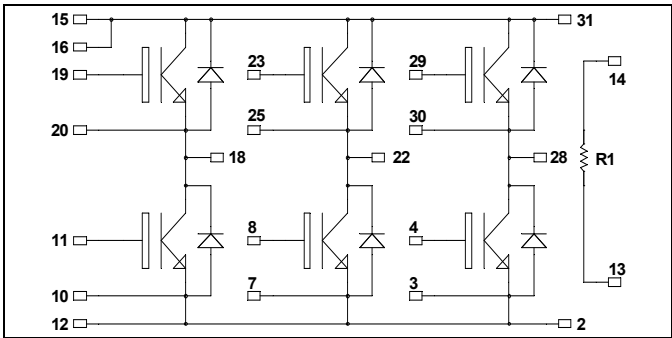
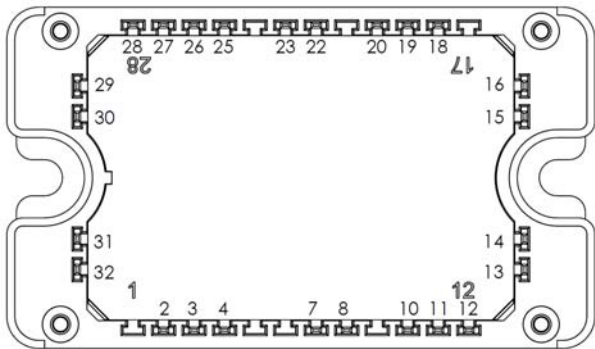


**3 Phase bridge
Trench + Field Stop IGBT4
Power Module**

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



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	± 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 _{CES}	Zero Gate Voltage Collector Current	V _{GE} = 0V, V _{CE} = 1200V			250	μA
V _{CE(sat)}	Collector Emitter saturation Voltage	V _{GE} = 15V I _C = 35A		1.85 2.25	2.25	V
V _{GE(th)}	Gate Threshold Voltage	V _{GE} = V _{CE} , I _C = 1.2mA	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		1950		pF
C _{oes}	Output Capacitance	V _{CE} = 25V		155		
C _{res}	Reverse Transfer Capacitance	f = 1MHz		115		
Q _G	Gate charge	V _{GE} = ±15V ; V _{CE} = 600V I _C = 35A		0.27		μC
T _{d(on)}	Turn-on Delay Time	Inductive Switching (25°C) V _{GE} = ±15V V _{CE} = 600V I _C = 35A R _G = 12Ω		130		ns
T _r	Rise Time			20		
T _{d(off)}	Turn-off Delay Time			300		
T _f	Fall Time			45		
T _{d(on)}	Turn-on Delay Time	Inductive Switching (150°C) V _{GE} = ±15V V _{CE} = 600V I _C = 35A R _G = 12Ω		150		ns
T _r	Rise Time			35		
T _{d(off)}	Turn-off Delay Time			350		
T _f	Fall Time			80		
E _{on}	Turn-on Switching Energy	V _{GE} = ±15V V _{CE} = 600V I _C = 35A		2.6 4		mJ
E _{off}	Turn-off Switching Energy	R _G = 12Ω		2 3		
I _{sc}	Short Circuit data	V _{GE} ≤ 15V ; V _{Bus} = 900V t _p ≤ 10μs ; T _j = 150°C		140		A
R _{thJC}	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 _{RRM}	Peak Repetitive Reverse Voltage				1200	V
I _{RM}	Reverse Leakage Current	V _R = 1200V			100	μA
I _F	DC Forward Current	T _c = 80°C		30		A
V _F	Diode Forward Voltage	I _F = 30A I _F = 60A I _F = 30A		2.6 3.2 1.8	3.1	V
t _{rr}	Reverse Recovery Time	I _F = 30A V _R = 800V		300 380		ns
Q _{rr}	Reverse Recovery Charge	di/dt = 200A/μs		360 1700		
R _{thJC}	Junction to Case Thermal Resistance				1.2	°C/W

Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
ΔR ₂₅ /R ₂₅			5		%
B _{25/85}	T ₂₅ = 298.15 K		3952		K
ΔB/B	T _C = 100°C		4		%

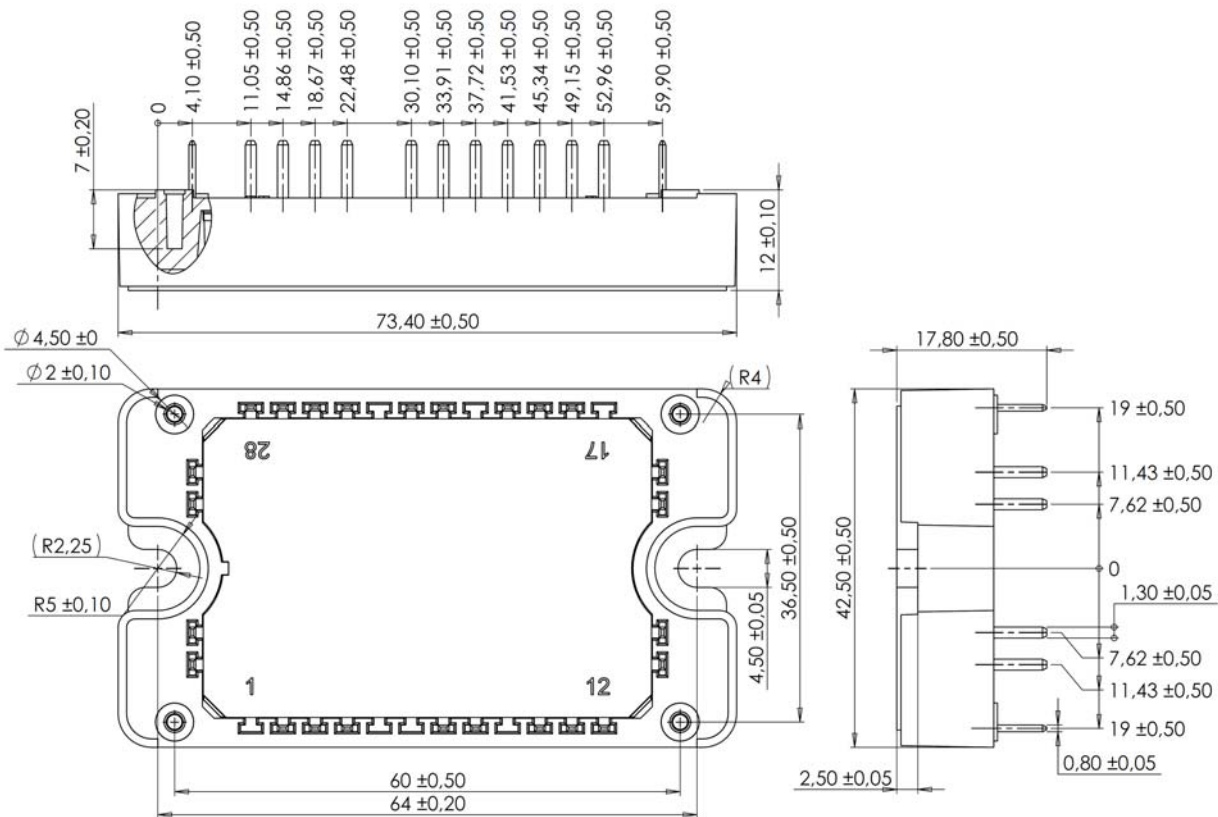
$$R_T = \frac{R_{25}}{\exp \left[B_{25/85} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

T: Thermistor temperature
 R_T: Thermistor value at T

Thermal and package characteristics

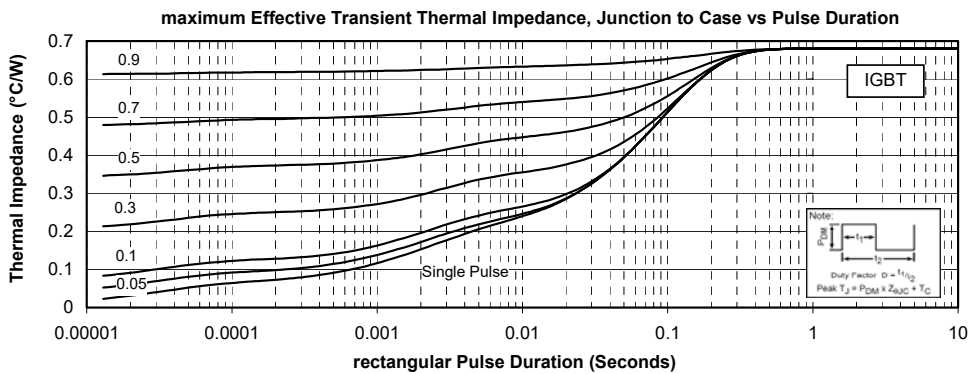
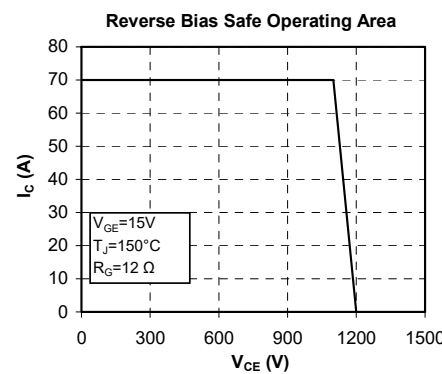
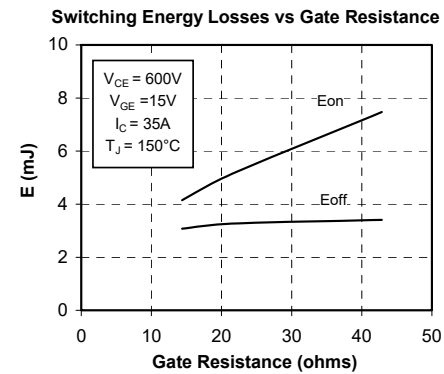
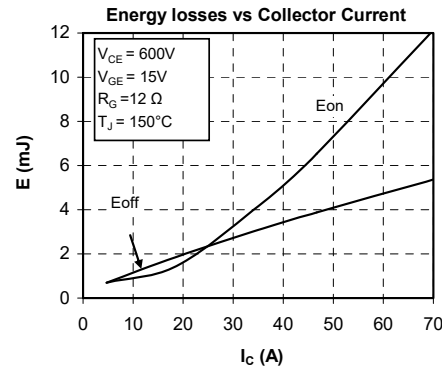
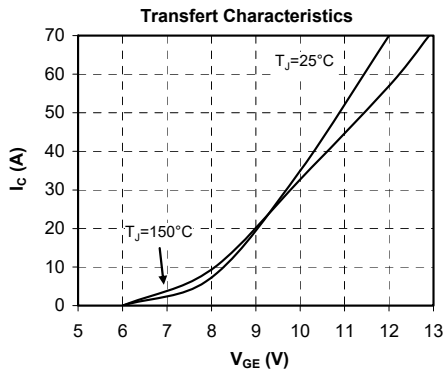
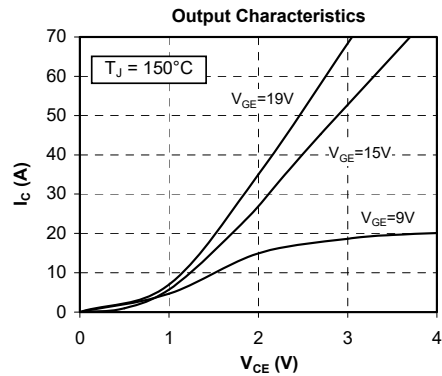
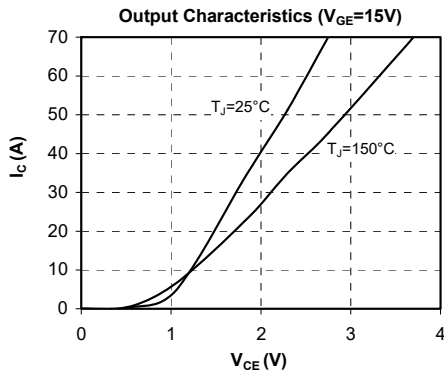
Symbol	Characteristic	Min	Max	Unit		
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000		V		
T _J	Operating junction temperature range	-40	175	°C		
T _{JOP}	Recommended junction temperature under switching conditions	-40	T _{Jmax} -25			
T _{STG}	Storage Temperature Range	-40	125			
T _C	Operating Case Temperature	-40	125			
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				110	g

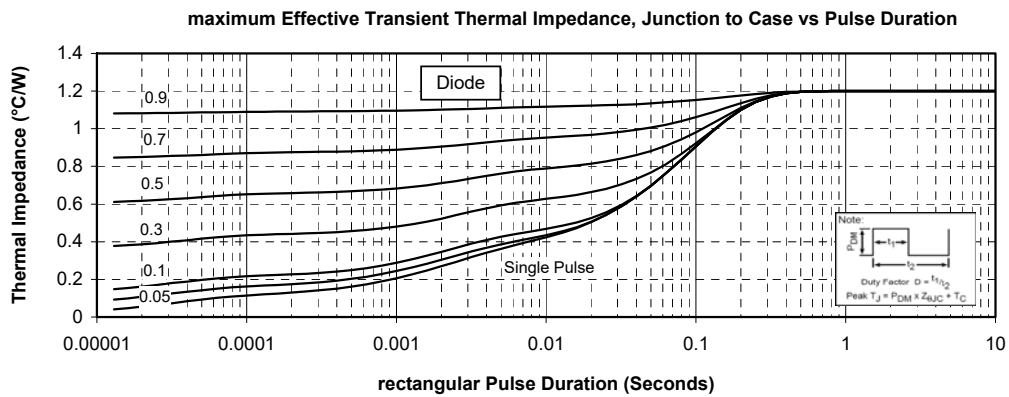
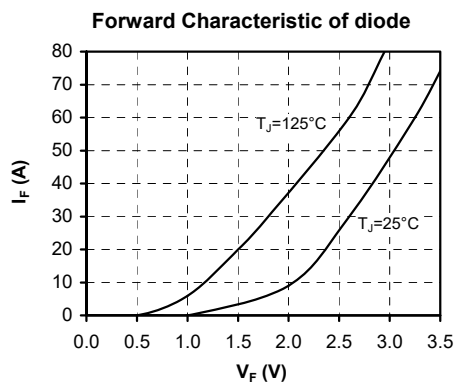
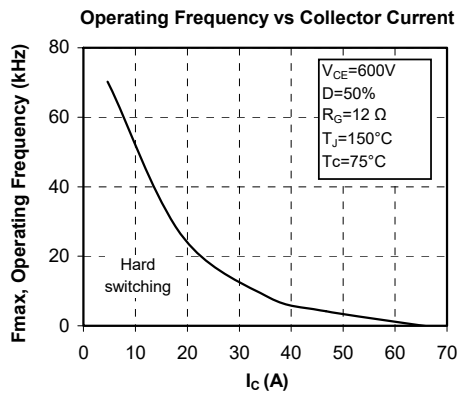
Package outline (dimensions in mm)



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

Typical Performance Curve





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