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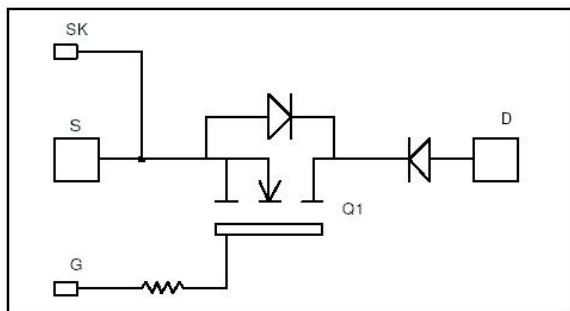


## Single switch with Series diode MOSFET Power Module

$$V_{DSS} = 1000V$$

$$R_{DSon} = 65m\Omega \text{ typ @ } T_j = 25^\circ C$$

$$I_D = 145A \text{ @ } T_c = 25^\circ C$$



### Application

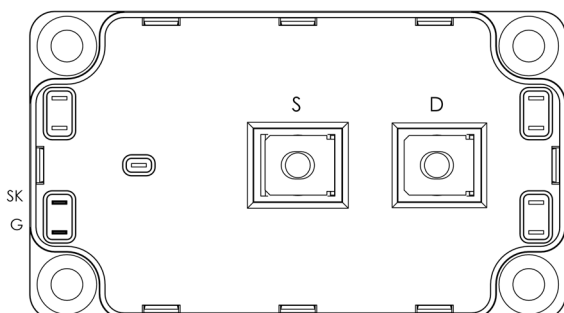
- Zero Current Switching resonant mode

### 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	1000	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$ 145 $T_c = 80^\circ C$ 110	A
$I_{DM}$	Pulsed Drain current	580	
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	78	m $\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$ 3250	W
$I_{AR}$	Avalanche current (repetitive and non repetitive)	30	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	$V_{GS} = 0V, V_{DS} = 1000V$ $T_j = 25^\circ\text{C}$			400	$\mu\text{A}$
		$V_{GS} = 0V, V_{DS} = 800V$ $T_j = 125^\circ\text{C}$			2	$\text{mA}$
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 72.5A$		65	78	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 20\text{mA}$	3		5	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			$\pm 400$	$\text{nA}$

### Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$		28.5		$\text{nF}$
$C_{oss}$	Output Capacitance	$V_{DS} = 25V$		5.08		
$C_{rss}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		0.9		
$Q_g$	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 500V$ $I_D = 145A$		1068		$\text{nC}$
$Q_{gs}$	Gate – Source Charge			136		
$Q_{gd}$	Gate – Drain Charge			692		
$T_{d(on)}$	Turn-on Delay Time	$V_{GS} = 15V$ $V_{Bus} = 500V$ $I_D = 145A$ $R_G = 0.75\Omega$		18		$\text{ns}$
$T_r$	Rise Time			14		
$T_{d(off)}$	Turn-off Delay Time			140		
$T_f$	Fall Time			55		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>25^\circ\text{C}</math></b> $V_{GS} = 15V, V_{Bus} = 670V$ $I_D = 145A, R_G = 0.75\Omega$		4.8		$\text{mJ}$
$E_{off}$	Turn-off Switching Energy			2.9		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 15V, V_{Bus} = 670V$ $I_D = 145A, R_G = 0.75\Omega$		8		$\text{mJ}$
$E_{off}$	Turn-off Switching Energy			3.9		

### Series diode ratings and characteristics

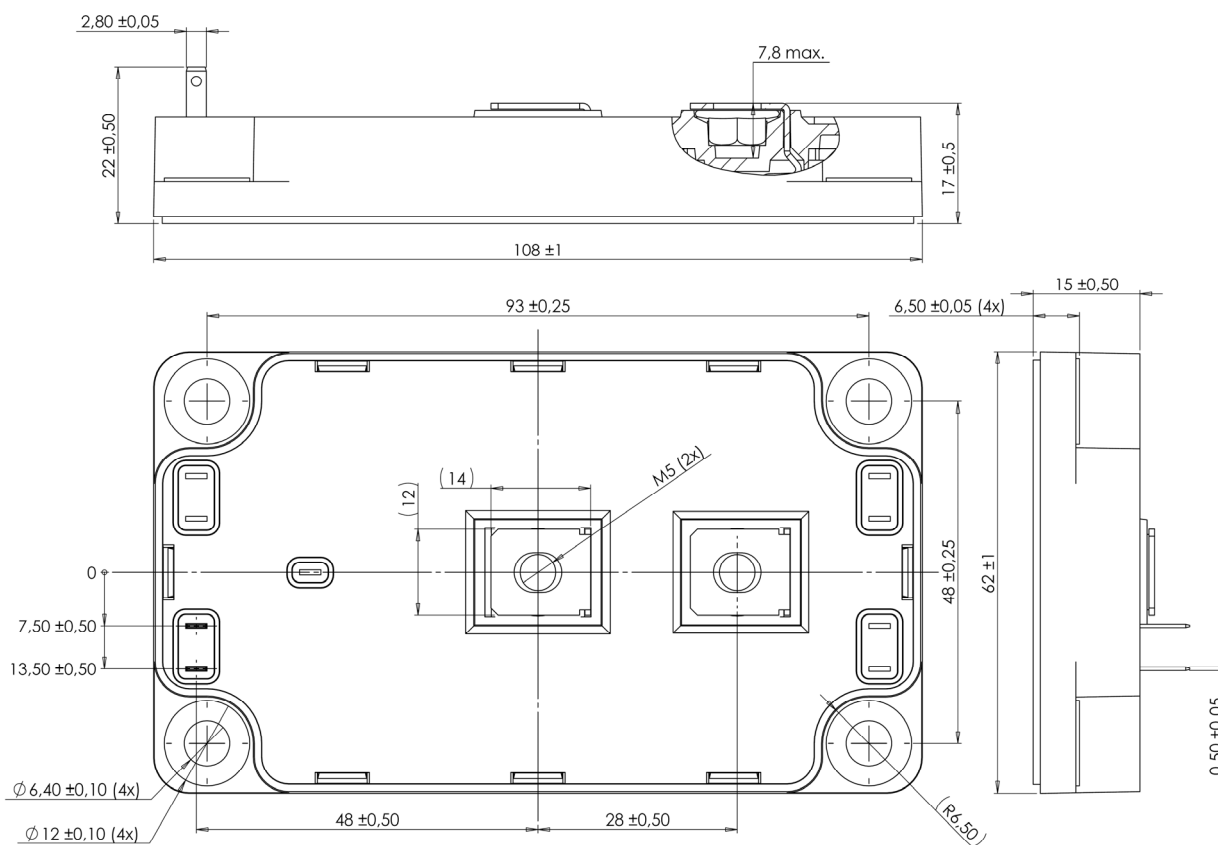
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		1000			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1000V$	$T_j = 25^\circ\text{C}$		750	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		1000	
$I_F$	DC Forward Current	$T_c = 80^\circ\text{C}$		240		A
$V_F$	Diode Forward Voltage	$I_F = 240A$		2	2.5	V
		$I_F = 480A$		2.2		
		$I_F = 240A$ $T_j = 125^\circ\text{C}$		1.7		
$t_{rr}$	Reverse Recovery Time	$I_F = 240A$ $V_R = 667V$ $di/dt = 800A/\mu\text{s}$	$T_j = 25^\circ\text{C}$	280		$\text{ns}$
			$T_j = 125^\circ\text{C}$	350		
$Q_{rr}$	Reverse Recovery Charge	$T_j = 25^\circ\text{C}$		3.04		$\mu\text{C}$
			$T_j = 125^\circ\text{C}$	14.4		



## Thermal and package characteristics

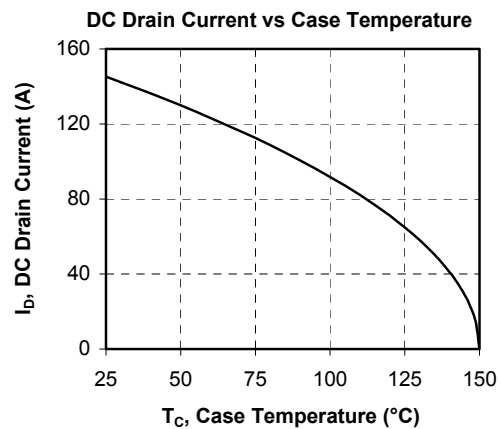
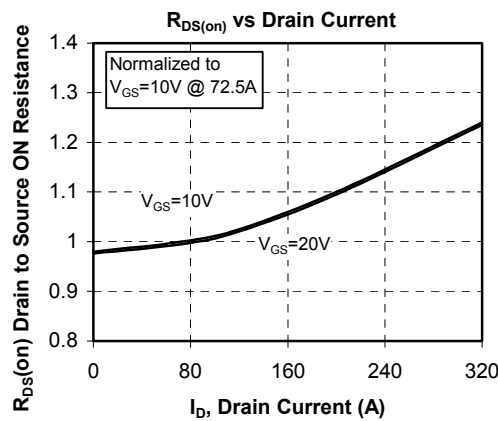
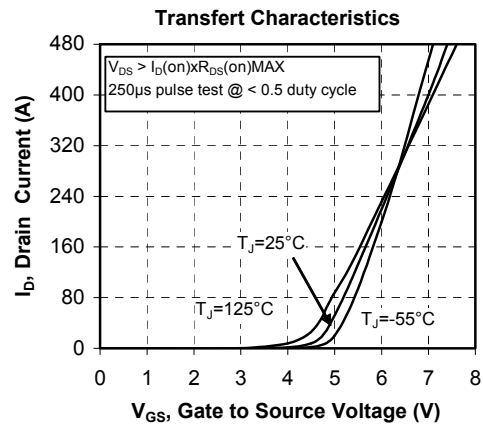
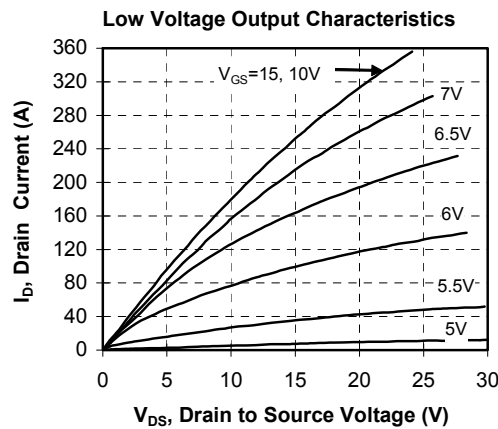
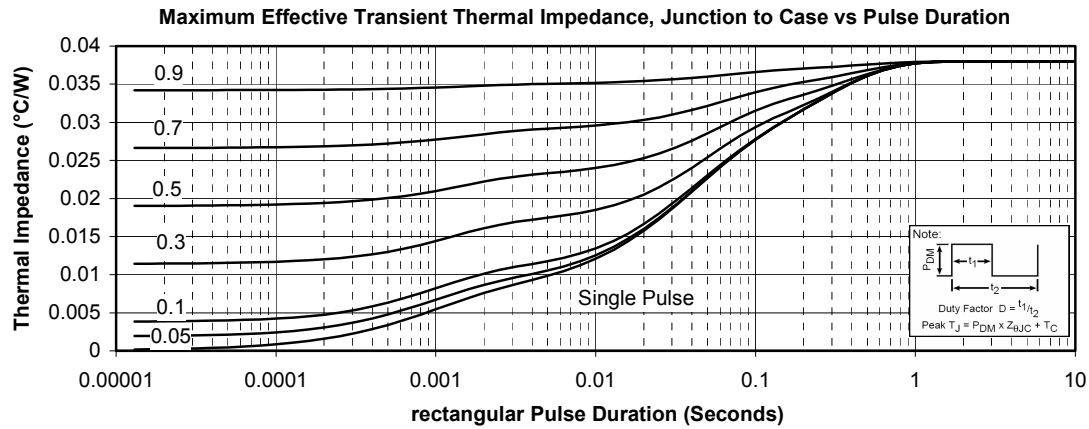
Symbol	Characteristic		Min	Typ	Max	Unit
R <sub>thJC</sub>	Junction to Case Thermal Resistance	Transistor			0.038	°C/W
		Series diode			0.23	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz		4000			V
T <sub>J</sub>	Operating junction temperature range		-40		150	°C
T <sub>STG</sub>	Storage Temperature Range		-40		125	
T <sub>C</sub>	Operating Case Temperature		-40		100	
Torque	Mounting torque	To Heatsink	M6	3	5	N.m
		For terminals	M5	2	3.5	
Wt	Package Weight				300	g

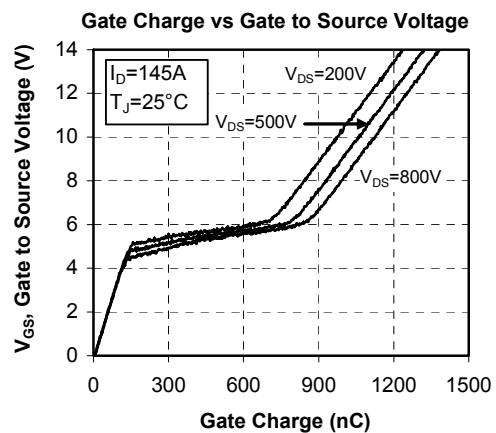
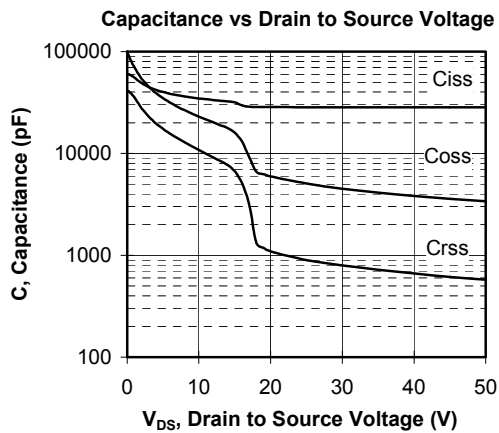
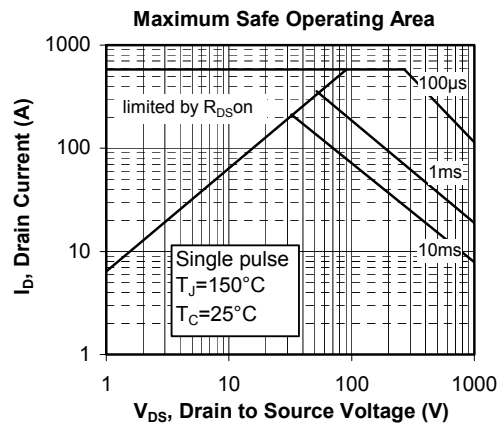
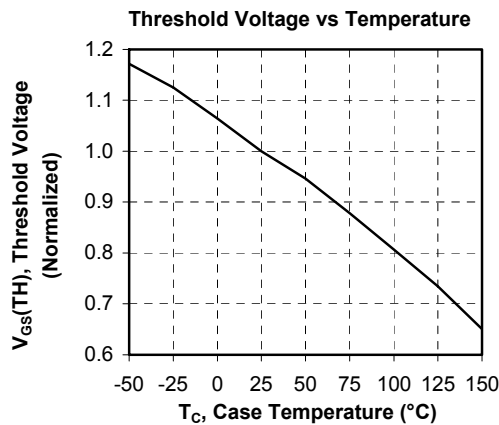
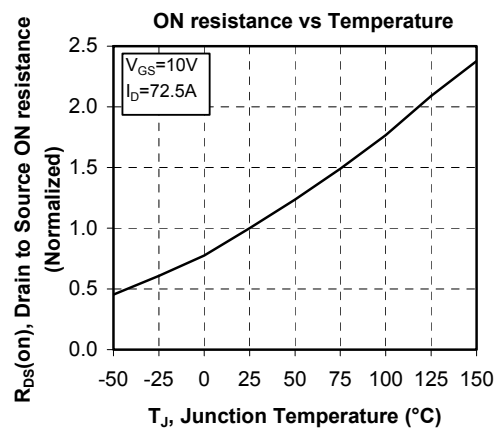
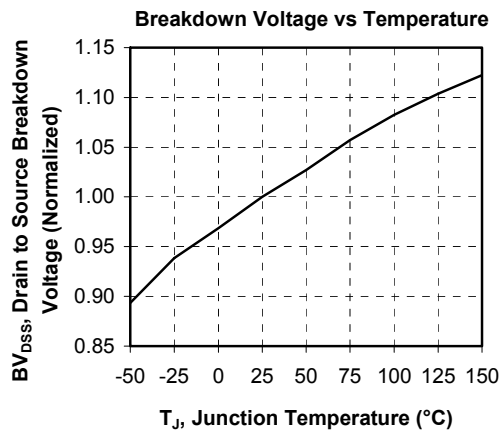
## SP6 Package outline (dimensions in mm)

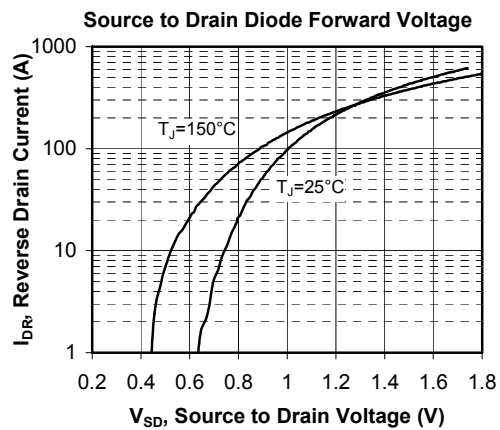
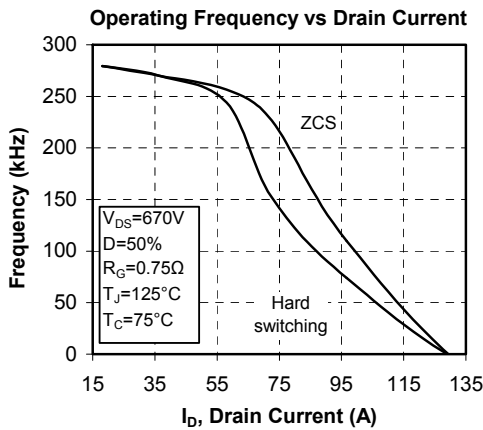
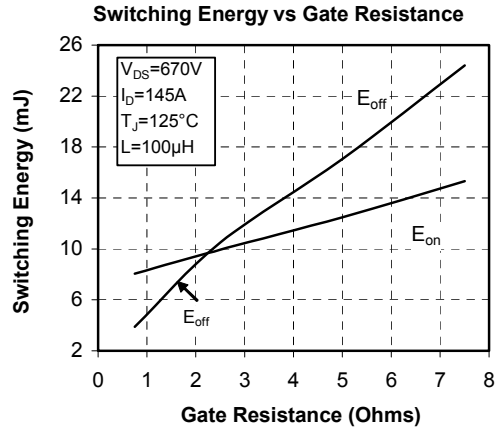
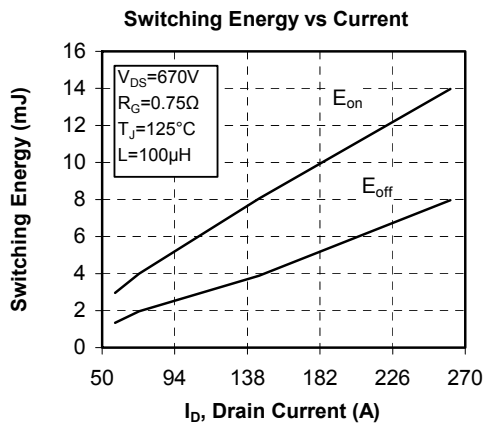
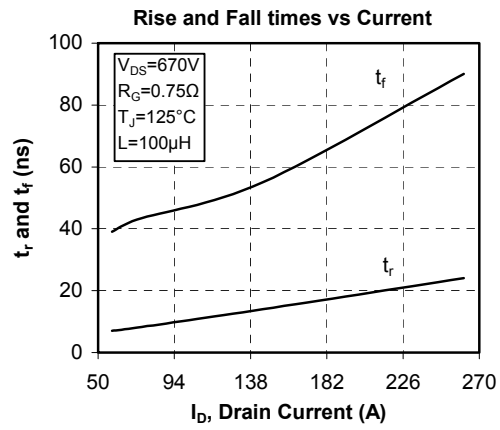
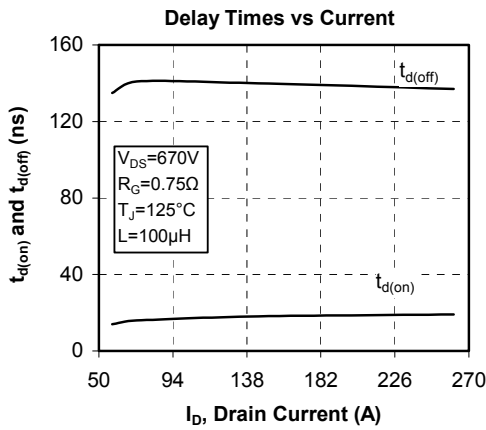


See application note APT0601 - Mounting Instructions for SP6 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve







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