



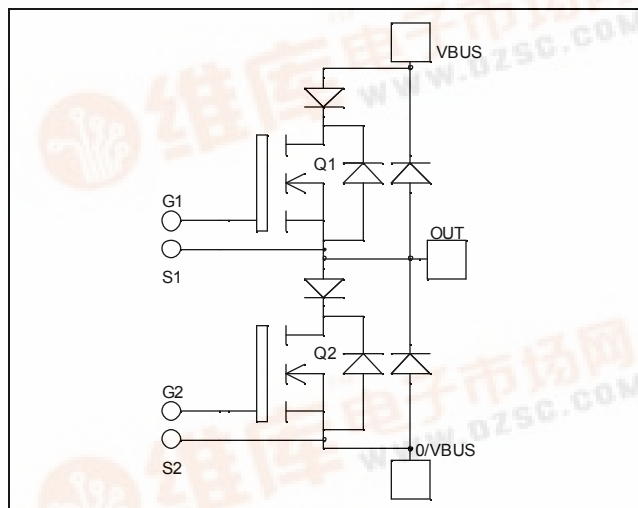
APT0502AM06SG

*Phase leg
Series & parallel diodes
MOSFET Power Module*

$$V_{DSS} = 200V$$

$$R_{DS(on)} = 6m\Omega \text{ typ @ } T_j = 25^\circ C$$

$$I_D = 300A \text{ @ } T_c = 25^\circ C$$



Application

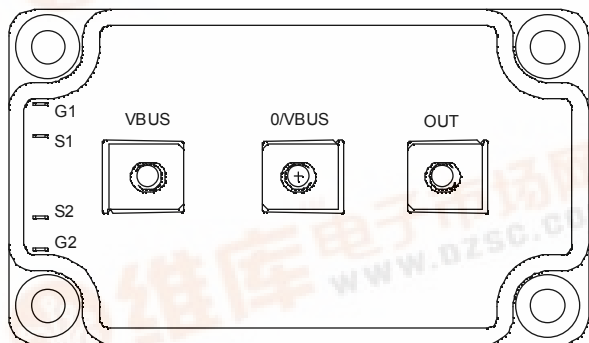
- Motor control
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

Features

- Power MOS 7[®] MOSFETs
 - Low $R_{DS(on)}$
 - 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	200	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	300
		$T_c = 80^\circ C$	225
I_{DM}	Pulsed Drain current	1200	
V_{GS}	Gate - Source Voltage	± 30	V
$R_{DS(on)}$	Drain - Source ON Resistance	7.2	m Ω
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

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

Electrical Characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 200V$			500	μA
		$V_{GS} = 0V, V_{DS} = 160V$			2000	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 150A$		6	7.2	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 6mA$	3		5	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			± 500	nA

Dynamic Characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
C_{iss}	Input Capacitance	$V_{GS} = 0V$		18.5		nF
C_{oss}	Output Capacitance	$V_{DS} = 25V$		6.03		
C_{rss}	Reverse Transfer Capacitance	$f = 1MHz$		0.58		
Q_g	Total gate Charge	$V_{GS} = 10V$		325		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 100V$		144		
Q_{gd}	Gate – Drain Charge	$I_D = 300A$		156		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C $V_{GS} = 15V$ $V_{Bus} = 133V$ $I_D = 300A$ $R_G = 0.8\Omega$		28		ns
T_r	Rise Time			56		
$T_{d(off)}$	Turn-off Delay Time			81		
T_f	Fall Time			99		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 133V$ $I_D = 300A, R_G = 0.8\Omega$		1543		μJ
E_{off}	Turn-off Switching Energy			1517		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 133V$ $I_D = 300A, R_G = 0.8\Omega$		2027		μJ
E_{off}	Turn-off Switching Energy			1770		

Series diode ratings and characteristics

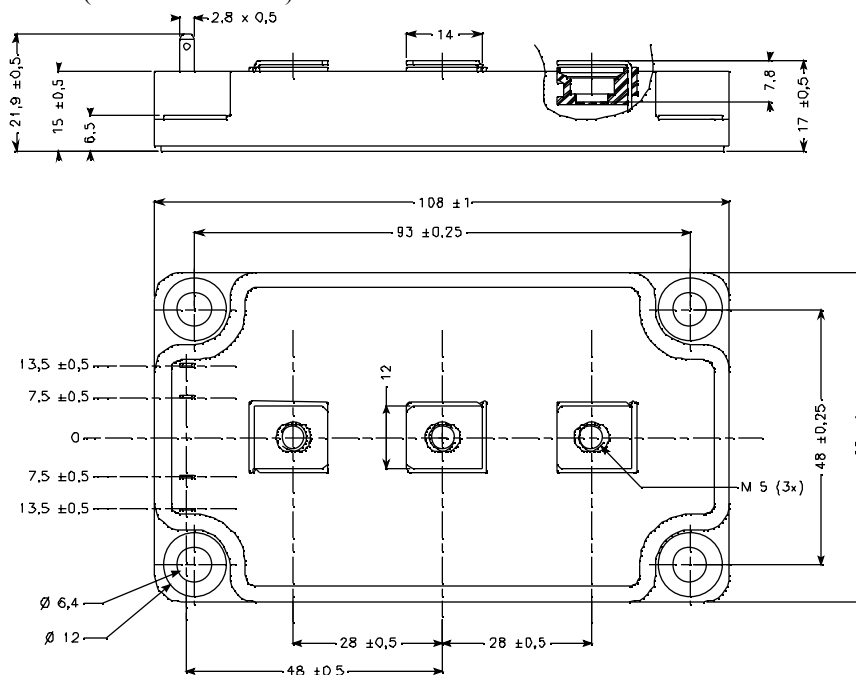
<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		200			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 200V$	$T_j = 25^\circ\text{C}$		350	μA
			$T_j = 125^\circ\text{C}$		600	
I_F	DC Forward Current	$T_c = 85^\circ\text{C}$		120		A
V_F	Diode Forward Voltage	$I_F = 120A$		1.1	1.15	V
		$I_F = 240A$		1.4		
		$I_F = 120A$	$T_j = 125^\circ\text{C}$	0.9		
t_{rr}	Reverse Recovery Time	$I_F = 120A$ $V_R = 133V$ $di/dt = 400A/\mu s$	$T_j = 25^\circ\text{C}$	31		ns
			$T_j = 125^\circ\text{C}$	60		
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$	120		nC
			$T_j = 125^\circ\text{C}$	500		

Parallel diode ratings and characteristics

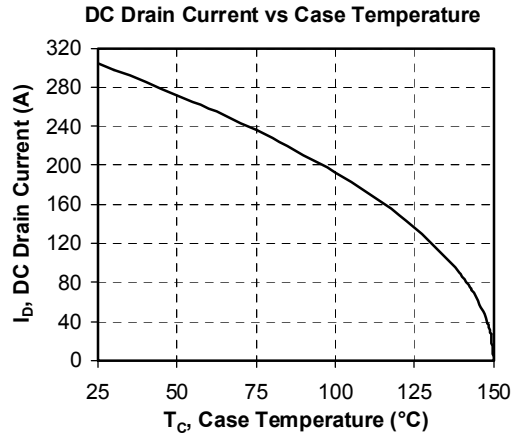
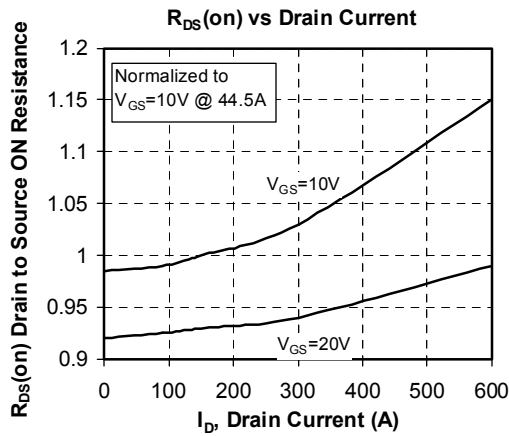
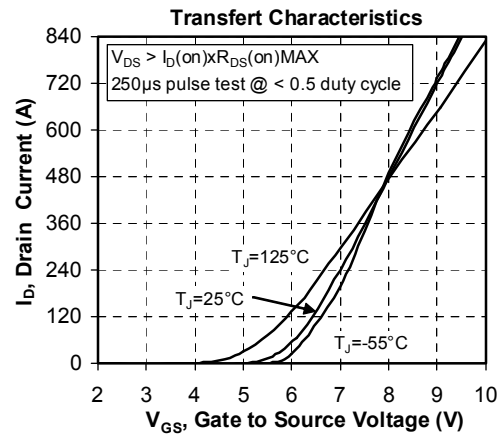
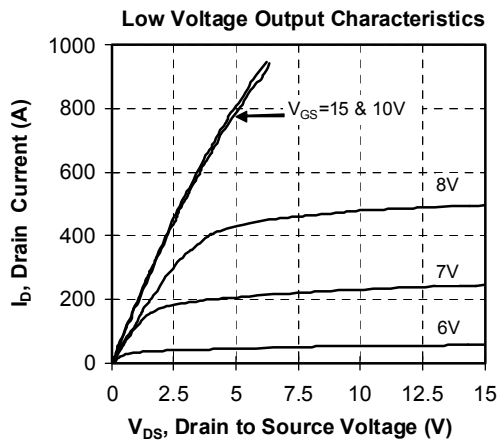
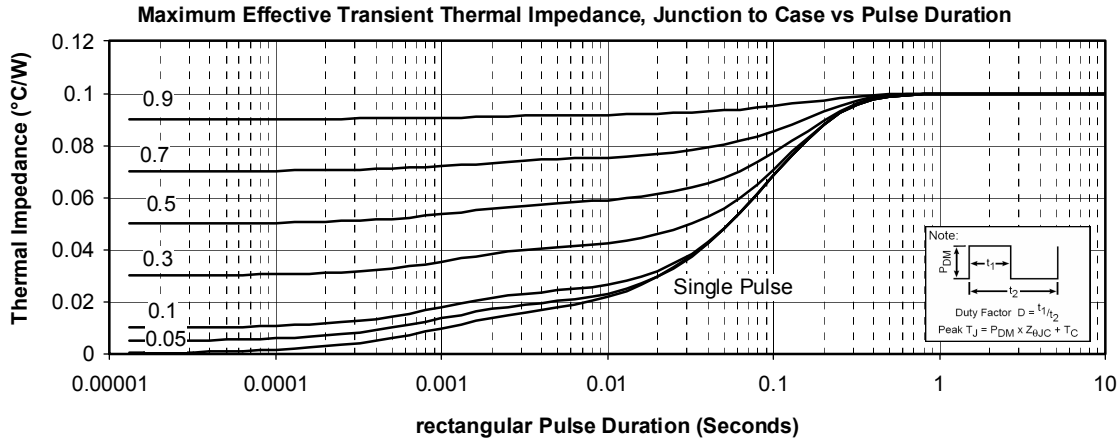
Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V _{RRM}	Maximum Peak Repetitive Reverse Voltage			200			V
I _{RM}	Maximum Reverse Leakage Current	V _R =200V	T _j = 25°C			350	μA
			T _j = 125°C			600	
I _F	DC Forward Current		T _c = 85°C		120		A
V _F	Diode Forward Voltage	I _F = 120A			1.1	1.15	V
		I _F = 240A			1.4		
		I _F = 120A	T _j = 125°C		0.9		
t _{rr}	Reverse Recovery Time	I _F = 120A V _R = 133 V di/dt = 400A/μs	T _j = 25°C		31		ns
			T _j = 125°C		60		
Q _{rr}	Reverse Recovery Charge			T _j = 25°C		120	
			T _j = 125°C		500		

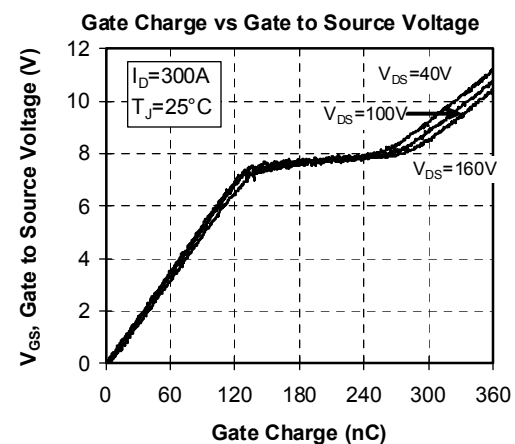
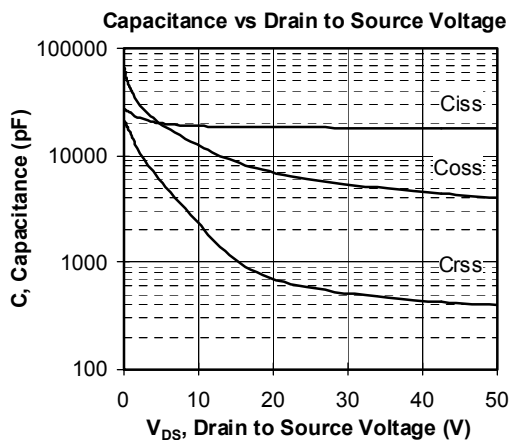
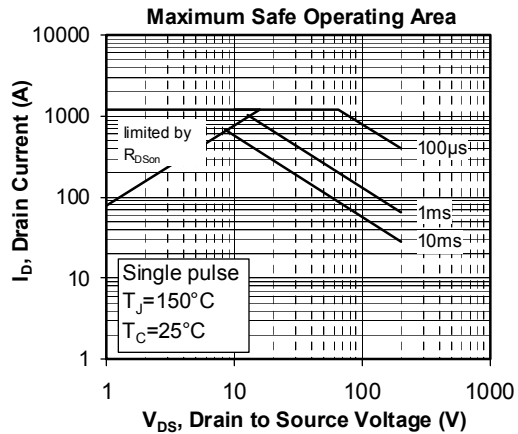
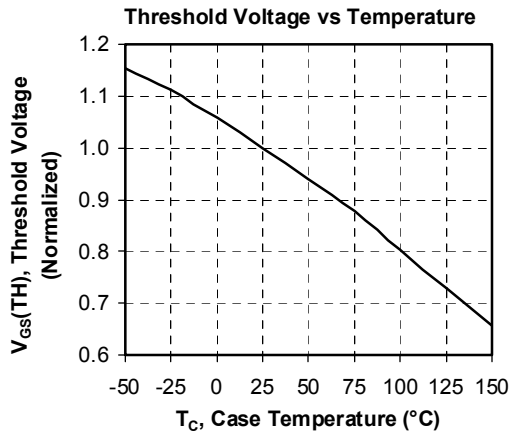
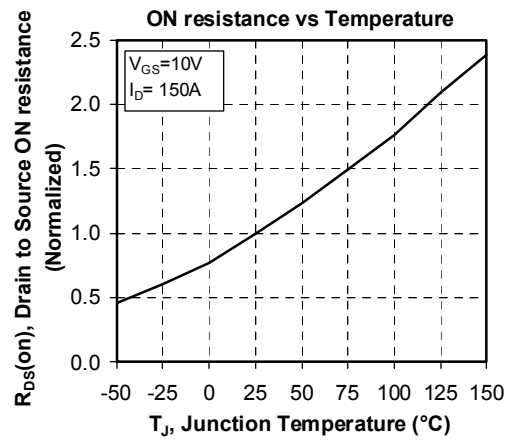
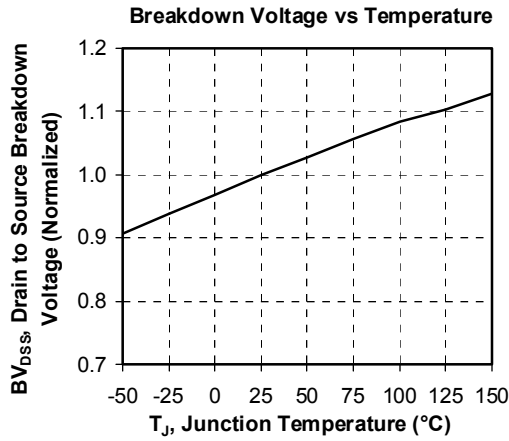
Thermal and package characteristics

Symbol	Characteristic			Min	Typ	Max	Unit
R_{thJC}	Junction to Case Thermal Resistance	Transistor				0.10	$^\circ C/W$
		Series diode				0.46	
		Diode parallel				0.46	
V_{ISOL}	RMS Isolation Voltage, any terminal to case $t = 1 \text{ min}$, $I_{isol} < 1mA$, 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

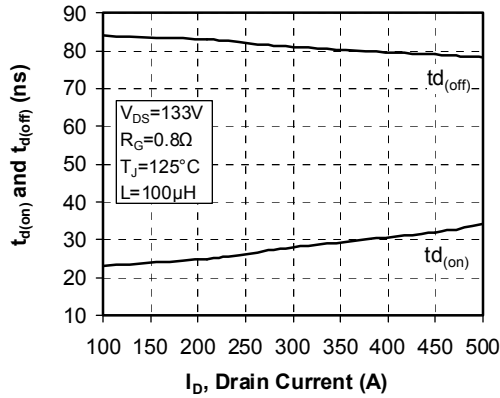
SP6 Package outline (dimensions in mm)

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

Typical Performance Curve

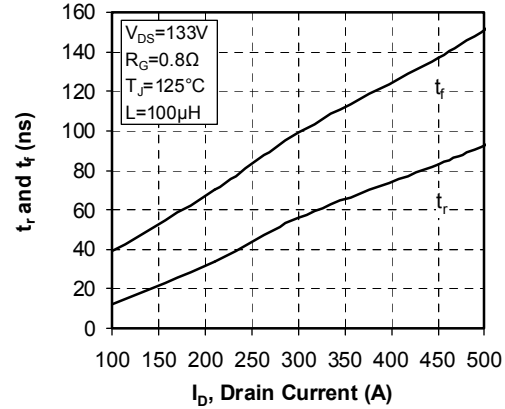




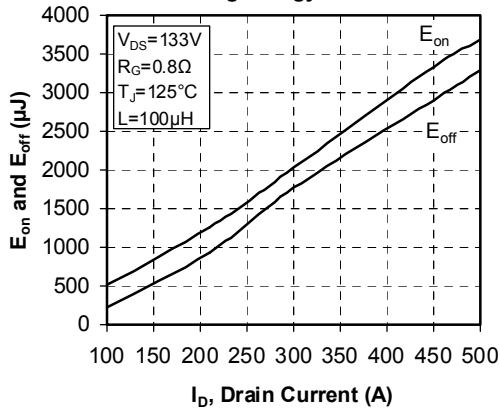
Delay Times vs Current



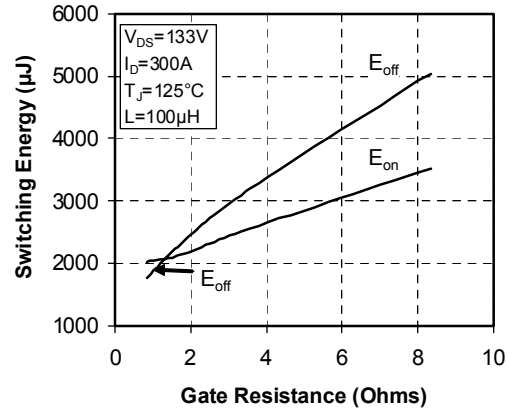
Rise and Fall times vs Current



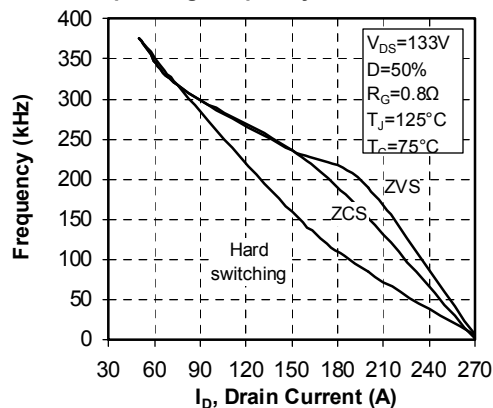
Switching Energy vs Current



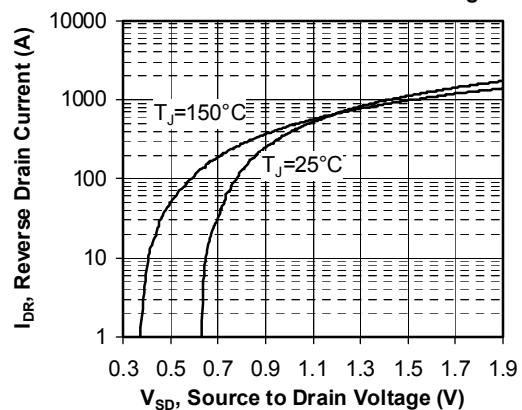
Switching Energy vs Gate Resistance



Operating Frequency vs Drain Current



Source to Drain Diode Forward Voltage



Microsemi reserves the right to change, without notice, the specifications and information contained herein

Microsemi's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 and foreign patents. U.S. and Foreign patents pending. All Rights Reserved.