# XS121 Satellite Board Product Brief

XS121 Satellite Board Product Brief

Proprietary and Confidential

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# 1.  Introduction

The A121 EVK is an evaluation kit designed to evaluate the Acconeer A121 pulsed coherent radar sensor. The kit consists of three boards: the XC120, XE121 and XS121. The XC120 board carries a cortex M7 MCU which is to be flashed with a software dedicated to stream data from the A121 radar sensor to Acconeer's "Exploration Tool" via USB HS 2.0[1]. The XC120 is intended to be used with the exploration server for streaming radar sensor data only and after flashing, no further configuration by the user is expected. The XE121 features an on board A121 pulsed coherent radar sensor and the possibility to add up to four additional A121 radar sensors via FFC (Flat Flexible Cable) to the XS121 radar sensor boards. This document focuses on the XS121 board. For details on XC120 and XE121 refer to the respective product briefs. For details on how to use the XC120, XE121 and XS121, refer to the A121 EVK Hardware User Guide available on the Acconeer Developer page: https://developer.acconeer.com/

Below a system overview is shown:



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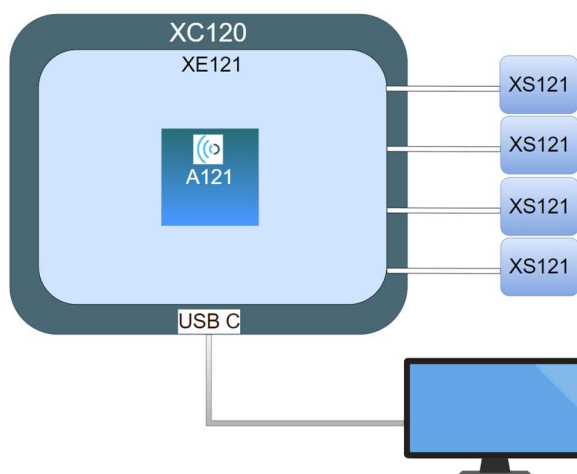
[1] Acconeer's "Exploration Tool" is supported by Linux and Windows OS.

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# 2. XS121 Satellite Board

## 2.1. Overview

The XS121 is a small satellite board equipped with an A121 pulsed coherent radar sensor that via FFC (Flat Flexible Cable) can be connected to the Acconeer Evaluation Board XE121. It is not a mandatory component in the Acconeer A121 Evaluation Kit but can come in handy when you want to evaluate multi sensor use cases or a use case where space for sensor placement is limited. It is not possible to operate the XS121 without an XE121 Evaluation board. The XS121 is delivered with an FFC cable from Molex: 0151660225. The FFC has 20 channels, 0.5mm pitch. The XS121 is compatible with the Acconeer LH112 lens kit.
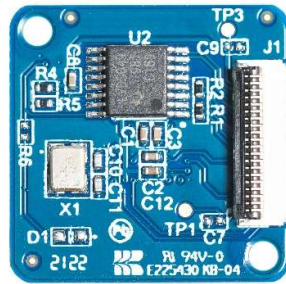
Picture 1 shows the block diagram of XS121:
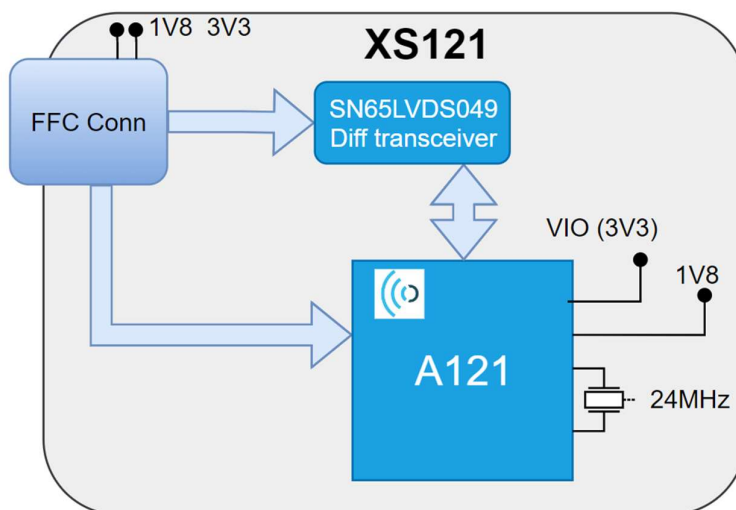


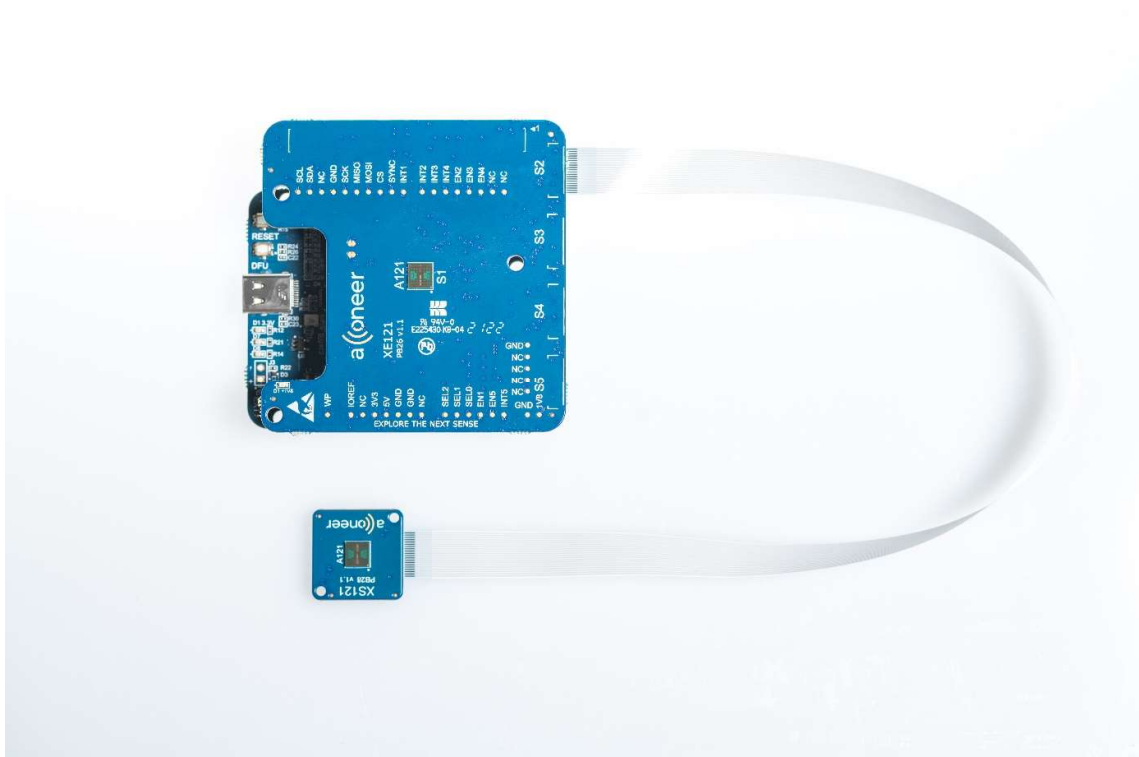**Picture 1. XS121 block diagram.**

In the pictures below, the XS121 front and reverse sides are shown as well as XS121 connected to XE121 and XC120.



**Picture 2. XS121 Satellite board, front side.**

**Picture 3. XS121 satellite board, reverse side.**



**Picture 4. XS121 connected to XE121 which in turn is connected to XC120.**

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## 2.2. Power

The XS121 satellite board is powered from the XE121 which in turn is powered from the XC120, Raspberry Pi or Nucleo Development board. Depending on your use case, if you run simultaneous radar measurements on more than 1 XS121, the power delivered from XC120 powered via USB connector (or Nucleo and Raspberry Pi powered via USB connector) may not be enough. In this case an external power supply is needed. The XC120 has such an option. Refer to XC120 Product Brief fore details: https://developer.acconeer.com/

For details how to use the Nucleo development board and the Raspberry Pi with external power supply, refer to official product information:
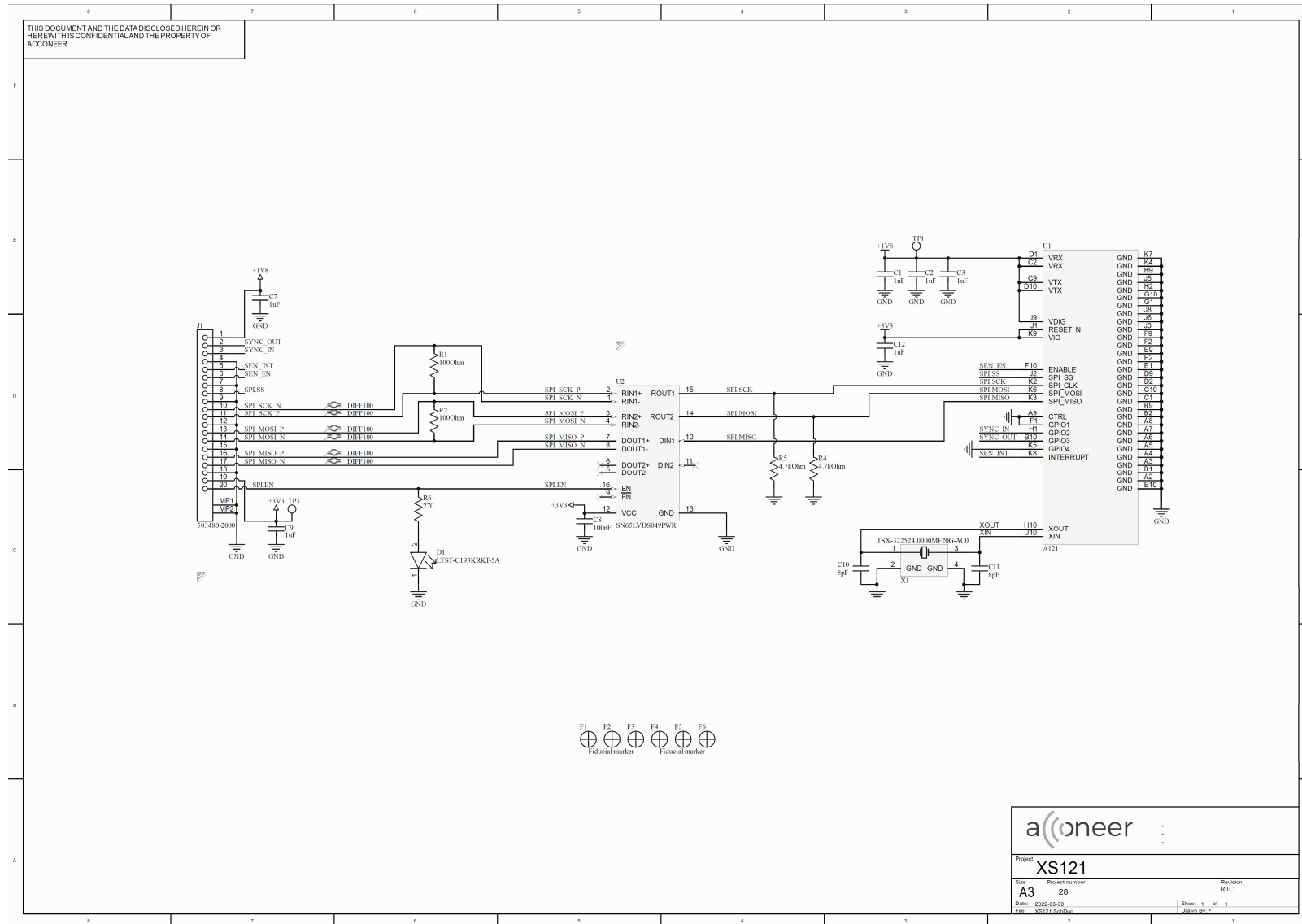
https://www.st.com/content/st_com/en.html

https://www.raspberrypi.com/documentation/computers/raspberry-pi.html - power-supply

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## 2.3.    Electrical Schematics

On the following pages, please find the electrical schematics for the XS121:

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## 2.4. Bill of Material

Table 1 shows the BOM for the XS121

| Component ref. | Part Number | QTY | Value | Comment |
|---|---|---|---|---|
| C1, C3 | 10/UF/K/X5R/50V/3216 | 2 | 10uF | |
| C10, C11, C2, C21, C23, C25, C28, C31, C33, C35, C37, C39, C4, C42, C44, C46, C5, C55, C6, C7, C8, C9 | 100/NF/J/50V/X5R/1005 | 22 | 100nF | |
| C20, C27, C34, C41 | 3.9/NF/K/50V/X7R/1005 | 4 | 3900pF | |
| C24, C26, C30, C32, C38, C40, C45, C47 | 1/UF/K/10V/X5R/1005 | 8 | 1uF | |
| L1 | MURATA, DFE252012R-H-1R0M=P2 | 1 | 1uH | |
| J1, J2, J3, J4 | Molex 503480-1600 | 4 | | 16Pin 0.5 FPCB CONN BACKFLIP |
| J5 | CNC, JINLIN, FH254-40DSMT/2.54MM 2*20 SMD | 1 | | |
| R1, R10, R11, R12, R18, R19, R2, R20, R21, R3, R38, R39, R4, R40, R41, R9 | 0/OHM/J/1005 | 16 | 0Ohm | |
| R13, R14, R15, R16, R17, R22, R23, R24, R25, R5, R6, R7, R8, R42, R43, R44, R45 | 10/KOHM/F/1005 | 17 | 10kOhm | |
| R27, R28, R30, R31, R33, R34, R36, R37 | 51/OHM/J/1005 | 8 | 51Ohm | |
| U1 | M24128-DRDW8TP/K | 1 | | |
| U2 | TPS62061DSGR | 1 | | |
| U3, U4 | 74LVC125APW | 2 | | |
| U5 | NLSV4T244MUTAG | 1 | | |
| U6, U7, U8, U9 | SN65LVDS049PW | 4 | | |

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## 2.5.    Pinning

Table 2 shows the FFC connector pinout for XS121.

| Pin Number | Description |
| --- | --- |
| 1 | +3.3V |
| 2 | +5V |
| 3 | SDA1 connected to EEPROM |
| 4 | Not connected |
| 5 | SCL1 connected to EEPROM |
| 6 | GND |
| 7 | Not connected |
| 8 | Not connected |
| 9 | GND |
| 10 | Not connected |
| 11 | PMU_EN |
| 12 | SPI_S1_ENABLE_N, selects sensor 1 to respond to SS_N. |
| 13 | SPI_S2_ENABLE_N, selects sensor 2 to respond to SS_N. |
| 14 | GND |
| 15 | SPI_S3_ENABLE_N, selects sensor 3 to respond to SS_N. |
| 16 | ENABLE_S1_3V3, selects sensor 1 to respond to ENABLE_N. |
| 17 | +3.3V |
| 18 | INTERRUPT_S3_3V3, interrupt from sensor 3. |
| 19 | SPI_MOSI_3V3 |
| 20 | GND |
| 21 | SPI_MISO_3V3 |
| 22 | INTERRUPT_S4_3V3, interrupt from sensor 4. |
| 23 | SPI_CLK_3V3 |
| 24 | SS_N, SPI slave select signal. |
| 25 | GND |
| 26 | SPI_S4_ENABLE_N, selects sensor 4 to respond to ENABLE_N. |
| 27 | Not connected |
| 28 | Not connected |
| 29 | ENABLE_S2_3V3, selects sensor 2 to respond to ENABLE_N. |
| 30 | GND |
| 31 | ENABLE_N, sensor enable signal. |

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| Pin Number | Description |
|---|---|
| 32 | ENABLE_S3_3V3, selects sensor 3 to respond to ENABLE_N. |
| 33 | Not connected |
| 34 | GND |
| 35 | Not connected |
| 36 | Not connected |
| 37 | ENABLE_S4_3V3, selects sensor 4 to respond to ENABLE_N. |
| 38 | INTERRUPT_S1_3V3, interrupt from sensor 1. |
| 39 | GND |
| 40 | INTERRUPT_S2_3V3, interrupt from sensor 2. |

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# 3. Revision History

| Date | Version | Changes |
|------|---------|---------|
| 2022-07-06 | 1.0 | Original Version |
| | | |
| | | |

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