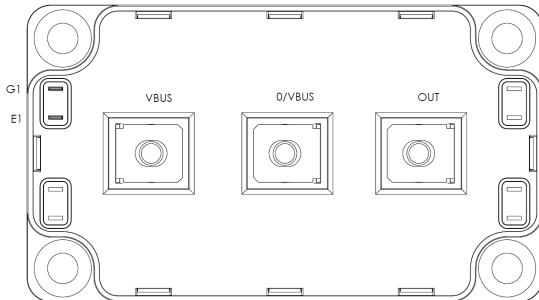
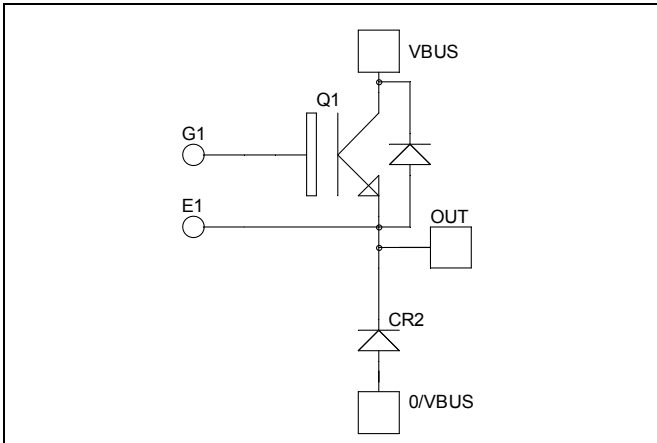


***Buck chopper  
Trench + Field Stop IGBT3  
Power Module***

**$V_{CES} = 600V$   
 $I_C = 450A @ T_c = 80^\circ C$**



### Application

- AC and DC motor control
- Switched Mode 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
  - 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	600	V
$I_C$	Continuous Collector Current	$T_c = 25^\circ C$	550
		$T_c = 80^\circ C$	450
$I_{CM}$	Pulsed Collector Current	$T_c = 25^\circ C$	600
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	1750
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	900A @ 550V

**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	$V_{GE} = 0\text{V}$ , $V_{CE} = 600\text{V}$			500	$\mu\text{A}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 450\text{A}$		1.4 1.5	1.8	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$ , $I_C = 2\text{mA}$	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	$V_{GE} = 0\text{V}$		37		nF
$C_{oes}$	Output Capacitance	$V_{CE} = 25\text{V}$		2.3		
$C_{res}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		1.1		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ ) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$ $I_C = 450\text{A}$ $R_G = 1\Omega$		130		ns
$T_r$	Rise Time			55		
$T_{d(off)}$	Turn-off Delay Time			250		
$T_f$	Fall Time			60		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $150^\circ\text{C}$ ) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$ $I_C = 450\text{A}$ $R_G = 1\Omega$		145		ns
$T_r$	Rise Time			60		
$T_{d(off)}$	Turn-off Delay Time			320		
$T_f$	Fall Time			80		
$E_{on}$	Turn on Energy	$V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$ $I_C = 450\text{A}$	$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	2.25 4.2		mJ
$E_{off}$	Turn off Energy	$R_G = 1\Omega$	$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	12.8 15.7		mJ

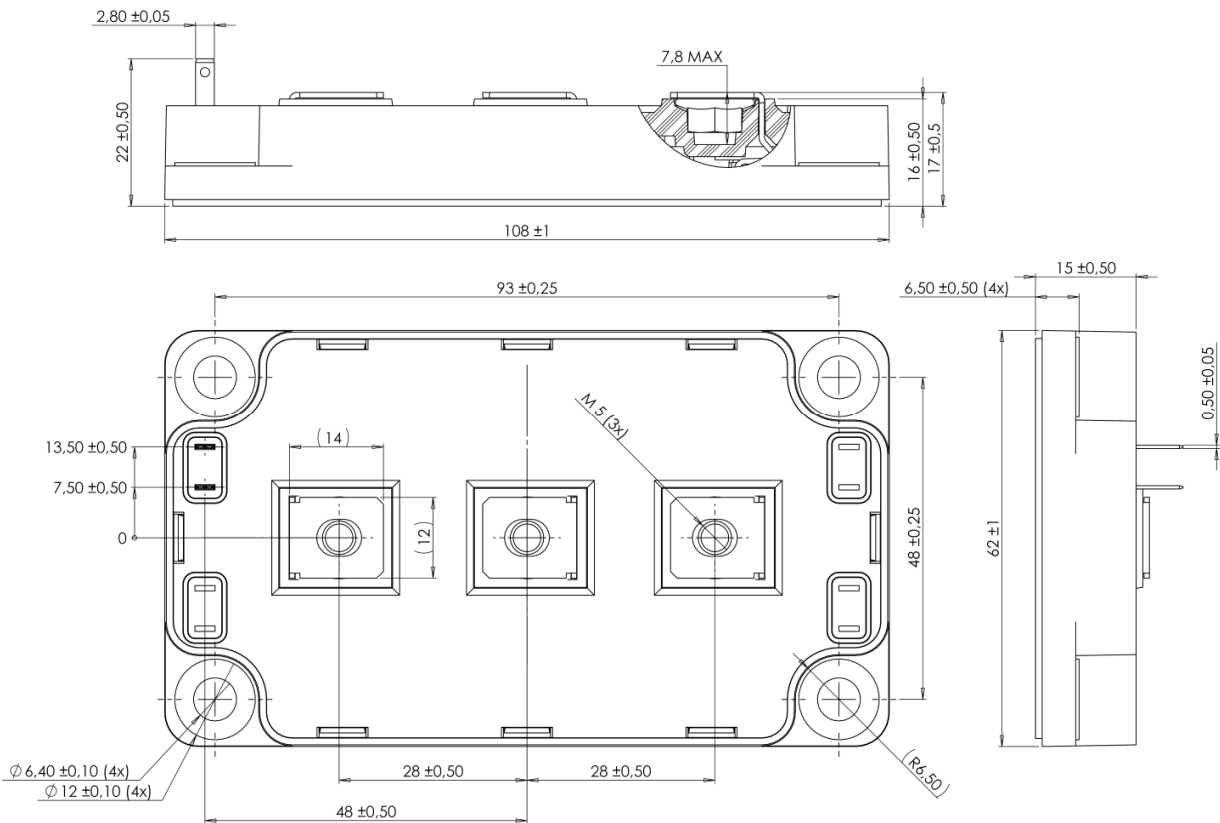
**Chopper diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		600			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 600\text{V}$			200 500	$\mu\text{A}$
$I_F$	DC Forward Current			450		A
$V_F$	Diode Forward Voltage	$I_F = 450\text{A}$ $V_{GE} = 0\text{V}$		1.5 1.4	1.9	V
$t_{rr}$	Reverse Recovery Time	$I_F = 450\text{A}$ $V_R = 300\text{V}$ $di/dt = 4000\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	120 210		ns
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	20.3 42.8		$\mu\text{C}$
$E_r$	Reverse Recovery Energy		$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	5.2 10.6		mJ

## Thermal and package characteristics

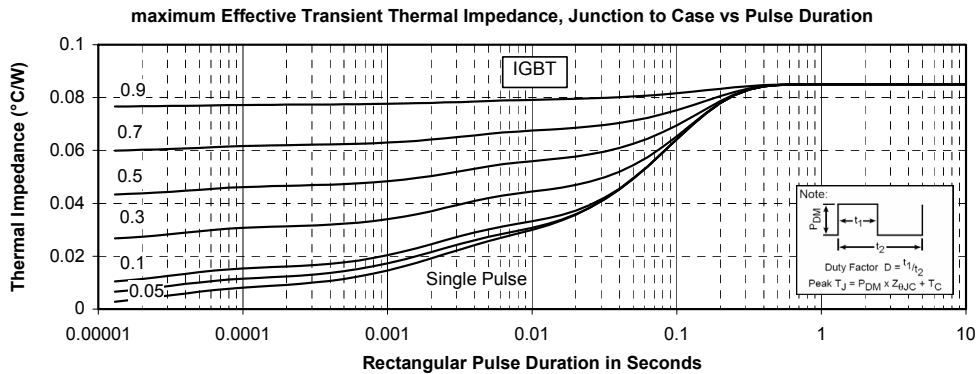
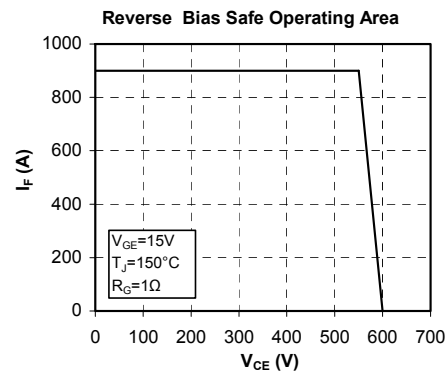
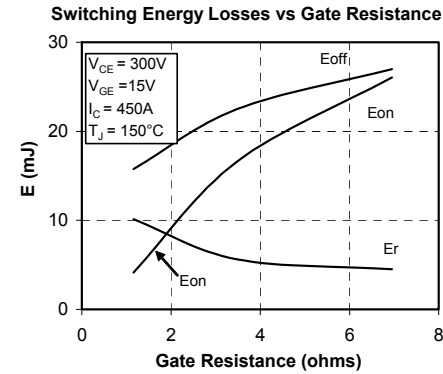
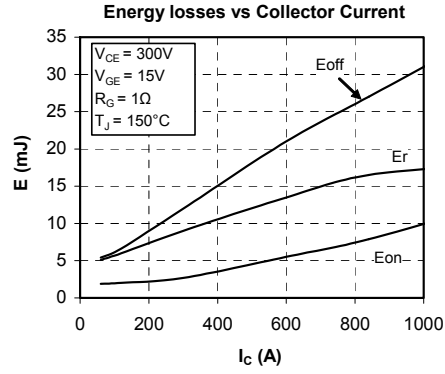
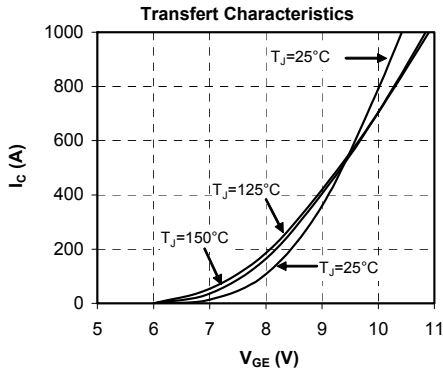
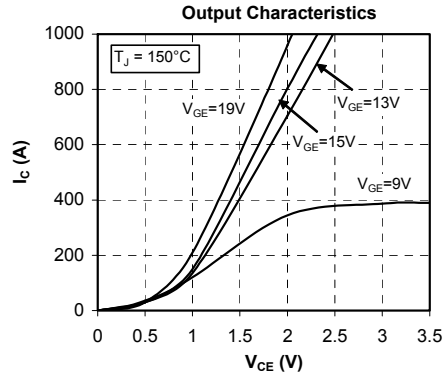
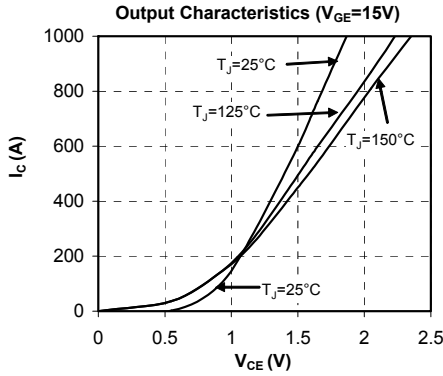
Symbol	Characteristic		Min	Typ	Max	Unit
R <sub>thJC</sub>	Junction to Case Thermal Resistance	IGBT			0.085	°C/W
		Diode			0.14	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz		4000			V
T <sub>J</sub>	Operating junction temperature range		-40		175	°C
T <sub>STG</sub>	Storage 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

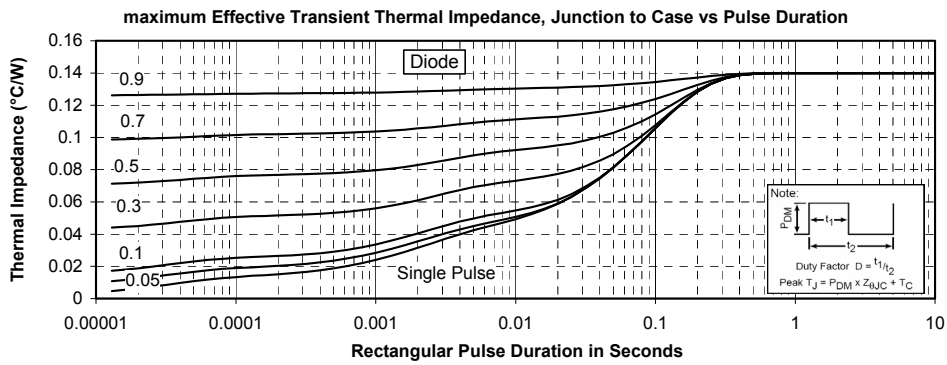
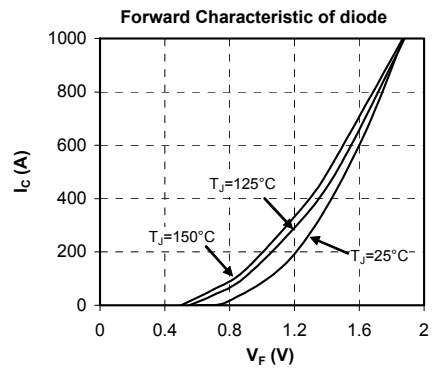
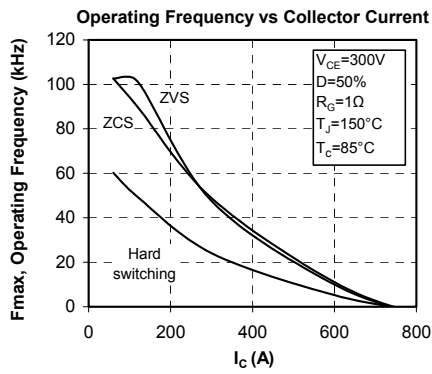
## SP6 Package outline (dimensions in mm)



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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