EMIPAK 1B PressFit Power Module
1200 V AC Line Input Rectification, Flexible Configuration, 20 A

EMIPAK 1B
(package example)

FEATURES

- MOAT standard recovery diode
- Exposed Al_2O_3 substrate with low thermal resistance
- Very low forward voltage drop
- Low internal inductances
- Qualified using AQG324 guideline as reference
- PressFit pins locking technology
  PATENT(S): www.vishay.com/patents
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

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.

PRIMARY CHARACTERISTICS	
D1 - D12	
V_{RRM}	1200 V
V_{FM} typical at 20 A	1.29 V
I_O at T_{SINK} = 97 °C	20 A
Package	EMIPAK 1B
Circuit configuration	6 x independent diodes legs for AC line input rectification
Type	Modules - diode, high voltage

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MAX.**	**UNITS**
Operating junction temperature	T_J		150	°C
Storage temperature range	T_{Stg}		-40 to +150	
RMS isolation voltage	V_{ISOL}	T_J = 25 °C, all terminals shorted, f = 50 Hz, t = 1 s	3500	V
D1 - D12				
Maximum DC output current	$I_{F(AV)}$	T_{SINK} = 25 °C	33	A
		T_{SINK} = 80 °C	23	
Power dissipation	P_D	T_{SINK} = 25 °C	87	W
		T_{SINK} = 80 °C	49	
Maximum peak one cycle forward non-repetitive surge current	I_{FSM}	10 ms sine or 6 ms rectangular pulse, T_J = 150 °C, no voltage reapplied	230	A
		8.3 ms sine, T_J = 150 °C, no voltage reapplied	241	A
Maximum I^2t capability for fusing	I^2t	No voltage reapplied, t = 10 ms	264	A^2s
		No voltage reapplied, t = 8.3 ms	241	
Maximum $I^2\sqrt{t}$ capability for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied	2647	$A^2\sqrt{s}$
Repetitive peak reverse voltage	V_{RRM}		1200	V
Low level value of threshold voltage	$V_{F(TO)1}$	(16.7 % x $I_{F(AV)}$ < I < x $I_{F(AV)}$), T_J = T_J maximum	0.92	V
High level value of threshold voltage	$V_{F(TO)2}$	(I > x $I_{F(AV)}$), T_J = T_J maximum	1.10	
Low level value of forward slope resistance	r_{f1}	(16.7 % x $I_{F(AV)}$ < I < x $I_{F(AV)}$), T_J = T_J maximum	51.3	mΩ
High level value of forward slope resistance	r_{f2}	(I > x $I_{F(AV)}$), T_J = T_J maximum	50.8	

PATENT(S): www.vishay.com/patents
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ELECTRICAL SPECIFICATIONS (T_J = 25 °C unless otherwise noted)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
D1 - D12						
Forward voltage drop	V_{FM}	I_F = 20 A	-	1.29	1.90	V
		I_F = 20 A, T_J = 150 °C	-	1.26	-	
Breakdown voltage	V_{BR}	I_R = 500 µA	1200	-	-	V
Reverse leakage current	I_{RM}	V_R = 1200 V	-	1.0	100	µA
		V_R = 1200 V, T_J = 150 °C	-	900	-	

INTERNAL NTC - THERMISTOR SPECIFICATIONS				
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**VALUE**	**UNITS**
Resistance	R_{25}	T_C = 25 °C	5000	Ω
	R_{100}	T_C = 100 °C	493 ± 5 %	
B-value	$B_{25/50}$	$R_2 = R_{25}$ exp. [$B_{25/50}$(1/T2 - 1/(298.15K))]	3375 ± 5 %	K
Maximum operating temperature			220	°C
Dissipation constant			2	mW/°C
Thermal time constant			8	s

THERMAL AND MECHANICAL SPECIFICATIONS					
PARAMETER	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
D1 - D12 - thermal resistance junction to sink (per diode) (1)	R_{thJS}	-	1.19	-	°C/W
Case to sink thermal resistance (per module) (1)		-	0.1	-	
Mounting torque (M4)		2	-	3	Nm
Weight		-	28	-	g

Note

(1) Mounting surface flat, smooth, and greased, λ_{grease} = 0.67 W/mK

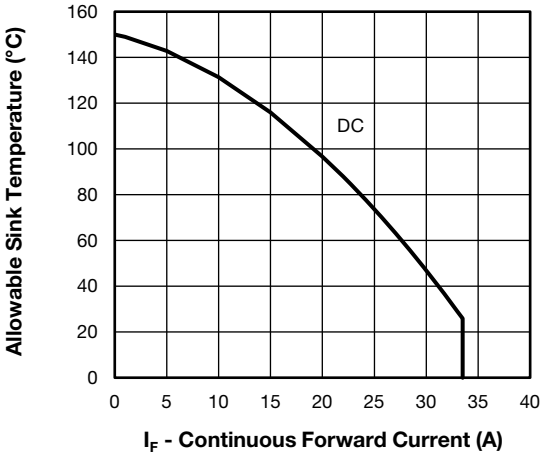

Fig. 1 - Allowable Sink Temperature vs. Continuous Forward Current
(Forward Current vs. Sink Temperature)

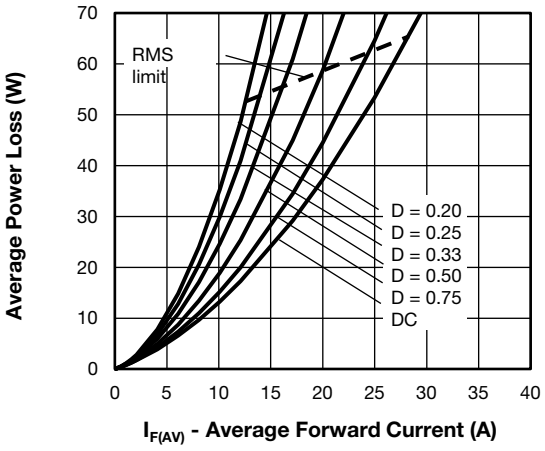

Fig. 2 - Average Power Loss vs Average Forward Current
(Forward Power Loss Characteristics)

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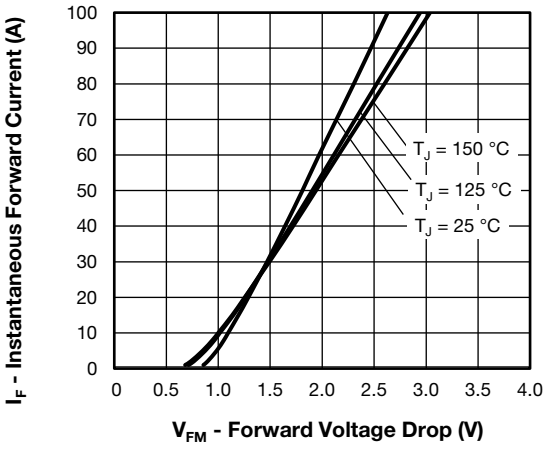

Fig. 3 - Typical Forward Voltage Drop vs. Instantaneous Forward Current (Per Diode)

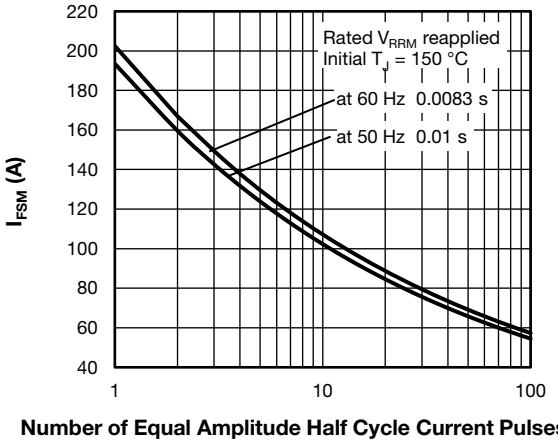

Fig. 5 - I_{FSM} vs. N (Non-Repetitive Peak Forward Surge Current vs. Number Pulses)

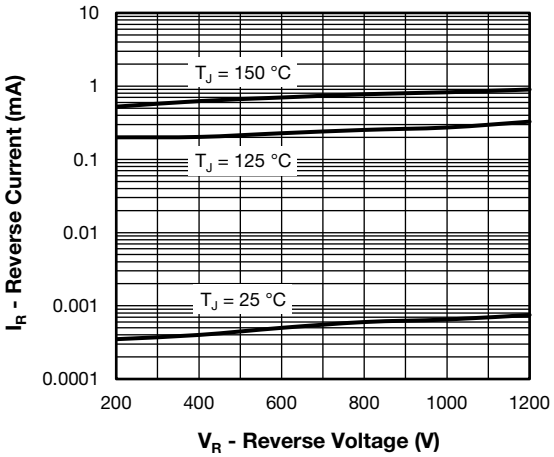

Fig. 4 - Typical Reverse Current vs. Reverse Voltage (Per Diode)

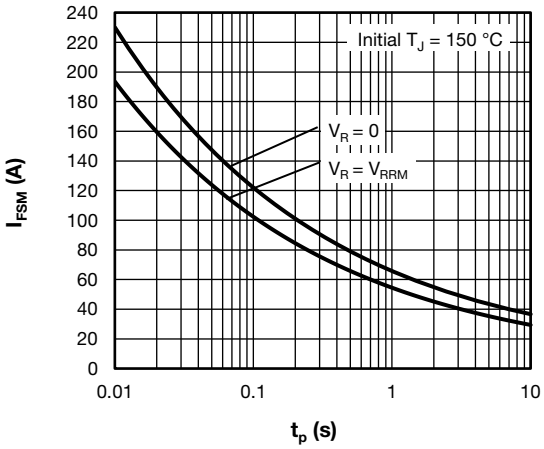

Fig. 6 - I_{FSM} vs. t_p (Non-Repetitive Peak Forward Surge Current vs. Pulse Duration)

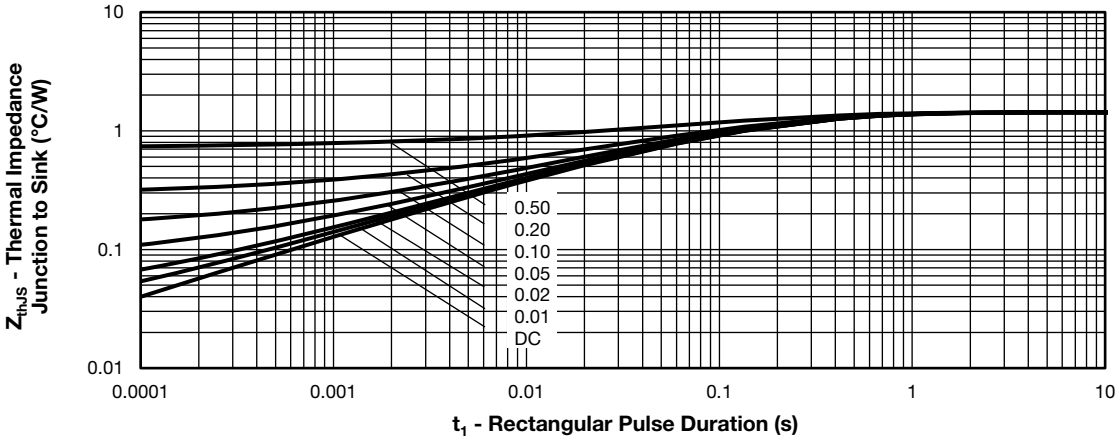

Fig. 7 - Z_{thJS} Thermal Impedance Junction to Sink vs. t1 Rectangular Pulse Duration (Maximum Thermal Impedance Z_{thJS} Characteristics Per Diode)

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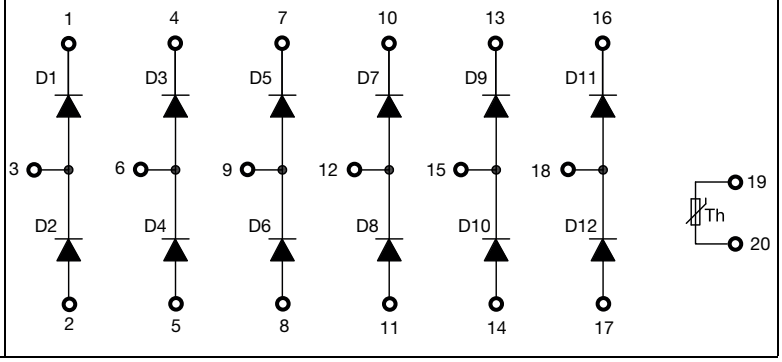
ORDERING INFORMATION TABLE

Device code

VS-	EN	V	020	M	120	M
1	2	3	4	5	6	7

- 1 - Vishay Semiconductors product
- 2 - Package indicator (EN = EMIPAK 1B)
- 3 - Circuit configuration (V = 6 x independent diodes legs for AC line input rectification)
- 4 - Current rating (020 = 20 A)
- 5 - Switch die technology (M = MOAT standard recovery diode)
- 6 - Voltage rating (120 = 1200 V)
- 7 - Diode technology (M = MOAT standard recovery diode)

CIRCUIT CONFIGURATION

CIRCUIT DESCRIPTION	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
6 x independent diodes legs for AC line input rectification	V	

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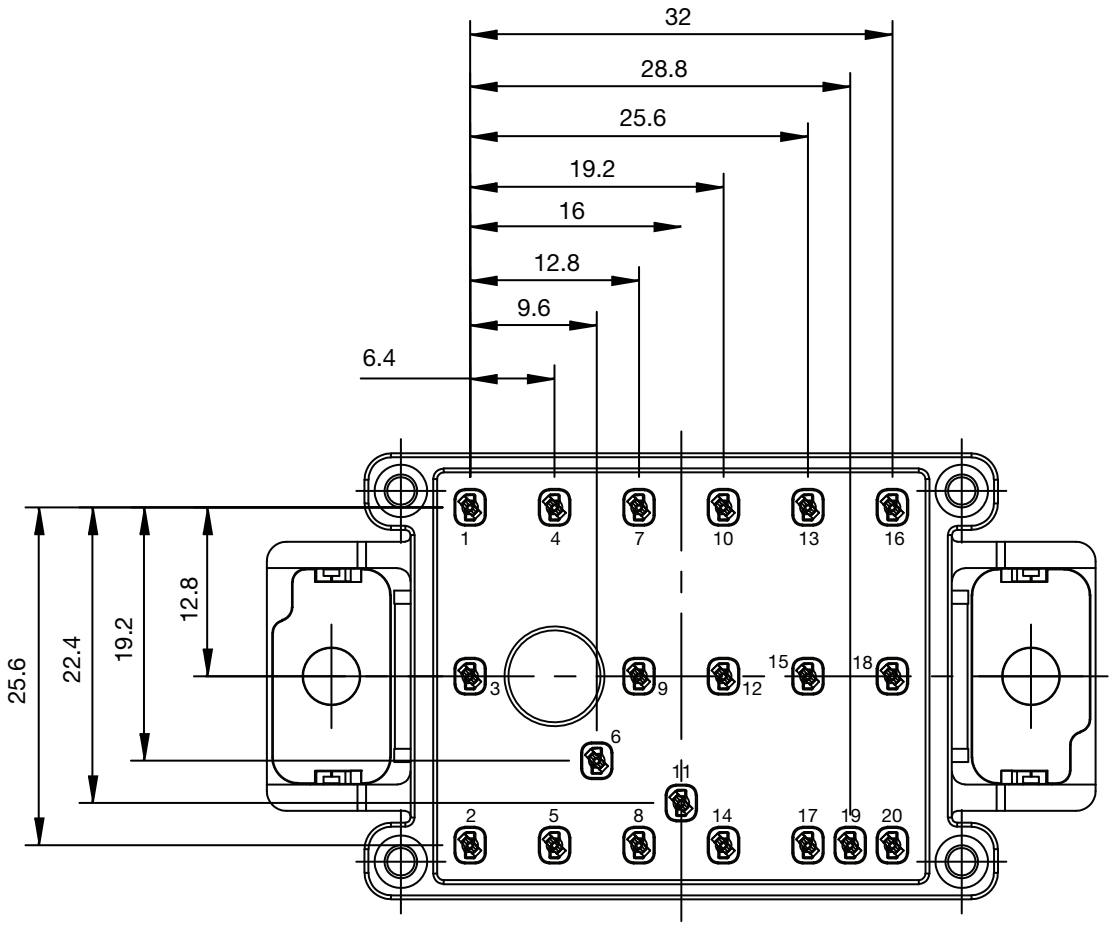
PACKAGE



LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95558
Application Note	www.vishay.com/doc?95580

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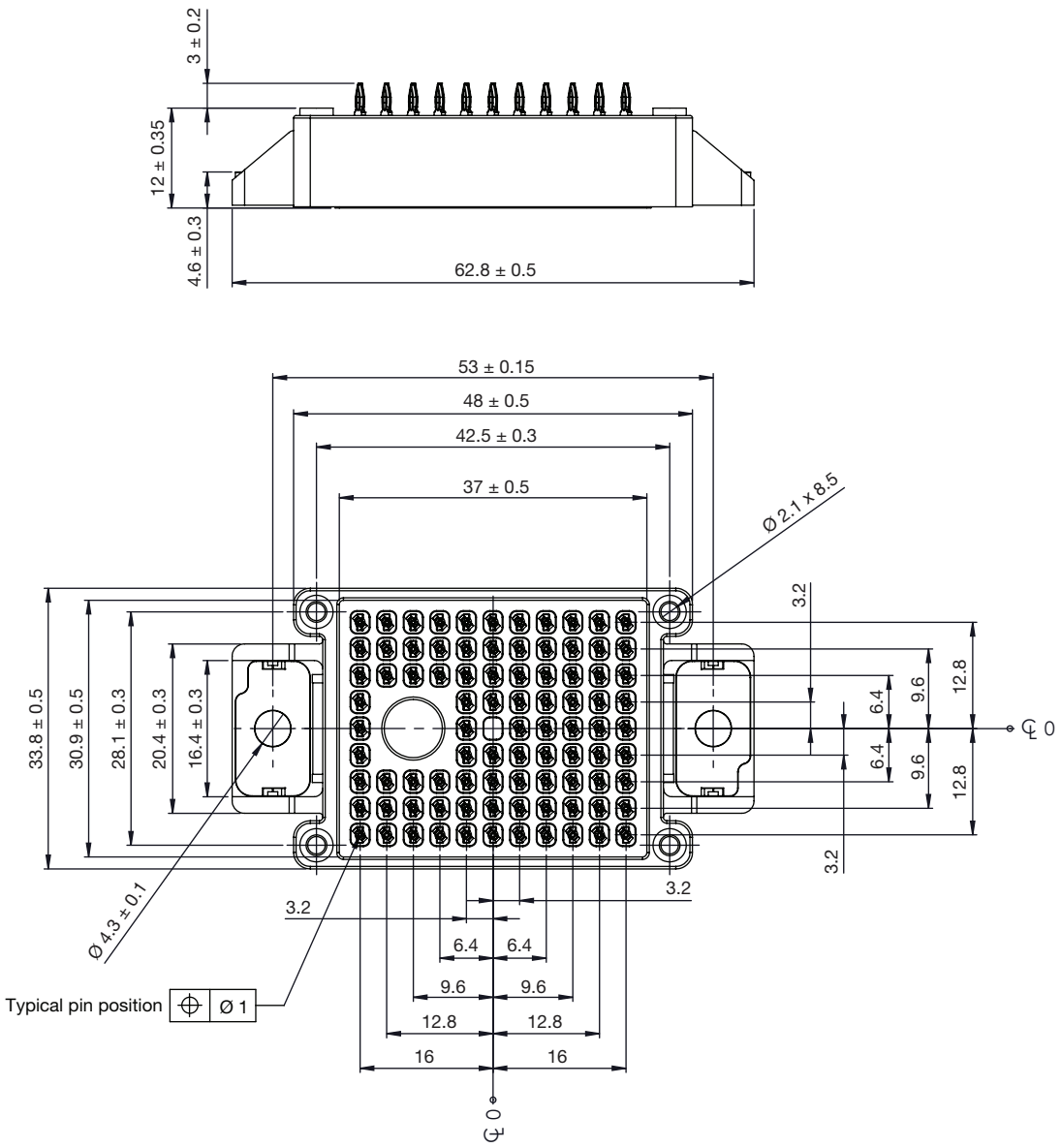
EMIPAK-1B PressFit

DIMENSIONS in millimeters



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