

# 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

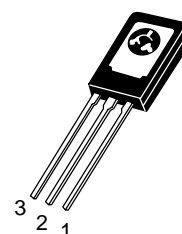
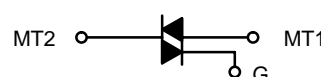
- Sensitive Gate Triggering Uniquely Compatible for Direct Coupling to TTL, HTL, CMOS and Operational Amplifier Integrated Circuit Logic Functions
- Gate Triggering: 4 Mode – 2N6071A, B; 2N6073A, B; 2N6075A, B
- Blocking Voltages to 600 V
- All Diffused and Glass Passivated Junctions for Greater Parameter 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



**ON Semiconductor®**

<http://onsemi.com>

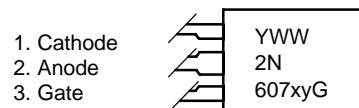
### TRIACS 4.0 A RMS, 200 – 600 V



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.

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

## 2N6071A/B Series

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

| Rating  | Symbol                                 | Value             | Unit                 |
|---|--|-------------------|----------------------|
| *Peak Repetitive Off-State Voltage (Note 1)<br>( $T_J = -40$ to $110^\circ\text{C}$ , Sine Wave, 50 to 60 Hz, Gate Open)<br>2N6071A,B<br>2N6073A,B<br>2N6075A,B | $V_{\text{DRM}}$ ,<br>$V_{\text{RRM}}$ | 200<br>400<br>600 | V                    |
| *On-State RMS Current ( $T_C = 85^\circ\text{C}$ ) Full Cycle Sine Wave 50 to 60 Hz   | $I_{\text{T(RMS)}}$                    | 4.0               | A                    |
| *Peak Non-repetitive Surge Current (One Full cycle, 60 Hz, $T_J = +110^\circ\text{C}$ )   | $I_{\text{TSM}}$                       | 30                | A                    |
| Circuit Fusing Considerations ( $t = 8.3$ ms)   | $I^2t$                                 | 3.7               | $\text{A}^2\text{s}$ |
| *Peak Gate Power (Pulse Width $\leq 1.0$ $\mu\text{s}$ , $T_C = 85^\circ\text{C}$ )   | $P_{\text{GM}}$                        | 10                | W                    |
| *Average Gate Power ( $t = 8.3$ ms, $T_C = 85^\circ\text{C}$ )  | $P_{\text{G(AV)}}$                     | 0.5               | W                    |
| *Peak Gate Voltage (Pulse Width $\leq 1.0$ $\mu\text{s}$ , $T_C = 85^\circ\text{C}$ )   | $V_{\text{GM}}$                        | 5.0               | V                    |
| *Operating Junction Temperature Range   | $T_J$                                  | $-40$ to $+110$   | $^\circ\text{C}$     |
| *Storage Temperature Range  | $T_{\text{stg}}$                       | $-40$ to $+150$   | $^\circ\text{C}$     |
| 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.  $V_{\text{DRM}}$  and  $V_{\text{RRM}}$  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   | $R_{\theta\text{JC}}$ | 3.5 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient                                       | $R_{\theta\text{JA}}$ | 75  | $^\circ\text{C/W}$ |
| Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds | $T_L$                 | 260 | $^\circ\text{C}$   |

\*Indicates JEDEC Registered Data.

## 2N6071A/B Series

### 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>( $V_D = \text{Rated } V_{DRM}, V_{RRM}; \text{Gate Open}$ ) | $I_{DRM}, I_{RRM}$ | – | – | 10 | $\mu\text{A}$ |
| $T_J = 25^\circ\text{C}$<br>$T_J = 110^\circ\text{C}$   |                    | – | – | 2  | $\text{mA}$   |

#### ON CHARACTERISTICS

|  |          |                  |                             |          |               |          |
|--|----------|------------------|-----------------------------|----------|---------------|----------|
| *Peak On-State Voltage (Note 3) ( $I_{TM} = \pm 6.0$ A Peak)   | $V_{TM}$ | –                | –                           | 2        | V             |          |
| *Gate Trigger Voltage (Continuous DC), All Quadrants<br>(Main Terminal Voltage = 12 Vdc, $R_L = 100\ \Omega$ , $T_J = -40^{\circ}\text{C}$ )                   | $V_{GT}$ | –                | 1.4                         | 2.5      | V             |          |
| Gate Non-Trigger Voltage, All Quadrants<br>(Main Terminal Voltage = 12 Vdc, $R_L = 100\ \Omega$ , $T_J = 110^{\circ}\text{C}$ )                                | $V_{GD}$ | 0.2              | –                           | –        | V             |          |
| *Holding Current<br>(Main Terminal Voltage = 12 Vdc, Gate Open, Initiating Current = $\pm 1$ Adc)<br>$T_J = -40^{\circ}\text{C}$<br>$T_J = 25^{\circ}\text{C}$ | $I_H$    | –<br>–           | –<br>–                      | 30<br>15 | mA            |          |
| Turn-On Time ( $I_{TM} = 14$ Adc, $I_{GT} = 100$ mAdc)   | $t_{gt}$ | –                | 1.5                         | –        | $\mu\text{s}$ |          |
|  |          |                  | QUADRANT<br>(Maximum Value) |          |               |          |
| Gate Trigger Current (Continuous DC)<br>(Main Terminal Voltage = 12 Vdc, $R_L = 100\ \Omega$ )   | Type     | $I_{GT}$ @ $T_J$ | 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  |          |                  |                             |          |               |          |

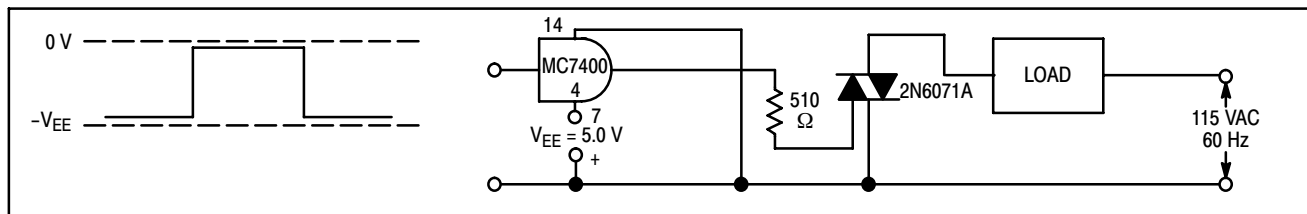
#### DYNAMIC CHARACTERISTICS

|   |            |   |   |   |                        |
|---|------------|---|---|---|------------------------|
| 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 | – | $\text{V}/\mu\text{s}$ |
|---|------------|---|---|---|------------------------|

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

\*Indicates JEDEC Registered Data.

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



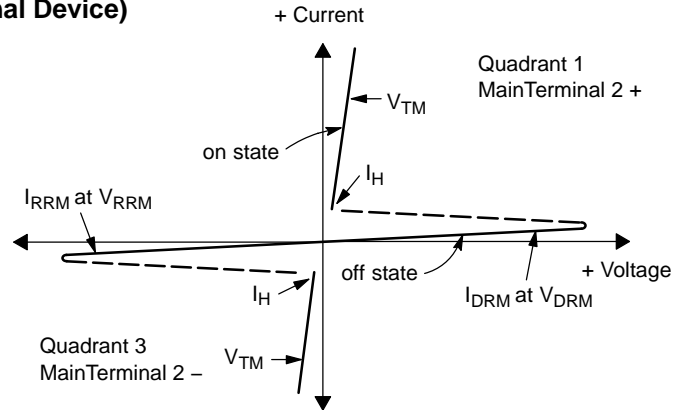
Trigger devices are recommended for gating on Triacs. They provide:

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

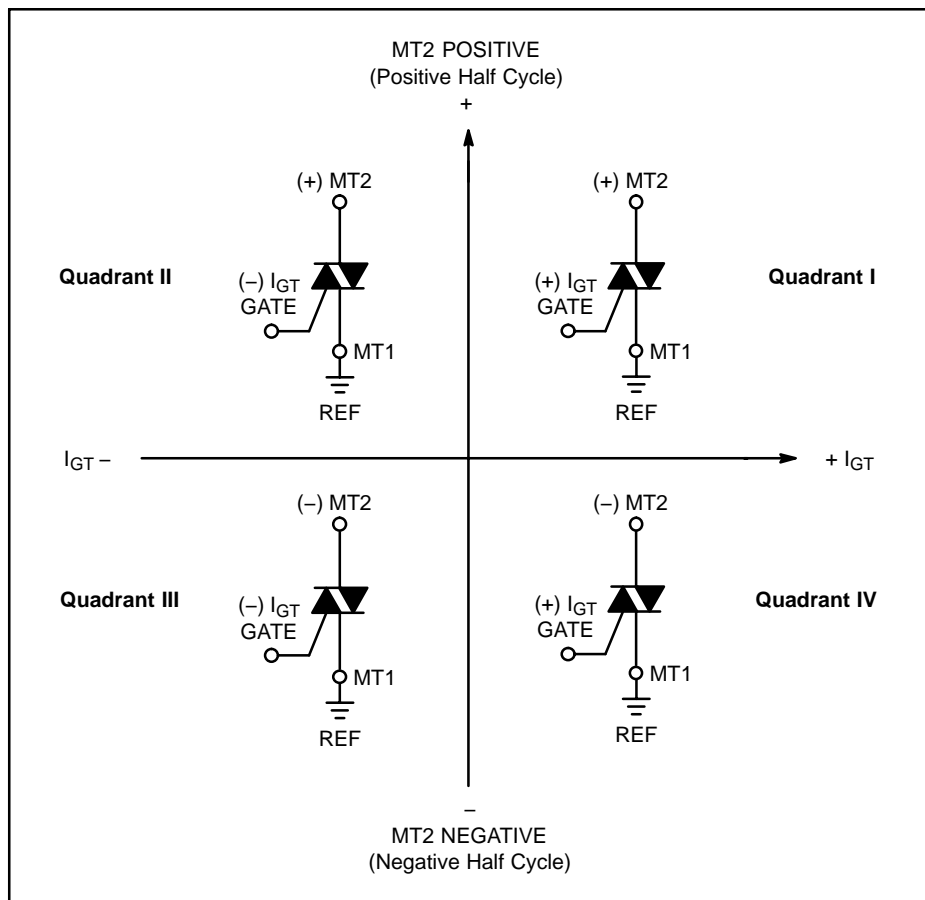
## 2N6071A/B Series

### 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 |                |

## 2N6071A/B Series

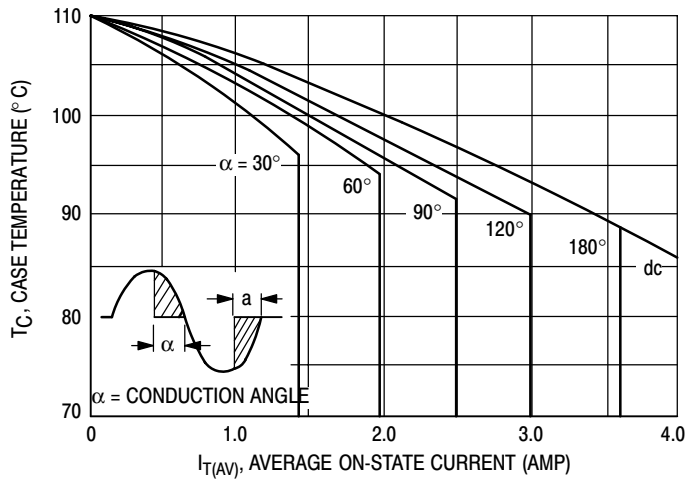


Figure 1. Average Current Derating

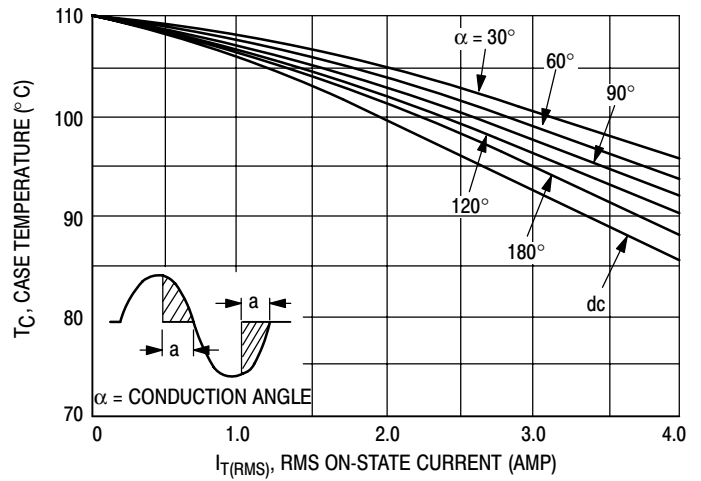


Figure 2. RMS Current Derating

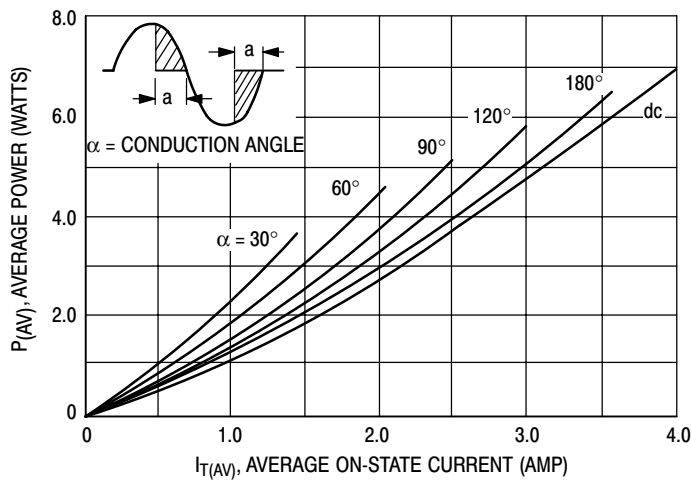


Figure 3. Power Dissipation

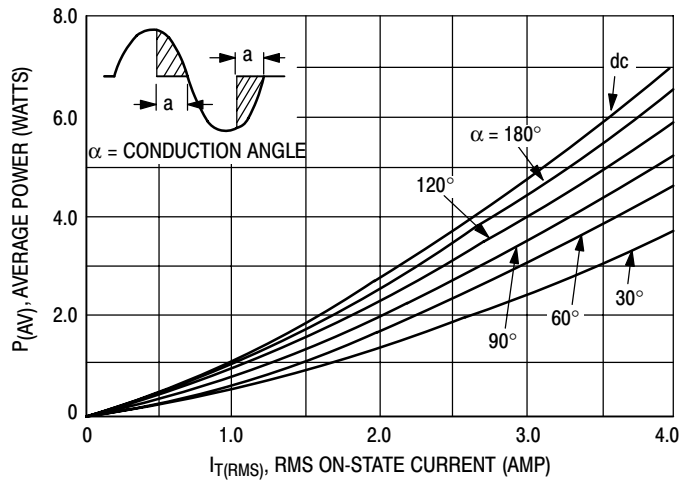


Figure 4. Power Dissipation

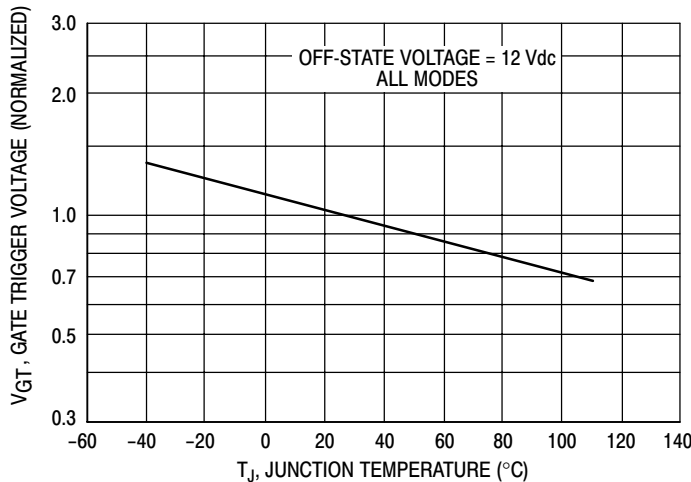


Figure 5. Typical Gate-Trigger Voltage

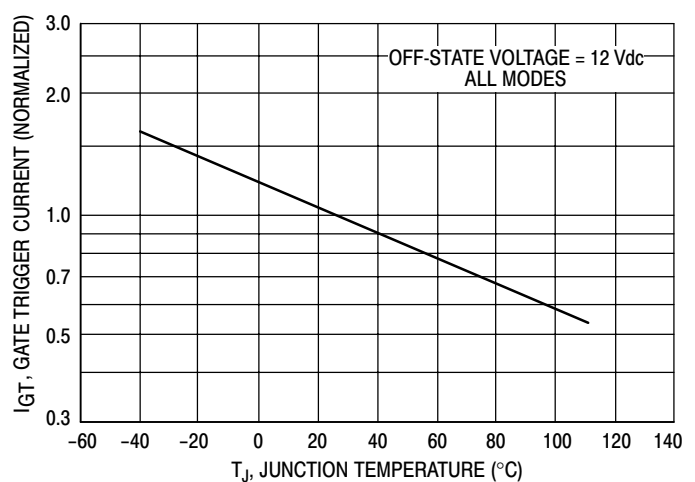


Figure 6. Typical Gate-Trigger Current

## 2N6071A/B Series

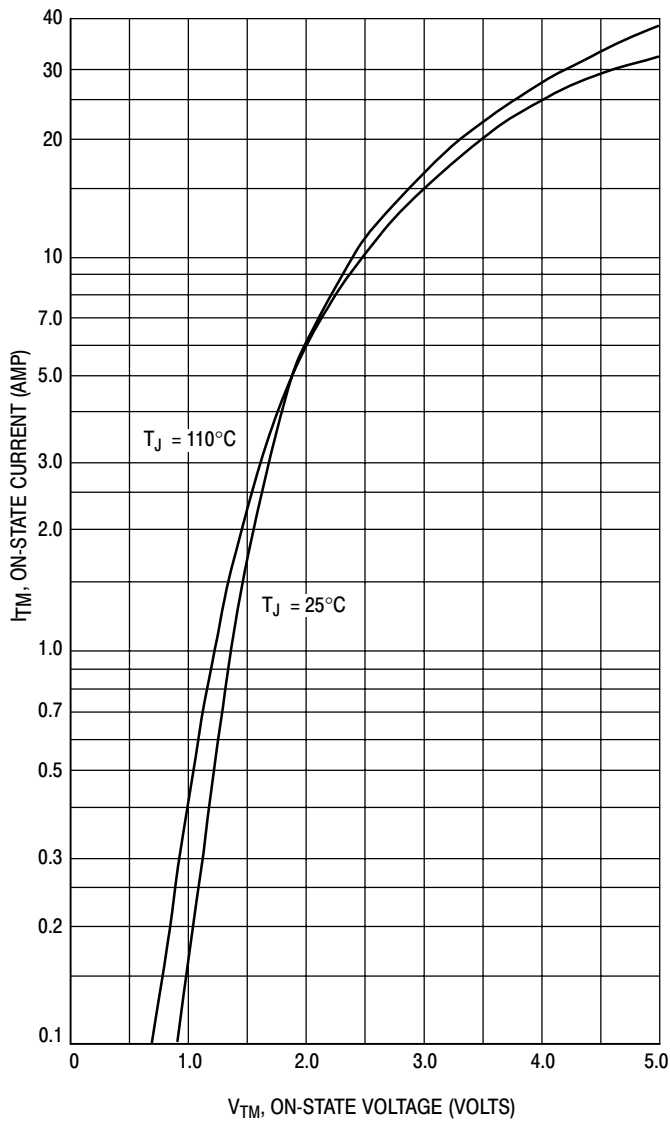


Figure 7. Maximum On-State Characteristics

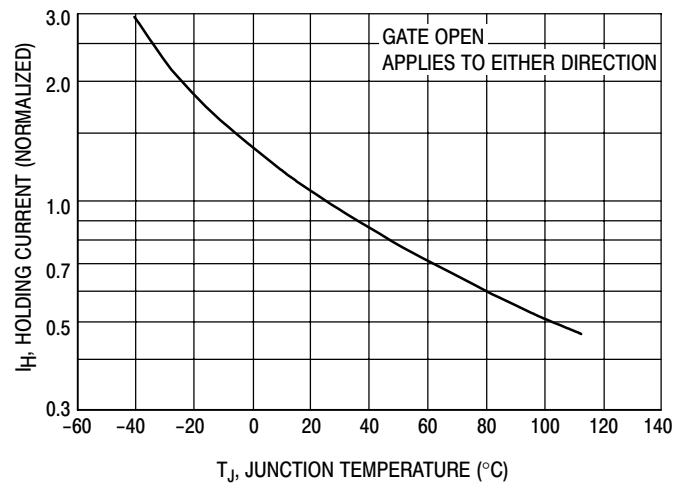


Figure 8. Typical Holding Current

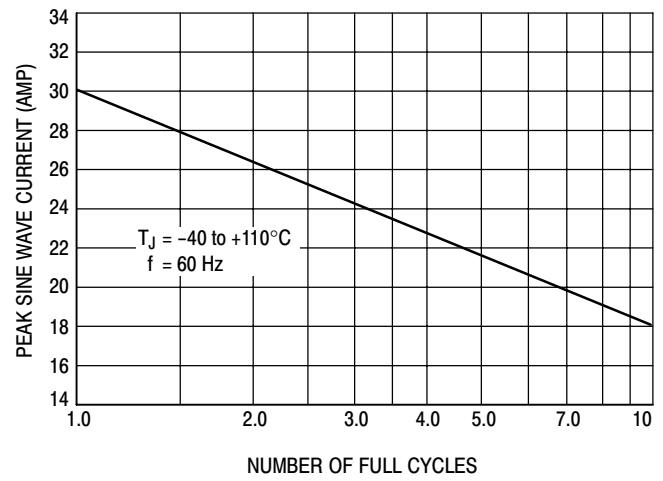


Figure 9. Maximum Allowable Surge Current

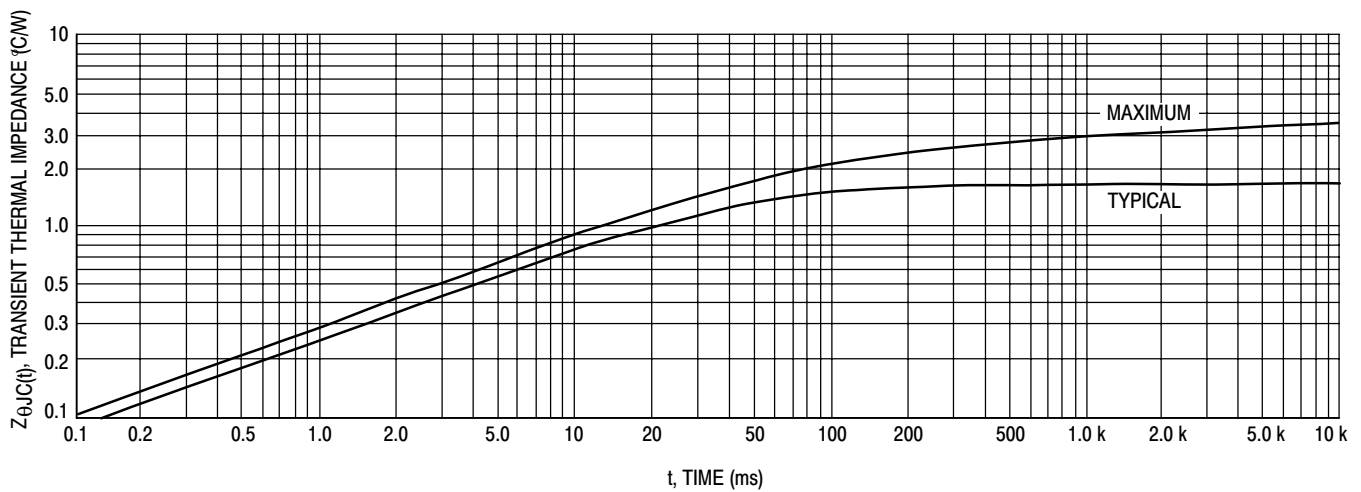


Figure 10. Thermal Response

## 2N6071A/B Series

### ORDERING INFORMATION

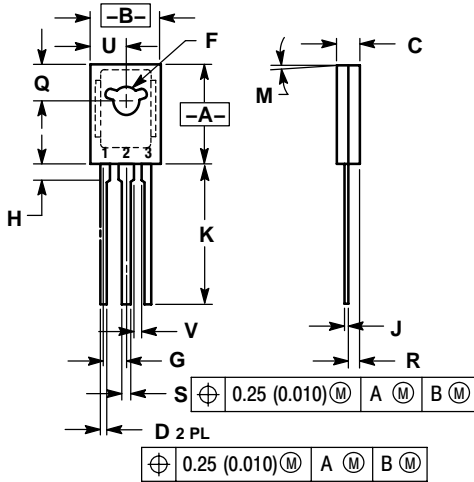
| Device    | Package             | Shipping†       |
|-----------|---------------------|-----------------|
| 2N6071A   | TO-225              | 500 Units / Box |
| 2N6071AG  | TO-225<br>(Pb-Free) |                 |
| 2N6071B   | TO-225              |                 |
| 2N6071BG  | TO-225<br>(Pb-Free)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

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# 2N6071A/B Series

## 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.

| 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

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
P.O. Box 61312, Phoenix, Arizona 85082-1312 USA  
Phone: 480-829-7710 or 800-344-3860 Toll Free USA/Canada  
Fax: 480-829-7709 or 800-344-3867 Toll Free USA/Canada  
Email: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

N. American Technical Support: 800-282-9855 Toll Free  
USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center  
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051  
Phone: 81-3-5773-3850

ON Semiconductor Website: <http://onsemi.com>

Order Literature: <http://www.onsemi.com/litorder>

For additional information, please contact your local Sales Representative.