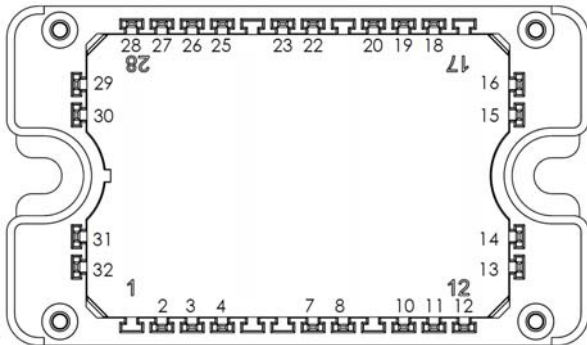
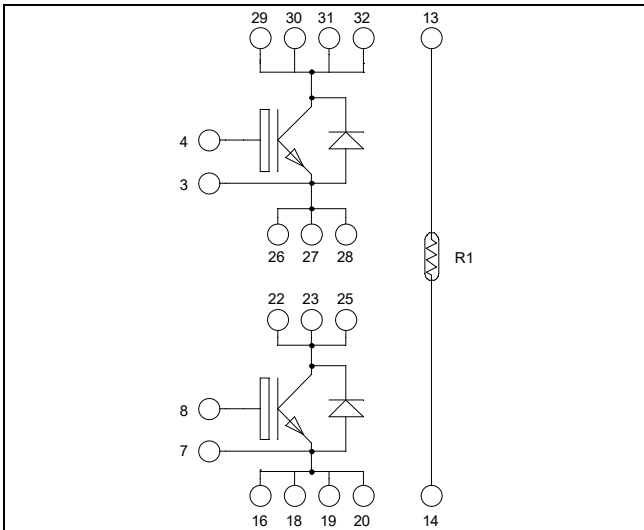


**Phase leg
Trench + Field Stop IGBT4
Power Module**

**$V_{CES} = 1200V$
 $I_C = 180A @ T_c = 100^\circ C$**



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	$T_c = 25^\circ C$	230
		$T_c = 100^\circ C$	180
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	300
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Power Dissipation	$T_c = 25^\circ C$	940
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	300A @ 1100V

Application

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

Features

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

Benefits

- 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_c of V_{CEsat}
- RoHS Compliant

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			300	μA
V _{CE(sat)}	Collector Emitter saturation Voltage	V _{GE} = 15V I _C = 150A		1.8 2.2	2.2	V
V _{GE(th)}	Gate Threshold Voltage	V _{GE} = V _{CE} , I _C = 5.5 mA	5.0	5.8	6.5	V
I _{GES}	Gate – Emitter Leakage Current	V _{GE} = 20V, V _{CE} = 0V			200	nA

Dynamic Characteristics (per IGBT)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C _{ies}	Input Capacitance	V _{GE} = 0V		9.3		nF
C _{oes}	Output Capacitance	V _{CE} = 25V		0.58		
C _{res}	Reverse Transfer Capacitance	f = 1MHz		0.5		
Q _G	Gate charge	V _{GE} = -8V / 15V ; V _{CE} = 600V I _C = 150A		0.85		μC
T _{d(on)}	Turn-on Delay Time	Inductive Switching (25°C) V _{GE} = ±15V V _{CE} = 600V I _C = 150A R _G = 3Ω		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 = 150A R _G = 3Ω		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 = 150A		13.5		mJ
E _{off}	Turn-off Switching Energy	R _G = 3Ω		14.5		mJ
I _{sc}	Short Circuit data	V _{GE} ≤ 15V ; V _{Bus} = 900V t _p ≤ 10μs ; T _j = 150°C		600		A
R _{thJC}	Junction to Case Thermal Resistance				0.16	°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			150	μA
I _F	DC Forward Current	T _c = 100°C		120		A
V _F	Diode Forward Voltage	I _F = 120A		2.5	3	V
		I _F = 240A		3		
		I _F = 120A T _j = 125°C		1.8		
t _{rr}	Reverse Recovery Time	I _F = 120A V _R = 800V di/dt = 400A/μs	T _j = 25°C	265		ns
			T _j = 125°C	350		
Q _{rr}	Reverse Recovery Charge	di/dt = 400A/μs	T _j = 25°C	1120		nC
			T _j = 125°C	5780		
R _{thJC}	Junction to Case Thermal Resistance				0.37	°C/W

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

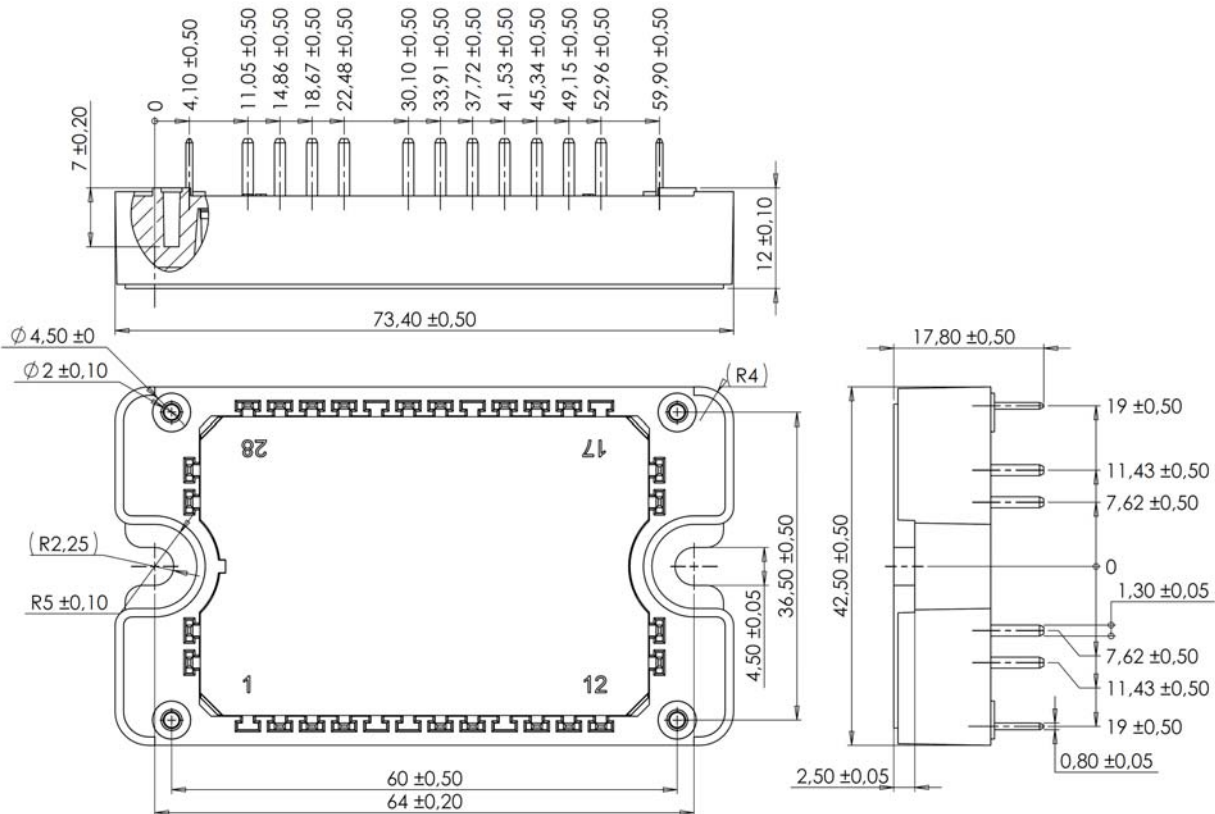
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

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		%

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

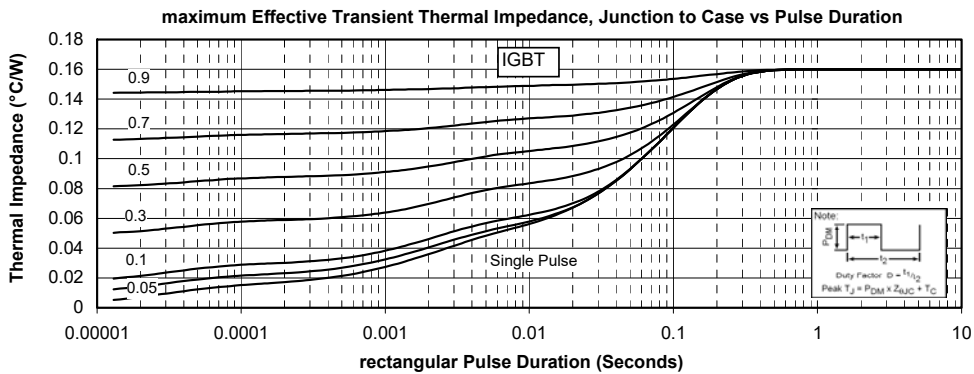
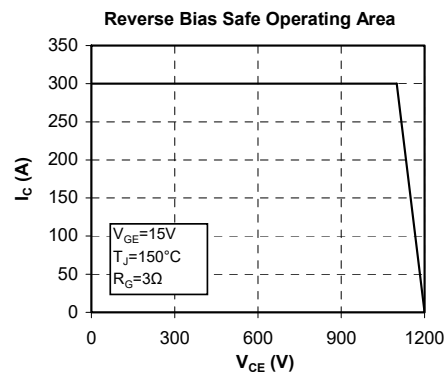
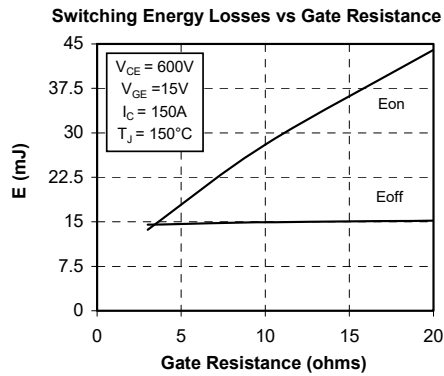
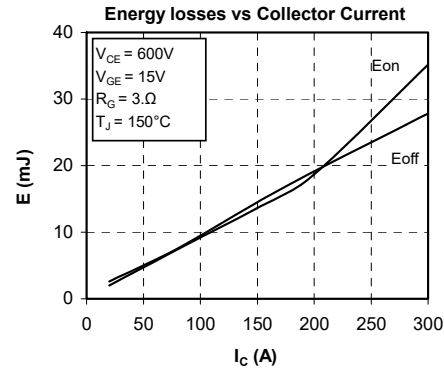
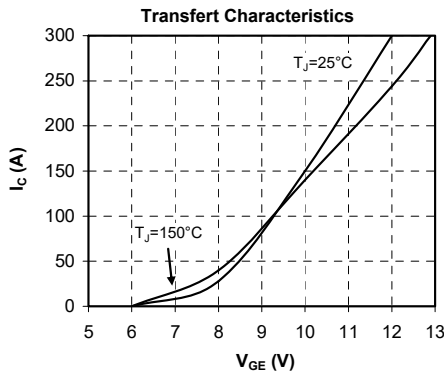
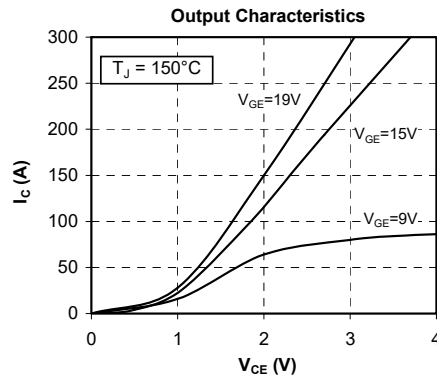
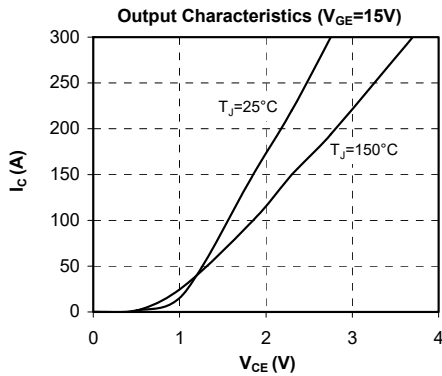
T: Thermistor temperature
 R_T: Thermistor value at T

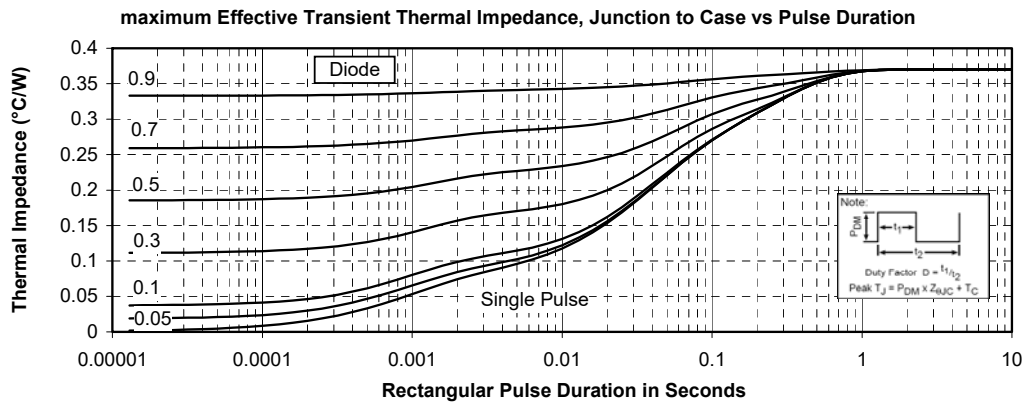
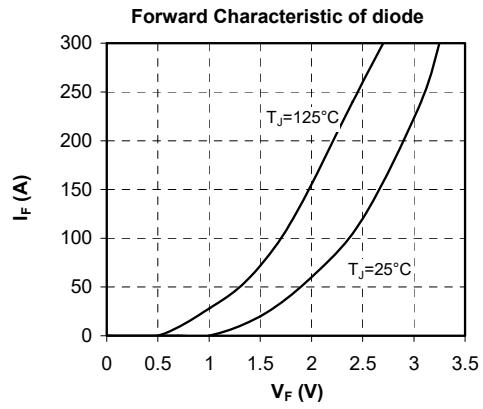
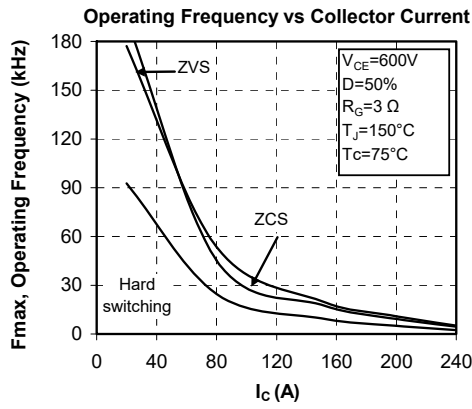
Package outline (dimensions in mm)



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

Typical Performance Curve





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