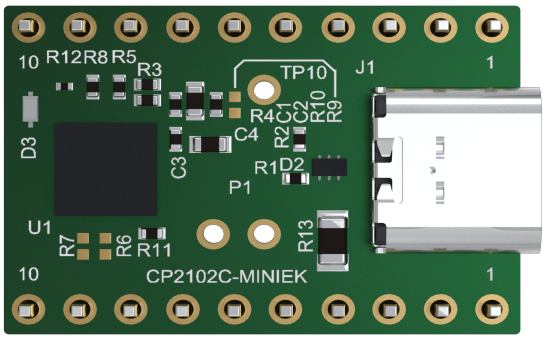
UG595: CP2102C USB-to-UART Bridge Mini Development Kit User's Guide

The CP2102C USB-to-UART Bridge Mini Development Kit is designed to showcase the various features of the CP2102C 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. CP2102C devices includes a USB 2.0 full-speed function controller, USB transceiver, oscillator, and Universal Asynchronous Receiver/Transmitter (UART) in packages as small as 4 mm x 4 mm. No other external USB components are required for development. By eliminating the need for complex firmware and driver development, the CP2102C devices enable quick USB connectivity with minimal development effort.



TARGET DEVICE

- CP2102C USB-to-UART bridge (CP2102C-A01-GQFN28R)

KIT FEATURES

- User LED
- 20-pin 2.54 mm breakout pads
- Line break support
- USB-powered

SOFTWARE SUPPORT

- Simplicity Studio™

ORDERING INFORMATION

- CP2102C-MINIEK

Table of Contents

1. Introduction

The CP2102C USB-to-UART Bridge Mini Development Kit is a compact and versatile board designed for developers and engineers looking to integrate USB connectivity into embedded systems. This development kit provides an easy-to-use solution for converting USB signals into UART serial data, making it ideal for applications that require reliable USB-to-serial communication.

The CP2102C USB-to-UART Bridge Mini Development Kit is optimized for ease of use, offering a plug-and-play experience with built-in USB and UART connectivity without the need for additional external components. It supports full-speed USB 2.0 data transfers and includes advanced features such as programmable baud rates, low-power operation, and integrated voltage regulators, enabling flexible and power-efficient designs.

With its compact form factor and user-friendly design, the CP2102C USB-to-UART Bridge Mini Development Kit board is perfect for prototyping, testing, and debugging applications that require reliable USB-to-serial communication, making it a valuable tool for developing a wide range of devices, from microcontroller-based projects to sensor networks and IoT systems.

1.1 Kit Contents

The following item is included in the box:

- 1x CP2102C USB-to-UART Bridge Mini Development Board (BRD8101A)

1.2 Getting Started

Step 1: Set Up Your Kit.

- Provide power to the board by connecting the USB Type-C connector to the PC using a USB Type-C cable (not provided as part of the kit). When a connection has been established successfully, the LED (D3) lights up (except when the board is connected to the external power supply unit on Breakout Pads or when CP2102C is in Suspend mode).

Step 2: Device Detection.

- The CP2102C device will appear under ports 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.

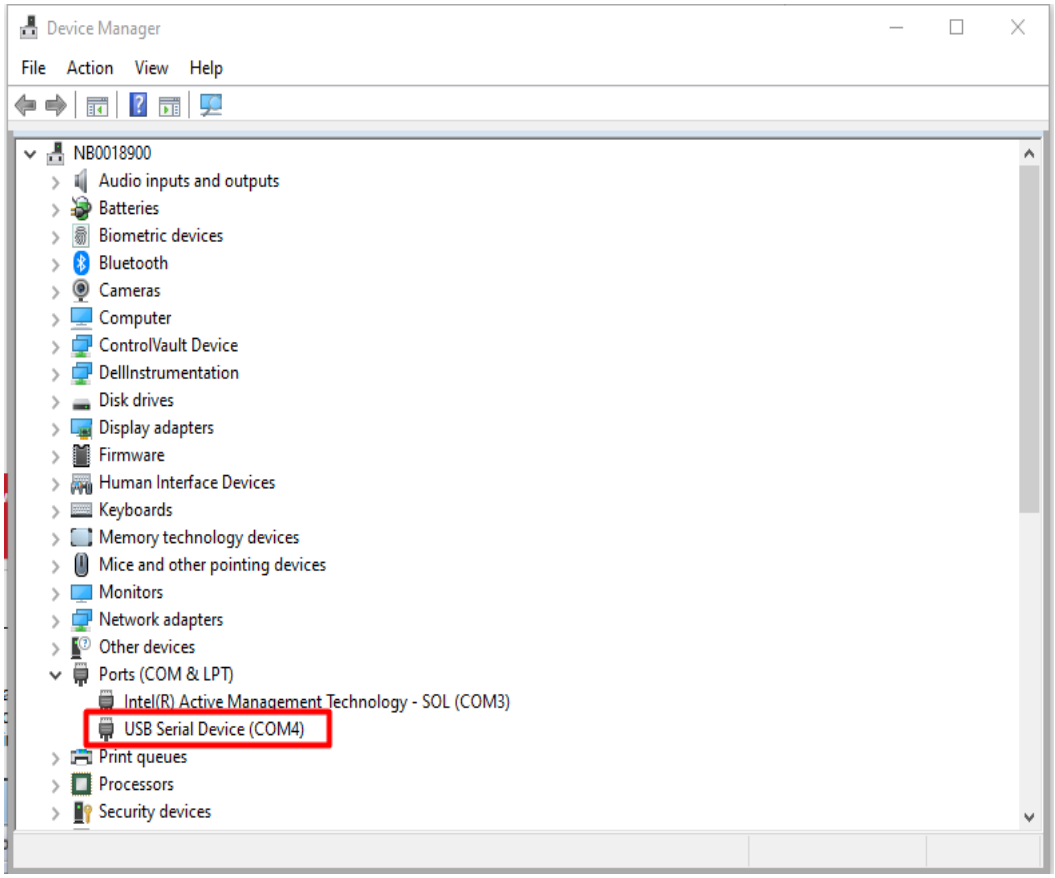


Figure 1.1. CP2102C USB-to-UART Bridge Mini Development Kit in Device Manager

Step 3: Loop-Back Test.

- Short the CP210x CTS and GND pins on header P2.
- Short the CP210x RXD and TXD pins on header P2.

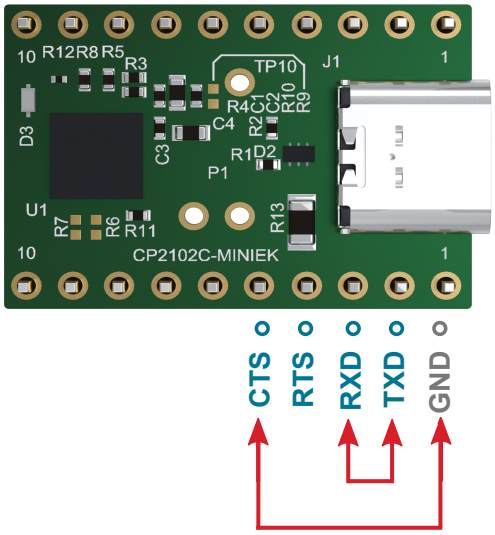


Figure 1.2. CP2102C USB-to-UART Bridge Mini Development Kit Connectors

Step 4: Transmit and Receive Data.

- In Windows, open a serial terminal program (downloaded separately, RealTerm pictured) to verify the CP2102C UART functionality.
- Set the baud rate and select the COM port from Device Manager.
- Type in the transmit area. The characters should echo back after looping through the CP2102C TXD and RXD pins.

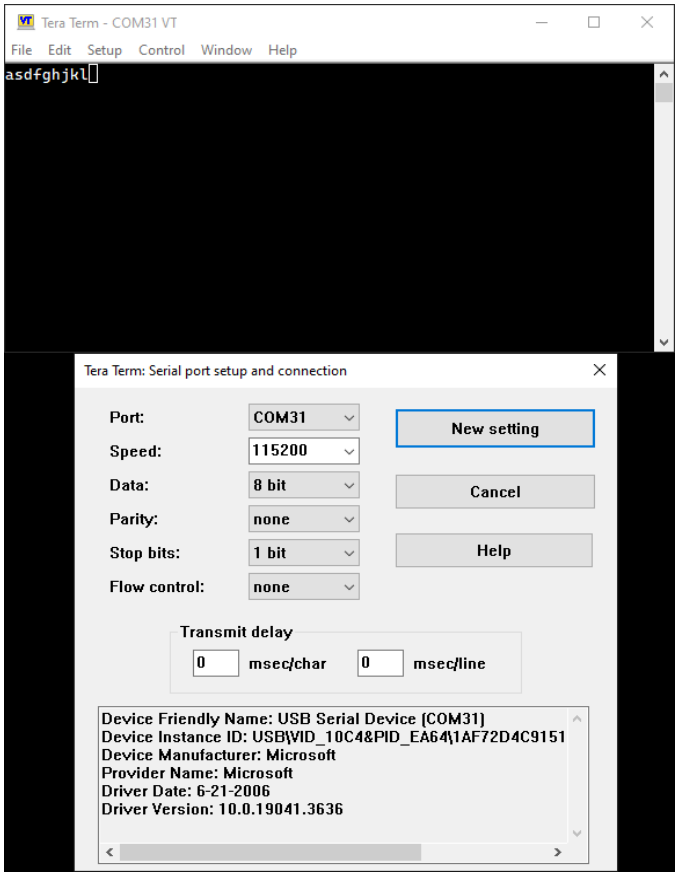


Figure 1.3. CP2102C USB-to-UART Bridge Mini Development Kit in Terminal Program

Detailed instructions for how to get started with your new CP2102C USB-to-UART Bridge Mini Development Kit can be found on the Silicon Labs web page: https://www.silabs.com/dev-tools

1.3 Hardware Content

The following key hardware elements are included on the CP2102C USB-to-UART Bridge Mini Development Kit:

- Full-speed USB 2.0 support
- Configurable baud rates and data formats
- Onboard status LED
- Breakout pads
- Line break support

1.4 Kit Hardware Layout

CP2102C USB-to-UART Bridge Mini Development Kit layout is shown below.

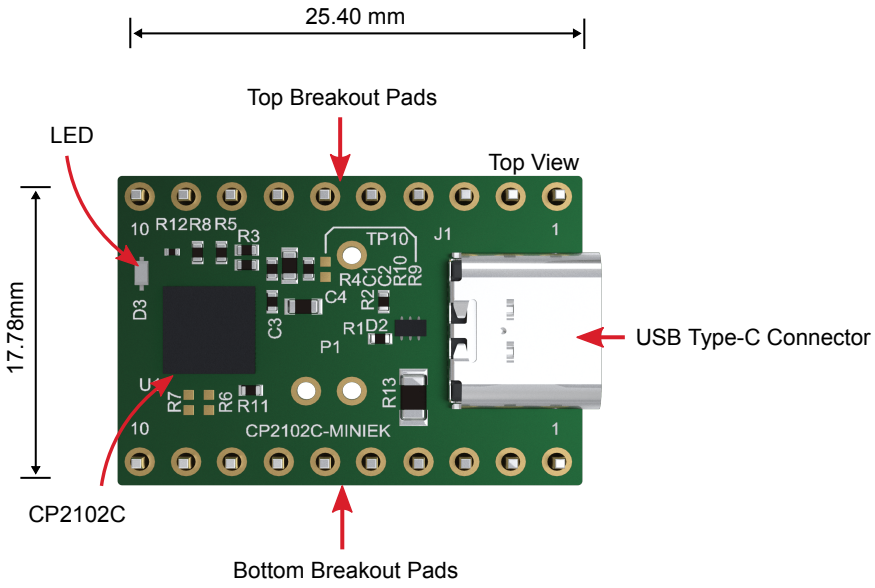


Figure 1.4. CP2102C USB-to-UART Bridge Mini Development Kit Hardware Layout

2. Specifications

2.1 Recommended Operating Conditions

Table 2.1. Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Operating Supply Voltage on VDD	V_{DD}	3.0	—	3.6	V
Operating Supply Voltage on VREGIN	V_{VREGIN}	3.0	—	5.25	V

2.2 Current Consumption

Table 2.2. Current Consumption

Parameter	Symbol	Condition	Typ	Unit
Normal Operation	I_{DD}	115200 baud transmitting continuous bidirectional data	9.5	mA
		3 Mbaud transmitting continuous bidirectional data	13.7	mA
USB Suspend	I_{DD}	—	195	µA
Held in Reset	I_{DD}	—	1.3	mA
USB Pull-up	I_{PU}	—	200	µA

2.3 Data Formats and Baud Rates

Table 2.3. Data Formats and Baud Rates

Parameter	Available Values
Data Bits	5, 6, 7, and 8
Stop Bits	1, 1.5[1], and 2
Party Types	none, even, odd, mark, space
Baud Rates	300, 600, 1200, 1800, 2400, 4000, 4800, 7200, 9600, 14400, 16000, 19200, 28800, 38400, 51200, 56000, 57600, 64000, 76800, 115200, 128000, 153600, 230400, 250000, 256000, 460800, 500000, 576000, 921600, 1000000, 1200000, 1500000, 2000000, 3000000

Note:
1. The stop bit is active for two bit times (when the data length is 6, 7, or 8 bits) or 1.5 bit times (when the data length is 5 bits).

3. Hardware

The core of the CP2102C USB-to-UART Bridge Mini Development Kit is the CP2102C USB-to-UART bridge. Refer to section 1.4 Kit Hardware Layout for placement and layout of the hardware components.

3.1 Block Diagram

An overview of the CP2102C USB-to-UART Bridge Mini Development Kit is illustrated in the figure below.

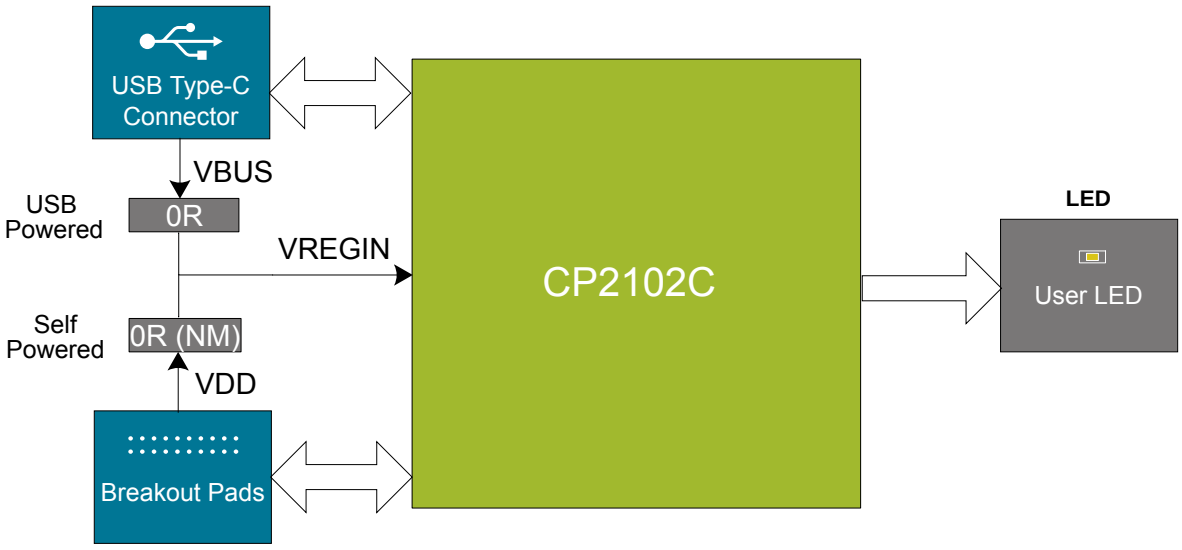


Figure 3.1. Kit Block Diagram

3.2 Power Supply

In CP2102C USB-to-UART Bridge Mini Development Kit, there are two primary power supply options for operation:.

- USB-powered
- Self-powered

The power topology of the kit is illustrated in the figure below.

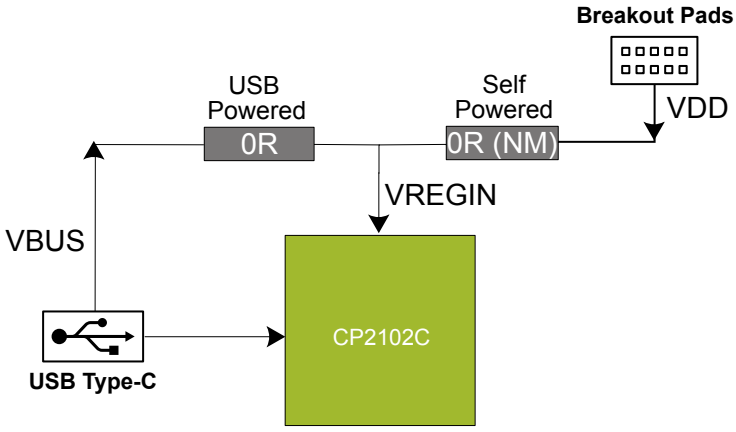


Figure 3.2. CP2102C USB-to-UART Bridge Mini Development Kit Power Topology

In USB-powered mode, the kit draws power directly from the USB port when it is connected to a computer or any other USB power source.

In self-powered mode, the kit is powered by an external power source via breakout pads.

Note: By default, this device operates in USB-powered mode. To switch to self-powered mode, remove R10 and solder R9.

3.3 LED

The kit features a green LED marked D3 controlled by the pin on the CP2102C. D3 is connected to pin SUSPENDb which is driven low when the device enters the USB suspend state.

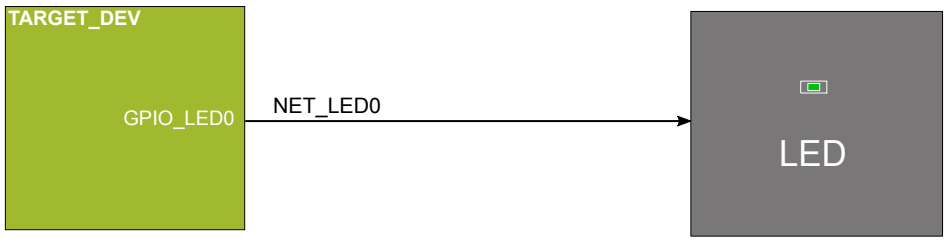


Figure 3.3. LED

3.4 Connectors

The CP2102C USB-to-UART Bridge Mini Development Kit features a USB Type-C connector and 20 breakout pads. The connectors are placed on the top side of the board, and their placement and pinout are shown in the figure below. For additional information on the connectors, see the following sub chapter.

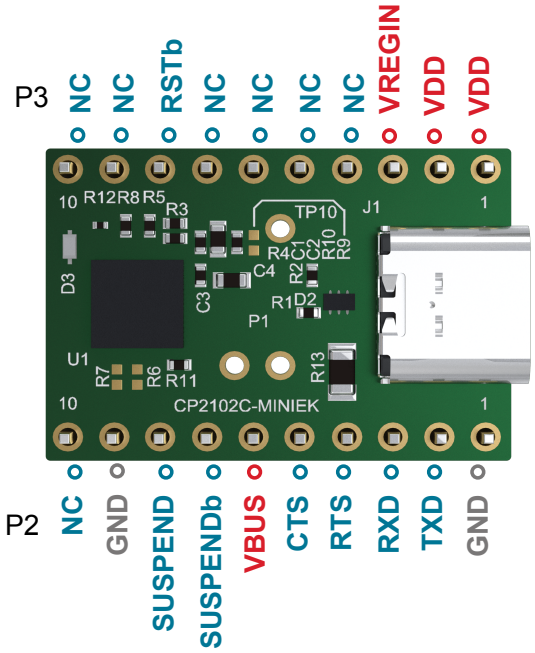


Figure 3.4. CP2102C USB-to-UART Bridge Mini Development Kit Connectors

3.4.1 Breakout Pads

Twenty breakout pads are provided and allow connection of external peripherals. There are 10 pads on the bottom side of the board, and 10 pads on the top. These have a standard 2.54 mm pitch, and pin headers can be soldered in if required. The breakout pads contain a number of I/O pins that can be used with most of the CP2102C USB-to-UART bridge's features. Additionally, the VREGIN (5V Regulator Input), VDD (Supply Power Input/ 5V Regulator Output), and VBUS power rails are also exposed on the pads.

The pin-routing on the CP2102C USB-to-UART Bridge Mini Development Kit is very flexible, so most peripherals can be routed to any pin. The table below shows the pin connections of the breakout pads with description.

Table 3.1. Bottom Row (P2) Pinout

Pin	CP2102C I/O Pin	Description
1	GND	Ground
2	TXD	Transmit Data
3	RXD	Receive Data
4	RTS	Request to Send
5	CTS	Clear to Send
6	VBUS	USB VBUS
7	SUSPENDb	Driven low when device enters USB suspend state
8	SUSPEND	Driven high when device enters USB suspend state
9	GND	Ground
10	NC	—

Table 3.2. Top Row (P3) Pinout

Pin	CP2102C I/O Pin	Description
1	VDD	3.3 V Regulator Output
2	VDD	3.3 V Regulator Output
3	VREGIN	5 V Regulator Input
4	NC	—
5	NC	—
6	NC	—
7	NC	—
8	RSTb	Active-low Reset
9	NC	—
10	NC	—

4. Schematics, Assembly Drawings, and BOM

Schematics, assembly drawings, and Bill of Materials (BOM) are available through Simplicity Studio when the kit documentation package has been installed. They are also available from the kit page on the Silicon Labs website: silabs.com.

5. Kit Revision History and Errata

5.1 Revision History

The kit revision can be found printed on the box label of the kit, as outlined in the figure below. The kit revision history is summarized in the table below.

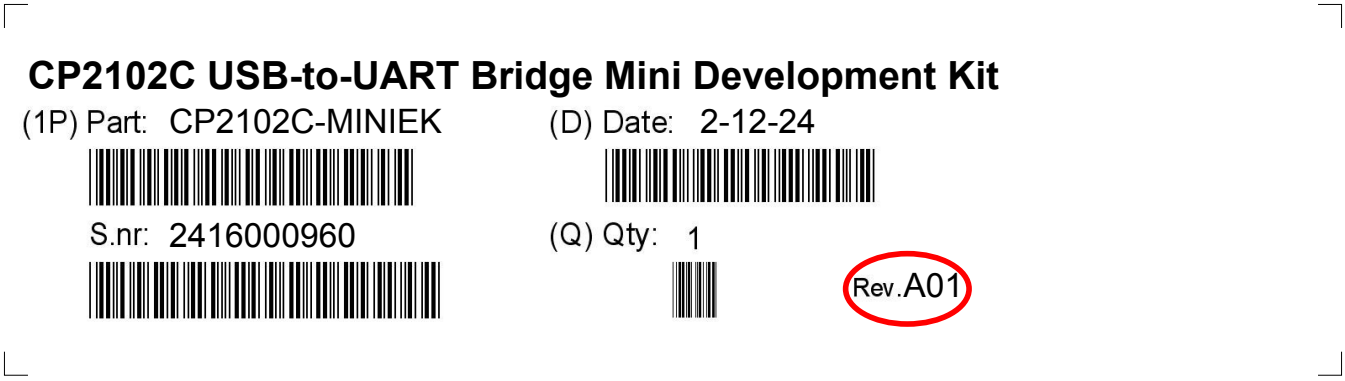


Figure 5.1. Revision Info

Table 5.1. Kit Revision History

Kit Revision	Released	Description
A01	2 December 2024	New kit introduction of CP2102C-MINIEK.

5.2 Errata

There are no known errata at present.

6. Board Revision History and Errata

6.1 Revision History

The board revision can be found laser printed on the board, and the board revision history is summarized in the following table.

Table 6.1. Board Revision History

Revision	Released	Description
A05	2 December 2024	Initial production release.

6.2 Errata

There are no known errata at present.

7. Document Revision History

Revision 1.0

January 2025

- Initial document release.

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