

## EMIPAK 1B PressFit Power Module 1200 V Silicon Carbide Single Phase Bridge, 30 A



**EMIPAK 1B**  
(package example)

### FEATURES

- SiC diode technology
- Exposed Al<sub>2</sub>O<sub>3</sub> substrate with low thermal resistance
- Very high frequency operating
- Low internal inductances
- Qualified using AQG324 guideline as reference
- PressFit pins locking technology  
PATENT(S): [www.vishay.com/patents](http://www.vishay.com/patents)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

### PRIMARY CHARACTERISTICS

SINGLE PHASE BRIDGE	
V <sub>RRM</sub>	1200 V
V <sub>FM</sub> typical at 30 A	1.35 V
I <sub>O</sub> at T <sub>SINK</sub> = 138 °C	30 A
Q <sub>C</sub> typical at 30 A	118 nC
Package	EMIPAK 1B
Circuit configuration	SiC diodes full bridge

### DESCRIPTION

The EMIPAK 1B package is easy to use thanks to the PressFit pins. The exposed substrate provides improved thermal performance.

The optimized layout also helps to minimize stray parameters, allowing for better EMI performance.

### ABSOLUTE MAXIMUM RATINGS (T<sub>J</sub> = 25 °C unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Operating junction temperature	T <sub>J</sub>		175	°C
Storage temperature range	T <sub>Stg</sub>		-40 to +150	
RMS isolation voltage	V <sub>ISOL</sub>	T <sub>J</sub> = 25 °C, all terminals shorted, f = 50 Hz, t = 1 s	3500	V
SINGLE PHASE BRIDGE				
Maximum output current of bridge	I <sub>O</sub>	180° conduction angle, T <sub>SINK</sub> = 25 °C	67	A
		180° conduction angle, T <sub>SINK</sub> = 80 °C	52	
Maximum peak one cycle forward non-repetitive surge current	I <sub>FSM</sub>	10 ms sine or 6 ms rectangular pulse, T <sub>J</sub> = 25 °C, no voltage reapplied	230	A
		8.3 ms sine, T <sub>J</sub> = 25 °C, no voltage reapplied	241	A
Maximum I <sup>2</sup> t capability for fusing	I <sup>2</sup> t	No voltage reapplied, t = 10 ms	265	A <sup>2</sup> s
		No voltage reapplied, t = 8.3 ms	240	
Maximum I <sup>2</sup> √t capability for fusing	I <sup>2</sup> √t	t = 0.1 ms to 10 ms, no voltage reapplied	2645	A <sup>2</sup> √s

### ELECTRICAL SPECIFICATIONS (T<sub>J</sub> = 25 °C unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
D1 - D4 SINGLE PHASE BRIDGE						
Forward voltage drop (per diode)	V <sub>FM</sub>	I <sub>F</sub> = 30 A	-	1.35	1.82	V
		I <sub>F</sub> = 30 A, T <sub>J</sub> = 150 °C	-	1.79	-	
Breakdown voltage (per diode)	V <sub>BR</sub>	I <sub>R</sub> = 1 mA	1200	-	-	V
Reverse leakage current (per diode)	I <sub>RM</sub>	V <sub>R</sub> = 1200 V	-	75	800	μA
		V <sub>R</sub> = 1200 V, T <sub>J</sub> = 150 °C	-	900	-	

**PATENT(S):** [www.vishay.com/patents](http://www.vishay.com/patents)

This Vishay product is protected by one or more United States and international patents.



SWITCHING CHARACTERISTICS ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
<b>D1 - D4 SINGLE PHASE BRIDGE</b>						
Total capacitive charge (per diode)	$Q_C$	$V_R = 800\text{ V}$ , $di/dt = 500\text{ A}/\mu\text{s}$	-	118	-	nC
Total capacitance (per diode)	C	$V_R = 1\text{ V}$ , $f = 1\text{ MHz}$	-	2780	-	pF
		$V_R = 800\text{ V}$ , $f = 1\text{ MHz}$	-	253	-	

INTERNAL NTC - THERMISTOR SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUE	UNITS
Resistance	$R_{25}$	$T_C = 25\text{ }^\circ\text{C}$	5000	$\Omega$
	$R_{100}$	$T_C = 100\text{ }^\circ\text{C}$	$493 \pm 5\%$	
B-value	$B_{25/50}$	$R_2 = R_{25} \exp. [B_{25/50} (1/T_2 - 1/298.15K)]$	$3375 \pm 5\%$	K
Maximum operating temperature			220	$^\circ\text{C}$
Dissipation constant			2	mW/ $^\circ\text{C}$
Thermal time constant			8	s

THERMAL AND MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS
SINGLE PHASE BRIDGE - Thermal resistance junction to sink (per diode) <sup>(1)</sup>	$R_{thJS}$	-	0.90	-	$^\circ\text{C}/\text{W}$
Case to sink thermal resistance (per module) <sup>(1)</sup>		-	0.1	-	
Mounting torque (M4)		2	-	3	Nm
Weight		-	28	-	g

**Note**

<sup>(1)</sup> Mounting surface flat, smooth, and greased,  $\lambda_{grease} = 0.67\text{ W/mK}$

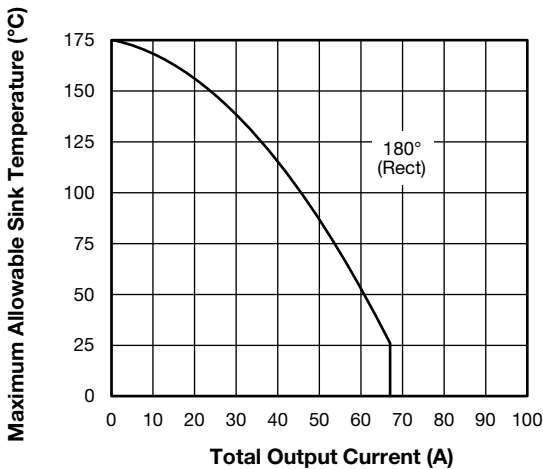


Fig. 1 - Current Rating Characteristics

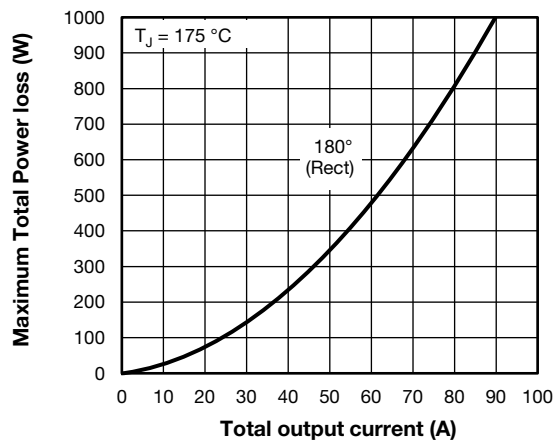


Fig. 2 - Total Power Loss Characteristics

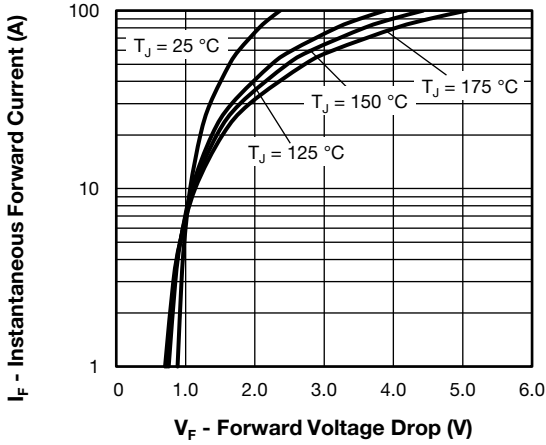


Fig. 3 - Typical Forward Voltage Drop vs. Instantaneous Forward Current (Per Diode)

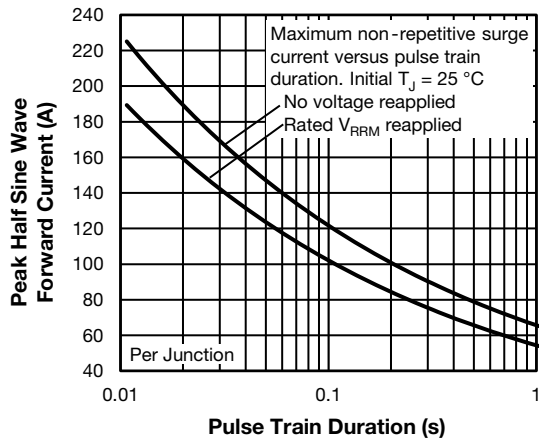


Fig. 6 - Maximum Non-Repetitive Surge Current (2)

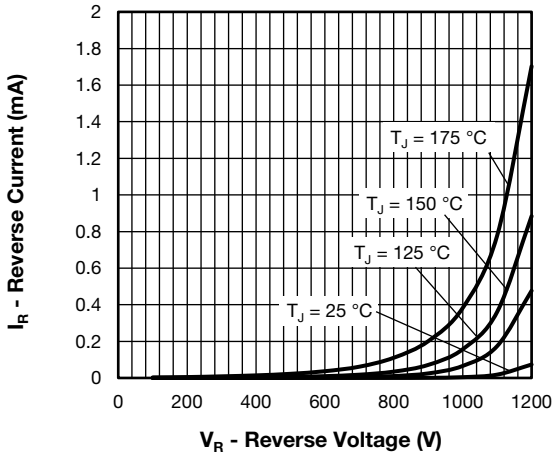


Fig. 4 - Typical Reverse Current vs. Reverse Voltage (Per Diode)

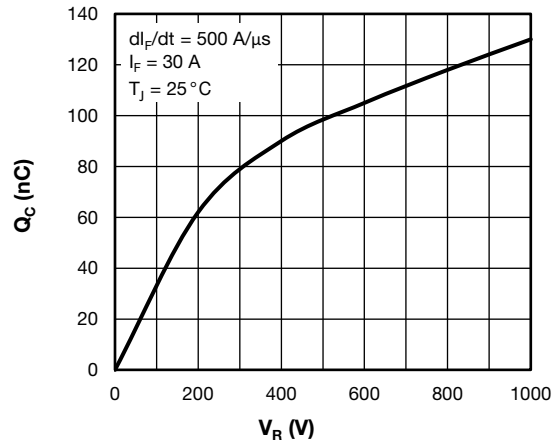


Fig. 7 - Total Capacitance Charge vs. Reverse Voltage (Per Diode)

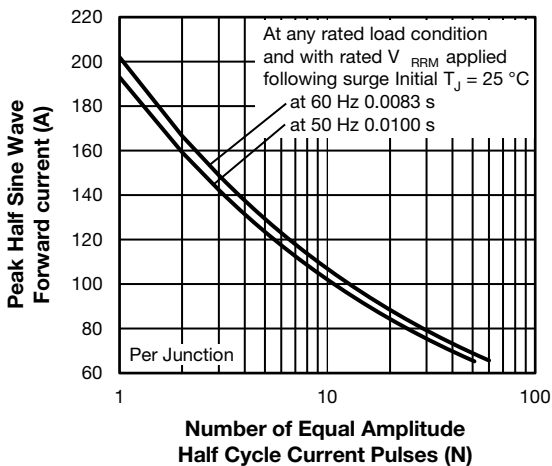


Fig. 5 - Maximum Non-Repetitive Surge Current (1)

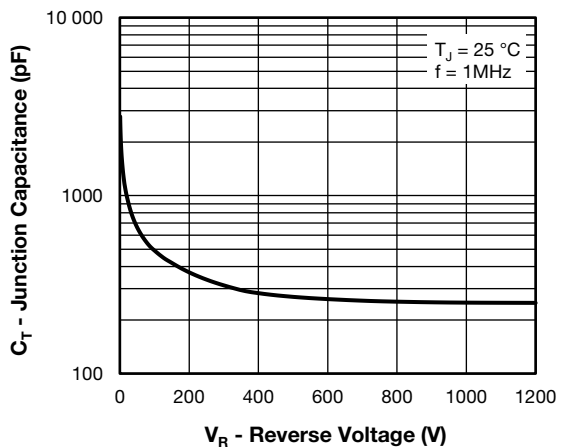


Fig. 8 - Typical Junction Capacitance vs. Reverse Voltage (Per Diode)

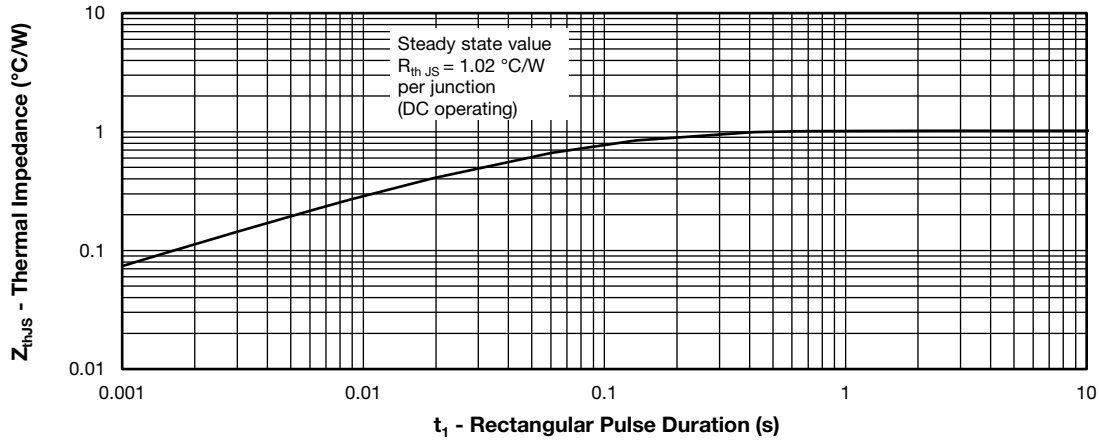


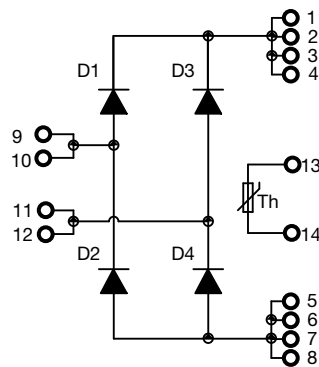
Fig. 9 -  $Z_{thJS}$  Thermal Impedance Characteristic (Per Diode)

**ORDERING INFORMATION TABLE**

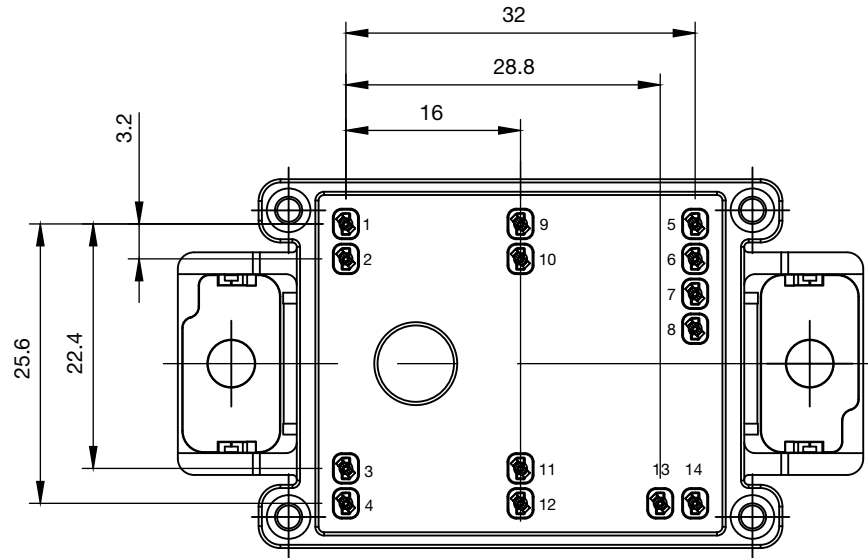
Device code	<b>VS-</b>	<b>EN</b>	<b>W</b>	<b>30</b>	<b>S</b>	<b>120</b>	<b>T</b>
	①	②	③	④	⑤	⑥	⑦

- 1** - Vishay Semiconductors product
- 2** - Package indicator (EN = EMIPAK 1B)
- 3** - Circuit configuration (W = SiC diodes full bridge)
- 4** - Current rating (30 = 30 A)
- 5** - Die technology (S = SiC diode)
- 6** - Voltage rating (120 = 1200 V)
- 7** - T = thermistor

**CIRCUIT CONFIGURATION**



## PACKAGE



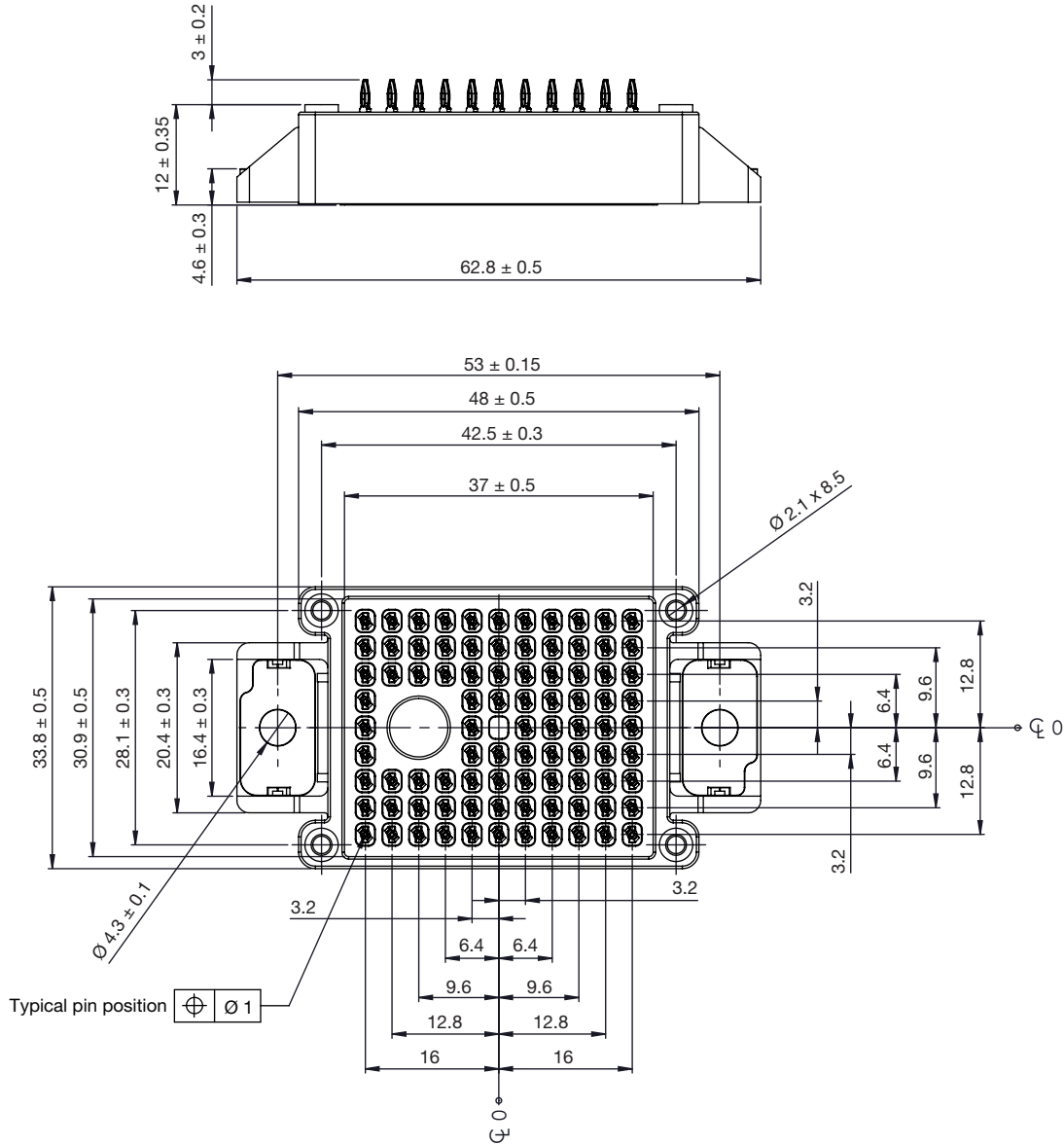
### LINKS TO RELATED DOCUMENTS

Dimensions	<a href="http://www.vishay.com/doc?95558">www.vishay.com/doc?95558</a>
Application Note	<a href="http://www.vishay.com/doc?95580">www.vishay.com/doc?95580</a>



### EMIPAK-1B PressFit

**DIMENSIONS** in millimeters





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