

# Surface-Mount TMBS® (Trench MOS Barrier Schottky) Rectifier



## FEATURES

- Low profile package - typical height of 0.88 mm
- Leadless DFN package with side-wettable flanks suitable for customer AOI (Automatic Optical Inspection)
- Low power losses, high efficiency
- Low forward voltage drop
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified available - Automotive ordering code; base P/NHM3
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

**AUTOMOTIVE  
GRADE**  
Available



**RoHS  
COMPLIANT**  
**HALOGEN  
FREE**

## LINKS TO ADDITIONAL RESOURCES



## TYPICAL APPLICATIONS

For use in low voltage, high frequency inverters, freewheeling, DC/DC converters, and polarity protection applications.

## MECHANICAL DATA

**Case:** DFN33A

Molding compound meets UL 94 V-0 flammability rating

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

M3 and HM3 suffix meet JESD 201 class 2 whisker test

| PRIMARY CHARACTERISTICS                  |        |
|--|--------|
| $I_{F(AV)}$                              | 5 A    |
| $V_{RRM}$                                | 200 V  |
| $I_{FSM}$                                | 100 A  |
| $V_F$ at $I_F = 2.5$ A ( $T_J = 125$ °C) | 0.58 V |
| $T_J$ max.                               | 175 °C |
| Package                                  | DFN33A |
| Circuit configuration                    | Single |

| MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)                            |                   |             |      |
|--|-------------------|-------------|------|
| PARAMETER  | SYMBOL            | V5N3202     | UNIT |
| Device marking code  |                   | V522        |      |
| Maximum repetitive peak reverse voltage  | $V_{RRM}$         | 200         | V    |
| Maximum average forward rectified current (fig. 1)                                 | $I_{F(AV)}^{(1)}$ | 5           | A    |
|  | $I_{F(AV)}^{(2)}$ | 2           | A    |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load | $I_{FSM}$         | 100         | A    |
| Operating junction temperature range   | $T_J^{(3)}$       | -40 to +175 | °C   |
| Storage temperature range  | $T_{STG}$         | -55 to +175 | °C   |

## Notes

(1) With infinite heatsink

(2) Free air, mounted on FR4 PCB, 2 oz., standard footprint

(3) The heat generated must be less than the thermal conductivity from junction-to-ambient:  $dP_D/dT_J < 1/R_{\theta JA}$



| ELECTRICAL CHARACTERISTICS (T <sub>J</sub> = 25 °C unless otherwise noted) |                        |                         |                               |        |      |      |
|--|------------------------|-------------------------|-------------------------------|--------|------|------|
| PARAMETER  | TEST CONDITIONS        |                         | SYMBOL                        | TYP.   | MAX. | UNIT |
| Instantaneous forward voltage  | I <sub>F</sub> = 2.5 A | T <sub>J</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.73   | -    | V    |
|  | I <sub>F</sub> = 5 A   |                         |                               | 0.79   | 0.84 |      |
|  | I <sub>F</sub> = 2.5 A | T <sub>J</sub> = 125 °C |                               | 0.58   | -    |      |
|  | I <sub>F</sub> = 5 A   |                         |                               | 0.64   | 0.70 |      |
| Reverse current  | V <sub>R</sub> = 160 V | T <sub>J</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | 0.0004 | -    | mA   |
|  |                        | T <sub>J</sub> = 125 °C |                               | 0.5    | -    |      |
|  | V <sub>R</sub> = 200 V | T <sub>J</sub> = 25 °C  |                               | -      | 0.07 |      |
|  |                        | T <sub>J</sub> = 125 °C |                               | 1      | 5    |      |
| Typical junction capacitance   | 4.0 V, 1 MHz           |                         | C <sub>J</sub>                | 340    | -    | pF   |

**Notes**(1) Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle(2) Pulse test: pulse width  $\leq 5\text{ ms}$ 

| THERMAL CHARACTERISTICS ( $T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise specified) |                          |      |      |                      |
|--|--------------------------|------|------|----------------------|
| PARAMETER  | SYMBOL                   | TYP. | MAX. | UNIT                 |
| Thermal resistance   | $R_{\theta JA}^{(1)(2)}$ | 118  | 148  | $^{\circ}\text{C/W}$ |
|  | $R_{\theta JA}^{(3)}$    | -    | 65   |                      |
|  | $R_{\theta JM}^{(4)}$    | 3.2  | 4    |                      |

**Notes**(1) The heat generated must be less than the thermal conductivity from junction-to-ambient:  $dP_D/dT_J < 1/R_{\theta JA}$ (2) Thermal resistance junction-to-ambient to follow JEDEC<sup>®</sup> 51-2A, device mounted on FR4 PCB, 2 oz., standard footprint

(3) Thermal resistance junction-to-ambient, free air with device mounted on FR4 PCB, 2 oz., 20 mm x 20 mm pad area

(4) Thermal resistance junction-to-mount to follow JEDEC 51-14 transient dual interface test method (TDIM)

**ORDERING INFORMATION TABLE**

Device code

|   |   |    |    |   |   |    |
|---|---|----|----|---|---|----|
| V | 5 | N3 | 20 | 2 | H | M3 |
| ① | ② | ③  | ④  | ⑤ | ⑥ | ⑦  |

- 1** - Vishay TMBS product
- 2** - Current rating (5 = 5 A)
- 3** - Package type (N3 = DFN33A)
- 4** - Voltage rating (20 = 200 V)
- 5** - TMBS generation option (2 = Gen2)
- 6** - Quality grade (H = AEC-Q101 qualified, otherwise = industry grade)
- 7** - Material / environmental category (M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free)

| ORDERING INFORMATION (Example) |                 |                        |               |                                    |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                  | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| V5N3202-M3/I                   | 0.031           | I                      | 6000          | 13" diameter plastic tape and reel |
| V5N3202HM3/I <sup>(1)</sup>    | 0.031           | I                      | 6000          | 13" diameter plastic tape and reel |

**Note**

(1) AEC-Q101 qualified

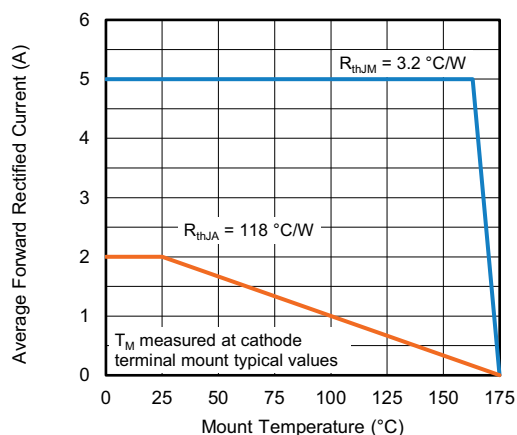
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

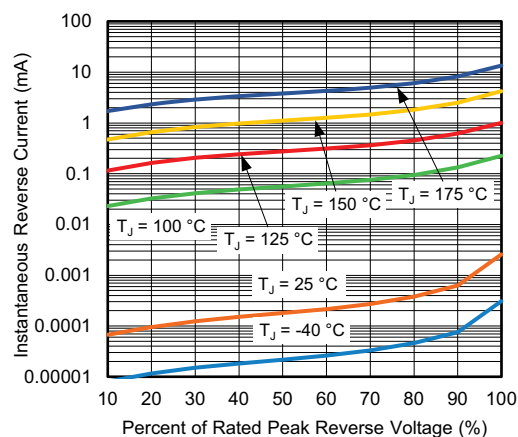


Fig. 4 - Typical Reverse Characteristics

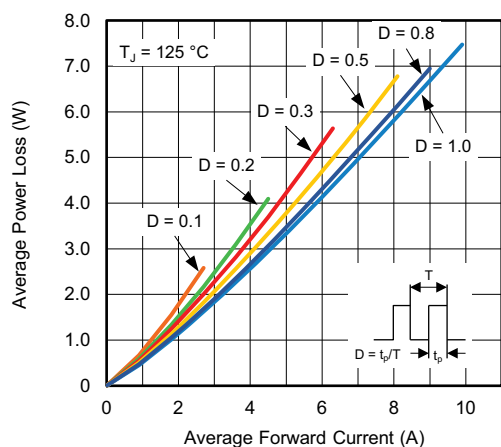


Fig. 2 - Forward Power Loss Characteristics

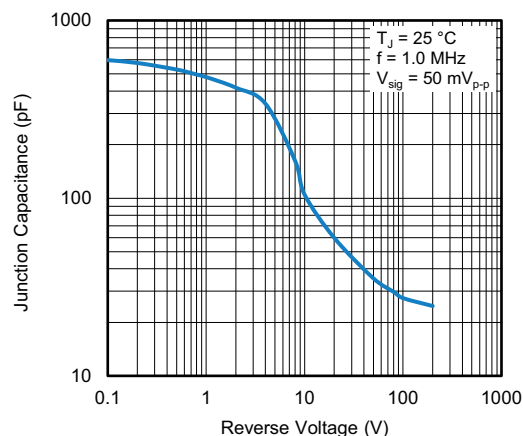


Fig. 5 - Typical Junction Capacitance

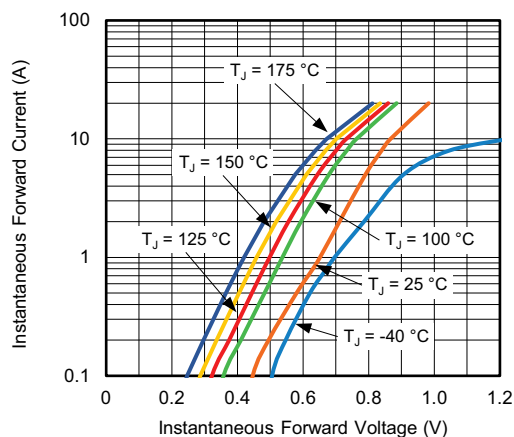


Fig. 3 - Typical Instantaneous Forward Characteristics

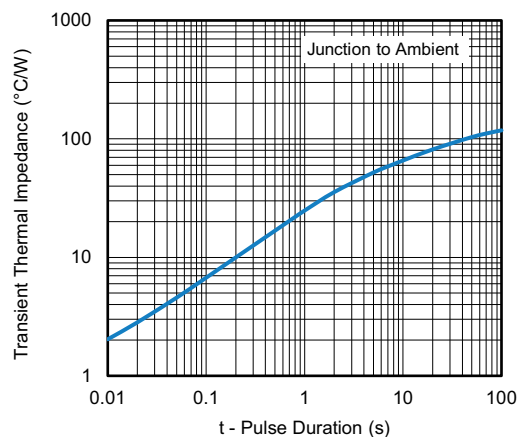


Fig. 6 - Typical Transient Thermal Impedance

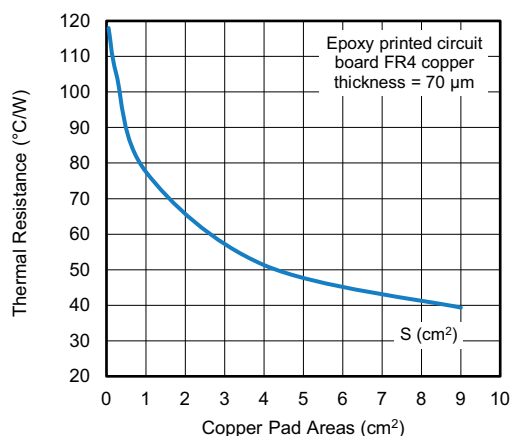


Fig. 7 - Thermal Resistance Junction-to-Ambient vs. Copper Pad Areas

# **PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)

## **DFN33A**





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