



DN0018 Design Note

DESIGNS
from our
LABS

15W High Power Factor LED Driver based on HVLED815PF

Designs from our labs describe tested circuit designs from ST labs which provide optimized solutions for specific applications. For more information or support, visit www.st.com

By Giovanni Gritti

Main components	
HVLED815PF	Offline LED driver with primary-sensing and high power factor up to 15 W
STPS3150UF	Power Schottky rectifier
STTH1L06A	Turbo 2 ultrafast high voltage rectifier

Specification

- 15 W Led Driver for European Input Voltage Range (220-230Vac +/- 20%)
- High Power Factor: > 0.95
- Low THD: < 20%
- High LED driver efficiency: > 84%

Circuit description

The LED driver board is based on a flyback topology using the STMicroelectronics HVLED815PF device.

The HVLED815PF is a high-voltage primary switcher intended for operating directly from the rectified mains with minimum external parts and enabling high power factor (> 0.90) to provide an efficient, compact and cost effective solution for LED driving. It combines a high-performance low voltage PWM controller chip and an 800 V, avalanche-rugged Power MOSFET, in the same package. There is no need for the optocoupler thanks to the patented primary sensing regulation (PSR) technique. The device assures protection against LED string fault (open or short).

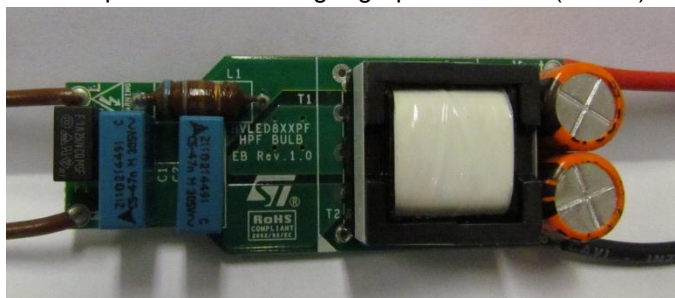
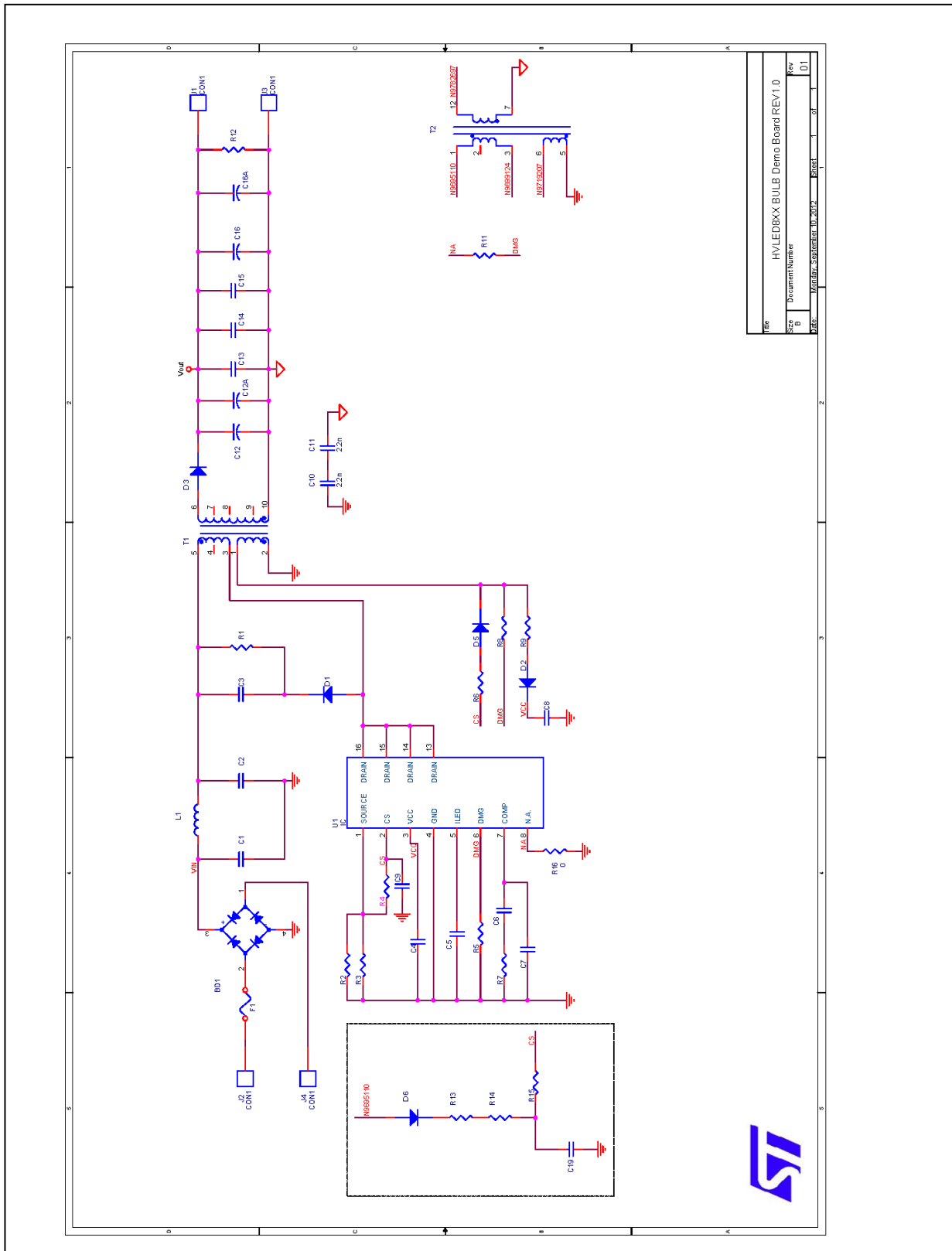


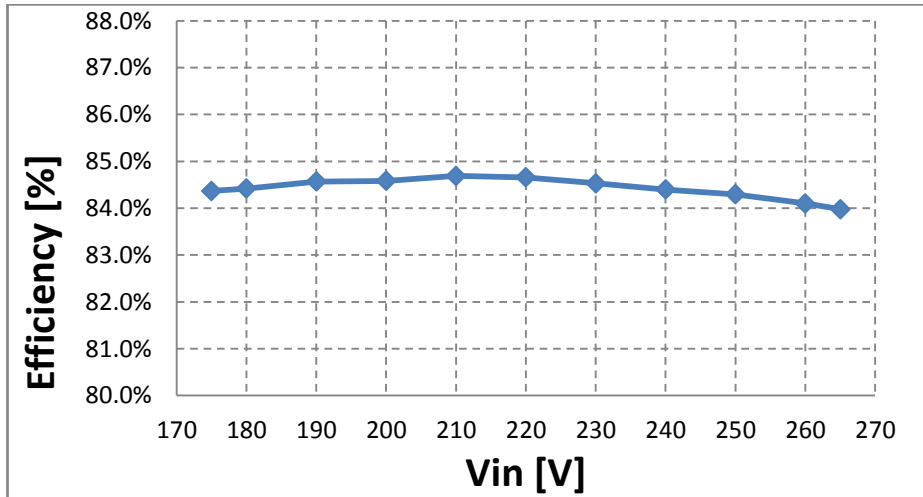
Figure 1. Circuit diagram



Measurement results

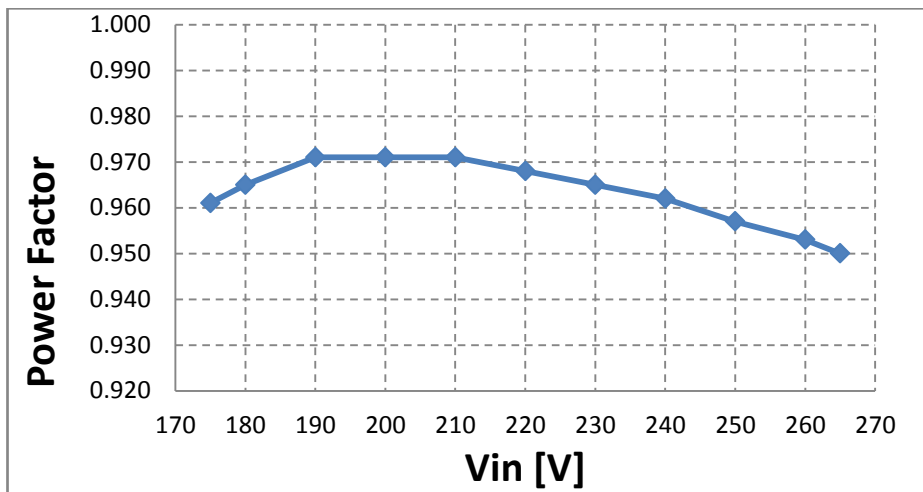
The led driver board has been tested in terms of system efficiency, power factor, output current line-regulation, harmonics distortion and thermal stress.

LED Driver Efficiency



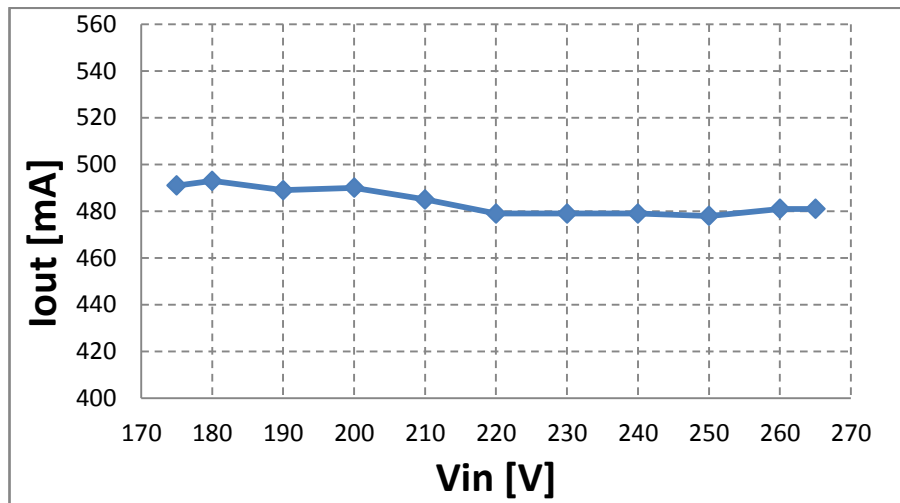
As shown in the previous picture the LED driver efficiency is over 84% in all the input voltage range.

Power Factor



As shown in the previous picture the Power Factor (PF) is over 0.95 in all the input voltage range.

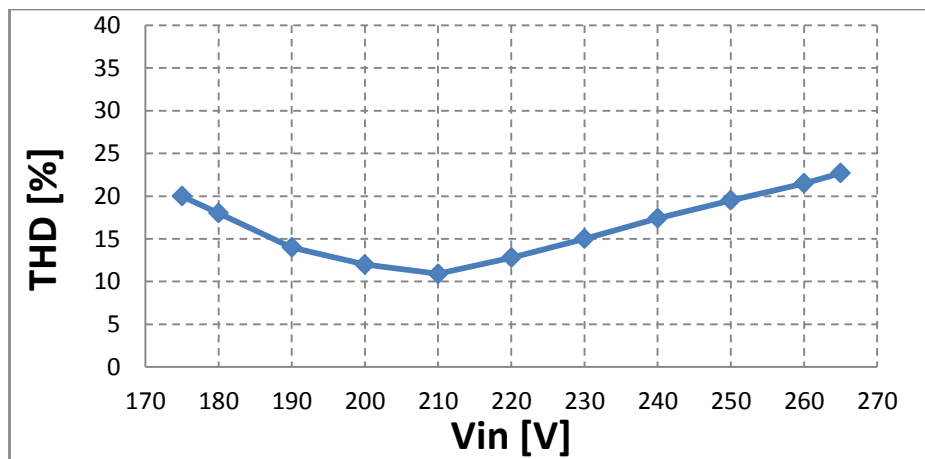
Output Current versus Input Voltage



The output current is 485mA +/- 2% over all the input voltage range.

Total Harmonic Distortion (THD)

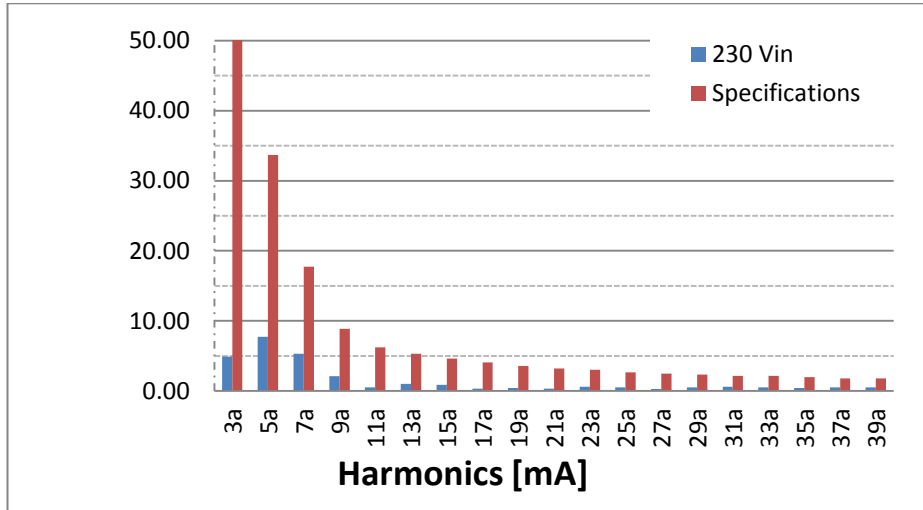
The following pictures show the total harmonic distortion (THD) versus line voltage:



THD at nominal input voltage is lower than 20%.

Harmonics

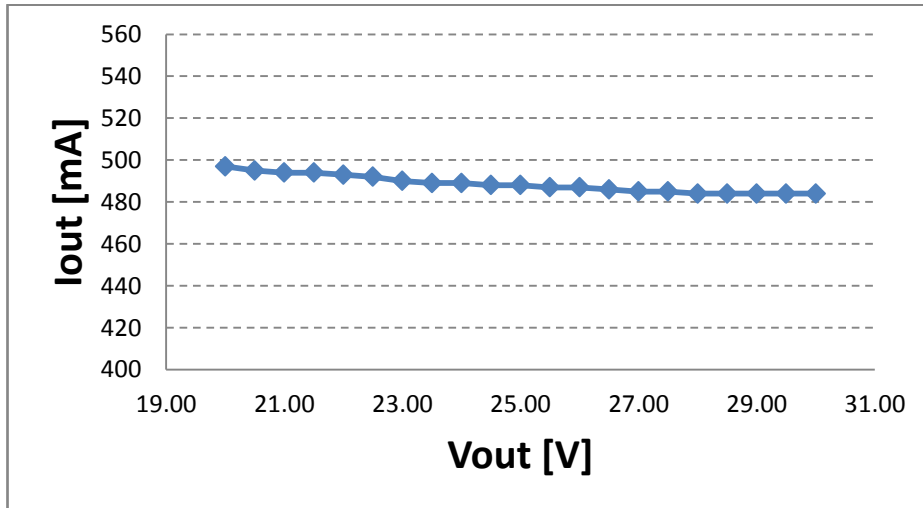
The following pictures show the harmonic at 230V input voltage:



The previous picture shows as the harmonics respect the limits for Class D equipment. (EN61000-3-2)

I_{out} versus V_{out}

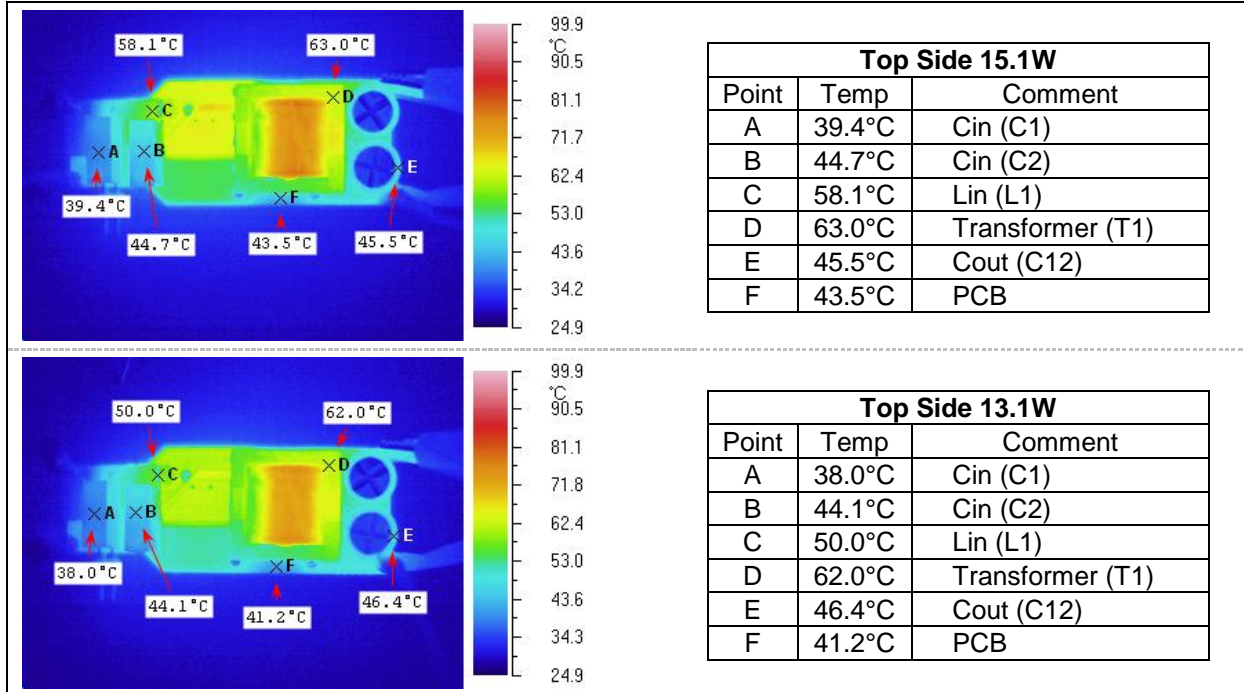
The following pictures show the measured average output current versus output voltage at 230V input voltage:



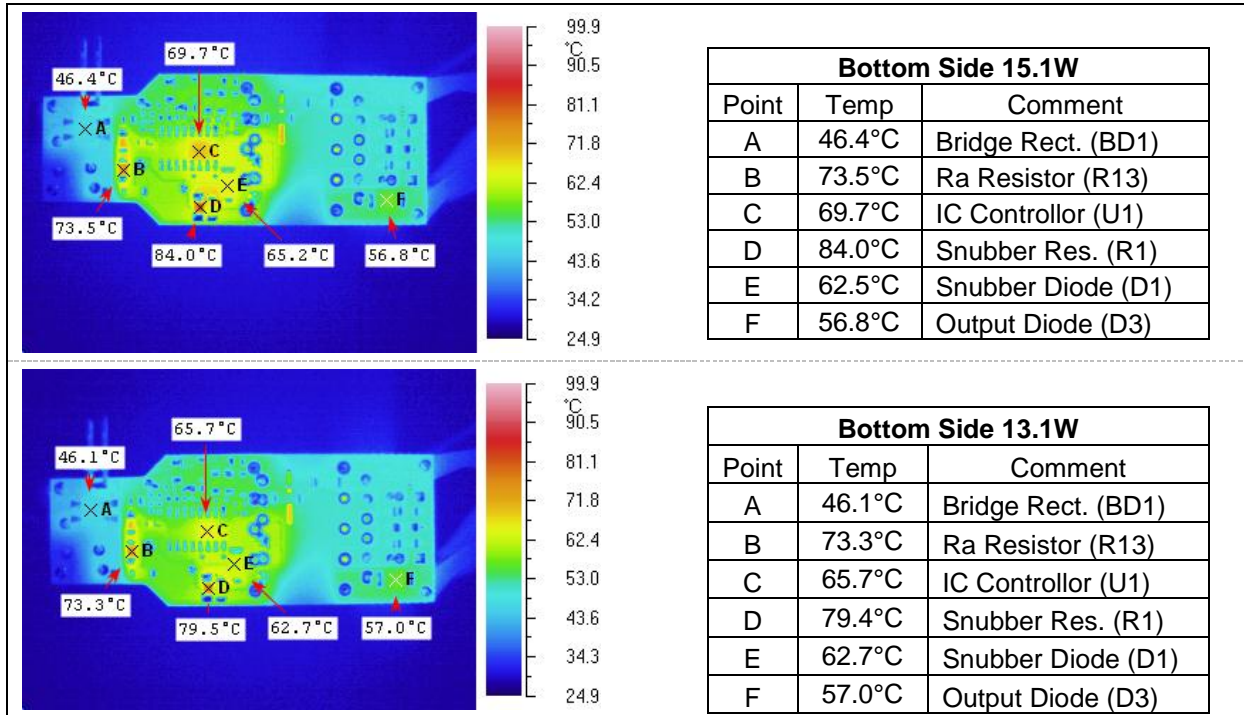
Thermal

Led driver has been tested at ambient temperature, for two output power conditions:

Top Side Temperature



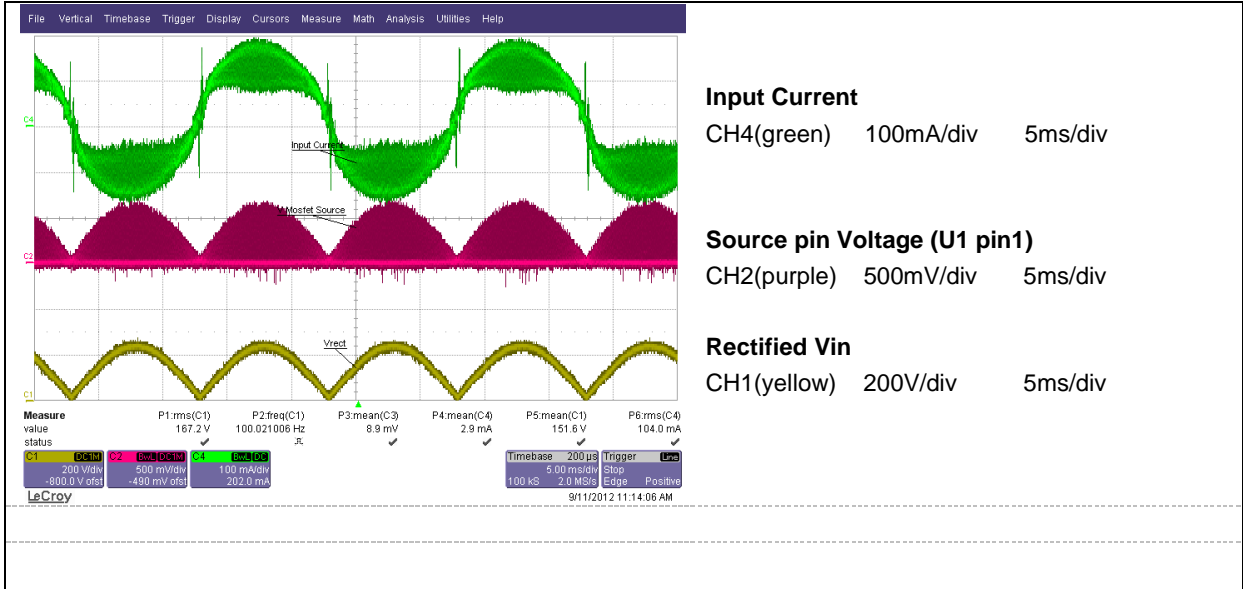
Bottom Side Temperature



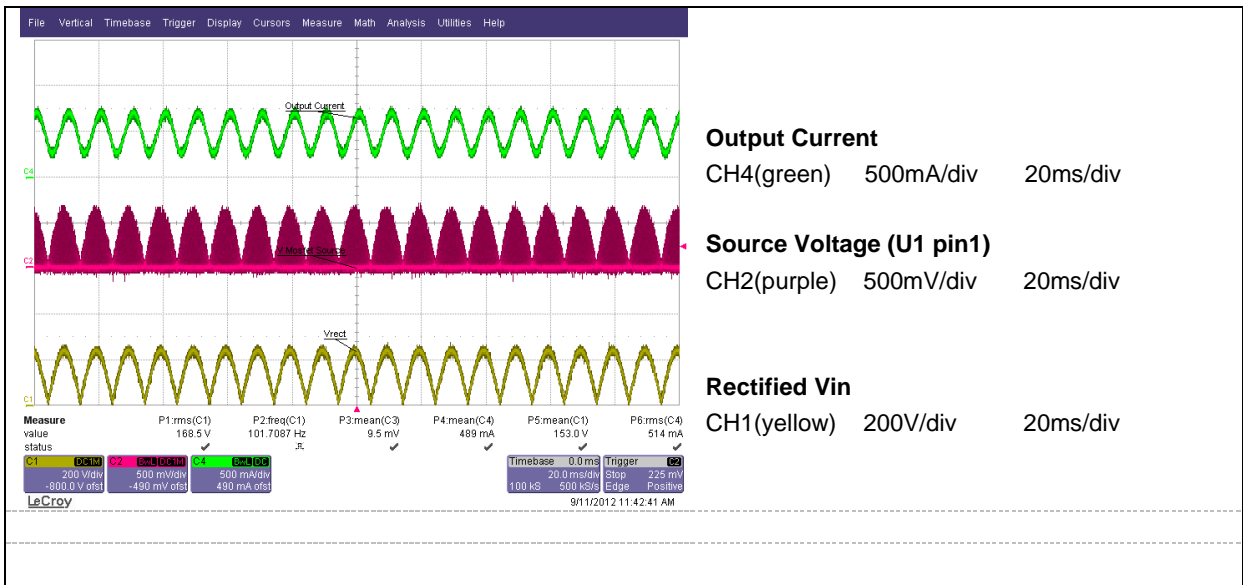
NOTE: Temperatures have been taken after a stable thermal condition (after 60min)

Electrical Waveform

Input Current & Voltage



Output Current



Support material

Documentation
Datasheet HVLED815PF: Offline LED driver with primary-sensing and high power factor up to 15W

Revision history

Date	Version	Changes
01-Aug-2013	1.0	Initial release

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