TESLA

MANUAL

of electronic tubes

RECEIVING TUBES
PICTURE TUBES
CATHODE-RAY TUBES
RECTIFIER TUBES
TRANSMITTING TUBES
MODULATING TUBES
IMPULSE TUBES
KLYSTRONS
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A. F. TRANSISTORS
H. F. TRANSISTORS
POWER TRANSISTORS
INTEGRATED CIRCUITS

MANUAL
OF ELECTRONIC TUBES
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This manual of TESLA electronic tubes and semi-conductor devices contains all basic technical data required for general information. It does not list detailed data required for the development and design of new electronic instruments. A concise catalogue of tubes compiled specially for the use of designers contains, in addition to all data, also the characteristics.

This catalogue is printed on loose leaves and is kept up-to-date by additions. Receiving tubes intended for use in newly designed receivers, instruments, etc., are listed in a table of preferred types.

KOVO, Foreign Trade Co.,
Dept. 8, Prague 7
Czechoslovakia

Contents of the catalogue according to tube types

Explanations of the electrical data of the tubes

In this manual, for the receiving tubes are listed only the following basic technical data:

Heating data
Static data
Operational data
Maximum ratings
Interelectrode capacitances

The heater voltage of tubes designed for parallel feed and the heater current of tubes with series feed are rated values and must be adhered to. The method of feed is always listed in the first line in the column „Heating“. The decisive value for tubes heated in parallel connection is always the voltage, whereas for tubes heated in series connection it is the current. Tubes of the „E“ line are in the majority of cases designed for parallel heating, only exceptionally is parallel and series feed permissible, in which cases both methods are listed in the respective data. The tubes of the „P“ and „U“ lines are exclusively for series feed.

Deviations from the rated heater voltage of tubes designed for heating in parallel connection, caused by the tolerances of the circuit components, must not exceed ± 5 %. For tubes designed for series connection, the permissible tolerance of the heater current is ± 3 %. Transitory mains voltage fluctuations must not exceed ± 10 % for both types of tubes. The voltage across the heater of tubes which operate in series connection a suitable dropping resistor in the heater circuit and at the moment of switching on, must not exceed the 1,5 multiple of the rated value (if no other value is listed). The actual magnitude of the applied dropping resistor must not differ by more than ± 3 % from the value ascertained by calculation.

Battery-operated tubes 1,4 V rated filament voltage can operate in parallel connection at maximum 1,5 V and minimum 1,15 V. When the filaments are connected in series, their rated voltage is reduced to 1,3 V, but the limits remain as before, i. e. 1,5 V and 1,15 V respectively. The magnitude of the dropping resistor must be adjusted so that the filament current of the tubes is reduced as follows: From $I_f = 25$ mA to 24 mA, from $I_f = 50$ mA to 48 mA and from $I_f = 100$ mA to 96 mA. The voltage of the source of heater current must be at least 10 times greater than the total of the rated heater voltages of the tubes employed. Then the permissible mains voltage fluctuations may reach maximum ± 10%. For by-passing the odditional cathode currents of the tubes, the individual heaters connected in series must be shunted by suitable parallel resistors.

In addition to dry batteries, also an alkaline or lead-acid storage battery may be empoyed. The voltage of the lead-acid battery must be limited by a dropping resistor. If a current derived from a mains transformer and rectified by a semi-conductor or vacuum tube rectifier is utilized, then thorough filtering must be applied. It is recommended to use an alkaline storage battery in lieu of the first filter capacitor, provided that for this application the battery has a capacitance of approximately 15^5 µF.

Tubes with thoriated tungsten cathodes are more sensitive to changes in the heater voltage than tubes with oxide-coated cathodes. Consequently, the above rule is not applicable to them. The permissible heater voltage deviation from the rated value is maximum ± 5 %.

The listed **static data** are average values ascertained by the measurement of many tubes in the test bays of the makers. The actual data of the individual tubes may differ within limits stipulated in the respective customers' acceptance test schedules. The listed electrode voltage are always to be understood as in relation to the cathode or, in the case of directly heated tubes, to the negative end of the filament.

The listed **operational data** are recommended values chosen so as to ensure the best possible and most efficient utilization of the tubes. It is essential to adhere to these data. It is strongly recommended to make sure measurement that the operational data are ensured before a new instrument is set in operation. Such a measurement can be limited to checking the anode current at the working point, the screen grid current, and all electrode voltages. It is necessary to employ for the measurements a voltmeter of high internal resistance in order to prevent excessive measuring errors. The control grid bias must not be measured between the cathode and the grid, but across the cathode resistor. If differences between the actual operational data and those listed in this manual are found, then by adjustment of the respective components it must be ensured that the maximum ratings are not exceeded.

The **maximum ratings** are operational limits of voltages, currents and disspations, whoch on no account must be exceeded when the instrument operates at the rated mains voltage. When a new instrument is being designed, attention must be paid to all possible voltage changes which can be caused by variations of the signal or by the tolerances of the applied components.

In output tubes, the voltages which depend an signal variations can exceed the maximum ratings by 5 % at the rated mains voltage, but the maximum anode dissipation and grid dissipation must not be exceeded. Tubes can operate at the maximum ratings only if transitory mains voltage fluctuations do not exceed ± 10% of the rated value. If mains voltage fluctuations larger than ± 10% are expected, then it is essential to take such measures as to prevent the pawering voltage of the instrument from exceeding ± 10% of the rated value not even transitorily.

The **maximum permissible temperature** of the tube envelopes must be considered also as a maximum rating which must not be exceeded. This temperature is 150° C if no other value is given for all miniature tubes. The maximum envelope temperature of other types is listed in the column „Max. ratings" of the data sheets.

The **interelectrode capacitances** are generally average values. Only the through-capacitance and some special cases are indicated as maximum or minimum values.

Explanations of some of the limiting values

Voltage between cothode and filament $U_{k/f}$:

The listed limiting value is to be understood as D. C. voltage, R. M. S. voltage or the sum of the two. If the polarity is not indicated, then the limiting value applies to voltages in both senses.

External resistance between cathode and filament $R_{k/f}$:

A resistor connected between cathode and filament should be as small as possible and must not exceed 20 kΩ. Only phase converters can have resistors of higher values connected.

Control grid leak resistance R_{g1}:

Unless indicated otherwise, the listed value of the control grid resistance is valid with an automatic bias applied (produced by a cathode resistor). If fixed grid bias is used (derived from an independent source) and no pertaining resistance value is indicated, then the permissible magnitude of the grid leak is maximum one half of that listed for automatic grid bias. If semi-automatic bias is applied (by using a common resistor in the negative branch, through which all tube currents flow), then unless indicated otherwise, the correct grid leak resistance in MΩ can be calculated as follows:

$$R_{g1}\ \max = 0{,}7\ \left(\frac{I_k \cdot R_{g1}}{I_s}\right)$$

where R_{g1} is the listed grid leak resistance for automatic grid bias in MΩ, I_k is the cathode current of the respective tube, and I_s is the sum of all currents in mA flowing through the negative branch.

Semi-automatic bias may be applied only if the cathode current I_k is more than 50 % of the total current I_s which flows through the resistor which produces the grid bias.

If it is permitted to produce the grid bias by the grid current across a resistor, then unless indicated otherwise, this resistor must not be larger than 22 MΩ.

Suppressor grid leak resistance R_{g_3}:

If no maximum permissible value is listed for the suppressor grid leak resistor, then the suppressor grid must be interconnected with the cathode or connected to zero potential.

Protective resistor (for rectifying valves) R_o:

A protective resistor R_o of specified magnitude must be applied in the anode circuit of each rectifying valve. If the valve is powered from a mains transformer, then the protective resistor is formed by the resistance of the transformer. Its magnitude is given as follows:

$$R_o = R_{sec} + p^2 R_{pr} + R_1$$

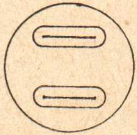
where R_{sec}	is the resistance of the secondary coil,
R_{pr}	is the resistance of the primary coil,
p	is the transformer ratio-half of the secondary turns: primary turns, and
R_1	is the series resistance, if any, in the secondary circuit which adjusts the transformer resistance to the specified value.

Charging filter capacitor C_N:

The limiting value of the charging capacitor C_N which is connected in parallel with the input of the H. T. filter is valid always for the listed resistance R_o. The charging capacitor must be considered always simultaneously with the protective resistor. By connecting a capacitor, the value of which exceeds the maximum limit, the peak current flowing through the rectifying valve is increased above the permissible value, thus imperilling the service life of the valve.

Notes on the application of electronic tubes

In general, electronic tubes can operate in any position except with the bases upwards. In all other positions than the vertical one, each tube must be suitably secured against loosening. This important especially with the miniature types slide out easily from their bases. The tube retainers must be designed so that they do not obstruct free air circulation around the tube envelopes, which is necessary for their proper cooling. A directly heated tube, if applied in the horizontal position, must be positioned so that its filament is in a vertical plane with the longer anode axis. A hot filament gets bent easily through its own weight and can cause a short circuit by touching the grid or anode.



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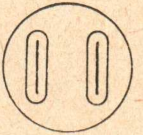


Correct

When the sockets of miniature electronic tubes are being wired, the following rules must be observed in order to prevent domage to the tubes:

a) The free contact springs of the sockets must not be employed as supporting points for the wiring or as auxiliary connections.
b) Diagonal pressures on the tube pins can cause cracks in the glass-to-metal seals and thus can destroy the tubes. Such pressures must be prevented by applying soft (flexible) leads in order to keep the socket springs mobile. During the wiring of the sockets, dummy tube bases should be inserted to keep the springs in the same positions in which they will actually operate.

c) The tube must be inserted and removed only in a direction perpendicular to the base. No tool of any description must be used for these operations.

d) Before inserting a tube into its socket, first the initial diagonal pressures of the contact springs must be lowered by the insertion of a dummy tube base.

e) Before a tube is inserted into a new socket, the tube base must be adjusted by inserting it into a jig for straightening the tube pins.

It is recommended to mount CR tubes horizontally. The tube sockets must not be applied for supporting the tubes. The connections to the sockets must be flexible and sufficiently long in order to prevent tightening and to allow for slight rotation of the tube, if necessary. The electronic tubes are designed for operation in surroundings of 85 % maximum relative humidity.

Glossary of the symbols and abbreviations applied for receiving, transmitting, amplifying and C. R. tubes

Symbols for electrode markings:

a	anode
d	anode of a diode
f	filament
f_s	centre tap of a filament or directly heated cathode
+f	positive pole of a filament
—f	negative pole of a filament
g	grid, control electrode of a C. R. tube or a TV picture tube
g_1	control grid
g_2	screen grid
g_3	suppressor grid or second control grid (for hexodes and heptodes)
g_4	screen grid
g_5	suppressor grid of a heptode
ic	internal connection – no connection must be applied to this pin
k	cathode
k_{vst}	cathode terminal, to which the input circuit is connected
$k_{v\acute{y}st}$	cathode terminal, to which the output circuit is connected
l	luminescent screen of a tuning indicator
s	internal screening
m	external screening
D	deflection element of a tuning indicator
D1, D2	deflection plates near to the cathode (in C. R. tubes)
D3, D4	deflection plates near to the screen (in C. R. tubes)
S	fluorescent screen of a C. R. tube or of a TV picture tube

The individual sections of combined tubes containing several electrode structures are marked with capital letters:

H	heptode or hexode
P	pentode
T	triode
Tt	tetrode

The individual sections of combined tubes containing several electrode structures of the same type (even if of different electrical data) are marked with Roman figures.

Symbols for voltage indication:

U_a	anode voltage, D. C. voltage between anode and cathode
$U_{l\sim}$	R. M. S. value of the A. C. output voltage
$U_{a\,ef}$	R. M. S. value of the A. C. anode voltage
U_{arc}	arc voltage
$U_{a\,sp}$	peak anode voltage
$-U_{a\,sp}$	peak anode voltage of opposite polarity (negative pole on the anode)
U_{ao}	anode voltage of a cold tube – D. C. voltage between the anode and cathode of an unheated electronic tube or of an electronic tube blocked by negative bias ($I_a = 0$ mA)
U_b	supply voltage – voltage of the source which supplies a tube via a resistor R_a, R_{g_2} or $R_{g_2+g_4}$
U_{bg_1}	supply voltage of the control grid
U_{bg_2}	supply voltage of the screen grid – voltage of the source which supplies the screen grid via resistor R_{g_2} or $R_{g_2+g_4}$
U_d	voltage on the anode of a diode
U_{di}	starting voltage of the diode current ($I_d \leqq +0,3\ \mu A$)
U_g	grid voltage
U_{gz}	cutoff voltage – bias of the control grid at which $I_a = 0$ mA
U_{g_1}	voltage of the control grid
$U_{g_1\,ef}$	R. M. S. value of the A. C. driving voltage
$U_{g_1\,i}$	grid bias for starting the grid current ($I_{g_1} \leqq +0,3\ \mu A$)
U_{g_2}	screen grid voltage
$U_{g_2\,o}$	screen grid voltage of a cold tube – D. C. voltage between the screen grid and the cathode of an unheated tube or of a tube blocked by negative bias ($I_a = I_{g_2} = 0$ mA)
$U_{g_2+g_4}$	voltage of the screen grids
$U_{g_2+g_4\,o}$	voltage of the screen grids of a cold tube
U_{g_3}	voltage of the suppressor grid
U_f	filament voltage
U_{ft}	filament voltage during the heating up period
U_{inv}	peak inverse voltage
$U_{k/f}$	voltage between the cathode and filament (D. C. or peak A. C. value)
U_j	screen voltage of a tuning indicator
U_{lo}	screen voltage of a cold tuning indicator (unheated tube)

$U_{o\,ef}$	R. M. S. value of the A. C. output voltage
U_{ss}	rectified voltage
$U_{tr\,ef}$	A. C. voltage across a transformer
U_{zap}	striking (ignition) voltage
U_{vf}	R. F. voltage

Symbols for current indication:

I_a	anode current
$I_{a\,sp}$	peak anode current
I_{a+g_2}	anode current and screen grid current of a pentode connected as a triode
I_{ao}	quiescent anode current – anode current flowing through a tube applied as a power amplifier without driving voltage ($U_{g_1\,ef} = 0$ V)
I_d	anode current of a diode
I_e	emission current
I_{g_1}	control grid current
I_{g_2}	screen grid current
$I_{g_2\,o}$	quiescent screen grid current – the current of the screen grid of a tube applied as a power amplifier without driving voltage ($U_{g_1\,ef} = 0$ V)
$I_{g_2+g_4}$	current of the screen grids g_2 a g_4
I_{gT+g_3}	control grid current of the triode section and current of the second control grid g_3 of a hexode (or heptode) applied as a mixer
I_f	filament current of a directly or indirectly heated cathode
I_k	cathode current
I_l	screen current of a tuning indicator
I_{ss}	rectified current
I_{sp}	rectified peak current

Symbols indicating power:

W_a	anode dissipation, given by the product of U_a and I_a
W_{g_1}	control grid dissipation, given by the product of $I_{g_1}^2$ and R_{g_1}
W_{g_2}	screen grid dissipation, given by the product of U_{g_2} and I_{g_2}
$W_{g_2+g_4}$	dissipation of the screen grids, given by the product of $U_{g_2+g_4}$ and $I_{g_2+g^4}$

W_s	loading of the screen of a C. R. tube or TV picture tube
P_o	output power of a power tube
P_o (10 %)	output power of a power tube at 10 % distortion
P_i	A. C. driving power

Sundry symbols:

C_N	Capacitance of capacitor directly behind power supply rectifier
D	grid transparency – reciprocal value of the amplification factor, $D = 1/\mu$
D_2	transparency of the screen grid – reciprocal value of the amplification factor, $D_2 = 1/\mu g_2/g_1$
R_a	anode loading resistor
$R_{a\text{-}\acute{a}}$	loading resistor between anodes (in push-pull amplifiers)
R_{ekv}	equivalent noise resistor
R_{g_1}	grid leak resistor of the control grid
R_{g_1}'	grid leak resistor of the control grid of a tube of the following stage
R_{g_2}	resistor in the screen grid curcuit
$R_{g_2+g_4}$	resistor in the circuit of the screen grids
R_{g_3}	grid leak resistor of the suppressor grid or of the second control grid
R_i	internal resistance
R_k	cathode resistor
$R_{k/f}$	external resistor between cathode and filament
R_o	limiting resistor in the anode circuit
R_z	loading resistor (in rectifiers)
R_D	leak resistor of the deflection plate of a C. R. tube
S	mutual conductance
S_c	conversion conductance – given by the current in the anode circuit of a mixer tube at a specified I. F. frequency, when an R. F. signal of 1 V R. M. S. is applied to the control grid of the mixer
S_{g_1/g_2+g_4}	static mutual conductance of a hexode or heptode mixer ($g_2 + g_4$ operate as the anode of the oscillator)
S_{D_1/D_2}	sensitivity of the deflection plates D1 and D2 near to the cathode.
S_{D_3/D_4}	sensitivity of the deflection plates D3 and D4 near to the screen

T_b	temperature of the envelope
k	overall harmonic distortion
f	frequency
t	period – time
θ_1	shadow section on fluorescent screen of sensitive systems
θ_2	shadow section on fluorescent screen of less sensitive systems
t_f	heating period of a tube
μ	amplification factor = 1/D
μ_{g_2/g_1}	amplification factor of the screen grid = $1/D_2$
V	amplification – voltage gain given by U_a/U_{g_1} (in resistance coupled amplifiers)
α	light sector on a fluorescent screen
β	shadow section on a fluorescent screen

Interelectrode capacitances:

In diodes and double diodes:

$C_{aa/k}$	anode against cathode
$C\ I/_{a}II$	anode I against anode II
$C_{a/k+s+f}$	anode against cathode connected to the inner screening and the filament
$C_{k/a+s+f}$	cathode against anode connected to the inner screening and the filament

In the remaining tubes:

C_a	output capacitance
C_{a/g_1}	through capacitance
$C_{a/k}$	anode against cathode
C_{g_1}	input capacitance
$C_{g_1/f}$	control grid against filament
$C_{g_1/k}$	control grid against cathode

In tubes with two control grids:

C_{a/g_3}	anode against the control grid g_3
C_{g_1/g_3}	control grid 1 against the 2nd control grid
$C_{g_2+g_4}$	output capacitance of the screen grids
C_{g_3}	input capacitance of the control grid g_3

In triode - heptodes or hexodes:

C_{g_3H+gT/q_1H}	capacitance of the control grid g_3 of the heptode section and of the control grid of the triode section against the control grid g_1 of the heptode

$C_{g_3H+gT/aH}$	capacitance of the control grid g_3 of the heptode section and the control grid of the triode section against the anode of the heptode
C_{gT/g_1H}	control grid of the triode section against the control grid of the heptode
C_{gT/g_3H}	input capacitance of the control grid of the triode section and of the control grid g_3 of the heptode

In C. R. tubes:

$C_{a/b}$	capacitance of the accelerating anode against metal shielding include picture tube mount
$C_{a2/m}$	capacitance of the accelerating anode a_2 against the outer conductive coating
C_g, C_{g1}	input capacitance of the control electrode
C_{D1}	input capacitance of the deflection electrode D1
C_{D2}	input capacitance of the deflection electrode D2
C_{D3}	input capacitance of the deflection electrode D3
C_{D4}	input capacitance of the deflection electrode D4
$C_{D1/D2}$	deflection plate D1 against D2
$C_{D1/D3}$	deflection plate D1 against D3
$C_{D1/D4+a2}$	deflection plate D1 against the plate D4 and the anode a_2
$C_{D3/D4+a2}$	deflection plate D3 against the plate D4 and the anode a_2
C_k	cathode capacitance against all other electrodes

RECEIVING TUBES

CATHODE-RAY AND PICTURE TUBES

TRANSMITTING AND AMPLIFIER TUBES,
IMPULSE AND MICROWAVE TUBES,
VACUUM CONDENSERS

SPECIAL TUBES
COLD CATHODE TUBES
PHOTOCELLS, PHOTOMULTIPLIERS,
CAMERA TUBES

SEMICONDUCTOR DIODES, RECTIFIERS,
PHOTODIODES, TRANSISTORS
INTEGRATED CIRCUITS

TABLE OF TUBE EQUIVALENTS
TABLE OF SEMICONDUCTOR DEVICES
EQUIVALENTS
TESLA TUBE COMPLEMENTS
FOR RECEIVER

Receiving and amplifying tubes

Table of preferred types

Filament			$U_f = 1{,}4$ V	$U_f = 6{,}3$ V	$I_f = 0{,}3$ A	$I_f = 0{,}1$ A
Diodes	For mains voltage rectifiers	Single	DY86 DY87 DY51	EY86 EY88 EY87	PY88	UY82 UY85
	High frequency	Single		EA52		
Triodes	Voltage amplifiers	Double		ECC82 ECC83 ECC85 ECC88 ECC189 E88CC ECC802S ECC803S	ECC82 ECC83 PCC85 PCC88 PCC189	UCC85
		With three diodes		EABC80	PABC80	UABC80
H. F. and A. F. pentodes	Linear	Single		EF80 EF86 E180F EF183 EF800 EF806S	EF80	
	Exponential	Single		EF184		
		With two diodes		EBF89		UBF89
Output tetrodes and pentodes	Up to W_a max = 18 W	Single		EL84 EL86 EL803S	PL84 PL500 PL504	UL84
		With a triode		ECL86 ECL85 ECL84 ECL200	PCL86 PCL85 PCL84 PCL200	UCL82
	W_a = 45 W	Single		EL34		
Mixer - oscillators, TV circuits	Combined	Triode-pentode		ECF200 ECF201 ECF801 ECF802 ECF803	PCF200 PCF201 PCF801 PCF802 PCF803	
		Triode-heptode		ECH81 ECH84 ECH200	PCH200	UCH81
Tuning indicator				EM84	PM84	UM80

Designations of the receiving tubes according to the TESLA standard NT – K 003

According to this standard are marked the electronic and gas discharge tubes manufactured by TESLA. The electrical properties and dimensions of these tubes tally with those of standard European types and are designated accordingly.

The designations of the electronic and discharge tubes are made up of figures and capital letters. The first part of the designation consits of figures, the middle part of letters, and the last part again of figures.

The first part of the designation is a group of figures indicating filament voltages in round figures.

The second part of the designation is a capital letter or a group of letters, indicating the type of electrode structure. Combined tubes of several sections are indicated by groups of capital letters in alphabetical order. Each section has its own particular letter in the designation. A cathode with the filament is considered as a single electrode.

The letters indicate the following:
A – diode (applied in the broadest sense)
B – double diode
C – triode (with the exception of output triodes)
D – output triode
E – tetrode
F – pentode (with the exception of output pentodes)
H – hexode, heptode including pentagrid
K – octode (also any structures of eight or more electrodes)
L – output pentode
M – electronic indicator (tuning)
W – half-wave gas-filled rectifier
X – full-wave gas-filled rectifier
Y – half-wave vacuum rectifier
Z – full-wove vacuum rectifier

The third part of the designation consists of a group of two or three figures. The first figure, 1 to 39, indicates the type of base, the last figure indicates in more detail the type and line of the tube.

The figures mean the following:

1 – octal base K 8/17 Standard: ČSN 35 8907
2 – loctal base S 8/18 Standard: ČSN 35 8903
3 – heptal base S 7/10 Standard: ČSN 35 8902
4 – noval base S 9/12 Standard: ČSN 35 8904
5 – all-glass nine-pin base S 9/25 Standard: ČSN 35 8905
9 – fitted with soldering wire terminals
21 – T base (all-metal line) Standard: ČSN 35 8913
22 – P base (with side contacts) Standard: ČSN 35 8914

The designation is written without hyphens, dashes or spaces. In special cases certain special types of tubes are marked with an extra letter after the third part of the designation. These letters indicate:

V – design with greater resistance to vibrations
Z – cathode with very long service life

Standard European Tube Designations

The electrical properties and dimensions of the tubes tally with those of standard European types and are designated accordingly. The designations of current tubes consist of figures and capital letters. At the beginning of the designation are letters, and the second part consists of figures.

The first part of the designation consists of a group of letters, the first of which always indicates the filament voltage in volts and the method of heating the filament, as follows:

A – heating voltage 4 V, parallel feed
D – heating voltage 1,4 V, or 1,2 V, battery operation, parallel or series feed
E – heating voltage 6,3 V, parallel feed (exceptionally also series feed)
G – heating voltage 5 V, porallel feed
P – heating current 0,3 A, series feed
U – heating current 0,1 V, series feed

The second and further letters of the first part of the designation indicate the structure of the electrode system. Combined electronic tubes of several sections are designated by a group of capital letters in alphabetical order. Each section hat its own particular letter in the designation. A cathode with the filament is considered as a single electrode. The meanings of the letters are as follows:

A – diode
B – double diode
C – triode (with the exception of output triodes)
D – output triode
E – tetrode (voltage amplifier)
F – pentode (with the exception of output pentodes)
H – hexode or heptode except a pentagrid
K – octode or pentagrid
L – output pentode or tetrode
M – electronic indicator (tuning)
Q – enneode

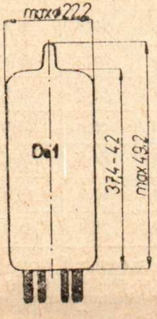
X – full-wave gas-filled rectifier
Y – half-wave vacuum rectifier
Z – full-wave vacuum rectifier

The second part of the designation consists of groups of figures indicating the types of the applied bases and the progressive numbering, as follows:

1 to 10 – various bases such as P, octal and pin types
11 to 15 – T bases
16 to 19 – P bases, octal
20 to 29 – loctal bases with the exception of the battery lines D 21 and DF 22
30 to 39 – octal bases K 8/18 Standard: ČSN 35 8907
80 to 89 – noval base S 9/12 Standard: ČSN 35 8904
90 to 99 – heptal bose S 7/10 Standard: ČSN 35 8902
180 to 189 – noval bases S 9/12 ČSN 35 8904
200 to – decal bases
500 to – magnoval bases
800 to – noval bases S 9/12 ČSN 35 8904

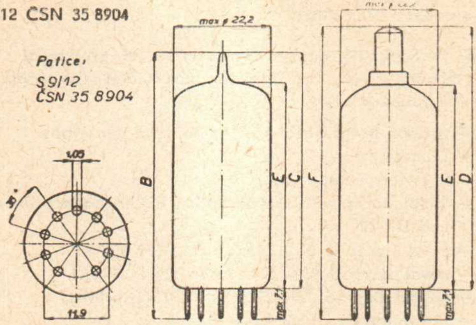
Special electronic tubes such as those of long service life, with narrow electrical tolerance, with structures specially designed to withstand vibrations, etc., are marked with specially adapted designations (E180F, E88CC, ECC803S, etc.) consisting of extended figure groups and in some cases with the letter S added.

Outlines of tubes: PCH200, PCL200, PCF200, PCF201



Dimensions of the tubes

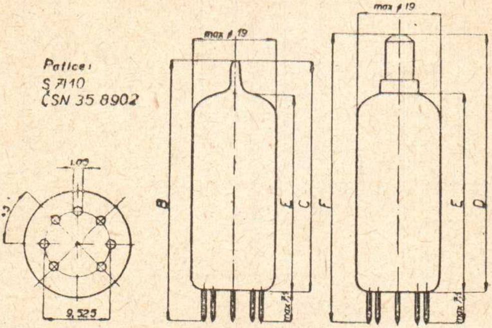
S 9/12 ČSN 35 8904



Size	Dimensions mm							
	B	C	D		E 1)			F
	max	max	min	max	min	nom	max	max
N 1	45,2	38,1	35,0	44,4	26,2	28	30,9	51,5
N 2	56,3	49,2	46,1	55,5	37,4	40	42	62,6
N 3	61,8	54,7	51,6	61,1	42,9	45	47,6	68,2
N 4	67,4	60,3	57,2	66,6	48,5	50	53,1	73,7
N 5	78,5	71,4	68,3	77,7	59,6	62	64,2	84,8
NA 28	45,2	38,1	36,6	42,8	26,2	28	30,9	49,9
NA 34	50,7	43,6	42,1	48,4	31,8	34	36,5	55,5
NA 40	56,3	49,2	47,7	53,9	37,4	40	42,0	61,0
NA 45	61,8	54,7	53,2	59,5	42,9	45	47,6	66,6
NA 50	67,4	60,3	58,8	65,0	48,5	50	53,1	72,1
NA 56	72,9	65,8	64,3	70,6	54,0	56	58,7	77,7
NA 62	78,5	71,4	69,9	76,2	59,6	62	64,2	83,3
NA 68	84,0	76,9	75,5	81,7	65,1	68	69,8	88,8

1) This dimension is measured from the seating of the base to the under surface of a measuring jig which is an annulus of 11.125 ± 0,025 mm inner diameter and edges of the opening of which are rounded up to a radius of 0,1 mm.

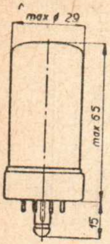
Dimensions of the tubes



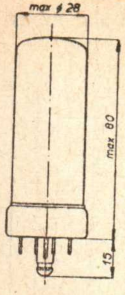
S 7/10 ČSN 35 8902

Size	Dimensions mm							
	B	C	D		E 1)			F
	max	max	min	max	min	max	max	max
M 1	45,2	38,1	35,0	44,4	26,2	28	30,9	51,5
M 2	54,7	47,6	44,5	53,9	35,8	38	40,4	61,0
M 3	61,0	53,9	50,8	60,3	42,1	44	46,8	67,4
M 4	67,4	60,3	57,2	66,6	48,5	50	53,1	73,7
M 5	75	68				60		

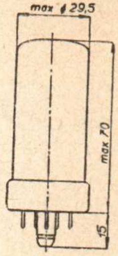
1) This dimension is measured from the seating of the base to the under surface of a measuring jig which is an annulus of 11.125 ± 0,025 mm inner diameter and edges of the opening of which are rounded up to a radius of 0,1 mm.



L1



L2



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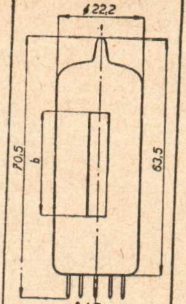

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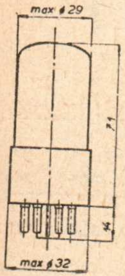

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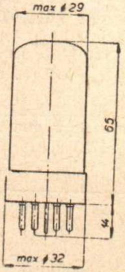

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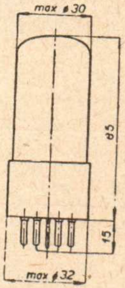

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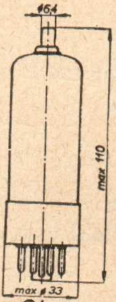
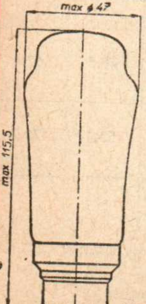


O4



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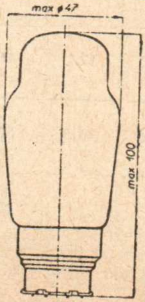

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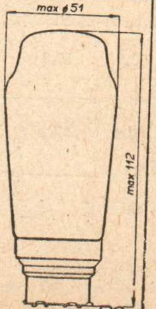

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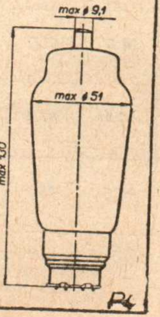

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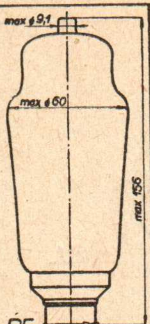

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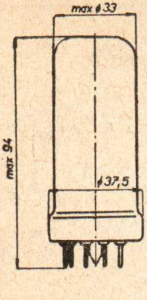
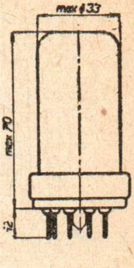


R1

R2



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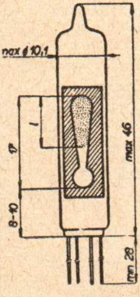
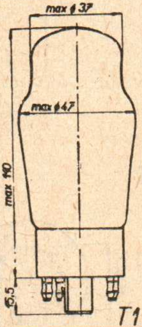


Sm1



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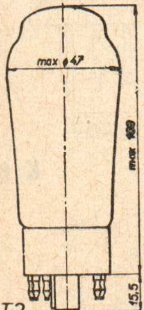
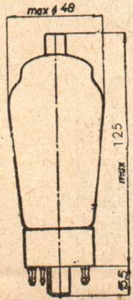


T2

T3



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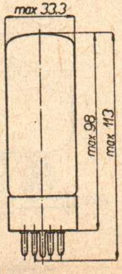

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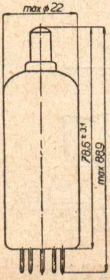

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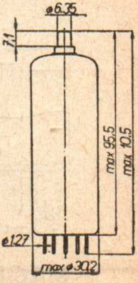
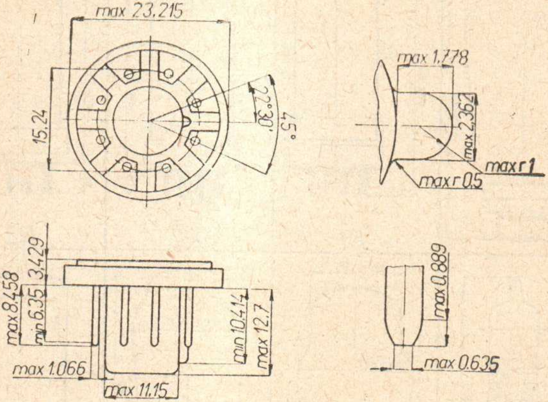
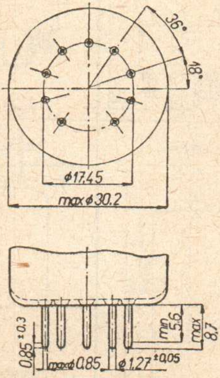


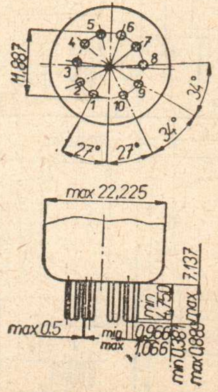
MN1



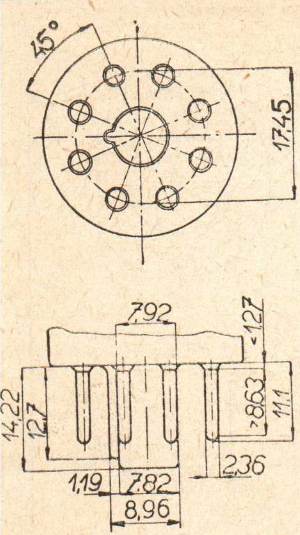
K 8/15



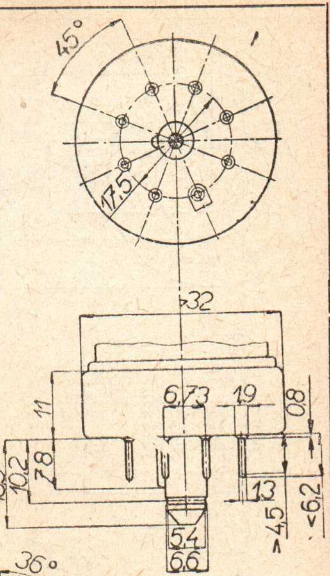
MAGNOVAL



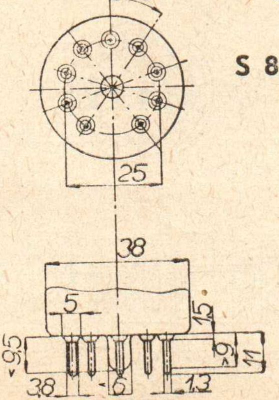
DEKAL



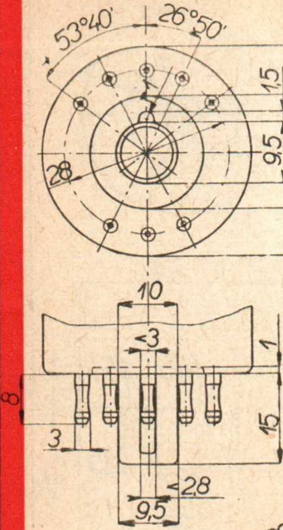
K 8/17



S 8/18



S 9/25



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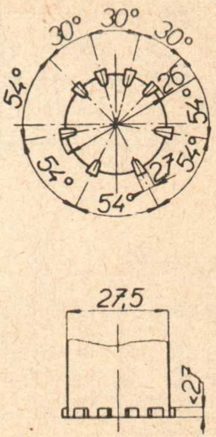

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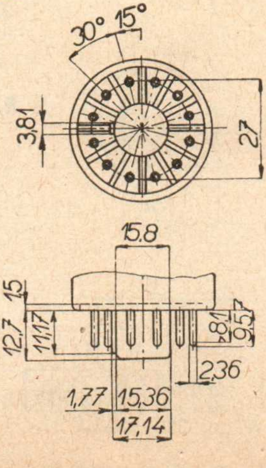
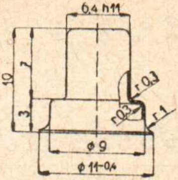


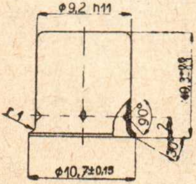
Duodekal
K 12/27



C 6.1

ONT 35 8961

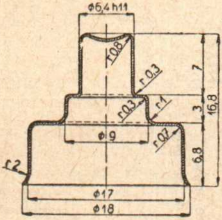
Material - brightly nickel-plated brass.
Applied for the electronic tubes:
1Y32, 1Y32T, PL81, PY83, 12QR50, 12QR51, EY83, EY88, PY88, EL81, EL36, PL36, PL500, EL500, PL504



C 9.1

ONT 35 8963

Material - brightly nickel-plated brass.
Applied for the electronic tubes:
6L50, 6L50V, EL12 spec., EL51, 4654



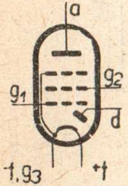
N22 VC 01

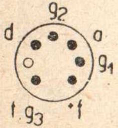
Material - brightly nickel-plated brass.
Applied for the electronic tubes:
DY86, EY86

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings

1AF33
1AF34

Size max
Ø 19×49 mm





Diode -
AF pentode,
AF amplifier,
AM demodulator

1AF33

U_f	1,4	V
I_f	25	mA

Direct heating

◍

U_a	67,5	V
U_{g2}	67,5	V
U_{g1}	−1	V
I_a	1,4	mA
I_{g2}	<0,4	mA
S 1)	>0,3	mA/V
R_i	0,6	MΩ
μ	300	
I_d	>0,1	mA
U_d	3	V

1) U_{g1} = −0,5 V

Capacitances

C_{g1}	2,4	pF
C_a	4,6	pF
$C_{a/g1}$	<0,3	pF
$C_{d/f}$	1,5	pF

1AF34

U_f	1,2	V
I_f	30	mA

Direct heating

AF resistance-coupled amplifier

U_b	45	67,5	90	V
R_a	1	1	1	MΩ
R_{g2}	3,3	3,3	3,3	MΩ
R_{g1}	10	10	10	MΩ
R_{g1}'	2,2	2,2	2,2	MΩ
I_b	0,05	0,075	0,1	mA
U_o/U_i	45	60	67	
k	2	3	5	%
$U_{o\,ef}$	5	5	5	V

AF resistance-coupled amplifier triode connection

U_b	90	90	V
R_a	0,22	0,47	MΩ
R_{g1}	10	10	MΩ
R_{g1}'	0,68	1,5	MΩ
U_b	0,25	0,13	mA
U_o/U_i	11	11,6	
k	1	0,8	%
$U_{o\,ef}$	5	5	V

Pentode

U_{ao}	250	V
U_a	90	V
U_{g2o}	250	V
U_{g2}	67,5	V
U_{g1}	0	V
I_k	4,5	mA
R_{g1}	3	MΩ
R_{g1} 1)	22	MΩ
U_f	1,6	V
U_f	>1,1	V

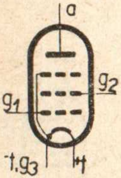
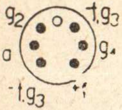
Diode

$U_{d\,sp}$	50	V
I_d	0,2	mA
$I_{d\,sp}$	1,2	mA

1) U_{g1} produced by R_{g1}

1AF34

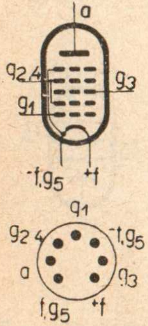
U_f	1,4	V
U_f	>0,9	V

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
1F33 **1F34** Variable-mu pentode RF, IF amplifier	Size max Ø 19×49 mm   	**1F33** U_f 1,4 V I_f 25 mA Direct heating ● U_a 67,5 V U_{g2} 67,5 V U_{g1} −1 V I_a 2,5 mA I_{g2} <1,3 mA S 1) >0,6 mA/V R_i >250 kΩ μ 400 1) U_{g1} — −0,5 V **1F34** U_f 1,2 V I_f 30 mA Direct heating	**RF and IF amplifier** U_a 45 67,5 V U_{g2} 45 67,5 V U_{g1} 0 —10 0 —16 V I_a 1,7 — 3,4 — mA I_{g2} 0,7 — 1,5 — mA S 0,65 0,01 0,75 0,01 mA/V R_i 0,35 >10 0,25 >10 MΩ $\mu_{g2/g1}$ 22 — 22 — U_a 90 90 V U_{g2} 45 67,5 V U_{g1} 0 —10 0 —16 V I_a 1,8 — 3,5 — mA I_{g2} 0,65 — 1,4 — mA S 0,7 0,01 0,75 0,01 mA/V R_i 0,8 >10 0,5 >10 MΩ $\mu_{g2/g1}$ 22 — 22 —	U_{ao} 150 V U_a 90 V U_{g2o} 150 V U_{g2} 67,5 V I_k 5,5 mA U_{g1} 0 V W_a 0,3 W W_{g2} 0,1 W R_{g1} 3 MΩ U_f 1,6 V U_f >1,1 V **Capacitances** C_{g1} 4,2 pF C_a 7,5 pF $C_{a/g1}$ <0,012 pF **1F34** U_f 1,4 V U_f >0,9 V

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings

1H33
1H34

Size max
Ø 19×49 mm



Variable-mu
heptode
Mixer

1H33

U_f	1,4	V
I_f	25	mA

Direct heating

●

U_a	90	V
U_{g3}	–0,5	V
U_{g2+4}	67,5	V
U_{g1}	–0,5	V
I_a	3,2	mA
I_{g2+4}	4,0	mA
$S_{g1/g2+g4}$	>0,45	mA/V
R_i	>250	kΩ

1H34

U_f	1,2	V
I_f	30	mA

Direct heating

Mixer

U_a	45		67,5		V
U_{g2+4}	45		67,5		V
R_{g1}	100		100		kΩ
I_{g1}	150		250		µA
U_{g3}	0	–9	0	–14	V
I_a	0,57	—	1,4	—	mA
I_{g2+4}	1,8	—	3,2	—	mA
S_c	235	5	280	5	µA/V
R_i	0,6	>10	0,5	>10	MΩ
I_k	2,5	—	5	—	mA
U_a	90		90		V
U_{g2+4}	45		67,5		V
R_{g1}	100		100		kΩ
I_{g1}	150		250		µA
U_{g3}	0	–9	0	–14	V
I_a	0,8	—	1,6	—	mA
I_{g2+4}	1,9	—	3,2	—	mA
S_c	250	5	300	5	µA/V
R_i	0,8	>10	0,6	>10	MΩ
I_k	2,75	—	5	—	mA

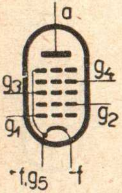
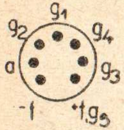
U_{ao}	250	V
U_a	90	V
U_{g2+4o}	90	V
U_{g2+4}	67,5	V
U_{g3}	0	V
I_k	5,5	mA
R_{g3}	3	MΩ
U_f	1,6	V
U_f	>1,1	V

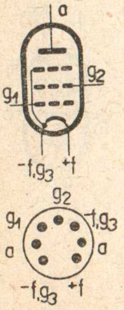
Capacitances

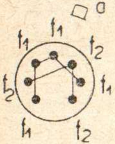
C_{g1}	3,8	pF
C_{g3}	6,2	pF
C_a	9	pF
C_{g2+4}	12,5	pF
$C_{a/g1}$	<0,1	pF
$C_{a/g3}$	<0,4	pF
$C_{g1/g2}$	<0,2	pF

1H34

U_f	1,4	V
U_f	>0,9	V

Type Application	Dimensions Base	Heating Static data			Operational Data				Maximum Ratings		
1H35	Size max	U_f	1,4	V	Mixer				U_f	1,6	V
	Ø 19×49 mm	I_f	25	mA	U_a	64	85	V	U_f min	1,1	V
		Direct heating			U_{g3}	0	0	V	U_a	90	V
		●			R_{g2}	18	33	kΩ	W_a	0,15	W
					R_{g4}	0	120	kΩ	U_{g4}	67,5	V
		U_a	67,5	V	R_{g1}/f	27	27	kΩ	W_{g4}	0,03	W
		U_{g4}	45	V	U_{g2}	35	35	V	U_{g3}	0	V
		U_{g3}	−0,5	V	U_{g4}	64	68	V	U_{g2}	67,5	V
		U_{g2}	45	V	$U_{g1\ ef}$	4	4	V	W_{g2}	0,1	W
		U_{g1}	−0,5	V	I_a	0,55	0,6	mA	U_{g1}	0	V
		I_a	1,9	mA	I_{g2}	1,6	1,5	mA	I_k	3	mA
		I_{g4}	<1	mA	I_{g4}	0,12	0,14	mA	R_{g3}/f	3	MΩ
		I_{g2}	1,85	mA	I_k	2,45	2,4	mA	R_{g1}/f	0,1	MΩ
		$S_{g1}/g2$	0,4	mA/V	I_{g1}	85	85	µA			
					S_c	130	160	µA/V	Capacitances		
					R_i	0,9	1	MΩ	C_{g3}	6,5	pF
					U_{g3} (S_c−2 µA/V)	−4,5	−6,5	V	C_a	12	pF
									$C_a/g3$	<0,4	pF
Variable-mu heptode Mixer											

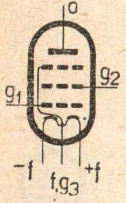
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
1L33 **1L34** Output pentode Power amplifier	Size max Ø 19×49 mm  	**1L33** U_f 1,4 V I_f 50 mA Direct heating ● U_a 90 V U_{g2} 67,5 V U_{g1} −7 V I_a 7,5 mA I_{g2} 1,5 mA S 1,4 mA/V R_i 100 kΩ μ 140 I_{az} (U_{g1}=−15 V) <0,6 mA **1L34** U_f 1,2 V I_f 60 mA Direct heating	AF power amplifier class A U_a 45 67,5 90 V U_{g2} 45 67,5 67,5 V U_{g1} −4,5 −7 −7 V I_a 3,8 7,2 7,4 mA I_{g2} 0,8 1,5 1,4 mA S 1,25 1,3 1,4 mA/V R_a 8 5 8 kΩ $U_{g1\,ef}$ 3,2 5 5 V P_o 65 160 230 mW k 12 10 12 % AF push-pull power amplifier, class B U_b 90 V U_a 80 V U_{g2} 57,5 V U_{g1} −9,9 V $R_{a-a'}$ 16 kΩ $U_{g1\,ef}$ 0 7,3 V I_a 2×1,5 2×4,4 mA I_{g2} 2×0,3 2×1,35 mA P_o 0 325 mW k — 5 %	U_{ao} 250 V U_a 90 V U_{g20} 250 V U_{g2} 67,5 V W_a 0,7 W W_{g2} (U_{g1}∼=0 V) 0,12 W W_{g2} (U_{g1}=max) 0,2 W I_k (U_{g1}∼=0 V) 9 mA I_k (U_{g1}∼max) 12 mA R_{g1} 2 MΩ U_f 1,6 V U_f >1,1 V Capacitances C_{g1} 5 pF C_a 6 pF $C_{a/g1}$ <0,45 pF **1L34** U_f 1,4 V U_f >0,9 V

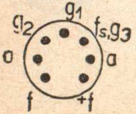
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
1Y32 **1Y32T**	Size M 4 	**1Y32** U_f 1,4 V I_f 265 mA Direct heating Thoriated tungsten cathode ● I_a 4 mA U_a 45 V	Half-wave HT rectifier U_{ss} max 8 kV (I_{ss}=2 mA) U_{ss} max 10 kV Z_{trafo} 500 kΩ C_N (f — 50 c/s) 50 kpF C_N (vf) 500 pF To be replace by 1Y32T	U_{inv} 20 kV I_{sp} 10 mA I_{ss} 2 mA f 300 kc/s Capacitances $C_{a/k}$ 0,6 pF
HT diode Half-wave rectifier for TV receiver HT sources		**1Y32T** U_f 1,4 V I_f 265 mA Direct heating Oxide-coated filament ● I_a >5 mA U_a 150 V		U_f 1,7 V U_f min 1,1 V U_{inv} 20 kV U_{ss} 15 kV I_{ss} 0,2 mA C_N 2500 pF Capacitances $C_{a/k}$ 1,5 pF

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings

3L31

Size max
Ø 19×49 mm





Pentode
AF, RF power
amplifier

U_f	2,8	V
I_f	50	mA
U_f	1,4	V
I_f	100	mA

Indirect heating

●

U_a	150	V
U_{g3}	0	V
U_{g2}	90	V
U_{g1}	−8,5	V
I_a	14	mA
I_{g2}	2,2	mA
S	1,9	mA/V
R_i	100	kΩ
µ	190	

Capacitances

C_{g1}	4,2	pF
C_a	4,9	pF
C_a/g_1	<0,38	pF

AF power amplifier, class A

U_f	1,4		1,4		V
U_a	135		150		V
U_{g2}	90		90		V
U_{g1}	−8		−8,8		V
$U_{g1\,ef}$	0	5,5	0	6	V
I_{g2}	2,8	3,5	2,2	3,5	mA
I_a	14,8	15	14,2	14,2	mA
S	2,1		2,1		mA/V
R_i	44		50		kΩ
R_a	8		8		kΩ
P_o	0,6		0,7		W
k	10		10		%

RF power amplifier – f = 10 Mc/s

U_f	1,4	V
U_a	150	V
U_{g2}	135	V
R_{g1}	0,2	MΩ
I_a	18,5	mA
I_{g2}	6,5	mA
I_{g1}	0,13	mA
P_o	1	W

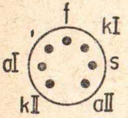
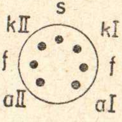
AF amplifier

U_a	150	V
U_{g2}	90	V
W_a	2	W
W_{g2}	0,4	W
I_k	18	mA
R_{g1} 1)	0,7	MΩ
R_{g1} 2)	0,5	MΩ

1) U_{g1} automatic
2) U_{g1} fixed

RF amplifier

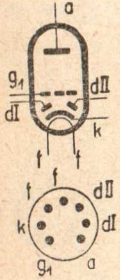
U_a	150	V
U_{g2}	135	V
U_{g1}	−30	V
I_a	20	mA
I_{g1}	0,25	mA
I_k	25	mA
W_{g2}	0,9	W
W_a	2	W

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
6B31 **6B32** Twin diode with separate cathodes AM, FM demodulator, ratio detector, full-wave rectifier	Size M 1  	U_f 6,3 V I_f 0,3 A I_f 0,3 A U_f 6,3 V Indirect heating ● U_a 4 V I_a >10 mA  **6B31**	**Half-wave rectifier** $U_{a\,ef}$ 150 V R_o 300 Ω I_{ss} 9 mA I_{sp} 54 mA **Full-wave rectifier** $U_{a\,ef}$ 2×150 V R_o 2×300 Ω C_N 8 µF R_z 10 kΩ I_{ss} >17 mA **Capacitances** $C_{aI/kI+s+f}$ 3,2 pF $C_{aII/kII+s+f}$ 3,2 pF $C_{kI/aI+s+f}$ 3,6 pF $C_{kII/aII+s+f}$ 3,6 pF $C_{aI/aII}$ <0,05 pF	Each section U_{inv} 420 V I_{sp} 54 mA I_{ss} 9 mA W_a 0,5 W $U_{k/f}$ 300 V $R_{k/f}$ 20 kΩ C_N 8 µF R_o >300 Ω

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings

6BC32
EBC91

Size M 3



AF triode-twin diode
AF resistance-coupled amplifier
and RF rectifier

U_f	6,3	V
I_f	0,3	A
I_f	0,3	A
U_f	6,3	V
Indirect heating		
●		
U_a	250	V
U_{g1}	−2	V
I_a	1	mA
S	1,55	mA/V
μ	100	
R_i	62,5	kΩ
I_{az} (U_{g1} = −4,5 V)	<0,15	mA
U_d	4	V
I_d	>0,15	mA

AF resistance-coupled amplifier

U_b	180	300	300	V
R_a	0,22	0,22	0,47	MΩ
R_k	3,9	3,1	5,9	kΩ
R_{g1}	1	1	1	MΩ
R_{g1}'	1	1	2,2	MΩ
C_k	1,8	2,1	1,1	μF
C_v 1)	3	3	2	kpF
$U_{a\,sp}$	39	79	92	V
V	63	68	75	

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1) Coupling capacitor

Kapacitances

C_{g1}	2	pF
C_a	0,65	pF
$C_{a/g1}$	2	pF
$C_{d/g1}$	<0,04	pF
$C_{d/k}$	<1,2	pF

Triode

U_{ao}	500	V
U_a	330	V
W_a	0,5	W
$+U_{g1}$	0	V
$-U_{g1}$	−50	V
R_{g1} (p)	1	MΩ
R_{g1}	3	MΩ
R_{g1} 1)	10	MΩ
$R_{k/f}$	20	kΩ
$U_{k/f}$	90	V
I_k	8	mA

Diodes

$U_{d\,sp}$	90	V
I_d	1	mA
$I_{d\,sp}$	6	mA

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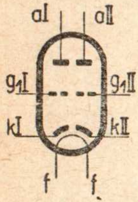
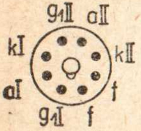
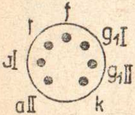
1) U_{g1} produced by R_{g1}

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
6CC10 Twin triode with separate cathodes AF amplifier	Size O 1   	U_f 6,3 V I_f 0,6 A Indirect heating ● U_a 250 V U_{g1} −8 V I_a 9,5 mA S 2,6 mA/V μ 20 R_i 7,7 kΩ I_{az} (U_{g1} = −24 V) <0,005 mA	AF resistance - coupled amplifier U_b 180 300 V R_a 0,1 0,1 MΩ R_k 3,23 2,44 kΩ R_{g1} 1 1 MΩ R_{g1}' 0,5 0,25 MΩ C_k 1,15 1,42 μF C_v 6 12,5 kpF $U_{a\,sp}$ 38 56 V V 14 14 **Capacitances** Triode I II C_{g1} 2,1 1,85 pF C_a 2,5 2,4 pF C_a/g_1 3,6 3,6 pF Only for information. – No on stock!	U_{ao} 330 V U_a 275 V W_a 2,75 W U_{g1} min −0,5 V U_{g1} −100 V R_{g1} 2 MΩ I_k 10 mA $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ I_{g1} 2 mA

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
6CC31 **ECC91** Twin triode RF, AF amplifier, oscillator, mixer, phase invertor	Size M 2  	U_f 6,3 V I_f 0,45 A Indirect heating ● U_a 100 V $-U_{g1}$ 0,85 V I_a 8,5 mA S 5,3 mA/V μ 38 R_i 7,1 kΩ	**RF amplifier, class C** U_a 150 V U_{g1} −10 V (R_{g1} 625 Ω or R_k 220 Ω) I_{aI+aII} 30 mA $I_{g1I+g1II}$ 16 mA P_i 0,35 W P_o 3,5 W **Mixer** U_a 150 V R_k 800 Ω I_a 4,8 mA S_c 1,9 mA/V R_i 10,2 kΩ $U_{osc\ ef}$ 3 V R_{g1} 0,5 MΩ **Phase invertor** U_b 250 V R_{aI} 25 kΩ R_{aII} 25 kΩ R_k 200 Ω C_k 100 μF R_{g1I} 0,5 MΩ R_{g1II} 25 kΩ I_{aI+aII} 10 mA $U_{g1}\sim$ 0,5 0,9 V $U_a\sim$ 12 19,6 V V 24 21,8 k <0,3 3,2 %	U_{ao} 500 V U_a 300 V W_a 1,5 W I_a 15 mA I_{g1} 8 mA R_{g1} (k) 0,5 MΩ U_{g1} −40 V $U_{k/f}$ 100 V λ min 0,5 m R_k >50 Ω **Capacitances 1)** C_{g1} 2,2 pF C_a 0,55 pF C_a/g_1 1,6 pF

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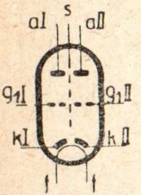
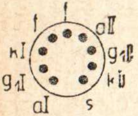
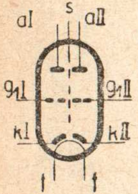
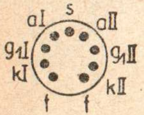
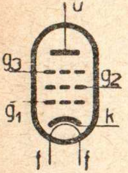
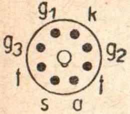
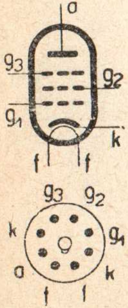
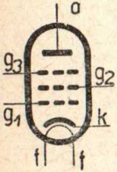
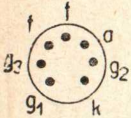
1) Without screening

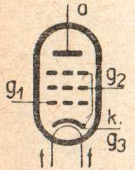
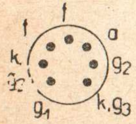
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
6CC41   Twin triode with separate cathodes AF amplifier, phase invertor	Size N 1	U_f 6,3 V I_f 0,3 A Indirect heating ● U_a 250 V I_a 2,3 mA S 2 mA/V μ 100 R_i 50 kΩ U_{g1} −1,5 V I_{az} (U_{g1} = −5,5) <0,02 mA	AF resistance-coupled amplifier U_b 180 300 300 V R_a 0,22 0,22 0,47 MΩ R_k 3,5 2,8 5,2 kΩ R_{g1} 1 1 1 MΩ R_{g1}' 0,47 0,47 1 MΩ C_k 2,1 2,3 1,3 μF C_v 1) 6 6 3 kpF $U_{a\sim sp}$ 34 69 77 V V 59 65 73 1) Coupling capacitor	U_{ao} 500 V U_a 300 V W_a 1 W R_{g1} (k) 2 MΩ R_{g1} 1) 10 MΩ I_k 10 mA R_{g1} (p) 0,5 MΩ $U_{k/f}$ ±100 V 1) U_{g1} produced by I_{g1} **Capacitances** C_{g1} 1,75 pF C_a 1,0 pF $C_{a/g1}$ 2,2 pF $C_{aI/aII}$ <0,05 pF $C_{aI/g1II}$ <0,01 pF $C_{aII/g1I}$ <0,01 pF

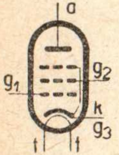
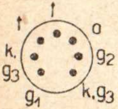
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
6CC42 Twin triode with separate cathodes HF, VHF amplifier, mixer, oscillator	Size max Ø 22,2×55 mm  	U_f 6,3 V I_f 0,35 A Indirect heating ● U_a 150 V R_k 240 Ω I_a 8 mA S 5,5 mA/V μ 35 R_i 6,7 kΩ I_{az} (U_{g1} = −10 V) <80 μA	HF and VHF amplifier U_b 250 V R_a 1) 12,5 kΩ U_a 150 V R_k 240 Ω I_a 8 mA S 5,5 mA/V R_i 6,7 kΩ 1) R_a shunted by $C_a = 1$ kpF	U_{ao} 550 V U_a 300 V W_a 1,5 W I_k 18 mA R_{g1} 1 MΩ $U_{k/f}$ 100 V Capacitances 1) C_{g1} 2,2 pF C_a 0,4 pF $C_{a/g1}$ <1,6 pF $C_{aI/aII}$ <0,3 pF 1) Without screening

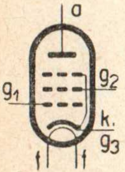
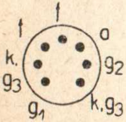
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
6F10 RF pentode RF, IF, wideband amplifier	Size O 2  	U_f 6,3 V I_f 0,45 A Indirect heating ● U_a 300 V U_{g3} 0 V U_{g2} 150 V R_k 160 Ω I_a 10,25 mA I_{g2} 2,2 mA S 9 mA/V μ_{g2}/g_1 50 R_i 300 kΩ	RF amplifier U_b 300 V U_a 300 300 V U_{g3} 0 0 V U_{g2} 150 V R_{g2} 0 60 kΩ R_k 160 160 Ω I_a 10,25 10,25 mA I_{g2} 2,5 2,5 mA S 9 9 mA/V R_i 300 300 kΩ Z_{g1} (f – 100 Mc/s) 540 Ω R_{ekv} 650 Ω RF amplifier, g2 and g3 connected to a U_a 150 V μ 40 R_k 160 Ω R_i 3,6 kΩ I_a 12,5 mA S 11 mA/V Only for information. – No on stock!	U_{ao} 550 V U_a 310 V W_a 3,3 W U_{g20} 550 V U_{g2} 165 V W_{g2} (U_{g1} ~ – 0 V) 0,45 W W_{g2} (U_{g1} ~ max) 0,8 W I_k 25 mA $-U_{g1}$ –30 mA R_{g1} 0,5 MΩ R_{g1} 1) 0,25 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ Triode connection U_a 165 V 1) U_{g1} fixed **Capacitances** C_{g1} 11 pF C_a 5 pF $C_{a/g1}$ <0,015 pF

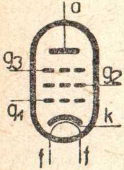
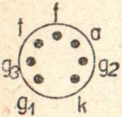
Type Application	Dimensions Base	Static data Heating	Operational Data	Maximum Ratings
6F24 RF high-slope pentode RF, IF, wideband amplifier	Size L 3 	U_f 6,3 V I_f 0,45 A Indirect heating ● U_a 250 V U_{g3} 0 V U_{g2} 200 V U_{g1} −2 V I_a 15 mA I_{g2} 2,1 mA S 10 mA/V R_i 0,3 MΩ I_{az} (U_{g1} = −7 V) <0,5 mA	RF amplifier class A U_a 250 V U_{g3} 0 V U_{g2} 200 V R_k 120 Ω I_a 15 mA I_{g2} 2,1 mA S 10 mA/V R_i 0,3 MΩ	U_{ao} 400 V U_a 250 V W_a 4 W U_{g2} 250 V W_{g2} 0,45 W I_k 20 mA R_{g1} 0,5 MΩ $U_{k/f}$ 50 V **Capacitances** C_{g1} 10,5 pF C_a 5,9 pF $C_{a/g1}$ <0,035 pF

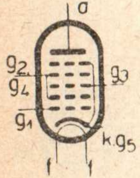
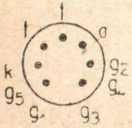
Type	Dimensions	Heating			Operational Data				Maximum Ratings		
Application	Base	Static data									
6F31	Size M 2	U_f	6,3	V	RF and IF amplifier				U_{ao}	500	V
6BA6		I_f	0,3	A	U_a	100	250	V	$U_{\imath}$	300	V
		Indirect heating			U_{g3}	0	0	V	W_a	3	W
			●		U_{g2}	100	100	V	U_{g2o}	300	V
		U_a	250	V	R_k	68	68	Ω	U_{g2}	125	V
		U_{g3}	0	V	I_a	10,8	11	mA	W_{g2}	0,6	W
		U_{g2}	100	V	I_{g2}	4,4	4,2	mA	$-U_{g1}$	–50	V
		R_k	68	Ω	S	4,3	4,4	mA/V	R_{g1}	3	MΩ
		I_a	11	mA	R_i	0,25	1,5	MΩ	$U_{k/f}$	150	V
		I_{g2}	4,2	mA	U_{g1} (S=44 µA/V)	–20	–20	V	T_b	150	°C
		S	4,4	mA/V							
		R_i	1,5	MΩ					Capacitances		
		I_{az} (U_{g1} = –20 V)							C_{g1}	5,5	pF
			<0,4	mA					C_a	5	pF
									$C_{a/g1}$	<0,005	pF
RF variable-mu pentode RF, IF amplifier											

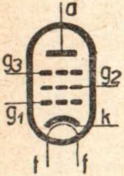
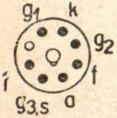
Type Application	Dimensions Base	Heating Static data			Operational Data				Maximum Ratings		
6F32	Size max	U_f	6,3	V	RF amplifier, class A				U_{ao}	320	V
EF95	∅ 19×45,2 mm	I_f	0,175	A	U_a	120	180	V	U_a	200	V
		Indirect heating			U_{g2}	120	120	V	W_a	1,7	W
		●			R_k	200	200	Ω	U_{g20}	320	V
		U_a	120	V	I_a	7,5	7,7	mA	U_{g2}	150	V
		U_{g2}	120	V	I_{g2}	2,5	2,4	mA	W_{g2}	0,5	W
		R_k	200	Ω	S	5	5,1	mA/V	I_k	18	mA
		I_a	7,5	mA	R_i	0,34	0,69	MΩ	R_{g1}	1	MΩ
		I_{g2}	<3,5	mA	Z_{g1} (f=50 Mc/s)	25	25	kΩ	$U_{k/f}$	100	V
		S	5,2	mA/V	R_{ekv}	2	2	kΩ	$R_{k/f}$	20	kΩ
		$\mu_{g2/g1}$	25								
		R_i	>0,25	MΩ	RF amplifier, class A –				Capacitances		
					Triode connection						
					U_a	120	180	V	C_{g1}	4,5	pF
					U_{g1}	−2,65	−6	V	C_a	2,8	pF
					R_k	265	925	Ω	$C_{a/g1}$	<0,025	pF
					I_a	10	6,5	mA			
					S	6	3,5	mA/V			
					R_i	5	6,66	kΩ			
					μ	30	23,3				
					Z_{g1} (f=100 Mc/s)	9,5		kΩ			
RF high-slope pentode RF, IF, wideband amplifier					R_{ekv}	700		Ω			

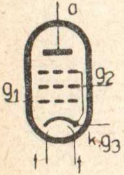
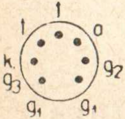
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
6F32V RF high-slope pentode RF, IF, wideband amplifier	Size M 1  	U_f 6,3 V I_f 0,175 A Indirect heating ● U_a 120 V U_{g2} 120 V R_k 200 Ω I_a 7,5 ± 2,5 mA I_{g2} <3,5 mA S 5,2 ± 1,4 mA/V R_i >250 kΩ I_{az} (R_a = 100 kΩ U_{g1} = −10 V) <200 µA	RF amplifier, class A U_a 120 180 V U_{g2} 120 120 V R_k 200 200 Ω I_a 7,5 7,7 mA I_{g2} 2,5 2,4 mA S 5,2 5,1 mA/V R_i 300 500 kΩ Z_{g1} (f = 50 Mc/s) 25 kΩ R_{ekv} 1 kΩ High-reliability tube Vibration and shock proofed Exacting tolerances Stabilized	U_a 200 V W_a 1,8 W U_{g2} 150 V W_{g2} 0,55 W I_k 20 mA R_{g1} 1 MΩ $U_{k/f}$ ±120 V $R_{k/f}$ 20 kΩ U_f 7 V U_f >5,7 V **Capacitances** C_{g1} 4,3 ± 0,5 pF C_a 3,4 ± 0,6 pF $C_{a/g1}$ <0,02 pF

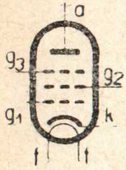
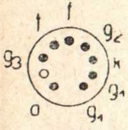
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
6F35 **6AJ5**	Size max ∅ 19×45,2 mm	U_f 6,3 V I_f 0,175 A Indirect heating ●	RF and IF amplifier, class A	U_{ao} 250 V U_a 180 V W_a 1,7 W U_{g2o} 250 V U_{g2} 75 V W_{g2} 0,5 W U_{g1} 0 V I_k 18 mA $U_{k/f}$ 90 V
		U_a 28 V U_{g2} 28 V U_{g1} –0,8 V I_a 3 mA I_{g2} 1,3 mA S 2,8 mA/V I_{az} (U_{g1} = –3 V) <0,5 mA	U_a 28 V U_{g2} 28 V R_k 270 Ω I_a 2,7 mA I_{g2} 1 mA S 2,7 mA/V R_i 100 kΩ	**Capacitances** C_{g1} 5,5 pF C_a 2,8 pF C_a/g_1 <0,03 pF
				
RF high-slope pentode RF, IF amplifier				

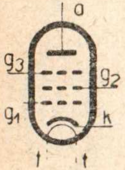
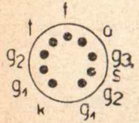
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
6F36 **6AH6** RF high-slope pentode RF, IF, wideband amplifier	Size M 3  	U_f 6,3 V I_f 0,45 A Indirect heating ● U_a 300 V U_{g3} 0 V U_{g2} 150 V R_k 160 Ω I_a 10,25 mA I_{g2} 2,2 mA S 9 mA/V R_i 1 MΩ I_{az} (U_{g1} = –6 V) <0,6 mA **Capacitances** C_{g1} 13,2 pF C_a 6,5 pF $C_{a/g1}$ 1) <0,015 pF 1) With screening	**RF amplifier** U_b 300 V U_a 300 300 V U_{g3} 0 0 V U_{g2} 150 V R_{g2} 0 60 kΩ R_k 160 160 Ω I_a 10,25 10,25 mA I_{g2} 2,2 2,2 mA S 9 9 mA/V R_i 0,5 0,5 MΩ **RF amplifier, g2 and g3 connected to a** U_a 150 V R_k 160 Ω I_a 12,5 mA S 11 mA/V μ 40 R_i 3,6 kΩ U_{g1} (I_a = 10 μA) –7 V	U_{ao} 550 V U_a 300 V W_a 3,3 W U_{g2o} 550 V U_{g2} 165 V W_{g2} (U_{g1}~ = 0 V) 0,45 W W_{g2} (U_{g1} ~ max) 0,8 W I_k 25 mA $-U_{g1}$ –30 V R_{g1} 0,5 MΩ R_{g1} 1) 0,25 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ Triode connection U_a 165 V 1) U_{g1} fixed

Type Application	Dimensions Base	Heating Static data			Operational Data				Maximum Ratings		
6H31	Size M 2	U_f	6,3	V	U_a	100	250	V	U_{ao}	550	V
6BE6		I_f	0,3	A	$U_{g2}+g_4$	100	100	V	U_a	300	V
		Indirect heating			U_{g3}	−1,5	−1,5	V	W_a	1	W
		●			$U_{g1\,ef}$	10	10	V	$U_{g2}+g_{40}$	300	V
		U_a	250	V	I_a	2,8	3	mA	$U_{g2}+g_4$	100	V
		$U_{g2}+g_4$	100	V	$I_{g2}+g_4$	7,3	7,1	mA	$W_{g2}+g_4$	1	W
		U_{g3}	−1,5	V	I_{g1}	0,5	0,5	mA	U_{g1}	0	V
		I_{g1}	0,5	mA	I_k	10,6	10,6	mA	U_{g1}	−50	V
		I_a	3	mA	R_{g1}	20	20	kΩ	U_{g3}	0	V
		$I_{g2}+g_4$	<9,5	mA	R_i	0,5	1	MΩ	$-U_{g3}$	−50	V
		R_{g1}	20	kΩ	S_c	0,455	0,475	mA	I_k	14	mA
		C_{g1}	4	µF	U_{g3} (S_c=10 µA/V)	−30	−30	V	$U_{k/f}$	90	V
		$U_{g1\,ef}$	10	V					R_{g3}	20	kΩ
		f	50	Hz	**Capacitances**						
					C_{g3}	7,15		pF			
		S_c	>0,3	mA/V	C_a	8,6		pF			
		$U_{g3\,ef}$	0,354	V	C_{g1}	5,5		pF			
					C_a/g_3	<0,35		pF			
					C_{g1}/g_3	<0,15		pF			
					C_a/g_1	<0,06		pF			
Variable-mu heptode Mixer											

Type Application	Dimensions Base	Static data Heating	Operational Data	Maximum Ratings
6L10   Power pentode for wideband amplifiers	Size O 2	U_f 6,3 V I_f 0,65 A Indirect heating ◍ U_a 300 V U_{g3} 0 V U_{g2} 150 V U_{g1} −3 V I_a 30 mA I_{g2} 7 mA S 11 mA/V $\mu_{g2/g1}$ 20 R_i 90 kΩ	**Wideband amplifier output stage:** U_a 300 V — S 11 mA/V U_{g3} 0 V — R_i 90 kΩ U_{g2} 150 V — R_a 7 kΩ R_k 80 Ω — P_o 3,5 W I_{ao} 30 mA — k 10 % I_a 30,5 mA — $U_{g1\,ef}$ 2 V I_{g20} 7 mA I_{g2} 9 mA **Video amplifier output stage:** U_b 300 — 300 V U_a 145 — 200 V U_{g3} 0 — 0 V R_{g2} 0 — 25 kΩ U_{g2} 115 — (125) V R_k 0 — 57 Ω R_{g1} 0,1 — – MΩ U_{g1} 0 — (−2) V I_a 45 — 28 mA I_{g2} 13 — 7 mA R_a 3,5 — 3,5 kΩ $U_{a\sim sp/sp}$ 135 — 140 V $U_{g1\sim sp/sp}$ 4 — 4 V Only for information. – No on stock!	U_{ao} 550 V U_a 330 V W_a 9 W U_{g20} 550 V U_{g2} 330 V W_{g2} ($U_{g1\sim}$ = 0 V) 1,5 W W_{g2} (U_{g1} ~ max) 3 W I_k 50 mA R_{g1} 0,1 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ **Capacitances** C_{g1} 13 pF C_a 6,5 pF $C_{a/g1}$ <0,06 pF

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
6L31 **6AQ5** Output beam tetrode AF power amplifier	Size M 2  	U_f 6,3 V I_f 0,45 A Indirect heating ● U_a 250 V U_{g2} 250 V U_{g1} −12,5 V I_a 45 mA I_{g2} <8,5 mA S 4,1 mA/V R_i 52 kΩ I_{az} (U_{g1} = −30 V) <8 mA	AF power amplifier, class A U_a 180 250 V U_{g2} 180 250 V U_{g1} −8,5 −12,5 V I_{ao} 29 45 mA I_a 30 47 mA I_{g2o} 3 4,5 mA I_{g2} 4 7 mA R_i 58 52 kΩ S 3,7 4,1 mA/V R_a 5,5 5 kΩ P_o 2 4,5 W k 8 8 % AF push-pull amplifier, class AB U_a 250 V U_{g2} 250 V U_{g1} −15 V I_{ao} 2×35 mA I_a 2×39,5 mA I_{g2o} 2×2,5 mA I_{g2} 2×6,5 mA $R_{a\text{-}a'}$ 10 kΩ $U_{g1\,ef}$ 10,5 V P_o 10 W k 5 %	U_{ao} 500 V U_a 315 V W_a 12 W U_{g2o} 500 V U_{g2} 285 V W_{g2o} 2,5 W W_{g2} 3 W I_k 60 mA R_{g1} 0,5 MΩ R_{g1} 1) 0,1 MΩ $U_{k/f}$ 100 V 1) U_{g1} fixed **Capacitances** $C_{a/g1}$ <0,6 pF

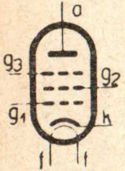
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
6L41   Beam tetrode AF, RF power amplifier, frequency multiplier	Size max Ø 22×70 mm	U_f 6,3 V I_f 0,75 A Indirect heating ● U_a 300 V U_{g3} 0 V U_{g2} 250 V U_{g1} –6 V I_a 50 mA I_{g2} 5 mA S 7 mA/V $\mu_{g1/g2}$ 16 S/C 0,5 I_{az} (U_{g1} = –25 V) <3 mA	**Oscillator or power amplifier –** **f = 50 Mc/s** U_a 300 V R_{g1} 22 kΩ U_{g2} 250 V I_{g1} 3 mA U_{g1} –60 V $U_{g1\,šp}$ 80 V I_a 50 mA W_{g1} 0,35 W I_{g2} 5 mA P_o 8 W **Frequency multiplier –** **f max = 175 Mc/s** Doubler Trebler U_a 300 300 V U_{bg2} 300 300 V R_{g2} 12,5 12,5 kΩ U_{g1} –75 –100 V I_a 40 35 mA I_{g2} 4 5 mA R_{g1} 75 100 kΩ I_{g1} 1 1 mA $U_{g1\,sp}$ 95 120 V W_{g1} 0,6 0,6 W P_o 3,6 2,8 W	U_a 300 V W_a 12 W U_{g2} 250 V W_{g2} 2,0 W I_{g1} 5 mA I_k 55 mA $I_{k\,šp}$ 100 mA $U_{k/f}$ 100 V f 175 Mc/s T_b 250 °C **Capacitances** C_{g1} 9,5 pF C_a 5,4 pF $C_{a/g1}$ <0,45 pF

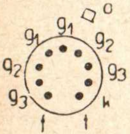
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
6L43 Power pentode for video and wideband amplifiers	Size N 4  	U_f 6,3 V I_f 0,65 A Indirect heating ● U_a 300 V U_{g3} 0 V U_{g2} 150 V U_{g1} –3 V I_a 30 mA I_{g2} 7 mA S 11 mA/V $\mu_{g2/g1}$ 20 R_i 90 kΩ I_{az} (U_{g1} = –20 V) <0,1 mA	**Wideband amplifier output stage** U_a 300 V — S 11 mA/V U_{g3} 0 V — R_i 90 kΩ U_{g2} 150 V — R_a 7 kΩ R_k 80 Ω — P_o 3,5 W I_{ao} 30 mA — k 10 % I_a 30,5 mA — $U_{g1\,ef}$ 2 V I_{g2o} 7 mA I_{g2} 9 mA **Video amplifier output stage** U_b 300 — 300 V U_a 145 — 200 V U_{g3} 0 — 0 V R_{g2} 0 — 25 kΩ U_{g2} 115 — (125) V R_k 0 — 57 Ω R_{g1} 0,1 — – MΩ I_a 45 — 28 mA I_{g2} 13 — 7 mA R_a 3,5 — 3,5 kΩ $U_{a\,sp/sp}$ 135 — 140 V $U_{g1\,sp/sp}$ 4 — 4 V	U_{ao} 550 V U_a 330 V W_a 9 W U_{g2o} 550 V U_{g2} 330 V W_{g2} ($U_{g1\,ef}$ = 0 V) 1,5 W W_{g2} ($U_{g1\,ef}$ max) 3 W I_k 50 mA R_{g1} 0,1 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ **Capacitances** C_{g1} 11 pF C_a 5,5 pF $C_{a/g1}$ <0,1 pF

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings

6L50

Size R 2





Beam tetrode
AF, RF power amplifier

Heating / Static data

U_f	6,3	V
I_f	1,0	A
t_f	25	s
Indirect heating		
●		
U_a	400	V
U_{g3}	0	V
U_{g2}	250	V
U_{g1}	–25	V
I_a	30	mA
I_{g2}	2	mA
S	3,5	mA/V
R_i	75	kΩ

AF and RF amplifier, class A

U_a	250	300	325	350	V
U_{g2}	250	200	250	250	V
R_k	180	250	165	320	Ω
I_{ao}	72	48	80	54	mA
I_a	79	55	88	66	mA
I_{g2o}	5	2,5	5	2,5	mA
I_{g2}	7,3	4,7	7,5	7	mA
S	6	5,3	5,5	5,2	mA/V
R_i	22,5	35	25	33	kΩ
R_a	2,5	4,5	3	4,2	kΩ
P_o	6,5	6,5	7	10,8	W
$U_{g1\,sp}$	14	12,5	14	18	V
k	10	11	8,5	15	%

AF push-pull amplifier, class AB2

U_a	360	V	I_{g2}	16	mA
U_{g2}	270	V	$R_{a-a'}$	3,8	kΩ
U_{g1}	–22,5	V	P_o	47	W
I_{ao}	88	mA	$U_{g1\,sp}$	72	V
I_a	205	mA	k	2	%
I_{g2o}	5	mA			

Maximum Ratings

U_a	1000	V
U_{g2}	400	V
W_a	25	W
W_{g2}	3,5	W
I_k	125	mA
$I_{k\,sp}$	300	mA
$I_{k\sqcap}$ 1)	1,5	A
R_{g1} 2)	0,1	MΩ
R_{g1}	0,25	MΩ
$U_{k/f}$	80	V
$R_{k/f}$	20	kΩ

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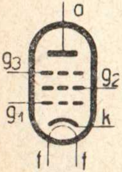
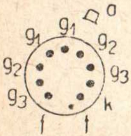
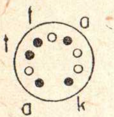
1) $t_{ip} = 1$ µs
2) U_{g1} fixed

Capacitances

C_{g1}	9,7	pF
C_a	7,3	pF
$C_{a/g1}$	<0,35	pF

Type	Dimensions	Heating	Operational Data	Maximum Ratings
Application	Base	Static data		
6L50S **(6L50V)** Beam tetrode AF, RF power amplifier for pulse operation	Size R 2  	U_f 6,3 V I_f 1,0 A t_f 25 s Indirect heating ◍ U_a 400 V U_{g3} 0 V U_{g2} 250 V U_{g1} –25 V I_a 30 mA I_{g2} 2 mA S 3,5 mA/V R_i 75 kΩ	**Pulse operation** U_a 3000 V U_{g2} 250 V U_{g1} –70 V $U_{g1\,ip}$ až +20 V I_a 330 mA I_{g2} 30 mA I_{g1} 30 mA	U_a 4500 V 1) U_{g2} 800 V W_a 18 W W_{g2} 3 W I_k 100 mA $I_{k\,šp}$ 300 mA $I_{k\,it}$ 2) 1500 mA R_{g1} 3) 100 kΩ R_{g1} 250 kΩ $U_{k/f}$ 80 V $R_{k/f}$ 20 kΩ 1) Pulse duration max 10 µs, max 15 % per. 2) $t_{ip} = 1$ µs 3) U_{g1} fixed **Capacitances** C_{g1} 9,7 pF C_a 7,3 pF $C_{a/g1}$ <0,3 pF

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
6Y50	Size R 1	U_f 6,3 V	**Half-wave rectifier**	U_{inv} 3500 V
		I_f 1,65 A	$U_{a}\sim_{ef}$ 1) 1200 V	W_a 10 W
		t_f 1 min	I_{ss} 220 mA	I_{ss} 220 mA
		Indirect heating	U_{ss} 1350 V	I_{sp} 700 mA
			R_t 150 Ω	R_t >150 Ω
		●	C_N 4 µF	$U_{k/f}$ 50 V
		U_a 30 V		
		I_a >200 mA	**Full-wave rectifier**	**Capacitances**
			$U_{a}\sim_{ef}$ 1) 2×850 V	$C_{a/k}$ 5 pF
			I_{ss} 400 mA	
			U_{ss} 800 V	
			R_t 2×150 Ω	
			C_N 4 µF	
				
HT diode Half-wave rectifier full-wave rectifier (two tubes)				

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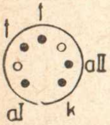
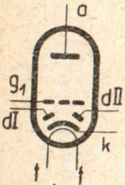
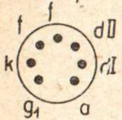
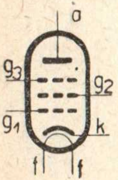
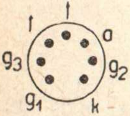
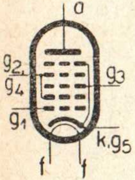
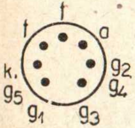
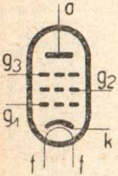
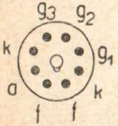
1) U_a must be connected after heating the cathode, otherwise U_{inv} must be reduced to 2000 V.

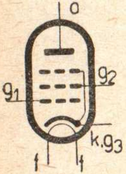
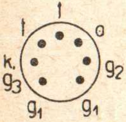
Type Application	Dimensions Base	Heating Static data		Operational Data			Maximum Ratings	
6Z31	Size M 3	U_f	6,3 V	**Filter input:**	**Capacitive**	**Inductive**	U_{inv}	1000 V
		I_f	0,6 A	$U_{a\sim ef}$	2×325	2×450 V	I_{sp}	300 mA
		Indirect heating		C_N	max 4	– µF	I_{ss}	70 mA
		●		R_t	150	– Ω	$U_{k/f}$	450 V
		I_d	50 mA	L	–	min 8 H	C_N	16 µF
		R_i	250 Ω	I_{ss}	70	70 mA		
				U_{ss}	355	375 V		
								
								
Twin diode Full-wave rectifier								

Type Application	Dimensions Base	Heating Static data			Operational Data					Maximum Ratings		
12BC32	Size max	I_f	150	mA	**AF resistance-coupled amplifier**					**Triode**		
	Ø 19×57 mm	U_f	12,6	V	U_b	180	300	300	V	U_f	14	V
		Indirect heating			R_a	0,22	0,22	0,47	MΩ	U_f	>11,4	V
		●			R_k	3,9	3,1	5,9	kΩ	U_{ao}	500	V
		U_a	100	V	R_{g1}	1	1	1	MΩ	U_a	330	V
		U_{g1}	−1	V	R_{g1}'	1	1	2,2	MΩ	W_a	0,5	W
		I_a	0,5	mA	C_k	1,8	2,1	1,1	µF	$+U_{g1}$	0	V
		S	1,25	mA/V	C_v 1)	3	3	2	kpF	$-U_{g1}$	−50	V
		µ	100		$U_a \sim sp$	39	79	92	V	R_{g1}	3	MΩ
		R_i	80	kΩ	V	63	68	75		R_{g1} 1)	10	MΩ
										$R_{k/f}$	20	kΩ
		U_d	4	V	1) Coupling capacitor					$U_{k/f}$	150	V
		I_d	>0,15	mA						I_k	8	mA
					**Capacitances**							
					C_{g1}			2	pF	**Diode**		
					C_a			0,65	pF	$U_{d\ sp}$	90	V
					$C_{a/g1}$			2	pF	I_d	1	mA
					$C_{d/g1}$			<0,04	pF	$I_{d\ sp}$	6	mA
					$C_{d/k}$			<1,2	pF			
										1) U_{g1} produced by R_{g1}		
Twin diode-AF triode RF rectifier AF resistance-coupled amplifier												

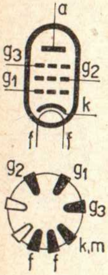
Type Application	Dimensions Base	Heating Static data			Operational Data				Maximum Ratings		
12F31	Size M 3	I_f	150	mA	**RF and IF amplifier**				U_{ao}	500	V
		U_f	12,6	V	U_a	100	250	V	U_a	300	V
		Indirect heating			U_{g3}	0	0	V	W_a	3	W
		●			U_{g2}	100	100	V	U_{g2o}	300	V
		U_a	250	V	R_k	68	68	Ω	U_{g2}	125	V
		U_{g3}	0	V	I_a	10,8	11	mA	W_{g2}	0,6	W
		U_{g2}	100	V	I_{g2}	4,4	4,2	mA	U_{g1}	0	V
		R_k	68	Ω	S	4,3	4,4	mA/V	$-U_{g1}$	–50	V
		I_a	11	mA	R_i	0,25	1,5	MΩ	R_{g1}	3	MΩ
		I_{g2}	4,2	mA					$U_{k/f}$	150	V
		R_i	1,5	MΩ					T_b	150	°C
		S	4,4	mA/V					**Capacitances**		
		I_{az} (U_{g1} = –20 V)							C_{g1}	5,5	pF
			<0,4	mA					C_a	5	pF
									C_a/g_1	<0,005	pF
Variable-mu pentode RF, IF amplifier											

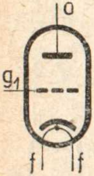
Type Application	Dimensions Base	Heating Static data			Operational Data				Maximum Ratings		
12H31	Size max	I_f	150	mA	Mixer				U_{ao}	500	V
	∅ 19×57 mm	U_f	12,6	V	U_a	100	250	V	U_a	300	V
		Indirect heating			U_{g2+g4}	100	100	V	W_a	1	W
		●			U_{g3}	−1,5	−1,5	V	U_{g2+g4o}	300	V
		U_a	250	V	$U_{g1\,ef}$	10	10	V	U_{g2+g4}	100	V
		U_{g2+g4}	100	V	I_a	2,8	3	mA	W_{g2+g4}	1	W
		U_{g3}	−1,5	V	I_{g2+g4}	7,3	7,1	mA	U_{g1}	0	V
		R_{g1}	20	kΩ	I_{g1}	0,5	0,5	mA	$-U_{g1}$	−50	V
		I_{g1}	0,5	mA	I_k	10,6	10,6	mA	U_{g3}	0	V
		I_a	3	mA	R_{g1}	20	20	kΩ	$-U_{g3}$	−50	V
		I_{g2+g4}	<9,5	mA	R_i	0,5	1	MΩ	R_{g1}	1	MΩ
		R_{g1}	20	kΩ	S_c	0,455	0,475	mA/V	R_{g3}	1	MΩ
		C_{g1}	4	µF	U_{g3} (S_c = 4 µA/V)	−30	−30	V	I_k	14	mA
		$U_{g1\,ef}$	10	V					$U_{k/f}$	150	V
		f	50	Hz	Capacitances				U_f	14	V
					C_{g3}	7,15		pF	U_f	>11,4	V
		I_{az} (U_{g3} = −30 V)			C_a	8,6		pF			
			<0,4	mA	C_{g1}	5,5		pF			
					$C_{a/g3}$	<0,35		pF			
					$C_{g1/g3}$	<0,15		pF			
					$C_{a/g1}$	<0,05		pF			
					$C_{g1/k}$	2,75		pF			
					C_k	13,5		pF			
Variable-mu heptode Mixer											

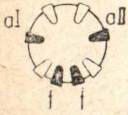
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
18F24  RF high-slope pentode RF, IF, wideband amplifier	Size L 3	U_f 18 V I_f 0,165 A Indirect heating ● U_a 250 V U_{g3} 0 V U_{g2} 200 V U_{g1} −2 V I_a 15 mA I_{g2} 2,1 mA S 10 mA/V R_i 0,3 MΩ I_{az} (U_{g1} = −7 V) <0,5 mA	**RF amplifier, class A** U_a 250 V U_{g3} 0 V U_{g2} 200 V R_k 120 Ω I_a 15 mA I_{g2} 2,1 mA S 10 mA/V R_i 0,3 MΩ	U_{ao} 400 V U_a 250 V W_a 4 W U_{g2} 250 V W_{g2} 0,45 W I_k 20 mA R_{g1} 0,5 MΩ $U_{k/f}$ 50 V **Capacitances** C_{g1} 10,5 pF C_a 5,9 pF $C_{a/g1}$ <0,035 pF

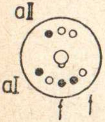
Type	Base	Heating			Operational Data					Maximum Ratings		
Application	Dimensions	Static data										
35L31	Size M 4	I_f	150	mA	AF power amplifier, class A					U_{ao}	550	V
		U_f	35	V	U_a	100	180	200	V	U_a	250	V
		Indirect heating			U_{g2}	100	180	200	V	W_a	11	W
		●			R_k	140	140	200	Ω	U_{g2o}	550	V
		U_a	200	V	I_a	32,5	61	55	mA	U_{g2}	250	V
		U_{g2}	200	V	I_{g2}	5,5	10	9,5	mA	W_{g2} (U_{g1} ~ 0 V)		
		U_{g1}	−13	V	S	7,5	9	8	mA/V		1,9	W
		I_a	55	mA	R_i	25	22	25	kΩ	W_{g2} (U_{g1} ~ max)		
		I_{g2}	9,5	mA	R_a	3	3	3,5	kΩ		3,5	W
		S	8	mA/V	P_o	1,35	4,8	4,8	W	R_{g1}	1	MΩ
		R_i	25	kΩ	k	10	10	10	%	$U_{k/f}$	150	V
		I_a (U_{g1} = −28 V)			$U_{g1\,ef}$	3,8	6,2	6,2	V	$R_{k/f}$	20	kΩ
			<10	mA	$U_{g1\,ef}$ (P_o = 50 mW)					U_f	38,5	V
						0,55	0,5	0,5	V	U_f	>31,5	V
										Capacitances		
										C_a/g_1	<1,2	pF
												
Output pentode AF power amplifier												

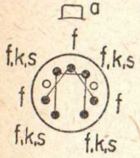
Type	Dimensions	Heating			Operational Data				Maximum Ratings		
Application	Base	Static data									
35Y31	Size M 4	I_f	150	mA	$U_{a\,ef}$	127–170	170–250	V	U_{inv}	700	V
		U_f	35	V	R_o (C_N=60 μF)	100	175	Ω	$U_{a\,ef}$	250	V
		Indirect heating			(C_N=32 μF)	75	125	Ω	I_{ss}	140	mA
					(C_N=16 μF)	30	75	Ω	$I_{šp}$	850	mA
					(C_N= 8 μF)	0	0	Ω	W_a	2,5	W
					C_N	32	32	μF	$U_{k/f}$	550	V
					I_{ss}	140	140	mA	U_f	38,5	V
					U_{ss}	103	165	V	U_f	>31,5	V
 											
Diode Half-wave rectifier											

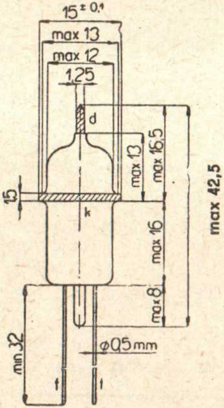
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
4654 Power pentode AF power amplifier	Size P 4 	U_f 6,3 V I_f 1,35 A Indirect heating ◍ U_a 400 V U_{g3} 0 V U_{g2} 425 V U_{g1} −33 V I_a 45 mA I_{g2} 5 mA S 6 mA/V R_i 30 kΩ I_{az} (U_{g1} = −45) <15 mA	**AF push-pull power amplifier, class AB** U_a 400 400 600 V U_{g3} 0 0 0 V U_{g2} 425 425 400 V U_{g1} – −30 −33 V R_k 315 – – Ω I_{ao} 2×45 2×27,5 2×26 mA I_a 2×50 2×97 2×80 mA I_{g2o} 2×5 2×3 2×2,5 mA I_{g2} 2×13 2×23 2×20 mA R_{a-a} 10 5 10 kΩ P_o 25 52,5 69 W k 4 3,5 5 % $U_{g1\,ef}$ 18,5 22 22 V	U_{ao} 1200 V U_a 600 V W_a 18 W U_{g2o} 1000 V U_{g2} 425 V U_{g2o} 3 W W_{g2} 10 W I_k 120 mA $U_{k/f}$ 50 V $R_{g1}(k)$ 0,7 MΩ $R_{g1}(p)$ 0,5 MΩ $R_{k/f}$ 10 kΩ **Capacitances** C_{g1} 15,5 pF C_a 10 pF $C_{g1/a}$ <0,9 pF

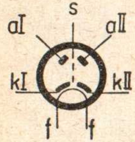
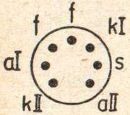
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
AD1N Power triode AF power amplifier	Size P 1  	U_f 4 V I_f 2 A t_f 16 s Indirect heating ● U_a 250 V U_{g1} −45 V I_a 60 mA S 4,3 mA/V R_i 1035 Ω μ 4,4 I_{az} (U_{g1} = −70 V) 10 mA	**AF power amplifier, class A** U_b 295 V U_{g1} −45 V I_a 60 mA R_a 2300 Ω R_k 750 Ω P_o 4,2 W $U_{g1\,ef}$ 30 V k 5 % **AF push-pull power amplifier** U_b 295 V R_k 375 Ω $R_{a-a'}$ 4 kΩ I_{ao} 2×60 mA I_a 2×64 mA P_o 9,5 W $U_{g1\,ef}$ 30 V k 1,5 %	U_{ao} 550 V U_a 250 V W_a 15 W I_k 90 mA R_{g1} 1) 0,3 MΩ R_{g1} 2) 0,7 MΩ 1) U_{g1} fixed 2) U_{g1} automatic **Capacitances** C_{g1} 14,4 pF C_a 10 pF $C_{a/g1}$ 6,9 pF

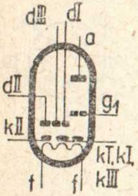
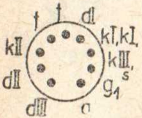
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
AZ1 **AZ4** 	Size P 2 Size P 3	**AZ1** U_f 4 V I_f 1,1 A Direct heating ● U_a 26 V I_a 50 mA	$U_{tr\ ef}$ 2×500 V I_{ss} 60 mA R_t $>2\times100\ \Omega$ $U_{tr\ ef}$ 2×400 V I_{ss} 75 mA R_t $>2\times80\ \Omega$ $U_{tr\ ef}$ 2×300 V I_{ss} 100 mA R_t $>2\times60\ \Omega$ Overall length max 110 mm at tubes TELAM	$U_{tr\ ef}$ 2×500 V C_N 60 μF
 Full-wave rectifier		**AZ4** U_f 4 V I_f 2,2 A Direct heating ● U_a 27,5 V I_a 100 mA	$U_{tr\ ef}$ 2×500 V I_{ss} 120 mA R_t $>2\times100\ \Omega$ $U_{tr\ ef}$ 2×400 V I_{ss} 150 mA R_t $>2\times80\ \Omega$ $U_{tr\ ef}$ 2×300 V I_{ss} 200 mA R_t $>2\times60\ \Omega$ Overall length max 125 mm at tubes TELAM	$U_{tr\ ef}$ 2×500 V C_N 60 μF

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
AZ11 **AZ12**	Size T 1 Size T 2	**AZ11** U_f 4 V I_f 1,1 A Direct heating ● U_a 26 V I_a 50 mA	$U_{tr\ ef}$ 2×500 V I_{ss} 60 mA R_t >2×100 Ω $U_{tr\ ef}$ 2×400 V I_{ss} 75 mA R_t >2×80 Ω $U_{tr\ ef}$ 2×300 V I_{ss} 100 mA R_t >2×60 Ω	$U_{tr\ ef}$ 2×500 V C_N 60 µF
  Full-wave rectifier		**AZ12** U_f 4 V I_f 2,2 A Direct heating ● U_a 27,5 V I_a 100 mA	$U_{tr\ ef}$ 2×500 V I_{ss} 120 mA R_t >2×100 Ω $U_{tr\ ef}$ 2×400 V I_{ss} 150 mA R_t >2×80 Ω $U_{tr\ ef}$ 2×300 V I_{ss} 200 mA R_t >2×60 Ω Overall length max 135 mm at tubes TELAM	$U_{tr\ ef}$ 2×500 V C_N 60 µF

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
DY86 HT diode Half-wave rectifier for TV receiver HT sources	Size N 4  	U_f 1,4 V I_f 0,53 A Indirect heating ● U_a 100 V I_a 12 mA	U_{ss} 18 kV U_{ss} 20 kV I_{ss} 150 µA I_{ss} 0 µA 1. Pulse duration 18 % of a cycle, max 18 µs 2. Absolute value 3. Pulse duration 10 % of a cycle, max 10 µs Permissible tolerances of filament voltage: $I_a \leqq 200$ µA ± 15 % $I_a > 200$ µA ± 7 %	$-U_{a\,sp}$ 1) 22 kV $-U_{a\,sp}$ ($I_a = 0$) 24 kV $-U_{a\,sp}$ 2) 27 kV I_{ss} 0,8 mA I_{sp} 40 mA C_N 2000 pF T_b 150 °C **Half-wave rectifier** **f = 50 c/s** Sinusoidal waveform $U_{a\,ef}$ 5 kV I_a 3 mA C_N 0,2 µF R_{tr} >100 kΩ **Capacitances** $C_{a/k+f+s}$ 2,5 pF

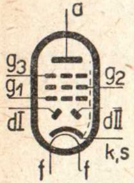
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EA52 Vacuum diode for measuring purposes up to 1000 Mc/s		U_f 6,3 V I_f 0,3 A Indirect heating ● U_d <3 V I_d 0,5 mA $R_{is\ a/k}$ >10 000 MΩ		U_{inv} (f <100 Mc/s) 1000 V U_{inv} (f >100 Mc/s) $1000 \cdot \frac{100}{f}$ V I_k 300 µA $I_{k\ sp}$ 5 mA $U_{k/f}$ 50 V $R_{k/f}$ 20 kΩ U_f >5,6 V U_f 7 V f [MHZ] **Capacitances** $C_{a/k}$ <0,5 pF

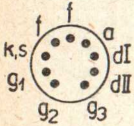
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EAA91 **6B32** Twin diode with separate cathodes, AM, FM, demodulator, ratio detector, full-wave rectifier	Size max Ø 19×48 mm  	U_f 6,3 V I_f 0,3 A I_f 0,3 A U_f 6,3 V Indirect heating ● U_a 4 V I_a >10 mA	**Half-wave rectifier** $U_{a\,ef}$ 150 V R_o 300 Ω I_{ss} 9 mA I_{sp} 54 mA **Full-wave rectifier** $U_{a\,ef}$ 2×150 V R_o 2×300 Ω C_N 1 µF R_z 15 kΩ U_{ss} 130 V **Capacitances** $C_{aI/kI+s+f}$ 2,2 pF $C_{aII/kII+s+f}$ 2,2 pF $C_{kI/aI+s+f}$ 3,3 pF $C_{kII/aII+s+f}$ 3,3 pF $C_{aI/aII}$ <0,05 pF	**Each section** U_{inv} 420 V I_{ss} 9 mA I_{sp} 1) 90 mA W_a 0,5 W $U_{+k/f-}$ 330 V $U_{-k/f+}$ 150 V $R_{k/f}$ 20 kΩ U_{di} ($I_d \leqq 0,3$ µA) −1,3 V C_N 8 µF R_o >200 Ω 1) Max, 18 µs, max 18% of a cycle

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EABC80 Diode-twin diode-AF triode FM demodulator, AM demodulator, AF amplifier	Size NA 50  	U_f 6,3 V I_f 0,45 A t_f 15 s Indirect heating ● U_a 250 V U_{g1} −3 V I_a 1 mA S 1,2 mA/V μ 70 R_i 58 kΩ I_{az} (U_{g1} = −6 V) <0,15 mA $U_{dII,\ dIII}$ 5 V $I_{dII,\ dIII}$ 25 mA $R_{dII,\ dIII}$ 200 Ω R_{dI} 5 kΩ U_{dI} 5 V I_{dI} 1 mA	**AF resistance-coupled amplifier** U_b 250 250 250 V R_a 300 200 100 kΩ R_{g1} 10 10 10 MΩ R_{g1}' 1 1 1 MΩ I_a 0,6 0,8 1,3 mA $U_{g1\ ef}$ 67 68 78 mV $U_{a\ ef}$ 4 4 4 V k 0,3 0,25 0,3 % V 60 59 51 **AF resistance-coupled amplifier** $C_{g_1/kI,\ III}$ 1,9 pF $C_{a/kI,\ III}$ 0,8 pF C_{a/g_1} 2,0 pF $C_{dI/kI,\ III+f}$ 0,8 pF $C_{dII/kI,\ III+kII+f}$ 4,8 pF $C_{dIII/kI,\ III+kII+f}$ 4,8 pF $C_{g_1/f}$ <0,1 pF	**Triode** U_{ao} 550 V U_a 300 V W_a 1 W I_k 5 mA R_{g1} 3 MΩ R_{g1} 1) 22 MΩ $U_{k/f}$ 150 V $R_{k/f}$ 20 kΩ 1) U_{g1} produced by R_{g1} **Diode** $U_{dI\ inv}$ 350 V $U_{dII\ inv}$ 350 V $U_{dIII\ inv}$ 350 V I_{dI} 1 mA $I_{dI\ sp}$ 6 mA $I_{dII\ III}$ 10 mA $I_{dII,\ III\ sp}$ 75 mA

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings

EBF89 Size N 4





Twin diode-variable-mu pentode
AM demodulator,
RF, IF amplifier

U_f	6,3	V
I_f	0,3	A
I_f	0,3	A
U_f	6,3	V
t_f	16	s

Indirect heating

●

U_a	250	V
U_{g3}	0	V
U_{g2}	100	V
U_{g1}	−2	V
I_a	9	mA
I_{g2}	2,7	mA
S	3,8	mA/V
R_i	1	MΩ
$\mu_{g2/g1}$	20	
I_{az} (U_{g1} = −20 V)	10	µA
U_d	4	V
I_d	>0,3	mA

RF and IF amplifier

$U_b=U_a$	250		250		V
U_{g3}	0		0		V
R_{g2}	56		62		kΩ
U_{g1}	−2	−20	−2	−20	V
I_a	9	—	9	—	mA
I_{g2}	2,7	—	2,7	—	mA
S	3,8	0,2	4,5	0,2	mA/V
R_i	1	—	0,9	—	MΩ

Capacitances

Pentode		Between sections	
C_{g1}	5 pF	$C_{dI/a}$	0,15 pF
C_a	5,5 pF	$C_{dII/a}$	0,025 pF
$C_{a/g1}$	<0,0035 pF	$C_{dI/g1}$	<0,0008 pF
$C_{g1/f}$	0,05 pF	$C_{dII/g1}$	<0,001 pF

Diodes

$C_{dI/k}$	2,5	pF
$C_{dII/k}$	2,5	pF
$C_{dI/dII}$	<0,25	pF
$C_{dI/f}$	0,015	pF
$C_{dII/f}$	0,003	pF

Pentode

U_{ao}	550	V
U_a	300	V
W_a	2,25	W
U_{g2o}	550	V
U_{g2}	300	V
W_{g2}	0,45	W
I_k	16,5	mA
R_{g1}	3	MΩ
R_{g1} 1)	22	MΩ
R_{g3}	10	kΩ
$U_{k/f}$	100	V
$R_{k/f}$	20	kΩ

Diodes

U_d	200	V
I_d	0,8	mA
$I_{d\,sp}$	5	mA

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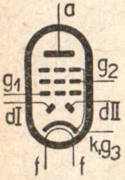
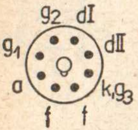
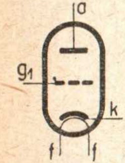
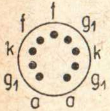
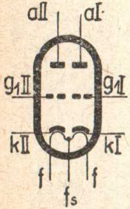
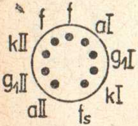
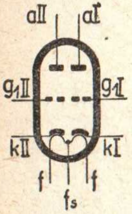
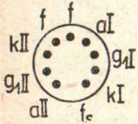
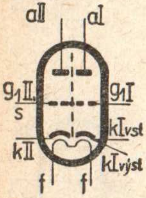
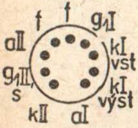
1) U_{g1} produced by R_{g1}

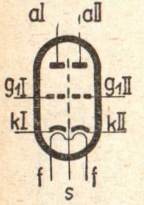
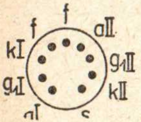
Type	Dimensions	Heating			Operational Data				Maximum Ratings		
Application	Base	Static data									
EBL21	Size L 2	U_f	6,3	V	AF power amplifier, class A				U_{ao}	550	V
		I_f	0,9	A	U_a	250	250	V	U_a	300	V
		t_f	22	s	U_{g2}	250	250	V	W_a	11	W
		Indirect heating			R_k	105	150	Ω	U_{g2o}	550	V
		●			I_a	44	36	mA	U_{g2}	300	V
		U_a	250	V	I_{g2}	5,5	4,5	mA	W_{g2o}	1,7	W
		U_{g2}	250	V	S	9,5	9	mA/V	W_{g2}	2,75	W
		U_{g1}	−6	V	R_i	30	50	kΩ	I_k	60	mA
		I_a	36	mA	R_a	5,7	7	kΩ	R_{g1}	1	MΩ
		I_{g2}	4,5	mA	P_o	4,5	4,5	W	$R_{k/f}$	5	kΩ
		S	9	mA/V	k	7	10	%	$U_{k/f}$	50	V
		$\mu_{g2/g1}$	23		$U_{g1\,ef}$	3,9	4,2	V	U_{dI}, U_{dII}	200	V
		R_i	50	kΩ					I_{dI}, I_{dII}	0,8	mA
		I_{az} (U_{g1} = −14 V)			AF push-pull power amplifier,						
			<7	mA	class AB				Capacitances		
					U_a	300		V	$C_{a/g1}$	<1,4	pF
		U_d	15	V	U_{g2}	300		V	$C_{dI/k}$	1,8	pF
		I_d	>3	mA	R_k	130		Ω	$C_{dII/k}$	2,0	pF
					R_a	9		kΩ	$C_{g1/dI}$	<0,1	pF
Twin diode-AF power					$U_{g1\,ef}$	0	7	V	$C_{g1/dII}$	<0,05	pF
pentode					I_a	2×30	2×36	mA	$C_{a/dI}$	<0,06	pF
Demodulator,					I_{g2}	2×3,8	2×6,5	mA	$C_{a/dII}$	<0,02	pF
AVC source,					P_o	0	13,2	W	$C_{dI/dII}$	<0,15	pF
AF power amplifier					k	0	1,8	%			

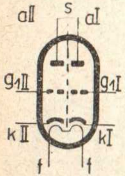
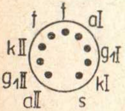
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EC86 VHF high-slope triode Pre-stage and self-excited mixer for frequencies up to 800 Mc/s	Size N 2  	U_f 6,3 V I_f 0,18 A Indirect heating ● U_a 175 V U_{g1} −1,5 V I_a 12 mA S 14 mA/V μ 70 I_{az} (U_{g1} = −4 V) <0,15 mA	**RF amplifier, grounded grid** U_a 175 V R_k 125 Ω I_a 12 mA S 14 mA/V R_{ekv} 250 Ω **Self-excited mixer** U_b 220 V R_a 1) 5,6 kΩ R_{g1} 50 kΩ I_a 12 mA I_{g1} 50 μA --- 1) R_a shunted with capacitor C_a	U_{ao} 500 V U_a 220 V W_a 2,2 W I_k 20 mA $-U_{g1}$ 50 V R_{g1} 1 MΩ $U_{+k/f-}$ 130 V $U_{k/f\ ef}$ 50 V $R_{k/f}$ 20 kΩ **Capacitances** $C_{a/g1}$ 2 pF $C_{g1/k}$ 3,6 pF $C_{a/k}$ 0,2 pF $C_{g1/f}$ <0,35 pF $C_{k/f+g1}$ 6,6 pF $C_{g1/k+f}$ 3,9 pF $C_{a/k+f}$ 0,3 pF $C_{a/g1+f}$ 2,1 pF

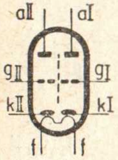
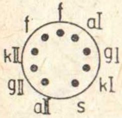
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
ECC82 Twin triode AF resistance-coupled amplifier, phase invertor, multivibrator	Size NA 50  	U_f 6,3/12,6 V I_f 0,3/0,15 A I_f 0,3 A U_f 6,3 V t_f <19 s indirect heating ● U_a 260 V R_k 800 Ω I_a 10,5 mA S 2,2 mA μ 17 D 5,9 % R_i 7,7 kΩ I_{az} (U_{g1} = −25 V) $<0,2$ mA	**AF resistance-coupled amplifier** Both sections in cascade connection) U_b 250 350 V R_a 200 200 kΩ I_{aI+aII} 1,82 2,64 mA R_k 2 2 kΩ $U_{g1\,ef}$ 0,083 0,14 V $U_{a\,ef}$ 15 25 V V 180 180 k 2 2 % **Directly coupled phase invertor** U_b 250 350 V I_{aI} 0,75 1,05 mA I_{aII} 0,65 0,9 mA $U_{g1\,ef}$ 1,36 2,2 V $U_{a\,ef}$ 15 24 V V 11 11 k 1 1 % C_{g_1I/g_1II} $<0,008$ pF $C_{g_1I/aII}$ $<0,03$ pF $C_{g_1II/aI}$ $<0,03$ pF	U_{ao} 550 V U_a 300 V W_a 2,75 W R_{g1} 1 MΩ R_{g1} 1) 0,25 MΩ I_k 20 mA $I_{k\,sp}$ 2) 100 mA $U_{k/f}$ ±180 V $U_{k/f}$ 4) 315 V $R_{k/f}$ 20 kΩ $R_{k/f}$ 3) 150 kΩ $-U_{g1}$ 100 V $-U_{g1\,sp}$ 180 V 1) Fixed bias 2) 4% of a cycle, max 0,8 ms 3) As phase invertor 4) During the heating up period **Capacitances** $C_{g/k+f}$ 1,8 pF $C_{aI/kI+f}$ 0,5 pF $C_{aII/kII+f}$ 0,37 pF $C_{a/g1}$ $<1,9$ pF $C_{g1/f}$ $<0,17$ pF $C_{aI/aII}$ $<0,3$ pF

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
ECC83 Twin triode AF resistance-coupled amplifier, phase invertor	Size NA 50   	U_f 6,3/12,6 V I_f 0,3/0,15 A I_f 0,3 A U_f 6,3 V t_f 16 s Indirect heating ● U_a 250 V R_k 1600 Ω I_a 1,2 mA S 1,6 mA/V μ 100 R_i 62,5 kΩ I_{az} (U_{g1} = −8 V) <0,1 mA	**AF resistance-coupled amplifier** U_b 300 300 300 V R_a 500 250 100 kΩ R_{g1} 1 1 1 MΩ R_{g1} 1) 1 0,5 0,25 MΩ R_k 3,5 1,8 0,9 kΩ V 70 65 54 **Phase invertor** U_b 250 250 V $I_{aI}+I_{aII}$ 1 1,1 mA R_{aI} 100 200 kΩ R_{aII} 100 200 kΩ R_k 70 1 kΩ $U_{g1\,ef}$ 0,8 0,6 V $U_{a\,ef}$ 20 35 V V 25 58 k 1,8 5,5 %	U_{ao} 550 V U_a 300 V W_a 1 W I_k 8 mA $R_{1\,(k)}$ 2,2 MΩ R_{g1} 1) 22 MΩ $-U_{g1}$ −50 V $U_{k/f}$ ±180 V $R_{k/f}$ 20 kΩ $R_{k/f}$ 2) 120 kΩ T_b 150 °C 1) U_{g1} produced by R_{g1} 2) Employed as a phase invertor **Capacitances** $C_{I/kI+f}$ 0,45 pF $C_{II/kII+f}$ 0,3 pF $C_{1/k+f}$ 1,6 pF $C_{a/}$ 1,7 pF $C_{I/cII}$ <0,3 pF $C_{I/\,II}$ <0,025 pF $C_{II/\,1I}$ <0,025 pF $C_{g1I/g1II}$ <0.01 pF $C_{1/f}$ <0,15 pF

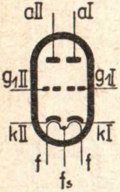
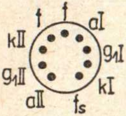
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
ECC84 Twin triode VHF cascade amplifier	Size N 2  	U_f 6,3 V I_f 0,33 A t_f 15 s Indirect heating ● U_a 90 V U_{g1} −1,5 V I_a 12 mA S 6 mA/V μ 24 R_i 4 kΩ I_{az} (U_{g1} = −9 V) <0,2 mA	**VHF cascade amplifier:** Section I: grounded cathode Section II: grounded grid Section I: f = 200 Mc/s Z_{g1} 4 kΩ f = 100 Mc/s Z_{g1} 16 kΩ f = 50 Mc/s Z_{g1} 64 kΩ F = 6,5 **Capacitances:** $C_{gI/k+f}$ 2,3 pF C_{kII+f} 2,5 pF $C_{aI/k+f}$ 0,5 pF $C_{kII/aII}$ 0,17 pF $C_{gI/aI}$ 1,1 pF $C_{aII/gII}$ 2,3 pF $C_{gI/f}$ 0,25 pF $C_{aII/gII+f}$ 2,5 pF $C_{kII/gII+f}$ 4,5 pF $C_{gI/aII}$ 0,06 pF	**Section I and II:** U_{ao} 550 V U_a 180 V W_a 2 W W_{aI+aII} 3,5 W I_k 18 mA $R_{k/f}$ 20 kΩ **Section I:** R_{g1I} 0,5 MΩ $U_{f/kI\ sp}$ 100 V **Section II:** R_{g1II} 1) 20 kΩ R_{g1II} 2) 100 kΩ $U_{+k/f-}$ 3) 250 V $U_{-k/f+}$ 100 V 1) $R_k \geqq 100\ \Omega$ 2) U_{g1} derived from a voltage divider connected between $+U_b$ and 0. 3) D. C. component max 180 V.

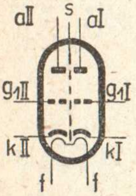
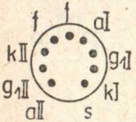
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
ECC85 Twin triode VHF cascade amplifier, mixer	Size N 2  	U_f 6,3 V I_f 0,38 A Indirect heating ● U_a 250 V R_k 230 Ω I_a 10 mA S 5,9 mA/V μ 57 D 1,75 % R_i 9,7 kΩ I_{az} (U_{g1} = −15 V) <0,1 mA	**HF and VHF amplifier** U_b 250 V S 6 mA/V R_a [1]) 1,8 kΩ R_i 9,7 kΩ U_a 230 V R_k 200 Ω I_a 10 mA Z_{g1} (f=100 Mc/s) 6 kΩ R_{ekv} 500 Ω 1) Shunted with capacitor 1000 pF **Self-excited mixer** U_b 250 V R_i 22 kΩ R_a 12 kΩ $U_{osc\ ef}$ 3 V U_a 187 V S_c 2,3 mA/V R_{g1} 1 MΩ S_{mf} 2,8 mA/V I_a 5,2 mA Z_{g1} (f=100 Mc/s) 15 kΩ Only for information	U_{ao} 550 V U_a 300 V W_a 2,5 W W_{aI+aII} 4,5 W I_k 15 mA $-U_{g1}$ 100 V R_{g1} 1 MΩ $U_{k/f}$ 90 V $R_{k/f}$ 20 kΩ **Capacitances** $C_{a/g}$ 1,5 pF $C_{g/k+f+s}$ 3 pF $C_{a/k}$ 0,18 pF $C_{a/k+f+s}$ 1,2 pF $C_{aI/aII}$ <0,04 pF $C_{aI/kII}$ <0,008 pF $C_{g1I/gII}$ <0,003 pF $C_{aI/gII}$ <0,008 pF $C_{aII/gI}$ <0,008 pF $C_{aII/kI}$ <0,008 pF $C_{g1I/kII}$ <0,003 pF $C_{gII/kI}$ <0,003 pF

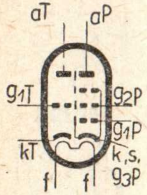
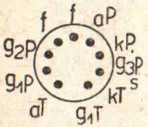
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
ECC88 Twin triode with separate cathodes VHF cascade amplifier	Size NA 50   	U_f 6,3 V I_f 0,335 A Indirect heating ● U_a 90 V R_k 87 Ω I_a 15 mA S 12,5 mA/V μ 33 R_i 2,6 kΩ I_{az} (U_{g1} = −8 V) <35 µA R_{ekv} <600 Ω	Section I: grounded cathode Section II: grounded grid Section II must be provided with fixed bias derived from a voltage divider; for section I the bias can be produced by I_{g1} on a grid leak resistor, but the anode voltage of section I must not exceed 75 V under no-signal conditions. 1) Without screening	U_{ao} 550 V U_a 130 V W_a 1,8 W I_k 25 mA $-U_{g1}$ 50 V W_{g1} 0,03 W R_{g1} 1 MΩ $U_{kI/f}$ 50 V $R_{k/f}$ 20 kΩ **Section II:** $U_{+kII/f-ef}$ 150 V $U_{+k/f-ss}$ 130 V **Capacitances** 1) $C_{aI+kI+f+s}$ 1,8 pF $C_{gI+kI+f+s}$ 3,3 pF $C_{aI/gI}$ 1,4 pF $C_{I/f}$ <0,16 pF $C_{aII/gII+f+s}$ 2,8 pF $C_{kII/gII+f+s}$ 6 pF $C_{aII/gII}$ <1,8 pF $C_{aII/kII}$ 0,18 pF $C_{kII/f}$ <3,5 pF $C_{aI/aII}$ <0,045 pF $C_{gI/aII}$ <0,005 pF

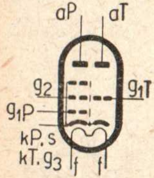
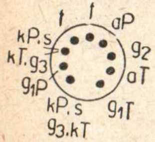
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
ECC189 Variable-mu twin triode with separate cathodes VHF cascade amplifier in TV receivers	 	U_f 6,3 V I_f 0,34 A Indirect heating ● U_a 90 V R_k 93,5 Ω I_a 15 mA S 12,5 mA/V R_i 2,5 kΩ U_{g1z} (S=625 µA/V) −5 V U_{g1z} (S=125 µA/V) −9 V	Section I: grounded cathode Section II: grounded grid **Capacitances** (without external screening) $C_{gI/kI+f+s}$ 3,5 pF $C_{aI/kI+f+s}$ 1,7 pF $C_{aI/gI}$ 1,9 pF $C_{gI/f}$ <0,28 pF $C_{kII/gII+f+s}$ 6 pF $C_{aII/gII+f+s}$ 3,4 pF $C_{gII/aII}$ 1,9 pF $C_{kII/f}$ 3 pF $C_{aII/kII}$ 0,18 pF $C_{aI/aII}$ <0,045 pF $C_{gI/aII}$ <0,004 pF	U_{ao} 550 V U_a 130 V W_a 1,8 W I_k 22 mA $-U_{g1}$ 50 V $R_{g1\ I}$ 1 MΩ $R_{g1\ II}$ 0,5 MΩ $U_{kI/f}$ ± 50 V $U_{+kII/f}$ 150 V $U_{-kII/f}$ 50 V $R_{k/f}$ 20 kΩ

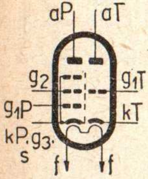
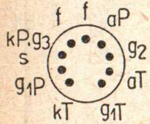
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
ECC802S Twin triode AF resistance-coupled amplifier, phase invertor, multivibrator	Size N 2 	U_f 6,3/12,6 V I_f 0,3/0,15 A Indirect heating ● U_a 250 V R_k 800 Ω I_a 10,6±1.9 mA S 2,2+0,5 −0,4 mA/V μ 17 R_i 7,7 kΩ I_{az} (U_{g1} = −20 V) <0,4 mA $-I_{g1}$ <0,4 μA	Reliability Vibration and shock proofed Exacting tolerances Long life	U_{ao} 550 V U_a 300 V W_a 2,75 W I_k 15 mA $I_{k\,sp}$ 1) 200 mA $-U_{g1}$ 100 V R_{g1} 1 MΩ R_{g1} 2) 0,25 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ $R_{k/f}$ 3) 150 kΩ T_b 170 °C U_f 6,3 ± 5 % V U_f 12,6 ± 5 % V 1) Max 10% of a cycle, max 2 ms. 2) Fixed bias 3) As phase invertor **Capacitances** C_{g1} 1,8 ± 0,3 pF C_{aI} 0,37 ± 0,1 pF C_{aII} 0,25 ± 0,1 pF $C_{a/g1}$ 1,95 ± 0,3 pF $C_{a/f}$ <0,23 pF

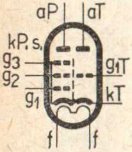
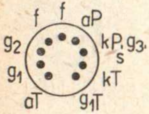
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
ECC803S Twin triode AF resistance-coupled amplifier, phase invertor	Size N 2  	U_f 6,3/12,6 V I_f 0,3/0,15 A Indirect heating ● U_a 250 V U_{g1} −2 V I_a 1,25±0,5 mA S 1,6+0,45 −0,35 mA/V μ 95±20 R_i 59 kΩ I_{az} (U_{g1} = −8 V) <0,07 mA $-I_{g1}$ <0,4 μA	Reliability Vibration and shock proofed Exacting tolerances Long life	U_{ao} 550 V U_a 300 V W_a 1 W I_k 8 mA $-U_{g1}$ 50 V R_{g1} 2,2 MΩ R_{g1} 1) 22 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ $R_{k/f}$ 2) 150 kΩ T_b 170 °C 1) U_{g1} produced by R_{g1} 2) Employed as a phase invertor **Capacitances** C_g 2,0 ± 0,4 pF C_{aI} 0,4 + 0,2 pF −0,1 pF C_{aII} 0,3 + 0,2 pF −0,1 pF $C_{aI/gI}$ 2,0 ± 0,4 pF $C_{aII/gII}$ 2,0 ± 0,4 pF $C_{g/f}$ <0,15 pF $C_{aI/aII}$ <1 pF

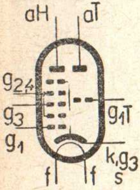
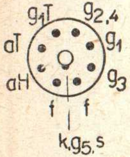
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
E88CC Twin triode with separate cathodes VHF cathode amplifier	Size N 2  	U_f 6,3 V±5 % I_f 0,3 A Indirect heating ● U_{ba} 100 V U_{g1} +9 V R_k 680 Ω I_a 15±0,8 mA S 12,5+2,5 −2 mA/V μ 33±5 R_{ekv} <500 Ω F 4,6 dB $-U_{g1z}$ (I_a=0,1 mA) 6,5 V $-I_{g1}$ <0,1 μA	**Capacitances** $C_{aI/kI+f+s}$ 1,75 ± 0,2 pF $C_{aI/kI+f}$ 0,5 ± 0,1 pF $C_{aII/kII+f+s}$ 1,65 ± 0,2 pF $C_{aII/kII+f}$ 0,4 ± 0,1 pF $C_{g/k+f+s}$ 3,1 ± 0,6 pF $C_{g/a}$ 1,4 ± 0,2 pF $C_{g/k+f}$ 3,1 ± 0,6 pF $C_{a/k}$ 0,18 ± 0,04 pF $C_{aI/aII}$ <0,045 pF $C_{gI/gII}$ <0,005 pF Reliability Vibration and shock proofed Exacting tolerances Long life	U_{ao} 550 V U_a (I_a = 0) 400 V U_a 220 V U_a ($W_a \leqq 0{,}8$ W) 250 V W_a 1,5 W W_a ($W_{aI+aII} \leqq 2$ W) 1,8 W $-U_{g1}$ −100 V $-U_{g1\,sp}$ 2) −200 V W_{g1} 0,03 W I_k 20 mA $I_{k\,sp}$ 2) 100 mA R_{g1} 1 MΩ $U_{+k/f-}$ 120 V $U_{-k/f+}$ 60 V $R_{k/f}$ 20 kΩ T_b 170 °C 2) Pulse duration max 10% of a cycle, max 0,2 ms.

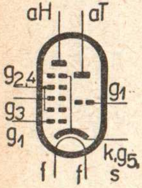
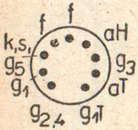
Type	Dimensions	Heating	Operational Data	Maximum Ratings
Application	Base	Static data		
ECF82 Triode-pentode Oscillator- mixer for TV receivers	Size N 2  	U_f 6,3 V I_f 0,45 A Indirect heating ● U_a 250 V U_{g2} 110 V U_{g1} −0,9 V I_a 10 mA I_{g2} 3,5 mA S 5,2 mA/V R_i 0,4 MΩ $\mu_{g2/g1}$ 35 I_{az} ($U_{g1} = -10$ V) <0,15 mA **Triode** U_a 150 V U_{g1} −1 V I_a 18 mA S 8,5 mA/V μ 40 R_i 4,7 kΩ I_{az} ($U_{g1} = -10$ V) <0,35 mA	**Pentode as mixer** $U_a = U_b$ 170 200 250 V R_{g2} 30 45 70 kΩ R_{g1} 1 1 1 MΩ U_{g1} 0 0 0 V $U_{osc\ ef}$ 3 3 3 V I_a 4,7 4,9 5,2 mA I_{g2} 2 1,9 1,9 mA I_{g1} 3,7 3,7 3,7 μA S_c 1,65 1,8 1,9 mA/V Z_{g1}(f=100 Mc/s) 10 10 10 kΩ **Triode as oscillator** U_b 170 200 250 V R_a 20 20 20 kΩ R_{g1} 20 20 20 kΩ $U_{osc\ ef}$ 3 3 3 V I_a 3,3 4,1 5,7 mA I_{g1} 160 160 160 μA S_{ef} 2,8 3,2 4 mA/V **Capacitances** Pentode Triode C_{g1} 5 pF C_{g1} 2,5 pF C_a 2,6 pF C_a 0,4 pF $C_{a/g1}$ 0,01 pF $C_{a/g1}$ 1,8 pF $C_{f/k}$ 2,6 pF $C_{f/k}$ 2,5 pF $C_{aP/aT}$ 0,07 pF	**Pentode** U_{ao} 550 V U_a 300 V W_a 2,8 W U_{g2o} 550 V U_{g2} 300 V W_{g2} 0,5 W I_k 20 mA R_{g1} 1 MΩ $U_{+k/f-}$ 220 V $U_{-k/f+}$ 90 V $R_{k/f}$ 20 kΩ **Triode** U_{ao} 550 V U_a 300 V W_a 2,7 W I_k 20 mA R_{g1} 1 MΩ $U_{+k/f-}$ 220 V $U_{-k/f+}$ 90 V $R_{k/f}$ 20 kΩ

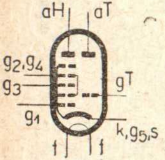
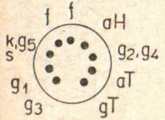
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
ECF801 **ECF803** Triode-pentode Oscillator - UHF mixer, I. IF amplifier in TV set for IV. and V. TV band	Size NA 34  **ECF801** 	U_f 6,3 V I_f 0,38 A Indirect heating ● **Pentode** U_a 170 V U_{g2} 120 V R_k 110 Ω I_a 10 mA I_{g2} 3 mA S 11 mA/V μ_{g2}/g_1 55 R_i >350 kΩ R_{ekv} 1,5 kΩ R_{vst} (f = 50 Mc/s) 10 kΩ --- U_a 200 V U_{g2} 200 V U_{g1} −12 V S 0,11 mA/V	**Pentode as mixer** U_b 200 200 V R_a 2,7 4,7 kΩ R_{g2} 27 27 kΩ R_{g1} 0,1 1 MΩ U_{bg1} −1,4 0 V I_a 10 9,3 mA I_{g2} 3 2,9 mA $U_{osc\ ef}$ 1,6 1,6 V S_c 5 4,7 mA/V I_{g1} 8 2,3 µA **Pentode as IF amplifier** U_b 200 200 V R_a 2,7 4,7 kΩ R_{g2} 27 27 kΩ R_{g1} 0,1 1 MΩ U_{bg1} −1,4 0 V I_a 10 13 mA I_{g2} 3 3,9 mA S 11 14,5 mA/V S (−12 V) : S (−1,4 V) 1 : 1000	**Pentode** U_{ao} 550 V U_a 250 V W_a 2 W U_{g2o} 550 V U_{bg2} 250 V U_{g2} 250 V W_{g2} ($-U_{g1}$ <1,5 V) 0,45 W W_{g2} ($-U_{g1}-1,5$ <2 V) 0,4 W W_{g2} ($-U_{g1}$ >2 V) 0,3 W I_k 18 mA R_{g1} (p) 1 MΩ R_{g1} (k) 2,2 MΩ $-U_{g1}$ 50 V $U_{k/f}$ 100 V $U_{k/f\ ef}$ 50 V

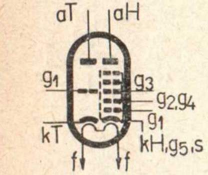
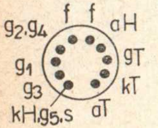
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
ECF801 **ECF803**	 **ECF803** 	**Triode** U_a 100 V R_k 200 Ω I_a 15 mA S 9 mA/V µ 20 I_{az} (U_{g1} = -10 V) <0,1 mA	**Triode as oscillator** U_b 200 200 V R_a 8,2 12 kΩ R_{g1} 10 10 kΩ I_a 16 12 mA $U_{osc\ ef}$ 4,5 3,3 V S_{ef} 3,7 3,7 mA/V **Capacitances** Pentode Triode C_{g1} 6,2 pF C_{g1} 3,3 pF C_a 3,7 pF C_a 1,7 pF $C_{a/g1}$ 9<12 mpF $C_{a/g1}$ 1,8 pF $C_{g1/g2}$ 1,6 pF **Between sections** $C_{aP/aT}$ <0,025 pF $C_{aP/g1T}$ <0,01 pF $C_{g1P/aT}$ <0,01 pF $C_{g1P/g1T}$ <0,01 pF	**Triode** U_{ao} 550 V U_a 125 V W_a 1,5 W I_k 20 mA R_{g1} 500 kΩ $-U_{g1}$ 50 V $U_{k/f}$ 100 V $U_{k/f\ ef}$ 50 V

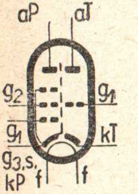
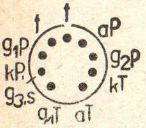
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
ECF802 Triode-pentode Triode as reactance tube, pentode as sine -oscillator, puls-shaper	Size NA 40  	U_f 6,3 V I_f 0,43 A Indirect heating ● **Triode** U_a 200 V I_a 3,5 mA R_k 570 Ω S 3,5 mA/V μ 70 R_i 20 kΩ I_{az} ($U_{g1} = -9$ V) $<$0,05 mA **Pentode** U_a 100 V U_{g2} 100 V R_k 130 Ω I_a 6 mA I_{g2} 1,7 mA S 5,5 mA/V $\mu g_2/g_1$ 47 R_i 400 kΩ I_{az} ($U_{g1} = -4$ V) $<$0,27 mA	Pentode U_a 100 200 V U_{g2} 100 200 V U_{g1} 0 −1 −16 V I_a 12,5 6 $<$0,01 mA I_{g2} 3,5 1,7 — mA Triode I_a (I_{g1} = 10 μA) 10 mA **Capacitances** Pentode: C_{g1} 5,4 pF; $C_{a/g1}$ 0,06 pF; $C_{g1/f}$ $\leqq$0,1 pF Triode: C_{g1} 2,4 pF; $C_{a/g1}$ 1,5 pF; $C_{g1/f}$ $\leqq$0,1 pF To avoid hum interference the A. C. component of $U_{k/f}$ should not exceed 65 V at the specified value of Z_{g1}.	**Triode** U_{ao} 550 V U_a 250 V W_a 1,4 W I_k 10 mA R_{g1} (p) 3 MΩ $U_{k/f}$ 100 V Z_{g1} (50 Hz) 50 kΩ **Pentode:** U_{ao} 550 V U_a 250 V W_a 1,2 W $U_{g2\,o}$ 550 V U_{g2} 250 V W_{g2} 0,8 W I_k 15 mA $I_{k\,sp}$ 1) 50 mA R_{g1} (p) 0,56 MΩ R_{g1} (k) 1 MΩ $U_{k/f}$ 100 V Z_{g1} (50 Hz) 300 kΩ 1) Max. 30 μs, duty cycle max 30%

Type Application	Dimensions Base	Heating Static data	Operational Data		Maximum Ratings
ECH21 Triode-Heptode Mixer, Oscillator, RF, IF, AF amplifier, phase invertor	Size L 1  	U_f 6,3 V I_f 0,34 A t_f 15 s Indirect heating ◍ Heptode U_a 250 V $U_{g2}+_{g4}$ 100 V U_{g3} 0 V U_{g1} −2,65 V I_a 5,3 mA I_{g2} 3,5 mA S 2,15 mA/V $\mu_{g2}+_{q4}/_{g1}$ 20 R_i 900 kΩ Triode U_a 100 V U_{g1} −2,5 V I_a 5 mA S 2,1 mA/V µ 19 I_{az} (U_{g1} = −7 V) <1,9 mA	Heptode: Mixer U_b 250 V R_{g2+g4} 24 kΩ R_k 150 Ω R_{g3+gT} 50 kΩ I_{g3+gT} 190 µA U_{g1} $\overbrace{-2\ -24{,}5}$ V I_{g2+g4} 100 250 V I_a 3 – mA I_{g2+g4} 6,2 – mA S_c 780 7,8 µA R_i 1,4 >3 MΩ Triode: Oscillator: U_b 250 V R_a 20 kΩ R_{gT+g3} 50 kΩ I_a 4,5 mA S_{ef} 0,55 mA/V I_{gT+g3} 190 µA (g_T connected to g_{3H})	IF amplifier U_b 250 V U_{g3} 0 V R_{g2+g4} 45 kΩ U_{g1} $\overbrace{-2\ -44}$ V U_{g2+g4} 90 250 V I_a 5,3 – mA I_{g2+g4} 3,5 – mA S 2200 2,2 µA $\mu_{g2/g1}$ 18 – R_i 0,9 >10 MΩ (g_3 spoj s k) AF resistance-coupled amplifier: U_b 250 V R_a 0,2 MΩ U_{g1} −2 −4 V I_a 1 0,9 mA $U_{o\ ef}$ 7,5 7,5 V V 13 12 k 2,5 2 %	Heptode U_{ao} 550 V U_a 300 V W_a 1,5 W U_{g2+g4o} 550 V U_{g2+g4} (I_a=3 mA) 100 V U_{g2+g4} (I_a <1 mA) 300 V W_{g2+g4} 1 W I_k 15 mA R_{g1} 3 MΩ R_{g3} 3 MΩ $U_{k/f}$ 50 V $R_{k/f}$ 20 kΩ Triode U_{ao} 550 V U_a 175 V W_a 0,5 W R_{g1} 3 MΩ

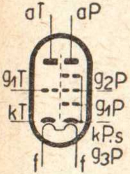
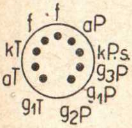
Type Application	Base Dimensions	Heating Static data	Operational Data		Maximum Ratings
ECH81 Triode-Heptode Heptode: Mixer, RF, IF, AF amplifier Triode: Oscillator, self-excited mixer, AF amplifier	Size N 4  	U_f 6,3 V I_f 0,3 A I_f 0,3 A U_f 6,3 V Indirect heating ● **Heptode** U_a 250 V U_{g2+g4} 100 V U_{g1} −2 V I_a 6,5 mA I_{g2} 3,8 mA S 2,4 mA/V $\mu_{g2+g4/g1}$ 20 R_i 0,7 MΩ **Triode** U_a 100 V U_{g1} 0 V I_a 13,5 mA S 3,7 mA/V μ 22 R_i 6 kΩ	**Heptode: Mixer** g_3 conn. to g_{1T} $U_b=U_a$ 250 V R_{g2+g4} 24 kΩ R_{g3+g1T} 47 kΩ I_{g3+g1T} 200 μA U_{g1} −2 −28,5 V I_a 3,2 – mA I_{g2+g4} 6 – mA S_c 775 7,75 μA/V R_i 1 >3 MΩ R_{ekv} 70 – kΩ **Triode: Oscillator** U_b 250 V R_a 33 kΩ R_{g1} 47 kΩ I_{g1} 200 μA I_a 4,5 mA S_{ef} 0,65 mA/V **Capacitances** C_{g1H} 4,8 pF C_{g3H} 6 pF $C_{g1H/aH}$ <0,0065 pF	**RF, IF amplifier** g_3 conn. to k $U_b=U_a$ 250 V R_{g2+g4} 39 kΩ U_{g1} −2 −42 V I_a 6,5 – mA I_{g2+g4} 3,75 – mA S 2400 24 μA/V R_i 0,7 10 MΩ R_{ekv} 8,5 – kΩ Z_{g1} (f=100 Mc/s) 1,6 kΩ **AF Amplifier** U_b 250 V R_a 200 kΩ U_{g1} −2 −4 V I_a 2 1 mA V 12,5 11,1 U_{g1ef} 0,95 2,7 V k 3,5 6 % C_{g1T} 2,6 pF C_{aT} 1,8 pF C_{aTg1T} 1 pF	**Heptode** U_{ao} 550 V U_a 330 V W_a 1,7 W U_{g2+g4o} 550 V U_{g2+g4} 125 V U_{g2+g4} (I_{aH} <1 mA) 300 V W_{g2+g4} 1 W I_k 12,5 mA R_{g1} 3 MΩ R_{g3} 3 MΩ $R_{k/f}$ 20 kΩ $U_{k/f}$ 100 V **Triode:** U_{ao} 550 V U_a 250 V W_a 0,8 W I_k 6,5 mA R_{g1} 3 MΩ R_{g1} 1) 50 kΩ I_{g1} 1 mA 1) Optimum value, triode employed as oscillator

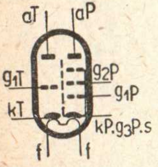
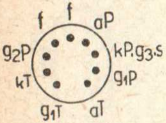
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
ECH84 Triode-heptode: sinewave oscillator- pulse separators in TV-receivers	Size NA 50  	U_f 6,3 V I_f 0,3 A Indirect heating ● **Triode** U_a 50 V U_{g1} 0 V I_a 3 mA S 3,7 mA/V µ 50 I_{az} (U_a = 200 V, U_{g1} = −11 V) <0,1 mA **Heptode** U_a 135 V U_{g2+g4} 14 V U_{g3} 0 V U_{g1} 0 V I_a 1,7 mA I_{g2+g4} 0,9 mA S_{g1} 2,2 mA/V U_{g1z} (I_a = 20 µA U_{g3} = 0 V) −1,9 V	**Capacitances:** (without external screen) **Triode:** C_g 3 pF $C_{g/a}$ 1,1 pF **Heptode:** $C_{g1H/aH}$ <0,009 pF $C_{g3/k}$ 0,5 pF **Between sections:** $C_{aH/aT}$ <0,25 pF $C_{g1H/gT}$ <0,1 pF $C_{aH/gT}$ <0,09 pF $C_{aT/g3H}$ <0,13 pF $C_{aT/g1H}$ <0,08 pF U_{g3z} (I_a = 20 µA U_{g1} = 0 V) −2,0 V	**Heptode** U_{ao} 550 V U_a 250 V W_a 1,7 W U_{g2+g4o} 550 V U_{g2+g4} 250 V U_{g2+g4} >10 V W_{g2+g4} 0,8 W $-U_{g1\ sp}$ 150 V $-U_{g3\ sp}$ 150 V I_k 12,5 mA R_{g1} 3 MΩ R_{g3} 3 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ **Triode** U_{ao} 550 V U_a 250 V W_a 1,3 W I_k 10 mA R_g 3 MΩ $-U_{g\ sp}$ 200 V

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
ECH200 Triode-heptode pulse separators and amplifier in TV receivers	Size De 1  	U_f 6,3 V I_f 0,435 V Indirect heating ◍ U_a 14 V U_{g3} 0 V U_{g2+g4} 14 V U_{g1} 0 V I_a 1,5 mA I_{g2+g4} 1,3 mA U_a 14 V U_{g2+g4} 14 V $+I_{g1}$ 100 µA $+I_{g3}$ 1 µA I_a 750 µA Triode: U_a 100 V R_k 110 V I_a 9 mA S 8,8 mA/V µ 50 I_{az} (U_a = 200 V, U_{g1} = 11 V) <100 µA	**Capacitances:** (without external screening) **Heptode** **Triode** C_{g1} 4,4 pF C_{g1} 3,3 pF C_a 5,4 pF C_a 1,7 pF $C_{a/g1}$ <0,1 pF $C_{a/g1}$ 1,8 pF $C_{a/g3}$ <0,25 pF $C_{g1/g3}$ 0,3 pF **Between sections** $C_{g1H/g1T}$ <0,005 pF $C_{g3H/aT}$ <0,02 pF $C_{g1H/aT}$ <0,01 pF $C_{aH/aT}$ <0,15 pF **Static data of heptode** U_a 14 V U_a 14 V U_{g3} 0 V U_{g2+g4} 14 V U_{g2+g4} 14 V U_{g3} +25 V U_{g1} −2,4 V U_{g1} −2,7 V I_{az} <20 µA I_{az} <20 µA U_a 14 V U_a 14 V U_{g2+g4} 14 V U_{g2+g4} 14 V U_{g3} −2,2 V I_{az} <20 µA U_{g1} 0 V I_{g1} +100 µA I_{az} <20 µA $-U_{g3}$ <2,3 V	**Heptode** U_{ao} 550 V U_a 100 V W_a 0,5 W U_{g2+g4o} 550 V U_{g2+g4} 50 V U_{g2+g4} >6 V W_{g2+g4} 0,5 V I_k 8 mA $-U_{g1\,sp}$ 100 V $-U_{g3\,sp}$ 150 V R_{g1} 3 MΩ R_{g3} 3 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ **Triode:** U_{ao} 550 V U_a 250 V W_a 1,5 W I_k 20 mA $-U_{g1\,sp}$ 200 V $R_{g1}\ (p)$ 2 MΩ $R_{g1}\ (k)$ 3 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ

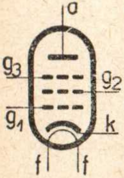
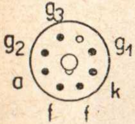
Type	Dimensions	Heating			Operational Data					Maximum Ratings		
Application	Base	Static data										
ECL82	Size N 5	U_f	6,3	V	Pentode: AF power amplifier class A:					Pentode		
		I_f	0,78	A	U_a	170	200	200	V	U_{ao}	900	V
		Indirect heating			U_{g2}	170	170	200	V	U_a	600	V
		●			U_{g1}	−11,5	−12,5	−16	V	$+U_{a\,sp}$ 1)	2500	V
		Pentode			I_a	41	35	35	mA	$-U_{a\,sp}$	500	V
		U_a	200	V	I_{g2}	8	6,5	7	mA	W_a (U_a >250 V)		
		U_{g2}	200	V	R_a	3,9	5,6	5,6	kΩ		5	W
		U_{g1}	−16	V	$U_{g1\,ef}$	6	5,8	6,6	V	W_a (U_a <250 V)		
		I_a	35	mA	P_o	3,3	3,4	3,5	W		7	W
		I_{g2}	7	mA	k	10	10	10	%	U_{g2o}	550	V
		S	6,4	mA/V						U_{g2}	300	V
					AF push-pull amplifier, class AB:							
		$\mu_{g2/g1}$	9,5							W_{g2o}	1,8	W
					U_a		170	200	V			
		R_i	20	kΩ						W_{g2}	3,2	W
					U_{g2}		170	200	V			
		Triode								I_k	50	mA
					R_k		135	165	Ω			
		U_a	100	V						R_{g1} 2)	1	MΩ
					I_{ao}		2×33	2×35	mA			
		U_{g1}	0	V						R_{g1} 3)	2	MΩ
					I_a		2×37	2×38	mA			
		I_a	3,5	mA						$U_{k/f}$	100	V
					I_{g2o}		2×6,2	2×6,5	mA			
		S	2,5	mA/V						$R_{k/f}$	20	kΩ
Triode-pentode					I_{g2}		2×15	2×16,5	mA			
		μ	70									
Pentode:					$R_{a\text{-}a'}$		5	5	kΩ			
AF power amplifier,					$U_{g1\,ef}$		9	10,9	V			
vertical amplifier					P_o		7	9	W			
output stage					k		4	4,8	%			
Triode:												
AF amplifier, multivibrator												

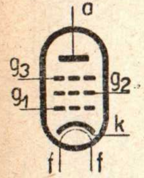
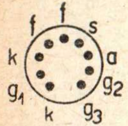
<table>
<tr><th>Type
Application</th><th>Dimensions
Base</th><th>Heating
Static data</th><th>Operational Data</th><th>Maximum Ratings</th></tr>
<tr><td>ECL82</td><td></td><td>Capacitances
Pentode
C_{g1} 9,3 pF
C_a 8 pF
$C_{a/g1}$ $<0,3$ pF
Triode
C_{g1} 3 pF
C_a 4,3 pF
$C_{a/g1}$ 4,5 pF
Between sections
$C_{gT/aP}$ $<0,02$ pF</td><td>Vertical amplifier output stage:
It must be ensured that under full signal conditions $I_{a\,sp} = 85$ mA at $U_a = 50$ V and $U_{g2} = 170$ V.
Anode current of an average new tube:
$I_{a\,sp} = 135$ mA at $U_a = 50$ V,
$U_{g2} = 170$ V.
U_{g1} to be set to $I_{g1} = +0,3$ µA
Triode: AF resistance-coupled amplifier:
U_b 170 200 170 200 V
R_a 220 220 220 220 kΩ
R_{g1} 3 3 22 22 MΩ
R_{g1}' 700 700 700 700 kΩ
R_k 2700 2200 0 0 Ω
I_a 0,43 0,52 0,5 0,61 mA
$U_{a\,ef}$ 25 26 20 25 V
V 51 52 53 55
k 2,3 1,6 1,4 1,4 %</td><td>Triode
U_{ao} 550 V
U_a 300 V
$U_{a\,sp}$ 1) 600 V
W_a 1 W
I_k 15 mA
$I_{k\,sp}$ 1) 250 mA
R_{g1} 2) 1 MΩ
R_{g1} 3) 3 MΩ
R_{g1} 4) 22 MΩ
Z_{g1} (50 c/s) 0,5 MΩ
$U_{k/f}$ 100 V
$R_{k/f}$ 20 kΩ
1) Max 4% of a cycle, max 0,8 ms.
2) U_{g1} fixed
3) U_{g1} automatic
4) U_{g1} produced by I_{g1}</td></tr>
<tr><td></td><td></td><td colspan="3">Oscillator:
It must be ensured that $I_{k\,sp}$ does not exceed 100 mA. Thus permissible tolerances and the emission loss during the service life of the tube will be accounted for. It is recommended to insert unshunted resistors into the grid and anode circuits to limit the search currents.</td></tr>
</table>

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
ECL84 Triode-pentode with separate cathodes Triode: Gated AVC, sync separation Pentode: Video output stage for TV receiver	Size N 4   	U_f 6,3 V I_f 0,72 A Indirect heating ● **Triode** U_a 200 V U_{g1} −1,7 V I_a 3 mA S 4 mA/V μ 65 **Pentode** U_a 200 V U_{g2} 200 V U_{g1} −2,9 V I_a 18 mA I_{g2} 3 mA S 10,4 mA/V $\mu_{g2/g1}$ 36 R_i >130 kΩ	**Video output stage amplifier** U_b 170 200 220 V R_a 3 3 3 kΩ U_{g2} 170 200 220 V U_{g1} −2 −2,8 −3,3 V I_a 18 18 18 mA I_{g2} 3,2 3,1 3,1 mA S 10,4 10 9,7 mA/\ **Capacitances** **Pentode** C_{g1} 9 pF C_a 4,5 pF $C_{a/g1}$ <0,1 pF **Triode** C_{g1} 4 pF C_a 2,3 pF $C_{a/g1}$ 2,7 pF $C_{g/f}$ >0,045 pF <0,1 pF **Between section** $C_{aT/g1P}$ <0,01 pF $C_{g1T/g1P}$ <0,01 pF 1) Max. 18 % of a cycle, max. 18 μs. 2) U_{g1} fixed	**Triode** U_{ao} ± 550 V U_a ± 250 V $U_{a\,sp}$ 1) 600 V W_a 1 W I_k 12 mA R_{g1} 2) 1 MΩ R_{g1} 3 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ **Pentode** U_{ao} 550 V U_a 250 V W_a 4 W U_{g2o} 550 V U_{g2} 250 V W_{g2} 1,7 W I_k 40 mA R_{g1} 2) 1 MΩ R_{g1} 2 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ

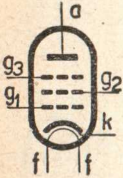
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
ECL86 Triode-pentode with separate cathodes A. F. voltage amplifier, output amplifier class A, AB	Size N 5  	U_f 6,3 V I_f 0,7 A Indirect heating ● **Triode** U_a 250 V U_{g1} −1,9 V I_a 1,2 mA S 1,6 mA/V μ 100 I_{az} (U_{g1} = −4 V) <0,06 mA **Pentode** U_a 250 V U_{g2} 250 V U_{g1} −7 V I_a 36 mA I_{g2} 6 mA S 10 mA/V R_i 48 kΩ $\mu_{g2}/g1$ 21 I_{az} (U_{g1} = −20 V) <0,5 mA	**Triode as A. F. resistance coupled amplifier** U_b 200 250 V R_a 220 220 kΩ R_{g1} 10 10 MΩ R_{g1}' 680 680 kΩ R_{gen} 47 47 kΩ I_a 0,42 0,6 mA $U_{a\,ef}$ 3,2 3,2 V V 66 70 k 0,6 0,4 % **Pentode as A. F. output amplifier** U_a 250 250 250 V U_{g2} 210 250 250 V R_k 130 270 170 Ω I_{ao} 36 26 36 mA I_a 36,5 27 37 mA I_a 2) 36 25,5 36,5 mA I_{g20} 5,6 4,4 6 mA I_{g2} 10 8 10,2 mA I_{g2} 2) 10,5 13 13 mA R_a 7 10 7 kΩ $U_{g1\,ef}$ (P_o = 50 mW) 0,28 0,28 0,3 V ——— 1) As phase invertor	**Triode** U_{ao} 550 V U_a 300 V W_a 0,5 W I_k 4 mA R_{g1} 2 MΩ Z_{g1} (f = 50 Hz) 0,5 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ $R_{k/f}$ 1) 120 kΩ **Pentode** U_{ao} 550 V U_a 300 V W_a 9 W U_{g2o} 550 V U_{g2} 300 V W_{g2} ($U_{g1\,ef}$ = 0) 1,5 W W_{g2} ($U_{g1\,ef}$ max) 3 W I_k 55 mA R_{g1} 1 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ

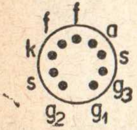
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
ECL86			$U_{g1\,ef}$ (P_o při k = 10 %) 3,1 2,7 3,2 V $U_{g1\,ef}$ 2) 3,2 4 3,8 V P_o (k=10 %) 4 2,8 4 W P_o 2) 4,25 3,6 4,5 W k 2) 12 17 14 % **Pentode as A. F. output amplifier class AB** U_{ba} 250 300 V U_{bg2} 250 300 V R_k 3) 90 145 Ω I_{ao} 2×35 2×31 mA I_a 2) 2×37,3 2×37 mA I_{g2} 2×5,6 2×5 mA I_{g2} 2) 2×9 2×10,6 mA $R_{a\text{-}a}$ 8,2 9,1 kΩ $U_{g1\,ef}$ (P_o = 50 mW) 2×0,24 2×0,26 V $U_{g1\,ef}$ 2) 2×5,1 2×8,7 V P_o 2) 10 14,3 W k 4,5 5 % --- 2) At level to contact potencial 3) common	**Capacitances 1)** **Triode** C_{g1} 2,3 pF C_a 2,5 pF C_{1}/g_1 1,6 pF C_{g1}/f <0,006 pF **Pentode** C_{g1} 10 pF C_a/g_1 <0,4 pF C_{g1}/f <0,2 pF **Between section** C_{g1T}/g_{1P} <0,02 pF C_{aT}/g_{1P} <0,2 pF C_{aT}/aP <0,15 pF C_{g1T}/aP <0,01 pF C_{g1T}/aP 2) <0,002 pF --- 1) Without external screen. 2) With external screen ∅ 22,5 mm

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EF22 Variable-mu pentode RF, IF, AF amplifier	Size L 1  	U_f 6,3 V I_f 0,2 A t_f 12 s Indirect heating ● U_a 250 V U_{g3} 0 V U_{g2} 100 V U_{g1} –2,5 V I_a 6 mA I_{g2} 1,7 mA S 2,2 mA/V I_a (U_{g1} = –35 V) <25 µA	**RF and IF amplifier** $U_b = U_a$ 250 250 V U_{g3} 0 0 V R_{g2} 90 0 kΩ R_k 325 325 Ω U_{g1} –2,5 –58 –2,5 –24 V U_{g2} 100 250 100 – V I_a 6 – 6 – mA I_{g2} 1,7 – 1,7 – mA S 2200 4,5 2200 5,5 µA/V R_i 1,2 >10 1,2 >10 MΩ $\mu_{g2/g1}$ 17 – 17 –	U_{ao} 550 V U_a 300 V W_a 2 W U_{g2o} 550 V U_{g2} (I_a=6 mA) 125 V U_{g2} (I_a<3 mA) 300 V W_{g2} 0,3 W I_k 10 mA R_{g1} 3 MΩ $U_{k/f}$ 50 V $R_{k/f}$ 20 kΩ **Capacitances** C_{g1} 5 pF C_a 5,5 pF $C_{a/g1}$ <0,002 pF

Type Application	Dimensions Base	Heating Static data			Operational Data				Maximum Ratings		
EF80	Size N 4	U_f	6,3	V	RF and IF amplifier				U_{ao}	550	V
		I_f	0,3	A	U_a	170	200	250 V	U_a	300	V
		t_f	20	s	U_{g3}	0	0	0 V	W_a	2,5	W
		Indirect heating			U_{g2}	170	200	250 V	U_{g2o}	550	V
		●			R_k	160	200	270 Ω	U_{g2}	300	V
		U_a	170	V	I_a	10	10	10 mA	W_{g2}	0,7	W
		U_{g3}	0	V	I_{g2}	2,5	2,6	2,8 mA	I_k	15	mA
		U_{g2}	170	V	S	7,4	7,1	6,8 mA/V	R_{g1}	1	MΩ
		U_{g1}	−2	V	R_i	500	550	650 kΩ	R_{g1} 2)	0,5	MΩ
		I_a	10	mA	Z_{g1} (f=100 Mc/s)	2,5	3	3,75 kΩ	$U_{k/f}$	150	V
		I_{g2}	2,5	mA	R_{ekv}	1	1,1	1,2 kΩ	$R_{k/f}$	20	kΩ
		S	7,4	mA/V	Self-excited additive mixer						
		$\mu_{g2/g1}$	50		U_b	170	200	250 V	1) U_{g1} fixed		
		R_i	500	kΩ	U_{g3}	0	0	0 V			
		I_{az} (U_{g1} = −5 V)			U_{g2}	25	25	25 kΩ	**Capacitances**		
			1,8	mA	R_k	500	300	250 Ω	C_{g1}	7,5	pF
					R_{g1}	200	200	200 kΩ	C_{g2}	5,4	pF
					I_a	4,5	6	8,5 mA	C_a	3,35	pF
					I_{g2}	1,5	1,7	2,5 mA	$C_{a/g1}$	0,008	pF
					I_{g1}	1,5	1,5	1,5 µA	$C_{g2/g1}$	2,9	pF
RF pentode RF, iF, wideband amplifier, video amplifier, mixer					R_i	450	500	540 kΩ	$C_{a/k}$	0,012	pF
					S_c	2,75	2,8	3,15 mA/V	$C_{g1/f}$	<0,15	pF
					$U_{osc\,ef}$	1,6	1,6	1,8 V	$C_{f/k}$	<6	pF
					Z_{g1} (f=100 Mc/s)		6	kΩ			
					R_{ekv}		5,5	kΩ			

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EF86	Size N 2			





Pentode
Anti-microphonic
preamplifier stage

U_f	6,3	V
I_f	0,2	A
Indirect heating		
●		
U_a	250	V
U_{g3}	0	V
U_{g2}	140	V
U_{g1}	−2	V
I_a	3	mA
I_{g2}	0,6	mA
S	2	mA/V
μ	38	
D	2,65	%
R_i	2,5	MΩ
I_{az} (U_{g1} = −6 V)	<0,1	mA

AF resistance-coupled amplifier			
U_b	400	250	V
R_a	100	100	kΩ
R_{g2}	400	400	kΩ
R_k	1	1	kΩ
R_{g1}'	320	320	kΩ
I_k	3,3	2,1	mA
V	124	112	
$U_{a\,ef}$	87	50	V
k	5	5	%
AF resistance-coupled amplifier in triode connection			
U_b	100	250	V
R_a	200	200	kΩ
R_k	4,5	1,5	kΩ
R_{g1}'	1	1	kΩ
I_a+I_{g2}	0,28	0,85	mA
V	27	31	

The tube can be employed without any special provision against microphony and hum. In a receiver for P_o = 50 mW, the driving voltage U_{g1} ef must be $\geqq$0,5 mV. In a amplifier for P_o = 5 W, the driving voltage $U_{g1\,ef}$ must be $\geqq$5 mV. In both cases R_{g1} must be $\leqq$1 MΩ.

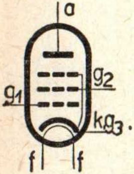
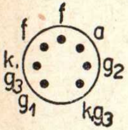
U_{ao}	550	V
U_a	300	V
W_a	1	W
U_{g2o}	550	V
U_{g2}	200	V
W_{g2}	0,2	W
I_k	6	mA
R_{g1} (W_a <0,2 W)	10	MΩ
R_{g1} (W_a >0,2 W)	3	MΩ
R_{g1} 1)	22	MΩ
$U_{+k/-f}$	100	V
$U_{-k/+f}$	50	V
$R_{k/f}$	20	kΩ
$R_{k/f}$ 2)	120	kΩ

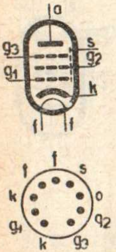
1) U_{g1} produced by R_{g1}

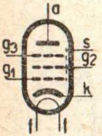
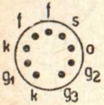
2) Employed as phase inventor

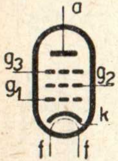
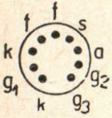
Capacitances

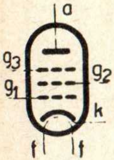
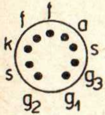
C_{g1}	4	pF
C_a	5	pF
$C_{a/g1}$	$\leqq$0,05	pF
$C_{g1/f}$	$\leqq$0,003	pF

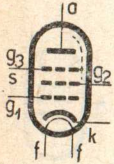
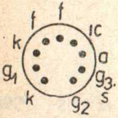
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EF95 **6F32** RF high-slope pentode RF, IF, wideband amplifier	Size max Ø 19×45,2 mm  	U_f 6,3 V I_f 0.175 A Indirect heating ● U_a 120 V U_{g2} 120 V R_k 200 Ω I_a 7,5 mA I_{g2} <3,5 mA S 5,2 mA/V $\mu_{g2/g1}$ 25 R_i >0,25 MΩ	RF amplifier, class A U_a 120 180 V U_{g2} 120 120 V R_k 200 200 Ω I_a 7,5 7,7 mA I_{g2} 2,5 2,5 mA S 5 5,1 mA/V R_i 0,34 0,69 MΩ Z_{g1} (f−50 Mc/s) 25 25 kΩ R_{ekv} 2 2 kΩ RF amplifier, class A – triode connection U_a 120 180 V U_{g1} −2,65 −6 V R_k 265 925 Ω I_a 10 6,5 mA S 6 3,5 mA/V R_i 5 6,66 kΩ μ 30 23,3 Z_{g1} (f−100 Mc/s) 9,5 kΩ R_{ekv} 700 Ω	U_{ao} 320 V U_a 200 V W_a 1,7 W U_{g2o} 320 V U_{g2} 150 V W_{g2} 0,5 W I_k 18 mA R_{g1} 1 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ Capacitances C_{g1} 4,5 pF C_a 2,8 pF $C_{a/g1}$ <0,025 pF

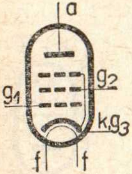
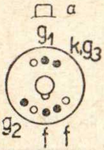
Type Application	Dimensions Base	Heating Static data		Operational Data						Maximum Ratings	
EF183	Size N 3	U_f	6,3 V	RF, IF amplifier						U_{ao}	550 V
		I_f	0,3 A	U_a	200		200		V	U_a	250 V
				U_{g3}	0		0		V	W_a	2,5 W
		I_f	0,3 A	U_{bg2}	200		230		V	U_{g2o}	550 V
		U_f	6,3 V	R_{g2}	24		39		kΩ	U_{g2}	250 V
		Indirect heating								W_{g2}	0,65 W
		●		U_{g1}	−2	−9,5	−2,1	−12	V	$-U_{g1}$	50 V
		U_a	200 V	I_a	12	2,7	10,5	2,4	mA	I_k	20 mA
		U_{g3}	0 V	S	12,5	0,625	10,6	0,5	mA/V	R_{g1} (k)	1 MΩ
		U_{g2}	90 V							R_{g3}	50 kΩ
		U_{g1}	−2 V							$U_{k/f}$	150 V
		I_a	12 mA							$R_{k/f}$	20 kΩ
		I_{g2}	4,5 mA							$-U_{g1}i$ (I_{g1} − +0,3 µA)	1,3 V
		S	12,5 mA/V								
		R_i	500 kΩ							**Capacitances**	
		Z_{g1} (f − 40 Mc/s)	10 kΩ							C_{g1}	9 pF
										C_a	3 pF
										$C_{a/g1}$	<0,0055 pF
Variable-mu pentode RF, IF amplifier in TV - receivers											

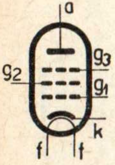
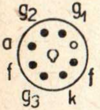
Type	Dimensions	Heating			Operational Data					Maximum Ratings		
Application	Base	Static data										
EF184	Size N 3	U_f	6,3	V	IF, RF amplifier					U_{ao}	550	V
		I_f	0,3	A	U_a	170	200	230	V	U_a	250	V
					U_{g3}	0	0	0	V	W_a	2,5	W
		I_f	0,3	A	U_{g2}	170	200	230	V	U_{g2o}	550	V
		U_f	6,3	V	R_k	140	140	140	Ω	U_{g2}	250	V
		Indirect heating			I_a	10	10	10	mA	W_{g2}	0,9	W
		●			I_{g2}	4,1	4,1	4,1	mA	$-U_{g1}$	50	V
		U_a	200	V	S	15,6	15,6	15,6	mA/V	I_k	25	mA
		U_{g3}	0	V	R_i	330	510	680	kΩ	R_{g1} (k)	1	MΩ
		U_{g2}	200	V	μ_{g2}/g_1	60	60	60		$U_{k/f}$	150	V
		U_{g1}	–2,5	V	Z_{g1} (f – 40 Mc/s)					$R_{k/f}$	20	kΩ
		I_a	10	mA		9,5	9,8	10,1	kΩ	$-U_{g1i}$ (I_{g1} – +0,3 μA)		
		I_{g2}	4,1	mA							1,3	V
		S	15	mA/V								
		R_i	380	kΩ						**Capacitances**		
		μ_{g2}/g_1	60							C_{g1}	10	pF
		I_{az} (U_{g1} – –4 V)								C_a	3	pF
			<2	mA						C_a/g_1	<0,0055	pF
RF high slope pentode IF amplifier in TV - receivers												

Type	Dimensions	Heating	Operational Data	Maximum Ratings
Application	Base	Static data		
EF800	Size N 4	U_f 6,3 V	U_a 170 V	U_f 6,3 ± 0,3 V
		I_f 0,295 A	U_{g3} 0 V	U_{ao} 550 V
		Indirect heating	U_{g2} 170 V	U_a 250 V
		●	R_k 160 Ω	W_a 1,7 W
		U_a 170 V	I_a 10 mA	U_{g2o} 550 V
		U_{g3} 0 V	I_{g2} 2,5 mA	U_{g2} 250 V
		U_{g2} 170 V	S 7,5 mA/V	W_{g2} 0,45 W
		R_k 160 Ω	R_i 400 kΩ	I_k 12,5 mA
		I_a 10+1,5 mA	R_{ekv} 1 kΩ	U_{g1} 0 V
		−1 mA	R_{vst} (f−100 Mc/s) 1) 3 kΩ	$-U_{g1}$ 30 V
		I_{g2} 2,5+0,5 mA		R_{g1} (p) 0,5 MΩ
		−0,3 mA	1) Pin 1 connected with pin 3.	R_{g1} 1 MΩ
		S 7,5±1 mA/V		$U_{+k/f-}$ 100 V
		$\mu_{g2/g1}$ 60±10		$U_{-k/f+}$ 60 V
		R_i 400±100 kΩ		$R_{k/f}$ 20 kΩ
		$-I_{g1}$ ≦0,3 µA		$U_{g1\,i}$ (I_{g1} − +0,3 µA)
		I_{az} (U_{g1} − −6 V)		−1,3 V
		<350 µA		T_b 170 °C
		R_{ekv} 1 <1,4 kΩ		
			Reliability	**Capacitances**
RF pentode			Vibration and shock proofed	C_{g1} 8,1 ± 0,6 pF
RF, IF, wideband			Exacting tolerances	C_a 3,4 ± 0,4 pF
amplifier, video			Long life	$C_{a/g1}$ <0,008 pF
amplifier, mixer				$C_{g1/f}$ <0,15 pF

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EF806S AF pentode Anti-microphonic preamplifier stage	Size N 2  	U_f 6,3 V I_f 0,2 A Indirect heating ● U_a 250 V U_{g3} 0 V U_{g2} 140 V R_k 500 Ω I_a 3,2+0,6 mA −0,5 mA I_{g2} 0,6±0,15 mA S 2±0,4 mA/V $\mu_{g2/g1}$ 38 R_i 2,5 MΩ $-I_{g1}$ <0,1 µA I_{az} (U_{g1} — −6 V) <0,15 mA	AF resistance-coupled amplifier U_b 100 200 250 300 V R_a 100 100 100 100 kΩ R_{g2} 470 390 390 390 kΩ R_{g1}' 330 330 330 330 kΩ R_k 1,5 1 1 1 kΩ I_k 1 1,65 2,05 2,45 mA V 95 106 112 116 $U_{a\,ef}$ 22 40 50 64 V k 5 5 5 5 % Reliability Vibration and shock proofed Exacting tolerances Long life	U_f 6,3 ± 0,3 V U_{ao} 550 V U_a 300 V W_a 1 W U_{g2o} 550 V U_{g2} 200 V W_{g2} 0,2 W I_k 6 mA R_{g1} (W_a <0,2 W) 10 MΩ R_{g1} (W_a >0,2 W) 3 MΩ R_{g1} ¹) 22 MΩ $U_{k/f}$ ±100 V $R_{k/f}$ 20 kΩ T_b 170 °C 1) U_{g1} produced by R_{g1} **Capacitances** C_{g1} 4 pF C_a 5,5 pF $C_{a/g1}$ <0,05 pF $C_{g1/f}$ <0,0025 pF

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
E180F   High-slope pentode Wideband amplifier	Size N 1	U_f 6,3 V I_f 0,3 A Indirect heating ● U_a 190 V U_{g3} 0 V U_{g2} 160 V U_{g1} +9 V R_k 630 Ω I_a 13±0,8 mA I_{g2} 3,3±0,4 mA S 16,5 mA/V ±2,3 mA/V $\mu_{g2/g1}$ 50 R_i 90 >45 kΩ $-I_{g1}$ <0,5 µA R_{ekv} <600 Ω U_a 180 V U_{g3} 0 V U_{g2} 150 V I_a 0,8 mA $-U_{g1z}$ <4,5 V	U_{ba} 190 V $R_a\sim$ 14 kΩ U_{g3} 0 V P_o 0,95 0,35 W U_{bg2} 160 V k 10 2,5 % U_{bg1} +9 V R_{ekv} 460 Ω R_k 630 Ω Z_{g1} (f=100 Mc/s) I_a 13 mA 2 kΩ 1) I_{g2} 3,3 mA Triode cannection g_2 connected to a, g_3 connected to k U_{ba} 160 V S 18,5 mA/V U_{bg1} +9 V µ 50 R_k 620 Ω R_i 2,7 kΩ I_a 16,5 mA R_{ekv} 225 Ω 1) Pin 1 connected to pin 3. Capacitances C_{g1} 3) 7,5 pF $C_{a/g1}$ 3) <0,03 pF C_a 3) 2,0 pF $C_{g1/f}$ 3) <0,1 pF $C_{a/k}$ 3) <0,1 pF 2) Without screening. 3) With screening of diam. 22,2 mm internal diameter.	U_{ao} 400 V U_a 210 V W_a 3 W U_{g2o} 400 V U_{g2} 175 V W_{g2} 0,9 W I_k 25 mA $+U_{g1}$ 0 V $-U_{g1}$ −50 V $-U_{g1\,sp}$ −100 V R_{g1} 1) 0,5 MΩ R_{g1} 2) 0,25 MΩ $U_{k/f}$ 60 V $R_{k/f}$ 20 kΩ T_b 155 °C 1) U_{g1} automatic 2) U_{g1} fixed Long life Vibration and shock proofed Exacting tolerances Reliability

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EL12 spec. Output pentode AF power amplifier	Size T 4  	U_f 6,3 V I_f 1,2 A t_f 25 s Indirect heating ● U_a 425 V U_{g2} 425 V U_{g1} −19 V I_a 42 mA I_{g2} 5 mA S 10 mA/V R_i 50 kΩ I_{az} (U_{g1} = −35 V) 6 mA	AF push-pull amplifier, class AB U_a 425 V U_{g2} 425 V U_{g1} −19 V I_{ao} 2×42 mA I_a 2×96 mA I_{g2o} 2×5 mA I_{g2} 2×26 mA $R_{a-a'}$ 5 kΩ R_{g2} 2×4 kΩ P_o 43 W $U_{g1\,ef}$ 27 V k 5 %	U_{ao} 800 V U_a 425 V W_a 18 W U_{g2o} 800 V U_{g2} 425 V W_{g2o} 5 W W_{g2} 11 W I_k 90 mA $R_{g1}(p)$ 0,3 MΩ $R_{g1}(k)$ 0,5 MΩ $R_{k/f}$ 5 kΩ $U_{k/f}$ 50 V Capacitances C_{g1} 17,5 pF C_a 7 pF $C_{a/g1}$ <0,8 pF

Type	Dimensions	Heating			Operational Data				Maximum Ratings		
Application	Base	Static data									
EL34	Size O 5	U_f	6,3	V	AF power amplifier class A				U_{ao}	2000	V
		I_f	1,5	A	U_b	265	265	V	U_a	800	V
		Indirect heating			U_a	250	250	V	U_a (g_2 s a)	425	V
		●			U_{g3}	0	0	V	W_a ($U_{g1\,ef}$ = 0 V)		
		U_a	250	V	R_{g2}	2	0	kΩ		25	W
		U_{g3}	0	V	U_{g1}	−14,5	−13,5	V	W_a ($U_{g1\,ef}$ = max)		
		U_{g2}	265	V	I_a	70	100	mA		27,5	W
		U_{g1}	−13,5	V	I_{g2}	10	14,9	mA	W_a (g_2 s a)	33	W
		I_a	100	mA	S	9	11	mA/V	U_{g2o}	800	W
		I_{g2}	14,9	mA	μ_{g2}/g_1	11	11		U_{g2}	425	V
		S	11	mA/V	R_i	18	15	kΩ	W_{g2}	8	W
		μ_{g2}/g_1	11		R_a	3	2	kΩ	I_k	150	mA
		R_i	15	kΩ	$U_{g1\,ef}$	9,3	8,7	V	R_{g1}	700	kΩ
		I_{az} (U_{g1} = −30 V)			P_o	8	11	W	R_{g1} 1)	500	kΩ
			<7	mA	k	10	10	%	$U_{k/f}$	100	V
		as triode			$U_{g1\,ef}$ (P_o = 50 mW)				$R_{k/f}$	20	kΩ
		U_a	250	V		0,65	0,5	V			
		U_{g3}	0	V					1) Fixed bias		
		U_{g2}	na a		Capacitances						
		$-U_{g1}$	15	V	C_{g1}	15,2		pF			
		I_a	85	mA	C_a	8,4		pF			
Output pentode		S	12	mA/V	$C_{a/g1}$	<1,1		pF			
AF power amplifier		μ	10,5		$C_{k/f}$	10		pF			
class A, AB, B		R_i	8,7	kΩ	$C_{g1/f}$	<1		pF			

Type Application	Operational Data

EL34

A. F. push-pull amplifier, class AB

U_b	375	V
U_{g3}	0	V
R_{g2}	470	Ω
R_k	130	Ω
R_{a-a}	3,4	kΩ
I_{ao}	2×75	mA
I_a	2×95	mA
I_{g2o}	2×11,5	mA
I_{g2}	2×22,5	mA
U_a+U_{Rko}	355	V
U_a+U_{Rk}	350	V
$U_{g1\ ef}$	21	V
P_o	35	W
k	5	%

AF push-pull amplifier, class B

U_b	375	425	800	V
U_{g3}	0	0	0	V
R_{g2} ²)	470	1000	750 ¹)	Ω
U_{g1}	−32	−38	−39	V
R_{a-a}	3,8	3,4	11	kΩ
I_{ao}	2×35	2×30	2×25	mA
I_a	2×93	2×120	2×91	mA
I_{g2o}	2×4,7	2×4,4	2×3	mA
I_{g2}	2×25	2×25	2×19	mA
U_{ao}	370	425	795	V
U_a	325	400	775	V
$U_{g1\ ef}$	22,7	27	23,4	V
P_o	36	55	100	W
k	6	5	5	%

AF power amplifier, class AB –
g_2 connected to a,
g_3 connected to k

U_b	400	V
R_k	220	Ω
R_{a-a}	5	kΩ
I_{ao}	2×65	mA
I_a	2×71	mA
$U_{g1\ ef}$	22	V
P_o	16,5	W
k	3	%

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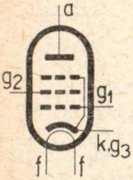
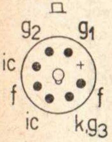
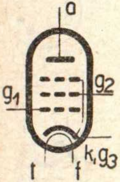
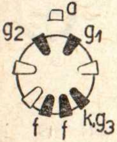
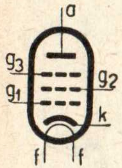
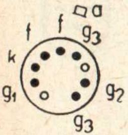
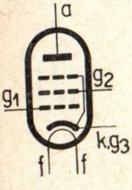
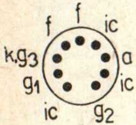
¹) U_{bg2} — 400 V

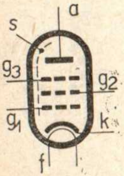
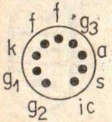
²) R_{g2} Common for both tubes

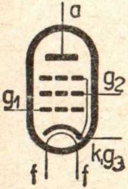
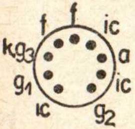
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EL36 Output pentode Horizontal deflection amplifier output stage	Size O 4  	U_f 6,3 V I_f 1,25 A Indirect heating ● U_a 170 V U_{g2} 170 V U_{g1} –21 V I_a 100 mA I_{g2} 8 mA S 11 mA/V $\mu_{g2/g1}$ 5,6 R_i 5,5 kΩ I_{az} (U_{g1} = –60 V) <1 mA	**Horizontal deflection amplifier output stage:** With regard to the permissible tolerances and the emission loss during the service life of the tube, it must be ensured that $I_{a\,sp}$ remains approximately 75 % of the values listed below: U_a 70 170 V U_{g2} 170 170 V U_{g1} –1 –1 V $I_{a\,sp}$ 1) 500 550 mA 1) Current of a new tube **Capacitances** C_{g1} 18 pF C_a 8 pF $C_{a/g1}$ <1,1 pF	U_{ao} 550 V U_a 250 V $+U_{a\,sp}$ 1) 7 kV $-U_{a\,sp}$ 1) 1,5 kV W_a 10 W U_{g2o} 550 V U_{g2} 250 V W_{g2} 3) 4 W W_a+W_{g2} 2) 13 W I_k 200 mA R_{g1} 0,5 MΩ $R_{k/f}$ 20 kΩ $U_{-k/f+}$ 100 V $U_{+k/f-}$ 100 V 1) Max 18% of a cycle, max 18 µs. 2) Horizontal deflection amplifier output stage. 3) During the heating-up period of booster diode W_{g2} max 7 W.

Type Application	Dimensions Base	Heating Static data			Operational Data						Maximum Ratings		
EL51	Size P 5	U_f	6,3	V	AF push-pull amplifier, class AB						U_{ao}	1500	V
		I_f	1,9	A	U_a	500	V	U_a	750	V	U_a	750	V
		t_f	25	s	U_{g2}	500	V	U_{g2}	750	V	W_a	45	W
		Indirect heating			R_k 1)	100	Ω	U_{g1}	−42	V	U_{g2o}	1500	V
		●			I_{ao}	2×95	mA	I_{ao}	2×40	mA	U_{g2}	750	V
		U_a	500	V	I_a	2×115	mA	I_a	2×150	mA	W_{g2o}	7	W
		U_{g2}	500	V	I_{g2o}	2×12,5	mA	I_{g2o}	2×6	mA	W_{g2}	25	W
		U_{g1}	−22	V	I_{g2}	2×30	mA	I_{g2}	2×35	mA	I_k	200	mA
		I_a	90	mA	$R_{a-a'}$	4,8	kΩ	$R_{a-a'}$	6	kΩ	R_{g1} 1)	0,7	MΩ
		I_{g2}	<16	mA	P_o	70	W	R_{g2} 1)	1000	Ω	R_{g1} 2)	0,2	MΩ
		S	11	mA/V	k	6	%	P_o	125	W	$R_{k/f}$	10	kΩ
		R_i	>20	kΩ	$U_{g1\,ef}$	20	V	k	7	%	$U_{k/f}$	50	V
		U_a	850	V				$U_{g1\,ef}$	29	V	1) U_{g1} automatic		
		U_{g2}	850	V							2) U_{g1} fixed		
		U_{g1}	−37,5	V							**Capacitances**		
		I_a	>70	mA							$C_{a/g1}$	<1,5	pF
		U_{g1}	−67,5	V									
		I_a	<13	mA	1) Common resistor for both tubes								
Output pentode Power amplifier													

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EL81 Output pentode Horizontal deflection amplifier output stage of TV receivers, AF push-pull amplifier	Size N 5  	U_f 6,3 V I_f 1 A Indirect heating ● U_a 170 V U_{g3} 0 V U_{g2} 170 V U_{g1} –22 V I_a 45 mA I_{g2} 3,3 mA S 6,2 mA/V μ_{g2}/g_1 5,5 R_i 10 kΩ I_{az} (U_{g1} = –35 V) <12 mA **Capacitances** C_{g1} 16 pF C_a 7 pF C_a/g_1 <0,8 pF C_a/k <0,1 pF C_{g1}/f <0,2 pF	With regard to the permissible tolerances and the emission loss during the service life of the tube, not exceed the values listed below it must be ensured that $I_{a\ sp}$ does under the following conditions: U_a 70 70 V U_{g2} 170 200 V U_{g1} –1 –1 V $I_{a\ sp}$ <350 <420 mA*) $I_{a\ sp}$ <250 <310 mA *) Of a new tube **AF push-pull amplifier, class B** U_a 170 200 V U_{g3} 0 0 V U_{g2} 170 200 V U_{g1} –27 –31,5 V R_{g2} 1 1 kΩ $R_{a-a'}$ 2,5 2,5 kΩ $U_{g1\ ef}$ 19 22,5 V I_{ao} 2×20 2×25 mA I_a 2×73 2×87 mA I_{g2o} 2×1,5 2×2 mA I_{g2} 2×10 2×12,5 mA P_o (k=5,5 %) 13,5 20 W	U_{ao} 550 V U_a 300 V $+U_{a\ sp}$ [1] 7 kV W_a 8 W U_{g3} 0 V U_{g2o} 550 V U_{g2} 300 V W_{g2} [2] 4,5 W W_{g2} [3] 6 W W_a+W_{g2} 10 W I_k 180 mA U_k/f 100 V R_k/f 20 kΩ R_{g1} 0,5 MΩ t# 18 µs t#/T 1 : 4,5 1) Max 18% of a cycle, max 18 µs. 2) Horizontal deflection amplifier output stage. 3) During the heating-up period of booster diode.

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EL82 Output pentode AF amplifier, vertical deflection amplifier output stage of TV receivers	Size N 5  	U_f 6,3 V I_f 0,8 A Indirect heating ● U_a 170 V U_{g2} 170 V U_{g1} −10,4 V I_a 53 mA I_{g2} 10 mA S 9 mA/V µ 10 R_i 20 kΩ **Capacitances** C_{g1} 12,5 pF C_a 5,5 pF $C_{a/g1}$ <0,5 pF $C_{g1/f}$ <0,15 pF	**AF amplifier, class A** $U_a - U_b$ 170 200 V U_{g2} 170 — V R_{g2} — 680 Ω R_k 165 260 Ω I_a 53 45 mA I_{g2} 10 8,5 mA $U_{g1\,ef}$ 6 7 V R_a 3 4 kΩ P_o 4 4,2 W k 10 10 % **AF push-pull amplifier, class A** U_a 200 V U_{g2} 200 V R_k 1) 135 Ω I_a 2×52 mA I_{g2} 2×19 mA R_{a-a} 4 kΩ P_o 12 W k 5 % $U_{g1\,ef}$ 13,5 V 1) Common **Vertical deflection amplifier output stage:** With regard to the permissible tolerances and the emission loss during the service life of the tube, it is recommended to ensure that the listed anode current is not exceeded. U_a 50 V $I_{a\,sp}$ $\leqq$ 90 mA U_{g2} 170 V U_a 60 V $I_{a\,sp}$ $\leqq$120 mA U_{g2} 200 V	U_{ao} 550 V U_a 250 V U_a 1) 450 V $+U_{a\,sp}$ 2) 2,5 kV $-U_{a\,sp}$ 500 V W_a 9 W U_{g2o} 550 V U_{g2} 250 V W_{g2} 2,5 W I_k 75 mA R_{g1} 3) 0,4 MΩ R_{g1} 1 MΩ U_{g1i} ($I_{g1} \leqq +0{,}3$ µA) −1,2 V $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ 1) $W_a < 4{,}5$ W 2) Max 10% of a cycle, max 2 ms 3) U_{g1} fixed.

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EL83 High-slope pentode Output stage of wideband and video amplifier	Size N 5  	U_f 6,3 V I_f 0,71 A Indirect heating ● U_a 200 V U_{g3} 0 V U_{g2} 200 V U_{g1} −3,5 V I_a 36 mA I_{g2} 5 mA S 10,5 mA/V $\mu_{g2/g1}$ 24 R_i 100 kΩ I_{az} (U_{g1} — −10 V) <1,5 mA	**Video amplifier** U_b 200 V U_{g3} 0 V U_{g2} 200 V R_k 500 Ω R_a 5 kΩ I_a 10,4 mA I_{g2} 2 mA **Capacitances** C_{g1} 10,8 pF C_a 6,6 pF $C_{a/g1}$ $\leqq$ 0,1 pF $C_{g1/f}$ $\leqq$ 0,15 pF	U_{ao} 550 V U_a 300 V W_a 9 W U_{g2o} 550 V U_{g2} 300 V W_{g2} 2 W R_{g1} 1) 1 MΩ R_{g1} 2) 0,5 MΩ I_k 70 mA $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ 1) U_{g1} automatic 2) U_{g1} fixed

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EL84 Power pentode AF power amplifier	Size N 5  	U_f 6,3 V I_f 0,76 A Indirect heating ⊕ U_a 250 V U_{g2} 250 V U_{g1} −7,3 V I_a 48 mA I_{g2} 5,5 mA S 11,3 mA/V $\mu_{g1/g2}$ 19 R_i 30 kΩ	**AF amplifier, class A** U_a 250 250 250 V U_{g2} 250 250 200 V R_k 135 210 160 Ω I_a 49,5 36 36 mA I_{g2} 10,8 4,1 3,9 mA S 11,3 10 10,4 mA/V R_i 40 40 40 kΩ R_a 5,2 7 7 kΩ P_o 5,7 4,2 4,3 W k 10 10 10 % $U_{g1\ ef}$ 4,3 3,5 3,4 V **AF push-pull amplifier, class AB** U_a 250 300 V U_{g2} 250 300 V R_k 1) 130 130 Ω R_{a-a} 8 8 kΩ I_{ao} 2×31 2×36 mA I_a 2×37,5 2×46 mA I_{g2o} 2×3,5 2×4 mA I_{g2} 2×7,5 2×11 mA $U_{g1\ ef}$ 8 10 V P_o 11 17 W k 3 4 % 1) Common	U_{ao} 550 V U_a 300 V W_a 12 W U_{g2o} 550 V U_{g2} 300 V W_{g2o} 2 W W_{g2} 4 W $-U_{g1}$ 100 V I_k 65 mA R_{g1} 1) 1 MΩ R_{g1} (p) 0,3 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ 1) U_{g1} automatic **Capacitances** C_{g1} 11 pF C_a 6 pF $C_{a/g1}$ <0,7 pF

Type Application	Dimensions Base	Heating Static data	Operational Data				Maximum Ratings
EL84			**AF push-pull amplifier, class B**				
			U_a	250	300	V	
			U_{g2}	250	300	V	
			U_{g1}	–11,6	–14,7	V	
			I_{ao}	2×10	2×7,5	mA	
			I_a	2×37,5	2×46	mA	
			I_{g2o}	2×1,1	2×0,8	mA	
			I_{g2}	2×7,5	2×11	mA	
			R_{a-a}	8	8	kΩ	
			$U_{g1\,ef}$	8	10	V	
			P_o	11	17	W	
			k	3	4	%	
			AF push-pull amplifier, class AB				
			g_2 connected to a				
			U_a	250	300	V	
			R_k 1)	270	270	Ω	
			R_{a-a}	10	10	kΩ	
			$U_{g1\,ef}$	8,3	10	V	
			I_{ao}	2×10	2×24	mA	
			I_a	2×21,7	2×26	mA	
			P_o	3,4	5,2	W	
			k	2,5	2,5	%	

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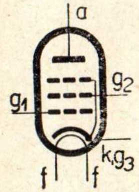
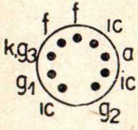
1) Common

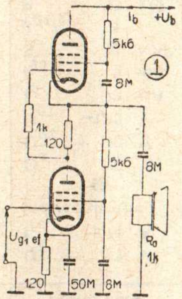
Type Application	Dimensions Base	Heating Static data			Operational Data				Maximum Ratings		
EL86	Size N 5	U_f	6,3	V	**AF amplifier, class A**				U_{ao}	550	V
		I_f	0,76	A	U_a	100	170	V	U_a	250	V
		Indirect heating			U_{g2}	100	170	V	W_a	12	W
		●			U_{g1}	−6,7	−12,5	V	U_{g2o}	550	V
		U_a	170	V	I_a	43	70	mA	U_{g2}	200	V
		U_{g2}	170	V	I_{g2o}	3	5	mA	W_{g2o}	1,75	W
		U_{g1}	−12,5	V	I_{g2}	11	22	mA	W_{g2}	6	W
		I_a	70	mA	R_a	2,4	2,4	kΩ	R_{g1} 1)	1	MΩ
		I_{g2}	5	mA	$U_{g1\,ef}$	4,3	7	V	I_k	100	mA
		S	10	mA/V	k	10	10	%	$U_{+k/f}$ 2)	300	V
		$\mu_{g2/g1}$	8		P_o	1,9	5,6	W	$U_{-k/f+}$	100	V
		R_i	23	kΩ					$R_{k/f}$	20	kΩ
									1) U_{g1} automatic 2) DC component max 150 V		
									Capacitances		
									C_{g1}	12	pF
									C_a	6	pF
Power pentode AF power amplifier without transformer									$C_{a/g1}$	<1	pF

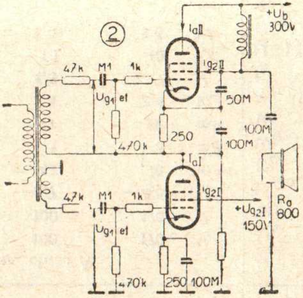
EL86

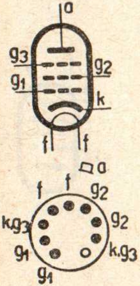
AF push-pull amplifier without output transformer

U_b	300	V
I_{bo}	69	mA
I_b	67	mA
R_a	1	kΩ
$U_{g1\,ef}$	5,7	V
P_o	4,8	W
k	9,3	%

U_b	300	V
R_a	800	Ω
$U_{g1\,ef}$	9,9	V
P_o	7,5	W
k	2,9	%
I_{aIIo}	52	mA
I_{aII}	51,5	mA
I_{g2IIo}	3,9	mA
I_{g2II}	10,1	mA





Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EL500 Output pentode Horizontal deflection amplifier output stage of TV-receivers	Size MN 1 	U_f 6,3 V I_f 1,35 A Indirect heating ● U_a 75 V U_{g2} 200 V U_{g1} −10 V $I_{a\,sp}$ 440 mA $I_{g2\,sp}$ 30 mA (measured dynamicaly) U_a 170 V U_{g2} 170 V $-U_{g1}$ 60 V I_a <1 mA	Horizontal deflection amplifier output stage	U_{ao} 550 V U_a 250 V U_a (U_{g2} − 130 V) >23 V U_a (U_{g2} − 190 V) >33 V $U_{a\,sp}$ 3) 7 kV U_{g2o} 550 V U_{g2} 250 V I_k 250 mA R_{g1} (k) 0,5 MΩ R_{g1} 1) 2) 2,2 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ

U_b V	R_{g2} min kΩ	U_{g2} V	U_a V	$-U_{g1}$ V	$I_{a\,sp}$ mA
170	1,2				
		130	62	6	250
		150	66	7	310
200	1,5	130	65	6	250
		150	69	7	310
		170	73	8	360
230	2,2	150	72	7	310
		170	76	8	360
		190	80	9	420
190	2,2			+1	230
230	2,2			+1	320

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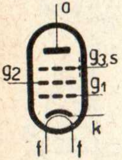
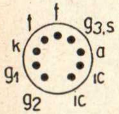
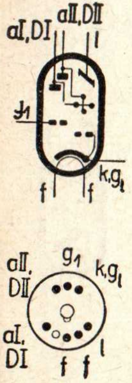
1) In stabilized circuit.

2) Z_{g1} (f = 50 c/s) $\leqq$ 200 kΩ

3) Max 22% of a cycle, max 18 µs.

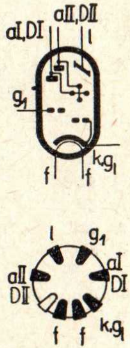
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EL803S High-slope pentode Output stage of wideband and video amplifier	Size N 5  	U_f 6,3 V I_f 0,65 A Indirect heating ● U_a 200 V U_{g3} 0 V U_{g2} 200 V R_k 110 Ω I_a 32+4 −4,5 mA I_{g2} 4,7±0,9 mA S 10±1,8 mA/V $\mu_{g2/g1}$ 22±6 R_i 60 ± 20 kΩ $-I_{g1}$ <0,5 µA I_{az} (U_{g1} = −10 V) <2,5 mA	Reliability Vibration and shock proofed Exacting tolerances Long life	U_f 6,3 ± 0,3 V U_{ao} 550 V U_a 250 V W_a 6,5 W U_{g2o} 550 V U_{g2} 250 V W_{g2} 1,5 W I_k 40 mA R_{g1} 1 MΩ R_{g1} 1) 0,5 MΩ $U_{k/f}$ ±120 V $R_{k/f}$ 20 kΩ U_{g1i} (I_{g1} $\leqq$ + 0,3 µA) −1,3 V 1) U_{g1} fixed **Capacitances** C_{g1} 10,4 ± 0,6 pF C_a 8,9 ± 0,4 pF $C_{a/g1}$ <0,12 pF $C_{g1/f}$ <0,15 pF

Type Application	Dimensions Base	Heating Static data			Operational Data				Maximum Ratings		
EM11 **EM4n**	Size T 3	U_f	6,3	V	U_b	200	250	V	U_{aIo}	550	V
		I_f	0,2	A	R_{aI}	2	2	MΩ	U_{aI}	275	V
		Indirect heating			R_{aII}	1	1	MΩ	U_{aIIo}	550	V
					I_l (U_{g1}−0)	0,55	0,75	mA	U_{aII}	275	V
					U_{g1} (θ_1−85°)	0	0	V	U_{lo}	550	V
					U_{g1} (θ_2−85°)	0	0	V	U_l	275	V
					U_{g1} (θ_1−5°)	−5,5	−6,5	V	R_{g1}	3	MΩ
					U_{g1} (θ_2−5°)	−12	−15	V	$R_{k/f}$	20	kΩ
									$U_{k/f}$	100	V

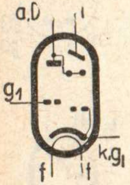
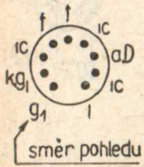


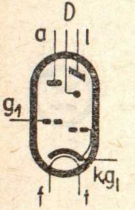
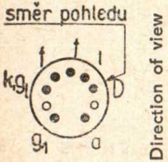
EM11

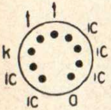
Tuning indicator

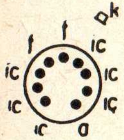


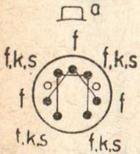
EM4n

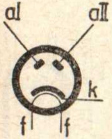
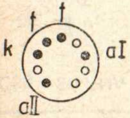
Type Application	Dimensions Base	Heating Static data			Operational Data					Maximum Ratings		
EM80	Size N 4	**EM80**			U_b		250		V	U_{ao}	550	V
EM81	Size N 4	U_f	6,3	V	U_l		250		V	U_a	300	V
		I_f	0,3	A	R_a+D		0,5		MΩ	W_a	0,2	W
		Indirect heating			R_{g1}		3		MΩ	U_{lo}	550	V
		●			U_{g1}	−4,5	−10	−20	V	U_l	300	V
		U_a	100	V	α	25	45	–	°	U_l	>160	V
		U_l	100	V	I_l	–	–	<3,8	mA	I_k	4	mA
		U_{g1}	−2	V	Capacitances					R_{g1}	3	MΩ
		I_a	2,75	mA	C_{g1}	2,9	pF			R_a	>200	kΩ
		S	>0,7	mA/V	C_a/g_1	1,1	pF			$U_{k/f}$	100	V
										$R_{k/f}$	20	kΩ
		EM81			U_b		250		V	U_{ao}	550	V
		U_f	6,3	V	U_l		250		V	U_a	300	V
		I_f	0,3	A	R_a+D		500		kΩ	W_a	0,2	W
		Indirect heating			R_{g1}		3		MΩ	U_{lo}	550	V
		●			U_{g1}	−7,8	−4,8	−20	V	U_l	300	V
		U_a	100	V	I_l	–	–	<3,8	mA	U_l	>160	V
		U_l	100	V	β	25	45	–	°	I_k	4	mA
		U_{g1}	−2	V	Capacitances					R_{g1}	3	MΩ
		I_a	2,75	mA	C_{g1}	2,9	pF			R_a	>200	kΩ
	Direction of view	S	>0,7	mA/V	C_a/g_1	1,1	pF			$U_{k/f}$	100	V
Tuning indicator										$R_{k/f}$	20	kΩ

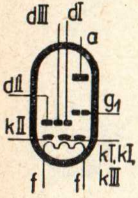
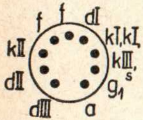
Type Application	Dimensions Base	Heating Static data			Operational Data				Maximum Ratings		
EM84	Size N 6	U_f	6,3	V	$U_b = U_l$	250		V	U_{aa}	550	V
		I_f	0,21	A	R_a	500		kΩ	U_a	300	V
		Indirect heating			R_{g1}	3		MΩ	W_a	0,5	W
		●			U_{g1}	0	−22	V	U_{Do}	550	V
		U_b	250	V	I_l	1,0	1,8	mA	U_D	300	V
		U_l	250	V	I_a	0,45	0,06	mA	U_{lo}	550	V
		R_a	0,5	MΩ	b	21	0	mm	U_l	300	V
		R_{g1}	3	MΩ		(>15	<3)	mm	U_l	>170	V
		U_{g1}	0/-22	V					R_{g1}	3	MΩ
		I_l	<2/<3	mA					$U_{k/f}$	100	V
		b	21/0	mm					T_b	120	°C
									**Capacitances**		
									$C_{a/k}$	0,8	pF
Tuning indicator											

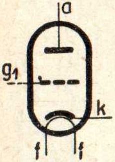
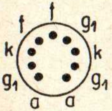
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EY82 Diode Half-wave rectifier	Size N 5  	U_f 6,3 V I_f 0,9 A Indirect heating ● I_d 150 mA R_i 67,5 Ω	**Full-wave rectifier (2 tubes)** $U_{a\,ef}$ 2×250 2×280 2×300 V I_{ss} 360 360 360 mA U_{ss} 225 250 268 V C_N 60 60 60 μF R_o 2×75 2×95 2×110 Ω	U_{inv} 850 V $U_{a\,ef}$ 2×300 V I_{ss} 180 mA I_{sp} 1100 mA $U_{k/f}$ 450 V C_N 60 μF Min. protective anode resistance R_o min [Ω] — $U_{a\,ef}$ [V] 2×75 — 2×250 2×95 — 2×280 2×110 — 2×300

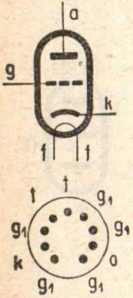
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
EY83 **EY88**   Switching diode for horizontal amplifier output stages	Size N 5 Size N 7	**EY83** U_f 6,3 V I_f 0,95 A Indirect heating ● U_a 15 V I_a >120 mA	**Capacitances** $C_{a/k}$ <6,2 pF $C_{k/f}$ <2,4 pF	U_{inv} 1) 5 kV $U_{inv\ sp}$ 1) 5,6 kV I_a 175 mA $I_{a\ sp}$ 500 mA $U_{+k/f\ sp}$ 1) 5 kV $U_{+k/f\ sp}$ 1) 2) 5,6 kV 1) Max 10% of a cycle, max 18 µs. 2) Absolute maximum.
		EY88 U_f 6,3 V I_f 1,55 A Indirect heating ● U_a 15 V I_a >125 mA	**Capacitances** $C_{a/k}$ 8,6 pF $C_{k/f}$ 2 pF	U_{ao} 550 V U_a 250 V I_a 220 mA $I_{a\ sp}$ 550 mA U_{inv} 1) 6 kV U_{inv} 1) 2) 7,5 kV $U_{+k/f-\ sp}$ 1) 6,6 kV $U_{f/zem\ ef}$ 220 V W_a 5 W 1) Max 22% of a cycle, max 18 µs. 2) Absolute maximum.

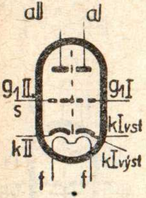
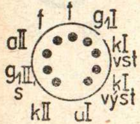
Type	Dimensions	Heating	Operational Data	Maximum Ratings
Application	Base	Static data		
EY86   HT diode Half-wave rectifier for TV receiver HT sources	Size N 4	U_f 6,3 V I_f 0,09 A Indirect heating ⊛ U_a 100 V I_a 12 mA	U_{ss} 18 kV U_{ss} 20 kV I_{ss} 150 µA I_{ss} 0 µA **Permissible tolerances of filament voltage:** I_a $\leq$200 µA ± 15 % I_a >200 µA ± 7 % 1) Pulse duration 18 % of a cycle, max 18 µs. 2) Absolute value. 3) Pulse duration 10 % of a cycle, max. 10 µs.	$-U_{a\,sp}$ 1) 22 kV $-U_{a\,sp}$ (I_a=0) 24 kV $-U_{a\,sp}$ 2) 27 kV I_{ss} 0,8 mA I_{sp} 3) 40 mA C_N 2000 pF T_b 150 °C Half-wave rectifier f = 50 c/s. Sinusoidal waveform $U_{a\,ef}$ 5 kV I_a 3 mA C_N 0,2 µF R_{tr} >100 kΩ **Capacitances** $C_{a/k+f+s}$ 2,5 pF

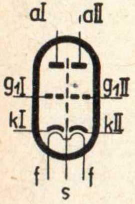
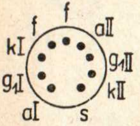
Type Application	Dimensions Base	Heating Static data			Operational Data					Maximum Ratings		
EZ80	Size N 4	**EZ80**			$U_{a\,ef}$	2×220	2×250	2×350	V	$U_{a\,ef}$	2×350	V
EZ81	Size N 5	U_a	6,3	V	R_o	2×75	2×125	2×300	Ω	I_{ss}	90	mA
		I_f	0.6	A	C_N	50	50	50	µF	I_{sp}	270	mA
		Indirect heating			I_{ss}	90	90	90	mA	C_N	50	µF
		●			U_{ss}	230	265	360	V	$U_{+k/f-}$ 1)	500	V
		U_a	22	V						1) Peak value, DC component max 350 V.		
		I_a	70	mA								
		EZ81			$U_{a\,ef}$	2×250	2×300	2×350	V	U_{inv}	1000	V
		U_a	6,3	V	R_o	>2×150	>2×200	<2×240	Ω	$U_{a\,ef}$	2×350	V
		I_f	1	A	C_N	50	50	50	µF	I_{ss}	150	mA
		Indirect heating			I_{ss}	150	150	150	mA	I_{sp}	450	mA
		●			U_{ss}	243	293	348	V	$U_{+k/f-}$ 1)	500	V
		$U_{a\,ef}$	2×350	V						C_N	50	µF
		R_o	2×240	Ω						1) Peak value, DC component max 350 V.		
		R_z	2300	Ω								
		C_N	50	µF								
		I_{ss}	>134	mA								
		●										
		I_d	110	mA								
Full-wave rectifier		R_i	130	Ω								

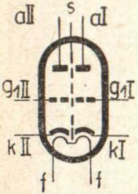
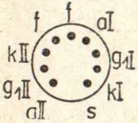
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PABC80	Size NA 50	I_f 0,3 A U_f 9,5 V t_f <22 s Indirect heating ● U_a 250 V R_k 3 kΩ I_a 1 mA S 1,2 mA/V μ 70 R_i 58 kΩ I_{az} (U_{g1} = −6 V) <0,15 mA U_{dI} 5 V I_{dI} >1 mA R_{dI} 5 kΩ $U_{dII,\ dIII}$ 5 V $I_{dII,\ dIII}$ 25 >13 mA $R_{dII,\ dIII}$ 200 Ω R_{dII}/R_{dIII} >0,67 <1,5	**AF resistance-coupled amplifier** U_b 200 200 200 V R_a 300 200 100 kΩ R_{g1} 10 10 10 MΩ R_{g1}' 1 1 1 MΩ I_a 0,45 0,6 0,95 mA $U_{g1\,ef}$ 70 72 80 mV $U_{a\,ef}$ 4 4 4 V k 0,4 0,4 0,3 % V 57 56 50 **Capacitances** $C_{g1/kI,\ III}$ 1,9 pF $C_{a/kI,\ III}$ 0,8 pF $C_{a/g1}$ 2 pF $C_{dI/kI,\ III+f}$ 0,8 pF $C_{dII/kI,\ III+kII+f}$ 4,8 pF $C_{dIII/kI,\ III+kII+f}$ 4,8 pF $C_{g1/f}$ <0,1 pF	**Triode** U_{ao} 550 V U_a 250 V W_a 1 W I_k 5 mA R_{g1} 3 MΩ R_{g1} 1) 22 MΩ $U_{k/f}$ 150 V $R_{k/f}$ 20 kΩ 1) U_{g1} produced by R_{g1} **Diodes** $U_{dI\,inv}$ 350 V $U_{dII\,inv}$ 350 V $U_{dIII\,inv}$ 350 V $I_{dI\,sp}$ 6 mA $I_{dII,\ III\,sp}$ 75 mA I_{dI} 1 mA $I_{dII,\ III}$ 10 mA
  Diode - twin diode - AF triode AM demodulator, FM demodulator, AF amplifier				

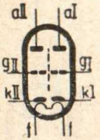
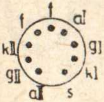
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PC86 VHF high-slope triode Pre-stage and selfexcited mixer for frequencies up to 800 Mc/s	Size N 2  	I_f 0,3 A U_f 3,8 V t_f <22 s Indirect heating ● U_a 175 V U_{g1} −1,5 V I_a 12 mA S 14 mA/V μ 70 I_{az} (U_{g1} = −4 V) <0,15 mA	**RF amplifier, grounded grid** U_a 175 V R_k 125 Ω I_a 12 mA S 14 mA/V R_{ekv} 250 Ω **Self-excited mixer** U_b 220 V R_a 1) 5,6 kΩ R_{g1} 50 kΩ I_a 12 mA I_{g1} 50 μA 1) R_a shunted with capacitor C_a	U_{ao} 550 V U_a 220 V W_a 2,2 W I_k 20 mA $-U_{g1}$ 50 V R_{g1} 1 MΩ $U_{+k/f-}$ 130 V $U_{k/f\ ef}$ 50 V $R_{k/f}$ 20 kΩ **Capacitances** $C_{a/g1}$ 2 pF $C_{g1/k}$ 3,6 pF $C_{a/k}$ 0,2 pF $C_{g1/f}$ <0,35 pF $C_{k/f+g1}$ 6,6 pF $C_{g1/k+f}$ 3,9 pF $C_{a/k+f}$ 0,3 pF $C_{a/g1+f}$ 2,1 pF

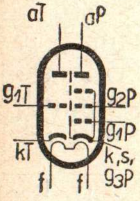
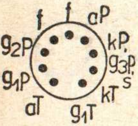
Type	Dimensions	Heating	Operational Data	Maximum Ratings
Application	Base	Static data		
PC88  High slope VHF triode RF amplifier up to 1000 Mc/s	Size NA 34	U_f 3,8 V I_f 0,3 A Indirect heating ● U_a 160 V R_k 100 Ω I_a 12,5 mA S 13,5 mA/V μ 65 R_{ekv} 240 Ω F_z (f = 850 MHz) 9 $f_{res}\ a/g$ 1700 MHz $f_{res}\ g/k$ 1000 MHz	**Capacitances** With external shield (m) connected to g_1: $C_{g1+m/k+f}$ 3,8 pF $C_{a/g1+m}$ 1,7 pF $C_{a/k+f}$ 0,055 pF Without external shield $C_{g1/a}$ 1,2 pF	U_{ao} 550 V U_a 175 V W_a 2 W i_k 13 mA $-U_{g1}$ 50 V W_{g1} 50 mW $R_{g1}(k)$ 0,5 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ

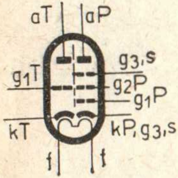
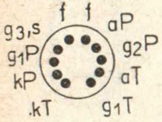
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PCC84 Twin triode VHF cascade amplifier	Size N 2  	I_f 0,3 A U_f 7,2 V t_f 15 s Indirect heating ● U_a 90 V U_{g1} −1,5 V I_a 12 mA S 6 mA/V μ 24 R_i 4 kΩ	**VHF cascade amplifier:** Section I: grounded cathode Section II: grounded grid Section I: f = 200 Mc/s Z_{g1} 4 kΩ f = 100 Mc/s Z_{g1} 16 kΩ f = 50 Mc/s Z_{g1} 64 kΩ F = 6,5 Capacitances $C_{gI/k+f}$ 2,3 pF $C_{kII/f}$ 2,5 pF $C_{aI/k+f}$ 0,5 pF $C_{kII/aII}$ 0,17 pF $C_{gI/aI}$ 1,1 pF $C_{aII/gII}$ 2,3 pF $C_{gI/f}$ 0,25 pF $C_{aII/gII+f}$ 2,5 pF $C_{kII/gII+f}$ 4,5 pF $C_{gI/aII}$ 0,006 pF	**Section I and II:** U_{ao} 550 V U_a 180 V W_a 2 W W_{aI+aII} 3,5 W I_k 18 mA $R_{k/f}$ 20 kΩ **Section I:** R_{g1I} 0,5 MΩ $U_{f/kI\ sp}$ 100 V **Section II:** R_{g1II} 1) 20 kΩ R_{g1II} 2) 100 kΩ $U_{+k/f-}$ 3) 250 V $U_{-k/f+}$ 100 V 1) $R_k \geqq 100\ \Omega$ 2) U_{g1} derived from a voltage divider connected between $+U_b$ and 0. 3) DC component max 180 V.

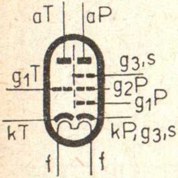
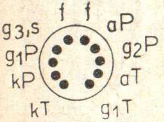
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PCC85 Twin triode VHF cascade amplifier, mixer	Size N 2  	I_f 0,3 A U_f 9 V t_f 18 s Indirect heating ● U_a 170 V R_k 150 Ω I_a 10 mA S 6,2 mA/V μ 50 R_i 8 kΩ I_{az} (U_{g1} = −7 V) <1 mA	**RF and VHF amplifier** U_b 170 V S 4,7 mA/V R_a 1) 1,3 kΩ R_i 10,5 kΩ U_a 160 V R_{ekv} 650 Ω R_k 330 Ω Z_{g1} (f=100 Mc/s) I_a 6 mA 8 kΩ 1) Shunted with capacitor 1000 pF **Self-excited mixer** U_b 170 V I_a 4,8 mA R_a 4,7 kΩ S_c 2,2 mA/V R_{g1} 1 MΩ R_i 16 kΩ $U_{osc\,ef}$ 2,8 V Z_{g1} (f=100 Mc/s) 15 kΩ	U_{ao} 550 V U_a 250 V W_a 2,5 W $W_{aI}+W_{aII}$ 4,5 W I_k 15 mA $-U_{g1}$ 100 V R_{g1} 1 MΩ $U_{+k/f-}$ 200 V $U_{-k/f+}$ 90 V $R_{k/f}$ 20 kΩ **Capacitances** $C_{a/g}$ 1,85 pF $C_{g/k+f+s}$ 3,3 pF $C_{a/k}$ 0,23 pF $C_{a/k+f+s}$ 1,6 pF $C_{aI/aII}$ 0,04 pF $C_{aI/kII}$ <0,008 pF $C_{gI/gII}$ 0,003 pF $C_{aI/gII}$ <0,008 pF $C_{aII/gI}$ <0,008 pF $C_{aII/kI}$ <0,008 pF $C_{gI/kII}$ <0,003 pF $C_{gII/kI}$ <0,003 pF

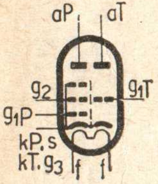
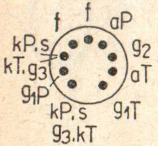
Type Application	Dimensions Base	Heating	Operational Data	Maximum Ratings
		Static data		
PCC88   Twin triode with separate cathodes VHF cascade amplifier	Size NA 40	I_f 0,3 A U_f 7 V t_f <19 s Indirect heating ● U_a 90 V R_k 87 Ω I_a 15 mA S 12,5 mA/V μ 33 R_i 2,6 kΩ R_{ekv} 300 Ω I_{jz} (U_{g1} = −8) <0,035 mA R_{ekv} <600 Ω	Section I: grounded cathode Section II: grounded grid Section II must be provided with fixed bias derived from a voltage divider; for section I the bias can be produced by I_{g1} on a grid leak resistor, but the anode voltage of section I must not exceed 75 V under no-signal conditions. $C_{aI/aII}$ <0,045 pF $C_{gI/aII}$ <0,005 pF	U_{ao} 550 V U_a 130 V W_a 1,8 W I_k 25 mA $-U_{g1}$ −50 V W_{g1} 0,03 W R_{g1} 1 MΩ $R_{k/f}$ 20 kΩ $U_{k/f\,ef}$ 80 V T_b 170 °C **Section II:** $U_{+k/f-}$ 180 V DC component 130 V **Capacitances** $C_{aI/kI+f+s}$ 1,8 pF $C_{gI/kI+f+s}$ 3,3 pF $C_{aI/gI}$ 1,4 pF $C_{gI/f}$ <0,13 pF $C_{aII/gII+f+s}$ 2,8 pF $C_{kII/gII+f+s}$ 6 pF $C_{aII/gII}$ <1,8 pF $C_{aII/kII}$ 0,18 pF $C_{kII/f}$ <3,5 pF

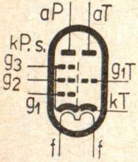
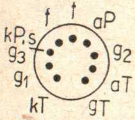
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PCC189 Variable-mu twin triode with separate cathodes VHF cascade amplifier in TV-receivers	Size N 2  	I_f 0,3 A U_f 7,2 A t_f <19 s Indirect heating ● U_a 90 V R_k 93,5 Ω I_a 15 mA S 12,5 mA/V R_i 2,5 kΩ U_{g1z} (S−625 µA/V) −5 V U_{g1z} (S−125 µA/V) −9 V	Section I:grounded cathode Section II: grounded grid **Capacitances** Without external shield $C_{g1/kI+f+s}$ 3,5 pF $C_{aI/kI+f+s}$ 1,7 pF $C_{aI/gI}$ 1,9 pF $C_{gI/f}$ <0,28 pF $C_{kII/gII+f+s}$ 6 pF $C_{aII/gII+f+s}$ 3,4 pF $C_{aII/gII}$ 1,9 pF $C_{kII/f}$ 3 pF $C_{aII/kII}$ 0,18 pF $C_{aI/aII}$ <0,045 pF $C_{gI/aII}$ <0.004 pF	U_{ao} 550 V U_a 130 V W_a 1,8 W I_k 22 mA $-U_{g1}$ 50 V R_{g1I} 1 MΩ R_{g1II} 0,5 MΩ $U_{kI/f}$ 80 V $U_{kII/f\ ef}$ 80 V $U_{+kII/f}$ 1) 180 V $R_{k/f}$ 20 kΩ 1) DC component max 130 V

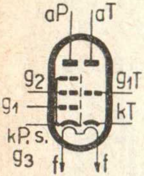
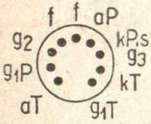
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PCF82 Triode-pentode Oscillator, mixer for TV receivers	Size N 2  	I_f 0,3 A U_f 9,5 V Indirect heating ● **Pentode** U_a 250 V U_{g2} 110 V U_{g1} –0,9 V I_a 10 mA I_{g2} 3,5 mA S 5,2 mA/V R_i 0,4 MΩ $\mu_{g2/g1}$ 35 I_{az} (U_{g1} = –10 V) <0,15 mA **Triode** U_a 150 V U_{g1} –1 V I_a 18 mA S 8,5 mA/V μ 40 R_i 4,7 kΩ I_{az} (U_{g1} = –10 V) <0,35 mA	**Pentode as mixer** $U_a = U_b$ 170 200 250 V R_{g2} 30 45 70 kΩ R_{g1} 1 1 1 MΩ U_{g1} 0 0 0 V $U_{osc\ ef}$ 3 3 3 V I_a 4,7 4,9 5,2 mA I_{g2} 2 1,9 1,9 mA I_{g1} 3,7 3,7 3,7 μA S_c 1,65 1,8 1,9 mA/V Z_{g1} (f = 100 Mc/s) 10 10 10 kΩ **Triode as oscillator** U_b 170 200 250 V R_a 20 20 20 kΩ R_{g1} 20 20 20 kΩ $U_{osc\ ef}$ 3 3 3 V I_a 3,3 4,1 5,7 mA I_{g1} 160 160 160 μA S_{ef} 2,8 3,2 4 mA/V **Capacitances Pentode** **Triode** C_{g1} 5 pF C_{g1} 2,5 pF C_a 2,6 pF C_a 0,4 pF $C_{a/g1}$ 0,01 pF $C_{a/g1}$ 1,8 pF $C_{f/k}$ 2,6 pF $C_{f/k}$ 2,5 pF $C_{aP/aT}$ 0,07 pF	**Pentode** U_{ao} 550 V U_a 300 V W_a 2,8 W U_{g2o} 550 V U_{g2} 300 V W_{g2} 0,5 W I_k 20 mA R_{g1} 1 MΩ $U_{+k/f-}$ 220 V $U_{-k/f+}$ 90 V $R_{k/f}$ 20 kΩ **Triode** U_{ao} 550 V U_a 300 V W_a 2,7 W I_k 20 mA R_{g1} 1 MΩ $U_{+k/f-}$ 220 V $U_{-k/f+}$ 90 V U_f 14,3 V

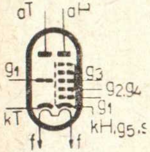
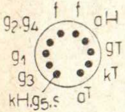
Type Application	Base Dimensions	Heating Static data	Operational Data	Maximum Ratings
PCF200 Triode-pentode Triode for AGC amplifier, sync. separator and pulse amplifier, fm limiter, noise detector, pentode for IF sound and video amplifier	Size De 1  	I_f 0,3 A U_f 8 V t_f <19 s Indirect heating **Pentode** U_a 160 V U_{g3} 0 V U_{g2} 135 V R_k 93 Ω I_a 13 mA I_{g2} 5,3 mA S 14 mA/V $\mu_{g2/g1}$ 53 I_{az} (U_{g1} = −8 V) <0,1 mA **Triode** U_a 170 V R_k 120 Ω I_a 8,5 mA S 5,2 mA/V μ 57 I_{az} (U_{g1} = −8 V) <0,1 mA	**Pentode: IF video and sound amplifier** U_b 200 V R_a 3,3 kΩ R_{g2} 12 kΩ R_k 100 Ω I_a 13 mA I_{g2} 5 mA S 14 mA/V g_{g1} (f=40 Mc/s) 150 μA/V **Capacitances** (without external shield) **Pentode** C_{g1} 6,0 pF C_a 3,3 pF $C_{g1/k}$ 3,7 pF $C_{a/g1}$ 0,0056 pF $C_{g1/g2}$ 1,7 pF **Triode** C_g 2,1 pF C_a 3,0 pF $C_{a/g}$ 2,2 pF **Between sections** $C_{aP/aT}$ <0,015 pF $C_{g1P/aT}$ <0,0012 pF $C_{g1P/gT}$ 0,0015 pF	**Pentode** U_{ao} 550 V U_a 250 V W_a 2,1 W U_{g2o} 550 V U_{g2} 250 V W_{g2} 0,75 W I_k 20 mA R_{g1} 1 MΩ $U_{k/f}$ 150 V **Triode** U_{ao} 550 V U_a 250 V $U_{a\,sp}$ 1) 600 V W_a 1,5 W I_k 18 mA R_{g1} 1 MΩ $U_{k/f}$ 2) 150 V $R_{k/f}$ 50 kΩ 1) $I_a \leqq 0,1$ mA; max 18 % of a cycle, max 18 μs. 2) $U_{+k/f}$ max = 350 V, dc component max 200 V, ac component RMS max 150 V

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PCF201 Triode-pentode Triode as pulse amplifier, sync. separator, line-blocking oscillator or multivibrator, pentode for video IF amplifier	Size De 1  	I_f 0,3 A U_f 8 V t_f <19 s Indirect heating ● **Pentode:** U_a 160 V U_{g3} 0 V U_{g2} 110 V R_k 77 Ω I_a 13 mA I_{g2} 5,3 mA S 12,6 mA/V $\mu_{g2/g1}$ 45 **Triode** U_a 100 V R_k 143 Ω I_a 14 mA S 4,8 mA/V μ 17,5 I_{az} (U_{g1} = −18 V) <0,1 mA	**Pentode: IF video amplifier** $U_b = U_a$ 210 V U_{g3} 0 V R_{g2} 18 kΩ R_{g1} 100 kΩ R_k 77 Ω U_{g1} (S = 1,26 mA/V) −5,1 V U_{g1} (S = 0,126 mA/V) −19 V g_{g1} (f = 40 MHz) 135 µA/V **Triode as line-blocking oscillator** U_a 30 V U_{g1} 1,5 V $I_{k\,sp}$ 40 mA $I_{a\,sp}$ 25 mA $I_{g1\,sp}$ 15 mA **Capacitances:** (without external shield) **Pentode** C_{g1} 6,5 pF C_a 3,3 pF $C_{a/g1}$ 0,0065 pF **Triode:** C_{g1} 2,5 pF C_a 3 pF $C_{a/g1}$ 2 pF	**Pentode** U_{ao} 550 V U_a 250 V W_a 2,1 W U_{g2o} 550 V U_{g2} 250 V W_{g2} 0,7 W I_k 20 mA R_{g1} 1 MΩ $U_{k/f}$ 150 V **Triode** U_{ao} 550 V U_a 250 V W_a 1.5 W I_k 18 mA $I_{k\,sp}$ 1) 50 mA R_{g1} 1 MΩ $U_{k/f}$ 150 V $R_{k/f}$ 50 kΩ 1) Max. 10% of a cycle, max 10 µs

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PCF801 **PCF803** Triode-pentode oscillator-UHF Mixer, I. I. F. Amplifier in TV-set for IV. and V. TV band	Size NA 34  **PCF801** 	I_f 0,3 A U_f 8,5 V t_f <19 s Indirect heating ● **Pentode** U_a 170 V U_{g2} 120 V R_k 110 Ω I_a 10 mA I_{g2} 3 mA S 11 mA/V $\mu_{g2/g1}$ 55 R_i >350 kΩ R_{ekv} 1,5 kΩ R_{vst} (f = 50 Mc/s) 10 kΩ U_a 200 V U_{g2} 200 V U_{g1} −12 V S 0,11 mA/V	Pentode as mixer U_b 200 200 V R_a 2,7 4,7 kΩ R_{g2} 27 27 kΩ R_{g1} 0,1 1 MΩ U_{bg1} −1,4 0 V I_a 10 9,3 mA I_{g2} 3 2,9 mA $U_{osc\,ef}$ 1,6 1,6 V S_c 5 4,7 mA/V I_{g1} 8 2,3 μA Pentode as IF amplifier U_b 200 200 V R_a 2,7 4,7 kΩ R_{g2} 27 27 kΩ R_{g1} 0,1 1 MΩ U_{bg1} −1,4 0 V I_a 10 13 mA I_{g2} 3 3,9 mA S 11 14,5 mA/V S (−12 V) : (−1,4 V) 1 : 1000	Pentode U_{ao} 550 V U_a 250 V W_a 2 W U_{g2o} 550 V U_{bg2} 250 V U_{g2} 250 V W_{g2} ($-U_{g1}$ <1,5 V) 0,45 W ($-U_{g1}$ = 1,5 <2 V) 0,4 W ($-U_{g1}$ >2 V) 0,3 W I_k 18 mA R_{g1} (p) 1 MΩ R_{g1} (k) 2,2 MΩ $-U_{g1}$ 50 V $U_{k/f}$ 100 V $U_{k/f\,ef}$ 50 V

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PCF801 PCF803	 **PCF803** 	**Triode** U_a 100 V R_k 200 Ω I_a 15 mA S 9 mA/V μ 20 I_{az} (U_{g1} = −10 V) $<$0,1 mA	**Triode as oscillator** U_b 200 200 V R_a 8,2 12 kΩ R_{g1} 10 10 kΩ I_a 16 12 mA $U_{osc\ ef}$ 4,5 3,3 V S_{ef} 3,7 3,7 mA/V **Capacitances** **Pentode** **Triode** C_{g1} 6,2 pF C_{g1} 3,3 pF C_a 3,7 pF C_a 1,7 pF $C_{a/g1}$ 9$<$12 mpF $C_{a/g1}$ 1,8 pF $C_{g1/g2}$ 1,6 pF **Between systems** $C_{aP/aT}$ $<$0,025 pF $C_{g1P/aT}$ $<$0,01 pF $C_{aP/g1T}$ $<$0,01 pF $C_{g1P/g1T}$ $<$0,01 pF	**Triode:** U_{ao} 550 V U_a 125 V W_a 1,5 W I_k 20 mA R_{g1} 500 kΩ $-U_{g1}$ 50 V $U_{k/f}$ 100 V $U_{k/f\ ef}$ 50 V

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PCF802 Triode-pentode Triode as reactance tube, pentode as sine oscillator, puls-shaper	Size NA 40  	I_f 0,3 A U_f 9 V t_r [illegible] s **Indirect heating** ● **Triode** U_a 200 V I_a 3,5 mA R_k 570 Ω S 3,5 mA/V μ 70 R_i 20 kΩ I_{az} (U_{g1T} = −9 V) <0,05 mA **Pentode** U_a 100 V U_{g2} 100 V R_k 130 Ω I_a 6 mA I_{g2} 1,7 mA S 5,5 mA/V $\mu_{g2/g1}$ 47 R_i 400 kΩ I_{az} (U_{g1} = −4 V) <0,27 mA	**Pentode** U_a 100 200 V U_{g2} 100 200 V U_{g1} 0 $\overbrace{\qquad}$ −1 −16 V I_a 12,5 6 <0,01 mA I_{g2} 3,5 1,7 mA **Triode** I_a (I_{g1} = 10 μA) 10 mA **Capacitances** **Pentode** C_{g1} 5,4 pF, $C_{a/g1}$ 0,06 pF, $C_{g1/f}$ <0,1 pF **Triode** C_{g1} 2,4 pF, $C_{a/g1}$ 1,5 pF, $C_{g1/f}$ <0,1 pF To avoid hum interference the A. C. component of $U_{k/f}$ should not exceed 65 V at the specified value of Z_{g1}.	**Triode** U_{ao} 550 V U_a 250 V W_a 1,4 W I_k 10 mA R_{g1} (p) 3 MΩ $U_{k/f}$ ±100 V Z_{g1} (50 c/s) 50 kΩ **Pentode** U_{ao} 550 V U_a 250 V W_a 1,2 W U_{g2o} 550 V U_{g2} 250 V W_{g2} 0,8 W I_k 15 mA $I_{k\,sp}$ 1) 50 mA R_{g1} (p) 0,56 MΩ R_{g1} (k) 1 MΩ $U_{k/f}$ 100 V Z_{g1} (50 c/s) 300 kΩ 1) Max. 30 μs, duty cycle max 30%

Type Application	Dimensions Base	Heating Static data	Operational Data		Maximum Ratings
PCH200 Triode-heptode pulse separators and amplifier in TV receivers	Size De 1  	I_f 0,3 A U_f 9,2 V t_f <19 s Heptode U_a 14 V U_{g3} 0 V U_{g2} 14 V U_{g1} 0 V I_a 1,5 mA I_{g2+g4} 1,3 mA U_a 14 V U_{g2+g4} 14 V $+I_{g1}$ 100 µA $+I_{g3}$ 1 µA I_a 750 µA Triode U_a 100 V R_k 110 Ω I_a 9 mA S 9 mA/V µ 50 I_{az} ($U_a = 200$ V, $U_{g1} = -11$ V) <0,1 mA	**Capacitances** (without exter. screen.) **Heptode** C_{g1} 4,4 pF C_a 5,0 pF C_a/g_1 <0,1 pF C_a/g_3 <0,25 pF C_{g1}/g_3 0,3 pF **Between sections** $C_{g1H/g1T}$ <0,005 pF $C_{g1H/aT}$ <0,01 pF **Statistic data of heptode** U_a 14 V U_{g3} 0 V U_{g2+g4} 14 V U_{g1} −2,4 V I_{az} <20 µA U_a 14 V U_{g2+g4} 14 V U_{g3} −2,2 V U_{g1} 0 V I_{az} <20 µA	 Triode C_{g1} 3,3 pF C_a 1,7 pF C_a/g_1 1,8 pF $C_{g3H/aT}$ <0,02 pF $C_{aH/aT}$ <0,15 pF U_a 14 V U_{g2+g4} 14 V U_{g3} +25 V U_{g1} −2,7 V I_{az} <20 µA U_a 14 V U_{g2+g4} 14 V I_a 20 µA I_{g3} +100 µA $-U_{g3}$ <2,3 V	**Heptode** U_{ao} 550 V U_a 100 V W_a 0,5 W U_{g2+g4o} 550 V U_{g2+g4} 50 V U_{g2+g4} >6 V W_{g2+g4} 0,5 W I_k 8 mA $-U_{g1\,sp}$ 100 V $-U_{g3\,sp}$ 150 V R_{g1} 3 MΩ R_{g3} 3 MΩ $U_{k/f}$ 100 V $R_{k/f}$ 20 kΩ **Triode** U_{ao} 550 V U_a 250 V W_a 1,5 W I_k 20 mA $-U_{g1\,sp}$ 200 V R_{g1} (p) 2 MΩ R_{g1} (k) 3 MΩ $U_{k/f}$ [1] 170 V $R_{k/f}$ 20 kΩ

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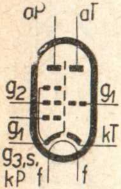
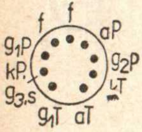
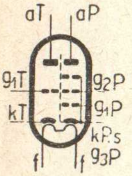
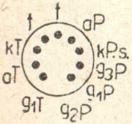
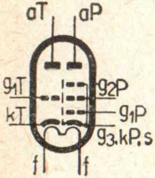
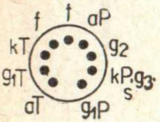
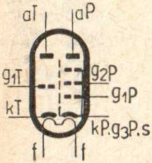
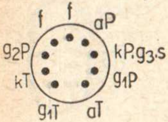
[1] Max. DC component 70 V. AC component 100 V.

Type • Application	Dimensions Base	Heating			Operational Data					Maximum Ratings		
		Static data										
PCL82	Size N 5	I_f	0,3	A	Pentode: AF power amplifier,					Pentode		
		U_f	16	V	class A					U_{ao}	900	V
		t_f	<20	s	U_a	170	200	200	V	U_a	600	V
		Indirect heating			U_{g2}	170	170	200	V	$+U_{a\,sp}$ 1)	2500	V
		●			U_{g1}	−11,5	−12,5	−16	V	$-U_{a\,sp}$	500	V
		Pentode			I_a	41	35	35	mA	W_a (U_a >250 V)		
		U_a	200	V	I_{g2}	8	6,5	7	mA		5	W
		U_{g2}	200	V	R_a	3,9	5,6	5,6	kΩ	W_a (U_a <250 V)		
		U_{g1}	−16	V	$U_{g1\,ef}$	6	5,8	6,6	V		7	W
		I_a	35	mA	P_o	3,3	3,4	3,5	W	U_{g20}	550	V
		I_{g2}	<7	mA	k	10	10	10	%	U_{g2}	300	V
		S	6,4	mA/V						W_{g20}	1,8	W
		$\mu_{g2/g1}$	9,5		AF push-pull amplifier, class AB					W_{g2}	3,2	W
		R_i	20	kΩ	U_a		170	200	V	I_k	50	mA
		Triode			U_{g2}		170	200	V	R_{g1} 2)	1	MΩ
		U_a	100	V	R_k		135	165	Ω	R_{g1} 3)	2	MΩ
		U_{g1}	0	V	I_{ao}		2×33	2×35	mA	$U_{k/f}$	200	V
		I_a	3,5	mA	I_a		2×37	2×38	mA	$R_{k/f}$	20	kΩ
Triode-pentode		S	2,5	mA/V	I_{g20}		2×6,2	2×6,5	mA			
Pentode		μ	70		I_{g2}		2×15	2×16,5	mA			
AF power amplifier,					$R_{a-a'}$		5	5	kΩ			
vertical amplifier					$U_{g1\,ef}$		9	10,9	V			
output stage					P_o		7	9	W			
Triode: AF amplifier					k		4	4,8	%			

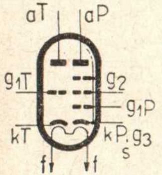
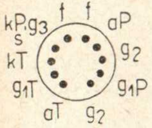
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PCL82		**Capacitances** **Pentode** C_{g1} 9,3 pF C_a 8 pF $C_{a/g1}$ <0,3 pF **Triode** C_{g1} 3 pF C_a 4,3 pF $C_{a/g1}$ 4,5 pF Between sections $C_{gT/aP}$ <0,02 pF	**Vertical amplifier output stage** It must be ensured that under full signal conditions $I_{a\,sp}$ = 85 mA at U_a = 50 V and U_{g2} = 170 V. Anode current of an average new tube: $I_{a\,sp}$ = 135 mA at U_a = 50 V. U_{g2} = 170 V U_{g1} to be set to I_{g1} = 0,3 μA. **Triode: AF resistance-coupled amplifier** U_b 170 200 170 200 V R_a 220 220 220 220 kΩ R_{g1} 3 3 22 22 MΩ R_{g1}' 700 700 700 700 kΩ R_k 2700 2200 0 0 Ω I_a 0,43 0,52 0,5 0,61 mA $U_{a\,ef}$ 25 26 20 25 V V 51 52 53 55 k 2,3 1,6 1,4 1,4 % **Oscillator:** It must be ensured that $I_{k\,sp}$ does not exceed 100 mA. Thus the permissible tolerances and the emission loss during the service life of the tube will be accounted for. It is recommended to insert unshunted resistors into the grid and anode circuits to limit the search currents.	**Triode** U_{ao} 550 V U_a 300 V $U_{a\,sp}$ 1) 600 V W_a 1 W I_k 15 mA $I_{k\,sp}$ 1) 250 mA R_{g1} 2) 1 MΩ R_{g1} 3) 3 MΩ R_{g1} 4) 22 MΩ Z_{g1} (50 c/s) 0,5 MΩ $U_{k/f}$ 200 V $R_{k/f}$ 20 kΩ 1) Max 4% of a cycle, max 0,8 ms 2) U_{g1} fixed 3) U_{g1} automatic 4) U_{g1} produced by I_{g1}

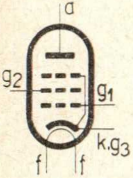
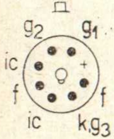
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PCL84 Triode-pentode with separate cathodes Triode: Gated AGC, sync separation Pentode: Video output stage for TV-receivers	Size N 4  	I_f 0,3 A U_f 15 V Indirect heating ● **Triode** U_a 200 V U_{g1} −1,7 V I_a 3 mA S 4 mA/V μ 65 I_{az} (U_{g1} = −4 V) <0,6 mA **Pentode** U_a 200 V U_{g2} 200 V U_{g1} −2,9 V I_a 18 mA I_{g2} 3 mA S 10,4 mA/V $\mu_{g2/g1}$ 36 R_i >130 kΩ I_{az} (U_{g1} = −8 V) <1,3 mA	**Video output stage** U_b 170 200 220 V R_a 3 3 3 kΩ U_{g2} 170 200 220 V U_{g1} −2 −2,8 −3,3 V I_a 18 18 18 mA I_{g2} 3,2 3,1 3,1 mA S 10,4 10 9,7 mA/V **Capacitances** **Pentode** C_{g1} 9 pF C_a 4,5 pF $C_{a/g1}$ <0,1 pF **Triode** C_{g1} 4 pF C_a 2,3 pF $C_{a/g1}$ 2,7 pF $C_{g1/f}$ >0,045 pF <0,1 pF **Between sections** $C_{aT/g1P}$ <0,01 pF $C_{g1T/g1P}$ <0,01 pF 1) Max. 18 % af a cycle, max. 18 µs 2) U_{g1} fixed	**Triode** U_{ao} ±500 V U_a ±250 V $U_{a\,sp}$ 1) 600 V W_a 1 W I_k 12 mA R_{g1} 2) 1 MΩ R_{g1} 3 MΩ $U_{-k/f+}$ 150 V $U_{+k/f-}$ 200 V +150 Vef $R_{k/f}$ 20 kΩ **Pentode** U_{ao} 550 V U_a 250 V W_a 4 W U_{g2o} 550 V U_{g2} 250 V W_{g2} 1,7 W I_k 40 mA R_{g1} 2) 1 MΩ R_{g1} 2 MΩ $U_{k/f}$ 200 V $R_{k/f}$ 20 kΩ

Type	Dimensions	Heating	Operational Data	Maximum Ratings
Application	Base	Static data		
PCL85 Triode-pentode Oscillator, preamplifier pentode as vertical deflection output stage	Size N 5  	I_f 0,3 A U_f 14,5 V Indirect heating **Pentode** U_a 50 V U_{g2} 170 V U_{g1} −1 V $I_{a\ sp}$ 200 mA $I_{g2\ sp}$ 35 mA U_a 65 V U_{g2} 210 V U_{g1} −1 V $I_{a\ sp}$ 285 mA $I_{g2\ sp}$ 45 mA **Triode** U_a 100 V U_{g1} 0 V I_a 10 mA S 5,5 mA/V µ 50 R_i 9 kΩ	**Vertical deflection amplifier output stage** Values of voltages and currents at max. excitation: **Anode peak current** – $I_{a\ sp}$: With regard to the permissible tolerances and the characteristic data loss of the tubes during the service life of the tube and mains voltage decrease to 10 % must be the circuit projected for maximum value of anode current as 60 % characteristic value at bias voltage $U_{g1} = -1$ V and such screen voltage, which at mains voltage decrease to 10 % in intended circuit is at a disposal. **Minimal anode voltage** – $U_{a\ min}$: In order not to exceed the maximum permissible value of screen grid, the circuit should be designed in such a way that at a mains voltage decrease of 10 % below nominal anode voltage at the end of scan will not be lower than the value of screen grid voltage. Continuation on p. 159	Pentode U_{ao} 550 V U_a 250 V U_a min U_{g2} = 150 V >40 V U_{g2} = 190 V >52 V $U_{a\ sp}$ 3) 2000 V W_a 7 W W_a 4) 9 W U_{g2o} 550 V U_{g2} 250 V W_{g2} 1,5 W W_{g2} 4) 2 W I_k 75 mA R_{g1} (p) 1 MΩ R_{g1} (k) 2,2 MΩ $U_{k/f}$ 200 V $R_{k/f}$ 20 kΩ Triode U_{ao} 550 V U_a 250 V W_a 0,5 W I_k 15 mA $I_{k\ sp}$ 1) 100 mA $I_{k\ sp}$ 2) 200 mA

Type	Dimensions	Heating			Operational Data				Maximum Ratings		
Application	Base	Static data									
PCL86	Size N 5	I_f	0,3	A	**Triode as AF resistance-coupled amplifier**				**Triode**		
		U_f	14,5	V	U_b	200	230	V	U_{ao}	550	V
		Indirect heating			R_a	220	220	kΩ	U_a	250	V
		●			R_{g1}	10	10	MΩ	W_a	0,5	W
		Triode			R_{g1}'	680	680	kΩ	I_k	4	mA
		U_a	230	V	R_{gen}	47	47	kΩ	R_{g1} (p)	1	MΩ
		U_{g1}	−1,7	V	I_a	0,42	0,52	mA	R_{g1} (k)	2	MΩ
		I_a	1,2	mA	$U_{a\ ef}$	3,2	3,2	V	R_{g1} (i)	22	MΩ
		S	1,6	mA/V	V	66	68		$U_{k/f}$	100	V
		μ	100		k	0,6	0,5	%	$R_{k/f}$	20	kΩ
		**Pentode**									
		U_a	230	V	**Pentode as AF output amplifier class A**				**Pentode**		
		U_{g2}	230	V	U_a	200	230	V	U_{ao}	550	V
		U_{g1}	−5,7	V	U_{g2}	200	230	V	U_a	250	V
		I_a	39	mA	R_k	67	115	Ω	W_a	9	W
		I_{g2}	6,5	mA	R_a	4,7	5,1	kΩ	U_{g2o}	550	V
		S	10,5	mA/V	I_{ao}	46	40	mA	U_{g2}	250	V
		$\mu_{g2/g1}$	21		I_a	46,5	42	mA	W_{g2o}	1,5	W
Triode-pentode with separate cathodes AF voltage amplifier, output amplifier class A, AB		R_i	45	kΩ	I_{g2o}	7,6	6,7	mA	W_{g2}	3	W
					I_{g2}	8,8	11,4	mA	I_k	55	mA
					$U_{g1\ ef}$	1,9	3,3	V	$R_{g1}(k)$	1	MΩ
					P_o	2	4	W	$U_{k/f}$	100	V
					k	4	10	%	$R_{k/f}$	20	kΩ

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PCL86			**Capacitances** 1) **Triode** C_{g1} 2,3 pF C_a 2,5 pF $C_{a/g1}$ 1,6 pF $C_{g1/f}$ <0,006 pF **Pentode** C_{g1} 10 pF $C_{a/g1}$ <0,4 pF $C_{g1/f}$ <0,2 pF	**Between section:** $C_{g1T/g1P}$ <0,02 pF $C_{aT/g1P}$ <0,2 pF $C_{aT/aP}$ <0,15 pF $C_{g1T/aP}$ <0,01 pF $C_{g1T/aP}$ 2) <0,002 pF 1) Without screening 2) With screening ∅ 22,5 mm
PCL85			**Capacitances** $C_{aP/g1P}$ <0,6 pF $C_{aT/g1P}$ <0,08 pF $C_{g1P/f}$ <0.2 pF $C_{g1T/aP}$ <0,03 pF $C_{gT/g1P}$ <0,18 pF	R_{g1} (p) 1 MΩ R_{g1} (k) 3,3 MΩ $U_{k/f}$ 200 V 1) Max 4% of a cycle, max 0,8 ms 2) Max 2% of a cycle, max 0,4 ms 3) Max. 5% of a cycle, max. 1 ms. 4) Absolute maximum.

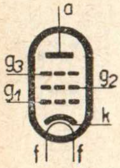
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PCL200 Triode-pentode with separate cathodes Triode as gated AGC stage, pentode as video output stage for TV receivers	Size NA 62  	I_f 0,3 A U_f 15,5 V t_f <19 s Indirect heating ● **Triode** U_a 200 V R_k 175 Ω I_a 8,5 mA S 5,2 mA/V μ 55 I_{az} (U_{g1} = –12 V) <0,1 mA **Pentode** U_a 150 V U_{g2} 220 V R_k 44 Ω I_a 40 mA I_{g2} 8 mA S 28 mA/V R_i 22 kΩ I_{az} (U_{g1} = –14 V) <0,2 mA	**Pentode as video output amplifier** U_{ba} 200 220 V U_{bg2} 200 220 V R_a 2,7 3,6 kΩ R_k 18 30 Ω I_k ($U_{g1\,sp}$ = 0) 62 55 mA $U_{g1\,sp/sp}$ ($U_{a\,sp/sp}$=100 V) 2,9 2,8 V **Capacitances** **Pentode** C_{g1} 14,5 pF C_a 5,8 pF $C_{a/g1}$ 0,07 pF **Triode** C_{g1} 3,2 pF C_a 4,4 pF $C_{a/g1}$ 2,5 pF **Between systems:** $C_{a\,P/aT}$ <0,2 pF $C_{g1\,P/gT}$ <0,01 pF $C_{a\,T/g1P}$ <0,015 pF $C_{a\,P/g1T}$ <0,05 pF	**Triode** $U_{a\,sp}$ [1] 600 V U_{ao} 550 V U_a 250 V W_a 1,7 W I_k 15 mA R_{g1} (p) 0,5 MΩ $U_{k/f}$ 200 V **Pentode** U_{ao} 550 V U_a 250 V W_a 6 W $U_{g2\,o}$ 550 V U_{g2} 250 V W_{g2} 2,5 W I_k 85 mA R_{g1} (p) 0,5 MΩ $U_{k/f}$ [2] 200 V 1) I_a <0,1 mA; max 18 % of a cycle, max. 18 μs. 2) DC component max. 100 V

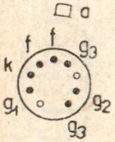
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PL36 Output pentode Horizontal deflection amplifier output stage of TV receivers	Size O 4  	I_f 0,3 A U_f 25 V t_f 20 s Indirect heating ● U_a 170 V U_{g2} 170 V U_{g1} −21 V I_a 100 mA I_{g2} 8 mA S 11 mA/V $\mu_{g2/g1}$ 5,6 R_i 5,5 kΩ I_{az} (U_{g1} = −60 V) <1 mA	Horizontal deflection amplifier output stage: With regard to the permissible tolerances and the emission loss during the service life of the tube, it must be ensured that $I_{a\,sp}$ remains approximately 75 % of the values listed below. U_a 70 170 V U_{g2} 170 170 V U_{g1} −1 −1 V $I_{a\,sp}$ 1) 500 550 mA --- 1) Current of a new tube. **Capacitances** C_{g1} 18 pF C_a 8 pF $C_{a/g1}$ <1,1 pF	U_{ao} 550 V U_a 250 V $+U_{a\,sp}$ 1) 7 kV $-U_{a\,sp}$ 1) −1,5 kV W_a 10 W U_{g2o} 550 V U_{g2} 250 V W_{g2} 3) 4 W W_a+W_{g2} 2) 13 W I_k 200 mA R_{g1} 0,5 MΩ $R_{k/f}$ 20 kΩ $U_{-k/f+}$ 200 V $U_{+k/f-}$ 250 V --- 1) Max 18% of a cycle, max 18 μs 2) As horizontal deflection amplifier output stage 3) During the heating-up period of booster diode, W_{g2} max 7 W.

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings

FL81

Size N 5





Output pentode
Horizontal deflection amplifier output stage of TV receivers,
AF push-pull amplifier

I_f	0,3	A
U_f	21,5	V
t_f	<30	s

Indirect heating

●

U_a	170	V
U_{g3}	0	V
U_{g2}	170	V
U_{g1}	−22	V
I_a	45	mA
I_{g2}	3,3	mA
S	6,2	mA/V
$\mu_{g2/g1}$	5,5	
R_i	10	kΩ
I_{az} ($U_{g1} = -35$ V)	<12	mA

Capacitances

C_{g1}	16	pF
C_a	7	pF
$C_{a/g1}$	<0,8	pF
$C_{a/k}$	<0,1	pF
$C_{g1/f}$	<0,2	pF

Horizontal defl. amplifier output stage: With regard to the permissible tolerances and the emission loss during the service life of the tube, it must be ensured that $I_{a\,sp}$ does not exceed the values listed below under the following conditions:

U_a	70	70	V
U_{g2}	170	200	V
U_{g1}	−1	−1	V
$I_{a\,sp}$	<350	<420	mA*)
$I_{a\,sp}$	<250	<310	mA

AF push-pull amplifier, class B

U_a	170	200	V
U_{g3}	0	0	V
U_{g2}	170	200	V
U_{g1}	−27	−31,5	V
R_{g2}	1	1	kΩ
$R_{a-a'}$	2,5	2,5	kΩ
$U_{g1\,cf}$	19	22,5	V
I_{ao}	2×20	2×25	mA
I_a	2×73	2×87	mA
I_{g20}	2×1,5	2×2	mA
I_{g2}	2×10	2×12,5	mA
P_o	13,5	20	W
k	5,5	5.5	%

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*) Of a new tube.

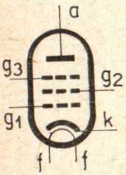
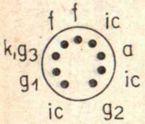
U_{ao}	550	V
U_a	250	V
$+U_{a\,sp}$ 1)	7	kV
W_a	8	W
U_{g3}	0	V
U_{g2o}	550	V
U_{g2}	250	V
W_{g2} 2)	4,5	W
W_{g2} 3)	6	W
W_a+W_{g2}	10	W
I_k	180	mA
$U_{k/f}$	200	V
$R_{k/f}$	20	kΩ
R_{g1}	0,5	MΩ
t_{ip}	18	µs
t_{ip}/T	1 : 4,5	

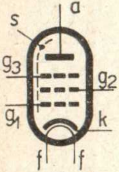
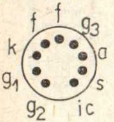
---

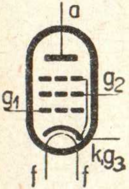
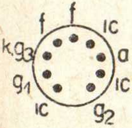
1) Max 18% of a cycle, max 18 µs

2) As horizontal deflection amplifier output stage

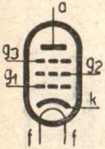
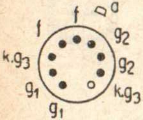
3) During the heating-up period of booster diode.

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PL82 Output pentode AF amplifier, vertical output stage of TV receivers	Size N 5  	I_f 0,3 A U_f 16,5 V t_f 15 s Indirect heating ● U_a 170 V U_{g2} 170 V U_{g1} −10,4 V I_a 53 mA I_{g2} 10 mA S 9 mA/V $\mu_{g2/g1}$ 10 R_i 20 kΩ	**AF amplifier, class A:** $U_a = U_b$ 170 200 V U_{g2} 170 – V R_{g2} – 680 Ω R_k 165 260 Ω I_{g2} 10 8,5 mA I_a 53 45 mA $U_{g1\,ef}$ 6 7 V R_a 3 4 kΩ P_o 4 4,2 W k 10 10 % **AF push-pull amplifier, class A:** U_a 200 V U_{g2} 200 V R_k 1) 135 Ω $R_{a-a'}$ 4 kΩ P_o 12 W k 5 % $U_{g1\,ef}$ 13,5 V 1) Common **Vertical deflection amplifier output stage:** With regard to the permissible tolerances and the emission loss during the service life of the tube, it is recommended to ensure that the listed anode current is not exceeded. U_a 50 V $I_{a\,sp}$ ≤90 mA U_{g2} 170 V	U_{ao} 550 V U_a (W_a <4,5 W) 450 V U_a 250 V $+U_{a\,sp}$ 1) 2,5 kV $-U_{a\,sp}$ −500 V W_a 9 W U_{g2o} 550 V U_{g2} 250 V W_{g2} 2,5 W I_k 75 mA R_{g1} 2) 1 MΩ R_{g1} 3) 0,4 MΩ $U_{k/f}$ 200 V $R_{k/f}$ 20 kΩ 1) Max 10% of a cycle, max 2 ms 2) U_{g1} automatic 3) U_{g1} fixed **Capacitances** C_{g1} 12,5 pF C_a 5,5 pF $C_{a/g1}$ ≦0,5 pF $C_{g1/f}$ ≦0,15 pF

Type Application	Dimensions Base	Heating Static data			Operational Data				Maximum Ratings		
PL83	Size N 5	I_f	0,3	A	**Video amplifier:**				U_{ao}	550	V
		U_f	15	V	U_b	170	200	V	U_a	250	V
		t_f	<15	s	U_{g3}	0	0	V	W_a	9	W
		Indirect heating			U_{g2}	170	200	V	U_{g2o}	550	V
		●			R_k	500	500	Ω	U_{g2}	250	V
		U_a	200	V	R_a	5	5	kΩ	W_{g2}	2	W
		U_{g3}	0	V	I_a	8,4	10,4	mA	R_{g1} 1)	1	MΩ
		U_{g2}	200	V	I_{g2}	1,8	2	mA	R_{g1} 2)	0,5	MΩ
		U_{g1}	−3,5	V					I_k	70	mA
		I_a	36	mA	Capacitances				$U_{k/f}$ 3)	200	V
		I_{g2}	5	mA	C_{g1}		10,8	pF	$R_{k/f}$	20	kΩ
		S	10,5	mA/V	C_a		6,6	pF			
		$\mu_{g2/g1}$	24		$C_{a/g1}$		≦0,1	pF	1) U_{g1} automatic		
		R_i	100	kΩ	$C_{g1/f}$		≦0,15	pF	2) U_{g1} fixed		
		I_{az} (U_{g1} = −12 V)							3) DC component		
			<1,5	mA					max 150 V		
High-slope pentode Output stage of wideband and video amplifiers											

Type Application	Dimensions Base	Heating Static data			Operational Data				Maximum Ratings		
PL84	Size N 5	I_f	0,3	A	AF power amplifier, class A						
		U_f	15	V	$U_b=U_a$	170	200	V	U_{ao}	550	V
		t_f	13	s	R_{g2}	0	500	Ω	U_a	250	V
		Indirect heating			U_{g2}	170	200	V	W_a	12	W
		●			U_{g1}	−12,5	−17,3	V	U_{g2o}	550	V
		U_a	170	V	I_a	70	60	mA	U_{g2}	200	V
		U_{g2}	170	V	I_{g2}	5	4,1	mA	W_{g2o}	1,75	W
		U_{g1}	−12,5	V	R_a	2,4	2,4	kΩ	W_{g2}	6	W
		I_a	70	mA	$U_{g1\,ef}$	7	7,8	V	I_k	100	mA
		I_{g2}	5	mA	P_o	5,6	5,2	W	R_{g1} 1)	1	MΩ
		S	10	mA/V	k	10	10	%	$U_{k/f}$	200	V
		$\mu_{g2/g1}$	8		AF push-pull power amplifier, class:				$R_{k/f}$	20	kΩ
		R_i	23	kΩ		**AB**	**B**				
					U_a	170	170	V	1) U_{g1} automatic		
					U_{g2}	170	170	V	Capacitances		
					R_k	120	0	Ω	C_{g1}	12	pF
					U_{g1}	–	−20,5	V	C_a	6	pF
					I_{ao}	2×56,5	2×15	mA	$C_{a/g1}$	<1	pF
					I_a	2×57,5	2×57,5	mA			
					I_{g2o}	2×3	2×0,7	mA			
					I_{g2}	2×20,5	2×20,5	mA			
					$U_{g1\,ef}$	13,1	14,6	V			
					$R_{a-a'}$	3,5	3,5	kΩ			
Power pentode AF power amplifier					P_o	13	13,5	W			
					k	4,5	4,8	%			

<table>
<tr><th>Type
Application</th><th>Dimensions
Base</th><th>Heating
Static data</th><th>Operational Data</th><th>Maximum Ratings</th></tr>
<tr>
<td>**PL500**

Output pentode
Horizontal deflection amplifier output stage of TV-receivers</td>
<td>Size MN 1

 </td>
<td>I_f 0,3 A
U_f 27 V
t_f 15 <19 s
Indirect heating
●
U_a 75 V
U_{g2} 200 V
U_{g1} −10 V
$I_{a\,sp}$ 440 mA
$I_{g2\,sp}$ 30 mA
(measured dynamicaly)

U_a 170 V
U_{g2} 170 V
$-U_{g1}$ 60 V
I_a <1 mA</td>
<td>Horizontal deflection amplifier output stage:
<table>
<tr><th>U_b</th><th>R_{g2} min</th><th>U_{g2}</th><th>U_a</th><th>$-U_{g1}$</th><th>$I_{a\,sp}$</th></tr>
<tr><td>V</td><td>kΩ</td><td>V</td><td>V</td><td>V</td><td>mA</td></tr>
<tr><td>170</td><td>1,2</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>130</td><td>62</td><td>6</td><td>250</td></tr>
<tr><td></td><td></td><td>150</td><td>66</td><td>7</td><td>310</td></tr>
<tr><td>200</td><td>1,5</td><td>130</td><td>65</td><td>6</td><td>250</td></tr>
<tr><td></td><td></td><td>150</td><td>69</td><td>7</td><td>310</td></tr>
<tr><td></td><td></td><td>170</td><td>73</td><td>8</td><td>360</td></tr>
<tr><td>230</td><td>2,2</td><td>150</td><td>72</td><td>7</td><td>310</td></tr>
<tr><td></td><td></td><td>170</td><td>76</td><td>8</td><td>360</td></tr>
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<tr><td>190</td><td>2,2</td><td></td><td></td><td>+ 1</td><td>230</td></tr>
<tr><td>230</td><td>2,2</td><td></td><td></td><td>+ 1</td><td>320</td></tr>
</table>
</td>
<td>U_{ao} 550 V
U_a 250 V
U_a (U_{g2} – 130 V) >23 V
U_a (U_{g2} – 190 V) >33 V
$U_{a\,sp}$ 3) 7 kV
U_{g2o} 550 V
U_{g2} 250 V
I_k 250 mA
R_{g1} (k) 0,5 MΩ
R_{g1} 1) 2) 2,2 MΩ
$U_{k/f}$ 220 V
$R_{k/f}$ 20 kΩ

1) In stabilized circuit
2) Z_{g1} (f = 50 c/s) $\leqq$ 200 kΩ
3) Max 22% of a cycle, max 18 µs.</td>
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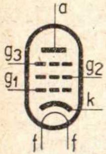
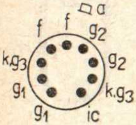
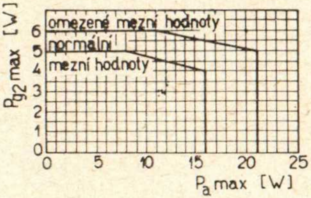
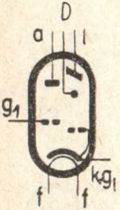
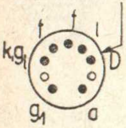
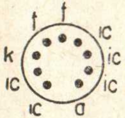
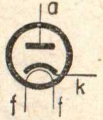
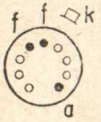
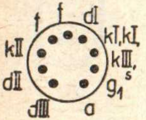
</table>

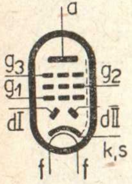
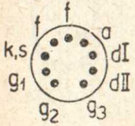
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PL 504 Output pentode Horizontal deflection amplifier output stage of TV-receivers	Size MN 1  	I_f 0,3 A U_f 27 V t_f <19 s Indirect heating ◍ U_a 50 V U_{g2} 200 V U_{g1} –10 V $I_{a\,sp}$ 420 mA $I_{g2\,sp}$ 37 mA **[measured dynamically]** U_a 170 V U_{g2} 170 V U_{g1} –60 V I_a $<0{,}7$ mA **Capacitances:** C_{g1} 22 pF C_a 9 pF $C_{a/g1}$ $<1{,}5$ pF		U_{a0} 550 V U_a 250 V U_a [$I_{a\,sp}$ = 250 mA] >49 V U_a [$I_{a\,sp}$ = 500 mA] >63 V $U_{a\,sp}$ 1) 7 kV $U_{g2\,0}$ 550 V U_{g2} 250 V I_k 250 mA $R_{g1}\,(k)$ 0,5 MΩ R_{g1} 2) 3) 2,2 MΩ $U_{k/f}$ 220 V $R_{k/f}$ 20 kΩ T_b 250 °C 1) Max. 22 % of a cycle, max. 18 µs. 2) In stabilized circuit. 3) Z_{g1} [f = 50 c/s] $\leqq 200$ kΩ

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PM84 Tuning indicator	Size N 6  Direction of view  	I_f 0,3 A U_f 4,5 V Indirect heating ● U_b 170 V U_l 170 V R_a 500 kΩ R_{g1} 3 MΩ U_{g1} 0/–15 V b 20/0 mm	$U_b - U_l$ 170 V R_a 500 kΩ R_{g1} 3 MΩ U_{g1} 0 –15 V I_l 0,7 0,95 mA I_a 0,3 0,04 mA b 20 0 mm	U_{ao} 550 V U_a 300 V W_a 0,5 W U_{lo} 550 V U_l 300 V U_l >170 V U_{Do} 550 V U_D 300 V R_{g1} 3 MΩ I_k 3 mA $U_{k/f}$ 100 V T_b 120 °C Capacitances $C_{a/k}$ 0,8 pF

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PY82   HT diode Half-wave rectifier	Size N 5	I_f 0,3 A U_f 19 V t_f <30 s Indirect heating ● I_d 150 mA R_i 67,5 Ω	Half-wave rectifier $U_{a\ ef}$ 127 200 220 240 250 V I_{ss} 180 180 180 180 180 mA U_{ss} 127 195 195 195 195 V C_N 60 60 60 60 60 µF R_o 0 30 65 105 125 Ω	U_{inv} 700 V $U_{a\ ef}$ 250 V I_{ss} 180 mA $U_{k/f}$ 550 V $U_{+k/f-}$ 250 V + 220 Vef C_N 60 µF Min. protective anode resistance R_o mln [Ω] — $U_{a\ ef}$ [V] 0 — 127 30 — 200 40 — 220 80 — 240 100 — 250

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
PY83 PY88	Size N 5 Size N 7  	**PY83** I_f 0,3 A U_f 20 V t_f <35 s Indirect heating ● U_a 15 V I_a >120 mA	**Capacitances** $C_{a/k}$ <6,2 pF $C_{k/f}$ <2,4 pF	U_{inv} 1) 5 kV $U_{inv\ sp}$ 1) 5,6 kV I_a 175 mA $I_{a\ sp}$ 1) 500 mA $U_{+k/f\ sp}$ 1) 5 kV $U_{+k/f\ sp}$ 1)2) 5,6 kV 1) Max 18% of a cycle, max 18 µs 2) Absolute maximum
Booster diode for horizontal amplifier output stage	 	**PY88** I_f 0,3 A U_f 30 V t_f <25 s Indirect heating ● U_a 15 V I_a >125 mA	1) Max 22 % of a cycle, max 18 µs 2) Absolute maximum **Capacitances** $C_{a/k}$ 8,6 pF $C_{k/f}$ 2 pF	U_{ao} 550 V U_a 250 V I_a 220 mA $I_{a\ sp}$ 550 mA U_{inv} 1) 6 kV U_{inv} 1) 2) 7,5 kV $U_{+k/f-\ sp}$1) 6,6 kV $U_{f/zem\ ef}$ 220 V W_a 5 W

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
UABC80 Diode-twin diode- AF triode AM demodulator, FM demodulator, AF amplifier	Size NA 50   	I_f 0,1 A U_f 28,5 V Indirect heating ● U_a 250 V U_{g1} −3 V I_a 1 mA S 1,2 mA/V μ 70 R_i 58 kΩ I_{az} (U_{g1} = −6 V) <0,15 mA ● U_{dI} 5 V I_{dI} 1 mA R_{dI} 5 kΩ $U_{dII,\ dIII}$ 5 V $I_{dII,\ dIII}$ 25 mA $R_{dII,\ dIII}$ 200 Ω $R_{dII,\ dIII}$ >0,67 <1,5	AF resistance-coupled amplifier U_b 200 200 200 V R_a 300 200 100 kΩ R_{g1} 10 10 10 MΩ R_{g1}' 1 0,7 0,7 MΩ I_a 0,45 0,6 0,95 mA $U_{g1\ ef}$ 70 74 82 mV $U_{a\ ef}$ 4 4 4 V k 0,4 0,45 0,35 % V 57 54 49 Capacitances $C_{g1/kI,\ III}$ 1,9 pF $C_{a/kI,\ III}$ 0,8 pF $C_{a/g1}$ 2 pF $C_{dI/kI,\ III+f}$ 0,8 pF $C_{dII/kI,\ III+kII+f}$ 4,8 pF $C_{dIII/kI,\ III+kII+f}$ 4,8 pF $C_{g1/f}$ <0,1 pF	Triode U_{ao} 550 V U_a 250 V W_a 1 W I_k 5 mA R_{g1} 3 MΩ R_{g1} 1) 22 MΩ $U_{k/f}$ 150 V $R_{k/f}$ 20 kΩ 1) U_{g1} produced by R_{g1} Diodes $U_{dI\ inv}$ 350 V $U_{dII\ inv}$ 350 V $U_{dIII\ inv}$ 350 V $I_{dI\ sp}$ 6 mA $I_{dII,\ III\ sp}$ 75 mA I_{dI} 1 mA $I_{dII,\ III}$ 10 mA

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
UBF89 Twin diode-variable-mu pentode Am demodulator, RF, IF amplifier	Size N 4  	I_f 0,1 A U_f 19 V Indirect heating ● U_a 250 V U_{g3} 0 V U_{g2} 100 V U_{g1} −2 V I_a 9 mA I_{g2} 2,7 mA S 3,8 mA/V $\mu_{g2/g1}$ 20 R_i 1 MΩ I_{az} (U_{g1} = −20 V) <80 µA U_d 4 V I_d >0,3 mA	**RF and IF amplifier** $U_b - U_a$ 100 200 V U_{g3} 0 0 V U_{g2} 0 30 V U_{g1} −2 −10 −1,5 −20 V I_a 8,5 – 11 – mA I_{g2} 2,8 – 3,3 – mA S 3,5 0,11 4,5 0,12 mA/V R_i 0,3 – 0,6 – MΩ **Capacitances** Pentode C_{g1} 5 pF C_a 5,5 pF $C_{a/g1}$ <0,0035 pF $C_{g1/f}$ 0,05 pF Between sections $C_{dI/a}$ 0,15 pF $C_{dII/a}$ 0,025 pF $C_{dI/g1}$ <0,0008 pF $C_{dII/g1}$ <0,001 pF **Diodes** $C_{dI/k}$ 2,5 pF $C_{dII/k}$ 2,5 pF $C_{dI/dII}$ <0,25 pF $C_{dI/f}$ 0,015 pF $C_{dII/f}$ 0,003 pF	**Pentode** U_{ao} 550 V U_a 300 V W_a 2,25 W U_{g2o} 550 V U_{g2} 300 V W_{g2} 0,45 W I_k 16,5 mA R_{g1} 3 MΩ R_{g1} [1] 22 MΩ R_{g3} 10 kΩ $U_{k/f}$ 150 V $R_{k/f}$ 20 kΩ **Diodes** U_d 200 V I_d 0,8 mA $I_{d\,sp}$ 5 mA

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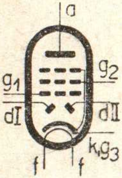
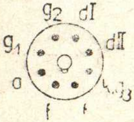
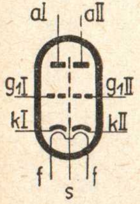
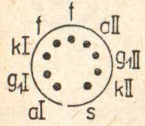
[1] U_{g1} produced by R_{g1}

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
UBL21 Twin diode-power pentode Power amplifier, detector, AVC source	Size L 2   	I_f 0,1 A U_f 55 V t_f 20 s Indirect heating ● U_a 200 V U_{g2} 200 V U_{g1} −13 V I_a 55 mA I_{g2} 9,5 mA S 8 mA/V R_i 25 kΩ	Power amplifier, class A U_a 100 180 200 V U_{g2} 100 180 200 V R_k 140 140 200 Ω I_a 32,5 61 55 mA I_{g2} 5,5 10 9,5 mA S 7,5 9 8 mA/V R_i 25 22 25 kΩ R_a 3 3 3,5 kΩ P_o 1,35 4,8 4,8 W k 10 10 10 % $U_{g1\ ef}$ 3,8 6,2 6,2 V Push-pull power amplifier, class AB U_a 100 200 V U_{g2} 100 200 V R_k 170 116 Ω $R_{a-a'}$ 5,5 4 kΩ $U_{g1\ ef}$ $\overbrace{0 \quad 6{,}2}$ $\overbrace{0 \quad 12}$ V I_a 2×17,5 2×19,6 2×50 2×56 mA I_{g2} 2×2,8 2×5 2×7,8 2×14 mA P_o 0 2,2 0 12,5 W k – 4 – 3,9 %	Pentode U_{ao} 550 V U_a 250 V W_a 11 W U_{g2o} 550 V U_{g2} 250 V W_{g2} ($U_{g1\ ef}$ = 0 V) 1,9 W W_{g2} ($U_{g1\ ef}$ max) 3,5 W I_k 75 mA R_{g1} 1 MΩ $R_{k/f}$ 20 kΩ $U_{k/f}$ 150 V Diodes $U_{dI,\ dII\ sp}$ 200 V $I_{dI,\ dII}$ 0,8 mA Capacitances $C_{a/g1}$ <1,2 pF $C_{dI/k}$ <2,2 pF $C_{dII/k}$ <2,2 pF $C_{dI/g1}$ <0,1 pF $C_{dII/g1}$ <0,1 pF

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
UCC85 Twin triode VHF-cascade amplifier, mixer	Size N 2  	I_f 0,1 A U_f 26 V Indirect heating ● U_a 170 V R_k 150 Ω I_a 10 mA S 6,2 mA/V μ 50 R_i 8 kΩ I_{az} (U_{g1} = −7 V) <1 mA	**RF and VHF amplifier** U_b 170 V — S 4,7 mA/V R_a 1) 1,3 kΩ — R_i 10,5 kΩ U_a 160 V — R_{ekv} 650 Ω R_k 330 Ω — Z_{g1} (f = 100 Mc/s) I_a 6 mA — 8 kΩ **Self-excited mixer** U_b 200 V — I_a 5,2 mA R_a 1) 8,2 kΩ — S_c 2,3 mA/V R_{g1} 1 MΩ — R_i 15 kΩ $U_{osc\ ef}$ 2,8 V — Z_{g1} (f = 100 Mc/s) 15 kΩ	U_{ao} 550 V U_a 250 V W_a 2,5 W $W_{aI}+W_{aII}$ 4,5 W I_k 15 mA R_{g1} 1 MΩ $-U_{g1}$ −100 V $U_{+k/f-}$ 200 V $U_{-k/f+}$ 90 V $R_{k/f}$ 20 kΩ **Capacitances** $C_{a/g}$ 1,85 pF $C_{g/k+f+s}$ 3,3 pF $C_{a/k}$ 0,23 pF $C_{a/k+f+s}$ 1,6 pF $C_{aI/aII}$ 0,04 pF $C_{aI/kII}$ <0,008 pF $C_{gI/gII}$ 0,003 pF $C_{aI/gII}$ <0,008 pF $C_{aII/gI}$ <0,008 pF $C_{aII/kI}$ <0,008 pF $C_{gI/kII}$ <0,003 pF $C_{gII/kI}$ <0,003 pF

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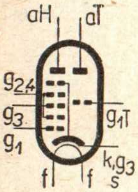
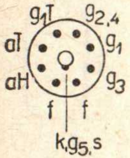
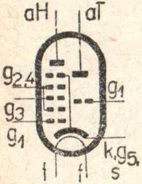
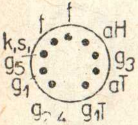
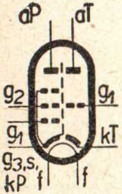
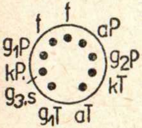
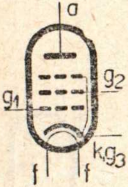
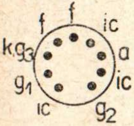
1) Shunted with capacitor 1000 pF.

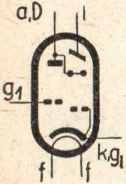
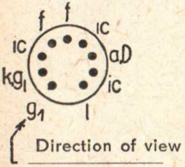
Type	Dimensions	Heating	Operational Data		Maximum Ratings
Application	Base	Static data			
UCH21 Triode-heptode Mixer, oscillator, AF, IF, RF amplifier phase invertor	Size L 1  	I_f 0,1 A U_f 20 V t_f 38 s Indirect heating ● **Heptode** U_a 200 V U_{g2+g4} 100 V U_{g3} 0 V U_{g1} −2,65 V I_a 5,2 mA I_{g2} 3,5 mA S 2,15 mA/V R_i 0,7 MΩ $\mu_{g2/g1}$ 18 **Triode** U_a 100 V U_{g1} −2,5 V I_a 5 mA S 2,1 mA/V μ 19 I_{az} (U_{g1} = −7 V) <1,9 mA	**Heptode: Mixer** U_b 200 V R_{g2+g4} 15,5 kΩ R_k 150 Ω R_{g3+gT} 50 kΩ I_{g3+gT} 190 μA U_{g1} −2 −28 V U_{g2+g4} 100 200 V I_a 3,5 – mA I_{g2+g4} 6,5 – mA S_c 750 7,5 μA/V R_i 1 >10 MΩ **Triode: Oscillator** U_b 200 V R_a 20 kΩ R_{gT+g3} 50 kΩ I_{gT+g3} 190 μA I_a 4,1 mA S_{ef} 0,45 mA/V **Capacitances:** **Heptode** C_{g1} 7 pF C_a 9,2 pF $C_{a/g1}$ <0,003 pF	**RF, IF amplifier:** U_b 200 V U_{g3} 0 V R_{g2+g4} 30 kΩ U_{g1} −2 −36 V U_{g2+g4} 94 200 V I_a 5,2 – mA I_{g2+g4} 3,5 – mA S 2200 2,2 μA/V R_i 0,7 10 MΩ $\mu_{g2/g1}$ 19 – (g_3 spoj s k) **AF resistance-coupled amplifier** U_b 200 V R_a 0,2 MΩ U_{g1} −2 −4 V I_a 0,8 0,37 mA U_{oef} 7,5 7,5 V V 10 10 k 2,8 6 % **Triode:** C_{g1} 4,3 pF C_a 3,6 pF $C_{a/g1}$ <1,25 pF	**Heptode** U_{ao} 550 V U_a 250 V W_a 1,5 W U_{g2+g4o} 550 V U_{g2+g4} (I_a = 3 mA) 100 V U_{g2+g4} (I_a <1 mA) 250 V W_{g2+g4} 1 W I_k 15 mA R_{g1} 3 MΩ R_{g3} 3 MΩ $U_{k/f}$ 150 V $R_{k/f}$ 20 kΩ **Triode** U_{ao} 550 V U_a 175 V W_a 0,5 W R_{g1} 3 MΩ

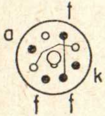
Type	Dimensions	Heating	Operational Data		Maximum Ratings
Application	Base	Static data			
UCH81 Triode-heptode Heptode: Mixer, RF, IF, AF amplifier Triode: Oscillator, self-oscillating mixer, AF amplifier	Size N 4  	I_f 0,1 A U_f 19 V Indirect heating ● Heptode U_a 250 V U_{g2+g4} 100 V U_{g1} −2 V I_a 6,5 mA I_{g2} 3,8 mA S 2,4 mA/V $\mu_{g2+g4/g1}$ 20 R_i 0,7 MΩ Triode U_a 100 V U_{g1} 0 V I_a 13,5 mA S 3,7 mA/V μ 22 R_i 6 kΩ	**Heptode: Mixer** g_3 connected to g_{1T} $U_b=U_a$ 200 V R_{g2+g4} 10 kΩ R_{g3+g1T} 47 kΩ I_{g3+g1T} 230 μA R_k 150 Ω U_{g1} $\overbrace{-2{,}5\ \ -28}$ V I_a 3,7 − mA I_{g2+g4} 8,1 − mA S_c 755 7,5 μA/V R_i 1 >3 MΩ R_{ekv} 75 kΩ **Triode: Oscillator** U_b 200 V R_a 16 kΩ R_{g1} 47 kΩ I_{g1} 230 μA I_a 5 mA S_{ef} 0,58 mA/V **Capacitances:** C_{g1H} 4,8 pF C_{g3H} 6 pF $C_{g1H/aH}$ <0,0065 pF	**IF amplifier:** g_3 connected to k $U_b=U_a$ 200 V R_{g2+g4} 18 kΩ R_k 220 Ω U_{g1} −2,6 −33 V I_a 7,6 − mA I_{g2+g4} 4,3 − mA S 2400 24 μA/V R_i 0,6 10 MΩ R_{ekv} 9,7 − kΩ **AF resistance-coupled amplifier** U_b 250 V R_a 100 kΩ U_{g1} −2 −4 V I_a 2 1,75 mA U_{g1ef} 1 2,7 V V 12,5 11,1 k 3,5 6 % C_{g1T} 2,6 pF C_{aT} 1,8 pF $C_{aT/g1T}$ 1 pF	**Heptode:** U_{ao} 550 V U_a 250 V W_a 1,7 W U_{g2+g4o} 550 V U_{g2+g4} 125 V U_{g2+g4} (I_{aH} <1 mA) 200 V W_{g2+g4} 1 W I_k 12,5 mA R_{g1} 3 MΩ R_{g3} 3 MΩ $R_{k/f}$ 20 kΩ $U_{k/f}$ 100 V **Triode:** U_{ao} 550 V U_a 250 V W_a 0,8 W I_k 6,5 mA R_{g1} 3 MΩ R_{g1} 1) 50 kΩ I_{g1} 1 mA 1) Optimum value, triode employed as oscillator

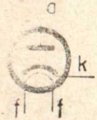
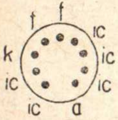
Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
UCL82 Triode-pentode Pentode: AF power amplifier Triode: AF amplifier	Size N 5  	I_f 0,1 A U_f 50 V Indirect heating ● **Pentode** U_a 200 V U_{g2} 200 V U_{g1} −16 V I_a 35 mA I_{g2} 7 mA S 6,4 mA/V $\mu_{g2/g1}$ 9,5 R_i 20 kΩ **Triode** U_a 100 V U_{g1} 0 V I_a 3,5 mA S 2,5 mA/V μ 70	**Pentode: AF power amplifier, class A** U_a 170 200 200 V U_{g2} 170 170 200 V U_{g1} −11,5 −12,5 −16 V I_a 41 35 35 mA I_{g2} 8 6,5 7 mA R_a 3,9 5,6 5,6 kΩ $U_{g1\,ef}$ 6 5,8 6,6 V P_o 3,3 3,4 3,5 W k 10 10 10 % **AF push-pull amplifier, class AB** U_a 170 200 V U_{g2} 170 200 V R_k 135 165 Ω I_{ao} 2×33 2×35 mA I_a 2×37 2×38 mA I_{g2o} 2×6,2 2×6,5 mA I_{g2} 2×15 2×16,5 mA $R_{a-a'}$ 5 5 kΩ $U_{g1\,ef}$ 9 10,9 V P_o 7 9 W k 4 4,8 %	**Pentode** U_{ao} 900 V U_a 600 V W_a (U_a >250 V) 5 W W_a (U_a <250 V) 7 W U_{g2o} 550 V U_{g2} 300 V W_{g2o} 1,8 W W_{g2} 3,2 W I_k 50 mA R_{g1} [1]) 1 MΩ R_{g1} [2]) 2 MΩ $U_{k/f}$ 200 V $R_{k/f}$ 20 kΩ

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
UCL82		**Capacitances** **Pentode** C_{g1} 9,3 pF C_a 8 pF C_a/g_1 <0,3 pF C_{g1}/f <0,3 pF **Triode** C_{g1} 3 pF C_a 4,3 pF C_a/g_1 4,5 pF C_{g1}/f <0,02 pF **Between sections** C_{gT}/aP <0,02 pF C_{gT}/g_1P <0,025 pF C_{aT}/aP <0,25 pF C_{aT}/g_1P <0,02 pF	**Triode: AF resistance-coupled amplifier** U_b 170 200 170 200 V R_a 100 100 100 100 kΩ R_k 1,8 1,5 0 0 kΩ R_{g1} 3 3 22 22 MΩ R_{g1}' 700 700 700 700 kΩ I_a 0,67 0,84 0,86 1,05 mA $U_{a\,ef}$ 25 30 19 24 V V 46 47 49 50 k 2,8 2,3 1,4 1,5 %	**Triode:** U_{ao} 550 V U_a 300 V W_a 1 W I_k 15 mA R_{g1} 1) 1 MΩ R_{g1} 2) 3 MΩ R_{g1} 3) 22 MΩ Z_{g1} (50 c/s) 0,5 MΩ U_k/f 200 V R_k/f 20 kΩ 1) U_{g1} fixed 2) U_{g1} automatic 3) U_{g1} produced by I_{g1}

Type	Dimensions	Heating			Operational Data					Maximum Ratings		
Application	Base	Static data										
UL84	Size N 5	I_f	0,1	A	AF power amplifier, class A					U_{ao}	550	V
		U_f	45	V	U_a		100	170	V	U_a	250	V
		Indirect heating			U_{g2}		100	170	V	W_a	12	W
		●			U_{g1}		−6,7	−12,5	V	U_{g2o}	550	V
		U_a	100	V	I_a		43	70	mA	U_{g2}	250	V
		U_{g2}	100	V	I_{g2}		3	5	mA	W_{g2o}	1,75	W
		U_{g1}	−6,7	V	R_a		2,4	2,4	kΩ	W_{g2}	6	W
		I_a	43	mA	$U_{g1\,ef}$		4,3	7	V	I_k	100	mA
		I_{g2}	3	mA	P_o		1,9	5,6	W	R_{g1}	1	MΩ
		S	9	mA/V	k		10	10	%	$U_{k/f}$	200	V
		$\mu_{g2/g1}$	8		AF push-pull amplifier, class					$R_{k/f}$	20	kΩ
		R_i	23	kΩ		AB	AB	B				
					U_a	100	170	170	V	1) U_{g1} automatic		
					U_{g2}	100	170	170	V			
					R_k	135	120	0	Ω	Capacitances		
					U_{g1}	–	–	−20,5	V	C_{g1}	12	pF
					I_{ao}	2×29	2×56,5	2×15	mA	C_a	6	pF
					I_a	2×31	2×57,5	2×57,5	mA	$C_{a/g1}$	<1	pF
					I_{g2o}	2×1.6	2×3	2×0,7	mA	$C_{g1/f}$	<0,25	pF
					I_{g2}	2×7	2×20,5	2×20,5	mA			
					$R_{a-a'}$	3,5	3,5	3,5	kΩ			
Power pentode					$U_{g1\,ef}$	7	13,1	14,6	V			
AF power amplifier					P_o	3,6	13	13,5	W			
					k	3	4,5	4,8	%			

Type Application	Dimensions Base	Heating Static data			Operational Data					Maximum Ratings		
UM80	Size N 4	I_f	0,1	A	U_b		250		V	U_{ao}	550	V
		U_f	19	V	U_l		250		V	U_a	250	V
		Indirect heating			R_{g1}		3		MΩ	W_a	0,2	W
		●			R_a+D		0,5		MΩ	U_{lo}	550	V
		U_a	100	V	U_{g1}	−4,5	−10	−20	V	U_l	250	V
		U_l	100	V	α	25	45	–	°	U_l	>160	V
		U_{g1}	−2	V	I_l	–	–	<3,8	mA	I_k	4	mA
		I_a	2,55	mA						R_{g1}	3	MΩ
		S	>0,7	mA/V						R_a	>200	kΩ
										$U_{k/f}$	200	V
										$R_{k/f}$	20	kΩ
										**Capacitances**		
										C_{g1}	2,9	pF
										$C_{a/g1}$	1,1	pF
Tuning indicator												

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
UY1N **UY1NS**	Size ○ 3 	I_f 0,1 A U_f 50 V t_f 40 s Indirect heating ● U_a 14 V I_a 140 mA	**UY1N** **Half-wave rectifier** $U_{a\,ef}$ 120 220 V R_o 0 125 Ω C_N 32 32 µF I_{ss} 50 140 50 140 mA U_{ss} 132 104 234 114 V	$U_{a\,ef}$ 250 V I_{ss} 140 mA $U_{k/f}$ 550 V U_{inv} 700 V W_a 2,5 W
			**UY1NS** **Half-wave rectifier** $U_{a\,ef}$ 120 250 V R_o 0 175 Ω C_N 32 32 µF I_{ss} 50 140 50 140 mA U_{ss} 132 104 250 174 V	$U_{a\,ef}$ 275 V I_a 140 mA U_{inv} 700 V $U_{k/f}$ 750 V U_{inv} 1) 800 V W_a 2,5 W 1) Peak value
Half-wave rectifier UY1NS for the TESLA 4203A TV-set				

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
UY82 **UY85**	Size N 5 Size N 4 	**UY82** I_f 0,1 A U_f 55 V t_f 35 s Indirect heating ● $U_{a\,ef}$ 220 V R_o 65 Ω R_z 1080 Ω C_N 60 µF I_{ss} >173 mA	Min. protective anode resistance $U_{a\,ef}$ [V] — $R_{o\,min}$ [Ω] 127 — 0 200 — 30 220 — 40 240 — 80 250 — 100 I_d 150 mA R_i 67,5 Ω	U_{inv} 700 V $U_{a\,ef}$ 250 V I_{ss} 180 mA $U_{k/f}$ 550 V $U_{+k/f-}$ 250 V + 220 Vef C_N 60 µF +50 %
Half-wave rectifier		**UY85** I_f 0,1 A U_f 38 V **Indirect heating** ● $U_{a\,ef}$ 220 V R_o 90 Ω R_z 1950 Ω C_N 100 µF I_{ss} >104 mA	**Half-wave rectifier** $U_{a\,ef}$ 110 127 220 250 V I_{ss} 110 110 110 110 mA U_{ss} 112 135 215 245 V C_N 100 100 100 100 µF R_o 0 0 90 100 Ω I_d 80 mA R_i 65 Ω	U_{inv} 700 V I_{ss} 110 mA I_{sp} 660 mA $U_{k/f}$ 550 V C_N 100 µF Min. protective anode resistance R_o min [Ω] — $U_{a\,ef}$ [V] 0 — 110 0 — 127 90 — 220 100 — 250

Cathode-ray and picture tubes

Designations of the C. R. tubes according to the TESLA standard NT-K 003.

According to this standard the C. R. tubes manufactured by TESLA are marked. The electrical properties and dimensions of these tubes tally with those of standard European types and are designated accordingly.

The designations of the C. R. tubes consist of three parts made up of groups of figures, letters and again figures. The centre letter group indicates the type of the tube. The first figure group indicates either the diameter or diagonal of the C. R. tube screen. This dimension is given in round figures in centimetres. The group of letters indicates the design of the C. R. tube. The letters indicate the following:

QP – C. R. tube with magnetic deflection or monoscope
QQ – C. R. tube with magnetic deflection and electrostatic focusing
QR – C. R. tube with electrostatic deflection

The third part of the designation consists of a group of figures. The numbers 40 to 86 indicate the type of screen, as follows:

40 – monoscope
41 – green phosphor, medium afterglow
42 – blue-green phosphor, long afterglow
44 – white phosphor, medium afterglow
47 – blue phosphor, very long afterglow
50 – skiatron
51 – blue phosphor, short afterglow
52 – orange phosphor, long afterglow
55 – blue-green phosphor, very short afterglow
86 – yellow phosphor, very long afterglow

In the C. R. tubes 7QR20, 12QR50 and 12QR51, marked in the old manner, the third part of the designation has another meaning. The first figure of the designation refers to the type of base, the second figure indicates the type, special electrical properties, or the mechanical design or properties of the screen.

The first figure of the designation indicates the base:

2 – loctal S8/18 Standard: ČSN 35 8903
5 – all-glass nine-pin base S9/25 Standard: ČSN 38 8905.

Standard European C. R. tube designations

The electrical properties and dimensions of the C. R. tubes tally with those of standard European types and are designated accordingly.

The designations of the C. R. tubes consist of three parts, first a group of letters followed by two groups of figures separated by a dash. Between the group of letters and the first group of figures a space is left.

The type of tube is indicated by the first letter group. The first letter indicates the following:

A – magnetic deflection, electrostatic focusing

M – magnetic deflection, magnetic focusing

The second letter indicates the phosphor colour and afterglow of the C. R. tube screen:

B – blue phosphor, short afterglow

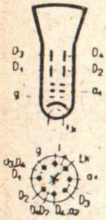
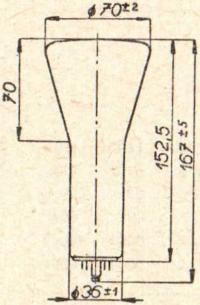
W – white phosphor ⟨TV picture tube⟩

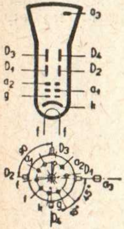
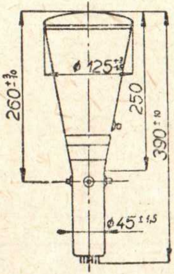
The following figure group indicates the diameter of the screen in cm in C. R. tubes with circular screen and the diagonal of the screen in cm in C. R. tubes with rectangular screens.

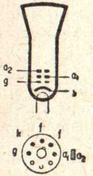
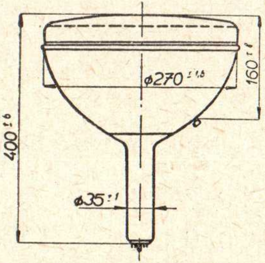
The last group of figures, separated from the preceding group by a dash, indicates the design or series type number.

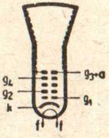
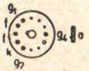
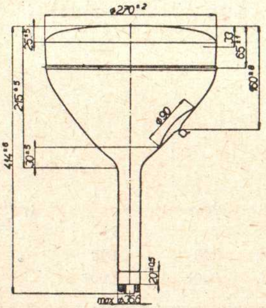
Conversion table for the transformation of the deflection sensitivity of the CR tubes into deflection factors

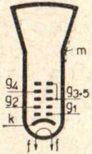
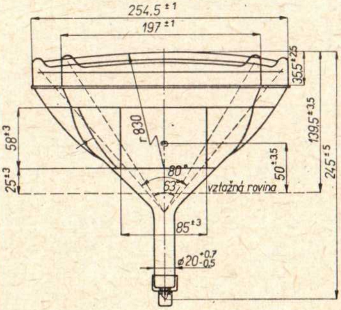
Deflection sensitivity [mm/V]	Deflection factor		Deflection sensitivity [mm/V]	Deflection factor	
	[V/cm]	[V/inch]		[V/cm]	[V/inch]
0,083	120	305	0,38	26	66
0,091	110	279	0,42	24	61
0,100	100	254	0,45	22	56
0,105	95	241	0,50	20	51
0,111	90	229	0,53	19	48
0,118	85	216	0,56	18	46
0,125	80	203	0,59	17	43
0,130	75	191	0,63	16	40,7
0,14	70	178	0,67	15	38,1
0,15	65	165	0,71	14	36,5
0,17	60	152	0,77	13	33
0,18	55	140	0,83	12	30,5
0,20	50	127	0,91	11	27,9
0,22	45	114	1,00	10	25,4
0,25	40	102	1,11	9	22,9
0,26	38	97	1,25	8	20,3
0,28	36	91	1,33	7,5	19,1
0,29	34	86	1,43	7	17,8
0,31	32	81	1,54	6,5	16,5
0,33	30	76	1,67	6	15,2
0,36	28	71	1,82	5,5	14
			2,00	5	12,7

Type Application	Base	Heating Static data	Operational Data	Maximum Ratings
7QR20 CR tube for oscilloscopes, with electrostatic deflection and focusing. Green phosphor Medium afterglow Useful screen min Ø 50 mm Base: S 8/18		U_f 6,3 V I_f 0,6 A Indirect heating ● C_g <9,6 pF C_{D1} <3,6 pF C_{D2} <3,6 pF C_{D3} <4,8 pF $C_{D1/D2}$ <0,9 pF $C_{D1/D3}$ <0,35 pF $C_{D3/D4+a_2}$ <4,2 pF $C_{D1/D4+a_2}$ <1,1 pF ● U_{a2} 800 V U_{a1} 185 V $-U_{gz}$ 24–56 V $S_{D1/D2}$ >0,22 mm/V $S_{D3/D4}$ >0,18 mm/V $-U_{gm}$ <40 V $-U_{gz}$ 24–56 V	U_{a2} 500 800 V U_{a1} 120 190 V U_{gz} –25 –40 V $S_{D1/D2}$ 0,44 0,275 mm/V $S_{D3/D4}$ 0,4 0,25 mm/V 	U_{a2} 1000 V U_{a1} 500 V U_g 0 V R_g 1,5 MΩ $E_{D/D}$ 1) 500 V I_k 50 μA --- 1) Peak voltage between the plates Not for new equipment!

Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings
12QR50 **12QR51** CR tube for oscilloscopes, with electrostatic deflection and focusing. Useful screen Ø 100 mm Base: S 9/25 Colour of screen: **12QR50** Green phosphor Medium afterglow **12QR51** blue fluorescence yellow/green phosphorescence Long afterglow		U_f 6,3 V I_f 0,6 A Indirect heating ● C_g <8 pF $C_{D1/D2}$ <1,3 pF $C_{D3/D4}$ <1,8 pF $C_{D1/-}$ <4,3 pF $C_{D3/-}$ <6 pF C_{D1} <3 pF C_{D2} <3 pF C_{D3} <3,5 pF C_{D4} <4,1 pF C_k <6 pF ● U_{a3} 3000 V U_{a2} 1500 V U_{a1} 400 V $-U_{gz}$ 34–84 V	U_{a3} 1500 3000 4000 V U_{a2} 1500 1500 2000 V U_{a1} 400 400 500 V U_{gz} –60 –60 –80 V $S_{D1/D2}$ 0,8 0,62 0,48 mm/V $S_{D3/D4}$ 0,4 0,31 0,24 mm/V 	U_{a3} 4400 V U_{a2} 2200 V U_{a1} 1100 V U_{a2}/U_{a3} 2 $-U_{g1}$ 150 V $-U_{g1}$ >0 V U_{a2}/D 500 V R_g 1,5 MΩ R_D 3 MΩ $U_{k/f}$ 125 V Not for new equipment!

Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings
25QP21 CR tube for measuring purposes, with electromagnetic deflection and focusing Colour of screen blue/white fluorescence Yellow-green phosphorescence Long afterglow Magnetic ion trap Conductive outer coating Deflection angle 55° Useful screen Ø 245 mm Base: S 8/18		U_f 6,3 V I_f 0,6 A Indirect heating ● C_{a1} <6 pF C_g <8 pF C_k <8 pF	U_{a2} 6000 8000 V U_{a1} 250 250 V $-U_{gz}$ 45 V $-U_{gm}$ 1) <38 V 1) I_k = 100 µA 	U_{a2} 10 kV U_{a1} 400 V $-U_g$ 150 V $-U_g$ >0 V R_g 1,5 MΩ $U_{k/f}$ 125 V I_k 50 µA Not for new equipment!

Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings
250QQ86 **251QQ47**		U_f 6,3 V I_f 0,3 A Indirect heating ● C_{g1} <8 pF C_k <8 pF $C_{a/m}$ >500 pF	$U_{a+g3+g5}$ 12 kV U_{g4} 0 – 400 V U_{g2} 250 V $-U_{g1z}$ 27 – 63 V $-U_{g1m}$ (I_k – 100 µA) <38 V I_k 50 µA	$U_{a+g3+g5}$ 15 kV $U_{a+g3+g5}$ >10 kV U_{g4} 500 V $-U_{g4}$ 500 V U_{g2} 400 V U_{g2} >200 V $-U_{g1}$ 145 V $-U_{g1}$ >0 V U_{g1} +2 V I_k 50 µA R_{g1} 0,5 MΩ $U_{+k/f-}$ 180 V $U_{-k/f+}$ 125 V W_s 10 mW/cm^2 $R_{k/f}$ 1 MΩ
CR tube with electromagnetic deflection and electrostatic focusing. Colour of screen: **250QQ86** yellow fluorescence yellow phosphorescence **251QQ47** blue/white fluorescence yellow/green phosphorescence Long afterglow Conductive outer coating Useful screen diameter 245 mm Deflection angle 55° Base: K 12/27		 		Not for new equipment!

Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings
282QQ52 Measuring CR tube with electromagnetic deflection and electrostatic focusing. Reinforced envelope (metal shielding) include tube mount. Colour of screen orange Persistence long Conductive outer coating Useful screen area min. 171×228 mm Deflection angle: Vertical 63° Horizontal 80° Diagonal 90° Without ion trap Base: arranged miniature S7/10		U_f 11 V I_f 68 mA t_f <35 s Indirect heating ● C_{g1} 6 pF C_a 3 pF $C_{g3} + g_5/m$ >550 pF <800 pF $C_{a/b}$ 125 pF  	U_{g3+g5} 11 kV U_{g4} 0 . . . 350 V U_{g2} 250 V $-U_{g1z}$ 35 . . .69 V 	U_{g3+g5} 12 kV U_{g3+g5} >7,5 kV U_{g4} 450 V $-U_{g4}$ 100 V U_{g2} 450 V U_{g2} >180 V $-U_{g1\ sp}$ 350 V $-U_{g1}$ 100 V $-U_{g1}$ 0 V $+U_{g1\ sp}$ 2 V R_{g1} 1,5 MΩ Z_{g1} (50 Hz) 0,5 MΩ $U_{k/f}$ 80 V $U_{k/f\ sp}$ 130 V $R_{k/f}$ 2) 1 MΩ $Z_{k/f}$ (50 Hz) 3) 0,1 MΩ $Z_{k/f}$ (50 Hz) 2) 1 MΩ U_f >9,9 V U_f <12,1 V 1) Max. 22 % of a cycle, max. 1,5 ms. 2) Parallel feed from a separate transformer 3) Series feed

Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings

430QP47
430QP86

CR tube with electromagnetic deflection and focusing.
Colour of screen:

430QP47
Fluorescence blue/white
Phosphorescence yellow/green

430QP86
Fluorescence yellow
Phosphorescence yellow
Long afterglow
Conductive outer coating
Useful screen area 273 × 362 mm

Deflection angle:

Vertical	50°
Horizontal	65°
Diagonal	70°

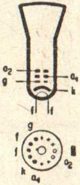
Base: K 12/27

U_f	6,3	V
I_f	0,3	A
t_f	<40	s

Indirect heating

●

C_{g1}	<8	pF
C_k	$<6{,}5$	pF
$C_{a2/m}$	>800	pF
	<2000	pF



U_{a2}	14	kV
U_{a1}	300	V
$-U_{gz}$	35 – 85	V
$-U_{gm}$ 1)	<36	V
I_k	50	µA

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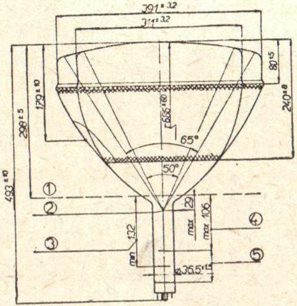
1) $I_k = 100$ µA; $U_{gm} = U_{gz} - U_g$; U_g bias at which $I_k = 100$ µA.



U_{a2}	16	kV
U_{a2}	>12	kV
U_{a1}	460	V
U_{a1}	>200	V
$-U_g$	-150	V
$-U_g$	>0	V
$+U_{g\,sp}$	$+2$	V
R_g	0,5	MΩ
I_k	100	µA
W_s	10	mW/cm
$U_{+k/f-}$ 1)	410	V
$U_{+k/f-}$	180	V
$U_{-k/f+}$	125	V
$R_{k/f}$ 2)	1	MΩ
$R_{k/f}$ 3)	20	kΩ

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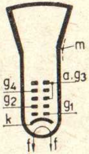
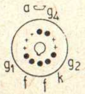
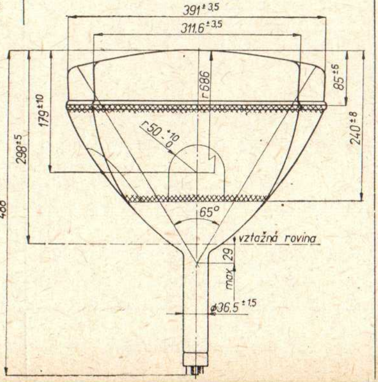
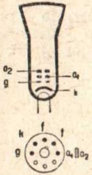
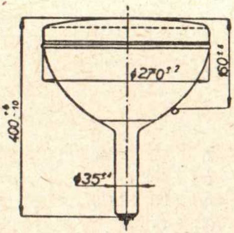
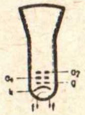
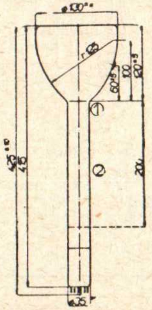
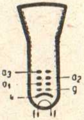
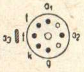
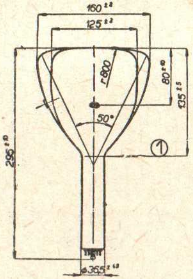
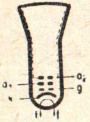
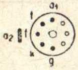
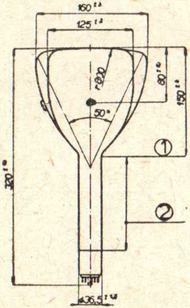
1) During the heating up period
2) Parallel feed
3) Series feed

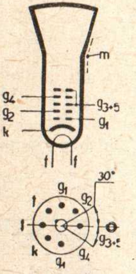
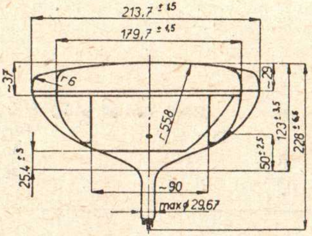
Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings
430QQ86 Measuring CR tube with electromagnetic deflection and electrostatic focusing. Colour of screen yellow Persistence long Conductive outer coating Useful screen area min 273 × 362 mm Deflection angle Vertical 50° Horizontal 65° Diagonal 90° Base: K 12/27		U_f 6,3 V I_f 0,3 A t_f 20<40 s Indirect heating ◍ C_{g1} <8 pF C_k <8 pF $C_{a/m}$ >800 pF <2000 pF  	U_a 14 kV U_{g4} 0 . . . 400 V U_{g2} 300 V $-U_{g1z}$ 35 . . . 85 V 	U_a 16 kV U_a >12 kV U_{g4} 500 V $-U_{g4}$ 500 V U_{g2} 460 V U_{g2} >200 V $-U_{g1}$ 150 V $-U_{g1}$ >0 V $+U_{g1\ sp}$ 2 V R_{g1} 500 kΩ $U_{+k/f-}$ 1) 410 V $U_{+k/f-}$ 180 V $U_{-k/f+}$ 125 V $R_{k/f}$ 2) 1 MΩ $R_{k/f}$ 3) 20 kΩ I_k 4) 100 μA U_f 7 V U_f >5,7 V 1) During the heating up period 2) Parallel feed 3) Series feed 4) Short-time

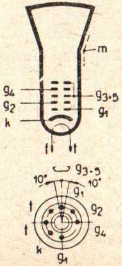
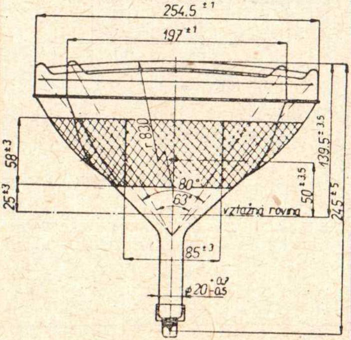
Type Application	Base	Heating Static data			Operational Data				Maximum Ratings		
25QP20		U_f	6,3	V	U_{a2}	6000	8000	V	U_{a2}	10	kV
		I_f	0,3	A	U_{a1}	250	250	V	U_{a1}	400	V
		Indirect heating			U_{gz}	–40	–45	V	$-U_g$	150	V
		●			U_{gm} 1)	–25	–25	V	$-U_g$	>0	V
		C_{a1}	<6	pF	U_{gm} 2)	–20	–20	V	R_g	1,5	MΩ
		C_g	<8	pF					$U_{k/f}$	±125	V
		C_k	<8	pF	1) I_k – 100 µA		2) I_k >60 <100 µA		I_k	50	µA
TV picture tube with electromagnetic deflection and focusing. TV-white screen Short afterglow Conductive outer coating Magnetic ion trap Deflection angle 55° Useful screen Ø 245 mm Base: S 8/18									Not for new equipment!		

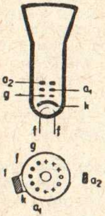
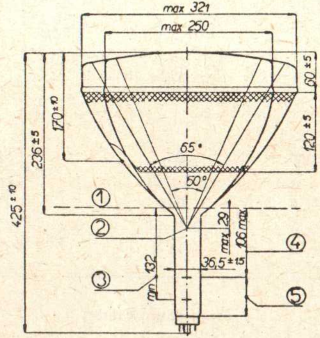
Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings
131QP55 **131QP56** TV picture pick-up tube with electromagnetic deflection and focusing, used as flying spot scanner. Deflection angle 45° Useful screen area 80 × 60 mm Colour of screen: **131QP55** blue/green fluorescence very short afterglow (1 µs) **131QP56** blue/violett fluorescence very short afterglow (0,3 µs)		U_f 6,3 V I_f 0,3 A Indirect heating ● C_{g1} 8 pF C_k 6,5 pF   Manufacturer: VÚVET	U_a 25 kV U_{g2} 250 V $-U_{g1z}$ 27 – 63 V U_{g1m} 1) <25 V 1) I_k = 50 µA 	U_a 27 kV U_a >10 kV U_{g2} 400 V U_{g2} >200 V $-U_{g1}$ 125 V $-U_{g1}$ >0 V R_{g1} 1,5 MΩ I_k 100 µA $U_{k/f}$ ±125 V U_f 7 V U_f >5,7 V

Type Application	Base	Heating	Operational Data	Maximum Ratings
		Capacitances		
180QQ44 **180QQ86** TV picture tube with electromagnetic deflection and electrostatic focusing. **180QQ44** TV-white screen, metal-backed Medium afterglow **180QQ86** Yellow screen, metal-backed Long afterglow Deflection angle 55° Useful screen area 105 × 140 mm		U_f 6,3 V I_f 0,3 A Indirect heating ● C_{g1} <8 pF C_k <8 pF   Manufacturer: VÚVET	U_{a3} 10 kV U_{a2} 0 ÷ 400 V U_{a1} 250 V $-U_{gz}$ 27 – 63 V $-U_{gm}$ (I_k = 50 μA) <25 V 	U_{a3} 12 kV U_{a3} >8 kV U_{a2} 600 V $-U_{a2}$ 600 V U_{a1} 400 V U_{a1} >200 V $-U_{g1}$ 125 V $-U_{g1}$ >0 V I_k 50 μA R_g 1,5 MΩ $U_{k/f}$ ±125 V

Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings
182QP44 TV picture tube with electromagnetic deflection and focusing Black/white phosphor, metallized screen Medium afterglow Deflection angle 55° Useful screen area 105 × 140 mm	 	U_f 6,3 V I_f 0,3 A Indirect heating ● C_{g1} <8 pF C_k <8 pF Manufacturer: VÚVET	U_{a2} 10 kV U_{a1} 250 V $-U_{gz}$ 27 – 63 V $-U_{gm}$ (I_k = 50 μA) <25 V 	U_{a2} 12 kV U_{a2} >8 kV U_{a1} 400 V U_{a1} >200 V $-U_{g1}$ 125 V $-U_{g1}$ >0 V I_k 50 μA R_{g1} 1,5 MΩ $U_{k/f}$ ±125 V

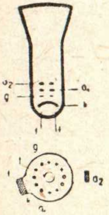
Type Application	Dimensions	Heating Capacitances	Operational Data	Maximum Ratings
251QQ44 TV picture tube with electromagnetic deflection and electrostatic focusing. TV-white screen Medium afterglow Conductive outer coating Centering magnet 0–10 G Useful screen area min. 158 × 195 mm Deflection angle: Vertical 64° Horizontal 75° Diagonal 90° Without ion trap Base: K 8/15		U_f 11,5 V I_f 0,1 A t_f <35 s Indirect heating ● C_{g1} 6 pF C_k 5 pF $C_{g3+g5/m}$ >300 pF <800 pF 	U_{g3+g5} 10 kV U_{g4} 0 – 400 V U_{g2} 400 V $-U_{g1z}$ 40 – 77 V I_k 50 μA $-U_{g1m}$ 1) <32 V 1) $I_k = 100$ μA; $U_{g1m} = U_{g1z} - U_{g1}$; U_{g1} bias at which $I_k = 100$ μA. 	U_{g3+g5} 12 kV U_{g3+g5} >8 kV U_{g4} 1000 V $-U_{g4}$ 500 V U_{g2} 500 V U_{g2} >200 V $-U_{g1\,sp}$ 400 V $-U_{g1}$ 150 V $-U_{g1}$ >0 V $U_{g1\,sp}$ 2 V R_{g1} 1,5 MΩ Z_{g1} (50 c/s) 0,5 MΩ I_k 100 μA W_s 10 mW/cm² $U_{+k/f-}$ 200 V $U_{+k/f-\,sp}$ 280 V $U_{-k/f+}$ 125 V $R_{k/f}$ 1 MΩ $Z_{k/f}$ (50 c/s) 1 MΩ U_f 12,65 V U_f >10,35 V Not for new equipment!

Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings
280QQ44 TV picture tube with electromagnetic deflection and electrostatic focusing. Reinforced envelope (metal shielding) including tube mount. TV-white screen Medium afterglow Conductive outer coating Centering magnet 0–10 G Useful screen area min. 171 × 228 mm Deflection angle: Vertical 63° Horizontal 80° Diagonal 90° Without ion trap Base: arranged miniature S 7/10		U_f 11 V I_f 80 mA t_f <35 s Indirect heating ● C_{g_1} 6 pF C_k 3 pF $C_{g_3+g_5/m}$ >550 pF <850 pF 	$U_{g_3+g_5}$ 11 kV U_{g_4} 0 – 350 V U_{g_2} 250 V $-U_{g_{1z}}$ 32 – 58 V I_k 50 µA 	$U_{g_3+g_5}$ 12 kV $U_{g_3+g_5}$ >7,5 kV U_{g_4} 450 V $-U_{g_4}$ 100 V U_{g_2} 450 V U_{g_2} 180 V $-U_{g_1\,sp}$ 350 V $-U_{g_1}$ 100 V $-U_{g_1}$ >0 V $U_{g_1\,sp}$ +2 V R_{g_1} 1,5 MΩ Z_{g_1} (50 c/s) 0,5 MΩ W_s 10 mW/cm $U_{+k/f-}$ 80 V $U_{+k/f-\,sp}$ 130 V $R_{k/f}$ 1) 1 MΩ $Z_{k/f}$ 1) 1 MΩ U_f 12,1 V U_f >9,9 V 1) Parallel feed from separed transformer

Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings
351QP44 TV picture tube with electromagnetic deflection and focusing. TV-white screen Medium afterglow Ion trap: magnet 60 G Conductive outer coating Useful screen area 220×294 mm Deflection angle: Vertical 50° Horizontal 65° Diagonal 70° Base: K 12/27		U_f 6,3 V I_f 0,3 A I_f 0,3 A U_f 6,3 V t_f <30 s Indirect heating ● C_g <8 pF C_k <6,5 pF $C_{a_2/m}$ >700 pF <1500 pF Not for new equipment!	U_{a2} 12 kV U_{a1} 250 V $-U_{gz}$ 27 – 63 V $-U_{gm}$ 1) <30 V I_k 50 µA Trace width 0,35 mm 1) $I_k = 100\ \mu A$; $U_{gm} = U_{gz} - U_g$; U_g bias at which $I_k = 100\ \mu A$. 	U_{a2} 14 kV U_{a2} >7 kV U_{a1} 400 V U_{a1} >160 V $-U_g$ 150 V $-U_g$ >0 V $+U_{g\,sp}$ 2 V R_g 0,5 MΩ I_k 100 µA W_s 10 mW/cm $U_{+k/f-}$ 1) 410 V $U_{+k/f-}$ 180 V $U_{-k/f+}$ 125 V $R_{k/f}$ 2) 1 MΩ $Z_{k/f}$ 3) (f – 50 c/s) 0,1 MΩ 1) During the heating-up period 2) Parallel feed 3) Series feed

Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings

430QP44



TV picture tube with electromagnetic deflection and focusing.
TV-white screen
Medium afterglow
Ion trap: magnet 60 G
Conductive outer coating
Useful screen area
273×362 mm
Deflection angle:

Vertical	50°
Horizontal	65°
Diagonal	70°

Base: K 12/27

Heating

U_f	6,3	V
I_f	0,3	A
I_f	0,3	A
U_f	6,3	V
t_f	<30	s

Indirect heating

●

Capacitances

C_g	<8	pF
C_k	<6,5	pF
$C_{a_2/m}$	>800	pF
	<2000	pF

Not for new equipment!

Operational Data

U_{a2}	14	kV
U_{a1}	400	V
U_{gz}	−44 . . . . −103	V
U_{gz} prům.	−73	V
U_{gm} 1)	−36	V max
I_k	50	μA
Trace width	0,38	mm

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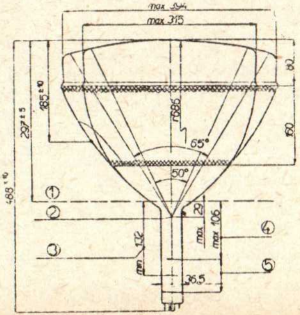
1) $I_k = 100\ \mu A$; $U_{gm} = U_{gz} - U_g$; U_g bias at which $I_k = 100\ \mu A$.



Maximum Ratings

U_{a2}	16	kV
U_{a2}	>12	kV
U_{a1}	460	V
U_{a1}	>200	V
$-U_g$	−150	V
U_g	0	V
$+U_{g\ sp}$	+2	V
R_g	0,5	MΩ
I_k	100	μA
W_s	10	mW/cm²
$U_{+k/f-}$ 1)	410	V
$U_{+k/f-}$	180	V
$U_{-k/f+}$	125	V
$R_{k/f}$ 2)	1	MΩ
$Z_{k/f}$ (50 c/s)3)	0,1	MΩ

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1) During the heating-up period
2) Parallel feed
3) Series feed

Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings

AW 43–80

TV picture tube with electromagnetic deflection and electrostatic focusing.
TV-white screen, metal-backed
Medium afterglow
Ion trap: magnet 60 G
Centering magnet: 0–10 G
Conductive outer coating
Useful screen area 282×363 mm

Deflection angle:	
Vertical	68°
Horizontal	85°
Diagonal	90°

Base: K 12/27

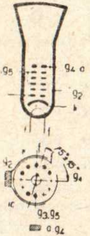
U_f	6,3	V
I_f	0,3	A

I_f	0,3	A
U_f	6,3	V
t_f	<45	s

Indirect heating

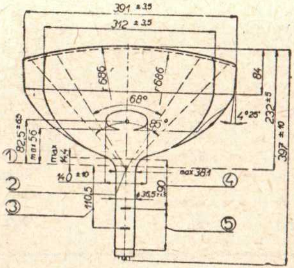
●

C_{g1}	7	pF
C_k	5	pF
$C_{g4+a/m}$	>800	pF
	<1800	pF



U_{g4+a}	15		kV
U_{g3+g5}	0–400		V
U_{g2}	300	400	V
$-U_{g1z}$	40÷80	53÷107	V
$-U_{g1m}$ ¹)	–	<38	V

1) $I_k = 100\ \mu A$; $U_{g1m} = U_{g1z} - U_{g1}$; U_{g1} bias at which $I_k = 100\ \mu A$.



Not for new equipment!

U_{g4+a}	17	kV
U_{g4+a}	>12	kV
U_{g2}	500	V
U_{g2}	>200	V
$+U_{g3+g5}$	500	V
$-U_{g3+g5}$	500	V
$-U_{g1}$	150	V
$-U_{g1}$	>0	V
$+U_{g1\ sp}$	2	V
I_k	150	μA
R_{g1}	1,5	MΩ
$U_{+k/f-}$ ¹)	410	V
$U_{+k/f-}$	200	V
$U_{+k/f-\ sp}$	280	V
$U_{-k/f+}$	125	V
$R_{k/f}$	1	MΩ
Z_{g1} (50 c/s)	0,5	MΩ
$Z_{k/f}$ (50 c/s) ²)	0,1	MΩ

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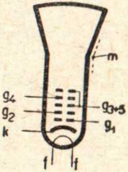
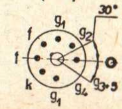
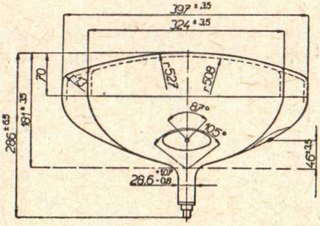
1) During the heating-up period

2) Series feed

Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings
431QQ44 TV picture tube with electromagnetic deflection and electrostatic focusing. TV-white screen, metal-backed Medium afterglow Centering magnet: 0–10 G Conductive outer coating Useful screen area 295×374 mm Deflection angle: Vertical 87° Horizontal 105° Diagonal 110° Without ion trap Base: K 8/15		U_f 6,3 V I_f 0,3 A I_f 0,3 A U_f 6,3 V Indirect heating ● C_{g1} 6 pF C_k 5 pF $C_{a/m}$ >700 pF <1500 pF   	$U_{g3}+g_5$ 16 kV U_{g4} 0–400 V U_{g2} 400 V $-U_{g1z}$ 38–94 V $-U_{g1m}$ 1) <38 V I_k 100 µA 1) I_k = 100 µA; $U_{g1m} = U_{g1z} - U_{g1}$; U_{g1} bias at which I_k = 100 µA.  Not for new equipment!	$U_{g3}+g_{50}$ 16 kV $U_{g3}+g_5$ >13 kV U_{g4} 1000 V $-U_{g4}$ 500 V U_{g2} 500 V U_{g2} >200 V $-U_{g1}$ 150 V $-U_{g1}$ >0 V $+U_{g1\,sp}$ 2 V I_k 150 µA $U_{+k/f-}$ 1) 410 V $U_{+k/f-}$ 200 V $U_{+k/f-\,sp}$ 280 V $U_{-k/f+}$ 125 V R_{g1} 1,5 MΩ Z_{g1} (50 c/s) 0,5 MΩ $R_{k/f}$ 3) 1 MΩ $Z_{k/f}$ (50 c/s) 2) 0,1 MΩ $Z_{k/f}$ (50 c/s) 3) 1 MΩ 1) During the heating-up period 2) Series feed 3) Parallel feed

Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings

470QQ44

TV picture tube with electromagnetic deflection and electrostatic focusing.
TV-white screen,
Medium afterglow
Centering magnet:
0–10 G
Conductive outer coating
Useful screen area
min. 305×384 mm
Deflection angle:

Vertical	82°
Horizontal	99°
Diagonal	110°

Without ion trap
Base: K 8/15

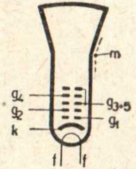
Heating / Capacitances

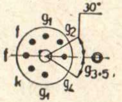
U_f	6,3	V
I_f	0,3	A
I_f	0,3	A
U_f	6,3	V
t_f	<35	s

Indirect heating

●

C_{g1}	6	pF
C_k	5	pF
$C_{g3+g5/m}$		
	>700	pF
	<1500	pF





Operational Data

U_{g3+g5}	16	kV
U_{g4}	0 – 400	V
U_{g2}	400	V
$-U_{g1z}$	40 – 77	V
I_k	100	µA
$-U_{g1m}$ [1]	<34	V

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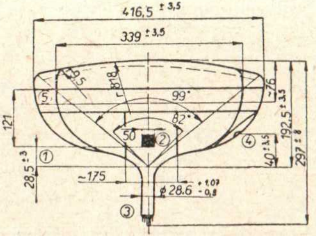
[1] $I_k = 100$ µA; $U_{g1m} = U_{g1z} - U_{g1}$; U_{g1} bias at which $I_k = 100$ µA.



3) Parallel feed

Maximum Ratings

U_{g3+g50}	17	kV
U_{g3+g5}	16	kV
U_{g3+g5}	>13	kV
U_{g4}	1000	V
$-U_{g4}$	500	V
U_{g2}	700	V
U_{g2}	>350	V
$-U_{g1\ sp}$	400	V
$-U_{g1}$	150	V
$-U_{g1}$	>0	V
$+U_{g1\ sp}$	2	V
R_{g1}	1,5	MΩ
Z_{g1} (50 c/s)	0,5	MΩ
I_k	150	µA
W_s	10	mW/cm²
$U+k/f-$ [1]	410	V
$U+k/f-$	200	V
$U+k/f-\ sp$	280	V
$U-k/f+$	125	V
$R_{k/f}$ [3]	1	MΩ
$Z_{k/f}$ (50 c/s) [3]	1	MΩ
$Z_{k/f}$ (50 c/s)[2]	0,1	MΩ

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[1] During the heating-up period

[2] Series feed

Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings

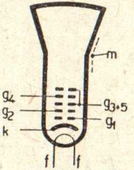
472QQ44

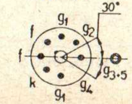
TV picture tube with electromagnetic deflection and electrostatic focusing.
Reinforced envelope (metal shielding) including tube mount
TV-white screen
Medium afterglow
Centering magnet:
0–10 G
Conductive outer coating
Useful screen area min. 305×384 mm
Deflection angle:

Vertical	82°
Horizontal	99°
Diagonal	110°

Without ion trap
Base: K 8/15

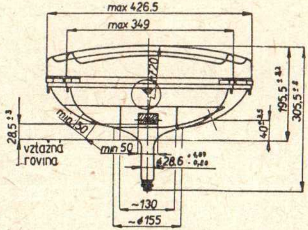
U_f	6,3	V
I_f	0,3	A
t_f	<35	s
Indirect heating		
	●	
C_{g1}	6	pF
C_k	5	pF
$C_{g3+g5/m}$	>1000	pF
	<1500	pF
$C_{g3+g5/b}$	350	pF





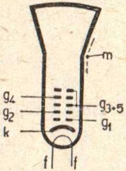
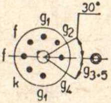
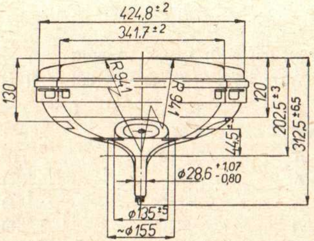
U_{g3+g5}	18	kV
U_{g4}	0 – 400	V
U_{g2}	400	V
$-U_{g1}$	40 – 77	V
I_k	100	µA
$-U_{g1m}$ 1)	<32	V

1) I_k = 100 µA; $U_{g1m} = U_{g1z} - U_{g1}$; U_{g1} bias at which I_k = 100 µA.



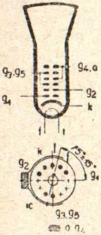
1. Max. 22 % of a cycle, max. 1,5 ms.
2. During the heating-up period
3. Parallel feed
4. Series feed

U_{g3+g5o}	18	kV
U_{g3+g5}	>13	kV
U_{g4}	1000	V
$-U_{g4}$	500	V
$+U_{g4\,sp}$ 1)	2500	V
U_{g2}	550	V
U_{g2}	>350	V
$-U_{g1}$	150	V
$+U_{g1}$	0	V
$+U_{g1\,sp}$	2	V
$-U_{g1\,sp}$ 1)	400	V
R_{g1}	1,5	MΩ
Z_{g1} (50 c/s)	0,5	MΩ
$U_{+k/f-}$ 2)	410	V
$U_{+k/f-}$	200	V
$U_{+k/f-sp}$	300	V
$U_{-k/f+}$	125	V
$U_{-k/f+sp}$	250	V
W_s	10	mW/cm²
$R_{k/f}$ 3)	1	MΩ
$Z_{k/f}$ (50 c/s) 4)	— 0,1	MΩ
$Z_{k/f}$ (50 c/s) 3)	1	MΩ

Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings
502QQ44 TV picture tube with electromagnetic deflection and electrostatic focusing. Reinforced envelope (metal shielding) including tube mount TV-white screen Medium afterglow Centering magnet: 0–10 G Conductive outer coating Useful screen area min 308×393,7 mm Deflection angle: Vertical 81° Horizontal 98° Diagonal 114° Without ion trap Base: K 8/15		U_f 6,3 V I_f 0,3 A I_f 0,3 A U_f 6,3 V Indirect heating ● C_{g1} 6 pF C_k 5 pF $C_{g3+g5/m}$ min 1000 pF max 1500 pF $C_{g3+g5/b}$ 400 pF  	U_{g3+g5} 18 kV U_{g4} 0 – 400 V U_{g2} 400 V $-U_{g1z}$ 40 – 77 V I_k 100 µA $-U_{g1m}$ 1) <32 V 1) $I_k = 100\ \mu A$; $U_{g1m} = U_{g1z} - U_{g1}$; U_{g1} bias at which $I_k = 100\ \mu A$.  2) Series feed 3) Parallel feed	U_{g3+g50} 20 kV U_{g3+g5} >13 kV $U_{g4\,sp}$ 2500 V U_{g4} 1000 V $-U_{g4}$ 500 V U_{g2} 550 V U_{g2} >350 V $-U_{g1\,sp}$ 400 V $-U_{g1}$ 150 V $-U_{g1}$ >0 V $U_{g1\,sp}$ +2 V R_{g1} 1,5 MΩ Z_{g1} (50 c/s) 0,5 MΩ $U_{+k/f-}$ 1) 410 V $U_{+k/f-}$ 135 V $U_{+k/f-\,sp}$ 250 V $U_{-k/f+}$ 180 V $U_{-k/f+\,sp}$ 300 V $R_{k/f}$ 3) 1 MΩ $Z_{k/f}$ (50 c/s) 3) 1 MΩ $Z_{k/f}$ (50 c/s) 2) 0,1 MΩ 1) During the heating-up period

Type Application	Dimensions	Heating Capacitances	Operational Data	Maximum Ratings

AW 53–80



TV picture tube with electromagnetic deflection and electrostatic focusing.
TV-white screen, metal-backed
Medium afterglow
Ion trap: magnet 60 G
Centering magnet: 0–10 G
Useful screen area 486×381 mm
Deflection angle:

Vertical	68°
Horizontal	85°
Diagonal	90°

Base: K 12/27

U_f	6,3	V
I_f	0,3	A
I_f	0,3	A
U_f	6,3	V
t_f	<45	s

Indirect heating

●

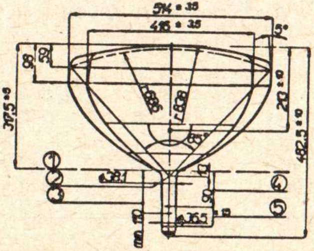
C_{g1}	7	pF
C_k	5	pF
$C_{a/m}$	>1250	pF
	<2500	pF

Not for new equipment!

U_a	15	kV
U_{g3}	0–400	V
U_{g2}	400	V
$-U_{g1z}$	53 ÷ 107	V
I_k	100	µA
$-U_{g1m}$ 1)	<38	V

---

1) $U_{g1m} = U_{g1z} - U_{g1}$;
U_{g1} bias at which I_k = 100 µA.



U_a	17	kV
U_a	>12	kV
U_{g3}	500	V
$-U_{g3}$	500	V
U_{g2}	500	V
U_{g2}	>200	V
$-U_{g1}$	150	V
$-U_{g1}$	>0	V
$+U_{g1\,sp}$	2	V
R_{g1}	1,5	MΩ
Z_{g1} (50 c/s)	0,5	MΩ
I_k	150	µA
W_s	10	mW/cm²
$U_{+k/f-}$ 1)	410	V
$U_{+k/f-}$	200	V
$U_{+k/f-\,sp}$	280	V
$U_{-k/f+}$	125	V
$R_{k/f}$	1	MΩ
$Z_{k/f}$ (50 c/s) 2)	0,1	MΩ

---

1) During the heating-up period
2) Series feed

Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings
531QQ44				

U_f	6,3	V
I_f	0,3	A
I_f	0,3	A
U_f	6,3	V

Indirect heating

●

C_{g1}	6	pF
C_k	5	pF
$C_{a/m}$	>1200	pF
	<2500	pF

$U_{g3}+g_5$	16	kV
U_{g4}	0–400	V
U_{g2}	400	V
$-U_{g1z}$	38–94	V
$-U_{g1m}$ 1)	<38	V
I_k	100	µA

---

1) $I_k = 100$ µA; $U_{g1m} = U_{g1z} - U_{g1}$; U_{g1} bias at which $I_k = 100$ µA.

$U_{g3}+g_{50}$	16	kV
$U_{g3}+g_5$	>13	kV
U_{g4}	1000	V
$-U_{g4}$	500	V
U_{g2}	500	V
U_{g2}	>200	V
$-U_{g1}$	150	V
$-U_{g1}$	>0	V
$+U_{g1\ sp}$	2	V
I_k	150	µA
$U_{+k/f-}$ 1)	410	V
$U_{+k/f-}$	200	V
$U_{+k/f-\ sp}$	280	V
$U_{-k/f+}$	125	V
R_{g1}	1,5	MΩ
Z_{g1} (50 c/s)	0,5	MΩ
$R_{k/f}$ 3)	1	MΩ
$Z_{k/f}$ (50 c/s)2)	0,1	MΩ
$Z_{k/f}$ (50 c/s) 3)	1	MΩ

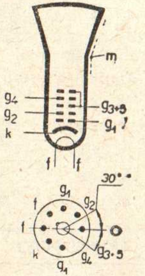
---

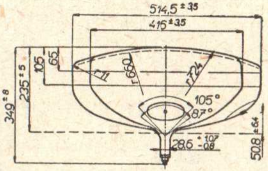
1) During the heating-up period
2) Series feed
3) Parallel feed

TV picture tube with electromagnetic deflection and electrostatic focusing.
TV-white screen, metal-backed
Medium afterglow
Centering magnet:
0–10 G
Conductive outer coating
Useful screen area
382×484 mm
Deflection angle:

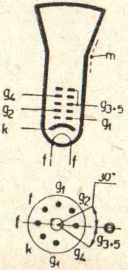
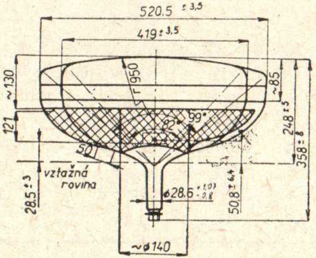
Vertical	87°
Horizontal	105°
Diagonal	110°

Without ion trap
Base: K 8/15





Not for new equipment/

Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings
590QQ44 TV picture tube with electromagnetic deflection and electrostatic focusing. TV-white screen Medium afterglow Centering magnet: 0–10 G Conductive outer coating Useful screen area min. 385×489 mm Deflection angle: Vertical 82° Horizontal 99° Diagonal 110° Without ion trap Base: K 8/15		U_f 6,3 V I_f 0,3 A I_f 0,3 A U_f 6,3 V t_f <35 s Indirect heating ● C_{g1} 6 pF C_k 5 pF $C_{g3+g5/m}$ >1200 pF <2500 pF 	U_{g3+g5} 16 kV U_{g4} 0 – 400 V U_{g2} 400 V $-U_{g1z}$ 40 – 77 V I_k 100 µA $-U_{g1m}$ 1) <32 V 1) $I_k = 100\ \mu A$; $U_{g1m} = U_{g1z} - U_{g1}$; U_{g1} bias at which $I_k = 100\ \mu A$. 	U_{g3+g50} 16 kV U_{g3+g5} >13 kV U_{g4} 1000 V $-U_{g4}$ 500 V U_{g2} 500 V U_{g2} >200 V $-U_{g1\ sp}$ 400 V $-U_{g1}$ 150 V $-U_{g1}$ >0 V $+U_{g1\ sp}$ 2 V R_{g1} 1,5 MΩ Z_{g1} (50 c/s) 0,5 MΩ W_s 10 mW/cm² $U_{+k/f-}$ 1) 410 V $U_{+k/f-}$ 200 V $U_{+k/f-\ sp}$ 280 V $U_{-k/f+}$ 125 V $R_{k/f}$ 3) 1 MΩ $Z_{k/f}$ (50 c/s) 3) 1 MΩ $Z_{k/f}$ (50 c/s)2) 0,1 MΩ 1) During the heating-up period 2) Series feed 3) Parallel feed

Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings

592QQ44

TV picture tube with electromagnetic deflection and electrostatic focusing.
Reinforced envelope (metal shielding) including tube mount
TV-white screen
Medium afterglow
Centering magnet:
0–10 G
Conductive outer coating
Useful screen area
min. 385×489 mm
Deflection angle:

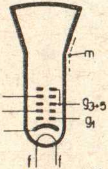
Vertical	82°	
Horizontal	99°	
Diagonal	110°	

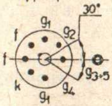
Without ion trap
Base: K 8/15

U_f	6,3	V
I_f	0,3	A
t_f	<19	s

Indirect heating
●

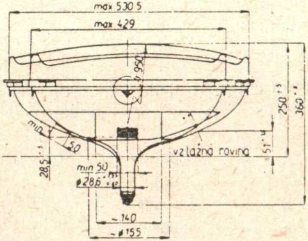
C_{g1}	6	pF
C_k	5	pF
$C_{g3+g5/m}$		
	>1300	pF
	<1900	pF
$C_{g3+g5/b}$	350	pF





$U_{g3}+g_5$	18	18	kV
U_{g4}	0 – 400	0 – 400	V
U_{g2}	400	500	V
$-U_{g1}$	40 – 77	50 – 93	V
I_k	100	100	µA
$-U_{g1m}$ 1)	<32	<32	V

1) $I_k = 100$ µA; $U_{g1m} = U_{g1z} - U_{g1}$; U_{g1} bias at which $I_k = 100$ µA.



1). Max. 22 % of a cycle, max. 1,5 ms.

2) During the heating up period

3) Parallel feed

4) Series feed

$U_{g3}+g_{50}$	18	kV
$U_{g3}+g_5$	>13	kV
U_{g4}	1000	V
$-U_{g4}$	500	V
$+U_{g4\,sp}$ 1)	2500	V
U_{g2}	550	V
U_{g2}	>350	V
$-U_{g1}$	150	V
$+U_{g1}$	0	V
$+U_{g1\,sp}$	2	V
$-U_{g1\,sp}$ 1)	400	V
R_{g1}	1,5	MΩ
Z_{g1} (50 c/s)	0,5	MΩ
$U_{+k/f-}$ 2)	410	V
$U_{+k/f-}$	200	V
$U_{+k/f-sp}$	300	V
$U_{-k/f+}$	125	V
$U_{-k/f+sp}$	250	V
W_s	10	mW/cm²
$R_{k/f}$ 3)	1	MΩ
$Z_{k/f}$ (50 c/s) 4)	0,1	MΩ
$Z_{k/f}$ (50 c/s) 3)	1	MΩ

Vacuum rectifying diodes
Gas discharge rectifying diodes
Transmitting tubes
Amplifying and modulating tubes
Vacuum capacitors
Pulse tetrodes
Pulse thyratrons
Klystrons
Magnetrons
Travelling wave tubes
Carcinotrons
TR and ATR switch tubes

Designations of rectifying, transmitting, modulating, power amplifying and pulse tubes according to the TESLA standard NT - K 003

The rectifying, transmiting, modulating, power amplifying and pulse tubes designed and manufactured by TESLA are marked according to this standard. To the group of electronic and discharge tubes intended for use in transmitters, belong only types which for commercial reasons cannot be designated with other marking. The designations are composed of letters and figures.

Rectifying, transmitting, modulating and power amplifying tubes:

The designations of rectifying, transmitting, modulating and power amplifying tubes have three parts. The first part consists of letters, the second of figures and the third again of letters.

The first letter of the first part of the designation indicates the application or function as follows:

R – Transmitting tube (or vacuum rectifying tube)
U – Rectifying discharge tube
Z – Special-purpose amplifying and modulating tube

The second letter indicates the electrode structure according to the same code which applies to receiving tubes:

A – diode
B – twin diode
C – Low-power triode or thyratron at rectifying discharge tubes
D – Transmitting or amplifying triode
E – Tetrode
L – Pentode

The second part of the designation which consists of figures, indicates the mean rectified current in mA or A of vocuum rectifying tubes, or the mean rectified current in A of discharge tubes. If the letter X or Y follows the figures, then the mean rectified current hat always to be understood in A.

The second part of the designation indicates in the case of transmitting and modulating tubes the anode dissipation in terms of W od kW, as determined by the third part of the tube designation. If the letter X, Y or V follows after the figures, then anode dissipation has to be understood in kW.

The third part of the designation indicates the construction or a special design and the series. The first letter indicates the following:

X – Forced air cooling
Y – Water cooling
V – Vapour cooling

The next letter indicates the order of the tube or its design, and is in alphabetical order beginning with A. Some designs are indicated as follows:

A, B, C, D, E	– Tubes with stems and leading-in conductor wires
F, G, I, K	– Tubes with pressed glass headers and pin connections
H, J	– Tubes with high-efficiency WTh cathodes
L, M, N, Q, P	– Tubes of coaxial design.

If only one letter is in the last part of the designation, then the tube is always of all-glass design and is radiation or air-cooled. If the penultimate letter is X, Y or V, then the tube always has an external anode.

Pulse tetrodes and thyratrons:

The designations of pulse tetrodes differ slightly from those described above.

This designation is composed of three parts. The first part consists of figures, the second of letters and the third again of figures. The first letter in the second part indicates the following:

R – Transmitting tube
T – Thyratron

The second of this part indicates the following:

P – Pulse diode
Q – Double pulse diode
R – Pulse triode
S – Pulse tetrode
T – Pulse pentode
U – Pulse tube with six or more electrodes

The first figure of the first part of the designation indicates the heater power according to the following table:

Heater power up to [W]	0	10	20	50	100	300	1000	3000	Above 3000
First figure	1	2	3	4	5	6	7	8	9

The second figure of the first part of the designation is the type number.

The third part of the designation is a group of figures indicating:

20 – All-glass socket
40–99 – Employed material or design

Designations of the microwave tubes

The microwave tubes designed and manufactured by TESLA are marked as follows.

The designations of the microwave tubes are composed of three parts.

The first part consists of figures, the second **of letters** and the third again of figures.

The type of the tube is indicated by the centre, letter, part of the designation.

The first letter of this part indicates the following:

R – Transmitting tube (electron conduction)
S – Drift tube (electron induction)
T – Switching tube

If the first letter is S, then the next letter of the same part indicates the following:

A – Low-power magnetron for continuous operation
E – Travelling-wave tube
P – Pulse magnetron
R – Reflex klystron

If the first letter is T, then the next letter of the same part indicates the following:

N – Protective tube

The first figure of the first part of the tube designation indicates the heater power according to the following table:

Heater power up to [W]	0	10	20	50	100	300	1000	3000	>3000
First figure	1	2	3	4	5	6	7	8	9

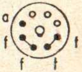
The second figure of the same part of the designation is the type number.

The third part of the designation is a group of figures. The numbers 40 to 99 indicate the employed material or the design.

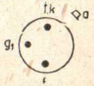
The meanings of some of the numbers are as follows:

51 – Internal resonance cavity, coaxial outlet
52 – Internal resonance cavity, waveguide outlet
53 – External resonance cavity

Vacuum rectifying tubes

Type	U_f V	I_f A	t_f s	R_i Ω	I_e A	U_{inv} max kV	$U_{a\ ef}$ max kV	I_a max A	$I_{a\ sp}$ max A	W_a max W	Cooling	Base connections
EY3000N	6,3	1,65	60	150		3,5		120	750	10		
RA0007A is not in production	1,4	3,5			0,002	0,6		0,0007				
RA0007B	1,4	3,5			0,002	0,6		0,0007				
RA025B	5 6	10 8,5		500	>1,2	60	20	0,25	0,85	100		f on base a on cap base: E40
RA05A	6	<32		<350	>4,5	60	25	0,7	3	200		
RA7XL	5,5	<90		<40	>30	25	10	7	20	2500	air	coaxial
RA7YA	18–20,6	110–125		75	20		20	7	20	20 k	watter	
RA7YB	18–21	110–130		80	20	55	20	7	20	20 k	watter	
RA100A	5	6,5		<220	>0,8	40	12,5	0,1	0,75	75		f on base E40

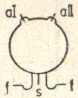
Gas discharge rectifying tubes

Type	U_f V	I_f A	t_f minut	U_{inv} max kV	$U_{a\,ef}$ max kV	I_a max A	$I_{a\,sp}$ max A	U_{arc} V	T_0 min - max °C	Filling	Base connections
DCG4/1000	2,5	5	1	10	3,5	0,25	1	16	+15 ÷ +40	Hg	a on cap f on base
UA025A	2,5	5	1	10	3,5	0,25	1	18,5	−40 ÷ +70	Ar	
UA1A	4	9–13	10	9	8	1	5		+15 ÷ +40	Hg	
UA1B	4	9–13	2	9	8	1	5		+15 ÷ +50	Ar	
UA3A	5	12,5–14,5	20	12	11	3	15		+15 ÷ +40	Hg	
UA5A	5	12,5–14,5	20	12	11	5	25		+15 ÷ +40	Hg	
UC5A thyratron	3	18–22		3	2,5	5	20	f max 150 c/s	+15 ÷ +50	Hg	

IGNITRONS

Type	U_{arc} V	I_{ign} A	I A	$U_{ign\,ef}$ V	f_{max} kc/s	T_a min–max °C	Filling	Base connection
I-03/5	15	5	1000	300	1	+15 ÷ +30	Hg	

Full wave low voltage gas discharge rectifying tubes

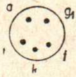
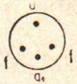
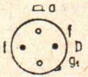
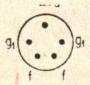
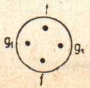
Type	U_f	I_f	t_f	U_{arc} max	U_{zap} max	U_{inv} max	$U_{a\,ef}$		I_{ss} max	$I_{ss\,sp}$ max	R_0 min	Base connections
	V	A	s	V	V	V	min V	max V	A	A	Ω	
367	1,8– 1,9	7	60– 120	12	18	100	16	45	6	18	1	
1710	1,9– 1,95	7	60– 120	16	25	425	25	150	3	9	2,5	
1738	1,9– 1,95	18	60– 120	12,5	25	270	20	95	15	45	0,2	f on base a on cap
1749A	1,9– 1,95	29	60– 120	12,5	30	270	30	95	25	75	0,1	
1749S	1,9– 1,95	29	60– 120	25	40	540	40	190	25	75	0,1	

Before the discharge tubes 1710, 1738, 1749A and 1749S are set in operation, each must be conditioned by connecting first one anode and then the other for 15 minutes. During the conditioning, the mercury adhering to the tube structure evaporates and condenses near the base of the tube. This in essential in order to prevent arcing between the anodes. – These discharge tubes have a screening between the anodes which is connected to a terminal and is suitable for use as auxiliary striking anode in order to reduce the striking voltage of the tubes by connection to the cathode via a resistor of 10 kΩ. The tube 1749A is provided with this resistor.

Transmitting triodes radiation or air cooled

Type	U_f V	I_f A	μ	S mA/V	R_i kΩ	I_e A	C_{g1} pF
RC5B	12,6	0,08	20	6	3,3		1,6
RC5C	2,4	0,4	28	6	3,3		1,6
RD27AS	4	1,75–2,2	9,5	7,5	1,265		9
RD200B	10,8	4–4,4	20–24	4,4	5	>2	6
RD300S	5	14	24	6	4		7
RD1XA	15,8–17	19–24	31–39		10,5–15,3	>2,3	23,2
RD1XH	9	14–17	31–39		10,5–15,3	4,5	24
RD1,5XA	12,5–13,5	39–43	22–30		6–8	3,7	16
RD2XF	12	45–55	20–24	5,6	3,5–4,5	5	12

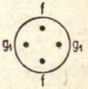
Transmitting triodes radiation or air cooled

C_a pF	C_{a/g_1} pF	W_a max kW	I_a max A	U_a max kV	f_{max} Mc/s	Base cennections
0,4	1,05	5W	0,03	0,3		
0,4	1,05	5W	0,03	0,3		
3,5	8	0,027	0,175	0,6 0,4	3 >25	
1,5	6,5	0,2	0,275	3,5 2,0	10 >60	
0,2	5,8	0,3	0,45	4	200	
1,6	15,9	1	0,4	10 5	3 30	
1,6	15,9	1	0,6 0,4	10 5	3 30	
2	20	1,5	0,6	10	30	
1	9	2	1	5 3	110 150	g_1 delši koliky

Transmitting triodes air cooled

Type	U_f V	I_f A	μ	S mA/V	R_i kΩ	I_e A	C_{g1} pF
RD2XG	12	45–55	20–24	4,44– 6,85	3,5–4,5	5	12
RD2XH	7,5	24–30	20–24	4,45– 6,85	3,5–4,5	9	12
RD2XJ	7,5	24–30	20–24	4,45– 6,85	3,5–4,5	9	12
RD5XF	11	115–135	19–21	10	2,0–2,5	9,3	23,5
RD5XG	11	115–135	19–21	10	2,0–2,5	9,3	23,5
RD5XH	6–7	68–78	19–21	10	2,0–2,5	12	23,5
RD8XA	18,5– 20,6	66–74	33–44		4,4–6	11	26,6
RD8XH	10–11	42–48	33–44		4,4–6	>16	26,6

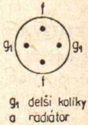
Transmitting triodes air cooled

C_a pF	C_{a/g_1} pF	W_a max kW	I_a max A	U_a max kV	f_{max} Mc/s	Base connections
1	9	2	1	5 3	110 150	 g_1 delší kolíky a radiátor
1	9	2	1	5 3	110 150	
1	9	2	1	5 3	110 150	
3	18,5	5	2	8,5 5,5	40 100	
3	18,5	5	2	8,5 5,5	40 100	
3	18,5	5	2	8,5 5,5	40 100	
1,5	29,5	8	2,6	12	3	 a radiátor
1,5	29,5	8	2,6	12	3	

Transmitting triodes air cooled

Type	U_f V	I_f A	μ	S mA/V	R_i kΩ	I_e A	C_{g1} pF
RD12XA is not in production	18–20	94–102	40–50		4,5–5,2	13,2	29,6
RD12XB	18–20	94–102	40–50		4,5–5,2	13,2	33
RD12XH	10,5–12	53–60	40–50		4,5–5,2	>18	30
RD20XF	19–21	220–250	25–32	15	1,6–2,1	30	58
RD20XH	12,5	102–110	26–32	15	1,6–2,1	>45	58
RD20XK	12,5	102–110	26–32	15	1,6–2,1	>45	58
RD50XA	30–33	210–240	44–52		2,0–2,5	50	65
RD50XH	19	125–135	44–52		2,0–2,5	>65	65

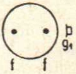
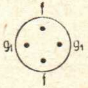
Transmitting triodes air cooled

C_a pF	C_{a/g_1} pF	W_a max kW	I_a max A	U_a max kV	f_{max} Mc/s	Base connections
2,3	21,5	12	2,5	15 9	3 30	
3	22	12	2,5	15 9	3 30	
3	22	12	2,5	15 9	3 30	
1	35	20	5	15 10,5	5 30	
4	35	20	5	15 10,5	5 30	
4	35	20	5	15 10,5	5 30	
7	45	50	10	20	3	
7	45	50	12	18	3	

Transmitting triodes watter cooled

Type	U_f V	I_f A	μ	S mA/V	R_i kΩ	I_e A	C_{g1} pF
RD5YA	18–20	44–56	34–43		6–8,5	>5,5	23
RD5YB	12–13	44–51	22–30		6–9	5	16
RD5YF	11	115–135	19–21	10	2–2,5	9,3	23,5
RD5YH	7	68–78	19–21	10	2–2,5	18	23,5
RD12YA is not in production	18,5–20,6	66–74	33–34		4,4–6,0	11	26,6
RD12YB	18,5–20,6	66–74	33–48		4,4–6,0	11	26,6
RD12YH	10–11	42–48	33–34		4,4–6,0	16	26,6
RD18YA	18–20	94–104	40–50		4,5–5,2	13,2	30

Transmitting triodes watter cooled

C_a pF	C_{a/g_1} pF	W_a max kW	I_a max A	U_a max kV	f_{max} Mc/s	Base connections
1,3	27	5	1,2	10 8	3 20	 a radiátor
2	20	5	1,6	8	5	 g_1 delší kolíky a radiátor
3	18,5	5	2	8,5 5,5	40 100	
3	18,5	5	2	8,5 5,5	40 100	
1,5	29,5	12	2,6	15	3	 a radiátor
1,5	29,5	12	2	12 9	3 30	
1,5	29,5	12	2	12 9	3 30	
3	22	18	2,5	15 9	3 30	

Transmitting triodes watter cooled

Type	U_f V	I_f A	μ	S mA/V	R_i kΩ	I_e A	C_{g1} pF
RD18YH	10,5–12	53–60	40–50		4,5–5,2	>18	30
RD75YB	30–33	220–250	44–52		2,0–2,5	50	65
RD75YH	19	125–135	44–52		2,0–2,5	65	65
RD150YA	31,5–34	440–470	40–48		0,8–1,2	100	101
RD150YB	31,5–34	440–470	40–48		0,8–1,2	100	101
RD150YH	18,5	335–365	40–48		0,8–1,2	130	101
RD150YJ	18,5	335–365	40–48		0,8–1,2	130	101
RD50YA	17,5– 19,5	340–380	50		5	52	

Transmitting triodes watter cooled

C_a pF	C_a/g_1 pF	W_a max kW	I_a max A	U_a max kV	f_{max} Mc/s	Base connections
3	22	18	2,5	15 9	3 30	
7	45	75	10	20 17	3 3 (osc)	
7	45	75	12	20 17	3 3 (osc)	
6	51	150	20	20 15	3 3 (mod/a)	
6	51	150	20	20 15 11	3 3 (mod/a) 30 (mod/a)	
4,6	56	150	20	20 15 11	3 3 (mod/a) 30 (mod/a)	
6	51	150	20	20 15	3 3 (mod/a)	
		50	10	20	10	special

Coaxial transmitting triodes air cooled

Type	U_f	I_f	μ	S	R_i	I_e	C_{g1}
	V	A		mA/V	kΩ	A	pF
RD3XL	6–7	100	75	>40		30	52
RD10XL	6–7	155–180	70–75	>40		>45	
RD20XL	9–11	<180	45	45		50	75
RD50XL	12–14	260	40–60	125		125	175

Coaxial transmitting triodes vapour cooled

Type	U_f	I_f	μ	S	R_i	I_e	C_{g1}
	V	A		mA/V	kΩ	A	pF
RD50VL	12–14	260	60–80	>70			170
RD70VL	12–14	260	40–60	130		125	175

Transmitting pentodes

Type	U_f	I_f	μ	S	C_{g1}	C_a	$C_{a/g1}$
	V	A		mA/V	pF	pF	pF
RL15A	2,4/ 4,8	1,2/ 0,6	7	4	12	13,8	<0,25
RL65A	10	1,65– 2,05		1,5	11	10	0,01

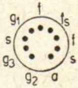
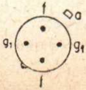
Coaxial transmitting triodes air cooled

C_a pF	C_{a/g_1} pF	W_a max kW	I_a max A	U_a max kV	f_{max} Mc/s	Terminals connections
0,65	16	3	2	6	100	
		10		8		
1,8	50	20	5	10	100	
2	70	50	14	15	100	

Coaxial transmitting triodes vapour cooled

C_a pF	C_{a/g_1} pF	W_a max kW	I_a max A	U_a max kV	f_{max} Mc/s	Terminals connections
2	52	50	14	15	100	
2	70	70	14	15	100	

Transmitting pentodes

W_a max W	I_a max mA	U_a max V	W_{g_2} max W	U_{g_2} max W	f_{max} Mc/s	Terminals connections
20		350 500	5	350	60 30	
65	125	1500	15	400	3 15	

Modulating triodes air cooled

Type	U_f V	I_f A	μ	S mA/V	R_i kΩ	I_e A	C_{g1} pF
ZD1XB	17,6–20	22–27	6,0–7,5			>2,2	26,4
ZD8XA	16–18,6	68–76	5,4–7			7	26,8
ZD3XH	7–7,5	48	11–12	>30	<0,5	>14	38
ZD1000F	7,0–7,5	28–34	11–12	>30	<0,5	>8	38,5

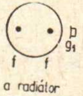
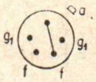
Modulating triodes watter cooled

Type	U_f V	I_f A	μ	S mA/V	R_i kΩ	I_e A	C_{g1} pF
ZD12YA	16–18,6	68–76	5,4–7			7	26,8

Coaxial modulating tetrodes air cooled

Type	U_f V	I_f A	$\mu_{g2/g1}$	S mA/V	C_{g1} pF	C_a pF	$C_{a/g1}$ pF
ZE025XS	12,6	1,75	5	24	30	8	0,06

Modulating triodes air cooled

C_a pF	C_{a/g_1} pF	W_a max kW	I_a max A	U_a max kV	f_{max} Mc/s	Base connections
13,8	11,6	1,2	0,4	6	3	
2,6	25,5	8	1,5	12	20	
2,5	26	3	1,5	6	60	
2,6	17	1	1	4	60	

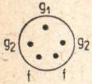
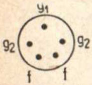
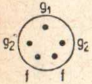
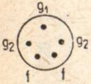
Modulating triodes watter cooled

C_a pF	C_{a/g_1} pF	W_a max kW	I_a max A	U_a max kV	f_{max} Mc/s	Base connections
2,6	25,5	12	1,5	12	20	

Coaxial modulating tetrodes air cooled

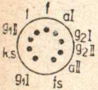
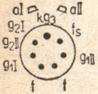
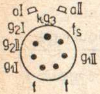
W_a max W	I_a max V	U_a max V	W_{g_2} max W	U_{g_2} max V	f_{max} Mc/s	Base connections
250	500	2000	18	350	400	

Allglas transmitting tetrodes

Type	U_f V	I_f A	u_{g_2/g_1}	S mA/V	U_a max kV	I_a max mA	W_a max W	U_{g_2} max V	W_{g_2} max W
RE65A	6	3,5	5	4	3	150	65	600	10
					3	150	65	600	10
					3	150	65	400	10
					2,5	120	45	400	10
					3		65	600	10
RE125A, RE125C	5	6,6	6,2	2,5	3	225	125	600	20
					3	225	125	400	20
					3	225	125	400	20
					2,5	200	85	400	20
RE400F, RE400C	5	12,5– 15,5	5	>2,5	4	350	400	600	35
					3,2	275	270	600	35
					4	275	270	600	35
RE1000F 	7,5	25– 31	6,1	5,2	6 6,5	700	1000	1000	110

Type	Class Conditions	f Mc/s	U_a V	U_{g2} V	$-U_{g1}$ V	I_a mA	I_{g2} mA	$U_{g1\,ef}$ V	P_o W
RE65A	AB1-mod		1750	500	90	170	17	64,3	175
	AB2-mod		1800	250	35	220	25	64,3	270
	C–A1	<50	1500	250	75	150	35	128,6	170
	C–A1	<50	3000	250	90	115	20	121,7	280
	C–A3	<50	1500	250	125	120	35	160,6	145
	C–A3	<50	2500	250	150	108	16	167,8	225
	B–SSB	<150	2500	500	100	230	35	214,5	325
RE125A, C	AB1 mod		2000	600	94	240	6,4	67	230
	AB2-mod		2000	350	45	300	5	75	350
	C–A1	<120	2000	350	100	200	50	164,3	275
	C–A1	<120	3000	350	150	167	30	200	375
	C–A3	<120	2000	350	220	150	33	268	225
	C–A3	<120	2500	350	210	152	30	257	300
RE400F, C	C–A1	<75	2500	500	200	350	46	213	640
		<75	4000	500	220	350	40	227	1100
		<110	3500	500	170	500	34		1160
		<110	4000	500	170	540	31		1440
	C–A3, CCS	<75	2000	500	220	275	30	290	380
		<75	3000	500	220	275	26	290	630
	C–A3, ICAS	<30	2000	500	220	275	30	290	380
		<30	3650	500	225	275	23	315	765
RE1000F		<60							
		<150							

Allglas transmitting twin tetrodes

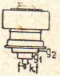
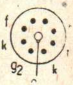
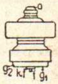
Type	U_f V	I_f A	μ_{g_2/g_1}	S mA/V	U_a max V	I_a max mA	W_a max W	U_{g_2} max V	W_{g_2} max W
QQE03/12	6,3 12,6	0,82 0,41	7,5	3,3	300	2×45	2×5	200	2
					300	2×55	2×7	200	
					300	2×30	2×5	200	2
					300	2×42	2×7	200	2
					300	2×50	2×7	200	4
QQE03/20 **SRS 4452**	6,3 12,6	1,3 0,65	8	2,5	600	2×55 1)	2×10	250	3
					500	2×50 1)	2×10	250	3
					600	2×55 1)	2×10	225	3
					600	2×50 1)	2×10	250	3
					600	2×55 1) 1) I_k	2×10	250	3
KEE30B **SRS 4451** 	6,3 12,6	2,5 1,25		>4	600 500	2×120	2×20	250	2×3

Type	Conditions Class	f Mc/s	U_a V	U_{g2} V	$-U_{g1}$ V	I_a mA	I_{g2} mA	$U_{g1}/g_1\ sp$ V	P_o W
QQE03/12	C–A1,	<200	200	R_{g2}=22 kΩ	R_{g1}=15 kΩ	2×35	2,2	115	8,4
	CCS	<200	300	175	40	2×37,5	2,3	110	14,5
	C–A1,	<200	200	R_{g2}=8,2 kΩ	R_{g1}=15 kΩ	2×42	3,1	130	10
	ICAS	<200	300	200	45	2×50	3	130	18,5
	C, fn, CCS	67/200	300	150	100	2×24	2	230	6,5
	C, fn, ICAS	67/200	300	150	100	2×32,5	3,5	240	7,8
	AB1		300	200	21,5	2×35	12,6	43,5	12
	AB2		300	200	21,5	2×50	11,4	64	17,5
QQE03/20	C–A1,	<200	600	250	60	2×50	8		48
	C–A1	<400	400	250	50	2×50	5		24
	C–A3	<200	500	250	80	2×40	8		31
		<400	300	250	50	2×40	6		13
	B, SSB	<30	600	225	26,5	86	10	24	33,2
	C, fn	133/400	300	250	175	2×45	5,6		8
	B		500	250	26	2×36,5	16,2	52	23,5
REE30B	C, A1	<200	400	250	60	2×100	2×8	160	56
		<400	400	250	50	2×100	2×5	140	50
		<475	350	250	45	2×100	2×4,5	130	40
	C, A3	<200	500	250	100	2×90	2×8	120	63
	C, fn	50/150	500	250	150	2×60	2×5	360	20
	B1		600	250	27	2×62	2×11,5	55	50
	B2		600	250	25	2×100	2×13	77,5	86

Coaxial transmitting tetrodes air cooled

Type	U_f V	I_f A	μ_{g_2/g_1}	S mA/V	I_e A	C_{g1} pF	C_a pF
RE0125XL	6,3	4,7–5,6	13	>20		40	6,8
RE025XA **RE025XB**	6	2,5	5	12		16	4,7
RE041XL	12,6	3,3–4	19	28		68	8,5
RE1,5XL	6,3	33	10	16	7	30	12
RE5XL	6–7	90–110	5	>30	>30	49	15
RE5XN	6–7	90–110	5	>30	>30	49	15
RE20XL	6–7	180–220	6	>60	>60	90	35

Coaxial transmitting tetrodes air cooled

C_{a/g_1} pF	W_a max kW	I_a max A	U_a max kV	W_{g_2} max W	U_{g_2} max V	f_{max} Mc/s	Base connections
0,1	0,15	0,3	1,5	10	400	500	
0,06	0,25	0,25	2	12	400	400	
0,12	0,5	0,4	4	20	600	250	
0,3	2	1	5	75	830	250	
	5	2,6	4	300	1250	240	
	5	2,6	4	300	1250	240	
	20		8	800	1250	220	

Coaxial transmitting tetrodes air cooled

Type	U_f V	I_f A	$\mu g_2/g_1$	S mA/V	$C_{g1/k}$ pF	$C_{a/k}$ pF	W_a max kW	I_a max A
RE01XM	26,5 6,3	0,5 2					0,15	
RE025XM	6	<3,2	5	10	27	5	0,25	0,25
RE5XM	12,6	<38	17	40	36	10	5	1,5

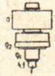
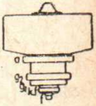
Rectifying diode for pulse technique

Type	U_f V	I_f A	U_{inv} max kV	I_{ss} max mA	$I_{ss\ sp}$ max A	W_a max W
RA03YA	7	<6,2	30	250	1,5	70

Vacuum capacitors

Type	C pF	$U_{z\ sp}$ kV
TC001	50 ± 10 %, 50 ± 5 %, (20, 30, 40 ± 10 %)	22
TC005	100 ± 10 %, (100 ± 5 %, 50, 125 ± 10 %)	30
TC008	C_1 – 3,5 ± 10 % + C_2 – 50 ± 10 %	60 (C_1)
TC009	C_1 – 3,7 ± 10 % + C_2 – 59 ± 10 %	100 (C_2)
TC010	6 ± 10 %, 12 ± 10 %, (6 ± 5 %, 12 ± 5 %)	40
TC021	500 ± 10 % 1), 250 ± 10 % 2)	24

Coaxial transmitting tetrodes air cooled

U_a max kV	W_{g_2} max W	U_{g_2} max V	W_{g_1} max W	T_b max °C	f_{max} Mc/s	Base connections
0,9		300			1200	ekvivalent 6884 6816
2	12	300	2	200	1200	
8	60	600	30	150–200	900	

Rectifying diode for pulse technique

t_f min s	Cooling	T_a max °C		Base connections
90	by air or oil	150		

Vacuum capacitors

$I_{vf\ ef}$ A	P_j kVA	T_o °C	r_{max} %	Remarks
20	200	−10 ÷ +40	80	
50	350	−10 ÷ +60	80	
		−10 ÷ +60	80	f = 50 c/s – 30 Mc/s
		−10 ÷ +40	80	f = 50 c/s – 100 Mc/s
20	350	−10 ÷ +40	80	
$80^{1)}$.50^{2}		+10 ÷ +45		f max = 30 MHz

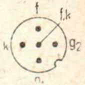
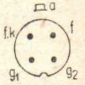
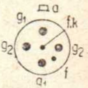
Pulse tetrodes

Type	U_f V	I_f A	$U_{a\,ip}$ max kV	$I_{a\,ip}$ max A	W_a max W	U_{g2} max V
40RS40	25	2,3–2,8	20	15	60	1300
50RS20	25	2,5–3,2	18	15	60	1300
60RS40	25	6,5	30	40	150	2100

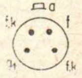
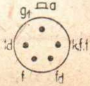
Pulse thyratrons

Type	U_f V	I_f A	U_a max kV	$U_{a\,inv}$ max kV	$I_{a\,ip}$ max A	$-U_g$ max V
51TR40	6,3	10,6	16	14	325	200
53TR40	6,3	9	20	20	500	200
61TR40	6,3	<32	25	25	1000	

Pulse tetrodes

W_{g2} max W	$-U_{g1}$ max V	$+U_{g1}$ max V	t_{ip} max µs	t_{ip}/f_{ip} max	Base connections
8	750–800	250	2	0,001	
8	700	300	0,3–1		
27	1000	350	0,3–1	f_{ip} = 500–4000 c/s	

Pulse thyratrons

$+U_g$ max V	t_{ip} max µs	t_{ip}/T max	t_{ip}/f_{ip} max	T_a °C	Base connections
150	6	1 : 1000	0,001	−40 ÷ +100	
200	6	1 : 1000			
700	4				

Reflex klystrons

Type	f min – max Mc/s	$\Delta f_{1/2}$ Mc/s	U_f V	I_f A
20SR51	9050 – 9500	>30	6,3	<0,6
21SR51	4400 – 4480 4480 – 5220	>30	6,3	0,7
22SR51	3895 – 3944 3944 – 4545	>25	6,3	0,7
23SR51	5125 – 6000	>30	6,3	0,7
24SR51	5882 – 6666	>30	6,3	0,7
25SR51	6525 – 7500	>30	6,3	0,7
26SR51	7140 – 8333	>30	6,3	0,7
27SR51	8110 – 9230	>30	6,3	0,7
28SR51	8800 – 10050	>30	6,3	0,7
29SR51	6465 – 6765	>30	6,3	0,7
202SR51	2650 – 3300	–	6,3	1
203SR51	8800 – 9800	>30	6,3	0,7
221SR51	4500 – 5100	>30	6,3	0,7
227SR51 *)	8110 – 9230	>30	6,3	0,7
204SR51	2600 – 3000	–	6,3	1

Reflex klystrons

U_{rs} V	$-U_{rf}$ V	P_o mW	U_{rs} max V	I_k max mA	Base connections
300	120 – 210	>15	330	25	
300	60 – 200	>20 >40	330	35	
300	60 – 200	>30 >45	330	30	
300	60 – 200	>30	330	30	
300	60 – 200	>25	330	30	
300	60 – 200	>20	330	30	
300	60 – 200	>20	330	30	
300	60 – 200	>20	330	30	
300	60 – 200	>15	330	30	
250	30 – 80	>10	330	25	
300	50 – 300	>40	350	30	
300	90 – 160	>15	330	30	
250	40 – 150	>20	330	30	
300	60 – 200	>20	330	30	
300	50 – 250	>70	500	35	

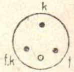
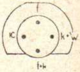
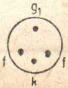
Power reflex klystrons

Type	f min – max Mc/s	Δf ½ Mc/s	U_f V	I_f A
213SR51	4400 – 5000	>30	6,3	<1
214SR51	4400 – 5000	>30	6,3	<1
24SR52	6500 – 6900	>28	6,3	0,9
27SR52	6570 – 6830	>20	6,3	0,9
20SR52	8100 – 8500	>30	6,3	<1,5
22SR52	6500 – 6900	>30	6,3	0,8–0,9
220SR52	8050 – 8200 8200 – 8750	>30	6,3	<1,5
28SR52	8500 – 10000	>30	6,3	<1,5
20SR53	1700 – 3900	>15	6,3	<1
20SR53S	1700 – 3900	>15	6,3	<1
21SR53	2000 – 8000 8000 – 12000		6,3	0,8

1) f — 2803 – 2940 Mc/s

2) f — 2600 – 3000 Mc/s

Power reflex klystrons

U_{rs} V	$-U_{rf}$ V	P_o mW	U_{rs} max V	I_k max mA	Base connections
1000	100–450	>1200	1000	120	
1000	100–450	>1200	1000	120	
750	<500	>750			
500	100–250	100			
750	100–500	>750	765	110	
750	50–400	1000	750	100	
750	100–500	>650 >750	765	110	
500	100–500	>100		80	
280	80–150	>80 1)	300	45	
280	80–150	>65 2)	300	45	
1000 1250	20–600 20–600	>10 >10	1500	25	

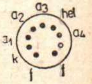
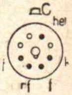
Travelling wave tubes

Type	f min – max Mc/s	U_f V	I_f A	U_c V	U_{hel} V
20SE4	2700 – 3500	6,3	0,8	800	390–450
31SE1	4400 – 5000	6,3	1,8	$<$1500	1500–1700

Carcinotrons

Type	f min – max Mc/s	U_f V	I_f A	U_a V	U_g V
30SE51	2600–3950	6,3	2,3	230–950	50–90
31SE51	3950–5850	6,3	2,15	330–1250	50–90
32SE51	5850–8200	6,3	2,15	300–1000	50–90
33SE51	8200–12400	6,3	2,15	250–1100	50–90

Travelling wave tubes

P_o mW	A dB	F dB	U_c max V	U_{hel} max V	Base connections
1	25	<7			
5000	<38	<28	2500	2500	

Carcinotrons

P_o mW	B G	U_a max V	I_k max mA	U_g max V	Base connections
20–400	650	1200	50	100	
20–400	650	1300	45	100	
10–200	650	1200	35	100	
10–150	650	1200	35	100	

Pulsed magnetrons

Type	f min – max Mc/s	U_f V	I_f A	$U_{a\,ip}$ kV	$I_{a\,ip}$ A	t_{ip} µs	f_{ip} c/s	$P_{o\,ip}$ kW	$U_{a\,ip}$ max kV	$I_{a\,ip}$ max A	t_{ip} max µs
21SP40	1800–2100	1,5	3,8	0,95	0,14				0,95	0,14	
40SP51	2800–2900	17	2,6–3,1	21–26	<55	1,8–2	400	>600	30	55	2
40SP52	9100–9400	12,6	2,8–3,3	13–16,5	<25	1–0,3	1000–3000	>120	16,5	25	
41SP52	9100–9400	12,6	3,8	14,5–17	22,5–27,5	1	1000	>150			0,3–1
42SP52	9400–9600	12,6	3	13–16,5	17–25	1–0,3	1000–3000	>120	16,5	25	
52SP52	9500–9600	12	<5	<21	<28	1–0,5	1000–2000	>200	21	28	
53SP52	9050–9650	12,6	<4,2	<23	<30	1	1000	>200	23	30	
57SP52	9050–9650	12,6	<4,2	<23	<30	1	1000	>200	23	30	
58SP52	9300–9500	12,6	<4,2	<23	<30	1	1000	>200	23	30	
64SP52	2699–2709	20	<7	<32	<90	>2	600	>800	32	90	
65SP52	2891–2901	20	<7	<32	<90	>2	600	>800	32	90	
66SP52	2905–2915	20	<7	<32	<90	>2	600	>800	32	90	

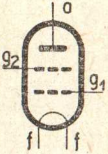
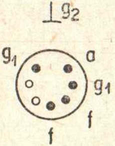
C. W. magnetrons

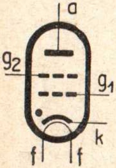
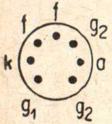
Type	f min – max Mc/s	U_f V	I_f A	U_a V	I_a A	P_o min kW	Cooling
31SA51	2400–2500	8	<1,5	1500	0,35	0,08–0,2	by air
60SA51	2325–2425	7–8	<28	5500	0,4–0,8	2	by water
62SA51	1220–1280	10–11	<28	4500– 6200	0,8–1,8	5	by air
63SA51	2325–2425	7	<28	5500	0,4–0,8	2	by air

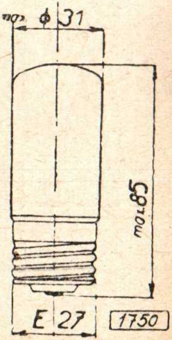
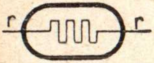
TR and ATR switch tubes

T y p e	f min – max Mc/s	P_{sp} max kW	t_{ip} max µs	f_{ip} max c/s	b_d max dB	P_{ob} max dB	P_p max ergů	T_a °C	Remarks
10TN52	2764,5–2935,5	600	2	400	3 1)	0,3	2500	–40 ÷ +45	1) t = 10 µs
10TN53	2600–3000	800	2	600	3 1)		0,07 2)	–40 ÷ +45	1) t = 10 µs 2) erg/imp
11TN52	9000–9600	150	0,3–1			0,8		–40 ÷ +70	
12TN52	8820–9490	240	0,3–1		3 2)		0,25	–40 ÷ +85	2) t = 6 µs
14TN52	9000–9600	150	0,3–1		3 2)	1	0,25	–40 ÷ +70	2) t = 6 µs
17TN52	2770–2930	800	2	600	3 3)		6000	. . . . +60	3) t = 35 µs
18TN52	2650–2810	800	2	600	3 3)		6000	. . . . +60	3) t = 35 µs
110TN52	8900–9700	200	1	1000	3 2)	0,4		. . . . +50	2) t = 6 µs

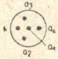
Electrometer tetrodes
Special purpose tubes
Thyratrons
Current - regulators
Voltage stabilizers
Overvoltage switching discharge tubes
Decade counting tubes
Special discharge tubes
Photocells
Photomultipliers
Image camera tubes
Image converters
Vacuum gauge tubes
Electrodes for neon arc lamp

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
1NE9 **2NE9** **4NE9**		U_f 1,25 V I_f 26 mA Direct heating ●	Is not manufactured!	
		**1NE9, 4NE9** U_a 10 V U_{g1} 8 V U_{g2} −2,5 V I_a 350 µA I_{g1} 675 µA S_a/g_2 >60 µA/V $-I_{g2}$ <3.10-13 A 4NE9: <3.10-12 A	U_a 10 V U_{g1} 8 V U_{g2} −2,5 V I_a 350 µA I_{g1} 675 µA $-I_{g2}$ 3.10-13 A	U_f 1,3 V U_f >1,1 V U_a 12 V U_{g1} 10 V $-U_{g2}$ 4 V
Electrometer tetrode Wire terminals		**2NE9** U_a 8 V U_{g1} 4 V U_{g2} −2 V I_a 125 µA I_{g1} 200 µA S_a/g_2 >30 µA/V $-I_{g2}$ <4.10-14 A	U_a 8 V U_{g1} 4 V $-U_{g2}$ 2 V I_a 120 µA I_{g1} 200 µA $-I_{g1}$ 2.10-14 A	U_f 1,3 V U_f >1,1 V U_a 10 V U_{g1} 8 V $-U_{g2}$ 4 V

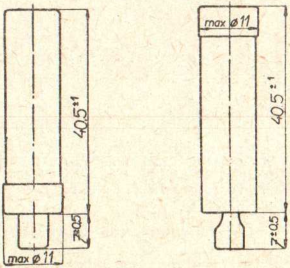
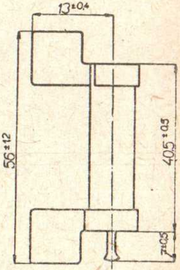
Type Application	Dimensions Base	Heating	Operational Data	Maximum Ratings
		Static data		
21TE31 Gas filled tetrode	Size M 3  	U_f 6,3 V I_f 0,6 A Indirect heating ● U_{arc} 8 V t_i 0,5 µs t_d (U_{g1} = –10 V) 0,75 µs t_d (U_{g1} = –100 V) 0,35 µs	$U_{a\,ef}$ 400 V U_{g2} 0 V U_{g1} –6 V $U_{g1\,ip}$ 6 V R_{g1} 1 MΩ R_a [2] 2 kΩ --- [2] R_a must be applied also at other operational values Is not manufactured Replace by S 1,3/0,5 i V	U_f 7 V U_f >5,7 V U_a 650 V U_{inv} 1300 V U_{g2} –100 V $U_{g2\,arc}$ –10 V U_{g1} –100 V $U_{g1\,arc}$ –10 V I_k [1] 100 mA $I_{k\,sp}$ 500 mA I_{g2} 10 mA I_{g1} 10 mA R_{g1} 10 MΩ $U_{+k/f-}$ 100 V $U_{-k/f+}$ 25 V T_o –55 ÷ +90 °C --- [1] Mean value of a 30 second interval.

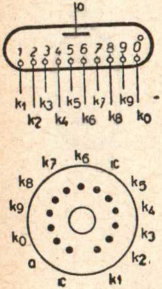
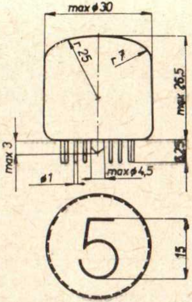
Type Application	Base	Operational Data					Dimensions
		T$_a$ °C	U$_{stab}$ V	I$_{stab}$ [mA] A	B	$\triangle$I$_{stab}$ mA	
V255-12-18A **V255-12-18B**		+20	12–18	247–258	252–263	≤ 6	
		+50	12–18	245–260	250–265	≤ 8	
		−50	12–18	245–260	250–265	≤ 8	
		+50 až −50	12–18			≤ 8	
	Patice: Edison E27 r na patici Socket: Edison E 27 r on Socket	Barretters which respond to both conditions (i. g. 255–258 mA) are marked B.					
Current-regulator for industrial applications							

VOLTAGE STABILIZER

Type	Number of paths	U_{zap} V	U_{stab} V	I_{stab} min – max mA	$\triangle U_{stab}$ V	Remarks	Dimensions mm	Base connection
11TA31	1	185	155	5–30	<5	I_{max} (t <10 s) 75 mA C_{max} paralelně 0,1 μF	Ø 19 × 70	
14TA31	1	105	75	5–30 5–40	<4 <6	I_{max} (t <10 s) 100 mA U_b >105 V	Ø 19 × 70	
10TA9	1		300– 500	0,015– 0,075	<15	$T_a = -40 \div 50$ °C	Ø 11 × 42	
14TA9	1	100	70	0,5–1,2	± 2		Ø 12,5 × 43	
11TF25	4	330	70 140 210 280	5–40	<16	$R_i = 4 \times 60\ \Omega$ U_b >450 V	Ø 47 × 144	
12TF25	4	330	70 140 210 280	10–80	<12	$R_i = 4 \times 30\ \Omega$ U_b >450 V	Ø 61 × 153	

Is not manufactured! Recommended replace: 11TA31 by StR 150/30, StR 150/60 – 14TA31 by StR 75/60 – 14TA9 by GR 29–60, SStR 85/5

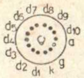
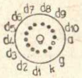
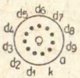
Type Application	Base	Static data	Operational Data	Maximum Ratings
11TN40 **11TN41** Overvoltage switching discharge tubes		$U_{zap\ ef}$ 1) <400 V $U_{zap\ ef}$ 2) 200–300 V U_{zap} 3) <1000 V R_{is} (U_{is} = 100 V) >10 MΩ	$U_{a\ ef}$ 250 V I_a (t – 0,25 s) 40 V 1) 1st striking, RMS value 2) 2nd and further strikings, RMS value 3) Surge peak voltage, wave 1/50th µsec positive or negative 4) 100 surge current, wave 10/20th µsec  Design 1 Design 2 **11TN40**	I_a (t – 0,25 s) 40 A I_a 4) 500 A  **11TN41**

Type Application	Base	Static data	Operational Data	Maximum Ratings
ZM1020 Decade numerical indicating tube for indication of number 0 thru 9 for measuring and counting apparatus		U_b 170 V R_a 15 kΩ I_k 2<2,5 mA U_{arc} >120 V U_b 160 V R_1 15 kΩ U_{zap} <160 V I_a 2<2,5 mA	DC operating conditions U_b 170 250 300 V R_a 15 56 86 kΩ U_{arc} 140 140 140 V 	U_b 350 V U_b >160 V I_k >1 mA I_k 1) 2,5 mA $I_{k\,sp}$ 10 mA U_{kk} >60 V U_a-U_{kk} <120 V T_o −50 °C T_o +70 °C 1) $\tau_{av} = 20$ ms

PHOTOCELLS

Type	**20PA91**	**25PA91**	**20PA95**	**20PF5**	**62PA90 VÚVET**	**62PA250 VÚVET**	**50PF9 VÚVET**
Sort	vacuum	gas filled	gas filled	gas filled	vacuum	vacuum	vacuum
Cathode surface [cm^2]	4	4	5	5	3	3	
λ [A]	8000–9000	8000–9000	8000	8000	4500	4500	
S [μA/Lm]	10–15	80–150	80–250	>100	50–100	50–100	>25
U_b [V]	100	100	100 ± 10	100 ± 10	100–200	100–200	100–200
I_k [μA]	1,5	1,5	0,5/cm^2	0,5/cm^2			0,5 / cm^2
R_i (darkness)	$>10^{11}$	$>10^{10}$	$>10^{10}$	$>10^{10}$	10^{10}	10^{10}	
Maximum ratings:							
U_{zap} [V]	–	>130	>110	>110	–		
U_b [V]	500	100	U_{zap} - 20 V	U_{zap} - 20 V	200	200	200
I_k [μA]	3	3	–	–	0,7; 1,5 [1]	0,7; 1,5 [1]	0,5 / cm^2
T_o [°C]	50	50	50	50	60	60	
Capacitances:							
$C_{a/k}$ [pF]	5	5	5	5	<3	<3	
Base connections:	a - red k - blue (white)	a - red k - blue (white)	a - red k - blue (white)		a - red k - blue		
					[1] t <1 hod.	[1] t <1 hod.	I_k <1,5 cm t <1 hod.

PHOTOMULTIPLIERS

Type		61PK412	61PK413	61PK414	61PK415	61PK422	62PK401
Number of dynodes		10				10	9
Cathode diameter	[mm]	43				115	1,25 cm²
λ	[A]	4600				4600	4200
S_K	[µA/lm]	40–70	35–80	50–90	35–90	25–70	40
S_a	[A/lm]	100				50	80
A		$5.10^5–1.10^7$				$5.10^5–1.10^7$	
U_b	[V]	1500				1600	1050
$U_k/_{D1}$	[V]	<400				<600	200
U_g	[V]	0–100 % $U_k/_{D1}$				0–100 % $U_k/_{D1}$	$U_a/_{D9}$ – 50
Maximum ratings:							
U_C	[V]	1600				1700	1150
U_D	[V]	150				150	
I_a	[µA]	50				50	10
I_a 1)	[µA]	100				100	100
I_{ao}	[A]	1.10^{-7}	5.10^{-8}	$5.10.^{-8}$	3.10^{-8}	1.10^{-7}	0,2 µA
T_a	[°C]	50				50	50
Capacitances:							
$C_a/_D$ *max*	[pF]	8				10	8
$C_a/-$ *max*	[pF]	12				25	10
Base connections:		 				 	

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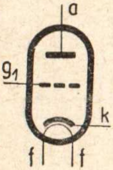
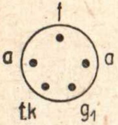
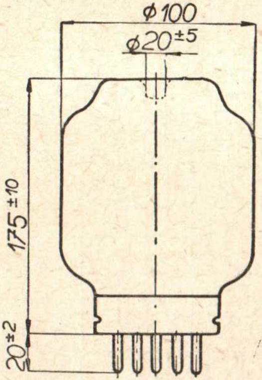
1) Transitorily

Type	61PK412	61PK413	61PK414	61PK415	61PK422
Resolving power Crystal NaI (Tl radiator Cs ^{137})	11–13	9–11	7–9	7–11	9–15 %
Energetic equivallent of noise	–	6–8	4–6	1–5	6–15 keV

Type Application	Base	Heating	Operational Data	Maximum Ratings
31UA9 a – brown f – yellow f, k – yellow Low - pressure hydrogen spectral discharge tube for continuous spectrum 4000 – 2200 Å for use in spectrometers.		U_f 6,3 V I_f <2,7 A t_f 15 min Indirect heating	U_a 220–250 V I_a 300 mA R_a 300 Ω W_a 40 W Manufacturer: **VÚVET**	U_a 250 V I_a 1) 500 mA I_a 2) 1000 mA 1) Maximum time 1 hour. 2) Maximum time 1 minute

Type Application	Dimensions Base	Heating Static data	Operational Data	Maximum Ratings
41UC25   Low - pressure hydrogen spectral discharge tube for ultraviolet sources of continuous spectrum to 2000 Å		U_f 24 V I_f <3,1 A U_f 27 V I_f <3,4 A U_f 30 V I_f <3,55 A t_f 15 mln Manufacturer: **VÚVET**	U_a 220–250 V I_a 1,5 A I_{g1} 50–200 mA R_a 60 Ω R_{g1} 4 kΩ 	W_a 500 W U_a 250 V I_{g1} >50 mA I_{g1} 200 mA I_a 1,5 A I_a 1) 2 A

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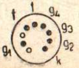
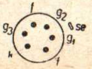
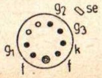
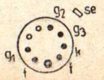
1) Short duration max. 1 hour.

KVANTICON CAMERA TUBES

	Type		41QV4	41QV41 VUVET	43QV26 43QV26-P VUVET	44QV26 VUVET
	U_f	[V]	6,3	6,3	6,3	6,3
	I_f	[A]	0,36	0,3	0,3	0,3
	Image on photocathode	[mm]	9 × 12	6 × 4,5	11,25×15	17,25×23,5
	λ	[mμ]	450–470	400–500	400–500	400–500
	U_{se}	[V]	≦120	<100	<100	<100
	U_{g4}	[V]	250	–		
	U_{g3}	[V]	250	300–400	300–400	300–400
	U_{g2}	[V]	300	350–400	350–400	350–400
	$-U_{g1}$	[V]	5 – 120	30–140	30–140	30–140
	I_{se}	[μA]	>0,15 (25 lx)	>0,15 (25 lx)	>0,2 (25 lx) >0,35 (1000 lx)	>0,3 (1000 lx)
Maximum ratings	U_{se}	[V]	120	100	100	100
	U_{g4}	[V]	400	–		
	U_{g3}	[V]	400	400	400	400
	U_{g2}	[V]	400	400	400	400
	$-U_{g1z}$	[V]	5 – 120	140	140	140
	I_k	[mA]	0,35	0,5	0,5	0,5
	E_{se}	[lx]	100	10 000	10 000	10 000
	T_{se}	[°C]	60	60	60	60
	$C_{se}/-$	[pF]	<6	<2	<5	<10
	Dimensions (Ø×l)	[mm]	28×156,7±2	16,6×91±2	Ø 28,5×165-3	Ø 38,5×192±2
	Base connections:					

<table>
<tr><th>Type
Application</th><th>Base</th><th>Heating
Dimensions</th><th>Operational Data</th><th>Maximum Ratings</th></tr>
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50QM8

Superorthicon camera tube with electromagnetic deflection and focusing
Resolving power 625 lines
Image on the photocathode 24 × 32 mm
Base: diheptal and 7-pin base
Maximum of spectral sensitivity 400–520 mμ

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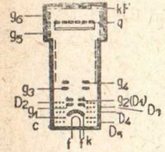

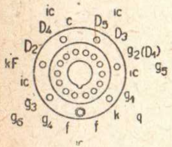

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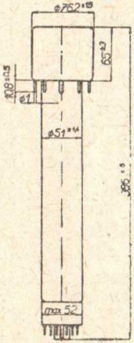
U_f 6,3 V
I_f 0.6 A
Indirect heating



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V o l t a g e s :
Photocathode U_{KF} -240 ÷ -500 V
Accelerating electrode U_{g6} 65 – 85 % U_{KF}
Target U_q -3 ÷ +5 V
Decelerating electrode U_{g5} 0 ÷ 160 V
Focusing electrode U_{g4} 50 ÷ 270 V
Multiplier cylinder U_{g3} 200 ÷ 300 V
1st fynode U_{D1} 250 V
2nd fynode U_{D2} 38 % U_c
3rd dynode U_{D3} 56,5 % U_c
4th dynode U_{D4} 75,5 % U_c
5th dynode U_{D5} 93,5 % U_c
Collector U_c 1500 V
Collector current I_c <150 μA
Output signal current (E=0,4 lx) >6 μA
Magnetic field intensity in centre of focusing coil 75 G
Target temperature T_q 35 – 50 °C

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<td>

U_f 6,6 V
U_{kF} –550 V
U_c 1650 V
$U_{D/D}$ 350 V
U_{g6} –450 V
U_q –10 ÷ +10 V
U_{g5} 160 V
U_{g4} 300 V
U_{g3} 400 V
U_{D1} 350 V
U_{g1} –150 V
E_{kF} (t – 15 s) 1) 5 lx
E_{kF} 2) 500 lx
I_k 50 μA
I_k (t ≤ 10 min) 100 μA
I_c 150 μA
T_b (q) 35–50 °C

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1) Static scene
2) Mobile scene

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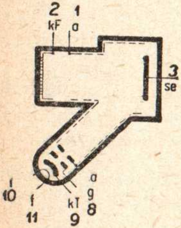
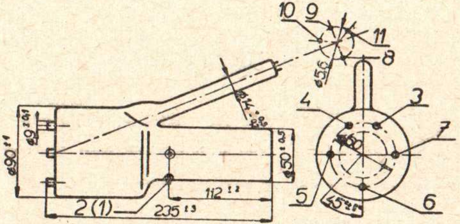
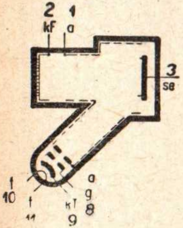
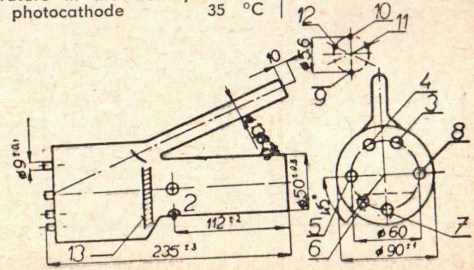
</tr>
</table>

Type Application	Base	Operational Data	Maximum Ratings
51QM8 **52QM8** Maximum of spectral sensitivity 400–520 mμ	VÚVET	Operational data corresponding with 50QM8 with exception this data: Output signal current in characteristic bent >6 μA Resolution at temperature +40 °C In the centre of picture: signal amplitude for 400 lines min 55 % (51QM8) min 50 % (52QM8) signal amplitude for 500 lines min 30 % In the picture corners: signal amplitude for 400 lines 51QM8 min 20 % 52QM8 min 23 % Signal-to-noise ratio: 51QM8 min 31 dB 52QM8 min 30 dB	E_{kF} (t = 15 s) 1) 5 lx E_{kF} 2) 500 lx T_b (q) 35–50 °C 1) Static scene 2) Mobile scene
511QM8 **512QM8** Maximum of spectral sensitivity 480–550 mμ	VÚVET	Operational data corresponding with 50QM8 with exception this data: Output signal current in characteristic bent >6 μA Resolution at temperature +40 °C In the centre of picture: signal amplitude for 400 lines min 55 % (511QM8) min 50 % (512QM8) signal amplitude for 500 lines min 30 % In the picture corners: signal amplitude for 400 lines 511QM8 min 20 % 522QM8 min 23 % Signal-to-noise ratio: 511QM8 min 31 dB 512QM8 min 30 dB	E_{kF} (t = 15 s) 1) 5 lx E_{kF} 2) 500 lx T_b (q) 35–50 °C 1) Static scene 2) Mobile scene

Type Application	Base	Heating Dimensions	Operational Data	Maximum Ratings
62QK40 Supericonoscope camera tube with electromagnetic deflection and focusing. Integrated sensitivity >50 µA/lm Resolving power >600 lines Gradation 8 steps Image on the photocathode 12×16 mm Maximum spectral sensitivity 450–530 mµ		U_f 6,3 V I_f 0,36 V t_f 1 min Indirect heating ● $C_{se}/_{1+kr}$ 16 pF **Base connection:** 1. a anode 2. kF photocathode 3. se target 4. kr parts of frame 5. – unused 6. kr parts of frame 7. kr parts of frame 8. g control electrode 9. kT thermocathode 10. f heater 11. f heater	Anode voltage against the thermocathode +1050 V Anode voltage against the photocathode +1050 V Voltage of the thermocathode −1050 V Voltage of the photocathode −1050 V Cut-off voltage −30 ÷ −75 V Output signal current E = 26 lx >0,12 µA E = 16 lx >0,085 µA E = 65 lx >0,19 µA Temperature in the vicinity of the photocathode 35 °C 	U_f 7 V U_f >5,7 V U_{kF} 1150 V U_{kT} 1600 V I_{kF} 0,57 µA E_{kF} ($I_k \leqq$ 0,57 µA) 65 lx T_a −30 ÷ +58 °C

Type Application	Base	Heating Dimensions	Operational Data	Maximum Ratings
63QK40 Supericonoscope camera tube with helping photocathode (rieseliconoscop) with electromagnetic deflection and focusing Integrated sensitivity >50 μA/lm Resolving power >600 lines Gradation 8 steps Image on the photocathode 12×16 mm Maximum spectral sensitivity 450–530 mμ		U_f 6,3 V I_f 0,36 A Indirect heating ● $C_{se}/a+k_r$ 16 pF **Base connection:** 1. a anode 2. kF photocathode 3. se target 4. 2nd frame 5. 3rd frame 6. ap helping anode 7. main frame 8. 4th frame 9. g control electrode 10. kT thermocathode 11. f heater 12. f heater 13. kFp helping photocathode	Anode voltage against the thermocathode +1050 V Anode voltage against the photocathode +1050 V Voltage of helping anode 0–5 V Voltage of the thermocathode −1050 V Voltage of the photocathode −1050 V Cut-off voltage −30 ÷ −75 V Output signal current E = 16 lx >0,1 μA E = 26 lx >0,13 μA E = 65 lx >0,2 μA Temperature in the vicinity of the photocathode 35 °C 	U_f 7 V U_f >5,7 V U_{kF} 1150 V U_{kT} 1600 V I_{kF} 0,57 μA E_{kF} (I_{kF} ≦0,57 μA) 65 lx T_a −30 + 50 °C

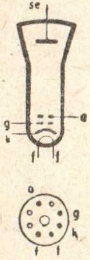
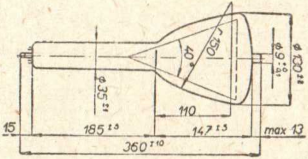
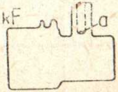
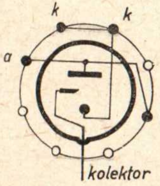
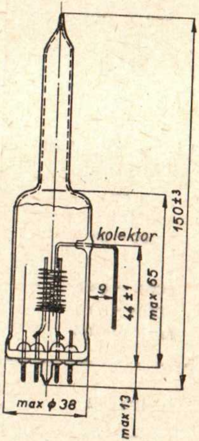
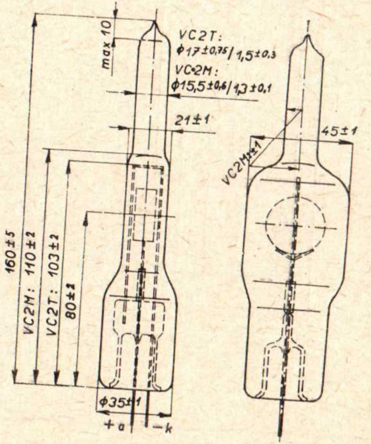
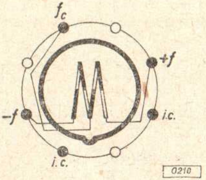
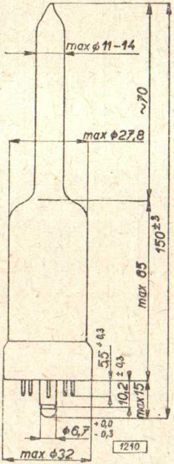
Type Application	Base	Heating Capacitances	Operational Data	Maximum Ratings
130QP44 Monoscope image tube for black/white television Electromagnetic deflection and focusing. Resolving power 625 lines Deflection angle 40° Base: S 8/18		U_f 6,3 V I_f 0,6 A t_f >5 min Indirect heating C_{se} 6±1,5 pF C_g <8 pF	U_a 2000 V U_{se} 1900 V $-U_{gz}$ (I_k <1 μA) 50 – 125 V I_k ≦200 μA I_{se} 1 μA R_p 1.5 kΩ Resolving power >600 lines 	U_a 2000 V U_a >1600 V U_{se} 1900 V U_{se} >1600 V $-U_g$ 150 V U_g 0 V R_g 1,5 MΩ $U_{k/f}$ 125 V I_k 200 μA

IMAGE CONVERTERS

Type		03QA41	22QA41	23QA41
Sensitivity on		X - ray	infra-red ray	infra-red-ray
λ max	[Å]		8000 – 9000	8000 – 9000
λ	[Å]		4000 – 12000	4000 – 12000
Resolving power	[lines/mm]	2×16/cm	40 – 50	40 – 50
Image magnification	[%]		0,55	0,55
Photocath. diameter	[mm]	190	35	22
Screen diameter	[mm]	21	18	11
S_{kF}	[μA/lm]		20–30 (U_a = 200 V)	20 – 30
U_{a1}	[kV]	22 – 24	17	15
U_{a2}	[V]	0 – 300	–	–
Maximum ratings:				
U_{a1}	[kV]	22 – 24	18	16
E_{kF}	[lx]		0,5	0,5
r	[°C]		–30 + +45	–30 ÷ +45
Colour of screen		yellow / green	green	green
Afterglow			medium	medium
Dimensions:	[mm]	Ø 230×350	54 × 68	46 × 50
				

Type Application	Operational Data	Maximum Ratings
VA1M Triode vacuum gauge for measuring of high vacuum from 1.10-2 to 1.10-8 torr Socket: S 8/18	$U_{a/k}$ 150 V I_E 0,1 – 1 – 10 mA Working position: vertical  	Values valid at degasing: $U_{a/k}$ 400 V I_E 20 mA T_a +5 . . +40 °C

Type Application	Characteristic Data	Outlines
VC2M **VC2T**		
Vacuum gauge for Penning vacuometer with measuring range 10^{-3} to 10^{-6} torr Operational data: U_{ao} 200 V I_a 0,001-2 mA R_o 1 MΩ H 380 Oe Measuring range I_a 0.0016...1,2 mA Vacuum 10^{-6} 10^{-3} torr		

Type Application	Characteristic Data	Operational Data Dimensions
VG1M Thermocouple vacuum gauge for measuring of rough vacuum from 1 to 1.10^3 torr	Heating data: U_f 20 V I_f 2 × 125 mA Thermoelectric voltage 20 . . . . 60 mV at pressure 1.10^3 torr Socket: S 8/18	$U_{f\,cf}$ 20 V I_f 2 × 125 mA t_f 2 min U_{thermo} >35 mV (T_a = 15 –20 °C) $T_{a\,max}$ = +5 . . . .+40 °C Working position: arbitrary, but recommended position vertical  

Germanium diodes
Germanium junction rectifiers
Germanium power rectifiers
Silicon diodes
Silicon rectifiers
Silicon Zener diodes
Germanium A. F. transistors
Germanium R. F. transistors
Germanium power transistors
Germanium photodiodes
Silicon photodiodes
Silicon A. F. transistors
Silicon R. F. transistors
Silicon R. F. switching power transistors
Silicon phototransistors
Integrated circuits

Designations of the semiconductor components according to the TESLA standard NT – K 003

The semiconductor components manufactured by TESLA are designated according to this standard.

The designation consists of three parts, groups of figure, letters and again figures.

The first figure group gives the type number.

The centre letter of the designation indicates the type.

The letter group indicates the following:

NN – point contact crystal diodes
NP – junction rectifiers
NQ – point contact crystal diodes for higher frequencies
NT – point contact transistors
NU – junction transistors
NV – special transistors
PN – resistive photocells
PP – barrier photocells

The third part of the designation is a group of figures. The numbers 40 to 99 indicate the material or mechanical structure as follows:

40 to 49 – glass
50 to 59 – ceramic material
60 to 69 – synthetic material
70 to 79 – metal
80 to 99 – special design

The designs of the transistors and photocells are indicated by the last figure in the last group as follows:

0 – envelope Ø 5 × 13 mm, axial wire terminals
1 – envelope Ø 20 × 50 mm, wire terminals on one side of the envelope
2 – bead on the terminals (without envelope)
3 – flat button type envelope, radial terminals
4 – cylindrical design Ø 6 × 28 mm, tape terminals
5 – special designs for the measurement of temperatures

New designations of the semiconductor components TESLA

According to standard TESLA NR-K026 are designed the new semiconductor components manufactured by TESLA. The designation consists of two parts – group of letters and group of figures. The group of letters have two or three letters and indicates the type of semiconductor device. First letter of this group indicates the used semiconductor material:

G – Germanium

K – Silicon

The second letter of this group indicates the type of device:

A – Diode
C – A. F. transistors (R_t >15 °C/W)
D – A. F. power transistors (R_t <15 °C)
E – Tunnel diodes
F – R. F. transistors
L – R. F. power transistors
P – Photodiodes and phototransistors
S – Transistors for switching applications
U – Power transistors for switching applications
T – Controlled power rectifiers (thyristors)
Y – Rectifiers
Z – Zener diodes, reference diodes

The group of figures, following the letters group, have always two or three figures and are only used for consecutive numbering without technical significance.

Explanations of symbols applied for diodes and rectifiers

$C_{K/A}$	capacitance cathode – anode
C_N	filter input capacitor
f	frequency
F	cooling surface
I_{AK}	forward current
I_{AKM}	forward peak current
$I_{AKM\,imp}$	forward pulse current
I_{KA}	reverse current
I_o	rectified current
I_Z	Zener current
K	thermal resistance
k_t	thermal coefficient
P_d	power dissipation
r_{KA}	dynamic Zener resistance
R_o	protective series resistance
R_p	parallel resistance, connected across the rectifier
T_a	ambient temperature
T_d	diode temperature
T_j	junction temperature
T_p	case temperature
T_s	storage temperature
$U_{a\,eff}$	A. C. effective anode voltage
U_{AK}	forward voltage
U_{KA}	reverse voltage
U_{KAM}	peak reverse voltage
$U_{KAM\,imp}$	pulse reverse voltage
U_o	rectified voltage
U_{ss}	rectified voltage
$U_{vf\,eff}$	R. F. effective voltage
U_Z	Zener voltage
τav	integration time
η	efficiency

Germanium point contact diodes

It is not in production Replace by GA200 – GA207

Type	Application	Characteristic Data					Maximum Ratings						Coloured marking band
		I_{AK} U_{AK} – 1 V min mA	I_{KA} při U_{KA}				I_{AK} mA	I_{AK} max 10 minut mA	I_{AKM} 2) mA	I_{AKM} Imp 3) mA	U_{KA} V	U_{KAM} V	
			3 V µA	10 V µA	50 V µA	100 V µA							
1NN41 1NN40	Ri re	(15) 5		(21) <10(			15	50	150	500	20	25	White
2NN41 2NN40	General	(7) 2,5			(510) <1600		15	50	150	500	50	55	Yellow
3NN41 3NN40	General	(12) 5		(25) <50	(250) <800		15	50	150	500	60	75	Blue
4NN41 4NN40	General	(15) 4			(330) <833		12	40	150	500	85	90	Green
5NN41 5NN40	Selection type	(8) 3	(4) <6		(60)	(220) <625	10	30	100	500	100	120	Red
6NN41 6NN40	Detector	(14) 1,5	1)								20	25	Black
7NN41	Video detector	5		<100			15	50	150	500	10	15	Violet

Inherent capacitance: 1 pF approx.
Max. operational frequency: 100 Mc/s.
Valid at 20 °C ambient temperature
(The data on brackets are average current values.)

1) At U_{KA} = 1 V, the current I_{KA} <0,1. I_{AK} measured at +1 V.

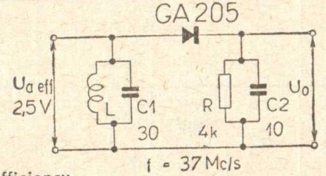
2) Max. 50 peaks in 24 hours.

3) Max. 100 surges during the service life of the diode, or 10 at 2 seconds intervals.

Germanium point-contact diodes

Type	Characteristic Data				Maximum Ratings							Coloured marking band
	I_{AK}	U_{AK}	U_{KA} při I_{KA}		T_a	U_{KA}	U_{KAM} 1)	U_{KAM} imp 2)	I_{ss}	I_{AKM} 1)	I_{AKM} imp 2)	
	mA	V	V	µA	°C	V	V	V	mA	mA	mA	
GA 200	>2,5	1	50	<1600	25	50	55		15	150	500	Brown
GA 201	5	<1	>15	200	25–60	15	25	30	15	25	500	White
GA 202	5	<1	>10 >30	100 200	25–60	30	40	50	15	25	500	Yellow
GA 203	5	<1	>5 >50	25 200	25 60	60 45	75 60	85 75	20 20	75 75	500 500	Blue
GA 204	5	<1	>10 >100	25 200	25 60	120 100	140 110	150 120	20 15	75 75	500 500	Green
GA 205	5	<1	>10 >15	100 200	25–60	15	25	30	15	25	500	Red
2-GA 206	5	1	>10 >30	25 200	25–60	30	40	–	2,5	10	50	Violet
GA 207	>1,5	1	1	<0,1 . I_{AK}	25	20	25					Khaki

P_{max} (T_a *max* 45 °C)	100	mW
T_j *max*	100	°C
T_a *max*	–60 ÷ +85	°C
T_s *max*	–60 ÷ +85	°C



R. F. efficiency of diodes GA205:

$$\eta = \frac{U_o}{U_{a\,eff}\cdot\sqrt{2}}\cdot 100 \geq 50\ \%$$

2-GA206:

ΔI_{AK}	0,5	<1	mA
U_{AK}	1		V

---

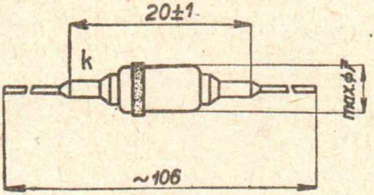
1) f >25 c/s

2) Max 1 sec., interval between pulses min. 2 minutes

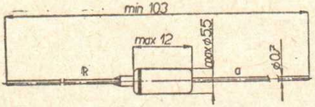
Valid at +25 °C ambient temperature.

The maximum permissible time periods for heating of the ends of the wire terminals during soldering, when Sn40Pb soft solder and a soldering iron 250 °C are used, are as follows:

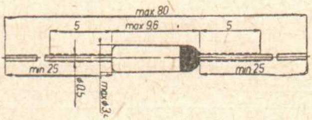
With unshortened wire terminals	max. 6 seconds
With wire terminals shortened to 15 mm	max. 2 seconds



Dimensions of the diodes of the NN40 line



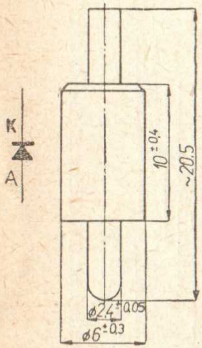
Dimensions of the diodes of the NN41 line



Dimensions of the diodes of the GA 200 line

Type Application	Static data	Maximum Ratings

GA301



Germanium point-contact diode for R. F. detectors up to 2000 Mc/s.

				Measured at			
I_{AK}	≧	2	mA	U_{AK}	=	1	V
I_{KA}	≦	5	µA	U_{KA}	=	1	V
R_1	≧	50	kΩ	f	=	1	MHz 1)
R_{200}	≧	4	kΩ	f	=	200	MHz 1)
C_{AK}	≦	1	pF	f	=	1	MHz 1)
η	≧	55	%	f	=	1000	MHz 2)

U_{KA}	40	V
U_{KAM} 3)	60	V
I_{AKM}	10	mA
$I_{AKM\ imp}$ 4)	25	mA
T_a	−20 . . . +60	°C

1) Measured with R. F. bridge at diode voltage $U_{vf} = 100$ mV.

2) Measured in transition probe 70 Ω and at R. F. voltage $U_{vf} = 2,7$ V.

3) Max. 50 pulses during the service lifetimes. Pulse duration max. 0,5 sec. Time interval between pulses min. 2 minutes.

4) Pulse duration max. 1 sec. Time interval between pulses min. 2 minutes.

Type Application	Static data	Maximum Ratings
GAZ51		

Germanium diode with gold point contact for switching applications

	min.	nom.	max.	
T_a		25		°C
U_{AK} (I_{AK} = 0,1 mA)	0,12	0,21	0,24	V
U_{AK} (I_{AK} = 1 mA)		0,28		V
U_{AK} (I_{AK} = 10 mA)	0,32	0,4	0,5	V
U_{AK} (I_{AK} = 30 mA)	0,38	0,52	0,62	V
I_{KA} (U_{KA} = 1,5 V)		0,3	1	µA
I_{KA} (U_{KA} = 10 V)		0,8	3	µA
I_{KA} (U_{KA} = 25 V)		2	7,5	µA
T_a		60		°C
U_{AK} (I_{AK} = 0,1 mA)	0,06	0,14	0,22	V
U_{AK} (I_{AK} = 1 mA)	0,12	0,22	0,3	V
U_{AK} (I_{AK} = 10 mA)	0,24	0,36	0,48	V
U_{AK} (I_{AK} = 30 mA)	0,32	0,46	0,6	V
I_{KA} (U_{KA} = 1,5 V)		2,5	10	µA
I_{KA} (U_{KA} = 10 V)		5	20	µA
I_{KA} (U_{KA} = 25 V)		8	50	µA

Outlines corresponding with OA7

T_a	25	75	°C
U_{KA}	25	25	V
U_{KAM} 1)	25	25	V
$U_{KAM\ imp}$ 2)	30	30	V
I_{AK}	140	50	mA
I_{AKM} 1)	250	250	mA
$I_{AKM\ imp}$ 3)	400	400	mA
I_O 1)	80	40	mA
T_a	–60 . . . +75		°C
T_s	–60 . . . +75		°C

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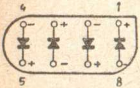
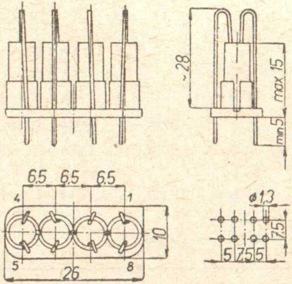
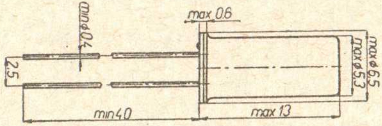
1) Sinusoidal waveform, f $\geq$ 20 Hz.

2) t $<$10 ms

3) t $<$1 s

Type Application	Static data	Maximum Ratings
4-GAZ51  Germanium gold point contact diodes quad of GAZ51	Each diode at quad must be concorded to characteristic data and maximum ratings of GAZ51. Further is all diodes quad measured in diodes quad matching equipment 12YZO55. Carrier frequency leak can be max. –6,5 dB in temperature range from +10 to +45 °C and at carrier frequency 120 kc/s with level of –0,5 to –0,9 Np.  	

Type Application	Static data						Maximum Ratings			
OA5	T_a		25		60	°C	T_a	+25	+75	°C
	U_{AK}	(I_{AK} = 0,1 mA)	0,15	<0,25	<0,2	V	U_{KA}	100	50	V
	U_{AK}	(I_{AK} = 10 mA)	0,4	<0,55	<0,5	V	U_{KAM}1)	100	50	V
	U_{AK}	(I_{AK} = 200 mA)	0,8	<1	<1	V	$U_{KAM\ imp}$ 2)			
	U_{AK}	(I_{AK} = 300 mA)	0,9	<1,25	<1,25	V		100	50	V
							I_{AK} (U_{KA} = 0 V)			
	I_{KA}	(U_{KA} = 1,5 V)	0,8	<5	<26	µA		130	45	mA
	I_{KA}	(U_{KA} = 10 V)	1,1	<6	<30	µA	I_{AK} (U_{KA} = 100 V)			
	I_{KA}	(U_{KA} = 50 V)	2,5	<9	<60	µA		115	35	mA
	I_{KA}	(U_{KA} = 100 V)	8	<30	<120	µA	I_{AKM}1)	350	350	mA
							$I_{AKM\ imp}$ 3)			
								1000	–	mA
							$I_{AKM\ imp}$ 2)			
								500	–	mA
							$I_{AKM\ imp}$ 4)			
								600	–	mA
							τ_{av}	50	–	ms
							T_a	−60 ÷ +75		°C
							T_s	−55 ÷ +75		°C
Germanium diode with welded gold point contact for switching applications				1) f <20 c/s; f_{imp} ≦20 c/s; T/t <0,5 2) t_{imp} ≦1 s			3) t_{imp} ≦1 µs; T/t ≦0,01 4) t_{imp} ≦0,3 µs			

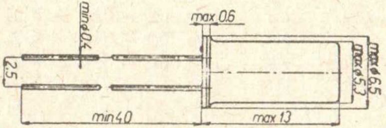
Type Application	Static data	Maximum Ratings

OA7

Germanium diode with welded gold point contact for switching applications

T_a	25		60	°C
U_{AK} (I_{AK} = 0,1 mA)	0,21	<0,24	<0,18	V
U_{AK} (I_{AK} = 10 mA)	0,43	<0,52	< 0,5	V
U_{AK} (I_{AK} = 30 mA)	0,54	<0,67	<0,65	V
I_{KA} (U_{KA} = 1,5 V)	0,12	<1	<10	µA
I_{KA} (U_{KA} = 10 V)	0,23	<3	<18	µA
I_{KA} (U_{KA} = 25 V)	0,72	<7,5	<45	µA

I_{KA} po 3,5 µs	< 25 µA	U_{KA} = 5 V I_{AK} = 5 mA
I_{KA} po 0,5 µs	<250 µA	



Replaced by GAZ51

U_{KA}	15	V
U_{KAM} ¹)	25	V
$U_{KAM\ imp}$ ²)	30	V
I_{AK} ³)	50	mA
I_{AKM} ¹)	50	mA
$I_{AKM\ imp}$ ²)	400	mA
T_a	−60 ÷ +75	°C
T_s	−60 ÷ +75	°C
K	0,4	°C/mW

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¹) Peak value

²) Max. 1 sec. as single pulse

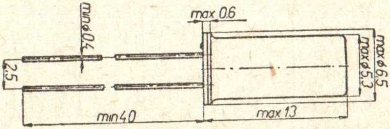
³) U_{KAM} = 25 V, half-cycle max. 50 msec.

Type Application	Static data	Maximum Ratings

OA9

Germanium diode with welded gold point contact for switching applications

T_a	25		60	°C
U_{AK} (I_{AK} = 0,1 mA)	0,16	< 0,2	<0,16	V
U_{AK} (I_{AK} = 10 mA)	0,32	<0,42	<0,36	V
I_{KA} (U_{KA} = 1,5 V)	0,9	<2,5	<18	µA
I_{KA} (U_{KA} = 10 V)	1,5	< 7	<26	µA
I_{KA} (U_{KA} = 25 V)	3,3	< 14	<50	µA



T_a	+75	°C
U_{KA}	25	V
U_{KAM} 1)	25	V
$U_{KAM\ imp}$ 2)	40	V
I_{AKM} 1) (U_{KAM} = 25 V)	500	mA
I_{AK}	100	mA
I_{ss} 3)	50	mA
I_{ss} 4)	35	mA
$I_{AKM\ imp}$ 2)	800	mA
I_{KA} 5)	150	µA
τ_{av}	50	ms
K (T_a = 25 °C)	0,4	°C/mW
T_a	−60 ÷ +75	°C
T_s	−60 ÷ +75	°C

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1) f >20 c/s; f_{imp} >20 c/s, T/t $<0,5$

2) t_{imp} <1 s

3) At sinusoidal input voltages and resistive load.

4) At sinusoidal input voltages and capacitive load.

5) After 3,5 µsec past switching from I_{AK} = 400 mA on U_{KA} = 10 V, T_a = 25 °C.

Germanium junction rectifiers 0,3 A and 0,5 A

Type	Characteristic Data			Maximum Ratings						
	I_{AK} $U_{AK}=0{,}5$ V min mA	I_{KA} at U_{KA} max mA	V	$U_{a\,ef}$ 3) V	U_{KA} V	I_{AK} mA	I_{AKM} 1) A	I_{AKM} 2) imp A	P_d W	R_p kΩ
1NP70	300	3	30	12	36	300	5	15	0,3	1,5
2NP70	300	2	50	20	60	300	5	15	0,3	4,7
3NP70	300	1,5	100	38	110	300	5	15	0,3	10
4NP70	300	1	200	70	210	300	5	15	0,3	18
5NP70	300	1,3	150	55	160	300	5	15	0,3	15
6NP70	300	0,7	250	90	260	300	5	15	0,3	22
11NP70	500	3	30	12	36	500	7	25	0,3	1,5
12NP70	500	2	50	20	60	500	7	25	0,3	4,7
13NP70	500	1,5	100	38	110	500	7	25	0,3	10
14NP70	500	1	200	70	210	500	7	25	0,3	18
15NP70	500	1,3	150	55	160	500	7	25	0,3	15
16NP70	500	0,7	250	90	260	500	7	25	0,3	22

Operational frequency:	0–50 kc/s
Operational temperature of the rectifier:	−40 ÷ +50 °C
Storage temperature of the rectifier:	−40 ÷ +75 °C
Relative humidity of the store room:	75 %

In new design to be replaced by silicon rectifiers!

The data are valid at $T_a = 25$ °C

1) For max. 10 ms
2) Max. 50 surges per 24 hours
3) For a filter with capacitive input.

Recommended replace:
KY701 Series for 1NP70–6NP70
KY721 Series for 11NP70–16NP70

Germanium power rectifiers 3, 5 and 10 A

Type	Characteristic Data			Maximum Ratings						R_p min
	I_{AK} $U_{AK}=0{,}5$ V min	I_{KA} při U_{KA} max		$U_{a\,ef}$ 1)	U_{KA}	I_{AK}	I_{AKM} imp 2)	P_{di}	F min	
	A	mA	V	V	V	A	A	W	cm^2	kΩ
20NP70	3	30	18	6	18	3	50	2,7	150	0,4
21NP70	3	20	30	10	30	3	50	2,7	150	0,7
22NP70	3	15	50	16	50	3	50	2,7	150	1,7
23NP70	3	10	100	30	100	3	50	2,7	150	4
24NP70	3	8	150	45	150	3	50	2,7	150	6,4
25NP70	3	6	200	60	200	3	50	2,7	150	12,5
30NP70	5	25	18	6	18	5	70	4,5	220	0,4
31NP70	5	18	30	10	30	5	70	4,5	220	0,7
32NP70	5	13	50	16	50	5	70	4,5	220	1,7
33NP70	5	9	100	30	100	5	70	4,5	220	4
34NP70	5	7	150	45	150	5	70	4,5	220	6,4
35NP70	5	5	200	60	200	5	70	4,5	220	12,5
40NP70	10	20	18	6	18	10	100	7,5	440	0,4
41NP70	10	15	30	10	30	10	100	7,5	440	0,7
42NP70	10	11	50	16	50	10	100	7,5	440	1,7
43NP70	10	8	100	30	100	10	100	7,5	440	4
44NP70	10	6	150	45	150	10	100	7,5	440	6,4
45NP70	10	4	200	60	200	10	100	7,5	440	12,5

It is not in production! In new design to be replaced by silicon rectifiers!

Germanium power rectifiers 20 A

Type	Characteristic Data			Maximum Ratings						
	I_{AK} $U_{AK}=0{,}6$ V min	I_{KA} max	at U_{KA}	$U_{a\,ef}$ 1)	U_{KA}	I_{AK}	I_{AKM} imp 3)	P_{di}	F 4) min	R_p min
	A	mA	V	V	V	A	A	W	cm²	kΩ
81NP71	20	15	40	12	42	20	100	12	350	0,33
82NP71	20	12	80	24	84	20	100	12	350	0,56
83NP71	20	8	150	40	157	20	100	12	350	1,2

Measured with rectifiers provided with the specified cooling plates and at ambient temperature:

+20 °C at rectifiers for 3, 5 and 10 A
+25 °C at rectifiers for 20 A

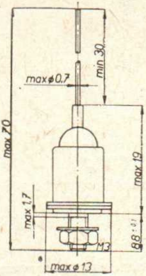
Operational ambient temperature
−40 thru +50 °C.

Remarks:

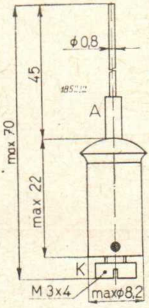
1. For a filter with capacitive input.
2. Max. 10 msec; interval between two surges greater as 5 minutes.
3. Max. 10 msec; max. 50 surges during 24 hours.
4. The dimensions of the cooling surface valid at forced air cooling with the flow of air 10 m/sec. and temperature of the cooling air max. 25 °C.

It is not in production! In new design to be replaced by silicon rectifiers!

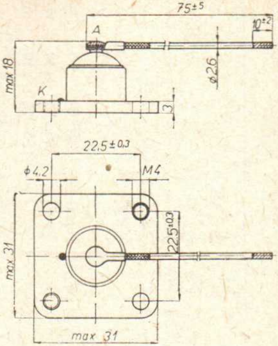
Recommended replace: KY708–KY710 for 20NP70–25NP70, 30NP70–35NP70, 40NP70–45NP70
KY715–KY717 for 81NP71–83NP71



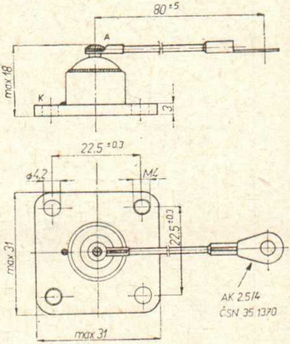
1NP70 – 16NP70
new design



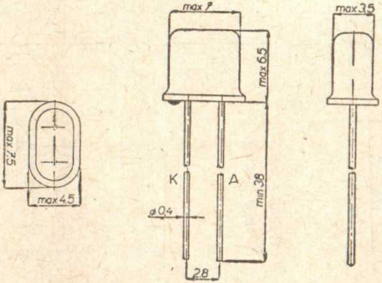
1NP70 – 16NP70
old design



20NP70–25NP70
30NP70–35NP70
40NP70–45NP70



81NP71–83NP71

Type Application	Static data	Maximum Ratings
KA501 **KA501** selection   Silicon diode p-n with welded point contact for rectifying of small R. F. currents	measured at U_{AK} <1 V I_{AK} = 9 mA, T_a = 25 °C I_{KA} <1 µA U_{KA} = 10 V, T_a = 25 °C $C_{K/A}$ 6,5 pF U_{KA} = 10 V, T_a = 25 °C R_t 1 °C/mW **KA501:** I_{KA} <50 µA U_{KA} = 50 V, T_a = 25 °C **KA501** selection: I_{KA} <3 µA U_{KA} = 100 V, T_a = 25 °C 	**KA501:** U_{KA} 50 V U_{KAM} 55 V **KA501** selection: U_{KA} 115 V U_{KAM} 125 V I_{ss} (T_a = 25 °C) 50 mA I_{ss} (T_a = 100 °C) 30 mA I_{ss} (T_a = 150 °C) 10 mA $I_{AKM\ imp}$ [1] (T_a = 25 °C) 350 mA $I_{AKM\ imp}$ [1] (T_a = 100 °C) 200 mA P_d 150 mW T_j 175 °C T_a –55 ÷ +150 °C T_s –55 ÷ +150 °C [1] Max. 1 sec.

Type Application	Static data	Maximum Ratings

KA502
KA504

Silicon diode p-n with welded point contact for rectifying of small R. F. current

Coloured marking:
KA 502 yellow
KA 504 green

			measured at	
I_{AK}	<1	V	I_{AK} = 9 mA;	T_a = 25 °C
I_{KA}	<0,01	µA	U_{KA} = 10 V,	T_a = 25 °C
I_{KA}	0,4	µA	U_{KA} = 10 V,	T_a = 100 °C
I_{KA}	7	µA	U_{KA} = 10 V;	T_a = 150 °C
I_{KA}	1	µA	U_{KA} = 100 V,	T_a = 100 °C
I_{KA}	10	µA	U_{KA} = 100 V,	T_a = 150 °C
U_{KA}	>100	V	I_{KA} = 0,2 µA,	T_a = 25 °C
	KA 502	KA-504		
r_d	–	>180 kΩ	$\left\{\begin{array}{l} U_{vf} = 6\ V; \\ f = 1\ Mc/s \end{array}\right.$	T_a = 25 °C
R_{ts}	>2000	>5000 MΩ		
R_t	1	1 °C/mW		
$C_{K/A}$	3,5<5	3,5<5 pF	U_{KA} = 10 V;	T_a = 25 °C
$C_{K/A}$	2	2 pF	U_{KA} = 100 V;	T_a = 25 °C

Outline and dimensions are like, the same KA501.

U_{KA}	115	V
U_{KAM}	125	V
I_{ss} (T_a = 25 °C)	50	mA
I_{ss} (T_a = 100 °C)	30	mA
I_{ss} (T_a = 150 °C)	10	mA
$I_{AKM\ imp}$ 1) (T_a = 25 °C)	350	mA
$I_{AKM\ imp}$ 1) (T_a = 100 °C)	200	mA
P_d	150	mW
T_j	175	°C
T_a	−60 ÷ +150	°C
T_s	−60 + +150	°C

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1) Max. 1 sec.

Type Application	Static data	Maximum Ratings

KA503

Silicon diode p-n with welded point contact for rectifying of small R. F. current

				measured at	
U_{AK}		<1	V	I_{AK} = 9 mA,	T_a = 25 °C
I_{KA}		$<0{,}01$	µA	U_{KA} = 10 V,	T_a = 25 °C
I_{KA}		0,4	µA	U_{KA} = 10 V,	T_a = 100 °C
I_{KA}		7	µA	U_{KA} = 10 V,	T_a = 150 °C
I_{KA}		1,5	µA	U_{KA} = 200 V,	T_a = 100 °C
I_{KA}		15	µA	U_{KA} = 200 V,	T_a = 150 °C
U_{KA}		>200	V	I_{KA} = 0,2 µA,	T_a = 25 °C
C_{KA}	3,5	<5	pF	U_{KA} = 10 V,	T_a = 25 °C
C_{KA}		2	pF	U_{KA} = 100 V,	T_a = 25 °C
C_{KA}		1,5	pF	U_{KA} = 200 V,	T_a = 25 °C
R_{is}		>2000	MΩ		
R_i		1	°C/mW		

Outline and dimensions are like, the same KA501.

U_{KA}	215	V
U_{KAM}	225	V
I_{ss} (T_a = 25 °C)	50	mA
I_{ss} (T_a = 100 °C)	30	mA
I_{ss} (T_a = 150 °C)	10	mA
$I_{AKM\ imp}$ [1] (T_a = 25 °C)	350	mA
$I_{AKM\ imp}$ [1] (T_a = 100 °C)	200	mA
P_d	150	mW
T_j	175	°C
T_a	$-60 + +150$	°C
T_s	$-60 + +150$	°C

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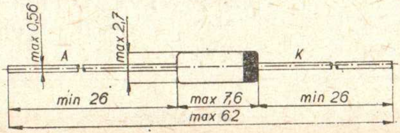
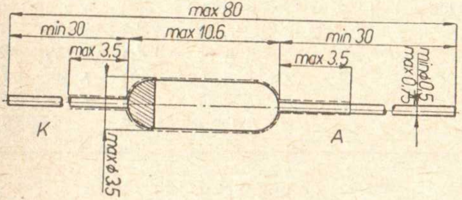
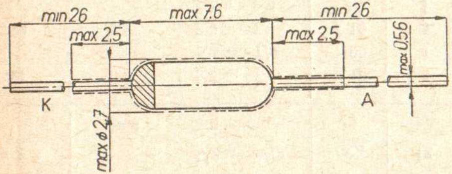
[1] Max. 1 sec.

Type Application	Static data	Maximum Ratings
KA206 **KA207**	**KA206:** measured at: U_{AK} <1 V $I_{AK} = 10$ mA U_{KA} >50 V $I_{KA} = 5$ µA I_{KA} $<0{,}05$ µA $U_{KA} = 20$ V I_{KA} <10 µA $U_{KA} = 20$ V, $T_a = 125$ °C t_{rr} 4 ns $I_{AK} = 5$ mA on $U_{KA} = 6$ V, $I_{KA} = 0{,}5$ mA Q_s <50 pC $I_{AK} = 5$ mA on $U_{KA} = 6$ V, $t = 20$ ns C_D 2 <3 pF $U_{KA} = 0$ V	**KA206** U_{KA} 50 V I_{AK} 75 mA I_{AKM} 250 mA P 200 mW T_a −65...+125 °C
Silicon planar pitaxial diodes or switching application	**KA207:** U_{AK} <1 V $I_{AK} = 10$ mA U_{KA} >100 V $I_{KA} = 5$ µA I_{KA} $<0{,}05$ µA $U_{KA} = 20$ V I_{KA} <10 µA $U_{KA} = 20$ V, $T_a = 125$ °C t_{rr} 4 ns $I_{AK} = 5$ mA on $U_{KA} = 6$ V, $I_{KA} = 0{,}5$ mA Qs <50 pC $I_{AK} = 5$ mA on $U_{KA} = 6$ V, $t = 20$ ns C_D 2 <3 pF $U_{KA} = 0$ V 	**KA207** U_{KA} 100 V I_{AK} 75 mA I_{AKM} 250 mA P 200 mW T_a −65...+125 °C

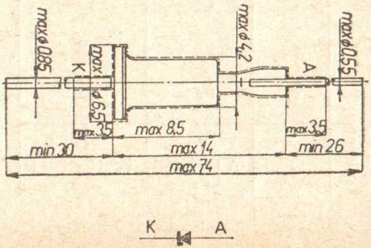
Type Application	Static data	Maximum Ratings
KA201 **KA202** Silicon voltage variable capacitor diodes – varicaps – AFC diode for UHF tuner	**KA201** **KA202** I_{KA} (U_{KA} = 12 V) <0,5 <0,5 µA C_{KA_1} (U_{KA_1} = 4 V; f = 0,5 Mc/s) 22 (15–30) 36 (25–50) pF C_{KA_2} : C_{KA_1} (U_{KA_2} = 10 V : U_{KA_1} = 4 V; f = 0,5 MHz) 0,69 <0,74 0,69 <0,74 R_s 1,6 <3 1,6 <3 Ω I_{KA} (U_{KA} = 10 V; T_a = 85 °C) <6 <6 µA 	U_{KA} 20 V U_{KAM} 20 V T_j +100 °C K 0,4 °C/mW T_a –65 . . . +100 °C T_s –65 . . . +100 °C

Type Application	Static data	Maximum Ratings
KA204 Silicon voltage variable capacitor diode – varicap – diode for tunning in UHF region	C_{KA1} 14,5 (13...16) pF U_{KA}=4 V, f=0,5 MHz red 13 ...14,5 pF green 14,5...16 pF $C_{KA1} : {KA_2}$ 2,55 (2,4...2,7) $U_{KA1} : U_{KA_2}$=3 : 30 V, f = 0,5 MHz R_s 1,2 <2 Ω U_{KA}=2 V, f =100 MHz I_{KA} ≦0,1 μA U_{KA} = 30 V	U_{KA} 32 V U_{KAM} 32 V T_j 125 °C R_t 0,4 °C/mW T_a –65...+125 °C T_s –65...+125 °C

KA204



KZ721 – KZ724
KZZ71 – KZZ76



SILICON ZENER DIODES

Type	Characteristic Data							Max. Ratings	
		U_Z [V]	r_{KA}	I_Z	K_Z	U_{AK} ($I_{AK}=50$ mA)	I_{KA} ($U_{KA}=1$ V)	I_Z	P_d 1)
	nom	min – max	Ω	mA	10^{-4}/°C	V	μA	mA	mW
KZ721	6,8	5,8 – 7,8	≦10	5	+7	<1	<0,1	36	280
		5,6 – 7,8	100	1	–				
KZ722	8,2	7,0 – 9,4	≦10	5	+8	<1	<0,1	30	280
		6,8 – 9,4	20	1	–				
KZ723	10	8,6 – 11,8	≦20	5	+8	<1	<0,1	23	280
		8,4 – 11,8	100	1	–				
KZ724	12	10,2 – 14	≦50	5	+10	<1	<0,1	20	280
		9,8 – 14	200	1	–				
KZZ71	6,7	5,8 – 7,5	≦8	5	–1 . . . +7	<1	<0,1	36	280
		6,0 – 7,4	≦30	1	–				
KZZ72	7,7	7,0 – 8,5	≦6	5	0 . . . +7	<1	<0,1	33	280
		6,8 – 8,4	≦12	1	–				
KZZ73	8,7	8,0 – 9,5	≦10	5	+2 . . . +8	<1	<0,1	30	280
		7,8 – 9,4	≦18	1	–				
KZZ74	9,7	9,0 – 10,5	≦12	5	+4 . . . +9	<1	<0,1	26	280
		8,8 – 10,5	≦25	1	–				
KZZ75	11	10 – 12	≦15	5	+4 . . . +9,5	<1	<0,1	23	280
		9,8 – 12	≦30	1	–				
KZZ76	12,6	11,2 – 14	≦18	5	+5 . . . +9,5	<1	<0,1	20	280
		10,8 – 14	≦35	1	–				

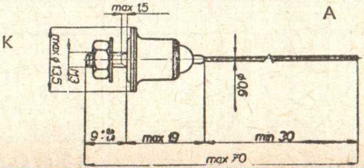
T_j max 155 °C R_{t1} max 12 °C/W R_t max 200 °C/W T_a max –65 . . . +125 °C   1) T_a max ≦60 °C

ZENER DIODES

Type	Characteristic Data						Maximum Ratings			
	U_Z	r_{KA}	I_Z	K_t at I_Z	I_{AK} U_{AK}=1 V	I_{KA} U_{KA}=1 V	I_Z	I_Z 1)	P_d 2)	P_d 1) 2)
	V	Ω	mA	. 10^{-4}/°C	mA	µA	mA	mA	W	W
1NZ70	5–6	1 <2	100	–3 . . . +5	1500 >250	0,05 <0,1	230	790	1,25	5
2NZ70	6–7	1 <2	100	0 . . . +6	1500 >250	0,05 <0,1	200	700	1,25	5
3NZ70	7–8	1 <2	100	+2 . . . +7	1500 >250	0,05 <0,1	180	640	1,25	5
4NZ70	8–9	1 <2	100	+4 . . . +7	1500 >250	0,05 <0,1	170	590	1,25	5
5NZ70	8,8–11	2 <4	50	+4 . . . +8	1500 >250	0,05 <0,1	130	460	1,25	5
6NZ70	11–13,5	4 <7	50	+4 . . . +8	1500 >250	0,05 <0,1	110	340	1,25	5
7NZ70	13,5–16,5	6 <11	50	+5 . . . +9	1500 >250	0,05 <0,1	90	300	1,25	5
8NZ70	16,2–20	10 <18	25	+5 . . . +9	1500 >250	0,05 <0,1	70	250	1,25	5
KZ799	30 ± 1,8		25	two diodes in series connection			70	250	1,25	5

T_j	max	150	°C
K_1	max	0,01	°C/mW
K	max	0,08	°C/mW
K 1)	max	0,021	°C/mW

Valid at ambient temperature 25 °C



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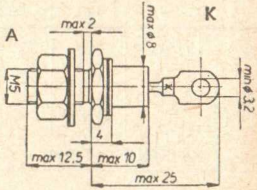
1) With Al cooling surface 60×60×2 mm

2) Ambient temperature max 45 °C

SILICON ZENER DIODES

Type	Characteristic Data						Maximum Ratings			
	U_Z	r_{KA}	I_Z	k_t at I_Z	I_{AK} $U_{AK} \leqq 1{,}3$ V	I_{KA} $U_{KA}-1$ V	I_Z	I_Z 1)	P_d	P_d 1)
	V	V	mA	.10-4/°C	mA	μA	mA	mA	W	W
KZ703	6–7,8	<1	1000	5	300 2)	<50	320	1300	2,6	10
KZ704	7–9,2	<1	1000	5	300	<50	270	1100	2,6	10
KZ705	8–10,2	<2	500	7	300	<50	240	970	2,6	10
KZ706	9,4–11,6	<2	500	7	300	<50	210	850	2,6	10
KZ707	10,6–13,2	<2	500	7	300	<50	190	750	2,6	10
KZ708	12–14,8	<2	500	8	300	<50	170	670	2,6	10
KZ709	13,6–16,8	<3	500	8	300	<50	150	600	2,6	10
KZ710	15,2–19	<3	500	8	300	<50	135	530	2,6	10
KZ711	16,8–21	<3	250	9	300	<50	120	470	2,6	10
KZ712	19–23,6	<3	250	9	300	<50	105	420	2,6	10
KZ713	21,6–26,6	<3	250	9	300	<50	95	370	2,6	10
KZ714	24,2–29,8	<4	250	9	300	<50	85	330	2,6	10
KZ715	27–33	<4	250	9	300	<50	75	300	2,6	10

T_j	max	155	°C
K	max	55	°C/W
K_1	max	3,5	°C/W



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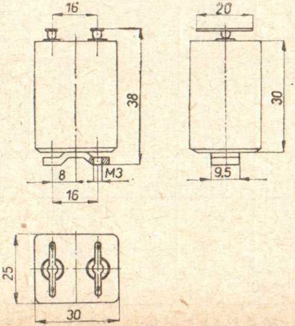
1) Al cooling surface 100×100×2 mm, $T_a = 25$ °C, or 160×160×2 mm, $T_a = 60$ °C.

2) $U_{AK} \leqq 1$ V

Type Application	Operational Data	Maximum Ratings
KZZ81 **KZZ82** **KZZ83** Semiconductor two-pole temperature compensated for voltage subnormal and reference voltage source	measured at U_Z 7,5 – 9 V I_Z = 20 .... 100 mA r_{KA} <15 Ω 1) K_Z KZZ81 $<10^{-7}$ 1/°C T_a = 0 .... +50 °C KZZ82 $<10^{-6}$ 1/°C T_a = 0 .... +50 °C KZZ83 $<10^{-5}$ 1/°C T_a = 0 .... +50 °C 1) Measured at working point, i. e. at centre of working range of each diode. 	I_Z 100 mA T_a 0 . . . +50 °C

SILICON JUNCTION RECTIFIER 0,5 AND 1 A

Type	Characteristic Data			Maximum Ratings						
	I_{AK} min U_{AK}=1,1 V mA	I_{KA} at max µA	U_{KA} V	$U_{a\,ef}$ 2) V	U_{KAM} V	I_{AK} mA	I_{AKM} A	I_{AKM} imp 3) A	C_N µF	R_p kΩ
32NP75	500	10	80	24	84	500	5	15	1000	82
33NP75	500	10	150	40	157	500	5	15	400	150
34NP75	500	10	250	60	262	500	5	15	300	270
35NP75	500	10	400	120	420	500	5	15	200	470
36NP75	500	10	700	220	735	500	5	15	100	680
37NP75	500 1)	10	1200	380	1260	500	5	15	50	1000
42NP75	1000	10	80	24	84	1000	10	30	1000	82
43NP75	1000	10	150	40	157	1000	10	30	400	150
44NP75	1000	10	250	60	262	1000	10	30	300	270
45NP75	1000	10	400	120	420	1000	10	30	200	470
46NP75	1000	10	700	220	735	1000	10	30	100	680
KY701	1000	350 4)	80	24	80	700 5)	6	30 6)	1000	Rochr=0,8 Ω
KY702	1000	350 4)	150	40	150	700 5)	6	30 6)	500	1,5 Ω
KY703	1000	350 4)	250	60	250	700 5)	6	30 6)	400	2,5 Ω
KY704	1000	350 4)	400	120	400	700 5)	6	30 6)	300	4 Ω
KY705	1000	350 4)	700	220	700	700 5)	6	30 6)	200	7 Ω
KY721	1000	350 4)	80	24	80	1000 5)	10	30 6)	1000	Rochr=0,8 Ω
KY722	1000	350 4)	150	40	150	1000 5)	10	30 6)	500	1,5 Ω
KY723	1000	350 4)	250	60	250	1000 5)	10	30 6)	400	2,5 Ω
KY724	1000	350 4)	400	120	400	1000 5)	10	30 6)	300	4 Ω
KY725	1000	350 4)	700	220	700	1000 5)	10	30 6)	200	7 Ω

32NP75 – 46NP75

Protective resistor min. 7Ω

Operational frequency 0–50 kc/s

Operational ambient temperature –40 thru +80 °C

Case temperature max 140 °C

The data are valid at T_a = 25 °C

KY701 – KY725

Junction temperature +125 °C

Ambient temperature –65 . . . +125 °C

1) $U_{AK} = 1{,}15$ V

2) For a filter with capacitive input.

3) Max. 10 msec., max. 200 surges during 24 hours; interval between two surges greater as 2 sec.

4) $T_a = +125$ °C

5) T_a max = 55 °C

6) t ≤ 10 ms

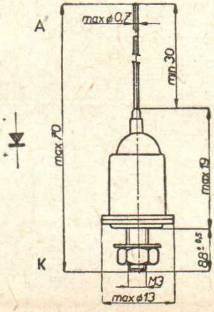
All technical data valid at ambient temperature +25 °C. At higher temperatures must be lowered maximum inversion voltage and permanently rectified current. Maximum ambient temperature +140 °C. At higher temperatures as +80 °C is recommended to applied a cooling fan of 25 sq. cm area and made of an aluminium plate.

Connection of the rectifiers:

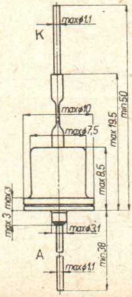
The rectifiers can be connected in parallel or in series. It is necessary to connect to each rectifier, which is used in series connection, a parallel resistor, the magnitude R_0 of which should be maximum one third of the internal resistance of the rectifier in the inverse direction. Recommended R_0 values are listed in the table.

Mounting:

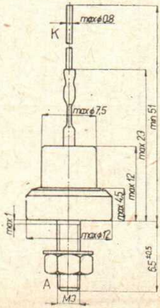
The rectifier has to be mounted in the respective equipment by its bracket, using a M3 screw. During soldering, harmful heat must be led off by gripping the soldered terminals with flat nose pliers. The maximum permissible time period for heating the unshortened terminal with a soldering iron the tip of which is 250 °C hot, is 6 seconds.



32NP75 - 46NP75

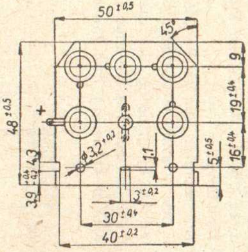


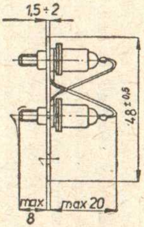
KY701 - KY705

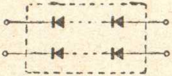
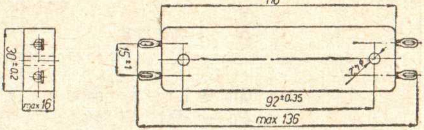


KY721 - KY725

Type Application	Characteristic Data	Operational Data	Maximum Ratings
KA220/05  Silicon junction rectifier for rectifying A. C. voltage 220 V in power supply TV sets with capacitance load	T_a 25 °C I_{KA} <10 µA U_{KA} 700 V U_{AK} <5,2 V I_{AK} 0,5 A T_p +125 °C I_{KA} <850 µA U_{KA} 700 V	T_a max +80 °C U_{eff} 220 V I_{AK} max 500 mA R_o >7 10 Ω C_N 100 200 µF	T_a +80 °C U_{KAM} 720 V I_{AK} 0,5 A I_{AKM} 5 A $I_{AKM\ imp}$ 1) 15 A R_o >7 Ω C_N 200 µF 1) Max. 200 surges during 24 hours; the interval between two current surges greater as 2 seconds.





Type Application	Operational Data	Maximum Ratings
KY298 Silicon junction diodes package A. C. voltage 2×600 V full wave rectifier	U_{AK} ≦4,5 V I_{AK} = 0,5 A U_{KA} ≧2000 V I_{KA} = 100 μA **Full wave rectifier:** $U_{a\,ef}$ 2 × 600 V R_o min 2 × 10 Ω $C_{N\,max}$ 100 μF $I_{AK\,max}$ 0,5 0,3 A $T_{a\,max}$ 50 70 °C   	Valid for each element: U_{KA} 2000 V U_{KAM} 2400 V $U_{a\,ef}$ 1) 600 V I_O 500 mA I_{AKM} 5 A $I_{AKM\,imp}$ 2) 15 A f 500 c/s C_N 100 μF R_o >10 Ω T_j +155 °C T_a −55 ÷ +100 °C K 12 °C/W 1) For a filter with capacitive input. 2) Max. 10 msec., max. 200 surges during 24 hours; the interval between two current surges greater as 2 seconds.

<table>
<tr><th>Type
Application</th><th>Static data</th><th>Maximum Ratings</th></tr>
<tr>
<td>

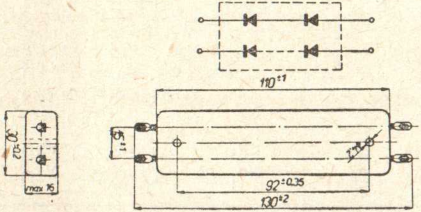
KY299

Silicon junction diodes package, A. C. voltage 2×300 V full wave rectifier

</td>
<td>

U_{AK} <5,5 V I_{AK} = 0,5 A
U_{KA} >1000 V I_{KA} = 100 µA

Full wave rectifier:
$U_{a\ eff}$ 2 × 300 V
$I_{AK\ max}$ 0,3 A
R_o min 2 × 10 Ω
$C_{N\ max}$ 100 µF
$T_{a\ max}$ +70 °C



</td>
<td>

Valid for each element:
U_{KA} 1000 V
U_{KAM} 1250 V
$U_{a\ eff}$ 300 V
I_{AK} 0,3 A
I_{AKM} 3 A
$I_{AKM\ imp}$ 1) 9 A
f 25 – 500 c/s
C_N 100 µF
R_o >10 Ω
T_j 125 °C
T_a –60 ÷ +70 °C
T_s –60 ÷ +70 °C

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1) Max. 200 surges during 24 hours; the interval between two current surges greater as 2 seconds.

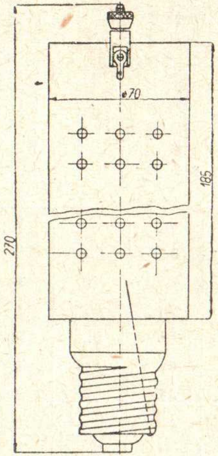
</td>
</tr>
</table>

Silicon H. T. Rectifiers

Type	I_{AK} at	U_{AK}	Maximum Ratings		
		max	U_{KA}	$U_{a\,ef}$ 1)	I_{AK}
	A	V	kV	V	A
KY287	0,5	9	4	1,2	0,5
KY288	0,5	18	8	2,4	0,5
KY289	0,5	27	12	3,6	0,5
KY292	1	4,5	2	0,6	1
KY293	1	9	4	1,2	1
KY294	1	13,5	6	1,8	1
KY295	1	18	8	2,4	1

1) Valid at capacitive input filter.

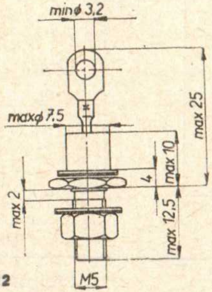
Socket: E40 – Goliath.



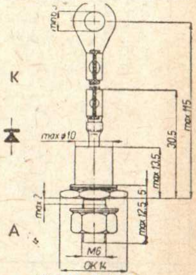
Silicon rectifiers 10 and 20 A

Type	Characteristic data			Maximum Ratings							
	I_{AK} $U_{AK} \leqq 1{,}1$ V	I_{AK} at max	U_{AK}	$U_{a\,ef}$ 1)	U_{KA}	U_{KAM} 2)	$U_{KAM\,imp}$ 3)	I_O 4)	I_O 5)	I_{AKM} 5)	$I_{AKM\,imp}$ 3) 5)
	V	µA	V	V	V	V	V	A	A	A	A
KY 708	10	60	100	30	90	100	120	2	10	40	80
KY 710	10	60	200	60	180	200	240	2	10	40	80
KY 711	10	60	300	90	270	300	360	2	10	40	80
KY 712	10	60	400	120	360	400	480	2	10	40	80
KY 715	20	100	100	30	90	100	120	4	20	70	140
KY 717	20	100	200	60	180	200	240	4	20	70	140
KY 718	20	100	300	90	270	300	360	4	20	70	140
KY 719	20	100	400	120	360	400	480	4	20	70	140

T_j	max	+155	°C	
T_a	max	–60…+150	°C	
P_d	max	12	W	KY708 – KY712
		24	W	KY715 – KY719
K_1		2	°C/W	KY708 – KY712
		1,5	°C/W	KY715 – KY719



KY708–KY712



KY715–KY719

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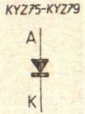
1. For capacitive input filter.
2. Sinusoidal waveform, f >20 Hz.
3. t <10 ms
4. T_a max. = 40 °C, without cooling
5. T_a max. = 85 °C, with cooling surface

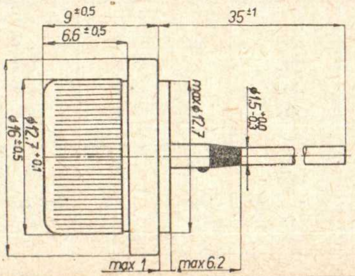
The data are valid at T_a = 25 °C

Silicon Rectifiers 20 A for Alternators

Type	Characteristic data			Maximum Ratings						
	I_{AK} $U_{AK} \leqq 1{,}1$ V	I_{AK} max	at U_{AK}	U_{KA}	U_{KAM} 1)	$U_{KAM\,imp}$	I_O 3)	I_O 4)	I_{AKM} 1)	$I_{AKM\,imp}$ 2) 5)
	A	µA	V	V	V	V 2)	A	A	A	A
KYZ70	20	100	50	45	50	60	20	4	70	1400
KYZ71	20	100	100	90	100	120	20	4	70	1400
KYZ72	20	100	200	180	200	240	20	4	70	1400
KYZ73	20	100	300	270	300	360	20	4	70	1400
KYZ74	20	100	400	360	400	480	20	4	70	1400
KYZ75	20	100	50	45	50	60	20	4	70	1400
KYZ76	20	100	100	90	100	120	20	4	70	1400
KYZ77	20	100	200	180	200	240	20	4	70	1400
KYZ78	20	100	300	270	300	360	20	4	70	1400
KYZ79	20	100	400	360	400	480	20	4	70	1400

P_C max 24 W
T_j max 155 °C
T_a max −55 . . . +155 °C
R_{t1} max 2,2 °C/W





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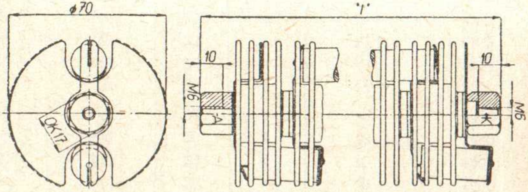
1) f >20 c/s (sinusoidal waveform)
2) Max. 10 msec; max. 200 surges per 24 hours
3) Arithmetical mean value.
4) T_a max. 40 °C
5) T_a max. 85 °C

Silicon H. T. Rectifiers

Type	I_{AK} at	U_{AK}	I_{AK} at	U_{AK}	Maximum Ratings						
			μA		U_{KA}	U_{KAM}	$U_{KAM\ imp}$	I_O 2)	I_{AKM}	I_{AKM} 1) 3) imp	f max
	A	V	max	kV	kV	kV	kV 1)	A	A	A	Hz
KYZ81	20	12	120	3	3	3	3,6	8	70	140	500
KYZ82	20	12	120	4	4	4	4,8	8	70	140	500
KYZ83	20	15	120	4,8	4,8	4,8	5,8	8	70	140	500
KYZ84	20	17	120	5,6	5,6	5,6	6,7	8	70	140	500

T_j	max	155	°C
T_a	max	−40 . . . +125	°C
T_s	max	−40 . . . +125	°C
R_t	max	10	°C/W



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1) Max. 10 msec; max. 200 surges per 24 hours.

2) T_a max. = 20 °C; at T_a max. = 60 °C; I_o max, = 5,5 A;

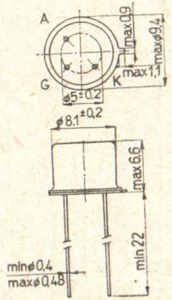
3) T_a max. = 85 °C

Type	Length l [mm]
KYZ81	296 ± 7
KYZ82	296 ± 7
KYZ83	348 ± 7
KYZ84	402 ± 7

THYRISTORS PNPN 1A

Type	$U_{(BO)}$ min 1) 2) 3)	$U_{R\ (BR)}$ ($I_{R\ (BR)}$ = 1 mA)	I_{FD} at U_{FD} max	I_{FD} at U_{FD} 1) 2)	I_R at U_R max	I_R at U_R 1) 2)	I_H 3) max	I_{GT} 1) 3) (U_{FD} = 10V) max	U_{GT} 1) 3) (U_{FD} = 10V) max	U_T 4) (I_T = 1 A) max	U_{FD} 1) 2) 5) max	U_R 1) 2) max
	V	V 2)	mA	V	mA	V	mA	mA	V	V	V	V
KT501	60	60	0,5	50	0,5	50	17	10	3	1,7	50	50
KT502	120	120	0,5	100	0,5	100	17	10	3	1,7	100	100
KT503	240	240	0,5	200	0,5	200	17	10	3	1,7	200	200
KT504	360	360	0,5	300	0,5	300	17	10	3	1,7	300	300
KT505	480	480	0,5	400	0,5	400	17	10	3	1,7	400	400

t_d		1	µs	(I_T = 1 A, U_{FD} = 40 V)
t_r		1	µs	(I_T = 1 A, U_{FD} = 40 V)
t_{off}		40	µs	(I_T = 1 A, I_R = 1 A, R_{GK} = 100 Ω)
I_T	max	0,4	A	(T_a = 0 °C θ = 180 °)
I_T	max	1	A	(T_p = 60 °C θ = 180 °)
$I_{T\ imp}$	max	15	A	(t max = 10 ms)
I_{FG}	max	100	mA	
$R_{t\ 1}$	max	60	°C/W	
T_a	max	−65 . . . +125	°C	



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1) R_{GK} = 1 kΩ

2) $T_a \leq +125$ °C

3) T_a = + 25 °C

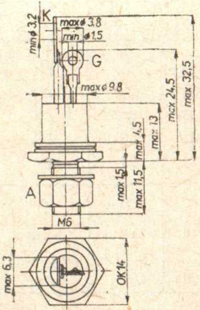
4) Direct current.

5) At $T_a \leq 0$ °C must be decreased of 20%.

THYRISTORS PNPN 3A

Type	$U_{(BO)}$ min 1) 2) 3) V	$U_{R(BR)}$ min $I_{R(BR)}$ = = 1 mA 1) 2) 3) V	I_{FD} at U_{FD} max mA	1) 2) V	I_R at U_R max mA	1) 2) V	I_H max 3) mA	I_{GT} 1) 3) (U_{FD} = = 10 V) max mA	U_{GT} 1) 3) (U_{FD} = = 10 V) max V	U_T 3) (I_T=3 A) max V	U_{FD} 1) 2) 4) max V	U_R 1) 2) 4) max V
KT710	60	60	0,5	50	0,5	50	20	15	3	2	50	50
KT711	120	120	0,5	100	0,5	100	20	15	3	2	100	100
KT712	240	240	0,5	200	0,5	200	20	15	3	2	200	200
KT713	360	360	0,5	300	0,5	300	20	15	3	2	300	300
KT714	480	480	0,5	400	0,5	400	20	15	3	2	400	400

t_{on}		2	µs	(I_T = 3 A, ϑ = 90°)
t_{off}		40	µs	(U = 20 V, R_{GK} = 100 Ω, I_T = 3 A)
I_T	max	1	A	($T_a \leqq$ 30 °C)
I_T	max	3	A	($T_C \leqq$ +60 °C, ϑ = 180°, half wave sinusoidal waveform)
I_{FG}	max	200	mA	
R_{t1}	max	4	°C/W	
T_j	max	+125	°C	
T_a	max	−65 . . . +125	°C	



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1) R_{GK} = 1 kΩ

2) $T_a \leqq$ +125 °C

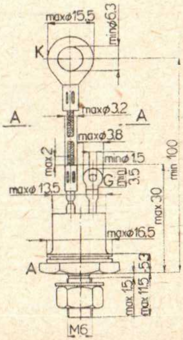
3) $T_a \leqq$ +25 °C

4) At T_a = 0 . . . −65 °C must be decreased of 20%.

THYRISTORS PNPN 15 A

Type	$U_{(BO)}$ min 1) 2) V	$U_{R\,(BR)}$ min $I_{R\,(BR)} = 5$ mA 1) 2) 3) V	I_{FD} at U_{FD}		I_R at U_R		I_H max 2) mA	I_{GT} 1) 3) ($U_{FD} = 10$ V) max mA	U_{GT} 1) 3) ($U_{FD} = 10$ V) max V	U_T 3) ($I_T = 3$ A) max V	U_{FD} 1) 3) max V	U_R 1) 3) max V
			max mA	1) 2) V	max mA	1) 2) V						
KT701	60	60	3	50	3	50	50	40	3	1,7	50	50
KT702	120	120	3	100	3	100	50	40	3	1,7	100	100
KT703	240	240	3	200	3	200	50	40	3	1,7	200	200
KT704	360	360	3	300	3	300	50	40	3	1,7	300	300
KT705	480	480	3	400	3	400	50	40	3	1,7	400	400

I_o	max	3	A	($T_a \leqq 30$ °C, without cooling surface)
I_o	max	15	A	($T_C \leqq 65$ °C, $\Theta = 180$ °, half wave sinusoidal waveform)
$I_{T\,imp}$	max	120	A	($t \leqq 10$ ms, T_j max = 125 °C)
I_{FG}	max	2	A	
U_{FG}	max	10	V	
P_{FG}	max	2	W	
T_j	max	+125	°C	
T_a	max	−65 . . . +125	°C	
R_{t1}	max	1,5	°C	
i^2t		100	A^2s	(2 ms $\leqq t \leqq$ 10 ms, $I_o = 15$ A, $T_C \leqq 60$ °C)



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1) $T_a = +125$ °C   2) $T_a = +25$ °C

3) At $T_a = 0 \ldots -65$ °C must be decreased of 20%.

Silicon Point-Contact Diodes for Mixers

Type	f min – max Mc/s	Conversion loss dB	Noise factor	I. F. impedance Ω	Standing wave ratio	Max. energy of leaking power peak [erg]
33NQ52	3000–10000	<8	<2,7	200 – 800	–	2
34NQ52	3000–10000	<6,5	<2,7	200 – 800	–	2
35NQ52	6000–10000	<6	<2	325 – 475	<1,5	1

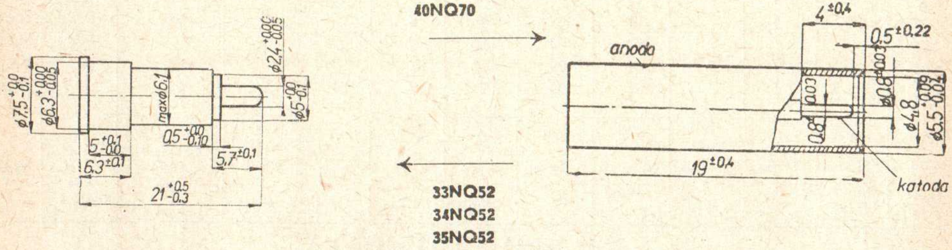
Silicon Point-Contact Diodes for Microwave Detectors

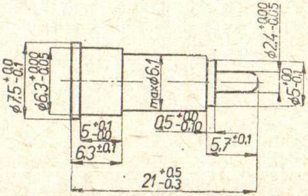
Type	Rectified current µA	I_{AKM} max mA	U_{KAM} max V	Parallel capacitance pF	R. F. input power mW	T_a min – max °C
40NQ70	> 50 1) >450 2)	10	2,5	20	5	–40 . . . +45

1) f = 8,2 – 12,4 GHz, P = 1 mW

2) f = 12 GHz, P = 1 mW

The data are valid at T_a = 20 °C.



Type Application	Operational Data	Maximum Ratings
36NQ52 Silicon point-contact diode with great noise for noise generator	Measured at R_{AK} <500 Ω — U_{AK} = 1,5 V R_{KA} >5000 Ω — U_{KA} = 1,5 V I_{KA} 1) <1 mA — U_{KA} = 6 V $P_{\check{S}}$ 2) 63,6× — I_{KA} = 0,5 mA ± 10 %, T_a = −10 . . . +70 °C, R_Z = 75 Ω ± 10 %, f = 30 MHz $P_{\check{S}}$ 2) >60× — after 100 service hours, I_{KA} = 0,5 mA ± 10 % 1) U_{KA} = 6 V peak value of pulse voltage (half rectified A. C. main voltage with frequency 50 Hz). 2) Min. noise power must be 63,6 times greater (18 dB) as power of the thermal noise of the ohmic resistance with noise diode at unenergized reverse current I_{KA}. 	I_{KA} 6 mA U_{KA} 6 V T_a >−40 °C

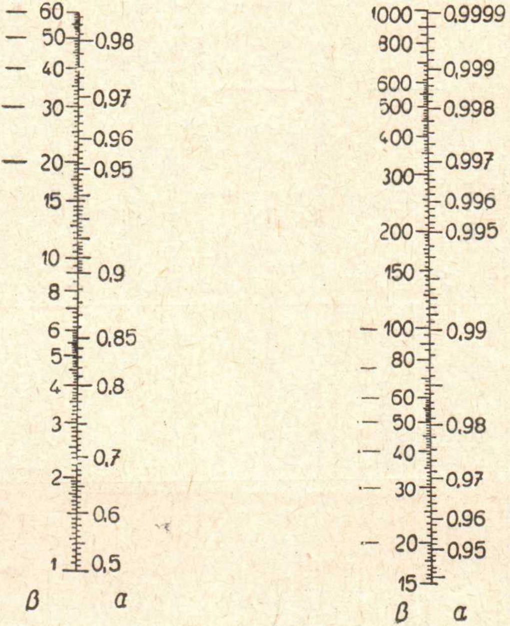
Glossary of abbreviations used in connection with transistors:

$C_{b'c}$	capacitance of a base to collector
f	frequency
f_{α}	cut-off frequency in grounded base connection
f_{β}	cut-off frequency in grounded emitter connection
F	noise factor
h_{11}	input impedance, output short-circuited
h_{12}	reverse voltage ratio, input open
h_{21}	current transfer ratio, output short-circuited
h_{22}	output admittance, input open
I_{B}	base current
i_{BM}	base current, peak value
$\pm i_{BM}$	base current, peak absolute value
I_{C}	collector current
i_{CM}	collector current, peak value
$\pm i_{CM}$	collector current, peak absolute value
I_{CBO}	collector current in grounded base circuit
I_{CEO}	collector current in grounded emitter circuit
I_{E}	emitter current
i_{EM}	emitter current, peak value
$\pm i_{EM}$	emitter current, peak absolute value
I_{EBO}	emitter current in grounded base circuit
K	heat resistance
P_{C}	collector dissipation
R_{BE}	external resistance between base and emitter
R_{g}	input source impedance
T_{a}	ambient temperature
T_{j}	junction temperature
T_{s}	storage temperature
U_{BE}	base voltage in grounded emitter circuit
U_{CB}	collector voltage in grounded base circuit
u_{CBM}	collector voltage in grounded base circuit, peak value
U_{CE}	collector voltage in grounded emitter circuit
u_{CEM}	collector voltage in grounded emitter circuit, peak value
U_{CEO}	collector knee voltage in grounded emitter circuit
U_{CES}	collector saturation voltage in grounded emitter circuit
U_{EB}	emitter voltage in grounded base circuit
u_{EBM}	emitter voltage in grounded base circuit, peak value
β	current gain factor in grounded emitter circuit
$\varkappa$	temperature coefficient

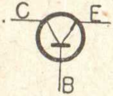
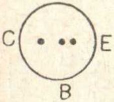
The transfer of the values of current amplification factor

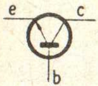
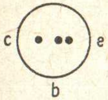
h_{21e} on h_{21b}

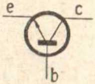
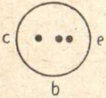
(β) on (α)

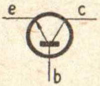
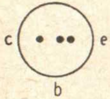


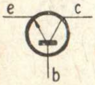
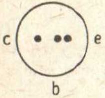
$$\beta = \frac{\alpha}{1-\alpha}$$

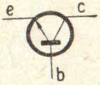
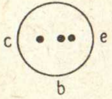
Type Application	Characteristic data	Operational Data	Maximum Ratings
101NU70 **102NU70** **103NU70** **104NU70**   n-p-n junction transistor for D. C., A. F. and pulse amplifier, A. F. generator	grounded base **101NU70** I_{CBO} <20 µA U_{CB} 5 V **102NU70** I_{CBO} <15 µA U_{CB} 5 V **103NU70** **104NU70** I_{CBO} <10 µA U_{CB} 5 V Not for new equipment. Outline K 504	grounded base **101NU70** **102NU70** measured at h_{11b} <120 $<120\ \Omega$ U_{CB} 5 V h_{12b} <10 $<6.10^{-3}$ $-I_E$ 1 mA h_{21b} $>0{,}84$ 0,92–0,95 f 1 kc/s h_{22b} <3 <2 µS f_α 1) >200 >500 kc/s U_{CB} 5 V $-I_E$ 1 mA **103NU70** **104NU70** h_{11b} <120 $<120\ \Omega$ U_{CB} 5 V h_{12b} <6 $<6.10^{-3}$ $-I_E$ 1 mA h_{21b} 2) $>0{,}95$ $>0{,}95$ f 1 kc/s h_{22b} <2 <2 µS f_α 1) >500 >500 kc/s U_{CB} 5 V $-I_E$ 1 mA grounded emitter F <15 dB U_{CE} 5 V (only 104NU70) I_B 25 µA f 1 kc/s 1) Cut-off frequency, at which the current amplification factor drops by −3 dB. 2) When the types are classified according to the magnitude of h_{21e} they are colour coded as follows: 20–30 red 60–75 blue 30–40 orange 75–100 violet 40–50 yellow >100 white	**101NU70** U_{CB} 10 V U_{CE} 20 V $-I_E$ 3 mA I_{CM} 100 mA P_C 30 mW $\varkappa$ 0,5 mW/°C T_a −40 ÷ +50 °C T_s −40 ÷ +60 °C **102NU70** **103NU70** **104NU70** U_{CB} 20 V U_{CE} 25 V $-I_E$ 5 mA I_{CM} 100 mA P_C 50 mW $\varkappa$ 0,5 mW/°C T_a −40 ÷ +50 °C T_s −40 ÷ +60 °C

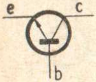
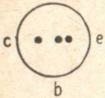
Type	Characteristic Data	Operational Data	Maximum Ratings
105NU70 Not for new equipment! Replace by GC 526, GC 527   n-p-n junction transistor for D. C., A. F. and pulse amplifier, A. F. generator	grounded base I_{CBO} 5 <12 µA U_{CB} 4,5 V grounded emitter I_{CEO} 110 <225 µA U_{CE} 4,5 V Outline K 504	grounded base — measured at h_{11b} 71 (58–88) Ω — U_{CB} 2 V h_{12b} 7.10-4 — I_C 0,5 mA h_{21b} 0,968 (0,952–0,976) — f 1 kc/s h_{22b} 0,7 (<1,3) µS f_α 1000 >600 kc/s — U_{CB} 6 V, I_C 1 mA grounded emitter h_{11e} 1,7 (1,0–2,5) kΩ h_{12e} 9.10-4 (<27.10-4) — U_{CB} 2 V h_{21e} 30 (20–40) — I_C 0,5 mA h_{22e} 23 (<53) µS — f 1 kc/s f_β 30 kc/s F <10 dB U_{BE} 110 (75–150) mV — U_{CE} 4,5 V I_C 0,4 (0,21–0,65) mA — I_B 10 µA U_{BE} 210 (150–270) mV — U_{CE} 4,5 V I_C 10 (4,6–13,2) mA — I_B 250 µA	U_{EB} 10 V u_{EBM} 10 V U_{CB} 32 V u_{CBM} 32 V U_{CE} (R_{BE} <0,6 kΩ) 30 V U_{CE} (R_{BE} >40 kΩ) 10 V $-I_E$ 12 mA $-I_{EM}$ 55 mA I_C 10 mA i_{CM} 50 mA I_B 2 mA i_{BM} 5 mA P_C 125 mW T_j +75 °C K 0,4 °C/mW T_a > −40 °C

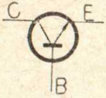
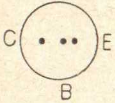
Type	Characteristic Data	Operational Data	Maximum Ratings
106NU70 Not for new equipment! Replace by GC 526, GC 527   n-p-n junction transistor for D. C., A. F. and pulse amplifier	grounded base I_{CBO} 4,5 <12 μA U_{CB} 4,5 V grounded emitter I_{CEO} 150 <325 μA U_{CB} 4,5 V Outline K 504	grounded base } measured at h_{11b} 17 (10–25) Ω } U_{CB} 2 V h_{12b} 8.10^{-4} } I_C 3 mA h_{21b} 0,979 (0,968-0,987) } f 1 kc/s h_{22b} 1,6 ($<2,7$) μS f_α 1250 (>800) kc/s } U_{CB} – 6 V, I_C 1 mA grounded emitter h_{11e} 0,8 (0,4–1,5) kΩ h_{12e} $5,4.10^{-4}$ ($<17.10^{-4}$) } U_{CE} 2 V h_{21e} 47 (30–75) } I_C 3 mA h_{22e} 80 (<200) μS } f 1 kc/s f_β 25 kc/s F <10 dB } U_{CE} 2 V, I_C 0,5 mA, f 1 kc/s U_{BE} 110 (80–155) mV } U_{CE} 4,5 V I_C 0,7 (0,36–1,2) mA } I_B 10 μA U_{BE} 210 (150–270) mV } U_{CE} 4,5 V I_C 14 (10–25) mA } I_B 250 μA	U_{EB} 10 V u_{EBM} 10 V U_{CB} 32 V u_{CBM} 32 V U_{CE} (R_{BE} $<0,6$ kΩ) 30 V U_{CE} (R_{BE} >40 kΩ) 10 V $-I_E$ 12 mA $-I_{EM}$ 55 mA I_C 10 mA I_{CM} 50 mA I_B 2 mA I_{BM} 5 mA P_C 125 mW T_j +75 °C K 0,4 °C/mW T_a > -40 °C

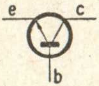
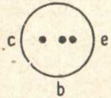
Type	Characteristic Data	Operational Data		Maximum Ratings
107NU70 Not for new equipment! Replace by GC 526, GC 527	grounded base I_{CBO} 4,5 <12 µA U_{CB} 4,5 V grounded emitter I_{CEO} 350 <550 µA U_{CE} 4,5 V	grounded base h_{11b} 14 Ω h_{12b} 10^{-3} h_{21b} 0,989 (0,985-0,991) h_{22b} 14 µS	measured at U_{CB} 2 V I_C 3 mA f 1 kc/s	U_{EB} 10 V u_{EBM} 10 V U_{CB} 32 V u_{CBM} 32 V U_{CE} ($R_{BE} < 0{,}6$ kΩ) 30 V U_{CE} ($R_{BE} > 40$ kΩ) 10 V $-I_E$ 12 mA $-I_{EM}$ 55 mA I_C 10 mA I_{CM} 50 mA I_B 2 mA i_{BM} 5 mA P_C 125 mW T_j +75 °C K 0,4 °C/mW T_a > −40 °C
		f_α 1500 (> 1000) kc/s	U_{CB} 6 V I_C 1 mA	
 		grounded emitter h_{11e} 1,3 (0,7–2) kΩ h_{12e} $8{,}10^{-4}$ ($<20.10^{-4}$) h_{21e} 90 (65–130) h_{22e} 125 <250 µS f_β 15 kc/s	U_{CE} 2 V I_C 3 mA f 1 kc/s	
		F <10 dB	U_{CE} 2 V I_C 0,5 mA f 1 kc/s	
		U_{BE} 120 (90–175) mV I_C 1,1 (0,75–1,9) mA	U_{CE} 4,5 V I_B 10 µA	
n-p-n junction transistor for D. C., A. F. and pulse amplifier	Outline K 504	U_{BE} 210 (150–270) mV I_C 22 (13,5–33) mA	U_{CE} 4,5 V I_B 250 µA	

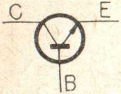
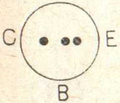
Type	Characteristic Data	Operational Data	Maximum Ratings
101NU71   n-p-n junction transistor for A. F. medium power amplifier, class A. B.	grounded base I_{CBO} 4,5 <10 µA U_{CB} 6 V I_{EBO} 4,5 <10 µA U_{EB} 6 V grounded emitter I_{CE} <50 µA U_{CE} 6 V R_{BE} 500 Ω Outline K 504	measured at f_T >0,7 Mc/s } U_{CE} 6 V, I_C 10 mA F <10 dB } U_{CE} 2 V, I_C 0,5 mA, f 1 kc/s U_{BE_1} 0,115–0,155 V } U_{CB} 6 V, $-I_E$ 1,5 mA U_{BE_2} <0,45 V } U_{CB} 0 V, $-I_E$ 80 mA U_{BE_3} <0,7 V } U_{CB} 0 V, $-I_E$ 125 mA β 70 (45–120) } U_{CB} 6 V, $-I_E$ 10 mA β 50 (40–100) } U_{CB} 0 V, $-I_E$ 80 mA β >25 } U_{CB} 0 V, $-I_E$ 125 mA β >15 } U_{CB} 0 V, $-I_E$ 250 mA	U_{EB} 10 V u_{EBM} 10 V U_{CB} 30 V u_{CBM} 30 V U_{CE} (R_{BE} <0,5 kΩ) 30 V U_{CE} (R_{BE} >40 kΩ) 10 V I_C 250 mA i_{CM} 250 mA I_B 20 mA i_{BM} 20 mA P_C 125 mW P_C 1) 165 mW T_j +75 °C K 0,4 °C/mW K 1) 0,3 °C/mW T_a > −40 °C 1) With cooling surface 12,5 cm²

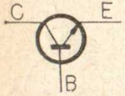
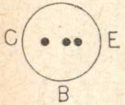
Type	Characteristic Data	Operational Data	Maximum Ratings
2-101NU71 **2-104NU71**   n-p-n junction transistor for A. F. push-pull medium power amplifier, class B	Outline K 504	Technical data are identical with transistors 101NU71 or 104NU71. The transistors are matched in pairs according to the amplification factors which must not differ by more than 15 % under the following conditions: U_{CB} = 6 V | U_{CB} = 0 V $-I_E$ = 10 mA | $-I_E$ = 80 mA	

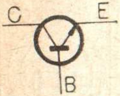
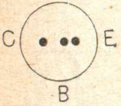
Type	Characteristic Data	Operational Data	Maximum Ratings
102NU71   n-p-n junction transistor for switching and pulse technique or A. F. medium power amplifier	grounded base I_{CBO} 4,5 <10 µA U_{CB} 6 V I_{EBO} 4,5 <10 µA U_{EB} 6 V grounded emitter I_{CE} <50 µA U_{CE} 6 V R_{BE} 500 Ω Outline K 504	measured at f_T >0,7 Mc/s } U_{CE} 6 V, I_C 10 mA U_{BE} <0,45 V } U_{CB} 0 V, $-I_E$ 80 mA U_{BE} <0,7 V } U_{CB} 0 V, $-I_E$ 125 mA β 140 (65–220) } U_{CB} 6 V, $-I_E$ 10 mA β 120 (50–200) } U_{CB} 0 V, $-I_E$ 80 mA β >35 } U_{CB} 0 V, $-I_E$ 125 mA β >25 } U_{CB} 0 V, $-I_E$ 250 mA	U_{EB} 10 V u_{EBM} 10 V U_{CB} 30 V u_{CBM} 30 V U_{CE} (R_{BE} <0,5 kΩ) 30 V U_{CE} (R_{BE} >40 kΩ) 10 V I_C 250 mA i_{CM} 250 mA I_B 20 mA i_{BM} 20 mA P_C 125 mW P_C [1] 165 mW T_j +75 °C K 0,4 °C/mW K [1] 0,3 °C/mW T_a > −40 °C [1] With cooling surface 12,5 cm^2

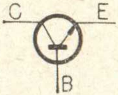
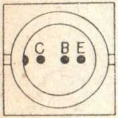
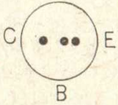
Type	Characteristic Data	Operational Data		Maximum Ratings
103NU71	grounded base	grounded emitter	measured at	U_{EB} 10 V
	I_{CBO} <10 µA	U_{CE} >48 V	I_C 0,2 mA	u_{EBM} 10 V
	U_{CB} 6 V		R_{BE} 500 Ω	U_{CB} 48 V
	I_{EBO} <10 µA	f_T >700 kc/s	U_{CE} 6 V	u_{CBM} 48 V
	U_{EB} 6 V		I_C 10 mA	U_{CE} (R_{BE} <0,5 kΩ)
		U_{CES} <0,22 V	I_C 125 mA	48 V
	grounded emitter		I_B 10 mA	U_{CE} (R_{BE} >40 kΩ)
	I_{CE} <50 µA	U_{BE} <0,7 V	U_{CB} 0 V	16 V
	U_{CE} 6 V		$-I_E$ 125 mA	I_C 250 mA
	R_{BE} 500 Ω	U_{BE} <0,45 V	U_{CB} 0 V	i_{CM} 250 mA
			$-I_E$ 80 mA	I_B 20 mA
		β 45 . . . 200	U_{CB} 6 V	i_{BM} 20 mA
			$-I_E$ 10 mA	P_C 125 mW
		β 30 . . . 200	U_{CB} 0 V	P_C 1) 165 mW
			$-I_E$ 80 mA	T_j +75 °C
		β >25	U_{CB} 0 V	K 0,4 °C/mW
			$-I_E$ 125 mA	K 1) 0,3 °C/mW
		β >15	U_{CB} 0 V	T_a −40 °C
			$-I_E$ 250 mA	T_s −40 ÷ +75 °C
n-p-n junction transistor for switching and pulse technique or A. F. medium power amplifier	Cutline K 504			1) With cooling surface 12,5 cm²

Type	Characteristic Data	Operational Data		Maximum Ratings
104NU71	grounded base I_{CBO} 4,5 <10 μA U_{CB} 6 V	f_T >0,7 Mc/s	measured at U_{CE} 6 V I_C 10 mA	U_{EB} 10 V u_{EBM} 10 V U_{CB} 20 V
	I_{EBO} 4,5 <10 μA U_{EB} 6 V	F <10 dB	U_{CB} 2 V I_C 0,5 mA f 1 kc/s	u_{CBM} 20 V U_{CE} (R_{BE} <0,5 kΩ) 20 V
	grounded emitter I_{CE} <50 μA U_{CE} 6 V R_{BE} 500 Ω	U_{BE_1} 0,115– 0,155 V	U_{CB} 6 V $-I_E$ 1,5 mA	U_{CE} (R_{BE} >40 kΩ) 7 V i_C 250 mA
		U_{BE_2} <0,45 V	U_{CB} 0 V $-I_E$ 80 mA	i_{CM} 250 mA I_B 20 mA
		U_{BE_3} <0,7 V	U_{CB} 0 V $-I_E$ 125 mA	i_{BM} 20 mA P_C 125 mW
		β 70 (45–120)	U_{CB} 6 V $-I_E$ 10 mA	P_C 1) 165 mW T_j +75 °C
		β 50 (30–100)	U_{CB} 0 V $-I_E$ 80 mA	K 0,4 °C/mW K 1) 0,3 °C/mW
		β >25	U_{CB} 0 V $-I_E$ 125 mA	T_a > −40 °C
		β >15	U_{CB} 0 V $-I_E$ 250 mA	1) With cooling surface 12,5 cm^2
n-p-n junction transistor A. F. medium power amplifier, class A. B.	Outline K 504			

Type	Characteristic Data	Operational Data	Maximum Ratings
GC525   n-p-n junction transistor for D. C., A. F. and pulse amplifier, A. F. generator	I_{CBO} <12 µA U_{CB} 6 V I_{CER} <35 µA U_{CE} 6 V R_{BE} 500 Ω I_{CER} <200 µA U_{CER} 15 V R_{BE} 500 Ω Outline K 504	measured at h_{21e} 20 . . . 150 — $U_{CB} = 6$ V, $-I_E = 1$ mA, f = 1 kHz 20 . . . 40 orange 30 . . . 60 yellow 50 . . . 100 green 75 . . . 150 blue $\|h_{21e}\|$ >2 — $U_{CB} = 6$ V, $-I_E = 1$ mA, f = 0,3 MHz U_{CES} 0,13 <0,25 V — $I_C = 125$ mA, $I_B = 10$ mA F <10 dB — $U_{CE} = 2$ V, $I_C = 0{,}5$ mA, f = 1 kHz, $\Delta f = 200$ Hz, $R_g = 500\ \Omega$ h_{11e} 1,3 kΩ h_{12e} 0,85 . 10^{-3} h_{21e} 55 h_{22e} 33 µS } $U_{CE} = 6$ V, $I_C = 1$ mA, f = 1 kHz U_{BE} 0,31 V — $U_{CB} = 0$ V, $-I_E = 80$ mA f_T 1,2 MHz — $U_{CB} = 6$ V, $-I_E = 1$ mA, f = 0,3 MHz I_B 0,19 mA U_{BE} 0,17 V } $U_{CB} = 6$ V, $-I_E = 10$ mA, I_B 2,1 mA U_{BE} 0,31 V } $U_{CB} = 0$ V, $-I_E = 80$ mA I_{is} <15 µA — $U_{is} = 30$ V	U_{CBO} 15 V U_{CER} (R_{BE} <500 Ω) 15 V U_{EB} 10 V I_C 125 mA I_{CM} 250 mA I_E 145 mA I_{EM} 250 mA I_B 20 mA I_{BM} 125 mA T_j +75 °C P_{tot} (T_a <45 °C) 130 mW T_a >−55 °C T_a +70 °C U_{is} 80 V

Type	Characteristic Data	Operational Data	Maximum Ratings
GC526   n-p-n junction transistor for D. C., A. F. and pulse amplifier, A. F. generator Replace 105NU70, 106NU70, 107NU70	I_{CBO} <12 µA U_{CB} 6 V I_{CER} <35 µA U_{CER} 6 V R_{BE} 500 Ω I_{CER} <200 µA U_{CER} 32 V R_{BE} 500 Ω Outline K 504	measured at h_{21e} 20 . . . 150 U_{CB} = 6 V, $-I_E$=1 mA, f = 0,3 MHz 20 . . . 40 orange 30 . . . 60 yellow 50 . . . 100 green 75 . . . 150 blue $\|h_{21e}\|$ >2 U_{CB} = 6 V, $-I_E$=1 mA, f = 0,3 MHz U_{CES} 0,13 <0,25 V I_C=125 mA, I_B=10 mA F <10 dB U_{CE}=2 V, I_C=0,5 mA, f = 1 kHz, Δf=200 Hz, R_g = 500 Ω h_{11e} 1,3 kΩ h_{12e} 0,85 . 10^{-3} h_{21e} 55 h_{22e} 33 µS } U_{CE} = 6 V, I_C = 1 mA, f = 1 kHz f_T 1,2 MHz U_{CB}=6 V, $-I_E$=1 mA, f = 0,3 MHz I_B 0,19 mA U_{BE} 0,17 V } U_{CB}=6 V, $-I_E$=10 mA, I_B 2,1 mA U_{BE} 0,31 V } U_{CB}=0 V, $-I_E$=80 mA I_{is} <15 µA U_{is} = 30 V	U_{CBO} 32 V U_{CER} (R_{BE} <500 Ω) 32 V U_{EB} 10 V I_C 125 mA I_{CM} 250 mA I_E 145 mA I_{EM} 250 mA I_B 20 mA I_{BM} 125 mA T_j +75 °C P_{tot} (T_a <45 °C) 130 mW T_a >−55 °C T_a +70 °C U_{is} 80 V

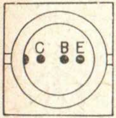
Type	Characteristic Data	Operational Data	Maximum Ratings
GC527   n-p-n junction transistor for D. C., A. F. and pulse amplifier, A. F. generator. Replace 105NU70, 106NU70, 107NU70	I_{CBO} <12 µA U_{CB} 6 V I_{CER} <35 µA U_{CER} 6 V R_{BE} 500 Ω I_{CER} <200 µA U_{CER} 32 V R_{BE} 500 Ω Outline K 504	h_{21e} 50 . . . 150 measured at $U_{CB} = 6$ V, $-I_E=1$ mA, f = 1 kHz 50 . . . 100 green 75 . . . 150 blue $\|h_{21e}\|$ >2 $U_{CB} = 6$ V, $-I_E=1$ mA, f = 0,3 MHz U_{CES} 0,12 <0,25 V I_C=125 mA, I_B=10 mA F <6 dB U_{CE}=2 V, I_C=0,5 mA, f = 1 kHz, Λf=200 Hz, R_g = 500 Ω h_{11e} 1,6 kΩ h_{12e} 1,3 . 10^{-3} h_{21e} 80 h_{22e} 43 µS } $U_{CE} = 6$ V, $I_C = 1$ mA, f = 1 kHz f_T 1,4 MHz $U_{CB} = 6$ V, $-I_E=1$ mA, f = 0,3 MHz I_B 0,125 mA U_{BE} 0,17 V } U_{CB}=6 V, $-I_E$=10 mA I_B 1,6 mA U_{BE} 0,31 V } U_{CB}=0 V, $-I_E$=80 mA I_{is} <15 µA U_{is} = 30 V	U_{CBO} 32 V U_{CER} (R_{BE} <500 Ω) 32 V U_{EB} 10 V I_C 125 mA I_{CM} 250 mA I_E 145 mA I_{EM} 250 mA I_B 20 mA I_{BM} 125 mA T_j +75 °C P_{tot} (T_a <45 °C) 130 mW T_a >−55 °C T_a +70 °C U_{is} 80 V

Type	Characteristic Data			Operational Data				Maximum Ratings		
GC520 **GC520K**	I_{CBO}	<35	µA				measured at	U_{CB}	32	V
	U_{CB}	10	V	U_{CBO}	>32	V	$I_{CB}=0{,}2$ mA	U_{CBM}	32	V
	I_{CEO}	1000	µA	U_{CEO}	>16	V	$I_{CE}=1$ A, $R_{BE}=\infty$	U_{CE}	16	V
	U_{CE}	6	V	U_{CEV}	>32	V	$I_{CE}=0{,}2$ mA, $-U_{BE}=$ $=1$ V	U_{EB}	10	V
								U_{EBM}	10	V
				U_{EBO}	>10	V	$I_{EB}=0{,}2$ mA	I_C	1	A
				I_{B1}	0,7	mA	$U_{CB}=0$ V, $-I_E=50$ mA	I_{CM}	2	A
				U_{EB1}	0,25	V		$I_{CM\ imp}$ 1)	2	A
				I_{B2}	1,2 – 6	mA	$U_{CB}=0$ V, $-I_E=300$ mA	$-I_E$	1	A
				U_{BE_2}	$<0{,}65$	V		$-I_{EM}$ 1)	2	A
				h_{21e}	50 . . . 250			I_B	0,1	A
				I_{B3}	18	mA	$U_{CB}=0$ V, $-I_E=1000$ mA	I_{BM} 1)	0,5	A
				U_{BE_3}	0,8	V		P_C ($T_a \leqq 45$ °C)		
				U_{CES}	$<0{,}6$	V	$I_C=1$ A, $I_B=30$ mA		1	W
				$\|h_{12e}\|$	>2		$U_{CB}=2$ V, $-I_E=10$ mA, f = 500 kHz	T_j	90	°C
								T_a	−55...+85	°C
GC520K	**GC520**			f_β	>10	kHz	$U_{CB}=2$ V, $-I_E=10$ mA	R_{t1}	45	°C/W
				r_{bb}	90	Ω	$U_{CB}=6$ V, $-I_E=1$ mA, f = 0,5 MHz	R_t	200	°C/W
				C_{22b}	150	pF	$U_{CB}=6$ V, f=0,5 MHz	1) $t_{ip} \leqq 20$ ms		
n-p-n junction transistor for A. F. amplifiers medium power Complementary to GC510, GC510K	Outlines: **GC520** K 504 **GC520K** p. 418									

Type	Characteristic Data	Operational Data	Maximum Ratings

Type

GC521, GC521K
GC522, GC522K

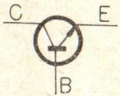


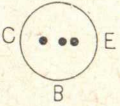
GC521K
GC522K

n-p-n junction transistor for A. F. amplifiers medium power
Complementary to
GC511, GC511K
GC512, GC512K

Characteristic Data

I_{CBO}	<35	µA
U_{CB}	10	V
I_{CEO}	1000	µA
U_{CE}	6	V





GC521
GC522

GC521, GC522 K 504
GC521K, GC522K
p. 418

Operational Data

	GC521	GC522		measured at
U_{CBO}	>25	>20	V	I_{CB}=0,2 A
U_{CEO}	>15	>15	V	I_{CE}=1 A, $R_{BE}=\infty$
U_{CEV}	>25		V	I_{CE}=0,2 mA, -U_{BE}=1 V
U_{CEV}	–	>20	V	I_{CE}=0,5 mA, -U_{BE}=1 V
U_{EB}	>10	>10	V	I_{EB}=0,2 mA
I_{B_1}	0,5	0,6	mA	U_{CB}=0 V, -I_E=50 mA
U_{BE_1}	0,25	0,25	V	
I_{B_2}	0,6–3	0,6–6	mA	U_{CB}=0 V, -I_E=300 mA
U_{BE_2}	<0,65	<0,65	V	
h_{21E}	100..500	50..500		
I_{B_3}	8	12	mA	U_{CB}=0 V, -I_E=1000 mA
U_{BE_3}	0,8	0,8	V	
U_{CES}	<0,6	–	V	I_C=1 A, I_B=15 mA
U_{CES}	–	<0,6	V	I_C=1 A, I_B=30 mA
$\lvert h_{21e}\rvert$	>2	>2		U_{CB}=2 V, -I_E=10 mA, f=500 kHz
f_β	>10	>10	kHz	U_{CB}=2 V, -I_E=10 mA,
r_{bb}	90	90	Ω	U_{CB}=6 V, -I_E=1 mA, f=0,5 MHz
C_{22b}	150	150	pF	U_{CB}=6 V, f=0,5 MHz

Outlines:

Maximum Ratings

	GC521	GC522	
U_{CB}	25	20	V
U_{CBM}	25	20	V
U_{CEM}	15	15	V
U_{EB}	10		V
U_{EBM}	10		V
I_C	1		A
I_{CM}	2		A
$I_{CM\,imp}$ 1)	2		A
$-I_E$	1		A
$-I_{EM}$ 1)	2		A
I_B	0,1		A
I_{BM} 1)	0,5		A
P_C ($T_a \leqq 45$ °C)	1		W
T_j	90		°C
T_a	–55...+85		°C
R_{t_1}	45		°C/W
R_t	200		°C/W

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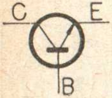
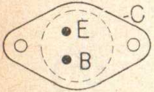
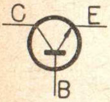
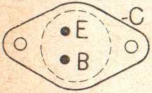
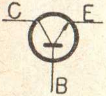
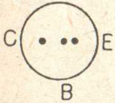
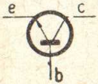
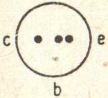
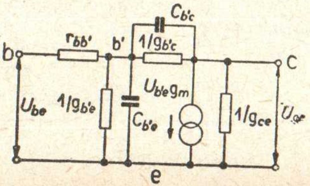
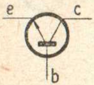
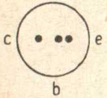
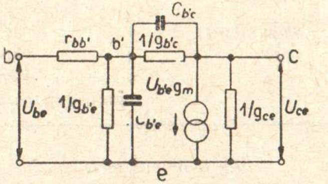
1) $t_{ip} \leqq 20$ ms

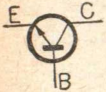
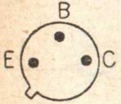
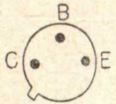
Type	Characteristic Data			Operational Data				Maximum Ratings		
GD607	I_{CBO}	<35	µA				**measured at**	U_{CB}	32	V
	U_{CB}	10	V	U_{CEO}	>18	V	$I_C=1$ A	U_{CER}	(R_{BE} $\leqq 500\ \Omega$)	
				U_{CER}	>32	V	$I_C=0{,}5$ mA, $R_{BE}=500\ \Omega$		32	V
	I_{CBO}	<1	mA	U_{EB}	>10	V	$I_E=0{,}2$ mA	U_{CEO}	20	V
	U_{CB}	10	V	I_{B_1}	0,28...1,65	mA		U_{EBO}	10	V
	T_C	+75	°C	U_{BE_1}	$<0{,}3$	V	$U_{CB}=0$ V, $-I_E=50$ mA	I_C	1	A
				h_{21E}	30...180			I_{CM}	2	A
				I_{B_2}	2,17...12,5	mA		$-I_E$	1	A
				U_{BE_2}	$<0{,}65$	V	$U_{CB}=0$ V, $-I_E=500$ mA	$-I_{EM}$	2	A
				h_{21E}	40...230			I_B	0,1	A
				I_{B_3}	6...30	mA		T_j	+90	°C
				U_{BE_3}	<1	V	$U_{CB}=0$ V, $-I_E=1$ A	P_{tot} ($T_C \leqq +60$ °C)		
				h_{21E}	33...165				4	W
				U_{CES}	$<0{,}6$	V	$I_C=1$ A, $I_B=30$ mA	T_a	−55...+85	°C
				$\|h_{21e}\|$	>2		$U_{CB}=2$ V, $-I_E=10$ mA,	R_{t1}	7,5	°C/W
							$f=0{,}5$ MHz			
				f_β	>10	kHz	$U_{CB}=2$ V, $-I_E=10$ mA			
n-p-n junction transistor for A. F. power amplifiers Complementary to GD617	Outlines K 602									

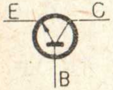
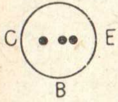
Type	Characteristic Data			Operational Data					Maximum Ratings			
					GD608	GD609		Measured at		GD608	GD609	
GD608 **GD609**	I_{CBO}	<35	µA	U_{CEO}	>15	>15	V	$I_C=1$ A	U_{CB}	25	20	V
	U'_{CB}	10	V	U_{CER}	>25	–	V	$I_C=0{,}2$mA, $R_{BE}=500\ \Omega$	U_{CE}	18	16	V
	I_{CBO}	<1	mA	U_{CER}	–	>20	V	$I_C=0{,}5$ mA, $R_{BE}=500\ \Omega$	U_{CER} ($R_{BE} \leqq 500\ \Omega$)			
	U_{CB}	10	V	U_{EB}	>10	>10	V	$I_E=0{,}2$ mA		15	15	V
	T_C	+75	°C	I_{B1}	0,1..0,5	0,1..1,65	mA	$U_{CB}=0$ V, $-I_E=50$ mA	U_{EB}	10		V
				U_{BE_1}	<0,3	<0,3	V		I_C	1		A
				h_{21E}	100..500	30..500			I_{CM}	2		A
				I_{B_2}	1,4...5	1,4...12,5	mA	$U_{CB}=0$ V, $-I_E=500$ mA	$-I_E$	1		A
				U_{BE_2}	<0,65	<0,65	V		$-I_{EM}$	2		A
				h_{21E}	100..360	40..360			I_B	0,1		A
				I_{B_3}	<15	<30	mA	$U_{CB}=0$ V, $-I_E=1$ A	P_{tot} ($T_C \leqq +60$ °C)			
				U_{BE_3}	<1	<1	V			4		W
				h_{21E}	40..360	>33			T_j	+90		°C
				U_{CES}	<0,6	–	V	$I_C=1$ A, $I_B=15$ mA	T_a	−55...+85		°C
				U_{CES}	–	<0,6	V	$I_C=1$ A, $I_B=30$ mA	R_{t1}	7,5		°C/W
				$\lvert h_{21e}\rvert$	>2	>2		$U_{CB}=2$ V, $-I_E=10$ mA, f=0,5 MHz				
				f_β	>10	>10	kHz	$U_{CB}=2$ V, $-I_E=10$ mA				
n-p-n junction transistor for A. F. power amplifiers Complementary to GD618 GD619	Outlines K 602											

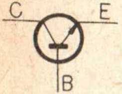
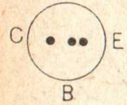
Type	Characteristic Data	Operational Data	Maximum Ratings
152NU70 **153NU70** **154NU70**   n-p-n junction transistor for 152NU70 Mixer 153NU70 IF amplifier 154NU70 Oscillator	I_{CBO} <10 µA U_{CB} 5 V **153NU70** Classified transistors according to the $C_{b'c}$ are colour coded as follows: 8-9 pF green 9-10,7 pF blue 10,7-13,1 pF red 13,1-15,9 pF yellow 15,9-18 pF black 18-22 pF white 22-26 pF violet Outline K 504	**152NU70, 154NU70** grounded base measured at f_α >2,5 Mc/s U_{CB} 5 V I_C 0,5 mA grounded emitter h_{21e} 20–100 U_{CE} 5 V I_C 0,5 mA **152NU70:** F <10 dB U_{CE} 5 V I_C 0,5 mA **154NU70:** f 250 kc/s F <20 dB **153NU70** grounded base f_α >1 Mc/s U_{CB} 5 V I_C 0,5 mA grounded emitter h_{21e} 10–40 U_{CE} 5 V I_C 0,5 mA F <20 dB U_{CE} 5 V I_C 0,5 mA f 250 kc/s $C_{b'c}$ 8–26 pF U_{CE} 6 V I_C 1 mA	U_{CB} 10 V u_{CBM} 10 V U_{CE} 6 V u_{CEM} 6 V U_{EB} 5 V u_{EBM} 5 V I_C 5 mA i_{CM} 10 mA $-I_E$ 5 mA $-i_{EM}$ 10 mA P_C 50 mW T_j 75 °C T_a −40 ÷ +70 °C K 1 °C/mW

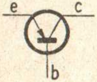
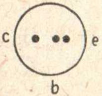
Type	Characteristic Data	Operational Data	Maximum Ratings
155NU70   n-p-n junction transistor for I. F. amplifier	grounded base I_{CBO} 0,5 <2 μA U_{CB} 2 V I_{CBO} <10 μA U_{CB} 15 V I_{EBO} 0,4 <2 μA U_{EB} 2 V I_{EBO} <40 μA U_{EB} 12 V grounded emitter I_{CEO} 12 <40 μA U_{CF} 2 V Classified transistors according to the $C_{b'c}$ are colour coded as follows: 8-9 pF green 9-10,7 pF blue 10,7-13,1 pF red 13,1-15,9 pF yellow 15,9-18 pF black Outline K 504	grounded base U_{CB} 6 V $-I_E$ 1 mA f_α 6 (3–12) Mc/s grounded emitter U_{CE} 6 V $-I_E$ 1 mA β 50 (25–125) $C_{b'c}$ 10,5 (7–14) pF $C_{b'e}$ 1000 pF g_{ce} 15 (<40) μS $g_{b'e}$ 760 μS $g_{b'c}$ $<0,5$ μS g_m 39 mA/V $r_{bb'}$ 75 <200 Ω $r_{bb'}/f_{\alpha b}$ 12,5 (5–30) Ω/Mc/s 	U_{CE} (R_{BE} = 1 kΩ) 15 V u_{CEM} (R_{BE} = 1 kΩ) 15 V U_{CE} (R_{BE} = 400 kΩ) 5 V u_{CEM} (R_{BE} = 400 kΩ) 5 V U_{CB} 15 V u_{CBM} 15 V U_{EB} 8 V u_{EBM} 12 V $-I_E$ 5 mA $-i_{EM}$ 10 mA I_C 5 mA i_{CM} 10 mA P_C 83 mW K 0,6 °C/mW T_j 75 °C T_a >-40 °C

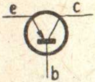
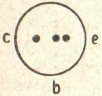
Type	Characteristic Data	Operational Data	Maximum Ratings
156NU70   n-p-n junction transistor for R. F. amplifier, mixer and self-excited mixer	grounded base I_{CBO} 0,5 <2 µA U_{CB} 2 V I_{CBO} <10 µA U_{CB} 15 V I_{EBO} 0,4 <2 µA U_{EB} 2 V I_{EBO} <40 µA U_{EB} 12 V grounded emitter I_{CEO} 25 <75 µA U_{CE} 2 V Outline K 504	grounded base U_{CB} 6 V $-I_E$ 1 mA f_α 15 (7,5–30) Mc/s grounded emitter U_{CB} 6 V $-I_B$ 1 mA β 100 (45–225) $C_{b'e}$ 10,5 (7–14) pF $C_{b'e}$ 410 pF g_{ce} 40 (<100) µS $g_{b'e}$ 390 µS $g_{b'c}$ <0,5 µS g_m 39 mA/V $r_{bb'}$ 110 <250 Ω $r_{bb'}/f_{\alpha b}$ 7,5 (3,5–20) Ω/Mc/s 	U_{CE} (R_{BE} = 1 kΩ) 15 V u_{CEM} (R_{BE} = 1 kΩ) 15 V U_{CE} (R_{BE} = 400 kΩ) 5 V u_{CEM} (R_{BE} = 400 kΩ) 5 V U_{CB} 15 V u_{CBM} 15 V U_{EB} 8 V u_{EBM} 12 V $-I_E$ 5 mA $-i_{EM}$ 10 mA I_C 5 mA i_{CM} 10 mA P_C 83 mW K 0,6 °C/mW T_j 75 °C T_a > −40 °C

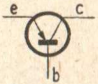
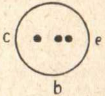
Type	Characteristic Data	Operational Data	Maximum Ratings
GS501 **GS502** **GS504**   **GS501** **GS502** n-p-n germanium junction transistor for switching application GS502 symmetrical	I_{CBO} <3 μA U_{CB} 6 V I_{CBO} <50 μA U_{CB} 20 V I_{CBO} GS501 <35 μA GS502 <60 μA GS504 <35 μA U_{CB} 6 V T_a 60 °C I_{EBO} <3 μA U_{EB} 6 V I_{EBO} <50 μA U_{EB} 20 V  **GS504**	GS501 GS504 / GS502 — measured at I_B 0,1–0,3 / 0,1–0,3 mA — U_{CB}=0 V, $-I_E$= 15 mA $-I_B$ – / <19 mA — U_{CB}=0 V, $-I_E$=300 mA I_B <11 / <11 mA — U_{CB}=0 V, $-I_E$=300 mA U_{BE} <0,8 / <0,8 V — U_{CB}=0 V, $-I_E$=300 mA U_{BE} – / 0,4 V — U_{CB}=0 V, $-I_E$=300 mA U_{BE} <0,27 / <0,27 V — U_{CB}=0 V, $-I_E$= 15 mA U_{CES} 0,2<0,4 / 0,2<0,4 V — I_C=400 mA, I_B=20 mA $C_{b'c}$ <30 / <30 pF — U_{CE}=6 V, $-I_E$=3 mA, f = 3 MHz $r_{bb'}$ 100 / <180 Ω — U_{CB}=6 V, $-I_E$=3 mA, f = 0,5 MHz f_T 18 / 18 MHz — U_{CB}=6 V, $-I_E$=3 mA, $\|h_{21e}\|$ >4,5 / >4,5 — U_{CB}=6 V, $-I_E$=3 mA, f = 1 MHz Outlines K 505	U_{CB} 20 V U_{CBM} 20 V U_{CE} 20 V U_{EB} 20 V U_{EBM} 20 V I_C 400 mA I_{CM} 400 mA $I_{CM\ imp}$ 400 mA I_E 400 mA I_{EM} 400 mA I_B [1] 40 mA I_{BM} 400 mA P_C 150 mW T_j +75 °C T_a −40 ... +70 °C R_{t1} 0,2 °C/mW R_t 0,35 °C/mW [1] $t_{ip} \leq 20$ ms

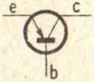
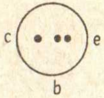
Type	Characteristic Data	Operational Data	Maximum Ratings
GS506   Germanium n-p-n junction transistor for R. F. amplifiers and switching application	I_{CBO} <2 µA U_{CB} 2 V I_{CBO} <10 µA U_{CB} 15 V I_{EBO} <2 µA U_{EB} 2 V I_{EBO} <40 µA U_{EB} 12 V I_{CEO} <75 µA U_{CE} 2 V Outline K 504	measured at h_{21E} 40–300 $U_{CB} = 6$ V, I_E − 1 mA, $\|h_{21e}\|$ >10 $U_{CB}=6$ V, I_E −1 mA, f = 1 MHz U_{BE} <200 mV $U_{CB}=6$ V, I_E −1 mA, C_{22b} <15 pF $U_{CB}=6$ V, I_E −1 mA, f = 1 MHz r_{bb}' <250 Ω $U_{CB}=6$ V, I_E −1 mA, f = 0,5 MHz f_T 14 >10 MHz $U_{CB}=6$ V, I_E −1 mA, f = 1 MHz Q_S <1 µs $U_{CE}=6$ V, I_C −5 mA, I_{B1} =5 mA, I_{B2}−2,5 mA,	U_{CB} 15 V U_{CBM} 15 V U_{CE} 1) 15 V U_{CEM} 1) 15 V U_{EB} 8 V U_{EBM} 12 V I_{CE} 10 mA I_{CEM} 2) 20 mA $I_{CEM\ imp}$ 20 mA I_{BM} 5 mA T_j 75 °C P_C 85 mW P_C 3) 150 mW T_a −40 . . . +70 °C R_t 0,6 °C/mW R_{t1} 0,15 °C/mW 1) $R_{BE} = 1$ kΩ 2) $-U_{BE} = 0{,}3 \ldots 3$ V; $U_{CEM} \cdot I_{CEM} \leqq 300$ mW, · $f_{ip} > 1$ kHz, $V_T \leqq 0{,}2$ 3) S chladicí plochou, $R_t \leqq 120$ °C/W

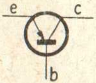
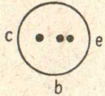
Type	Characteristic Data			Operational Data					Maximum ratings		
GS507	I_{CBO}	1,5	<3 µA					measured at	U_{CB}	15	V
	U_{CB}		2 V	h_{21E}	77	40...300		$U_{CB}=0$, $I_E=1$ mA	U_{CBM}	15	V
	I_{CBO}	1,85	<10 µA	I_B	13	3,3...25	µA	$U_{CB}=0$, $I_E=1$ mA	U_{CE} 1)	15	V
	U_{CB}		15 V	U_{BE}	145	<200	mV	$U_{CB}=6$ V, $I_E=1$ mA	U_{CEM} 1)	15	V
	I_{EBO}	1,25	<3 µA	$\|h_{21e}\|$		>10		$U_{CB}=6$ V, $I_E=1$ mA,	U_{EB}	8	V
	U_{EB}		2 V					f=1 MHz	U_{EBM}	12	V
				$r_{bb'}$	142	<250	Ω	$U_{CB}=6$ V, $I_E=1$ mA,	I_{CE}	30	mA
	I_{EBO}	1,5	<10 µA					f=1 MHz	I_{CEM}	60	mA
	U_{EB}		12 V	C_{22b}	13,6	<20	pF	$U_{CB}=6$ V, $I_E=1$ mA,	$I_{CEM\,imp}$ 3)	60	mA
	I_{CEO}	46	<200 µA					f=0,5 MHz	I_{BM}	5	mA
	U_{CE}		2 V	Q_S	0,65	<1,2	µs	$U_{CC}=6$ V, $I_C=5$ mA,	T_j	75	°C
								$I_{B_1}=5$ mA, $I_{B_2}=2,5$ mA	P_C	85	mW
				f_T	18	>10	MHz	$U_{CB}=6$ V, $I_E=1$ mA,	P_C 2)	160	mW
								f=1 MHz	R_t	0,6	°C/mW
									R_{t_1}	0,2	°C/mW
									T_a	−40...+70	°C
Germanium n-p-n junction transistor for R. F. amplifiers and switching application	Outline K 504								1) $R_{BE}=1\ k\Omega$ 2) With cooling surface, $R_t \leqq 100$ °C. 3) $-U_{BE} = 0,3...3$ V, $U_{CEM} \cdot I_{CEM}$ <900 mW, $f_{ip} > 1$ kHz, $V_T \leqq 0,2$		

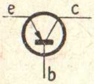
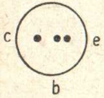
Type	Characteristic Data	Operational Data	Maximum Ratings
OC70   p-n-p junction transistor for D. C.. A. F. and pulse amplifier, A. F. generator Not for new equipment. Replace by GC 515	grounded base $-I_{CBO}$ 5 <12 µA $-U_{CB}$ 4,5 V grounded emitter $-I_{CEO}$ 110 <225 µA $-U_{CB}$ 4,5 V Outline K 504	grounded base measured at h_{11b} 71 (58–88) Ω } $-U_{CB}$ 2 V h_{12b} 7.10-4 } $-I_C$ 0,5 mA $-h_{21b}$ 0,968 (0,952–0,976) } f 1 kc/s h_{22b} 0,7 (<1,3) µS f_α >300 kc/s } $-U_{CB}$ 6 V } $-I_C$ 1 mA grounded emitter h_{11e} 2,2 (1,2–3,6) kΩ h_{12e} 9.10-4 (<27.10-4) h_{21e} 30 (20–40) } $-U_{CE}$ 2 V h_{22e} 23 (<53) µS } $-I_C$ 0,5 mA f_β 15 kc/s } f 1 kc/s F 10 (<15) dB $-U_{BE}$ 110 (75–150) mV } $-U_{CE}$ 4,5 V $-I_C$ 0,4 (0,21–0,65) mA } $-I_B$ 10 µA $-U_{BE}$ 275 (180–300) mV } $-U_{CE}$ 4,5 V $-I_C$ 10 (4,6–13,2) mA } $-I_B$ 250 µA	U_{CB} 32 V u_{CBM} 32 V U_{CE} (R_{BE} <0,6 kΩ) 30 V U_{CE} (R_{BE} >40 kΩ) 10 V $-I_E$ 12 mA $-i_{EM}$ 55 mA I_C 10 mA i_{CM} 50 mA I_B 2 mA i_{BM} 5 mA P_C 125 mW T_j 75 °C K 0,4 °C/mW T_a > −40 °C

Type	Characteristic Data	Operational Data	Maximum ratings
OC71   p-n-p junction transistor for D. C.. A. F. and pulse amplifier, A. F. generator Not for new equipment. Replace by GC 516	grounded base $-I_{CBO}$ 4,5 <12 µA $-U_{CB}$ 4,5 V grounded emitter $-I_{CEO}$ 150 <325 µA $-U_{CE}$ 4,5 V Outline K 504	grounded base — measured at h_{11b} 17 (10–25) Ω h_{12b} 8.10-4 $-h_{21b}$ 0,979 (0,968–0,987) h_{22b} 1,6 (<2,7) µS } $-U_{CB}$ 2 V, $-I_C$ 3 mA, f 1 kc/s f_α >400 kc/s } $-U_{CB}$ 6 V, $-I_C$ 1 mA grounded emitter h_{11e} 0,8 (0,4–1,5) kΩ h_{12e} 5,4.10-4 (<17.10-4) h_{21e} 47 (30–75) h_{22e} 80 (<200) µS f_β 10 kc/s } $-U_{CE}$ 2 V, $-I_C$ 3 mA, f 1 kc/s F 10 (<15) dB } $-U_{CE}$ 2 V, $-I_C$ 0,5 mA $-U_{BE}$ 110 (80–155) mV $-I_C$ 0,7 (0,36–1,2) mA } $-U_{CE}$ 4,5 V, $-I_B$ 10 µA $-U_{BE}$ 270 (190–300) mV $-I_C$ 14 (7,2–21) mA } $-U_{CE}$ 4,5 V, $-I_B$ 250 µA	$-U_{CB}$ 32 V $-u_{CBM}$ 32 V $-U_{CE}$ (R_{BE} <0,6 kΩ) 30 V $-U_{CE}$ (R_{BE} >40 kΩ) 10 V I_E 12 mA i_{EM} 55 mA $-I_C$ 10 mA $-I_{CM}$ 50 mA $-I_B$ 2 mA $-i_{BM}$ 5 mA P_C 125 mW T_j +75 °C K 0,4 °C/mW T_a > −40 °C

Type	Characteristic Data	Operational Data	Maximum Ratings
OC72   p-n-p junction transistor A. F. medium power amplifier, class A, B Not for new equipment. Replace by GC 507	grounded base $-I_{CBO}$ 4,5 <10 µA $-U_{CB}$ 10 V $-I_{EBO}$ 4,5 <10 µA $-U_{EB}$ 10 V grounded emitter I_{CEO} 125 <300 µA $-U_{CB}$ 6 V Outline K 504	grounded emitter — measured at f_β 8 >6 kc/s — $-U_{CE}$ 6 V, $-I_C$ 10 mA F <15 dB — $-U_{CE}$ 2 V, $-I_C$ 0,5 mA, f 1 kc/s $-I_C$ 7,5 <15 µA — $-U_{CE}$ 30 V, U_{BE} $\geq 0{,}5$ V $-I_C$ 0,7–3,2 mA — $-U_{CE}$ 6 V, $-U_{BE}$ 0,15 V β 70 45–120 — $-U_{CE}$ 6 V, $-I_C$ 10 mA β 50 30–90 — $-U_{CE}$ 0,7 V, $-I_C$ 80 mA β >25 — $-U_{CE}$ 0,7 V, $-I_C$ 125 mA β >15 — $-U_{CE}$ 1 V, $-I_C$ 250 mA	$-U_{EB}$ 10 V $-u_{EBM}$ 10 V $-U_{CB}$ 32 V $-u_{CBM}$ 32 V $-U_{CE}$ (R_{BE} <1 kΩ) 30 V U_{CE} (R_{BE} >40 kΩ) 10 V $-I_C$ 50 mA $-i_{CM}$ 125 mA $\pm i_{CM}$ 250 mA I_E 50 mA I_{EM} 130 mA $\pm i_{EM}$ 250 mA $-I_B$ 20 mA $\pm i_{BM}$ 125 mA P_C 125 mW P_C 1) 165 mW T_j +75 °C K 0,4 °C/mW K 1) 0,3 °C/mW T_a > -40 °C 1) With cooling surface 12,5 cm^2

Type	Characteristic Data	Operational Data	Maximum Ratings
2-OC72   p-n-p junction transistors for A. F. push-pull medium power amplifier, class B Not for new equipment. Replace by 2-GC507 2-GC508	Outline K 504	Technical data are identical with transistors OC72. The transistors are matched in pairs according to the amplification factors which must not differ by more than 15 % under the following conditions: $-U_{CE}$ 6 V | $-U_{CE}$ 0,7 V $-I_C$ 10 mA | $-I_C$ 80 mA	

Type	Characteristic Data	Operational Data		Maximum Ratings
OC75   p-n-p junction transistor for D. C.. A. F. and pulse amplifier Not for new equipment. Replace by GC 517, GC 518, GC 519	grounded base $-I_{CBO}$ 4,5 <12 µA $-U_{CB}$ 4,5 V grounded emitter $-I_{CEO}$ 350 <550 µA $-U_{CB}$ 4,5 V Outline K 504	grounded base h_{11b} 14 Ω h_{12b} 10^{-3} $-h_{21b}$ 0,989 (0,985–0,991) h_{22b} 1,4 µS	measured at $-U_{CB}$ 2 V $-I_C$ 3 mA f 1 kc/s	$-U_{CB}$ 32 V $-u_{CBM}$ 32 V $-U_{CE}$ (R_{BE} $<0,6$ kΩ) 30 V $-U_{CE}$ (R_{BE} >40 kΩ) 10 V I_E 12 mA I_{EM} 55 mA $-I_C$ 10 mA $-I_{CM}$ 50 mA $-I_B$ 2 mA $-I_{BM}$ 5 mA P_C 125 mW T_j +75 °C K 0,4 °C/mW T_a >-40 °C
		f_α >700 kc/s	$-U_{CB}$ 6 V $-I_C$ 1 mA	
		grounded emitter h_{11e} 1,3 (0,7–2) kΩ h_{12e} 8.10^{-4} ($<20.10^{-4}$) h_{21e} 90 (65–130) h_{22e} 125 (<250) µS	$-U_{CE}$ 2 V $-I_C$ 3 mA f 1 kc/s	
		f_β 8 kc/s	$-U_{CE}$ 2 V $-I_C$ 3 mA	
		F 10 (<15) dB	$-U_{CE}$ 2 V $-I_C$ 0,5 mA f 1 kc/s	
		$-U_{BE}$ 120 (90–175) mV $-I_C$ 1,1 (0,75–1,9) mA	$-U_{CE}$ 4,5 V $-I_B$ 10 µA	
		$-U_{BE}$ 270 (190–300) mV $-I_C$ 22 (13,5–33 mA	$-U_{CE}$ 4,5 V $-I_B$ 250 µA	

Type	Characteristic Data	Operational Data		Maximum ratings	
OC76   p-n-p junction transistor for switching and pulse technique Not for new equipment. Replace by GC 508	grounded base $-I_{CBO}$ 4,5 <10 µA $-U_{CB}$ 10 V $-I_{EBO}$ 4,5 <10 µA $-U_{EB}$ 10 V grounded emitter $-I_{CEO}$ 200 <600 µA $-U_{CE}$ 6 V Outline K 504	grounded emitter f_β >6 kc/s $-I_C$ 7,5 <15 µA β 45–330 β 30–230 β >25 β >15	measured at $-U_{CE}$ 6 V $-I_C$ 10 mA $-U_{CE}$ 30 V $U_{BE} \geqq 0{,}5$ V $-U_{CE}$ 6 V $-I_C$ 10 mA $-U_{CE}$ 0,7 V $-I_C$ 80 mA $-U_{CE}$ 0,7 V $-I_C$ 125 mA $-U_{CE}$ 1 V $-I_C$ 250 mA	$-U_{EB}$ $-u_{EBM}$ $-U_{CB}$ $-u_{CBM}$ $-U_{CE}$ (R_{BE} <1 kΩ) $-U_{CE}$ (R_{BE} >40 kΩ) $-i_C$ $\pm i_{CM}$ I_E $\pm i_{EM}$ $-I_B$ $\pm i_{BM}$ P_C P_C 1) T_j K K 1) T_a	10 V 10 V 32 V 32 V 30 V 10 V 125 mA 250 mA 125 mA 250 mA 20 mA 125 mA 125 mW 165 mW +75 °C 0,4 °C/mW 0,3 °C/mW > −40 °C

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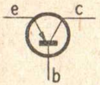
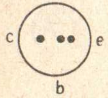
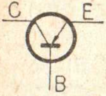
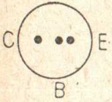
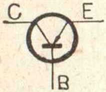
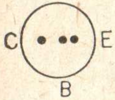
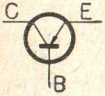
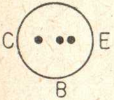
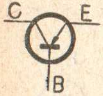
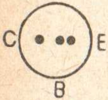
1) With cooling surface 12,5 cm²

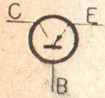
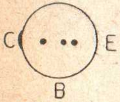
Type	Characteristic Data	Operational Data	Maximum ratings
OC77   p-n-p junction transistor for switching and pulse technique Not for new equipment. Replace by GC 509	grounded base $-I_{CBO}$ 4,5 <10 µA $-U_{CB}$ 10 V $-I_{EBO}$ 4,5 <10 µA $-U_{EB}$ 10 V grounded emitter $-I_{CEO}$ 200 <600 µA $-U_{CB}$ 6 V Outline K 504	grounded emitter measured at f_β >6 kc/s $\}$ $-U_{CE}$ 6 V, $-I_C$ 10 mA $-I_C$ 15 <30 µA $\}$ $-U_{CE}$ 60 V, $U_{BE} \geqq 0{,}5$ V β >45 $\}$ $-U_{CE}$ 6 V, $-I_C$ 10 mA β >30 $\}$ $-U_{CE}$ 0,7 V, $-I_C$ 80 mA β >25 $\}$ $-U_{CE}$ 0,7 V, $-I_C$ 125 mA β >15 $\}$ $-U_{CE}$ 1 V, $-I_C$ 250 mA	$-U_{EB}$ 10 V $-u_{EBM}$ 10 V $-U_{CB}$ 60 V $-u_{CBM}$ 60 V $-U_{CE}$ (R_{BE} $<0{,}4$ kΩ) 60 V $-U_{CE}$ (R_{BE} >40 kΩ) 16 V $-i_C$ 125 mA $\pm i_{CM}$ 250 mA I_E 125 mA i_{EM} ± 250 mA $-I_B$ 20 mA $\pm i_{BM}$ 125 mA P_C 125 mW P_C 1) 165 mW T_j +75 °C K 0,4 °C/mW K 1) 0,3 °C/mW T_a > -40 °C 1) With cooling surface 12,5 cm^2

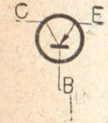
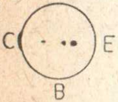
Type	Characteristic Data			Operational Data						Maximum ratings		
GC500	grounded base						measured at			$-U_{CB}$	24	V
	$-I_{CBO}$	<16	µA	$-U_{CES}$	<0,45	V	$-I_C$	600	mA	$-U_{CE}$ 1)	24	V
	$-U_{CB}$	6	V				$-I_B$	40	mA	$-U_{EB}$	10	V
	$-I_{CBO}$ 70	<330	µA	$\|h_{22e}\|$	>5		$-U_{CB}$	6	V	$-I_C$	300	mA
	$-U_{CB}$	6	V				I_E	50	mA	$-I_{CM}$	600	mA
	$T_{\grave{a}}$	60	°C				f	100	kc/s	I_E	340	mA
										i_{EM}	600	mA
	$-I_{EBO}$	<16	µA	$-I_{B1}$	<1,7	mA	$-U_{CB}$	0	V	T_j	75	°C
	$-U_{EB}$	6	V	$-U_{BE1}$	<350	mV	I_E	50	mA	K	0,22	°C/mW
				β_1	50					K 2)	0,09	°C/mW
	grounded emitter			$-I_{B2}$	7,5	mA	$-U_{CB}$	0	V	P_C	550	mW
	$-I_{CE}$	<60	µA	$-U_{BE2}$	600	mV	I_E	300	mA	T_s	−60 ÷ +75	°C
	$-U_{CE}$	6	V	β_2	40							
	R_{BE}	500	Ω							1) R_{BE} <500 Ω		
				I_{B3}	<30	mA	$-U_{CB}$	0	V	2) With cooling surface		
				$-U_{BE3}$	<1,1	V	I_E	600	mA			
				β_3	30							
				$r_{bb'}$	<75	Ω	$-U_{CB}$	6	V			
							I_E	10	mA			
				F	15	dB	$-U_{CB}$	6	V			
							I_E	5	mA			
p-n-p junction transistor for A. F. medium power amplifier, class A, B	Outlines:						R_g	500	Ω			
	K 501 old design						f	1	kc/s			
	K 504 new design											

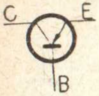
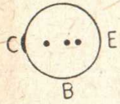
Type	Characteristic Data	Operational Data	Maximum ratings
2-GC500   p-n-p junction transistor for A. F. push-pull medium power amplifier, class B	Outlines: K 501 old design K 504 new design	Technical data are identical with transistors 2-GC500. The transistors are matched in pairs according to the amplification factors which must not differ by more than 15 % under the following conditions: $-U_{CB}$ 6 V | $-U_{CB}$ 0 V I_E 50 mA | I_E 300 mA	

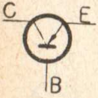
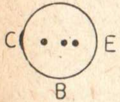
Type	Characteristic Data	Operational Data	measured at	Maximum Ratings
GC501	grounded base			$-U_{CB}$ 24 V
	$-I_{CBO}$ <16 μA	$-U_{CES}$ <0,45 V	$-I_C$ 600 mA	$-U_{CE}$ ¹) 24 V
	$-U_{CB}$ 6 V		$-I_B$ 40 mA	$-U_{EB}$ 10 V
	$-I_{CBO}$ 70 <330 μA	$\lvert h_{21e} \rvert$ >10	$-U_{CB}$ 6 V	$-I_C$ 300 mA
	$-U_{CB}$ 6 V		I_E 50 mA	$-I_{CM}$ 600 mA
	T_a 60 °C		f 100 kc/s	I_E 340 mA
	$-I_{EBO}$ <16 μA	$-I_{B1}$ <0,75 mA	$-U_{CB}$ 0 V	i_{EM} 600 mA
	$-U_{EB}$ 6 V	$-U_{BE1}$ <350 mV	I_E 50 mA	T_j 75 °C
		β_1 95		K 0,22 °C/mW
	grounded emitter	$-I_{B2}$ 3,5 mA	$-U_{CB}$ 0 V	K ²) 0,09 °C/mW
	$-I_{CE}$ <60 μA	$-U_{BE}$ 600 mV	I_E 300 mA	P_C 550 mW
	$-U_{CE}$ 6 V	β_2 85		T_s −60 ÷ +75 °C
	R_{BE} 500 Ω	$-I_{B3}$ <12 mA	$-U_{CB}$ 0 V	¹) R_{BE} <500 Ω
		$-U_{BE3}$ <1,1 V	I_E 600 mA	¹) With cooling surface
		β_3 70		
		$r_{bb'}$ <75 Ω	$-U_{CB}$ 6 V	
			I_E 10 mA	
		F 15 dB	$-U_{CB}$ 6 V	
			I_E 5 mA	
			R_g 500 Ω	
			f 1 kc/s	
p-n-p junction transistor for A. F. medium power amplifier, class A, B	Outlines: K 501 old design K 504 new design			

Type	Characteristic Data	Operational Data		Maximum Ratings
GC502	grounded base $-I_{CBO}$ <16 µA $-U_{CB}$ 6 V	$-U_{CES}$ <0,45 V	measured at $-I_C$ 600 mA $-I_B$ 40 mA	$-U_{CB}$ 32 V $-U_{CE}$ 1) 32 V $-U_{EB}$ 20 V $-I_C$ 300 mA $-i_{CM}$ 600 mA I_E 340 mA i_{EM} 600 mA T_j 75 °C K 0,22 °C/mW K 2) 0,09 °C/mW P_C 550 mW T_s $-60 \div +75$ °C
	$-I_{CBO}$ 70 <330 µA $-U_{CB}$ 6 V T_a 60 °C	$\|h_{21e}\|$ >10	$-U_{CB}$ 6 V I_E 50 mA f 100 kc/s	
	$-I_{EBO}$ <16 µA $-U_{EB}$ 6 V	$-I_{B_1}$ <0,75 mA $-U_{BE_1}$ <350 mV β_1 95	$-U_{CB}$ 0 V I_E 50 mA	
	$-U_{EBF}$ 0,1 V $-U_{CB}$ 32 V	$-I_{B_2}$ 3,5 mA $-U_{BE}$ 600 mV β_2 85	$-U_{CB}$ 0 V I_E 300 mA	
	grounded emitter $-I_{CE}$ <60 µA $-U_{CE}$ 6 V R_{BE} 500 Ω	$-I_{B_3}$ <12 mA $-U_{BE_3}$ <1,1 V β_3 70	$-U_{CB}$ 0 V I_E 600 mA	1) R_{BE} <500 Ω 1) With cooling surface
		$r_{bb'}$ <75 Ω	$-U_{CB}$ 6 V I_E 10 mA	
p-n-p junction transistor for A. F. medium power amplifier, class A, B	Outlines: K 501 old design K 504 new design			

Type	Characteristic Data	Operational Data	Maximum Ratings
GC507	$-I_{CBO}$ 4,5 <10 μA	measured at	$-U_{CB}$ 32 V
	$-U_{CB}$ 6 V	$-U_{CES}$ 0,15 <0,22 V $-I_C$ = 125 mA, $-I_B$=10 mA	$-U_{CBM}$ 32 V
	$-I_{EBO}$ 3,5 <10 μA	$-U_{BE_1}$ 0,115 . . . 0,155 V $-U_{CB}$ = 6 V, I_E = 1,5 mA	$-U_{CE}$ (R_{BE} <800 Ω) 32 V
	$-U_{EB}$ 6 V	$-U_{BE_2}$ <0,45 V $-U_{CB}$ = 0 V, I_E = 80 mA	
	$-I_{CEO}$ 150 μA	$-U_{BE_3}$ <0,7 V $-U_{CB}$ = 0 V, I_E =125 mA	$-U_{CE}$ (R_{BE} >30 kΩ) 10 V
	$-U_{CE}$ 6 V	h_{21E} 80 45 . . . 120 $-U_{CB}$ = 6 V, I_E = 10 mA	$-U_{EB}$ 10 V
	$-I_{CER}$ <50 μA	h_{21E} 30 . . . 100 $-U_{CB}$ = 0 V, I_E = 80 mA	$-U_{EBM}$ 10 V
	$-U_{CE}$ 6 V	h_{21E} >25 $-U_{CB}$ = 0 V, I_E =125 mA	$-I_C$ 125 mA
	R_{BB} 500 Ω	h_{21E} >15 $-U_{CB}$ = 0 V, I_E =250 mA	$-I_{CM}$ 250 mA
		$\|h_{21E}\|$ >1 $-U_{CB}$ = 0 V, I_E = 10 mA, f = 0,3 MHz	I_E 130 mA
			I_{EM} 250 mA
		F 6 <15 dB $-U_{CE}$ = 2 V, $-I_C$=0,5 mA, f = 1 kHz	$-I_B$ 20 mA
			$-I_{BM}$ 125 mA
		f_T >300 kHz $-U_{CB}$ = 0 V, I_E = 10 mA	P_C 125 mW
			P_C 1) 165 mW
			K 0,4 °C/mW
			K 1) 0,3 °C/mW
			T_j +75 °C
			T_a −60 . . . +75 °C
			1) With cooling surface 12,5 cm^2
p-n-p junction transistor for A. F. amplifiers medium power	Outline K 504		

Type	Characteristic Data	Operational Data	Maximum Ratings
GC508   p-n-p junction transistor for A. F. amplifiers medium power	$-I_{CBO}$ 4,5 <10 µA $-U_{CB}$ 6 V $-I_{EBO}$ 3,5 <10 µA $-U_{EB}$ 6 V $-I_{CEO}$ 350 µA $-U_{CE}$ 6 V $-I_{CER}$ <50 µA $-U_{CE}$ 6 V R_{BE} 500 Ω Outline K 504	measured at $-U_{CES}$ 0,15 $<0{,}22$ V $-I_C = 125$ mA, $-I_B = 10$ mA $-U_{BE_2}$ $<0{,}45$ V $-U_{CB} = 0$ V, $I_E = 80$ mA $-U_{BE_3}$ $<0{,}7$ V $-U_{CB} = 0$ V, $I_E = 125$ mA h_{21E} 125 65 . . . 220 $-U_{CB} = 6$ V, $I_E = 10$ mA h_{21E} >50 $-U_{CB} = 0$ V, $I_E = 80$ mA h_{21E} >35 $-U_{CB} = 0$ V, $I_E = 125$ mA h_{21E} >25 $-U_{CB} = 0$ V, $I_E = 250$ mA $\lvert h_{21E}\rvert$ >1 $-U_{CB} = 0$ V, $I_E = 10$ mA, $f = 0{,}3$ MHz f_T >300 kHz $-U_{CB} = 0$ V, $I_E = 10$ mA $r_{bb'}$ 60 Ω $-U_{CE} = 6$ V, $I_E = 1$ mA	$-U_{CB}$ 32 V $-U_{CBM}$ 32 V $-U_{CE}$ ($R_{BE} <800\ \Omega$) 32 V $-U_{CE}$ ($R_{BE} >30$ kΩ) 10 V $-U_{EB}$ 10 V $-U_{EBM}$ 10 V $-I_C$ 125 mA $-I_{CM}$ 250 mA I_E 130 mA I_{EM} 250 mA $-I_B$ 20 mA $-I_{BM}$ 125 mA P_C 125 mW P_C 1) 165 mW K 0,4 °C/mW K 1) 0,3 °C/mW T_j +75 °C T_a −60 . . . +75 °C 1) With cooling surface 12,5 cm^2

Type	Characteristic Data	Operational Data	Maximum Ratings
2-GC507 **2-GC508**   p-n-p junction transistors for A. F. push-pull medium power amplifier, class B	Outline K 504	Technical data are identical with transistors GC 507 and GC 508. The transistors are matched in pairs according to the amplification factors which must not differ by more than 15 % under the following conditions: $-U_{CB}$ 6 V | $-U_{CB}$ 0 V I_E 10 mA | I_E 80 mA	

Type	Characteristic Data	Operational Data		Maximum Ratings
GC509	$-I_{CBO}$ 4,5 <10 µA		measured at	$-U_{CB}$ 60 V
	$-U_{CB}$ 6 V	$-U_{CES}$ 0,15 $<0{,}22$ V	$-I_C = 125$ mA, $-I_B = 10$ mA	$-U_{CBM}$ 60 V
	$-I_{EBO}$ 3,5 <10 µA	$-U_{BE_2}$ $<0{,}45$ V	$-U_{CB} = 0$ V, $I_E = 80$ mA	$-U_{CE}$ ($R_{BE} < 600\ \Omega$) 60 V
	$-U_{EB}$ 6 V	$-U_{BE_3}$ $<0{,}7$ V	$-U_{CB} = 0$ V, $I_E = 125$ mA	
	$-I_{CEO}$ 350 µA	h_{21E} 125 >45	$-U_{CB} = 6$ V, $I_E = 10$ mA	$-U_{CE}$ ($R_{BE} > 40$ kΩ) 16 V
	$-U_{CE}$ 6 V	h_{21E} >30	$-U_{CB} = 0$ V, $I_E = 80$ mA	$-U_{EB}$ 10 V
	$-I_{CER}$ <50 µA	h_{21E} >25	$-U_{CB} = 0$ V, $I_E = 125$ mA	$-U_{EBM}$ 10 V
	$-U_{CE}$ 6 V	h_{21E} >15	$-U_{CB} = 0$ V, $I_E = 250$ mA	$-I_C$ 125 mA
	R_{BB} 500 Ω	$\|h_{21e}\|$ >1	$-U_{CB} = 0$ V, $I_E = 10$ mA, $f = 0{,}3$ MHz	$-I_{CM}$ 250 mA
				I_E 130 mA
		f_T >300 kHz	$-U_{CB} = 0$ V, $I_E = 10$ mA,	I_{EM} 250 mA
		$r_{bb'}$ 70 Ω	$-U_{CE} = 6$ V, $I_E = 1$ mA	$-I_B$ 20 mA
				$-I_{BM}$ 125 mA
				P_C 125 mW
				P_C 1) 165 mW
				K 0,4 °C/mW
				K 1) 0,3 °C/mW
				T_j +75 °C
				T_a −60 . . . +75 °C
p-n-p junction transistor for A. F. amplifiers medium power	Outline K 504			

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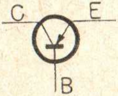
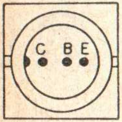
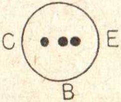
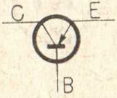
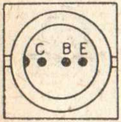
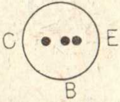
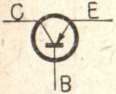
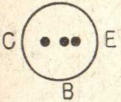
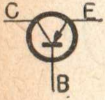
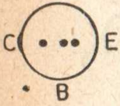
1) With cooling surface 12,5 cm²

Type	Characteristic Data	Operational Data	Maximum ratings
GC510 **GC510K**	$-I_{CBO}$ <10 µA	measured at	$-U_{CB}$ 32 V
	$-U_{CB}$ 10 V	$-U_{CBO}$ >32 V $-I_{CBO} = 0{,}2$ mA	$-U_{CBM}$ 32 V
	$-I_{CEO}$ 450 µA	$-U_{CEO}$ >16 V $-I_C = 1$ A, $R_{BE}=\infty$	$-U_{CE}$ 16 V
	$-U_{CE}$ 6 V	$-U_{CEV}$ >32 V $-I_C = 0{,}2$ mA, $U_{BE}=1$ V	$-U_{EB}$ 10 V
		$-U_{EBO}$ >10 V $I_{EB} = 0{,}2$ mA	$-U_{EBM}$ 10 V
 	 	$-U_{BE_1}$ 0,3 V $U_{CB} = 0$ V, $I_E = 50$ mA	$-I_C$ 1 A
		$-U_{BE_2}$ $<0{,}45$ V $U_{CB} = 0$ V, $I_E = 300$ mA	$-I_{CM}$ 2 A
		$-U_{BE_3}$ 0,7 V $U_{CB} = 0$ V, $I_E = 1000$ mA	$-I_{CM\,imp}$ [1] 2 A
		I_{B1} 0,5 mA $U_{CB} = 0$ V, $I_E = 50$ mA	I_E 1 A
		I_{B2} 1,7...5 mA $U_{CB} = 0$ V, $I_E = 300$ mA	I_{EM} [1] 2 A
		I_{B3} 16,5 mA $U_{CB} = 0$ V, $I_E = 1000$ mA	$-I_B$ 100 mA
 	 	h_{21E} 60...175 $-U_{CB} = 0$ V, $I_E = 300$ mA	$-I_{BM}$ [1] 500 mA
		$\|h_{21e}\|$ >2 $-U_{CB} = 2$ V, $I_E = 10$ mA, f = 500 kHz	P_C ($T_a \leqq 45$ °C) 1 W
			T_j 90 °C
		U_{CES} $<0{,}6$ V $-I_C = 1$ A, $-I_B = 50$ mA	T_a −55 . . . +85 °C
		f_β $>0{,}01$ MHz $-U_{CB} = 2$ V, $I_E = 10$ mA	R_{t_1} <45 °C/W
		C_{22b} 85 pF $-U_{CB} = 6$ V, $I_E = 0$, f = 500 kHz	R_t 200 °C/mW
		$r_{bb'}$ 80 Ω $-U_{CB} = 6$ V, $I_E = 1$ mA, f = 500 kHz	[1] $t_{ip} < 20$ ms
p-n-p junction transistor for A. F. amplifiers medium power	Outlines: GC 510 K 504 GC 510K p. 418		

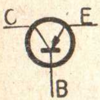
Type	Characteristic Data			Operational Data				Maximum Ratings		
GC511, GC511K	$-I_{CBO}$	<15	µA		**GC511**	**GC512**	measured at	$-U_{CB}$	25	V
GC512, GC512K	$-U_{CB}$	10	V	$-U_{CBO}$	>25	>25 V	$-I_{CBO}=0,2$ mA	$-U_{CBM}$	25	V
	$-I_{CEO}$	450	µA	$-U_{CEO}$	>15	>15 V	$-I_C=1$A, $R_{BE}=\infty$	$-U_{CE}$	15	V
	$-U_{CE}$	6	V	$-U_{CEV}$	>25	>25 V	$I_C=0,2$ mA, $U_{BE}=1$ V	$-U_{EB}$	10	V
				$-U_{EBO}$	>10	>10 V	$I_{EB}=0,2$ mA	$-U_{EBM}$	10	V
				$-U_{BE_1}$	0,3	0,3 V	$U_{CB}=0$ V, $I_E=$ 50 mA	$-I_C$	1	A
				$-U_{BE_2}$	<0,45	<0,85 V	$U_{CB}=0$ V, $I_E=$ 300 mA	$-I_{CM}$	2	A
				$-U_{BE_3}$	0,7	– V	$U_{CB}=0$ V, $I_E=1000$ mA	$-I_{CM\ imp}$ 1)	2	A
				I_{B_1}	0,3	1,1 mA	$U_{CB}=0$ V, $I_E=$ 50 mA	I_E	1	A
				I_{B_2}	0,6...3	<12 mA	$U_{CB}=0$ V, $I_E=$ 300 mA	I_{EM} 1)	2	A
				I_{B_3}	8,5	– mA	$U_{CB}=0$ V, $I_E=1000$ mA	$-I_B$	100	mA
				I_{B_3}	–	23 mA	$U_{CB}=0$ V, $I_E=$ 600 mA	$-I_{BM}$ 1)	500	mA
				$\|h_{21e}\|$	>2	>1,4	$-U_{CB}=2$ V, $I_E=$ 10 mA	P_C ($T_a \leqq 45$ °C)	1	W
							f = 500 kHz	T_j	90	°C
				f_β	>0,01	>0,01 MHz	$-U_{CB}=2$ V, $I_E=10$ mA	T_a	−55 . . . +85	°C
				C_{22b}	85	85 pF	$-U_{CB}=6$ V, $I_E=$ 0 mA,	R_{t1}	<45	°C/W
							f=500 kHz	R_t	200	°C/mW
				$r_{bb'}$	80	80 Ω	$-U_{CB}=6$ V, $I_E=$ 1 mA,			
							f=500 kHz	1) $t_{ip} < 20$ ms		
	Outlines:			U_{CES}	<0,6	– V	$-I_C=1$ A, $-I_B=12,5$ mA			
	GC 511, GC 512			U_{CES}	–	<0,45 V	$-I_C=0,6$ A, $-I_B=40$ mA			
p-n-p junction	K 504			h_{21E}	100...500	>25	$U_{CB}=0$ V, $I_E=300$ mA			
transistor for	GC 511K, GC512K									
A. F. amplifiers	p. 418									
medium power										

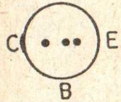
Type	Operational Data					Maximum Ratings		
GC515 **GC516**		**GC515**	**GC516**		measured at	$-U_{CB}$	32	V
	h_{21e}	20–40	30–60		$-U_{CE}$=6 V, I_E= 1 mA	$-U_{CBM}$	32	V
	h_{11e}	1,2	1,2	kΩ		$-U_{CE}$ 1)	32	V
	h_{12e}	10	10.10_{-3}			$-U_{CEM}$ 1)	32	V
	h_{22e}	40	40	µS		$-U_{EB}$	10	V
	$-U_{BE}$	0,08-0,17	0,08-0,17	V	$-U_{CB}$=6 V, I_E= 1 mA	$-U_{EBM}$	10	V
	$-I_{B1}$	0,25	0,2	mA	$-U_{CB}$=6 V, I_E=10 mA	$-I_C$	125	mA
	$-I_{B2}$	3	2,2	mA	$-U_{CB}$=0 V, I_E=80 mA	$-I_{CM}$	250	mA
	$-U_{CES}$	≦0,32	≦0,32	V	$-I_C$=125 mA, $-I_B$=10 mA	I_E	130	mA
	$-I_C$	10	10	µA	$-U_{CE}$=30 V, $+U_{BE}$=0,5 V	I_{EM}	250	mA
	$\|h_{21e}\|$	>1	>1		$-U_{CB}$=6 V, I_E=10 mA,	$-I_B$	20	mA
					f=0,3 MHz	$-I_{BM}$	125	mA
	F	8<12	8<12	dB	$-U_{CE}$=2 V, $-I_C$=0,5 mA,	P_C	125	mW
					R_g=500 Ω	P_C 2)	165	mW
	f_α	0,3	0,3	MHz	$-U_{CE}$= 6V, $-I_C$=1 mA	T_j	75	°C
	f_β	0,012	0,012	MHz	$-U_{CE}$=6 V, $-I_C$=1 mA	T_a	−65 . . . +70	°C
	$-I_{CBO}$	<10	<10	µA	$-U_{CB}$ = 6 V	R_{t1}	0,4	°C/mW
	$-I_{CER}$	<50	<50	µA	$-U_{CE}$ = 6 V, R_{BE} = 500 Ω	R_{t1} 2)	0,3	°C/mW
	$-I_{CEO}$	200	200	µA	$-U_{CE}$ = 6 V	U_{is}	80	V
	I_{is}	<3	<3	µA	U_{is} = 6 V			
p-n-p junction transistor for A. F. amplifiers medium power	Outline K 504					1) R_{BE} = 500 Ω 1) With cooling surface 12,5 cm^2		

Type	Characteristic Data	Operational Data	Maximum Ratings
GC517   p-n-p junction transistor for A. F. amplifiers	$-I_{CBO}$ <10 µA $-U_{CB}$ 6 V $-I_{CER}$ <50 µA $-U_{CE}$ 6 V R_{BE} 500 Ω $-I_{CEO}$ 200 µA $-U_{CE}$ 6 V I_{is} <3 µA U_{is} 6 V Outline K 504	measured at h_{21e} 50 – 100 } $-U_{CE}=6$ V, $I_E=1$ mA h_{11e} 2 kΩ } $-U_{CE}=6$ V, $I_E=1$ mA h_{12e} 20 .10^{-3} } $-U_{CE}=6$ V, $I_E=1$ mA h_{22e} 60 } $-U_{CE}=6$ V, $I_E=1$ mA $-U_{BE}$ 0,08 – 0,17 V $-U_{CB}=6$ V, $I_E=1$ mA $-I_{B1}$ 0,12 mA $-U_{CB}=6$ V, $I_E=10$ mA $-I_{B2}$ 1,6 mA $-U_{CB}=0$ V, $I_E=80$ mA $-U_{CES}$ <0,22 V $-I_C=125$ mA, $-I_B=10$ mA $-I_C$ 10 µA $-U_{CE}=30$ V, $+U_{BE}=0,5$ V $\|h_{21e}\|$ >1 $-U_{CB}=6$ V, $I_E=10$ mA, f=0,3 MHz F 8 <12 dB $-U_{CE}=2$ V, $-I_C=0,5$ mA, $R_g=500$ Ω f_α 0,4 MHz $-U_{CE}=6$V, $-I_C=1$ mA f_β 0,012 MHz $-U_{CE}=6$ V, $-I_C=1$ mA	$-U_{CB}$ 32 V $-U_{CBM}$ 32 V $-U_{CE}$ 1) 32 V $-U_{CEM}$ 1) 32 V $-U_{EB}$ 10 V $-U_{EBM}$ 10 V $-I_C$ 125 mA $-I_{CM}$ 250 mA I_E 130 mA I_{EM} 250 mA $-I_B$ 20 mA $-I_{BM}$ 125 mA P_C 125 mW P_C 2) 165 mW T_j 75 °C T_a −65 . . . +70 °C R_{t1} 0,4 °C/mW R_{t1} 2) 0,3 °C/mW U_{is} 80 V 1) R_{BE} = 500 Ω 1) With cooling surface 12,5 cm²

Type

GC518
GC519





p-n-p junction transistor for A. F. amplifiers

Operational Data

	GC518	GC519		
h_{21e}	75–150	125–250		$-U_{CE}=6$ V, $I_E=1$ mA
h_{11e}	3,5	6	kΩ	
h_{12e}	25	35	.10-3	
h_{22e}	80	100	µS	
$-U_{BE}$	0,08-0,17	0,08-0,17	V	$-U_{CB}=6$ V, $I_E=1$ mA
$-I_{B1}$	0,08	0,06	mA	$-U_{CB}=6$ V, $I_E=10$ mA
$-I_{B2}$	1	0,7	mA	$U_{CB}=0$ V, $I_E=80$ mA
$-U_{CES}$	<0,22	<0,22	V	$-I_C=125$ mA, $-I_B=10$ mA
$-I_C$	10	10	µA	$-U_{CE}=30$ V, $+U_{BE}=0{,}5$ V
$\|h_{21e}\|$	>1	>1		$U_{CB}=6$ V, $I_E=10$ mA, $f=0{,}3$ MHz
F	8<12	8<12	dB	$-U_{CE}=2$ V, $-I_C=0{,}5$ mA, $R_g=500$ Ω
f_α	0,7	0,7	MHz	$-U_{CE}=6$ V, $-I_C=1$ mA
f_β	0,01	0,01	MHz	$-U_{CE}=6$ V, $-I_C=1$ mA
$-I_{CBO}$	<10	<10	µA	$-U_{CB}=6$ V
$-I_{CER}$	<50	<50	µA	$-U_{CE}=6$ V, $R_{BE}=500$ Ω
$-I_{CEO}$	200	200	µA	$-U_{CE}=6$ V
I_{is}	<3	<3	µA	$U_{is}=6$ V

Outline K 504

Maximum Ratings

$-U_{CB}$	32	V
$-U_{CBM}$	32	V
$-U_{CE}$ 1)	32	V
$-U_{CEM}$ 1)	32	V
$-U_{EB}$	10	V
$-U_{EBM}$	10	V
$-I_C$	125	mA
$-I_{CM}$	250	mA
I_E	130	mA
I_{EM}	250	mA
$-I_B$	20	mA
$-I_{BM}$	125	mA
P_C	125	mW
P_C 2)	165	mW
T_j	75	°C
T_a	−65 . . . +70	°C
R_{t1}	0,4	°C/mW
R_{t1} 2)	0,3	°C/mW
U_{is}	80	V

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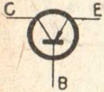
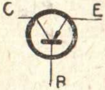
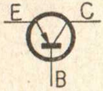
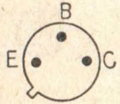
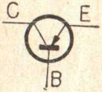
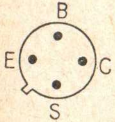
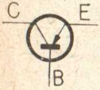
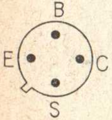
1) $R_{BE}=500$ Ω
1) With cooling surface 12,5 cm²

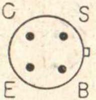
Type	Characteristic Data	Operational Data	Maximum Ratings
OC169   p-n-p junction transistor for I. F. amplifier 10,7 Mc/s in broadcast receivers	grounded base $-I_{CBO}$ 1,5 <13 µA $-U_{CB}$ 6 V $-I_{CBO}$ <50 µA $-U_{CB}$ 20 V $-I_{EBO}$ <50 µA $-U_{EB}$ 0,5 V ● Working point $-U_{CE}$ 6 V I_B 1 mA Outline K 506	grounded emitter measured at $-U_{BE}$ 260 (210–330) mV $-U_{CE}$ 6 V I_E 1 mA $-I_B$ 15 (<50) µA $-U_{CE}$ 6 V I_E 1 mA β 20–300 $-U_{CE}$ 6 V I_E 1 mA f 1 kc/s F 3 (<8) dB $-U_{CE}$ 6 V I_E 1 mA R_g 200 Ω f 450 kc/s F 4 (<8) dB $-U_{CE}$ 6 V I_E 1 mA R_g 150 Ω f 10,7 Mc/s grounded base measured at f_T 50 Mc/s $-U_{CB}$ 6 V I_E 1 mA $\|y_{21e}\|$ 25 >21 mS $-U_{CB}$ 6 V I_E 1 mA f 10,7 Mc/s $\|h_{21e}\|$ >1 $-U_{CB}$ 6 V I_E 1 mA f 30 Mc/s	$-U_{CB}$ 20 V $-U_{CBM}$ 20 V $-U_{CE}$ 20 V $-U_{EB}$ 4 V $-u_{EBM}$ 4 V $-I_C$ 10 mA I_E 10 mA I_B ±1 mA P_C (T_a – 45 °C) 50 mW T_j 75 °C K (T_a – 0–55 °C) 0,6 °C/mW T_s –55 + +75 °C

Type	Characteristic Data	Operational Data			Maximum Ratings
OC170   p-n-p junction transistor for I. F. amplifier 10,7 Mc/s, mixer - oscillator stages in SW broadcast set	grounded base $-I_{CBO}$ 1,5 <13 μA $-U_{CB}$ 6 V $-I_{CBO}$ <50 μA $-U_{CB}$ 20 V $-I_{EBO}$ <50 μA $-U_{EB}$ 0,5 V Working point $-U_{CE}$ 6 V I_E 1 mA Outline K 506	grounded base		measured at	$-U_{CB}$ 20 V $-U_{CBM}$ 20 V $-U_{CE}$ 20 V $-U_{EB}$ 4 V $-u_{EBM}$ 4 V $-I_C$ 10 mA I_E 10 mA I_B ±1 mA P_C (T_a – 45 °C) 50 mW T_j 75 °C K (T_a = 0–55 °C) 0,6 °C/mW T_s –55 ÷ +75 °C
		$-U_{BE}$	260 (210–330) mV	$-U_{CE}$ 6 V I_E 1 mA	
		$-I_B$	15 (<50) μA	$-U_{CE}$ 6 V I_E 1 mA	
		β	100 (20–300)	$-U_{CE}$ 6 V I_E 1 mA f 1 kc/s	
		$\|h_{21e}\|$	>1	$-U_{CB}$ 6 V I_E 1 mA f 30 Mc/s	
		$\|y_{21e}\|$	29 >27 mS	$-U_{CB}$ 6 V I_E 1 mA f 10,7 Mc/s	
		F	3 (<8) dB	$-U_{CE}$ 6 V I_E 1 mA R_g 200 Ω f 450 kc/s	
		F	4 (<8) dB	$-U_{CE}$ 6 V I_E 1 mA R_g 150 Ω f 10,7 Mc/s	
		grounded base f_T	50 Mc/s	$-U_{CB}$ 6 V I_E 1 mA	

Type	Operational Data								Maximum Ratings		
		GF501	GF502	GF503	GF504		measured at		**GF501, GF502**		
GF501 **GF502** **GF503** **GF504**	h_{21E}	>10	>10	>10	>10		$-U_{CB}$	= 9 V	$-U_{CB}$	24	V
							I_E	= 10 mA	$-U_{CE}$	12	V
	$\|h_{21e}\|$	>3	>3	>3	>3		$-U_{CB}$	= 9 V	**GF503**		
							I_E	= 10 mA	$-U_{CB}$	24	V
							f	= 100 Mc/s	$-U_{CE}$	9	V
	$r_{b'b} C_{b'c}$	<56	<70	<50	<70	ps	$-U_{CB}$	= 9 V	**GF504**		
							I_E	= 2 mA	$-U_{CB}$	28	V
							f	= 30 Mc/s	$-U_{CE}$	12	V
	$R_e(h_{11e})$	50	75	50	75	Ω	$-U_{CB}$	= 9 V	$-U_{EB}$	0,5	V
							I_E	= 2 mA	$-I_C$	100	mA
							f	= 100 Mc/s	I_E	100	mA
	$-U_{CBO}$	>24	>24	>24	>28	V	$-I_{CBO}$	= 100 µA	$-I_B$	50	mA
									P_C	300	mW
	$-U_{CEO}$	>16	>16	–	>16		$-I_{CEO}$	= 2 mA	P_C 1)	750	mW
									T_j	100	°C
	$-U_{EBO}$	$>0,5$	$>0,5$	$>0,5$	$>0,5$	V	$-I_{EBO}$	= 100 µA	R_t	0,25	°C/mW
Germanium R. F. mesa p-n-p transistors for R. F., UHF and VHF amplifiers, mixers, oscillators Outlines K 505	G_o	20	18	20	18	dB	$-U_{CB}$	= 9 V	R_{t1}	0,1	°C/mW
							I_E	= 2 mA	T_a	−40 ÷ +85	°C
							f	= 100 MHz			
	C_{22b}	2,1		$<3,5$		pF	$-U_{CB}$	= 9 V			
							I_E	= 2 mA			
							f	= 5 Mc/s			
	$-I_{CBO}$			<18		µA	$-U_{CB}$	= 15 V			

Type	Characteristic Data	Operational Data			Maximum Ratings
GF505 **GF506**	$-I_{CBO}$ <10 µA $-U_{CB}$ 12 V			measured at	$-U_{CB}$ 24 V $-U_{CEO}$ 18 V $-U_{EB}$ 0,3 V $-I_C$ 10 mA I_E 10 mA $-I_B$ 5 mA P_C ($T_a \leqq 45$ °C) 60 mW T_j +90 °C R_{t1} 0,75 °C/mW T_a −30 . . . +75 °C
		$-U_{BE}$	<0,42 V	$-U_{CB}$=12 V, I_E=1 mA	
		h_{21e} GF505 GF506	50>25 20>10	$-U_{CB}$=12 V, I_E=1 mA, f = 1 kHz	
		$\|h_{21e}\|$	>1,7	$-U_{CB}$=12 V, I_E=1 mA, f = 100 MHz	
		$r_{b'b} \cdot C_{b'c}$	<15 ps	$-U_{CB}$=12 V, I_E=1 mA, f = 2 MHz	
		R_e (h_{11e})	45 Ω	$-U_{CB}$=12 V, I_E=1 mA, f = 200 MHz	
		$-U_{CBO}$	>24 V	$-I_{CBO}$ = 100 µA	
		$-U_{CEO}$	>18 V	$-I_{CEO}$ = 500 µA	
		$-U_{EBO}$	>0,3 V	$-I_{EBO}$ = 100 µA	
		C_{22b}	<0,8 pF	$-U_{CB}$=12 V, I_E=1 mA, f = 2 MHz	
		F	<7,5 dB	$-U_{CB}$=12 V, I_E=1 mA, f=200 MHz, Rg=75 Ω	
		$\|h_{21e}\|$ FG505 GF506	1,3 1,1	$-U_{CB}$=12 V, I_E=1 mA, f = 200 MHz	
Germanium R. F. Mesa p-n-p transistor for VHF amplifiers, mixers and oscillators	Outlines K 507				

Type	Characteristic Data	Operational Data		Maximum Ratings
GF507	$-I_{CBO}$ <8 μA		measured at	$-U_{CB}$ 20 V
	$-U_{CB}$ 20 V	$-U_{CEO}$ >15 V	$-I_{CE}=500$ μA	$-U_{CEO}$ 15 V
		$-U_{EBO}$ >0,3 V	$-I_{EB}=100$ μA	$-U_{EB}$ 0,3 V
		$-U_{BE}$ 0,32 . . . 0,43 V $-I_B$ <135 μA h_{21E} >11	$-U_{CB}=12$ V, $I_E=1,5$ mA	$-I_C$ 10 mA I_E 10 mA $-I_B$ 1 mA
		$\lvert h_{21e}\rvert$ 5 >2,5	$-U_{CB}=12$ V, $I_E=1,5$ mA, f=100 MHz	P_C ($T_a \leq +45$ °C) 60 mW
		$r_{bb'} \cdot C_{b'c}$ 3,5 <5 ps C_{22b} <0,4 pF	$-U_{CB}=12$ V, $I_E=1,5$ mA, f=2 MHz	T_j +90 °C T_a −30...+75 °C R_{t1} 750 °C/W
		F <9 dB	$-U_{CB}=12$ V, $I_E=1,5$ mA, f=800 MHz, $R_g=75\ \Omega$	U_{is} 50 V
		A_{pb} >11 a) dB 9–11 b) dB	$-U_{CB}=12$ V, $I_E=1,5$ mA, f=800 MHz	
		h_{21e} 50	$-U_{CB}=12$ V, $I_E=1,5$ mA, f=1 kHz	
		R_{is} >1 MΩ	U_{is} = 20 V	
Germanium p-n-p Mesa transistor for pre-stages, mixer and oscillatoı up to 800 MHz	Outlines K 507	a) for pre-stages; b) for mixers and oscillators Type A – white coloured B – green coloured		

Type	Operational Data					Maximum Ratings		
		GF514	GF515	GF516	measured at			
GF514 **GF515** **GF516**	$-U_{CBO}$	>32	>32	>32 V	$-I_C = 0{,}05$ mA	$-U_{CB}$ ¹)	32	V
	$-U_{EBO}$	$>0{,}5$	$>0{,}5$	$>0{,}5$ V	$-I_{EBO} = 100$ µA	$-U_{CE}$	32	V
	$\lvert h_{12e} \rvert$	$>2{,}5$	$>1{,}5$	$>1{,}5$	$-U_{CB} = 6$ V, $I_E = 1$ mA, $f = 30$ MHz	$-I_C$ I_E $\pm I_B$	10 11 1	mA mA mA
	$r_{bb'} \cdot c_{b'c}$	<24	<24	<60 ps	$-U_{CB} = 6$ V, $I_E = 1$ mA, $f = 2$ MHz	P_C ($T_a \leqq 30$ °C)	60	mW
	$-U_{BE}$		0,21 . . . 0,33 V		$-U_{CB} = 6$ V, $I_E = 1$ mA	T_j	+75	°C
	$-I_B$	<25	<25	<25 µA	$-U_{CB} = 6$ V, $I_E = 1$ mA	T_a	$-55 \ldots +75$	°C
	h_{21e}	140	140	140	$-U_{CB} = 6$ V, $I_E = 1$ mA, $f = 1$ kHz	R_t	750	°C/W
	$R_e (h_{11e})$	15	15	15 Ω	$-U_{CB} = 6$ V, $I_E = 1$ mA, $f = 200$ MHz	R_{t1} ²)	450	°C/W
	f_T	90	60	60 MHz	$-U_{CB} = 6$ V, $I_E = 1$ mA, $f = 30$ MHz	1) $Z_B : Z_E \leqq 15$ 2) With ideal cooling		
	F	8,5	–	– dB	$-U_{CB} = 6$ V, $I_E = 1$ mA, $R_g = 60\ \Omega$, $f = 100$ MHz			
	F	–	2	2 dB	$-U_{CB} = 6$ V, $I_E = 1$ mA, $R_g = 500\ \Omega$, $f = 1$ MHz			
p-n-p junction diffused transistors for I. F. amplifiers 10,7 MHz, mixers, oscillators on S. W. and V. H. F. bands	C_{22b}	$2<5$	$2<5$	$2<5$ pF	$-U_{CB} = 6$ V, $I_E = 1$ mA, $f = 2$ MHz			
	$-I_{CBO}$	$1{,}5<8$	$1{,}5<8$	$1{,}5<8$ µA	$-U_{CB} = 6$ V			
	Outline K 507							

Type	Operational Data				Maximum Ratings		
GF517				measured at	$-U_{CB}$ 1)	20	V
	$-U_{CBO}$		>20 V	$-I_C$ $=0{,}05$ mA	$-U_{CE}$	20	V
	$-U_{EBO}$		$>0{,}5$ V	$-I_{EBO}=100$ µA	$-I_C$	10	mA
	$\|h_{21e}\|$		>1	$-U_{CB}=6$ V, $I_E=1$ mA,	I_E	11	mA
				f = 30 MHz	$\pm I_B$	1	mA
	$r_{bb'}\cdot C_{b'c}$		<100 ps	$-U_{CB}=6$ V, $I_E=1$ mA,	P_C ($T_a \leqq 30$ °C)		
				f = 2 MHz		60	mW
	$-U_{BE}$	0,21 . . . 0,33 V		$-U_{CB}=6$ V, $I_E=1$ mA	T_j	+75	°C
	$-I_B$		<50 µA	$-U_{CB}=6$ V, $I_E=1$ mA	T_a	−55 . . . +75	°C
	h_{21e}		100	$-U_{CB}=6$ V, $I_E=1$ mA,	R_t	750	°C/W
				f = 1 kHz	R_{t1} 2)	450	°C/W
	R_e (h_{11e})		15 Ω	$-U_{CB}=6$ V, $I_E=1$ mA,			
				f = 200 MHz			
	f_T		50 MHz	$-U_{CB}=6$ V, $I_E=1$ mA,			
				f = 30 MHz			
	F		2 dB	$-U_{CB}=6$ V, $I_E=1$ mA,			
				$R_g=500$ Ω, f=1 MHz			
	C_{22b}	2	<5 pF	$-U_{CB}=6$ V, $I_E=1$ mA,			
				f = 2 MHz			
	$-I_{CBO}$	1,5	<13 µA	$-U_{CB}=6$ V			
p-n-p junction diffused transistors for I. F. amplifiers 10,7 MHz, mixer, oscillators on S. W. bands	Outline K 507						

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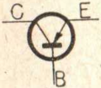
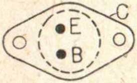
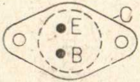
1) $Z_B : Z_E \leqq 15$

2) With ideal cooling

Type	Operational Data				Maximum Ratings		
GD617				measured at	$-U_{CB}$	32	V
	$-U_{CEO}$	>16	V	$-I_C=1$ A	$-U_{CEO}$	16	V
	$-U_{CER}$	>32	V	$-I_C=0,2$ mA, $R_{BE}=500\ \Omega$	$-U_{CER}$ ($R_{BE}=500\ \Omega$)	32	V
	$-U_{EB}$	>10	V	$I_E=0,2$ mA	$-U_{EB}$	10	V
	$-I_{B1}$	0,28 . . . 0,9	mA	$I_E=50$ mA, $-U_{CB}=0$ V	$-I_C$	1	A
	$-U_{BE1}$	<0,28	V		$-I_{CM}$	2	A
	h_{21E}	55 . . . 180			I_E	1	A
	$-I_{B2}$	2,17...12,5	mA	$I_E=500$ mA, $-U_{CB}=0$ V	I_{EM}	2	A
	$-U_{BE2}$	<0,45	V		$-I_B$	0,1	A
	h_{21E}	40 . . . 230			T_j	+90	°C
	$-I_{B3}$	6 . . . 22	mA	$I_E=1$ mA, $-U_{CB}=0$ V	P_{tot} ($T_C \leqq +60$ °C)	4	W
	$-U_{BE3}$	<0,7	V				
	h_{21E}	45 . . . 165			T_a	−55 . . . +85	°C
	$-U_{CES}$	<0,6	V	$-I_C=1$ A, $-I_B=20$ mA	R_{t1}	7,5	°C/W
	$\lvert h_{21e} \rvert$	>2		$I_E=10$ mA, $-U_{CB}=2$ V, f=0,5 MHz			
	f_β	>10	kHz	$I_E=10$ mA, $-U_{CB}=2$ V			
	$-I_{CBO}$	<10	µA	$-U_{CB}=10$ V			
p-n-p junction transistor for A. F. power amplifier Complementary to GD607	$-I_{CBO}$	<600	µA	$-U_{CB}=10$ V, $T_c=+75$ °C			
Outlines K602							

Type

GD618
GD619



p-n-p junction
transistor for A. F.
power amplifier
Complementary to
GD608, GD609

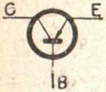
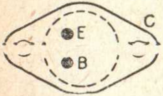
Outlines K602

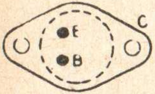
Operational Data

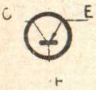
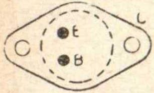
	GD618	GD619	measured at
$-U_{CEO}$	>15	>15 V	$-I_C=1$ A
$-U_{CER}$	>25	>25 V	$-I_C=0{,}2$ mA, $R_{BE}=500\ \Omega$
$-U_{EB}$	>10	>10 V	$-I_E=0{,}2$ mA
$-I_{B1}$	0,3	$<1{,}7$ mA	$I_E=50$ mA, $-U_{CB}=0$ V
$-U_{EB1}$	$<0{,}28$	$<0{,}28$ V	
h_{21E}	165	>30	
$-I_{B2}$	1,4...5	1,4...12,5 mA	$I_E=500$ mA, $-U_{CB}=0$ V
$-U_{BE2}$	$<0{,}45$	$<0{,}45$ V	
h_{21E}	100...360	40...360	
$-I_{B3}$	$<12{,}5$	<63 mA	$I_E=1$ A, $-U_{CB}=0$ V
$-U_{BE3}$	$<0{,}7$	$<0{,}7$ V	
h_{21E}	>80	>12	
U_{CES}	$<0{,}6$	– V	$-I_C=1$ A, $-I_B=12$ mA
U_{CES}	–	$<0{,}6$ V	$-I_C=1$ A, $-I_B=60$ mA
$\lvert h_{21e}\rvert$	>2	$>1{,}2$	$I_E=10$ mA, $-U_{CB}=2$ V, $f=0{,}5$ MHz
f_β	>10	>10 kHz	$I_E=10$ mA, $-U_{CB}=2$ V
I_{CBO}	<15	<15 µA	$-U_{CB}=10$ V
I_{CBO}	<600	<600 µA	$-U_{CB}=10$ V, $T_c=+75$ °C

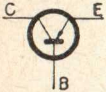
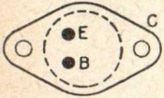
Maximum Ratings

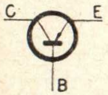
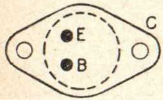
	GD618	GD619	
$-U_{CB}$	25		V
$-U_{CEO}$	18	16	V
$-U_{CER}$ ($R_{BE}=500\ \Omega$)	25		V
$-U_{EB}$	10		V
$-I_C$	1		A
$-I_{CM}$	2		A
I_E	1		A
I_{EM}	2		A
$-I_B$	0,1		A
T_j	+90		°C
P_{tot} ($T_C \leqq +60$ °C)	4		W
T_a	–55...+85		°C
R_{t1}	7,5		°C/W

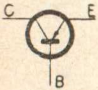
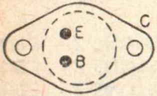
Type	Characteristic Data		Operational Data					Maximum Ratings	
OC27 **OC26**	grounded base		grounder emitter			measured at		$-U_{CB}$	32 V
	$-I_{CBO}$	<100 µA		**OC26**	**OC27**			$-U_{CE}$ 1)	16 V
	$-U_{CB}$	6 V	$-U_{CEM}$	> 32	> 32 V	$-I_C$	3 mA	$-U_{CE}$ 2)	32 V
	$-I_{CBO}$	<10 mA				R_{BE}	30 Ω	$-U_{EB}$	10 V
	$-U_{CB}$	6 V	$-U_{CES}$	< 0,4	< 0,4 V	$-I_C$	3 A	$-I_C$	3,5 A
	T_p	100 °C				$-I_B$	0,5 A	P_C	12,5 W
			$-U_{BE_1}$	< 0,28	< 0,28 V	$-U_{CE}$	6 V	K	1,2 °C/W
						I_E	0,1 A	T_j	90 °C
 			$-U_{BE_2}$	< 0,75	< 0,7 V	$-U_{CE}$	0 V	T_a	> −55 °C
						I_E	1 A	T_s	−55 ÷ +75 °C
			$-U_{BE_3}$	< 1,2	< 1 V	$-U_{CE}$	0 V		
						I_E	3 A		
			β_1	20–75	60–180	$-U_{CE}$	6 V		
						I_E	0,1 A		
 			β_2	20–60	40–160	$-U_{CE}$	0 V	All data valid at case temperature +25 °C	
						I_E	1 A		
			β_3	15–50	30–125	$-U_{CE}$	0 V		
						I_E	3 A		
			grounded base						
			f_T	> 0,15	> 0,15 Mc/s	$-U_{CB}$	6 V		
						I_E	1 A		
p-n-p junction A. F. transistors A. F. power amplifier class A, B, for switching technique	Outline K 601							1) R_{BE} >700 Ω 2) R_{BE} <30 Ω	

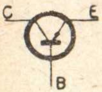
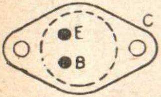
Type	Characteristic Data	Operational Data	Maximum ratings
2-OC26 **2-OC27**   p-n-p junction matched pair transistors for A. F. amplifiers Class B	Outline K 601	**Technical data are identical with transistors OC26 or OC27.** The transistors are matched in pairs according to the amplification factors β_2 and β_3 which must not differ by more than 15 % under the following conditions: $-U_{CB}$ 0 V | $-U_{CB}$ 0 V I_E 1 A | I_E 3 A	

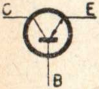
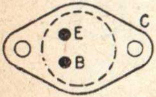
Type	Characteristic Data	Operational Data	Maximum Ratings
OC30 **2-OC30**   p-n-p junction transistor for A. F. power amplifier, class A or B, for switching technique, matched pair transistors for push-pull amplifier, class B	grounded base $-I_{CBO}$ 12 <35 μA $-U_{CB}$ 6 V Outline K 602	grounded base measured at f_T >0,15 Mc/s $-U_{CB}$ 6 V grounded emitter I_E 0,1 A $-U_{CEM}$ >32 V $-I_C$ 3 mA R_{BE} 500 Ω $-U_{CES}$ <0,3 V $-I_B$ 0,3 A $-I_C$ 1,5 A $-U_{BE}$ V · β · $-U_{CE}$ V · I_E A 0,14 (0,11-0,18) · 32 (17-110) · 14 · 0,01 0,22 (0,17-0,3) · 36 (18-110) ¹) · 6 · 0,1 0,38 (<0,5) · (16–90) · 0 · 0,8 0,47 (<0,7) · (>14) · 0 · 1,5 ¹) β_2 18– 35 designed A 35– 70 designed B 70–110 designed C **Matched pair transistors 2-OC30:** Technical data are identical with transistors OC30. The transistors are matched in pairs according to the amplification factor β which must not differ by more than 15 % in working points. $-U_{CE}$ 6 V | $-U_{CE}$ 0 V I_E 0,1 V | I_E 1,5 A All techn. data are valid at $T_p = 25$ °C.	$-U_{CB}$ 32 V $-u_{CB}$ 32 V $-U_{CE}$ (R_{BE} <500 Ω) 32 V $-u_{CEM}$ (R_{BE} <500 Ω) 32 V $-U_{CE}$ (R_{BE} >10,5 kΩ) 16 V $-u_{CEM}$ (R_{BE} >10,5 kΩ) 16 V $-U_{EB}$ 10 V $-U_{EBM}$ 10 V $-I_C$ 1,4 A $-i_{CM}$ 1,4 A $-I_B$ 0,25 A $-i_{BM}$ 0,25 A I_E 1,5 A i_{EM} 1,5 A T_j 75 °C K 7,5 °C/W T_a −60 ÷ +75 °C

Type	Characteristic Data	Operational Data	Maximum Ratings
2NU72 2-2NU72 **3NU72 2-3NU72** **4NU72 2-4NU72** **5NU72 2-5NU72**   p-n-p junction transistor for A. F. power amplifier, class A or B, for switching technique, matched pair transistors for push-pull amplifier, class B	grounded base $-I_{CBO}$ <35 µA $-U_{CB}$ 6 V Outline K 602	**2NU72 3NU72 4NU72 5NU72** $-U_{CE}$ >24 >32 >48 >60 V $-I_C$ 3 3 3 3 mA R_{BE} 500 500 500 500 Ω measured at $-U_{CES}$ <0,3 V $-I_C$ 1,5 A $-I_B$ 0,3 A $-U_{BE}$ <0,9 V $-U_{CE}$ 0 V I_E 1,5 A β >10 $-U_{CE}$ 0 V I_E 1,5 A grounded base f_T >0,1 Mc/s $-U_{CB}$ 6 V I_E 0,1 A **Matched pair transistors 2-2NU72 to 2-5NU72:** Technical data are identical with transistors 2NU72 to 5NU72. The transistors are matched in pairs according to the amplification factors β which must not differ by more than 15 % in working point. All techn. data are valid at T_p = 25 °C.	**2NU72 3NU72** $-U_{CB}$ 24 32 V $-U_{CE}$ [1] 24 32 V $-U_{EB}$ 8 10 V **4NU72 5NU72** $-U_{CB}$ 48 60 V $-U_{CE}$ [1] 48 60 V $-U_{EB}$ 15 20 V $-I_C$ 1,5 A $-I_B$ 0,3 A P_C 4 W K 7,5 °C/W T_j 75 °C T_a −60 °C T_s −60 ÷ +75 °C 1) R_{BE} <100 Ω

Type	Characteristic Data	Operational Data	Maximum Ratings
2NU73 2-2NU73 3NU73 2-3NU73 4NU73 2-4NU73 5NU73 2-5NU73 6NU73 2-6NU73 7NU73 2-7NU73   p-n-p junction transistor for A. F. power amplifier, class A or B, for switching technique, matched pair transistors for push-pull amplifier, class B	grounded base $-I_{CBO}$ <100 µA $-I_{CB}$ 6 V $-I_{CBO}$ <10 mA $-U_{CB}$ 6 V T_p 100 °C Outline K 601	grounded emitter 2NU73 3NU73 4NU73 $-U_{CE}$ >24 >32 >48 V $-I_C$ 3 3 3 mA R_{BE} 30 30 30 Ω 5NU73 6NU73 7NU73 $-U_{CE}$ >60 >70 >80 V $-I_C$ 3 3 3 mA R_{BE} 30 30 30 Ω measured at U_{CES} $<0,4$ V $-I_C$ 3 A $-I_B$ 0,5 A $-U_{BE}$ $<1,2$ V $-U_{CE}$ 0 V I_E 3 A β >10 $-U_{CE}$ 0 V I_E 3 A grounded base f_T $>0,15$ Mc/s $-U_{CE}$ 6 V I_E 1 mA **Matched pair transistors 2-2NU73 to 2-7NU73:** Technical data are identical with transistors 2NU73 to 7NU73. The transistors are matched in pairs according to the amplification factors β which must not differ by more than 15 % in working point. All techn. data are valid at $T_p = 25$ °C.	2NU73 3NU73 $-U_{CB}$ 24 32 V $-U_{CE}$ [1] 24 32 V $-U_{EB}$ 8 10 V 4NU73 5NU73 $-U_{CB}$ 48 60 V $-U_{CE}$ [1] 48 60 V $-U_{EB}$ 15 20 V 6NU73 7NU73 $-U_{CB}$ 70 80 V $-U_{CE}$ [1] 70 80 V $-U_{EB}$ 25 30 V $-I_C$ 3,5 A $-I_B$ 1 A P_C 12,5 W K 1,8 °C/W T_j 90 °C T_a > -55 °C T_s $-55 \div +75$ °C [1] R_{BE} $\leqq 30$ Ω

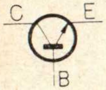
Type	Characteristic Data	Operational Data	Maximum Ratings
2NU74 **2-2NU74** **3NU74** **2-3NU74**   p-n-p junction transistor for A. F. power amplifier, class A or B, for switching technique, matched pair transistors for push-pull amplifier, class B	grounded base $-I_{CBO}$ <1 mA $-U_{CB}$ 6 V $-I_{CBO}$ <50 mA $-U_{CB}$ 6 V T_p 100 °C Outline K 603	grounded emitter measured at $-U_{CE}$ >32 V $-I_C$ 0,02 A R_{BE} 30 Ω $-U_{BE}$ <1,5 V I_E 10 A $-U_{CE}$ 0 V $-U_{CES}$ <1 V $-I_C$ 10 A $-I_B$ 1 A **2NU74** β 20–60 $-U_{CE}$ 0 V I_E 10 A **3NU74** β 50–130 $-U_{CE}$ 0 V I_E 10 A grounded base f_T >0,15 Mc/s I_E 1 A $-U_{CB}$ 6 V **Matched pair transistors 2-2NU74 and 2-3NU74:** Technical data are identical with transistors 2NU74 and 3NU74: The transistors are matched in pairs according to the amplification factors β which must not differ by more than 15 % in working point. All techn. data are valid at T_p = 25 °C.	$-U_{CB}$ 50 V $-u_{CBM}$ 50 V $-U_{CE}$ [1]) 32 V $-u_{CEM}$ [1]) 32 V $-U_{EB}$ 10 V $-u_{EBM}$ 10 V $-I_C$ 15 A $-i_{CM}$ 15 A I_E 16,5 A i_{EM} 16,5 A $-I_B$ 1,5 A $-i_{BM}$ 1,5 A P_C 50 W T_j 100 °C T_a > −60 °C K 1,2 °C/W T_s −60 ÷ +100 °C [1]) R_{BE} <30 Ω

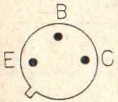
Type	Characteristic Data	Operational Data	Maximum Ratings
4NU74 2-4NU74 5NU74 2-5NU74   p-n-p junction transistor for A. F. power amplifier, class A or B, for switching technique, matched pair transistors for push-pull amplifier, class B	grounded base $-I_{CBO}$ <1 mA $-U_{CB}$ 6 V $-I_{CBO}$ <50 mA $-U_{CB}$ 6 V T_p 100 °C Outline K 603	grounded emitter measured at $-U_{CE}$ >48 V $-I_C$ 0,02 A R_{BE} 30 Ω $-U_{BE}$ $<1,5$ V I_E 10 A $-U_{CE}$ 0 V $-U_{CES}$ <1 V $-I_C$ 10 A $-I_B$ 1 A **4NU74** β 20–60 $-U_{CE}$ 0 V I_E 10 A **5NU74** β 50–130 $-U_{CE}$ 0 V I_E 10 A grounded base t_T $>0,15$ Mc/s I_E 1 A $-U_{CB}$ 6 V **Matched pair transistors 2-4NU74 and 2-5NU74:** Technical data are identical with transistors 4NU74 and 5NU74. The transistors are matched in pairs according to the amplification factors β which must not differ by more than 15 % in working point. All techn. data are valid at $T_p = 25$ °C.	$-U_{CB}$ 60 V $-u_{CBM}$ 60 V $-U_{CE}$ [1] 48 V $-u_{CEM}$ [1] 48 V $-U_{EB}$ 15 V $-u_{EBM}$ 15 V $-I_C$ 15 A $-i_{CM}$ 15 A I_E 16,5 A i_{EM} 16,5 A $-I_B$ 1,5 A $-i_{BM}$ 1,5 A P_C 50 W T_j 100 °C T_a > -60 °C K 1,2 °C/W T_s $-60 \div +100$ °C [1] R_{BE} <30 Ω

Type	Characteristic Data	Operational Data	Maximum Ratings
6NU74 **2-6NU74** **7NU74** **2-7NU74**   p-n-p junction transistor for A. F. power amplifier, class A or B, for switching technique, matched pair transistors for push-pull amplifier, class B	grounded base $-I_{CBO}$ <1 mA $-U_{CB}$ 6 V $-I_{CBO}$ <50 mA $-U_{CB}$ 6 V T_p 100 °C Outline K 603	grounded emitter measured at $-U_{CE}$ >70 V $-I_C$ 0,02 A R_{BE} 30 Ω $-U_{BE}$ <1,5 V I_E 10 A $-U_{CE}$ 0 V $-U_{CES}$ <1 V $-I_C$ 10 A $-I_B$ 1 A **6NU74** β 20–60 $-U_{CE}$ 0 V I_E 10 A **7NU74** β 50–130 $-U_{CE}$ 0 V I_E 10 A grounded base f_T >0,15 Mc/s I_E 1 A $-U_{CB}$ 6 V **Matched pair transistors 2-6NU74 and 2-7NU74:** Technical data are identical with transitors 6NU74 and 7NU74. The transistors are matched in pairs according to the amplification factors β which must not differ by more than 15 % in working point. All techn. data are valid at $T_p = 25$ °C.	$-U_{CB}$ 90 V $-u_{CBM}$ 90 V $-U_{CE}$ 1) 70 V $-u_{CEM}$ 1) 70 V $-U_{EB}$ 15 V $-u_{EBM}$ 15 V $-I_C$ 15 A $-I_{CM}$ 15 A I_E 16,5 A I_{EM} 16,5 A $-I_B$ 1,5 A $-i_{BM}$ 1,5 A P_C 50 W T_j 100 °C T_a > −60 °C K 1,2 °C/W T_s −60 ÷ +100 °C 1) R_{BE} <30 Ω

Type	Operational Data	Maximum Ratings

KC507
KC508
KC509





Silicon n-p-n epitaxial planar transistors for A. F. pre-stages

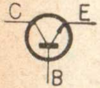
	KC507	KC508	KC509		measured at
U_{CBO}	>45	>20	>20	V	$I_{CBO}=15$ nA
U_{CEO}	>45	>20	>20	V	$I_{CEO}=2$ mA
U_{EBO}	>5	>5	>5	V	$I_{EBO}=1$ µA
I_{B_1}	$<0{,}5$	$<0{,}5$	$<0{,}25$	µA	$U_{CE}=5$ V, $I_E=10$ µA
h_{21E}	>20	>20	>40		
I_{B_2}	<16	<16	<16	µA	$U_{CE}=5$ V, $I_E=2$ mA
I_{B_3}	70	70	40	µA	$U_{CE}=5$ V, $I_C=20$ mA
h_{21E}	285	285	500		
I_{B_4}	600	600	400	µA	$U_{CE}=5$ V, $I_C=100$ mA
U_{CES}	$<0{,}25$	$<0{,}25$	$<0{,}25$	V	$I_C=10$ mA, $I_B=0{,}5$ mA
U_{CES}	$<0{,}6$	$<0{,}6$	$<0{,}6$	V	$I_C=100$ mA, $I_B=5$ mA
$\lvert h_{21e}\rvert$	$>1{,}5$	$>1{,}5$	$>1{,}5$		$U_{CE}=5$ V, $I_C=10$ mA, $f=100$ MHz
h_{21e}	125 . . 500	125 . . 500	240 . . 900		$U_{CB}=5$ V, $-I_E=2$ mA, $f=1$ kHz
C_{CB}	$<4{,}5$	$<4{,}5$	$<4{,}5$	pF	$U_{CB}=10$ V, $f=1$ MHz
F	<10	<10	–	dB	$U_{CE}=5$ V, $I_C=0{,}2$ mA, $R_G=2$ kΩ, $f=1$ kHz, $\Delta f=200$ Hz
F	–	–	<4	dB	$U_{CE}=5$ V, $I_C=0{,}2$ mA, $R_G=2$ kΩ, $f=30$ Hz . . . 15 kHz

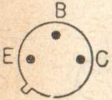
Outlines K 507

	KC507	KC508 KC509	
U_{CBO}	45	20	V
U_{CBM}	45	20	V
U_{CEO}	45	20	V
U_{EBO}	5		V
U_{EBM}	5		V
I_C	100		mA
I_{CM}	200		mA
$I_{CM\,imp}$	200		mA
$-I_E$	100		mA
$-I_{EM}$	200		mA
I_B	15		mA
i_{BM}	20		mA
P_C	300		mW
T_j	+175		°C
$T_{\imath}$	–55...+175		°C
R_{t1}	200		°C/W

Type	Operational Data	Maximum Ratings

KF503
KF504





Silicon n-p-n planar epitaxial transistors R. F, amplifier and video output stages

	KF503	**KF504**		measured at
I_{CBO}	<500	–	nA	$U_{CB} = 50$ V
I_{CBO}	–	<100	nA	$U_{CB} = 140$ V
U_{CES}	0,15	<0,7	V	$I_C = 10$ mA, $I_B = 1$ mA
U_{BE}	0,7		V	$U_{CB} = 10$ V, $-I_E = 10$ mA
I_B	<0,5	0,33	mA	$U_{CB} = 10$ V, $-I_E = 10$ mA
h_{21E}	80			$U_{CB} = 10$ V, $-I_E = 30$ mA
h_{21E}	70			$U_{CB} = 10$ V, $-I_E = 10$ mA
$\lvert h_{21e}\rvert$	>3			$U_{CB} = 10$ V, $-I_E = 10$ mA, f = 30 MHz
R_e (h_{11e})	20		Ω	$U_{CB} = 10$ V, $-I_E = 10$ mA, f = 100 MHz
$r_{bb'} \cdot C_{b'c}$	30	<150	ps	$U_{CB} = 10$ V, $-I_E = 10$ mA, f = 2 MHz
C_{22b}	<3,5		pF	$U_{CB} = 10$ V, $-I_E = 10$ mA, f = 2 MHz
U_{CER}	>100	>160	V	$I_C = 1$ mA, $R_{BE} = 1$ kΩ
U_{CEO}	> 60	>100	V	$I_C = 5$ mA, $R_{BE} = \infty$
f_T	150	150	MHz	$U_{CB} = 10$ V, $-I_E = 10$ mA,

Outlines K 505

R_{t1}	60	°C/W
T_a	−60 . . . +155	°C

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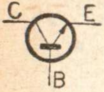
1) With ideal cooling

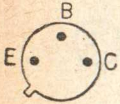
Maximum Ratings

KF503		
U_{CB}	120	V
U_{CEK} $(R_{BE} = 0$ Ω$)$	100	V
U_{CER} $(R_{BE} \leqq 1$ kΩ$)$	100	V
U_{CE} $(R_{BE} = \infty)$	60	V
KF504		
U_{CB}	170	V
U_{CEK} $(R_{BE} = 0$ Ω$)$	160	V
U_{CER} $(R_{BE} \leqq 1$ kΩ$)$	160	V
U_{CE} $(R_{BE} = \infty)$	100	V
U_{EB}	5	V
I_C	50	mA
$-I_E$	60	mA
I_B	10	mA
P_{tot}	700	mW
P_{tot} 1)	2,5	W
T_j	175	°C
R_t	220	°C/W

Type

KF506
KF507
KF508





Silicon n-p-n planar transistors for R. F. amplifiers

Operational Data

	KF506	**KF507**	**KF508**		measured at
I_{CBO}	<10	–	<10	nA	$U_{CB} = 60$ V
I_{CBO}	–	<500	–	nA	$U_{CB} = 30$ V
U_{CES}	<1,5	<1,5	<1,5	V	$I_C = 150$ mA, $I_B = 15$ mA
U_{BES}	0,95	<1,3		V	$I_C = 150$ mA, $I_B = 15$ mA
I_B	<1	–	–	μA	$U_{CB} = 10$ V, $-I_E = 5$ μA
I_B	80–290	<290	33–110	μA	$U_{CB} = 10$ V, $-I_E = 10$ mA
I_B	<3,75	<3,75	<1,5	mA	$U_{CB} = 10$ V, $-I_E = 150$ mA
h_{21E}	35–125	>35	90–300		$U_{CB} = 10$ V, $-I_E = 10$ mA
h_{21E}	85>40	100>40	150>100		$U_{CB} = 10$ V, $-I_E = 150$ mA
h_{21E}	55>20	>20	75>40		$U_{CB} = 10$ V, $-I_E = 500$ mA
$r_{bb'}$	35	35	35	Ω	$U_{CB} = 10$ V, $-I_E = 0{,}3$ mA, f = 1 kHz, $\Delta f = 200$ Hz
F	4<10	6	3,5<8	dB	$U_{CB} = 10$ V, $-I_E = 10$ mA, f = 2 MHz
C_{22b}		18<25		pF	$U_{CB} = 10$ V, $-I_E = 0$ mA, f = 2 MHz
f_T	100>60	100>50	120>70	MHz	$U_{CB} = 10$ V, $-I_E = 50$ mA, f = 30 MHz
U_{CBO}	>75	>40	>75	V	$I_C = 0{,}1$ mA
U_{EBO}	>7	>5	>7	V	$I_E = 0{,}1$ mA

Outlines K 505

Maximum Ratings

KF506
KF508

U_{CB}	75	V
U_{EB}	7	V
U_{CER} (R_{BE} <500 Ω)		
KF506	50	V
KF508	60	V

KF507

U_{CB}	40	V
U_{CER} (R_{BE} <500 Ω)	32	V
U_{EB}	5	V

I_C	500	mA
$-I_E$	500	mA
I_B	50	mA
P_{tot}	0,8	W
P_{tot} 1)	2,6	W
T_j	200	°C
R_{t1}	60	°C/W
R_t	220	°C/W
T_a	–65 . . . +200	°C

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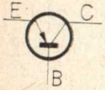
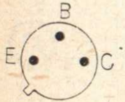
2) With ideal cooling

Type	Operational Data	Maximum Ratings

KF517





Silicon p-n-p planar epitaxial transistors for R. F. amplifiers
Complementary to KF 507

Operational Data

			measured at
$-I_{CBO}$	<500	nA	$-U_{CB} = 30$ V
$-I_{CEO}$	<1	μA	$-U_{CE} = 10$ V, $R_{BE} = \infty$
$-U_{CBO}$	>40	V	$-I_{CBO} = 100$ μA
$-U_{EBO}$	>5	V	$-U_{EBO} = 100$ μA
$-U_{CES}$	<1,5	V	$-I_C = 150$ mA, $-I_B = 15$ mA
$-I_{B2}$	<500	μA	$-U_{CB} = 10$ V, $I_E = 10$ mA
h_{21E}	>20		
$-I_{B3}$	<7	mA	$-U_{CB} = 10$ V, $I_E = 150$ mA
h_{21E}	>20		
h_{21E}	>10		$-U_{CB} = 10$ V, $I_E = 500$ mA
f_T	>40	MHz	$-U_{CB} = 10$ V, $I_E = 50$ mA, f = 30 MHz
C_{22b}	<30	pF	$-U_{CB} = 10$ V, $I_E = 0$ mA, f = 2 MHz
h_{11}	2,2	kΩ	$-U_{CE} = 5$ V, $-I_C = 1$ mA, f = 1 kHz
h_{12}	2,2 . 10^{-4}		
h_{21}	50		
h_{22}	12,5	μS	

Outlines K 505

Maximum Ratings

$-U_{CBO}$	40	V
$-U_{CEO}$ 3)	32	V
$-U_{EBO}$	5	V
$-I_C$	500	mA
I_E	500	mA
$-I_B$	50	mA
P_C 1)	0,8	W
P_C 2)	2,6	W
T_j	+200	°C
T_a	−65...+200	°C
R_{t1}	60	°C/W
R_t	220	°C/W

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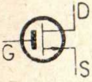
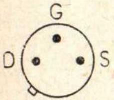
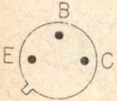
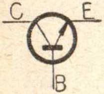
1) Without cooling
2) With ideal cooling
3) $R_{BE} \leqq 10\ \Omega$

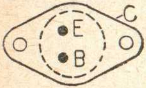
Type	Characteristic Data	Operational Data	Maximum Ratings
KF520   Silicon field effect MOS transistor for pre-stages with high input resistance	R_{Gi} >10^{14} Ω C_{Gi} 8 pF U_{DS} 10 V U_{GS} 10 V S >300 μS U_{DS} 10 V I_D 3 mA U_{GS} 0 V Outlines K 505	**Y-parameters:** I_D=5 πA, U_D=15 V f 1 10 30 50 MHz Y_{11S} R_{11} – 200 33 10 kΩ C_{11} 7 7 7 7 pF Y_{22S} R_{22} 18 15 8 5 kΩ C_{22} 7 7 7 7 pF Y_{12S} R_{12} – 200 40 20 kΩ C_{12} 1,5 1,5 1,5 1,5 pF **Noise voltage:** I_D=3 mA, U_D=10 V f_o = 10 Hz: $\sqrt{\overline{e_s^{-2}}}$ ± 2,4 μV/Hz$^{1/2}$ f_o = 1 kHz: $\sqrt{\overline{e_s^{-2}}}$ ± 2,55 μV/Hz$^{1/2}$ f_o = 10 kHz: $\sqrt{\overline{e_s^{-2}}}$ ± 0,09 μV/Hz$^{1/2}$ Recommended protection of gate-electrode against breakdown in cases when is necessary high input resistance of transistor: neon tube FN 2 (producer TESLA Holešovice).	U_{GS} ±70 V U_{DS} +30 V P_{tot} 200 mW

Type	Operational Data				Maximum Ratings		
KS500				measured at	U_{CB}	25	V
	I_{CBO}	<0,5	μA	$U_{CB} = 15$ V	U_{CE}	14	V
	I_{CBO}	<30	μA	$U_{CB} = 15$ V, $T_a = 150$ °C	U_{EB}	5	V
	U_{CBO}	>25	V	$I_{CB} = 1$ μA	I_C	200	mA
	U_{CEO}	>14	V	$I_{CE} = 10$ mA	$-I_E$	200	mA
	U_{EBO}	>5	V	$I_{EB} = 10$ μA	I_B	20	mA
	U_{CES}	<0,6	V	$I_C = 10$ mA, $I_B = 1$ mA	P_{tot}	1	W
	U_{CES}	<1	V	$I_C = 10$ mA, $I_B = 0{,}5$ mA	T_j	200	°C
	U_{CES}	<1	V	$I_C = 10$ mA, $I_B = 0{,}17$ mA	T_a	−65…+200	°C
	U_{BES}	<0,9	V	$I_C = 10$ mA, $I_B = 1$ mA	R_{ti}	150	°C/W
	t_{on}	<40	ns	$I_C = 10$ mA, $I_{B1} = 3$ mA,	R_t	500	°C/W
	t_{off}	<75	ns	$-I_{B2} = 1$ mA, $R_L = 270\ \Omega$			
	τs	<25	ns	$I_C = I_{B1} = -I_{B2} = 10$ mA, $R_L = 1$ kΩ			
	f_T	>200	MHz	$U_{CE} = 10$ V, $I_C = 10$ mA, $f = 100$ MHz			
	C_{22b}	<5	pF	$U_{CB} = 5$ V, $f = 1$ MHz			
	h_{21E}	>20		$U_{CE} = 1$ V, $I_C = 10$ mA			
Silicon n-p-n planar epitaxial transistor for switching technique	Outlines K 507						

Type	Operational Data	Maximum Ratings

KU601
KU602





Silicon mesa n-p-n transistors for switching technique with current to 2 A

				measured at
I_{CBO}		<50	µA	U_{CB} = 10 V
I_{CBO}		100	µA	U_{CB} = 60 V, T_a = 100 °C
U_{CB}	KU601	>60	V	I_C = 300 µA
	KU602	>120	V	I_C = 300 µA
U_{CER}	KU601	>60	V	I_C = 300 µA, R_{BE} = 30 Ω
	KU602	>120	V	I_C = 300 µA, R_{BE} = 30 Ω
U_{CES}		<1,4	V	I_C = 1 A, I_B = 0,2 A
I_B		<50	mA	U_{CB} = 6 V, $-I_E$ = 1 A
h_{21e}		>20		U_{CB} = 6 V, $-I_E$ = 0,2 A
U_{BE}		<1	V	U_{CB} = 6 V, $-I_E$ = 0,2 A
U_{BE}		<1,5	V	U_{CB} = 6 V, $-I_E$ = 1 A
U_{EB}		>3	V	$+I_E$ = 1 mA
$\|h_{21e}\|$		>9		U_{CB} = 12 V, $-I_E$ = 0,5 A, f = 1 MHz
$r_{bb'}$		5	Ω	U_{CB} = 12 V, $-I_E$ = 0,5 A, f = 0,3 MHz
C_{22b}		250	pF	U_{CB} = 12 V, $-I_E$ = 0,1 A, f = 0,3 MHz

Outlines p. 422

	KU601	KU602	
U_{CB}	60	120	V
U_{CBM}	60	120	V
U_{CE} 1)	60	120	V
U_{CEM}	50	80	V
U_{EB}	3		V
U_{EBM}	3		V
I_C	2		A
I_{CM}	2		A
$-I_E$	2,5		A
$-I_{EM}$	2,5		A
I_B	0,5		A
I_{BM}	0,5		A
T_j	+155		°C
P_c (T_a <105 °C) 2)	10		W
R_t	30		°C/W
R_{t1}	<5		°C/W
T_a	−55 . . . +155		°C

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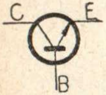
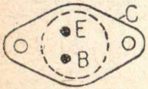
1) $I_C \leqq 500$ µA, R_{BE} = 30 Ω

2) With ideal cooling

Type	Operational Data				Maximum Ratings		
KU605	I_{CBO}	<1	mA	U_{CB} = 50 V	U_{CB}	200	V
	I_{CBO}	0,5	mA	U_{CB} = 80 V, T_a = 100 °C	U_{CBM}	200	V
	U_{CB}	>200	V	I_C = 15 mA	U_{CE} 1)	200	V
	$-I_{CER}$	<15	mA	U_{CE} = 200 V, R_{BE} = 3,9 Ω	U_{CEM} 2)	80	V
	U_{EB}	>5	V	$-I_E$ = 20 mA	U_{EB}	6	V
	I_B	<800	mA	U_{CE} = 1,7 V, I_C = 8 A	U_{EBM}	6	V
	U_{CES}	<1,7	V	I_C = 8 A, I_B = 0,8 A	I_C	10	V
	U_{BES}	<2,4	V	I_C = 7 A, I_B = 0,7 A	i_{CM}	10	A
	h_{21e}	>5		U_{CB} = 10 V, $-I_E$ = 500 mA,	$-I_E$	12	A
				f = 1 MHz	$-i_{EM}$	12	A
	$r_{bb'}$	2	Ω	U_{CB} = 10 V, $-I_E$ = 500 mA,	I_B	2	A
				f = 0,3 MHz	i_{BM}	2	A
	C_{22b}	600	pF	U_{CB} = 10 V, $-I_E$ = 0,1 mA,	P_c (T_a <80 °C) 3)		
				f = 0,3 MHz		50	W
	f_T	12	MHz	U_{CB} = 10 V, $-I_E$ = 500 mA,	T_j	+155	°C
				f = 1 MHz	R_{t1}	<1,5	°C/W
	t_r	<2	µs		R_t	30	°C/W
	t_f	<1,5	µs		T_a	−55 ... +155	°C

Silicon mesa n-p-n transistor for switching technique with current to 10 A

Outlines p. 422

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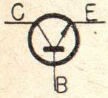
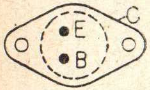
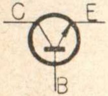
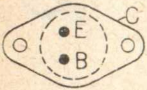
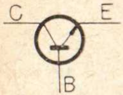
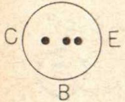
1) $I_C \leqq 5$ mA, R_{BE} = 3,9 Ω

2) $I_C \leqq 5$ mA, $R_{BE} \geqq 5$ kΩ

3) With ideal cooling

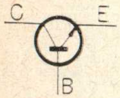
Type	Operational Data				Maximum Ratings		
KU606				measured at	U_{CB}	120	V
	I_{CBO}	<1	mA	$U_{CB} = 50$ V	U_{CBM}	120	V
	I_{CBO}	0,5	mA	$U_{CB} = 80$ V, $T_a = 100$ °C	U_{CE} 1)	120	V
	U_{CB}	>120	V	$I_C = 15$ mA	U_{CEM} 2)	60	V
	$-I_{CER}$	<15	mA	$U_{CE} = 120$ V, $R_{BE} = 3{,}9\ \Omega$	U_{EB}	6	V
	U_{EB}	>5	V	$-I_E = 20$ mA	U_{EBM}	6	V
	I_B	<1100	mA	$U_{CE} = 0$ V, $-I_E = 7$ A	I_C	8	A
	U_{CES}	<2,45	V	$I_C = 7$ A, $I_B = 0{,}7$ A	i_{CM}	8	A
	U_{BES}	<2,4	V	$I_C = 7$ A, $I_B = 0{,}7$ A	$-I_E$	10	A
	h_{21e}	>5		$U_{CB} = 10$ V, $-I_E = 500$ mA,	$-I_{EM}$	10	A
				$f = 1$ MHz	I_B	1,5	A
	$r_{bb'}$	2	Ω	$U_{CB} = 10$ V, $-I_E = 500$ mA,	i_{BM}	1,5	A
				$f = 0{,}3$ MHz	P_c (T_a <80 °C) 3)		
	C_{22b}	600	pF	$U_{CB} = 10$ V, $-I_E = 0{,}1$ mA,		50	W
				$f = 0{,}3$ MHz	T_j	+155	°C
	f_T	12	MHz	$U_{CB} = 10$ V, $-I_E = 500$ mA,	R_{t1}	<1,5	°C/W
				$f = 1$ MHz	R_t	30	°C/W
	t_r	<2	µs		T_a	−55 . . . +155	°C
	t_f	<1,5	µs				
Silicon mesa n-p-n transistor for switching technique with current to 10 A	Outlines p. 422				1) $I_C \leqq 5$ mA, $R_{BE} = 3{,}9\ \Omega$ 2) $I_C \leqq 5$ mA, $R_{BE} \geqq 5\ k\Omega$ 3) With ideal cooling		

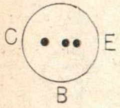
Type	Operational Data					Maximum Ratings		
					measured at			
KU607	I_{CBO}	$\leqq 1$		mA	$U_{CB}=150$ V	U_{CB}	210	V
	I_{CBO}	$\leqq 10$		mA	$U_{CB}=210$ V, $T_p=100$ °C	U_{CBM}	210	V
	I_{CES}	$\leqq 10$		mA	$U_{CE}=210$ V, $R_{BE}=0$ ($U_{BE}=0$)	U_{CES} 1)	210	V
	I_{EBO}	$\leqq 10$		mA	$U_{EB}=5$ V	U_{CESM} 1)	210	V
	I_B	10	$\leqq 50$	mA	$U_{CE}=1{,}7$ V, $I_C=0{,}5$ A	U_{CEO} 2)	80	V
	I_B	16,5	$\leqq 167$	mA	$U_{CE}=1{,}7$ V, $I_C=2$ A	U_{CEO} 2)	80	V
	I_B	250	$\leqq 800$	mA	$U_{CE}=1{,}7$ V, $I_C=8$ A	U_{EB}	5	V
	U_{BE}	0,7	$\leqq 1$	V	$U_{CE}=1{,}7$ V, $I_C=0{,}5$ A	U_{EBM}	5	V
	U_{BE}	0,8	$\leqq 1{,}2$	V	$U_{CE}=1{,}7$ V, $I_C=2$ A	I_C	10	A
	U_{BE}	1,1	$\leqq 2{,}4$	V	$U_{CE}=1{,}7$ V, $I_C=8$ A	I_{CM}	10	A
	U_{CES}	0,15	$\leqq 0{,}35$	V	$I_C=0{,}5$ A, $I_B=50$ mA	I_E	12	A
	U_{CES}	0,25	$\leqq 0{,}6$	V	$I_C=2$ A, $I_B=0{,}2$ A	I_{EM}	12	A
	U_{CES}	1,15	$\leqq 1{,}7$	V	$I_C=8$ A, $I_B=0{,}8$ A	I_B	2	A
	h_{21E}	50	>10		$U_{CE}=1{,}7$ V, $I_C=0{,}5$ A	I_{BM}	2	A
	h_{21E}	64,5	>12		$U_{CE}=1{,}7$ V, $I_C=2$ A	T_j	155	°C
	h_{21E}	32	>10		$U_{CE}=1{,}7$ V, $I_C=5$ A	P_{tot} 3)	70	W
	$\lvert h_{21e}\rvert$		$\geqq 3$		$U_{CB}=10$ V, $I_E=0{,}5$ A, f=3 MHz	T_a	−55 . . . +125	°C
	f_T		15	MHz	$U_{CB}=10$ V, $I_E=0{,}5$ A, f=3 MHz	R_{ti}	30	°C/W
	z_{12b}		4	Ω	$U_{CB}=10$ V, $I_E=0{,}1$ A, f=0,3 MHz	R_t	1,5	°C/W
	C_{22b}		500	pF	$U_{CB}=10$ V, $I_E=0{,}1$ A, f=0,3 MHz			
Silicon mesa n-p-n transistor for switching technique with current to 10 A	t_r		$\leqq 1$	µs	$I_C=10$ A, $\pm I_B=1$ A, $U_{CE}=40$ V	1) $R_{BE}=0$		
	t_s		$\leqq 1$	µs		2) $I_B=0$		
	t_f		$\leqq 0{,}5$	µs		3) $T_a<45$ °C, $U_{CE}=0$–70 V		
	Outlines p. 422							

Type	Operational Data				Maximum Ratings		
GCN53				measured at	U_{CB}	30	V
	I_{CBO}	<10	µA	$U_{CB} = 6$ V	U_{CBM}	30	V
	I_{CER}	<50	µA	$U_{CE} = 6$ V, $R_{BE} = 500\ \Omega$	U_{CE} ($R_{BE} < 0{,}5$ kΩ)		
	I_{EBO}	<10	µA	$U_{EB} = 6$ V		30	V
	U_{CER}	>30	V	$I_{CE} = 0{,}2$ mA, $R_{BE} = 500\ \Omega$	U_{CE} ($R_{BE} > 40$ kΩ)		
	U_{BE}	$<0{,}45$	V	$U_{CB} = 0$ V, $-I_E = 80$ mA		10	V
	U_{BE}	$<0{,}7$	V	$U_{CB} = 0$ V, $-I_E = 125$ mA	I_C	250	mA
	U_{CES}	$<0{,}22$	V	$I_C = 125$ mA, $I_B = 10$ mA	I_{CM}	250	mA
	h_{21E}	30 . . . 200		$U_{CE} = 0$ V, $-I_E = 80$ mA	I_B	20	mA
	h_{21E}	>25		$U_{CE} = 0$ V, $-I_E = 125$ mA	I_{BM}	20	mA
	h_{21E}	>15		$U_{CE} = 0$ V, $-I_E = 250$ mA	P_C	125	mW
	h_{21E} V:	50 . . . 100			P_C 1)	165	mW
	VI:	75 . . . 150		$U_{CE} = 6$ V, $-I_E = 10$ mA	T_j	+75	°C
	VII:	125 . . . 250			R_t	0,4	°C/mW
	f_T	>700	kHz	$U_{CE} = 6$ V, $I_C = 10$ mA	R_t 1)	0,3	°C/mW
					T_a	>-60	°C
					T_s	$-60 \ldots +75$	°C
Germanium n-p-n junction transistor for A. F. amplifiers, switching and pulse technique — industrial type Complementary to GCN 55	Operational reliability at $P_{C\ max}$ is better as 7,7 %/1000 h. Outlines K 504				1) With cooling surface 12,5 cm²		

Type

GCN54





Germanium n-p-n junction transistor for A. F. amplifiers, switching and pulse technique – industrial type
Complementary to GCN 56

Operational Data

			measured at
I_{CBO}	<10	µA	U_{CB} = 6 V
I_{CER}	<50	µA	U_{CE} = 6 V, R_{BE} = 500 Ω
I_{EBO}	<10	µA	U_{EB} = 6 V
U_{CER}	>48	V	I_C = 0,2 mA, R_{BE} = 500 Ω
U_{CES}	<0,22	V	I_C = 125 mA, I_B = 10 mA
U_{BE}	<0,7	V	U_{CB} = 0 V, $-I_E$ = 125 mA
U_{BE}	<0,45	V	U_{CB} = 0 V, $-I_E$ = 80 mA
h_{21E}	>15		U_{CB} = 0 V, $-I_E$ = 250 mA
h_{21E}	>25		U_{CB} = 0 V, $-I_E$ = 125 mA
h_{21E}	30 . . . 200		U_{CB} = 0 V, $-I_E$ = 80 mA
h_{21E} group:			
V:	50 . . . 100		
VI:	75 . . . 150		U_{CB} = 6 V, $-I_E$ = 10 mA
VII:	125 . . . 250		
f_T	>700	kHz	U_{CE} = 6 V, I_C = 10 mA

Operational reliability at $P_{C\ max}$ is better as 7,7 %/1000 h.

Outlines K 504

Maximum Ratings

U_{CB}	48	V
U_{CBM}	48	V
U_{CE} (R_{BE} <0,5 kΩ)	48	V
U_{CE} (R_{BE} >40 kΩ)	16	V
I_C	250	mA
I_{CM}	250	mA
I_B	20	mA
I_{BM}	20	mA
P_C	125	mW
P_C [1]	165	mW
T_j	+75	°C
K	0,4	°C/mW
K [1]	0,3	°C/mW
T_a	–60	°C
T_s	–60...+75	°C

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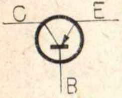
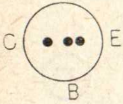
[1] With cooling surface 12,5 cm²

Type

GCN55





Germanium p-n-p junction transistor for A. F. amplifiers, switching and pulse technique – industrial type

Complementary to GCN 53

Operational Data

			measured at
$-I_{CBO}$	4,5	<10 µA	$-U_{CB} = 6$ V
$-I_{CER}$		<50 µA	$-U_{CE} = 6$ V, $R_{BE} = 500\ \Omega$
$-I_{EBO}$	3,5	<10 µA	$-U_{EB} = 6$ V
$-U_{CES}$	0,15	<0,22 V	$-I_C = 125$ mA, $-I_B = 10$ mA
h_{21E}		>15	$-U_{CB} = 0$ V, $I_E = 250$ mA
$-U_{BE}$		<0,7 V	$-U_{CB} = 0$ V, $I_E = 125$ mA
$-I_B$		<5 mA	
h_{21E}		>25	
$-U_{BE}$		<0,45 V	$-U_{CB} = 0$ V, $I_E = 80$ mA
$-I_B$	0,4...2,6 mA		
h_{21E}		>30	
$-I_B$	45...200 µA		$-U_{CB} = 6$ V, $I_E = 10$ mA
h_{21E} group			
V:	50...100		
VI:	75...150		
VII:	125...250		
$-I_C$	10	µA	$-U_{CE} = 30$ V, $U_{BE} = 0{,}5$ V
f_T		>0,3 MHz	$-U_{CB} = 6$ V, $I_E = 10$ mA
$\lvert h_{21e} \rvert$		>1	$-U_{CB} = 6$ V, $I_E = 10$ mA, $f = 0{,}3$ MHz

Operational reliability at $P_{C\ max}$ is better as 7,7 %/1000 h.

Outlines K 504

Maximum Ratings

$-U_{CB}$	32	V
$-U_{CBM}$	32	V
$-U_{CE}$ (R_{BE} <800 Ω)	32	V
$-U_{CE}$ (R_{BE} >30 kΩ)	10	V
$-U_{EB}$	10	V
$-U_{EBM}$	10	V
$-I_C$	125	mA
$-I_{CM}$	250	mA
I_E	130	mA
I_{EM}	250	mA
$-I_B$	20	mA
$-I_{BM}$	125	mA
P_C	125	mW
P_C [1]	165	mW
K	0,4	°C/mW
K [1]	0,3	°C/mW
T_j	+75	°C
T_a	−60...+75	°C

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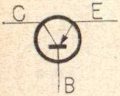
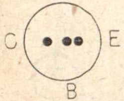
[1] With cooling surface 12,5 cm²

Type	Operational Data				Maximum Ratings		
GCN56				measured at	$-U_{CB}$	60	V
	$-I_{CBO}$	4,5	<10 μA	$-U_{CB} = 6$ V	$-U_{CBM}$	60	V
	$-I_{EBO}$	3,5	<10 μA	$-U_{EB} = 6$ V	$-U_{CE}$ (R_{BE} <500 Ω)		
	$-I_{CEO}$	350	μA	$-U_{CE} = 6$ V		60	V
	$-I_{CER}$		<50 μA	$-U_{CE} = 6$ V, $R_{BE} = 500\ \Omega$	$-U_{CE}$ (R_{BE} >40 kΩ)		
	$-U_{CES}$	0,15	<0,22 V	$-I_C = 125$ mA, $-I_B = 10$ mA		16	V
	$-U_{BE}$		<0,7 V	$-U_{CB} = 0$ V, $I_E = 125$ mA	$-U_{EB}$	10	V
	h_{21E}		>25		$-U_{EBM}$	10	V
	h_{21E}		>15	$-U_{CB} = 0$ V, $I_E = 250$ mA	$-I_C$	125	mA
	$-U_{BE}$		<0,45 V	$-U_{CB} = 0$ V, $I_E = 80$ mA	$-I_{CM}$	250	mA
	h_{21E}		>30		I_E	130	mA
	h_{21E} group:			$-U_{CB} = 6$ V, $I_E = 10$ mA	I_{EM}	250	mA
	V:		50 . . . 100		$-I_B$	20	mA
	VI:		75 . . . 150		$-I_{BM}$	125	mA
	VII:		125 . . . 250		P_C	125	mW
	$\lvert h_{21e} \rvert$		>1	$-U_{CB} = 6$ V, $I_E = 10$ mA, f = 0,3 MHz	P_C 1)	165	mW
					K	0,4	°C/mW
	f_T		>300 kHz	$-U_{CB} = 0$ V, $I_E = 10$ mA	K 1)	0,3	°C/mW
	$-I_C$	30	μA	$-U_{CB} = 60$ V, $+U_{BE} = 0,5$ V	T_j	+75	°C
Germanium p-n-p junction transistor for A. F. amplifiers, switching and pulse technique – industrial type Complementary to GCN 54	Operational reliability at $P_{C\ max}$ is better as 7,7 %/1000 h. Outlines K 504				T_a	–60...+75	°C

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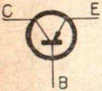
1) With cooling surface 12,5 cm²

Type	Characteristic Data			Operational Data				Maximum Ratings		
							measured at			
GFY50	$-I_{CBO}$	<13	µA	$-U_{CBO}$	>20	V	$-I_{CB}$ = 50 µA	Valid too for pulse operation:		
	$-U_{CB}$	6	V	$-U_{EBO}$	>0,5	V	$-I_{EB}$ = 50 µA	$-U_{CB}$ [2]	20	V
	$-I_{CEO}$	<450	µA	$-U_{BE}$	0,15 . . . 0,4	V	$-U_{CB}$ = 6 V, I_E = 1 mA	$-U_{CE}$ [2]	20	V
	$-U_{CE}$	6	V	$-I_B$	<60	µA	$-U_{CB}$ = 6 V, I_E = 1 mA	$-U_{EB}$	1	V
	R_{BE}	∞		h_{21e}	III 20-40 16-48			$-I_C$	10	mA
					IV 30-60 24-72		$-U_{CB}$ = 6 V, I_E = 1 mA, f = 1 kHz	I_E	10	mA
					V 50-100 40-120			$\pm I_B$	1	mA
					VI 75-150 60-180			P_C ($T_a \leqq$ 45 °C)	50	mW
					VII 125-250 100-300			T_j	+75	°C
					VIII 175-350 140-420			T_a	−55 . . . +70	°C
				F_1 [1]	<40	dB	$-U_{CB}$ = 6 V, I_E = 1 mA, R_g = 500 Ω, f = 1 kHz	U_{is}	20	V
				F_2	<8	dB	$-U_{CB}$ = 6 V, I_E = 1 mA, R_g = 500 Ω, f = 1 MHz	R_{is}	2	MΩ
				f_T	>30	MHz	$-U_{CB}$ = 6 V, I_E = 1 mA,			
				τ	<100	ps	$-U_{CB}$ = 6 V, I_E = 1 mA, f = 2 MHz			
Germanium p-n-p junction transistor for R. F. amplifiers – industrial type	Outlines K 506			C_{22b}	<5	pF	$-U_{CB}$ = 6 V, I_E = 1 mA, f = 2 MHz			

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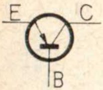
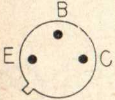
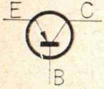
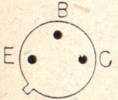
[1] Min. 80 % transistors has noise factor better as 20 dB

[2] $T_j \leqq$ +75 °C

Operational characteristics at life time test at P_C max. and U_{CB} max., as so as life time test at ambient temperature +85 °C guaranteed the quality level AQL 4 % at a risk of supplier and treacherous person 5 %. Estimation of quality for recognize life test: $-I_{CBO}$ <26 µA ($-U_{CB}$ = 6 V)

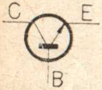
h_{21e} according to enlargement tolerances

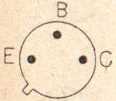
Type	Operational Data				Maximum Ratings		
KFY16				measured at	$-U_{CB}$	75	V
	$-I_{CBO}$	<10	nA	$-U_{CB} = 60$ V	$-U_{CER}$ ($R_{BE} \leqq 10\ \Omega$)		
	$-I_{CEO}$	<1	µA	$-U_{CE} = 10$ V, $R_{BE} = \infty$		50	V
	$-U_{CBO}$	>75	V	$-I_{CBO} = 100$ µA	$-U_{EBO}$	5	V
	$-U_{EBO}$	>5	V	$-I_{EBO} = 100$ µA	$-I_C$	500	mA
	$-U_{CES}$	$<1{,}5$	V	$-I_C = 150$ mA, $-I_B = 15$ mA	I_E	500	mA
	$-U_{BES}$	0,95 $<1{,}3$	V	$-I_C = 150$ mA, $-I_B = 15$ mA	$-I_B$	50	mA
	$-I_{B1}$	<5	µA	$-U_{CB} = 10$ V, $I_E = 0{,}1$ mA	T_j	+200	°C
	h_{21E}	>20			P_C 1)	0,8	W
	$-I_{B2}$	80–290	µA	$-U_{CB} = 10$ V, $I_E = 10$ mA	P_C 2)	2,6	W
	h_{21E}	35 . . . 125			R_{t1}	60	°C/W
	$-I_{B3}$	$<3{,}75$	mA	$-U_{CB} = 10$ V, $I_E = 150$ mA	R_t	220	°C/W
	h_{21E}	>40			T_a	−65...+200	°C
	h_{21E}	55 >20		$-U_{CE} = 10$ V, $I_E = 500$ mA			
	f_T	>50	MHz	$-U_{CB} = 10$ V, $I_E = 50$ mA, $f = 30$ MHz	1) Without cooling 2) With ideal cooling		
	C_{22b}	<30	pF	$-U_{CB} = 10$ V, $I_E = 0$ mA, $f = 2$ MHz			
Silicon p-n-p planar epitaxial transistor for R. F. amplifiers – industrial type Complementary to KFY34, KF506	F	4 <10	dB	$-U_{CB} = 10$ V, $-I_E = 0{,}3$ mA, $f = 1$ kHz, $R_g = 500\ \Omega$, $\Delta f = 200$ Hz			
	Outlines K 505						

Type	Operational Data				Maximum Ratings		
KFY18				measured at	$-U_{CB}$	75	V
	$-I_{CBO}$	<10	nA	$-U_{CB} = 60$ V	$-U_{CER}$ ($R_{BE} \leqq 10\ \Omega$)		
	$-I_{CEO}$	<1	µA	$-U_{CE} = 10$ V, $R_{BE} = \infty$		50	V
	$-U_{CBO}$	>75	V	$-I_{CBO} = 100$ µA	$-U_{EBO}$	5	V
	$-U_{EBO}$	>5	V	$-I_{EBO} = 100$ µA	$-I_C$	500	mA
	$-U_{CES}$	<1,5	V	$-I_C = 150$ mA, $-I_B = 15$ mA	I_E	500	mA
	$-U_{BES}$	0,95 <1,3	V	$-I_C = 150$ mA, $-I_B = 15$ mA	$-I_B$	50	mA
	$-I_{B1}$	<2,9	µA	$-U_{CB} = 10$ V, $I_E = 0{,}1$ mA	T_j	+200	°C
	h_{21E}	>35			P_C 1)	0,8	W
	$-I_{B2}$	33 . . . 110	µA	$-U_{CB} = 10$ V, $I_E = 10$ mA	P_C 2)	2,6	W
	h_{21E}	90 . . . 300			R_{t1}	60	°C/W
	$-I_{B3}$	<1,5	mA	$-U_{CB} = 10$ V, $I_E = 150$ mA	R_t	220	°C/W
	h_{21E}	>100			T_a	−65...+200	°C
	h_{21E}	75 >40		$-U_{CB} = 10$ V, $I_E = 500$ mA			
	f_T	>50	MHz	$-U_{CB} = 10$ V, $I_E = 50$ mA, $f = 30$ MHz	1) Without cooling		
					2) With ideal cooling		
	C_{22b}	<30	pF	$-U_{CB} = 10$ V, $I_E = 0$ mA, $f = 2$ MHz			
Silicon p-n-p planar epitaxial transistor for R. F. amplifiers – industrial type Complementary to KFY46, KF508	F	4 <8	dB	$-U_{CB} = 10$ V, $-I_E = 0{,}3$ mA, $f = 1$ kHz, $R_g = 500\ \Omega$, $\Delta f = 200$ Hz			
	Outlines K 505						

Type	Operational Data	Maximum Ratings

KFY34





Silicon n-p-n planar epitaxial transistor for R. F. amplifiers – industrial type
Complementary to KFY16

				measured at
I_{CBO}		<10	nA	$U_{CB} = 60$ V
I_{CBO}		<1	µA	$U_{CB} = 60$ V, $T_a = 150$ °C
U_{CBO}		>75	V	$I_{CBO} = 100$ µA
U_{FBO}		>7	V	$I_{EBO} = 100$ µA
U_{CES}	0,7	$<1,5$	V	$I_C = 150$ mA, $I_B = 15$ mA
U_{BES}		$<1,3$	V	$I_C = 150$ mA, $I_B = 15$ mA
I_{B_2}		<5	µA	$U_{CB} = 10$ V, $-I_E = 0,1$ mA
h_{21E}		>20		
I_{B_3}		<290	µA	$U_{CB} = 10$ V, $-I_E = 10$ mA
h_{21E}	80	>35		
I_{B_4}	1,25...3,75		mA	$U_{CB} = 10$ V, $-I_E = 150$ mA
h_{21E}	40...120			
I_{B_5}		<25	mA	$U_{CB} = 10$ V, $-I_E = 500$ mA
I_{B_5}		<500	µA	$U_{CB} = 10$ V, $-I_E = 10$ mA, $T_a = -55$ °C
f_T	100	>60	MHz	$U_{CB} = 10$ V, $-I_E = 50$ mA, $f = 30$ MHz
C_{22b}	18	<25	pF	$U_{CB} = 10$ V, $-I_E = 0$ mA, $f = 2$ MHz
F		<10	dB	$U_{CB} = 10$ V, $-I_E = 0,3$ mA, $f = 1$ kHz $R_g = 500\ \Omega$, $\Delta f = 200$ Hz

Outlines K 505

U_{CBO}	75	V
U_{CER} ($R_{BE} \leqq 10\ \Omega$)	50	V
U_{CEO} ($R_{BE} = \infty$)	30	V
U_{EBO}	7	V
I_C	500	mA
$-I_E$	500	mA
I_B	100	mA
P_C 1)	0,8	W
P_C 2)	2,6	W
R_{t1}	60	°C/W
R_t	220	°C/W
T_j	+200	°C
T_s	−65...+200	°C

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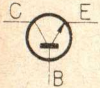
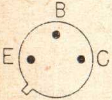
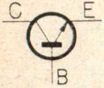
1) Without cooling

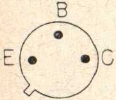
2) With ideal cooling

Type	Operational Data				Maximum Ratings	
KFY46				measured at	U_{CBO}	75 V
	I_{CBO}	<10	nA	$U_{CB} = 60$ V	U_{CER} ($R_{BE} \leqq 10\ \Omega$)	
	I_{CBO}	<1	µA	$U_{CB} = 60$ V, $T_a = 150$ °C		50 V
	U_{CBO}	>75	V	$I_{CBO} = 100$ µA	U_{CEO} ($R_{BE} = \infty$)	
	U_{EBO}	>7	V	$I_{EBO} = 100$ µA		30 V
	U_{CES}	<1,5	V	$I_C = 150$ mA, $I_B = 15$ mA	U_{EBO}	7 V
	U_{BES}	<1,3	V	$I_C = 150$ mA, $I_B = 15$ mA	I_C	500 mA
	I_{B2}	<2,9	µA	$U_{CB} = 10$ V, $-I_E = 0{,}1$ mA	$-I_E$	500 mA
	h_{21E}	>35			I_B	100 mA
	I_{B3}	<134	µA	$U_{CB} = 10$ V, $-I_E = 10$ mA	P_C 1)	0,8 W
	h_{21E}	140 >75			P_C 2)	2,6 W
	I_{B4}	0,5 . . . 1,5	mA	$U_{CB} = 10$ V, $-I_E = 150$ mA	R_{t1}	60 °C/W
	h_{21E}	100...300			R_t	220 °C/W
	I_{B5}	<12,5	mA	$U_{CB} = 10$ V, $-I_E = 500$ mA	T_j	+200 °C
	I_{B5}	<290	µA	$U_{CB} = 10$ V, $-I_E = 10$ mA, $T_a = -55$ °C	T_a	−65...+200 °C
	f_T	100 >70	MHz	$U_{CB} = 10$ V, $-I_E = 50$ mA, f = 30 MHz	1) Without cooling 2) With ideal cooling	
Silicon n-p-n planar epitaxial transistor for R. F. amplifiers – industrial type Complementary to KFY18	C_{22b}	18 <25	pF	$U_{CB} = 10$ V, $-I_E = 0$ mA, f = 2 MHz		
	F	<8	dB	$U_{CB} = 10$ V, $-I_E = 0{,}3$ mA, f = 1 kHz $R_g = 500\ \Omega$, $\Delta f = 200$ Hz		
	Outlines K 505					

Type	Operational Data	Maximum Ratings

KSY34





Silicon n-p-n planar epitaxial transistor for high speed switching – industrial type

			measured at
I_{CBO}	<70	nA	$U_{CB} = 50$ V
I_{CBO}	<70	μA	$U_{CB} = 50$ V, $T_a = 150$ °C
U_{CBO}	>60	V	$I_{CB} = 100$ μA
U_{CES}	>60	V	$I_{CE} = 10$ μA
U_{CEO}	>40	V	$I_{CE} = 10$ mA
U_{EBO}	>5	V	$I_{EB} = 10$ μA
U_{CES}	<1	V	$I_C = 500$ mA, $I_B = 50$ mA
U_{CES}	0,17	V	$I_C = 100$ mA, $I_B = 10$ mA
U_{BES}	<1,5	V	$I_C = 500$ mA, $I_B = 50$ mA
U_{BES}	0,85	V	$I_C = 100$ mA, $I_B = 10$ mA
U_{BES}	0,7	V	$I_C = 10$ mA, $I_B = 1$ mA
U_{BES}	0,62	V	$I_C = 1$ mA, $I_B = 0{,}1$ mA
h_{21E}	>10		$I_C = 500$ mA, $U_{CE} = 1$ V
h_{21E}	>25		$I_C = 100$ mA, $U_{CE} = 1$ V
h_{21E}	37		$I_C = 10$ mA, $U_{CE} = 1$ V
h_{21E}	23		$I_C = 1$ mA, $U_{CE} = 1$ V
f_T	>250	MHz	$I_C = 30$ mA, $U_{CE} = 10$ V, $f = 100$ MHz
C_{22b}	<6	pF	$U_{CB} = 10$ V, $f = 1$ MHz
C_{EBO}	22	pF	$U_{EB} = 1$ V, $f = 1$ MHz
t_{on}	<50	ns	$I_C = 500$ mA, $I_{B1} = 50$ mA,
t_{off}	<95	ns	$-I_{B2} = 25$ mA, $R_L = 80\ \Omega$, $U_E = 15$ V
t_{on}	30	ns	$I_C = 150$ mA, $I_{B1} = 15$ mA,
t_{off}	50	ns	$-I_{B2} = 15$ mA, $R_L = 150\ \Omega$

U_{CBO}	60	V
U_{CES}	60	V
U_{CEO}	40	V
U_{EB}	5	V
I_C	600	mA
$-I_E$	600	mA
I_B	200	mA
P_{tot} ($T_a \leqq 45$ °C) [1]	2,6	W
T_j	+200	°C
T_s	−65...+200	°C
R_{t1}	60	°C/W
R_t	220	°C/W

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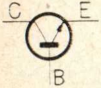
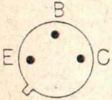
[1] With ideal cooling

Outlines K 505

Type	Operational Data	Maximum Ratings

KSY62





Silicon n-p-n planar epitaxial transistor for high speed switching – industrial type

				measured at
I_{CBO}		$<0{,}5$	μA	$U_{CB} = 15$ V
I_{CBO}		<30	μA	$U_{CB} = 15$ V, $T_a = 150$ °C
U_{CBO}		>25	V	$I_{CB} = 1$ μA
U_{CEO}		>15	V	$I_{CE} = 10$ mA
U_{EBO}		>5	V	$I_{EB} = 10$ μA
U_{CES}		$<0{,}6$	V	$I_C = 10$ mA, $I_B = 1$ mA
U_{BES}		$<0{,}9$	V	$I_C = 10$ mA, $I_B = 1$ mA
	KSY62A	**KSY62B**		
I_B	0,17...	0,033...		$I_C = 10$ mA, $U_{CE} = 1$ V
	0,5	0,33	mA	
h_{21E}	20..60	30...300		
t_{on}		<40	ns	$I_C = 10$ mA, $I_{B1} = 3$ mA,
t_{off}		<75	ns	$-I_{B2} = 1{,}5$ mA, $R_L = 270\ \Omega$
τs		<25	ns	$I_C = I_{B1} = -I_{B2} = 10$ mA, $R_L = 1\ k\Omega$
f_T		>200	MHz	$I_C = 10$ mA, $U_{CE} = 10$ V, f = 100 MHz
C_{22b}		<5	pF	$U_{CBO} = 5$ V, $I_E = 0$ mA, f = 1 MHz

Outlines K 507

U_{CB}	25	V
U_{CE}	15	V
U_{EB}	5	V
I_C	200	mA
$-I_E$	200	mA
I_B	20	mA
T_j	+200	°C
P_{tot} (T_a <45 °C) 2)	1	W
P_{tot} (T_a <25 °C) 1)	350	mW
R_{ti}	150	°C/W
R_t	500	°C/W
T_a	−65...+200	°C

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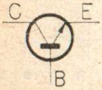
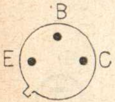
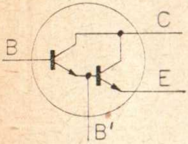
1) With ideal cooling

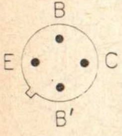
2) Without cooling

Type	Operational Data				Maximum Ratings		
KSY63				measured at	U_{CB}	40	V
	I_{CBO}	<25	nA	$U_{CB} = 20$ V	U_{EB}	5	V
	I_{CBO}	<15	µA	$U_{CB} = 20$ V, $T_a = 150$ °C	U_{CE}	15	V
	I_{CEV}	<10	µA	$U_{CE} = 20$ V, $U_{EB} = 0{,}25$ V,	I_C	200	mA
				$T_a = 125$ °C	I_B	20	mA
 C E B	U_{CBO}	>40	V	$I_{CB} = 1$ µA	P_{tot} (T_a <45 °C) 1)		
	U_{EBO}	>5	V	$I_{EB} = 10$ µA		1	W
	U_{CEO}	>15	V	$I_{CE} = 10$ mA	P_{tot} (T_a <25 °C) 2)		
	h_{21E}	>15		$U_{CE} = 1$ V, $I_C = 0{,}5$ mA		350	mW
	h_{21E}	30 . . . 120		$U_{CE} = 1$ V, $I_C = 10$ mA	R_{t1}	150	°C/W
 B E C	U_{CES}	$<0{,}4$	V	$I_C = 10$ mA, $I_B = 1$ mA	R_t	500	°C/W
	U_{BES}	$<0{,}8$	V	$I_C = 10$ mA, $I_B = 1$ mA	T_j	$+200$	°C
	f_T	>300	MHz	$U_{CE} = 10$ V, $I_C = 10$ mA,	T_a	$-65\ldots+200$	°C
				$f = 100$ MHz			
	C_{CBO}	<6	pF	$U_{CB} = 5$ V, $I_E = 0$, $f = 1$ MHz	1) With ideal cooling		
	τs	<25	ns	$I_C = I_{B1} = -I_{B2} = 10$ mA,	2) Without cooling		
				$R_L = 1$ kΩ			
	t_{on}	<40	ns	$I_C = 10$ mA, $I_{B1} = 3$ mA,			
	t_{off}	<75	ns	$-I_{B2} = 1{,}5$ mA, $R_L = 270$ Ω			
Silicon n-p-n planar epitaxial transistor for high speed switching – industrial type	Outlines K 507						

Type	Operational Data	Maximum Ratings

KFZ66





Silicon n-p-n planar transistor Darlington pair – industrial type

				measured at
I_{CBO}	1	<50	nA	U_{CBO} = 30 V
I_{CBO}	1	<50	µA	U_{CBO} = 30 V, T_a = +150 °C
I_{CEO}		<1	µA	U_{CEO} = 10 V, R_{BE} = ∞
U_{CBO}		>60	V	I_{CBO} = 100 µA
U_{CEO}		>30	V	I_{CE} = 10 mA, R_{BE} = ∞
U_{EBO}		>15	V	I_{EBO} = 100 µA
U_{CES}	1,05	<1,5	V	I_C = 150 mA, I_B = 1,5 mA
U_{BES}	1,6	<2,4	V	I_C = 150 mA, I_B = 1,5 mA
U_{BE}		1,2	V	U_{CB} = 10 V, $-I_E$ = 10 mA
h_{21E}		350		U_{CB} = 10 V, $-I_E$ = 0,1 mA
h_{21E}		1000		U_{CB} = 10 V, $-I_E$ = 1 mA
h_{21E}		3000		U_{CB} = 10 V, $-I_E$ = 10 mA
I_{B4}		<10	µA	
h_{21E}	7000	2000 . . . 20000		U_{CB} = 10 V, $-I_E$ = 100 mA
I_{B5}		5 . . . 50	µA	
h_{21E}		10000		U_{CB} = 10 V, $-I_E$ = 500 mA
$\|h_{21e}\|$	3,8	>2,3		U_{CB} = 10 V, $-I_E$ = 50 mA, f = 30 MHz
C_{22b}	30	<40	pF	U_{CB} = 10 V, $-I_E$ = 0, f = 2 MHz
C_{EBO}	35	<50	pF	U_{EB} = 0,5 V, I_C = 0 mA

Outlines K 505

U_{CBO}	60	V
U_{CEO} (R_{BE} = ∞)	30	V
U_{EBO}	15	V
I_C	500	mA
$-I_E$	500	mA
I_B	50	mA
P_C 1)	0,8	W
P_C ($T_a \leq 45$ °C) 2)	2,6	W
R_{t1}	60	°C/W
R_t	220	°C/W
T_j	+200	°C
T_a	−65...+200	°C

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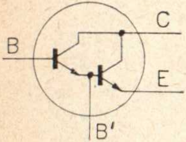
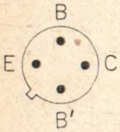
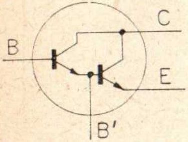
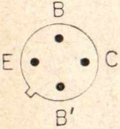
1) Without cooling

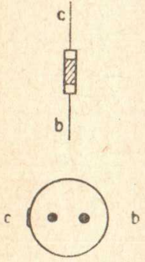
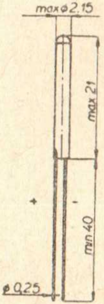
2) With ideal cooling

Type	Operational Data					Maximum Ratings		
KFZ68					measured at	U_{CBO}	60	V
	I_{CBO}	1	<50	nA	$U_{CBO} = 30$ V	U_{CEO} ($R_{BE} = \infty$)		
	I_{CBO}	1	<50	µA	$U_{CBO} = 30$ V, $T_a = +150$ °C		30	V
	I_{CEO}		<1	µA	$U_{CEO} = 10$ V, $R_{BE} = \infty$	U_{EBO}	15	V
	U_{CBO}		>60	V	$I_{CBO} = 100$ µA	I_C	500	mA
	U_{CEO}		>30	V	$I_{CE} = 10$ mA, $R_{BE} = \infty$	$-I_E$	500	mA
	U_{EBO}		>15	V	$I_{EBO} = 100$ µA	I_B	50	mA
	U_{CES}	1,05	$<1,5$	V	$I_C = 150$ mA, $I_B = 1,5$ mA	P_C 1)	0,8	W
	U_{BES}	1,6	$<2,4$	V	$I_C = 150$ mA, $I_B = 1,5$ mA	P_C ($T_a \leqq 45$ °C) 2)		
	U_{BE}		1,2	V	$U_{CB} = 10$ V, $-I_E = 10$ mA		2,6	W
	h_{21E}		750		$U_{CB} = 10$ V, $-I_E = 0,1$ mA	R_{t1}	60	°C/W
	h_{21E}		2200		$U_{CB} = 10$ V, $-I_E = 1$ mA	R_t	220	°C/W
	h_{21E}		6500		$U_{CB} = 10$ V, $-I_E = 10$ mA	T_j	$+200$	°C
	I_{B4}		$<3,3$	µA		T_a	$-65 \dots +200$	°C
	h_{21E}	20000	7000 . . . 70000		$U_{CB} = 10$ V, $-I_E = 100$ mA	1) Without cooling		
	I_{B5}		1,43 . . . 14,3	µA		2) With ideal cooling		
	h_{21E}		30000		$U_{CB} = 10$ V, $-I_E = 500$ mA			
	$\|h_{21e}\|$	3,8	$>2,3$		$U_{CB} = 10$ V, $-I_E = 50$ mA, $f = 30$ MHz			
Silicon n-p-n planar transistor Darlington pair – industrial type	C_{22b}	30	<40	pF	$U_{CB} = 10$ V, $-I_E = 0$, $f = 2$ MHz			
	C_{EBO}	35	<50	pF	$U_{EB} = 0,5$ V, $I_C = 0$ mA			
	Outlines K 505							

Type	Operational Data					Maximum Ratings		
KSZ62					measured at	U_{CBO}	25	V
	I_{CBO}		<500	μA	U_{CB} = 15 V	U_{CEO}	15	V
 	U_{CBO}		>25	V	I_{CB} = 1 μA	U_{EBO}	5	V
	U_{CEO}		>15	V	I_{CE} = 10 mA	I_C	200	mA
	U_{EBO}		>5	V	I_{EB} = 10 μA	$-I_E$	200	mA
	I_B		<0,16	μA	U_{CE} = 5 V, I_C = 100 μA	I_B	20	mA
	h_{21E}		>625			P_C (T_a <25 °C) 1)	350	mW
	U_{CES}	0,9	<1,2	V	I_C = 10 mA, I_B = 0,1 mA			
 	U_{BES}	1,5	<1,6	V	I_C = 10 mA, I_B = 0,1 mA	P_C (T_a <45 °C) 2)	1	W
		290	>200		U_{CB} = 10 V, I_E = 10 mA, f = 100 MHz	T_j	+200	°C
	C_{22b}	4,8	<6	pF	U_{CB} = 5 V, I_E = 0 mA, f = 1 MHz	T_a	−65...+200	°C
Silicon n-p-n planar epitaxial transistor Darlington pair – industrial type	Outlines K 505					1) Without cooling 2) With ideal cooling		

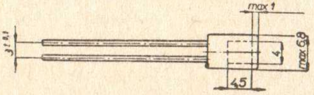
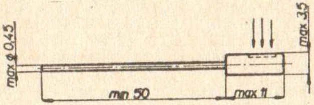
Glossary of abbreviations used in connection with photodiodes:

E	illumination
f	working frequency
I_F	photoelectric current – flowing through the photodiode at a specified light
I_{KA}	current of the photodiode in darkness
K	heat resistance
P_d	photodiode dissipation
R_i	internal resistance
R_Z	load resistance
T_p	case temperature
U_2	A. C. output voltage
U_{AK}	voltage on photodiode
U_F	photoelectric voltage
U_{FM}	photoelectric voltage, peak value
U_{KA}	voltage on photodiode
U_o	D. C. output voltage
$U_š$	dark noise voltage

Type	Characteristic Data	Operational Data	Maximum Ratings
10PN40  Subminiature germanium p-n photodiode	I_{KA} <15 μA U_{KA} 10 V I_{KA} <50 μA U_{KA} 50 V	measured at U_{FM} 1) 20 >12 V — U_{KA} 45 V, R_Z 100 kΩ UŠ <15 mV — U_{KA} 45 V, R_Z 100 kΩ, E 0 lx I_F 1) >6.10-3 μV/lx — U_{KA} 45 V, R_Z 100 kΩ, E 20 000 lx	U_{KA} 50 V I_{AK} 10 mA P_d 40 mW K 1,25 °C/mW T_a −40 ÷ +75 °C f 2) 0,3–5 kc/s 

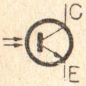
1) The sensitivity is defined as a voltage difference at illumination E = 20 000 lx (colour temperature 2400 °K) and in darkness across a resistor of 100 kΩ. The light is interrupted 300 times per second.

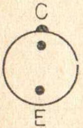
2) Frequency at which peak photoelectric voltage U_{FM} fall abouth 30 % in contrast to value, measured at f = 300 c/s; E = 5000 lx, R_Z = 110 kΩ.

Type	Characteristic Data	Operational Data	Maximum Ratings
1PP75   Silicon barrier surface photodiode with sensitivity 0,4–1,1 μ, for cinema technique, measurement and control devices	U_{KA} >5 V I_{KA} 50 μA E 0 lx	measured at U_0 >0,3 V E 1000 lx I_K >70 μA E 1000 lx U_2 >8 mV f 1 kc/s, R_Z 4 kΩ U_2 >3,6 mV f 7 kc/s, R_Z 4 kΩ   Red lead indicated the positive pole of the internal voltage at an illumination.	T_a −25 + +85 °C

Type

KP101





Silicon n-p-n planar phototransistor for photoelectric data scanning from perforated tape

Operational Data

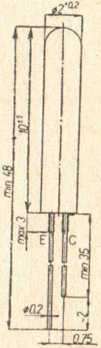
				measured at
I_L		>1	mA	$U_{CE} = 6$ V, E = 3200 lx
I_D		<100	nA	$U_{CE} = 32$ V, E = 0 lx
I_{CEO}		<100	nA	$U_{CE} = 32$ V
I_{CEO}		<80	µA	$U_{CE} = 32$ V, $T_a = 85$ °C
C_{22b}	5,2	<8	pF	$U_{CE} = 5$ V, f = 2 MHz
t_D 1)		<30	µs	$R_L = 1$ kΩ
S	1,8 . . . 3		µA/Lx	E=2500 . . . 4000 Lx, U_{CE}=2 . . 10 V
S	0,15 . . . 1		µA/Lx	E= 100 . . . 500 Lx, U_{CE}=2 . . 10 V

---

1) Afterglow duration

Maximum Ratings

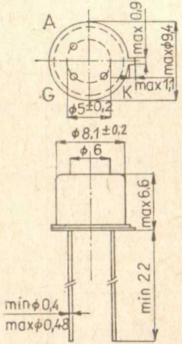
U_{CEO}	32	V
I_C	50	mA
P_C	50	mW
T_j	125	°C
T_a	−40 . . . +100	°C



PHOTOTHYRISTORS PNPN

Type	$U_{(BO)}$ min 1) 2) 3) 4)	$U_{R\ (BR)}$ $I_{R\ (BR)}$ = 1 mA min	I_{FD} at U_{FD} max 1) 2) 4)		U_{RD} $I_{RD} \leqq 0,5$ mA	E max U_{FD}=10 V, I_G=0	I_H 3) 5)	I_{GT} 3) 6)	U_{GT} 3) 6)	U_T I_T= 0,7 A max	U_{FD} U_{RD} max
	V	V 1) 2) 3) 4)	mA	V	V 1) 2) 4)	lx 3) 4)	mA	mA	V	V 3)	V 2) 4) 7)
KP500	30	30	0,5	25	25	4000	3	0,8	0,6	1,7	25
KP501	60	60	0,5	50	50	4000	3	0,8	0,6	1,7	50
KP502	120	120	0,5	100	100	4000	3	0,8	0,6	1,7	100
KP503	240	240	0,5	200	200	4000	3	0,8	0,6	1,7	200
KP504	360	360	0,5	300	300	4000	3	0,8	0,6	1,7	300

I_T		0,7 A	(T_p = 30 °C, θ = 180 °)
$I_{T\ imp}$	max	7 A	**($t_{ip} \leq$10 ms)**
I_{FGM}	max	100 mA	
I_T	max	250 mA	
T_j	max	+85 °C	
T_a	max	−25 . . . +85 °C	



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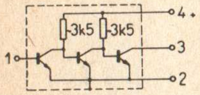
1) Without illumination
2) T_a = +85 °C
3) T_a = +25 °C
4) R_{GK} = 10 kΩ
5) I_G = 0
6) U_{FD} = 10 V
7) At T_a = −25 . . . 0 °C must be decreased of 20 %.

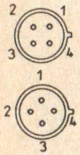
Glossary of abbreviations used in connection with integrated circuits

A_u	voltage amplification
A_{dd}	differential gain
f_{toggle}	clock frequency
I_{CC}	supply current
$I_{CC(1)}$	logical 1 level supply current (each gate)
$I_{CC(0)}$	logical 0 level supply current (each gate)
I_{Ex}	expander current
I_{OS}	short-circuit output current
$I_{vst(1)}$	logical 1 level input current (each input)
$I_{vst(0)}$	logical 0 level input current (each input)
I_X	expander current
K	distortion
N	fan-out from each output
R_f	rejector factor
R_{vst}	input resistance
t_{d1}	propagation delay time to logical 1 level
t_{d0}	propagation delay time to logical 0 level
t_{set-up}	input SET-UP time
t_{hold}	input hold time
t_{preset}	preset time – width of preset pulse
t_{clear}	clear time – width of clear pulse
U_b	unbalance
U_B	supply voltage
$U_{BE(Q)}$	base-emitter voltage of output transistor (Q)
U_{CC}	supply voltage
U_{i0}	input equalization voltage
$U_{š}$	noise voltage
U_{td}	temperature drift
U_0	output amplitude
$U_{vst(1)}$	logical 1 input voltage
$U_{vst(0)}$	logical 0 input voltage
$U_{výst(1)}$	logical 1 output voltage
$U_{výst(0)}$	logical 0 output voltage

Type	Operational Data	Maximum Ratings

MAA115
MAA125
MAA145





Silicon integrated three-stages amplifier A. F. and low I. F. amplifiers

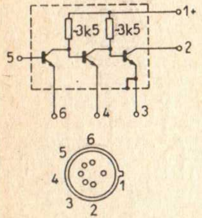
	MAA145	MAA125	MAA115		measured at
A_u	75 >70	–	–	dB	$U_B = 12$ V, $U_{2\,eff} = 3{,}6$ V, f = 1 kHz, $R_Z = 470\ \Omega$
A_u	–	75 >70	–	dB	$U_B = 7$ V, $U_{2\,eff} = 2{,}1$ V, f = 1 kHz, $R_Z = 470\ \Omega$
A_u 1)	–	–	>50	dB	$U_B = 1{,}3$ V, $U_{2\,eff} = 0{,}3$ V, f = 1 kHz, $R_Z = 470\ \Omega$
A_u	59 > 54	59 > 54	–	dB	$U_B = 7$ V, $U_{2\,eff} = 1{,}7$ V, f = 1 MHz, $R_Z = 470\ \Omega$
K	–	<1,5	–	%	$U_B = 7$ V, $U_{2\,eff} = 2{,}1$ V, f = 1 kHz, $R_Z = 470\ \Omega$
K	–	–	3 <10	%	$U_B = 1{,}3$ V, $U_{2\,eff} = 0{,}3$ V, f = 1 kHz, $R_Z = 470\ \Omega$
K	<1,5	–	–	%	$U_B = 12$ V, $U_{2\,eff} = 3{,}6$ V, f = 1 kHz, $R_Z = 470\ \Omega$
R_{vst}	–	>3	–	kΩ	$U_B = 7$ V, f = 1 kHz, $R_Z = 470\ \Omega$
R_{vst}	>2	–	–	kΩ	$U_B = 12$ V, f = 1 kHz, $R_Z = 470\ \Omega$
$U_{\check{s}}$	2 <5	2 <5	–	µV	$U_B = 4{,}5$ V, $R_Z = 470\ \Omega$, $R_g = 470\ \Omega$, f = 40 Hz . . . 15 kHz
$U_{\check{s}}$	–	–	<5	µV	$U_B = 1{,}3$ V, $R_Z = 470\ \Omega$ $R_g = 470\ \Omega$, f = 40 Hz . . . 15 kHz

1) Values valid at use of recommended circuit. Working point to be adjusted by potentiometer P1 on minimum distortion at gived value $U_{2\,eff}$ $R_g = 470\ \Omega$. See p. 409

U_B	MAA145	12	V
	MAA125	7	V
	MAA115	4	V
U_{32}	MAA145	10	V
	MAA125	7	V
	MAA115	4	V
I		50	mA
P_{tot}	($T_a \leqq 45$ °C)	300	mW
R_t		330	°C/W
T_j		150	°C
T_a		–55...+125	°C

Type	Operational Data	Maximum Ratings

MAA225
MAA245



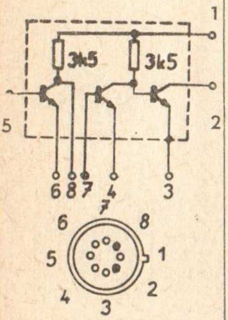
Silicon integrated three-stages amplifier for A. F. and low I. F. amplifiers

	MAA225	MAA245		measured at
A_u	84 >78	–	dB	$U_B = 7$ V, $U_{2\,eff} = 2{,}1$ V, f=1 kHz, $R_Z=470\ \Omega$, $R_g=1$ kΩ
A_u	–	90 >80	dB	$U_B = 12$ V, $U_{2\,eff} = 3{,}6$ V, f=1 kHz, $R_Z=470\ \Omega$, $R_g=1$ kΩ
A_u	70 >60	70 >60	dB	$U_B = 7$ V, $U_{2\,eff} = 1{,}7$ V, f=1 MHz, $R_Z=470\ \Omega$, $R_g=1$ kΩ
K	<10	–	%	$U_B = 7$ V, $U_{2\,eff} = 2{,}1$ V, $R_Z = 470\ \Omega$, $R_g = 1$ kΩ
K	–	<10	%	$U_B = 12$ V, $U_{2\,eff} = 3{,}6$ V, $R_Z = 470\ \Omega$, $R_g = 1$ kΩ
$U_š$	<2	–	μV	$U_B = 7$ V, $R_Z = 470\ \Omega$, $R_g = 470\ \Omega$
$U_š$	–	<2	%	$U_B = 12$ V, $R_Z = 470\ \Omega$, $R_g = 470\ \Omega$
R_{vst}	>0,5	–	kΩ	$U_B = 7$ V, f = 1 kHz, $R_Z = 470\ \Omega$
R_{vst}	–	>0,4	kΩ	$U_B = 12$ V, f=1 kHz, $R_Z=470\ \Omega$
R_1 3)	>6,8	>15	kΩ	

1) Values valid at use of recommended circuit. Working point to be adjusted by potentiometer P1 on minimum distortion at given value $U_{2\,eff}$. See p. 409.

3) Optimum value for minimum noise.

U_B		>1 V
U_B	MAA225	7 V
	MAA245	12 V
$U_{2/3M}$		
	MAA225	7 V
	MAA245	12 V
$U_{6/5M}$		6 V
I_2, I_3		40 mA
I_4		5 mA
I_6		5 mA
P_{tot}	($T_a \leqq 45$ °C)	300 mW
T_j		150 °C
R_t		300 °C/W
T_a	−55...+125	°C

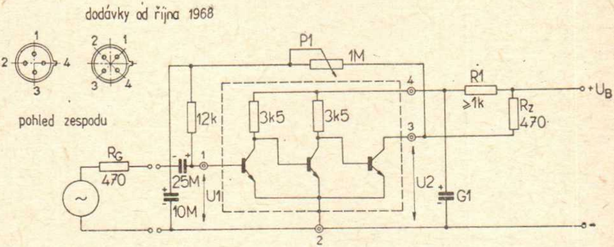
Type	Operational Data				Maximum Rattings		
MAA325				measured at	U_B	7	V
	A_u	>70	dB	$U_B = 7$ V, $U_{2\,eff} = 2{,}1$ V, f = 1 kHz,	$U_{1/4}$	7	V
				$R_g = 2$ kΩ, $R_Z = 470$ Ω	$U_{2/3}$	7	V
	A_u	>60	dB	$U_B = 7$ V, $U_{2\,eff} = 1{,}7$ V, f = 1 MHz,	$U_{8/6}$	7	V
				$R_g = 2$ kΩ	$U_{6/5\,M}$	6	V
	K	<10	%	$U_B = 7$ V, $U_{2\,eff} = 2{,}1$ V, f = 1 kHz,	$U_{4/7\,M}$	6	V
				$R_g = 2$ kΩ, $R_Z = 470$ Ω	$U_{8/50}$	20	V
	F 1)	<8	dB	$U_{8/6} = 6$ V, f = 1 kHz, $R_g = 2$ kΩ,	I_2	40	mA
				$I_G = 100$ µA, f = 30 Hz . . . 15 kHz	I_3	40	mA
	h_{21E}	>30		$U_{8/6} = 1$ V, $I_6 = 1$ mA	I_6	20	mA
	$U_{8/6\,sat}$	$<0{,}2$	V	$U_{1/6} = 6$ V, $I_C = 10 \,.\, I_B$	I_8	20	mA
	$U_{2/3\,sat}$	$<0{,}6$	V	$U_{1/3} = 6$ V, $U_{7/4} = 0$ V, $R_Z = 470$ Ω	I_5	10	mA
					I_4	5	mA
					I_7	10	mA
					$P[T_a < 45$ mW]	300	mW
					T_j	150	°C
					T_a	$-55 \ldots +125$	°C
Silicon integrated three-stages amplifier for A. F., I. F. and D. C. amplifiers							

1) Of first transistor.

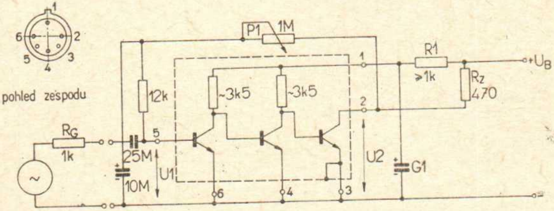
2) Values valid at use of recommended circuit.
Working point to be adjusted by potenciometer P1 on minimum distortion at given value $U_{2\,eff}$
See p. 409

Recommended working circuit of integrated circuits

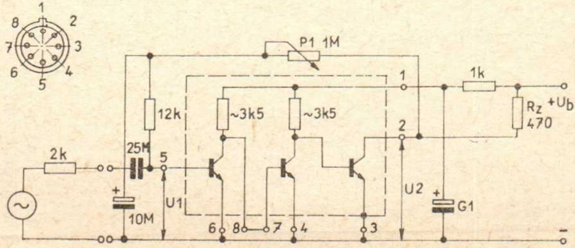
MAA 115, MAA 125, MAA 145

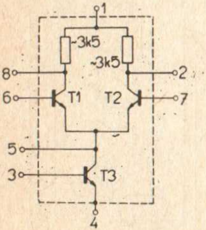
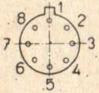


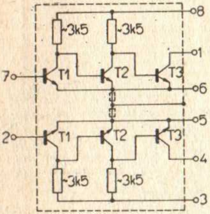
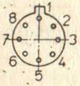
MAA 125, MAA 245



MAA 325

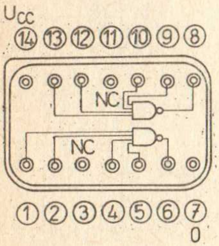


Type	Operational Data				Maximum Ratings		
MBA125 **MBA145**		**MBA125**	**MBA145**		P_{max}	300	mW
	U_B	14	24	V	T_a	−55...+125	°C
	h_{21E} T_1, T_2	>30	>30				
	R_f	>60	>60	dB			
	U_{td}	<20	<20	µV/°C			
	A_{dd}	>100	>120				
	U_{io}	<10	<10	mV			
	U_b	<400	<300	mV			
	U_o	>4	>7	V			
  Integrated circuit for differencial amplifiers							

Type	Operational Data				Maximum Ratings		
MBA225 **MBA245**		**MBA225**	**MBA 245**		U_B	MBA225	7 V
	U_B	7	12	V		MBA245	12 V
	A_u	>60	>60	dB	P_{tot}		300 mW
	R_{vst}	>3	>2	kΩ	I_{max}		300 mA
	K	$<1{,}5$	$<1{,}5$	%	T_a	−55…+125	°C
 	$U_š$	<5	<5	µV			
Integrated circuit for two channel amplifiers up to 10 MHz							

Type	Operational Data	Maximum Ratings

MHC111



Dual 4-input positive NAND gate

$X = \overline{ABCD}$

Recommended working point:

$U_{CC} = 4{,}75\text{–}5{,}25$ V, $N \leqq 10$, $T_a = 0 \ldots +70$ °C

			measured at
$U_{vst(1)}$	>2	V	$U_{CC} = 4{,}75$ V, $U_{v\acute{y}st}\ (0) \leqq 0{,}4$ V, $R = 272\ \Omega$
$U_{vst(0)}$	$<0{,}8$	V	$U_{CC} = 4{,}75$ V, $U_{v\acute{y}st}\ (1) \geqq 2{,}4$ V, $R = 6\ \text{k}\Omega$
$U_{v\acute{y}st(1)}$	$>2{,}4$	V	$U_{CC} = 4{,}75$ V, $U_{vst} = 0{,}8$ V, $I_L \geqq 400\ \mu$A, $R = 6\ \text{k}\Omega$
$U_{v\acute{y}st(0)}$	$<0{,}4$	V	$U_{CC} = 4{,}75$ V, $U_{vst} = 2$ V, $I_L \geqq 16$ mA, $R = 272\ \Omega$
$I_{vst(1)}$	<40	µA	$U_{CC} = 5{,}25$ V, $U_{vst} = 4{,}75$ V
$I_{vst(0)}$	$<1{,}6$	mA	$U_{CC} = 5{,}25$ V, $U_{vst} = 0{,}4$ V
I_{OS}	18 . . . 55	mA	$U_{CC} = 5{,}25$ V,
$I_{CC(1)}$	1	mA	$U_{CC} = 5$ V, $U_{vst} = 0$, $T_a = 25$ °C
$I_{CC(0)}$	3	mA	$U_{CC} = 5$ V, $U_{vst} = 5$ V, $T_a = 25$ °C.

Switching characteristics:

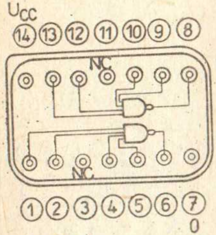
$U_{CC} = 5$ V, $T_a = 25$ °C

t_{d0}	8	<15	ns	$U_{CC} = 5$ V, $T_a = 25$ °C, $C_1 = 15$ pF, $N = 10$
t_{d1}	18	<29	ns	$U_{CC} = 5$ V, $T_a = 25$ °C, $C_1 = 15$ pF, $N = 1$

Outlines p. 423

Type	Operational Data

MHE111



NC - volný kolík

Dual 4-input positive NAND power gate

$X = \overline{ABCD}$

Recommended working point:

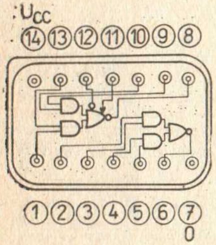
U_{CC} = 4,75–5,25 V, N $\leqq$ 30, T_a = 0 . . . +70 °C

				measured at
$U_{vst(1)}$		>2	V	U_{CC} = 4,75 V, $U_{v\acute{y}st\ (0)} \leqq$ 0,4 V, R = 90 Ω
$U_{vst(0)}$		<0,8	V	U_{CC} = 4,75 V, $U_{v\acute{y}st\ (1)} \geqq$ 2,4 V, R = 2 kΩ
$U_{v\acute{y}st(1)}$		>2,4	V	U_{CC} = 4,75 V, U_{vst} = 0,8 V, $I_L \geqq$ 1,2 mA, R = 2 kΩ
$U_{v\acute{y}st(0)}$		<0,4	V	U_{CC} = 4,75 V, U_{vst} = 2 V, $I_L \geqq$ 16 mA, R = 90 Ω
$I_{vst(1)}$		<40	µA	U_{CC} = 5,25 V, U_{vst} = 4,75 V
$I_{vst(0)}$		<1,6	mA	U_{CC} = 5,25 V, U_{vst} = 0,4 V
I_{OS}	18 . . . 70		mA	U_{CC} = 5,25 V,
$I_{CC(1)}$		2	mA	U_{CC} = 5 V, U_{vst} = 0
$I_{CC(0)}$		8,6	mA	U_{CC} = 5 V, U_{vst} = 0

Switching characteristics:

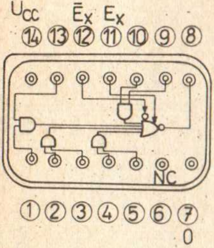
t_{d0}	8	<15	ns	U_{CC} = 5 V, T_a = 25 °C, C_1 = 15 pF, N = 10
t_{d1}	18	<29	ns	U_{CC} = 5 V, T_a = 25 °C, N = 1

Outlines p. 423

Type	Operational Data			
MHF111	**Recommended working point:**			
	U_{CC} = 4,75–5,25 V, N ≦ 10, T_a = 0 . . . +70 °C, pins 11 and 12 open			
				measured at
	$U_{vst(1)}$	>2	V	U_{CC} = 4,75 V, $U_{výst\ (0)}$ ≦ 0,4 V, R = 272 Ω
	$U_{vst(0)}$	<0,8	V	U_{CC} = 4,75 V, $U_{výst\ (1)}$ ≧ 2,4 V, R = 6 kΩ
	$U_{výst(1)}$	>2,4	V	U_{CC} = 4,75 V, U_{vst} = 0,8 V, I_L ≧ 400 μA, R = 6 kΩ
	$U_{výst(0)}$	<0,4	V	U_{CC} = 4,75 V, U_{vst} = 2 V, I_L ≧ 16 mA, R = 272 Ω
	$I_{vst(1)}$	<40	μA	U_{CC} = 5,25 V, U_{vst} = 4,75 V
	$I_{vst(0)}$	<1,6	mA	U_{CC} = 5,25 V, U_{vst} = 0,4 V
	I_{OS}	18 . . . 55	mA	U_{CC} = 5,25 V,
	$I_{CC(1)}$	2	mA	U_{CC} = 5 V, U_{vst} = 0
	$I_{CC(0)}$	3,7	mA	U_{CC} = 5 V, U_{vst} = 5 V
	Switching characteristics:			
	t_{d0}	8 <15	ns	U_{CC} = 5 V, T_a = 25 °C, C_1 = 15 pF, N = 10
	t_{d1}	18 <28	ns	U_{CC} = 5 V, T_a = 25 °C, C_1 = 15 pF, N = 1
	Electrical characteristics using expander inputs, T_a = 0 °C:			
	I_X	1,5 . . . 3,1	mA	U_{CC} = 4,75 V, U_1 = 0,4 V, I_L = 16 mA
Dual 2-wide 2-input AND-OR-INVERT gate for expanding with MYA111	$U_{BE(Q)}$	<1	V	U_{CC} = 4,75 V, U_2 = 1,4 V, R = 272 Ω, I_L = 16 mA, I_1 = 1,7 mA
	$U_{výst(1)}$	>2,4	V	U_{CC} = 4,75 V, I_L = 400 μA, R = 6 kΩ, I_1 = 0,27 mA, I_2 = 0,27 mA
$X = \overline{(AB) + (CD) + E}$ E = ABCD from MYA111	$U_{výst(0)}$	>0,4	V	U_{CC} = 4,75 V, U_2 = 1,4 V, R = 272 Ω, I_L = 16 mA, I_1 = 1,7 mA
	Outlines p. 423			

Type	Operational Data

MHG111



4-wide 2-input
AND-OR-INVERT gate

$X = \overline{(AB) + (CD) + (EF) + (GH) + EX}$

EX = ABCD from MYA111

Recommended working point:

$U_{CC} = 4{,}75\text{–}5{,}25$ V, $N \leqq 10$, $T_a = 0 \ldots +70$ °C, pins 11 and 12 open

				measured at
$U_{vst(1)}$		>2	V	$U_{CC} = 4{,}75$ V, $U_{out\ (0)} \leqq 0{,}4$ V
$U_{vst(0)}$		$<0{,}8$	V	$U_{CC} = 4{,}75$ V, $U_{out\ (1)} \geqq 2{,}4$ V
$U_{výst(1)}$		$>2{,}4$	V	$U_{CC} = 4{,}75$ V, $U_{vst} = 0{,}8$ V, $I_L = 400$ µA
$U_{výst(0)}$		$<0{,}4$	V	$U_{CC} = 4{,}75$ V, $U_{vst} = 2$ V, $I_L = 16$ mA
$I_{vst(1)}$		<40	µA	$U_{CC} = 5{,}25$ V, $U_{vst} = 2{,}4$ V
$I_{vst(0)}$		$<1{,}6$	mA	$U_{CC} = 5{,}25$ V, $U_{vst} = 0$
I_{OS}	20 . . . 55		mA	$U_{CC} = 5{,}25$ V,
$I_{CC(1)}$		4,2	mA	$U_{CC} = 5$ V, $U_{vst} = 5$ V
$I_{CC(0)}$		5,1	mA	$U_{CC} = 5$ V, $U_{vst} = 0$

Switching characteristic

t_{d0}	8	<15	ns	$U_{CC} = 5$ V, $T_a = 25$ °C, $N = 10$
t_{d1}	18	<29	ns	$U_{CC} = 5$ V, $T_a = 25$ °C, $N = 10$

Electrical characteristics using expander inputs, $T_a = 0$ °C:

I_X	$<2{,}9$	mA	$T_a = 70$ °C, $U'_{CC} = 4{,}75$ V, $U_1 = 0{,}4$ V, $I_L = 16$ mA
$U_{BE(Q)}$	<1	V	$U_{CC} = 4{,}75$ V, $I_L = 16$ mA, $I_1 = 0{,}62$ mA, $R_1 = 0$
$U_{výst(1)}$	$>2{,}4$	V	$U_{CC} = 4{,}75$ V, $I_L = 400$ µA, $I_1 = 0{,}15$ mA, $I_2 = 0{,}15$ mA
$U_{výst(0)}$	$>0{,}4$	V	$U_{CC} = 4{,}75$ V, $I_L = 16$ mA, $I_1 = 0{,}43$ mA, $R_1 = 130\ \Omega$

Maximum ratings: (Without cooling)

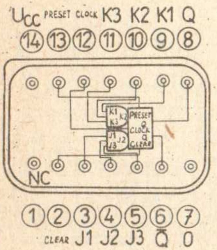
U_{CC}	max	7	V	T_a	max	0 . . . +70	°C
U_{vs}	max	5,5	V	T_s	max	−65 . . . +150	°C

Outlines p. 423

Type

Operational Data

MJA111



J-K Master-Slave Flip-Flop

Recommended operating conditions:

$U_{CC} = 4{,}75–5{,}25$ V, $N \leqq 10$, $t_{p(clock)} \geqq 20$ ns, $f_{toggle} = 0 \ldots 15$ MHz, $t_{set\text{-}up} > 0$, $t_{hold} > 0$, $t_{preset} > 25$ ns, $t_{clear} > 25$ ns

				measured at
$U_{vst(1)}$		>2	V	U_{CC} = 4,75 V
$U_{vst(0)}$		<0,8	V	U_{CC} = 4,75 V
$U_{výst(1)}$	3,5	>2,4	V	U_{CC} = 4,75 V, I_L = 400 µA
$U_{výst(0)}$	0,2	<0,4	V	U_{CC} = 4,75 V, I_L = 16 mA
$I_{vst(0)}$		<1,6	mA	U_{CC} = 5,25 V, U_{vst} = 0,4 V, (log. 0 input current J1, J2, J3, K1, K2 or K3)
$I_{vst(0)}$		<3,2	mA	U_{CE} = 5,25 V, U_{vst} = 0,4 V, (log. 0 input current at preset clear, or clock)
$I_{vst(1)}$		<40	µA	U_{CC} = 5,25 V, U_{vst} = 2,4 V (log. 1 input current J1, J2, J3, K1, K2 or K3)
$I_{vst(1)}$		<80	µA	U_{CC} = 5,25 V, U_{vst} = 2,4 V (log. 1 input current at preset, clear, or clock)
I_{OS}	20 . . . 57		mA	U_{CC} = 5,25 V, U_{vst} = 0 V
I_{CC}	8		mA	U_{CC} = 5 V, U_{vst} = 5 V

Switching characteristics:

t_{d0}	34	<50	ns	U_{CC} = 5 V, T_a = 25 °C, C_1 = 15 pF
t_{d1}	26	<50	ns	
t_{preset}	15		ns	
t_{clear}	15		ns	
t_{set-up}		>0	ns	
t_{hold}		>0	ns	

Maximum ratings:

U_{CC}	max	7	V
U_{vst}	max	5,25	V
T_a	max	0 . . . . + 70	°C
T_s	max	−65 . . . +150	°C

Outlines p. 423

Type	Operational Data
MYA111	**Recommended operating characteristics:**

Recommended operating characteristics:

$U_{CC} = 4,75 - 5,25$ V, $T_a = 0 \ldots +70$ °C

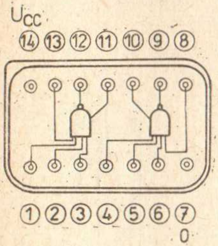
Max. number of expanders that may be fanned-in to one MHF111 is 4

				measured at
$U_{vst(1)}$		>2	V	$U_{CC} = 4,75$ V, $U_{vst} = 2$ V, $U_1 = 1$ V, $R = 1,1$ kΩ, $T_a = 0$ °C
$U_{vst(0)}$		$<0,8$	V	$U_{CC} = 4,75$ V, $U_{vst} = 0,8$ V, $U_1 = 4,75$ V, $R = 1,2$ kΩ, $I_{v\acute{y}st(0)} = 0,27$ mA, $T_a = 0$ °C,
$U_{v\acute{y}st(1)}$		$<0,4$	V	$U_{CC} = 4,75$ V, $U_{vst} = 2$ V, $U_1 = 1$ V, $R = 1,1$ kΩ, $T_a = 0$ °C
$I_{v\acute{y}st(1)}$		$>1,7$	mA	$U_{CC} = 4,75$ V, $U_{vst} = 2$ V, $U_1 = 1$ V, $I_2 = 1,5$ mA
$I_{v\acute{y}st(0)}$		<270	µA	$U_{CC} = 4,75$ V, $U_{vst} = 0,8$ V, $U_1 = 4,75$ V, $R_1 = 1,2$ kΩ, $T_a = 0$ °C
$I_{vst(1)}$		<40	µA	$U_{CC} = 5,25$ V, $U_{vst} = 4,75$ V, $T_a = 70$ °C
$I_{vst(0)}$		$<1,6$	mA	$U_{CC} = 5,25$ V, $U_{vst} = 0,4$ V
$I_{CC(1)}$		0,6	mA	$U_{CC} = 5$ V, $U_{vst} = 5$ V, $U_1 = 0,85$ V
$I_{CC(0)}$		1	mA	$U_{CC} = 5$ V, $U_{vst} = 0$ V, $U_1 = 0,85$ V

Switching characteristics: (through MHF 111)

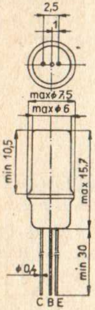
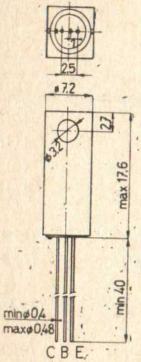
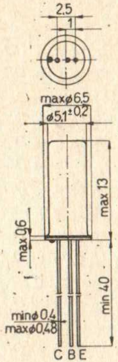
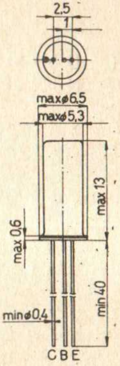
t_{d0}	10	<20	ns	$U_{CC} = 5$ V, $T_a = 25$ °C, $C_1 = 15$ pF, $N = 10$
t_{d1}	20	<34	ns	$U_{CC} = 5$ V, $T_a = 25$ °C, $C_1 = 15$ pF, $N = 1$

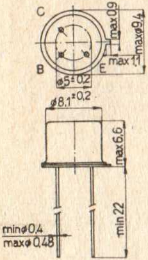
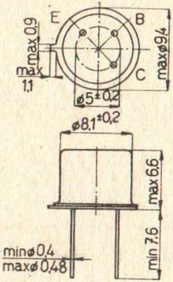
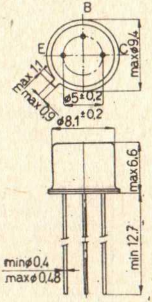
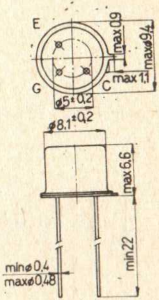
Outlines p. 423

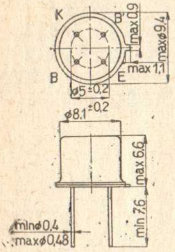
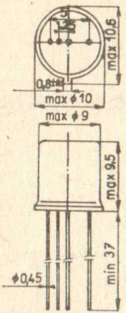
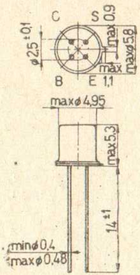
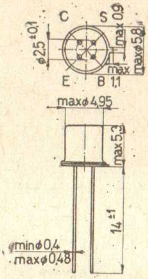


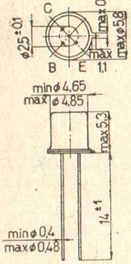
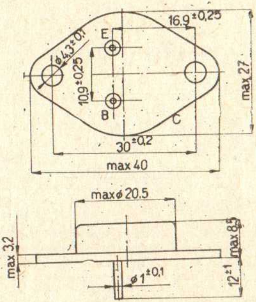
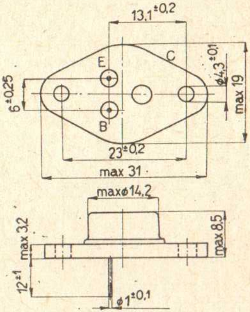
Dual 4-input expander for MHF 111

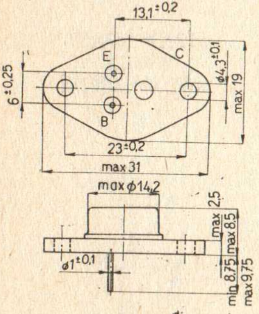
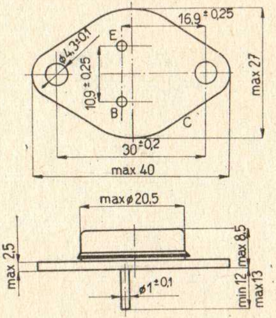
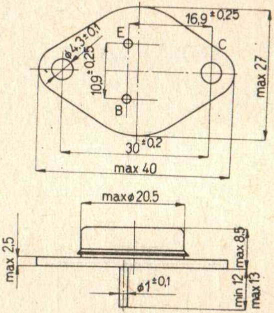
E = ABCD, when connected to pins 11 and 12 of MHF 111

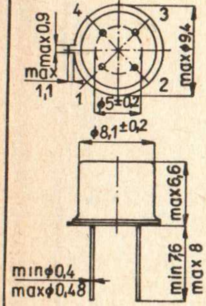
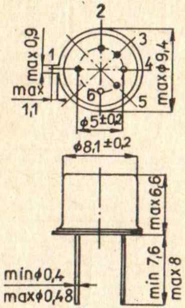
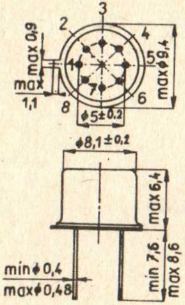
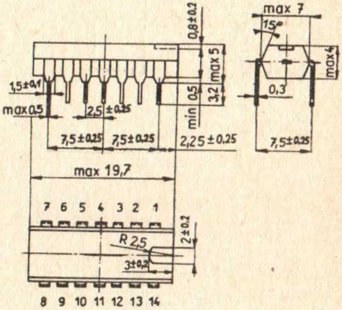
K 501	K	K 504	K 504
			
GC500 – GC502 (old design)	**GC510K – GC512K** **GC520K – GC522K**	**101NU70 – 156NU70** **GC507 – GC509** **GC515 – GC519** **GC525 – GC529** **GCN53 – GCN56** **GS506, GS507** (leads min. 30 mm) **OC70 – OC77**	**GC500 – GC502** (new design) **GC510 – GC512** **GC520 – GC522**

K 505	K 505	K 505	K 505
			
GS501 – GS502 **GS504** (connection C, B, E) **KF503 – KF504** **KF506 – KF508** **KF517** **KFY16, KFY18** **KFY34, KFY46**	**GF501 – GF504**	**KSY34**	**KF520**

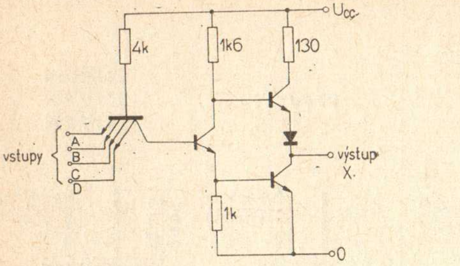
K 505	K 506	K 507	K 507
			
KFZ66 **KFZ68** **KSZ62**	**OC169, OC170** **GFY50**	**GF505 – GF507**	**GF514 – GF517**

K 507	K 601	K 602
		
KC507 – KC509 **KS500** **KSY62, KSY63**	**OC26, OC27** **2NU73 – 7NU73**	**OC30** **2NU72 – 5NU72**

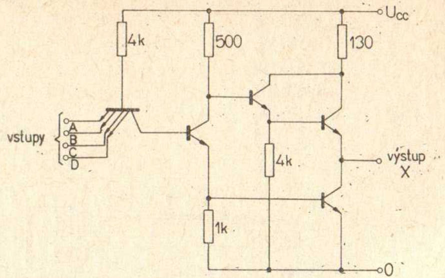
K 602	K 603	K
		
GD607 – GD609 **GD617 – GD619**	**2NU74 – 7NU74**	**KU601 – KU602** **KU605 – KU607**

TO – 5	TO – 5	TO – 5	
			
MAA115 **MAA125** **MAA145**	**MAA225** **MAA245**	**MAA325**	**MHC111** **MHE111** **MHF111** **MHG111** **MJA111** **MYA111**

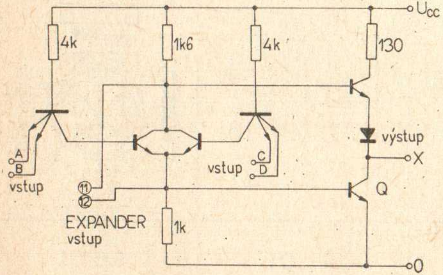
MHC111



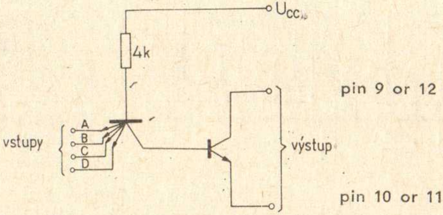
MHE111



MHF111

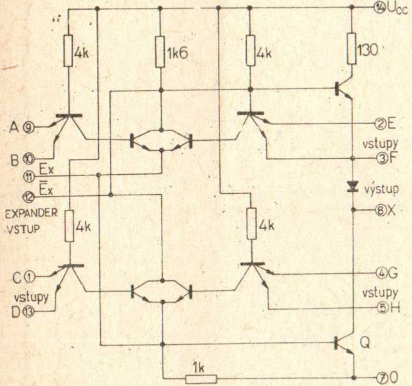


MYA111

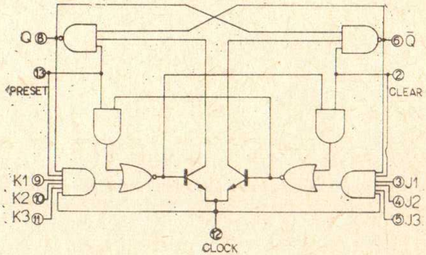


Remarks:
1. Pin 9 or 12 connection to pin 11 of MHF111
2. Pin 10 or 11 connection to pin 12 of MHF111

MHG111



MJA111



Comparison table for the equivalent and analogous types

Receiving tubes

Transmitting tubes

Semiconductor diodes

Transistors

Integrated circuits

Table of receiving tube equivalents

TESLA	European designation	Marconi	CV number	Other makers
1AF33	DAF96	ZD17 1)	CV784 1)	1FD1, 1FD9 1), 1S5T
1AF34				1Б2П, 1Б1П 1),3)
1F33	DF96	W17 1)	CV785 1)	1F3 1), 1T4T
1F34				1К2П, 1К1П 1),3)
1H33		X17 1)	CV782 1)	1C1 1), 1R5T
1H34				1А2П, 1А1П 1),3)
1H35	DK96			1AB6
1L33	DL91 1)		CV783 1)	1S4T
1NN41	OA160			
1Y32				1Z2
1Y32T				~1Z2
2NN41				1N51
3L31				3A4 1)
3NN41	OA50			1N34
4NN41				1N48
5NN41	OA55			1N38
6B32	EAA91, EB91	D77/D152	CV140, CV283	6D2, 6Х2П
6BC32	EBC91			6AV6
6CC10	ECC33	B65	CV1988	6SN7, 6H8C
6CC31	ECC91		CV858	6Н15П, 6J6
6CC41				6Н2П, 12AX7 2)
6CC42				6385, 2C51, 5760, 6Н3П
6F10			CV660	6AC7, 6Ж4
6F31	EF93	W727	CV454	6BA6, 6К4П
6F32	EF95		CV850	6AK5, 6Ж1П
6F32V				5654, 6AK5W, 6AK5WA
6F35				6AJ5
6F36				6AH6, 6Ж5П
6H31	EK90	X727	CV453	6А2П, 6BE6
6L10			CV1882	6AG7, 6П9
6L31	EL90	N727	CV1862	6005, 6AQ5, 6П1П 4)
6L41			CV2129	5763
6L43				6CL6
6NN41				1N64
6Z31				6X4, 6Ц4П

TESLA	European designation	Marconi	CV number	Other makers
7QR20	~DG7-6 4)			~3BP1, ~3QP1 4)
12BC32	HBC91			12AV6
12F31	HF93		CV1928	12BA6
12H31	HK90			12BE6
12QR50			CV1069 4)	5JP1 4)
12QR51				~OE411PAV 4)
25QP20				10BP4
25QP21				10BP7
251QQ44	A25-10W			
280QQ44	A28-13W			
470QQ44	AW47-91			19ALP4, 19AQP4, 19BEP4
472QQ44	A47-11W			
502QQ44	A50-12W			
590QQ44	AW59-90			23AJP4, 23AMP4, 23AQP4, 23BCP4
592QQ44	A59-12W/2, A59-11W			23DEP4, 23DRP4, 23FQP4 23HBP4
AZ1			CV2860	
DY86				1S2
E88CC				6922, CCa
E180F				6688, 5A/170K, EF861
EAA91				6AL5
EABC80		DH719		6LD12, 6T8, 6AK8
EBF89				7125, 6DC8
EC86				6CM4
EC88				6DL4, 6LD4
ECC82		B329	CV491	12AU7
ECC83		B339	CV492	12AX7, 6L13
ECC84				6CW7, 6Н14П
ECC85		B719		6L12, 6AQ8
ECC88				6DJ8, 6Н23П
ECC91				6J6, 6Н15П
ECC189				6ES8
ECC802S				12AU7WA, 6067
ECC803S				12AX7WA, 6057

TESLA	European designation	Marconi	CV number	Other makers
ECH81		X719	CV2128	6C12, 6AJ8, 6И1П
ECH84				6JX8
ECF82				6U8
ECL82				6BM8
ECL84				6DX8
ECL86				6GW8
EF80		Z719, Z152		64SPT, 6BX6
EF86		Z729		6267, 6Ж32П
EF89			CV2901	6DA6
EF183				6EH7, 6F29
EF184				6EJ7, 6F30
EF800				EF860
EF806S				6267
EL34				6CA7
EL36				6CM5
EL81			CV2721	6CJ6
EL82				6DY5
EL83			CV2726	6CK6, 6CN6
EL84		N709	CV2975	6P15, 6BQ5, 6П14П, 6L40
EL86				6CW5
EL500				6GB5A
EM4n			~CV1434	
EM80			CV1352	65ME, 6BR5, 6E1П
EM81				6DA5
EM84				6FG6
EY82				6H3
EY83				6Ц10П 3)
EY88				6AL3
EY86				6S2
EZ80				6V4
EZ81		U709		UU12, 6CA4
PABC80				9AK8
PCC84				30L1, 7AN7
PC86				4CM4
PC88				4DL4
PCC85				9AQ8

TESLA	European designation	Marconi	CV number	Other makers
PCC88				7DJ8
PCC189				7ES8
PCF82				9U8
PCF200				8X9
PCF801				8GJ7
PCF802				8JW8
PCL82		~LN309		16A8, 30P12
PCH200				9V9
PCL85				18GV8
PCL86				14GW8
PL36				25E5, 30P4
PL81		N152, N359		213Pen, 21A6
PL82		N154, N329		30P16, 16A5
PL83		N153		15A6
PL84				30P18
PL500				28GB5
PY82		U152		19SU, 19Y3
PY83				17Z3
PY88				30AE3
UABC80				10LD12
UBF89				10FD12, 19DC8, 19FL8
UCC85				10L14
UCH81				10C14, 19D8, 19AJ8
UCL82				10PL12, 50BM8
UL84				10P18, 45B5
UY85				38A3
UM80				19BR5
UY82				55N3

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1. Double heating current, TESLA type more economical

2. Different socket

3. Different heating voltage

4. Different external design

Table of receiving tube equivalents

Typ	TESLA	Typ	TESLA
1A1П 1) 3)	1H34	**6AH6**	6F36
1A2П	1H34	**6AJ5**	6F35
1AB6	1H35	**6AJ8**	ECH81
1Б1П 1) 3)	1AF34	**6AK5**	6F32, EF95
1Б2П	1AF34	**6AK5W**	6F32V
1C1 1)	1H33	**6AK5WA**	6F32V
1F3 1)	1F33	**6AK8**	EABC80
1FD1	1AF33	**6AL3**	EY88
1FD9 1)	1AF33	**6AL5**	6B32, EAA91
1K1П 1) 3)	1F34	**6AQ5**	6L31
1K2П	1F34	**6AQ8**	ECC85
1N34	3NN41	**6AV6**	6BC32
1N38	5NN41	**6BA6**	6F31
1N48	4NN41	**6BE6**	6H31
1N51	2NN41	**6BM8**	ECL82
1N64	6NN40	**6BR5**	EM80
1R5 1)	1H33	**6BQ5**	EL84
1R5T	1H33	**6BX6**	EF80
1S2	DY86	**6C12**	ECH81
1S4 1)	1L33	**6CA4**	EZ81
1S4T	1L33	**6CA7**	EL34
1S5 1)	1AF33	**6Ц4П**	6Z31
1S5T	1AF33	**6Ц10П** 2)	EY83
1T4 1)	1F33	**6CL6**	6L43
1T4T	1F33	**6CJ6**	EL81
1Z2	1Y32, ~1Y32T	**6CK6**	EL83
2C51	6CC42	**6CM4**	EC86
3A4 1)	3L31	**6CM5**	EL36
3BP1	~7QR20 4)	**6CM6**	6L31
3QP1	~7QR20 4)	**6CN6**	EL83
4CM4	PC86	**6CW5**	EL86
4DL4	PC88	**6CW7**	ECC84
5JP1	~12QR50 4)	**6D2**	6B32, EAA91
5A/170K	E180F	**6DA5**	EM81
6A2П	6H31	**6DA6**	EF89

Typ	TESLA
6DC8	EBF89
6DJ8	ECC88
6DL4	EC88
6DX8	ECL84
6DY5	EL82
6E1П	EM80
6EH7	EF183
6EJ7	EF184
6ES8	ECC189
6F24	EF184
6F25	EF183
6F29	EF183
6F30	EF184
6FG6	EM84
6GG6	EZ80
6GB5A	EL500
6GW8	ECL86
6И1П	ECH81
6J6	6CC31
6JX8	ECH84
6K4П	6F31
6L12	ECC85
6LD4	EC88
6LD12	EABC80
6L13	ECC83
6L40	EL84
6N3	EY82
6H2П	6CC41
6H3П	(6CC42)
6H14П	ECC84
6H15П	6CC31
6H23П	ECC88
6P15	EL84
6П1П 4)	6L31
6П14П	EL84
6П18П	EL82
6R3	EY83
6S2	EY86
6T8	EABC80
6U8	ECF82
6V4	EZ80
6V8	EABC80
6X2П	6B32, EAA91
6X4	6Z31
6Ж1П	6F32, EF95
6Ж5П	6F36
6Ж32П	EF86
7A7	EF22
7AN7	PCC84
7DJ8	PCC88
7ES8	PCC189
7FC7	PCC189
7L7	EF22
7T7	EF22
8GJ7	PCF801
8JW8	PCF802
8X9	PCF200
9AK8	PABC80
9AQ8	PCC85
9U8	PCF82
9V9	PCH200
10BP4	25QP20
10BP7	25QP21
10C14	UCH81
10FD12	UBF89
10L14	UCC85
10LD12	UABC80
10LD14	UCC85
10P18	UL84
10PL12	UCL82

Typ	TESLA
12AU7	ECC82
12AU7WA	ECC802S
12AV6	12BC32
12AX7	ECC83
12BA6	12F31
12BE6	12H31
14GW8	PCL86
15A6	PL83
15CW5	PL84
15DQ8	PCL84
16A5	PL82
16A8	PCL82
17CVP4	AW43-88 (431QQ44)
17DJP4	AW43-80
17Z3	PY83
18GV8	PCL85
19AJ8	UCH81
19ALP4	470QQ44
19AQP4	470QQ44
19BEP4	470QQ44
19BR5	UM80
19BX6	UF80
19D8	UCH81
19DC8	UBF89
19FL8	UBF89
19SU	PY82
19Y3	PY82
21A6	PL81
21DKP4	AW53-88 (531QQ44)
21ENP4	AW53-80
23AJP4	590QQ44
23AMP4	590QQ44
23AQP4	590QQ44
23BCP4	590QQ44
23DEP4	592QQ44
23DRP4	592QQ44
23FQP4	592QQ44
23HBP4	592QQ44
25E5	PL36
26AQ8	UCC85
28GB5	PL500
30AE3	PY88
30L1	PCC84
30P16	PL82
30P4	PL36
30P12	PCL82
30P16	PL82
30P18	PL84
38A3	UY85
45B5	UL84
50BM8	UCL82
55N3	UY82
64SPT	EF80
65ME	EM80
163Pen	PL82
213Pen	PL81
1232	EF22
5654	6F32V
6057	ECC803S
6067	ECC802S
6096	6F32V
6267	EF806S
6385	6CC42
6485	6F36
6688	E180F
6922	E88CC
7125	EBF89
A25-10W	251QQ44
A28-13W	280QQ44
A47-11W	472QQ44

Typ	TESLA	Typ	TESLA
A59-12W/2	592QQ44	CV2010	6CC31
A59-11W	592QQ44	CV2011	ECC83
AW47--91	470QQ44	CV2020	6F32, EF95
AW59-90	590QQ44	CV2024	6H31
B329	ECC82	CV2026	6F31
B339	ECC83	CV2128	ECH81
B719	ECC85	CV2129	6L41
BPM04	6L31	CV2492	E88CC
CCa	E88CC	CV2493	E88CC
~CV140	6B32, EAA91	CV2521	6F36
CK5654	6F32V	CV2525	6BC32
CV283	6B32, EAA91	CV2526	6BC32
CV453	6H31	CV2721	EL81
CV454	6F31	CV2726	EL83
CV491	ECC82	CV2843	6CC31
CV492	ECC83	CV2844	6Z31
CV493	6Z31	CV2877	6F32, EF95
CV782 1)	1H33	CV2860	AZ1
CV783 1)	1L33	CV2882	6B32, EAA91
CV784 1)	1AF33	CV2883	6L31
CV785 1)	1F33	CV2901	EF86
CV850	6F32, EF95	CV2940	EL36
CV858	6CC31	CV2966	EY86
CV1352	EM80	CV2975	EL84
CV1376	EF80	CV3998	E180F
CV1434	~EM4n	CV4003	ECC802S
CV1471	EL34	CV4004	ECC803S
CV1535	EZ80	CV5037	6F31
CV1736	EF80	CV5041	6L43
CV1741	EL34	CV5055	EM81
CV1862	6L31	CV5072	EZ81
CV1928	12F31	CV5077	PL81
CV2004	6B32, EAA91	CV5092	EF800
CV2005	6B32, EAA91	CV5094	EL86
CV2007	ECC82	CV5140	EA52

Typ	TESLA
CV5231	E88CC
CV5331	ECC189
D2M9	6B32, EAA91
D77	6B32, EAA91
D152	6B32, EAA91
DAF96	~1AF33
DF96	~1F33
DG7-6	~7QR20 4)
DH109	UABC80
DH719	EABC80
DK96	~1H35
DL91 1)	~1L33
DL93 1)	~3L31
DN143	EBL21
DP61	EF95, 6F32
E82CC	ECC802S
E83CC	ECC803S
E95F	6F32V
E2163	ECC82
E2164	ECC83
EAA91	6B32
EB91	6B32, EAA91
EBC91	6BC32
EBL71	EBL21
ECC91	6CC31
ECC802	ECC802S
ECC803	ECC803S
ECH71	ECH21
EF93	6F31
EF95	6F32
EF804	~EF86
EF860	EF800
EF861	E180F
EF905	6F32
EK90	6H31
EL90	6L31
EZ90	6Z31
HBC91	12BC32
HF93	12F31
HK90	12H31
HM04	6H31
LN119	UCL82
LN309	PCL82
M8100	6F32V
M8136	ECC802S
M8137	ECC803S
N119	UL84
N152	PL81
N153	PL83
N154	PL82
N309	PL83
N329	PL82
N339	PL81
N359	PL81
N369	PCL82
N709	EL84
N727	6L31
N379	PL84
OA50	3NN41
OA55	5NN41
OA160	1NN41
OE411PAV	~12QR51 4)
OSW2025	6CC31
OSW3118	AZ1
OSW3121	AZ11
PM04	6F31
PM05	6F32, EF95
RV120/500s	AZ4
T2M05	6CC31
TS51	~6F32, EF95

Typ	TESLA
TS52	6CC31
U26	EY86
U49	EY86
U78	6Z31
U119	UY85
U153	PY81, ~PY83
U154	PY82
U192	PY82
U251	PY81, ~PY83
U319	PY82
U329	PY81, ~PY83
U381	UY85
U709	EZ81
UCH71	UCH21
UU12	EZ81
V2M70	6Z31
VG3116	AZ12
VG5007	AZ1
VG5107	AZ11
VT171 1)	1H33
VT172 1)	1AF33
VT173 1)	1F33
W17 1)	1F33
W25	~1F33
W81	EF22
W143	EF22
W727	6F31
WD119	UBF89
WE17 1)	1F33
WE54	AZ1
WE55	AZ1
WE56	AZ4
X17 1)	1H33
X25	~1H35
X143	ECH21
X719	ECH81
X727	6H31
X77	6H31
X101	UCH21
X119	UCH81
Y119	UM80
Z152	EF80
Z719	EF80
Z729	EF86
ZD17 1)	1AF33
Z1494	6F32V
ZD25	~1AF33

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1. Double heating current, TESLA type more economical
2. Different socket
3. Different heating voltage
4. Different external design

Table of the transmitting tube equivalents

TESLA	Marconi	Philips	Brown-Boveri	Other makers
DCG4/1000	ESU866 1)	DCG4/1000		RG3-250, 866A 1)
QQE03/12		QQE03/12		RS1029, 6360
RA0007A	RHT1			
RA0007B	RHT1 1)			Z9C1 1)
RA025B				ESU74 3), ESU77 3)
RA05A				ESU151 3)
RA7XL	CAR4 4)			
RA7YB				U1
RA7YA	CAR6			
RA100A		8020 1), 56000 1)		100R 1), B1-0,1/40 1) W1-0,1/40 1)
RC5B				RD12Ta
RC5C				RD2,4Ta
RD1XA	ACT9			ГС-7 4)
RD1XH	ACT29 3)			
RD1,5XA				ES36
RD2XF			ATL2-1	
RD2XG			ATL2-1 3)	
RD2XH			BTL1-1 4)	SRL351 4), 3J/160E 4)
RD2XJ			BTL1-1 4)	SRL351 4), 3J/160E 3)
RD5XF			ATL5-1 3)	ГУ-89Б, 5667, 889B КС9Д 3)
RD5XG			ATL5-1	889 3)
RD5XH			BTL6-1 4)	6421 3), 3L6T 3) RS1001 4), RS533 4)
RD5YA	CAT3			
RD5YF	889A		ATW5-1 3)	5666 3)
RD5YH	889A 1)		ATW5-1 4)	5666 4)
RD8XA	ACT14 3)			3L20Z-2 4)
RD8XH	ACT14 3)			3L20Z-2 4)
RD12XA	ACT16 3)			3L20Z-3 4), ГС4Д 4)
RD12XB	ACT16 4)			ГС4Д 4)
RD12XH	ACT16 4)			3L20Z-2 4), ГС4Д 4)
RD12YA	CAT6			3V20Z-2 4), RS261 4) SRW319 4)
RD12YB	CAT6K			RS257 3)
RD12YH	CAT6K 1)			RS257 3)

TESLA	Marconi	Philips	Brown-Boveri	Other makers
RD18YA	CAT9			ГС4В 4), RS255 4) SRW317 4). TA12/20 4) 3V20Z-3 4)
RD18YH	CAT9 1)			3V20Z-3 4), RS255 4)
RD20XF			ATL20-1 4)	921 4)
RD20XH			ATL20-1 4)	
RD20XK			ATL20-1 4)	
RD20XL				RS522 4), ML6427 4)
RD27AS	DET5			P27-500
RD50XA	ACT201			125 4)
RD50XH	ACT201 1)			125 4)
RD50VL				RS526 4)
RD50XL				RS526 4)
RD50YA				E3
RD75YB	CAT201, CAT20C	TA18/100 4)		3V80Z 4)
RD75YH	CAT201 3)	TA18/100 4)		
RD150YA	CAT14C	TA20/250 4)		
RD150YB	CAT17C			134 4), 3V160Z 4), RS300
RD150YH	CAT27 3)			
RD150YJ	CAT14C 3)	TA20/250 4)		
RD200A	MT12			
RD200B			TL50-1 3)	W463 3), HF200 4) OQQ151/3000 4), AX9900 4) SRS326 4), KC-9 4)
RD300S		TB3/750		SRS360, TY3-250, 5867, 9901
RE0,125XL				ГУ33Б
RE025XS				4X250B, 4CX250B, 7203
RE041XL				ГУ34Б
RE1,5XL				ГУ40Б
RE5XL				4CX5000A 4)
RE5XN				4CX5000A 4)
RE20XL				4W20000A 4)
RE65A				4-65A, QY3-65

TESLA	Marconi	Philips	Brown-Boveri	Other makers
RE125A, RE125C		QB3/300 3)	160-1 3)	4-125A, 4D21, RS685 3), QY3-125, CV2130, 6155, RS1007 3)
RE400F, RE400C		QB3,5/750 4)		4-400A, 4S-040T 3) 6156, RS686 4), RS1002 4)
RE1000F				4-1000A, КЖ6Б 4)
REE30A				QQV07/40, 829B, CV2666
REE30B		QQE06-40		CV2797, QQV06/40, RS1009, SRS4451, 5894
RL15A 1), 2)				RL4.8P12
RL65A	PT6B	PC1,5/100 3)		OS70/1750 4), 828 4)
T329T				RS329, CV3855, OGQ501/3000 4)
UA025A		DCG4/1000 1)		AX224 1), CV1835 1) RR-3-250 1), 3B28 1)
UA1A	GU14			
UA3A	GU11			
UA5A	GU15			
ZD1XB	ACM1S			M-435 4), MC-9 4)
ZD8XA	ACM3			ГС9Д 4)
ZD12YA	CAM3	UA12/15		MC-7 4)
ZE025XS				4X250B 4)
40RS40		QEP20/18		4PR60A, QV20-P18, CV2752
50RS20				5D21, ГМИ-83
51TR40				5C22, ТГИ 326/16
53TR40				HY-1 1)

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1. Different mechanical design, or other socket

2. Without the diode

3. Partial equivalent

4. Approximate equivalent

GERMANIUM DIODES AND TRANSISTORS

Tesla	Valvo Philips Mullard	Siemens	Telefunken	Intermetall	STC
GA200 (2NN41)		AA113			
GA201		AA116			
GA202	OA79	AA119	OA172		
GA203	OA81	AA113	OA174		
GA204	OA81	AA117, AA118	OA161		
GA205	OA70, OA90		OA160		
GA206					
GA207 (6NN41)					
OA5	OA5, AAZ15		OA180, OA182	FD4, FD6, FD7	
OA7	OA7				
OA9	OA9			FD3, FD9	
GAZ51	OA7				
GC500	OC74, AC128			OC302	
GC501	OC79, AC128				
GC502	OC80, AC128				
GC507	OC72, AC132	TF75	OC604 spez.	(OC302), OC307-3	ACY36
GC508	OC76		OC602 spez.	OC307, OC308	ACY28, ASY58,
GC509	OC77, ASY77			OC309-2, OC309-3	ASY51, ASY52
GC510	AC128	AC128	AC117		
GC510K	AC128K	AC128K			
GC511	AC188	AC188			
GC511K	AC188K	AC188K			
GC512	–	–			
GC512K	–	–			

Tesla	Valvo Philips Mullard	Siemens	Telefunken	Intermetall ITT	STC
GC515	OC70, AC125	TF65, č, ž, b	OC601, OC602	OC303	ACY34, ACY27
GC516	OC71, AC126	TF65–z, f	OC603, OC604,	OC304-1	ACY35
GC517	OC75, AC126	ACY23, ACY32, ACY33–V	AC116ž AC116-z	 OC350, OC304-3	 (ACY30), ASY58
GC518	OC75	ACY33–VI			
GC519	OC75	ACY33–VII			
GC520	AC176	AC176	AC175		
GC520K	AC176K	AC176K			
GC521	AC187	AC187			
GC521K	AC187K	AC187K			
GC522	—	—			
GC522K	—	—			
GD601		AD130			
GD602		AD131			
GD603		AD132			
GD604		AD163			
GD607	AD161	AD161	AD161		
GD608		~AD161			
GD609		~AD161			
GD617	AD162	AD162	AD162		
GD618		~AD162			
GD619		~AD162			

Tesla	Valvo Philips Mullard	Siemens	Telefunken	Intermetall ITT	amer.
GF501		AFY11			2N1141
GF502		AFY10			2N1142
GF503					
GF504	~AFY14	AFY10			2N1143
GF505	AF106	AF106	AF106		
GF506	~AF106	~AF106	~AF106		
GF507	AF139	AF139	AF139		
GF514	AF124	AF124, AF114	AF134		
GF515	AF126	AF126, AF116	AF136		
GF516	AF127	AF127, AF116	AF137		
GF517	AF127	AF127, AF117	AF137		
GFY50	OC170 (pro prům. použití)				
OC169	OC169	AF127	OC613		
OC170	OC170	AF126	OC614		
OC170vkv	OC171	AF124	OC615		

Tesla	Valvo Philips Mullard	Siemens	Telefunken	Intermetall	STC
OC30	OC30	TF77, TF78/30III	OD603		
2NU72					
3NU72	OC30A	TF77, TF78/30I	OD603		
4NU72					
5NU72	OC30B	TF77/60, TF78/60I	OD603/50		
OC26	OC26,, AD148	TF80			
OC27	OC27				
2NU73					
3NU73	OC26	TF80			
4NU73					
5NU73		TF80/60			
6NU73					
7NU73					
2NU74	ADZ11	AD133III, IV,	AD130IIII–IV	CTP1504, CTP1508	
3NU74		AD133V	AD130V	(CTP1504, CTP1508)	2N1147A, 2N1146A
4NU74			AD131III–IV	CTP1504	
5NU74			AD131V	(CTP1504)	2N1147B, 2N1146B
6NU74	ADZ12		AD132III–IV	CTP1500, CTP1503	
7NU74			AD132V	(CTP1500, CTP1503)	2N1147C, 2N1146C

SILICON DIODES, TRANSISTORS AND RECTIFIERS

Tesla	Valvo Philips Mullard	Siemens	Telefunken
KA201	BA102	BA102	
KA202	BA102	BA102	
KA204	BA138	BA138	BA138
KA206			1N916
KA207			1N916
KC507	BC107	BC107	BC107
KC508	BC108	BC108	BC108
KC509	BC109	BC109	BC109
KD601		~BD109	
KF503	BF114, ~BF177	BF114, ~BF177	BF114
KF504	~BF178	BF110, ~BF178	BF110
KF506	2N1613	BFY34	
KF507		BFY33	
KF508	2N1711	BFY46	
KS500		~BSY62	
KSY62		BSY62	
KU601			
KU602			
KU605	BUY12		
KU607	~BUY12		
KU606	BUY13		

Tesla	STC	Intermetall	EBERLE (ECO)	Syntron
KY701		BYY31	0320, 0300, 0310	S1010
KY702		BYY32	0321, 0301, 0311	
KY703		BYY33	0322, 0302, 0312	S1020
KY704		BYY34, BY115	0324, 0304, 0314	S1040, S1030
KY705	BY104	BYY37, BY103, BY104	0327, 0307, 0317	S1070, S1060, S1050
KY721	FST3/1	BYY88, OY5061		S1210
KY722	FST3/2	BYY89, OY5062		
KY723	FST3/3	– OY5063		S1220
KY724	FST3/4	BY90, OY5064		S1240, S1230
KY725	FST3/6	BY91, OY5067		S1270, S1060, S1050
KY708		IS10–100	0601	
KY710		IS10–200	0602	
KY711		IS10–300	0604	
KY712		IS10–400	0606	
KY715		IS20–100		R2010, R2005
KY717		IS20–200		R2020, R2015
KY718		IS20–300		R2030, R2025
KY719		IS20–400		R2040, R2035

Tesla	LUCAS	Philips Valvo Compelec	Soral	Semikron	Hoffman	Siemens
KY701						SSi B01 10
KY702				SK0,5/02		SSi B01 20
KY703	DD003		05DA30	–		–
KY704	DD006, DD056	BY114	05DA40	SK0,5/06		SSi B01 40
KY705	DD058	BY100, BY127	05DA80	SK0,5/10		SSi B01 80
KY721						V–23212–C0810 E30C850Si
KY722						V–23212–C0820 E60C850Si
KY723		BYY22–200	08DE30	–		–
KY724	DD2066	BYY22–400	08DE40	SK1/06, SK0,9/06	–	V–23212–C0840 E125C850Si
KY725	DD2068	BYY22–800	08DE80	SK1/10, SK0,9/10	–	V–23212–C0880 E250C850Si
KY708	DD4521		10GE10	SK10/02	1N3890	–
KY710	DD4523	BYY22	10GE20	-	1N3891	SSi E0820K
KY711		BYY67	10GE30	SK10/06	1N3892	–
KY712	DD4526	BYY24	10GE40	SK10/06	1N3893	SSi E0840K
KY715		BYX13–200	30LC10	SK25/02		–
KY717		BYX13–400	30LC20	–		SSi E0820 FK06
KY718		BYX13–600	30LC30	SK25/06		
KY719		BYX13–800	30LC40	SK25/06		SSi E0840 FK06

Tesla	amer.
KY701	
KY702	
KY703	
KY704	
KY705	
KY721	1N908, 1N2104, 1N2610
KY722	
KY723	1N1909, 1N2105, 1N2611, 1N3639
KY724	1N2107, 1N2613, 1N3640, 1N1911, 1N2106, 1N2612
KY725	1N1914, 1N1913, 1N912, 1N2615, 1N2614, 1N2108, 1N3641
KY708	
KY710	
KY711	
KY712	
KY715	1N1342R, 1N1342AR, 1N1342BR, 1N1582R, 1N1613R, 1N2492R, 1N1341R, 1N1341AR, 1N1341BR, 1N1581R, 1N1612R, 1N2228R, 1N2491R
KY717	1N1124R, 1N1344R, 1N1344AR, 1N1344BR, 1N1583R, 1N1614R, 1N2230R, 1N2493R, 1N1343R, 1N1343AR, 1N1343BR
KY718	1N1125R, 1N1345R, 1N1345AR, 1N1345BR, 1N1584R, 1N2232R, 1N2494R
KY719	1N1126R, 1N1346R, 1N1346AR, 1N1346BR, 1N1585R, 1N1615R, 1N2234R, 1N2495R

Tesla	Siemens	Siemens podle DIN	Siemens	DIN
	V23212–		V23212–	
KY701	B0110	E30C600Si	B0610	E30C550Si
			B0710	E30C400Si
KY702	B0120	E60C600Si	B0620	E60C550Si
			B0720	E60C400Si
KY703	–	–		
KY704	B0140	E125C600Si	B0640	E125C550Si
			B0740	E125C400Si
KY705	B0180	E190C600Si	B0680	E250C550Si
	V23212–		B0780	E250C400Si
KY721	B0110	E30C600Si		
KY722	B0120	E60C600Si		
KY723				
KY724	B0140	E125C600Si		
KY725	B0180	E190C600Si		

Tesla	LUCAS	Philips Valvo Mullard Compelec	Siemens	Siemens DIN
KYZ70	DD5620	BYX21/100, BYX20/100	V23212–E1205	E15C20/2Si
KYZ71	DD5621	BYX21/200, BYX20/200	E1210	E30C20/2Si
KYZ72	DD5623		E1220	E60C20/2Si
KYZ73	–			
KYZ74	DD5626			
KYZ75	DD5620	BYX21/100R, BYX20/100R	V23212-E1105	E15C20/2Si
KYZ76	DD5621	BYX21/200R, BYX21/200R	E1110	E30C20/2Si
KYZ77	DD5623		E1120	E60C20/2Si
KYZ78	–			
KYZ79	DD5626			

Tesla	Transistor AG.	Texas I.	STC	Intermetall	EBERLE (ECO)	SESCO
KT501	BTX30–$\overline{50}$, TAG1–50, 2N1595	2N1595	CRS1/05AF	SiT 0,8/50	0750	11T4
KT502	BTX30–100, TAG1–100, 2N1596	2N1596	CRS1/10AF	SiT 0,8/100	0751	12T4
KT503	BTX30–200, TAG1–200, 2N1597	2N1597	CRS1/20AF	SiT 0,8/200	0753	14T4
KT504	BTX30–300, TAG1–300, 2N1598	2N1598	CRS1/30AF	SiT 0,8/300	–	16T4
KT505	BTX30–400, TAG1–400, 2N1599	2N1599	CRS1/40AF	SiT 0,8/400	–	
KT710	TAG3–50	2N1600	CRS3/05AF	SiT 4/50	TSi 5/50	
KT711	TAG3–100	2N1601	CRS3/10AF	SiT 4/100	TSi 5/100	
KT712	TAG3–200, 2N3228	2N1602	CRS3/20AF	SiT 4/200	TSi 5/200	
KT713	TAG3–300	2N1603	CRS3/30AF	SiT 4/300	TSi 5/300	
KT714	TAG3–400, 2N3525	2N1604	CRS3/40AF	SiT 4/400	TSi 5/400	

Tesla	Brush-Clevite	Intermetall	EBERLE (ECO)
KZ703	ZOE 6,8	–	1206
KZ704	ZOE 8,2	–	1208
KZ705	ZOE 10		1209, 4120
KZ706	ZOE 10		1211, 4121
KZ707	ZOE 12		1212, 4122
KZ708	ZOB13	–	1213, 4123
KZ709	ZOE15		1215, 4124
KZ710	ZOE18		1216, 4125
KZ711	ZOE18		1218, 4126
KZ712	ZOE22		1220, 4128
KZ713	ZOB24	–	1224, 4129
KZ714	ZOE27		1227, 4130
KZ715	ZOE33, ZOE27		1230, 4131
1NZ70	ZNB5,6; ZNE5,6	ZL5	1305
2NZ70	ZNB6,2; ZNE6,8	ZL6	1306
3NZ70	ZNB7,5	ZL7	1307
4NZ70	ZNB8,2; ZNE8,2	ZL8	1308
5NZ70	– ZNE10	ZL10	1310, 5320
6NZ70	ZNB12; ZNE12	ZL12	1312, 5322
7NZ70	ZNB15; ZNE15	ZL15	1315, 5324
8NZ70	ZNB18; ZNE18	ZL18	1318, 5326

Tesla	LUCAS	Valvo Philips Mullard	La Radiotechnique	IRC	Hoffman	STC
KZ703	—	OAZ224	—	—	1N2043	—
KZ704	ZD4008	OAZ226	—	—	1N2044	Z5D82BF
KZ705	ZD4009	OAZ227	—	—	1N2044	Z5D91BF
KZ706	ZD4010, ZD4011	OAZ228	—	—	1N2045, 1N2498	Z5D100BF
KZ707	ZD4012	OAZ230	—	—	1N2046, 1N2500	Z5D120BF
KZ708	ZD4013	OAZ231	—	—	1N1816, 1N2047	Z5D130BF
KZ709	ZD4015	OAZ232	—	—	1N1817	Z5D150BF
KZ710	ZD4018	OAZ233	—	—	1N1819	Z5D160BF
KZ711	ZD4020	OAZ234	—	—	1N1820, 1N2048	Z5D180BF
KZ712	ZD4022	OAZ236	—	—	1N1821	Z5D220BF
KZ713	ZD4024	OAZ237	—	—	1N1822, 1N2049	Z5D240BF
KZ714	ZD4027	—	—	—	1N1823	Z5D270BF
KZ715	ZD4030	—	—	—	1N1824	Z5D300BF
1NZ70	—	BZY96—C5V6	BZY74 BZZ14	1N1590	—	Z3B56BF
2NZ70	—	BZY96—C6V8	BZZ75 BZZ16	1N1591	1N1767	Z3B68BF
3ZN70	ZD2008	BZY96—C7V5	BZY75 BZZ17	1N1591	1N1768	Z3B75BF
4NZ70	ZC2008	BZY96—C8V2	— BZZ18	1N1592	1N1769	Z3B91BF
5NZ70	ZD2010	BZY95—C10	— BZZ19	1N1593	1N1771	Z3B100BF
6NZ70	ZD2012	BZY95—C12	— BZZ22	1N1594	1N1773	Z3B120BF
7NZ70	ZD2015	BZY95—C15	— BZZ24	1N1595	1N1775	Z3B150BF
8NZ70	ZD2018	BZY95—C18	— BZZ26	1N1596	1N1777	Z3B180BF

Tesla	Telefunken			Siemens	Valvo Philips	EBERLE ECO	
KZZ71	BZY85/D6V8	BZY85/C6V2	OA126/6,7	BZY83/D6V8	OAZ202	OA210	1106
KZZ72	/D8V2	/C7V5	OA126/8	/D8V2	OAZ205	OA211	1107
KZZ73	/D8V2	/C8V2	/9	/C9V1	OAZ206		1109
KZZ74	/D10	/C10	/10	/C10			1110, 1110c
KZZ75	/D12	/C11	/11	/C11			1111, 1111c
KZZ76	/D12	/C12, C13	/12	/C12, C13V5			1112, 1112c
KZ721	–	–	OA126/6,7	BZY83/D6V8	OAZ210		1106
KZ722	BZY85/D8V2		OA126/8,9	/D8V2	OAZ212		1108
KZ723	/D10		OA126/9, 10, 11	/D10	OAZ212, OAZ213		1110
KZ724	/D12		OA126/11, 12	/D12	OAZ213		1112

Tesla	LUCAS 0,6W	Intermetall		Brush- Clevite 250mW		STC	
KZZ71	–	ZG6,8	Z6K	ZE6,8	ZB6,2	ZFE6,8	ZFB6,2
KZZ72	ZC008	ZG8,2	Z7K	ZE8,2	ZB7,5	ZFE8,2	ZFB8,2
KZZ73	ZC009	ZG8,2 ZG10	Z8K	ZE8,2	ZB9,1	ZFE8,2	ZFE8,2
KZZ74	ZC010	ZG10	Z10K	ZE10	ZB10	ZFE10	ZFB10
KZZ75	ZC011		Z12K	ZE12	ZB11	ZFE12	ZFB12
KZZ76	ZC012, ZC013	ZG12	Z12K	ZE12	ZB12	ZFE12	ZFB12
KZ721				ZE6,8	ZC6,2	ZFE6,8	ZFC6,8
KZ722	ZD008	ZG8,2		ZE8,2	ZC8,2	ZFE8,2	ZFC8,2
KZ723	ZD010	ZG10		ZE10	ZC11	ZFE10	ZFC11
KZ724	ZD012	ZG12	Z12K	ZE12	ZC11, ZC14	ZFE12	ZFC11, ZFC14

SILICON PHOTODIODES, PHOTOTRANSISTORS AND PHOTOTHYRISTORS

Tesla	Valvo Philips Mullard	Siemens	Telefunken	SESCO	Texas I.	amer.
KP101		~BPY61			LS400	~1N2175
KP500				51T4C		
KP501				52T4C		
KP502				54T4C		
KP503				–		
KP504				–		
1PP75	~BPY10	BP100, BPY11				
10PN40	OAP12	APY10, APY11				

INTEGRATED CIRCUITS

Tesla	Siemens	Mullard
MAA115	TAA131 (epoxyd-package) TAA141 (package TO–18)	TAA263 (package TO–18)
MAA125 **MAA145**	TAA121 (two resistors has more, equal function)	

TESLA tube complement for receiver

TESLA

Radio receiver:

Beseda 845A	2×ECH4, EBL1, EM4, AZ1
Harmonie (Harmonie II)	ECH21, 2×EF22, EBL21, EM11, AZ11
Klasik	ECH21, 2×EF22, EBL21, EM11, AZ11
Kongres	ECH21, 2×EF22, EBL21, EM11, AZ11
Kvinta	ECH21, 3×EF22, EBL21, EM11, AZ1 (AZ11)
Liberator Super C420	ECH21, 2×EF22, EBL21, EM11, AZ11
Melodie (Melodie II)	ECH21, 2×EF22, EBL21, EM11, AZ11
Riava	2×ECH21, EBL21, EM4, AZ11
Romance	ECH21, 2×EF22, EM11, AZ11, EBL21
Rytmus	2×UCH21, UBL21, UY1N
Signál	2×ECH21, EBL21, EM11, AZ11
Talisman	2×UCH21, UBL21, UY1N
T120	2×UCH21, UBL21, UY1N
T254	2×UCH21, UBL21, UY1N
T613	EF12, EL11, AZ11
T666	ECH4, (6A8GT, 12A8GT), 6D6, 6Q7GT, 6V6G
T713	EF12, EL11, AZ11
T713 II	EF22, EBL22, AZ11
305U Talisman	2×UCH21, UBL21, UY1N
306U Talisman	2×UCH21, UBL21, UY1N
307U Talisman	2×UCH21, UBL21, UY1N
308U Talisman	2×UCH21, UBL21, UY1N
312A Junior	ECH81, EBF89, ECL82, EZ80 (EZ81)
314B Lunik	3×OC170, 105NU70, 106NU70, 2×101NU71, 1NN41, 5NN41
315A Sonatina	ECH81, EBF89, PCL82, PY82
316B	3×OC170, 2×OC71, 2×GC500 (OC74), 1NN41, 5NN41
317B	3×OC170, 105NU70, 106NU70, 2×101NU71, 2×1NN41
318B	3×OC170, 105NU70, 106NU70, 2×101NU71, 5NN41, 1NN41
318B-2	3×OC170, 2×OC71, 2×GC500 (OC74), 2×1NN41
320A Sputnik	ECH81, EBF89, ECL82, (selén)
320A-5	ECH81, EBF89, ECL82

320A-9	ECH81, EBF89, ECL82
321A	ECH81, EBF89, ECL82
323A	ECC85, EBF89, EAA91, ECL86
324A Nocturno	ECC85, EBF89, ECL86, 2×GA206
330A	ECH81, EBF89, ECL82
401U Accord	2×UCH21, UBL21, UY1N
405U	2×UCH21, UBL21, UY1N
406 Vltava	2×UCH21, UBL21, UY1N
407U	2×UCH21, UBL21, UY1N
410U	2×UCH21, UBL21, UY1N
411U	2×UCH21, UBL21, UY1N
420A	6H31, 6F31, 6BC32, 6L31, 6Z31
420U	12H31, 12F31, 12BC32, 35L31, 35Y31
422U	2×UCH21, UBL21, UY1N, EM11
424A Gavota	ECH81, EBF89, ECL82, EM80
425A	ECH81, EBF89, ECL82, EM80
426A Tenor	ECH81, EBF89, ECL82, EZ80 (EZ81)
427A Poézia	ECC85, ECH81, EBF89, EABC80, EL84, EM84
428A Gavota	ECH81, EBF89, ECL82, EM80
430B-2	2×OC171, 3×OC170, 2×OC71, 2×GC500 (OC74), 2×GA202 (OA172), GA203 (OA174)
431B-2 Havana	2×OC171 (OC170vkv), 3×OC170, 3×OC171, 2×GC500, 2×GA202, 2×KA501, GA201
431B Havana	3×OC170, OC75, OC71, 2-GC500, 2×OC171, KA501, GA201, 2-GA206 nebo GA202, OA7
432A	ECC85, ECH81, EBF89, EAA91, 2×ECL86
433A Carioca	ECC85, EBF89, EAA91, ECL86, EM84
501A Arie	2×ECH21, EBL21, AZ11
504U-II Pionýr	2×UCH21, UBL21, UY1N
505A Favorit	2×ECH21, EBL21, EM11, AZ11
506A	ECH21, 6F31, 6BC32, 6L31, AZ11
508B	1H33, 3×1F33, 2×1AF33, DLL101
510A	6H31, 6F31, 6BC32, 6L31, EM11, 6Z31
512A	6H31, 2×6F31, 6BC32, 5L31, EM11, 6Z31
514A	6H31, 2×6F31, 6BC32, 6L31, EM11, 6Z31
516A Largo	ECH21, 2×EF22, EBL21, EM11, AZ11
521A Populár	6H31, 6F31, 6BC32, 6L31, 6Z31, EM11
522A Rondo	2×ECH81, PABC80, PL82, EM80, (EM81), 6Z31
522A-a **522A-c** **Rondo**	2×ECH81, PABC80, PL82, EM80, (EM81), EZ81, (EZ80)
522A-b **522A-d** **Rondo**	2×ECH81, EABC80, EL84, EM80, (EM81), EZ81; (EZ80)
525A Kvarteto	ECC85, ECH81, 6F31; 6B32, 6BC32, PL82, EM80

526A Kantáta	ECH81, 6F31, 6BC32, 6L31, EZ81, (EZ80), EM80
527A Melódia	ECC85, ECH81, 6F31, 6B32, 6BC32, PL82, EM80
528A Rondo II	2×ECH81, EABC80, EL84, EM80, (EM81), EZ81, (EZ80)
532A Echo	ECC85, ECH81, EBF89, EABC80, EL84, EM84, selén
533A Fuga	ECC85, ECH81, EBF89, EABC80, EL84, EM84
534A Traviata	ECC85, ECH81, 6F31, 6B32, 6BC32, PL82, EM80
535A Echo Stereo	ECC85, ECH81, EBF89, 6B32, ECC83, 2×ECL82, EM84
536A Teslaton	ECC85, ECH81, EBF89, EAA91, ECL86, EM84
537A	ECC85, ECH81, EBF89, EABC80, 6BC32, 2×EL84, EM84
538A	ECC85, ECH81, EBF89, EAA91, 2×ECL86, EM84
603A Symfonic	ECH21, 2×EF22, EBL21, AZ11
605A Blaník	ECH21, 2×EF22, EBL21, AZ11
612A Dukla	ECH21, 6F31, 6BC32, 6L31, AZ11
614A	ECH21, 2×EF22, EBL21, EM11, AZ11
615A	ECH21, 6F31, 6BC32, 6L31, AZ11, EM11
616A	ECH21, 6F31, 6BC32, 6CC31, 2×6L31, 2×6Z31, EM11
618A Kriváň	ECH21, 6F31, 6BC32, 6L31, EM11, AZ11
619A Dalibor	ECH21, EF22, EBL21, AZ11, EM11
620A Máj	ECH21, 2×EF22, EBL21, AZ11, EM11
621A Opera	ECH21, 6F31, 6BC32, 6CC31, 2×6L31, 2×6Z31, EM11
622A	6H31, 6F32, 6F31, 6BC32, 6L31, AZ11, EM11
623A Máj	ECH21, 2×EF22, EBL21, AZ11, EM11
624 Chorál	ECH81, 6F31, 6B32, 6CC41, 6L31, AZ11, EM80
625 Hymnus	ECC85, ECH81, 2×6F31, 6B32, 6BC32, EF80, PL82, EZ81, EM80
627A Variace	ECC85, ECH81, 2×EBF89, EAA91, ECC83, EL84, EZ80, EM80
721 Festival	ECH81, 6F31, 6B32, 6L31, EM80, (EM81), 6CC41, AZ11
628A Lampa	6H31, 3×6F31, 6B32, 6M40 (EM80), 6F32, 6L31, AZ11
805A Filharmonie	ECC85, ECH81, 2×PL82, EM80, 2×6F31, 2×6B32, 2×6CC41
1PP 83500 Adaptor	ECC85, EBF89, EBF89, 6B32

Radio receiver with gramophone and / or tape recorder:

512030 512034 512035 512037 **Dominant**	ECH21, 2×EF22, EBL21, EM11, AZ11
512070 Tábor I	ECH21, EF22, 6B31, EM11, 2×6CC31, 6BC32, 2×EBL21, AZ12
512072 512073 Tábor II 512074	ECH21, EF22, 6B31, EM11, 2×6CC31, 2×EBL21, AZ12
1001A Dirigent	6H31, 6F31, 6BC32. 6L31, 6Z31, EM11
1002A Maestro	ECC85, ECH81, 2×6F31, 2×6B32, EF80, PL82, EZ81, EM80
1003A Orchestr	ECH81, 6F31, 6L31, 6BC32, EZ81, EM80
1004A Ouvertura	ECH81, 6F31, 6B32, 6L31, 6CC41, EM80, AZ11
1005A Pastorale	ECC85, ECH81, 6F31, 6BC32, 6B32, PL82, EM80
1006A	ECH81, EBF89, ECL82, EM80
1007A Allegro	ECC85, ECH81, 2×EBF89, EAA91, ECC83, EL84, EZ80, EM80
1107 Copélia	ECC85, ECH81, 2×EBF89 EAA91, ECC83, EL84, EZ80, EM80
1008A Liberta	ECH81, EBF89, ECL82, EM80
1009A Barcarola	ECC85, ECH81, EBF89, EABC80, EL84, EM84
1010A Dunaj	ECC85, ECH81, EBF89, EABC80, EL84, EM84
1011A, A-2 Dunajec	ECC85, ECH81, EBF89, EABC80, EL84, EM84
1012A Koncert Stereo	ECC85, ECH81, EBF89, 6B32, ECC83, 2×ECL86, EM84
1014A Fuga	ECC85, ECH81, EBF89, EAA91, ECL86, EM84
1016 Sonáta	ECC85, EBF89. EAA91, ECL86
1018 Liberta 2	ECH81, EBF89, ECL82, EM80
1019A Piano	ECC85, EBF89, EAA91, ECL86, EM84
1020A Capricio	ECC85, ECH81, EBF89, EAA91, ECL86, EM84
1101A 1102A **Jubilant**	ECH21, EF22, 6B31, 6CC41, EM11, 2×EBL21, 6CC41, AZ12 magnetofon 6CC42. 6F32. 6L31, EM11
1104A Bolero	ECH81, EM80, 6F31, 6B32. 6L31, 6CC41, AZ11
1105 Viola	ECC85, ECH81, 2×PL82, EM80, 6F31, 6F31, 2×6B32, 2×6CC41, magnetofon EF86, EM81. ECC83, EL84, EZ80
1106A Maestro II	ECC85, ECH81, 2×6F31. 6B32. 6BC32, EF80. PL82, EZ81, EM80

1107 Copélia	ECC85, ECH81, 2×EBF89, EAA91, ECC83, EL84, EM80, EZ80
1112A	ECC85, ECH81, EBF89, 6B32, ECC83, 2×ECL86, EM84
1118A Capella	ECC85, ECH81, EBF89, EAA91, 2×ECL86, EM84
1120A	ECC85, ECH81, EBF89, EABC80, EL84, EM84
1121A Baryton	ECC85, EBF89, EAA91, ECL86, EM84
Le 680	ECC85, ECH81, EBF89, EABC80, EL84, EM84
LE680 A5	ECC85, ECH81, EBF89, EAA91, ECL86, EM84
Stereofonic	ECC85, ECH81, EBF89, EBF89, EAA91, 2×ECC83, 2×EL84, EM80, EZ81

Autoradio receiver:

503BV	ECH21, ECH21, EBL21
531BV	
2101B	6CC42, 2×6F32, 6BC32, 6L31, 6Z31
2003BV Turista	2×EBF89, ECH81, EABC80, EL84
2004BV Turista univ.	2×EBF89, ECH81, EABC80, EL84
2007BV Standard	2×EBF89, ECH81, EABC80, EL84, ECC85
2008BV Standard univ.	2×EBF89, ECH81, EABC80, EL84, ECC85
2103BV Luxus	2×ECC82, 2×EBF89, ECH81, EL84, EABC80
2104BV Luxus univ.	2×ECC82, 2×EBF89, ECH81, EL84, EABC80
2203BV Ozvěna	2×ECC83. 2×EBF89, ECC85, ECH81, EABC80, 2×EL84, ECC85

Box radio receiver:

B452	DK21, DF21, DAC21, DL21
2701B T60	156NU70, 2×155NU70, 2×1NN41, 104NU70, 3×103NU70
2702B T60A	156NU70, 2×155NU70, 107NU70, 2×101NU71, 1NN41
2703B T60B	156NU70, 2×155NU70, 2×103NU70, 2-103NU70, 1NN41
2703B T60C	156NU70, 2×155NU70, 2×103NU70, 2-103NU70, 1NN41
2705B T60A-B	156NU70, 2×155NU70, 107NU70, 2×104NU71, 1NN41
2709B	3×OC170, 2×OC71, 2×GC500 (OC74). 2×1NN41
2710B Zuzana	3×SFT317, OC76, 104NU71, OC72, GA201
2711B Dana	3×OC170, OC75. 2×OC72, GA201
2712B Iris	3×SFT317, OC75, 2×OC72, GA201
2715B Monika	2×OC171, 3×OC170, 2×OC71, 2×OC72, 2×GA206 nebo GA201

2800 T58	2×154NU70, 3×153NU70, 1NN41, 104NU70, 103NU70, 2×103NU70
2800B-2 Mír	152NU70, 152NU70, 3×153NU70, 2×103NU70, 2-103NU70, 1NN41
2803 Perla	156NU70, 2×155NU70, 2×106NU70, 2×101NU71, 1NN41
2805B T61	OC170, 2×155NU70, 105NU70, 106NU70, 2×104NU71, 5NN41, 1NN41
2805B-2 Jalta	OC170, 2×155NU70, 105NU70, 106NU70, 2×104NU71, 5NN41, 1NN41
2812B Akcent	3×OC170, 2×OC171, OC71, OC75, 2×GC500, GA201, 2×GA202, 2×KA501
2815 Monika	2×OC171, 3×OC170, 2×OC71, 2×GC500, GA201, 2×GA202, KA501
2816 Gemini	2×OC171, 3×OC170, 2×OC71, 2×OC72, 2×GA206 nebo GA201
2816B Mambo	2×OC171, 3×OC170, 2×GA206, GA201, 2×OC71, 2×SFT352
2816B-5 Dolly	
2817B Twist	2×OC171, 3×OC170, 2×GA206, GA 201, 2×OC71, 2×OC72
2818B Big Beat	GF505, 4×OC170, OC75, OC71, 2×GC500, 2×GA206, GA201, KA501
2818B-2 Chanson	
T61	2×OC170, OC169, 2×OC71, 2×OC72, 1NN41, 5NN41
2805B-3 T63	OC170, 2×155NU70, 105NU70, 106NU70, 2×101NU71, 1NN41, 5NN41
T4	2×OC171, 3×OC170, 3×OA172, 2×KA501, 2×OC71, 2×OC74
3001B Minor	1H34, 1F34, 1AF34, 1L34
3002 Minor Duo	1H33, 1F33, 1AF33, 1L33
3101B	2×1F33, 1H33, 3L31, 1AF33
3102AB Orient	1H35, 1F33, 1AF33, 3L31, 6Z31
3103AB Rekreant	1H34, 2×1F34, 1AF34, 1L34

Television receiver:

4001A	8×6F32, 1Y32, 2×6B31, 3×6CC31, 2×6L31, 2×AZ4, 6L50, 6Z31, 6BC32, 25QP20
4002A	8×6F32, 1Y32, 2×6B31, 3×6CC31, 2×6L31, 6L50, 6Z31, 6BC32, 25QP20, 2×AZ4 rozhlasový přijímač: 2×ECH21, EM11
4102U Mánes	PCC84, 3×PCF82, 3×EF80, PABC80, 2×PL82, ECC82, PL81, PY83, DY86, 351QP44
4103U Aleš	PCC84, 3×PCF82, 3×EF80, PABC80, 2×PL82, ECC82, PL81, PY83, DY86, 1NN40, 430QP44

4106U Ametyst	PCC84, PCF82, 3×EF80, PL83, PCF82, EF80, PABC80, PL82, ECH81, PCL82, PCF82, PL36, PY83, DY86, AW43-80, 7NN41, (selén)
4108U Azurit	PCC84, 2×PCF82, 5×EF80, ECH81, 2×PCL82, 2×EAA91, PL36, PY88, DY86, PCL84, 431QQ44, KA220/05 (36NP75), 7NN41
4110U Oravan	PCC84, 2×PCF82, 5×EF80, PABC80, PL81, PL82, PCL82, ECC82, PY83, 351QP44, 7NN41, (selén), DY86
4111U Kriváň	PCC84, 2×PCF82, 5×EF80, PABC80, PL81, PL82, PCL82, ECC82, PY83, 430QP44, 7NN41, (selén), DY86
4112U Carmen	2×PCF82, 5×EF80, 2×EAA91, 2×PCL82, PCC84, PCL84, ECH81, PL36, PY88, DY86, 7NN41, 431QQ44 (AW43-88), KA220/05
4113 Štandard	PCC88, PCF82, 5×EF80, PCL84, ECH84, ECC82, PL500, PY88, DY86, 2×EAA91, 2×PCL82, 431QQ44, 7NN41, 2×3NN41, 36NP75
4114U Palas	PCC88, PCF82, 5×EF80, PCL84, ECH84, ECC82, PL500, PY88, DY86, 2×EAA91, 2×PCL82, 431QQ44, 7NN41, 2×3NN41, 36NP75
4115U Luneta	PCC88, PCF82, 5×EF80, PCL84, ECH84, ECC82, PL500, PY88, DY86, 2×EAA91, 2×PCL82, 431QQ44, 7NN41, 2×3NN41, 36NP75
4116U Marina	PCC88, PCF82, 5×EF80, PCL84, ECH84, ECC82, PL500, PY88, DY86, 2×EAA91, 2×PCL82, 470QQ44, 7NN41, 2×3NN41, 36NP75
4117U Anabela	PCC88, PCF82, 5×EF80, ECH84, ECC82, PL500, PY88, DY86, PCL84, 2×EAA91, 2×PCL82, 470QQ44, 2×3NN41, 7NN41, 36NP75
4118U Oliver	PCC88, 2×PCF82, EF183, 2×EF80, PCL84, PCL86, ECH84, PCL85, PL500, PY88, DY86, 472QQ44, 2×OC170, GA205, 2×GA204, GA201, 2×GA206, KA220/05
4119U Miriam **Marcela**	PCC88, 2×PCF82, EF183, 2×EF80, PCL85, ECH84, PCL86, PCL84, PL500, PY88, DY86, 470QQ44, 2×OC170, 2×GA204, GA205, GA201, 2×GA206, KA220/05
4151AB Camping 25	6×GF505, 5×OC70, 4×OC170, 4×GC500, KF504, KF506, 155NU70, 2×156NU70, OC72, 2×GS501, 2NU74, 6NU74, KU601, KU605, 2×GA201, 2×GA203, GA205, 2-GA206,

	2×KA503 nebo 2×KA502, KY702, KY705, 2×KY708, KY711, 4NZ70, 251QQ44, DY86
Camping 28	6–GF505, 5×OC70, 4×OC170, 4×GC500, KF504, KF506, 155NU70, 2×156NU70, OC72, 2×GS501, 2NU74, 6NU74, KU601, KU605, 2×GA201, 2×GA203, GA205, 2-GA206, 2×KA502, KY702, KY705, 2×KY708, KY711, 4NZ70, 280QQ44, DY51
4202A Akvarel	4×6CC42, 6×6F36, 2×1NN40, 2×6B32, 2×UBL21, 2×PY83, 4×UY1NS, 6L43, 6F31, 6CC41, PL81, 1Y32T, 350QP44
4203A Athos	4×6CC42, 6×6F36, 2×1NN40, 2×6B32, 2×UBL21, 2×PY83, 4×UY1NS, 6L43, 6F31, 6CC41, PL81, 1Y32T, 430QP44
4203A-5 Athos II	5×6CC42, 4×6F36, 2×6B32, 6CC41, 2×UBL21, 6L43, PL81, PY83, 1Y32T, 430QP44
4206U Astra **4206U-2**	2×PABC80, 2×PCF82, 2×PL82, 2×ECC82, 3×EF80, PCC84, PL81, PY83, DY86, 430QP44
4206U-6 Astra	PCC84, PCF82, 2×EF80, PCF82, PL83, PABC80, EF80, 2×PL82, 2×ECC82, PABC80, PL81, PY83, DY86, ECC82, 430QP44
4208U Narcis	2×PABC80, 2×PCF82, 2×PL82, PL83, PCL82 2×ECC82, 3×EF80 PCC84, PL36, PY83, DY86, AW53-80
4210U-1 Kamelie	PCC88, 2×PCF82, 5×EF80, PCL84, PCL82, PABC80, PL84, ECH81, EAA91, PL36, PY88, DY86. 431QQ44, 2×3NN41, 3×7NN41, KA220/05, (36NP75)
4211U-1 Lotos	PCC88, 2×PCF82, 5×EF80, PCL84, PCL82, PABC80, PL84, ECH81, EAA91, PL36, PY88, DY86. 531QQ44, 2×3NN41, 3×7NN41, KA220/05, (36NP75)
4212U-1 Orchidea	PCC88, PCF82, EF183, 4×EF80, PCL84, PCL86, 3×ECH84, PCL85, PL500, PY88, DY86, 590QQ44, 2-GA206, 2×GA205, 2×KA503, KA220/05
4213U-1 Mimosa	PCC88, PCF82, EF183, 4×EF80, PCL84, PCL86, 3×ECH84, PCL85, PL500, PY88, DY86, 531QQ44, 2×7NN41, 2-GA206, 2×GA205, 2×KA503, KA220/05

4214U Korund	2×PCF82, 5×EF80, 2×EAA91, 2×PCL82, PCC84, PCL84, ECH81, PL36, PY88, DY86, 7NN41, AW43-88 (431QQ44), KA220/05
4216 Jantar	2×PCF82, 5×EF80, 2×EAA91, 2×PCL82, PCC84, PCL84, ECH81, PL36, PY88, DY86, 7NN41, 531QQ44, KA220/05
4218U Blankyt	PCC88, 2×PCF82, EF183, 2×EF80, PCL85, ECH84, PCL86, PCL84, PL500, PY88, DY86, 590QQ44, 2×OC170, 2×GA206, 2×GA204, GA205, 2×GA201, KA220/05
4219U Dajana	PCC88, 2×PCF82, EF183, 2×EF80, PCL84, PCL86, ECH84, PCL85, PL500, PY88, DY86, 592QQ44, 2×OC170, GA205, 2×GA204, GA201, 2×GA206, KA220/05
4307A Semiramis	TV-receiver: 2×PABC80, PCC84, 2×PCF82, PL36, PL83, PY83, 3×ECC82, 3×EF80, DY86, PCL82, AW53-80 mixer: EF86 radio-receiver: ECH81, 2×6F31, 2×6B32, EM80, 2×6CC41, 2×PL82, EM80, ECC85 tape recorder: (EF804) EF86, EL84, ECC83, EM81, EZ80
4310 Marold	PCC84, 4×PCF82, 4×EF80, PL83, PABC80, 6B32, PL82, ECH81, PY83, PL36, DY86, 1NN41, AW53-80
4314A Brožík	TV-receiver: PCC84, 4×PCF82, 4×EF80, PL83, PABC80, 6B32, PL82, ECH81, PL36, PY83, DY86, 1NN41, AW53-80 radio-receiver: ECC85, ECH81, 2×6F31, 6B32, 6BC32, EF80, PL82, EZ81, EM80 amplifier Tesla: ECC83, 2×PL82, EZ81 amplifier Gramofonové závody: 2×ECC83, 2×35L31, 2×35Y31
4312A Holar	TV-receiver: PCC84, 4×PCF82, 4×EF80, PL83, PABC80, 6B32, PL82, ECH81, PL36, PY83, DY86, 1NN41, AW53-80 radio-receiver: ECC85, ECH81, 2×6F31, 6B32, 6BC32, EF80, PL82, EZ81, EM80

	amplifier Tesla:
	ECC83, 2×PL82, EZ81
	amplifier Gramofonové závody:
	2×ECC83, 2×35L31, 2×35Y31
4313 Brandl	TV-receiver:
	PCC84. 4×PCF82, 4×EF80, FL83, PABC80 6B32, PL82, ECH81, PL36, PY83, DY86, 1NN41, AW53-80
	radio-receiver:
	ECC85, ECH81, 2×6F31, 6B32, 6BC32, EF80, PL82, EZ81, EM80
	amplifier Tesla:
	ECC83, 2×PL82, EZ81
	amplifier Gramofonové závody:
	2×ECC83, 2×35L31, 2×35Y31
	tape recorder:
	EF86, ECC83. EM81, EL84, EZ80 (EZ81)
4316U Děvín	PCC84, 3×PCF82, 3×EF80, PABC80, 2×PL82, ECC82, PL81, PY83, DY86, 430QP44, 1NN41
4317A Muráň	PCC84, 2×PCF82, 5×EF80, PABC80, PL81, PL82, PCL82, ECC82, PY83, 430QP44, 7NN41, (selén), DY86
4320A Diamant	2×PCF82, 5×EF80, 2×EAA91, 2×PCL82, PCC84, PCL84, ECH81, PL36, PY88, DY86, 7NN41, AW43-88 (431QQ44), KA220/05
4325A Ametyst Sektor	televizor 4106U:
	PCC84, 2×PCF82, 5×EF80, PCL82, ECH81, PCL84, PL36, PY88, 2×EAA91, DY86, AW43-88 (431QQ44)
	radio-receiver:
	ECC85, ECH81, 2×6F31, 2×6CC41, 2×PL82, 2×6B32, EM81

Tape recorders:

ANP 201 Sonet	EF86, ECC83, EM81, EL84, EZ80 (EZ81)
ANP 210 Sonet Duo	EF86, ECC83, ECL82, EM84, (EM80), EZ80
ANP 212 B3	2×105NU70 ECC83. ECL82, ECC82, EM84, EZ80
AZZ 941	2×107NU70 (amplifier to B3)
ANP 220 B4	2×155NU70 nebo 2×106NU70, 105NU70, 3×106NU70, 104NU71, OC70, 2×OC72, GC500, 3×2NU72 nebo OC30, 6NN41, 3×33NP75
ANP 225 B41	4×106NU70, 104NU71, OC72, 2×2NU72 nebo OC30, 6NN41, 2×33NP75
ANP 223 B42	4×106NU70, 104NU71, OC72, 2×2NU72 nebo OC30, 6NN41, 2×33NP75
ANP 301 Korespondent	EF86, EBF89, ECC82
517 080 MGK 10	6CC42S, 6F32, 6F36, 6L31, 6Z31, EM11
2AN 38002 Adaptér	6CC41, 6CC31, 6Z31, EM11
MF52, MF2	EF86, ECC85, EL84, EM81, 6L31, EZ81, 2NN41
ANP 401 Uran	155NU70, 3×107NU70, OC71, 2×GC500, 2-GC500, 4NZ70, 1NN41
ANP 402 Start	105NU70, 2×107NU70, 2-104NU71, 104NU71

ANP 405	2×106NU70, 107NU70, 2×104NU71, 104NU71 (nebo 102NU71 nebo 101NU71)
Diktafon	ECC82, ECC83, 105NU70

Amplifiers:

KZ 8	6F31, 2×6BC32, 6CC31, 6L31, AZ12
AZK 101	3×ECC83, 2×EL84, EZ81
AZK 201	2×EF86, 3×ECC83, 2×EL34, GZ34, EM84, 4NN41
AZK 401	2×EF86, 3×ECC83, 2×EL34, EZ80, EM84, 5NN41, 4NN41, GZ34

Intercommunication amplifiers:

AZD 211	ECC84, EL84
ALS 210	4×3NU70

4920 A	3PN 380 72	EC82, E88C
	3PN 381 12	E88CC, E88CC

NOTICE:

NOTICE:

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NOTICE:

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NOTICE:

NOTICE:

TESLA

ROŽNOV

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