PCR sensor A2 EVK hardware user guide

- XE212

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Version 1.0: 2026-03-09

Acconeer AB

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1. Overview of the A212 Evaluation Kit

1.1 Introduction

The A212 Evaluation Kit (EVK) is a development platform featuring Acconeer's latest radar sensor, the A212. The A212 is a 60 GHz, multiantenna radar system based on leading-edge, patented pulsed coherent radar technology. The A212 is optimized for high precision and low power, delivered as a one package solution with an integrated MCU, RF front-end and antennas (3TX, 4RX).

The A212 sensor is perfectly suited for applications such as human presence detection, heartbeat monitoring, breathing and sleep measurements and water level monitoring.

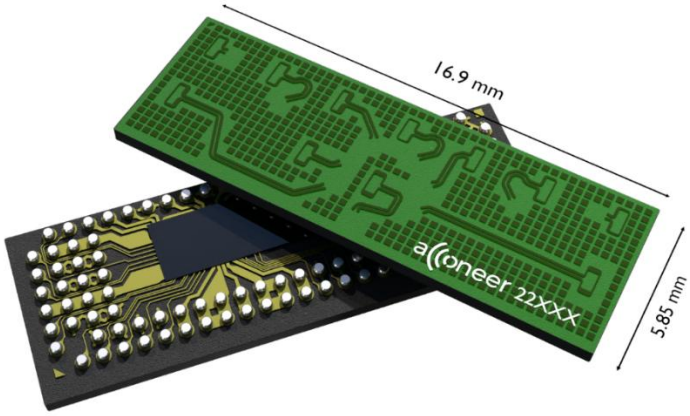


Figure 1: Acconeer's A212 Sensor

The A212 Evaluation kit (EVK) consists of a single board, the XE212, that supports users at different stages of development. The board comes pre-flashed with the exploration server SW so it can be connected directly to a PC and be used with Acconeer's Exploration tool. After the sensor's performance evaluation with the Exploration Tool, the XE212 can be used for on-sensor development and external host development.

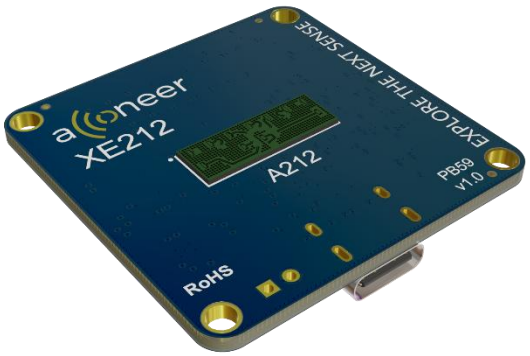


Figure 2: XE212 EVK

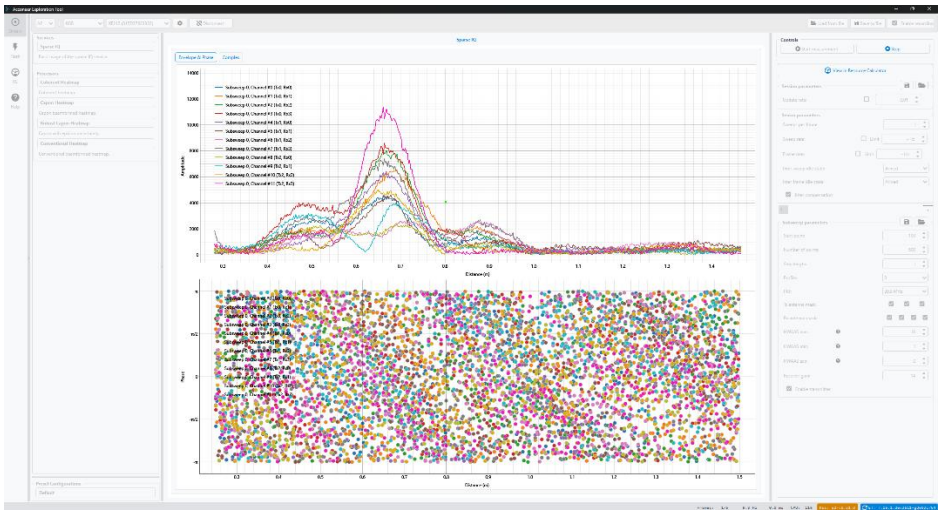


Figure 3: Exploration Tool

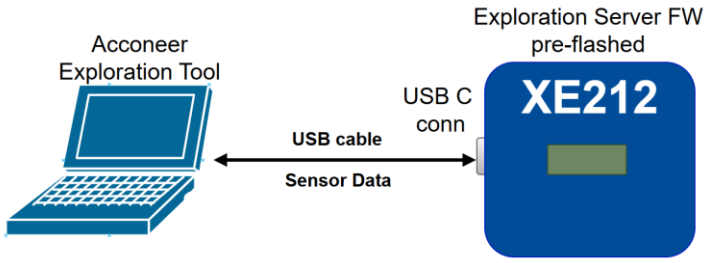


Figure 4: Connection of XE212 for use with Exploration tool

1.2 Getting Started

Acconeer provides a SW integration guideline “XE212 SDK User Guide” to help you get started. Refer to the SDK documentation provided in the SW package for the different SW guides.

To learn more about Acconeer’s Exploration Tool and how to install it refer to Acconeer documentation site: https://docs.acconeer.com/en/latest/exploration_tool

2. Software for the EVK

2.1 SW download

The SW will be distributed directly by Acconeer to selected customers. Please contact your sales representative regarding updates and technical support.

2.2 SW API Description

The Acconeer SW comes with an API (Application Programming Interface). Acconeer provides several service-oriented example applications, as well as customer guidelines for application development when utilizing the API. All APIs provided by Acconeer are documented.

Open the SW zip file provided by Acconeer. In the file structure, please locate /doc. doc/ contains API documentation in HTML format – simply open doc/html/index.html.

The two packages available for A212 development are summarized below:

acconeer_xe212_sdk_a2-vX_Y_Z.zip

- XE212 SDK User Guide.pdf
- RSS API HTML Documentation
- XE212 Firmware for Application Development
- Example Applications for the A212
- Tools to flash/download/start applications on the A212

acconeer_xe212_exploration_server_a2-vX_Y_Z.zip

- XE212 Firmware for Exploration Tool Evaluation

3. The EVK Hardware: XE212

3.1 Overview

The XE212 board allows users to quickly evaluate Acconeer's A212 sensor performance using the exploration tool as well as provide support for on-sensor development and external host development at a later stage. In addition, the XE212 can be used to measure the sensor's power consumption in different power modes. The XE212 could be used as a hardware reference design for the integration of the A212 into a PCB.

The XE212 board carries a cortex M7 MCU that acts as a high-speed bridge to stream radar sensor data from the A212 sensor to Acconeer's "Exploration Tool" via USB HS 2.0.[1] In addition to the exploration server SW, the XE212 is delivered with a bootloader so that it can be flashed via the USB interface. For details on how to flash the XE212, refer to the SDK documentation. Figure 5 shows the block diagram of the XE212 Board.

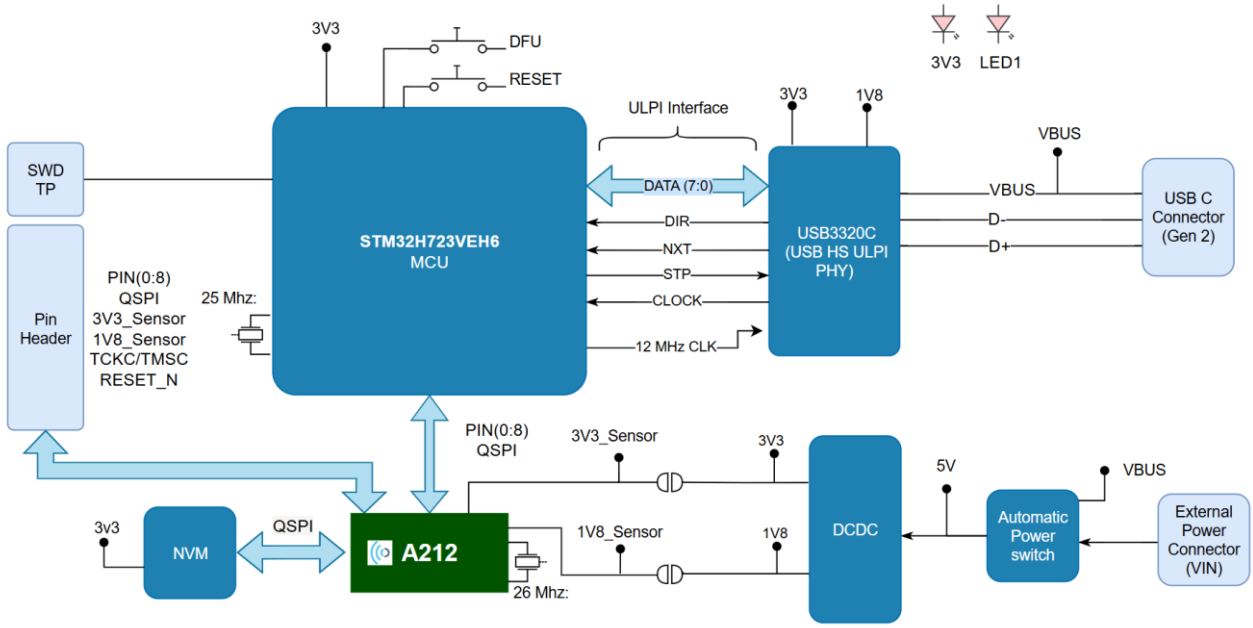


Figure 5: XE212 block diagram

The A212 GPIOs and communication pins are available via a male header connector (J4) in the bottom side of the XE212 board. See section 3.5 for full description of the pin header connections.

The XE212 has 2 tactile switches, RESET and DFU. To enter DFU mode, toggle the RESET tactile switch with the DFU pressed. The red LED labelled as "LED1" will blink when the MCU is in DFU mode.

[1] Acconeer's "Exploration Tool" is supported by Linux and Windows OS.

Some applications can run directly on the A212's internal MCU, i.e. no external host is needed. For these cases an external NVM is required to boot the A212. The XE212 board includes an NVM that allows booting from it directly, helping developers to write and test applications directly on the A212's MCU (on-sensor development). For application that require an external MCU host, the NVM is not required since the sensor can boot from the external MCU.

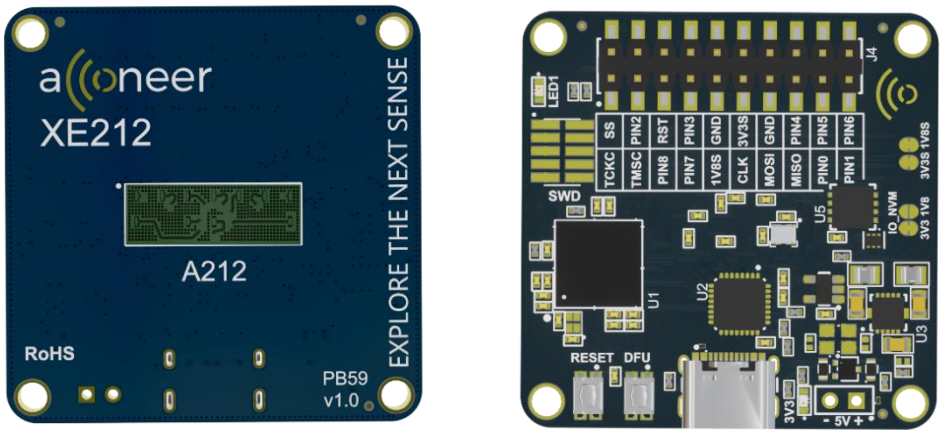


Figure 6: XE212 Top and Bottom view

3.2 Mechanical dimensions

The mechanical dimensions of the XE212 are presented below:

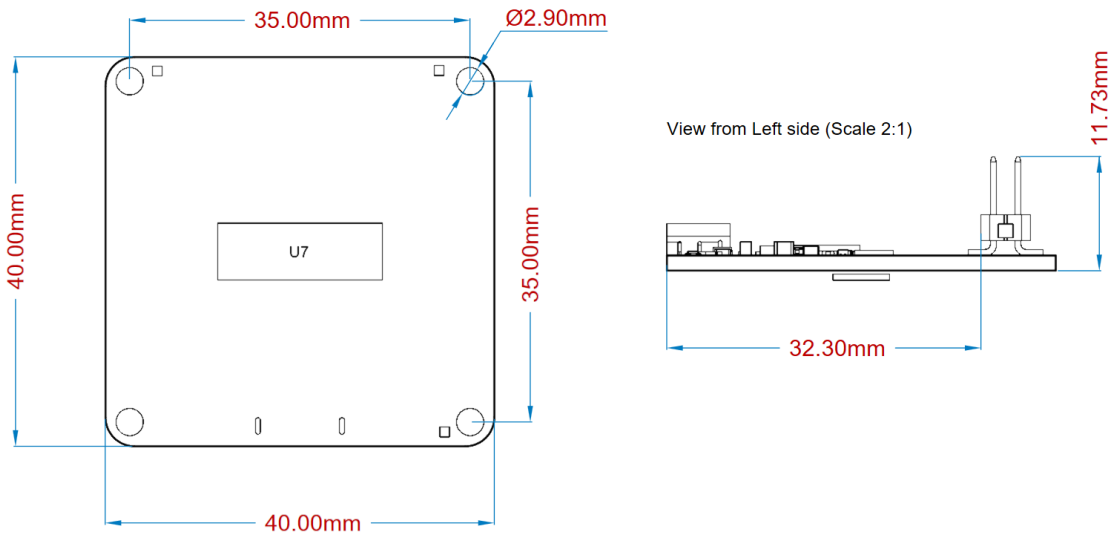


Figure 7: Mechanical dimensions

3.3 Male header connector

Error! Reference source not found. shows the pins available via the pin male header connector (J4) in the XE212:

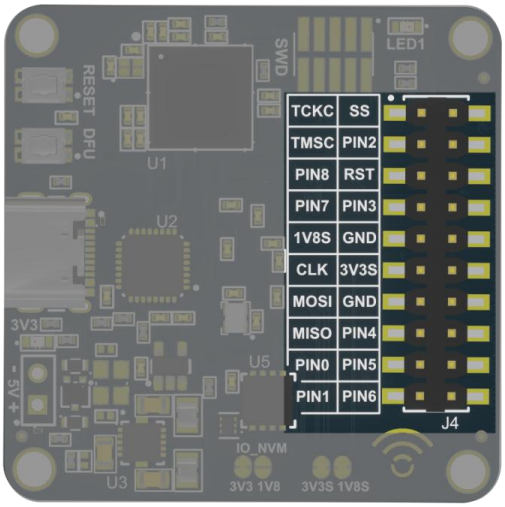


Figure 8: Pin header connector, J4

Table 1. Pinout of XE212

Pin	Description
PIN0	Connected to PIN0/IO2
PIN1	Connected to PIN1/IO3
PIN2	Connected to PIN2
PIN3	Connected to PIN3
PIN4	Connected to PIN4
PIN5	Connected to PIN5
PIN6	Connected to PIN6
PIN7	Connected to PIN7
PIN8	Connected to PIN8
CLK	Connected to SPI0_CLK
SS	Connected to SPI0_SS_N
MOSI	Connected to SPI0_MOSI/IO0
MISO	Connected to SPI0_MISO/IO1
GND	Connected to PCB Ground
3V3S	Connected to IO_VDD
1V8S	Connected to DIG_VDD, RX_VDD, TX_VDD, WG_VDD, ANA_VDD, XO_VDD and VCO_VDD
RST	Connected to RESET_N
TMSC	Connected to TMSC
TCKC	Connected to TCKC

3.4 Power Consumption measurements

The XE212 board is powered via USB (5V, 500mA). It contains buck regulators to provide 3.3V and 1.8V to the sensor. To measure A212 current consumption, disconnect the power to the sensor from the buck regulators and then power the sensor with an external power supply connected to the male pin header (J4) using the 3V3S, 1V8S and GND pins.

To disconnect the on-board regulators from the sensor, cut the 2 solder bridges labelled as 3V3S and 1V8S shown in figure 5. Each solder bridge will disconnect each power domain respectively. Note that the 3V3 LED indicator will still be connected to the 3V3 domain from the buck regulator even after the solder bridges are disconnected.

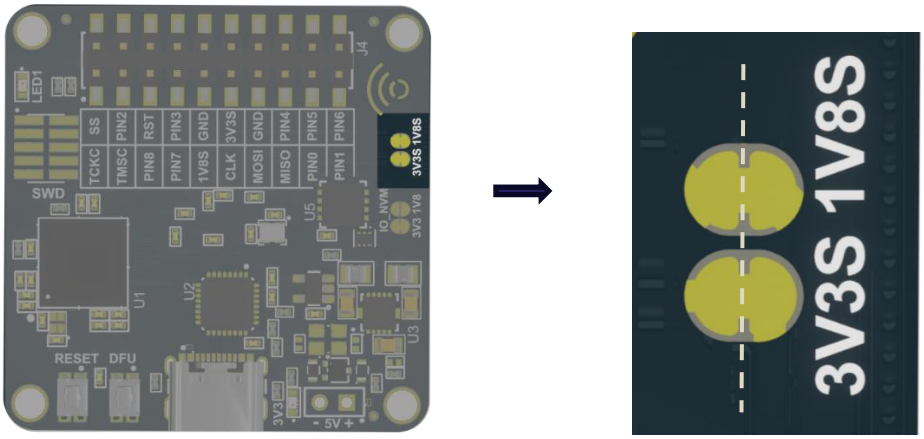
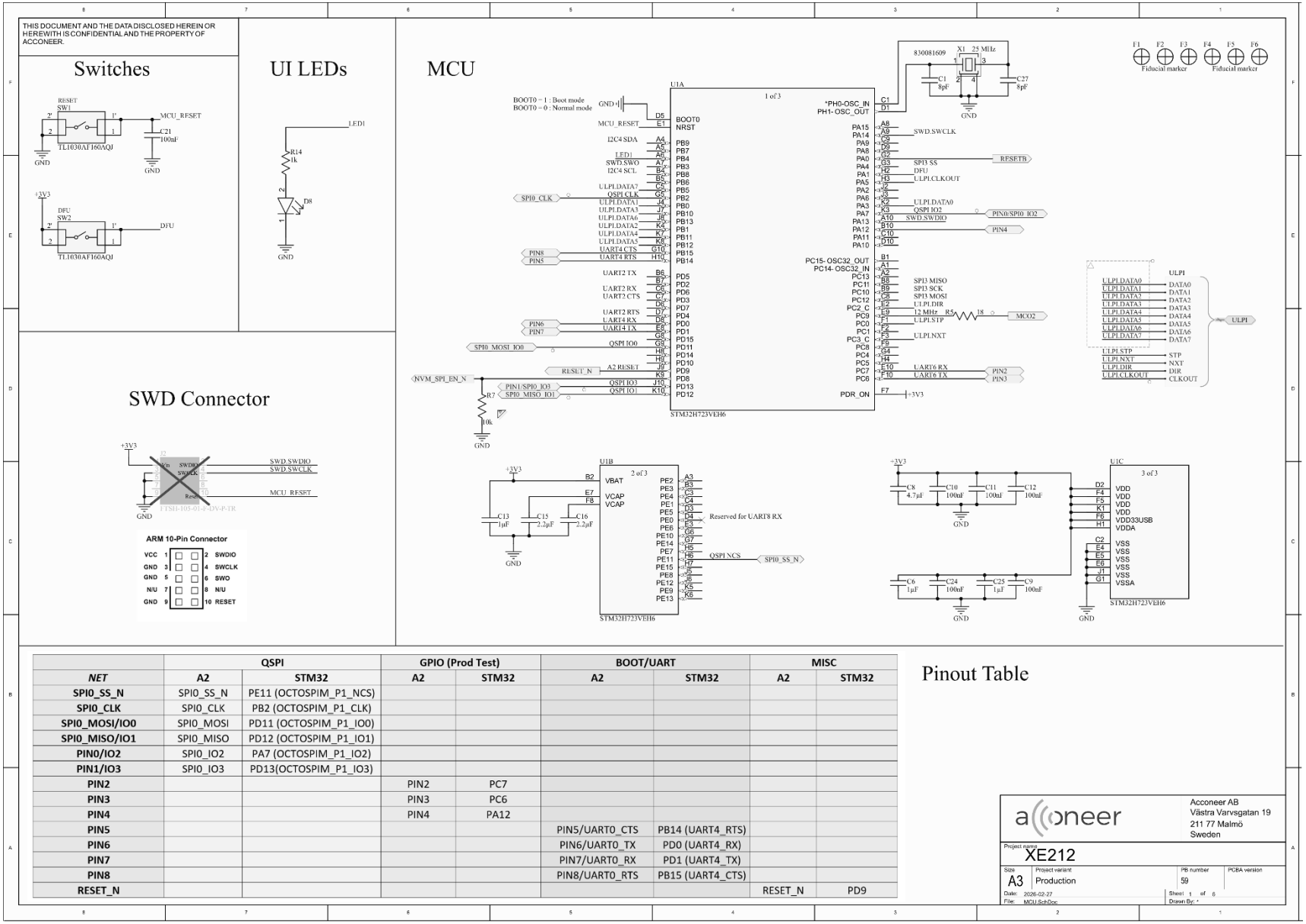


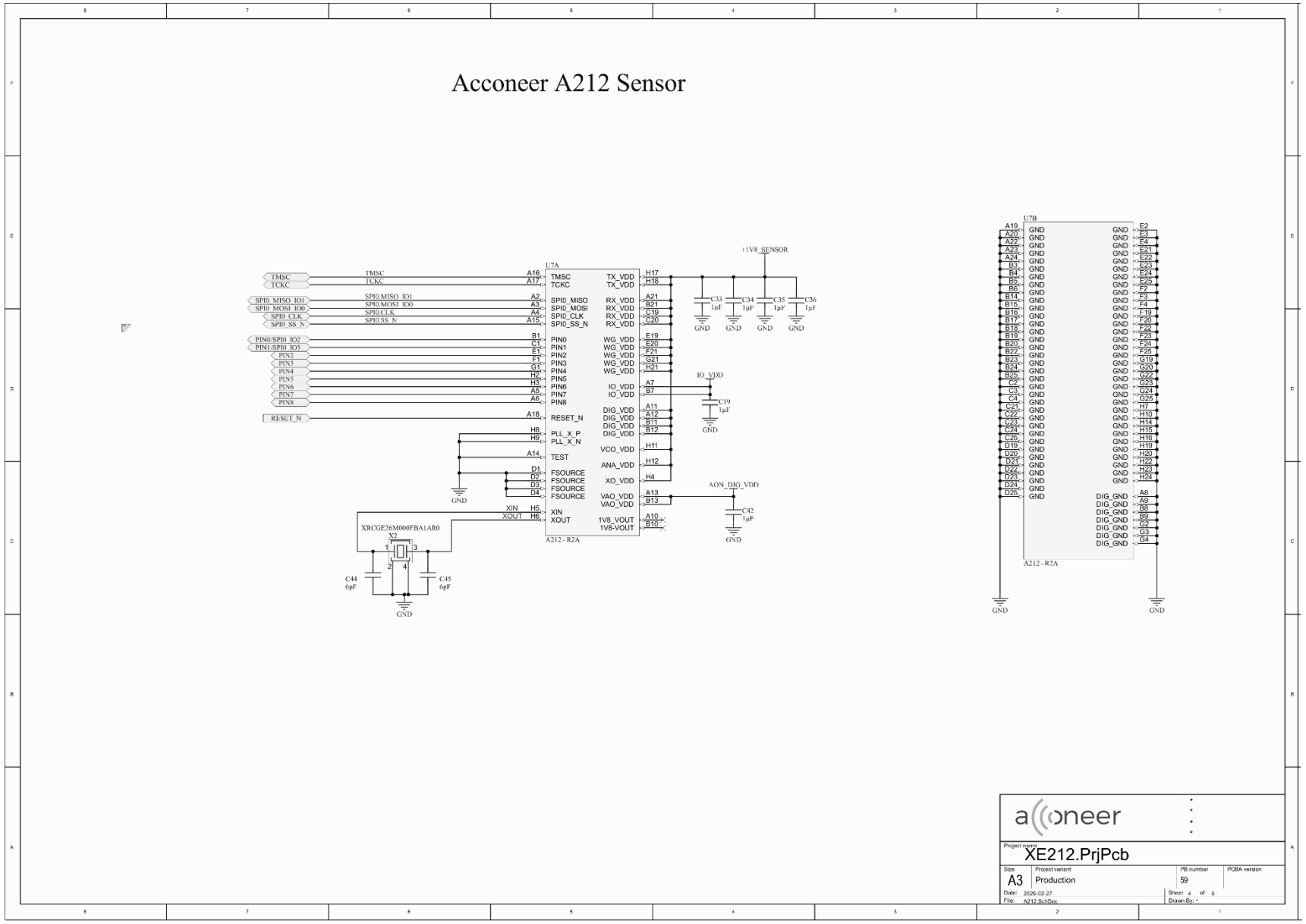
Figure 9: Solder bridges

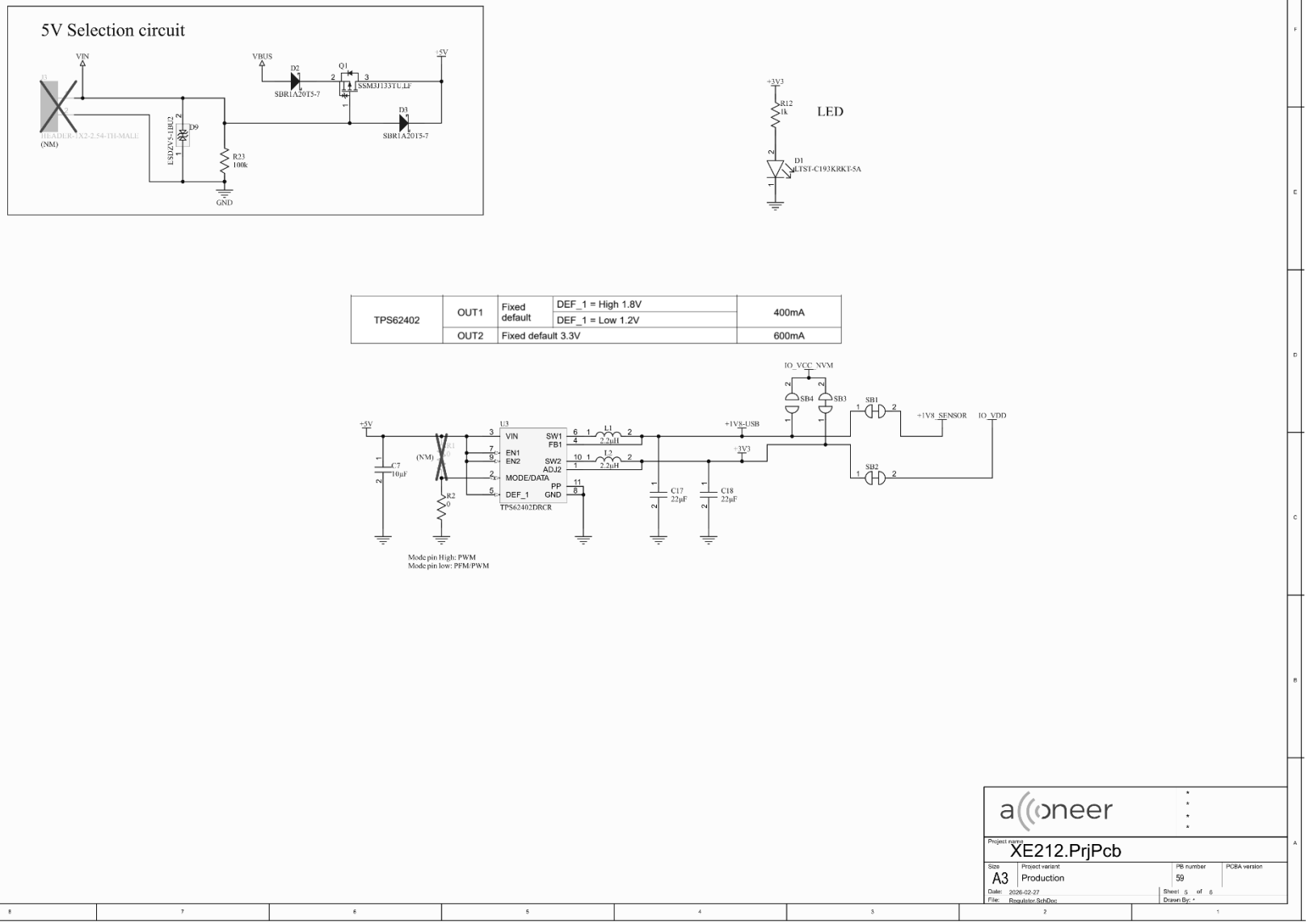
3.5 Electrical Schematics

On the following pages you will find the schematics for XE212:

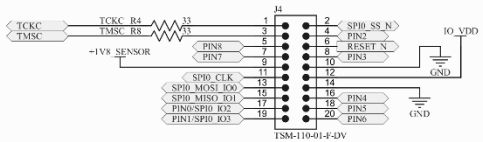


	QSPI		GPIO (Prod Test)		BOOT/UART		MISC	
NET	**A2**	**STM32**	**A2**	**STM32**	**A2**	**STM32**	**A2**	**STM32**
SPI0_SS_N	SPI0_SS_N	PE11 (OCTOSPIM_P1_NCS)						
SPI0_CLK	SPI0_CLK	PB2 (OCTOSPIM_P1_CLK)						
SPI0_MOSI/IO0	SPI0_MOSI	PD11 (OCTOSPIM_P1_IO0)						
SPI0_MISO/IO1	SPI0_MISO	PD12 (OCTOSPIM_P1_IO1)						
PIN0/IO2	SPI0_IO2	PA7 (OCTOSPIM_P1_IO2)						
PIN1/IO3	SPI0_IO3	PD13(OCTOSPIM_P1_IO3)						
PIN2			PIN2	PC7				
PIN3			PIN3	PC6				
PIN4			PIN4	PA12				
PIN5					PIN5/UART0_CTS	PB14 (UART4_RTS)		
PIN6					PIN6/UART0_TX	PD0 (UART4_RX)		
PIN7					PIN7/UART0_RX	PD1 (UART4_TX)		
PIN8					PIN8/UART0_RTS	PB15 (UART4_CTS)		
RESET_N							RESET_N	PD9





B2B Conn



USER3-4 Debug

Acconeer AB Västra Varvsgatan 19 211 77 Malmö Sweden			
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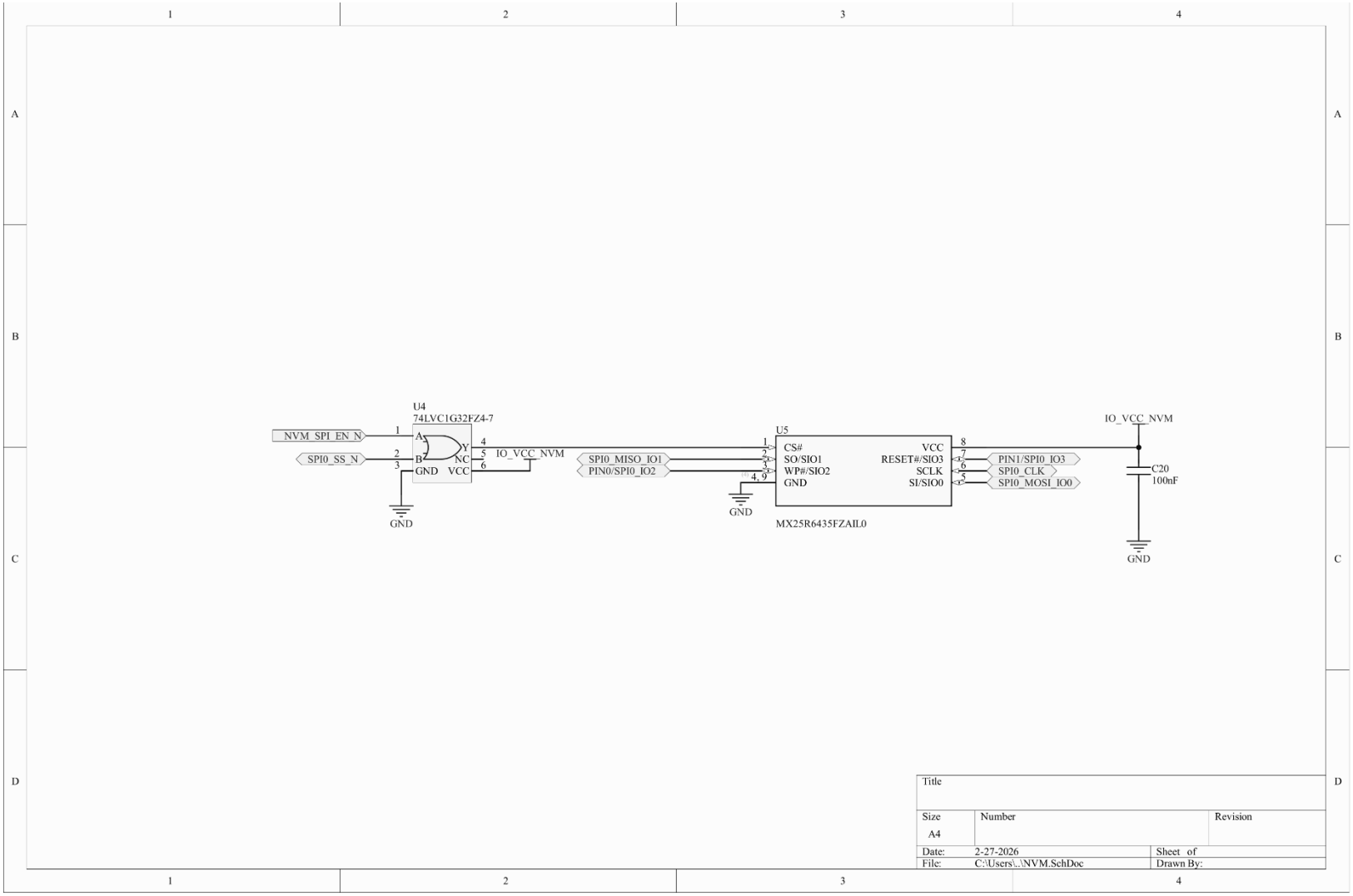
Date: 2026-02-27		Sheet: 2 of 6	
File: Conn.SchDoc		Drawn By: *	



3.6 Bill of Materials

Table 2 shows the BOM for the XE212

Table 2. The BOM for XE212.

Designator	Description	Qty	MPN	Manufacturer
C1, C27	Generic 8 pF SMD capacitor, metric 1005 (0402)	2		
C3, C4, C5, C9, C10, C11, C12, C20, C21, C24	Generic 100nF SMD capacitor, metric 1005 (0402)	10		
C6, C13, C25	Generic 1uF SMD capacitor, metric 1005 (0402)	3		
C7	Generic 10 µF SMD capacitor, metric 2012 (0805)	1		
C8	Generic 4.7µF SMD capacitor, metric 1005 (0402)	1		
C15, C16	Generic 2.2µF SMD capacitor, metric 1005 (0402)	2		
C17, C18	Generic 22 µF SMD capacitor, metric 2012 (0805)	2		
C19, C33, C34, C35, C36, C42	Generic 1uF SMD capacitor, X7R, -55 to 125 °C Temp spec, metric 1005 (0402)	6		
C26	Generic 100nF SMD capacitor, X7R, -55 to 125 °C Temp spec, metric 1005 (0402)	1		
C44, C45	Generic 6pF SMD capacitor, X7R, -55 to 125 °C Temp spec, metric 1005 (0402)	2		
D1, D8	LED Uni-Color Red 639nm 2-Pin Chip LED T/R	2	LTST-C193KRKT-5A	Lite-On
D2, D3	Diode Super Barrier 20V 1A Surface Mount SOD-523	2	SBR1A20T5-7	Diodes Inc.
D4, D9	General Purpose ESD Protection, Bi-Directional, 5.5V VRM max, CSPS BUMPLESS COATING, RoHS	2	ESDZV5-1BU2	STMicroelectronics
J1	USB Type C Female 16Positions 0.5mm Right Angle SMT Embossed T/R	1	217179-0001	Molex
J4	CONN HEADER SMD 20POS 2.54MM	1	TSM-110-01-F-DV	Samtec
L1, L2	Ind Power Chip Shielded Multi-Layer 2.2uH 30% 1MHz Ferrite 1.2A 0806	2	LQM2MPN2R2NG0L	Murata
Q1	MOSFET P-CH, 5.5A I(D), 20V, 1-Element, P-Channel, Silicon, Metal-oxide Semiconductor FET	1	SSM3J133TU,LF	Toshiba
R2	0 Ohm generic SMD resistor, +/-1%, metric 1005 (0402)	1		
R4, R8	33 Ohm generic SMD resistor, +/-1%, metric 1005 (0402)	2		
R5	18 Ohm generic SMD resistor, +/-1%, metric 1005 (0402)	1		

R6, R23	100 kOhm generic SMD resistor, +/-1% metric 1005 (0402)	2		
R7, R39	10 kOhm generic SMD resistor, +/-1%, metric 1005 (0402)	2		
R12, R14	1 kOhm generic SMD resistor, +/-1%, metric 1005 (0402)	2		
R36, R37	5.1 KOhm generic SMD resistor, +/-1%, metric 1005 (0402)	2		
R38	8.06K Ohm generic SMD resistor, +/-1%, metric 1005 (0402)	1		
SW1, SW2	Tactile Switch, 0.05A, 12VDC, 160GF, SMD;	2	TL1030AF160AQJ	E-Switch
U1	DSP with DP-FPU, Arm Cortex-M7 MCU with 512 Kbytes Flash, 564 Kbytes RAM, 550 MHz CPU, L1 cache, external memory interface, subset of peripherals. TFBGA, 100 pins package.	1	STM32H723VEH6	STMicroelectronics
U2	Hi-Speed USB 2.0 ULPI Transceiver	1	USB3320C-EZK	Microchip
U3	Dual, 400mA and 600mA, 2.25MHz Step-Down Converter with 1-Wire Interface in QFN 10-VSON -40 to 85	1	TPS62402DRCR	Texas Instruments
U4	OR Gate, LVC/LCX/Z Series, 1-Func, 2-Input, CMOS, PDSO6	1	74LVC1G32FZ4-7	Diodes Inc.
U5	FLASH - NOR Memory IC 64Mbit SPI - Quad I/O 80 MHz 8-USON (4x4) 1.8V/3.3V	1	MX25R6435FZAIL0	Macronix
U6	AND GATE - SN74LV1T08DBVR - AND Gate, 74LV1T08, 2 Inputs, 1.65 V to 5.5 V Supply, 25 mA Out, SOT-23-5	1	SN74LV1T08DBVR	Texas Instruments
U7	Acconeer A212 multi-channel pulse coherent radar (PCR)	1	A212 - R2A	Acconeer
X1	25 MHz ±10ppm Crystal 8pF 200 Ohms 4-SMD, No Lead 1.6x1.2 mm	1	830081609	Würth Elektronik
X2	Crystal 26.0000MHZ 6PF SMD	1	XRCGE26M000FBA1AR0	Murata

4 Safety

4.1 Electrostatic precautions

Please take electrostatic precautions, including using ground straps, when using the EVK or any of its components. An electrostatic discharge could damage the device.

5 Regulatory Information

Acconeer have no plans to certificate the A212 EVK, it is only for evaluation purposes. For A212 Certification status, refer to A212 datasheet.

6 Revision History

Date	Revision	Changes
2026-03-09	1.0	Original Version

7 Disclaimer

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