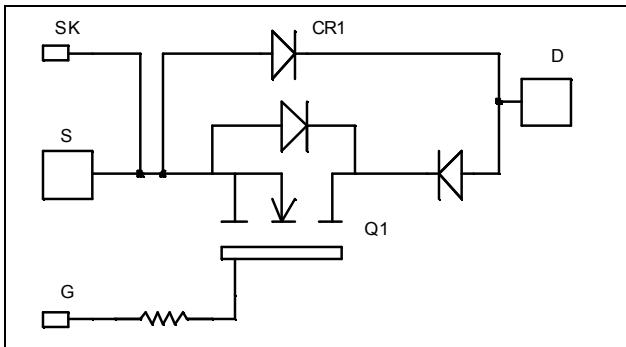


**Single switch
Series & parallel diodes
MOSFET Power Module**

$V_{DSS} = 1200V$
 $R_{DSon} = 100m\Omega$ typ @ $T_j = 25^\circ C$
 $I_D = 116A$ @ $T_c = 25^\circ C$

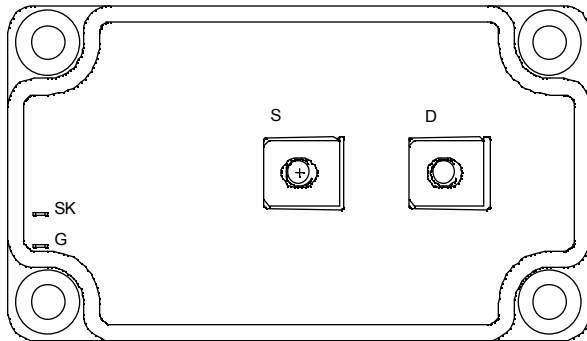


Application

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

Features

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



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 | $T_c = 25^\circ C$ | 116 |
| | | $T_c = 80^\circ C$ | 86 |
| I_{DM} | Pulsed Drain current | 464 | A |
| V_{GS} | Gate - Source Voltage | ± 30 | V |
| R_{DSon} | Drain - Source ON Resistance | 120 | $m\Omega$ |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ | 3290 |
| I_{AR} | Avalanche current (repetitive and non repetitive) | 24 | A |
| E_{AR} | Repetitive Avalanche Energy | 50 | mJ |
| E_{AS} | Single Pulse Avalanche Energy | 3200 | |

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 | mA |
| | | $V_{GS} = 0\text{V}, V_{DS} = 1000\text{V}$ | | | 3 | |
| $R_{DS(on)}$ | Drain – Source on Resistance | $V_{GS} = 10\text{V}, I_D = 58\text{A}$ | | 100 | 120 | m Ω |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS} = V_{DS}, I_D = 20\text{mA}$ | 3 | | 5 | V |
| I_{GSS} | Gate – Source Leakage Current | $V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$ | | | ± 400 | nA |

Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|------------------------------|--|-----|------|-----|------|
| C_{iss} | Input Capacitance | $V_{GS} = 0\text{V}$ | | 28.9 | | nF |
| C_{oss} | Output Capacitance | $V_{DS} = 25\text{V}$ | | 4.4 | | |
| C_{rss} | Reverse Transfer Capacitance | $f = 1\text{MHz}$ | | 0.8 | | |
| Q_g | Total gate Charge | $V_{GS} = 10\text{V}$ $V_{Bus} = 600\text{V}$ $I_D = 116\text{A}$ | | 1100 | | nC |
| Q_{gs} | Gate – Source Charge | | | 128 | | |
| Q_{gd} | Gate – Drain Charge | | | 716 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive switching @ 125°C $V_{GS} = 15\text{V}$ $V_{Bus} = 800\text{V}$ $I_D = 116\text{A}$ $R_G = 1.2\Omega$ | | 20 | | ns |
| T_r | Rise Time | | | 17 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 245 | | |
| T_f | Fall Time | | | 62 | | |
| E_{on} | Turn-on Switching Energy | Inductive switching @ 25°C $V_{GS} = 15\text{V}, V_{Bus} = 800\text{V}$ $I_D = 116\text{A}, R_G = 1.2\Omega$ | | 5 | | mJ |
| E_{off} | Turn-off Switching Energy | | | 4.6 | | |
| E_{on} | Turn-on Switching Energy | Inductive switching @ 125°C $V_{GS} = 15\text{V}, V_{Bus} = 800\text{V}$ $I_D = 116\text{A}, R_G = 1.2\Omega$ | | 9.2 | | mJ |
| E_{off} | Turn-off Switching Energy | | | 5.6 | | |

Series diode ratings and characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|-----------|---|---|---------------------------|-----|------|---------------|
| V_{RRM} | Maximum Peak 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 | $T_c = 80^\circ\text{C}$ | | 120 | | A |
| V_F | Diode Forward Voltage | $I_F = 120\text{A}$ | | 1.1 | 1.15 | V |
| | | $I_F = 240\text{A}$ | | 1.4 | | |
| | | $I_F = 120\text{A}$ | $T_j = 125^\circ\text{C}$ | | 0.9 | |
| t_{rr} | Reverse Recovery Time | $I_F = 120\text{A}$ $V_R = 133\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | | 31 | ns |
| | | | $T_j = 125^\circ\text{C}$ | | 60 | |
| Q_{rr} | Reverse Recovery Charge | $I_F = 120\text{A}$ $V_R = 133\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | | 120 | nC |
| | | | $T_j = 125^\circ\text{C}$ | | 500 | |

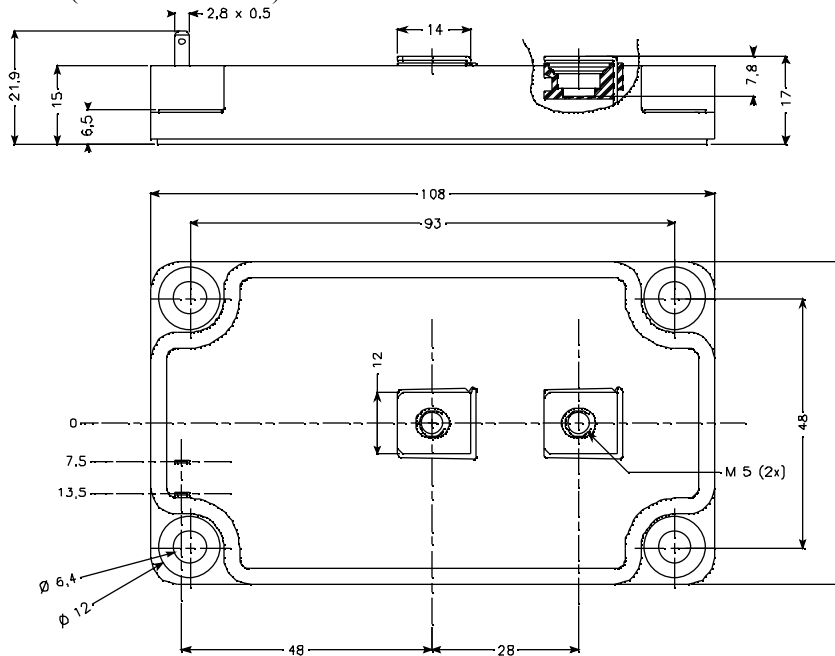
Parallel diode ratings and characteristics

| Symbol | Characteristic | Test Conditions | | Min | Typ | Max | Unit |
|-----------|---|--|---------------------|------|-----|-----|---------|
| V_{RRM} | Maximum Peak Repetitive Reverse Voltage | | | 1200 | | | V |
| I_{RM} | Maximum Reverse Leakage Current | $V_R=1200V$ | $T_j = 25^\circ C$ | | | 250 | μA |
| | | | $T_j = 125^\circ C$ | | | 750 | |
| I_F | DC Forward Current | | | | 180 | | A |
| V_F | Diode Forward Voltage | $I_F = 180A$ | | | 2.5 | 3 | V |
| | | $I_F = 360A$ | | | 3 | | |
| | | $I_F = 180A$ | $T_j = 125^\circ C$ | | 1.8 | | |
| t_{rr} | Reverse Recovery Time | $I_F = 180A$ $V_R = 800V$ $di/dt = 600A/\mu s$ | $T_j = 25^\circ C$ | | 265 | | ns |
| | | | $T_j = 125^\circ C$ | | 350 | | |
| Q_{rr} | Reverse Recovery Charge | $I_F = 180A$ $V_R = 800V$ $di/dt = 600A/\mu s$ | $T_j = 25^\circ C$ | | 3.6 | | μC |
| | | | $T_j = 125^\circ C$ | | 12 | | |

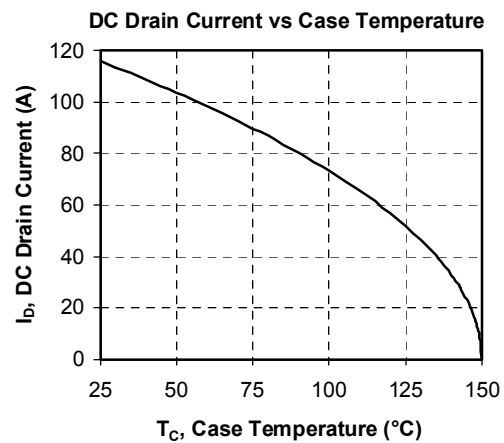
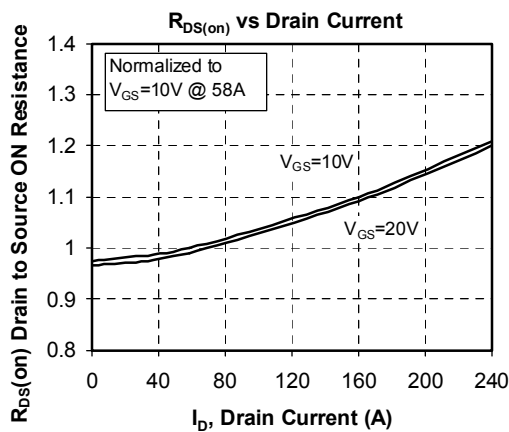
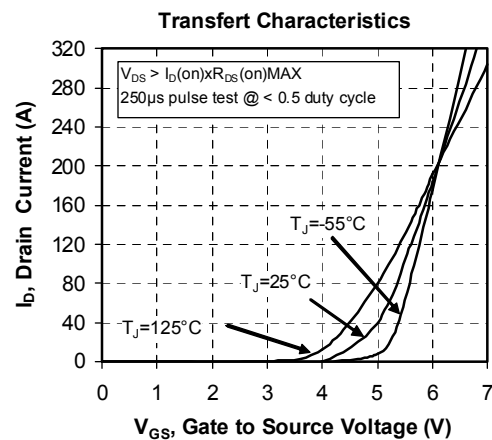
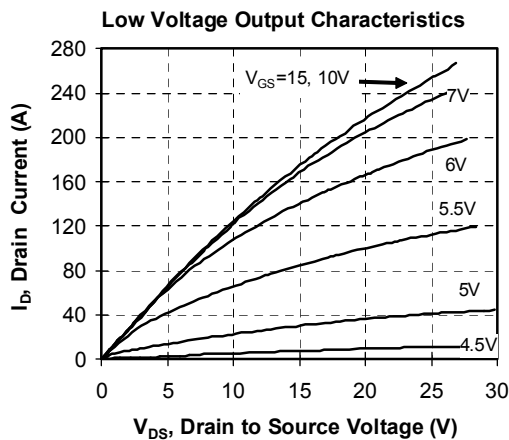
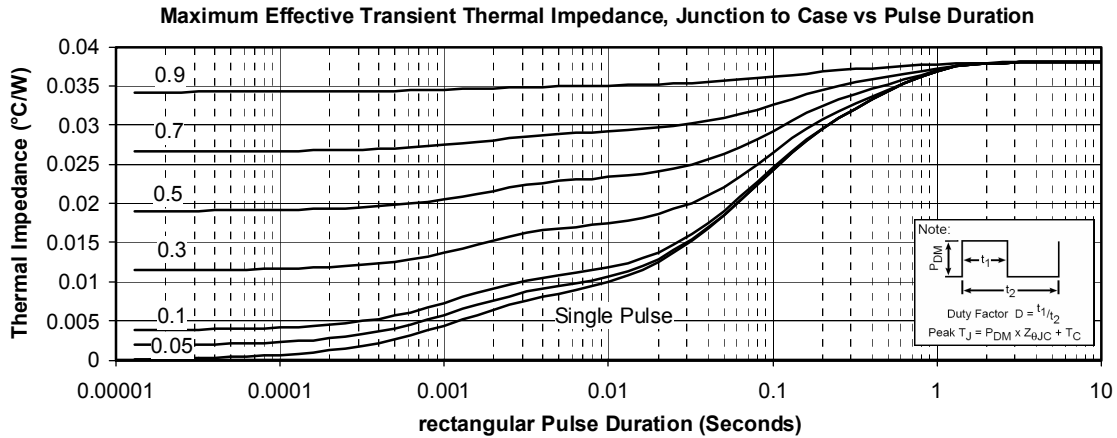
Thermal and package characteristics

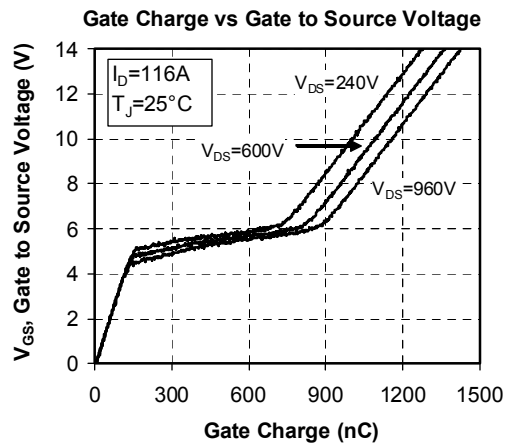
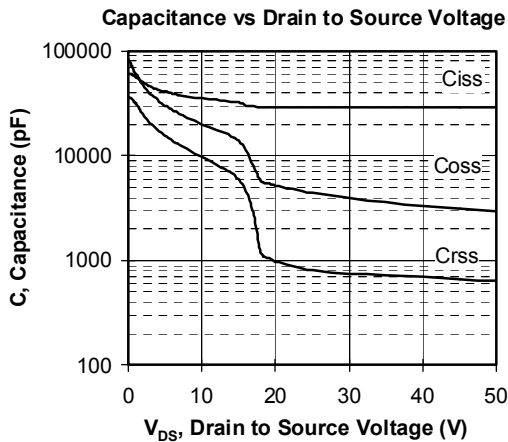
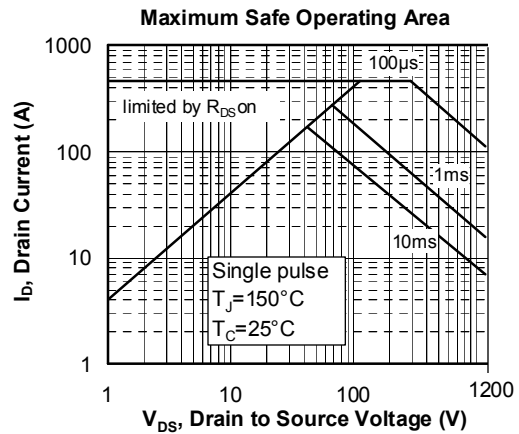
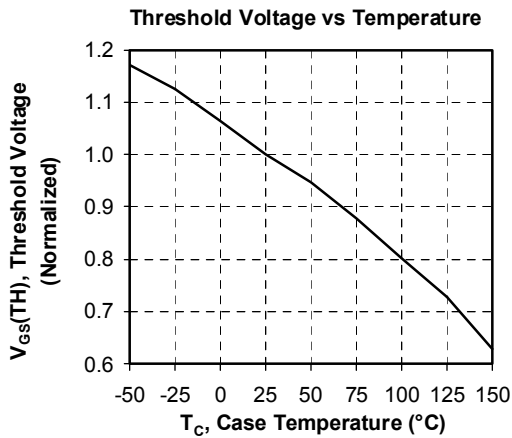
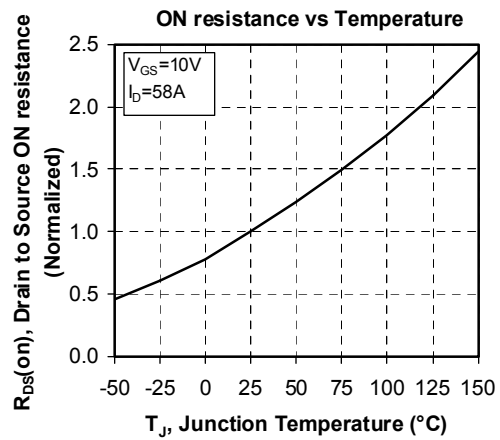
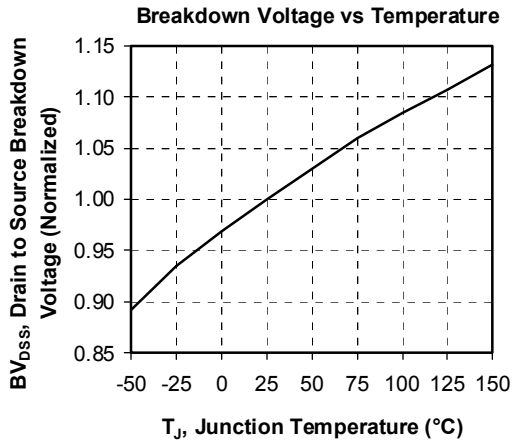
| Symbol | Characteristic | | | Min | Typ | Max | Unit |
|------------|---|----------------|----|------|-----|-------|--------------|
| R_{thJC} | Junction to Case Thermal Resistance | Transistor | | | | 0.038 | $^\circ C/W$ |
| | | Series diode | | | | 0.46 | |
| | | Parallel diode | | | | 0.32 | |
| 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 |

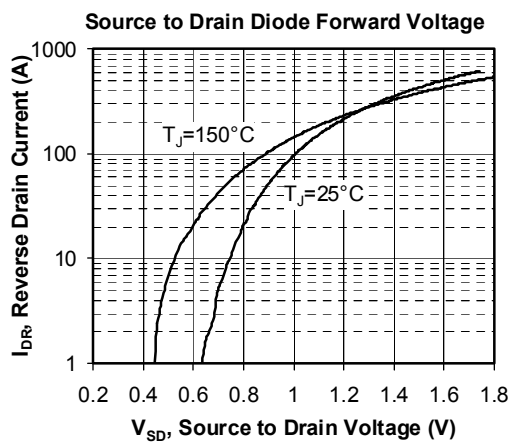
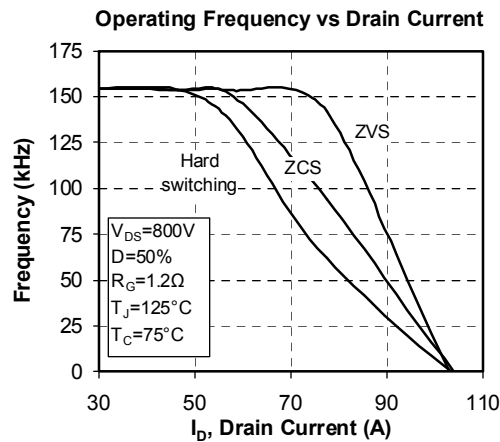
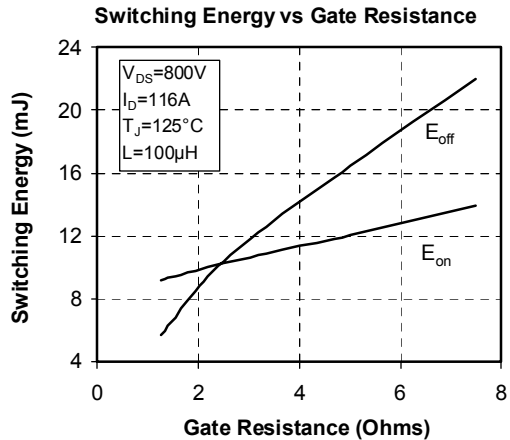
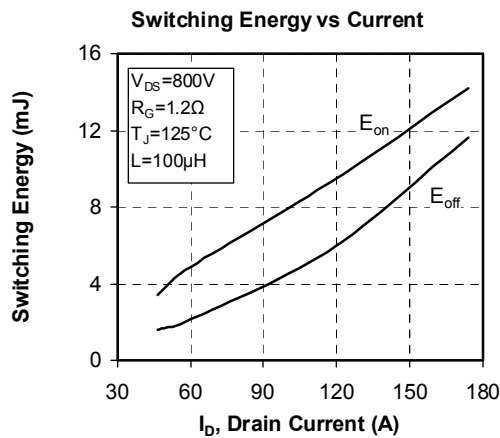
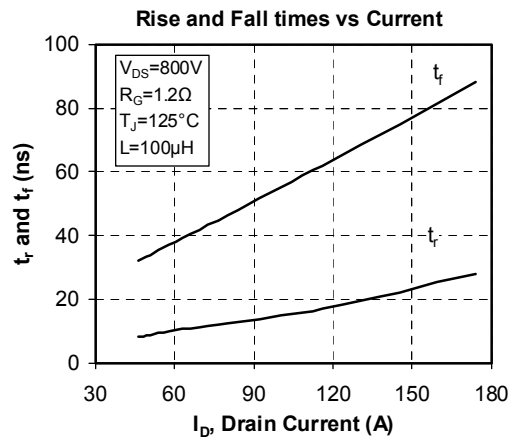
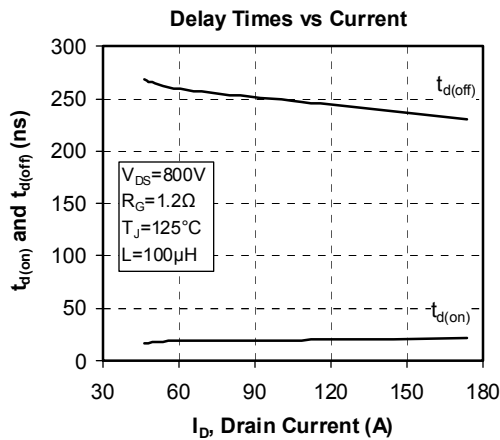
SP6 Package outline (dimensions in mm)



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

Typical Performance Curve






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