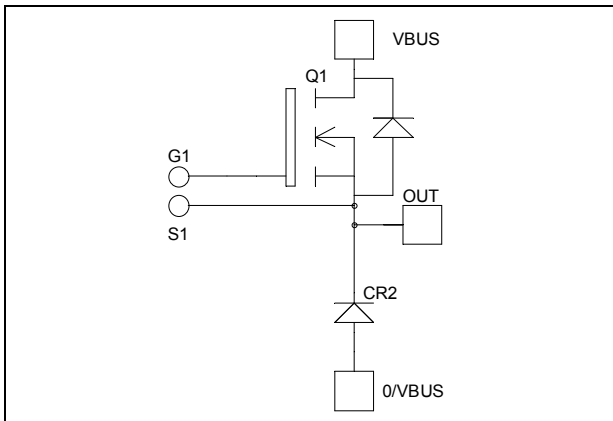


## Buck chopper MOSFET Power Module

$V_{DSS} = 500V$   
 $R_{DSon} = 17m\Omega \text{ typ @ } T_j = 25^\circ C$   
 $I_D = 180A \text{ @ } T_c = 25^\circ C$

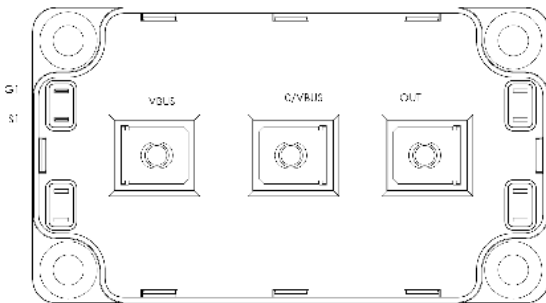


### Application

- AC and DC motor control
- Switched Mode Power Supplies

### 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




### 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	$T_c = 25^\circ C$	180
		$T_c = 80^\circ C$	135
$I_{DM}$	Pulsed Drain current	720	A
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	20	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	1250
$I_{AR}$	Avalanche current (repetitive and non repetitive)	51	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)

All ratings @  $T_j = 25^\circ\text{C}$  unless otherwise specified

**Electrical Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 500V			400	μA
		T <sub>j</sub> = 25°C				
		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 400V			2000	
R <sub>DS(on)</sub>	Drain – Source on Resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 90A		17	20	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 10mA	3		5	V
I <sub>GSS</sub>	Gate – Source Leakage Current	V <sub>GS</sub> = ±30 V, V <sub>DS</sub> = 0V			±200	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V		28		nF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> = 25V		5.6		
C <sub>rss</sub>	Reverse Transfer Capacitance	f = 1MHz		0.36		
Q <sub>g</sub>	Total gate Charge	V <sub>GS</sub> = 10V		560		nC
Q <sub>gs</sub>	Gate – Source Charge	V <sub>Bus</sub> = 250V		160		
Q <sub>gd</sub>	Gate – Drain Charge	I <sub>D</sub> = 180A		280		
T <sub>d(on)</sub>	Turn-on Delay Time	<b>Inductive switching @ 125°C</b> V <sub>GS</sub> = 15V V <sub>Bus</sub> = 333V I <sub>D</sub> = 180A R <sub>G</sub> = 0.5Ω		21		ns
T <sub>r</sub>	Rise Time			38		
T <sub>d(off)</sub>	Turn-off Delay Time			75		
T <sub>f</sub>	Fall Time			93		
E <sub>on</sub>	Turn-on Switching Energy	<b>Inductive switching @ 25°C</b> V <sub>GS</sub> = 15V, V <sub>Bus</sub> = 333V I <sub>D</sub> = 180A, R <sub>G</sub> = 0.5Ω		4140		μJ
E <sub>off</sub>	Turn-off Switching Energy			3380		
E <sub>on</sub>	Turn-on Switching Energy	<b>Inductive switching @ 125°C</b> V <sub>GS</sub> = 15V, V <sub>Bus</sub> = 333V I <sub>D</sub> = 180A, R <sub>G</sub> = 0.5Ω		6224		μJ
E <sub>off</sub>	Turn-off Switching Energy			4052		

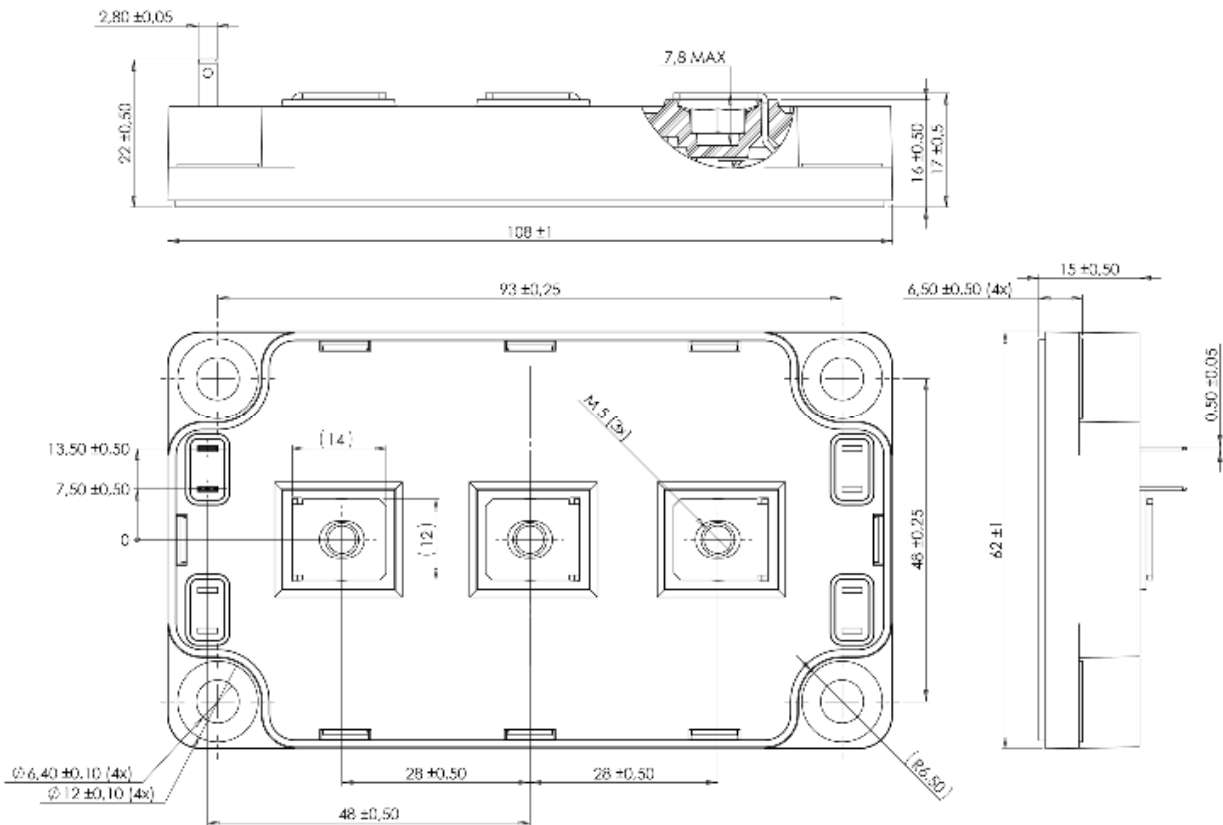
**Chopper diode ratings and characteristics**

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	T <sub>j</sub> = 25°C		500	μA
			T <sub>j</sub> = 125°C		1000	
I <sub>F</sub>	DC Forward Current	T <sub>c</sub> = 70°C		180		A
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 180A		1.6	1.8	V
		I <sub>F</sub> = 360A		1.9		
		I <sub>F</sub> = 180A	T <sub>j</sub> = 125°C	1.4		
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 180A V <sub>R</sub> = 400V	T <sub>j</sub> = 25°C		130	ns
			T <sub>j</sub> = 125°C		170	
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt = 600A/μs	T <sub>j</sub> = 25°C		660	nC
			T <sub>j</sub> = 125°C		2760	

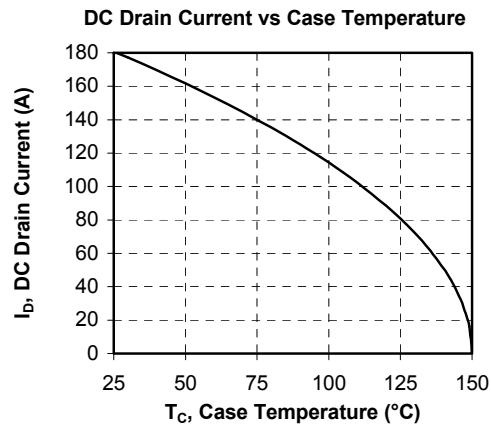
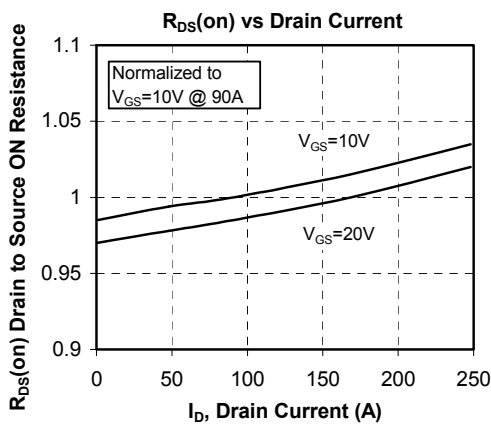
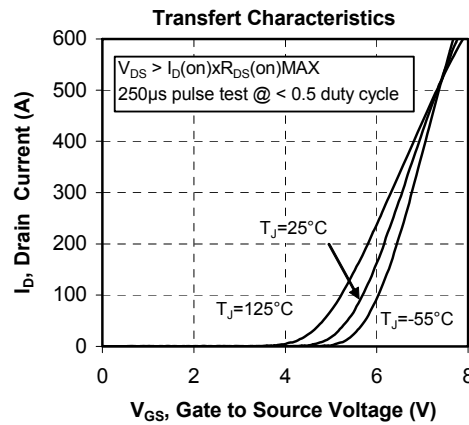
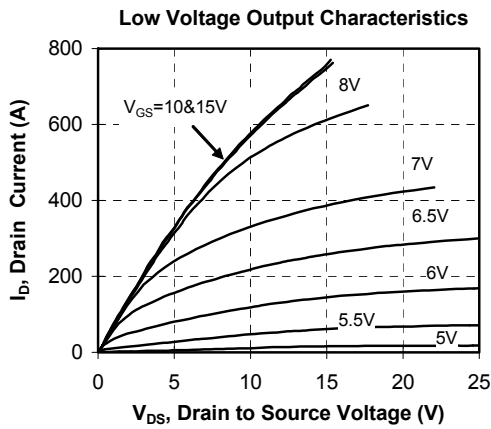
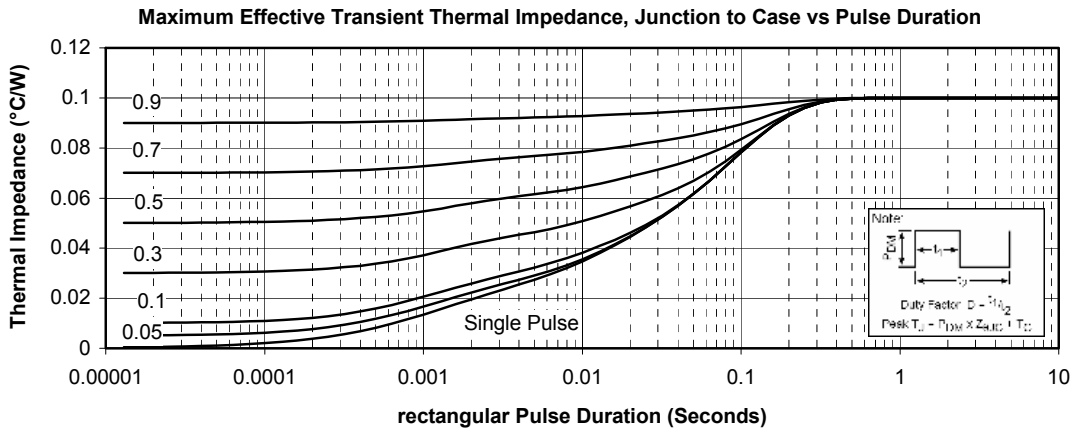
## Thermal and package characteristics

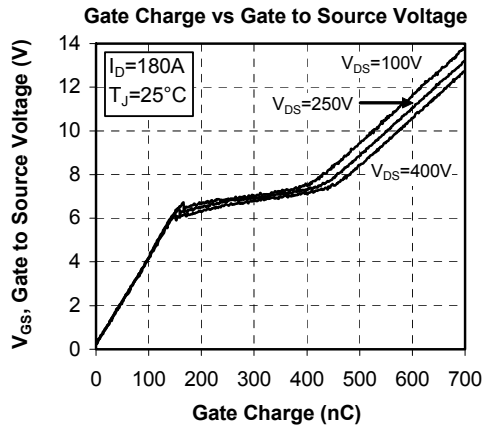
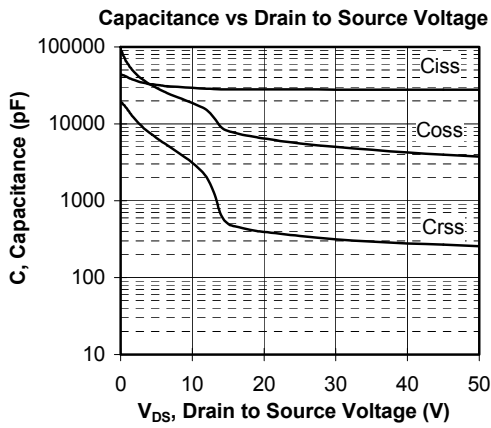
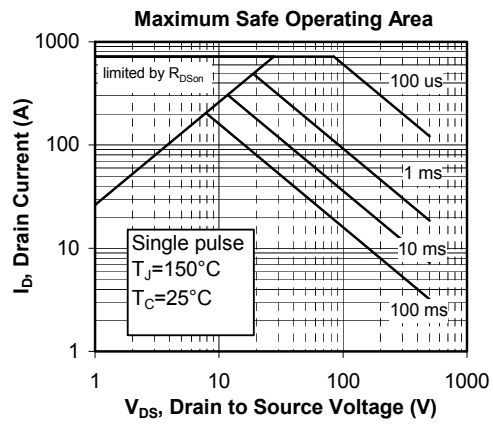
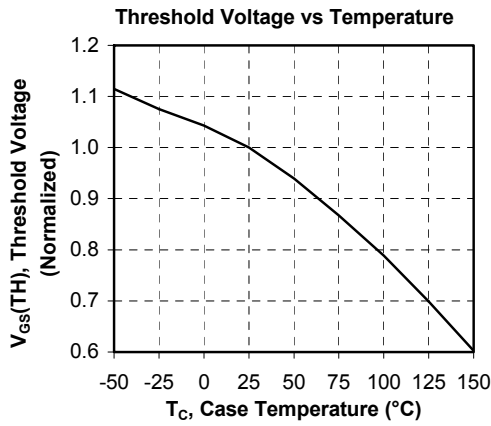
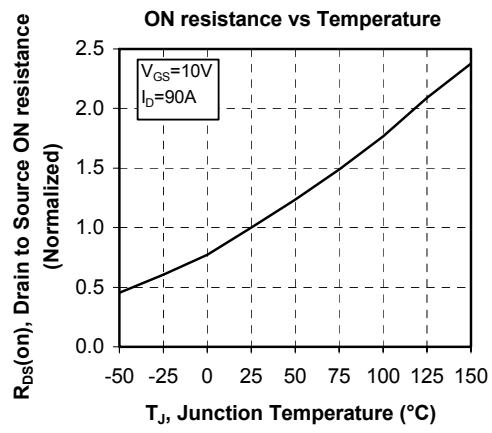
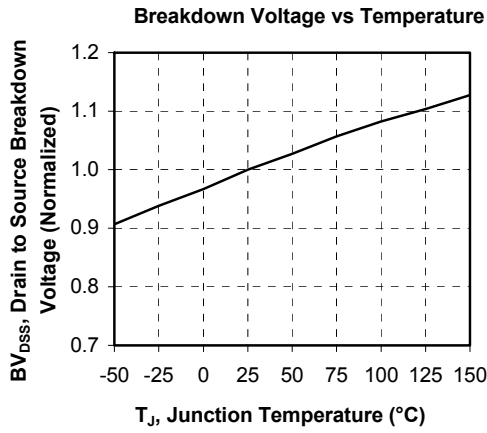
Symbol	Characteristic	Min	Typ	Max	Unit	
R <sub>thJC</sub>	Junction to Case Thermal Resistance	Transistor		0.1	°C/W	
		Diode		0.32		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000			V	
T <sub>J</sub>	Operating junction temperature range	-40		150	°C	
T <sub>STG</sub>	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	

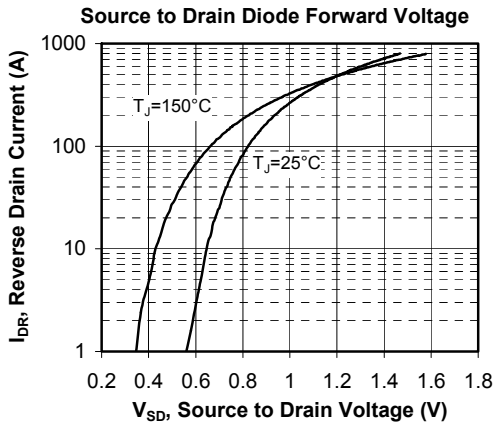
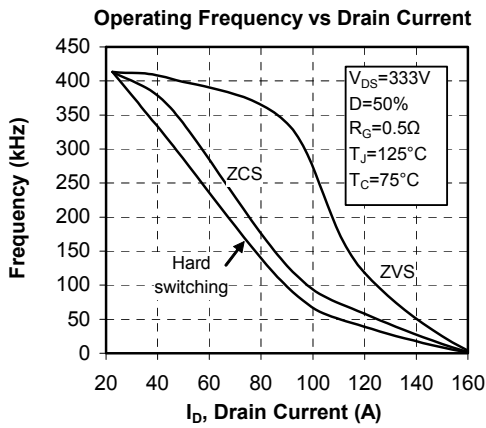
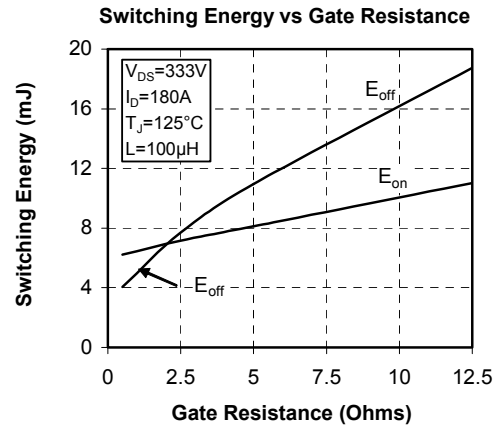
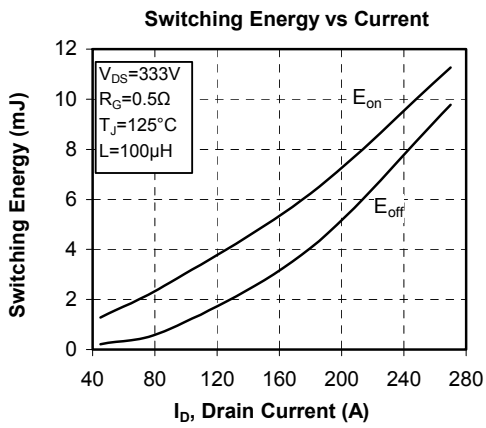
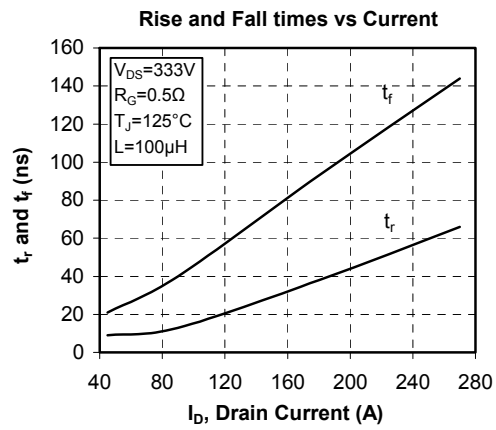
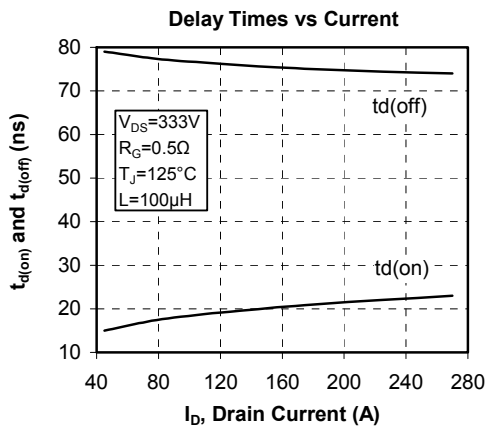
## SP6 Package outline (dimensions in mm)



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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