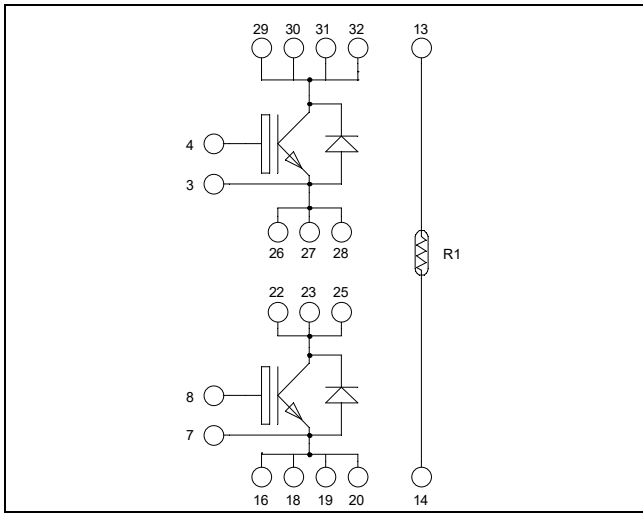


Phase leg
High speed Trench + Field Stop IGBT4
Power Module

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

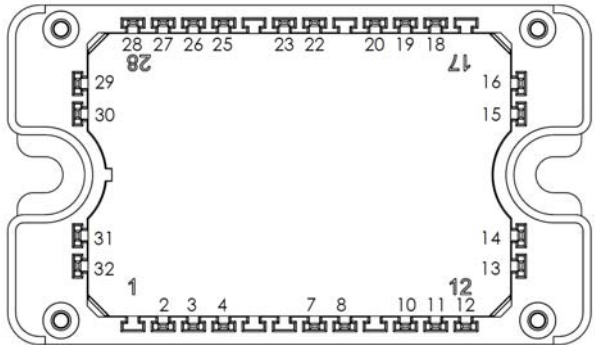


Application

- 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
- Kelvin emitter for easy drive
- 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
- Easy paralleling due to positive TC of VCEsat
- Each leg can be easily paralleled to achieve a phase leg of twice the current capability
- 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	$T_c = 25^\circ C$	185
		$T_c = 100^\circ C$	100
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	375
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Power Dissipation	650	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 _{CEs}	Zero Gate Voltage Collector Current	V _{GE} = 0V, V _{CE} = 1200V			50	μA
V _{CE(sat)}	Collector Emitter Saturation Voltage	V _{GE} = 15V I _C = 100A	1.7	T _j = 25°C 2.05	2.4	V
		T _j = 150°C 2.6				
V _{GE(th)}	Gate Threshold Voltage	V _{GE} = V _{CE} , I _C = 3.8 mA	5.0	5.8	6.5	V
I _{GES}	Gate – Emitter Leakage Current	V _{GE} = 20V, V _{CE} = 0V			150	nA

Dynamic Characteristics (per IGBT)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C _{ies}	Input Capacitance	V _{GE} = 0V V _{CE} = 25V f = 1MHz		6150		pF
C _{oes}	Output Capacitance			350		
C _{res}	Reverse Transfer Capacitance			300		
Q _G	Gate charge	V _{GE} = 15V, I _C = 100A V _{CE} = 960V		450		nC
T _{d(on)}	Turn-on Delay Time	Inductive Switching (25°C) V _{GE} = ±15V V _{Bus} = 600V I _C = 100A R _G = 5Ω		30		ns
T _r	Rise Time			57		
T _{d(off)}	Turn-off Delay Time			290		
T _f	Fall Time			16		
T _{d(on)}	Turn-on Delay Time	Inductive Switching (150°C) V _{GE} = ±15V V _{Bus} = 600V I _C = 100A R _G = 5Ω		30		ns
T _r	Rise Time			49		
T _{d(off)}	Turn-off Delay Time			366		
T _f	Fall Time			48		
E _{on}	Turn on Energy	V _{GE} = ±15V V _{Bus} = 600V I _C = 100A R _G = 5Ω	T _j = 25°C	7.7		mJ
			T _j = 150°C	9		
E _{off}	Turn off Energy		T _j = 25°C	2.9		
			T _j = 150°C	5.4		
I _{sc}	Short Circuit data	V _{GE} ≤ 15V ; V _{Bus} = 900V t _p ≤ 10μs ; T _j = 150°C		350		A
R _{thJC}	Junction to Case Thermal Resistance				0.23	°C/W

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 = 80°C		120		A
V _F	Diode Forward Voltage	I _F = 120A		2.6	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	I _F = 120A V _R = 800V 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

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

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		%

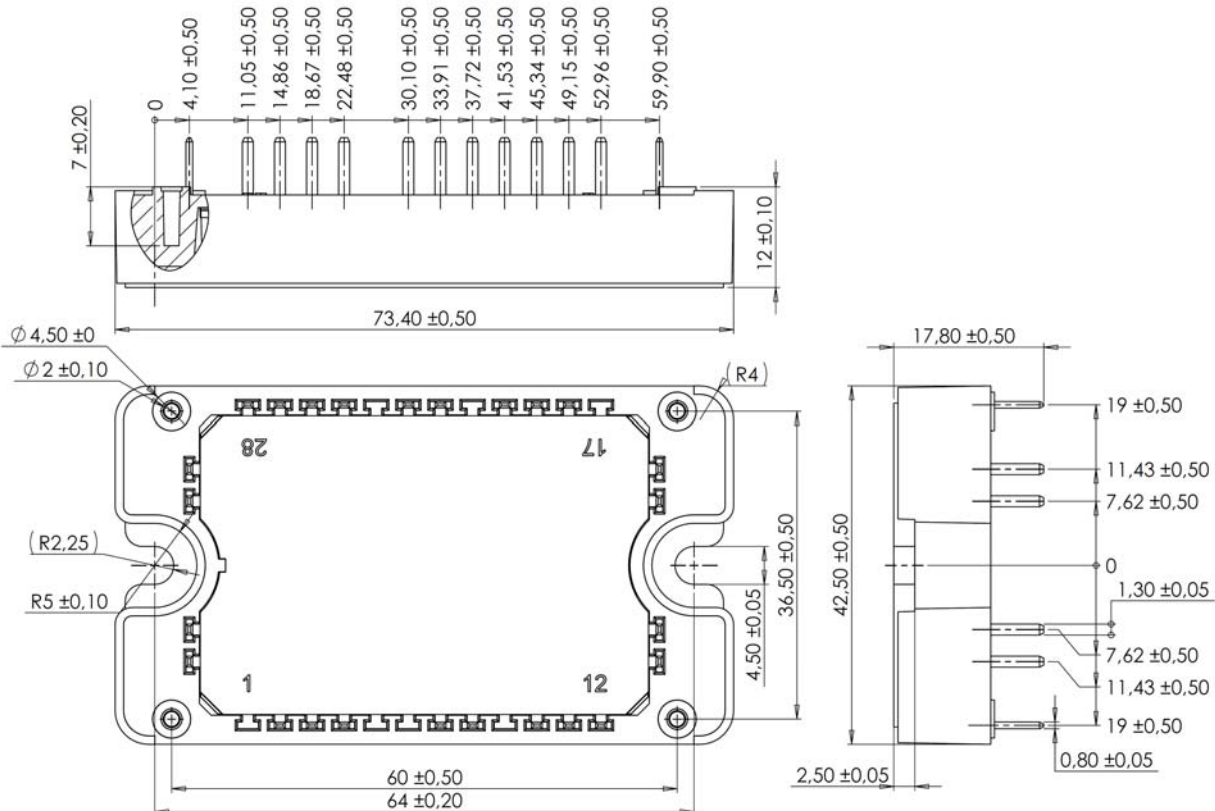
$$R_T = \frac{R_{25}}{\exp \left[B_{25/85} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

T: Thermistor temperature
 R_T: Thermistor value at T

Thermal and package characteristics

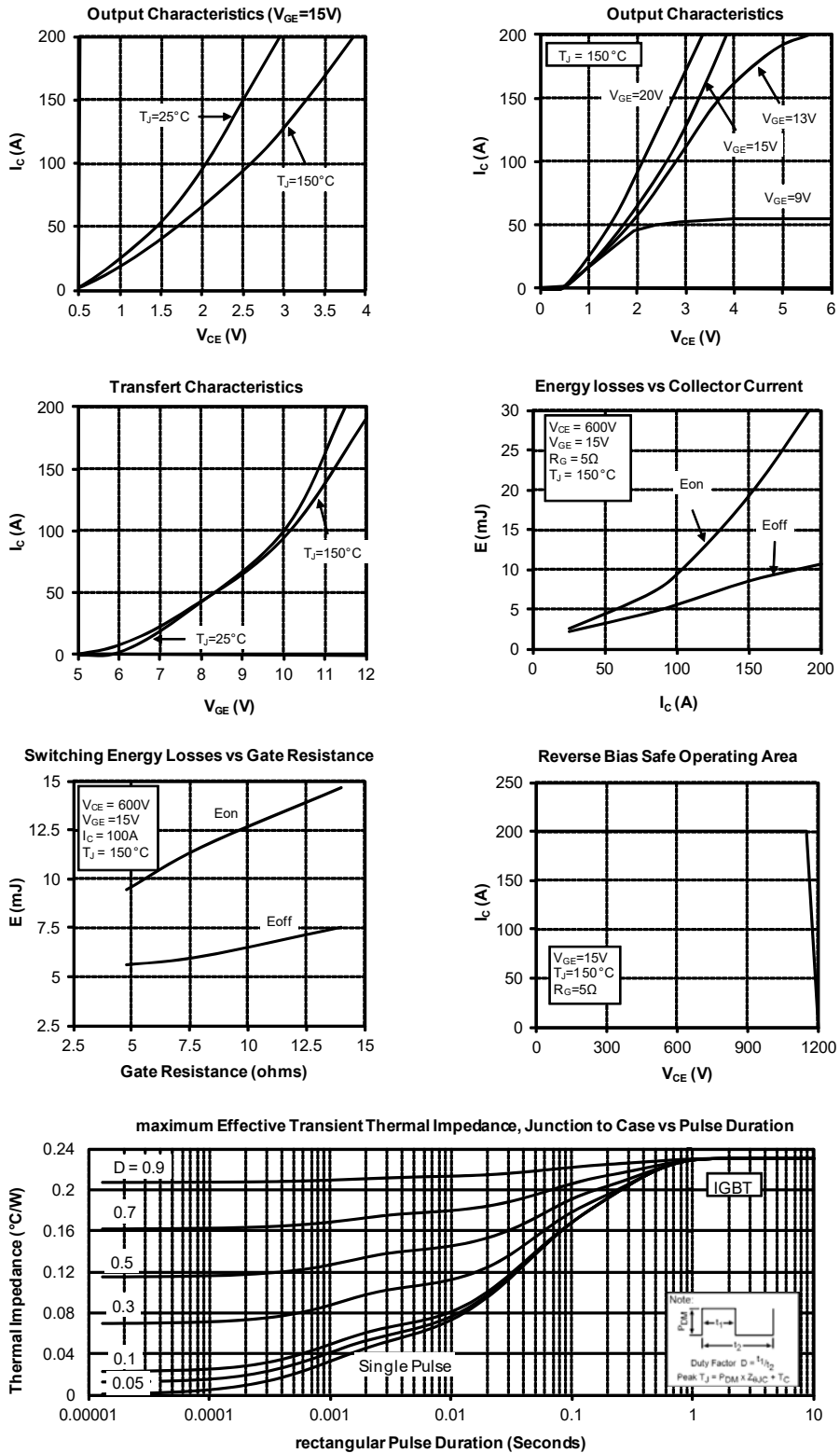
Symbol	Characteristic	Min	Max	Unit		
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000		V		
T _J	Operating junction temperature range	-40	175	°C		
T _{JOP}	Recommended junction temperature under switching conditions	-40	T _{Jmax} -25			
T _{STG}	Storage Temperature Range	-40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

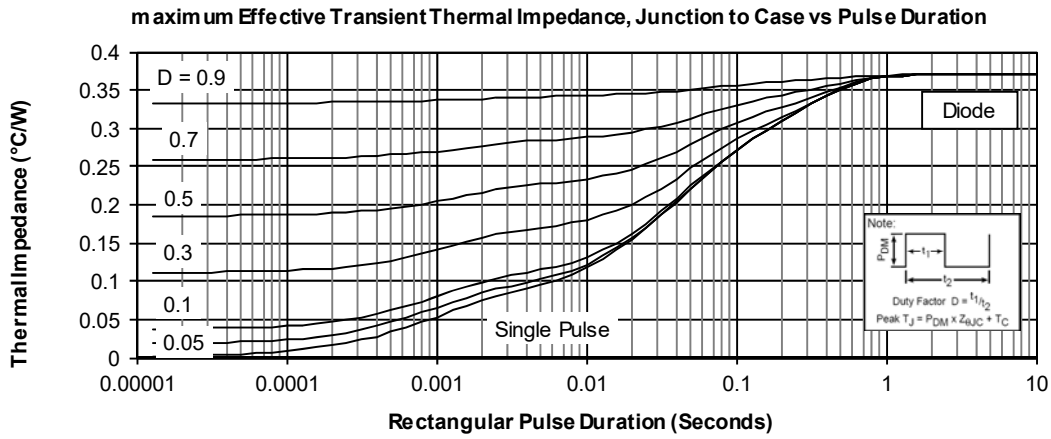
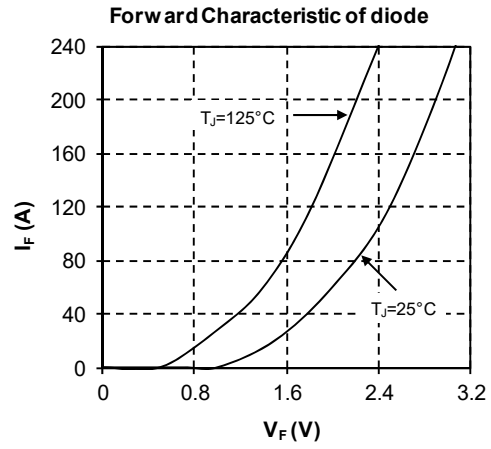
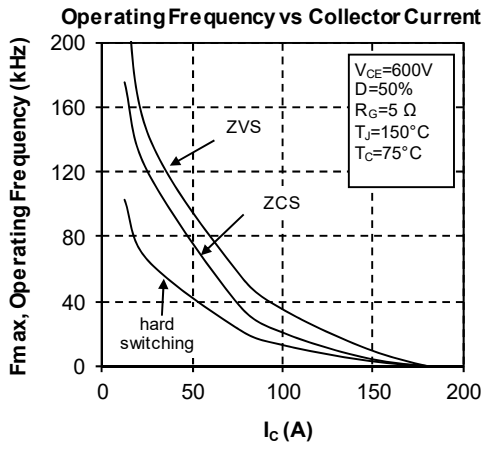
Package outline (dimensions in mm)



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

Typical performance curve





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