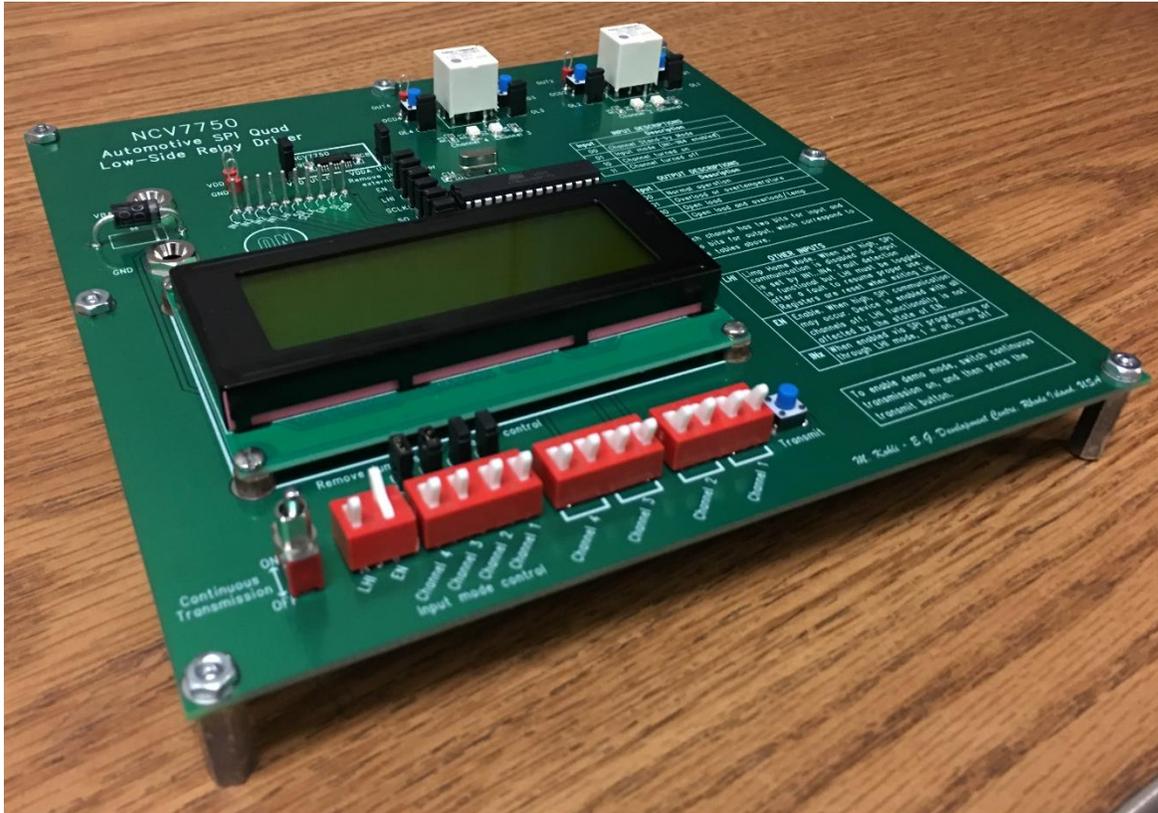




## Test Procedure for the NCV7750GEVB Evaluation Board



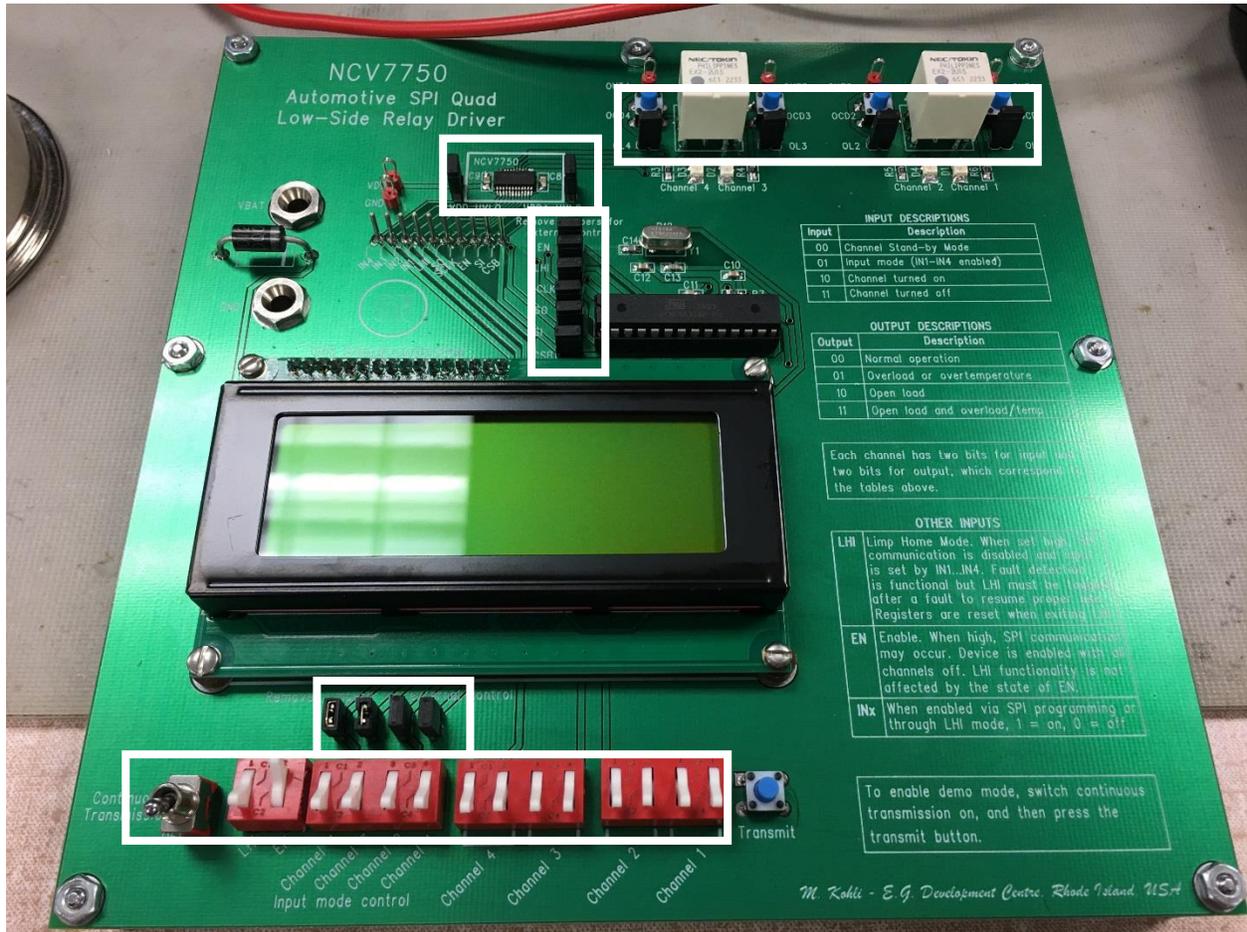
This document lists a test procedure for NCV7750GEVB that will demonstrate its functionality as well as provide a verification that it is operating correctly. Please follow each instruction in sequence; instructions are split up into sections and each section should be followed in sequence. For further information on the NCV7750 and the demo board, consult documentation entitled “NCV7750” and “NCV7750GEVB”.

### ***Equipment needed***

- NCV7750 GEVB
- Two banana jack cables
- ~14V, ~500mA power supply

### ***Startup***

- 1) The first thing to do is to ensure that all jumpers are inserted, and that all switches are in the down position. Switches and jumpers are outlined below:



2) After this is done, the board may be turned on by plugging in a power supply set to 14V. Ensure that both leads are correctly inserted into VBAT and GND banana terminals, and are not reversed before turning on supply. Ensure the supply can provide roughly 500mA.

When the supply is turned on, the following screen will show after a short delay:



After this, the user interface will show up



- Find the DIP switch labelled “EN”, near the left hand side of the board. Toggle this into the up position. The LCD should now look like this:



**Transmitting Data**

The NCV7750 is now enabled and ready to accept SPI transmission. Locate the DIP switches labelled Channel 1 through 4. For the rest of this test procedure, the following table will be used to better explain how to set the switches:

| Bit pattern per channel | Switch positions per channel        |
|-------------------------|-------------------------------------|
| 00                      | Left switch DOWN, right switch DOWN |
| 01                      | Left switch DOWN, right switch UP   |
| 10                      | Left switch UP, right switch DOWN   |
| 11                      | Left switch UP, right switch UP     |

- Set Channel 1 to 10. Now, press the transmit button. When the status updates to “Done”, it means that you can let go of the transmit button (this should happen almost immediately). The rightmost LED will light up. On the LCD, user input and output will appear too. The input will reflect what was entered on the DIP switches, and the output will be what is received from the NCV7750.
- Repeated transmit button actions will update the operation status. Press the transmit button again. The display should look like this:



Using the silkscreen tables, you can see that this input means that channel 1 is turned on, and that this output means that channels 1 through 4 is experiencing normal operation.

- Now set channels 2, 3 and 4 to 10, and press transmit. All of the LEDs should now be on. Press it again to update the output on the display. The display should now look like this:





Again, using the silkscreen tables, you can see that this input means that channels 1 through 4 are turned on, and this output means that channels 1 through 4 are operating normally.

### *Continuous mode*

Since pressing transmit each time can be a mundane task, especially since it needs to be pressed twice to receive the updated operating status as well as just update the input, there is a switch to enable continuous transmission. It is located to the far left of the board and is labelled “Continuous Transmission”.

- 1) Flip the “Continuous Transmission” switch up.

Initially, there will be no change on the board except the display, which will now show the following:

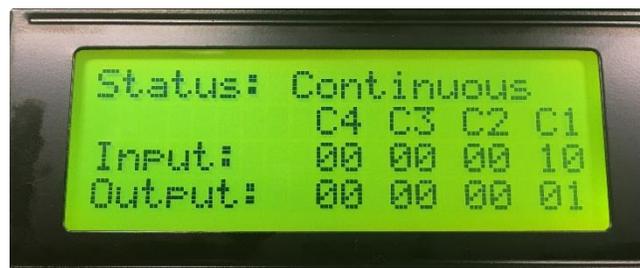


- 2) Now set all of the channels to 00. This will turn all LEDs off, and the effect will be realized immediately instead of having to wait for a transmit button press.

### *Overcurrent detection*

- 1) Set channel 1 back to 10. This will turn the channel 1 LED on.
- 2) Locate the right relay. To the right of this relay, there is a button labelled “OCD1”. Press this button and release. The LED will shut off immediately.

The display should now show the following:



- 3) Using the silkscreen tables, you can see that channel 1 has suffered an overload or overtemperature fault. Clearly in this case, it is an overload fault. The switches labelled “OCDx” cause a short between the OUTx pin of the NCV7750 and VBAT. This shuts the OUTx pin down, protecting the chip and the board from this short.

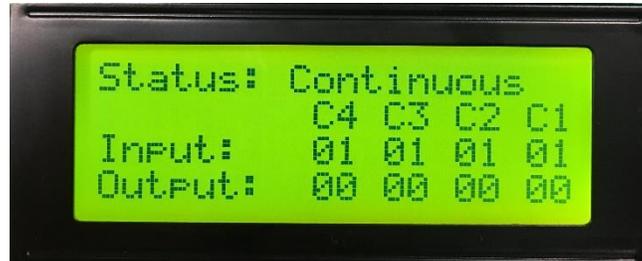
Notice also that the LED has not turned back on even after OCD1 is released. The NCV7750 must have its EN input cycled (or the chip power cycled) for this output to become useable again.



- 4) Flip the “EN” DIP switch down and then back up. The LED should come back on, and the output on the LCD will read zeroes.
- 5) Repeat this process for each channel to ensure overcurrent detection is working for all four channels.

#### *Input mode*

- 1) Set all of the channels to 01. This will set all LEDs off and the screen will look like this:



The sequence of switching the DIP switches does not matter. The previous set up was 10. Both 10→11→01 and 10→00→01 are valid.

From the silkscreen tables, we note that the outputs are now in “input mode”.

- 2) Locate the four DIP switches labelled “Input mode control”. Flip all four of them up. All four LEDs will now come back on. Flip all four mode control switches down. Input mode works by diverting control of the outputs to the INx pins of the NCV7750. The “Input mode control” switches are connected to these pins.

#### *Limp Home mode*

- 1) Set all channels to 10 again, and then flip all of the “Input mode control” switches back down. The four LEDs will stay on.

The sequence of switching the DIP switches does not matter. The previous set up was 10.

Both 10→11→01 and 10→00→01 are valid.

- 2) Locate the switch to the left of the “EN” switch labelled “LHI” and flip it up.

All LEDs will turn off, and the screen will look like the following:



Input is now diverted to the “Input mode control” switches again.

- 3) Switch all “Input mode control” switches up. All four LEDs should switch back on.



- 4) Put all switches down, excluding the “LHI” switch. This includes the “Continuous Transmit” switch and the EN switch. The screen should stay the same, and all LEDs should turn off.
- 5) Turn all of the “Input mode control” switches back up. The LEDs should turn on again. This demonstrates how Limp Home mode operates even independently of the “EN” input.

*Open load detection*



- 1) Turn the “LHI” switch down. The LCD should now show the following:

Turn all the switches to the down position.

- 2) Push the “Continuous Transmit” and “EN” switches into the up position, and then set each channel to 11. The LEDs will remain off, and the display should show the following:



From the silkscreen tables, we see that the outputs are now in “off” mode.

- 3) Carefully remove the all of the jumpers labelled “OLx”. Replace them after you do this without



modifying any DIP switches. The display should now show the following:

Using the silkscreen tables, you can see that all of the outputs have undergone an Open load fault. Likewise with the Over load fault, the “EN” input must be cycled (or the entire chip/board power cycled).

- 4) Flip the switch labelled “EN” down and up again.



- 5) Set all channels to 10. The four LEDs should light up again.

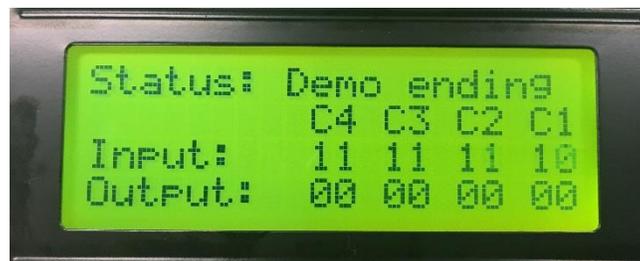
### **Demo mode**

This demonstration board is able to provide a demo to the user which simply cycles through a pre-programmed sequence of data transmissions.

- 1) Ensure “Continuous Transmission” switch is in the up position, and then press and release the transmit button. The demo should begin, and the display should show the following:



- 2) The demo mode loops forever. In order to exit it, hold down the transmit button until “Demo ending”



appears on the display, like so:

The current loop of the demo will finish, after which the demo mode will exit, and all 4 LEDs will come back on.

### **Undervoltage lockout**

- 1) Flip all DIP switches down except for “EN”. Keep “Continuous Transmission” up as well.
- 2) Find the jumper labelled “VDDA UVLO”. Remove it.
- 3) Set channels 1 to 4 to 10. Note that the LEDs stay off. This is because the NCV7750 is in undervoltage lockout.
- 4) Put the switch labelled “LHI” up.
- 5) Turn all of the “Input mode control” switches to the up position. The LEDs still remain off.
- 6) Turn all of the “Input mode control” switches and the “LHI” switch to the down position. Set channels 1 to 4 to 11.



- 7) Replace the jumper.
- 8) Find the jumper labelled "VDD UVLO". It is to the left of the "VDDA UVLO" jumper. Remove it.
- 9) Set channels 1 to 4 to 10. Note that the LEDs stay off again. The NCV7750 is in undervoltage lockout.
- 10) Put the "LHI" and "Input mode control" switches to the up position. Note that the LEDs are now on. The NCV7750 may enter LHI mode if the "VDD UVLO" jumper is removed, but not if "VDDA UVLO" jumper is removed.
- 11) Put the "LHI" and "Input mode control" switches back down. The LEDs are now off.
- 12) Set channels 1 to 4 to 00.
- 13) Replace the "VDD UVLO" jumper.

***Finishing***

If the board behaved in the way described here in response to these user inputs, then the board and NCV7750 chip is working as intended.