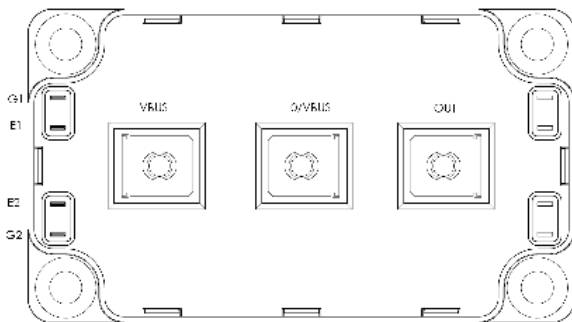
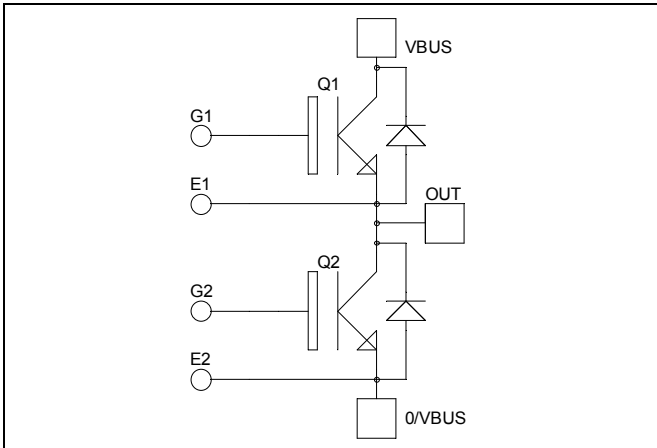


**Phase leg  
Trench + Field Stop IGBT3  
Power Module**

**$V_{CES} = 1700V$   
 $I_C = 300A @ T_c = 80^\circ C$**



### Application

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

### 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
  - 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		1700	V
$I_C$	Continuous Collector Current	$T_c = 25^\circ C$	400	A
		$T_c = 80^\circ C$	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	$T_c = 25^\circ C$	1660	W
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	600A @ 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	$V_{GE} = 0\text{V}, V_{CE} = 1700\text{V}$			750	$\mu\text{A}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 300\text{A}$		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	$V_{GE} = V_{CE}, I_C = 5\text{mA}$	5.0	5.8	6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$			600	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0\text{V}$		26.5		nF
$C_{oes}$	Output Capacitance	$V_{CE} = 25\text{V}$		1.1		
$C_{res}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		0.88		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ )		370		ns
$T_r$	Rise Time	$V_{GE} = 15\text{V}$ $V_{Bus} = 900\text{V}$		40		
$T_{d(off)}$	Turn-off Delay Time	$I_C = 300\text{A}$		650		
$T_f$	Fall Time	$R_G = 2.2\Omega$		180		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $125^\circ\text{C}$ )		400		ns
$T_r$	Rise Time	$V_{GE} = 15\text{V}$ $V_{Bus} = 900\text{V}$		50		
$T_{d(off)}$	Turn-off Delay Time	$I_C = 300\text{A}$		800		
$T_f$	Fall Time	$R_G = 2.2\Omega$		300		
$E_{on}$	Turn-on Switching Energy	$V_{GE} = 15\text{V}$ $V_{Bus} = 900\text{V}$		96		mJ
$E_{off}$	Turn-off Switching Energy	$I_C = 300\text{A}$ $R_G = 2.2\Omega$		94		

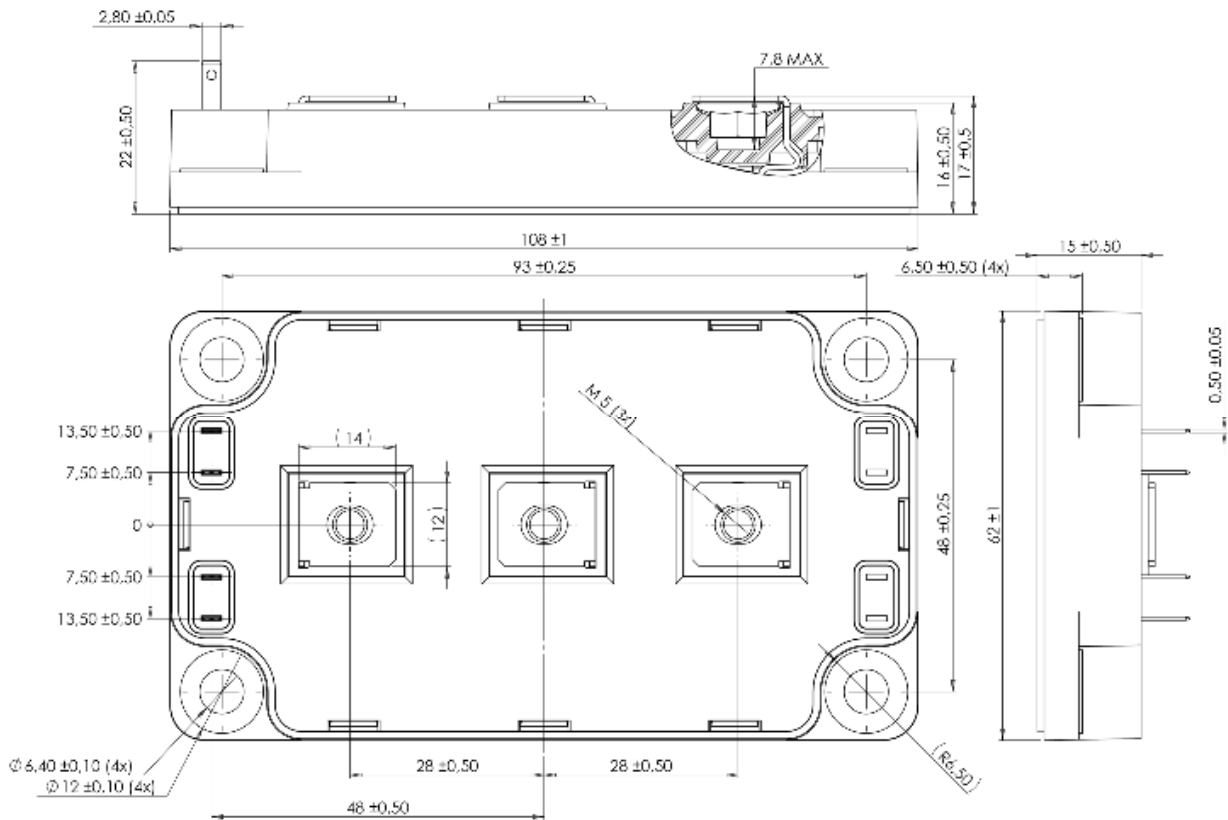
**Reverse diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		1700			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1700\text{V}$			750	$\mu\text{A}$
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$			1000	
$I_F$	DC Forward Current			300		A
$V_F$	Diode Forward Voltage	$I_F = 300\text{A}$		1.8	2.2	V
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		1.9		
$t_{rr}$	Reverse Recovery Time			385		ns
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		490		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 300\text{A}$ $V_R = 900\text{V}$ $di/dt = 3200\text{A}/\mu\text{s}$		76		$\mu\text{C}$
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		124		
$E_r$	Reverse Recovery Energy			35		mJ
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		70		

## Thermal and package characteristics

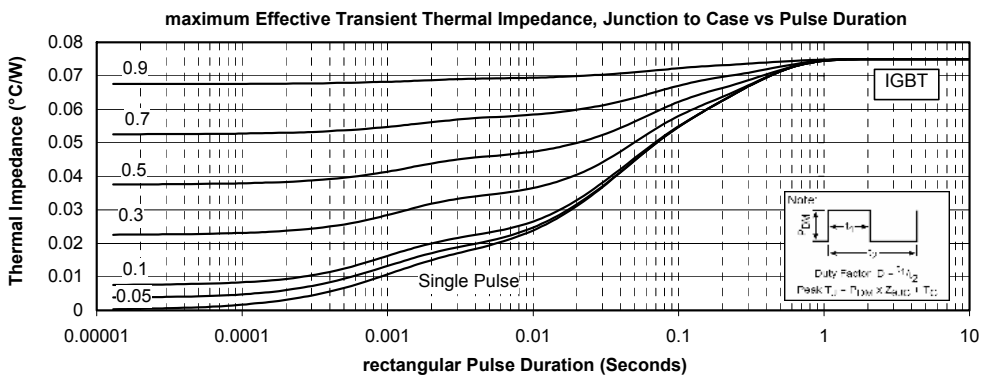
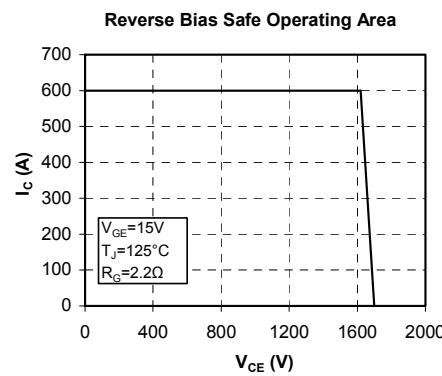
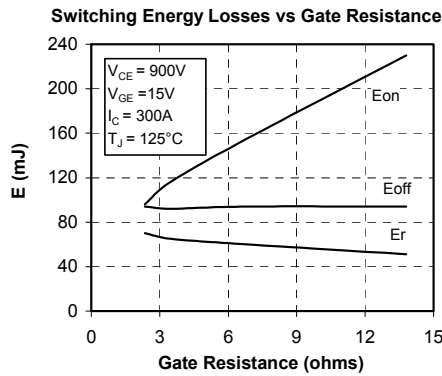
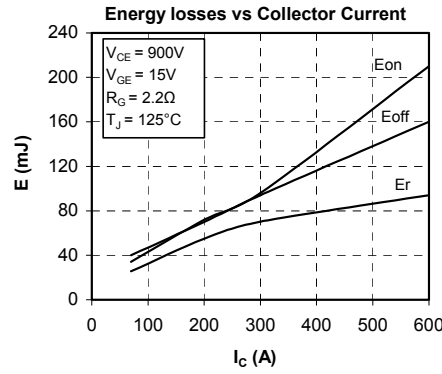
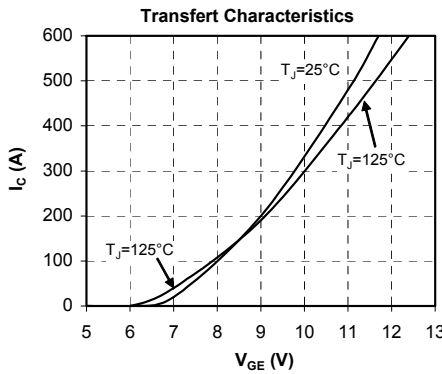
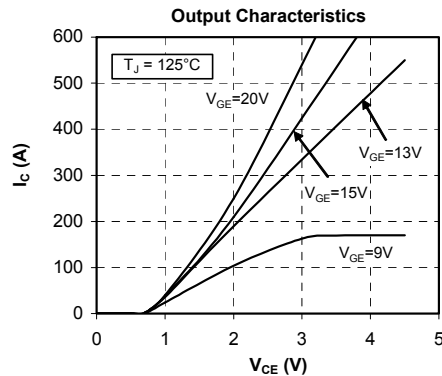
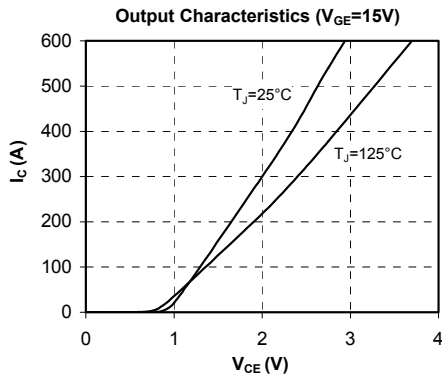
Symbol	Characteristic		Min	Typ	Max	Unit
R <sub>thJC</sub>	Junction to Case Thermal Resistance	IGBT			0.075	°C/W
		Diode			0.14	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz		4000			V
T <sub>J</sub>	Operating junction temperature range		-40		150	°C
T <sub>STG</sub>	Storage 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

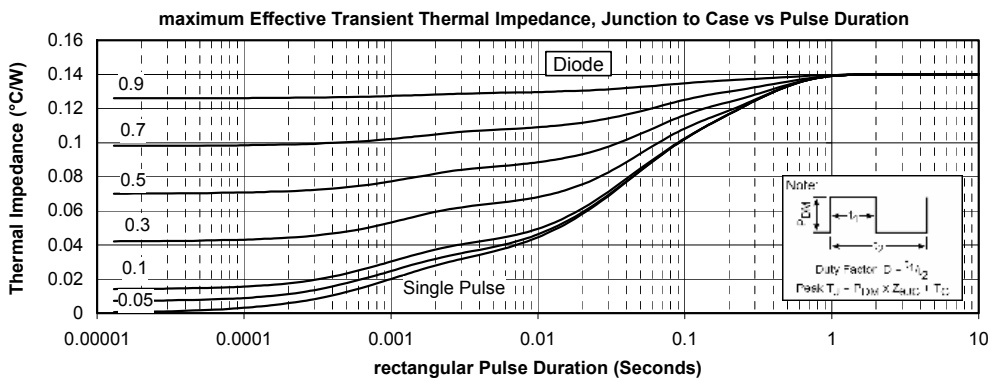
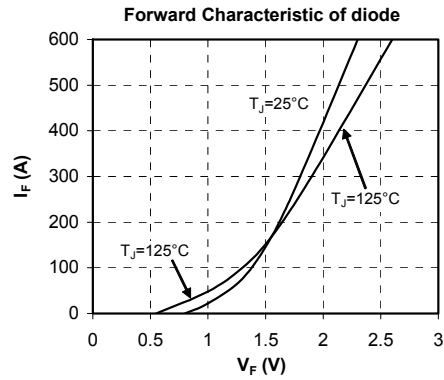
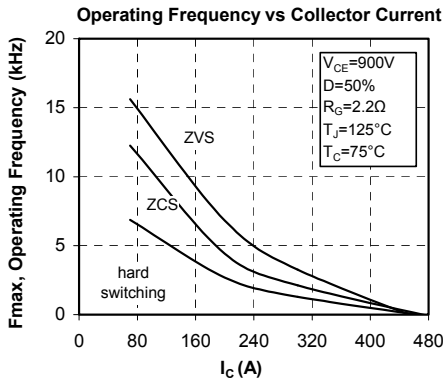
## SP6 Package outline (dimensions in mm)



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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