



ON Semiconductor®

Strata Enabled NCV48220 LDO Charge Pump EVB User Guide

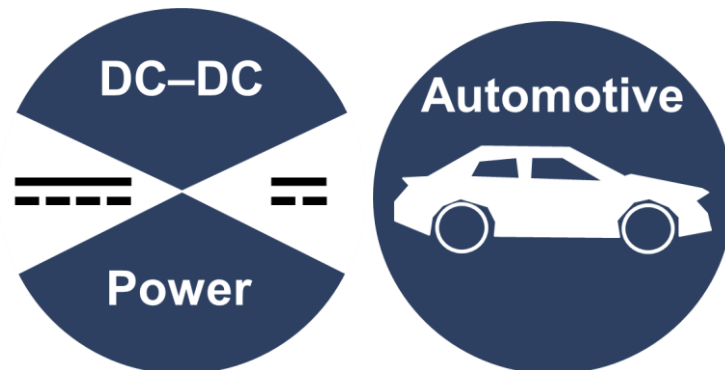


Table of Contents

INTRODUCTION.....	3
Device Features	3
Applications.....	3
USER GUIDE	4
Hardware Setup	4
User Interface	5

Introduction

The Strata Enabled NCV48220 LDO Charge Pump EVB provides an easy to use evaluation board within the Strata Developer Studio for the NCV48220 LDO Charge Pump from ON Semiconductor. Through the Strata User Interface, the developer can access datasheets, BOMs, schematics, and other collateral they may need. This document will explain how to get the EVB up and running with Strata.

Device Features

- Output Voltage: 5 V
- LDO Output Current: up to 150 mA
- Very Wide Input Voltage Operation Range: from 3 V to 40 V
- Very Low Quiescent Current: typ 35 μ A
- Enable Function (1.0 μ A max quiescent current when disabled)
- Microprocessor Compatible Control Functions:
 - Reset Output
- AEC-Q100 Grade 1 Qualified and PPAP Capable
- Protection Features:
 - Current Limitation
 - Thermal Shutdown
 - Reverse Bias Output Current

Applications

- Stop-Start Applications
- Instruments and Clusters
- Infotainment

User Guide

This section will explain how to use the Strata Enabled NCV48220 LDO Charge Pump EVB in a step by step manner and will cover both the hardware required as well as how to use the User Interface (UI) in Strata.

Hardware Setup

The hardware required for using the Strata Enabled NCV48220 LDO Charge Pump EVB are a computer (with Windows), and power supply (recommended 3V-40V voltage range, 2A current limit). An external load can be connected to the output of the board but is not required. Follow the steps below.

1. Connect the computer to the EVB using the mini USB connector J23 on the bottom of the board.
2. Plug the power supply into the input of the board using the banana plugs J19 (positive terminal) and J21 (negative terminal). Do not hot plug the power cables or apply over 40V to the input because this may damage circuitry on the board. The recommended input voltage range is 3V to 40V for normal operation.
3. A picture of the setup can be found in Figure 1. The red power cables denote positive polarity with respect to the black power cables.

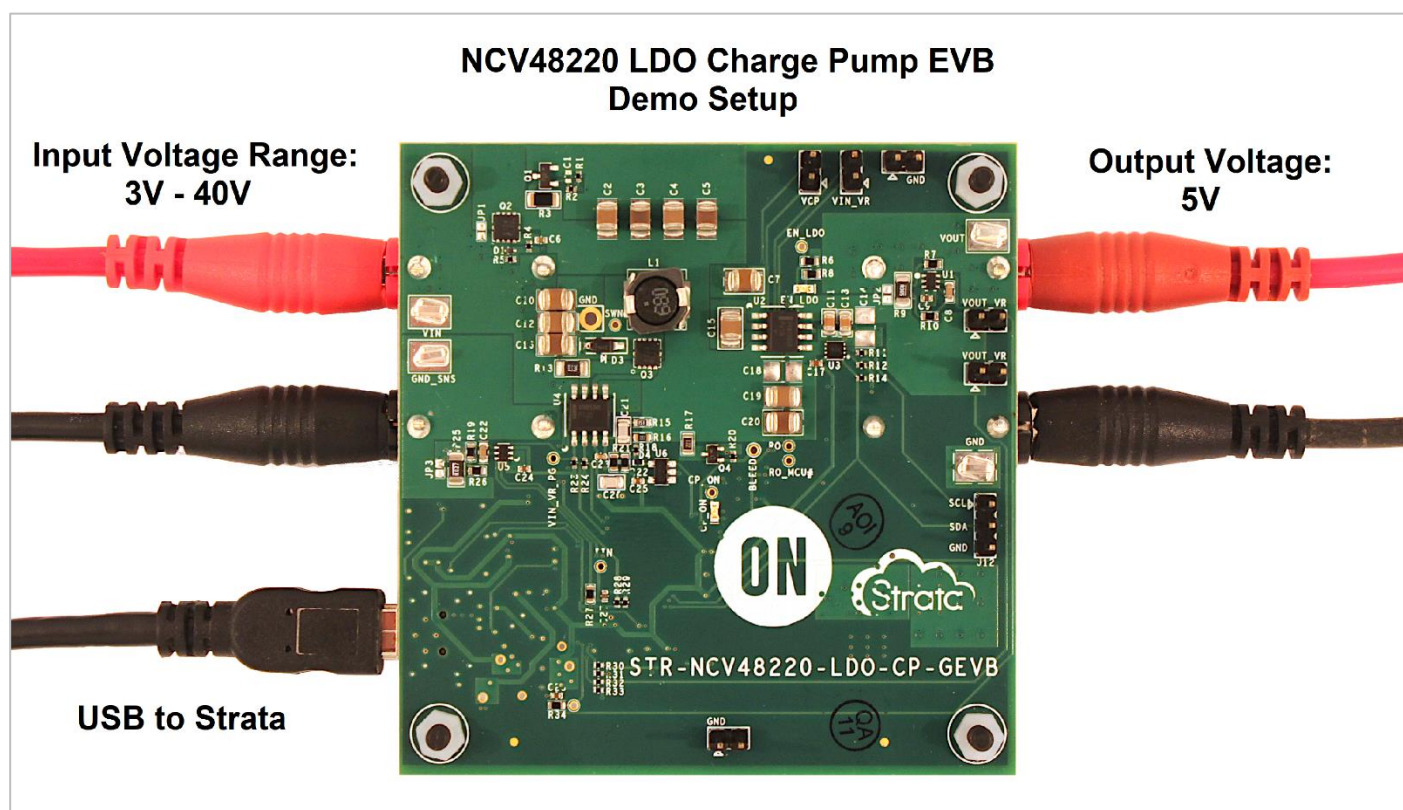


Figure 1: Demo setup

LDO Input Voltage Options

Figure 2 shows a simplified power flow diagram demonstrating the two LDO input voltage options available for this EVB. The LDO input power can be supplied either directly from the input banana plug connection through a load switch (“Bypass Input Regulator” option in Strata UI) or via a buck regulator with an adjustable output voltage (“DC-DC Buck Input Regulator” option in Strata UI). The load switch bypass option is intended to allow a full evaluation of the LDO over its entire input voltage range (3V – 40V) by directly connecting the board input power to the LDO input, while the buck regulator can be used so that the input voltage to the LDO can easily be adjusted through the Strata UI, albeit over a smaller range (2.5V – 15V), while supplying a fixed voltage to the board input. The buck regulator on this EVB cannot be used for input voltages over 18V, and if the Strata interface detects an input

voltage over 18V, both the bypass load switch and buck regulator will be disabled (“Off” option in Strata UI). The buck regulator UVLO triggers at approximately 3.1V.

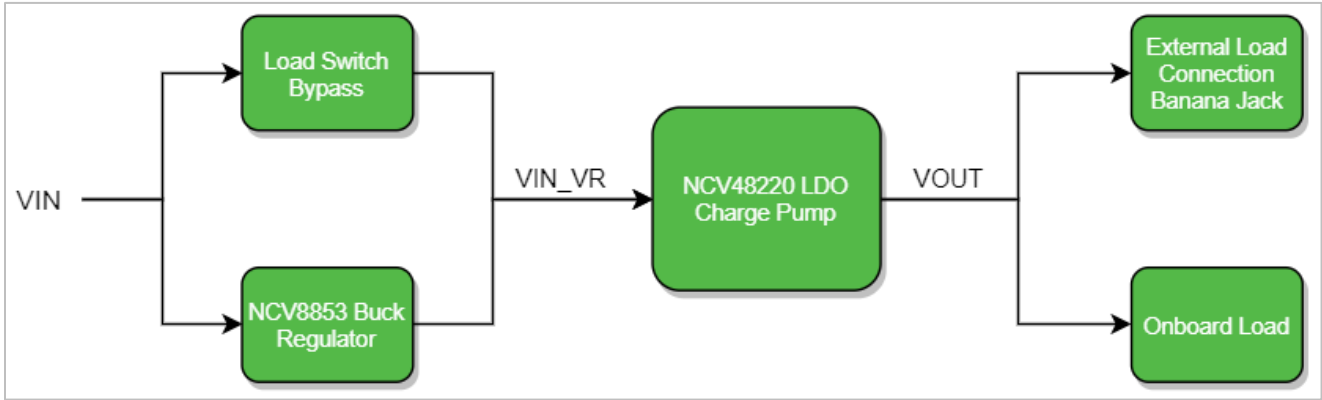


Figure 2: Simplified power flow diagram

User Interface

The UI within the Strata app will allow the user to control the LDO and monitor its telemetry without needing other lab equipment or training to do so. The steps below cover what is in the UI.

1. First, open the Strata app. The login page and home screen will appear.
2. Once logged in, the app will automatically detect the device that is plugged in and will bring up the UI for the EVB.
3. The main view that comes up (shown in Figure 3) offers basic telemetry, enable switches for enabling/disabling the LDO and onboard load, sliders for adjusting the onboard load current and input buck regulator output voltage, a drop-down box for selecting the LDO input voltage configuration, and a button for triggering the charge pump test waveform.

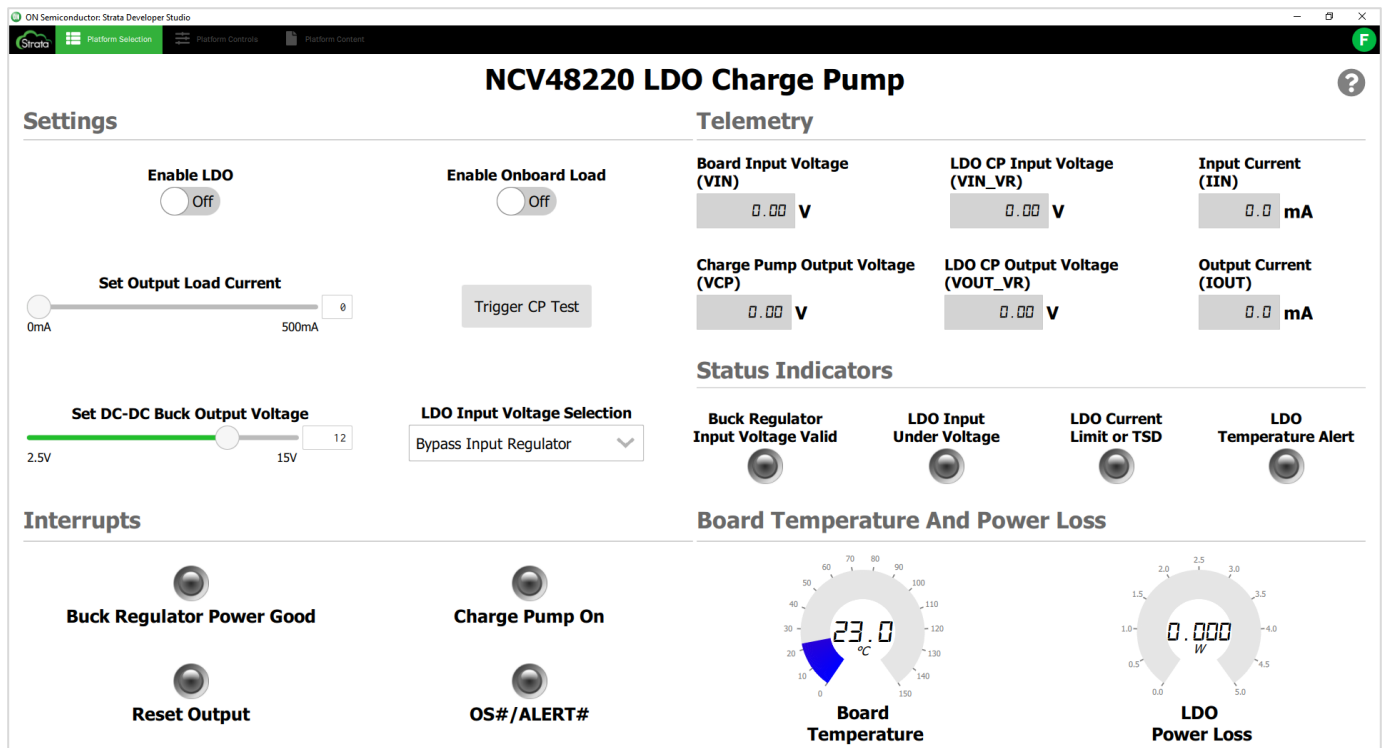


Figure 3: Basic UI view

4. The round button with a question mark in the top right corner is the Help button, and it will show the user what everything on the UI is doing.
5. To look at the collateral provided with the EVB, click on the “Platform Content” tab at the top of the screen.

Adjusting the LDO Input Voltage/Onboard Load Current

As discussed previously, when using the input buck regulator to supply power to the LDO, the LDO input voltage can be adjusted between 2.5V and 15V in the UI, assuming VIN is in the proper range (3.1V – 18V). If the voltage setting in the UI is set higher than VIN, the buck regulator output voltage setting will automatically be limited to VIN if the buck regulator is enabled. It is recommended not to adjust the buck regulator’s input voltage lower than the output voltage setting in the UI while the buck regulator is enabled as this may result in temporary instability in the buck regulator output voltage. The Strata interface will attempt to remedy the instability by readjusting the output voltage setting of the buck regulator. If the instability is not resolved after a few seconds, try readjusting the buck regulator output voltage in the UI.

An onboard load is also included on this EVB with a max load current of 500 mA, accuracy of ~2mA, and 1mA resolution. An external load can be used in parallel with the onboard load (see Figure 2). Both the buck regulator output voltage and output load current slider values in the UI can be adjusted while the buck regulator or onboard load are disabled, and the values will be set automatically when the respective components are activated again, assuming an appropriate input voltage has been supplied.

Charge Pump Test Waveform

The “Trigger CP Test” button in the UI will trigger a function to apply a sinusoidal voltage waveform to the LDO input via the input buck regulator to test the charge pump functionality. This test is intended to replicate the graph in Figure 26 of the NCV48220 datasheet (<https://www.onsemi.com/pub/Collateral/NCV48220-D.PDF>). For the test to be initiated, VIN must be greater than or equal to 12V, the input buck regulator and LDO are enabled, and the output current must be less than or equal to 150mA. Figure 3 shows the test waveform being triggered on this EVB.

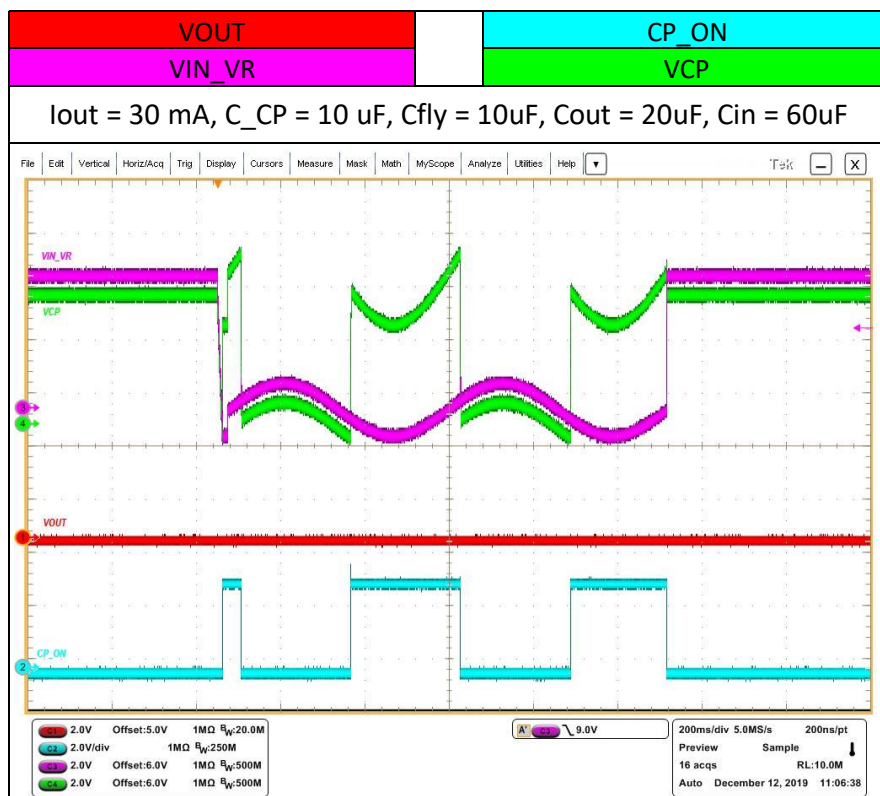


Figure 3: Charge pump test waveform

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor 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 as such not available for sale to consumers. The board is only intended for research, development, demonstration and evaluation purposes and should as such 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 delivered "AS IS" and without warranty of any kind including, but not limited to, that the board is production-worthy, that the functions contained in the board will meet your requirements, or that the operation of the board will be uninterrupted or error free. ON Semiconductor expressly disclaims all warranties, express, implied or otherwise, including without limitation, warranties of fitness for a particular purpose and non-infringement of intellectual property rights.

ON Semiconductor 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 ON Semiconductor shall not constitute any representation or warranty by ON Semiconductor, and no additional obligations or liabilities shall arise from ON Semiconductor having provided such information or services.

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. Should you purchase or use the board for any such unintended or unauthorized application, you shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of 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 ON Semiconductor 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.

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

LIMITATIONS OF LIABILITY: ON Semiconductor 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 ON Semiconductor is advised of the possibility of such damages. In no event shall ON Semiconductor'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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULLFILLMENT:

Literature Distribution Center for ON Semiconductor 19521 E.
32nd Pkwy, Aurora, Colorado 80011 USA

Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada

Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada

Email: orderlit@onsemi.com

N. American Technical Support:

800-282-9855 Toll Free USA/Canada

Europe, Middle East and Africa Technical Support:

Phone: 421 33 790 2910

ON Semiconductor Website:

<https://www.onsemi.com/>

Order Literature:

<https://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative