DN85

ZXSC400 1W/3W buck LED drivers

Ray Liu, Applications Engineer, Zetex Semiconductors

Description

In Figure 1, ZXSC400 is configured as a high efficiency buck LED driver. The target applications are either 1W (350mA) or 3W (700mA) drivers for white LED driven from a 4 cell battery, or a 2 alkaline cell input for flashlights. The supply voltage for ZXSC400 reference design is:

\[ V_{IN} = 3.8V \text{ to } 6V. \]

Parts lists for 1W and 3W design are shown in Table 1 and Table 2 respectively. Performance data is measured based on two different LED’s \( V_F \) binning with 0.3V \( V_F \) difference.

![Figure 1 Schematic diagram](image-url)
<table>
<thead>
<tr>
<th>Ref.</th>
<th>Value</th>
<th>Package</th>
<th>Part number</th>
<th>Manufacturer</th>
<th>Contact details</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1</td>
<td>N/A</td>
<td>SOT23-6</td>
<td>ZXSC400E6</td>
<td>Zetex</td>
<td><a href="http://www.zetex.com">www.zetex.com</a></td>
<td>LED Driver</td>
</tr>
<tr>
<td>Q1</td>
<td>N/A</td>
<td>SOT23</td>
<td>ZXTN25012EFL</td>
<td>Zetex</td>
<td><a href="http://www.zetex.com">www.zetex.com</a></td>
<td>Low sat NPN transistor</td>
</tr>
<tr>
<td>D1</td>
<td>40V/0.75A</td>
<td>SOT23</td>
<td>BAT750</td>
<td>Zetex</td>
<td><a href="http://www.zetex.com">www.zetex.com</a></td>
<td>40V/0.75A Schottky diode</td>
</tr>
<tr>
<td>L1</td>
<td>47μH</td>
<td>N/A</td>
<td>744052470</td>
<td>Wurth Elektronik</td>
<td><a href="http://www.we-online.com">www.we-online.com</a></td>
<td>ISAT = 520mA</td>
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<tr>
<td>R1</td>
<td>62mΩ</td>
<td>0805</td>
<td></td>
<td>Generic</td>
<td>N/A</td>
<td>0805 1%</td>
</tr>
<tr>
<td>R2</td>
<td>10Ω</td>
<td>0805</td>
<td></td>
<td>Generic</td>
<td>N/A</td>
<td>0805 5%</td>
</tr>
<tr>
<td>R3</td>
<td>47Ω</td>
<td>0805</td>
<td></td>
<td>Generic</td>
<td>N/A</td>
<td>0805 5%</td>
</tr>
<tr>
<td>C1</td>
<td>4.7μF/10V</td>
<td>1206</td>
<td></td>
<td>Generic</td>
<td>N/A</td>
<td>X7R/X5R</td>
</tr>
<tr>
<td>C2</td>
<td>100pF/10V</td>
<td>0805</td>
<td></td>
<td>Generic</td>
<td>N/A</td>
<td>COG/NPO</td>
</tr>
<tr>
<td>C3</td>
<td>1μF/10V</td>
<td>0805</td>
<td></td>
<td>Generic</td>
<td>N/A</td>
<td>X7R/X5R optional</td>
</tr>
</tbody>
</table>

Table 1  Bill of materials for 1W LED
Figure 2  Performance graphs for 1W design
<table>
<thead>
<tr>
<th>Ref.</th>
<th>Value</th>
<th>Package</th>
<th>Part number</th>
<th>Manufacturer</th>
<th>Contact details</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
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<td>ZXSC400E6</td>
<td>Zetex</td>
<td><a href="http://www.zetex.com">www.zetex.com</a></td>
<td>LED Driver</td>
</tr>
<tr>
<td>Q1</td>
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<td>SOT23</td>
<td>ZXTN25012EFL</td>
<td>Zetex</td>
<td><a href="http://www.zetex.com">www.zetex.com</a></td>
<td>Low sat NPN transistor</td>
</tr>
<tr>
<td>D1</td>
<td>40V/1A</td>
<td>SOT23</td>
<td>ZHCS1000</td>
<td>Zetex</td>
<td><a href="http://www.zetex.com">www.zetex.com</a></td>
<td>40V/1A Schottky diode</td>
</tr>
<tr>
<td>L1</td>
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<td>N/A</td>
<td>722065330</td>
<td>Wurth</td>
<td><a href="http://www.we-online.com">www.we-online.com</a></td>
<td>Isat=1.6A</td>
</tr>
<tr>
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<td>0805</td>
<td></td>
<td>Generic</td>
<td>N/A</td>
<td>0805 1%</td>
</tr>
<tr>
<td>R2</td>
<td>10Ω</td>
<td>0805</td>
<td></td>
<td>Generic</td>
<td>N/A</td>
<td>0805 5%</td>
</tr>
<tr>
<td>R3</td>
<td>47Ω</td>
<td>0805</td>
<td></td>
<td>Generic</td>
<td>N/A</td>
<td>0805 5%</td>
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<td>Generic</td>
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<td>X7R/X5R</td>
</tr>
<tr>
<td>C2</td>
<td>100pF/10V</td>
<td>0805</td>
<td></td>
<td>Generic</td>
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<td>COG/NPO</td>
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<td>2.2uF/10V</td>
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<td></td>
<td>Generic</td>
<td>N/A</td>
<td>X7R/X5R optional</td>
</tr>
</tbody>
</table>

Table 2  Bill of materials for 3W LED
Figure 3  Performance graphs for 3W design
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