CYW955513EVK-01 Evaluation Kit user guide

About this document

Scope and purpose

The Infineon AIROC™ CYW55513 Wi-Fi and Bluetooth® combo audio development Kit (CYW955513EVK-01) enables the evaluation, prototyping, and development of a wide array of Internet of Things (IoT) and audio applications using the AIROC™ CYW55513, ultra-low-power, single-chip, that support 1x1 Wi-Fi 6/6E, Bluetooth® LE 5.4. The device can support Bluetooth® Low Energy audio, with the LC3 codec running on the device enabling typical smart watch audio use cases.

The CYW55513 operates over the −40°C to +85°C temperature range and is available in a 0.35 mm pitch WLBGA package with the below major features:

- Three Serial Control Blocks (SCB) and supporting I2C/SPI/UART
- 9x TCPWM blocks
- PDM interface for digital microphone support
- 12-bit ADC with seven-channel mux input for analog microphone support or seven channels of DC sensing
- A pair of time-division multiplexing (TDM) interfaces enables a flexible interface for various audio use cases
- 4-wire UART or SDIO (shared with Wi-Fi) interface is available for interfacing with the host processor

Intended audience

This evaluation board is designed for technical specialists who are familiar with connectivity and interested in Bluetooth® Audio development. It is intended to be used under laboratory conditions.

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Safety precautions

***Note**: Please note the following warnings regarding the hazards associated with development systems*

Table 1 Safety precautions

	**Caution:** *The evaluation or reference board contains parts and assemblies sensitive to electrostatic discharge (ESD). Electrostatic control precautions are required when installing, testing, servicing or repairing the assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with electrostatic control procedures, refer to the applicable ESD protection handbooks and guidelines.*

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1 Introduction

Infineon AIROC™ CYW55513 Evaluation Kit (CYW955513EVK-01) is an excellent kit that allows developers to evaluate, prototype, and develop various Internet of Things (IoT) and Audio applications. The kit is built around the AIROC™ CYW55513, an ultra-low-power Wi-Fi and Bluetooth® combo single-chip. With this kit, you can easily evaluate the performance of the CYW55513 chip and develop applications that leverage its capabilities.

The CYW55513, CYW55512, and CYW55511 are a family of low-power, single-chip devices that support single-stream, tri-band, Wi-Fi 6/6E, IEEE 802.11ax-compliant Wi-Fi MAC/baseband/radio, and Bluetooth®/Bluetooth® Low Energy 5.4. In 802.11ax mode, the device supports rates up to 1024 QAM MCS11 in 20 MHz channels. The CYW55503, CYW55502, and CYW55501 are only Wi-Fi devices. All legacy rates in the 802.11a/b/g/n/ac are also supported. Included on-chip are 2.4 GHz, 5-7 GHz transmit power amplifiers (PA), and low-noise amplifiers (LNA). The device is also capable of operating with external power amplifiers and low-noise amplifiers, and antenna diversity, if an improved range is required. An SDIO v3.0 interface or GSPI are available for interfacing with the host.

CYW955513EVK-01, ModusToolbox™ software, and tools form a powerful but easy-to-use toolset that helps the users to create Wi-Fi and Bluetooth® enabled IoT and audio solutions. The CYW955513EVK-01 offers footprint compatibility with Arduino shields. The development environment is compatible with Windows, macOS, and Linux operating systems. In addition, the kit features an onboard programmer/debugger (KitProg3).

***Note**: This kit supports ModusToolbox™ software 3.2 or later.*

To order the Evaluation Kit (EVK), see CYW955513EVK-01 web page or contact Infineon's support team.

1.1 Kit contents

This evaluation kit box includes the following:

- CYW55513 Evaluation Board (CYW9CPM2BASE1 + CYW955513SDCM2WLIPA)
- Audio Shield Board (CYW9BTAUDIO5)
- USB Type-C to Type-C cable
- Two Triband PCB Antenna
- Quick start guide

1 Introduction



Figure 1 CYW955513EVK-01 kit contents

Figure 1 shows CYW955513EVK-01 kit contents. Inspect the kit contents. If you find any part missing, contact your nearest Infineon sales office for assistance: www.infineon.com/support.

1.2 Kit details

This kit has the following features:

- CYW55513 M.2 carrier module (CYW955513SDCM2WLIPA)
- Audio shield board (CYW9BTAUDIO5) for audio support
- Expansion headers compatible with Arduino shields
- One user button and two user LEDs
- One analog potentiometer and one digital ambient light sensor
- One user button and two user LEDs
- Onboard USB Type-C connector (J6) for powering, programming, and debugging purposes

Before connecting the kit to the PC, ensure that all jumpers on the baseboard and audio shield are in their default configuration as specified in Table 2 to Table 11 and shown in Figure 2.

See Getting started section for the steps to follow in order to start using the kit for development.

1 Introduction

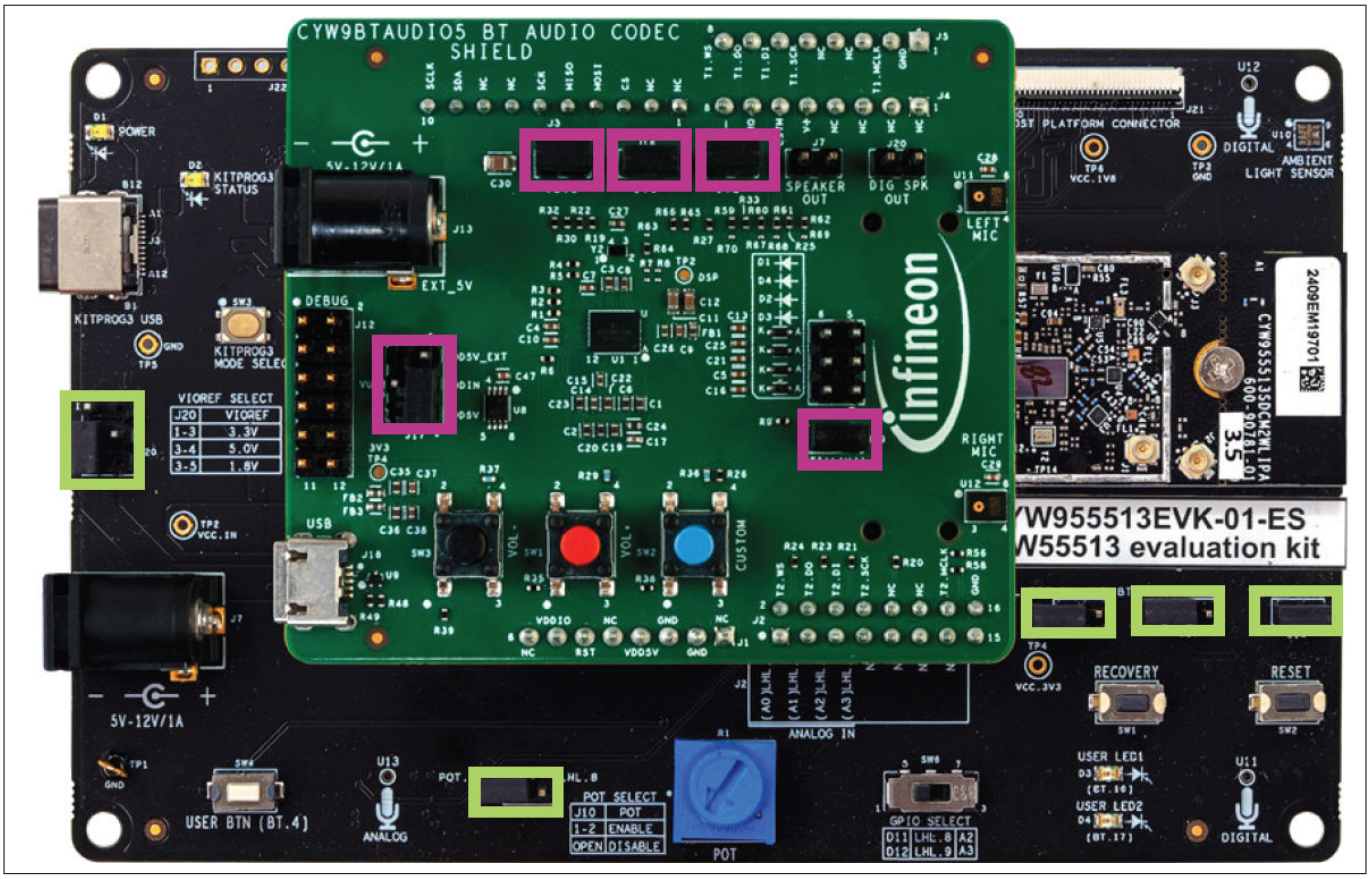


Figure 2 CYW955513EVK-01 default jumper setting

Figure 3 highlights the LEDs provided on CYW955513EVK-01:

- LED1 (Yellow) indicates that VBAT power is ON.
- LED2 (Yellow) indicates KitProg3 status.
- LED3 (Red) and LED4 (Orange) are generic user LEDs controlled by GPIOs. A label on the back of the kit provides the pin mapping.

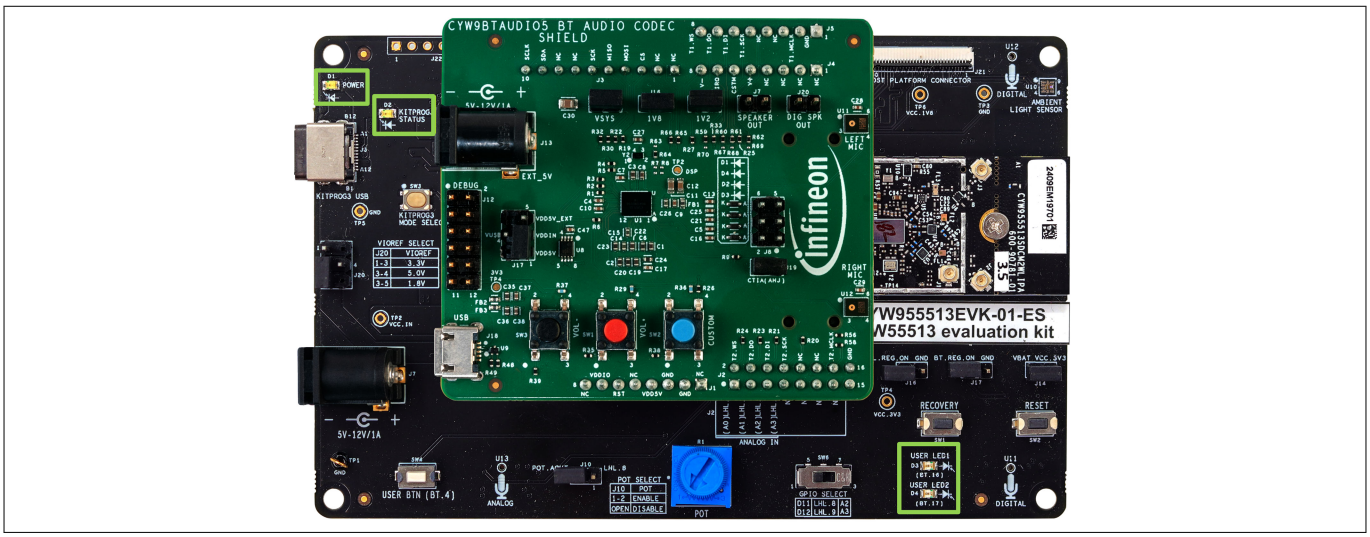


Figure 3 CYW955513EVK-01 LEDs

1.3 ModusToolbox™ software

ModusToolbox™ is a free software development ecosystem that includes the Eclipse IDE for ModusToolbox™, AIROC™ BTSTACK, Bluetooth® SDK, and Wi-Fi SDK to develop applications for Infineon IoT products. Eclipse IDE for ModusToolbox™ is a multi-platform, integrated development environment (IDE) used to create new applications, update application code, change middleware settings, and program or debug applications.

Using ModusToolbox™, you can enable and configure device resources and middleware libraries, write C source code, and program and debug the device. The build system infrastructure includes the new project creation wizard that can run independently of the Eclipse IDE, the make infrastructure, and other tools. This means you can choose your compiler, RTOS, and ecosystem without compromising usability or access to our industry-leading AIROC™ Wi-Fi and Bluetooth®, CAPSENSE™ Human Machine Interface (HMI), security, and various other features.

For more details on ModusToolbox™ installation and usage, see the Eclipse IDE for ModusToolbox™ user guide.

1.3.1 ModusToolbox™ code examples

This section provides information about the code examples available for the CYW55513 device.

The code examples are part of ModusToolbox™ 3.2 version (or later) and are located under the BSP CYW955513EVK-01.

1.4 Getting started

The user guide helps you find details about the CYW955513EVK-01 evaluation kit and how to use it. Follow the steps below to get started with developing your project using the kit.

1. Ensure that all the jumpers are set to the default configuration, as illustrated in Figure 2
2. Connect the headset to the headset jack connector (J10) located on the Audio Shield board
3. Connect the PCB antennas to the UFL connectors (J2, J3) located on the M.2 module
4. Connect the KitProg3 USB connector (J6) to your PC using the provided USB cable. If your PC does not support a Type-C USB port, use a Type-A to Type-C cable. Then, wait for the driver installation to complete
5. Press and hold the KitProg3 mode switch (SW3) on the Baseboard for 2 seconds to enable dual UART mode. This action enables the peripheral UART COM port for logs and the HCI UART COM port for programming. To confirm that the kit is in dual UART mode, check for the blinking of the KitProg3 status LED (D2)
6. Open the serial terminal application and connect to the peripheral COM port using the following settings:
   - Baud rate: 115200 bps; Data: 8 bits; Parity: None; Stop: 1 bit; Flow control: None; New line for receive data: Line Feed (LF) or Auto setting
7. Open ModusToolbox™ (3.2 or later), program and explore the code examples available for CYW955513EVK-01 kit under the AIROC™ Connectivity BSPs
8. If you are facing issue in programming the application to the kit, follow the steps below:
   a. Press and hold the **Recover** button on the kit
   b. Press and hold the **Reset** button on the kit
   c. Release the **Reset** button
   d. After one second, release the **Recover** button
   e. Then try again

1.5 IoT resources and technical support

Infineon provides a wealth of product documentation at the Wireless Connectivity webpage to help you select the right IoT device for your design. Additionally, Infineon Developer Community offers a platform for developers to access the latest software and tools, solving common evaluation and integration problems while directly interacting with both Infineon engineers and experienced peers.

2 Kit operation

This section provides detailed instructions to setup the Infineon CYW955513EVK-01 with Infineon ModusToolbox™ for Wi-Fi and Bluetooth® LE combo applications with a connected MCU. It introduces CYW955513EVK-01 and the features that are used as part of the kit's operation. Also, discusses the features such as Wi-Fi and Bluetooth® connectivity, MCU capabilities, programming/debugging, and a USB-UART bridge device that can be used to communicate with the CYW55513 device on this EVK.

2.1 Theory of operation

CYW955513EVK-01 is built around the CYW55513 device. Figure 4 shows the block diagram of the CYW55513 device. See the device datasheet for more details on device features.

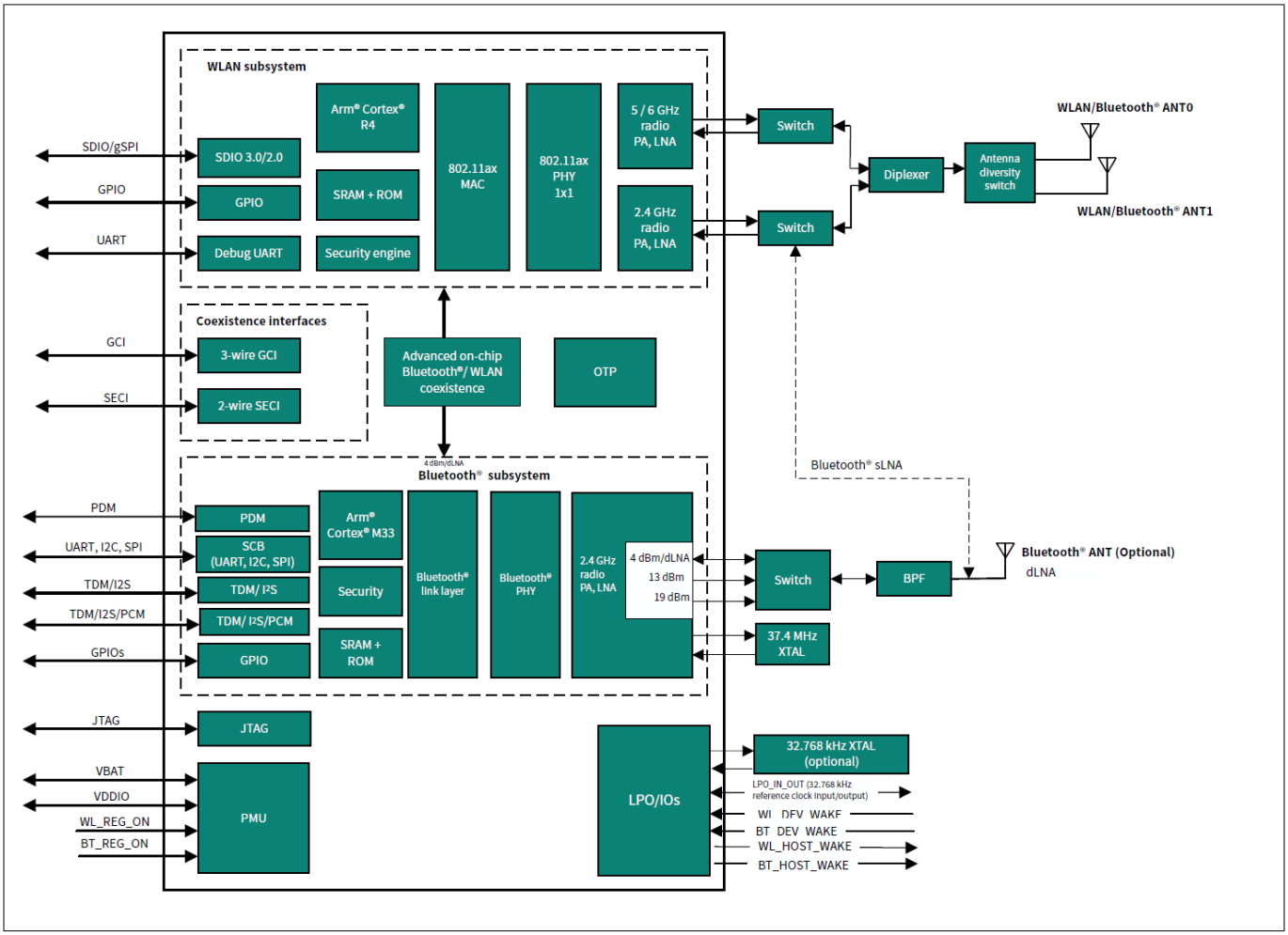


Figure 4 CYW55513 block diagram

Figure 5 illustrates the block diagram of CYW955513EVK-01. This board contains a CYW55513 Wi-Fi, Bluetooth®, and a USB-to-serial interface/programmer. The kit features Arduino form-factor-compatible headers, which enable Arduino shields to be plugged in, extending the EVK's capabilities. It also features one user button, a recovery button, a reset button, two user LEDs, a potentiometer, an ambient light sensor, an AMIC, and two DMICs.

Also, the Audio shield enables the user to explore various Bluetooth® audio development options with this kit.

2 Kit operation

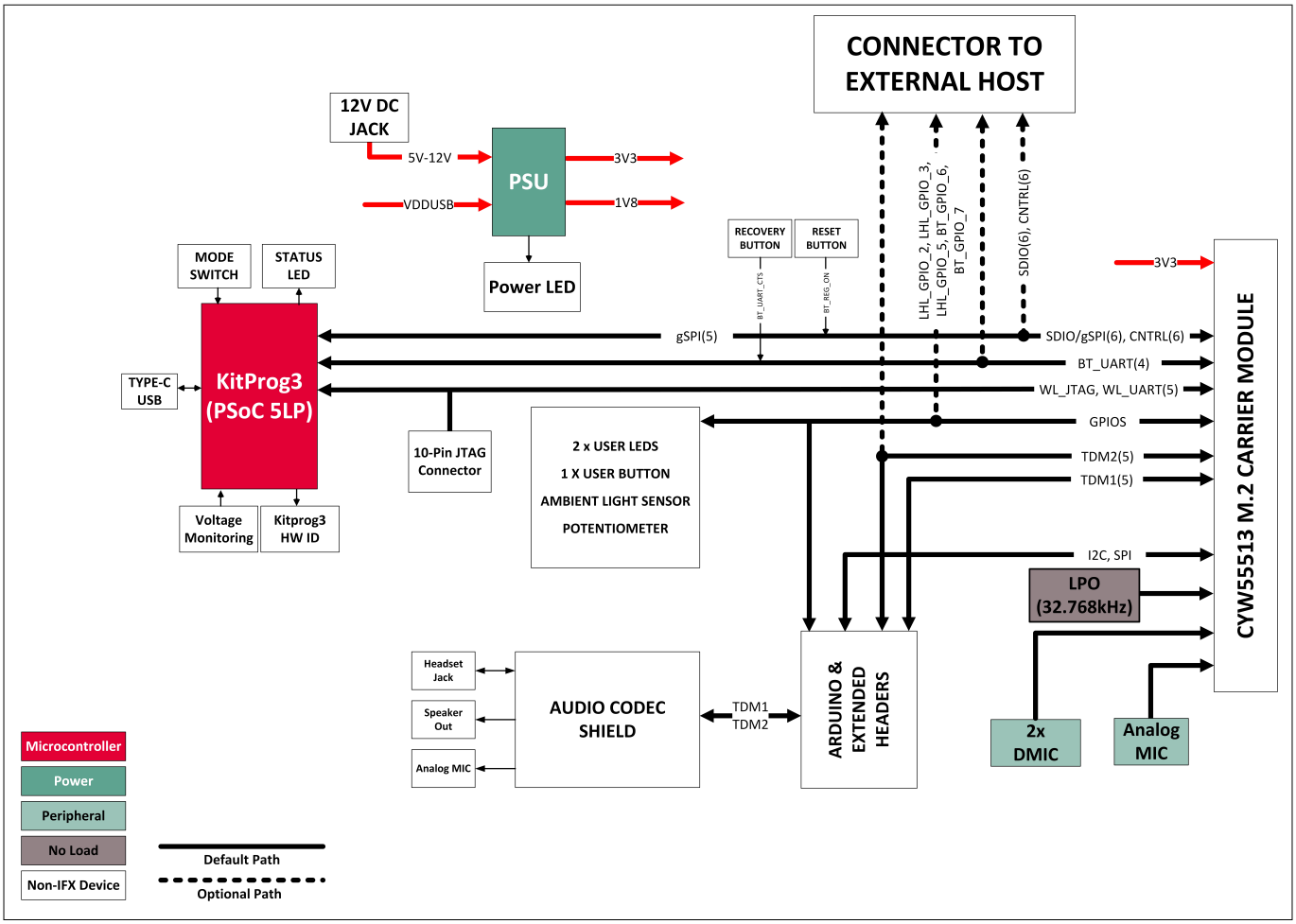


Figure 5 CYW955513EVK-01 block diagram

Figure 6 and Figure 7 show the markup of the CYW955513EVK-01.

2 Kit operation

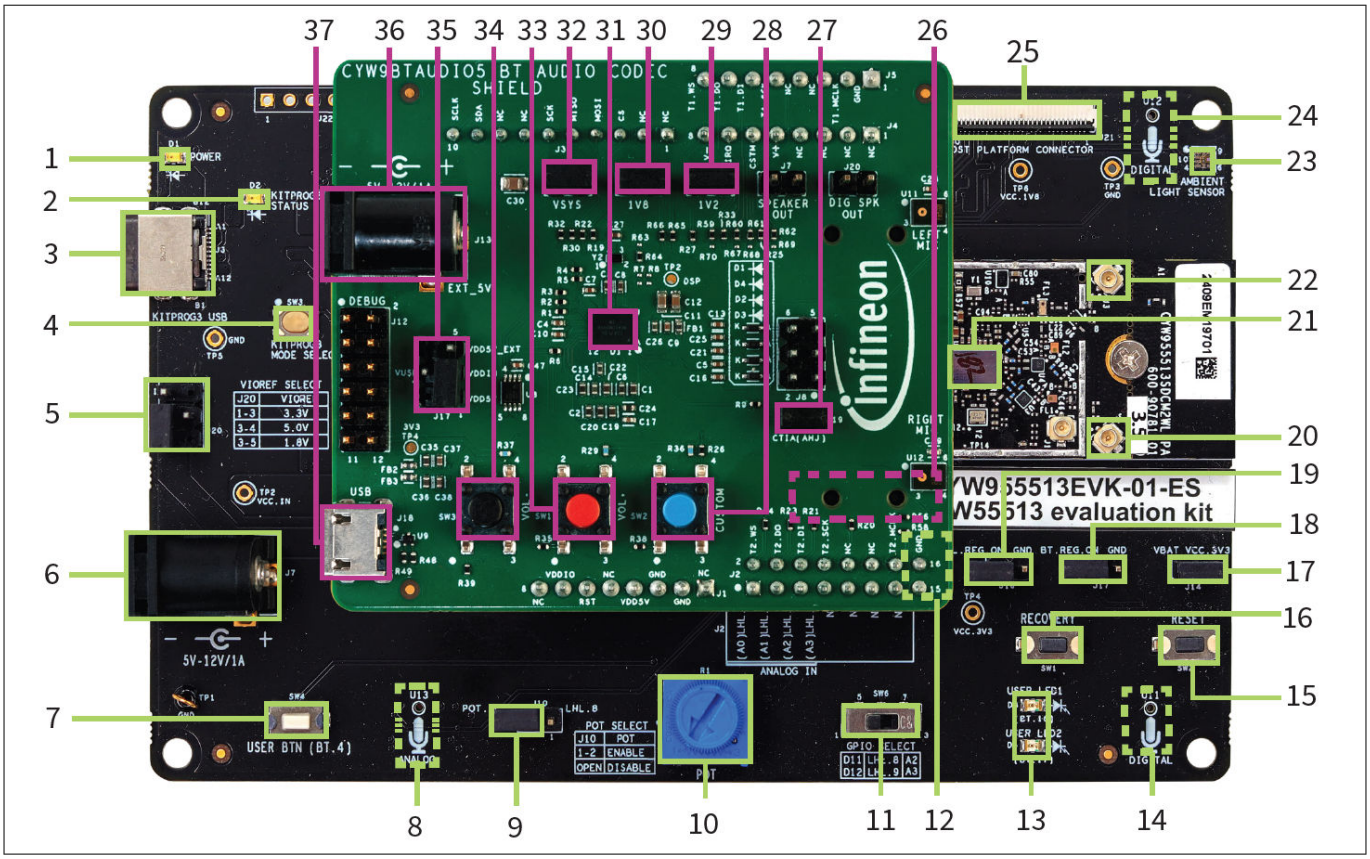


Figure 6 **CYW955513EVK-01 (top view)**

2 Kit operation

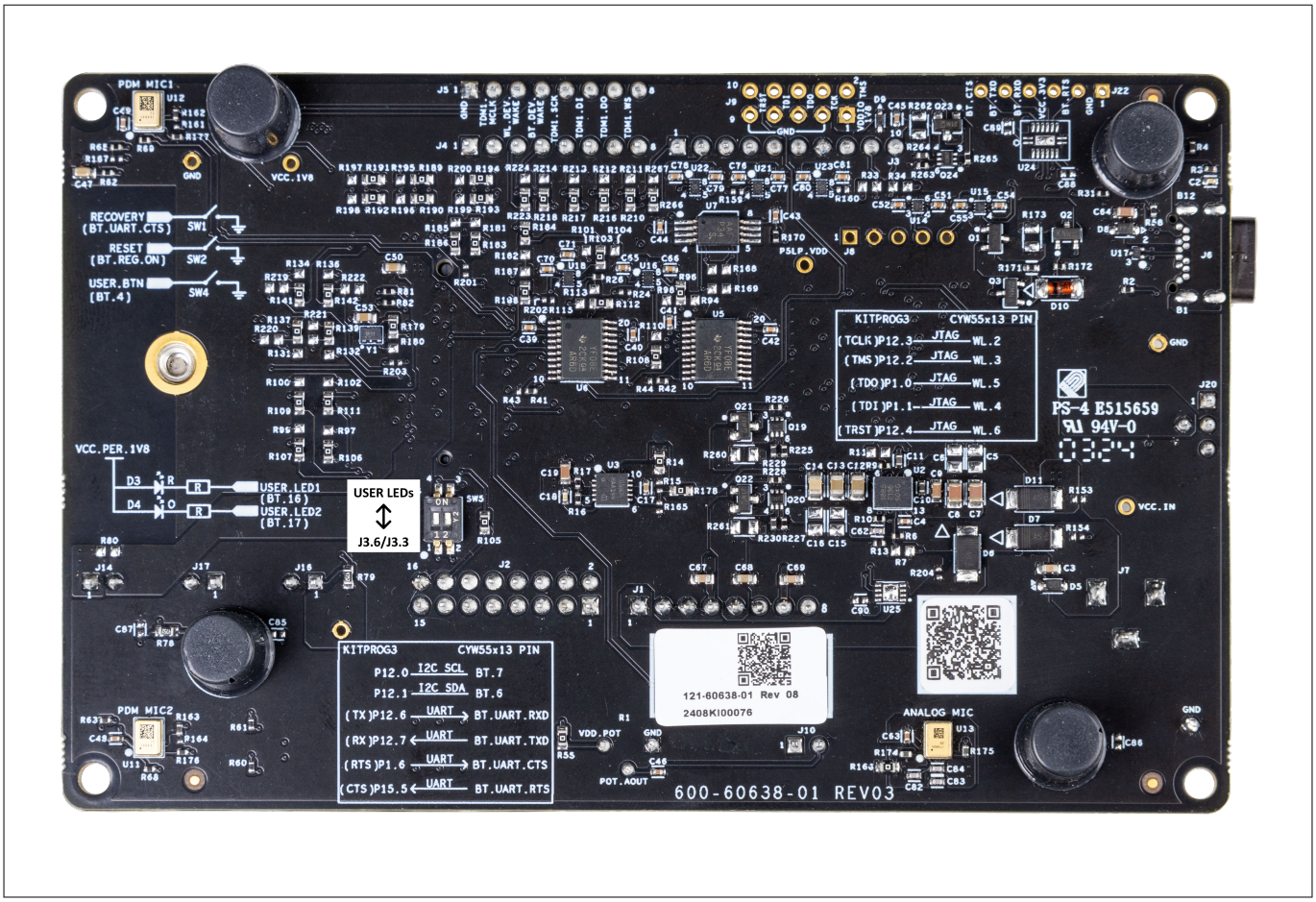


Figure 7 CYW955513EVK-01 (bottom view)

CYW955513EVK baseboard

1. **Power LED (D1):** This LED is used to indicate the status of power supplied to the board
2. **KitProg3 status LED (D2):** This LED indicates the status of KitProg3, whether it is in single UART or dual UART mode
3. **KitProg3 USB Type-C connector (J6):** Type-C USB female connector for connecting the kit to the PC using the provided USB Type-C cable. It is used for powering the board, programming, and USB-UART communication
4. **KitProg3 mode selection button (SW3):** This button is used to change the Kitprog3 mode between single and dual UART
5. **VIOREF voltage selection jumper (J20):** This jumper is used to select the voltage level of VIOREF (Arduino shield IO supply) power source. The possible selections are 1.8 V, 3.3 V, or 5.0 V
6. **External power supply VIN connector (J7):** This is an optional power supply DC jack that support 12 V and 1 A to power the board
7. **User button (SW4):** This button provides input to the CYW55513 device. When pressed, the button connects the CYW55513 pin to the ground. Therefore, the CYW55513 pin must be configured as a digital input with a resistive pull-up to detect the button press
8. **Analog mic (U13):** This input demonstrates the analog-to-digital capability of the device
9. **Potentiometer connection jumper (J10):** This jumper is used to connect or disconnect the on-board potentiometer from the CYW55513 device
10. **Potentiometer (R1):** This component enables the kit to demonstrate the analog input capability of the CYW55513 chip
11. **GPIO select switch (SW6):** This DPDT switch is used to select the connection of GPIO from the CYW55513 to the Arduino headers

12. **LED enable/disable switch (SW5):** This switch is used to enable or disable the user LEDs by connecting or disconnecting GPIOs from CYW55513.
13. **User LEDs (D3, D4):** The CYW55513 device controls these onboard LEDs. The LEDs operate on an ACTIVELOW basis, meaning that these pins need to be driven low in order to turn the LEDs on
14. **Digital mic 1 (U11):** This digital microphone is used to demonstrate the PDM interface of the CYW55513 device
15. **Reset button (SW2):** When pressed, this button connects the BT_REG_ON pin to ground and can be used to reset the CYW55513 device
16. **Recovery button (SW1):** When pressed, this button connects the BT_UART_CTS pin to ground and can be used to force the CYW55513 device into autobaud mode
17. **VBAT current measurement jumper (J14):** This jumper is used to power the M.2 carrier module. Remove this Jumper, and connect an ammeter to measure the current supplied to the carrier module
18. **Bluetooth® section disable jumper (J17):** When mounted, this jumper connects the BT_REG_ON pin to ground and can be used to enable or disable the Bluetooth® subsystem of the device
19. **WLAN section disable jumper (J16):** When mounted, this jumper connects the WL_REG_ON pin to ground and can be used to enable or disable the WLAN subsystem of the device
20. **Antenna Connector 2 (J2):** This is the auxiliary WLAN/BT antenna connector used to connect the provided PCB antenna
21. **AIROC™ CYW55513 Wi-Fi & Bluetooth® combo chip (CYW55513IUBGT) (U1):** AIROC™ Wi-Fi & Bluetooth® combo chip with Wi-Fi 6/6E and Bluetooth® 5.4 support. This is the heart of the kit
22. **Antenna Connector 1 (J3):** This is the main WLAN/BT antenna connector used to connect the provided PCB antenna
23. **Ambient light sensor (U10):** The on-board digital ambient light sensor can sense the ambient light intensity and provide the data to the CYW55513 device via I2C
24. **Digital mic 2 (U12):** Digital mic to demonstrate the PDM interface of the CYW55513 device
25. **External host platform interface connector (J21):** This 30-pin connector enables the CYW55513 device to connect to other host platforms
26. **CTIA headset connector (J10):** Headphone connector to connect the audio headset on the audio shield
27. **CTIA headset jumper (J19):** This jumper can be used to switch support between 3-pole and 4-pole headsets for the J10 headset jack. Mounting the jumper enables support for 4-pole headsets, while leaving it unpopulated allows for 3-pole headset support
28. **Custom button (SW2):** This button on the audio shield can be used for multiple functionalities, such as Pairing, audio play/pause, and more
29. **Codec 1.2 V jumper (J15):** Current measurement header for Audio Codec 1.2 V voltage rail
30. **Codec 1.8 V jumper (J16):** Current measurement header for Audio Codec 1.8 V voltage rail
31. **Audio codec CS47L35 (U1):** Audio codec that enables audio development functions with CYW55513 device
32. **VSYS enable jumper (J14):** Current measurement header for Audio Codec 5 V voltage rail
33. **Volume increase button (SW1):** This button on the audio shield can be used for multiple functionalities such as volume increase, next track, etc. while audio streaming
34. **Volume decrease button (SW3):** This button on the audio shield can be used for multiple functionalities such as volume decrease, previous track, etc. while audio streaming
35. **VDDIN selection jumper (J17):** This header can be used to select the 5V input supply for the audio shield. The default selection enables powering from the baseboard
36. **External 5 V DC Jack (J13):** This is an optional power supply DC jack that support 5 V and 1 A to power the audio shield board
37. **Micro-USB connector for USB-I2C bridge (J18):** Micro-USB Connector for alternate power supply option to audio shield board and, USB to serial communication bridge to the audio codec

2.2 Jumpers

Table 2 to Table 6 list the jumper settings on the CYW955513EVK-01.

Table 2 Baseboard jumper J14 pin configuration

Baseboard Jumper J14 (VBAT current measurement)	Default state	Connection on CYW55513	Description
1 and 2	Shorted	VBAT	Short this jumper to supply power to the VBAT of CYW55513. In addition, use this jumper to measure the current consumption of the VBAT domain.

Table 3 Baseboard jumper J16 pin configuration

Baseboard jumper J16 (WLAN Disable)	Default state	Connection on CYW55513	Description
1 and 2	Open	WL_REG_ON	Short this jumper to disable the WLAN section of the radio module on the M.2 carrier board.

Table 4 Baseboard jumper J17 pin configuration

Baseboard jumper J17 (BT Disable)	Default state	Connection on CYW55513	Description
1 and 2	Open	BT_REG_ON	Short this jumper to disable the BT subsystem of the CYW55513 device.

Table 5 Baseboard jumper J10 pin configuration

Baseboard jumper J10 (Potentiometer enable)	Default state	Connection on CYW55513	Description
1 and 2	Open	LHL_GPIO_8	Short this jumper to connect the onboard potentiometer to CYW55513.

Table 6 Baseboard jumper J20 pin configuration

Baseboard jumper J20 (Arduino header VIOREF select)	Default state	Connection on CYW55513	Description
1 and 3	Open	NA	Short these pins to supply 3.3 V to the VIOREF of the Arduino header.
3 and 4	Open		Short these pins to supply 5.0 V to the VIOREF of the Arduino header.

(table continues...)

Table 6 (continued) Baseboard jumper J20 pin configuration

Baseboard jumper J20 (Arduino header VIOREF select)	Default state	Connection on CYW55513	Description
3 and 5	Shorted		Short these pins to supply 1.8 V to the VIOREF of the Arduino header.

Table 7 Audio shield jumper J14 pin configuration

Audio shield jumper J14 (VSYS current measurement)	Default state	Connection on CS47L35 codec	Description
1 and 2	Shorted	SPKVDD	Short this jumper to provide power to the Core supply of CS47L35 codec. In addition, this jumper can be used to measure the current consumption of the VSYS domain.

Table 8 Audio shield jumper J15 pin configuration

Audio shield jumper J15 (CODEC_1V2 current measurement)	Default state	Connection on CS47L35 codec	Description
1 and 2	Shorted	CPVDD2 DCVDD FLVDD	Short this jumper to provide power to the 1.2 V rail of CS47L35 codec. In addition, this jumper can be used to measure the current consumption of codec from 1.2 V domain.

Table 9 Audio shield jumper J16 pin configuration

Audio shield jumper J16 (CODEC_1V8 current measurement)	Default state	Connection on CS47L35 codec	Description
1 and 2	Shorted	AVDD CPVDD1	Short this jumper to provide power to the 1.8 V rail of CS47L35 codec. In addition, this jumper can be used to measure the current consumption of codec from 1.8 V domain.

Table 10 Audio shield jumper J17 pin configuration

Audio shield jumper J17 (VDDIN 5V input selection jumper)	Default state	Connection on CS47L35 codec	Description
1 and 3	Shorted	NA	Short these pins to supply 5.0 V to the shield from the baseboard (J1).
3 and 4	Open		Short these pins to supply 5.0 V to the shield from the micro USB connector (J18).
3 and 5	Open		Short these pins to supply 5.0 V to the shield from the DC jack connector (J13).

Table 11 Audio shield jumper J19 pin configuration

Audio shield jumper J19 (Headset pole selection jumper)	Default state	Connection on CS47L35 codec	Description
1 and 2	Shorted	MICBIAS1B IN1BLP	If this jumper is open headset jack (J10) supports 3 pole headphone. Short this jumper to support CTIA 4 pole headset on the audio jack (J10)

2.3 Buttons and switches

Table 12 lists the buttons and switches on the CYW955513EVK-01.

Table 12 Baseboard button/switch functionality

Baseboard buttons/switch	Pressed state	Connection on CYW55513	Description
SW1	GND	BT_UART_CTS	Active low recovery button (black)
SW2	GND	BT_REG_ON	Active low reset button (black)
SW3	GND	NA	Switch to change the KP3 mode
SW4	GND	BT_GPIO_4	User application button (white)
SW5	NA	BT_GPIO_16 BT_GPIO_17	User LED1 and User LED2 enable/disable switch
SW6	NA	LHL_GPIO_8 LHL_GPIO_9	Arduino GPIO ADC/SPI selection switch

Table 13 Audio shield Button/Switch functionality

Audio shield button/ switch	Pressed state	Connection on CYW55513	Description
SW1	GND	BT_GPIO_4	Volume increase button(Red)
SW2	GND	LHL_GPIO_6	Custom button(Blue)
SW3	GND	BT_GPIO_5	Volume decrese button(Black)

2.4 Arduino-compatible headers

J1, J2, J3, J4, and J5 are Arduino shield-compatible headers.

Table 14 Header J1 pin configuration

Header J1	Arduino compatible pin	Connection on CYW55513	Description
1	VIN	NA	Input supply (5 V - 12 V) option to the kit from the Arduino shield
2	GND	GND	Ground
3	GND	GND	Ground
4	5V0	NA	5 V supply output to the Arduino shield
5	3V3	NA	3.3 V supply output to the Arduino shield
6	RESET	NA	Arduino shield reset from KP3
7	VIOREF	NA	I/O reference pin used by shields to determine the I/O voltage. It can be changed to 1.8 V, 3.3 V, and 5 V with J20 configuration.
8	NC	NC	No connect

Table 15 Header J2 pin configuration

Header J2	Arduino compatible pin	Connection on CYW55513	Description
1	A0	LHL_GPIO_4	LHL GPIO
2	NA	TDM2_WS	TDM2 interface word select
3	A1	LHL_GPIO_5	LHL GPIO
4	NA	TDM2_SDO	TDM2 interface data out
5	A2	LHL_GPIO_8	LHL GPIO
6	NA	TDM2_SDI	TDM2 interface data in
7	A3	LHL_GPIO_9	LHL GPIO
8	NA	TDM2_SCK	TDM2 interface slave clock
9	NC	NA	No connect

(table continues...)

Table 15 (continued) Header J2 pin configuration

Header J2	Arduino compatible pin	Connection on CYW55513	Description
10	NC	NA	No connect
11	NC	NA	No connect
12	NC	NA	No connect
13	NC	NA	No connect
14	NA	TDM2_MCK	TDM2 interface master clock
15	NC	NA	No connect
16	GND	GND	Ground

Table 16 Header J3 pin configuration

Header J3	Arduino compatible pin	Connection on CYW55513	Description
1	D8	NC	No Connect
2	D9	BT_GPIO_2	BT GPIO
3	D10	BT_GPIO_16	BT_GPIO
4	D11	LHL_GPIO_8	LHL GPIO
5	D12	LHL_GPIO_9	LHL GPIO
6	D13	BT_GPIO_17	BT GPIO
7	GND	GND	Ground
8	NC	NC	No connect
9	SDA	BT_GPIO_6	BT GPIO
10	SCL	BT_GPIO_7	BT GPIO

Table 17 Header J4 pin configuration

Header J4	Arduino compatible pin	Connection on CYW55513	Description
1	D0	LHL_GPIO_3	LHL GPIO
2	D1	LHL_GPIO_2	LHL GPIO
3	D2	BT_GPIO_3	BT GPIO
4	D3	NC	No connect
5	D4	BT_GPIO_4	BT GPIO
6	D5	LHL_GPIO_6	LHL_GPIO
7	D6	BT_GPIO_0	BT GPIO
8	D7	BT_GPIO_5	BT GPIO

Table 18 Header J5 pin configuration

Header J5	Arduino compatible pin	Connection on CYW55513	Description
1	NA	GND	Ground
2	NA	TDM1_MCK	TDM1 interface master clock
3	NA	WL_DEV_WAKE	WLAN device wake
4	NA	BT_DEV_WAKE	Bluetooth® device wake
5	NA	TDM1_SCK	TDM1 interface slave clock
6	NA	TDM1_DI	TDM1 interface data in
7	NA	TDM1_DO	TDM1 interface data out
8	NA	TDM1_WS	TDM1 interface word select

***Note**: The J5 header and even pins of the J2 header are not compatible with standard Arduino pinout and are compatible with the custom audio codec shield from Infineon for the BT audio support.*

2.5 Other headers

J9 is the JTAG/COEX header, which brings out the WL GPIOs of the CYW55513 device (not mounted by default; see the Kit reworks chapter for use).

Table 19 Header J9 pin configuration

Header J9	Pin name	Connection on CYW55513	Description
1	VDDIO_1V8	NA	1.8 V supply to the external debugger
2	TMS	GPIO_3	WL GPIO
3	GND	GND	Ground
4	TCK	GPIO_2	WL GPIO
5	GND	GND	Ground
6	TDO	GPIO_5	WL GPIO
7	GND	GND	Ground
8	TDI	GPIO_4	WL GPIO
9	GND	GND	Ground
10	TRST	GPIO_6	WL GPIO

J22 is a UART programming header using an external device that brings out the HCI UART pins of the CYW55513 device (not mounted by default; see the Kit reworks chapter for use).

Table 20 Header J22 pin configuration

Header J22	Pin name	Connection on CYW55513	Description
1	GND	GND	Ground
2	UART_RTS	BT_UART_RTS_N	UART request-to-send. Active-low request-to-send signal for the HCI UART interface.
3	VCC_3V3	NA	3.3 V supply
4	UART_RXD	BT_UART_RXD	UART serial input. Serial data input for the HCI UART interface.
5	UART_TXD	BT_UART_TXD	UART serial output. Serial data output for the HCI UART interface.
6	UART_CTS	BT_UART_CTS_N	UART clear-to-send. Active-low clear-to-send signal for the HCI UART interface.

Table 21 Header J21 pin configuration

Header J21	Pin name	Connection on CYW55513	Description
1	EX_LHL_GPIO_3/ UART_RXD	LHL_GPIO_3	LHL GPIO
2	EX_LHL_GPIO_2/ UART_TXD	LHL_GPIO_2	LHL_GPIO
3	WL_DEV_WAKE_M2	WL_DEV_WAKE	WLAN device wake
4	EX_LHL_GPIO_5/ UART_RTS	LHL_GPIO_5	LHL GPIO
5	BT_GPIO_7	BT_GPIO_7	BT GPIO
6	BT_GPIO_6	BT_GPIO_6	BT GPIO
7	WL_REG_ON_M2	WL_REG_ON	Enable it for WLAN section power supply. Not used in the CYW55513 device, connected to GND on the device side.
8	BT_REG_ON_M2	BT_REG_ON	Used by the PMU to power on or power off the internal CYW55513 regulators used by the Bluetooth® section.
9	EX_LPO_IN_3V3	LPO_IN_OUT	LPO clock input from external host board
10	BT_DEV_WAKE_M2	BT_DEV_WAKE	Bluetooth® device wake
11	GND	GND	Ground
12	EX_BT_UART_CTS	BT_UART_CTS_N	UART clear-to-send. Active-low clear-to-send signal for the HCI UART interface.
13	EX_BT_UART_RTS	BT_UART_RTS_N	UART request-to-send. Active-low request-to-send signal for the HCI UART interface.
14	EX_BT_UART_RXD	BT_UART_RXD	UART serial input. Serial data input for the HCI UART interface.

(table continues...)

Table 21 (continued) Header J21 pin configuration

Header J21	Pin name	Connection on CYW55513	Description
15	EX_BT_UART_TXD	BT_UART_TXD	UART serial output. Serial data output for the HCI UART interface.
16	GND	GND	Ground
17	BT_HOST_WAKE_M2	BT_HOST_WAKE	Bluetooth® host wake
18	GPIO0_WL_HOST_WAKE_M2	GPIO_0	WLAN host wake
19	GND	GND	Ground
20	EX_TDM2_DI	TDM2_DI	TDM2 interface data in
21	EX_TDM2_DO	TDM2_DO	TDM2 interface data out
22	EX_TDM2_WS	TDM2_WS	TDM2 interface word select
23	EX_TDM2_SCK	TDM2_SCK	TDM2 interface slave clock
24	GND	GND	Ground
25	EXT_SDIO_DATA3	SDIO_DATA_3	SDIO data line 3
26	EXT_SDIO_DATA2	SDIO_DATA_2	SDIO data line 2
27	EXT_SDIO_DATA1	SDIO_DATA_1	SDIO data line 1
28	EXT_SDIO_DATA0	SDIO_DATA_0	SDIO data line 0
29	EXT_SDIO_CMD	SDIO_CMD	SDIO command line
30	EXT_SDIO_CLK	SDIO_CLK	SDIO clock input

2.6 USB serial interface chip

A CY8C5868LTI-LP039 PSOC™ 5LP chip is used for onboard programming and USB-serial functionality. It connects the kit to the PC over a USB interface and to the CYW55513 device through the HCI, peripheral UARTs, and I2C pins. Optional SPI and JTAG connectivity are also supported by this chip.

2.7 Kit power supply

The CYW955513EVK-01 kit can be powered with the following power inputs:

- USB Type-C connector (J6)
- 5 V - 12 V, 1 A DC jack (J7)
- VIN pin of the J1 header (J1.1)

The input supply is provided to the buck regulator to generate 3.3 V for the VBAT supply of the device, and from the same 3.3 V; for the peripherals, 1.8 V is generated using an LDO. For more details about the power regulators, see the Hardware section.

2.8 Test points

There are three ground test points for easy connection of probes. Table 22 lists voltage at various domains that can be measured from their respective test points on the baseboard.

Table 22 Test points in CYW955513EVK-01

Label	Description
TP1, TP3, TP5	Ground
TP2	Input supply test point, VCC_IN
TP4	3.3 V rail test point, VCC_3V3
TP6	1.8 V rail test point, VCC_1V8
TP7	P5LP supply test point, P5LP_VDD

2.9 Current measurement

CYW955513EVK-01 has a VBAT (3.3 V) power domain to power the CYW55513 device. Current consumption of the M.2 carrier module with the CYW55513 device can be found out from the current consumed by the VBAT domain.

***Note**: To measure the current consumed by the VBAT domain, connect an ammeter across pin 1 and pin 2 of the jumper J14 on the baseboard.*

2.10 Pin configuration

GPIOs on the CYW55513 device can be multiplexed to various peripherals. For more information on the peripherals that can be routed to the various GPIOs; see the device datasheet.

For this board, the ModusToolbox™ initializes GPIOs to the platform's default configuration.

3 Hardware

This section describes the CYW955513EVK-01 kit hardware and its different blocks, such as the power supply, reset control, Arduino-compatible headers, other connectors, and peripherals. This kit consists of two boards: a baseboard with all peripherals and interconnect options and an M.2 carrier module with the CYW55513 device and audio shield board with the audio codec and audio interfaces.

See the CYW955513EVK-01 kit webpage for schematics and design files of the baseboard, M.2 carrier module, and audio shield.

3.1 M.2 carrier module

The baseboard design of the CYW955513EVK-01 board is designed to be modular so that different carrier modules can be used with the same baseboard. In this kit, the CYW955513SDCM2WLIPA M.2 carrier radio module, which employs the CYW55513 device, is connected to the baseboard through the M.2 interface.

The carrier module interface is a generic interface used across many devices. See device I/O mapping for a detailed interface description. SDIO, UART signals, and GPIOs are moved out from module pins to interface with the baseboard.

3.1.1 CYW55513

CYW55513 is the heart of the kit, which is an ultra-low-power, single-chip, that supports 1x1 Wi-Fi 6/6E, Bluetooth® LE 5.4, with integrated PMU, targeted at Internet of Things (IoT) and audio applications. An integrated 192 MHz Arm® Cortex®-CM33 runs the Wi-Fi and Networking Stacks, Bluetooth® LE 5.4, and supports a wide array of peripherals. The CYW55513 operates over the −40°C to +85°C temperature range and is available in a 0.35 mm pitch WLBGA package.

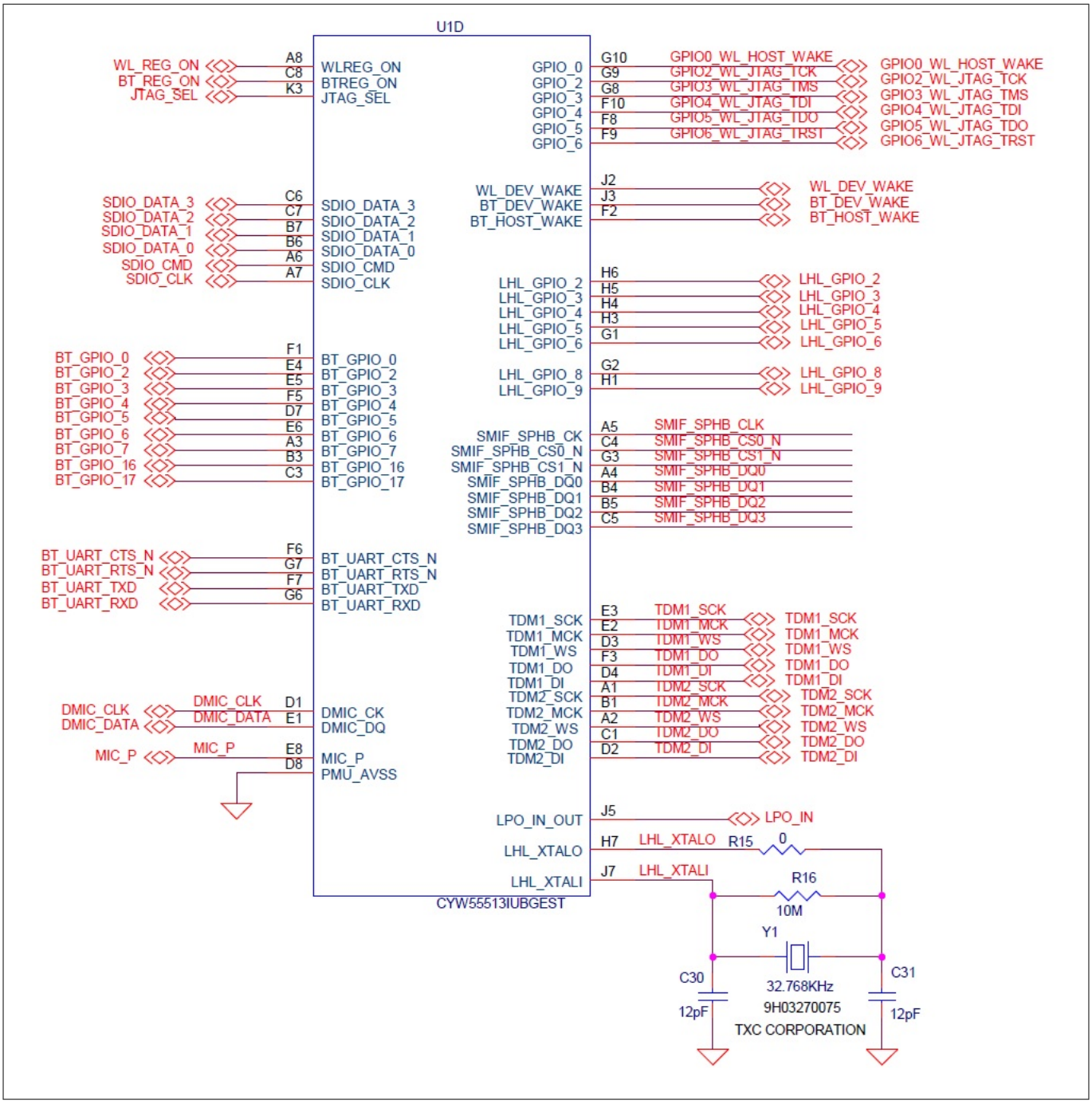


Figure 8 CYW55513 system

CYW55513 device powered from VBAT 3.3V and VDDIO 1.8V. All sections are powered from the internally generated power outputs.

3 Hardware

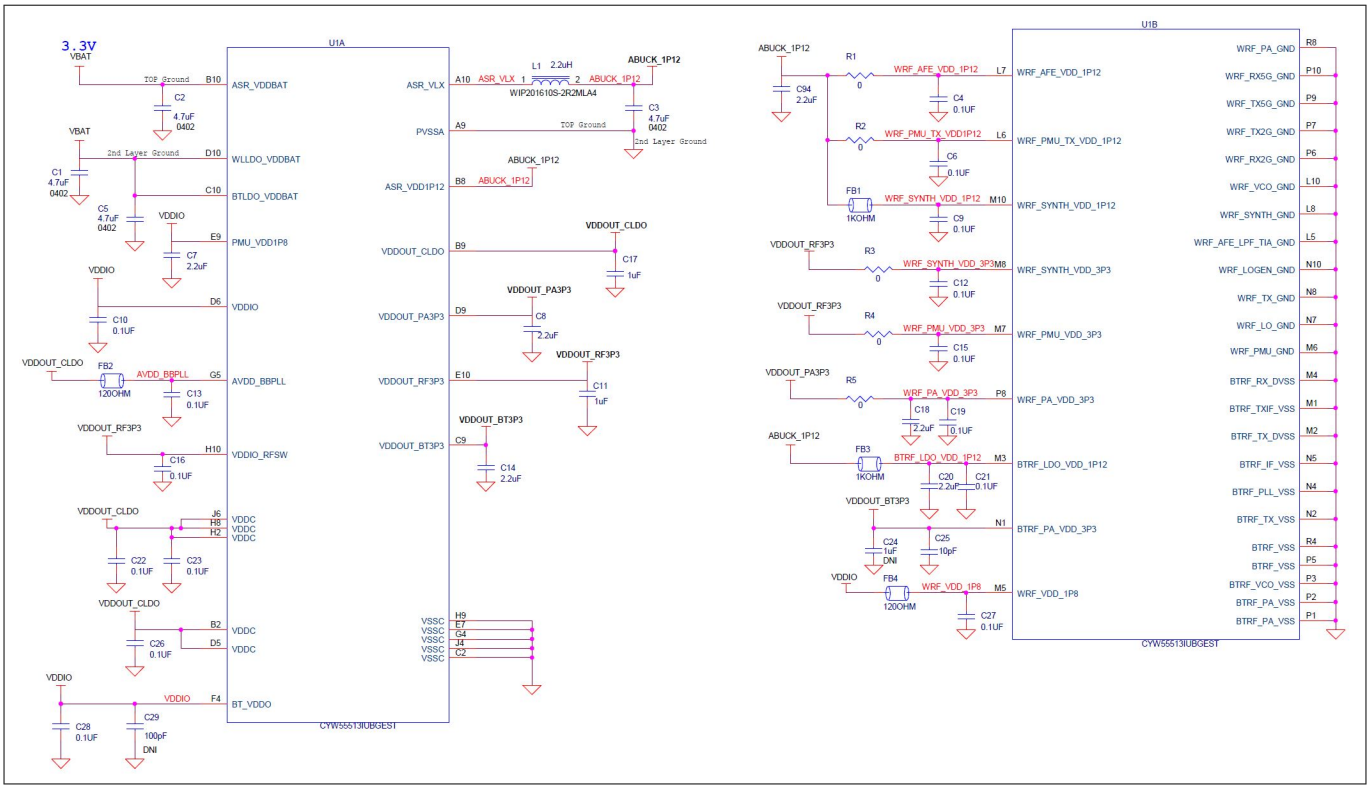


Figure 9 CYW55513 PMU topology

The M.2 Carrier Board is interfaced with the Baseboard via the M.2 E-Key standard edge finger connector.

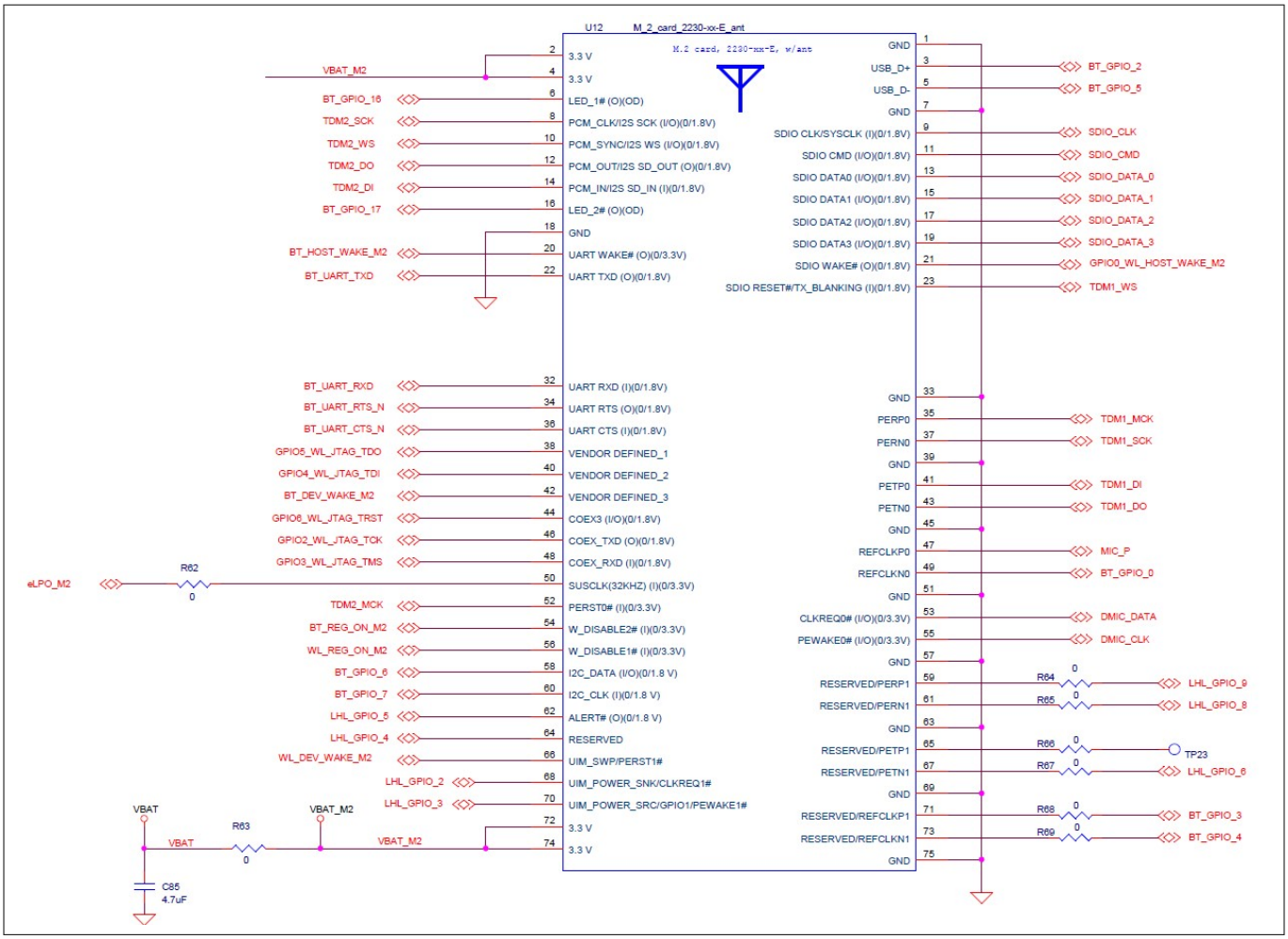


Figure 10 CYW55513 M2 interface

3.1.2 Crystals

The CYW55513 M.2 carrier module has two crystals onboard, a 37.4 MHz crystal which provides the system reference clock and can operate from an internal high-accuracy (~1%) and a 32.768 kHz low-power oscillator (iLPO) or external 32.76 kHz crystal (eLPO) for higher accuracy or from an external reference clock.

3.1.3 Memory

CYW955513SDCM2WLIPA M.2 carrier module also includes external memory connected to the CYW55513 device via the SMIF interface. One QSPI flash is provided on the M.2 carrier board, which is interfaced with CYW55513 device through an SMIF interface with separate chip select.

***Note**: The current revision of the kit does not support code execution from Flash, and the application is programmed directly to the chip RAM. Re-flashing to RAM is needed after a reset or power cycle of the kit.*

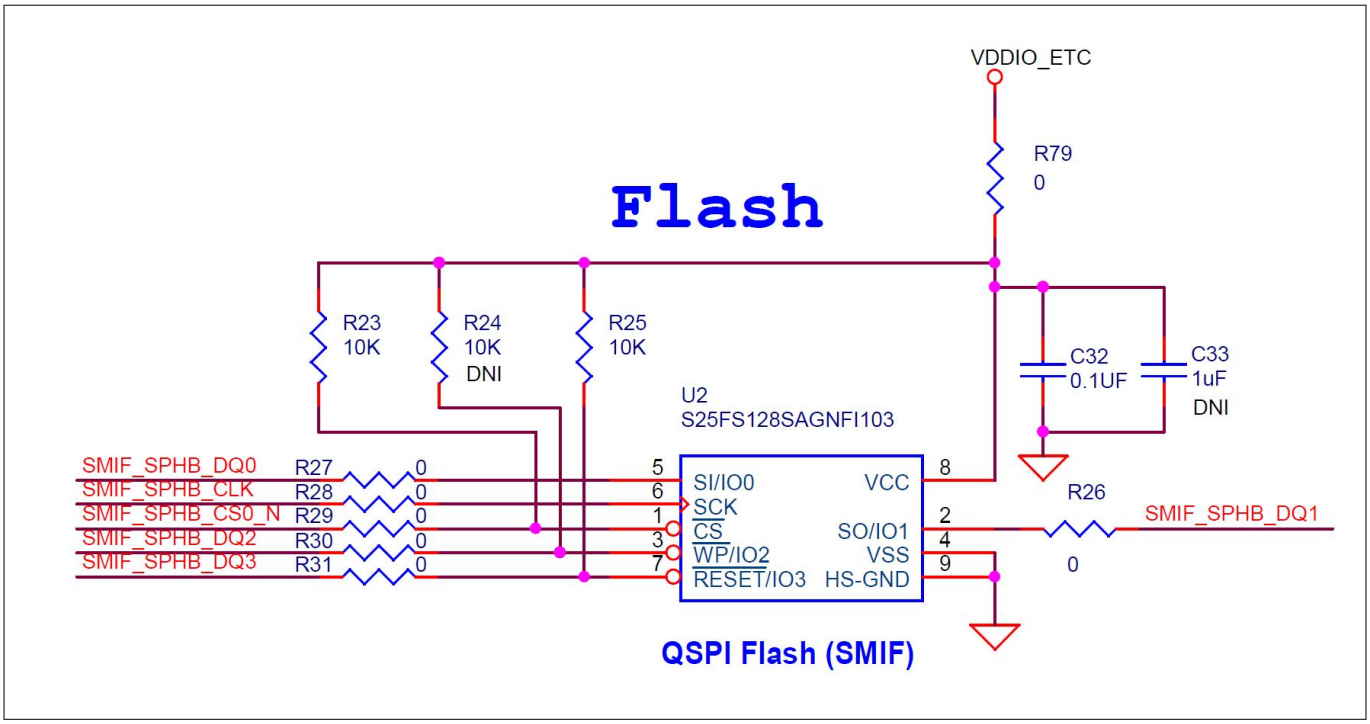


Figure 11 Memory

3.2 Baseboard

CYW9CPM2BASE1 is the baseboard on which the CYW55513 M.2 carrier module (CYW955513SDCM2WLIPA) is mounted. The baseboard is interfaced with the M.2 carrier module through the M.2 E-Key connector, and it provides different peripherals and extended connectors to demonstrate the capabilities of the CYW55513 device.

3.2.1 Serial communication between CYW55513 and PSOC™ 5LP KitProg3

The onboard CY8C5868LTI-LP039 PSOC™ 5LP device is a true programmable embedded system-on-chip responsible for two-channel USB-serial conversion on this baseboard. The USB-serial pins of the PSOC™ 5LP device are hard-wired to the HCI UART pins of the CYW55513 device. Also, one peripheral UART from the device also connected to the P5LP device, which can also be accessed via USB.

Mode switch SW3 can be used to switch between single and dual UART modes of operation of KitProg3. The status LED (LED2) indicates the current mode of KitProg3.

This kit supports a special operating mode that allows for two UART connections rather than a single UART plus bridging (USB-I2C or USB-SPI). To enter UARTx2 when the kit is in CMSIS-DAP Bulk or HID mode, press and hold the mode switch for at least two seconds. In UARTx2 mode, the KP3 status LED (LED2) blinks for 1 second at 2 Hz, then stays on for another second. To exit, press and hold the mode switch for at least two seconds. You can return to CMSIS-DAP Bulk mode.

***Note**: In single UART mode, only HCI UART will be connected to the USB, and for the debug logs, peripheral UART need to be enabled, and KP3 mode needs to be changed to dual-UART mode.*

KP3 supports other serial bridges like USB-I2C and USB-SPI, as well as USB-JTAG for debugging. All serial interfaces are connected through Level translators, as the P5LP device supports 5 V and the CYW55513 device supports 1.8 V.

***Note**: In KitProg3, 3[5] pin can be used for GPIO bridging. This pin is unidirectional (available signal transmittance only from CYW55513 to KitProg3) and the state of 3[5] pin can only read by kitprog3.*

3 Hardware

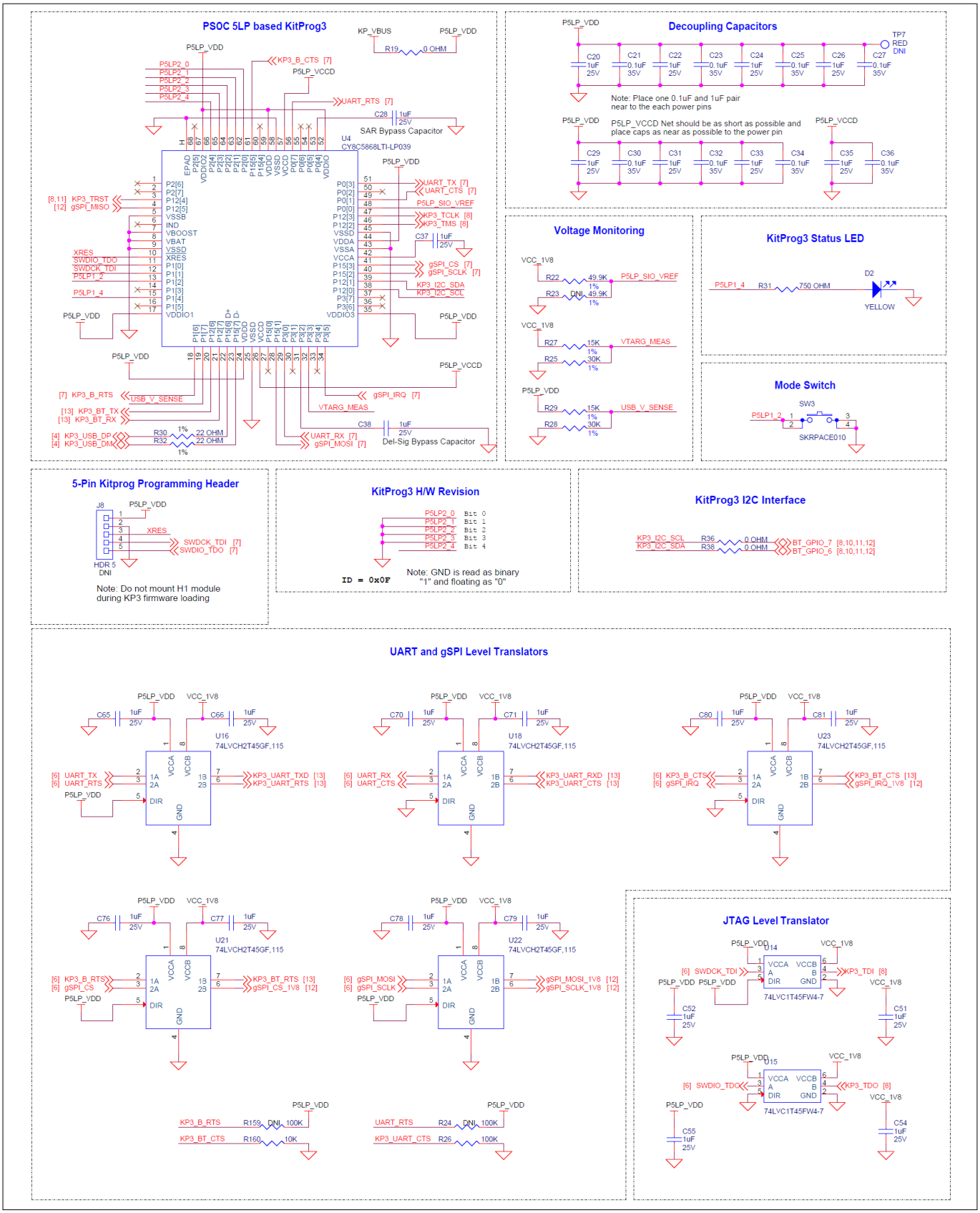


Figure 12 **Serial communication between CYW55513 and PSOC™ 5LP KitProg3 with level translators**

3.2.2 Baseboard power

The major power supply source to this kit is the USB Type-C connector (J6) with a 20 V overvoltage protection circuit. The kit also has one optional power supply option, 5 V - 12 V DC Jack (J7). These input source sections have transient voltage suppression (TVS-diode) to provide ESD protection for the power source at the connector. The amber power LED is connected to the VCC_3V3 rail through a current-limiting resistor to indicate the board power is ON.

The PSOC™ 5LP (KitProg3) is powered from the KP_VBUS rail with a 0 Ω resistor/jumper in series so that PSOC™ 5LP can be disconnected from the supply rail or used as a current measurement jumper. On the other hand, KP_VBUS also goes to the Arduino header (J1) as VCC_ARD_5V0 through a reverse voltage protection circuit.

The kit has a buck regulator that generates 3.3 V from the input sources, which are combined through ORing diodes. Generated 3.3 V will be used for VBAT supply to the CYW55513 device through a current measurement jumper (J14). This 3.3 V supply is also fed to one LDO to generate 1.8 V for other peripherals on the baseboard.

5 V and 3.3 V are going to the Arduino headers via reverse voltage protection circuits, and VIOREF voltage going to the Arduino header (J1) can be selected with the jumper configuration on the J20 header.

Figure 13 shows the power architecture of the CYW955513EVK-01.

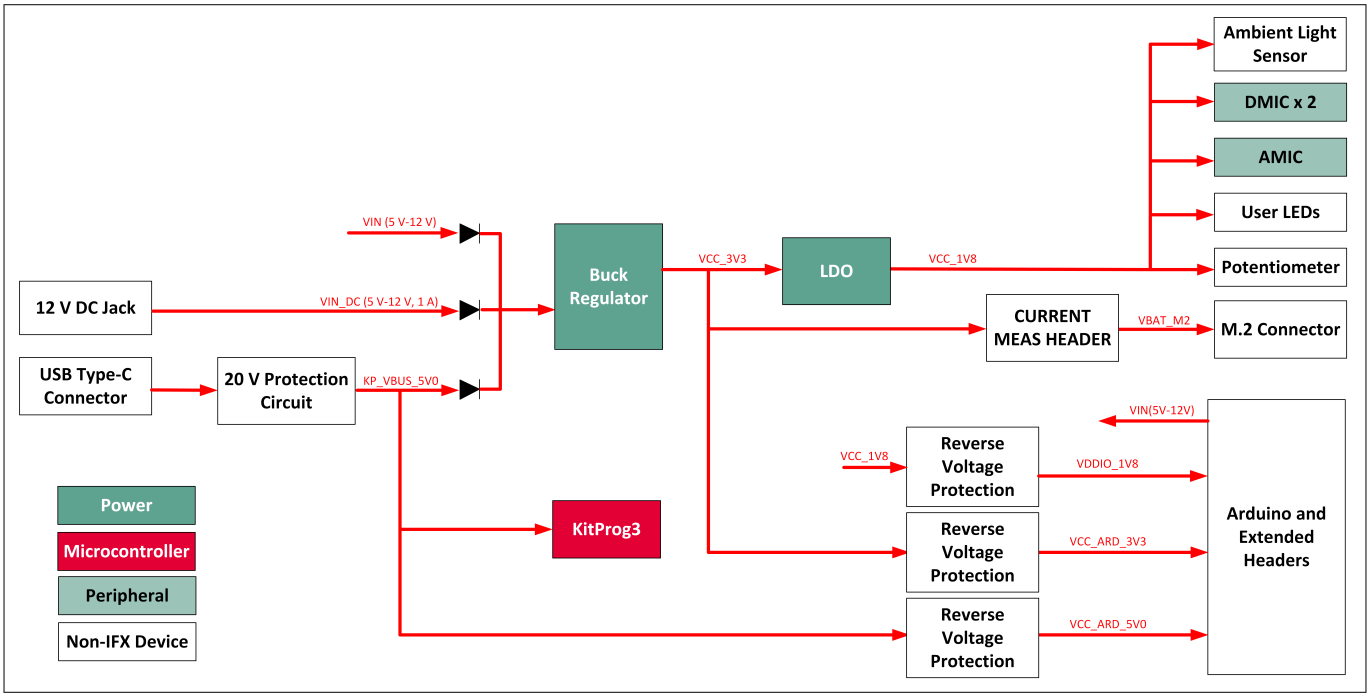


Figure 13 Power architecture of CYW955513EVK-01

The schematics of the power supply sections of the kit are provided below.

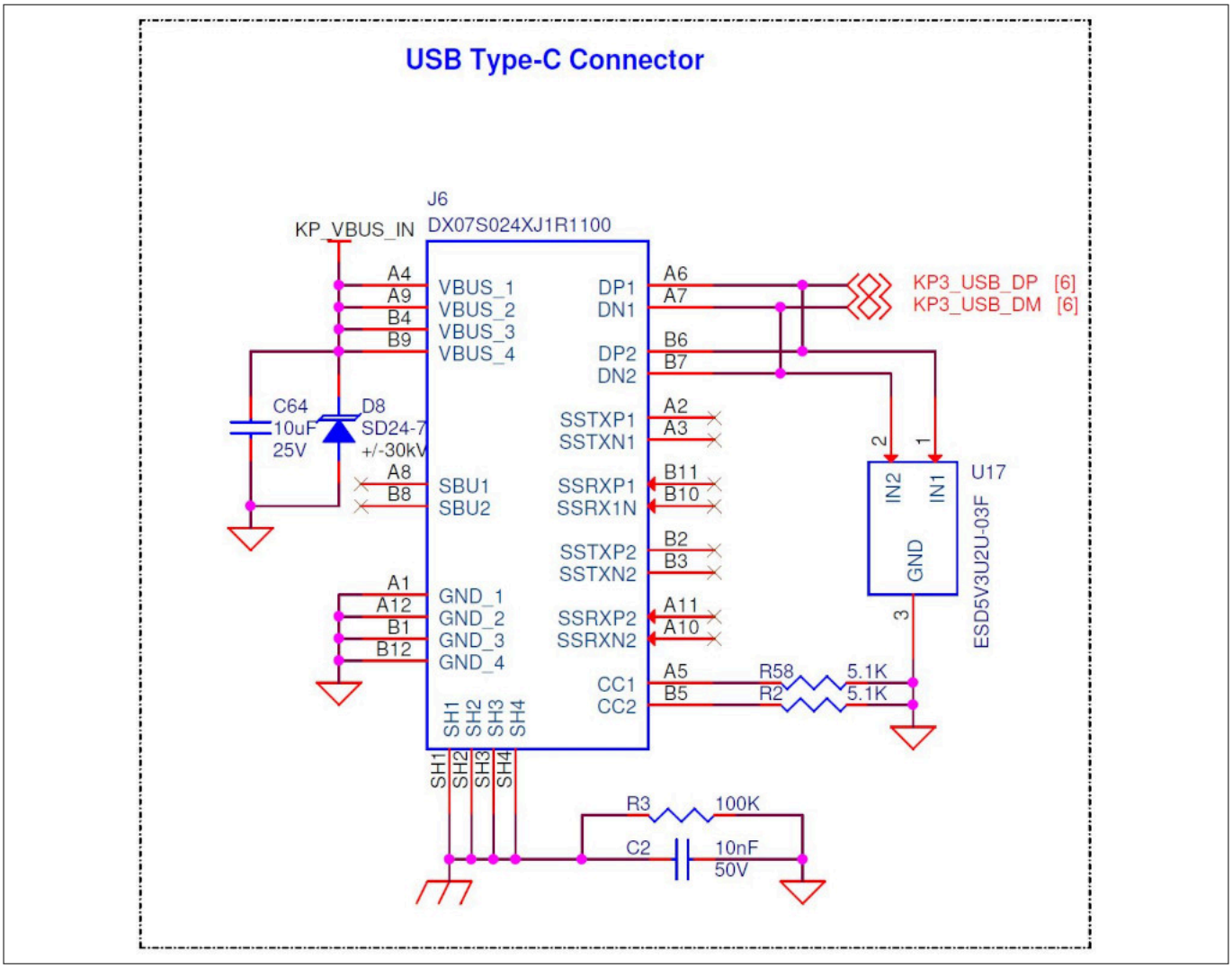


Figure 14 USB Type-C connector for power and KitProg3

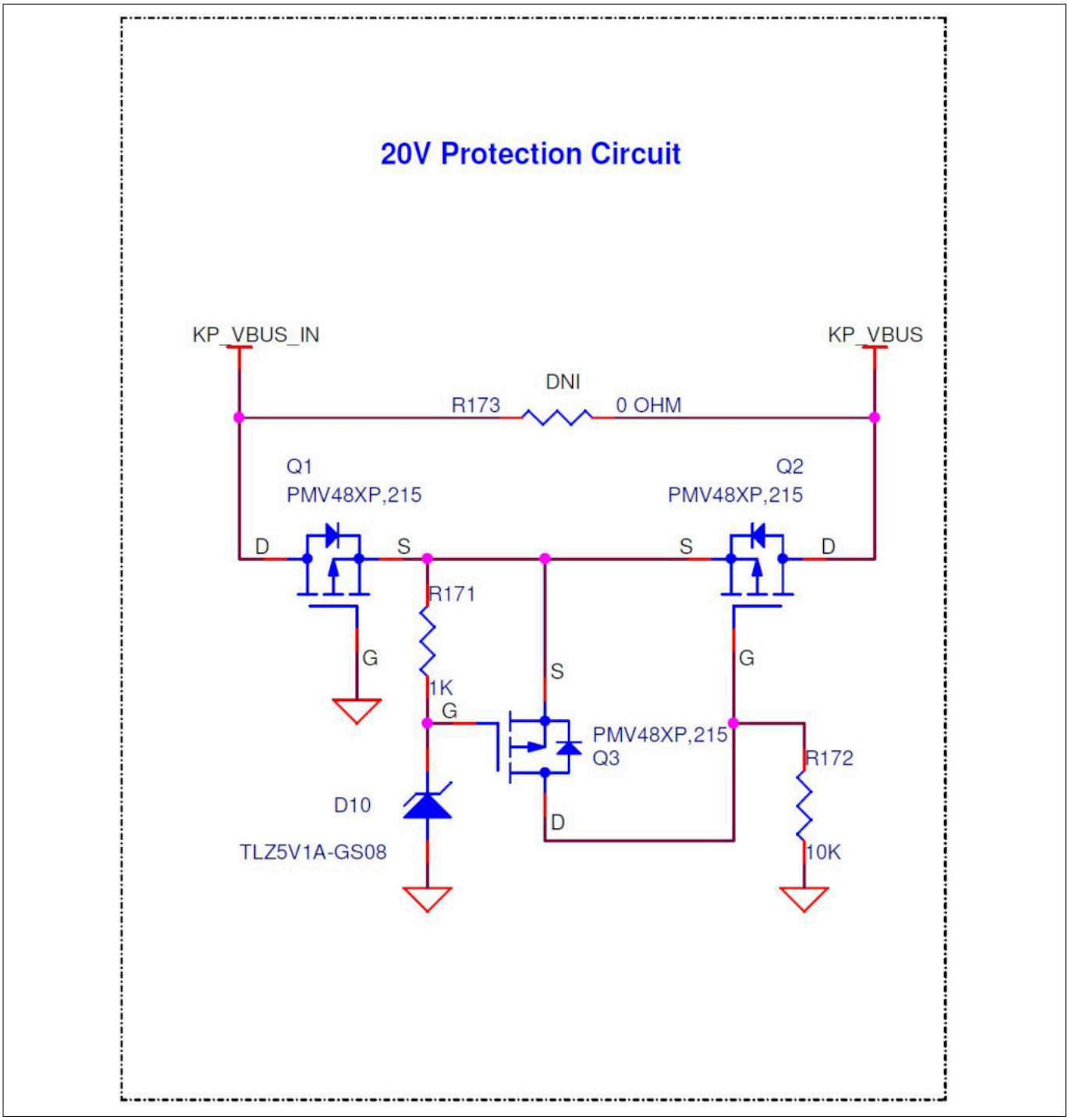


Figure 15 20 V protection circuit for USB

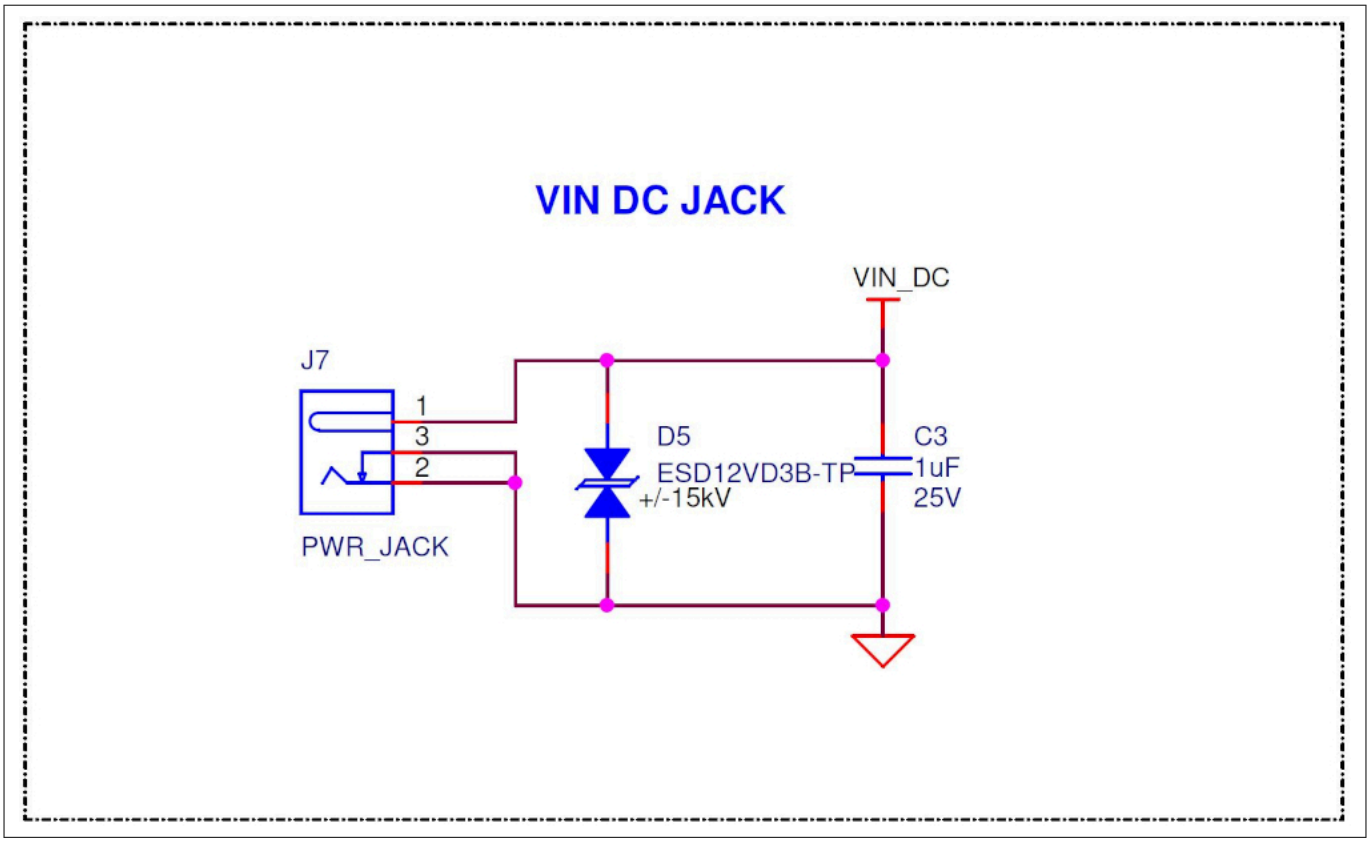


Figure 16 5 V - 12 V DC jack

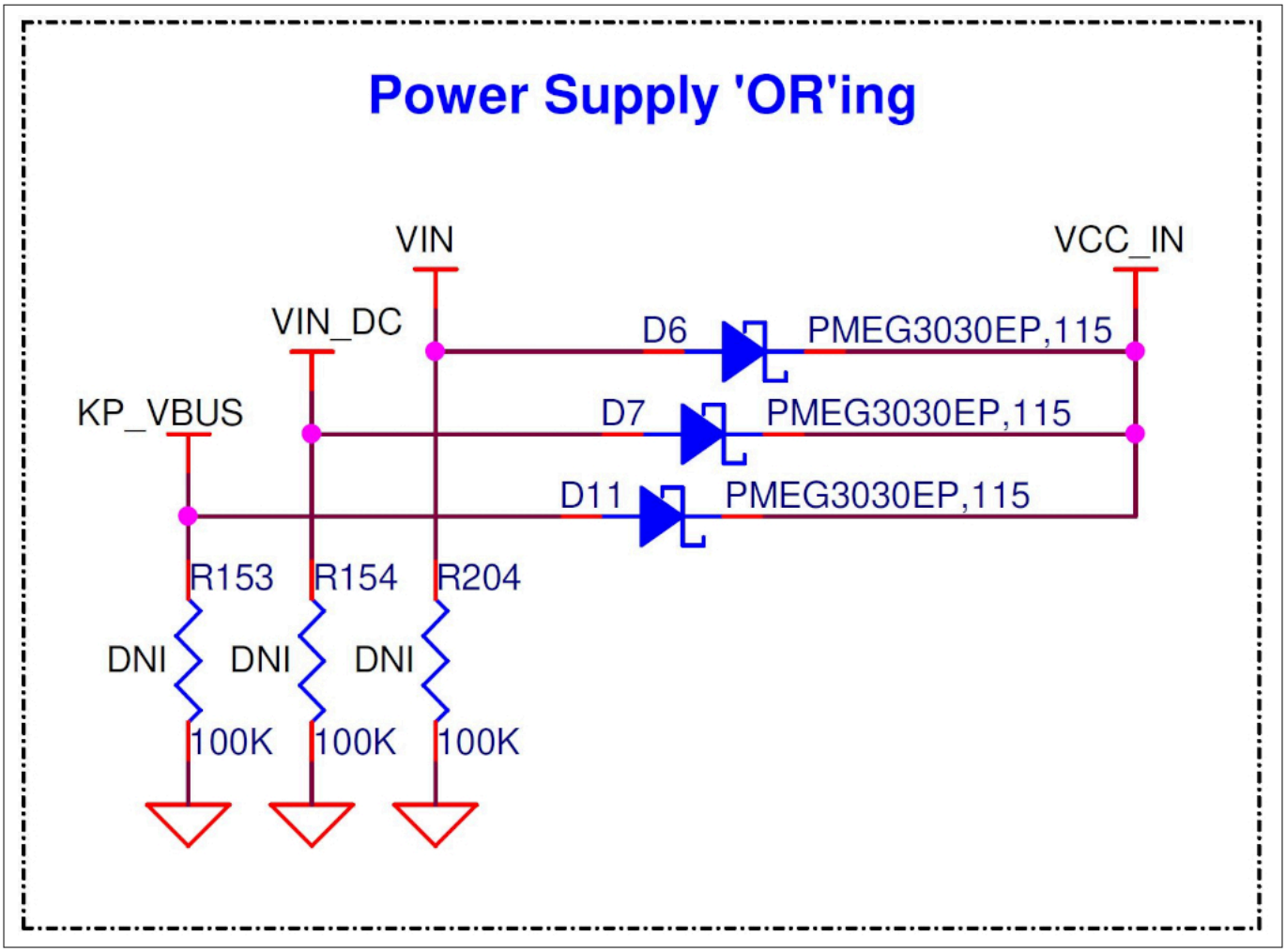


Figure 17 Power supply ORing circuit

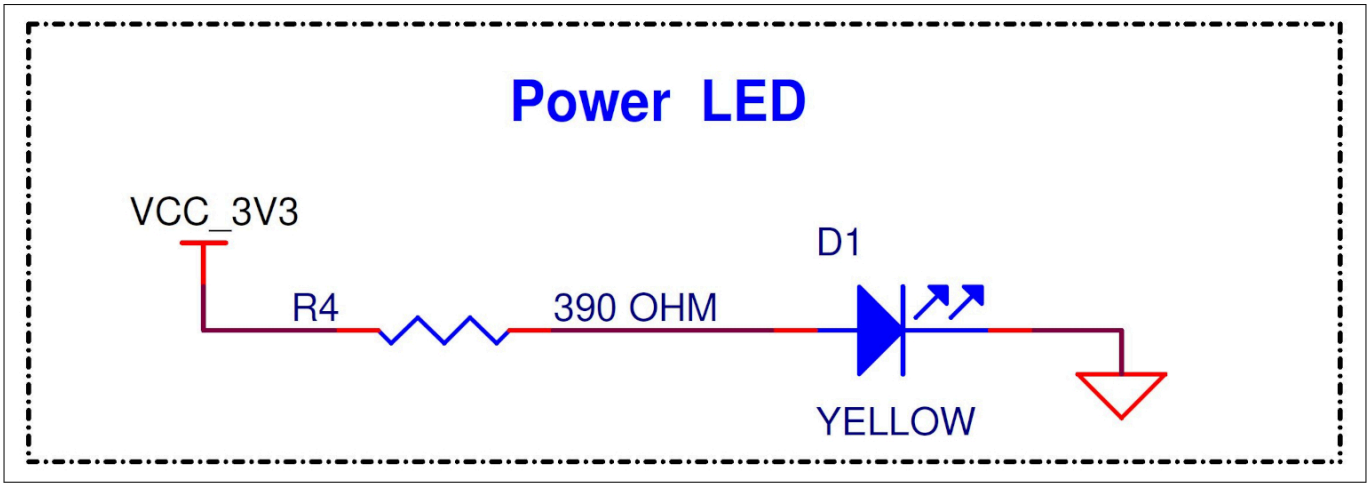


Figure 18 Power LED

3 Hardware

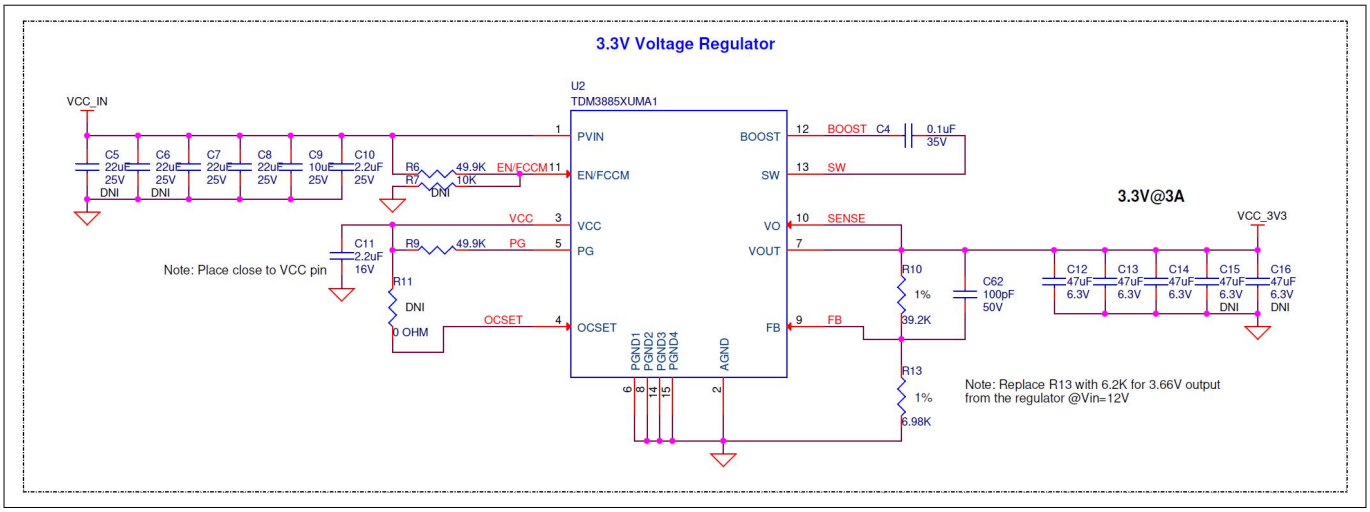


Figure 19 3.3 V Buck regulator

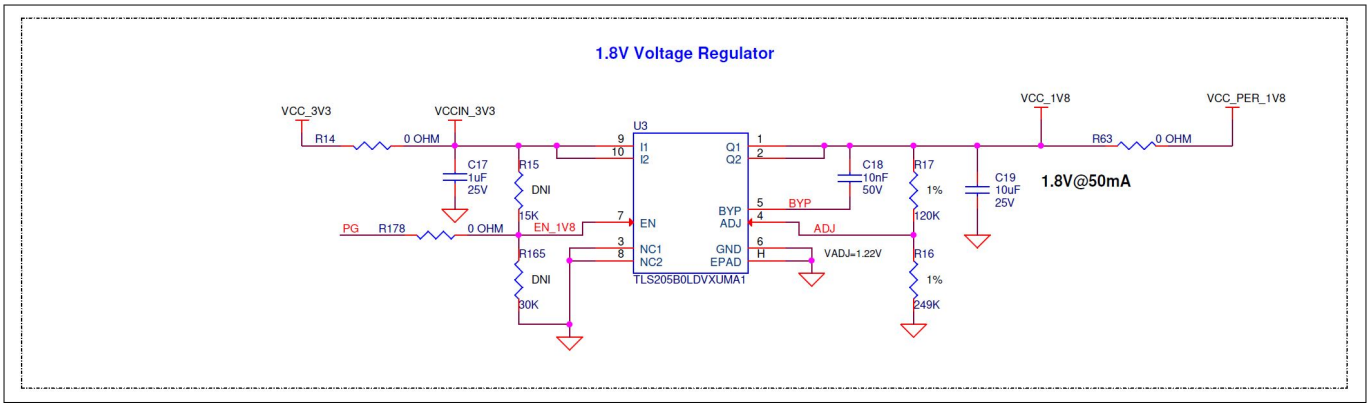


Figure 20 1.8 V LDO

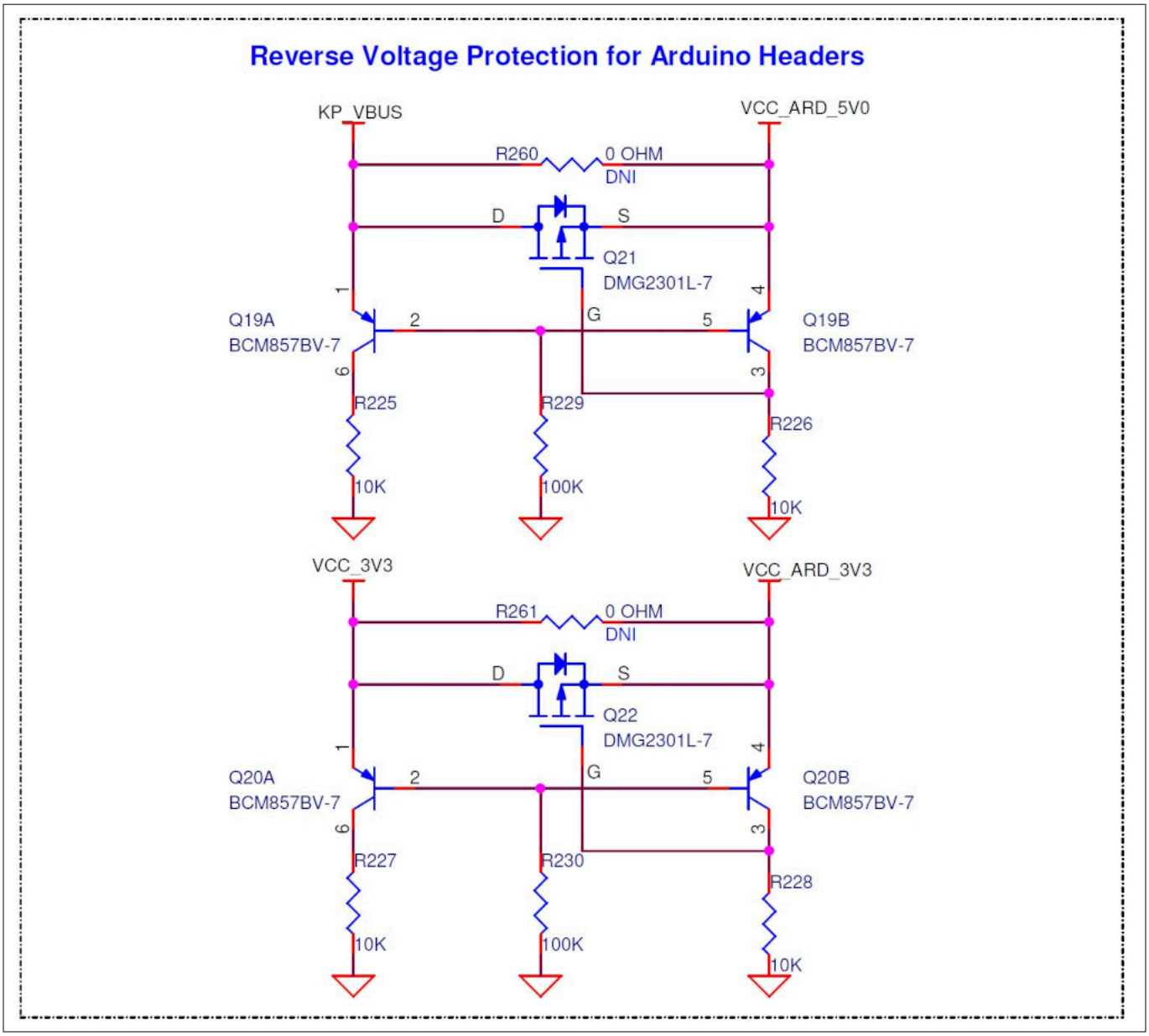


Figure 21 Reverse voltage protection circuit for Arduino headers

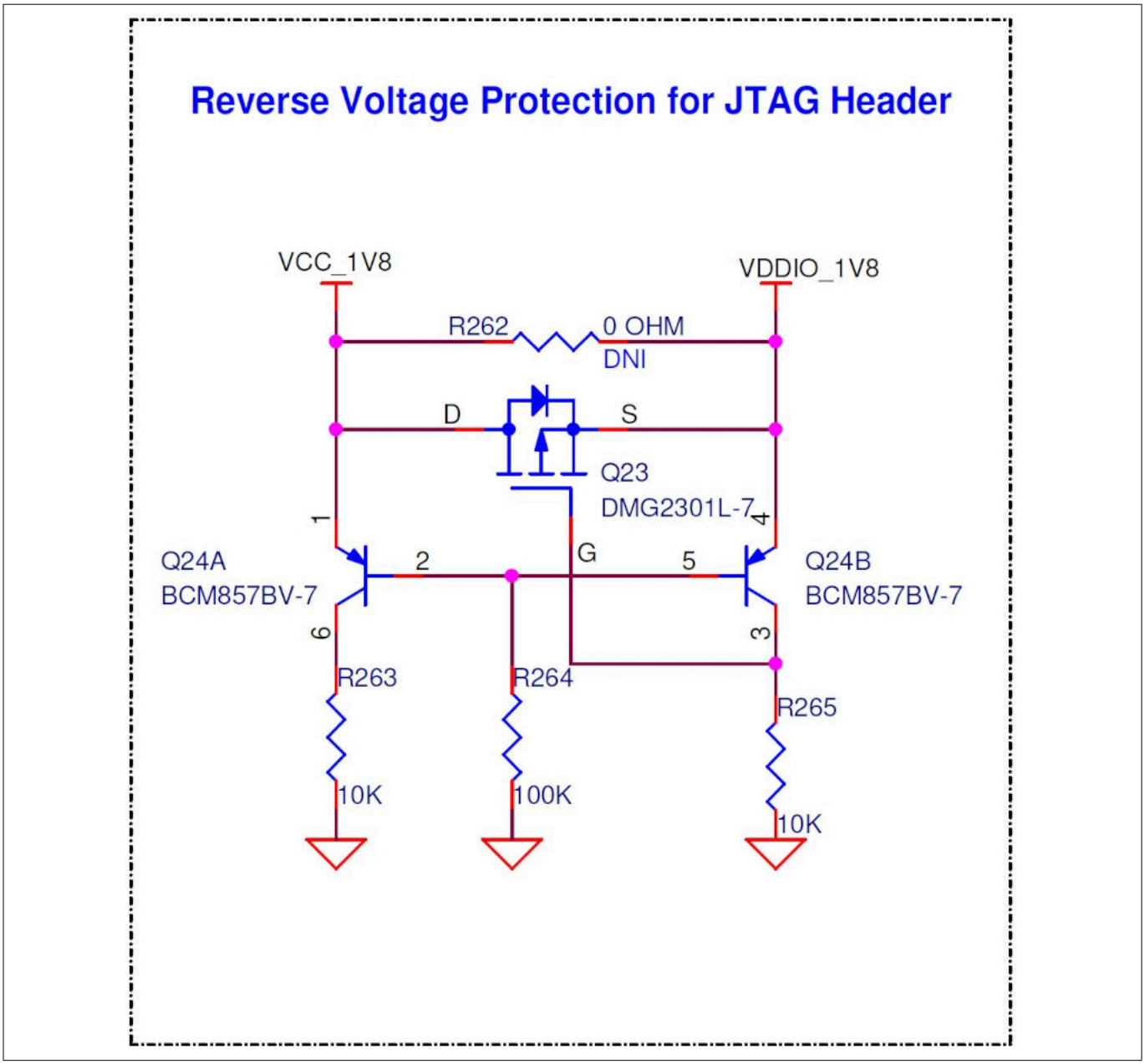


Figure 22 Reverse protection circuit for connector J9

3.2.3 Device recovery and reset

CYW955513EVK-01 has one recovery button and a reset button. The recovery button (SW1) connects to the BT_UART_CTS_N pin on the CYW55513 device, and while pressing the button, this pin is connected to ground and push the device into recovery mode.

SW2 on the kit is the reset button, which is connected to the BT_REG_ON pin of the CYW55513 device, and once button is pressed, it connects this pin to ground, disables the BT subsystem power supply, and makes the system reset. The BT_REG_ON pin of the device is also connected to the J17 header, and by placing jumper on the same, the BT subsystem can be permanently disabled.

Also, J16 connected to the WL_REG_ON pin of the CYW55513, can be mounted with the jumper to connect the pin to ground to disable the WLAN subsystem.

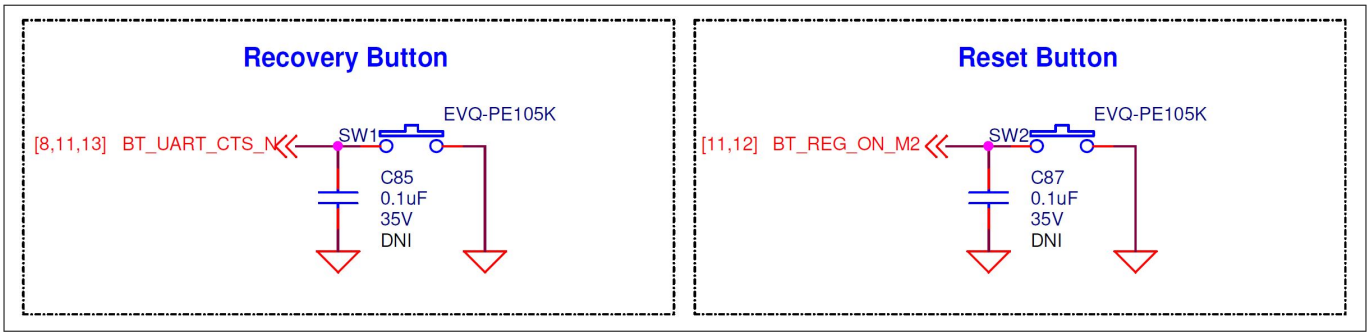


Figure 23 Reset and recovery buttons

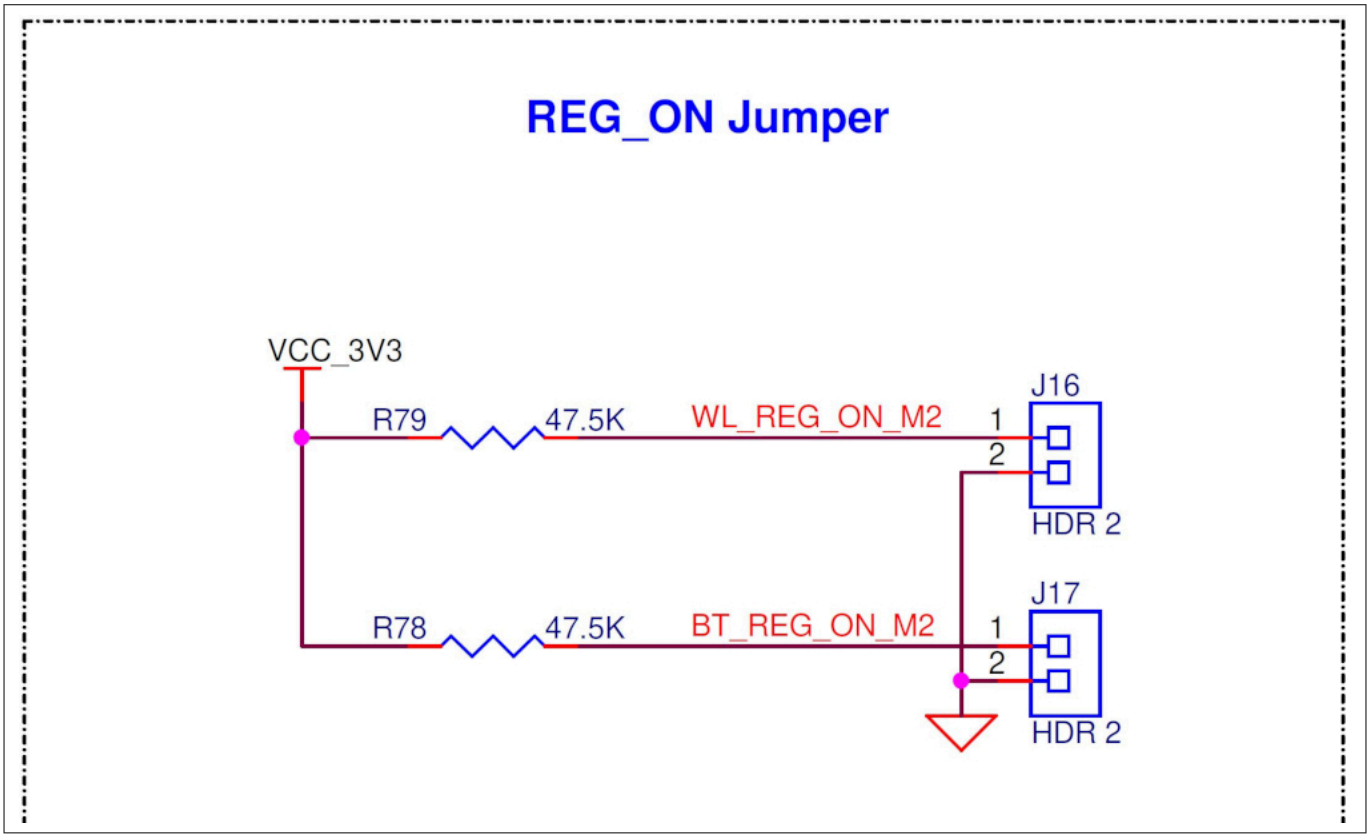


Figure 24 WL_REG_ON and BT_REG_ON jumpers

3.2.4 Digital (PDM) microphones

This kit has two digital mics that are connected to the CYW55513 device through the PDM interface and can be used for audio record functionalities in stereo mode. The select pin on each microphone is biased such that data is either on a HIGH or LOW of the clock signal. This digital mic is powered from the VCC_PER_1V8 power rail of the kit.

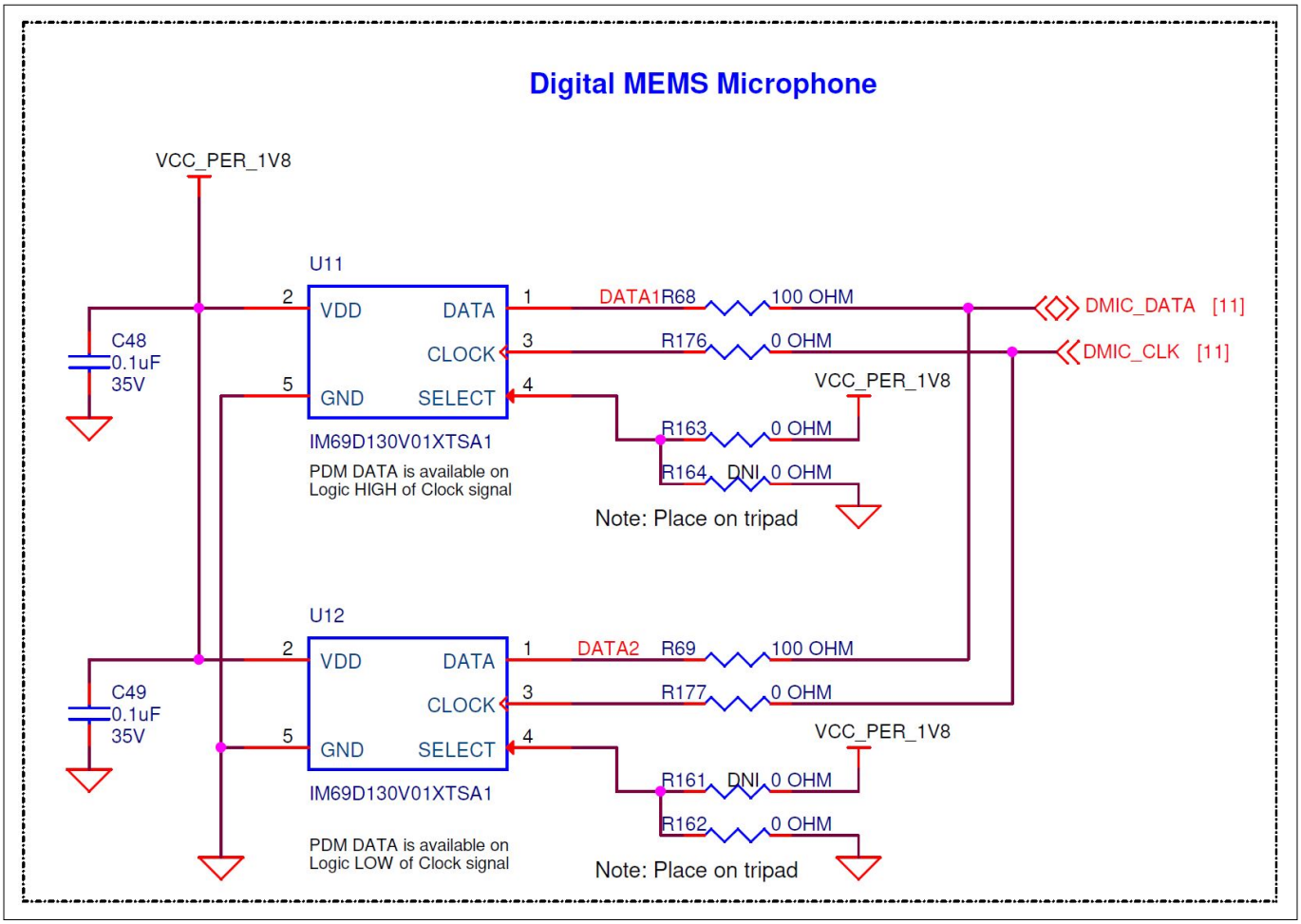


Figure 25 Digital microphone

3.2.5 Analog microphone

One analog microphone is also included in this kit to demonstrate the analog audio capability of the CYW55513 device. Differential output AMIC is interfaced with the CYW55513 device through the dedicated analog microphone input pin and AGND pin. This AMIC is powered by the VCC_PER_1V8 rail on the kit.

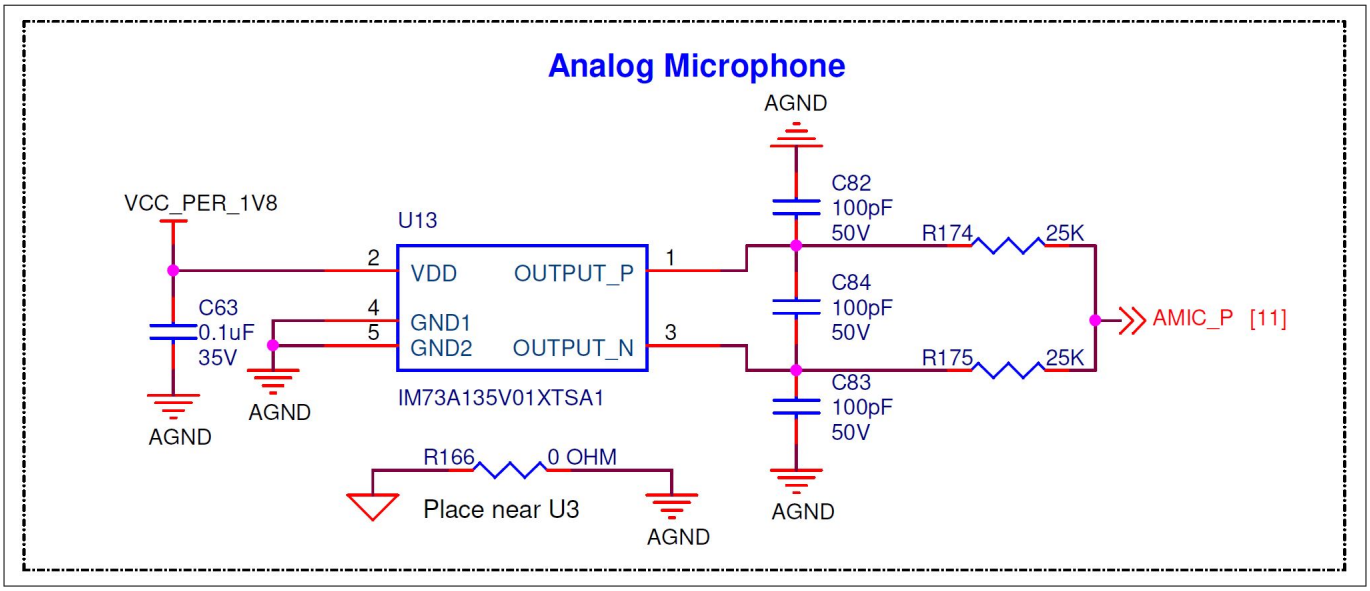


Figure 26 Analog microphone

3.2.6 Ambient light sensor

Kit is having a digital ambient light sensor on the baseboard, which is connected to the CYW55513 device via an I2C interface. The ambient light sensor is powered by the VCC_PER_1V8 power rail on the baseboard, sense the ambient light intensity, and provides data to the CYW55513 device via an I2C interface.

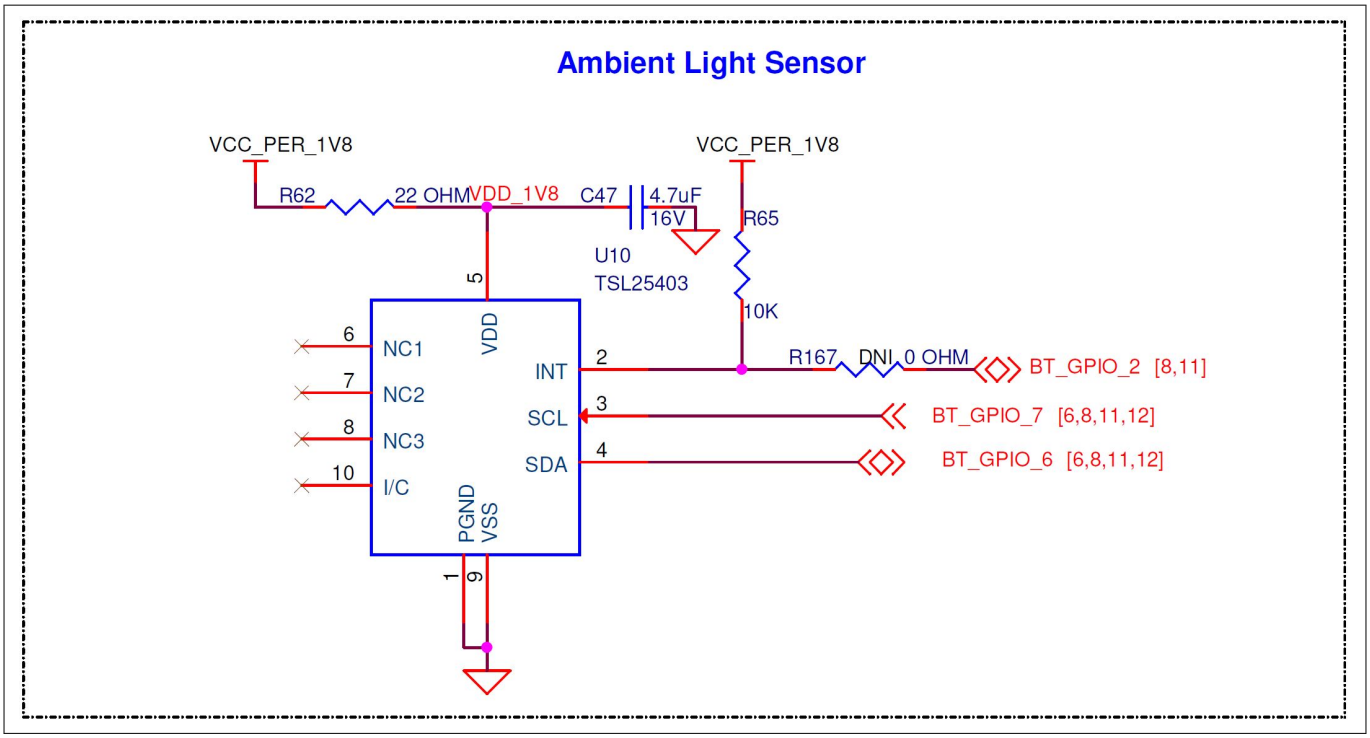


Figure 27 Ambient light sensor

3.2.7 User LEDs

There are two user LEDs on the baseboard that are connected to the GPIOs of the CYW55513 device. User LED1 is connected to the BT_GPIO_16, and user LED2 is connected to the BT_GPIO_17, and these connections to the LEDs can be isolated using the SW5 switch when the GPIOs are accessed on the Arduino connectors.

LEDs are connected to the device GPIOs, so the GPIOs need to be configured as low for glowing the LEDs.

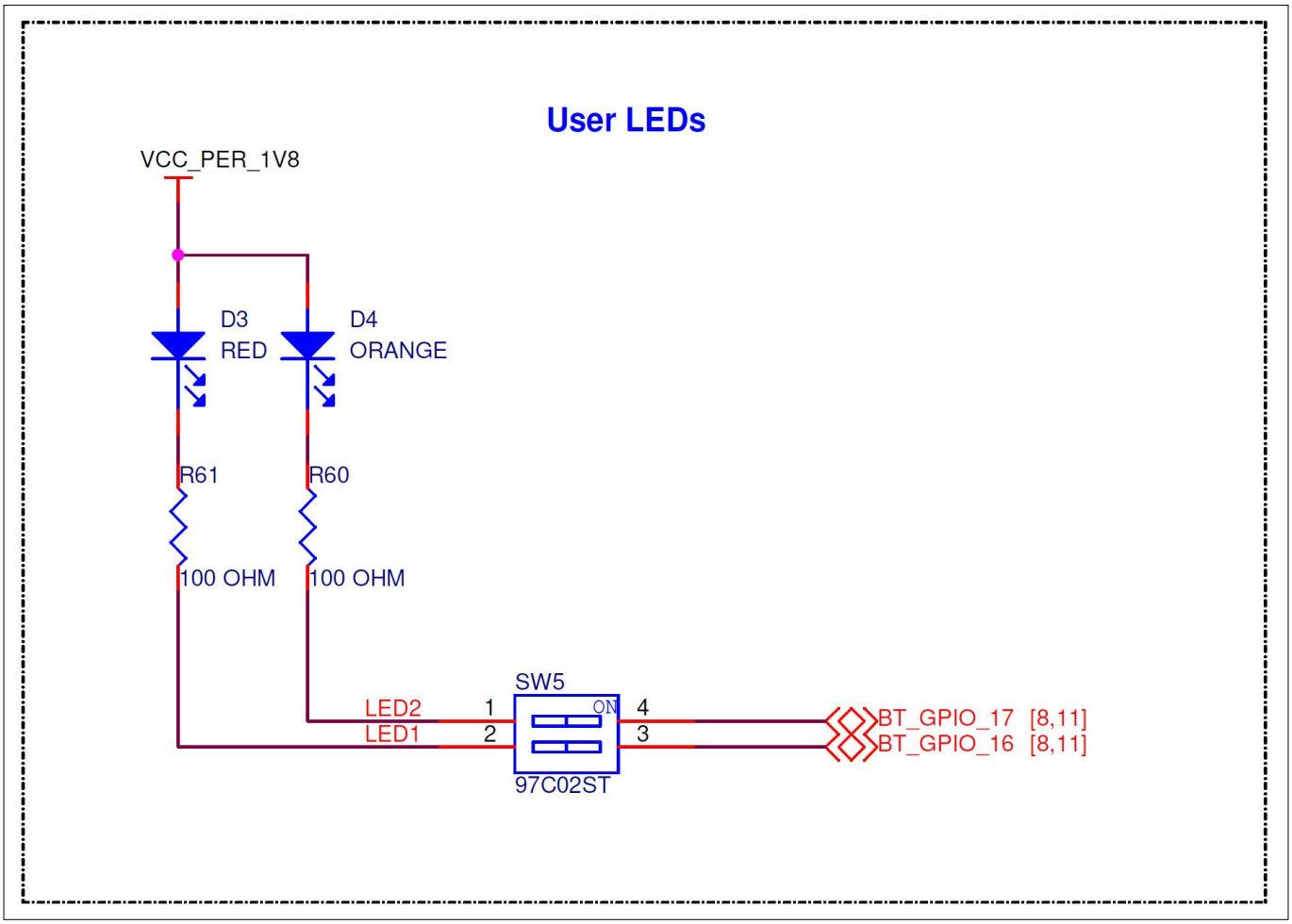


Figure 28 User LEDs and isolation switch

3.2.8 User button

One user-controlled button is available on the kit to provide user-specified inputs. This user button is connected to BT_GPIO_4 of the CYW55513 device as an active low input.

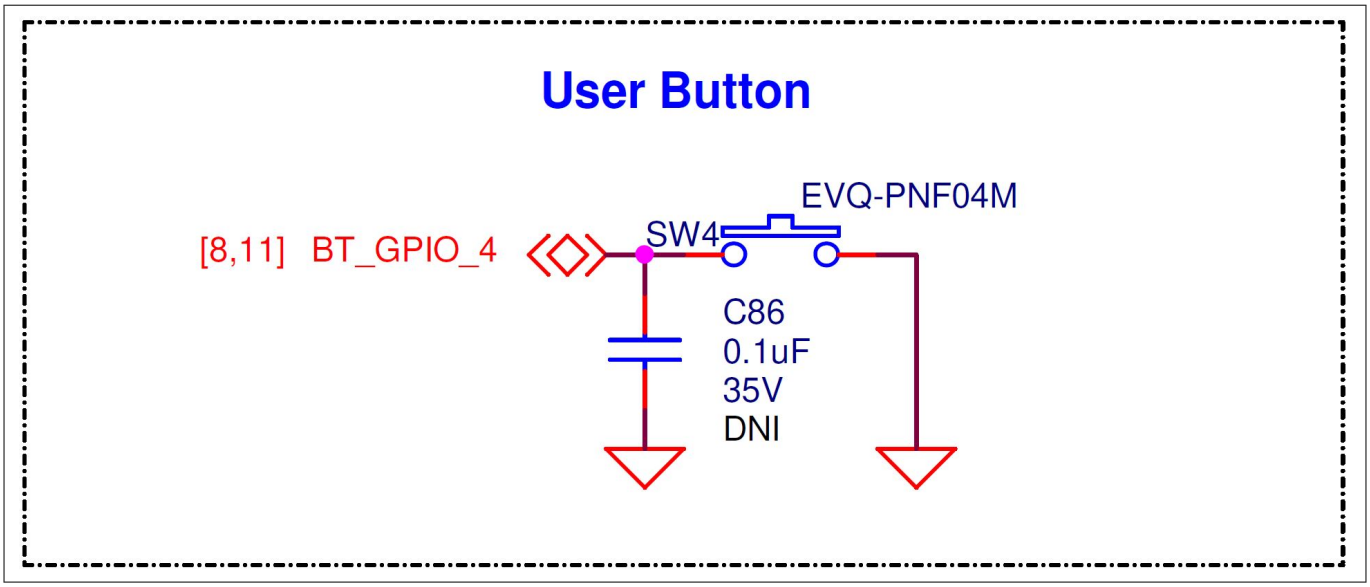


Figure 29 User button

3.2.9 Potentiometer

One Potentiometer is present on the kit and is connected to the ADC-capable pin (LHL_GPIO_8) of the CYW55513 device that enables the kit to demonstrate the analog capability of the device.

If this GPIO is used for other functionalities on the Arduino header, the potentiometer can be disconnected from the GPIO by removing the jumper from the J10 header.

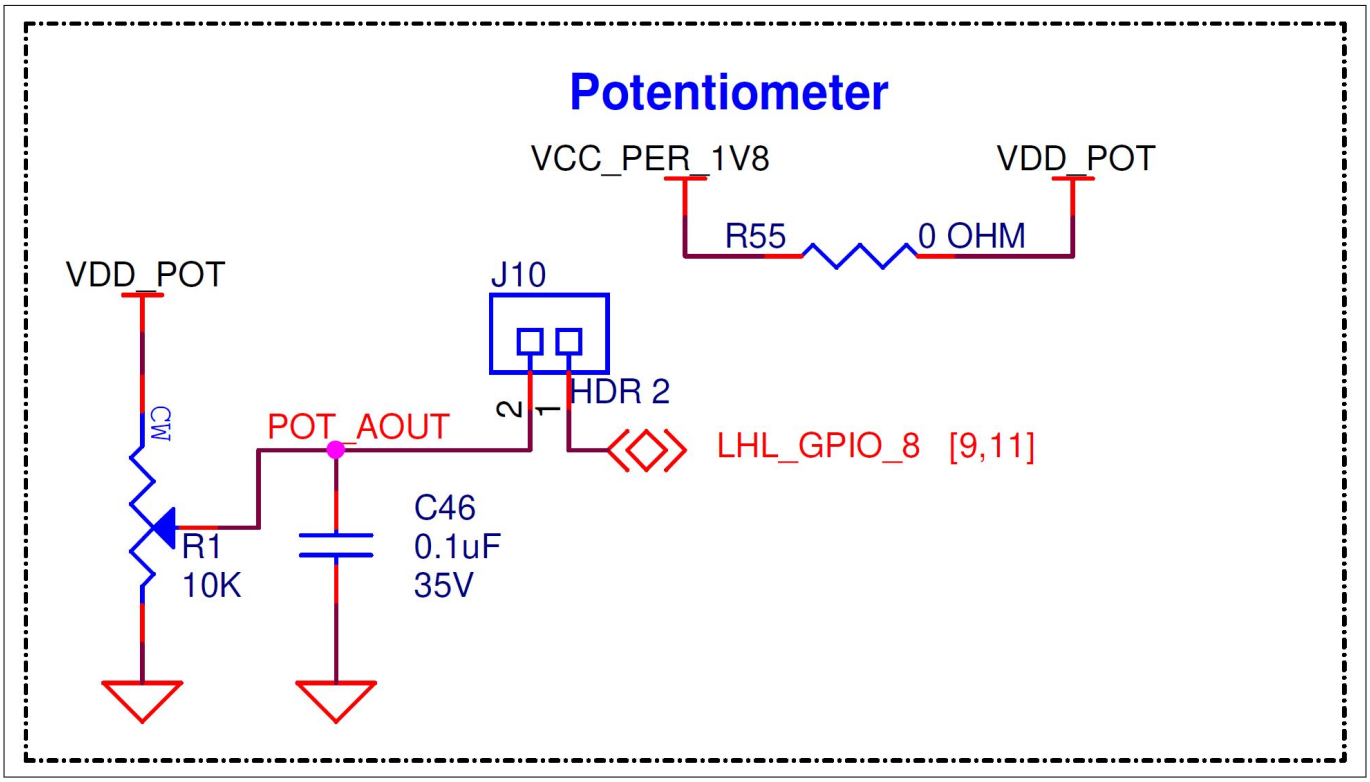


Figure 30 Potentiometer

3.2.10 Arduino compatible headers and extended headers

The baseboard supports generic Arduino-compatible Uno shields and selected Infineon custom-defined Arduino-compatible shields. All CYW55513 GPIO pins are moved out to Arduino-compatible headers. Some pins with fixed functions are also multiplexed through 0 Ω and connected to headers. The I/O headers J1-J4 whose position and pin map comply with the Arduino-compatible UNO R3 kit to support Arduino-compatible shields.

The system power signals are moved to the pins of J1. The power supply pins for Arduino-compatible VCC_ARD_3V3 and VCC_ARD_5V0 connect to VCC_3V3 and KP_VBUS through reverse voltage protection circuits. All GPIOs of the CYW55513 device are at 1.8 V, and level translators are used to level shift them to 3.3 V, 5 V to support those voltage levels, and VIOREF voltage can be selected with the jumper position in the J20 header.

Extended headers are also available on the kit and mapped to the TDM interfaces from the CYW55513 device to support the BT audio functionality.

The SW6 slide switch is used to switch the functionalities of the multiplexed GPIOs LHL_GPIO_8 and LHL_GPIO_9.

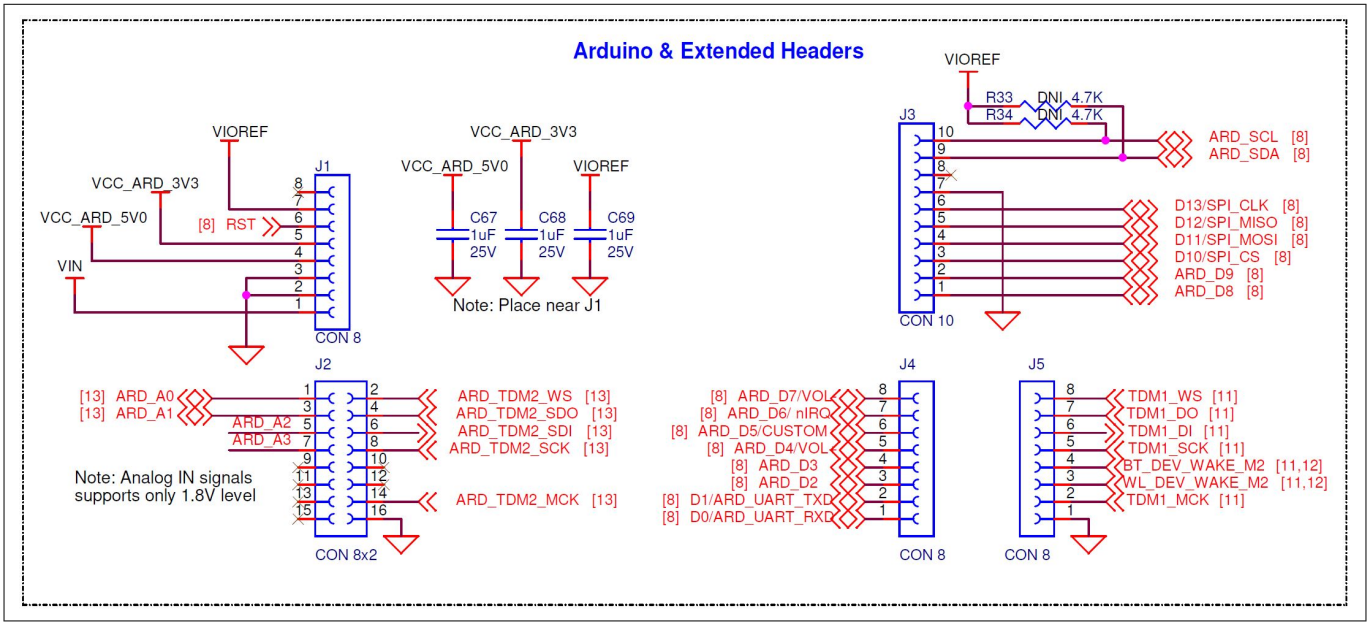


Figure 31 Arduino and extended headers

CYW55513 device have three Serial Communication Blocks (SCBs) supports three serial communication protocols: SPI, UART, and I2C. Only one of the protocols is supported by an SCB at any given time.

In CYW955513EVK-01, SPI interface to the Arduino header J3 and the Peripheral UART available on the USB connector(J6) uses the same SCB block (SCB1). So only one of them can be accessed at any given time.

3 Hardware

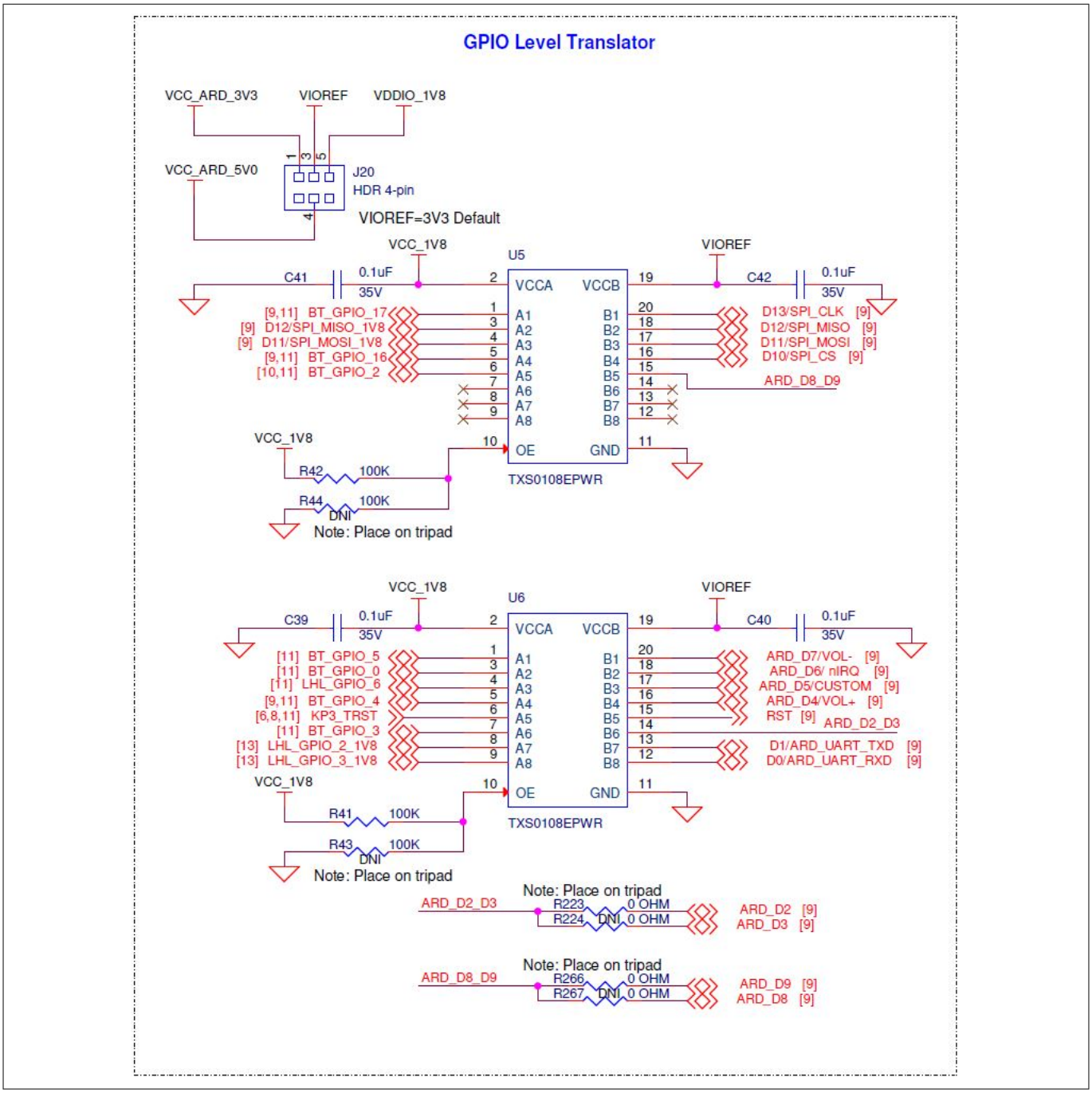


Figure 32 GPIO level translators for Arduino headers

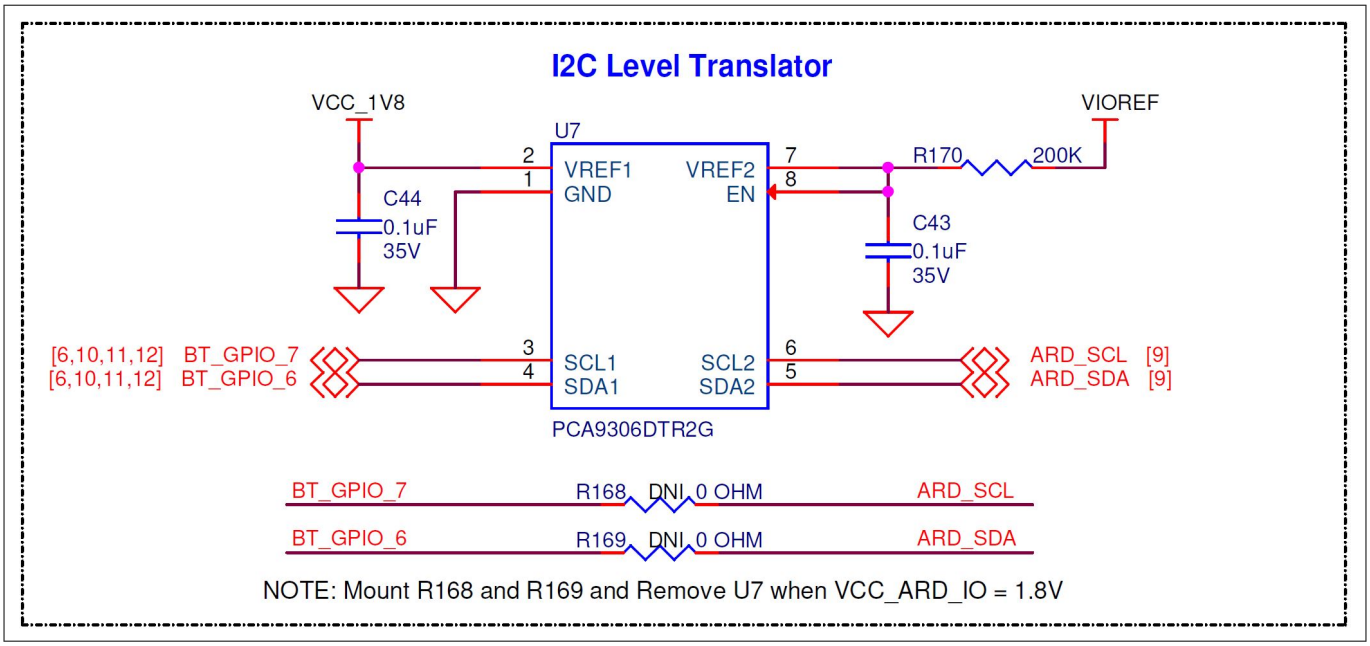


Figure 33 I2C level translator

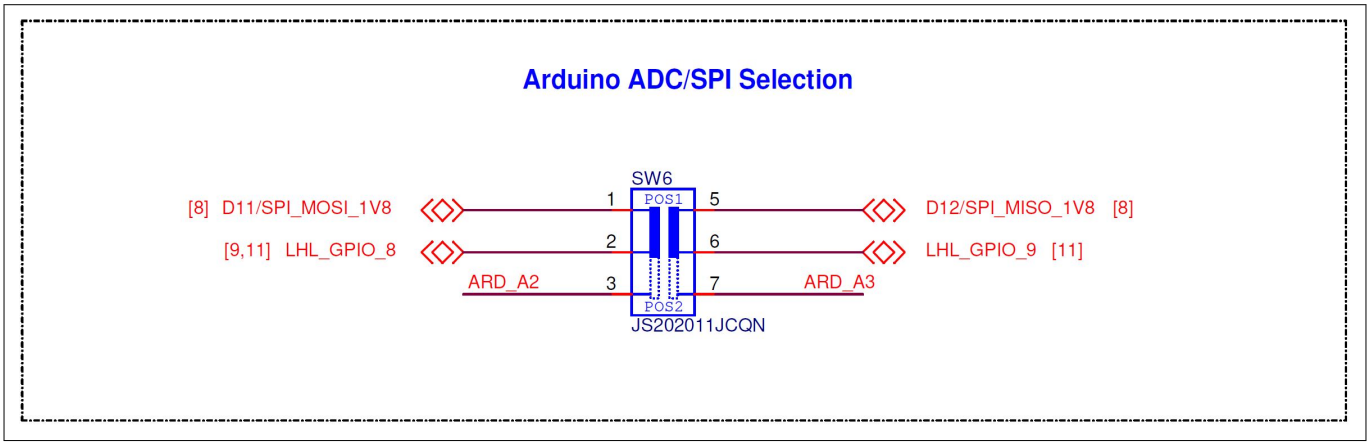


Figure 34 Multiplex switch for LHL_GPIO

3.2.11 M.2 connector for CYW55513 carrier module

The M.2 E-Key standard connector (J13) is used to interface the CYW55513 M.2 carrier module to the baseboard. This connector brings out all major interfaces like HCI UART, SDIO, TDM, and GPIOs from the device.

One external LPO option is provided on the baseboard, which is connected to the pin-50 of M.2 connector to provide 32.768 kHz clock to the M.2 carrier module.

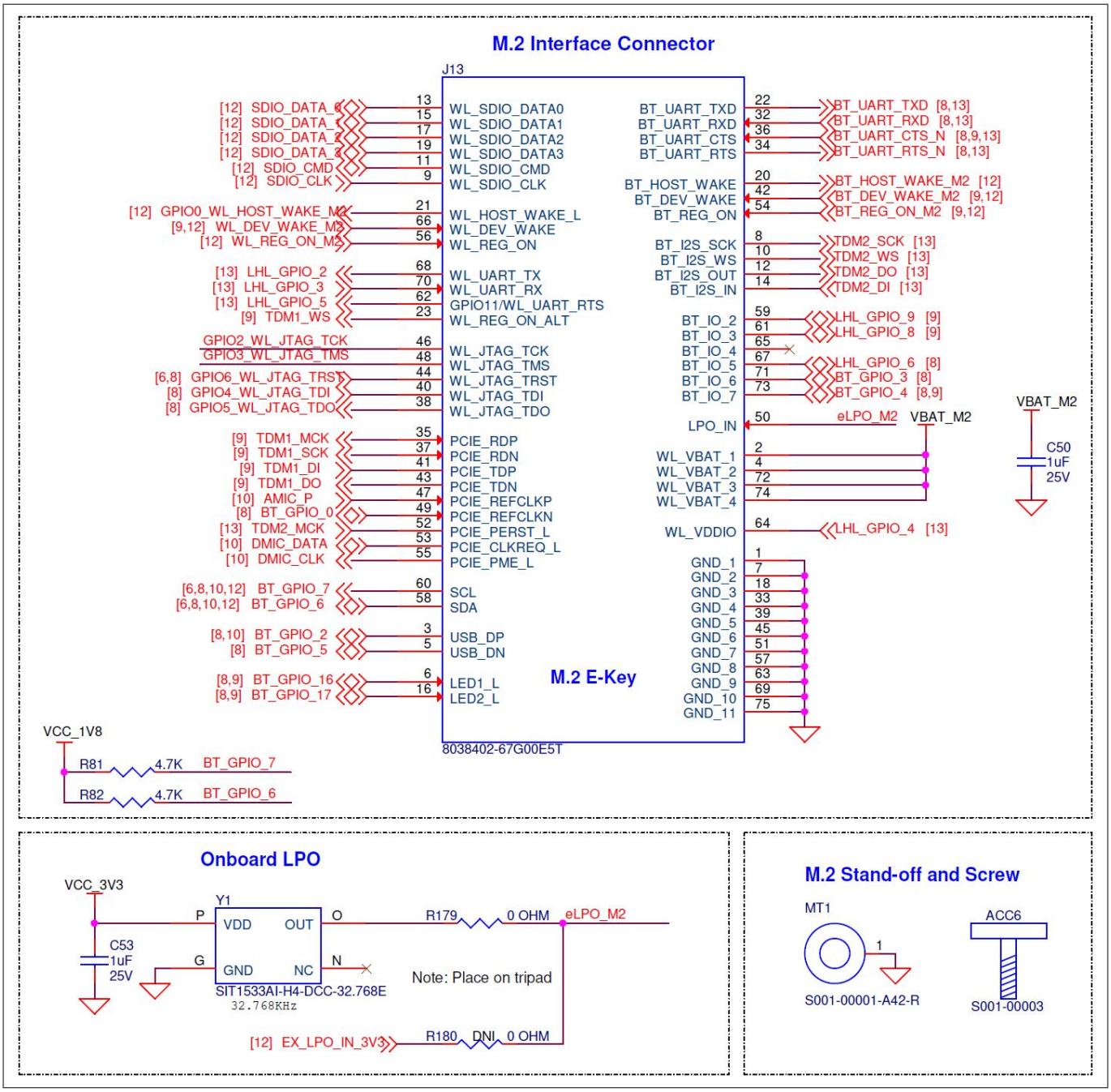


Figure 35 M.2 E-Key connector

3.2.12 JTAG connector

Connector J9 on the baseboard maps the WL GPIOs from the CYW55513 device, which functions as the JTAG/ COEX pins from the device. By default, this connector path is not mounted. See the Kit reworks chapter for the rework required to enable this path.

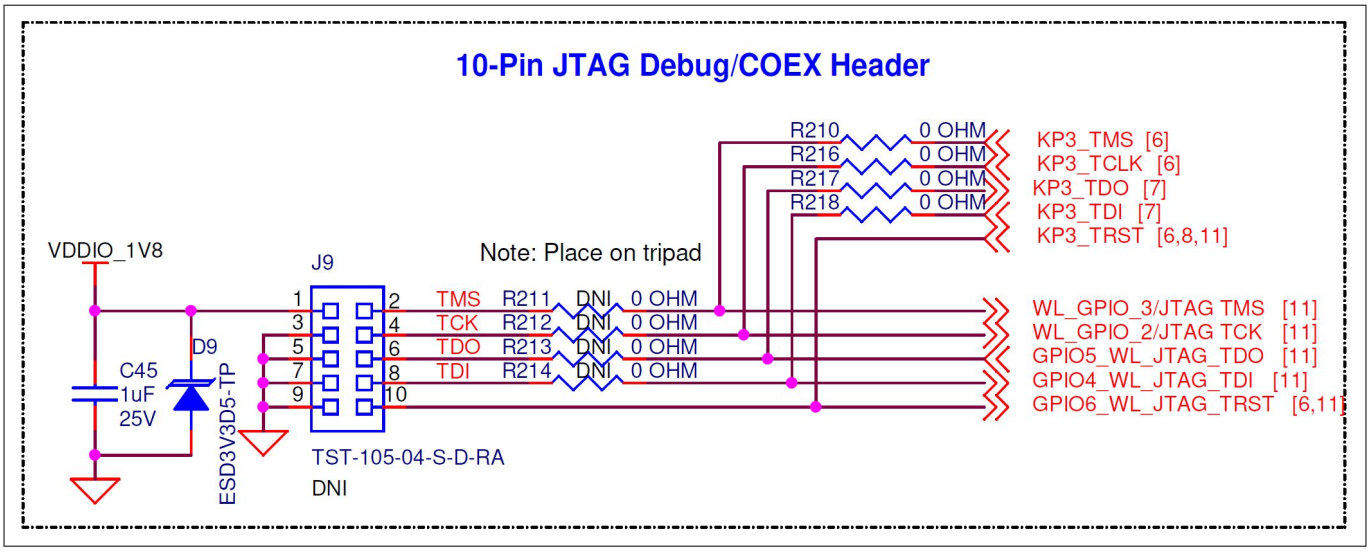


Figure 36 JTAG connector

3.2.13 UART connector

To enable UART programming from an external source, the baseboard has one 6-pin header (J22), which is not mount by default. It maps the HCI UART pins from the CYW55513 device with level translated to 3.3 V.

For details of the rework required to enable this path, see the Kit reworks chapter.

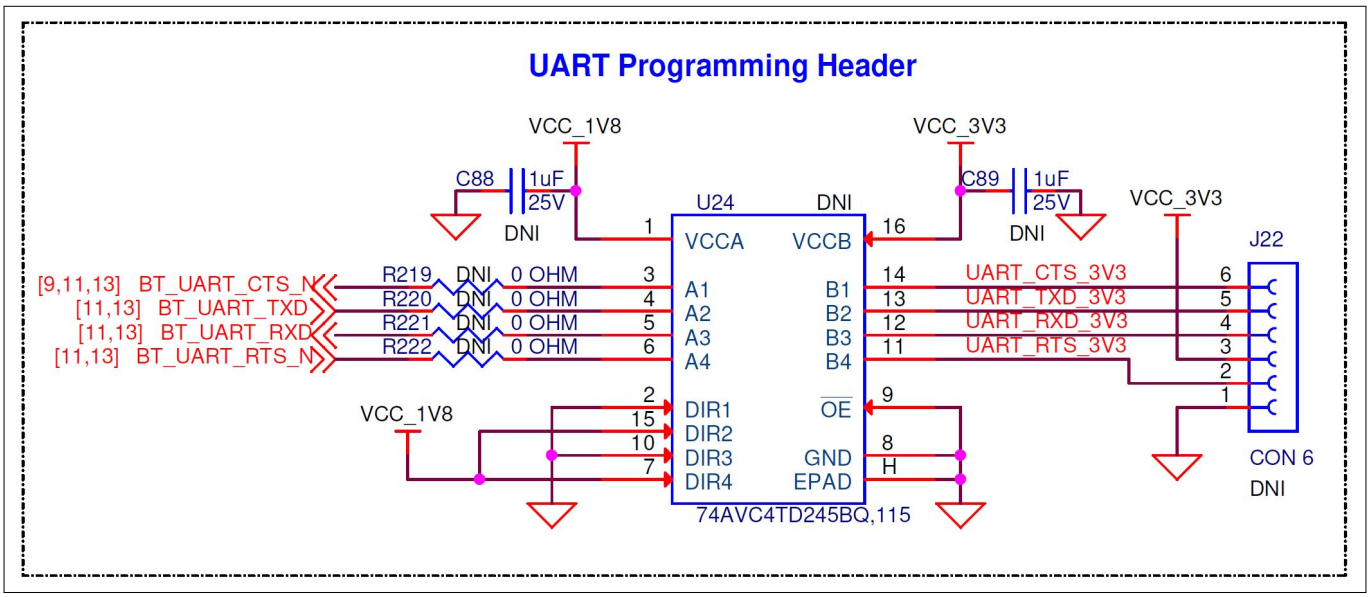


Figure 37 UART programming header

3.3 Audio shield board

The audio codec shield board CYW9BTAUDIO5 is a component of the CYW955513EVK-01 evaluation kit, designed to be compatible with the Arduino headers J1-J5 on the Baseboard. This feature enables the user to execute a variety of audio code examples with the CYW55513 device.

The audio shield board features the CS47L35 audio codec as its central component, facilitating communication with the CYW55513 device through 2xTDM interfaces. Equipped with a CTIA headset connector, on-board Analog Mic, and speaker output header, this board enables users to engage in various audio use cases.

3.3.1 Audio codec CS47L35

The CS47L35 is a highly integrated audio codec from Cirrus Logic that combines an advanced DSP feature set to enable a superior voice and audio experience for this kit. It communicates with the CYW55513 device through 2xTDM interfaces and provides the customer with a variety of audio code examples with a CTIA standard headphone jack, stereo analog mic, and speaker output header as user interfaces.

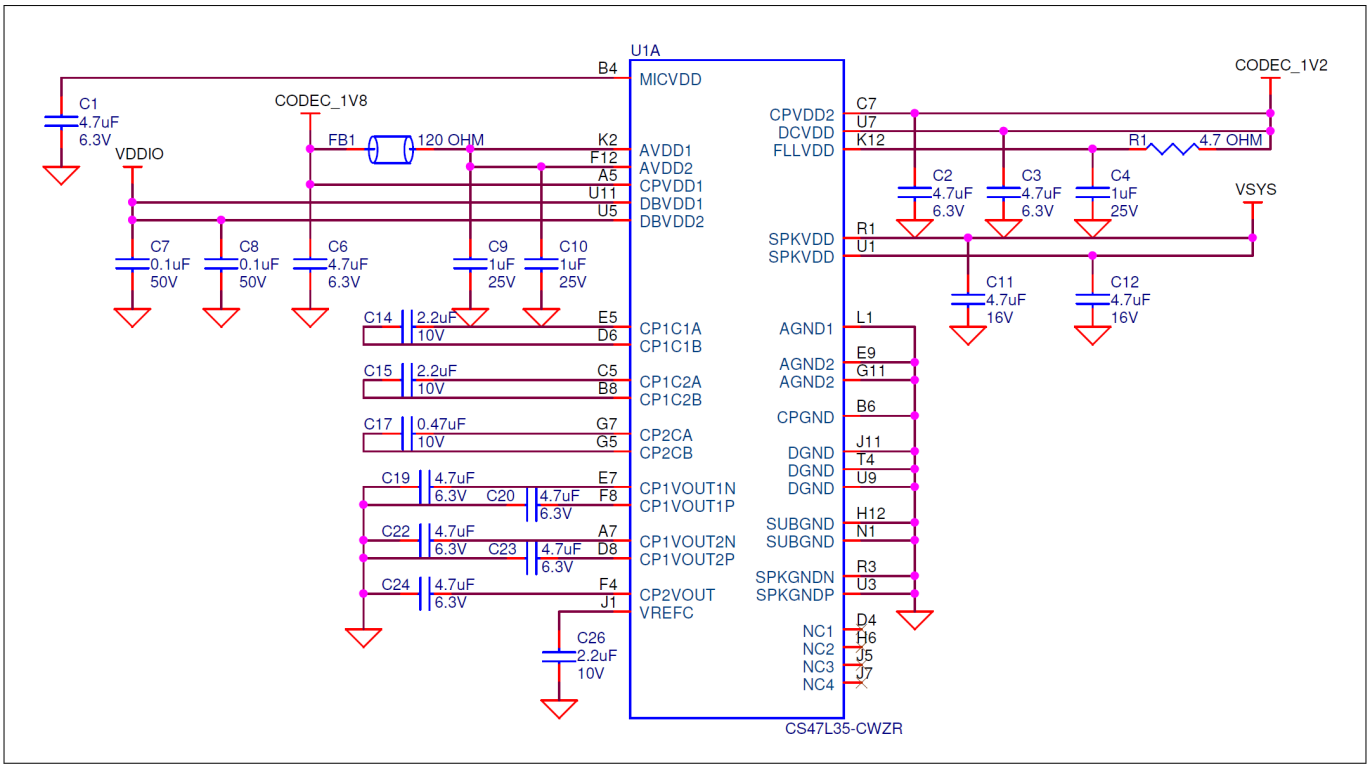


Figure 38 Audio codec power

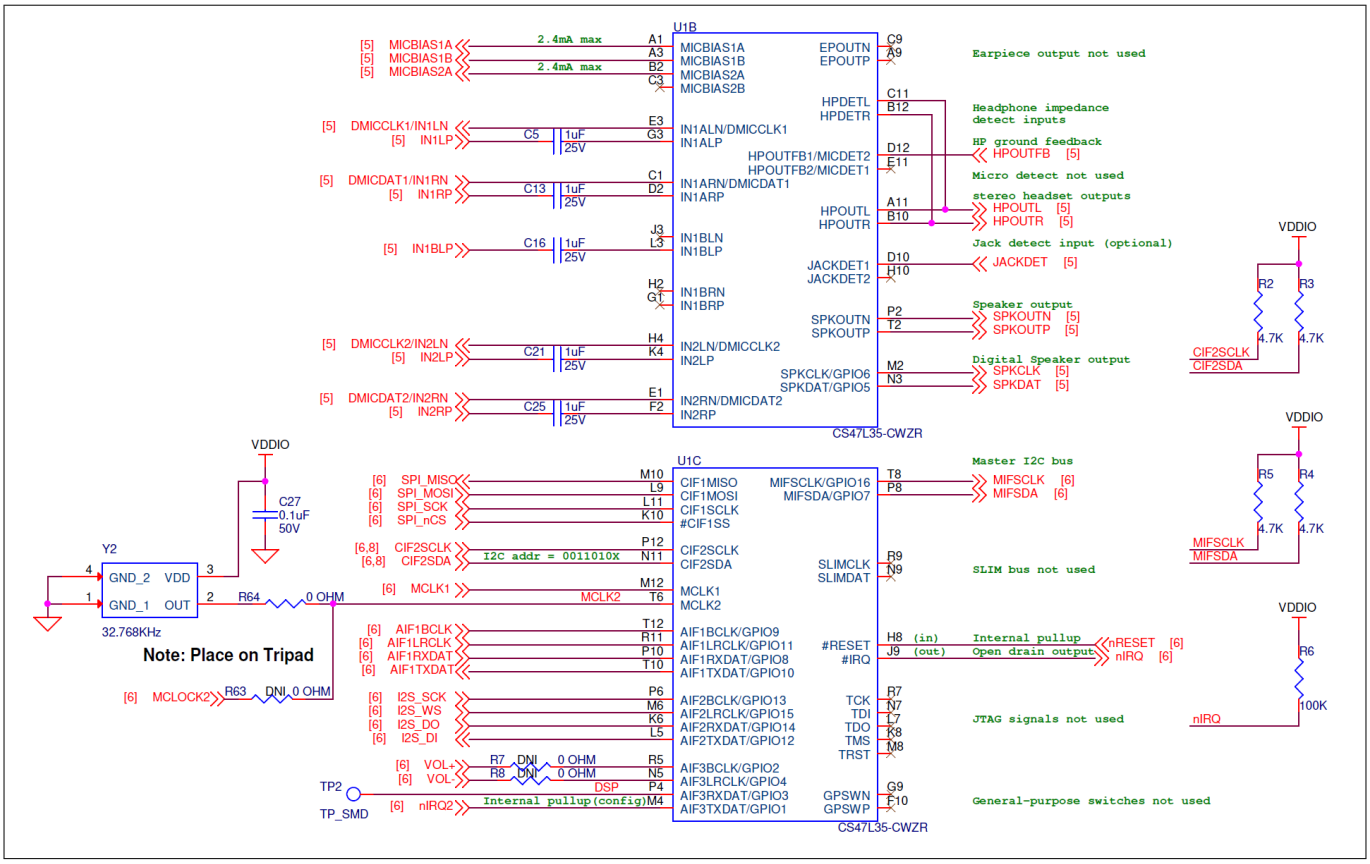


Figure 39 Audio codec interfaces

3.3.2 CITA headset connector

The headset connector (J10) allows the user to connect 3 or 4-pole headsets to the audio shield for the user audio interface. Furthermore, header J19 can be used to select between the 3-pole and 4-pole headset support.

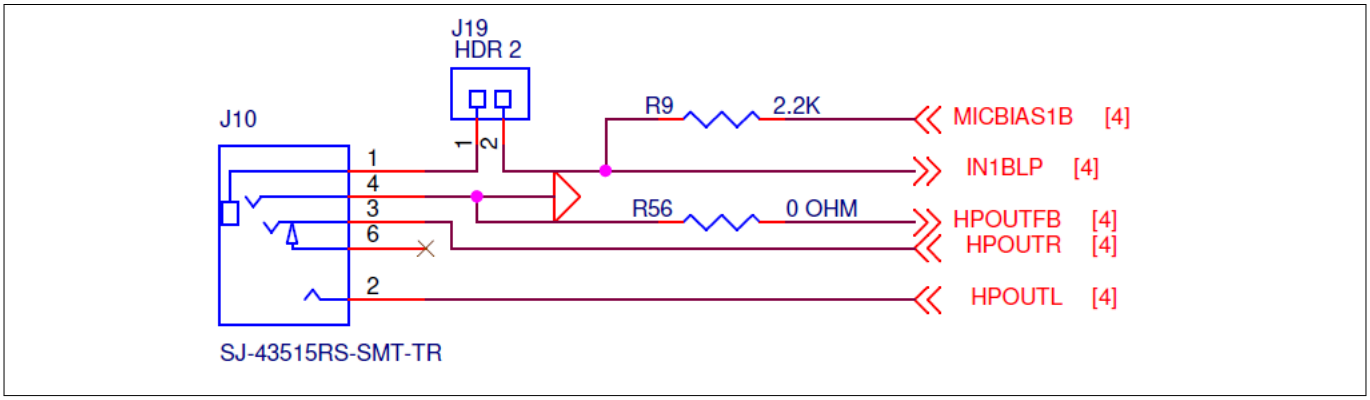


Figure 40 CITA Headset connector

3.3.3 Analog microphones

The audio shield includes two analog microphones (U11 and U12) which interface with the codec to enable the user to input stereo audio to the kit.

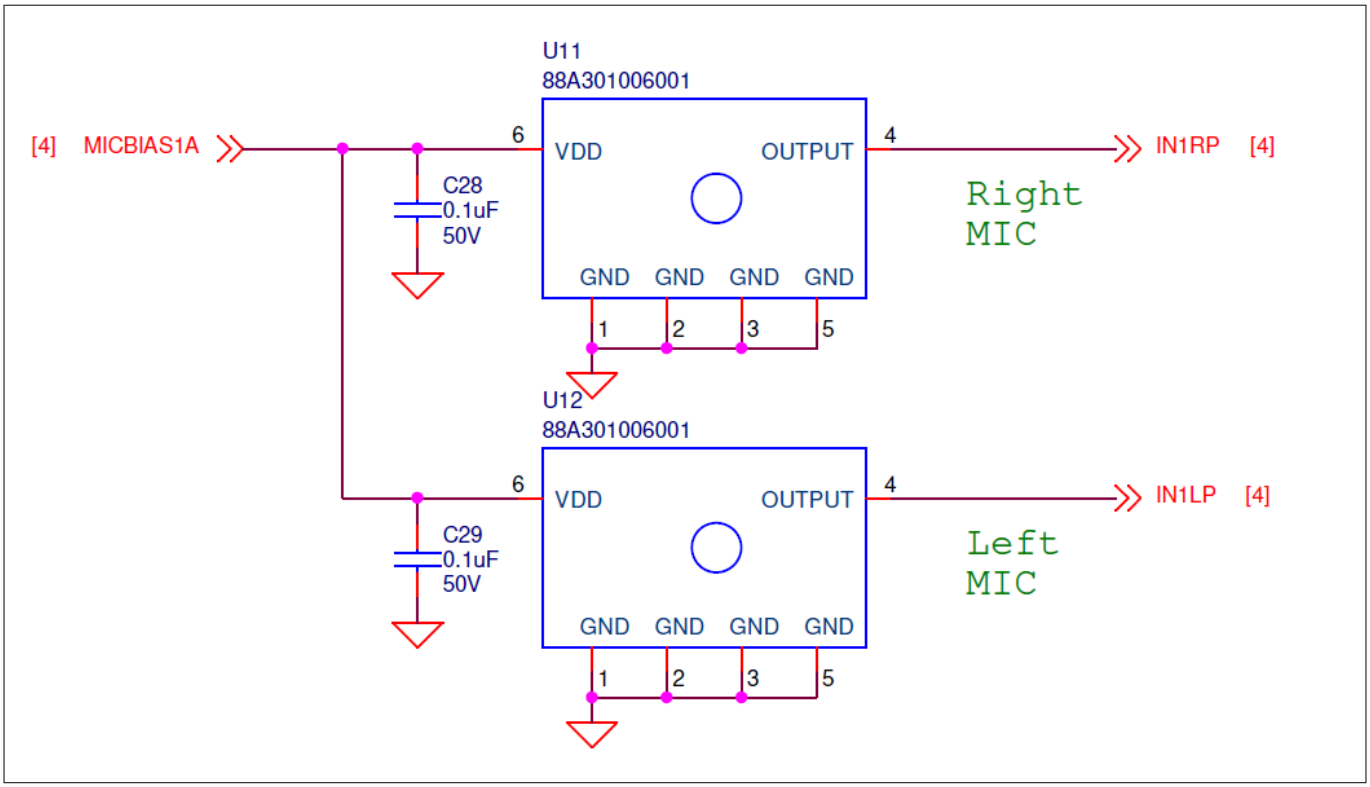


Figure 41 Analog microphones

3.3.4 Speaker output connector

The audio shield features a two-pin speaker out connector (J7). This connector allows for the attachment of an 8-ohm, 3W speaker to provide audio output from the kit.

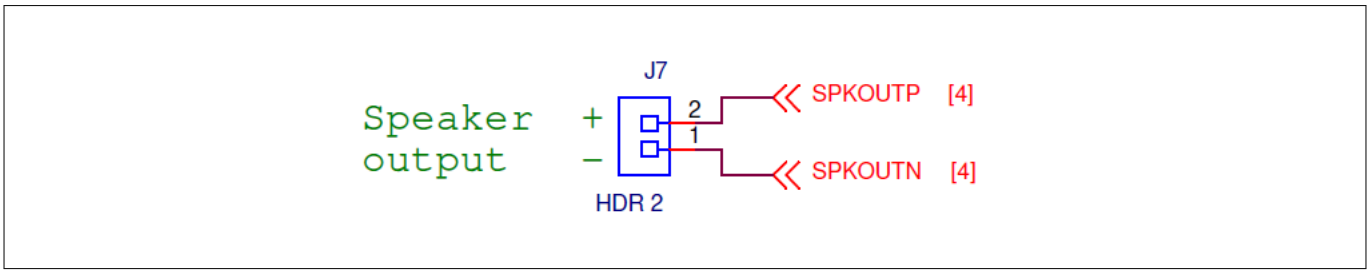


Figure 42 Speaker output connector

3.3.5 Shield headers

The audio shield is equipped with five Arduino-compatible headers that interface with the baseboard. These male headers support the 2xTDM interfaces for Bluetooth® audio, the SPI interface for codec configuration, and various GPIOs from the CTW955513 device to the audio shield.

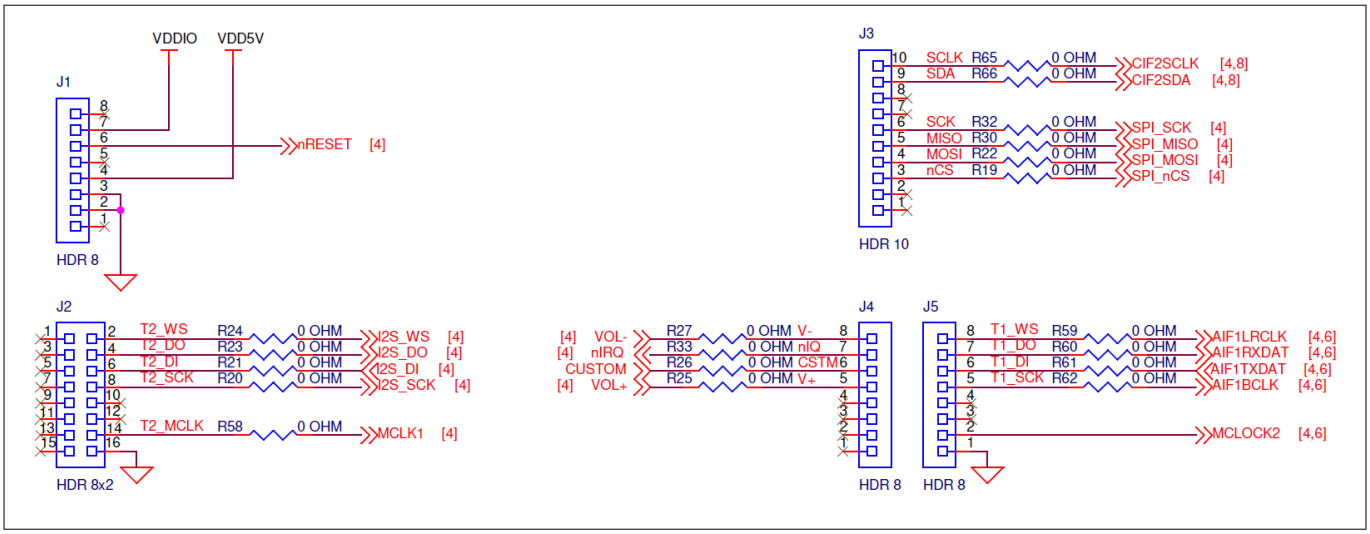


Figure 43 Shield headers

3.3.6 User buttons

The audio shield features three user-controlled buttons for user-specified inputs. These buttons are connected to BT_GPIO_4, BT_GPIO_5, and LHL_GPIO6 of the CYW55513 device as active low inputs.

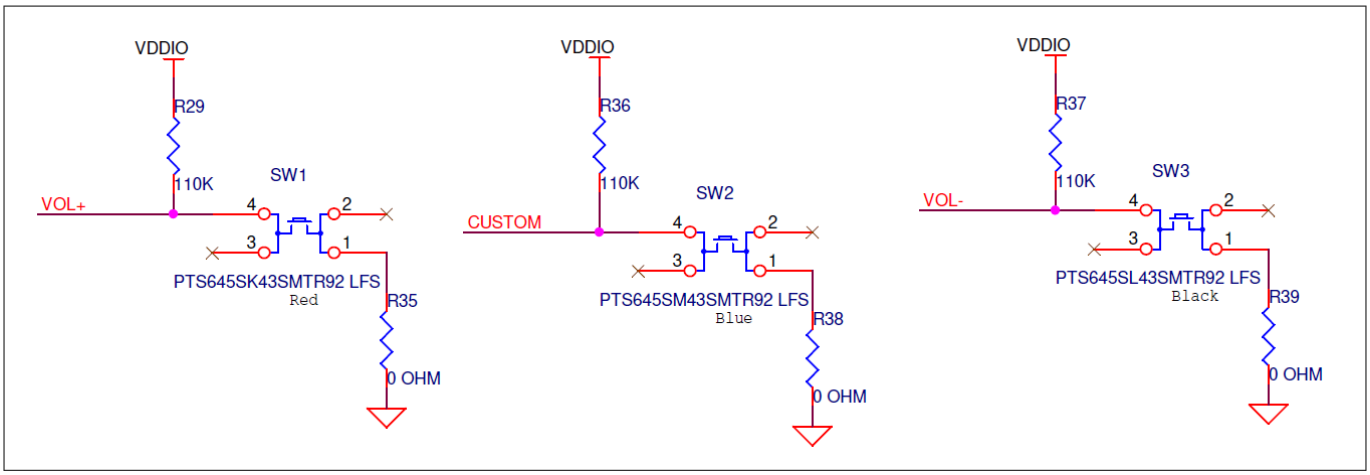


Figure 44 User buttons

3.3.7 Audio shield power

- Power supply options and selection
  - The audio shield's default power supply source is the 5 V supply from the baseboard via the J1 connector. Additionally, it offers two optional power supply options: the 5 V DC Jack (J7) and the micro-USB connector (J18). The selection of the input source can be configured using the jumper settings on the J17 header.
- Voltage regulation and current measurement
  - From the 5 V input, the shield generates 1.8 V and 1.2 V using LDOs to power the Codec component. The power section of the shield also incorporates current measurement jumpers for the 5 V, 1.8 V, and 1.2 V rails.

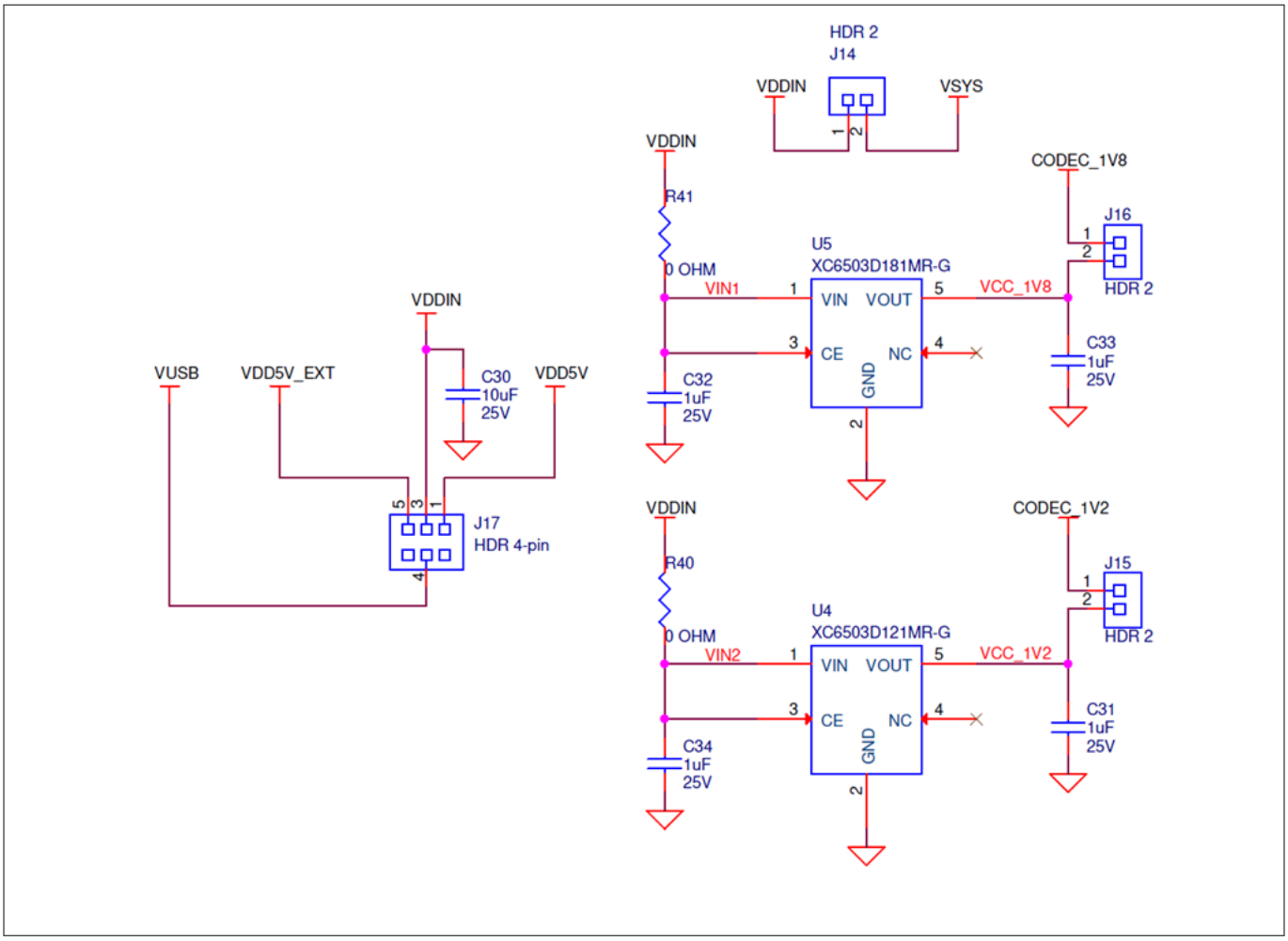


Figure 45 Audio shield power

3.3.8 USB serial bridge

The audio shield features an FT2232 device serving as a USB serial interface to the codec, accessible via the J18 micro-USB connector. This facilitates user access to and configuration of the register settings on the codec for custom applications.

3 Hardware

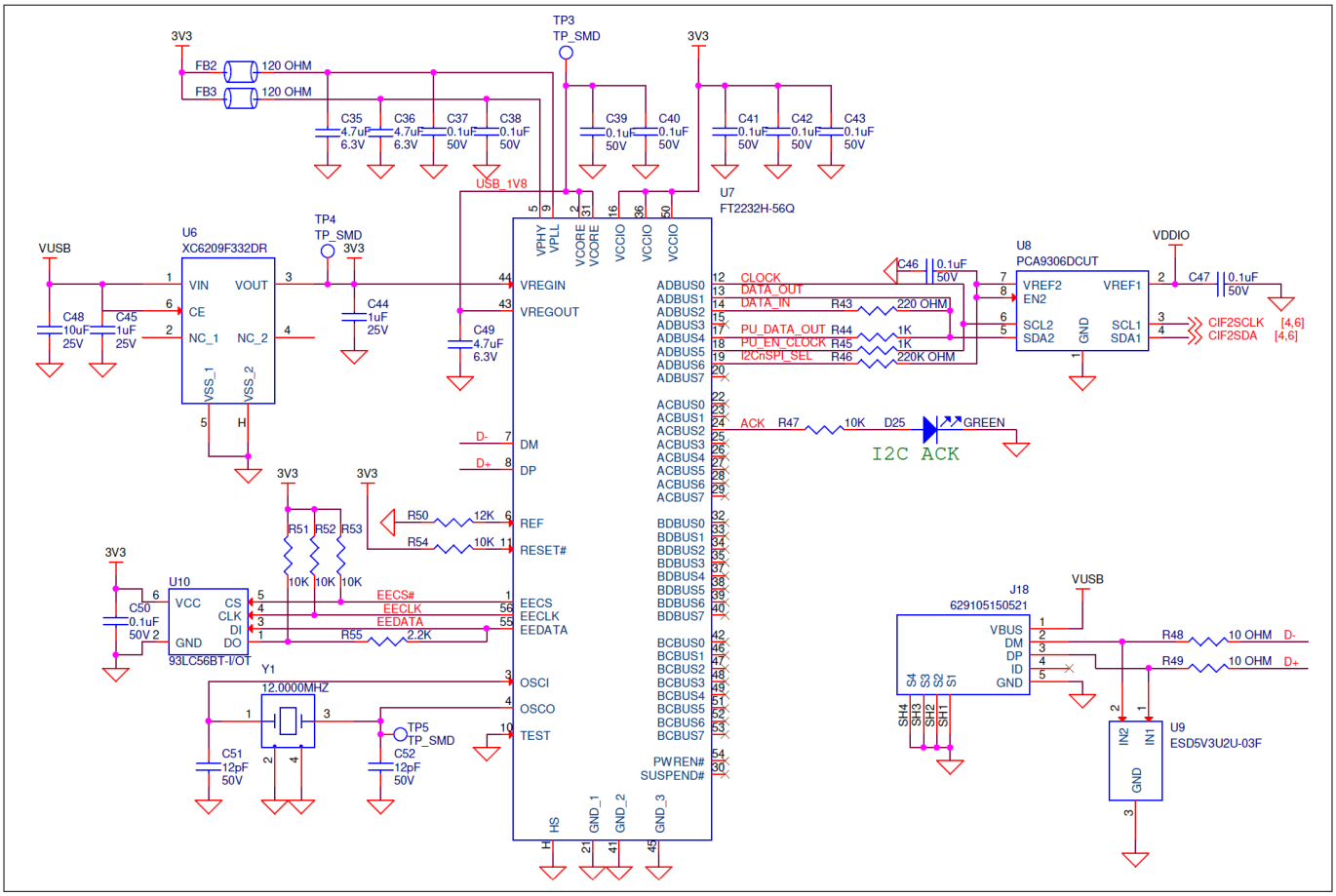


Figure 46 USB serial bridge

4 CYW55513 device I/O mapping

Table 23 gives the detailed I/O mapping of CYW55513 device and how it is connected to the peripherals and connectors on the baseboard. Baseboard connection 1 in the table defines the default configuration, and for other connection to enable, reworks may be required. See the Kit reworks chapter for more details.

Table 23 CYW55513 device I/O mapping

M.2 carrier module pin	M.2 carrier module pin name	CYW55513 pin	Baseboard connection 1 (Default)	Baseboard connection 2	Baseboard connection 3
1	GND	GND	GND	–	–
2	VBAT_M2	ASR_VDDBAT WLLDO_VDDBAT BTLDO_VDDBAT	VCC_3V3	–	–
3	BT_GPIO_2	BT_GPIO_2	ARD_D9	ARD_D8	ALS_INT
4	VBAT_M2	ASR_VDDBAT WLLDO_VDDBAT BTLDO_VDDBAT	VCC_3V3	–	–
5	BT_GPIO_5	BT_GPIO_5	ARD_D7/VOL	-	–
6	BT_GPIO_16	BT_GPIO_16	USER_LED1	D10/SPI_CS	–
7	GND	GND	GND	–	–
8	TDM2_SCK	TDM2_SCK	ARD_TDM2_SCK	EX_TDM2_SCK	–
9	SDIO_CLK	SDIO_CLK	gSPI_SCLK	EXT_SDIO_CLK	–
10	TDM2_WS	TDM2_WS	ARD_TDM2_WS	EX_TDM2_WS	–
11	SDIO_CMD	SDIO_CMD	gSPI_MOSI	EXT_SDIO_CMD	–
12	TDM2_DO	TDM2_DO	ARD_TDM2_DO	EX_TDM2_DO	–
13	SDIO_DATA_0	SDIO_DATA_0	gSPI_MISO	EXT_SDIO_DATA0	–
14	TDM2_DI	TDM2_DI	ARD_TDM2_DI	EX_TDM2_DI	–
15	SDIO_DATA_1	SDIO_DATA_1	gSPI_IRQ	EXT_SDIO_DATA1	–
16	BT_GPIO_17	BT_GPIO_17	USER_LED2	D13/SPI_CLK	–
17	SDIO_DATA_2	SDIO_DATA_2	GND	EXT_SDIO_DATA2	–
18	GND	GND	GND	–	–
19	SDIO_DATA_3	SDIO_DATA_3	gSPI_CS	EXT_SDIO_DATA3	–

(table continues...)

Table 23 (continued) CYW55513 device I/O mapping

M.2 carrier module pin	M.2 carrier module pin name	CYW55513 pin	Baseboard connection 1 (Default)	Baseboard connection 2	Baseboard connection 3
20	BT_HOST_WAKE_M2	BT_HOST_WAKE	J21.17	–	–
21	GPIO0_WL_HOST_WAKE_M2	GPIO0_WL_HOST_WAKE	J21.18	–	–
22	BT_UART_TXD	BT_UART_TXD	KP3_BT_RX	EX_BT_UART_TXD	J22.5
23	TDM1_WS	TDM1_WS	J5.8	–	–
32	BT_UART_RXD	BT_UART_RXD	KP3_BT_TX	EX_BT_UART_RXD	J22.4
33	GND	GND	GND	–	–
34	BT_UART_RTS_N	BT_UART_RTS_N	KP3_BT_CTS	EX_BT_UART_RTS	J22.2
35	TDM1_MCK	TDM1_MCK	J5.2	–	–
36	BT_UART_CTS_N	BT_UART_CTS_N	SW1	KP3_BT_RTS	EX_BT_UART_CTS, J22.6
37	TDM1_SCK	TDM1_SCK	J5.5	–	–
38	GPIO5_WL_JTAG_TDO	GPIO5_WL_JTAG_TDO	KP3_TDO	J9.6	–
39	GND	GND	GND	–	–
40	GPIO4_WL_JTAG_TDI	GPIO4_WL_JTAG_TDI	KP3_TDI	J9.8	–
41	TDM1_DI	TDM1_DI	J5.6	-	–
42	BT_DEV_WAKE_M2	BT_DEV_WAKE_M2	J5.4	J21.10	-
43	TDM1_DO	TDM1_DO	J5.7	-	–
44	GPIO6_WL_JTAG_TRST	GPIO6_WL_JTAG_TRST	KP3_TRST	J9.10	–
45	GND	GND	GND	–	–
46	GPIO2_WL_JTAG_TCK	GPIO2_WL_JTAG_TCK	KP3_TCLK	J9.4	–
47	AMIC_P	MIC_P	AMIC_P	–	–
48	GPIO3_WL_JTAG_TMS	GPIO3_WL_JTAG_TMS	KP3_TMS	J9.2	–
49	BT_GPIO_0	BT_GPIO_0	ARD_D6/ nIRQ	–	–
50	eLPO_M2	LPO_IN_OUT	eLPO_M2	–	–
51	GND	GND	GND	–	–

(table continues...)

Table 23 (continued) CYW55513 device I/O mapping

M.2 carrier module pin	M.2 carrier module pin name	CYW55513 pin	Baseboard connection 1 (Default)	Baseboard connection 2	Baseboard connection 3
52	TDM2_MCK	TDM2_MCK	ARD_TDM2_MCK	–	–
53	DMIC_DATA	DMIC_DQ	DMIC_DATA	–	–
54	BT_REG_ON_M2	BT_REG_ON	SW2	J17.1	J21.8
55	DMIC_CLK	DMIC_CK	DMIC_CLK	–	–
56	WL_REG_ON_M2	WL_REG_ON (RESERVED)	J16.1	J21.7	–
57	GND	GND	GND	–	–
58	BT_GPIO_6	BT_GPIO_6	KP3_SDA	ARD_SDA	J21.6
59	LHL_GPIO_9	LHL_GPIO_9	D12/ SPI_MISO	ARD_A3	–
60	BT_GPIO_7	BT_GPIO_7	KP3_SCL	ARD_SCL	J21.5
61	LHL_GPIO_8	LHL_GPIO_8	Potentiometer	D11/SPI_MOSI	ARD_A2
62	LHL_GPIO_5	LHL_GPIO_5	ARD_A1	KP3_UART_CTS	EX_LHL_GPIO_5/ UART_RTS
63	GND	GND	GND	–	–
64	LHL_GPIO_4	LHL_GPIO_4	ARD_A0	KP3_UART_RTS	–
65	NC	NA	-	-	-
66	WL_DEV_WAKE_M2	WL_DEV_WAKE	J5.3	J21.3	–
67	LHL_GPIO_6	LHL_GPIO_6	ARD_D5/ CUSTOM	–	–
68	LHL_GPIO_2	LHL_GPIO_2	KP3_UART_RXD	D1/ ARD_UART_TXD	EX_LHL_GPIO_2/ UART_TXD
69	GND	GND	GND	–	–
70	LHL_GPIO_3	LHL_GPIO_3	KP3_UART_TXD	D1/ ARD_UART_RXD	EX_LHL_GPIO_3/ UART_RXD
71	BT_GPIO_3	BT_GPIO_3	ARD_D2	ARD_D3	–
72	VBAT_M2	ASR_VDDBAT WLLDO_VDDBAT BTLDO_VDDBAT	VCC_3V3	–	–
73	BT_GPIO_4	BT_GPIO_4	USER_BUTTON	ARD_D4/VOL+	–

(table continues...)

Table 23 (continued) CYW55513 device I/O mapping

M.2 carrier module pin	M.2 carrier module pin name	CYW55513 pin	Baseboard connection 1 (Default)	Baseboard connection 2	Baseboard connection 3
74	VBAT_M2	ASR_VDDBAT WLLDO_VDDBAT BTLDO_VDDBAT	VCC_3V3	–	–
75	GND	GND	GND	–	–

5 Kit reworks

This section provides details about the reworks required to enable the sections in the kit hardware that are not available by default.

5.1 JTAG connector mounting

To enable the JTAG/COEX access from the kit, you need to mount the J9 connector and resistors R211, R212, R213, and R214 to connect the CYW55513 device GPIOs to J9 and need to isolate the connection to the KP3 by removing resistors R210, R216, R217, and R218.

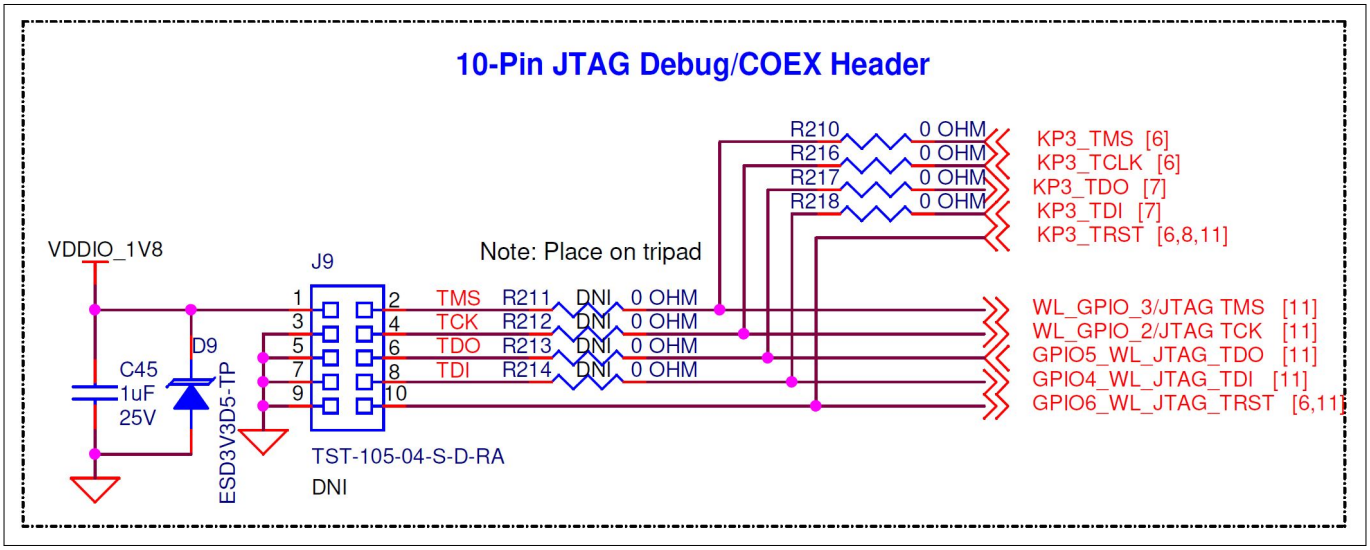


Figure 47 JTAG connector rework

5.2 UART connector mounting

To enable the external UART programming, you need to mount the J22 connector and level translator (U24), which is not mounted by default. The path to the connector from CYW55513 can be enabled by mounting R219, R220, R221, and R222 resistors and removing the connections R137, R139, R141, and R142 resistors.

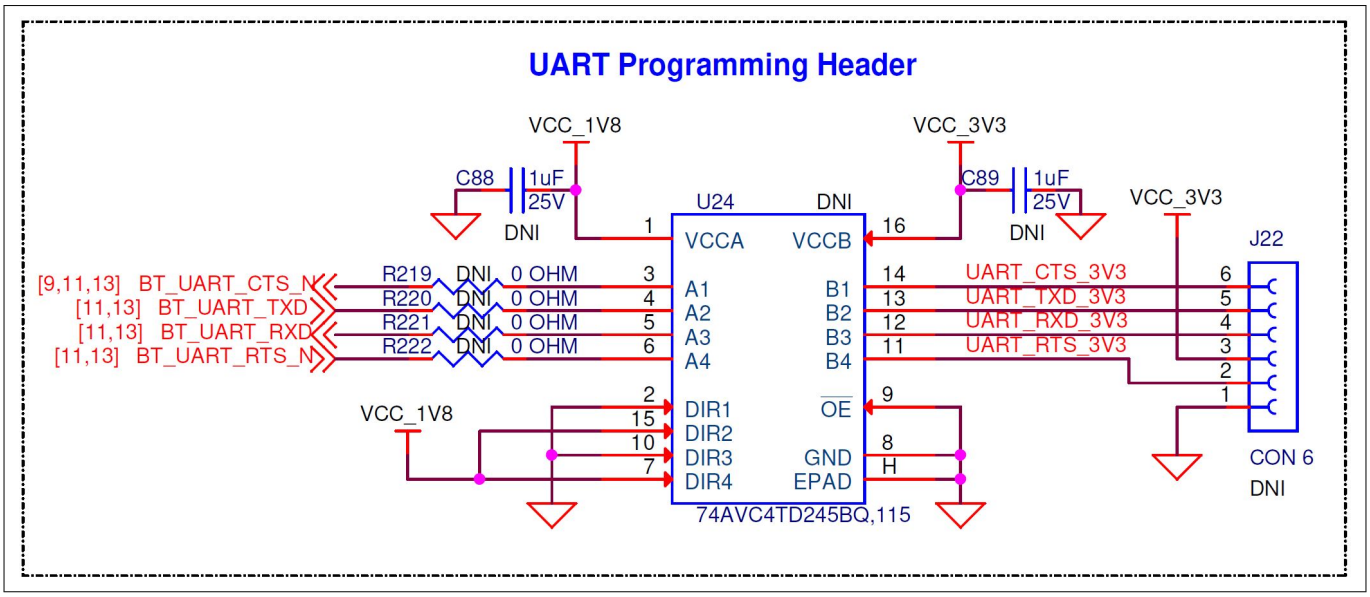


Figure 48 UART connector rework

5.3 CYW55513 device pin multiplex options

CYW55513 device major interfaces can be switched to the external host interface or Arduino header by mounting the series resistor in the path between the device and the external connector or to the Arduino header in the multiplex options.

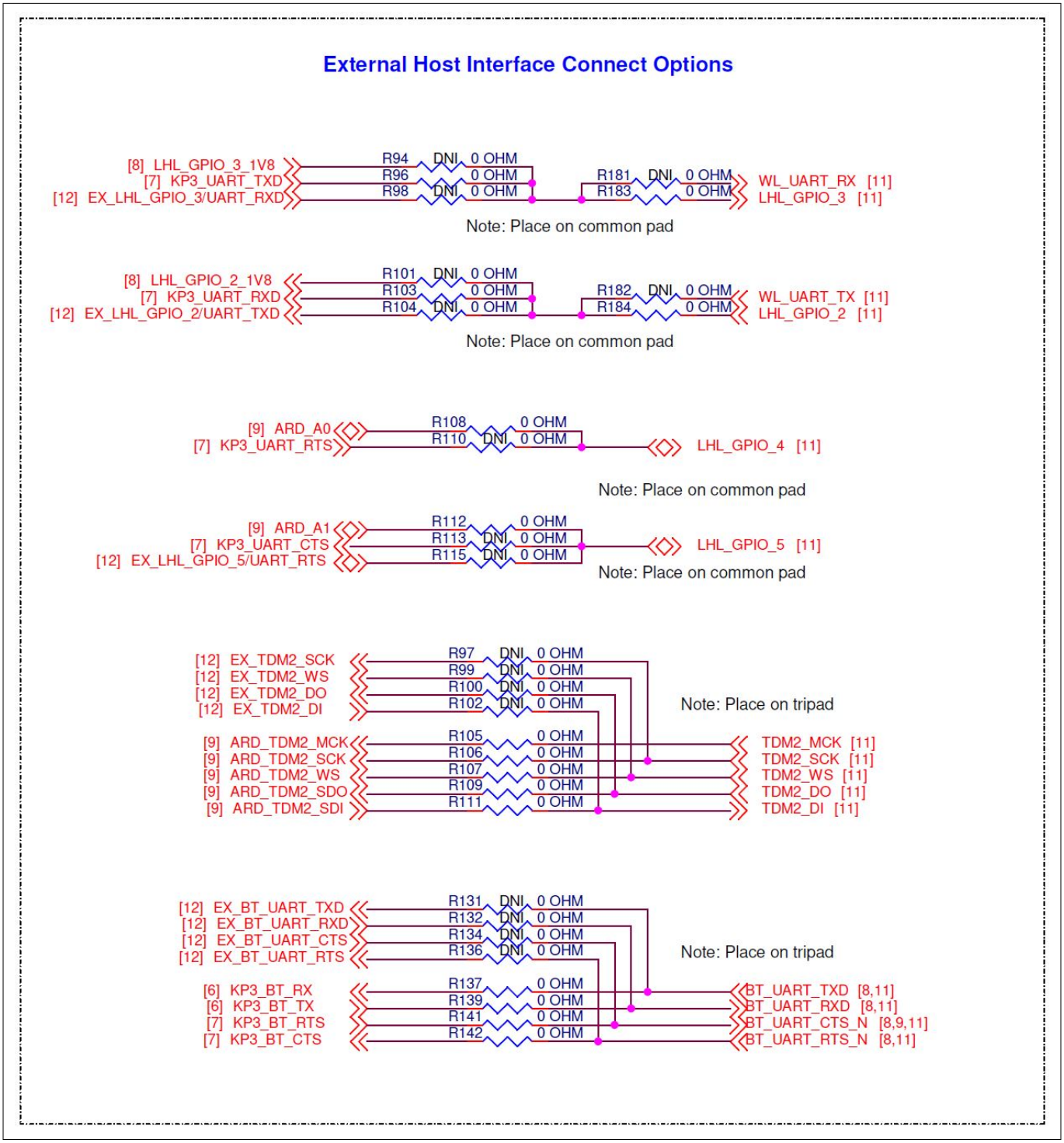


Figure 49 External host interface resistor mount options

5 Kit reworks

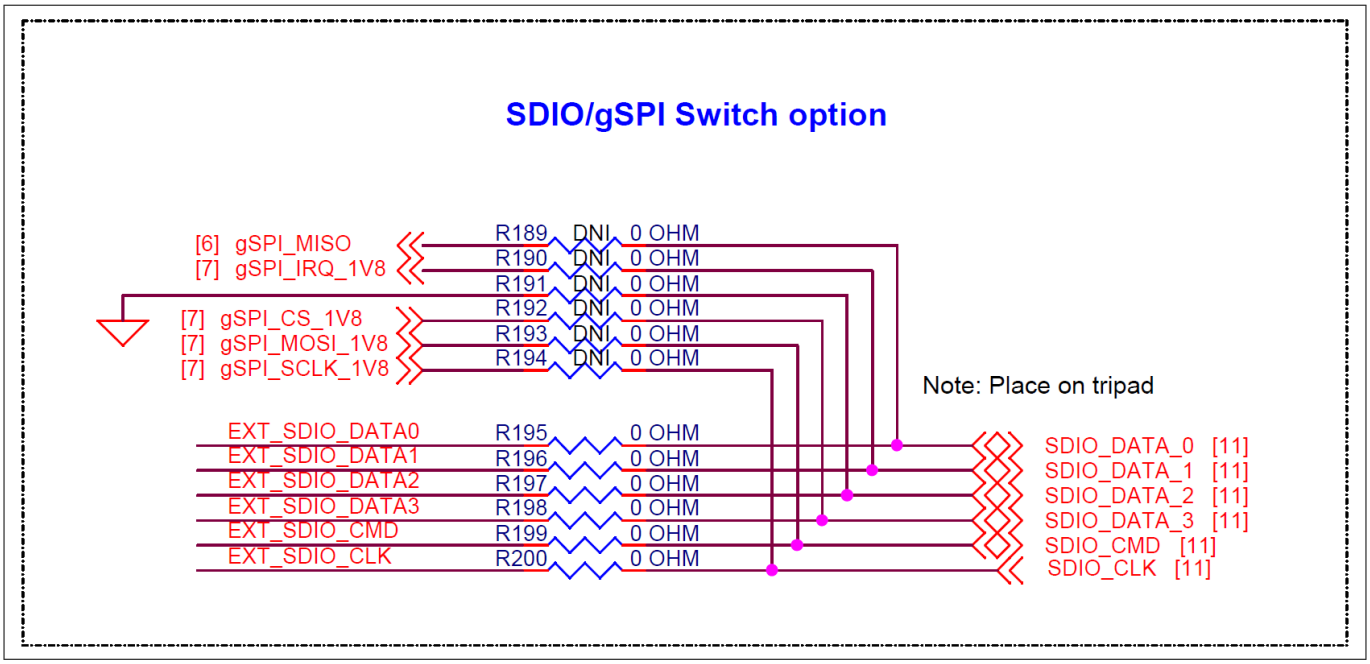


Figure 50 SDIO interface external host interface connect option

Revision history

Document version	Date of release	Description of changes
**	2023-11-23	• Initial release
*A	2024-03-18	• Added antenna part in the Kit contents • Updated Figure 1, Kit details, Theory of operation, and Figure 8 • Updated the CYW55513 section with schematic sections • Removed the Antenna section • Updated the Audio shield board section with the Audio shield top figure (Figure 40)
*B	2025-11-10	• Updated the following: - Intended audience in the About this document section - Kit contents - Kit details - ModusToolbox™ code examples - Getting started - Theory of operation - Baseboard jumper tables in the Jumpers section - Buttons and switches - Test points - Current measurement - Hardware - The title Power to Baseboard power - External host interface connector - Audio shield board • Added the following: - Audio shield jumpers tables in the Jumpers section - Audio shield buttons tables in the Buttons and switches section - Note in the Memory section
*C	2026-03-24	• Updated Kit contents • Updated Figure 1 - Removed 30-pin FFC cable with M.2 Adapter Card • Updated Kit details • Updated Theory of operation • Updated Other headers • Removed External host interface connector section

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