STPS20L15

Low drop OR-ing power Schottky diode

Description
Packaged in TO-220AC or D²PAK, this device is especially intended for use as an OR-ing diode in fault tolerant power supply equipments.

Table 1: Device summary

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I_F(AV)</td>
<td>20 A</td>
</tr>
<tr>
<td>V_RRM</td>
<td>15 V</td>
</tr>
<tr>
<td>V_F (typ.)</td>
<td>0.28 V</td>
</tr>
<tr>
<td>T_j (max.)</td>
<td>125 °C</td>
</tr>
</tbody>
</table>

Features
- Very low forward voltage drop for less power dissipation and reduced heatsink size
- Reverse voltage suited to OR-ing of 3 V, 5 V and 12 V rails
- Avalanche capability specified
- ECOPACK®2 compliant component for D²PAK on demand
## Characteristics

### Table 2: Absolute ratings (limiting values at 25 °C, unless otherwise specified)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{RRM}$</td>
<td>Repetitive peak reverse voltage</td>
<td>15</td>
<td>V</td>
</tr>
<tr>
<td>$I_{F(RMS)}$</td>
<td>Forward rms current</td>
<td>30</td>
<td>A</td>
</tr>
<tr>
<td>$I_{F(AV)}$</td>
<td>Average forward current</td>
<td>20</td>
<td>A</td>
</tr>
<tr>
<td>$I_{FSM}$</td>
<td>Surge non repetitive forward current</td>
<td>310</td>
<td>A</td>
</tr>
<tr>
<td>$P_{ARM}$</td>
<td>Repetitive peak avalanche power</td>
<td>970</td>
<td>W</td>
</tr>
<tr>
<td>$T_{stg}$</td>
<td>Storage temperature range</td>
<td>-65 to +150</td>
<td>°C</td>
</tr>
<tr>
<td>$T_j$</td>
<td>Maximum operating junction temperature (1)</td>
<td>125</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

1. ($dP_{tot}/dT_j < (1/R_{th(j-a)})$) condition to avoid thermal runaway for a diode on its own heatsink.

### Table 3: Thermal parameters

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Max. value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{th(j-c)}$</td>
<td>Junction to case</td>
<td>1.6</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

### Table 4: Static electrical characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_{R(i)}$</td>
<td>Reverse leakage current</td>
<td>$T_j = 25 \degree C$</td>
<td>$V_R = 15 V$</td>
<td>-</td>
<td>6</td>
<td>mA</td>
</tr>
<tr>
<td>$V_{F(i)}$</td>
<td>Forward voltage drop</td>
<td>$T_j = 125 \degree C$</td>
<td>$I_F = 19 A$</td>
<td>-</td>
<td>0.28</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_j = 125 \degree C$</td>
<td>$I_F = 40 A$</td>
<td>-</td>
<td>0.42</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$I_F = 19 A$</td>
<td>-</td>
<td>0.33</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$I_F = 40 A$</td>
<td>-</td>
<td>0.50</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

1. Pulse test: $t_b = 380 \mu s$, $\delta < 2\%$

To evaluate the maximum conduction losses, use the following equation:

$$P = 0.18 \times I_{F(AV)} + 8.10^{-3} \times I_{F(RMS)}^2$$
1.1 Characteristics (curves)

**Figure 1**: Average forward power dissipation versus average forward current

**Figure 2**: Average forward current versus ambient temperature ($\delta = 1$)

**Figure 3**: Normalized avalanche power derating versus pulse duration ($T_j = 125^\circ$C)

**Figure 4**: Relative variation of thermal impedance junction to case versus pulse duration

**Figure 5**: Reverse leakage current versus reverse voltage applied (typical values)

**Figure 6**: Junction capacitance versus reverse voltage applied (typical values)
Figure 7: Forward voltage drop versus forward current (typical values)

Figure 8: Forward voltage drop versus forward current (maximum values)

Figure 9: Thermal resistance junction to ambient versus copper surface under tab for D²PAK
2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0
- Recommended torque value: 0.55 N·m (for TO-220AC)
- Maximum torque value: 0.7 N·m (for TO-220AC)
2.1 D²PAK package information

This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.
### Table 5: D²PAK package mechanical data

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Millimeters</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min.</td>
<td>Max.</td>
</tr>
<tr>
<td>A</td>
<td>4.36</td>
<td>4.60</td>
</tr>
<tr>
<td>A1</td>
<td>0.00</td>
<td>0.25</td>
</tr>
<tr>
<td>b</td>
<td>0.70</td>
<td>0.93</td>
</tr>
<tr>
<td>b2</td>
<td>1.14</td>
<td>1.70</td>
</tr>
<tr>
<td>c</td>
<td>0.38</td>
<td>0.69</td>
</tr>
<tr>
<td>c2</td>
<td>1.19</td>
<td>1.36</td>
</tr>
<tr>
<td>D</td>
<td>8.60</td>
<td>9.35</td>
</tr>
<tr>
<td>D1</td>
<td>6.90</td>
<td>8.00</td>
</tr>
<tr>
<td>D2</td>
<td>1.10</td>
<td>1.50</td>
</tr>
<tr>
<td>E</td>
<td>10.00</td>
<td>10.55</td>
</tr>
<tr>
<td>E1</td>
<td>8.10</td>
<td>8.90</td>
</tr>
<tr>
<td>E2</td>
<td>6.85</td>
<td>7.25</td>
</tr>
<tr>
<td>e</td>
<td>2.54 typ.</td>
<td>0.100</td>
</tr>
<tr>
<td>e1</td>
<td>4.88</td>
<td>5.28</td>
</tr>
<tr>
<td>H</td>
<td>15.00</td>
<td>15.85</td>
</tr>
<tr>
<td>J1</td>
<td>2.49</td>
<td>2.90</td>
</tr>
<tr>
<td>L</td>
<td>1.90</td>
<td>2.79</td>
</tr>
<tr>
<td>L1</td>
<td>1.27</td>
<td>1.65</td>
</tr>
<tr>
<td>L2</td>
<td>1.30</td>
<td>1.78</td>
</tr>
<tr>
<td>R</td>
<td>0.4 typ.</td>
<td>0.015</td>
</tr>
<tr>
<td>V2</td>
<td>0°</td>
<td>8°</td>
</tr>
</tbody>
</table>
Figure 11: D²PAK recommended footprint (dimensions in mm)
2.2 TO-220AC package information

Figure 12: TO-220AC package outline

![TO-220AC package outline diagram]
### Table 6: TO-220AC package mechanical data

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Millimeters</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min.</td>
<td>Max.</td>
</tr>
<tr>
<td>A</td>
<td>4.40</td>
<td>4.60</td>
</tr>
<tr>
<td>C</td>
<td>1.23</td>
<td>1.32</td>
</tr>
<tr>
<td>D</td>
<td>2.40</td>
<td>2.72</td>
</tr>
<tr>
<td>E</td>
<td>0.49</td>
<td>0.70</td>
</tr>
<tr>
<td>F</td>
<td>0.61</td>
<td>0.88</td>
</tr>
<tr>
<td>F1</td>
<td>1.14</td>
<td>1.70</td>
</tr>
<tr>
<td>G</td>
<td>4.95</td>
<td>5.15</td>
</tr>
<tr>
<td>H2</td>
<td>10.00</td>
<td>10.40</td>
</tr>
<tr>
<td>L2</td>
<td>16.40 typ.</td>
<td></td>
</tr>
<tr>
<td>L4</td>
<td>13.00</td>
<td>14.00</td>
</tr>
<tr>
<td>L5</td>
<td>2.65</td>
<td>2.95</td>
</tr>
<tr>
<td>L6</td>
<td>15.25</td>
<td>15.75</td>
</tr>
<tr>
<td>L7</td>
<td>6.20</td>
<td>6.60</td>
</tr>
<tr>
<td>L9</td>
<td>3.50</td>
<td>3.93</td>
</tr>
<tr>
<td>M</td>
<td>2.6 typ.</td>
<td></td>
</tr>
<tr>
<td>Diam</td>
<td>3.75</td>
<td>3.85</td>
</tr>
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</table>
3 Ordering information

Table 7: Ordering information

<table>
<thead>
<tr>
<th>Order code</th>
<th>Marking</th>
<th>Package</th>
<th>Weight</th>
<th>Base qty.</th>
<th>Delivery mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>STPS20L15D</td>
<td>STPS20L15D</td>
<td>TO-220AC</td>
<td>1.86 g</td>
<td>50</td>
<td>Tube</td>
</tr>
<tr>
<td>STPS20L15G-TR</td>
<td>STPS20L15G</td>
<td>D²PAK</td>
<td>1.38 g</td>
<td>1000</td>
<td>Tape and reel</td>
</tr>
</tbody>
</table>

4 Revision history

Table 8: Document revision history

<table>
<thead>
<tr>
<th>Date</th>
<th>Revision</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-Jul-2012</td>
<td>3</td>
<td>Updated cover page, <strong>Section 3.1: &quot;Characteristics (curves)&quot;</strong>, <strong>Section 3: &quot;Characteristics&quot;</strong>, <strong>Section 4.2: &quot;D²PAK package information&quot;</strong> and <strong>Table 7: &quot;Ordering information&quot;</strong>.</td>
</tr>
<tr>
<td>13-Oct-2016</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
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