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

**FEATURES**
- Low profile package - typical height of 0.88 mm
- Leadless DFN package with side-wettable flanks suitable for customer AOI (Automatic Optical Inspection)
- Trench MOS Schottky technology
- Low power losses, high efficiency
- Low forward voltage drop
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified available
  - Automotive ordering code; base P/NHM3
- Compatible to SMP (DO-220AA) package case outline
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

**TYPICAL APPLICATIONS**
For use in low voltage, high frequency inverters, freewheeling, DC/DC converters, and polarity protection applications.

**MECHANICAL DATA**
- **Case:** DFN3820A
- Molding compound meets UL 94 V-0 flammability rating
- **Base P/N-M3** - halogen-free, RoHS-compliant, and commercial grade
- **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
- **Polarity:** color band denotes the cathode end

**PRIMARY CHARACTERISTICS**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>V5N22</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device marking code</td>
<td></td>
<td>V5D</td>
<td></td>
</tr>
<tr>
<td>Maximum repetitive peak reverse voltage</td>
<td>VRRM</td>
<td>200</td>
<td>V</td>
</tr>
<tr>
<td>Maximum average forward rectified current</td>
<td>IF(AV) (1)</td>
<td>5</td>
<td>A</td>
</tr>
<tr>
<td>Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load</td>
<td>IFSM (2)</td>
<td>100</td>
<td>A</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>PARAMETER</th>
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<th>V5N22</th>
<th>UNIT</th>
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<td>Device marking code</td>
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</tr>
<tr>
<td>Maximum repetitive peak reverse voltage</td>
<td>VRRM</td>
<td>200</td>
<td>V</td>
</tr>
<tr>
<td>Maximum average forward rectified current (fig. 1)</td>
<td>IF(AV) (1)</td>
<td>5</td>
<td>A</td>
</tr>
<tr>
<td>Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load</td>
<td>IFSM (2)</td>
<td>100</td>
<td>A</td>
</tr>
<tr>
<td>Operating junction and storage temperature range</td>
<td>Tj (3)</td>
<td>-40 to +175</td>
<td>°C</td>
</tr>
<tr>
<td>Operating junction and storage temperature range</td>
<td>Tstg (3)</td>
<td>-55 to +175</td>
<td>°C</td>
</tr>
</tbody>
</table>

**Notes**
1. With infinite heatsink
2. Free air, mounted on FR4 PCB, 2 oz., standard footprint
3. The heat generated must be less than the thermal conductivity from junction-to-ambient: $dP_{D}/dT_J < 1/R_{JUA}$
### ELECTRICAL CHARACTERISTICS \( (T_J = 25 \, ^{\circ}C \text{ unless otherwise noted}) \)

<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</td>
<td>( i_F = 2.5 , A ) ( T_J = 25 , ^{\circ}C )</td>
<td>( V_F ) (1)</td>
<td>0.74</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>( i_F = 5 , A ) ( T_J = 125 , ^{\circ}C )</td>
<td>-</td>
<td>0.81</td>
<td>0.85</td>
<td>V</td>
</tr>
<tr>
<td>Reverse current</td>
<td>( V_R = 160 , V ) ( T_J = 25 , ^{\circ}C )</td>
<td>( i_R ) (2)</td>
<td>0.0007</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>( V_R = 200 , V ) ( T_J = 25 , ^{\circ}C )</td>
<td>-</td>
<td>0.35</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>( T_J = 125 , ^{\circ}C )</td>
<td>-</td>
<td>-</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.8</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Typical junction capacitance</td>
<td>4.0 , V, 1 MHz</td>
<td>( C_J )</td>
<td>285</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 \( (T_A = 25 \, ^{\circ}C \text{ unless otherwise specified}) \)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal resistance</td>
<td>( R_{JA} ) (1)(2)</td>
<td>135</td>
<td>169</td>
<td>°C/W</td>
</tr>
<tr>
<td></td>
<td>( R_{JUM} ) (3)</td>
<td>5</td>
<td>6.3</td>
<td></td>
</tr>
</tbody>
</table>

Notes
(1) The heat generated must be less than the thermal conductivity from junction-to-ambient: \( dP/dT_J < 1/R_{JA} \)
(2) Thermal resistance junction-to-ambient to follow JEDEC® 51-2A, device mounted on FR4 PCB, 2 oz., standard footprint
(3) Thermal resistance junction-to-mount to follow JEDEC® 51-14 transient dual interface test method (TDIM)

### ORDERING INFORMATION TABLE

Device code

- Vishay TMBS product
- Current rating (5 = 5 A)
- Package type (N = DFN3820A)
- Voltage rating (2 = 200 V)
- TMBS generation option (2 = gen 2)
- Quality grade (H = AEC-Q101 qualified, - = industry grade)
- Material / Environment category (M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

### ORDERING INFORMATION (Example)

<table>
<thead>
<tr>
<th>PREFERRED P/N</th>
<th>UNIT WEIGHT (g)</th>
<th>PREFERRED PACKAGE CODE</th>
<th>BASE QUANTITY</th>
<th>DELIVERY MODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>V5N22-M3/H</td>
<td>0.023</td>
<td>H</td>
<td>3500</td>
<td>7&quot; diameter plastic tape and reel</td>
</tr>
<tr>
<td>V5N22-M3/I</td>
<td>0.023</td>
<td>I</td>
<td>14 000</td>
<td>13&quot; diameter plastic tape and reel</td>
</tr>
<tr>
<td>V5N22HM3/H (1)</td>
<td>0.023</td>
<td>H</td>
<td>3500</td>
<td>7&quot; diameter plastic tape and reel</td>
</tr>
<tr>
<td>V5N22HM3/I (1)</td>
<td>0.023</td>
<td>I</td>
<td>14 000</td>
<td>13&quot; diameter plastic tape and reel</td>
</tr>
</tbody>
</table>

Note
(1) AEC-Q101 qualified
RATINGS AND CHARACTERISTICS CURVES \( (T_A = 25 \, ^\circ C \text{ unless otherwise noted}) \)

**Fig. 1 - Maximum Forward Current Derating Curve**

**Fig. 2 - Forward Power Loss Characteristics**

**Fig. 3 - Typical Instantaneous Forward Characteristics**

**Fig. 4 - Typical Reverse Characteristics**

**Fig. 5 - Typical Junction Capacitance**

**Fig. 6 - Typical Transient Thermal Impedance**
PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

DFN3820A

Mounting Pad Layout

0.086 (2.18) 0.078 (1.98)
0.156 (3.95) 0.148 (3.75)

0.068 (1.73) 0.051 (1.30) 0.043 (1.09)
0.014 (0.35) ref
0.100 (2.55) 0.093 (2.35)

0.100 (2.55) 0.028 (0.70)
0.014 (0.35) ref
0.031 (0.80) ref
0.028 (0.70) 0.020 (0.50)

0.076 (1.93) 0.068 (1.73) 0.051 (1.30) 0.043 (1.09)
0.014 (0.35) ref
0.100 (2.55) 0.093 (2.35)

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0.014 (0.35) ref
0.031 (0.80) ref
0.028 (0.70) 0.020 (0.50)

0.039 (0.98) 0.031 (0.79)
0.006 (0.15)

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