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High Power Silicon Controlled Rectifier

1300 VOLTS 110 ARMS

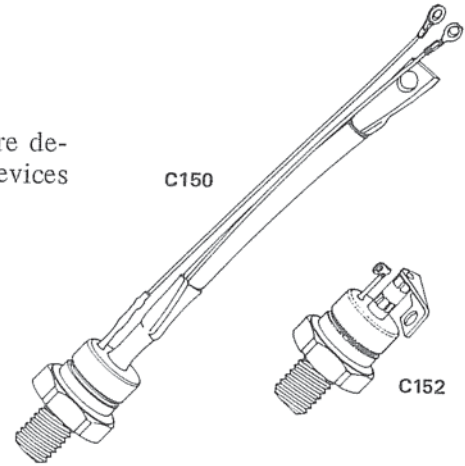
C150,2



The General Electric C150 and C152 Silicon Controlled Rectifiers are designed for phase control applications. These are all-diffused, Pic-Pac devices employing the field-proven amplifying gate.

FEATURES:

- High di/dt Rating
- High dv/dt Capability with Selections Available
- Excellent Surge and I²t Ratings Providing Easy Fusing
- Rugged Hermetic Package with Long Creepage Path



MAXIMUM ALLOWABLE RATINGS

| TYPE | REPETITIVE PEAK OFF-STATE VOLTAGE, V_{DRM}^1 $T_J = -40^\circ\text{C to } +125^\circ\text{C}$ | REPETITIVE PEAK REVERSE VOLTAGE, V_{RRM}^1 $T_J = -40^\circ\text{C to } +125^\circ\text{C}$ | NON-REPETITIVE PEAK REVERSE VOLTAGE, V_{RSM}^1 $T_J = +125^\circ\text{C}$ |
|--------------|--|--|--|
| C150, C152E | 500 Volts | 500 Volts | 600 Volts |
| C150, C152M | 600 | 600 | 720 |
| C150, C152S | 700 | 700 | 850 |
| C150, C152N | 800 | 800 | 950 |
| C150, C152T | 900 | 900 | 1075 |
| C150, C152P | 1000 | 1000 | 1200 |
| C150, C152PA | 1100 | 1100 | 1325 |
| C150, C152PB | 1200 | 1200 | 1450 |
| C150, C152PC | 1300 | 1300 | 1550 |

¹ Half sinewave waveform, 10 msec. max. pulse width.

| | |
|---|--|
| RMS On-State Current, $I_{T(RMS)}$ | 100 Amperes (All Conduction Angles) |
| Average On-State Current, $I_{T(AV)}$ | Depends on Conduction Angle (See Charts 1 and 4) |
| Peak One-Cycle Surge (Non-Repetitive) On-State Current, I_{TSM} (60 Hz) | 1500 Amperes |
| Peak One-Cycle Surge (Non-Repetitive) On-State Current, I_{TSM} (50 Hz) | 1400 Amperes |
| Critical Rate-of-Rise of On-State Current (Non-Repetitive)* | 800 A/ μ s |
| Critical Rate-of-Rise of On-State Current (Repetitive)* | 500 A/ μ s |
| I ² t (for fusing), for times \geq 1.5 milliseconds | 7000 (RMS Ampere) ² Seconds |
| Peak Gate Power Dissipation, P_{GM} | 10 Watts |
| Average Gate Power Dissipation, $P_{G(AV)}$ | 2 Watts |
| Storage Temperature, T_{stg} | -40°C to +150°C |
| Operating Temperature, T_J | -40°C to +125°C |
| Stud Torque | 125 Lbs.-In. (Min.) – 150 Lbs.-In. (Max.) 14 N-m (Min.) – 17 N-m (Max.) |

*di/dt ratings established in accordance with EIA-NEMA Standard RS-397, Section 5.2.2.6 for conditions of V_{DRM} stated above; 20 volts, 20 ohms gate trigger source with 0.5 μ sec short circuit trigger current rise time.

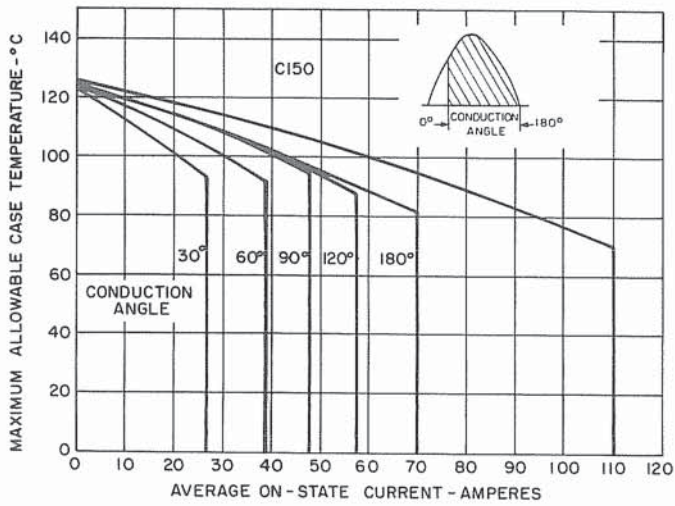
CHARACTERISTICS

| TEST | SYMBOL | MIN. | TYP. | MAX. | UNITS | TEST CONDITIONS |
|---|-------------------------|------|------|------|------------------------------|---|
| Repetitive Peak Reverse and Off-State Current | I_{DRM} and I_{RRM} | | | | mA | $T_J = +25^\circ\text{C}$ $V_{DRM} = V_{RRM} =$ |
| C150, C152E | | — | 3 | 10 | | 500 Volts Peak |
| C150, C152M | | — | 3 | 10 | | 600 |
| C150, C152S | | — | 3 | 10 | | 700 |
| C150, C152N | | — | 3 | 10 | | 800 |
| C150, C152T | | — | 3 | 10 | | 900 |
| C150, C152P | | — | 3 | 10 | | 1000 |
| C150, C152PA | | — | 3 | 10 | | 1100 |
| C150, C152PB | | — | 3 | 6 | | 1200 |
| C150, C152PC | | — | 3 | 5 | | 1300 |
| Repetitive Peak Reverse and Off-State Current | I_{DRM} and I_{RRM} | | | | mA | $T_J = +125^\circ\text{C}$ $V_{DRM} = V_{RRM}$ |
| C150, C152E | | — | 15 | 20 | | 500 Volts Peak |
| C150, C152M | | — | 15 | 20 | | 600 |
| C150, C152S | | — | 15 | 20 | | 700 |
| C150, C152N | | — | 15 | 20 | | 800 |
| C150, C152T | | — | 15 | 20 | | 900 |
| C150, C152P | | — | 15 | 20 | | 1000 |
| C150, C152PA | | — | 15 | 20 | | 1100 |
| C150, C152PB | | — | 10 | 13 | | 1200 |
| C150, C152PC | | — | 8 | 11 | | 1300 |
| Thermal Resistance | $R_{\theta JC}$ | — | .2 | .3 | $^\circ\text{C}/\text{Watt}$ | Junction-to-Case |
| Critical Rate-of-Rise of Off-State Voltage (Higher values may cause device switching) | dv/dt | 200 | 500 | — | $\text{V}/\mu\text{sec}$ | $T_J = +125^\circ\text{C}$, Rated V_{DRM} , Using Linear Exponential Rising Waveform. Gate Open Circuited. Exponential $dv/dt = \frac{V_{DRM}}{\tau} (.632)$ |
| Higher minimum dv/dt selections available – consult factory. | | | | | | |
| Holding Current | I_H | — | 20 | 500 | mAdc | $T_C = +25^\circ\text{C}$, Anode Supply = 24 Vdc. Initial Forward Current = 2 Amps. |
| Turn-On Delay Time | t_d | — | 1 | — | μsec | $T_C = +25^\circ\text{C}$, $I_T = 50$ Adc, $V_{DRM} = \text{Rated}$. Gate Supply: 10 Volt Open Circuit, 20 Ohm, 0.1 μsec max. rise time |
| Gate Pulse Width Necessary to Trigger | | — | 8 | 10 | μsec | $T_C = +25^\circ\text{C}$. Gate Supply: 20 Volt Open Circuit, 40 Ohm, 0.5 μsec rise time. $I_T = 1.0$ Amps. for High di/dt Capability. See Chart 9. |
| DC Gate Trigger Current | I_{GT} | — | 50 | 150 | mAdc | $T_C = +25^\circ\text{C}$, $V_D = 6$ Vdc, $R_L = 3$ Ohms |
| | | — | 75 | 200 | | $T_C = -40^\circ\text{C}$, $V_D = 6$ Vdc, $R_L = 3$ Ohms |
| | | — | 15 | 125 | | $T_C = +125^\circ\text{C}$, $V_D = 6$ Vdc, $R_L = 3$ Ohms |
| DC Gate Trigger Voltage | V_{GT} | — | 1.25 | 3.0 | Vdc | $T_C = -40^\circ\text{C}$ to $+120^\circ\text{C}$, $V_D = 6$ Vdc, $R_L = 3$ Ohms |
| | | 0.15 | — | — | | $T_C = +125^\circ\text{C}$, $V_D = \text{Rated}$, $R_L = 1000$ Ohms |
| Peak On-State Voltage | V_{TM} | — | 2.0 | 2.6 | Volts | $T_C = +25^\circ\text{C}$, $I_{TM} = 500$ Amps. Peak. Duty Cycle $\leq 0.01\%$ |
| Circuit Commutated Turn-Off Time** | t_q | — | 100 | † | μsec | (1) $T_J = +125^\circ\text{C}$ (2) $I_{TM} = 50$ Amps (3) $V_R = 50$ Volts Min. (4) V_{DRM} (Reapplied) = Rated (5) Rate-of-Rise of Reapplied Off-State Voltage = $20\text{V}/\mu\text{sec}$ Linear |

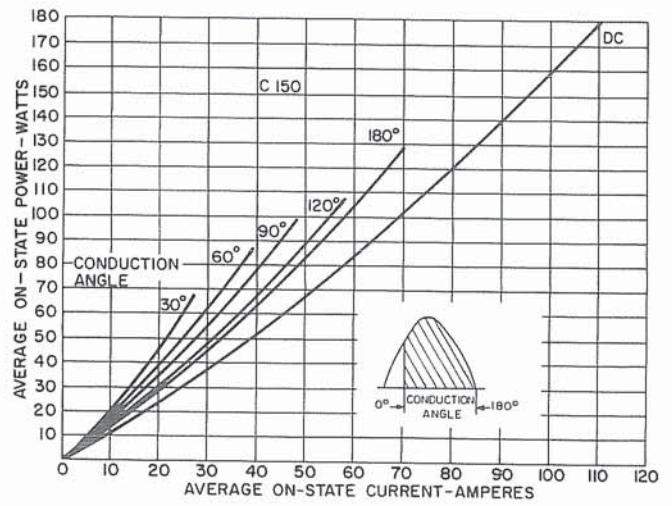
† Consult factory if guaranteed turn-off time is required.

** Typical turn-off time increases 30%, if I_{TM} is increased to 500 amps. 819

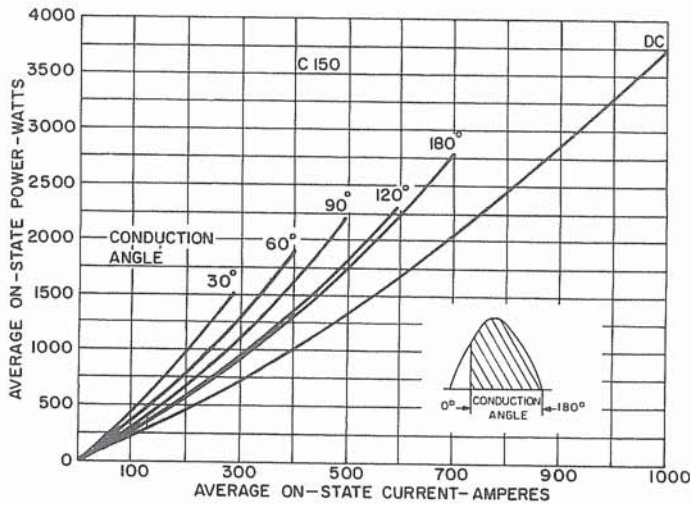
C150, C152



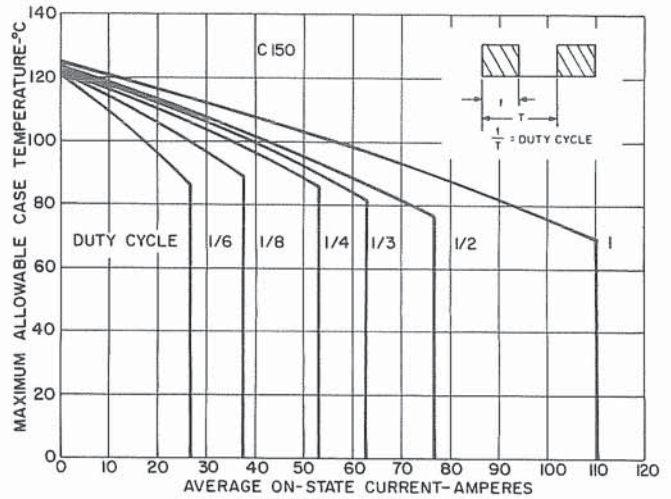
1. MAXIMUM ALLOWABLE CASE TEMPERATURE FOR SINUSOIDAL CURRENT WAVEFORM 50 TO 400 CPS



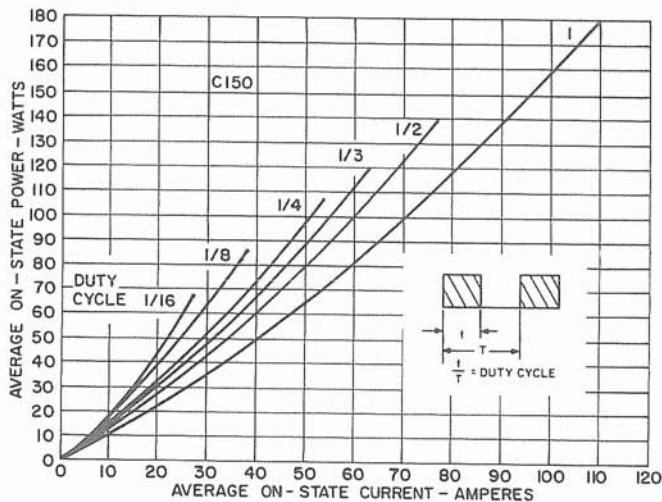
2. MAXIMUM ON-STATE POWER DISSIPATION FOR SINUSOIDAL CURRENT WAVEFORM



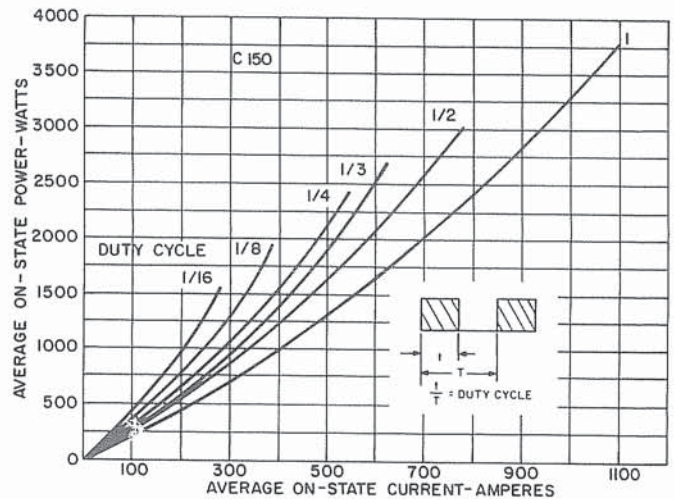
3. MAXIMUM ON-STATE POWER DISSIPATION FOR SINUSOIDAL CURRENT WAVEFORM (EXTENDED RANGE)



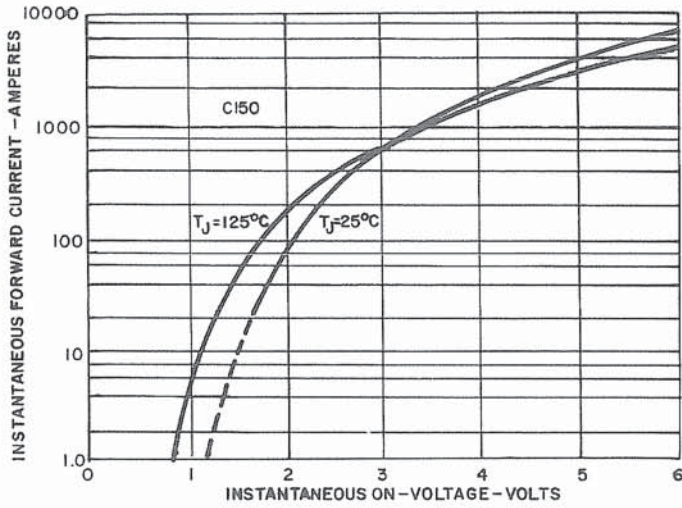
4. MAXIMUM ALLOWABLE CASE TEMPERATURE FOR RECTANGULAR CURRENT WAVEFORM - 50 TO 400 CPS



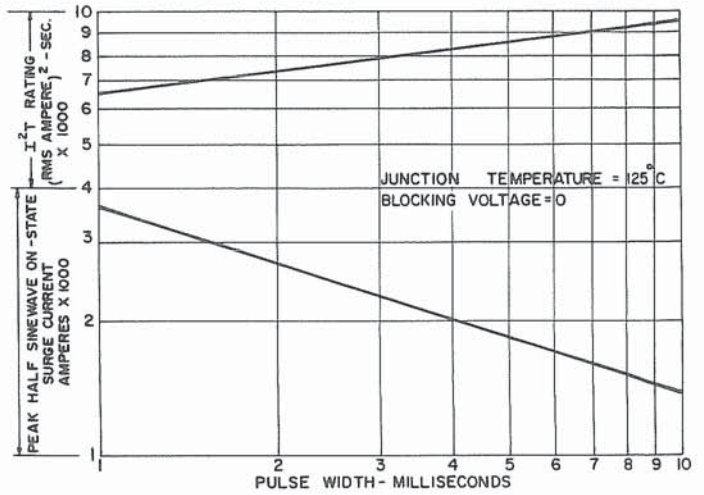
5. MAXIMUM ON-STATE POWER DISSIPATION FOR RECTANGULAR CURRENT WAVEFORM



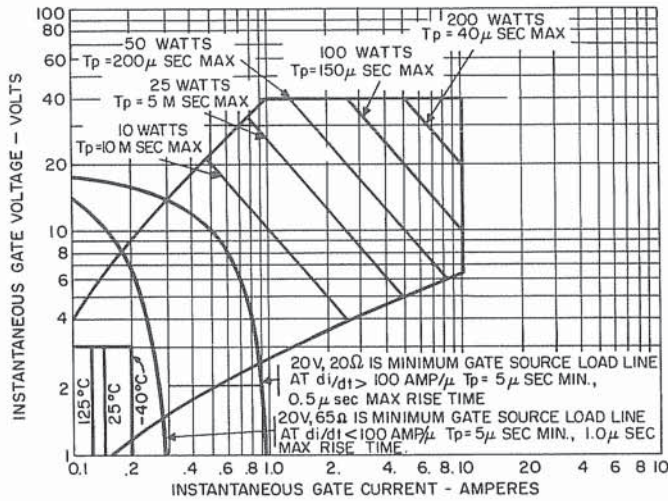
6. ON-STATE POWER DISSIPATION FOR RECTANGULAR CURRENT WAVEFORM



7. C150 FORWARD CONDUCTION CHARACTERISTIC, ON-STATE



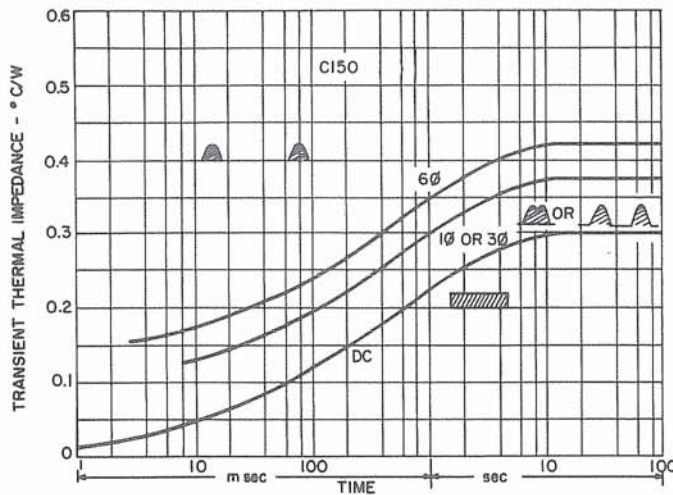
8. SUB-CYCLE SURGE RATING FOLLOWING RATED LOAD CONDITIONS



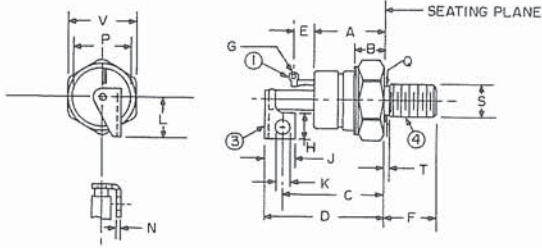
9. GATE TRIGGERING CHARACTERISTICS

NOTES:

1. Maximum allowable gate power dissipation = 2 Watts.
2. The locus of possible DC trigger points lie outside the boundaries shown at various case temperatures.
3. T_p = Rectangular Gate Current Pulse Width.



10. TRANSIENT THERMAL IMPEDANCE - JUNCTION-TO-CASE

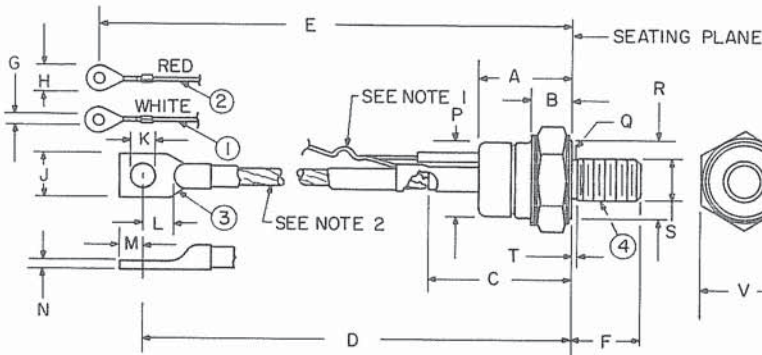


| MODEL | TERMINAL ① | TERMINAL ③ | TERMINAL ④ | S THREAD SIZE |
|-------|---------------|---------------|---------------|------------------|
| C152 | GATE | CATHODE + | ANODE - | 1/2-20 UNF-2A |

| SYM | INCHES | | METRIC MM | | SYM | INCHES | | METRIC MM | | NOTES |
|-----|------------|-------|--------------|-------|-----|--------|-------|--------------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | | MIN. | MAX. | MIN. | MAX. | |
| A | 1.020 | 1.140 | 25.90 | 28.96 | L | .590 | .640 | 14.98 | 16.26 | |
| B | .390 | .500 | 9.90 | 12.70 | | | | | | |
| C | 1.460 REF. | | 7.92 REF. | | N | .058 | .070 | 1.47 | 1.78 | |
| D | 1.660 | 1.800 | 42.16 | 45.72 | | | | | | |
| E | .312 REF. | | 7.92 REF. | | P | .840 | .910 | 21.33 | 23.11 | |
| F | .797 | .827 | 20.24 | 21.01 | | | | | | |
| G | .060 | .075 | 1.52 | 1.91 | Q | .425 | .499 | 10.79 | 12.67 | |
| H | .385 | .415 | 9.77 | 10.54 | T | — | .060 | — | 1.52 | 2 |
| J | .445 | .485 | 11.30 | 12.32 | V | 1.052 | 1.063 | 26.72 | 27.00 | |
| K | .198 | .212 | 5.02 | 5.38 | | | | | | |

NOTES:

1. One nut and one lockwasher supplied with each unit. Material of hardware is steel, cad plated.
2. "T" dimension is area of unthreaded portion. Complete threads are within 2.5 threads of seating plane.
3. Angular orientation of terminals is undefined.



| MODEL | TERMINAL ① | TERMINAL ② | TERMINAL ③ | TERMINAL ④ | S THREAD SIZE |
|-------|---------------|----------------|---------------|---------------|------------------|
| C150 | GATE | AUX CATHODE | CATHODE + | ANODE - | 1/2 20UNF-2A |

| SYM | INCHES | | METRIC MM | | SYM | INCHES | | METRIC MM | | NOTES |
|-----|--------|-------|--------------|--------|-----|--------|-------|--------------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | | MIN. | MAX. | MIN. | MAX. | |
| A | 1.020 | 1.140 | 25.90 | 28.96 | L | .330 | — | 8.38 | — | |
| B | .390 | .500 | 9.90 | 12.70 | M | .275 | .325 | 6.98 | 8.26 | |
| C | 1.570 | 1.750 | 39.87 | 44.45 | N | .065 | .095 | 1.65 | 2.41 | |
| D | 6.000 | 6.390 | 152.40 | 162.31 | P | .840 | .910 | 21.33 | 23.11 | |
| E | 6.850 | 7.500 | 173.99 | 190.50 | Q | .425 | .499 | 10.79 | 12.67 | |
| F | .797 | .827 | 20.24 | 21.01 | R | .920 | — | 23.36 | — | 4 |
| G | .140 | .150 | 3.55 | 3.81 | T | — | .060 | — | 1.57 | 5 |
| H | — | .300 | — | 7.62 | | | | | | |
| J | .500 | .610 | 12.70 | 15.49 | V | 1.052 | 1.063 | 26.72 | 27.00 | |
| K | .260 | .281 | 6.60 | 7.14 | | | | | | |

NOTES:

1. Gate and auxiliary cathode leads supplied lightly twisted together.
2. Flexible copper lead.
3. One nut and one lockwasher supplied with each unit. Material of hardware is steel, cad plated.
4. "R" dimension is diameter of effective seating area.
5. "T" dimension is area of unthreaded portion. Complete threads are within 2.5 threads of seating plane.
6. Angular orientation of terminals is undefined.

