

ELECTRONIC TUBE REFERENCE

1AG5

Voltage - Pentode or Tetrode (under 100V) electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

DIODE-PENTODE

Directly heated battery diode-pentode combining radio signal detection with subsequent low-frequency voltage amplification. The diode recovers the received signal while the pentode provides AF gain in economical portable receivers.

GENERAL CHARACTERISTICS

BASE DESIGNATION	6B	BASE PINS	7
NOMINAL HEATER	1.25 V / 30 mA	PARALLEL HEATER	– / –
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

SECTION RATINGS

SECTION1 Pentode	
PLATE RESISTANCE	2500000 Ω
TRANSCONDUCTANCE	0.00025 S
MAXIMUM PLATE VOLTAGE	50 V
MAXIMUM SCREEN VOLTAGE	50 V
MAXIMUM CATHODE CURRENT	0.5 mA
Detector-amplifier section from published subminiature table.	

SECTION2 Diode	
MAXIMUM CATHODE CURRENT	0.25 mA
Detector diode section; no separate diode electrical values published in this compact row.	

1AG5 — Subminiature Diode-Pentode Vacuum Tube

A subminiature, filament-type diode-pentode designed for detector-amplifier applications requiring extreme economy of space, weight, and battery drain.

Overview

The **1AG5** is a subminiature, filament-type diode-pentode vacuum tube. It is engineered for applications where space, weight, and battery power consumption must be minimized. The tube features a coated filament designed for low-voltage DC operation and can be operated in any mounting position. It is typically employed as a detector-amplifier in compact, portable electronic equipment.

Mechanical and Physical Characteristics

The 1AG5 is housed in a T-2X3 subminiature glass envelope. Its physical dimensions are characterized by:

- **Maximum overall length:** 1.5 inches (1-1/2")
- **Maximum width:** 0.385 inches
- **Maximum thickness:** 0.285 inches
- **Minimum lead length:** 1.5 inches (1-1/2")

The tube features tinned flexible leads with a diameter of 0.016 inches, spaced 0.048 inches center-to-center. A colored dot is located adjacent to Lead 1 to identify the lead sequence. The flexible leads can be soldered or welded directly to circuit components. Alternatively, standard subminiature sockets can be used if the leads are cut to a length of 0.020 inches.

Lead Connections and Pinout Configurations

The 1AG5 is documented with two distinct lead configurations, depending on the specific construction:

7-Lead Inline Configuration

In this arrangement, the leads are connected as follows (from left to right, with Lead 1 adjacent to the colored dot):

- **Lead 1:** Filament Negative (F_-) and Diode Plate (D_p) (the diode is located at the negative end of the filament)
- **Lead 2:** Grid #1 (G_1)
- **Lead 3:** Filament Positive (F_+)
- **Lead 4:** Grid #3 (G_3) — Deflector Plate 1
- **Lead 5:** Grid #2 (G_2)
- **Lead 6:** Grid #3 (G_3) — Deflector Plate 2
- **Lead 7:** Plate (P)

8-Lead Configuration

In this arrangement, the filament and diode plate connections are separated:

- **Lead 1:** Diode Plate (D_p)
- **Lead 2:** Grid #1 (G_1)
- **Lead 3:** Filament Negative (F_-)
- **Lead 4:** Grid #3 (G_3) — Deflector Plate 1
- **Lead 5:** Grid #2 (G_2)
- **Lead 6:** Grid #3 (G_3) — Deflector Plate 2
- **Lead 7:** Plate (P)
- **Lead 8:** Filament Positive (F_+)

In both configurations, Grid #3 consists of two separate deflector plates connected individually to Lead 4 and Lead 6. Another documented terminal connection standard designates the pinout as 6B.

Filament and Absolute Maximum Ratings

The 1AG5 is designed for battery-operated equipment, utilizing a coated filament with the following ratings:

- **Filament Voltage (DC):** 1.25 V (with an absolute maximum tolerance of $\pm 20\%$, i.e., 1.0 V to 1.5 V)
- **Filament Current:** 0.03 A (30 mA)

The absolute maximum ratings for the tube must not be exceeded:

- **Maximum Plate Voltage:** 50 V
- **Maximum Grid #2 Voltage:** 50 V
- **Maximum Total Cathode Current:** 0.5 mA
- **Maximum Diode Current (Continuous Operation):** 0.25 mA

Direct Interelectrode Capacitances

Approximate capacitances, measured with a close-fitting shield connected to Lead 4 (Grid #3 / Deflector Plate 1), are:

- **Grid to Plate (G_1 to P):** $0.10\ \mu\mu\text{f}$
- **Input (G_1 to $[F + G_2 + G_3]$):** $1.7\ \mu\mu\text{f}$
- **Output (P to $[F + G_2 + G_3]$):** $2.4\ \mu\mu\text{f}$ (Note: F represents the filament, which may include F_+ depending on the lead configuration).

Typical Operating Conditions and Characteristics

Class A_1 Amplifier Service

The 1AG5 can be operated as a Class A_1 amplifier under several typical operating points.

Parameter	Operating Point A	Operating Point B	Operating Point C
Filament Voltage (DC)	1.25 V	1.25 V	1.25 V
Filament Current	0.03 A	0.03 A	30 mA
Plate Voltage	22.5 V	45 V	45 V
Grid #2 Voltage	22.5 V	45 V	45 V
Grid #1 Voltage	0 V	-2.0 V	$R_g = 5\text{ M}\Omega$
Plate Resistance	0.7 $\text{M}\Omega$	2.5 $\text{M}\Omega$	0.26 $\text{M}\Omega$
Transconductance (Mutual Conductance)	235 μmhos	250 μmhos	350 μmhos
Plate Current	0.17 mA	0.28 mA	0.8 mA
Grid #2 Current	0.043 mA	0.12 mA	0.25 mA
Grid #1 Resistor	5 $\text{M}\Omega$	0 $\text{M}\Omega$	—
Minimum Diode Current (at 10 V DC)	0.5 mA	0.5 mA	—

Resistance-Coupled Amplifier Service

For resistance-coupled voltage amplifier applications, the following operating conditions are specified:

Parameter	Condition 1	Condition 2
Filament Voltage (DC)	1.25 V	1.25 V
Filament Current	0.03 A	0.03 A
Plate Supply Voltage	45 V	67.5 V
Grid #2 Supply Voltage	45 V	67.5 V
Grid #1 Voltage	0 V	0 V
Grid #1 Resistor	5 $\text{M}\Omega$	5 $\text{M}\Omega$

Parameter	Condition 1	Condition 2
Load Resistance	1.0 MΩ	1.0 MΩ
Series Grid #2 Resistor	5.0 MΩ	5.0 MΩ
Grid #2 By-pass Condenser	0.1 μf	0.1 μf
Grid #1 Resistor (Following Tube)	10 MΩ	10 MΩ
Approximate Voltage Gain	50	70

Qualitative Curve Observations

Pentode Connection

- **Plate Characteristics ($E_{c2} = 45$ V):** The plate current (I_b) curves exhibit a sharp knee below 15 V plate voltage. At $E_{[c1]}(/tubes/C1) = 0$ V, the plate current saturates near 0.8 mA to 0.85 mA. The Grid #2 current (I_{c2}) curves show a downward slope as plate voltage increases, leveling off above 25 V.
- **Plate Characteristics ($E_{c2} = 22.5$ V):** The knee occurs below 10 V plate voltage. At $E_{[c1]}(/tubes/C1) = 0$ V, the plate current saturates near 0.28 mA to 0.3 mA.
- **Transfer Characteristics ($E_b = 45$ V, $E_{c2} = 45$ V):** The transconductance (G_m) drops smoothly from approximately 300 μmhos at $E_{[c1]}(/tubes/C1) = 0$ V to near 0 μmhos at a cutoff voltage of approximately $-4.5extV$.
- **Transfer Characteristics ($E_b = 22.5$ V, $E_{c2} = 22.5$ V):** The transconductance drops from approximately 240 μmhos at $E_{[c1]}(/tubes/C1) = 0$ V to near 0 μmhos at a cutoff voltage of approximately $-2.0extV$ to $-2.2extV$.

Triode Connection

When triode-connected (with Grid #2 tied to the plate, operating at $E_f = 1.25extV$), the plate current curves exhibit typical triode-like exponential behavior. The plate current reaches approximately 1.3 mA to 1.5 mA at $E_b = 50extV$ and $E_{[c1]}(/tubes/C1) = 0$ V.

Technical Summary

The **1AG5** is a subminiature, filamentary diode-pentode designed for low-power, space-constrained applications. Operating with a nominal 1.25 V, 30 mA DC filament, it combines a signal diode and a high-gain pentode in a single T-2X3 glass envelope. The pentode section provides a transconductance of 235 to 350 μmhos depending on the operating point, with plate resistance values up to 2.5 *extMriangle* (or 2.5 *extMΩ*). In resistance-coupled amplifier service, the tube is capable of delivering voltage gains of 50 to 70 with plate supply voltages of 45 V to 67.5 V. Its flexible leads allow direct soldering or welding into circuits, making it highly suitable for compact, battery-operated detector-amplifier designs.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

195X Raytheon Special Purpose Tubes

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

195X RAYTHEON SPECIAL PURPOSE TUBES

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	45 V	—
Grid 1 return resistance	5 megohm	—
Grid 2 voltage	45 V	—
Plate current	0.8 mA	—
Grid 2 current	0.25 mA	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	260000 ohm	—
Transconductance	350 uS	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1961 Tung Sol

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

1961 TUNG SOL

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	45 V	ClassA

Characteristic		
Parameter	Published Value	Condition / Note
Minimum diode current	0.5 mA	40VDC

Capacitance		
Parameter	Published Value	Condition / Note
Grid to plate	0.1 pF	—



Source Operating Conditions

[Source PDF](#)

1966 Tung Sol Electronic Tubes 1 of 4

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

1966 TUNG SOL ELECTRONIC TUBES 1 OF 4

Section 1 · Pentode

Other		
Parameter	Published Value	Condition / Note
Filament voltage	1.25 V	—
Filament current	30 mA	—

1966 TUNG SOL ELECTRONIC TUBES 1 OF 4

Section 2 · Diode

Other		
Parameter	Published Value	Condition / Note
Maximum continuous diode current	—0.25 mA	—

Tube Tinker

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