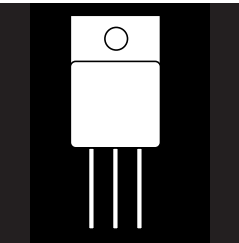


# INSULATED GATE BIPOLAR TRANSISTOR (IGBT) IN A HERMETIC TO-254AA PACKAGE



500 Volt, 5 And 10 Amp, N-Channel IGBT  
With a Soft Recovery Diode  
In A Hermetic Metal Package

## FEATURES

- Isolated Hermetic Metal Package
- High Input Impedance
- Low On-Voltage
- High Current Capability
- Fast Turn-Off
- Low Conductive Losses
- Available Screened To MIL-S-19500, TX, TXV And S Levels
- Free Wheeling Diode
- Ceramic Feedthroughs Available

## DESCRIPTION

This power module includes an IGBT power transistor which features a high impedance insulated gate and the low on-resistance characteristics of bipolar transistor with a free wheeling diode connected across the emitter and collector. These devices are ideally suited for motor drives, UPS converters, power supplies and resonant power converters.

## MAXIMUM RATINGS @ 25°C Unless Specified Otherwise

| PART NUMBER | I <sub>c</sub> (Cont.)<br>@ 90°C, A | V <sub>(BR)CES</sub><br>V | V <sub>CE (sat)</sub> (Typ.)<br>V | T <sub>f</sub> (Typ.)<br>ns | q <sub>jc</sub><br>°C/W | P <sub>D</sub><br>W | T <sub>J</sub><br>°C |
|-------------|-------------------------------------|---------------------------|-----------------------------------|-----------------------------|-------------------------|---------------------|----------------------|
| OM6508SA    | 5                                   | 500                       | 2.8                               | 400                         | 3.8                     | 35                  | 150                  |
| OM6509SA    | 10                                  | 500                       | 2.8                               | 400                         | 3.0                     | 42                  | 150                  |

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### SCHEMATIC

### MECHANICAL OUTLINE

### PIN CONNECTION

Pin 1: Collector  
Pin 2: Emitter  
Pin 3: Gate

### PACKAGE OPTIONS

MOD PAK

Z-TAB

6 PIN SIP

Standard Products are supplied with glass feedthroughs. For ceramic feedthroughs, add the letter "C" to the part number. Example - OMXXXXCSA.  
IGBTs are also available in Z-Tab, dual and quad pak styles - Please call the factory for more information.

## PRELIMINARY DATA: OM6508SA

## IGBT CHARACTERISTICS

| Parameter - OFF (see Note 1)                              | Min. | Typ. | Max. | Units   | Test Conditions                                                                                                       |
|-----------------------------------------------------------|------|------|------|---------|-----------------------------------------------------------------------------------------------------------------------|
| V <sub>(BR)CES</sub> Collector Emitter Breakdown Voltage  | 500  |      |      | V       | V <sub>CE</sub> = 0<br>I <sub>C</sub> = 250 $\mu$ A                                                                   |
| I <sub>CES</sub> Zero Gate Voltage Drain Current          |      |      | 0.25 | mA      | V <sub>CE</sub> = Max. Rat., V <sub>GE</sub> = 0                                                                      |
|                                                           |      |      | 1.0  | mA      | V <sub>CE</sub> = 0.8 Max. Rat., V <sub>GE</sub> = 0<br>T <sub>C</sub> = 125°C                                        |
| I <sub>GES</sub> Gate Emitter Leakage Current             |      |      | ±100 | nA      | V <sub>GE</sub> = ±20 V<br>V <sub>CE</sub> = 0 V                                                                      |
| Parameter - ON                                            |      |      |      |         |                                                                                                                       |
| V <sub>GE(th)</sub> Gate Threshold Voltage                | 2.0  |      | 4.0  | V       | V <sub>CE</sub> = V <sub>GE</sub> , I <sub>C</sub> = 250 $\mu$ A                                                      |
| V <sub>CE(sat)</sub> Collector Emitter Saturation Voltage |      | 3.0  |      | V       | V <sub>GE</sub> = 15 V, I <sub>C</sub> = 5 A<br>T <sub>C</sub> = 25°C                                                 |
| V <sub>CE(sat)</sub> Collector Emitter Saturation Voltage |      | 2.8  | 3.0  | V       | V <sub>GE</sub> = 15 V, I <sub>C</sub> = 5 A<br>T <sub>C</sub> = 100°C                                                |
| Dynamic                                                   |      |      |      |         |                                                                                                                       |
| g <sub>fs</sub> Forward Transductance                     |      | 2.0  |      | S       | V <sub>CE</sub> = 20 V, I <sub>C</sub> = 5 A                                                                          |
| C <sub>ies</sub> Input Capacitance                        |      | 260  |      | pF      | V <sub>GE</sub> = 0                                                                                                   |
| C <sub>oes</sub> Output Capacitance                       |      | 50   |      | pF      | V <sub>CE</sub> = 25 V                                                                                                |
| C <sub>res</sub> Reverse Transfer Capacitance             |      | 20   |      | pF      | f = 1 mHz                                                                                                             |
| Switching-Resistive Load                                  |      |      |      |         |                                                                                                                       |
| T <sub>d(on)</sub> Turn-On Time                           |      | 37   |      | nS      | V <sub>CC</sub> = 400 V, I <sub>C</sub> = 5 A                                                                         |
| t <sub>r</sub> Rise Time                                  |      | 150  |      | nS      | V <sub>GE</sub> = 15 V, R <sub>g</sub> = 47                                                                           |
| Switching-Inductive Load                                  |      |      |      |         |                                                                                                                       |
| t <sub>r(Volt)</sub> Off Voltage Rise Time                |      | .35  |      | $\mu$ S | V <sub>CEclamp</sub> = 400 V, I <sub>C</sub> = 5 A                                                                    |
| t <sub>f</sub> Fall Time                                  |      | .81  |      | $\mu$ S | V <sub>GE</sub> = 15 V, R <sub>g</sub> = 100                                                                          |
| t <sub>cross</sub> Cross-Over Time                        |      | 1.2  |      | $\mu$ S | L = 0.1 mH, T <sub>J</sub> = 100°C                                                                                    |
| E <sub>off</sub> Turn-Off Losses                          |      | .95  |      | mJ      |                                                                                                                       |
| DIODE CHARACTERISTICS                                     |      |      |      |         |                                                                                                                       |
| V <sub>F</sub> Maximum Forward Voltage                    |      |      | 1.5  | V       | I <sub>F</sub> = 8 A, T <sub>C</sub> = 25°C                                                                           |
|                                                           |      |      | 1.4  | V       | I <sub>F</sub> = 8 A, T <sub>C</sub> = 150°C                                                                          |
| I <sub>r</sub> Maximum Reverse Current                    |      |      | 150  | $\mu$ A | V <sub>R</sub> = 600 V, T <sub>C</sub> = 25°C                                                                         |
|                                                           |      |      | 1.5  | mA      | V <sub>R</sub> = 480 V, T <sub>C</sub> = 125°C                                                                        |
| t <sub>rr</sub> Reverse Recovery Time                     |      |      | 35   | nS      | I <sub>F</sub> = 1 A, d <sub>I</sub> /d <sub>t</sub> = -15 A $\mu$ /S<br>V <sub>R</sub> = 30 V, T <sub>J</sub> = 25°C |

Note 1: Limited by diode I<sub>r</sub> characteristic.

## PRELIMINARY DATA: OM6509SA

## IGBT CHARACTERISTICS

| Parameter - OFF (see Note 1)                              | Min. | Typ. | Max. | Units   | Test Conditions                                                                                                       |
|-----------------------------------------------------------|------|------|------|---------|-----------------------------------------------------------------------------------------------------------------------|
| V <sub>(BR)CES</sub> Collector Emitter Breakdown Voltage  | 500  |      |      | V       | V <sub>CE</sub> = 0<br>I <sub>C</sub> = 250 $\mu$ A                                                                   |
| I <sub>CES</sub> Zero Gate Voltage Drain Current          |      |      | 0.25 | mA      | V <sub>CE</sub> = Max. Rat., V <sub>GE</sub> = 0                                                                      |
|                                                           |      |      | 1.0  | mA      | V <sub>CE</sub> = 0.8 Max. Rat., V <sub>GE</sub> = 0<br>T <sub>C</sub> = 125°C                                        |
| I <sub>GES</sub> Gate Emitter Leakage Current             |      |      | ±100 | nA      | V <sub>GE</sub> = ±20 V<br>V <sub>CE</sub> = 0 V                                                                      |
| Parameter - ON                                            |      |      |      |         |                                                                                                                       |
| V <sub>GE(th)</sub> Gate Threshold Voltage                | 2.0  |      | 4.0  | V       | V <sub>CE</sub> = V <sub>GE</sub> , I <sub>C</sub> = 250 $\mu$ A                                                      |
| V <sub>CE(sat)</sub> Collector Emitter Saturation Voltage |      | 3.0  | 2.7  | V       | V <sub>GE</sub> = 15 V, I <sub>C</sub> = 10 A<br>T <sub>C</sub> = 25°C                                                |
| V <sub>CE(sat)</sub> Collector Emitter Saturation Voltage |      | 2.8  | 3.0  | V       | V <sub>GE</sub> = 15 V, I <sub>C</sub> = 10 A<br>T <sub>C</sub> = 100°C                                               |
| Dynamic                                                   |      |      |      |         |                                                                                                                       |
| g <sub>fs</sub> Forward Transductance                     | 2.5  |      |      | S       | V <sub>CE</sub> = 20 V, I <sub>C</sub> = 10 A                                                                         |
| C <sub>ies</sub> Input Capacitance                        |      |      | 950  | pF      | V <sub>GE</sub> = 0                                                                                                   |
| C <sub>oes</sub> Output Capacitance                       |      |      | 140  | pF      | V <sub>CE</sub> = 25 V                                                                                                |
| C <sub>res</sub> Reverse Transfer Capacitance             |      |      | 80   | pF      | f = 1 mHz                                                                                                             |
| Switching-Resistive Load                                  |      |      |      |         |                                                                                                                       |
| T <sub>d(on)</sub> Turn-On Time                           |      |      | 150  | nS      | V <sub>CC</sub> = 400 V, I <sub>C</sub> = 10 A<br>V <sub>GE</sub> = 15 V, R <sub>g</sub> = 100                        |
| T <sub>r</sub> Rise Time                                  |      |      | 1000 | nS      |                                                                                                                       |
| T <sub>d(off)</sub> Turn-Off Delay Time                   |      |      | 700  | nS      |                                                                                                                       |
| T <sub>f</sub> Fall Time                                  |      |      | 1500 | nS      |                                                                                                                       |
| Switching-Inductive Load                                  |      |      |      |         |                                                                                                                       |
| T <sub>d(off)</sub> Turn-Off Delay Time                   |      |      | 1.2  | $\mu$ S | V <sub>CEclamp</sub> = 350 V, I <sub>C</sub> = 10 A                                                                   |
| t <sub>f</sub> Fall Time                                  |      |      | 1.5  | $\mu$ S | V <sub>GE</sub> = 15 V, R <sub>g</sub> = 100                                                                          |
| t <sub>cross</sub> Cross-Over Time                        |      |      | 2.0  | $\mu$ S | L = 180 $\mu$ H, T <sub>J</sub> = 100°C                                                                               |
| E <sub>off</sub> Turn-Off Losses                          |      |      | 4.0  | mJ      |                                                                                                                       |
| DIODE CHARACTERISTICS                                     |      |      |      |         |                                                                                                                       |
| V <sub>F</sub> Maximum Forward Voltage                    |      |      | 1.4  | V       | I <sub>F</sub> = 16 A, T <sub>C</sub> = 25°C                                                                          |
|                                                           |      |      | 1.5  | V       | I <sub>F</sub> = 16 A, T <sub>C</sub> = 150°C                                                                         |
| I <sub>r</sub> Maximum Reverse Current                    |      |      | 500  | $\mu$ A | V <sub>R</sub> = 600 V, T <sub>C</sub> = 25°C                                                                         |
|                                                           |      |      | 3.0  | mA      | V <sub>R</sub> = 480 V, T <sub>C</sub> = 125°C                                                                        |
| t <sub>rr</sub> Reverse Recovery Time                     |      |      | 35   | nS      | I <sub>F</sub> = 1 A, d <sub>I</sub> /d <sub>t</sub> = -15 A $\mu$ /S<br>V <sub>R</sub> = 30 V, T <sub>J</sub> = 25°C |

Note 1: Limited by diode I<sub>r</sub> characteristic.