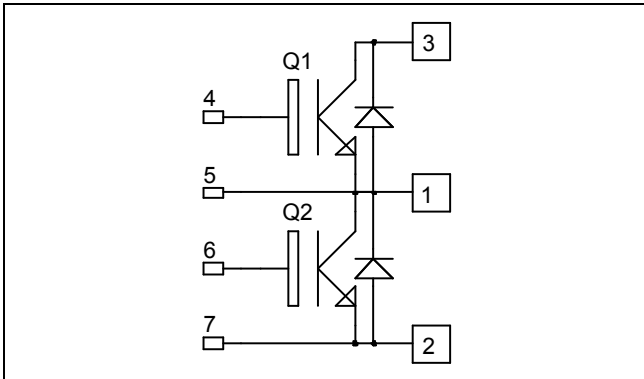


*Phase leg  
Trench + Field Stop IGBT3  
Power Module*

**$V_{CES} = 1700V$   
 $I_C = 300A @ T_c = 80^\circ C$**


**Application**

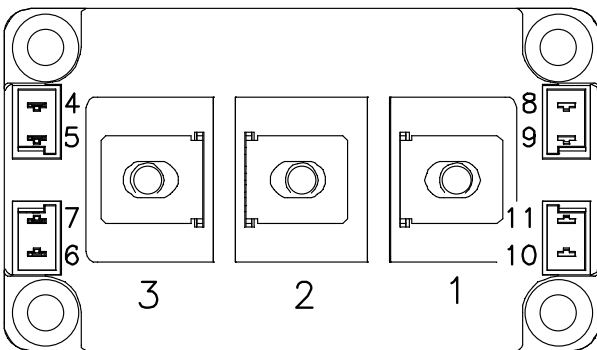
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

**Features**

- Trench + Field Stop IGBT3 Technology
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 20 kHz
  - Soft recovery parallel diodes
  - Low diode VF
  - Low leakage current
  - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- High level of integration
- M6 power connectors

**Benefits**

- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive  $T_C$  of  $V_{CEsat}$
- RoHS Compliant


**Absolute maximum ratings**

| Symbol    | Parameter                             | Max ratings         | Unit       |
|-----------|---------------------------------------|---------------------|------------|
| $V_{CES}$ | Collector - Emitter Breakdown Voltage | 1700                | V          |
| $I_C$     | Continuous Collector Current          | $T_C = 25^\circ C$  | 400        |
|           |                                       | $T_C = 80^\circ C$  | 300        |
| $I_{CM}$  | Pulsed Collector Current              | $T_C = 25^\circ C$  | 600        |
| $V_{GE}$  | Gate - Emitter Voltage                | $\pm 20$            | V          |
| $P_D$     | Maximum Power Dissipation             | $T_C = 25^\circ C$  | 1470       |
| RBSOA     | Reverse Bias Safe Operating Area      | $T_j = 125^\circ C$ | 600A@1650V |

**CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on [www.microsemi.com](http://www.microsemi.com)

All ratings @  $T_j = 25^\circ\text{C}$  unless otherwise specified

**Electrical Characteristics**

| Symbol       | Characteristic                      | Test Conditions                       | Min                       | Typ | Max | Unit |
|--------------|-------------------------------------|---------------------------------------|---------------------------|-----|-----|------|
| $I_{CES}$    | Zero Gate Voltage Collector Current | $V_{GE} = 0V, V_{CE} = 1700V$         |                           |     | 3   | mA   |
| $V_{CE(on)}$ | Collector Emitter on Voltage        | $V_{GE} = 15V$<br>$I_C = 300A$        | $T_j = 25^\circ\text{C}$  | 2.0 | 2.5 | V    |
|              |                                     |                                       | $T_j = 125^\circ\text{C}$ | 2.4 |     |      |
| $V_{GE(th)}$ | Gate Threshold Voltage              | $V_{GE} = V_{CE}, I_C = 12\text{ mA}$ | 5.2                       | 5.8 | 6.4 | V    |
| $I_{GES}$    | Gate – Emitter Leakage Current      | $V_{GE} = 20V, V_{CE} = 0V$           |                           |     | 400 | nA   |

**Dynamic Characteristics**

| Symbol       | Characteristic               | Test Conditions  | Min                       | Typ  | Max | Unit          |
|--------------|------------------------------|--|---------------------------|------|-----|---------------|
| $C_{ies}$    | Input Capacitance            | $V_{GE} = 0V, V_{CE} = 25V$<br>$f = 1\text{MHz}$   |                           | 27   |     | nF            |
| $C_{res}$    | Reverse Transfer Capacitance |  |                           | 0.9  |     |               |
| $Q_G$        | Gate charge                  | $V_{GE} = \pm 15V, I_C = 300A$<br>$V_{CE} = 900V$  |                           | 3.5  |     | $\mu\text{C}$ |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $25^\circ\text{C}$ )<br>$V_{GE} = \pm 15V$<br>$V_{Bus} = 900V$<br>$I_C = 300A$<br>$R_G = 4.7\Omega$  |                           | 280  |     | ns            |
| $T_r$        | Rise Time                    |  |                           | 80   |     |               |
| $T_{d(off)}$ | Turn-off Delay Time          |  |                           | 850  |     |               |
| $T_f$        | Fall Time                    |  |                           | 120  |     |               |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $125^\circ\text{C}$ )<br>$V_{GE} = \pm 15V$<br>$V_{Bus} = 900V$<br>$I_C = 300A$<br>$R_G = 4.7\Omega$ |                           | 300  |     | ns            |
| $T_r$        | Rise Time                    |  |                           | 100  |     |               |
| $T_{d(off)}$ | Turn-off Delay Time          |  |                           | 1000 |     |               |
| $T_f$        | Fall Time                    |  |                           | 200  |     |               |
| $E_{on}$     | Turn On Energy               | $V_{GE} = \pm 15V$<br>$V_{Bus} = 900V$<br>$I_C = 300A$<br>$R_G = 4.7\Omega$  | $T_j = 25^\circ\text{C}$  | 71   |     | mJ            |
| $E_{off}$    | Turn Off Energy              |  | $T_j = 125^\circ\text{C}$ | 105  |     |               |
|              |                              | $T_j = 25^\circ\text{C}$   | 64                        |      |     |               |
|              |                              | $T_j = 125^\circ\text{C}$  | 94                        |      |     |               |
| $I_{sc}$     | Short Circuit data           | $V_{GE} \leq 15V; V_{Bus} = 1000V$<br>$t_p \leq 10\mu\text{s}; T_j = 125^\circ\text{C}$                                    |                           | 1200 |     | A             |

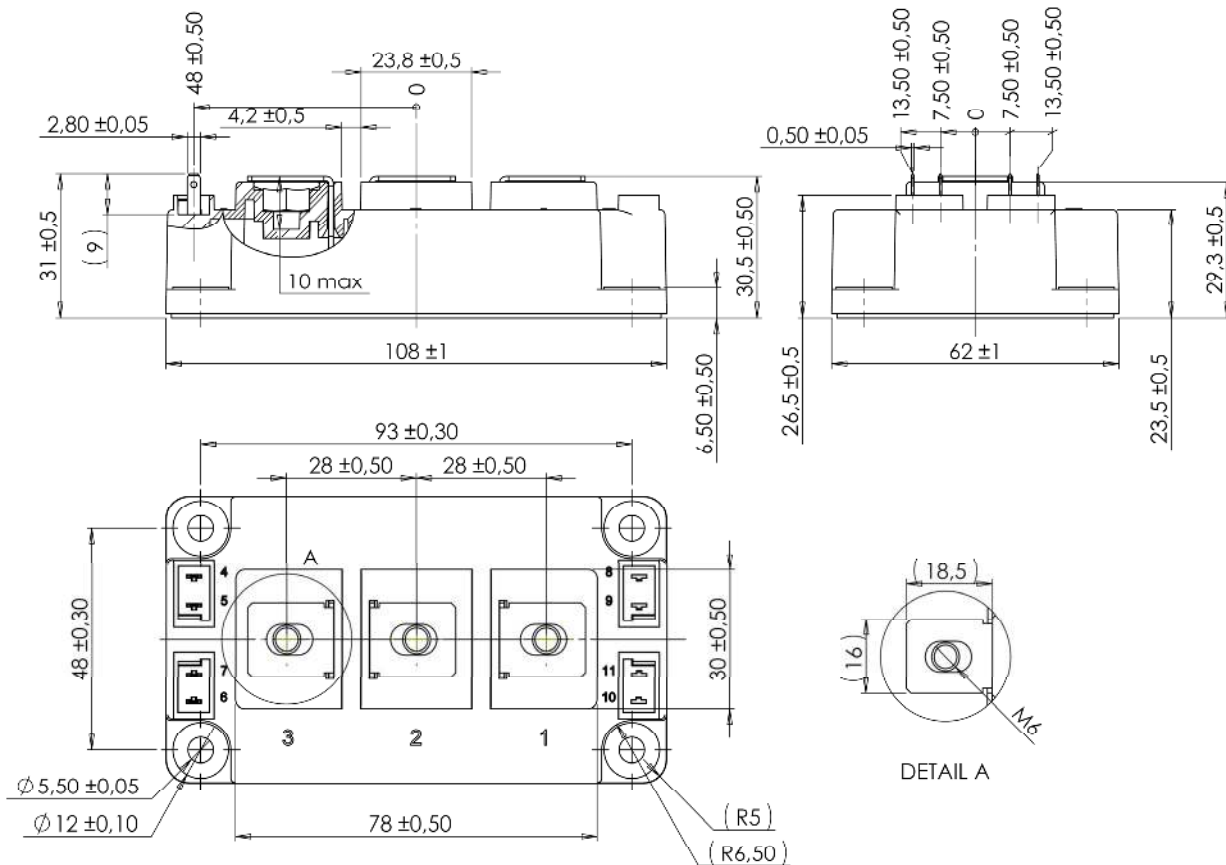
**Reverse diode ratings and characteristics**

| Symbol    | Characteristic                          | Test Conditions   | Min                       | Typ | Max  | Unit          |
|-----------|---|---|---------------------------|-----|------|---------------|
| $V_{RRM}$ | Maximum Peak Repetitive Reverse Voltage |   | 1700                      |     |      | V             |
| $I_{RRM}$ | Maximum Reverse Leakage Current         | $V_R = 1700V$   | $T_j = 25^\circ\text{C}$  |     | 750  | $\mu\text{A}$ |
|           |   |   | $T_j = 125^\circ\text{C}$ |     | 1000 |               |
| $I_F$     | DC Forward Current                      |   |                           | 300 |      | A             |
| $V_F$     | Diode Forward Voltage                   | $I_F = 300A$  | $T_j = 25^\circ\text{C}$  | 1.8 | 2.2  | V             |
|           |   |   | $T_j = 125^\circ\text{C}$ | 1.9 |      |               |
| $t_{rr}$  | Reverse Recovery Time                   | $I_F = 300A$<br>$V_R = 900V$<br>$di/dt = 3500A/\mu\text{s}$ | $T_j = 25^\circ\text{C}$  | 385 |      | ns            |
|           |   |   | $T_j = 125^\circ\text{C}$ | 490 |      |               |
| $Q_{rr}$  | Reverse Recovery Charge                 |   | $T_j = 25^\circ\text{C}$  | 76  |      | $\mu\text{C}$ |
|           |   |   | $T_j = 125^\circ\text{C}$ | 124 |      |               |
| $E_{rr}$  | Reverse Recovery Energy                 | $T_j = 25^\circ\text{C}$                                    | 35                        |     | mJ   |               |
|           |   | $T_j = 125^\circ\text{C}$                                   | 70                        |     |      |               |

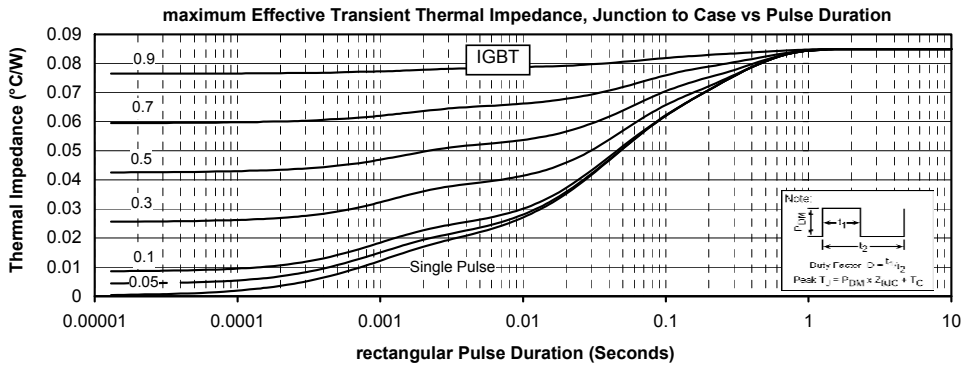
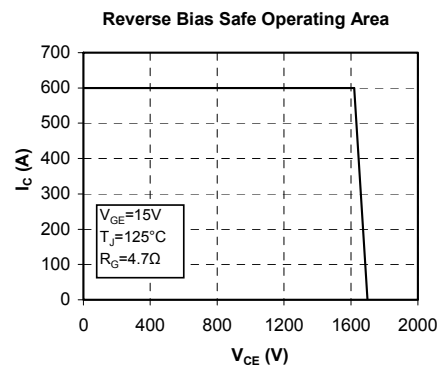
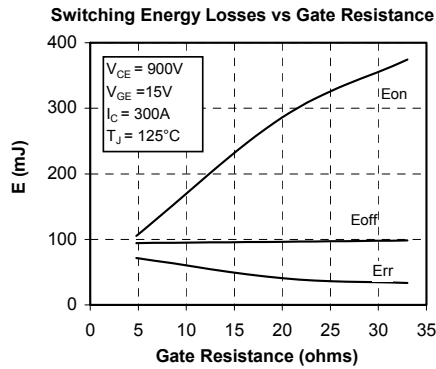
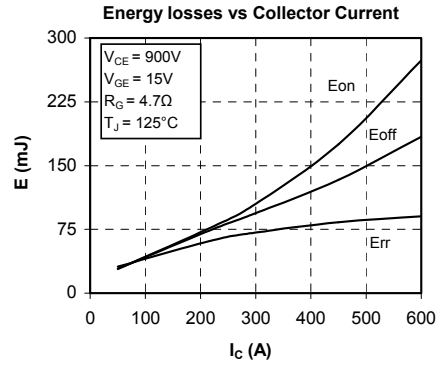
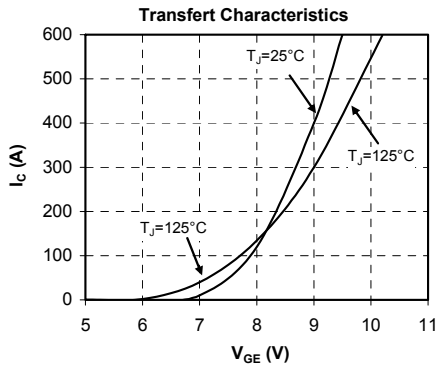
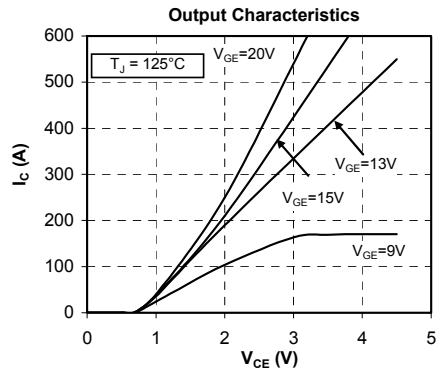
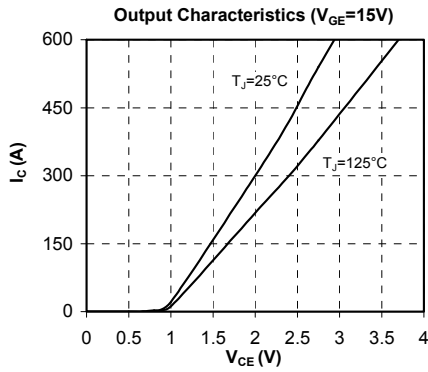
## Thermal and package characteristics

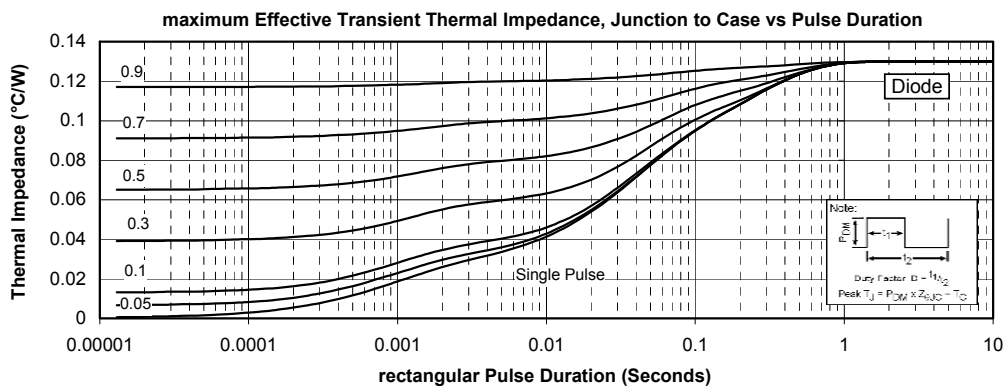
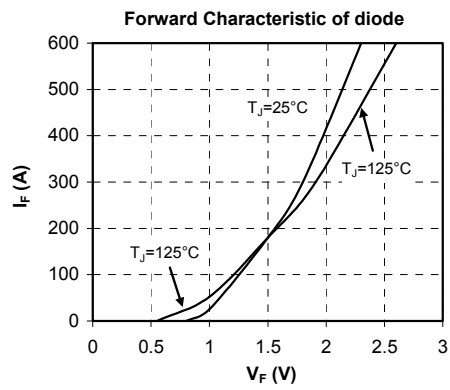
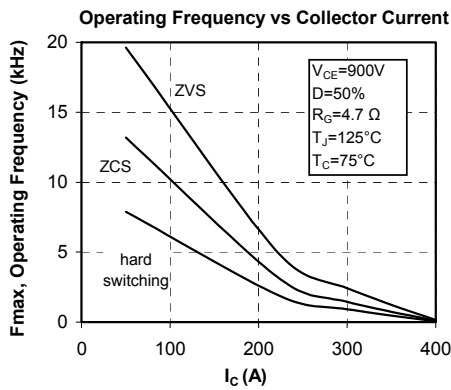
| Symbol            | Characteristic   |               | Min  | Typ | Max   | Unit |
|-------------------|--|---------------|------|-----|-------|------|
| R <sub>thJC</sub> | Junction to Case Thermal Resistance                          | IGBT          |      |     | 0.085 | °C/W |
|                   |  | Diode         |      |     | 0.13  |      |
| V <sub>ISOL</sub> | RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz |               | 4000 |     |       | V    |
| T <sub>J</sub>    | Operating junction temperature range                         |               | -40  |     | 150   | °C   |
| T <sub>STG</sub>  | Storage Temperature Range                                    |               | -40  |     | 125   |      |
| T <sub>C</sub>    | Operating Case Temperature                                   |               | -40  |     | 125   |      |
| Torque            | Mounting torque  | For terminals | M6   | 3   | 5     | N.m  |
|                   |  | To Heatsink   | M6   | 3   | 5     |      |
| Wt                | Package Weight   |               |      |     | 350   | g    |

### D3 Package outline (dimensions in mm)



## Typical Performance Curve





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