

# ARROW ARIS EDGE Board

## Hardware User's Guide

All information contained in these materials, including products and product specifications, represents information on the product at the time of publication and is subject to change by RELOC s.r.l. without notice.

# Outline

- 1. Introduction ..... 4
  - 1.1. Description ..... 4
  - 1.2. Kit contents ..... 4
  - 1.3. Getting started..... 4
- 2. System overview ..... 5
  - 2.1. Board main features ..... 5
  - 2.2. Block diagram ..... 6
- 3. Connectors ..... 7
  - 3.1. Arduino expansion connector ..... 9
  - 3.2. JTAG connectors..... 10
  - 3.3. USB device ..... 10
- 4. Usage ..... 11
  - 4.1. Power supply..... 11
  - 4.2. Power enable and measurement..... 11
  - 4.3. Push buttons, LEDs and buzzer ..... 12
- 5. Board layout..... 15

## Revisions

REVISION	DATE	DESCRIPTION	STATUS	AUTHOR	REVISER
0.1	10/01/2017	Document created	draft	L. Dal Bello	
1.0	20/01/2017	Document released	release	L. Dal Bello	A. Ricci
1.1	08/03/2017	Hardware description revised	release	A. Ricci	
1.2	05/05/2017	ARIS EDGE production release updates	release	A. Ricci	

## Disclaimer

All rights strictly reserved. Reproduction in any form is not permitted without written authorization from RELOC s.r.l.

<b>RELOC s.r.l.</b> HEADQUARTERS Via Borsari, 23/A 43126 – Parma (Italy)	info@reloc.it – <a href="http://www.reloc.it">www.reloc.it</a> Land +39-0521-1759942 Fax +39-0521-1913461
--	---

# 1. Introduction

## 1.1. Description

ARIS EDGE board, developed by RELOC for Arrow Electronics, is a ready-to-use Internet of Things (IoT) hardware and software platform that enables users to get their IoT applications up and running quickly, exploiting the Renesas Synergy development framework.

Based on Renesas Synergy S1 MCU with a 32-MHz ARM Cortex-M0+ core, the ARIS EDGE board has a host of features that equip it for smart sensing and IoT operations. Communication with other devices and the cloud is enabled by means of a flexible multi-protocol radio module, supporting Bluetooth Low Energy (BLE 4.1/4.2), Thread and ZigBee stacks. Board sensing capabilities include motion detection via 9-degrees-of-freedom IMU with sensor fusion capabilities, environmental temperature, humidity, pressure and ambient light sampling.

The Renesas Synergy Platform helps to accelerate IoT designs: a proven combination of hardware and software makes development easier and faster, thus encouraging innovation and product differentiation. The combination of Arrow ARIS board and Renesas Synergy software platform enables developers to reduce time-to-market and decreases the total cost of ownership of a product over its lifetime.

## 1.2. Kit contents

The following items are included in the box:

- 1x ARIS EDGE board
- 1x USB type A-male to mini-B-male cable

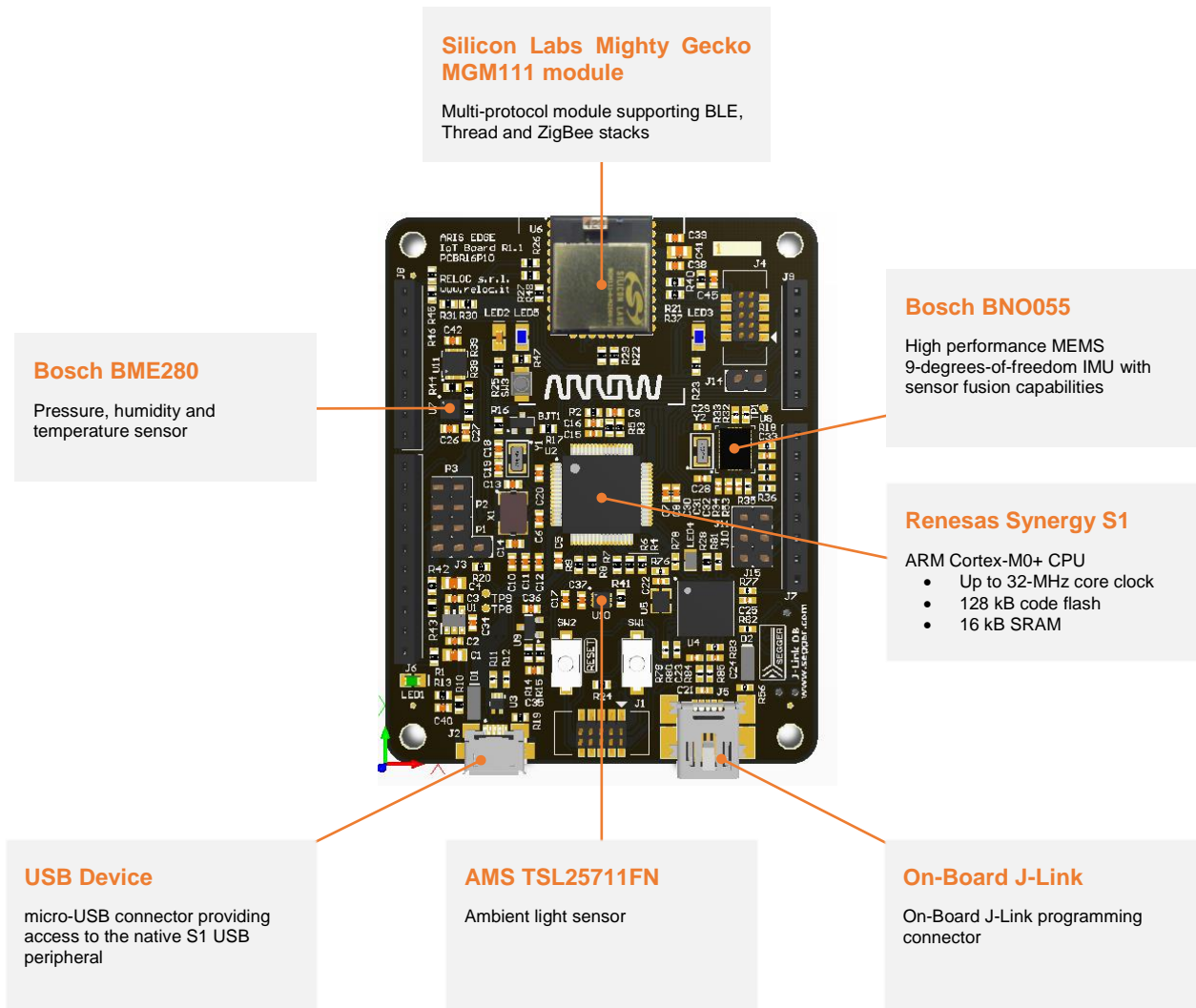
## 1.3. Getting started

Please refer to ARIS EDGE Software User's Guide to learn how to get started with the ARIS EDGE board.

## 2. System overview

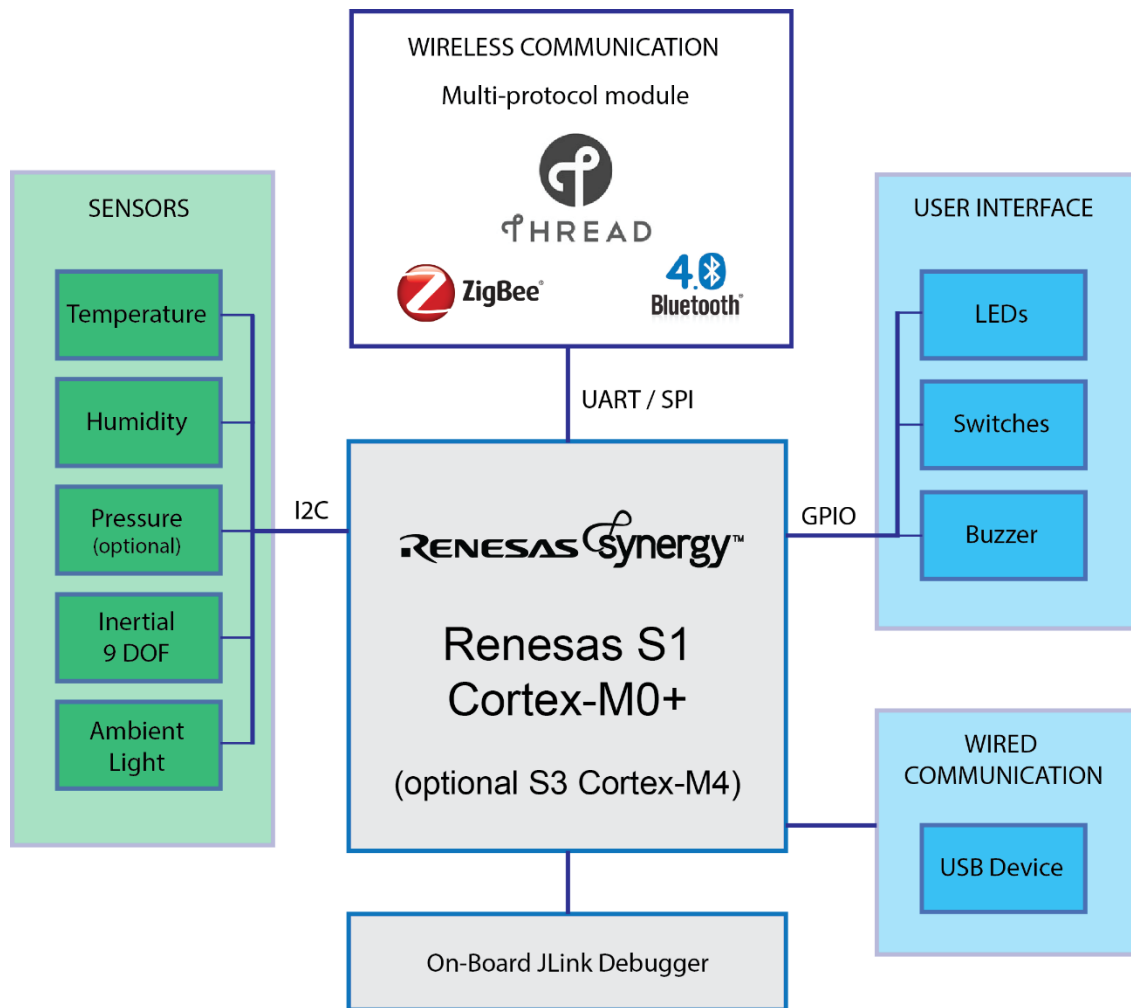
### 2.1. Board main features

ARIS EDGE board main features are resumed in the picture below.

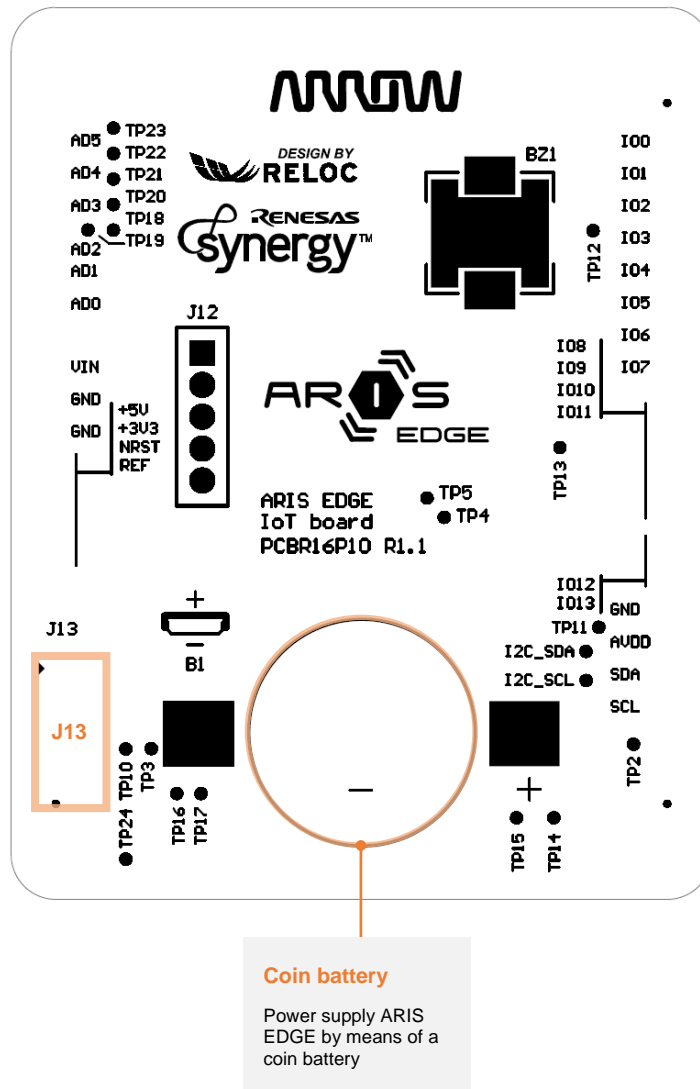


## 2.2. Block diagram

An overview of the functions of ARIS EDGE board is shown in the figure below:



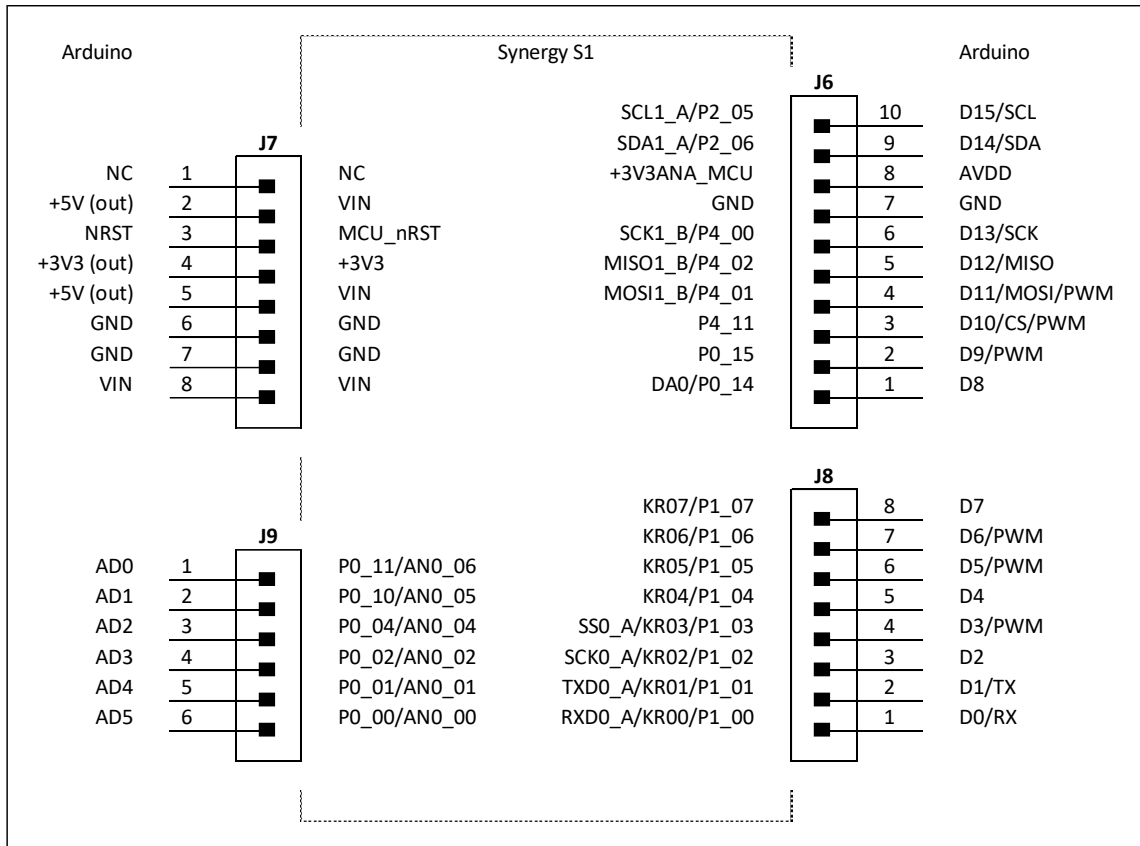






### 3.1. Arduino expansion connector

Connectors J6, J7, J8, J9 provides user with a standard Arduino shield expansion slot.



Signal	Description
NC	Not connected
VIN	Input voltage
MCU_nRST	MCU reset signal (active low)
+3V3	+3.3V power supply
GND	Ground connections
P0_00-04, P0_10-11	Analog inputs directly connected to MCU
P2_05-06	I2C interface (IIC1_A) shared with on-board sensors
+3V3ANA_MCU	Analog reference
P4_00-22, P4_11	SPI port (SCI1_B); GPIO P4_11 is used as SPI chip select signal
P0_15	GPIO shared with Light Sensor interrupt
P0_14	Digital to analog converter (DA0)
P1_04-07	GPIOs directly connected to MCU
P1_02-03	SPI port (SCIO_A) slave select and clock signals; P1_01-02 ports can be used as MOSI / MISO terminals
P1_00-01	SCIO_A uart transmitter and receiver signals

### 3.2. JTAG connectors

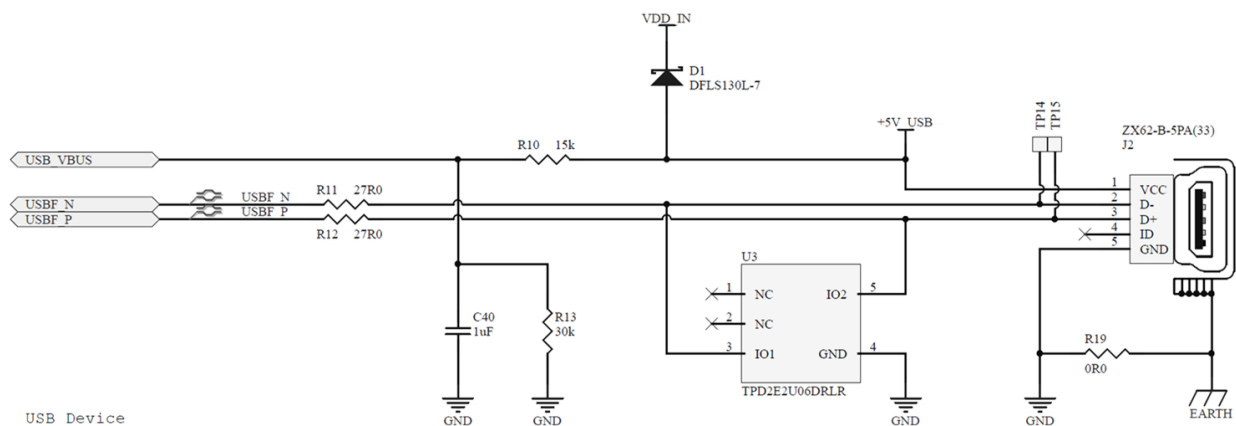
The ARIS EDGE development kit features an on-board SEGGER J-Link debugger (see J5 mini-USB port), which can be used to program and debug the Synergy S1 microcontroller.

The ARIS EDGE board includes additional JTAG connectors, which are generally not required for a “standard” usage. Nevertheless, the following description is provided for reference:

- J1 – JTAG connector which can be used to program and debug Synergy S1 with an external J-Link debugger;
- J4 – JTAG connector routed to the Silicon Labs Mighty Gecko system-on-chip (MGM111 module);
- J13 – E1 programmer connector routed to the Renesas RX621 chip. Such a chip provides users with the on-board SEGGER J-Link facility, thus it should not be erased and/or re-programmed.

### 3.3. USB device

The ARIS EDGE board is equipped with a USB Full-Speed (12 Mbps) device port on J2 connector. ARIS EDGE can be powered through this interface (see diode D1).



## 4. Usage

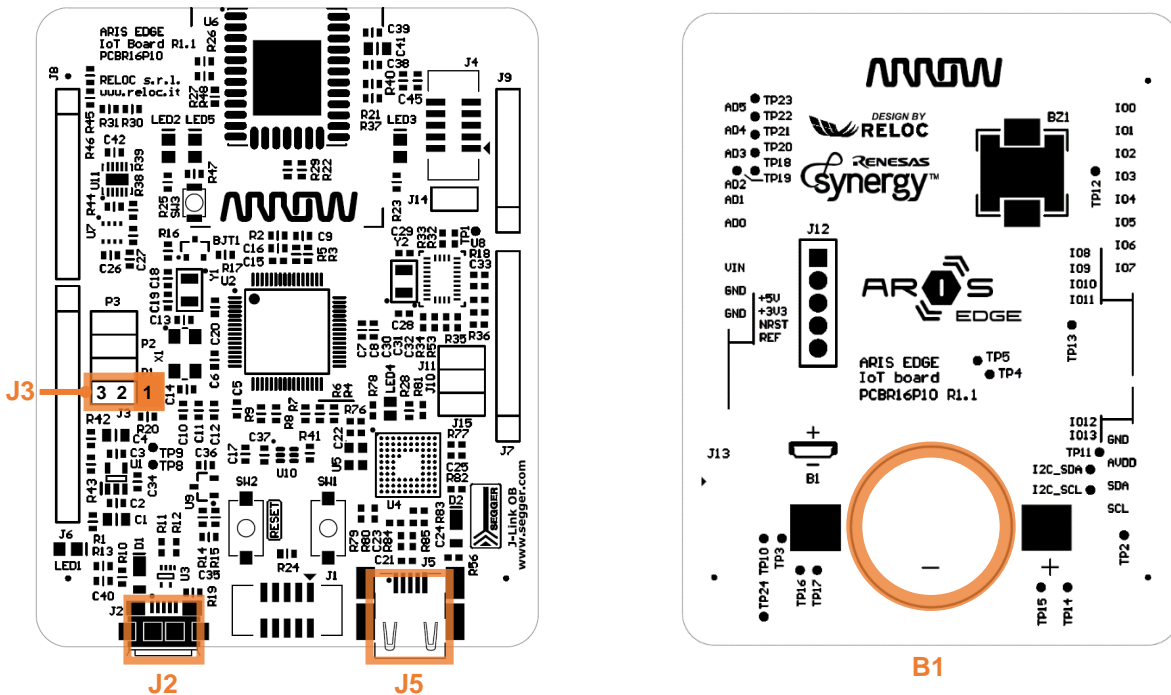
This chapter describes how to connect, configure and interact with the ARIS EDGE board.

### 4.1. Power supply

The ARIS EDGE board can be supplied with power from

- the mini-USB port J5,
- the micro-USB port J2,
- or the battery connector B1.

*Please Note: it is not recommended to use more than one power supply source at the same time.*

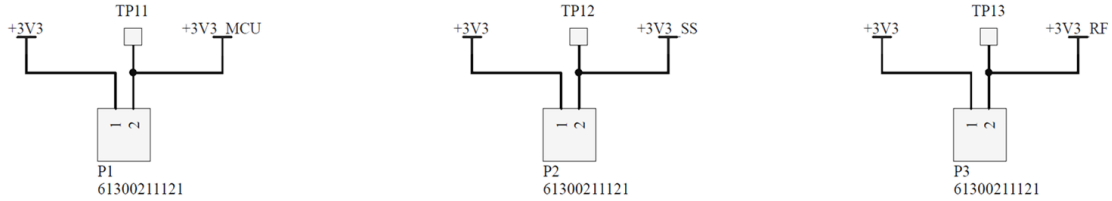


In order to power supply ARIS EDGE board either from J2 or J5, short J3 pins 2 and 3 (populated in the default configuration). Otherwise, short J2 pins 1 and 2 to exploit battery connector B1.

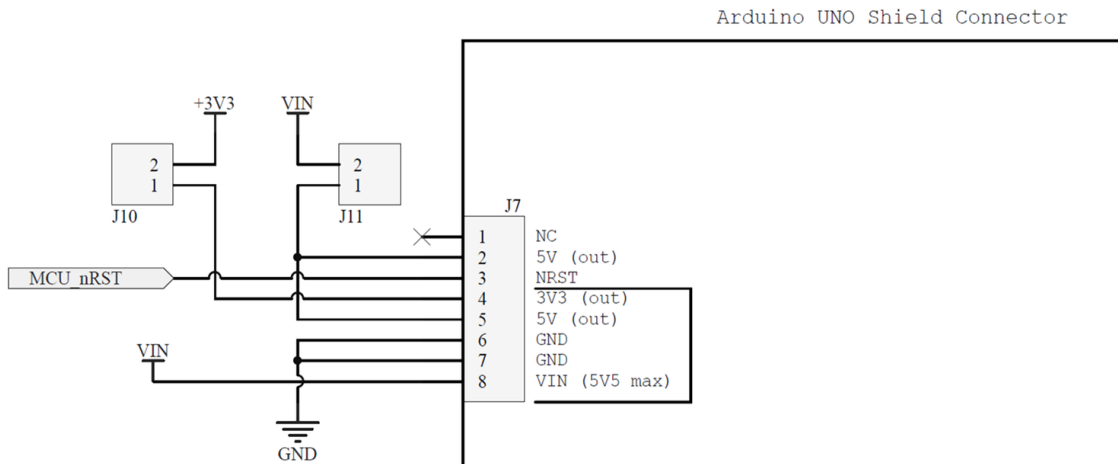
### 4.2. Power enable and measurement

P1, P2 and P3 (populated in the default configuration) provide power to the Synergy S1 MCU, sensors and radio module, respectively (i.e. connect the input power sources to the board loads).

They can also be used to measure the current consumption of the ARIS EDGE circuitry sections.



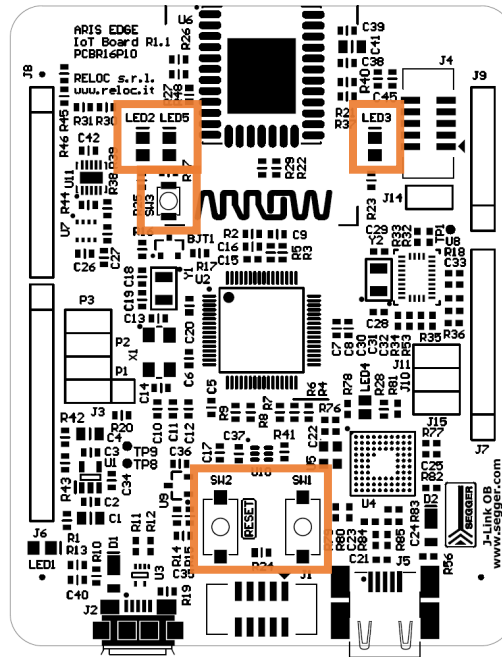
J10 and J11 (*not* populated in the default configuration) could be used to provide power to the Arduino connectors; before placing a jumper please check that current consumption of the shield is within maximum values provided by the +5V input and +3.3V regulated power supply.



### 4.3. Push buttons, LEDs and buzzer

ARIS EDGE developer is provided with a basic user interface, including buttons, LEDs and buzzer. Buttons and LEDs are directly connected to both Renesas Synergy S1 MCU (SW1, SW2, LED2, LED3) and Silicon Labs Mighty Gecko module (SW3, LED5).

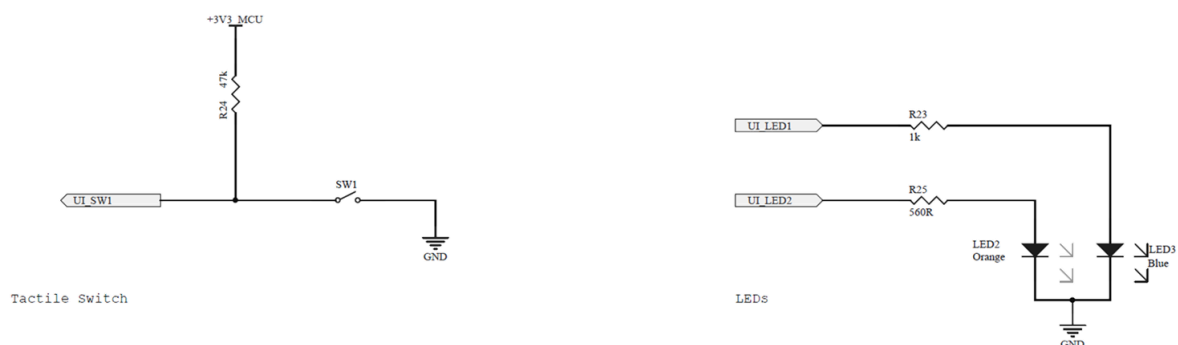
Buttons and LEDs positions are highlighted in the picture below.



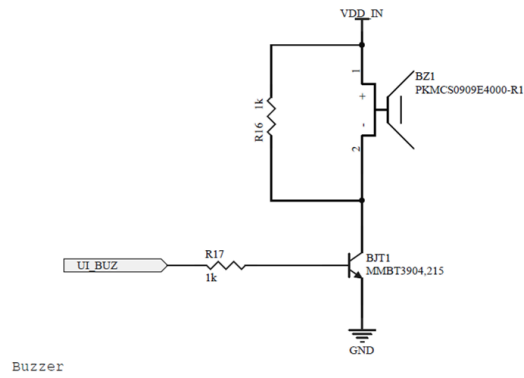
Mapping of the user interface to the S1 microcontroller and MGM111 module pins is provided below.

Device	Port	Schematic Signal	Description
Synergy S1	P3_01	UI_SW1	<b>SW1</b> tactile switch
	RES#	MCU_nRST	<b>SW2</b> tactile switch connected to MCU reset signal (active low)
	P1_13	UI_LED1	<b>LED3</b> Blue LED
	P3_03	UI_LED2	<b>LED2</b> Orange LED
	P5_01	UI_BUZ	<b>BZ1</b> buzzer
Mighty Gecko module	PA3	RF_SW	<b>SW3</b> tactile switch
	PA4	RF_LED	<b>LED5</b> Blue LED

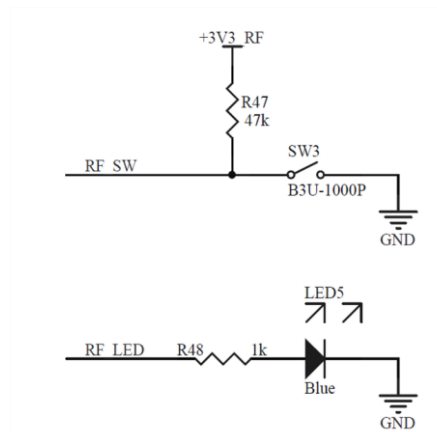
Schematic extracts are provided as an additional reference.



Synergy S1 tactile switch and LEDs.



Synergy S1 buzzer.



Mighty Gecko tactile switch and LED.

## 5. Board layout

Top and bottom board layouts (component placement and overlay) are provided for reference purposes.

