ON Semiconductor

Test Procedure for the NCV786XXAR10GEVK Evaluation KIT

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1.0 NCV786XX DEMO KIT VER 1: OVERVIEW

The NCV786xx DEMO KIT is composed of the following elements:

NAME / DESCRIPTION	QUANTITY PER KIT
NCV786xx Demo Board (Rev 2.2)	1
ECUSIM MKII 500 series module	1
KIT CASES with FOAM INSERT	1
USB cable 3ft (type A Male to B Male)	1
RJ-12 phone cable for SPI (14cm)	1
60W POWER SUPPLY	1
LED MODULES	2

Table 1 – NCV7866xx DEMO KIT v1: ITEMS LIST.

2.0 NCV786XX KIT PRODUCTION TEST PROCEDURE (PTP) – REV 2.2

Before shipping, the whole NCV786xx must be tested according to the procedure described in the following sections.

2.1 KIT TEST SETUP

SUMMARY of elements in the KIT to be tested

- NCV786xx DEMO BOARD REV 2.2;
- ECUSIM MKII 500 (USB to SPI INTERFACE);
- USB CABLE;
- SPI PHONE CABLE;
- POWER SUPPLY 60W;
- LED MODULEs (two);

Testing equipment

- BENCH DC POWER SUPPLY: at least 14V MAX - 7A;
- DC POWER SUPPLY CABLING (two red cables and one black cable BANANA type);
- 2 x MULTIMETER: Voltmeter, Ammeter;
- JUMPER with three connections, 2.54mm step;
- JUMPER with two connections, 2.54mm step (standard jumper);
- PC WITH NCV78663 TEST SAE GUI INSTALLED;
- Respectively NCV78663 Daughterboard (NV786630R1DAGEVB),
- Or NCV78763 Daughterboard (NV787630R1DAGEVB).

A summary test scheme is given in the following figure.

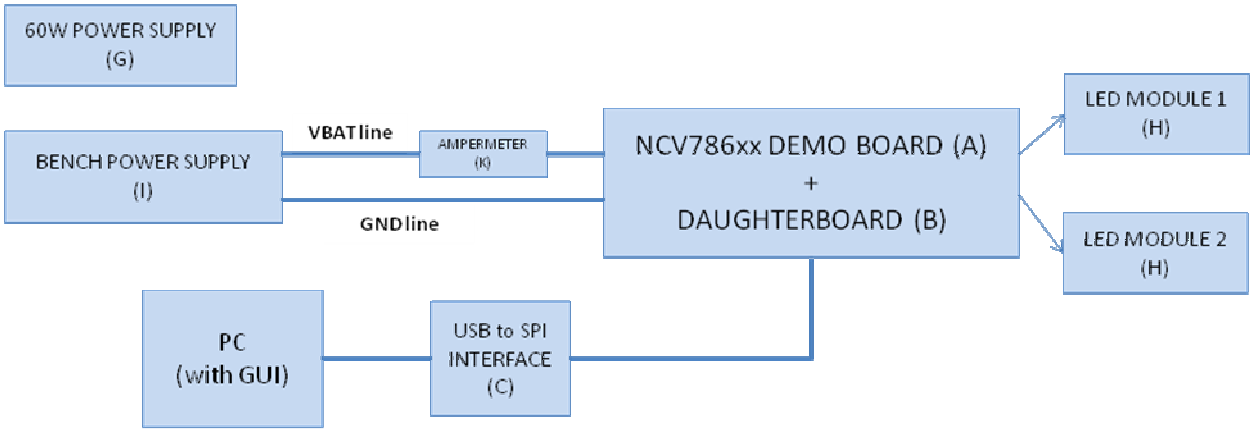

Figure 1 – NCV786xx DEMO KIT TEST BENCH SCHEME.

2.2 TEST PROCEDURE WALKTHROUGH – REV 2.2

2.2.1 PRELIMINARY CHECKS

Before starting the tests, the NCV78xxx Demo Board Rev 2.2 (S1) and respectively the NCV78663 daughterboard SET (S2) or the NCV78763 daughterboard SET (S2) must be visually inspected. The *test engineer* must check if the board looks conform (components type and orientation, soldering) to the reference prototype assigned by ONSEMICONDUCTOR. All components must be present on the board according to the BOM list.

No jumpers have to plugged in the board before starting the test.

2.2.2 FUNCTIONAL TESTS

1) Plug daughterboard (B) to Motherboard (A). Check that the white circle on the upper-left side of the daughterboard must correspond to the white circle on the Motherboard.

2) Connect the LED modules and the ECU SIM MKII via the phone cable to the Motherboard and via the USB cable to the PC.

3) While off, connect the DC bench power supply (I) to the Mother board (A) with the Ammeter (K) in between using the cabling (J). The current range in the Ammeter must be set to 10A.

4) Connect the voltmeter between Vboost test pin and the GND bar.

5) Still while off, set the DC bench power supply (I) current limitation to 500mA and voltage to **13V**.

6) Turn on supply voltage. Check LEDPOWER: if it is not lit (green), go to 6b). If LEDPOWER is correctly lit, observe power supply current limitation: if limit is kept for more than 3s, turn off power, unplug the daughterboard (B) and go to list point 2a). If no problem is found until this step, go to list point 7).

   6a) Turn on power again, if current limit is no more reached it means device in (S2) was damaged. In that case replace with a new device (S2)' and repeat from list point 1). Otherwise go to 6b).

   6b) **Turn off** power. Carefully repeat visual inspection already done in **2.2.1**. If root cause found go to 6a), otherwise stop TEST and generate REPORT.

7) Make sure the TEST Software in the PC is running.

8) Via the TEST SW GUI. Push "SPI DRIVER CONNECT". The GUI should respond with an acknowledge message. Set SPI rate to 500kHz.

9) Click "DISABLE BOOSTER" to remove any default Booster settings then take measurements described in the steps 10 thru 16.

10) Check that static current consumption on the Ammeter is between 2mA and 20mA. If not, go to 6b).

11) READ VBAT value via the ADC channel reading in the GUI (VBB_ADC): 12.6V < VBB_ADC < 13.4V. If not, report which value is read.

12) READ VBOOST value via GUI (VBOOST_ADC): 12.6V < VBOOST_ADC < 13.2V. If not, report which value is read.

13) READ VLED1 value via GUI (VLED1_ADC): VLED1 = 0V. If not, report which value is read.

14) READ VLED2 value via GUI (VLED2_ADC): VLED2 = 0V. If not, report which value is read.

15) A) NCV78**6**63 CASE: READ VTEMP1 value via GUI (VTEMP1_ADC): 2.8V < VTEMP1 < 3.0V. If not, report which value is read.

   B) NCV78**7**63 CASE: READ "VTEMP" verifying that the translated value is in line with ambient temperature ±5ºC. If not, report which value is read.

16) A) NCV78**6**63 CASE: READ VTEMP2 value via GUI (VTEMP2_ADC): 2.8V < VTEMP2 < 3.0V. If not, report which value is read.

   B) NCV78**7**63 CASE: skip point.

17) A) NCV78**6**63 CASE: SET BOOST **RANGE 02** by the GUI. (N.B. if former PAA silicon version is used, it shall be RANGE 14).

   B) NCV78**7**63 CASE: select boost target voltage (VBOOST_TRGT) of 29.4V and keep all other booster parameters default. Set buck channels current to the minimum by the **NCV78763 - BUCK REGULATOR SETTINGS** window, duty cycle for all channels to 100% then click to "UPDATE BUCKS".

18) Apply the 3 connections jumper (M) on control connector pins 1 to 3. The LED modules should be lit. If not, check proper connection of the jumper, then go to point 6b).

19) Verify with the measured **voltage** of the Voltmeter is between 29V and 31V. If not, report which value is read.

20) Verify that the measured **current** by the Ammeter is between **190mA and 250mA**. If not, report which value is read.

21) Increase the current limit on the bench supply to 3A for steps 22 thru 26.

22) SET CURRENT SETTING TO CHANNEL 1 to **960mA** (TOFF1_VLED = 22 [V X µs] for NCV78663, while BUCK01_VLEDxTOFF = 21.2 [V X µs] for the NCV78763).

23) Verify that the measured **current** by the Ammeter is between **1.2A and 1.45A**. If not, report which value is read.

24) SET CURRENT SETTING TO CHANNEL 2 to **960mA** (TOFF2_VLED = 22 [V X µs] for NCV78663, while BUCK02_VLEDxTOFF = 21.2 [V X µs] for the NCV78763).

25) Verify that the measured **current** by the Ammeter is between **2.2A and 2.5A**. If not, report which value is read.

26) Verify with the measured **voltage** of the Voltmeter is between 29V and 31V. If not, report which value is read.

27) Remove the 3 connections jumper (M) from control connector pins 1 to 3. The LED modules should be now off. If not, check proper disconnection of the jumper, then go to point 6b).

28) Unplug the DC bench supply and connect the 60W power supply in the KIT (G). Verify that the LED power on is lit. If not verify line connection of the power supply and that the power supply is working (it can be verified that its output voltage is between 11.8V and 12.2V). If not, replace the 60W power supply.

29) A) NCV78**6**63 CASE: SET **BOOST RANGE 04** by the GUI.

    B) NCV78**7**63 CASE: program a boost target voltage (VBOOST_TRGT) of 35V (click on “UPDATE BOOSTER”).

30) Place the 3 connections jumper (M) on control connector pins. The LED modules should be lit.

31) Verify that the Voltmeter output is between 32V and 38V. If not, report which value is read.

32) TEST END. The Motherboard (A) and the daughterboard (B) have to be labeled with a sticker. Please refer to the next section.

2.2.3 PRODUCTION TEST REPORT (PTR)

At the end of the test procedure, a Production Test Report (PTR) must be generated. The **PTR** must contain the following information:

- LOT NUMBER;
- DATE;
- SERIAL NUMBER of NCV78663 DEVICE
- PTP of reference (with revision no);
- DEMO BOARD + DAUGHTERBOARDs LABELS;
- TEST ENGINEER;
- For all the TEST step number, flag if some of the steps were unsuccessful and if so, provide the values found.

*The **PTR** must be given in two formats: a **pdf** format and a **spreadsheet** format (which can be opened by Excel).

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Наши контакты:

Телефон: +7 812 627 14 35

Электронная почта: sales@st-electron.ru

Адрес: 198099, Санкт-Петербург, Промышленная ул, дом № 19, литера Н, помещение 100-Н Офис 331