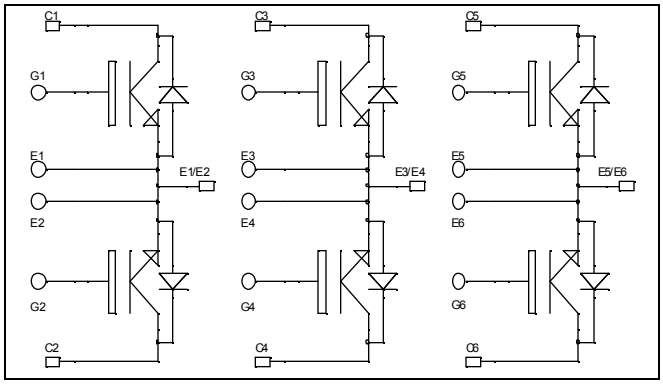
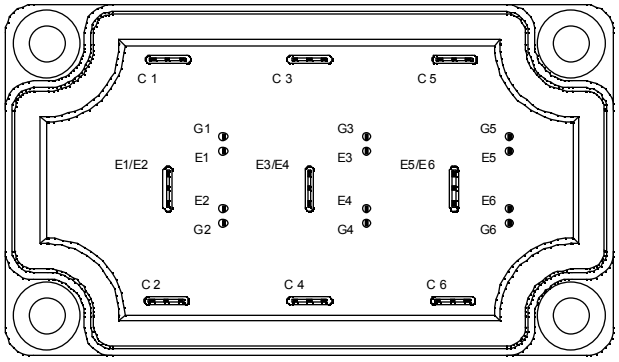
Triple dual Common Source NPT IGBT Power Module

V_{CES} = 600V
I_C = 90A @ Tc = 80°C





Application

- AC Switches
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

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
  - Lead frames for power connections
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Very low (12mm) profile
- Easy paralleling due to positive TC of VCEsat
- Each leg can be easily paralleled to achieve a dual common source configuration of three times the current capability
- 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°C	110	A
		T_c = 80°C	90	
I_{CM}	Pulsed Collector Current	T_c = 25°C	315	
V_{GE}	Gate – Emitter Voltage		±20	V
P_D	Maximum Power Dissipation	T_c = 25°C	416	W
RBSOA	Reverse Bias Safe Operating Area	T_j = 150°C	200A @ 600V	

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handing Procedures Should Be Followed. See application note APT0502 on www.microsemi.com

All ratings @ T_j = 25°C unless otherwise specified

Electrical Characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
I_{CES}	Zero Gate Voltage Collector Current	V_{GE} = 0V, V_{CE} = 600V	T_j = 25°C			250	µA
			T_j = 125°C			500	
$V_{CE(sat)}$	Collector Emitter saturation Voltage	V_{GE} =15V, I_C = 90A	T_j = 25°C		2.0	2.5	V
			T_j = 125°C		2.2		
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE} = V_{CE}, I_C = 1mA		3		5	V
I_{GES}	Gate – Emitter Leakage Current	V_{GE} = 20 V, V_{CE} = 0V				±150	nA

Dynamic Characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
C_{ies}	Input Capacitance	V_{GE} = 0V, V_{CE} = 25V, f = 1MHz			4300		pF
C_{oes}	Output Capacitance				470		
C_{res}	Reverse Transfer Capacitance				400		
Q_g	Total gate Charge	V_{GE} = 15V, V_{Bus} = 300V, I_C = 90A			330		nC
Q_{ge}	Gate – Emitter Charge				290		
Q_{gc}	Gate – Collector Charge				200		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C), V_{GE} = 15V, V_{Bus} = 400V, I_C = 90A, R_G = 5 Ω			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} = 15V, V_{Bus} = 400V, I_C = 90A, R_G = 5 Ω			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} = 15V, V_{Bus} = 400V, I_C = 90A, R_G = 5 Ω	T_j = 125°C		4.3		mJ
E_{off}	Turn-off Switching Energy		T_j = 125°C		3.5		

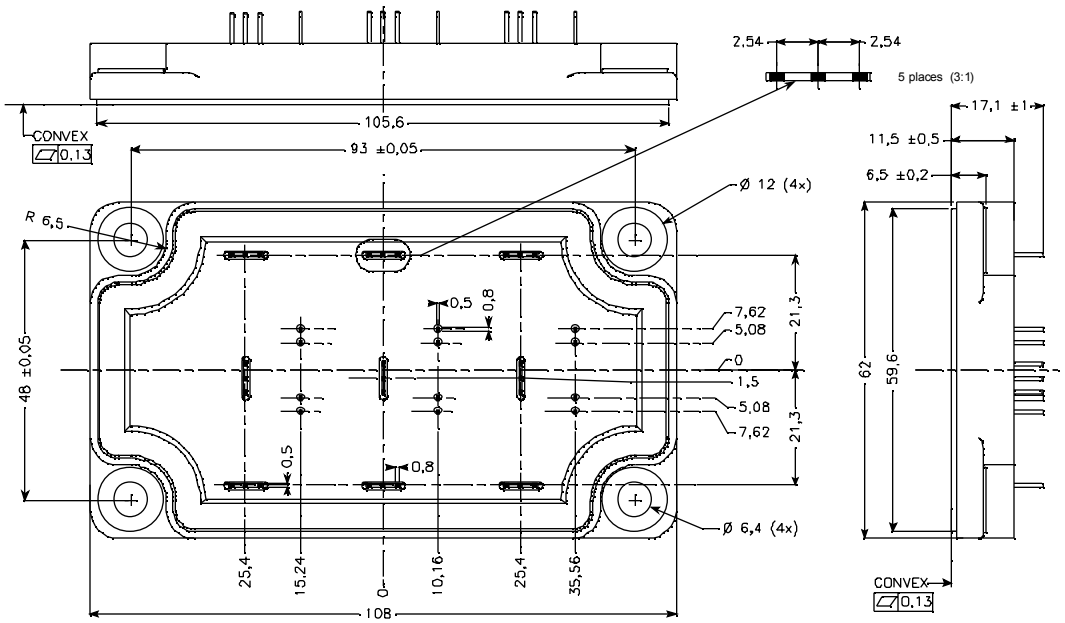
Diode ratings and characteristics

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			250	µA
			T_j = 125°C			500	
I_F	DC Forward Current		Tc = 70°C		60		A
V_F	Diode Forward Voltage	I_F = 60A			1.6	1.8	V
		I_F = 120A			1.9		
		I_F = 60A	T_j = 125°C		1.4		
t_{rr}	Reverse Recovery Time	I_F = 60A, V_R = 400V, di/dt =200A/µs	T_j = 25°C		130		ns
			T_j = 125°C		170		
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		220		nC
			T_j = 125°C		920		

Thermal and package characteristics

Symbol	*Characteristic*			*Min*	*Typ*	*Max*	*Unit*
R_{thJC}	Junction to Case Thermal Resistance		IGBT			0.3	°C/W
			Diode			0.9	
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
Wt	Package Weight					250	g

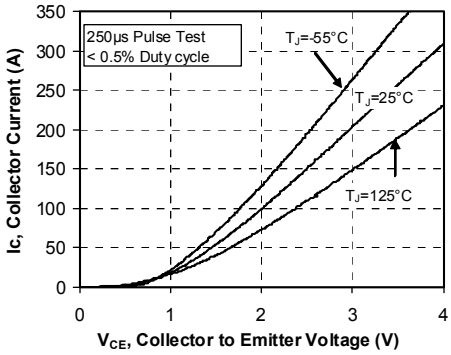
SP6-P Package outline (dimensions in mm)



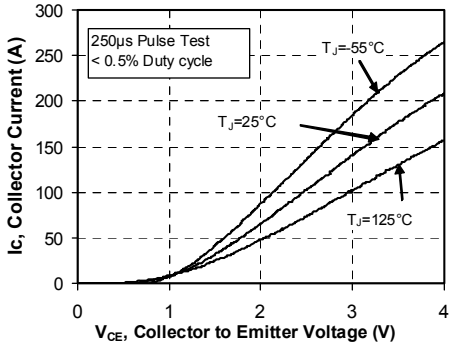
See application note 1902 - Mounting Instructions for SP6-P (12mm) Power Modules on www.microsemi.com

Typical Performance Curve

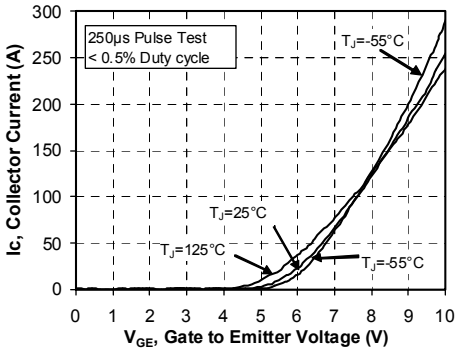
Output characteristics (V_{GE}=15V)



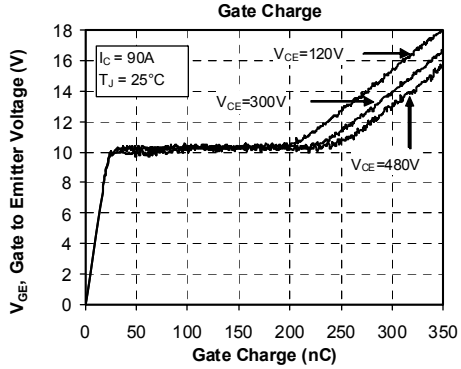
Output Characteristics (V_{GE}=10V)



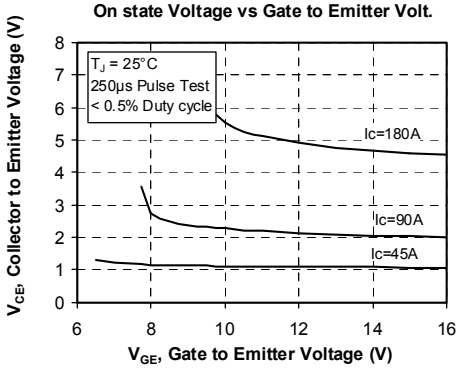
Transfer Characteristics



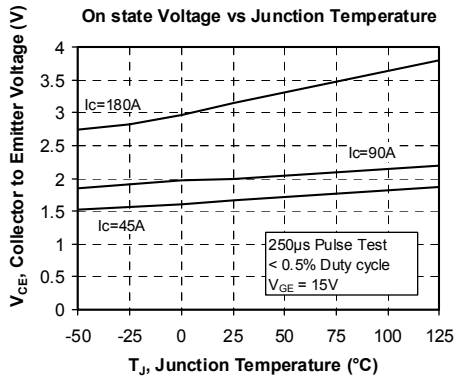
Gate Charge



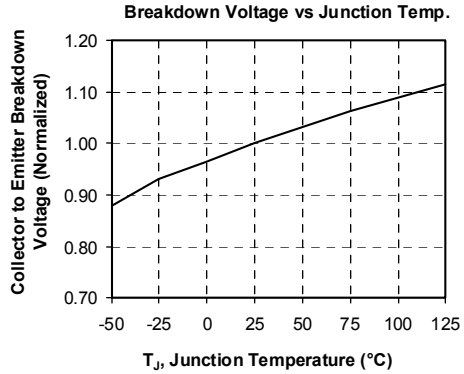
On state Voltage vs Gate to Emitter Volt.



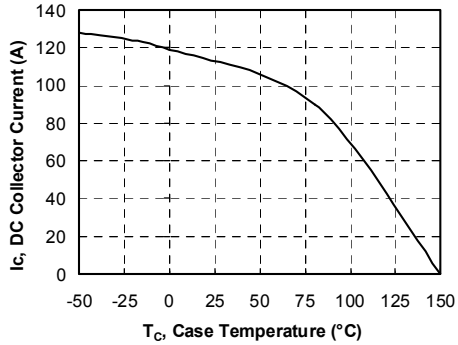
On state Voltage vs Junction Temperature



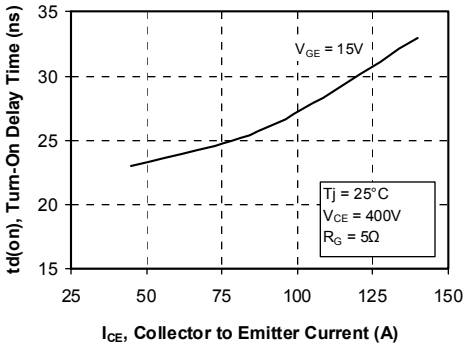
Breakdown Voltage vs Junction Temp.



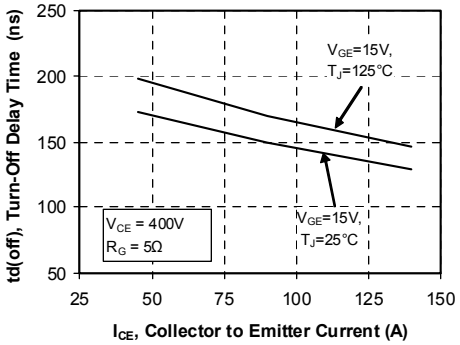
DC Collector Current vs Case Temperature



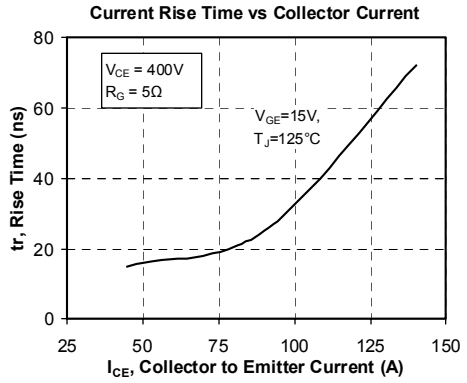
Turn-On Delay Time vs Collector Current



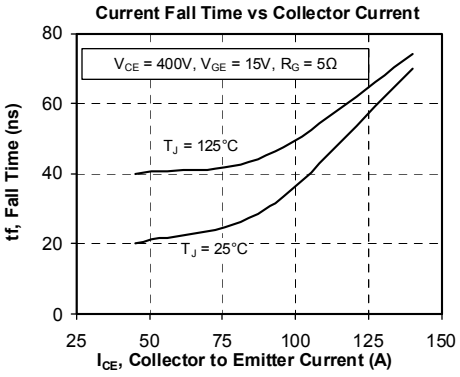
Turn-Off Delay Time vs Collector Current



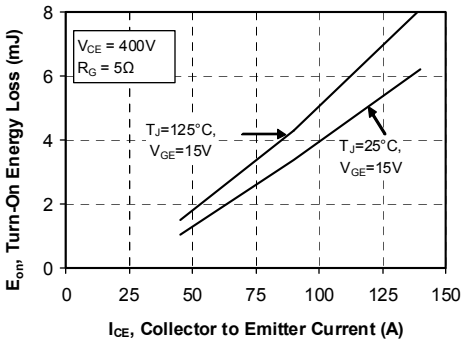
Current Rise Time vs Collector Current



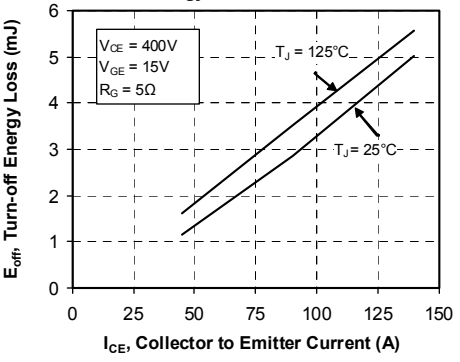
Current Fall Time vs Collector Current



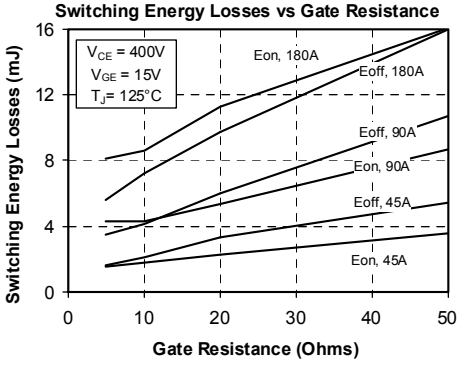
Turn-On Energy Loss vs Collector Current



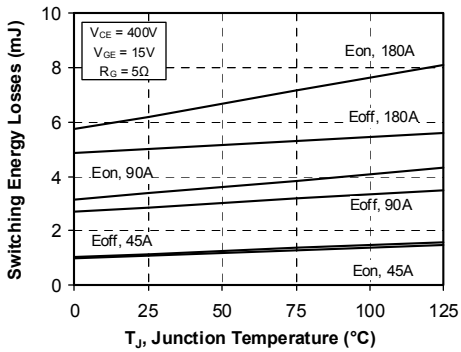
Turn-Off Energy Loss vs Collector Current



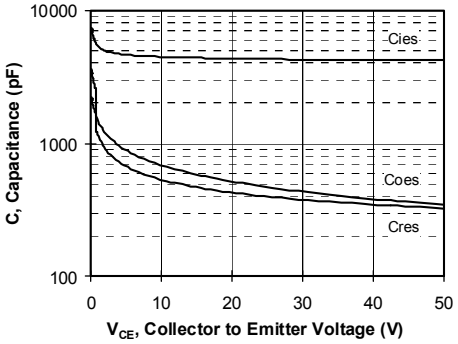
Switching Energy Losses vs Gate Resistance



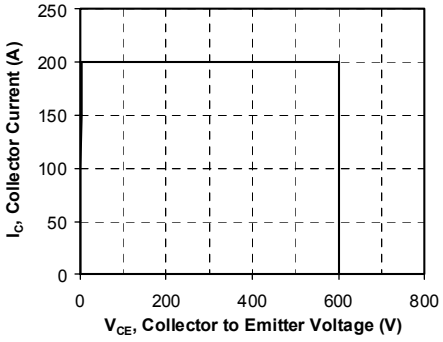
Switching Energy Losses vs Junction Temp.



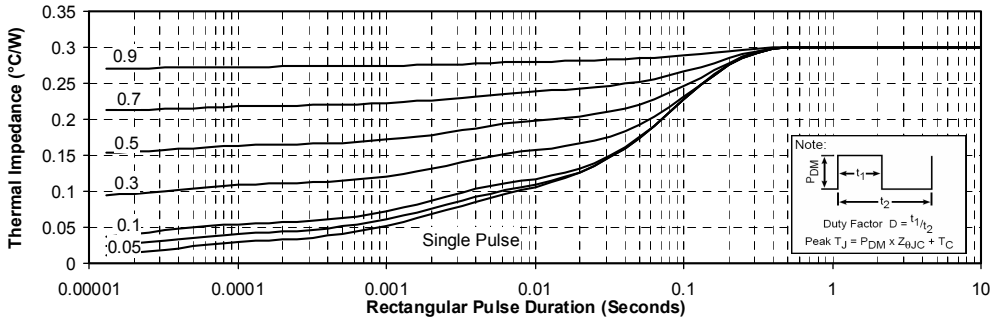
Capacitance vs Collector to Emitter Voltage



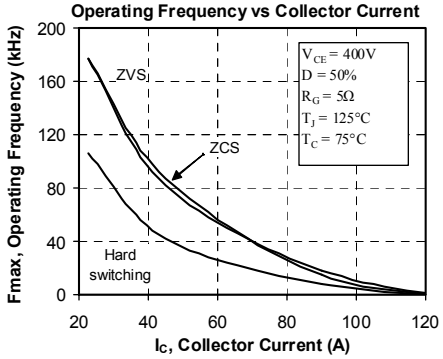
Reverse Bias Safe Operating Area



Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



Operating Frequency vs Collector Current



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.