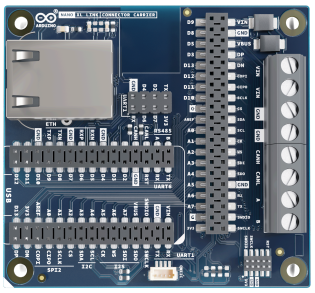
User Manual
SKU: ASX00090



Description

The Nano XL Link Connector Carrier is a practical way to expand the Nano XL Link development board's capabilities.

Whether you are working on complex communication networks, developing control applications, or building robust solutions, this carrier exposes all extended connections of the Nano XL form factor via pin headers and screw terminals.

The hardware integrates an RJ45 Ethernet port, plus dedicated RS485 and CAN bus connections, enabling new possibilities for automation, data acquisition, and real-time industrial communication.

Target Areas:

Industrial Automation, Production-Ready Solutions, Industrial Communication, Research and Development

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Product Intended Use

Arduino Hardware Products are primarily intended for development and prototyping but may also support production solutions. Developers must design and verify security controls early, based on the intended deployment environment. Security is a shared responsibility between Arduino and the solution builder, who must assess the hardware's available security features and add any necessary protections.

Visit docs.arduino.cc/tutorials/security/intended-use-and-security-model/ for the complete Arduino Hardware Products: Intended use and Security model.

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1 Application Examples

Industrial Automation & Production-Ready Solutions:

- **Heavy Machinery Control:** Use the integrated CAN bus to establish reliable communication with engine control units and industrial PLCs. In addition, the onboard screw terminals ensure field wiring withstands high-vibration environments, letting you move from testing to final deployment without custom hardware.
- **Distributed Sensor Networks:** Create robust data acquisition systems using the RS485 communication interface. This topology is ideal for transmitting telemetry over long distances across a production floor, offering strong electrical-noise immunity for secure assembly-line monitoring.

Industrial Communication:

- **Wired IoT Gateway:** Transform the Nano XL Link into a powerful data bridge using the RJ45 Ethernet port. The *carrier* can collect local real-time data from modules connected via the Qwiic or CAN bus connector and transmit it securely over a local wired network, facilitating integration with SCADA systems or cloud analytics servers without relying on wireless connections.
- **Wireless Hub:** Communicate wirelessly using a WiFi module connected to the *carrier* and expand your sensor network in hard-to-reach areas. By using the dedicated 2x4-pin female header for modules like the ESP8266 (ESP-01), you can build an IoT control hub that collects local data and transmits it to the cloud or SCADA systems, without installing additional wiring infrastructure.

Research and Development:

- **Advanced Rapid Prototyping:** Accelerate design and validation cycles in the lab. The *carrier* not only exposes all board connections through standard headers, but also includes a debugging SWD connector. This gives hardware and software engineers deep access for low-level debugging and programming of new technological concepts before mass production.

2 Features

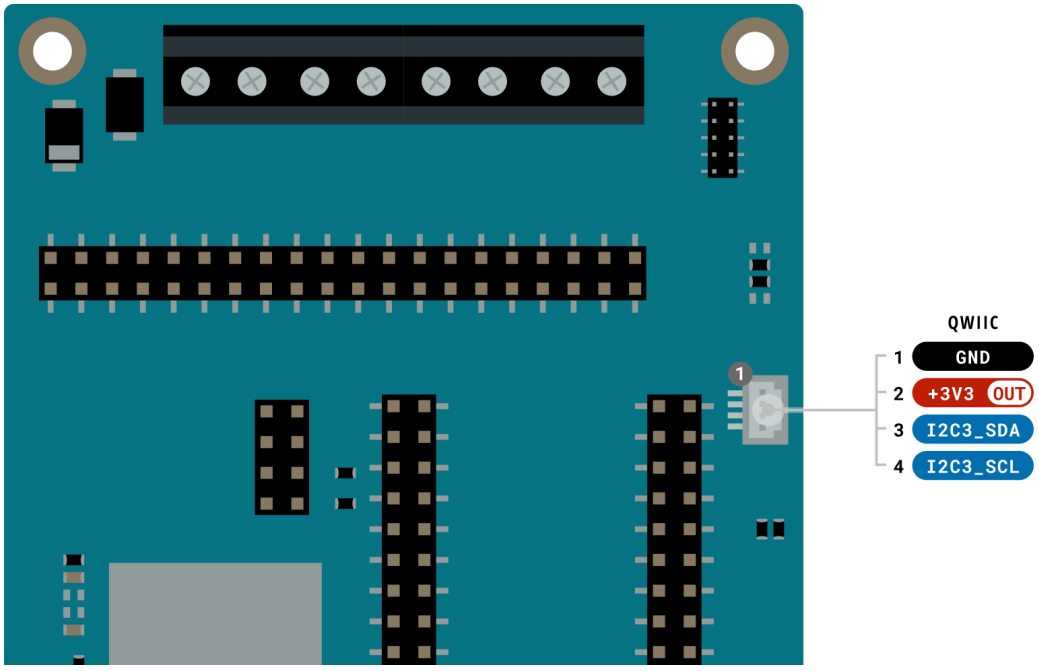
2.1 General Specifications Overview

The main features of the Nano XL Link Connector Carrier are detailed in the table shown below.

Feature	Description
Interfaces	1x Qwiic I2C Connector 1x Ethernet RJ45 Connector 1x WiFi Module ESP-01 Connector 1x SWD 2x5 1.27mm Connector 1x Screw Terminals block (RS485, CAN, Power IN)
IO Voltage	3.3 VDC
Dimensions	66 mm x 71.8 mm
Operating Temperatures	-40 °C to +85 °C

2.2 Qwiic I2C Connector

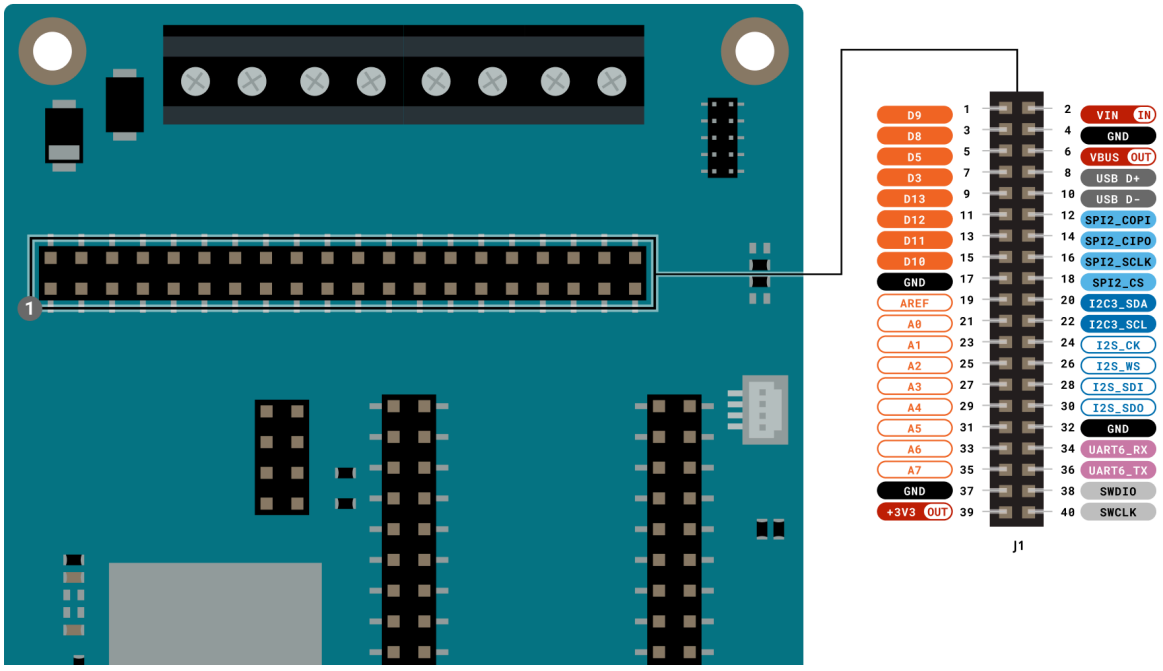
The Qwiic I2C connector (J7) connects to the board's standard I2C bus. It is powered via the +3.3 V output line, following the standard Qwiic ecosystem to allow seamless plug-and-play integration with a wide variety of external I2C sensors and modules.



Carrier Qwiic Connector

2.3 Breakout Headers

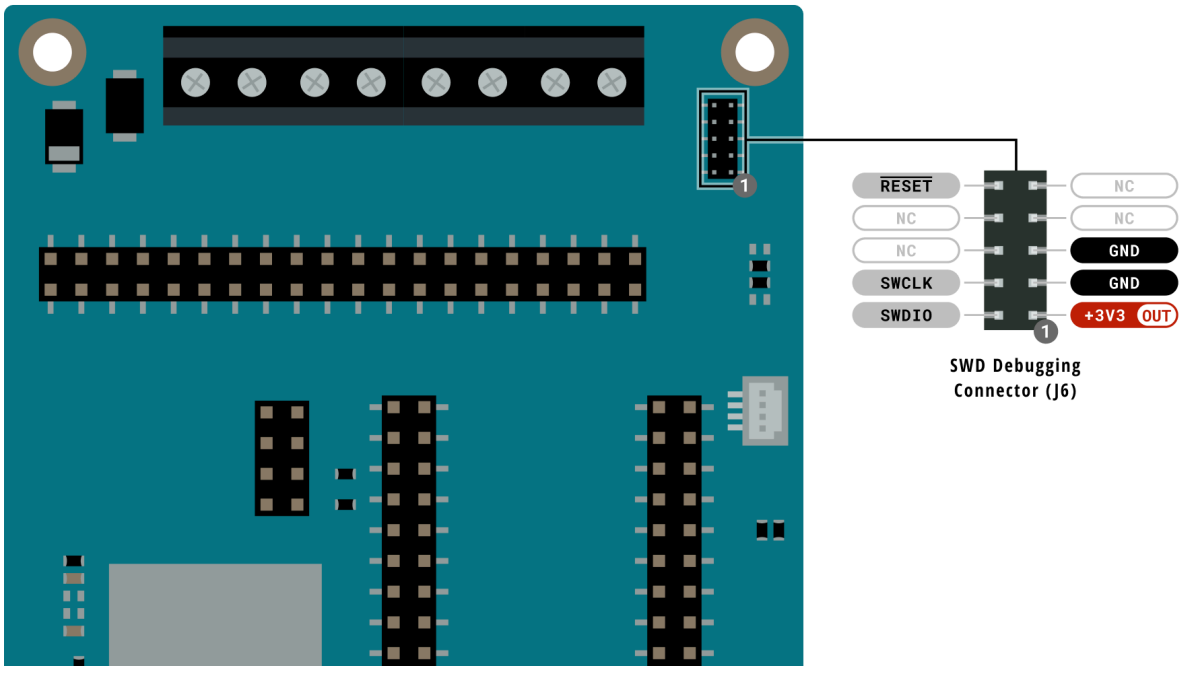
The carrier features a 2x20 female Breakout Header (J1) that expose the host Nano XL Link board's extended pinout. These headers provide access to all standard and extended GPIOs, SPI, I2C, I2S, and UART interfaces, allowing for highly flexible prototyping.



Carrier Breakout Headers

2.4 SWD Connector

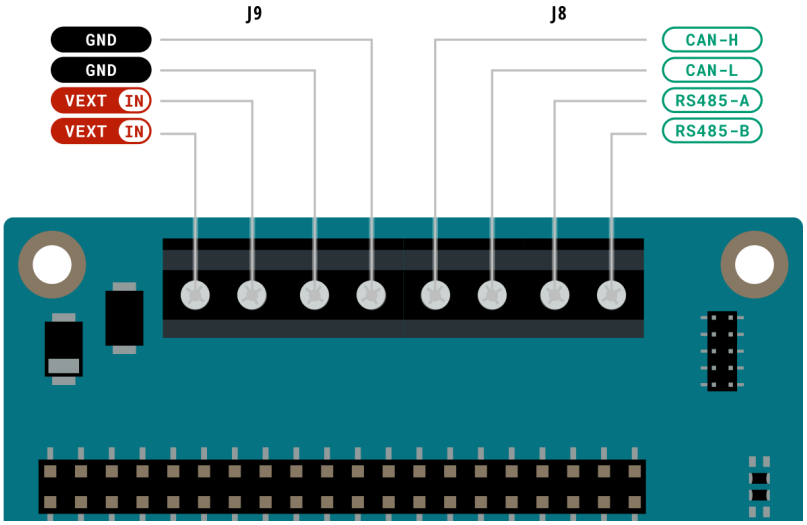
For advanced development, the board includes an SWD 2x5 1.27mm connector (J6). This provides a direct interface for low-level debugging and programming of the microcontroller, and is powered by the board's +3.3 V line.



Nano XL Link Connector Carrier SWD Connector

2.5 Screw Terminals

The Screw Terminals block (J8) is designed for robust, industrial-grade connections. It securely exposes the **RS485** and **CAN bus** interfaces for reliable communication in high-vibration environments. Additionally, it provides a Power IN terminal (J9) that accepts a +7-24V input (VIN) to power the carrier.

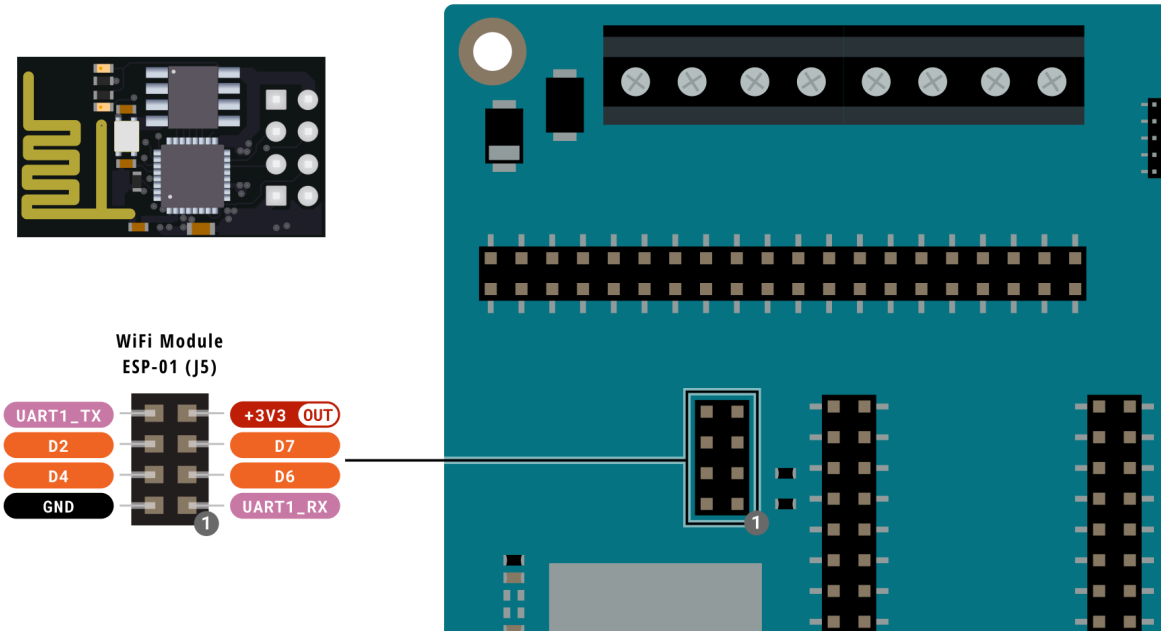


Nano XL Link Connector Carrier Screw Terminals

Note: The VEXT power input is protected by a rectifier diode and a TVS diode before feeding the Nano XL Link Header.

2.6 WiFi Module Connector

The carrier includes a dedicated 2x4 female header (J5) for an ESP8266 ESP-01 WiFi module. This connector is powered by the +3.3 V line and connects directly to the host board via UART1 and standard GPIOs, giving you an immediate way to add wireless capabilities to your setup.



Nano XL Link Connector Carrier WiFi Connector

2.7 Communication Interfaces

The Nano XL Link Connector Carrier exposes all the host board connections and communication interfaces through its dedicated ports and breakout headers.

Interfaces	Connector
I2C	- Breakout Headers (I2C3) - Qwiic I2C connector (I2C3) (J7)
SPI	- Breakout Headers (Two buses)
RS485	- Screw Terminals (J8)
CAN bus	- Screw Terminals (J8)
Serial (UART)	- Breakout Headers (UART6) - WiFi Module ESP-01 Connector (UART1)
WiFi	- WiFi Module ESP-01 Connector (J5)
Ethernet	- Ethernet RJ45 Connector (J2)
USB	- Breakout Headers
SWD	- Debugging Connector (J6)

2.8 Related Products

- Arduino® Nano XL Link (ABX00182)
- Arduino® Modulino™ nodes

3 Power and Ratings

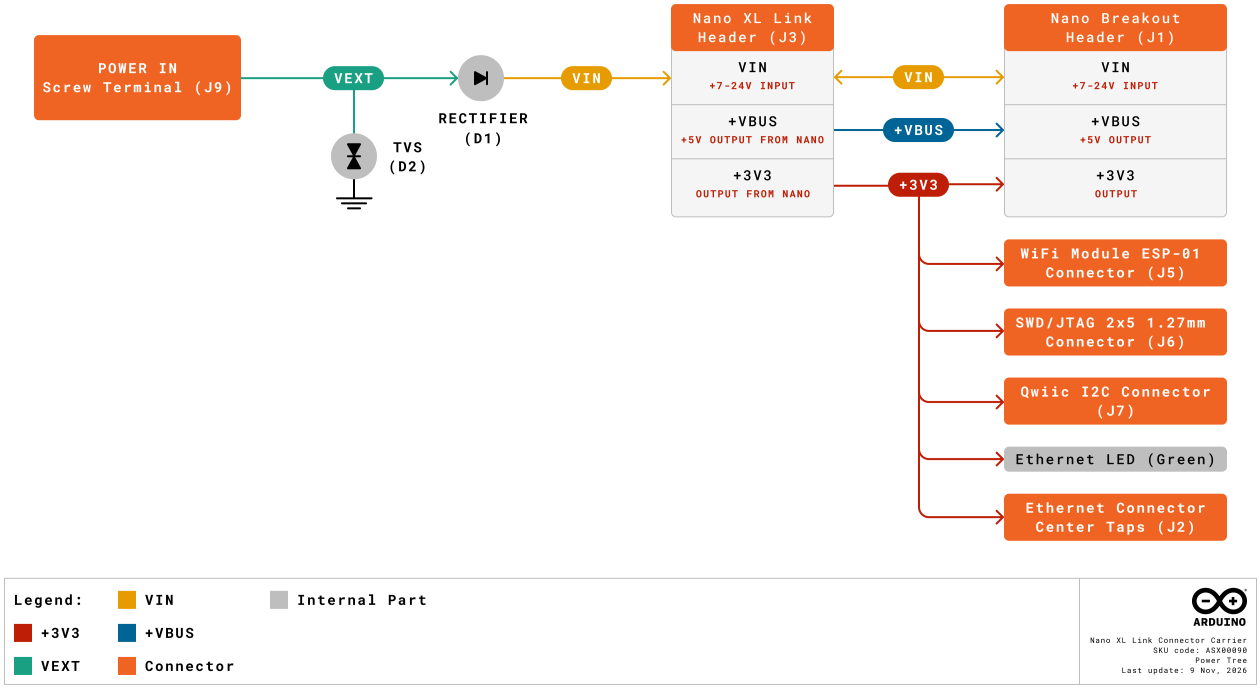
3.1 Recommended Operating Conditions

Symbol	Description	Min	Typ	Max	Unit
VIN	Input voltage	7.0	-	24	V
T_{OP}	Operating Temperature	-40	25	85	°C

Note: The Nano XL Link Connector Carrier draws power from the host board's regulated power nets. The carrier has no regulator.

3.2 Power Tree

The following diagram illustrates the Nano XL Link Connector Carrier's main system power architecture.



Nano XL Link Connector Carrier Power Tree

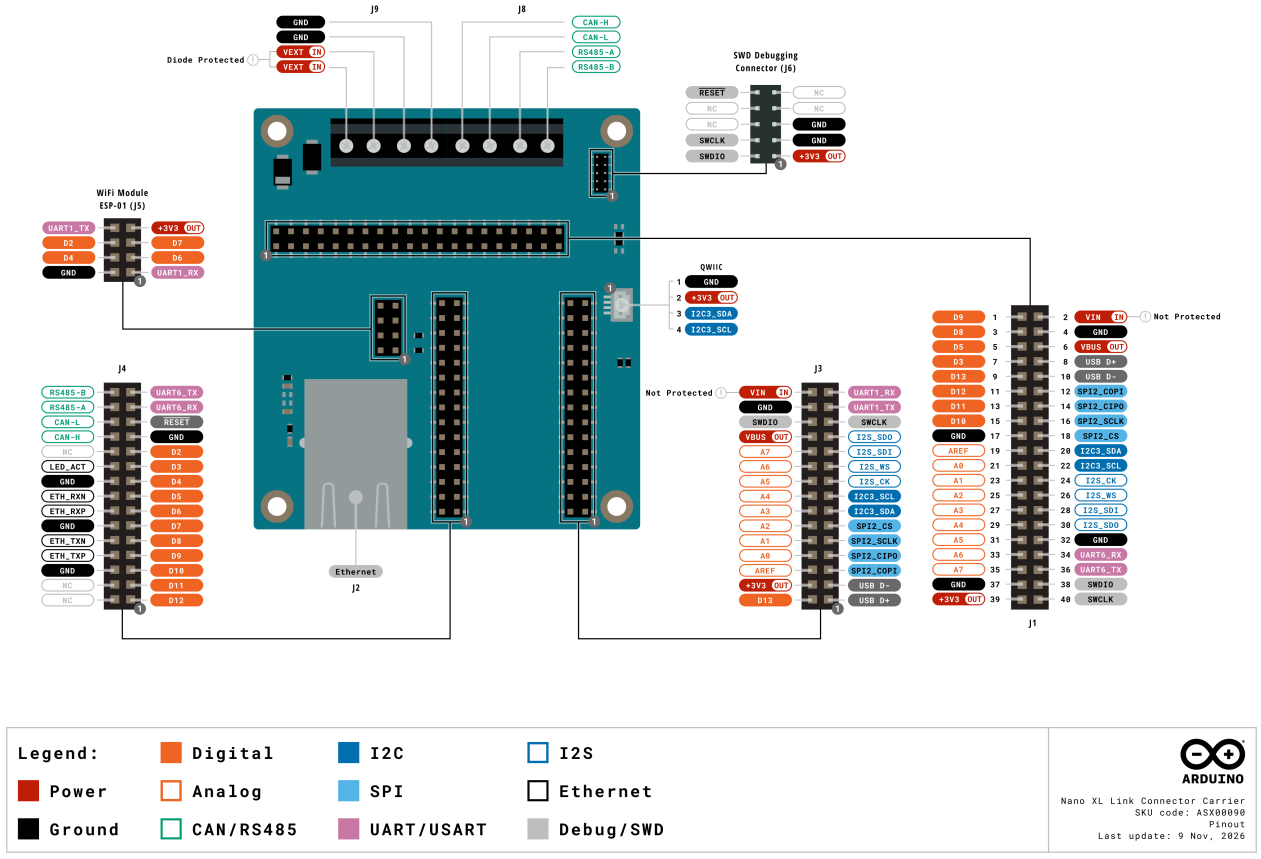
4 Functional Overview

The Nano XL Link Connector Carrier expands the Nano XL Link board's connectivity with a variety of communication interfaces, including CAN, RS485, and Ethernet. It also includes a Qwiic I2C connector, an ESP-01 WiFi module header, and robust screw terminals for industrial environments.

CAN, RS485 and Ethernet PHYs are included in the Nano XL Link.

4.1 Pinout

The following figure shows the Nano XL Link Connector Carrier pinout.



Pinout for Nano XL Link Connector Carrier

4.1.1 Nano XL Header (J4)

Pin No.	Inner Pin (Standard Nano Digital)	Pin No.	Outer Pin (XL Extension)
1	D12	30	NC
2	D11	29	NC
3	D10	28	GND
4	D9	27	ETH_TXP
5	D8	26	ETH_TXN
6	D7	25	GND
7	D6	24	ETH_RXP
8	D5	23	ETH_RXN
9	D4	22	GND
10	D3	21	LED_ACT
11	D2	20	NC
12	GND	19	CAN-H
13	RESET	18	CAN-L
14	UART6_RX	17	RS485-A
15	UART6_TX	16	RS485-B

4.1.2 Nano XL Header (J3)

Pin No.	Outer Pin (XL Extension)	Pin No.	Inner Pin (Standard Nano Analog)
1	USB D+	30	D13
2	USB D-	29	+3V3
3	COPI	28	AREF
4	CIPO	27	A0
5	SCLK	26	A1
6	CS	25	A2
7	SDA	24	A3
8	SCL	23	A4
9	CK	22	A5
10	WS	21	A6
11	SDI	20	A7
12	SDO	19	VBUS
13	SWCLK	18	SWDIO
14	UART1_TX	17	GND
15	UART1_RX	16	VIN

4.1.3 Nano Breakout Headers (J1)

The carrier exposes the board's I/O through a 2x20 pin breakout header.

Pin	Function	Pin	Function
1	D9	2	VIN
3	D8	4	GND
5	D5	6	VBUS
7	D3	8	USB D+
9	D13	10	USB D-
11	D12	12	COPI
13	D11	14	CIPO
15	D10	16	SCLK
17	GND	18	CS
19	AREF	20	SDA
21	A0	22	SCL
23	A1	24	CK
25	A2	26	WS
27	A3	28	SDI
29	A4	30	SDO
31	A5	32	GND
33	A6	34	UART6_RX
35	A7	36	UART6_TX
37	GND	38	SWDIO
39	+3V3	40	SWCLK

4.1.4 WiFi Module ESP-01 Connector (J5)

This 2x4 header provides connections to an ESP-01 WiFi module via UART1 and GPIOs.

Pin	Function	Pin	Function
1	UART1_RX	2	GND
3	D6	4	D4
5	D7	6	D2
7	+3V3	8	UART1_TX

4.1.5 SWD 2x5 1.27mm Connector (J6)

Used for low-level debugging and programming of the microcontroller.

Pin	Function	Pin	Function
1	+3V3	2	SWDIO
3	GND	4	SWCLK
5	GND	6	NC
7	NC	8	NC
9	NC	10	RESET

4.1.6 Qwiic I2C Connector (J7)

Follows the standard Qwiic ecosystem for plug-and-play I2C modules. It exposes the I2C3 bus of the Nano XL Link.

Pin	Function	Description
1	GND	Ground
2	+3V3	+3.3 V Power Rail
3	SDA	I2C Serial Data
4	SCL	I2C Serial Clock

4.1.7 RJ45 Ethernet Connector (J2)

The Nano XL Link Connector Carrier provides a robust, industrial-grade RJ45 connector to enable wired IoT and local network connectivity. Architecturally, the hardware is divided: while the physical RJ45 port and isolation magnetics are housed on the Carrier board, the Ethernet Physical Layer Transceiver (PHY) is integrated directly onto the Nano XL Link host board.

The host board utilizes the **Microchip KSZ8081RNAIA-TR**, a highly reliable 10Base-T/100Base-TX Ethernet PHY. It interfaces with the main microcontroller via a high-speed Reduced Media Independent Interface (RMII), ensuring efficient data transfer while minimizing pin usage.

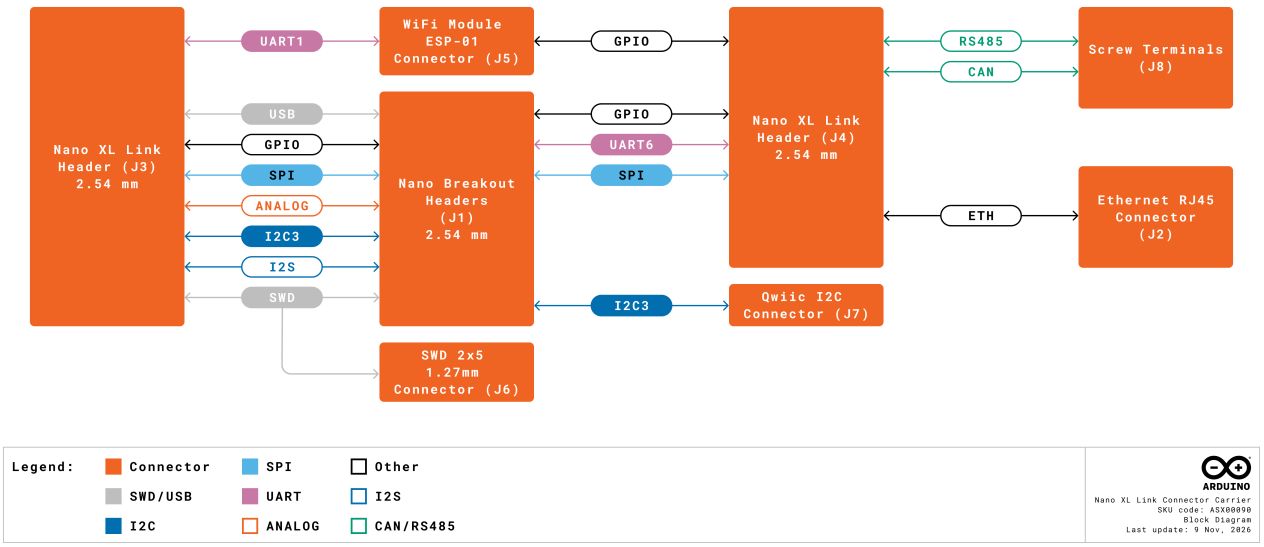
Key specifications of the PHY subsystem include:

- **Auto-Negotiation (10/100 Mbps):** Fully compliant with IEEE 802.3u standards. It automatically negotiates the highest possible speed (10 Mbps or 100 Mbps) and the optimal duplex mode (half or full-duplex) based on the capabilities of the connected switch or router.
- **Auto MDI/MDI-X Crossover:** Automatically detects the cable type and swaps the transmit/receive pairs internally if necessary. This completely eliminates the need for specialized crossover cables when connecting directly to another device.
- **Power Management:** Includes power-down and power-saving modes to reduce energy consumption when the network cable is unplugged.

The RJ45 connector on the carrier board features an integrated **status LED** driven directly by the PHY chip, providing immediate visual diagnostics of the network connection.

4.2 Block Diagram

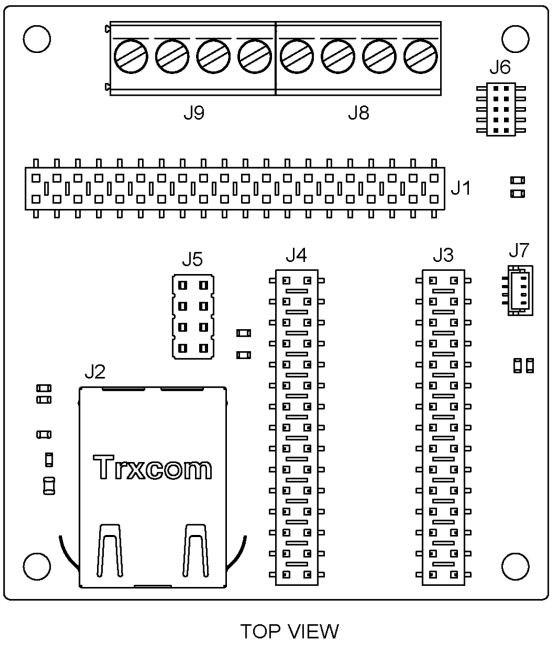
The figure below illustrates an overview of the Nano XL Link Connector Carrier's high-level architecture.



Nano XL Link Connector Carrier Block Diagram

5 Board Topology

5.1 Overall View



Top View of Nano XL Link Connector Carrier

Reference	Description
J1	Breakout Headers (2.54 mm)
J2	Ethernet RJ45 Connector
J3, J4	Nano XL Link Headers (2.54 mm)
J5	WiFi Module ESP-01 Connector
J6	SWD 2x5 1.27mm Connector
J7	Qwiic I2C Connector
J8	Screw Terminals block (CAN, RS485)
J9	Screw Terminals block (POWER IN)

6 Device Operation

6.1 Getting Started - IDE

If you want to program your Nano XL Link board to use the Nano XL Link Connector Carrier while offline, you need to install the Arduino® Desktop IDE **[1]**. To connect the Nano board to your computer, you will need a USB cable, which can also provide power to the board.

6.2 Online Resources

Now that you have learned the basics of what you can do with the carrier, explore its possibilities by checking out exciting projects on Arduino Project Hub **[4]**, the Arduino Library Reference **[5]**, and the online store **[6]**. Here, you can complement your board with sensors, actuators, and more.

7 Mechanical Information

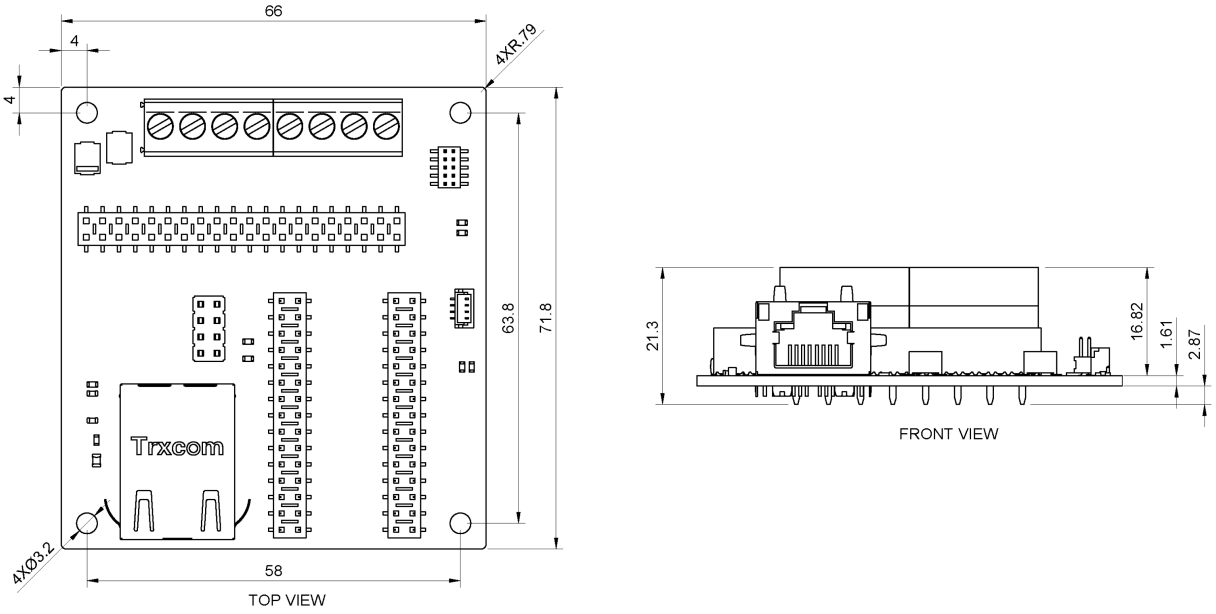
The Nano XL Link Connector Carrier is a double-sided 66 mm x 71.8 mm board. It features dual 30-pin female headers in the center to receive the host Nano XL Link board, flanked by two 2x20 breakout headers that expose all the board's pins.

Along the top edge, it includes an 8-position screw terminal block dedicated to power input, CAN bus, and RS485 connections. The board includes an RJ45 Ethernet port in the bottom left corner. Additional peripheral interfaces include a 2x4 female header on the left side for an ESP-01 WiFi module, a small Qwiic I2C connector on the right edge, and a 2x5 SWD connector located near the top right corner.

To simplify system integration, the Nano XL Link Connector Carrier features a form factor compatible with standard 4U DIN-rail open enclosures. This makes it an ideal, production-ready solution for transitioning directly from prototyping to industrial deployment.

7.1 Board Dimensions

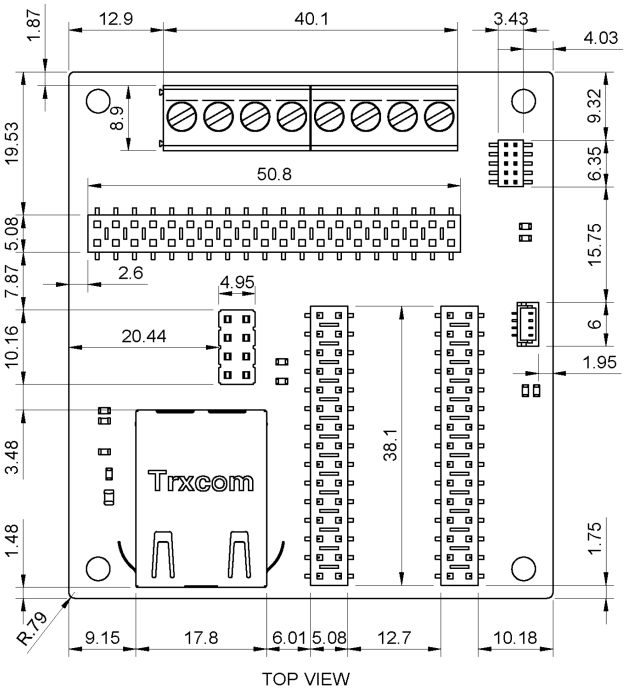
The following figure shows the outline and dimensions of the Nano XL Link Connector Carrier; all dimensions are in mm.



Mechanical View of Nano XL Link Connector Carrier

7.2 Board Connectors

The Nano XL Link Connector Carrier's connectors are placed on the top side of the board, as shown in the figure below; all dimensions are in mm.



Mechanical View of Nano XL Link Connector Carrier's Connectors

8 Certifications

8.1 Certifications Summary

Certification	Status
CE (European Union)	Yes
RoHS	Yes
REACH	Yes
WEEE	Yes
FCC (USA)	Yes
IC (Canada)	Yes
UKCA (UK)	Yes

8.2 Declaration of Conformity CE DoC (EU)

We declare under our sole responsibility that the products above are in conformity with the essential requirements of the following EU Directives and therefore qualify for free movement within markets comprising the European Union (EU) and European Economic Area (EEA).

8.3 Declaration of Conformity to EU RoHS & REACH 211 01/19/2021

Arduino boards are in compliance with RoHS 2 Directive 2011/65/EU of the European Parliament and RoHS 3 Directive 2015/863/EU of the Council of 4 June 2015 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Substance	Maximum Limit (ppm)
Lead (Pb)	1000
Cadmium (Cd)	100
Mercury (Hg)	1000
Hexavalent Chromium (Cr6+)	1000
Poly Brominated Biphenyls (PBB)	1000
Poly Brominated Diphenyl ethers (PBDE)	1000
Bis(2-Ethylhexyl) phthalate (DEHP)	1000
Benzyl butyl phthalate (BBP)	1000
Dibutyl phthalate (DBP)	1000
Diisobutyl phthalate (DIBP)	1000

Exemptions : No exemptions are claimed.

Arduino Boards are fully compliant with the related requirements of European Union Regulation (EC) 1907 /2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). We declare none of the SVHCs (https://echa.europa.eu/web/guest/candidate-list-table), the Candidate List of Substances of Very High Concern for authorization currently released by ECHA, is present in all products (and also package) in quantities totaling in a concentration equal or above 0.1%. To the best of our knowledge, we also declare that our products do not contain any of the substances listed on the "Authorization List" (Annex XIV of the REACH regulations) and Substances of Very High Concern (SVHC) in any significant amounts as specified by the Annex XVII of Candidate list published by ECHA (European Chemical Agency) 1907 /2006/EC.

8.4 Conflict Minerals Declaration

As a global supplier of electronic and electrical components, Arduino is aware of our obligations with regards to laws and regulations regarding Conflict Minerals, specifically the Dodd-Frank Wall Street Reform and Consumer Protection Act, Section 1502. Arduino does not directly source or process conflict minerals such as Tin, Tantalum, Tungsten, or Gold. Conflict minerals are contained in our products in the form of solder, or as a component in metal alloys. As part of our reasonable due diligence Arduino has contacted component suppliers within our supply chain to verify their continued compliance with the regulations. Based on the information received thus far we declare that our products contain Conflict Minerals sourced from conflict-free areas.

8.5 FCC Caution

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference

(2) this device must accept any interference received, including interference that may cause undesired operation.

FCC RF Radiation Exposure Statement:

1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. This equipment complies with RF radiation exposure limits set forth for an uncontrolled environment.
3. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator & your body.

English: User manuals for licence-exempt radio apparatus shall contain the following or equivalent notice in a conspicuous location in the user manual or alternatively on the device or both. This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

French: Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l' appareil nedoit pas produire de brouillage

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

IC SAR Warning:

English This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

French: Lors de l' installation et de l' exploitation de ce dispositif, la distance entre le radiateur et le corps est d 'au moins 20 cm.

Important: The operating temperature of the EUT can't exceed 85 °C and shouldn't be lower than -40 °C.

Hereby, Arduino S.r.l. declares that this product is in compliance with essential requirements and other relevant provisions of Directive 2014/53/EU. This product is allowed to be used in all EU member states.

9 Company Information

Company Information	Details
Company Name	Arduino S.r.l.
Company Address	Via Andrea Appiani 25, 20900 Monza (Italy)

10 Reference Documentation

Reference	Link
Arduino IDE (Desktop)	https://www.arduino.cc/en/Main/Software
Arduino IDE (Cloud)	https://app.arduino.cc/sketches
Nano XL Link Connector Carrier Documentation	https://docs.arduino.cc/hardware/nano-xl-carrier
Project Hub	https://projecthub.arduino.cc/
Language Reference	https://docs.arduino.cc/language-reference/
Arduino Store	https://store.arduino.cc/

11 Change Log

Date	Revision	Changes
10/11/2026	1	First Release