

# T2800D

## Triacs

### Silicon Bidirectional Thyristors

Designed primarily for full-wave ac control applications, such as light dimmers, motor controls, heating controls and power supplies.

#### Features

- Blocking Voltage to 400 V
- All Diffused and Glass Passivated Junctions for Greater Parameter Uniformity and Stability
- Small, Rugged, Thermowatt Construction for Low Thermal Resistance, High Heat Dissipation and Durability
- Four Quadrant Gating
- Pb-Free Package is Available\*

#### MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise noted)

| Rating  | Symbol                                 | Value       | Unit             |
|---|--|-------------|------------------|
| Peak Repetitive Off-State Voltage (Note 1)<br>(T <sub>J</sub> = -40 to +125°C, Gate Open)   | V <sub>DRM</sub> ,<br>V <sub>RRM</sub> | 400         | V                |
| On-State RMS Current<br>(All Conduction Angles, T <sub>C</sub> = +80°C)                     | I <sub>T(RMS)</sub>                    | 8.0         | A                |
| Peak Non-Repetitive Surge Current (One Full Cycle Sine Wave, 60 Hz, T <sub>J</sub> = +80°C) | I <sub>TSM</sub>                       | 100         | A                |
| Circuit Fusing Consideration (t = 8.3 ms)   | I <sup>2</sup> t                       | 40          | A <sup>2</sup> s |
| Peak Gate Power<br>(Pulse Width = 10 μs, T <sub>C</sub> = +80°C)                            | P <sub>GM</sub>                        | 16          | W                |
| Average Gate Power<br>(t = 8.3 ms, T <sub>C</sub> = +80°C)                                  | P <sub>G(AV)</sub>                     | 0.35        | W                |
| Peak Gate Current<br>(Pulse Width = 10 μs, T <sub>C</sub> = +80°C)                          | I <sub>GM</sub>                        | 4.0         | A                |
| Operating Junction Temperature Range  | T <sub>J</sub>                         | -40 to +125 | °C               |
| Storage Temperature Range   | T <sub>stg</sub>                       | -40 to +150 | °C               |

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.

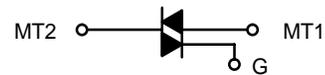
1. V<sub>DRM</sub> and V<sub>RRM</sub> for all types can be applied on a continuous basis. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.



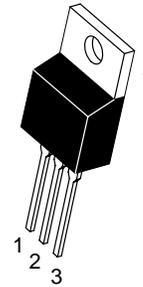
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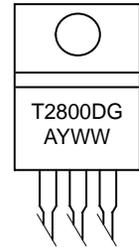
## TRIACS 8 AMPERES RMS, 400 VOLTS



#### MARKING DIAGRAM



**TO-220AB  
CASE 221A  
STYLE 4**



A = Assembly Location  
Y = Year  
WW = Work Week  
G = Pb-Free Package

#### PIN ASSIGNMENT

|   |                 |
|---|-----------------|
| 1 | Main Terminal 1 |
| 2 | Main Terminal 2 |
| 3 | Gate            |
| 4 | Main Terminal 2 |

#### ORDERING INFORMATION

| Device  | Package               | Shipping      |
|---------|-----------------------|---------------|
| T2800D  | TO-220AB              | 500 Units/Box |
| T2800DG | TO-220AB<br>(Pb-Free) | 500 Units/Box |

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

# T2800D

## THERMAL CHARACTERISTICS

| Characteristic  | Symbol          | Value | Unit          |
|---|-----------------|-------|---------------|
| Thermal Resistance, Junction-to-Case                                      | $R_{\theta JC}$ | 2.2   | $^{\circ}C/W$ |
| Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Sec | $T_L$           | 260   | $^{\circ}C$   |

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^{\circ}C$ 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  | $\mu A$              |
|   |                    | - | - | 2.0 | mA                   |
|   |                    |   |   |     | $T_C = 25^{\circ}C$  |
|   |                    |   |   |     | $T_C = 100^{\circ}C$ |

### ON CHARACTERISTICS

|  |              |     |      |     |         |
|--|--------------|-----|------|-----|---------|
| Peak On-State Voltage (Note 2)<br>( $I_T = \pm 30 \text{ A Peak}$ )  | $V_{TM}$     | -   | 1.7  | 2.0 | V       |
| Gate Trigger Current (Continuous dc)<br>( $V_D = 12 \text{ Vdc}, R_L = 100 \Omega$ )   | $I_{GT}$     |     |      |     | mA      |
|  | MT2(+), G(+) | -   | 10   | 25  |         |
|  | MT2(+), G(-) | -   | 20   | 60  |         |
|  | MT2(-), G(-) | -   | 15   | 25  |         |
|  | MT2(-), G(+) | -   | 30   | 60  |         |
| Gate Trigger Voltage (Continuous dc) (All Quadrants)<br>( $V_D = 12 \text{ Vdc}, R_L = 100 \Omega$ )   | $V_{GT}$     | -   | 1.25 | 2.5 | V       |
| Gate Non-Trigger Voltage (Continuous dc)<br>( $V_D = 12 \text{ V}, R_L = 100 \Omega, T_C = 100^{\circ}C$ )                                   | $V_{GD}$     | 0.2 | -    | -   | V       |
| Holding Current<br>( $V_D = 12 \text{ Vdc}, \text{ Initiating Current} = \pm 200 \text{ mA}, \text{ Gate Open}$ )                            | $I_H$        | -   | 15   | 30  | mA      |
| Gate Controlled Turn-On Time<br>( $V_D = \text{Rated } V_{DRM}, I_T = 10 \text{ A}, I_{GT} = 80 \text{ mA}, \text{ Rise Time} = 0.1 \mu s$ ) | $t_{gt}$     | -   | 1.6  | -   | $\mu s$ |

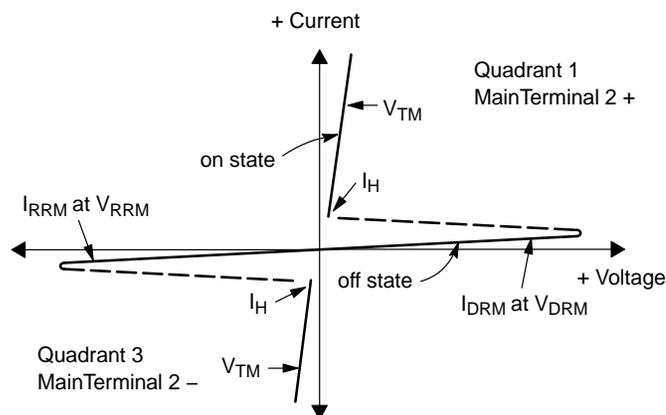
### DYNAMIC CHARACTERISTICS

|   |            |    |    |   |           |
|---|------------|----|----|---|-----------|
| Critical Rate-of-Rise of Commutation Voltage<br>( $V_D = \text{Rated } V_{DRM}, I_{T(RMS)} = 8 \text{ A}, \text{ Commutating } di/dt = 4.1 \text{ A/ms}, \text{ Gate Unenergized}, T_C = 80^{\circ}C$ ) | $dv/dt(c)$ | -  | 10 | - | $V/\mu s$ |
| Critical Rate-of-Rise of Off-State Voltage<br>( $V_D = \text{Rated } V_{DRM}, \text{ Exponential Voltage Rise, Gate Open}, T_C = 100^{\circ}C$ )  | $dv/dt$    | 60 | -  | - | $V/\mu s$ |

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

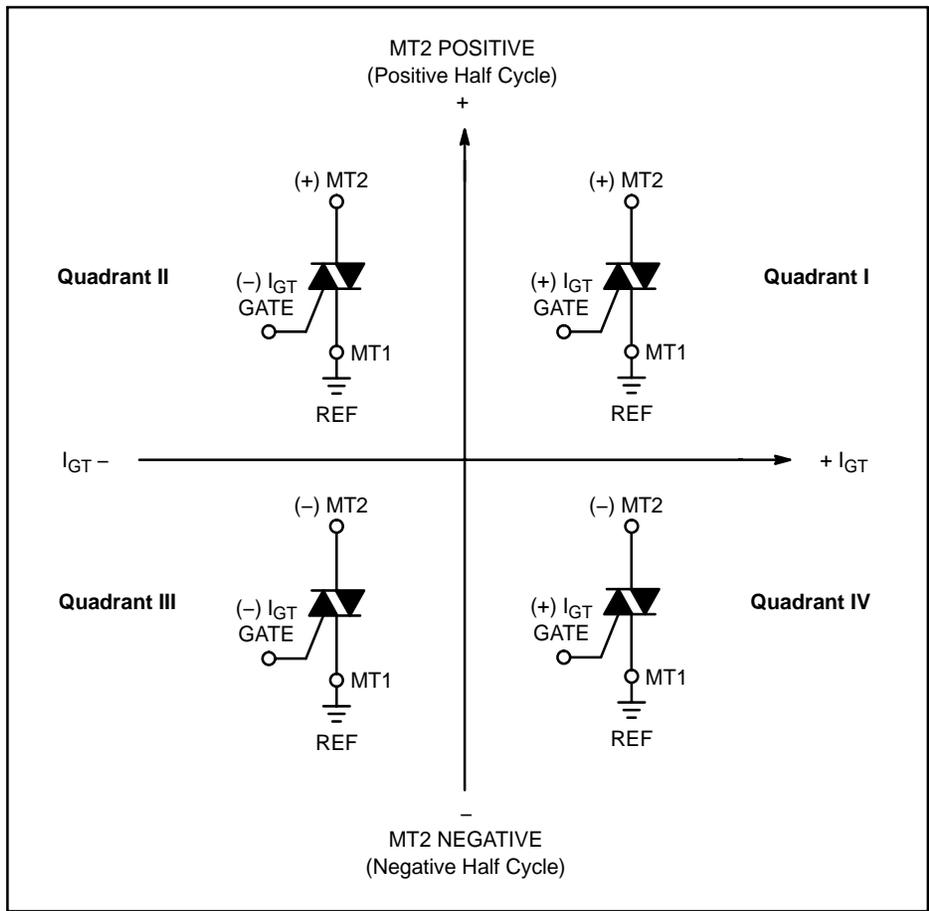
## Voltage Current Characteristic of Triacs (Bidirectional Device)

| 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                           |



# T2800D

## 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.

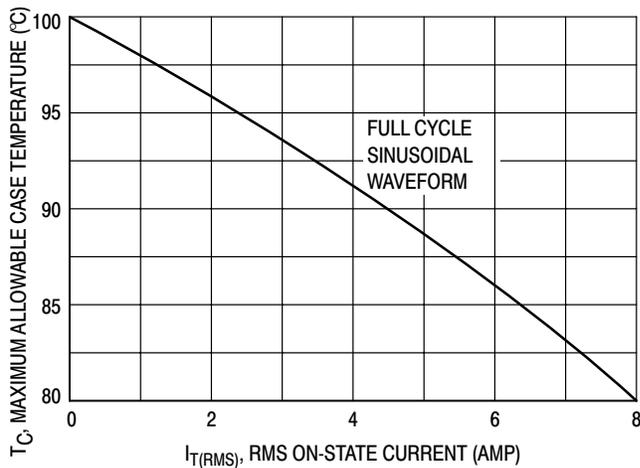


Figure 1. Current Derating

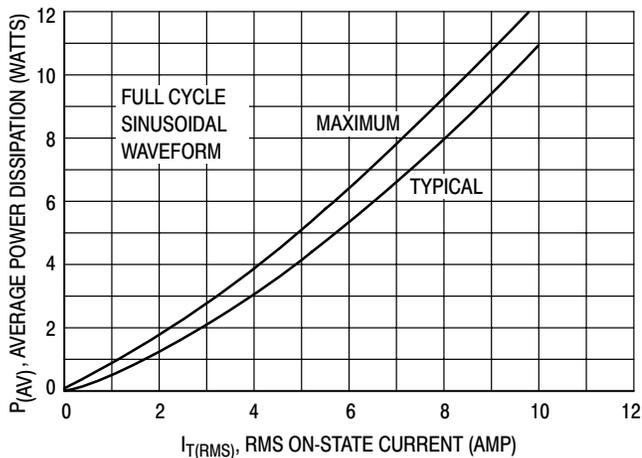
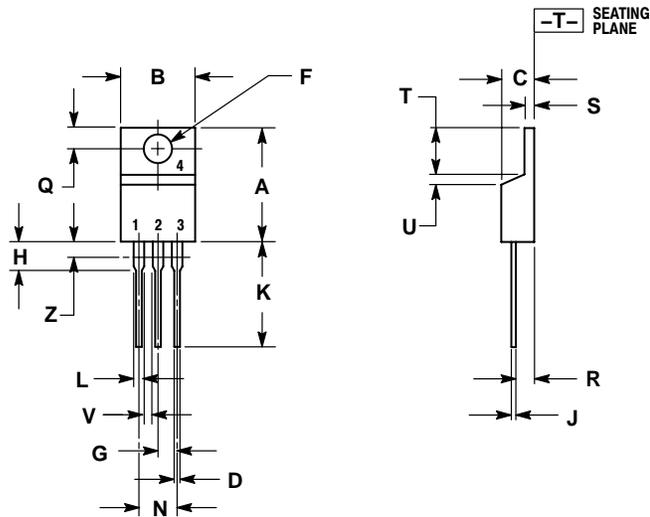


Figure 2. Power Dissipation

# T2800D

## PACKAGE DIMENSIONS

### TO-220 CASE 221A-07 ISSUE AA



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

| DIM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 0.570  | 0.620 | 14.48       | 15.75 |
| B   | 0.380  | 0.405 | 9.66        | 10.28 |
| C   | 0.160  | 0.190 | 4.07        | 4.82  |
| D   | 0.025  | 0.035 | 0.64        | 0.88  |
| F   | 0.142  | 0.147 | 3.61        | 3.73  |
| G   | 0.095  | 0.105 | 2.42        | 2.66  |
| H   | 0.110  | 0.155 | 2.80        | 3.93  |
| J   | 0.014  | 0.022 | 0.36        | 0.55  |
| K   | 0.500  | 0.562 | 12.70       | 14.27 |
| L   | 0.045  | 0.060 | 1.15        | 1.52  |
| N   | 0.190  | 0.210 | 4.83        | 5.33  |
| Q   | 0.100  | 0.120 | 2.54        | 3.04  |
| R   | 0.080  | 0.110 | 2.04        | 2.79  |
| S   | 0.045  | 0.055 | 1.15        | 1.39  |
| T   | 0.235  | 0.255 | 5.97        | 6.47  |
| U   | 0.000  | 0.050 | 0.00        | 1.27  |
| V   | 0.045  | ---   | 1.15        | ---   |
| Z   | ---    | 0.080 | ---         | 2.04  |

STYLE 4:

- PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. MAIN TERMINAL 2

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