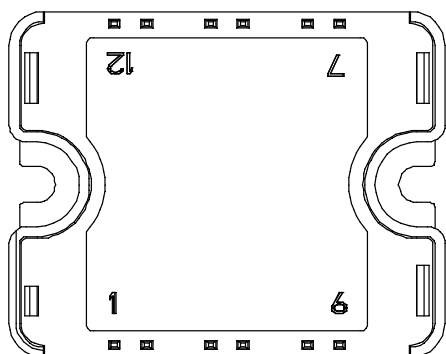
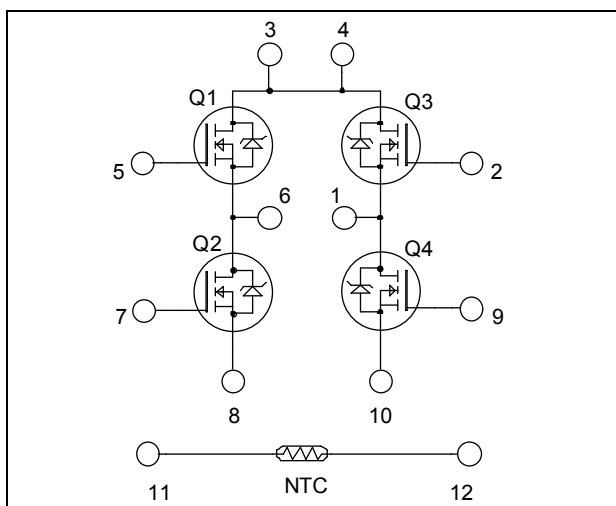


## Full - Bridge MOSFET Power Module

$V_{DSS} = 500V$

$R_{DSon} = 130m\Omega$  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	$\pm 30$	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](http://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	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		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	$V_{GS} = \pm 30\text{V}$			$\pm 100$	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	<b>Resistive switching @ <math>25^\circ\text{C}</math></b> $V_{GS} = 15\text{V}$ $V_{Bus} = 333\text{V}$ $I_D = 21\text{A}$ $R_G = 4.7\Omega$		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 <sub>S</sub>	Continuous Source current (Body diode)		T <sub>C</sub> = 25°C			25	A
			T <sub>C</sub> = 80°C			19	
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = - 21A				1	V
dv/dt	Peak Diode Recovery ❶					30	V/ns
t <sub>rr</sub>	Reverse Recovery Time	I <sub>S</sub> = - 21A V <sub>R</sub> = 100V di <sub>S</sub> /dt = 100A/μs	T <sub>j</sub> = 25°C			215	ns
			T <sub>j</sub> = 125°C			370	
Q <sub>rr</sub>	Reverse Recovery Charge		T <sub>j</sub> = 25°C		0.90		μC
			T <sub>j</sub> = 125°C		2.6		

❶  $dv/dt$  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**

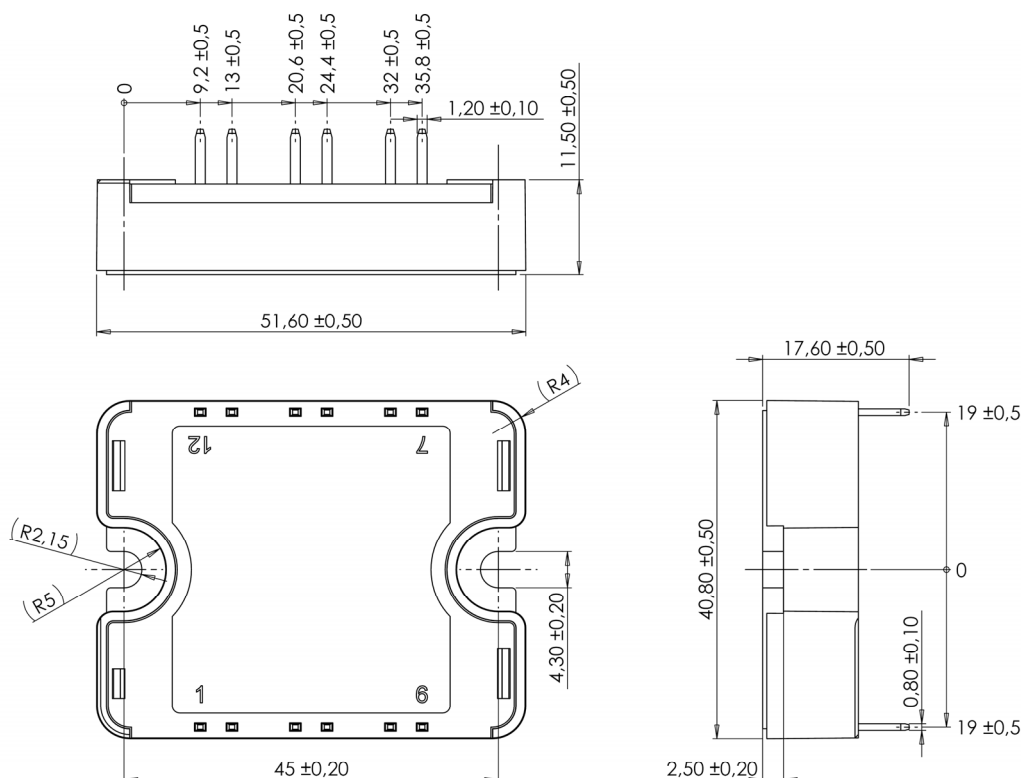
Symbol	Characteristic			Min	Typ	Max	Unit
R <sub>thJC</sub>	Junction to Case Thermal Resistance					0.6	°C/W
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz			4000			V
T <sub>J</sub>	Operating junction temperature range			-40		150	°C
T <sub>STG</sub>	Storage Temperature Range			-40		125	
T <sub>C</sub>	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 <sub>25</sub>	Resistance @ 25°C		50		kΩ
ΔR <sub>25</sub> /R <sub>25</sub>			5		%
B <sub>25/85</sub>	T <sub>25</sub> = 298.15 K		3952		K
ΔB/B	T <sub>C</sub> = 100°C		4		%

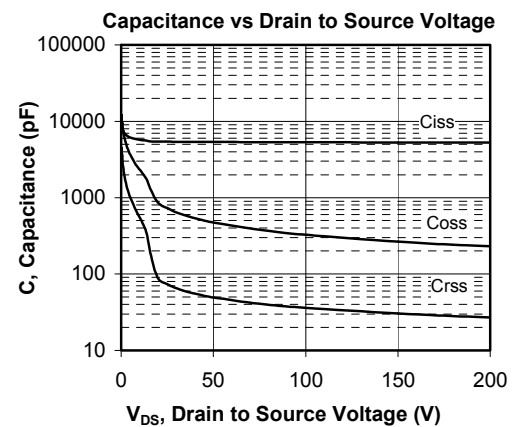
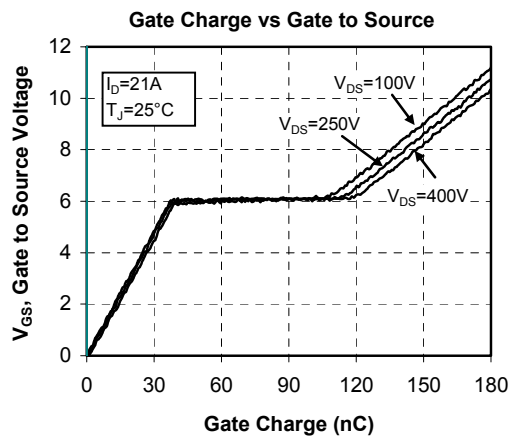
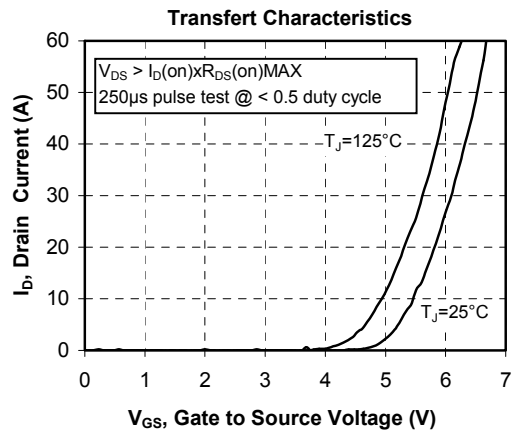
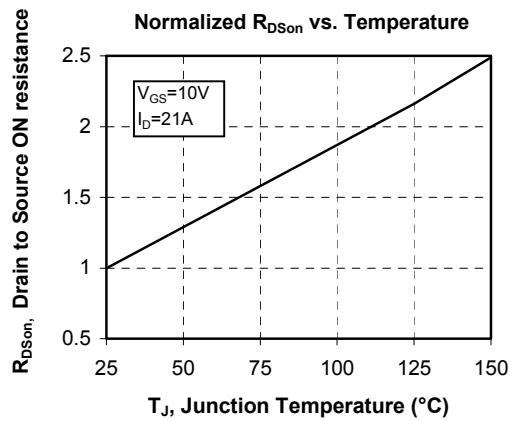
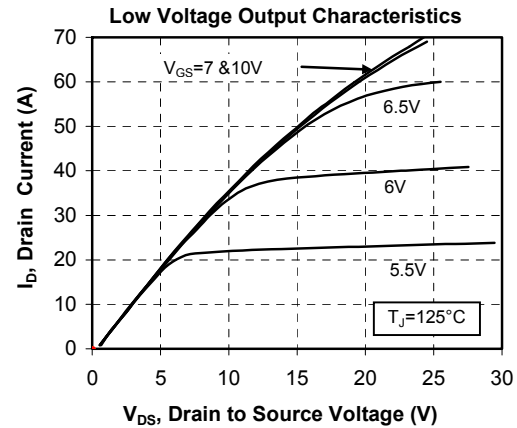
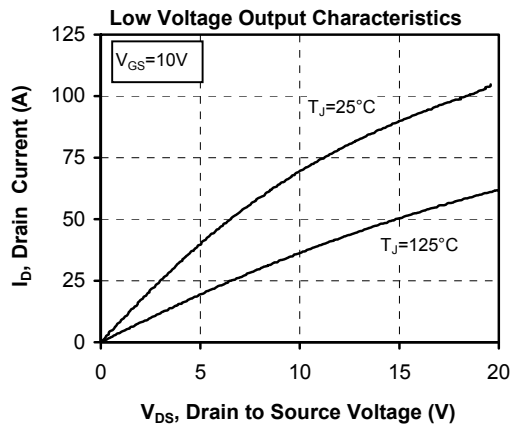
$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

T: Thermistor temperature  
 R<sub>T</sub>: Thermistor value at T

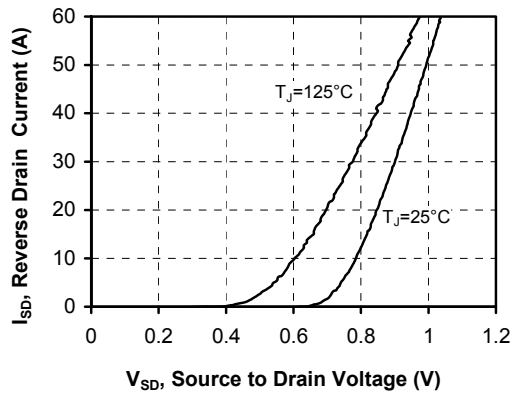
**SP1 Package outline** (dimensions in mm)


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

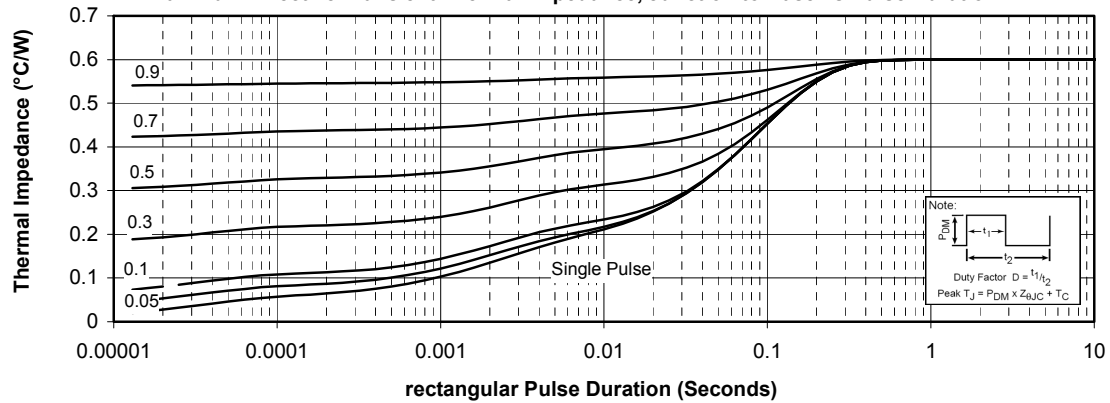
## Typical Performance Curve



Drain Current vs Source to Drain Voltage



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



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