6442
PLANAR TRIODE

DESCRIPTION AND RATING

FOR GROUNDED-GRID OSCILLATOR AND AMPLIFIER SERVICE

- Metal and Ceramic
- Small Size
- Two Kilowatts Useful Pulse Power Output

The 6442 is a high-mu, metal-and-ceramic triode intended for operation as a plate-pulsed, grounded-grid oscillator at frequencies as high as 5000 megacycles. The 6442 is also useful as a CW, radio-frequency power amplifier or frequency multiplier at frequencies as high as 2500 megacycles.

Features of the 6442 include small size, planar electrode construction with close spacing, inherent rigidity, an envelope structure convenient for coaxial circuit applications, and excellent resistance to vibration and shock.

GENERAL

ELECTRICAL
- Cathode—Coated Unipotential
- Heater Characteristics and Ratings
  - Heater Voltage, AC or DC * Volts
  - Heater Current at Ef = 0.3 volts 0.9† Amperes
- Direct Interelectrode Capacitances‡
  - Grid to Plate (g to p) 2.3 pf
  - Grid to Cathode (g to k) 5.0 pf
  - Plate to Cathode (p to k), max. 0.045 pf

MECHANICAL
- Mounting Position—Any
- Net Weight, approximate 1 Ounce
- Cooling—Conduction and Convection

MAXIMUM RATINGS

ABSOLUTE-MAXIMUM VALUES
PLATE-PULSED OSCILLATOR SERVICE
- Heater Voltage* 5.7 to 6.3 Volts
- Cathode Heating Time, minimum 60 Seconds
- Frequency 5000 Megacycles
- Peak Positive-Pulse Plate Supply Voltage 3000 Volts
- Duty Factor of Plate Pulse‡ 0.001
- Pulse Duration 2.0 Microseconds
- Plate Current Average 2.5 Milliamperes
  Average During Plate Pulse 2.5 Amperes

Negative Grid Voltage
- Average During Plate Pulse 100 Volts
- Grid Current
  Average 1.25 Milliamperes
  Average During Plate Pulse 1.25 Amperes
- Plate Dissipation 7.5 Watts
- Peak Heater-Cathode Voltage
- Heater Positive with Respect to
  Cathode 90 Volts
  Heater Negative with Respect to
  Cathode 90 Volts
- Envelope Temperature at Hottest Point 175°C

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.
MAXIMUM RATINGS (Continued)

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
Cathode Heating Time, minimum ........... 30 Seconds
Frequency ........................................ 2500 Megacycles
DC Plate Voltage .................................. 350 Volts
Negative DC Grid Voltage .................... 50 Volts
DC Plate Current .................................. 35 Milliamperes
DC Grid Current .................................. 15 Milliamperes
Plate Dissipation ................................ 8.0 Watts
Peak Heater-Cathode Voltage
Heater Positive with Respect to Cathode .................................. 90 Volts
Heater Negative with Respect to Cathode .................................. 90 Volts
Envelope Temperature at Hottest Point 175° 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
Cathode Heating Time, minimum ........... 30 Seconds
Frequency ........................................ 2500 Megacycles
DC Plate Voltage .................................. 275 Volts
Negative DC Grid Voltage .................... 50 Volts
DC Plate Current .................................. 35 Milliamperes
DC Grid Current .................................. 15 Milliamperes
Plate Dissipation ................................ 6.0 Watts
Peak Heater-Cathode Voltage
Heater Positive with Respect to Cathode .................................. 90 Volts
Heater Negative with Respect to Cathode .................................. 90 Volts
Envelope Temperature at Hottest Point 175° C

CHARACTERISTICS AND TYPICAL OPERATION

AVERAGE CHARACTERISTICS
Heater Voltage .................................. 6.3 Volts
Plate Voltage ................................... 350 Volts
Grid Voltage ................................... -4.25 Volts

Amplification Factor .................................. 50
Transconductance ................................ 16500 Micromhos
Plate Current ................................... 35 Milliamperes

PLATE-PULSED OSCILLATOR
Frequency ......................................... 3500 Megacycles
Heater Voltage ................................... 6.0 Volts
Duty Factor ........................................ 0.001
Pulse Duration .................................... 1.0 Microseconds
Pulse Repetition Rate ............................ 1000 Pulses per Second
Peak Positive-Pulse Plate Supply Voltage .................................. 3000 Volts
Negative Grid Voltage
Average During Plate Pulse .................................. 75 Volts
Grid-Bias Resistor ................................ 50 Ohms
Plate Current
Average ........................................... 2.5 Milliamperes
Average During Plate Pulse .................... 2.5 Amperes
Grid Current
Average ........................................... 1.25 Milliamperes
Average During Plate Pulse .................... 1.25 Amperes
Useful Power Output
Average ........................................... 2.0 Watts
Average During Plate Pulse .................... 2.0 Kilowatts

RADIO-FREQUENCY POWER AMPLIFIER—CLASS C TELEGRAPHY
Frequency ......................................... 1000 Megacycles
Heater Voltage ................................... 5.7 Volts
DC Plate Voltage .................................. 250 Volts
DC Plate Current .................................. 23 Milliamperes
DC Grid Current .................................. 6.0 Milliamperes
Driving Power ................................... 0.35 Watts
Useful Power Output ................................ 2.8 Watts
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 6.3 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 = 6.3 volts.
‡ Measured in a special shielded socket.
¶ Applications with a duty factor greater than 0.001 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 25 amperes.
** Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115 percent of the carrier conditions.

INITIAL CHARACTERISTICS LIMITS

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<th></th>
<th>Min.</th>
<th>Bogey</th>
<th>Max.</th>
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<tr>
<td>Heater Current</td>
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<td>Ef = 6.3 volts</td>
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<td>Grid Voltage</td>
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<tr>
<td>Ib = 35 ma</td>
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<td>-5.75 Volts</td>
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<tr>
<td>Ec adjusted for Ib = 35 ma</td>
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<td>Ec adjusted for Ib = 35 ma</td>
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<td>0.5 Microamperes</td>
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<td>Interelectrode Leakage Resistance</td>
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<td>Grid to Plate at 500 volts d-c</td>
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<td>Heater-Cathode Leakage Current</td>
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<td>Heater Negative with Respect to Cathode</td>
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<td>Grid to Cathode: (g to k)</td>
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<td>Plate to Cathode: (p to k)</td>
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<td>0.045</td>
<td>PicoFarads</td>
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SPECIAL PERFORMANCE TESTS

Pulsed-Oscillator Power Output
Tubes are tested for power output as an oscillator under the following conditions: Ef = 6.0 volts; F = 3450 MC, min.; cpy = 3000 volts; tp = 1.0 μsec. = 10%; prr adjusted for Du = 0.001 = 5%; Rg adjusted for Tb = 2.5 ma ................................................................. 1.75 Watts

Pulse Emission
Tubes are tested for pulse emission under the following conditions: Ef = 6.3 volts; tp = 1 to 3 μsec.; Du = 0.0005, min.; prr = 500 pps, max.; eb = ec and adjusted for is = 8 amp ............................................................... 175 Volts

Low Pressure Voltage Breakdown Test
Statistical sample tested for voltage breakdown at a pressure of 250 mm Hg. Tubes shall not give visual evidence of flashover when 3000 volts RMS, 60 cps, is applied between the plate and grid terminals

Low Pressure Voltage Breakdown Test
Statistical sample tested for voltage breakdown at a pressure of 20 mm Hg. Tubes shall not give visual evidence of flashover when 500 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 1.0 milliseconds duration in each of four 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 a pulsed oscillator to evaluate changes in power output with life.
Note 1. Applies to minimum surface for anode d-c and r-f terminal only. Other surfaces must not be used for these terminal purposes.

Note 2. Applies to minimum surface for grid d-c and r-f terminal only. Other surfaces, except for Notes 3 and 4, must not be used for terminal purposes.

Note 3. Applies to minimum surfaces for grid d-c and r-f terminal only.

Note 4. The cylindrical surface of this diameter may be used for grid d-c and r-f terminal purposes.

Note 5. The surfaces defined by Notes 2, 3, and 4 shall be the only surfaces used for tube stops and clamping purposes.

Note 6. Other surfaces shall not be used for cathode d-c and r-f terminal purposes.

Note 7. Other surfaces shall not be used for anode d-c and r-f terminal purposes.

Note 8. Applies to surface designated for cathode d-c and r-f terminal. Solder at brazed joint will not exceed the maximum diameter.

Note 9. The maximum eccentricity of the anode and cathode with respect to the grid terminal in a prescribed jig is 0.010 (or maximum total runout of 0.020) and is measured by indicators at the points designated.

Note 10. The maximum eccentricity of heater-terminal No. 1 and heater-terminal No. 2 with respect to the grid terminal in a prescribed jig is 0.015 (or maximum total runout of 0.030) and is measured by indicators at the points designated.

Note 11. Exhaust tubing must not be subjected to any mechanical stress.

Note 12. For reference only. Dimension does not include any possible solder fillet.

Note 13. This area is reserved for tube stamping and coding.
PULSED-OSCILLATOR PERFORMANCE
POWER OUTPUT VS. FREQUENCY

$E_{bb} = 3000$ VOLTS
$I_b = 2.5$ AMPERES - AVERAGE DURING PLATE PULSE
DUTY FACTOR - LESS THAN 0.001

AVERAGE CONSTANT-CURRENT CHARACTERISTICS

$E_f = 6.3$ VOLTS

$E_{bb} = 80$ MILLIAMPERES
$E_{bb} = 100$ MILLIAMPERES

0 100 200 300 400 500
PLATE VOLTAGE IN VOLTS

-14 -12 -10 -8 -6 -4 -2 0 2 4 6 8 10 12 14
GRID VOLTAGE IN VOLTS

OCTOBER 11, 1961
CW - AMPLIFIER PERFORMANCE
POWER OUTPUT VS. FREQUENCY

E_b = 300 VOLTS
I_b = 30 MILLIAMPERES
DRIVING POWER = 0.5 WATT

POWER OUTPUT IN WATTS

FREQUENCY IN KILOMEGACYCLES

DRIVE LEVEL

OCTOBER 11, 1961