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Test Procedure for the NCP1075PREGEVK Evaluation Board

Introduction

The ac-supply pre-regulator demo board is a universal input, off-line, 15-W output, constant voltage power supply for powering E-meters or white goods applications.

This pre-regulator is a specific function added to conventional SMPS, placed between ac-supply rectification and input bulk capacitor, supplying Flyback converter. This pre-regulator allows extra high ac-supply from mains (up to 460 Vac), supporting supply between 2 phases (instead of phase and neutral) without drawback of double input bulk capacitors and corresponding high supply voltage for Flyback converter build with cascade or very high voltage Power MOS transistor.

The pre-regulator is working likes an LDO, providing ~ 200 Vdc regulated voltage, but with switching behavior avoiding excessive power dissipation, heat sink and reliability issues.

If the solution can be used with any type of Switched Mode Power Supply, the limited power considered here makes the new NCP1075SOTGEVB evaluation board (configured for 12 V output) well defined for that type of applications.

The switching topology is a discontinuous mode flyback converter utilizing the ON Semi NCP1075 monolithic controller with internal MOSFET. The specific default demo board has an output rating of 12 V at 1 A max.

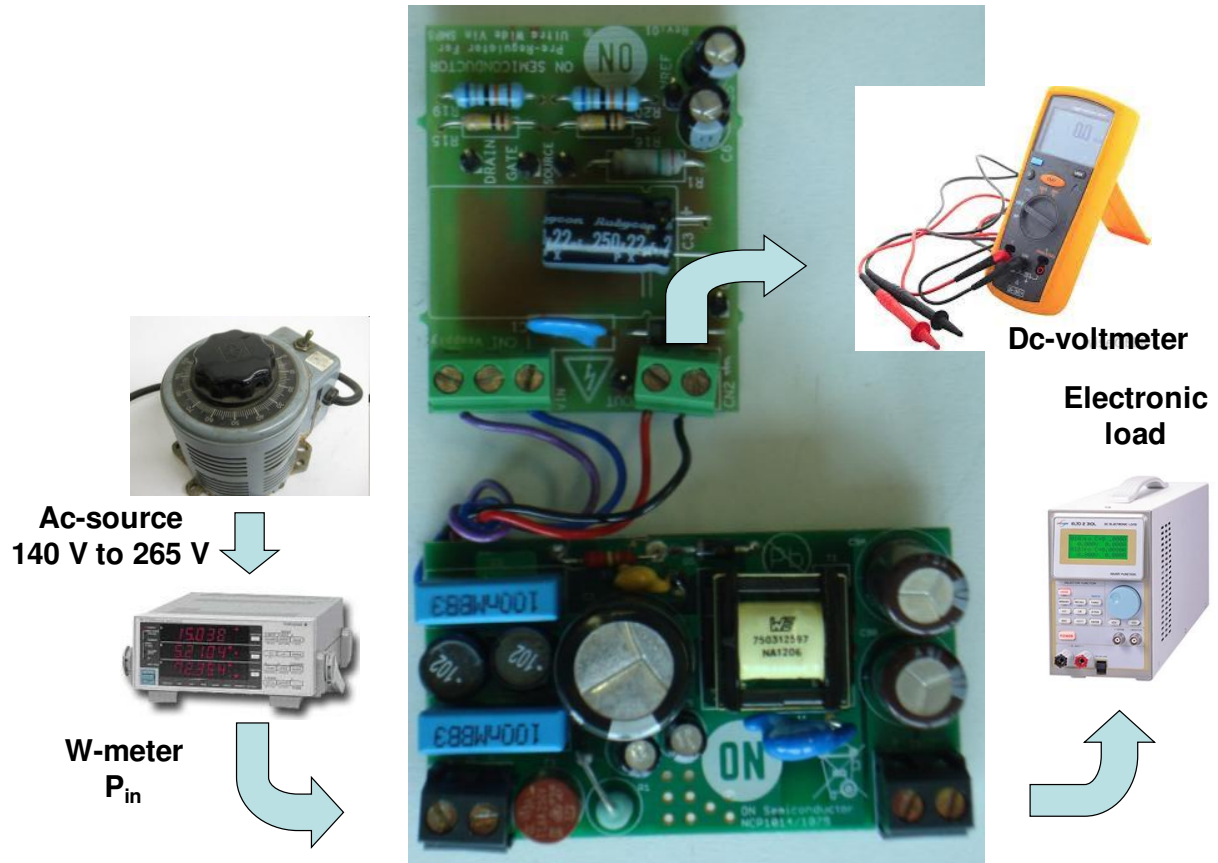
The interconnections of pre-regulator ask for some modification of original NCP1075SOTGEVB explained later-on.

Equipment Required

1. Adjustable, isolated AC power source (or a simple variac) capable of zero to 264 Vac output up to 3 A peak. AC source should have the capability of measuring input power in watts. If not, an AC line analyzer or AC wattmeter should be used.
2. Digital volt/amp meters to measure
 - a. Output voltage of the pre-regulator (~ 200 Vdc)
 - b. Output current and voltage to the electronic load (1 A / 12 Vdc).
3. A variable electronic load or rheostat capable of up to a 2-A load. If an electronic load is used it is preferable to have a constant resistance load mode. The current meter in the electronic load can be used in lieu of a series, in-line A-meter.

Setup Procedure

Set the equipment as shown in the picture below so that the output voltage and current of the NCP1075 demo board can be measured and the output voltage of the pre-regulator monitored.



Note: Indicated output polarity on above picture of demo board may not correspond to actual demo board. Please note output polarity as marked on demo board.

Test Procedure

1. Switch the electronic load on and set to 0.1 A, switch all of the digital meters on (assuming they are wired properly for voltage and current sensing).
2. With the ac source OFF, set the current limit on the AC source to 3 A and the output voltage to 264 Vac.
3. Turn on the ac source, the pre-regulator output voltage should be 200 Vdc \pm 20 V and the power supply output voltage should be 12 Vdc + 0.3 V, - 0.2 V (11.8 V to 12.3 V is default output voltage setup for this demo board).
4. Adjust the ac source to 230 Vac and check the input power (standby power). It should be below 2.2 W.
5. Adjust the electronic load from 0.1 A slowly up to 1 A (full load): Both pre-regulator and power supply output voltages should remain within previous voltage range and tolerances.
6. Increase the load to 2 A to kick in the over-current protection. This should result in a “hick-up” start-stop type of operation.
7. Set the load back to 1 A and the power supply should recover with proper output voltage.
8. Adjust the ac source down to 150 Vac and the pre-regulator output should still be in spec. Return the AC source to 230 Vac.
9. Switch the ac source off and disconnect the demo board.