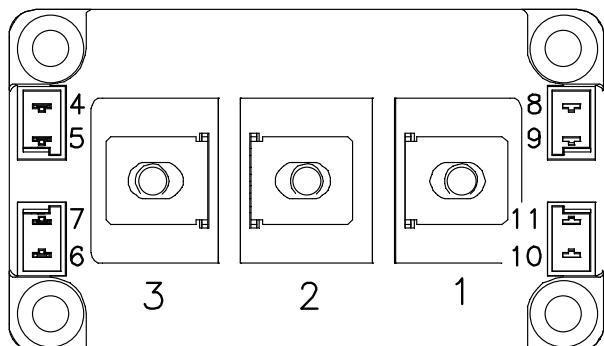
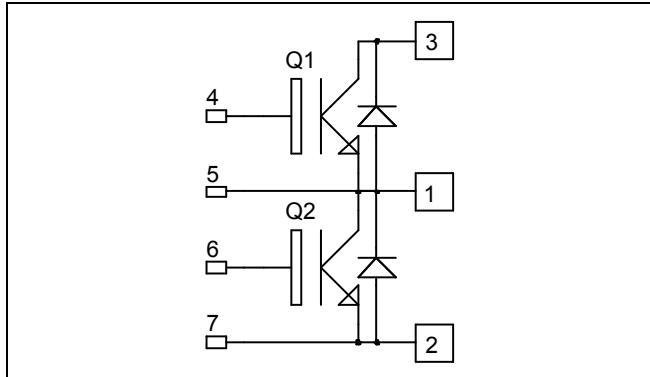


**Phase leg**  
**Trench + Field Stop IGBT4**  
**Power Module**

**$V_{CES} = 1200V$**   
 **$I_C = 325A @ T_c = 80^\circ C$**



**Absolute maximum ratings**

| Symbol    | Parameter                             | Max ratings         | Unit         |
|-----------|---------------------------------------|---------------------|--------------|
| $V_{CES}$ | Collector - Emitter Breakdown Voltage | 1200                | V            |
| $I_C$     | Continuous Collector Current          | $T_c = 25^\circ C$  | A            |
|           |                                       | $T_c = 80^\circ C$  |              |
| $I_{CM}$  | Pulsed Collector Current              | $T_c = 25^\circ C$  |              |
| $V_{GE}$  | Gate – Emitter Voltage                | $\pm 20$            | V            |
| $P_D$     | Maximum Power Dissipation             | $T_c = 25^\circ C$  | W            |
| RBSOA     | Reverse Bias Safe Operating Area      | $T_j = 125^\circ C$ | 600A @ 1100V |

 **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)

**Application**

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

**Features**

- Trench + Field Stop IGBT 4 Technology
  - Low voltage drop
  - Low leakage current
  - Low switching losses
  - Soft recovery parallel diodes
  - Low diode VF
  - 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

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  | $V_{GE} = 0\text{V}$ , $V_{CE} = 1200\text{V}$ |                           |     |     | 5   | mA   |
| $V_{CE(\text{sat})}$ | Collector Emitter saturation Voltage | $V_{GE} = 15\text{V}$                          | $T_j = 25^\circ\text{C}$  |     | 1.8 | 2.2 | V    |
|                      |                                      | $I_C = 300\text{A}$                            | $T_j = 125^\circ\text{C}$ |     | 2.2 |     |      |
| $V_{GE(\text{th})}$  | Gate Threshold Voltage               | $V_{GE} = V_{CE}$ , $I_C = 11\text{mA}$        |                           | 5.0 | 5.8 | 6.5 | V    |
| $I_{GES}$            | Gate – Emitter Leakage Current       | $V_{GE} = 20\text{V}$ , $V_{CE} = 0\text{V}$   |                           |     |     | 400 | nA   |

**Dynamic Characteristics**

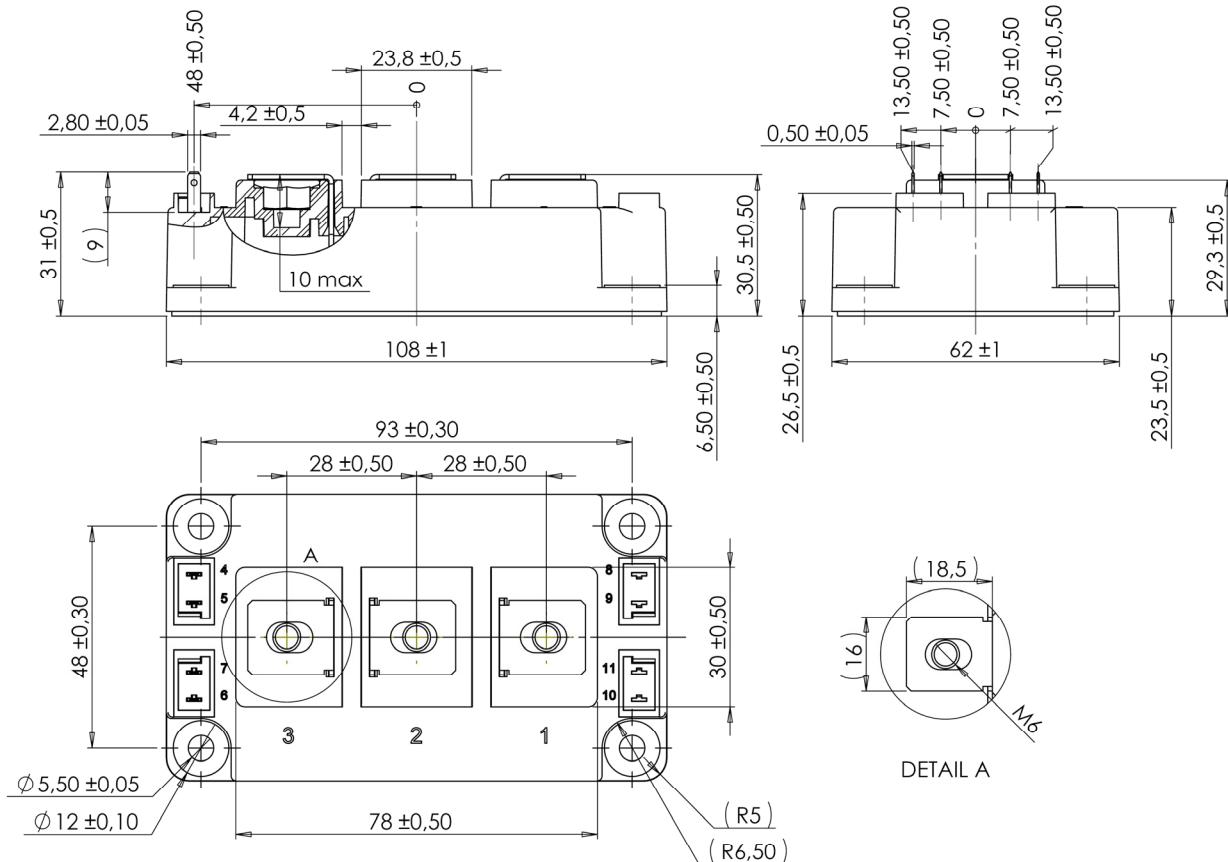
| Symbol       | Characteristic               | Test Conditions  |                           | Min | Typ  | Max | Unit          |
|--------------|------------------------------|--|---------------------------|-----|------|-----|---------------|
| $C_{ies}$    | Input Capacitance            | $V_{GE} = 0\text{V}$<br>$V_{CE} = 25\text{V}$<br>$f = 1\text{MHz}$   |                           |     | 18.6 |     | nF            |
| $C_{oes}$    | Output Capacitance           |  |                           |     | 1.16 |     |               |
| $C_{res}$    | Reverse Transfer Capacitance |  |                           |     | 1    |     |               |
| $Q_G$        | Gate charge                  | $V_{GE} = -8\text{V} / 15\text{V}$ ; $V_{CE} = 600\text{V}$  | $I_C = 300\text{A}$       |     | 1.7  |     | $\mu\text{C}$ |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $25^\circ\text{C}$ )<br>$V_{GE} = \pm 15\text{V}$<br>$V_{CE} = 600\text{V}$<br>$I_C = 300\text{A}$<br>$R_G = 1.5\Omega$  |                           |     | 200  |     | ns            |
| $T_r$        | Rise Time                    |  |                           |     | 40   |     |               |
| $T_{d(off)}$ | Turn-off Delay Time          |  |                           |     | 380  |     |               |
| $T_f$        | Fall Time                    |  |                           |     | 70   |     |               |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $150^\circ\text{C}$ )<br>$V_{GE} = \pm 15\text{V}$<br>$V_{CE} = 600\text{V}$<br>$I_C = 300\text{A}$<br>$R_G = 1.5\Omega$ |                           |     | 220  |     | ns            |
| $T_r$        | Rise Time                    |  |                           |     | 50   |     |               |
| $T_{d(off)}$ | Turn-off Delay Time          |  |                           |     | 450  |     |               |
| $T_f$        | Fall Time                    |  |                           |     | 80   |     |               |
| $E_{on}$     | Turn-on Switching Energy     | $V_{GE} = \pm 15\text{V}$<br>$V_{CE} = 600\text{V}$<br>$I_C = 300\text{A}$<br>$R_G = 1.5\Omega$  | $T_j = 150^\circ\text{C}$ |     | 27   |     | $\text{mJ}$   |
| $E_{off}$    | Turn-off Switching Energy    |  | $T_j = 150^\circ\text{C}$ |     | 29   |     | $\text{mJ}$   |
| $I_{sc}$     | Short Circuit data           | $V_{GE} \leq 15\text{V}$ ; $V_{Bus} = 900\text{V}$<br>$t_p \leq 10\mu\text{s}$ ; $T_j = 150^\circ\text{C}$                                     |                           |     | 1200 |     | A             |

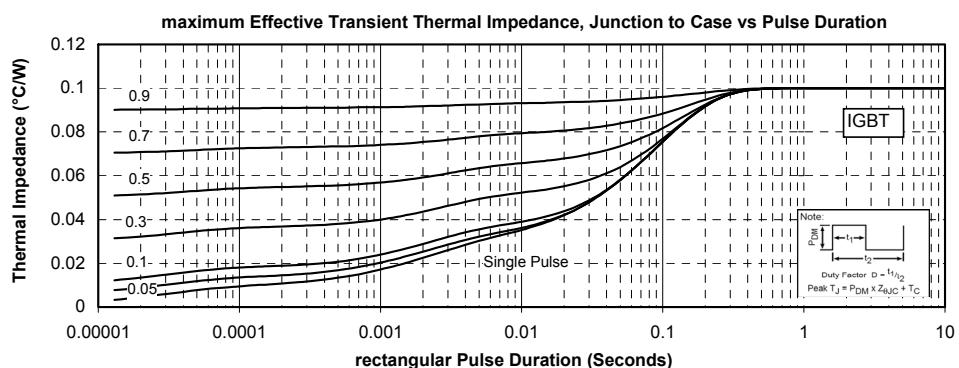
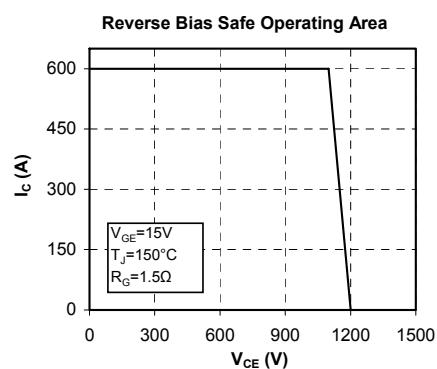
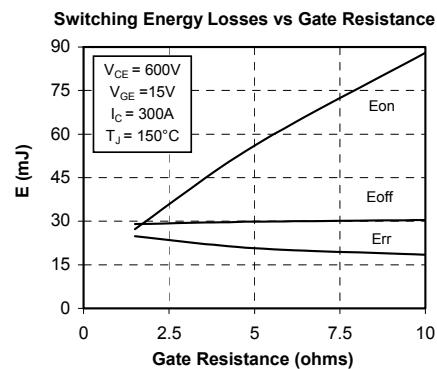
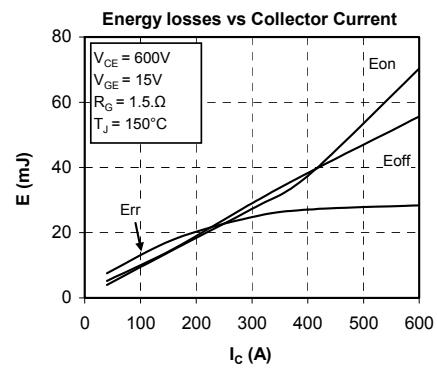
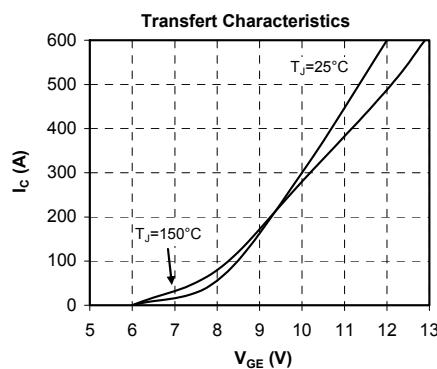
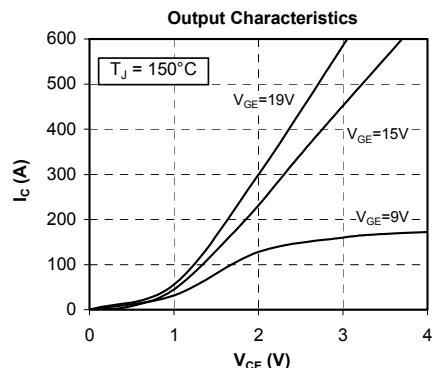
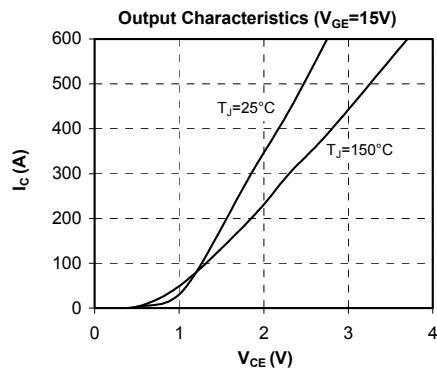
**Diode ratings and characteristics**

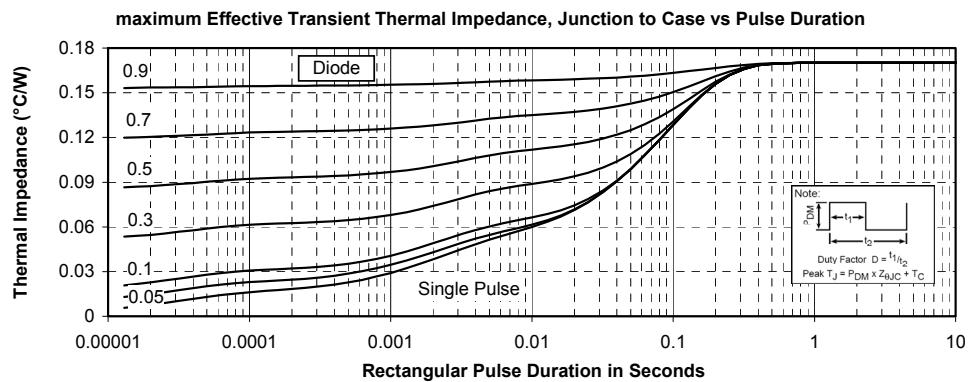
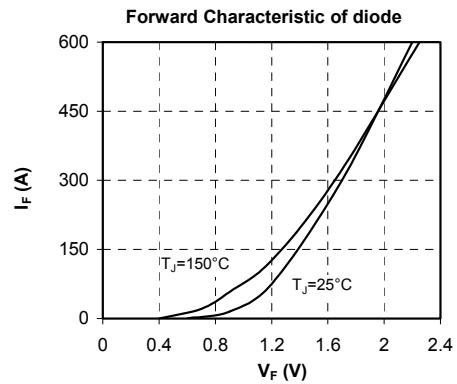
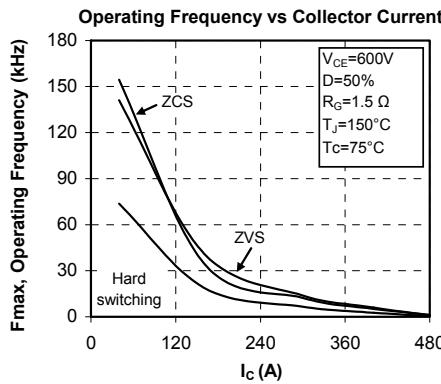
| Symbol    | Characteristic                     | Test Conditions  |                           | Min  | Typ  | Max  | Unit          |  |
|-----------|------------------------------------|--|---------------------------|------|------|------|---------------|--|
| $V_{RRM}$ | Maximum Repetitive Reverse Voltage | $V_R = 1200\text{V}$   |                           | 1200 |      |      | V             |  |
| $I_{RRM}$ | Maximum Reverse Leakage Current    |  | $T_j = 25^\circ\text{C}$  |      |      | 250  | $\mu\text{A}$ |  |
|           |                                    |  | $T_j = 150^\circ\text{C}$ |      |      | 2000 |               |  |
| $I_F$     | DC Forward Current                 |  | $T_C = 80^\circ\text{C}$  |      | 300  |      | A             |  |
| $V_F$     | Diode Forward Voltage              | $I_F = 300\text{A}$<br>$V_{GE} = 0\text{V}$                                      | $T_j = 25^\circ\text{C}$  |      | 1.7  | 2.2  | V             |  |
|           |                                    |  | $T_j = 150^\circ\text{C}$ |      | 1.65 |      |               |  |
| $t_{rr}$  | Reverse Recovery Time              | $I_F = 300\text{A}$<br>$V_R = 600\text{V}$<br>$di/dt = 7000\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$  |      | 155  |      | ns            |  |
|           |                                    |  | $T_j = 150^\circ\text{C}$ |      | 300  |      |               |  |
| $Q_{rr}$  | Reverse Recovery Charge            |  | $T_j = 25^\circ\text{C}$  |      | 29   |      | $\mu\text{C}$ |  |
|           |                                    |  | $T_j = 150^\circ\text{C}$ |      | 61   |      |               |  |
| $E_{rr}$  | Reverse Recovery Energy            |  | $T_j = 25^\circ\text{C}$  |      | 13   |      | $\text{mJ}$   |  |
|           |                                    |  | $T_j = 150^\circ\text{C}$ |      | 24   |      |               |  |

**Thermal and package characteristics**

| Symbol     | Characteristic   |               | Min  | Typ | Max  | Unit                        |
|------------|--|---------------|------|-----|------|-----------------------------|
| $R_{thJC}$ | Junction to Case Thermal Resistance                          | IGBT          |      |     | 0.10 | $^{\circ}\text{C}/\text{W}$ |
|            |  | Diode         |      |     | 0.17 |                             |
| $V_{ISOL}$ | RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz |               | 4000 |     |      | V                           |
| $T_J$      | Operating junction temperature range                         |               | -40  |     | 175  | $^{\circ}\text{C}$          |
| $T_{STG}$  | Storage Temperature Range                                    |               | -40  |     | 125  |                             |
| $T_C$      | 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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