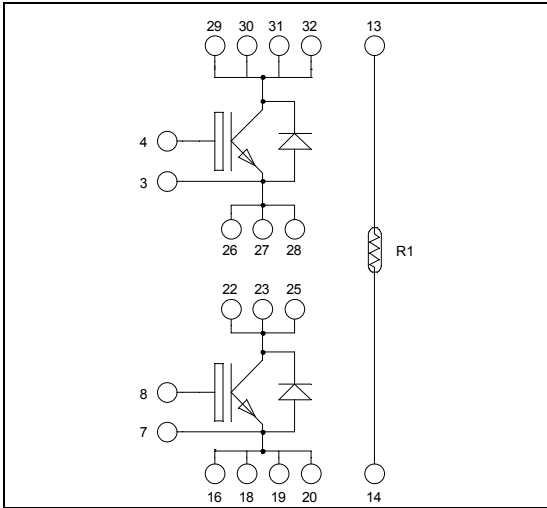


**Phase leg**  
**High speed Trench + Field Stop**  
**IGBT4**

**$V_{CES} = 1200V$**   
 **$I_C = 200A @ T_c = 100^\circ C$**

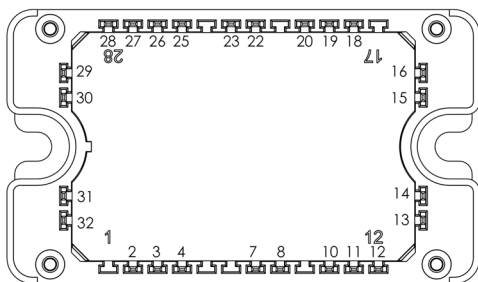


### Application

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

### Features

- **High speed Trench + Field Stop IGBT 4**
  - Low voltage drop
  - Low leakage current
  - Low switching losses
  - RBSOA and SCSOA rated
- Very low stray inductance
- Internal thermistor for temperature monitoring
- AlN substrate for improved thermal performance



### 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

Pins 29/30/31/32 must be shorted together  
 Pins 26/27/28/22/23/25 must be shorted together  
 to achieve a phase leg  
 Pins 16/18/19/20 must be shorted together

**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	$T_c = 25^\circ C$	400
		$T_c = 100^\circ C$	200
$I_{CM}$	Pulsed Collector Current	$T_c = 25^\circ C$	600
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	1250	W

 **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			100	μA
V <sub>CE(sat)</sub>	Collector Emitter Saturation Voltage	V <sub>GE</sub> = 15V I <sub>C</sub> = 160A	T <sub>j</sub> = 25°C 1.8	2.05 2.6	2.4	V
V <sub>GE(th)</sub>	Gate Threshold Voltage	V <sub>GE</sub> = V <sub>CE</sub> , I <sub>C</sub> = 6 mA	5.3	5.8	6.3	V
I <sub>GES</sub>	Gate – Emitter Leakage Current	V <sub>GE</sub> = 20V, V <sub>CE</sub> = 0V			480	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 f = 1MHz		9300		pF
C <sub>oes</sub>	Output Capacitance			600		
C <sub>res</sub>	Reverse Transfer Capacitance			520		
Q <sub>G</sub>	Gate charge	V <sub>GE</sub> = 15V, I <sub>C</sub> = 160A V <sub>CE</sub> = 960V		740		nC
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> = 160A R <sub>G</sub> = 3Ω		30		ns
T <sub>r</sub>	Rise Time			57		
T <sub>d(off)</sub>	Turn-off Delay Time			290		
T <sub>f</sub>	Fall Time			16		
T <sub>d(on)</sub>	Turn-on Delay Time	Inductive Switching (150°C) V <sub>GE</sub> = ±15V V <sub>Bus</sub> = 600V I <sub>C</sub> = 160A R <sub>G</sub> = 3Ω		30		ns
T <sub>r</sub>	Rise Time			49		
T <sub>d(off)</sub>	Turn-off Delay Time			366		
T <sub>f</sub>	Fall Time			48		
E <sub>on</sub>	Turn on Energy	V <sub>GE</sub> = ±15V V <sub>Bus</sub> = 600V I <sub>C</sub> = 160A R <sub>G</sub> = 3Ω	T <sub>j</sub> = 150°C		15	mJ
E <sub>off</sub>	Turn off Energy			T <sub>j</sub> = 150°C	9	
I <sub>sc</sub>	Short Circuit data	V <sub>GE</sub> ≤ 15V ; V <sub>Bus</sub> = 600V t <sub>p</sub> ≤ 10μs ; T <sub>j</sub> = 150°C		700		A
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.12	°C/W

**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			200	μA
I <sub>F</sub>	DC Forward Current	T <sub>c</sub> = 80°C		120		A
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 120A		2.5	3.5	V
		I <sub>F</sub> = 240A		3		
		I <sub>F</sub> = 120A	T <sub>j</sub> = 125°C	1.8		
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 120A V <sub>R</sub> = 800V di/dt = 400A/μs	T <sub>j</sub> = 25°C	265		ns
			T <sub>j</sub> = 125°C	350		
			T <sub>j</sub> = 25°C	1120		
Q <sub>rr</sub>	Reverse Recovery Charge	I <sub>F</sub> = 120A V <sub>R</sub> = 800V di/dt = 400A/μs	T <sub>j</sub> = 25°C	1120		nC
			T <sub>j</sub> = 125°C	5780		
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.26	°C/W

**Temperature sensor NTC** (see application note APT0406 on [www.microsemi.com](http://www.microsemi.com)).

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		%

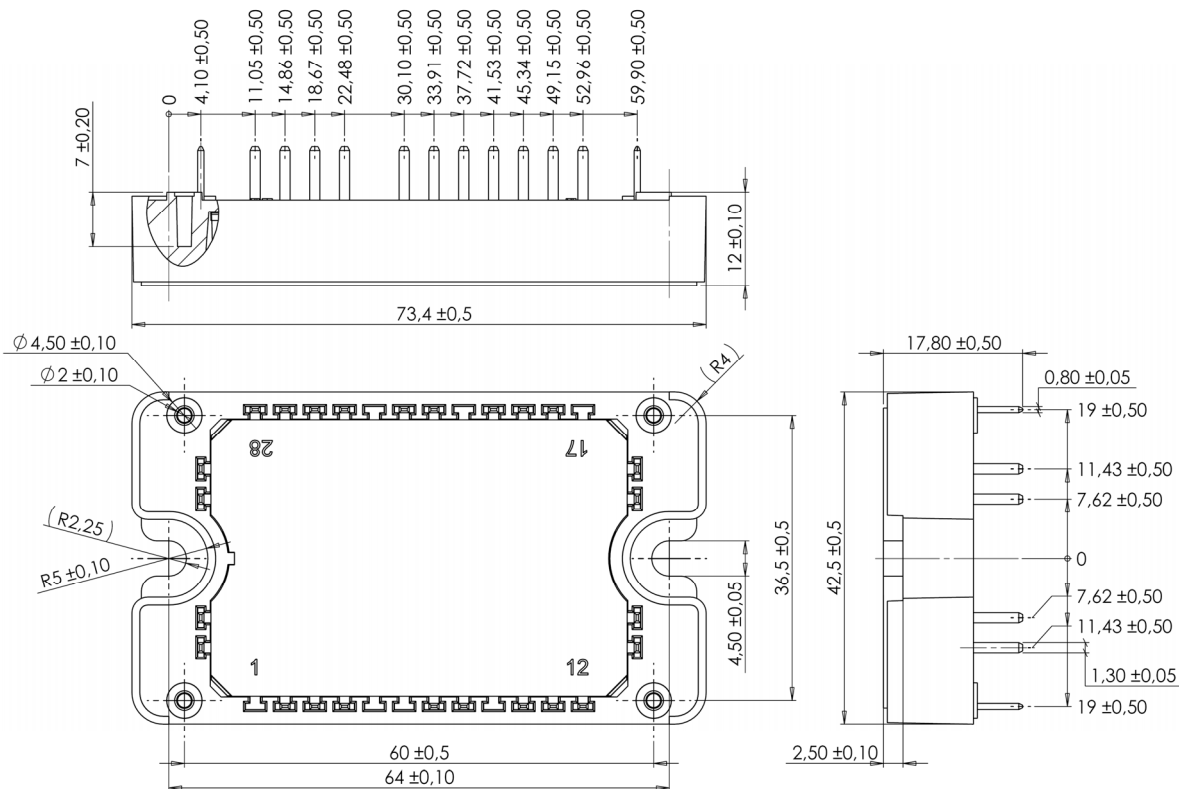
$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

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

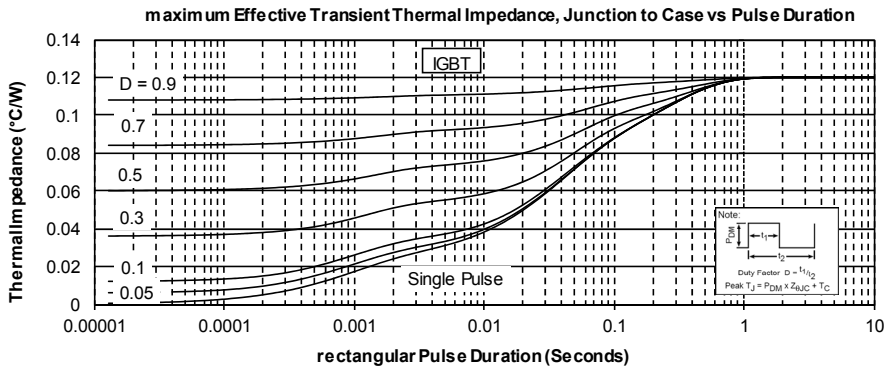
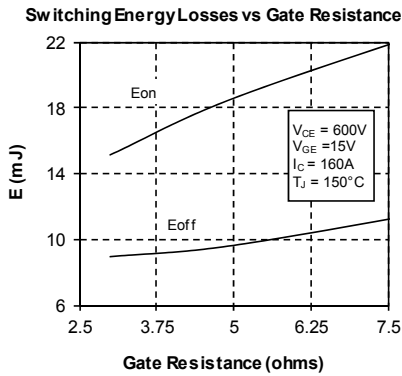
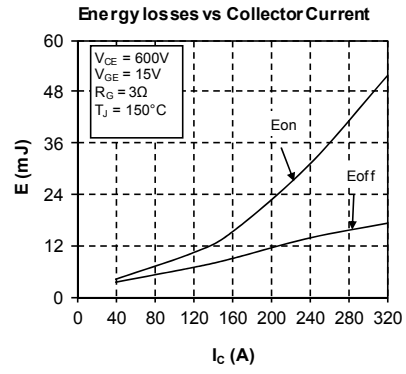
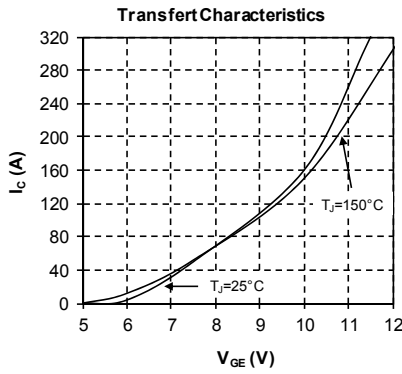
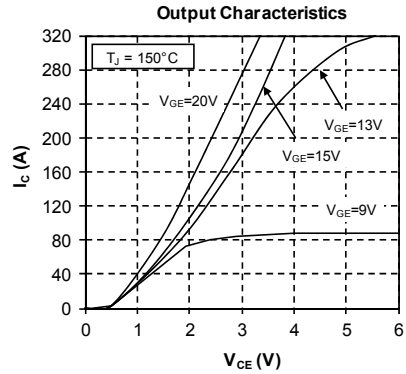
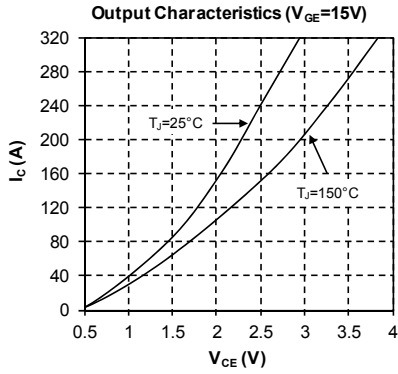
### Thermal and package characteristics

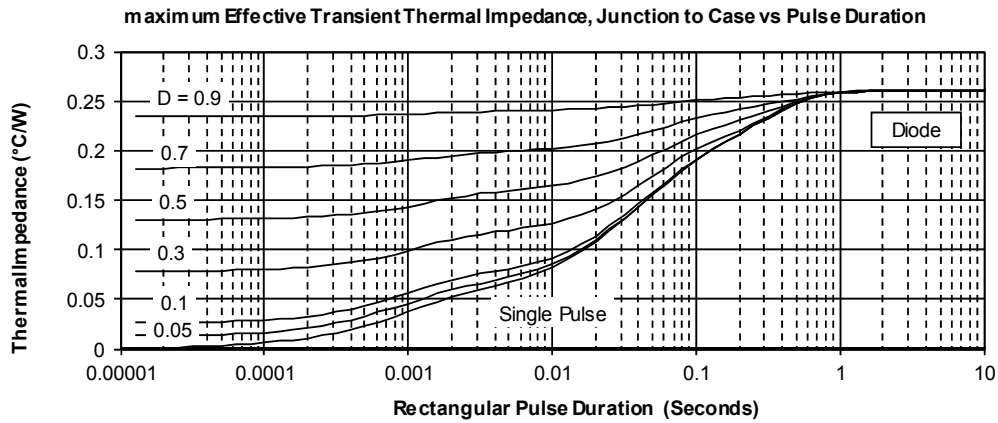
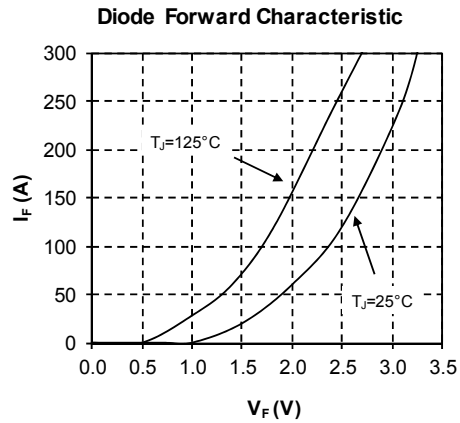
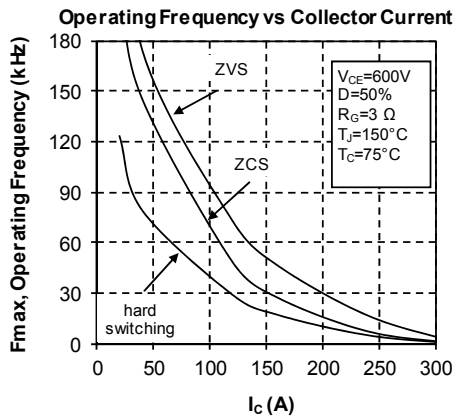
Symbol	Characteristic	Min	Max	Unit		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000		V		
T <sub>J</sub>	Operating junction temperature range	-40	175	°C		
T <sub>JOP</sub>	Recommended junction temperature under switching conditions	-40	T <sub>Jmax</sub> -25			
T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