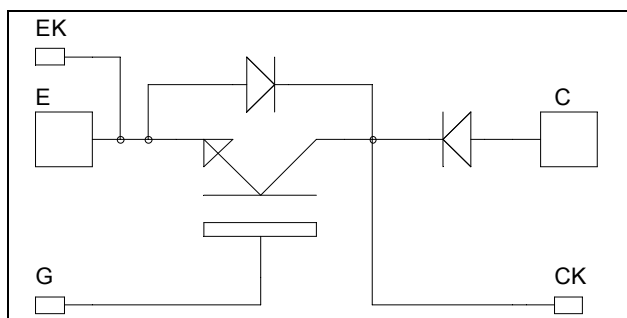


Single Switch with Series diodes NPT IGBT Power Module

$V_{CES} = 1200V$
 $I_C = 300A @ T_c = 80^\circ C$



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
 - 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 T_C 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 | $T_c = 25^\circ C$ 400 $T_c = 80^\circ C$ 300 | A |
| I_{CM} | Pulsed Collector Current | $T_c = 25^\circ C$ 600 | |
| V_{GE} | Gate - Emitter Voltage | ± 20 | V |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ 1780 | W |
| RBSOA | Reverse Bias Safe Operating Area | $T_j = 150^\circ C$ 600A @ 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

| <i>Symbol</i> | <i>Characteristic</i> | <i>Test Conditions</i> | | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> |
|---------------|--------------------------------------|---|---|------------|------------|------------|---------------|
| I_{CES} | Zero Gate Voltage Collector Current | $V_{GE} = 0\text{V}$ $V_{CE} = 1200\text{V}$ | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | | | 500 750 | μA |
| $V_{CE(sat)}$ | Collector Emitter saturation Voltage | $V_{GE} = 15\text{V}$ $I_C = 300\text{A}$ | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | | 3.3 4 | 3.9 | V |
| $V_{GE(th)}$ | Gate Threshold Voltage | $V_{GE} = V_{CE}, I_C = 12\text{mA}$ | | 4.5 | | 6.5 | V |
| I_{GES} | Gate – Emitter Leakage Current | $V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}$ | | | | ± 1 | μA |

Dynamic Characteristics

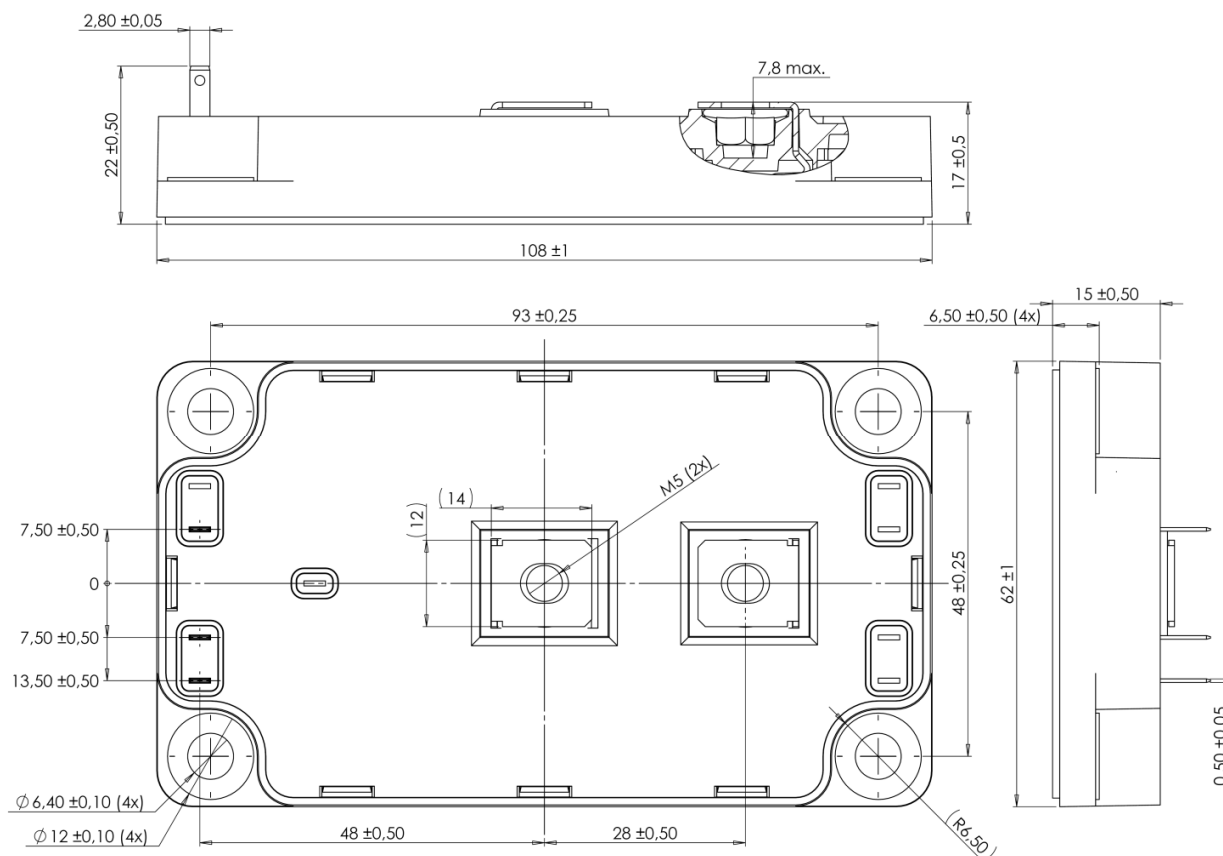
| <i>Symbol</i> | <i>Characteristic</i> | <i>Test Conditions</i> | | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> |
|---------------|------------------------------|---|---------------------------|------------|------------|------------|-------------|
| C_{ies} | Input Capacitance | $V_{GE} = 0\text{V}$ | | | 21 | | nF |
| C_{oes} | Output Capacitance | $V_{CE} = 25\text{V}$ | | | 2.9 | | |
| C_{res} | Reverse Transfer Capacitance | $f = 1\text{MHz}$ | | | 1.52 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (25°C) $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 300\text{A}$ $R_G = 3\Omega$ | | | 120 | | ns |
| T_r | Rise Time | | | | 50 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | | 310 | | |
| T_f | Fall Time | | | | 30 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (125°C) $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 300\text{A}$ $R_G = 3\Omega$ | | | 130 | | ns |
| T_r | Rise Time | | | | 60 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | | 360 | | |
| T_f | Fall Time | | | | 40 | | |
| E_{on} | Turn-on Switching Energy | $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 300\text{A}$ | $T_j = 125^\circ\text{C}$ | | 25 | | mJ |
| E_{off} | Turn-off Switching Energy | $R_G = 3\Omega$ | $T_j = 125^\circ\text{C}$ | | 15 | | |

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 =1200V | T _j = 25°C | | | 250 | μA | |
| | | | T _j = 125°C | | | 500 | | |
| I _F | DC Forward Current | | T _c = 80°C | | 300 | | A | |
| V _F | Diode Forward Voltage | I _F = 300A | T _j = 25°C | | 2.1 | | V | |
| | | | T _j = 125°C | | 1.9 | | | |
| t _{rr} | Reverse Recovery Time | I _F = 300A V _R = 600V di/dt =4500A/μs | T _j = 25°C | | 120 | | ns | |
| | | | T _j = 125°C | | 210 | | | |
| Q _{rr} | Reverse Recovery Charge | | T _j = 25°C | | 22 | | μC | |
| | | | T _j = 125°C | | 43 | | | |
| Er | Reverse Recovery Energy | | T _j = 25°C | | 7 | | mJ | |
| | | | T _j = 125°C | | 15 | | | |

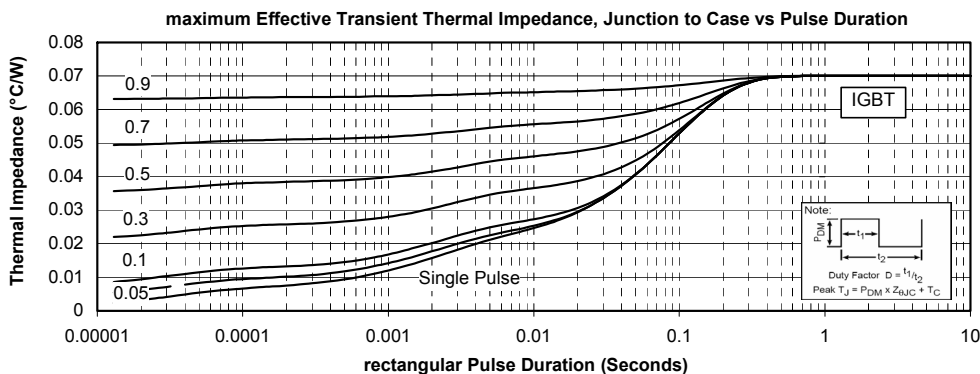
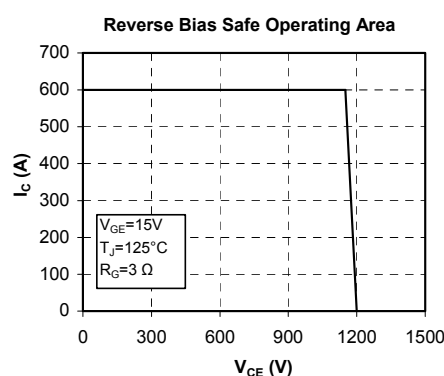
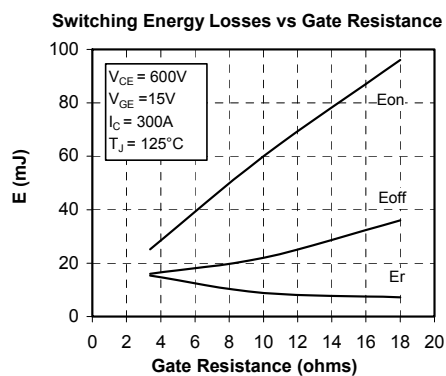
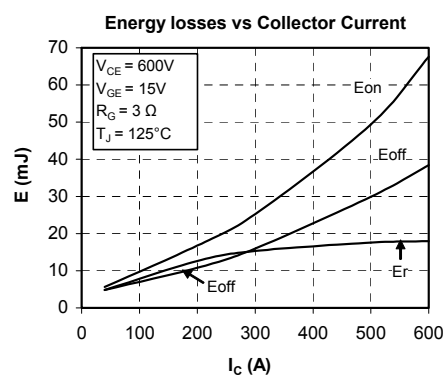
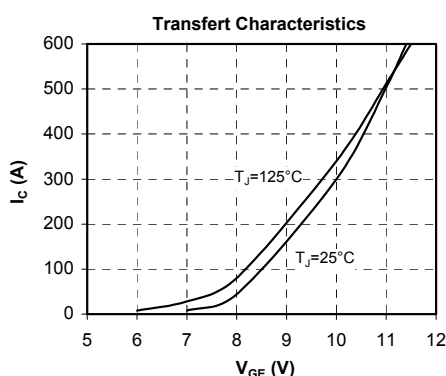
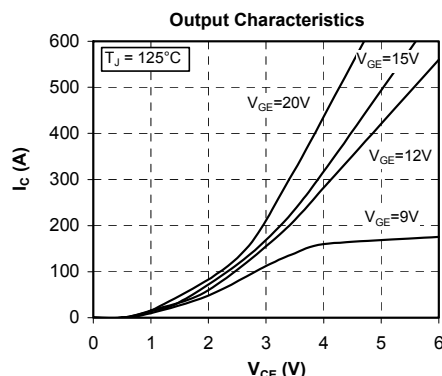
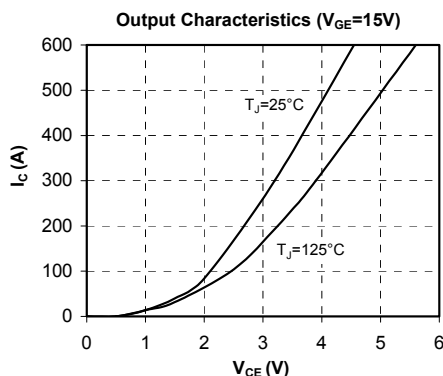
Thermal and package characteristics

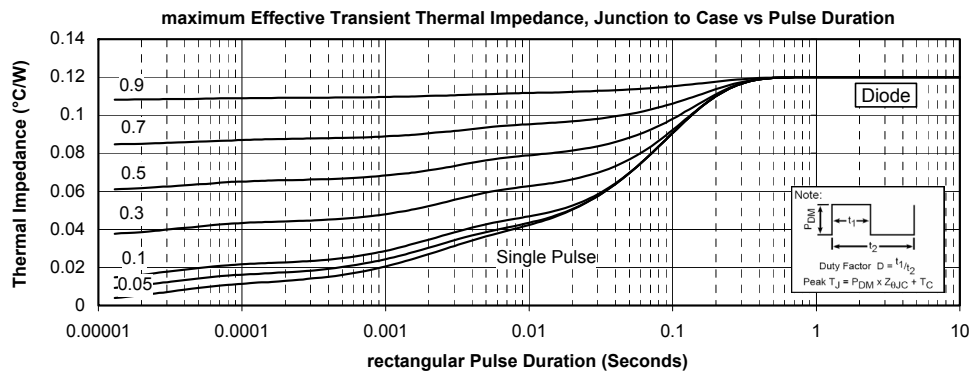
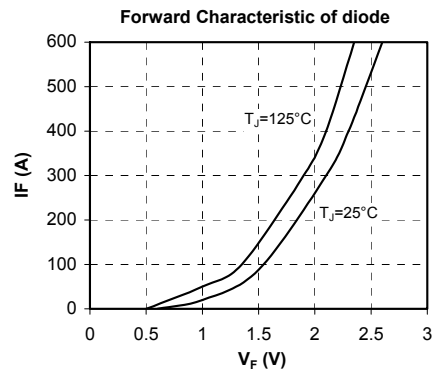
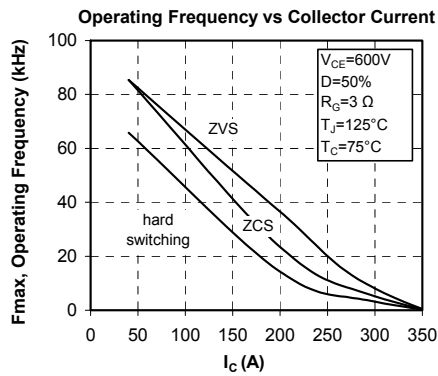
| Symbol | Characteristic | | Min | Typ | Max | Unit |
|-------------------|--|---------------|------|-----|------|------|
| R _{thJC} | Junction to Case Thermal Resistance | IGBT | | | 0.07 | °C/W |
| | | Diode | | | 0.12 | |
| V _{ISOL} | RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz | | 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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