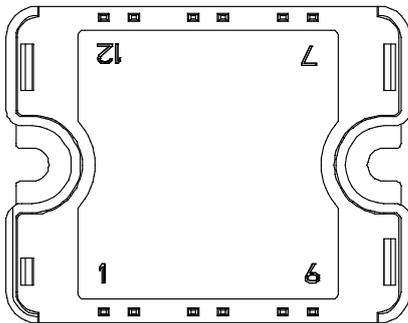
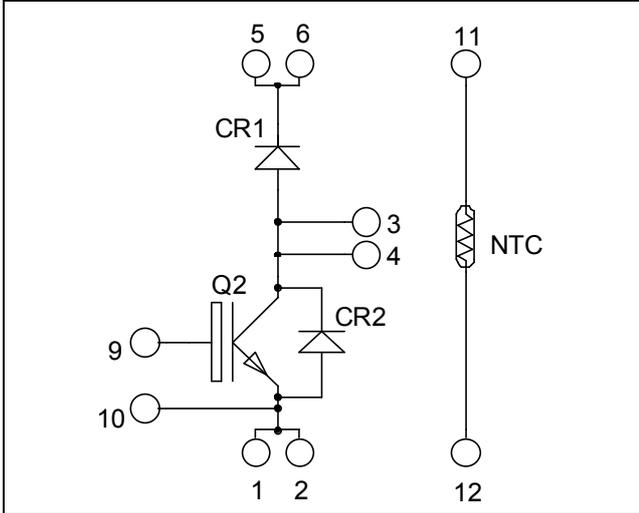


**Boost chopper  
High speed Trench + Field Stop IGBT4  
Power Module**

**$V_{CES} = 1200V$   
 $I_C = 100A @ T_c = 80^\circ C$**



Pins 1/2 ; 3/4 ; 5/6 must be shorted together

**Application**

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction

**Features**

- **High speed Trench + Field Stop IGBT 4 Technology**
  - Low voltage drop
  - Low leakage current
  - Low switching losses
- 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
- RoHS Compliant

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

**Absolute maximum ratings**

Symbol	Parameter	Max ratings	Unit
$V_{CES}$	Collector - Emitter Voltage	1200	V
$I_C$	Continuous Collector Current	$T_c = 25^\circ C$	170
		$T_c = 80^\circ C$	100
$I_{CM}$	Pulsed Collector Current	$T_c = 25^\circ C$	340
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Power Dissipation	520	W

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

**Electrical Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I <sub>CEs</sub>	Zero Gate Voltage Collector Current	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 1200V			50	μA
V <sub>CE(sat)</sub>	Collector Emitter Saturation Voltage	V <sub>GE</sub> = 15V I <sub>C</sub> = 100A	1.78	2.05	2.42	V
		T <sub>j</sub> = 25°C T <sub>j</sub> = 150°C		2.6		
V <sub>GE(th)</sub>	Gate Threshold Voltage	V <sub>GE</sub> = V <sub>CE</sub> , I <sub>C</sub> = 3.8 mA	5.1	5.8	6.4	V
I <sub>GES</sub>	Gate – Emitter Leakage Current	V <sub>GE</sub> = 20V, V <sub>CE</sub> = 0V			150	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C <sub>ies</sub>	Input Capacitance	V <sub>GE</sub> = 0V V <sub>CE</sub> = 25V f = 1MHz		6150		pF
C <sub>oes</sub>	Output Capacitance			460		
C <sub>res</sub>	Reverse Transfer Capacitance			345		
Q <sub>G</sub>	Gate charge	V <sub>GE</sub> = 15V, I <sub>C</sub> = 100A V <sub>CE</sub> = 960V		460		nC
T <sub>d(on)</sub>	Turn-on Delay Time	Inductive Switching (25°C) V <sub>GE</sub> = ±15V V <sub>Bus</sub> = 600V I <sub>C</sub> = 100A R <sub>G</sub> = 5Ω		30		ns
T <sub>r</sub>	Rise Time			57		
T <sub>d(off)</sub>	Turn-off Delay Time			290		
T <sub>f</sub>	Fall Time			16		
T <sub>d(on)</sub>	Turn-on Delay Time	Inductive Switching (150°C) V <sub>GE</sub> = ±15V V <sub>Bus</sub> = 600V I <sub>C</sub> = 100A R <sub>G</sub> = 5Ω		30		ns
T <sub>r</sub>	Rise Time			49		
T <sub>d(off)</sub>	Turn-off Delay Time			366		
T <sub>f</sub>	Fall Time			48		
E <sub>on</sub>	Turn on Energy	V <sub>GE</sub> = ±15V V <sub>Bus</sub> = 600V I <sub>C</sub> = 100A		9.5		mJ
E <sub>off</sub>	Turn off Energy	R <sub>G</sub> = 5Ω		5.6		
R <sub>G</sub>	Integrated gate resistor			7.5		Ω
I <sub>sc</sub>	Short Circuit data	V <sub>GE</sub> ≤ 15V ; V <sub>Bus</sub> = 600V t <sub>p</sub> ≤ 10μs ; T <sub>j</sub> = 150°C		350		A
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.29	°C/W

**Chopper diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V <sub>RRM</sub>	Peak Repetitive Reverse Voltage				1200	V
I <sub>RM</sub>	Reverse Leakage Current	V <sub>R</sub> = 1200V			100	μA
I <sub>F</sub>	DC Forward Current	T <sub>c</sub> = 60°C		100		A
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 100A		2.4	3.5	V
		I <sub>F</sub> = 150A		2.7		
		I <sub>F</sub> = 100A	T <sub>j</sub> = 125°C	1.8		
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 100A V <sub>R</sub> = 800V di/dt = 200A/μs	T <sub>j</sub> = 25°C	385		ns
			T <sub>j</sub> = 125°C	480		
Q <sub>rr</sub>	Reverse Recovery Charge		T <sub>j</sub> = 25°C	1.05		μC
			T <sub>j</sub> = 125°C	5.24		
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.35	°C/W

**IGBT parallel diode ratings and characteristics**

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V <sub>RRM</sub>	Peak Repetitive Reverse Voltage					1200	V
I <sub>RM</sub>	Reverse Leakage Current	V <sub>R</sub> =1200V				100	μA
I <sub>F</sub>	DC Forward Current		T <sub>c</sub> = 70°C		30		A
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 30A			2.6	3.5	V
		I <sub>F</sub> = 60A			3.2		
		I <sub>F</sub> = 30A	T <sub>j</sub> = 125°C		1.8		
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 30A V <sub>R</sub> = 800V di/dt = 200A/μs	T <sub>j</sub> = 25°C		300		ns
	T <sub>j</sub> = 125°C			360			
Q <sub>rr</sub>	Reverse Recovery Charge	I <sub>F</sub> = 30A V <sub>R</sub> = 800V di/dt = 200A/μs	T <sub>j</sub> = 25°C		360		nC
	T <sub>j</sub> = 125°C			1700			
R <sub>thJC</sub>	Junction to Case Thermal Resistance					1.2	°C/W

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

<i>Symbol</i>	<i>Characteristic</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
R <sub>25</sub>	Resistance @ 25°C		50		kΩ
ΔR <sub>25</sub> /R <sub>25</sub>			5		%
B <sub>25/85</sub>	T <sub>25</sub> = 298.15 K		3952		K
ΔB/B			4		%

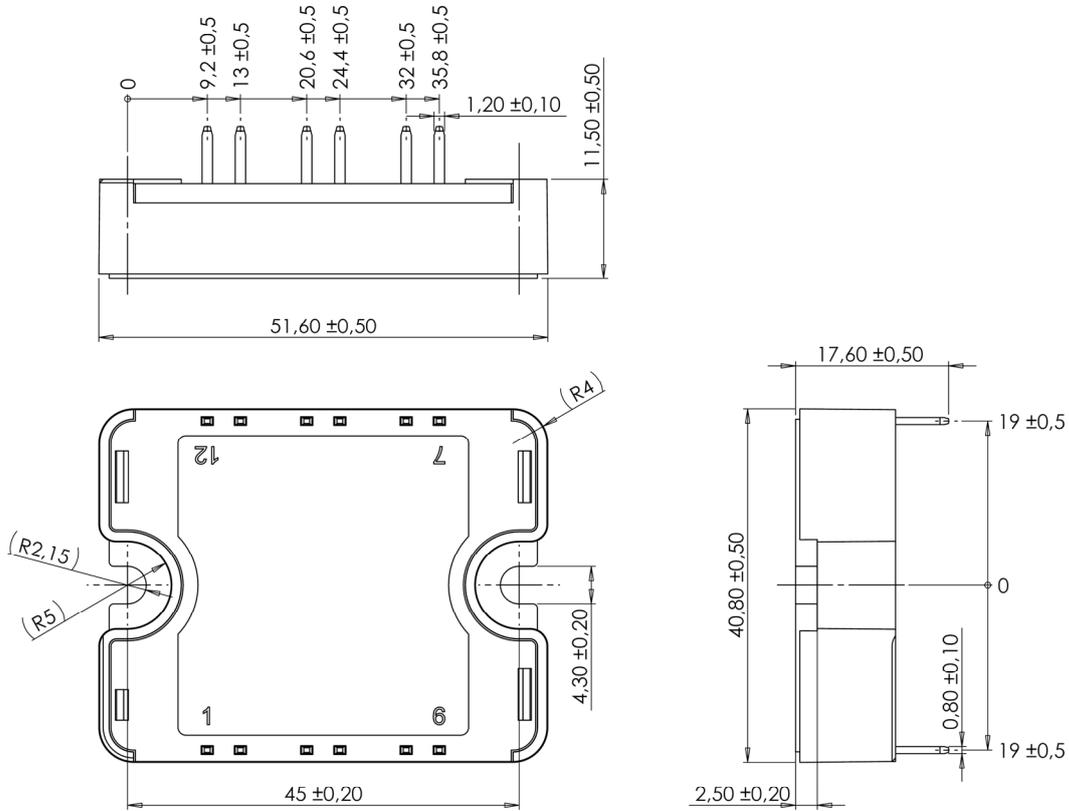
$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

T: Thermistor temperature  
 R<sub>T</sub>: Thermistor value at T

**Thermal and package characteristics**

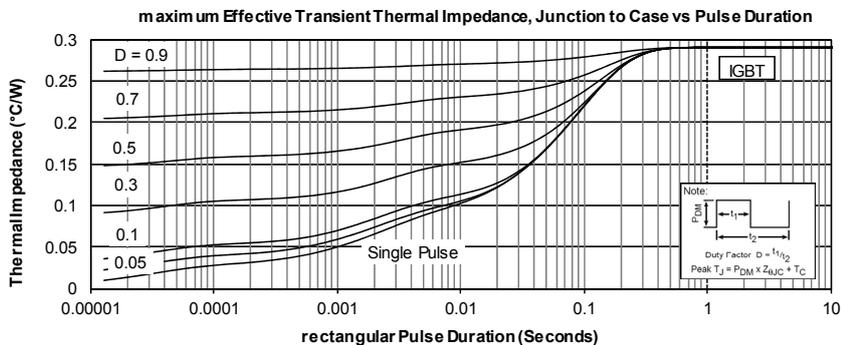
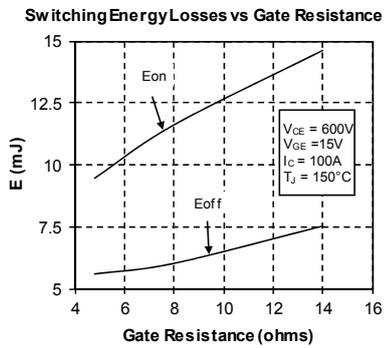
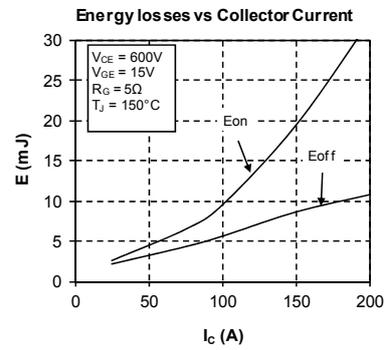
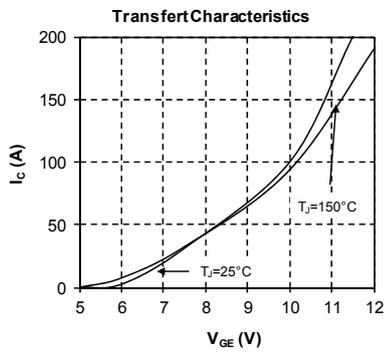
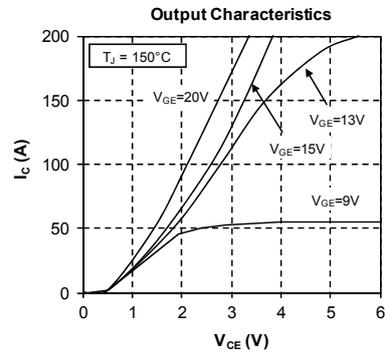
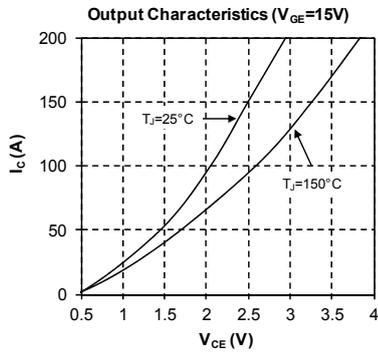
<i>Symbol</i>	<i>Characteristic</i>	<i>Min</i>	<i>Max</i>	<i>Unit</i>		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000		V		
T <sub>J</sub>	Operating junction temperature range	-40	175	°C		
T <sub>JOP</sub>	Recommended junction temperature under switching conditions	-40	T <sub>Jmax</sub> -25			
T <sub>STG</sub>	Storage Temperature Range	-40	125			
T <sub>C</sub>	Operating Case Temperature	-40	125			
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				80	g

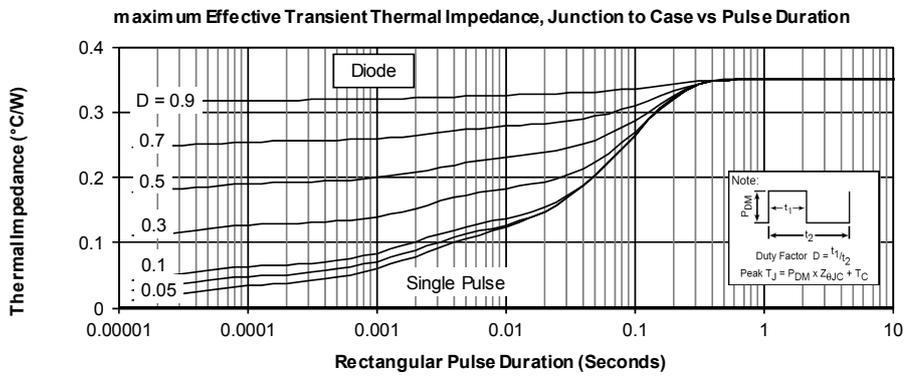
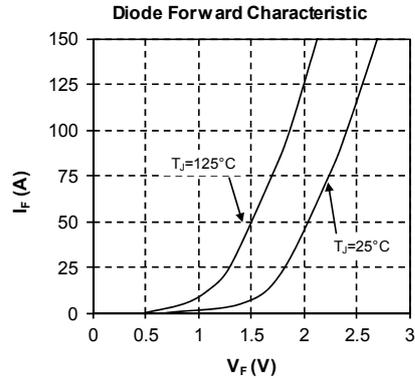
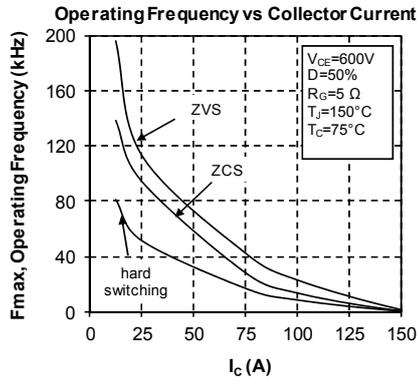
**Package outline (dimensions in mm)**



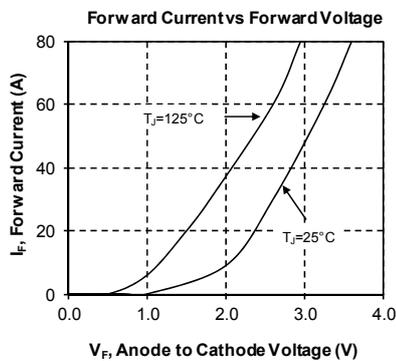
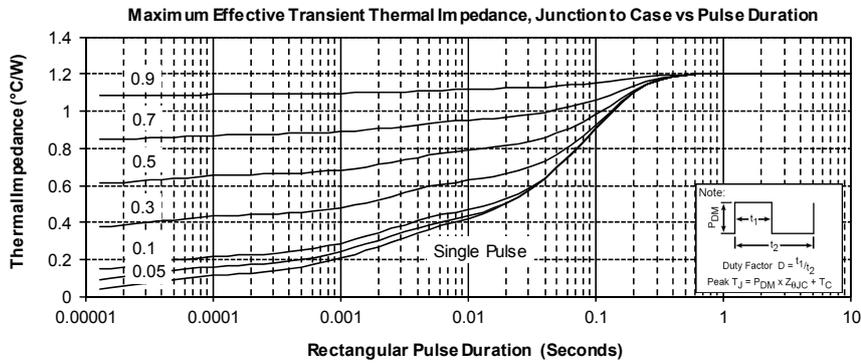
See application note 1904 - Mounting Instructions for SP1 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical IGBT & chopper diode performance curves





## IGBT parallel diode Typical Performance Curves



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