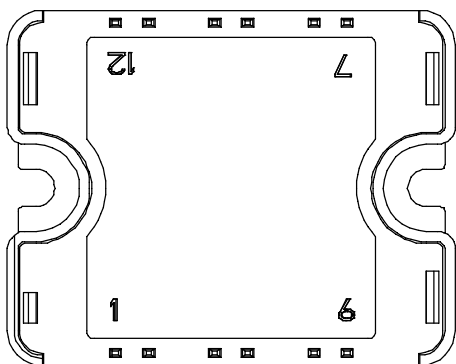
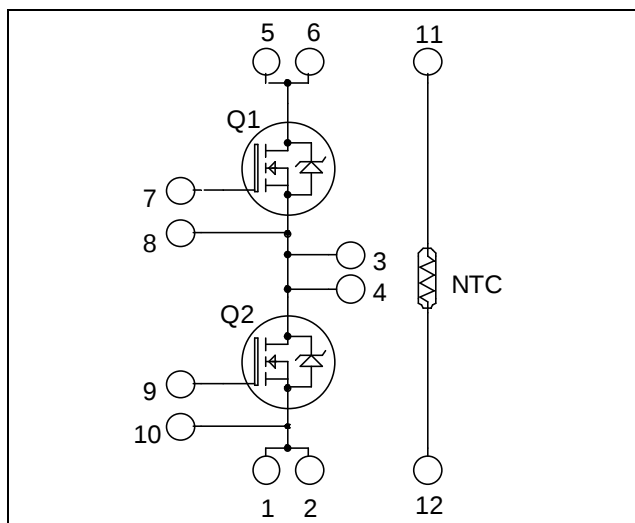


Phase leg MOSFET Power Module

$V_{DS} = 500V$

$R_{DS(on)} = 150m\Omega \text{ typ @ } T_j = 25^\circ C$

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



Pins 1/2 ; 3/4 ; 5/6 must be shorted together

Application

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

Features

- Power MOS 8™ Ultrafast FREDFETs
 - Low $R_{DS(on)}$
 - Low input and Miller capacitance
 - Low gate charge
 - Ultrafast 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
- RoHS Compliant

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{DS}	Drain - Source Breakdown Voltage	500	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	A
		$T_c = 80^\circ C$	
I_{DM}	Pulsed Drain current	135	
V_{GS}	Gate - Source Voltage	± 30	V
$R_{DS(on)}$	Drain - Source ON Resistance	180	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	W
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	$V_{GS} = 10\text{V}, I_D = 21\text{A}$		150	180	$\text{m}\Omega$
$V_{GS(th)}$	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	$V_{GS} = 0\text{V}$		5448		pF
C_{oss}	Output Capacitance	$V_{DS} = 25\text{V}$		735		
C_{rss}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		72		
Q_g	Total gate Charge	$V_{GS} = 10\text{V}$		170		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 250\text{V}$		38		
Q_{gd}	Gate – Drain Charge	$I_D = 21\text{A}$		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°C			25	A
			T _C = 80°C			19	
V _{SD}	Diode Forward Voltage	V _{GS} = 0V, I _S = - 21A				1	V
dv/dt	Peak Diode Recovery ❶					30	V/ns
t _{rr}	Reverse Recovery Time	I _S = - 21A V _R = 100V di _S /dt = 100A/μs	T _j = 25°C			215	ns
			T _j = 125°C			370	
Q _{rr}	Reverse Recovery Charge		T _j = 25°C		0.90		μC
			T _j = 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 _{thJC}	Junction to Case Thermal Resistance					0.6	°C/W
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	°C
T _{STG}	Storage Temperature Range			-40		125	
T _C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M4	2.5		4.7	N.m
Wt	Package Weight					80	g

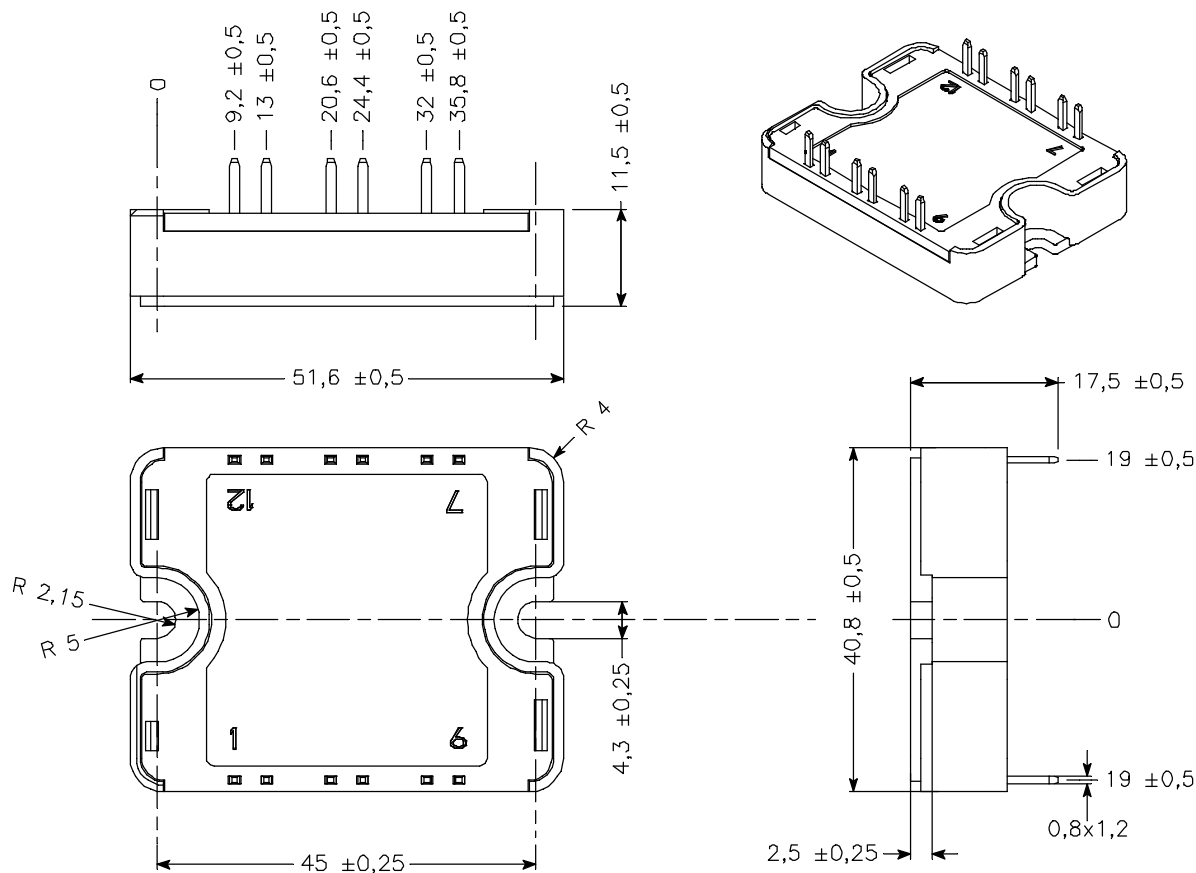
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

Symbol	Characteristic	Min	Typ	Max	Unit
R_{25}	Resistance @ 25°C		50		kΩ
$B_{25/85}$	$T_{25} = 298.15$ K		3952		K

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

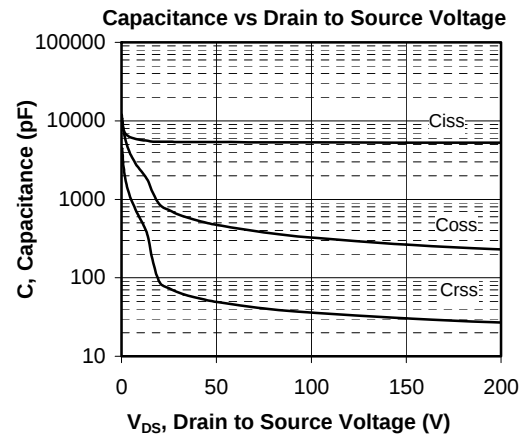
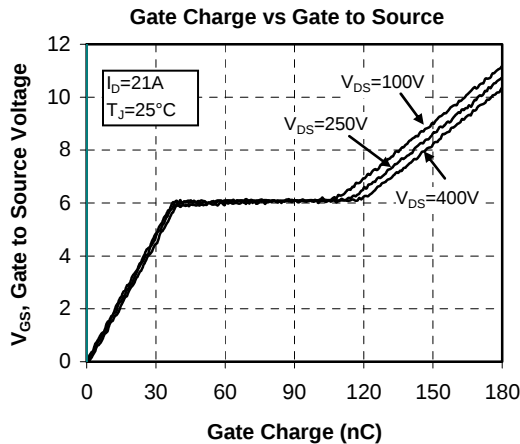
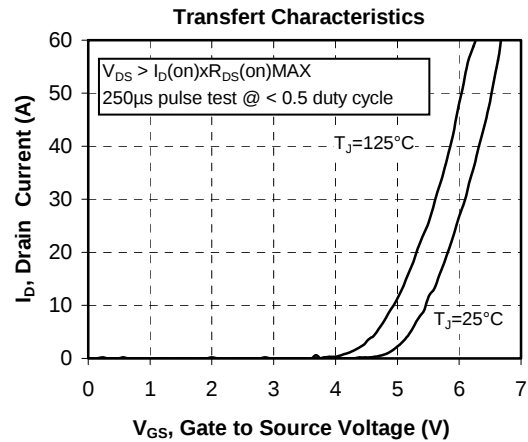
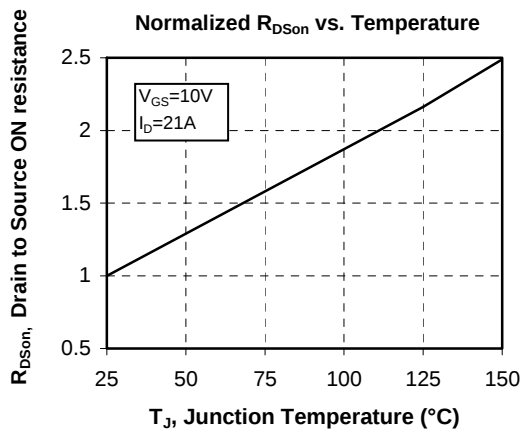
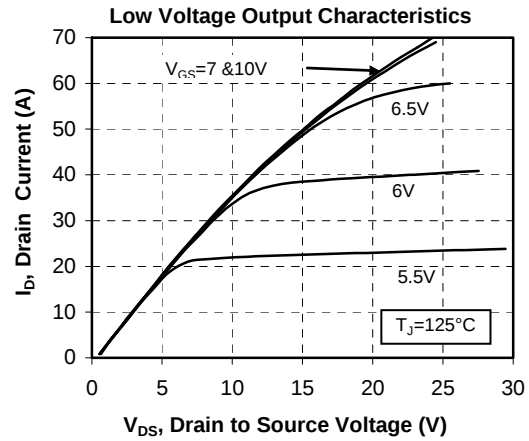
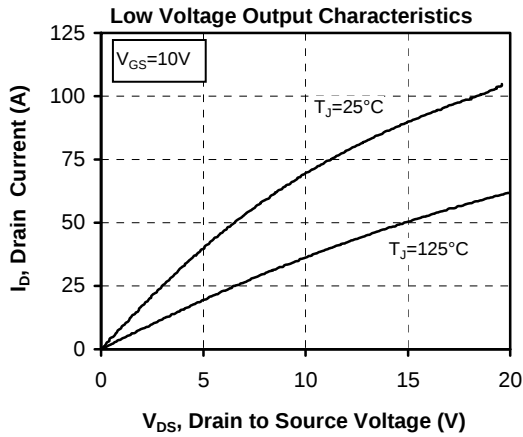
T: Thermistor temperature
 R_T : Thermistor value at T

SP1 Package outline (dimensions in mm)

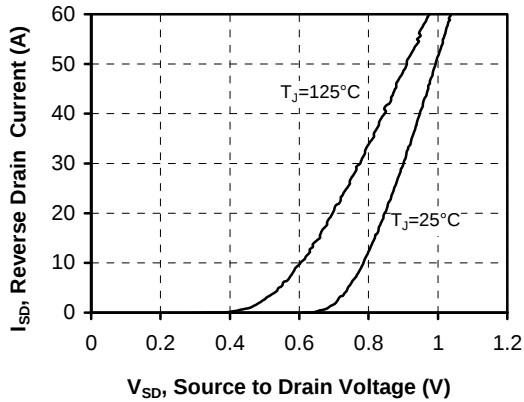


See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

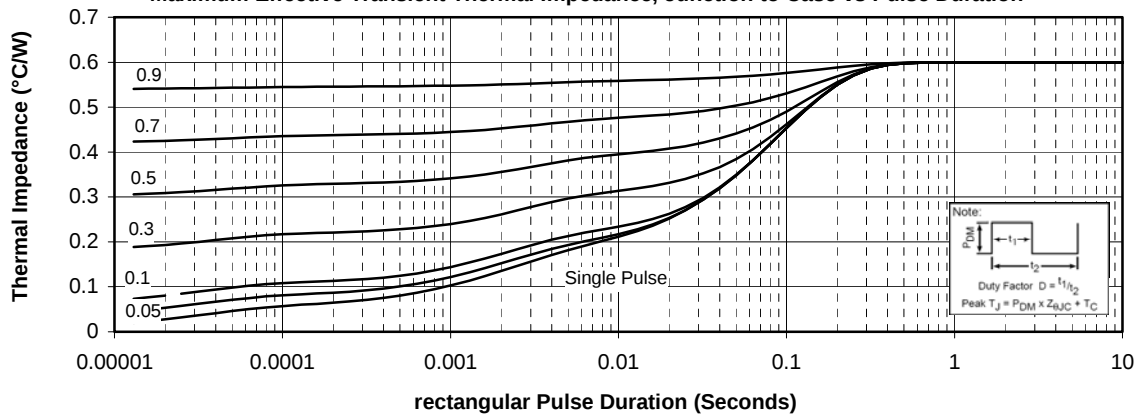
Typical Performance Curve



Drain Current vs Source to Drain Voltage



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



Microsemi reserves the right to change, without notice, the specifications and information contained herein

Microsemi's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 and foreign patents. U.S. and Foreign patents pending. All Rights Reserved.