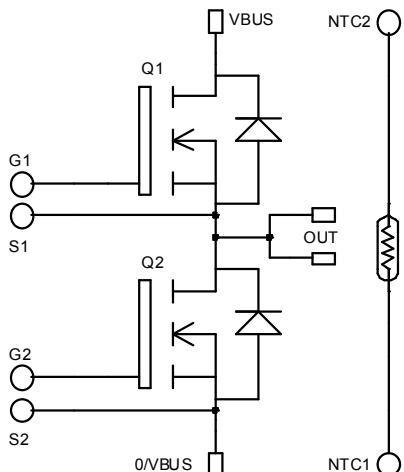


**Phase leg
MOSFET Power Module**

V_{DSS} = 200V
R_{DSon} = 8mΩ typ @ T_j = 25°C
I_D = 208A @ T_c = 25°C



Application

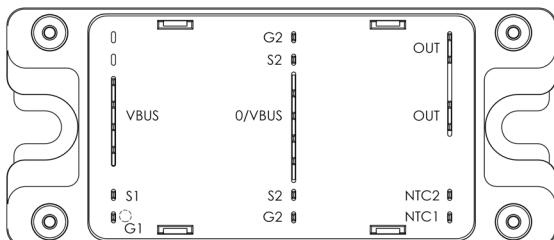
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

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	200	V
I _D	Continuous Drain Current	T _c = 25°C	A
		T _c = 80°C	
I _{DM}	Pulsed Drain current	832	
V _{GS}	Gate - Source Voltage	±30	V
R _{DSon}	Drain - Source ON Resistance	10	mΩ
P _D	Maximum Power Dissipation	T _c = 25°C	W
I _{AR}	Avalanche current (repetitive and non repetitive)	100	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	$V_{GS} = 0\text{V}, V_{DS} = 200\text{V}$	$T_j = 25^\circ\text{C}$			375
		$V_{GS} = 0\text{V}, V_{DS} = 160\text{V}$	$T_j = 125^\circ\text{C}$			1500
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 104\text{A}$		8	10	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 5\text{mA}$	3		5	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30\text{ V}, V_{DS} = 0\text{V}$			± 150	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}$ $V_{DS} = 25\text{V}$ $f = 1\text{MHz}$		14.4		nF
C_{oss}	Output Capacitance			4.66		
C_{rss}	Reverse Transfer Capacitance			0.29		
Q_g	Total gate Charge	$V_{GS} = 10\text{V}$ $V_{Bus} = 100\text{V}$ $I_D = 208\text{A}$		280		nC
Q_{gs}	Gate – Source Charge			106		
Q_{gd}	Gate – Drain Charge			134		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C $V_{GS} = 15\text{V}$ $V_{Bus} = 133\text{V}$ $I_D = 208\text{A}$ $R_G = 2.5\Omega$		32		ns
T_r	Rise Time			64		
$T_{d(off)}$	Turn-off Delay Time			88		
T_f	Fall Time			116		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C $V_{GS} = 15\text{V}, V_{Bus} = 133\text{V}$ $I_D = 208\text{A}, R_G = 2.5\Omega$		1698		μJ
E_{off}	Turn-off Switching Energy			1858		
E_{on}	Turn-on Switching Energy			1872		μJ
E_{off}	Turn-off Switching Energy	Inductive switching @ 125°C $V_{GS} = 15\text{V}, V_{Bus} = 133\text{V}$ $I_D = 208\text{A}, R_G = 2.5\Omega$		1972		

Source - Drain diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
I_S	Continuous Source current (Body diode)		$T_c = 25^\circ\text{C}$		208	A	
			$T_c = 80^\circ\text{C}$		155		
V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = - 208\text{A}$			1.3	V	
dv/dt	Peak Diode Recovery ①				5	V/ns	
t_{rr}	Reverse Recovery Time	$I_S = - 208\text{A}$ $V_R = 133\text{V}$ $di/dt = 200\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		230	ns	
			$T_j = 125^\circ\text{C}$		450		
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$	1.8		μC	
			$T_j = 125^\circ\text{C}$	6.8			

① dv/dt numbers reflect the limitations of the circuit rather than the device itself.

$I_S \leq - 208\text{A}$ $di/dt \leq 700\text{A}/\mu\text{s}$ $V_R \leq V_{DSS}$ $T_j \leq 150^\circ\text{C}$

Thermal and package characteristics

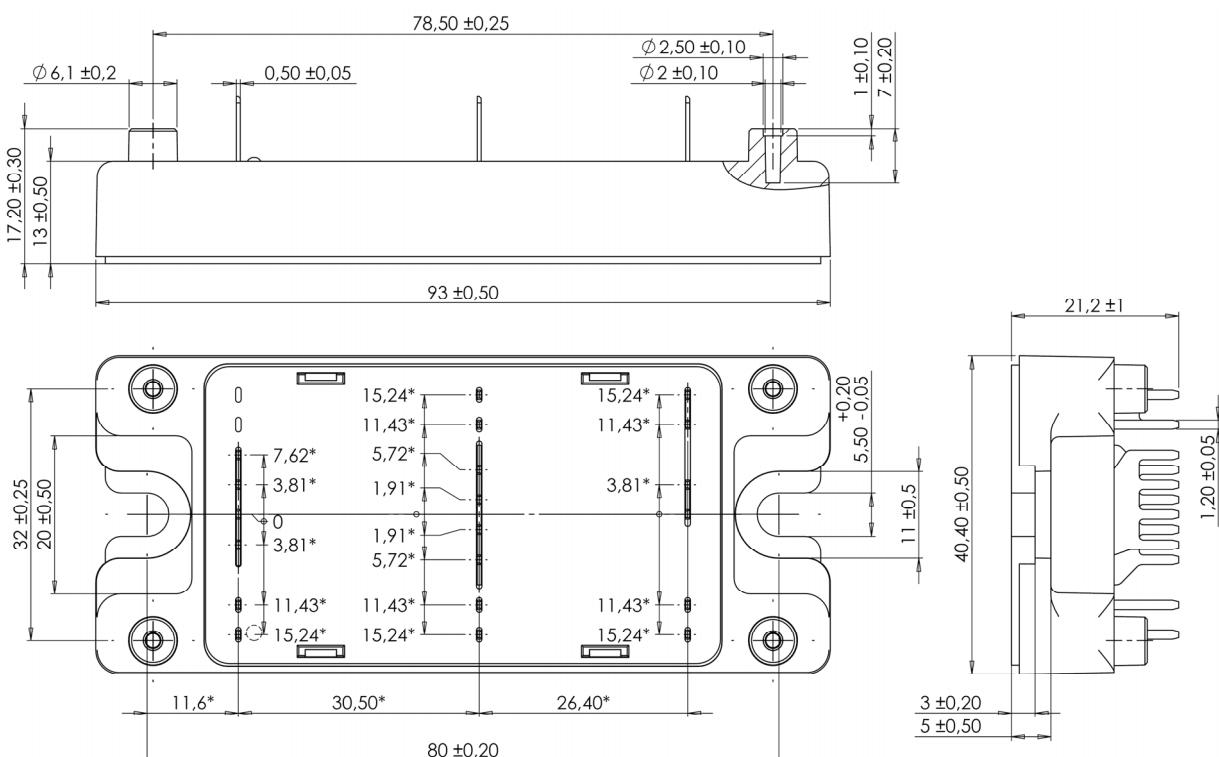
Symbol	Characteristic		Min	Typ	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance			0.16		°C/W
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000				V
T _J	Operating junction temperature range	-40		150		°C
T _{STG}	Storage Temperature Range	-40		125		
T _C	Operating Case 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

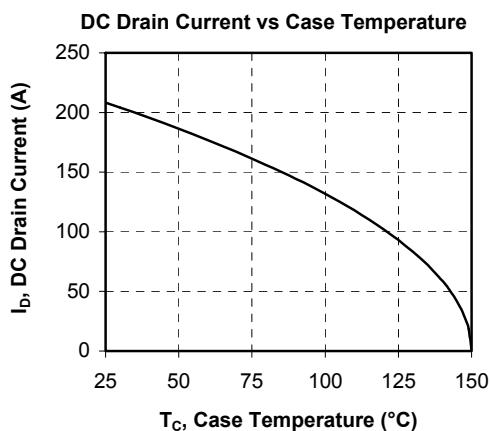
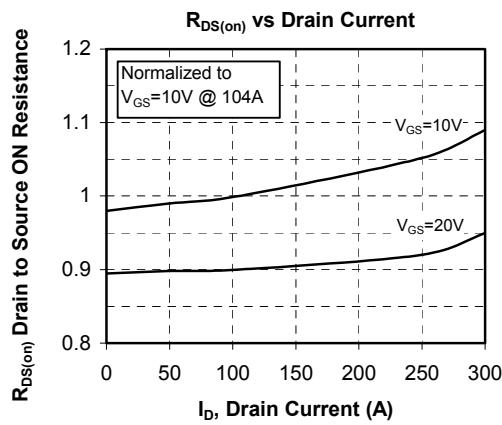
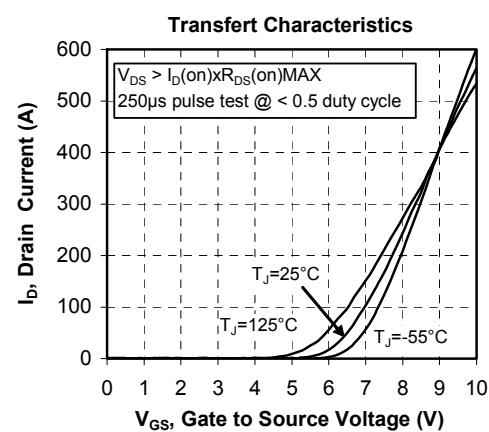
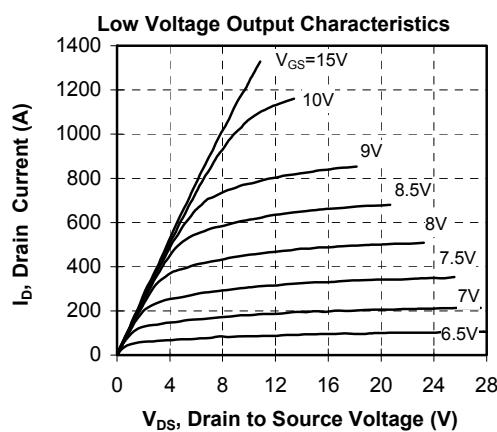
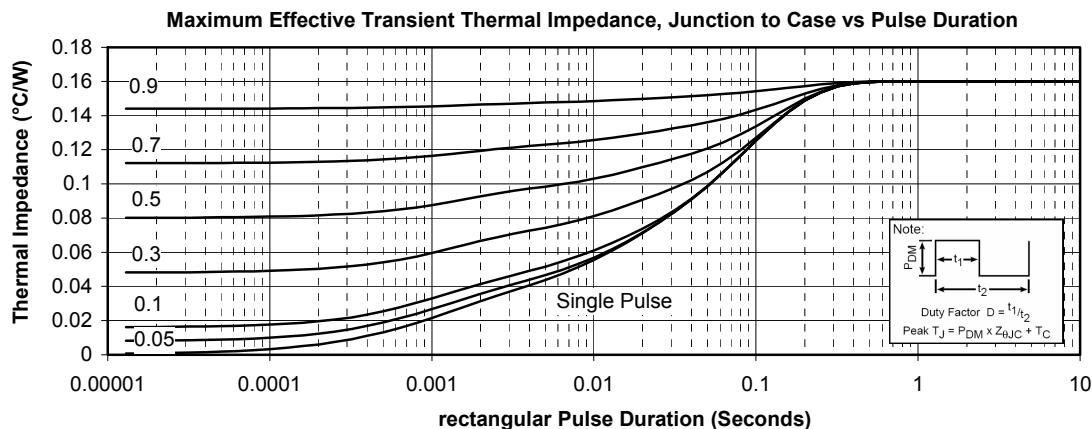
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]} \quad T: \text{ Thermistor temperature}$$

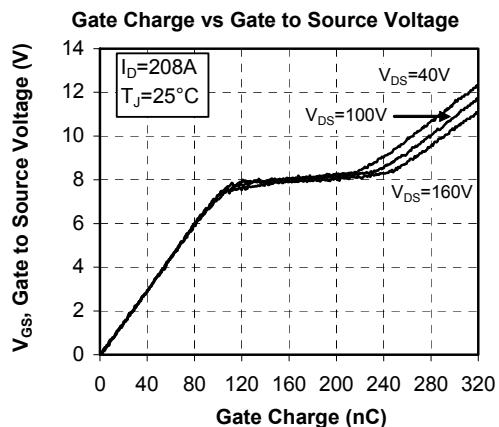
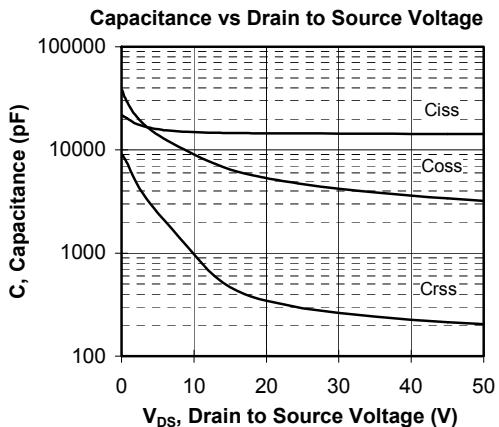
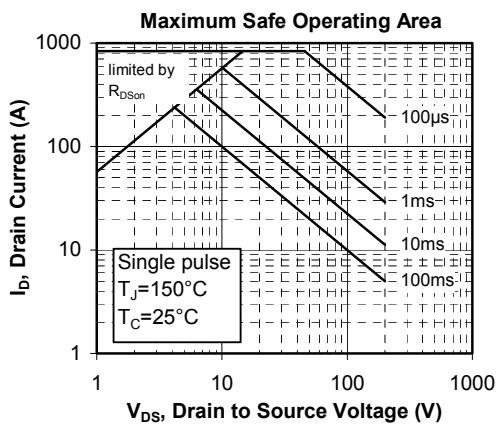
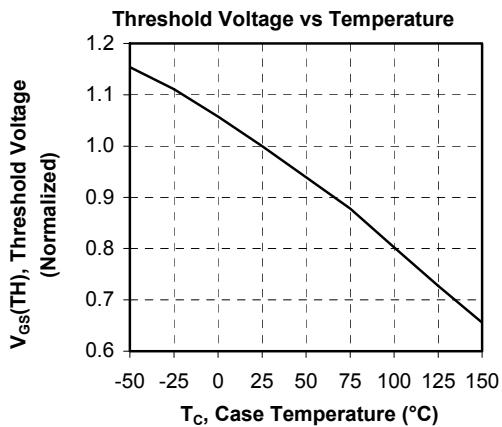
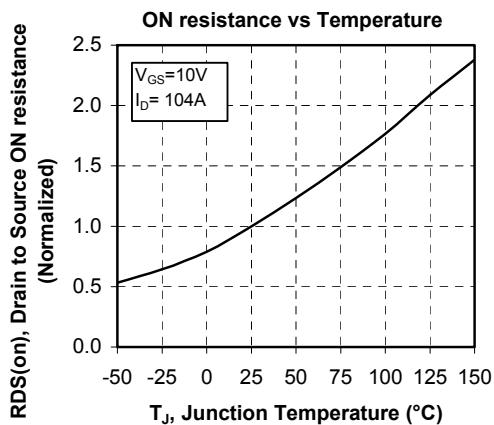
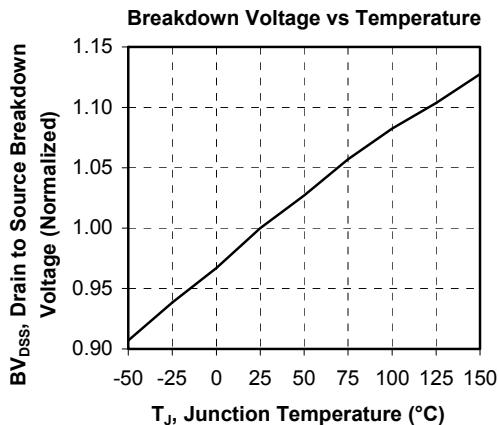
R_T: Thermistor value at T

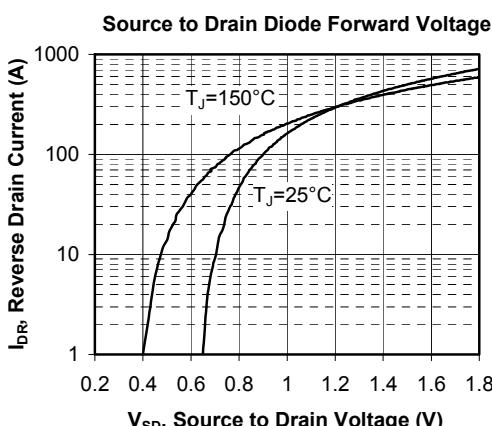
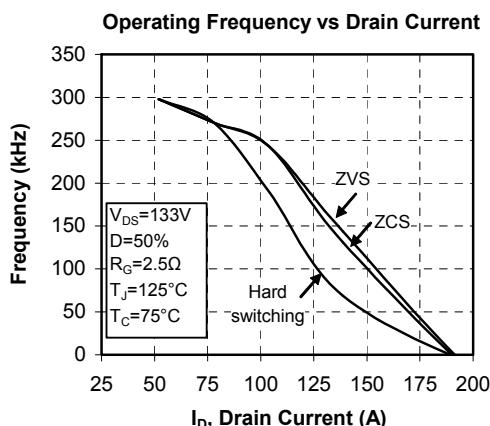
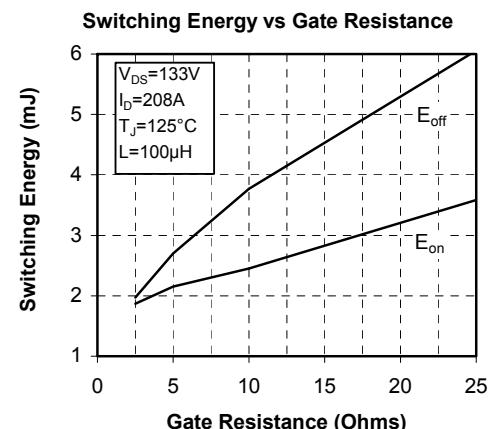
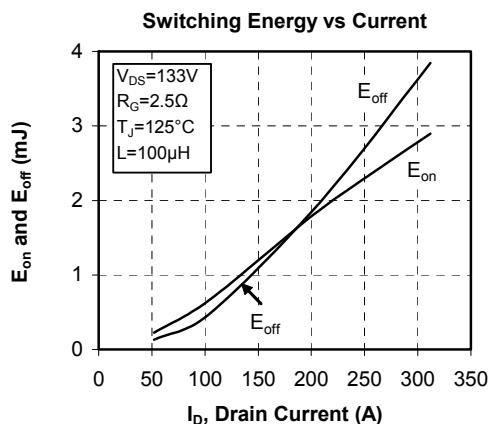
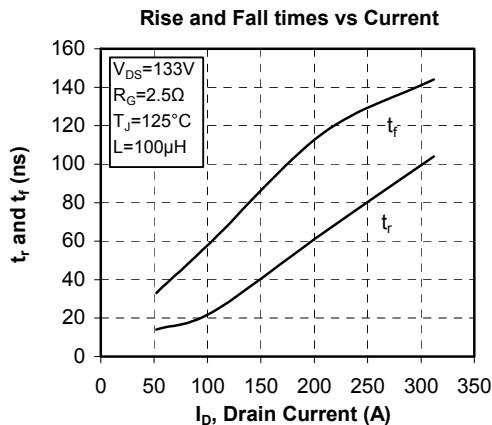
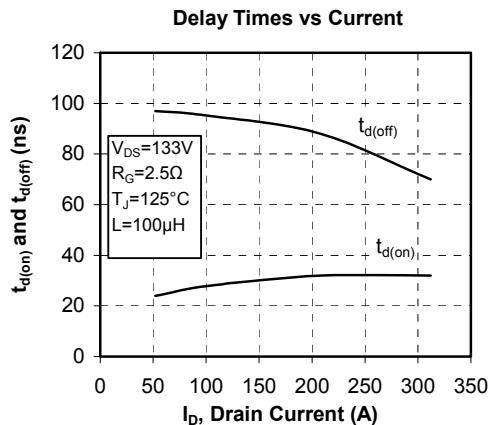
SP4 Package outline (dimensions in mm)

 ALL DIMENSIONS MARKED "!!!" ARE TOLERANCED AS : ± 0.2 [mm]

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

Typical Performance Curve







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