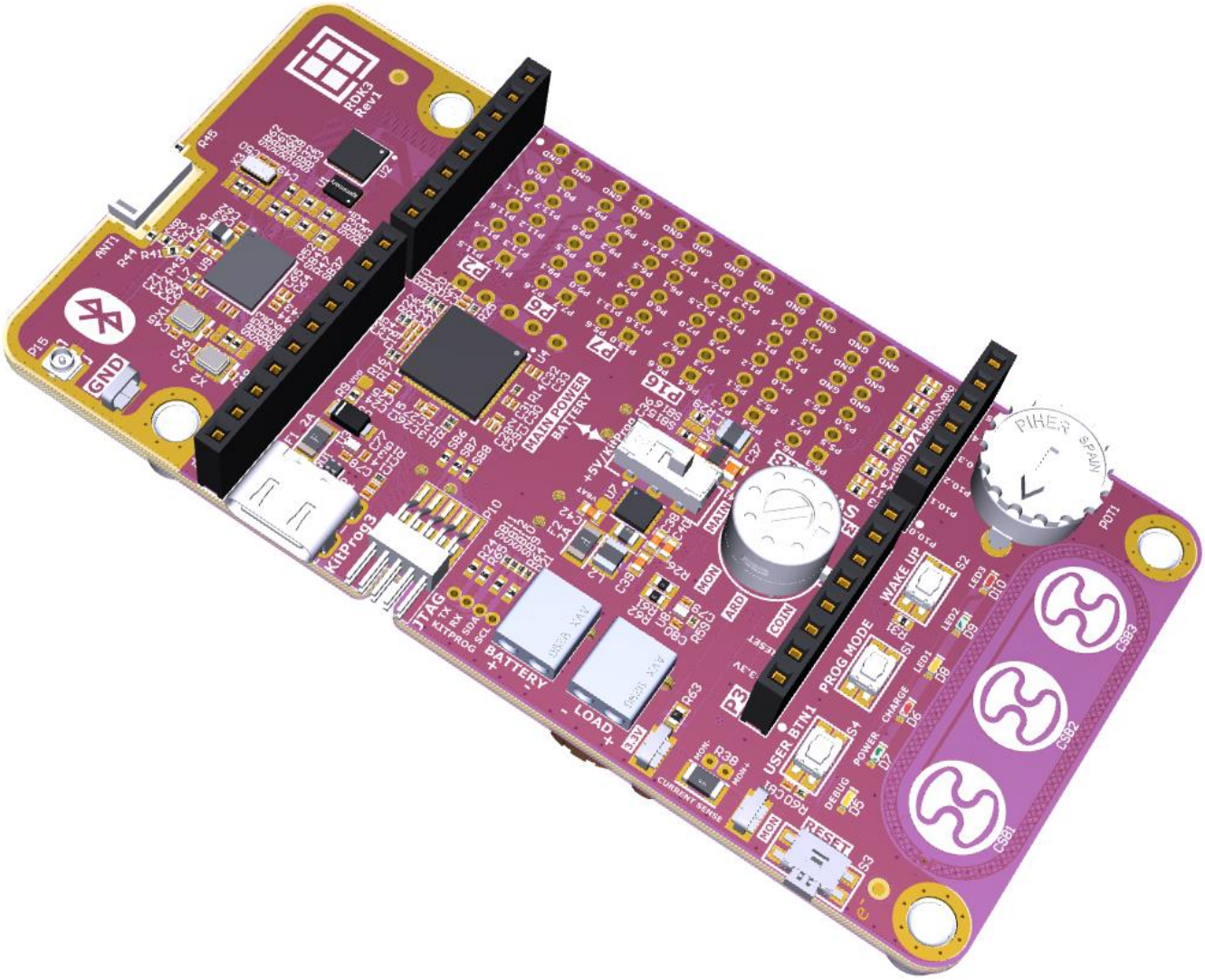
RDK3 User Manual



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Versions

Table 1

Version	Date	Rationale
0.1	November 03, 2022	First draft. Author: GDR

Introduction

The RDK3 is a Bluetooth™ LE 5.0 technology-based development board with enhanced security features that are inherited from PSoC64 family microcontrollers. Test.

Features

- CYB06447BZI-BLD53 – Infineon's High-Performance, Ultra-Low-Power secured MCU.
- All CYB06447BZI-BLD53 GPIOs are accessible via onboard headers.
- On-board debugger KitProg3 with I2C and UART USB bridge.
- 10-pin Amphenol ICC SWD header for J-Link.
- JAE USB Type-C connector for the KitProg3 debugger.
- On-board capacitive buttons based on CapSense® CSX technology.
- APS1604M-3SQR-ZR - APMemory External QSPI 16Mbit PSRAM Memory.
- S25FL064LABNFI043 - Infineon External QSPI 64Mbit NOR Flash.
- M830320 - On-board 2.45GHz Bluetooth antenna from AVX.
- U.FL connector for the external Bluetooth antenna from Amphenol RF.
- AVX multilayer ceramic transient voltage suppressors for the USB.
- AVX 9296 series POKE-HOME connectors.
- BD83070GWL - Switching mode power supply from ROHM.
- DIO59020CD12 - Li-ION Battery charger with USB-OTG Boost from DIOO.
- Keystone Electronics Corp. CR1220 coin battery socket for RTC and low-power applications.
- Current monitoring shunt resistor with Keystone Electronics Corp. P/N5019 test points.
- TOSHIBA Load Switches (with the current limiting capability) TCK1024G,LF.
- NISSHINBO low power amplifier NJU77001F.
- DIPTRONICS tactile buttons.
- Panasonic Right-angled tactile switch.
- C&K Rotary and Slider switch for power supply selections.
- PIHER Potentiometer for ADC peripheral evaluation.
- Passive components from Samsung EM, Yageo, and ASJ.
- CHILISIN Power Inductors.

Overview

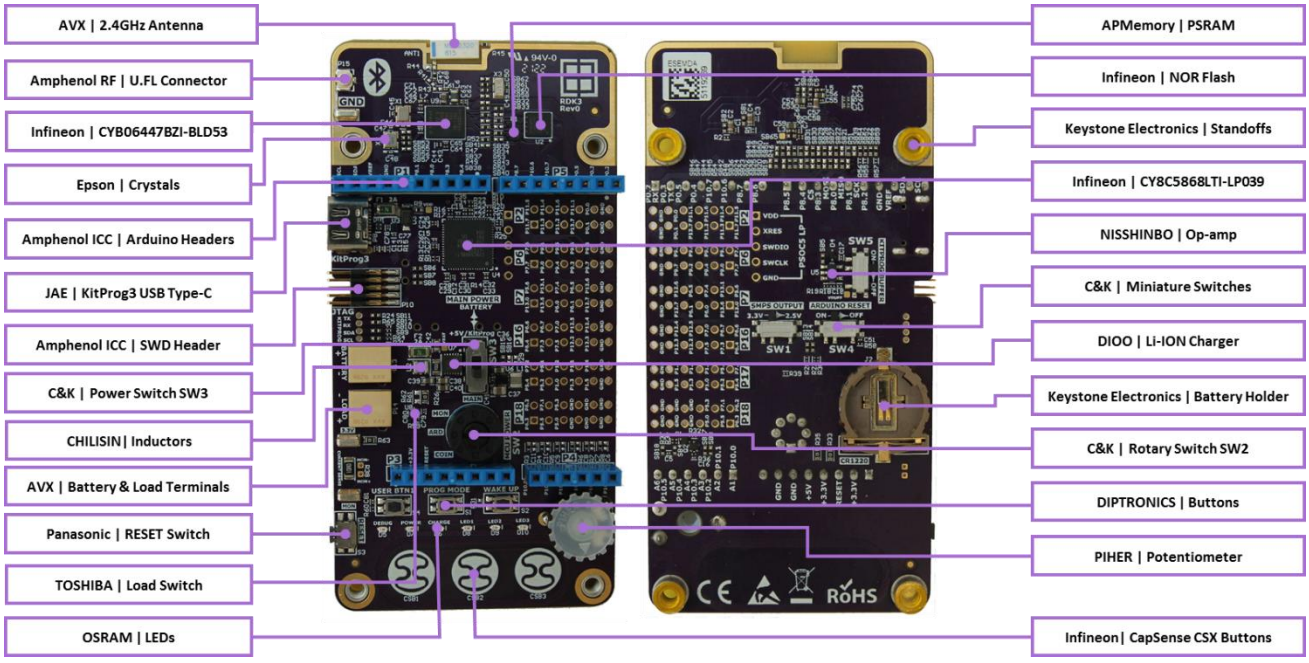


Fig. 1. RDK3 Board's layout.

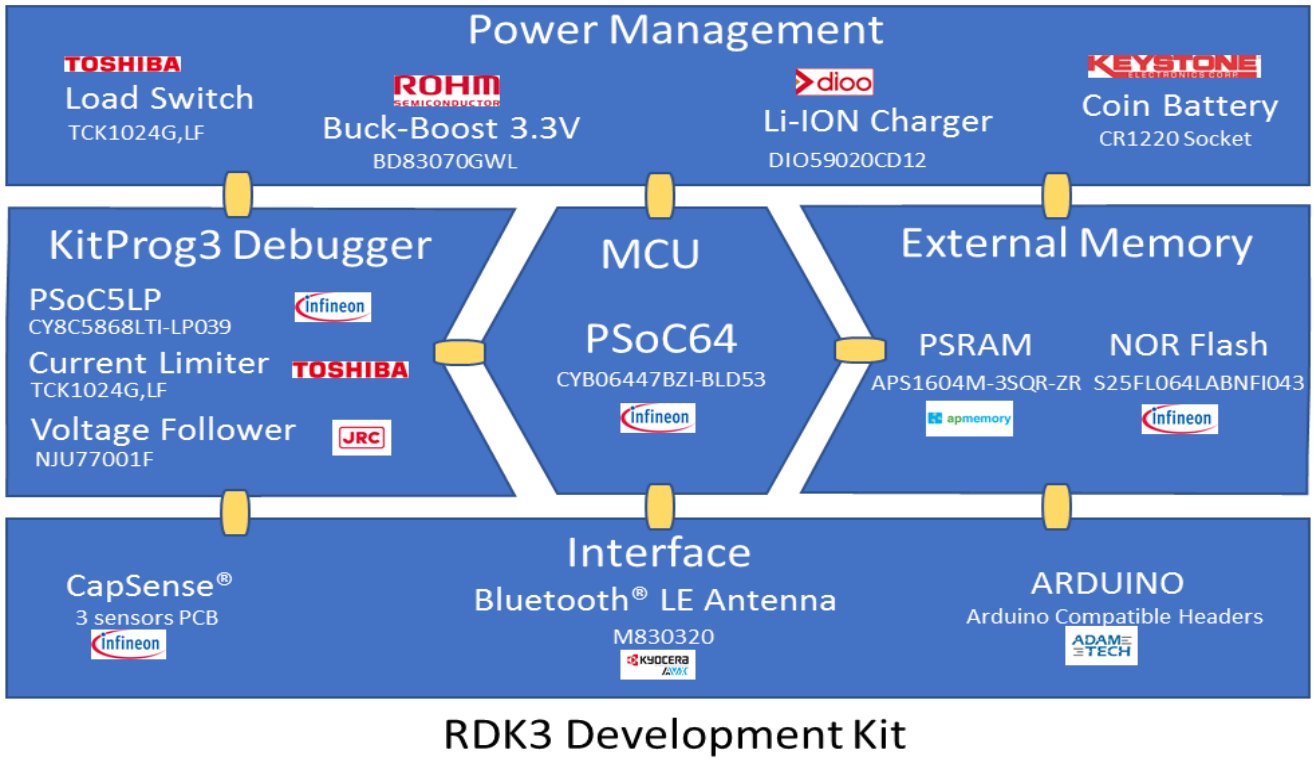


Fig. 2. Block diagram of the board.

Power Source Select

There are five ways to provide power for the MCU possible in RDK3:

1. KitProg3 USB Type-C port.
2. CR1220 coin battery socket.
3. Arduino connectors – configured using R35 and R33 0R 0603 resistors.
4. Li-ion Battery.
5. Current monitor TP6, only if R38 and R63 are removed.

Select one of the power sources using SW2 - the Coin Battery "**COIN**", Arduino headers +5V "**ARD**", Current Monitor Terminals "**MON**", 3.3V SMPS "**MAIN**". With SW3 users can select the power source as **BATT** – Li-ION battery or +5V power rail.

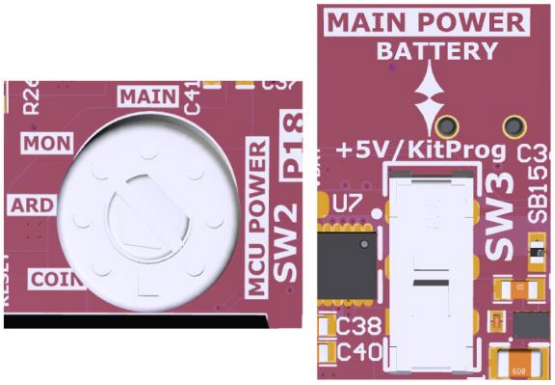


Fig. 3. Power source selectors.

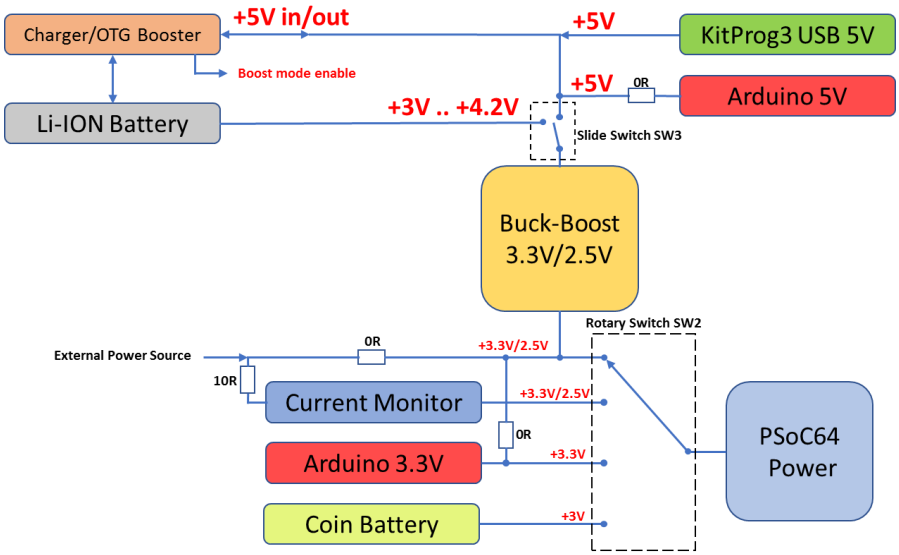


Fig. 4. RDK3 Power Distribution Diagram.

Programming Using External Connector

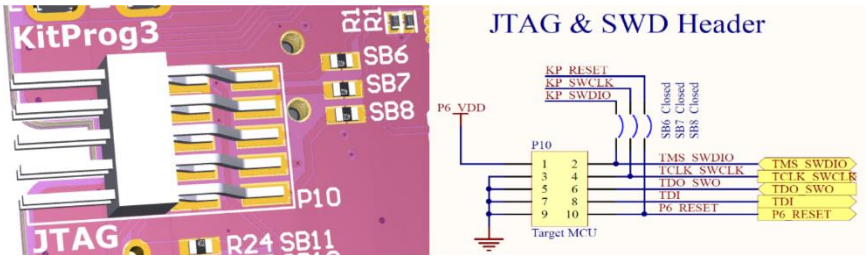


Fig. 5. 10-pin male 1.27mm pitch, SWD connector.

Users may use third-party programming devices to connect the CYB06447BZI-BLD53 target via the P10 SWD connector. The onboard “KitProg3” debugger should not be powered while using an external JTAG connector.

Spare GPIOs

All GPIOs of CYB06447BZI-BLD53 MCU are available at sockets P2, P6, P7, P16, P17, P18. Some may need to be configured using solder bridges.

Table 2

Socket P2 Pinout			
Pin No.	**Name**	**Name**	**Pin No.**
1	P11.7	P11.5	2
3	P11.3	P11.4	4
5	P11.2	P11.6	6
7	P13.7	P11.1	8
9	P0.1	P0.0	10
11	GND	GND	12

Table 3

Socket P6 Pinout			
Pin No.	**Name**	**Name**	**Pin No.**
1	P7.7	P7.6	2
3	P9.0	P9.1	4
5	P9.4	P9.5	6
7	P9.2	P9.6	8
9	P9.7	P9.3	10
11	GND	GND	12

Table 4

Socket P7 Pinout			
Pin No.	**Name**	**Name**	**Pin No.**
1	P13.0	P5.6	2
3	P13.6	P13.1	4
5	P6.0	P7.4	6
7	P6.1	P6.5	8
9	P12.7	P12.6	10
11	GND	GND	12

Table 5

Socket P16 Pinout			
Pin No.	**Name**	**Name**	**Pin No.**
1	P6.4	P6.6	2
3	P7.3	P6.7	4
5	P7.5	P7.0	6
7	P12.2	P12.5	8
9	P12.3	P12.4	10
11	GND	GND	12

Table 6

Socket P17 Pinout			
Pin No.	**Name**	**Name**	**Pin No.**
1	P5.4	P7.2	2
3	P5.2	P5.1	4
5	P1.0	P1.2	6
7	P1.3	P1.1	8
9	P1.5	P1.4	10
11	GND	GND	12

Table 7

Socket P18 Pinout			
Pin No.	**Name**	**Name**	**Pin No.**
1	P6.3	P6.2	2
3	P5.5	P7.1	4
5	P5.0	P5.3	6
7	GND	GND	8
9	GND	GND	10
11	GND	GND	12

Solder Bridges

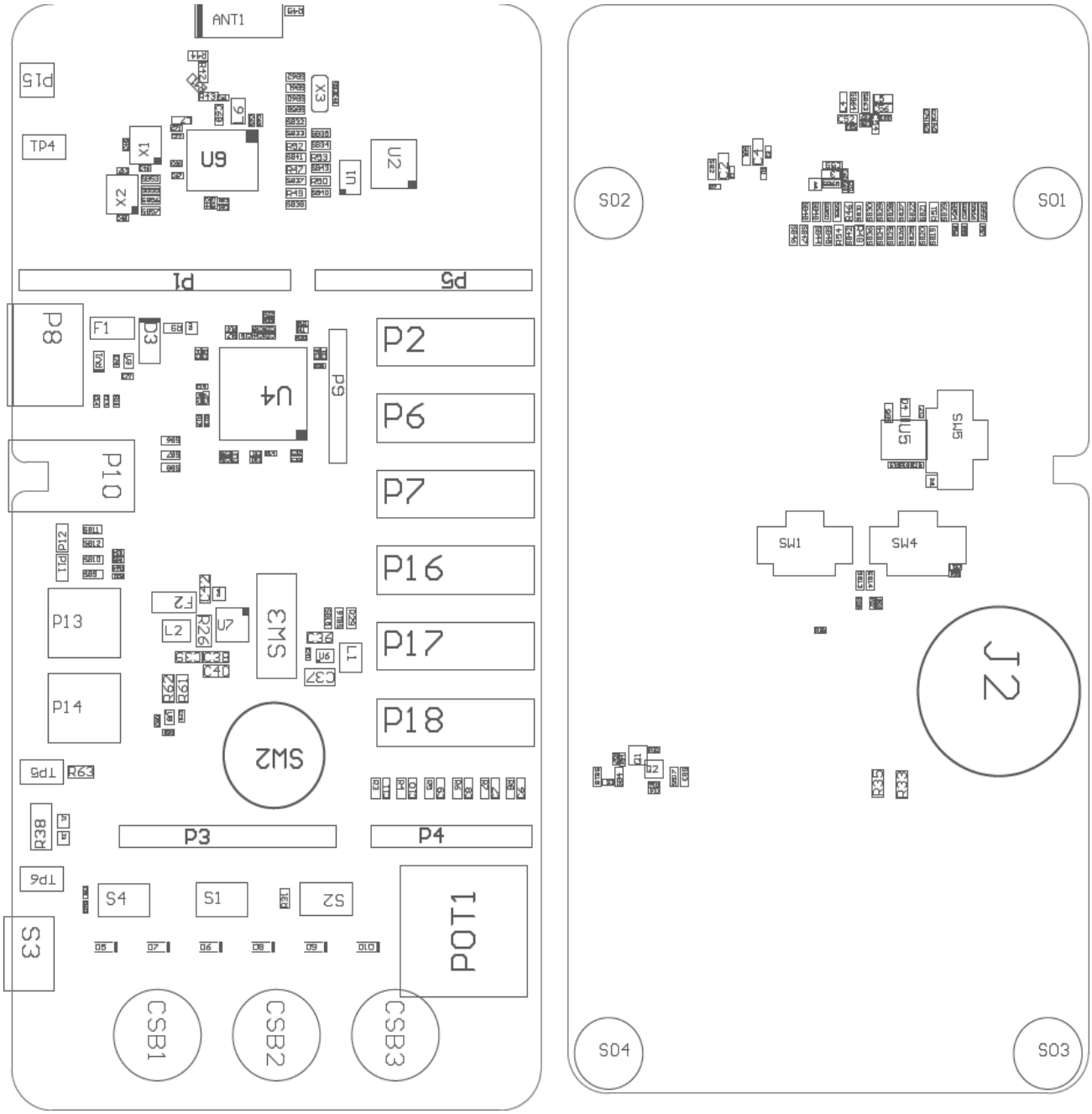


Fig. 6. Locations of the Solder Bridges [SBxx] (please check the assembly document to see in detail).

Table 8

Solder Bridge	Circuit	Default
SB1	+3.3V Supply for APS1604M-3SQR-ZR.	Closed
SB2	+3.3V Supply for S25FL064LABNFI043.	Closed
SB3	P6_VDD_BUF Supply for the Potentiometer.	Closed
SB4	Potentiometer output with ADC5 (P10.4).	Closed
SB5	P6_VDD NJU77001F (U5) Input+.	Closed
SB6	KitProg3 SWDIO with MCU SWDIO.	Closed
SB7	KitProg3 SWCLK with MCU SWCLK.	Closed
SB8	KitProg3 RESET with MCU RESET.	Closed
SB9	KitProg3 I2C SCL with MCU I2C SCL.	Closed
SB10	KitProg3 I2C SDA with MCU I2C SDA.	Closed
SB11	KitProg3 UART TX with MCU UART RX.	Closed
SB12	KitProg3 UART RX with MCU UART TX.	Closed
SB13	MCU I2C SDA with Charger (U7) I2C SDA.	Closed
SB14	MCU I2C SCL with Charger (U7) I2C SCL.	Closed
SB15	SMPS Power Input with SMPS EN pin.	Closed
SB16	MCU P0.5 with SMPS EN pin.	Opened
SB17	Battery Voltage Divider Control Input.	Closed
SB18	Battery Voltage Divider Output with P10.5.	Closed
SB19	P6.0 with P7 header GPIO 5.	Opened
SB20	KitProg3 UART TX with MCU P6.0.	Closed
SB21	P6.1 with P7 header GPIO 7.	Opened
SB22	KitProg3 UART RX with MCU P6.1.	Closed
SB23	P6.4 with P16 header GPIO 1.	Opened
SB24	JTAG TDO with MCU P6.4.	Closed
SB25	P6.5 with P7 header GPIO 8.	Opened
SB26	JTAG TDI with MCU P6.5.	Closed
SB27	P6.6 with P16 header GPIO 2.	Opened
SB28	JTAG TMS/SWDIO with MCU P6.6.	Closed
SB29	P6.7 with P16 header GPIO 4.	Opened
SB30	JTAG TCLK/SWCLK with MCU P6.7.	Closed
SB31	P7.0 with P18 header GPIO 4.	Opened
SB32	P11.1 with P2 header GPIO 8.	Opened
SB33	Flash QSPI SSEL with MCU P11.1.	Closed
SB34	P11.2 with P2 header GPIO 5.	Opened
SB35	PSRAM QSPI SSEL with MCU P11.2.	Closed
SB36	P7.3 with P16 header GPIO 3.	Opened
SB37	P11.3 with P2 header GPIO 3.	Opened
SB38	P11.4 with P2 header GPIO 4.	Opened

SB39	P7.4 with P7 header GPIO 6.	Opened
SB40	P11.5 with P2 header GPIO 2.	Opened
SB41	P11.6 with P2 header GPIO 6.	Opened
SB42	P7.5 with P16 header GPIO 5.	Opened
SB43	P11.7 with P2 header GPIO 1.	Opened
SB44	P12.2 with P16 header GPIO 7.	Opened
SB45	Load Switch Control EN with P12.2	Closed
SB46	P12.3 with P16 header GPIO 9.	Opened
SB47	Battery Voltage Divider Input with P12.3.	Closed
SB48	P12.4 with P16 header GPIO 10.	Opened
SB49	Charger DISABLE pin with P12.4	Closed
SB50	P12.5 with P16 header GPIO 8.	Opened
SB51	Charger BOOST EN with P12.5.	Closed
SB52	USER LED1 with P13.1	Closed
SB53	P12.6 with P7 header GPIO 10.	Opened
SB54	USER LED2 with P13.6	Closed
SB55	X2 pin 3 with MCU P12.6	Closed
SB56	X2 pin 1 with MCU P12.7	Closed
SB57	P12.7 with P7 header GPIO 9.	Opened
SB58	P0.0 with P2 header GPIO 10.	Opened
SB59	USER LED3 with P13.7	Closed
SB60	X3 pin 2 with P0.0	Closed
SB61	X3 pin 1 with P0.1	Closed
SB62	P0.1 with P2 header GPIO 9.	Opened
SB63	P6_VDD with MCU VBACKUP pin	Closed
SB64	VCOIN with MCU VBACKUP pin	Opened
SB65	P6_VDD with MCU VREF pin	Closed
SB66	USER BUTTON with MCU P13.0 pin	Closed

Fuses

The RDK3 board has two 2A fast-acting fuses F1 and F2 in a 1206 package; Part No: CC12H2A-TR „Eaton“.

Changing the fuses or solder bridges

The SMD „Chipping Tool“ is recommended to use for SMD solder bridges or fuses soldering on the RDK3 development board.

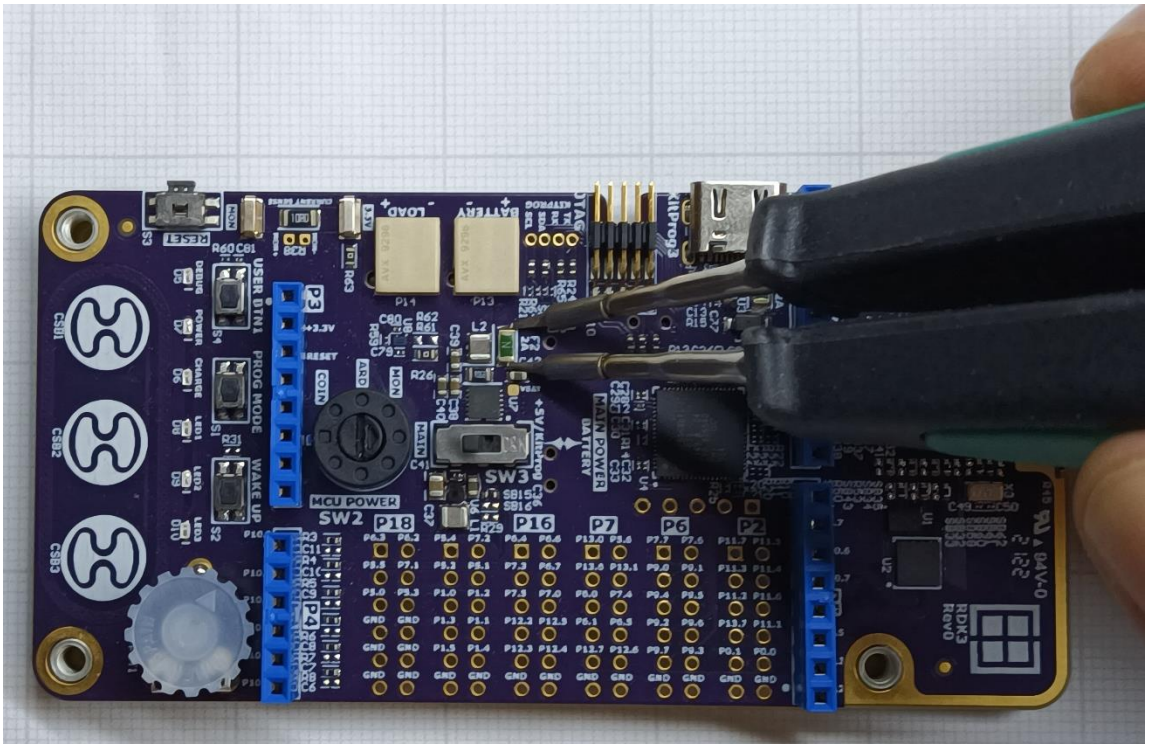


Fig. 7. Soldering the RDK3's fuse.

Insertion and extraction of wire from AVX 9296 connectors

The RDK3 board has two AVX 9296 2-pin connectors for the Li-ion battery and load connection (P13 and P14). The 20/22/24/26AWG wires are recommended to be striped from 3.5mm to 4.5mm before insertion. Once inserted it can be extracted without any tools. Gently rotate the wire while pulling until the extraction is complete. Please refer to the application note **201-01-167** provided by the AVX for more detailed information.

Bluetooth® SIG Qualification

The RDK3 board has been qualified with Bluetooth® SIG. The Declaration ID of the RDK3 is D061890 and it is referenced to the qualified design QDID: 99158.

RDK3 Electromagnetic Compatibility

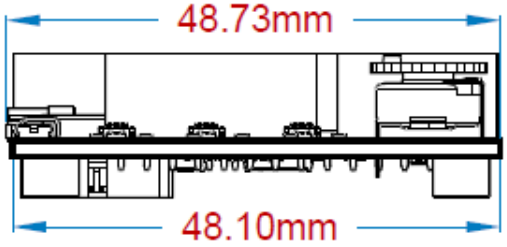
RDK3 was tested for electromagnetic disturbances and electromagnetic immunity and meets the requirements as in normative documents listed below:

Electromagnetic disturbances:
Radiated disturbance to 1 GHz.
IEC 61000-4-20

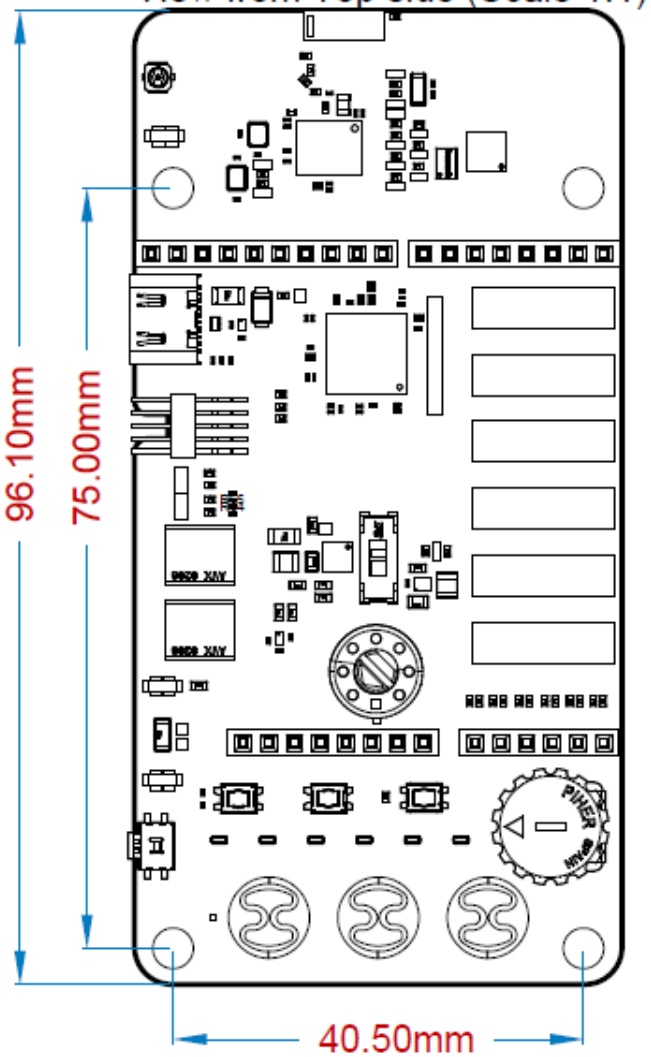
Harmonised Standard for access to radio spectrum:
Data transmission equipment operating in the 2,4 GHz band.
ETSI EN 300 328

Mechanical Layout

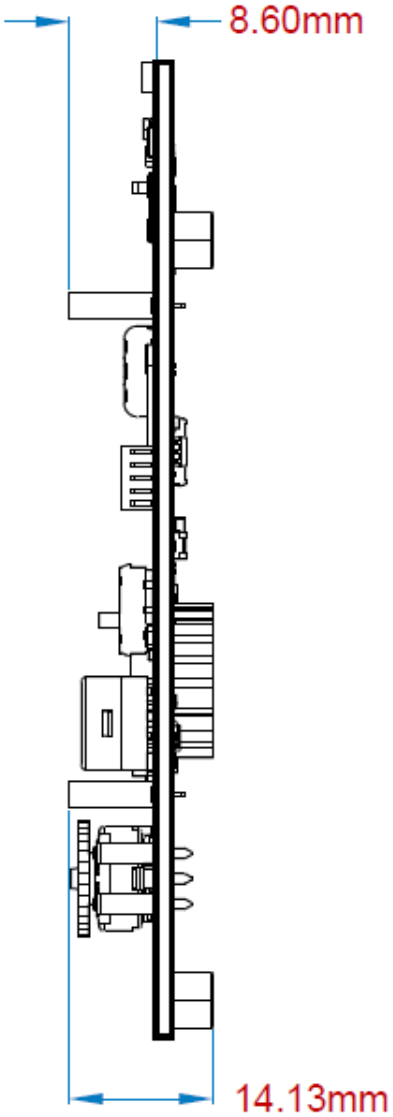
View from Front side (Scale 1:1)



View from Top side (Scale 1:1)



View from Right side (Scale 1:1)



Legal Disclaimer

The evaluation board is for testing purposes only and, because it has limited functions and limited resilience, is not suitable for permanent use under real conditions. If the evaluation board is nevertheless used under real conditions, this is done at one's responsibility; any liability of Rutronik is insofar excluded.