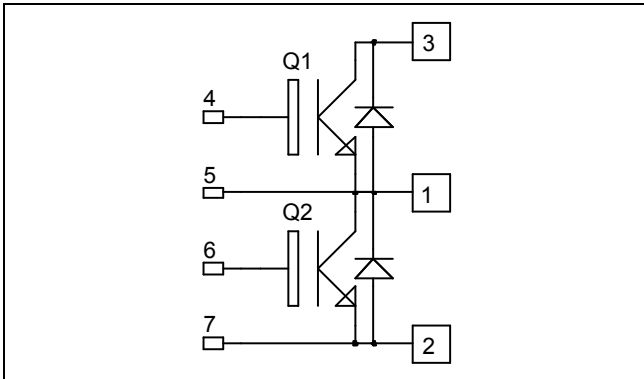


*Phase leg
Trench + Field Stop IGBT4
Power Module*

**$V_{CES} = 1200V$
 $I_C = 475A @ T_c = 80^\circ C$**



Application

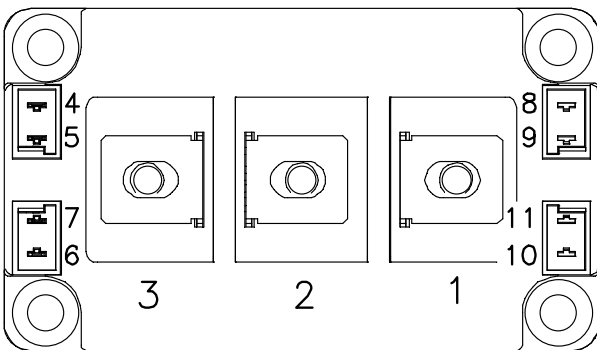
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

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



Absolute maximum ratings

| Symbol | Parameter | Max ratings | Unit |
|-----------|---------------------------------------|---------------------|--------------|
| V_{CES} | Collector - Emitter Breakdown Voltage | 1200 | V |
| I_C | Continuous Collector Current | $T_C = 25^\circ C$ | 610 |
| | | $T_C = 80^\circ C$ | 475 |
| I_{CM} | Pulsed Collector Current | $T_C = 25^\circ C$ | 900 |
| V_{GE} | Gate - Emitter Voltage | ± 20 | V |
| P_D | Maximum Power Dissipation | $T_C = 25^\circ C$ | 2080 |
| RBSOA | Reverse Bias Safe Operating Area | $T_j = 125^\circ C$ | 800A @ 1100V |

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on 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 | $V_{GE} = 0V, V_{CE} = 1200V$ | | | 5 | mA |
| $V_{CE(sat)}$ | Collector Emitter saturation Voltage | $V_{GE} = 15V$ $I_C = 400A$ | | 1.8 2.2 | 2.2 | V |
| | | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | | | | |
| $V_{GE(th)}$ | Gate Threshold Voltage | $V_{GE} = V_{CE}, I_C = 15mA$ | 5.0 | 5.8 | 6.5 | V |
| I_{GES} | Gate – Emitter Leakage Current | $V_{GE} = 20V, V_{CE} = 0V$ | | | 400 | nA |

Dynamic Characteristics

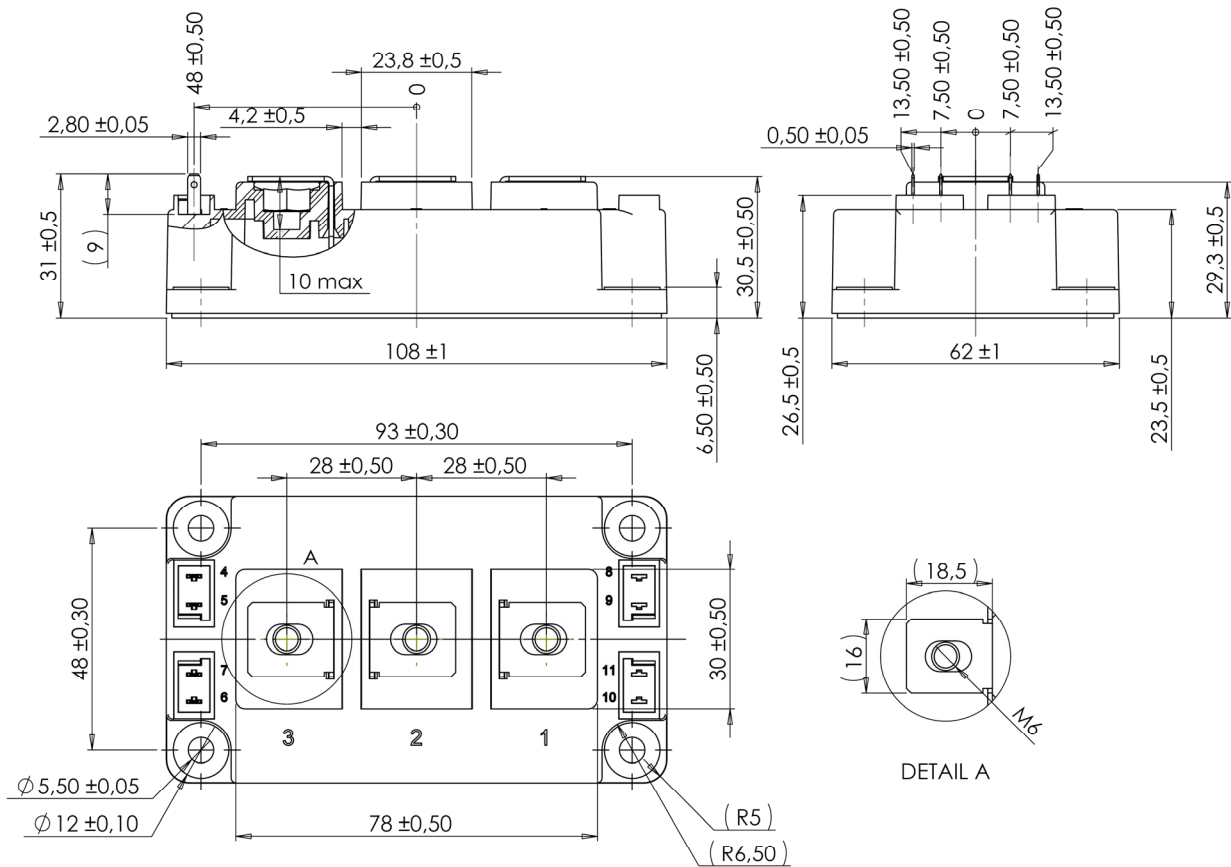
| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|------------------------------|---|---------------------------|------|-----|---------------|
| C_{ies} | Input Capacitance | $V_{GE} = 0V$ | | 24.6 | | nF |
| C_{oes} | Output Capacitance | $V_{CE} = 25V$ | | 1.62 | | |
| C_{res} | Reverse Transfer Capacitance | $f = 1MHz$ | | 1.38 | | |
| Q_G | Gate charge | $V_{GE} = -8V / 15V ; V_{CE} = 600V$ $I_C = 400A$ | | 2.3 | | μC |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (25°C) $V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 400A$ $R_G = 1\Omega$ | | 200 | | ns |
| T_r | Rise Time | | | 40 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 400 | | |
| T_f | Fall Time | | | 70 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (150°C) $V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 400A$ $R_G = 1\Omega$ | | 220 | | ns |
| T_r | Rise Time | | | 50 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 500 | | |
| T_f | Fall Time | | | 80 | | |
| E_{on} | Turn-on Switching Energy | $V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 400A$ | $T_j = 150^\circ\text{C}$ | 33 | | mJ |
| E_{off} | Turn-off Switching Energy | $R_G = 1\Omega$ | $T_j = 150^\circ\text{C}$ | 42 | | mJ |
| I_{sc} | Short Circuit data | $V_{GE} \leq 15V ; V_{Bus} = 900V$ $t_p \leq 10\mu\text{s} ; T_j = 150^\circ\text{C}$ | | 1600 | | A |

Diode ratings and characteristics

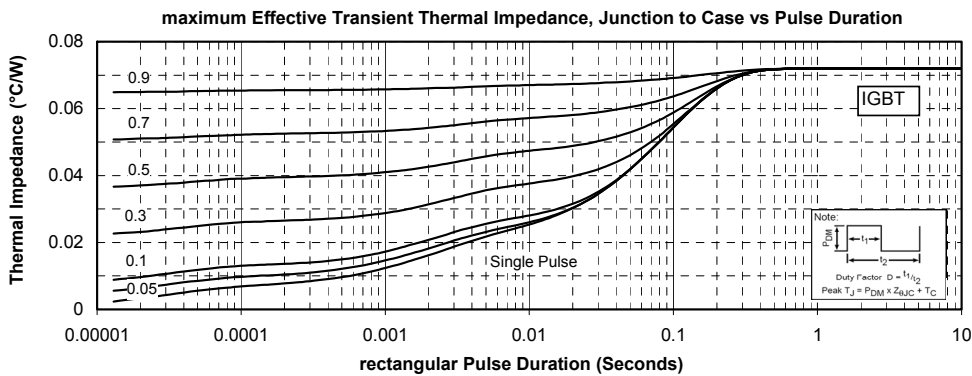
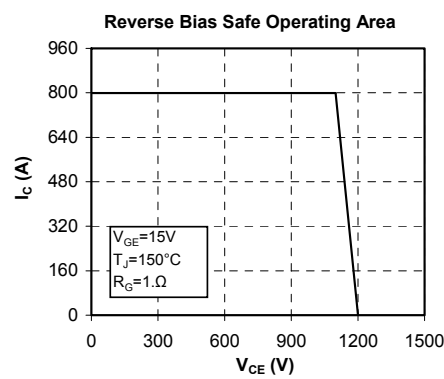
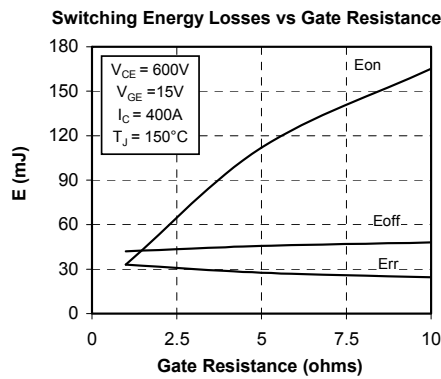
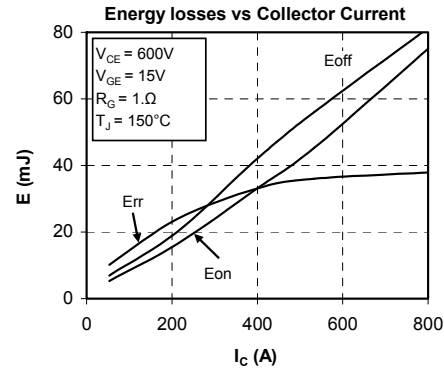
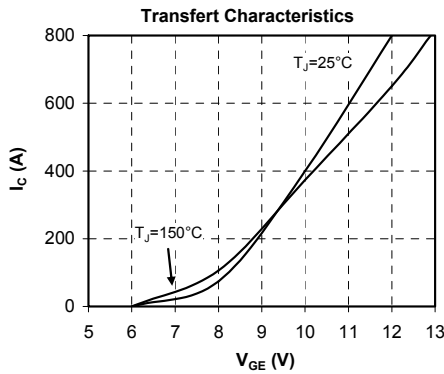
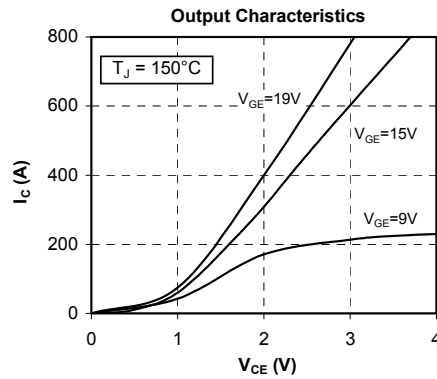
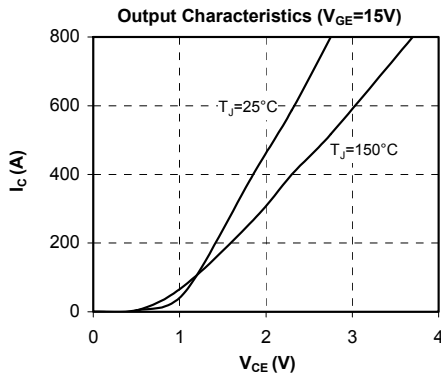
| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit | |
|-----------|------------------------------------|---|---|-------------|-------------|---------------|---------------|
| V_{RRM} | Maximum Repetitive Reverse Voltage | | 1200 | | | V | |
| I_{RRM} | Maximum Reverse Leakage Current | $V_R = 1200V$ | | | 250 2000 | μA | |
| | | $T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$ | | | | | |
| I_F | DC Forward Current | | | 400 | | A | |
| | | $T_C = 80^\circ\text{C}$ | | | | | |
| V_F | Diode Forward Voltage | $I_F = 400A$ $V_{GE} = 0V$ | | 1.7 1.65 | 2.2 | V | |
| | | $T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$ | | | | | |
| t_{rr} | Reverse Recovery Time | $I_F = 400A$ $V_R = 600V$ $di/dt = 7000A/\mu\text{s}$ | | 155 300 | | ns | |
| | | | $T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$ | | | | |
| Q_{rr} | Reverse Recovery Charge | | $T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$ | | 37.2 78 | | μC |
| | | | $T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$ | | 16 32 | | mJ |
| E_{rr} | Reverse Recovery Energy | | | | | | |

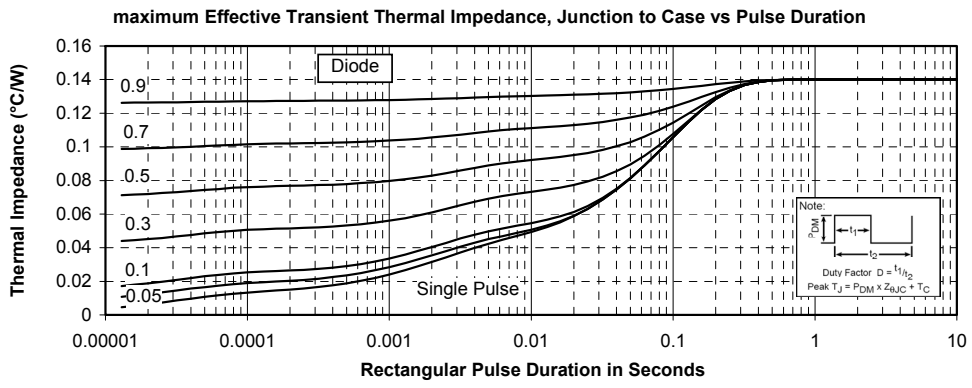
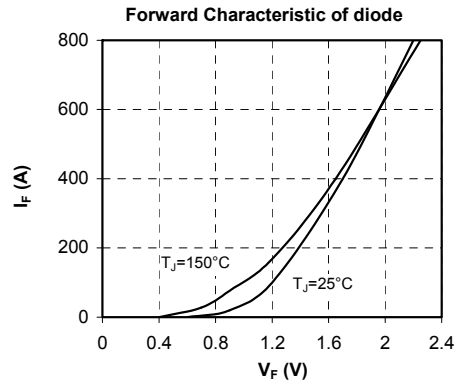
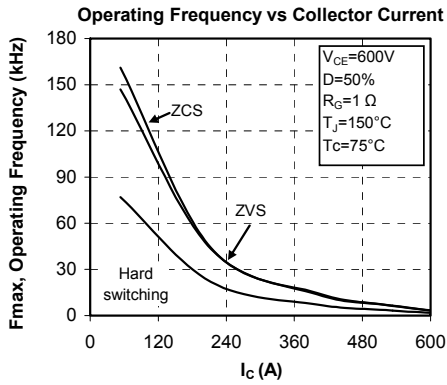
Thermal and package characteristics

| <i>Symbol</i> | <i>Characteristic</i> | | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> |
|-------------------|--|---------------|------------|------------|------------|-------------|
| R _{thJC} | Junction to Case Thermal Resistance | IGBT | | | 0.072 | °C/W |
| | | Diode | | | 0.14 | |
| V _{ISOL} | RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz | | 4000 | | | V |
| T _J | Operating junction temperature range | | -40 | | 175 | °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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