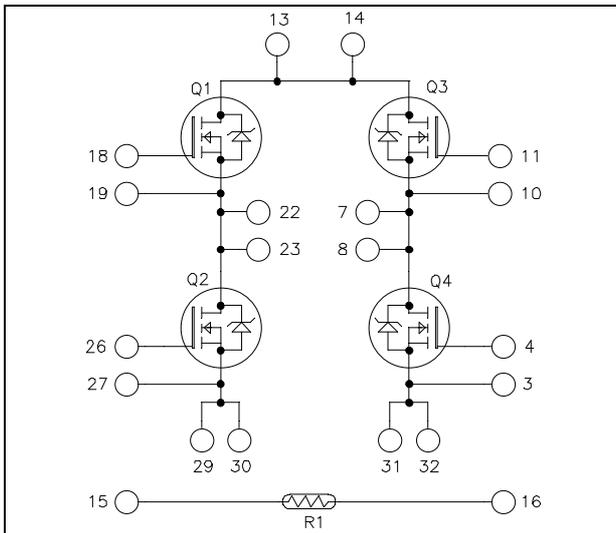


## Full bridge MOSFET Power Module

**$V_{DSS} = 1000V$**   
 **$R_{DSon} = 460m\Omega$  typ @  $T_j = 25^\circ C$**   
 **$I_D = 19A$  @  $T_c = 25^\circ C$**

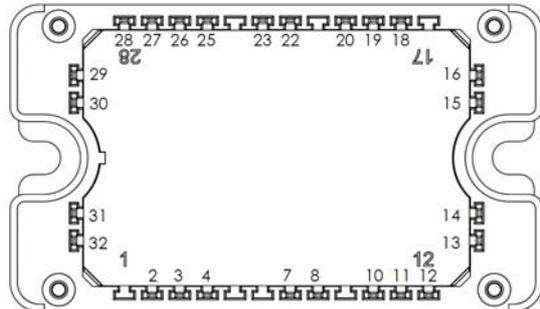


### Application

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

### Features

- **Power MOS 8™ Fast FREDFETs**
  - Low  $R_{DSon}$
  - Low input and Miller capacitance
  - Low gate charge
  - Fast intrinsic reverse diode
  - Avalanche energy rated
  - Very rugged
- Very low stray inductance
- Kelvin source for easy drive
- Internal thermistor for temperature monitoring



### 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
- Each leg can be easily paralleled to achieve a phase leg of twice the current capability
- RoHS Compliant

All multiple inputs and outputs must be shorted together  
 Example: 13/14 ; 29/30 ; 22/23 ...

**All ratings @  $T_j = 25^\circ C$  unless otherwise specified**

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Voltage	1000	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	19
		$T_c = 80^\circ C$	14
$I_{DM}$	Pulsed Drain current	120	A
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	552	$m\Omega$
$P_D$	Power Dissipation	$T_c = 25^\circ C$	357
$I_{AR}$	Avalanche current (repetitive and non repetitive)	16	A

**CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

**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	$V_{DS} = 1000V ; V_{GS} = 0V$			250	$\mu A$
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 16A$		460	552	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 2.5mA$	3	4	5	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30 V$			$\pm 150$	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	$V_{GS} = 0V$		6800		pF
$C_{oss}$	Output Capacitance	$V_{DS} = 25V$		715		
$C_{rss}$	Reverse Transfer Capacitance	$f = 1MHz$		92		
$Q_g$	Total gate Charge	$V_{GS} = 10V$		260		nC
$Q_{gs}$	Gate – Source Charge	$V_{Bus} = 500V$		46		
$Q_{gd}$	Gate – Drain Charge	$I_D = 16A$		125		
$T_{d(on)}$	Turn-on Delay Time	<b>Resistive switching @ 25°C</b> $V_{GS} = 15V$ $V_{Bus} = 667V$ $I_D = 16A$ $R_G = 2.2\Omega$		36		ns
$T_r$	Rise Time			37		
$T_{d(off)}$	Turn-off Delay Time			140		
$T_f$	Fall Time			35		
$R_{thJC}$	Junction to Case Thermal Resistance				0.35	$^{\circ}C/W$

**Source - Drain 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>	
$I_S$	Continuous Source current (Body diode)	$T_c = 25^{\circ}C$			19	A	
		$T_c = 80^{\circ}C$			14		
$V_{SD}$	Diode Forward Voltage	$V_{GS} = 0V, I_S = -16A$			1	V	
$dv/dt$	Peak Diode Recovery ❶				25	V/ns	
$t_{rr}$	Reverse Recovery Time	$I_S = -16A$ $V_R = 100V$ $di/dt = 100A/\mu s$	$T_j = 25^{\circ}C$			290	ns
			$T_j = 125^{\circ}C$			600	
$Q_{rr}$	Reverse Recovery Charge	$I_S = -16A$ $V_R = 100V$ $di/dt = 100A/\mu s$	$T_j = 25^{\circ}C$		1.3	$\mu C$	
			$T_j = 125^{\circ}C$		3.5		

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

$$I_S \leq -16A \quad di/dt \leq 1000A/\mu s \quad V_{DD} \leq 667V \quad T_j \leq 125^{\circ}C$$

## Thermal and package characteristics

Symbol	Characteristic	Min	Max	Unit		
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	125			
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				110	g

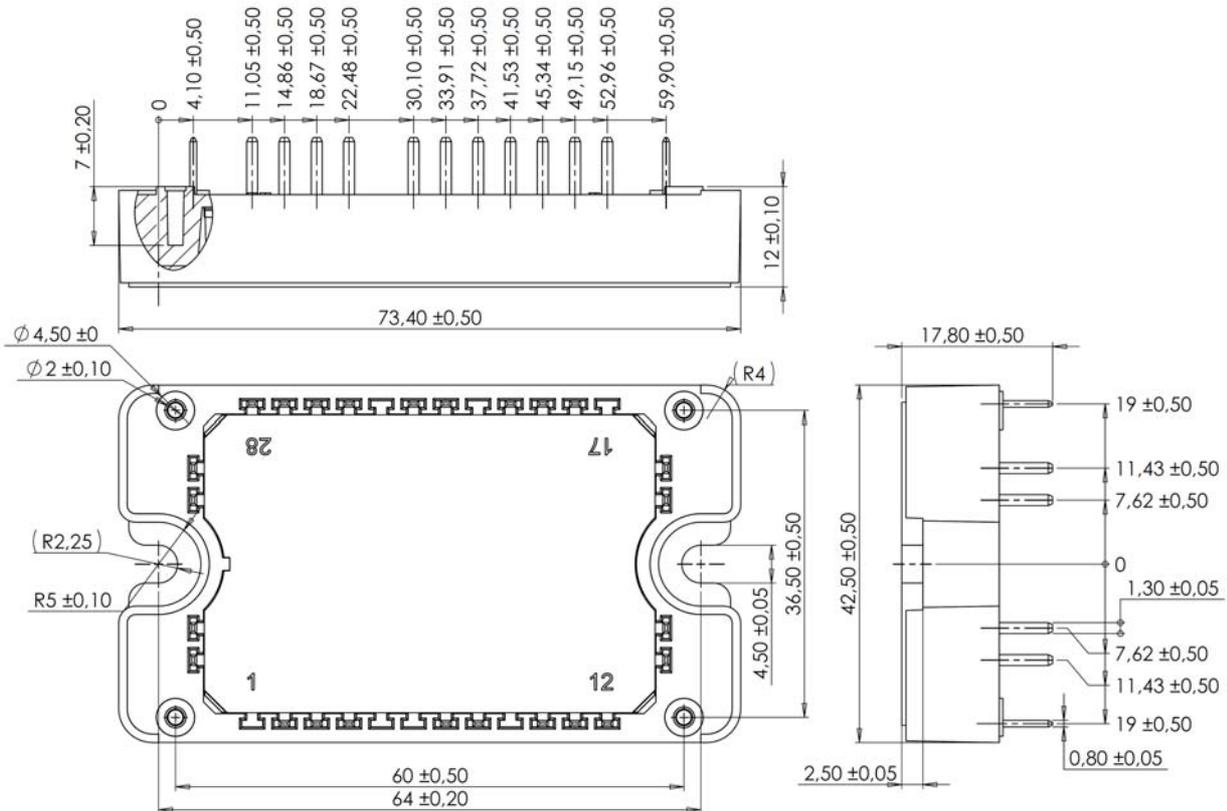
## Temperature sensor NTC (see application note APT0406 on [www.microsemi.com](http://www.microsemi.com) for more information).

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		T <sub>C</sub> =100°C	4		%

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

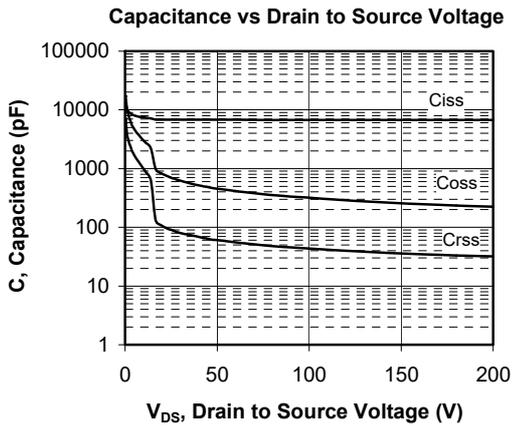
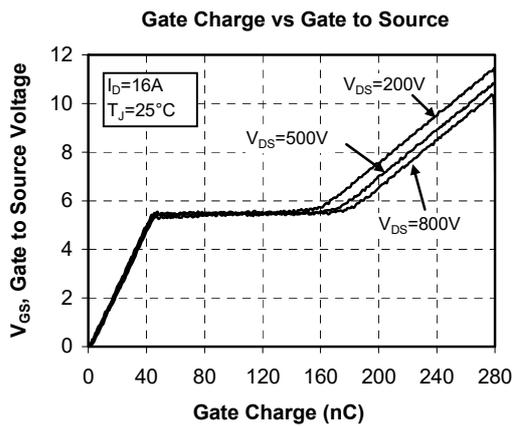
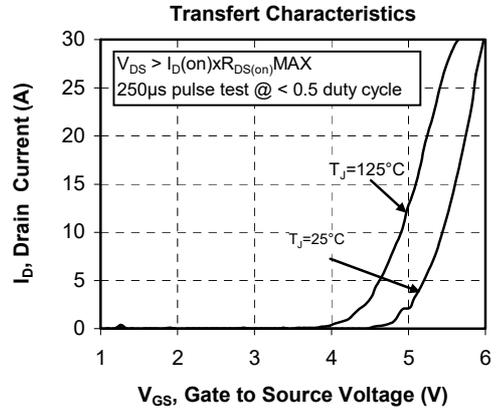
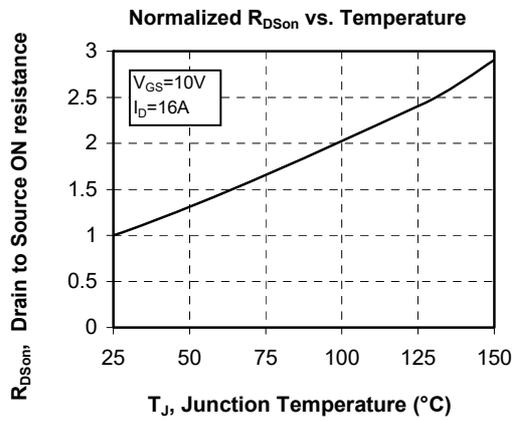
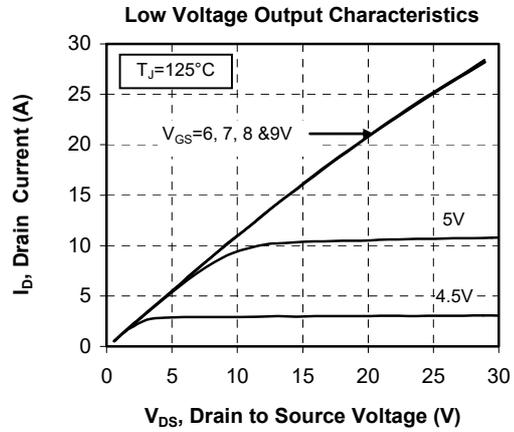
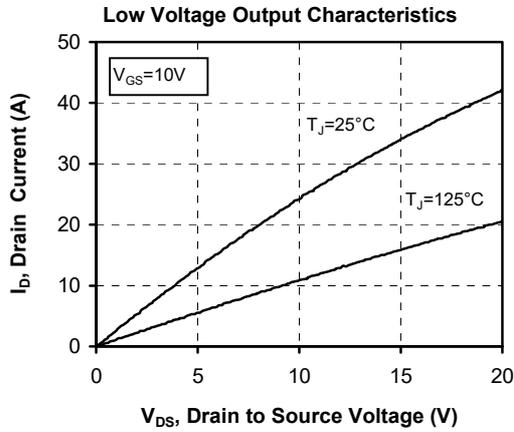
T: Thermistor temperature  
R<sub>T</sub>: Thermistor value at T

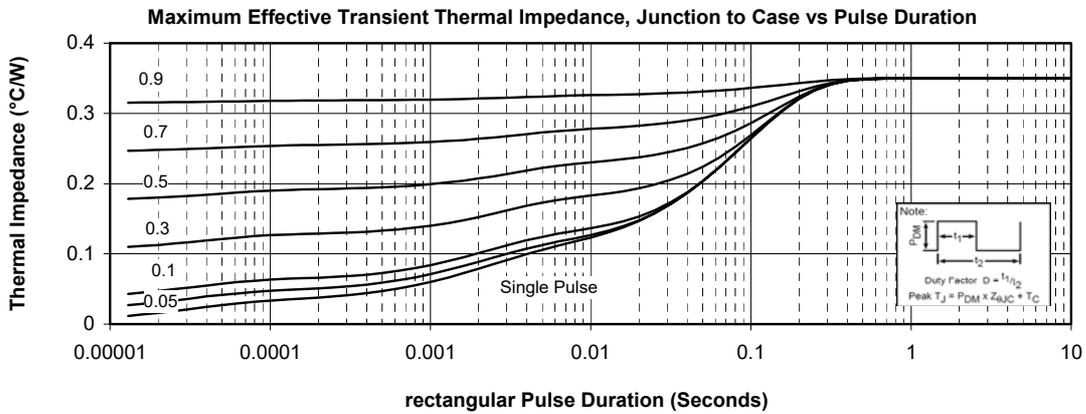
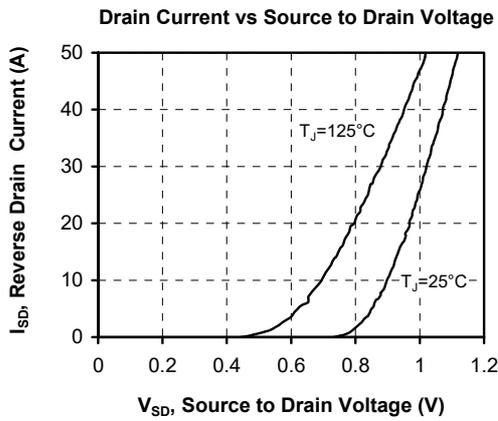
## Package outline (dimensions in mm)



See application note 1906 - Mounting Instructions for SP3F Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve





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