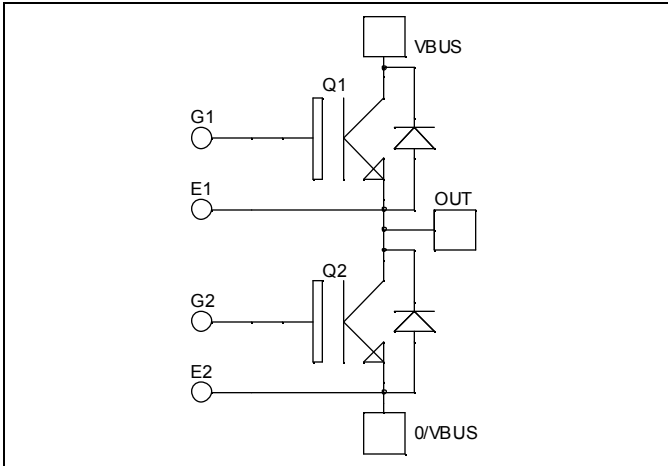


Phase leg NPT IGBT Power Module

$V_{CES} = 1200V$
 $I_C = 300A @ T_c = 80^\circ C$

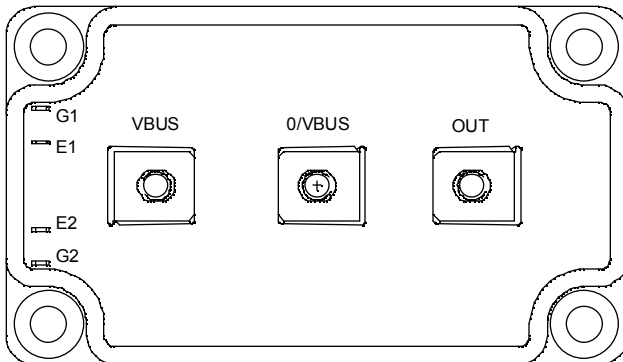


Application

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

Features

- Non Punch Through (NPT) FAST IGBT
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 50 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

- Outstanding performance at high frequency operation
- 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	$T_c = 25^\circ C$	400
		$T_c = 80^\circ C$	300
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	600
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	1780
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	600A @ 1200V

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on 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	$V_{GE} = 0\text{V}$			500	μA
		$V_{CE} = 1200\text{V}$	$T_j = 25^\circ\text{C}$			
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15\text{V}$		3.3	3.9	V
		$I_C = 300\text{A}$	$T_j = 25^\circ\text{C}$			
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 12\text{mA}$	4.5		6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}$			± 1	μA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$		21		nF
C_{oes}	Output Capacitance	$V_{CE} = 25\text{V}$		2.9		
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		1.52		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C)		120		ns
T_r	Rise Time	$V_{GE} = 15\text{V}$		50		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 600\text{V}$		310		
T_f	Fall Time	$I_C = 300\text{A}$		30		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C)		130		ns
T_r	Rise Time	$V_{GE} = 15\text{V}$		60		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 600\text{V}$		360		
T_f	Fall Time	$I_C = 300\text{A}$		40		
E_{on}	Turn-on Switching Energy	$V_{GE} = 15\text{V}$	$T_j = 125^\circ\text{C}$	25		mJ
E_{off}	Turn-off Switching Energy	$V_{Bus} = 600\text{V}$	$T_j = 125^\circ\text{C}$	15		
		$I_C = 300\text{A}$				
		$R_G = 3\Omega$				

Reverse diode ratings and characteristics

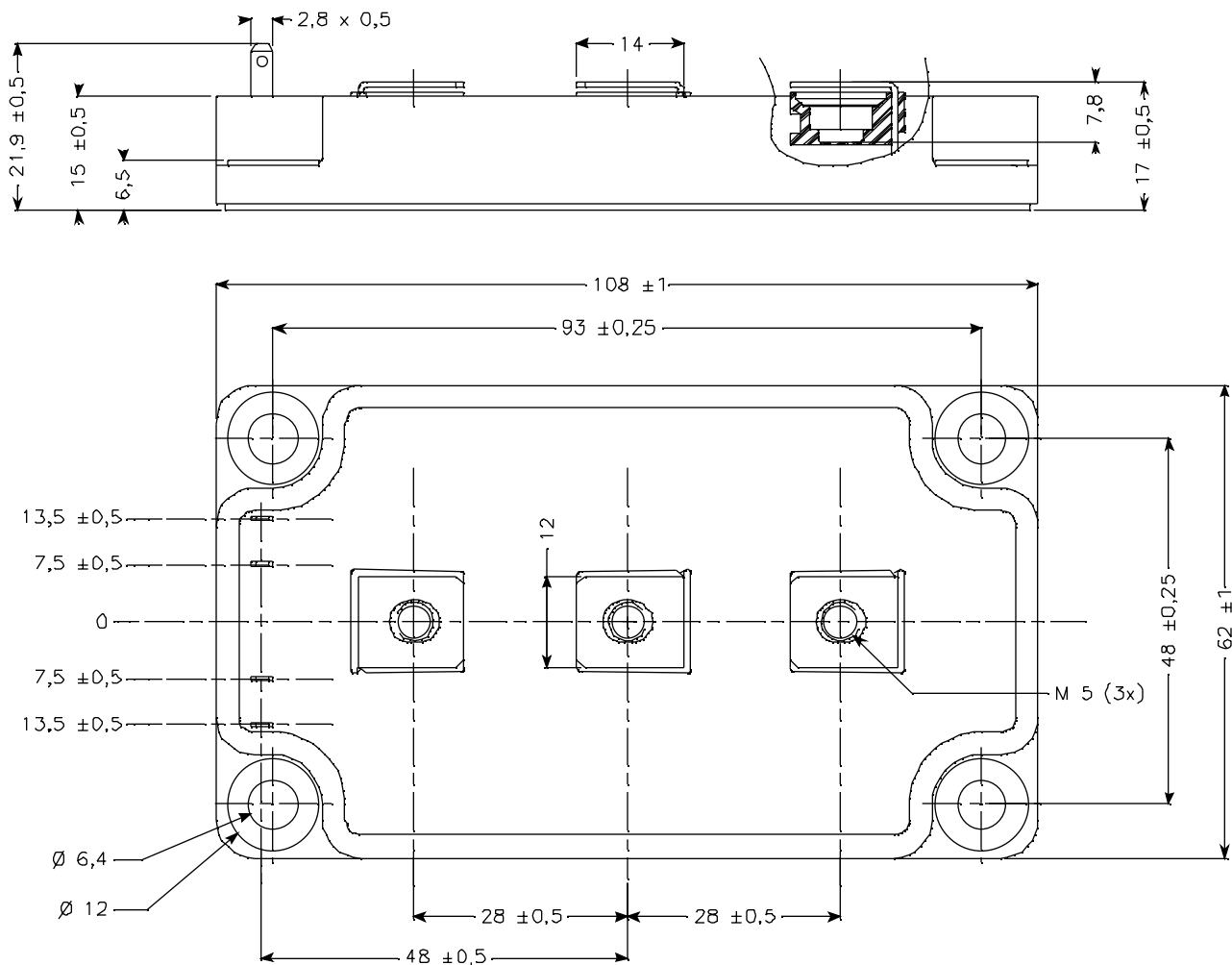
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		1200			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$		250	μA
			$T_j = 125^\circ\text{C}$		500	
I_F	DC Forward Current			300		A
V_F	Diode Forward Voltage	$I_F = 300\text{A}$	$T_j = 25^\circ\text{C}$	2.1		V
			$T_j = 125^\circ\text{C}$	1.9		
t_{rr}	Reverse Recovery Time	$I_F = 300\text{A}$	$T_j = 25^\circ\text{C}$	120		ns
			$T_j = 125^\circ\text{C}$	210		
Q_{rr}	Reverse Recovery Charge	$V_R = 600\text{V}$	$T_j = 25^\circ\text{C}$	22		μC
			$T_j = 125^\circ\text{C}$	43		
E_r	Reverse Recovery Energy	$di/dt = 4500\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	7		mJ
			$T_j = 125^\circ\text{C}$	15		

Thermal and package characteristics

Symbol Characteristic

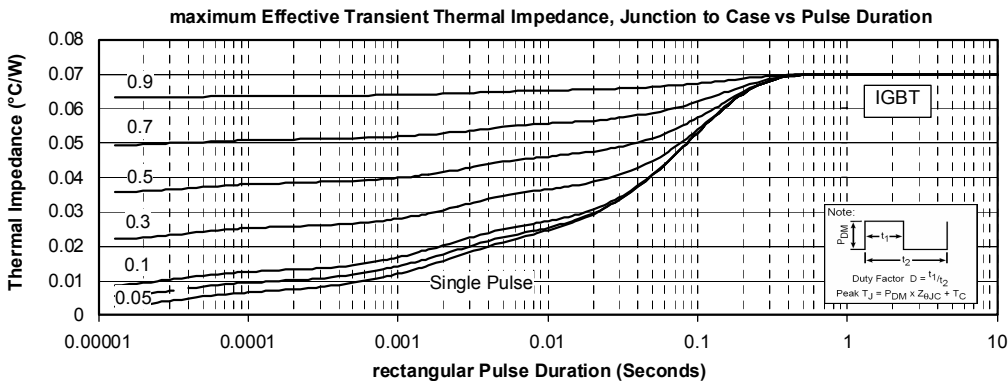
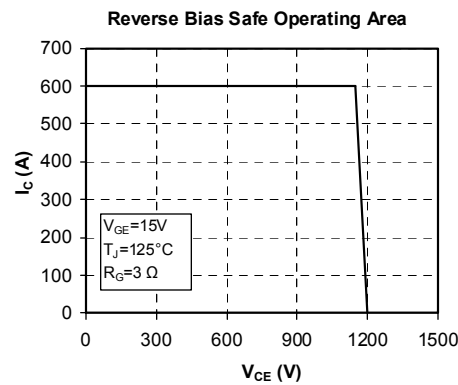
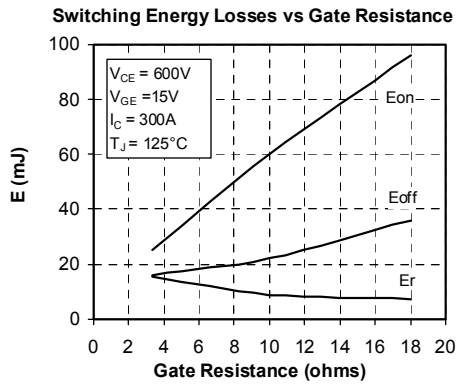
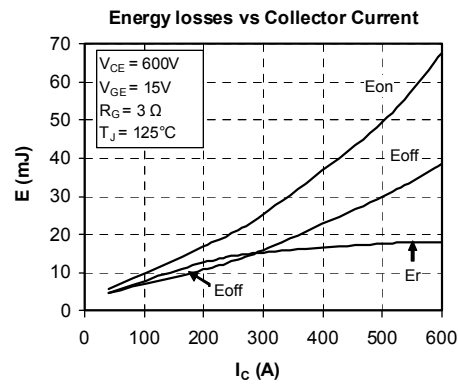
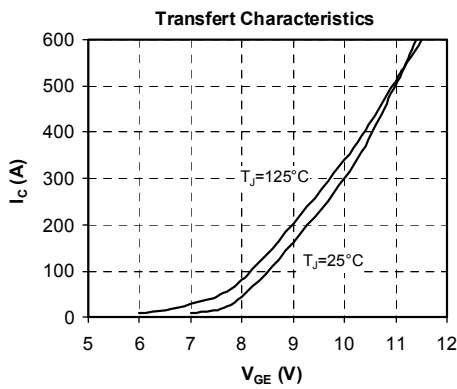
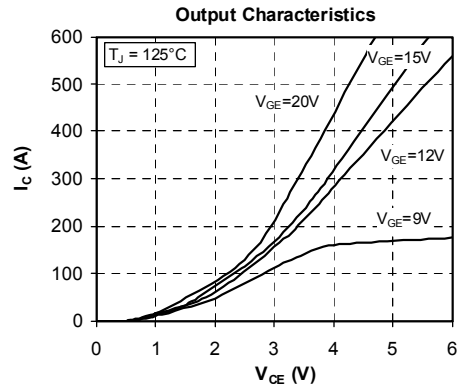
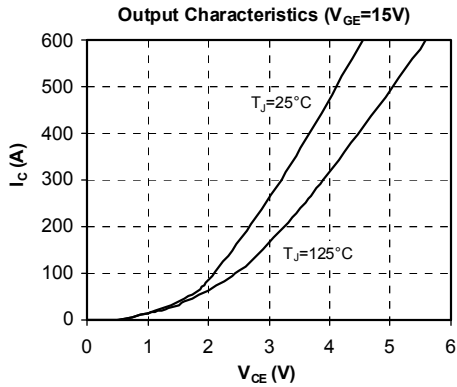
		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	
R _{thJC}	Junction to Case Thermal Resistance	IGBT		0.07	°C/W	
		Diode		0.12		
V _{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, I _{isol} <1mA, 50/60Hz	2500			V	
T _J	Operating junction temperature range	-40		150	°C	
T _{STG}	Storage Temperature 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	

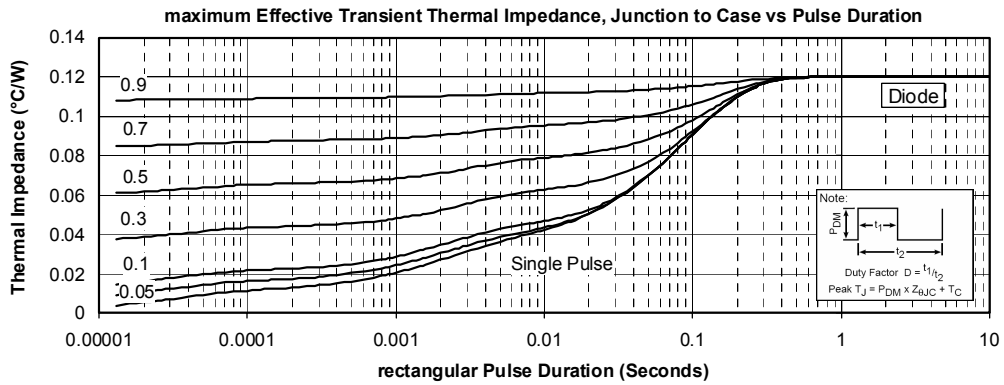
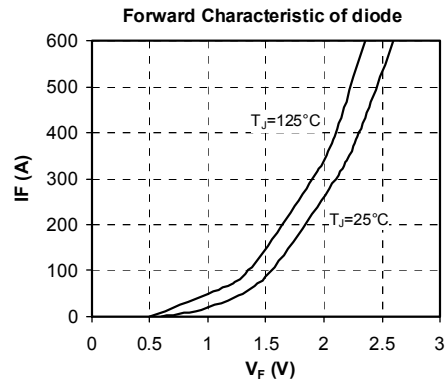
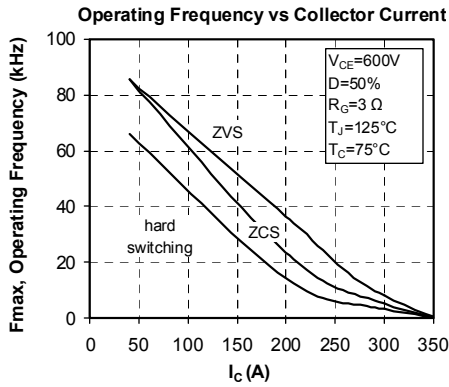
SP6 Package outline (dimensions in mm)



See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical Performance Curve





Microsemi reserves the right to change, without notice, the specifications and information contained herein

Microsemi's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 and foreign patents. U.S. and Foreign patents pending. All Rights Reserved.