NCV76124 Evaluation Kit User's Manual

GUI Based Evaluation Kit for the NCV76124 Rain and Light Interface Chip

EVBUM2827/D

Introduction

This document describes the NCV76124 Rain and Light Interface Evaluation kit and its properties. The evaluation kit is intended for demonstration of the measurement capabilities of the NCV76124. The kit can be used for first evaluations and is not intended for use at low and high automotive specified temperatures.

Features

- PC GUI Operation Via USB
- Based on the NCV76124 Rain and Light Interface Chip
- 5 Light Sensitive Photodiodes
- 2 IR Rain LEDs and Photodiodes for Rain Simulated Measurements

Typical Applications

- Demonstration of the NCV76124 Performance
- Evaluation Platform Assisting Software

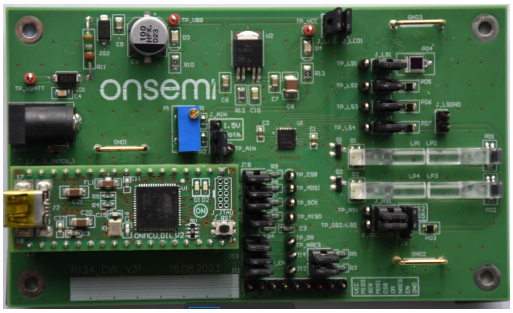


Figure 1. Evaluation Board Picture

GENERAL DESCRIPTION

The Evaluation kit is intended for use with the NCV76124 Rain and Light Interface chip. The kit provides 5 Light measurement channels and 2 Rain measurement channels. The Light channels are equipped with Photodiodes that mimic the different functions in the car for light measurement. The Rain channels contain two Infra Red LED's and two dedicated IR Photodiodes coupled with light guides. An ON−control piggy back micro controller board is controlling the NCV76124 chip and performs the functions for the watchdog operation.

The Evaluation kit is operated through a windows based GUI (Graphical User Interface) and is connected via a USB cable to the ON−control microcontroller of the evaluation board. The ON controller handles the translation from USB to the NCV76124 SPI format. With the GUI, the NCV76124 can be controlled for its full functionality.

For the description and capabilities of the NCV76124, refer to the datasheet of this devices.

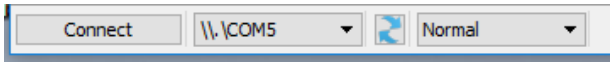
PC SOFTWARE REQUIREMENTS

The GUI operates with Microsoft Windows 7 and higher platforms. The GUI can be installed from the delivered USB stick by executing the file: R124_Setup.exe. Follow the instruction on the screen for installation.

Powering up the Evaluation Kit

1. Install the GUI software at an appropriate Windows platform with free USB channel.
2. Connect a 12 V power adaptor supply to the CON1 power inlet connector.
3. Connect the USB cable from the evaluation kit to the PC.
4. Wait until the drivers for the ON control board are found. Turn on the adapter supply.
5. Launch the NCV76124 GUI.

Click Connect button at the bottom left of the GUI screen.



If the connection is established, the NCV76124 application screen is launched.

The picture below shows the main Application screen of the GUI. From this main screen several sub screens can be selected (Green marked area):

– Config registers: gives the possibly to program all registers of the NCV76124.

– Status registers: for readout of the status registers and measurement result registers.

– Trimming registers: used for readout of some application relevant trimmed registers.

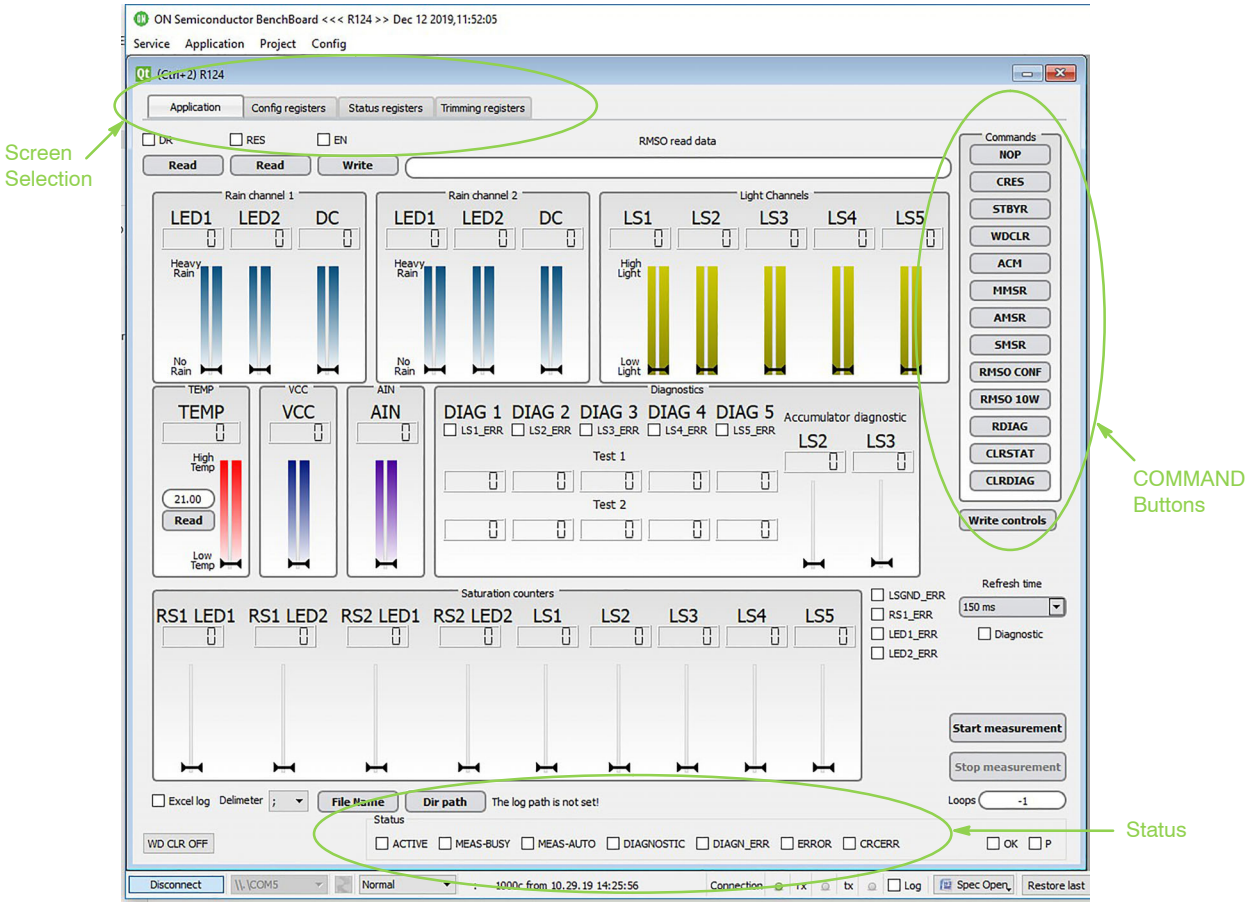


Figure 2. Application Screen of the GUI

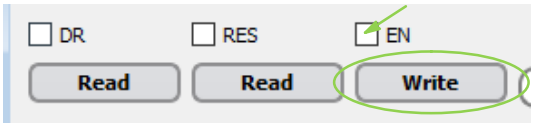
The COMMAND buttons are used to force operational modes or actions of the NCV76124 (refer to the datasheet).

EN Pin Operation

Before operating the NCV76124, the EN pin should be applied to bring the device from Sleep mode to Standby mode.

Please tag the EN checkbox shown in the below picture and press the “write” button to command the ON−controller on the evaluation kit to bring the EN pin High.

Status information that is coming back for each write and read command are shown at the bottom of the screen.



After this operation the device is in Standby mode.

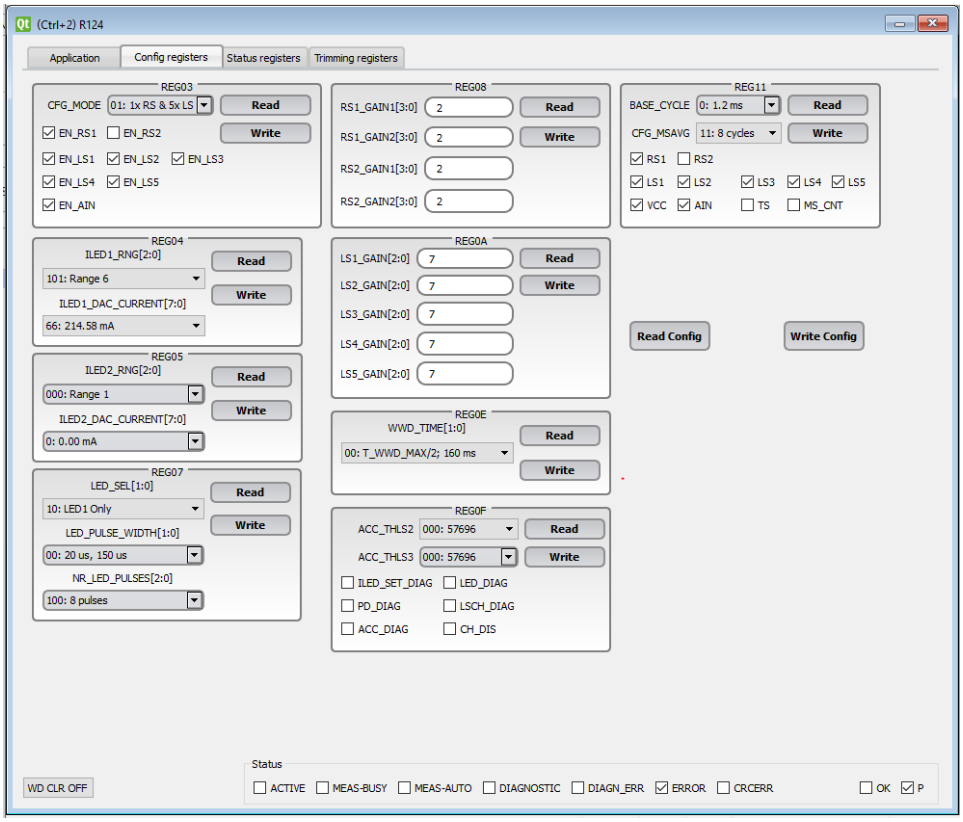
Config Registers

Click on the “Config register” button to go to the configuration screen.

In this screen the Hardware configuration and measurement configurations can be initiated.

The CFG_MODE register is used to set the hardware configuration and can only be written when the device is in Standby mode. All other register can be written in Standby as well as in Active mode. Below screen shows a default configuration for 1 Rain Channel and 5 Light channels operated.

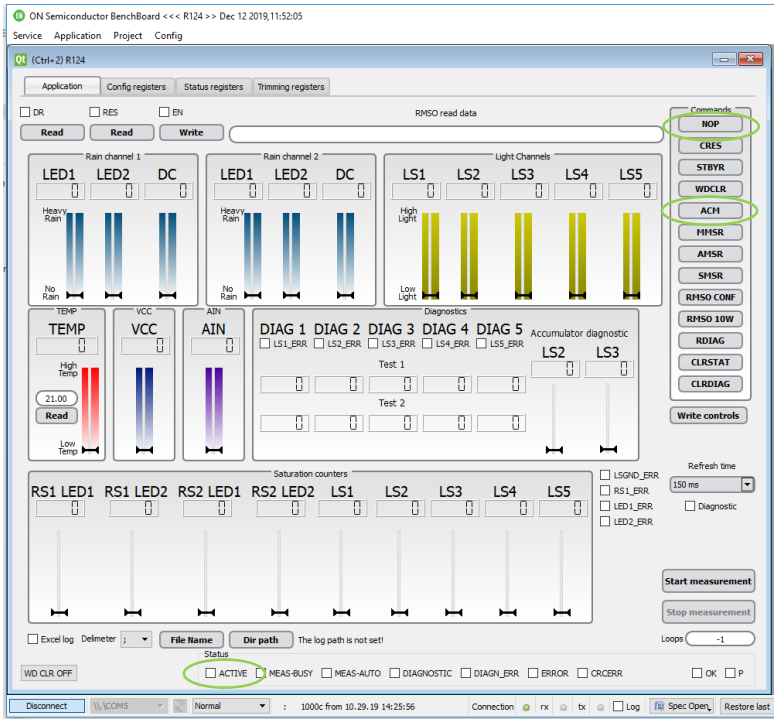
“Write Config” writes all configuration data in one shot to the NCV76124. “Read Config” reads back all the data. As shown, the registers can be written or read from the individual register boxes too.



When the configuration is written, the Application commands can be executed from the main “Application” screen.

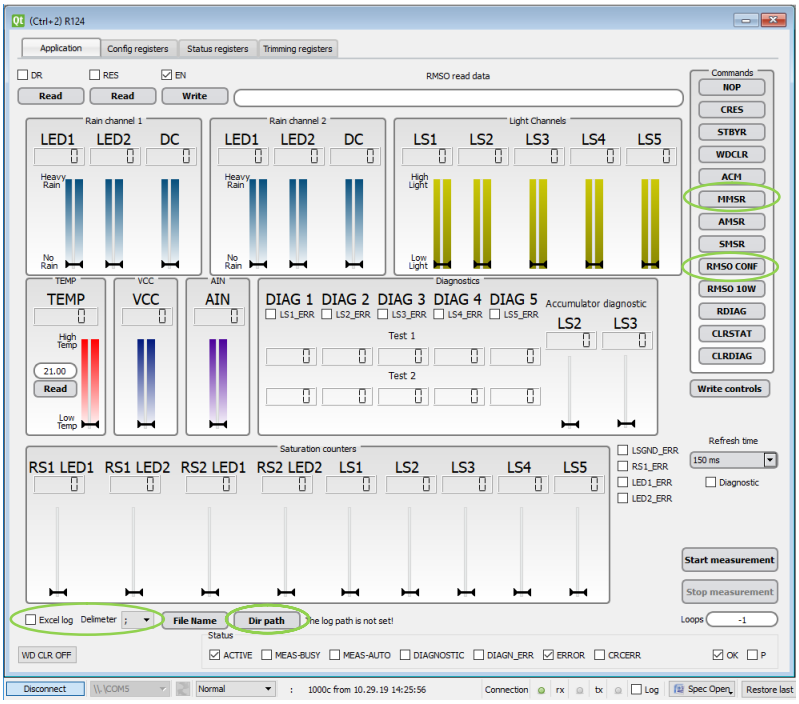
Single Measurement with the MMSR Command

Bring, by clicking the “ACM” button in the main Application screen, the device to Active mode. After the next SPI command, e.g. “NOP”, the status of the Active mode is presented in the “ACTIVE” tag box.



– A “MMSR”, manual measurement can be started now. Clicking the “RMSO CONF” button to read the configured measurement registers from the chip. The values are presented in the Status register screen (next page shown).

– A continuous measurement can be started by clicking the “Start measurement” button. After starting, the Evaluation kit will continuously measure and present the measurement values at the Main Application screen. The “Stop measurement” stops the measurement.



Logging the Measurement Result

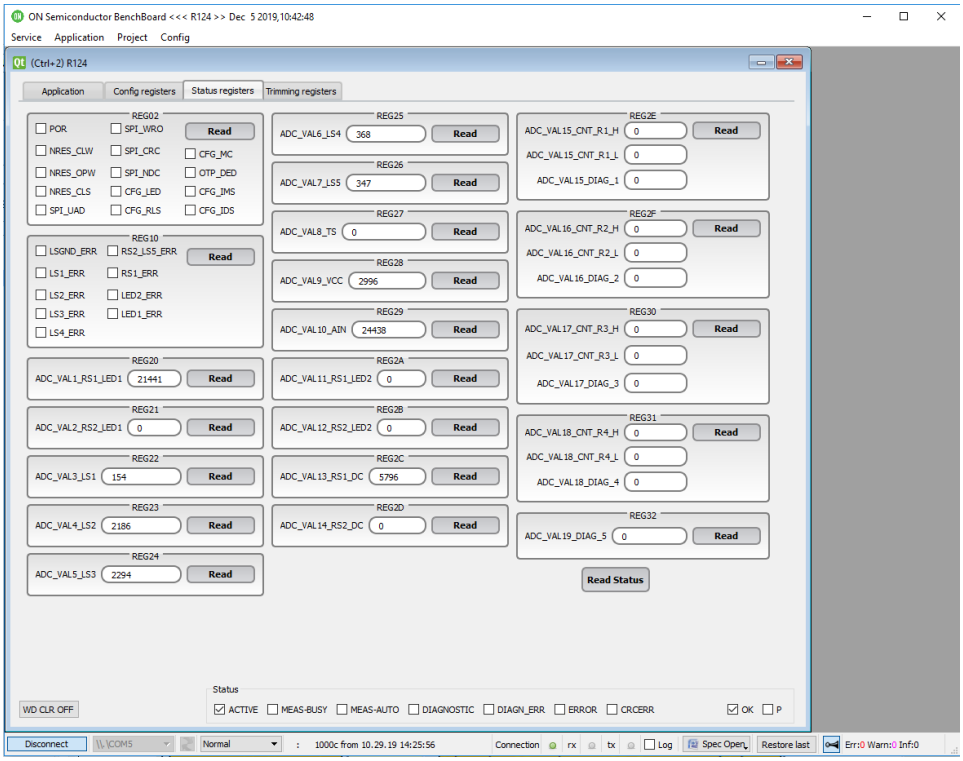
The GUI is able to log the measurement results in a comma or semi colon separated .csv format. The latter can be read by Excel directly and shows the results and configuration data in a formatted way.

- Set the Dir path where to write the csv file.
- Optionally set the File Name.
- Set the Delimiter to “;”.
- Tag the Excel log box.
- Set the loops to the number of measurements needed. A −1 value sets the number to infinite.
- Start the measurement to perform the measurements that is writing the .csv file line by line.

After the number of required measurements, the cycle stops automatically. When an addition number of measurements is started, the data is appended to the .csv file. When no File name is given, the GUI uses the actual date code for writing the file.

Status Registers

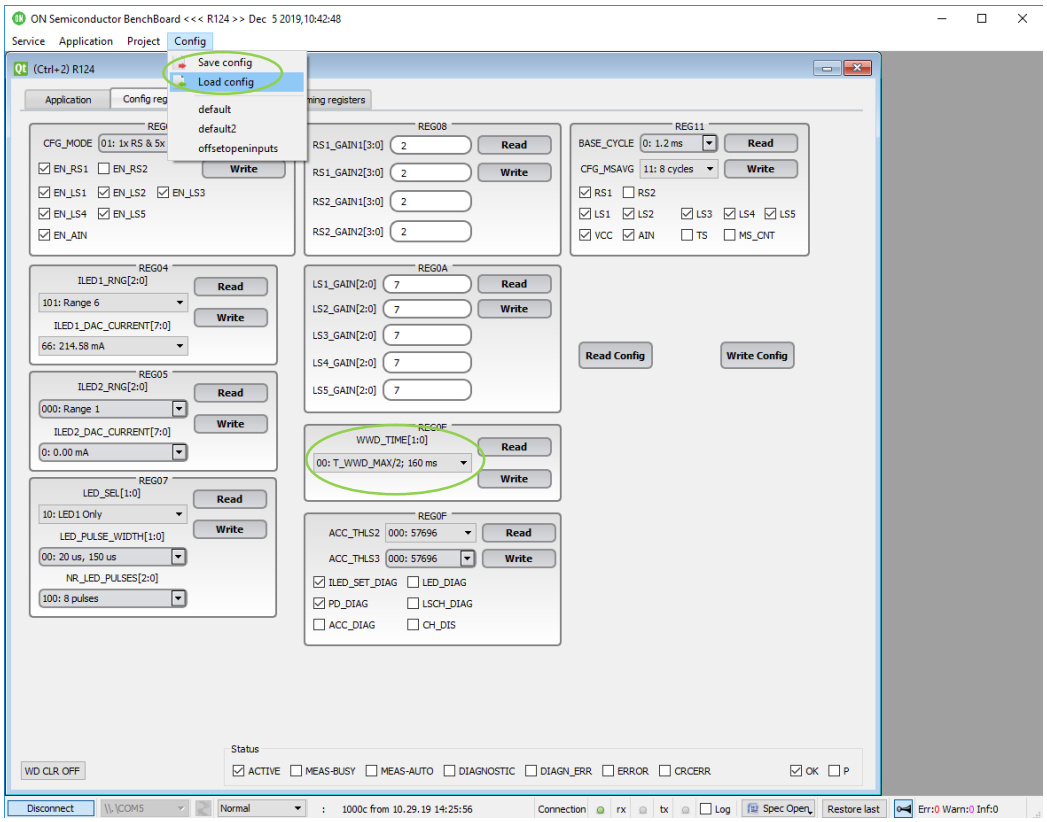
The status registers are individually shown in the status register screen.



Special attention can be taken to the Reg02 register. Configuration errors are shown here. Most of the times, when the measurement will not start, this status register will indicate the mistake in the hardware or measurement configuration.

Saving and Loading the Configuration Register Values

The configuration of the NCV76124 can be saved and read in a configuration file. Next picture shows the place at the GUI where this action can be performed.



Watchdog Operation

The watchdog of the NCV76124 is configurable for different watchdog timeout values. In the “config registers” screen the time can be set.

Because the timing update can only be performed in the first 160ms after a POR or when the EN pin goes high, the Evaluation kit and GUI uses a special trick to perform the update properly.

Normally when starting the GUI, the EN pin is low. The ON−controller at the evaluation board knows this state.

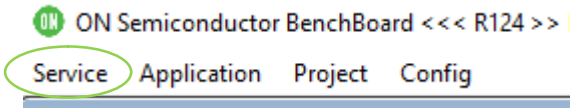
When in this state, the WWD_TIME[1:0], register update value is written to the micro controller, it saves this value (be aware: it cannot write the value to the chip yet, because the chip is in Sleep mode).

When the GUI now instructs the EN to become high, the micro controller will force the EN high and will write successively the WWD_TIME that was received before.

The ON−controller takes automatically care of the proper WDD_RST commands and synchronizes all other SPI commands with it.

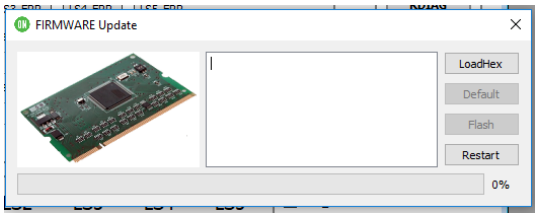
ON−Control Firmware Updates

When firmware updates are needed for the ON−control module, **onsemi** will deliver the update .HEX file. With the GUI it is possible to perform the update.



In the very top left screen click the “Service” mode button, then the firmware update button.

This enters the download page, where the HEX file can be loaded and programmed to the user flash memory of the ON−control board. Follow the instruction on the screen and perform the update.



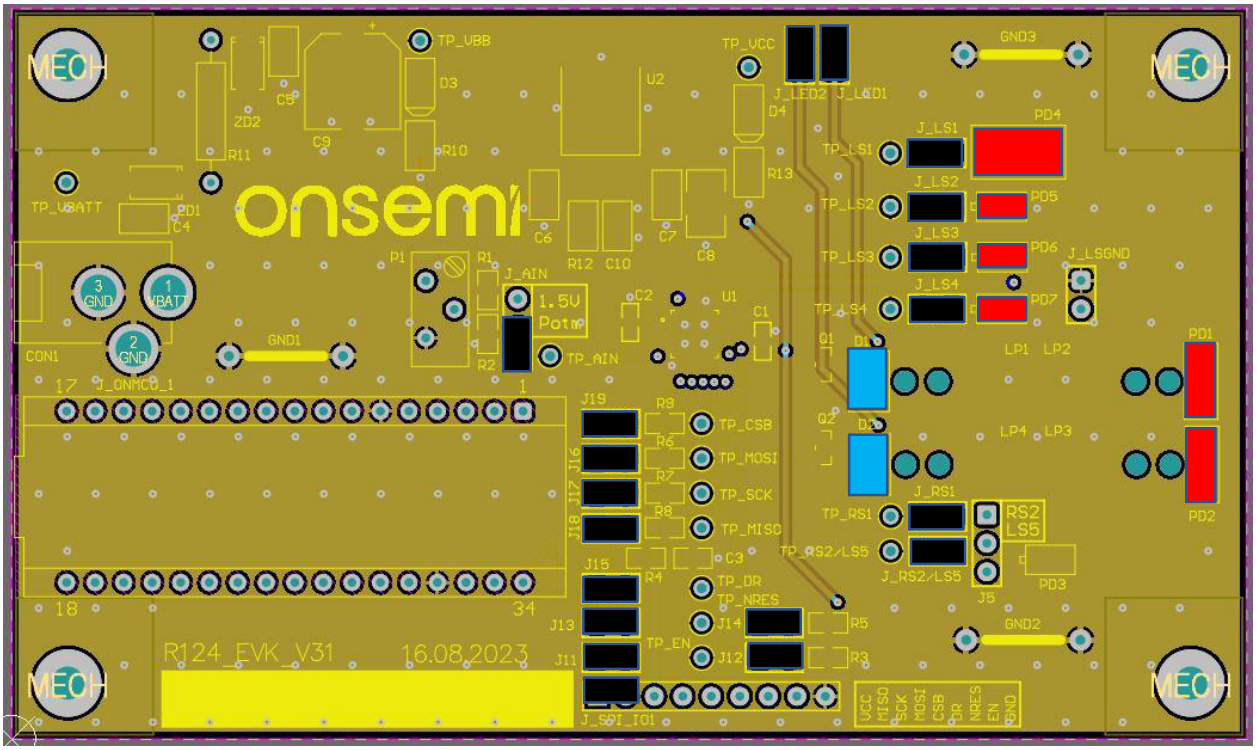
After downloading the HEX file, it take several seconds to reboot the ON−Control board.

NOTE: *Please, do not switch off the USB connection when the update is processed.*

EVALUATION KIT HARDWARE

The Evaluation kit is built around the ON−control micro controller that is mounted with a piggy back construction to the main board where the NCV76124 is soldered. Several jumpers are installed to enable the customer to enforce fault states for the LED and Photodiode connections. GND bars are installed for simplifying oscilloscope measurements.

The picture below shows the board lay−out set−up. The default jumpers are shown in Black, the Photodiodes in Red and the IR LEDs in Blue. The ON−Control firmware is programmed for use with these default jumper settings.



Photodiodes

Default Jumpers

IR LEDs

Figure 3. Board Lay−Out Set−Up

SCHEMATICS AND FURTHER DOCUMENTATION

For the schematics of the evaluation kit we refer to the file NCV76124_Schematics.pdf

For the latest datasheet version of the NC76124, please contact your local sales representative.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales