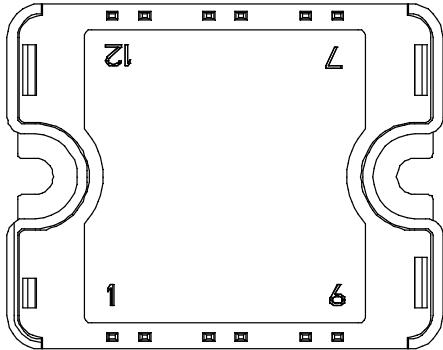
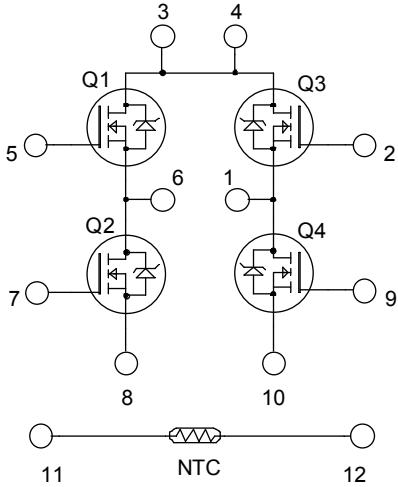


**Full - Bridge
MOSFET Power Module**

$V_{DSS} = 500V$
 $R_{DSon} = 130m\Omega$ typ @ $T_j = 25^\circ C$
 $I_D = 25A$ @ $T_c = 25^\circ C$



Pins 3/4 must be shorted together

Application

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

Features

- Power MOS 8™ FREDFETs
 - Low R_{DSon}
 - Low input and Miller capacitance
 - Low gate charge
 - Fast intrinsic reverse diode
 - Avalanche energy rated
 - Very rugged
- Very low stray inductance
 - Symmetrical design
- Internal thermistor for temperature monitoring
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Low profile
- Each leg can be easily paralleled to achieve a phase leg of twice the current capability
- RoHS Compliant

Absolute maximum ratings

| Symbol | Parameter | Max ratings | Unit |
|------------|---|--------------------|-----------|
| V_{DSS} | Drain - Source Breakdown Voltage | 500 | V |
| I_D | Continuous Drain Current | $T_c = 25^\circ C$ | 25 |
| | | $T_c = 80^\circ C$ | 19 |
| I_{DM} | Pulsed Drain current | 135 | |
| V_{GS} | Gate - Source Voltage | ± 30 | V |
| R_{DSon} | Drain - Source ON Resistance | 156 | $m\Omega$ |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ | 208 |
| I_{AR} | Avalanche current (repetitive and non repetitive) | 21 | A |

 **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 | $V_{DS} = 500\text{V}$ $V_{GS} = 0\text{V}$ | $T_j = 25^\circ\text{C}$ | | | 250 | μA |
| | | | $T_j = 125^\circ\text{C}$ | | | 1000 | |
| $R_{DS(on)}$ | Drain – Source on Resistance | $V_{GS} = 10\text{V}$, $I_D = 21\text{A}$ | | | 130 | 156 | $\text{m}\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS} = V_{DS}$, $I_D = 1\text{mA}$ | | 3 | 4 | 5 | V |
| I_{GSS} | Gate – Source Leakage Current | $V_{GS} = \pm 30\text{ V}$ | | | | ± 100 | nA |

Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | | Min | Typ | Max | Unit |
|--------------|------------------------------|---|--|-----|------|-----|-------------|
| C_{iss} | Input Capacitance | $V_{GS} = 0\text{V}$ $V_{DS} = 25\text{V}$ $f = 1\text{MHz}$ | | | 5448 | | pF |
| C_{oss} | Output Capacitance | | | | 735 | | |
| C_{rss} | Reverse Transfer Capacitance | | | | 72 | | |
| Q_g | Total gate Charge | $V_{GS} = 10\text{V}$ $V_{Bus} = 250\text{V}$ $I_D = 21\text{A}$ | | | 170 | | nC |
| Q_{gs} | Gate – Source Charge | | | | 38 | | |
| Q_{gd} | Gate – Drain Charge | | | | 80 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Resistive switching @ 25°C $V_{GS} = 15\text{V}$ $V_{Bus} = 333\text{V}$ $I_D = 21\text{A}$ $R_G = 4.7\Omega$ | | | 29 | | ns |
| T_r | Rise Time | | | | 35 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | | 80 | | |
| T_f | Fall Time | | | | 26 | | |

Source - Drain diode ratings and characteristics

| Symbol | Characteristic | Test Conditions | | Min | Typ | Max | Unit | |
|----------|---|--|---------------------------|-----|------|-----|---------------|--|
| I_S | Continuous Source current (Body diode) | | $T_c = 25^\circ\text{C}$ | | | 25 | A | |
| | | | $T_c = 80^\circ\text{C}$ | | | 19 | | |
| V_{SD} | Diode Forward Voltage | $V_{GS} = 0\text{V}$, $I_S = - 21\text{A}$ | | | | 1 | V | |
| dv/dt | Peak Diode Recovery ① | | | | | 30 | V/ns | |
| t_{rr} | Reverse Recovery Time | $I_S = - 21\text{A}$ $V_R = 100\text{V}$ $di_S/dt = 100\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | | | 215 | ns | |
| | | | $T_j = 125^\circ\text{C}$ | | | 370 | | |
| Q_{rr} | Reverse Recovery Charge | | $T_j = 25^\circ\text{C}$ | | 0.90 | | μC | |
| | | | $T_j = 125^\circ\text{C}$ | | 2.6 | | | |

 ① dv/dt numbers reflect the limitations of the circuit rather than the device itself.

 $I_S \leq - 21\text{A}$ $di/dt \leq 1000\text{A}/\mu\text{s}$ $V_{DD} \leq 333\text{V}$ $T_j \leq 125^\circ\text{C}$

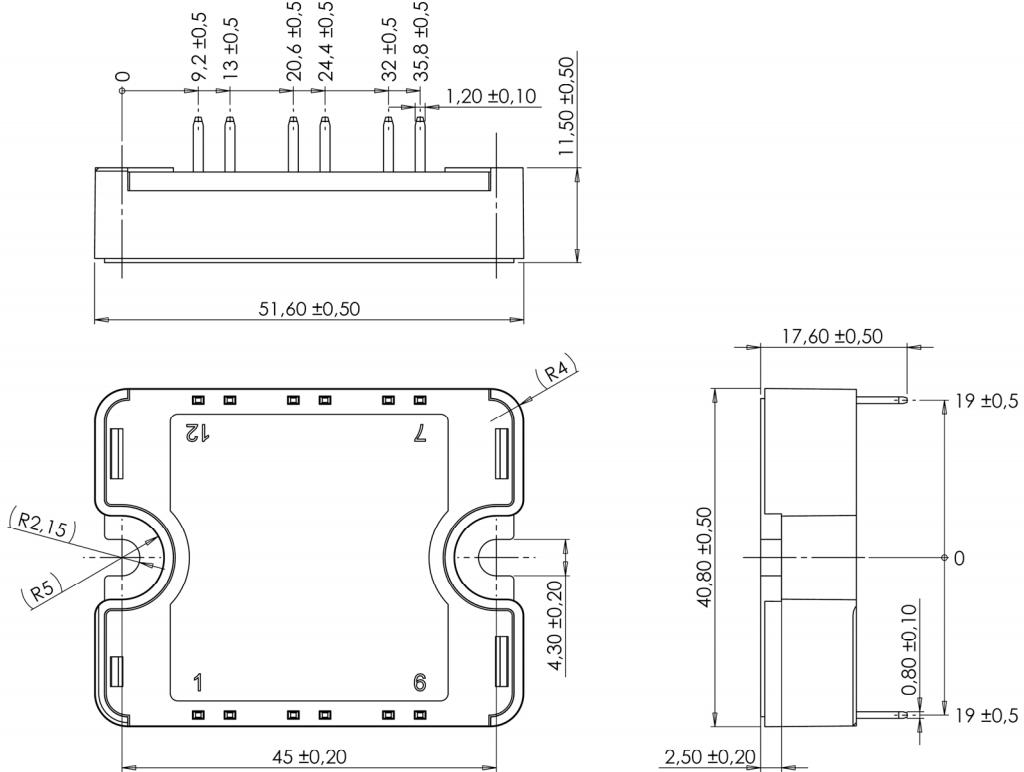
Thermal and package characteristics

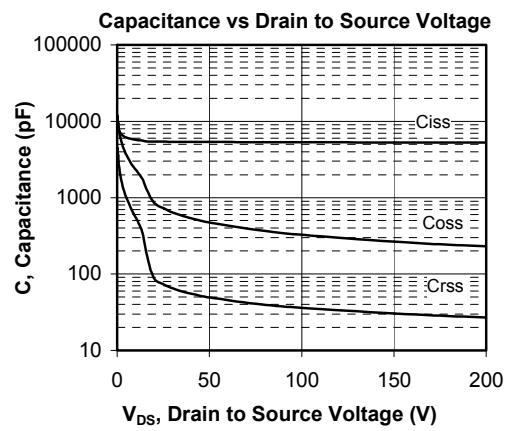
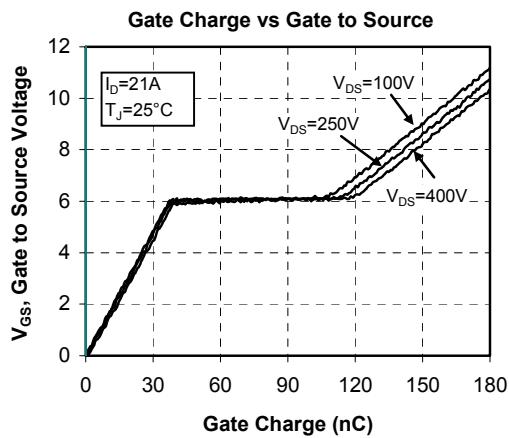
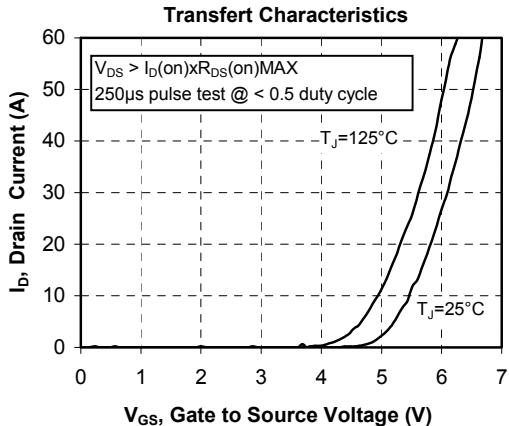
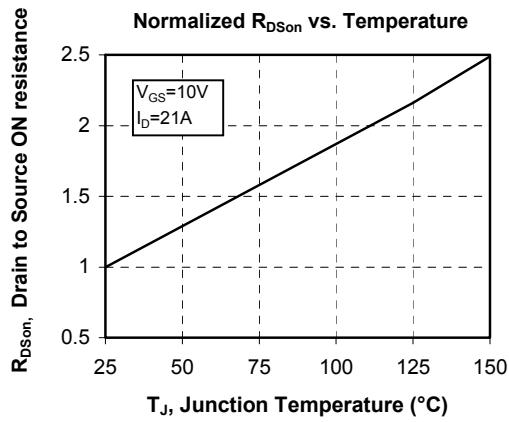
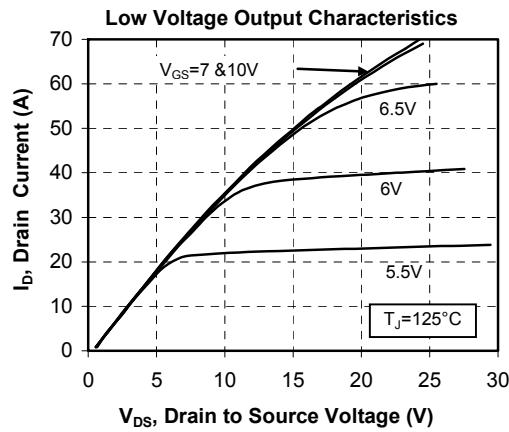
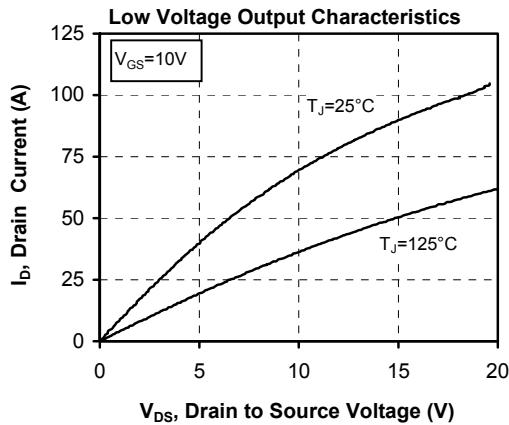
| Symbol | Characteristic | | Min | Typ | Max | Unit |
|------------|--|-------------|------|-----|-----|------|
| R_{thJC} | Junction to Case Thermal Resistance | | | | 0.6 | °C/W |
| V_{ISOL} | RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz | | 4000 | | | V |
| T_J | Operating junction temperature range | | -40 | | 150 | |
| T_{STG} | Storage Temperature Range | | -40 | | 125 | °C |
| T_C | Operating Case Temperature | | -40 | | 100 | |
| Torque | Mounting torque | To heatsink | M4 | 2 | 3 | N.m |
| Wt | Package Weight | | | | 80 | g |

Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

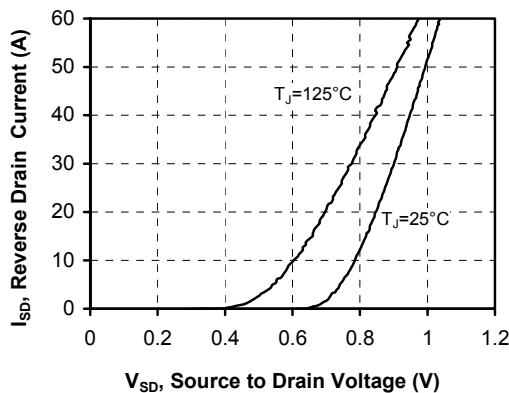
| Symbol | Characteristic | | Min | Typ | Max | Unit |
|------------------------|---------------------|----------------|-----|------|-----|------|
| R_{25} | Resistance @ 25°C | | | 50 | | kΩ |
| $\Delta R_{25}/R_{25}$ | | | | 5 | | % |
| $B_{25/85}$ | $T_{25} = 298.15$ K | | | 3952 | | K |
| $\Delta B/B$ | | $T_C = 100$ °C | | 4 | | % |

$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]} \quad \begin{array}{l} T: \text{Thermistor temperature} \\ R_T: \text{Thermistor value at } T \end{array}$$

SP1 Package outline (dimensions in mm)

 See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

Typical Performance Curve


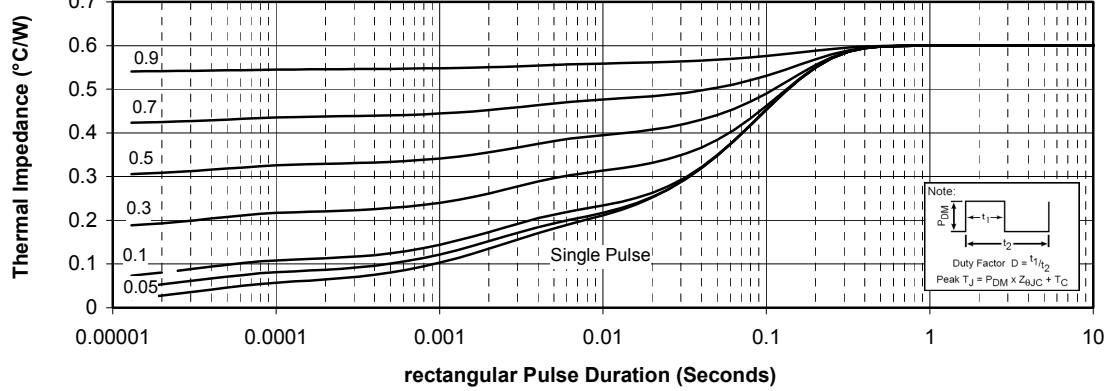
Drain Current vs Source to Drain Voltage



I_{SD} , Reverse Drain Current (A)

V_{SD} , Source to Drain Voltage (V)

Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



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