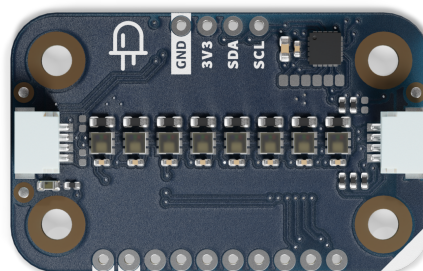


Product Reference Manual

SKU: ABX00109



Description

The Modulino® Pixels features **eight LC8822-2020 RGB LEDs** driven by an on-board **STM32C011F4** microcontroller. This setup enables simple I2C connectivity for controlling colorful visual effects, animations, or status indications in a wide variety of projects.

Target Areas

Maker, beginner, education



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1 Application Examples

- **Colorful Displays** Create dynamic LED patterns, color indicators, or simple pixel-art displays.
- **Notifications & Alerts** Represent sensor data or status updates (e.g., temperature ranges, motion detection) via color-coded lights.
- **Interactive Installations** Combine with other Modulino® nodes (e.g., Knob or Buttons) to build interactive lighting dashboards or IoT displays.



2 Features

- **Eight LC8822-2020 RGB LEDs** providing individually addressable full-color output.
- **STM32C011F4** microcontroller that manages LED control over I2C.
- **3.3 V** operation via the Qwiic interface; supports 2.0 V–3.6 V supply range on the MCU.
- **SWD** header for reprogramming and advanced control.
- Ideal for **lighting effects**, **progress bars**, or any **multi-color** output in maker projects.

2.1 Contents

SKU	Name	Purpose	Quantity
ABX00109	Modulino® Pixels	8× individually addressable RGB 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

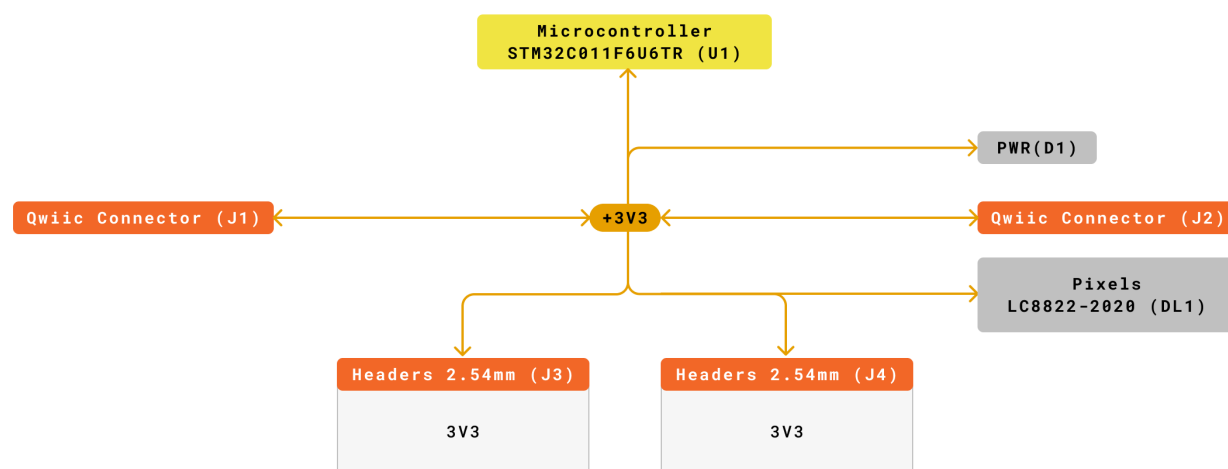
- **Microcontroller supply range:** 2.0 V – 3.6 V (STM32C011F4)
- **Powered at 3.3 V** through the Qwiic interface (in accordance with the Qwiic standard)
- **Operating temperature:** –40 °C to +85 °C

Typical current consumption:

- Up to **33 mA per RGB LED** at full brightness * 8 LEDs (264 mA total), plus ~3.4 mA for the microcontroller. Actual usage depends on brightness and color settings.

5 Power Tree

The power tree for the modulino can be consulted below:



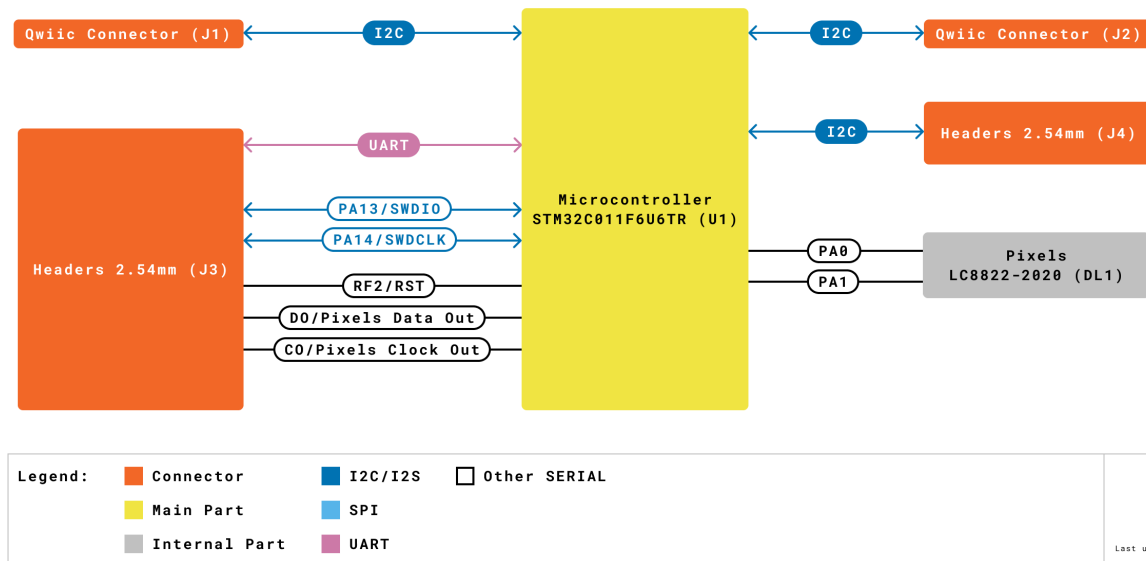
Legend:	Connector	+3V3
VIN	Main Part	+5V
VBUS	Internal Part	

Modulino Pixels
 SKU code: ADX00109
 Power Tree
 Last update: 05 Feb, 2025

Modulino® Pixels Power Tree

6 Block Diagram

This module includes an STM32C011F4 microcontroller managing eight LC8822-2020 RGB LEDs. It communicates with the host via I2C by default but can be reprogrammed via SWD for custom functionality.



Modulino® Pixels block diagram

7 Functional Overview

The Modulino® Pixels node uses the on-board **STM32C011F4** to handle LED data and provide an I2C interface. Each of the eight **LC8822-2020 RGB LEDs** can be addressed and controlled individually for color and brightness. Advanced users may reprogram the MCU (via SWD) to alter LED control logic or to interface via other protocols.

7.1 Technical Specifications

Specification	Details
Microcontroller	STM32C011F4 (handles I2C, LED driving logic)
Accuracy	ADC: ± 2 LSB typical INL
Resolution	12-bit ADC
Actuator	8× LC8822-2020 RGB LEDs
Supply Voltage	Min: 2.0 V, Max: 3.6 V
Power Consumption	Up to 33 mA/LED at full white brightness × 8 = 264 mA, plus ~3.4 mA for MCU
Communication	I2C (Qwiic), SWD (debug/reprogram), optional UART/SPI if reprogrammed
Resolution	12-bit ADC in MCU (optional for other expansions)

7.2 Pinout

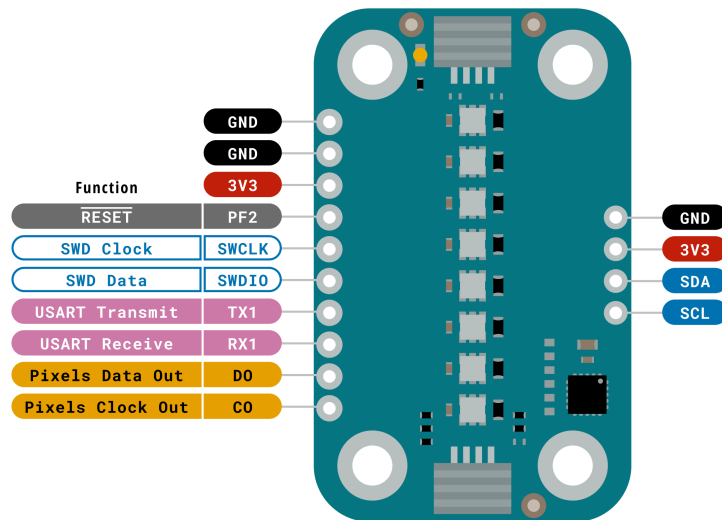
Qwiic / I2C (1×4 Header)

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 (LED & MCU Signals)

Pin	Function
CO	Clock Out (for chained LEDs)
DO	Data Out (for chained LEDs)
RX1	UART Receive
TX1	UART Transmit
SWDIO	SWD Data
SWCLK	SWD Clock
PF2	NRST (Reset)



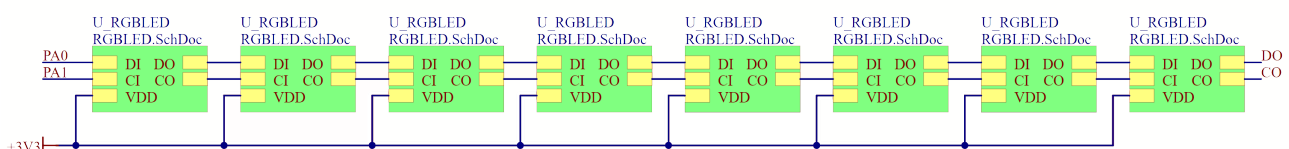
Legend: Power Ground	Digital	I2C	Other SERIAL
	Analog	SPI	Analog
	Main Part	UART/USART	PWM/Timer

ARDUINO
Modulino Pixels
SKU code: ABX00109
Pinout
Last update: 18 Jun, 2024

Pinout Overview

The header can be used to add more LC8822-2020 RGB's LED in a daisy chain configuration. Built-in LEDs open for extension

It also has other I2C interface controller IC pins usable for other purposes or for reprogramming it using its SWD interface. These provide a place to mount header pins if desired.

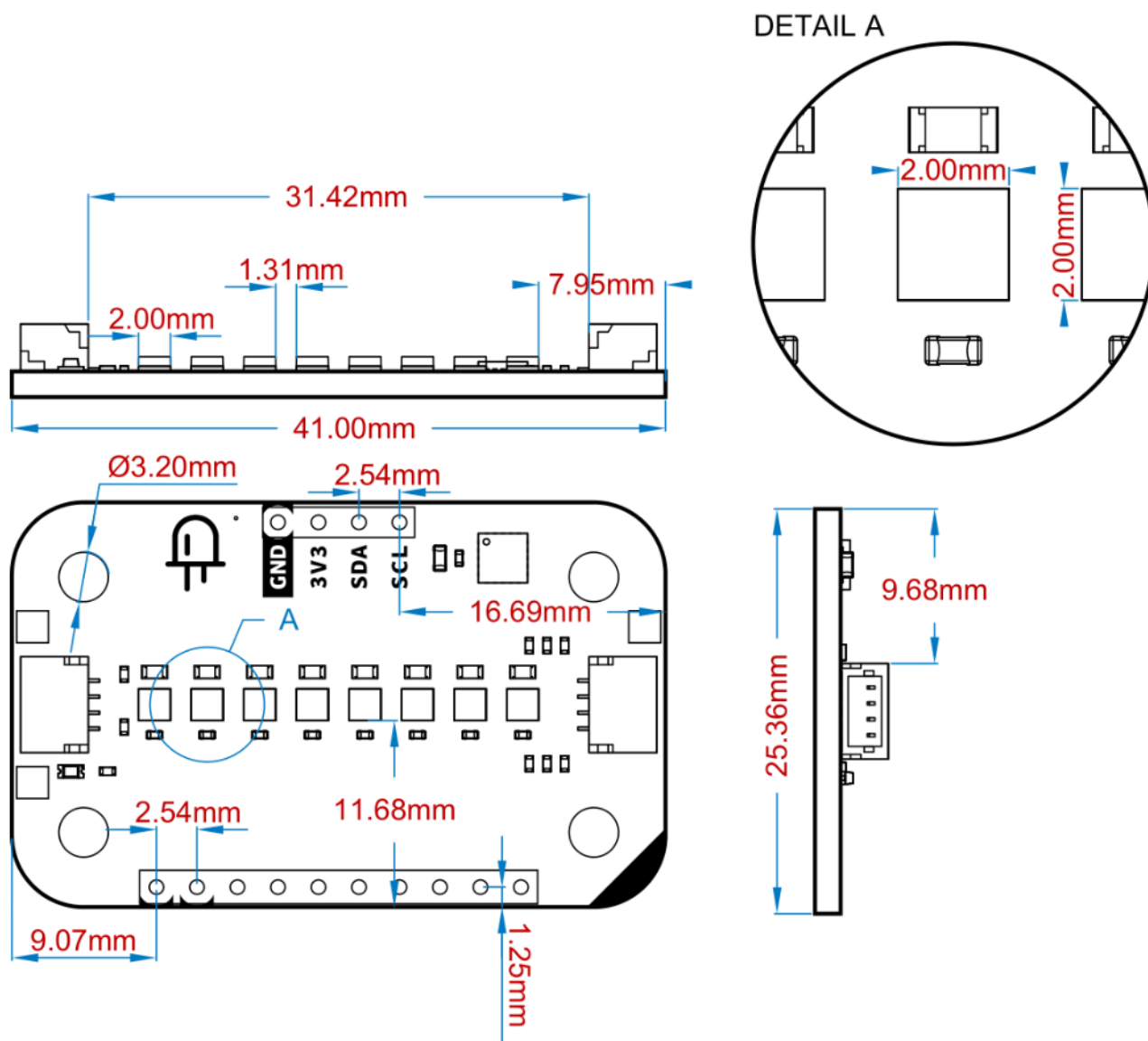


LED extension

7.3 Power Specifications

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

7.4 Mechanical Information



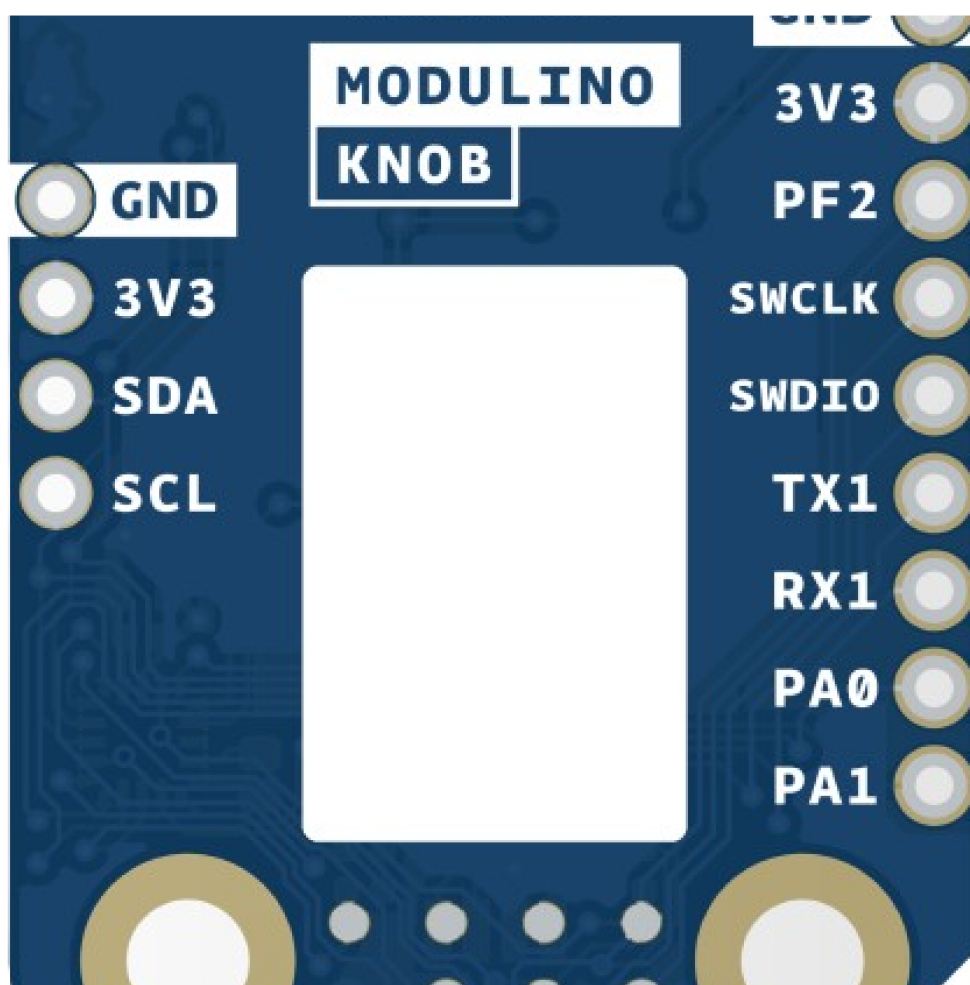
Modulino® Pixels Mechanical Information

- 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 PIXELS	8× LC8822-2020 RGB LEDs	0x6C	Any custom address (via FW config)	0x36

Note: Default address is **0x6C**. You can change it via the Modulino® library or custom firmware. A white rectangle on the board silk can be used to record a new address.

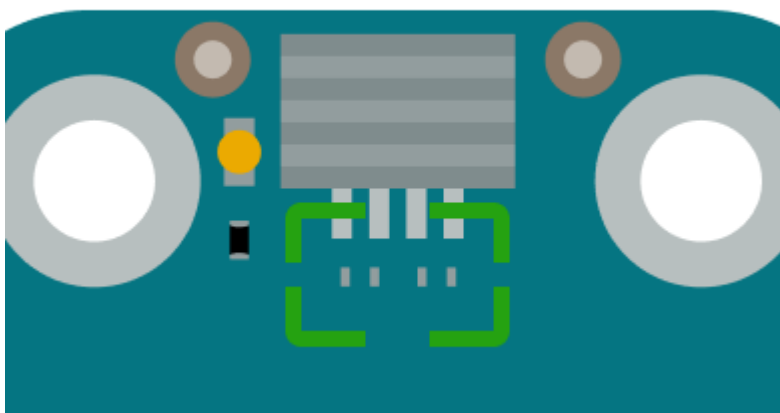


Blank silk for identification

7.6 Pull-up Resistors

The 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 need 4.7 K resistors in an SMD 0402 format are recommended.

These are positioned near the Qwiic connector on the power LED side.



Generic pull-up resistor position

8 Device Operation

By default, this node operates as an I2C target device on the Qwiic bus. The integrated microcontroller receives LED control commands and drives each of the eight LC8822-2020 RGB LEDs. For advanced usage, you may reprogram the microcontroller to add different communication protocols or custom LED driving modes.

Use any 3.3 V microcontroller or Arduino board. The official Modulino® libraries facilitate controlling the RGB LEDs with easy I2C commands to set colors, brightness, or special effects. Make sure your power supply can handle the current draw if driving all LEDs at full brightness.



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