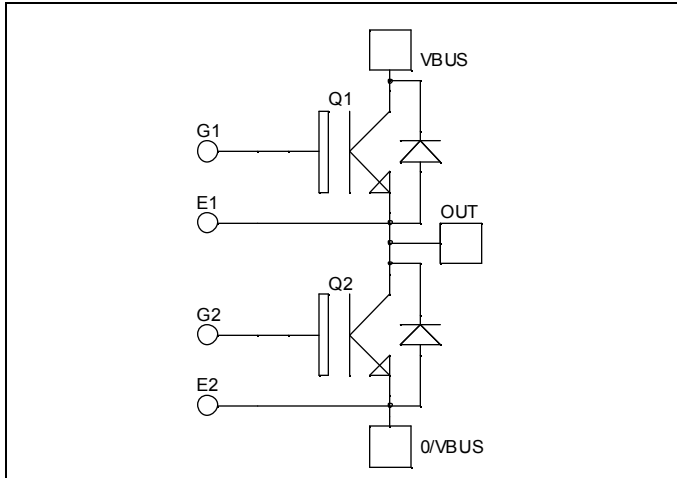


*Phase leg  
Trench + Field Stop IGBT®  
Power Module*

**$V_{CES} = 600V$   
 $I_C = 300A @ T_c = 80^\circ C$**

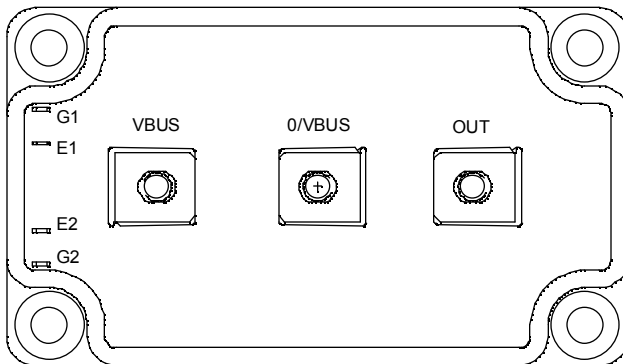


### Application

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

### Features

- Trench + Field Stop IGBT® Technology
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 20 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

- 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	$T_C = 25^\circ C$	430
		$T_C = 80^\circ C$	300
$I_{CM}$	Pulsed Collector Current	$T_C = 25^\circ C$	500
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_C = 25^\circ C$	1150
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	600A @ 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	$V_{GE} = 0\text{V}$ , $V_{CE} = 600\text{V}$			350	$\mu\text{A}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 300\text{A}$	$T_j = 25^\circ\text{C}$	1.4	1.8	V
			$T_j = 150^\circ\text{C}$	1.5		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$ , $I_C = 1.5\text{ mA}$	5.0	5.8	6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}$ , $V_{CE} = 0\text{V}$			500	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0\text{V}$		24		nF
$C_{oes}$	Output Capacitance	$V_{CE} = 25\text{V}$		1.5		
$C_{res}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		0.75		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ )		115		ns
$T_r$	Rise Time	$V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$		45		
$T_{d(off)}$	Turn-off Delay Time	$I_C = 300\text{A}$		200		
$T_f$	Fall Time	$R_G = 1.8\Omega$		55		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $150^\circ\text{C}$ )		120		ns
$T_r$	Rise Time	$V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$		50		
$T_{d(off)}$	Turn-off Delay Time	$I_C = 300\text{A}$		250		
$T_f$	Fall Time	$R_G = 1.8\Omega$		70		
$E_{on}$	Turn on Energy	$V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$	$T_j = 25^\circ\text{C}$	1.5		mJ
			$T_j = 150^\circ\text{C}$	2.7		
$E_{off}$	Turn off Energy	$I_C = 300\text{A}$ $R_G = 1.8\Omega$	$T_j = 25^\circ\text{C}$	8.55		mJ
			$T_j = 150^\circ\text{C}$	10.5		

**Reverse diode ratings and characteristics**

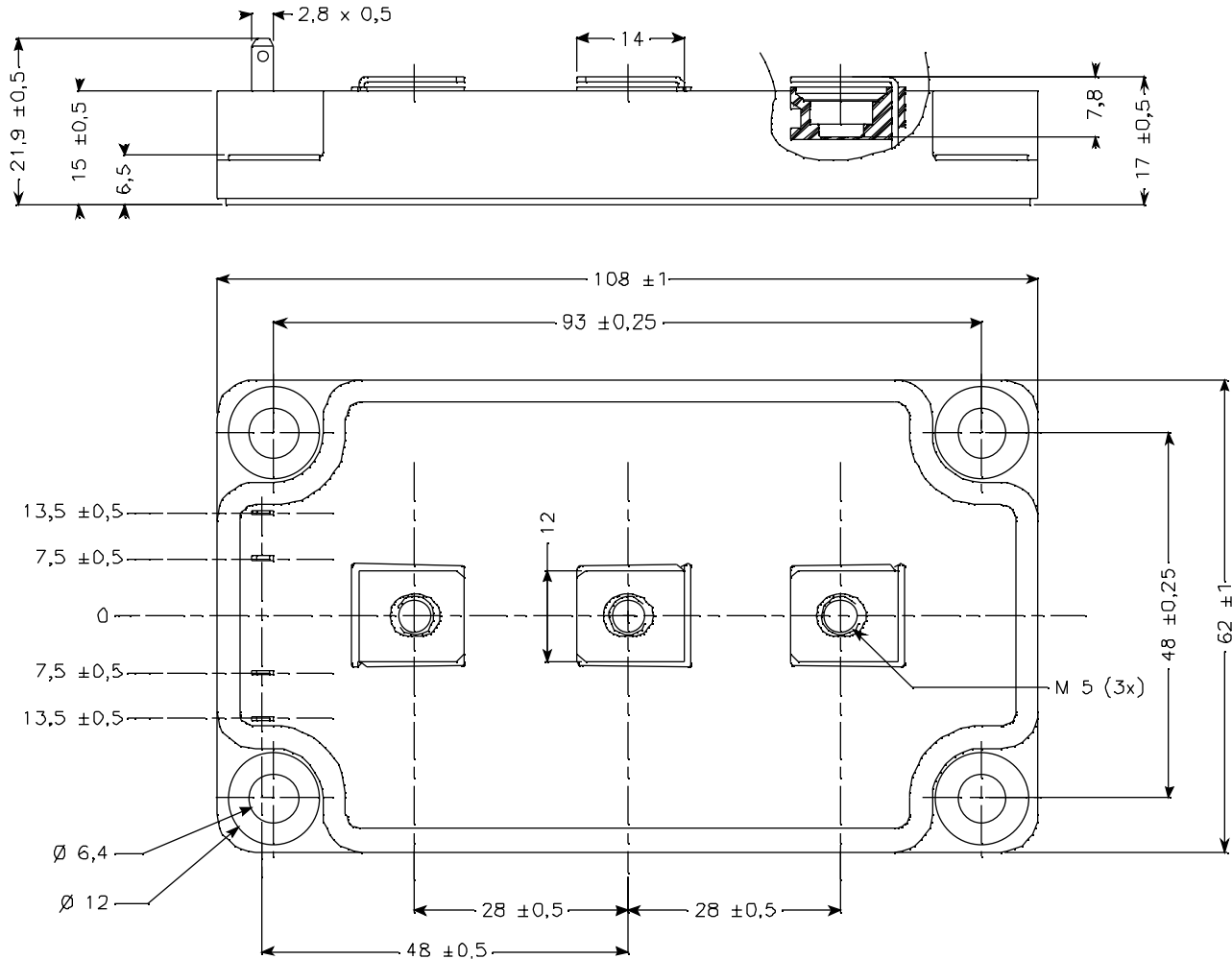
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		600			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 600\text{V}$	$T_j = 25^\circ\text{C}$		150	$\mu\text{A}$
			$T_j = 150^\circ\text{C}$		400	
$I_F$	DC Forward Current		$T_c = 80^\circ\text{C}$	300		A
$V_F$	Diode Forward Voltage	$I_F = 300\text{A}$ $V_{GE} = 0\text{V}$	$T_j = 25^\circ\text{C}$	1.5	1.9	V
			$T_j = 150^\circ\text{C}$	1.4		
$t_{rr}$	Reverse Recovery Time		$T_j = 25^\circ\text{C}$	130		ns
			$T_j = 150^\circ\text{C}$	225		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 300\text{A}$ $V_R = 300\text{V}$ $di/dt = 3100\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	13.5		$\mu\text{C}$
			$T_j = 150^\circ\text{C}$	28.5		
$E_r$	Reverse Recovery Energy		$T_j = 25^\circ\text{C}$	3.5		mJ
			$T_j = 150^\circ\text{C}$	7.1		

## Thermal and package characteristics

*Symbol Characteristic*

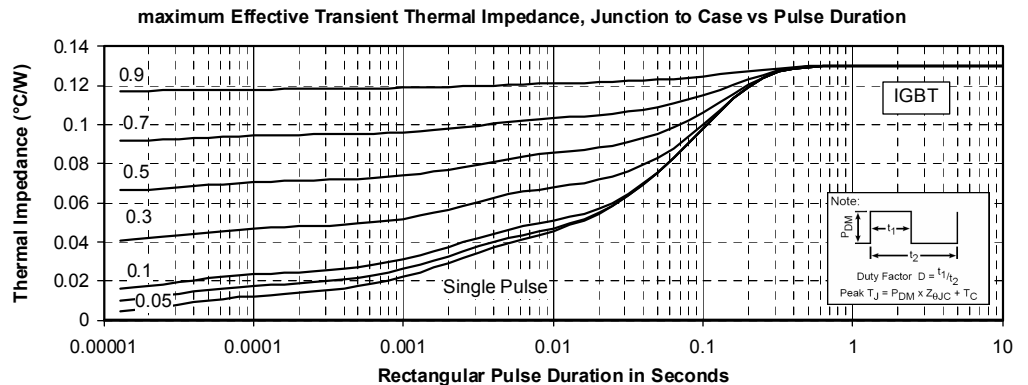
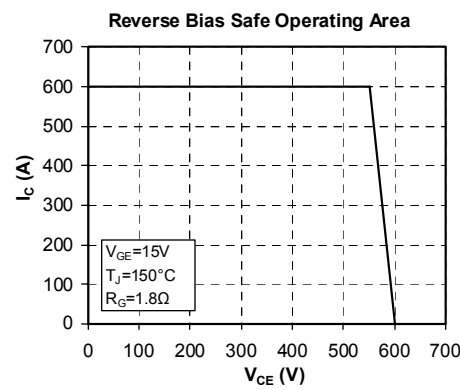
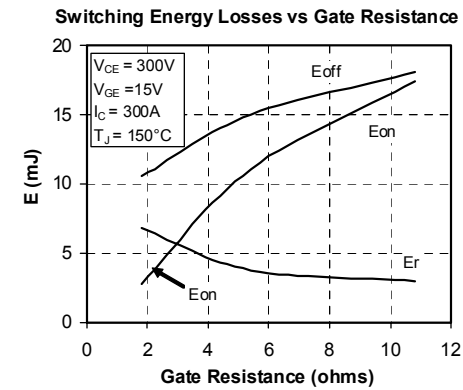
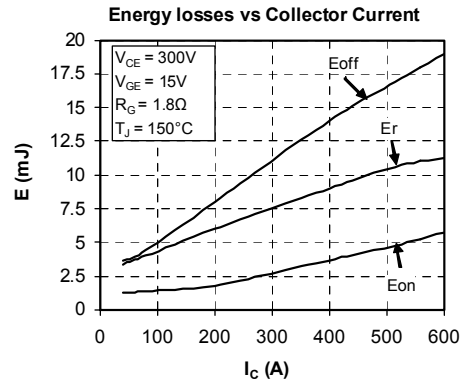
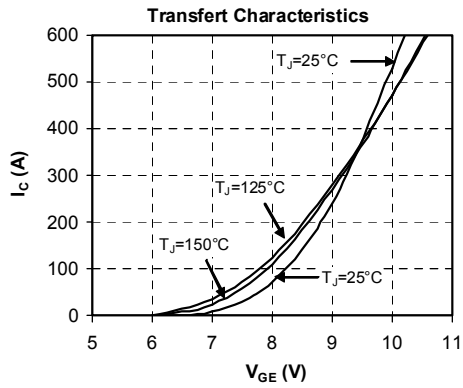
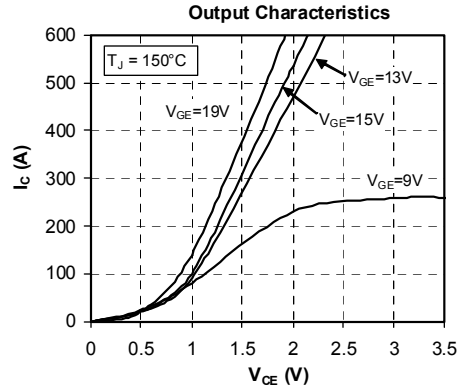
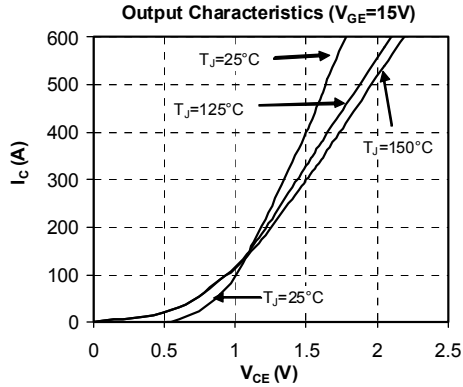
<i>Symbol</i>	<i>Characteristic</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
$R_{thJC}$	Junction to Case Thermal Resistance	IGBT			0.13	°C/W
		Diode			0.21	
$V_{ISOL}$	RMS Isolation Voltage, any terminal to case t = 1 min, I isol < 1 mA, 50/60Hz		2500			V
$T_J$	Operating junction temperature range		-40		175	°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

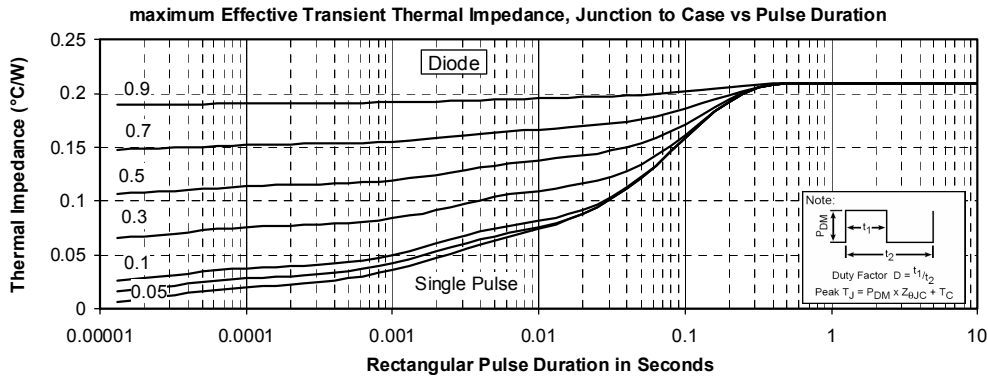
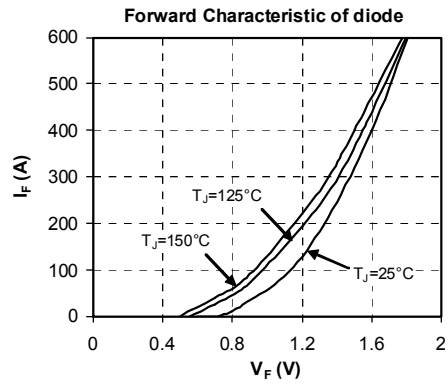
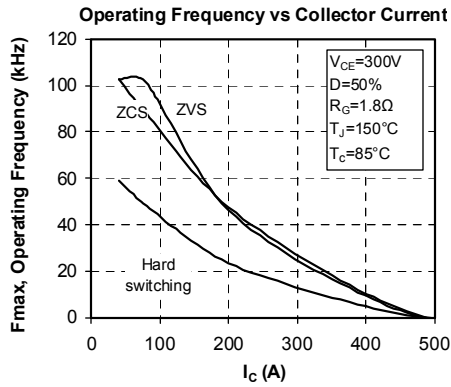
## SP6 Package outline (dimensions in mm)



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

## Typical Performance Curve





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