

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- μ 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 $E_f = 6.0$ 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 25C, Plate
Dissipation 100 Watts 12.5 Cu.Ft.Per.Min.

MAXIMUM RATINGS

ABSOLUTE-MAXIMUM VALUES

RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEGRAPHY

Key-Down Conditions Per Tube Without Amplitude Modulation§	Peak Negative RF Grid Voltage 400 Volts
Heater Voltage* 4.5 to 5.7 Volts	DC Grid Current 50 Milliamperes
Frequency 2500 Megacycles	DC Cathode Current 125 Milliamperes
DC Plate Voltage 1000 Volts	Plate Dissipation 100 Watts
Negative DC Grid Voltage 150 Volts	Grid Dissipation 2.0 Watts
Peak Positive RF Grid Voltage 30 Volts	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	Peak Negative RF Grid Voltage 400 Volts
Heater Voltage* 4.5 to 5.7 Volts	DC Grid Current 50 Milliamperes
Frequency 2500 Megacycles	DC Cathode Current 100 Milliamperes
DC Plate Voltage¶ 600 Volts	Plate Dissipation 70 Watts
Negative DC Grid Voltage 150 Volts	Grid Dissipation 2.0 Watts
Peak Positive RF Grid Voltage 30 Volts	Envelope Temperature at Hottest Point 300 C

PLATE-PULSED OSCILLATOR OR AMPLIFIER

Heater Voltage* 5.7 to 6.0 Volts	Negative Grid Voltage
Frequency 3000 Megacycles	Average During Plate Pulse†† 150 Volts
Peak Positive-Pulse Plate Supply Voltage 3500 Volts	Grid Current
Duty Factor of Plate Pulse $\# \Delta$ 0.0025	Average During Plate Pulse 1.8 Amperes
Pulse Duration 3.0 Microseconds	Plate Dissipation Δ 27 Watts
Plate Current	Grid Dissipation Δ 2.0 Watts
Average During Plate Pulse Δ^{**} 3.0 Amperes	Envelope Temperature at Hottest Point . 300 C

CHARACTERISTICS AND TYPICAL OPERATION

AVERAGE CHARACTERISTICS

Heater Voltage.....	6.0	Volts
Plate Voltage.....	600	Volts
Grid Voltage§§.....		Volts
Amplification Factor.....	100	
Transconductance.....	25000	Micromhos
Plate Current.....	70	Milliamperes

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
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* 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 $\pm 5\%$. 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 $E_f = 6.0$ 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.

DC Plate Voltage.....	1000	Volts
DC Grid Voltage, approximate.....	-22	Volts
DC Plate Current.....	90	Milliamperes
DC Grid Current.....	10	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		
Average During Plate Pulse.....	3.0	Amperes
Grid Current		
Average During Plate Pulse.....	1.8	Amperes
Useful Power Output		
Average During Plate Pulse.....	1.6	Kilowatts

¶ 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 $I_b = 70$ milliamperes.

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.

The equipment manufacturer should design so that initially and throughout life no absolute-maximum value for the intended service is exceeded with any tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of the tube under consideration and of all other electron devices in the equipment.

The tubes and arrangements disclosed herein may be covered by patents of General Electric Company or others. Neither the disclosure of any information herein nor the sale of tubes by General Electric Company conveys any license under patent claims covering combinations of tubes with other devices or

elements. In the absence of an express written agreement to the contrary, General Electric Company assumes no liability for patent infringement arising out of any use of the tubes with other devices or elements by any purchaser of tubes or others.

INITIAL CHARACTERISTICS LIMITS

	Min.	Max.	
Heater Current			
E _f = 6.0 volts.....	0.90	1.05	Amperes
Grid Voltage			
E _f = 6.0 volts, E _b = 1000 volts, I _b = 100 ma.....	-2.0	-7.0	Volts
Grid Voltage			
E _f = 6.0 volts, E _b = 1000 volts, I _b = 1.0 ma.....		-25	Volts
Negative Grid Current			
E _f = 6.0 volts, E _b = 1000 volts, E _c adjusted for I _b = 100 ma.....		8.0	Microamperes
Interelectrode Leakage Resistance			
E _f = 6.0 volts, Polarity of applied d-c interelectrode voltage is such that no cathode emission results			
Grid to Cathode at 500 volts d-c.....	50		Megohms
Interelectrode Capacitances			
Grid to Plate: (g to p).....	1.95	2.15	Picofarads
Grid to Cathode: (g to k).....	5.6	7.0	Picofarads
Plate to Cathode: (p to k).....		0.035	Picofarads

SPECIAL PERFORMANCE TESTS

	Min.	Max.	
Oscillator Power Output			
Tubes are tested for power output as an oscillator under the following conditions: E _f = 5.0 volts; F = 2500 MC, min.; E _b = 1000 volts; I _b = 90 ma.....		15	Watts
Pulsed-Oscillator Power Output			
Tubes are tested for power output as an oscillator under the following conditions: E _f = 5.8 volts; F = 3000 MC, min.; e _{py} = 3500 volts; t _p = 3.0 μsec. ± 10%; D _u = 0.0025 ± 5%; R _g adjusted for I _b = 7.5 ma; E _c = -1.5 volts, max.; I _c = 4.5 ma, max.....		4.0	Watts
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

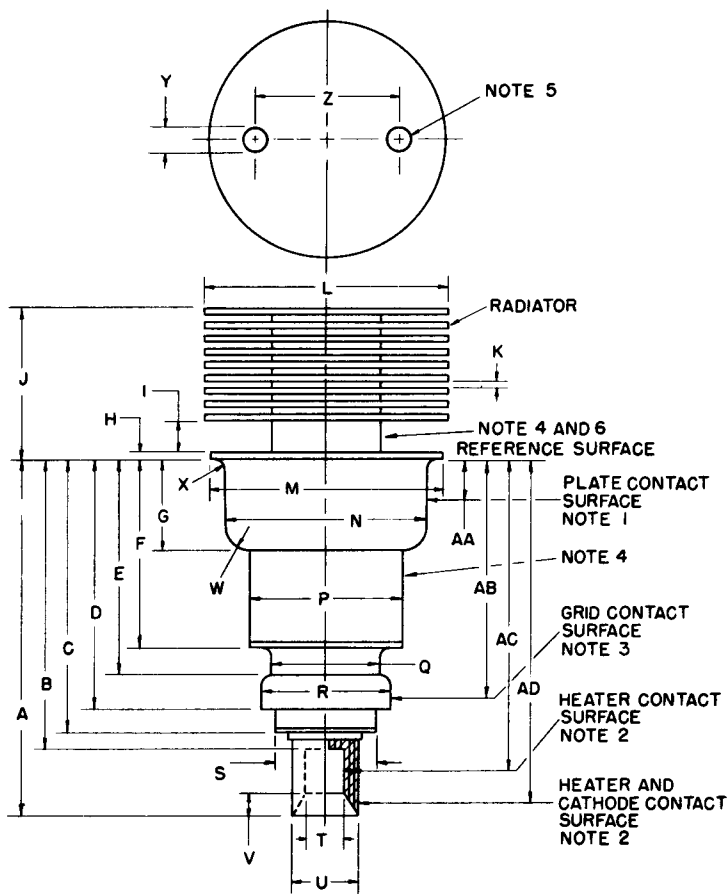
Shock

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



**DIMENSIONS FOR
 OUTLINE (INCHES)**

Ref.	Minimum	Maximum
A	1.815	1.875
B	.....	1.534
C	.....	1.475
D	1.289	1.329
E	1.085	1.135
F	.880	.920
G	.462	.477
H	.....	.040
I	.125	.185
J	.766	.826
K	.025	.046
L	1.234	1.264
M	1.180	1.195
N	1.025	1.035
P	.772	.792
Q	.541	.561
R	.655	.665
S	.....	.545
T	.213	.223
U	.315	.325
V	.....	.086
W	.....	.100
X	.....	.035
Y	.105	.145
Z	.650	.850

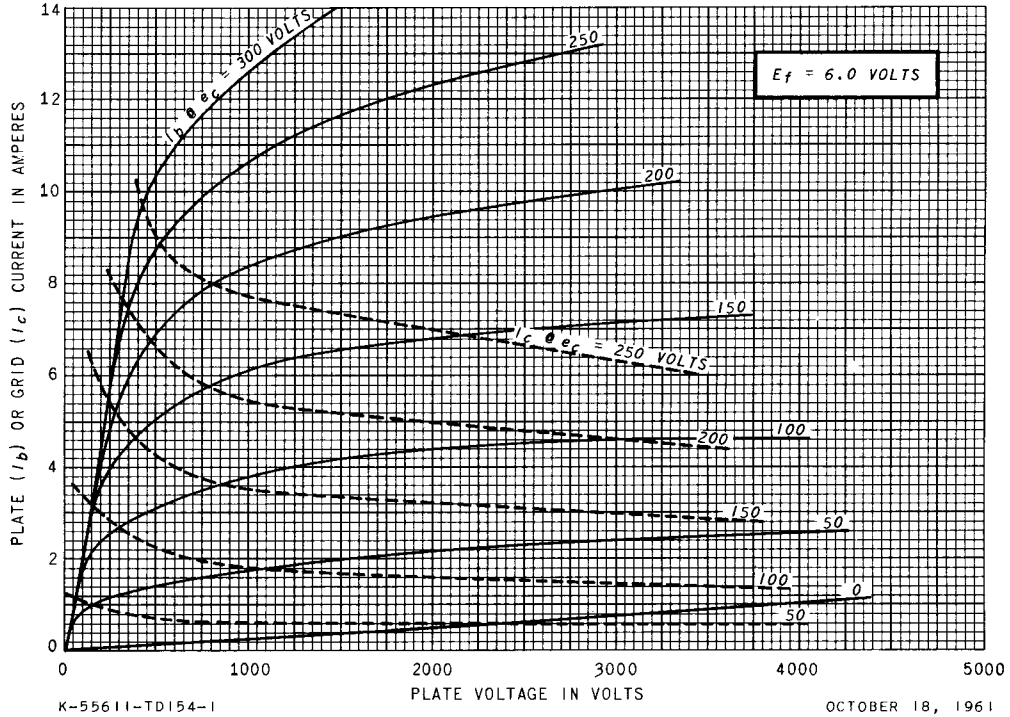
**DIMENSIONS FOR ELECTRODE
 CONTACT AREA (INCHES)**

Ref.	Dimension	Contact
AA	.198 ± .163	Plate
AB	1.225 ± .040	Grid
AC	1.631 ± .097	Heater
AD	1.645 ± .170	Cathode

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.

AVERAGE PLATE CHARACTERISTICS



AVERAGE PLATE CHARACTERISTICS

