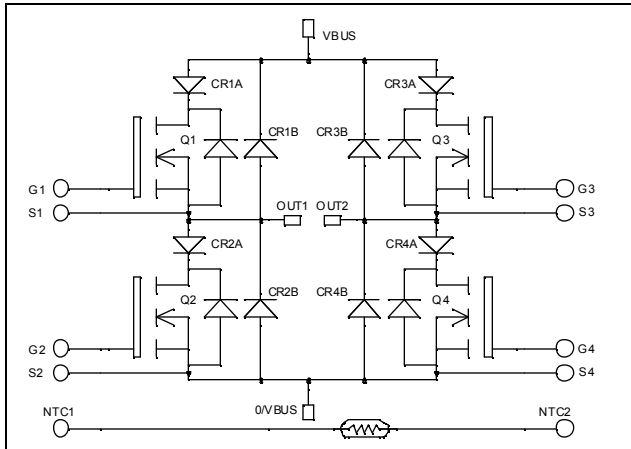


Full bridge
Series & parallel diodes
MOSFET Power Module

$V_{DSS} = 500V$

$R_{DSon} = 75m\Omega$ typ @ $T_j = 25^\circ C$

$I_D = 46A$ @ $T_c = 25^\circ C$



Application

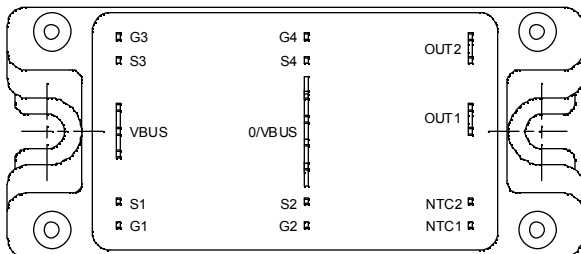
- Motor control
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

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



Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Breakdown Voltage	500	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	46
		$T_c = 80^\circ C$	34
I_{DM}	Pulsed Drain current	184	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	90	$m\Omega$
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	357
I_{AR}	Avalanche current (repetitive and non repetitive)	46	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

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	$V_{GS} = 0\text{V}, V_{DS} = 500\text{V}$	$T_j = 25^\circ\text{C}$			100	μA
		$V_{GS} = 0\text{V}, V_{DS} = 400\text{V}$	$T_j = 125^\circ\text{C}$			500	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 23\text{A}$			75	90	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 2.5\text{mA}$		3		5	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$				± 100	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	$V_{GS} = 0\text{V}$			5600		pF
C_{oss}	Output Capacitance	$V_{DS} = 25\text{V}$			1200		
C_{rss}	Reverse Transfer Capacitance	$f = 1\text{MHz}$			90		
Q_g	Total gate Charge	$V_{GS} = 10\text{V}$			123		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 250\text{V}$			33		
Q_{gd}	Gate – Drain Charge	$I_D = 46\text{A}$			65		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C			18		ns
T_r	Rise Time	$V_{GS} = 15\text{V}$			35		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 333\text{V}$			87		
T_f	Fall Time	$I_D = 46\text{A}$ $R_G = 5\Omega$			77		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C			755		μJ
E_{off}	Turn-off Switching Energy	$V_{GS} = 15\text{V}, V_{Bus} = 333\text{V}$ $I_D = 46\text{A}, R_G = 5\Omega$			726		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C			1241		μJ
E_{off}	Turn-off Switching Energy	$V_{GS} = 15\text{V}, V_{Bus} = 333\text{V}$ $I_D = 46\text{A}, R_G = 5\Omega$			846		

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	$V_R = 200\text{V}$	$T_j = 25^\circ\text{C}$			250	μA
			$T_j = 125^\circ\text{C}$			500	
I_F	DC Forward Current	$T_c = 85^\circ\text{C}$			30		A
V_F	Diode Forward Voltage	$I_F = 30\text{A}$			1.1	1.15	V
		$I_F = 60\text{A}$			1.4		
		$I_F = 30\text{A}$	$T_j = 125^\circ\text{C}$		0.9		
t_{rr}	Reverse Recovery Time	$I_F = 30\text{A}$ $V_R = 133\text{V}$	$T_j = 25^\circ\text{C}$		24		ns
			$T_j = 125^\circ\text{C}$		48		
Q_{rr}	Reverse Recovery Charge	$di/dt = 200\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		33		nC
			$T_j = 125^\circ\text{C}$		150		

Parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V _{RRM}	Maximum Peak Repetitive Reverse Voltage		600			V
I _{RM}	Maximum Reverse Leakage Current	V _R =600V			250	μA
		T _j = 25°C				
		T _j = 125°C			500	
I _F	DC Forward Current			30		A
		T _c = 70°C				
V _F	Diode Forward Voltage	I _F = 30A		1.6	1.8	V
		I _F = 60A		1.9		
		I _F = 30A	T _j = 125°C	1.4		
t _{rr}	Reverse Recovery Time	I _F = 30A V _R = 400V di/dt = 200A/μs	T _j = 25°C	85		ns
			T _j = 125°C	160		
Q _{rr}	Reverse Recovery Charge	I _F = 30A V _R = 400V di/dt = 200A/μs	T _j = 25°C	130		nC
			T _j = 125°C	700		

Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit	
R _{thJC}	Junction to Case Thermal Resistance	Transistor		0.35	°C/W	
		Diode		1.2		
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	M5	2.5	4.7	N.m
Wt	Package Weight				160	g

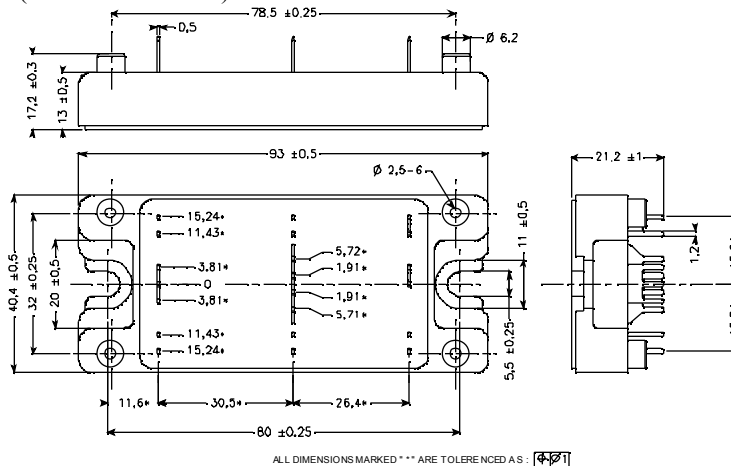
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

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

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

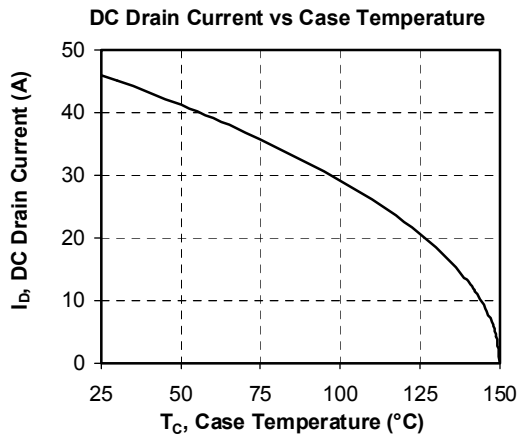
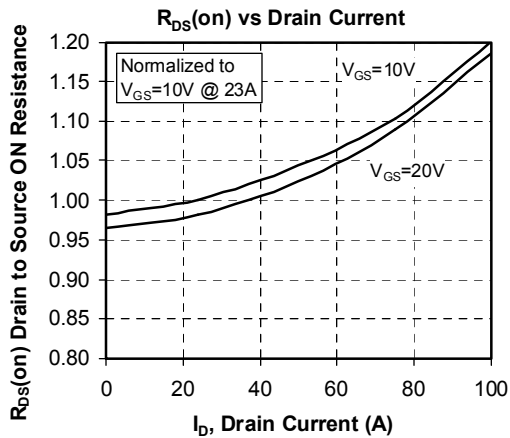
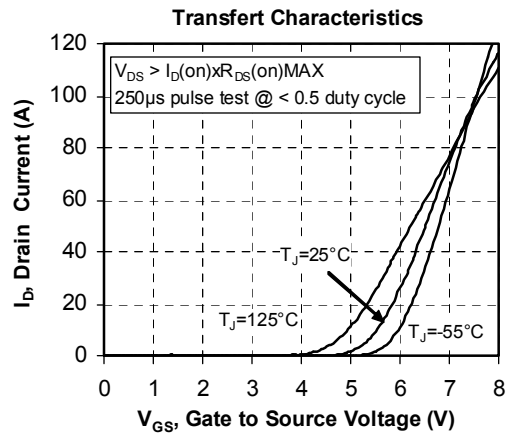
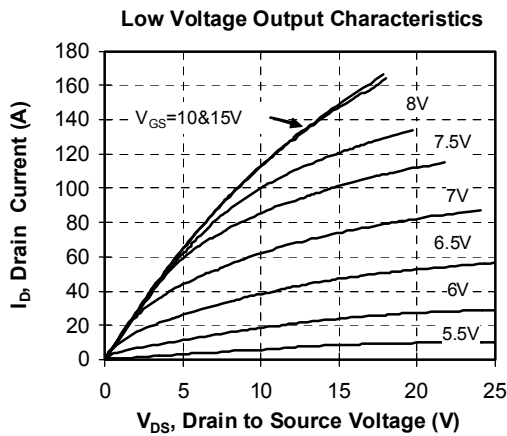
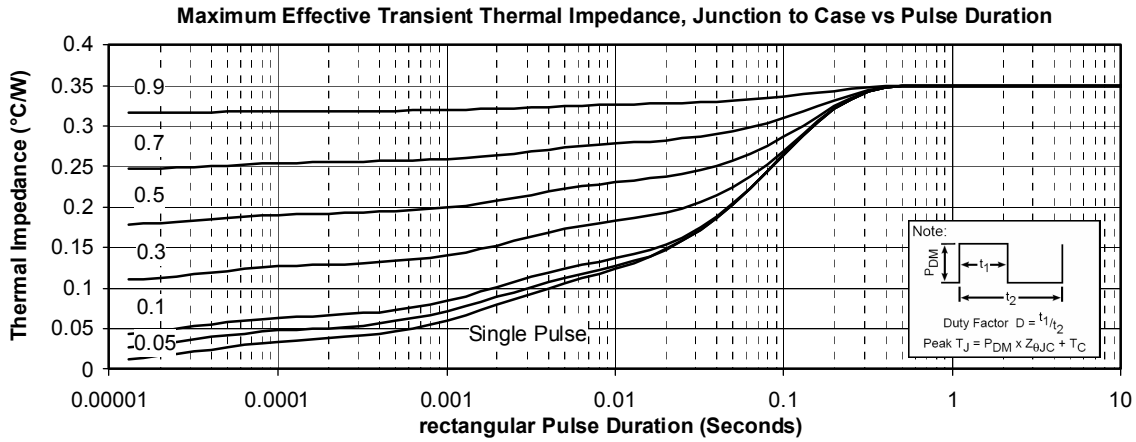
T: Thermistor temperature
R_T: Thermistor value at T

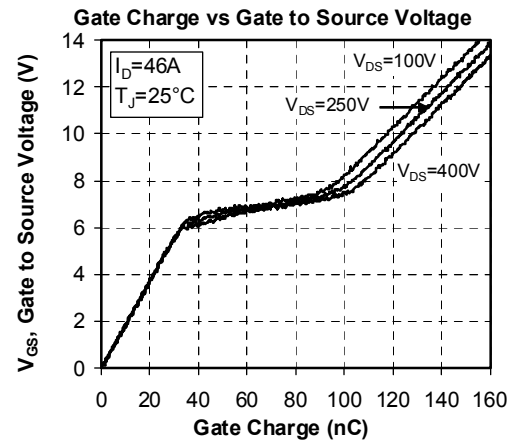
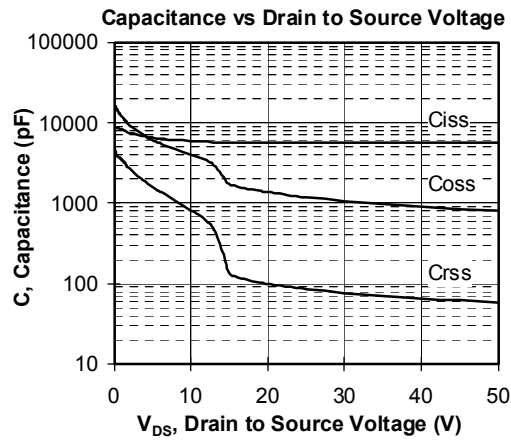
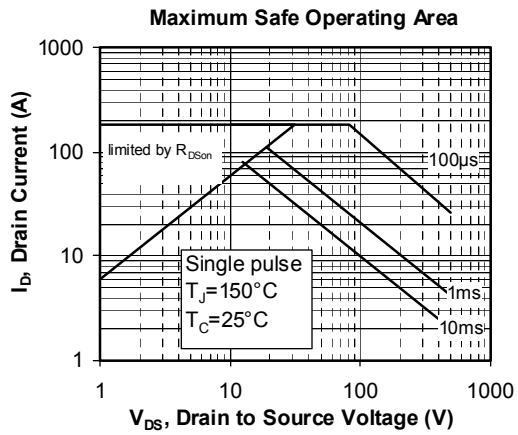
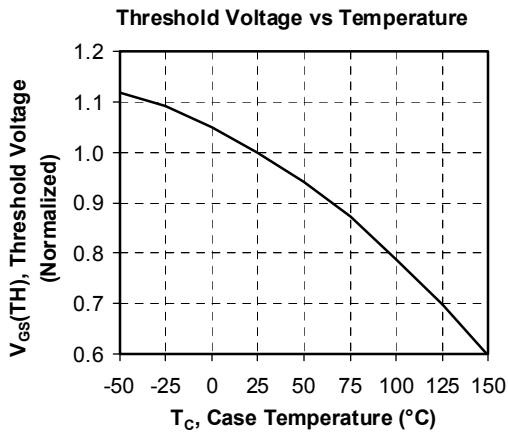
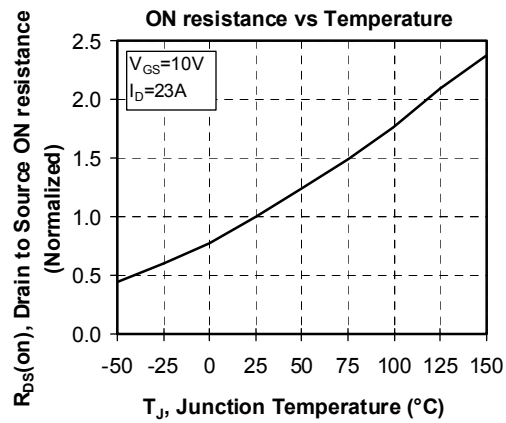
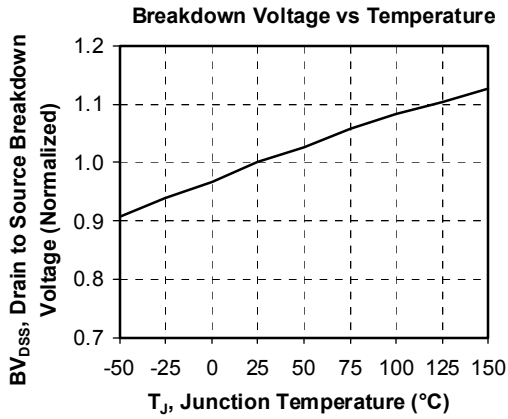
SP4 Package outline (dimensions in mm)

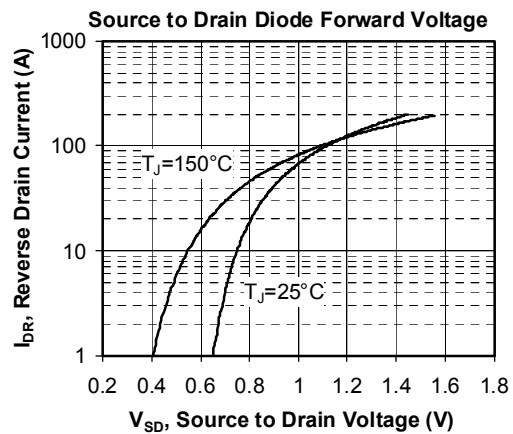
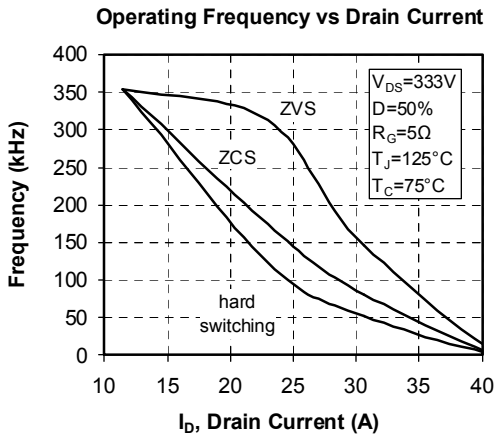
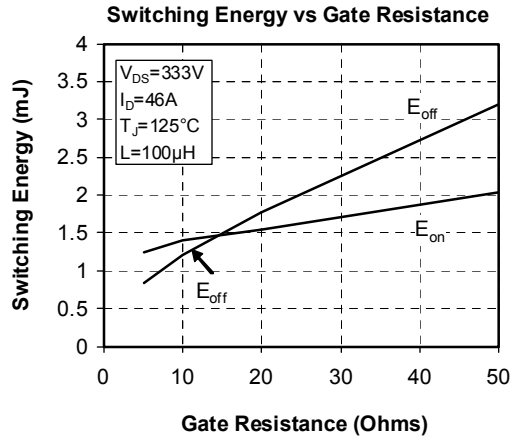
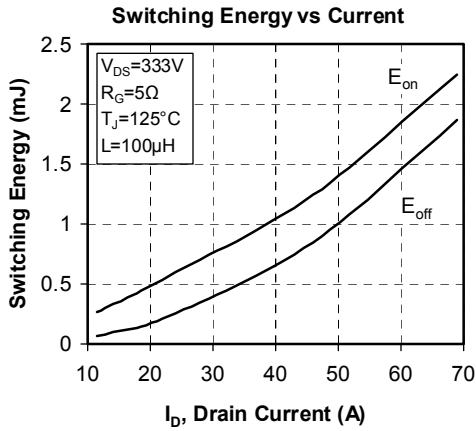
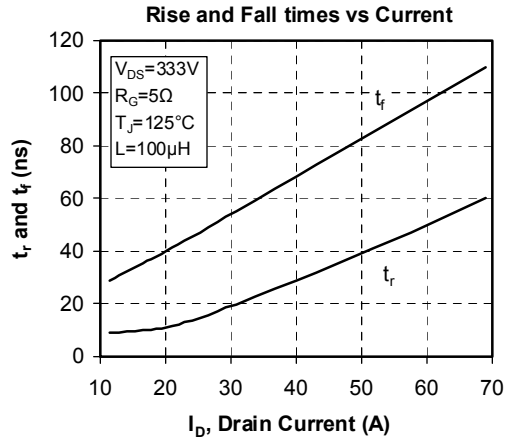
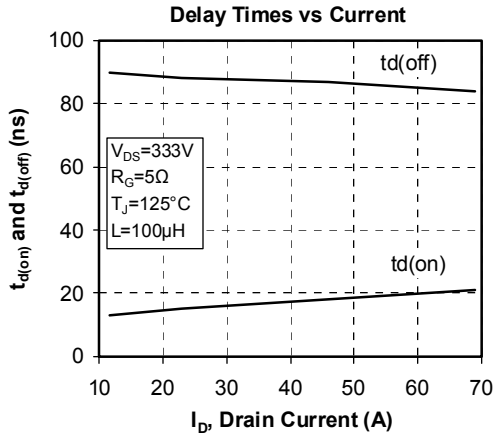


See application note APT0501 - Mounting Instructions for SP4 Power Modules on www.microsemi.com

Typical Performance Curve







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