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Strata Enabled NCV48220 LDO Charge Pump EVB User Guide

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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 μA
- Enable Function (1.0 μA 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

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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.

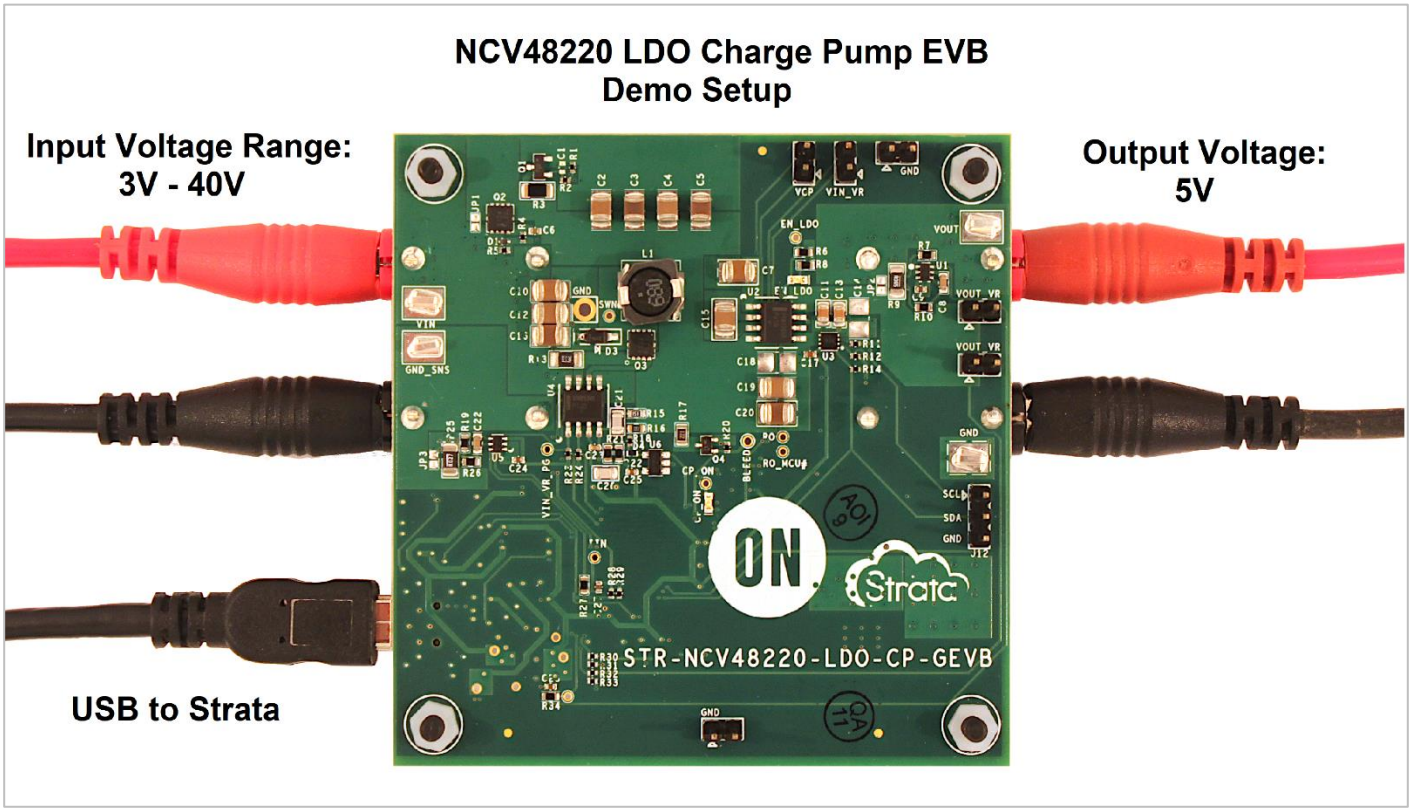

Figure 1: Demo setup

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.

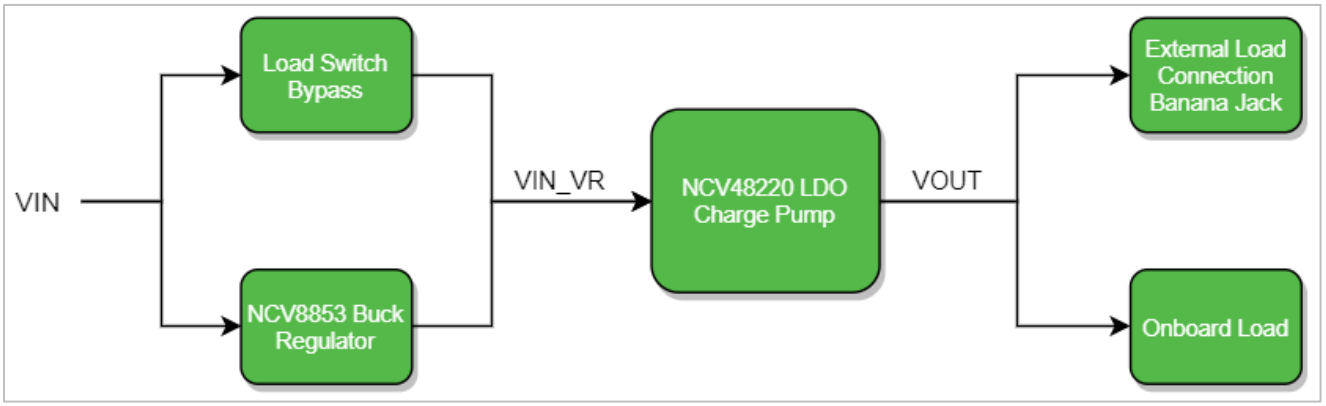

Figure 2: Simplified power flow diagram

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.

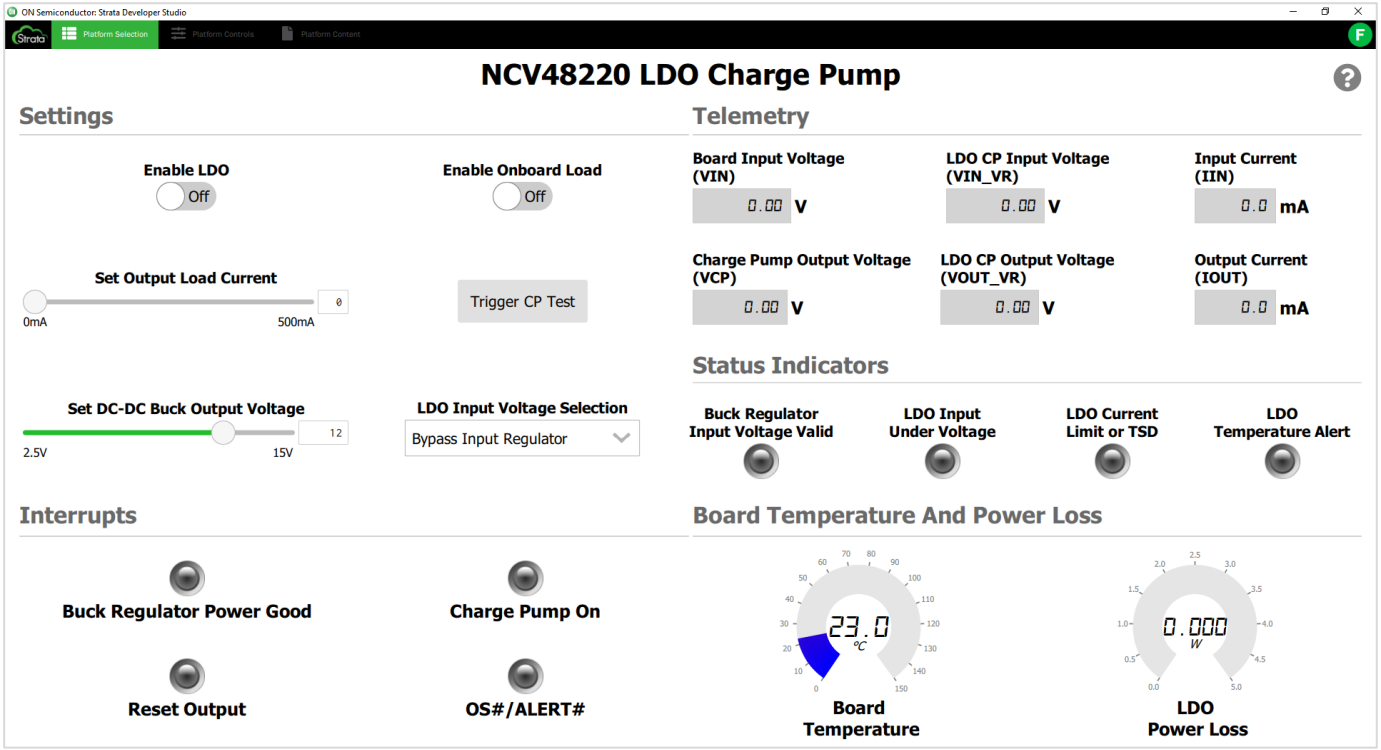

Figure 3: Basic UI view

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 outptut 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.

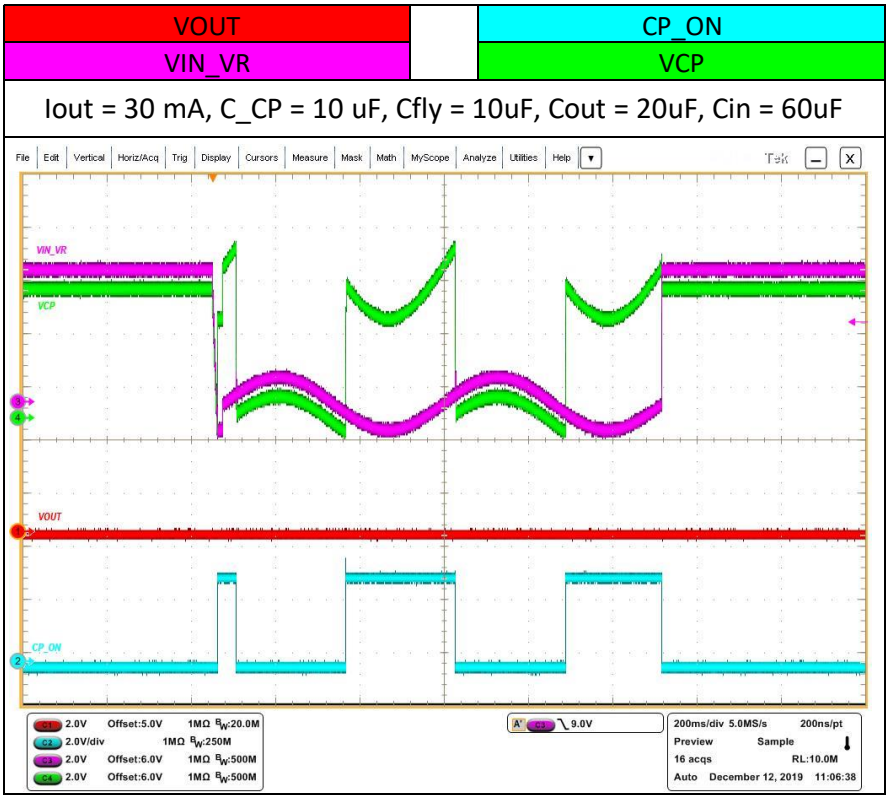

Figure 3: Charge pump test waveform

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