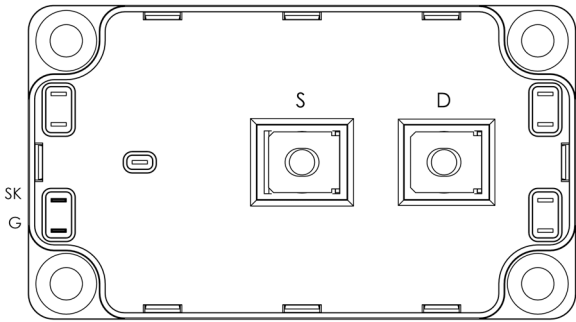
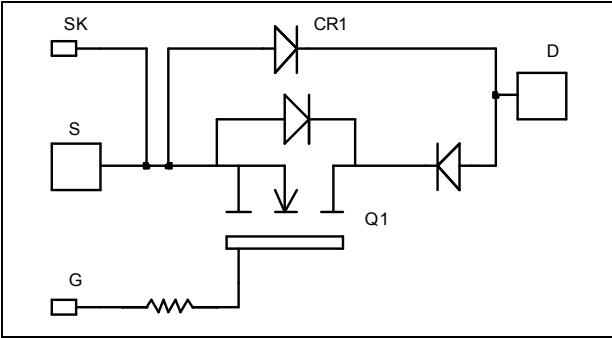


Single switch  
Series & parallel diodes  
MOSFET Power Module

**$V_{DSS} = 500V$**   
 **$R_{DSon} = 13m\Omega$  typ @  $T_j = 25^\circ C$**   
 **$I_D = 335A$  @  $T_c = 25^\circ C$**



**Application**

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

**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

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

**Absolute maximum ratings**

<i>Symbol</i>	<i>Parameter</i>	<i>Max ratings</i>	<i>Unit</i>
$V_{DSS}$	Drain - Source Breakdown Voltage	500	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	335
		$T_c = 80^\circ C$	250
$I_{DM}$	Pulsed Drain current	1340	A
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	15	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	3290
$I_{AR}$	Avalanche current (repetitive and non repetitive)	71	A
$E_{AR}$	Repetitive Avalanche Energy	50	mJ
$E_{AS}$	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)

**Electrical Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 500V$			400	$\mu A$
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 167.5A$		13	15	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 20mA$	3		5	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			$\pm 300$	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$		42.2		nF
$C_{oss}$	Output Capacitance	$V_{DS} = 25V$		8.24		
$C_{rss}$	Reverse Transfer Capacitance	$f = 1MHz$		0.42		
$Q_g$	Total gate Charge	$V_{GS} = 10V$		800		nC
$Q_{gs}$	Gate – Source Charge	$V_{Bus} = 250V$		200		
$Q_{gd}$	Gate – Drain Charge	$I_D = 335A$		420		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive switching @ 125°C</b> $V_{GS} = 15V$ $V_{Bus} = 333V$ $I_D = 335A$ $R_G = 0.8\Omega$		21		ns
$T_r$	Rise Time			42		
$T_{d(off)}$	Turn-off Delay Time			96		
$T_f$	Fall Time			100		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ 25°C</b> $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 335A, R_G = 0.8\Omega$		4		mJ
$E_{off}$	Turn-off Switching Energy			4.16		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ 125°C</b> $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 335A, R_G = 0.8\Omega$		6.32		mJ
$E_{off}$	Turn-off Switching Energy			4.64		
$R_{thJC}$	Junction to Case Thermal Resistance				0.038	$^{\circ}C/W$

**Series diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		600			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 600V$			150	$\mu A$
$I_F$	DC Forward Current	$T_c = 80^{\circ}C$		360		A
$V_F$	Diode Forward Voltage	$I_F = 360A$		1.7	2.5	V
		$I_F = 720A$		2		
		$I_F = 360A, T_j = 125^{\circ}C$		1.4		
$t_{rr}$	Reverse Recovery Time	$I_F = 360A$ $V_R = 400V$ $di/dt = 1200A/\mu s$	$T_j = 25^{\circ}C$	70		ns
			$T_j = 125^{\circ}C$	140		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 360A$ $V_R = 400V$ $di/dt = 1200A/\mu s$	$T_j = 25^{\circ}C$	0.6		$\mu C$
			$T_j = 125^{\circ}C$	4.2		
$R_{thJC}$	Junction to Case Thermal Resistance				0.16	$^{\circ}C/W$

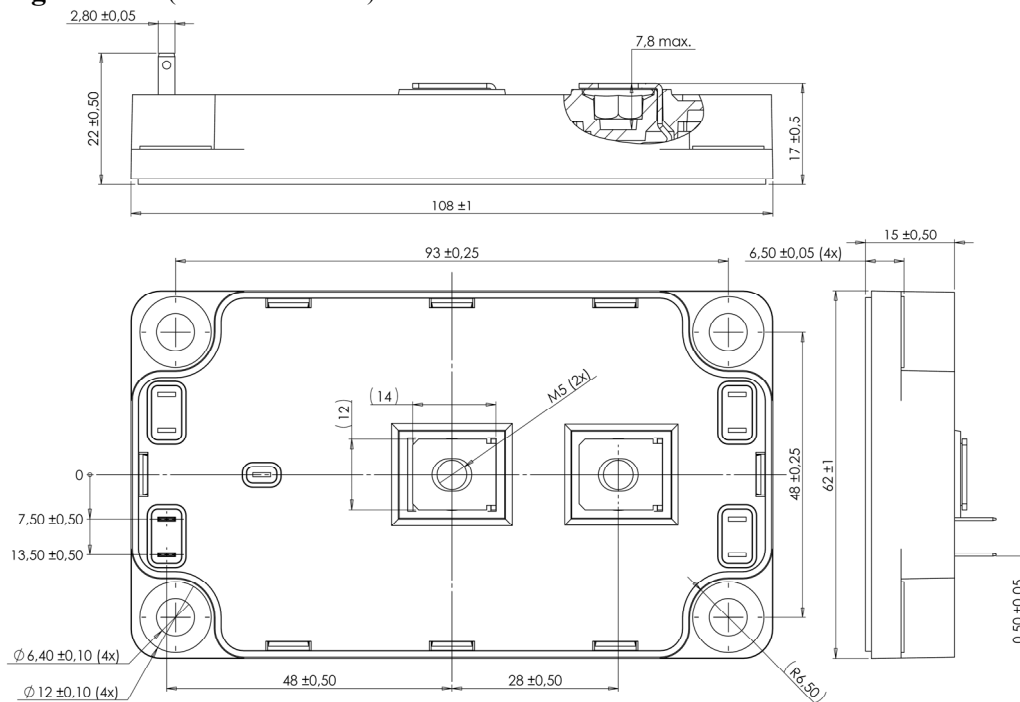
## Parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V <sub>RRM</sub>	Maximum Peak Repetitive Reverse Voltage		600			V
I <sub>RM</sub>	Maximum Reverse Leakage Current	V <sub>R</sub> = 600V			150	μA
I <sub>F</sub>	DC Forward Current	T <sub>c</sub> = 80°C		360		A
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 360A		1.7	2.5	V
		I <sub>F</sub> = 720A		2		
		I <sub>F</sub> = 360A	T <sub>j</sub> = 125°C	1.4		
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 360A V <sub>R</sub> = 400V di/dt = 1200A/μs	T <sub>j</sub> = 25°C	70		ns
			T <sub>j</sub> = 125°C	140		
Q <sub>rr</sub>	Reverse Recovery Charge	I <sub>F</sub> = 360A V <sub>R</sub> = 400V di/dt = 1200A/μs	T <sub>j</sub> = 25°C	0.6		μC
			T <sub>j</sub> = 125°C	4.2		
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.16	°C/W

## Thermal and package characteristics

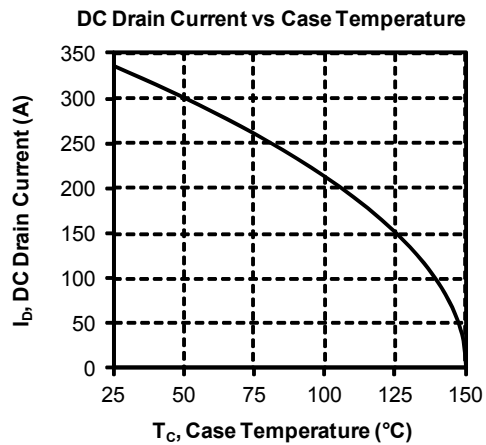
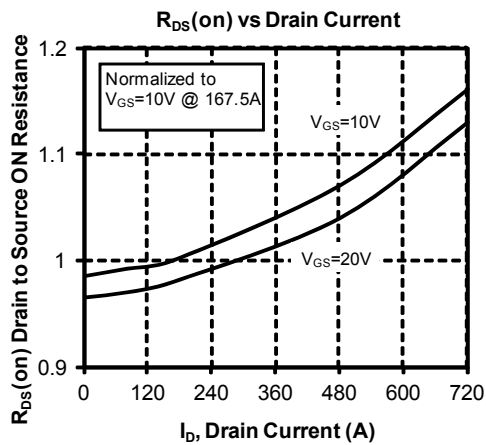
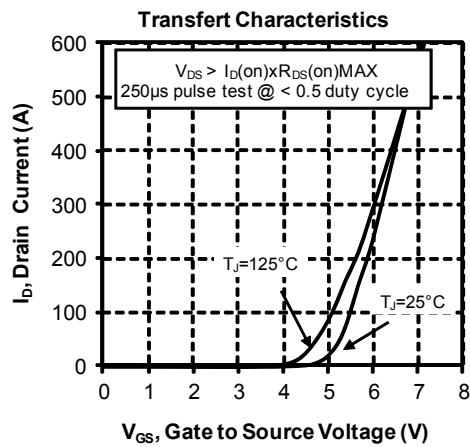
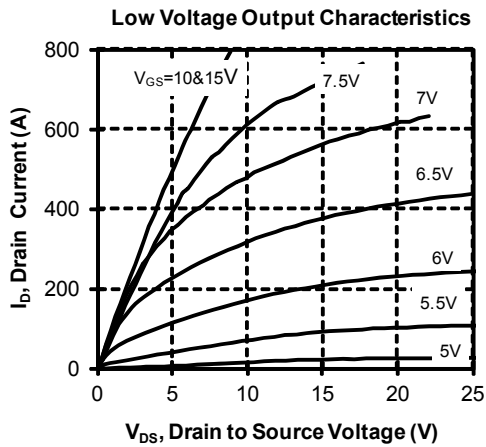
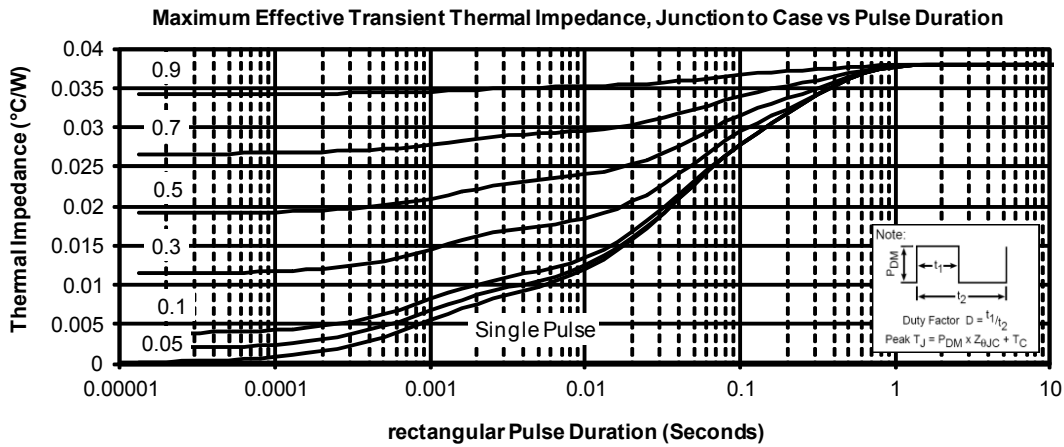
Symbol	Characteristic	Min	Max	Unit		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000		V		
T <sub>J</sub>	Operating junction temperature range	-40	150	°C		
T <sub>JOP</sub>	Recommended junction temperature under switching conditions	-40	T <sub>Jmax</sub> -25			
T <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

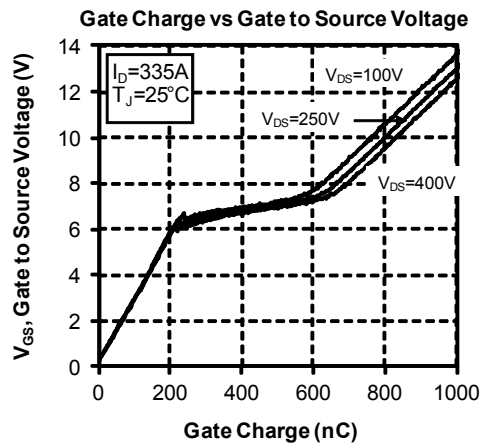
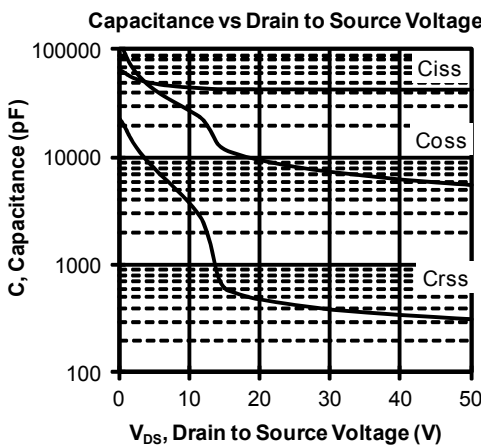
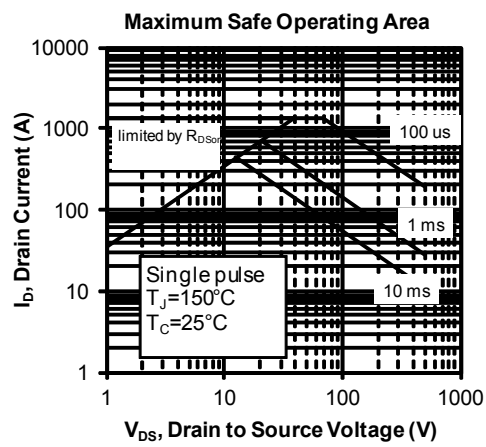
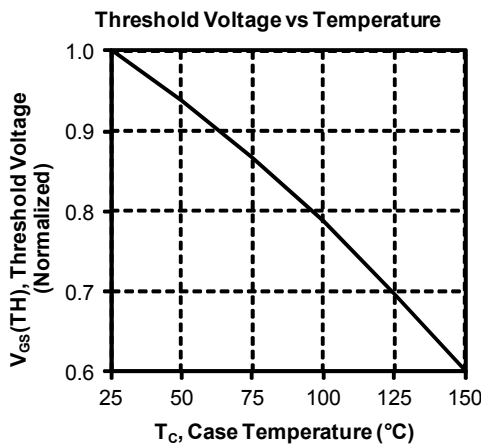
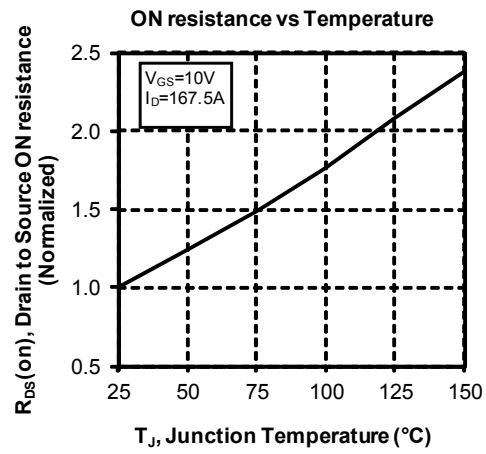
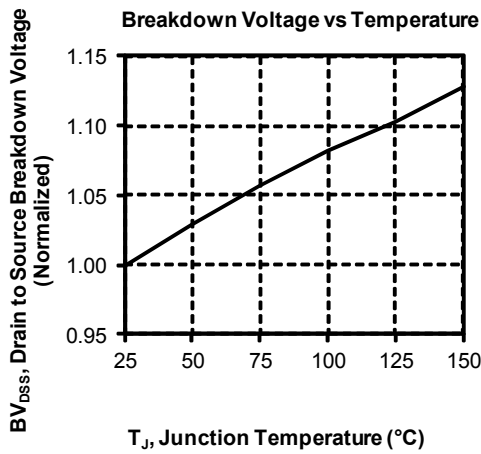
## SP6 Package outline (dimensions in mm)



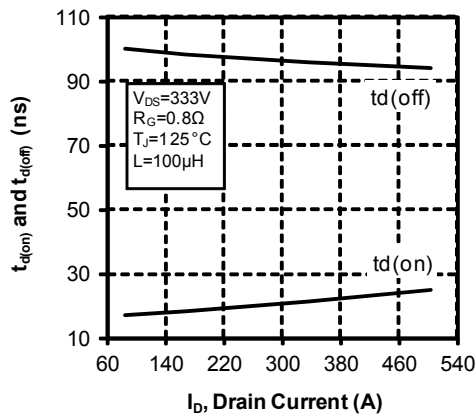
See application note APT0601 - Mounting Instructions for SP6 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve

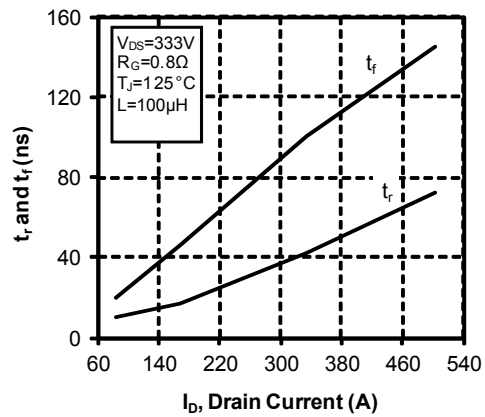




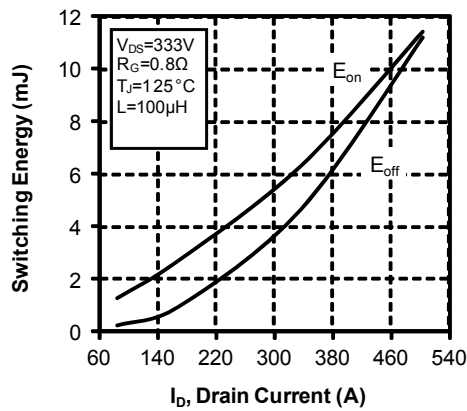
Delay Times vs Current



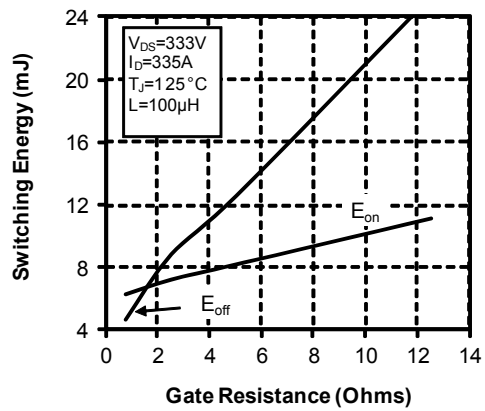
Rise and Fall times vs Current



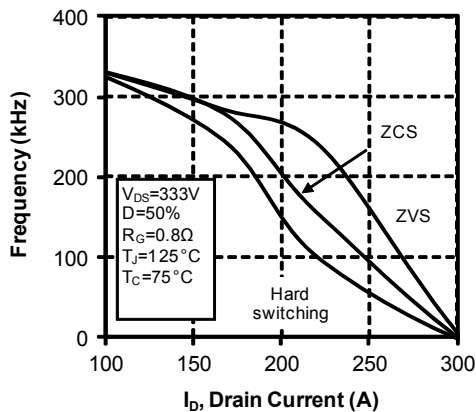
Switching Energy vs Current



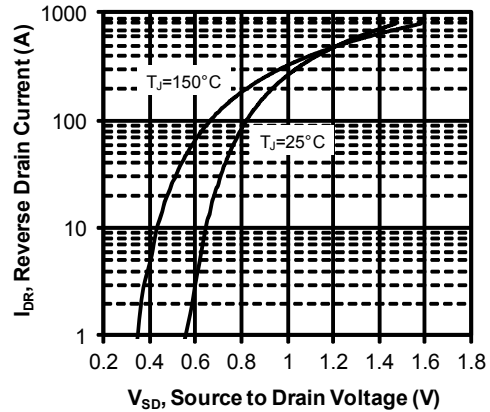
Switching Energy vs Gate Resistance



Operating Frequency vs Drain Current



Source to Drain Diode Forward Voltage



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