

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 Al₂O₃ 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

| 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 |

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 | | | | |
|---|---------------------|---|-------------|-------------------|
| 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 ² t capability for fusing | I ² t | No voltage reapplied, t = 10 ms | 264 | A ² s |
| | | No voltage reapplied, t = 8.3 ms | 241 | |
| Maximum I ² √t capability for fusing | I ² √t | t = 0.1 ms to 10 ms, no voltage reapplied | 2647 | A ² √s |
| Repetitive peak reverse voltage | V _{RRM} | | 1200 | V |
| Low level value of threshold voltage | V _{F(TO)1} | (16.7 % × 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 % × 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

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



| ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | | | | |
|---|----------|--|------|------|------|---------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| D1 - D12 | | | | | | |
| Forward voltage drop | V_{FM} | $I_F = 20\text{ A}$ | - | 1.29 | 1.90 | V |
| | | $I_F = 20\text{ A}, T_J = 150\text{ }^\circ\text{C}$ | - | 1.26 | - | |
| Breakdown voltage | V_{BR} | $I_R = 500\text{ }\mu\text{A}$ | 1200 | - | - | V |
| Reverse leakage current | I_{RM} | $V_R = 1200\text{ V}$ | - | 1.0 | 100 | μA |
| | | $V_R = 1200\text{ V}, T_J = 150\text{ }^\circ\text{C}$ | - | 900 | - | |

| INTERNAL NTC - THERMISTOR SPECIFICATIONS | | | | |
|---|-------------|---|----------------|----------------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | VALUE | UNITS |
| Resistance | R_{25} | $T_C = 25\text{ }^\circ\text{C}$ | 5000 | Ω |
| | 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 | $\text{mW}/^\circ\text{C}$ |
| 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 | - | $^\circ\text{C}/\text{W}$ |
| 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, $\lambda_{grease} = 0.67\text{ W/mK}$

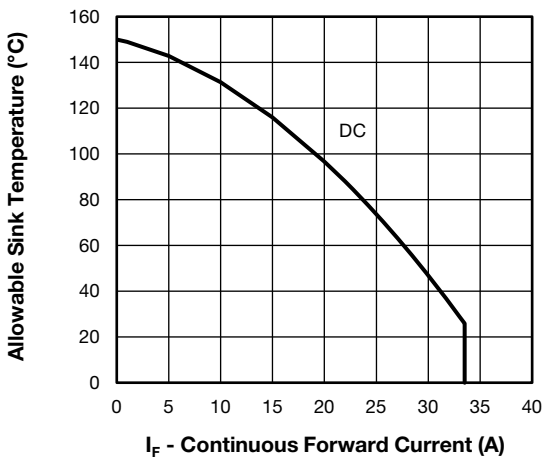


Fig. 1 - Allowable Sink Temperature vs. Continuous Forward Current (Forward Current vs. Sink Temperature)

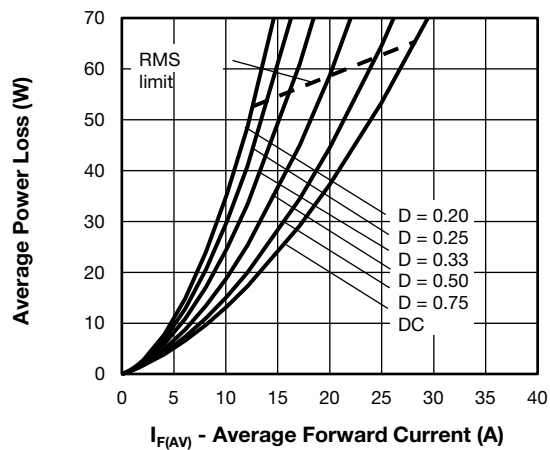


Fig. 2 - Average Power Loss vs. Average Forward Current (Forward Power Loss Characteristics)

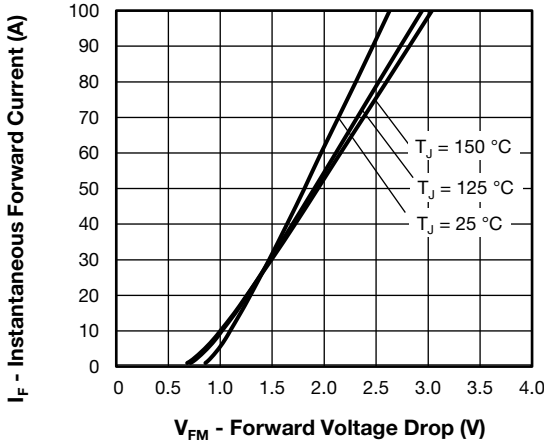


Fig. 3 - Typical Forward Voltage Drop vs. Instantaneous Forward Current (Per Diode)

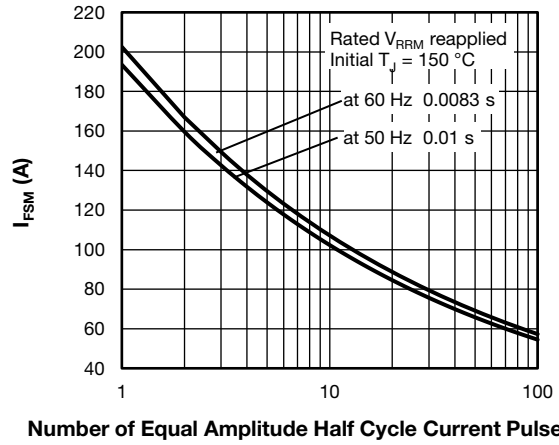


Fig. 5 - I_{FSM} vs. N (Non-Repetitive Peak Forward Surge Current vs. Number Pulses)

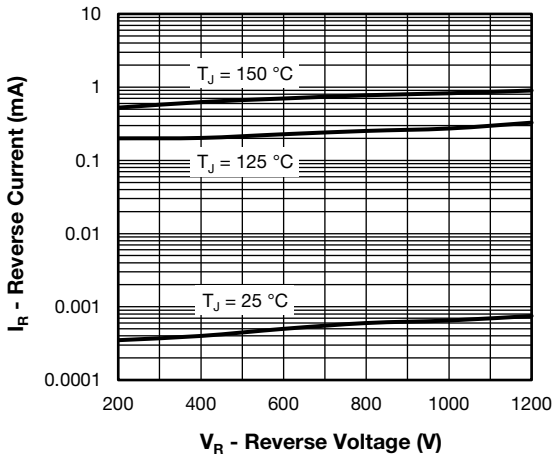


Fig. 4 - Typical Reverse Current vs. Reverse Voltage (Per Diode)

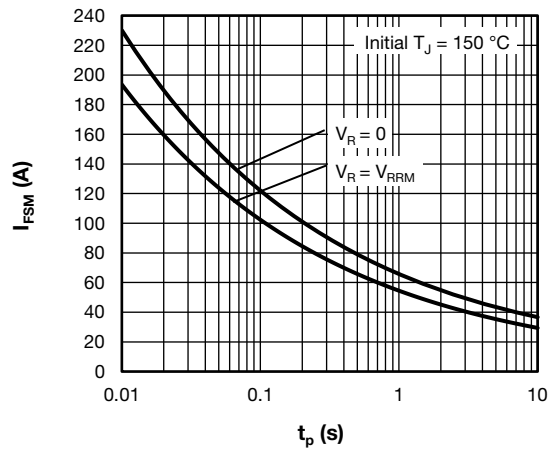


Fig. 6 - I_{FSM} vs. t_p (Non-Repetitive Peak Forward Surge Current vs. Pulse Duration)

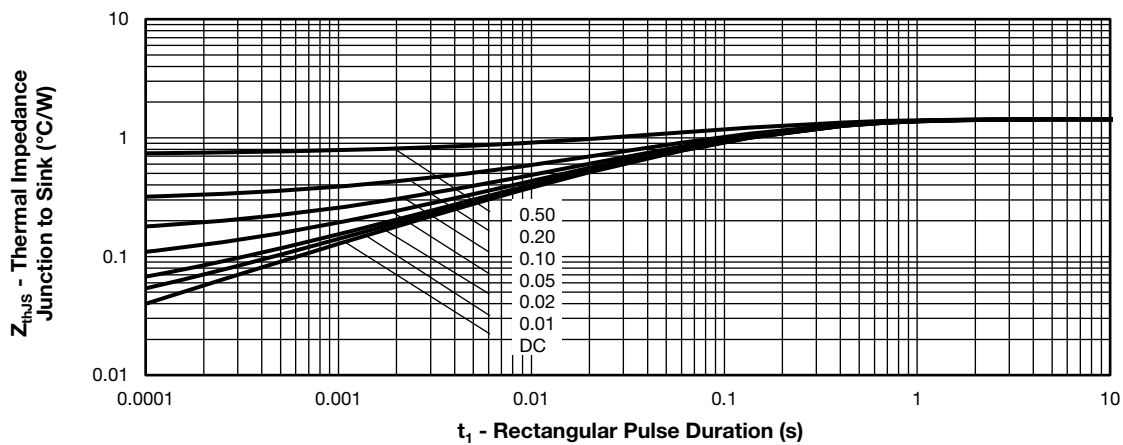
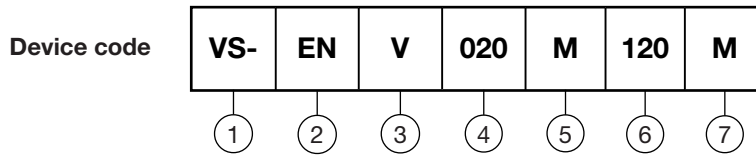


Fig. 7 - Z_{thJS} Thermal Impedance Junction to Sink vs. t_1 Rectangular Pulse Duration (Maximum Thermal Impedance Z_{thJS} Characteristics Per Diode)

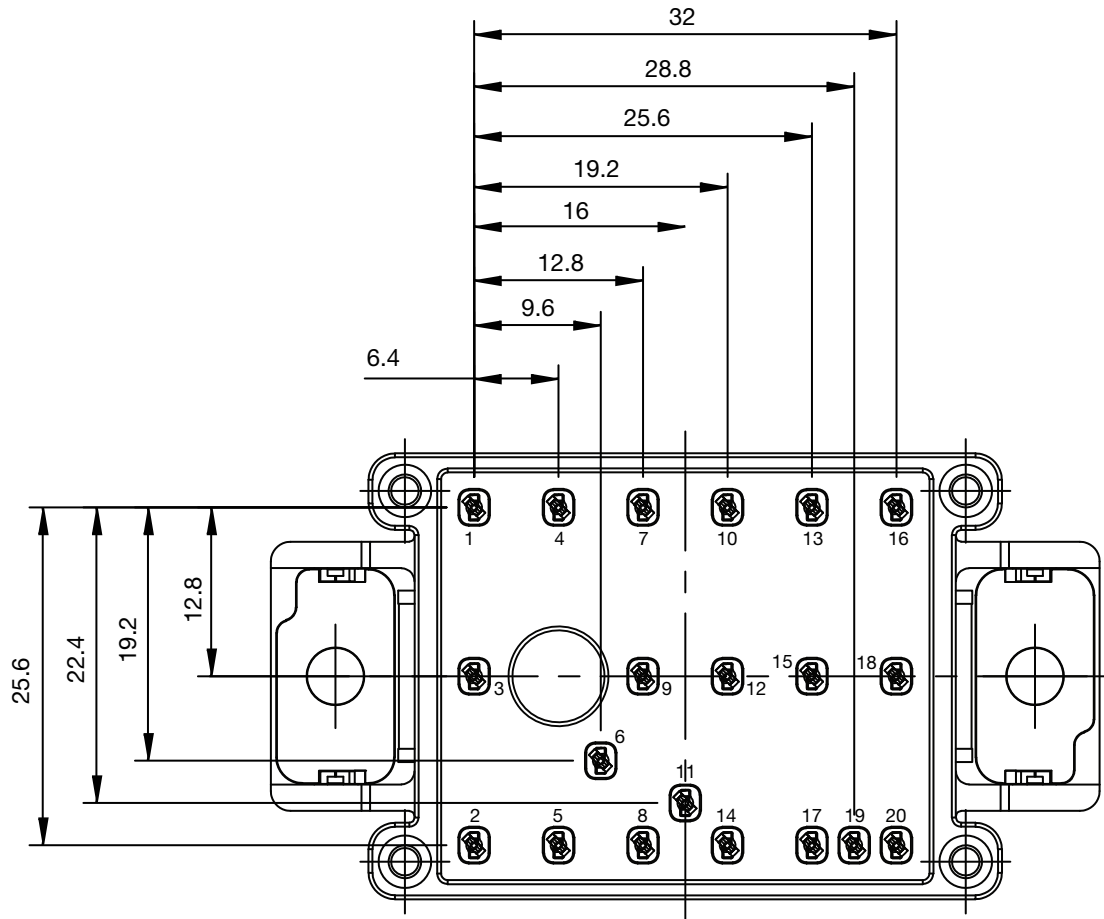
ORDERING INFORMATION TABLE


- 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 | |



PACKAGE



LINKS TO RELATED DOCUMENTS

| | |
|------------------|--|
| Dimensions | www.vishay.com/doc?95558 |
| Application Note | www.vishay.com/doc?95580 |



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