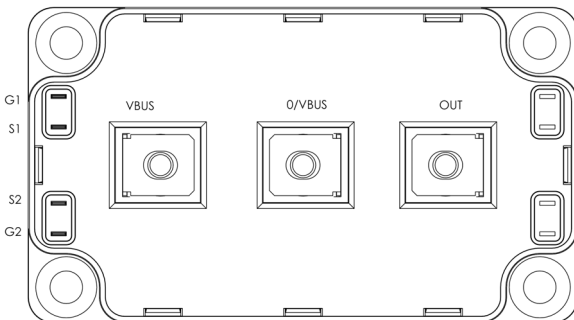
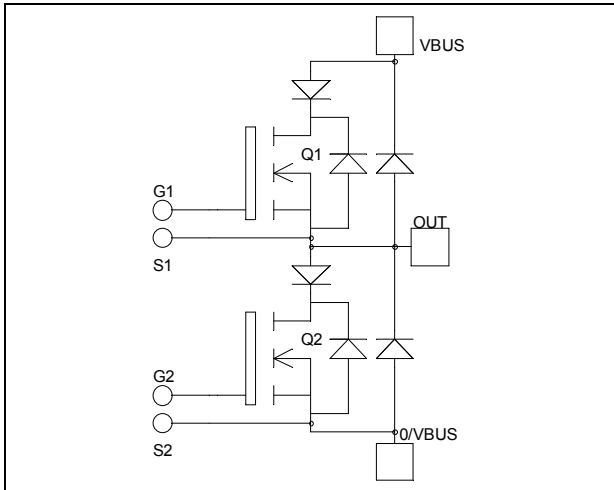


*Phase leg  
Series & parallel diodes  
MOSFET Power Module*

**$V_{DSS} = 500V$**   
 **$R_{DSon} = 24m\Omega$  typ @  $T_j = 25^\circ C$**   
 **$I_D = 150A$  @  $T_c = 25^\circ C$**



### Application

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

### Features

- Power MOS 7<sup>®</sup> MOSFETs
  - Low  $R_{DSon}$
  - Low input and Miller capacitance
  - Low gate charge
  - Fast intrinsic reverse diode
  - 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

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

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Breakdown Voltage	500	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	150
		$T_c = 80^\circ C$	110
$I_{DM}$	Pulsed Drain current	600	A
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	28	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	1250
$I_{AR}$	Avalanche current (repetitive and non repetitive)	24	A
$E_{AR}$	Repetitive Avalanche Energy	30	mJ
$E_{AS}$	Single Pulse Avalanche Energy	1300	

**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	$V_{GS} = 0V, V_{DS} = 500V$			500	$\mu A$
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 75A$		24	28	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 6mA$	3		5	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			$\pm 600$	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$		19.6		nF
$C_{oss}$	Output Capacitance	$V_{DS} = 25V$		4.2		
$C_{rss}$	Reverse Transfer Capacitance	$f = 1MHz$		0.3		
$Q_g$	Total gate Charge	$V_{GS} = 10V$		434		nC
$Q_{gs}$	Gate – Source Charge	$V_{Bus} = 250V$		120		
$Q_{gd}$	Gate – Drain Charge	$I_D = 150A$		216		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive switching @ 125°C</b> $V_{GS} = 15V$ $V_{Bus} = 333V$ $I_D = 150A$ $R_G = 0.8\Omega$		10		ns
$T_r$	Rise Time			17		
$T_{d(off)}$	Turn-off Delay Time			50		
$T_f$	Fall Time			41		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ 25°C</b> $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 150A, R_G = 0.8\Omega$		1.9		mJ
$E_{off}$	Turn-off Switching Energy			1.5		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ 125°C</b> $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 150A, R_G = 0.8\Omega$		3.3		mJ
$E_{off}$	Turn-off Switching Energy			1.7		
$R_{thJC}$	Junction to Case Thermal Resistance				0.1	$^{\circ}C/W$

**Series diode ratings and characteristics**

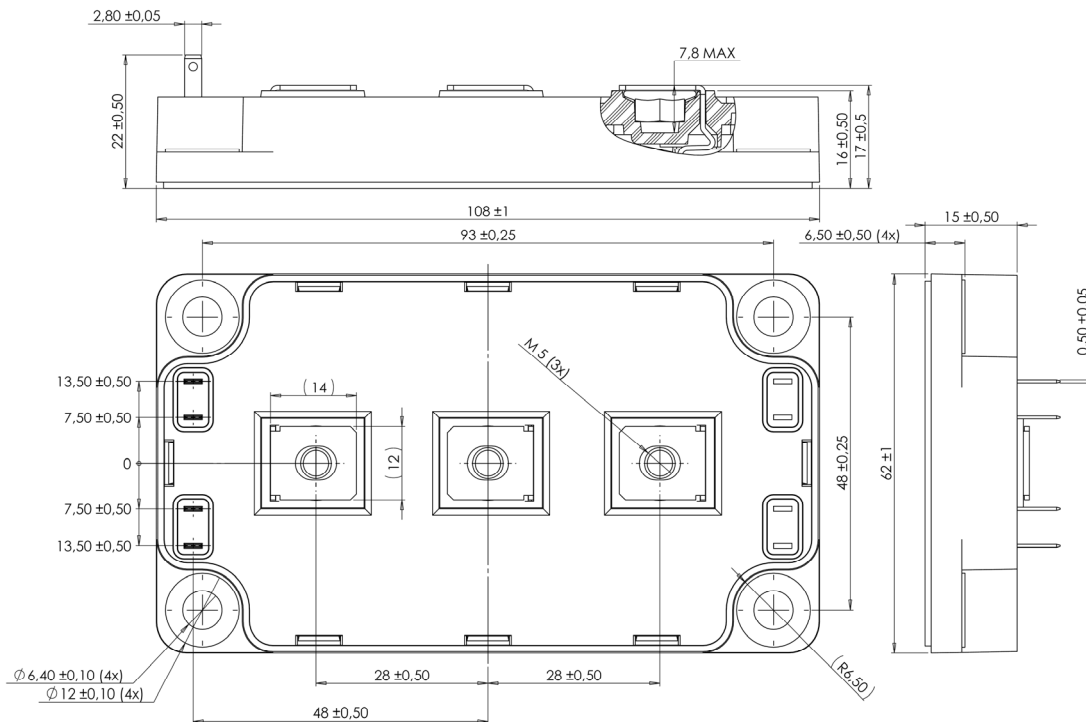
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		600			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 600V$			150	$\mu A$
$I_F$	DC Forward Current	$T_c = 80^{\circ}C$		200		A
$V_F$	Diode Forward Voltage	$I_F = 200A$ $V_{GE} = 0V$	$T_j = 25^{\circ}C$	1.6	2	V
			$T_j = 150^{\circ}C$	1.5		
$t_{rr}$	Reverse Recovery Time	$I_F = 200A$ $V_R = 300V$ $di/dt = 2800A/\mu s$	$T_j = 25^{\circ}C$	125		ns
			$T_j = 150^{\circ}C$	220		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 200A$ $V_R = 300V$ $di/dt = 2800A/\mu s$	$T_j = 25^{\circ}C$	9.4		$\mu C$
			$T_j = 150^{\circ}C$	19.8		
$E_r$	Reverse Recovery Energy	$I_F = 200A$ $V_R = 300V$ $di/dt = 2800A/\mu s$	$T_j = 25^{\circ}C$	2.2		mJ
			$T_j = 150^{\circ}C$	4.8		
$R_{thJC}$	Junction to Case Thermal Resistance				0.39	$^{\circ}C/W$

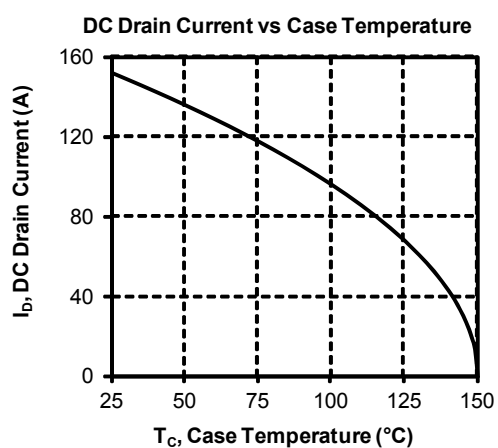
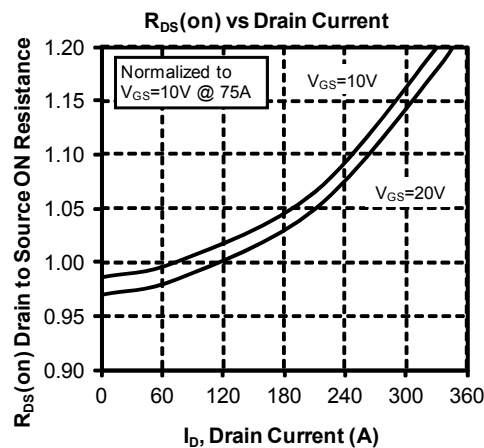
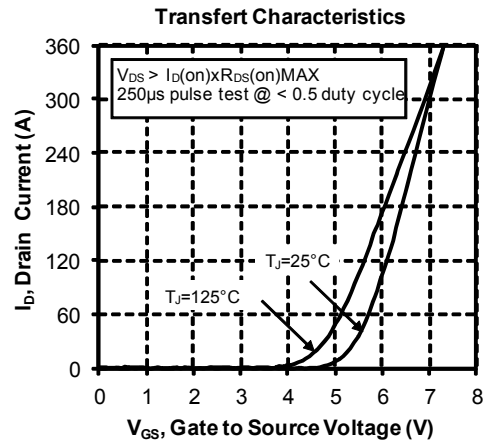
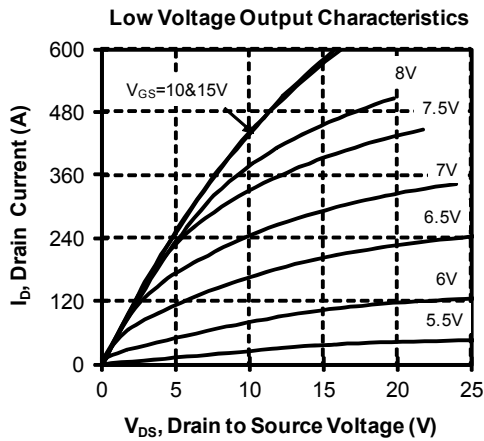
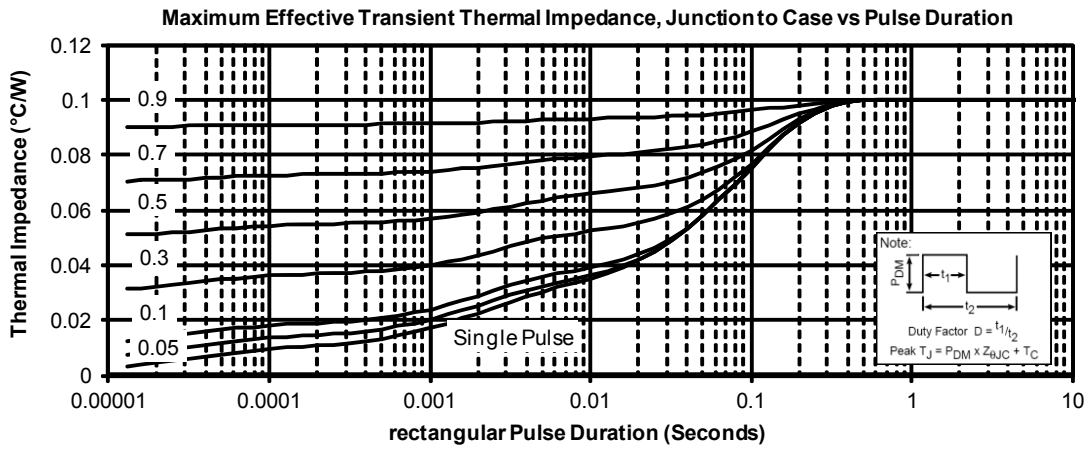
**Parallel diode ratings and characteristics**

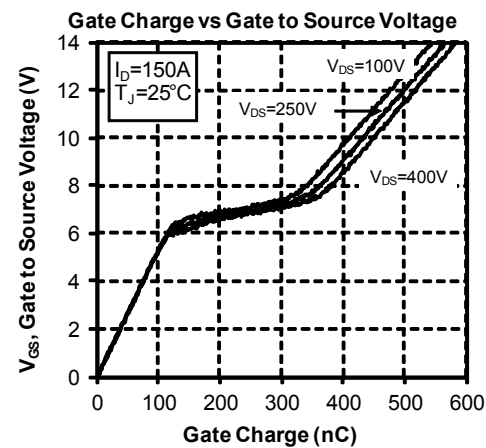
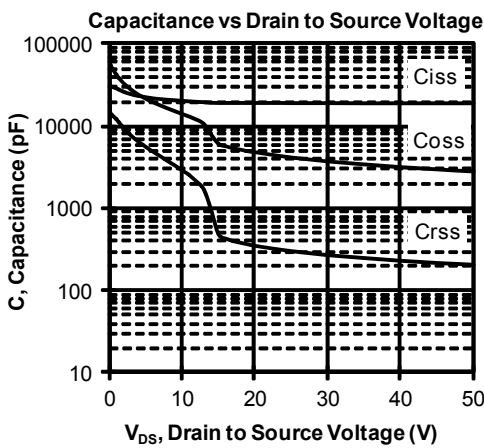
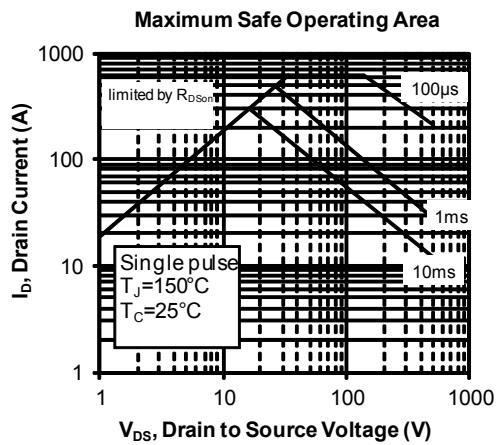
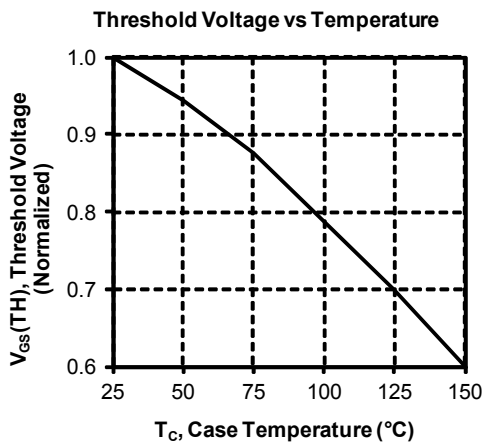
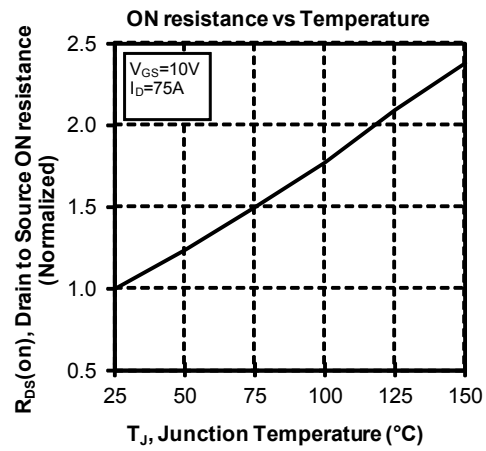
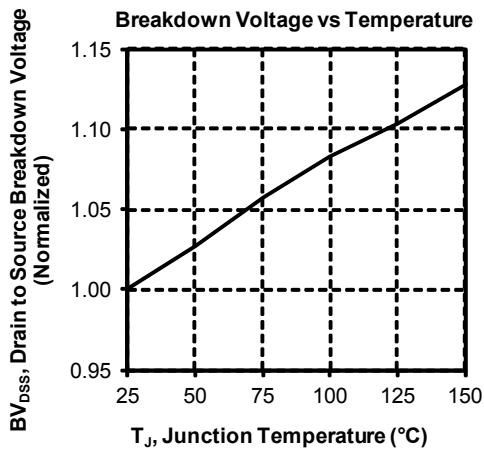
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V <sub>RRM</sub>	Maximum Repetitive Reverse Voltage		600			V
I <sub>RM</sub>	Maximum Reverse Leakage Current	V <sub>R</sub> = 600V			350	μA
I <sub>F</sub>	DC Forward Current	T <sub>c</sub> = 70°C		120		A
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 120A		1.6	1.8	V
		I <sub>F</sub> = 240A		1.9		
		I <sub>F</sub> = 120A	T <sub>j</sub> = 125°C	1.4		
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 120A V <sub>R</sub> = 400V di/dt = 400A/μs	T <sub>j</sub> = 25°C	130		ns
			T <sub>j</sub> = 125°C	170		
Q <sub>rr</sub>	Reverse Recovery Charge	I <sub>F</sub> = 120A V <sub>R</sub> = 400V di/dt = 400A/μs	T <sub>j</sub> = 25°C	440		nC
			T <sub>j</sub> = 125°C	1840		
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.46	°C/W

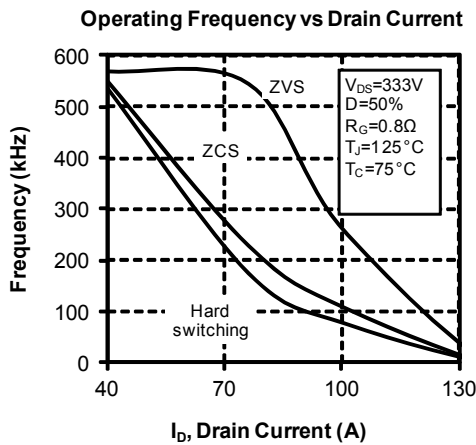
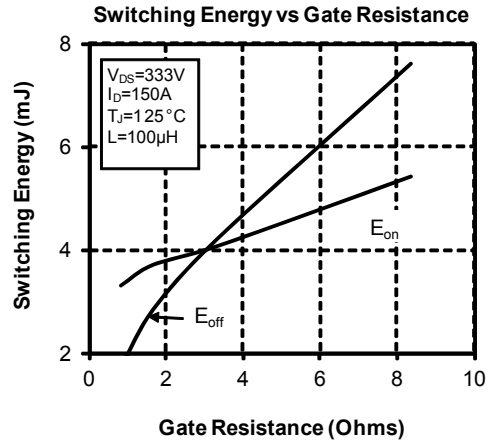
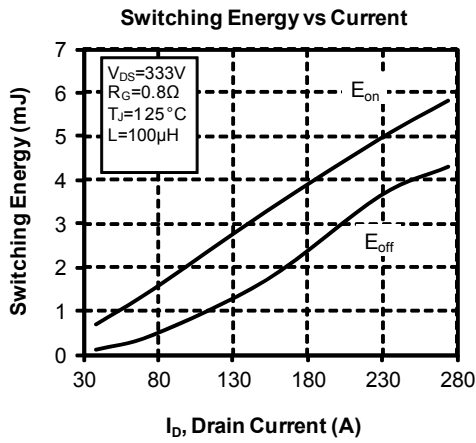
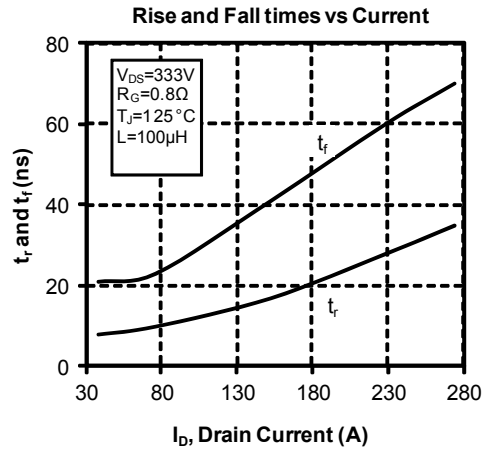
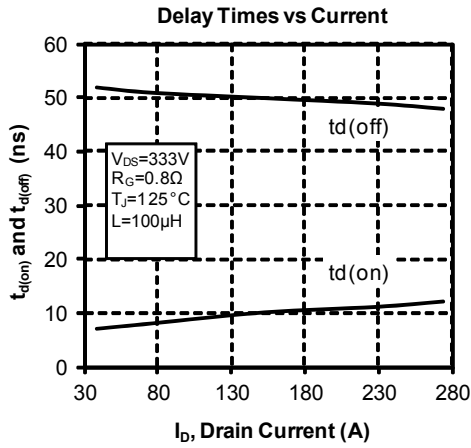
**Thermal and package characteristics**

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		
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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