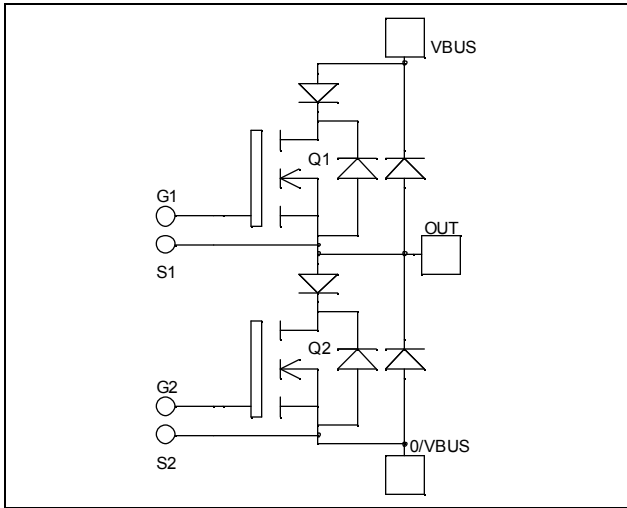


*Phase leg  
Series & parallel diodes  
MOSFET Power Module*

**$V_{DSS} = 1200V$**   
 **$R_{DSon} = 200m\Omega$  typ @  $T_j = 25^\circ C$**   
 **$I_D = 50A$  @  $T_c = 25^\circ C$**


**Application**

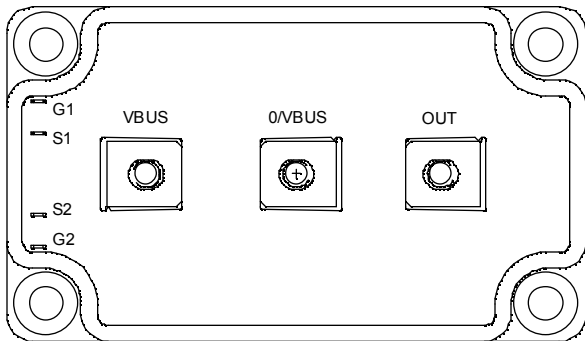
- Motor control
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

**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


**Absolute maximum ratings**

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Breakdown Voltage	1200	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	50
		$T_c = 80^\circ C$	37
$I_{DM}$	Pulsed Drain current	200	A
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	240	m $\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	1250
$I_{AR}$	Avalanche current (repetitive and non repetitive)	12	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)

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	$V_{GS} = 0\text{V}, V_{DS} = 1200\text{V}$			1.5	mA
		$V_{GS} = 0\text{V}, V_{DS} = 1000\text{V}$			6	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 25\text{A}$		200	240	m $\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 6\text{mA}$	3		5	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$			$\pm 450$	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}$		15.2		nF
$C_{oss}$	Output Capacitance	$V_{DS} = 25\text{V}$		2.2		
$C_{rss}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		0.42		
$Q_g$	Total gate Charge	$V_{GS} = 10\text{V}$		600		nC
$Q_{gs}$	Gate – Source Charge	$V_{Bus} = 600\text{V}$		84		
$Q_{gd}$	Gate – Drain Charge	$I_D = 50\text{A}$		390		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive switching @ 125°C</b> $V_{GS} = 15\text{V}$ $V_{Bus} = 800\text{V}$ $I_D = 50\text{A}$ $R_G = 0.8\Omega$		10		ns
$T_r$	Rise Time			10		
$T_{d(off)}$	Turn-off Delay Time			68		
$T_f$	Fall Time			36		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ 25°C</b> $V_{GS} = 15\text{V}, V_{Bus} = 800\text{V}$ $I_D = 50\text{A}, R_G = 0.8\Omega$		2.79		mJ
$E_{off}$	Turn-off Switching Energy			0.6		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ 125°C</b> $V_{GS} = 15\text{V}, V_{Bus} = 800\text{V}$ $I_D = 50\text{A}, R_G = 0.8\Omega$		5.6		mJ
$E_{off}$	Turn-off Switching Energy			0.81		

**Series diode ratings and characteristics**

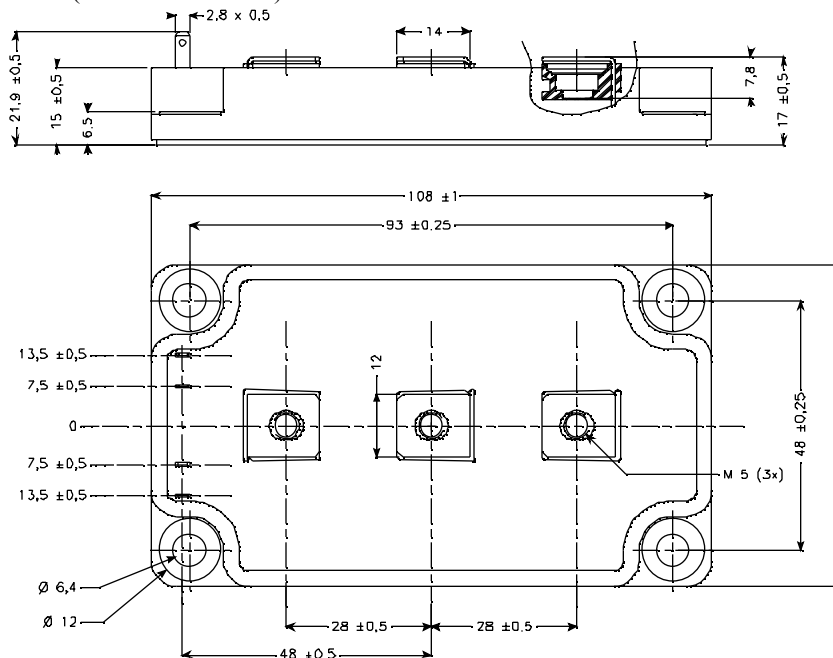
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Repetitive Reverse Voltage		200			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 200\text{V}$	$T_j = 25^\circ\text{C}$		350	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		600	
$I_F$	DC Forward Current			60		A
$V_F$	Diode Forward Voltage	$I_F = 60\text{A}$		1.1	1.15	V
		$I_F = 120\text{A}$		1.4		
		$I_F = 60\text{A}$	$T_j = 125^\circ\text{C}$		0.9	
$t_{rr}$	Reverse Recovery Time	$I_F = 60\text{A}$ $V_R = 133\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		24	ns
			$T_j = 125^\circ\text{C}$		48	
$Q_{rr}$	Reverse Recovery Charge	$I_F = 60\text{A}$ $V_R = 133\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		66	nC
			$T_j = 125^\circ\text{C}$		300	

**Parallel diode ratings and characteristics**

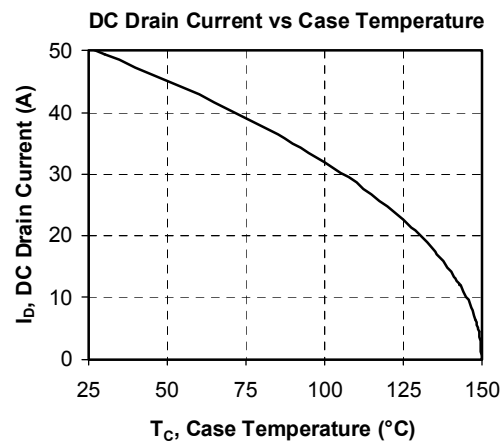
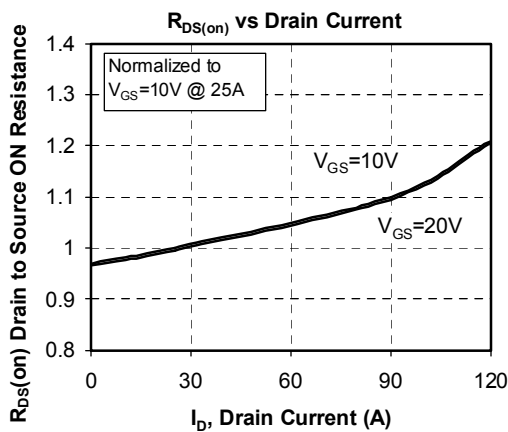
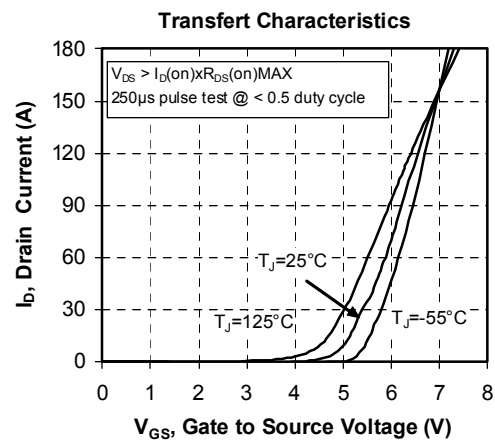
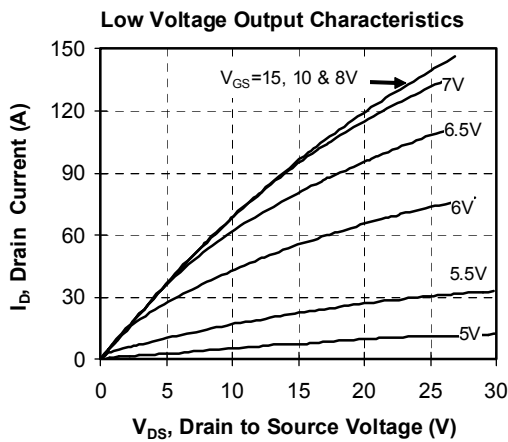
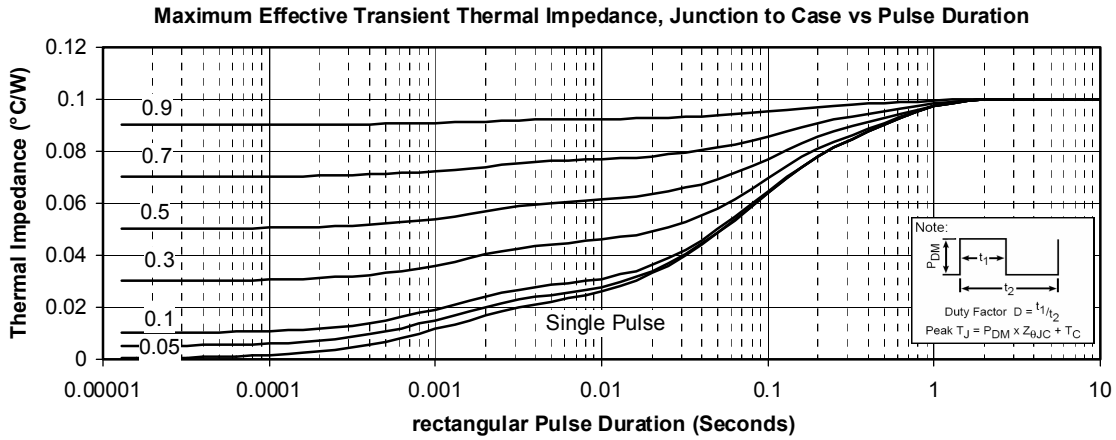
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Repetitive Reverse Voltage		1200			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1200V$	$T_j = 25^\circ C$		350	$\mu A$
			$T_j = 125^\circ C$		600	
$I_F$	DC Forward Current			120		A
$V_F$	Diode Forward Voltage	$I_F = 120A$		2	2.5	V
		$I_F = 240A$		2.3		
		$I_F = 120A$	$T_j = 125^\circ C$	1.8		
$t_{rr}$	Reverse Recovery Time	$I_F = 120A$ $V_R = 800V$ $di/dt = 400A/\mu s$	$T_j = 25^\circ C$	400		ns
			$T_j = 125^\circ C$	470		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 120A$ $V_R = 800V$ $di/dt = 400A/\mu s$	$T_j = 25^\circ C$	2.4		$\mu C$
			$T_j = 125^\circ C$	8		

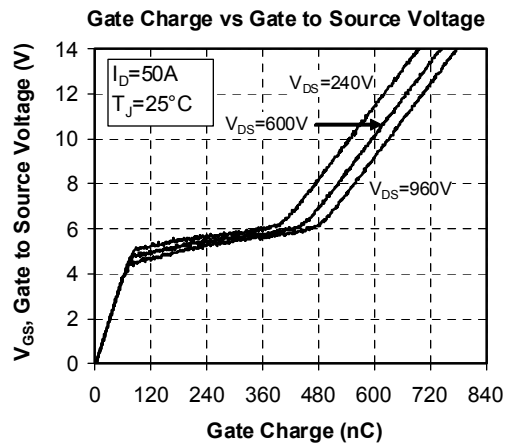
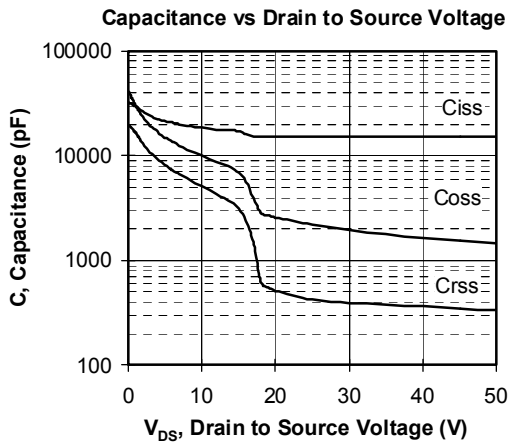
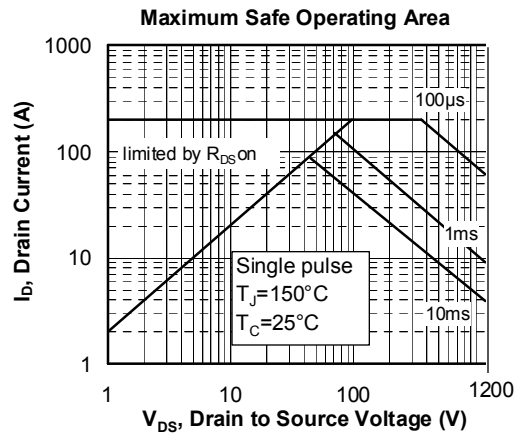
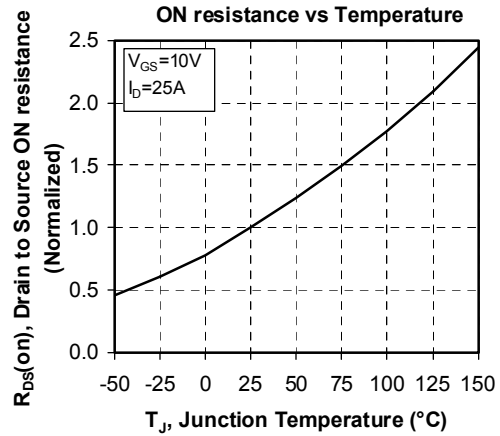
**Thermal and package characteristics**

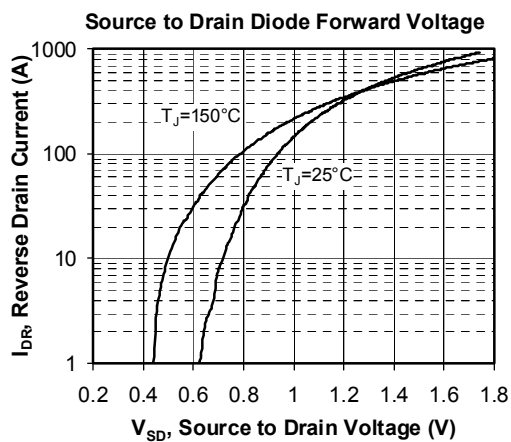
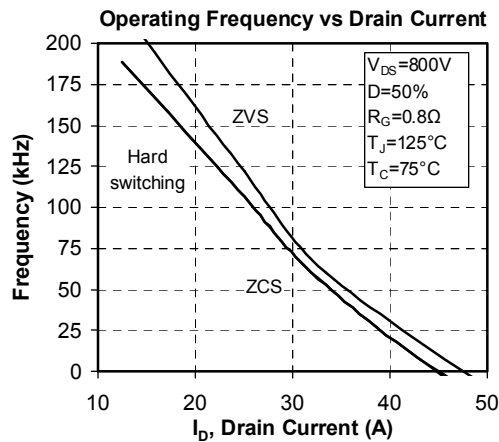
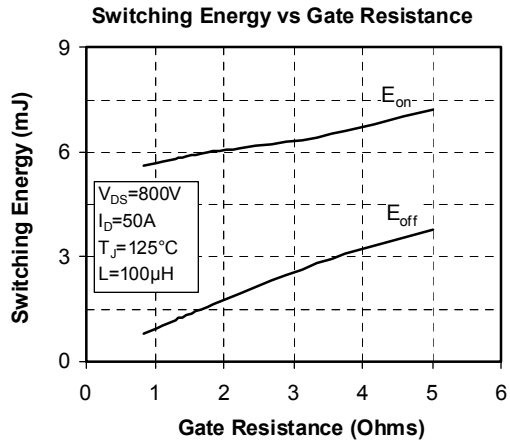
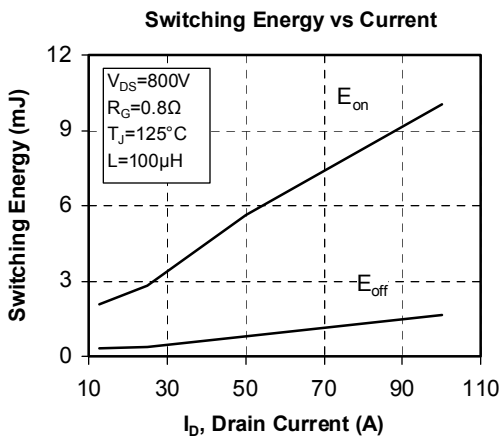
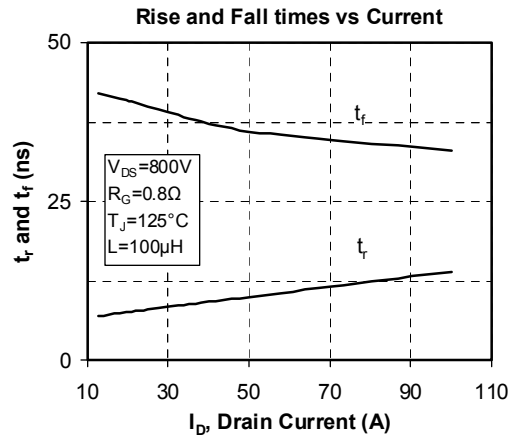
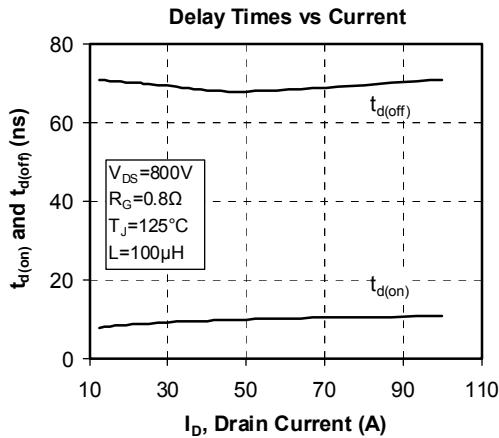
Symbol	Characteristic	Min	Typ	Max	Unit	
$R_{thJC}$	Junction to Case Thermal Resistance	Transistor		0.1	$^\circ C/W$	
		Series diode		0.65		
		Parallel diode		0.46		
$V_{ISOL}$	RMS Isolation Voltage, any terminal to case $t = 1$ min, $I_{isol} < 1mA$ , 50/60Hz	2500			V	
$T_J$	Operating junction temperature 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](http://www.microsemi.com)

## Typical Performance Curve







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