

UG254: CP2102N-MINIEK Kit User's Guide

The CP2102N-MINIEK kit is designed to showcase the various features of the CP2102N USBXpress® devices.

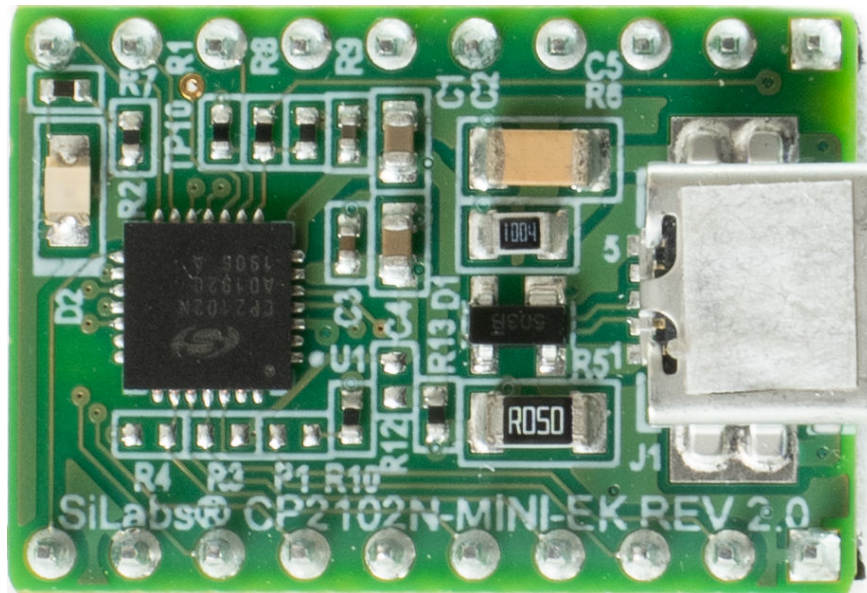
These highly-integrated USB-to-UART bridge controllers provide a simple solution for updating RS-232 designs to USB using a minimum of components and PCB space. By eliminating the need for complex firmware and driver development, the CP2102N devices enable quick USB connectivity with minimal development effort.

The kit includes the following:

- CP2102N USB-to-UART Bridge Mini Evaluation Board
- Getting Started card

KEY FEATURES

- CP2102N USB-to-UART Bridge
- Headers for easy access to UART, GPIO, and Battery Charger Detect pins
- 0.1" header pitch for breadboard compatibility
- Small board size



1. Getting Started

1. Download and Install the Latest Virtual COM Port (VCP) Drivers.

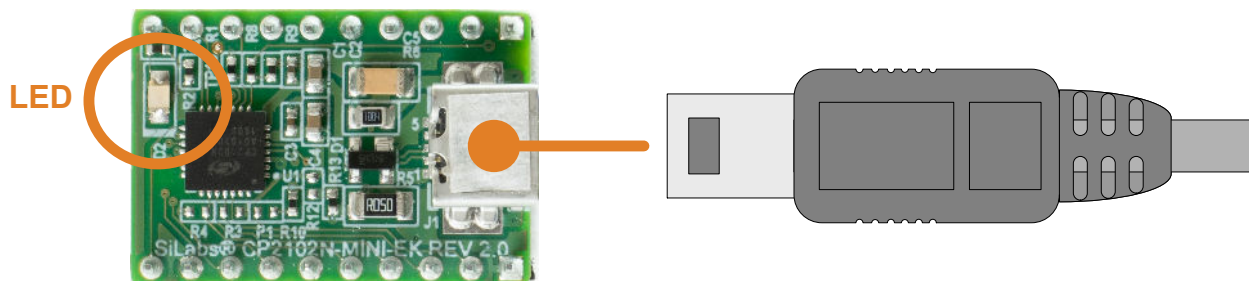
The Virtual COM Port (VCP) drivers enable the CP2102N to appear as a standard COM port. Download the latest version of drivers from the Silicon Labs website:

<https://www.silabs.com/developers/usb-to-uart-bridge-vcp-drivers>

In most cases, select the default option without serial enumeration.

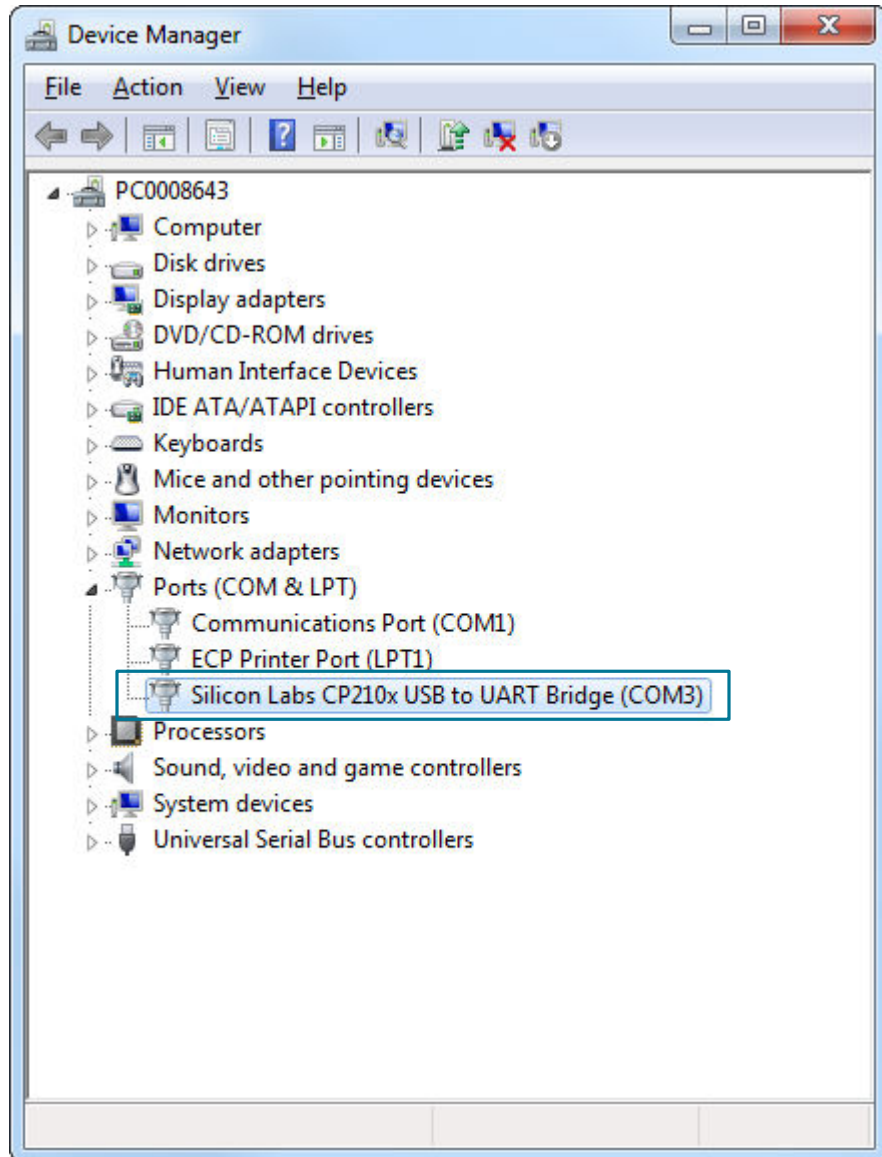
2. Set Up Your Kit.

- a. Provide power to the board by connecting the mini USB connector to the PC using a mini USB cable (not provided). When a connection has been established successfully, the LED (marked in the picture) lights up.



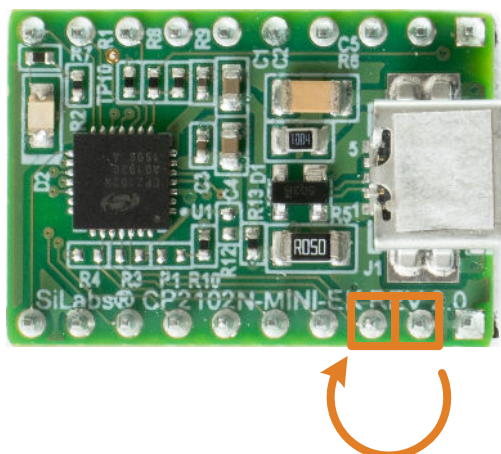
3. Detect Your Device.

The CP2102N device will appear as a COM port in Device Manager in Windows. As a virtual COM port, the CP210x functions identically to a real COM port from the reference point of both the host application and the serial device, and it can support serial device control requests defined in the Microsoft Win32® Communications API.



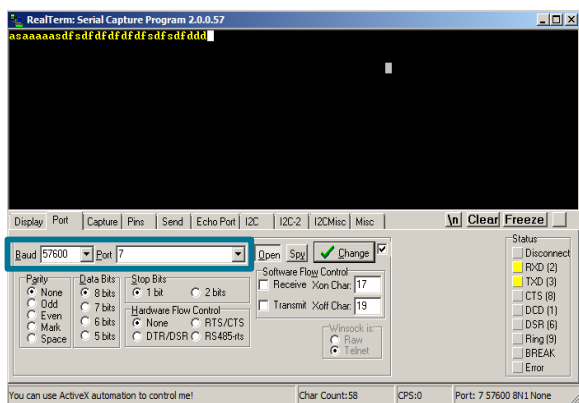
4. Set up a Loop-Back Test.

Short the CP210x RXD and TXD pins on header J2.



5. Send and Receive Some Data.

- a. In Windows, open a serial terminal program (downloaded separately, RealTerm pictured) to verify the CP2102N UART functionality.
- b. Set the baud rate and select the COM port from Device Manager.
- c. Type in the transmit area. The characters should echo back after looping through the CP2102N TXD and RXD pins.



6. Utilize the Available Resources.

The next section includes additional resources available for the device, including documentation and application notes.

2. Relevant Documentation

The following Application Notes are applicable to CP2102N devices:

- *AN721: USBXpress™ Device Configuration and Programming Guide* — This application note guides developers through the configuration process of USBXpress devices using Simplicity Studio [**Xpress Configurator**].
- *AN220: USB Driver Customization* — This document and accompanying software enable the customization of the CP210x Virtual COM Port (VCP) and USBXpress drivers.
- *AN197: Serial Communications Guide for CP210x* — This document describes recommendations for communicating with USBXpress CP210x devices using the Virtual COM Port (VCP) driver.
- *AN976: CP2101/2/3/4/9 to CP2102N Porting Guide* — This document guides developers on how to migrate existing systems using the CP2101/2/3/4/9 to the CP2102N.
- *AN169: USBXpress® Programmer's Guide* — This application note provides recommendations and examples for developing using the USBXpress direct-access driver.
- *AN807: Recertifying a Customized Windows Driver Package* — This document describes the WHQL certification process required for customized drivers.
- *AN223: Runtime GPIO Control for CP210x* — This document describes how to toggle GPIO pins from the USB host.

Application Notes can be accessed on the Silicon Labs website (www.silabs.com/interface-appnotes) or in Simplicity Studio using the **[Getting Started]>[Application Notes]** area of the launcher.

3. Device Customization

Device customization for the CP2102N is done through Xpress Configurator, which is available in Simplicity Studio:

<http://www.silabs.com/simplicity>

The Simplicity Studio software package contains all the tools, drivers, configuration software, and documentation needed to use the CP2102N USB-to-UART Bridge Mini Evaluation Board.

After downloading the latest version of Simplicity Studio and installing the software:

1. Install the CP210x Virtual COM Port Driver during the software setup steps, if it's not already installed. This action can always be accessed through **[Help]>[Setup Tasks]**.
2. Connect the CP2102N to the PC.
3. Select **[CP2102N]** under **[Devices]**. On the board, a successful USB connection is established when the SUSPENDB LED (D2) turns on.
4. Click on **[Compatible Tools]>[Xpress Configurator]** to open Xpress Configurator and customize the device.

Documentation for each of the customization options is provided within Xpress Configurator. More information on each of these options can be found in *AN721: USBXpress™ Device Configuration and Programming Guide*, which is available on the Silicon Labs website (www.silabs.com/interface-appnotes) or within Simplicity Studio under **[Getting Started]>[Application Notes]**.

4. Driver Options and Software Interface

4.1 Virtual COM Port (VCP) Driver

CP2102N devices are pre-programmed with a VID of 0x10C4 and PID of 0xEA60. This VID and PID combination matches the Virtual COM Port (VCP) driver. With this driver, the CP2102N will appear as a COM port and can be accessed using any terminal program or custom-written software. Install the VCP driver as part of the Simplicity Studio installation or download it directly from the Silicon Labs website (www.silabs.com/interface-software).

If the Virtual COM Port (VCP) drivers are used, the CP2102N will appear as a COM port in the Device Manager, as shown in the figure below. The CP2102N will always use the lowest available COM port for operation. For instance, if COM ports 1 and 2 are in use by other peripherals and applications, the CP2102N will use COM 3.

The CP2102N functions identically to a COM port from the reference point of both the host application and the serial device, and it can support serial device control requests defined in the Microsoft Win32® Communications API. Examples for how to communicate with the device as a serial COM port are included in *AN197: Serial Communications Guide for CP210x* or in the SDK.

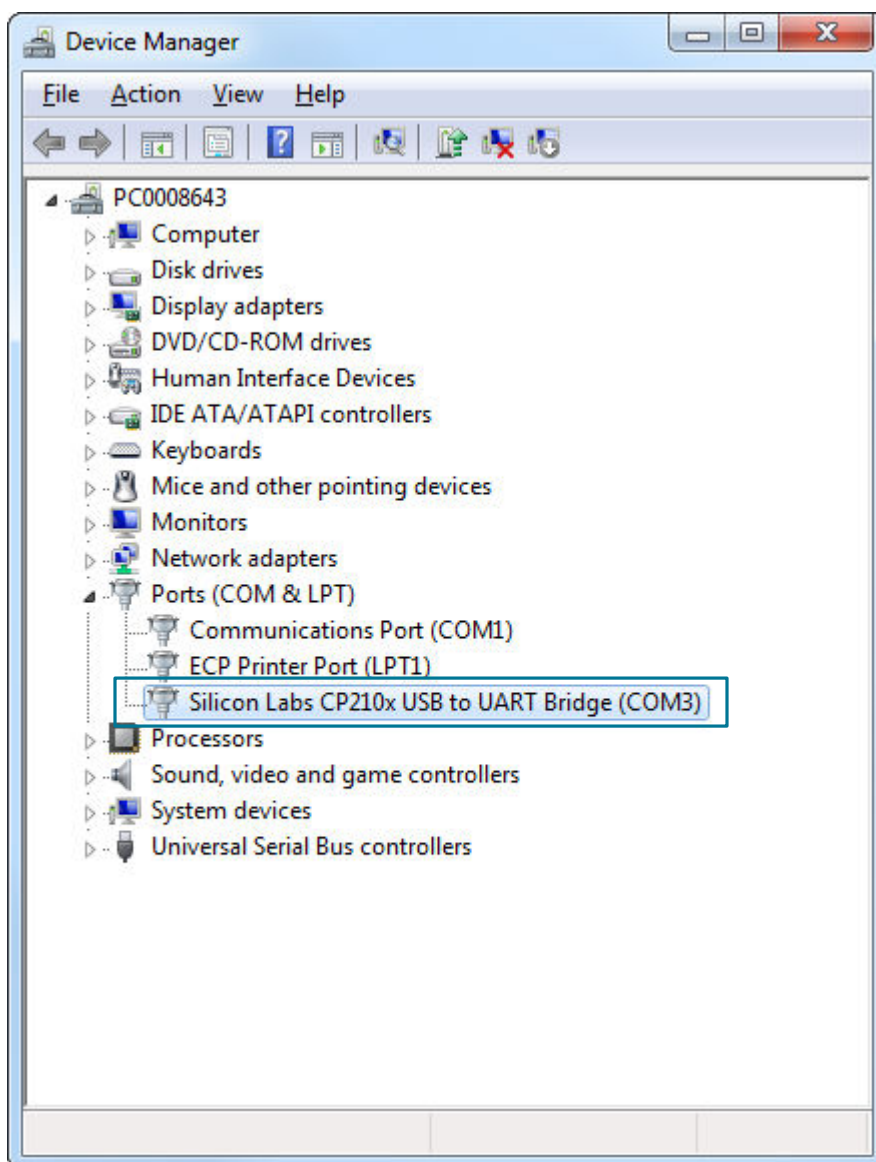


Figure 4.1. CP2102N in Device Manager — VCP

4.2 USBXpress Driver

An alternative driver is the USBXpress® direct-access driver, which is also available on the Silicon Labs website (www.silabs.com/interface-software). Rather than appearing as a COM port, software can use a simple, high-level Application Program Interface (API) to provide access to CP2102N for complete USB connectivity. No USB protocol or host device driver expertise is required. The USBXpress Development Kit includes Windows device drivers, Windows device driver installer, and host interface function library (host API) provided in the form of a Windows Dynamic Link Library (DLL). See Application Note *AN169: USBXpress® Programmer's Guide* for detailed information on using the USBXpress drivers.

If the USBXpress drivers are used, the CP2102N will appear as a USB USBXpress device as shown in the figure below. Examples for how to communicate with the device using the USBXpress interface are included in *AN169: USBXpress® Programmer's Guide*.

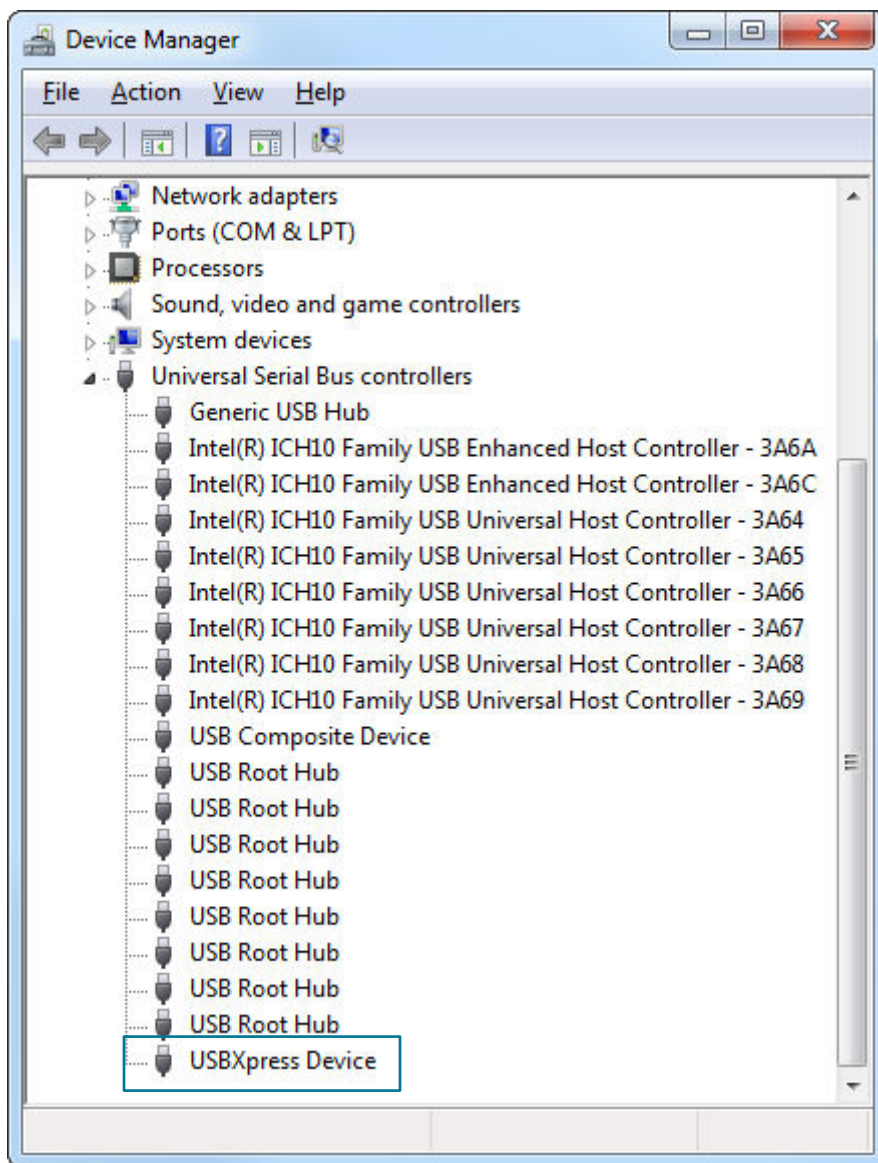


Figure 4.2. CP2102N in Device Manager — USBXpress

5. Hardware Overview

The CP2102N Mini Evaluation Kit includes an evaluation board with a CP2102N device pre-installed for evaluation and preliminary software development. Numerous input/output (I/O) connections are provided to facilitate prototyping using the evaluation board. Refer to the figure below for the locations of the various I/O connectors.

Table 5.1. CP2102N Mini Evaluation Board Component Overview

Component	Description
D2	SUSPENDb indicator LED
J1	USB mini connector
J2	Header for UART pins (TX, RX, RTS, CTS), VBUS pin, suspend pins, and Charge Enable pin CHR0
J5	Header for power pins (VDD, VREGIN), reset pin, GPIOs, and Charge Enable pins (CHREN, CHR1)

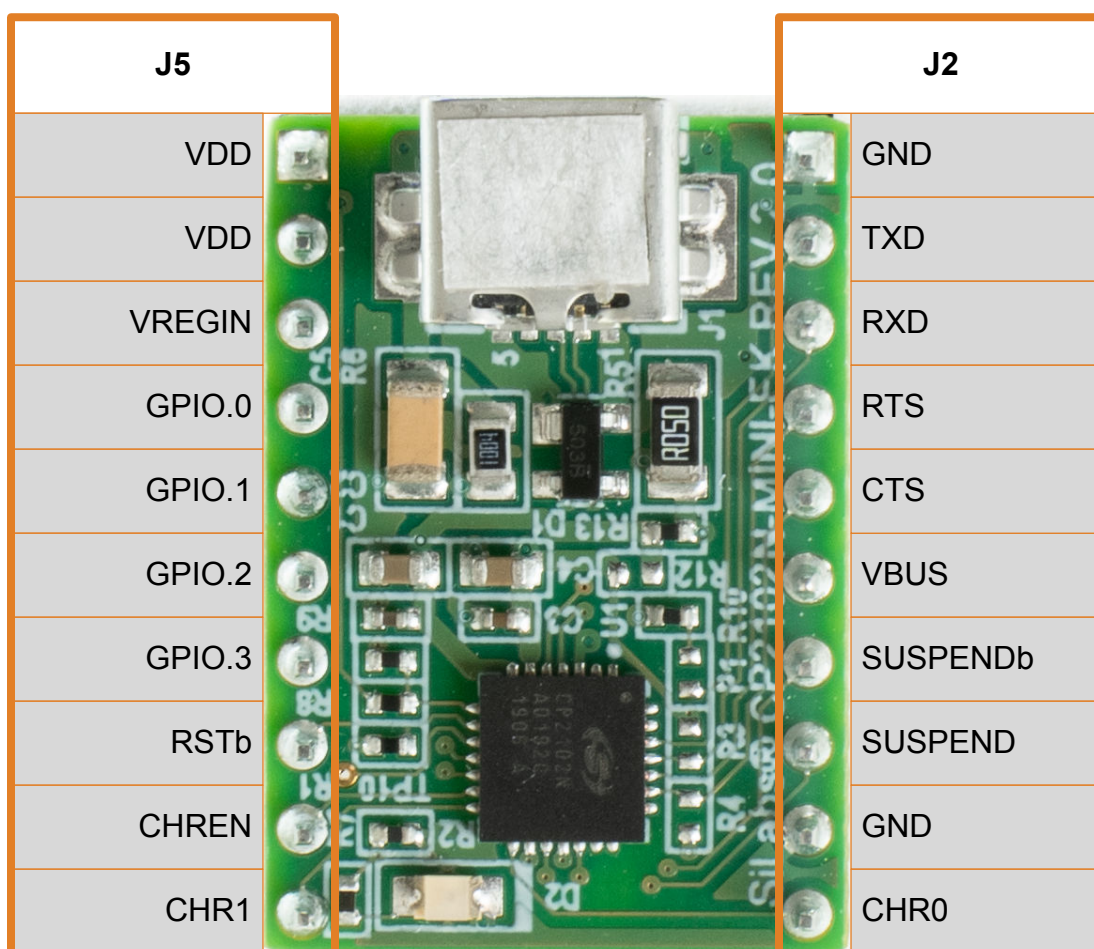


Figure 5.1. CP2102N Mini Evaluation Board

5.1 USB Interface (J1)

A Universal Serial Bus (USB) mini connector (J1) is provided to facilitate connections to the USB interface on the CP2102N. See the table below for the USB pin definitions.

Table 5.2. USB Mini Connector Pin Descriptions

Pin Number	Description
1	VBUS
2	D-
3	D+
4	ID (Not Connected)
5	Ground

5.2 Headers (J2 and J5)

The J2 and J5 headers provides direct access to the CP2102N power, reset, UART, suspend, and charge enable pins. See the table below for the J2 and J5 pin descriptions.

Table 5.3. J2 Pin Descriptions

Pins	Signal	CP2102N Direction	Description
1	GND	N/A	Ground
2	TXD	Output	Transmit Data
3	RXD	Input	Receive Data
4	RTS	Output	Request to Send
5	CTS	Input	Clear to Send
6	VBUS	Input	USB VBUS
7	SUSPENDb	Output	Driven low when device enters USB suspend state.
8	SUSPEND	Output	Driven high when device enters USB suspend state.
9	GND	N/A	Ground
10	CHR0	Output	Enable charging circuit (500 mA)

Table 5.4. J5 Pin Descriptions

Pins	Signal	CP2102N Direction	Description
1	VDD	Output	3.3 V Regulator Output
2	VDD	Output	3.3 V Regulator Output
3	VREGIN	Input	5 V Regulator Input
4	GPIO.0	Input / Output	General Purpose I/O 0
5	GPIO.1	Input / Output	General Purpose I/O 1
6	GPIO.2	Input / Output	General Purpose I/O 2
7	GPIO.3	Input / Output	General Purpose I/O 3
8	RSTb	Input	Active-low Reset
9	CHREN	Output	Enable charging circuit (100 mA)
10	CHR1	Output	Enable charging circuit (1.5 A)

6. Schematics and BOM

6.1 Board Files

The schematics and bill of materials (BOM) for the CP2102N USB-to-UART Bridge Mini Evaluation Board are available through Simplicity Studio when the kit documentation package has been installed. To access these documents, click the **[Documentation]** tab in the launcher, and manually specify the connected board.

6.2 Board Revision History

Rev00 Boards

- Initial production revision.
- BOM specifies CP2102N-A01 chip revision.

Rev00 errata:

- Board does not include required voltage divider on VBUS pin as described in section 2.3 of the [CP2102N Datasheet](#).

Rev 2.0 Boards

- Second production revision.
- BOM specifies CP2102N-A02 chip revision.
- Added voltage divider to VBUS pin.
- Added optional pulldown resistor for line break support (CP2102N-A02 only).

Rev 2.0 errata:

- These boards do not currently have any known issues.

7. Revision History

Revision 0.1

October, 2016

- Initial revision.

Revision 0.2

December, 2019

- Updated Revision History format.
- Updated images throughout to reflect hardware revision 2.0.
- Updated [6.2 Board Revision History](#) to reflect hardware revision 2.0.
- Corrected error in pinout diagram in [Figure 5.1 CP2102N Mini Evaluation Board on page 9](#).

Revision 0.3

May, 2021

- Updated the link of the VCP Driver in [1. Getting Started](#).
- Updated the title of AN721, AN976, AN169, AN807.
- Corrected Pin 1 and Pin 2 descriptions in [Table 5.4 J5 Pin Descriptions on page 11](#).

Simplicity Studio

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