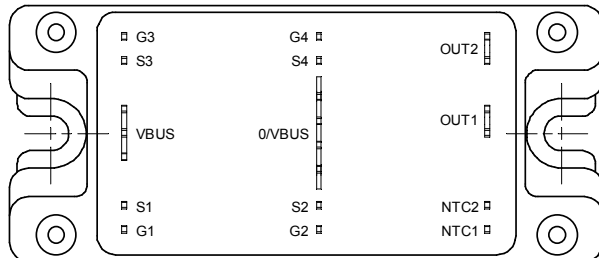
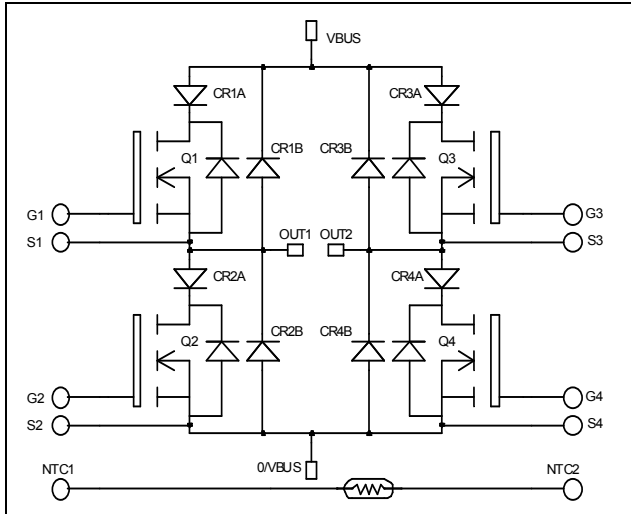


**Full - Bridge  
Series & SiC parallel diodes  
Super Junction  
MOSFET Power Module**



**$V_{DSS} = 900V$**   
 **$R_{DSon} = 120m\Omega$  max @  $T_j = 25^\circ C$**   
 **$I_D = 30A$  @  $T_c = 25^\circ C$**

### Application

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

### Features

- **COOLMOS**  
Power Semiconductors
  - Ultra low  $R_{DSon}$
  - Low Miller capacitance
  - Ultra low gate charge
  - Avalanche energy rated
- **Parallel SiC Schottky Diode**
  - Zero reverse recovery
  - Zero forward recovery
  - Temperature Independent switching behavior
  - Positive temperature coefficient on VF
- 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
$V_{DSS}$	Drain - Source Breakdown Voltage	900	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	30
		$T_c = 80^\circ C$	23
$I_{DM}$	Pulsed Drain current	75	A
$V_{GS}$	Gate - Source Voltage	$\pm 20$	V
$R_{DSon}$	Drain - Source ON Resistance	120	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	250
$I_{AR}$	Avalanche current (repetitive and non repetitive)	8.8	A
$E_{AR}$	Repetitive Avalanche Energy	2.9	mJ
$E_{AS}$	Single Pulse Avalanche Energy	1940	

**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	$V_{GS} = 0V, V_{DS} = 900V$ $T_j = 25^\circ\text{C}$			100	$\mu\text{A}$
		$V_{GS} = 0V, V_{DS} = 900V$ $T_j = 125^\circ\text{C}$		500		
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 26A$		100	120	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 3\text{mA}$	2.5	3	3.5	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 20V, V_{DS} = 0V$			100	$\text{nA}$

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V; V_{DS} = 100V$ $f = 1\text{MHz}$		6800		$\text{pF}$
$C_{oss}$	Output Capacitance			330		
$Q_g$	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 400V$ $I_D = 26A$		270		$\text{nC}$
$Q_{gs}$	Gate – Source Charge			32		
$Q_{gd}$	Gate – Drain Charge			115		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive Switching (<math>125^\circ\text{C}</math>)</b> $V_{GS} = 10V$ $V_{Bus} = 600V$ $I_D = 26A$ $R_G = 7.5\Omega$		70		$\text{ns}$
$T_r$	Rise Time			20		
$T_{d(off)}$	Turn-off Delay Time			400		
$T_f$	Fall Time			25		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>25^\circ\text{C}</math></b> $V_{GS} = 10V; V_{Bus} = 600V$ $I_D = 26A; R_G = 7.5\Omega$		900		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy			750		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 10V; V_{Bus} = 600V$ $I_D = 26A; R_G = 7.5\Omega$		1278		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy			867		

**Series 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	$V_R = 200V$	$T_j = 25^\circ\text{C}$		250	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		500	
$I_F$	DC Forward Current			30		A
$V_F$	Diode Forward Voltage	$I_F = 30A$		1.1	1.15	V
		$I_F = 60A$		1.4		
		$I_F = 30A$ $T_j = 125^\circ\text{C}$		0.9		
$t_{rr}$	Reverse Recovery Time	$I_F = 30A$ $V_R = 133V$ $di/dt = 200A/\mu\text{s}$	$T_j = 25^\circ\text{C}$		24	$\text{ns}$
			$T_j = 125^\circ\text{C}$		48	
$Q_{rr}$	Reverse Recovery Charge	$I_F = 30A$ $V_R = 133V$ $di/dt = 200A/\mu\text{s}$	$T_j = 25^\circ\text{C}$		33	$\text{nC}$
			$T_j = 125^\circ\text{C}$		150	

## Parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V <sub>RRM</sub>	Maximum Peak Repetitive Reverse Voltage			1200			V
I <sub>RM</sub>	Maximum Reverse Leakage Current	V <sub>R</sub> =1200V	T <sub>j</sub> = 25°C		32	200	μA
			T <sub>j</sub> = 175°C		56	1000	
I <sub>F</sub>	DC Forward Current				10		A
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 10A	T <sub>j</sub> = 25°C		1.6	1.8	V
			T <sub>j</sub> = 175°C		2.3	3	
Q <sub>C</sub>	Total Capacitive Charge	I <sub>F</sub> = 10A, V <sub>R</sub> = 600V di/dt = 500A/μs			40		nC
Q	Total Capacitance	f = 1MHz, V <sub>R</sub> = 200V			96		pF
		f = 1MHz, V <sub>R</sub> = 400V			69		

## Thermal and package characteristics

Symbol	Characteristic			Min	Typ	Max	Unit
R <sub>thJC</sub>	Junction to Case Thermal Resistance	Transistor				0.5	°C/W
		Series diode				1.2	
		Parallel SiC diode				1.8	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, I <sub>isol</sub> < 1mA, 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	M5	2.5		4.7	N.m
Wt	Package Weight					160	g

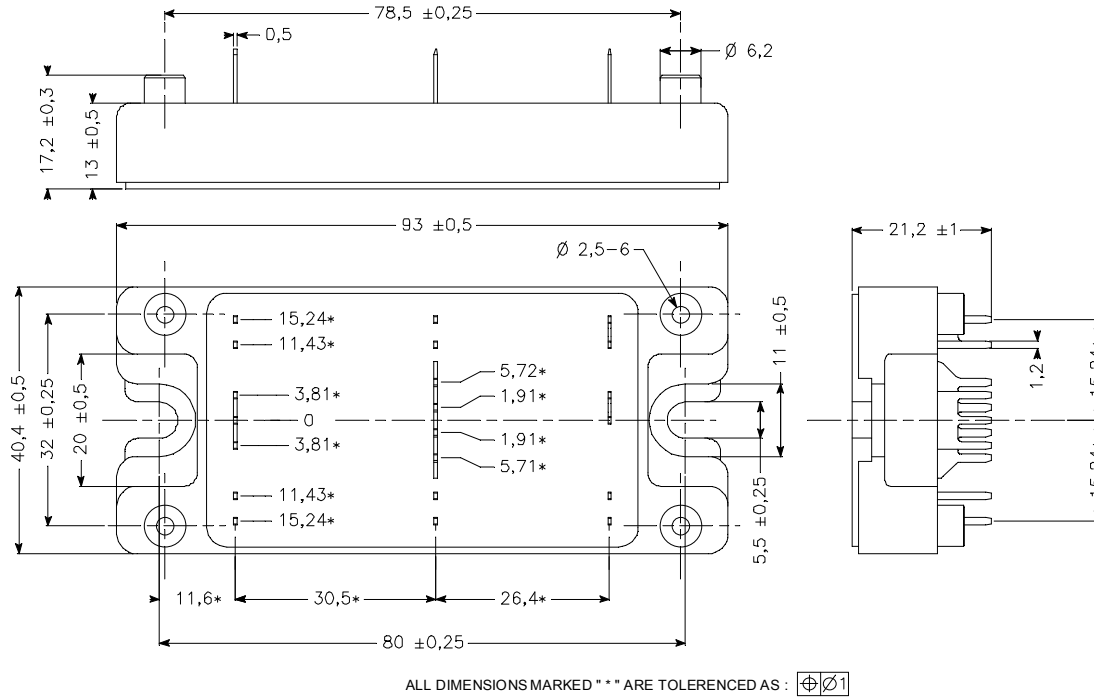
## Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

Symbol	Characteristic	Min	Typ	Max	Unit
R <sub>25</sub>	Resistance @ 25°C		50		kΩ
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			4		%

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

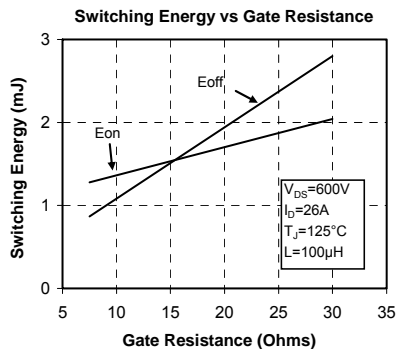
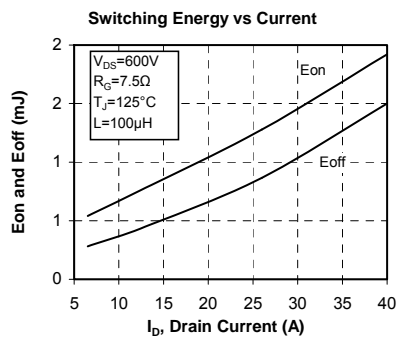
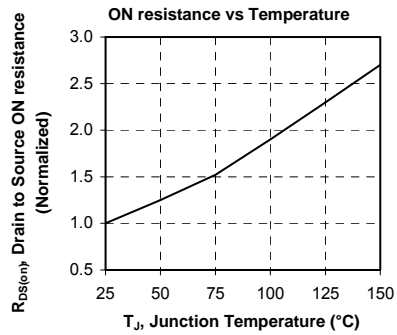
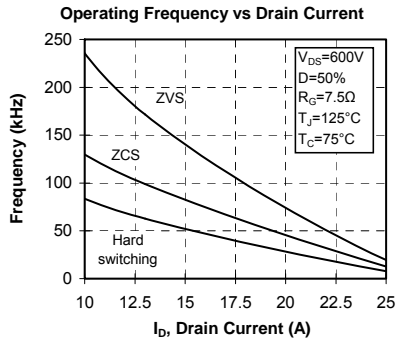
T: Thermistor temperature  
 R<sub>T</sub>: Thermistor value at T

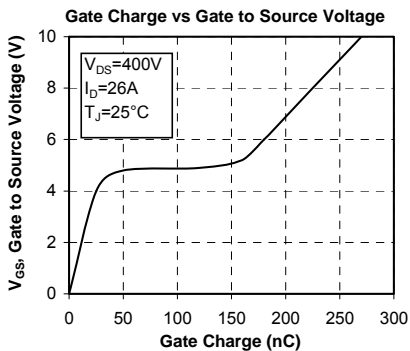
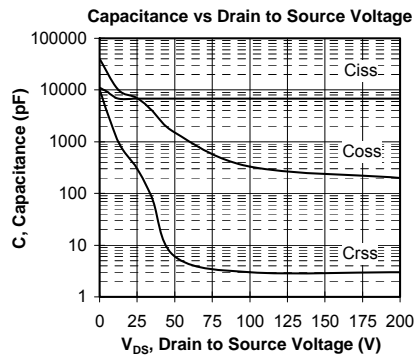
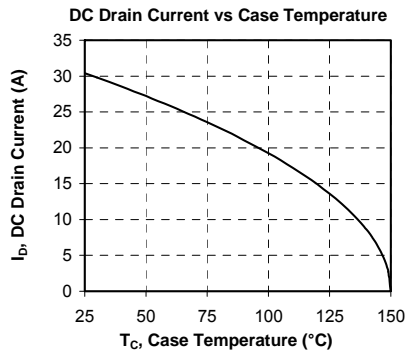
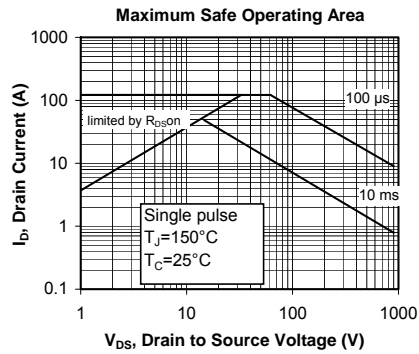
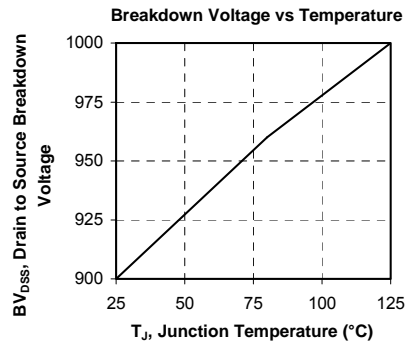
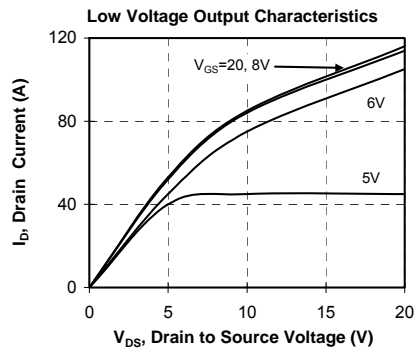
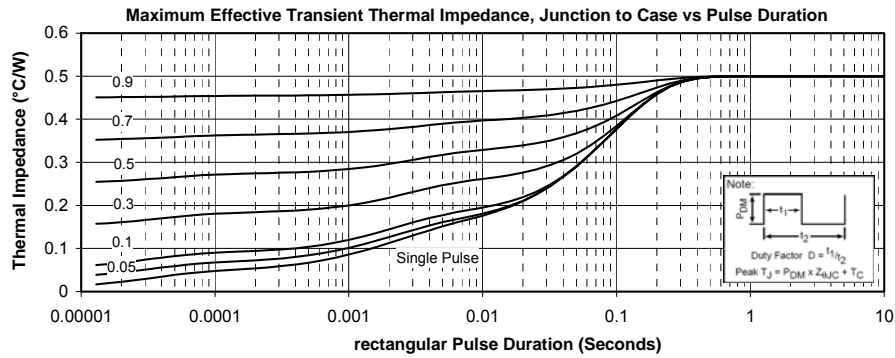
## SP4 Package outline (dimensions in mm)



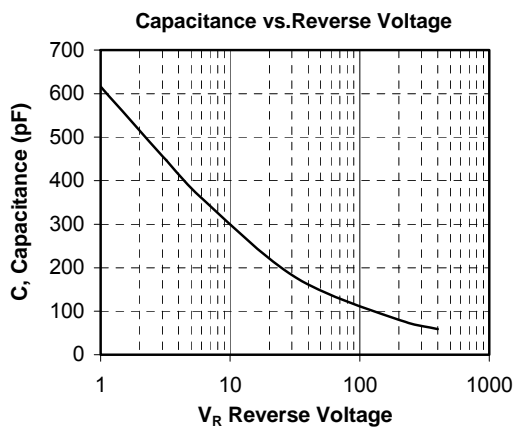
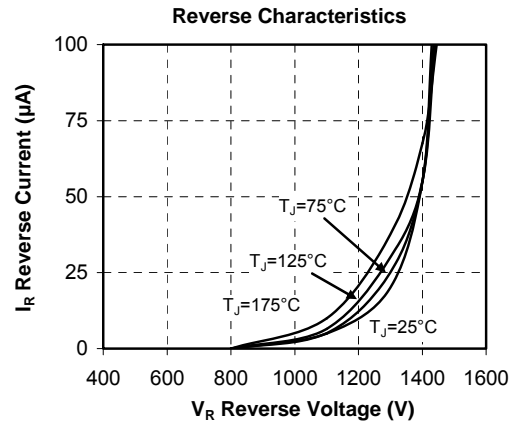
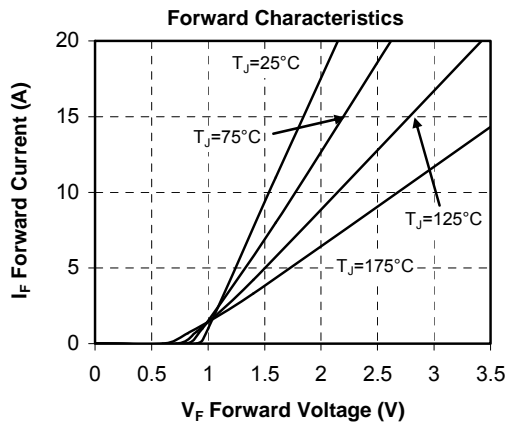
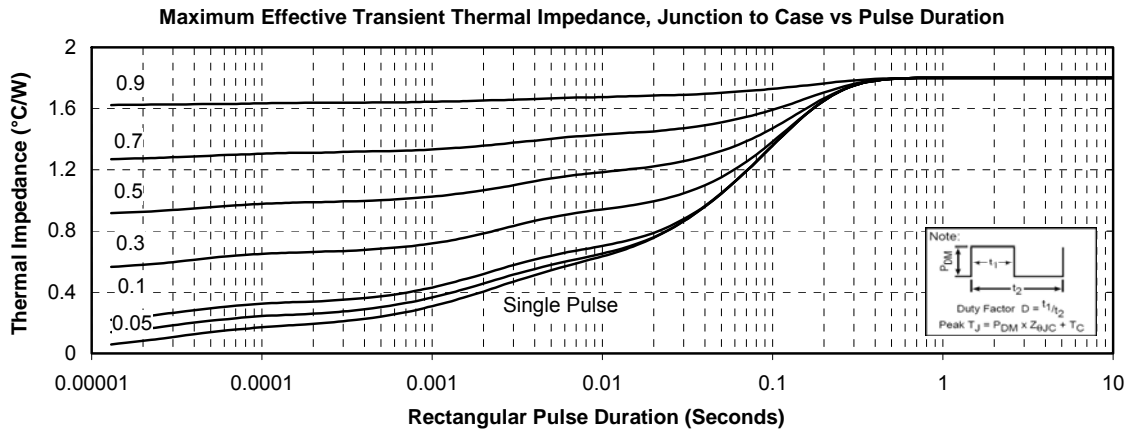
See application note APT0501 - Mounting Instructions for SP4 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical CoolMOS Performance Curve





## Typical SiC Diode Performance Curve



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