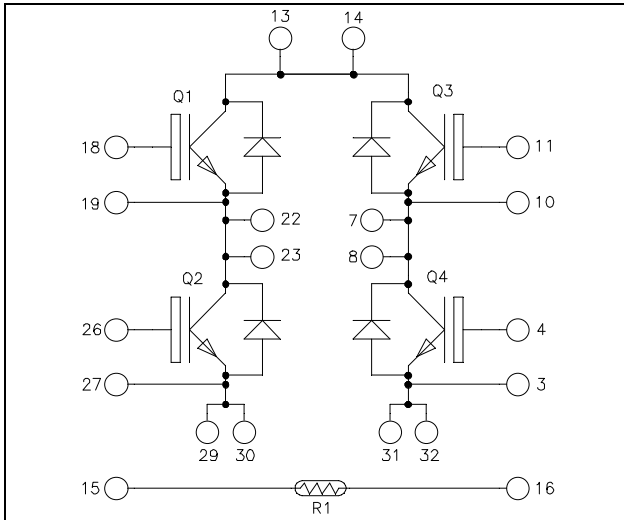


**Full bridge
Trench + Field Stop IGBT4
Power module**

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



Application

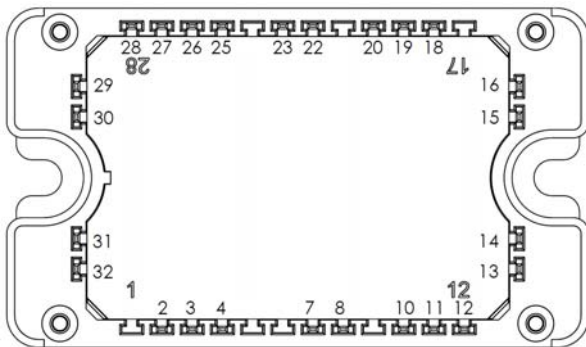
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

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
		$T_j = 25^\circ C$ $T_j = 150^\circ C$				
$V_{GE(th)}$	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	$V_{GE} = \pm 15V; V_{CE} = 600V$ $I_C = 50A$		0.38		μC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ($25^\circ C$) $V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 50A$ $R_G = 8.2\Omega$		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 ($150^\circ C$) $V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 50A$ $R_G = 8.2\Omega$		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	$V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 50A$	$T_j = 25^\circ C$ $T_j = 150^\circ C$	3.8 5.5		mJ
E_{off}	Turn-off Switching Energy	$R_G = 8.2\Omega$	$T_j = 25^\circ C$ $T_j = 150^\circ C$	2.5 4.5		mJ
I_{sc}	Short Circuit data	$V_{GE} \leq 15V; V_{Bus} = 900V$ $t_p \leq 10\mu s; T_j = 150^\circ C$		200		A
R_{thJC}	Junction to Case Thermal Resistance				0.53	$^\circ C/W$

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	$T_c = 80^\circ C$		60		A
V_F	Diode Forward Voltage	$I_F = 60A$		2.5	3	V
		$I_F = 120A$		3		
		$I_F = 60A$	$T_j = 125^\circ C$	1.8		
t_{rr}	Reverse Recovery Time	$I_F = 60A$ $V_R = 800V$ $di/dt = 200A/\mu s$	$T_j = 25^\circ C$	265		ns
			$T_j = 125^\circ C$	350		
			$T_j = 25^\circ C$	560		
Q_{rr}	Reverse Recovery Charge		$T_j = 125^\circ C$	2890		nC
R_{thJC}	Junction to Case Thermal Resistance				0.9	$^\circ C/W$

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

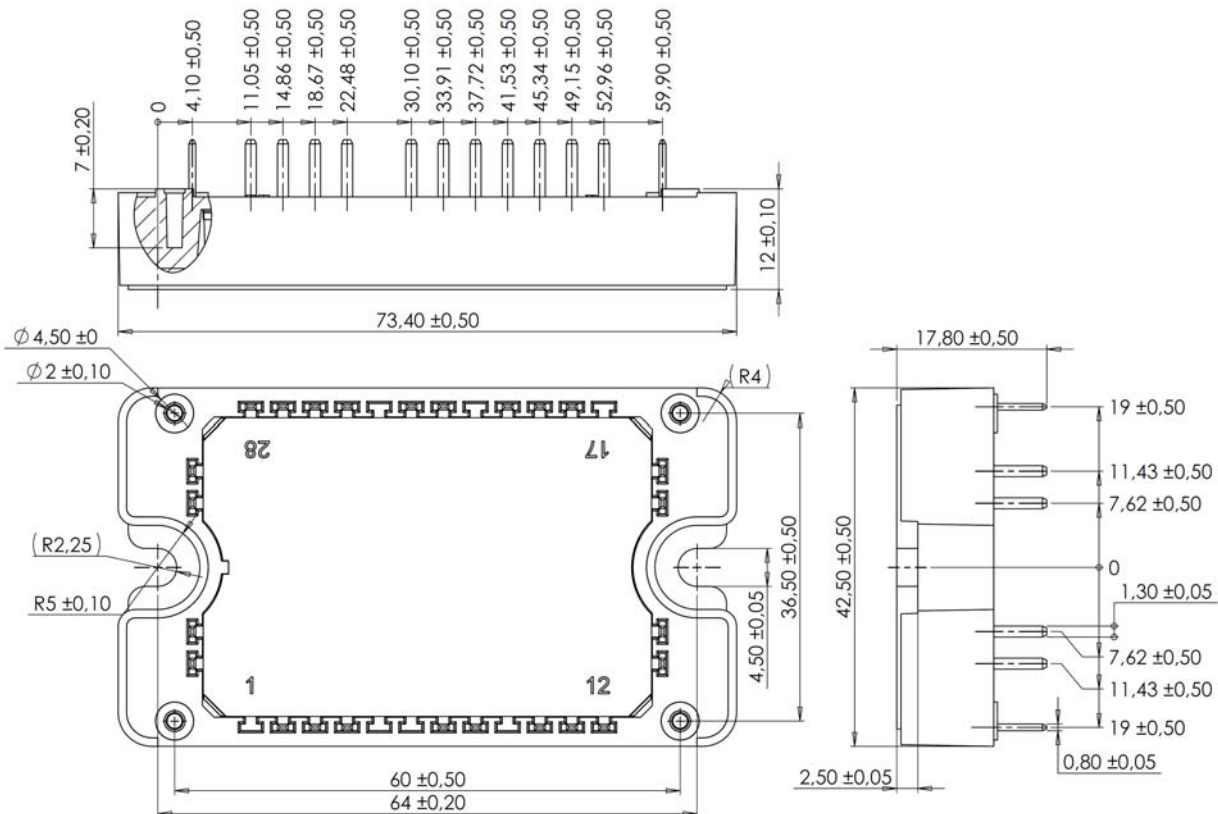
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

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	%

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

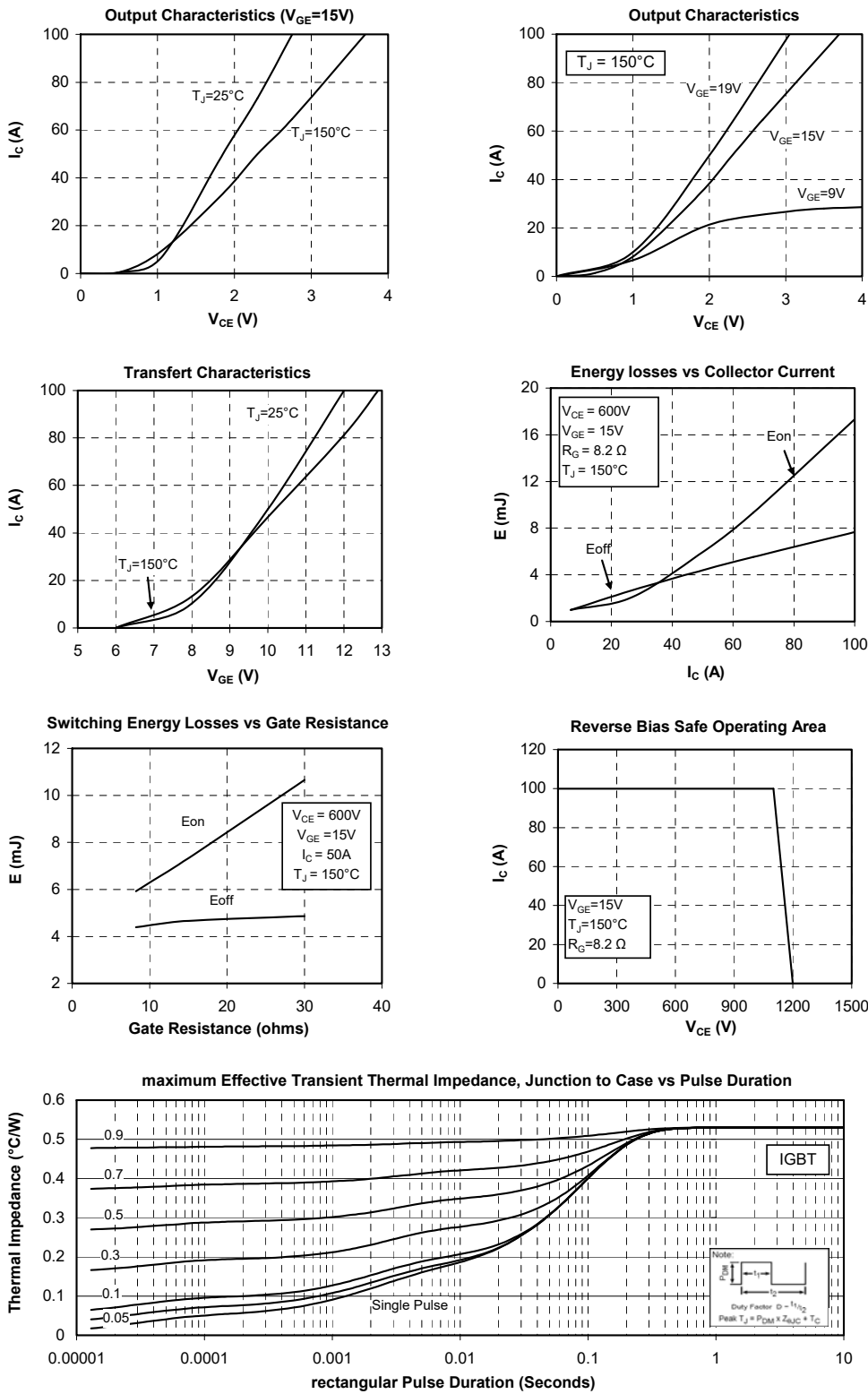
T: Thermistor temperature
 R_T: Thermistor value at T

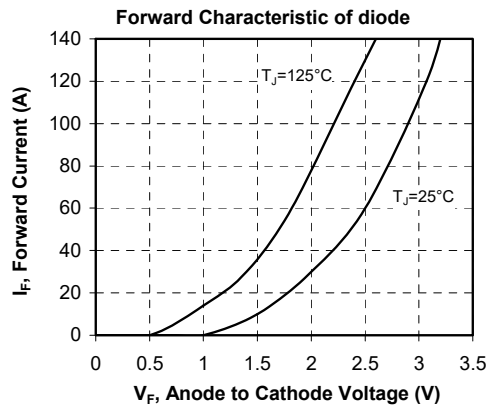
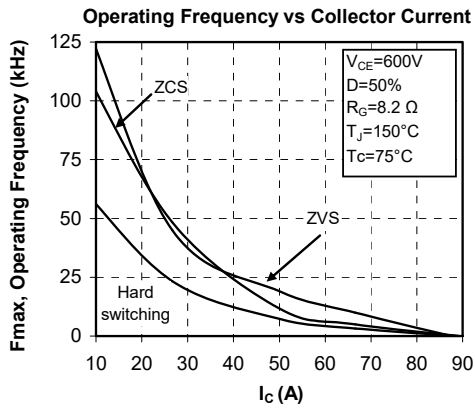
Package outline (dimensions in mm)



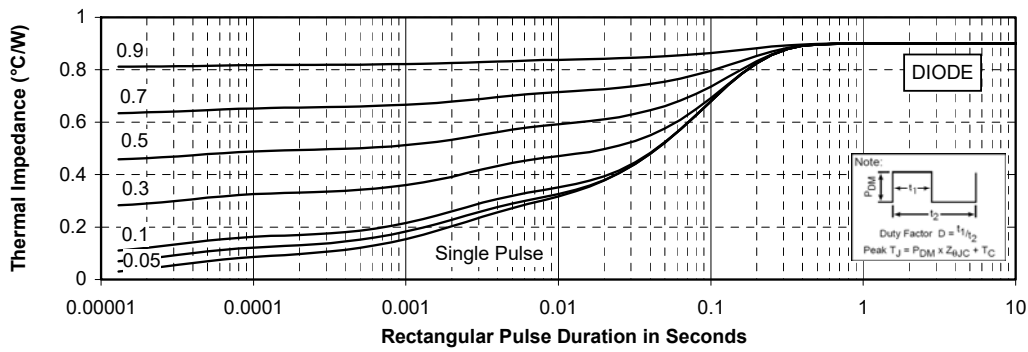
See application note 1906 - Mounting Instructions for SP3F Power Modules on www.microsemi.com

Typical Performance Curve





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



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