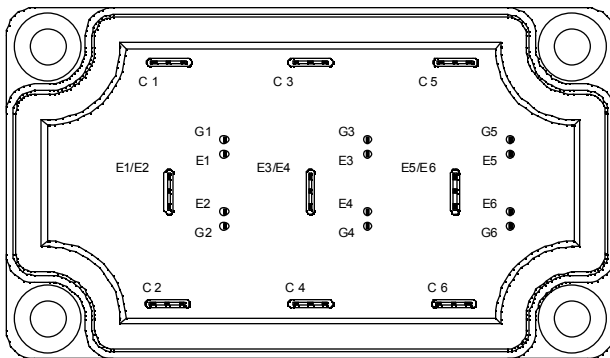
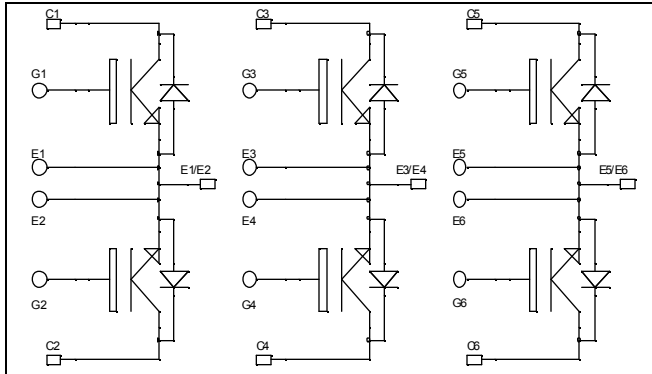


## Triple dual Common Source NPT IGBT Power Module

$V_{CES} = 600V$   
 $I_C = 90A @ T_c = 80^\circ C$



### Application

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

### Features


- Non Punch Through (NPT) Fast IGBT®
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 100 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

### 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
- Very low (12mm) profile
- Easy paralleling due to positive TC of VCESat
- Each leg can be easily paralleled to achieve a dual common source configuration of three times the current capability
- RoHS compliant

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{CES}$	Collector - Emitter Breakdown Voltage	600	V
$I_C$	Continuous Collector Current	$T_c = 25^\circ C$	110
		$T_c = 80^\circ C$	90
$I_{CM}$	Pulsed Collector Current	$T_c = 25^\circ C$	315
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	416
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	200A @ 600V

 **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	$V_{GE} = 0\text{V}$ $V_{CE} = 600\text{V}$			250 500	$\mu\text{A}$
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 90\text{A}$		2.0 2.2	2.5	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 1\text{mA}$	3		5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$			$\pm 150$	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0\text{V}$		4300		pF
$C_{oes}$	Output Capacitance	$V_{CE} = 25\text{V}$		470		
$C_{res}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		400		
$Q_g$	Total gate Charge	$V_{GE} = 15\text{V}$		330		nC
$Q_{ge}$	Gate – Emitter Charge	$V_{Bus} = 300\text{V}$		290		
$Q_{gc}$	Gate – Collector Charge	$I_C = 90\text{A}$		200		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ )		26		ns
$T_r$	Rise Time	$V_{GE} = 15\text{V}$		25		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 400\text{V}$		150		
$T_f$	Fall Time	$I_C = 90\text{A}$ $R_G = 5\ \Omega$		30		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $125^\circ\text{C}$ )		26		ns
$T_r$	Rise Time	$V_{GE} = 15\text{V}$		25		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 400\text{V}$		170		
$T_f$	Fall Time	$I_C = 90\text{A}$ $R_G = 5\ \Omega$		40		
$E_{on}$	Turn-on Switching Energy	$V_{GE} = 15\text{V}$ $V_{Bus} = 400\text{V}$		4.3		mJ
$E_{off}$	Turn-off Switching Energy	$I_C = 90\text{A}$ $R_G = 5\ \Omega$		3.5		

**Diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		600			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 600\text{V}$			250 500	$\mu\text{A}$
$I_F$	DC Forward Current			60		A
$V_F$	Diode Forward Voltage	$I_F = 60\text{A}$		1.6	1.8	V
		$I_F = 120\text{A}$		1.9		
		$I_F = 60\text{A}$ $T_j = 125^\circ\text{C}$		1.4		
$t_{rr}$	Reverse Recovery Time	$I_F = 60\text{A}$ $V_R = 400\text{V}$		130 170		ns
		$di/dt = 200\text{A}/\mu\text{s}$				
$Q_{rr}$	Reverse Recovery Charge			220 920		nC
		$T_j = 125^\circ\text{C}$				

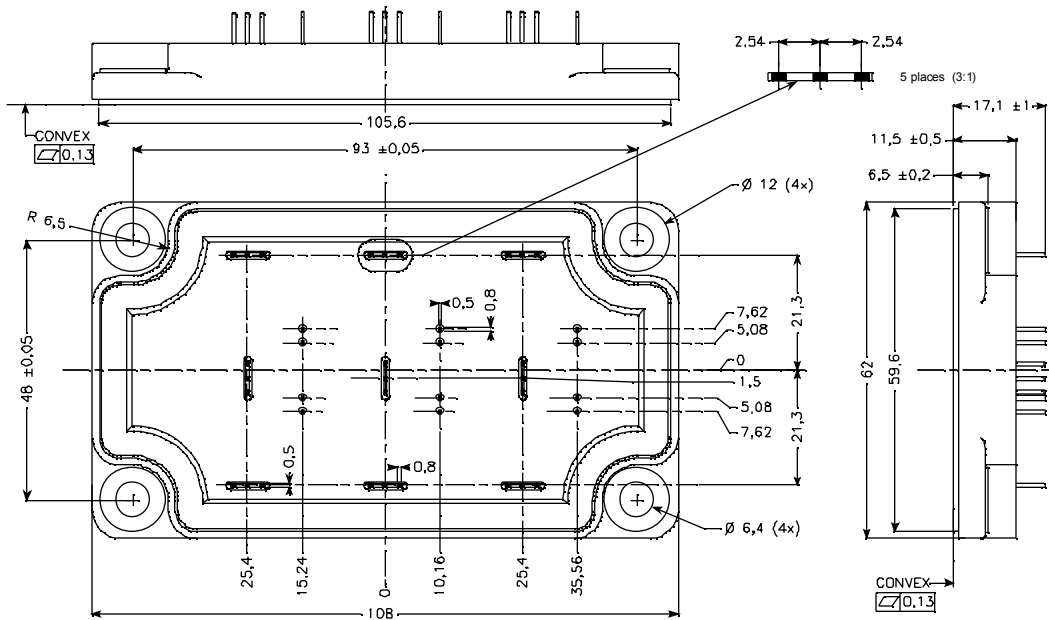
## Thermal and package characteristics

*Symbol Characteristic*

*Min Typ Max Unit*

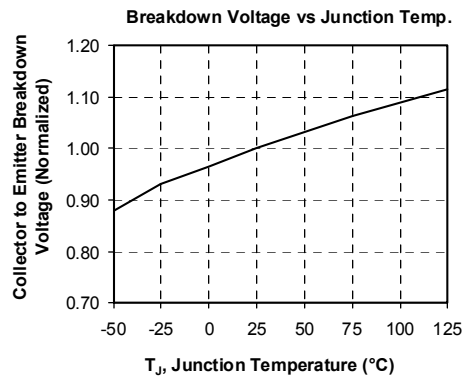
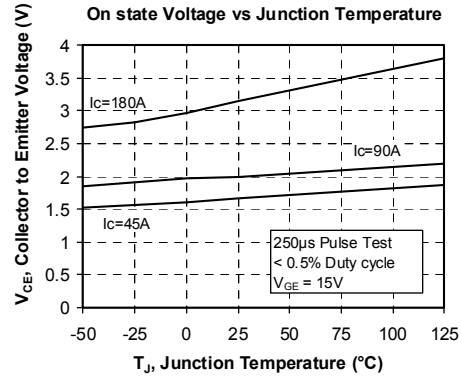
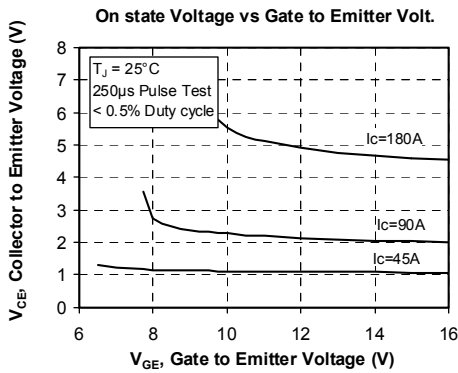
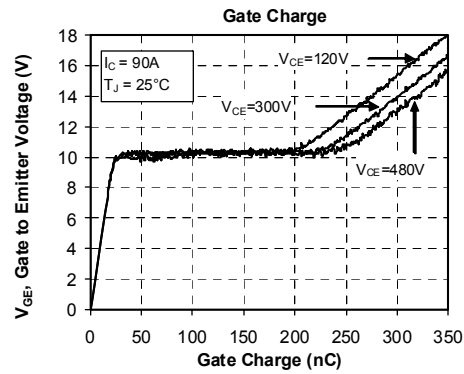
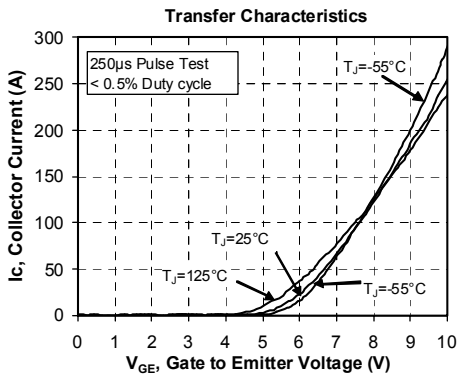
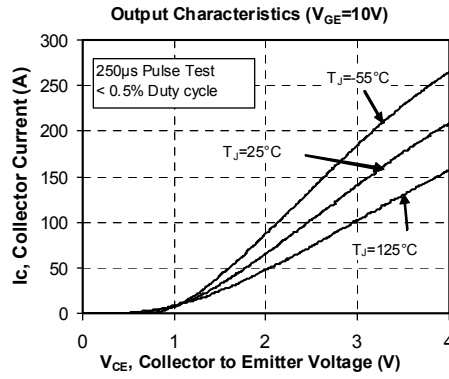
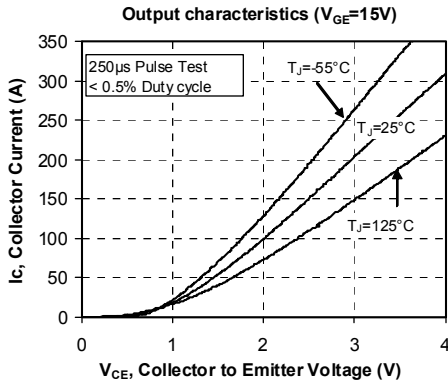
Symbol	Characteristic				Unit	
		Min	Typ	Max		
R <sub>thJC</sub>	Junction to Case Thermal Resistance	IGBT		0.3	°C/W	
		Diode		0.9		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, I <sub>isol</sub> < 1mA, 50/60Hz	2500			V	
T <sub>J</sub>	Operating junction temperature range	-40		150	°C	
T <sub>STG</sub>	Storage Temperature Range	-40		125		
T <sub>C</sub>	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M6	3	5	N.m
Wt	Package Weight				250	g

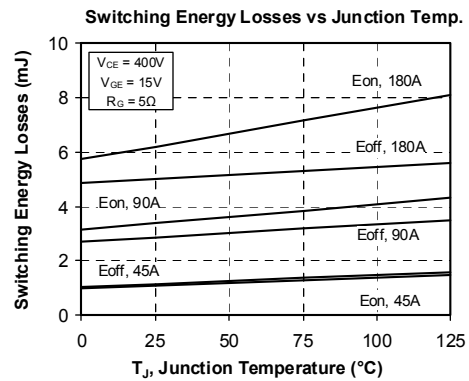
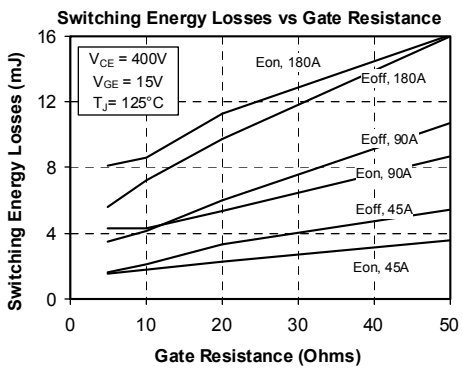
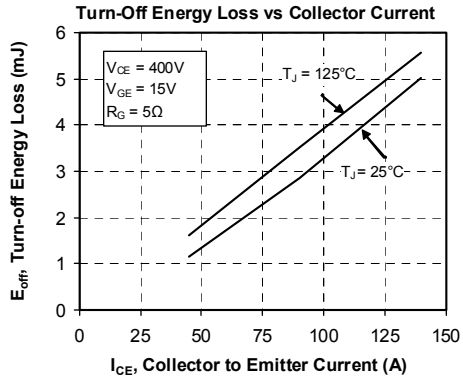
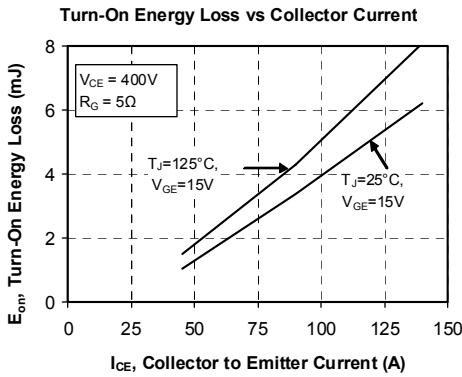
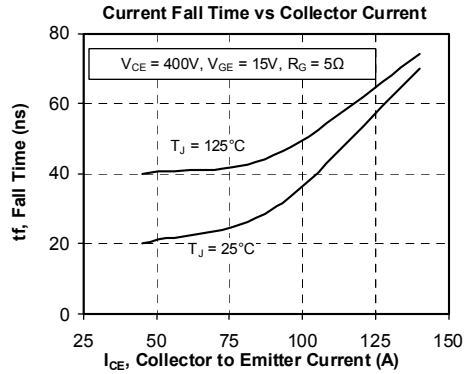
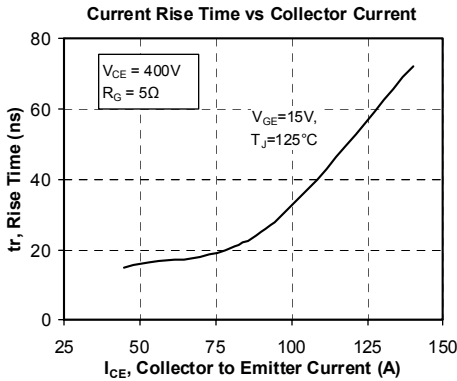
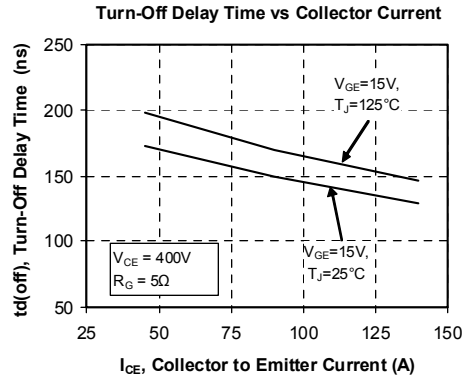
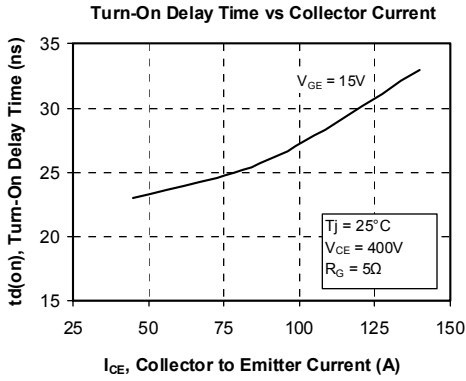
## SP6-P Package outline (dimensions in mm)

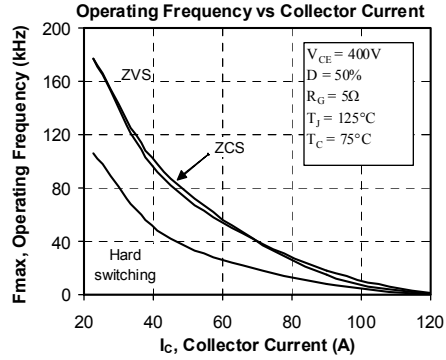
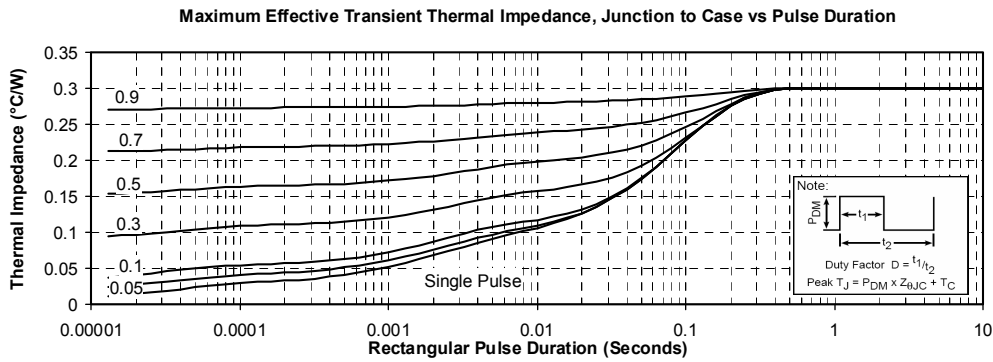
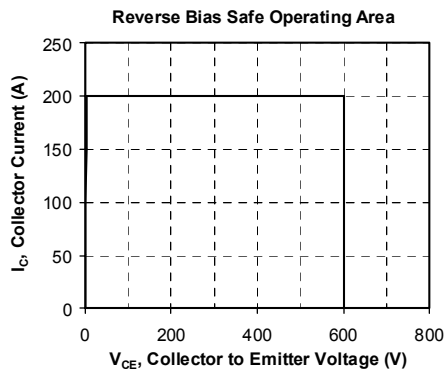


See application note 1902 - Mounting Instructions for SP6-P (12mm) Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve







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