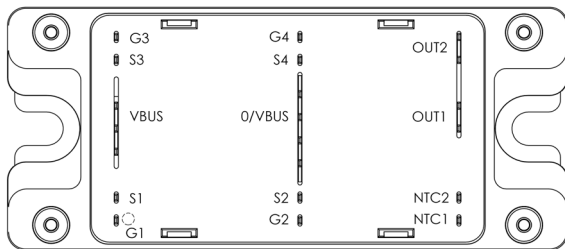
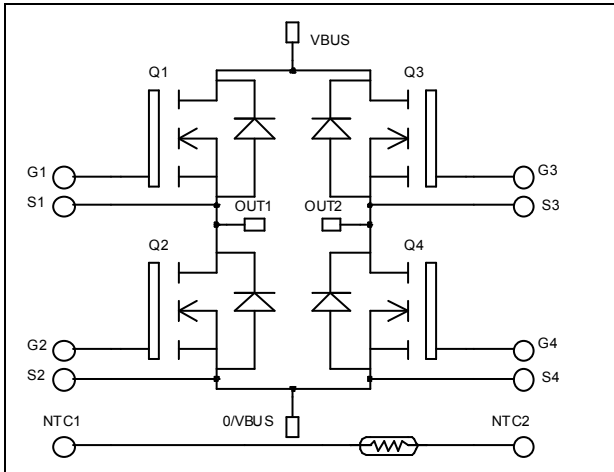


## Full - Bridge MOSFET Power Module

$V_{DSS} = 200V$   
 $R_{DSon} = 20m\Omega \text{ typ @ } T_j = 25^\circ C$   
 $I_D = 89A \text{ @ } T_c = 25^\circ C$



### Application

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

### Features

- Power MOS 7<sup>®</sup> 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
- 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 Voltage	200	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	89
		$T_c = 80^\circ C$	66
$I_{DM}$	Pulsed Drain current	356	A
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	24	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	357
$I_{AR}$	Avalanche current (repetitive and non repetitive)	89	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](http://www.microsemi.com)

All ratings @  $T_j = 25^\circ\text{C}$  unless otherwise specified

**Electrical Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$BV_{DSS}$	Drain - Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	200			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 200V$			250	$\mu A$
		$V_{GS} = 0V, V_{DS} = 160V$			1000	
$R_{DS(on)}$	Drain - Source on Resistance	$V_{GS} = 10V, I_D = 44.5A$		20	24	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	$V_{GS} = \pm 30V, V_{DS} = 0V$			$\pm 100$	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1MHz$		6850		pF
$C_{oss}$	Output Capacitance			2180		
$C_{rss}$	Reverse Transfer Capacitance			97		
$Q_g$	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 100V$ $I_D = 75A$		112		nC
$Q_{gs}$	Gate - Source Charge			43		
$Q_{gd}$	Gate - Drain Charge			47		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive switching @ 125°C</b> $V_{GS} = 15V$ $V_{Bus} = 133V$ $I_D = 75A$ $R_G = 5\Omega$		28		ns
$T_r$	Rise Time			56		
$T_{d(off)}$	Turn-off Delay Time			81		
$T_f$	Fall Time			99		
$E_{off}$	Turn-off Switching Energy	$V_{GS} = 15V$ $V_{Bus} = 133V$	$T_j = 25^\circ\text{C}$		455	$\mu J$
$E_{off}$	Turn-off Switching Energy	$I_D = 75A$ $R_G = 5\Omega$		$T_j = 125^\circ\text{C}$		531

**Source - Drain diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$I_S$	Continuous Source current (Body diode)		$T_c = 25^\circ\text{C}$		89	A
			$T_c = 80^\circ\text{C}$		66	
$V_{SD}$	Diode Forward Voltage	$V_{GS} = 0V, I_S = -75A$			1.3	V
dv/dt	Peak Diode Recovery ①				8	V/ns
$t_{rr}$	Reverse Recovery Time	$I_S = -75A$ $V_R = 133V$	$T_j = 25^\circ\text{C}$		220	ns
			$T_j = 125^\circ\text{C}$		420	
$Q_{rr}$	Reverse Recovery Charge	$di/dt = 100A/\mu s$	$T_j = 25^\circ\text{C}$	1.07		$\mu C$
			$T_j = 125^\circ\text{C}$	2.9		

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

$$I_S \leq -75A \quad di/dt \leq 700A/\mu s \quad V_R \leq V_{DSS} \quad T_j \leq 150^\circ\text{C}$$

## Thermal and package characteristics

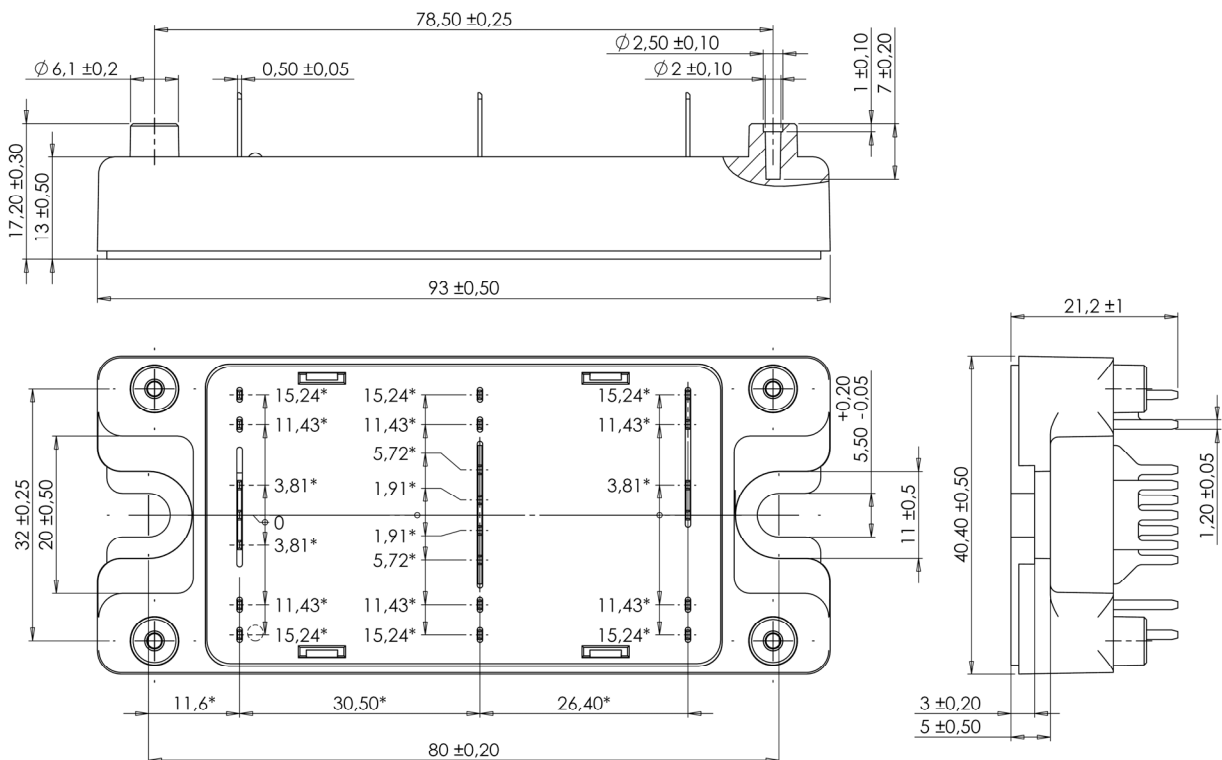
Symbol	Characteristic	Min	Max	Unit		
R <sub>thJC</sub>	Junction to Case Thermal Resistance		0.35	°C/W		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000		V		
T <sub>J</sub>	Operating junction temperature range	-40	150	°C		
T <sub>JOP</sub>	Recommended junction temperature under switching conditions	-40	T <sub>Jmax</sub> -25			
T <sub>STG</sub>	Storage Temperature Range	-40	125			
T <sub>C</sub>	Operating Case Temperature	-40	100			
Torque	Mounting torque	To Heatsink	M5	2.5	4.7	N.m
Wt	Package Weight				160	g

Symbol	Characteristic	Min	Typ	Max	Unit
R <sub>25</sub>	Resistance @ 25°C		50		kΩ
ΔR <sub>25</sub> /R <sub>25</sub>			5		%
B <sub>25/85</sub>	T <sub>25</sub> = 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<sub>T</sub>: Thermistor value at T

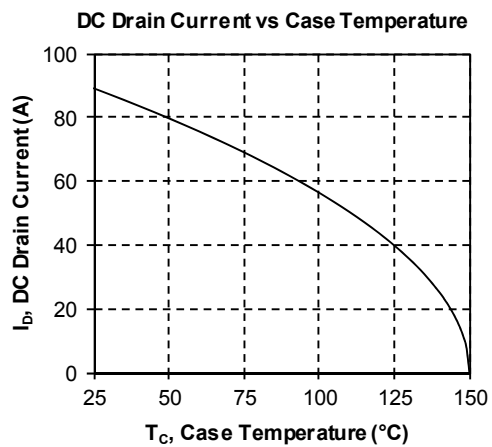
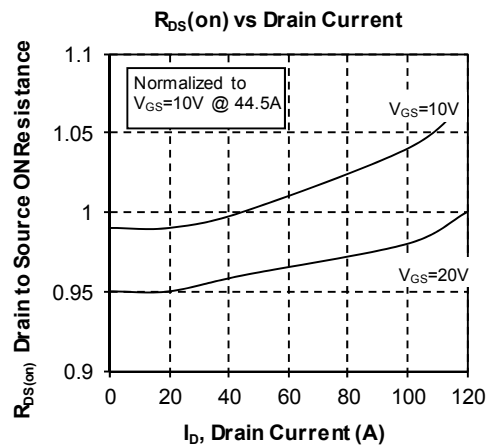
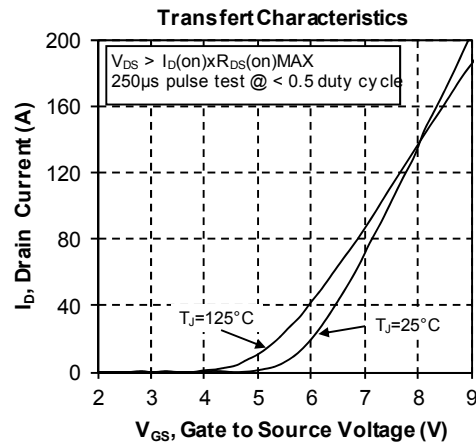
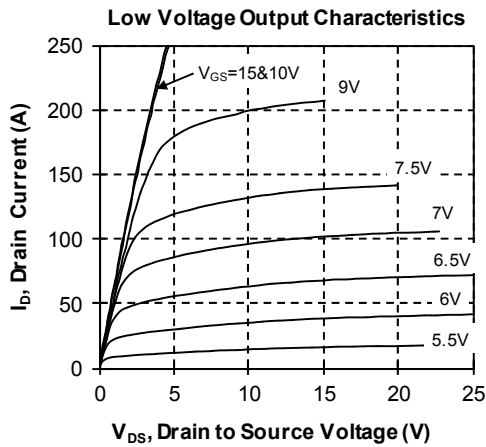
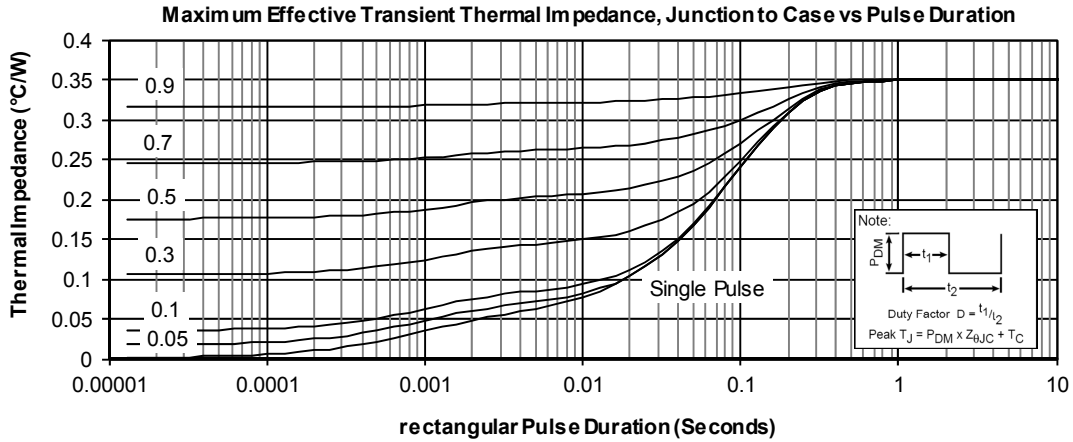
## SP4 Package outline (dimensions in mm)

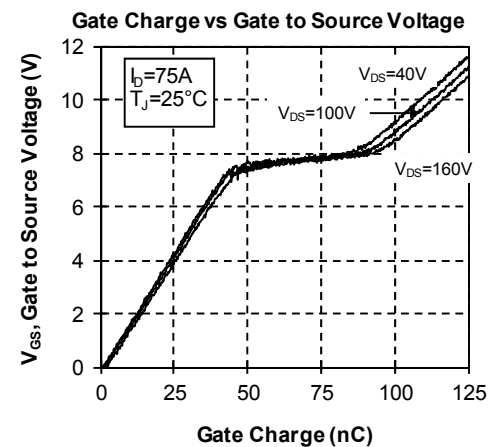
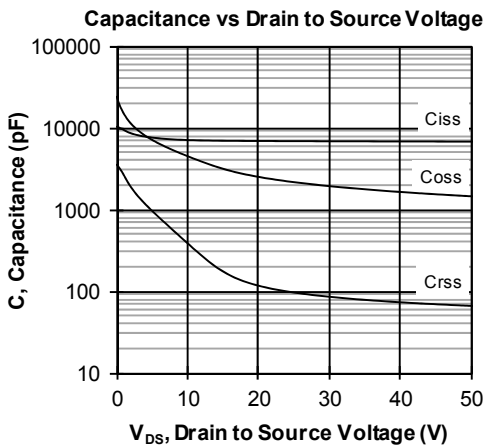
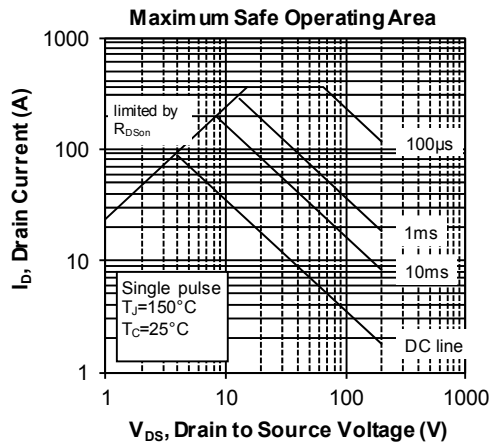
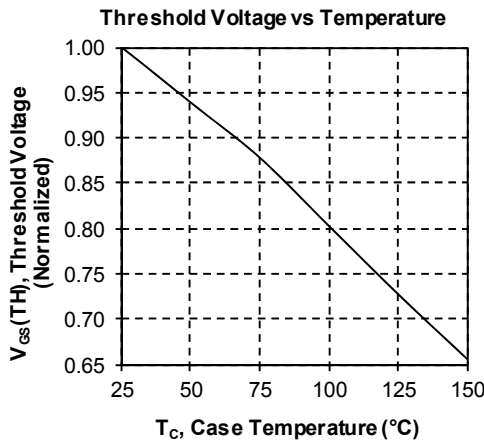
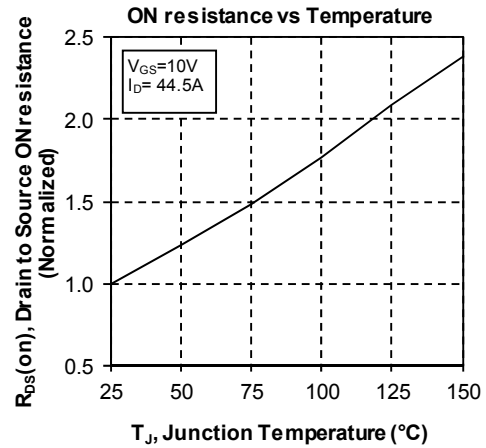
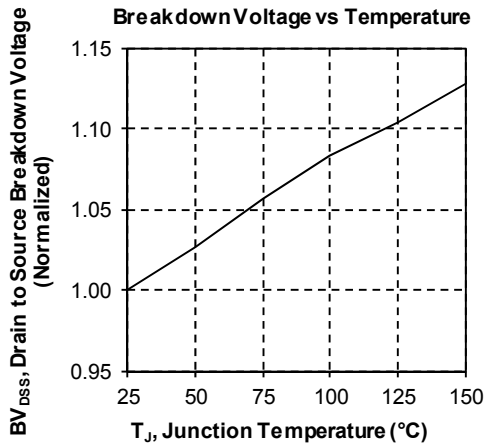


ALL DIMENSIONS MARKED "\*" ARE TOLERANCED AS:  $\pm \phi 1$

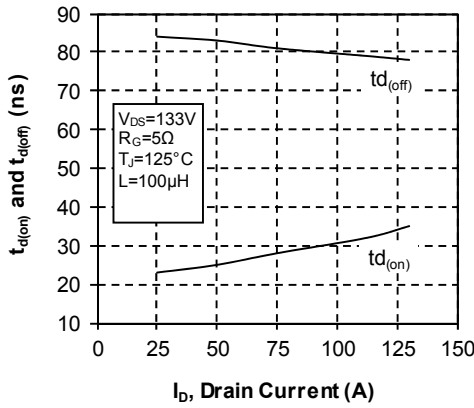
See application note APT0501 - Mounting Instructions for SP4 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve

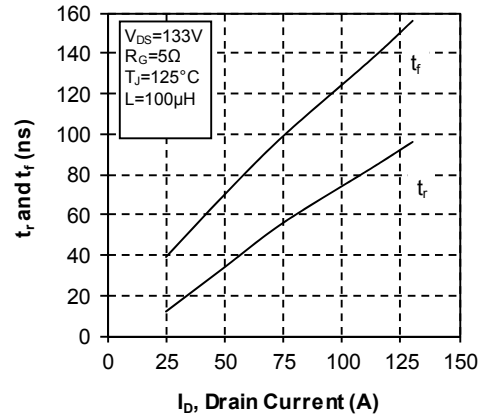




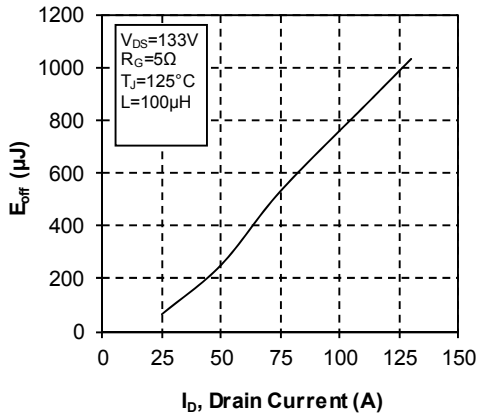
**Delay Times vs Current**



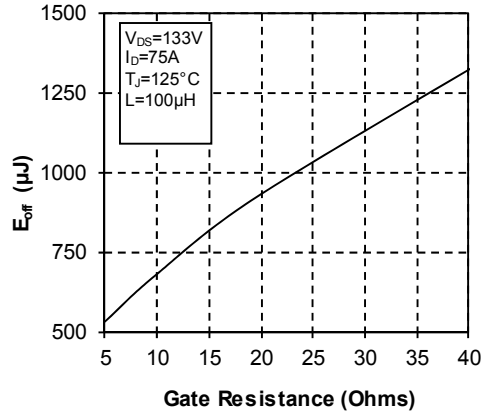
**Rise and Fall times vs Current**



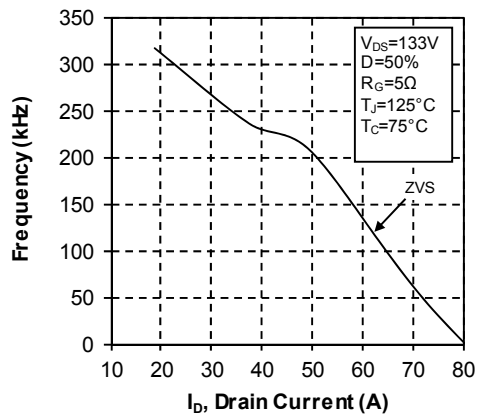
**Switching Energy vs Current**



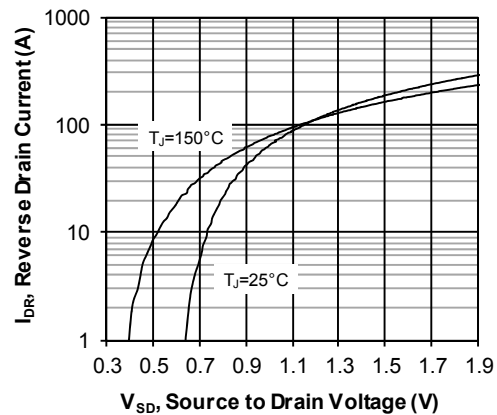
**Switching Energy vs Gate Resistance**



**Operating Frequency vs Drain Current**



**Source to Drain Diode Forward Voltage**



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