

**Asymmetrical - Bridge  
Trench + Field Stop IGBT®  
Power Module**

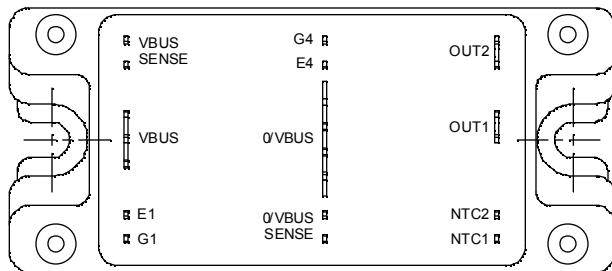
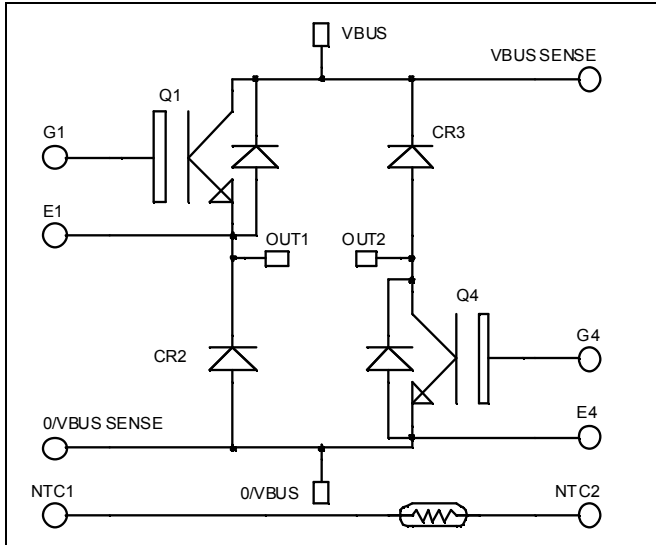
**$V_{CES} = 600V$   
 $I_C = 75A @ T_c = 80^\circ C$**

### Application

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

### Features

- Trench + Field Stop IGBT® Technology
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 20 kHz
  - Soft recovery parallel diodes
  - Low diode VF
  - Low leakage current
  - Avalanche energy rated
  - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- Very low stray inductance
  - Symmetrical design
  - Lead frames for power connections
- Internal thermistor for temperature monitoring
- High level of integration



### Benefits

- Stable temperature behavior
- Very rugged
- Solderable terminals for easy PCB mounting
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive TC of VCEsat
- Low profile
- RoHS Compliant

### Absolute maximum ratings

| Symbol    | Parameter                             | Max ratings         | Unit        |
|-----------|---------------------------------------|---------------------|-------------|
| $V_{CES}$ | Collector - Emitter Breakdown Voltage | 600                 | V           |
| $I_C$     | Continuous Collector Current          | $T_c = 25^\circ C$  | 100         |
|           |                                       | $T_c = 80^\circ C$  | 75          |
| $I_{CM}$  | Pulsed Collector Current              | $T_c = 25^\circ C$  | 140         |
| $V_{GE}$  | Gate - Emitter Voltage                | $\pm 20$            | V           |
| $P_D$     | Maximum Power Dissipation             | $T_c = 25^\circ C$  | 250         |
| RBSOA     | Reverse Bias Safe Operating Area      | $T_J = 150^\circ C$ | 150A @ 550V |

**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  | $V_{GE} = 0\text{V}, V_{CE} = 600\text{V}$  |                           |     | 250 | $\mu\text{A}$ |
| $V_{CE(sat)}$ | Collector Emitter Saturation Voltage | $V_{GE} = 15\text{V}$<br>$I_C = 75\text{A}$ | $T_j = 25^\circ\text{C}$  | 1.5 | 1.9 | V             |
|               |                                      |   | $T_j = 150^\circ\text{C}$ | 1.7 |     |               |
| $V_{GE(th)}$  | Gate Threshold Voltage               | $V_{GE} = V_{CE}, I_C = 600\mu\text{A}$     | 5.0                       | 5.8 | 6.5 | V             |
| $I_{GES}$     | Gate – Emitter Leakage Current       | $V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$   |                           |     | 600 | nA            |

**Dynamic Characteristics**

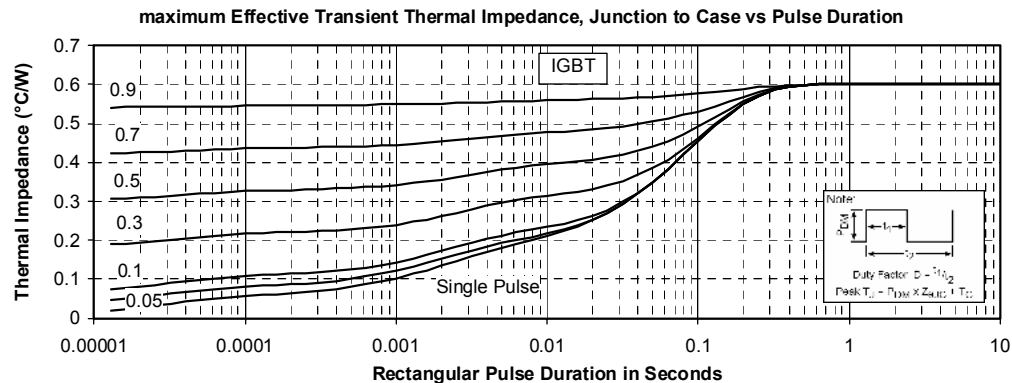
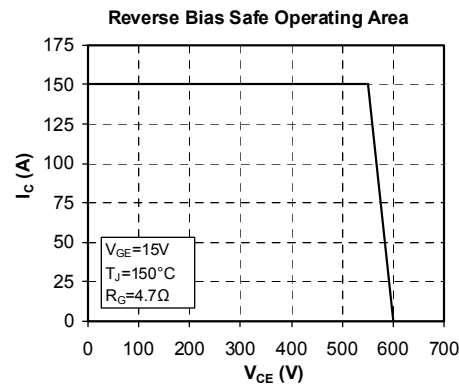
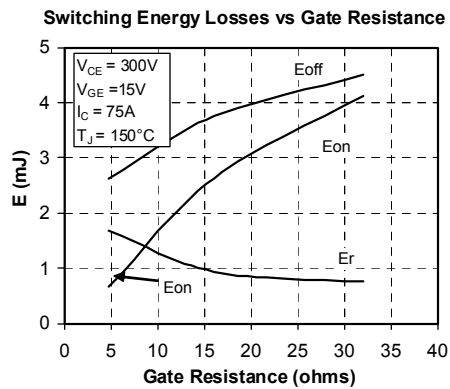
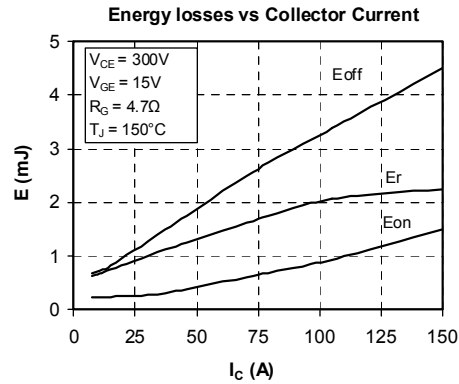
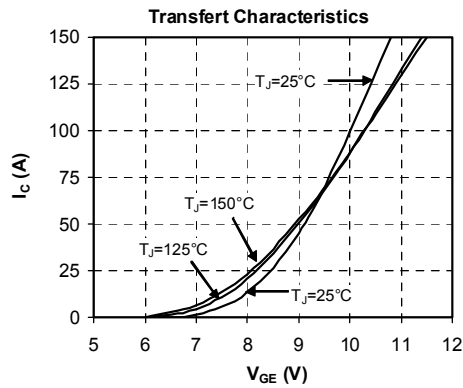
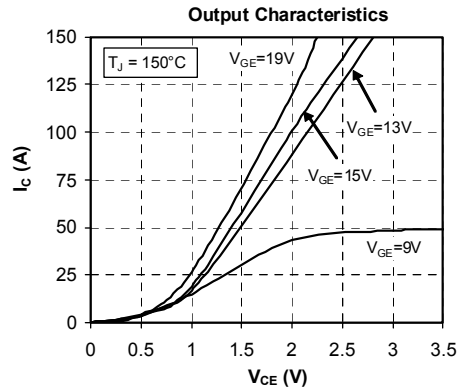
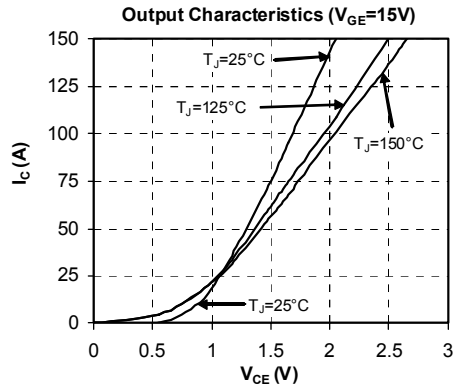
| Symbol       | Characteristic               | Test Conditions                                      | Min                       | Typ  | Max | Unit |
|--------------|------------------------------|--|---------------------------|------|-----|------|
| $C_{ies}$    | Input Capacitance            | $V_{GE} = 0\text{V}$                                 |                           | 4620 |     | pF   |
| $C_{oes}$    | Output Capacitance           | $V_{CE} = 25\text{V}$                                |                           | 300  |     |      |
| $C_{res}$    | Reverse Transfer Capacitance | $f = 1\text{MHz}$                                    |                           | 140  |     |      |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $25^\circ\text{C}$ )           |                           | 110  |     | ns   |
| $T_r$        | Rise Time                    | $V_{GE} = \pm 15\text{V}$                            |                           | 45   |     |      |
| $T_{d(off)}$ | Turn-off Delay Time          | $V_{Bus} = 300\text{V}$                              |                           | 200  |     |      |
| $T_f$        | Fall Time                    | $I_C = 75\text{A}$<br>$R_G = 4.7\Omega$              |                           | 40   |     |      |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $150^\circ\text{C}$ )          |                           | 120  |     | ns   |
| $T_r$        | Rise Time                    | $V_{GE} = \pm 15\text{V}$                            |                           | 50   |     |      |
| $T_{d(off)}$ | Turn-off Delay Time          | $V_{Bus} = 300\text{V}$                              |                           | 250  |     |      |
| $T_f$        | Fall Time                    | $I_C = 75\text{A}$<br>$R_G = 4.7\Omega$              |                           | 60   |     |      |
| $E_{on}$     | Turn-on Switching Energy     | $V_{GE} = \pm 15\text{V}$<br>$V_{Bus} = 300\text{V}$ | $T_j = 25^\circ\text{C}$  | 0.35 |     | mJ   |
|              |                              | $I_C = 75\text{A}$                                   | $T_j = 150^\circ\text{C}$ | 0.6  |     |      |
| $E_{off}$    | Turn-off Switching Energy    | $R_G = 4.7\Omega$                                    | $T_j = 25^\circ\text{C}$  | 2.2  |     | mJ   |
|              |                              |  | $T_j = 150^\circ\text{C}$ | 2.6  |     |      |

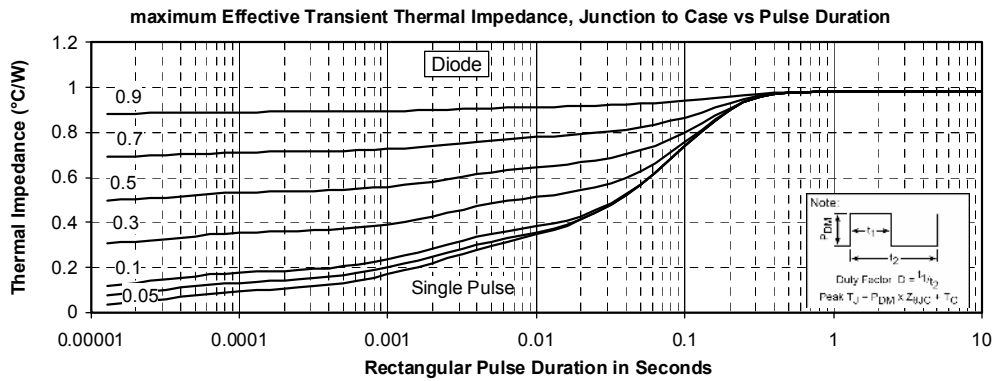
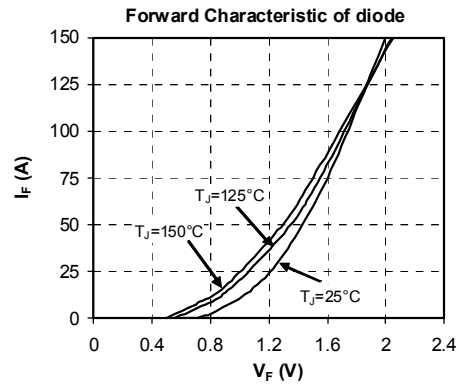
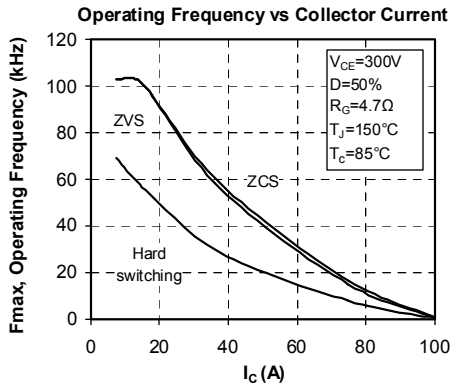
**Diode ratings and characteristics**

| Symbol    | Characteristic                          | Test Conditions   | Min                       | Typ  | Max | Unit          |
|-----------|---|---|---------------------------|------|-----|---------------|
| $V_{RRM}$ | Maximum Peak Repetitive Reverse Voltage |   | 600                       |      |     | V             |
| $I_{RM}$  | Maximum Reverse Leakage Current         | $V_R = 600\text{V}$   | $T_j = 25^\circ\text{C}$  |      | 250 | $\mu\text{A}$ |
|           |   |   | $T_j = 150^\circ\text{C}$ |      | 500 |               |
| $I_F$     | DC Forward current                      |   | $T_c = 80^\circ\text{C}$  | 75   |     | A             |
| $V_F$     | Diode Forward Voltage                   | $I_F = 75\text{A}$<br>$V_{GE} = 0\text{V}$                                      | $T_j = 25^\circ\text{C}$  | 1.6  | 2   | V             |
|           |   |   | $T_j = 150^\circ\text{C}$ | 1.5  |     |               |
| $t_{rr}$  | Reverse Recovery Time                   | $I_F = 75\text{A}$<br>$V_R = 300\text{V}$<br>$di/dt = 2000\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$  | 100  |     | ns            |
|           |   |   | $T_j = 150^\circ\text{C}$ | 150  |     |               |
| $Q_{rr}$  | Reverse Recovery Charge                 |   | $T_j = 25^\circ\text{C}$  | 3.6  |     | $\mu\text{C}$ |
|           |   |   | $T_j = 150^\circ\text{C}$ | 7.6  |     |               |
| $E_r$     | Reverse Recovery Energy                 |   | $T_j = 25^\circ\text{C}$  | 0.85 |     | mJ            |
|           |   |   | $T_j = 150^\circ\text{C}$ | 1.8  |     |               |



## Typical Performance Curve





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