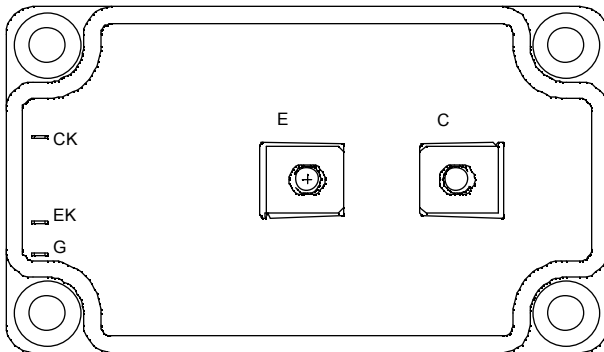
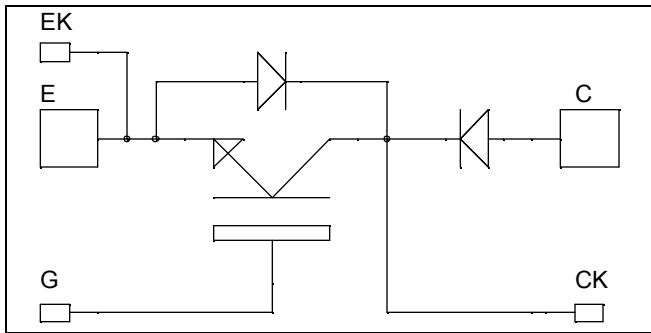


**Single Switch
with Series diodes
NPT IGBT Power Module**

**$V_{CES} = 1200V$
 $I_C = 200A @ T_c = 80^\circ C$**



Application

- Zero Current Switching resonant mode

Features

- Non Punch Through (NPT) FAST IGBT
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 50 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
 - M5 power connectors
- High level of integration

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
- 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 | $T_c = 25^\circ C$ | 275 | A |
| | | $T_c = 80^\circ C$ | 200 | |
| I_{CM} | Pulsed Collector Current | $T_c = 25^\circ C$ | 600 | |
| V_{GE} | Gate - Emitter Voltage | | ± 20 | V |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ | 1136 | W |
| RBSOA | Reverse Bias Safe Operating Area | $T_j = 150^\circ C$ | 400A @ 1200V | |

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 | $V_{GE} = 0\text{V}$ $V_{CE} = 1200\text{V}$ | $T_j = 25^\circ\text{C}$ | | 500 | μA |
| | | | $T_j = 125^\circ\text{C}$ | | 750 | |
| $V_{CE(sat)}$ | Collector Emitter saturation Voltage | $V_{GE} = 15\text{V}$ $I_C = 200\text{A}$ | $T_j = 25^\circ\text{C}$ | 3.2 | 3.7 | V |
| | | | $T_j = 125^\circ\text{C}$ | 4.0 | | |
| $V_{GE(th)}$ | Gate Threshold Voltage | $V_{GE} = V_{CE}, I_C = 4\text{mA}$ | 4.5 | | 6.5 | V |
| I_{GES} | Gate – Emitter Leakage Current | $V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}$ | | | ± 300 | nA |

Dynamic Characteristics

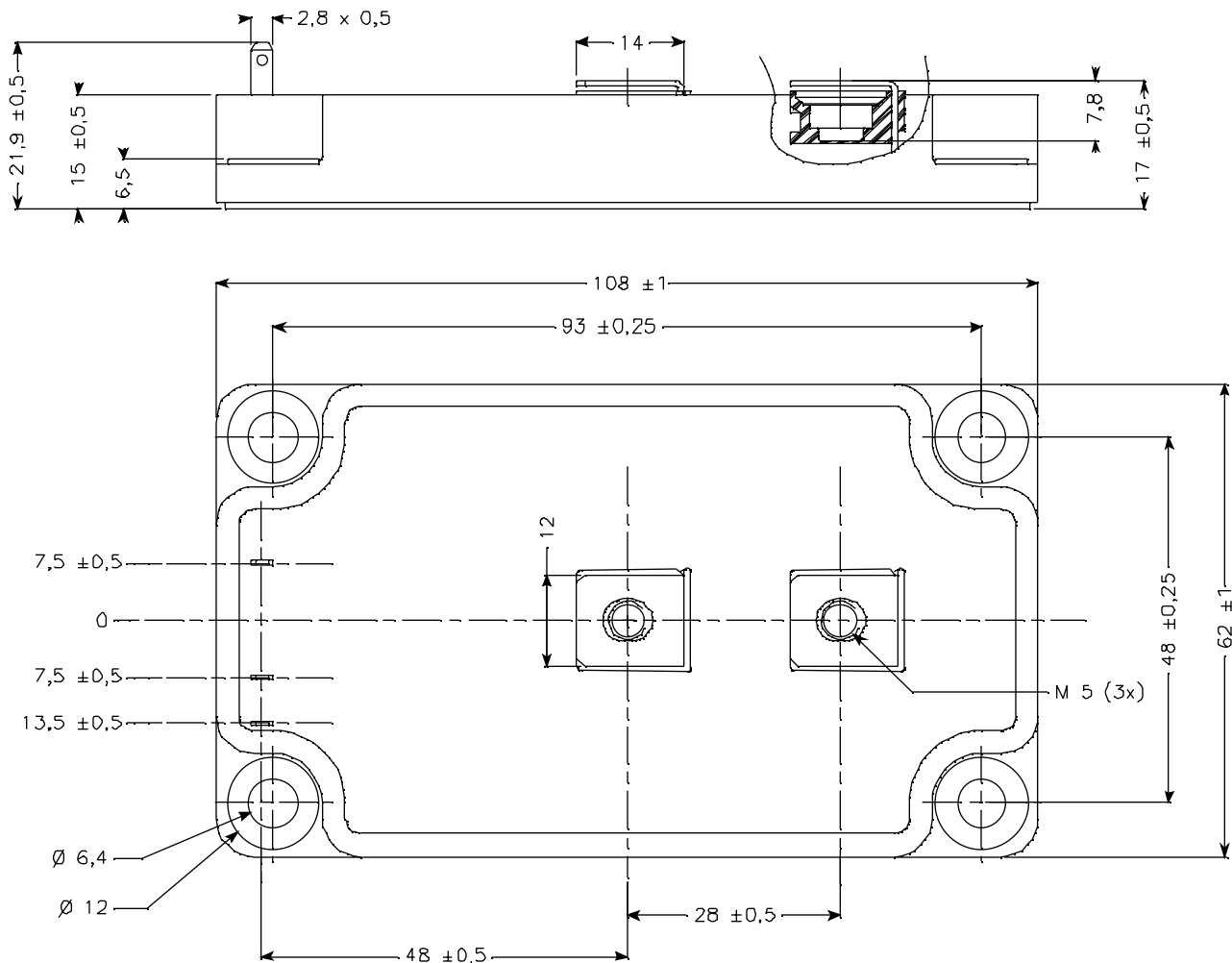
| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|------------------------------|---|---------------------------|------|-----|------|
| C_{ies} | Input Capacitance | $V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$ | | 13.8 | | nF |
| C_{oes} | Output Capacitance | | | 1.32 | | |
| C_{res} | Reverse Transfer Capacitance | | | 0.88 | | |
| Q_g | Total gate Charge | $V_{GS} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 200\text{A}$ | | 1320 | | nC |
| Q_{ge} | Gate – Emitter Charge | | | 140 | | |
| Q_{gc} | Gate – Collector Charge | | | 800 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (125°C) $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 200\text{A}$ $R_G = 1.2\Omega$ | | 35 | | ns |
| T_r | Rise Time | | | 65 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 320 | | |
| T_f | Fall Time | | | 30 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (125°C) $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 200\text{A}$ $R_G = 1.2\Omega$ | | 35 | | ns |
| T_r | Rise Time | | | 65 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 360 | | |
| T_f | Fall Time | | | 40 | | |
| E_{on} | Turn-on Switching Energy | $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 200\text{A}$ $R_G = 1.2\Omega$ | $T_j = 125^\circ\text{C}$ | 22 | | mJ |
| E_{off} | Turn-off Switching Energy | | $T_j = 125^\circ\text{C}$ | 12.2 | | |

Series diode ratings and characteristics

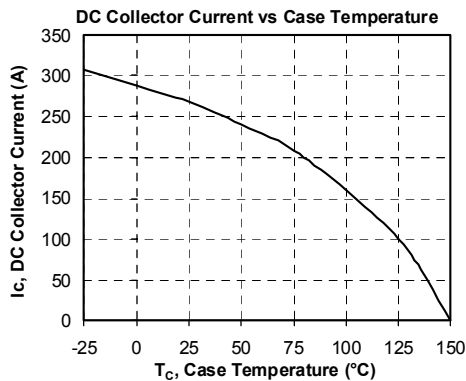
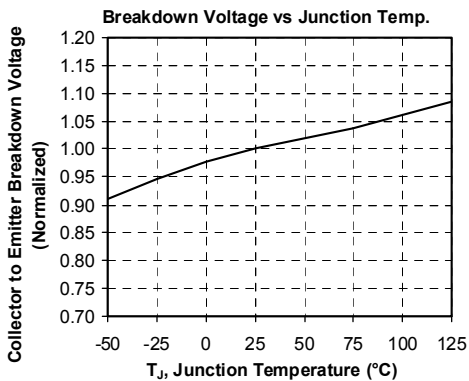
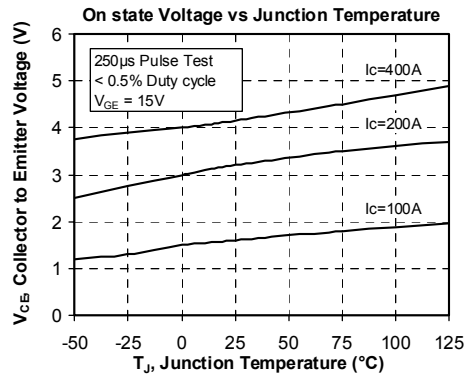
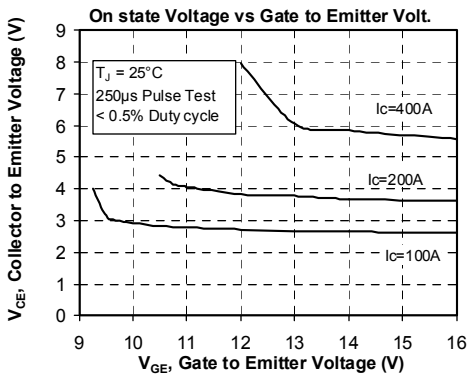
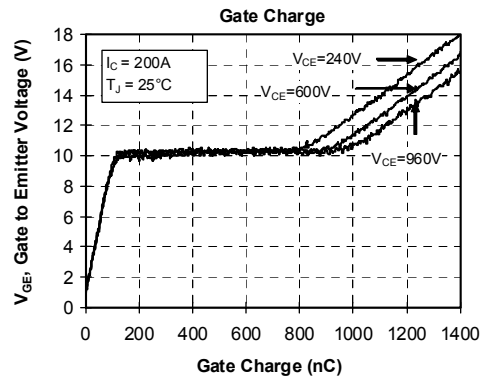
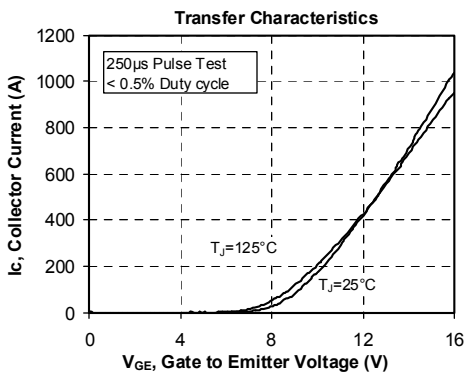
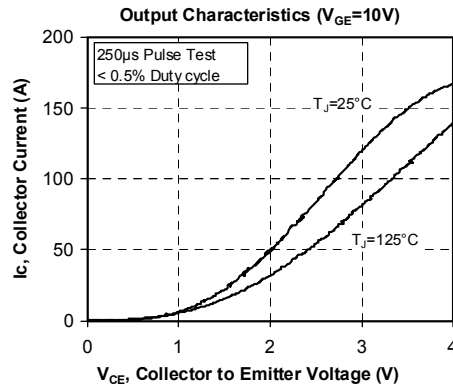
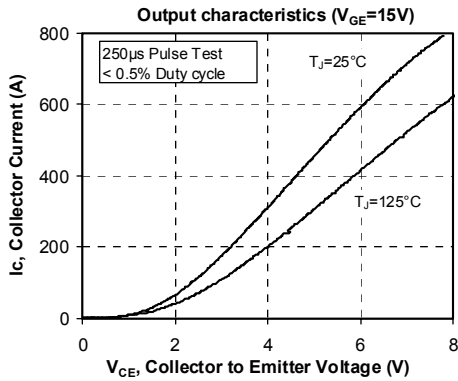
| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|-----------|------------------------------------|--|---------------------------|-----|------|---------------|
| V_{RRM} | Maximum Repetitive Reverse Voltage | | 1200 | | | V |
| I_{RM} | Maximum Reverse Leakage Current | $V_R = 1200\text{V}$ | $T_j = 25^\circ\text{C}$ | | 750 | μA |
| | | | $T_j = 125^\circ\text{C}$ | | 1000 | |
| I_F | DC Forward Current | $T_c = 70^\circ\text{C}$ | | 240 | | A |
| V_F | Diode Forward Voltage | $I_F = 240\text{A}$ | | 2 | 2.5 | V |
| | | $I_F = 480\text{A}$ | | 2.3 | | |
| | | $I_F = 240\text{A}$ | $T_j = 125^\circ\text{C}$ | | 1.8 | |
| t_{rr} | Reverse Recovery Time | $I_F = 240\text{A}$ $V_R = 800\text{V}$ | $T_j = 25^\circ\text{C}$ | 400 | | ns |
| | | | $T_j = 125^\circ\text{C}$ | 470 | | |
| Q_{rr} | Reverse Recovery Charge | $di/dt = 800\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | 4.8 | | μC |
| | | | $T_j = 125^\circ\text{C}$ | 16 | | |

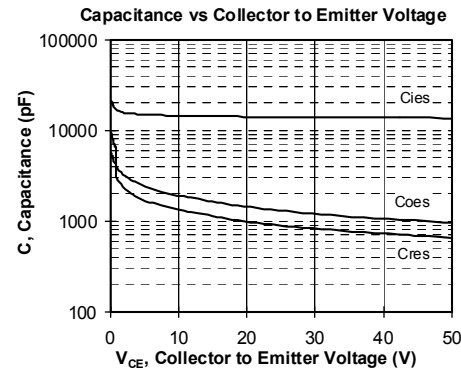
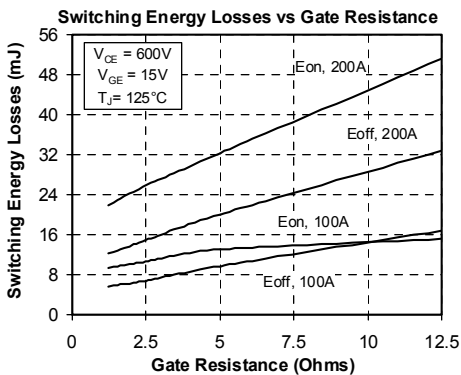
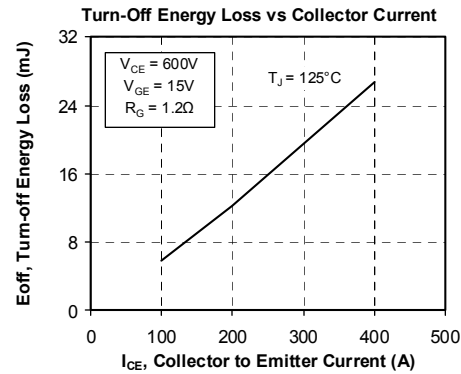
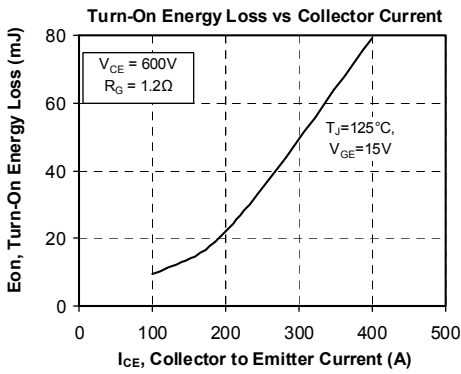
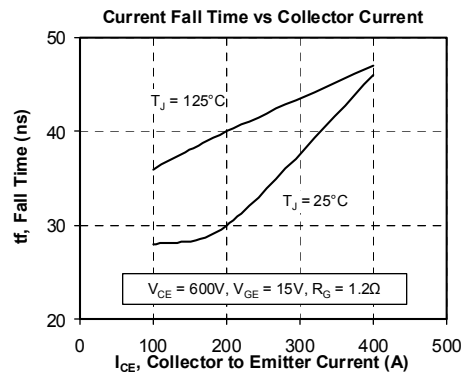
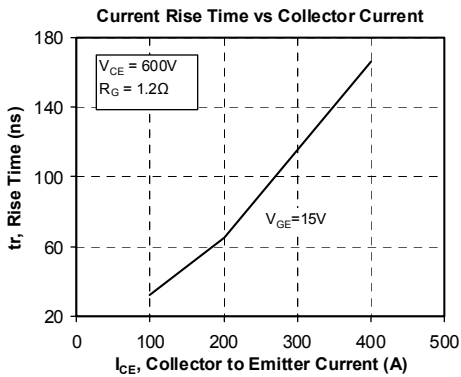
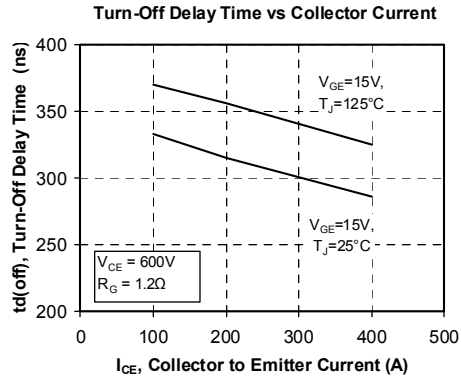
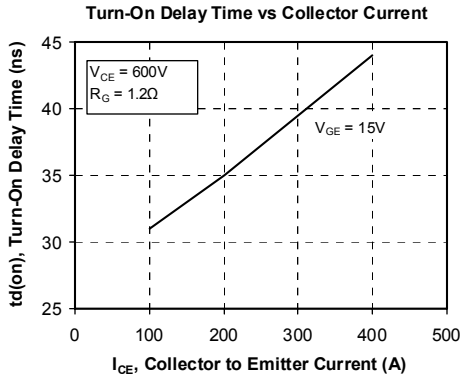
Thermal and package characteristics
Symbol Characteristic

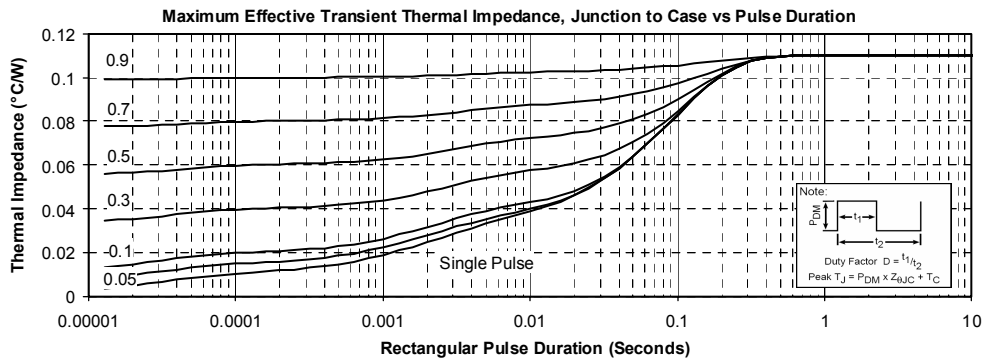
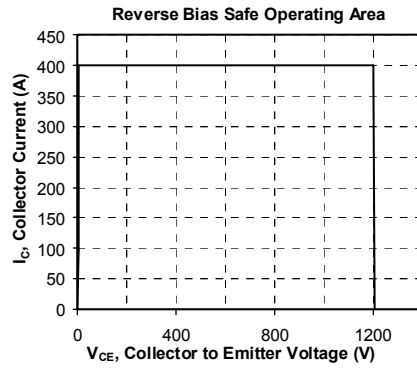
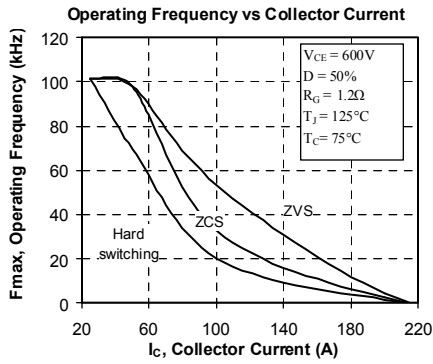
| | | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> | |
|-------------------|--|---------------|------------|------------|-------------|-----|
| R _{thJC} | Junction to Case Thermal Resistance | IGBT | | 0.11 | °C/W | |
| | | Diode | | 0.23 | | |
| V _{ISOL} | RMS Isolation Voltage, any terminal to case t = 1 min, I _{isol} < 1 mA, 50/60Hz | 2500 | | | 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 | | | 280 | 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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