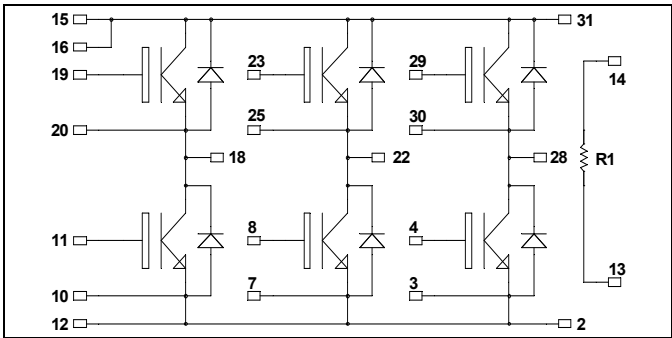
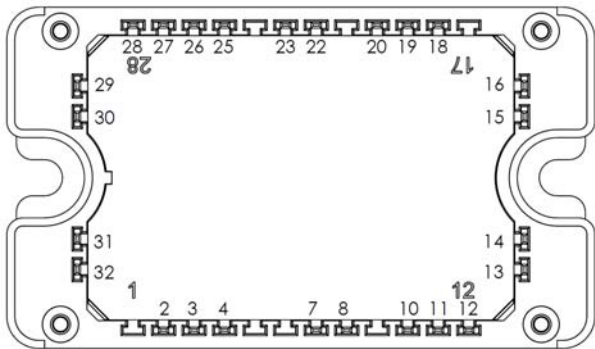


**3 Phase bridge  
Trench + Field Stop IGBT4  
Power Module**

**$V_{CES} = 1200V$   
 $I_C = 40A @ T_c = 80^\circ C$**



It is recommended to connect a decoupling capacitor between pins 31 & 2 to reduce switching overvoltages, if DC Power is connected between pins 15, 16 & 12. Pins 15 & 16 must be shorted together.



**Application**

- Motor control

**Features**

- **Trench + Field Stop IGBT 4**
  - Low voltage drop
  - Low leakage current
  - Low switching losses
  - Low tail current
  - RBSOA and SCSOA rated
- Kelvin emitter 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
- RoHS compliant

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

**Absolute maximum ratings (per IGBT)**

Symbol	Parameter	Max ratings	Unit
$V_{CES}$	Collector - Emitter Voltage	1200	V
$I_C$	Continuous Collector Current	$T_C = 25^\circ C$	65
		$T_C = 80^\circ C$	40
$I_{CM}$	Pulsed Collector Current	$T_C = 25^\circ C$	70
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Power Dissipation	$T_C = 25^\circ C$	220
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	70A @ 1100V

**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> = 35A		1.85 2.25	2.25	V
V <sub>GE(th)</sub>	Gate Threshold Voltage	V <sub>GE</sub> = V <sub>CE</sub> , I <sub>C</sub> = 1.2mA	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		1950		pF
C <sub>oes</sub>	Output Capacitance	V <sub>CE</sub> = 25V		155		
C <sub>res</sub>	Reverse Transfer Capacitance	f = 1MHz		115		
Q <sub>G</sub>	Gate charge	V <sub>GE</sub> = ±15V ; V <sub>CE</sub> = 600V I <sub>C</sub> = 35A		0.27		μC
T <sub>d(on)</sub>	Turn-on Delay Time	Inductive Switching (25°C) V <sub>GE</sub> = ±15V V <sub>CE</sub> = 600V I <sub>C</sub> = 35A R <sub>G</sub> = 12Ω		130		ns
T <sub>r</sub>	Rise Time			20		
T <sub>d(off)</sub>	Turn-off Delay Time			300		
T <sub>f</sub>	Fall Time			45		
T <sub>d(on)</sub>	Turn-on Delay Time	Inductive Switching (150°C) V <sub>GE</sub> = ±15V V <sub>CE</sub> = 600V I <sub>C</sub> = 35A R <sub>G</sub> = 12Ω		150		ns
T <sub>r</sub>	Rise Time			35		
T <sub>d(off)</sub>	Turn-off Delay Time			350		
T <sub>f</sub>	Fall Time			80		
E <sub>on</sub>	Turn-on Switching Energy	V <sub>GE</sub> = ±15V V <sub>CE</sub> = 600V		2.6 4		mJ
E <sub>off</sub>	Turn-off Switching Energy	I <sub>C</sub> = 35A R <sub>G</sub> = 12Ω		2 3		
I <sub>sc</sub>	Short Circuit data	V <sub>GE</sub> ≤ 15V ; V <sub>Bus</sub> = 900V t <sub>p</sub> ≤ 10μs ; T <sub>j</sub> = 150°C		140		A
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.68	°C/W

**Reverse diode ratings and characteristics** (per diode)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V <sub>RRM</sub>	Peak Repetitive Reverse Voltage				1200	V
I <sub>RM</sub>	Reverse Leakage Current	V <sub>R</sub> = 1200V			100	μA
I <sub>F</sub>	DC Forward Current	T <sub>c</sub> = 80°C		30		A
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 30A I <sub>F</sub> = 60A I <sub>F</sub> = 30A		2.6 3.2 1.8	3.1	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 30A V <sub>R</sub> = 800V		300 380		ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt = 200A/μs		360 1700		
R <sub>thJC</sub>	Junction to Case Thermal Resistance				1.2	°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		%

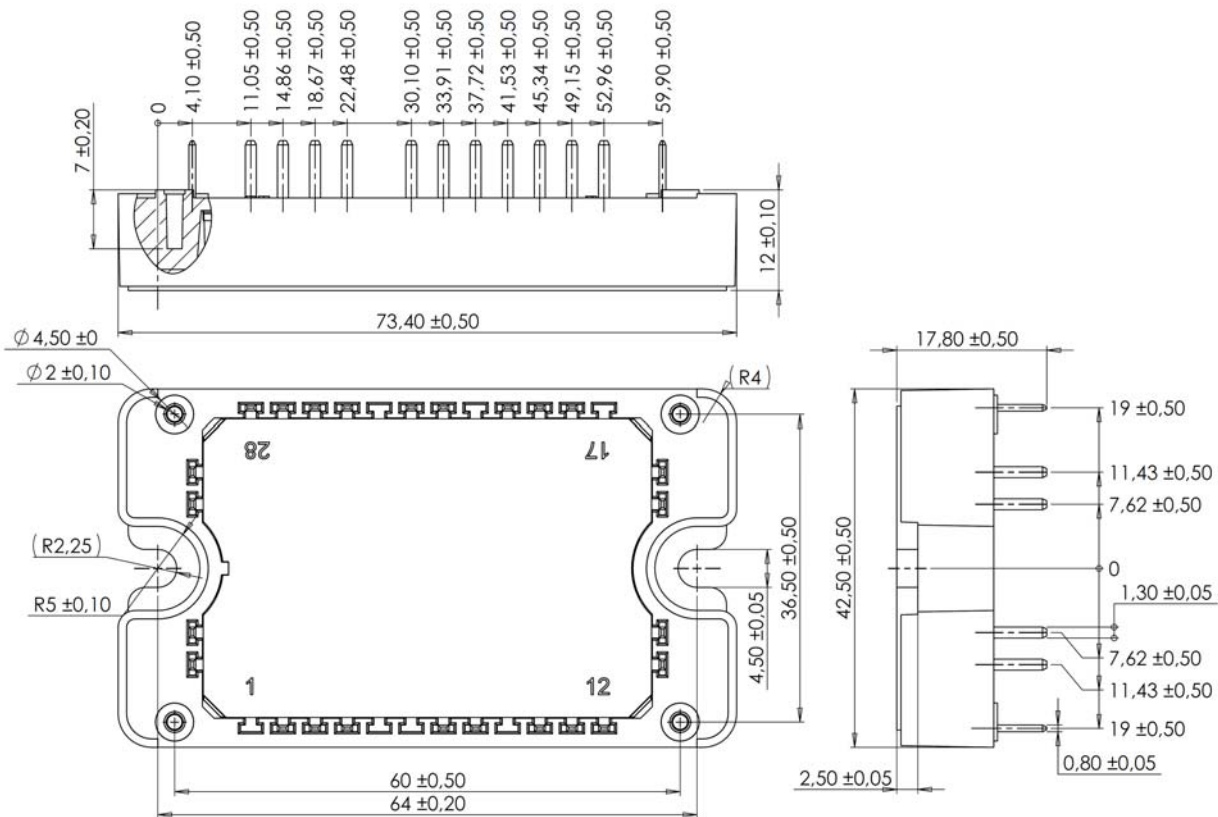
$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

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

### Thermal and package characteristics

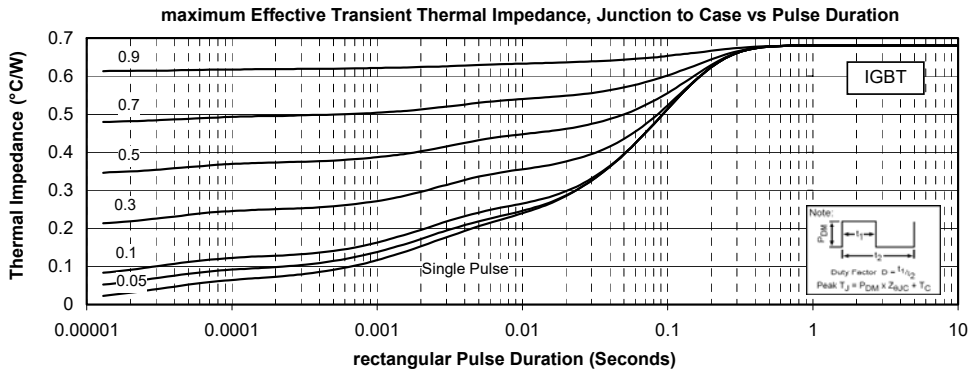
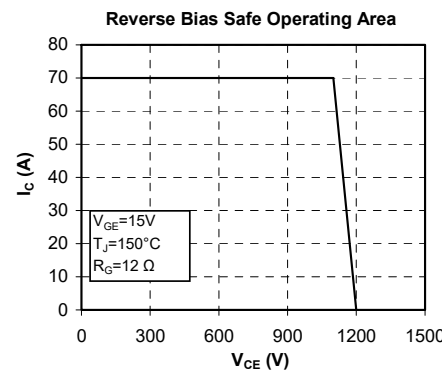
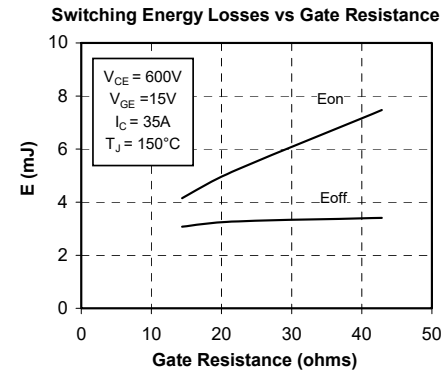
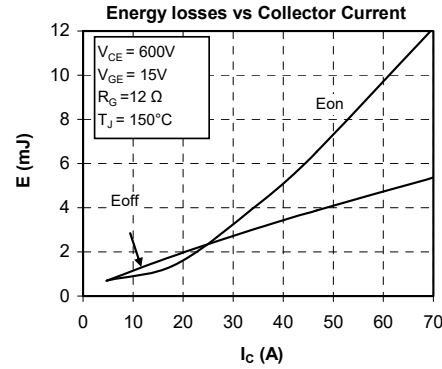
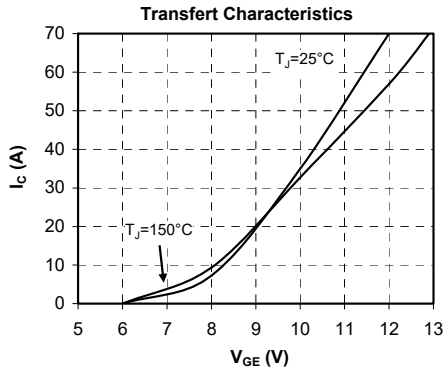
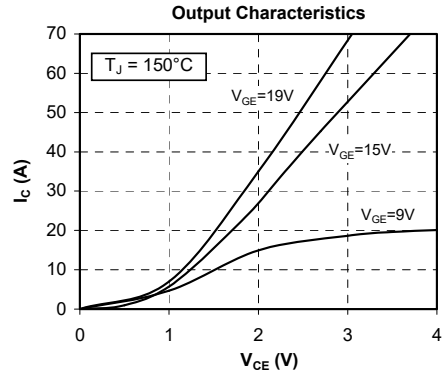
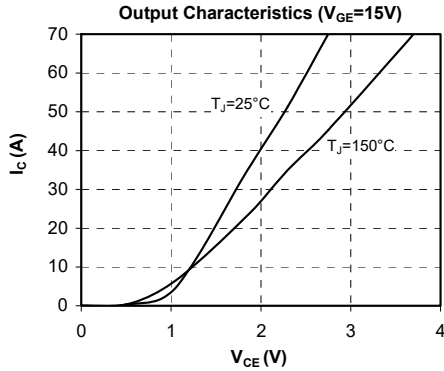
Symbol	Characteristic	Min	Max	Unit		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000		V		
T <sub>J</sub>	Operating junction temperature range	-40	175	°C		
T <sub>JOP</sub>	Recommended junction temperature under switching conditions	-40	T <sub>Jmax</sub> -25			
T <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

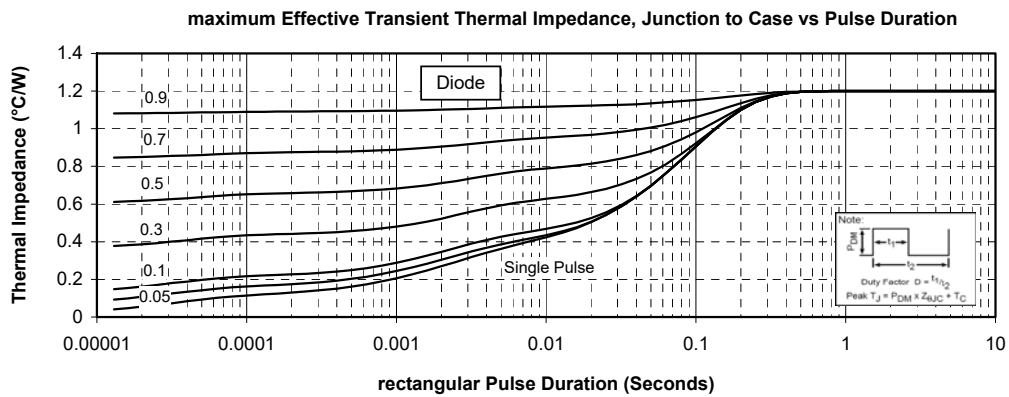
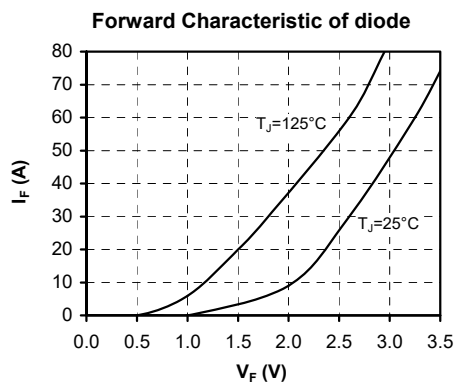
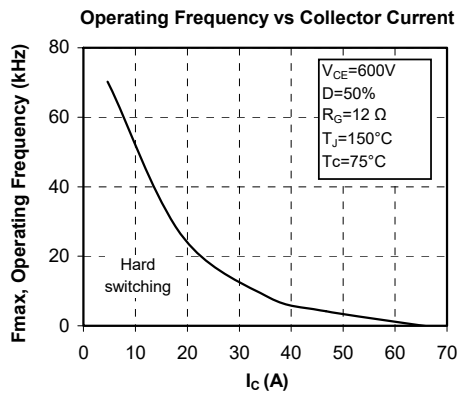
### Package outline (dimensions in mm)



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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