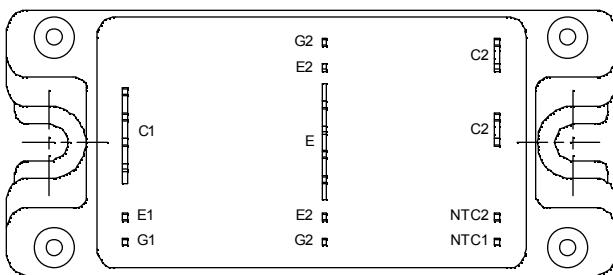
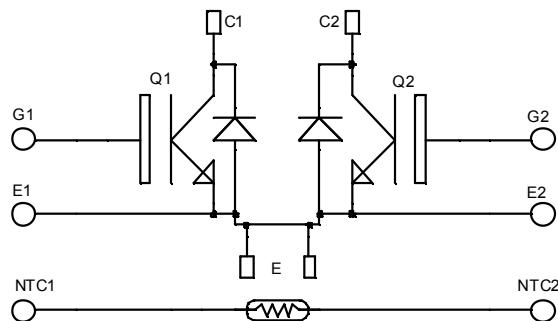


**Dual common source  
Trench + Field Stop IGBT®  
Power Module**



**V<sub>CES</sub> = 1700V  
I<sub>C</sub> = 50A @ T<sub>c</sub> = 80°C**

**Application**

- AC Switches
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

**Features**

- 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 SCSOA 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	1700	V
I <sub>C</sub>	Continuous Collector Current	T <sub>c</sub> =25°C	A
		T <sub>c</sub> =80°C	
I <sub>CM</sub>	Pulsed Collector Current	T <sub>c</sub> =25°C	100
V <sub>GE</sub>	Gate – Emitter Voltage	±20	V
P <sub>D</sub>	Maximum Power Dissipation	T <sub>c</sub> =25°C	312
RBSOA	Reverse Bias Safe Operating Area	T <sub>j</sub> =125°C	100A @ 1600V

 **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	$V_{GE} = 0\text{V}$ , $V_{CE} = 1700\text{V}$				250	$\mu\text{A}$
$V_{CE(\text{sat})}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$	$T_j = 25^\circ\text{C}$		2.0	2.4	$\text{V}$
		$I_C = 50\text{A}$	$T_j = 125^\circ\text{C}$		2.4		
$V_{GE(\text{th})}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$ , $I_C = 1\text{mA}$		5.0	5.8	6.5	$\text{V}$
$I_{GES}$	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	$V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$		4400			$\text{pF}$
$C_{oes}$	Output Capacitance			180			
$C_{res}$	Reverse Transfer Capacitance			150			
$T_{d(on)}$	Turn-on Delay Time	$V_{GE} = 15\text{V}$ $V_{Bus} = 900\text{V}$ $I_C = 50\text{A}$ $R_G = 10\Omega$	Inductive Switching ( $25^\circ\text{C}$ )	370			$\text{ns}$
$T_r$	Rise Time			40			
$T_{d(off)}$	Turn-off Delay Time			650			
$T_f$	Fall Time			180			
$T_{d(on)}$	Turn-on Delay Time		Inductive Switching ( $125^\circ\text{C}$ )	400			$\text{ns}$
$T_r$	Rise Time	$V_{GE} = 15\text{V}$ $V_{Bus} = 900\text{V}$ $I_C = 50\text{A}$ $R_G = 10\Omega$		50			
$T_{d(off)}$	Turn-off Delay Time			800			
$T_f$	Fall Time			300			
$E_{on}$	Turn-on Switching Energy	$V_{GE} = 15\text{V}$ $V_{Bus} = 900\text{V}$ $I_C = 50\text{A}$ $R_G = 10\Omega$	$T_j = 125^\circ\text{C}$		16		$\text{mJ}$
$E_{off}$	Turn-off Switching Energy		$T_j = 125^\circ\text{C}$		15		

**Diode ratings and characteristics**

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit	
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage			1700			$\text{V}$	
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1700\text{V}$	$T_j = 25^\circ\text{C}$			250	$\mu\text{A}$	
			$T_j = 125^\circ\text{C}$			500		
$I_F$	DC Forward Current		$T_c = 80^\circ\text{C}$		50		$\text{A}$	
$V_F$	Diode Forward Voltage	$I_F = 50\text{A}$	$T_j = 25^\circ\text{C}$		1.8	2.2	$\text{V}$	
			$T_j = 125^\circ\text{C}$		1.9			
$t_{rr}$	Reverse Recovery Time	$I_F = 50\text{A}$ $V_R = 900\text{V}$ $di/dt = 800\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		385		$\text{ns}$	
			$T_j = 125^\circ\text{C}$		490			
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$		14		$\mu\text{C}$	
			$T_j = 125^\circ\text{C}$		23			
$E_r$	Reverse Recovery Energy		$T_j = 25^\circ\text{C}$		6		$\text{mJ}$	
			$T_j = 125^\circ\text{C}$		12			

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

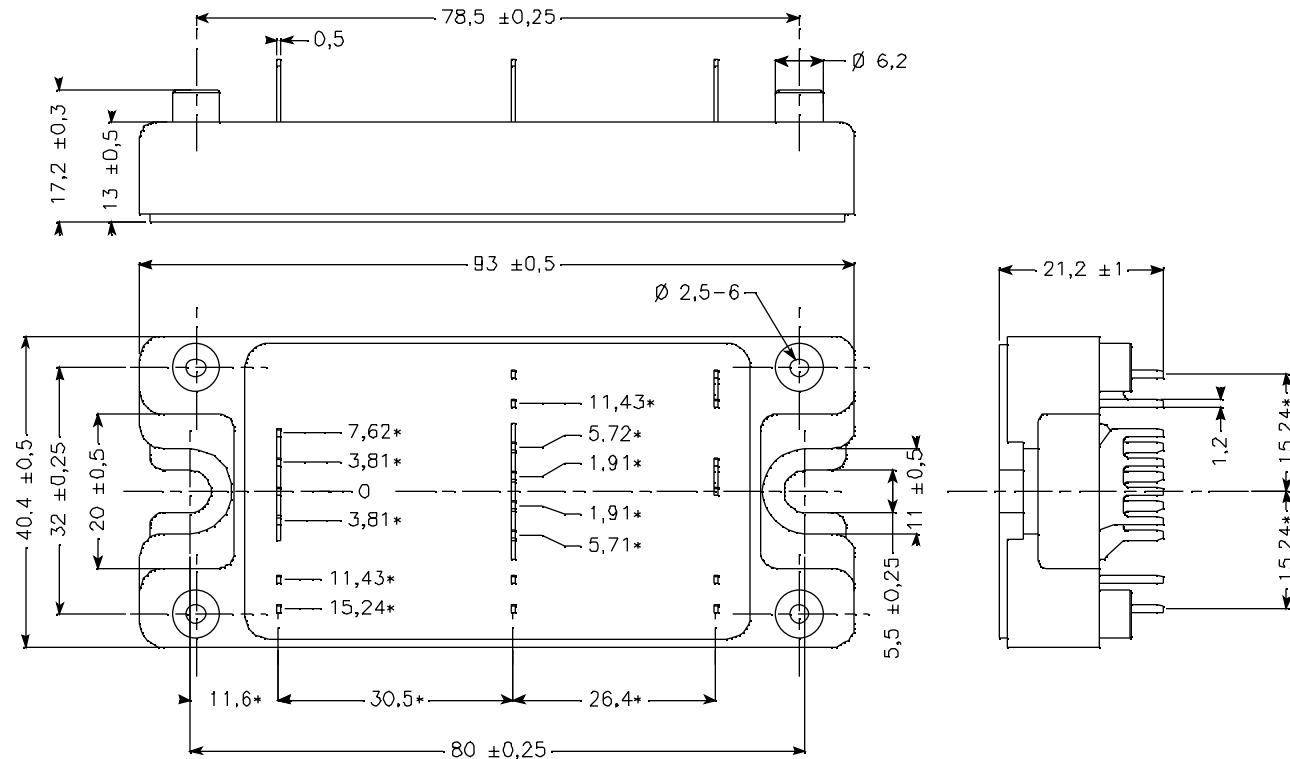
Symbol	Characteristic		Min	Typ	Max	Unit
R <sub>25</sub>	Resistance @ 25°C			50		kΩ
B <sub>25/85</sub>	T <sub>25</sub> = 298.15 K			3952		K

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

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

**Thermal and package characteristics**

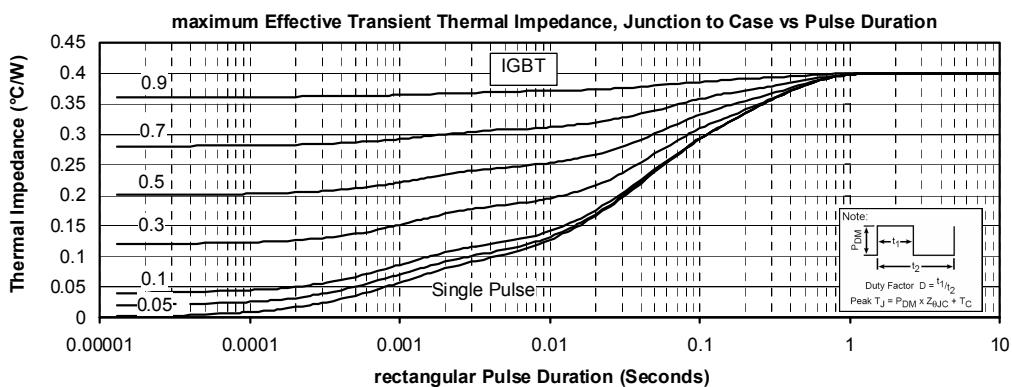
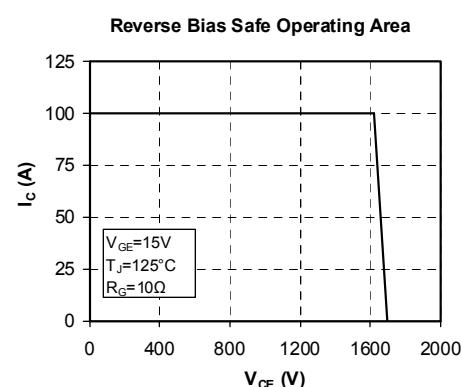
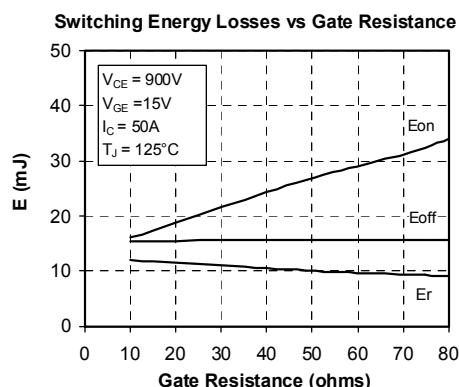
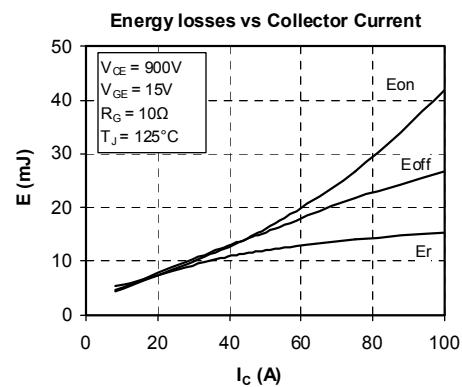
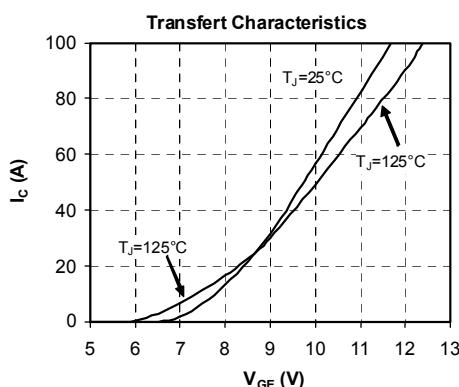
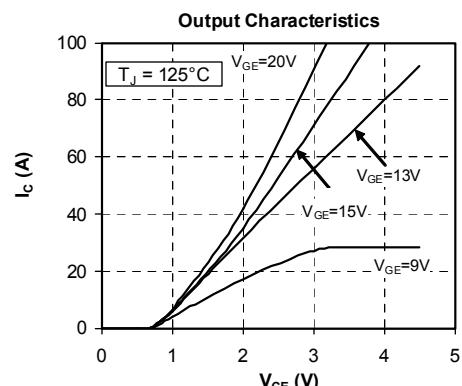
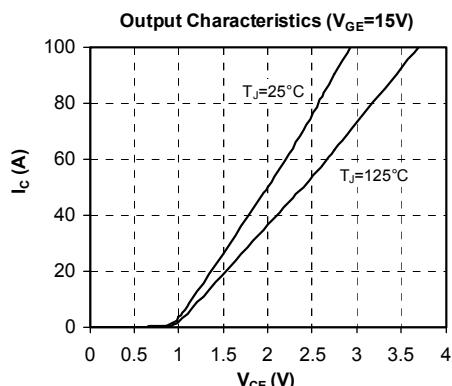
Symbol	Characteristic		Min	Typ	Max	Unit
R <sub>thJC</sub>	Junction to Case Thermal Resistance	IGBT			0.4	°C/W
		Diode			0.7	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, I isol < 1mA, 50/60Hz	3500				V
T <sub>J</sub>	Operating junction temperature range	-40		150		
T <sub>STG</sub>	Storage Temperature Range	-40		125		°C
T <sub>C</sub>	Operating Case Temperature	-40		100		
Torque	Mounting torque	To Heatsink	M5	2.5	4.7	N.m
Wt	Package Weight			160		g

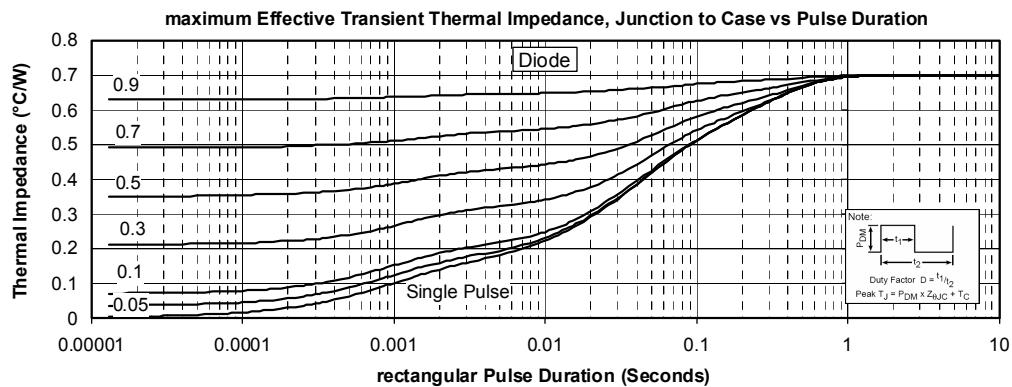
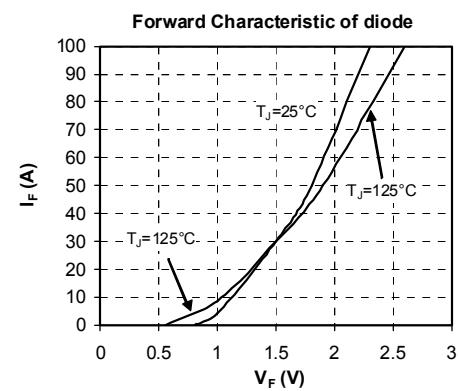
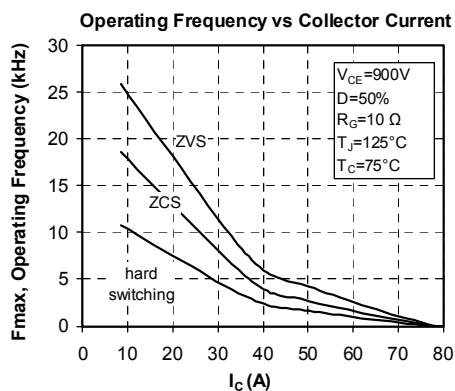
**SP4 Package outline (dimensions in mm)**

 ALL DIMENSIONS MARKED " \* " ARE TOLERENCED AS :  $\oplus/\ominus 1$ 

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



### Typical Performance Curve





Microsemi reserves the right to change, without notice, the specifications and information contained herein

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