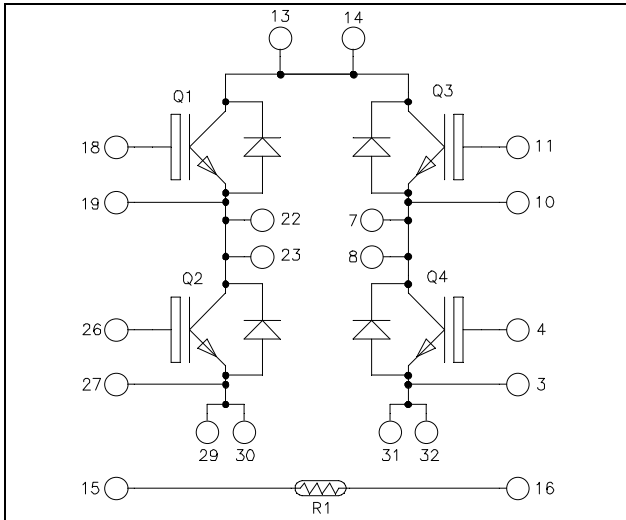


**Full bridge
Trench + Field Stop IGBT4
Power module**

**$V_{CES} = 1200V$
 $I_C = 60A @ T_c = 80^\circ C$**


Application

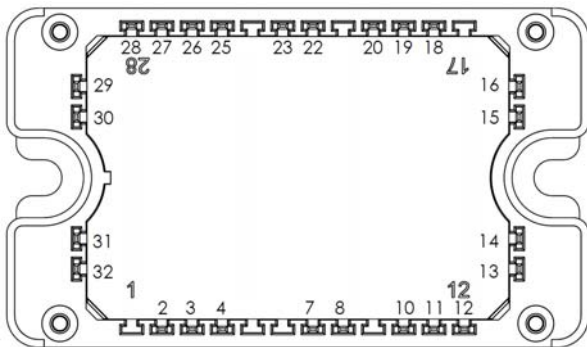
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

Features

- **Trench + Field Stop IGBT 4**
 - Low voltage drop
 - Low leakage current
 - Low switching losses
 - Low leakage 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
- Easy paralleling due to positive TC of V_{CEsat}
- Each leg can be easily paralleled to achieve a phase leg of twice the current capability
- RoHS compliant



All multiple inputs and outputs must be shorted together
 Example: 13/14 ; 29/30 ; 22/23 ...

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	$T_C = 25^\circ C$	80
		$T_C = 80^\circ C$	60
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ C$	100
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Power Dissipation	$T_C = 25^\circ C$	280
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	100A @ 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 = 50A		1.85 2.25	2.25	V
V _{GE(th)}	Gate Threshold Voltage	V _{GE} = V _{CE} , I _C = 1.6mA	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		2770		pF
C _{oes}	Output Capacitance	V _{CE} = 25V		205		
C _{res}	Reverse Transfer Capacitance	f = 1MHz		160		
Q _G	Gate charge	V _{GE} = ±15V ; V _{CE} = 600V I _C = 50A		0.38		μC
T _{d(on)}	Turn-on Delay Time	Inductive Switching (25°C) V _{GE} = ±15V V _{CE} = 600V I _C = 50A R _G = 8.2Ω		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 = 50A R _G = 8.2Ω		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 = 50A R _G = 8.2Ω	T _J = 25°C	3.8		mJ
			T _J = 150°C	5.5		
E _{off}	Turn-off Switching Energy	I _C = 50A R _G = 8.2Ω	T _J = 25°C	2.5		mJ
			T _J = 150°C	4.5		
I _{sc}	Short Circuit data	V _{GE} ≤ 15V ; V _{Bus} = 900V t _p ≤ 10μs ; T _J = 150°C		200		A
R _{thJC}	Junction to Case Thermal Resistance				0.53	°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		60		A
V _F	Diode Forward Voltage	I _F = 60A		2.5	3	V
		I _F = 120A		3		
		I _F = 60A T _J = 125°C		1.8		
t _{rr}	Reverse Recovery Time	I _F = 60A V _R = 800V di/dt = 200A/μs	T _J = 25°C	265		ns
			T _J = 125°C	350		
Q _{rr}	Reverse Recovery Charge	di/dt = 200A/μs	T _J = 25°C	560		nC
			T _J = 125°C	2890		
R _{thJC}	Junction to Case Thermal Resistance				0.9	°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

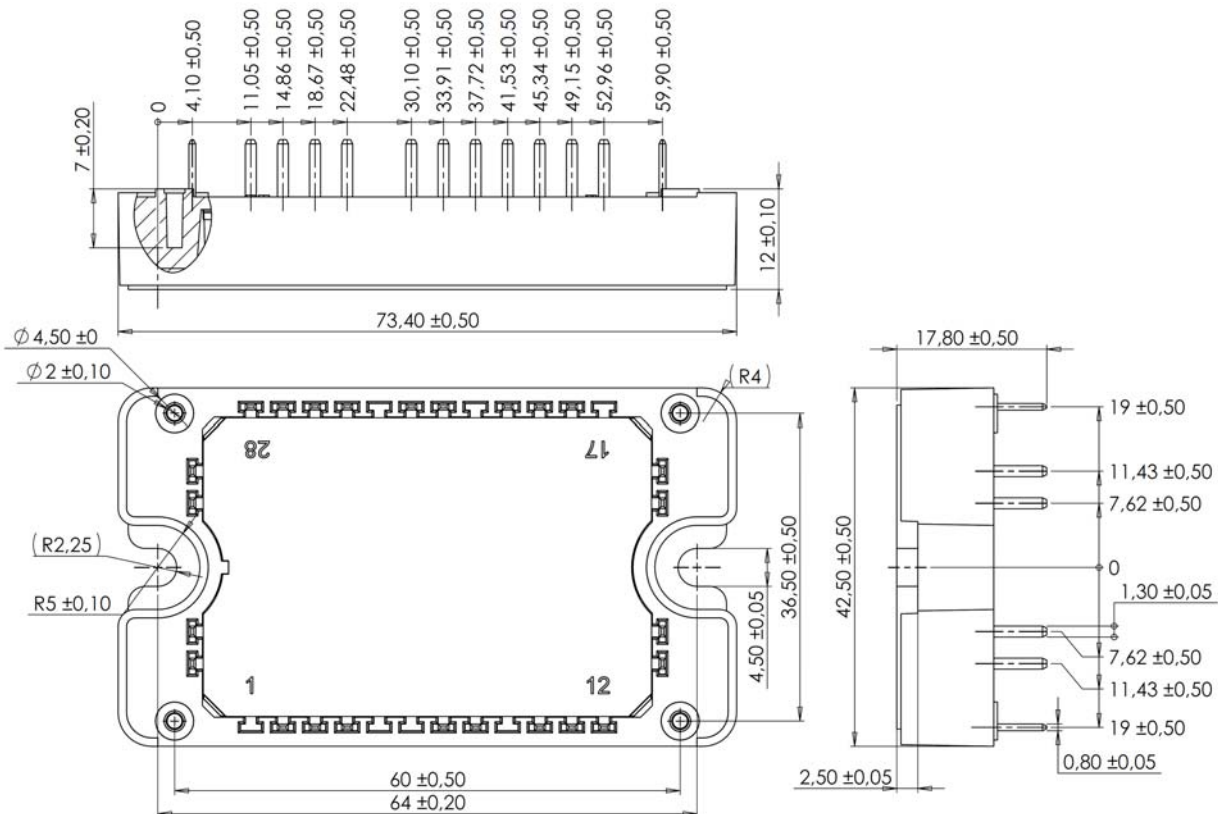
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

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				4	%

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

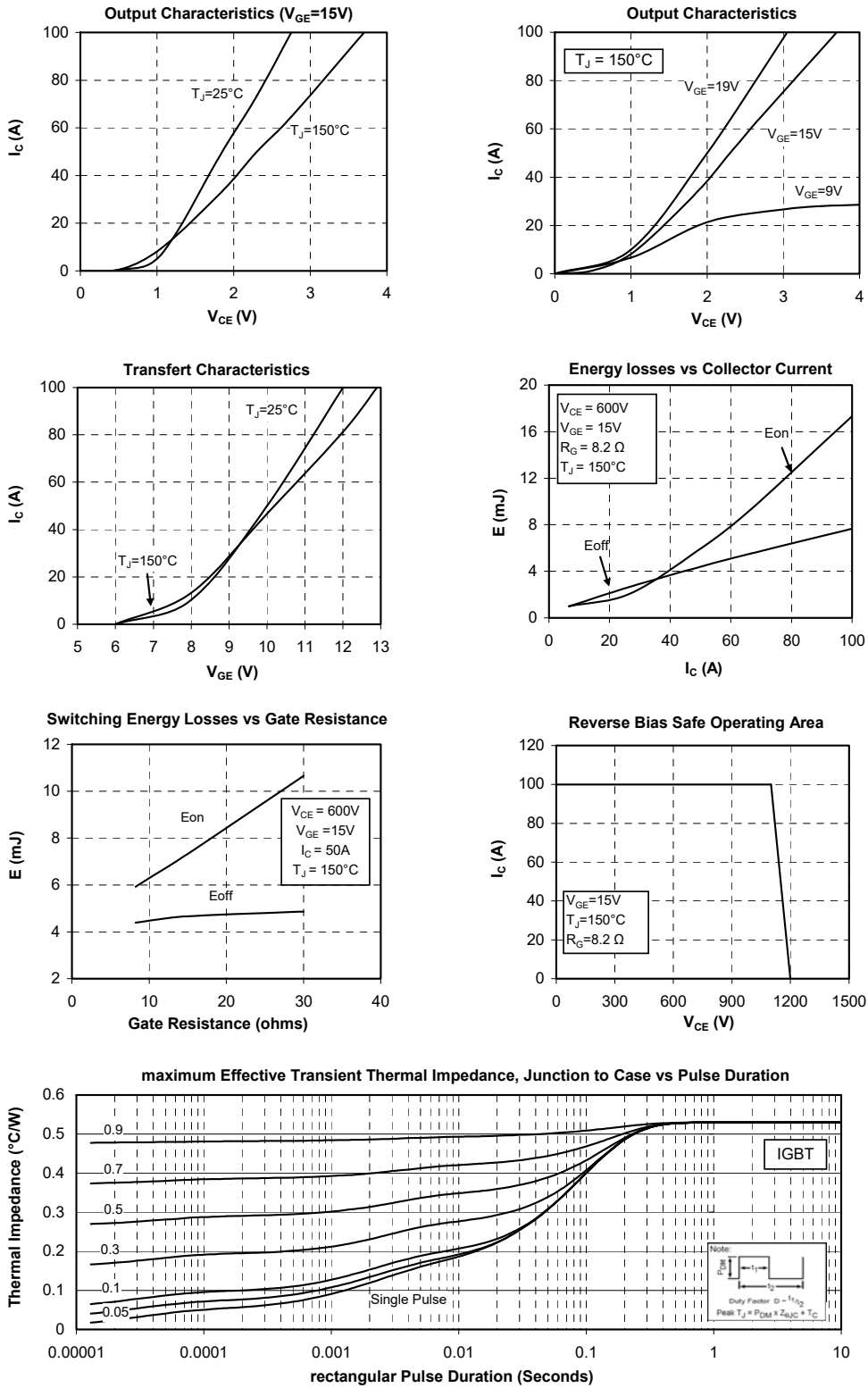
T: Thermistor temperature
 R_T: Thermistor value at T

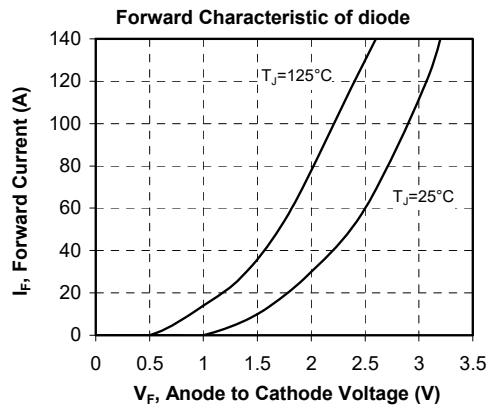
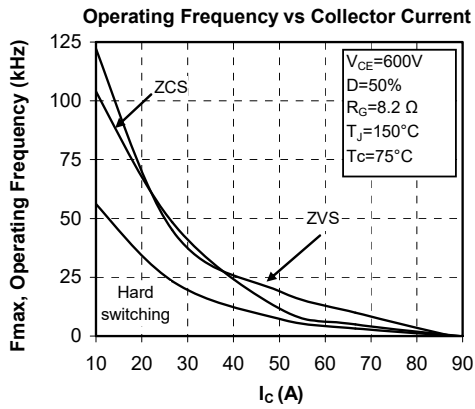
Package outline (dimensions in mm)



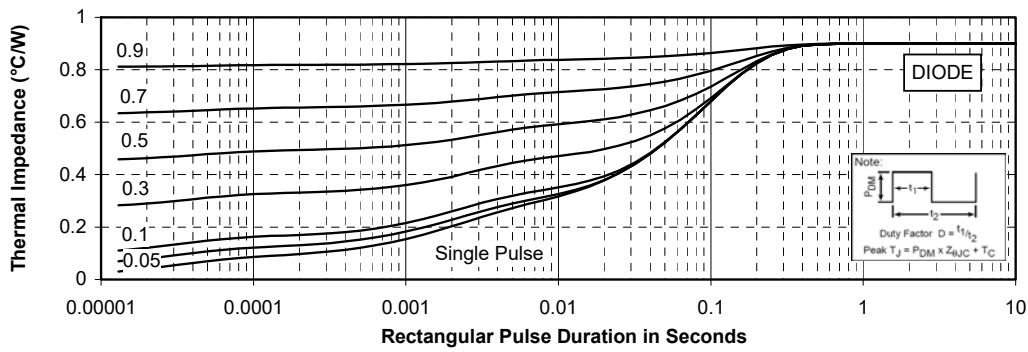
See application note 1906 - Mounting Instructions for SP3F Power Modules on www.microsemi.com

Typical Performance Curve





maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



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