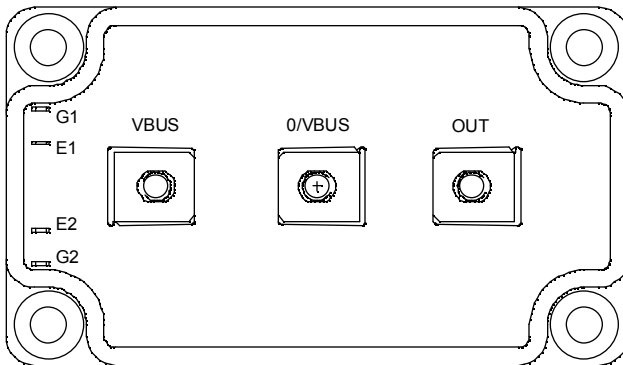
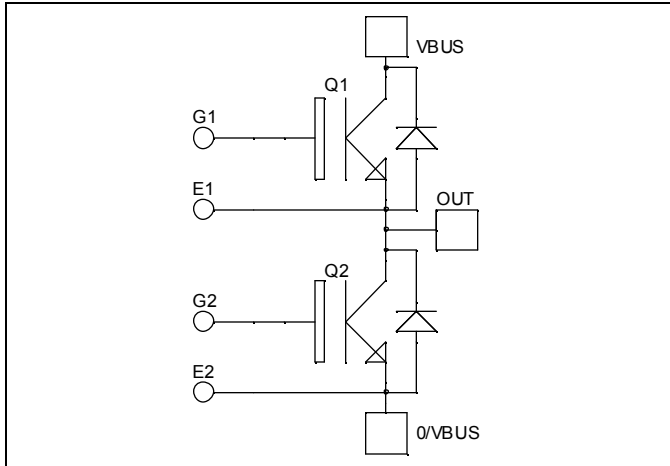


Phase leg NPT IGBT Power Module

$V_{CES} = 600V$
 $I_C = 350A @ T_c = 80^\circ C$



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 100 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	600	V
I_C	Continuous Collector Current	$T_c = 25^\circ C$	430
		$T_c = 80^\circ C$	350
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	1225
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	1562
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	800A @ 600V

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

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}$ $V_{CE} = 600\text{V}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$			200 1750	μA
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 360\text{A}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		2.0 2.2	2.5	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 4\text{mA}$		3		5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}$				± 300	nA

Dynamic Characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$			17.2		nF
C_{oes}	Output Capacitance	$V_{CE} = 25\text{V}$			1.88		
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$			1.6		
Q_g	Total gate Charge	$V_{GE} = 15\text{V}$			1320		nC
Q_{ge}	Gate – Emitter Charge	$V_{Bus} = 300\text{V}$			1160		
Q_{gc}	Gate – Collector Charge	$I_C = 360\text{A}$			800		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = 15\text{V}$ $V_{Bus} = 400\text{V}$ $I_C = 360\text{A}$ $R_G = 1.25\Omega$			26		ns
T_r	Rise Time				25		
$T_{d(off)}$	Turn-off Delay Time				150		
T_f	Fall Time				30		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) $V_{GE} = 15\text{V}$ $V_{Bus} = 400\text{V}$ $I_C = 360\text{A}$ $R_G = 1.25\Omega$			26		ns
T_r	Rise Time				25		
$T_{d(off)}$	Turn-off Delay Time				170		
T_f	Fall Time				40		
E_{on}	Turn-on Switching Energy	$V_{GE} = 15\text{V}$ $V_{Bus} = 400\text{V}$	$T_j = 125^\circ\text{C}$		17.2		mJ
E_{off}	Turn-off Switching Energy	$I_C = 360\text{A}$ $R_G = 1.25\Omega$	$T_j = 125^\circ\text{C}$		14		

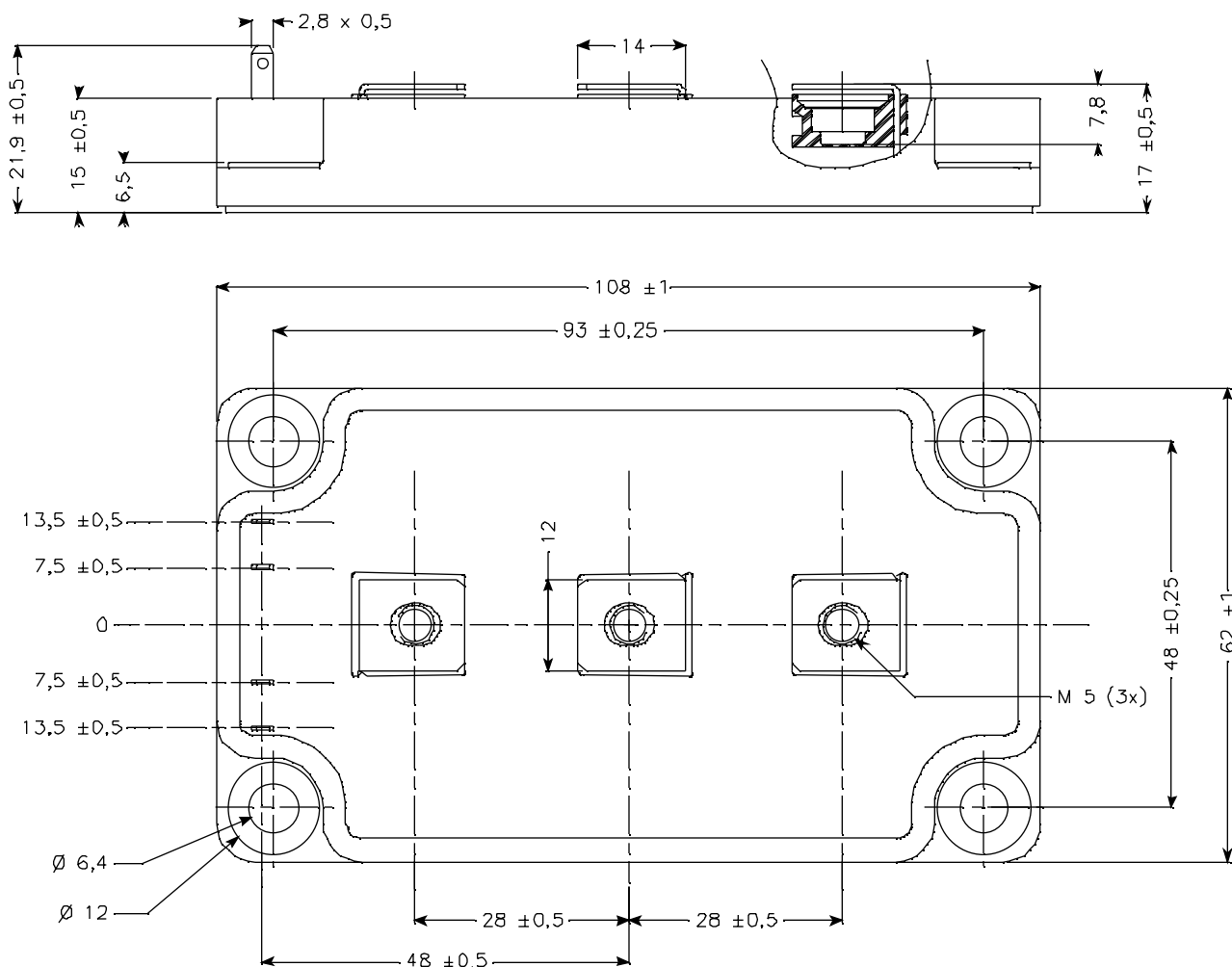
Reverse diode ratings and characteristics

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 =600V	T _j = 25°C			750	μA	
			T _j = 125°C			1500		
I _F	DC Forward Current		T _c = 80°C		400		A	
V _F	Diode Forward Voltage	I _F = 400A			1.6	1.8	V	
		I _F = 800A			1.9			
		I _F = 400A	T _j = 125°C		1.4			
t _{rr}	Reverse Recovery Time	I _F = 400A V _R = 400V di/dt =800A/μs	T _j = 25°C		180		ns	
			T _j = 125°C		220			
Q _{rr}	Reverse Recovery Charge			T _j = 25°C		1560		nC
				T _j = 125°C		5800		

Thermal and package characteristics

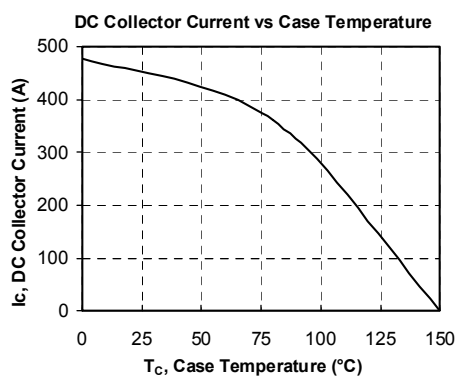
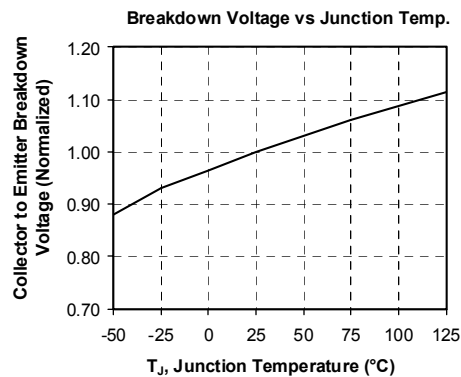
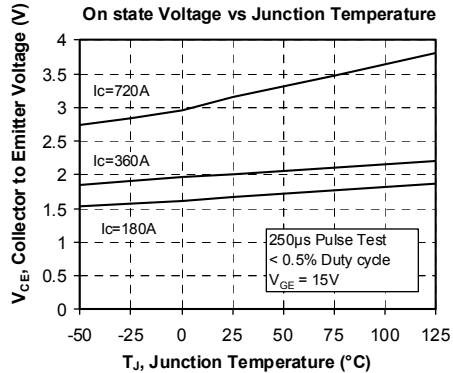
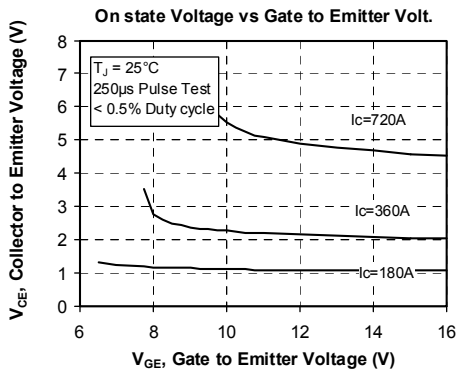
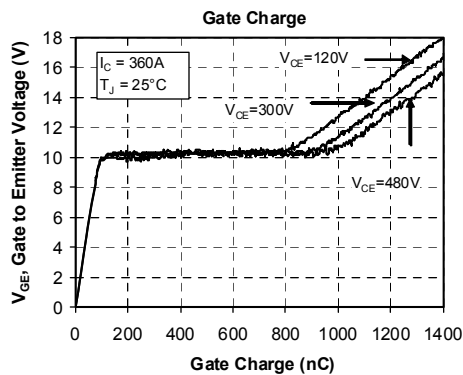
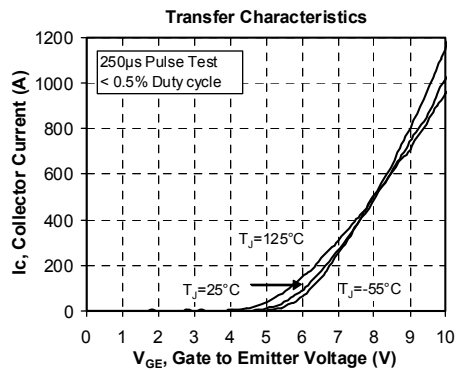
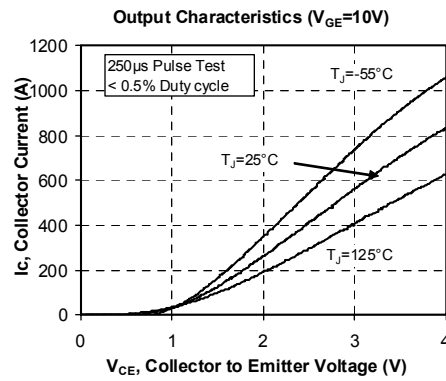
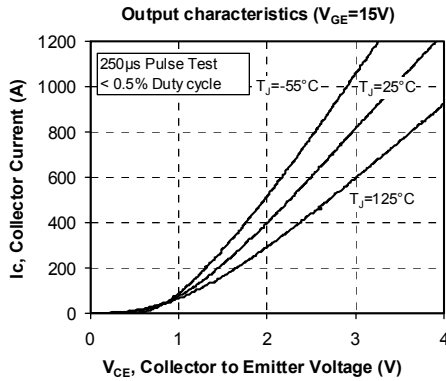
Symbol	Characteristic		Min	Typ	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance	IGBT			0.08	°C/W
		Diode			0.16	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, I isol < 1mA, 50/60Hz		2500			V
T _J	Operating junction temperature range		-40		150	°C
T _{STG}	Storage Temperature Range		-40		125	
T _C	Operating Case Temperature		-40		100	
Torque	Mounting torque	To heatsink	M6	3		N.m
		For terminals	M5	2		
Wt	Package Weight				280	g

SP6 Package outline (dimensions in mm)

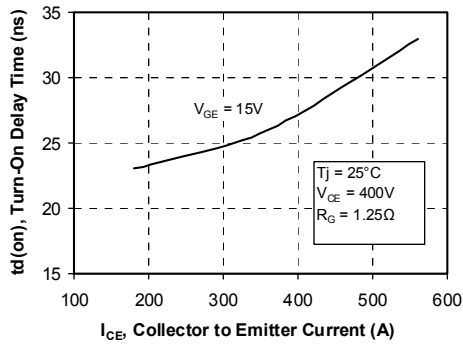


See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

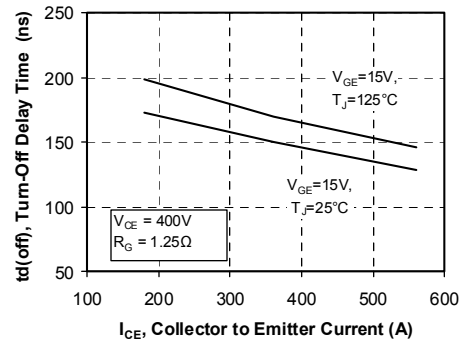
Typical Performance Curve



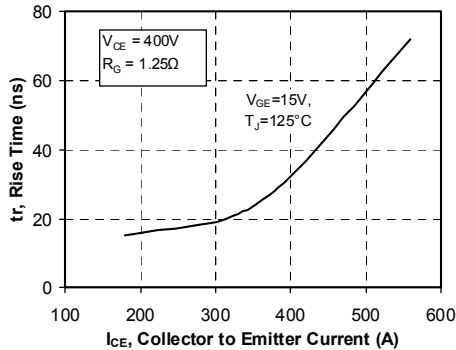
Turn-On Delay Time vs Collector Current



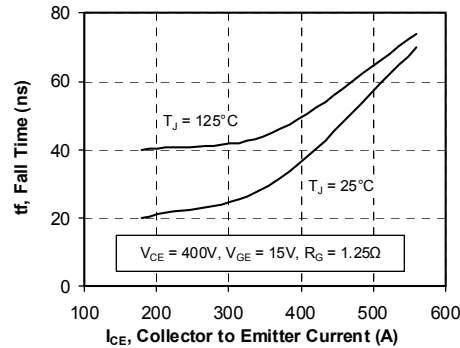
Turn-Off Delay Time vs Collector Current



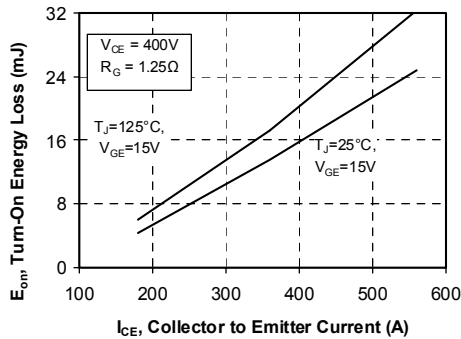
Current Rise Time vs Collector Current



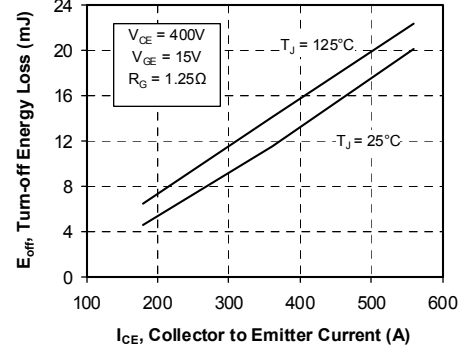
Current Fall Time vs Collector Current



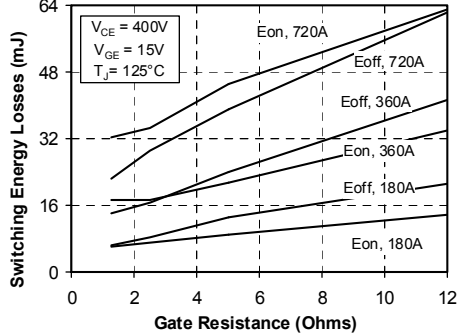
Turn-On Energy Loss vs Collector Current



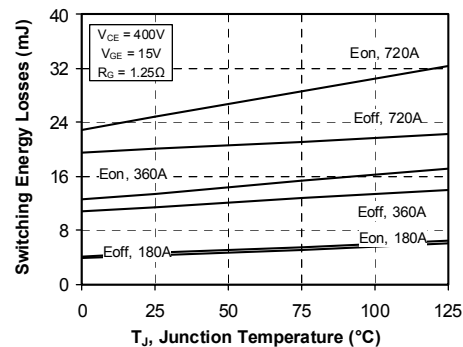
Turn-Off Energy Loss vs Collector Current

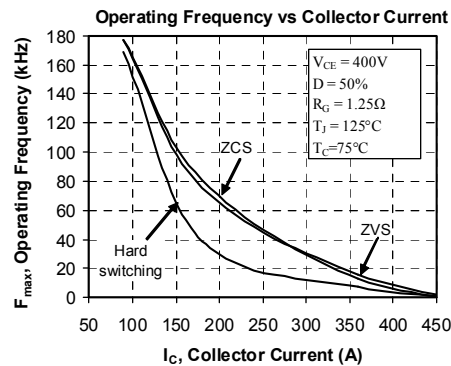
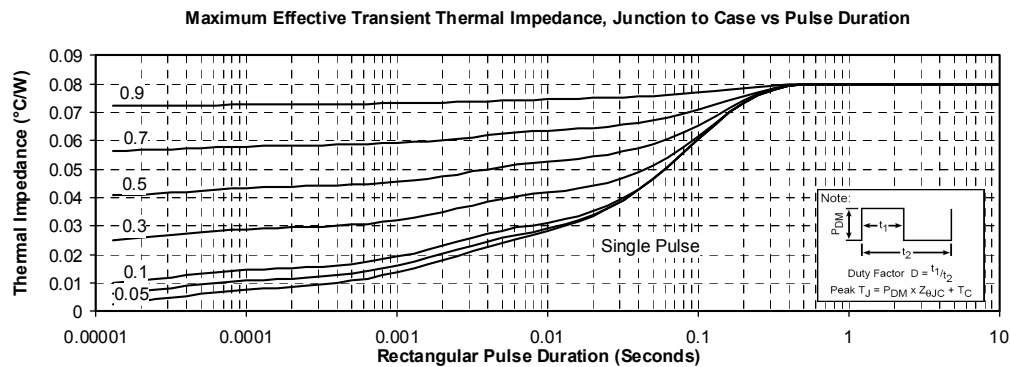
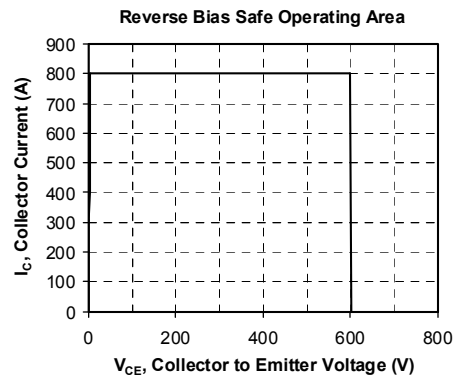
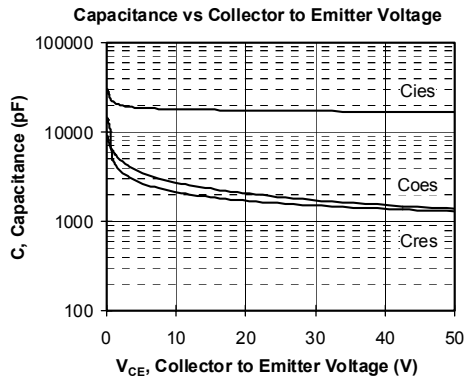


Switching Energy Losses vs Gate Resistance



Switching Energy Losses vs Junction Temp.





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.