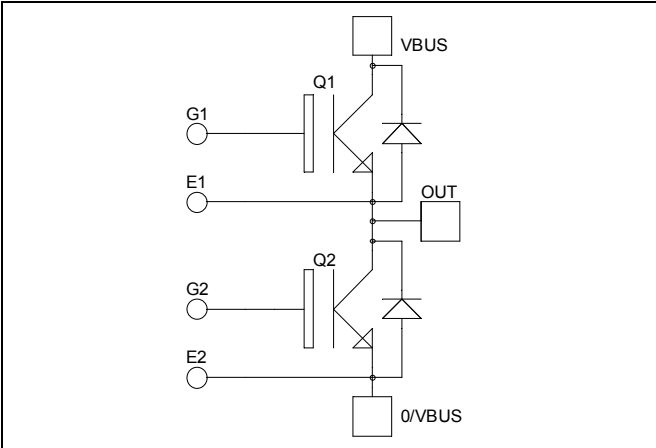


*Phase leg*  
**Fast Trench + Field Stop IGBT3**  
**Power Module**

**$V_{CES} = 1200V$**   
 **$I_C = 150A @ T_c = 80^\circ C$**

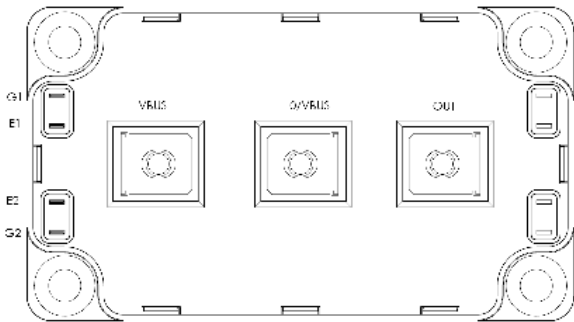


**Application**

- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

**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
  - M5 power connectors
- High level of integration



**Benefits**

- Stable temperature behavior
- Very rugged
- 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	$T_c = 25^\circ C$	220
		$T_c = 80^\circ C$	150
$I_{CM}$	Pulsed Collector Current	$T_c = 25^\circ C$	350
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	690
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	300A @ 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	$V_{GE} = 0V, V_{CE} = 1200V$			350	$\mu\text{A}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15V$ $I_C = 150A$		1.7 2.0	2.1	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 3\text{ mA}$	5.0	5.8	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	$V_{GE} = 0V$		10.7		nF
$C_{oes}$	Output Capacitance	$V_{CE} = 25V$		0.56		
$C_{res}$	Reverse Transfer Capacitance	$f = 1\text{ MHz}$		0.48		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ )		280		ns
$T_r$	Rise Time	$V_{GE} = \pm 15V$		40		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 600V$		420		
$T_f$	Fall Time	$I_C = 150A$ $R_G = 2.2\Omega$		75		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $125^\circ\text{C}$ )		290		ns
$T_r$	Rise Time	$V_{GE} = \pm 15V$		45		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 600V$		520		
$T_f$	Fall Time	$I_C = 150A$ $R_G = 2.2\Omega$		90		
$E_{on}$	Turn-on Switching Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 600V$		14		mJ
$E_{off}$	Turn-off Switching Energy	$I_C = 150A$ $R_G = 2.2\Omega$		16		

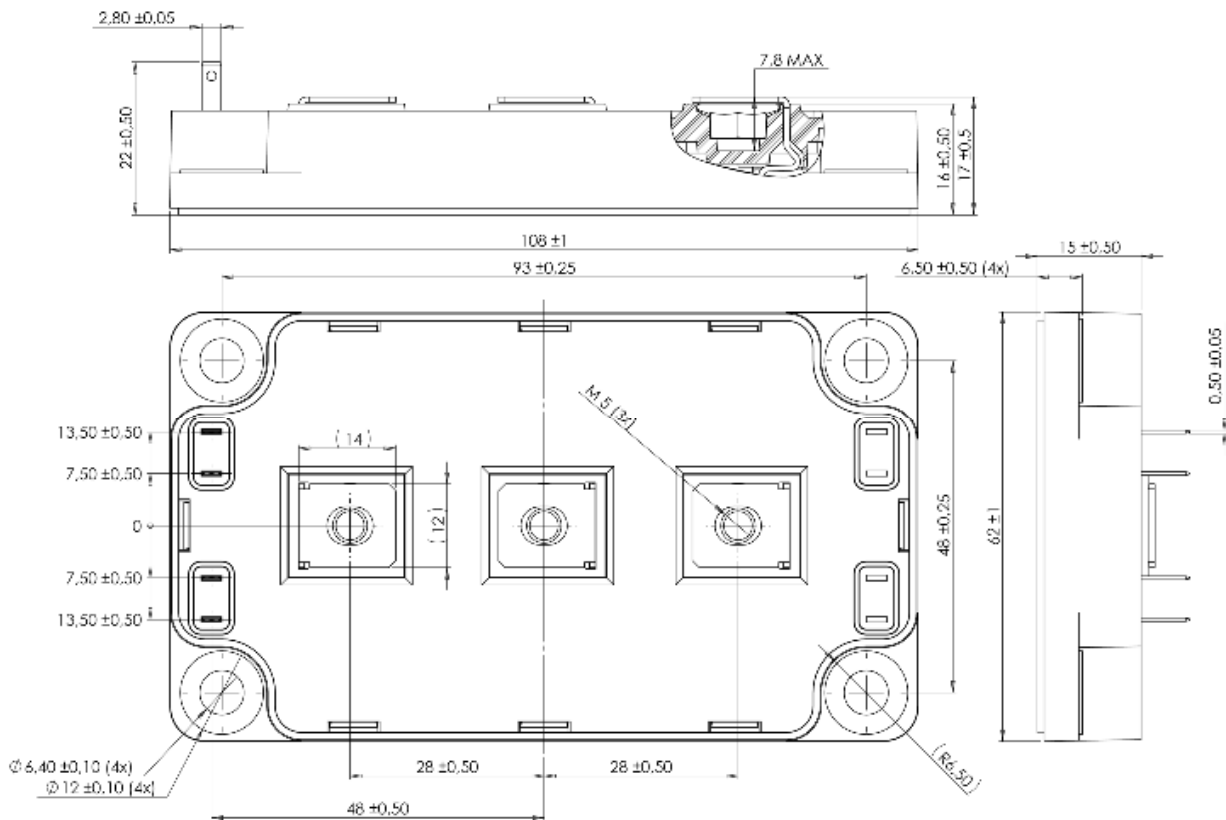
**Reverse diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		1200			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1200V$			250 600	$\mu\text{A}$
$I_F$	DC Forward Current			150		A
$V_F$	Diode Forward Voltage	$I_F = 150A$		1.6 1.6	2.1	V
$t_{rr}$	Reverse Recovery Time			170 280		ns
$Q_{rr}$	Reverse Recovery Charge	$I_F = 150A$ $V_R = 600V$ $di/dt = 2500A/\mu\text{s}$		14 28		$\mu\text{C}$
$E_r$	Reverse Recovery Energy			6 11		mJ

## Thermal and package characteristics

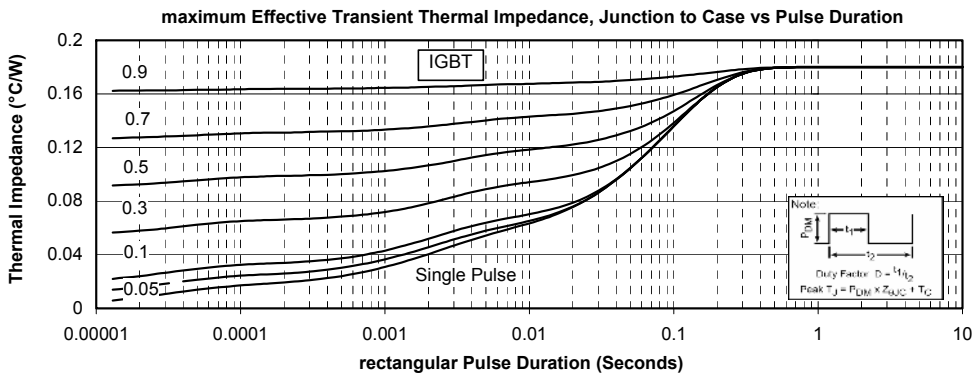
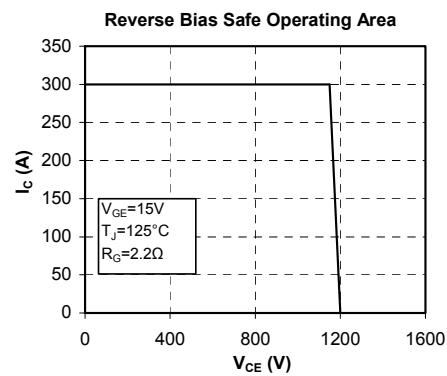
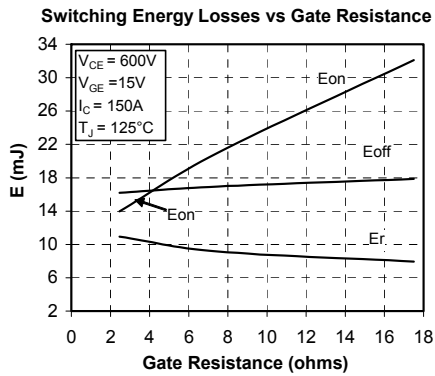
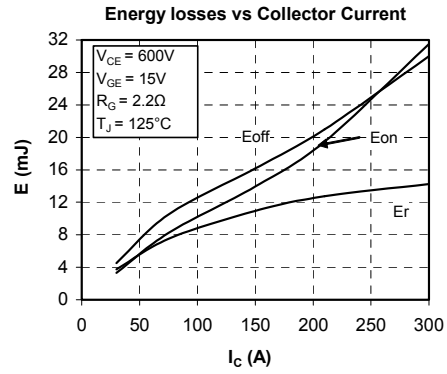
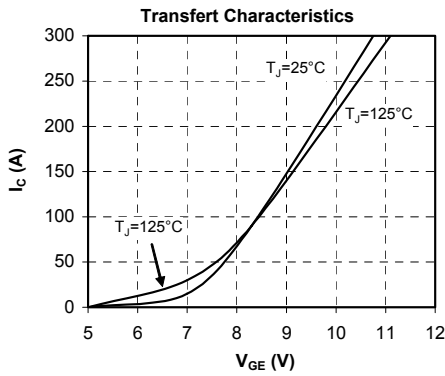
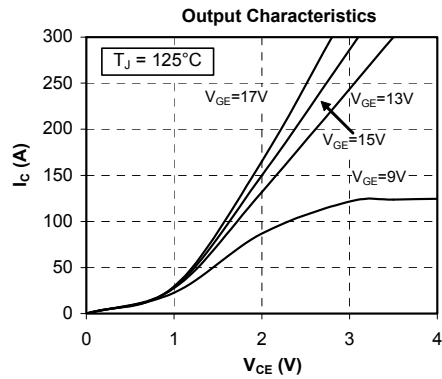
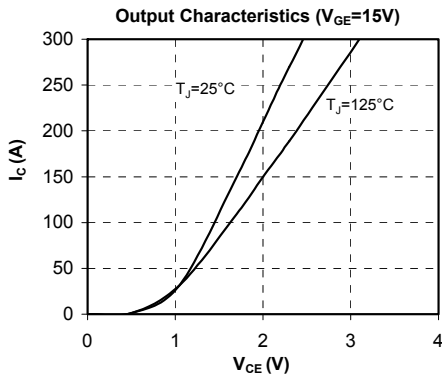
Symbol	Characteristic	Min	Typ	Max	Unit	
R <sub>thJC</sub>	Junction to Case Thermal Resistance	IGBT		0.18	°C/W	
		Diode		0.32		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000			V	
T <sub>J</sub>	Operating junction temperature range	-40		150	°C	
T <sub>STG</sub>	Storage Temperature Range	-40		125		
T <sub>C</sub>	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M6	3	5	N.m
		For terminals	M5	2	3.5	
Wt	Package Weight			300	g	

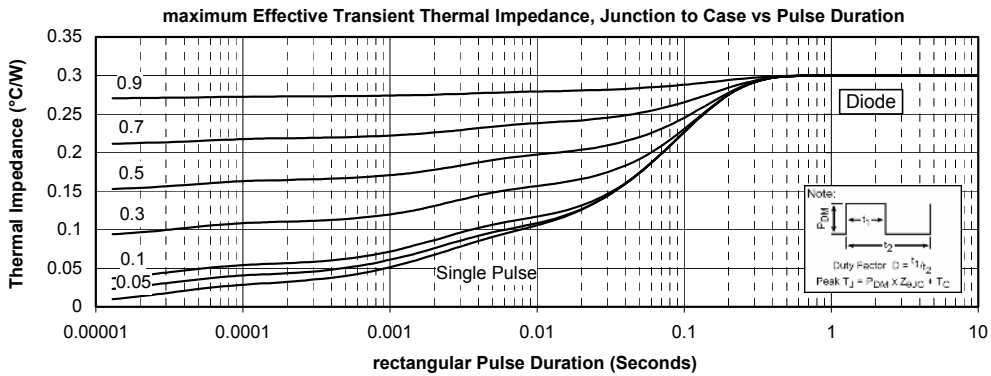
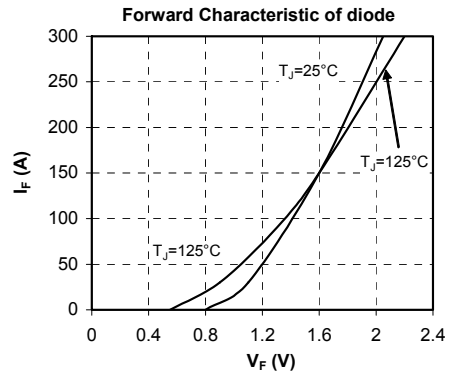
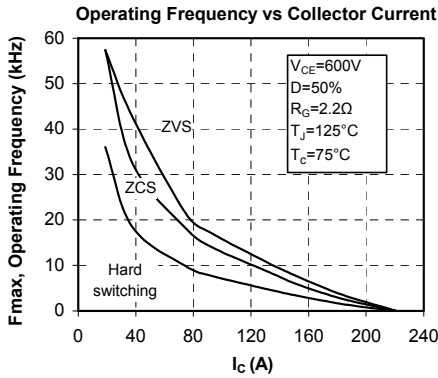
## SP6 Package outline (dimensions in mm)



See application note APT0601 - Mounting Instructions for SP6 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve





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