ON Semiconductor®

Test Procedure for the NCL30060LED1GEVB Evaluation Board

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Introduction:

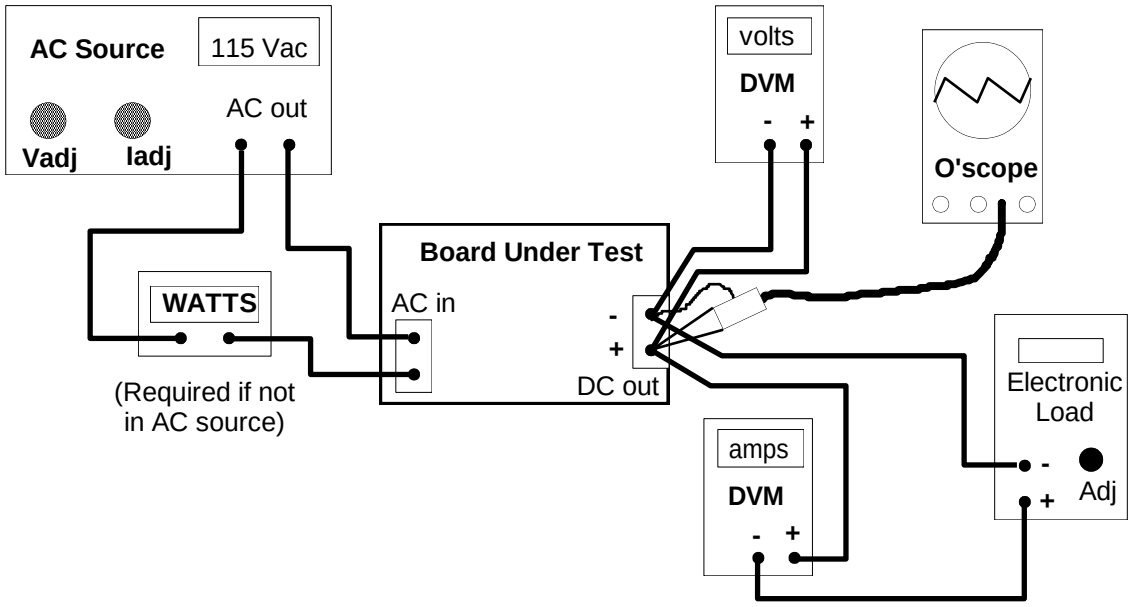
The NCL30060GEVB Evaluation Board is a 90 – 305 Vac input, isolated high power factor single-stage off-line power supply intended to provide a constant current output for powering high brightness LEDs. The evaluation board is configured to provide a nominal current of 700 mA with an open LED clamp voltage of ~41V. The switching topology is a critical conduction mode (CrM) flyback converter.

Test Equipment Required:

1. Adjustable, isolated AC power source capable of zero to 305 Vac output at up to 500mA. AC source should have the capability of measuring delivered power in watts and power factor. If not, an AC line analyzer or AC wattmeter should be used.
2. Digital volt/amp meters to measure output current and voltage to the electronic load.
3. A variable electronic load or rheostat capable of up to 30 watts and at least 60 volts. If an electronic load is used it must have a constant resistance mode.
4. Oscilloscope with probe to monitor output ripple on the demo converter.

Setup Procedure:

Set the equipment as shown in the diagram on the next page so the input and output voltage and current of the evaluation board can be measured. The oscilloscope should be set up so that the output ripple can be monitored.



Test Procedure:

1. Connect UUT (Unit Under Test) to the test setup. Switch the electronic load on, set to constant resistance mode and adjust load to high resistance/zero current load; switch all of the digital meters on (assuming they are wired properly for voltage and current sensing); turn the oscilloscope on with sensing in DC mode at 10 V per division vertical and a sweep rate of 2.5 mS per division. Set bandwidth to 20 MHz or less. Connect the scope probe to the demo board's output terminals.
2. With the AC source OFF, set the current limit on the AC source to 500 mA and the output voltage to 0 Vac.
3. Turn on the AC source. Monitor the UUT output voltage with the oscilloscope, where the output should be less than 1 volt. Slowly increase the AC source voltage. When the AC source voltage is between 80 and 84 Vac, the output voltage should ramp up to between 41 and 48 volts. (This is the System Startup threshold.) Note, the converter will cycle on and off at about a 1 second rate. This will be visible on the oscilloscope, and there may be audible sound each time the converter energizes. (This is the Over Voltage Protection function.)
4. Increase AC source voltage to 115 Vac. Adjust the electronic load from no load slowly up until the output voltage reduces to between 34 and 39 volts. The output current should be within the range of 665 to 735 mA. Record the measured load current for future reference. Figure 1 shows a typical voltage/current regulation curve for this driver operating at 115 Vac input.
5. Using the test conditions from step 4, Power Factor should be greater than 0.97. Compute efficiency by multiplying load current times load voltage and dividing by input power. Efficiency should be greater than 85%.
6. Set the oscilloscope to AC mode at 200 mV per division. The output ripple should measure less than 2 V peak-to-peak including switching spikes.
7. Increase the load (reduce the resistance) slowly and the current should remain constant within +/- 5 mA of the recorded value as the voltage reduces with increased load

(constant current output.) The current should be in range from 40 volts down to about 11 volts output. Adjust the electronic load back to 34 to 39 volts. Turn off the AC source.

8. Connect a variable lab supply to 'Dimming' connector J31 observing polarity. Adjust the lab supply to 10 volts nominal. Turn on the AC source at 115 Vac. Output current will vary with lab supply voltage. With 10 volts applied to J31, output current should be 665 to 735 mA. Output current should reduce as the lab supply voltage is reduced down to about 1 volt, where further reduction in lab supply voltage will have no effect on output current. At zero volts on J31, output current should be between 80 and 150 mA.
9. Turn off the AC source. Remove the connection from the variable lab supply to J31.
10. Turn on the AC source and adjust the voltage to 90 Vac. Verify the output current is within +/-1% of the value recorded in step 4 above.
11. Increase the AC source voltage to 305 Vac, or the highest available voltage provided it does not exceed 305 Vac. Verify output current is within +/- 1% of the value recorded in step 4 above.
12. Reduce the AC source voltage to 80 Vac. Now, slowly decrease the AC source voltage while monitoring the output current. The output current should reduce to <10 mA when the AC input voltage is between 70 and 73 Vac. (This is the System Shutdown threshold.)
13. Turn the AC source off and disconnect UUT from test set.

End of Test.

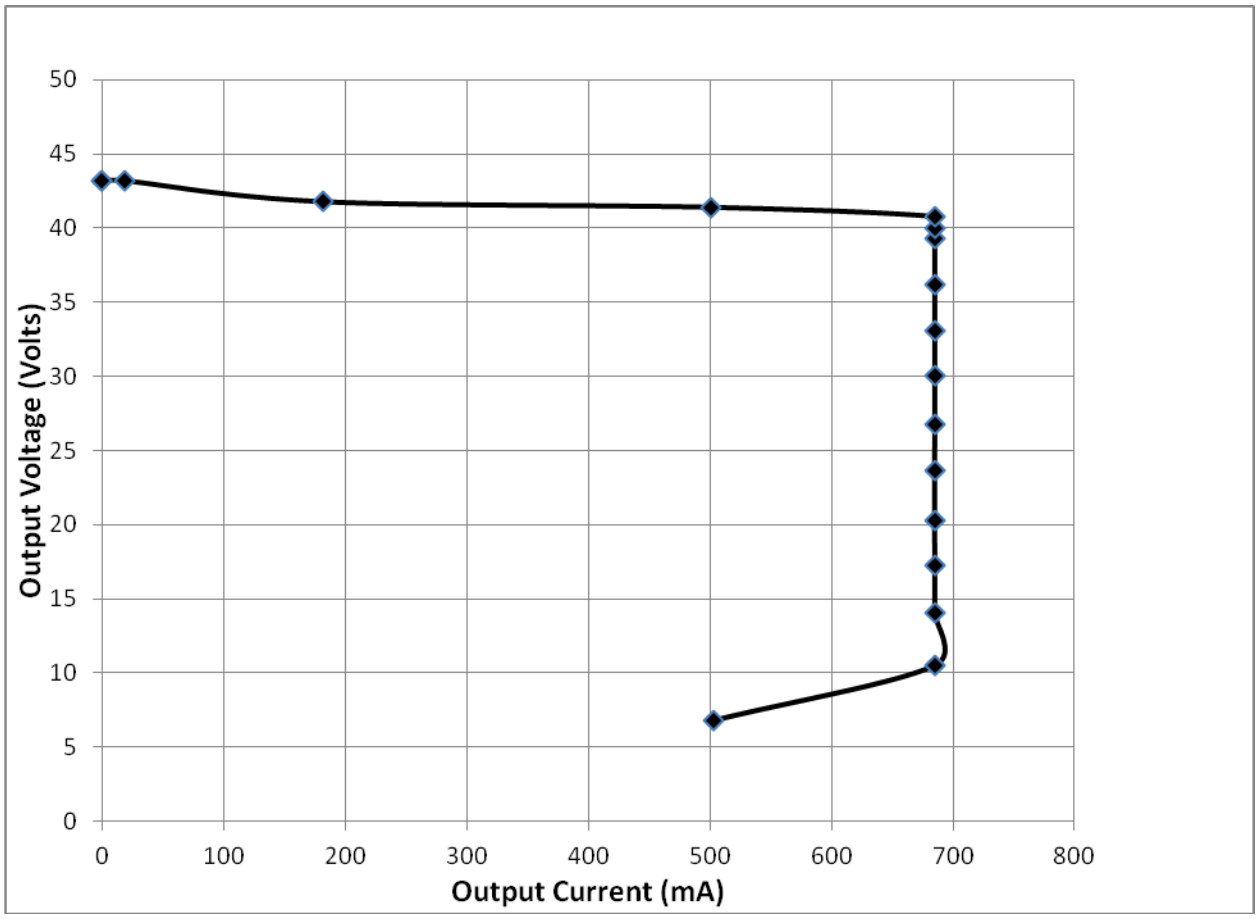


Figure 1 – Typical Current Transfer Function