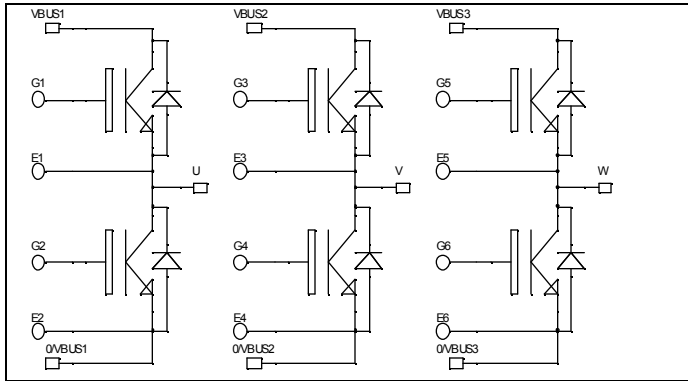


**Triple phase leg
Trench + Field Stop IGBT[®]
Power Module**

**$V_{CES} = 1700V$
 $I_C = 50A @ T_c = 80^\circ C$**

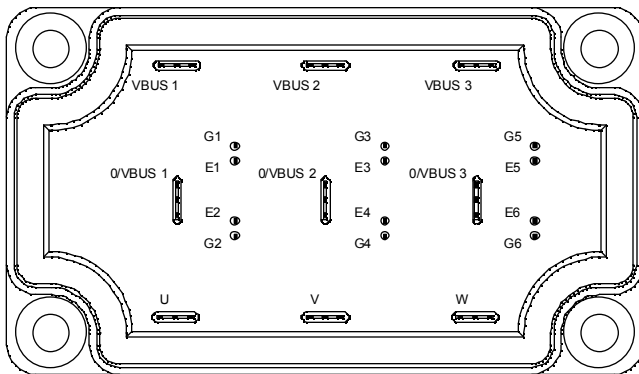


Application

- 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
 - Lead frames for power connections
- High level of integration
- Kelvin emitter for easy drive



Benefits

- Stable temperature behavior
- Very rugged
- Solderable terminals for easy PCB mounting
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive TC of VCEsat
- Very low (12mm) profile
- 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	1700	V
I_C	Continuous Collector Current	$T_c = 25^\circ C$	70
		$T_c = 80^\circ C$	50
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	100
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	310
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	100A @ 1600V

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	$V_{GE} = 0\text{V}, V_{CE} = 1700\text{V}$			250	μA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 50\text{A}$	$T_j = 25^\circ\text{C}$	2.0	2.4	V
			$T_j = 125^\circ\text{C}$	2.4		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 1\text{mA}$	5.0	5.8	6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$			400	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	$V_{GE} = 0\text{V}$		4400		pF
C_{oes}	Output Capacitance	$V_{CE} = 25\text{V}$		180		
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		150		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = 15\text{V}$ $V_{Bus} = 900\text{V}$ $I_C = 50\text{A}$ $R_G = 10\Omega$		370		ns
T_r	Rise Time			40		
$T_{d(off)}$	Turn-off Delay Time			650		
T_f	Fall Time			180		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) $V_{GE} = 15\text{V}$ $V_{Bus} = 900\text{V}$ $I_C = 50\text{A}$ $R_G = 10\Omega$		400		ns
T_r	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			800		
T_f	Fall Time			250		
E_{on}	Turn-on Switching Energy	$V_{GE} = 15\text{V}$ $V_{Bus} = 900\text{V}$ $I_C = 50\text{A}$ $R_G = 10\Omega$	$T_j = 125^\circ\text{C}$	16		mJ
E_{off}	Turn-off Switching Energy		$T_j = 125^\circ\text{C}$	15		

Diode ratings and characteristics

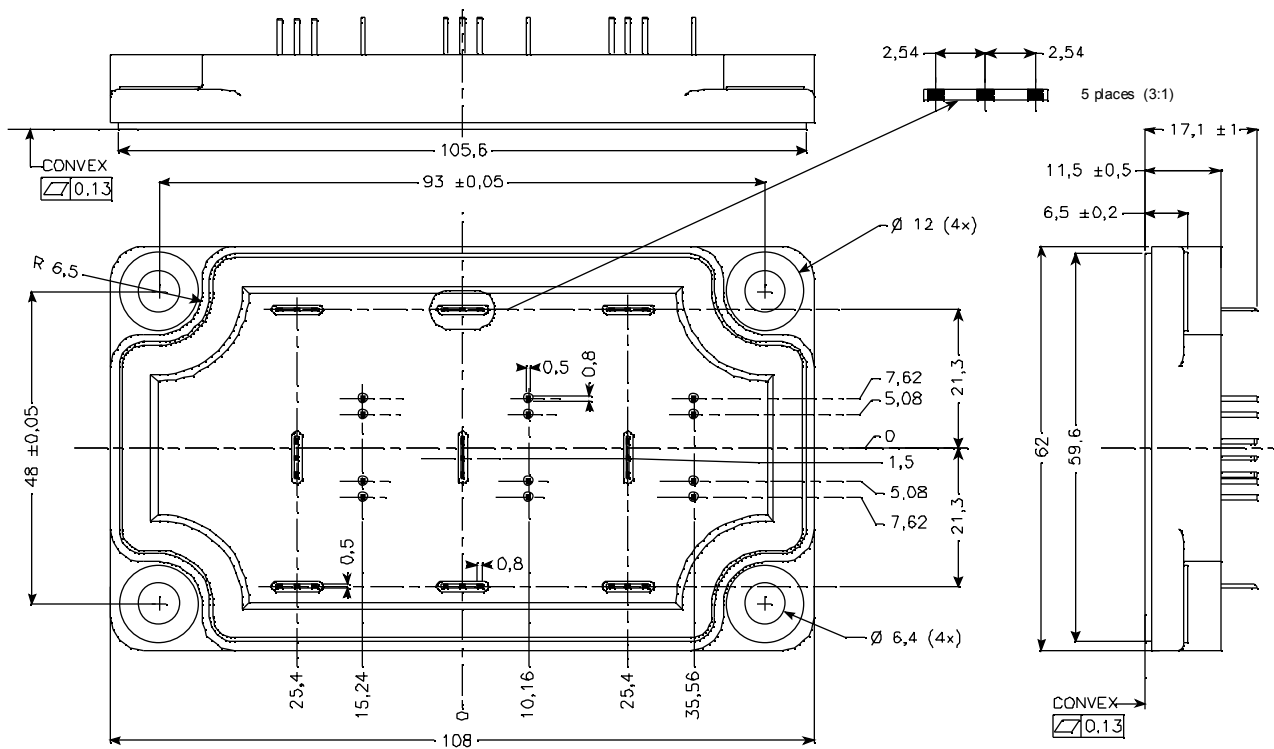
<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		1700			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 1700\text{V}$	$T_j = 25^\circ\text{C}$		250	μA
			$T_j = 125^\circ\text{C}$		500	
I_F	DC Forward Current		$T_c = 80^\circ\text{C}$	50		A
V_F	Diode Forward Voltage	$I_F = 50\text{A}$	$T_j = 25^\circ\text{C}$	1.8	2.2	V
			$T_j = 125^\circ\text{C}$	1.9		
t_{rr}	Reverse Recovery Time	$I_F = 50\text{A}$ $V_R = 900\text{V}$ $di/dt = 800\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	385		ns
			$T_j = 125^\circ\text{C}$	490		
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$	14		μC
			$T_j = 125^\circ\text{C}$	23		
E_r	Reverse Recovery Energy	$T_j = 25^\circ\text{C}$	6		mJ	
		$T_j = 125^\circ\text{C}$	12			

Thermal and package characteristics

Symbol Characteristic

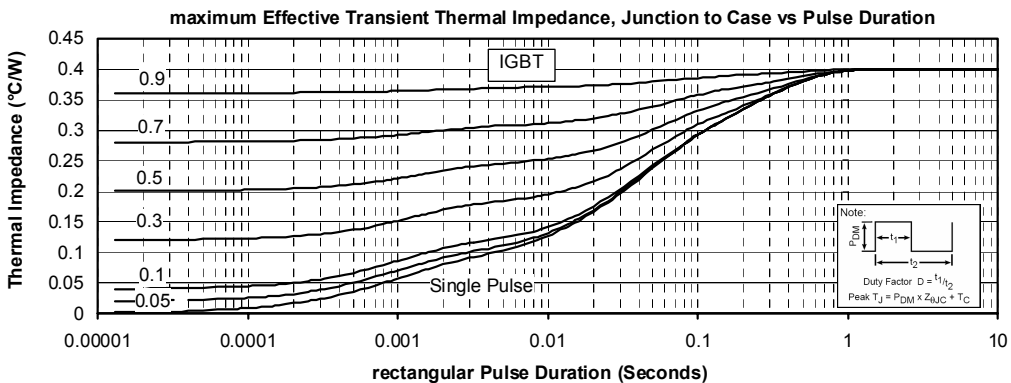
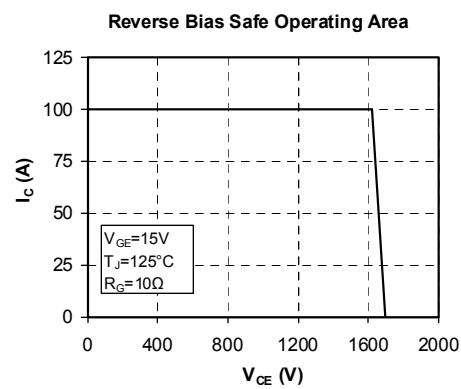
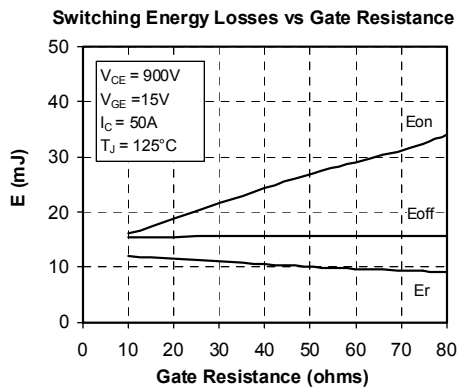
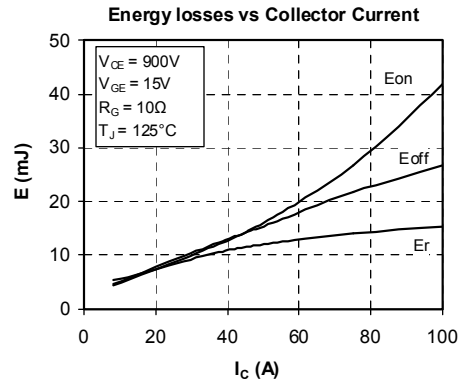
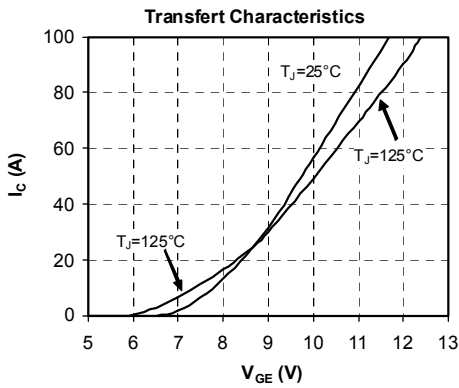
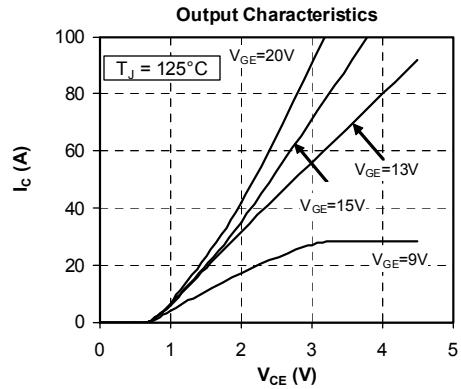
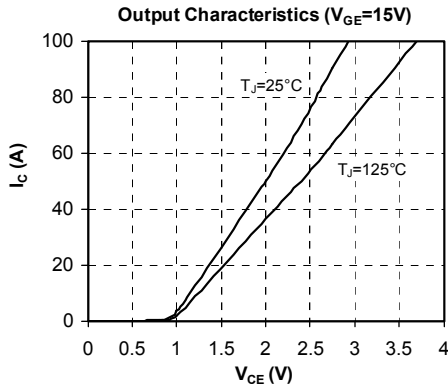
		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	
R _{thJC}	Junction to Case Thermal Resistance	IGBT		0.4	°C/W	
		Diode		0.7		
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, I _{isol} < 1mA, 50/60Hz	3500			V	
T _J	Operating junction temperature range	-40		150	°C	
T _{STG}	Storage Temperature 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

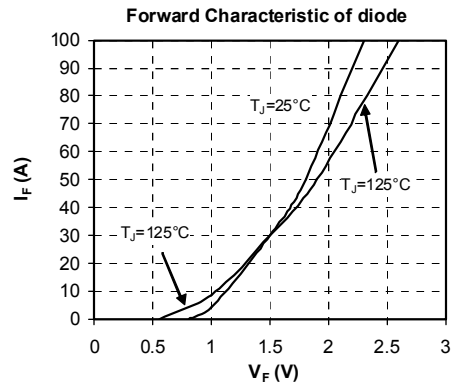
SP6-P Package outline (dimensions in mm)



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

Typical Performance Curve





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