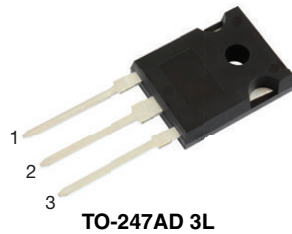


# Dual High Voltage TMBS<sup>®</sup> (Trench MOS Barrier Schottky) Rectifier

 Ultra Low  $V_F = 0.47\text{ V}$  at  $I_F = 5.0\text{ A}$ 


## FEATURES

- Trench MOS Schottky technology
- Low forward voltage drop, low power losses
- High efficiency operation
- Solder bath temperature 275 °C maximum, 10 s per JESD 22-B106
- 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)


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

## TYPICAL APPLICATIONS

For use in high frequency DC/DC converters, switching power supplies, freewheeling diodes, OR-ing diode, and reverse battery protection in commercial, industrial, and automotive application.

| PRIMARY CHARACTERISTICS                                |                |
|--|----------------|
| $I_{F(AV)}$  | 2 x 30 A       |
| $V_{RRM}$  | 170 V          |
| $I_{FSM}$  | 350 A          |
| $V_F$ at $I_F = 30\text{ A}$ ( $T_J = 125\text{ °C}$ ) | 0.65 V         |
| $T_J$ max.   | 175 °C         |
| Package  | TO-247AD 3L    |
| Circuit configuration                                  | Common cathode |

## MECHANICAL DATA

**Case:** TO-247AD 3L

Molding compound meets UL 94 V-0 flammability rating

Base P/N-M3 - halogen-free, RoHS-compliant

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

("\_X" denotes revision code e.g. A, B,.....)

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

M3 suffix meets JESD 201 class 1A whisker test, HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** as marked

**Mounting torque:** 10 in-lbs maximum

| MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)                     |                      |             |      |
|--|----------------------|-------------|------|
| PARAMETER  | SYMBOL               | VX60170PW   | UNIT |
| Maximum repetitive peak reverse voltage  | $V_{RRM}$            | 170         | V    |
| Maximum average forward rectified current (fig. 1)                                 | $I_{F(AV)}$          | per device  | 60   |
|  |                      | per diode   | 30   |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load | $I_{FSM}$            | 350         | A    |
| Operating junction temperature range   | $T_J$ <sup>(1)</sup> | -40 to +175 | °C   |
| Storage temperature range  | $T_{STG}$            | -40 to +175 |      |

### Note

<sup>(1)</sup> 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 per diode                                    | I <sub>F</sub> = 5 A   | T <sub>J</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.61   | -    | V    |
|  | I <sub>F</sub> = 15 A  |                         |                               | 0.72   | -    |      |
|  | I <sub>F</sub> = 30 A  |                         |                               | 0.79   | 0.84 |      |
|  | I <sub>F</sub> = 5 A   | T <sub>J</sub> = 125 °C |                               | 0.47   | -    |      |
|  | I <sub>F</sub> = 15 A  |                         |                               | 0.57   | -    |      |
|  | I <sub>F</sub> = 30 A  |                         |                               | 0.65   | 0.71 |      |
| Reverse current at rated V <sub>R</sub> per diode                          | V <sub>R</sub> = 136 V | T <sub>J</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | 0.0015 | -    | mA   |
|  |                        | T <sub>J</sub> = 125 °C |                               | 2.8    | -    |      |
|  | V <sub>R</sub> = 170 V | T <sub>J</sub> = 25 °C  |                               | -      | 0.2  |      |
|  |                        | T <sub>J</sub> = 125 °C |                               | 4.5    | 15   |      |
| Typical junction capacitance   | 4.0 V, 1 MHz           |                         | C <sub>J</sub>                | 2800   | -    | pF   |

**Notes**

- (1) Pulse test: 300 μs pulse width, 1 % duty cycle  
(2) Pulse test: Pulse width ≤ 5 ms

| THERMAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted) |                                 |           |      |
|---|---------------------------------|-----------|------|
| PARAMETER   | SYMBOL                          | VX60170PW | UNIT |
| Typical thermal resistance per device                                   | R <sub>θJC</sub> <sup>(1)</sup> | 0.6       | °C/W |

**Note**

- (1) Thermal resistance junction-to-case to follow JEDEC® 51-14 transient dual interface test method (TDIM)

| ORDERING INFORMATION (Example)  |                 |              |               |               |
|---------------------------------|-----------------|--------------|---------------|---------------|
| PREFERRED P/N                   | UNIT WEIGHT (g) | PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| VX60170PW-M3/P                  | 5.64            | P            | 25/tube       | Tube          |
| VX60170PWHM3_A/P <sup>(1)</sup> | 5.64            | P            | 25/tube       | Tube          |

**Note**

- (1) AEC-Q101 qualified

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

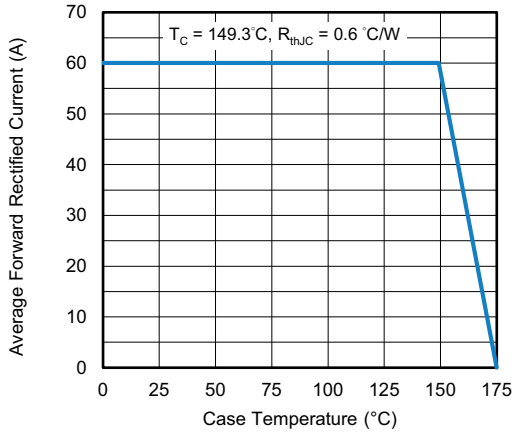


Fig. 1 - Maximum Forward Current Derating Curve

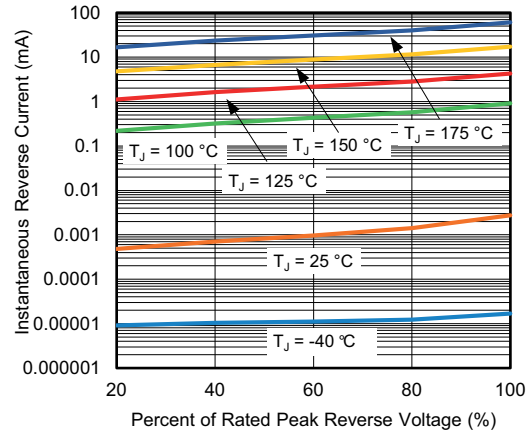


Fig. 4 - Typical Reverse Leakage Characteristics

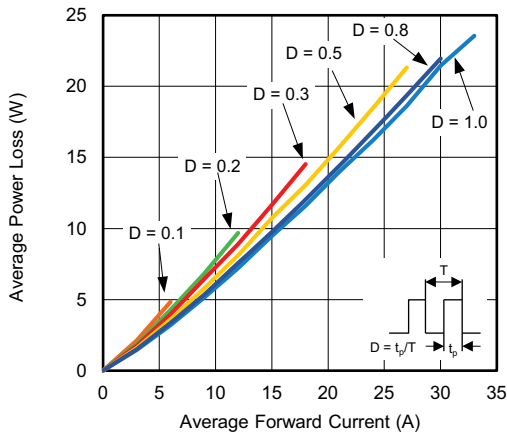


Fig. 2 - Average Power Loss Characteristics

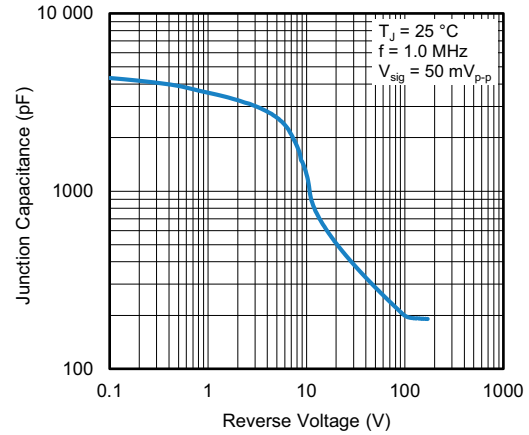


Fig. 5 - Typical Junction Capacitance

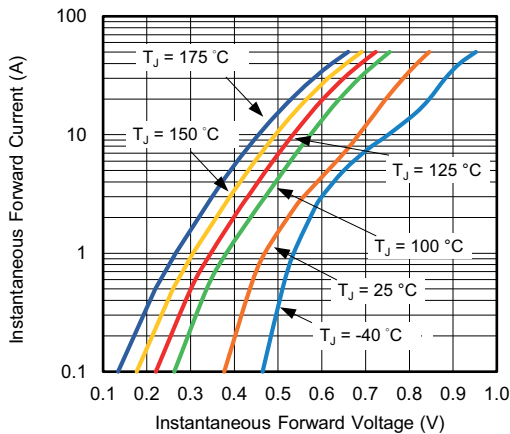


Fig. 3 - Typical Instantaneous Forward Characteristics

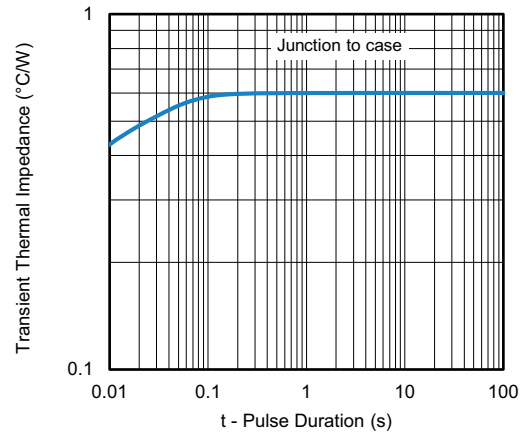
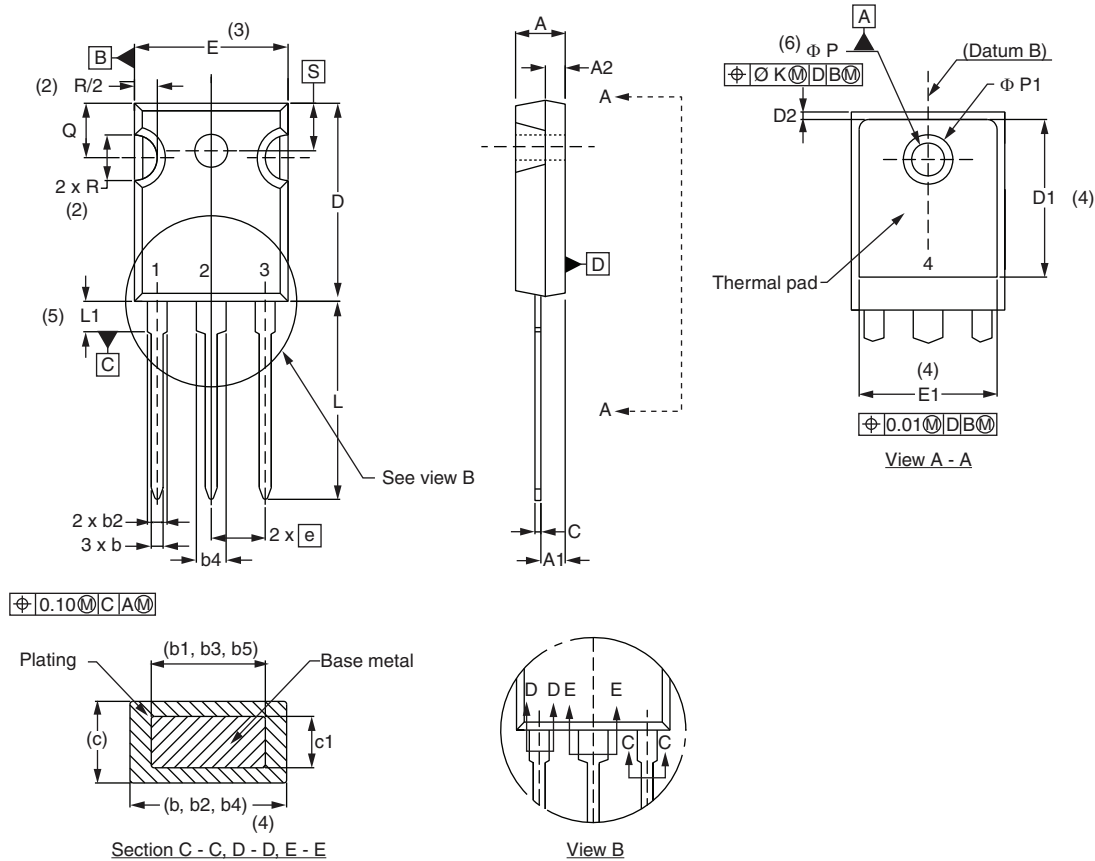


Fig. 6 - Typical Transient Thermal Impedance

**PACKAGE OUTLINE DIMENSIONS** in millimeters (inches) **TO-247AD 3L**


| SYMBOL | MILLIMETERS |       | INCHES |       | NOTES | SYMBOL | MILLIMETERS |       | INCHES    |       | NOTES |
|--------|-------------|-------|--------|-------|-------|--------|-------------|-------|-----------|-------|-------|
|        | MIN.        | MAX.  | MIN.   | MAX.  |       |        | MIN.        | MAX.  | MIN.      | MAX.  |       |
| A      | 4.65        | 5.31  | 0.183  | 0.209 |       | D2     | 0.51        | 1.30  | 0.020     | 0.051 |       |
| A1     | 2.21        | 2.59  | 0.087  | 0.102 |       | E      | 15.29       | 15.87 | 0.602     | 0.625 | 3     |
| A2     | 1.50        | 2.49  | 0.059  | 0.098 |       | E1     | 13.46       | -     | 0.53      | -     |       |
| b      | 0.99        | 1.40  | 0.039  | 0.055 |       | e      | 5.46 BSC    |       | 0.215 BSC |       |       |
| b1     | 0.99        | 1.35  | 0.039  | 0.053 |       | Ø K    | 0.254       |       | 0.010     |       |       |
| b2     | 1.65        | 2.39  | 0.065  | 0.094 |       | L      | 19.81       | 20.32 | 0.780     | 0.800 |       |
| b3     | 1.65        | 2.34  | 0.065  | 0.092 |       | L1     | 3.71        | 4.29  | 0.146     | 0.169 |       |
| b4     | 2.59        | 3.43  | 0.102  | 0.135 |       | Ø P    | 3.56        | 3.66  | 0.14      | 0.144 |       |
| b5     | 2.59        | 3.38  | 0.102  | 0.133 |       | Ø P1   | -           | 6.98  | -         | 0.275 |       |
| c      | 0.38        | 0.89  | 0.015  | 0.035 |       | Q      | 5.31        | 5.69  | 0.209     | 0.224 |       |
| c1     | 0.38        | 0.84  | 0.015  | 0.033 |       | R      | 4.52        | 5.49  | 0.178     | 0.216 |       |
| D      | 19.71       | 20.70 | 0.776  | 0.815 | 3     | S      | 5.51 BSC    |       | 0.217 BSC |       |       |
| D1     | 13.08       | -     | 0.515  | -     | 4     |        |             |       |           |       |       |

**Notes**

- (1) Dimensioning and tolerancing per ASME Y14.5M-1994
- (2) Contour of slot optional
- (3) Dimension D and E do not include mold flash. These dimensions are measured at the outermost extremes of the plastic body
- (4) Thermal pad contour optional with dimensions D1 and E1
- (5) Lead finish uncontrolled in L1
- (6) Ø P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
- (7) Outline conforms to JEDEC® outline TO-247 with exception of dimension A min., D, E min., Q min., S, and note 4



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