RGB-LED Driver with microcontroller-based color mixing

- Input: 5 .. 50V
- Output: 3x 350mA
- Switching Frequency: 800 kHz
- PWM-Dimming with Microcontroller MSP430G2332
- Possibility to connected one master board and several slave boards
- Auxiliary buck with 3.45V @ 50mA for use at high input voltage
  Alternative: linear regulator for use at lower input voltages
1 Auxiliary Buck – Switching Node

The switching node of the auxiliary buck is shown in Figure 1. The input voltage is set at 24V and the load is very low (supplies only MCU and buffer), therefore it works in discontinuous conduction mode.

Channel C2: **Switching node**

5V/div, 2us/div

![Figure 1](image-url)
2 LED Current

The output current of one LED driver module configured for 350mA is shown in Figure 2. The input voltage is set at 24V and 5 LEDs in series (10..15V) are connected to the module.

Channel C2: **Output current, 144mA ripple**
100mA/div, 1us/div

![Figure 2](Image)
The PWM modulated output current of one LED driver module is shown in Figure 3 and Figure 4.
The input voltage is set at 24V and 5 LEDs in series (10..15V) are connected to the module.

Channel C2: **Output current, PWM modulated**
100mA/div, 20ms/div & 5us/div

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**Figure 3**

**Figure 4**
3 Thermal measurement

The thermal image (Figure 5) shows the circuit at an ambient temperature of 21 °C with an input voltage of 24V and an output current of 350mA for each of the three modules.

![Thermal Image](image)

**Figure 5**

<table>
<thead>
<tr>
<th>Markers</th>
<th>Label</th>
<th>Temperature</th>
<th>Emissivity</th>
<th>Background</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1</td>
<td>44.4 °C</td>
<td>0.95</td>
<td>21.0 °C</td>
<td></td>
</tr>
<tr>
<td>U2</td>
<td>45.8 °C</td>
<td>0.95</td>
<td>21.0 °C</td>
<td></td>
</tr>
<tr>
<td>U3</td>
<td>44.5 °C</td>
<td>0.95</td>
<td>21.0 °C</td>
<td></td>
</tr>
</tbody>
</table>
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