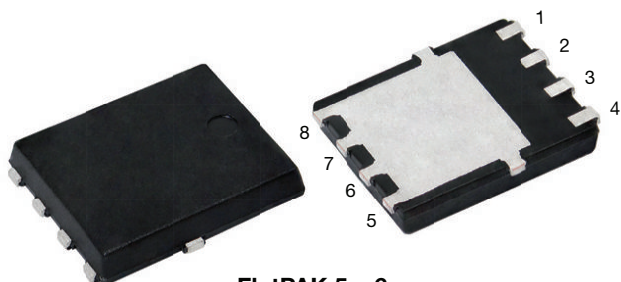


# High Current Density Surface-Mount (TMBS®) Trench MOS Barrier Schottky Rectifier

Ultra Low  $V_F = 0.36\text{ V}$  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](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 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                                |               |
|--------------------------------------------------------|---------------|
| $I_{F(AV)}$                                            | 20 A          |
| $V_{RRM}$                                              | 60 V          |
| $I_{FSM}$                                              | 220 A         |
| $V_F$ at $I_F = 20\text{ A}$ ( $T_J = 125\text{ °C}$ ) | 0.52 V        |
| $T_J$ max.                                             | 165 °C        |
| Package                                                | FlatPAK 5 x 6 |
| Circuit configuration                                  | Single        |

| MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)                     |                   |             |      |
|------------------------------------------------------------------------------------|-------------------|-------------|------|
| PARAMETER                                                                          | SYMBOL            | V20KM60     | UNIT |
| Device marking code                                                                |                   | 20M60       |      |
| Maximum repetitive peak reverse voltage                                            | $V_{RRM}$         | 60          | V    |
| Maximum DC forward current                                                         | $I_{F(AV)}^{(1)}$ | 20          | A    |
|                                                                                    | $I_{F(AV)}^{(2)}$ | 4.7         |      |
| 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 <sub>J</sub> = 25 °C unless otherwise noted) |                       |                         |                               |      |      |      |
|----------------------------------------------------------------------------|-----------------------|-------------------------|-------------------------------|------|------|------|
| PARAMETER                                                                  | TEST CONDITIONS       |                         | SYMBOL                        | TYP. | MAX. | UNIT |
| Instantaneous forward voltage                                              | I <sub>F</sub> = 5 A  | T <sub>J</sub> = 25 °C  | V <sub>F</sub> <sup>(1)</sup> | 0.47 | -    | V    |
|                                                                            | I <sub>F</sub> = 10 A |                         |                               | 0.51 | -    |      |
|                                                                            | I <sub>F</sub> = 20 A |                         |                               | 0.58 | 0.65 |      |
|                                                                            | I <sub>F</sub> = 5 A  | T <sub>J</sub> = 125 °C |                               | 0.36 | -    |      |
|                                                                            | I <sub>F</sub> = 10 A |                         |                               | 0.42 | -    |      |
|                                                                            | I <sub>F</sub> = 20 A |                         |                               | 0.52 | 0.57 |      |
| Reverse current                                                            | V <sub>R</sub> = 60 V | T <sub>J</sub> = 25 °C  | I <sub>R</sub> <sup>(2)</sup> | -    | 0.4  | mA   |
|                                                                            |                       | T <sub>J</sub> = 125 °C |                               | 6    | 20   |      |
| Typical junction capacitance                                               | 4.0 V, 1 MHz          |                         | C <sub>J</sub>                | 2860 | -    | 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 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                      |
| V20KM60-M3/H                    | 0.10            | H                      | 1500          | 7" diameter plastic tape and reel  |
| V20KM60-M3/I                    | 0.10            | I                      | 6000          | 13" diameter plastic tape and reel |
| V20KM60-M3/IE <sup>(2)</sup>    | 0.10            | IE                     | 6000          | 13" diameter plastic tape and reel |
| V20KM60HM3/H <sup>(1)</sup>     | 0.10            | H                      | 1500          | 7" diameter plastic tape and reel  |
| V20KM60HM3/I <sup>(1)</sup>     | 0.10            | I                      | 6000          | 13" diameter plastic tape and reel |
| V20KM60HM3/IE <sup>(1)(2)</sup> | 0.10            | IE                     | 6000          | 13" diameter plastic tape and reel |

**Notes**

(1) AEC-Q101 qualified

(2) Component rotate 90° in cavity

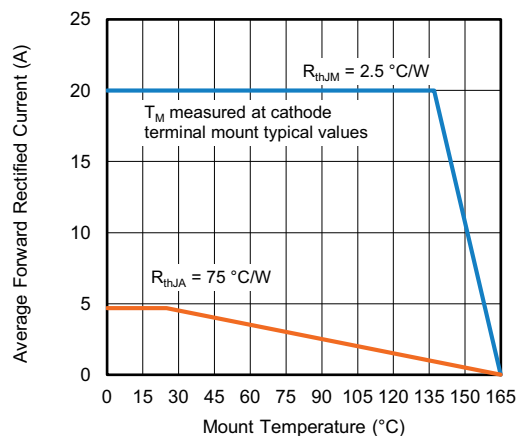
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

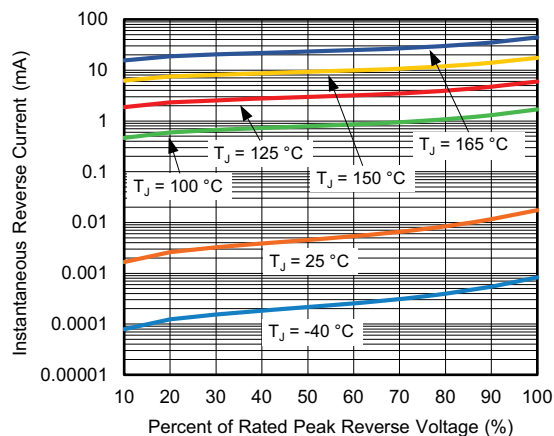


Fig. 4 - Typical Reverse Leakage Characteristics

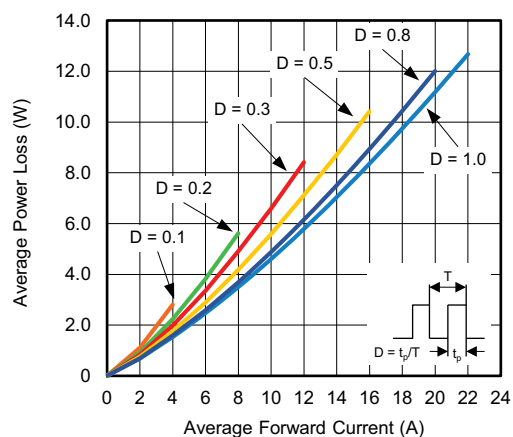


Fig. 2 - Forward Power Loss Characteristics

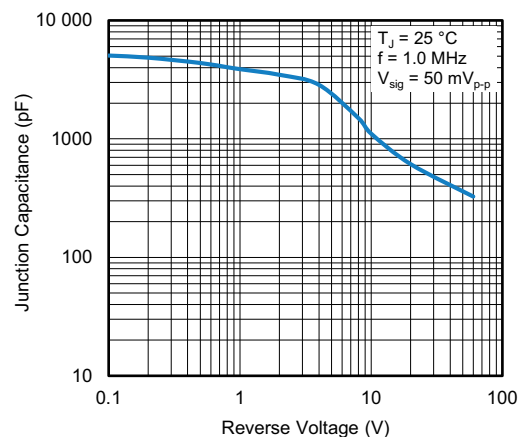


Fig. 5 - Typical Junction Capacitance

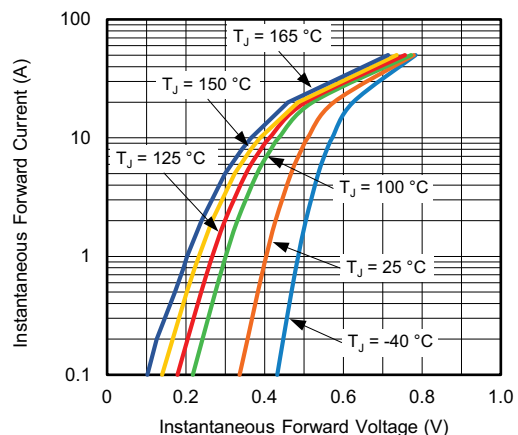


Fig. 3 - Typical Instantaneous Forward Characteristics

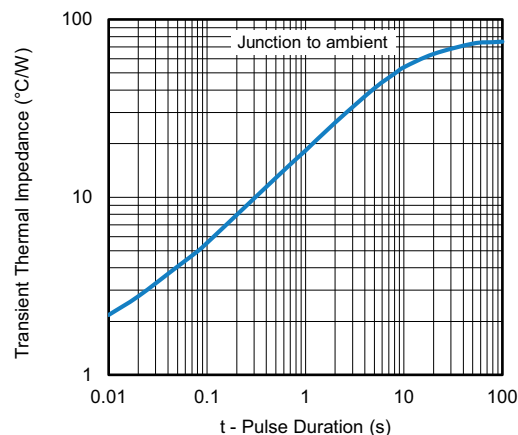
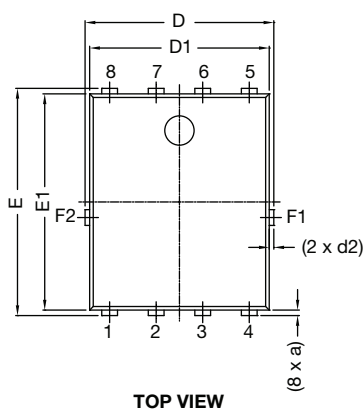
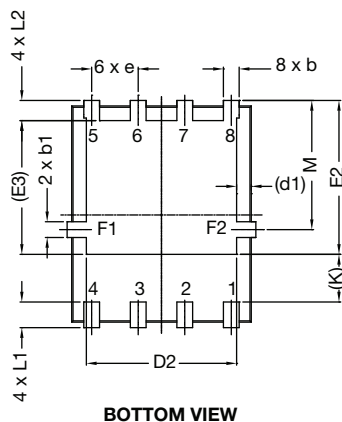
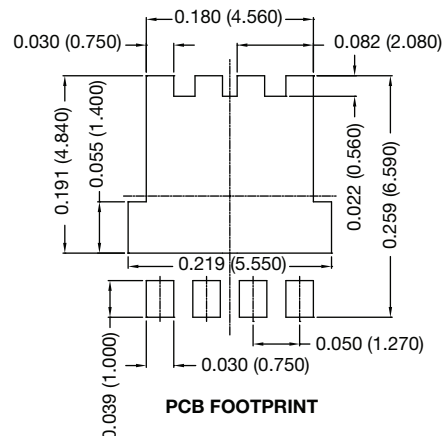
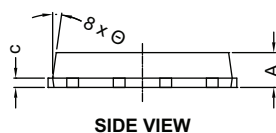


Fig. 6 - Typical Transient Thermal Impedance

**DIMENSIONS** in inches (millimeters)**FlatPAK 5 x 6****TOP VIEW****BOTTOM VIEW****PCB FOOTPRINT****SIDE VIEW**

| 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 |
| 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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