

Description

The Modulino® Buttons, powered by an on-board STM32C011F4 microcontroller, features three SPST push buttons and three indicator LEDs. This setup enables both simple digital input reading via I2C and more advanced interfacing or reprogramming options. Ideal for projects that require user interaction, menu navigation, or quick control inputs.

Target Areas

Maker, beginner, education



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1 Application Examples

- **Interactive Interfaces** Integrate multiple buttons into a project to navigate menus or adjust settings in real time.
- **Educational Projects** Teach fundamentals of state detection (pressed/released) and microcontroller-based I2C communication.
- **Control Panels** Combine button inputs with other Modulino® nodes (e.g., display, buzzer) for a complete user interface.



2 Features

- Three **SPST push buttons** and three on-board indicator LEDs.
- Integrated **STM32C011F4** microcontroller providing I2C interface by default.
- **Optional SWD** interface for custom firmware and advanced features.
- Designed for **3.3 V** operation via the Qwiic connector (I2C).
- Ideal for **user interaction** and input within modular IoT or maker projects.

2.1 Contents

SKU	Name	Purpose	Quantity
ABX00110	Modulino® Buttons	3× push buttons and indicator LEDs	1
	I2C Qwiic cable	Compatible with the Qwiic standard	1

3 Related Products

- *SKU: ASX00027* – Arduino® Sensor Kit
- *SKU: K000007* – Arduino® Starter Kit
- *SKU: AKX00026* – Arduino® Oplà IoT Kit

4 Rating

4.1 Recommended Operating Conditions

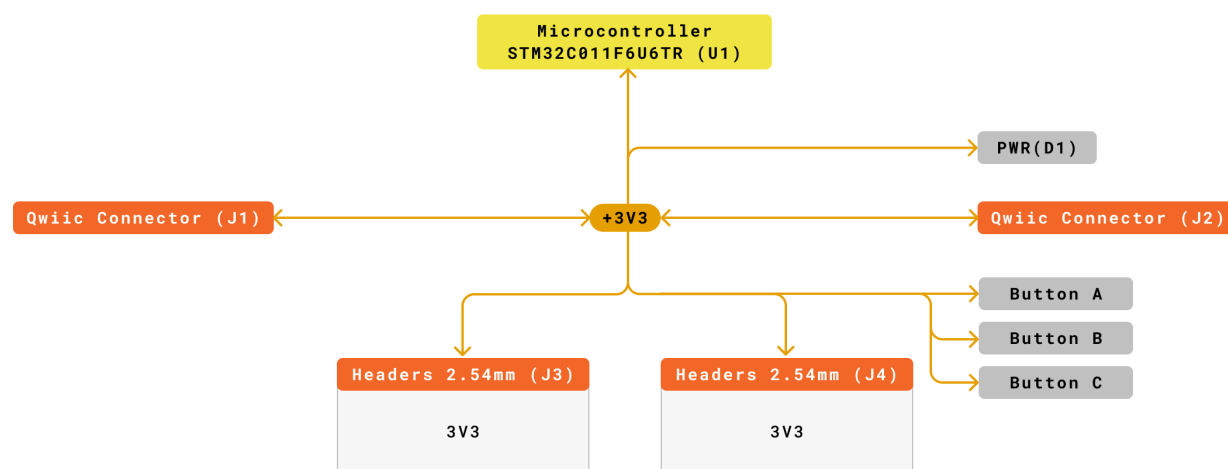
- **Microcontroller supply range:** 2.0 V – 3.6 V (STM32C011F4)
- **Powered at 3.3 V** through the Qwiic interface (in accordance with the Qwiic standard)
- **Operating temperature:** –40 °C to +85 °C

Typical current consumption:

- Push buttons + LEDs: $\sim 2.5 \text{ mA} \times 3 + \sim 3.4 \text{ mA}$
- Microcontroller idle: $\sim 3.4 \text{ mA}$

5 Power Tree

The power tree for the modulino can be consulted below:



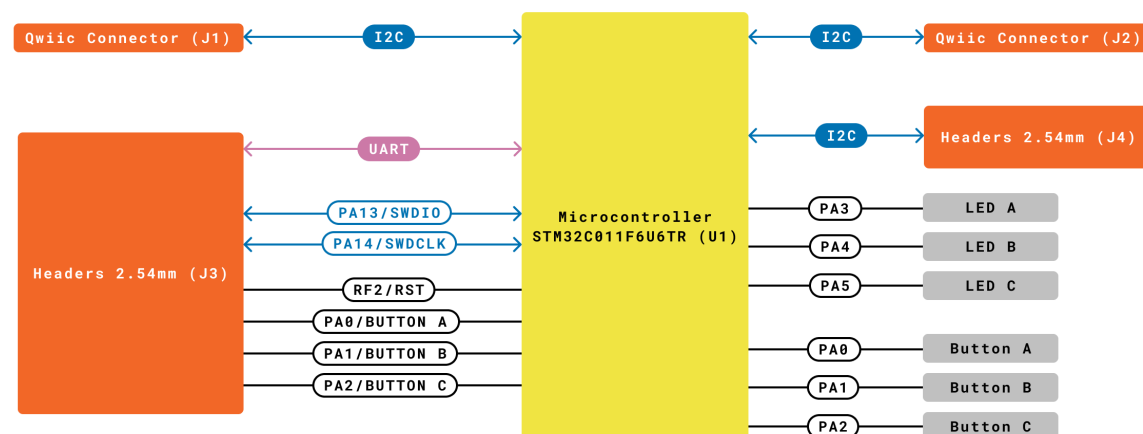
Legend:	■ Connector	■ +3V3
■ VIN	■ Main Part	■ +5V
■ VBUS	■ Internal Part	

Modulino Buttons
 SKU code: ADX00110
 Power Tree
 Last update: 04 Feb, 2025

Modulino® Buttons Power Tree

6 Block Diagram

This module includes an STM32C011F4 microcontroller handling button inputs and LED outputs. It communicates via I2C by default, but can be reprogrammed via SWD for custom functionality.



Legend:	Connector	I2C/I2S	Other SERIAL
	Main Part	SPI	
	Internal Part	UART	



Modulino Buttons
SKU code: ASX08118
Block Diagram
Last update: 04 Feb, 2025

Modulino® Buttons block diagram

7 Functional Overview

The Modulino® Buttons node has a dedicated microcontroller (STM32C011F4) which scans the three SPST push buttons and drives the three LEDs. By default, it exposes a standard I2C interface over the Qwiic connector. The on-board firmware reports button states and allows simple LED control via I2C registers. Advanced users can re-flash the microcontroller via the SWD interface for additional custom logic.

7.1 Technical Specifications (Module-Specific)

Specification	Details
Microcontroller	STM32C011F4
Accuracy	ADC: ± 2 LSB typical INL
Resolution	12-bit ADC
Supply Voltage	Min: 2.0 V, Max: 3.6 V
Power Consumption	$\sim 2.5 \text{ mA} \times 3 + 3.4 \text{ mA}$ (LEDs + MCU)
User Inputs	3× SPST push buttons
LEDs	3× indicator LEDs (controlled by MCU)
Communication	I2C (Qwiic), SWD (reprogramming), UART (option)



7.2 Pinout

Qwiic / I2C (1×4 Header)

Pin	Function
GND	Ground
3.3 V	Power Supply (3.3 V)
SDA	I2C Data
SCL	I2C Clock

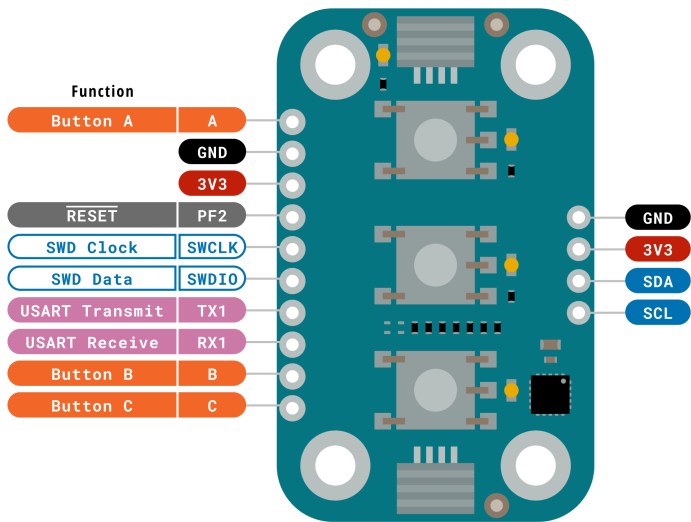
These pads and the Qwiic connectors share the same I2C bus at 3.3 V.

Additional 1×10 Header (STM32C011F4 Signals)

Pin	Function
PA0	Button/LED line (MCU)
PA1	Button/LED line (MCU)
PA2	Button/LED line (MCU)
RX1	UART Receive (optional)
TX1	UART Transmit (optional)
SWDIO	SWD Data
SWCLK	SWD Clock
PF2	NRST (Reset)

Note:

- The board can be reprogrammed via SWD to implement custom functionality.
- Pull-up resistor pads exist for optional I2C lines, but are not populated by default.



Legend:	Digital	I2C	Other SERIAL
	Power	Analog	SPI
	Ground	Main Part	UART/USART
			Analog
			PWM/Timer

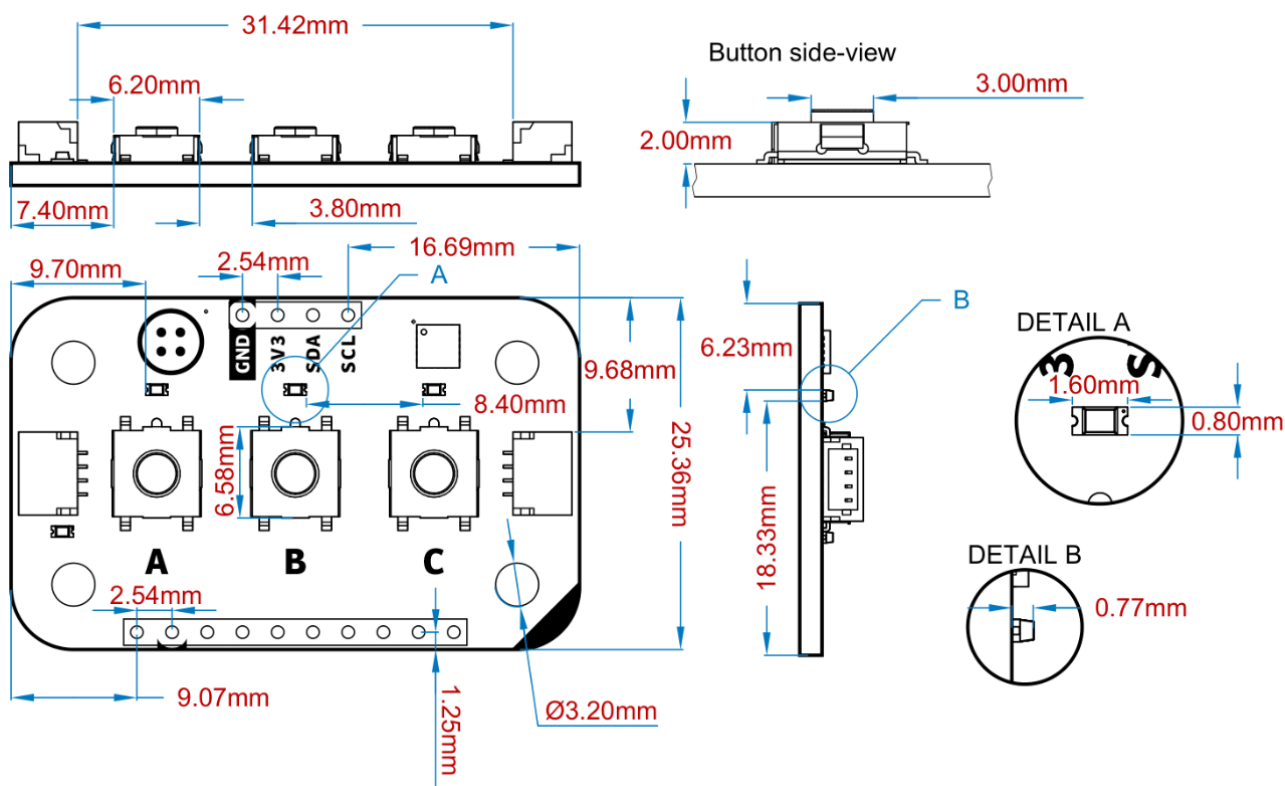
Modulino Buttons
SKU code: ABX00110
Pinout
Last update: 18 Jun, 2024

Pinout Overview

7.3 Power Specifications

- **Nominal operating voltage:** 3.3 V via Qwiic
- **Microcontroller voltage range:** 2.0 V–3.6 V

7.4 Mechanical Information



Modulino® Buttons Mechanical Information

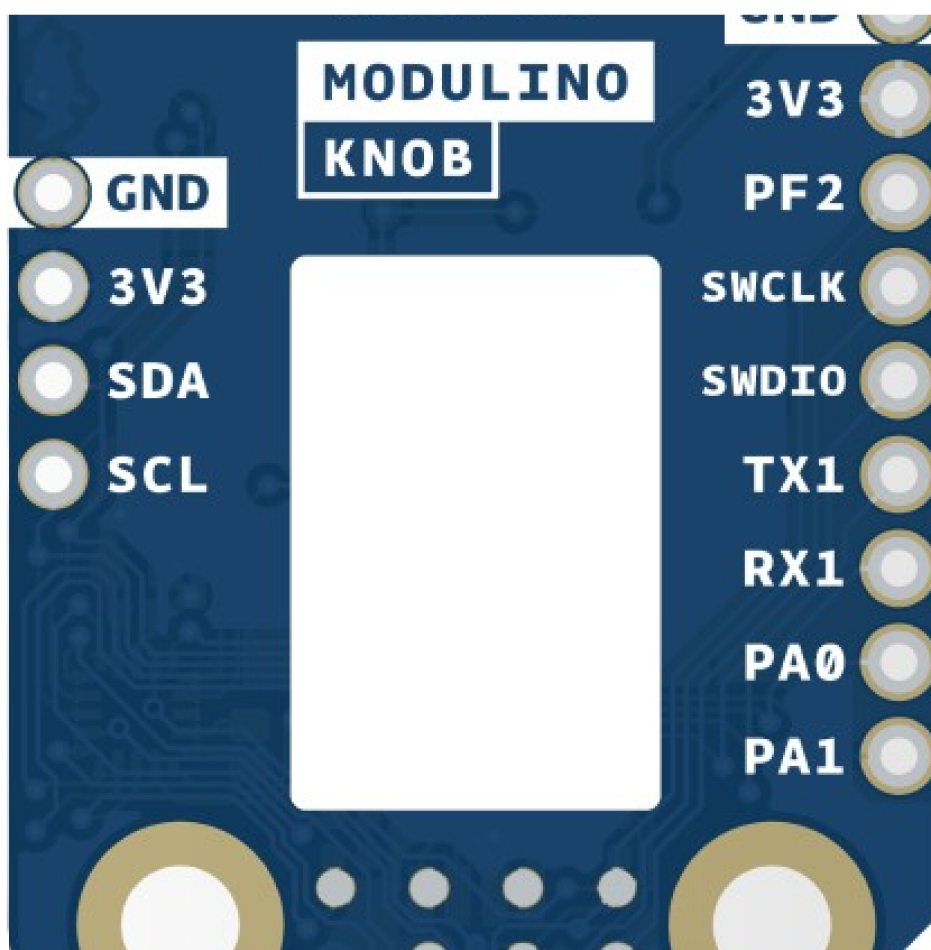
- Board dimensions: 41 mm × 25.36 mm
- Thickness: 1.6 mm (±0.2 mm)
- Four mounting holes (Ø 3.2 mm)
 - Hole spacing: 16 mm vertically, 32 mm horizontally

7.5 I2C Address Reference

Board Silk Name	Sensor/Actuator	Modulino I2C Address (HEX)	Editable Addresses (HEX)	Hardware I2C Address (HEX)
MODULINO BUTTONS	3× SPST Push Buttons	0x7C	Any custom address (via software config.)	0x3E

Note:

- Default I2C address is **0x7C**.
- “Hardware I2C Address” might be seen by advanced scanners, but you should use 0x7C in your code unless changed.
- A white rectangle on the bottom silk allows users to write a new address after reconfiguration.

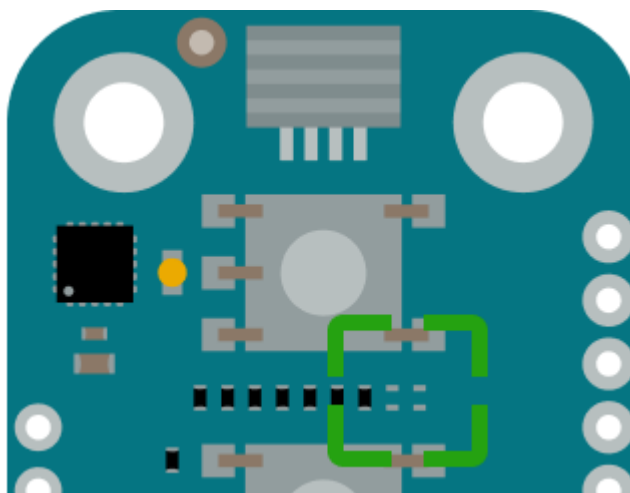


Blank silk for identification

7.5.1 Pull-up Resistors

This module has pads for optional I2C pull-up mounting in both data lines. No resistors are mounted by default but in case the resistors are needed 4.7 K resistors in an SMD 0402 format are recommended.

These are positioned between the button B and C.



Generic pull-up resistor position

8 Device Operation

By default, the board is an I2C target device. It manages button inputs and LED outputs through integrated firmware. Simply connect it to a 3.3 V Qwiic interface. If needed, you can reprogram the STM32C011F4 via SWD to modify or extend functionality. A LED positioned near each button indicates operation, this is hardware connected by the button directly and cannot be altered with firmware.

Company Information

Company name	Arduino SRL
Company Address	Via Andrea Appiani, 25 - 20900 MONZA (Italy)



Reference Documentation

Ref	Link
Arduino IDE (Desktop)	https://www.arduino.cc/en/Main/Software
Arduino Courses	https://www.arduino.cc/education/courses
Arduino Documentation	https://docs.arduino.cc/
Arduino IDE (Cloud)	https://create.arduino.cc/editor
Cloud IDE Getting Started	https://docs.arduino.cc/cloud/web-editor/tutorials/getting-started/getting-started-web-editor
Project Hub	https://projecthub.arduino.cc/
Library Reference	https://github.com/arduino-libraries/
Online Store	https://store.arduino.cc/

Revision History

Date	Revision	Changes
11/07/2024	1	First release