

# CP2110-EK

# **CP2110 EVALUATION KIT USER'S GUIDE**

# 1. Kit Contents

The CP2110 Evaluation Kit contains the following items:

- CP2110 Evaluation Board
- RS232 Serial Cable
- USB Cable
- Quick Start Guide

# 2. Relevant Documentation

Application notes can be found on the Interface Application Notes page for all fixed-function devices: www.silabs.com/interface-appnotes.

- AN721: USBXpress<sup>™</sup> Device Configuration and Programming Guide Customize the VID, PID, serial number, and other parameters stored in the CP2110 one-time programmable ROM.
- AN433: CP2110/4 HID-to-UART API Specification— Provides function descriptions and examples for all of the PC software functions that control the CP2110.
- AN434: CP2110/4 Interface Specification Describes the HID report format for CP2110 devices.

# 3. Software Setup

The Software Development Kit (SDK) packages and documentation for the CP2110 kit can be found on the device page: (https://www.silabs.com/interface/usb-bridges/classic/device.cp2110-f02-gm1) and contains the following:

- CP2110/4 Software packages (Software & Tools Tab)
- USBXpress Host SDK (Software & Tools Tab)
- Documentation: (Tech Docs tab)
  - CP2110 Data Sheets
  - CP2110 User's Guide (this document)

**Note:** Follow the instruction to install the SDK to the system. The CP2110 is an HID device, so a driver does not need to be installed on most operating systems.

# 4. CP2110 Hardware Interface

Connect the CP2110 evaluation board to a PC as shown in Figure 1.

- 1. Connect one end of the USB cable to a USB Port on the PC.
- 2. Connect the other end of the USB cable to the USB connector on the CP2110 evaluation board.
- 3. Connect one end of the RS-232 serial cable to the DB-9 connector on the CP2110 evaluation board.
- 4. Connect the other end of the RS-232 serial cable to the target serial device.

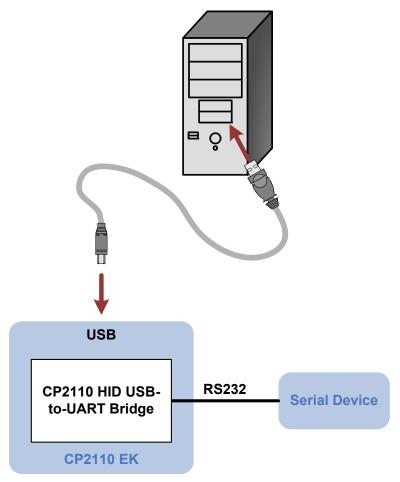


Figure 1. Hardware Setup



# 5. CP2110 Software Interface

The CP2110 is an HID device that uses the standard HID functions available in the operating system. To facilitate this process in Windows, Silicon Labs packaged the standard HID functions into the SLABHIDDevice DLL in the CP2110 software package. The HID report structure for the CP2110 is customized for the device and is not compatible with other HID report structures, like a mouse or keyboard. AN434, "CP2110/4 Interface Specification" describes the custom HID report structure for the CP2110, and AN433, "CP2110/4 HID-to-UART API Specification" describes the API software functions that can be used to read or write data and control the CP2110 from the PC. The software application described in "6. CP2110 Windows Application" provides an example of how to use these functions.

The CP2110 appears as an HID device in Device Manager as shown in Figure 2.

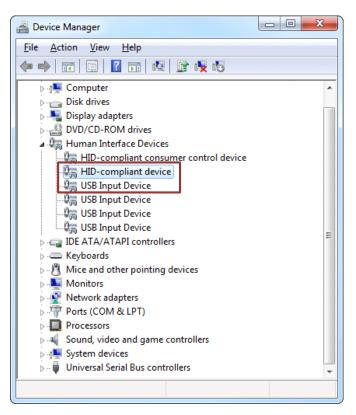


Figure 2. CP2110 in Device Manager



# 6. CP2110 Windows Application

The HIDUart application is an example application that uses the Windows CP2110 HID-to-UART DLL to transmit and receive data with the CP2110. The application also has access to the CP2110's GPIO pins. The HIDUart application is installed as part of the SDK installation process (Section 3). The following steps describe how to start the application and use some of the features.

- 1. Ensure that the hardware is connected to a Windows PC as shown in Section 4. If the device is properly connected, the red SUSPEND LED on the CP2110 evaluation board will turn on.
- 2. Launch the HIDUart application, which is found by clicking Start→All Programs→Silicon Laboratories→HIDUart Example.
- 3. In the application, configure the baud rate, data bits, parity, stop bits, and type of flow control using the drop-down menus. This configuration should match the communication settings used by the serial device.
- 4. Click **Connect** to start communication between the application and the CP2110 evaluation board. Once connected, the USB descriptors retrieved from the device are shown under **Device Information**.

Connection	Device Informa	tion		
0005F5C5	vid:	10c4	PID: ea80	
Disco	nnect Serial:	0005F5C5		
Configurati	Path:	\\?\hid#vid_100	4&pid_ea80#6&1c65	94a9&0&0000#{4d1e5
Baud Rate:	Part Number:	10	Version: 1	
115200	Part Number:			
D: P: S:	FC: Manufacturer:	Silicon Laborato	ries	
8 v) N v) 1 v)	No	CP2110 HID US	B-to-UART Bridge	
Pin Control	Data Transfer Transmit:			
GPIO.0 / CLK:	sdfsdf			Transmit
		<b>~</b> (5)		Ascii
GPIO.2 / CTS:				O Hex
		-		<b>*</b>
GPIO.4 / TX Toggle: 🛛 🛛	Receive:			
en ele rent rom regioner i la	73 64 66 7	3 64 66		sdfsdf 🔺
GPIO.6:				
GPIO.9:				6
				-
	4			F

#### Figure 3. HIDUart Example Application after Connection

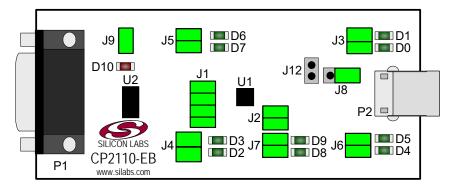
- 5. Type data in the Transmit text box and click Transmit to send data from the PC to the serial device.
- 6. Send data from serial device to the PC. Any data sent by the serial device to the PC is automatically updated in the **Receive text box**.
- 7. The HIDUart example automatically recognizes how the GPIO pins are configured and enables/disables the ability to change and read the pin. The default configuration is shown in Figure 3. Use the **Get** and **Set** buttons to read and write the GPIO pins' latch values. For GPIO pins that are configured as outputs, setting the pin to logic low 0 will turn on the corresponding LED on the CP2110 evaluation board.



# 7. Evaluation Board Overview

The CP2110 Evaluation Kit includes an evaluation board with a CP2110 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 Figure 4 for the locations of the various I/O connectors.

- P1 DB9 connector for RS-232 interface
- P2 USB connector for USB interface
- J1 UART signal access connector
- J2 VDD and VIO power connectors
- J3 GPIO0 and GPIO1 LED connectors
- J4 GPIO2 and GPIO3 LED connectors
- J5 GPIO4 and GPIO5 LED connectors
- J6 GPIO6 and GPIO7 LED connectors
- J7 GPIO8 and GPIO9 LED connectors
- J8 <u>REGIN pin power connector</u>
- J9 SUSPEND RED LED connector
- J12 Self-Power mode VDD and GND access connectors





### 7.1. LED Headers (J3, J4, J5, J6, J7)

Connectors J3, J4, J5, J6, and J7 are provided to allow access to the 10 GPIO pins on the CP2110. Place shorting blocks on these headers to connect the GPIO pins to the 10 green LEDs D0 - D9. These LEDs can be used to indicate active communications through the CP2110. Table 1 shows the LED corresponding to each header position.

LED	Pins	LED	Pins
GPIO0-D0	J3[3:4]	GPIO5-D6	J5[1:2]
GPIO1-D1	J3[1:2]	GPIO6-D4	J6[3:4]
GPIO2-D2	J4[3:4]	GPIO7-D5	J6[1:2]
GPIO3-D3	J4[1:2]	GPIO8-D8	J7[3:4]
GPIO4-D7	J5[3:4]	GPIO9-D9	J7[1:2]

Table 1. J2 and J3 LED Locations
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# 7.2. Universal Serial Bus (USB) Interface (P2)

A Universal Serial Bus (USB) connector (P2) is provided to facilitate connections to the USB interface on the CP2110. See Table 2 for the USB pin definitions.

#### **Table 2. USB Connector Pin Descriptions**

Pin #	Description	
1	VBUS	
2	D-	
3	D+	
4	GND (Ground)	

### 7.3. UART Signals (P1, J1)

An RS-232 transceiver circuit and DB9 connector (P1) are provided on the evaluation board to connect the CP2110 virtual serial port to external serial devices. See Table 3 for the RS-232 (P1) pin descriptions. The J1 connector is provided to facilitate direct access to the CP2110's UART signals. Shorting blocks on J1 are required to connect the UART signals to the USB connector (P2). See Table 4 for J1 pin descriptions.

Pin	Signal	CP2110 Direction	Description
2	RXD	Input	Receive Data
3	TXD	Output	Transmit Data
5	GND		Ground
7	RTS	Output	Request to Send
8	CTS	Input	Clear to Send

#### Table 3. RS-232 Pin Descriptions

	Pins	Signal	CP2110 Direction	Description
ĺ	1-2	TXD	Output	Transmit Data
ĺ	3-4	RXD	Input	Receive Data
ĺ	5-6	RTS	Output	Request to Send
	7-8	CTS	Input	Clear to Send

#### Table 4. J1 Pin Descriptions



# 7.4. VDD and VIO Power Connector (J2)

This header (J2) is included on the evaluation board to provide several power options. The following describes the function of each pin:

- Pins 1,3: Connects CP2110 VIO input (pin 5) to CP2110 VDD (pin 6). Remove the shorting block to power VIO from an external source.
- Pins 2,4: Connects the main +VDD\_A net to the CP2110 VDD (pin 6). The main +VDD\_A net powers the RS-232 transceiver on the evaluation board.

#### 7.5. REGIN Power Connector and Self-Powered Mode Connector (J8, J12)

The J8 header is used to connect the CP2110 REGIN pin (pin 7) to the VBUS source from the USB connector (default) or to the CP2110 VDD pin (pin 6). When connected to the VBUS source, the device is intended for buspowered operation. When connected to the CP2110 VDD pin, the device is intended for self-powered operation. When in self-powered operation, an external power source can be connected to the J12 header to power the VDD pin directly.

# 7.6. .SUSPEND LED Connector (J9)

The J9 header is used to connect the CP2110 SUSPEND pin (pin 17) to the D10 red LED. When the LED is on, the device has enumerated with the PC operating normally. When the LED is off, the device has not yet enumerated or is in the USB Suspend state.



# 8. Schematic

PLACE CLOSE TO U2 PIN 19 ---- R1 ----- 112 ----- 112 ----- 112 RF4 RUBBER\_F001 9:14 H ¶\_0 q RF3 RUBBER\_F001 5 5 1 1 1 1 1 RF2 RUBBER\_F00T R10UT U2 SP3223EUCY B۴ C.1UF C7 X78 [ 0.10F \$ O-₽ ₹  $s_{\rm s} \lesssim \xi$ 470 TX RX C GPI09 GPIOB SREEN ź TP3 CPIO5 RXT J7 GPI09 117 GPI08 117 GPI08 117 \*a ⊗—| |-GPI06 GPI07 GPI08 1000 € ( C CPIO9 ∑ ₩ GPIO5\_RX1 SUSPEND 7 PND 6PI06 15 6PI06 14 14 6PI08 13 ↓ Ist PLACE CAPS CLOSE TO UI PIN 8 @ TP10 -GM\_QFN24 TP2 🖗 ιđ ₿O € TP9 5 C6 X7R 0.1UF 5 ≶ § ₹ { \$ GPI04\_TXT RX TX GPI03\_R8485 GPI03\_CTS GPI02\_CTS GPI01\_RTS VBUS C5 GPI07 D5 GREEN GPI06 JdX. P2 USB\_CONN\_TY و ع VBUS + <del>2</del> A\_O SELF SELF D11 DIODE-SP0503BAHTG C9 X7R 0.10F 순 ŝO VIO VIO X7R 1.0UF € 1 C2 X7R 0.1UF 41 ₩ ₩ 2 ≥ 470 ≅≶₿ -11-GPI03\_RS485 C1 TANT 4.7UF GPI02\_CTS GREEN COLLE CIT PI03\_RS485 12300 CPI02\_CTS 13000 SELF PWR HEADER



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SUSPEND LED

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PI05\_RXT

5

GPI04\_TXT ♥★

D6 GREEN

₽Ś₿

01\_RTS

₽ ≶ ₿

GPI00\_clk

GPI01\_RTS

GREEN



# **DOCUMENT CHANGE LIST**

# Revision 0.3 to Revision 0.4

- Updated "Kit Contents" on page 1 to remove DVD.
- Updated "Relevant Documentation" on page 1.
- Updated "Software Setup" on page 1.
- Updated "Table 1" to remove duplicate GPIO4-7, correct one of them to GPIO5-6.
- Updated section "7.3 UART signals" to correct RS232 P2 pin -> RS232 (P1) pin.
- Updated section "7.4 VDD and VIO power connector" to correct the header (J4) -> the header (J2).

#### **Revision 0.2 to Revision 0.3**

- Updated "1. Kit Contents" to change CD-ROM to DVD.
- Added "2. Relevant Documentation" and "5. CP2110 Software Interface".
- Updated "3. Software Setup" to point to the drivers on the website.
- Updated Figure 1.
- Updated Figure 3 with numbered steps matching the instructions in "6. CP2110 Windows Application".

