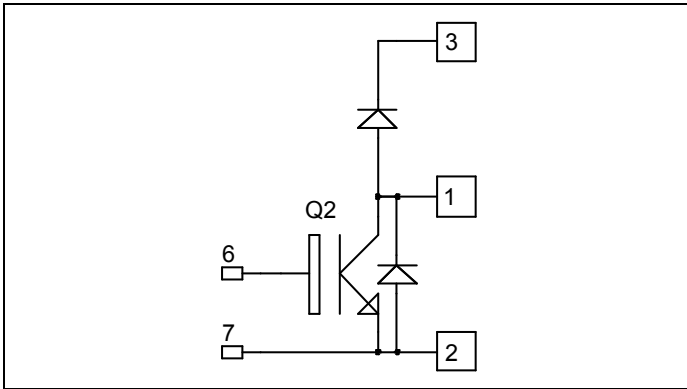


**Boost chopper  
Trench + Field Stop IGBT  
Power Module**

**$V_{CES} = 1200V$   
 $I_C = 150A @ T_c = 80^\circ C$**

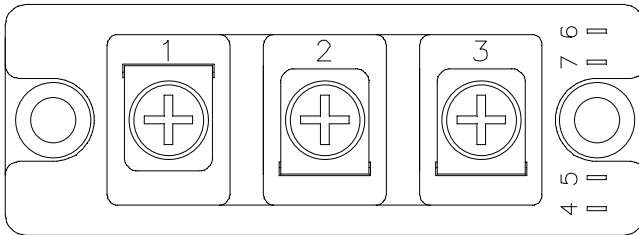


### Application

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction

### 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
  - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- High level of integration
- M5 power connectors



### Benefits

- Outstanding performance at high frequency operation
- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive TC of VCEsat
- RoHS Compliant

### Absolute maximum ratings

| Symbol    | Parameter                             | Max ratings         | Unit         |
|-----------|---------------------------------------|---------------------|--------------|
| $V_{CES}$ | Collector - Emitter Breakdown Voltage | 1200                | V            |
| $I_C$     | Continuous Collector Current          | $T_C = 25^\circ C$  | 220          |
|           |                                       | $T_C = 80^\circ C$  | 150          |
| $I_{CM}$  | Pulsed Collector Current              | $T_C = 25^\circ C$  | 300          |
| $V_{GE}$  | Gate - Emitter Voltage                | $\pm 20$            | V            |
| $P_D$     | Maximum Power Dissipation             | $T_C = 25^\circ C$  | 690          |
| RBSOA     | Reverse Bias Safe Operating Area      | $T_j = 125^\circ C$ | 300A @ 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)

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  | $V_{GE} = 0\text{V}, V_{CE} = 1200\text{V}$  |                           |     | 250 | $\mu\text{A}$ |
| $V_{CE(sat)}$ | Collector Emitter Saturation Voltage | $V_{GE} = 15\text{V}$<br>$I_C = 150\text{A}$ | $T_j = 25^\circ\text{C}$  | 1.7 | 2.1 | V             |
|               |                                      |  | $T_j = 125^\circ\text{C}$ | 2.0 |     |               |
| $V_{GE(th)}$  | Gate Threshold Voltage               | $V_{GE} = V_{CE}, I_C = 6\text{mA}$          | 5.0                       | 5.8 | 6.5 | V             |
| $I_{GES}$     | Gate – Emitter Leakage Current       | $V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$    |                           |     | 600 | nA            |

## Dynamic Characteristics

| Symbol       | Characteristic               | Test Conditions  | Min                       | Typ  | Max | Unit          |
|--------------|------------------------------|--|---------------------------|------|-----|---------------|
| $C_{ies}$    | Input Capacitance            | $V_{GE} = 0\text{V}$   |                           | 10.8 |     | nF            |
| $C_{oes}$    | Output Capacitance           | $V_{CE} = 25\text{V}$  |                           | 0.56 |     |               |
| $C_{res}$    | Reverse Transfer Capacitance | $f = 1\text{MHz}$  |                           | 0.5  |     |               |
| $Q_G$        | Gate charge                  | $V_{GE} = \pm 15\text{V}, I_C = 150\text{A}$<br>$V_{CE} = 600\text{V}$                               |                           | 1.4  |     | $\mu\text{C}$ |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $25^\circ\text{C}$ )   |                           | 250  |     | ns            |
| $T_r$        | Rise Time                    | $V_{GE} = \pm 15\text{V}$  |                           | 90   |     |               |
| $T_{d(off)}$ | Turn-off Delay Time          | $V_{Bus} = 600\text{V}$<br>$I_C = 150\text{A}$   |                           | 550  |     |               |
| $T_f$        | Fall Time                    | $R_G = 4.7\Omega$  |                           | 130  |     |               |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $125^\circ\text{C}$ )  |                           | 300  |     | ns            |
| $T_r$        | Rise Time                    | $V_{GE} = \pm 15\text{V}$  |                           | 100  |     |               |
| $T_{d(off)}$ | Turn-off Delay Time          | $V_{Bus} = 600\text{V}$<br>$I_C = 150\text{A}$   |                           | 650  |     |               |
| $T_f$        | Fall Time                    | $R_G = 4.7\Omega$  |                           | 180  |     |               |
| $E_{on}$     | Turn on Energy               | $V_{GE} = \pm 15\text{V}$<br>$V_{Bus} = 600\text{V}$   | $T_j = 125^\circ\text{C}$ | 11   |     | mJ            |
| $E_{off}$    | Turn off Energy              | $I_C = 150\text{A}$<br>$R_G = 4.7\Omega$   | $T_j = 125^\circ\text{C}$ | 26   |     |               |
| $I_{sc}$     | Short Circuit data           | $V_{GE} \leq 15\text{V}; V_{Bus} = 900\text{V}$<br>$t_p \leq 10\mu\text{s}; T_j = 125^\circ\text{C}$ |                           | 600  |     | A             |

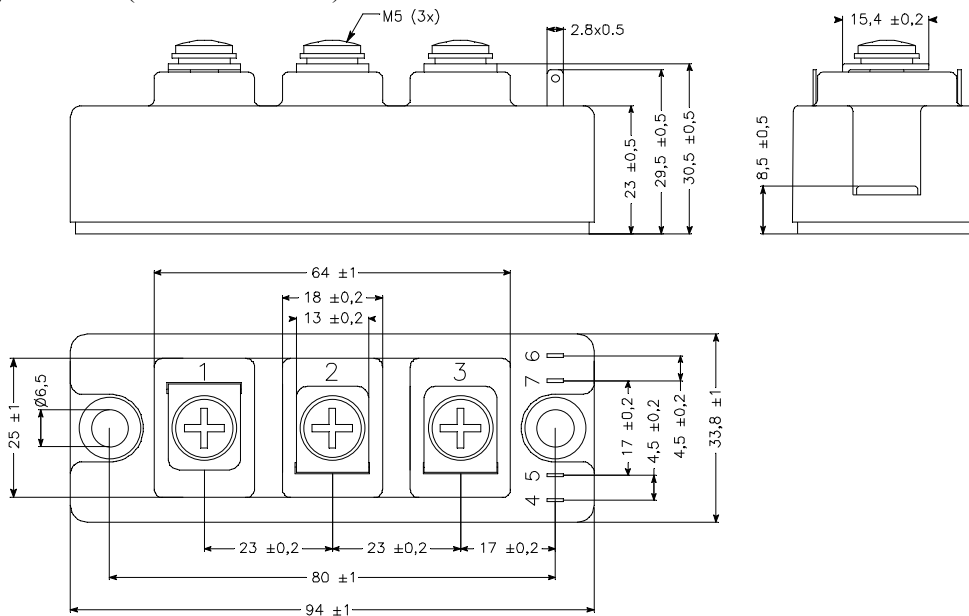
## Chopper diode ratings and characteristics

| Symbol    | Characteristic                          | Test Conditions  | Min                       | Typ | Max | Unit          |
|-----------|---|--|---------------------------|-----|-----|---------------|
| $V_{RRM}$ | Maximum Peak Repetitive Reverse Voltage |  | 1200                      |     |     | V             |
| $I_{RM}$  | Maximum Reverse Leakage Current         | $V_R = 1200\text{V}$   | $T_j = 25^\circ\text{C}$  |     | 250 | $\mu\text{A}$ |
|           |   |  | $T_j = 125^\circ\text{C}$ |     | 500 |               |
| $I_F$     | DC Forward current                      |  | $T_c = 80^\circ\text{C}$  | 150 |     | A             |
| $V_F$     | Diode Forward Voltage                   | $I_F = 150\text{A}$<br>$V_{GE} = 0\text{V}$                                      | $T_j = 25^\circ\text{C}$  | 1.6 | 2.1 | V             |
|           |   |  | $T_j = 125^\circ\text{C}$ | 1.6 |     |               |
| $t_{rr}$  | Reverse Recovery Time                   | $I_F = 150\text{A}$<br>$V_R = 600\text{V}$<br>$di/dt = 3000\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$  | 250 |     | ns            |
|           |   |  | $T_j = 125^\circ\text{C}$ | 350 |     |               |
| $Q_{rr}$  | Reverse Recovery Charge                 |  | $T_j = 25^\circ\text{C}$  | 15  |     | $\mu\text{C}$ |
|           |   |  | $T_j = 125^\circ\text{C}$ | 29  |     |               |
| $E_{rr}$  | Reverse Recovery Energy                 |  | $T_j = 25^\circ\text{C}$  | 7   |     | mJ            |
|           |   |  | $T_j = 125^\circ\text{C}$ | 12  |     |               |

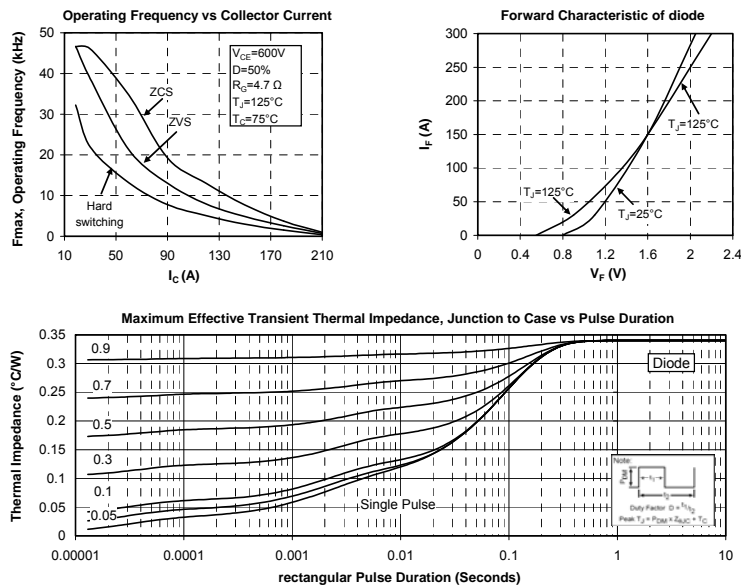
## Thermal and package characteristics

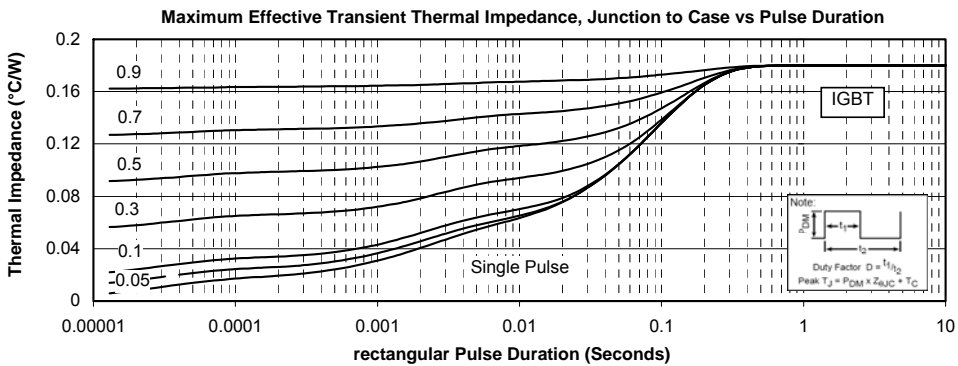
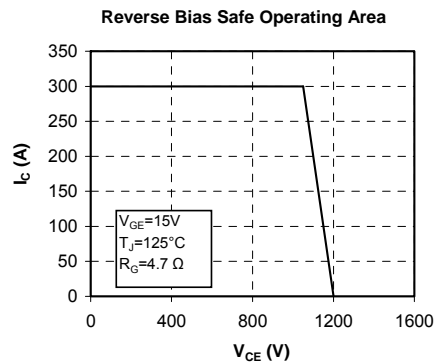
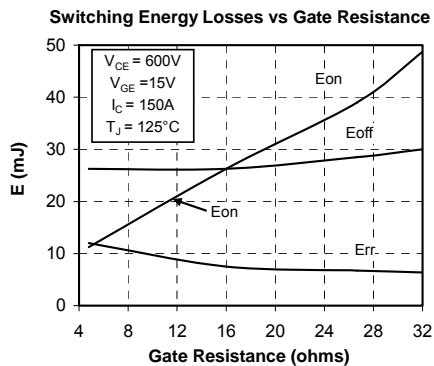
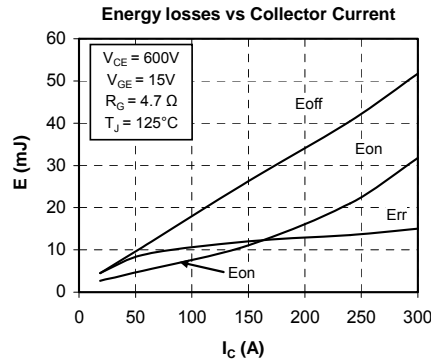
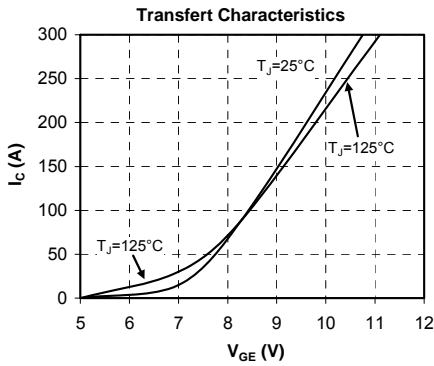
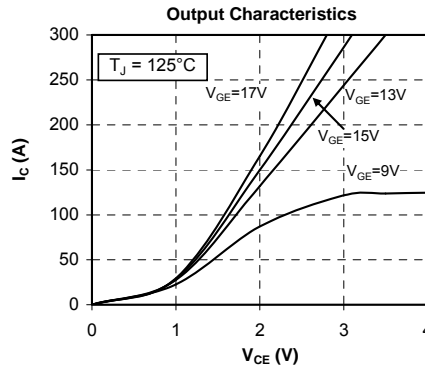
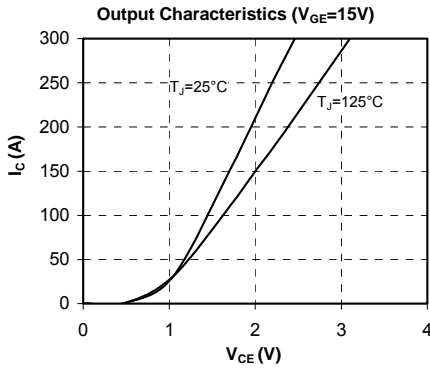
| Symbol     | Characteristic  | Min           | Typ | Max  | Unit |     |
|------------|---|---------------|-----|------|------|-----|
| $R_{thJC}$ | Junction to Case Thermal Resistance   | IGBT          |     | 0.18 | °C/W |     |
|            |   | Diode         |     | 0.34 |      |     |
| $V_{ISOL}$ | RMS Isolation Voltage, any terminal to case $t=1$ min, $I_{isol}<1$ mA, 50/60Hz | 4000          |     |      | V    |     |
| $T_J$      | Operating junction temperature range  | -40           |     | 150  | °C   |     |
| $T_{STG}$  | Storage Temperature Range   | -40           |     | 125  |      |     |
| $T_C$      | Operating Case Temperature  | -40           |     | 125  |      |     |
| Torque     | Mounting torque   | For terminals | M5  | 2    | 3.5  | N.m |
|            |   | To Heatsink   | M6  | 3    | 5    |     |
| Wt         | Package Weight  |               |     | 180  | g    |     |

### D1 Package outline (dimensions in mm)



### Typical Performance Curve





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