1 TPS92314 DIM Experimental Results (230VAC)

2 Specifications

- Input Power ≈ 8W
- Output Power ≈ 7W
- Line Voltage = 200~240VAC
- Line Frequency = 50Hz
- LED Forward Voltage = 20V
- LED Current ≈ 350mA
- Efficiency > 80% @230VAC
- Power Factor ≥ 0.9
- Topology: Single-stage buck-boost
- Solution size: 56mm (L) x 22mm (W) x 14mm (H)

3 Test Equipment

- Voltage Source: 190 V_{RMS} to 265 V_{RMS} isolated AC source PCR500LA (KIKUSUI)
- Multi meters: Agilent 34401A
- Power Meter: YOKOGAWA WT210
- Output Load: 7 LEDs in series (VF = 3 V at 350mA per LED)
- Oscilloscope: TDS3045C (TEKTRONIX)
- Operating Temperature: 25°C
- Recommended Wire Gauge: 18 AWG not more than two feet long
4 Performance Date and Typical Characteristic Curves.

<table>
<thead>
<tr>
<th>Preset Voltage (V)</th>
<th>40</th>
<th>60</th>
<th>80</th>
<th>100</th>
<th>120</th>
<th>140</th>
<th>160</th>
<th>180</th>
<th>200</th>
<th>220</th>
<th>240</th>
<th>260</th>
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<tbody>
<tr>
<td>Frequency (Hz)</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
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<tr>
<td>Input Voltage (V)</td>
<td>40.0</td>
<td>60.0</td>
<td>80.0</td>
<td>100.0</td>
<td>120.0</td>
<td>140.0</td>
<td>160.0</td>
<td>180.0</td>
<td>200.0</td>
<td>220.0</td>
<td>240.0</td>
<td>260.2</td>
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<tr>
<td>Input Current (A)</td>
<td>0.021</td>
<td>0.029</td>
<td>0.034</td>
<td>0.037</td>
<td>0.040</td>
<td>0.041</td>
<td>0.043</td>
<td>0.043</td>
<td>0.046</td>
<td>0.046</td>
<td>0.046</td>
<td>0.038</td>
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<tr>
<td>Input Power (W)</td>
<td>0.82</td>
<td>1.72</td>
<td>2.68</td>
<td>3.66</td>
<td>4.66</td>
<td>5.68</td>
<td>6.70</td>
<td>6.72</td>
<td>7.75</td>
<td>8.79</td>
<td>9.02</td>
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<tr>
<td>Power Factor</td>
<td>0.961</td>
<td>0.983</td>
<td>0.986</td>
<td>0.986</td>
<td>0.979</td>
<td>0.973</td>
<td>0.974</td>
<td>0.967</td>
<td>0.960</td>
<td>0.947</td>
<td>0.932</td>
<td>0.915</td>
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<td>Output Voltage (V)</td>
<td>18.38</td>
<td>18.74</td>
<td>19.02</td>
<td>19.25</td>
<td>19.46</td>
<td>19.64</td>
<td>19.81</td>
<td>19.84</td>
<td>20.00</td>
<td>20.15</td>
<td>20.18</td>
<td>20.11</td>
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<tr>
<td>Output Current (A)</td>
<td>0.029</td>
<td>0.065</td>
<td>0.104</td>
<td>0.145</td>
<td>0.185</td>
<td>0.227</td>
<td>0.269</td>
<td>0.269</td>
<td>0.311</td>
<td>0.353</td>
<td>0.356</td>
<td>0.360</td>
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<td>Output Power (W)</td>
<td>0.53</td>
<td>1.22</td>
<td>1.99</td>
<td>2.78</td>
<td>3.61</td>
<td>4.46</td>
<td>5.32</td>
<td>5.34</td>
<td>6.22</td>
<td>7.11</td>
<td>7.18</td>
<td>7.23</td>
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<tr>
<td>Efficiency (%)</td>
<td>64.7</td>
<td>71.0</td>
<td>74.1</td>
<td>76.1</td>
<td>77.4</td>
<td>78.5</td>
<td>79.4</td>
<td>80.2</td>
<td>80.8</td>
<td>80.6</td>
<td>80.1</td>
<td>79.3</td>
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4.1.1 Table 1 Test Data from 60VAC to 260VAC/50Hz

1. Efficiency

![Efficiency vs AC Line Dimming Voltage](image)

4.2

4.2.1 Figure 2 Efficiency vs. Line Voltage from 40VAC to 260VAC/50Hz
2. Power Factor

4.3

4.3.1 Figure 3  Power Factor vs. Line Voltage from 40VAC to 260VAC/50Hz

3. LED Current vs Line Voltage

4.3.2

4.3.3 Figure 4  ILED vs. AC Line Dimming Voltage from 40 to 260VAC/50Hz.
1. Input and Line Voltage Waveforms vs. Dimmer Setting

4.3.4

4.3.5 Figure 5 Dimmer Full ON

4.3.6 CH2– Input Voltage; CH4– Input current

4.3.7 Figure 6 Dimmer FULL ON

4.3.8 CH1– Output Voltage; CH2– Input Voltage; CH4– Output current
4.3.9  Input and Line Voltage Waveforms vs. Dimmer Setting

4.3.11  Figure 7 Dimmer 50% ON

4.3.12  CH2– Input Voltage; CH4– Input Current

4.3.13  Figure 8 Dimmer 50% ON

4.3.14  CH1– Output Voltage; CH2– Input Voltage; CH4– Output Current
4.3.16 Input and Line Voltage Waveforms vs. Dimmer Setting

4.3.17

4.3.18 Figure 9 Dimmer minimum ON

4.3.19 CH2– Input Voltage; CH4– Input Current

4.3.20 Figure 10 Dimmer Minimum ON

4.3.21 CH1– Output Voltage; CH2 – Input Voltage; CH4 – Output Current
2. Switch Node Voltage Valley Switching

4.3.22 Figure 11 Switch Node and Output Current Waveform

4.3.23 CH1 – Output Voltage; CH2 – Switch Node LX; CH4 – Output Current
4.3.24 Total Harmonic Distortion

![Total Harmonic Current (THD)](chart)

4.3.25 Figure 12 Current Harmonic Performance vs. EN/IEC61000-3-2 Class C Limits at 230VAC/50Hz
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