

## VB40M120C-E3, VB40M120C-M3, VB40M120CHM3

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Vishay General Semiconductor

RoHS

# **Dual High Voltage Trench MOS Barrier Schottky Rectifier**

Ultra Low  $V_F = 0.46 \text{ V}$  at  $I_F = 5 \text{ A}$ 





| PRIMARY CHARACTERISTICS |                |  |  |  |
|-------------------------|----------------|--|--|--|
| I <sub>F(AV)</sub>      | 2 x 20 A       |  |  |  |
| $V_{RRM}$               | 120 V          |  |  |  |
| I <sub>FSM</sub>        | 250 A          |  |  |  |
| $V_F$ at $I_F = 20$ A   | 0.64 V         |  |  |  |
| T <sub>J</sub> max.     | 150 °C         |  |  |  |
| Package                 | TO-263AB       |  |  |  |
| Diode variations        | Common cathode |  |  |  |

#### **FEATURES**

- Trench MOS Schottky technology
- · Low forward voltage drop, low power losses
- High efficiency operation
- AEC-Q101 qualified available
  - Automotive ordering code: base P/NHM3
- Meets MSL level 1, per J-STD-020, LF maximum peak
- of 245 °C

  Material categorization: for definitions of compliance
- Material categorization: for definitions of compliance please see <a href="https://www.vishay.com/doc?99912"><u>www.vishay.com/doc?99912</u></a>

#### **TYPICAL APPLICATIONS**

For use in solar cell junction box as a bypass diode for protection, using DC forward current without reverse bias.

#### **MECHANICAL DATA**

Case: TO-263AB

Molding compound meets UL 94 V-0 flammability rating

Base P/N-E3 - RoHS-compliant, commercial grade

Base P/N-M3 - halogen-free, RoHS-compliant, and commercial grade

Base P/NHM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified

**Terminals:** Matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

E3, M3, and HM3 suffix meets JESD 201 class 2 whisker test

Polarity: As marked

| MAXIMUM RATINGS (T <sub>A</sub> = 25 °C unless otherwise noted)                             |            |                                   |             |      |
|---|------------|-----------------------------------|-------------|------|
| PARAMETER   |            | SYMBOL                            | VB40M120C   | UNIT |
| Maximum repetitive peak reverse voltage   |            | $V_{RRM}$                         | 120         | V    |
| Maximum average forward rectified current (fig. 1)  | per device | I <sub>F(AV)</sub>                | 40          | A    |
|   | per diode  |                                   | 20          |      |
| Peak forward surge current 8.3 ms single half sine-wav superimposed on rated load per diode | е          | I <sub>FSM</sub>                  | 250         |      |
| Voltage rate of change (rated V <sub>R</sub> )  |            | dV/dt                             | 10 000      | V/µs |
| Operating junction and storage temperature range  |            | T <sub>J</sub> , T <sub>STG</sub> | -40 to +150 | °C   |

# VB40M120C-E3, VB40M120C-M3, VB40M120CHM3

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| <b>ELECTRICAL CHARACTERISTICS</b> (T <sub>A</sub> = 25 °C unless otherwise noted) |                        |                         |                               |      |      |      |
|---|------------------------|-------------------------|-------------------------------|------|------|------|
| PARAMETER   | TEST CONDITIONS        |                         | SYMBOL                        | TYP. | MAX. | UNIT |
| Instantaneous forward voltage per diode   | I <sub>F</sub> = 5 A   | T <sub>A</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.54 | -    | V    |
|   | I <sub>F</sub> = 10 A  |                         |                               | 0.64 | -    |      |
|   | I <sub>F</sub> = 20 A  |                         |                               | 0.79 | 0.89 |      |
|   | I <sub>F</sub> = 5 A   | T <sub>A</sub> = 125 °C |                               | 0.46 | -    |      |
|   | I <sub>F</sub> = 10 A  |                         |                               | 0.54 | -    |      |
|   | $I_F = 20 \text{ A}$   |                         |                               | 0.64 | 0.72 |      |
| Reverse current per diode   | V <sub>R</sub> = 90 V  | T <sub>A</sub> = 25 °C  | I <sub>R</sub> (2)            | 4    | -    | μΑ   |
|   |                        | T <sub>A</sub> = 125 °C |                               | 3    | -    | mA   |
|   | V <sub>P</sub> = 120 V | T <sub>A</sub> = 25 °C  |                               | -    | 500  | μΑ   |
|   |                        | T <sub>A</sub> = 125 °C |                               | 6    | 32   | mA   |

#### **Notes**

(1) Pulse test: 300 µs pulse width, 1 % duty cycle

(2) Pulse test: Pulse width  $\leq$  20 ms

| THERMAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted) |                  |     |      |  |
|---|------------------|-----|------|--|
| PARAMETER   | SYMBOL VB40M120C |     | UNIT |  |
| Typical thermal resistance per diode                                    | $R_{	heta JC}$   | 1.8 | °C/W |  |

| ORDERING INFORMATION (Example) |                    |                 |              |               |               |  |
|--------------------------------|--------------------|-----------------|--------------|---------------|---------------|--|
| PACKAGE                        | PREFERRED P/N      | UNIT WEIGHT (g) | PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |  |
| TO-263AB                       | VB40M120C-E3/4W    | 1.39            | 4W           | 50/tube       | Tube          |  |
| TO-263AB                       | VB40M120C-E3/8W    | 1.39            | 8W           | 800/reel      | Tape and reel |  |
| TO-263AB                       | VB40M120C-M3/I     | 1.39            | I            | 800/reel      | Tape and reel |  |
| TO-263AB                       | VB40M120CHM3/I (1) | 1.39            | I            | 800/reel      | Tape and reel |  |

#### Note

(1) AEC-Q101 qualified

### **RATINGS AND CHARACTERISTICS CURVES** (T<sub>A</sub> = 25 °C unless otherwise noted)

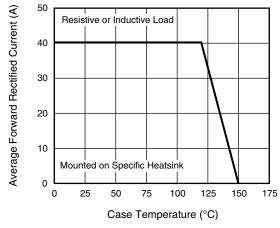


Fig. 1 - Maximum Forward Current Derating Curve

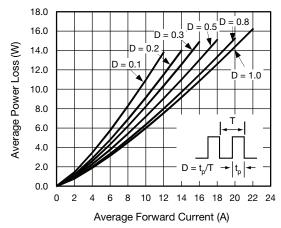


Fig. 2 - Forward Power Loss Characteristics Per Diode





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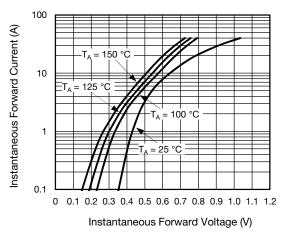


Fig. 3 - Typical Instantaneous Forward Characteristics Per Diode

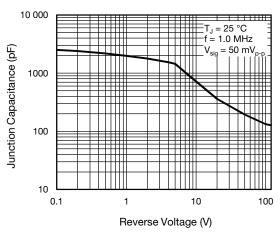


Fig. 5 - Typical Junction Capacitance Per Diode

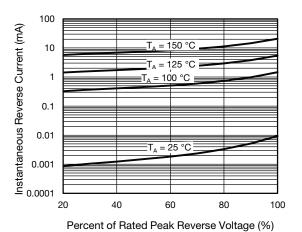


Fig. 4 - Typical Reverse Characteristics Per Diode

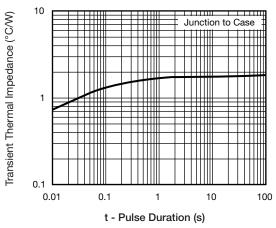
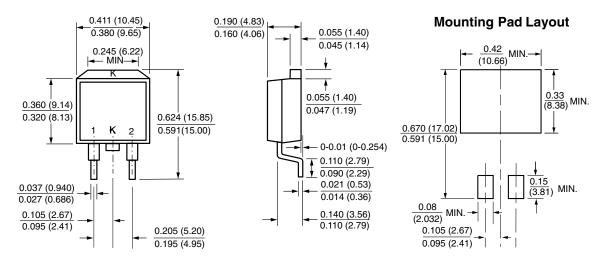


Fig. 6 - Typical Transient Thermal Impedance Per Diode

### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

### TO-263AB





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