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# UG271: CP2615-EK2 User's Guide

The CP2615 device is designed to enable rapid development of USB-based audio applications.

The CP2615 simplifies the process of transferring audio data from USB to I2S without any code development, speeding time to market for USB audio accessories such as USB speakers, USB headphones and USB music boxes, as well as VoIP systems. The CP2615 includes a USB 2.0 full-speed function controller, USB transceiver, oscillator, I2S (audio) interface, I2C (control) interface and UART interface in a compact 5 x 5 mm QFN-32 package ideal for space-constrained portable audio applications.

The CP2615-EK2 kit includes the following:

- CP2615 Audio Bridge evaluation board
- 1 x Micro USB OTG adapter
- 1 x USB Type-C to USB-A adapter
- 1 x mini USB cable
- 1 x micro USB cable
- Quick-Start Card

**KEY FEATURES**

- USB Audio class 1.0
- Supports USB HID Consumer Controls for Volume and Mute Synchronization
- Includes USB-UART bridge function
- Supports 48 kHz,16-bit/ 24-bit stereo digital audio
- Integrated USB transceiver; no external resistors required
- Integrated clock; no external crystal required
- On-chip voltage regulator: 3.45 V output
- Self-powered or Bus-powered
- No firmware development
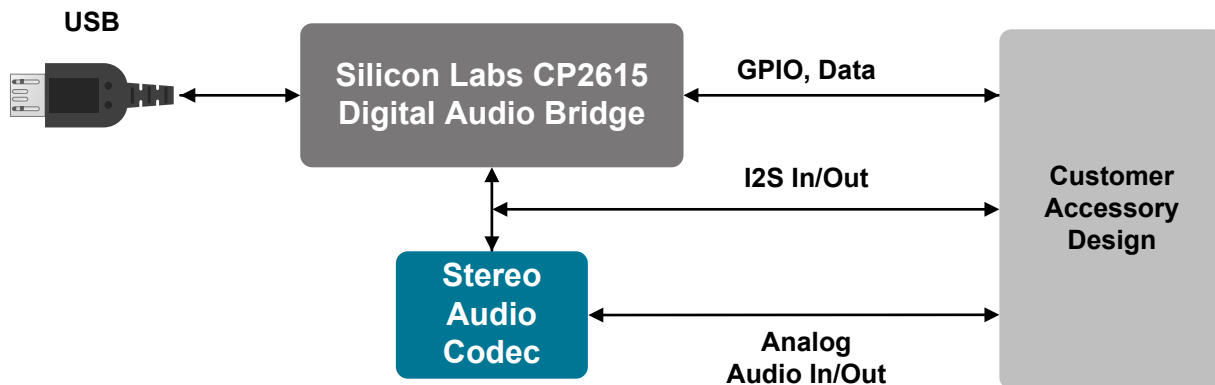
# 1. Getting Started

To start developing with the CP2615-EK2 Kit:

1. Connect the USB micro cable to [**J11**] of the CP2615 board. Depending on the type of receptable on your phone, attach either the micro OTG adapter or the USB Type-C adapter to the other end of the USB cable. Then connect the other end of the adapter to your Android phone.
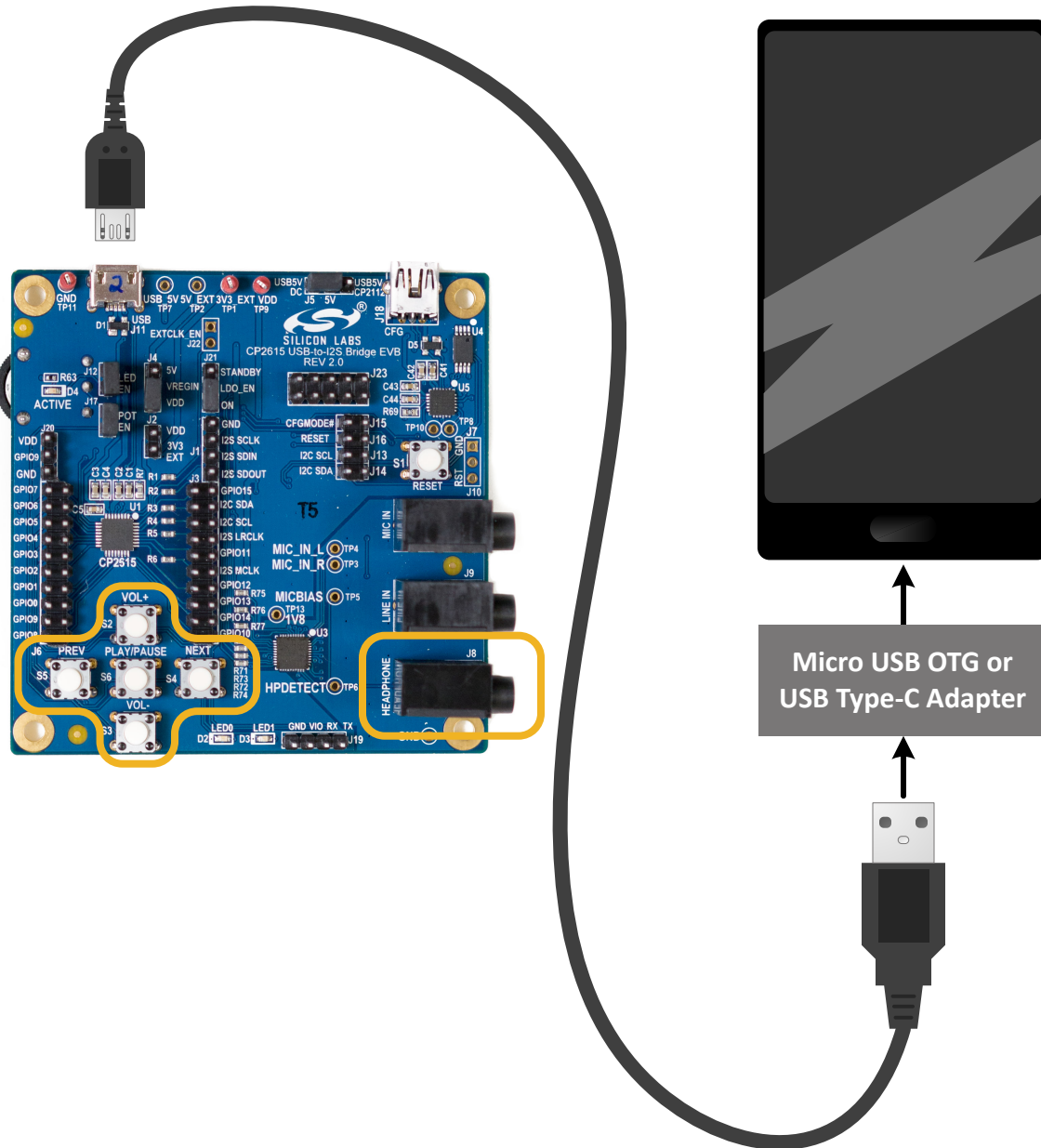
**Micro OTG Adapter Cable**



**USB Type-C Adapter Cable**

2. Connect headphones to [**J8**] of the CP2615 board and use your favorite Android audio application to play music.
3. Use the buttons to control volume, play and pause the music, and skip to the next track or back to the previous track.

## 2. Hardware Overview

The CP2615-EK2 board enables audio development. The figures below provide an overview of the board and the simplified board block diagram. Full schematics for the board can be found in the Schematics section.
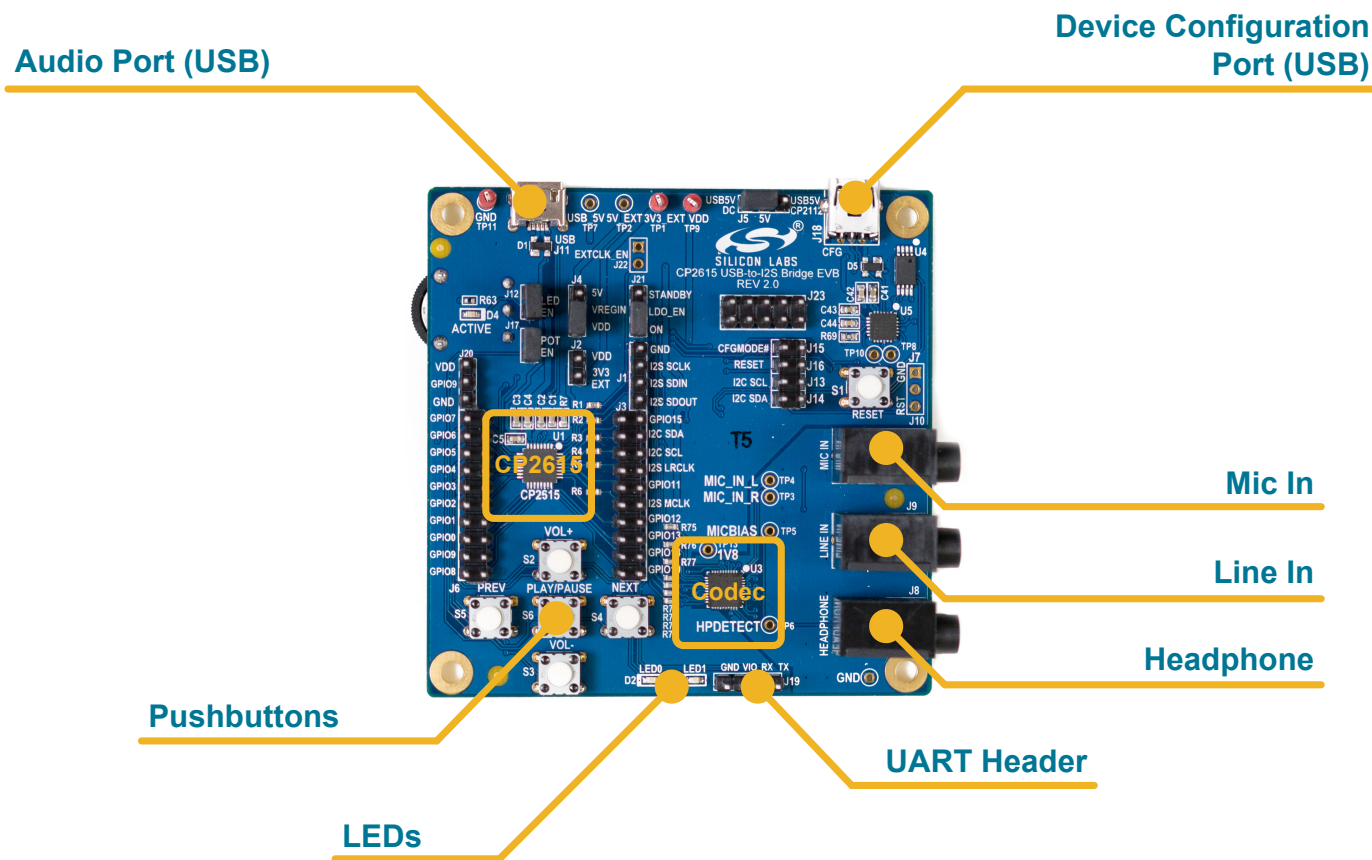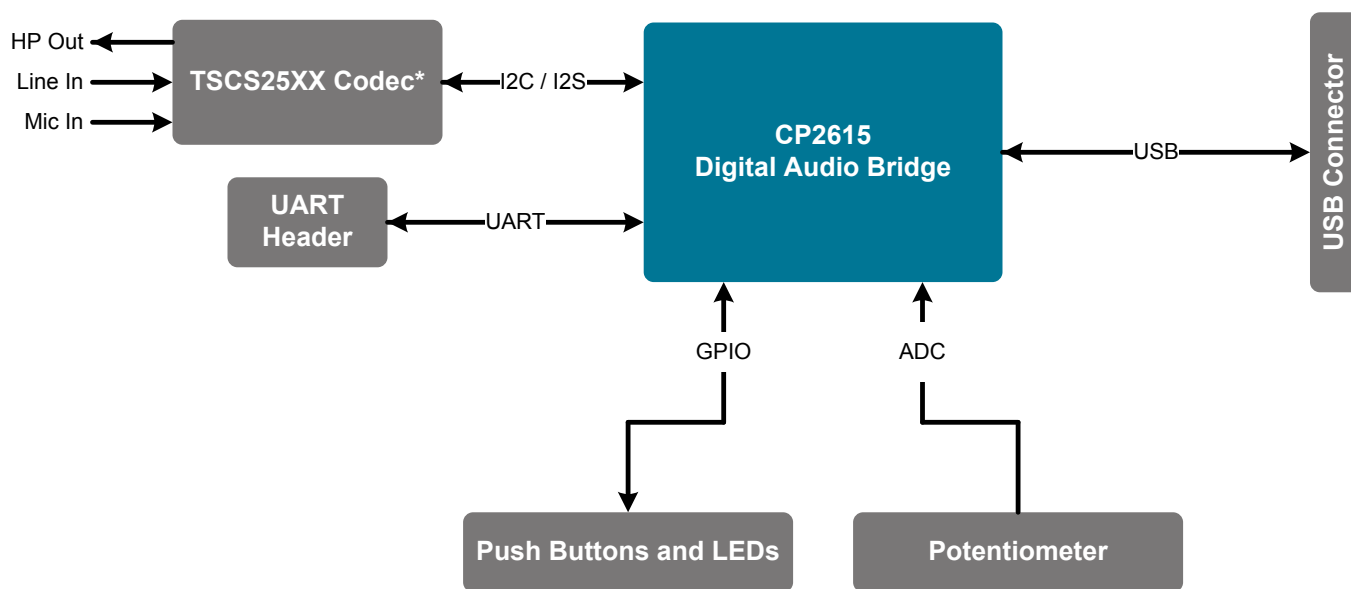


**Figure 2.1.  CP2615-EK2 Digital Audio Evaluation Kit**

* Other codec solutions are supported.

**Figure 2.2.  CP2615-EK2 Digital Audio Evaluation Kit—Simplified Board Block Diagram**

## 2.1 Power Selection Jumpers

The CP2615-EK2 supports USB bus-powered or self-powered configurations based on jumper settings. In USB bus-powered mode, the CP2615-EK2 is powered by VBUS from the Audio USB connector (J11). In self-powered mode, the CP2615-EK2 is powered from either the Configuration USB connector (J18) or from an external supply.

**Table 2.1. USB Bus-Powered Configuration**

| Header | Position |
|--------|----------|
| J5 | USB5V/DC (left) |
| J4 | 5V − VREGIN (top) |
| J2 | Open (not installed) |

**Table 2.2. Self-Powered Configuration**

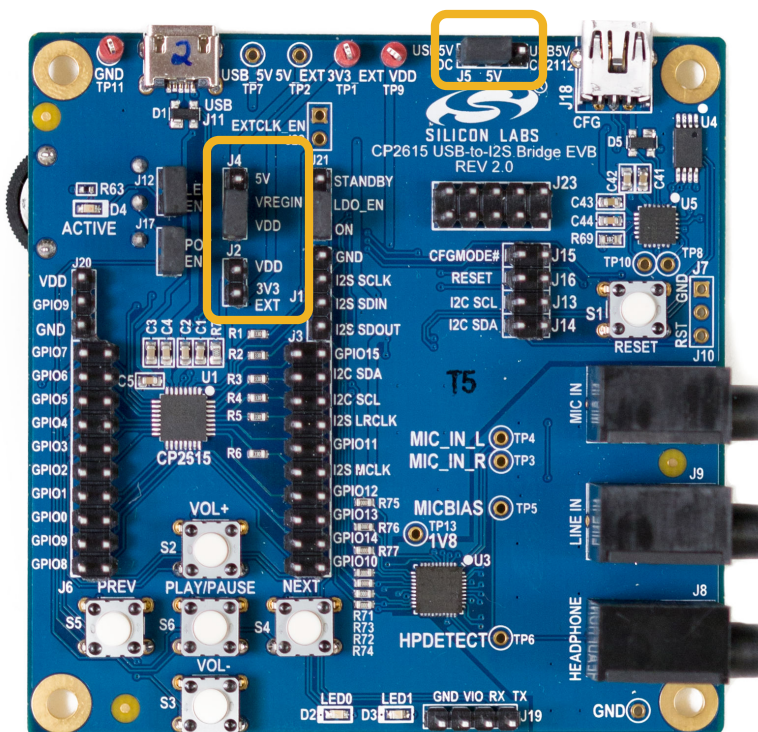| Header | Position |
|--------|----------|
| J5 | Open (not installed) |
| J4 | VREGIN − VDD (bottom) |
| J2 | Installed |
| TP1 | Apply external 3.3 V |



**Figure 2.3. Power Jumpers**

## 2.2 CP2615 Configuration Jumpers

The CP2615-EK2 includes a CP2112 and a set of jumpers that are used to configure the CP2615 device over the I2C bus.

**Table 2.3. CP2615 Configuration Jumpers**

| Header | Description |
|--------|-------------|
| J15 | Connects CP2112 pin GPIO.0/TXT to the CP2615 CFGMODEb pin |
| J16 | Connects CP2112 pin GPIO.1/RXT to the CP2615 RSTb pin |
| J13 | Connects CP2112 SCL pin to the I2C_SCL net and CP2615 I2C SCL pin |
| J14 | Connects CP2112 SDA pin to the I2C_SDA net and CP2615 I2C SDA pin |
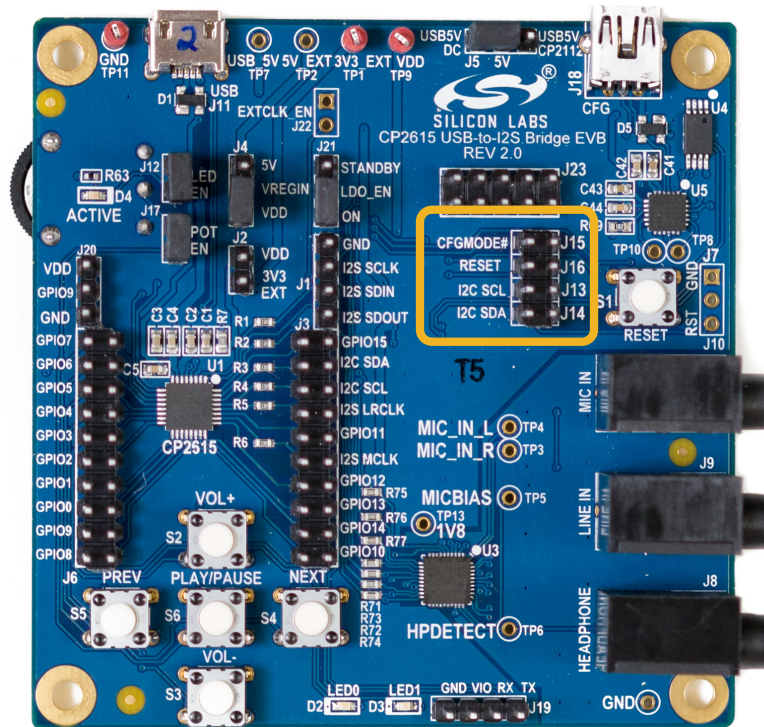


**Figure 2.4. CP2615 Configuration Jumpers**

## 2.3 Other Jumpers

The remaining jumpers on the boards disconnect peripherals like the potentiometer. All I/O also connect to the CP2615 through a zero-Ω resistor to isolate I/O from the board functions and enable development with application-specific hardware.

**Table 2.4. Other Jumpers**

| Header | Description |
|---|---|
| J12 | Connects the ACTIVE LED (D4) to CP2615 pin GPIO.2 |
| J17 | Connects the potentiometer (R63) to CP2615 pin GPIO.8/VBUS_SENSE/ADC |
| J19 | UART Connector |
| J21 | LDO_EN jumpered to ON: Power to codec and I2C pullup resistors is always applied. (NOTE: JP1 must be in this position when programming a configuration.)<br><br>LDO_EN jumpered to STANDBY: Power to codec and I2C pullup resistors is controlled by CP2615 GPIO.2 pin. |
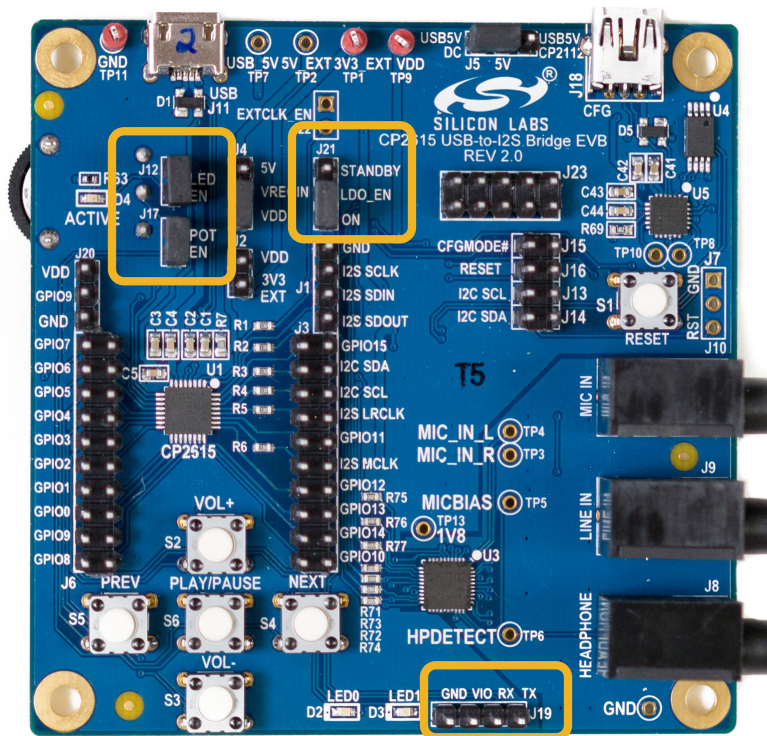


**Figure 2.5. Other Jumpers**

# 3. Device Customization

The CP2615 has several configurable options. The application note, *AN1044: CP2615 Customization Utility User Guide*, describes the configuration options in detail and how to use Xpress Configurator in Simplicity Studio (www.silabs.com/simplicity) to configure a CP2615 device. Once testing and development are complete, Silicon Labs offers CP2615 pre-programming services. Contact your local sales representative for more information.

**Note:** The following shorting blocks need to be installed to program a device using Xpress Configurator:

• J15 — CFGMODE#

• J16 — RESET

• J13 — I2C SCL

• J14 — I2C SDA

• J21 — LDO_EN to ON
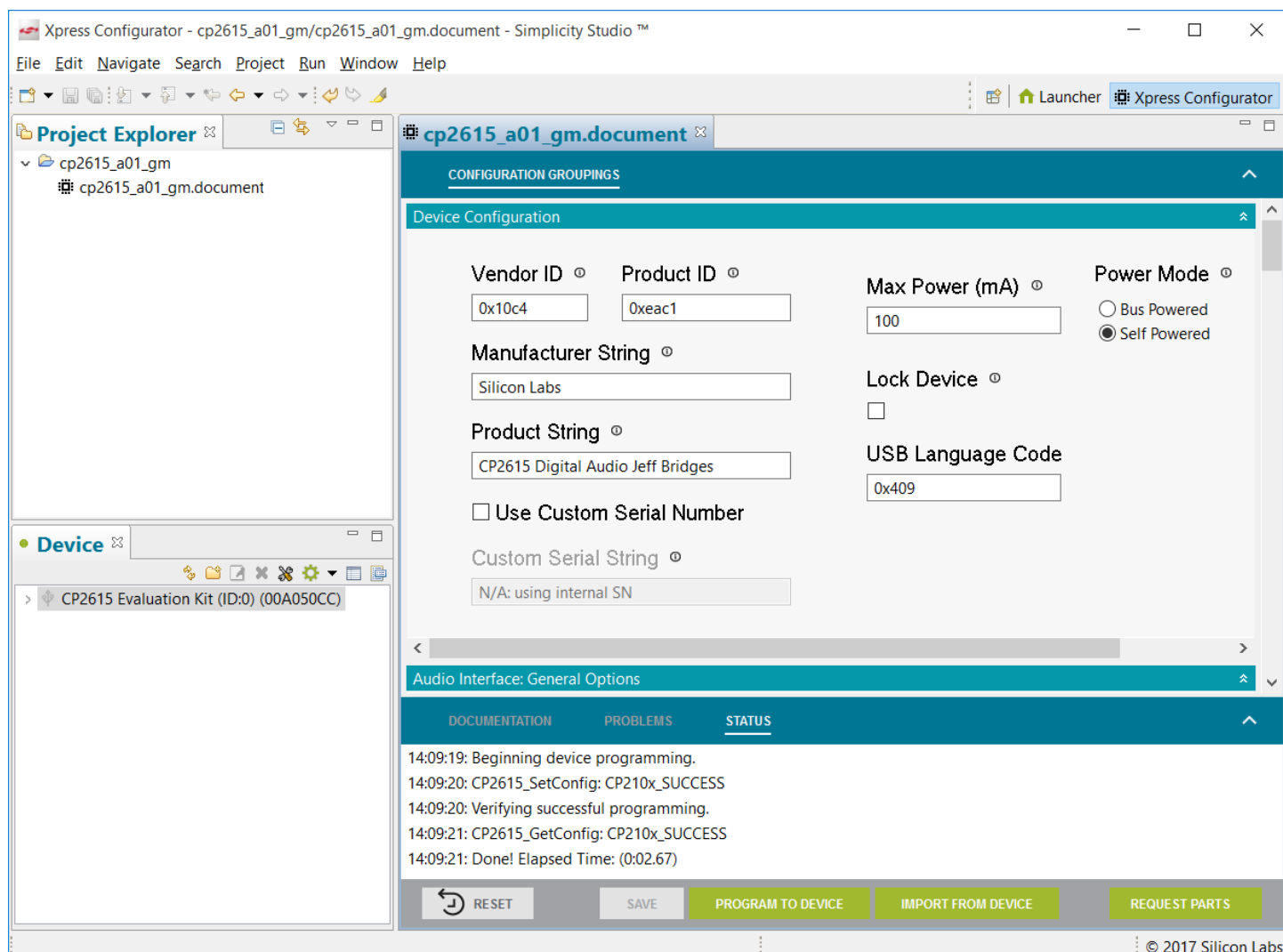


**Figure 3.1. Xpress Configurator**

### 3.1 CP2615 Customization on a Custom Board

To customize a CP2615 during development and prototyping, Xpress Configurator is the recommended GUI tool.

In a production setting, the Standalone Manufacturing Tool is an available command line tool for Windows, Mac and Linux. For more information about the Standalone Manufacturing Tool, see Application Note *AN721: USBXpress Device Customization Guide*.

To customize a CP2615, Xpress Configurator and the Standalone Manufacturing Tool require a CP2112 USB-to-I2C bridge, and the CP2112's PID must be 0xEA93. See the following connection diagram.
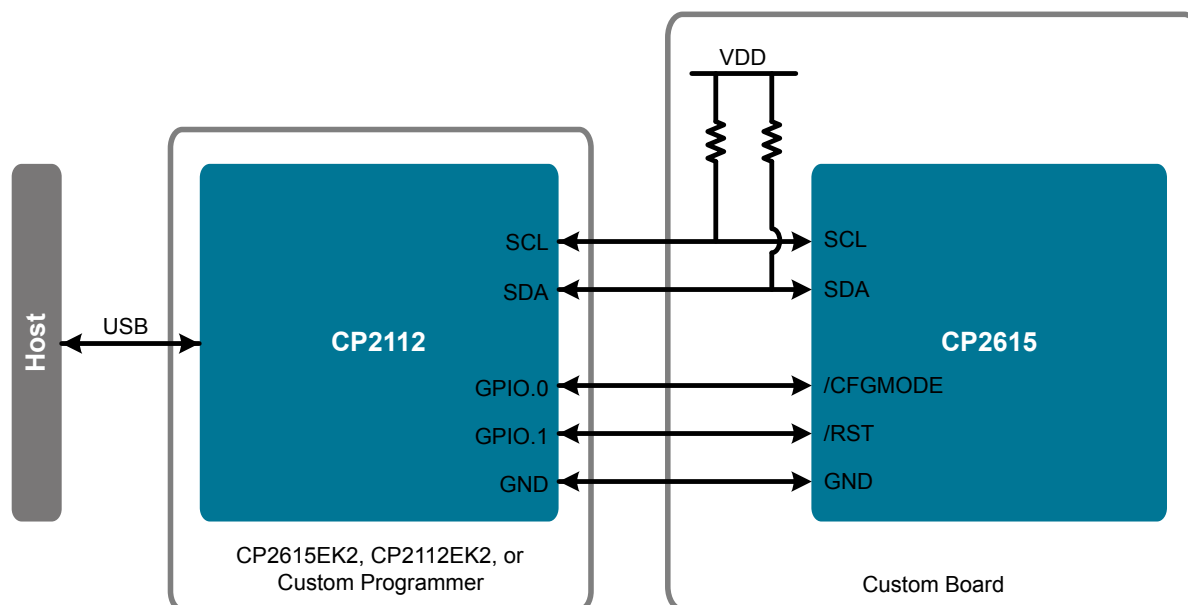


**Figure 3.2. Connection Diagram**

By default, the CP2112 PID is 0xEA90. To change the PID of a CP2112, use Xpress Configurator and refer to Application Note *AN721: USBXpress Device Customization Guide*.

**Note:** A CP2112 with PID 0xEA93 is included on the CP2615 Evaluation Board. Therefore, the CP2615 on the CP2615 Evaluation Board is ready for customization by Xpress Configurator and the Standalone Manufacturing Tool.

**Note:** When using the CP2112 on the CP2615 Evaluation Kit to program a CP2615 on a custom board, remove the shorting blocks on J13, J14, J15, and J16.

## 4. Schematics and Bill of Materials

The schematics and bill of materials (BOM) for the CP2615-EK2 board are available through Simplicity Studio (www.silabs.com/simplicity) when the kit documentation package has been installed.

# 5. Board Revision History

- 1.0 — Initial production revision.

**1.0 Revision Boards**

The left and right audio channels are reversed on this revision of the board. There is a codec setting that can swap the channels to the correct order, but the default board configuration will be incorrect. For more information on how to update the board configuration setting for an affected board, see the following Knowledge Base article:

http://community.silabs.com/t5/Interface-Knowledge-Base/LEFT-and-RIGHT-CODEC-Channels-Reversed-on-the-CP2615-USB-to-I2S/ta-p/197919

This issue will be corrected in the next revision.

# 6. Revision History

## 6.1 Revision 0.4

April, 2018
- Updated part number to replace CP2615-EK with CP2615-EK2.
- Updated figures for board revision 2.0.
- Header JP1 renamed to J21 in 2.3 Other Jumpers.
- Added J21 to 3. Device Customization.

## 6.2 Revision 0.3

July 17, 2017
- Added 3.1 CP2615 Customization on a Custom Board.

## 6.3 Revision 0.2

May 5, 2017
- Added 5. Board Revision History.

## 6.4 Revision 0.1

April 12, 2017
- Initial release.

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