- 12 A Continuous On-State Current
- 100 A Surge-Current
- Glass Passivated Wafer
- 400 V to 800 V Off-State Voltage
- Max I<sub>GT</sub> of 20 mA

# TO-220 PACKAGE (TOP VIEW) K 1 2 G 3

Pin 2 is in electrical contact with the mounting base.

MDC1ACA

#### absolute maximum ratings over operating case temperature (unless otherwise noted)

| RATING   |         | SYMBOL              | VALUE       | UNIT |  |
|--|---------|---------------------|-------------|------|--|
|  | TIC126D |                     | 400         |      |  |
| Repetitive peak off-state voltage  | TIC126M | V                   | 600         | V    |  |
|  | TIC126S | $V_{DRM}$           | 700         |      |  |
|  | TIC126N |                     | 800         |      |  |
|  | TIC126D |                     | 400         | V    |  |
| Panetitiva neek reverse voltage  | TIC126M | V                   | 600         |      |  |
| Repetitive peak reverse voltage  | TIC126S | V <sub>RRM</sub>    | 700         |      |  |
|  | TIC126N |                     | 800         |      |  |
| Continuous on-state current at (or below) 70°C case temperature (see Note 1)         |         | I <sub>T(RMS)</sub> | 12          | Α    |  |
| Average on-state current (180° conduction angle) at (or below) 70°C case temperature |         | 1                   | 7.5         | Α    |  |
| (see Note 2)   |         | I <sub>T(AV)</sub>  | 7.5         | ^    |  |
| Surge on-state current at (or below) 25°C case temperature (see Note 3)              |         | I <sub>TM</sub>     | 100         | Α    |  |
| Peak positive gate current (pulse width ≤ 300 μs)                                    |         | I <sub>GM</sub>     | 3           | Α    |  |
| Peak gate power dissipation (pulse width ≤ 300 μs)                                   |         | $P_{GM}$            | 5           | W    |  |
| Average gate power dissipation (see Note 4)  |         | $P_{G(AV)}$         | 1           | W    |  |
| Operating case temperature range   |         | T <sub>C</sub>      | -40 to +110 | °C   |  |
| Storage temperature range  |         | T <sub>stg</sub>    | -40 to +125 | °C   |  |
| Lead temperature 1.6 mm from case for 10 seconds                                     |         | $T_L$               | 230         | °C   |  |

NOTES: 1. These values apply for continuous dc operation with resistive load. Above 70°C derate linearly to zero at 110°C.

- 2. This value may be applied continuously under single phase 50 Hz half-sine-wave operation with resistive load. Above 70°C derate linearly to zero at 110°C.
- 3. This value applies for one 50 Hz half-sine-wave when the device is operating at (or below) the rated value of peak reverse voltage and on-state current. Surge may be repeated after the device has returned to original thermal equilibrium.
- 4. This value applies for a maximum averaging time of 20 ms.



#### electrical characteristics at 25°C case temperature (unless otherwise noted)

|                                      | PARAMETER  |  | TEST CONDITION          | ONS                       | MIN | TYP | MAX | UNIT |
|--------------------------------------|--|--|-------------------------|---------------------------|-----|-----|-----|------|
| I <sub>DRM</sub>                     | Repetitive peak off-state current                            | V <sub>D</sub> = rated V <sub>DRM</sub>                      |                         | T <sub>C</sub> = 110°C    |     |     | 2   | mA   |
| I <sub>RRM</sub>                     | Repetitive peak reverse current                              | V <sub>R</sub> = rated V <sub>RRM</sub>                      | I <sub>G</sub> = 0      | T <sub>C</sub> = 110°C    |     |     | 2   | mA   |
| I <sub>GT</sub>                      | Gate trigger current   | V <sub>AA</sub> = 12 V                                       | $R_L = 100 \Omega$      | t <sub>p(g)</sub> ≥ 20 μs |     | 8   | 20  | mA   |
| V <sub>GT</sub> Gate trigger voltage | $V_{AA} = 12 \text{ V}$ $t_{p(g)} \ge 20  \mu\text{s}$       | $R_L = 100 \Omega$   | $T_C = -40^{\circ}C$    |                           |     | 2.5 |     |      |
|                                      | Gate trigger voltage   | $V_{AA} = 12 \text{ V}$ $t_{p(g)} \ge 20  \mu\text{s}$       | $R_L = 100 \Omega$      |                           |     | 0.8 | 1.5 | V    |
|                                      |  | $V_{AA} = 12 \text{ V}$ $t_{p(g)} \ge 20  \mu\text{s}$       | $R_L = 100 \Omega$      | T <sub>C</sub> = 110°C    | 0.2 |     |     |      |
| I <sub>H</sub> Holding current       | $V_{AA} = 12 \text{ V}$<br>Initiating $I_T = 100 \text{ mA}$ |  | T <sub>C</sub> = - 40°C |                           |     | 100 | mA  |      |
|                                      | Tiolding durions   | $V_{AA} = 12 \text{ V}$<br>Initiating $I_T = 100 \text{ mA}$ |                         |                           |     |     | 40  |      |
| V <sub>T</sub>                       | On-state voltage   | I <sub>T</sub> = 12 A  | (see Note 5)            |                           |     |     | 1.4 | V    |
| dv/dt                                | Critical rate of rise of off-state voltage                   | V <sub>D</sub> = rated V <sub>D</sub>                        | I <sub>G</sub> = 0      | T <sub>C</sub> = 110°C    |     | 400 |     | V/µs |

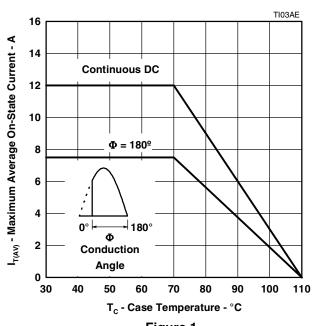
NOTE 5: This parameter must be measured using pulse techniques,  $t_p = 300 \mu s$ , duty cycle  $\leq 2 \%$ . Voltage sensing-contacts, separate from the current carrying contacts, are located within 3.2 mm from the device body.

#### thermal characteristics

|                 | PARAMETER                               | MIN | TYP | MAX  | UNIT |
|-----------------|---|-----|-----|------|------|
| $R_{\theta JC}$ | Junction to case thermal resistance     |     |     | 2.4  | °C/W |
| $R_{\theta JA}$ | Junction to free air thermal resistance |     |     | 62.5 | °C/W |

#### THERMAL INFORMATION

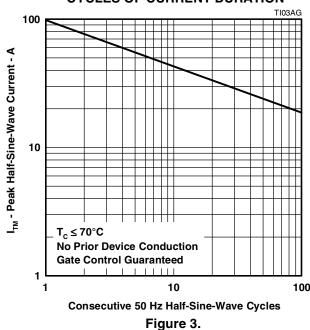
# AVERAGE ON-STATE CURRENT DERATING CURVE



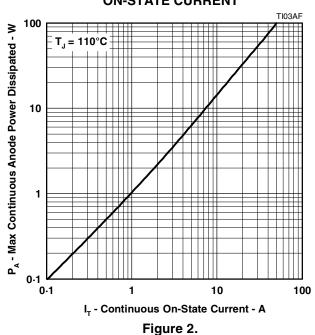
### Figure 1.

## SURGE ON-STATE CURRENT

#### **CYCLES OF CURRENT DURATION**



#### MAX ANODE POWER LOSS vs ON-STATE CURRENT



TRANSIENT THERMAL RESISTANCE

#### **CYCLES OF CURRENT DURATION**

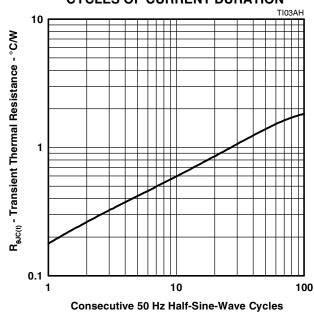
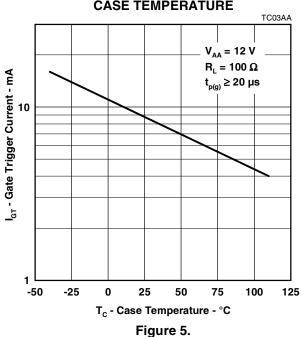


Figure 4.

#### TYPICAL CHARACTERISTICS

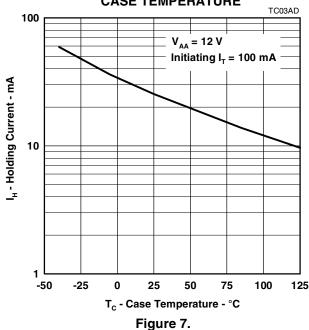
#### **GATE TRIGGER CURRENT** vs

#### **CASE TEMPERATURE**

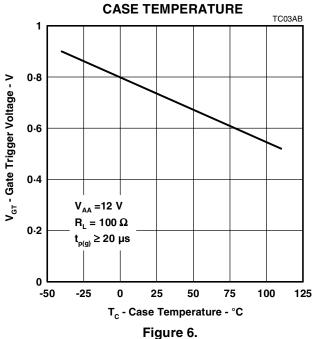


#### **HOLDING CURRENT** vs

## **CASE TEMPERATURE**



## **GATE TRIGGER VOLTAGE**



## **PEAK ON-STATE VOLTAGE**

#### **PEAK ON-STATE CURRENT**

