

# High Current Density Surface-Mount Trench MOS Barrier Schottky Rectifier

Ultra Low  $V_F = 0.32\text{ V}$  at  $I_F = 2.5\text{ A}$



FlatPAK 5 x 6



## DESIGN SUPPORT TOOLS

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## FEATURES

- Trench MOS Schottky technology
- Low forward voltage drop, low power losses
- High efficiency operation
- 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

## TYPICAL APPLICATIONS

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

## MECHANICAL DATA

**Case:** FlatPAK 5 x 6

Molding compound meets UL 94 V-0 flammability rating

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

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 meets JESD 201 class 2 whisker test

| PRIMARY CHARACTERISTICS                               |                   |
|---|-------------------|
| $I_{F(AV)}$   | 2 x 5 A           |
| $V_{RRM}$   | 45 V              |
| $I_{FSM}$   | 100 A             |
| $V_F$ at $I_F = 5\text{ A}$ ( $T_A = 125\text{ °C}$ ) | 0.39 V            |
| $T_J$ max.  | 150 °C            |
| Package   | FlatPAK 5 x 6     |
| Circuit configuration                                 | Separated cathode |

| MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)                               |                   |             |      |
|--|-------------------|-------------|------|
| PARAMETER  | SYMBOL            | V10KL45DU   | UNIT |
| Device marking code  |                   | V10L45D     |      |
| Maximum repetitive peak reverse voltage  | $V_{RRM}$         | 45          | V    |
| Maximum DC forward current per diode   | $I_{F(AV)}^{(1)}$ | 5           | A    |
|  | $I_{F(AV)}^{(2)}$ | 3.3         | A    |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load per diode | $I_{FSM}$         | 100         | A    |
| Operating junction temperature range   | $T_J^{(3)}$       | -40 to +150 | °C   |
| Storage temperature range  | $T_{STG}$         | -55 to +150 | °C   |

### Notes

(1) With infinite heatsink

(2) Free air, mounted on recommended pad area

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



| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) |                      |                                   |             |      |      |      |
|--|----------------------|-----------------------------------|-------------|------|------|------|
| PARAMETER  | TEST CONDITIONS      |                                   | SYMBOL      | TYP. | MAX. | UNIT |
| Instantaneous forward voltage per diode  | $I_F = 2.5\text{ A}$ | $T_A = 25\text{ }^\circ\text{C}$  | $V_F^{(1)}$ | 0.43 | -    | V    |
|  | $I_F = 5\text{ A}$   |                                   |             | 0.48 | 0.56 |      |
|  | $I_F = 2.5\text{ A}$ | $T_A = 125\text{ }^\circ\text{C}$ |             | 0.32 | -    |      |
|  | $I_F = 5\text{ A}$   |                                   |             | 0.39 | 0.47 |      |
| Reverse current per diode  | $V_R = 45\text{ V}$  | $T_A = 25\text{ }^\circ\text{C}$  | $I_R^{(2)}$ | -    | 0.65 | mA   |
|  |                      | $T_A = 125\text{ }^\circ\text{C}$ |             | 8    | 45   |      |
| Typical junction capacitance per diode   | 4.0 V, 1 MHz         |                                   | $C_J$       | 900  | -    | pF   |

**Notes**

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

| <b>THERMAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) |                          |      |      |                    |
|---|--------------------------|------|------|--------------------|
| PARAMETER   | SYMBOL                   | TYP. | MAX. | UNIT               |
| Thermal resistance per diode  | $R_{\theta JA}^{(1)(2)}$ | 100  | -    | $^\circ\text{C/W}$ |
|   | $R_{\theta JM}^{(3)}$    | 3.0  | 4.0  |                    |

**Notes**

- (1) The heat generated must be less than thermal conductivity from junction-to-ambient:  $dP_D/dT_J < 1/R_{\theta JA}$
- (2) Free air, mounted on recommended copper pad area; thermal resistance  $R_{\theta JA}$  - junction-to-ambient
- (3) Mounted on infinite heat sink; thermal resistance  $R_{\theta JM}$  - junction-to-mount

| <b>ORDERING INFORMATION</b> (Example) |                 |                        |               |                                    |
|---------------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                         | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| V10KL45DU-M3/H                        | 0.10            | H                      | 1500          | 7" diameter plastic tape and reel  |
| V10KL45DU-M3/I                        | 0.10            | I                      | 6000          | 13" diameter plastic tape and reel |
| V10KL45DUHM3/H <sup>(1)</sup>         | 0.10            | H                      | 1500          | 7" diameter plastic tape and reel  |
| V10KL45DUHM3/I <sup>(1)</sup>         | 0.10            | 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)

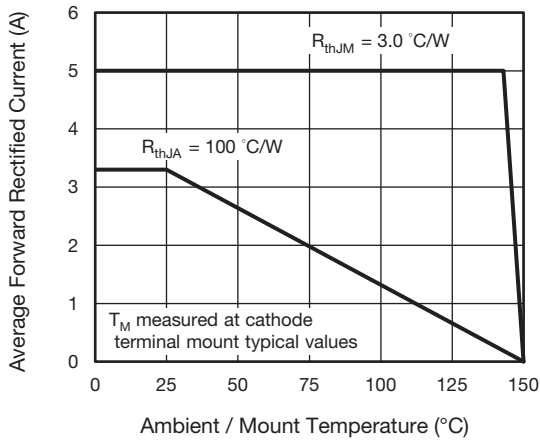


Fig. 1 - Maximum Forward Current Derating Curve

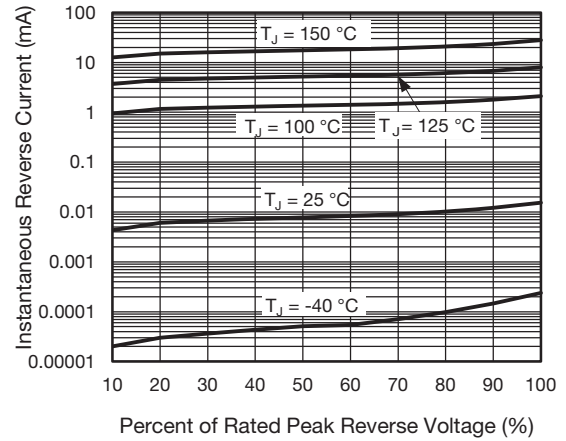


Fig. 4 - Typical Reverse Leakage Characteristics

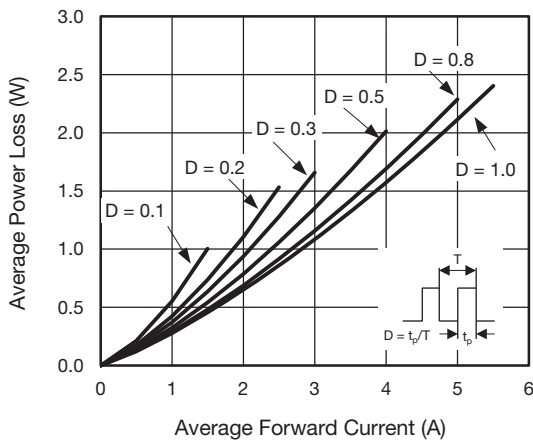


Fig. 2 - Forward Power Loss Characteristics

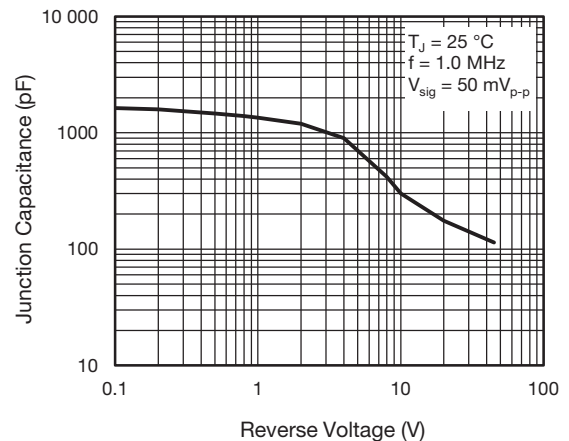


Fig. 5 - Typical Junction Capacitance

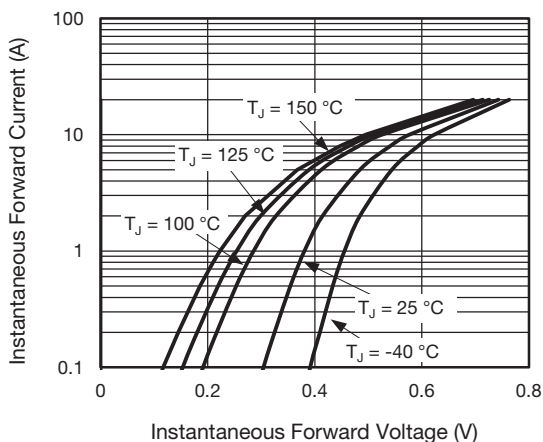


Fig. 3 - Typical Instantaneous Forward Characteristics

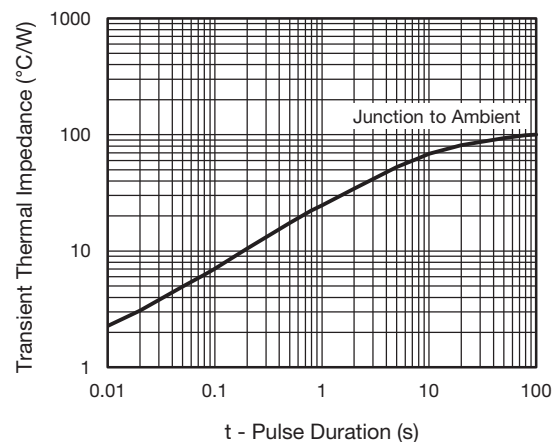
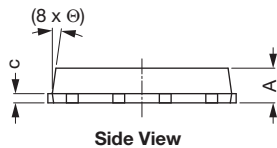
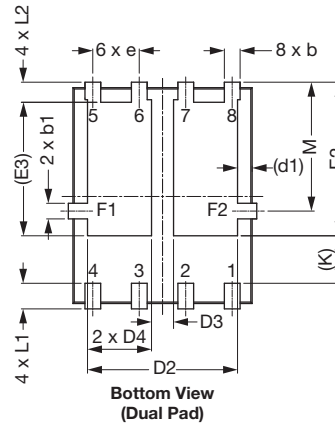


Fig. 6 - Typical Transient Thermal Impedance



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



| DIM. | INCHES    |       |       | MILLIMETERS |       |      |
|------|-----------|-------|-------|-------------|-------|------|
|      | MIN.      | NOM.  | MAX.  | MIN.        | NOM.  | MAX. |
| A    | 0.035     | 0.039 | 0.043 | 0.89        | 0.99  | 1.09 |
| (a)  | -         | 0.006 | -     | -           | 0.15  | -    |
| b    | 0.013     | 0.017 | 0.020 | 0.32        | 0.43  | 0.52 |
| b1   | 0.013     | 0.017 | 0.020 | 0.32        | 0.43  | 0.52 |
| c    | 0.008     | -     | 0.014 | 0.20        | -     | 0.35 |
| D    | 0.197     | 0.203 | 0.209 | 5.00        | 5.15  | 5.30 |
| D1   | 0.189     | 0.193 | 0.197 | 4.80        | 4.90  | 5.00 |
| D2   | 0.154     | 0.161 | 0.169 | 3.90        | 4.10  | 4.30 |
| D3   | 0.020     | 0.024 | 0.031 | 0.50        | 0.60  | 0.80 |
| D4   | 0.063     | 0.069 | 0.075 | 1.60        | 1.75  | 1.90 |
| (d1) | -         | 0.016 | -     | -           | 0.40  | -    |
| (d2) | -         | 0.005 | -     | -           | 0.125 | -    |
| E    | 0.238     | 0.244 | 0.250 | 6.05        | 6.20  | 6.35 |
| E1   | 0.228     | 0.232 | 0.236 | 5.80        | 5.90  | 6.00 |
| E2   | 0.157     | 0.165 | 0.173 | 4.00        | 4.20  | 4.40 |
| (E3) | -         | 0.144 | -     | -           | 3.65  | -    |
| e    | 0.050 BSC |       |       | 1.27 BSC    |       |      |
| (K)  | 0.039     | -     | -     | 1.00        | -     | -    |
| L1   | 0.019     | -     | 0.043 | 0.48        | -     | 1.10 |
| L2   | 0.012     | -     | 0.031 | 0.30        | -     | 0.80 |
| M    | 0.128     | 0.138 | 0.148 | 3.25        | 3.50  | 3.75 |
| Θ    | 0°        | -     | 10°   | 0°          | -     | 10°  |

**Notes**

- Dimensioning and tolerancing per ASME Y14.5-2009
- Dimensions D1 and E1 do not include mold flash or gate burrs
- Dimension (XX) means reference only



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