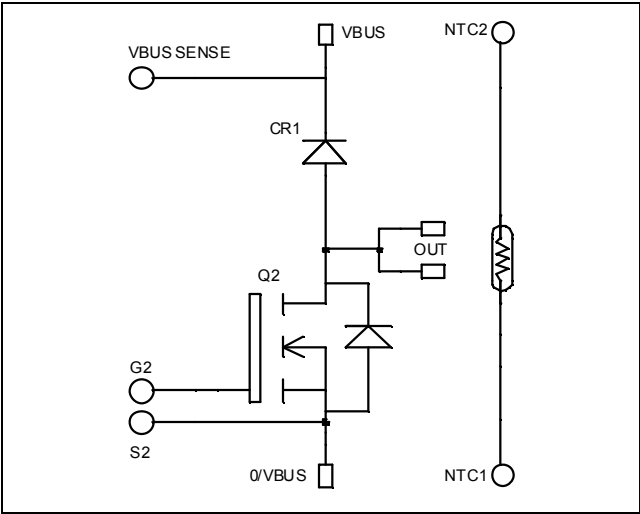


## Boost chopper MOSFET Power Module

$V_{DSS} = 100V$   
 $R_{DSon} = 4.5m\Omega \text{ typ @ } T_j = 25^\circ C$   
 $I_D = 278A \text{ @ } T_c = 25^\circ C$

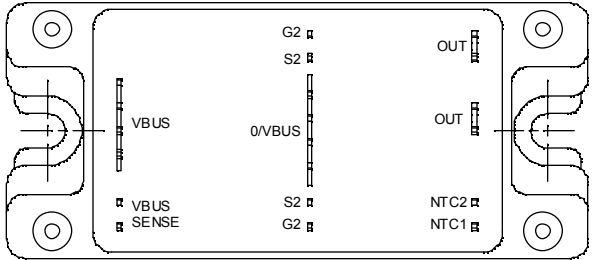


### Application

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction

### Features

- Power MOS V<sup>®</sup> MOSFETs
  - Low R<sub>DSon</sub>
  - Low input and Miller capacitance
  - Low gate charge
  - Avalanche energy rated
  - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
  - Symmetrical design
  - Lead frames for power connections
- 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 <sub>DSS</sub>	Drain - Source Breakdown Voltage	100	V
I <sub>D</sub>	Continuous Drain Current	T <sub>c</sub> = 25°C	278
		T <sub>c</sub> = 80°C	207
I <sub>DM</sub>	Pulsed Drain current	1100	A
V <sub>GS</sub>	Gate - Source Voltage	±30	
R <sub>DSon</sub>	Drain - Source ON Resistance	5	mΩ
P <sub>D</sub>	Maximum Power Dissipation	T <sub>c</sub> = 25°C	780
I <sub>AR</sub>	Avalanche current (repetitive and non repetitive)	100	A
E <sub>AR</sub>	Repetitive Avalanche Energy	50	mJ
E <sub>AS</sub>	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](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	$V_{GS} = 0V, V_{DS} = 100V$			200	$\mu\text{A}$
		$V_{GS} = 0V, V_{DS} = 80V$			1000	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 125A$		4.5	5	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 5\text{mA}$	2		4	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			$\pm 200$	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$		20		nF
$C_{oss}$	Output Capacitance	$V_{DS} = 25V$		8		
$C_{rss}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		2.9		
$Q_g$	Total gate Charge	$V_{GS} = 10V$		700		nC
$Q_{gs}$	Gate – Source Charge	$V_{Bus} = 50V$		120		
$Q_{gd}$	Gate – Drain Charge	$I_D = 250A$		360		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 15V$ $V_{Bus} = 66V$ $I_D = 250A$ $R_G = 2.5\Omega$		80		ns
$T_r$	Rise Time			165		
$T_{d(off)}$	Turn-off Delay Time			280		
$T_f$	Fall Time			135		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>25^\circ\text{C}</math></b> $V_{GS} = 15V, V_{Bus} = 66V$ $I_D = 250A, R_G = 2.5\Omega$		1.1		mJ
$E_{off}$	Turn-off Switching Energy			1.2		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 15V, V_{Bus} = 66V$ $I_D = 250A, R_G = 2.5\Omega$		1.22		mJ
$E_{off}$	Turn-off Switching Energy			1.28		

**Chopper diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		200			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 200V$	$T_j = 25^\circ\text{C}$		350	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		600	
$I_F$	DC Forward Current			200		A
$V_F$	Diode Forward Voltage	$I_F = 200A$		1		V
		$I_F = 400A$		1.4		
		$I_F = 200A$	$T_j = 125^\circ\text{C}$	0.9		
$t_{rr}$	Reverse Recovery Time	$I_F = 200A$ $V_R = 133V$	$T_j = 25^\circ\text{C}$	60		ns
			$T_j = 125^\circ\text{C}$	110		
$Q_{rr}$	Reverse Recovery Charge	$di/dt = 400A/\mu\text{s}$	$T_j = 25^\circ\text{C}$	400		nC
			$T_j = 125^\circ\text{C}$	1680		

**Thermal and package characteristics**

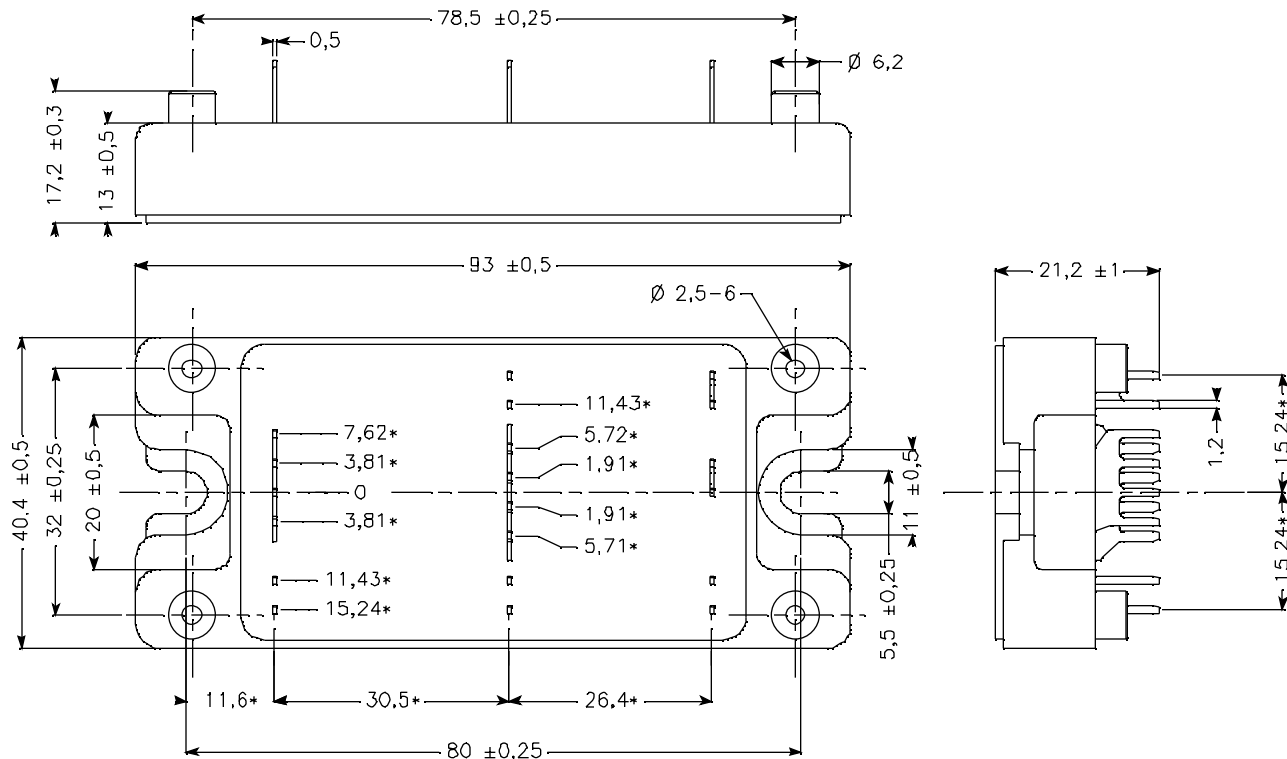
Symbol	Characteristic	Min	Typ	Max	Unit	
R <sub>thJC</sub>	Junction to Case Thermal Resistance	Transistor		0.16		
		Diode		0.29	°C/W	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, I <sub>isol</sub> < 1mA, 50/60Hz	2500			V	
T <sub>J</sub>	Operating junction temperature range	-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	M5	2.5	4.7	N.m
Wt	Package Weight				160	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
B <sub>25/85</sub>	T <sub>25</sub> = 298.15 K		3952		K

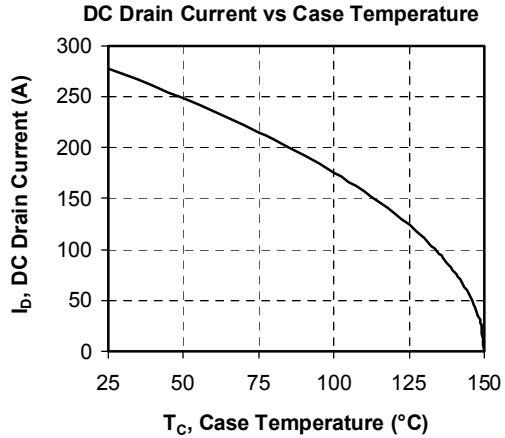
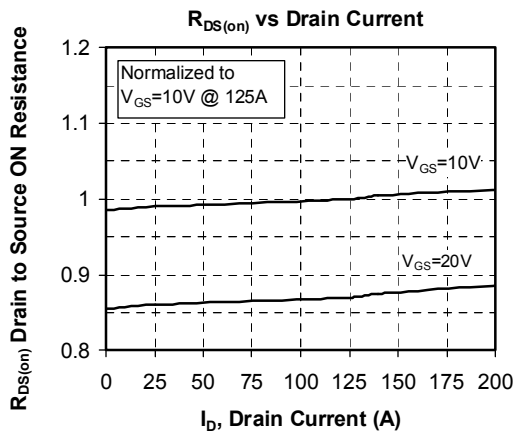
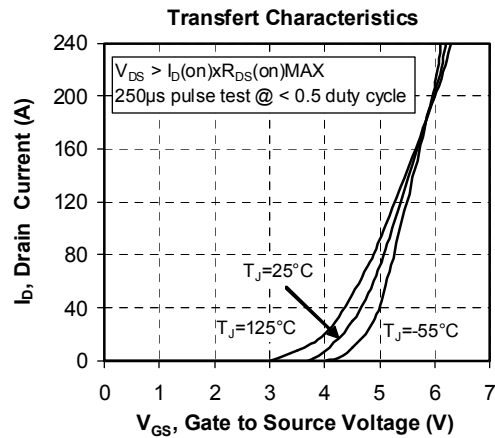
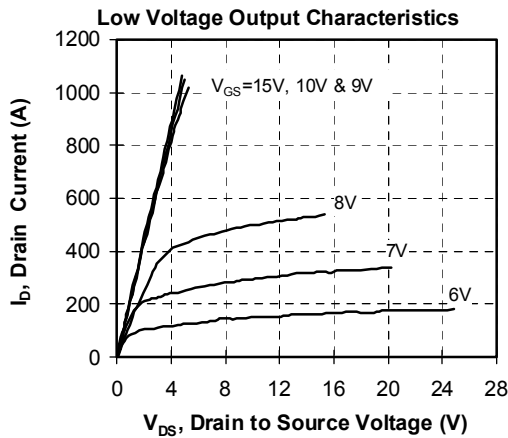
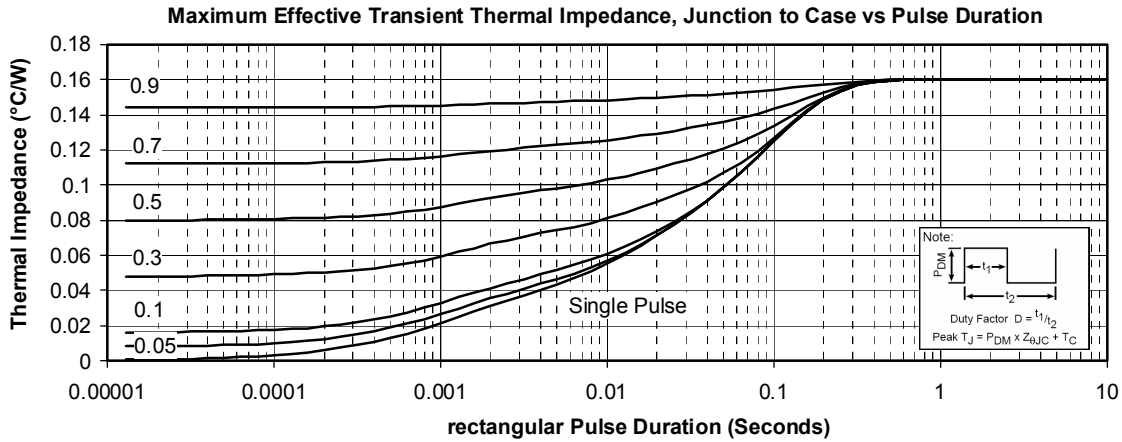
$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

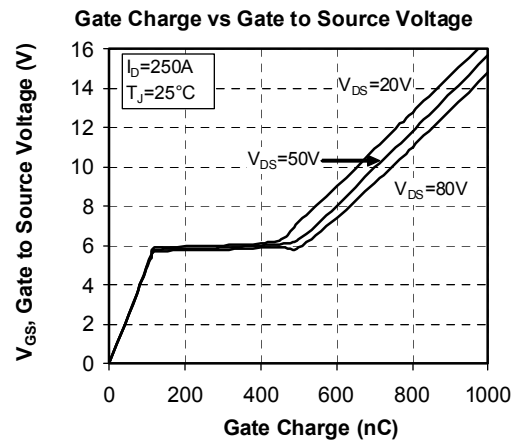
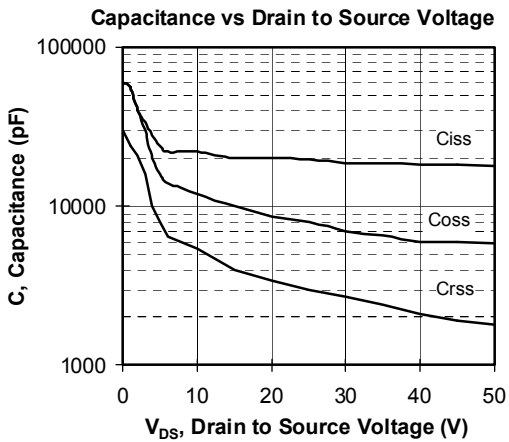
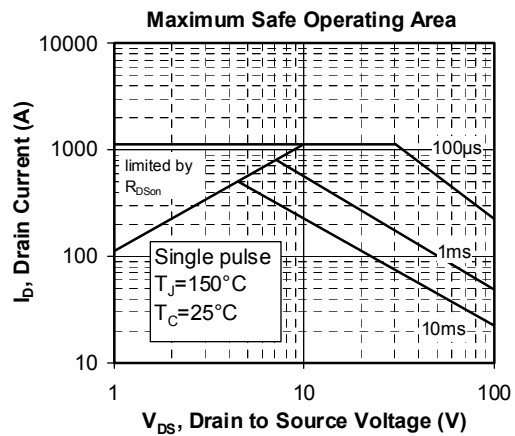
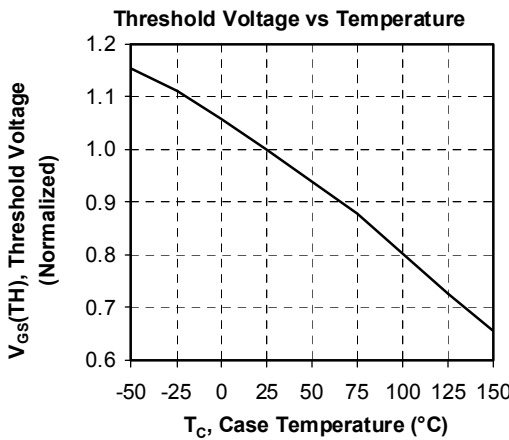
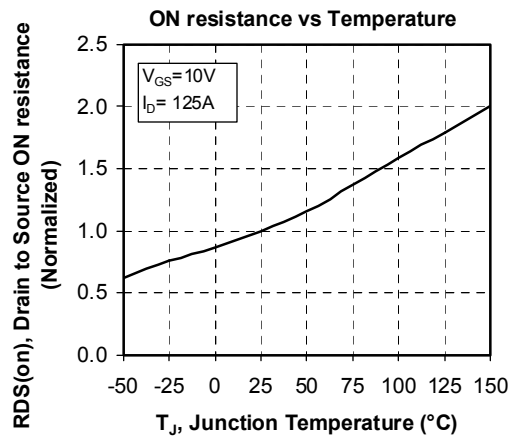
T: Thermistor temperature  
 R<sub>T</sub>: Thermistor value at T

**SP4 Package outline** (dimensions in mm)

 ALL DIMENSIONS MARKED "\*" ARE TOLERANCED AS:  $\boxed{\oplus \ominus 0.1}$ 

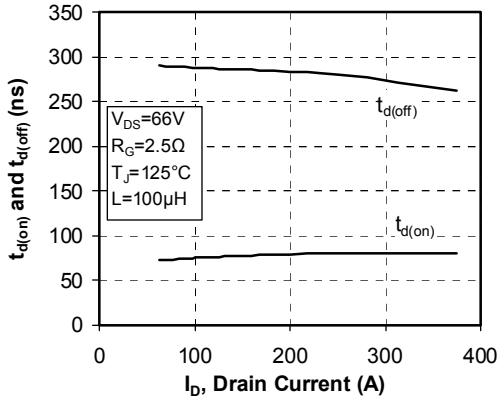
See application note APT0501 - Mounting Instructions for SP4 Power Modules on www.microsemi.com

## Typical Performance Curve

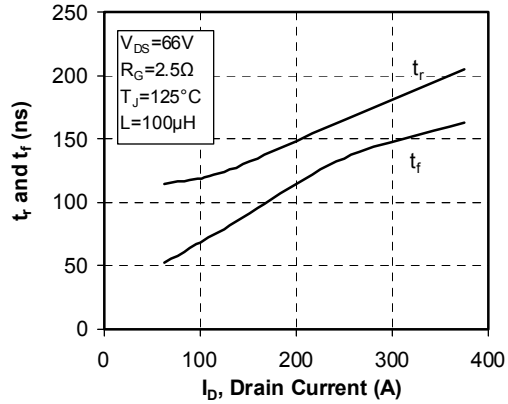




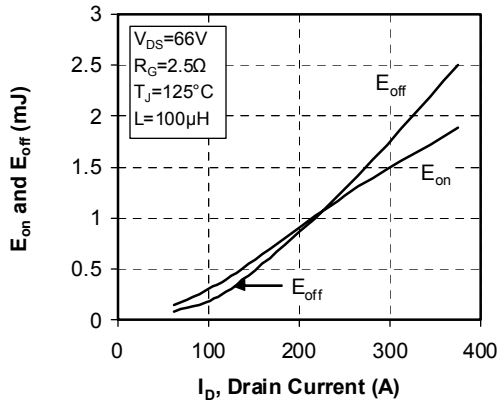
**Delay Times vs Current**



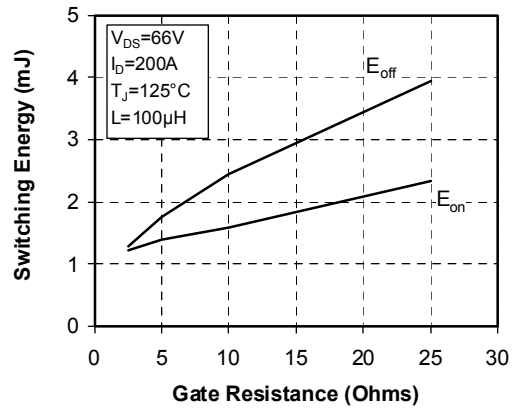
**Rise and Fall times vs Current**



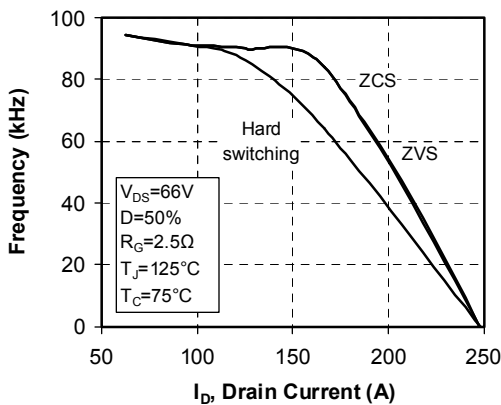
**Switching Energy vs Current**



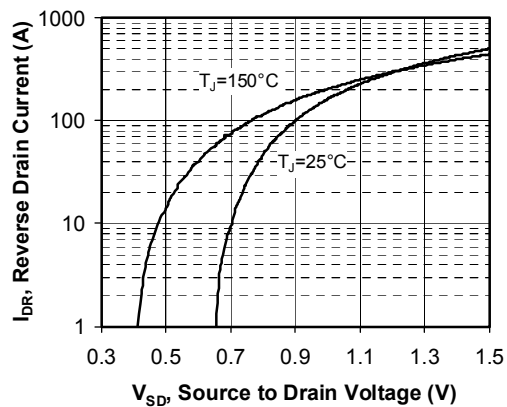
**Switching Energy vs Gate Resistance**



**Operating Frequency vs Drain Current**



**Source to Drain Diode Forward Voltage**



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

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