



ELECTRONIC TUBE REFERENCE

12Z8

Voltage - Pentode High Frequency (single) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

PENTODE

Russian high-frequency pentode with a short characteristic, designed for high-frequency voltage amplification. Manufacturer documentation specifies a 2,000-hour service-life guarantee and electrical characteristics for RF signal-amplifier operation.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	8
NOMINAL HEATER	12.6 V / 150 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Pentode	
TRANSCONDUCTANCE	0.00165 S
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM SCREEN VOLTAGE	140 V
MAXIMUM PLATE DISSIPATION	2.8 W
MAXIMUM SCREEN DISSIPATION	0.7 W
English-primary bilingual extraction; published electrical table values retained in parameters.	

12Z8 — High-Frequency Pentode with Short Characteristic Curve

The **12Z8** (also designated in Cyrillic as **12Ж8**) is a high-frequency pentode with a short characteristic curve, designed for the amplification of intermediate- and high-frequency voltages. It features an indirectly heated oxide-coated cathode, a metal envelope, and an octal base.

Construction, Physical Dimensions, and Environmental Ratings

The 12Z8 is enclosed in a metal case (envelope) that provides robust mechanical protection and built-in electrostatic shielding. The metal envelope is internally connected to pin 1 of the octal base.

Physical Dimensions

- **Maximum overall height:** 67 mm
- **Maximum envelope diameter:** 27 mm
- **Maximum base diameter:** 33 mm
- **Maximum weight:** 42 g

Environmental and Mechanical Durability

The tube is designed to operate reliably under demanding environmental conditions:

- **Ambient temperature range:** -60 °C to +70 °C
- **Relative humidity:** 95% to 98% at an ambient temperature of +20 °C
- **Mechanical vibration resistance:** Capable of withstanding vibration loads up to 6 g
- **Service life guarantee:** Minimum of 2000 hours of operation

Heater and Pinout Configuration

The 12Z8 features an indirectly heated, oxide-coated unipotential cathode. The heater is designed for a nominal 12.6 V supply, making it suitable for series heater strings or 12 V electrical systems.

Heater Specifications

- **Nominal heater voltage (U_h):** 12.6 V
- **Permissible heater voltage range:** 11.3 V to 13.9 V
- **Nominal heater current (I_h):** 150 ± 15 mA
- **Calculated nominal heater power:** 1.89 W (calculated as 12.6 V multiplied by 0.150 A)

Pin Connection (Octal Base)

The tube uses a standard octal base with the following pin assignments (viewed from the bottom of the tube):

- **Pin 1:** Metal envelope / shield
- **Pin 2:** Heater
- **Pin 3:** Grid 3 (Suppressor Grid)
- **Pin 4:** Grid 1 (Control Grid)
- **Pin 5:** Cathode
- **Pin 6:** Grid 2 (Screen Grid)

- **Pin 7:** Heater
- **Pin 8:** Plate (Anode)

Electrical Characteristics and Operating Points

The typical electrical characteristics of the 12Z8 are measured under specific Class A amplifier operating conditions.

Typical Operating Conditions

- **Plate voltage (U_a):** 250 V
- **Grid 2 (screen) voltage ($U_{[g2]}(/tubes/G2)$):** 100 V
- **Grid 3 (suppressor) voltage (U_{g3}):** 0 V
- **Grid 1 (control grid) bias (U_{g1}):** -3 V

Measured Characteristics at Typical Operating Point

- **Plate current (I_a):** 3 ± 1 mA
- **Grid 2 current ($I_{[g2]}(/tubes/G2)$):** 0.8 ± 0.4 mA
- **Transconductance (S):** 1.65 ± 0.35 mA/V
- **Plate cutoff current (I_{az}):** ≤ 30 μ A (measured at a control grid bias $U_{g1} = -10$ V)

Interelectrode Capacitances

The 12Z8 exhibits low interelectrode capacitances, which is critical for stable high-frequency operation:

- **Input capacitance (Grid 1 to cathode, C_{g1k}):** 6 ± 1.1 pF
- **Output capacitance (Plate to cathode, C_{ak}):** 7 ± 1.8 pF
- **Feedback capacitance (Grid 1 to plate, C_{g1a}):** ≤ 0.005 pF

The extremely low grid-to-plate feedback capacitance (≤ 0.005 pF) is a key feature of this pentode, minimizing Miller effect and preventing unwanted oscillations in high-frequency amplifier stages.

Maximum and Minimum Permissible Ratings

To ensure the guaranteed service life of 2000 hours, the operating conditions must be kept within the following absolute limits:

Parameter	Minimum Limit	Maximum Limit
Heater voltage (U_h)	11.3 V	13.9 V
Plate voltage (U_a)	—	330 V

Parameter	Minimum Limit	Maximum Limit
Grid 2 voltage ($U_{[g2] (/tubes/G2)}$)	—	140 V
Plate dissipation (P_a)	—	2.8 W
Grid 2 dissipation ($P_{[g2] (/tubes/G2)}$)	—	0.7 W
Heater-to-cathode voltage (U_{kh})	—	100 V

Characteristic Curves and Behavior

The behavior of the 12Z8 is illustrated by several characteristic curves.

Pentode Operation

Under standard pentode operation ($U_h = 12.6 \text{ V}$, $U_{[g2] (/tubes/G2)} = 100 \text{ V}$, $U_{g3} = 0 \text{ V}$), the plate current (I_a) and screen grid current ($I_{[g2] (/tubes/G2)}$) curves demonstrate typical pentode knee characteristics. Above a plate voltage of approximately 50 V, the plate current becomes highly independent of plate voltage, confirming a high dynamic plate resistance. The control grid voltage (U_{g1}) regulates the plate current from its maximum at 0 V down to near-cutoff around -8 V to -10 V .

Triode-Connected Operation

When the 12Z8 is triode-connected, the plate current (I_a) versus plate voltage (U_a) curves show typical triode behavior. At $U_h = 12.6 \text{ V}$, positive control grid voltages (up to $+6 \text{ V}$) and negative control grid voltages (down to -18 V) show a progressive shift in the conduction threshold and plate resistance.

Transfer Characteristics

The transfer curves ($I_a, I_{[g2] (/tubes/G2)}$ vs. U_{g1}) at $U_a = 250 \text{ V}$ and $U_{g3} = 0 \text{ V}$ show the effect of varying the screen grid voltage ($U_{[g2] (/tubes/G2)}$) at 75 V , 100 V , and 125 V . Higher screen grid voltages shift the transfer curve to the left, increasing both plate current and transconductance for a given control grid bias.

Suppressor Grid Control

The relationship of plate current to suppressor grid voltage ($I_a = f(U_{g3})$) is plotted at $U_a = 250 \text{ V}$, $U_{[g2] (/tubes/G2)} = 100 \text{ V}$, and $U_{g1} = -3 \text{ V}$. The curve shows that the suppressor grid can be used to control plate current, with the plate current dropping from approximately 3 mA at $U_{g3} = 0 \text{ V}$ down to zero as the suppressor grid is biased highly negative, reaching cutoff near -80 V . This characteristic indicates potential application in dual-control or modulating circuits.

Technical Summary

The **12Z8** is a robust, metal-envelope high-frequency pentode featuring a short characteristic curve, an octal base, and a 12.6 V heater. It is designed for intermediate- and high-frequency voltage amplification under demanding environmental conditions, including temperatures from -60 °C to +70 °C and vibration loads up to 6 g. With a transconductance of 1.65 mA/V, a low plate current of 3 mA, and an exceptionally low grid-to-plate capacitance of ≤ 0.005 pF, it provides stable, high-gain amplification. The tube's suppressor grid also offers a wide control range, adding versatility to its application profile.

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 K	8 h	БЛ1с0к0уаСТОТНЕИИ НЕНТОН ф КОПОТКОН Xapak- The 127K8 high-frequency pentode with a short
Source symbol aroseuHocts	2000 μ A	IapanrupoBannas poaroseuHocts 2000 uacos. Service life guarantee: 2000 hr.
Service life	2000 h	IapanrupoBannas poaroseuHocts 2000 uacos. Service life guarantee: 2000 hr.
Source symbol U,	1286 V	U, 1286V Uy -3V I,)) <30uA
Source symbol Uy	-3 V	U, 1286V Uy -3V I,)) <30uA
Published electrical parameter	<30 μ A	U, 1286V Uy -3V I,)) <30uA
Source symbol I,	150+15 mA	I, 150+15 mA Ug 0 S 1,65-:0,35 mA/V
Published electrical parameter	0.35 mA/V	I, 150+15 mA Ug 0 S 1,65-:0,35 mA/V
Source symbol U,	250 V	U, 250V I, 3xImA I, 0804 mA
Source symbol I,	804 mA	U, 250V I, 3xImA I, 0804 mA
Source symbol Ug,	100 V	Ug, 100V
Published electrical parameter	10 V	ATE Uy =—10V.
Published electrical parameter	1.1 pF	Cyrc 6%1,1 pF
Source symbol C,	7±18 pF	C, 7=18pF
Source symbol Cgta	<0.005 pF	Cgta < 0,005 pF
Source symbol U,	139 V	U, 139V 113V
Source symbol V	113 V	U, 139V 113V
Source symbol U,	330 V	U, 330V

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Source symbol Ug2	140 V	Ug2 140V
Source symbol P,	28 W	P, 28W
Source symbol sz	7 W	sz 07 W
Source symbol Uy,	100 V	Uy, 100V
Published electrical parameter	227 mA	227 max
Published electrical parameter	33 mA	@#33max
Published electrical parameter	1 V	[7] /=01V
Published electrical parameter	40 W	40 WY
Published electrical parameter	0 V	0 s P A 193 4 ¢ U _{py} =0V -1¥ -2V -3V -4V
Published electrical parameter	-2 V	0 s P A 193 4 ¢ U _{py} =0V -1¥ -2V -3V -4V
Source symbol V	-3 V	0 s P A 193 4 ¢ U _{py} =0V -1¥ -2V -3V -4V
Source symbol V	-4 V	0 s P A 193 4 ¢ U _{py} =0V -1¥ -2V -3V -4V
Source symbol LA	8 V	A L LA 8V] eE PR A5V
Source symbol A	5 V	A L LA 8V] eE PR A5V
Published electrical parameter	126 V	(TpHOLHOE BKJIOUEHHE) 1, U _r =126V
Published electrical parameter	100 V	(tr1;de ccl);ge'c;tmn) — — =1 U _{gy} =100 V
Published electrical parameter	250 V	—_ — —-Ig2 U _r =250V V
Published electrical parameter	3 V	U _y =—3V
Published electrical parameter	3 A	14 3ak. 738 197

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