

supernova



binho

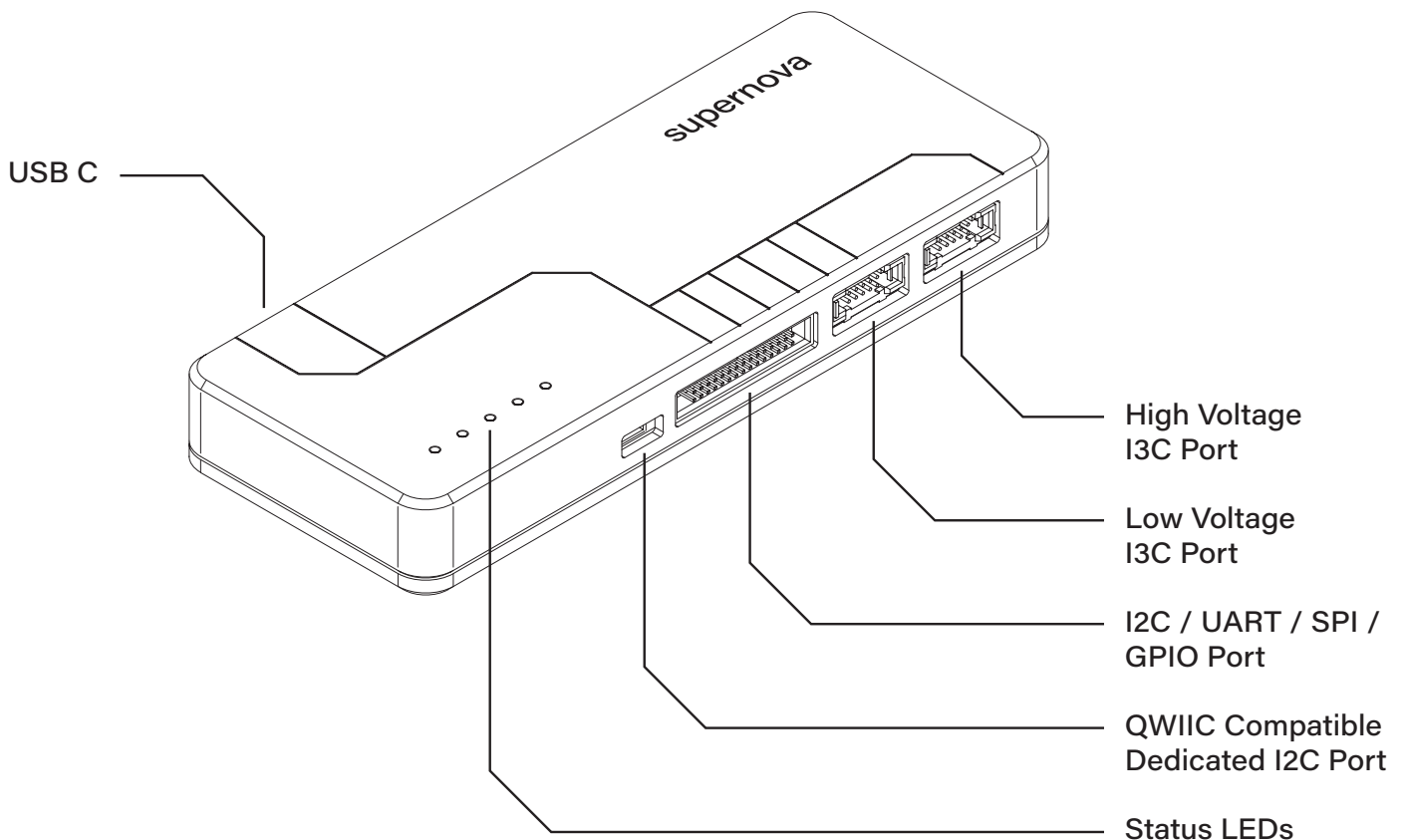
The Supernova joins the Binho family of USB host adapters as an all-in-one solution that supports I3C, I2C, and SPI protocols in both controller and peripheral modes, plus UART and GPIO. Paired with Binho Mission Control, the multi-platform desktop app for interacting with USB host adapters, or the Python/C++ SDKs, the Supernova dramatically simplifies device orchestration during embedded system development and testing.

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1. Description

The Supernova is a USB 2.0 Full Speed HID device that provides an array of connectors including an I2C Qwiic 4-pin port, a versatile 2x15 pins connector for I2C/UART/SPI/GPIO functions, and a duo of I3C dedicated 10-pin ports segmented for low and high voltage.

In combination with the desktop app Binho Mission Control, the Supernova enables Windows, Linux, and Mac users to quickly and easily start interacting with their testing devices through various digital communication protocols and GPIOs. When used alongside the C++ and Python SDKs, users can write programs and scripts to create automations.



2. Common Applications

Testing and debugging: Streamlined testing and debugging of embedded systems.

Hardware and firmware design: Reduces the code-build-test cycle, increasing the speed of analysis and solution design.

Research and hands-on experimentation: Facilitates rapid trials with new devices such as sensors, accelerometers, microcontrollers, and more, across a variety of protocols, without the need to write a single line of code.

Learning purposes: Eases the learning curve when mastering new protocols or devices.

3. Features

DEVICE MANAGEMENT

Retrieve System Information: Easily access comprehensive device information.

Voltage Configuration: Flexibly adapt bus voltages to various device requirements.

Device Control: Provides straightforward mechanisms to reset the device or initiate boot mode.

I2C COMMUNICATION PROTOCOL

Roles: Comprehensive support for I2C Controller role.

Bus Voltage: Versatile voltage adjustment ranging from 1.2V to 3.3V.

Frequency Range: Adjustable SCL clock frequency to suit different communication needs, ranging from 10 KHz to 1 MHz.

Write and Read Operations: Streamlined operations to facilitate both writing to and reading from devices.

Register Address Setting: Offers the capability to set specific register addresses.

Non-Stop Transactions: Supports “non-stop” or “repeated start” conditions.

Parameter Setting: Simplified parameter configuration for optimal communication.

I3C COMMUNICATION PROTOCOL

Roles: I3C Controller in both SDR and HDR-DDR modes, I3C Target in both SDR and HDR-DDR modes, and I3C Target with Secondary Controller capability. I3C Basic v1.1.1 (backwards-compatible with I3C Basic v1.0).

Bus Voltage: Wide voltage range from 0.8V to 3.3V.

Working Frequencies:

- Push-Pull Modes: 3.75 MHz to 12.5 MHz.
- Open-Drain Modes: 100 KHz to 4.17 MHz.

Enhanced Features:

- Dynamic Address Assignments for flexible device communication.
- Comprehensive transaction types including I3C Private Write and Read, and Common Command Code (CCC) transactions.
- Legacy I2C backward compatibility for seamless integration.
- Advanced features like In-Band Interrupts (IBIs), Hot-Join, and Controller role handoff.
- Efficient data operations with expansive write and read capabilities.
- Dynamic Target Devices Table that’s user-configurable and automatically updated.

With these features, the Binho Supernova ensures an unparalleled level of control, adaptability, and comprehensive management over communication protocols, making it an indispensable tool for embedded system development and testing.

4. Hardware Specifications

POWER REQUIREMENTS

Power Source: USB Type-C port
Max. Current & Voltage: 500 mA @ 5 V
Max. Power Consumption: 2.5 W

INTERFACES

USB-C: Serves as both power input and data interface.

Unified Interface: Consolidates I2C, UART, SPI, and GPIO functions.

I3C Interfaces:

- Low Voltage Interface: Supports I3C bus voltages ranging from 0.8V to 1.2V.
- High Voltage Interface: Supports I3C bus voltages ranging from 1.2V to 3.3V.

INDICATORS

MCU Operation Indicators:

- RGB Neopixels:
 - Normal Operation: Cycles between green and blue in a sinusoidal pattern when the device is in a resting state.
- Command Reception: Pauses for 30 seconds upon receiving a command.

USB Communication:

- Fourth Neopixel: Illuminates when the Supernova receives a message via USB.
- Fifth Neopixel: Lights up upon sending a response back to the USB host.

5. User and Application Programming Interfaces

BINHO MISSION CONTROL (BMC)

BMC is a multi-platform desktop application meticulously designed to optimize and simplify device orchestration throughout the entire embedded system development and testing cycle. Rather than navigating the time-consuming feedback loop often encountered when coding, building, and testing via a microcontroller, BMC reduces these complexities into a streamlined and user-friendly GUI experience.

Supported Devices:

- Binho Nova Host Adapter.
- Binho Supernova Host Adapter.
- Future compatibility with other host adapters in the market.
- For users who may not have immediate access to the supported physical devices, the app offers built-in simulators.

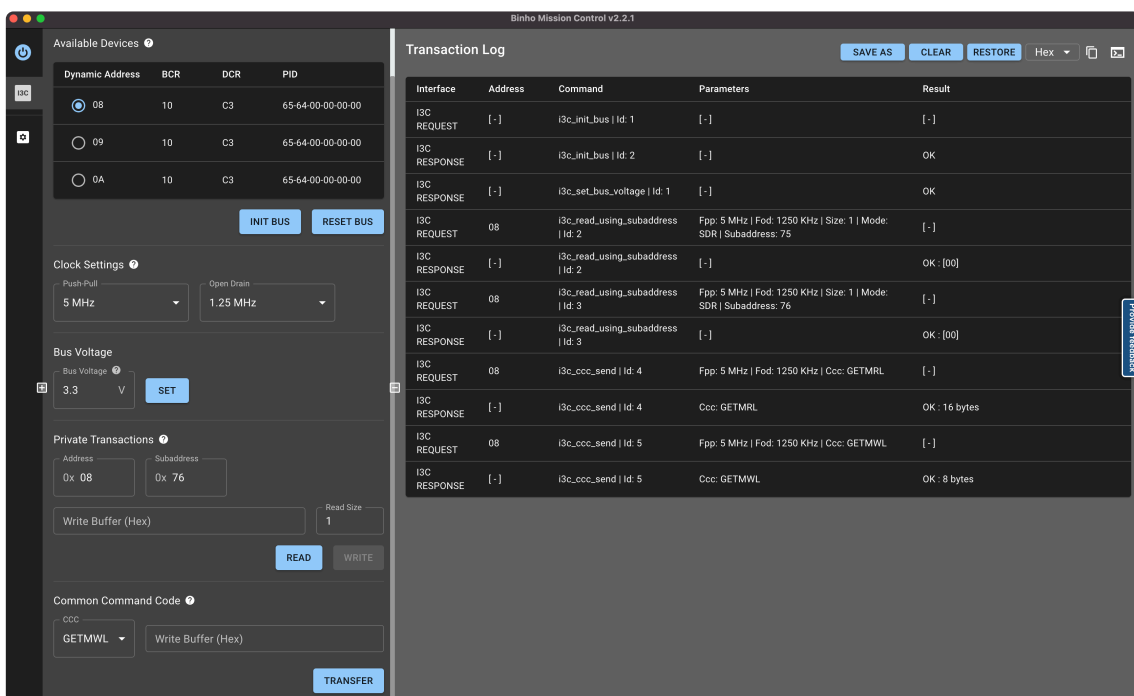
Core Features:

- **Diverse Protocol Support:** Seamlessly interface with devices across a variety of protocols, including I2C, I3C, SPI, GPIO, UART, and 1-WIRE.

- **Transactional Clarity:** Effortlessly execute various protocol transactions, from standard write and read operations to advanced functions such as transfer and CCC commands.
- **Intuitive Configuration:** Tailor your device interactions by configuring parameters specific to each protocol. Whether it's adjusting the bus voltage, setting the clock frequency, determining the read payload size, or assigning the address, BMC puts you in the driver's seat.
- **User-Friendly Design:** Boasting a clear and intuitive interface, BMC ensures that both novices and experts can get the most out of their device interactions.
- **Unified Experience Across Devices:** Whether you're working with the Binho Nova or the Binho Supernova, BMC offers a consistent and comprehensive experience.

System Compatibility:

Compatible with Windows, Linux, and macOS, ensuring a consistent and smooth experience irrespective of your operating system of choice.



5. User and Application Programming Interfaces

SUPERNOVA SDK

Whether you need to automate testing processes, streamline device communication, or craft custom workflows for your embedded systems, the SupernovaSDK is your ultimate ally. Designed specifically for the Binho Supernova USB host adapter, this Python package transforms complex tasks into straightforward operations. Dive deep into the world of embedded system development and testing, and harness the power of this SDK to provide an unmatched hardware control experience for developers and engineers alike.

Highlights:

- **Robust Protocol Support:** Ensures precise and effortless communication with devices operating on I2C and I3C protocols.
- **Controller Facilitation:** Allows the host adapter to play its role as a Controller device.
- **Firmware Updates:** Allows users to update the firmware via the SDK.
- **Jupyter Notebook Compatibility:** Enables developers to seamlessly craft interactive scripts, tests and documentation.

System Prerequisites:

- **Python Version:** 3.10 or higher.
- **OS Compatibility:** Windows, MacOS, or Linux.
- **Device Requirement:** Binho Supernova USB host adapter, with the firmware kept up-to-date.

FOR C/C++ DEVELOPERS

For developers aiming to interface with the Nova and Supernova through applications, tools, and programs written in C/C++, the BMC SDK is the ideal choice. Specifically crafted for C/C++ environments, this dynamic library establishes a seamless connection between your software solutions and the Binho Nova and Supernova USB host adapters.

6. Connector Pinout



QWIIC Compatible Dedicated I2C Port

- 1 GND
- 2 VTARGET
- 3 SDA
- 4 SCL

I2C / UART / SPI / GPIO Port

- I2C**
 - 1 SCL
 - 3 SDA
- UART**
 - 5 RX
 - 7 TX
 - 9 RTS
 - 11 CTS
- SPI**
 - 13 MOSI
 - 15 MISO
 - 17 CLK
 - 19 CS 0
 - 20 CS 1
 - 21 CS 2
 - 22 CS 3
- GPIO**
 - 23 1
 - 24 2
 - 25 3
 - 26 4
 - 27 5
 - 28 6
 - 29 VTARGET
 - 30 AIN
 - GND

Low Voltage and High Voltage I3C Port

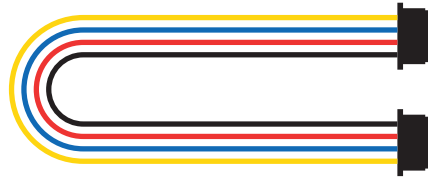
- 1 VTARGET
- 2 DETECT
- GND
- 7 SCL
- 9 SDA

7. Unboxing the Supernova

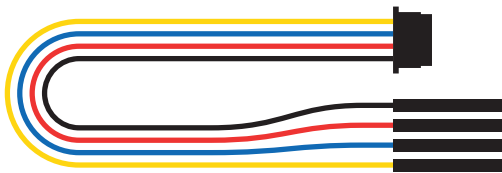
USB A to USB Type-C cable



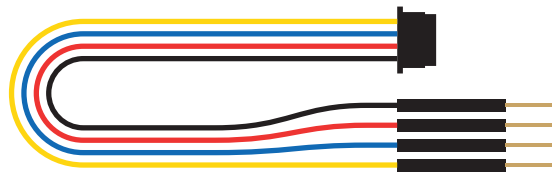
Qwiic JST SH 4-Pin Cable - 50mm Long



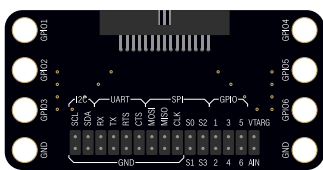
Qwiic JST SH 4-pin to Premium Female Sockets Cable - 150mm Long



Qwiic JST SH 4-pin to Premium Male Headers Cable - 150mm Long



Binho Supernova Breakout Board for 2x15 1.27 mm pitch to 2x15 2.54 mm pitch male pin header adaptation



2x15 pin 1.27 mm pitch Flat Ribbon Cable



I3C High Quality Harness

