PLANAR TRIODE

DESCRIPTION AND RATING

FOR GROUNDED-GRID OSCILLATOR, AMPLIFIER, AND FREQUENCY MULTIPLIER SERVICE

Metal and Ceramic
High Transconductance

Pulse Rated
Shock Resistant

100 Watts Plate Dissipation

The 7289 is a metal-and-ceramic, high-mu triode designed for use as a grounded-grid CW oscillator, amplifier, or frequency multiplier at frequencies as high as 2500 megacycles. In addition, it may be used as a plate-pulsed oscillator or amplifier at frequencies as high as 3000 megacycles.

Features of the 7289 include planar electrode construction, high plate dissipation capability, excellent electrode isolation, low radio-frequency losses, high transconductance, and low interelectrode capacitances.

GENERAL

ELECTRICAL
Cathode—Coated Unipotential
Heater Characteristics and Ratings
Heater Voltage, AC or DC ............. * Volts
Heater Current at Ef = 6.0 volts ..... 1.0† Amperes
Cathode Heating Time, minimum ... 60 Seconds
Direct Interelectrode Capacitances‡
Grid to Plate: (g to p) ............. 2.0 pf
Grid to Cathode: (g to k) ......... 6.3 pf
Plate to Cathode:
(p to k), maximum .................. 0.035 pf

MECHANICAL
Mounting Position—Any—Only Plate Flange to be Used as a Socket Stop and Clamp
Net Weight, approximate ............ 2.5 Ounces
Cooling
Plate and Plate Seal—Conduction and Forced Air
Grid and Cathode Seals—Conduction and Forced Air
Recommended Air Flow Cowling—157-JAN
Recommended Air Flow on Plate Radiator at Sea Level
Incoming Air Temperature 25°C, Plate
Dissipation 100 Watts ............ 12.5 Cu.Ft.PerMin.

MAXIMUM RATINGS

ABSOLUTE-MAXIMUM VALUES
RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEGRAPHY

Key-Down Conditions Per Tube Without Amplitude
Modulation‡
Heater Voltage* .................. 4.5 to 5.7 Volts
Frequency .................. 2500 Megacycles
DC Plate Voltage ............. 1000 Volts
Negative DC Grid Voltage .... 150 Volts
Peak Positive RF Grid Voltage .. 30 Volts

Peak Negative RF Grid Voltage ......... 400 Volts
DC Grid Current .................. 50 Milliamperes
DC Cathode Current .......... 125 Milliamperes
Plate Dissipation ............... 100 Watts
Grid Dissipation .................. 2.0 Watts
Envelope Temperature at Hottest Point 300 C

RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEPHONY

Carrier Conditions Per Tube For Use With a Maximum
Modulation Factor of 1.0
Heater Voltage* .................. 4.5 to 5.7 Volts
Frequency .................. 2500 Megacycles
DC Plate Voltage† .................. 600 Volts
Negative DC Grid Voltage .... 150 Volts
Peak Positive RF Grid Voltage .. 30 Volts

Peak Negative RF Grid Voltage ......... 400 Volts
DC Grid Current .................. 50 Milliamperes
DC Cathode Current .......... 100 Milliamperes
Plate Dissipation .................. 70 Watts
Grid Dissipation .................. 2.0 Watts
Envelope Temperature at Hottest Point 300 C

PLATE-PULSED OSCILLATOR OR AMPLIFIER

Heater Voltage* .................. 5.7 to 6.0 Volts
Frequency .................. 3000 Megacycles
Peak Positive-Pulse Plate Supply Voltage ............. 3500 Volts
Duty Factor of Plate Pulse s △ .................. 0.0025
Pulse Duration .................. 3.0 Microseconds
Plate Current
Average During Plate Pulse△* .................. 3.0 Amperes

Negative Grid Voltage
Average During Plate Pulse†† .................. 150 Volts
Grid Current
Average During Plate Pulse .................. 1.8 Amperes
Plate Dissipation △ .................. 27 Watts
Grid Dissipation △ .................. 2.0 Watts
Envelope Temperature at Hottest Point 300 C
CHARACTERISTICS AND TYPICAL OPERATION

**AVERAGE CHARACTERISTICS**

- Heater Voltage: 6.0 Volts
- Plate Voltage: 600 Volts
- Grid Voltage: 100 Volts
- Amplification Factor: 25000 Micromhos
- Transconductance: 70 Milliamperes
- Plate Current: 1000 Volts
- DC Grid Voltage, approximate: 90 Milliamperes
- DC Plate Current: 1.0 Milliamperes
- Useful Power Output: 17 Watts
- PLATE-PULSED OSCILLATOR
  - Frequency: 3000 Megacycles
  - Heater Voltage: 5.8 Volts
  - Duty Factor: 0.0025
  - Pulse Duration: 3.0 Microseconds
  - Peak Positive-Pulse Plate-Supply Voltage: 3500 Volts
  - Plate Current: 3.0 Amperes
  - Average During Plate Pulse: 1.8 Amperes
  - Grid Current: 1.6 Kilowatts

**RADIO-FREQUENCY POWER AMPLIFIER**

- Frequency: 500 Megacycles
- DC Plate Voltage: 900 Volts
- DC Grid Voltage: 40 Volts
- DC Plate Current: 90 Milliamperes
- DC Grid Current, approximate: 30 Milliamperes
- Driving Power, approximate: 6 Watts
- Useful Power Output: 40 Watts

**RADIO-FREQUENCY OSCILLATOR**

- Frequency: 2500 Megacycles

* The equipment designer should design the equipment so that heater voltage is centered at some value within the range of 4.5 to 5.7 volts for CW operation, or 5.7 to 6.0 volts for pulse operation. Heater voltage variations about the center value should be kept as small as practical and should not, in any case, exceed ±5%. The optimum center value of heater voltage depends on the cathode current and on other parameters of circuit design and operation. For specific recommendations, contact your General Electric tube sales representative.

† Heater current of a bogey tube at Ef = 6.0 volts.

‡ Measured in a special shielded socket.

§ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

¶ For modulation factors less than 1.0, a higher d-c plate voltage may be used if the sum of the peak positive audio voltage and the d-c plate voltage does not exceed 1200 volts.

$ Applications with a duty factor greater than 0.0025 should be referred to your General Electric tube sales representative for recommendations.

△ In any 5000-microsecond interval.

** The regulation and/or series plate-supply impedance must be such as to limit the peak current, with the tube considered a short circuit, to a maximum of 30 amperes.

†† The maximum instantaneous value should be within the range of +250 to −750 volts.

§§ Adjusted for Ib = 70 milliamperes.

All absolute-maximum ratings are limiting values of operating and environmental conditions applicable to any electron tube of a specified type as defined by its published data and should not be exceeded under the worst probable conditions.

The tube manufacturer chooses these values to provide acceptable serviceability of the tube, making no allowance for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in the characteristics of the tube under consideration and of all other electron devices in the equipment.

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INITIAL CHARACTERISTICS LIMITS

Heater Current
\[ E_h = 6.0 \text{ volts} \] .......................... 0.90 1.05 Amperes

Grid Voltage
\[ E_h = 6.0 \text{ volts}, \ E_b = 1000 \text{ volts}, \ I_b = 100 \text{ ma} \] .......................... -2.0 -7.0 Volts

Grid Voltage
\[ E_h = 6.0 \text{ volts}, \ E_b = 1000 \text{ volts}, \ I_b = 1.0 \text{ ma} \] .......................... -25 Volts

Negative Grid Current
\[ E_h = 6.0 \text{ volts}, \ E_b = 1000 \text{ volts}, \ E_c \text{ adjusted for } I_b = 100 \text{ ma} \] .......................... 8.0 Microamperes

Interelectrode Leakage Resistance
\[ E_h = 6.0 \text{ volts}, \ \text{Polarity of applied d-c interelectrode voltage is such} \] .......................... 50 Megohms

that no cathode emission results

Grid to Cathode at 500 volts d-c .......................... 1.95 2.15 Picofarads

Interelectrode Capacitances

Grid to Plate: (g to p) ........................................... 5.6 7.0 Picofarads

Grid to Cathode: (g to k) ........................................... 0.035 Picofarads

Plate to Cathode: (p to k) ........................................... 0.035 Picofarads

SPECIAL PERFORMANCE TESTS

Min.  Max.

Oscillator Power Output
\[ E_h = 5.0 \text{ volts}; \ F = 2500 \text{ MC, min.; } E_b = 1000 \text{ volts}; \ I_b = 90 \text{ ma} \] ........................................... 15 Watts

Pulsed-Oscillator Power Output
\[ E_h = 5.8 \text{ volts}; \ F = 3000 \text{ MC, min.; } E_p = 3500 \text{ volts}; \.tp = 3.0 \mu \text{sec. } = 10\%; \ Du = 0.0025 \pm 5\%; \ R_g \text{ adjusted for} \] ........................................... 4.0 Watts

Ib = 7.5 ma; \ Ec = -1.5 volts, max.; \ I_c = 4.5 ma, max.

Low Pressure Voltage Breakdown Test

Statistical sample tested for voltage breakdown at a pressure of 54 mm Hg. Tubes shall not give visual evidence of flashover when 1000 volts RMS, 60 cps, is applied between the plate and grid terminals.

DEGRADATION RATE TESTS

Shock
Statistical sample subjected to 5 impact accelerations of approximately 400 G and 0.5 milliseconds duration in each of three positions. The accelerating forces are applied by the Navy-type, High Impact (flyweight) Shock Machine.

500-Hour Life Test
Statistical sample operated for 500 hours as an oscillator to evaluate changes in power output with life.
PHYSICAL DIMENSIONS

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DIMENSIONS FOR ELECTRODE CONTACT AREA (INCHES)

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<tr>
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<tr>
<td>AB</td>
<td>1.225 ± .040</td>
<td>Grid</td>
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<td>AC</td>
<td>1.631 ± .097</td>
<td>Heater</td>
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<td>AD</td>
<td>1.645 ± .170</td>
<td>Cathode</td>
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NOTES

1. The total indicated runout of the plate contact surface with respect to the cathode contact surfaces will not exceed .020 inch.
2. The total indicated runout of the cathode contact surface with respect to the heater contact surfaces will not exceed .012 inch.
3. The total indicated runout of the grid contact surface with respect to the cathode contact surface will not exceed .020 inch.
4. Do not clamp or locate on this surface.
5. Hole provided for tube extractor through the top fin only.
6. Measure plate shank temperature on this surface.