Dual Low-Voltage TMBS® (Trench MOS Barrier Schottky) Rectifier

Ultra Low $V_F = 0.34$ V at $I_F = 5.0$ A

FEATURES

- Trench MOS Schottky technology
- Very low profile - typical height of 1.7 mm
- Ideal for automated placement
- 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

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.

MECHANICAL DATA

Case: SMPD (TO-263AC)
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 meet JESD 201 class 2 whisker test

Polarity: as marked

MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise noted)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>V20D45C</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device marking code</td>
<td></td>
<td>V20D45C</td>
<td></td>
</tr>
<tr>
<td>Maximum repetitive peak reverse voltage</td>
<td>$V_{RRM}$</td>
<td>45</td>
<td>V</td>
</tr>
<tr>
<td>Maximum average forward rectified current (fig. 1) per device</td>
<td>$I_{FAV}$</td>
<td>20</td>
<td>A</td>
</tr>
<tr>
<td>Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load</td>
<td>$I_{FSM}$</td>
<td>120</td>
<td>A</td>
</tr>
<tr>
<td>Operating junction temperature range</td>
<td>$T_J$</td>
<td>-40 to +150</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>$T_{STG}$</td>
<td>-55 to +150</td>
<td>°C</td>
</tr>
</tbody>
</table>

Notes

(1) Mounted on infinite heatsink
(2) The heat generated must be less than the thermal conductivity from junction-to-ambient: $dP/dT_J < 1/R_{JUA}$
**ELECTRICAL CHARACTERISTICS** (\(T_A = 25 \, ^\circ\text{C}\) unless otherwise noted)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITIONS</th>
<th>SYMBOL</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instantaneous forward voltage per diode</td>
<td>(I_F = 5 , \text{A}) (T_A = 25 , ^\circ\text{C})</td>
<td>(V_F)</td>
<td>0.44</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>(I_F = 10 , \text{A}) (T_A = 25 , ^\circ\text{C})</td>
<td></td>
<td>0.49</td>
<td>0.57</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(I_F = 5 , \text{A}) (T_A = 125 , ^\circ\text{C})</td>
<td></td>
<td>0.34</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(I_F = 10 , \text{A}) (T_A = 125 , ^\circ\text{C})</td>
<td></td>
<td>0.40</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>Reverse current at rated (V_R) per diode</td>
<td>(V_R = 45 , \text{V}) (T_A = 25 , ^\circ\text{C})</td>
<td>(I_R)</td>
<td>-</td>
<td>1</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>(V_R = 45 , \text{V}) (T_A = 125 , ^\circ\text{C})</td>
<td></td>
<td>10</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Typical junction capacitance</td>
<td>4.0 V, 1 MHz</td>
<td>(C_J)</td>
<td>1900</td>
<td>-</td>
<td>pF</td>
</tr>
</tbody>
</table>

**Notes**

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

**THERMAL CHARACTERISTICS** (\(T_A = 25 \, ^\circ\text{C}\) unless otherwise noted)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>V20D45C</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical thermal resistance per device</td>
<td>(R_{thJC})</td>
<td>1.8</td>
<td>°C/W</td>
</tr>
<tr>
<td></td>
<td>(R_{thJA}) ((2)(3))</td>
<td>48</td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

(1) Mounted on infinite heatsink  
(2) The heat generated must be less than the thermal conductivity from junction-to-ambient: \(dP_d/dT_J < 1/R_{thJA}\)  
(3) Free air, without heatsink

**ORDERING INFORMATION** (Example)

<table>
<thead>
<tr>
<th>PREFERRED P/N</th>
<th>UNIT WEIGHT (g)</th>
<th>PACKAGE CODE</th>
<th>BASE QUANTITY</th>
<th>DELIVERY MODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>V20D45C-M3/I</td>
<td>0.55</td>
<td>I</td>
<td>2000/reel</td>
<td>13&quot; diameter plastic tape and reel</td>
</tr>
<tr>
<td>V20D45CM3/I (1)</td>
<td>0.55</td>
<td>I</td>
<td>2000/reel</td>
<td>13&quot; diameter plastic tape and reel</td>
</tr>
</tbody>
</table>

**Note**

(1) AEC-Q101 qualified

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

![Maximum Forward Current Derating Curve](image1)

![Average Power Loss Characteristics](image2)
**Fig. 3 - Typical Instantaneous Forward Characteristics**

**Fig. 4 - Typical Reverse Leakage Characteristics**

**Fig. 5 - Typical Junction Capacitance**

**Fig. 6 - Typical Transient Thermal Impedance**

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

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