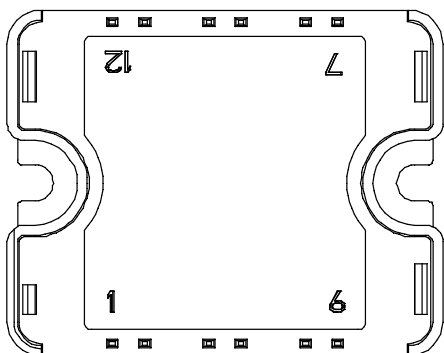
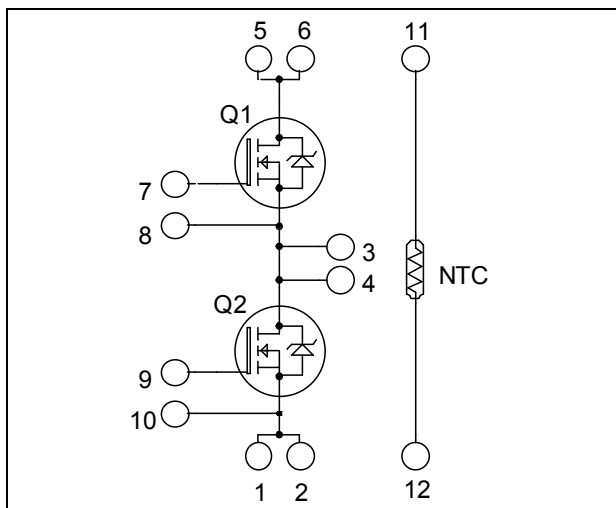


Phase leg MOSFET Power Module

$$V_{DSS} = 1000V$$

$$R_{DSon} = 400m\Omega \text{ typ @ } T_j = 25^{\circ}C$$

$$I_D = 21A \text{ @ } T_c = 25^{\circ}C$$



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™ Fast 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
- RoHS Compliant

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Breakdown Voltage	1000	V
I_D	Continuous Drain Current	$T_c = 25^{\circ}C$ 21 $T_c = 80^{\circ}C$ 16	A
I_{DM}	Pulsed Drain current	140	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	480	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^{\circ}C$ 390	W
I_{AR}	Avalanche current (repetitive and non repetitive)	18	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	$V_{DS} = 1000\text{V}$ $V_{GS} = 0\text{V}$	$T_j = 25^\circ\text{C}$		250	μA
			$T_j = 125^\circ\text{C}$		1000	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 18\text{A}$		400	480	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 2.5\text{mA}$	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	$V_{GS} = 0\text{V}$		7868		pF
C_{oss}	Output Capacitance	$V_{DS} = 25\text{V}$		825		
C_{rss}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		104		
Q_g	Total gate Charge	$V_{GS} = 10\text{V}$		305		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 500\text{V}$		55		
Q_{gd}	Gate – Drain Charge	$I_D = 18\text{A}$		145		
$T_{d(on)}$	Turn-on Delay Time	Resistive switching @ 25°C $V_{GS} = 15\text{V}$ $V_{Bus} = 667\text{V}$ $I_D = 18\text{A}$ $R_G = 2.2\Omega$		44		ns
T_r	Rise Time			40		
$T_{d(off)}$	Turn-off Delay Time			150		
T_f	Fall Time			38		

Source - Drain diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_S	Continuous Source current (Body diode)	$T_c = 25^\circ\text{C}$			21	A
		$T_c = 80^\circ\text{C}$			16	
V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = -18\text{A}$			1.1	V
dv/dt	Peak Diode Recovery ❶				25	V/ns
t_{rr}	Reverse Recovery Time	$I_S = -18\text{A}$ $V_R = 100\text{V}$	$T_j = 25^\circ\text{C}$		300	ns
			$T_j = 125^\circ\text{C}$		650	
Q_{rr}	Reverse Recovery Charge	$di/dt = 100\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	1.61		μC
			$T_j = 125^\circ\text{C}$	4.21		

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

$I_S \leq -16\text{A}$ $di/dt \leq 1000\text{A}/\mu\text{s}$ $V_{DD} \leq 667\text{V}$ $T_j \leq 125^\circ\text{C}$

Thermal and package characteristics

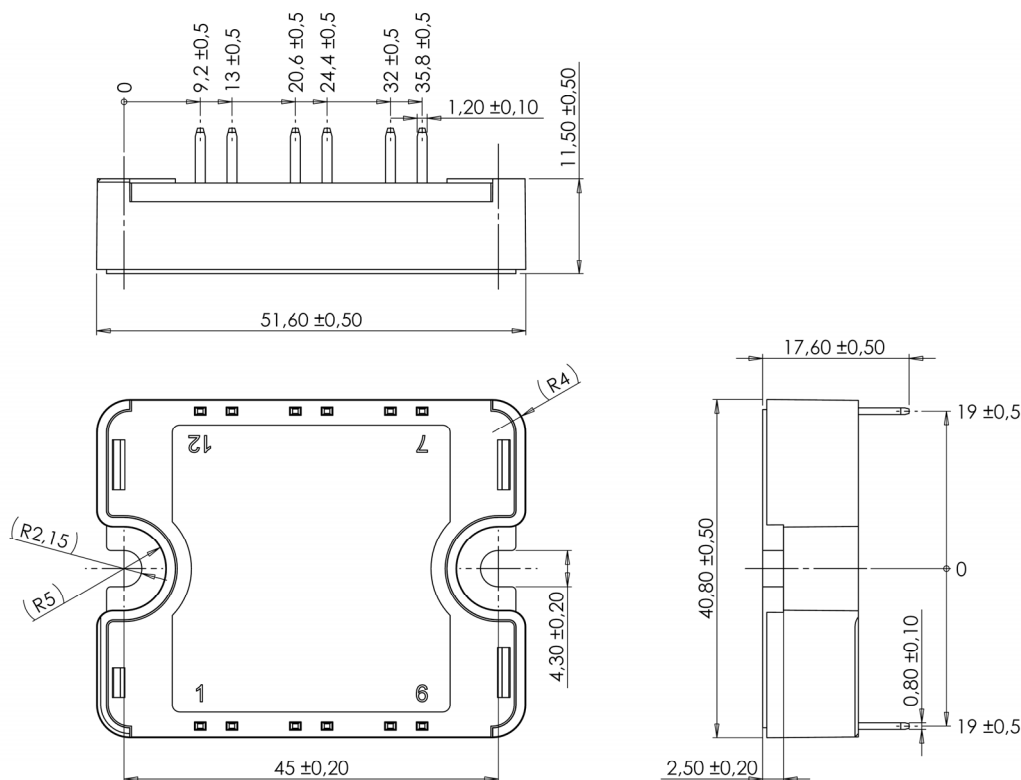
Symbol	Characteristic	Min	Typ	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance			0.32	°C/W
V _{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000			V
T _J	Operating junction temperature range	-40		150	°C
T _{STG}	Storage Temperature Range	-40		125	
T _C	Operating Case Temperature	-40		100	
Torque	Mounting torque	To heatsink	M4	2	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

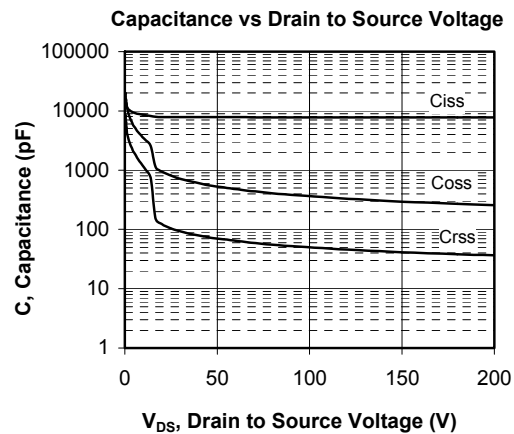
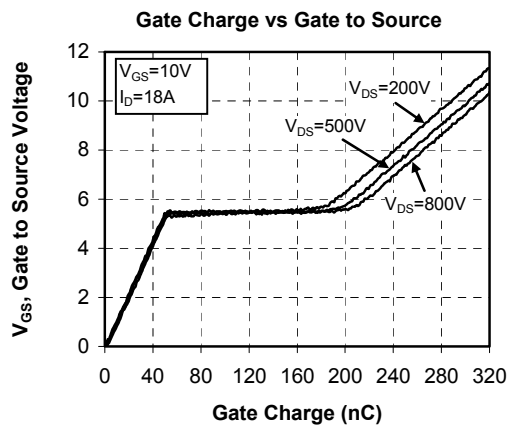
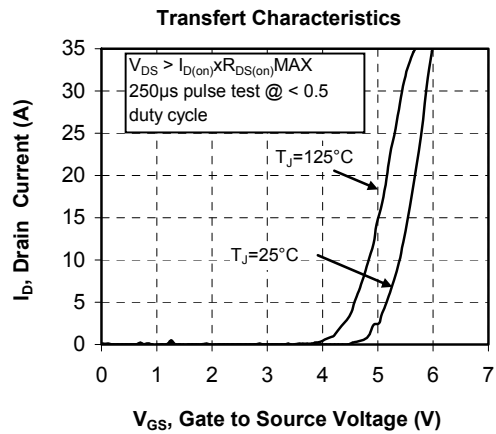
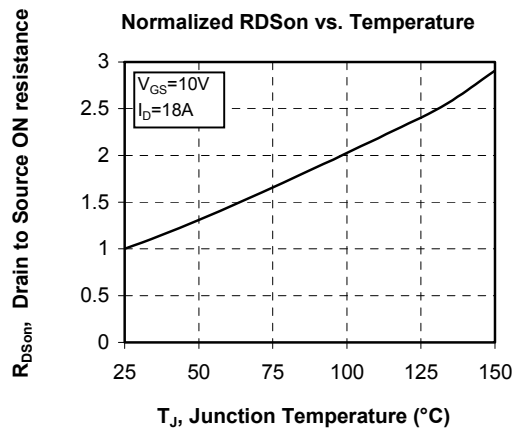
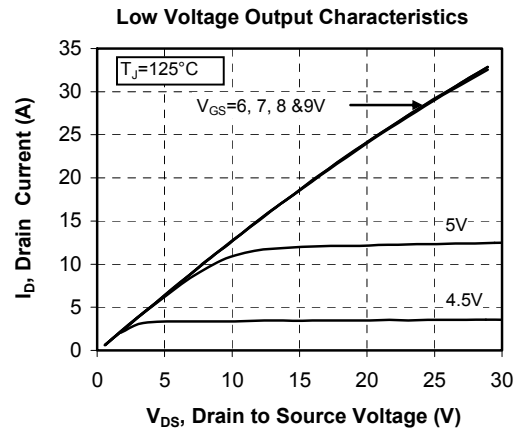
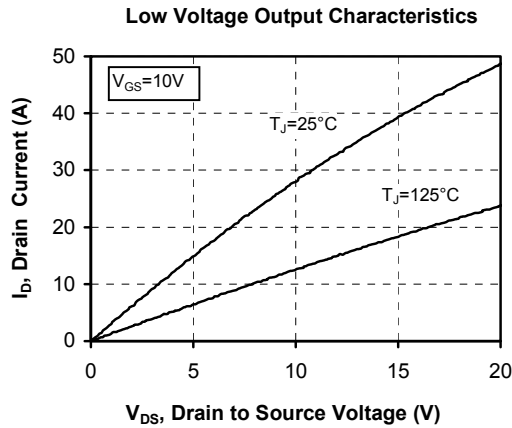
$$R_T = \frac{R_{25}}{\exp \left[B_{25/85} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

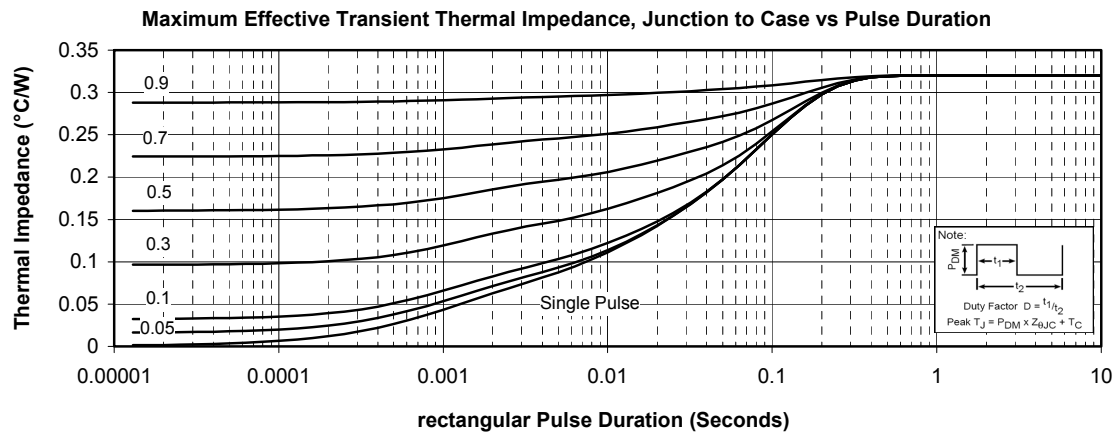
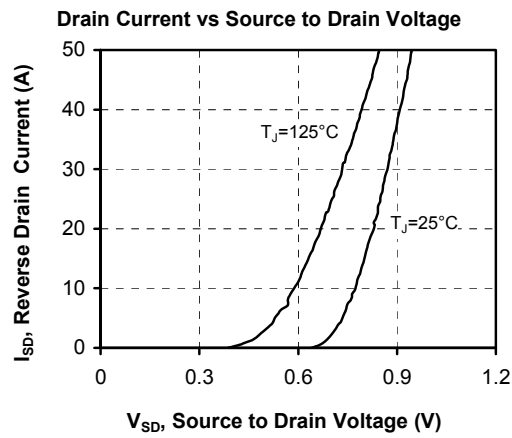
T: Thermistor temperature
 R_T: Thermistor value at T

SP1 Package outline (dimensions in mm)


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

Typical Performance Curve





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