



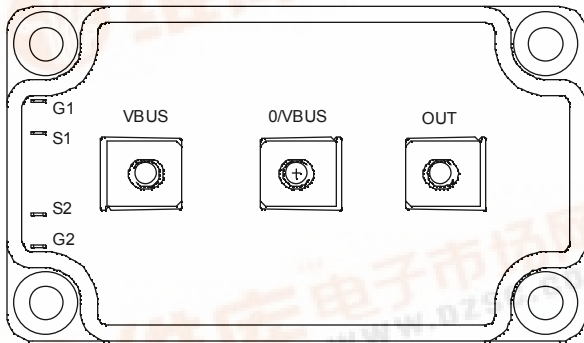
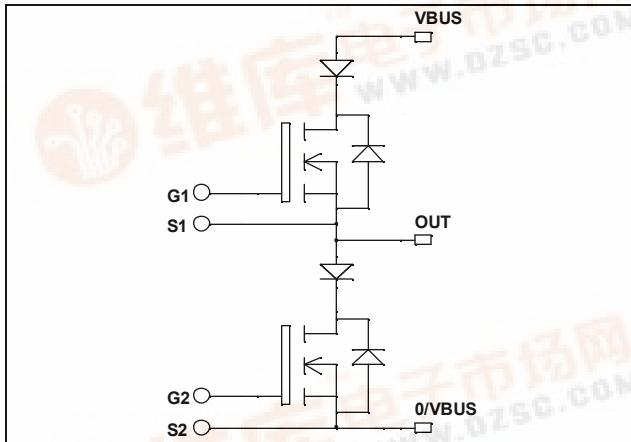
APT0502

*Phase leg
with Series diodes
MOSFET Power Module*

$$V_{DS} = 1000V$$

$$R_{DS(on)} = 130m\Omega \text{ typ @ } T_j = 25^\circ C$$

$$I_D = 65A @ T_c = 25^\circ C$$

**Application**

- Zero Current Switching resonant mode

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_{DS}	Drain - Source Breakdown Voltage	1000	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$ 65	A
		$T_c = 80^\circ C$ 49	
I_{DM}	Pulsed Drain current	240	
V_{GS}	Gate - Source Voltage	± 30	V
$R_{DS(on)}$	Drain - Source ON Resistance	156	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$ 1250	W
I_{AR}	Avalanche current (repetitive and non repetitive)	24	A
E_{AR}	Repetitive Avalanche Energy	30	mJ
E_{AS}	Single Pulse Avalanche Energy	1300	

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	$V_{GS} = 0V, V_{DS} = 1000V$ $T_j = 25^\circ\text{C}$			600	μA
		$V_{GS} = 0V, V_{DS} = 800V$ $T_j = 125^\circ\text{C}$			2	mA
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 32.5A$		130	156	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 6\text{mA}$	3		5	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			± 450	nA

Dynamic Characteristics

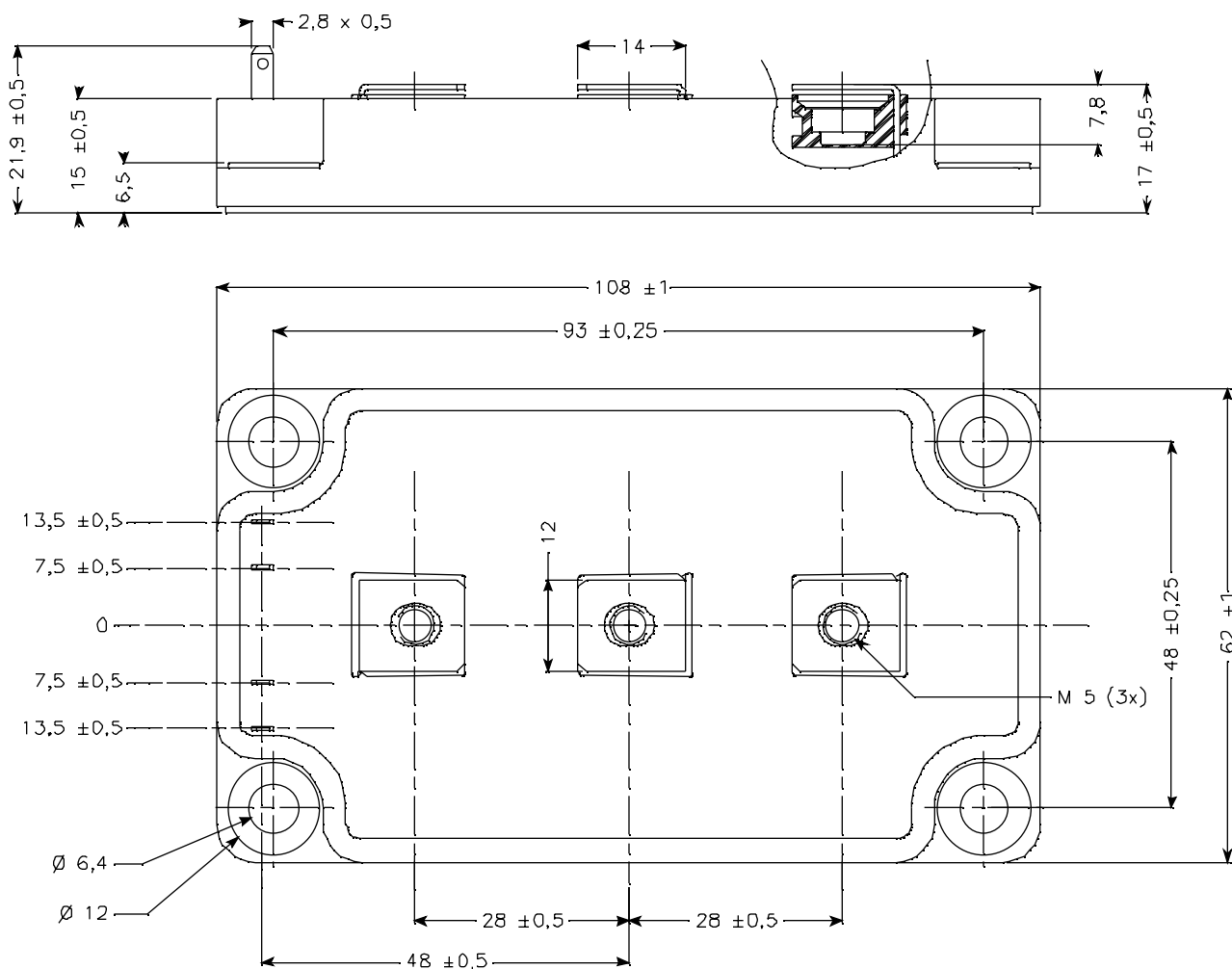
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$		15.2		nF
C_{oss}	Output Capacitance	$V_{DS} = 25V$		2.6		
C_{rss}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		0.42		
Q_g	Total gate Charge	$V_{GS} = 10V$		562		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 500V$		75		
Q_{gd}	Gate – Drain Charge	$I_D = 65A$		363		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C $V_{GS} = 15V$ $V_{Bus} = 667V$ $I_D = 65A$ $R_G = 0.5\Omega$		9		ns
T_r	Rise Time			9		
$T_{d(off)}$	Turn-off Delay Time			50		
T_f	Fall Time			24		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 667V$ $I_D = 65A, R_G = 0.5\Omega$		2.13		mJ
E_{off}	Turn-off Switching Energy			0.46		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 667V$ $I_D = 65A, R_G = 0.5\Omega$		4.4		mJ
E_{off}	Turn-off Switching Energy			0.57		

Series 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	$V_R = 1200V$	$T_j = 25^\circ\text{C}$		150	μA
			$T_j = 125^\circ\text{C}$		600	
I_F	DC Forward Current	$T_c = 100^\circ\text{C}$		120		A
V_F	Diode Forward Voltage	$I_F = 120A$		2.5	3	V
		$I_F = 240A$		3		
		$I_F = 120A$ $T_j = 125^\circ\text{C}$		1.8		
t_{rr}	Reverse Recovery Time	$I_F = 120A$ $V_R = 800V$ $di/dt = 400A/\mu\text{s}$	$T_j = 25^\circ\text{C}$	265		ns
			$T_j = 125^\circ\text{C}$	350		
Q_{rr}	Reverse Recovery Charge	$di/dt = 400A/\mu\text{s}$	$T_j = 25^\circ\text{C}$	1120		nC
			$T_j = 125^\circ\text{C}$	5800		

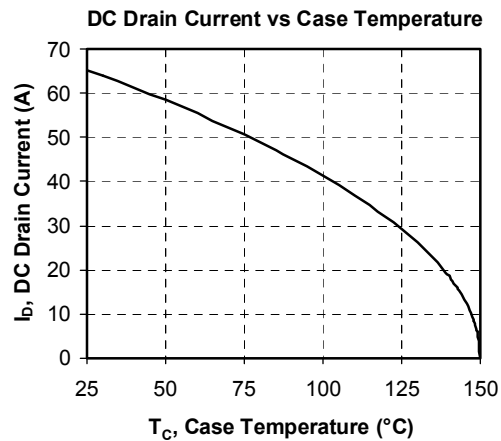
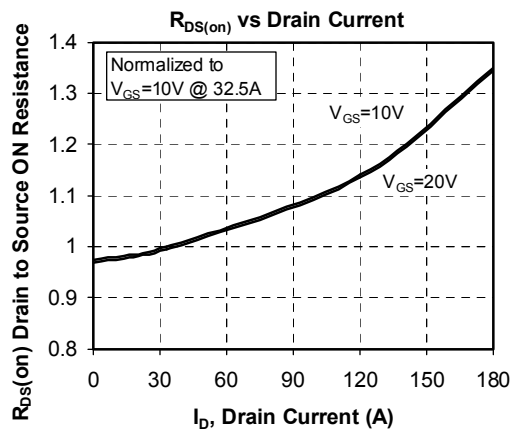
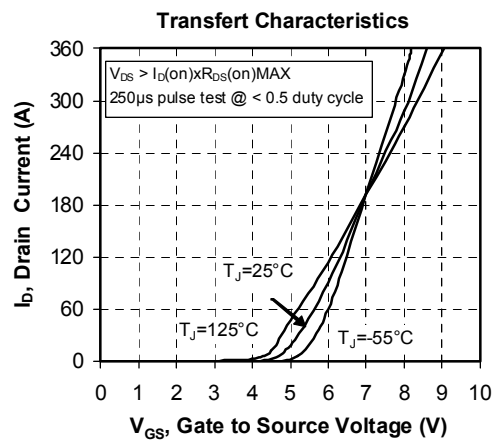
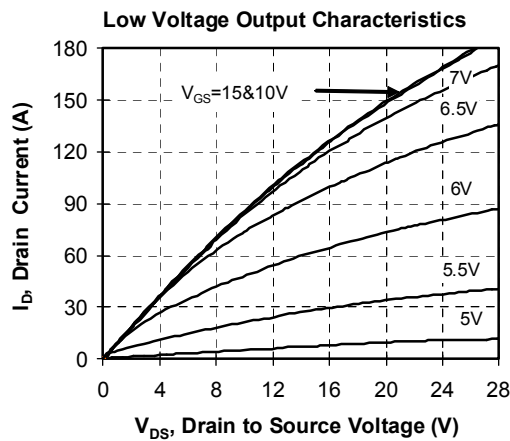
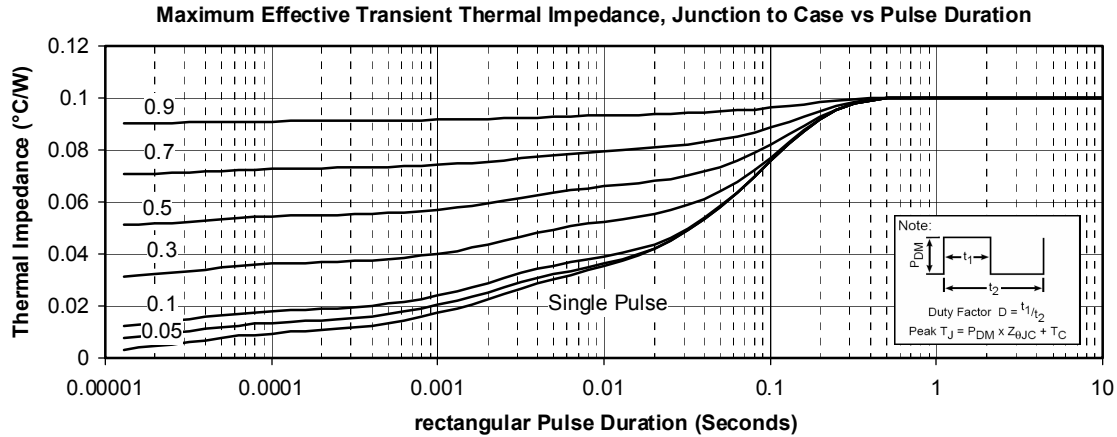


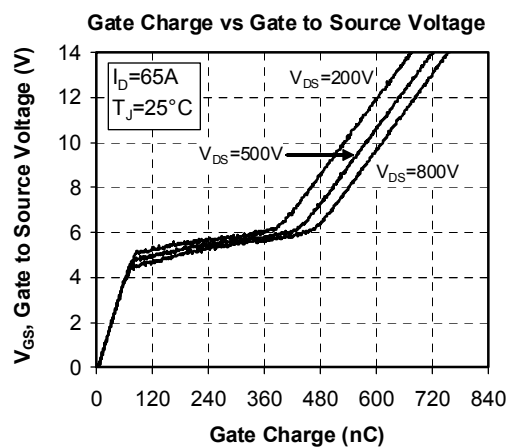
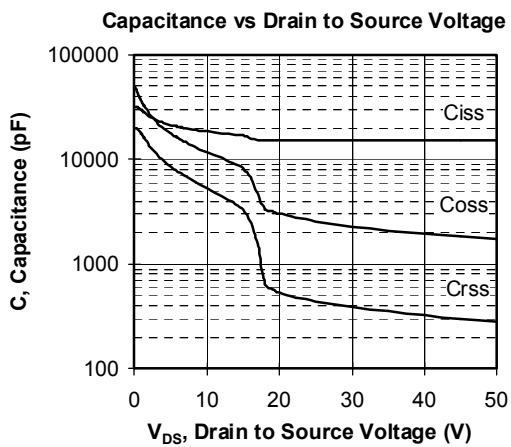
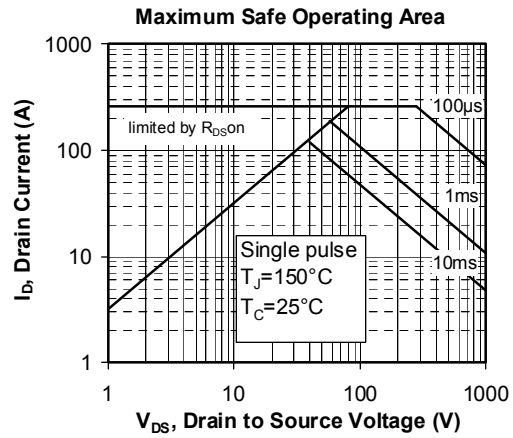
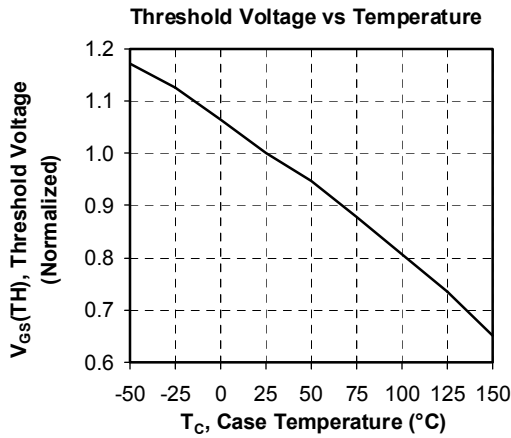
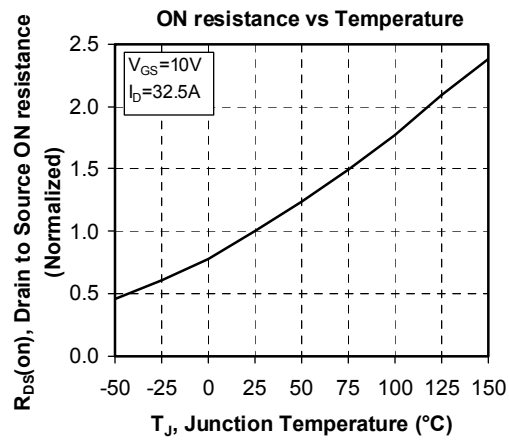
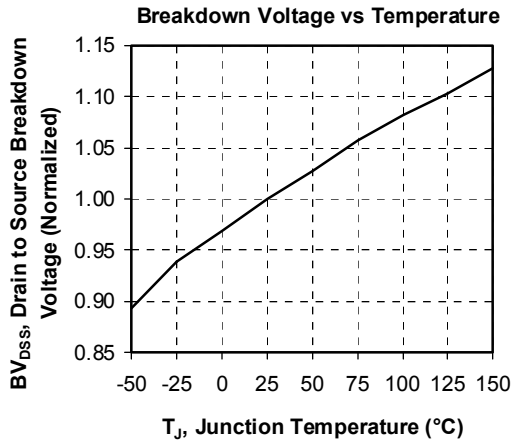
Symbol	Characteristic		Min	Typ	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance	Transistor			0.10	°C/W
		Series diode			0.46	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, I isol<1mA, 50/60Hz		2500			V
T _J	Operating junction temperature range		-40		150	°C
T _{STG}	Storage Temperature Range		-40		125	
T _C	Operating Case Temperature		-40		100	
Torque	Mounting torque	To heatsink	M6	3		N.m
		For terminals	M5	2		
Wt	Package Weight				280	g

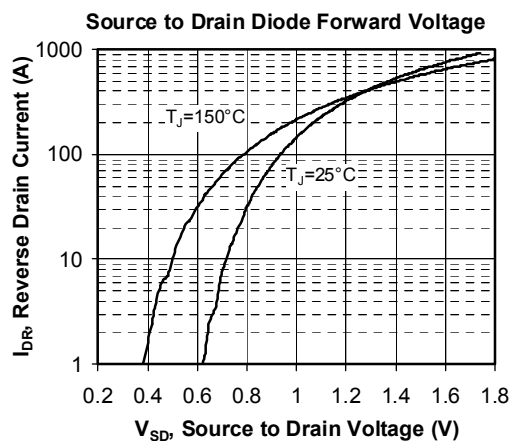
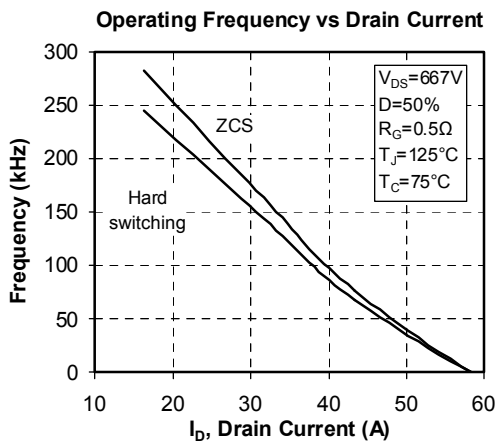
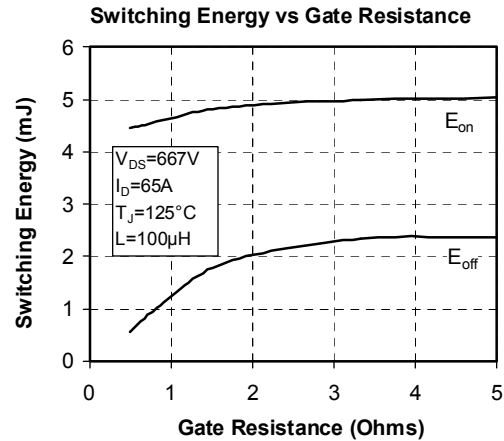
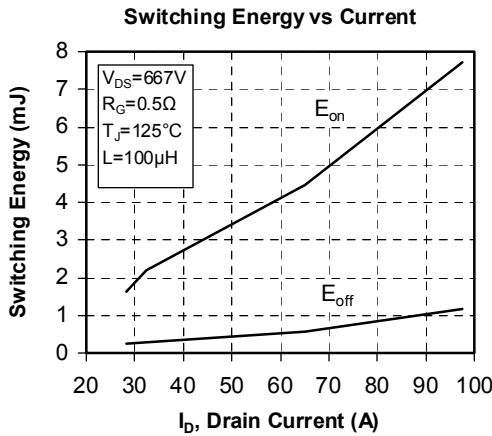
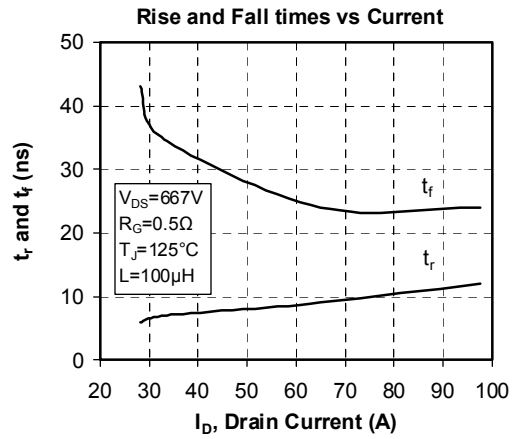
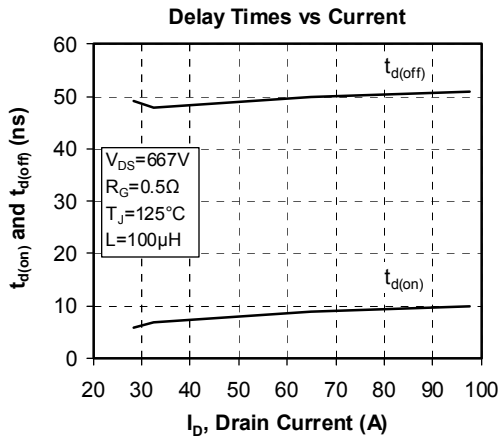


See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical Performance Curve







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