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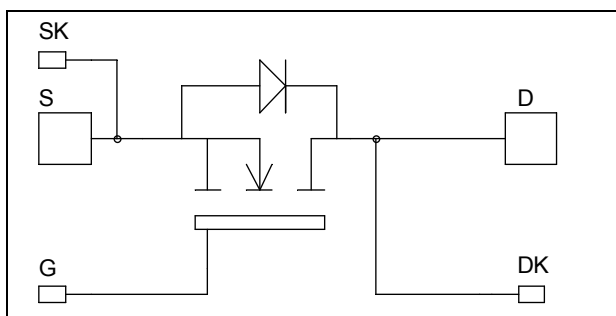


Single Switch MOSFET Power Module

$$V_{DSS} = 1000V$$

$$R_{DSon} = 60m\Omega \text{ typ @ } T_j = 25^\circ C$$

$$I_D = 129A \text{ @ } T_c = 25^\circ C$$



Application

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

Features

- Power MOS 7[®] FREDFETs
 - 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
- AlN substrate for 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 | 1000 | V |
| I_D | Continuous Drain Current | $T_c = 25^\circ C$ 129 $T_c = 80^\circ C$ 97 | A |
| I_{DM} | Pulsed Drain current | 516 | |
| V_{GS} | Gate - Source Voltage | ± 30 | V |
| R_{DSon} | Drain - Source ON Resistance | 70 | m Ω |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ 2272 | W |
| I_{AR} | Avalanche current (repetitive and non repetitive) | 25 | A |
| E_{AR} | Repetitive Avalanche Energy | 50 | mJ |
| E_{AS} | Single Pulse Avalanche Energy | 3000 | |

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 | $V_{GS} = 0V, V_{DS} = 1000V$ $T_j = 25^\circ\text{C}$ | | | 600 | μA |
| | | $V_{GS} = 0V, V_{DS} = 800V$ $T_j = 125^\circ\text{C}$ | | | 3 | |
| $R_{DS(on)}$ | Drain – Source on Resistance | $V_{GS} = 10V, I_D = 64.5A$ | | 60 | 70 | $\text{m}\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS} = V_{DS}, I_D = 15\text{mA}$ | 3 | | 5 | V |
| I_{GSS} | Gate – Source Leakage Current | $V_{GS} = \pm 30V, V_{DS} = 0V$ | | | ± 500 | nA |

Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|------------------------------|--|-----|------|-----|------|
| C_{iss} | Input Capacitance | $V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{MHz}$ | | 31.1 | | nF |
| C_{oss} | Output Capacitance | | | 5.28 | | |
| C_{rss} | Reverse Transfer Capacitance | | | 0.96 | | |
| Q_g | Total gate Charge | $V_{GS} = 10V$ $V_{Bus} = 500V$ $I_D = 129A$ | | 1116 | | nC |
| Q_{gs} | Gate – Source Charge | | | 144 | | |
| Q_{gd} | Gate – Drain Charge | | | 732 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive switching @ 125°C $V_{GS} = 15V$ $V_{Bus} = 670V$ $I_D = 129A$ $R_G = 0.8\Omega$ | | 18 | | ns |
| T_r | Rise Time | | | 12 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 155 | | |
| T_f | Fall Time | | | 40 | | |
| E_{on} | Turn-on Switching Energy | Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 670V$ $I_D = 129A, R_G = 0.8\Omega$ | | 5.4 | | mJ |
| E_{off} | Turn-off Switching Energy | | | 3.7 | | |
| E_{on} | Turn-on Switching Energy | Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 670V$ $I_D = 129A, R_G = 0.8\Omega$ | | 8.5 | | mJ |
| E_{off} | Turn-off Switching Energy | | | 4.7 | | |

Source - Drain diode ratings and characteristics

| Symbol | Characteristic | Test Conditions | | Min | Typ | Max | Unit |
|-----------------|---|---|------------------------|-----|------|-----|------|
| I _S | Continuous Source current (Body diode) | | T _C = 25°C | | | 129 | A |
| | | | T _C = 80°C | | | 97 | |
| V _{SD} | Diode Forward Voltage | V _{GS} = 0V, I _S = - 129A | | | | 1.3 | V |
| dv/dt | Peak Diode Recovery ❶ | | | | | 18 | V/ns |
| t _{rr} | Reverse Recovery Time | I _S = - 129A V _R = 670V di _S /dt = 600A/μs | T _j = 25°C | | | 320 | ns |
| | | | T _j = 125°C | | | 650 | |
| Q _{rr} | Reverse Recovery Charge | | T _j = 25°C | | 21.6 | | μC |
| | | | T _i = 125°C | | 58.3 | | |

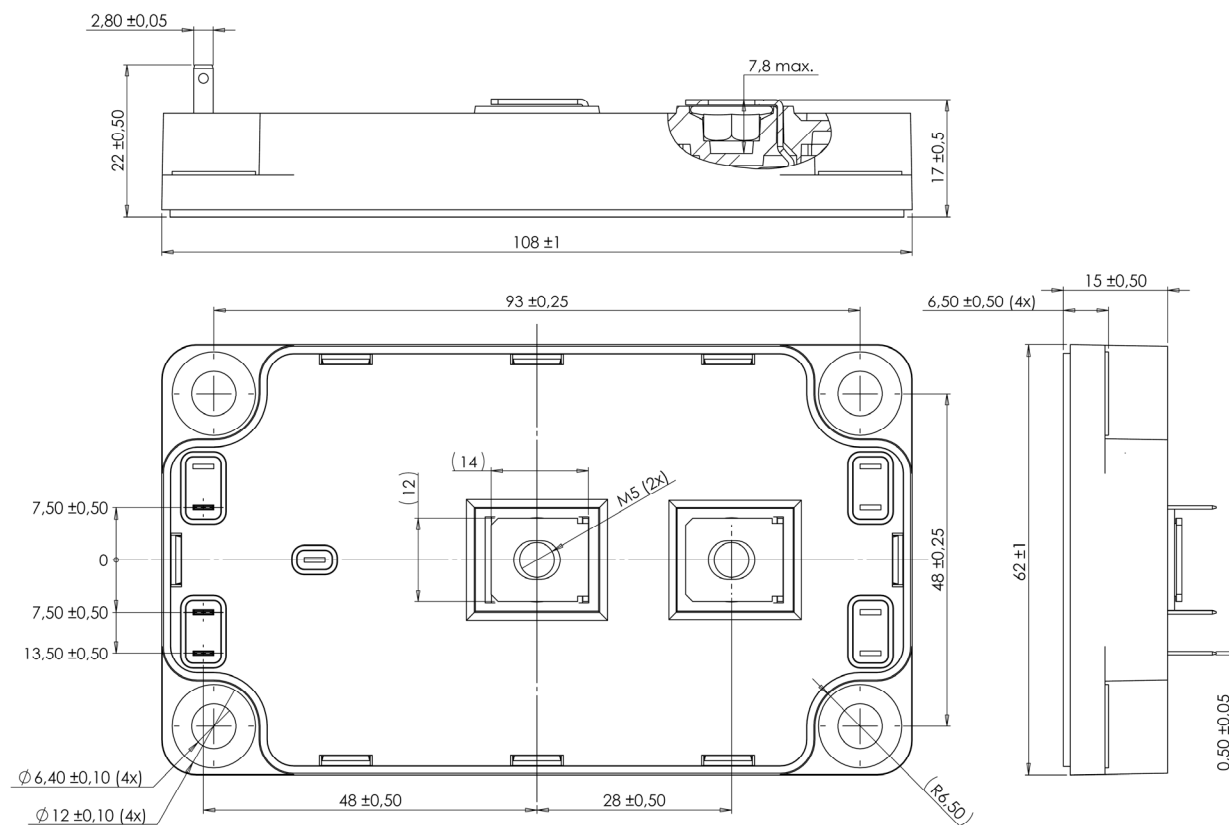
❶ dv/dt numbers reflect the limitations of the circuit rather than the device itself.

$I_S \leq -129A$ $di/dt \leq 700A/\mu\text{s}$ $V_R \leq V_{DSS}$ $T_j \leq 150^\circ\text{C}$

Thermal and package characteristics

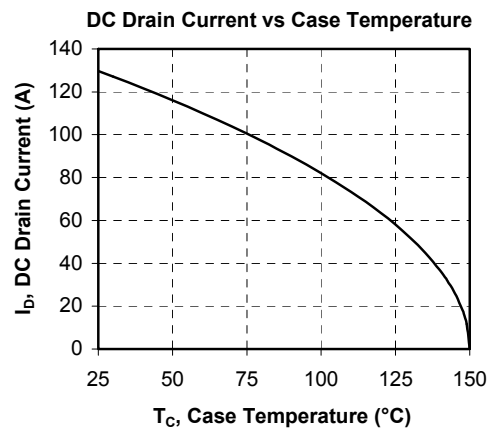
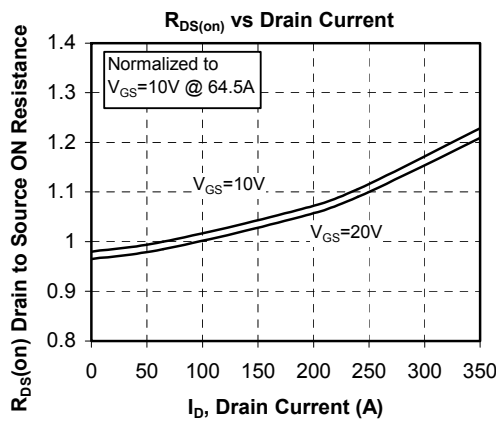
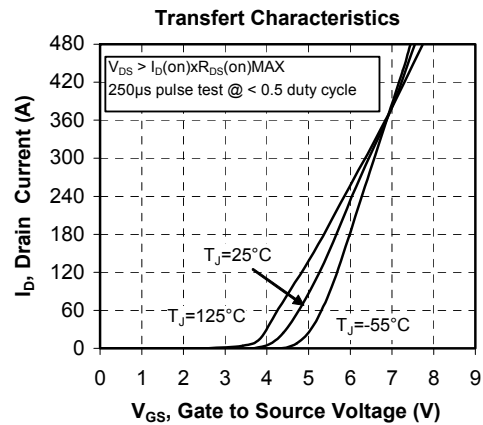
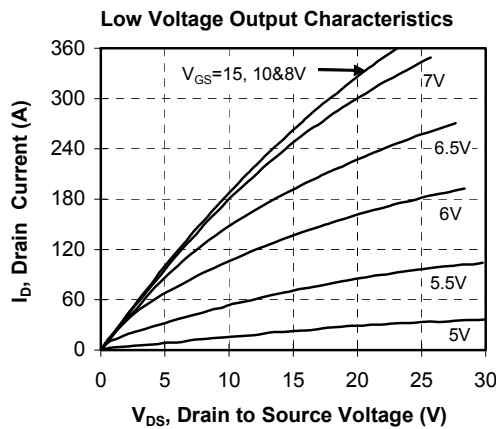
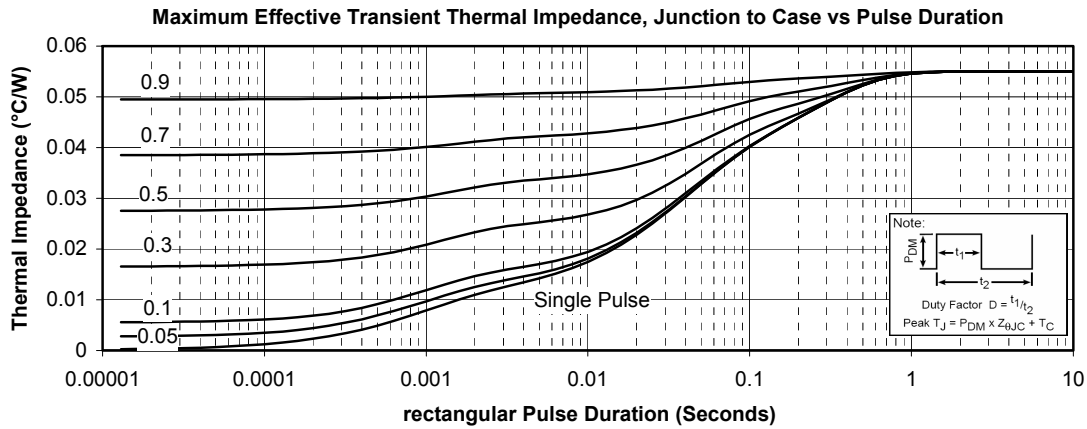
| Symbol | Characteristic | Min | Typ | Max | Unit |
|-------------------|---|---------------|-----|-------|------|
| R _{thJC} | Junction to Case Thermal Resistance | | | 0.055 | °C/W |
| V _{ISOL} | RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz | 4000 | | | V |
| T _J | Operating junction 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 | N.m |
| | | For terminals | M5 | 2 | |
| Wt | Package Weight | | | 300 | g |

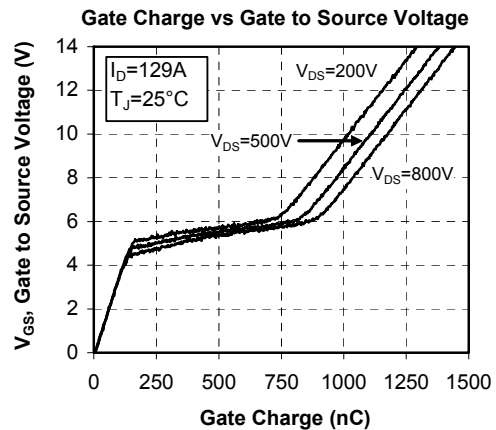
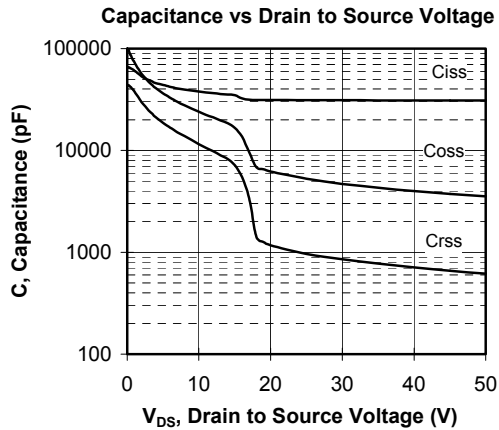
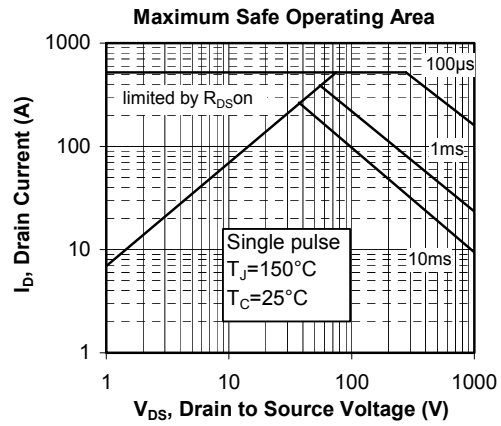
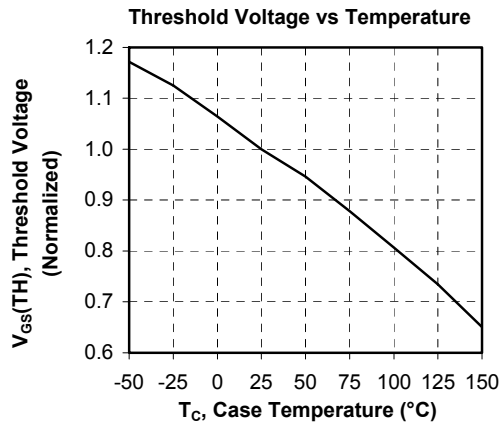
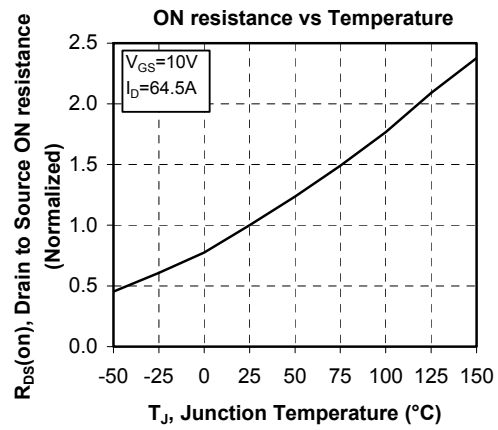
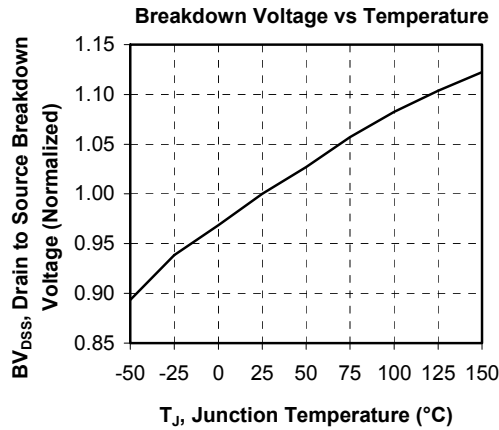
SP6 Package outline (dimensions in mm)

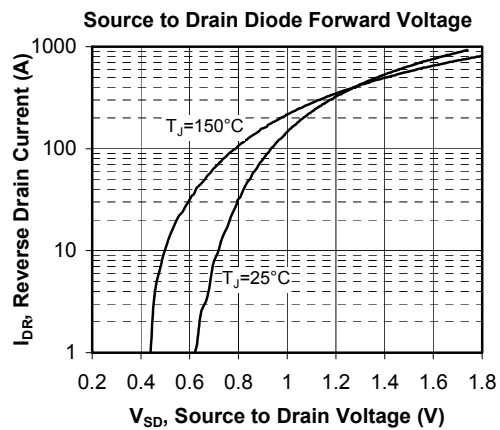
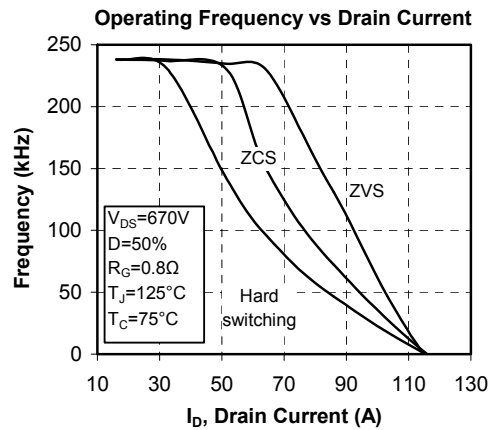
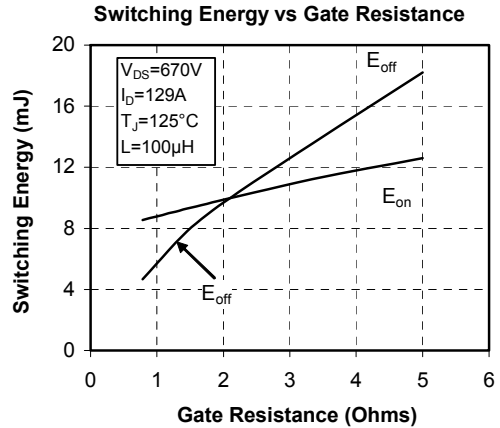
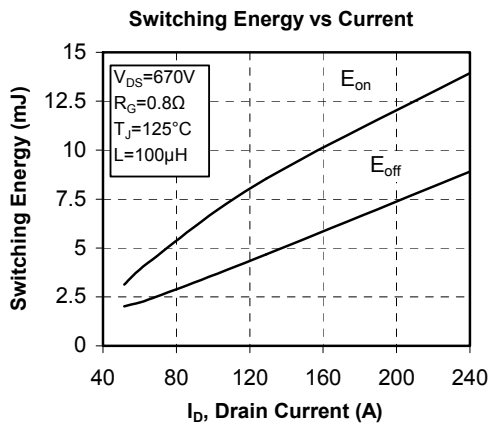
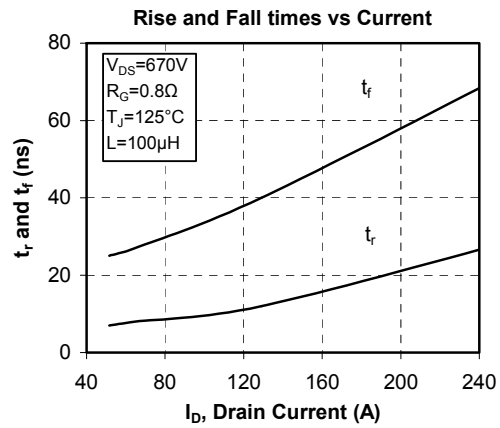
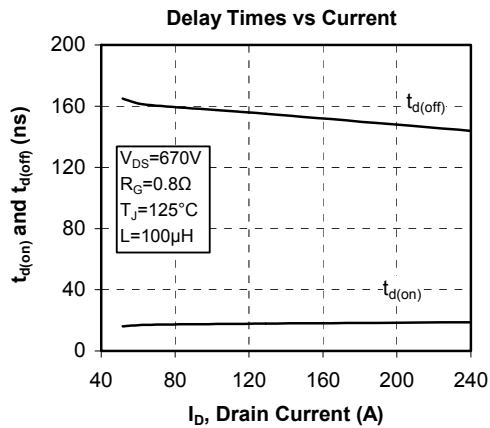


See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical Performance Curve







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