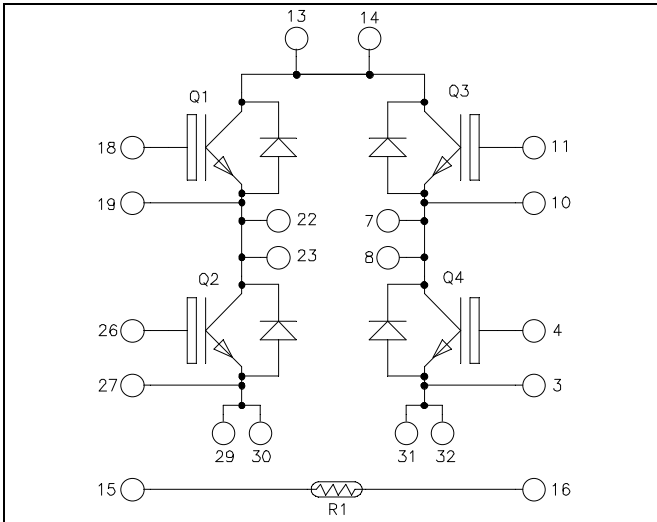


Full - Bridge  
Fast Trench + Field Stop IGBT3  
Power Module

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

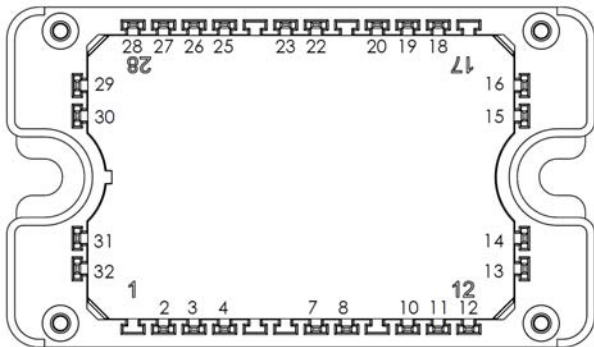


### Application

- 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
$I_{CES}$	Zero Gate Voltage Collector Current	$V_{GE} = 0V$ ; $V_{CE} = 1200V$			250	$\mu A$
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15V$ $I_C = 50A$	1.4	1.7	2.1	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$ , $I_C = 2mA$	5.0	5.8	6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20V$ , $V_{CE} = 0V$			400	nA

**Dynamic Characteristics (per IGBT)**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0V$ , $V_{CE} = 25V$		3600		pF
$C_{rss}$	Reverse Transfer Capacitance	$f = 1MHz$		160		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 50A$ $R_G = 18\Omega$		90		ns
$T_r$	Rise Time			30		
$T_{d(off)}$	Turn-off Delay Time			420		
$T_f$	Fall Time			70		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 50A$ $R_G = 18\Omega$		90		ns
$T_r$	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			520		
$T_f$	Fall Time			90		
$E_{on}$	Turn-on Switching Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 50A$ $R_G = 18\Omega$	$T_j = 125^\circ C$	5		mJ
$E_{off}$	Turn-off Switching Energy		$T_j = 125^\circ C$	5.5		
$R_{thJC}$	Junction to Case Thermal Resistance				0.45	$^\circ C/W$

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

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Peak Repetitive Reverse Voltage				1200	V
$I_{RM}$	Reverse Leakage Current	$V_R = 1200V$			250	$\mu A$
$I_F$	DC Forward Current	$T_c = 70^\circ C$		60		A
$V_F$	Diode Forward Voltage	$I_F = 60A$		2	2.5	V
		$I_F = 120A$		2.3		
		$I_F = 60A$	$T_j = 125^\circ C$	1.8		
$t_{rr}$	Reverse Recovery Time	$I_F = 60A$ $V_R = 800V$ $di/dt = 200A/\mu s$	$T_j = 25^\circ C$	400		ns
			$T_j = 125^\circ C$	470		
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ C$	1200		nC
			$T_j = 125^\circ C$	4000		
$E_r$	Reverse Recovery Energy	$I_F = 60A$ $V_R = 800V$ $di/dt = 1000A/\mu s$	$T_j = 125^\circ C$	2.2		mJ
$R_{thJC}$	Junction to Case Thermal Resistance				0.9	$^\circ C/W$

**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		%

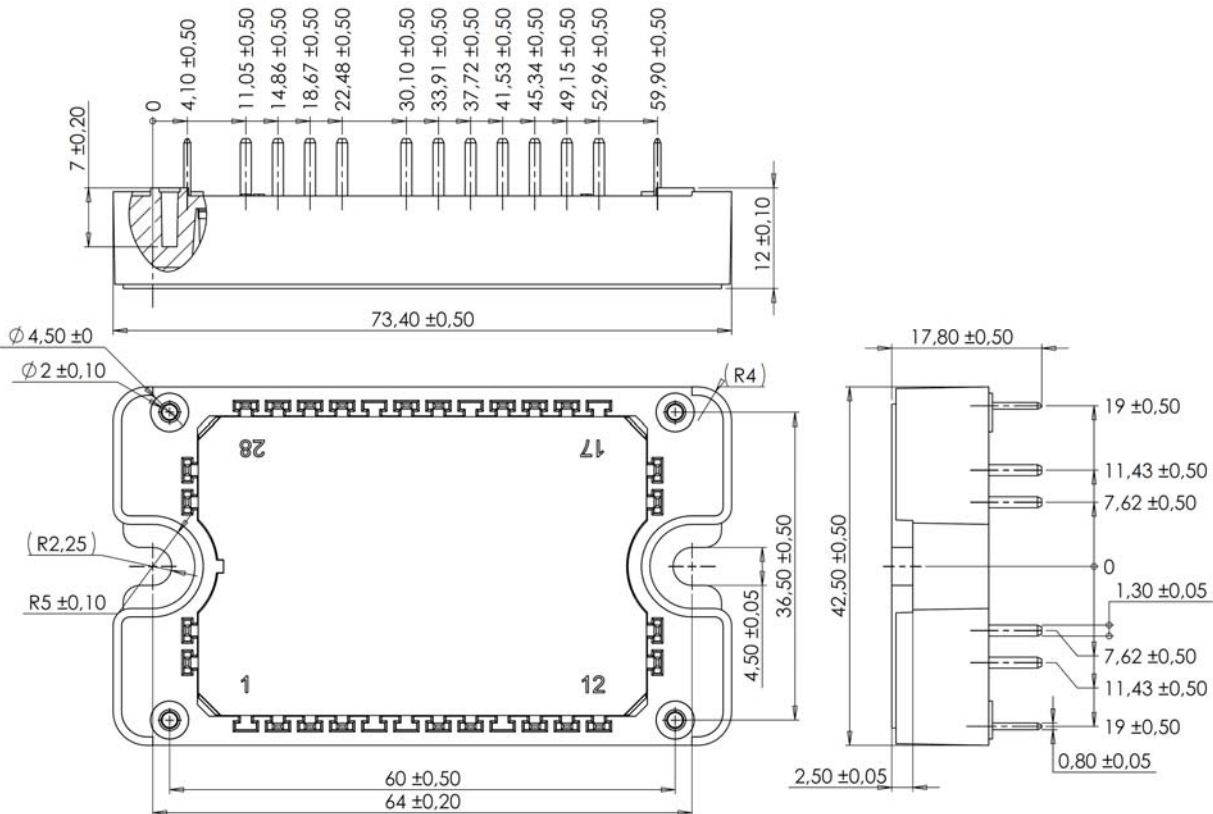
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

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

### Thermal and package characteristics

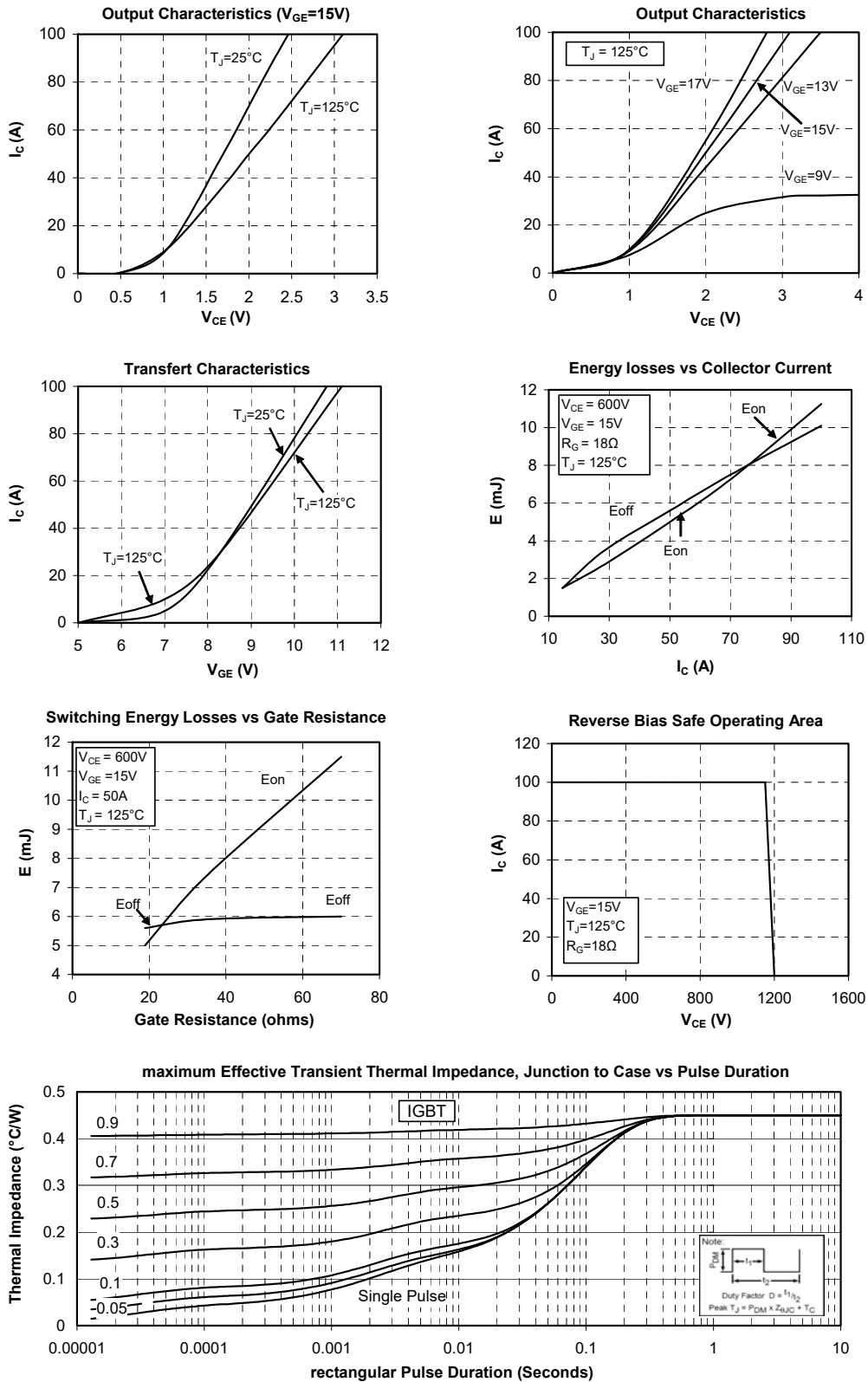
Symbol	Characteristic	Min	Max	Unit		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000		V		
T <sub>J</sub>	Operating junction temperature range	-40	150	°C		
T <sub>JOP</sub>	Recommended junction temperature under switching conditions	-40	T <sub>Jmax</sub> - 25			
T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

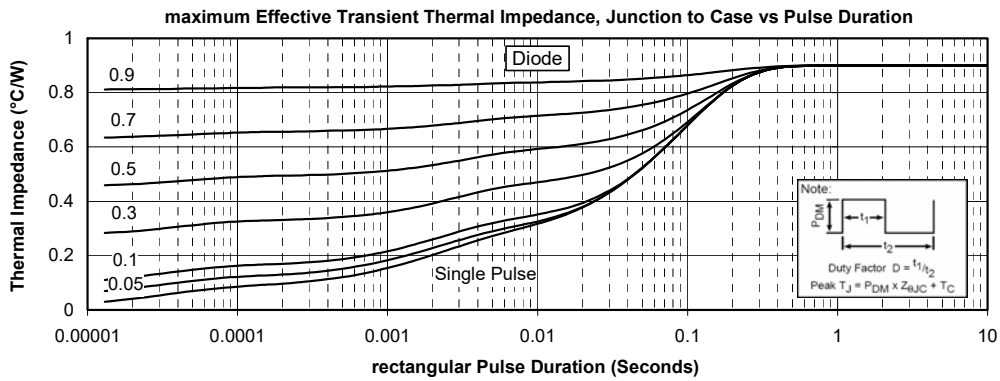
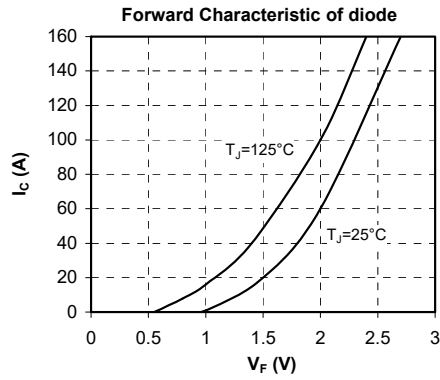
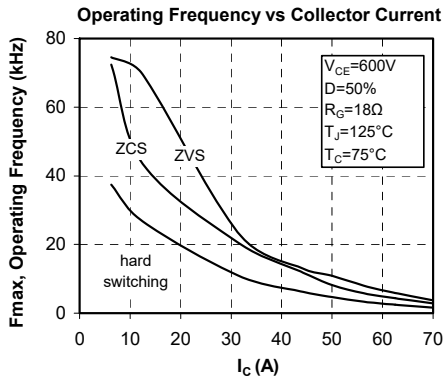
### Package outline (dimensions in mm)



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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