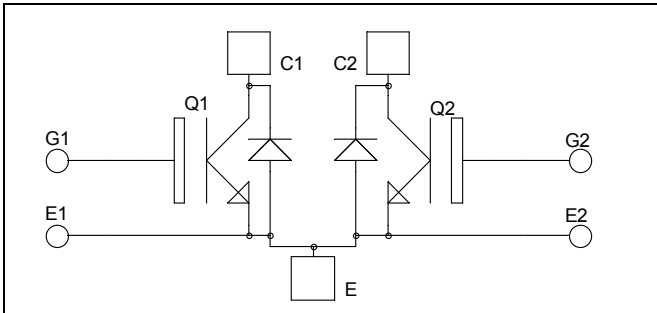


**Dual common source
Fast Trench + Field Stop IGBT3
Power Module**

**$V_{CES} = 1200V$
 $I_C = 400A @ T_c = 80^\circ C$**

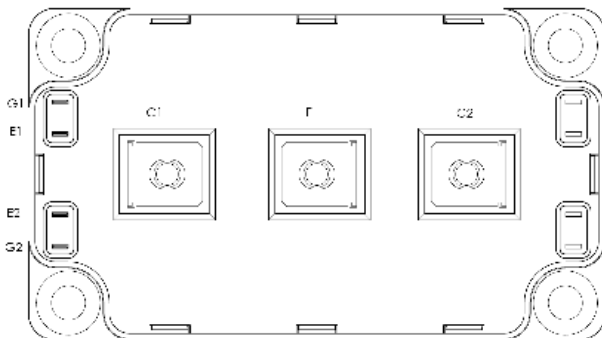


Application

- AC Switches
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

Features

- Fast 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
- Very low stray inductance
 - Symmetrical design
 - M5 power connectors
- High level of integration



Benefits

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

Absolute maximum ratings

| Symbol | Parameter | | Max ratings | Unit |
|-----------|---------------------------------------|---------------------|--------------|------|
| V_{CES} | Collector - Emitter Breakdown Voltage | | 1200 | V |
| I_C | Continuous Collector Current | $T_c = 25^\circ C$ | 560 * | A |
| | | $T_c = 80^\circ C$ | 400 | |
| I_{CM} | Pulsed Collector Current | $T_c = 25^\circ C$ | 800 | |
| V_{GE} | Gate - Emitter Voltage | | ± 20 | V |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ | 1785 | W |
| RBSOA | Reverse Bias Safe Operating Area | $T_j = 125^\circ C$ | 800A @ 1100V | |

* Specification of IGBT device but output current must be limited to 500A to not exceed a delta of temperature greater than 100°C for the connectors.

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 | $V_{GE} = 0\text{V}$, $V_{CE} = 1200\text{V}$ | | | 750 | μA |
| $V_{CE(sat)}$ | Collector Emitter Saturation Voltage | $V_{GE} = 15\text{V}$ $I_C = 400\text{A}$ | $T_j = 25^\circ\text{C}$ 1.4 | $T_j = 125^\circ\text{C}$ 1.7 | 2.1 | V |
| $V_{GE(th)}$ | Gate Threshold Voltage | $V_{GE} = V_{CE}$, $I_C = 4\text{mA}$ | 5.0 | 5.8 | 6.5 | V |
| I_{GES} | Gate – Emitter Leakage Current | $V_{GE} = 20\text{V}$, $V_{CE} = 0\text{V}$ | | | 800 | nA |

Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|------------------------------|---|---------------------------|-----|-----|------|
| C_{ies} | Input Capacitance | $V_{GE} = 0\text{V}$ | | 28 | | nF |
| C_{oes} | Output Capacitance | $V_{CE} = 25\text{V}$ | | 1.6 | | |
| C_{res} | Reverse Transfer Capacitance | $f = 1\text{MHz}$ | | 1.2 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (25°C) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 400\text{A}$ $R_G = 1.2\Omega$ | | 260 | | ns |
| T_r | Rise Time | | | 30 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 420 | | |
| T_f | Fall Time | | | 80 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (125°C) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 400\text{A}$ $R_G = 1.2\Omega$ | | 290 | | ns |
| T_r | Rise Time | | | 50 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 520 | | |
| T_f | Fall Time | | | 100 | | |
| E_{on} | Turn on Energy | $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 400\text{A}$ $R_G = 1.2\Omega$ | $T_j = 125^\circ\text{C}$ | 40 | | mJ |
| E_{off} | Turn off Energy | | $T_j = 125^\circ\text{C}$ | 40 | | |

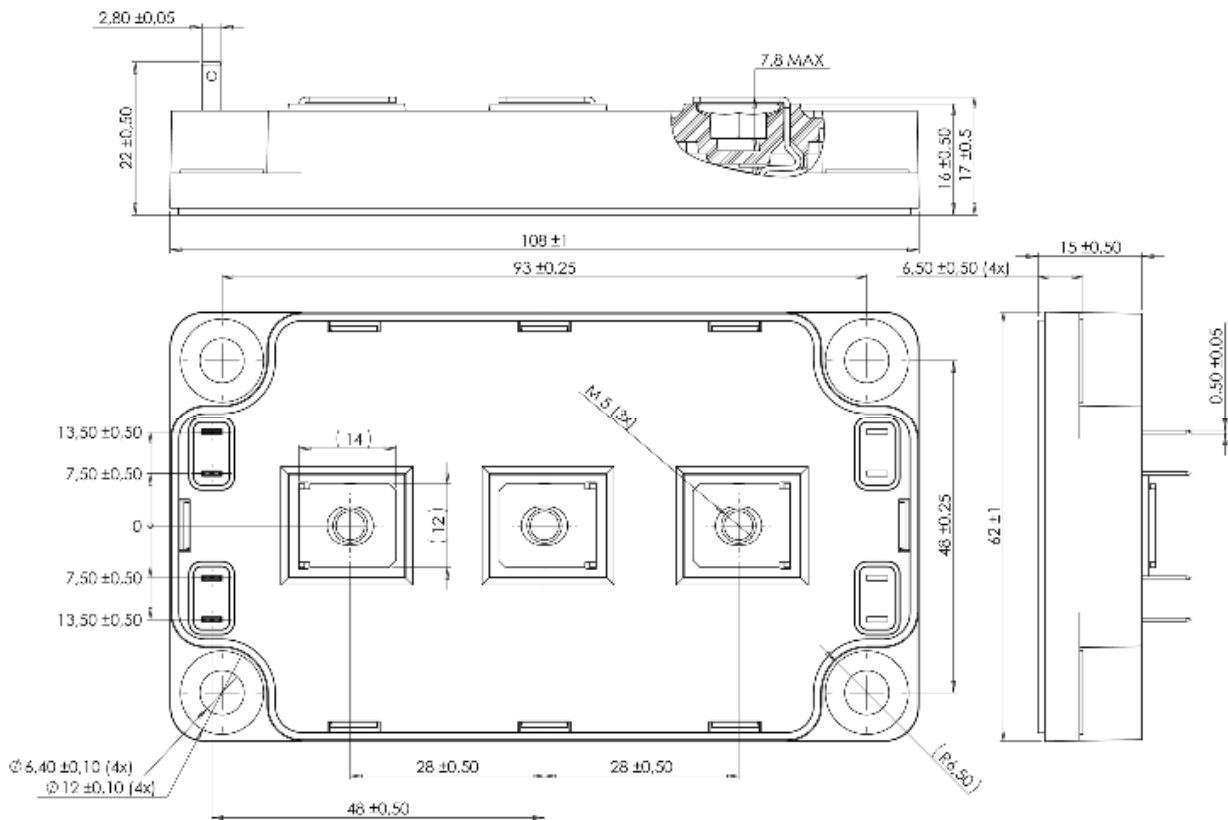
Reverse diode ratings and characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|-----------|---|--|---------------------------|-----|-----|---------------|
| V_{RRM} | Maximum Peak Repetitive Reverse Voltage | | 1200 | | | V |
| I_{RM} | Maximum Reverse Leakage Current | $V_R = 1200\text{V}$ | $T_j = 25^\circ\text{C}$ | | 700 | μA |
| | | | $T_j = 125^\circ\text{C}$ | | 900 | |
| I_F | DC Forward Current | | $T_c = 80^\circ\text{C}$ | 400 | | A |
| V_F | Diode Forward Voltage | $I_F = 400\text{A}$ $V_{GE} = 0\text{V}$ | $T_j = 25^\circ\text{C}$ | 1.6 | 2.1 | V |
| | | | $T_j = 125^\circ\text{C}$ | 1.6 | | |
| t_{rr} | Reverse Recovery Time | $I_F = 400\text{A}$ $V_R = 600\text{V}$ $di/dt = 4000\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | 170 | | ns |
| | | | $T_j = 125^\circ\text{C}$ | 280 | | |
| Q_{rr} | Reverse Recovery Charge | | $T_j = 25^\circ\text{C}$ | 36 | | μC |
| | | | $T_j = 125^\circ\text{C}$ | 72 | | |
| E_r | Reverse Recovery Energy | | $T_j = 25^\circ\text{C}$ | 20 | | mJ |
| | | | $T_j = 125^\circ\text{C}$ | 36 | | |

Thermal and package characteristics

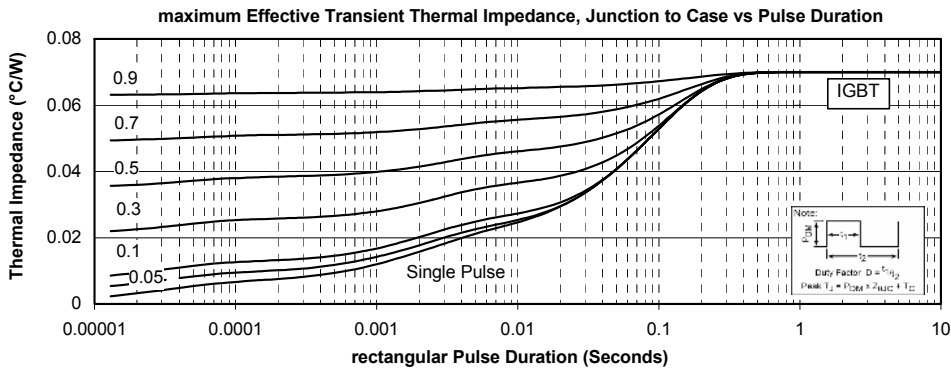
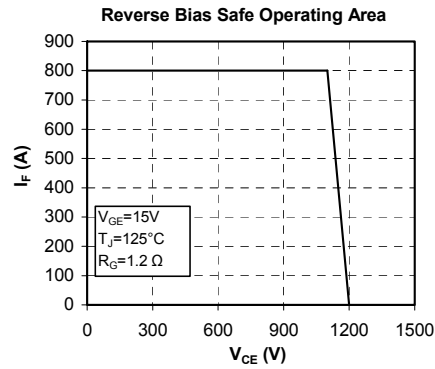
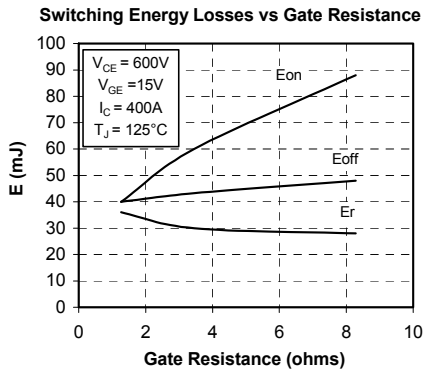
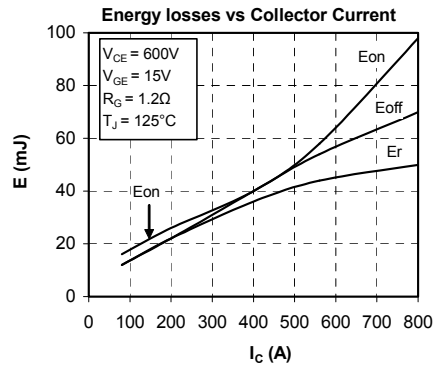
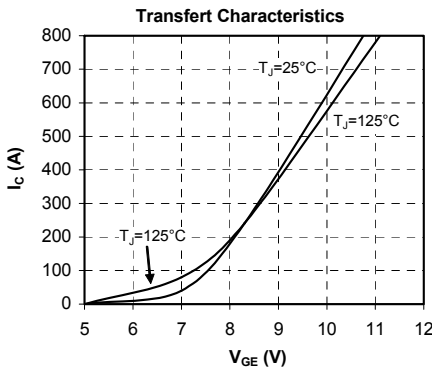
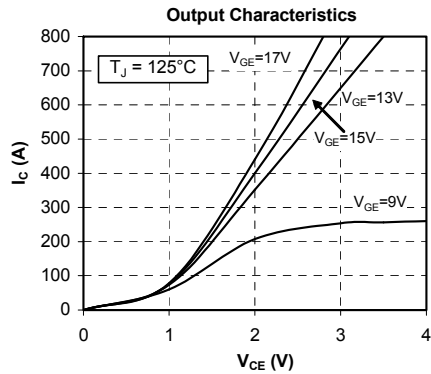
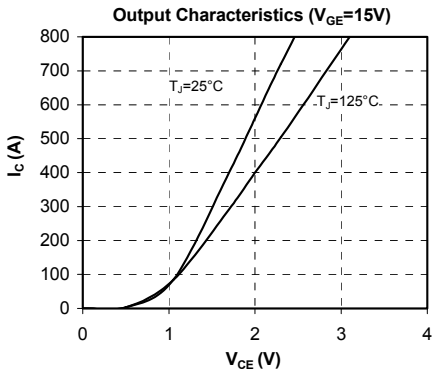
| Symbol | Characteristic | Min | Typ | Max | Unit | |
|-------------------|--|---------------|-----|------|------|-----|
| R _{thJC} | Junction to Case Thermal Resistance | IGBT | | 0.07 | °C/W | |
| | | Diode | | 0.13 | | |
| V _{ISOL} | RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz | 4000 | | | V | |
| T _J | Operating junction temperature range | -40 | | 150 | °C | |
| T _{STG} | Storage Temperature Range | -40 | | 125 | | |
| T _C | Operating Case Temperature | -40 | | 100 | | |
| Torque | Mounting torque | To heatsink | M6 | 3 | 5 | N.m |
| | | For terminals | M5 | 2 | 3.5 | |
| Wt | Package Weight | | | 300 | g | |

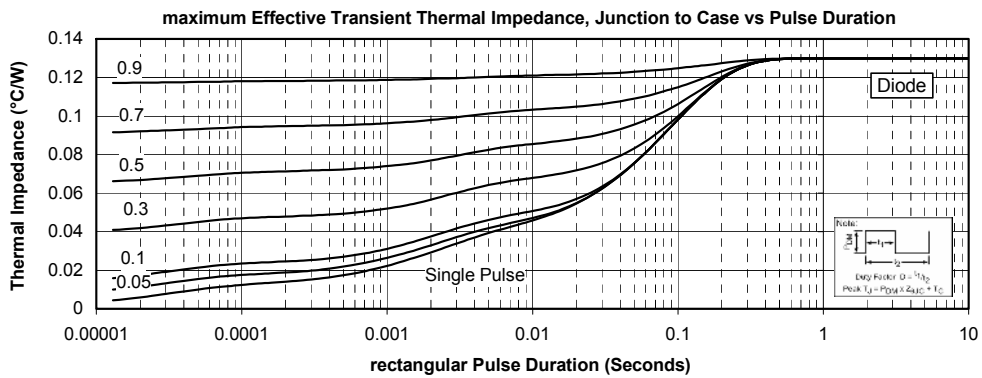
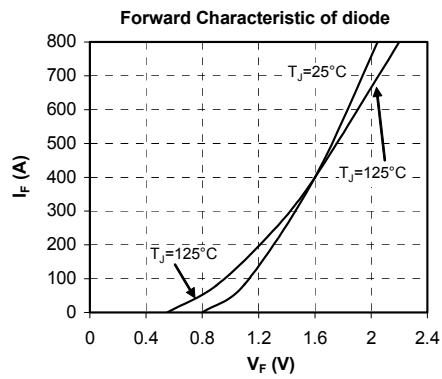
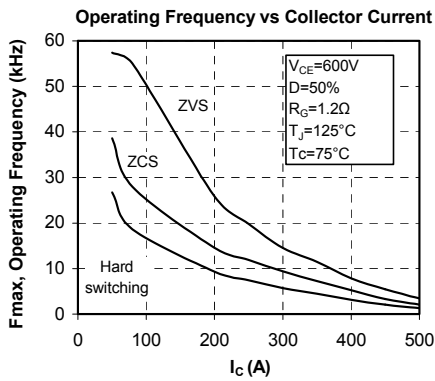
SP6 Package outline (dimensions in mm)



See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical Performance Curve





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