



ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

12S3S

1 SECTION
CONSTRUCTION
TRIODE

Voltage - Triode (single) electronic tube

Russian oscillator triode intended for signal-generation service. Available translated source material supports oscillator operation without a more specific application.

GENERAL CHARACTERISTICS

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

SECTION RATINGS

SECTION1 Triode	
TRANSCONDUCTANCE	0.003 S
AMPLIFICATION FACTOR	95
MAXIMUM PLATE VOLTAGE	250 V
Published ratings/characteristics promoted where clearly identified; additional bilingual values retained as parameters.	

12S3S — Decimeter-Wave Oscillator Triode

The **12S3S** (Cyrillic: **12C3C**) is an indirectly heated glass-envelope triode designed specifically for generation and oscillation in the decimeter-wave (microwave) band. Featuring an oxide-coated cathode and a robust mechanical construction, this tube is engineered to maintain stable performance under demanding environmental and mechanical conditions.

Construction, Physical Dimensions, and Pinout

The 12S3S is constructed in a glass envelope with seven rigid leads extending from the base. The physical design is optimized for high-frequency operation, minimizing lead inductance and maximizing thermal dissipation.

Physical Dimensions and Weight

- **Maximum Weight:** 98 g
- **Overall Length (Height):** 41 mm (+0.2 / -0.5 mm)
- **Pin Length:** 5 ± 0.5 mm
- **Pin Circle Diameter:** 12.1 mm
- **Pin Diameter:** 1.4 mm (+0.03 / -0.05 mm)
- **Envelope Diameters:** 26.6 mm maximum at the base, 27.0 mm maximum at the body, and 32.0 mm maximum at the widest section.

Pin Connections

The tube utilizes a seven-pin base arrangement. When viewed from the bottom, the pin connections are assigned as follows:

Pin Number	Electrode Connection
1	Heater (h)
2	Cathode (k)
3	Heater (h)
4	Plate / Anode (a)
5	Plate / Anode (a)
6	Grid (g)
7	Grid (g)

The parallel connections for the plate (pins 4 and 5) and the grid (pins 6 and 7) are a deliberate design feature to reduce parasitic lead inductance, which is critical for stable operation at decimeter wavelengths.

Electrical Characteristics and Operating Points

The 12S3S operates with a nominal heater voltage of 12.6 V. Below are the typical electrical characteristics and operating parameters established for the tube:

Heater Ratings

- **Nominal Heater Voltage (U_h):** 12.6 V
- **Nominal Heater Current (I_h):** 103 ± 17 mA

Typical Static Operating Point

At a specified static operating point, the tube exhibits the following characteristics:

- **Plate Voltage (U_a):** 100 V
- **Grid Voltage (U_g):** -4 ± 2 V (measured at a plate current of 10 mA)
- **Plate Current (I_a):** 30 ± 15 mA
- **Transconductance (S):** 3 ± 1 mA/V (measured at a plate current of 10 mA)
- **Amplification Factor (μ):** 12.5

High-Frequency Self-Excitation Operating Point

When operated under self-excitation conditions in the microwave band, the tube is characterized by:

- **Plate Voltage (U_a):** 130 V
- **Cathode Current (I_k):** 30 mA
- **Operating Wavelength (λ):** 30 cm
- **Oscillation Output Power (P_k):** 275 mW (minimum)

Interelectrode Capacitances

To facilitate operation in the decimeter-wave region, the 12S3S is designed with very low internal capacitances:

- **Grid-to-Cathode Capacitance (C_{g1k}):** 1.55 ± 0.25 pF
- **Cathode-to-Plate Capacitance (C_{ak}):** 0.65 ± 0.15 pF
- **Grid-to-Plate Capacitance (C_{g1a}):** 1.15 ± 0.25 pF

These low values minimize capacitive loading and feedback, allowing the triode to function efficiently as an oscillator at frequencies corresponding to wavelengths down to 30 cm.

Maximum and Minimum Permissible Ratings

To ensure reliable operation and prevent premature failure, the operating conditions of the 12S3S must be maintained within the following absolute limits:

Parameter	Minimum Value	Maximum Value
Heater Voltage (U_h)	10.8 V	14.5 V
Plate Voltage (U_a)	—	300 V

Parameter	Minimum Value	Maximum Value
Grid Voltage (U_g)	-250 V	50 V
Plate Dissipation (P_a)	—	5 W
Grid Dissipation (P_g)	—	0.25 W
Average Cathode Current (I_k)	—	30 mA
Peak Cathode Current (I_k peak)	—	200 mA
Heater-to-Cathode Voltage (U_{kh})	—	100 V
Operating Wavelength (λ)	30 cm	—
Bulb Temperature (T_{bulb})	—	150 °C

Environmental and Mechanical Tolerances

The 12S3S is designed to withstand harsh environmental conditions and mechanical stress, making it suitable for specialized or mobile equipment:

- **Ambient Temperature Range:** -60 °C to +70 °C
- **Relative Humidity:** 95% to 98% (tested at +20 °C)
- **Vibration Resistance:** Withstands vibration loads up to 2.5 g
- **Impact Resistance:** Withstands multiple impact loads up to 12 g
- **Guaranteed Service Life:** 400 hours

Characteristic Curves and Interpretation

The published performance curves for the 12S3S illustrate the relationship between the electrode voltages and currents under nominal heater conditions ($U_h = 12.6$ V):

- **Plate Characteristics (I_a vs. U_a):** The family of curves plotted for grid voltages (U_g) ranging from 0 V to -10 V shows a steady rise in plate current as plate voltage increases. A dashed boundary line represents the maximum plate dissipation limit ($P_{a\text{ max}} = 5$ W), defining the safe operating area for continuous service.
- **Transfer Characteristics (I_a vs. U_g):** Plotted at plate voltages of 50 V, 100 V, 150 V, 200 V, and 250 V, these curves demonstrate the triode's control grid effectiveness. The transconductance remains relatively linear over the primary operating region, confirming stable gain and oscillation characteristics.

Technical Summary

The **12S3S** is a specialized, ruggedized **decimeter-wave oscillator triode** featuring a **12.6 V heater**, an **indirectly heated cathode**, and a **seven-pin glass envelope**. With an amplification factor of **12.5**, a transconductance of **3 mA/V**, and a maximum plate dissipation of **5 W**, it is optimized for high-frequency signal generation down to a wavelength of **30 cm**. Its dual-pin connections for the grid and plate, combined with low interelectrode capacitances and high mechanical resistance to vibration and shock, make it a highly reliable component for microwave-band applications.

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 · Triode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Source symbol AMANA	30 h	IJa paboTHI B AMANA30HE AECUMMETPOBLIX BOJIH. operation in the microwave band.
Source symbol oaroeuHocts	400 W	lapantnpoBannass pgoaroeuHocts 400 wacos. Service life guarantee: 400 hr.
Service life	400 h	lapantnpoBannass pgoaroeuHocts 400 wacos. Service life guarantee: 400 hr.
Source symbol Uy	126 V	Uy 126 V I, 3015 mA
Source symbol I,	3015 mA	Uy 126 V I, 3015 mA
Source symbol I	10317 mA	I 10317 mA P.? 275 mW
Published electrical parameter	275 mW	I 10317 mA P.? 275 mW
Source symbol U,	100 V	U, 100 V SY) 3=l mA/V
Published electrical parameter	4±2 V	Ug) —4x2V i3 12,5
Published electrical parameter	10 mA	') B paGoueit Touxre, npu I, = 10 mA.
Published electrical parameter	130 V	%) B pexume caMoBo3Gyxaenus npy U, = 130 V, I, =30 mA, A =30 cm. Under self-
Published electrical parameter	30 mA	%) B pexume caMoBo3Gyxaenus npy U, = 130 V, I, =30 mA, A =30 cm. Under self-
Published electrical parameter	550.25 pF	CgIk 1,550,25 pF
Published electrical parameter	0.15 pF	Cak 0,65:+0,15 pF
Published electrical parameter	0.25 pF	Cgla 1,15::0,25 pF

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Source symbol U,	145 V	U, 145V 108V LY 30 mA
Source symbol V	108 V	U, 145V 108V LY 30 mA
Source symbol LY	30 mA	U, 145V 108V LY 30 mA
Source symbol U,	300 V	U, 300V 1. ?) 200 mA
Published electrical parameter	200 mA	U, 300V 1. ?) 200 mA
Source symbol U,	50 V	U, 50V —250 V Ugn 100 V
Published electrical parameter	250 V	U, 50V —250 V Ugn 100 V
Source symbol Ugn	100 V	U, 50V —250 V Ugn 100 V
Source symbol P,	5 W	P, 5 W A - 30 cm
Source symbol P	0.25 W	P 0,25 W Tfiamloua 150°C
Source symbol Cpennee	3 h	) Cpennee 3Hauenwe.
Source symbol JIMKOB0E	3 h	2) JIMKOB0E 3HAUEHHUE,
Published electrical parameter	8 mA	~ {8max
Published electrical parameter	1 Ω	1q, Ta'/ 1 W,
Published electrical parameter	1 W	1q, Ta'/ 1 W,
Source symbol A	1 A	/ A / A 1A / \
Published electrical parameter	200 μA	a IHU/ 200 Ua,V Uy, vV -2 10 -§ -6 -4 -2 [
Published electrical parameter	6 V	— — —Pimax Uh=12'6v Uh=12,6V
Published electrical parameter	12.6 V	— — —Pimax Uh=12'6v Uh=12,6V



SOURCE DATA APPENDIX

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

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Guaranteed service life	400 h	PublishedGuarantee

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