



ELECTRONIC TUBE REFERENCE

12G4

Voltage - Triode (single) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

TRIODE

Medium-mu miniature general-purpose triode for voltage amplification in receiving and general electronic equipment.

GENERAL CHARACTERISTICS

BASE DESIGNATION	7B6	BASE PINS	7
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 Triode	
PLATE RESISTANCE	7700 Ω
TRANSCONDUCTANCE	0.0026 S
AMPLIFICATION FACTOR	20
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	2.5 W
<i>Published source values promoted where applicable.</i>	

12G4 — Medium-Mu Triode Vacuum Tube

The **12G4** is a general-purpose, medium-mu triode vacuum tube designed in a miniature glass envelope. It is intended for use in a variety of electronic applications requiring a single triode with moderate amplification capabilities. The electrical characteristics of the 12G4 are identical to those of the [12J5GT](#) glass-octal triode, and it is electrically similar to a single section of the [6SN7GT](#) twin triode, with the primary distinction being its heater configuration.

Mechanical Specifications and Basing

The 12G4 is constructed using a T-5 1/2 glass bulb and a miniature button 7-pin base. It features a compact physical profile suitable for space-constrained layouts and can be operated in any mounting position.

Physical Dimensions

- **Maximum Overall Length:** 2 3/8 inches
- **Maximum Seated Height:** 2 1/8 inches
- **Maximum Diameter:** 3/4 inch

Pinout and Connection Diagram

The tube utilizes the **6BG** basing arrangement. Underneath the base, the pin connections are assigned as follows:

Pin Number	Connection	Description
1	P	Plate (internally connected to Pin 5)
2	IC / NC	Internal Connection / No Connection
3	H	Heater
4	H	Heater
5	P	Plate (internally connected to Pin 1)
6	G	Grid
7	K	Cathode

The dual plate connections on Pin 1 and Pin 5 are tied together internally. Pin 2 is designated as No Connection (NC) or Internal Connection (IC) depending on the manufacturer, meaning it should not be used for external circuit tie points.

Heater and Maximum Ratings

The 12G4 incorporates a coated unipotential cathode. The heater is designed to operate from either an AC or DC source.

Heater Characteristics

- **Heater Voltage:** 12.6 V
- **Heater Current:** 0.15 A (150 mA)

- **Calculated Heater Power:** $12.6\text{ V} \times 0.15\text{ A} = 1.89\text{ W}$

Design Center Maximum Ratings

The maximum ratings are established under the RMA Standard M8-210 design center system:

- **Maximum Plate Voltage:** 300 V
- **Maximum Plate Dissipation:** 2.5 W
- **Maximum Heater-Cathode Voltage:** $\pm 90\text{ V}$ (or 90 V Max.)

Electrical Characteristics and Operating Points

The 12G4 provides moderate transconductance and an amplification factor of 20. Typical Class A operating conditions are specified at two distinct plate voltage levels:

Parameter	Operating Point A	Operating Point B
Plate Voltage	90 V	250 V
Grid Voltage	0 V	-8 V
Plate Current	10 mA	9 mA
Transconductance	3,000 μmhos	2,600 μmhos
Plate Resistance	6,700 Ω	7,700 Ω
Amplification Factor (μ)	20	20
Grid Voltage for 10 μA Plate Current (Approx. Cutoff)	-7 V	-18 V

The relationship between the parameters at Operating Point B can be verified by the standard triode formula: $\mu \approx g_m \times r_p$ Using the values from Point B: $0.0026\text{ S} \times 7,700\text{ }\Omega = 20.02$ This closely matches the published amplification factor of 20.

Direct Interelectrode Capacitances

The direct interelectrode capacitances of the 12G4 vary depending on whether an external physical shield is employed. Standard measurements are defined both with and without a shield (such as Shield No. 308 or Shield No. 316) connected directly to the cathode:

Capacitance Parameter	Unshielded	Shielded
Grid to Plate (C_{gp})	3.4 μF	3.4 μF
Input (C_{in})	2.4 μF	2.6 μF
Output (C_{out})	0.9 μF	3.2 μF

The addition of an external shield significantly increases the output capacitance from 0.9 μF to 3.2 μF , while the input capacitance increases slightly from 2.4 μF to 2.6 μF . The grid-to-plate capacitance remains unchanged at 3.4 μF .

Analysis of Characteristic Curves

The published average plate and transfer characteristics provide a detailed view of the 12G4's behavior across various operating regions.

Average Plate Characteristics

The plate characteristics map plate current (I_b) against plate voltage (V_b) for grid bias voltages (E_c) ranging from positive values down to -30 V .

- **Positive Grid Region:** Curves for positive grid voltages (such as $+2\text{ V}$, $+4\text{ V}$, and $+6\text{ V}$) are documented along with their corresponding grid current (I_c) curves, shown as dashed lines. These curves illustrate the onset of grid conduction when the grid is driven positive relative to the cathode.
- **Negative Grid Region:** The family of curves demonstrates a highly linear relationship in the typical operating regions, particularly at plate voltages between 100 V and 300 V with moderate negative grid bias.

Average Transfer Characteristics

The transfer characteristics plot plate current (I_b), amplification factor (μ), and plate resistance (r_p) against control grid voltage.

- **Heater Voltage Discrepancy in Curves:** Notably, some published transfer curves are plotted with a heater voltage (E_f) of 6.3 V instead of the nominal 12.6 V , reflecting the tube's close relationship to 6.3 V prototypes.
- **At 250 V Plate Voltage ($E_b = 250\text{ V}$):** As the control grid voltage moves from -16 V toward 0 V , the plate resistance (r_p) drops from approximately $25\text{ k}\Omega$ down to $6.5\text{ k}\Omega$. Concurrently, the amplification factor (μ) rises from about 15 to 22, and the plate current increases rapidly.
- **At 100 V Plate Voltage ($E_b = 100\text{ V}$):** Over a grid voltage range of -8 V to 0 V , the plate resistance falls from over $20\text{ k}\Omega$ to approximately $6.5\text{ k}\Omega$, while the amplification factor rises from 14 to 21.

Related Designations

The 12G4 is closely related to several other classic vacuum tube types:

- **12J5GT:** The 12G4 shares identical electrical characteristics with this larger, octal-based single triode.
- **6SN7GT:** The electrical behavior of the 12G4 is highly similar to a single triode section of the 6SN7GT twin triode, except for the heater voltage requirement (the 12G4 requires a 12.6 V heater, whereas the 6SN7GT operates on a 6.3 V heater).

Technical Summary

The **12G4** is a miniature, 7-pin, medium-mu triode featuring a coated unipotential cathode, a 12.6 V / 0.15 A heater, and a T-5 1/2 glass envelope. With an amplification factor of 20, a plate resistance of 6,700 to 7,700 Ω , and a maximum plate dissipation rating of 2.5 W, it serves as a compact, general-purpose voltage amplifier. Its electrical identity with the [12J5GT](#) and similarity to a single section of the [6SN7GT](#) make it a familiar and predictable choice for classic triode circuit designs.



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 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	12.6 V	—
Heater current	150 mA	—

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-to-plate capacitance	3.4 pF	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1966 Tung Sol Electronic Tubes 3 of 4

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

1966 TUNG SOL ELECTRONIC TUBES 3 OF 4

Section 1 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	250 V	ClassA
Grid voltage	-8 V	ClassA
Plate current	9 mA	ClassA

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Transconductance	2600 μ S	ClassA

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Amplification factor	20	ClassA

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-to-plate capacitance	3.4 pF	WithoutShield
Input capacitance	2.4 pF	WithoutShield
Output capacitance	0.9 pF	WithoutShield

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