

## 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.

- 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 Volts
- 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

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

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

\*Indicates JEDEC Registered Data.

(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.

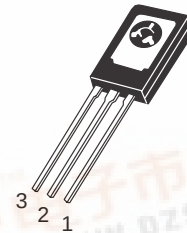
(2) Torque rating applies with use of a compression washer. Mounting torque in excess of 6 in. lb. does not appreciably lower case-to-sink thermal resistance. Main terminal 2 and heatsink contact pad are common.



**ON Semiconductor**

<http://onsemi.com>

**TRIACS**  
**4 AMPERES RMS**  
**200 thru 600 VOLTS**



**TO-225AA**  
**(formerly TO-126)**  
**CASE 077**  
**STYLE 5**

#### PIN ASSIGNMENT

|   |                 |
|---|-----------------|
| 1 | Main Terminal 1 |
| 2 | Main Terminal 2 |
| 3 | Gate            |

#### ORDERING INFORMATION

| Device  | Package | Shipping |
|---------|---------|----------|
| 2N6071A | TO225AA | 500/Box  |
| 2N6071B | TO225AA | 500/Box  |
| 2N6073A | TO225AA | 500/Box  |
| 2N6073B | TO225AA | 500/Box  |
| 2N6075A | TO225AA | 500/Box  |
| 2N6075B | TO225AA | 500/Box  |

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



## 2N6071A/B Series

### THERMAL CHARACTERISTICS

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

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^{\circ}\text{C}$ unless otherwise noted; Electricals apply in both directions)

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

### OFF CHARACTERISTICS

|                                                                                            |                    |                             |   |   |    |               |
|--------------------------------------------------------------------------------------------|--------------------|-----------------------------|---|---|----|---------------|
| *Peak Repetitive Blocking Current<br>( $V_D = \text{Rated } V_{DRM}, V_{RRM}$ ; Gate Open) | $I_{DRM}, I_{RRM}$ | $T_J = 25^{\circ}\text{C}$  | — | — | 10 | $\mu\text{A}$ |
|                                                                                            |                    | $T_J = 110^{\circ}\text{C}$ | — | — | 2  | $\text{mA}$   |

### ON CHARACTERISTICS

|                                                                                                                                                         |                 |                                     |         |          |           |          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------|---------|----------|-----------|----------|
| *Peak On-State Voltage <sup>(1)</sup><br>(I <sub>TM</sub> = ± 6 A Peak)                                                                                 | V <sub>TM</sub> | —                                   | —       | 2        | Volts     |          |
| *Gate Trigger Voltage (Continuous dc)<br>(Main Terminal Voltage = 12 Vdc, R <sub>L</sub> = 100 Ohms, T <sub>J</sub> = −40°C)<br>All Quadrants           | V <sub>GT</sub> | —                                   | 1.4     | 2.5      | Volts     |          |
| Gate Non–Trigger Voltage<br>(Main Terminal Voltage = 12 Vdc, R <sub>L</sub> = 100 Ohms, T <sub>J</sub> = 110°C)<br>All Quadrants                        | V <sub>GD</sub> | 0.2                                 | —       | —        | Volts     |          |
| *Holding Current<br>(Main Terminal Voltage = 12 Vdc, Gate Open,<br>Initiating Current = ± 1 Adc)<br>(T <sub>J</sub> = −40°C)<br>(T <sub>J</sub> = 25°C) | I <sub>H</sub>  | —<br>—                              | —<br>—  | 30<br>15 | mA        |          |
| Turn-On Time<br>(I <sub>TM</sub> = 14 Adc, I <sub>GT</sub> = 100 mAdc)                                                                                  | t <sub>gt</sub> | —                                   | 1.5     | —        | μs        |          |
|                                                                                                                                                         |                 | QUADRANT<br>(Maximum Value)         |         |          |           |          |
| Gate Trigger Current (Continuous dc)<br>(Main Terminal Voltage = 12 Vdc, R <sub>L</sub> = 100 ohms)                                                     | Type            | I <sub>GT</sub><br>@ T <sub>J</sub> | I<br>mA | II<br>mA | III<br>mA | IV<br>mA |
|                                                                                                                                                         | 2N6071A         | +25°C                               | 5       | 5        | 5         | 10       |
|                                                                                                                                                         | 2N6073A         | −40°C                               | 20      | 20       | 20        | 30       |
|                                                                                                                                                         | 2N6075A         |                                     |         |          |           |          |
|                                                                                                                                                         | 2N6071B         | +25°C                               | 3       | 3        | 3         | 5        |
|                                                                                                                                                         | 2N6073B         | −40°C                               | 15      | 15       | 15        | 20       |
| 2N6075B                                                                                                                                                 |                 |                                     |         |          |           |          |

### DYNAMIC CHARACTERISTICS

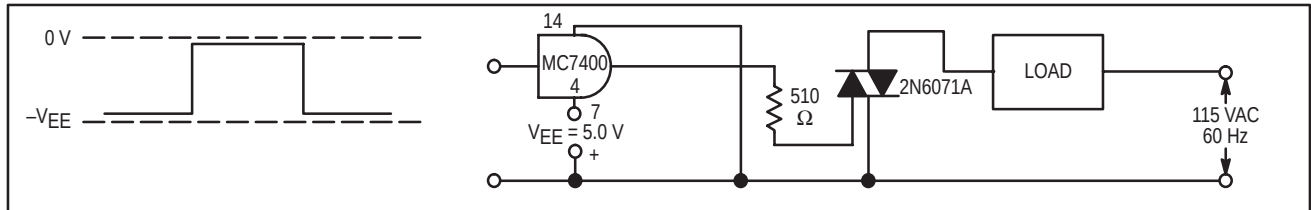
|                                                                                                                                                                                                  |            |   |   |   |                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---|---|---|------------------------|
| Critical Rate of Rise of Commutation Voltage<br>@ $V_{DRM}$ , $T_J = 85^{\circ}\text{C}$ , Gate Open, $I_{TM} = 5.7 \text{ A}$ , Exponential Waveform,<br>Commutating $di/dt = 2.0 \text{ A/ms}$ | $dv/dt(c)$ | — | 5 | — | $\text{V}/\mu\text{s}$ |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---|---|---|------------------------|

\*Indicates JEDEC Registered Data.

(1) Pulse Test: Pulse Width  $\leq 2.0 \text{ ms}$ , Duty Cycle  $\leq 2\%$ .

## 2N6071A/B Series

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

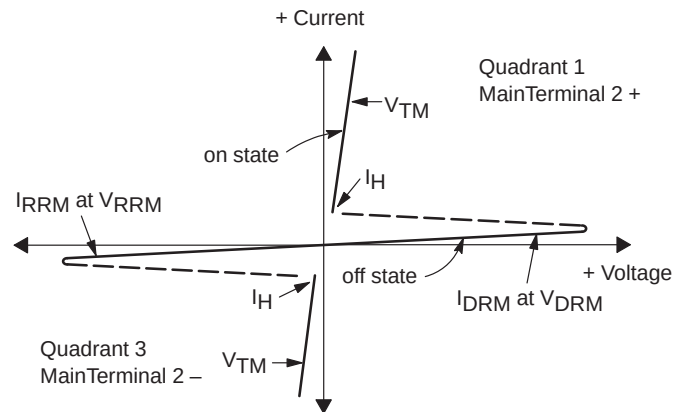


Trigger devices are recommended for gating on Triacs. They provide:

1. Consistent predictable turn-on points.
2. Simplified circuitry.
3. Fast turn-on time for cooler, more efficient and reliable operation.

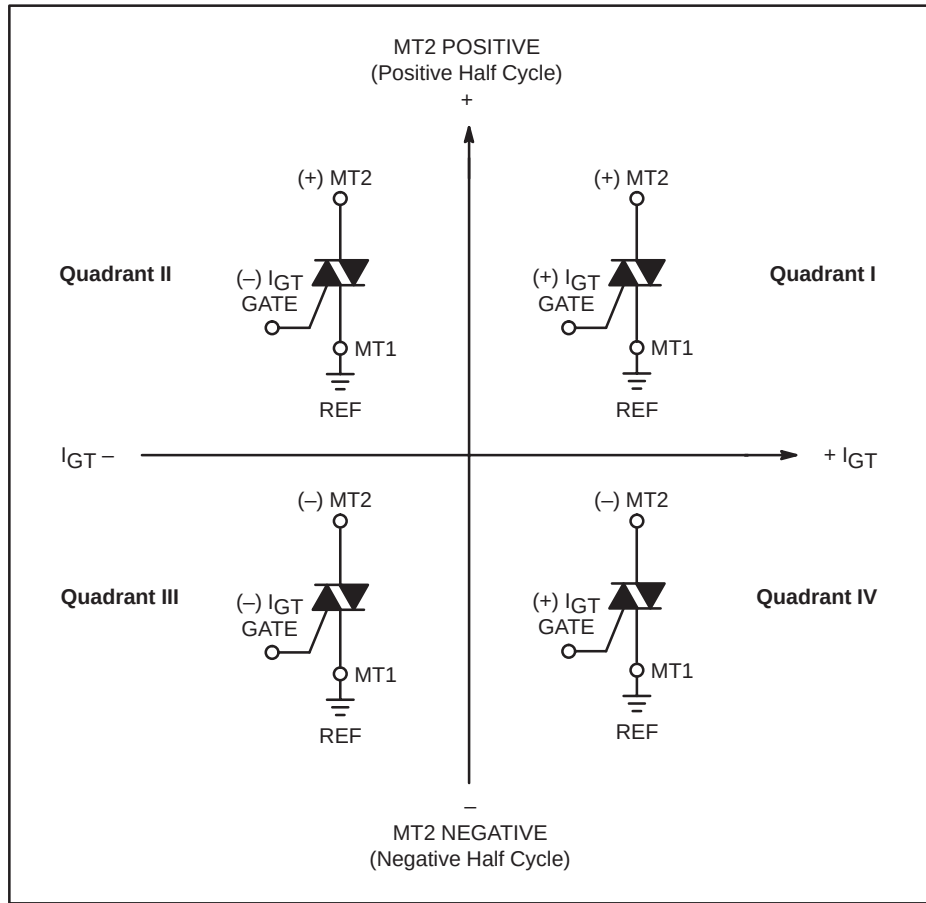
### Voltage Current Characteristic of Triacs (Bidirectional Device)

| 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                           |



## 2N6071A/B Series

### 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 |                |

## 2N6071A/B Series

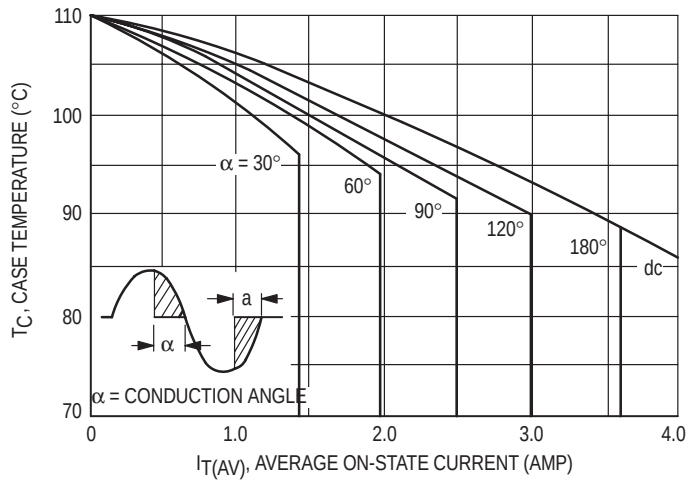


Figure 1. Average Current Derating

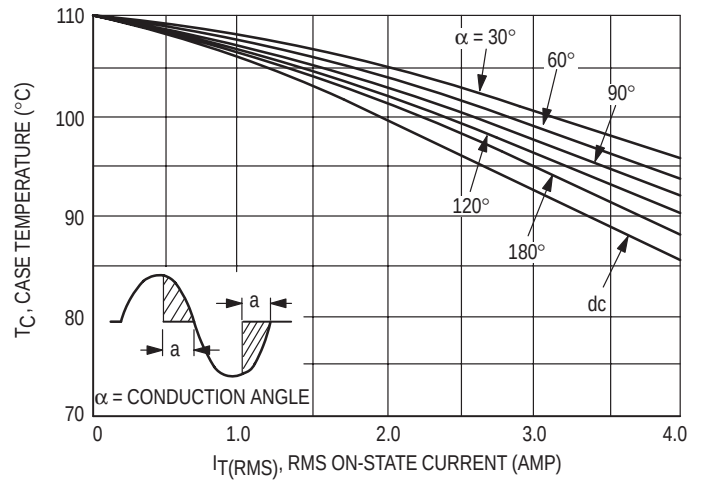


Figure 2. RMS Current Derating

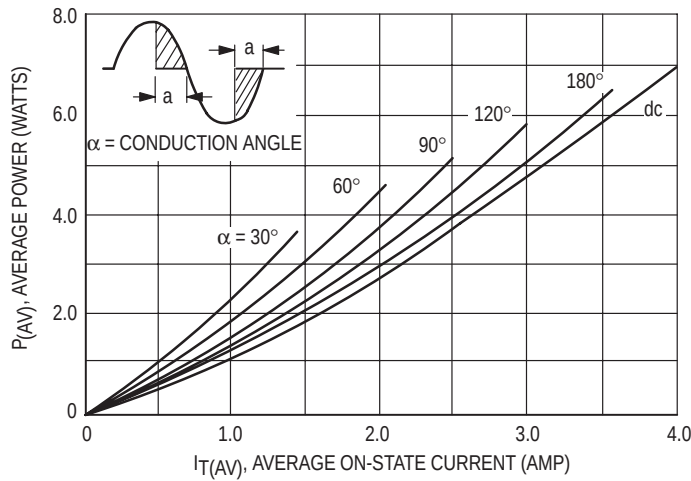


Figure 3. Power Dissipation

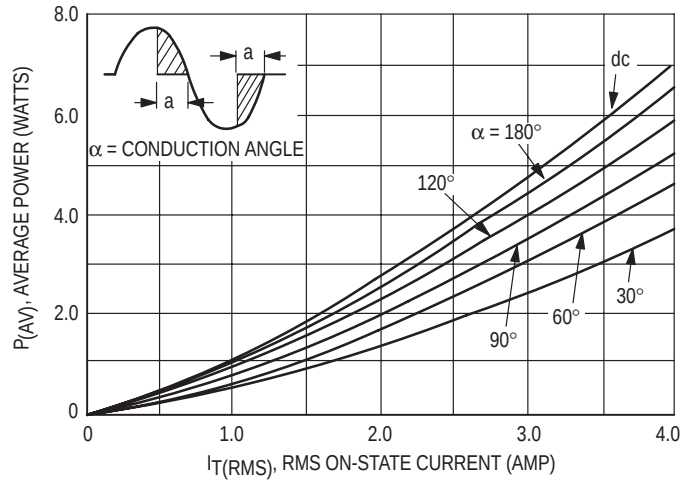


Figure 4. Power Dissipation

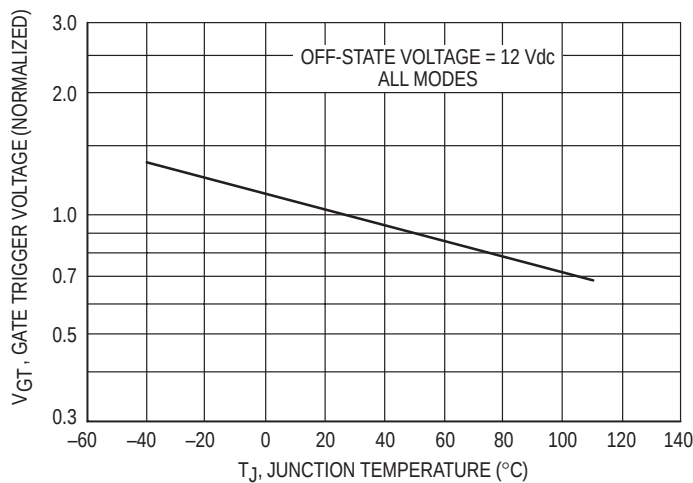


Figure 5. Typical Gate-Trigger Voltage

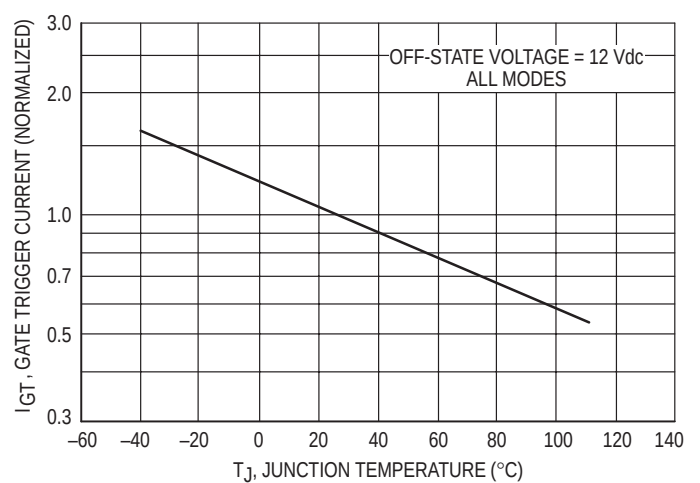


Figure 6. Typical Gate-Trigger Current

## 2N6071A/B Series

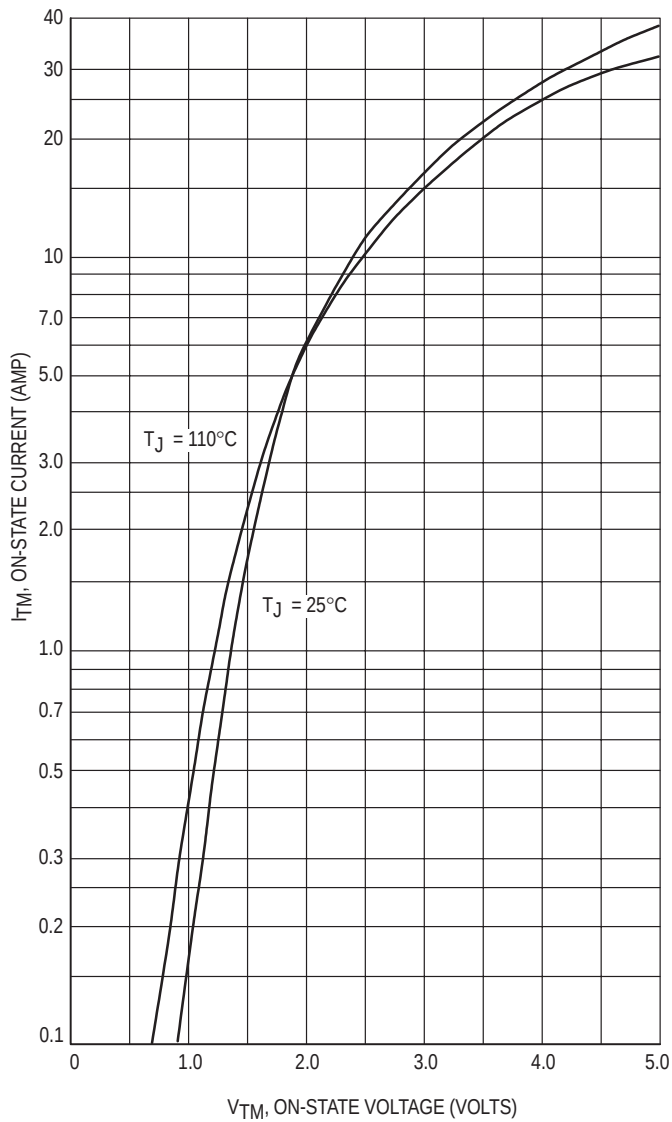


Figure 7. Maximum On-State Characteristics

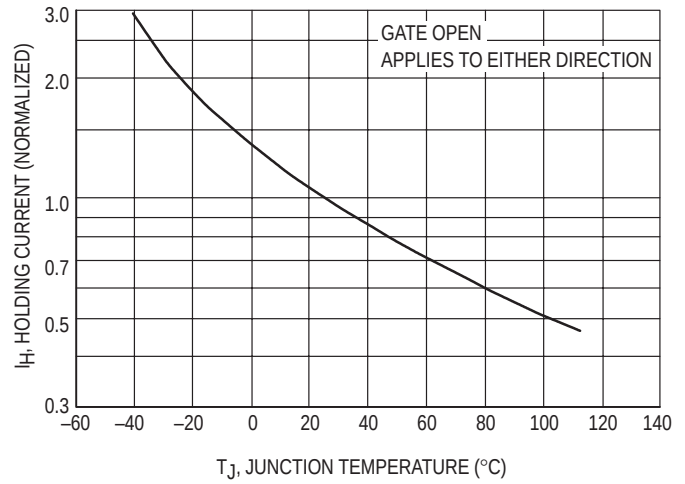


Figure 8. Typical Holding Current

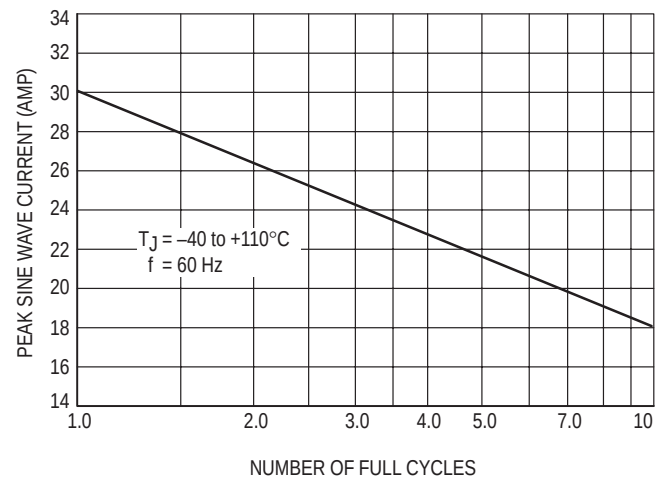


Figure 9. Maximum Allowable Surge Current

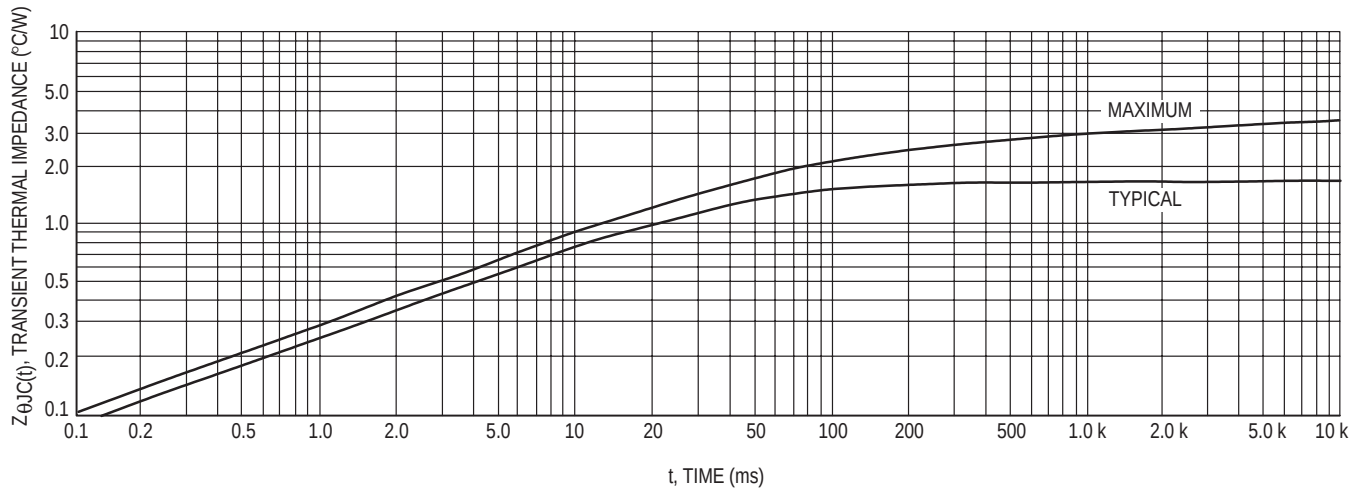
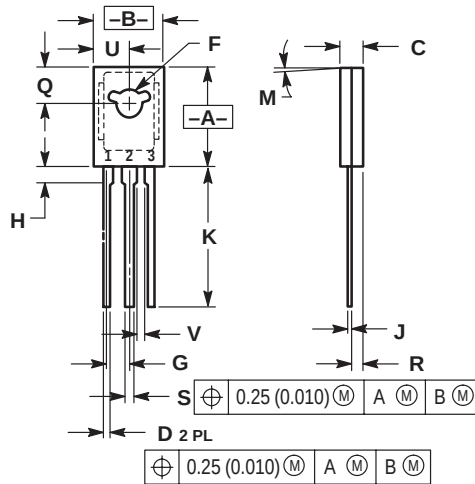


Figure 10. Thermal Response

# 2N6071A/B Series

## PACKAGE DIMENSIONS

TO-225AA  
(formerly TO-126)  
CASE 077-09  
ISSUE W



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | 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

## 2N6071A/B Series

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