

ELECTRONIC TUBE REFERENCE

7588

Voltage - Triode (single high frequency) electronic tube

CONSOLIDATED TECHNICAL DATA
1 SECTION
CONSTRUCTION
TRIODE

Metal-ceramic planar triode for high-frequency electronic service.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	6.3 V / 400 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Triode	
TRANSCONDUCTANCE	0.045 S
AMPLIFICATION FACTOR	175
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	5.5 W
Promoted only from clearly labeled printed ratings/characteristics; specialized and operating data retained in parameter rows.	

7588 — High-Mu Metal-Ceramic Planar RF Amplifier Triode

An industrial broadband radio-frequency triode designed for amplification up to 500 MHz, with high transconductance, low-noise operation, and controlled mechanical and electrical reliability.

Overview

The **7588** is a **high-mu, ceramic-and-metal planar triode** manufactured by General Electric for **broadband radio-frequency amplification at frequencies up to 500 megacycles (500 MHz)**. The manufacturer documents a compact high-frequency electrode structure, very high transconductance, low-noise performance, and extensive electrical and mechanical qualification testing.

Unlike a conventional general-purpose receiving triode, the 7588 is designed for demanding RF amplifier service. Its principal characteristic point gives an amplification factor of approximately **175** and transconductance of **45,000 micromhos (45 mA/V)**. These values identify a high-gain, high-slope device intended for broadband amplification rather than audio power output.

Construction, Heater, and Mounting

The tube has a **ceramic-and-metal planar construction**, a **coated unipotential cathode**, and separately accessible heater, cathode, grid, and plate connections. General Electric permits mounting in any position and supplies a detailed dimensional and mounting drawing.

Heater characteristic	Value
Nominal voltage	6.3 V
Voltage tolerance	±0.3 V
Nominal current	0.40 A
Initial heater-current range	0.37-0.43 A
Calculated heater power	2.52 W
Heater supply	AC or DC
Maximum heater-to-cathode voltage	±50 V

The mechanical sheet illustrates a **T-bolt mounting arrangement**. General Electric specifies that a stainless-steel T-bolt may be inserted into the tube's mounting-base slot, rotated 90 degrees, and fastened to a chassis or circuit board using a **4-40 nut and lock washer**. The tightening torque must not exceed **3 inch-pounds**.

This mounting method is part of the manufacturer's documented high-frequency mechanical construction and is relevant to maintaining reliable contact and alignment.

Typical Electrical Characteristics

General Electric provides the following average characteristic point:

Parameter	Value
Plate voltage	200 V

Parameter	Value
Grid supply voltage	+6 V , under the stated test arrangement
Cathode-bias resistor	270 Ω
Amplification factor	175
Plate resistance	Approximately 3,900 Ω
Transconductance	45,000 μmhos (45 mA/V)
Plate current	24 mA
Grid voltage at 100 μA plate current	Approximately −5 V
Noise figure at 200 MHz	3.0 dB , typical

The positive grid-supply specification is part of the manufacturer's particular characteristic test arrangement. It does not override the published **zero maximum positive DC grid-to-cathode voltage** rating for general operation.

The electrical relationship $\mu \approx g_m \times r_p$ is consistent with the nominal figures: $0.045 \text{ S} \times 3,900 \Omega \approx 175.5$.

Production Characteristic Limits

General Electric gives initial characteristic acceptance ranges:

Characteristic	Minimum	Nominal	Maximum
Heater current	370 mA	400 mA	430 mA
Plate current, specified test	17 mA	25 mA	33 mA
Transconductance	35,000 μmhos	45,000 μmhos	55,000 μmhos
Amplification factor	140	175	210
Noise figure at 200 MHz	—	3.0 dB	4.8 dB

The noise figure is measured in a **grounded-grid amplifier at 200 MHz**, corrected for second-stage noise and diode temperature. It should not be treated as a universal noise figure at every frequency or source impedance.

The manufacturer also specifies a maximum **20% transconductance change** when heater voltage is reduced from 6.3 V to 5.7 V under the defined test conditions.

Absolute-Maximum Ratings

Parameter	Maximum
Plate voltage	300 V
Plate dissipation	5.5 W
DC cathode current	30 mA
Positive DC grid-to-cathode voltage	0 V
Negative DC grid voltage	50 V
Heater positive relative to cathode	50 V
Heater negative relative to cathode	50 V
Grid-circuit resistance, fixed bias	0.025 MΩ (25 kΩ)
Grid-circuit resistance, cathode bias	0.1 MΩ (100 kΩ)
Maximum envelope temperature	250°C

General Electric explicitly describes these as **absolute-maximum values** that must not be exceeded under worst probable operating conditions. The equipment designer must allow for variations in supply voltage, component values, load, signal, environment, and tube characteristics.

Interelectrode Capacitances

Measurement	Nominal value
Grid to plate	2.8 pF
Grid to heater and cathode	6.5 pF
Plate to heater and cathode	0.075 pF
Heater to cathode	2.6 pF

The production tolerance ranges include **2.1-3.5 pF grid-to-plate**, **5.1-8.3 pF input**, **0.05-0.10 pF output**, and **1.9-3.3 pF heater-to-cathode capacitance**.

These capacitances are significant in a broadband RF amplifier because they influence input and output loading and the amount of signal coupling between electrodes.

Grid Recovery and Pulse Behavior

General Electric includes a specialized **grid-recovery test**. The sheet explains that a grid driven positive by a pulse of signal or noise can exhibit recovery behavior resembling an unwanted RC network in series

with the grid, causing temporary changes in plate current.

The specified test applies pulses that drive the grid approximately **3 V positive relative to the cathode**, at **60 pulses per second** and approximately **0.12% duty cycle**. The manufacturer limits the change in average plate current to **1.0 mA** and the peak plate-current backswing to **2.0 mA**.

These are test criteria for identifying undesirable recovery behavior, not general permission to exceed the normal grid-voltage ratings.

Mechanical, Vibration, and Altitude Qualification

The 7588 is supported by extensive special-performance testing.

General Electric specifies low-frequency vibration testing at **40 Hz and 15 g peak acceleration**, with an output-noise limit of **25 mV RMS**. Its variable-frequency vibration test covers **100-2,000 Hz at 10 g**, with a **75 mV RMS** output limit under the stated circuit.

A low-pressure breakdown test simulates approximately **100,000 feet altitude**, using **300 V RMS at 60 Hz** between plate and grid at an air pressure of approximately **8 mm Hg**. The tube must not exhibit flashover or corona under the specified test.

Shock qualification subjects statistical samples to approximately **450 g impacts** in multiple mounting orientations, followed by electrical evaluation.

Life and Stability Testing

The General Electric documentation includes several qualification programs:

- **Early-hour stability testing**, evaluating transconductance change after 2 and 20 hours.
- **Survival-rate testing** at approximately 100 hours.
- **Intermittent life testing** over 1,000 hours, with periodic electrical evaluation.
- **Interface-life testing** over 1,000 hours with heater-only operation.
- **Heater-cycling testing** for at least 2,000 cycles.

These are manufacturer qualification procedures, not a single unconditional guaranteed operating-life rating. They demonstrate the emphasis on stable transconductance, insulation integrity, heater-cathode behavior, and resistance to early failure.

Characteristic Curves

The six-page General Electric sheet includes average plate-characteristic curves and plots of transconductance and amplification factor against plate current. These illustrate the dependence of the tube's high-gain characteristics on operating point and provide a basis for analyzing broadband RF amplifier stages.

Technical Summary

The 7588 is a **6.3 V / 400 mA high-mu ceramic-and-metal planar triode** for **broadband RF amplification up to 500 MHz**. Its nominal characteristics include $\mu \approx 175$, **45 mA/V transconductance**, **3.9 k Ω plate resistance**, and approximately **24 mA plate current**.

With **5.5 W maximum plate dissipation**, a **3 dB typical noise figure at 200 MHz**, compact planar construction, and extensive mechanical and electrical qualification tests, it is a specialized high-performance industrial RF amplifier triode rather than a conventional low-frequency receiving valve.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1968 General Electric Co

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

1968 GENERAL ELECTRIC CO

Section 1 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage, ACor DC*. 6.3 =0.3 Volts trical connections.	0.3 Volts	Published datasheet; semantic line recovery
Heater Currenttt. 0.4 Amperes	0.4 Amperes	Published datasheet; semantic line recovery
Grid to Plate: (gtop)..... 2.8 pf	2.8 pf	Published datasheet; semantic line recovery
Output:pto(th+k).. 0.075 pf	0.075 pf	Published datasheet; semantic line recovery
Heater to Cathode: (htok). 2.6 pf	2.6 pf	Published datasheet; semantic line recovery
Plate Voltage. 300 Volts Heater Positive with Respect to Cathode. 50 Volts	300 Volts	Published datasheet; semantic line recovery
Plate Voltage. 300 Volts Heater Positive with Respect to Cathode. 50 Volts	50 Volts	Published datasheet; semantic line recovery
Heater Negative with Respect to Cathode. 50 Volts	50 Volts	Published datasheet; semantic line recovery
Positive DC Grid-to-Cathode Voltage.. 0 Volts	0 Volts	Published datasheet; semantic line recovery
Negative DC Grid Voltage.....50 Volts	50 Volts	Published datasheet; semantic line recovery

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Dissipation. 5.5 Watts With Cathode Bias. 0.1 Megohms	5.5 Watts	Published datasheet; semantic line recovery
Plate Dissipation. 5.5 Watts With Cathode Bias. 0.1 Megohms	0.1 Megohms	Published datasheet; semantic line recovery
Transconductance. 45000 Micromhos	45000 Micromhos	Published datasheet; semantic line recovery
Plate Voltage. 200 Volts	200 Volts	Published datasheet; semantic line recovery
Plate Current. 24 Milliamperes	24 Milliamperes	Published datasheet; semantic line recovery
Positive Grid Voltage. 6.0 Volts Grid Voltage, approximate	6 Volts	Published datasheet; semantic line recovery
Cathode-Bias Resistor. 270 Ohms Ib =100 Microamperes. -5 Volts	270 Ohms	Published datasheet; semantic line recovery
Cathode-Bias Resistor. 270 Ohms Ib =100 Microamperes. -5 Volts	100 Microamperes	Published datasheet; semantic line recovery
Cathode-Bias Resistor. 270 Ohms Ib =100 Microamperes. -5 Volts	5 Volts	Published datasheet; semantic line recovery
Amplification Factor. 175 Noise Figure. 3.0 Decibels	3 Decibels	Published datasheet; semantic line recovery
t Heater current of a bogey tube at Ef =6.3 volts.	6.3 volts	Published datasheet; semantic line recovery
€[Measured at 200 megacycles in a grounded- grid amplifier and corrected for second-stage noise figure and	200 megacycles	Published datasheet; semantic line recovery

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Difference between transconductance at Ef =6.3 volts and trans-	6.3 volts	Published datasheet; semantic line recovery
pressed as a percentage of transconductance at Ef=6.3volts.	6.3 volts	Published datasheet; semantic line recovery
Gridto Plate: (10 P). ot 2.1 2.8 3.5 pf	3.5 pf	Published datasheet; semantic line recovery
Heater to Cathode: (htok). 1.9 2.6 33 pf	33 pf	Published datasheet; semantic line recovery
Heater Positive with Respect to Cathode. 0 20 Microamperes	20 Microamperes	Published datasheet; semantic line recovery
Heater Negative with Respect to Cathode. 20 Microamperes	20 Microamperes	Published datasheet; semantic line recovery
Ef=6.3 volts. Polarity of applied d-c interelectrode voltage is	6.3 volts	Published datasheet; semantic line recovery
Grid to All at 100 volts d-C... 50 Megohms	100 volts	Published datasheet; semantic line recovery
Plate to All at 300 volts d-C.. 50 ..., ... Megohms	300 volts	Published datasheet; semantic line recovery
Change in Average Plate Current..... , e 1.0 Milliamperes	1 Milliamperes	Published datasheet; semantic line recovery
Peak Plate Current Backswing. 2.0 Milliamperes	2 Milliamperes	Published datasheet; semantic line recovery
Upon application to the grid of a pulse driving it 3 volts	3 volts	Published datasheet; semantic line recovery
+100 volts, Rg=0.1 meg, and Rk =68 ohms. Following the test, tubes are evaluated for low frequency vibrational out-	100 volts	Published datasheet; semantic line recovery

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
+100 volts, Rg=0.1 meg, and Rk =68 ohms. Following the test, tubes are evaluated for low frequency vibrational out-	68 ohms	Published datasheet; semantic line recovery
Ehk = – 70 volts, Rk =270 ohms, Rg=0.1 meg. Heater voltage is cycled (on 134 hours, off 1\$ hour). Tubes are evaluated,	70 volts	Published datasheet; semantic line recovery
Ehk = – 70 volts, Rk =270 ohms, Rg=0.1 meg. Heater voltage is cycled (on 134 hours, off 1\$ hour). Tubes are evaluated,	270 ohms	Published datasheet; semantic line recovery
Statistical sample operated for 1000 hours with Ef =6.6 volts, no other voltages applied, and evaluated for cathode	6.6 volts	Published datasheet; semantic line recovery
test include Ef =7.5 volts cycled for one minute on and one minute off, Eb =Ec =0 volts, and Ehk =70 volts with heater	7.5 volts	Published datasheet; semantic line recovery
test include Ef =7.5 volts cycled for one minute on and one minute off, Eb =Ec =0 volts, and Ehk =70 volts with heater	0 volts	Published datasheet; semantic line recovery
test include Ef =7.5 volts cycled for one minute on and one minute off, Eb =Ec =0 volts, and Ehk =70 volts with heater	70 volts	Published datasheet; semantic line recovery
Heater Voltage	6.3 V	Published datasheet
Heater Current	400 mA	Published datasheet

TUBE TINKER

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