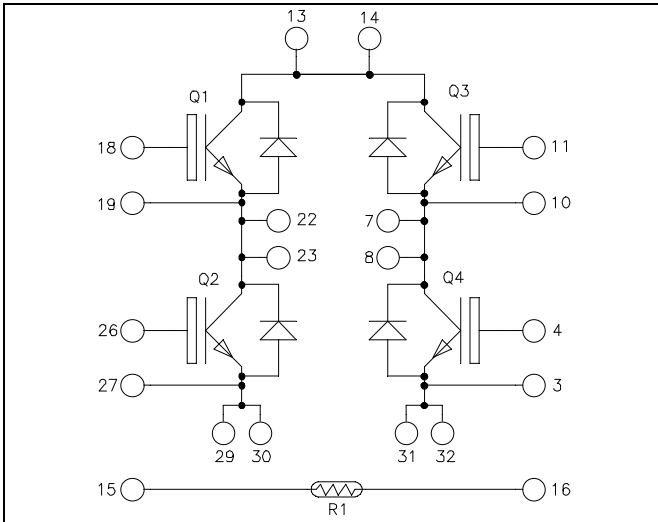


Full - Bridge  
Fast Trench + Field Stop IGBT3  
Power Module

V<sub>CES</sub> = 1200V  
I<sub>C</sub> = 50A @ T<sub>C</sub> = 80°C

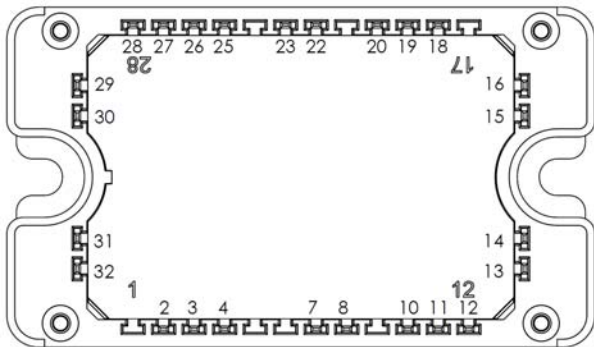


### Application

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

### Features

- **Fast Trench + Field Stop IGBT3**
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 20 kHz
  - Low leakage current
  - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- Low stray inductance
- Internal thermistor for temperature monitoring



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

### 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
- Easy paralleling due to positive T<sub>C</sub> of V<sub>CEsat</sub>
- Each leg can be easily paralleled to achieve a phase leg of twice the current capability
- RoHS Compliant

**All ratings @ T<sub>j</sub> = 25°C unless otherwise specified**

### Absolute maximum ratings (per IGBT)

Symbol	Parameter	Max ratings	Unit
V <sub>CES</sub>	Collector - Emitter Voltage	1200	V
I <sub>C</sub>	Continuous Collector Current	T <sub>C</sub> = 25°C	75
		T <sub>C</sub> = 80°C	50
I <sub>CM</sub>	Pulsed Collector Current	T <sub>C</sub> = 25°C	100
V <sub>GE</sub>	Gate - Emitter Voltage	±20	V
P <sub>D</sub>	Power Dissipation	T <sub>C</sub> = 25°C	270
RBSOA	Reverse Bias Safe Operating Area	T <sub>J</sub> = 125°C	100A @ 1150V

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

## Electrical Characteristics (per IGBT)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I <sub>CES</sub>	Zero Gate Voltage Collector Current	V <sub>GE</sub> = 0V ; V <sub>CE</sub> = 1200V			250	μA
V <sub>CE(sat)</sub>	Collector Emitter saturation Voltage	V <sub>GE</sub> = 15V I <sub>C</sub> = 50A	1.4	1.7	2.1	V
		T <sub>j</sub> = 25°C T <sub>j</sub> = 125°C		2.0		
V <sub>GE(th)</sub>	Gate Threshold Voltage	V <sub>GE</sub> = V <sub>CE</sub> , I <sub>C</sub> = 2mA	5.0	5.8	6.5	V
I <sub>GES</sub>	Gate – Emitter Leakage Current	V <sub>GE</sub> = 20V, V <sub>CE</sub> = 0V			400	nA

## Dynamic Characteristics (per IGBT)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C <sub>ies</sub>	Input Capacitance	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 25V		3600		pF
C <sub>rss</sub>	Reverse Transfer Capacitance	f = 1MHz		160		
T <sub>d(on)</sub>	Turn-on Delay Time	Inductive Switching (25°C) V <sub>GE</sub> = ±15V V <sub>Bus</sub> = 600V I <sub>C</sub> = 50A R <sub>G</sub> = 18Ω		90		ns
T <sub>r</sub>	Rise Time			30		
T <sub>d(off)</sub>	Turn-off Delay Time			420		
T <sub>f</sub>	Fall Time			70		
T <sub>d(on)</sub>	Turn-on Delay Time	Inductive Switching (125°C) V <sub>GE</sub> = ±15V V <sub>Bus</sub> = 600V I <sub>C</sub> = 50A R <sub>G</sub> = 18Ω		90		ns
T <sub>r</sub>	Rise Time			50		
T <sub>d(off)</sub>	Turn-off Delay Time			520		
T <sub>f</sub>	Fall Time			90		
E <sub>on</sub>	Turn-on Switching Energy	V <sub>GE</sub> = ±15V V <sub>Bus</sub> = 600V I <sub>C</sub> = 50A		5		mJ
E <sub>off</sub>	Turn-off Switching Energy	R <sub>G</sub> = 18Ω		5.5		
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.45	°C/W

## Reverse diode ratings and characteristics (per diode)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V <sub>R RM</sub>	Peak Repetitive Reverse Voltage				1200	V
I <sub>RM</sub>	Reverse Leakage Current	V <sub>R</sub> = 1200V			250	μA
I <sub>F</sub>	DC Forward Current	T <sub>c</sub> = 70°C		60		A
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 60A		2	2.5	V
		I <sub>F</sub> = 120A		2.3		
		I <sub>F</sub> = 60A T <sub>j</sub> = 125°C		1.8		
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 60A V <sub>R</sub> = 800V di/dt = 200A/μs	T <sub>j</sub> = 25°C	400		ns
			T <sub>j</sub> = 125°C	470		
Q <sub>rr</sub>	Reverse Recovery Charge		T <sub>j</sub> = 25°C	1200		nC
			T <sub>j</sub> = 125°C	4000		
E <sub>r</sub>	Reverse Recovery Energy	I <sub>F</sub> = 60A V <sub>R</sub> = 800V di/dt = 1000A/μs		2.2		mJ
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.9	°C/W

**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		%

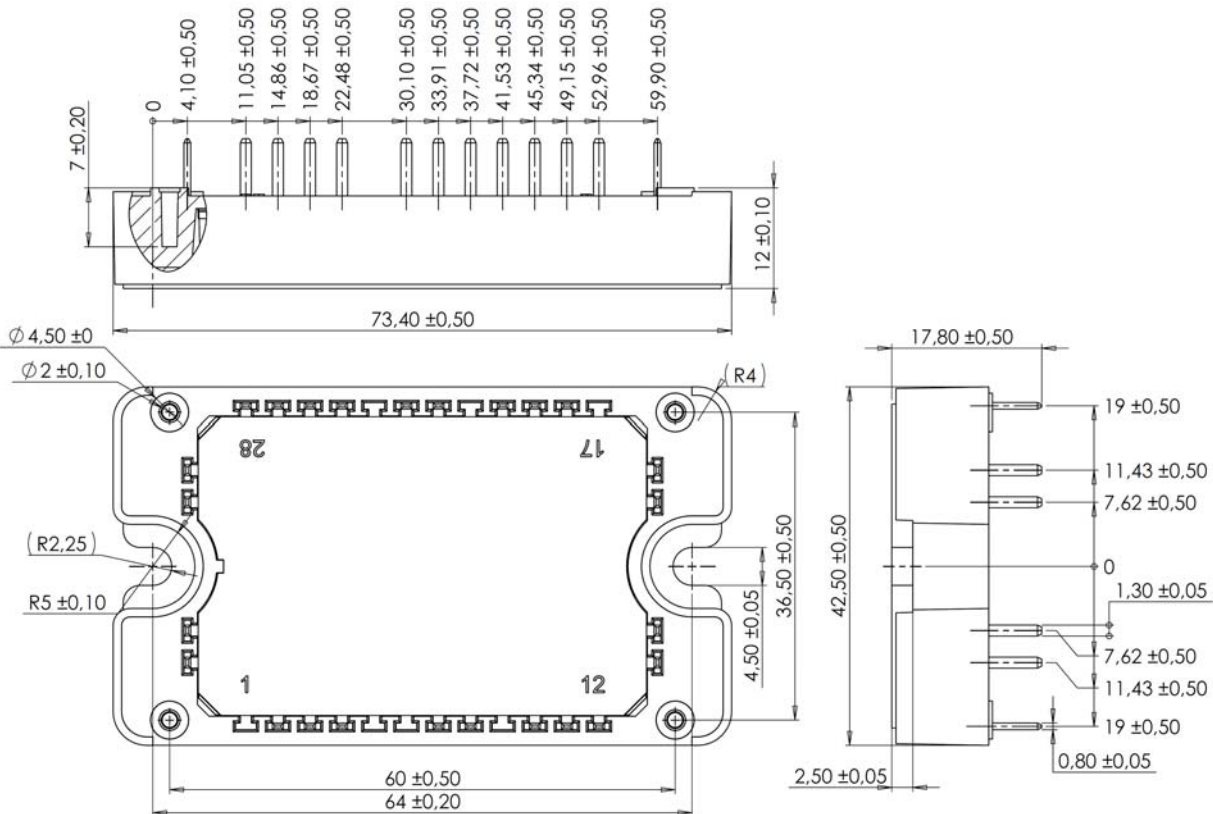
$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

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

### Thermal and package characteristics

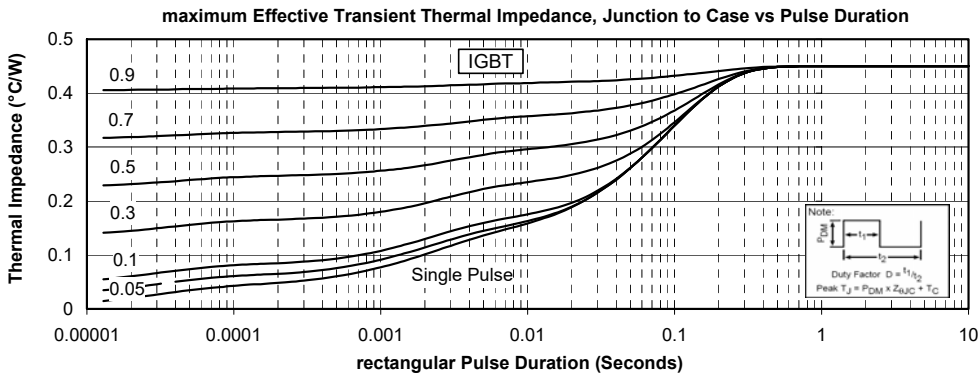
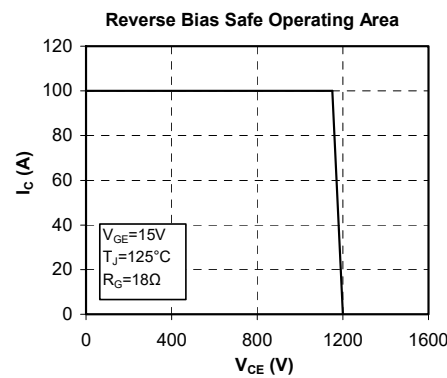
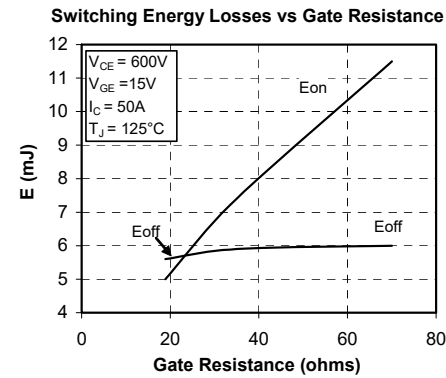
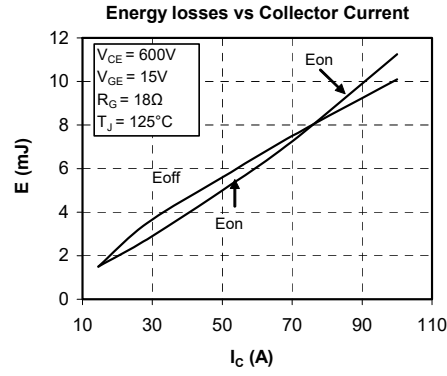
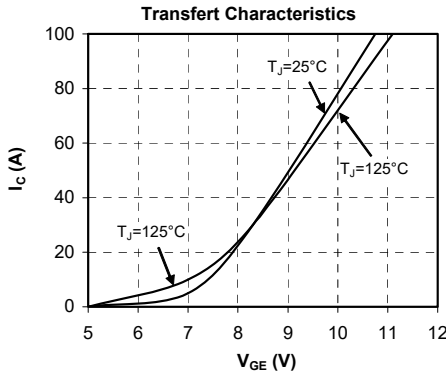
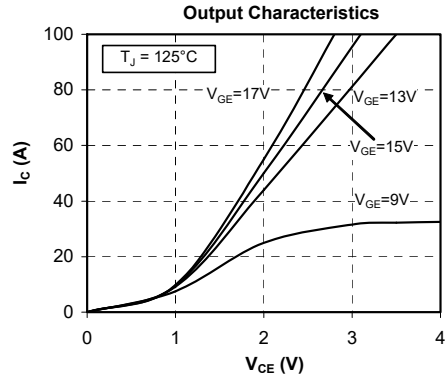
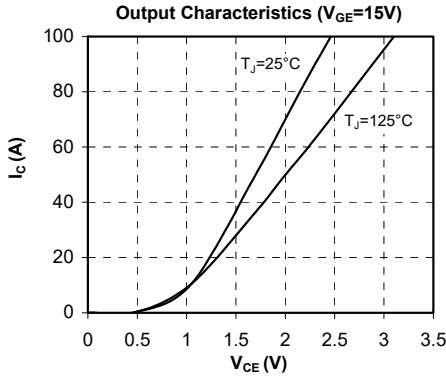
Symbol	Characteristic	Min	Max	Unit		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000		V		
T <sub>J</sub>	Operating junction temperature range	-40	150	°C		
T <sub>JOP</sub>	Recommended junction temperature under switching conditions	-40	T <sub>Jmax</sub> - 25			
T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

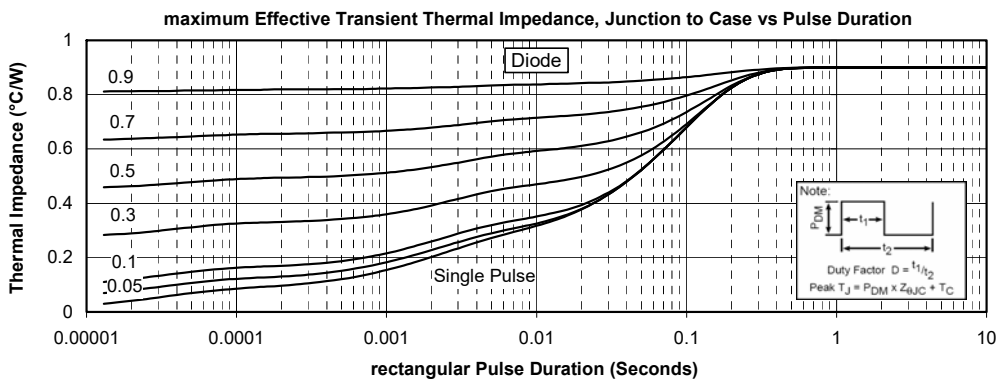
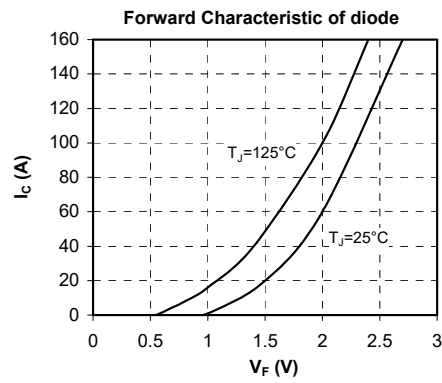
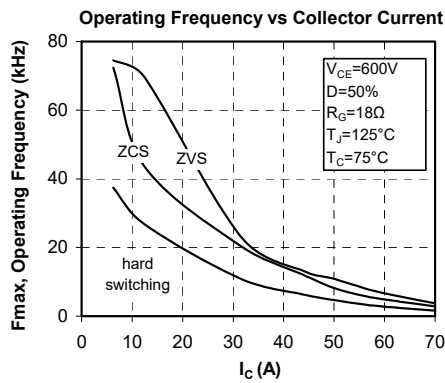
### Package outline (dimensions in mm)



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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**Телефон:** +7 812 627 14 35

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