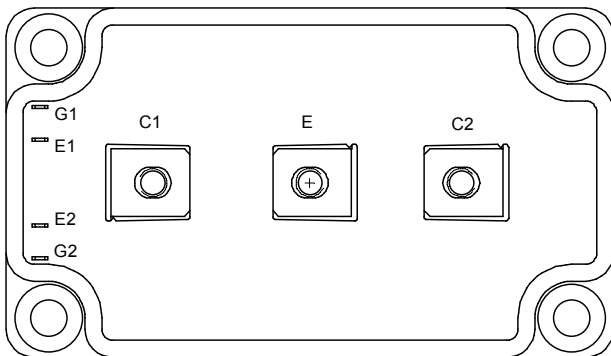
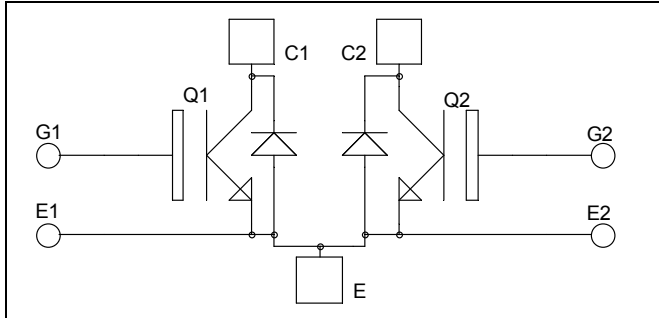


## Dual Common Source NPT IGBT Power Module

$V_{CES} = 1200V$   
 $I_C = 300A @ T_c = 80^\circ C$



### 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 50 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
  - M5 power connectors
- High level of integration

### Benefits

- Outstanding performance at high frequency operation
- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive  $T_c$  of  $V_{CEsat}$
- 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	$T_c = 25^\circ C$	400
		$T_c = 80^\circ C$	300
$I_{CM}$	Pulsed Collector Current	$T_c = 25^\circ C$	600
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	1780
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	600A @ 1200V

**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	$V_{GE} = 0\text{V}$ $V_{CE} = 1200\text{V}$	$T_j = 25^\circ\text{C}$			500	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$			750	
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 300\text{A}$	$T_j = 25^\circ\text{C}$		3.3	3.9	V
			$T_j = 125^\circ\text{C}$		4		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 12\text{mA}$		4.5		6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}$				$\pm 1$	$\mu\text{A}$

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$			21		nF
$C_{oes}$	Output Capacitance				2.9		
$C_{res}$	Reverse Transfer Capacitance				1.52		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ )			120		ns
$T_r$	Rise Time	$V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 300\text{A}$ $R_G = 3\Omega$			50		
$T_{d(off)}$	Turn-off Delay Time				310		
$T_f$	Fall Time				30		
$T_{d(on)}$	Turn-on Delay Time		Inductive Switching ( $125^\circ\text{C}$ )			130	
$T_r$	Rise Time	$V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 300\text{A}$ $R_G = 3\Omega$			60		
$T_{d(off)}$	Turn-off Delay Time				360		
$T_f$	Fall Time				40		
$E_{on}$	Turn-on Switching Energy		$V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$	$T_j = 125^\circ\text{C}$		25	
$E_{off}$	Turn-off Switching Energy	$I_C = 300\text{A}$ $R_G = 3\Omega$	$T_j = 125^\circ\text{C}$		15		

**Diode ratings and characteristics**

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage			1200			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$			250	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$			500	
$I_F$	DC Forward Current				300		A
$V_F$	Diode Forward Voltage	$I_F = 300\text{A}$	$T_j = 25^\circ\text{C}$		2.1		V
			$T_j = 125^\circ\text{C}$		1.9		
$t_{rr}$	Reverse Recovery Time	$I_F = 300\text{A}$ $V_R = 600\text{V}$ $di/dt = 4500\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		120		ns
			$T_j = 125^\circ\text{C}$		210		
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$		22		$\mu\text{C}$
			$T_j = 125^\circ\text{C}$		43		
$E_r$	Reverse Recovery Energy	$T_j = 25^\circ\text{C}$		7		mJ	
		$T_j = 125^\circ\text{C}$		15			

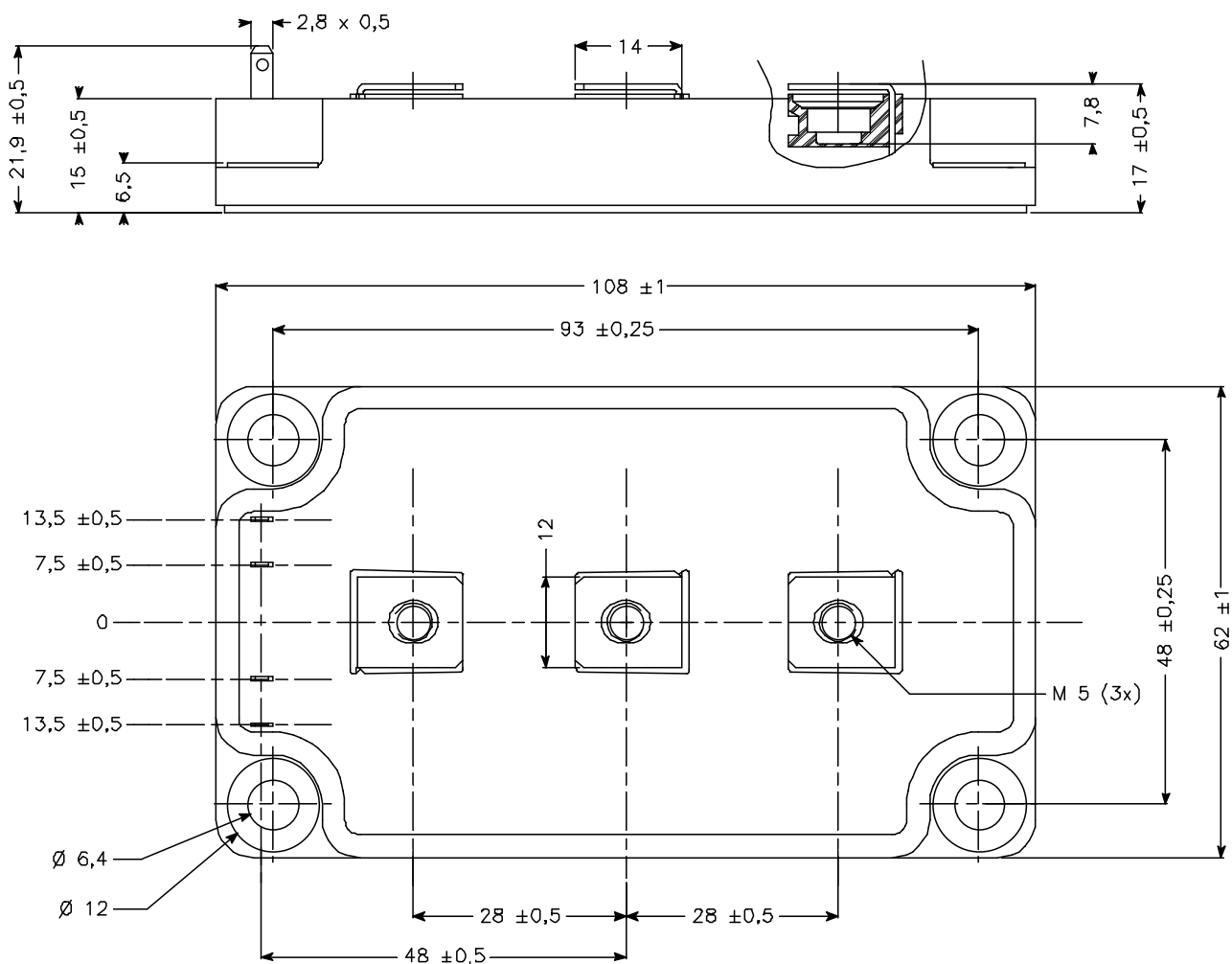
## Thermal and package characteristics

*Symbol Characteristic*

*Min Typ Max Unit*

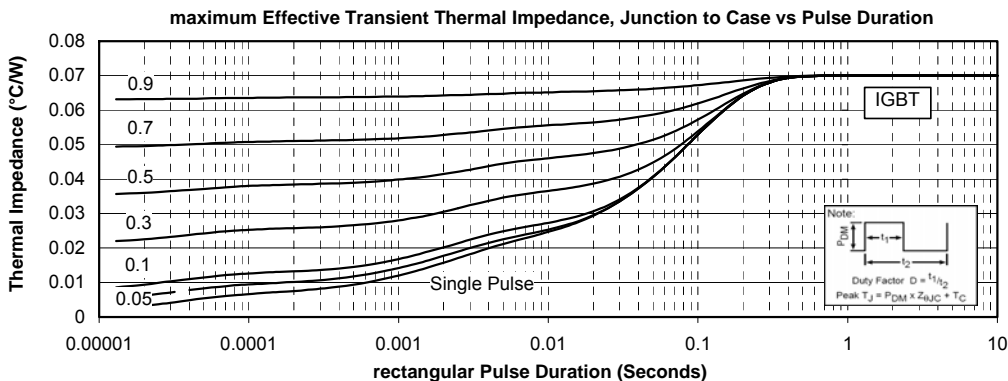
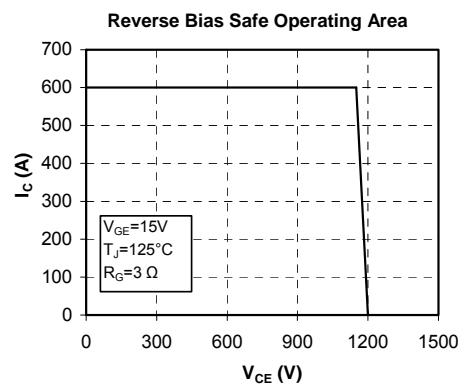
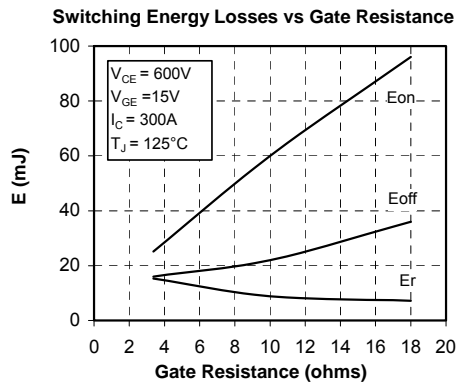
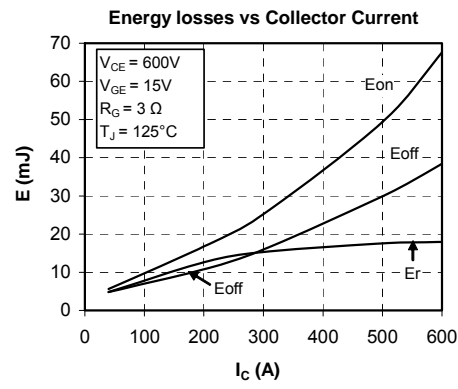
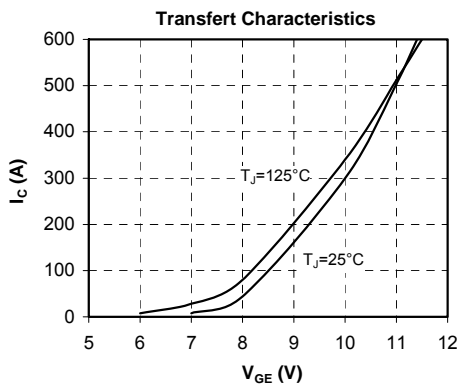
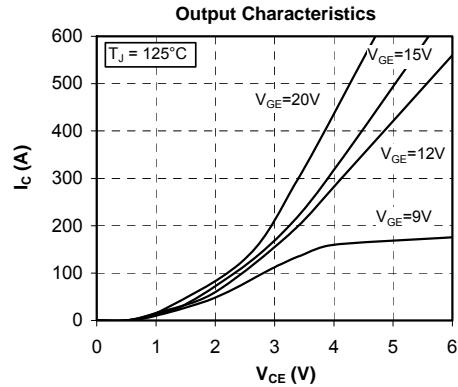
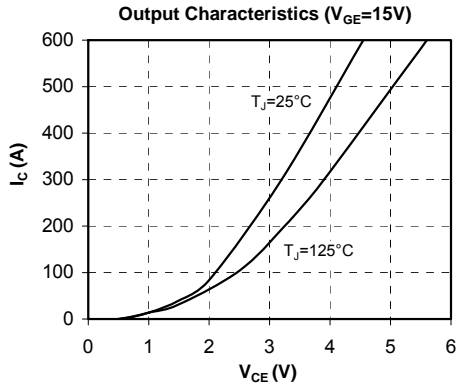
<i>Symbol</i>	<i>Characteristic</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	
$R_{thJC}$	Junction to Case Thermal Resistance	IGBT		0.07	°C/W	
		Diode		0.12		
$V_{ISOL}$	RMS Isolation Voltage, any terminal to case $t=1$ min, $I_{isol}<1$ mA, 50/60Hz	2500			V	
$T_J$	Operating junction temperature range	-40		150	°C	
$T_{STG}$	Storage Temperature Range	-40		125		
$T_C$	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M6	3	5	N.m
		For terminals	M5	2	3.5	
Wt	Package Weight			280	g	

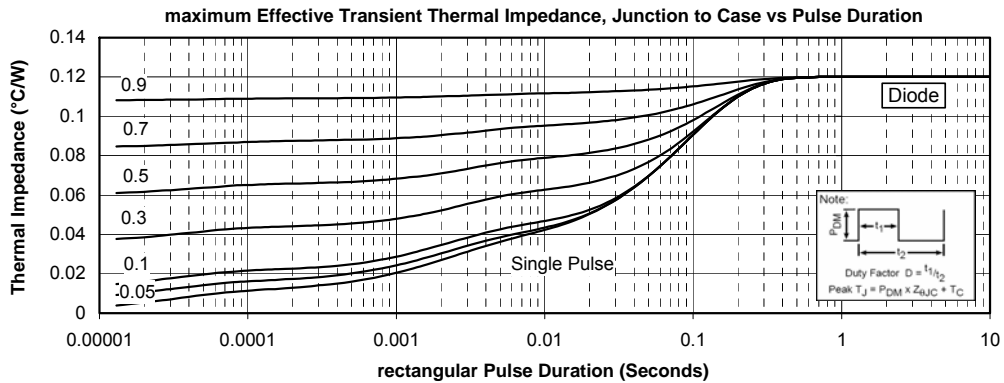
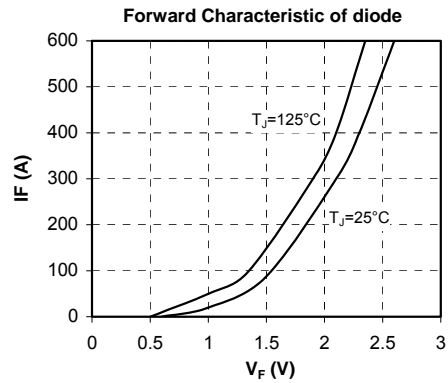
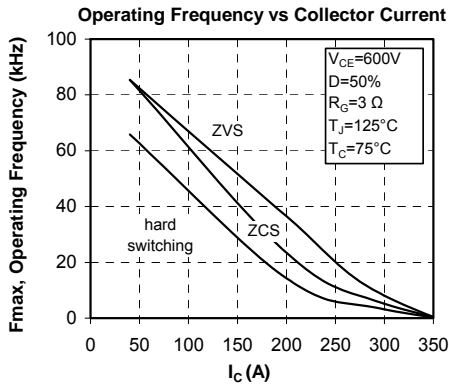
## SP6 Package outline (dimensions in mm)



See application note APT0601 - Mounting Instructions for SP6 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

Microsemi's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 and foreign patents. U.S and Foreign patents pending. All Rights Reserved.