

# KIT\_PSE84\_AI PSOC™ Edge E84 AI Kit guide

## About this document

### Scope and purpose

This guide provides information about the PSOC™ Edge E84 AI Kit contents. It also provides the information about how to use the out-of-box application.

### Intended audience

This document is intended for all embedded developers using the KIT\_PSE84\_AI PSOC™ Edge E84 AI kit.

---

**Important notice****Important notice**

**“Evaluation Boards and Reference Boards” shall mean products embedded on a printed circuit board (PCB) for demonstration and/or evaluation purposes, which include, without limitation, demonstration, reference and evaluation boards, kits and design (collectively referred to as “Reference Board”).**

**Environmental conditions have been considered in the design of the Evaluation Boards and Reference Boards provided by Infineon Technologies. The design of the Evaluation Boards and Reference Boards has been tested by Infineon Technologies only as described in this document. The design is not qualified in terms of safety requirements, manufacturing and operation over the entire operating temperature range or lifetime.**

**The Evaluation Boards and Reference Boards provided by Infineon Technologies are subject to functional testing only under typical load conditions. Evaluation Boards and Reference Boards are not subject to the same procedures as regular products regarding returned material analysis (RMA), process change notification (PCN) and product discontinuation (PD).**

**Evaluation Boards and Reference Boards are not commercialized products, and are solely intended for evaluation and testing purposes. In particular, they shall not be used for reliability testing or production. The Evaluation Boards and Reference Boards may therefore not comply with CE or similar standards (including but not limited to the EMC Directive 2004/EC/108 and the EMC Act) and may not fulfill other requirements of the country in which they are operated by the customer. The customer shall ensure that all Evaluation Boards and Reference Boards will be handled in a way which is compliant with the relevant requirements and standards of the country in which they are operated.**

**The Evaluation Boards and Reference Boards as well as the information provided in this document are addressed only to qualified and skilled technical staff, for laboratory usage, and shall be used and managed according to the terms and conditions set forth in this document and in other related documentation supplied with the respective Evaluation Board or Reference Board.**

**It is the responsibility of the customer’s technical departments to evaluate the suitability of the Evaluation Boards and Reference Boards for the intended application, and to evaluate the completeness and correctness of the information provided in this document with respect to such application.**

**The customer is obliged to ensure that the use of the Evaluation Boards and Reference Boards does not cause any harm to persons or third party property.**

**The Evaluation Boards and Reference Boards and any information in this document is provided "as is" and Infineon Technologies disclaims any warranties, express or implied, including but not limited to warranties of non-infringement of third party rights and implied warranties of fitness for any purpose, or for merchantability.**

**Infineon Technologies shall not be responsible for any damages resulting from the use of the Evaluation Boards and Reference Boards and/or from any information provided in this document. The customer is obliged to defend, indemnify and hold Infineon Technologies harmless from and against any claims or damages arising out of or resulting from any use thereof.**

**Infineon Technologies reserves the right to modify this document and/or any information provided herein at any time without further notice.**

---

## Safety precautions

### Safety precautions

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

**Table 1** Safety precautions


	<p><b>Caution:</b> 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.</p>
---	--

Table of contents

Table of contents

- About this document** ..... 1
- Important notice** ..... 2
- Safety precautions** ..... 3
- Table of contents** ..... 4
- 1 Introduction** ..... 6
  - 1.1 Kit contents ..... 6
  - 1.2 Getting started ..... 6
  - 1.3 Board details ..... 7
  - 1.4 Additional learning resources ..... 12
  - 1.5 Technical support ..... 12
  - 1.6 Documentation conventions ..... 12
- 2 Kit operation** ..... 13
  - 2.1 Theory of operation ..... 13
  - 2.2 Using the OOB example ..... 17
  - 2.3 Creating a project and program/debug using ModusToolbox™ software ..... 17
- 3 Hardware** ..... 21
  - 3.1 Schematics ..... 21
  - 3.2 Hardware functional description ..... 21
    - 3.2.1 Power supply sub system ..... 21
      - 3.2.1.1 Power supply inputs ..... 21
      - 3.2.1.2 Voltage regulators ..... 24
    - 3.2.2 PSOC™ 5LP-based KitProg3 programmer and debugger ..... 26
      - 3.2.2.1 PSOC™ 5LP-based KitProg3 ..... 26
      - 3.2.2.2 KitProg3 serial interface with PSOC™ Edge E84 ..... 28
      - 3.2.2.3 KitProg3 onboard target voltage measurement ..... 28
      - 3.2.2.4 KitProg3 programming mode selection button and status LED ..... 29
    - 3.2.3 PSOC™ Edge E84 MCU features ..... 29
      - 3.2.3.1 PSOC™ Edge E84 MCU power ..... 30
      - 3.2.3.2 PSOC™ Edge E84 MCU I/O signals ..... 32
      - 3.2.3.3 PSOC™ Edge E84 MCU clock sources ..... 33
      - 3.2.3.4 PSOC™ Edge E84 MCU programming/debugging interface ..... 34
      - 3.2.3.5 PSOC™ Edge E84 MCU external memory interface ..... 35
      - 3.2.3.6 PSOC™ Edge E84 MCU USB interface ..... 37
      - 3.2.3.7 PSOC™ Edge E84 MCU MIPI DSI interface ..... 39
  - 3.2.4 Sensor sub system ..... 40
    - 3.2.4.1 XENSIV™ Sensor subsystem ..... 40
      - 3.2.4.1.1 XENSIV™ digital barometric pressure sensor ..... 40
      - 3.2.4.1.2 XENSIV™ MEMS digital microphones ..... 41

**Table of contents**

3.2.4.1.3	XENSIV™ MEMS analog microphones .....	42
3.2.4.1.4	XENSIV™ 60 GHz RADAR sensor .....	43
3.2.4.2	6-axis IMU .....	45
3.2.4.3	3-axis Geo-magnetic sensor .....	46
3.2.4.4	Digital Humidity sensor .....	47
3.2.5	Reset and user buttons .....	47
3.2.6	User LED's and Power LED's .....	48
3.2.7	Wi-Fi® 6 & Bluetooth® LE 5.4 Dual-Radio module interface .....	49
3.2.8	I/O expansion header .....	52
3.2.8.1	Digital I/O interface header .....	52
3.2.8.2	Analog I/O interface header .....	53
3.2.8.3	Boot Options and Alternate serial interface header .....	54
3.2.8.4	I2C interface connector .....	55
3.2.9	Audio Class-D amplifier .....	56
3.3	KIT_PSE84_AI kit rework for evaluating additional features .....	57
3.3.1	Enabling the external programming/debugging interface .....	57
3.3.2	Enabling addition Boot configurations .....	58
3.3.3	Enabling the alternate serial interface .....	59
3.3.4	Enabling external powering option .....	60
3.3.5	Enabling external I2C device interface .....	60
3.3.6	Enabling Analog I/O interface .....	61
3.3.7	Enabling the Speaker interface .....	62
3.3.8	Enabling the external power and I2C interface for MIPI DSI displays .....	63
3.4	Bill of materials .....	64
<b>4</b>	<b>Glossary</b> .....	<b>65</b>
	<b>Revision history</b> .....	<b>68</b>
	<b>Trademarks</b> .....	<b>69</b>
	<b>Disclaimer</b> .....	<b>70</b>

1 Introduction

1 Introduction

The PSOC™ Edge E84 AI kit enables you to evaluate and develop your applications using the PSOC™ Edge E84 series MCU (called “PSOC™ E84”) and a multitude of on-board multimedia, Machine Learning (ML), and connectivity features like Raspberry Pi compatible MIPI-DSI displays, analog and digital microphones for audio interfaces, and AIROC™ CYW55513IUBGT based Wi-Fi & Bluetooth® combo Murata Type 2FY (LBEE5HY2FY) connectivity module. The kit also has 512-Mbit Quad-SPI NOR Flash and 128-Mbit Octal-SPI HYPERRAM™. The board features an on-board programmer/debugger (KitProg3), JTAG/SWD debug headers, expansion I/O header, USB-C connectors, 6-axis IMU sensor, 3-axis magnetometer, barometric pressure sensor, humidity sensor, RADAR sensor, user LEDs and user button. The MCU power domain and peripheral power domain supports following operating voltages - 1.8V and 3.3V.

PSOC™ E84 MCU is an ultra-low-power PSOC™ device specifically designed for ML, wearables and IoT products like smart thermostats, smart locks, smart home appliances and industrial HMI.

PSOC™ E84 MCU is a true programmable embedded system-on-chip with dual CPUs, integrating a 400 MHz Arm® Cortex® -M55 as the primary application processor, a 200 MHz Arm® Cortex® -M33 that supports low-power operations, and a 400 MHz Arm® Ethos-U55 as a neural net companion processor, graphics and audio block, DSP capability, security enclave with crypto accelerators and protection units, high-performance memory expansion capability (QSPI, and Octal HYPERRAM™), low-power analog subsystem with high performance analog-to-digital conversion and low-power comparators, on-board IoT connectivity module , communication channels, programmable analog and digital blocks that allow higher flexibility, in-field tuning of the design, and faster time-to-market.

You can use ModusToolbox™ software to develop and debug your PSOC™ E84 MCU projects. [ModusToolbox™ software](#) is a set of tools that enable you to integrate these devices into your existing development methodology.

1.1 Kit contents

PSOC™ Edge E84 AI Kit includes:

- PSOC™ Edge E84 AI board
- OV7675 DVP camera module

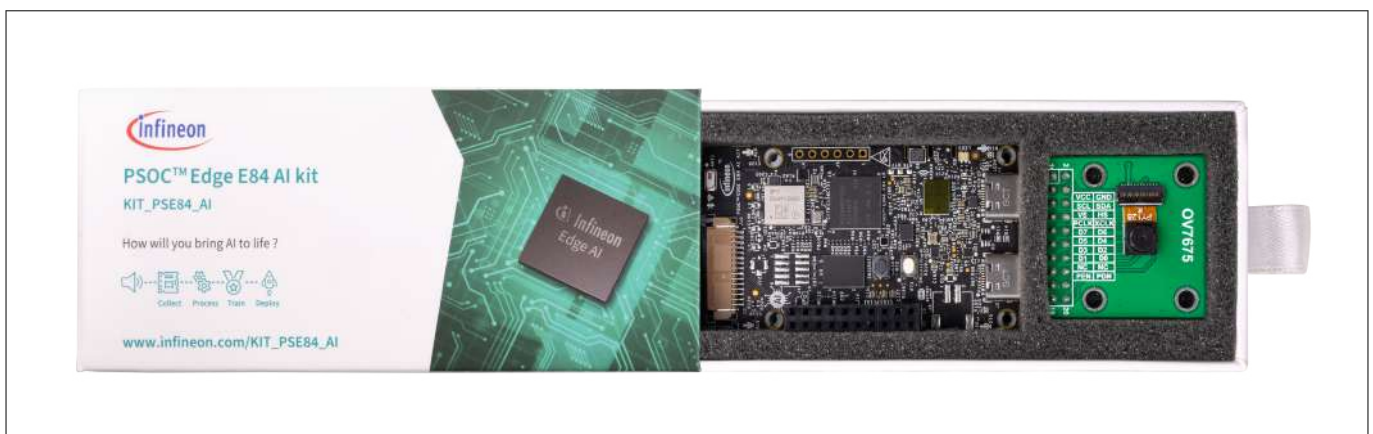


Figure 1 Kit content

1.2 Getting started

This guide will help you get acquainted with this evaluation kit:

- The [Kit operation](#) chapter describes the major features of the PSOC™ Edge E84 AI board and its functionalities, such as programming and debugging

**1 Introduction**

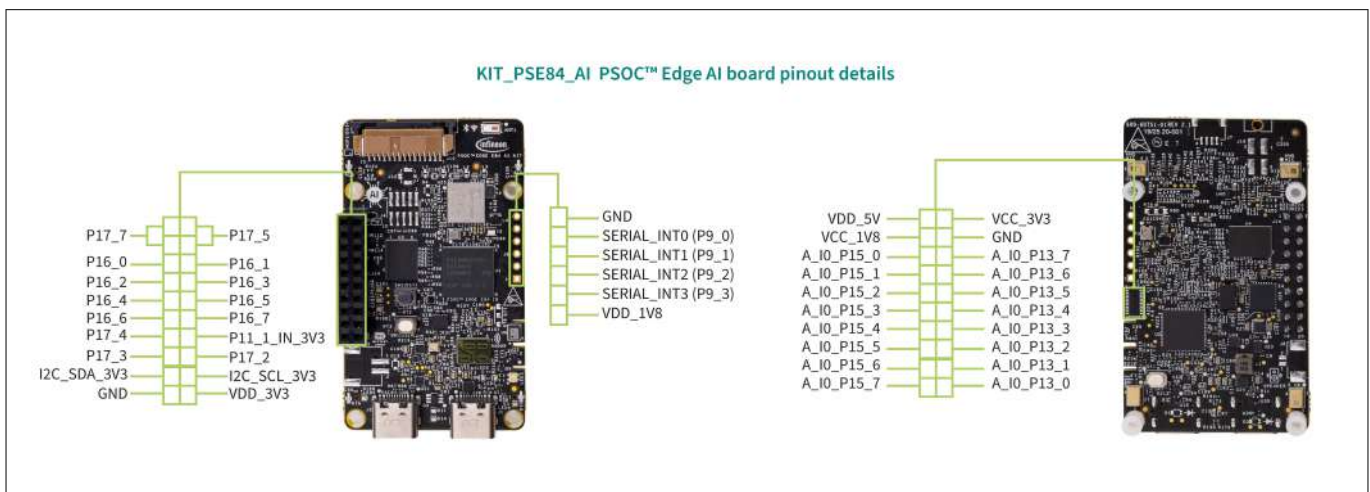
- The [Hardware](#) chapter provides a detailed hardware description, kit schematics, and the bill of materials (BOM)
- Application development using PSOC™ Edge E84 AI kit is supported in ModusToolbox™ software. For the latest software support for this development kit, including the different development ecosystems, see the [AN235935 - Getting started with PSOC™ Edge E84 MCU on ModusToolbox™ software](#).
  - ModusToolbox™ software is a free development ecosystem that includes the ModusToolbox™ IDE. Using ModusToolbox™ IDE, you can enable and configure device resources, middleware libraries, program and debug the device. You can download the software from the [ModusToolbox™ home page](#)
- [DEEPCRAFT™ Studio](#) is a development platform for machine learning on edge devices. Its work flow is optimized for embedded devices
- There are various Code Examples to evaluate the PSOC™ Edge E84 AI kit, which familiarizes you with PSOC™ Edge E84 MCU and helps you creates your own design. These examples can be accessed through ModusToolbox™ Project Creator tool. Alternatively, you can visit [Code examples for ModusToolbox™ software page](#) to access these examples

**1.3 Board details**

The PSOC™ Edge E84 AI board has the following features:

- PSOC™ Edge E84 MCU - PSE846GPS2DBZC4A. See the device [datasheet](#)
- AIROC™ [CYW55513IUBGT](#) based Wi-Fi & Bluetooth® combo Murata Type 2FY ([LBEE5HY2FY](#)) connectivity module
- Raspberry Pi compatible MIPI-DSI display interface
- 512-Mbit external Quad-SPI NOR flash that provides fast, expandable memory for data and code
- 128-Mbit PSRAM
- 6-axis accelerometer and gyroscope (BMI270), 3-axis magnetometer (BMM350), XENSIV™ digital barometric pressure sensor with built-in temperature sensor (DPS368), digital humidity and temperature sensor (SHT40) and XENSIV™ 60 GHz RADAR sensor (BGT60TR13C) for data collection
- KitProg3 onboard SWD programmer/debugger, USB-UART, and USB-I2C bridge functionality
- Supports 1.8 V and 3.3 V operation of PSOC™ Edge E84 MCU
- Three user LEDs, a user button, and a reset button for PSOC™ Edge E84 MCU
- One mode selection button and one status LED for KitProg3

The following figure shows the pinout of the evaluation board.



**Figure 2 Board pinout**

**1 Introduction**

**Table 2 Board pinout**

PSOC™ Edge E84 MCU pin number	Connection signal	Functionality
XRES	Hardware Reset	Used to reset the PSOC™ Edge E84 MCU
P0.0	Memory reset	Resets the connected external memory
P0.1	PSRAM_CS	Chip select signal for the PSRAM module
P1.0	QSPI FLASH DATA0	Data line 0 for QSPI Flash interface
P1.1	QSPI FLASH DATA1	Data line 1 for QSPI Flash interface
P1.2	QSPI FLASH DATA2	Data line 2 for QSPI Flash interface
P1.3	QSPI FLASH DATA3	Data line 3 for QSPI Flash interface
P2.0	QSPI_CS	Chip select signal for QSPI Flash interface
P3.0	I3C_SCL	Clock signal for I3C communication
P3.1	I3C_SDA	Data signal for I3C communication
P4.0	PSRAM DATA0	Data line 0 for PSRAM interface
P4.1	PSRAM DATA1	Data line 1 for PSRAM interface
P4.2	PSRAM DATA2	Data line 2 for PSRAM interface
P4.3	PSRAM DATA3	Data line 3 for PSRAM interface
P4.4	PSRAM DATA4	Data line 4 for PSRAM interface
P4.5	PSRAM DATA5	Data line 5 for PSRAM interface
P4.6	PSRAM DATA6	Data line 6 for PSRAM interface
P4.7	PSRAM DATA7	Data line 7 for PSRAM interface
P6.0	PSOC™ Edge E84 MCU JTAG TDO/SWD SWO	Test Data Out or Serial Wire Output for debugging
P6.1	PSOC™ Edge E84 MCU TDI	Test Data In for JTAG debugging
P6.2	PSOC™ Edge E84 MCU TMS/SWD SWDIO	Test Mode Select or Serial Wire Debug I/O
P6.3	PSOC™ Edge E84 MCU TCK/SWD SWCLK	Test Clock for JTAG or Serial Wire Debug
P6.4	INT Pin for magnetometer	Interrupt signal from the magnetometer sensor
P6.5	MCU UART RXD pin for KitProg3 TXD	UART receive pin connected to KitProg3 TXD
P6.6	INT Pin for IMU sensor	Interrupt signal from the IMU sensor
P6.7	MCU UART TXD pin for KitProg3 RXD	UART transmit pin connected to KitProg3 RXD

**(table continues...)**

**1 Introduction**

**Table 2 (continued) Board pinout**

PSOC™ Edge E84 MCU pin number	Connection signal	Functionality
P7.0	User button	General-purpose I/O signal interfaced to user button input
P7.1	USB ID	USB ID signal for OTG functionality
P7.3	USB DIR	USB direction control signal
P7.4	EXTERNAL CLK	External clock input for system timing
P7.5	USB OUT1	USB output signal 1 from DRP controller
P7.6	USB OUT2	USB output signal 2 from DRP controller
P7.7	INT Pin for IMU1	Interrupt signal from the second IMU/Motion sensor
P8.0	I2C SCL (1.8V)	Clock signal for I2C communication (1.8V level)
P8.1	I2C SDA (1.8V)	Data signal for I2C communication (1.8V level)
P8.3	USB CF	USB connection fault signal from DRP controller
P8.5	PDM CLOCK	Clock signal for PDM interface of Digital Microphones
P8.6	PDM DATA	Data signal for PDM interface of Digital Microphones
P9.0	SERIAL INTO	Alternate serial interface signal 0
P9.1	SERIAL INT1	Alternate serial interface signal 1
P9.2	SERIAL INT2	Alternate serial interface signal 2
P9.3	SERIAL INT3	Alternate serial interface signal 3
P10.0	BT UART TXD	Transmit data pin for Bluetooth® HCI UART interface
P10.1	BT UART RXD	Receive data pin for Bluetooth® HCI UART interface
P10.2	BT UART RTS	Ready-to-send signal for Bluetooth® HCI UART interface
P10.3	BT UART CTS	Clear-to-send signal for Bluetooth® HCI UART interface
P10.4	BT HOST WAKE	Wake-up signal for the Bluetooth® host
P10.5	USER LED2	General-purpose I/O signal interfaced to Second onboard user LED

**(table continues...)**

**1 Introduction**

**Table 2 (continued) Board pinout**

PSOC™ Edge E84 MCU pin number	Connection signal	Functionality
P10.6	BT DEV WAKE	Wake-up signal for the Bluetooth® device
P10.7	USER LED1	General-purpose I/O signal interfaced to First onboard user LED
P11.0	BT REG ON	Power regulator control for Bluetooth® section of 2FY module
P11.2	WL BT DEV WAKE	Wake-up signal for Wi-Fi and Bluetooth® device
P11.3	INT Pin for pressure sensor	Interrupt signal from the pressure sensor
P11.4	WL REG ON	Power regulator control for Wi-Fi section of 2FY module
P11.6	WL HOST WAKE	Wake-up signal for Wi-Fi host
P12.0	WL SDIO CLOCK	Clock signal for Wi-Fi SDIO interface
P12.1	WL SDIO DATA0	Data line 0 for Wi-Fi SDIO interface
P12.2	WL SDIO DATA1	Data line 1 for Wi-Fi SDIO interface
P12.3	I2S TX FYSYNC	Frame sync signal for I2S transmit (Word select signal)
P12.4	WL SDIO DATA2	Data line 2 for Wi-Fi SDIO interface
P12.5	WL SDIO DATA3	Data line 3 for Wi-Fi SDIO interface
P14.0	AMIC1 CTB INP	Positive input for analog microphone 1
P14.1	AMIC1 CTB INN	Negative input for analog microphone 1
P14.2	AMIC1 CTB OUT	Analog output from the MCU
P14.3	AMIC2 CTB OUT	Analog output from the MCU
P14.4	AMIC2 CTB INP	Positive input for analog microphone 2
P14.5	AMIC2 CTB INN	Negative input for analog microphone 2
P14.6	AMIC1 CTB REF	Reference input for analog microphone 1 to MCU
P14.7	AMIC2 CTB REF	Reference input for analog microphone 2 to MCU
P17.0	I2C SCL (3.3V)	Clock signal for I2C communication (3.3V level)

**(table continues...)**

**1 Introduction**

**Table 2 (continued) Board pinout**

<b>PSOC™ Edge E84 MCU pin number</b>	<b>Connection signal</b>	<b>Functionality</b>
P17.1	I2C SDA (3.3V)	Data signal for I2C communication (3.3V level)
P17.6	BOOT	Used to control boot mode of the PSOC™ Edge E84 MCU
P18.0	WCO_OUT	Output for the Watch Crystal Oscillator
P18.1	WCO_IN	Input for the Watch Crystal Oscillator
P19.0	ECO_IN	Input for the External Crystal Oscillator
P19.1	ECO_OUT	Output for the External Crystal Oscillator
P20.1	ALT_SER_INT_CONFIG_1	Alternate serial interrupt configuration 1
P20.2	ALT_SER_INT_CONFIG_2	Alternate serial interrupt configuration 2
P20.3	RSPI_IRQ	Interrupt request pin for Radar functionality
P20.4	USER_LED_RGB_GREEN	Green channel of the RGB LED
P20.5	USER_LED_RGB_BLUE	Blue channel of the RGB LED
P20.6	USER_LED_RGB_RED	Red channel of the RGB LED
P20.7	RXRES_L	Reset signal for Radar functionality
P21.0	WL SDIO CMD	Command signal for Wi-Fi SDIO interface
P21.1	I2S TX SD	Data signal for I2S transmit interface
P21.2	I2S TX SCK	Clock signal for I2S transmit interface
P21.3	I2S TX MCK	Master clock for I2S transmit interface
P21.4	RSPI_MISO	Master In Slave Out for Radar sensor SPI interface
P21.5	RSPI_MOSI	Master Out Slave In for Radar sensor SPI interface
P21.6	RSPI_CLK	Clock signal for Radar sensor SPI interface
P21.7	RSPI_CS	Chip select signal for Radar sensor SPI interface

## 1 Introduction

### 1.4 Additional learning resources

Infineon provides a wealth of data in the [PSOC™ Edge E84](#) webpage to:

- Select the right PSOC™ device for the design
- Quickly and effectively integrate the device into the design

### 1.5 Technical support

For assistance, go to Infineon [support](#) page. Visit [Infineon Developer Community](#) to ask any product-related questions.

User can also use the [Self-help \(Technical Documents\)](#) support resources for quick assistance

### 1.6 Documentation conventions

**Table 3** Document conventions for guide

Convention	Usage
Courier New	Displays file locations, user entered text, and source code: C:\...cd\icc\
Italics	Displays file names and reference documentation: Read about the <code>sourcefile.hex</code> file in the PSOC™ Creator user guide.
File >Open	Represents menu paths: <b>File &gt; Open &gt; New Project</b>
Bold	Displays commands, menu paths, and icon names in procedures: Click the <b>File</b> icon and then click <b>Open</b> .
Times New Roman	Displays an equation: $2 + 2 = 4$
Text in gray boxes	Describes cautions or unique functionality of the product

2 Kit operation

2 Kit operation

This chapter introduces you to various features of the PSOC™ Edge E84 AI board, including the theory of operation and the on-board KitProg3 programming and debugging functionality, USB-UART, and USB-I2C bridges.

2.1 Theory of operation

The PSOC™ Edge E84 AI kit is built around a PSOC™ Edge E84 MCU. Figure 3 shows the Architecture block diagram of the PSOC™ Edge E84 MCU used on the board. For details of device features, see the datasheet.

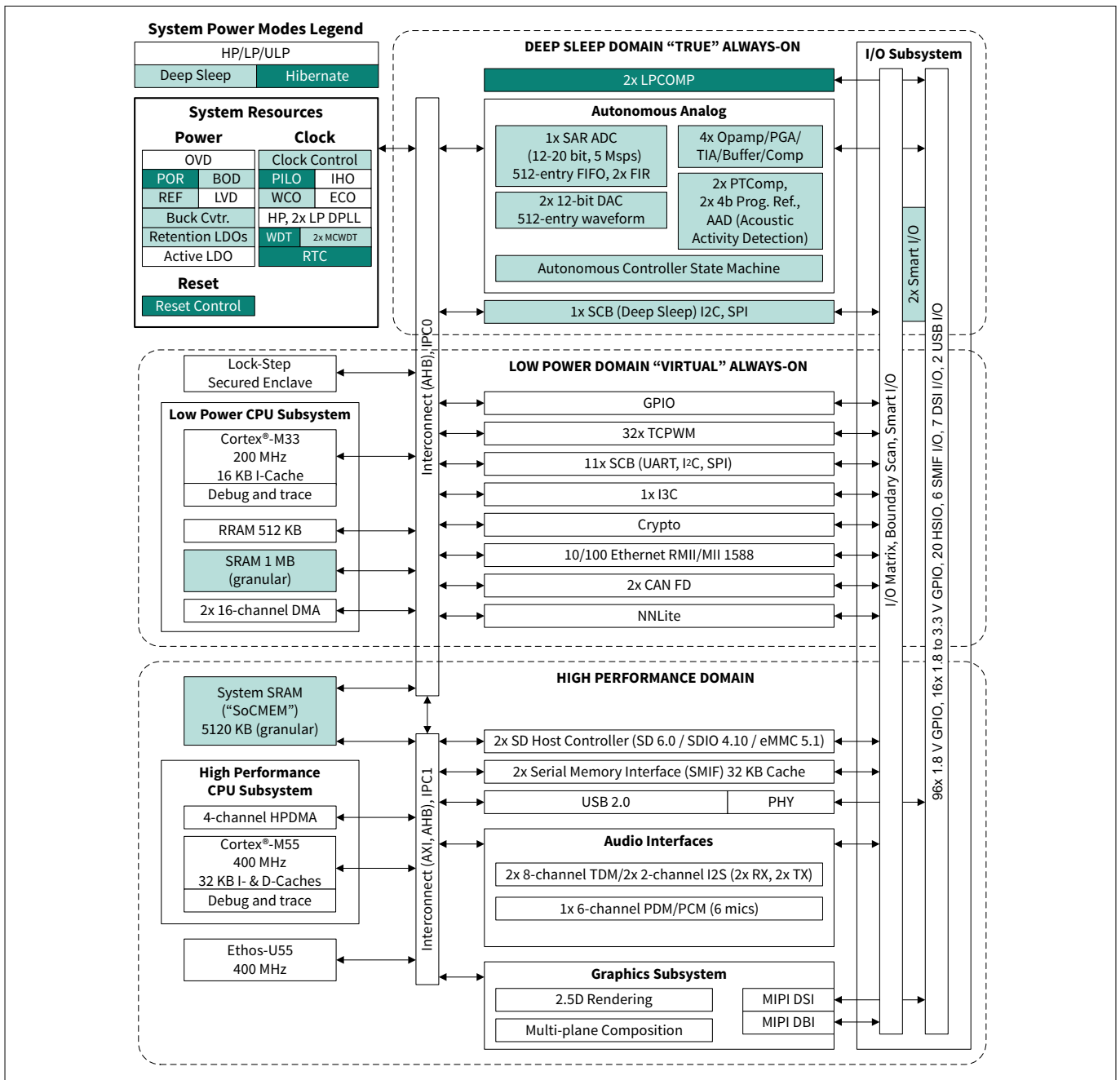


Figure 3 PSOC™ Edge E84 MCU block diagram

2 Kit operation

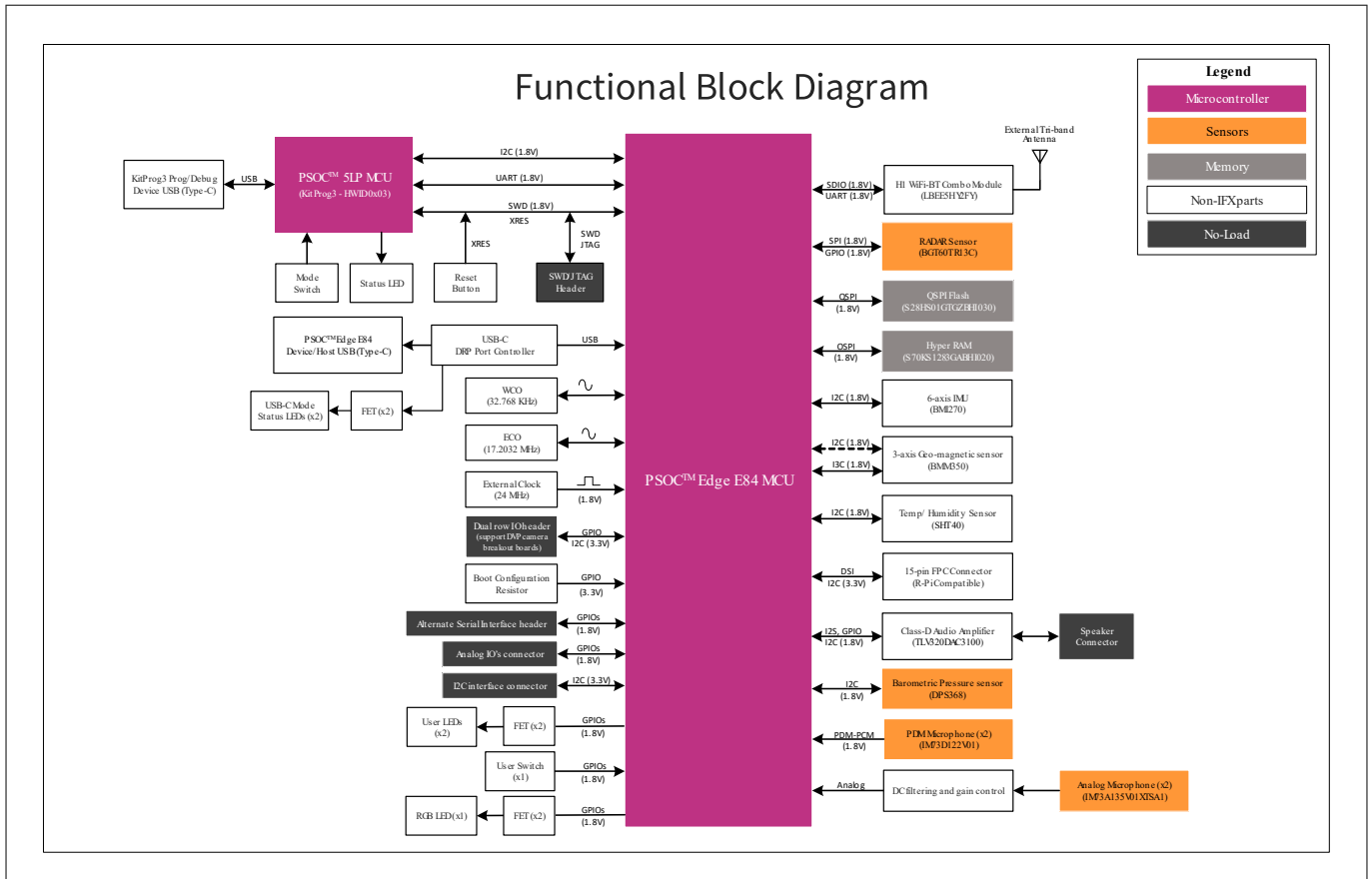


Figure 4 PSOC™ Edge E84 AI Board block diagram

Figure 5 and Figure 6 show the markup of the evaluation board.

2 Kit operation

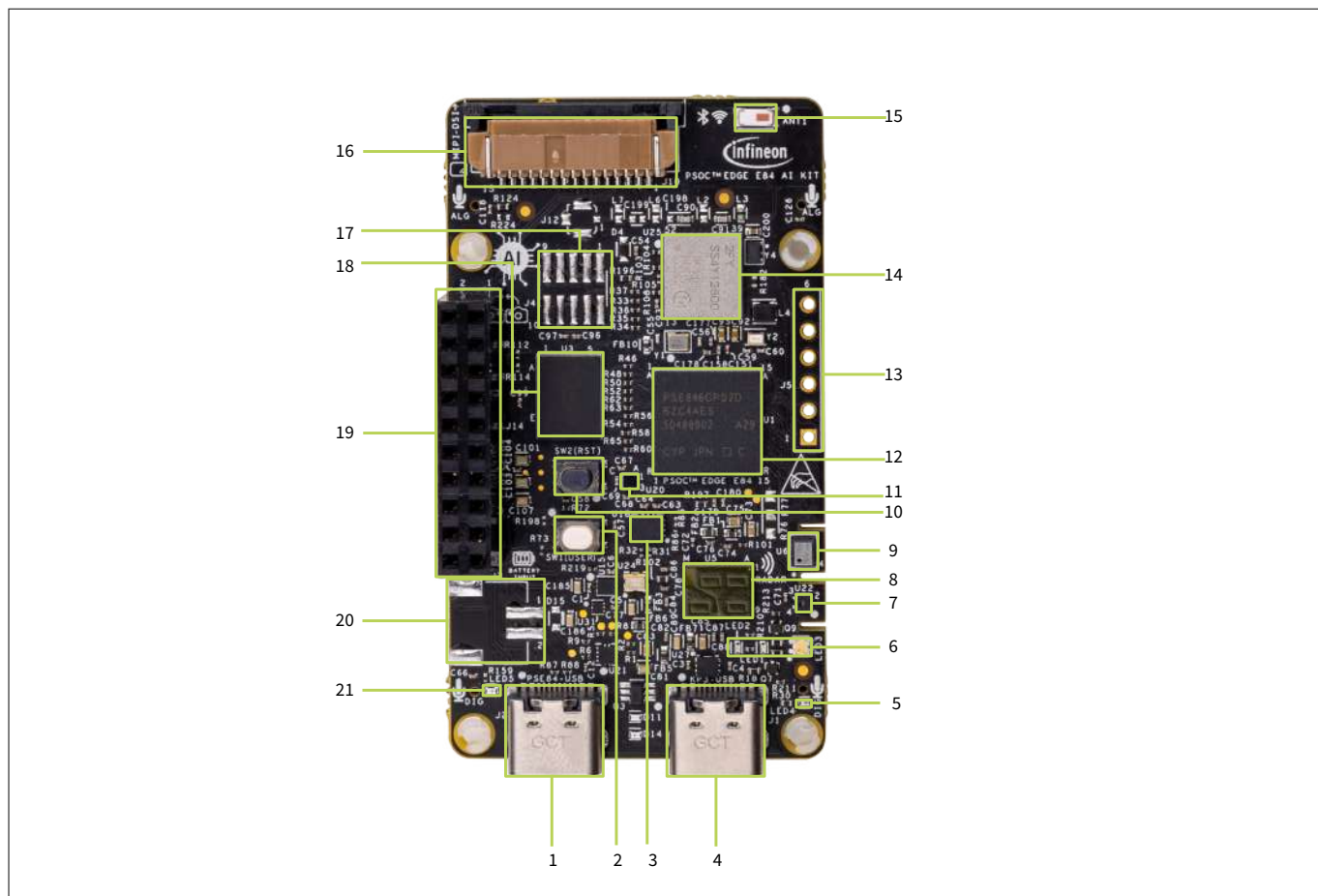


Figure 5 PSOC™ Edge E84 AI Board - Top view

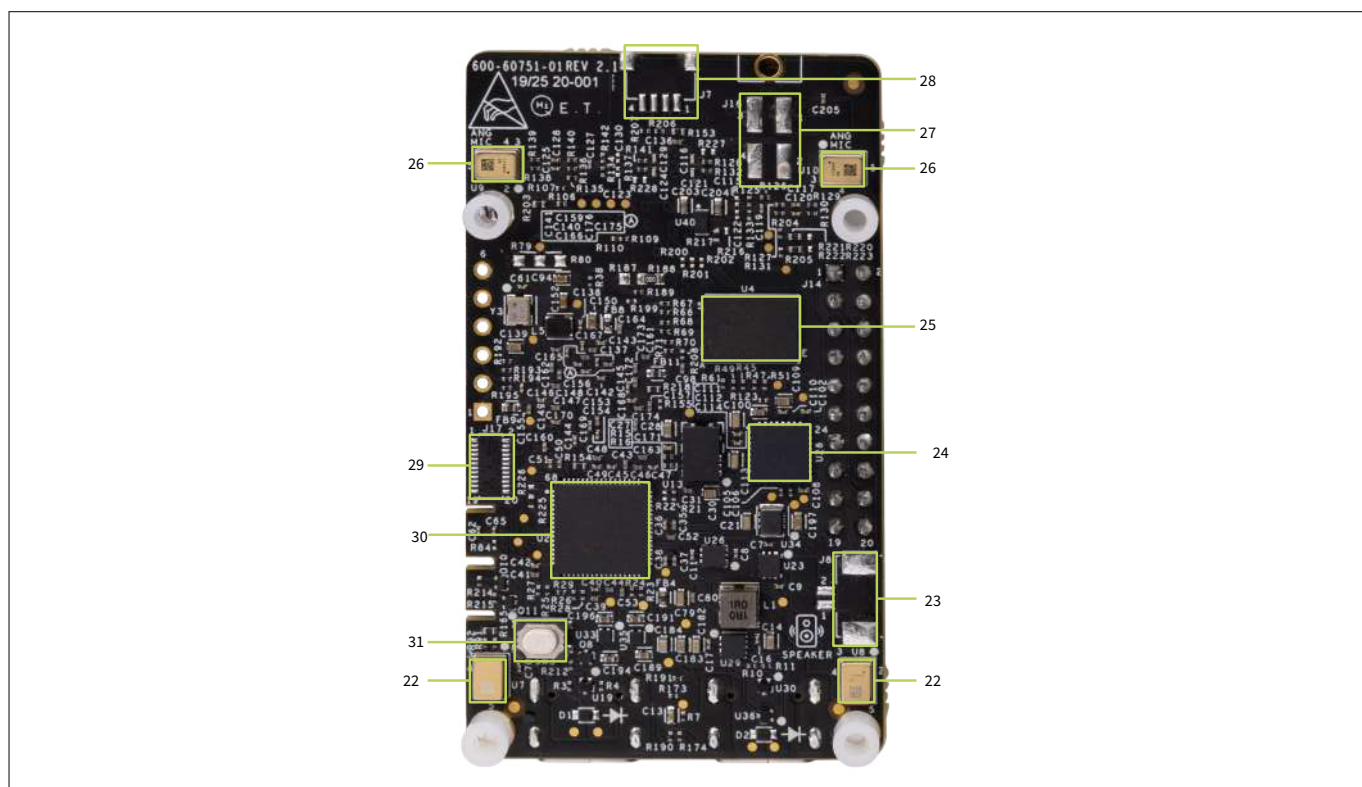


Figure 6 PSOC™ Edge E84 AI Board - Bottom view

## 2 Kit operation

PSOC™ Edge E84 AI board has the following peripherals:

1. **PSOC™ Edge E84 USB Device/Host connector (J2):** Use this USB connector to connect to a PC for using the PSOC™ Edge E84 MCU USB applications. This connector can be used to power the kit at voltage 5V, maximum 3A
2. **PSOC™ Edge E84 MCU user button (SW1):** This button can be used to provide input to the PSOC™ Edge E84 MCU.
 

*Note: By default, this button connects the PSOC™ Edge E84 MCU pin to ground when pressed; hence, you need to configure the PSOC™ Edge E84 MCU pin as a digital input with a resistive pull-up for detecting the button press. It also provides a wake-up source in low-power modes of the device*
3. **6-axis accelerometer and gyroscope (U18):** This kit contains a BMI270 motion sensor with a 6-axis accelerometer and gyroscope. It can interface via I2C with a PSOC™ Edge E84 MCU
4. **KitProg3 program/debug USB Type-C connector (J1):** The USB cable connects between this USB connector and the PC to use the KitProg3 onboard programmer and debugger, and to provide power to the board
5. **KitProg3 status LED (LED4):** This amber LED indicates the status of KitProg3. For details on the KitProg3 status, see the [KitProg3 User Guide](#)
6. **User LEDs (LED1,LED2,LED3):** These onboard LEDs can be controlled by the PSOC™ Edge E84 MCU. The LEDs are active HIGH, so the pins must be driven to high for turning on the LEDs. LED1 is Green color LED, LED2 is Blue color LED and LED3 is RGB-type LED
7. **Digital humidity and temperature sensor (U22):** The kit comprises the SHT40 humidity sensor. This sensor communicates with the PSOC™ Edge E84 MCU via the I2C interface
8. **XENSIV™ 60 GHz RADAR sensor (BGT60TR13C, U5):** The kit comprises the XENSIV™ BGT60TR13C RADAR sensor. This sensor communicates with the PSOC™ Edge E84 MCU via the SPI interface
9. **XENSIV™ digital barometric air pressure sensor (DPS368, U6):** This is an Infineon digital MEMS barometric pressure sensor (DPS368) with a built-in temperature sensor. This sensor uses I2C to transfer the sensor data
10. **PSOC™ Edge E84 MCU reset button (SW2):** This button is used to reset PSOC™ Edge E84 MCU. It connects the PSOC™ Edge E84 MCU reset (XRES) pin to the ground
11. **3-axis magnetometer (U20):** This kit contains a motion sensor with a 3-axis magnetometer, which can be interfaced with a PSOC™ Edge E84 MCU via I3C
12. **PSOC™ Edge E84 MCU (PSE846GPS2DBZC4A, U1):** This kit is designed to highlight the features of the PSOC™ Edge E84 MCU
13. **Expansion I/O headers (J5):** This header brings out a few I/Os for general purpose applications. This header can also be used as alternate serial interface to program PSOC Edge E84 MCU
14. **CYW55513-based Murata Type 2FY module (U25):** Type 2FY is a small and high performance module based on Infineon's CYW55513 combo chipset which supports Wi-Fi 802.11a/b/g/n/ac/ax & Bluetooth® 5.4 BR/EDR/LE up to 143Mbps PHY data rate on Wi-Fi, 3Mbps PHY data rate on Bluetooth and 2Mbps PHY data rate on Bluetooth® LE. The WLAN section supports SDIO 3.0 interface and the Bluetooth® section supports high-speed 4-wire UART interface and PCM for audio data. Type 2FY module is packaged in an impressively small form factor that facilitates integration into size and power-sensitive applications such as IoT applications, handheld wireless system, gateway and more
15. **Wi-Fi/BT antenna (ANT1):** This is the onboard antenna connected to the Wi-Fi and Bluetooth® module
16. **Raspberry Pi compatible MIPI-DSI display connector (J10):** Connector header for Raspberry Pi compatible MIPI-DSI displays
17. **PSOC™ Edge E84 MCU 10-pin SWD/JTAG program and debug header (J4):** This 10-pin header provision allows for JTAG/SWD interface for programming and debugging
18. **128-Mbit Octal-SPI HYPERRAM™(S70KS1283GABHI020, U3):** 128-Mbit HYPERRAM™ device is a high-speed CMOS, self-refresh DRAM, The HYPERRAM™ device provides an xSPI (Octal) slave interface to the

## 2 Kit operation

host system. The xSPI (Octal) interface has an 8-bit (1 byte) wide DDR data bus and use only word-wide (16-bit data) address boundaries

19. **DVP Camera Interface header (J14):** The header provides an easy plug and play interfacing of DVP camera module. These I/O can also be used as general purpose I/O's
20. **Battery input connector (J3):** This is used for connecting a Li-ion battery for powering the kit
21. **Power LED (LED5) :** This amber LED indicates the status of power supplied to the board
22. **XENSIV™ digital MEMS microphones (IM73D122V01, U7, U8):** These two are Infineon's digital MEMS microphones that are used to capture sound and generate digital audio data, which is transferred through the PDM interface
23. **Speaker connector output (J8):** Connector for speaker interface
24. **Audio DAC and Amplifier (U28):** The kit contains an audio amplifier (U28), which is a low-power, highly integrated, high-performance stereo audio DAC with 24-bit stereo playback and digital audio processing blocks which supports from between 8KHz to 192KHz sampling rates
25. **512-Mbit Quad-SPI NOR flash (S25HS512TFABHI013, U4):** The S25HS512T NOR flash of 512-Mbit capacity is connected to the Quad SPI interface of the PSOC™ Edge E84 MCU
26. **Analog Microphone (IM73A135V01XTSA1, U9, U10):** Onboard analog microphones for Voice User Interface (VUI) applications like smart speakers, home automation and IoT devices
27. **Raspberry Pi compatible display capacitive touch connector input (J10):** Display power and touch input connector
28. **I2C interface (J7):** This kit contains a QWIIC interface, which can use the I2C protocol to allow multiple “slave” digital integrated circuits (“chips”) to communicate with one or more “master” chips with mere two wires
29. **Analog IO interface header (J17):** It provides connectivity to a few I/O's supporting analog functionality of the PSOC™ Edge E84 MCU GPIOs compatible with 1.8 V I/O logic level
30. **KitProg3 (PSOC™ 5LP) programmer and debugger (CY8C5868LTI-LP039, U2):** The PSOC™ 5LP device (CY8C5868LTI-LP039), serving as KitProg3, is a multi-functional system that includes a SWD programmer, debugger, USB-I2C bridge, and USB-UART bridge. For more details, see the [KitProg3 User Guide](#)
31. **KitProg3 programming mode selection button (SW3):** This button allows you to switch between various modes of operation of KitProg3 (CMSIS-DAP BULK, CMSIS-DAP HID). For more details, see the [KitProg3 User Guide](#)

### 2.2 Using the OOB example

The PSOC™ Edge E84 AI kit is pre-programmed with a demo that allows the user to launch the required application. The instructions required to run this demo are displayed on the serial terminal.

The available applications in this demo are as follows:

1. **Voice Assistant:** This app controls the LED based on voice commands. The PDM mic on-board is used to detect a wake word "Okay Infineon" followed by commands to turn the LED on or off and control the LED brightness. Please refer the CE [README](#) for the entire command list and other details.
2. **Gesture Detection:** This app uses the on-board radar sensor to detect different gestures like Push and Swipe Right/Left/Up/Down. Please refer the CE [README](#) for more details.

### 2.3 Creating a project and program/debug using ModusToolbox™ software

The PSOC™ Edge E84 AI kit can be programmed and debugged using the onboard KitProg3. KitProg3 is an onboard programmer/debugger with USB-UART and USB-I2C functionality. Infineon's PSOC™ 5LP device is used to implement KitProg3 functionality. For more details on the KitProg3 functionality, see [KitProg3 User Guide](#).

#### Programming and debugging using ModusToolbox™

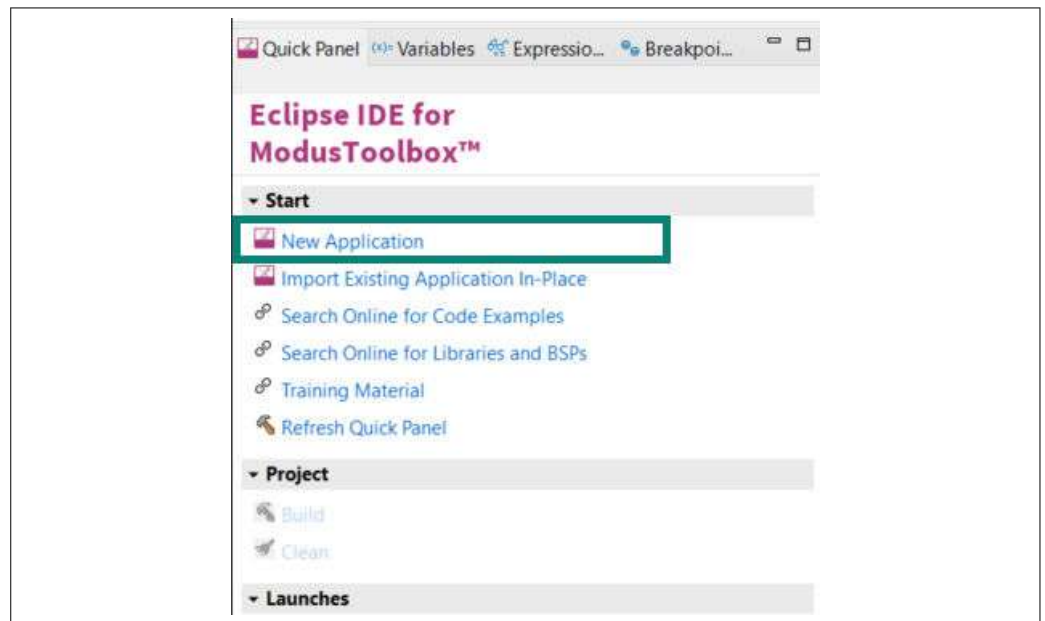
## 2 Kit operation

This section gives a quick overview of programming and debugging using ModusToolbox™. For detailed instructions, see **Help > Eclipse for ModusToolbox™ IDE Documentation > User Guide**.

1. Connect the board (J1) to the PC using the USB cable. It enumerates as a USB composite device if you are connecting it to your PC for the first time. KitProg3 can operate either in CMSIS-DAP Bulk mode (default) or in CMSIS-DAP HID mode. KitProg3 also supports CMSIS-DAP Bulk mode with two UARTs. Programming is faster with the Bulk mode. The status LED is always ON in Bulk mode; ramping at 1 Hz rate in HID mode. If you do not see the desired LED status, see the KitProg3 user guide for details on the KitProg3 status and troubleshooting instructions.

**Note:** *By default only Bulk mode is enabled*

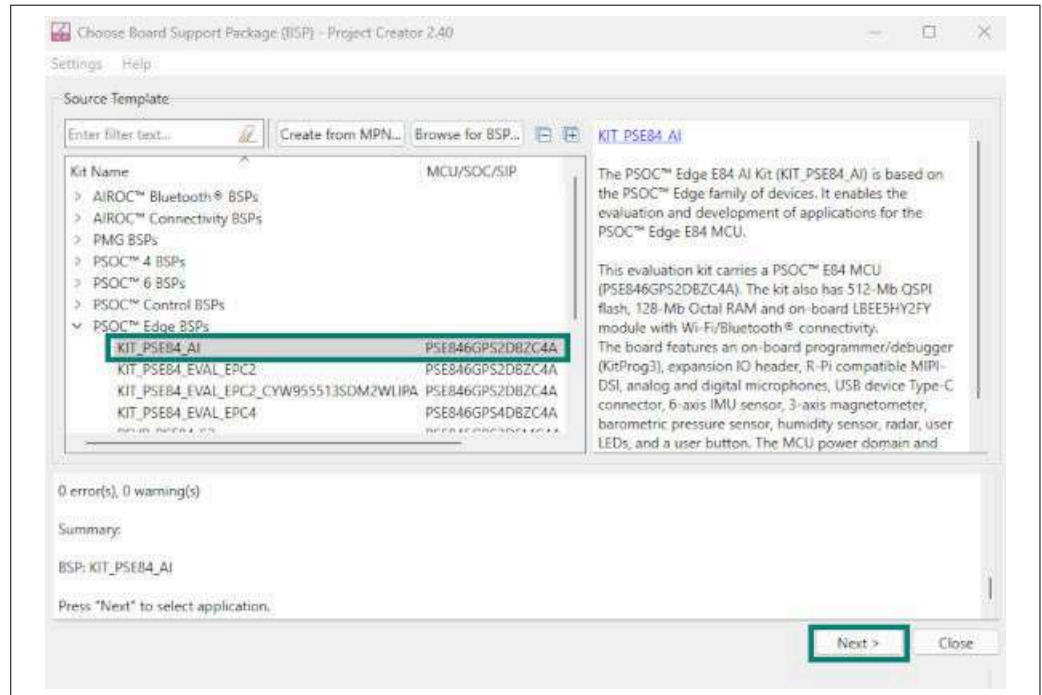
2. In the ModusToolbox™ IDE, import the desired code example (application) into a new workspace.
  - a. Click **New Application** from **Quick Panel**



**Figure 7 Create new application**

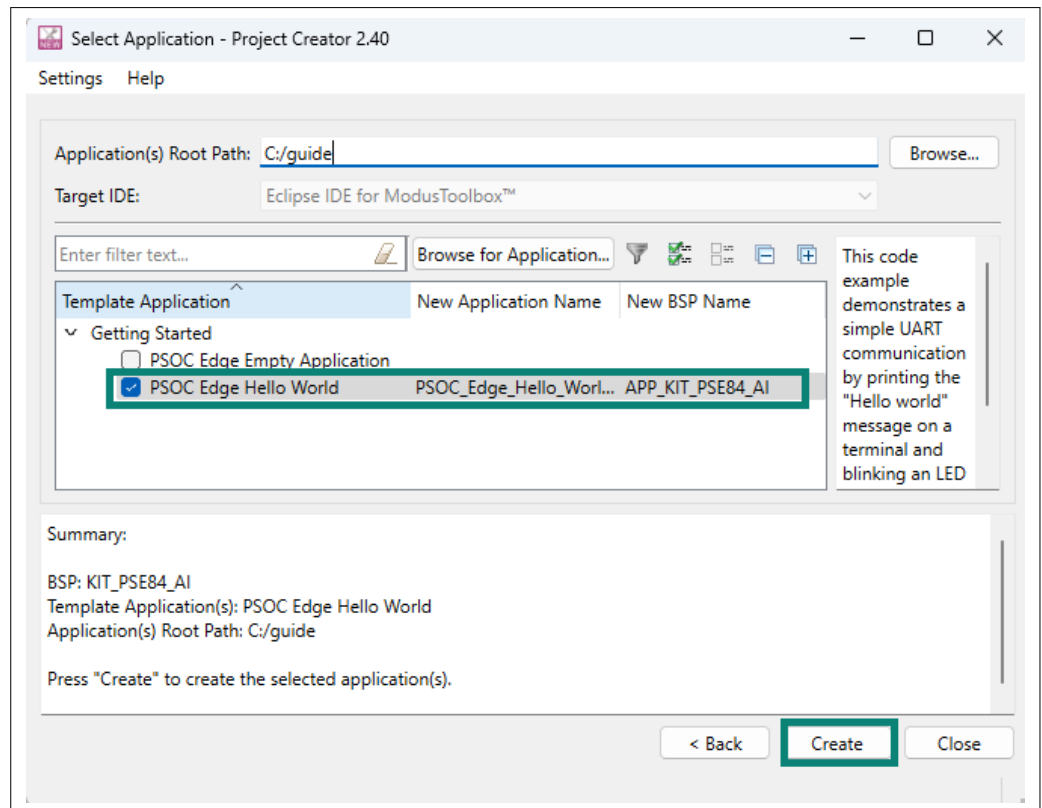
- b. Select the KIT\_PSE84\_AI in the Choose **BSP Target window** and click **Next**.

2 Kit operation



**Figure 8** New application creation: Choose target BSP

- c. Select the application in the **Select Application window** and click **Create**.



**Figure 9** New application creation

3. To build and program a PSOC™ Edge E84 MCU application in the Project Explorer, select **<App\_Name> project**. In the **Quick Panel**, scroll to the **Launches** section and click the **<App\_Name> Program Application**, as shown in the following figure.

2 Kit operation

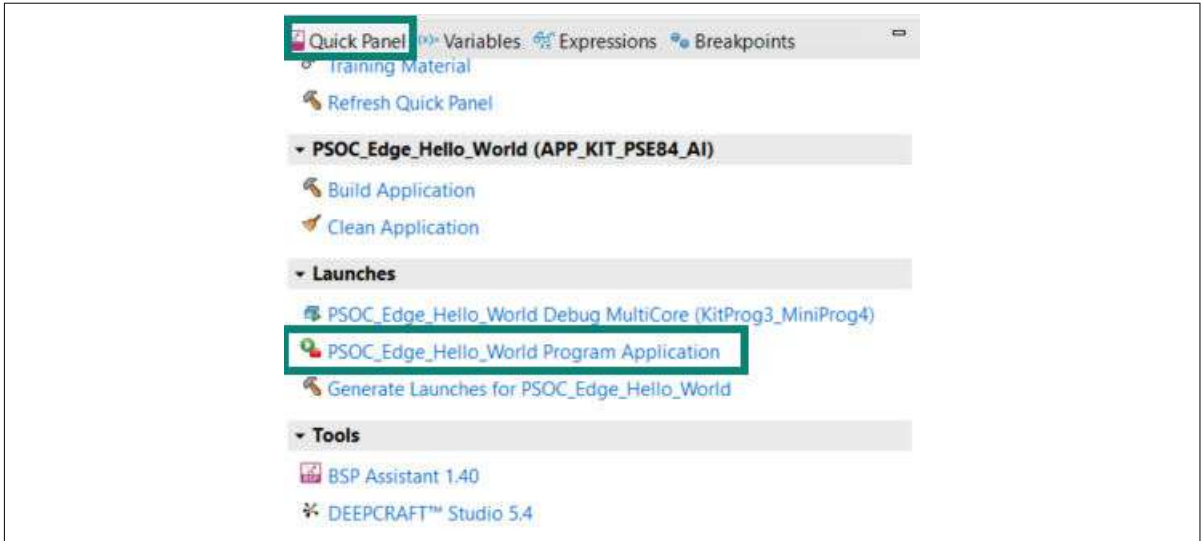


Figure 10 Programming in ModusToolbox™

- 4. ModusToolbox™ has an integrated debugger. To debug a PSOC™ Edge E84 MCU application in the Project Explorer, select the <App\_Name> project. In the **Quick Panel**, scroll to the **Launches** section and click the <App\_Name> **Debug MultiCore(KitProg3\_MiniProg4)** configuration as shown in the following figure. For a detailed explanation on how to debug using ModusToolbox™, refer [ModusToolbox™ user guide](#).

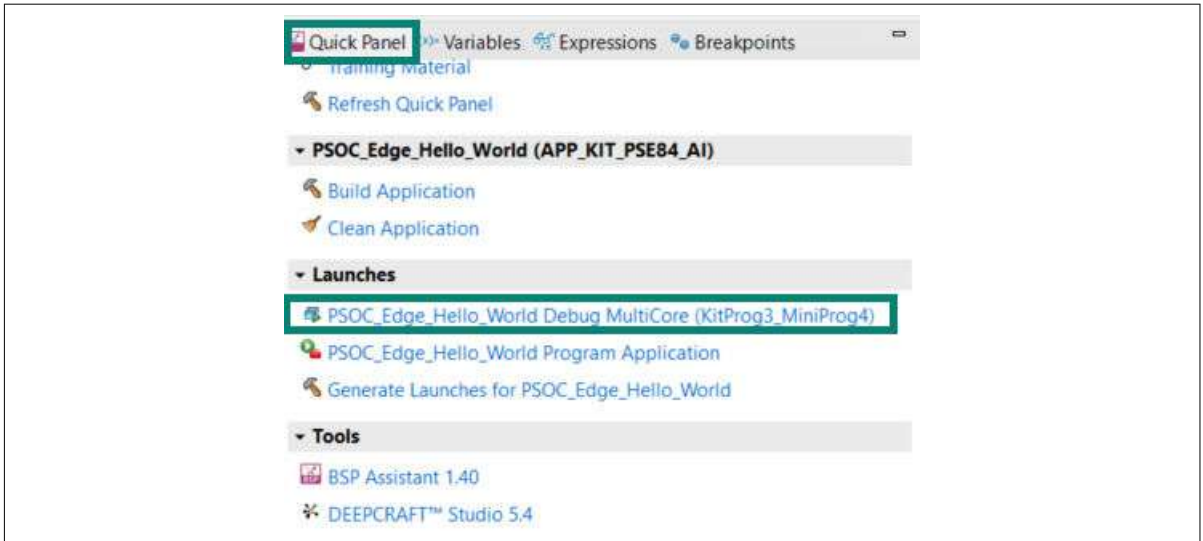


Figure 11 Debugging in ModusToolbox™

3 Hardware

3 Hardware

3.1 Schematics

Refer to the schematic files available on the [kit webpage](#).

3.2 Hardware functional description

3.2.1 Power supply sub system

3.2.1.1 Power supply inputs

The power supply system on this board is versatile, allowing the board to be supplied from any of the following sources:

- 5 V input from on board KitProg3 Type-C USB connector (**J1**)
- 5 V input from the PSOC™ Edge E84 MCU Type-C USB connector (**J2**)
- 3 V - 5 V from the external/Battery power input connector (**J3**) - by default this connector is not populated

The power supply system is designed to provide 1.8 V (core and I/O), and 3.3 V (I/O) operating voltages to the PSOC™ Edge E84 MCU and 5 V for the PSOC™ 5LP based KitProg3 operation. In addition, the voltages of 1.8 V, 3.3 V, and 5 V rails are also used for the operation of PSOC™ Edge E84 MCU, memory, and various sensors available on the kit.

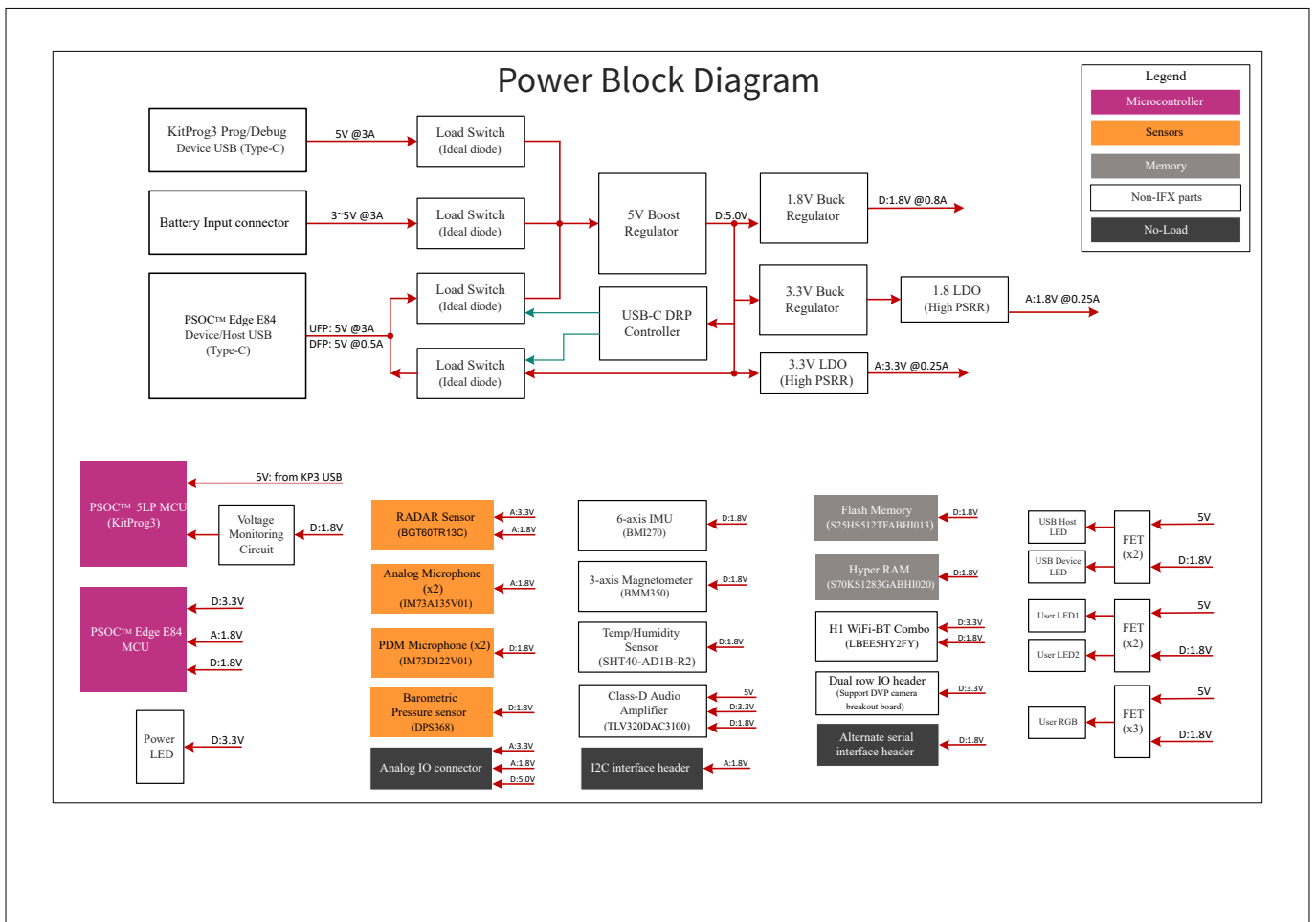
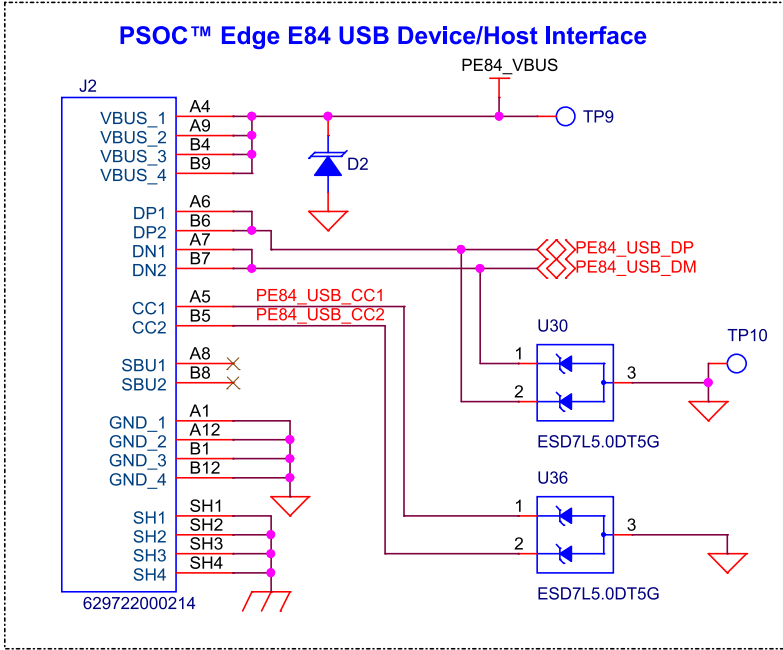
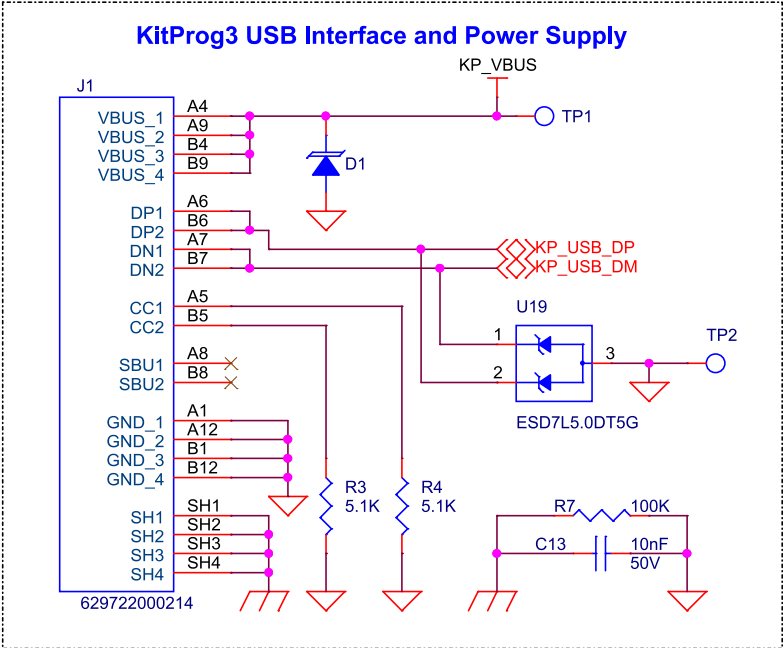


Figure 12 Block diagram of power architecture

3 Hardware



3 Hardware

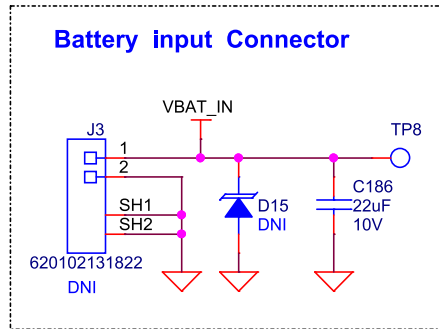


Figure 13 Schematic of power supply inputs of evaluation kit

The KitProg3 Type-C USB connector (J1) and PSOC™ Edge E84 device USB connector (J2) can only provide 5 V/3 A, as it is hard configured by pulling the CC1 and CC2 lines of J1 connector to GND by the 5.1 KΩ pull-down resistor (R3, and R4) and for J2 the CC1 and CC2 lines are controlled by DRP controller (U21).

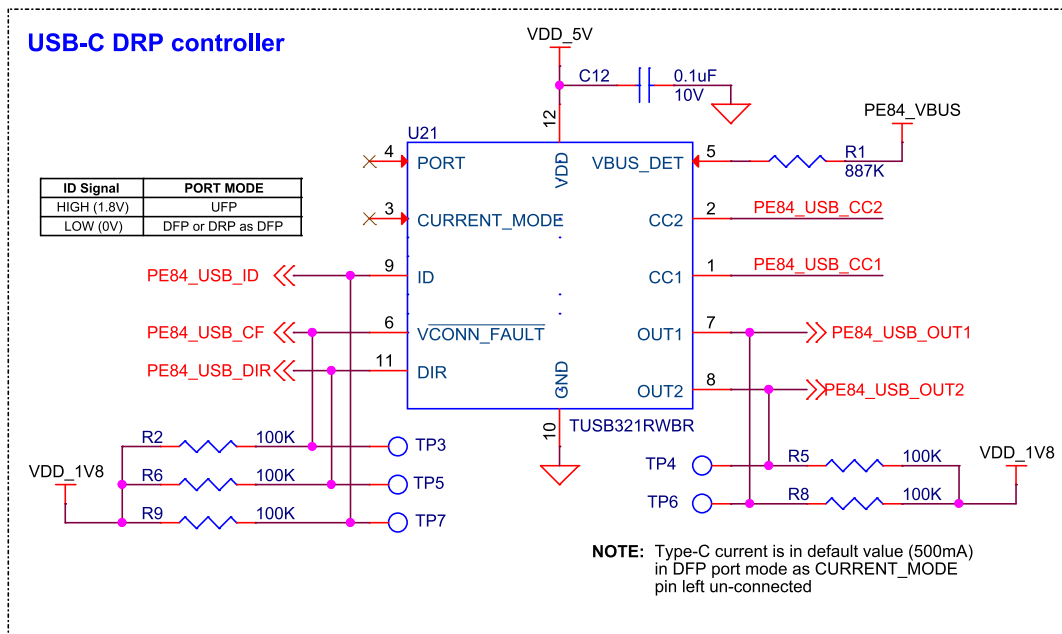


Figure 14 Schematic of DRP controller

PSOC™ Edge E84 device USB connector can also be used as host interface (when DRP controller detects the devices connected to J2) with auto switching of power supply and maximum host current is limited to 500mA. The supply rails KP\_VBUS (5 V from J1), PE84\_VBUS (5 V from J2), and VBAT\_IN from battery input connector (J3) are combined into VCC\_IN through ideal diode ‘OR’ing circuits (U23, U26, and U27), as shown in the following figure.

3 Hardware

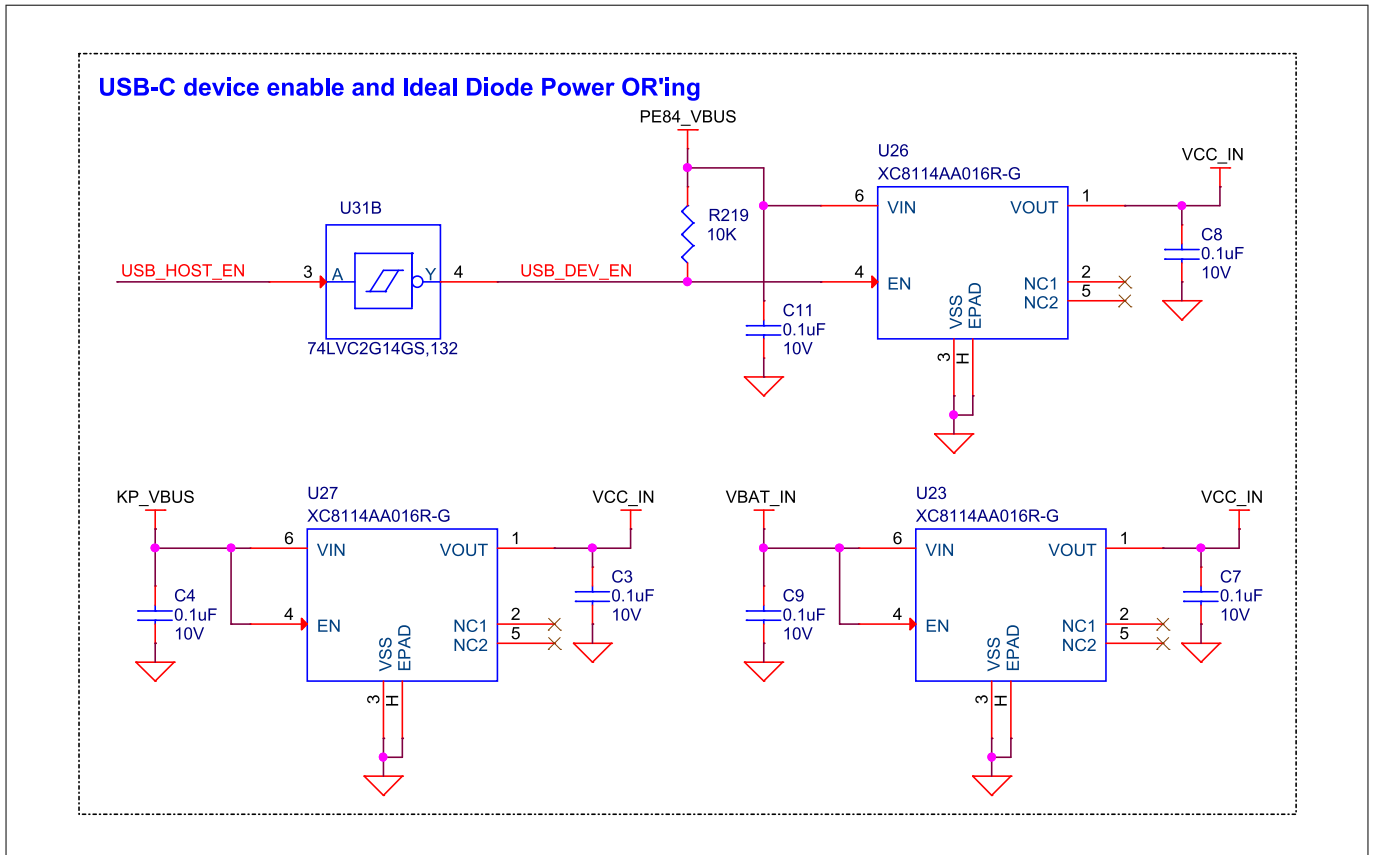


Figure 15 Schematic of power supply Or'ing

The VCC\_IN supply rail serves as an input to the switching and linear voltage regulator to power the different peripherals on the board.

3.2.1.2 Voltage regulators

There are five voltage regulators present on the board:

- 5V Boost regulator (**U29**): Powers the USB host interface of PSOC™ Edge E84 device and next stage of voltage regulators
- 3.3V Buck regulator (**U13**): Powers the Wi-Fi & Bluetooth® module VBAT power supply, PSOC Edge E84 device IO's supply, Audio DAC (**U28**) and MIPI DSI compatible displays
- 1.8 V Buck regulator (**U34**): Powers the PSOC™ Edge E84 device core and IO's power supply
- 3.3 V LDO linear voltage regulator (**U35**): Powers the onboard RADAR sensor
- 1.8 V LDO linear voltage regulator (**U33**): Powers the Analog domain of PSOC™ Edge E84 MCU and onboard RADAR sensor

VCC\_IN rail powers the 5V Boost regulator (**U29**). The VDD\_5V rail powers a 3.3V Buck regulator (**U13**), 1.8V Buck regulator (**U34**), 3.3 V LDO linear voltage regulator (**U35**). VDD\_3V3 rail powers a 1.8 V LDO linear voltage regulator (**U33**).

3 Hardware

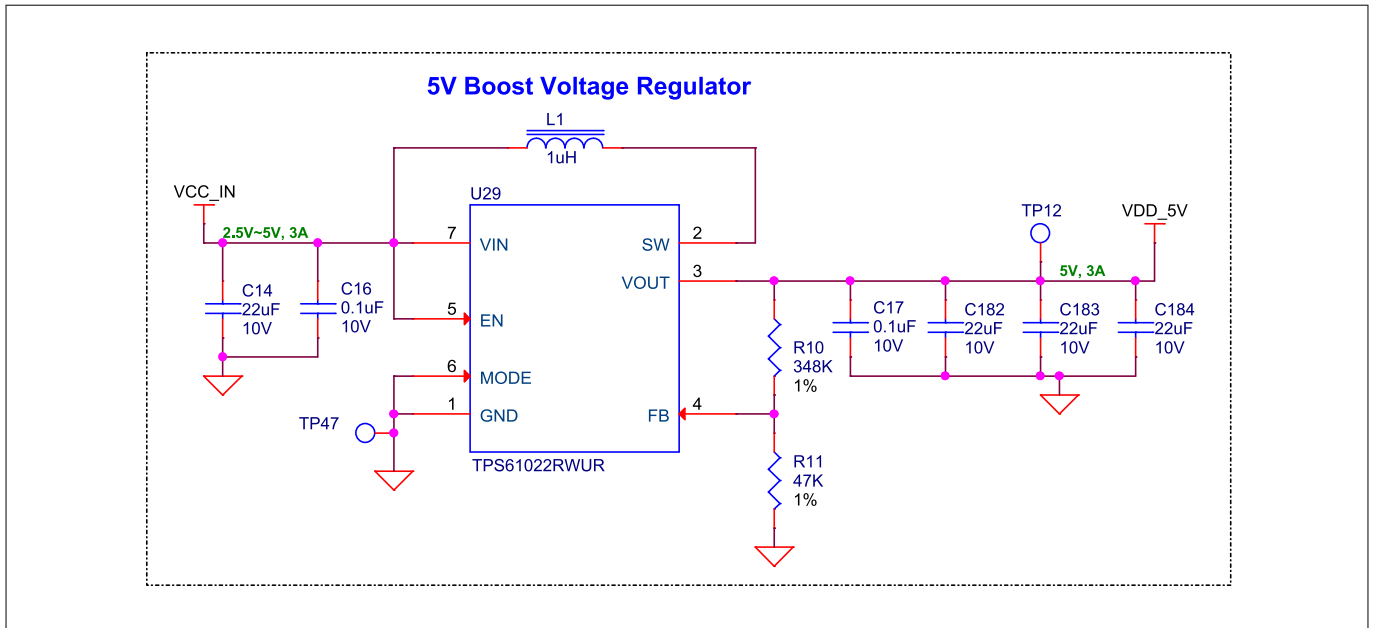


Figure 16 Schematic of 5V Boost power supply regulator (U29)

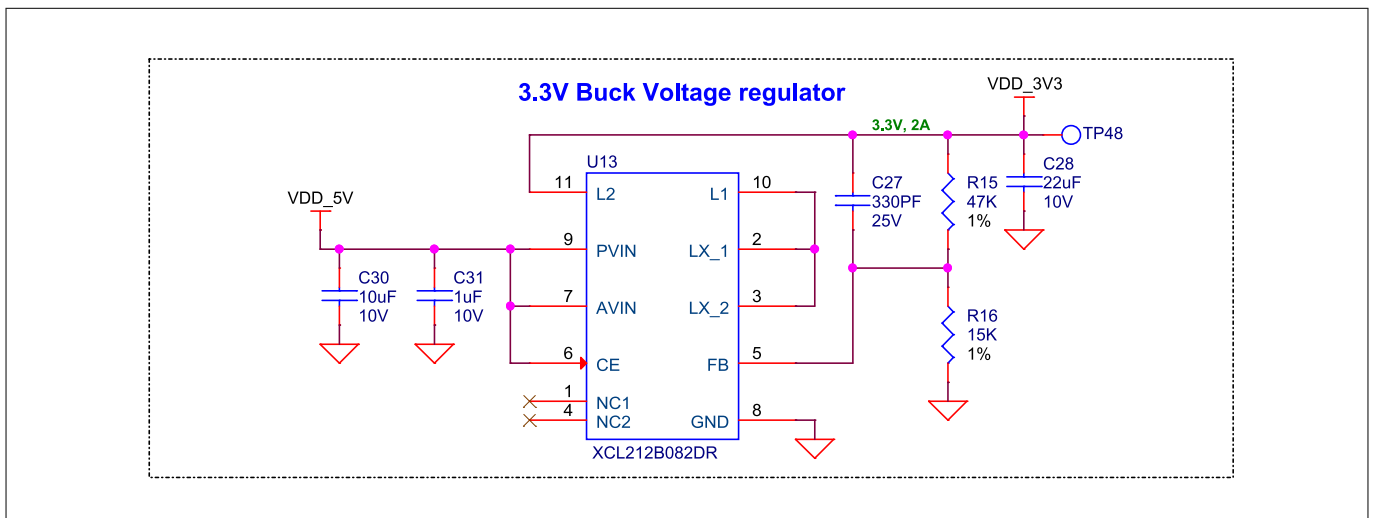


Figure 17 Schematic of 3.3V Buck power supply regulator (U13)

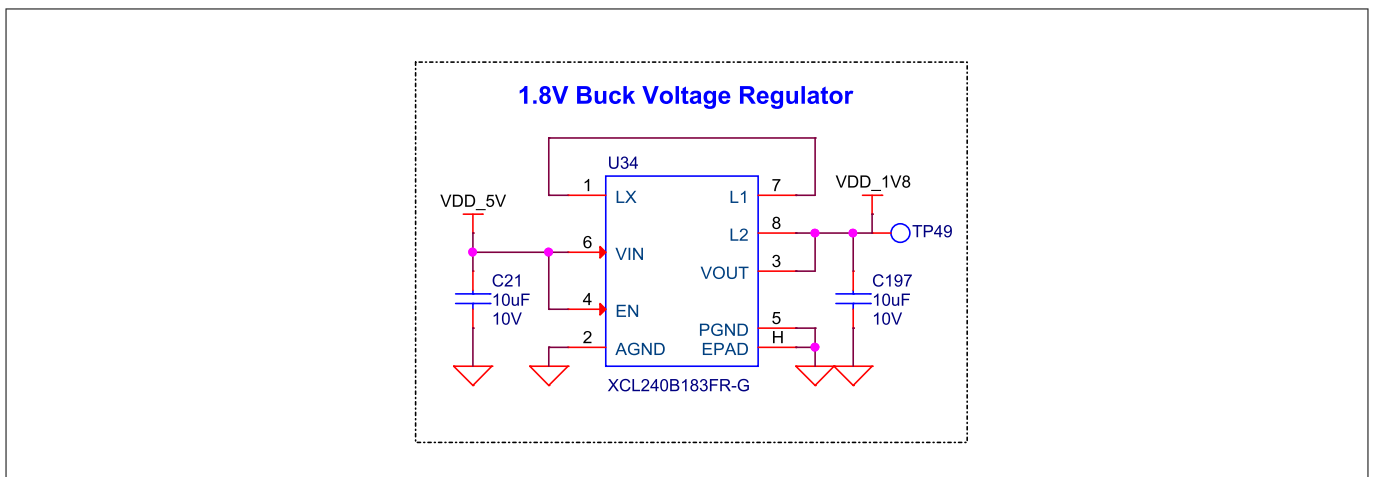


Figure 18 Schematic of 1.8V Buck power supply regulator (U34)

3 Hardware

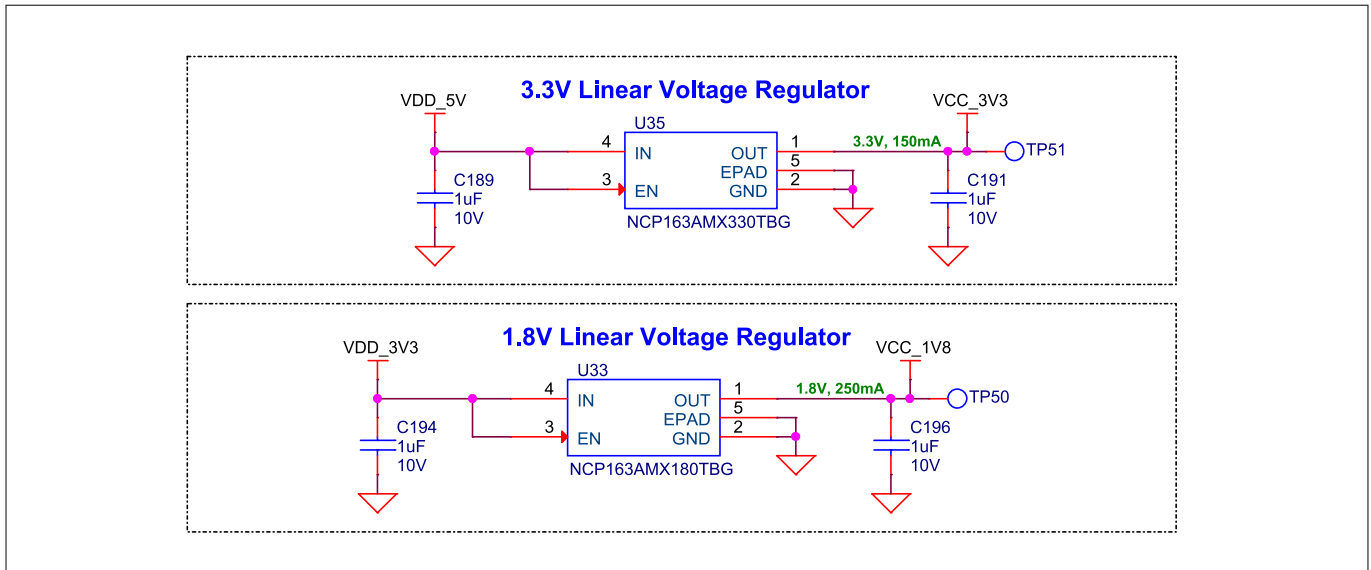


Figure 19 Schematic of 3.3 V and 1.8 V LDO linear voltage regulators (U35, U33)

3.2.2 PSOC™ 5LP-based KitProg3 programmer and debugger

3.2.2.1 PSOC™ 5LP-based KitProg3

The onboard PSOC™ 5LP (CY8C5868LTI-LP039 - U2) device is used as the KitProg3 programmer/debugger to program and debug the PSOC™ Edge E84 MCU. PSOC™ 5LP device is connected to the USB port of a PC through a Type-C USB connector, and to the SWD and other communication interfaces of the PSOC™ Edge E84 MCU.

For more information, see the following:

- [PSOC™ 5LP webpage](#)
- [CY8C58LPxx family datasheet](#)

3 Hardware

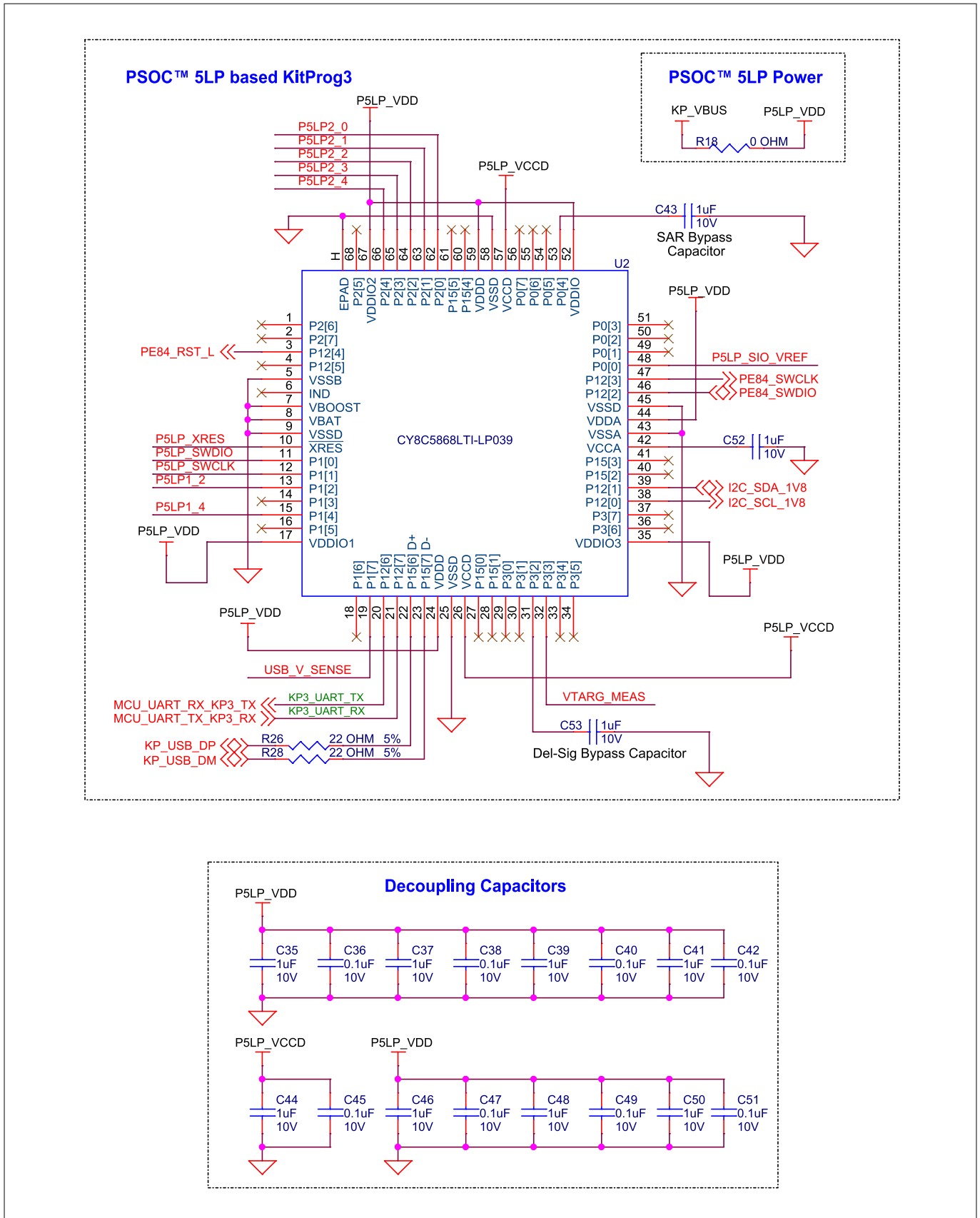


Figure 20 Schematic of PSOC™ 5LP based KitProg3

3 Hardware

3.2.2.2 KitProg3 serial interface with PSOC™ Edge E84

In addition to being used as an onboard programmer/debugger using the SWD/JTAG interface, the PSOC™ 5LP device also functions as an interface for the USB-UART and USB-I2C bridges. The USB-Serial pins of the PSOC™ 5LP devices are hard-wired to the I2C/UART pins of the PSOC™ Edge E84 MCU. The I2C pins are also available on the expansion I/O header, and connected to all I2C interface-based sensors. Therefore, the PSOC™ 5LP device can be used to control a sensor with the I2C interface and PSOC™ Edge E84 MCU.

Table 4 Pin assignments of serial interface between PSOC™ 5LP and PSOC™ Edge E84

PSOC™ 5LP signal	PSOC™ Edge E84 I/O (signal)	Logic level
PE84_SWCLK	P6[3]	1.8 V
PE84_SWDIO	P6[2]	1.8 V
PE84_RST_L	XRES	1.8 V
I2C_SDA_1V8	P8[1]	1.8 V
I2C_SCL_1V8	P8[0]	1.8 V
MCU_UART_RX_KP_TX	P6[5]	1.8 V
MCU_UART_TX_KP_RX	P6[7]	1.8 V

3.2.2.3 KitProg3 onboard target voltage measurement

PSOC™ 5LP of KitProg3 uses an ADC to measure the onboard target voltage. Before the ADC input, there is a voltage divider to bring the target voltage within the dynamic range.

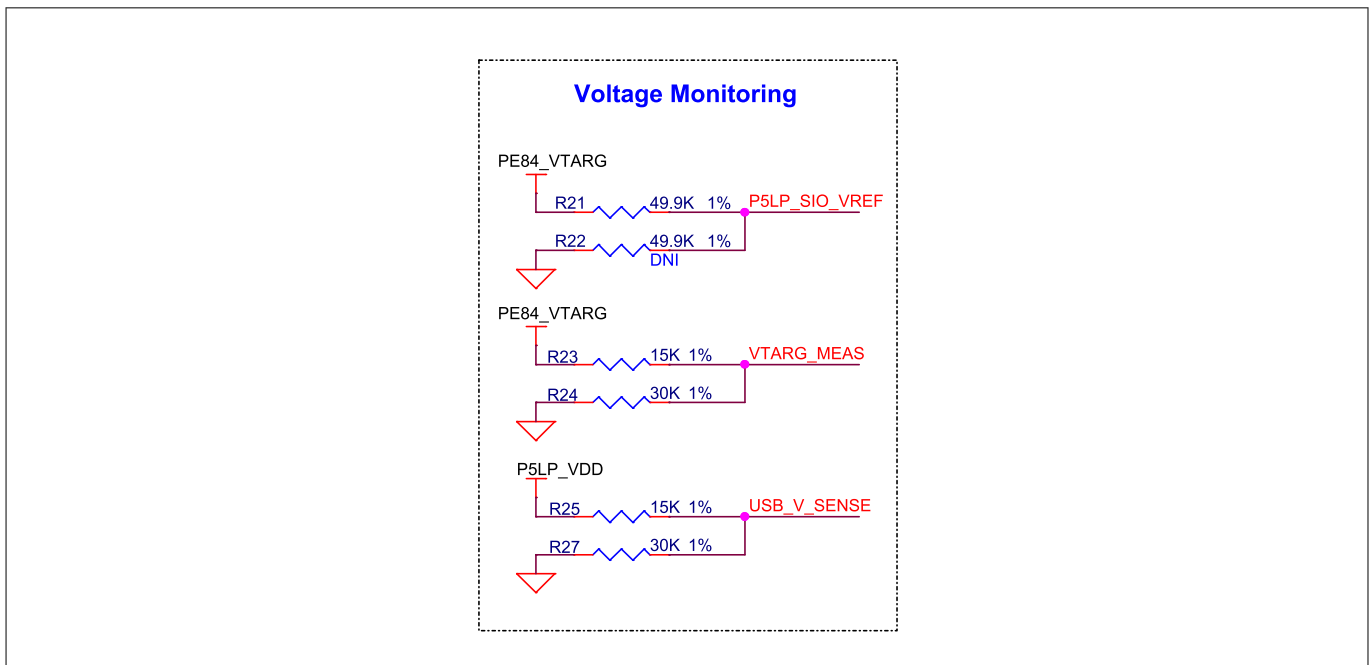


Figure 21 Schematic of KitProg3 onboard target voltage monitoring circuit

This feature allows you to measure the target MCU voltage through KitProg3 using PSOC™ or ModusToolbox™ programmer tools.

3 Hardware

3.2.2.4 KitProg3 programming mode selection button and status LED

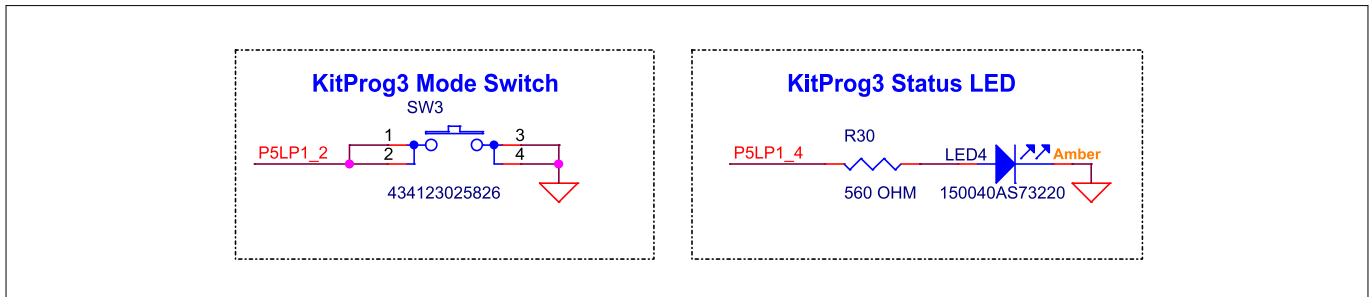
There is a mode selection button (SW3) connected to the P1[2] pin of the PSOC™ 5LP device for programming mode selection. This button can be used to switch between Bulk and HID modes (see the [KitProg3 user guide](#) for details). The button works in an active LOW configuration and is shorted to GND when pressed.

PSOC™ 5LP has a status LED (D12, Amber) connected to its P1[4] pin of the PSOC™ 5LP device, which indicates the programming status. See the following table for a summary of the LED status:

**Table 5 KitProg3 mode switching**

KitProg3 programming modes	Status LED (D2)
CMSIS-DAP/Bulk mode (default)	ON
CMSIS-DAP/HID mode	RAMPING at 1 Hz

**Note:** Switching between the programming modes can be done through the [Firmware-loader tool](#). For details, see Section Mode Switching in the [KitProg3 user guide](#).



**Figure 22 Schematic of KitProg3 mode selection button (SW3) and status LED (D12)**

3.2.3 PSOC™ Edge E84 MCU features

PSOC™ Edge E84 MCU is a dual-CPU microcontroller with a neural net companion processor, DSP capability, high-performance memory expansion capability, low-power analog subsystem with high-performance analog-to-digital conversion and low-power comparators, IoT connectivity, communication channels, and programmable analog and digital blocks. It also has audio and graphics blocks.

PSOC™ Edge E84 MCU has the following features:

High-performance compute, DSP, and machine learning (ML) blocks

- Low-power CPU block for security, control, and communication
- Security up to Infineon Edge Protect Category 4 (EPC 4); supported by Trusted Firmware-M (TF-M), and mbedTLS crypto acceleration package
- Lock-step secured enclave protected Root-of-Trust (RoT), secured boot, secured firmware updates
- Low-power operation: multiple power modes; DC-DC buck converter; dynamic voltage and frequency management
- Optimizable power: independent voltage domains; selectable SRAM retention
- Communications and connectivity: USB, SD host, Serial Memory Interface (SMIF), Ethernet, CAN FD, I3C, I2C, UART, SPI
- Graphics and audio blocks
- Always-on power domain: Autonomous Analog with ADC, DAC, opamps, comparators, Acoustic Activity Detection (AAD)

**3 Hardware**

- Programmable GPIO pins: drive modes, strengths, and slew rates; over-voltage tolerant (OVT) pins for I2C compliance. Some ports have a smart I/O programmable logic array
- ModusToolbox™ development environment; installable SDKs and libraries; industry-standard Arm® tools; RTOS support

PSOC™ Edge E84 MCU offers several key features that enable it to run the machine learning algorithms efficiently. These include a dual CPU subsystem for parallel processing, a large memory capacity for storing and processing datasets, low-power operation for battery-powered applications, flexible clocking options for timing control, high-speed data access and communication, analog processing capabilities, and programmable GPIOs for hardware control. For more details, see the PSOC™ Edge E84 MCU datasheet.

In addition, Infineon's broad portfolio of hardware, software, and tool solutions, combined with DEEPCRAFT™'s expertise in developing robust machine learning solutions for edge devices, making it easier to leverage the advanced opportunities from AI/ML. DEEPCRAFT™ Studio, an end-to-end development platform, is planned for ML model creation, training, and deployment. This platform will enable you to bring AI into various embedded applications, enhancing functionalities, control, energy efficiency, and privacy. With DEEPCRAFT™ AI, you can benefit from a faster time to market, serving a wide range of applications for global customers.

**3.2.3.1 PSOC™ Edge E84 MCU power**

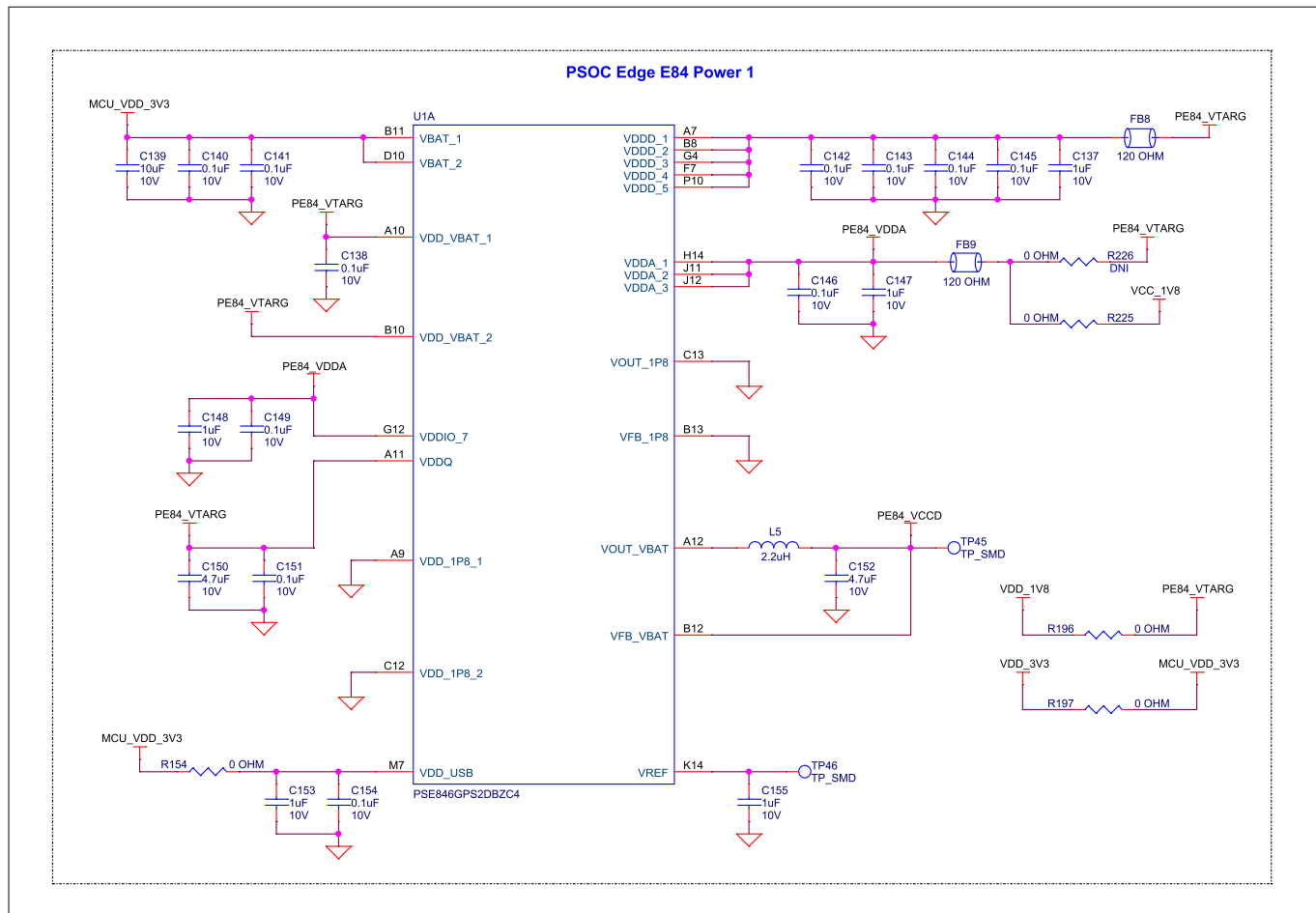
PSOC™ Edge E84 MCU is designed to operate at low power, making it suitable for battery-powered applications. The powering section of the board includes the core and I/O domain power connections, decoupling capacitors, and ferrite beads to isolate the digital and analog domains.

The core and I/O domain power connections are designed to provide a stable and efficient power supply to the PSOC™ Edge E84 MCU. The core power supply is connected to the VCC\_1V8 rail, while the I/O power supply is connected to both the VCC\_3V3 and VCC\_1V8 power rails. These power rails are designed to provide the required voltage levels for the core and I/O operations.

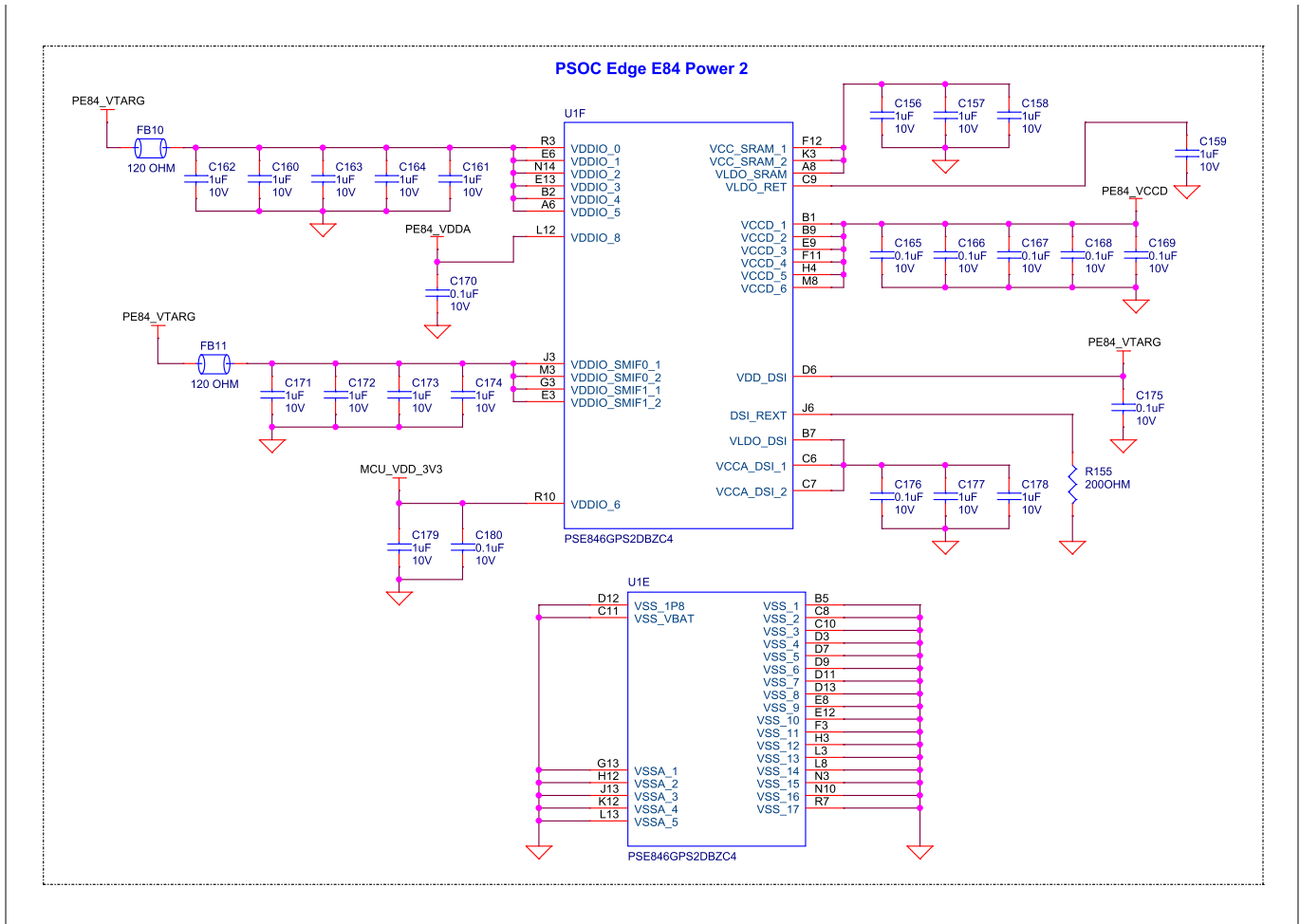
**Table 6 PSOC™ Edge E84 MCU power rail details**

PSOC™ Edge E84 MCU power rail	Supply voltage rail
VBAT	VCC_3V3 (3.3 V)
VDDA, VDDIO7, VDDIO8	VCC_1V8 (1.8 V from Linear regulator)
VDDUSB	VCC_3V3 (3.3 V)
VDD_VBAT	VCC_1V8 (1.8 V)
VDDQ	VCC_1V8 (1.8 V)
VDDD	VCC_1V8 (1.8 V)
VDDIO_SMIF0, VDDIO_SMIF1, VDDIO1, VDDIO2, VDDIO3, VDDIO4, VDDIO5	VCC_1V8 (1.8 V)
VDDIO6	VCC_3V3 (3.3 V)
VCCD	0.7 V/0.8 V/0.9 V (internal Buck regulator)

3 Hardware



3 Hardware



**Figure 23 Schematic for PSOC™ Edge E84 MCU power rail connections**

Ferrite beads are used to isolate the digital and analog domains, preventing interference between these two domains. They are placed on the power lines connecting the digital and analog domains, ensuring that the power supply remains stable and free from interference.

Decoupling capacitors are placed close to the power pins of the MCU to filter out high-frequency noise and prevent it from affecting the operation of the MCU. These capacitors maintain a stable power supply and improve the system's performance.

**3.2.3.2 PSOC™ Edge E84 MCU I/O signals**

The PSOC™ Edge E84 MCU features a comprehensive set of I/O ports designed to facilitate easy interfacing with various sensors and peripherals. PSOC™ Edge E84 MCU has **22 I/O ports**, each of which can be configured with different functions based on the application requirements (refer to the datasheet for the list of alternate functions supported by the I/Os of each port). Each I/O port of the PSOC™ Edge E84 MCU is associated with a dedicated power supply, enabling users to configure different I/O ports at different logic levels.

**Table 7 PSOC™ Edge E84 MCU I/O ports and associated power rails**

PSOC™ Edge E84 MCU I/O ports	PSOC™ Edge E84 MCU power rail	Logic level
P0, P4	VDDIO_SMIF1 (VDD_1V8)	1.8 V
P1, P2, P3, P5	VDDIO_SMIF0 (VDD_1V8)	1.8 V

(table continues...)

3 Hardware

Table 7 (continued) PSOC™ Edge E84 MCU I/O ports and associated power rails

PSOC™ Edge E84 MCU I/O ports	PSOC™ Edge E84 MCU power rail	Logic level
P6, P7	VDDIO0 (VDD_1V8)	1.8 V
P8	VDDIO1 (VDD_1V8)	1.8 V
P9, P20	VDDIO2 (VDD_1V8)	1.8 V
P10, P11	VDDIO3 (VDD_1V8)	1.8 V
P12, P21	VDDIO4 (VDD_1V8)	1.8 V
P13, P14	VDDIO7 (VCC_1V8)	1.8 V
P15	VDDIO8 (VCC_1V8)	1.8 V
P16, P17	VDDIO6 (VDD_3V3)	3.3/1.8 V
P18, P19	VDDIO5 (VDD_1V8)	1.8 V

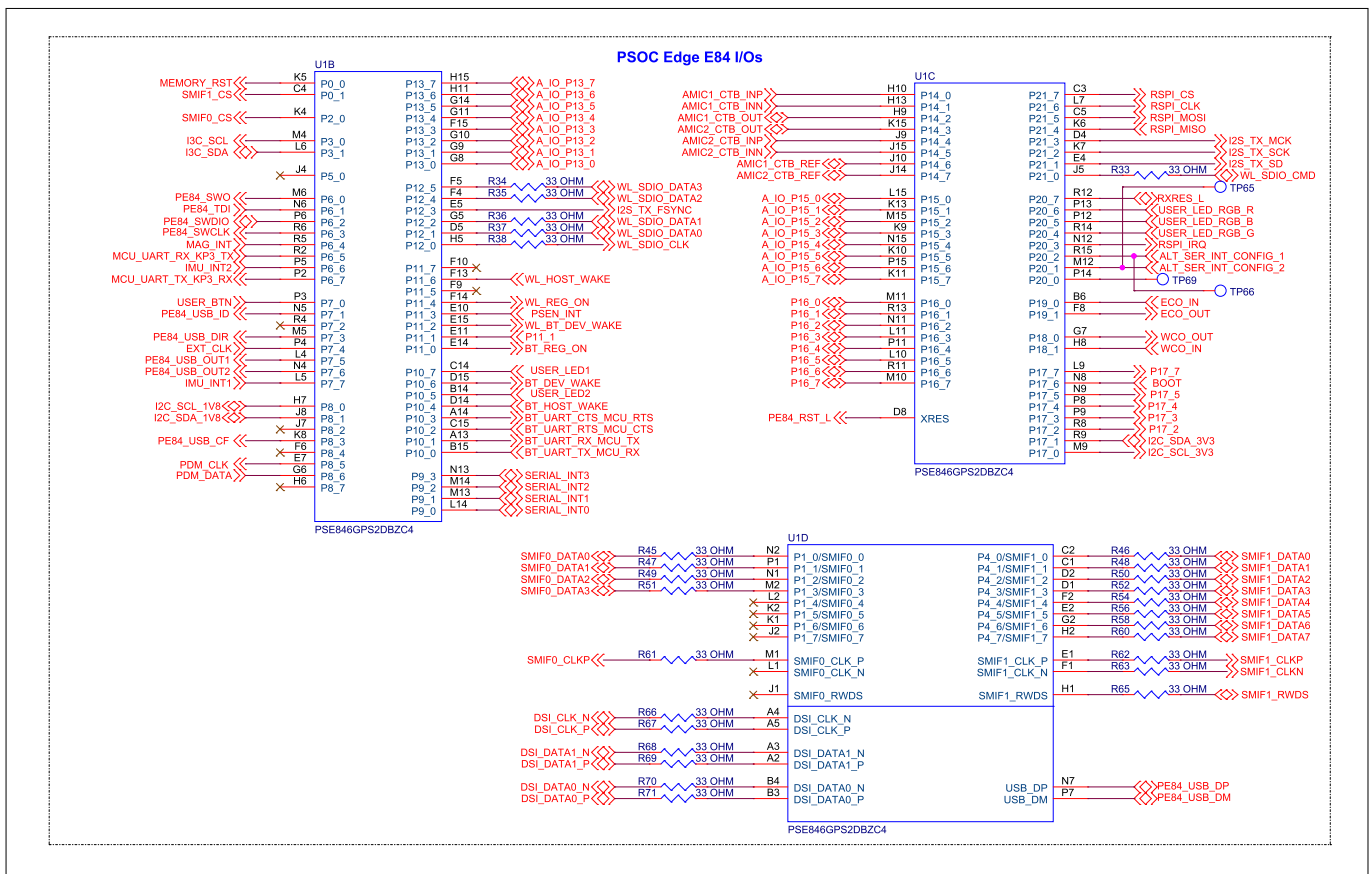


Figure 24 Schematic of PSOC™ Edge E84 MCU I/O signals

3.2.3.3 PSOC™ Edge E84 MCU clock sources

The PSOC™ Edge E84 AI kit is designed to support advanced applications with its hardware features. It includes a **24 MHz** external clock source from a crystal oscillator (**Y3**) connected to **P7[4]** as primary clock source. A **17.2032 MHz** clock source from a crystal (**Y1**) connected to **P19[0]** and **P19[1]** and a **32.768 KHz** clock source from crystal (**Y2**) is connected to **P18[0]**, **P18[1]** to enable the ECO (External Crystal Oscillator) and WCO (Watch Crystal Oscillator) modes of the PSOC™ Edge E84 MCU.

3 Hardware

The external clock source and ECO mode is used for high-performance clock generation, which is crucial for applications that require fast processing speeds. The WCO mode, on the other hand, is used for low-power operation, allowing the device to run at reduced power consumption while still maintaining accurate timekeeping.

For USB functionality, it is recommended to use an external clock source for precise clock generation. This is because USB communication requires a stable and precise clock signal to ensure reliable data transfer. The external clock source can be connected to the PSOC™ Edge E84 MCU's USB clock input, providing the necessary clock signal for USB operation.

By utilizing these features, the PSOC™ Edge E84 AI kit provides high-performance clock generation, low-power operation, and reliable USB communication, making it suitable for advanced applications.

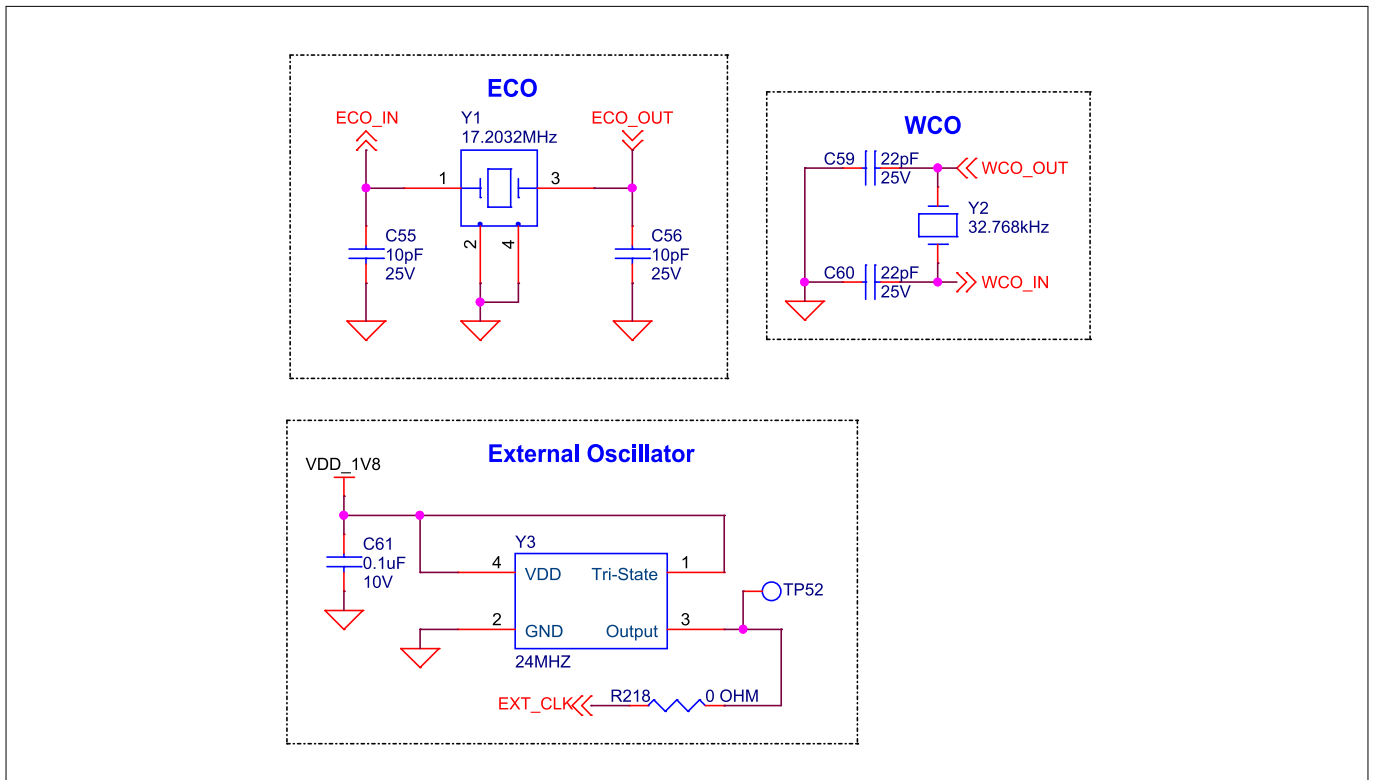
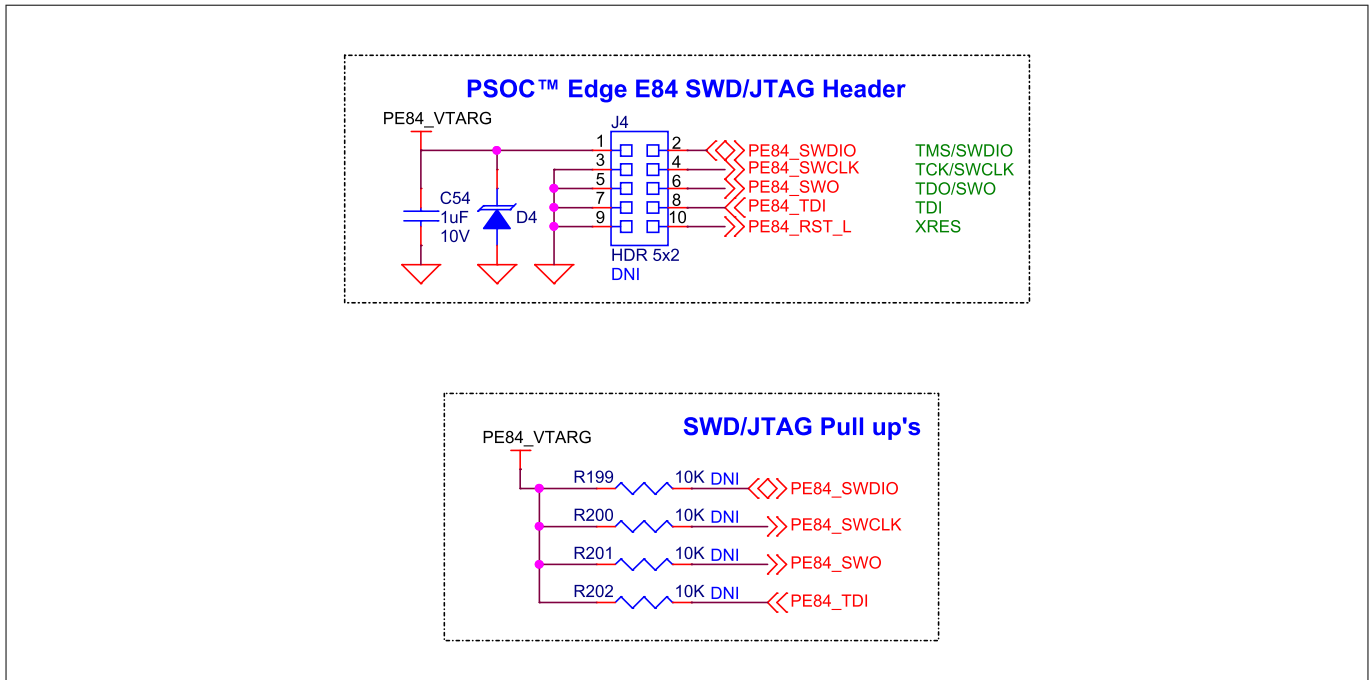


Figure 25 Schematic of clock sources for External clock source, ECO and WCO of PSOC™ Edge E84 MCU

3.2.3.4 PSOC™ Edge E84 MCU programming/debugging interface

In the PSOC™ Edge E84 AI Board, a default programming/debugging interface is through the on board KitProg3 programmer/debugger. In addition, you can use an external programmer like MiniProg4 to program/debug PSOC™ Edge E84 device through this 10-pin header (J4) which is not populated by default.

3 Hardware



**Figure 26 PSOC™ Edge E84 MCU SWD/JTAG header interface schematic**

The interface circuit **D4** provides ESD protection, and **C54** provides filtered reference voltage for external programmer to detect the target voltage of the PSOC™ Edge E84 device.

**Note:** Do not feed power to the board through this header. The **J4.1** needs to be used only for taking the target voltage reference.

**3.2.3.5 PSOC™ Edge E84 MCU external memory interface**

PSOC™ Edge E84 AI Kit has Infineon's Quad SPI NOR flash memory **S25HS512TFABHI013 (U4)** of 512 Mb and Octal PSRAM memory **S70KS1283GABHI020 (U3)** of 128Mb. The NOR flash is connected to the Quad SPI interface and PSRAM memory is connected to Octal SPI interface (which also support hyper bus interface) of the PSOC™ Edge E84 MCU. The NOR flash device supports 4-bit (Quad I/O) serial commands. The NOR flash device can be used for both data and code memory with execute-in-place (XIP) support and encryption.

**Table 8 Pin assignments of QSPI flash memory interface**

Signal name	PSOC™ Edge E84 I/O	Logic level
SMIF0_DATA0	P1[0]	1.8 V
SMIF0_DATA1	P1[1]	1.8 V
SMIF0_DATA2	P1[2]	1.8 V
SMIF0_DATA3	P1[3]	1.8 V
SMIF0_CLKP	SMIF0_CLK_P	1.8 V
SMIF0_CS	P2[0]	1.8 V

3 Hardware

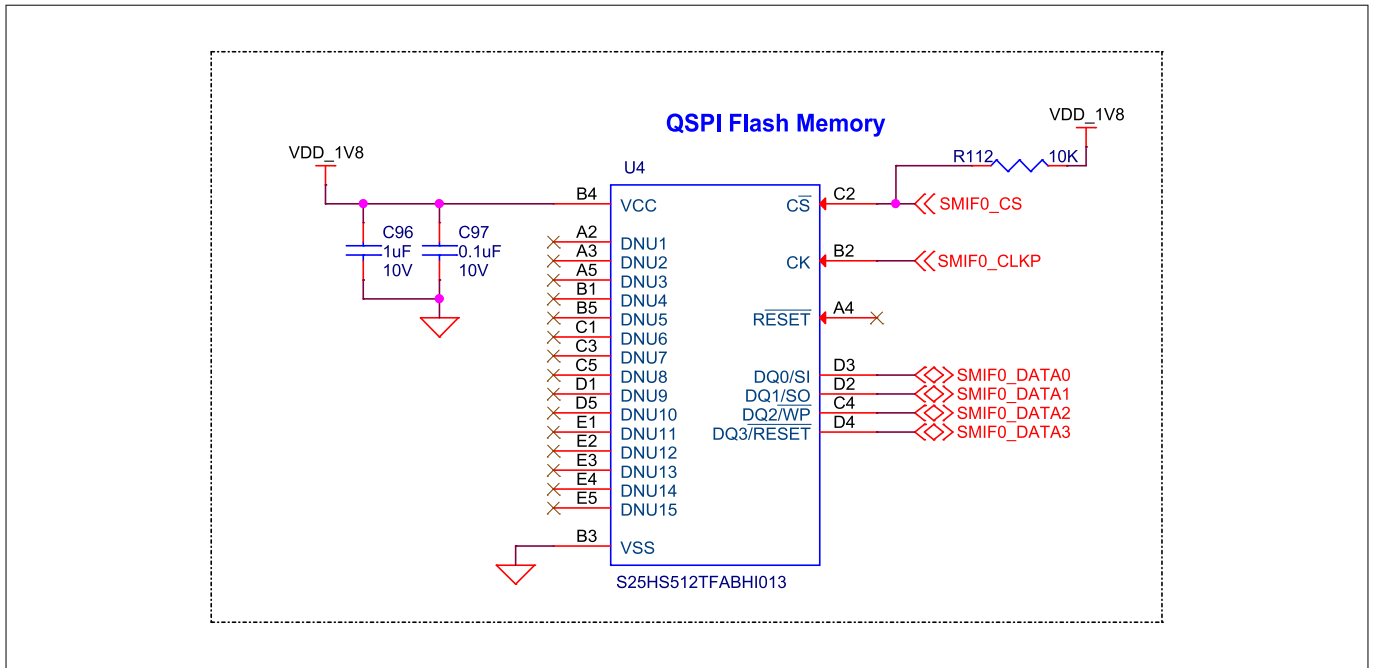


Figure 27 Schematic of QSPI flash memory interface

Table 9 Pin assignments of PSRAM memory Octal/Hyper-bus interface

Signal name	PSOC™ Edge E84 I/O	Logic level
SMIF1_DATA0	P4[0]	1.8 V
SMIF1_DATA1	P4[1]	1.8 V
SMIF1_DATA2	P4[2]	1.8 V
SMIF1_DATA3	P4[3]	1.8 V
SMIF1_DATA4	P4[4]	1.8 V
SMIF1_DATA5	P4[5]	1.8 V
SMIF1_DATA6	P4[6]	1.8 V
SMIF1_DATA7	P4[7]	1.8 V
SMIF1_RWDS	SMIF1_RWDS	1.8V
SMIF1_CLKP	SMIF1_CLK_P	1.8 V
SMIF1_CLKN	SMIF1_CLK_N	1.8 V
SMIF1_CS	P0[1]	1.8 V
MEMORY_RST	P0[0]	1.8V

3 Hardware

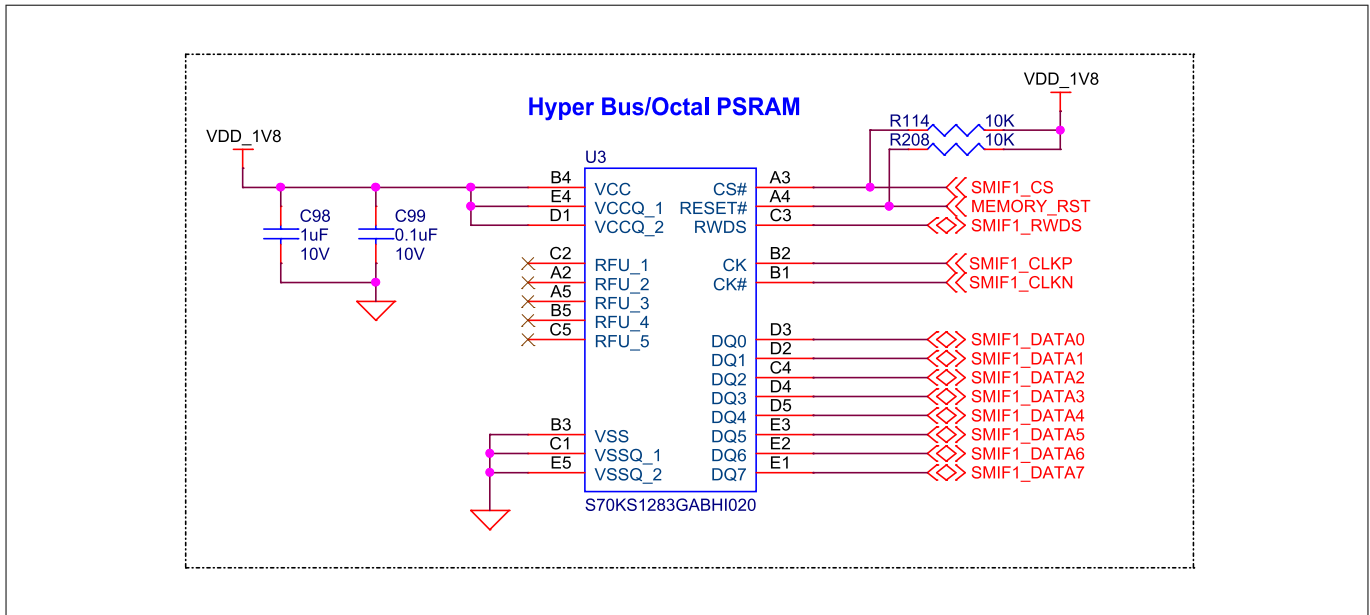


Figure 28 Schematic of PSRAM memory Octal/Hyper-bus interface

3.2.3.6 PSOC™ Edge E84 MCU USB interface

The PSOC™ Edge E84 AI Evaluation Kit consists of a Type-C USB connector (**J2**) for the PSOC™ Edge E84 MCU supporting both device and host mode, which can also be used as a power source for the board, as mentioned in section *Power inputs and over voltage protection*. The USB lines are connected to the PSOC™ Edge E84 MCU through an ESD protection (**U30**). A USB-C DRP controller is used to switch power paths to power up board when connected to a USB host and to feed the power when an USB device is connected to **J2**.

**Note:** When USB device is connected to **J2**, the maximum load current that can be supported for the USB device is limited to **500mA**.

Table 10 PSOC™ Edge E84 USB interface pin assignments

Signal name	PSOC™ Edge E84 MCU I/O	Description
PE84_USB_DP	USBDP	USB Data signals
PE84_USB_DM	USBDM	USB Data signals
PE84_USB_ID	P7[1]	USB Host/Device identification
PE84_USB_CF	P8[3]	Over current fault signal
PE84_USB_DIR	P7[3]	identification signal for detection of USB-C plug orientation
PE84_USB_OUT1, PE84_USB_OUT2	P7[5], P7[6]	when MCU is configured in device, these signals are used to detect the USB-C DFP current mode

3 Hardware

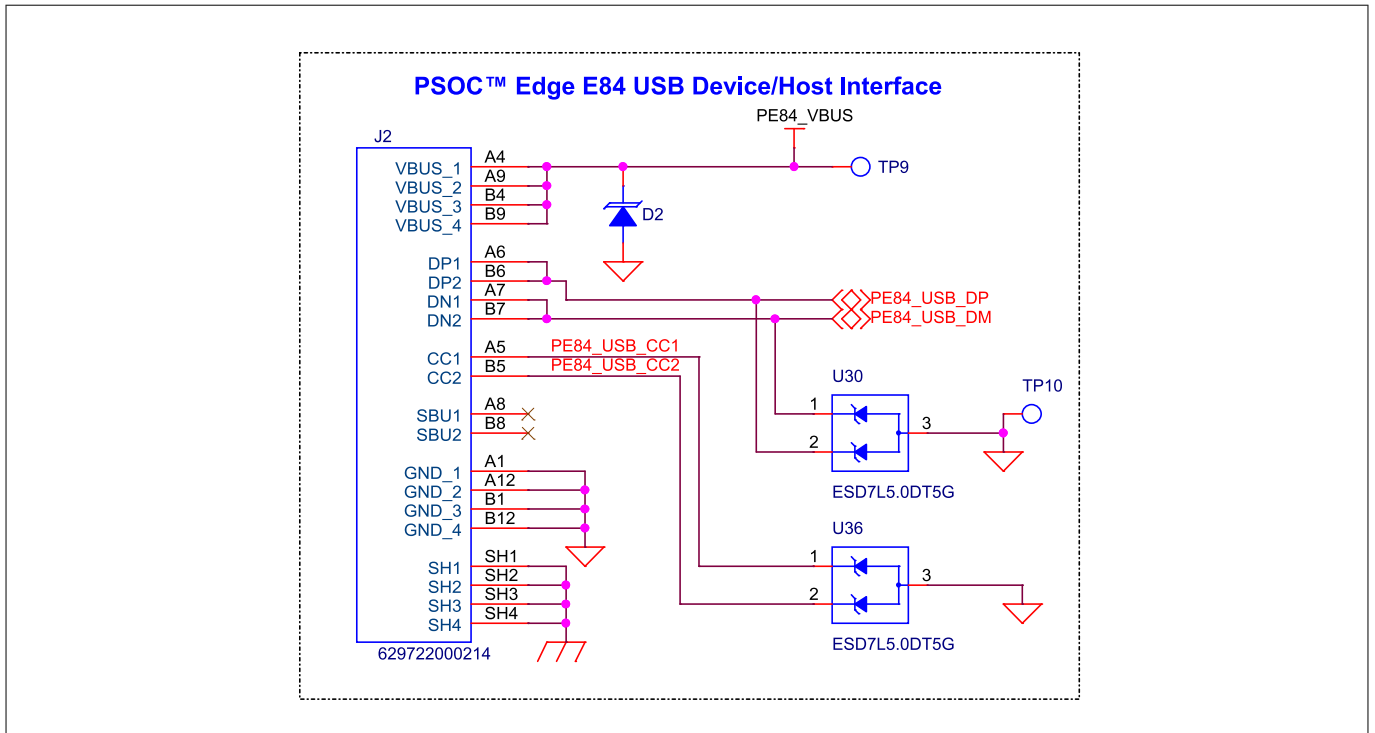


Figure 29 Schematic for PSOC™ Edge E84 USB host/device interface and power supply

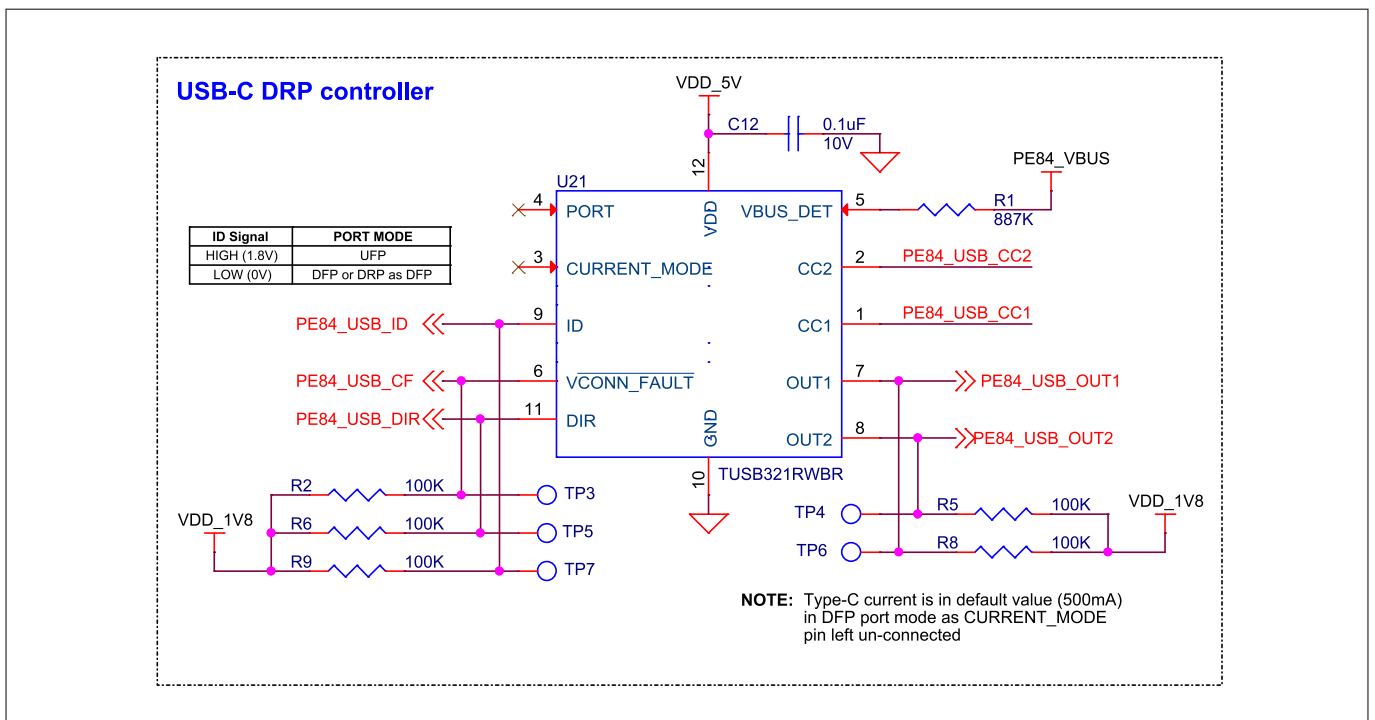


Figure 30 Schematic for USB-C DRP controller

There are 2 LED's (**D11**, **D14**) which indicate the status of the PSOC™ Edge E84 USB connected to a device or host. LED **D11** will be turned ON when this USB-C is configured as host (DFP mode), **D12** will be on when configured as device (UFP mode).

3 Hardware

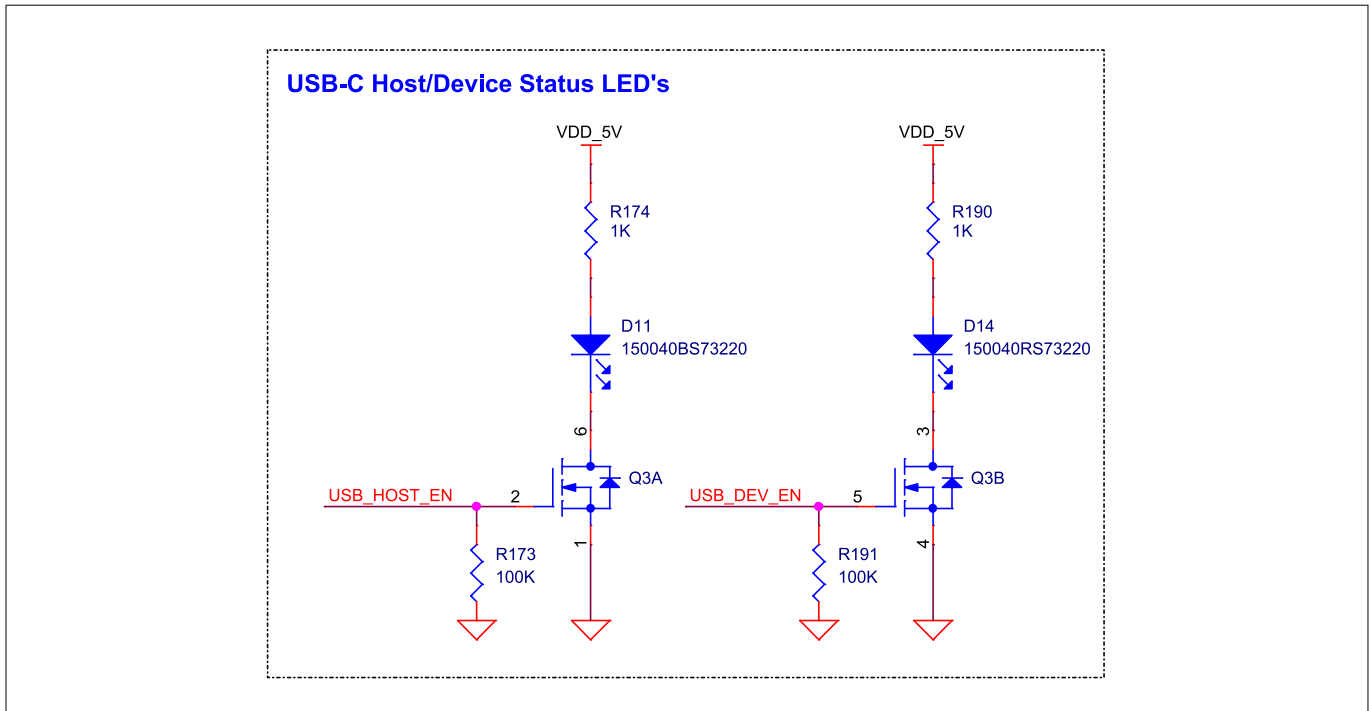


Figure 31 Schematic for USB-C Host/Device status LED's

3.2.3.7 PSOC™ Edge E84 MCU MIPI DSI interface

The kit has an on board MIPI-DSI display interface that supports a two-lane protocol that can go up to 1.5 Gbps speed per data lane. There is a Raspberry pi display compatible connector supporting MIPI-DSI interface (J10). For few of the display a separate power, and touch controller interface is provided, in such cases connector J10 can be used for the display driver interface and J16 for the capacitive touch driver interface.

**Note:** J16 is not populated by default, if using the display which needs external power and touch controller interface consider of populating J16.

The MIPI-DSI Raspberry-Pi Interface (J10) supports a wide range of standard Raspberry-Pi displays. The list of supported/recommended displays is mentioned in Table 11.

Table 11 Supported displays

Display Type	Display Name/MPN (MFR)	Supported Through
Raspberry-Pi compatible display <sup>1)</sup>	2.8 inch MIPI-DSI 480×6400 Capacitive Touch Display (Waveshare)	J10
	4 inch MIPI-DSI 800×480 Capacitive Touch Display (Waveshare)	J10
	4.3 inch MIPI-DSI 800×480 Capacitive Touch Display (Waveshare)	J10
	5 inch MIPI-DSI 800×480 Capacitive Touch Display (Waveshare)	J10
	7 inch MIPI-DSI 800×480 Capacitive Touch Display (Waveshare)	J10, J16

(table continues...)

3 Hardware

Table 11 (continued) Supported displays

Display Type	Display Name/MPN (MFR)	Supported Through
	7 inch MIPI-DSI 1024×600 IPS Capacitive Touch Display (Waveshare)	<b>J10, J16</b>

1) May support any other R-Pi-compatible display that complies with the standard 15-pin R-Pi pin out.

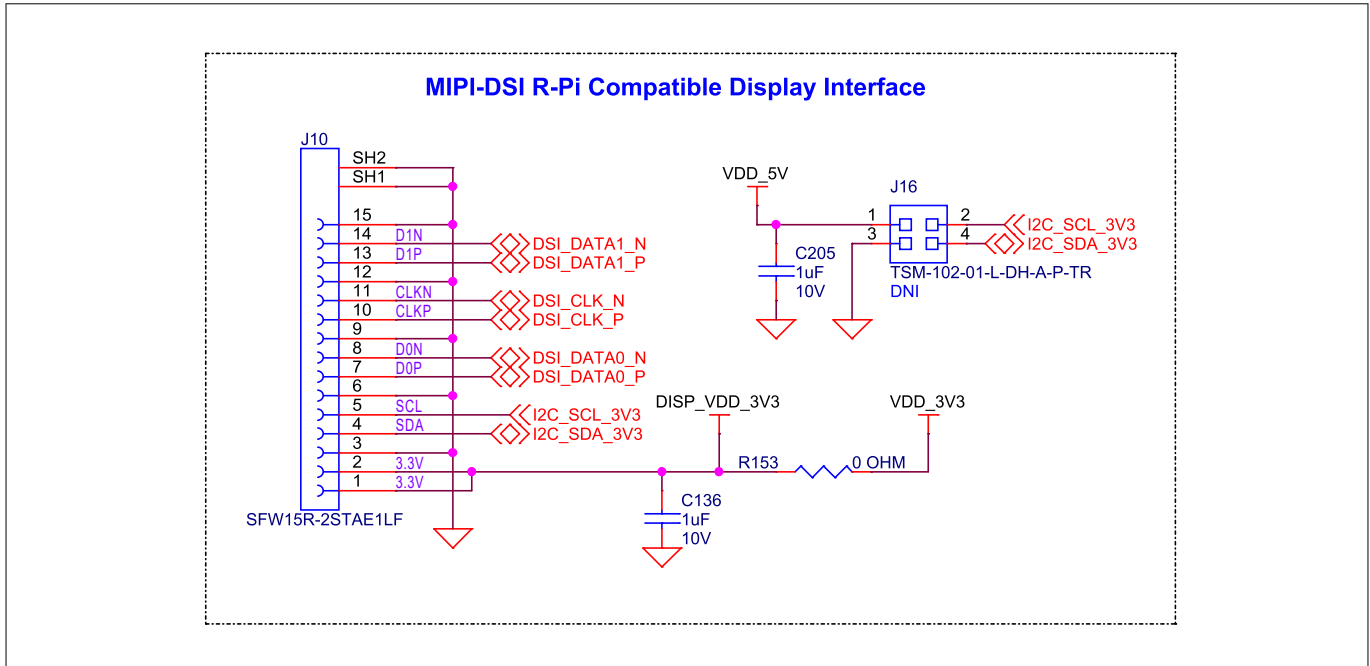


Figure 32 Schematic of MIPI-DSI interface

3.2.4 Sensor sub system

3.2.4.1 XENSIV™ Sensor subsystem

3.2.4.1.1 XENSIV™ digital barometric pressure sensor

The PSOC™ Edge E84 AI Kit contains Infineon's digital barometric pressure sensor (U6) **DPS368XTSA1**. The sensor uses an I2C interface to communicate, along with an interrupt signal, **PSEN\_INT**. The default I2C address is **0x77**. To change the address to **0x76**, populate **R84**.

Table 12 Pin assignment for digital XENSIV™ barometric pressure sensor interface signals

Signal name	PSOC™ Edge E84 I/O	Logic level
I2C_SDA_1V8	P8[1]	1.8 V
I2C_SCL_1V8	P8[0]	1.8 V
PSEN_INT	P11[3]	1.8 V

3 Hardware

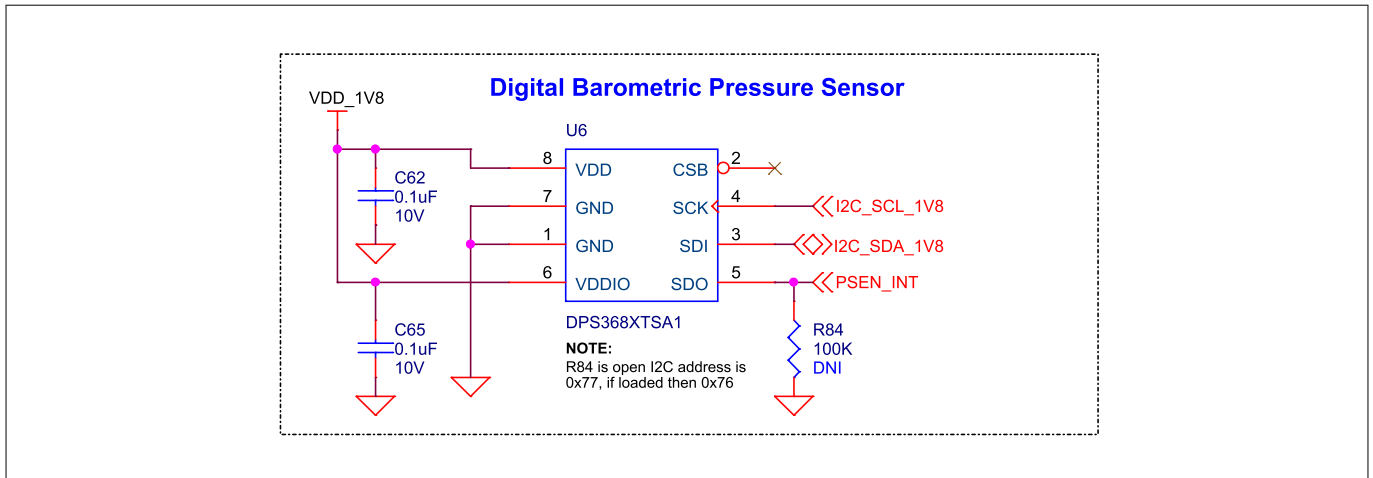


Figure 33 Schematic of digital XENSIV™ barometric pressure sensor interface

3.2.4.1.2 XENSIV™ MEMS digital microphones

The PSOC™ Edge E84 AI Kit contains Infineon's two digital PDM MEMS microphones (**U7**, **U8**) **IM73D122V01XTMA1** which share the same PDM bus.

Each PDM microphone has a SELECT pin. If this pin is connected to GND, the PDM data is available on the falling edge of the PDM clock. If this pin is connected to VDD, the PDM data is available on the rising edge of the PDM clock.

The left PDM microphone (**U8**) data is available on the falling edge of the PDM\_CLK, as the SELECT pin is tied to GND. The right PDM microphone (**U7**) data is available on the rising edge of the **PDM\_CLK**, as the **SELECT** pin is tied to VDD\_1V8. The microphones are placed ~27 mm apart and are supplied from a 1.8 V (VDD\_1V8) rail.

Table 13 Pin assignment of microphones PDM interface

Signal name	PSOC™ Edge E84 I/O	Logic level
PDM_CLK	P8[5]	1.8 V
PDM_DATA	P8[6]	1.8 V

3 Hardware

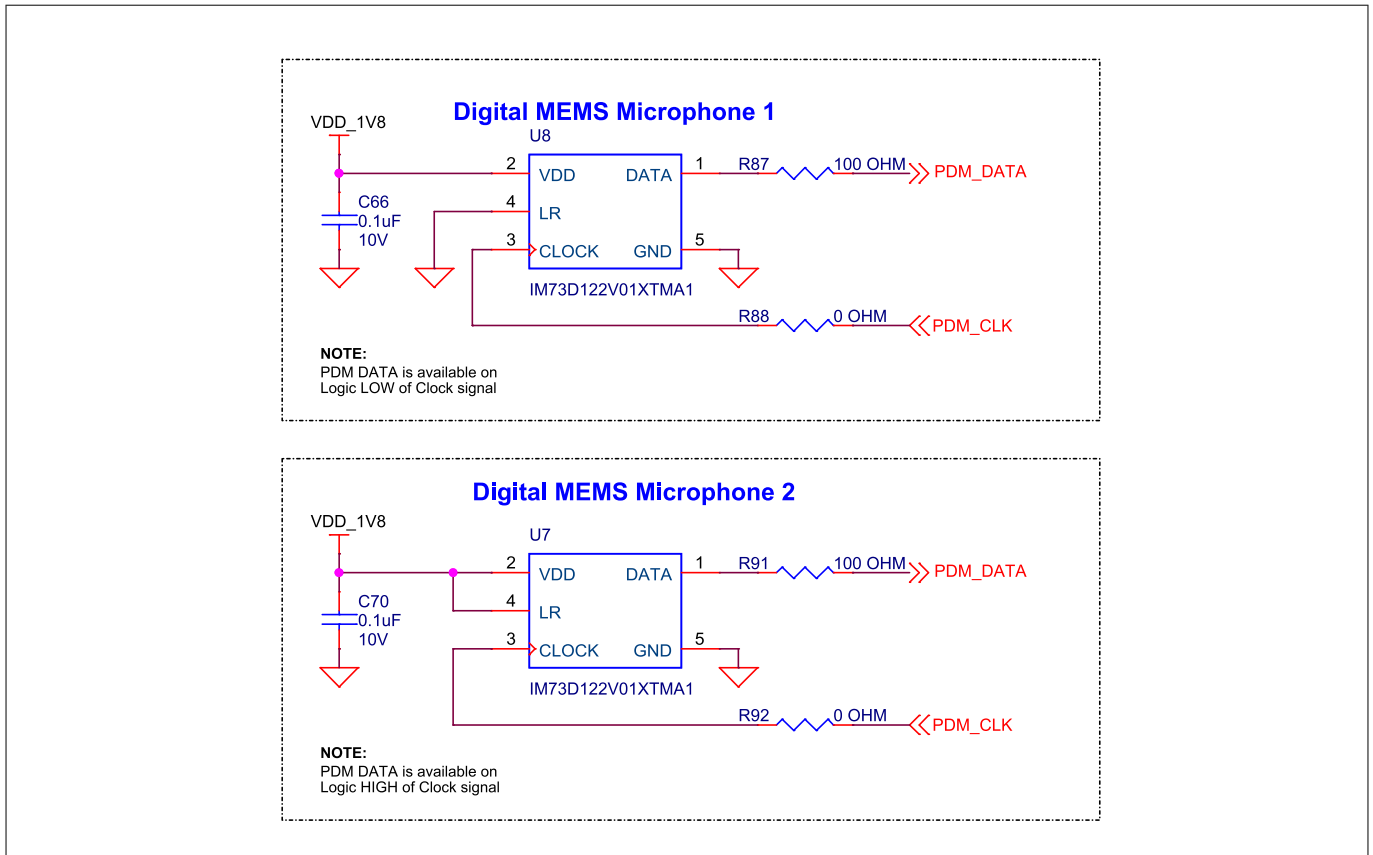


Figure 34 Schematic of digital microphones interface

3.2.4.1.3 XENSIV™ MEMS analog microphones

The PSOC™ Edge E84 AI kit contains two analog XENSIV™ MEMS microphones (**U9, U10**) IM73A135V01XTSA1 from Infineon Technologies which are designed for high SNR (low self-noise) and low distortion (high AOP) applications. **U10** is the left channel microphone and **U9** being the right channel, placed ~32 mm apart from each other. Both microphones are supplied from 1.8 V (VCC\_1V8) rail.

Table 14 Analog microphone signal pin assignment

Signal name	PSOC™ Edge E84 I/O
AMIC1_CTB_INP	P14[0]
AMIC1_CTB_INN	P14[1]
AMIC1_CTB_OUT	P14[2]
AMIC1_CTB_REF	P14[6]
AMIC2_CTB_INP	P14[4]
AMIC2_CTB_INN	P14[5]
AMIC2_CTB_OUT	P14[3]
AMIC2_CTB_REF	P14[7]

3 Hardware

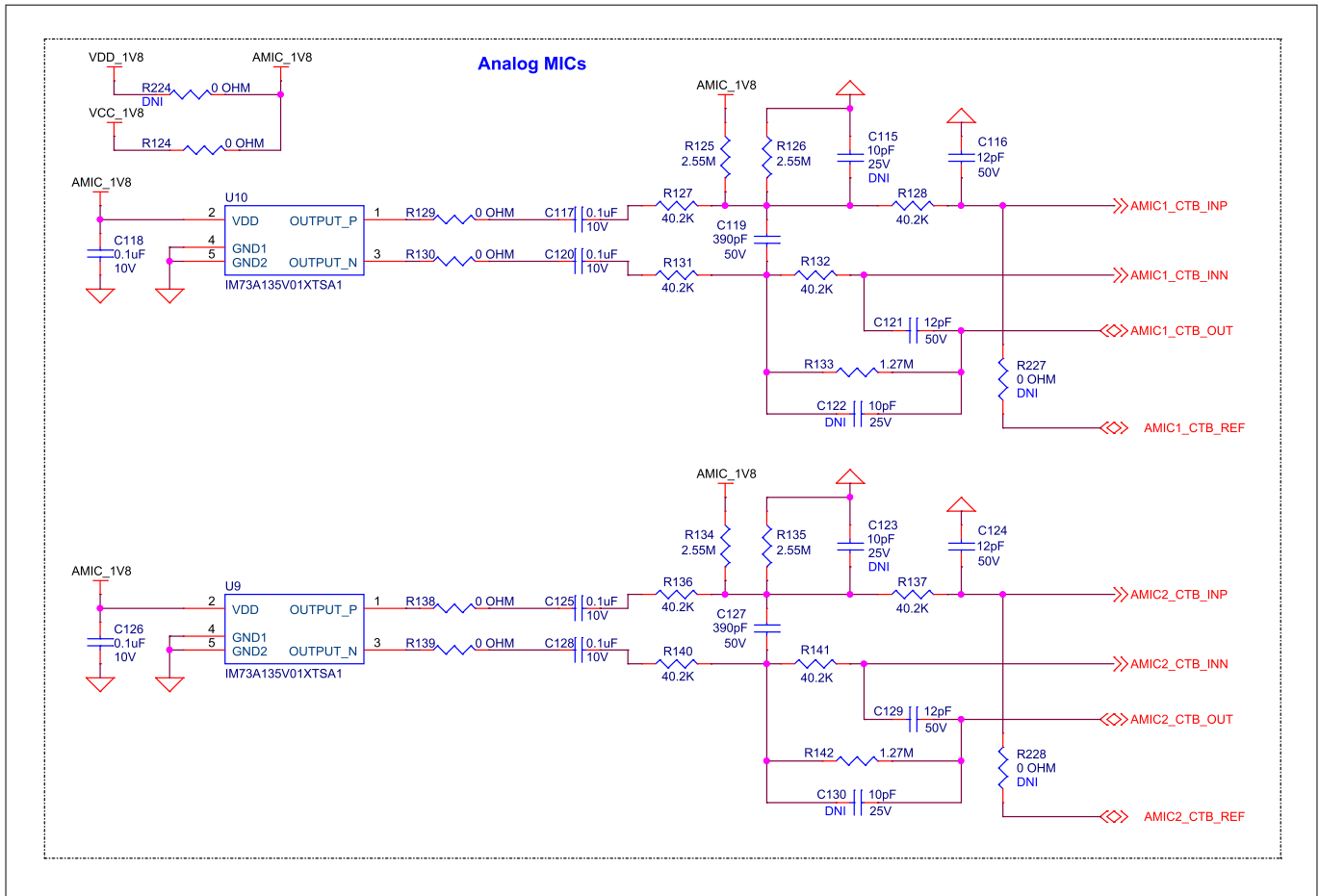


Figure 35 Schematic of analog microphones

3.2.4.1.4 XENSIV™ 60 GHz RADAR sensor

The PSOC™ Edge E84 AI Kit contains Infineon's XENSIV™ 60 GHz RADAR sensor (U5) BGT60TR13CE6327XUMA1. The BGT60TR13C MMIC is a 60 GHz radar sensor with integrated antennas; one transmitting and three receiving antennas. The sensor incorporates an L-shaped antenna array, ensuring both horizontal and vertical angular measurements. This sensor comes with an Antennas in Package (AIP) concept, which eliminates the antenna design complexity at the user end, and the PCB can be designed with standard FR4 materials. For more details, see the [RADAR sensor webpage](#). The RADAR sensor uses an SPI interface to communicate, along with an interrupt signal (RSPI\_IRQ) and reset signal (RXRES\_L).

Table 15 Pin assignment details for RADAR sensor interface

Signal name	PSOC™ Edge E84 IO	Logic level
RSPI_CS	P21[7]	1.8 V
RSPI_CLK	P21[6]	1.8 V
RSPI_MOSI	P21[5]	1.8 V
RSPI_MISO	P21[4]	1.8 V
RSPI_IRQ	P20[3]	1.8 V
RXRES_L	P20[7]	1.8 V

3 Hardware

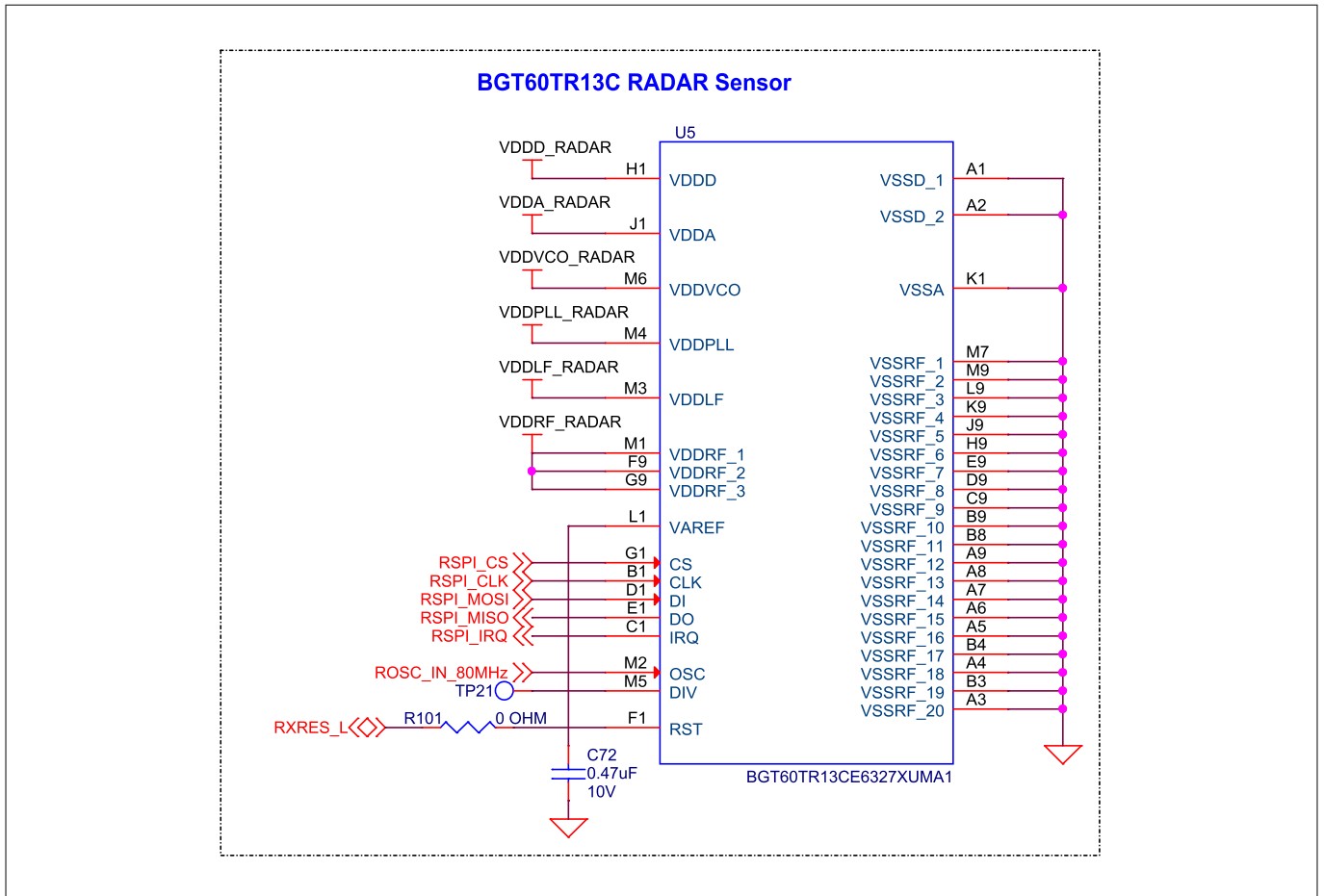


Figure 36 Schematic of RADAR sensor interface

The RADAR sensor uses power supply filters, including ferrite beads and various capacitors, as shown in the following figure.

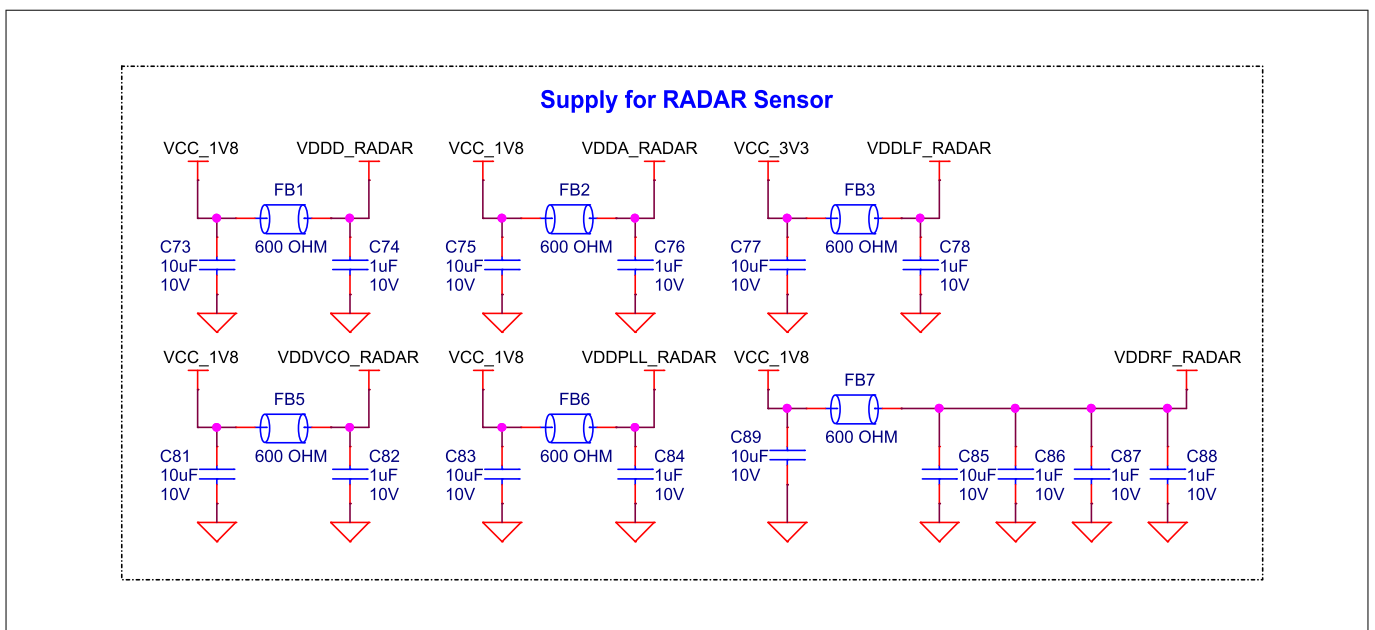


Figure 37 Schematic RADAR sensor power supply filtering

3 Hardware

The following figure shows how an onboard crystal oscillator (U24) feeds 80 MHz clock input to the RADAR sensor.

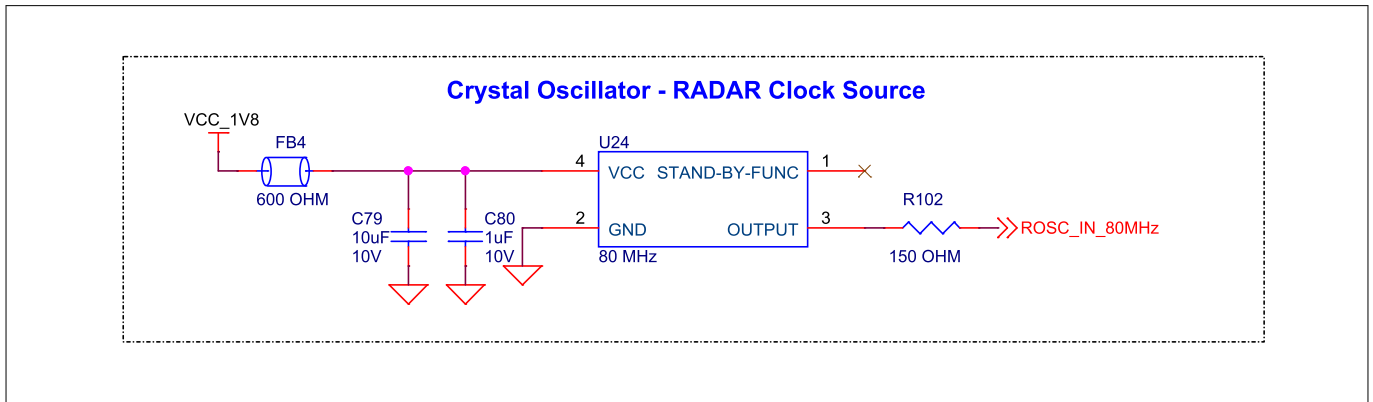


Figure 38 Schematic of crystal oscillator for RADAR sensor clock input

3.2.4.2 6-axis IMU

6-axis IMU (accelerometer + gyroscope) for acceleration and gyroscopic angular rate sensing in each spatial direction.

This kit contains a 6-axis motion sensor (U18), also known as the inertial measurement unit (IMU), which provides precise 3-axis acceleration and 3-axis gyroscopic angular rate data in each spatial direction. The sensor uses an I2C interface to communicate, along with two interrupt signals, which are connected to the IMU\_INT1 and IMU\_INT2 pins of the sensor to the PSOC™ Edge E84 MCU by default. The default I2C secondary address is 0x68 (also configurable to 0x69 by removing R86 and populating R85).

Table 16 Pin assignment for 6-axis IMU interface signals

Signal name	PSOC™ Edge E84 I/O	Logic level
I2C_SDA_1V8	P8[1]	1.8 V
I2C_SCL_1V8	P8[0]	1.8 V
IMU_INT1	P7[7]	1.8 V
IMU_INT2	P6[6]	1.8 V

3 Hardware

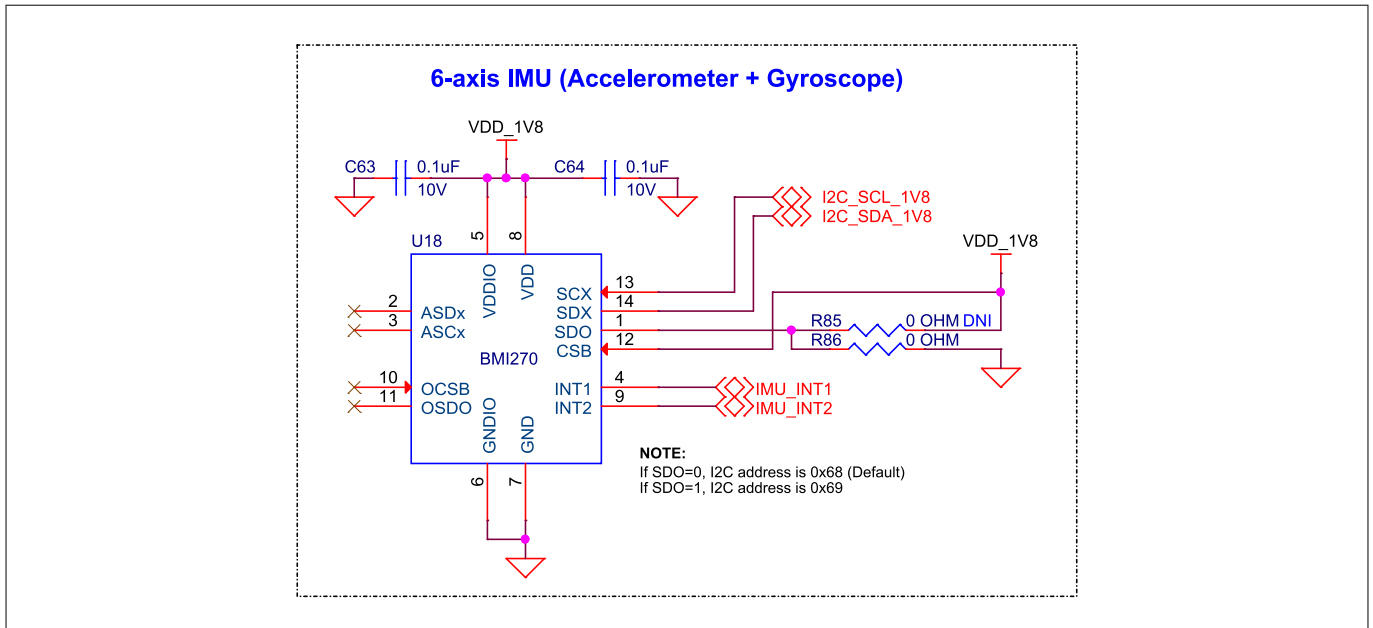


Figure 39 Schematic of 6-axis IMU (accelerometer + gyroscope)

3.2.4.3 3-axis Geo-magnetic sensor

This kit contains a 3-axis magnetometer sensor (U20), which is for sensing the direction and strength of the geomagnetic field. The sensor uses an I3C interface to communicate with PSOC™ Edge E84 device, along with an interrupt signal **MAG\_INT** by default. The I3C address is configured to **0x15**. This sensor interface can be configured to I2C by rework of resistor **R220** and **R223**.

Table 17 Pin assignment for 3-axis magnetometer interface signals

Signal name	PSOC™ Edge E84 I/O	Logic level
I3C_SDA	P3[1]	1.8 V
I3C_SCL	P3[0]	1.8 V
MAG_INT	P6[4]	1.8 V

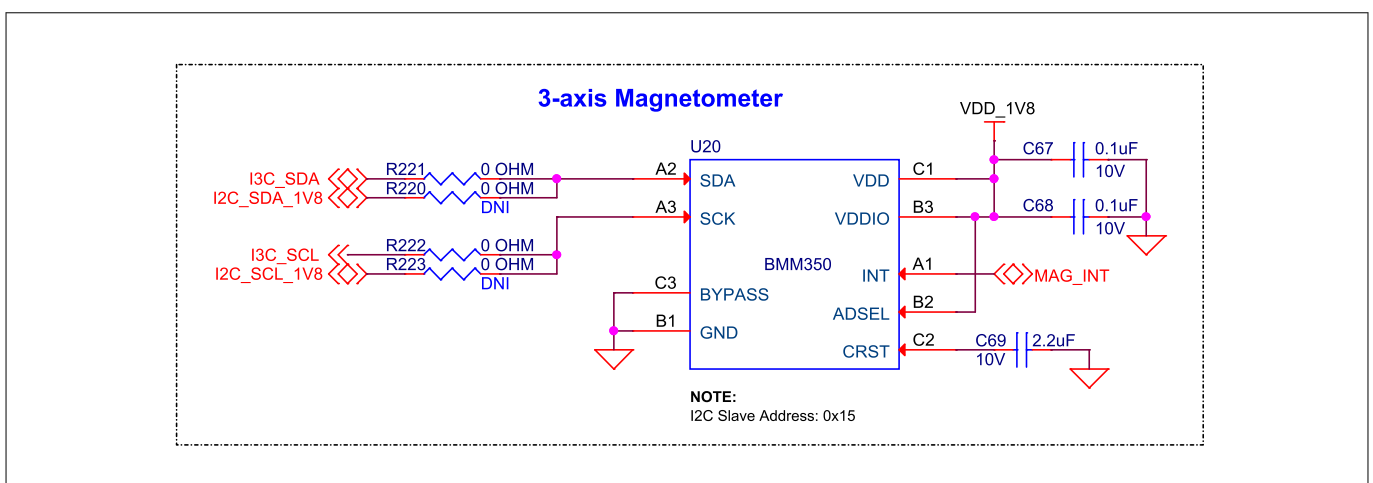


Figure 40 Schematic of a 3-axis magnetometer

3 Hardware

3.2.4.4 Digital Humidity sensor

This kit features a digital humidity sensor SHT40 (U22), which comes equipped with a built-in temperature sensor. This sensor communicates with the PSOC™ Edge E84 MCU via the I<sup>2</sup>C interface. The default I2C address for this sensor is 0x44. This sensor is powered with 1.8 V supply from the rail VDD\_1V8.

Table 18 Pin assignment for digital humidity sensor interface signals

Signal name	PSOC™ Edge E84 I/O	Logic level
I2C_SDA_1V8	P8[1]	1.8 V
I2C_SCL_1V8	P8[0]	1.8 V

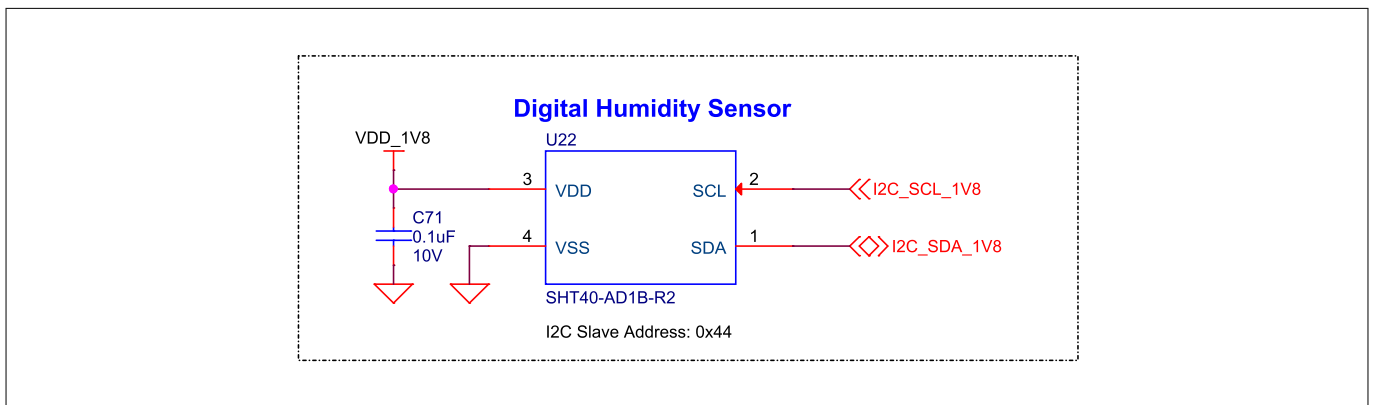


Figure 41 Schematic of the digital humidity sensor interface

3.2.5 Reset and user buttons

This Kit contains one reset button (SW2) for resetting the PSOC™ Edge E84 MCU. When this SW2 button is pressed, the PE84\_RST\_L line of the PSOC™ Edge E84 MCU is pulled to the ground, which in turn resets the target device. The 4.7K pull-up resistor on the PE84\_RST\_L is populated on the kit.

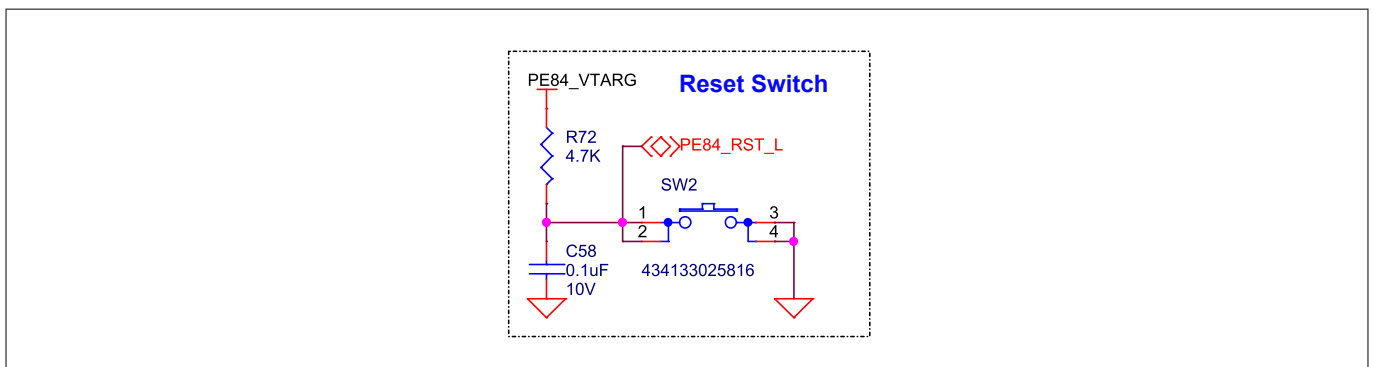


Figure 42 Schematic for Reset button interface

The board features a user button SW1, which serves as a general user input or for controlling different application states. The PSOC™ Edge E84 MCU pin P7[0] connected to user button SW1 is pulled to the ground through a 1K resistor when this button is pressed.

3 Hardware

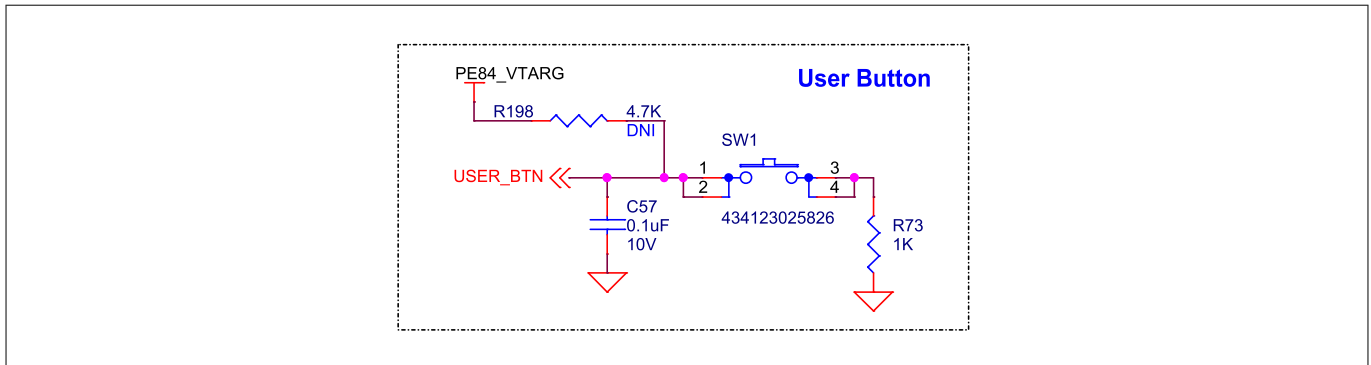


Figure 43 Schematic for User button interface

3.2.6 User LED's and Power LED's

The kit contains two discrete user LEDs: **LED1** (GREEN), **LED2** (BLUE), one user RGB LED (**LED3**) and a power LED **LED5** (AMBER) for indication.

The power LED (**LED5**) indicates that the board is powered from either the on board KitProg3 Type-C USB connector (**J1**), PSOC™ Edge E84 Type-C USB connector (**J2**), or external power/battery input connector (**J3**).

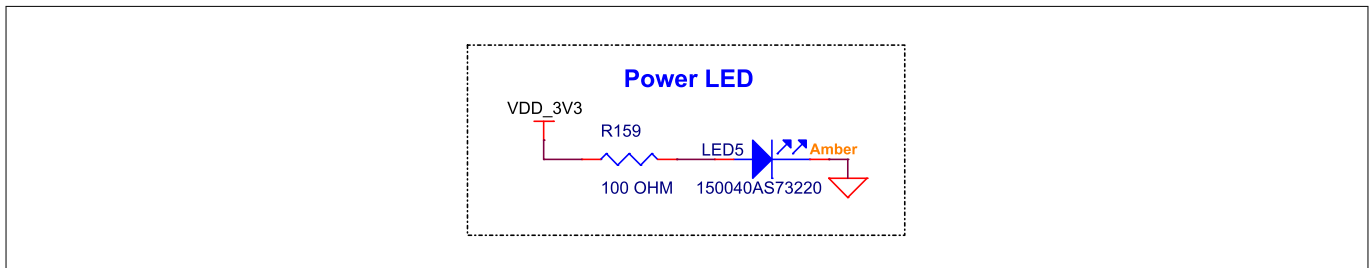


Figure 44 Schematic for power LED

The user LED's (**LED1** and **LED2**) and user RGB LED (**LED3**) are connected to I/O's of the PSOC™ Edge E84 MCU, respectively. The user LED's are active HIGH, so the pins must be driven HIGH to turn ON the LED's.

Table 19 Pin assignments for user LED's

Signal name	PSOC™ Edge E84 I/O	Logic level
USER_LED1	P10[7]	1.8 V
USER_LED2	P10[5]	1.8 V
USER_LED_RGB_R	P20[6]	1.8 V
USER_LED_RGB_G	P20[4]	1.8 V
USER_LED_RGB_B	P20[5]	1.8 V

3 Hardware

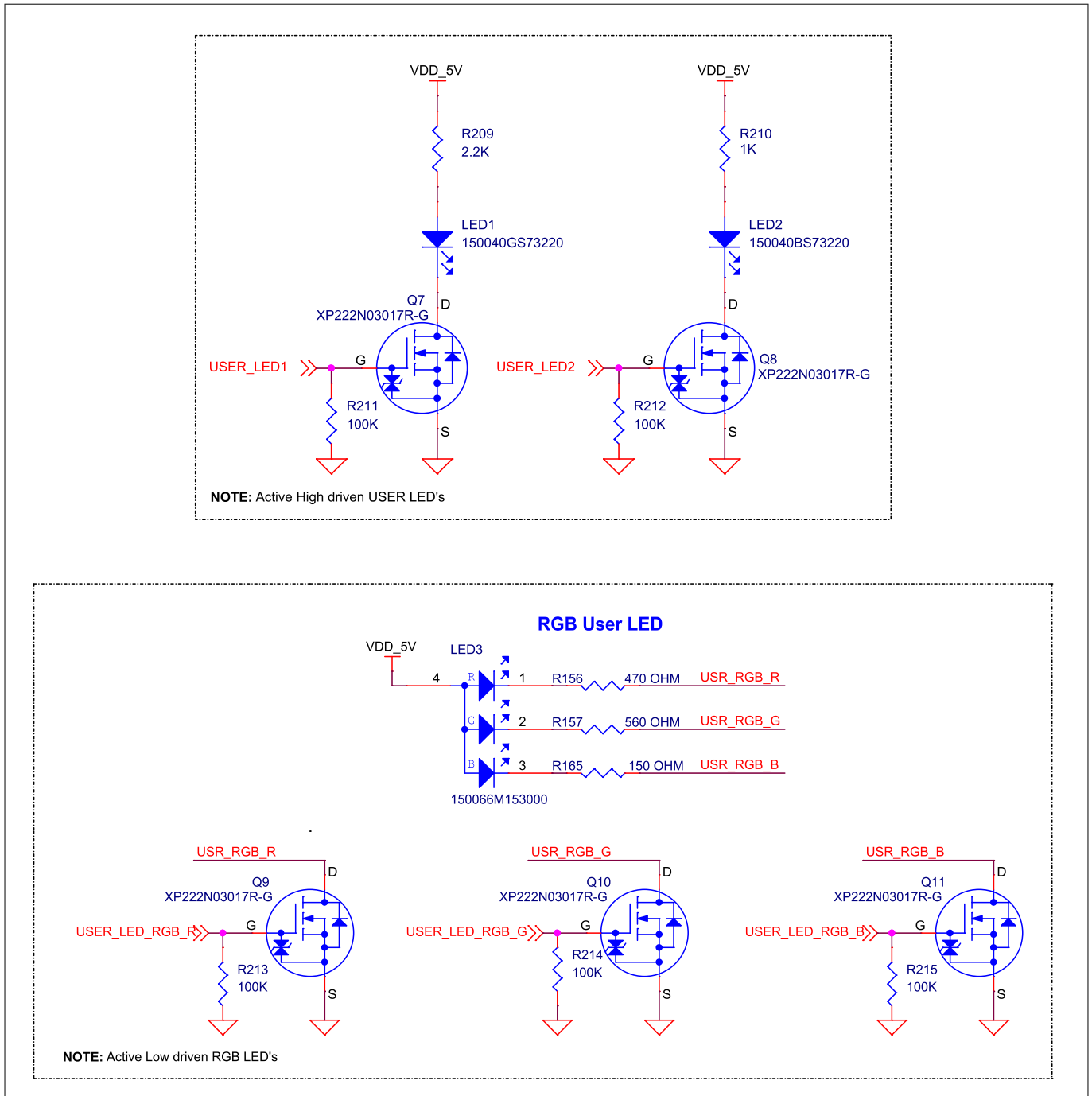


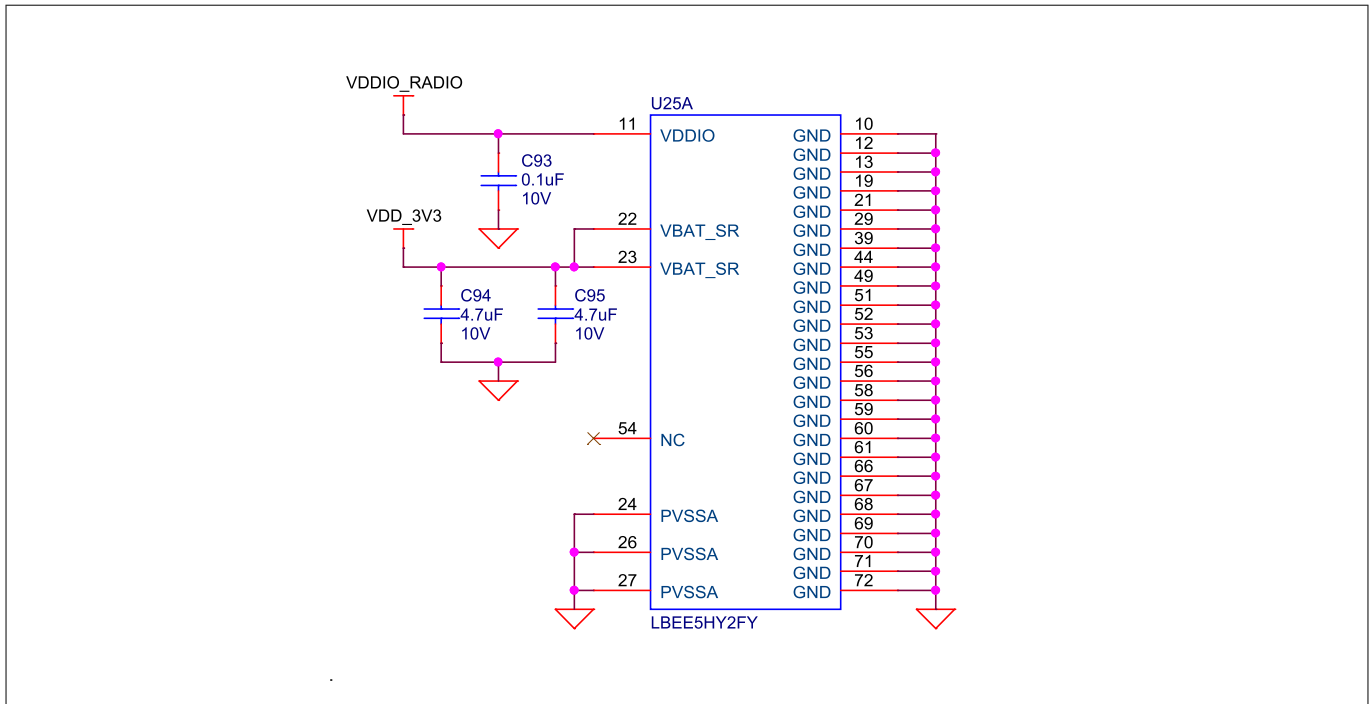
Figure 45 Schematic of user LED's

3.2.7 Wi-Fi® 6 & Bluetooth® LE 5.4 Dual-Radio module interface

The LBEE5HY2FY SiP (system-in-package) module (2FY module), powered by the Infineon CYW55513 chipset, is a dual-mode wireless solution that offers Wi-Fi® 802.11a/b/g/n/ac/ax + Bluetooth® 5.4 BR/EDR/LE up to 143Mbps PHY data rate on Wi-Fi, 3Mbps PHY data rate on Bluetooth and 2Mbps PHY data rate on Bluetooth® LE. The WLAN section supports SDIO 3.0 interface and the Bluetooth® section supports high-speed 4-wire UART interface. This module is designed for easy integration into various applications, providing reliable and high-speed wireless connectivity.

The 2FY module is powered with an external VBAT supply voltage of 3.3 V and an I/O's supply voltage of 1.8 V for interface IOs.

3 Hardware



**Figure 46 2FY module power supply schematic**

PSOC™ Edge E84 device communicates to 2FY module using a standard SDIO interface for WLAN and UART interface for Bluetooth® operation. PSOC™ Edge E84 device interface with 2FY module supports the following features.

**Table 20 PSOC™ Edge E84 and 2FY module interface details**

2FY module signal	PSOC™ Edge E84 MCU I/O	Description
BT_REG_ON	P11[0]	BT_REG_ON signal controlled by PSOC™ Edge E84 device I/O used to power up or power down the internal regulators used by the Bluetooth® section. Also, when deasserted, this pin holds the Bluetooth® section in reset.
WL_REG_ON	P11[4]	WL_REG_ON signal controlled by PSOC™ Edge E84 device I/O used to power up or power down the internal regulators used by the WLAN section. Also, when deasserted, this pin holds the WLAN section in reset.
WL_HOST_WAKE	P11[6]	Wi-Fi HOST_WAKE or general-purpose I/O signal
BT_HOST_WAKE	P10[4]	Bluetooth® HOST_WAKE or general-purpose I/O signal
BT_DEV_WAKE	P10[6]	DEV_WAKE or general-purpose I/O signal
SDIO_CLK	P12[0]	SDIO clock input
SDIO_CMD	P21[0]	SDIO command line
SDIO_DATA[0]	P12[1]	SDIO Data lines
SDIO_DATA[1]	P12[2]	SDIO Data lines
SDIO_DATA[2]	P12[4]	SDIO Data lines

(table continues...)

3 Hardware

Table 20 (continued) PSOC™ Edge E84 and 2FY module interface details

2FY module signal	PSOC™ Edge E84 MCU I/O	Description
SDIO_DATA[3]	P12[5]	SDIO Data lines
BT_UART_TXD	P10[0]	UART serial output. Serial data output for the HCI UART interface.
BT_UART_RXD	P10[1]	UART serial input. Serial data input for the HCI UART interface.
BT_UART_CTS	P10[3]	UART clear-to-send. Active-low clear-to-send signal for the HCI UART interface.
BT_UART_RTS	P10[2]	UART request-to-send. Active-low request to send signal for the HCI UART interface.

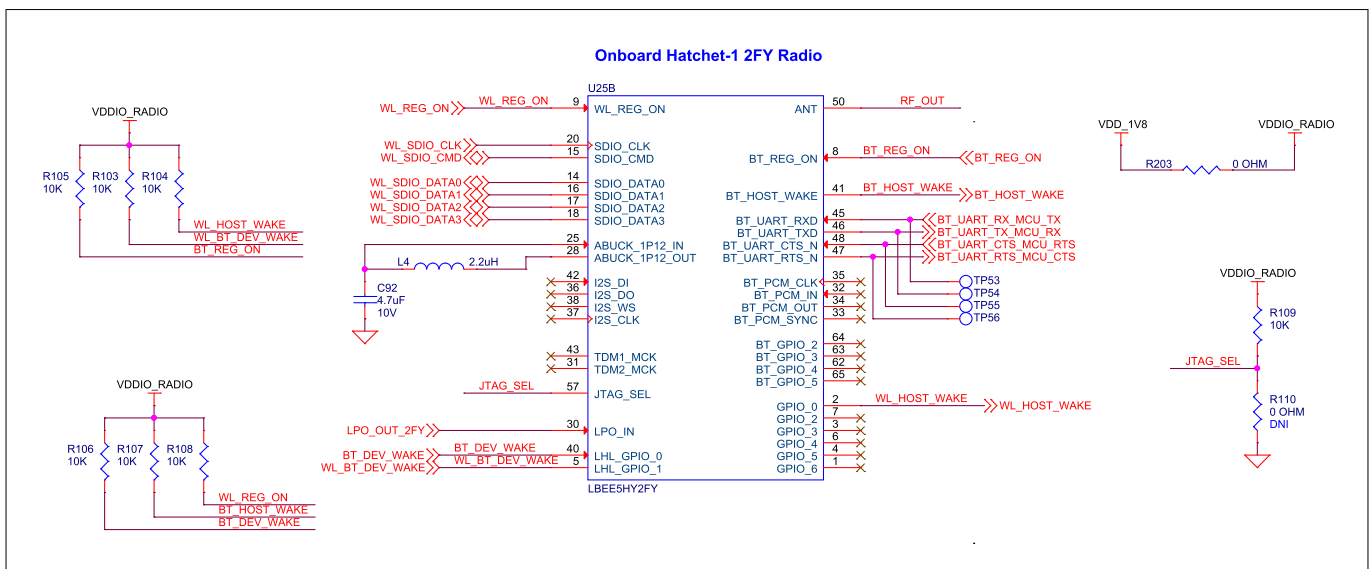


Figure 47 2FY module interface schematic

An on board oscillator (Y4) of 32.768 KHz is used to provide external clock input (LPO\_OUT\_2FY) to the 2FY module.

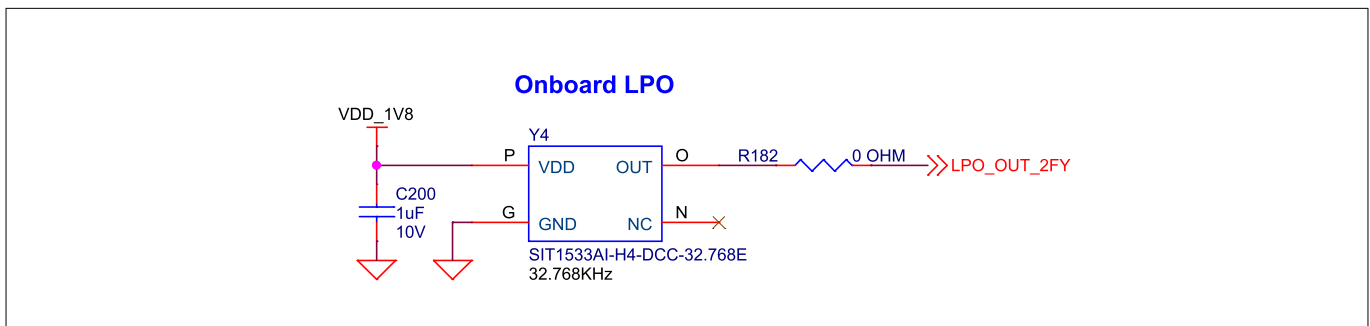


Figure 48 External LPO schematic

2FY module antenna output is connected to an on board chip antenna with a matching circuit, as shown in the following figure.

3 Hardware

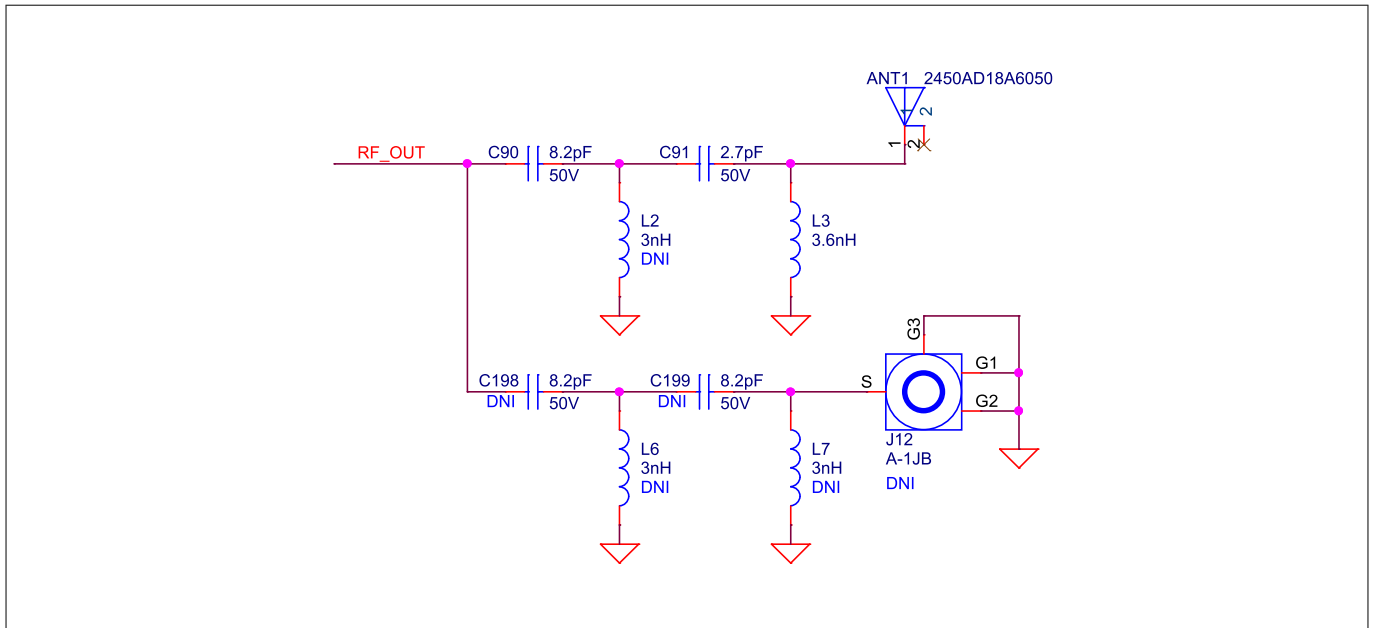


Figure 49 2FY module RF front-end schematic

3.2.8 I/O expansion header

3.2.8.1 Digital I/O interface header

There is a 100 mil pitch expansion headers (**J14**) which provide connectivity to a few of the PSOC™ Edge E84 MCU GPIOs compatible with 3.3 V I/O logic level.

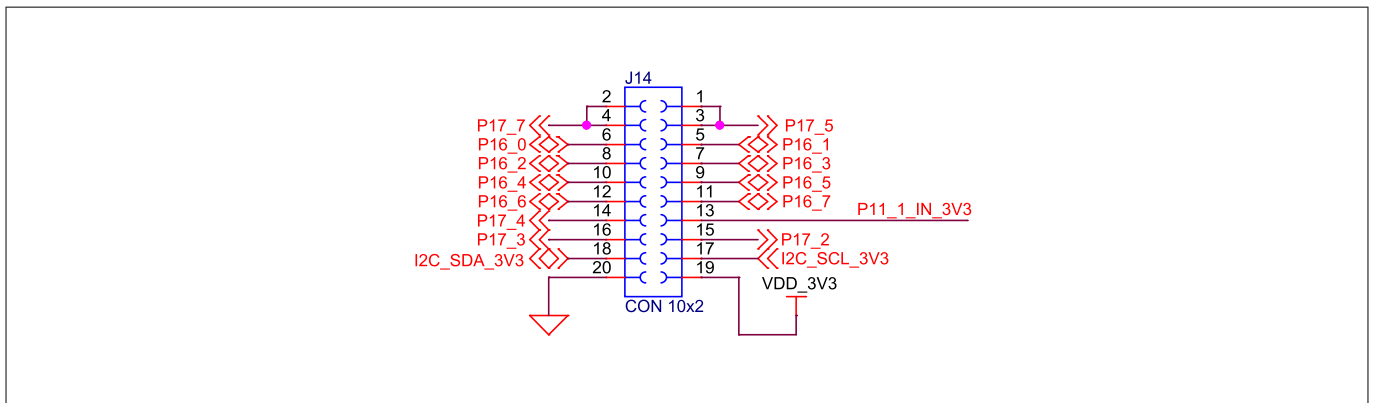


Figure 50 Schematic of the expansion header

**Note:** This digital I/O interface header has signal **P11\_1\_IN\_3V3** which supports only input functionality.

This header (**J14**) can be used to interface the OV7675 DVP camera module which is provided as part of the kit. A level translator circuit is used to convert the 3.3 V I/O logic level signal coming from the header (**J14**) pin number **13** connected to MCU I/O pin **P11[1]** to support the PCLK function of DVP camera module interface.

3 Hardware

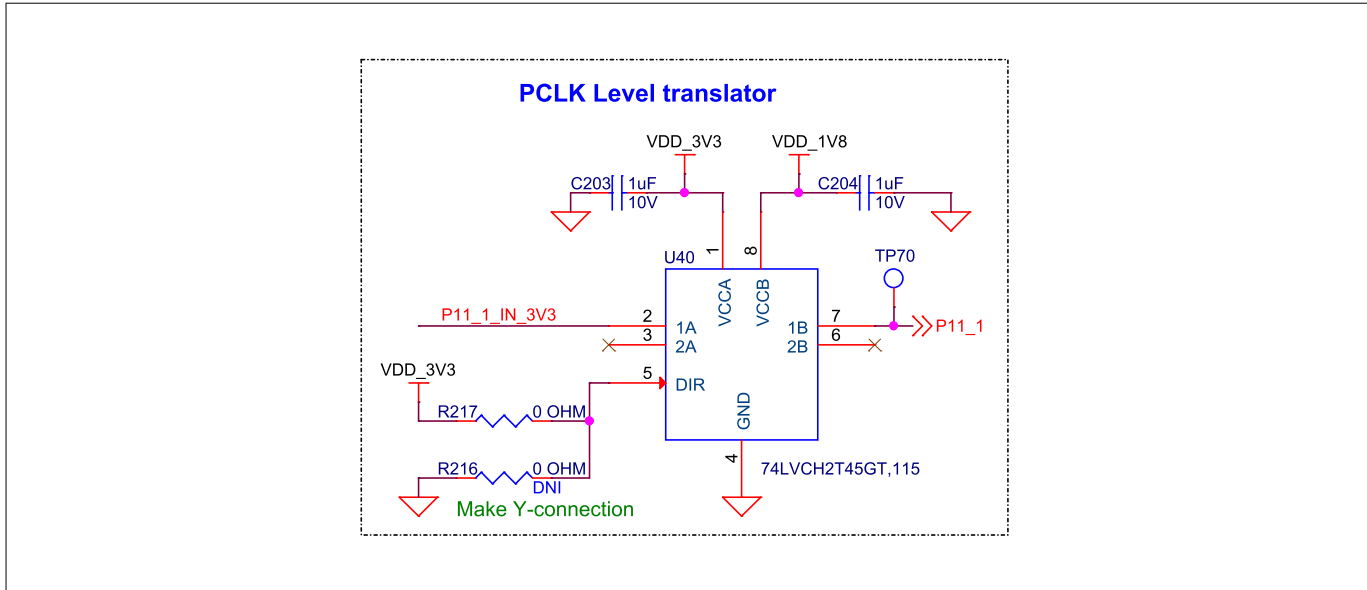


Figure 51 Schematic of the level translator



Figure 52 Connecting the DVP camera module to PSOC™ Edge E84 AI board

3.2.8.2 Analog I/O interface header

There is a 0.4mm pitch connector (J17) which provide connectivity to a few I/O's supporting analog functionality of the PSOC™ Edge E84 MCU GPIOs compatible with 1.8 V I/O logic level. By default this connector (J17) is not populated.

3 Hardware

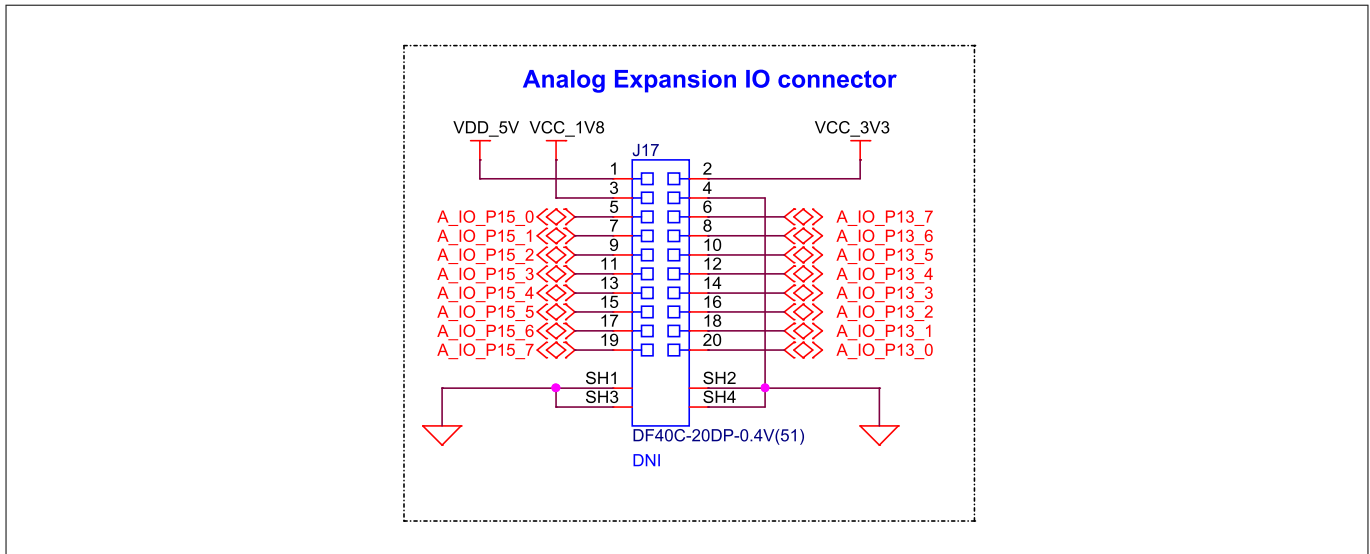


Figure 53 Schematic of the expansion header

3.2.8.3 Boot Options and Alternate serial interface header

There is a 1-bit boot configuration resistor provision (R187 and R188) that sets the boot location for the PSOC™ Edge E84 MCU. The resistor provision output is connected to the P17[6] pin of the PSOC™ Edge E84, whose state is read by the MCU, and based on that, the boot location is set. See Table 21 for the boot source options. By default, the resistor position is set to provide logic 1 (ON - R188 is populated).

Table 21 Boot configuration

Resistor Populated	Boot location
R187 Populated - logic level at P17[6] is 0 (OFF)	Internal RRAM
R188 Populated - logic level at P17[6] is 1 (ON, Default)	External FLASH (On board QSPI flash memory)

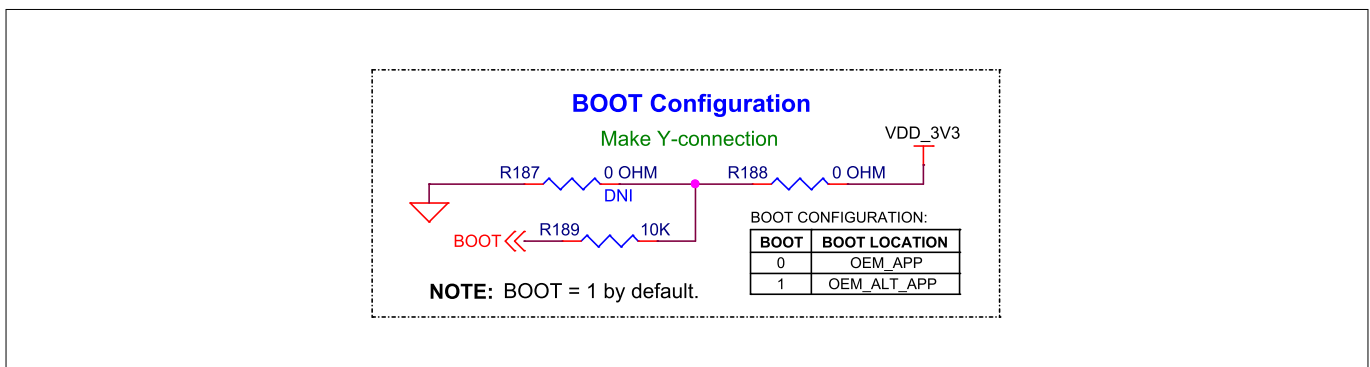


Figure 54 Schematic of boot configuration resistor provision

There is an 100mil pitch single row header (J5) which is used as GPIO interface by default. This header can also be used as alternate serial interface to program PSOC Edge E84 MCU by configuring the resistor provisions as show in the figure

3 Hardware

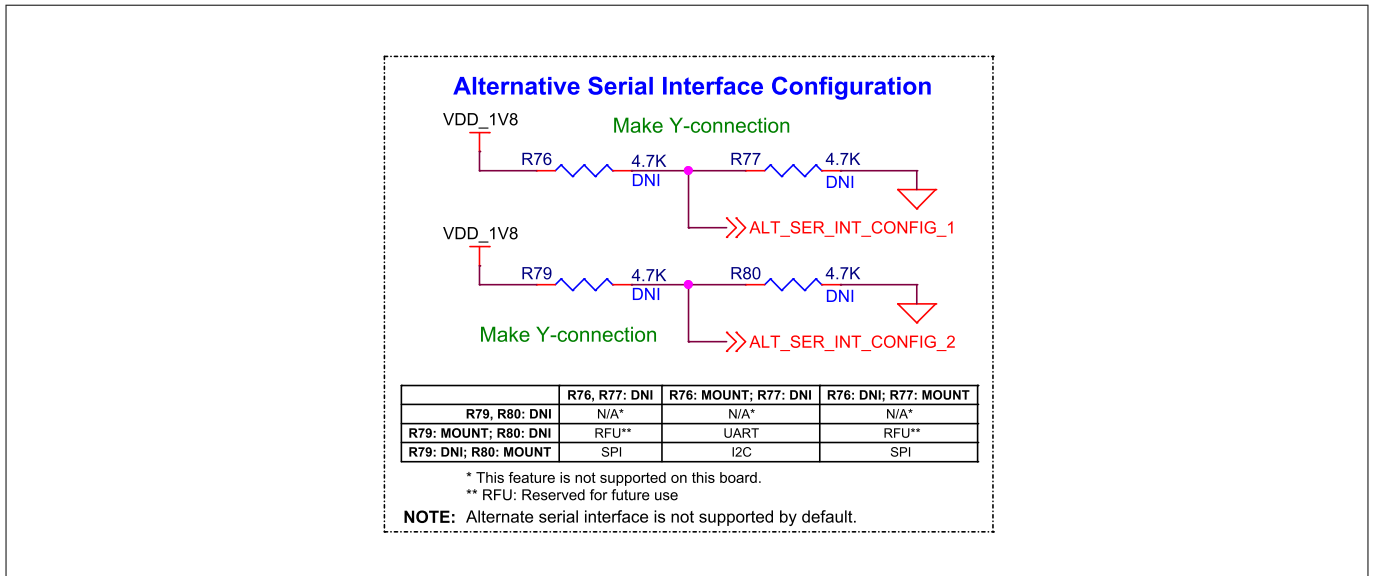


Figure 55 Schematic of Alternate serial interface configuration resistor provision

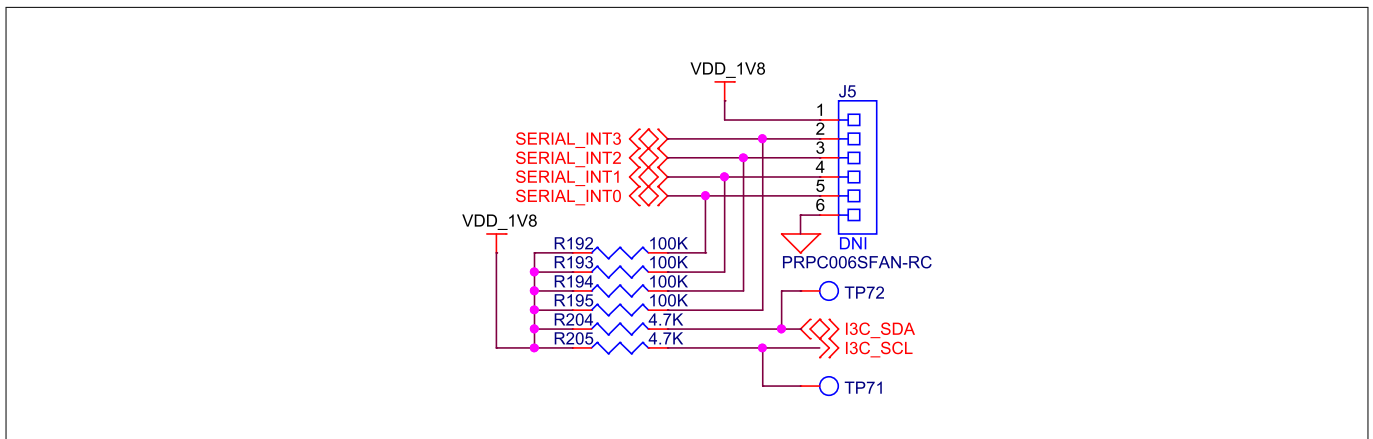


Figure 56 Schematic of Alternate serial interface header

3.2.8.4 I2C interface connector

The PSOC™ Edge E84 AI kit comes with a 4-pin connector (**J7**) designed to extend the I2C interface from the PSOC™ Edge E84 MCU. The extension capability is specifically for adding I2C-based add-on boards.

This interface connector is compatible with QWIIC connection system boards, a product of SparkFun. By using the 4-pin connector, you can attach the QWIIC boards to the PSOC™ Edge E84 MCU. This expands the functionality of the PSOC™ Edge E84 MCU, as it allows it to connect and interact with multiple system boards that support the QWIIC system.

**Note:** By default this header is not populated, to enable this interface **J7** connector has to be populated.

3 Hardware

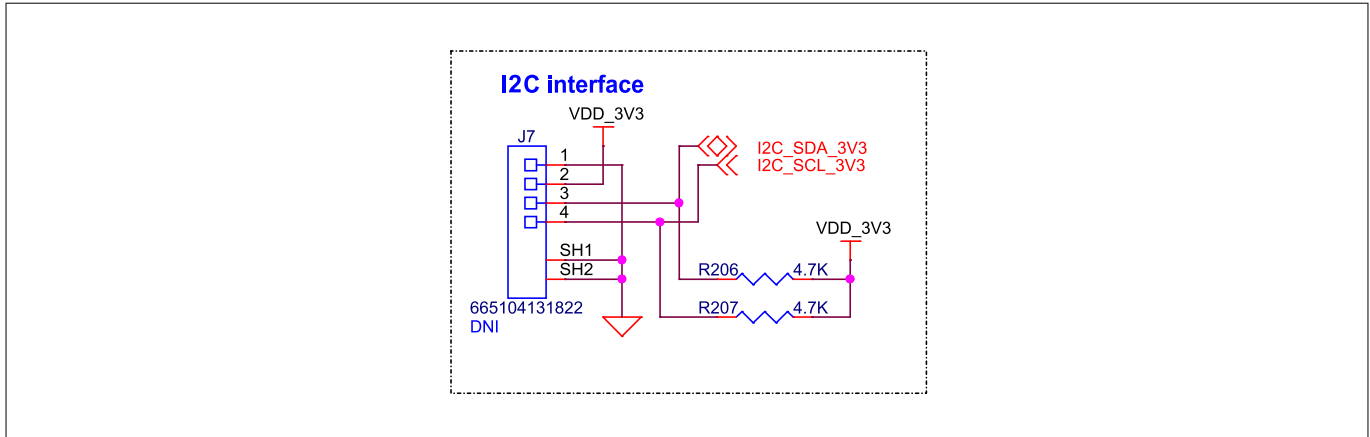


Figure 57 Schematic of I2C interface connector

Table 22 Pin assignment details of I2C interface connector

Pin details	PSOC™ Edge E84 I/O	Logic level
J7.3	P17[1] (I2C_SDA_3V3)	3.3 V
J7.4	P17[0] (I2C_SCL_3V3)	3.3 V

3.2.9 Audio Class-D amplifier

The kit contains an audio amplifier (U28), which is a low-power, highly integrated, high-performance stereo audio DAC with 24-bit stereo playback and digital audio processing blocks which supports of 8KHz to 192KHz sampling rates. It contains a Class-D BTL mono speaker driver and a Class A/B stereo headphone driver. The amplifier is connected to a 2pin connector (J8) which can drive upto 2.5 W mono speaker.

Additionally, there is a pair of test points (TP24, TP25) for analog input L/R channels which can be used as input for analog audio signal. The amplifier is interfaced with PSOC™ Edge E84 MCU on the EVK via an I2S interface for audio data communication and an I2C interface which provides control and full access on the registers and the state machines. The amplifier’s DVDD, IOVDD domains are supplied from 1.8 V (VDD\_1V8); AVDD, HPVDD domains are supplied from 3.3 V (VDD\_3V3) and SPKVDD domain from 5 V (VDD\_5V). The I2C device slave address is 0x18.

Table 23 Audio amplifier signal pin assignment

Signal name	PSOC™ Edge E84 I/O	Logic level
I2S_TX_MCK (I2S MCLK)	P21[3]	1.8 V
I2S_TX_SCK (I2S Clock)	P21[2]	1.8 V
I2S_TX_SD (I2S data input)	P21[1]	1.8 V
I2S_TX_FSYNC (I2S word select)	P12[3]	1.8 V

3 Hardware

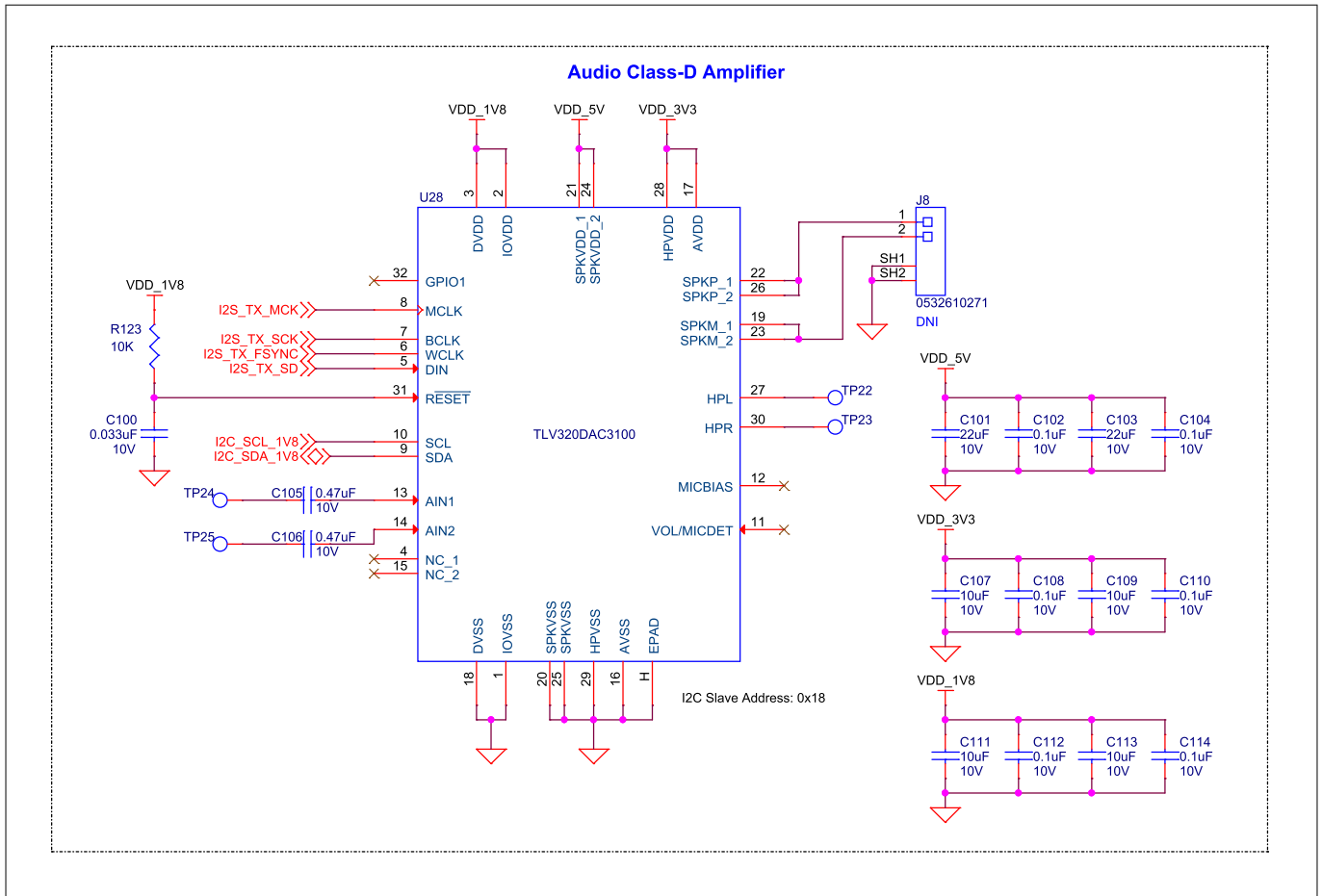


Figure 58 Schematic of audio class-D amplifier

3.3 KIT\_PSE84\_AI kit rework for evaluating additional features

3.3.1 Enabling the external programming/debugging interface

The default programming/debugging interface for the PSOC™ Edge E84 device is the on board KitProg3. A 10-pin header (J4) is provided on the kit to interface with an external programmer, such as MiniProg4. By populating the J4 header, MiniProg4 can be directly connected to the PSOC™ Edge E84 device.

Table 24 Rework components with reference and manufacturer details

Reference	Description	Manufacturer	Manufacturer part number
J4	CONN, HDR, MALE, DUAL, 10POS, 1.27 mm, GOLD, STR, SMD	Samtec	FTSH-105-01-L-DV-K-P-TR

Figure 59 shows the reworked schematic sections.

3 Hardware

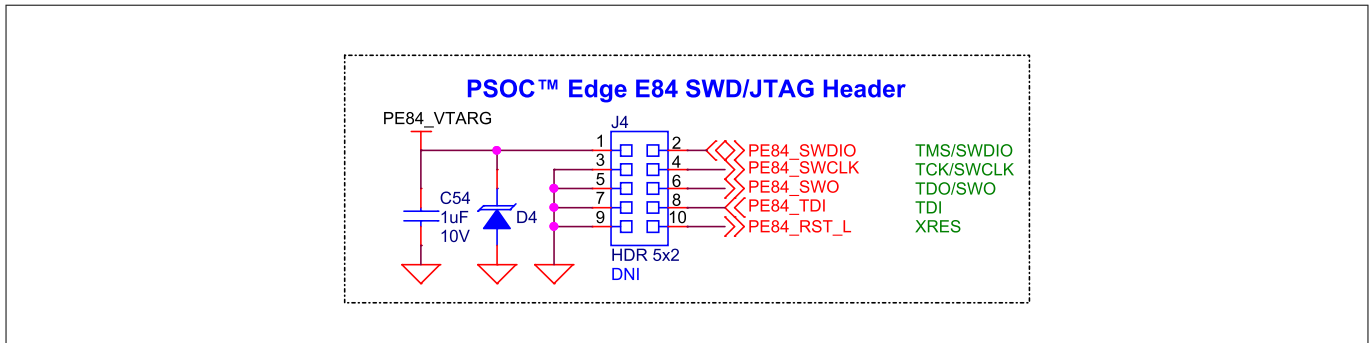


Figure 59 Schematic of rework regions to enable the external programming interface

Table 25 J4 header pin assignment for interfacing with MiniProg4

Pin details	Kit function	MiniProg4 interface function
J4.1	VTAR_REF, PSOC™ Edge E84 device voltage reference	VTARG, to sense the target MCU voltage
J4.2	P6[2], Port 6 Pin 2, is a GPIO of the PSOC™ Edge E84 device that supports the SWD interface and is connected to the target MCU via the SWDIO signal.	SWDIO, SWD data in/out interface with the target MCU
J4.3	GND, ground reference of prototyping board	GND, ground reference of MiniProg4
J4.4	P6[3], Port 6 Pin 3, is a GPIO of the PSOC™ Edge E84 device that supports the SWD interface and is connected to the target MCU via the SWDCLK signal.	SWDCLK, SWD clock interface with the target MCU
J4.5	GND, ground reference of the prototyping board	GND, ground reference of MiniProg4
J4.6	P6[0], Port 6 Pin 0, is a GPIO of the PSOC™ Edge E84 device that supports the SWD interface and is connected to the target MCU via the SWO signal. Also support TDO signal of JTAG interface.	SWO, serial wire output signal of SWD interface and TDO signal of JTAG interface with the target MCU
J4.7	GND, ground reference of the prototyping board	GND, ground reference of MiniProg4
J4.8	P6[1], Port 6 Pin 1, is a GPIO of the PSOC™ Edge E84 device that supports the JTAG interface and is connected to the target MCU via the TDI signal.	TDI signal of JTAG interface with the target MCU
J4.9	GND, ground reference of the prototyping board	GND, ground reference of MiniProg4
J4.10	XRES_L, reset signal for the PSOC™ Edge E84 device	XRES, reset signal for the target MCU

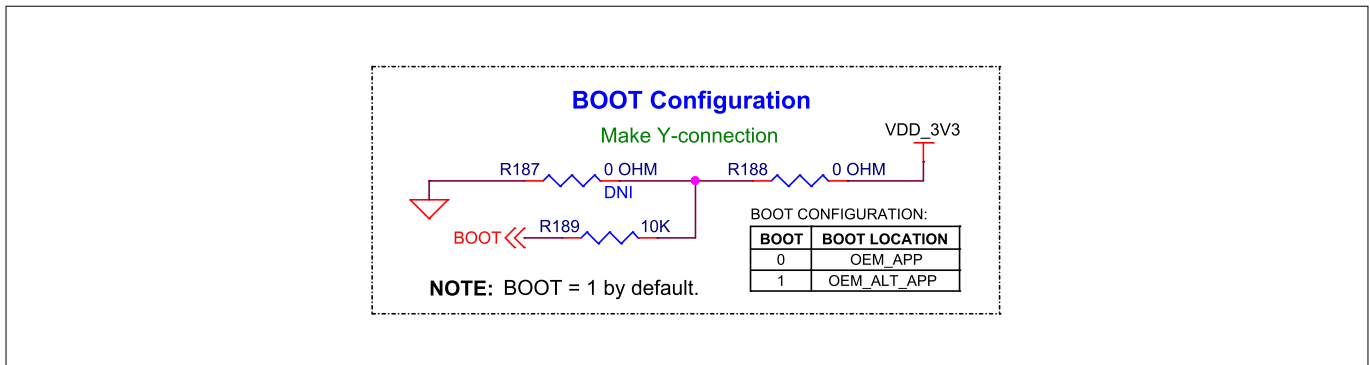
3.3.2 Enabling addition Boot configurations

There is a 1-bit boot configuration resistor provision (**R187** and **R188**) that sets the boot location for the PSOC™ Edge E84 MCU. The resistor provision output is connected to the **P17[6]** pin of the PSOC™ Edge E84, whose state is read by the MCU, and based on that, the boot location is set. By default, the resistor position is set to provide logic 1 (ON - R188 is populated).

3 Hardware

**Table 26** Boot configuration

Resistor Populated	Boot location
R187 Populated - logic level at <b>P17[6]</b> is <b>0</b> (OFF)	Internal RRAM
R188 Populated - logic level at <b>P17[6]</b> is <b>1</b> (ON, Default)	External FLASH (On board QSPI flash memory)



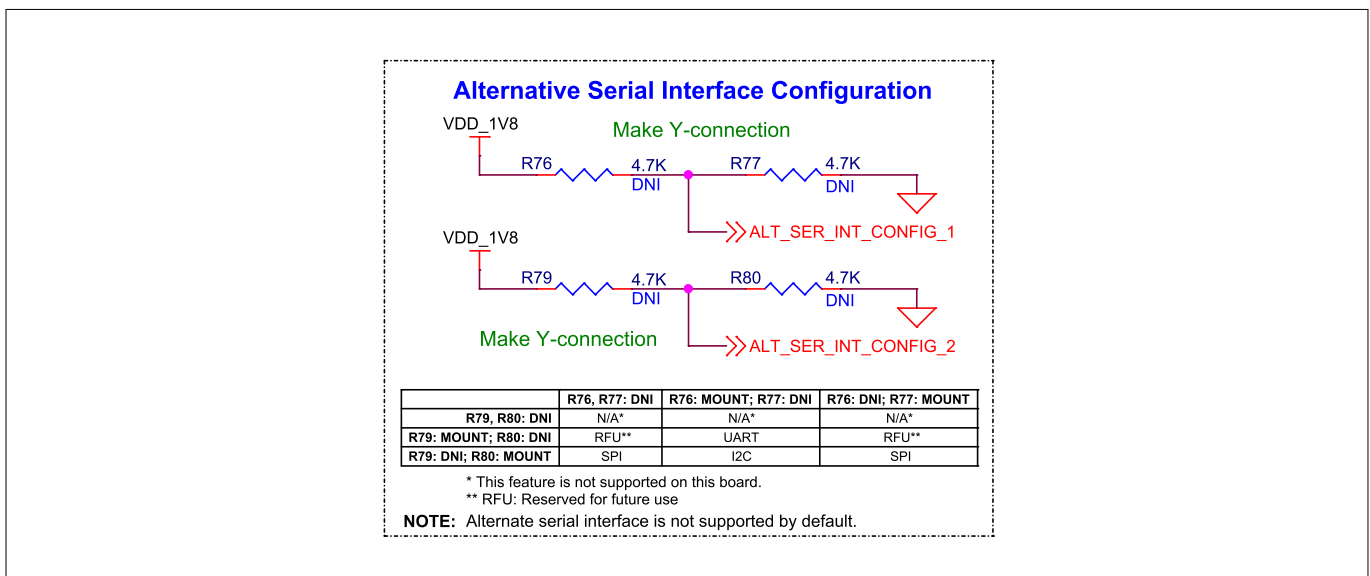
**Figure 60** Schematic of boot configuration resistor provision

**3.3.3 Enabling the alternate serial interface**

There is an 100mil pitch single row header (**J5**) which is used as GPIO interface by default. This header can also be used as alternate serial interface to program PSOC Edge E84 MCU by configuring the resistor provisions as show in the figure [Figure 61](#) will enable the alternate serial interface with UART, SPI, I2C and USB.

**Table 27** Rework components with reference and manufacturer details

Reference	Description	Manufacturer	Manufacturer part number
R76, R77, R79, R80	RES, Fixed, 4.7K, 5%, 1/10W, 0603	Wurth	560112116045
J5	CONN, HEADER, VERT, 6POS, 2.54MM, TH	Sullins	PRPC006SFAN-RC



**Figure 61** Schematic of Alternate serial interface configuration resistor provision

3 Hardware

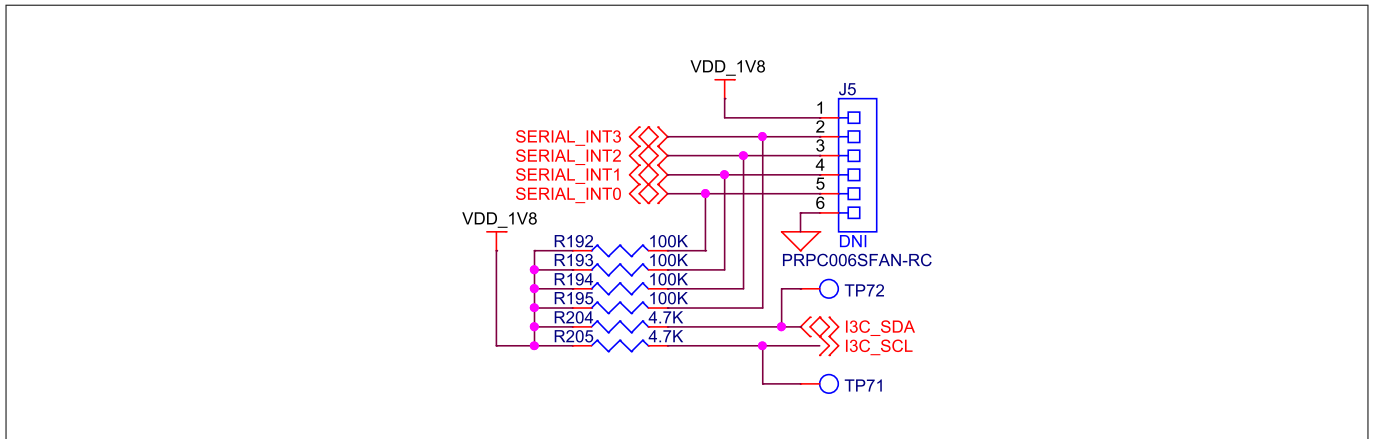


Figure 62 Schematic of Alternate serial interface header

3.3.4 Enabling external powering option

An external/Battery power input connector (J3) provides on-board to power the board from an external power source of voltage ranging from 3V to 5V. J3 connector is also used to connect an external lithium ion battery. By default, J3 connector is not populated and to use this feature, need to populate the J3 connector and populate D15 TVS diode.

Table 28 Rework components with reference and manufacturer details

Reference	Description	Manufacturer	Manufacturer part number
J3	CONN, HDR, 1x2POS, SHROUNDED, R/A, 2MM PITCH, SMT	Würth	620102131822
D15	DIODE, TVS, 17.3V, 15A, SOD-523	Diodes Incorporated	T5V0S5A-7

Figure 63 shows the reworked schematic sections.

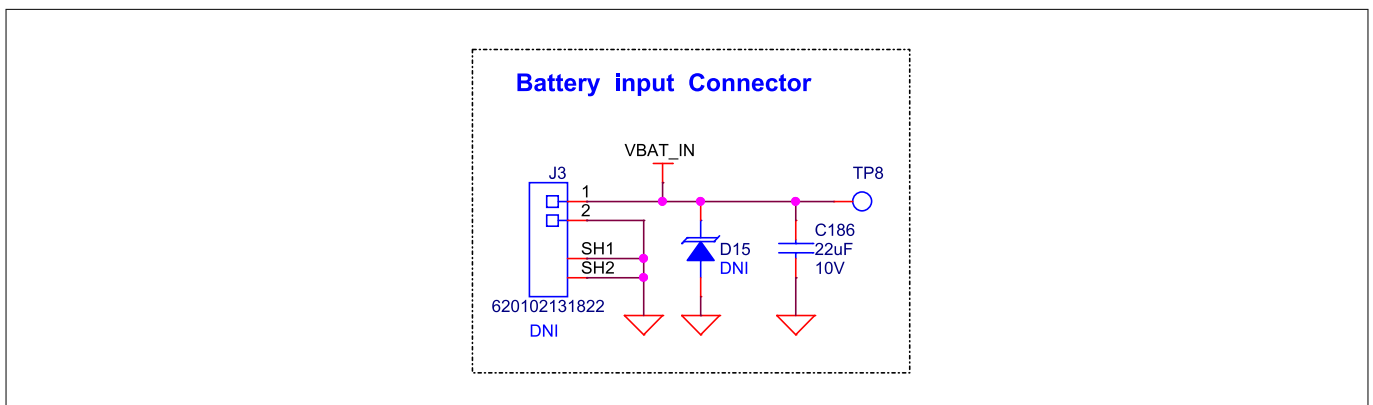


Figure 63 Schematic of rework regions to enable the external power input for the PSOC™ Edge E84 device

3.3.5 Enabling external I2C device interface

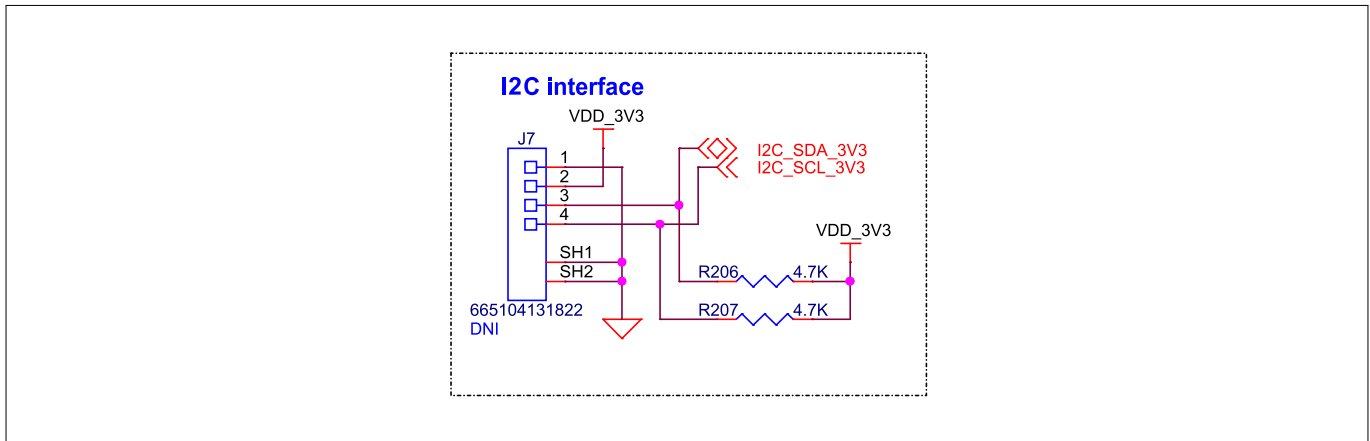
The PSOC™ Edge E84 AI kit features a 4-pin connector (J7) that extends the I2C interface of the PSOC™ Edge E84 MCU, enabling the addition of external I2C-based add-on boards. This connector is compatible with the QWIIC connection system by SparkFun, offering a plug-and-play method to connect QWIIC interface compatible boards without the need for soldering or complex wiring.

3 Hardware

**Table 29 Rework components with reference and manufacturer details**

Reference	Description	Manufacturer	Manufacturer part number
J7	CONN, HEADER, R/A, 4POS, 1MM, SMD	Wurth	620102131822

Figure 64 shows the reworked schematic sections.



**Figure 64 Schematic of rework regions to enable the external I2C device interface**

**Table 30 J7 header pin assignment for extending the I2C interface**

Pin details	Kit function
J7.1	connected to ground rail
J7.2	connected to 3.3 V power rail
J7.3	P17[1], Port 17 Pin 1, is a GPIO of the PSOC™ Edge E84 device that supports I2C interface and is connected to I2C SDA signal of MCU
J7.4	P17[0], Port 17 Pin 0, is a GPIO of the PSOC™ Edge E84 device that supports I2C interface and is connected to I2C CLK signal of MCU

**3.3.6 Enabling Analog I/O interface**

There is a 0.4mm pitch connector (**J17**) which provide connectivity to a few I/O's supporting analog functionality of the PSOC™ Edge E84 MCU GPIOs compatible with 1.8 V I/O logic level. By default this connector (**J17**) is not populated. To enable this analog I/O interface the following connector (**J17**) has to be populated.

**Table 31 Rework components with reference and manufacturer details**

Reference	Description	Manufacturer	Manufacturer part number
J17	CONN, PLUG, DUAL, 20POS, 0.4mm, SMD, GOLD	Hirose Electric Co Ltd	DF40C-20DP-0.4V(51)

3 Hardware

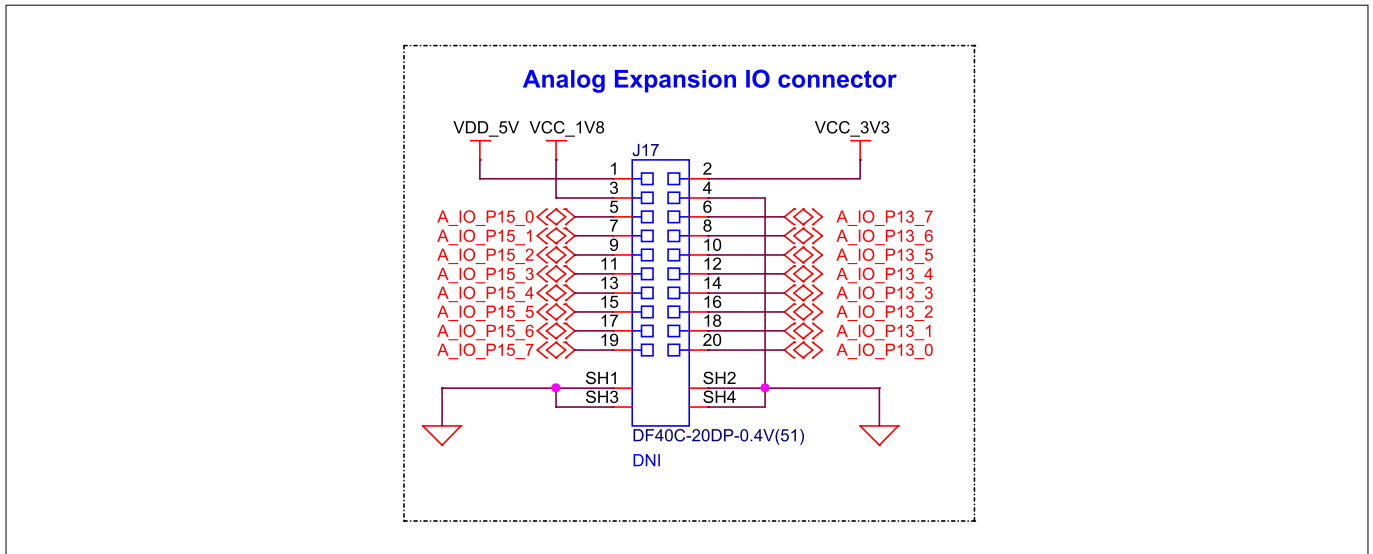


Figure 65 Schematic of the expansion header

3.3.7 Enabling the Speaker interface

To enable the speaker interface, ensure the **J8 connector** is populated to connect a mono speaker (up to 2.5 W). The Class-D BTL mono speaker driver is powered by the **SPKVDD domain**, which is already supplied with **5 V (VDD\_5V)** on the board. The amplifier communicates with the MCU via the **I2S interface** for audio data and the **I2C interface** (slave address 0x18) for control and configuration. Proper initialization through the I2C interface is necessary to activate the Class-D driver and enable the speaker output. Details about the **J8 connector** can be found in the rework section below.

Table 32 Rework components with reference and manufacturer details

Reference	Description	Manufacturer	Manufacturer part number
J8	CONN, HDR, MALE, R/A, 2POS, 1.25MM, SMD	Molex	532610271

3 Hardware

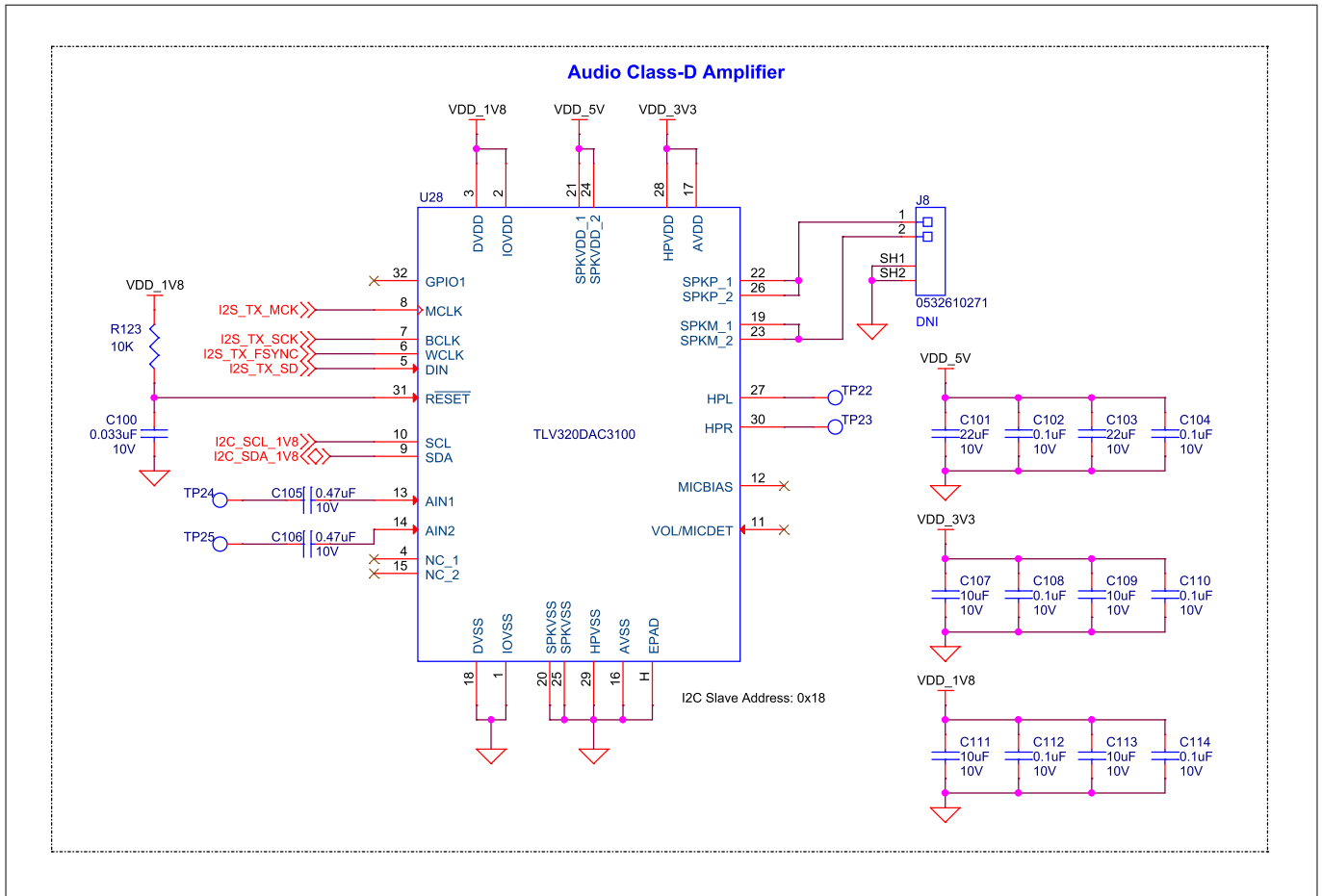


Figure 66 Schematic of audio class-D amplifier with speaker interface connector

3.3.8 Enabling the external power and I2C interface for MIPI DSI displays

To enable the external power and I2C interface for **MIPI DSI displays**, ensure the **J16 connector (TSM-102-01-L-DH-A-P-TR)** is populated. This connector provides a **5 V supply** and an **I2C interface** necessary for enabling compatibility with select MIPI DSI Raspberry Pi interface displays that require external power and I2C for touch functionality. The 5 V power is supplied directly through the board, while the I2C interface allows communication for touch-related operations. Proper initialization of the I2C interface is required to ensure seamless functionality with the connected display.

Details about the **J16 connector** can be found in the rework section below.

Table 33 Rework components with reference and manufacturer details

Reference	Description	Manufacturer	Manufacturer part number
J16	CONN, HDR, MALE, 4 POS, 2.54 MM, GOLD, RA, SMD	Samtec	TSM-102-01-L-DH-A-P-TR

3 Hardware

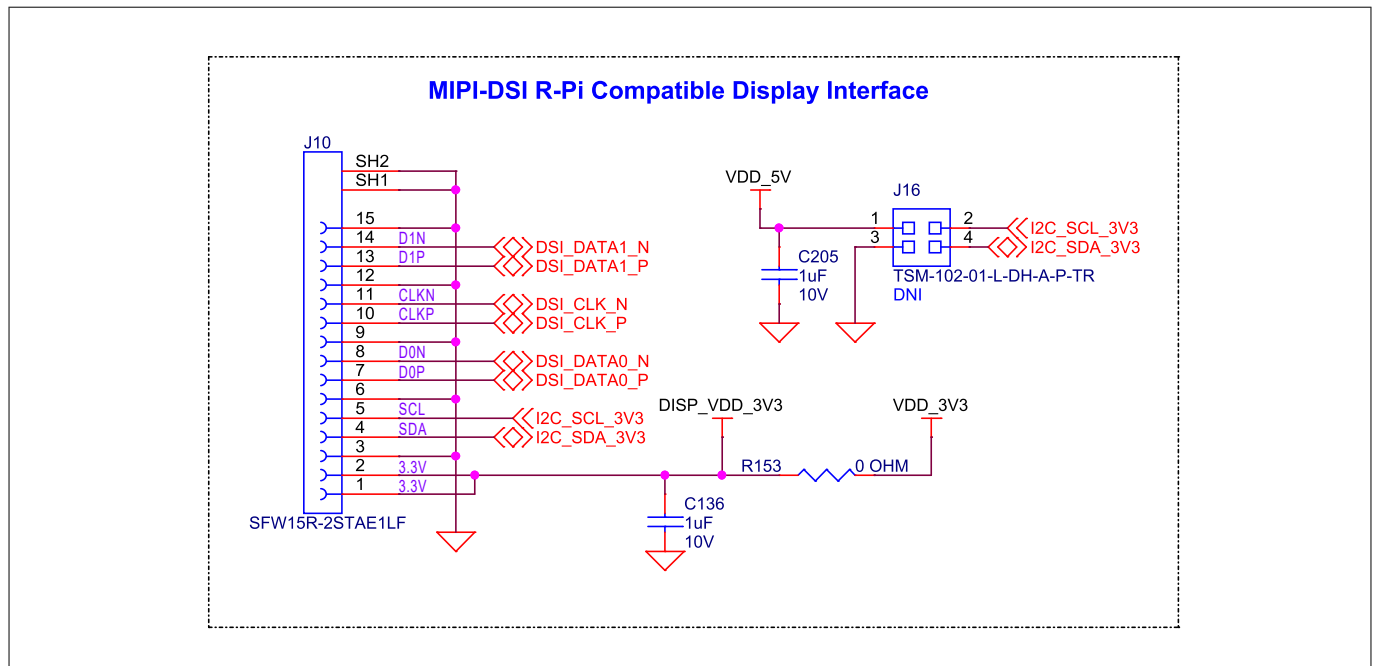


Figure 67 Schematic of MIPI-DSI interface with external power and I2C interface header

3.4 Bill of materials

See the bill of materials available on the [kit webpage](#).

---

## 4 Glossary

### 4 Glossary

**ADC**

Analog-to-Digital Converter

**BOM**

Bill of Materials

**CTS**

Clear To Send

**DAC**

Digital to Analog Conversion

**DC**

Direct Current

**DSI**

Display Serial Interface

**ECO**

External Crystal Oscillator

**ESD**

Electrostatic Discharge

**GPIO**

General-Purpose Input/Output

**IC**

Integrated Circuit

**IDE**

Integrated Development Environment

**IMU**

Inertial Measurement Unit

**I/O**

Input/Output

**IoT**

Internet of Things

**I2C**

Inter-integrated Circuit

**I2S**

Inter-IC Sound

**I3C**

Improved Inter-Integrated Circuit

**JTAG**

Joint Test Action Group

**LED**

Light-emitting Diode

**LPO**

Low Power Oscillator

**MCU**

Microcontroller Unit

**MEMS**

Micro Electro Mechanical systems

**MIPI**

---

## 4 Glossary

Mobile Industry Processor Interface

### **OSPI**

Octal Serial Peripheral Interface

### **OVP**

Overvoltage Protection

### **PC**

Personal Computer

### **PD**

Power Delivery

### **PDL**

Peripheral Driver Library

### **PDM**

Pulse Density Modulation

### **PSOC™**

Programmable System-on-Chip

### **PMU**

Power Management Unit

### **QSPI**

Quad Serial Peripheral Interface

### **RAM**

Random Access Memory

### **RC**

Resistor Capacitor

### **RTS**

Ready To Send

### **RX**

Receiver

### **SCL**

Serial Clock

### **SD**

SD card

### **SDA**

Serial Data

### **SDIO**

Secure Digital Input Output

### **SDK**

Software Development Kit

### **SMIF**

Serial Memory Interface

### **SPI**

Serial Peripheral Interface

### **SWCLK**

Serial Wire Clock

### **SWD**

Serial Wire Debug

### **SWDIO**

---

## 4 Glossary

Serial Wire Debug Input Output

**SWO**

Serial Wire Out

**SRAM**

Static Random-Access Memory

**TX**

Transmitter

**UART**

Universal Asynchronous Receiver Transmitter

**USB**

Universal Serial Bus

**WCO**

Watch Crystal Oscillator

**WLAN**

Wireless LAN

**R-Pi**

Raspberry Pi

**XRES**

External Reset

---

## Revision history

### Revision history

Document version	Date of release	Description of changes
**	2025-08-12	Initial release
*A	2025-09-25	Updated links in the document

---

## Trademarks

### Trademarks

PSoC™, formerly known as PSoC™, is a trademark of Infineon Technologies. Any references to PSoC™ in this document or others shall be deemed to refer to PSoC™.

#### **Trademarks**

All referenced product or service names and trademarks are the property of their respective owners.

**Edition 2025-09-25**

**Published by**

**Infineon Technologies AG**

**81726 Munich, Germany**

**© 2025 Infineon Technologies AG**

**All Rights Reserved.**

**Do you have a question about any aspect of this document?**

**Email: [erratum@infineon.com](mailto:erratum@infineon.com)**

**Document reference**

**IFX-pga1745308669718**

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office ([www.infineon.com](http://www.infineon.com))

#### **Warnings**

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.