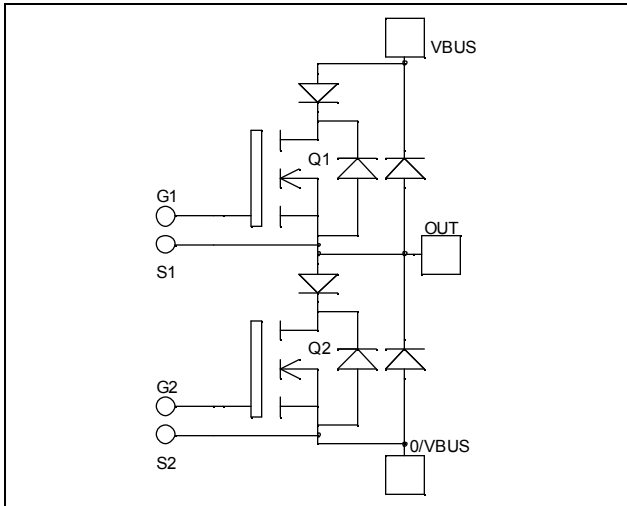


*Phase leg
Series & parallel diodes
MOSFET Power Module*

$V_{DSS} = 1200V$
 $R_{DSon} = 200m\Omega$ typ @ $T_j = 25^\circ C$
 $I_D = 50A$ @ $T_c = 25^\circ C$


Application

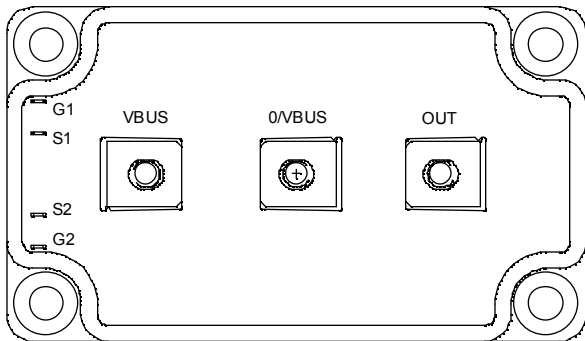
- Motor control
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

Features

- Power MOS 7[®] MOSFETs
 - Low R_{DSon}
 - Low input and Miller capacitance
 - Low gate charge
 - Fast intrinsic reverse diode
 - Avalanche energy rated
 - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
 - Symmetrical design
 - M5 power connectors
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Low profile
- RoHS Compliant


Absolute maximum ratings

| Symbol | Parameter | Max ratings | Unit |
|------------|---|--------------------|------------|
| V_{DSS} | Drain - Source Breakdown Voltage | 1200 | V |
| I_D | Continuous Drain Current | $T_c = 25^\circ C$ | 50 |
| | | $T_c = 80^\circ C$ | 37 |
| I_{DM} | Pulsed Drain current | 200 | A |
| V_{GS} | Gate - Source Voltage | ± 30 | V |
| R_{DSon} | Drain - Source ON Resistance | 240 | m Ω |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ | 1250 |
| I_{AR} | Avalanche current (repetitive and non repetitive) | 12 | A |
| E_{AR} | Repetitive Avalanche Energy | 30 | mJ |
| E_{AS} | Single Pulse Avalanche Energy | 1300 | |

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_{DSS} | Zero Gate Voltage Drain Current | $V_{GS} = 0\text{V}, V_{DS} = 1200\text{V}$ | | | 1.5 | mA |
| | | $V_{GS} = 0\text{V}, V_{DS} = 1000\text{V}$ | | | 6 | |
| $R_{DS(on)}$ | Drain – Source on Resistance | $V_{GS} = 10\text{V}, I_D = 25\text{A}$ | | 200 | 240 | m Ω |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS} = V_{DS}, I_D = 6\text{mA}$ | 3 | | 5 | V |
| I_{GSS} | Gate – Source Leakage Current | $V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$ | | | ± 450 | nA |

Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|------------------------------|---|-----|------|-----|------|
| C_{iss} | Input Capacitance | $V_{GS} = 0\text{V}$ | | 15.2 | | nF |
| C_{oss} | Output Capacitance | $V_{DS} = 25\text{V}$ | | 2.2 | | |
| C_{rss} | Reverse Transfer Capacitance | $f = 1\text{MHz}$ | | 0.42 | | |
| Q_g | Total gate Charge | $V_{GS} = 10\text{V}$ | | 600 | | nC |
| Q_{gs} | Gate – Source Charge | $V_{Bus} = 600\text{V}$ | | 84 | | |
| Q_{gd} | Gate – Drain Charge | $I_D = 50\text{A}$ | | 390 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive switching @ 125°C $V_{GS} = 15\text{V}$ $V_{Bus} = 800\text{V}$ $I_D = 50\text{A}$ $R_G = 0.8\Omega$ | | 10 | | ns |
| T_r | Rise Time | | | 10 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 68 | | |
| T_f | Fall Time | | | 36 | | |
| E_{on} | Turn-on Switching Energy | Inductive switching @ 25°C $V_{GS} = 15\text{V}, V_{Bus} = 800\text{V}$ $I_D = 50\text{A}, R_G = 0.8\Omega$ | | 2.79 | | mJ |
| E_{off} | Turn-off Switching Energy | | | 0.6 | | |
| E_{on} | Turn-on Switching Energy | Inductive switching @ 125°C $V_{GS} = 15\text{V}, V_{Bus} = 800\text{V}$ $I_D = 50\text{A}, R_G = 0.8\Omega$ | | 5.6 | | mJ |
| E_{off} | Turn-off Switching Energy | | | 0.81 | | |

Series diode ratings and characteristics

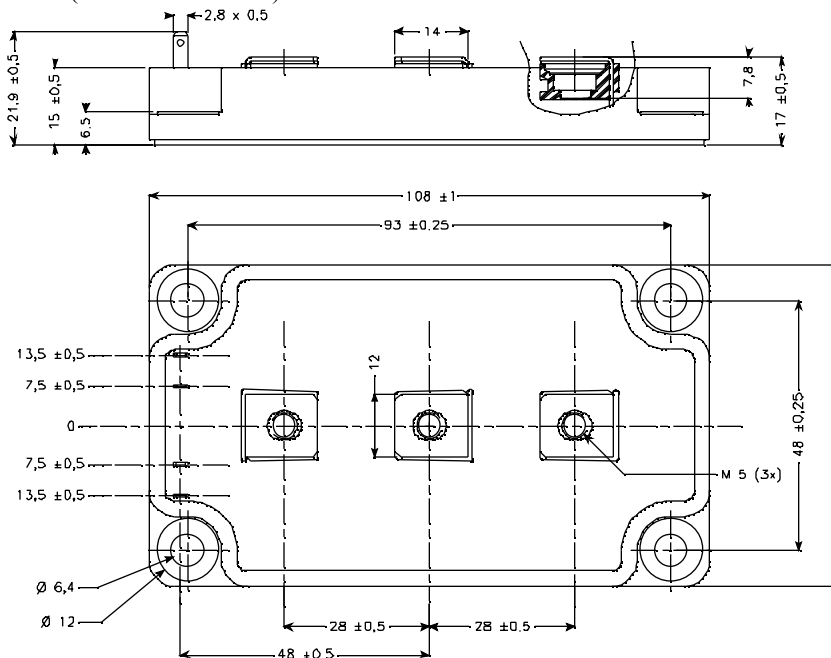
| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|-----------|------------------------------------|--|---------------------------|-----|------|---------------|
| V_{RRM} | Maximum Repetitive Reverse Voltage | | 200 | | | V |
| I_{RM} | Maximum Reverse Leakage Current | $V_R = 200\text{V}$ | $T_j = 25^\circ\text{C}$ | | 350 | μA |
| | | | $T_j = 125^\circ\text{C}$ | | 600 | |
| I_F | DC Forward Current | $T_c = 85^\circ\text{C}$ | | 60 | | A |
| V_F | Diode Forward Voltage | $I_F = 60\text{A}$ | | 1.1 | 1.15 | V |
| | | $I_F = 120\text{A}$ | | 1.4 | | |
| | | $I_F = 60\text{A}$ | $T_j = 125^\circ\text{C}$ | | 0.9 | |
| t_{rr} | Reverse Recovery Time | $I_F = 60\text{A}$ $V_R = 133\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | | 24 | ns |
| | | | $T_j = 125^\circ\text{C}$ | | 48 | |
| Q_{rr} | Reverse Recovery Charge | $I_F = 60\text{A}$ $V_R = 133\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | | 66 | nC |
| | | | $T_j = 125^\circ\text{C}$ | | 300 | |

Parallel diode ratings and characteristics

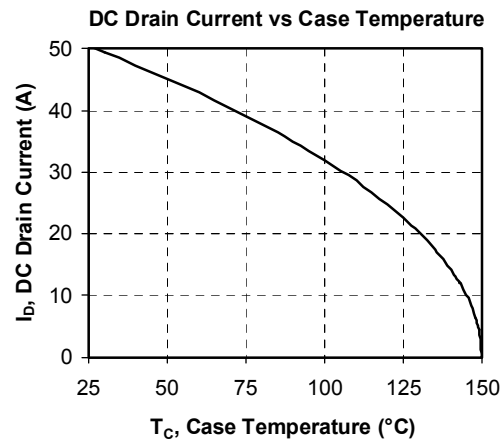
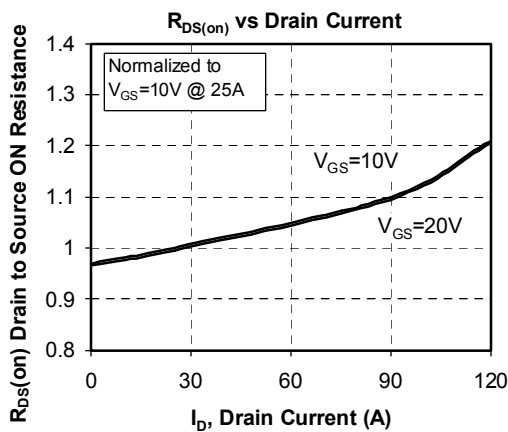
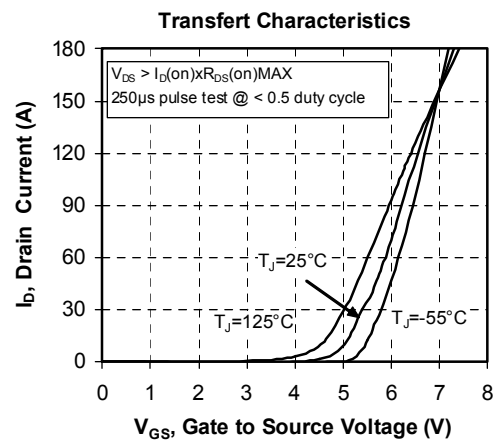
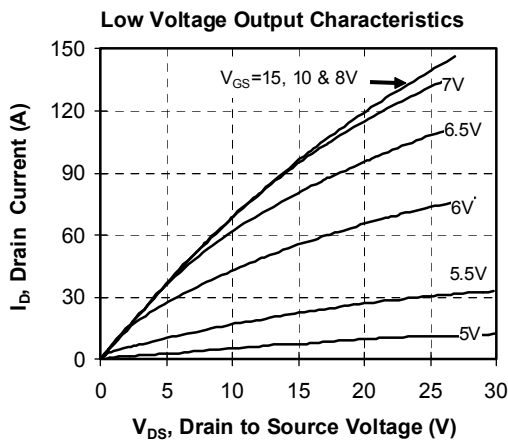
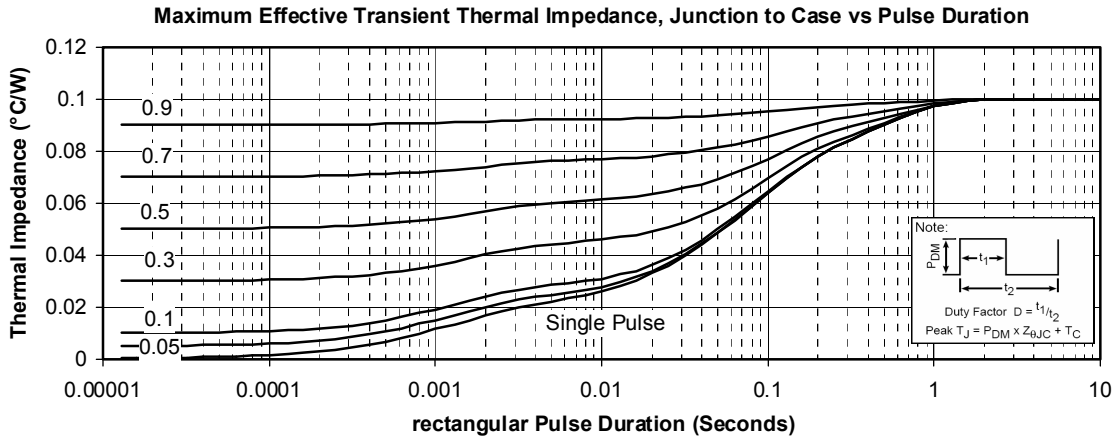
| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|-----------|------------------------------------|--|---------------------|-----|-----|---------|
| V_{RRM} | Maximum Repetitive Reverse Voltage | | 1200 | | | V |
| I_{RM} | Maximum Reverse Leakage Current | $V_R = 1200V$ | $T_j = 25^\circ C$ | | 350 | μA |
| | | | $T_j = 125^\circ C$ | | 600 | |
| I_F | DC Forward Current | | | 120 | | A |
| V_F | Diode Forward Voltage | $I_F = 120A$ | | 2 | 2.5 | V |
| | | $I_F = 240A$ | | 2.3 | | |
| | | $I_F = 120A$ | $T_j = 125^\circ C$ | 1.8 | | |
| t_{rr} | Reverse Recovery Time | $I_F = 120A$ $V_R = 800V$ $di/dt = 400A/\mu s$ | $T_j = 25^\circ C$ | 400 | | ns |
| | | | $T_j = 125^\circ C$ | 470 | | |
| Q_{rr} | Reverse Recovery Charge | $I_F = 120A$ $V_R = 800V$ $di/dt = 400A/\mu s$ | $T_j = 25^\circ C$ | 2.4 | | μC |
| | | | $T_j = 125^\circ C$ | 8 | | |

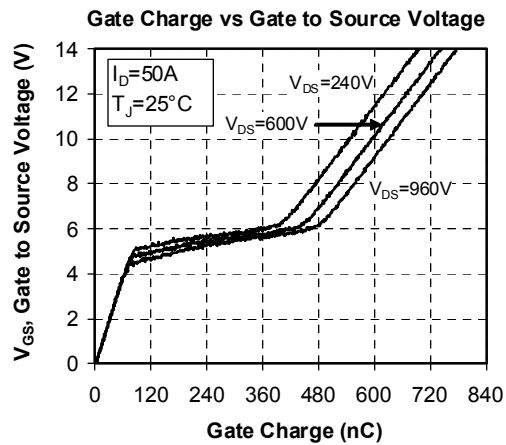
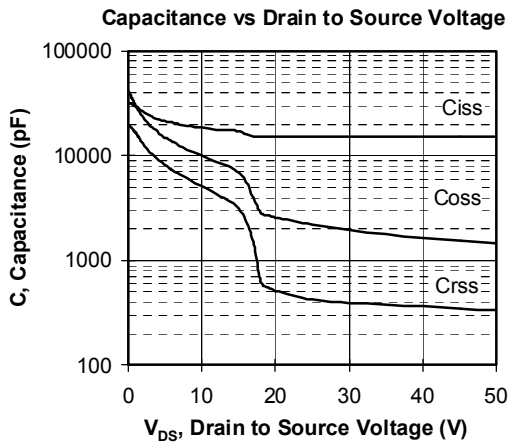
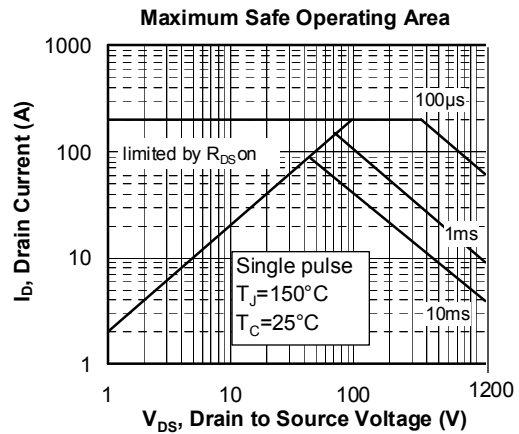
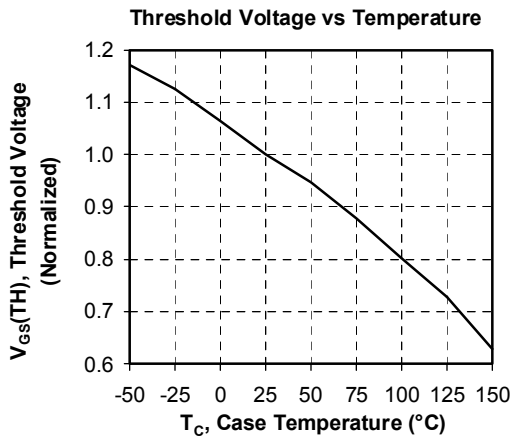
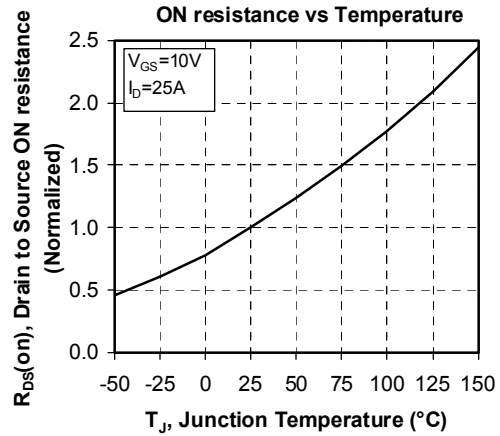
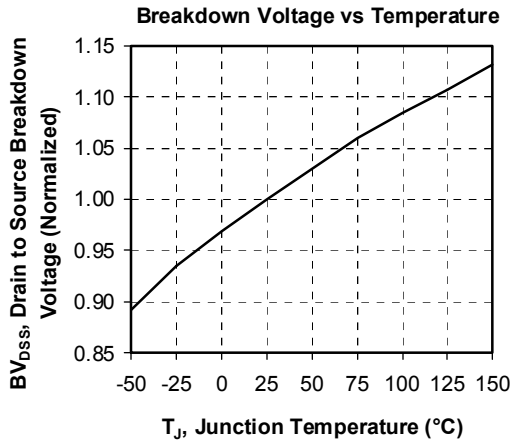
Thermal and package characteristics

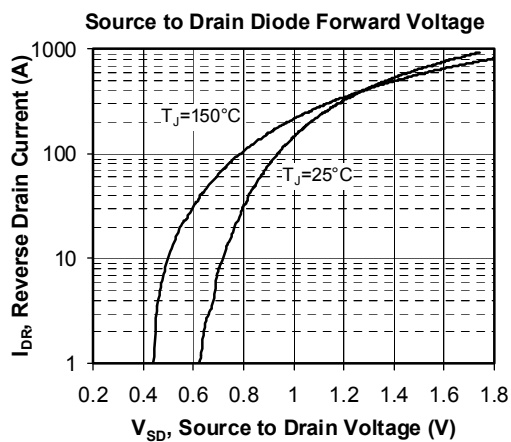
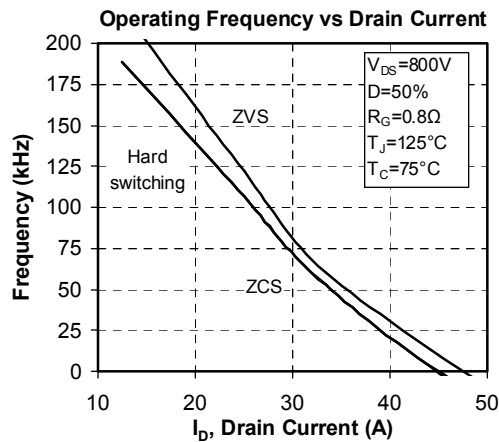
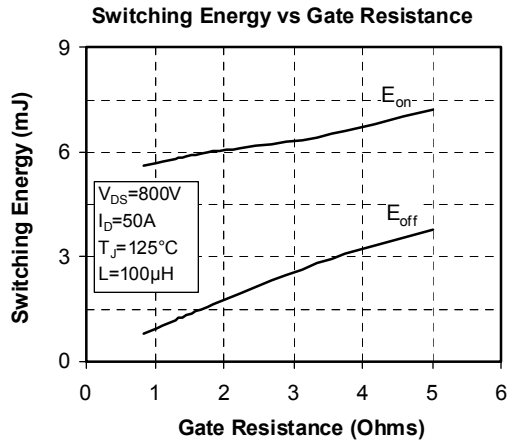
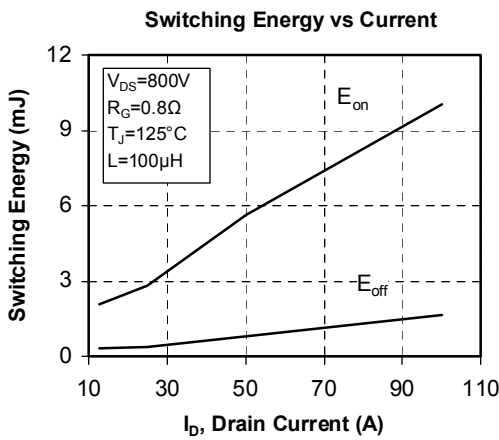
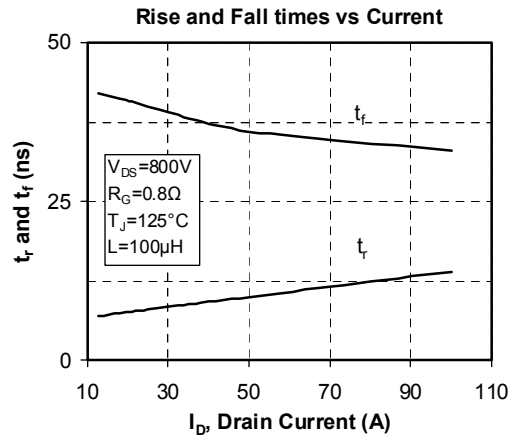
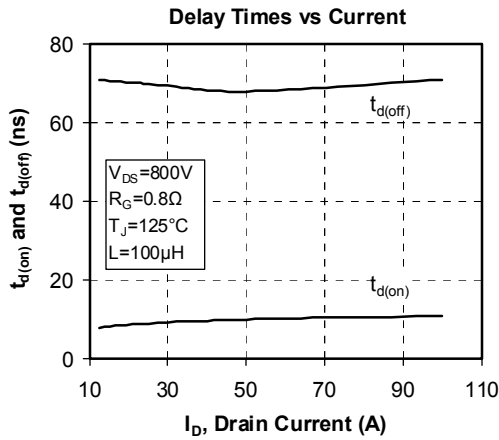
| Symbol | Characteristic | Min | Typ | Max | Unit | |
|------------|---|----------------|-----|------|--------------|-----|
| R_{thJC} | Junction to Case Thermal Resistance | Transistor | | 0.1 | $^\circ C/W$ | |
| | | Series diode | | 0.65 | | |
| | | Parallel diode | | 0.46 | | |
| V_{ISOL} | RMS Isolation Voltage, any terminal to case $t = 1$ min, $I_{isol} < 1mA$, 50/60Hz | 2500 | | | V | |
| T_J | Operating junction temperature range | -40 | | 150 | $^\circ C$ | |
| 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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