

OBJECTIVE FOR DEVELOPMENTAL TYPE

Z-5099-A*

PLANAR TRIODE

The Z-5099-A is a high-mu triode for use in grounded-grid Class C power amplifiers, oscillators, or frequency multipliers at frequencies up to 2500 megacycles. Typical power output is 19 watts at 2500 megacycles and 40 watts at 500 megacycles. The metal-ceramic construction permits the tube to withstand shock tests at 400G. The specially designed radiator enables the plate to dissipate 100 watts with conduction cooling when a heat sink sufficient to limit the seal temperature to 200 C maximum is used.

The Z-5099-A features graduated-diameter disk seals for maximum efficiency in cavity and parallel-line circuits thus assuring both low lead inductances and electrode isolation. Other features include high transconductance and low interelectrode capacitances.

GENERAL

Electrical

Cathode - Coated Unipotential

Heater Characteristics and Ratings

Heater Voltage, AC or DC+	6.3	Volts
Heater Current‡	1.0	Amperes
Cathode Heating Time, minimum	60	Seconds
Direct Interelectrode Capacitances§		
Grid to Plate	2.0	pf
Grid to Cathode	6.5	pf
Plate to Cathode, maximum	0.029	pf

Mechanical

Mounting Position - Any

Maximum Diameter	1 59/64	Inches
Maximum Over-all Length	2 43/64	Inches

Radiator may be used as a mounting flange. Plate, grid, cathode finger contacts, and radiator mounting must be sufficiently flexible to allow for maximum eccentricities and tilt.

Net Weight, approximate	3.5	Ounces
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Cooling

Plate and Plate Seal - Conduction or Forced Air

Grid and Cathode Seals - Conduction or Forced Air

Radiator must be securely fastened to an appropriate heat sink to limit seal to maximum temperature under operating conditions.

Maximum Temperature of Any Seal	200	C
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MAXIMUM RATINGS

Absolute-Maximum Values

Radio-Frequency Power Amplifier or Oscillator - Class C Telegraphy

Key-Down Conditions per Tube Without Amplitude Modulation

Heater Voltage	+	
DC Plate Voltage	1000	Volts
DC Cathode Current	125	Milliamperes
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
Plate Dissipation	100	Watts
Grid Dissipation	2.0	Watts
Frequency	2500	Megacycles

Radio-Frequency Power Amplifier or Oscillator - Class C Telephony

Carrier Conditions per Tube for Use With a Maximum Modulation Factor of 1.0

Heater Voltage	+	
DC Plate Voltage	600	Volts
DC Cathode Current	100	Milliamperes
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
Plate Dissipation	70	Watts
Grid Dissipation	2.0	Watts
Frequency	2500	Megacycles

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.

CHARACTERISTICS AND TYPICAL OPERATION

Average Characteristics

Plate Voltage	600	Volts
Plate Current	70	Milliamperes
Amplification Factor	100	
Transconductance	24000	Micromhos

Z-5099-A

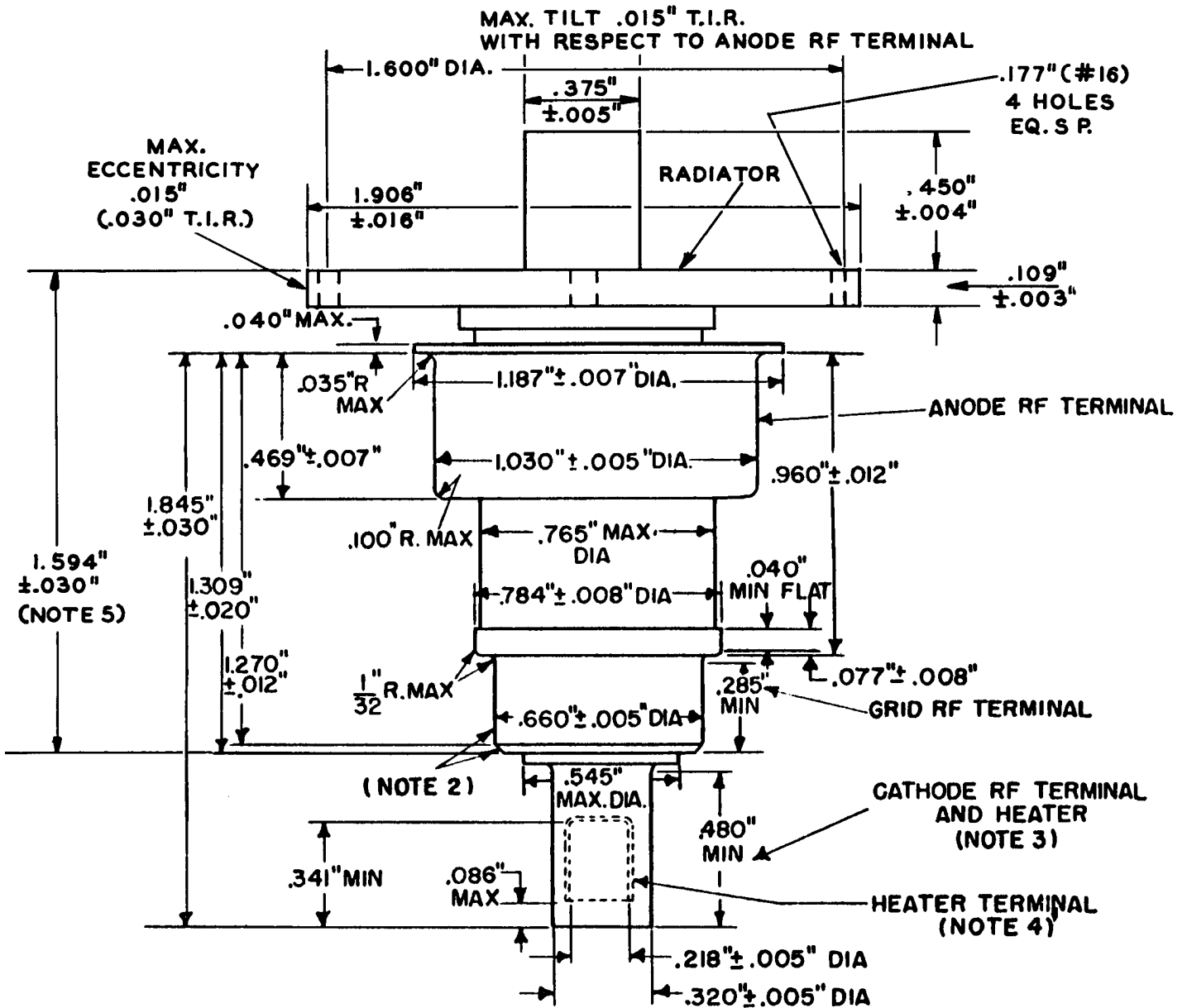
CHARACTERISTICS AND TYPICAL OPERATION (Continued)

Class C Oscillator, Grid Return Circuit

Frequency	500	2500	Megacycles
DC Plate Voltage	900	1000	Volts
DC Cathode Current	120	117	Milliamperes
DC Grid Current	30	27	Milliamperes
DC Grid Voltage	-40	-22	Volts
Useful Power Output	40	19	Watts

- * Publication of these data does not obligate the General Electric Company to manufacture a tube with these characteristics.
- + The Z-5099-A operates at frequencies where it is necessary to consider transit-time effects of the electron current. The principal effects influencing tube operation are the decrease in power output and operating efficiency with increase in frequency, and the bombardment and heating of the cathode by electrons from the region of the grid, which can be severe enough to result in short tube life and erratic operation. Operating frequency, circuit design and adjustment, grid bias, and grid current contribute to the degree of cathode bombardment. There is an optimum heater voltage which will maintain the cathode at the correct operating conditions. If the conditions of operation result in appreciable cathode back-heating, it may be necessary to start dynamic tube operation at normal heater voltage, followed by a reduction of heater voltage to the proper value. A maximum variation of plus or minus five percent in heater voltage is recommended where extended tube life is a factor.
- ‡ Heater current of a bogey tube at $E_f = 6.3$ volts.
- § Measured in a special shielded socket.
- ¶ 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.

2/15/63 (B)
Supersedes 9/20/62 (B)



NOTES:

1. External metal parts plated with 30 MSI minimum of copper and/or silver.
2. Solder not to extend radially beyond RF terminal.
3. The cathode RF terminal and grid RF terminal concentric with respect to the anode terminal within $0.020''$ (runout within $0.040''$).
4. The heater terminal concentric with respect to the cathode RF terminal within $0.012''$ (runout within $0.024''$).
5. Measure at two diametrically opposite points and average reading.