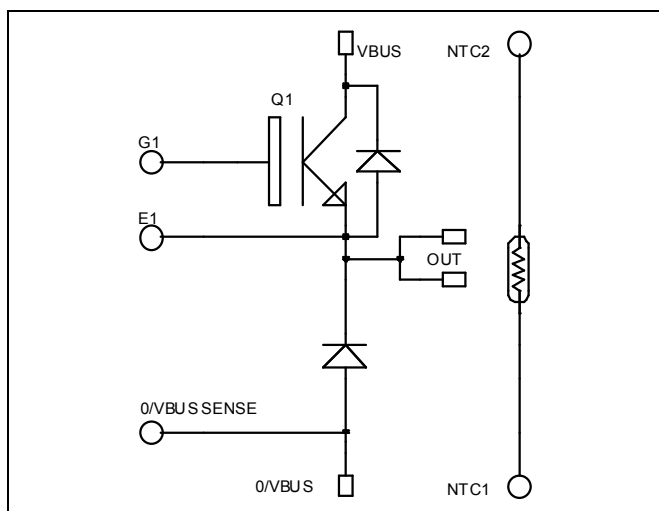


***Buck chopper  
Fast Trench + Field Stop IGBT3  
Power Module***

**$V_{CES} = 1200V$   
 $I_C = 75A @ T_c = 80^\circ C$**

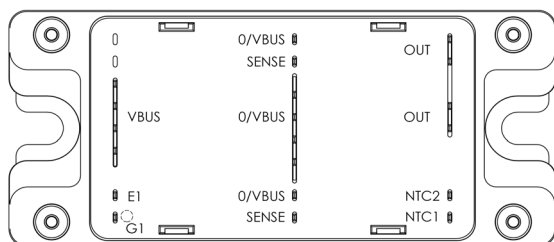


## Application

- AC and DC motor control
- Switched Mode Power Supplies

## Features

- Fast Trench + Field Stop IGBT3 Technology
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 20 kHz
  - Soft recovery parallel diodes
  - Low diode VF
  - Low leakage current
  - 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
$V_{CES}$	Collector - Emitter Breakdown Voltage	1200	V
$I_C$	Continuous Collector Current	$T_c = 25^\circ C$	110
		$T_c = 80^\circ C$	75
$I_{CM}$	Pulsed Collector Current	$T_c = 25^\circ C$	175
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	357
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	150A @ 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	$V_{GE} = 0V, V_{CE} = 1200V$			250	$\mu A$
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15V$ $I_C = 75A$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	1.4 2.0	2.1	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 3mA$	5.0		6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			400	nA

### Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0V$		5340		pF
$C_{oes}$	Output Capacitance	$V_{CE} = 25V$		280		
$C_{res}$	Reverse Transfer Capacitance	$f = 1MHz$		240		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ )		260		ns
$T_r$	Rise Time	$V_{GE} = \pm 15V$ $V_{Bus} = 600V$		30		
$T_{d(off)}$	Turn-off Delay Time	$I_C = 75A$		420		
$T_f$	Fall Time	$R_G = 4.7\Omega$		70		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $125^\circ\text{C}$ )		285		ns
$T_r$	Rise Time	$V_{GE} = \pm 15V$ $V_{Bus} = 600V$		50		
$T_{d(off)}$	Turn-off Delay Time	$I_C = 75A$		520		
$T_f$	Fall Time	$R_G = 4.7\Omega$		90		
$E_{on}$	Turn-on Switching Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $T_j = 125^\circ\text{C}$		7		mJ
$E_{off}$	Turn-off Switching Energy	$I_C = 75A$ $R_G = 4.7\Omega$ $T_j = 125^\circ\text{C}$		8.1		

### Chopper 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	$V_R = 1200V$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		250 500	$\mu A$
$I_F$	DC Forward Current		$T_c = 80^\circ\text{C}$	75		A
$V_F$	Diode Forward Voltage	$I_F = 75A$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	1.5 1.4	2.0	V
$t_{rr}$	Reverse Recovery Time	$I_F = 75A$ $V_R = 600V$ $di/dt = 2000A/\mu s$	$T_j = 25^\circ\text{C}$	150		ns
			$T_j = 125^\circ\text{C}$	250		
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$	7		$\mu C$
			$T_j = 125^\circ\text{C}$	13.5		
$E_r$	Reverse Recovery Energy		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	3.7 7.2		mJ

**Temperature sensor NTC** (see application note APT0406 on [www.microsemi.com](http://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

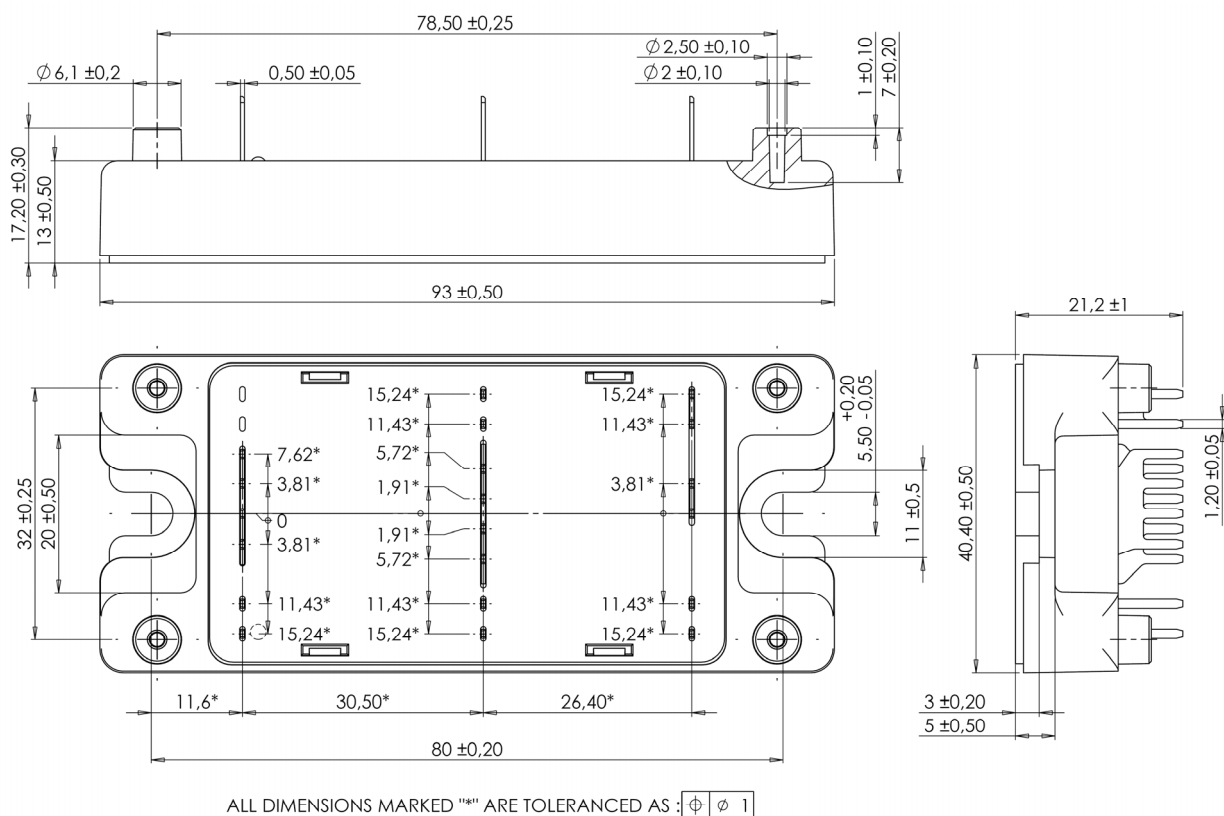
$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

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

## Thermal and package characteristics

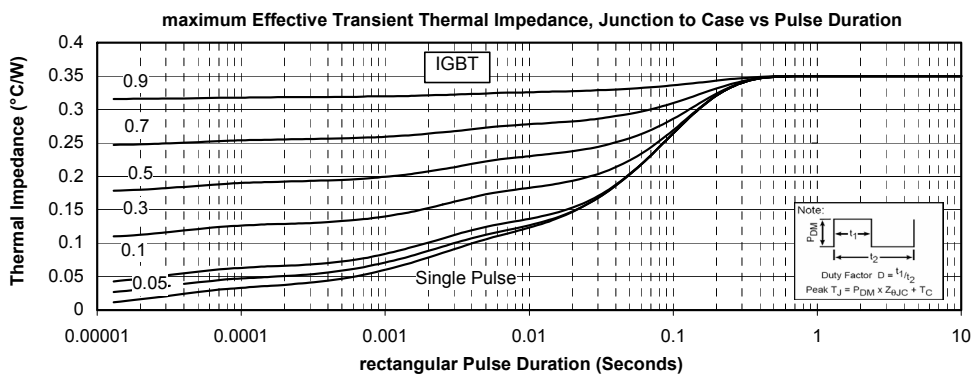
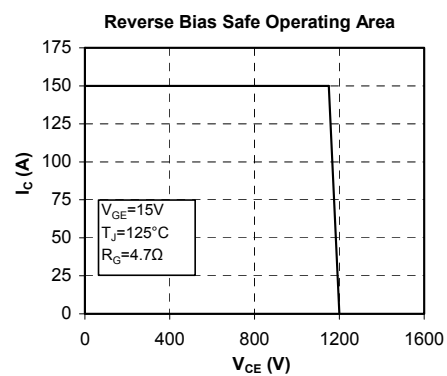
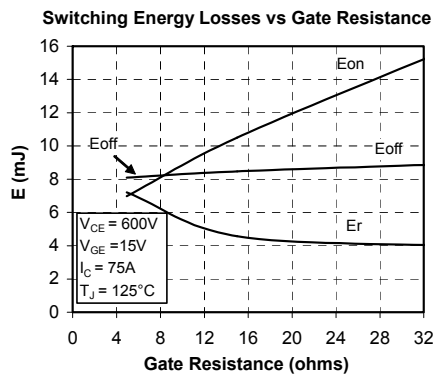
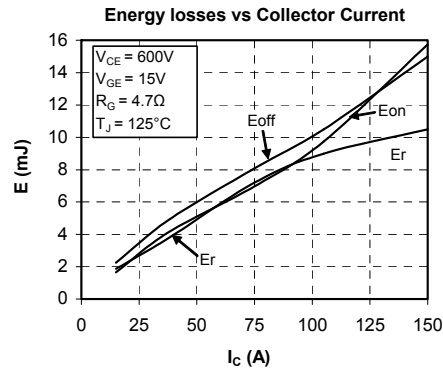
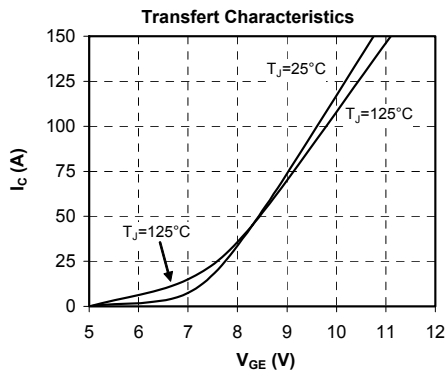
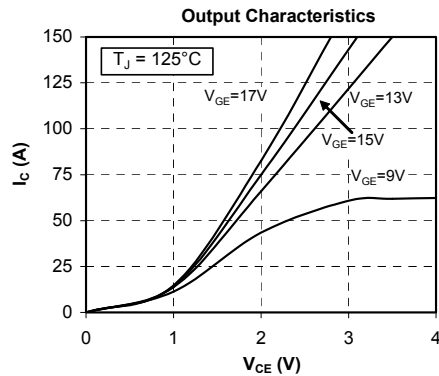
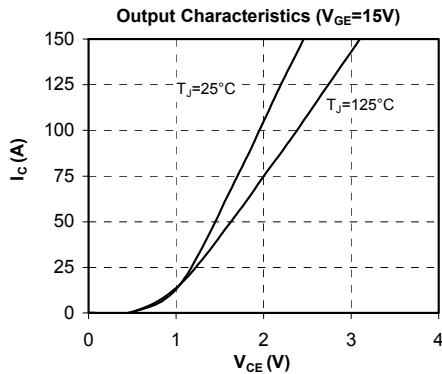
Symbol	Characteristic			Min	Typ	Max	Unit
R <sub>thJC</sub>	Junction to Case Thermal Resistance			IGBT		0.35	°C/W
				Diode		0.48	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000			V
T <sub>J</sub>	Operating junction temperature range			-40		150	°C
T <sub>STG</sub>	Storage Temperature Range			-40		125	
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

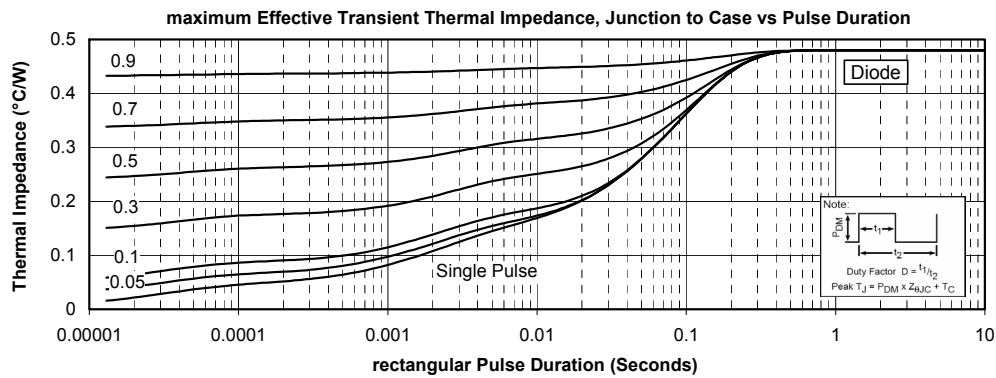
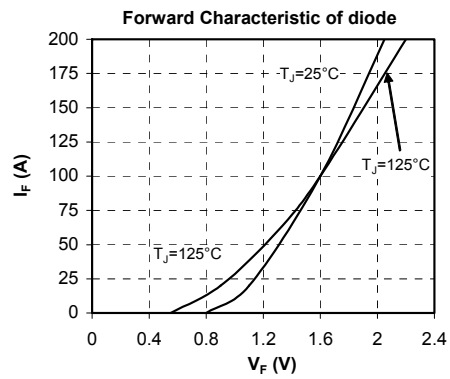
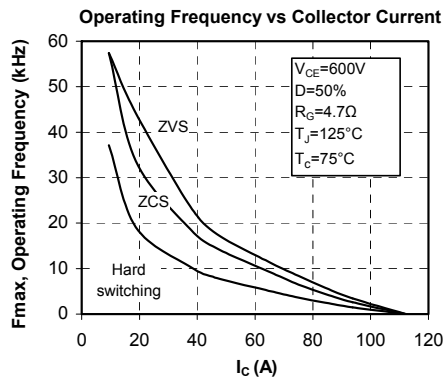
## SP4 Package outline (dimensions in mm)



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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