

MCR22-6, MCR22-8

Preferred Device

Sensitive Gate Silicon Controlled Rectifiers Reverse Blocking Thyristors

Designed and tested for repetitive peak operation required for CD ignition, fuel ignitors, flash circuits, motor controls and low-power switching applications.

- 150 Amperes for 2 μ s Safe Area
- High dv/dt
- Very Low Forward "On" Voltage at High Current
- Low-Cost TO-226AA (TO-92)
- Device Marking: Device Type, e.g., MCR22-6, Date Code

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

| Rating | Symbol | Value | Unit |
|--|--------------------------|----------------|----------------------|
| Peak Repetitive Off-State Voltage ($R_{GK} = 1K$, $T_J = -40$ to $+110^\circ\text{C}$, Sine Wave, 50 to 60 Hz, Gate Open) MCR22-6 MCR22-8 | V_{DRM} , V_{RRM} | 400 600 | Volts |
| On-State Current RMS (180° Conduction Angles, $T_C = 80^\circ\text{C}$) | $I_T(\text{RMS})$ | 1.5 | Amps |
| Peak Non-repetitive Surge Current, $T_A = 25^\circ\text{C}$ (1/2 Cycle, Sine Wave, 60 Hz) | I_{TSM} | 15 | Amps |
| Circuit Fusing Considerations ($t = 8.3$ ms) | I^2t | 0.9 | A^2s |
| Forward Peak Gate Power (Pulse Width ≤ 1.0 μsec , $T_A = 25^\circ\text{C}$) | P_{GM} | 0.5 | Watt |
| Forward Average Gate Power ($t = 8.3$ msec, $T_A = 25^\circ\text{C}$) | $P_{G(AV)}$ | 0.1 | Watt |
| Forward Peak Gate Current (Pulse Width ≤ 1.0 μs , $T_A = 25^\circ\text{C}$) | I_{FGM} | 0.2 | Amp |
| Reverse Peak Gate Voltage (Pulse Width ≤ 1.0 μs , $T_A = 25^\circ\text{C}$) | V_{RGM} | 5.0 | Volts |
| Operating Junction Temperature Range @ Rated V_{RRM} and V_{DRM} | T_J | -40 to +110 | $^\circ\text{C}$ |
| Storage Temperature Range | T_{stg} | -40 to +150 | $^\circ\text{C}$ |

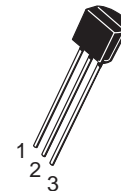
(1) V_{DRM} and V_{RRM} for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.



ON Semiconductor

<http://onsemi.com>

SCRs
1.5 AMPERES RMS
400 thru 600 VOLTS



TO-92 (TO-226AA)
CASE 029
STYLE 10

| PIN ASSIGNMENT | |
|----------------|---------|
| 1 | Cathode |
| 2 | Gate |
| 3 | Anode |

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 7 of this data sheet.

Preferred devices are recommended choices for future use and best overall value.

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THEMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--|-----------------|------|---------------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 50 | $^{\circ}C/W$ |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 160 | $^{\circ}C/W$ |
| Lead Solder Temperature (Lead Length $\geq 1/16''$ from case, 10 s Max) | T_L | +260 | $^{\circ}C$ |

ELECTRICAL CHARACTERISTICS ($T_C = 25^{\circ}C$ unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | | |
|---|----------------------|--------------------|---|---|-----|---------|
| Peak Repetitive Forward or Reverse Blocking Current ($V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}; R_{GK} = 1000 \text{ Ohms}$) | $T_C = 25^{\circ}C$ | I_{DRM}, I_{RRM} | — | — | 10 | μA |
| | $T_C = 110^{\circ}C$ | | — | — | 200 | μA |

ON CHARACTERISTICS

| | | | | | | |
|---|----------------------|----------|-----|-----|-----|---------|
| Peak Forward On-State Voltage ⁽¹⁾ ($I_{TM} = 1 \text{ A Peak}$) | | V_{TM} | — | 1.2 | 1.7 | Volts |
| Gate Trigger Current (Continuous dc) ⁽²⁾ ($V_{AK} = 6 \text{ Vdc}, R_L = 100 \text{ Ohms}$) | $T_C = 25^{\circ}C$ | I_{GT} | — | 30 | 200 | μA |
| | $T_C = -40^{\circ}C$ | | — | — | 500 | |
| Gate Trigger Voltage (Continuous dc) ⁽²⁾ ($V_{AK} = 7 \text{ Vdc}, R_L = 100 \text{ Ohms}$) | $T_C = 25^{\circ}C$ | V_{GT} | — | — | 0.8 | Volts |
| | $T_C = -40^{\circ}C$ | | — | — | 1.2 | |
| Gate Non-Trigger Voltage ⁽¹⁾ ($V_{AK} = 12 \text{ Vdc}, R_L = 100 \text{ Ohms}$) | $T_C = 110^{\circ}C$ | V_{GD} | 0.1 | — | — | Volts |
| Holding Current ($V_{AK} = 12 \text{ Vdc}, \text{ Gate Open}$) Initiating Current = 200 mA | $T_C = 25^{\circ}C$ | I_H | — | 2.0 | 5.0 | mA |
| | $T_C = -40^{\circ}C$ | | — | — | 10 | |

DYNAMIC CHARACTERISTICS

| | | | | | | |
|--|--|-------|---|----|---|------------|
| Critical Rate of Rise of Off-State Voltage ($T_C = 110^{\circ}C$) | | dv/dt | — | 25 | — | V/ μs |
|--|--|-------|---|----|---|------------|

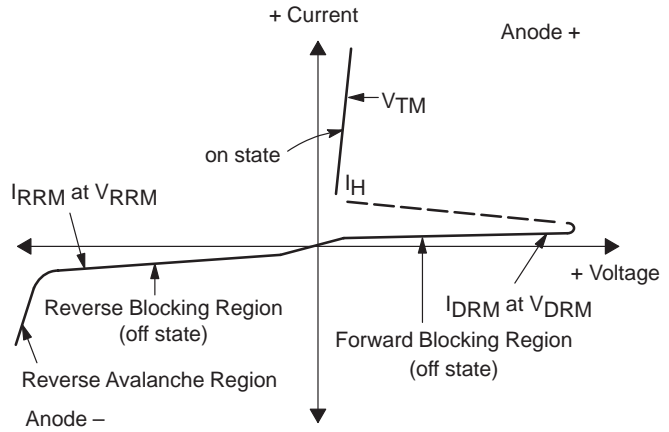
(1) Pulse Width = 1.0 ms, Duty Cycle $\leq 1\%$.

(2) R_{GK} Current not included in measurement.

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Voltage Current Characteristic of SCR

| Symbol | Parameter |
|-----------|---|
| V_{DRM} | Peak Repetitive Off State Forward Voltage |
| I_{DRM} | Peak Forward Blocking Current |
| V_{RRM} | Peak Repetitive Off State Reverse Voltage |
| I_{RRM} | Peak Reverse Blocking Current |
| V_{TM} | Peak on State Voltage |
| I_H | Holding Current |



CURRENT DERATING

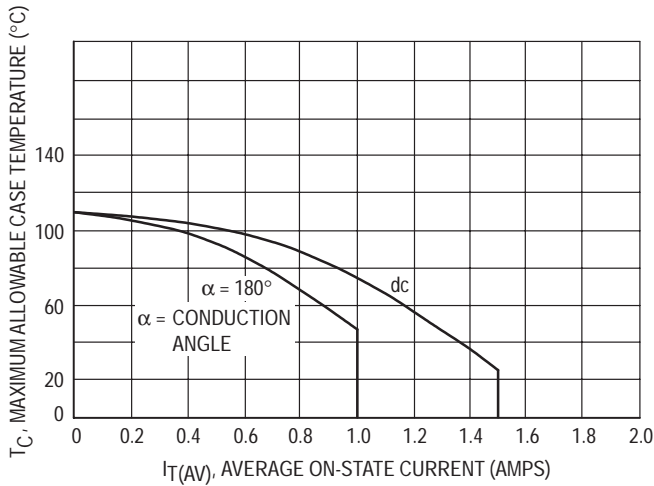


Figure 1. Maximum Case Temperature

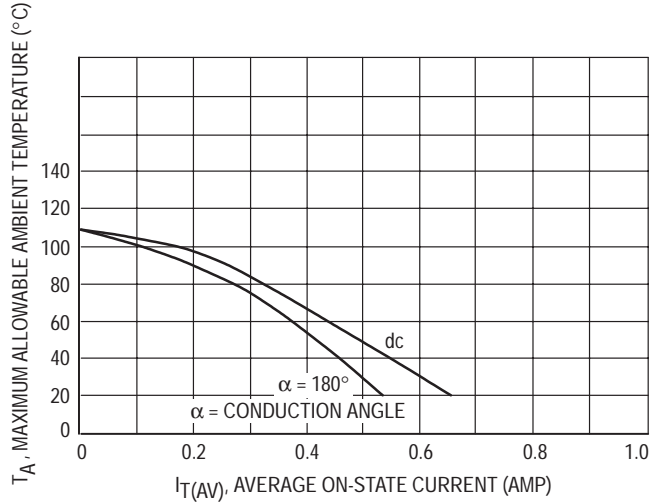


Figure 2. Maximum Ambient Temperature

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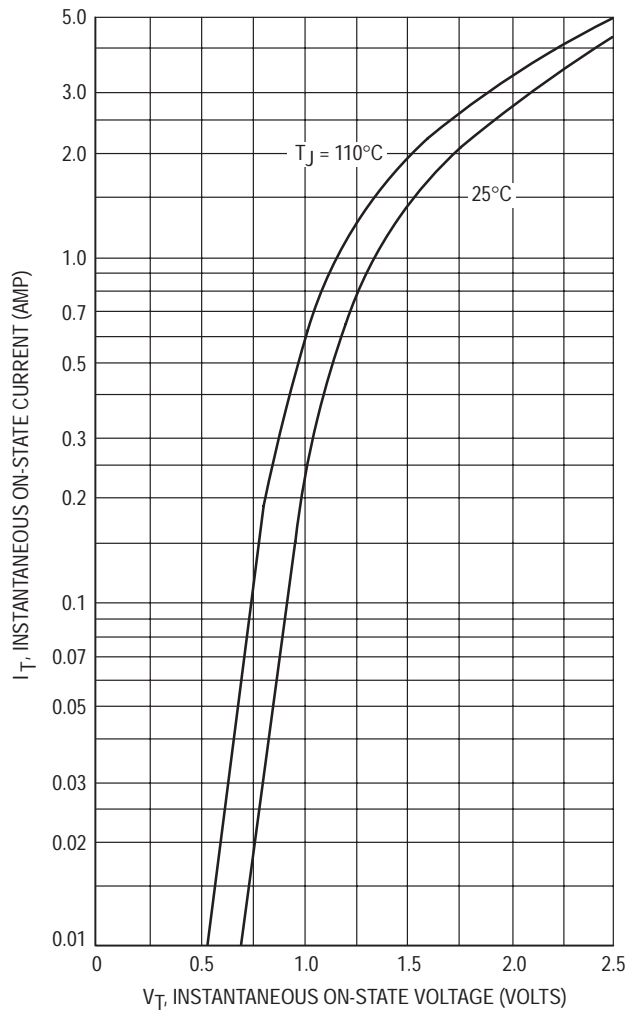


Figure 3. Typical Forward Voltage

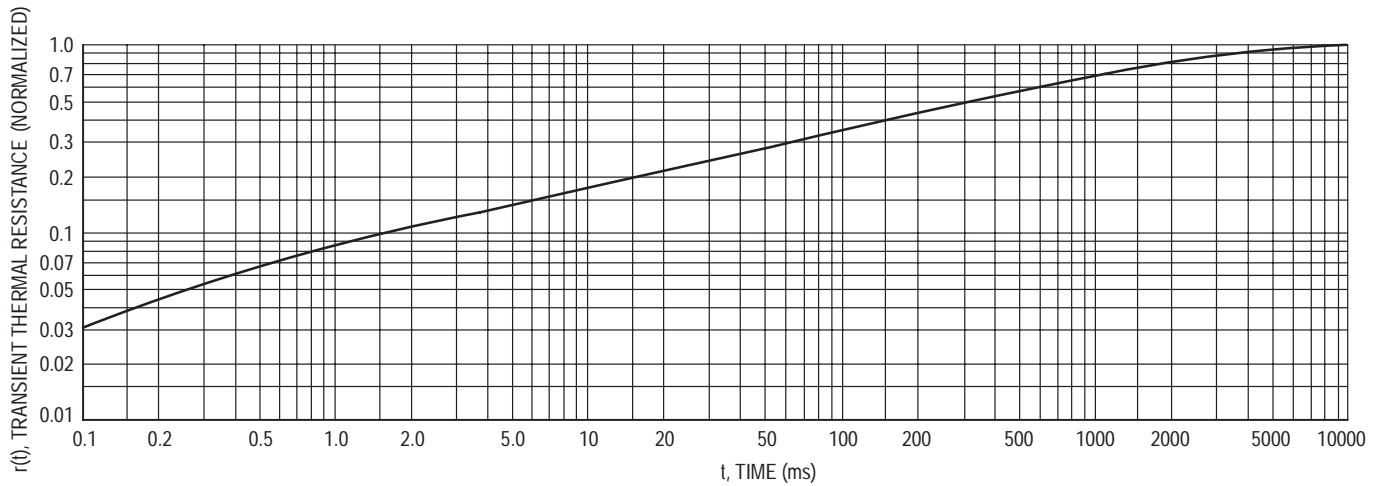


Figure 4. Thermal Response

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TYPICAL CHARACTERISTICS

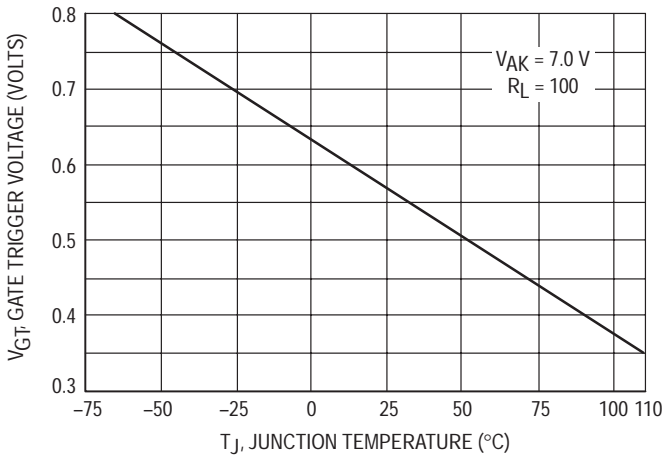


Figure 5. Typical Gate Trigger Voltage

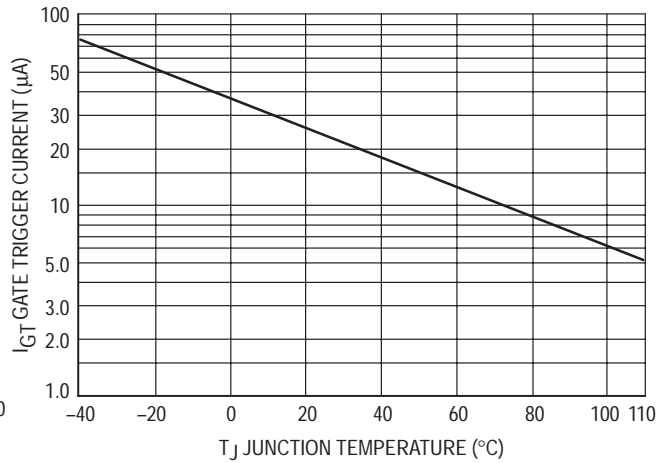


Figure 6. Typical Gate Trigger Current

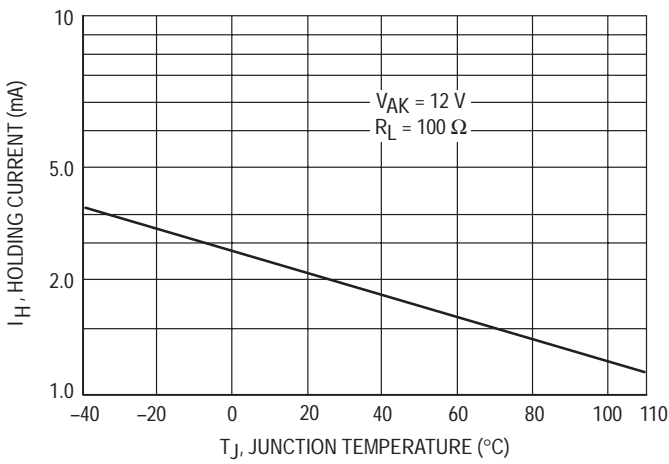


Figure 7. Typical Holding Current

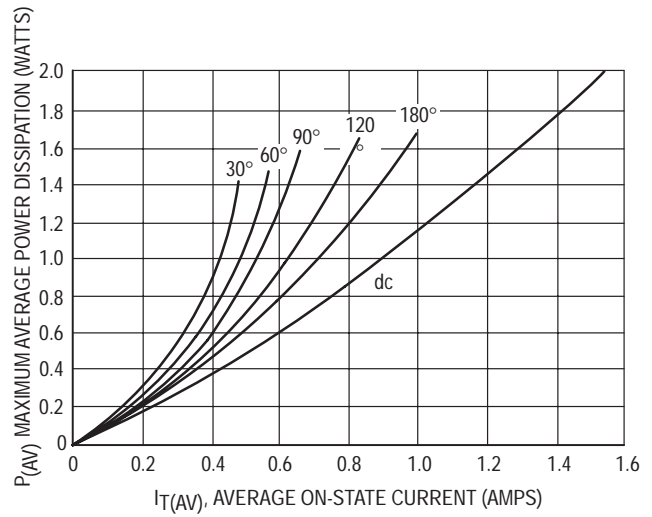


Figure 8. Power Dissipation

TO-92 EIA RADIAL TAPE IN FAN FOLD BOX OR ON REEL

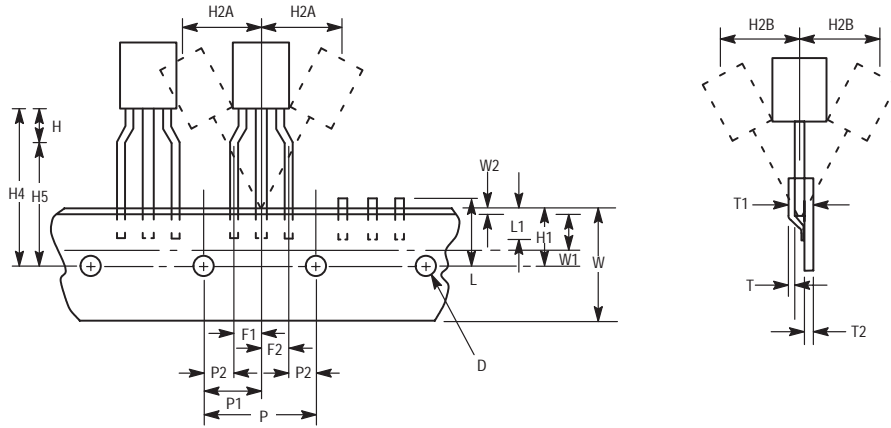


Figure 9. Device Positioning on Tape

| Symbol | Item | Specification | | | |
|--------|--------------------------------------|---------------|---------|------------|------|
| | | Inches | | Millimeter | |
| | | Min | Max | Min | Max |
| D | Tape Feedhole Diameter | 0.1496 | 0.1653 | 3.8 | 4.2 |
| D2 | Component Lead Thickness Dimension | 0.015 | 0.020 | 0.38 | 0.51 |
| F1, F2 | Component Lead Pitch | 0.0945 | 0.110 | 2.4 | 2.8 |
| H | Bottom of Component to Seating Plane | .059 | .156 | 1.5 | 4.0 |
| H1 | Feedhole Location | 0.3346 | 0.3741 | 8.5 | 9.5 |
| H2A | Deflection Left or Right | 0 | 0.039 | 0 | 1.0 |
| H2B | Deflection Front or Rear | 0 | 0.051 | 0 | 1.0 |
| H4 | Feedhole to Bottom of Component | 0.7086 | 0.768 | 18 | 19.5 |
| H5 | Feedhole to Seating Plane | 0.610 | 0.649 | 15.5 | 16.5 |
| L | Defective Unit Clipped Dimension | 0.3346 | 0.433 | 8.5 | 11 |
| L1 | Lead Wire Enclosure | 0.09842 | — | 2.5 | — |
| P | Feedhole Pitch | 0.4921 | 0.5079 | 12.5 | 12.9 |
| P1 | Feedhole Center to Center Lead | 0.2342 | 0.2658 | 5.95 | 6.75 |
| P2 | First Lead Spacing Dimension | 0.1397 | 0.1556 | 3.55 | 3.95 |
| T | Adhesive Tape Thickness | 0.06 | 0.08 | 0.15 | 0.20 |
| T1 | Overall Taped Package Thickness | — | 0.0567 | — | 1.44 |
| T2 | Carrier Strip Thickness | 0.014 | 0.027 | 0.35 | 0.65 |
| W | Carrier Strip Width | 0.6889 | 0.7481 | 17.5 | 19 |
| W1 | Adhesive Tape Width | 0.2165 | 0.2841 | 5.5 | 6.3 |
| W2 | Adhesive Tape Position | .0059 | 0.01968 | .15 | 0.5 |

NOTES:

1. Maximum alignment deviation between leads not to be greater than 0.2 mm.
2. Defective components shall be clipped from the carrier tape such that the remaining protrusion (L) does not exceed a maximum of 11 mm.
3. Component lead to tape adhesion must meet the pull test requirements.
4. Maximum non-cumulative variation between tape feed holes shall not exceed 1 mm in 20 pitches.
5. Holddown tape not to extend beyond the edge(s) of carrier tape and there shall be no exposure of adhesive.
6. No more than 1 consecutive missing component is permitted.
7. A tape trailer and leader, having at least three feed holes is required before the first and after the last component.
8. Splices will not interfere with the sprocket feed holes.

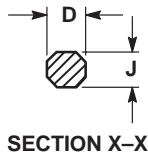
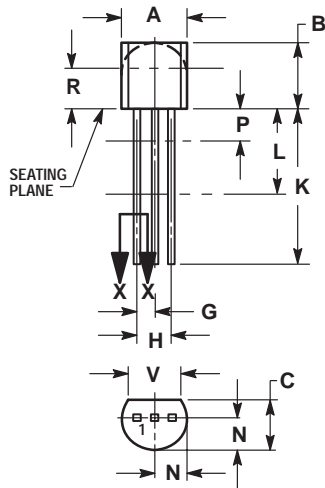
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ORDERING & SHIPPING INFORMATION: MCR22 Series packaging options, Device Suffix

| U.S. | Europe Equivalent | Shipping | Description of TO92 Tape Orientation |
|---|-------------------|--|---|
| MCR22-6,8 MCR22-6RLRA MCR22-6RLRP | MCR22-8RL1 | Radial Tape and Reel (2K/Reel) Bulk in Box (5K/Box) | Flat side of TO92 and adhesive tape visible N/A, Bulk |
| | MCR22-8ZL1 | Radial Tape and Reel (2K/Reel) Radial Tape and Fan Fold Box (2K/Box) Radial Tape and Fan Fold Box (2K/Box) | Round side of TO92 and adhesive tape visible Round side of TO92 and adhesive tape visible Flat side of TO92 and adhesive tape visible |

PACKAGE DIMENSIONS

TO-92 (TO-226AA) CASE 029-11 ISSUE AJ



NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.
- CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
- LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.175 | 0.205 | 4.45 | 5.20 |
| B | 0.170 | 0.210 | 4.32 | 5.33 |
| C | 0.125 | 0.165 | 3.18 | 4.19 |
| D | 0.016 | 0.021 | 0.407 | 0.533 |
| G | 0.045 | 0.055 | 1.15 | 1.39 |
| H | 0.095 | 0.105 | 2.42 | 2.66 |
| J | 0.015 | 0.020 | 0.39 | 0.50 |
| K | 0.500 | --- | 12.70 | --- |
| L | 0.250 | --- | 6.35 | --- |
| N | 0.080 | 0.105 | 2.04 | 2.66 |
| P | --- | 0.100 | --- | 2.54 |
| R | 0.115 | --- | 2.93 | --- |
| V | 0.135 | --- | 3.43 | --- |

STYLE 10:

- PIN 1. CATHODE
- GATE
- ANODE

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