



ELECTRONIC TUBE REFERENCE

1A2P

Voltage - Radio Detector Converter electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

HEPTODE

Battery or receiving-tube frequency converter combining local-oscillator and mixer action for superheterodyne radio service. Its multi-grid structure provides frequency conversion while minimizing component count and, in battery types, filament power.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	7
NOMINAL HEATER	1.2 V / 30 mA	PARALLEL HEATER	— / —
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Heptode	
MAXIMUM PLATE VOLTAGE	90 V
MAXIMUM SCREEN VOLTAGE	75 V
MAXIMUM PLATE DISSIPATION	0.3 W
MAXIMUM CATHODE CURRENT	3 mA
Russian 1A2P directly heated oxide-coated battery heptode for frequency conversion, filament 1.2 V, 30 mA. Manufacturer maximum anode voltage 90 V, grids 2 and 4 screen voltage 75 V and anode dissipation 0.3 W. Maximum AVERAGE cathode current 3 mA; separate peak cathode current limit 9 mA, not to be stored as the continuous maximum. Typical anode 60 V, screens 45 V, plate current ~0.71 mA. Conversion conductance ~0.24 mA/V and heterodyne oscillator conductance ~0.82 mA/V are mode-specific and not static transconductance.	

1A2P — Miniature Frequency-Conversion

Heptode

The **1A2P** (also designated as **1A2Π**) is a miniature, directly heated heptode designed primarily for frequency conversion applications in radio receivers. Featuring an oxide-coated filamentary cathode, this glass-envelope tube is engineered for low power consumption and reliable operation under varied environmental conditions.

Construction, Filament, and Base Pinout

The 1A2P is housed in a miniature glass envelope with a maximum mass of 10 grams. It features a maximum diameter of 19.2 mm, a body height of 40 ± 2.5 mm, and a maximum overall height of 57 mm including the pins. The tube utilizes a 7-pin miniature base (compatible with the RSH4 socket type) and can be operated in any mounting position.

The filament is directly heated and oxide-coated, designed for low-voltage battery operation. The filament ratings and connections are as follows:

Parameter	Value
Nominal Filament Voltage	1.2 V
Minimum Filament Voltage	0.9 V
Maximum Filament Voltage	1.4 V
Nominal Filament Current	30 mA (0.03 A)
Filament Current Range	27 to 33 mA (0.027 to 0.033 A)

The 7-pin base configuration provides the following connections:

- **Pin 1:** Cathode (negative filament terminal) and Grid 5
- **Pin 2:** Anode
- **Pin 3:** Grid 2 and Grid 4
- **Pin 4:** Grid 1
- **Pin 5:** Cathode (negative filament terminal) and Grid 5
- **Pin 6:** Grid 3
- **Pin 7:** Cathode (positive filament terminal)

In this heptode structure, Grid 5 is internally tied to the negative side of the filamentary cathode (Pins 1 and 5), while Grid 2 and Grid 4 are internally connected to each other and brought out to Pin 3.

Electrical Characteristics and Operating Points

The typical electrical parameters of the 1A2P are specified under the following test conditions: a filament voltage (U_f) of 1.2 V, an anode voltage (U_a) of 60 V, screen grid voltages ($U_{[g2]}(/tubes/G2),g4$) of 45 V, a

control grid voltage (U_{g3}) of 0 V, and an RMS oscillator grid voltage (U_{g1_rms}) of 8 V. Under these conditions, the typical parameters are:

- **Anode Current (I_a):** 0.7 ± 0.3 mA
- **Screen Grid Current ($I_{[g2]}(/tubes/G2) + I_{g4}$):** 1.1 ± 0.5 mA
- **Grid 1 Current (I_{g1}):** 115 μ A (with a -35 μ A tolerance, i.e., 80 to 115 μ A)
- **Grid 1 Leak Resistance:** 51 k Ω
- **Conversion Transconductance (S_C):** 0.24 mA/V (with a -0.07 mA/V tolerance, i.e., 0.17 to 0.24 mA/V) at an alternating U_{g3} of 0.7 V_{rms}
- **Heterodyne Oscillator Transconductance (S_{het}):** 0.82 mA/V (with a -0.17 mA/V tolerance, i.e., 0.65 to 0.82 mA/V) measured at an anode voltage of 45 V
- **Inverse Grid 3 Current (I_{g3_inv}):** ≤ 0.3 μ A at a grid bias of $U_{g3} = -1$ V
- **End-of-Life Conversion Transconductance:** ≥ 0.1 mA/V after 1500 operating hours

Maximum Ratings and Environmental Limits

To ensure reliable operation and prevent premature degradation, the operating conditions of the 1A2P must be kept within the following absolute limit values:

Parameter	Limit Value
Maximum Anode Voltage	90 V
Maximum Grid 2 and Grid 4 Voltage	75 V
Maximum Anode, Grid 2, and Grid 4 Supply Source Voltage	250 V
Maximum Average Cathode Current	3 mA
Maximum Peak Cathode Current	9 mA
Maximum Anode Dissipation	0.3 W

Service and Environmental Conditions

The tube is designed to withstand mechanical and environmental stress, making it suitable for portable or ruggedized equipment:

- **Vibration Resistance:** Capable of withstanding continuous vibration at 50 Hz with an acceleration of up to 2.5 g.
- **Ambient Temperature Range:** -45 $^{\circ}$ C to +70 $^{\circ}$ C.
- **Relative Humidity:** Up to 98% at temperatures up to 25 $^{\circ}$ C.

Interelectrode Capacitances

The interelectrode capacitances of the 1A2P heptode are characterized as follows:

- **Input Capacitance:** 5.1 pF
- **Output Capacitance:** 6.3 pF
- **Transfer Capacitance:** ≤ 0.6 pF
- **Heterodyne Oscillator Input Capacitance:** 0.95 pF
- **Heterodyne Oscillator Output Capacitance:** 7.3 pF
- **Grid 1 to Grid 3 Capacitance:** 0.14 pF
- **Grid 1 Leak Capacitance:** 4×10^{-6} pF

Characteristic Curves and Behavior

The physical behavior of the 1A2P is characterized by several key non-linear relationships:

- **Filament Voltage Effects:** Both the filament current and the heterodyne oscillator transconductance rise non-linearly as the filament voltage (U_f) is increased from 0.2 V to 1.6 V.
- **Anode Voltage Saturation:** The anode current and the combined screen grid (Grid 2 and Grid 4) current exhibit saturation behavior as the anode voltage (U_a) increases beyond 20 V. This saturation is observed across various Grid 1 bias voltages.
- **Heterodyne Oscillator Triode Behavior:** When Grids 2 and 4 are connected directly to the anode to operate the structure as a triode oscillator, the heterodyne anode characteristics show typical triode-like behavior. Under these conditions, the anode current can reach up to 6 mA at a combined anode and screen voltage ($U_{a,[g2](/tubes/G2),g4}$) of 220 V with a Grid 1 bias (U_{g1}) of -4 V.

Technical Summary

The **1A2P** is a miniature, directly heated heptode designed for frequency conversion in battery-powered and portable radio equipment. Operating with a nominal filament supply of 1.2 V at 30 mA, it provides a conversion transconductance of 0.24 mA/V and a heterodyne oscillator transconductance of 0.82 mA/V under typical operating conditions. With its robust mechanical ratings, including vibration resistance up to 2.5 g and a wide operating temperature range from -45 °C to +70 °C, the 1A2P offers reliable performance in a compact 10-gram glass envelope.

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 · Heptode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Anode voltage	60 V	Published operating point
Grid 2 and grid 4 voltage	45 V	Published operating point
Grid 1 AC voltage	8 V	RMS
Anode current	0.71 mA	Published nominal
Grid 2 and grid 4 current	1.1 mA	Published nominal
Grid 1 leak resistance	51 kOhm	Published value
Conversion transconductance	0.24 mA/V	Grid 3 AC 0.7 V RMS
Heterodyne oscillator transconductance	0.82 mA/V	Anode 45 V
Grid 3 inverse current	0.3 uA	Grid 3 -1 V
Input capacitance	5.1 pF	Published value
Output capacitance	6.3 pF	Published value

TUBE TINKER

An independent reference for electronic tubes, vacuum tubes,
and their source documents.

[Catalog](#) [Tube types](#) [Full books](#) [Blog](#) [Feedback & corrections](#)

© 2026 Tube Tinker