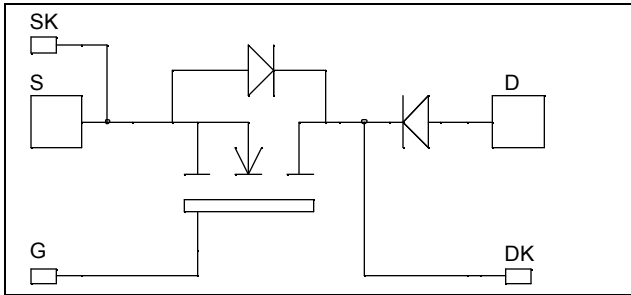


Single switch  
with Series diodes  
MOSFET Power Module

**$V_{DSS} = 1200V$**   
 **$R_{DSon} = 70m\Omega$  typ @  $T_j = 25^\circ C$**   
 **$I_D = 171A$  @  $T_c = 25^\circ C$**

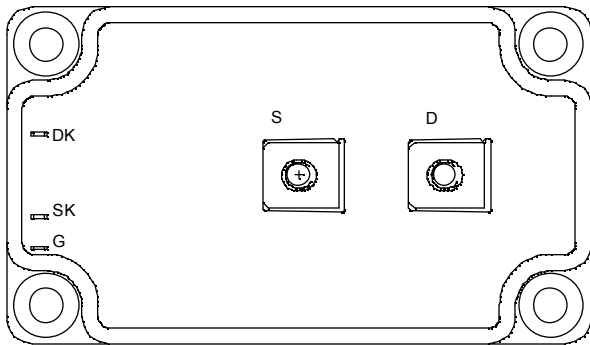


### Application

- Zero Current Switching resonant mode

### Features

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




### Benefits

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

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Breakdown Voltage	1200	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	171
		$T_c = 80^\circ C$	126
$I_{DM}$	Pulsed Drain current	684	A
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	80	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	5000
$I_{AR}$	Avalanche current (repetitive and non repetitive)	24	A
$E_{AR}$	Repetitive Avalanche Energy	50	mJ
$E_{AS}$	Single Pulse Avalanche Energy	3200	

 **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	$V_{GS} = 0\text{V}, V_{DS} = 1200\text{V}$			1.5	mA
		$V_{GS} = 0\text{V}, V_{DS} = 1000\text{V}$	$T_j = 25^\circ\text{C}$		6	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 85.5\text{A}$		70	80	m $\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 30\text{mA}$	3		5	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$			$\pm 600$	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}$		43.5		nF
$C_{oss}$	Output Capacitance	$V_{DS} = 25\text{V}$		6.6		
$C_{rss}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		1.2		
$Q_g$	Total gate Charge	$V_{GS} = 10\text{V}$		1650		nC
$Q_{gs}$	Gate – Source Charge	$V_{Bus} = 600\text{V}$		192		
$Q_{gd}$	Gate – Drain Charge	$I_D = 171\text{A}$		1074		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive switching @ 125°C</b> $V_{GS} = 15\text{V}$ $V_{Bus} = 800\text{V}$ $I_D = 171\text{A}$ $R_G = 0.8\Omega$		20		ns
$T_r$	Rise Time			17		
$T_{d(off)}$	Turn-off Delay Time			245		
$T_f$	Fall Time			62		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ 25°C</b> $V_{GS} = 15\text{V}, V_{Bus} = 800\text{V}$ $I_D = 171\text{A}, R_G = 0.8\Omega$		7.6		mJ
$E_{off}$	Turn-off Switching Energy			6.9		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ 125°C</b> $V_{GS} = 15\text{V}, V_{Bus} = 800\text{V}$ $I_D = 171\text{A}, R_G = 0.8\Omega$		13.8		mJ
$E_{off}$	Turn-off Switching Energy			8.5		

**Series diode ratings and characteristics**

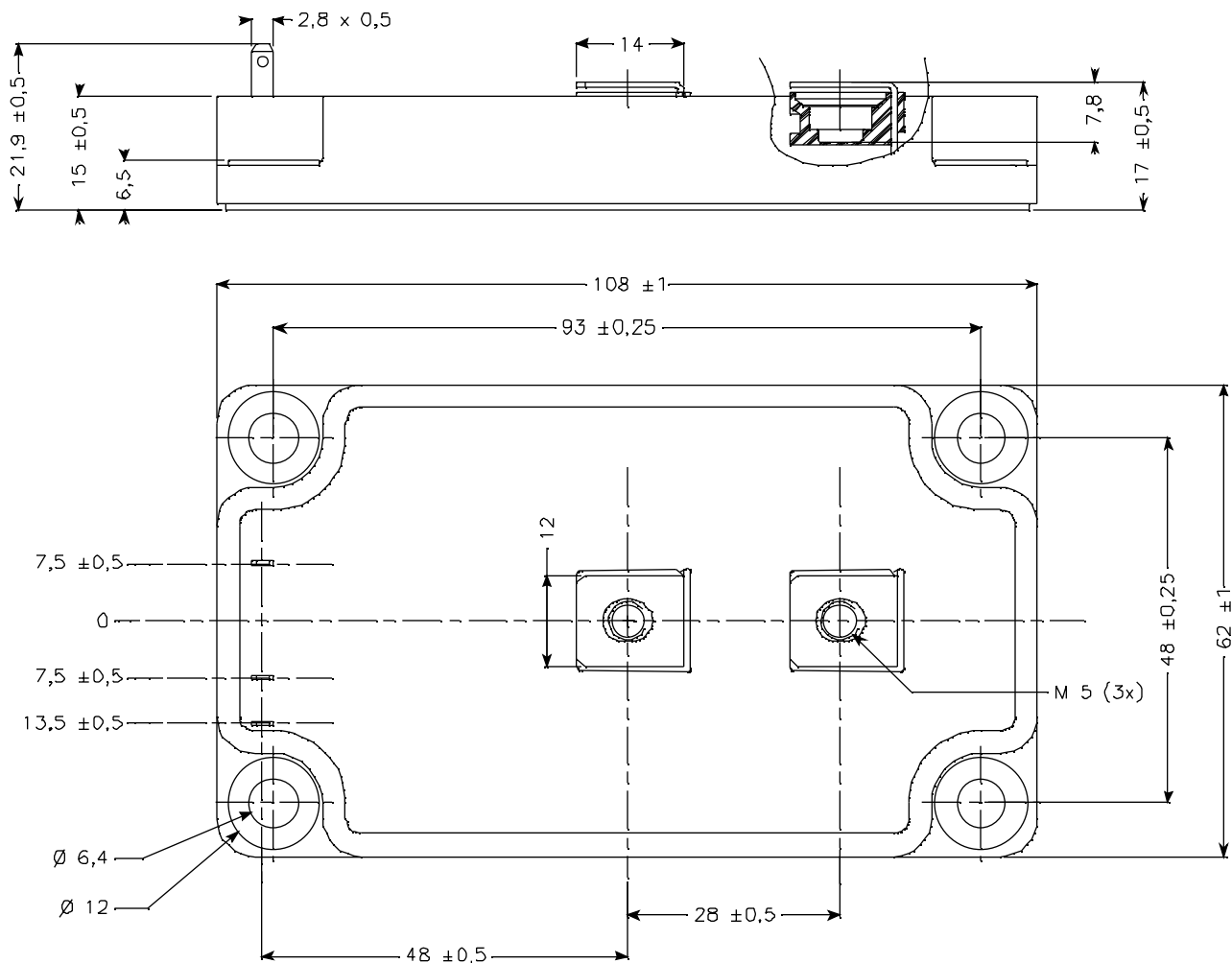
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Repetitive Reverse Voltage		1200			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$		750	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		1000	
$I_F$	DC Forward Current			240		A
$V_F$	Diode Forward Voltage	$I_F = 240\text{A}$		2	2.5	V
		$I_F = 480\text{A}$		2.3		
		$I_F = 240\text{A}$	$T_j = 125^\circ\text{C}$	1.8		
$t_{rr}$	Reverse Recovery Time	$I_F = 240\text{A}$ $V_R = 800\text{V}$ $di/dt = 800\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	400		ns
			$T_j = 125^\circ\text{C}$	470		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 240\text{A}$ $V_R = 800\text{V}$ $di/dt = 800\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	4.8		$\mu\text{C}$
			$T_j = 125^\circ\text{C}$	16		

### Thermal and package characteristics

#### Symbol Characteristic

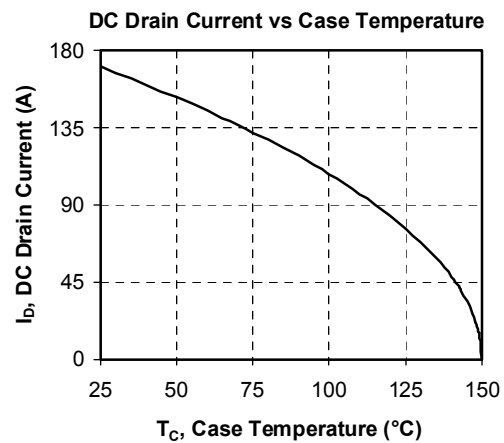
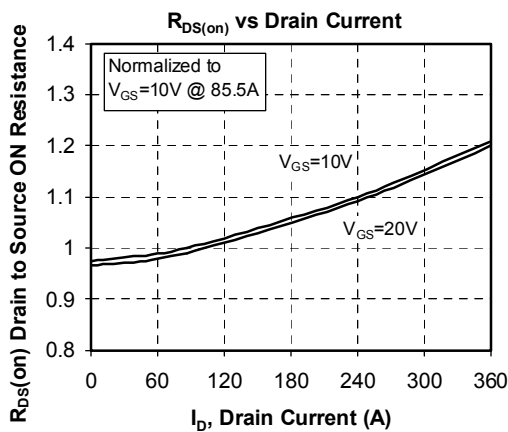
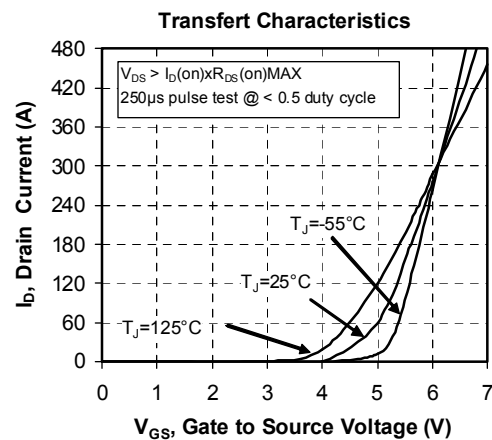
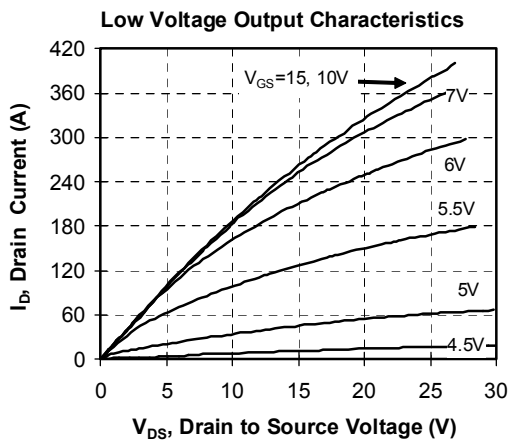
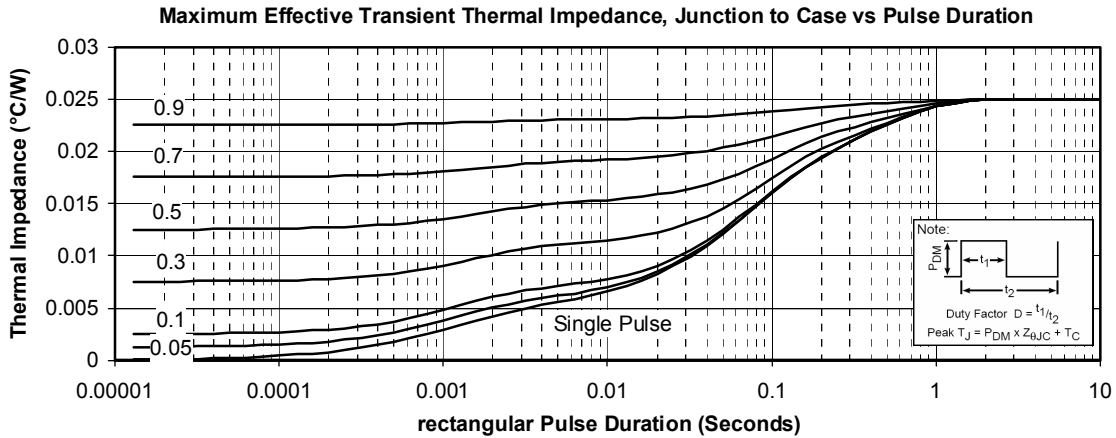
Symbol	Characteristic	Min	Typ	Max	Unit	
R <sub>thJC</sub>	Junction to Case Thermal Resistance	Transistor		0.025	°C/W	
		Series diode		0.23		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, I <sub>isol</sub> <1mA, 50/60Hz	2500			V	
T <sub>J</sub>	Operating junction temperature range	-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	M6	3	5	N.m
		For terminals	M5	2	3.5	
Wt	Package Weight			280	g	

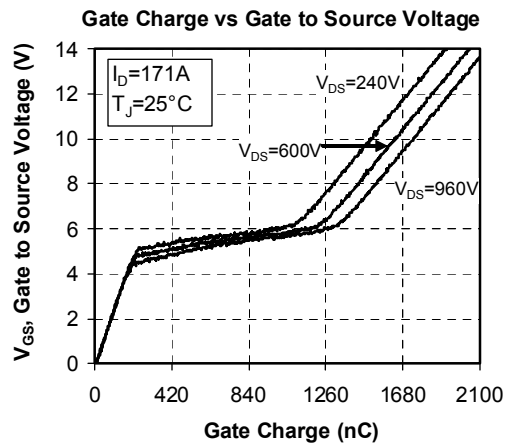
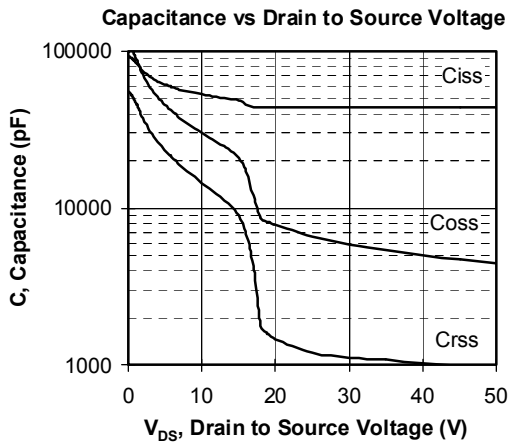
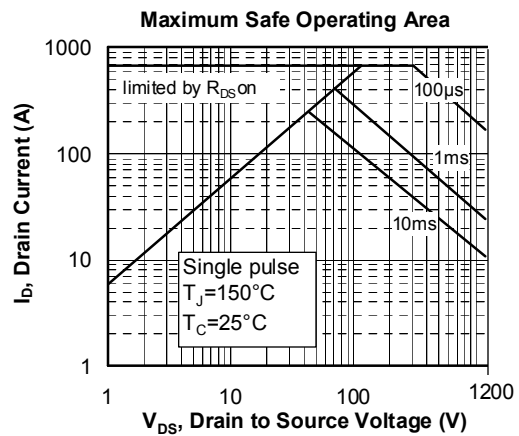
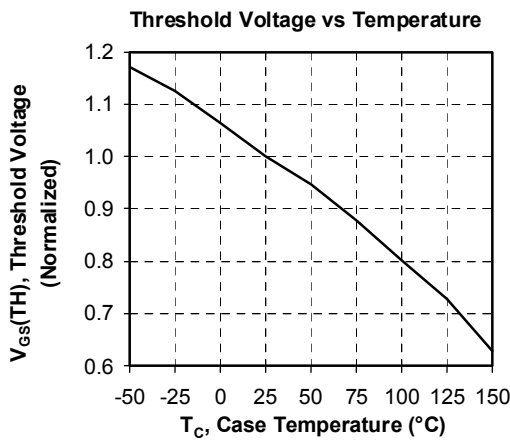
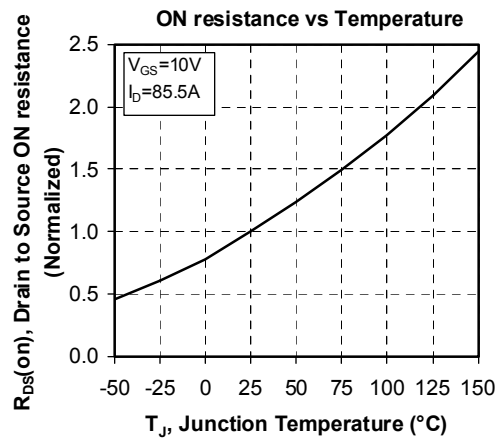
### SP6 Package outline (dimensions in mm)

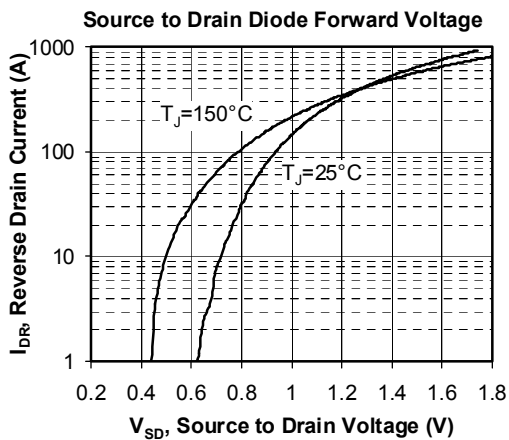
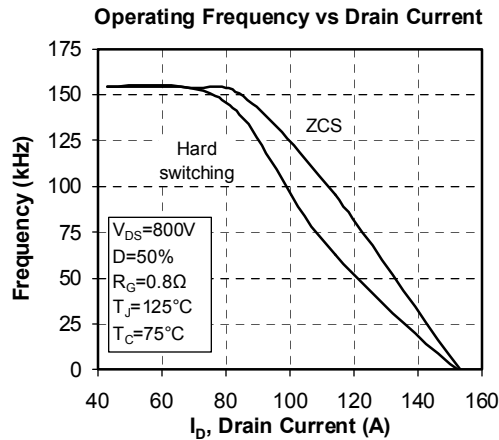
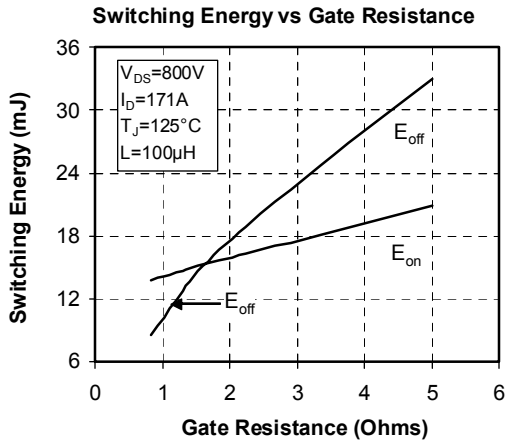
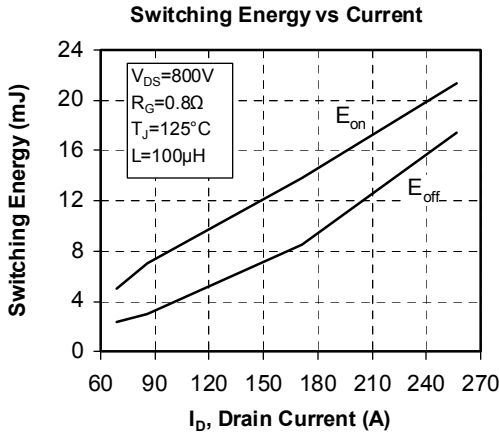
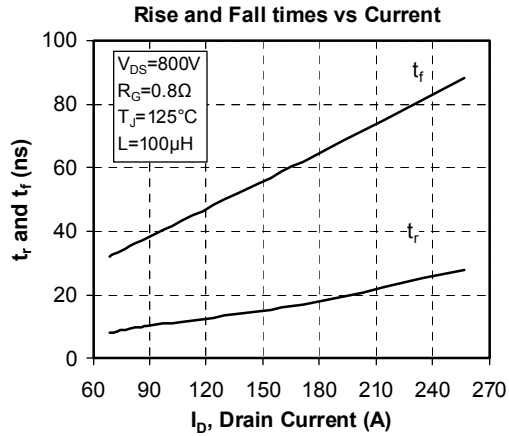
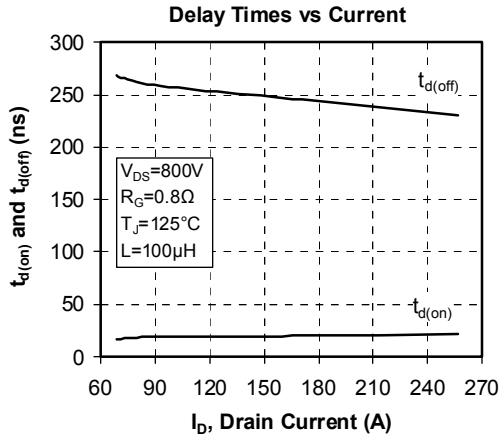


See application note APT0601 - Mounting Instructions for SP6 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve







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