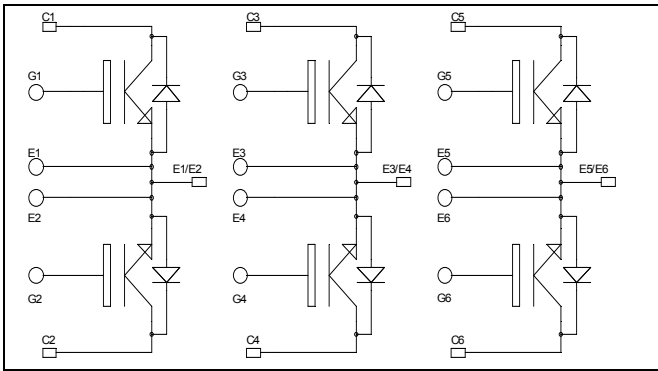


**Triple Dual Common Source  
Trench + Field Stop IGBT3  
Power Module**

**$V_{CES} = 1700V$   
 $I_C = 50A @ T_c = 80^\circ C$**

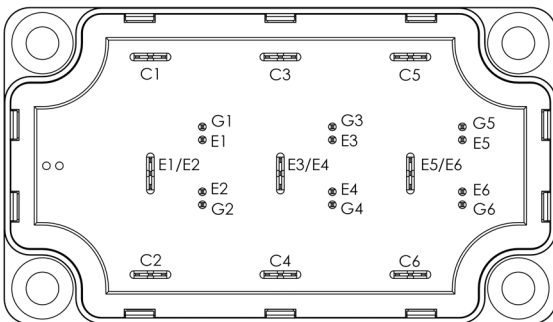


### Application

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

### Features

- 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
- Kelvin emitter for easy drive



### 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
- Very low (12mm) profile
- 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	1700	V
$I_C$	Continuous Collector Current	$T_c = 25^\circ C$	70
		$T_c = 80^\circ C$	50
$I_{CM}$	Pulsed Collector Current	$T_c = 25^\circ C$	100
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	310
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	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	$\mu\text{A}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 50\text{A}$		2.0	2.4	V
		$T_j = 25^\circ\text{C}$				
		$T_j = 125^\circ\text{C}$		2.4		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 1\text{mA}$	5.0	5.8	6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$			400	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0\text{V}$		4400		pF
$C_{oes}$	Output Capacitance	$V_{CE} = 25\text{V}$		180		
$C_{res}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		150		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ )		370		ns
$T_r$	Rise Time	$V_{GE} = 15\text{V}$		40		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 900\text{V}$		650		
$T_f$	Fall Time	$I_C = 50\text{A}$ $R_G = 10\Omega$		180		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $125^\circ\text{C}$ )		400		ns
$T_r$	Rise Time	$V_{GE} = 15\text{V}$		50		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 900\text{V}$		800		
$T_f$	Fall Time	$I_C = 50\text{A}$ $R_G = 10\Omega$		250		
$E_{on}$	Turn-on Switching Energy	$V_{GE} = 15\text{V}$ $V_{Bus} = 900\text{V}$	$T_j = 125^\circ\text{C}$	16		mJ
$E_{off}$	Turn-off Switching Energy	$I_C = 50\text{A}$ $R_G = 10\Omega$	$T_j = 125^\circ\text{C}$	15		

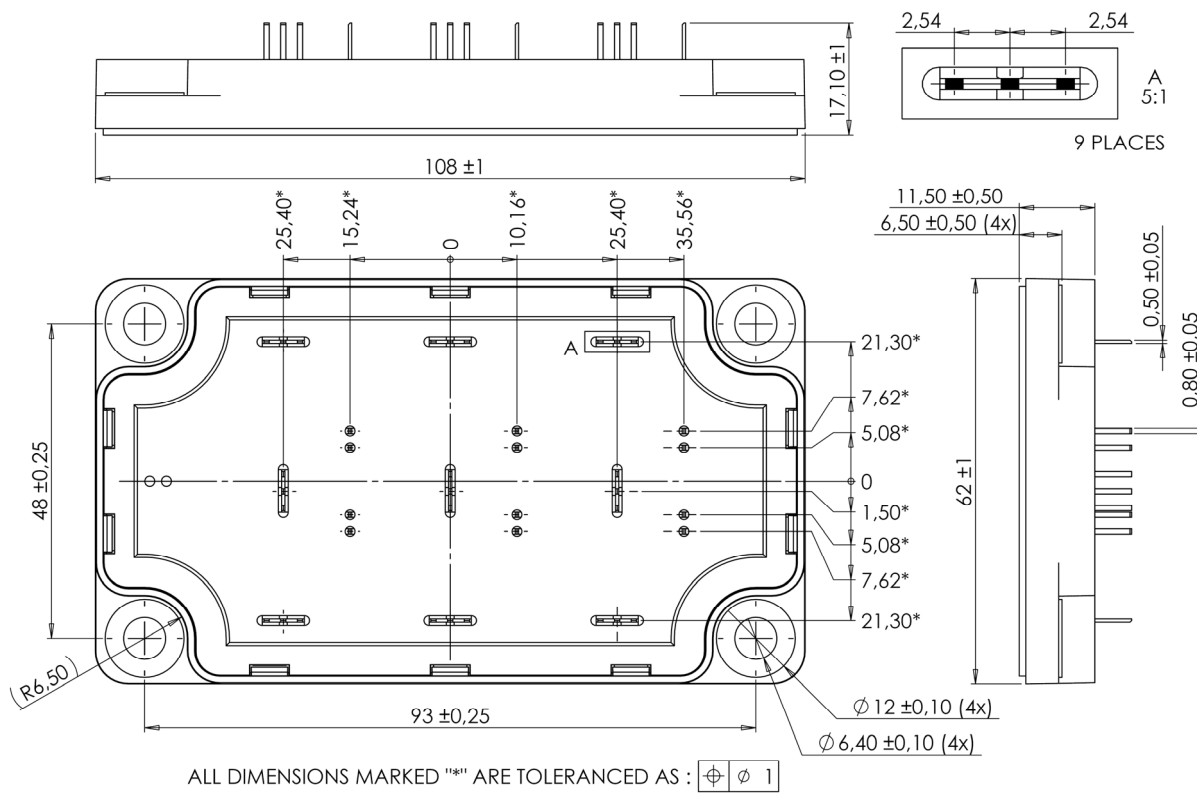
**Diode ratings and characteristics**

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

## Thermal and package characteristics

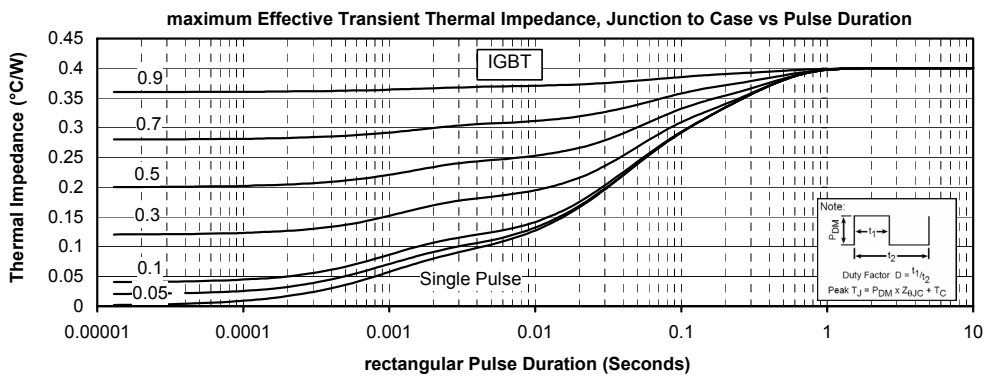
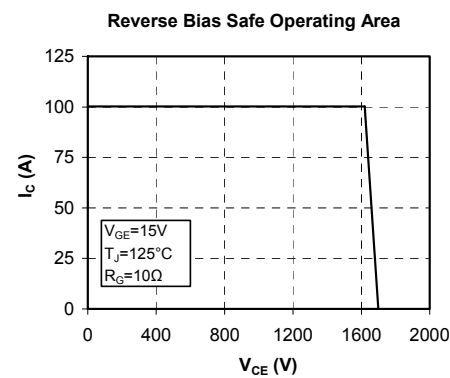
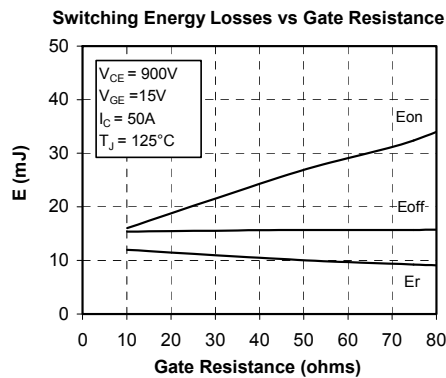
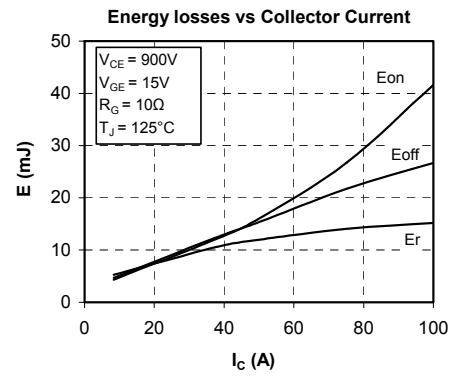
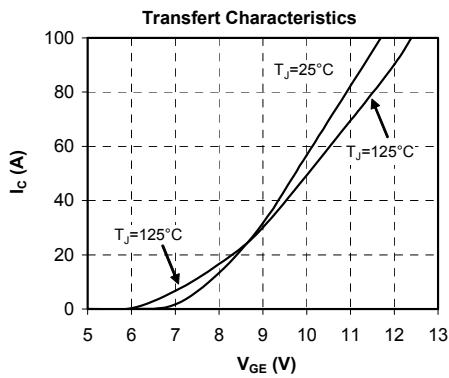
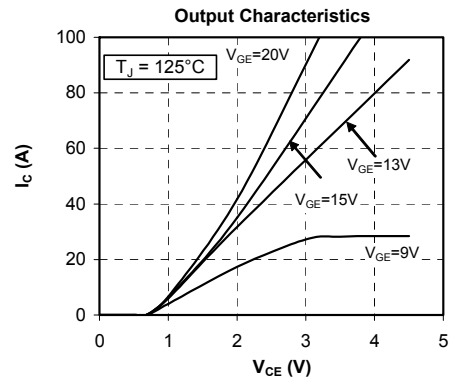
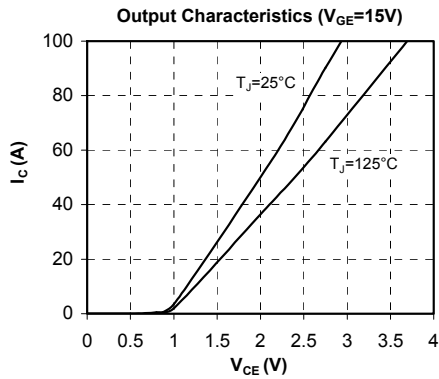
Symbol	Characteristic	Min	Typ	Max	Unit	
R <sub>thJC</sub>	Junction to Case Thermal Resistance	IGBT		0.4	°C/W	
		Diode		0.7		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000			V	
T <sub>J</sub>	Operating junction temperature range	-40		150	°C	
T <sub>STG</sub>	Storage Temperature Range	-40		125		
T <sub>C</sub>	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M6	3	5	N.m
Wt	Package Weight				250	g

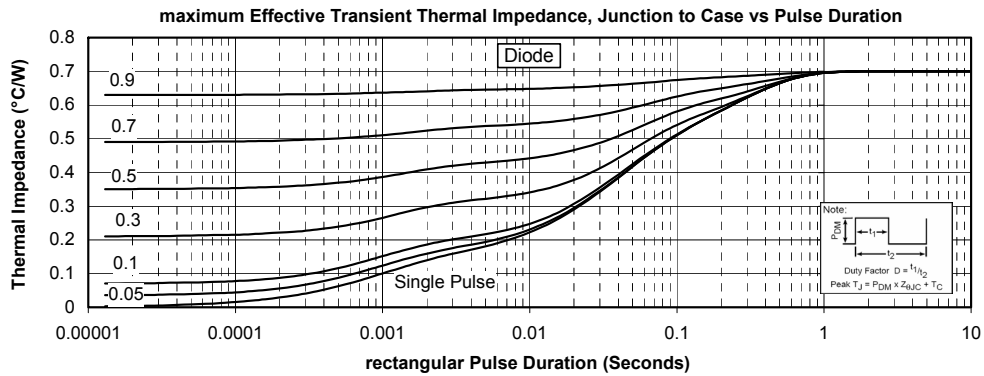
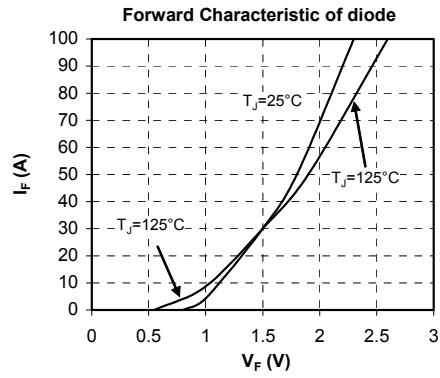
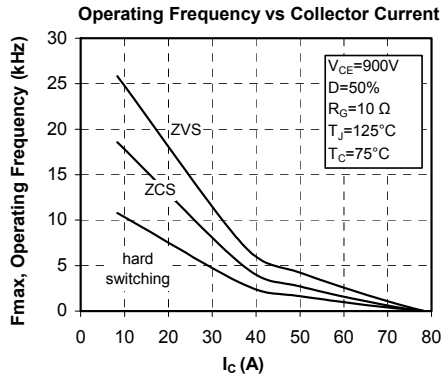
## SP6-P Package outline (dimensions in mm)



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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