



**ELECTRONIC  
INNOVATIONS  
IN ACTION**

**MICROWAVE DEVICES**

**6299**

## Planar Triode

**FOR GROUNDED-GRID CLASS A  
UHF AMPLIFIER APPLICATIONS**

The 6299 is a high-mu, metal-and-ceramic triode intended for operation as a grounded-grid, Class A radio-frequency amplifier at frequencies as high as 3000 megacycles.

Features of the tube include small size, planar electrode construction with close spacing, inherent rigidity, and an envelope structure convenient for coaxial circuit applications.

At 1200 megacycles a noise figure of less than 8.5 decibels may be obtained when the 6299 is used in a grounded-grid coaxial circuit.

In radar receivers, or similar applications, where the grid of the tube may be driven positive by leakage pulses, consideration should be given to use of the 7644 in place of the 6299.

### GENERAL

#### ELECTRICAL

Cathode - Coated Unipotential	
Heater Characteristics and Ratings	
Heater Voltage, AC or DC*	6.3±0.3 Volts
Heater Current†	0.3 Amperes
Direct Interelectrode Capacitances‡	
Grid to Plate: (g to p)	1.75 pf
Grid to Cathode and Heater:	
g to (h + k)	3.65 pf
Plate to Cathode and Heater:	
p to (h + k)	0.015 pf

#### MECHANICAL

Operating Position - Any	
Net Weight, approximate . . . . .	1/6 Ounce
Cooling - Conduction¶	

### MAXIMUM RATINGS

#### ABSOLUTE-MAXIMUM VALUES

Plate Voltage . . . . .	200	Volts
Positive DC Grid Voltage . . . . .	0	Volts
Negative DC Grid Voltage . . . . .	15	Volts
Plate Dissipation . . . . .	2.0	Watts
DC Plate Current . . . . .	12	Milliamperes
DC Grid Current‡ . . . . .	0Δ	Milliamperes
Envelope Temperature at Hottest Point . . . . .	150	C

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

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

The devices 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 devices by General Electric Company conveys any license under patent claims covering combinations of these devices 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 these devices with other devices or elements by any purchaser or others.



Supersedes PI Sheet dated 10-66

## CHARACTERISTICS AND TYPICAL OPERATION

### AVERAGE CHARACTERISTICS

Plate Voltage. . . . .	. 175	Volts
Grid Voltage $\phi$ . . . . .	---	Volts
Amplification Factor . . . . .	. 110	
Plate Resistance, approximate . . . . .	7300	Ohms
Transconductance. . . . .	15000	Micromhos
Plate Current. . . . .	. 10	Milliamperes
Plate Voltage, approximate, $I_b = 10$ Milliamperes, Ec = 0 volts . . . . .	. 125	Volts

### CLASS A, RF AMPLIFIER—GROUNDED-GRID, COAXIAL-TYPE CIRCUIT

Frequency . . . . .	450	1200	1200	1200	3000	Megacycles
Plate Voltage. . . . .	**	---	**	175	**	Volts
Plate-Supply Voltage $\ddagger$ . . . . .	---	300	---	---	---	Volts
Resistor in Plate Circuit (bypassed) . . . . .	---	17500	---	---	---	Ohms
Grid Voltage $\S\S$ . . . . .	. 0	0	0	$\P\P$	0	Volts
Plate Current. . . . .	10	10	10	10	10	Milliamperes
Bandwidth, min . . . . .	. 9	10	10	10	10	Megacycles
Gain . . . . .	17.5	17	17	17	11	Decibels
Noise Figure, Power-Matched . . . . .	4.5	8.2	8.0	8.5	13.2	Decibels

### NOTES

- \* The equipment designer should design the equipment so that heater voltage is centered at the specified bogey value, with heater supply variations restricted to maintain heater voltage within the specified tolerance.
- $\ddagger$  Heater current of a bogey tube at  $E_f = 6.3$  volts.
- $\S$  Without external shield.
- $\P$  Good thermal contact to the anode and cathode must be provided to conduct heat from the elements. The anode contact must be sufficiently flexible to keep lateral force on the anode terminal at a minimum.
- # The 6299 is rated only for Class A amplifier service.
- $\Delta$  Does not apply to initial-emission-velocity current.
- $\phi$  Adjusted for  $I_b = 10$  milliamperes.
- \*\* Adjust for  $I_b = 10$  milliamperes; range must be variable from 75 to 200 volts.
- $\ddagger\ddagger$  Supply should be regulated.
- $\S\S$  For operation above 1000 megacycles, the minimum noise figure will generally be obtained by operation at zero bias. For operation below 1000 megacycles, the use of a cathode resistor or grid bias should be evaluated for the particular application.
- $\P\P$  Adjusted for  $I_b = 10$  milliamperes; 200 ohm variable cathode resistor recommended.

## INITIAL CHARACTERISTICS LIMITS

	Min.	Bogey	Max.	
Heater Current				
Ef = 6.3 volts . . . . .	280	300	320	Milliamperes
Plate Voltage				
Ef = 6.3 volts, Ec = 0 volts, Eb adjusted for Ib = 10 ma . . . . .	75	125	175	Volts
Transconductance				
Ef = 6.3 volts, Eb = 175 volts, Ec adjusted for Ib = 10 ma. . . . .	11500	15000	---	Micromhos
Amplification Factor				
Ef = 6.3 volts, Eb = 175 volts, Ec adjusted for Ib = 10 ma . . . . .	85	110	140	
Interelectrode Leakage Resistance				
Ef = 6.3 volts, Polarity of applied d-c interelectrode voltage is such that no cathode emission results.				
Grid to Cathode and Heater at 45 volts d-c . . . . .	0.25	---	---	Megohms
Grid to Plate at 500 volts d-c . . . . .	5.0	---	---	Megohms
Interelectrode Capacitances				
Grid to Plate: (g to p) . . . . .	1.5	1.75	2.0	Picofarads
Grid to Cathode and Heater: g to (h + k) . . . . .	3.0	3.65	5.0	Picofarads
Plate to Cathode and Heater: p to (h + k) . . . . .	---	0.015	0.025	Picofarads

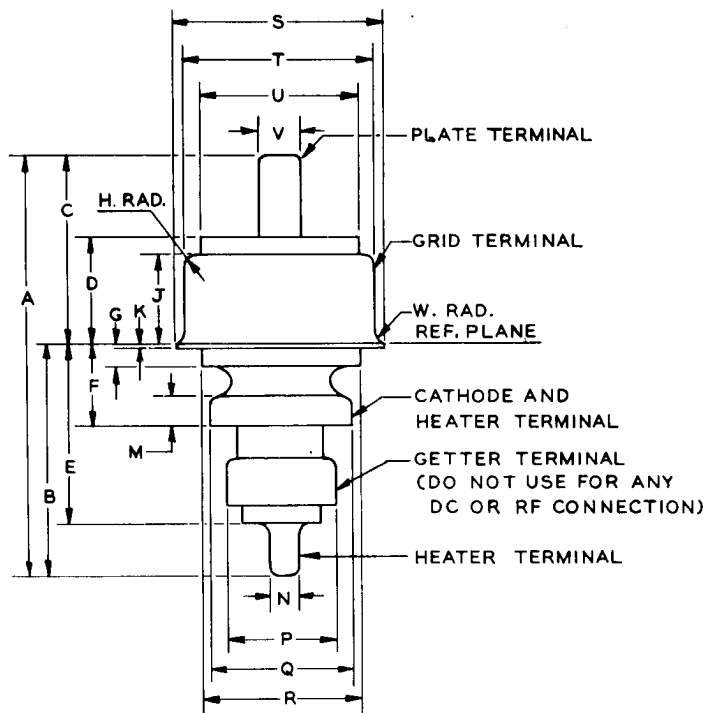
## SPECIAL PERFORMANCE TESTS

	Min.	Max.	
Noise Figure - 450 MC			
Ef = 6.3 volts, Ec = 0 volts, Eb adjusted for Ib = 10 ma, F = 450±5 MC . . . . .	---	5.0	Decibels
Noise Figure - 1200 MC			
Ef = 6.3 volts, Ec = 0 volts, Eb adjusted for Ib = 10 ma, F = 1200±5 MC . . . . .	---	8.5	Decibels
Noise Figure - 3000 MC			
Ef = 6.3 volts, Ec = 0 volts, Eb adjusted for Ib = 10 ma, F = 3000±5 MC . . . . .	---	13.5	Decibels
Power Gain - 450 Mc			
Ef = 6.3 volts, Ec = 0 volts, Eb adjusted for Ib = 10 ma, F = 450±5 MC, Bandwidth = 9 MC, min. . . . .	15	---	Decibels
Power Gain - 1200 MC			
Ef = 6.3 volts, Ec = 0 volts, Eb adjusted for Ib = 10 ma, F = 1200±5 MC, Bandwidth = 10 MC, min. . . . .	15	---	Decibels
Power Gain - 3000 MC			
Ef = 6.3 volts, Ec = 0 volts, Eb adjusted for Ib = 10 ma, F = 3000±5 MC, Bandwidth = 10 MC, min. . . . .	10	---	Decibels

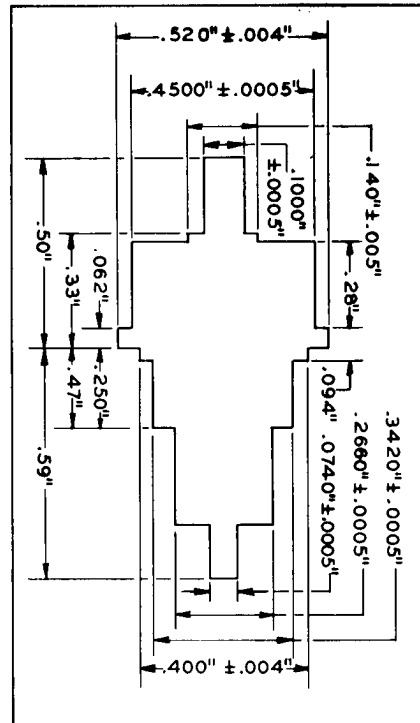
## DEGRADATION RATE TESTS

1000-Hour Life  
 Statistical sample operated for 1000 hours to evaluate changes in transconductance and noise figure with life.

PHYSICAL DIMENSIONS

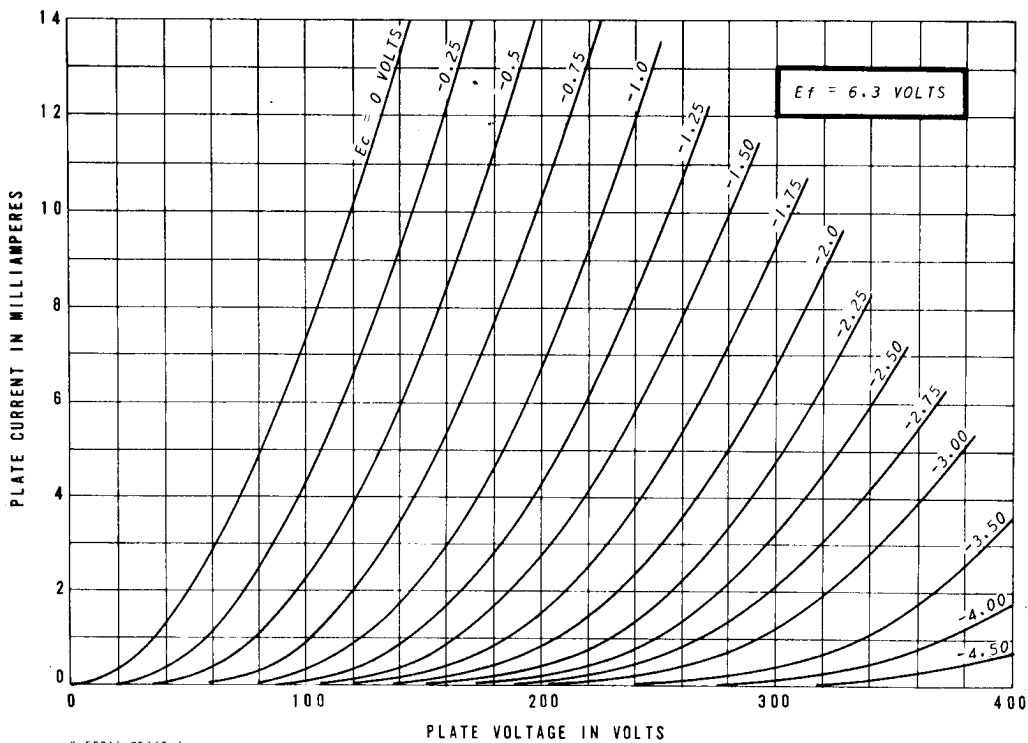


ALIGNMENT GAUGE

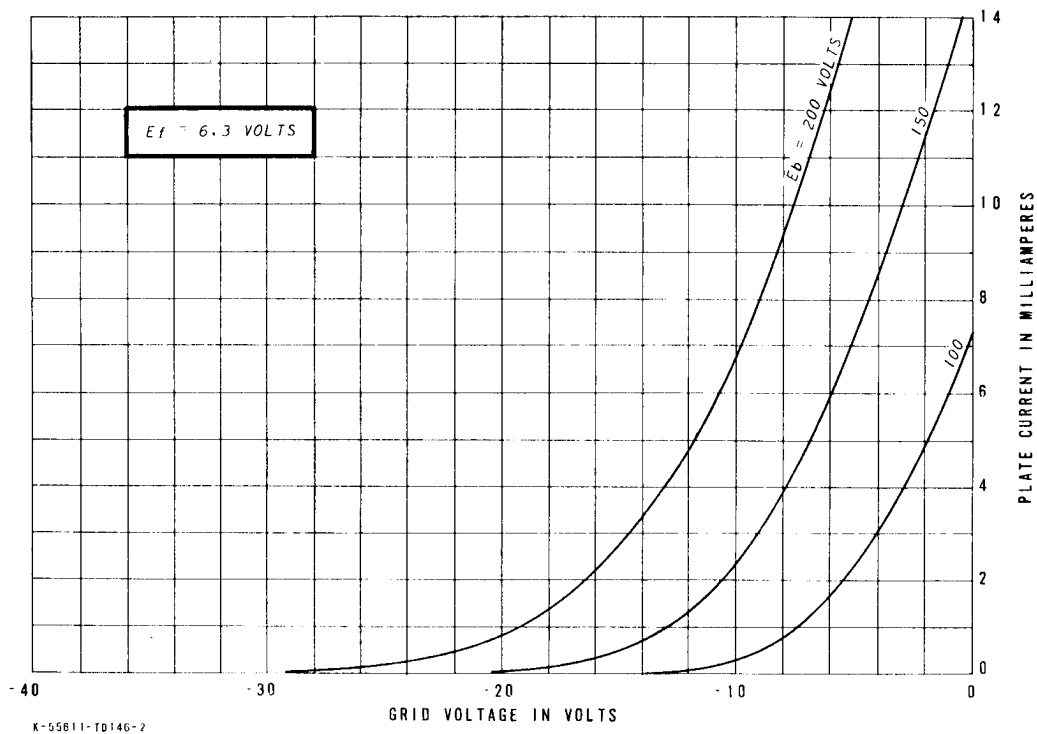


Ref.	INCHES		MILLIMETERS	
	Minimum	Maximum	Minimum	Maximum
A	0.960	1.040	24.38	26.42
B	0.530	0.590	13.46	14.99
C	0.410	0.470	10.41	11.94
D	---	0.272	---	6.91
E	---	0.475	---	12.07
F	0.163	0.193	4.14	4.90
G	---	0.060	---	1.52
H	---	0.030	---	0.76
J	0.190	0.210	4.83	5.33
K	0.009	0.015	0.23	0.38
M	0.040	0.070	1.02	1.78
N	0.059	0.065	1.50	1.65
P	---	0.257	---	6.53
Q	0.326	0.334	8.28	8.48
R	---	0.385	---	9.78
S	0.483	0.497	12.27	12.62
T	0.435	0.445	11.05	11.30
U	---	0.385	---	9.78
V	0.088	0.094	2.24	2.39
W	---	0.008	---	0.20

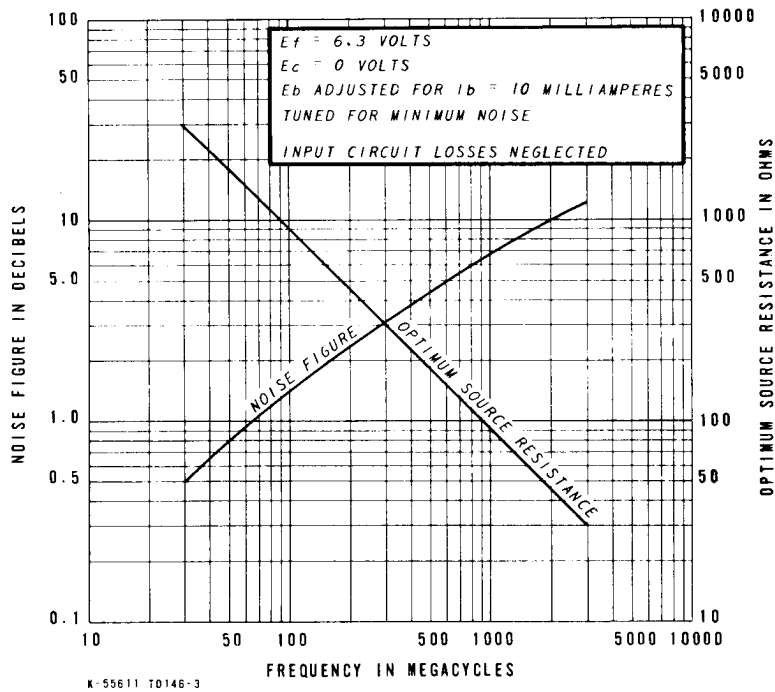
AVERAGE PLATE CHARACTERISTICS



AVERAGE TRANSFER CHARACTERISTICS



PREDICATED NOISE PERFORMANCE



TUBE PRODUCTS DEPARTMENT

GENERAL  ELECTRIC

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