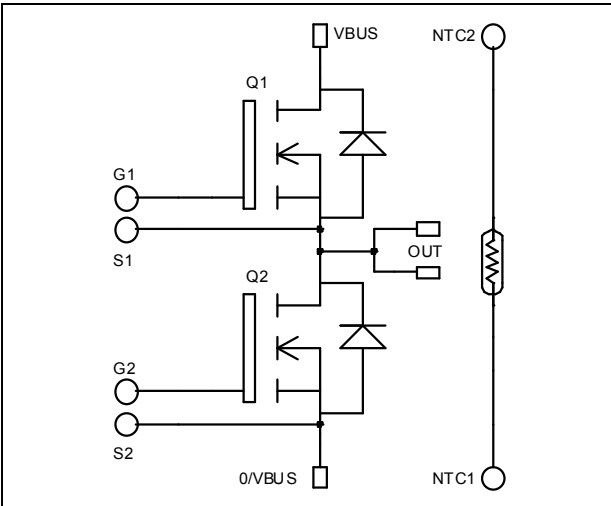


Phase Leg MOSFET Power Module

$V_{DSS} = 1200V$
 $R_{DSon} = 290m\Omega \text{ typ @ } T_j = 25^\circ C$
 $I_D = 34A \text{ @ } T_c = 25^\circ C$

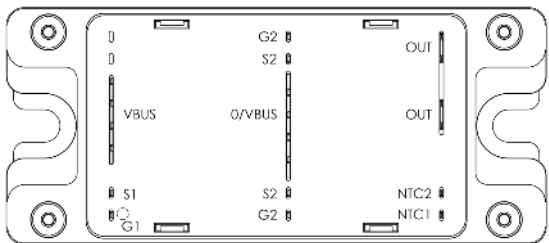


Application

- 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
- 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	1200	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	34
		$T_c = 80^\circ C$	25
I_{DM}	Pulsed Drain current	136	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	348	$m\Omega$
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	780
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			350	μA
		T _j = 25°C				
		V _{GS} = 0V, V _{DS} = 1000V			1500	
R _{DS(on)}	Drain – Source on Resistance	V _{GS} = 10V, I _D = 17A		290	348	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 5mA	3		5	V
I _{GSS}	Gate – Source Leakage Current	V _{GS} = ±30 V, V _{DS} = 0V			±150	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C _{iss}	Input Capacitance	V _{GS} = 0V V _{DS} = 25V f = 1MHz		10.3		nF
C _{oss}	Output Capacitance			1.54		
C _{rss}	Reverse Transfer Capacitance			0.26		
Q _g	Total gate Charge	V _{GS} = 10V V _{Bus} = 600V I _D = 34A		374		nC
Q _{gs}	Gate – Source Charge			48		
Q _{gd}	Gate – Drain Charge			240		
T _{d(on)}	Turn-on Delay Time	Inductive switching @ 125°C V _{GS} = 15V V _{Bus} = 800V I _D = 34A R _G = 2.5Ω		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 = 34A, R _G = 2.5Ω		1980		μJ
E _{off}	Turn-off Switching Energy			1371		
E _{on}	Turn-on Switching Energy	Inductive switching @ 125°C V _{GS} = 15V, V _{Bus} = 800V I _D = 34A, R _G = 2.5Ω		3131		μJ
E _{off}	Turn-off Switching Energy			1714		

Source - Drain diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
I _S	Continuous Source current (Body diode)	T _c = 25°C			34	A	
		T _c = 80°C			25		
V _{SD}	Diode Forward Voltage	V _{GS} = 0V, I _S = - 34A			1.3	V	
dv/dt	Peak Diode Recovery ❶				18	V/ns	
t _{rr}	Reverse Recovery Time	I _S = - 34A V _R = 600V di _S /dt = 200A/μs	T _j = 25°C			320	ns
			T _j = 125°C			650	
Q _{rr}	Reverse Recovery Charge		T _j = 25°C		4	μC	
			T _j = 125°C		14		

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

I_S ≤ - 34A di/dt ≤ 700A/μs V_R ≤ V_{DSS} T_j ≤ 150°C

Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit	
R _{thJC}	Junction to Case Thermal Resistance			0.16	°C/W	
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 _{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

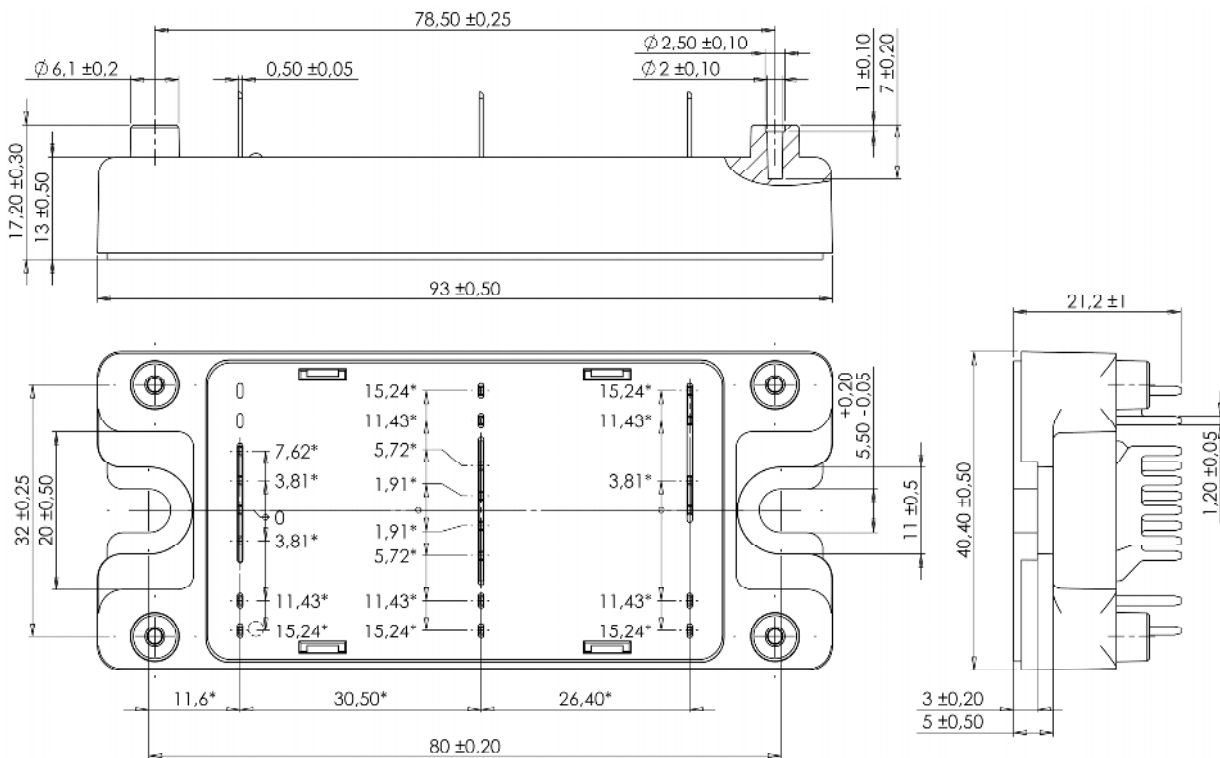
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

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

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

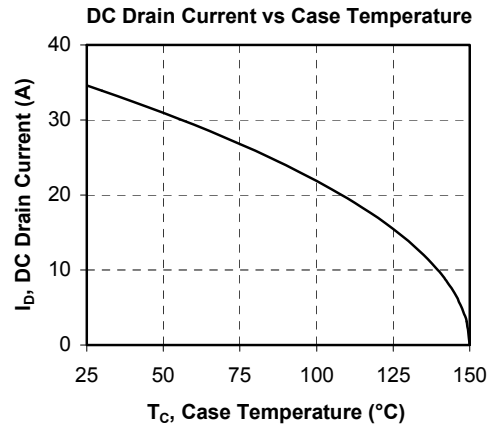
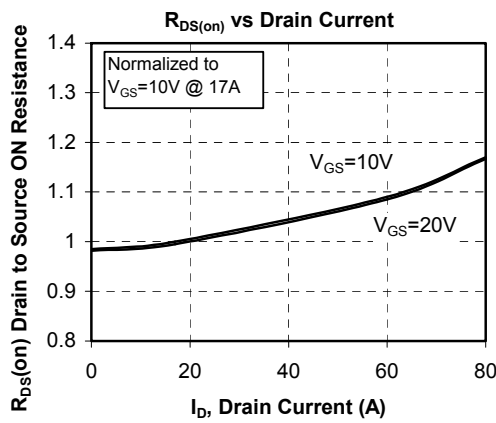
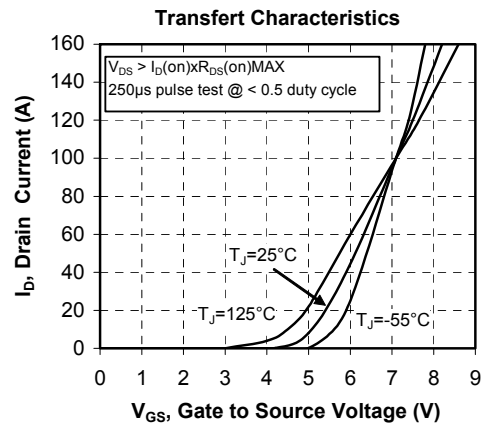
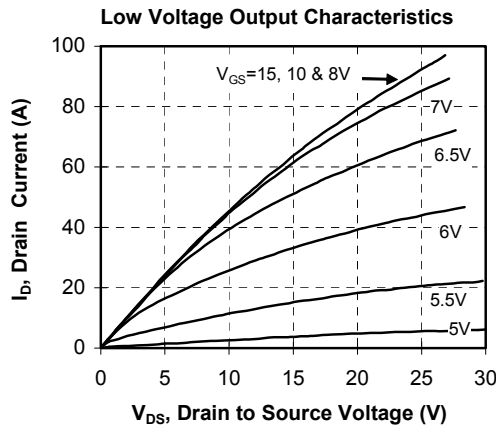
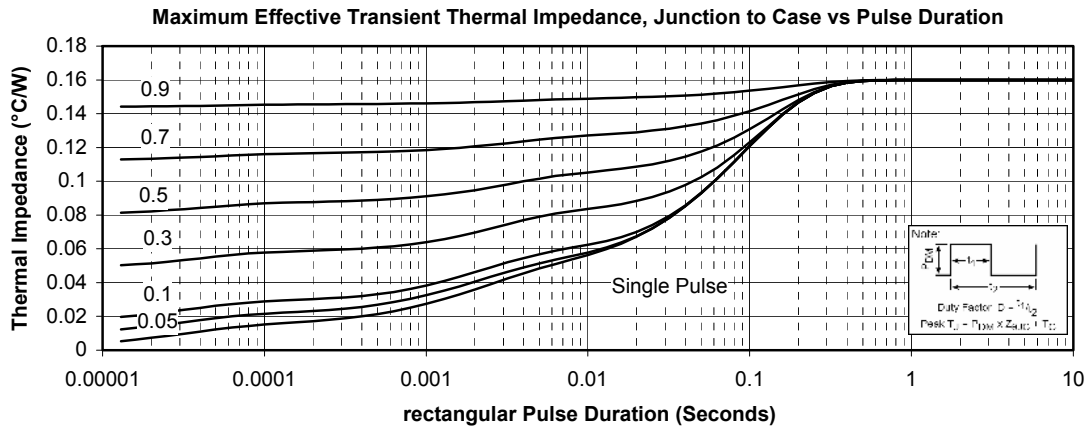
T: Thermistor temperature
 R_T: Thermistor value at T

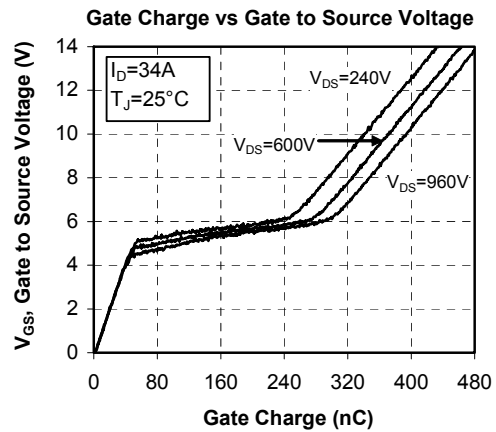
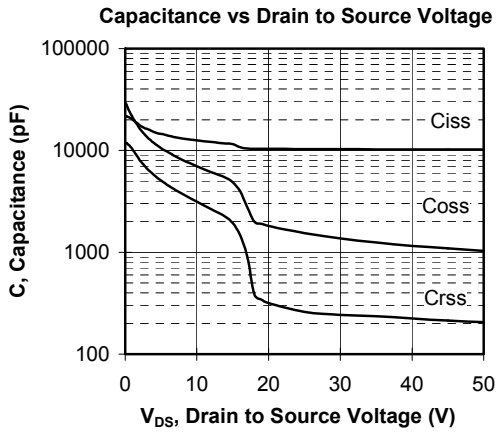
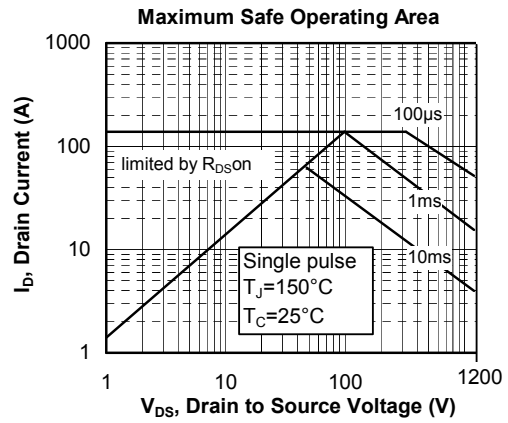
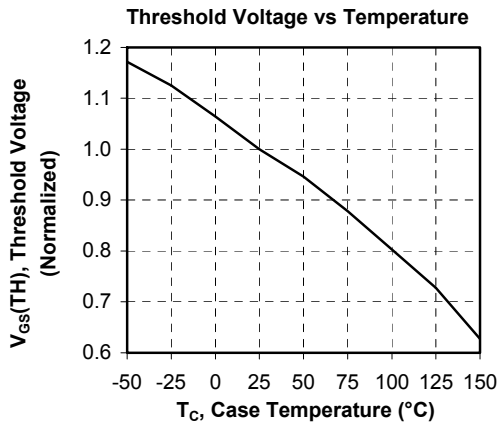
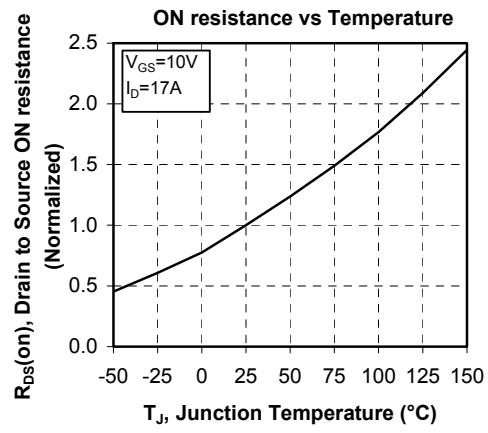
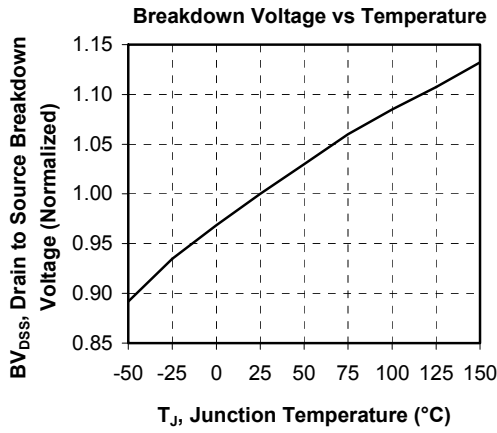
SP4 Package outline (dimensions in mm)

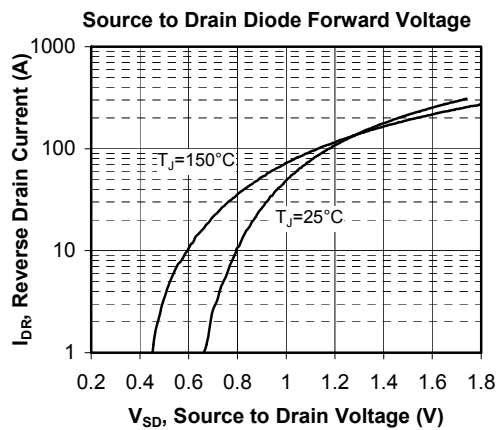
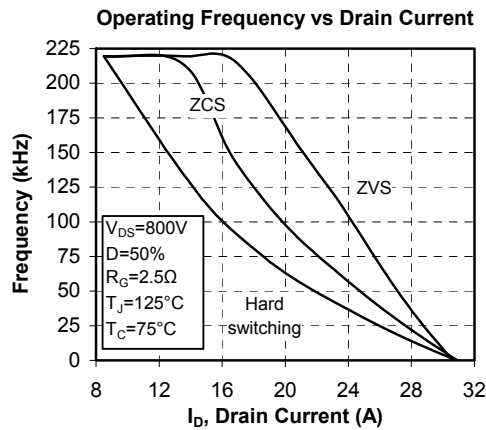
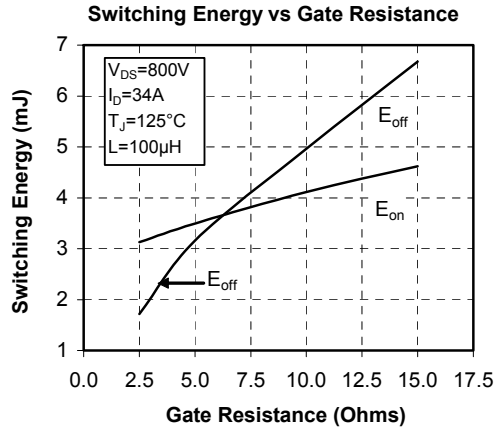
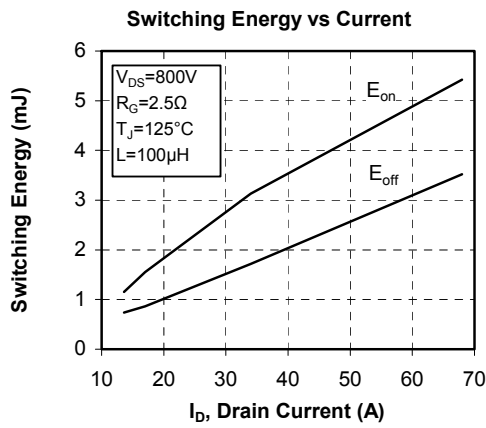
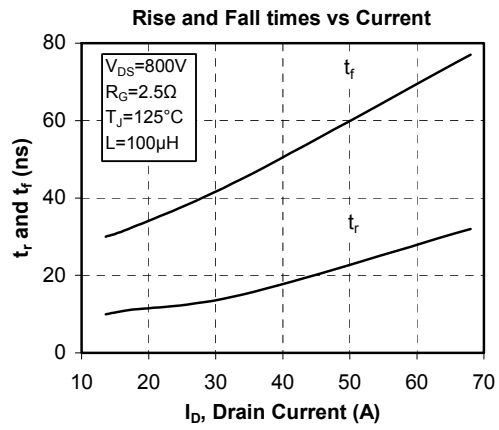
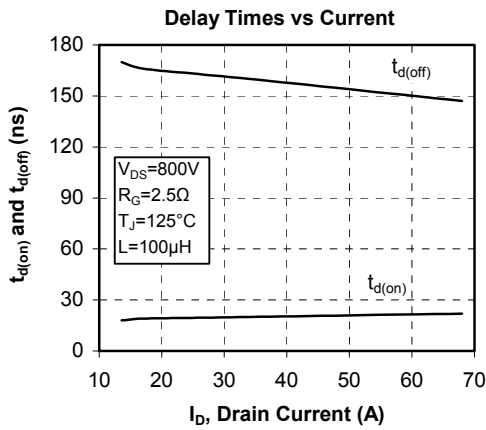


ALL DIMENSIONS MARKED "*" ARE TOLERANCED AS: ± 0.1

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

Typical Performance Curve






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