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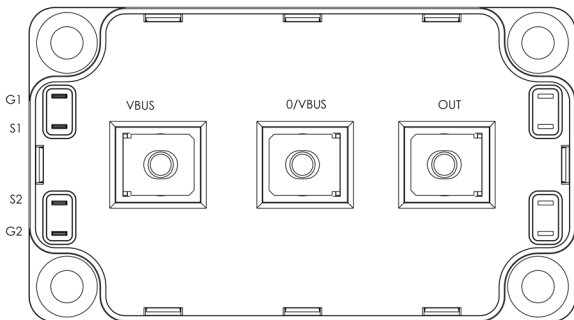
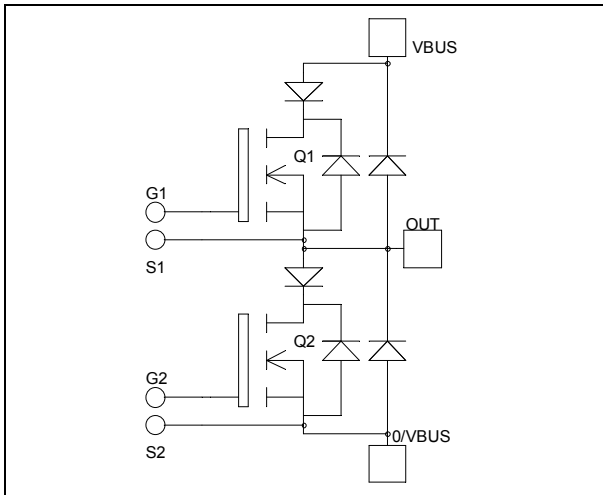
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*Phase leg*  
*Series & parallel diodes*  
*MOSFET Power Module*

**$V_{DSS} = 1200V$**   
 **$R_{DSon} = 200m\Omega$  typ @  $T_j = 25^\circ C$**   
 **$I_D = 50A$  @  $T_c = 25^\circ C$**


**Application**

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

**Features**

- Power MOS 7<sup>®</sup> MOSFETs
  - Low  $R_{DSon}$
  - Low input and Miller capacitance
  - Low gate charge
  - Fast intrinsic reverse diode
  - Avalanche energy rated
  - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
  - Symmetrical design
  - M5 power connectors
- High level of integration

**Benefits**

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Low profile
- RoHS Compliant

**All ratings @  $T_j = 25^\circ C$  unless otherwise specified**

**Absolute maximum ratings**

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Breakdown Voltage	1200	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	50
		$T_c = 80^\circ C$	37
$I_{DM}$	Pulsed Drain current	200	A
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	240	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	1250
$I_{AR}$	Avalanche current (repetitive and non repetitive)	12	A
$E_{AR}$	Repetitive Avalanche Energy	30	mJ
$E_{AS}$	Single Pulse Avalanche Energy	1300	

**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)

**Electrical Characteristics**

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 1200V$			1.5	mA
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 25A$		200	240	m $\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 6mA$	3		5	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			$\pm 600$	nA

**Dynamic Characteristics**

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$		15.2		nF
$C_{oss}$	Output Capacitance	$V_{DS} = 25V$		2.2		
$C_{rss}$	Reverse Transfer Capacitance	$f = 1MHz$		0.42		
$Q_g$	Total gate Charge	$V_{GS} = 10V$		600		nC
$Q_{gs}$	Gate – Source Charge	$V_{Bus} = 600V$		84		
$Q_{gd}$	Gate – Drain Charge	$I_D = 50A$		390		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive switching @ 125°C</b> $V_{GS} = 15V$ $V_{Bus} = 800V$ $I_D = 50A$ $R_G = 0.8\Omega$		10		ns
$T_r$	Rise Time			10		
$T_{d(off)}$	Turn-off Delay Time			68		
$T_f$	Fall Time			36		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ 25°C</b> $V_{GS} = 15V, V_{Bus} = 800V$ $I_D = 50A, R_G = 0.8\Omega$		2.79		mJ
$E_{off}$	Turn-off Switching Energy			0.6		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ 125°C</b> $V_{GS} = 15V, V_{Bus} = 800V$ $I_D = 50A, R_G = 0.8\Omega$		5.6		mJ
$E_{off}$	Turn-off Switching Energy			0.81		
$R_{thJC}$	Junction to Case Thermal Resistance				0.1	°C/W

**Series diode ratings and characteristics**

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		1000			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1000V$			300	$\mu A$
$I_F$	DC Forward Current	$T_c = 80°C$		120		A
$V_F$	Diode Forward Voltage	$I_F = 120A$		1.9	2.5	V
		$I_F = 240A$		2.2		
		$I_F = 120A, T_j = 125°C$		1.7		
$t_{rr}$	Reverse Recovery Time	$I_F = 120A$ $V_R = 667V$ $di/dt = 400A/\mu s$	$T_j = 25°C$	280		ns
			$T_j = 125°C$	350		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 120A$ $V_R = 667V$ $di/dt = 400A/\mu s$	$T_j = 25°C$	1.52		$\mu C$
			$T_j = 125°C$	7.2		
$R_{thJC}$	Junction to Case Thermal Resistance				0.46	°C/W

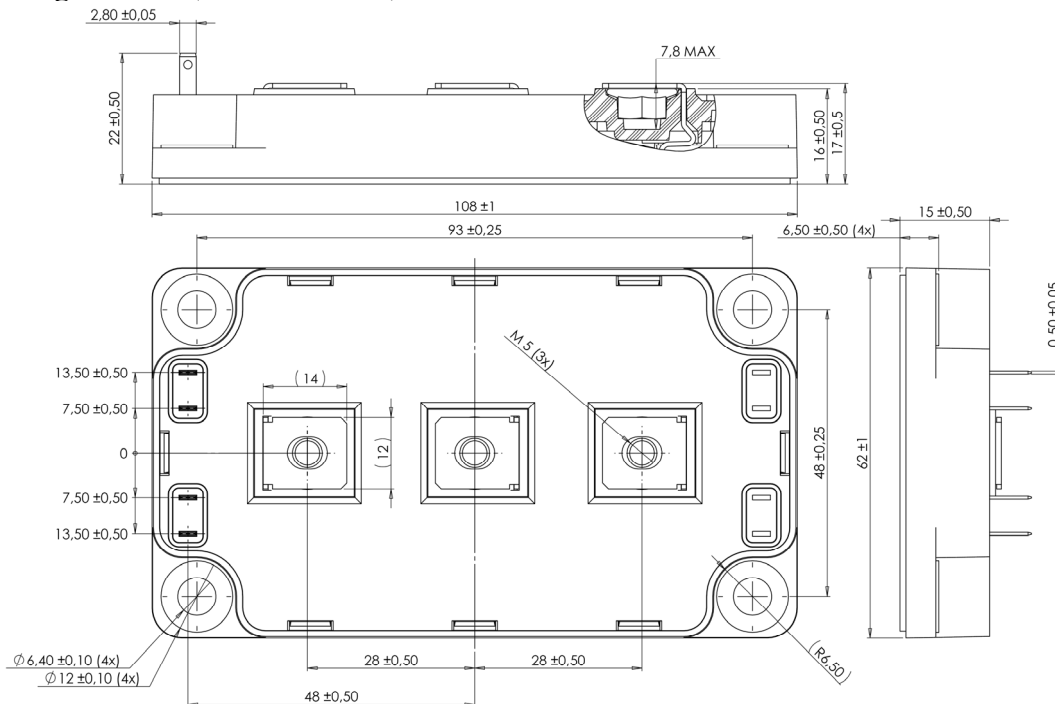
## Parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Repetitive Reverse Voltage		1200			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R=1200V$			350	$\mu A$
$I_F$	DC Forward Current	$T_c = 70^\circ C$		120		A
$V_F$	Diode Forward Voltage	$I_F = 120A$		2	2.5	V
		$I_F = 240A$		2.3		
		$I_F = 120A$	$T_j = 125^\circ C$	1.8		
$t_{rr}$	Reverse Recovery Time	$I_F = 120A$ $V_R = 800V$ $di/dt = 400A/\mu s$	$T_j = 25^\circ C$	400		ns
	$T_j = 125^\circ C$		470			
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ C$	2.4		
		$T_j = 125^\circ C$	8			
$R_{thJC}$	Junction to Case Thermal Resistance				0.46	$^\circ C/W$

## Thermal and package characteristics

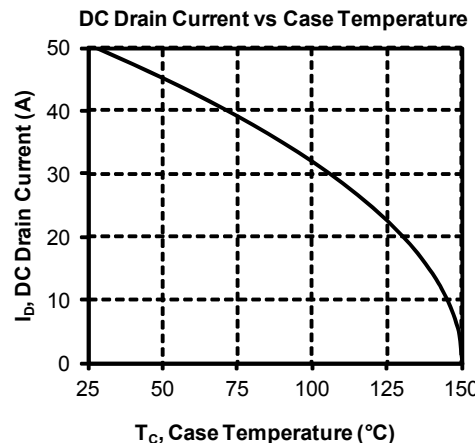
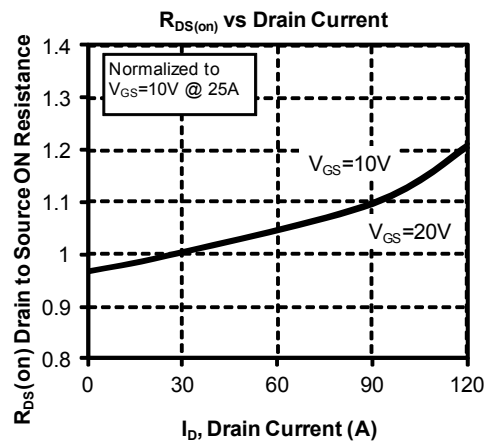
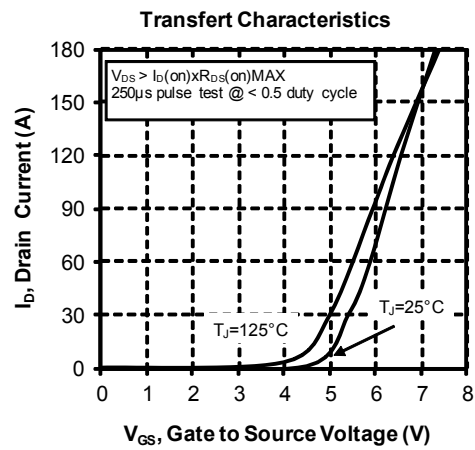
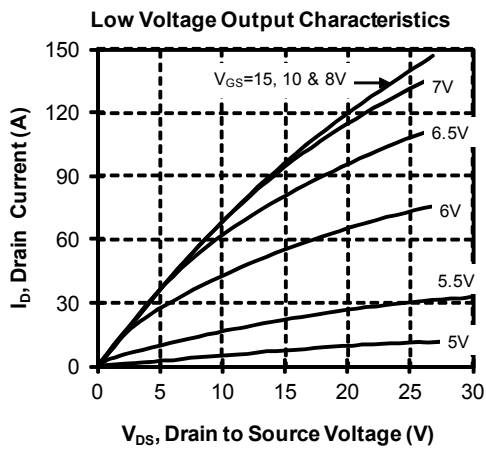
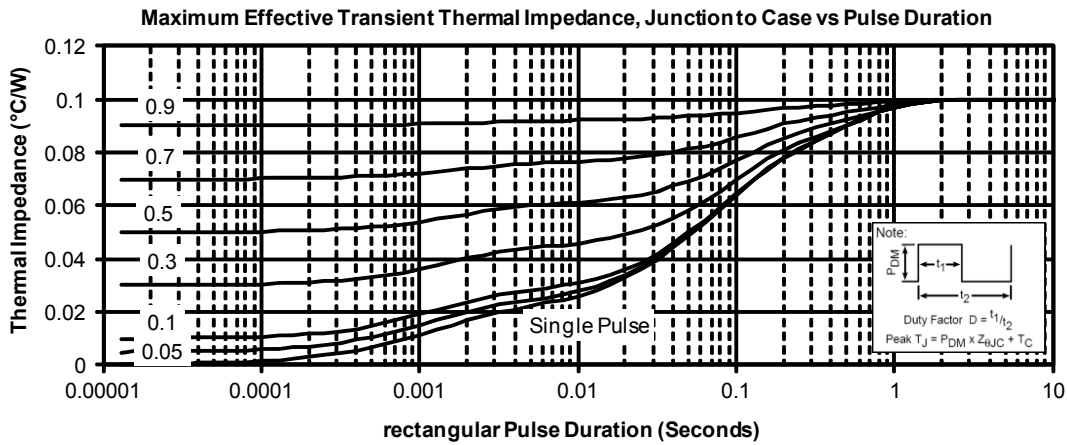
Symbol	Characteristic	Min	Max	Unit		
$V_{ISOL}$	RMS Isolation Voltage, any terminal to case $t=1$ min, 50/60Hz	4000		V		
$T_j$	Operating junction temperature range	-40	150	$^\circ C$		
$T_{JOP}$	Recommended junction temperature under switching conditions	-40	$T_{jmax} -25$			
$T_{STG}$	Storage Temperature Range	-40	125			
$T_c$	Operating Case Temperature	-40	100			
Torque	Mounting torque	To heatsink	M6	3	5	N.m
		For terminals	M5	2	3.5	
Wt	Package Weight			300	g	

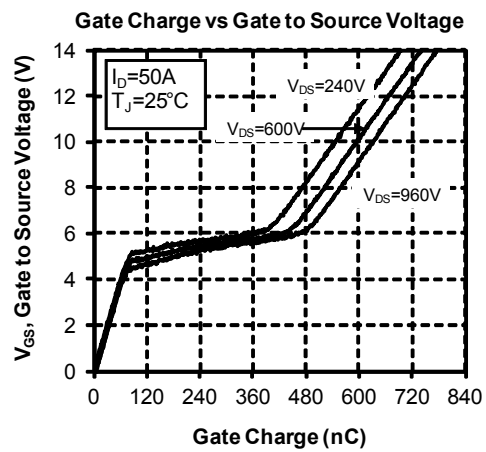
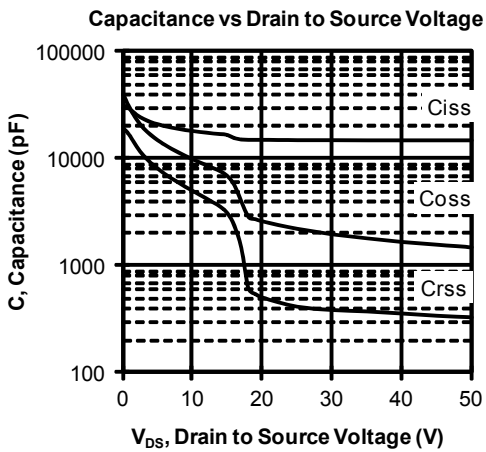
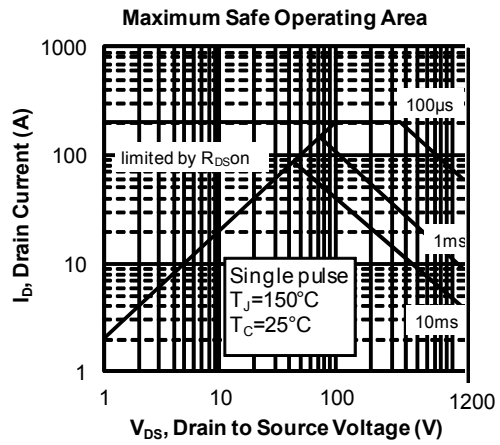
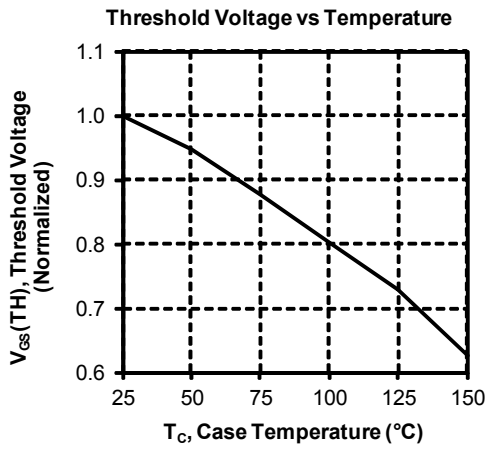
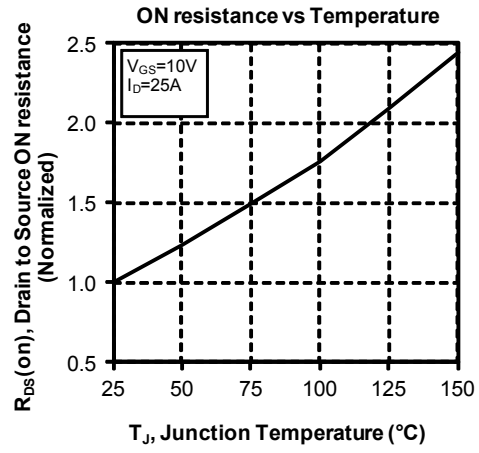
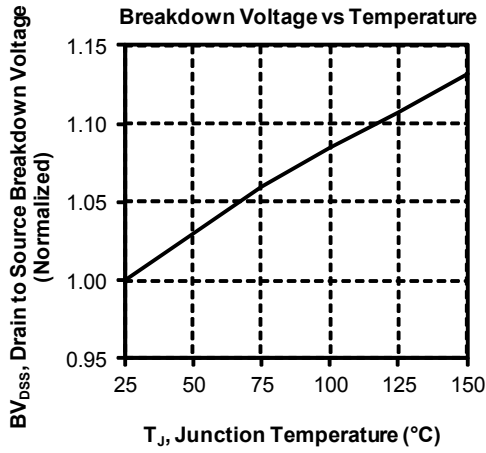
## SP6 Package outline (dimensions in mm)



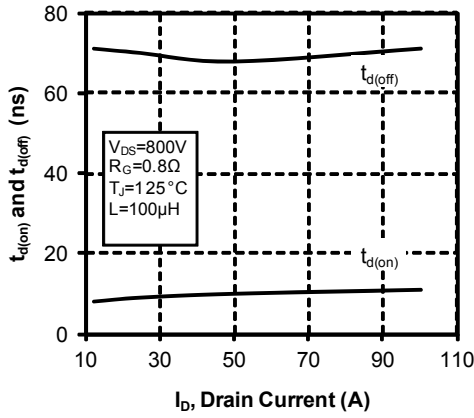
See application note APT0601 - Mounting Instructions for SP6 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve

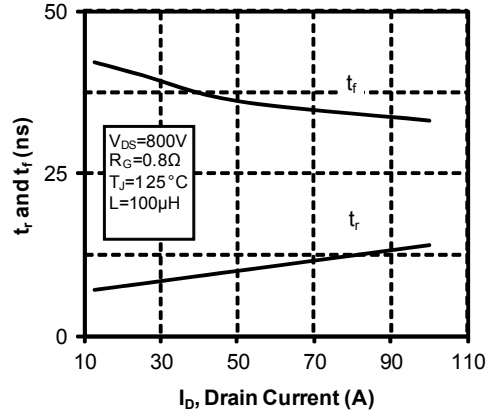




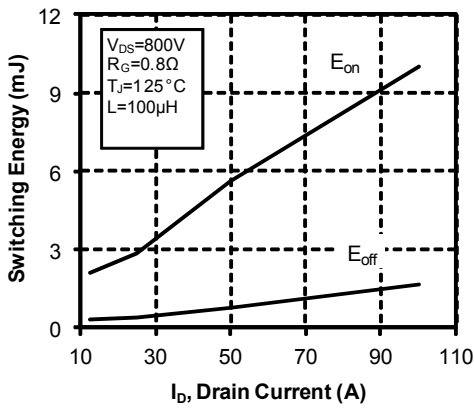
**Delay Times vs Current**



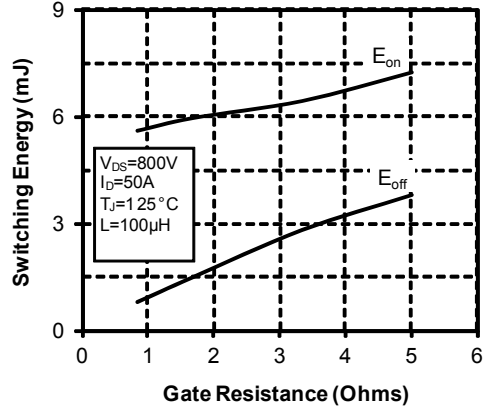
**Rise and Fall times vs Current**



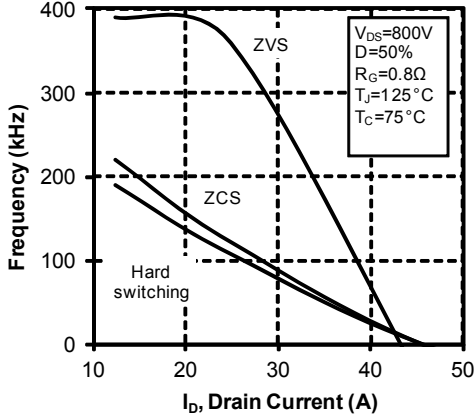
**Switching Energy vs Current**



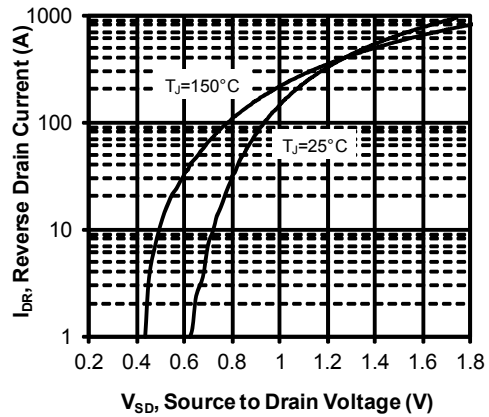
**Switching Energy vs Gate Resistance**



**Operating Frequency vs Drain Current**



**Source to Drain Diode Forward Voltage**



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