



ELECTRONIC TUBE REFERENCE

12GT5

Power - TV Horizontal Output (sweep) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

BEAMPOWER

Beam-power horizontal-output tube for CRT television line-deflection circuits, handling approximately 6.5 kV positive plate pulses and substantial cathode current.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	9
NOMINAL HEATER	12.6 V / 600 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Beam Power	
PLATE RESISTANCE	15000 Ω
TRANSCONDUCTANCE	0.0071 S
AMPLIFICATION FACTOR	4.4
MAXIMUM PLATE VOLTAGE	770 V
MAXIMUM SCREEN VOLTAGE	220 V
MAXIMUM PLATE DISSIPATION	17.5 W
MAXIMUM SCREEN DISSIPATION	3.5 W
MAXIMUM CATHODE CURRENT	175 mA

12GT5 — Beam Power Pentode

The **12GT5** and its variant, the **12GT5A**, are Novar-type beam power pentodes designed primarily for use as horizontal deflection amplifiers in television receivers. These tubes are characterized by their high

peak plate current capabilities, high plate dissipation ratings, and a 12.6-volt heater designed for series or parallel heater strings.

Overview and Variant Differences

The 12GT5 and [12GT5A](#) are electrical equivalents to the 6.3-volt heater types [6GT5](#) and [6GT5A](#), respectively, differing only in their heater ratings. The 12GT5 series features a Novar T-12 construction with a 9-pin button base.

The primary distinction between the 12GT5 and the [12GT5A](#) lies in their physical dimensions and base construction:

- **12GT5:** Utilizes a Novar Button 9-pin E9-76 base and has a maximum seated height of 3.050 inches and a maximum overall height of 3.410 inches.
- **[12GT5A](#):** Utilizes a Novar Button 9-pin E9-88 base featuring an exhaust tip on the base. It has a shorter bulb design, with a maximum seated height of 2.500 inches and a maximum overall height of 2.880 inches.

Both variants share a maximum diameter of 1.562 inches and use the 9NZ basing configuration.

Construction, Basing, and Interelectrode Capacitances

The 12GT5 and [12GT5A](#) are housed in a T-12 glass envelope. The 9NZ basing arrangement provides the following pin connections, viewed from the bottom of the tube:

Pin	Connection
Pin 1	Cathode (K)
Pin 2	Grid No. 1 (G1)
Pin 3	Grid No. 2 (G2)
Pin 4	Heater (H)
Pin 5	Heater (H)
Pin 6	Grid No. 1 (G1)
Pin 7	Grid No. 2 (G2)
Pin 8	Internal Connection (IC) — Do Not Use
Pin 9	Plate (P)

The direct interelectrode capacitances of the unshielded tube are:

- **Grid No. 1 to Plate:** 0.26 pF
- **Input ([g1](#) to [h](#) + [k](#) + [g2](#) + [g3](#)):** 15 pF
- **Output ([p](#) to [h](#) + [k](#) + [g2](#) + [g3](#)):** 6.5 pF

Heater Specifications and Operating Limits

The heater is designed for operation from either an AC or DC supply. The heater characteristics and limits are as follows:

Heater Parameter	Value
Heater Voltage	12.6 V
Heater Current	0.600 ± 0.040 A
Average Warm-up Time	11 seconds

Heater-Cathode Voltage Ratings

To prevent insulation breakdown, the voltage difference between the heater and cathode must be kept within the following limits:

- **Heater Negative with Respect to Cathode:** 200 V (Total DC and Peak)
- **Heater Positive with Respect to Cathode:** 100 V DC (100 V maximum continuous DC, 200 V maximum Total DC and Peak)

Horizontal Deflection Amplifier Ratings

Under the Design Maximum Rating System, the maximum ratings for horizontal deflection amplifier service are:

Parameter	Maximum Rating
DC Plate Supply Voltage (Boost + DC Power Supply)	770 V
Peak Positive Plate Voltage	6500 V
Peak Negative Plate Voltage	1500 V
Grid No. 2 (Screen Grid) Voltage	220 V
Negative Grid No. 1 (Control Grid) Voltage	-55 V
Peak Negative Grid No. 1 Voltage	330 V
Plate Dissipation	17.5 W
Grid No. 2 Input	3.5 W
Average Cathode Current	175 mA
Peak Cathode Current	550 mA

Parameter	Maximum Rating
Grid No. 1 Circuit Resistance	1.0 MΩ
Bulb Temperature (at hottest point)	240 °C

For operation in a 525-line, 30-frame television system, the duty cycle of the horizontal voltage pulse must not exceed 15% of one horizontal scanning cycle. Additionally, when operating in stages utilizing grid leak bias, an adequate cathode bias resistor or other protective means must be employed to safeguard the tube in the event that excitation is lost.

Electrical Characteristics and Typical Operation

At a typical Class A operating point, the electrical characteristics of the 12GT5 and [12GT5A](#) are:

- **Plate Voltage:** 250 V
- **Grid No. 2 Voltage:** 150 V
- **Grid No. 1 Voltage:** -22.5 V
- **Plate Current:** 70 mA
- **Grid No. 2 Current:** 2.1 mA
- **Transconductance:** 7100 μmhos
- **Plate Resistance:** 15,000 Ω
- **Amplification Factor (Triode Connected):** 4.4 (measured with 150 V on the plate and Grid No. 2, and -22.5 V on Grid No. 1)
- **Grid No. 1 Cutoff Voltage:** -42 V (approximate value for a plate current of 1 mA)

Instantaneous Plate Knee Values

The tube is capable of delivering high peak currents at low plate voltages, as demonstrated by the following instantaneous knee values:

- **Plate Voltage (Eb):** 60 V
- **Grid No. 2 Voltage (Ec2):** 150 V
- **Grid No. 1 Voltage (Ec1):** 0 V
- **Plate Current (Ib):** 390 mA
- **Grid No. 2 Current (Ic2):** 32 mA

Technical Summary

The **12GT5** and [12GT5A](#) are high-performance Novar beam power pentodes designed for horizontal deflection amplifier service. Operating with a 12.6 V, 0.600 A heater with a controlled 11-second warm-up time, they are well-suited for series-string television designs. The 12GT5 features a standard Novar T-12 envelope, while the [12GT5A](#) offers a more compact physical profile with an exhaust tip on the base. Both variants provide robust electrical ratings, including a peak positive plate voltage limit of 6500 V, a plate dissipation rating of 17.5 W, and the ability to deliver high peak currents at low plate voltages.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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

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Section 1 · Beam Power

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	12.6 V	—
Heater current	600 mA	—
Maximum DC plate voltage	770 V	HorizontalDeflection
Peak positive-pulse plate voltage	6500 V	HorizontalDeflection
Maximum screen voltage	220 V	HorizontalDeflection
Average cathode current	175 mA	HorizontalDeflection
Plate dissipation	17.5 W	—
Heater warm-up time	11 s	ControlledWarmup

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	250 V	ClassA
Screen voltage	150 V	ClassA
Plate current	70 mA	ClassA
Plate resistance	15000 ohm	ClassA
Transconductance	7100 uS	ClassA

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-to-plate capacitance	0.26 pF	—

TUBE TINKER

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

