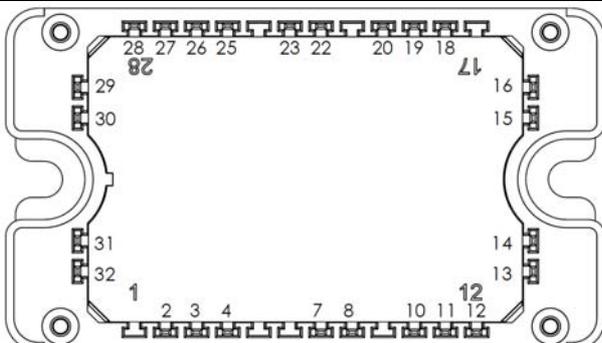
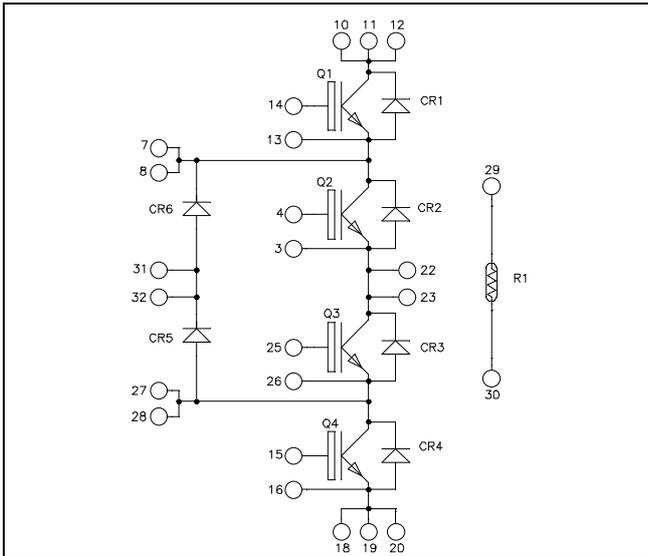


**Three level inverter
Trench + Field Stop IGBT3
Power Module**

**$V_{CES} = 600V$
 $I_C = 75A @ T_c = 80^\circ C$**



All multiple inputs and outputs must be shorted together
 Example: 10/11/12 ; 7/8 ...

Application

- Solar converter
- Uninterruptible Power Supplies

Features

- Trench + Field Stop IGBT3
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 20 kHz
 - Low leakage current
 - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- Very low stray inductance
- High level of integration
- Internal thermistor for temperature monitoring

Benefits

- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Low profile
- RoHS Compliant

All ratings @ $T_j = 25^\circ C$ unless otherwise specified

Q1 to Q4 Absolute maximum ratings (per IGBT)

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Voltage	600	V
I_C	Continuous Collector Current	$T_C = 25^\circ C$	100
		$T_C = 80^\circ C$	75
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ C$	140
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Power Dissipation	$T_C = 25^\circ C$	250
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	150A @ 550V

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

Q1 to Q4 Electrical Characteristics (per IGBT)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I _{CEs}	Zero Gate Voltage Collector Current	V _{GE} = 0V, V _{CE} = 600V			250	μA
V _{CE(sat)}	Collector Emitter Saturation Voltage	V _{GE} = 15V		1.5	1.9	V
		I _C = 75A	T _j = 25°C			
V _{GE(th)}	Gate Threshold Voltage	V _{GE} = V _{CE} , I _C = 600μA	5.0	5.8	6.5	V
I _{GES}	Gate – Emitter Leakage Current	V _{GE} = 20V, V _{CE} = 0V			600	nA

Q1 to Q4 Dynamic Characteristics (per IGBT)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C _{ies}	Input Capacitance	V _{GE} = 0V V _{CE} = 25V f = 1MHz		4620		pF
C _{oes}	Output Capacitance			300		
C _{res}	Reverse Transfer Capacitance			140		
Q _G	Gate charge	V _{GE} = ±15V, I _C = 75A V _{CE} = 300V		0.8		μC
T _{d(on)}	Turn-on Delay Time	Inductive Switching (25°C) V _{GE} = ±15V V _{Bus} = 300V I _C = 75A R _G = 4.7Ω		110		ns
T _r	Rise Time			45		
T _{d(off)}	Turn-off Delay Time			200		
T _f	Fall Time			40		
T _{d(on)}	Turn-on Delay Time	Inductive Switching (150°C) V _{GE} = ±15V V _{Bus} = 300V I _C = 75A R _G = 4.7Ω		120		ns
T _r	Rise Time			50		
T _{d(off)}	Turn-off Delay Time			250		
T _f	Fall Time			60		
E _{on}	Turn-on Switching Energy	V _{GE} = ±15V V _{Bus} = 300V		0.6		mJ
E _{off}	Turn-off Switching Energy	I _C = 75A R _G = 4.7Ω		2.6		mJ
I _{sc}	Short Circuit data	V _{GE} ≤ 15V ; V _{Bus} = 360V t _p ≤ 6μs ; T _j = 150°C		380		A
R _{thJC}	Junction to Case Thermal Resistance				0.60	°C/W

CR1 to CR4 diode ratings and characteristics (per diode)

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V _{RRM}	Peak Repetitive Reverse Voltage					600	V
I _{RM}	Reverse Leakage Current	V _R =600V				150	μA
I _F	DC Forward Current		T _c = 80°C		50		A
V _F	Diode Forward Voltage	I _F = 50A V _{GE} = 0V	T _j = 25°C		1.6	2	V
			T _j = 150°C		1.5		
t _{rr}	Reverse Recovery Time		T _j = 25°C		100		ns
			T _j = 150°C		150		
Q _{rr}	Reverse Recovery Charge	I _F = 50A V _R = 300V di/dt = 1800A/μs	T _j = 25°C		2.6		μC
			T _j = 150°C		5.4		
E _{rr}	Reverse Recovery Energy		T _j = 25°C		0.60		mJ
			T _j = 150°C		1.20		
R _{thJC}	Junction to Case Thermal Resistance					1.42	°C/W

CR5 & CR6 diode ratings and characteristics (per diode)

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V _{RRM}	Peak Repetitive Reverse Voltage					600	V
I _{RM}	Reverse Leakage Current	V _R =600V				250	μA
I _F	DC Forward current		T _c = 80°C		75		A
V _F	Diode Forward Voltage	I _F = 75A V _{GE} = 0V	T _j = 25°C		1.6	2	V
			T _j = 150°C		1.5		
t _{rr}	Reverse Recovery Time		T _j = 25°C		100		ns
			T _j = 150°C		150		
Q _{rr}	Reverse Recovery Charge	I _F = 75A V _R = 300V di/dt = 2000A/μs	T _j = 25°C		3.6		μC
			T _j = 150°C		7.6		
E _{rr}	Reverse Recovery Energy		T _j = 25°C		0.85		mJ
			T _j = 150°C		1.8		
R _{thJC}	Junction to Case Thermal Resistance					0.98	°C/W

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

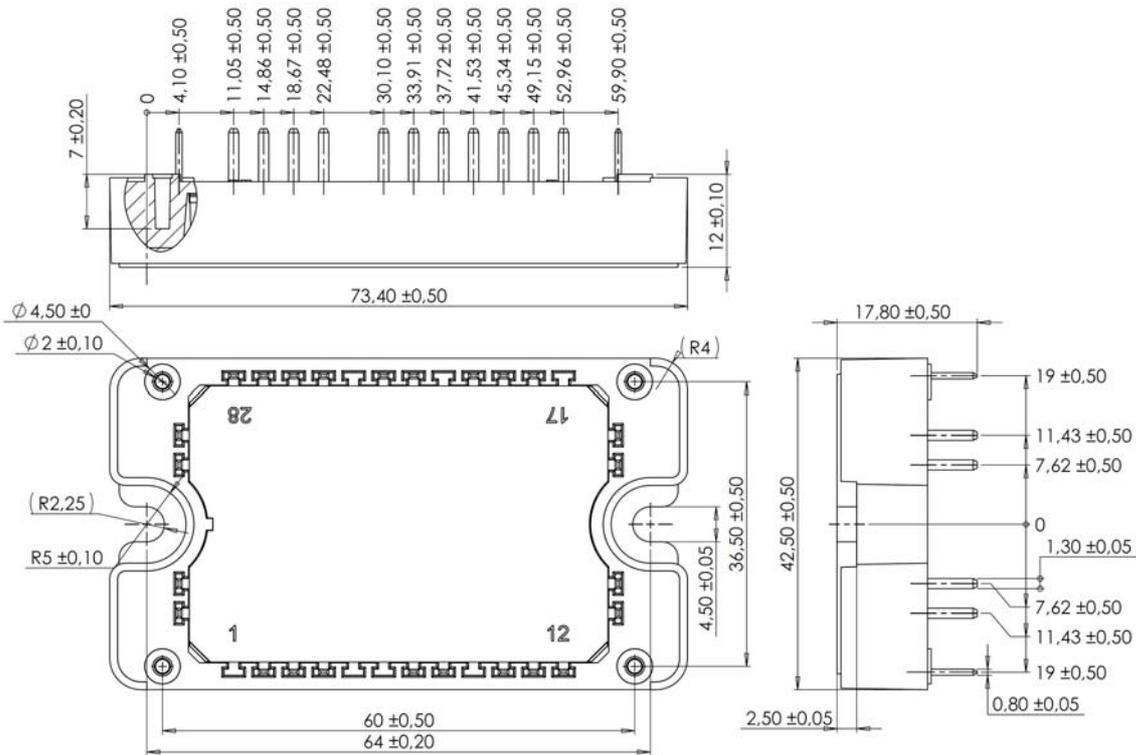
Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
ΔR ₂₅ /R ₂₅			5		%
B _{25/85}	T ₂₅ = 298.15 K		3952		K
ΔB/B			4		%

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

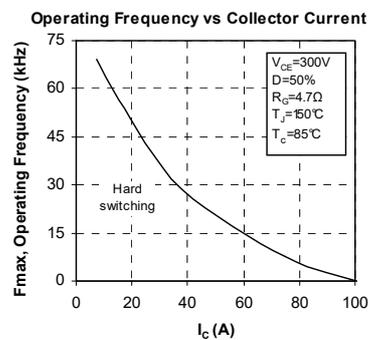
T: Thermistor temperature
 R_T: Thermistor value at T

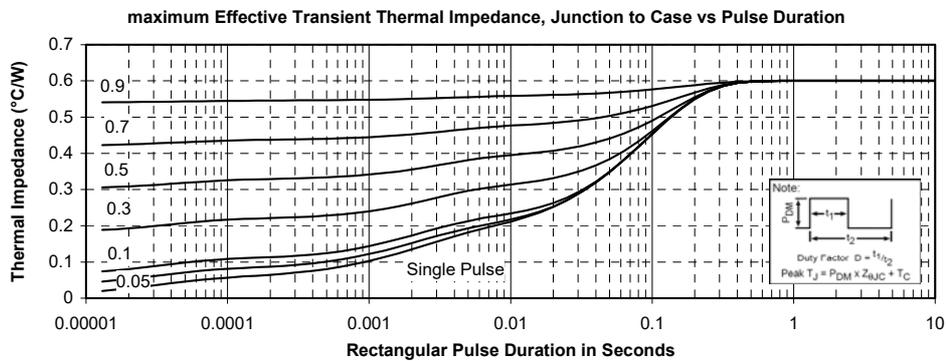
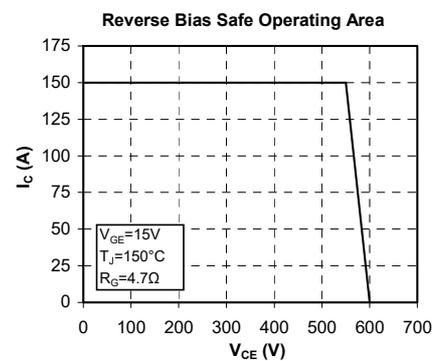
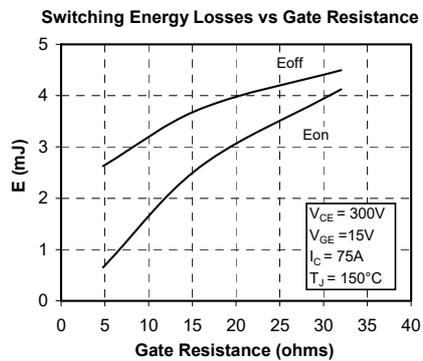
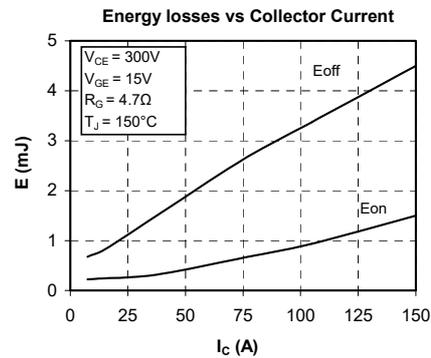
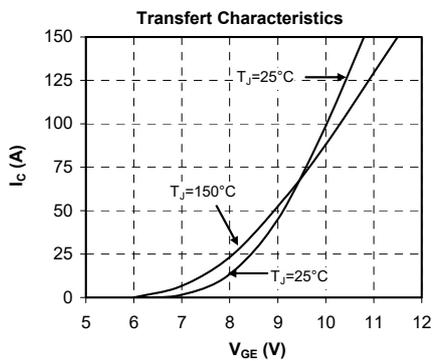
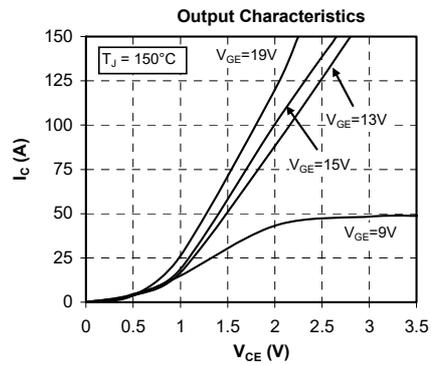
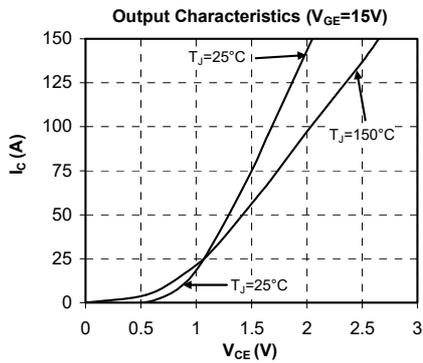
Thermal and package characteristics

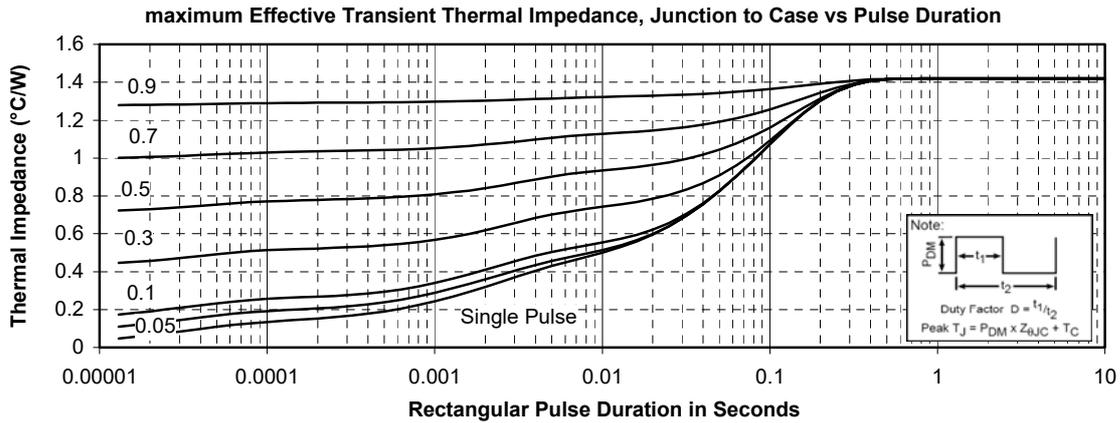
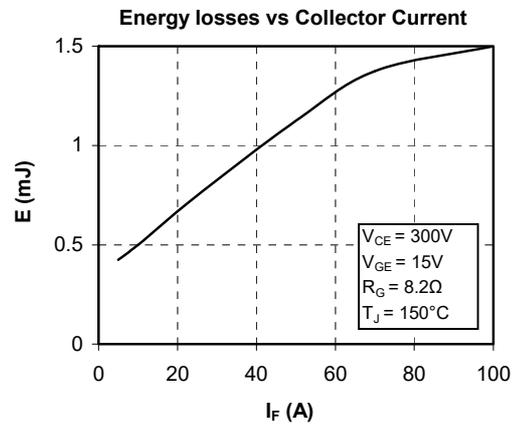
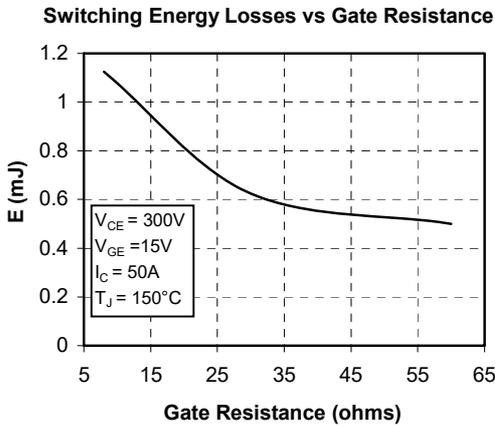
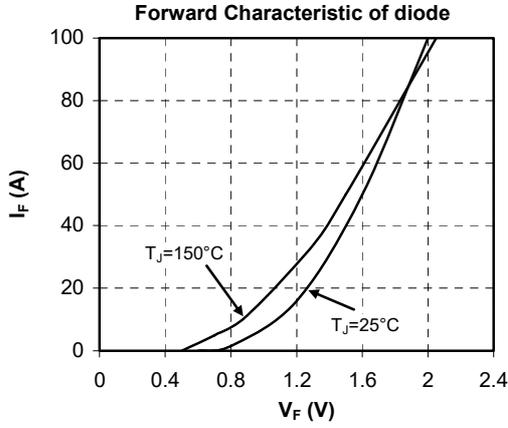
Symbol	Characteristic	Min	Max	Unit		
V _{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000		V		
T _J	Operating junction temperature range	-40	175	°C		
T _{JOP}	Recommended junction temperature under switching conditions	-40	T _{Jmax} -25			
T _{STG}	Storage Temperature Range	-40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

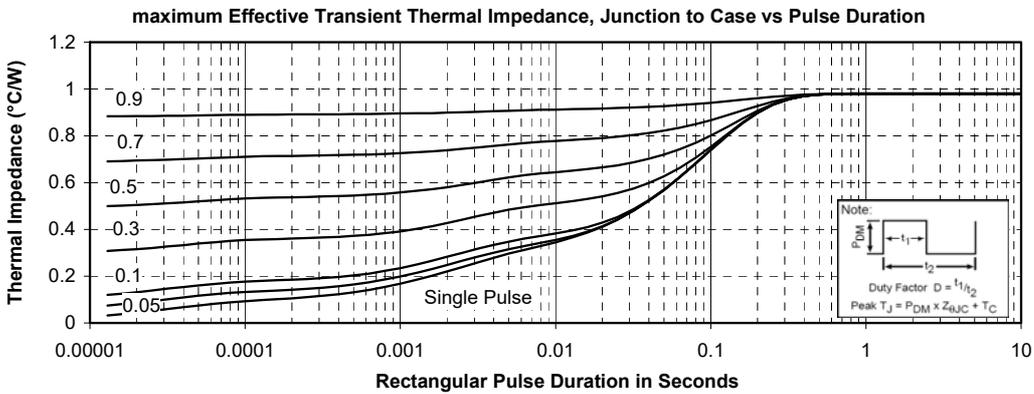
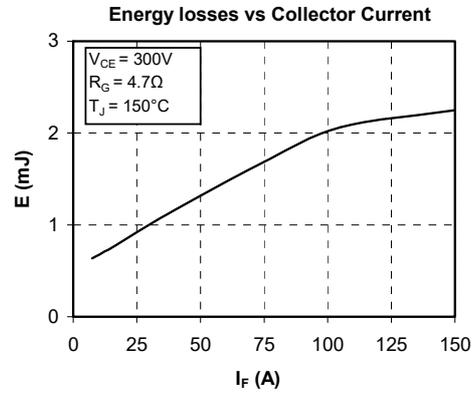
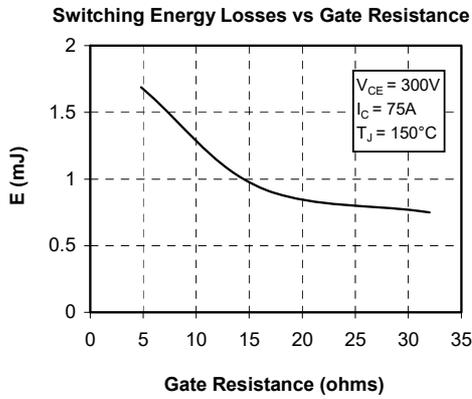
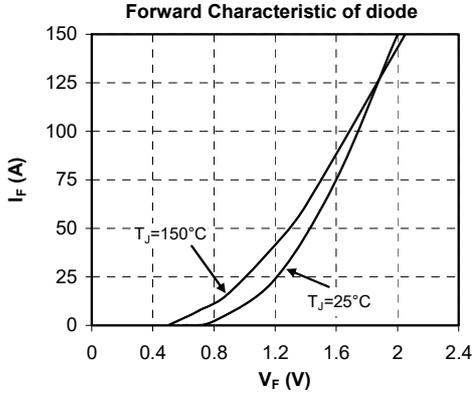
Package outline (dimensions in mm)


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

Q1 to Q4 Typical performance curve




CR1 to CR4 Typical performance curve


CR5 & CR6 Typical performance curve


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