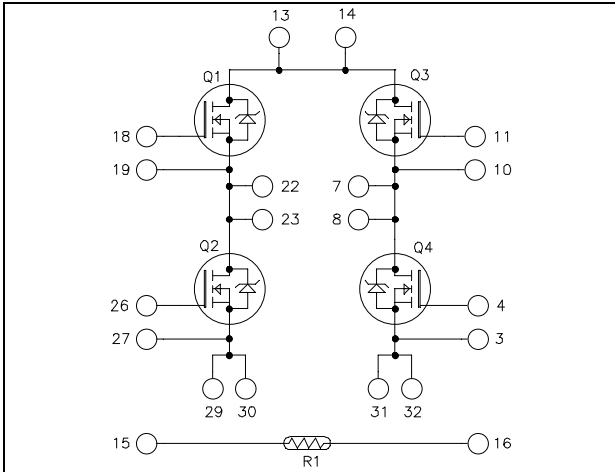


**Full - Bridge  
Super Junction MOSFET  
Power Module**

**$V_{DSS} = 600V$**   
 **$R_{DSon} = 70m\Omega \text{ max @ } T_j = 25^\circ C$**   
 **$I_D = 39A \text{ @ } T_c = 25^\circ C$**



**Application**

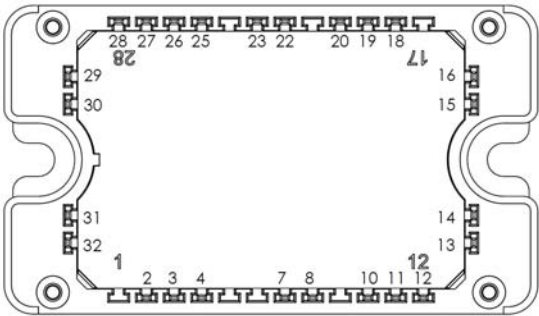
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

**Features**

- **Super junction MOSFET**
  - Ultra low  $R_{DSon}$
  - Low Miller capacitance
  - Ultra low gate charge
  - Avalanche energy rated
  - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
- 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** (per super junction MOSFET)

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Voltage	600	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	39
		$T_c = 80^\circ C$	29
$I_{DM}$	Pulsed Drain current	160	A
$V_{GS}$	Gate - Source Voltage	$\pm 20$	V
$R_{DSon}$	Drain - Source ON Resistance	70	$m\Omega$
$P_D$	Power Dissipation	$T_c = 25^\circ C$	250
$I_{AR}$	Avalanche current (repetitive and non repetitive)	20	A
$E_{AR}$	Repetitive Avalanche Energy	1	mJ
$E_{AS}$	Single Pulse Avalanche Energy	1800	

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

**Electrical Characteristics** (per super junction MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 600V			25	μA
R <sub>DS(on)</sub>	Drain – Source on Resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 39A			70	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 2.7mA	2.1	3	3.9	V
I <sub>GSS</sub>	Gate – Source Leakage Current	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0V			±100	nA

**Dynamic Characteristics** (per super junction MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V		7		nF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> = 25V		2.56		
C <sub>rss</sub>	Reverse Transfer Capacitance	f = 1MHz		0.21		
Q <sub>g</sub>	Total gate Charge	V <sub>GS</sub> = 10V V <sub>Bus</sub> = 300V I <sub>D</sub> = 39A		259		nC
Q <sub>gs</sub>	Gate – Source Charge			29		
Q <sub>gd</sub>	Gate – Drain Charge			111		
T <sub>d(on)</sub>	Turn-on Delay Time	<b>Inductive Switching @ 125°C</b> V <sub>GS</sub> = 15V V <sub>Bus</sub> = 400V I <sub>D</sub> = 39A R <sub>G</sub> = 5Ω		21		ns
T <sub>r</sub>	Rise Time			30		
T <sub>d(off)</sub>	Turn-off Delay Time			283		
T <sub>f</sub>	Fall Time			84		
E <sub>on</sub>	Turn-on Switching Energy	<b>Inductive switching @ 25°C</b> V <sub>GS</sub> = 15V, V <sub>Bus</sub> = 400V I <sub>D</sub> = 39A, R <sub>G</sub> = 5Ω		670		μJ
E <sub>off</sub>	Turn-off Switching Energy			980		
E <sub>on</sub>	Turn-on Switching Energy	<b>Inductive switching @ 125°C</b> V <sub>GS</sub> = 15V, V <sub>Bus</sub> = 400V I <sub>D</sub> = 39A, R <sub>G</sub> = 5Ω		1096		μJ
E <sub>off</sub>	Turn-off Switching Energy			1206		
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.50	°C/W

**Source - Drain diode ratings and characteristics** (per super junction MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I <sub>S</sub>	Continuous Source current (Body diode)	T <sub>c</sub> = 25°C		39		A
		T <sub>c</sub> = 80°C		29		
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = - 39A			1.2	V
dv/dt	Peak Diode Recovery ❶				6	V/ns
t <sub>rr</sub>	Reverse Recovery Time	I <sub>S</sub> = - 39A ; V <sub>R</sub> = 350V		580		ns
Q <sub>rr</sub>	Reverse Recovery Charge	di <sub>S</sub> /dt = 100A/μs		23		μC

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

$$I_S \leq - 39A \quad di/dt \leq 100A/\mu s \quad V_R \leq V_{DSS} \quad T_J \leq 150^\circ C$$

**Thermal and package characteristics**

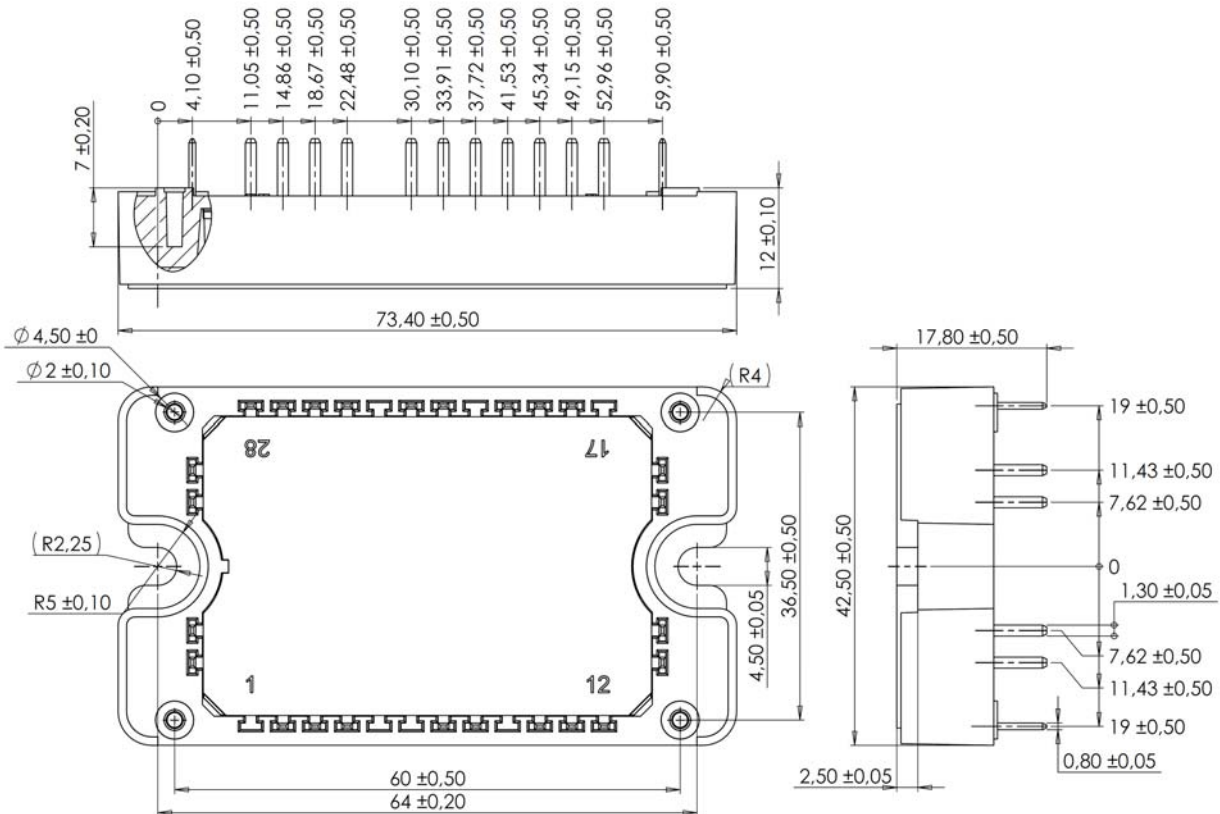
Symbol	Characteristic	Min	Max	Unit		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000		V		
T <sub>J</sub>	Operating junction temperature range	-40	150	°C		
T <sub>JOP</sub>	Recommended junction temperature under switching conditions	-40	T <sub>Jmax</sub> -25			
T <sub>STG</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 for more information).

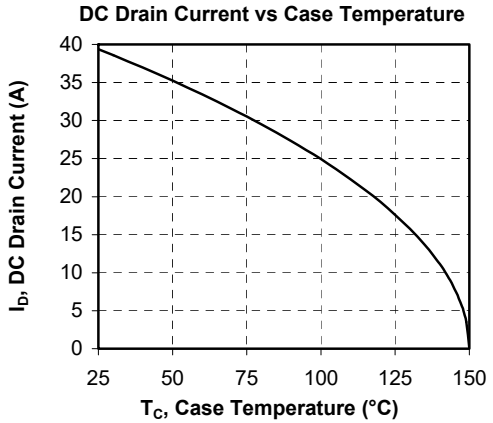
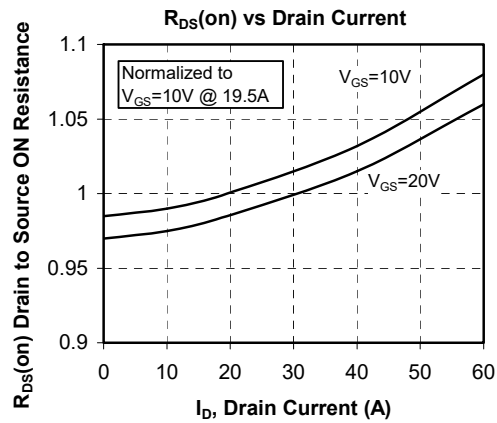
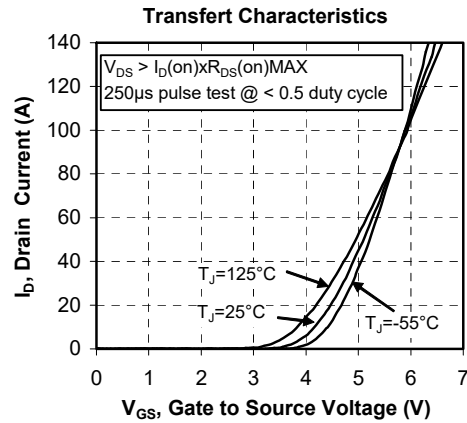
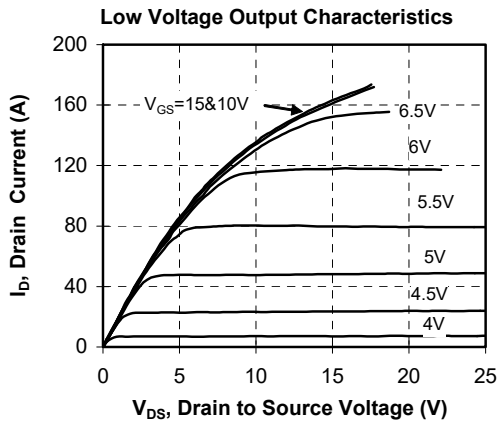
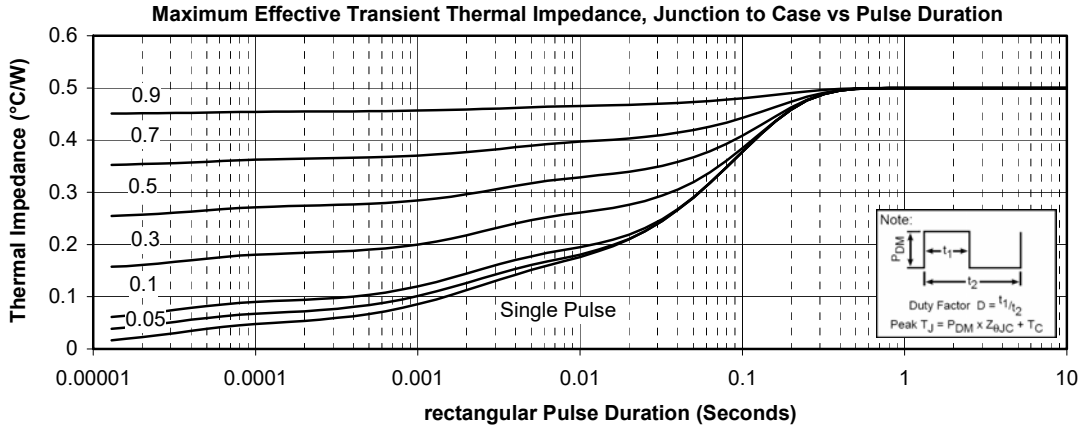
Symbol	Characteristic	Min	Typ	Max	Unit
R <sub>25</sub>	Resistance @ 25°C		50		kΩ
ΔR <sub>25</sub> /R <sub>25</sub>			5		%
B <sub>25/85</sub>	T <sub>25</sub> = 298.15 K		3952		K
ΔB/B			4		%

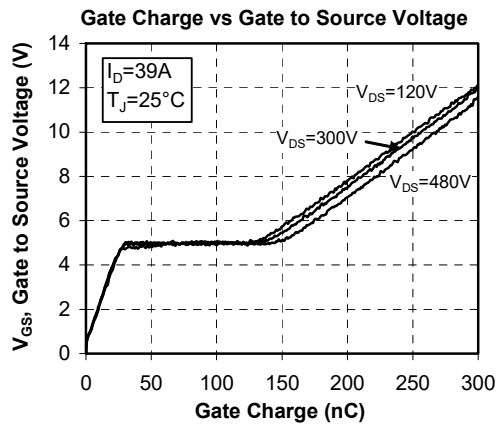
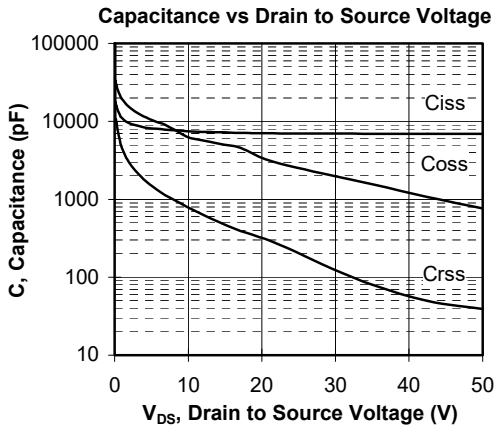
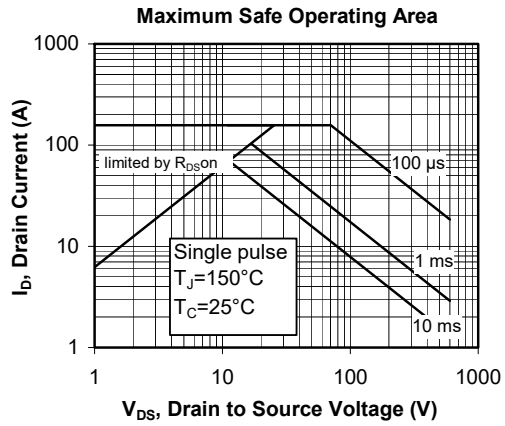
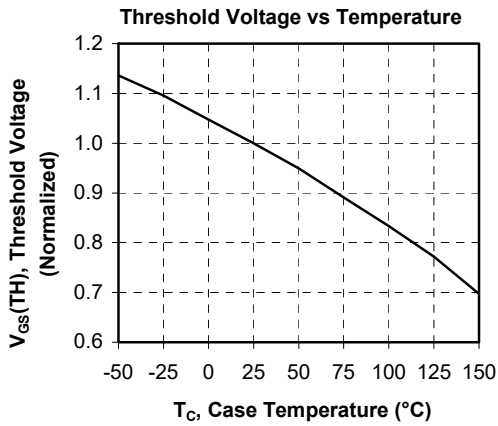
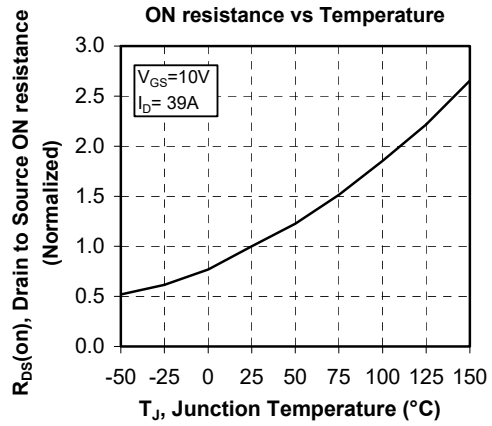
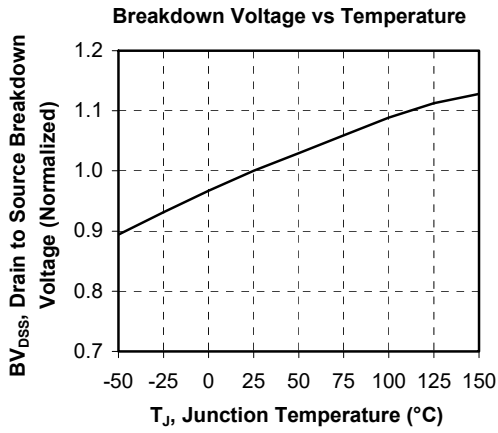
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

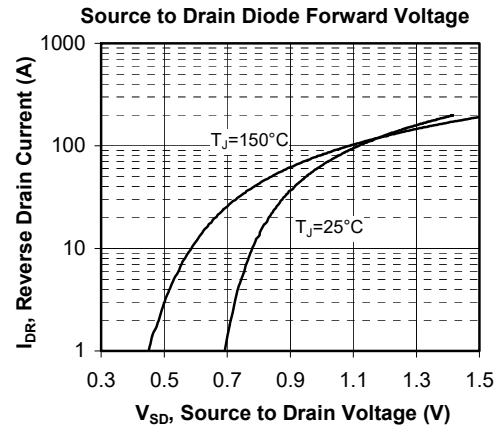
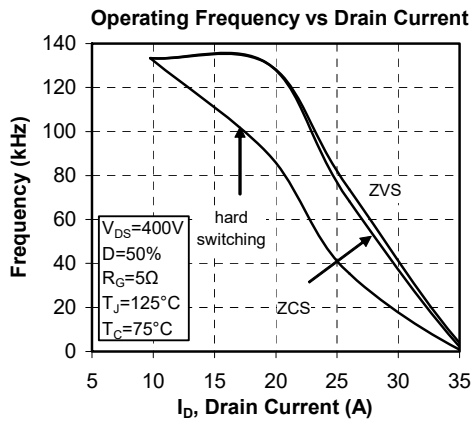
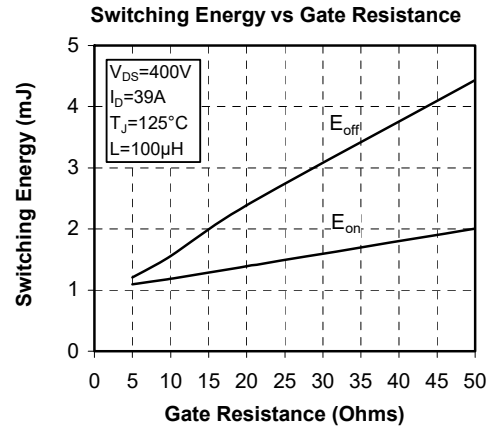
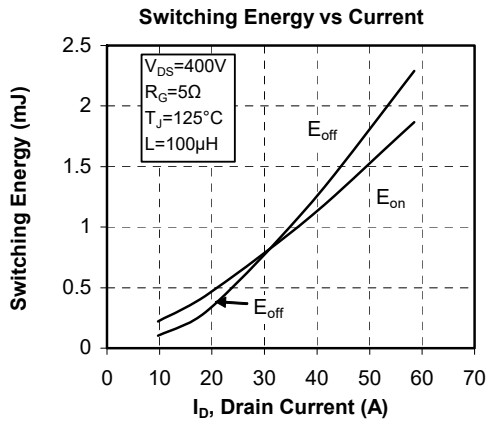
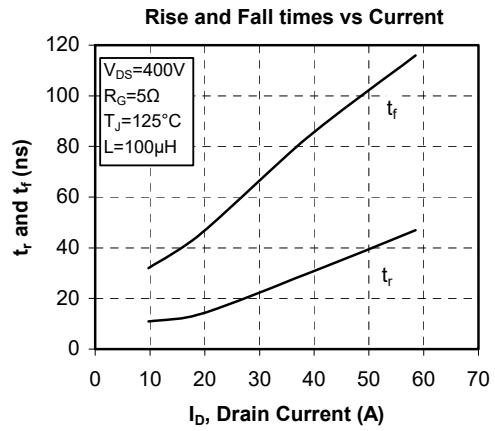
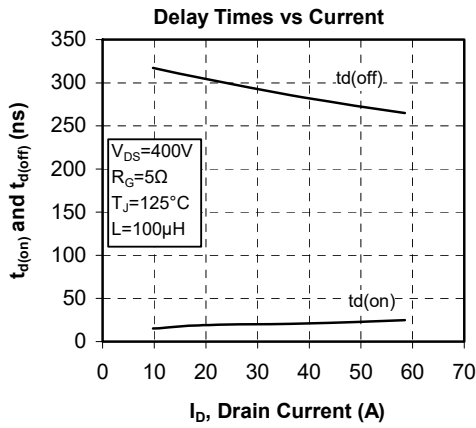
T: Thermistor temperature  
 R<sub>T</sub>: Thermistor value at T

**Package outline** (dimensions in mm)


See application note 1906 - Mounting Instructions for SP3F Power Modules on www.microsemi.com

**Typical Performance Curve**






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