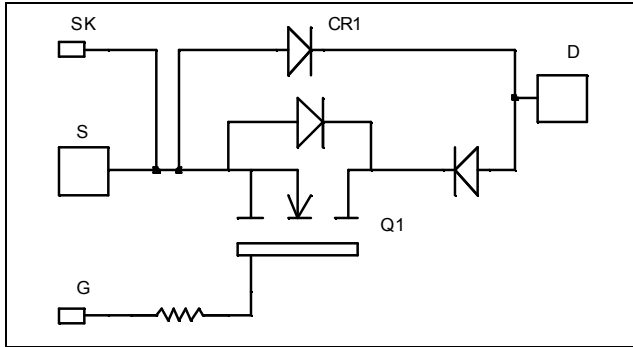


*Single switch
Series & parallel diodes
MOSFET Power Module*

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



Application

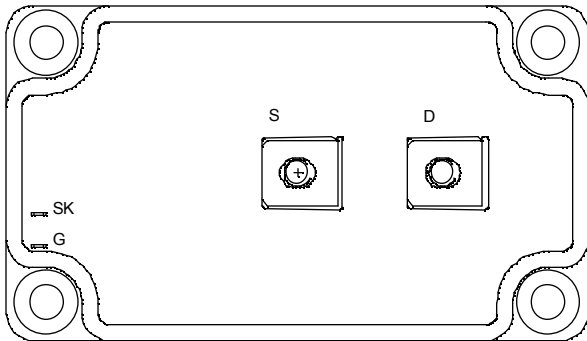
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

Features

- Power MOS 7[®] 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	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	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	15	m Ω
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

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	$V_{GS} = 0\text{V}, V_{DS} = 500\text{V}$			400	μA
		$V_{GS} = 0\text{V}, V_{DS} = 400\text{V}$			2000	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 167.5\text{A}$		13	15	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 20\text{mA}$	3		5	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$			± 300	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}$ $V_{DS} = 25\text{V}$ $f = 1\text{MHz}$		42.2		nF
C_{oss}	Output Capacitance			8.24		
C_{rss}	Reverse Transfer Capacitance			0.42		
Q_g	Total gate Charge	$V_{GS} = 10\text{V}$ $V_{Bus} = 250\text{V}$ $I_D = 335\text{A}$		800		nC
Q_{gs}	Gate – Source Charge			200		
Q_{gd}	Gate – Drain Charge			420		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C $V_{GS} = 15\text{V}$ $V_{Bus} = 333\text{V}$ $I_D = 335\text{A}$ $R_G = 0.8\Omega$		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	Inductive switching @ 25°C $V_{GS} = 15\text{V}, V_{Bus} = 333\text{V}$ $I_D = 335\text{A}, R_G = 0.8\Omega$		4		mJ
E_{off}	Turn-off Switching Energy			4.16		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15\text{V}, V_{Bus} = 333\text{V}$ $I_D = 335\text{A}, R_G = 0.8\Omega$		6.32		mJ
E_{off}	Turn-off Switching Energy			4.64		

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	$V_R = 200\text{V}$	$T_j = 25^\circ\text{C}$		750	μA
			$T_j = 125^\circ\text{C}$		1000	
I_F	DC Forward Current			240		A
V_F	Diode Forward Voltage	$I_F = 240\text{A}$		1.1	1.15	V
		$I_F = 480\text{A}$		1.4		
		$I_F = 240\text{A}$	$T_j = 125^\circ\text{C}$	0.9		
t_{rr}	Reverse Recovery Time	$I_F = 240\text{A}$ $V_R = 133\text{V}$	$T_j = 25^\circ\text{C}$	31		ns
			$T_j = 125^\circ\text{C}$	60		
Q_{rr}	Reverse Recovery Charge	$di/dt = 800\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	240		nC
			$T_j = 125^\circ\text{C}$	1000		

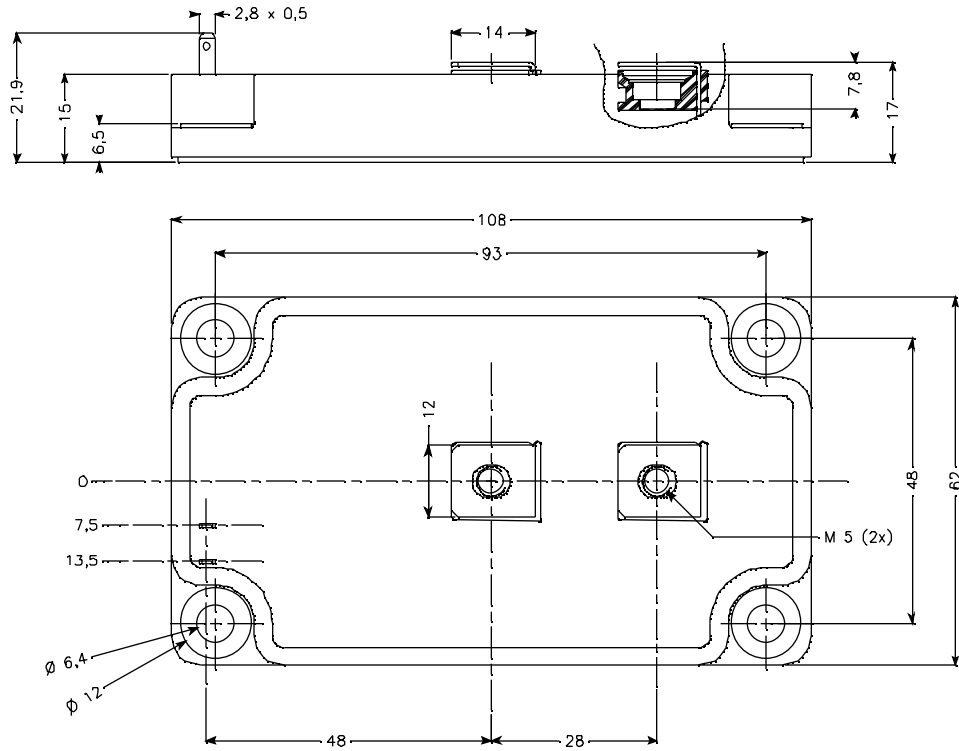
Parallel diode ratings and characteristics

<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			600			V
I_{RM}	Maximum Reverse Leakage Current	$V_R=600V$	$T_j = 25^\circ C$			1500	μA
			$T_j = 125^\circ C$			3000	
I_F	DC Forward Current	$T_c = 70^\circ C$			360		A
V_F	Diode Forward Voltage	$I_F = 360A$			1.6	1.8	V
		$I_F = 720A$			1.9		
		$I_F = 360A$	$T_j = 125^\circ C$		1.4		
t_{rr}	Reverse Recovery Time	$I_F = 360A$ $V_R = 400V$ $di/dt = 1000A/\mu s$	$T_j = 25^\circ C$		130		ns
			$T_j = 125^\circ C$		170		
Q_{rr}	Reverse Recovery Charge	$I_F = 360A$ $V_R = 400V$ $di/dt = 1000A/\mu s$	$T_j = 25^\circ C$		1.32		μC
			$T_j = 125^\circ C$		5.5		

Thermal and package characteristics

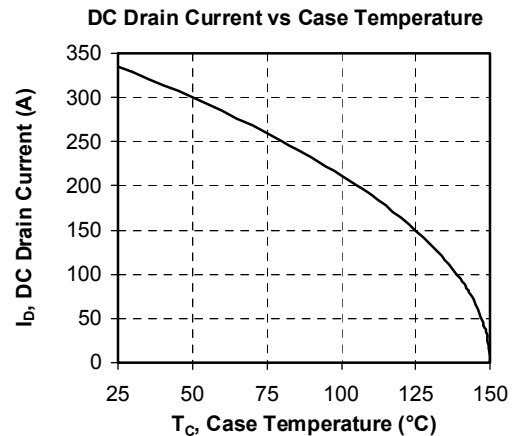
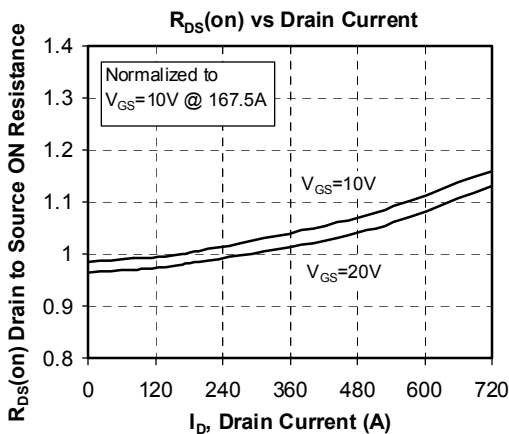
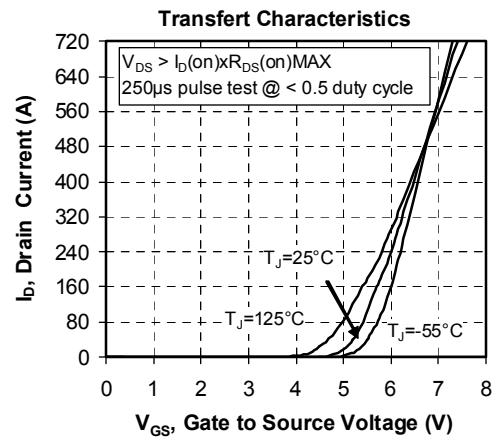
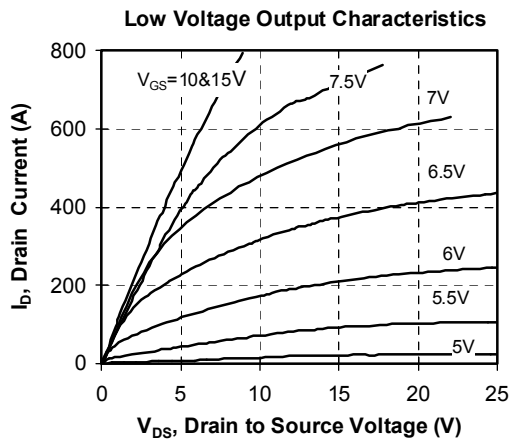
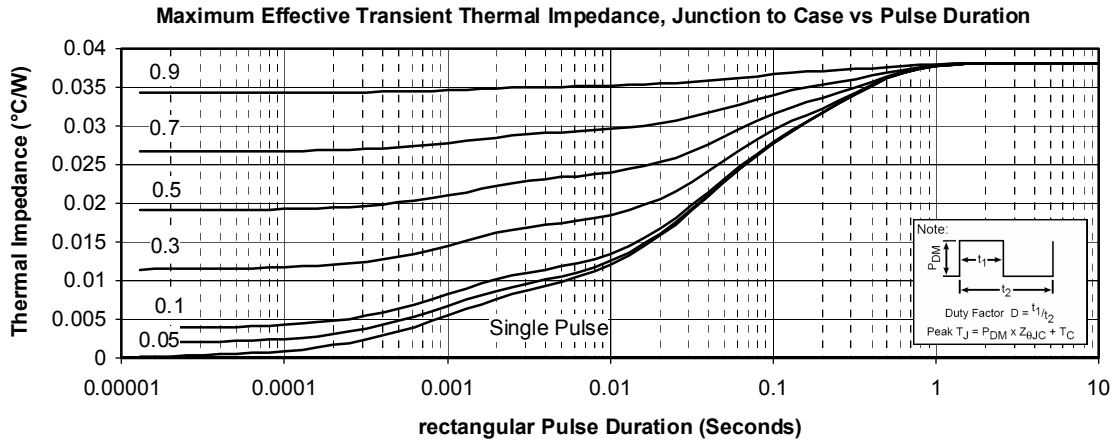
<i>Symbol</i>	<i>Characteristic</i>			<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
R_{thJC}	Junction to Case Thermal Resistance	Transistor				0.038	$^\circ C/W$
		Series diode				0.23	
		Parallel diode				0.16	
V_{ISOL}	RMS Isolation Voltage, any terminal to case $t=1$ min, $I_{isol}<1mA$, 50/60Hz			2500			V
T_j	Operating junction temperature range			-40		150	$^\circ C$
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					280	g

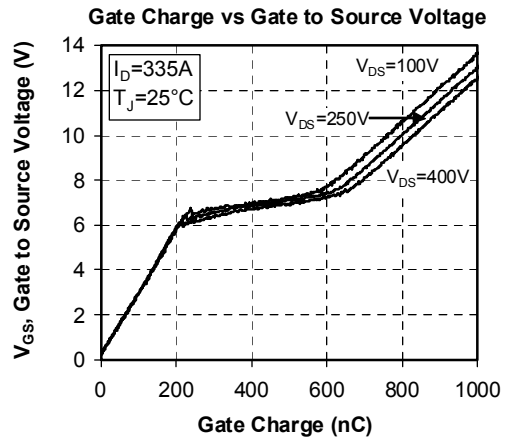
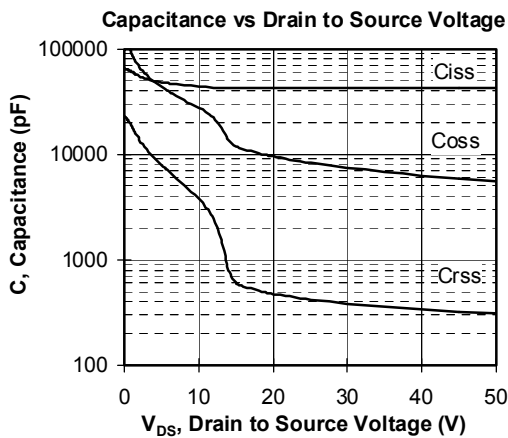
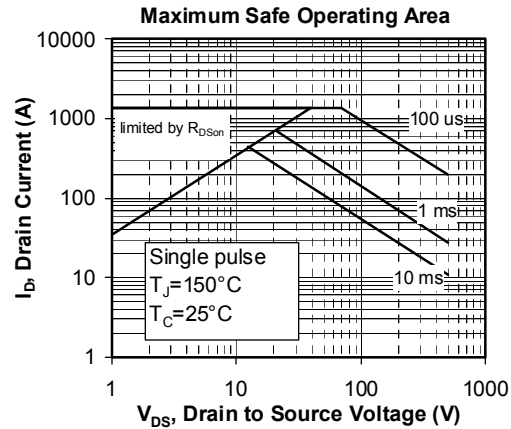
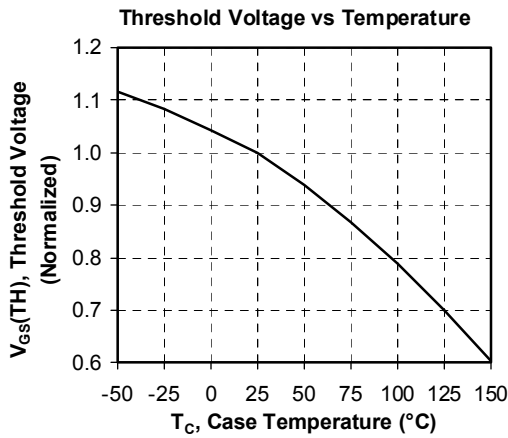
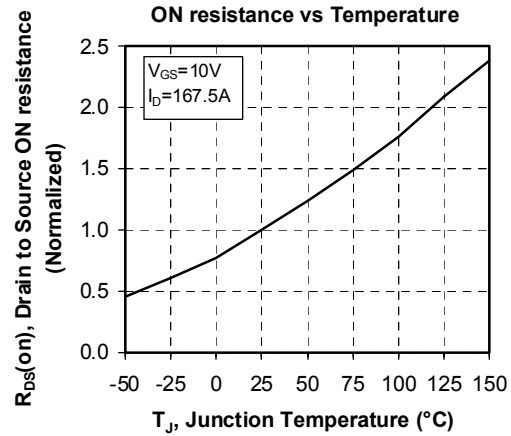
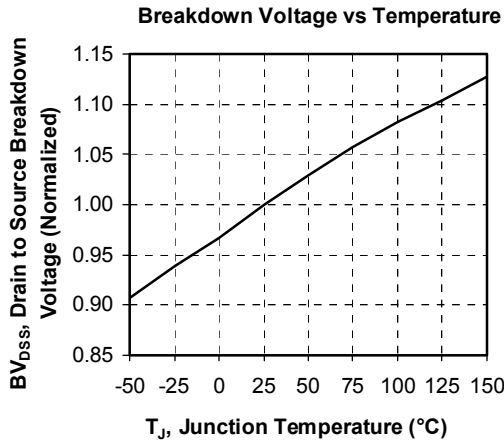
SP6 Package outline (dimensions in mm)

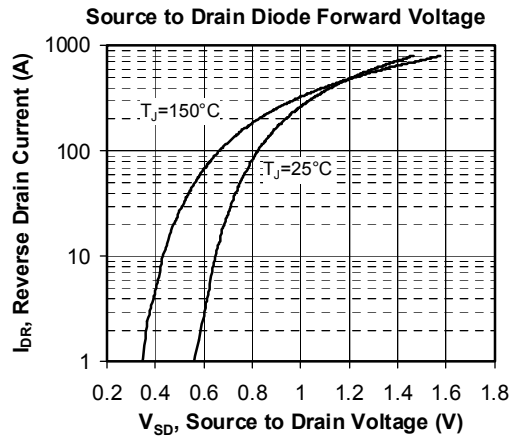
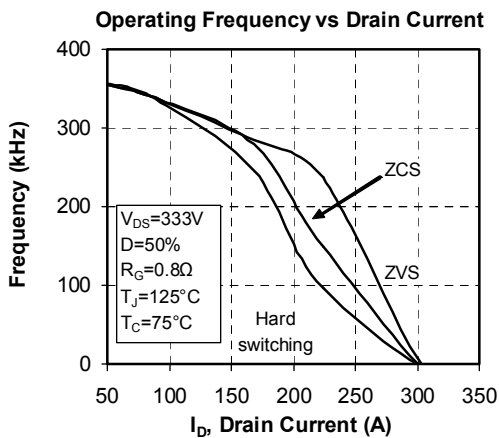
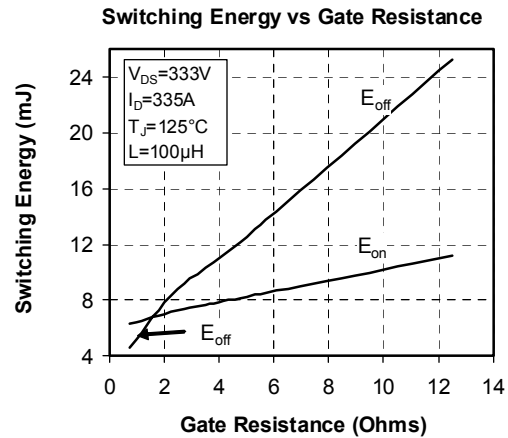
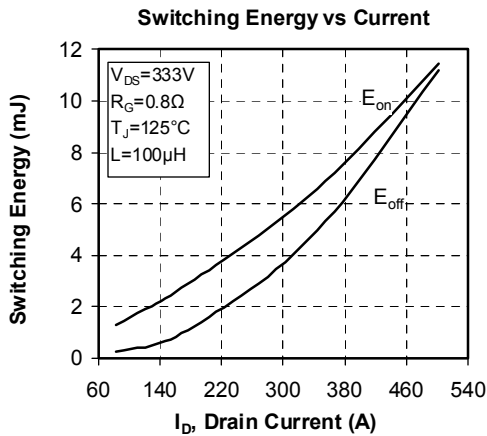
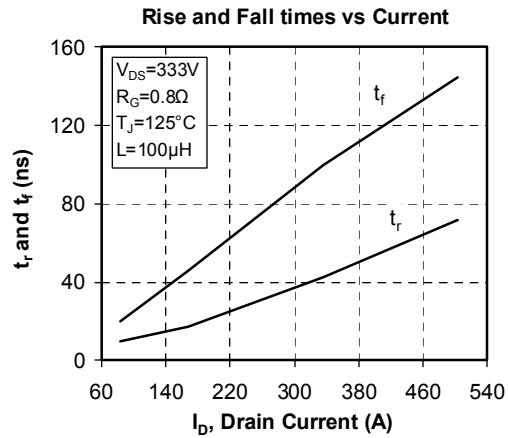
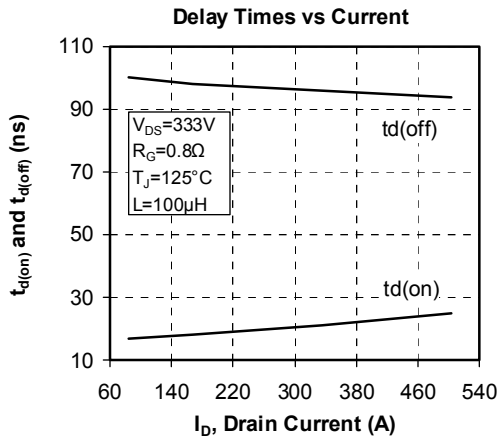


See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical Performance Curve







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