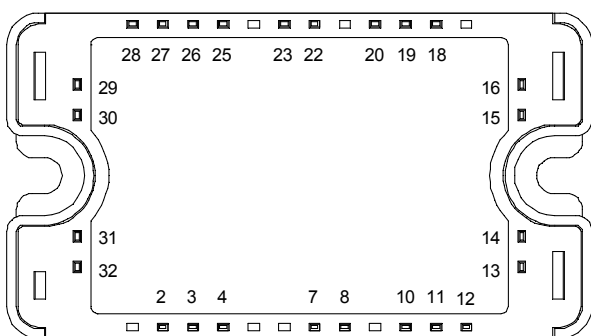
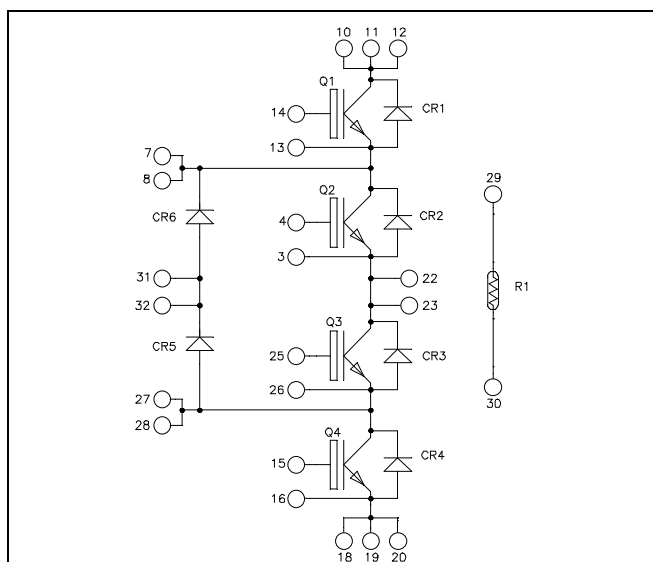


*Three level inverter
Trench + Field Stop IGBT4*

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



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 IGBT 4 Technology
 - Low voltage drop
 - Low leakage current
 - Low switching losses
- 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
- Easy paralleling due to positive TC of V_{CESat}
- Low profile
- RoHS Compliant

Q1 to Q4 Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown 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	Maximum 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.
See application note APT0502 on www.microsemi.com

All ratings @ $T_J = 25^\circ\text{C}$ unless otherwise specified

Q1 to Q4 Electrical Characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0V, V_{CE} = 1200V$			1	mA
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15V$ $I_C = 50A$		1.8 2.2	2.2	V
		$T_J = 25^\circ\text{C}$ $T_J = 150^\circ\text{C}$				
$V_{GE(th)}$	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

Q1 to Q4 Dynamic Characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
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°C) $V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 50A$ $R_G = 8.2\Omega$		50		ns
T_r	Rise Time			27		
$T_{d(off)}$	Turn-off Delay Time			270		
T_f	Fall Time			70		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) $V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 50A$ $R_G = 8.2\Omega$		50		ns
T_r	Rise Time			30		
$T_{d(off)}$	Turn-off Delay Time			290		
T_f	Fall Time			80		
E_{on}	Turn-on Switching Energy	$V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 50A$	$T_J = 25^\circ\text{C}$ $T_J = 150^\circ\text{C}$	3.8 5.5		mJ
E_{off}	Turn-off Switching Energy	$R_G = 8.2\Omega$	$T_J = 25^\circ\text{C}$ $T_J = 150^\circ\text{C}$	2.5 4.5		mJ
I_{sc}	Short Circuit data	$V_{GE} \leq 15V; V_{Bus} = 900V$ $t_p \leq 10\mu s; T_J = 150^\circ\text{C}$		200		A
R_{thJC}	Junction to Case Thermal Resistance				0.53	$^\circ\text{C/W}$

CR1 to CR6 diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V _{RRM}	Maximum Peak Repetitive Reverse Voltage			1200			V
I _{RM}	Maximum Reverse Leakage Current	V _R =600V	T _j = 25°C T _j = 150°C			100 500	μA
I _F	DC Forward Current		T _c = 80°C		30		A
V _F	Diode Forward Voltage	I _F = 30A			2.6	3.1	V
		I _F = 60A			3.2		
		I _F = 30A	T _j = 125°C		1.8		
t _{rr}	Reverse Recovery Time	I _F = 30A V _R = 800V di/dt = 200A/μs	T _j = 25°C		300		ns
			T _j = 125°C		380		
Q _{rr}	Reverse Recovery Charge		T _j = 25°C		360		nC
			T _j = 125°C		1700		
E _{rr}	Reverse Recovery Energy	I _F = 30A V _R = 800V di/dt = 1000A/μs	T _j = 125°C		1.6		mJ
R _{thJC}	Junction to Case Thermal Resistance					1.2	°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		%

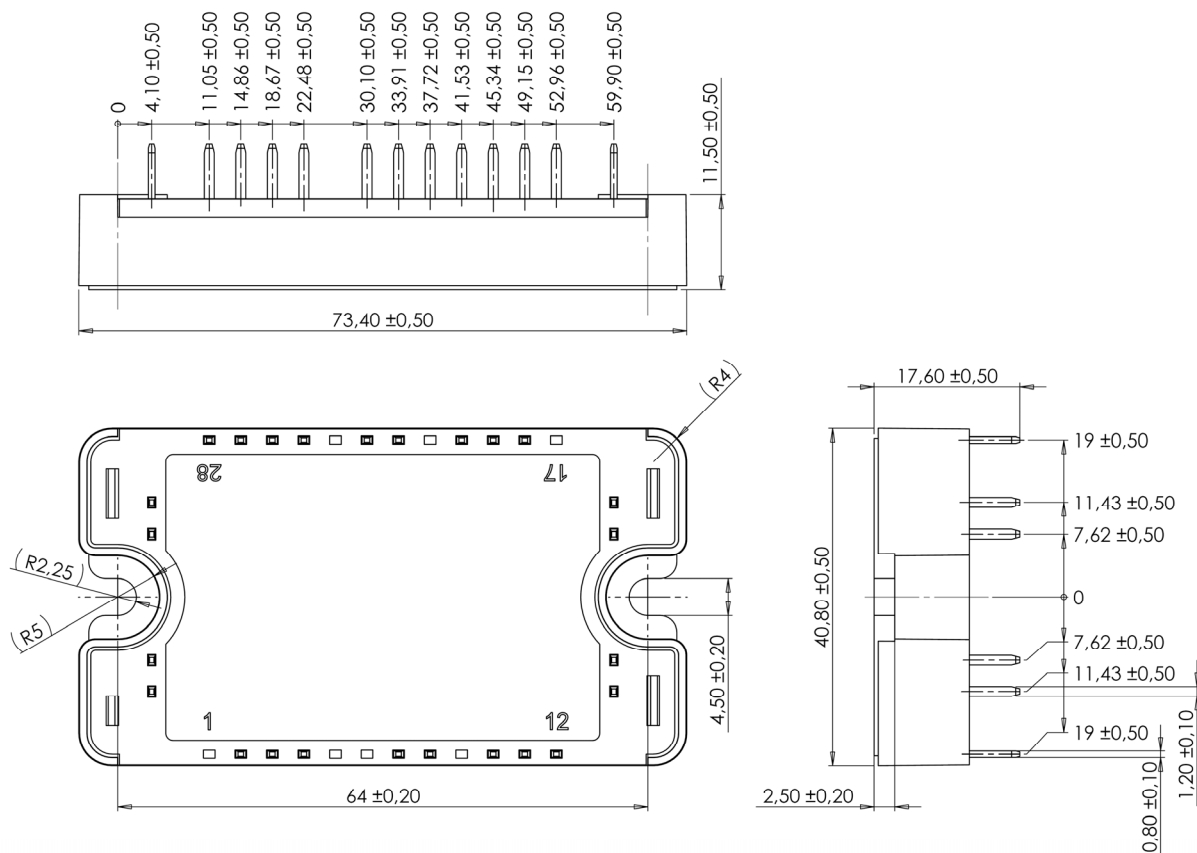
$$R_T = \frac{R_{25}}{\exp \left[B_{25/85} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

T: Thermistor temperature
R_T: Thermistor value at T

Thermal and package characteristics

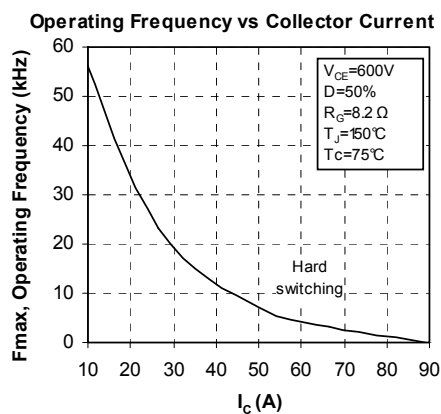
Symbol	Characteristic			Min	Typ	Max	Unit
V _{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000			V
T _J	Operating junction temperature range			-40		175	°C
T _{STG}	Storage Temperature Range			-40		125	
T _C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M4	2		3	N.m
Wt	Package Weight					110	g

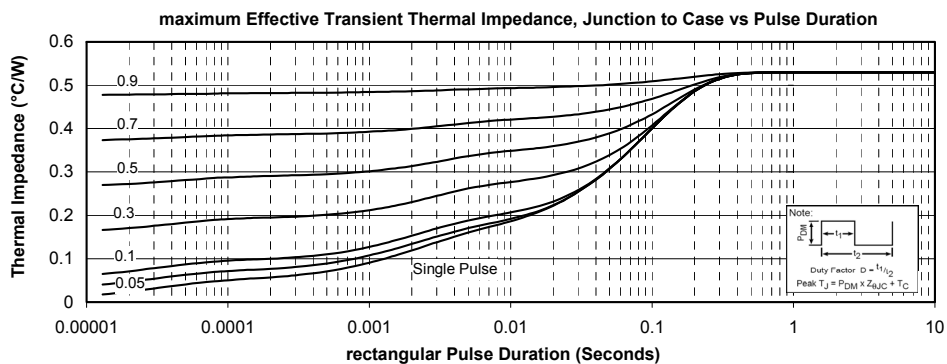
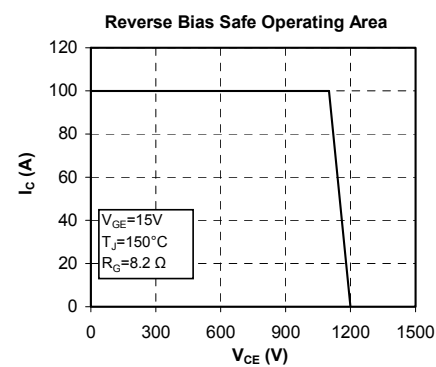
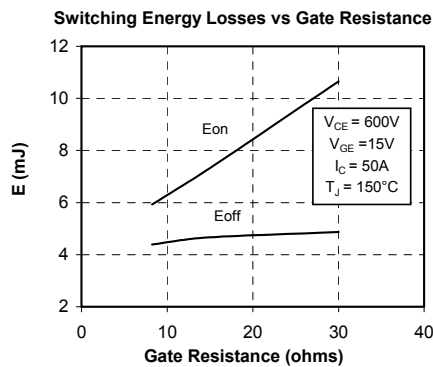
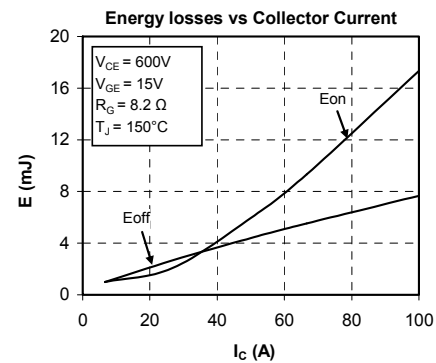
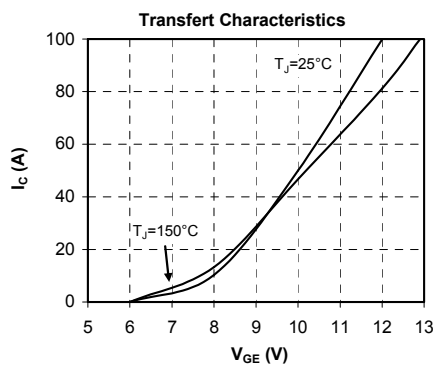
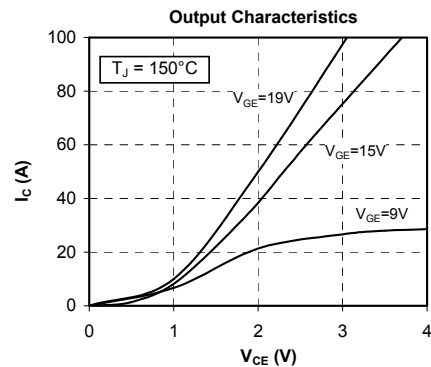
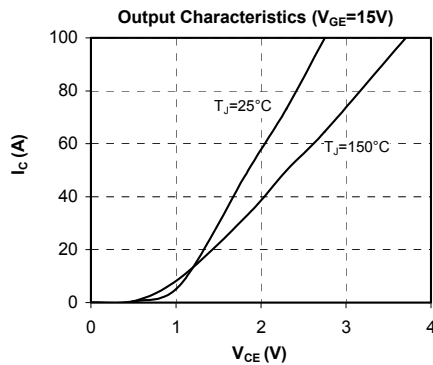
SP3 Package outline (dimensions in mm)



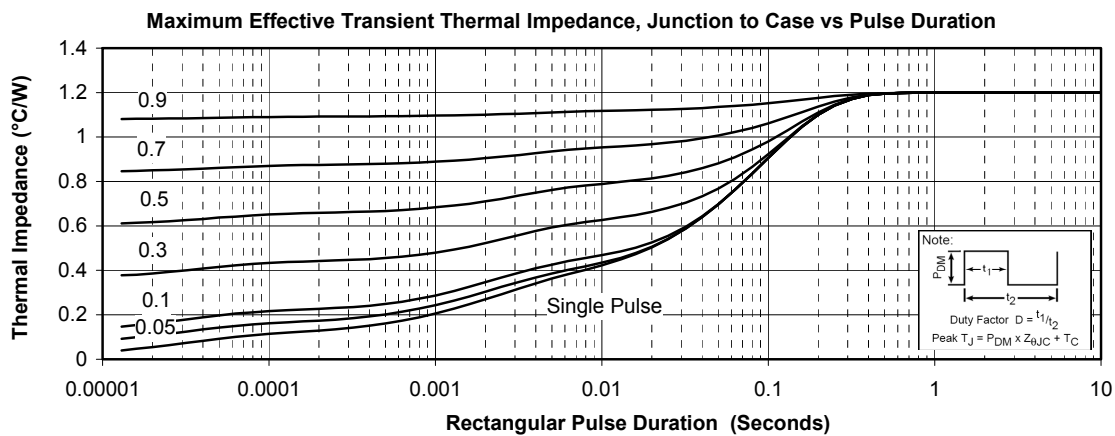
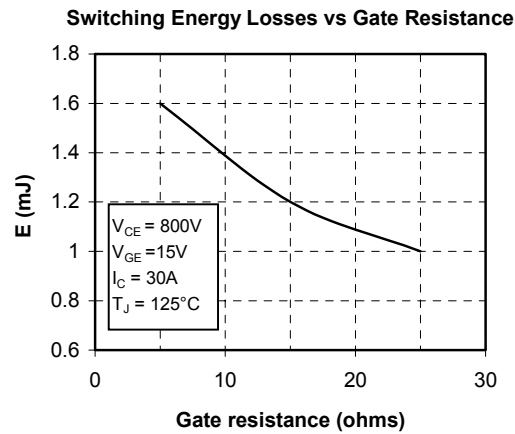
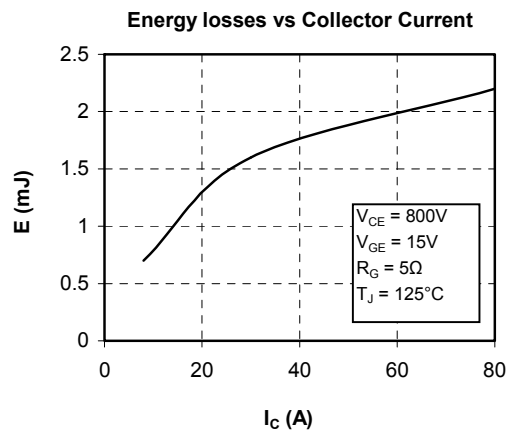
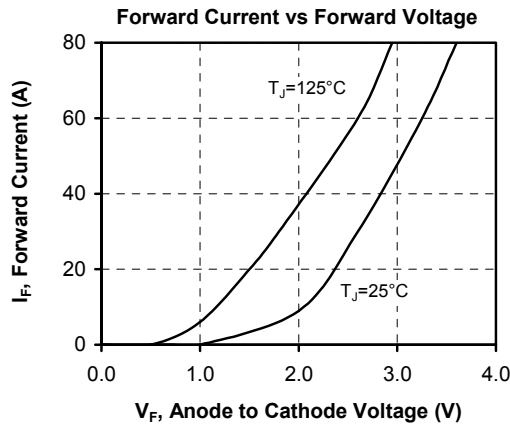
See application note 1901 - Mounting Instructions for SP3 Power Modules on www.microsemi.com

Q1 to Q4 Typical performance curve





CR1 to CR6 Typical performance curve



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