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.

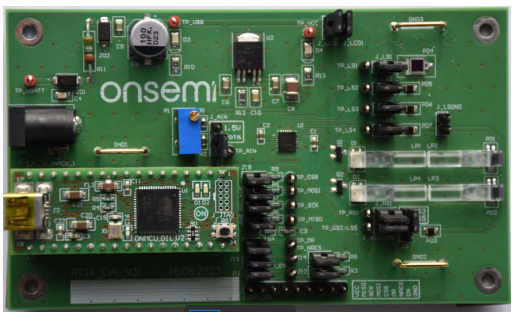


Figure 1. Evaluation Board Picture

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

© Semiconductor Components Industries, LLC, 2022

Downloaded from Arrow.com.

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.

Downloaded from Arrow.com.

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.

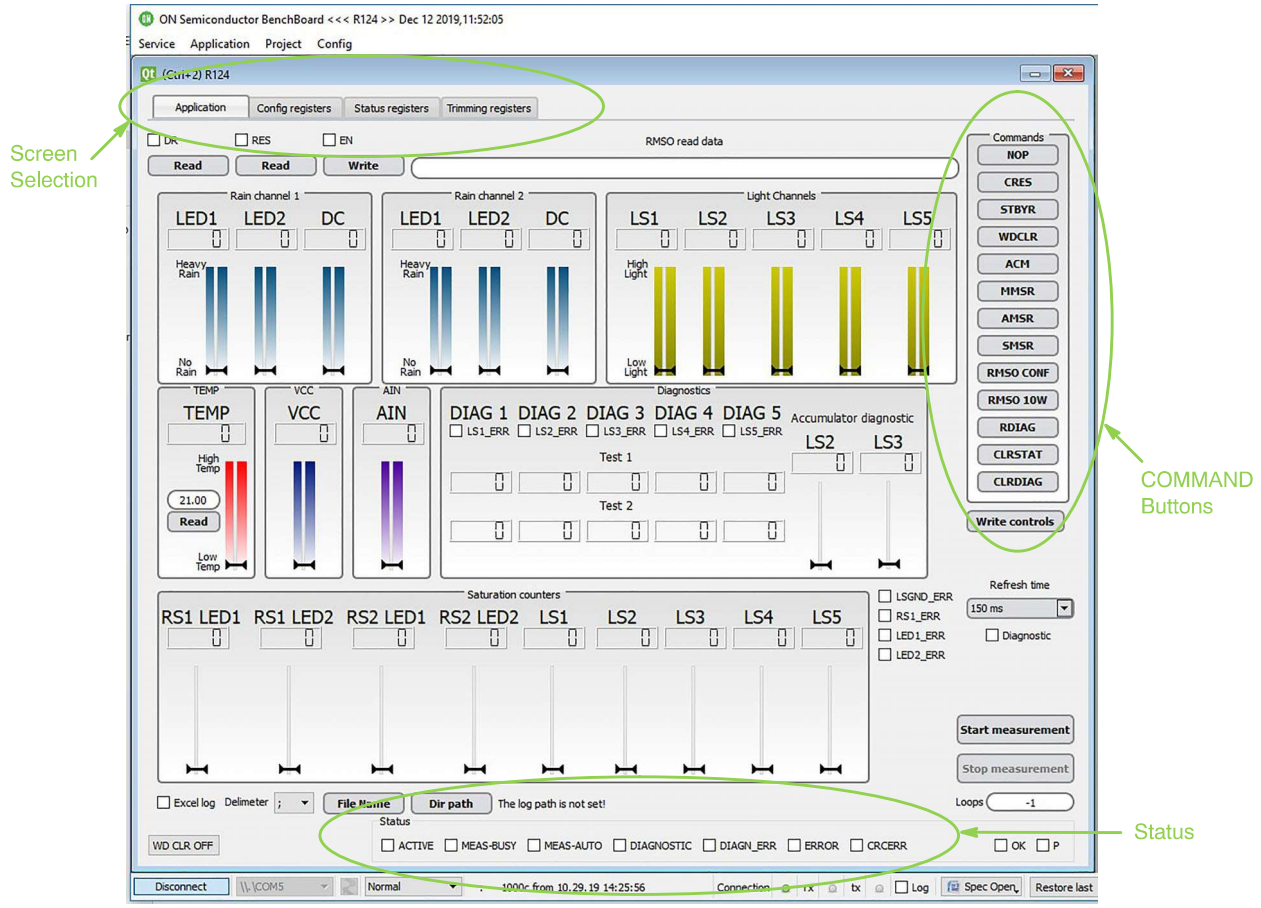


Figure 2. Application Screen of the GUI

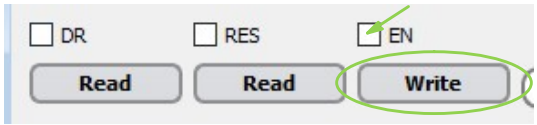
The COMMAND buttons are used to force operational modes or actions of the NCV76124 (refer to the datasheet).

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

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.



After this operation the device is in Standby mode.

Downloaded from Arrow.com.

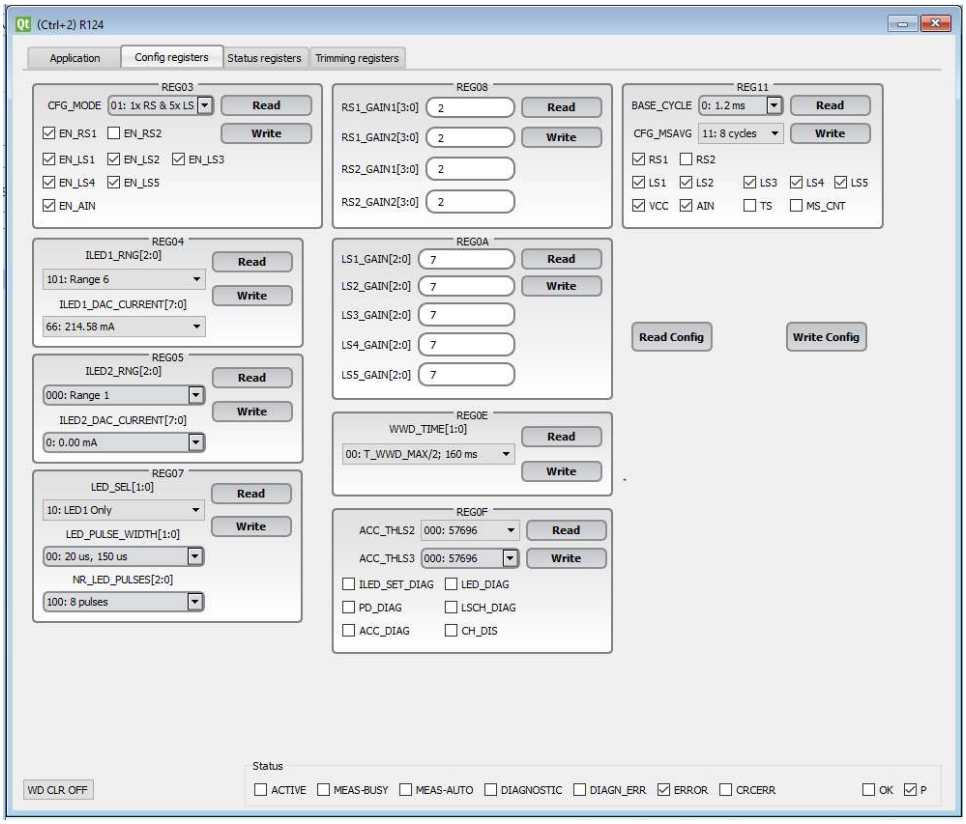
Config Registers

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.

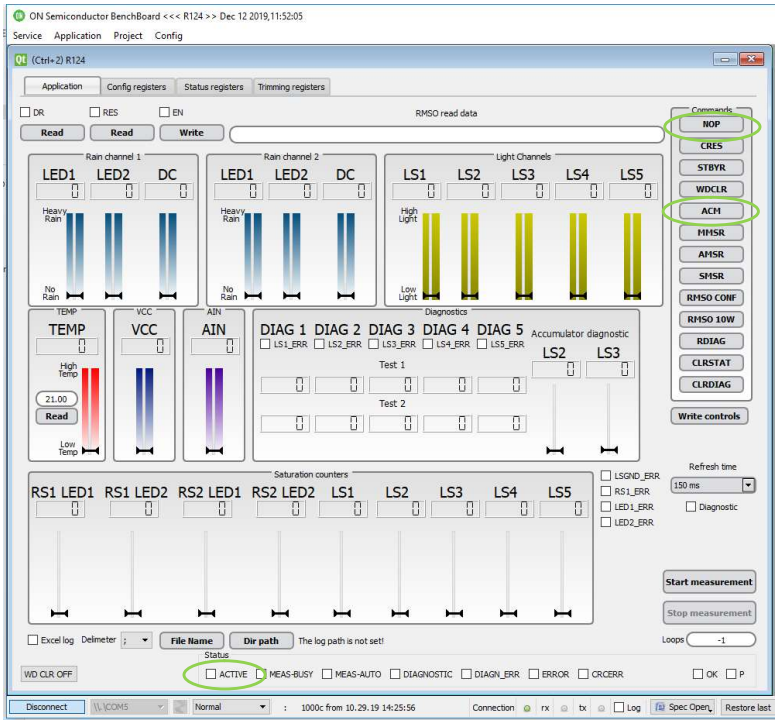


When the configuration is written, the Application commands can be executed from the main “Application” screen.

Downloaded from Arrow.com.

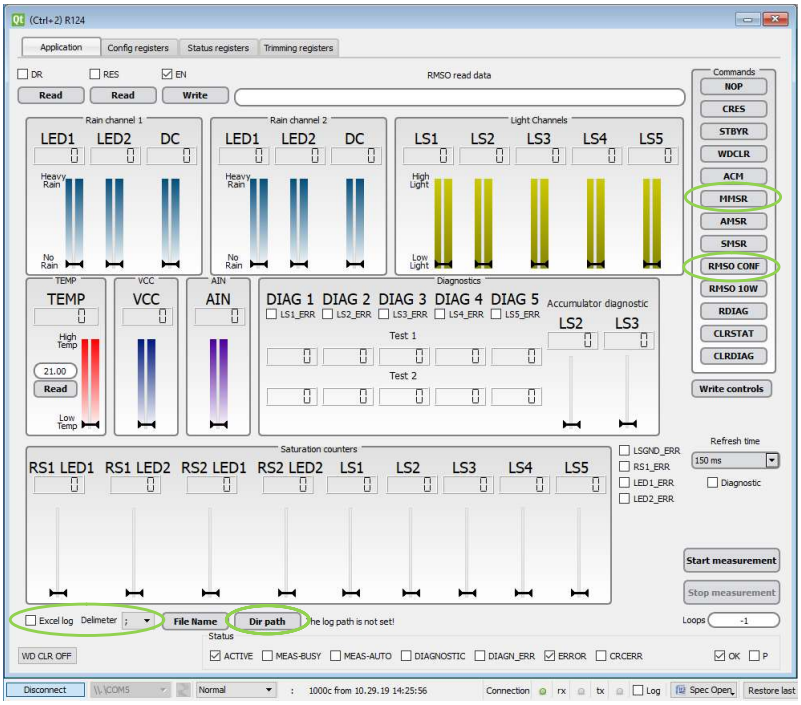
Single Measurement with the MMSR Command

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.



Downloaded from Arrow.com.

Logging the Measurement Result

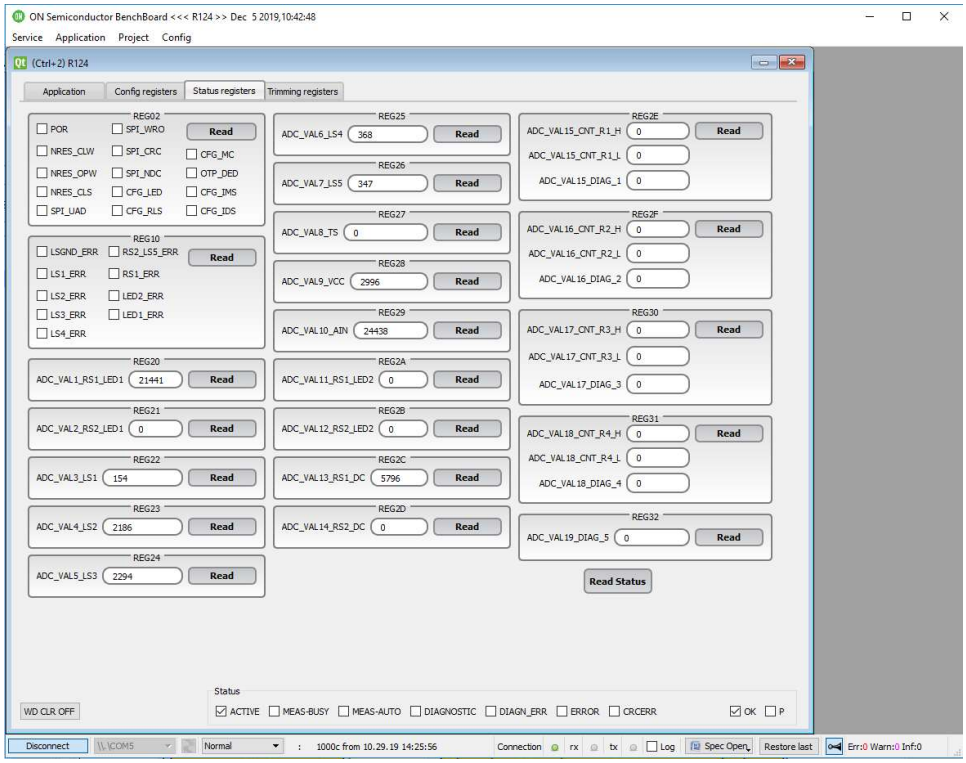
The GUI is able to log the measurement results in a comma or semi colon separated .csv format. The latter can be read by Excel directly and shows the results and configuration data in a formatted way.

- 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.

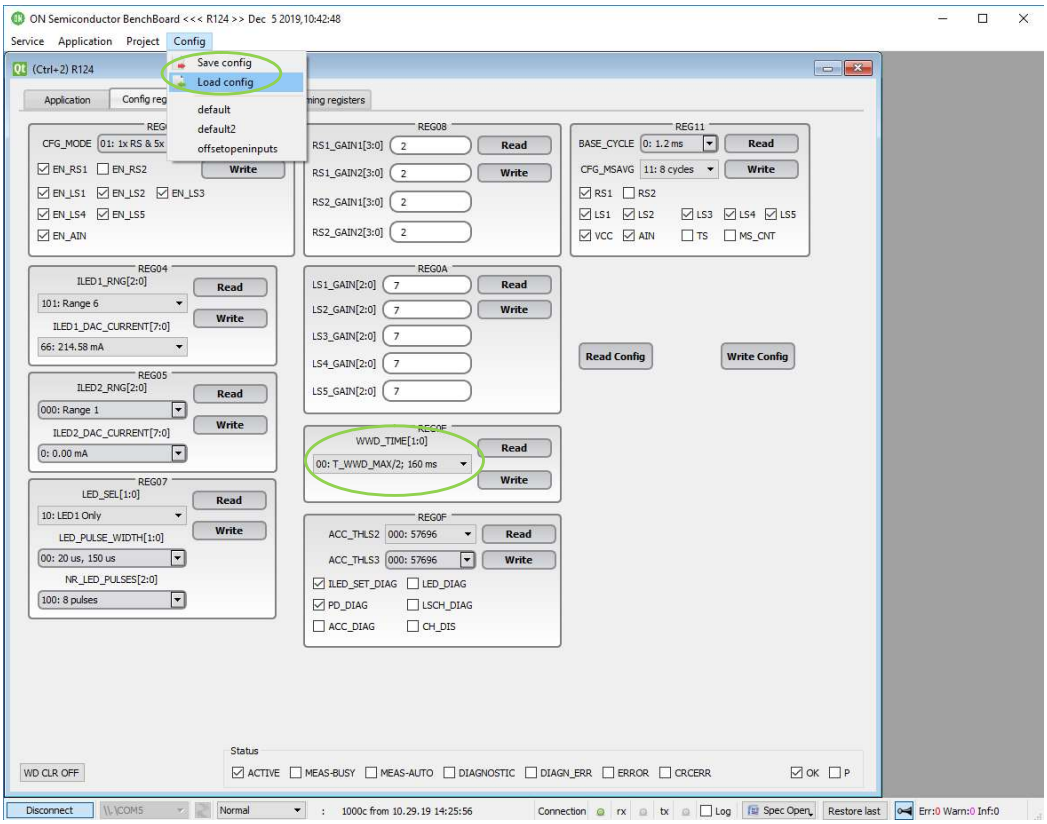


Special attention can be taken to the Reg02 register. Configuration errors are shown here. Most of the times, when the measurement will not start, this status register will indicate the mistake in the hardware or measurement configuration.

Downloaded from Arrow.com.

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.

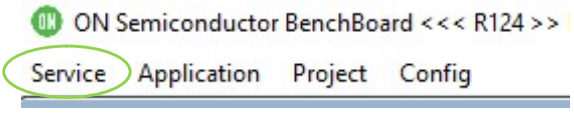
When in this state, the WWD_TIME[1:0], register update value is written to the micro controller, it saves this value (be aware: it cannot write the value to the chip yet, because the chip is in Sleep mode).

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.

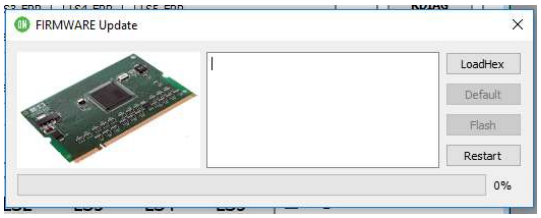
ON−Control Firmware Updates

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.*

Downloaded from Arrow.com.

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.

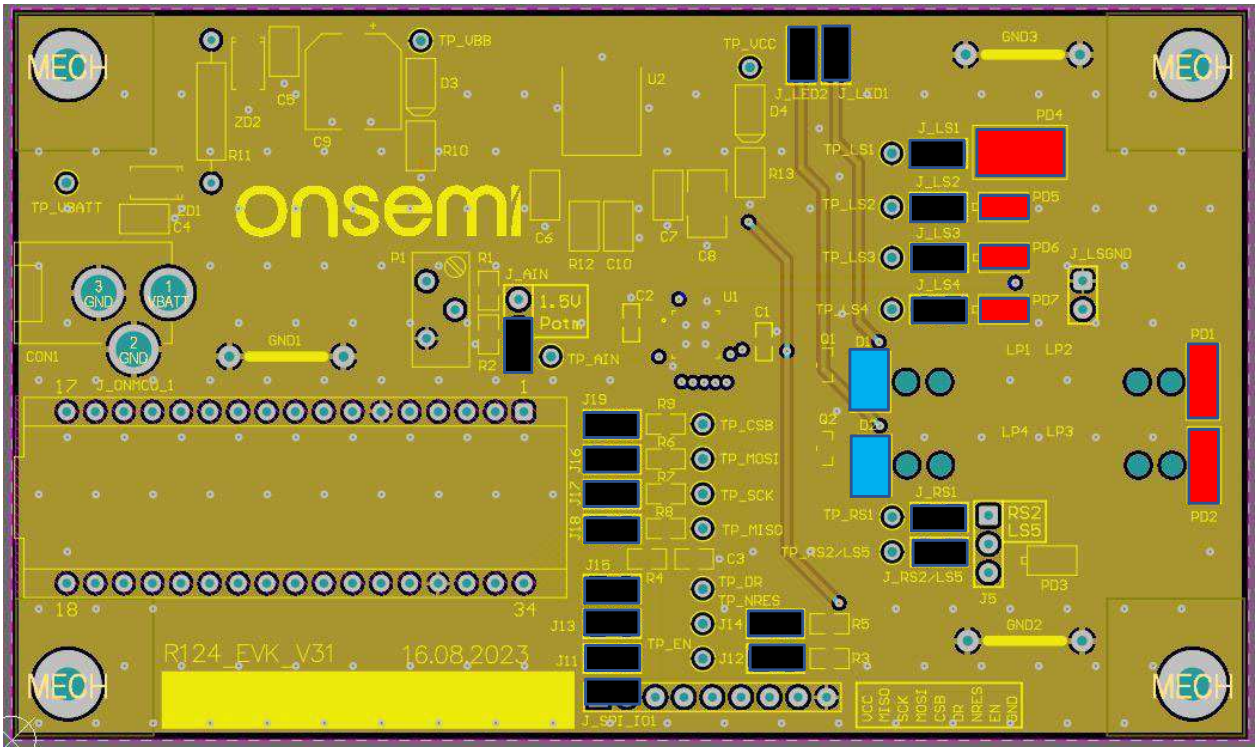


Figure 3. Board Lay−Out Set−Up

Downloaded from Arrow.com.

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.

Downloaded from Arrow.com.

onsemi, , and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent–Marking.pdf. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

The evaluation board/kit (research and development board/kit) (hereinafter the "board") is not a finished product and is not available for sale to consumers. The board is only intended for research, development, demonstration and evaluation purposes and will only be used in laboratory/development areas by persons with an engineering/technical training and familiar with the risks associated with handling electrical/mechanical components, systems and subsystems. This person assumes full responsibility/liability for proper and safe handling. Any other use, resale or redistribution for any other purpose is strictly prohibited.

THE BOARD IS PROVIDED BY ONSEMI TO YOU "AS IS" AND WITHOUT ANY REPRESENTATIONS OR WARRANTIES WHATSOEVER. WITHOUT LIMITING THE FOREGOING, ONSEMI (AND ITS LICENSORS/SUPPLIERS) HEREBY DISCLAIMS ANY AND ALL REPRESENTATIONS AND WARRANTIES IN RELATION TO THE BOARD, ANY MODIFICATIONS, OR THIS AGREEMENT, WHETHER EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, INCLUDING WITHOUT LIMITATION ANY AND ALL REPRESENTATIONS AND WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE, NON–INFRINGEMENT, AND THOSE ARISING FROM A COURSE OF DEALING, TRADE USAGE, TRADE CUSTOM OR TRADE PRACTICE.

onsemi reserves the right to make changes without further notice to any board.

You are responsible for determining whether the board will be suitable for your intended use or application or will achieve your intended results. Prior to using or distributing any systems that have been evaluated, designed or tested using the board, you agree to test and validate your design to confirm the functionality for your application. Any technical, applications or design information or advice, quality characterization, reliability data or other services provided by **onsemi** shall not constitute any representation or warranty by **onsemi**, and no additional obligations or liabilities shall arise from **onsemi** having provided such information or services.

onsemi products including the boards are not designed, intended, or authorized for use in life support systems, or any FDA Class 3 medical devices or medical devices with a similar or equivalent classification in a foreign jurisdiction, or any devices intended for implantation in the human body. You agree to indemnify, defend and hold harmless **onsemi**, its directors, officers, employees, representatives, agents, subsidiaries, affiliates, distributors, and assigns, against any and all liabilities, losses, costs, damages, judgments, and expenses, arising out of any claim, demand, investigation, lawsuit, regulatory action or cause of action arising out of or associated with any unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of any products and/or the board.

This evaluation board/kit does not fall within the scope of the European Union directives regarding electromagnetic compatibility, restricted substances (RoHS), recycling (WEEE), FCC, CE or UL, and may not meet the technical requirements of these or other related directives.

FCC WARNING – This evaluation board/kit is intended for use for engineering development, demonstration, or evaluation purposes only and is not considered by **onsemi** to be a finished end product fit for general consumer use. It may generate, use, or radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference. Operation of this equipment may cause interference with radio communications, in which case the user shall be responsible, at its expense, to take whatever measures may be required to correct this interference.

onsemi does not convey any license under its patent rights nor the rights of others.

LIMITATIONS OF LIABILITY: **onsemi** shall not be liable for any special, consequential, incidental, indirect or punitive damages, including, but not limited to the costs of requalification, delay, loss of profits or goodwill, arising out of or in connection with the board, even if **onsemi** is advised of the possibility of such damages. In no event shall **onsemi**'s aggregate liability from any obligation arising out of or in connection with the board, under any theory of liability, exceed the purchase price paid for the board, if any.

The board is provided to you subject to the license and other terms per **onsemi**'s standard terms and conditions of sale. For more information and documentation, please visit www.onsemi.com.

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

◊

Downloaded from Arrow.com.