# 2N6071A/B Series

**Preferred Device**

# Sensitive Gate Triacs

## Silicon Bidirectional Thyristors

Designed primarily for full-wave AC control applications, such as light dimmers, motor controls, heating controls and power supplies; or wherever full-wave silicon gate controlled solid-state devices are needed. Triac type thyristors switch from a blocking to a conducting state for either polarity of applied anode voltage with positive or negative gate triggering.

### Features

- Sensitive Gate Triggering Uniquely Compatible for Direct Coupling to TTL, HTL, CMOS and Operational Amplifier Integrated Circuit Logic Functions
- Gate Triggering: 4 Mode – 2N6071A, B; 2N6073A, B; 2N6075A, B
- Blocking Voltages to 600 V
- All Diffused and Glass Passivated Junctions for Greater Parameter Uniformity and Stability
- Small, Rugged, Thermopad Construction for Low Thermal Resistance, High Heat Dissipation and Durability
- Device Marking: Device Type, e.g., 2N6071A, Date Code

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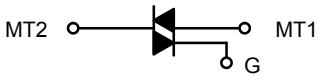
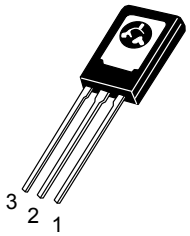
**TRIACS**
**4.0 A RMS, 200 – 600 V**

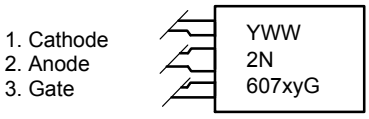



**REAR VIEW**
**SHOW TAB**

**TO–225**
**CASE 077**
**STYLE 5**

### MARKING DIAGRAM




| | |
|---|---|
| x | = 1, 3, 5 |
| y | = A, B |
| Y | = Year |
| WW | = Work Week |
| G | = Pb-Free Package |

### 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.

**MAXIMUM RATINGS** ($T_J$ = 25°C unless otherwise noted)

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| *Peak Repetitive Off-State Voltage (Note 1)<br>($T_J$ = −40 to 110°C, Sine Wave, 50 to 60 Hz, Gate Open)<br>2N6071A,B<br>2N6073A,B<br>2N6075A,B | $V_{DRM}$,<br>$V_{RRM}$ | <br><br>200<br>400<br>600 | V |
| *On-State RMS Current ($T_C$ = 85°C) Full Cycle Sine Wave 50 to 60 Hz | $I_{T(RMS)}$ | 4.0 | A |
| *Peak Non-repetitive Surge Current (One Full cycle, 60 Hz, $T_J$ = +110°C) | $I_{TSM}$ | 30 | A |
| Circuit Fusing Considerations (t = 8.3 ms) | $I^2t$ | 3.7 | $A^2s$ |
| *Peak Gate Power (Pulse Width ≤ 1.0 μs, $T_C$ = 85°C) | $P_{GM}$ | 10 | W |
| *Average Gate Power (t = 8.3 ms, $T_C$ = 85°C) | $P_{G(AV)}$ | 0.5 | W |
| *Peak Gate Voltage (Pulse Width ≤ 1.0 μs, $T_C$ = 85°C) | $V_{GM}$ | 5.0 | V |
| *Operating Junction Temperature Range | $T_J$ | -40 to +110 | °C |
| *Storage Temperature Range | $T_{stg}$ | -40 to +150 | °C |
| Mounting Torque (6-32 Screw) (Note 2) | - | 8.0 | in. lb. |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. $V_{DRM}$ and $V_{RRM}$ for all types can be applied on a continuous basis. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.
2. Torque rating applies with use of a compression washer. Mounting torque in excess of 6 in. lb. does not appreciably lower case-to-sink thermal resistance. Main terminal 2 and heatsink contact pad are common.

**THERMAL CHARACTERISTICS**

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| *Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 3.5 | °C/W |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 75 | °C/W |
| Maximum Lead Temperature for Soldering Purposes 1/8″ from Case for 10 Seconds | $T_L$ | 260 | °C |

*Indicates JEDEC Registered Data.

**ELECTRICAL CHARACTERISTICS** ($T_C$ = 25°C unless otherwise noted; Electricals apply in both directions)

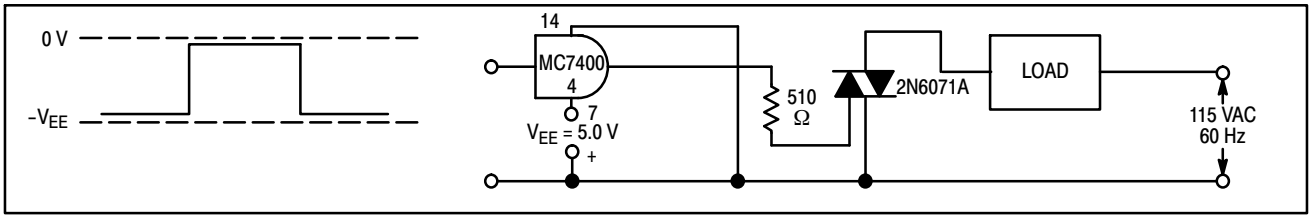
| Characteristic | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| *Peak Repetitive Blocking Current ($V_D$ = $V_{DRM}$ = $V_{RRM;}$ Gate Open) | $T_J$ = 25°C | $I_{DRM,}$ $I_{RRM}$ | - | - | 10 | μA |
| | $T_J$ = 110°C | | - | - | 2 | mA |
| **ON CHARACTERISTICS** | | | | | | |
| *Peak On-State Voltage (Note 3) ($I_{TM}$ = ±6.0 A Peak) | | $V_{TM}$ | - | - | 2 | V |
| *Gate Trigger Voltage (Continuous DC), All Quadrants (Main Terminal Voltage = 12 Vdc, $R_L$ = 100 Ω, $T_J$ = -40 °C) | | $V_{GT}$ | - | 1.4 | 2.5 | V |
| Gate Non- Trigger Voltage, All Quadrants (Main Terminal Voltage = 12 Vdc, $R_L$ = 100 Ω, $T_J$ = 110°C) | | $V_{GD}$ | 0.2 | - | - | V |
| *Holding Current (Main Terminal Voltage = 12 Vdc, Gate Open, Initiating Current = ±1 Adc) | $T_J$ = -40 °C | $I_H$ | - | - | 30 | mA |
| | $T_J$ = 25°C | | - | - | 15 | |
| Turn-On Time ($I_{TM}$ = 14 Adc, $I_{GT}$ = 100 mAdc) | | $t_{gt}$ | - | 1.5 | - | μs |

| | | | QUADRANT (Maximum Value) | | | |
|---|---|---|---|---|---|---|
| | Type | $I_{GT}$ @ $T_J$ | I mA | II mA | III mA | IV mA |
| Gate Trigger Current (Continuous DC) (Main Terminal Voltage = 12 Vdc, $R_L$ = 100 Ω) | 2N6071A 2N6073A 2N6075A | +25°C | 5 | 5 | 5 | 10 |
| | | -40 °C | 20 | 20 | 20 | 30 |
| | 2N6071B 2N6073B 2N6075B | +25°C | 3 | 3 | 3 | 5 |
| | | -40 °C | 15 | 15 | 15 | 20 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| Critical Rate of Rise of Commutation Voltage @ $V_{DRM}$, $T_J$ = 85°C, Gate Open, $I_{TM}$ = 5.7 A, Exponential Waveform, Commutating di/dt = 2.0 A/ms | | dv/dt(c) | - | 5 | - | V/μs |

3. Pulse Test: Pulse Width ≤ 2.0 ms, Duty Cycle ≤ 2%.
*Indicates JEDEC Registered Data.

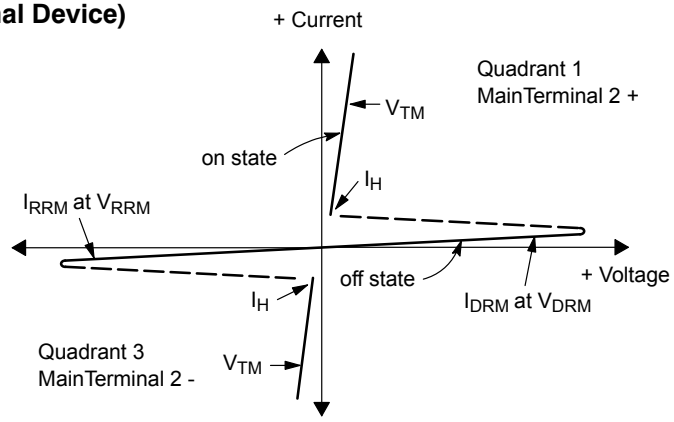
**SAMPLE APPLICATION:**
**TTL-SENSITIVE GATE 4 AMPERE TRIAC**
**TRIGGERS IN MODES II AND III**



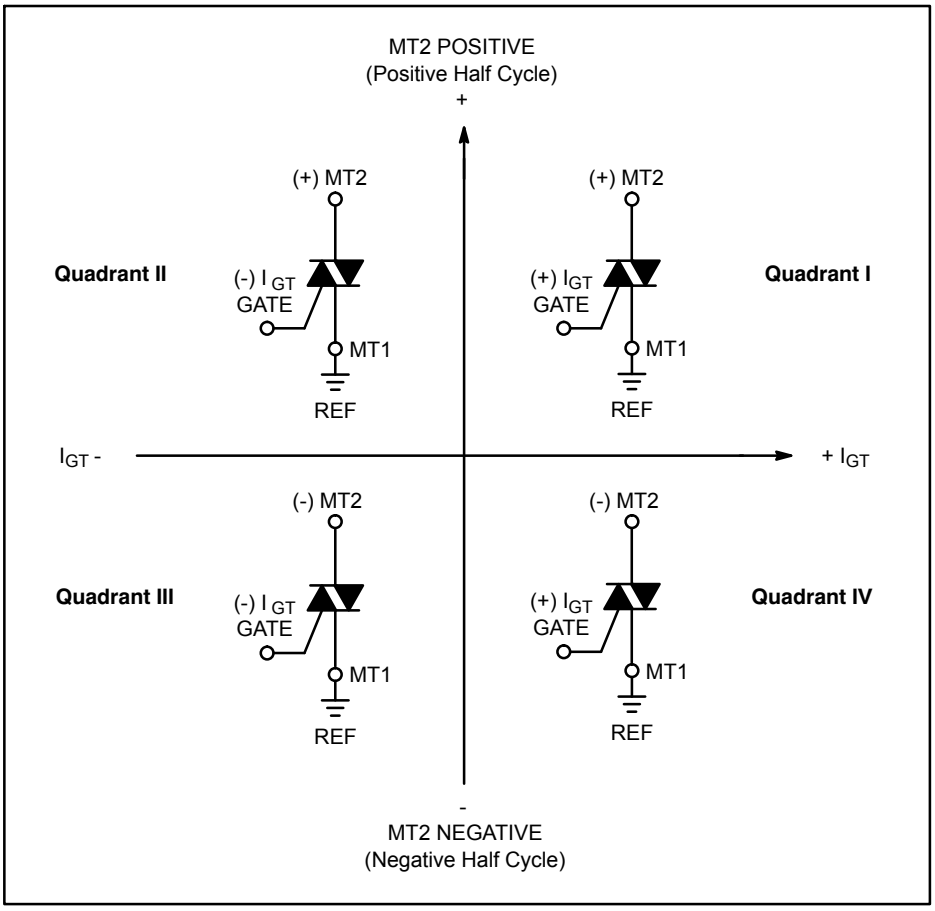

Trigger devices are recommended for gating on Triacs. They provide:
1. Consistent predictable turn-on points.
2. Simplified circuitry.
3. Fast turn-on time for cooler, more efficient and reliable operation.

## Voltage Current Characteristic of Triacs (Bidirectional Device)

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




## Quadrant Definitions for a Triac




All polarities are referenced to MT1.
With in-phase signals (using standard AC lines) quadrants I and III are used.

**SENSITIVE GATE LOGIC REFERENCE**

| IC Logic Functions | Firing Quadrant | | | |
|---|---|---|---|---|
| | I | II | III | IV |
| TTL | | 2N6071A Series | 2N6071A Series | |
| HTL | | 2N6071A Series | 2N6071A Series | |
| CMOS (NAND) | 2N6071B Series | | | 2N6071B Series |
| CMOS (Buffer) | | 2N6071B Series | 2N6071B Series | |
| Operational Amplifier | 2N6071A Series | | | 2N6071A Series |
| Zero Voltage Switch | | 2N6071A Series | 2N6071A Series | |

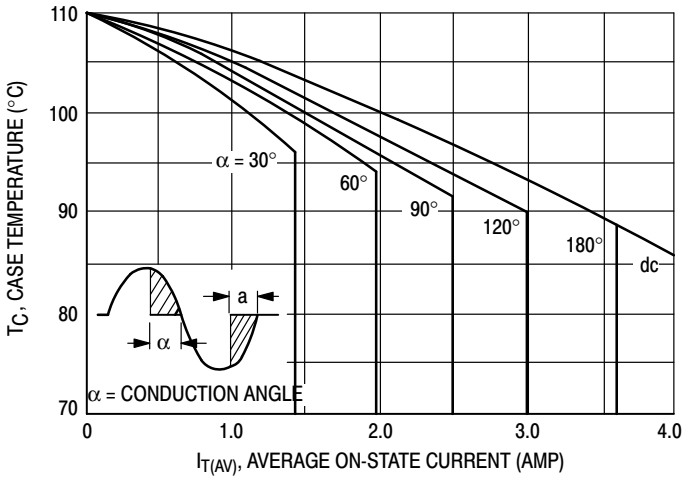



**Figure 1. Average Current Derating**

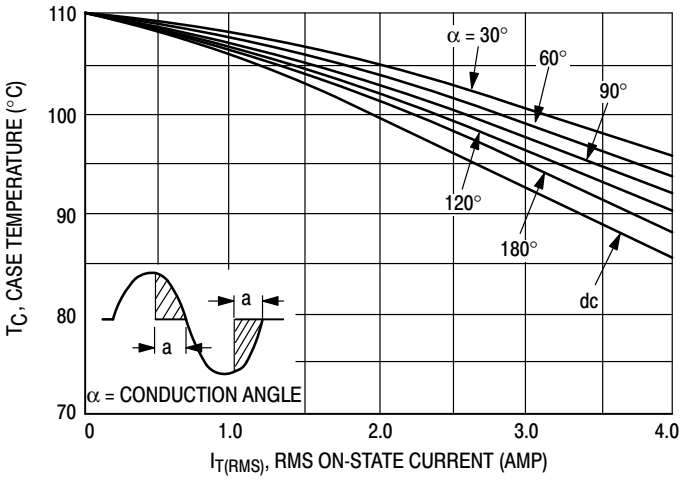



**Figure 2. RMS Current Derating**

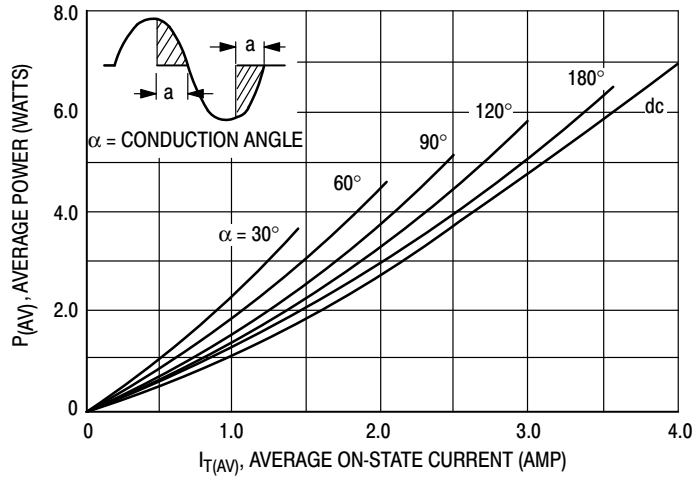



**Figure 3. Power Dissipation**

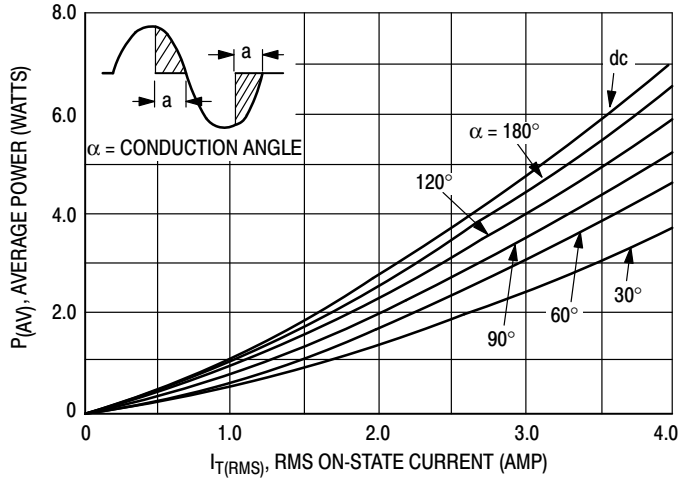



**Figure 4. Power Dissipation**

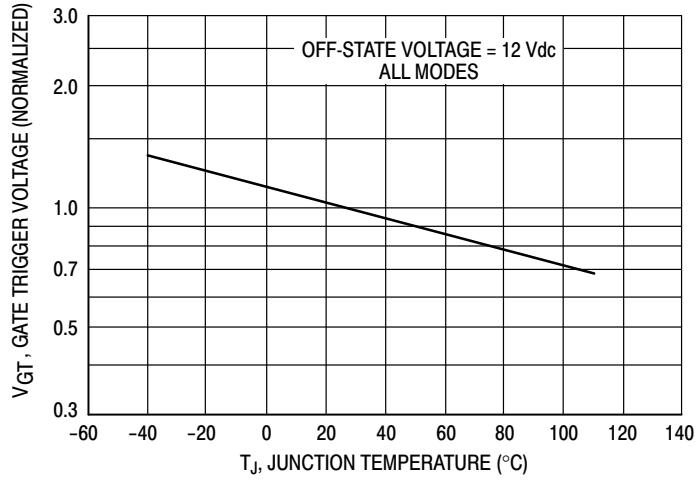



**Figure 5. Typical Gate−Trigger Voltage**

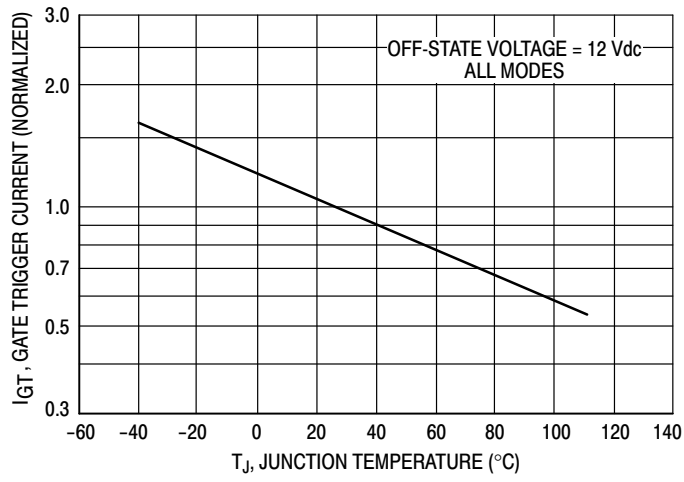



**Figure 6. Typical Gate−Trigger Current**

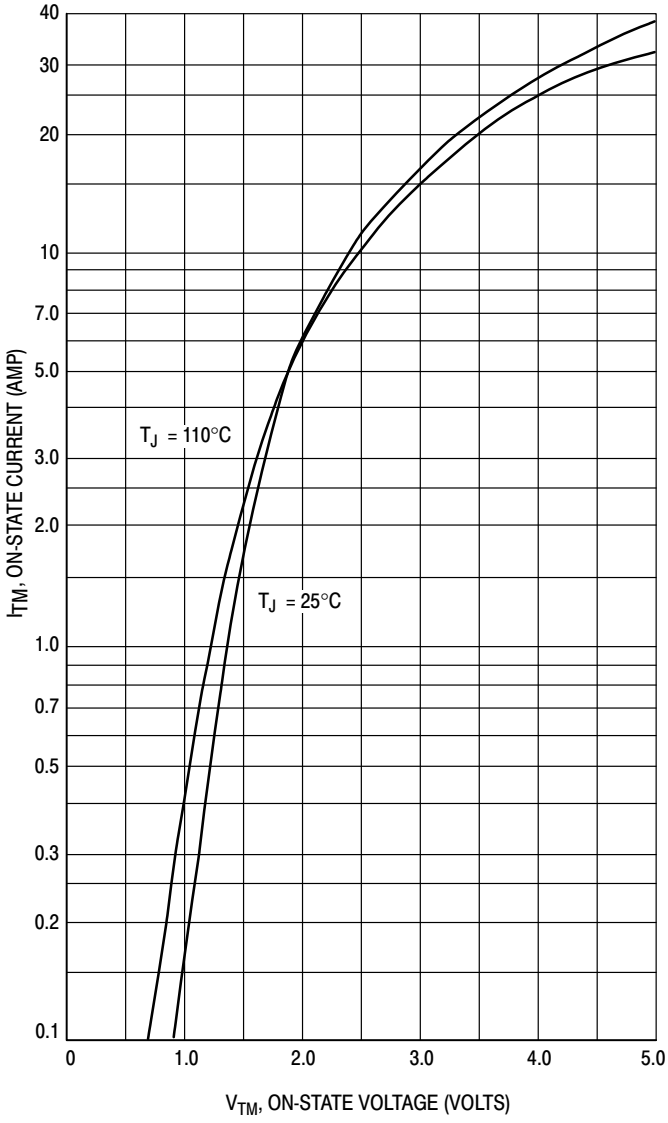



**Figure 7. Maximum On−State Characteristics**

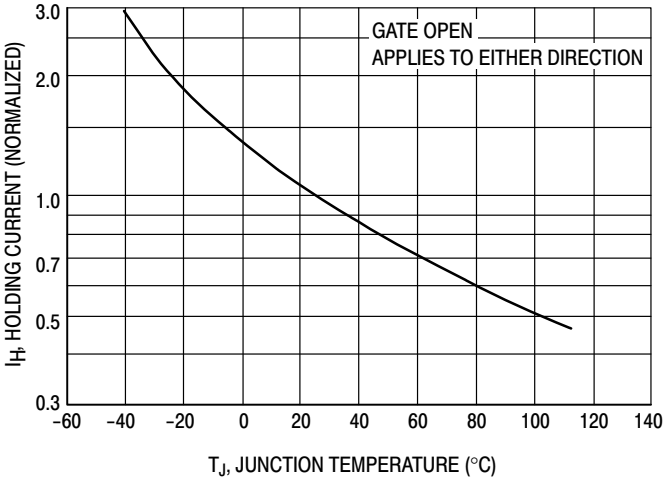



**Figure 8. Typical Holding Current**

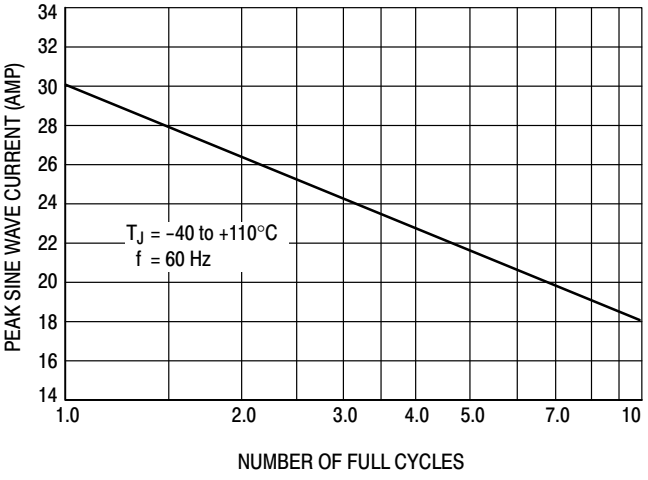



**Figure 9. Maximum Allowable Surge Current**

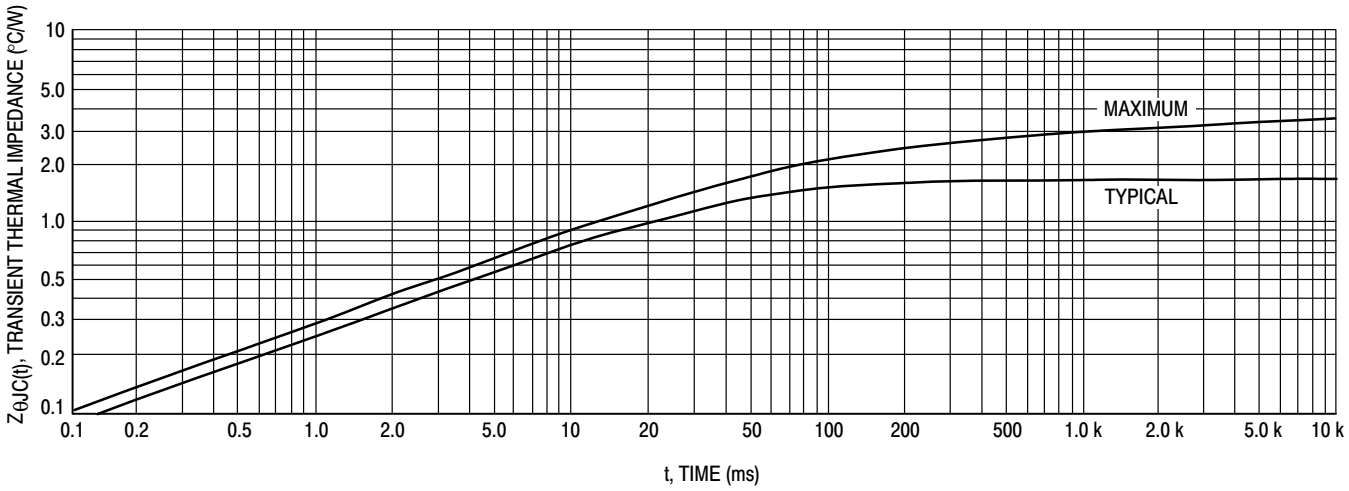


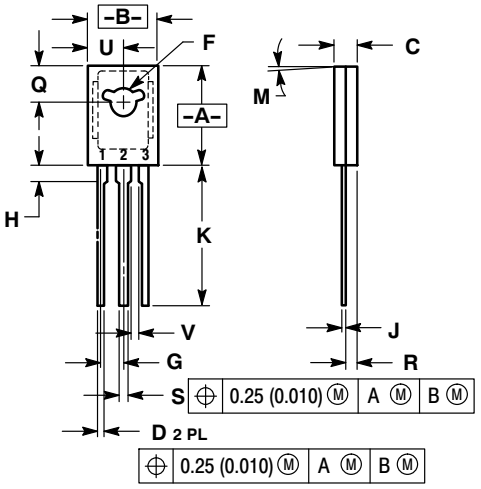

**Figure 10. Thermal Response**

**ORDERING INFORMATION**

| Device | Package | Shipping† |
|---|---|---|
| 2N6071A | TO-225 | 500 Units / Box |
| 2N6071AG | TO-225 (Pb-Free) | |
| 2N6071AT | TO-225 | 50 Units / Tube<br>2000 Units / Box |
| 2N6071ATG | TO-225 (Pb-Free) | 50 Units / Tube<br>2000 Units / Box |
| 2N6071B | TO-225 | 500 Units / Box |
| 2N6071BG | TO-225 (Pb-Free) | |
| 2N6071BT | TO-225 | 50 Units / Tube<br>2000 Units / Box |
| 2N6071BTG | TO-225 (Pb-Free) | 50 Units / Tube<br>2000 Units / Box |
| 2N6073A | TO-225 | 500 Units / Box |
| 2N6073AG | TO-225 (Pb-Free) | |
| 2N6073B | TO-225 | |
| 2N6073BG | TO-225 (Pb-Free) | |
| 2N6075A | TO-225 | |
| 2N6075AG | TO-225 (Pb-Free) | |
| 2N6075B | TO-225 | |
| 2N6075BG | TO-225 (Pb-Free) | |

## PACKAGE DIMENSIONS

**TO−225**
CASE 77-09
ISSUE Z




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 077−01 THRU −08 OBSOLETE, NEW STANDARD 077−09.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.425 | 0.435 | 10.80 | 11.04 |
| B | 0.295 | 0.305 | 7.50 | 7.74 |
| C | 0.095 | 0.105 | 2.42 | 2.66 |
| D | 0.020 | 0.026 | 0.51 | 0.66 |
| F | 0.115 | 0.130 | 2.93 | 3.30 |
| G | 0.094 BSC | | 2.39 BSC | |
| H | 0.050 | 0.095 | 1.27 | 2.41 |
| J | 0.015 | 0.025 | 0.39 | 0.63 |
| K | 0.575 | 0.655 | 14.61 | 16.63 |
| M | 5° TYP | | 5° TYP | |
| Q | 0.148 | 0.158 | 3.76 | 4.01 |
| R | 0.045 | 0.065 | 1.15 | 1.65 |
| S | 0.025 | 0.035 | 0.64 | 0.88 |
| U | 0.145 | 0.155 | 3.69 | 3.93 |
| V | 0.040 | --- | 1.02 | --- |

STYLE 5:
PIN 1. MT 1
2. MT 2
3. GATE



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