



APT0502TA57FPG

Triple phase leg MOSFET Power Module

$$V_{DSS} = 1200V$$

$$R_{DSon} = 570m\Omega \text{ typ @ } T_j = 25^\circ C$$

$$I_D = 17A \text{ @ } T_c = 25^\circ C$$

Application

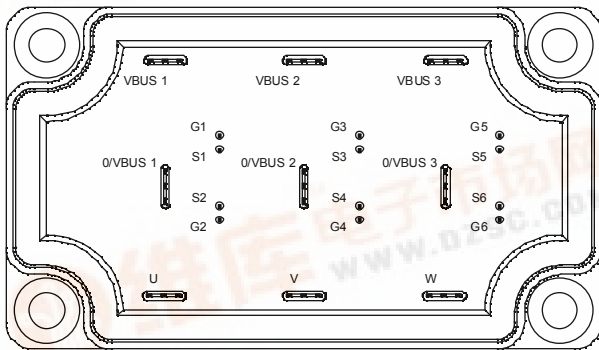
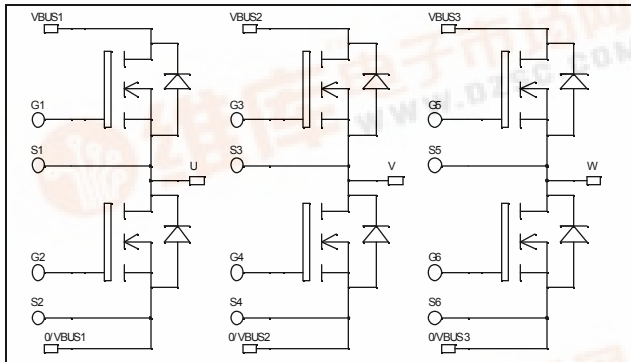
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

Features

- Power MOS 7[®] FREDFETs
 - 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
 - Lead frames for power connections
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Very low (12mm) profile
- Each leg can be easily paralleled to achieve a phase leg of three times the current capability
- Module can be configured as a three phase bridge
- Module can be configured as a boost followed by a full bridge
- RoHS Compliant



Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Breakdown Voltage	1200	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	17
		$T_c = 80^\circ C$	13
I_{DM}	Pulsed Drain current	68	A
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	684	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	390
I_{AR}	Avalanche current (repetitive and non repetitive)	22	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

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	$V_{GS} = 0V, V_{DS} = 1200V$			250	μA
		$V_{GS} = 0V, V_{DS} = 1000V$			1000	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 8.5A$		570	684	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 2.5mA$	3		5	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			± 100	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$		5155		pF
C_{oss}	Output Capacitance	$V_{DS} = 25V$		770		
C_{rss}	Reverse Transfer Capacitance	$f = 1MHz$		130		
Q_g	Total gate Charge	$V_{GS} = 10V$		187		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 600V$		24		
Q_{gd}	Gate – Drain Charge	$I_D = 17A$		120		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C $V_{GS} = 15V$ $V_{Bus} = 800V$ $I_D = 17A$ $R_G = 5\Omega$		20		ns
T_r	Rise Time			15		
$T_{d(off)}$	Turn-off Delay Time			160		
T_f	Fall Time			45		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 800V$ $I_D = 17A, R_G = 5\Omega$		990		μJ
E_{off}	Turn-off Switching Energy			685		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 800V$ $I_D = 17A, R_G = 5\Omega$		1565		μJ
E_{off}	Turn-off Switching Energy			857		

Source - Drain diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_S	Continuous Source current (Body diode)	$T_c = 25^\circ\text{C}$			17	A
		$T_c = 80^\circ\text{C}$			13	
V_{SD}	Diode Forward Voltage	$V_{GS} = 0V, I_S = -17A$			1.3	V
dv/dt	Peak Diode Recovery ❶				18	V/ns
t_{rr}	Reverse Recovery Time	$I_S = -17A$ $V_R = 600V$ $di/dt = 100A/\mu s$	$T_j = 25^\circ\text{C}$		320	ns
			$T_j = 125^\circ\text{C}$		650	
Q_{rr}	Reverse Recovery Charge	$I_S = -17A$ $V_R = 600V$ $di/dt = 100A/\mu s$	$T_j = 25^\circ\text{C}$	2		μC
			$T_j = 125^\circ\text{C}$	7		

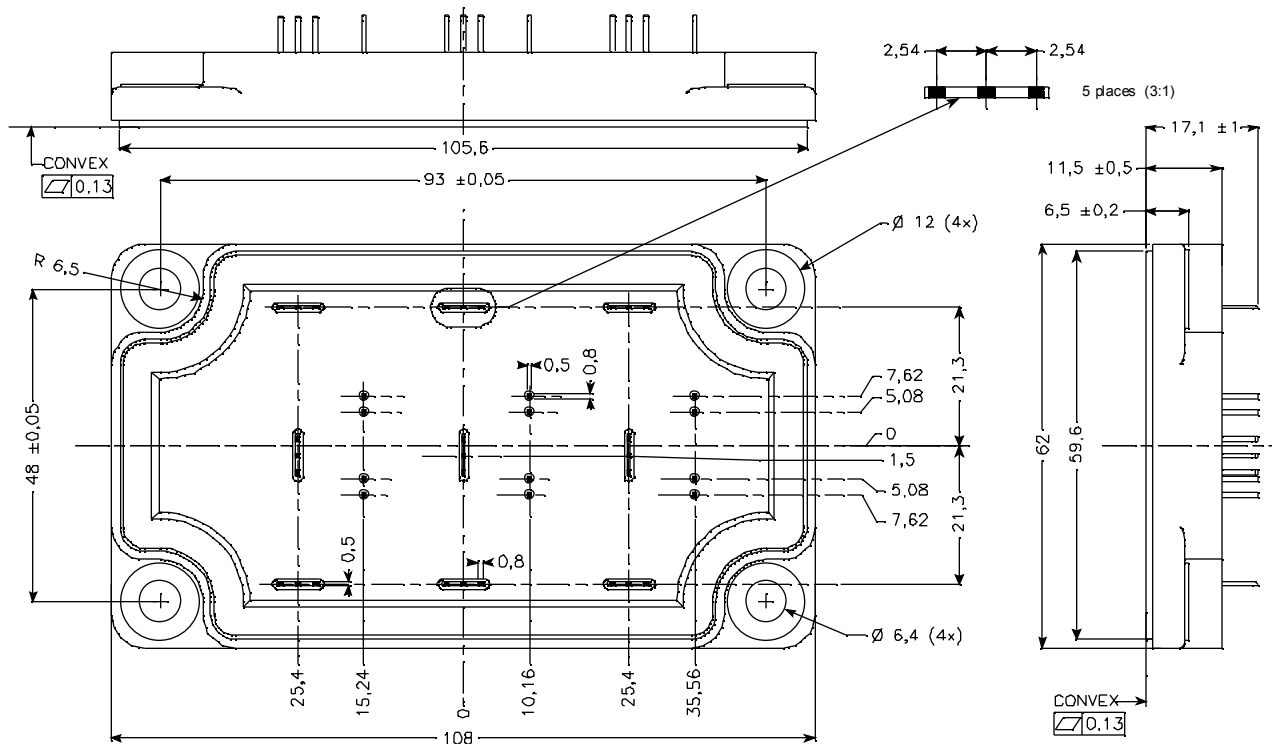
❶ dv/dt numbers reflect the limitations of the circuit rather than the device itself.

$I_S \leq -17A$ $di/dt \leq 700A/\mu s$ $V_R \leq V_{DSS}$ $T_j \leq 150^\circ\text{C}$

Thermal and package characteristics

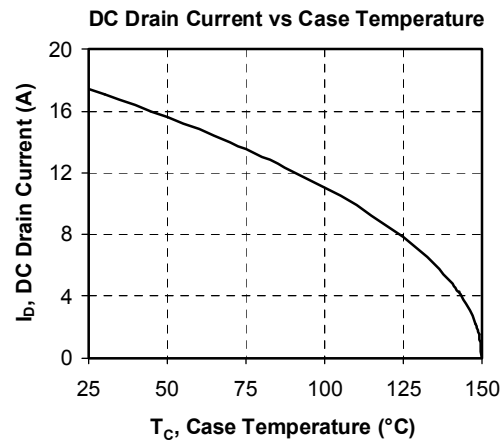
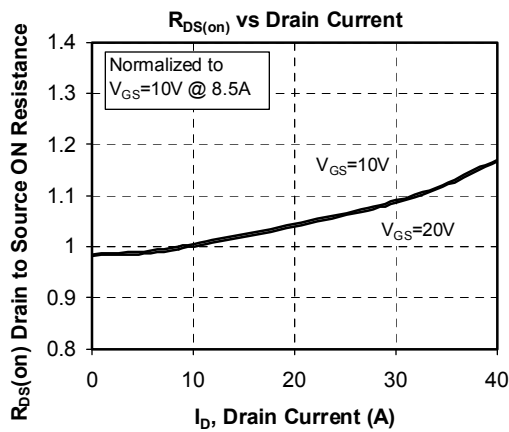
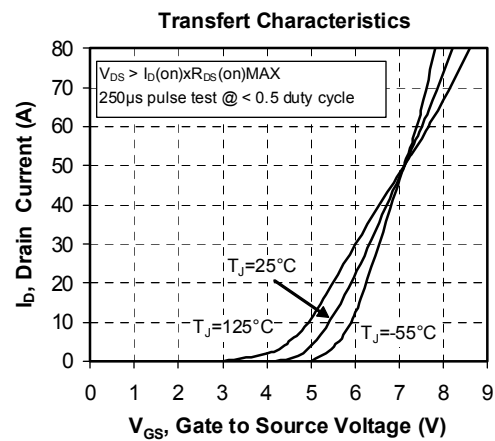
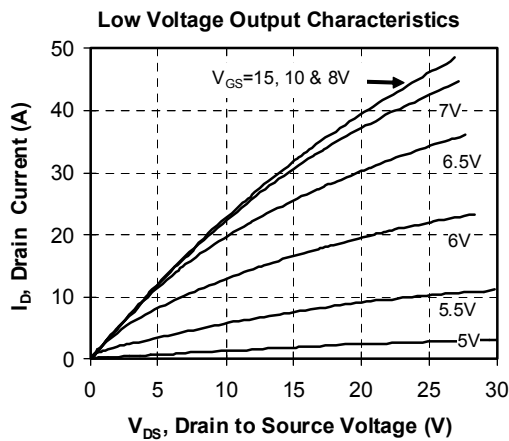
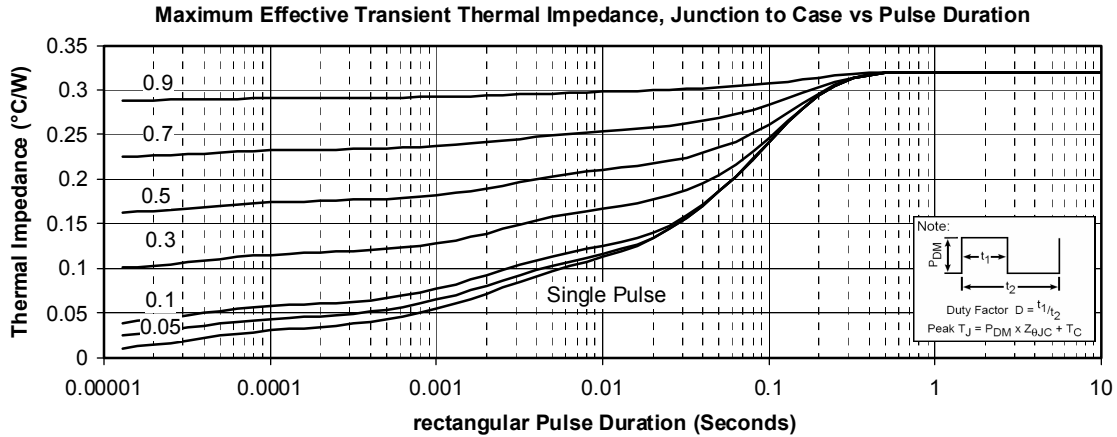
Symbol	Characteristic			Min	Typ	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance					0.32	°C/W
V _{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, I isol<1mA, 50/60Hz			2500			V
T _J	Operating junction temperature range			-40		150	°C
T _{STG}	Storage Temperature Range			-40		125	
T _C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M6	3		5	N.m
Wt	Package Weight					250	g

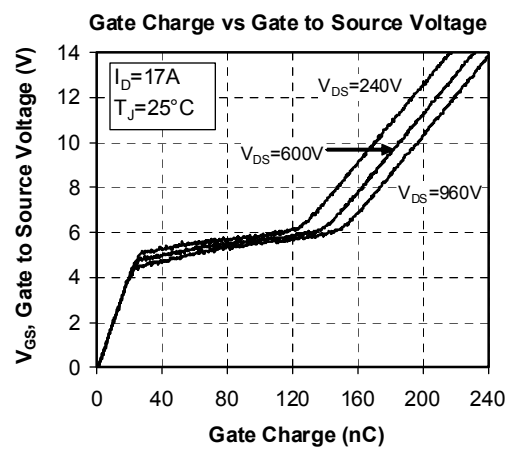
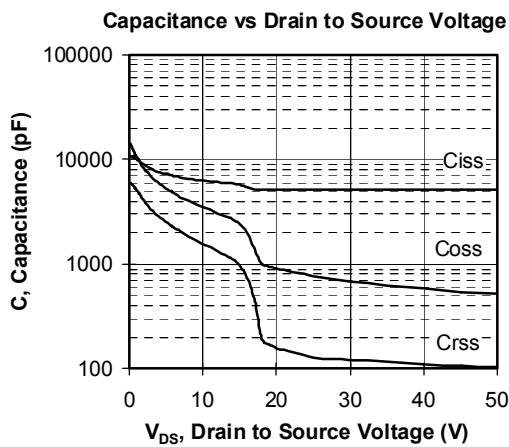
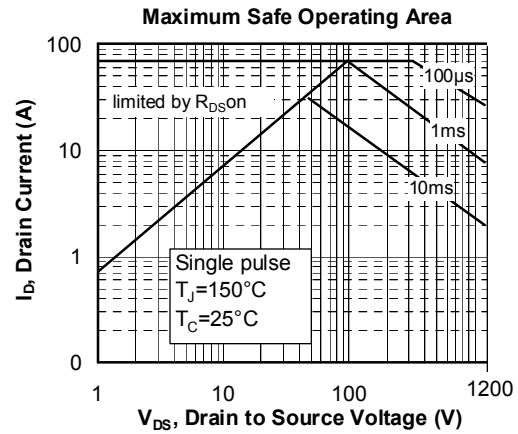
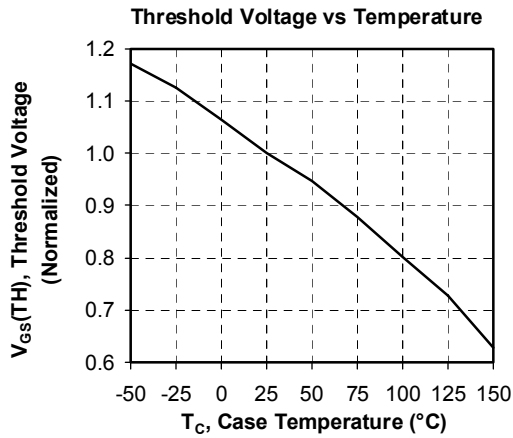
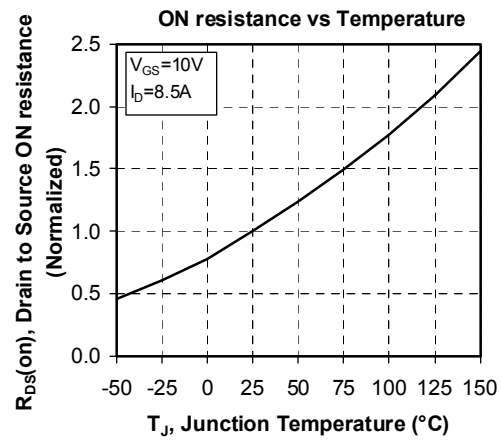
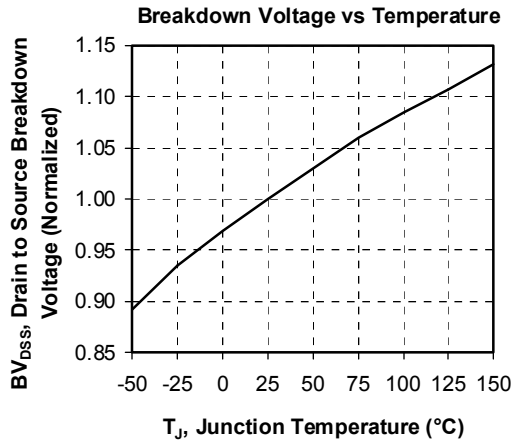
SP6-P Package outline (dimensions in mm)

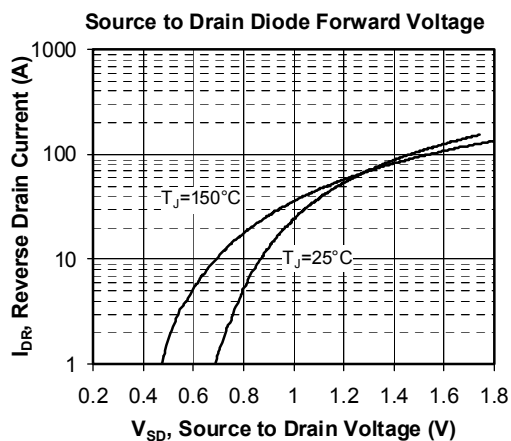
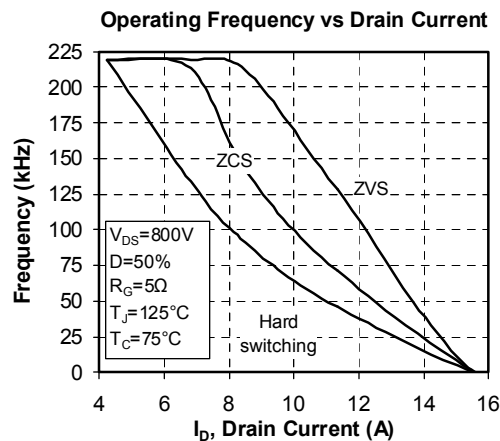
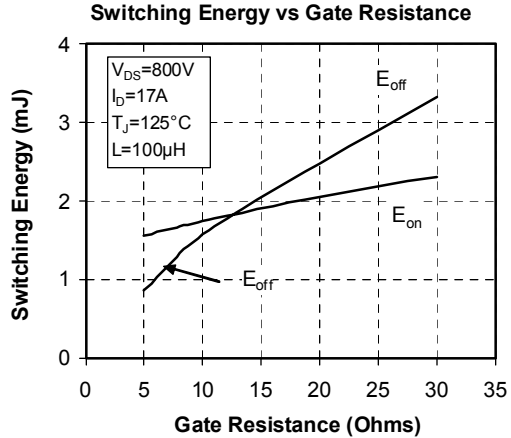
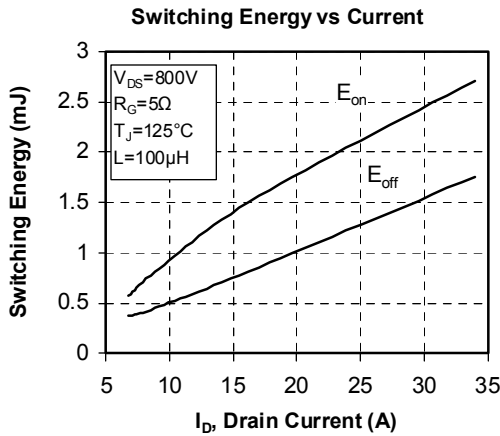
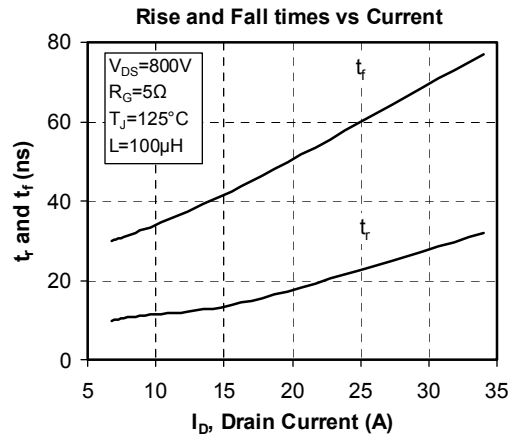
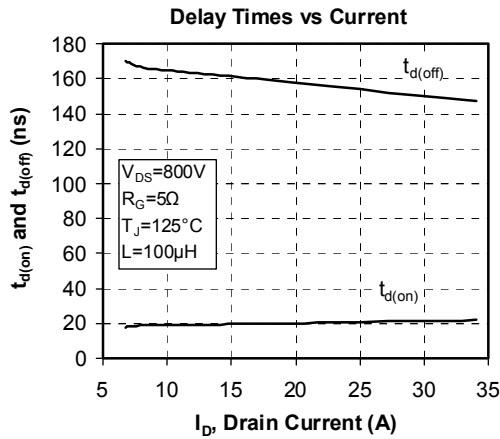


See application note 1902 - Mounting Instructions for SP6-P (12mm) Power Modules on www.microsemi.com

Typical Performance Curve







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