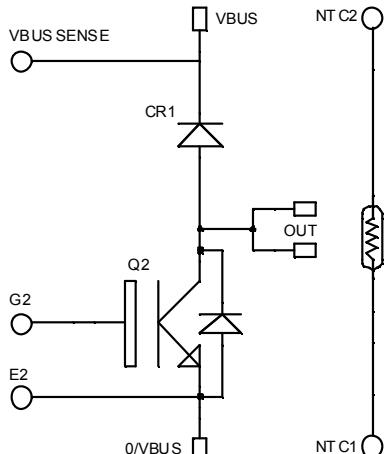


**Boost chopper  
Fast Trench + Field Stop IGBT®  
Power Module**

**V<sub>CES</sub> = 1200V  
I<sub>C</sub> = 150A @ T<sub>c</sub> = 80°C**

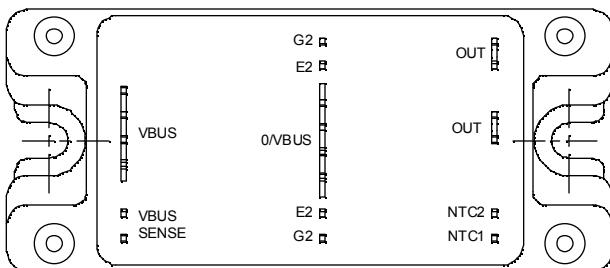


**Application**

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

**Features**

- Fast Trench + Field Stop IGBT® Technology
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 20 kHz
  - Soft recovery parallel diodes
  - Low diode VF
  - Low leakage current
  - Avalanche energy rated
  - RBSOA and SCOSA rated
- Kelvin emitter for easy drive
- Very low stray inductance
  - Symmetrical design
  - Lead frames for power connections
- High level of integration
- Internal thermistor for temperature monitoring



**Benefits**

- Stable temperature behavior
- Very rugged
- Solderable terminals for easy PCB mounting
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive TC of VCESat
- Low profile
- RoHS Compliant

**Absolute maximum ratings**

Symbol	Parameter	Max ratings	Unit
V <sub>CES</sub>	Collector - Emitter Breakdown Voltage	1200	V
I <sub>C</sub>	Continuous Collector Current	T <sub>c</sub> = 25°C	220
		T <sub>c</sub> = 80°C	150
I <sub>CM</sub>	Pulsed Collector Current	T <sub>c</sub> = 25°C	350
V <sub>GE</sub>	Gate – Emitter Voltage	±20	V
P <sub>D</sub>	Maximum Power Dissipation	T <sub>c</sub> = 25°C	690
RBSOA	Reverse Bias Safe Operating Area	T <sub>j</sub> = 125°C	300A @ 1150V

 **CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on [www.microsemi.com](http://www.microsemi.com)

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

**Electrical Characteristics**

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
$I_{CES}$	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}$ , $V_{CE} = 1200\text{V}$				350	$\mu\text{A}$
$V_{CE(\text{sat})}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 150\text{A}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		1.7 2.0	2.1	$\text{V}$
$V_{GE(\text{th})}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$ , $I_C = 3\text{ mA}$		5.0	5.8	6.5	
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}$ , $V_{CE} = 0\text{V}$				400	$\text{nA}$

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$			10.7		$\text{nF}$
$C_{oes}$	Output Capacitance				0.56		
$C_{res}$	Reverse Transfer Capacitance				0.48		
$T_{d(on)}$	Turn-on Delay Time	$V_{GE} = \pm 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 150\text{A}$ $R_G = 2.2\Omega$	Inductive Switching ( $25^\circ\text{C}$ )		280		$\text{ns}$
$T_r$	Rise Time				40		
$T_{d(off)}$	Turn-off Delay Time				420		
$T_f$	Fall Time				75		
$T_{d(on)}$	Turn-on Delay Time	$V_{GE} = \pm 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 150\text{A}$ $R_G = 2.2\Omega$	Inductive Switching ( $125^\circ\text{C}$ )		290		$\text{ns}$
$T_r$	Rise Time				45		
$T_{d(off)}$	Turn-off Delay Time				520		
$T_f$	Fall Time				90		
$E_{on}$	Turn-on Switching Energy	$V_{GE} = \pm 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 150\text{A}$	$T_j = 125^\circ\text{C}$		14		$\text{mJ}$
$E_{off}$	Turn-off Switching Energy	$R_G = 2.2\Omega$	$T_j = 125^\circ\text{C}$		16		

**Chopper diode ratings and characteristics**

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage	$V_R = 1200\text{V}$		1200			$\text{V}$
$I_{RM}$	Maximum Reverse Leakage Current		$T_j = 25^\circ\text{C}$			250	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$			500	
$I_F$	DC Forward Current		$T_c = 80^\circ\text{C}$		150		$\text{A}$
$V_F$	Diode Forward Voltage	$I_F = 150\text{A}$	$T_j = 25^\circ\text{C}$		1.6	2.1	$\text{V}$
			$T_j = 125^\circ\text{C}$		1.6		
$t_{rr}$	Reverse Recovery Time	$I_F = 150\text{A}$ $V_R = 600\text{V}$ $dI/dt = 3000\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		170		$\text{ns}$
			$T_j = 125^\circ\text{C}$		280		
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$		15		$\mu\text{C}$
			$T_j = 125^\circ\text{C}$		29		
$E_r$	Reverse Recovery Energy		$T_j = 25^\circ\text{C}$		7		$\text{mJ}$
			$T_j = 125^\circ\text{C}$		12		

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

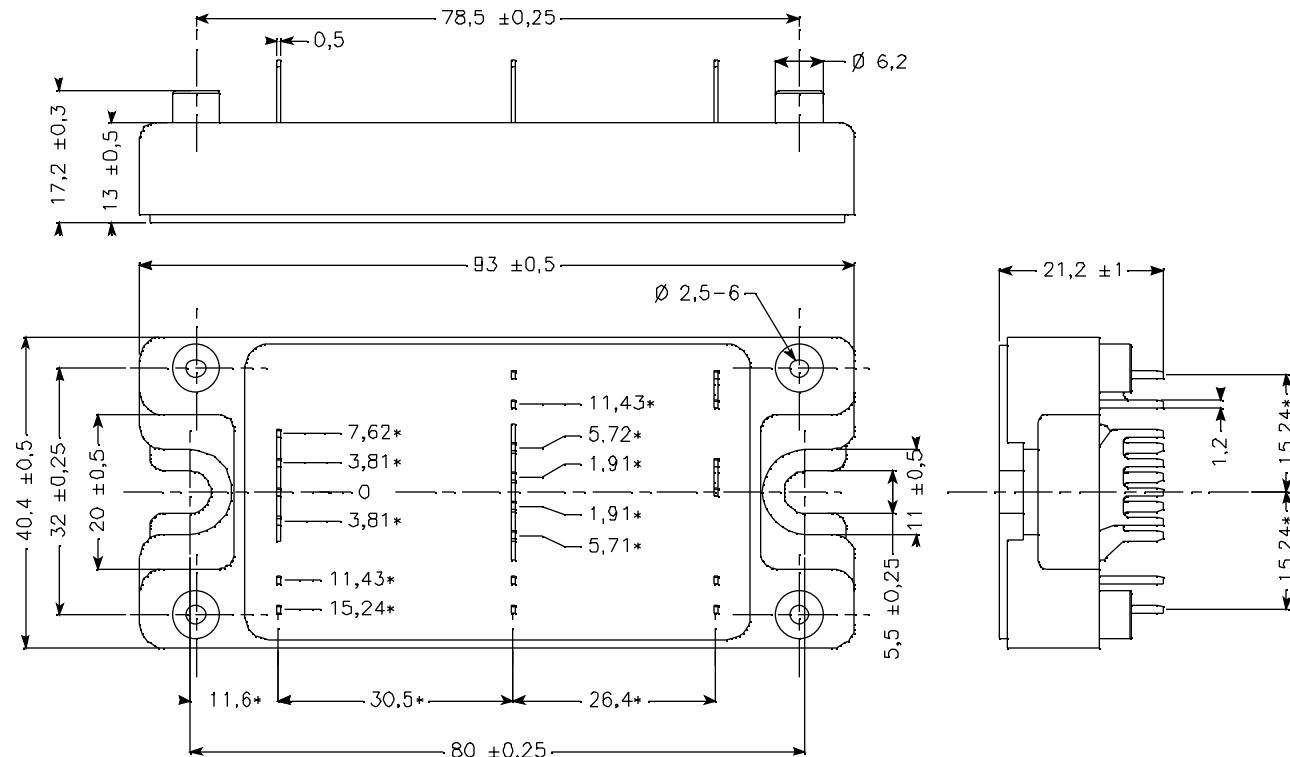
Symbol	Characteristic		Min	Typ	Max	Unit
R <sub>25</sub>	Resistance @ 25°C			50		kΩ
B <sub>25/85</sub>	T <sub>25</sub> = 298.15 K			3952		K

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

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

**Thermal and package characteristics**

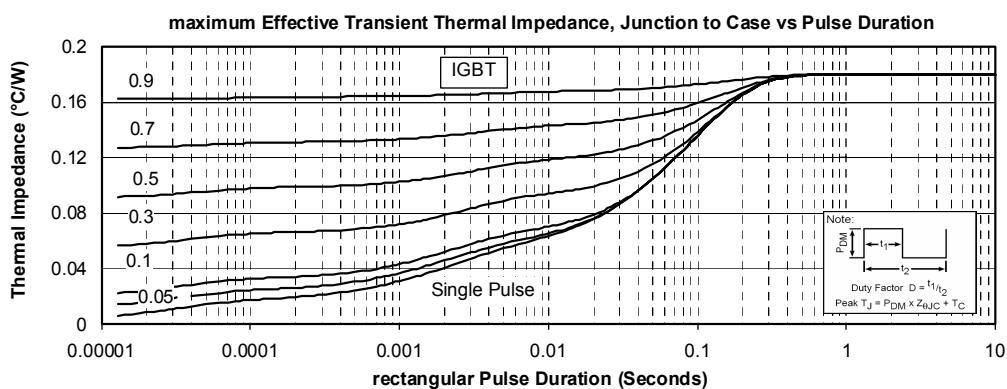
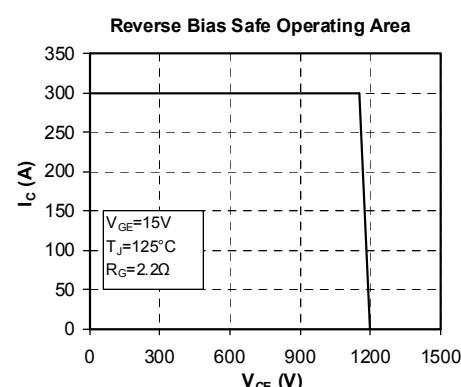
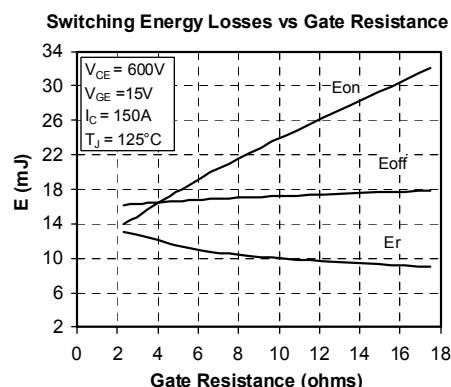
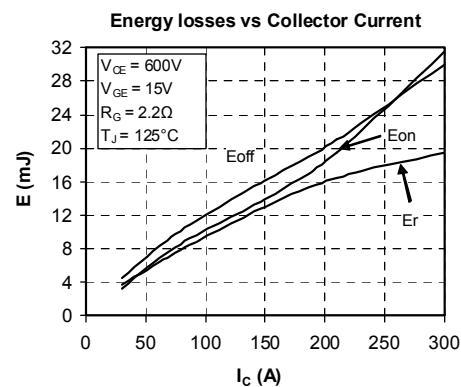
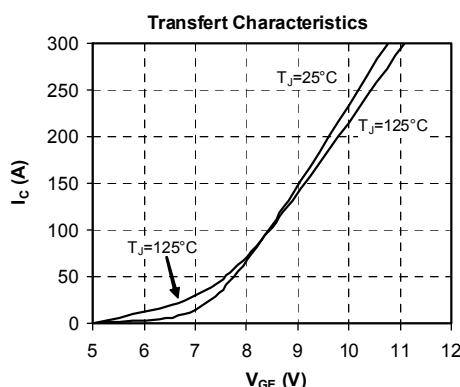
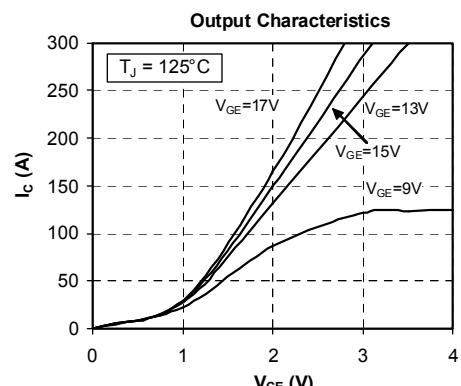
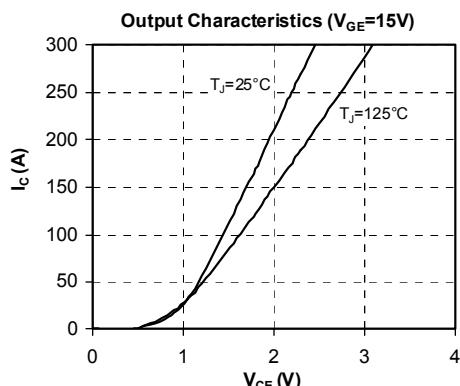
Symbol	Characteristic		Min	Typ	Max	Unit
R <sub>thJC</sub>	Junction to Case Thermal Resistance	IGBT			0.18	°C/W
		Diode			0.34	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, I isol<1mA, 50/60Hz	2500				V
T <sub>J</sub>	Operating junction temperature range	-40		150		
T <sub>STG</sub>	Storage Temperature Range	-40		125		°C
T <sub>C</sub>	Operating Case Temperature	-40		125		
Torque	Mounting torque	To Heatsink	M5	2.5	4.7	N.m
Wt	Package Weight				160	g

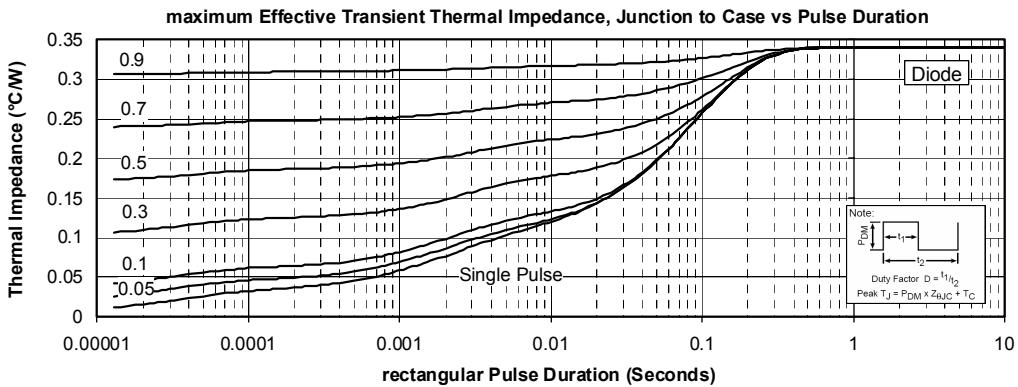
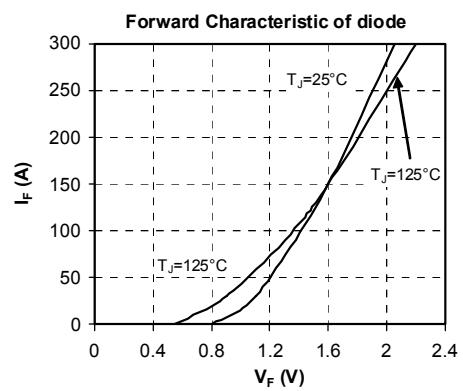
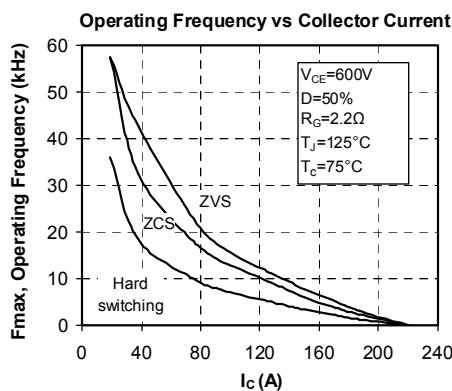
**SP4 Package outline (dimensions in mm)**

 ALL DIMENSIONS MARKED " \* " ARE TOLERENCED AS : 

 See application note APT0501 - Mounting Instructions for SP4 Power Modules on [www.microsemi.com](http://www.microsemi.com)



### Typical Performance Curve





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