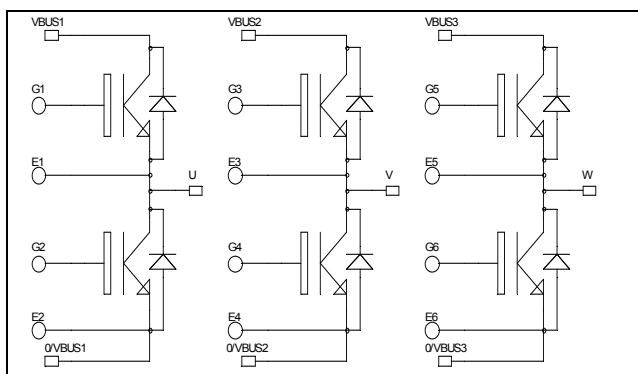


Triple phase leg NPT IGBT Power Module

$V_{CES} = 600V$
 $I_C = 90A @ T_c = 80^\circ C$



Application

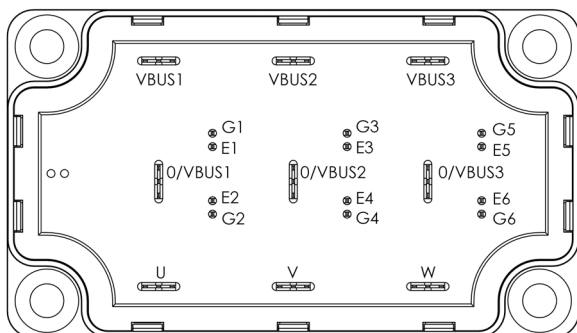
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

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
 - 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 V_{CEsat}
- Each leg can be easily paralleled to achieve a phase leg of three times the current capability
- Module can be configured as a three phase bridge
- Module can be configured as a boost followed by a full bridge
- RoHS compliant



Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage	600	V
I_C	Continuous Collector Current	$T_c = 25^\circ C$ 110 $T_c = 80^\circ C$ 90	A
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$ 315	
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$ 416	W
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$ 200A @ 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

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

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$		4300		pF
C_{oes}	Output Capacitance	$V_{CE} = 25\text{V}$		470		
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		400		
Q_g	Total gate Charge	$V_{GE} = 15\text{V}$		330		nC
Q_{ge}	Gate – Emitter Charge	$V_{Bus} = 300\text{V}$		290		
Q_{gc}	Gate – Collector Charge	$I_C = 90\text{A}$		200		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C)		26		ns
T_r	Rise Time	$V_{GE} = 15\text{V}$		25		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 400\text{V}$		150		
T_f	Fall Time	$I_C = 90\text{A}$ $R_G = 5\ \Omega$		30		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C)		26		ns
T_r	Rise Time	$V_{GE} = 15\text{V}$		25		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 400\text{V}$		170		
T_f	Fall Time	$I_C = 90\text{A}$ $R_G = 5\ \Omega$		40		
E_{on}	Turn-on Switching Energy	$V_{GE} = 15\text{V}$ $V_{Bus} = 400\text{V}$ $T_j = 125^\circ\text{C}$		4.3		mJ
E_{off}	Turn-off Switching Energy	$I_C = 90\text{A}$ $R_G = 5\ \Omega$ $T_j = 125^\circ\text{C}$		3.5		

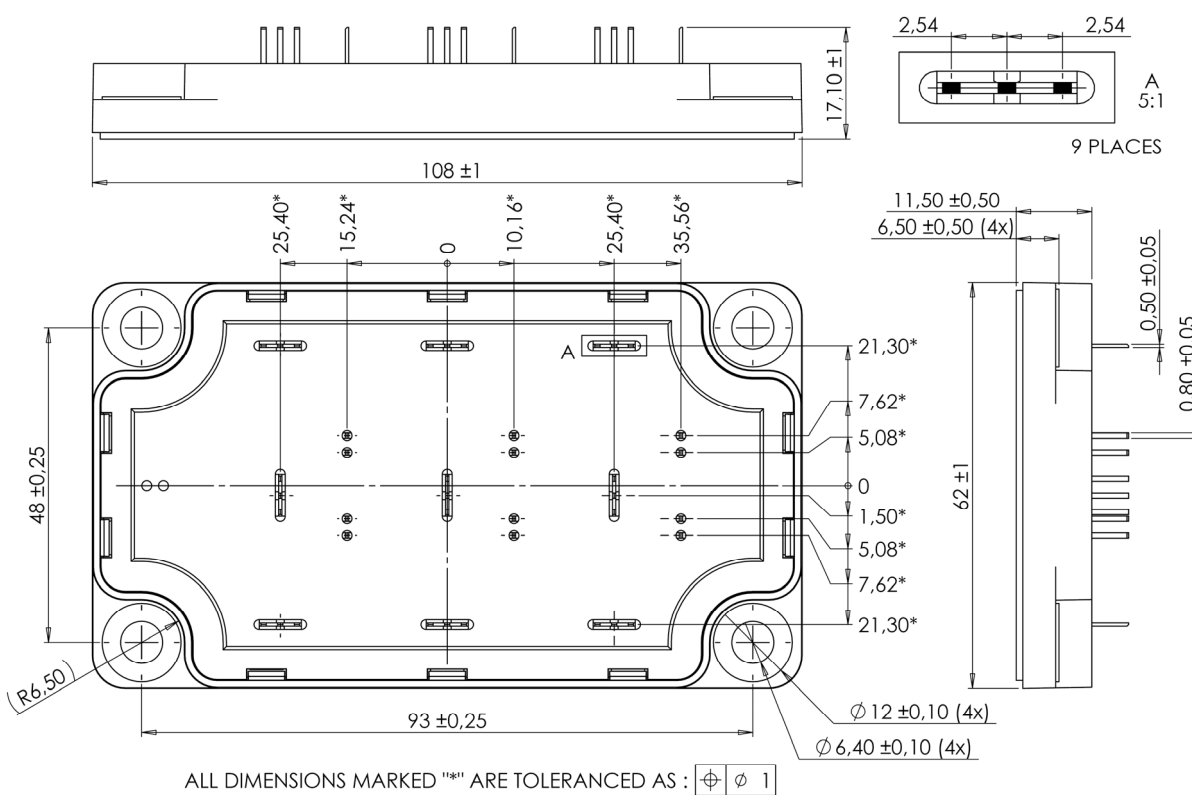
Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		600			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 600\text{V}$ $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$			250 500	μA
I_F	DC Forward Current	$T_c = 70^\circ\text{C}$		60		A
V_F	Diode Forward Voltage	$I_F = 60\text{A}$ $I_F = 120\text{A}$ $I_F = 60\text{A}$, $T_j = 125^\circ\text{C}$		1.6 1.9 1.4	1.8	V
t_{rr}	Reverse Recovery Time	$I_F = 60\text{A}$ $V_R = 400\text{V}$ $di/dt = 200\text{A}/\mu\text{s}$ $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		130 170		ns
Q_{rr}	Reverse Recovery Charge	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		220 920		nC

Thermal and package characteristics

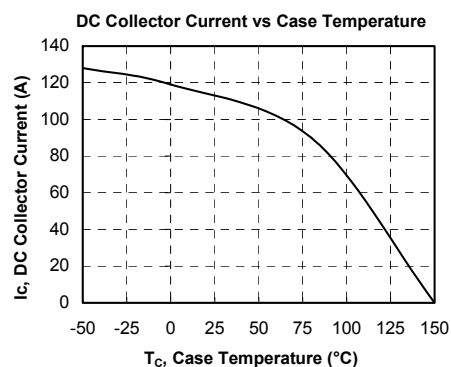
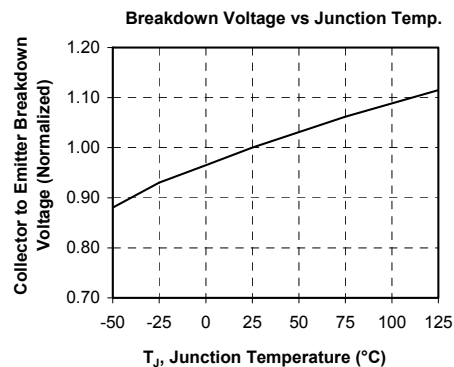
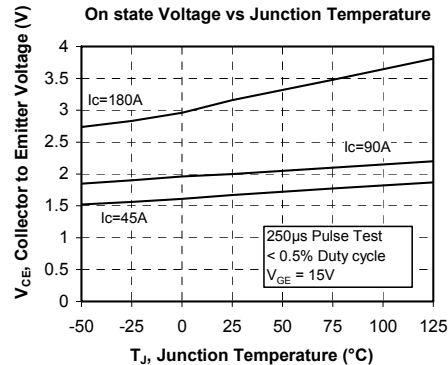
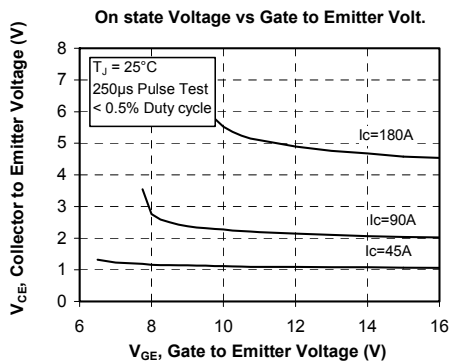
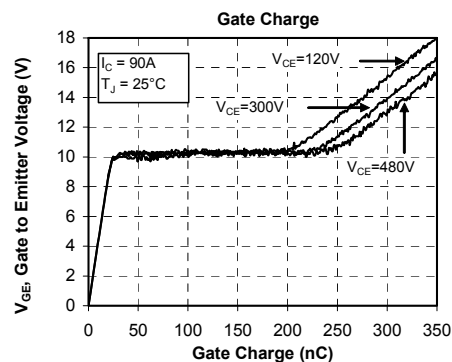
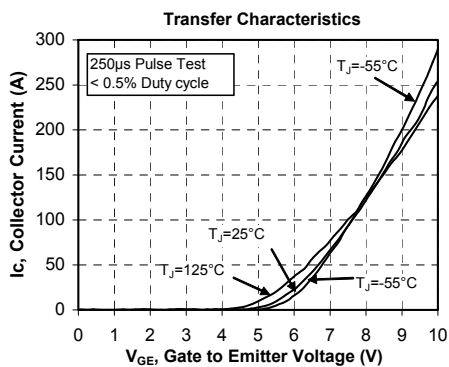
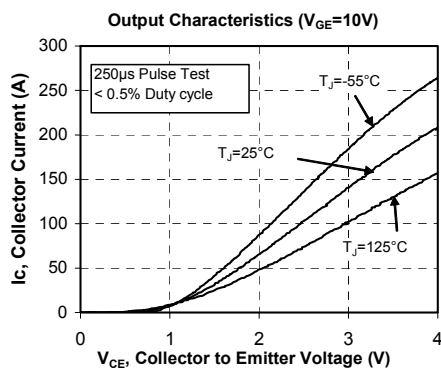
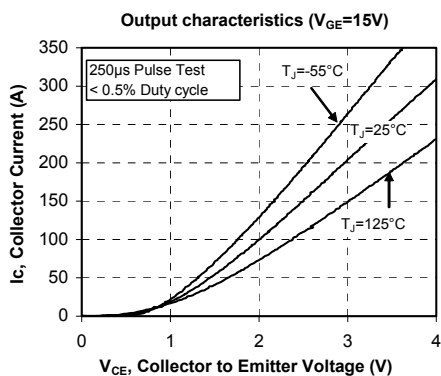
<i>Symbol</i>	<i>Characteristic</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
R _{thJC}	Junction to Case Thermal Resistance	IGBT			0.3	°C/W
		Diode			0.9	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz		4000			V
T _J	Operating junction temperature range		-40		150	°C
T _{STG}	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

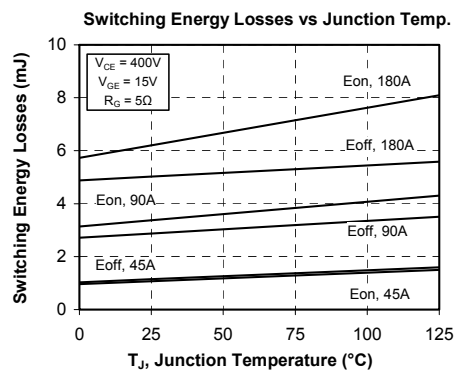
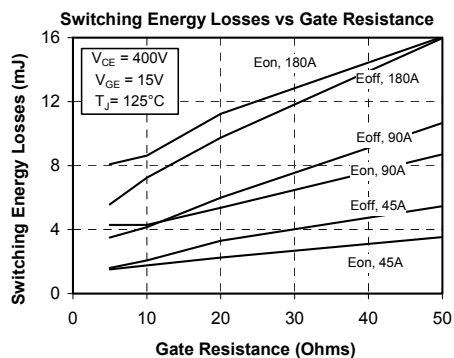
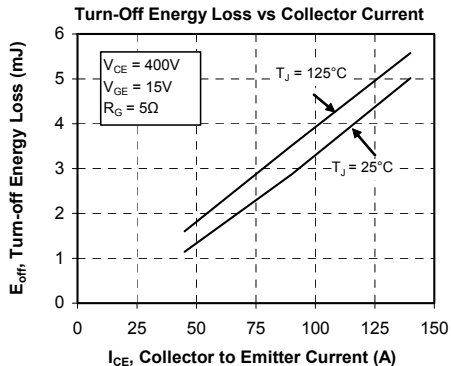
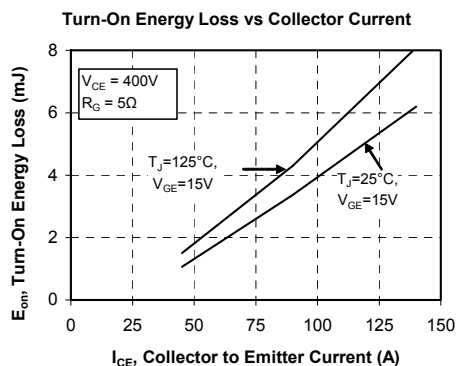
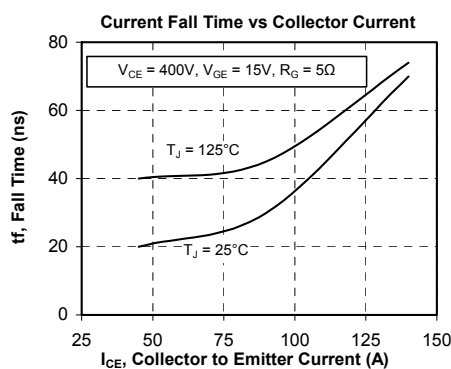
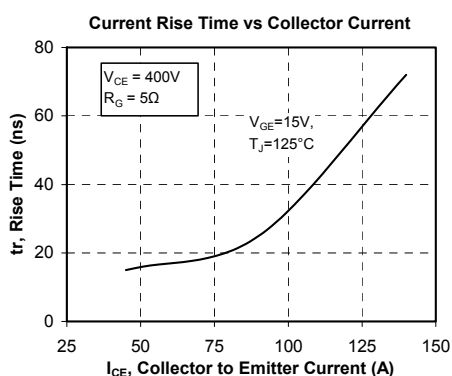
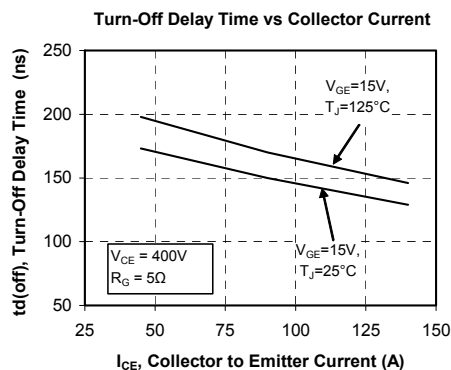
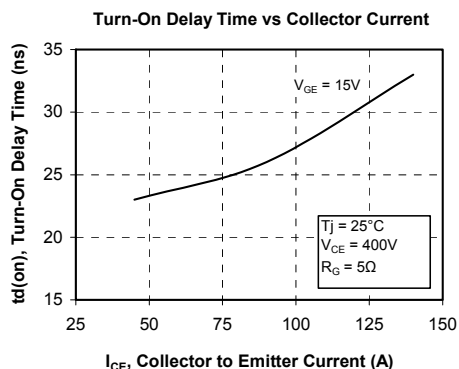
SP6-P Package outline (dimensions in mm)

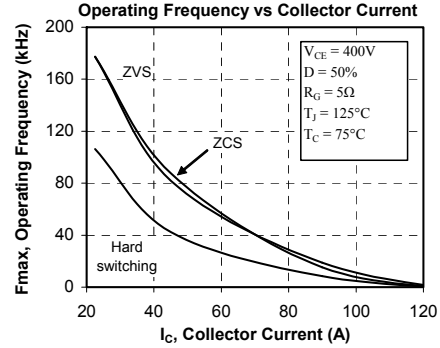
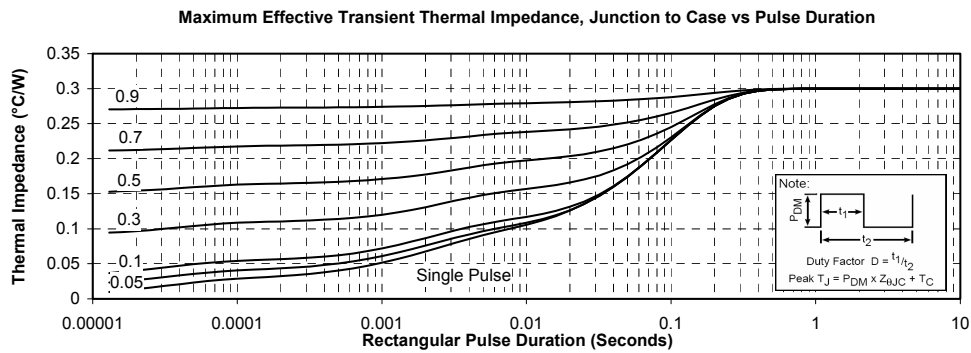
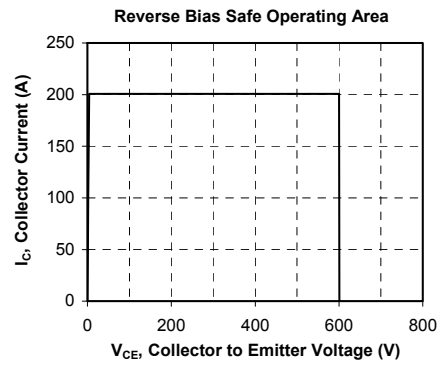
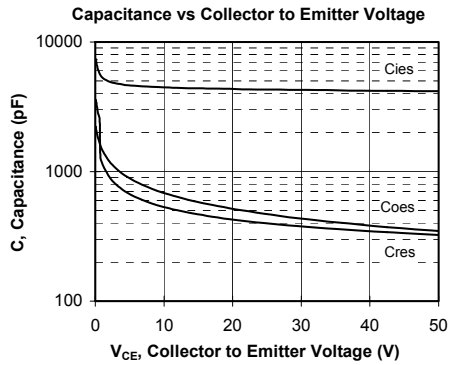


See application note 1902 - Mounting Instructions for SP6-P (12mm) Power Modules on www.microsemi.com

Typical Performance Curve







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