

High Current Density Surface-Mount (TMBS®) Trench MOS Barrier Schottky Rectifier

 Ultra Low $V_F = 0.45\text{ V}$ at $I_F = 5\text{ A}$

FlatPAK 5 x 6

1, 2, 3, 4 5, 6, 7, 8

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

 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.

LINKS TO ADDITIONAL RESOURCES


[3D Models](#)

PRIMARY CHARACTERISTICS

| | |
|--|---------------|
| $I_{F(AV)}$ | 20 A |
| V_{RRM} | 120 V |
| I_{FSM} | 220 A |
| V_F at $I_F = 20\text{ A}$ ($T_J = 125\text{ °C}$) | 0.64 V |
| T_J max. | 165 °C |
| Package | FlatPAK 5 x 6 |
| Circuit configuration | Single |

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

MAXIMUM RATINGS ($T_A = 25\text{ °C}$ unless otherwise noted)

| PARAMETER | SYMBOL | V20KM120 | UNIT |
|--|-------------------|-------------|------|
| Device marking code | | 20M12 | |
| Maximum repetitive peak reverse voltage | V_{RRM} | 120 | V |
| Maximum DC forward current | $I_{F(AV)}^{(1)}$ | 20 | A |
| | $I_{F(AV)}^{(2)}$ | 4 | |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load | I_{FSM} | 220 | |
| Operating junction temperature range | $T_J^{(3)}$ | -40 to +165 | °C |
| Storage temperature range | T_{STG} | -55 to +165 | |

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: $dP_D/dT_J < 1/R_{\theta JA}$

**ELECTRICAL CHARACTERISTICS** ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted)

| PARAMETER | TEST CONDITIONS | SYMBOL | TYP. | MAX. | UNIT | |
|-------------------------------|----------------------|-----------------------------------|-------------|-------|------|----|
| Instantaneous forward voltage | $I_F = 5\text{ A}$ | $T_J = 25\text{ }^\circ\text{C}$ | $V_F^{(1)}$ | 0.54 | - | V |
| | $I_F = 10\text{ A}$ | | | 0.64 | - | |
| | $I_F = 20\text{ A}$ | | | 0.81 | 0.87 | |
| | $I_F = 5\text{ A}$ | $T_J = 125\text{ }^\circ\text{C}$ | | 0.45 | - | |
| | $I_F = 10\text{ A}$ | 0.54 | | - | | |
| | $I_F = 20\text{ A}$ | 0.64 | | 0.69 | | |
| Reverse current | $V_R = 90\text{ V}$ | $T_J = 25\text{ }^\circ\text{C}$ | $I_R^{(2)}$ | 0.008 | - | mA |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | 3.5 | - | |
| | $V_R = 120\text{ V}$ | $T_J = 25\text{ }^\circ\text{C}$ | | - | 0.5 | |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | 6 | 30 | |
| Typical junction capacitance | 4.0 V, 1 MHz | C_J | 1920 | - | pF | |

Notes

- (1) Pulse test: 300 μs 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 noted)

| PARAMETER | SYMBOL | TYP. | MAX. | UNIT |
|--------------------|--------------------------|------|------|--------------------|
| Thermal resistance | $R_{\theta JA}^{(1)(2)}$ | 75 | - | $^\circ\text{C/W}$ |
| | $R_{\theta JM}^{(3)}$ | 2.5 | 3.5 | |

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 heatsink; thermal resistance $R_{\theta JM}$ - junction-to-mount

ORDERING INFORMATION (Example)

| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
|------------------------------|-----------------|------------------------|---------------|------------------------------------|
| V20KM120-M3/H | 0.10 | H | 1500 | 7" diameter plastic tape and reel |
| V20KM120-M3/I | 0.10 | I | 6000 | 13" diameter plastic tape and reel |
| V20KM120HM3/H ⁽¹⁾ | 0.10 | H | 1500 | 7" diameter plastic tape and reel |
| V20KM120HM3/I ⁽¹⁾ | 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)

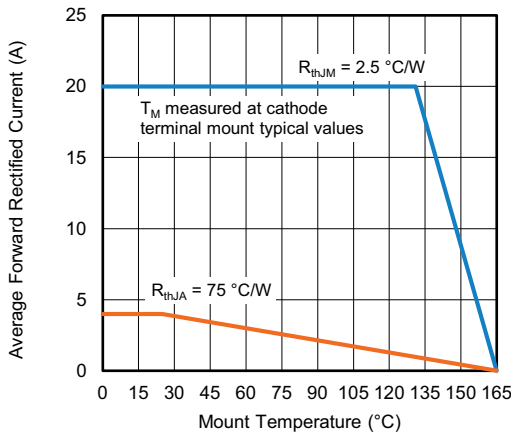


Fig. 1 - Maximum Forward Current Derating Curve

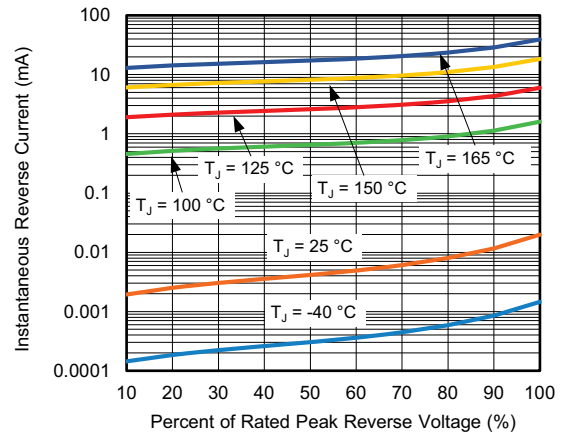


Fig. 4 - Typical Reverse Leakage Characteristics

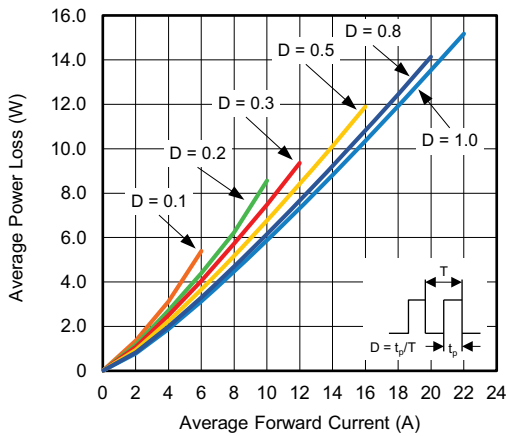


Fig. 2 - Forward Power Loss Characteristics

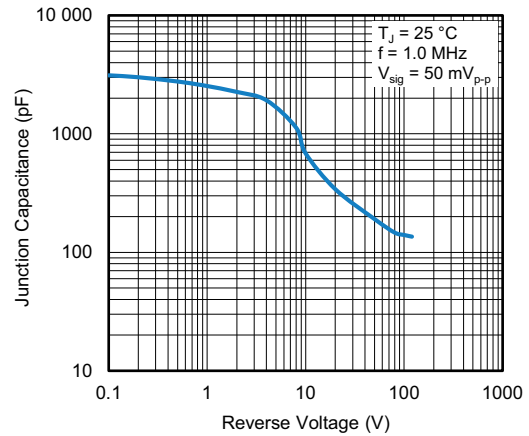


Fig. 5 - Typical Junction Capacitance

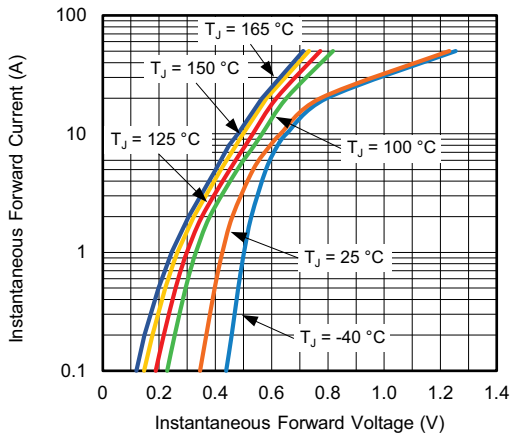


Fig. 3 - Typical Instantaneous Forward Characteristics

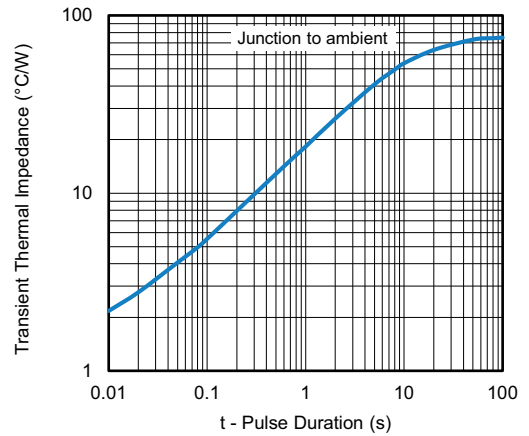
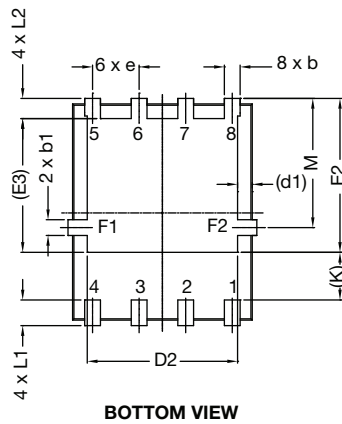
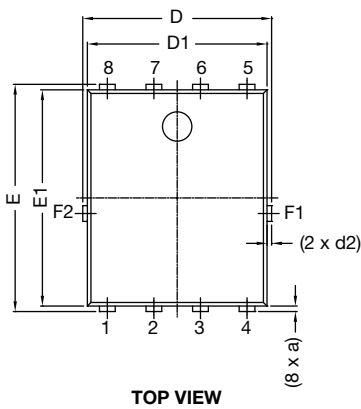


Fig. 6 - Typical Transient Thermal Impedance

DIMENSIONS in inches (millimeters)

FlatPAK 5 x 6


| 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 |
| (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 |
| Ø | 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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