ABBYCUS IOX

ABBY-IOX-BREAKOUT

A low cost breakout board for the development, debug, and rapid programming of the IOX series of co-processor modules.
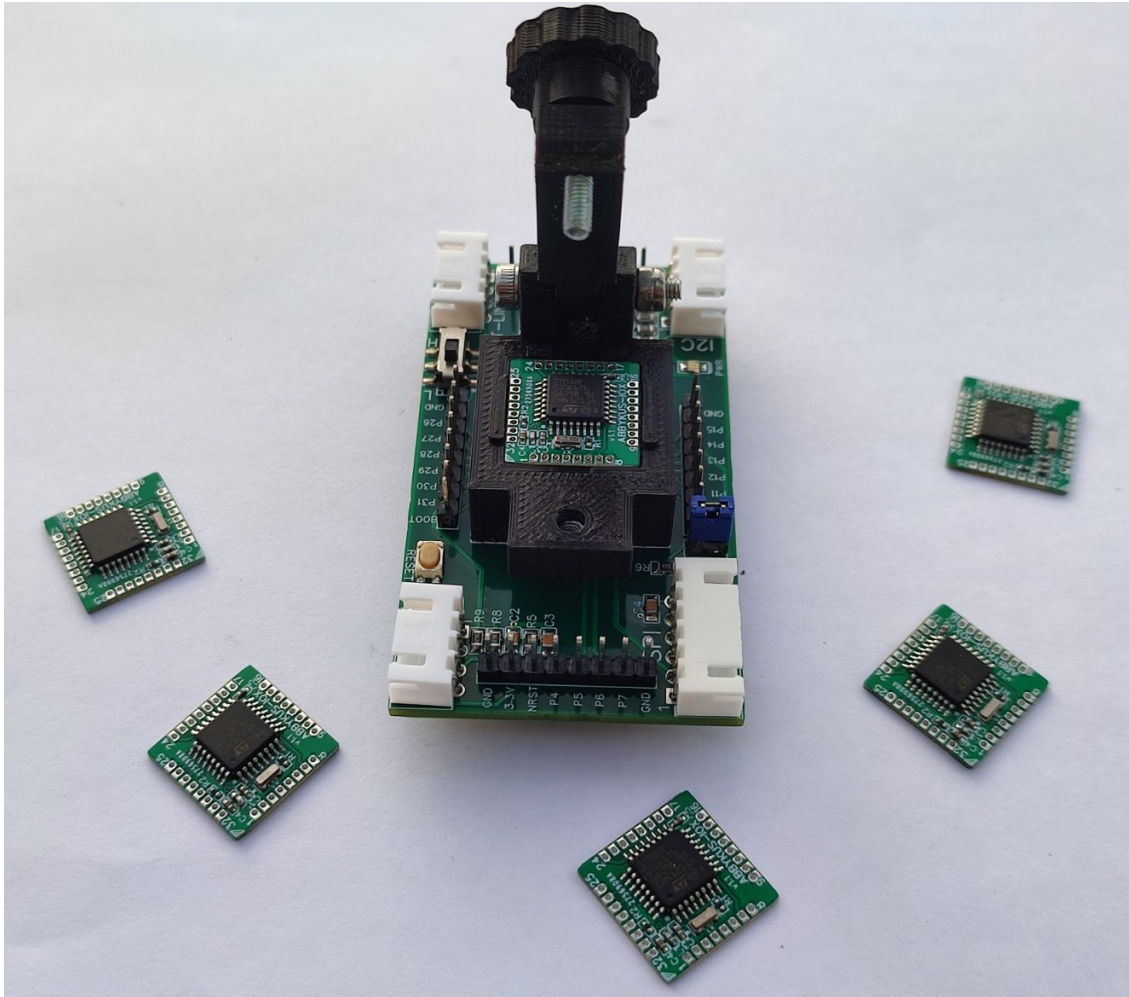

Figure 1. IOX Breakout Board

Features

- DIY programming and debugging using the STMicroelectronics ST-LINK V2 debugger (not supplied).

- Serial bus connectors for I2C, UART, and SPI.

- Pogo-pin socket allows quick change for rapid updates and DIY programming.

- Robust socket clamp prevents Pogo-pin damage.

- 32 breakout pins to 0.1" headers.

- Built-in power LED and user LED on pin 10 (GPIO 4).

- Small form factor (4cm x 7cm) PCB.

See also...

Description

The ABBY-IOX-BREAKOUT board allows testing, programming, and debugging of an ABBY-IOX co-processor device. The breakout board includes connectors for all three available interfaces (I2C, UART, and SPI).

Also included is a connector for an ST-LINK V2 programmer / debugger tool available from STMicroelectronics.

There are two indicator LED's on board:

GREEN – indicates 3.3V power is applied.

RED – user programmable indicator which is connected to pin 10 (GPIO 4). This LED can be disabled by removing the LED jumper.

The breakout board contains four 0.1" 8 pin headers corresponding to the four sides of the IOX module.
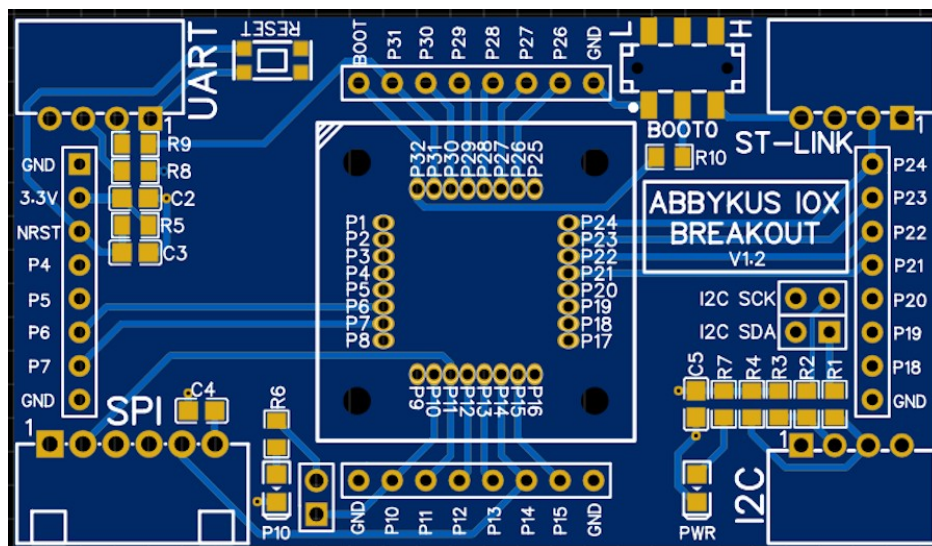

Figure 2. IOX-BREAKOUT PCB Top View

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Physical Dimensions

Figure 3. PCB Dimension
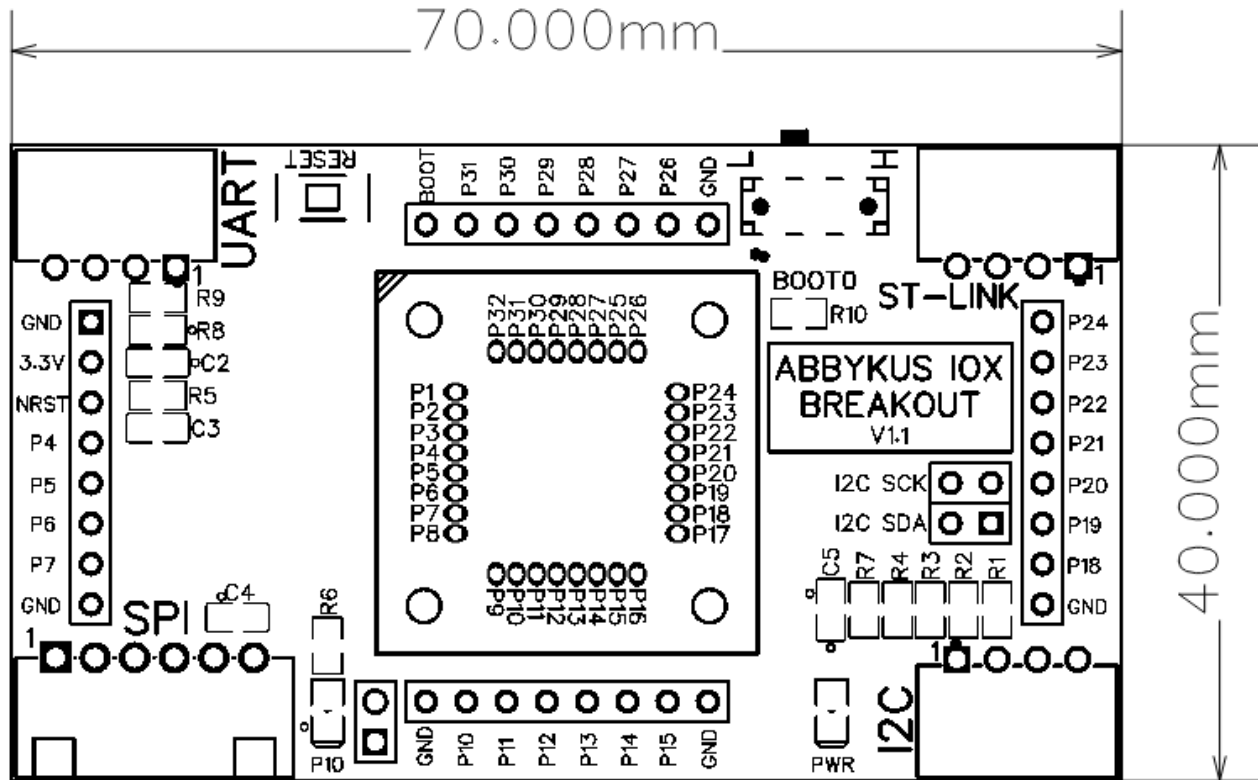
The IOX-BREAKOUT board measures LWD: 70mm x 40mm x 35mm (depth including the pogo pin fixture).

Weight 32 grams.

Power Requirement

The IOX-BREAKOUT board requires an externally supplied voltage of 2.5V to 3.6V DC (typically 3.3V).

NOTE: The IOX co-processor devices are **not** 5V tolerant. Any voltage applied to the 3.3V input pin or any of the I/O pins should never exceed 3.6V.

External 3.3V power can be connected to any of the serial bus connectors or the ST-LINK connector as follows:

- **ST-LINK** connector, 3.3V = pin 4, GND = pin 1.

- **I2C** connector, 3.3V = pin 4, GND = pin 1.

- **UART** connector, 3.3V = pin 4, GND = pin 1.

- **SPI** connector, 3.3V = pin 6, GND = pin 1.

<mark>IMPORTANT</mark>: PCB version **1.1** has errors on the bottom silkscreen as follows:

I2C connector

UART connector

SPI connector

Please use the corrected silkscreen below for power connection:
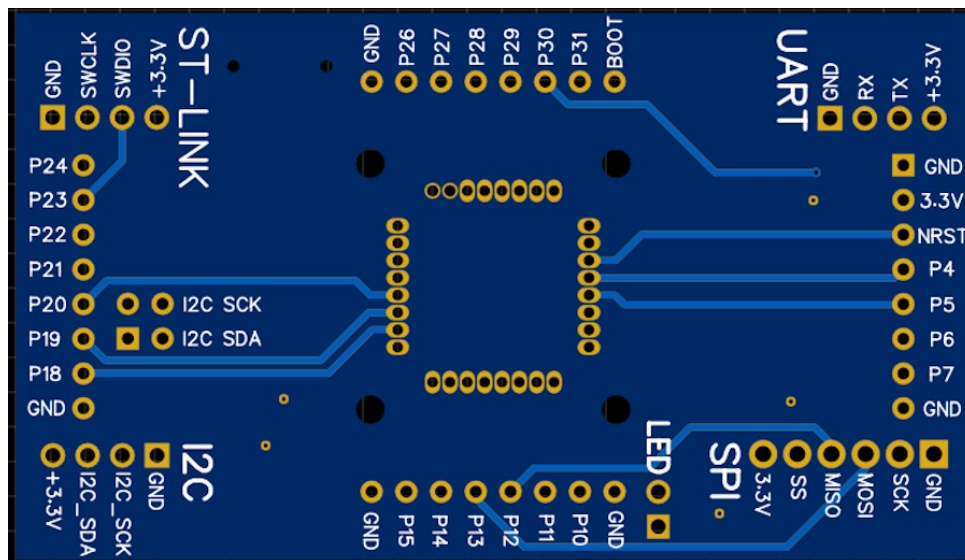

Figure 4. IOX-BREAKOUT PCB SilkBottom

I2C Connection

The *ABBY-IOX-I2C* version uses the standard Inter-Integrated-Circuit (I2C) serial bus to communicate with a master device. More information about the I2C bus can be found *here.*

I2C is a 2-wire serial synchronous communication bus used to send commands to the IOX-I2C device. More information about this version of the IOX series can be found *on github*.

The I2C connector is a 2.5mm spacing 4 pin right angle connector. Mating connectors are the XH-4Y series with pins XH-PT. The pinout is as follows:

Pin	Description
1	GROUND
2	I2C_SCK – I2C serial clock input.
3	I2C_SDA – I2C bidirectional data pin.
4	+3.3V – Power for the IOX device under test.

NOTE: When using the breakout board in I2C mode, the two I2C jumpers at SCK and SDA should be installed. In UART mode these two jumpers should be removed.

UART Connection

The *ABBY-IOX-UART* version uses the standard Universal Asynchronous Receiver-Transmitter (UART) serial bus to communicate with a master device. More information about the UART bus can be found *here.*

UART is a 2-wire serial asynchronous bus used to send commands to the IOX-UART device. More information about this version of the IOX series can be found *on github*.

The UART connector is a 2.5mm spacing 4 pin right angle connector. Mating connectors are the XH-4Y series with pins XH-PT. The pinout is as follows:

Pin	Description
1	GROUND
2	RX – UART serial data input. Should connect to master TX signal.
3	TX – UART serial data output. Should connect to master RX.
4	+3.3V – Power for the IOX device under test.

NOTE: When using the breakout board in UART mode, the two I2C jumpers at SCK and SDA should be removed. In I2C mode these two jumpers should be installed.

SPI Connection

The *ABBY-IOX-SPI* version uses the standard Serial Peripheral Interface (SPI) bus to communicate with a master device. More information about the SPI bus can be found *here.*

SPI is a 4-wire high speed serial asynchronous bus used to send commands to the IOX-SPI device. More information about this version of the IOX series can be found *on github*.

The UART connector is a 2.5mm spacing 4 pin right angle connector. Mating connectors are the XH-6Y series with pins XH-PT. The pinout is as follows:

Pin	Description
1	GROUND
2	+3.3V – Power for the IOX device under test.
3	SCK – SPI clock line.
4	MOSI – SPI Master Out / Serial In
5	MISO – SPI Master In / Serial Out
6	SS – SPI device select.

ST-LINK Connection

The IOX-BREAKOUT board includes a connection for the STMicroelectronics ST-LINK V2 programmer / debugger. This allows for firmware updates and DIY programming & debugging. More information about the ST-LINK programmer can be found *here.*

The ST-LINK connector is a 2.5mm spacing 4 pin right angle connector. Mating connectors are the XH-4Y series with pins XH-PT. The pinout is as follows:

Pin	Description
1	GROUND
2	SWCLK – signal from the ST-LINK programmer – GPIO14.
3	SWDIO – signal from the ST-LINK programmer – GPIO13.
4	+3.3V – Power for the IOX device under test.

NOTE: The signals SWDIO & SWCLK connect to GPIO13 and GPIO14. This means that debugging may not work if the above GPIO's are used for a different purpose.
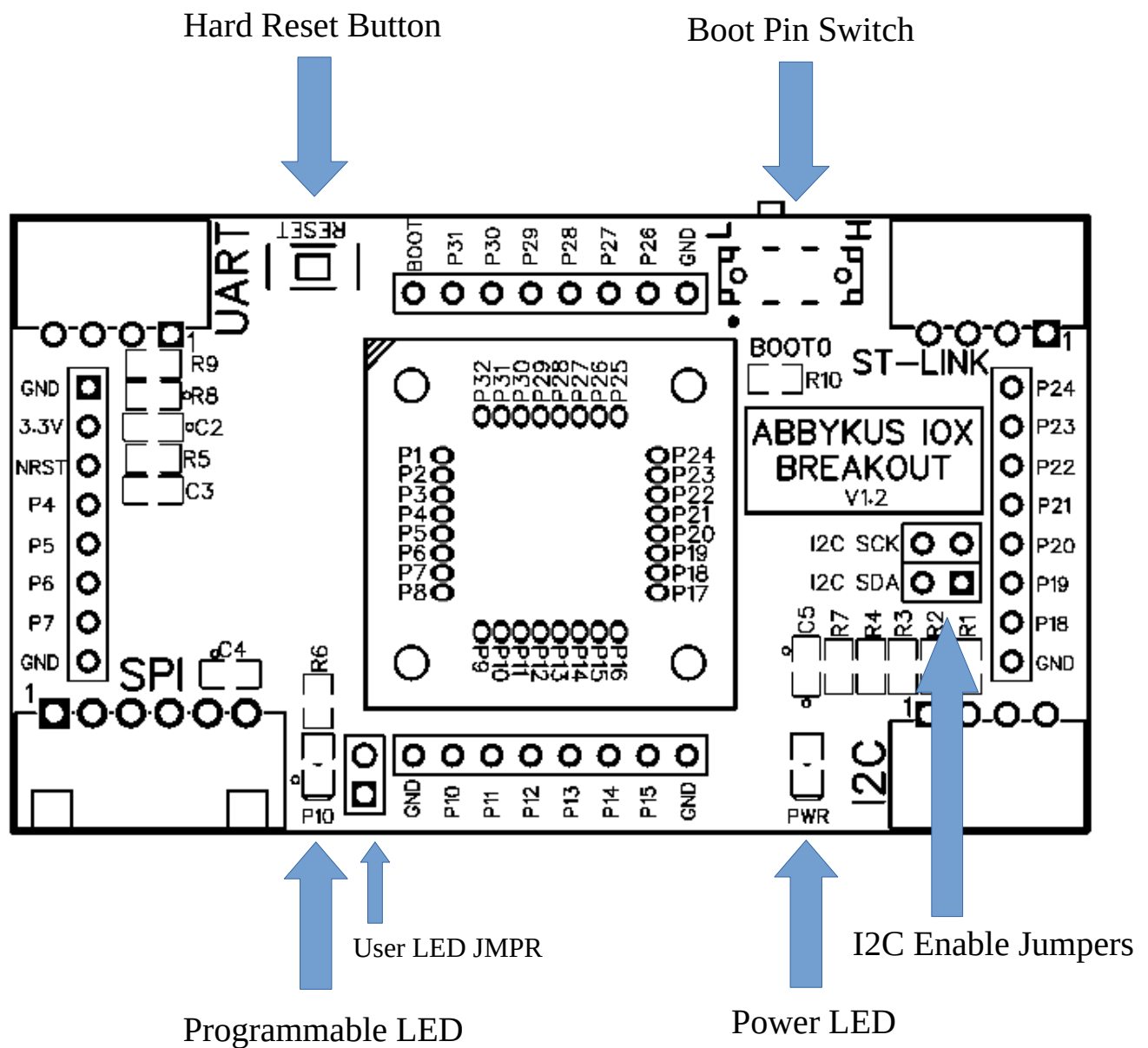
Miscellaneous

Hard Reset Button

Boot Pin Switch

User LED JMPR

I2C Enable Jumpers

Programmable LED

Power LED

Figure 5. Miscellaneous Information

Hard Reset Button

The hard reset button connects the IOX NRST signal to ground when pressed. This will force a hard reset to the IOX device rebooting the MCU and causing all I/O pins to be put in their reset condition (low power analog input).

Boot Pin Switch

The boot pin switch is used to set the IOX Boot Pin (pin 32) to a LOW or HIGH state.

For normal operation the boot pin switch should be set to the 'L' position. When using the ST-LINK V2 programmer / debugger, it may be required to set the boot pin high during programming. See here for more information.

I2C Enable Jumpers

There are two jumpers that enable the board to use the I2C serial bus. The jumpers are necessary because the I2C bus signals use the same IOX pins as the UART serial bus. When the IOX-UART version is used, the I2C Enable jumpers should be removed.

Power LED

A green LED indicating that power is applied to the breakout board.

Programmable LED

A red LED that is optionally connected to IOX pin 10 (GPIO4). The LED will be lit when GPIO4 is HIGH.

The LED can be disconnected by removing the User LED jumper located next to the programmable LED.
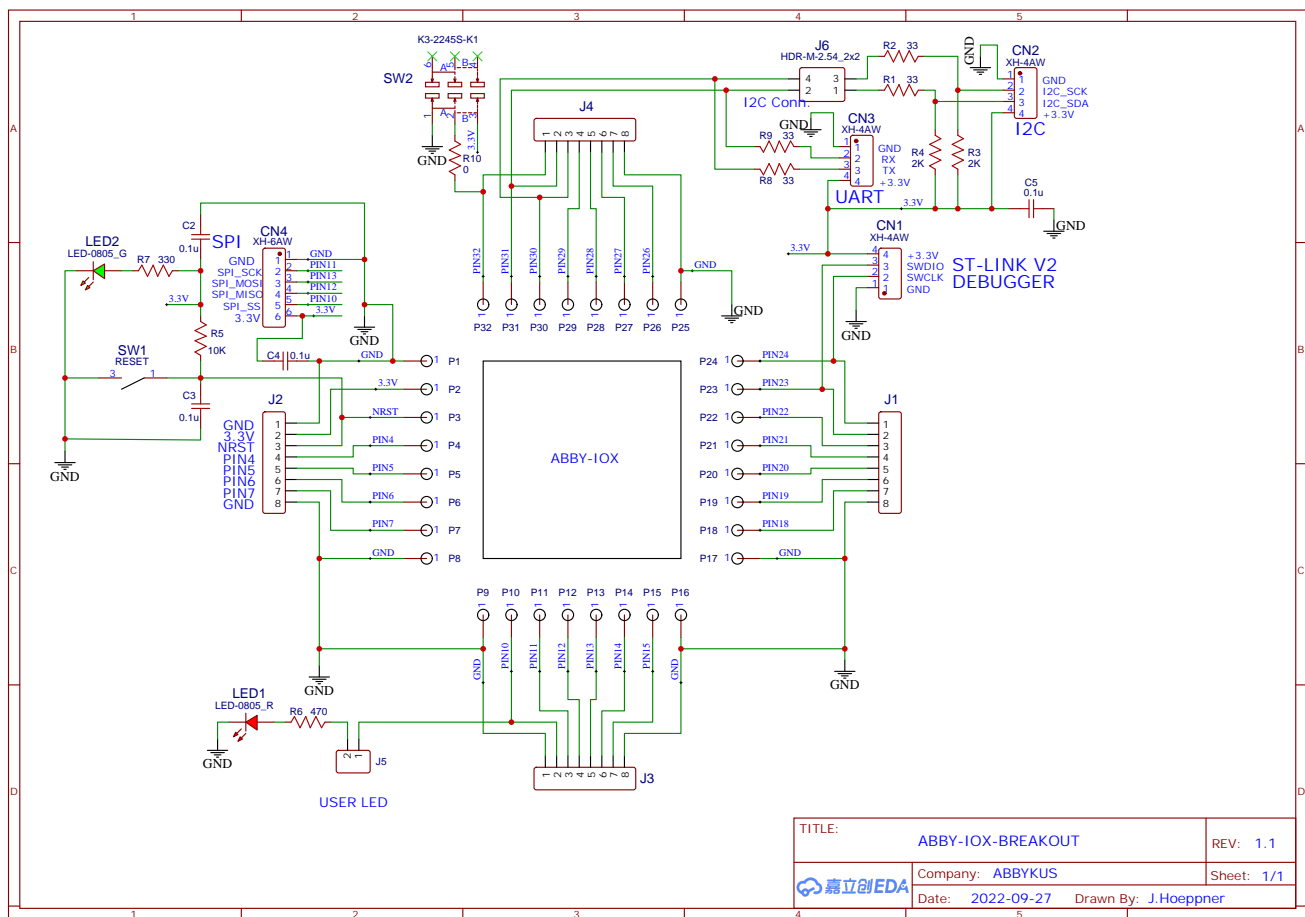
SCHEMATIC

Figure 6. IOX-BREAKOUT Board Schematic

The schematic PDF can also be found here.