



ELECTRONIC TUBE REFERENCE

10P12S

Power - Pentode Single (NOT beam) (under 10W) electronic tube

CONSOLIDATED TECHNICAL
DATA

1 SECTION
CONSTRUCTION
PENTODE

Russian output pentode designed for low-frequency power amplification in long-distance wire-communication equipment. Manufacturer documentation identifies audio-frequency power delivery as its primary function.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	5
NOMINAL HEATER	10 V / 640 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Pentode	
TRANSCONDUCTANCE	0.00285 S
AMPLIFICATION FACTOR	95
MAXIMUM PLATE VOLTAGE	250 V
MAXIMUM PLATE DISSIPATION	8 W
<i>Published ratings/characteristics promoted where clearly identified; additional bilingual values retained as parameters.</i>	

10P12S — Low-Frequency Power Pentode

The **10P12S** (Cyrillic: **10П12С**) is an indirectly heated glass-envelope output pentode designed primarily for low-frequency power amplification in long-distance wire communication and telephone service systems. It features an oxide-coated cathode, an octal base, and a top-cap connection for the control grid.

Engineered for high reliability in demanding telecommunication infrastructure, the 10P12S is built to withstand harsh environmental conditions. It operates reliably across an ambient temperature range of **-60 °C to +70 °C** and can tolerate a relative humidity of **95% to 98%** at an ambient temperature of **+20 °C**. The tube has a maximum weight of **50 grams** and carries a guaranteed service life of **1000 hours**.

Physical Construction, Dimensions, and Pinout

The 10P12S is constructed in a glass bulb with a standard octal base. To minimize input capacitance and improve isolation, the control grid (g_1) is terminated to a metal top cap at the apex of the bulb.

Physical Dimensions

- **Maximum Bulb Diameter:** 40 mm
- **Maximum Base Diameter:** 29.4 mm
- **Maximum Overall Height:** 125 mm
- **Top Cap Diameter:** 9 mm
- **Top Cap Height:** Minimum 8 mm (with a maximum overall top cap assembly height of 10.5 mm)

Pinout Configuration

The tube utilizes a specialized 5-pin configuration on its octal base, with the electrodes assigned as follows (viewed from the underside of the base):

Pin Number	Electrode Connection
1	Heater (h)
2	Anode (a)
3	Screen Grid (g_2)
4	Cathode (k) and Suppressor Grid (g_3) (internally connected)
5	Heater (h)
Top Cap	Control Grid (g_1)

Electrical Characteristics and Operating Points

The nominal electrical characteristics of the 10P12S are specified under static DC conditions, while its dynamic performance is rated under specific load conditions.

Nominal Static Characteristics

Under a nominal heater supply of **10 V** and standard electrode potentials, the tube exhibits the following typical parameters:

Parameter	Symbol	Nominal Value
Heater Voltage	U_h	$\$10 \pm 1\$ \text{ V}$
Heater Current	I_h	640 mA
Anode Voltage	U_a	135 V
Screen Grid Voltage	$U_{[g2]} (/tubes/G2)$	135 V
Control Grid Bias	U_{g1}	−15 V
Anode Current	I_a	$\$31 \pm 9\$ \text{ mA}$
Screen Grid Current	$I_{[g2]} (/tubes/G2)$	$\$7 \times 3\$ \text{ mA}$
Transconductance	S	$\$2.85 \pm 0.35\$ \text{ mA/V}$
Internal Resistance	R_i	$\geq 30 \text{ k}\Omega$

Dynamic Operating Points and Power Output

The 10P12S is optimized for power amplification at elevated anode voltages. The documentation defines two primary operating conditions for evaluating output power and non-linear distortion:

1. Output Power Measurement Condition:

- Anode Voltage (U_a): 180 V
- Effective AC Control Grid Voltage ($U_{g1\sim\text{eff}}$): $\$10.6\$ \text{ V}$
- Load Resistance (R_a): 4 k Ω
- Resulting Output Power (P_{out}): $\geq 2.2 \text{ W}$**

2. Distortion Measurement Condition:

- Output Power (P_{out}): $\$2.2\$ \text{ W}$
- Anode Voltage (U_a): 180 V
- Load Resistance (R_a): 4 k Ω
- Non-linear Distortion Coefficient (k_f): 14%**

Maximum and Minimum Permissible Ratings

To ensure the guaranteed service life and prevent premature failure, the operating conditions of the 10P12S must be maintained within the following absolute limits:

Rating Parameter	Symbol	Minimum Limit	Maximum Limit
Heater Voltage	U_h	$\$9.3\$ \text{ V}$	$\$10.7\$ \text{ V}$
Anode Voltage	U_a	—	200 V

Rating Parameter	Symbol	Minimum Limit	Maximum Limit
Screen Grid Voltage	$U_{[g2]}(/tubes/G2)$	—	150 V
Anode Dissipation	P_a	—	8 W
Screen Grid Dissipation	$P_{[g2]}(/tubes/G2)$	—	\$1.5\$ W
Heater-to-Cathode Voltage	U_{kh}	—	150 V

Interelectrode Capacitances

The physical separation of the control grid to the top cap, combined with the internal shielding of the suppressor grid, results in low feedback capacitance. The interelectrode capacitances are rated as follows:

- **Input Capacitance (Grid 1 to Cathode):** $C_{g1k} = 7.7 \pm 1.8$ pF
- **Output Capacitance (Anode to Cathode):** $C_{ak} = 8.5 \pm 2.5$ pF
- **Feedback Capacitance (Grid 1 to Anode):** $C_{g1a} \leq 0.4$ pF

Analysis of Characteristic Curves

The operational behavior of the 10P12S is illustrated by two sets of family curves: the anode characteristics and the transfer characteristics.

Anode Characteristics ($I_a, I_{g2} = f(U_a)$)

The family of curves plotting anode current (I_a) and screen grid current ($I_{[g2]}(/tubes/G2)$) against anode voltage (U_a) is recorded at a nominal heater current of 640 mA and a fixed screen voltage ($U_{[g2]}(/tubes/G2)$) of 135 V.

- **Anode Current (I_a):** Represented by solid lines, the curves demonstrate typical pentode behavior. Above an anode voltage of approximately 50 V, the plate current flattens into a knee, showing high dynamic plate resistance. The curves are plotted for control grid bias steps from $U_{g1} = 0$ V down to -25 V.
- **Screen Grid Current ($I_{[g2]}(/tubes/G2)$):** Represented by dashed lines, the screen current remains relatively low and stable across the normal operating range of anode voltages, though it rises slightly at very low anode potentials where the anode's ability to collect electrons is reduced.
- **Dissipation Boundary ($P_{a\max}$):** A dash-dot curve represents the maximum continuous anode dissipation limit of 8 W, defining the safe boundary for load-line selection.

Transfer Characteristics ($I_a, I_{g2} = f(U_{g1})$)

The transfer curves plot the currents as a function of control grid voltage (U_{g1}) at a fixed anode voltage (U_a) of 135 V and nominal heater current.

- Curves are provided for three screen grid voltages ($U_{[g2]}(/tubes/G2)$): 120 V, 135 V, and 150 V.
- As the control grid bias becomes more negative, both the anode current (solid lines) and screen grid current (dashed lines) decrease smoothly. Cutoff is achieved near $U_{g1} = -25$ V to -30 V depending on the screen voltage.
- The transconductance (S) is represented by the slope of the I_a curve, which is steepest and most linear in the region between $U_{g1} = -5$ V and -15 V.

Technical Summary

The **10P12S** is a specialized, ruggedized **low-frequency power pentode** featuring a **10 V / 640 mA heater**, an **octal base**, and a **top-cap control grid**. Optimized for wire communication systems, it delivers a nominal output power of ≥ 2.2 W into a **4 k Ω** load at an anode voltage of **180 V**, with a distortion factor of **14%**. With its robust environmental tolerances (operating from **-60 °C to +70 °C**), low feedback capacitance ($C_{g1a} \leq 0.4$ pF), and a guaranteed service life of **1000 hours**, the 10P12S represents a highly stable and reliable solution for long-distance telecommunication and low-frequency power amplification.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

195X Russian

Published test conditions and operating points. Values on this page are preserved as reported by this source.

195X RUSSIAN

Section 1 · Pentode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Source symbol CBSI	3 h	CTBaxX JAajJbHEH MPOBOJHOHN CBSI3H. ance wire service systems.
Service life	1000 h	TapanrupoBanuas poarosedHocts 1000 gacos. Service life guarantee: 1000 hr.
Source symbol U,	10±1 V	U, 10=1V Uy =15V k?) 149%
Published electrical parameter	15 V	U, 10=1V Uy =15V k?) 149%
Source symbol I	640 mA	I 640 mA I, 319 mA S 2,85+0,35 mA/V
Source symbol I,	319 mA	I 640 mA I, 319 mA S 2,85+0,35 mA/V
Source symbol S	2.85+0.35 mA/V	I 640 mA I, 319 mA S 2,85+0,35 mA/V
Source symbol U,	13 V	U, 13V I, 7+3mA R, >30kQ
Source symbol I,	7+3 mA	U, 13V I, 7+3mA R, >30kQ
Source symbol R,	>30 kQ	U, 13V I, 7+3mA R, >30kQ
Source symbol Uy	135 V	Uy 135V P,l) >22W
Published electrical parameter	>22 W	Uy 135V P,l) >22W
Source symbol DIPE	180 V	DIPE 180 V, Ugy_
Published electrical parameter	106 V	oy =106 V, R, =4 k2,
Published electrical parameter	180 V	W, U =180V , P, =4kQ.
Published electrical parameter	4 kQ	W, U =180V , P, =4kQ.
Source symbol Cope	77+1.8 pF	Cope 77 +1,8 pF
Source symbol ak	85+2.5 pF	Cao ak 85 +2,5 pF

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Source symbol gla	<0.4 pF	C gla < 0,4 pF
Source symbol U,	107 V	U, 107V 93V
Source symbol V	93 V	U, 107V 93V
Source symbol U,	200 V	U, 200V
Source symbol Ugg	150 V	Ugg 150 V
Source symbol P,	8 W	P, 8W
Source symbol Pg2	1.5 W	Pg2 1,5 W
Source symbol U,	150 V	U, 150V
Published electrical parameter	10.5 mA	10,5 maz
Published electrical parameter	40 mA	@40 max
Published electrical parameter	125 mA	125 max
Published electrical parameter	2294 mA	2294 maz
Source symbol N	5 V	N 5V
Published electrical parameter	-10 V	-10V -
Source symbol N	-5 V	= N -5V
Published electrical parameter	25 V	gpl'fll/ 25V -1V 15V - 20V - 25V t
Source symbol V	-1 V	gpl'fll/ 25V -1V 15V - 20V - 25V t
Source symbol V	15 V	gpl'fll/ 25V -1V 15V - 20V - 25V t
Published electrical parameter	20 V	gpl'fll/ 25V -1V 15V - 20V - 25V t
Published electrical parameter	4 V	4 Vi 05 i
Published electrical parameter	200 μA	200 Ua. -16
Published electrical parameter	850 mA	Ia I, = 850 mA — Ia I, =850 mA
Published electrical parameter	185 V	Ug=185V — = gy U, =135V
Published electrical parameter	135 V	Ug=185V — = gy U, =135V

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1970 Russian Tubes Mashpriborintorg

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1970 RUSSIAN TUBES MASHPRIBORINTORG

Section 1 · Pentode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Guaranteed service life	1000 h	PublishedGuarantee
Transconductance	2.85 mA/V	PublishedElectricalCharacteristics

TUBE TINKER

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