**LQA30T300**

**Qspeed™ Family**

300 V, 30 A Q-Series Diode

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**Product Summary**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>( I_{F(AVG)} )</td>
<td>30 A</td>
</tr>
<tr>
<td>( V_{RRM} )</td>
<td>300 V</td>
</tr>
<tr>
<td>( Q_{RR} ) (Typ at 125 °C)</td>
<td>53 nC</td>
</tr>
<tr>
<td>( I_{RRM} ) (Typ at 125 °C)</td>
<td>2.85 A</td>
</tr>
<tr>
<td>Softness ( t_s/t_a ) (Typ at 125 °C)</td>
<td>0.6</td>
</tr>
</tbody>
</table>

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**General Description**

This device has the lowest \( Q_{RR} \) of any 300V Silicon diode. Its recovery characteristics increase efficiency, reduce EMI and eliminate snubbers.

**Applications**

- AC/DC and DC/DC output rectification
- Output & freewheeling diodes
- Motor control drive circuits
- Uninterruptible Power Supply (UPS) inverters

**Features**

- Low \( Q_{RR} \), Low \( I_{RRM} \), Low \( t_{RR} \)
- High \( dI/dt \) capable (1000A/µs)
- Soft recovery

**Benefits**

- Increases efficiency
- Eliminates need for snubber circuits
- Reduces EMI filter component size & count
- Enables extremely fast switching

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**Absolute Maximum Ratings**

Absolute maximum ratings are the values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Rating</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>( V_{RRM} )</td>
<td>Peak repetitive reverse voltage</td>
<td></td>
<td>300</td>
<td>V</td>
</tr>
<tr>
<td>( I_{F(AVG)} )</td>
<td>Average forward current</td>
<td>( T_J = 150 , ^\circ C, , T_C = 99 , ^\circ C )</td>
<td>30</td>
<td>A</td>
</tr>
<tr>
<td>( I_{FSM} )</td>
<td>Non-repetitive peak surge current</td>
<td>60 Hz, ( 1/2 ) cycle</td>
<td>200</td>
<td>A</td>
</tr>
<tr>
<td>( I_{FSM} )</td>
<td>Non-repetitive peak surge current</td>
<td>( 1/2 ) cycle of ( T = 28 ) us Sinusoid, ( T_C = 25 , ^\circ C )</td>
<td>350</td>
<td>A</td>
</tr>
<tr>
<td>( T_J )</td>
<td>Maximum junction temperature</td>
<td></td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>( T_{STG} )</td>
<td>Storage temperature</td>
<td>Leads at 1.6mm from case, 10 sec</td>
<td>−55 to 150</td>
<td>°C</td>
</tr>
<tr>
<td>( P_D )</td>
<td>Power dissipation</td>
<td>( T_C = 25 , ^\circ C )</td>
<td>113</td>
<td>W</td>
</tr>
</tbody>
</table>

---

**Thermal Resistance**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Resistance from:</th>
<th>Conditions</th>
<th>Rating</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>( R_{JUA} )</td>
<td>Junction to ambient</td>
<td>TO-220</td>
<td>62</td>
<td>°C/W</td>
</tr>
<tr>
<td>( R_{JUC} )</td>
<td>Junction to case</td>
<td>TO-220</td>
<td>1.1</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

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RoHS Compliant

Package uses Lead-free plating and Green mold compound.
Halogen free per IEC 61249-2-21.

www.powerint.com

January 2011
## Electrical Specifications at $T_J= 25 \degree C$ (unless otherwise specified)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td><strong>DC Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_R$</td>
<td>Reverse current</td>
<td>$V_R = 300 V$, $T_J = 25 \degree C$</td>
<td>-</td>
<td>-</td>
<td>250</td>
<td>$\mu A$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 300 V$, $T_J = 125 \degree C$</td>
<td>-</td>
<td>1.0</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td>$V_F$</td>
<td>Forward voltage</td>
<td>$I_F = 30 A$, $T_J = 25 \degree C$</td>
<td>-</td>
<td>1.66</td>
<td>1.95</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 30 A$, $T_J = 150 \degree C$</td>
<td>-</td>
<td>1.45</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$C_J$</td>
<td>Junction capacitance</td>
<td>$V_R = 10 V$, 1 MHz</td>
<td>-</td>
<td>89</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td><strong>Dynamic Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_{RR}$</td>
<td>Reverse recovery time, $dI_F/dt = 200A/\mu s$, $V_R=200V$, $I_F=30 A$</td>
<td>$T_J=25 \degree C$</td>
<td>-</td>
<td>13.7</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_J=125 \degree C$</td>
<td>-</td>
<td>28.5</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$Q_{RR}$</td>
<td>Reverse recovery charge, $dI_F/dt = 200A/\mu s$, $V_R=200V$, $I_F=30 A$</td>
<td>$T_J=25 \degree C$</td>
<td>-</td>
<td>13</td>
<td>19</td>
<td>nC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_J=125 \degree C$</td>
<td>-</td>
<td>53</td>
<td>-</td>
<td>nC</td>
</tr>
<tr>
<td>$I_{RRM}$</td>
<td>Maximum reverse recovery current, $dI_F/dt = 200A/\mu s$, $V_R=200V$, $I_F=30 A$</td>
<td>$T_J=25 \degree C$</td>
<td>-</td>
<td>1.5</td>
<td>2.2</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_J=125 \degree C$</td>
<td>-</td>
<td>2.85</td>
<td>-</td>
<td>A</td>
</tr>
<tr>
<td>$S$</td>
<td>Softness = $\frac{t_b}{t_a}$</td>
<td>$dI_F/dt = 200A/\mu s$, $V_R=200V$, $I_F=30 A$</td>
<td>$T_J=25 \degree C$</td>
<td>-</td>
<td>0.6</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_J=125 \degree C$</td>
<td>-</td>
<td>0.6</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Note to component engineers:** Q-Series diodes employ Schottky technologies in their design and construction. Therefore, component engineers should plan their test setups to be similar to traditional Schottky test setups. (For further details, see application note AN-300.)

![Figure 1. Reverse Recovery Definitions](image1)

![Figure 2. Reverse Recovery Test Circuit](image2)
Electrical Specifications at $T_J = 25 \, ^\circ\text{C}$ (unless otherwise specified)

![Figure 3. Typical $I_F$ vs $V_F$](image)

![Figure 4. Typical $I_F$ vs $V_F$](image)

![Figure 5. Typical $C_J$ vs $V_R$](image)

![Figure 6. DC Current Derating Curve](image)

![Figure 7. Typical $Q_{on}$ vs $I_F$ at $T_J=125 \, ^\circ\text{C}$](image)

![Figure 8. Typical $t_{rr}$ vs $I_F$ at $T_J=125 \, ^\circ\text{C}$](image)
Figure 9. Power Derating Curve

Figure 10. IF(Peak) vs TC, f=70 kHz

Figure 11. Normalized Maximum Transient Thermal Impedance
Dimensional Outline Drawings

![Dimensional Outline Drawings](image)

<table>
<thead>
<tr>
<th>Millimeters</th>
<th>Dim</th>
<th>MIN</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td>4.32</td>
<td>4.70</td>
</tr>
<tr>
<td>A1</td>
<td></td>
<td>1.14</td>
<td>1.40</td>
</tr>
<tr>
<td>A2</td>
<td></td>
<td>2.03</td>
<td>2.79</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>0.34</td>
<td>0.610</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td>9.65</td>
<td>10.67</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td>2.49</td>
<td>2.59</td>
</tr>
<tr>
<td>E1</td>
<td></td>
<td>4.98</td>
<td>5.18</td>
</tr>
<tr>
<td>F</td>
<td></td>
<td>0.508</td>
<td>1.016</td>
</tr>
<tr>
<td>F1</td>
<td></td>
<td>1.14</td>
<td>1.78</td>
</tr>
<tr>
<td>H</td>
<td></td>
<td>14.71</td>
<td>16.51</td>
</tr>
<tr>
<td>H1</td>
<td></td>
<td>5.84</td>
<td>6.55</td>
</tr>
<tr>
<td>H2</td>
<td></td>
<td>8.51</td>
<td>9.25</td>
</tr>
<tr>
<td>H3</td>
<td></td>
<td>3.53</td>
<td>3.96</td>
</tr>
<tr>
<td>H4</td>
<td></td>
<td>2.54</td>
<td>3.05</td>
</tr>
<tr>
<td>L</td>
<td></td>
<td>12.70</td>
<td>14.22</td>
</tr>
<tr>
<td>L1</td>
<td></td>
<td>-</td>
<td>6.35</td>
</tr>
</tbody>
</table>

**Mechanical Mounting Method**

<table>
<thead>
<tr>
<th>Maximum Torque / Pressure specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw through hole in package tab</td>
</tr>
<tr>
<td>Clamp against package body</td>
</tr>
<tr>
<td>1 Newton Meter (nm) or 8.8 inch-pounds (lb-in)</td>
</tr>
<tr>
<td>12.3 kilogram-force per square centimeter (kgf/cm²) or 175 lbf/in²</td>
</tr>
</tbody>
</table>

**Soldering time and temperature:** This product has been designed for use with high-temperature, lead-free solder. The component leads can be subjected to a maximum temperature of 300 °C, for up to 10 seconds. See Application Note AN-303, for more details.

**Ordering Information**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
<th>Packing</th>
</tr>
</thead>
<tbody>
<tr>
<td>LQA30T300</td>
<td>TO-220AC</td>
<td>50 units/tube</td>
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## LQA30T300

<table>
<thead>
<tr>
<th>Revision</th>
<th>Notes</th>
<th>Date</th>
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<tbody>
<tr>
<td>1.1</td>
<td>Released by Qspeed</td>
<td>05/09</td>
</tr>
<tr>
<td>1.2</td>
<td>Converted to Power Integrations Document</td>
<td>01/11</td>
</tr>
</tbody>
</table>
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