

Full bridge Series & parallel diodes MOSFET Power Module

$V_{DSS} = 1000V$

$R_{DSon} = 450m\Omega$ typ @ $T_j = 25^\circ C$

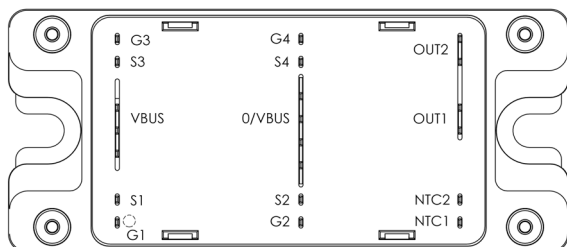
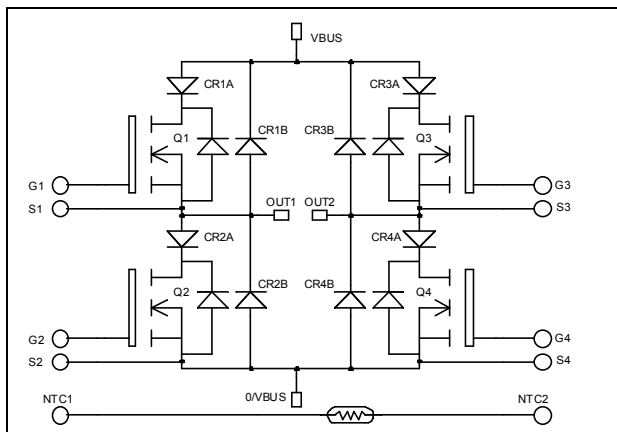
$I_D = 18A$ @ $T_c = 25^\circ C$

Application

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

Features

- Power MOS 7[®] MOSFETs
 - Low R_{DSon}
 - Low input and Miller capacitance
 - Low gate charge
 - Avalanche energy rated
 - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
 - Symmetrical design
 - Lead frames for power connections
- Internal thermistor for temperature monitoring
- 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
- 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	1000	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	18
		$T_c = 80^\circ C$	14
I_{DM}	Pulsed Drain current	72	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	540	$m\Omega$
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	357
I_{AR}	Avalanche current (repetitive and non repetitive)	18	A
E_{AR}	Repetitive Avalanche Energy	50	mJ
E_{AS}	Single Pulse Avalanche Energy	2500	

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on 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} = 1000V			100	μA
		V _{GS} = 0V, V _{DS} = 800V			500	
R _{DS(on)}	Drain – Source on Resistance	V _{GS} = 10V, I _D = 9A		450	540	mΩ
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} = ±30 V, V _{DS} = 0V			±100	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C _{iss}	Input Capacitance	V _{GS} = 0V		4350		pF
C _{oss}	Output Capacitance	V _{DS} = 25V		715		
C _{rss}	Reverse Transfer Capacitance	f = 1MHz		120		
Q _g	Total gate Charge	V _{GS} = 10V		154		nC
Q _{gs}	Gate – Source Charge	V _{Bus} = 500V		26		
Q _{gd}	Gate – Drain Charge	I _D = 18A		97		
T _{d(on)}	Turn-on Delay Time	Inductive switching @ 125°C V _{GS} = 15V V _{Bus} = 667V I _D = 18A R _G = 5Ω		10		ns
T _r	Rise Time			12		
T _{d(off)}	Turn-off Delay Time			121		
T _f	Fall Time			35		
E _{on}	Turn-on Switching Energy	Inductive switching @ 25°C V _{GS} = 15V, V _{Bus} = 667V I _D = 18A, R _G = 5Ω		639		μJ
E _{off}	Turn-off Switching Energy			380		
E _{on}	Turn-on Switching Energy	Inductive switching @ 125°C V _{GS} = 15V, V _{Bus} = 667V I _D = 18A, R _G = 5Ω		1046		μJ
E _{off}	Turn-off Switching Energy			451		
R _{thJC}	Junction to Case Thermal Resistance				0.35	°C/W

Series diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V _{RRM}	Maximum Peak Repetitive Reverse Voltage		1000			V
I _{RM}	Maximum Reverse Leakage Current	V _R = 1000V			250	μA
I _F	DC Forward Current	T _c = 65°C		30		A
V _F	Diode Forward Voltage	I _F = 30A		1.9	2.3	V
		I _F = 60A		2.2		
		I _F = 30A, T _j = 125°C		1.7		
t _{rr}	Reverse Recovery Time	I _F = 30A V _R = 667V di/dt = 200A/μs	T _j = 25°C	290		ns
			T _j = 125°C	390		
Q _{rr}	Reverse Recovery Charge	I _F = 30A V _R = 667V di/dt = 200A/μs	T _j = 25°C	670		nC
			T _j = 125°C	2350		
R _{thJC}	Junction to Case Thermal Resistance				1.2	°C/W

Parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V _{RRM}	Maximum Peak Repetitive Reverse Voltage			1000			V
I _{RM}	Maximum Reverse Leakage Current	V _R =1000V				250	μA
I _F	DC Forward Current		T _c = 65°C		30		A
V _F	Diode Forward Voltage	I _F = 30A			1.9	2.3	V
		I _F = 60A			2.2		
		I _F = 30A	T _j = 125°C		1.7		
t _{rr}	Reverse Recovery Time	I _F = 30A V _R = 667V di/dt = 200A/μs	T _j = 25°C		290		ns
			T _j = 125°C		390		
Q _{rr}	Reverse Recovery Charge		T _j = 25°C		670		nC
			T _j = 125°C		2350		
R _{thJC}	Junction to Case Thermal Resistance					1.2	°C/W

Thermal and package characteristics

Symbol	Characteristic			Min	Max	Unit
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz			4000		V
T _J	Operating junction temperature range			-40	150	°C
T _{JOP}	Recommended junction temperature under switching conditions			-40	T _{jmax} -25	
T _{STG}	Storage Temperature Range			-40	125	
T _C	Operating Case Temperature			-40	100	
Torque	Mounting torque	To Heatsink	M5	2.5	4.7	N.m
Wt	Package Weight				160	g

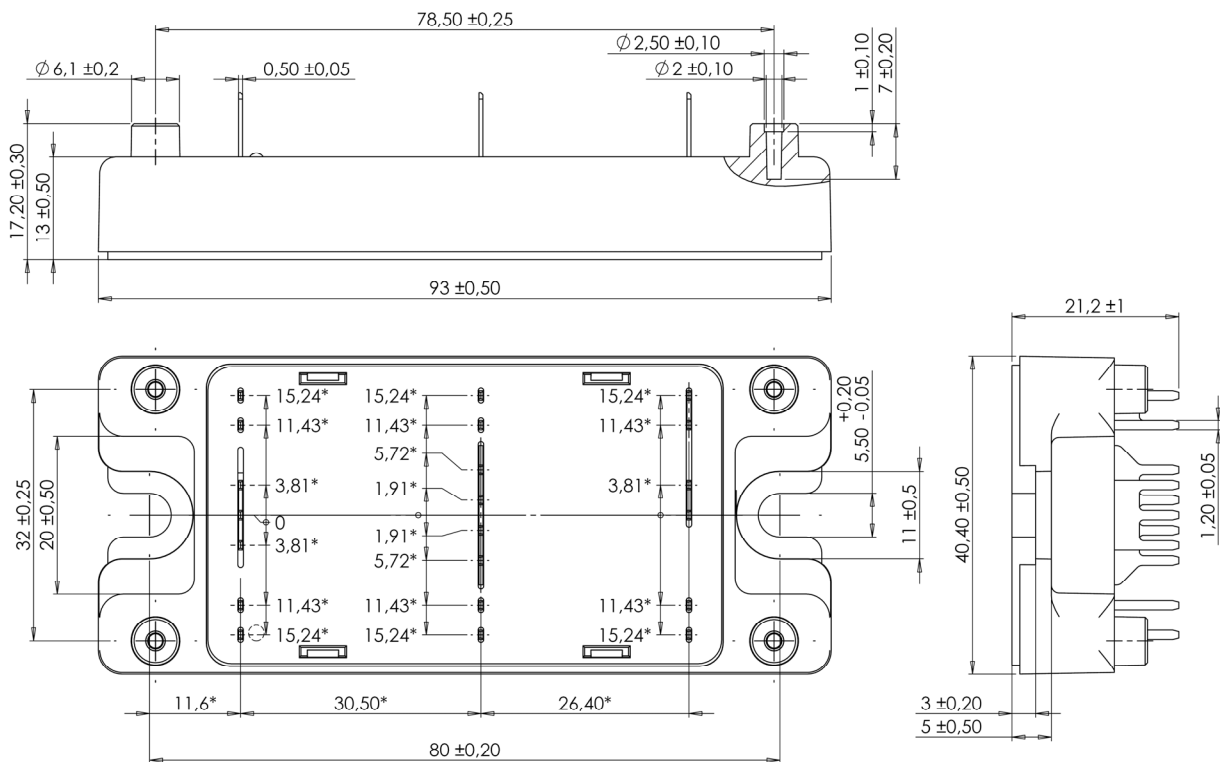
Temperature sensor NTC (see application note APT0406 on www.microsemi.com).

Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
ΔR ₂₅ /R ₂₅			5		%
B _{25/85}	T ₂₅ = 298.15 K		3952		K
ΔB/B			4		%

$$R_T = \frac{R_{25}}{\exp \left[B_{25/85} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

T: Thermistor temperature
 R_T: Thermistor value at T

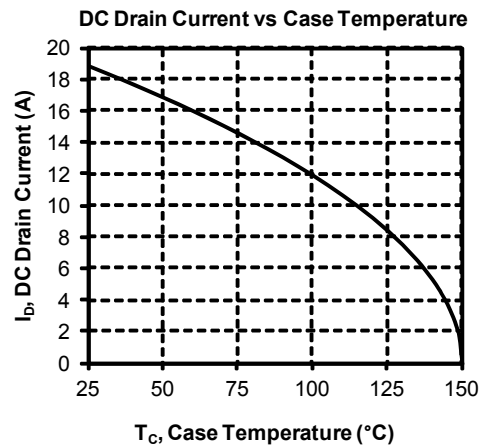
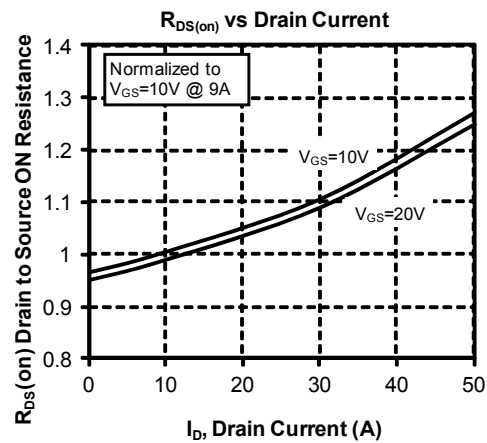
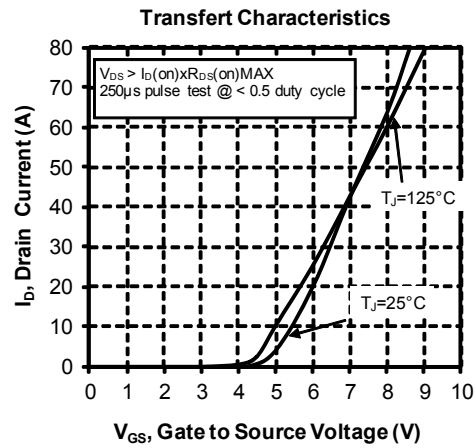
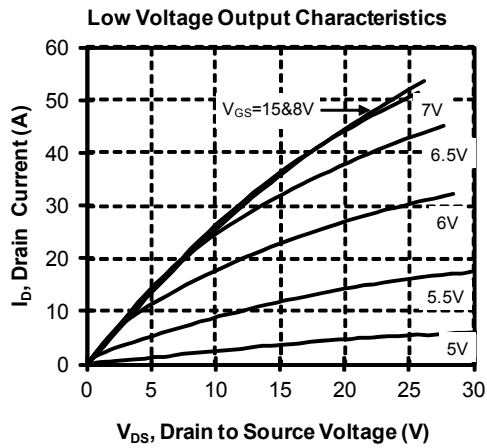
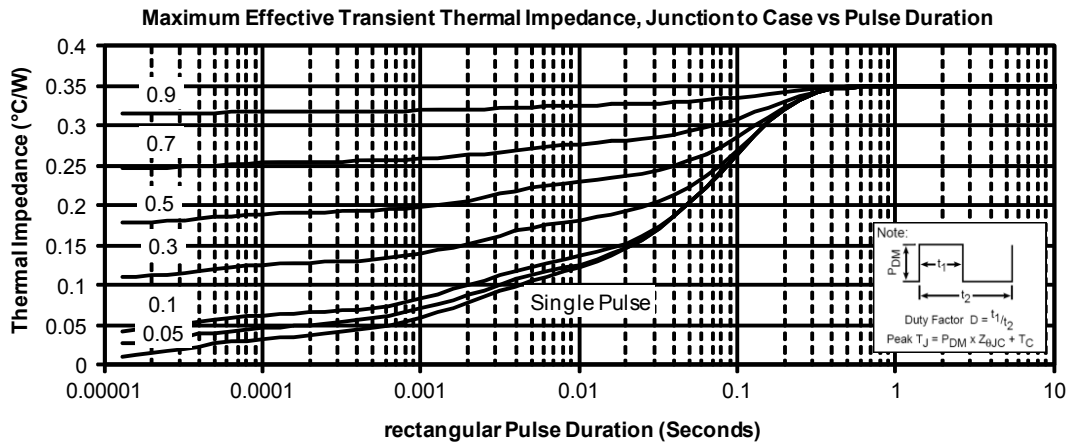
SP4 Package outline (dimensions in mm)

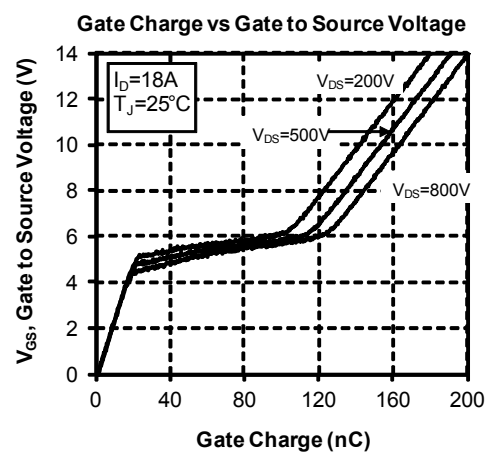
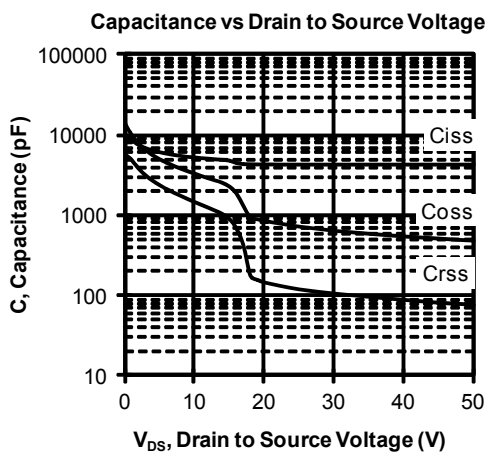
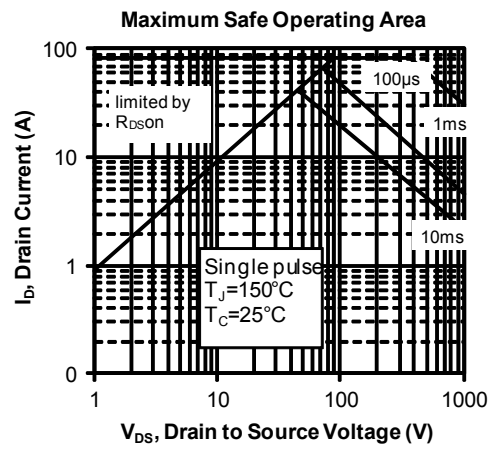
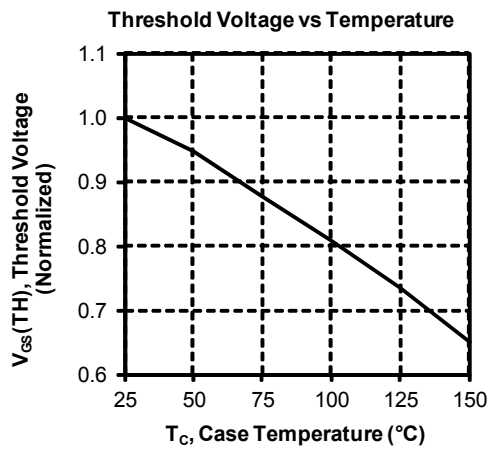
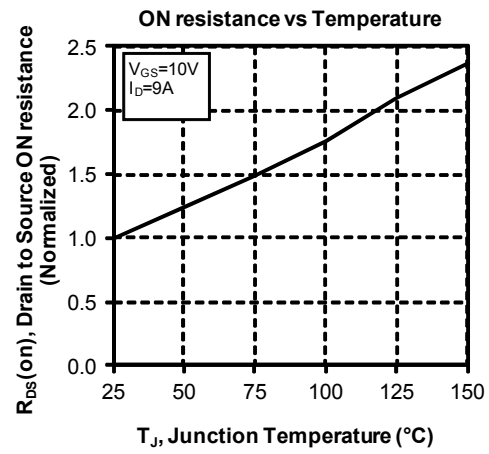
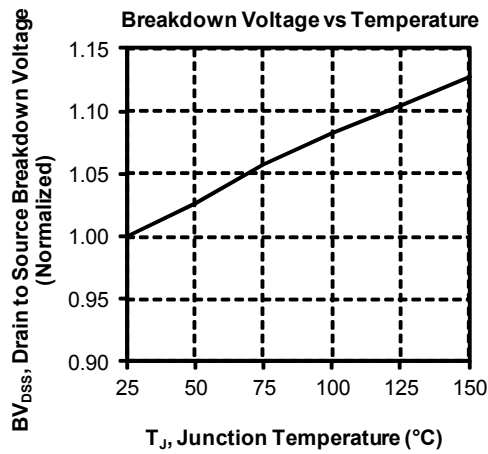


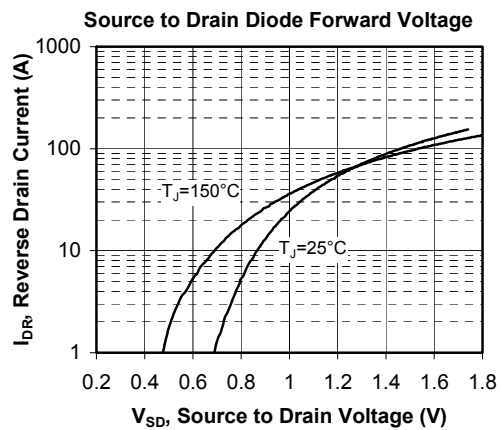
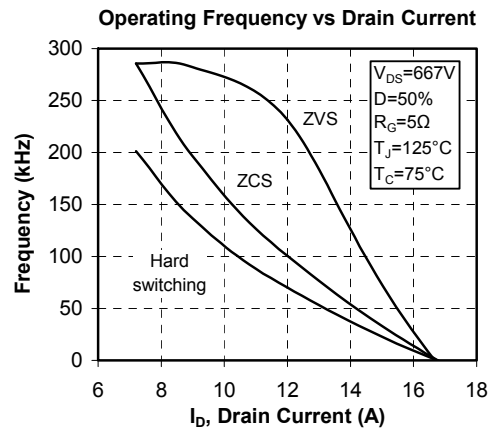
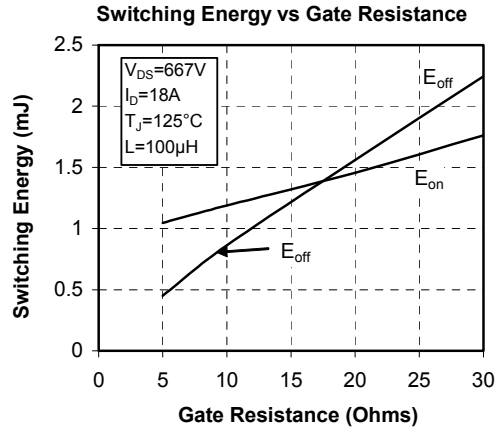
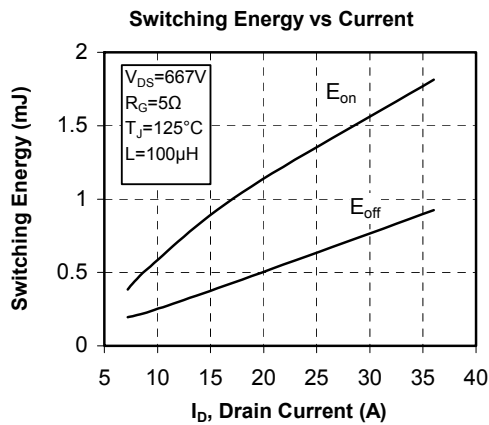
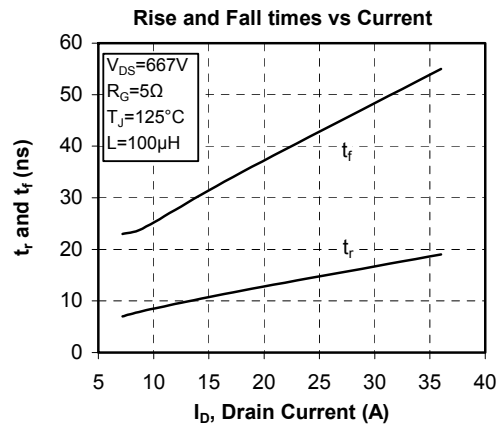
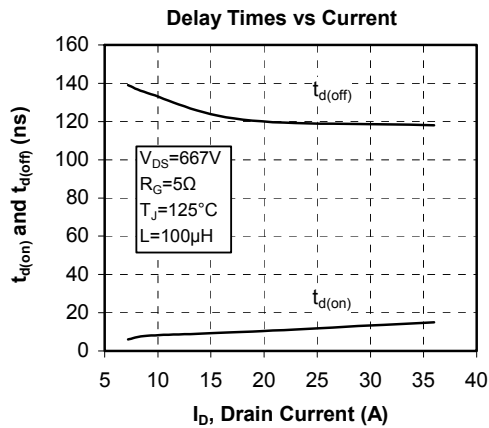
ALL DIMENSIONS MARKED "*" ARE TOLERANCED AS : $\pm \phi 1$

See application note APT0501 - Mounting Instructions for SP4 Power Modules on www.microsemi.com

Typical Performance Curve







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