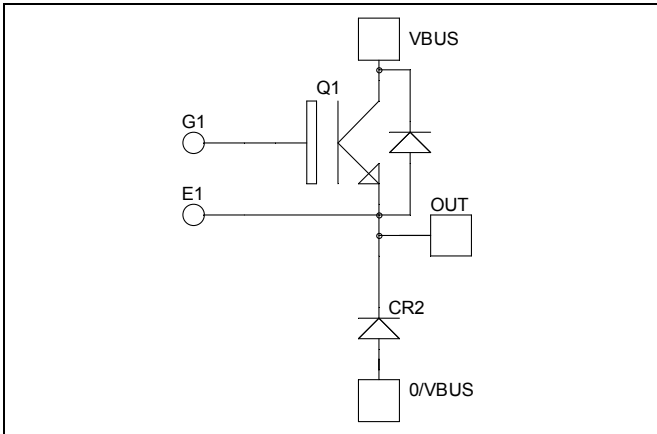


**Buck chopper
Trench + Field Stop IGBT3
Power Module**

**$V_{CES} = 1700V$
 $I_C = 150A @ T_c = 80^\circ C$**

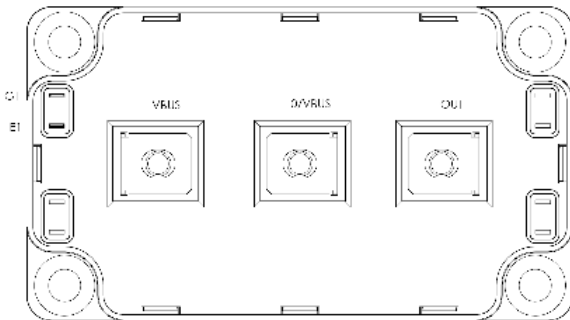


Application

- AC and DC motor control
- Switched Mode Power Supplies

Features

- 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 VCEsat
- Low profile
- RoHS Compliant

Absolute maximum ratings

| Symbol | Parameter | Max ratings | Unit |
|-----------|---------------------------------------|---------------------|--------------|
| V_{CES} | Collector - Emitter Breakdown Voltage | 1700 | V |
| I_C | Continuous Collector Current | $T_c = 25^\circ C$ | 250 |
| | | $T_c = 80^\circ C$ | 150 |
| I_{CM} | Pulsed Collector Current | $T_c = 25^\circ C$ | 300 |
| V_{GE} | Gate - Emitter Voltage | ± 20 | V |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ | 890 |
| RBSOA | Reverse Bias Safe Operating Area | $T_j = 125^\circ C$ | 300A @ 1600V |

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 | $V_{GE} = 0\text{V}, V_{CE} = 1700\text{V}$ | | | 350 | μA |
| $V_{CE(sat)}$ | Collector Emitter Saturation Voltage | $V_{GE} = 15\text{V}$ $I_C = 150\text{A}$ | | 2.0 | 2.4 | V |
| | | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | | 2.4 | | |
| $V_{GE(th)}$ | Gate Threshold Voltage | $V_{GE} = V_{CE}, I_C = 3\text{mA}$ | 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 | $V_{GE} = 0\text{V}$ | | 13.5 | | nF |
| C_{oes} | Output Capacitance | $V_{CE} = 25\text{V}$ | | 0.55 | | |
| C_{res} | Reverse Transfer Capacitance | $f = 1\text{MHz}$ | | 0.44 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (25°C) | | 370 | | ns |
| T_r | Rise Time | $V_{GE} = 15\text{V}$ $V_{Bus} = 900\text{V}$ | | 40 | | |
| $T_{d(off)}$ | Turn-off Delay Time | $I_C = 150\text{A}$ | | 650 | | |
| T_f | Fall Time | $R_G = 4.7\Omega$ | | 180 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (125°C) | | 400 | | ns |
| T_r | Rise Time | $V_{GE} = 15\text{V}$ $V_{Bus} = 900\text{V}$ | | 50 | | |
| $T_{d(off)}$ | Turn-off Delay Time | $I_C = 150\text{A}$ | | 800 | | |
| T_f | Fall Time | $R_G = 4.7\Omega$ | | 300 | | |
| E_{on} | Turn-on Switching Energy | $V_{GE} = 15\text{V}$ $V_{Bus} = 900\text{V}$ | | 48 | | mJ |
| E_{off} | Turn-off Switching Energy | $I_C = 150\text{A}$ $R_G = 4.7\Omega$ | | 47 | | |

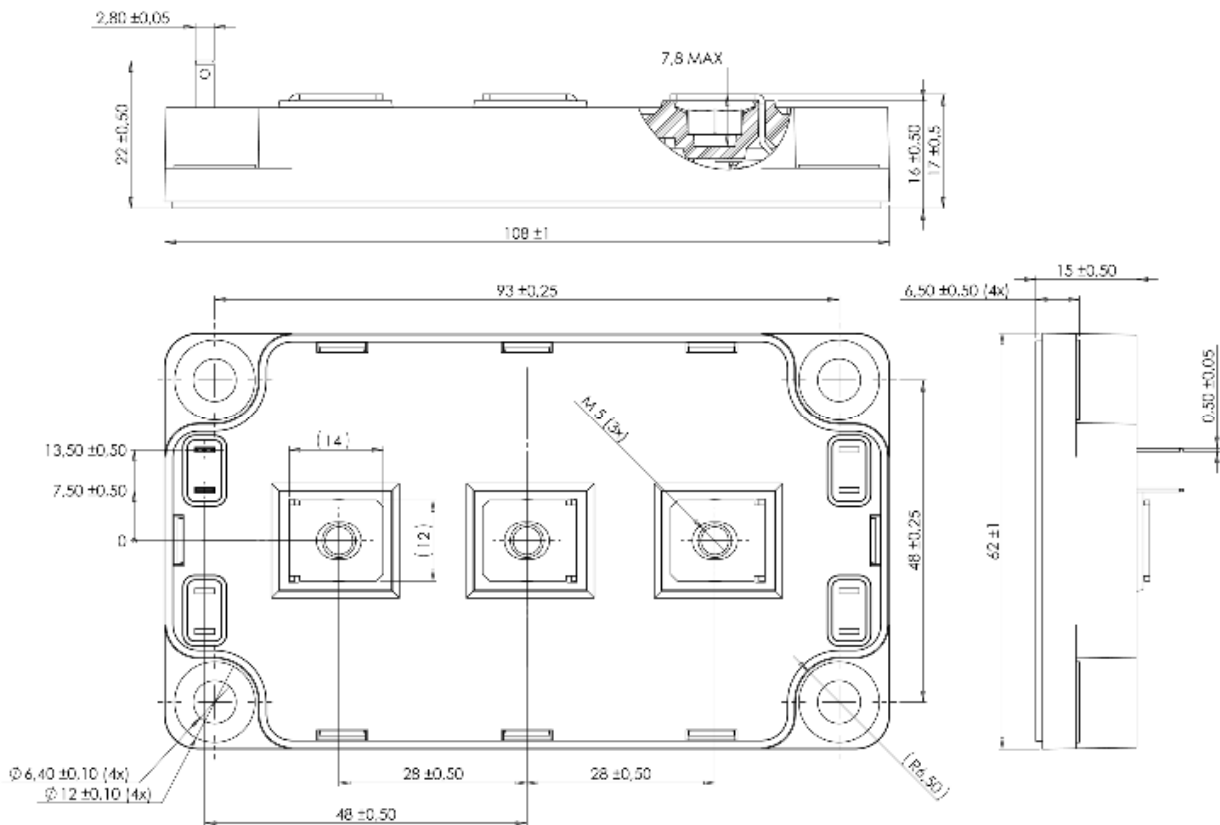
Chopper diode ratings and characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|-----------|---|--|------|------|-----|---------------|
| V_{RRM} | Maximum Peak Repetitive Reverse Voltage | | 1700 | | | V |
| I_{RM} | Maximum Reverse Leakage Current | $V_R = 1700\text{V}$ | | | 350 | μA |
| | | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | | | 600 | |
| I_F | DC Forward Current | | | 150 | | A |
| V_F | Diode Forward Voltage | $I_F = 150\text{A}$ | | 1.8 | 2.2 | V |
| | | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | | 1.9 | | |
| t_{rr} | Reverse Recovery Time | | | 385 | | ns |
| | | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | | 490 | | |
| Q_{rr} | Reverse Recovery Charge | $I_F = 150\text{A}$ $V_R = 900\text{V}$ $di/dt = 1600\text{A}/\mu\text{s}$ | | 38 | | μC |
| | | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | | 62 | | |
| E_r | Reverse Recovery Energy | | | 17.5 | | mJ |
| | | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | | 35 | | |

Thermal and package characteristics

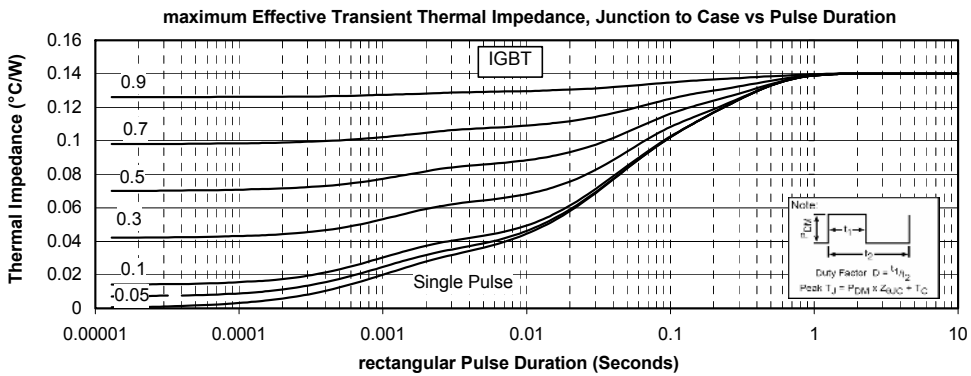
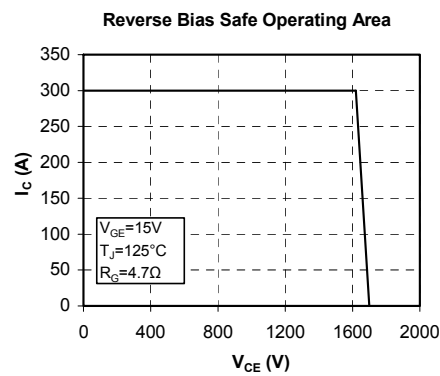
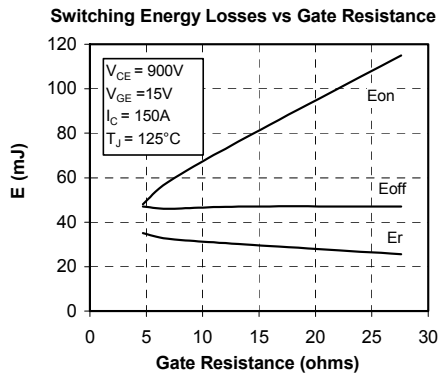
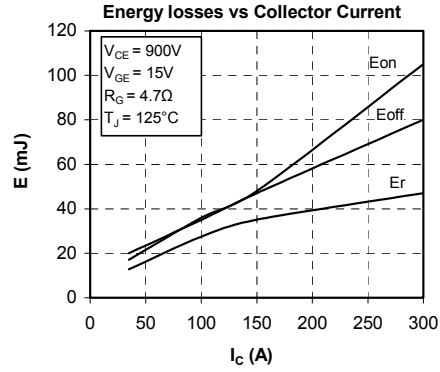
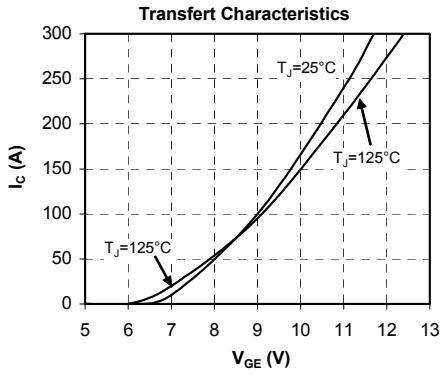
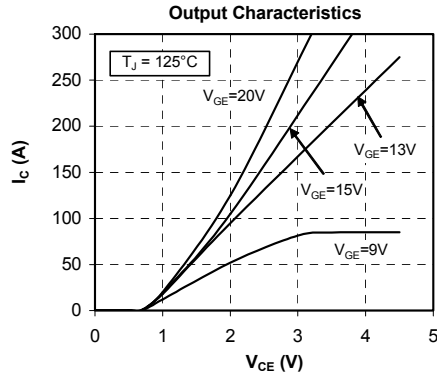
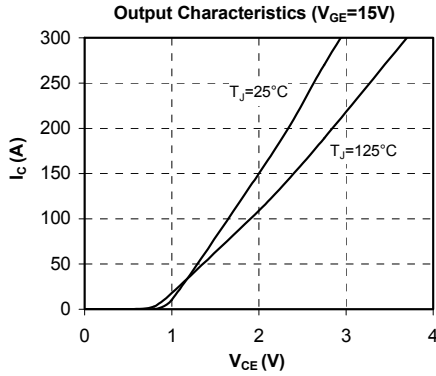
| Symbol | Characteristic | Min | Typ | Max | Unit | |
|-------------------|--|---------------|-----|------|------|-----|
| R _{thJC} | Junction to Case Thermal Resistance | IGBT | | 0.14 | °C/W | |
| | | Diode | | 0.26 | | |
| V _{ISOL} | RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz | 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 | |

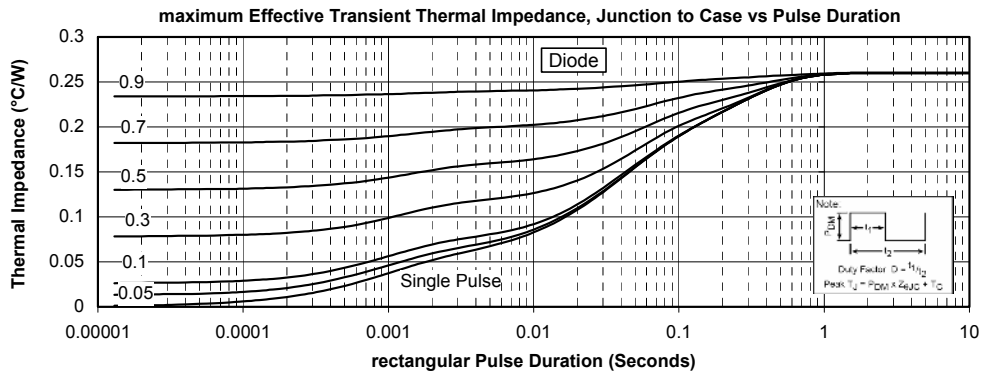
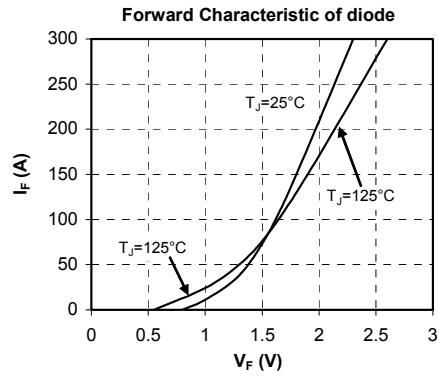
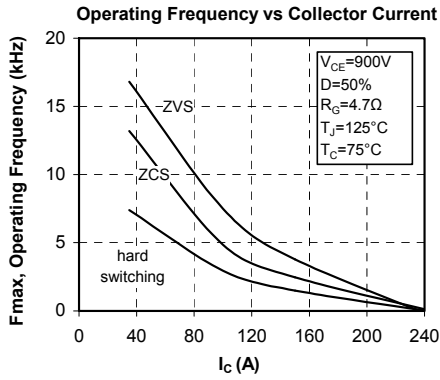
SP6 Package outline (dimensions in mm)



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

Typical Performance Curve





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