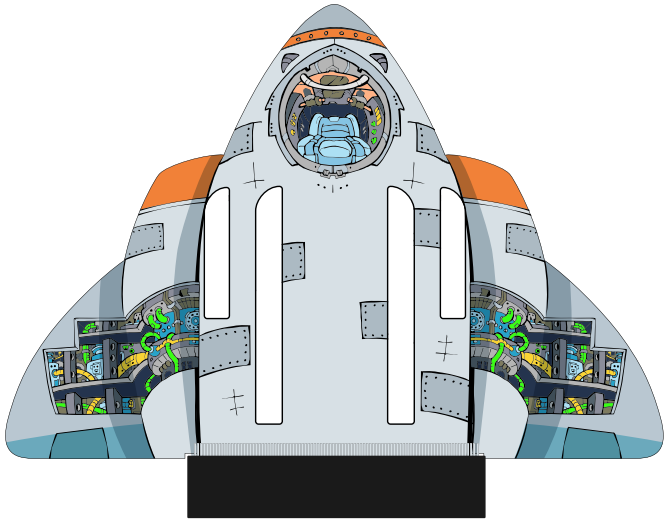
MISSION MONOTONIA

STEM Learning Kit Series



The Bolt Board

DATASHEET

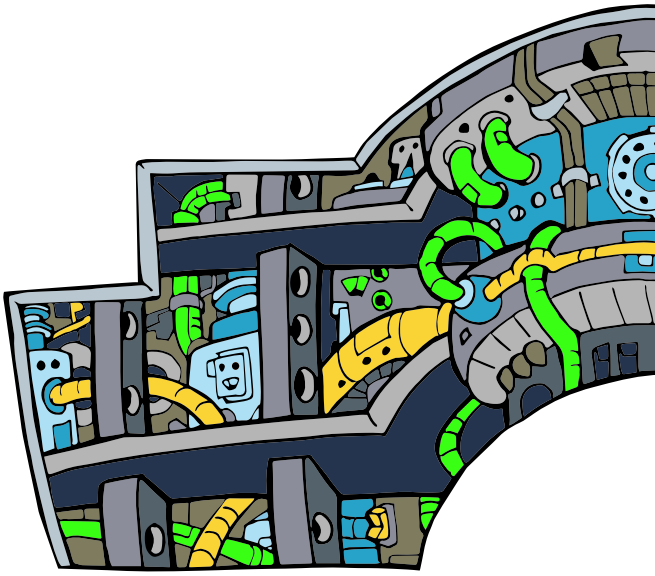
amomii

Description

The Bolt board, shaped like a rocket from the BAM series, is a core component designed to simplify electronics and mechanics for young learners. It acts as a central hub, enabling a BBC micro:bit to connect seamlessly with external sensors and components, bridging the gap between programmable microcontrollers and the physical world.

A key feature is its reversible connection to the micro:bit, offering project flexibility by allowing both boards to face independently. This ensures optimal positioning of built-in RGB lights and other features on both the micro:bit and the Bolt board.

The board provides an authentic learning experience by utilizing real-world engineering components. Students can power their creations and the micro:bit itself via USB-C. Its versatility makes it a foundational element for all projects within the kit, supporting a hands-on educational journey.



Key Features

• **Physical-First Approach:** Engineered to support projects that emphasize building and physical interaction, complementing the digital aspects of the micro:bit.

• **Ecosystem Integration:** Features dedicated ports for seamless connection to the amomii ecosystem of custom sensors and actuators, expanding the project possibilities.

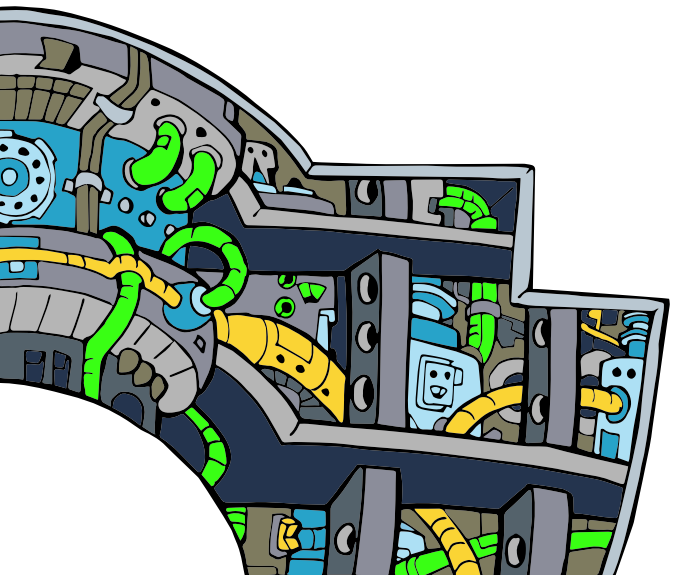
• **Intuitive micro:bit Integration:** Features a reversible, plug-and-play connector for the BBC micro:bit, allowing for flexible project designs.

• **Onboard RGB Lights:** Includes integrated RGB LEDs that can be controlled to provide visual feedback and enhance project aesthetics.

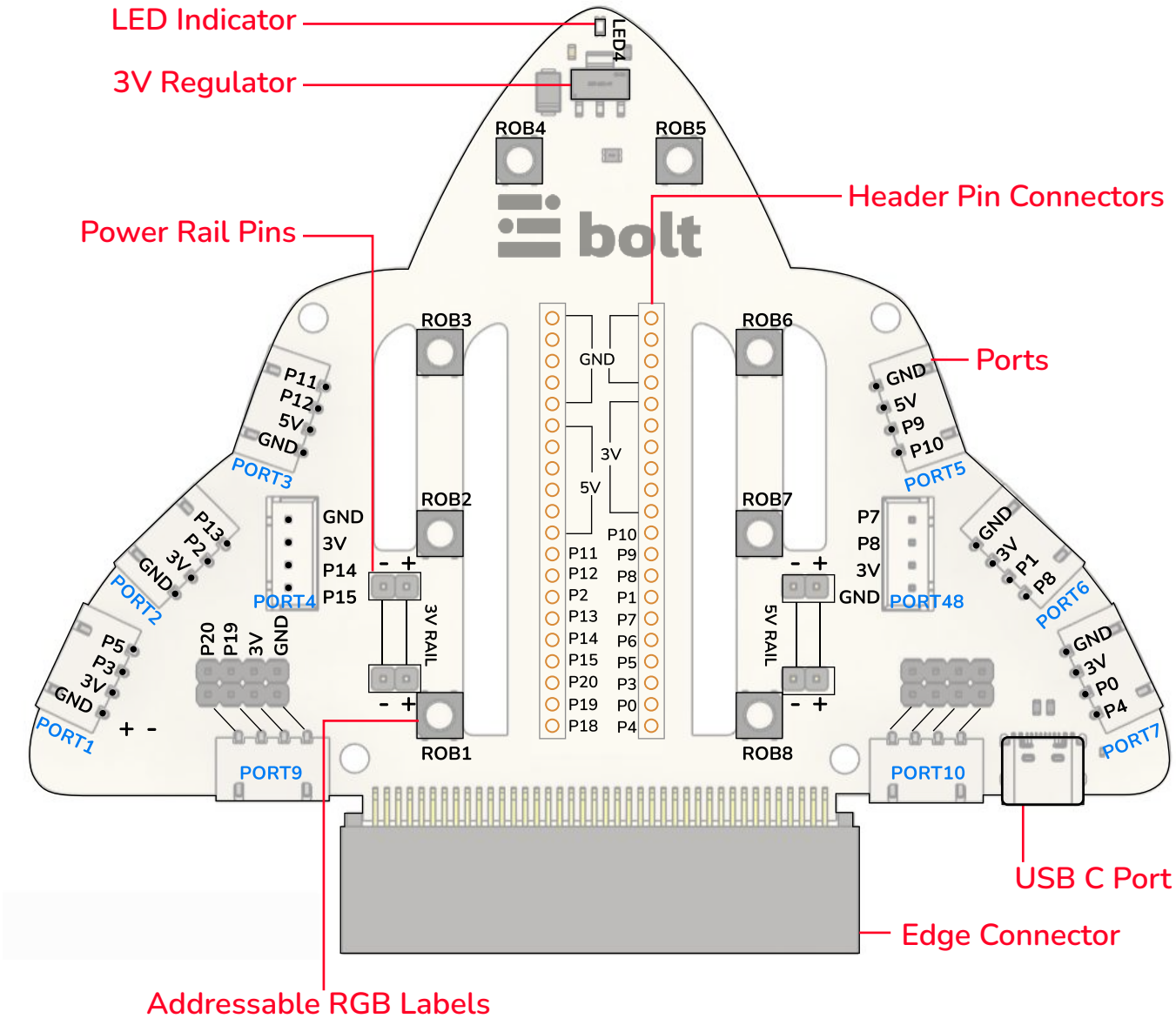
• **USB-C Power:** A modern USB-C port provides reliable power to both the Bolt board and the connected micro:bit.

• **Real-World Components:** Designed with authentic engineering components to provide a genuine and educational experience in electronics.

• **Durable & Engaging Design:** The board's shape, resembling a rocket from the BAM series, is both engaging and robust for educational use.



Components

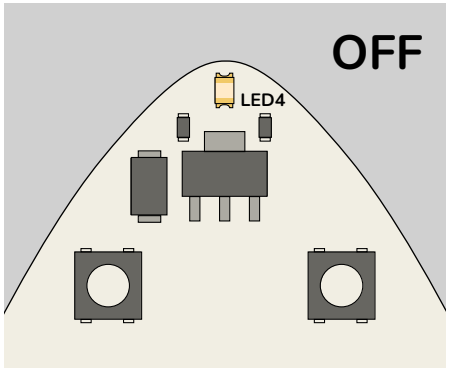


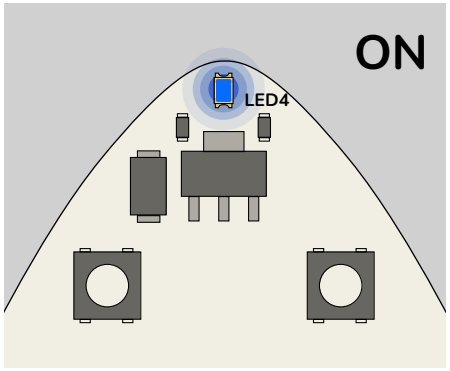
- **USB C Port**

The USB C port on the Bolt board

- **LED Indicator**

A single LED indicates when the board is receiving power from the USB-C port.

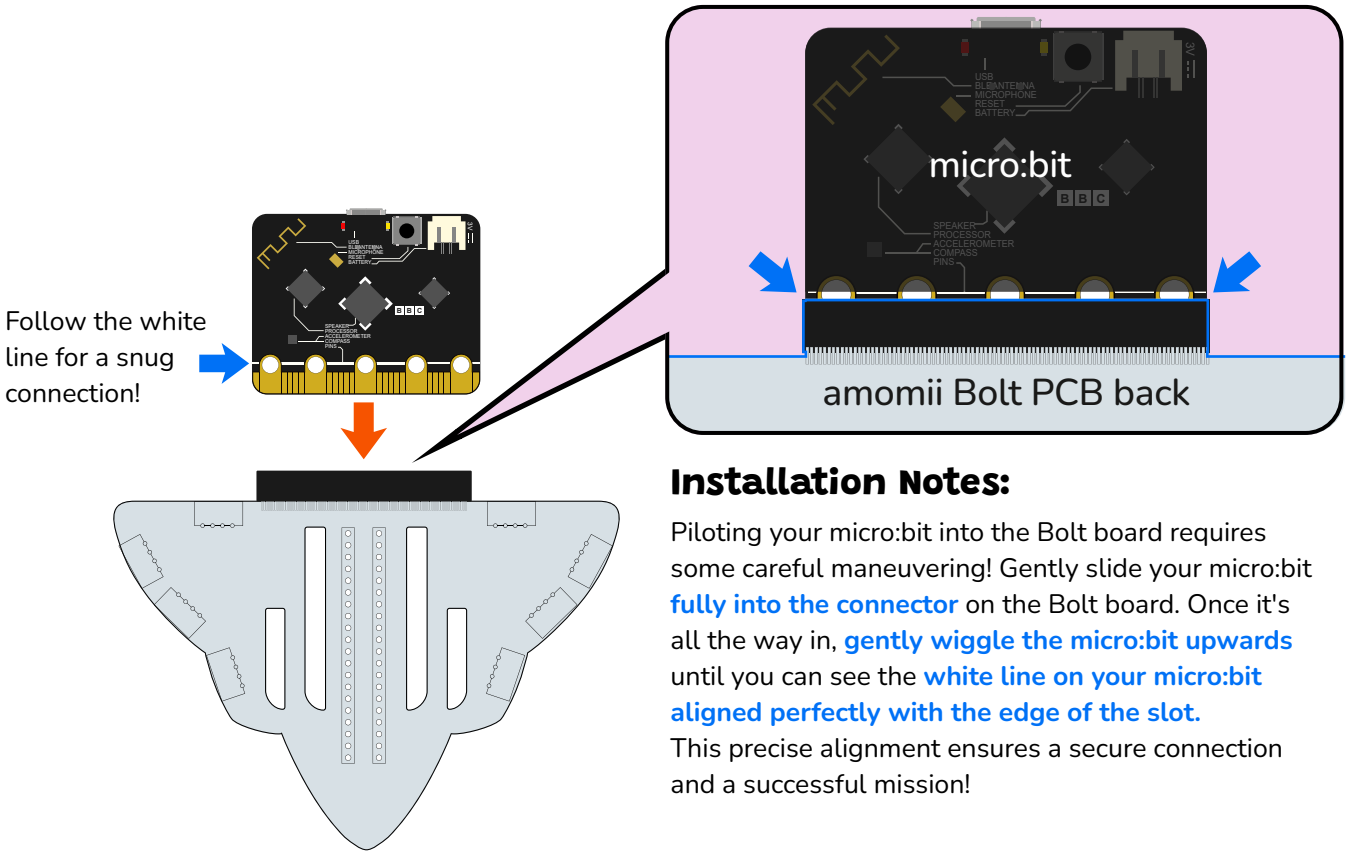




- **Edge Connector**

The micro:bit connects to the Bolt board via this **Edge Connector.**

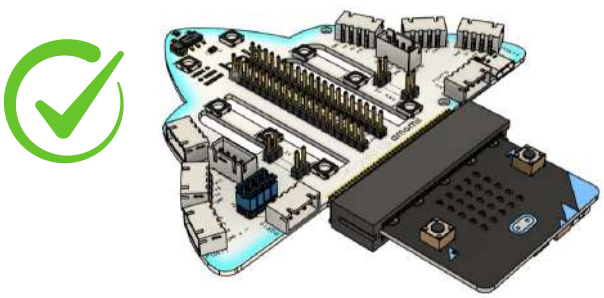
To ensure a reliable connection, the white line on the micro:bit must align with the top edge of the connector. Pushing the micro:bit too far may result in an unstable connection. The easiest way to achieve the correct alignment is to fully insert the micro:bit and then pull it back slightly until the line aligns with the edge of the connector.



Installation Notes:

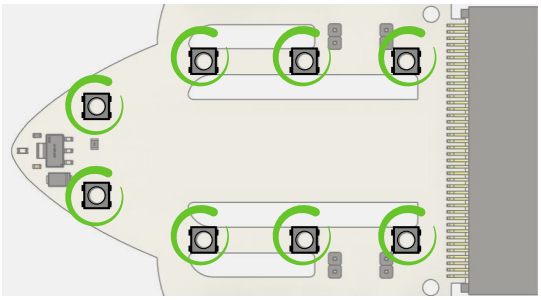
Piloting your micro:bit into the Bolt board requires some careful maneuvering! Gently slide your micro:bit **fully into the connector** on the Bolt board. Once it's all the way in, **gently wiggle the micro:bit upwards** until you can see the **white line on your micro:bit aligned perfectly with the edge of the slot.**
This precise alignment ensures a secure connection and a successful mission!

A unique feature of the design is that the micro:bit can be connected facing up or down. This reversible feature provides flexibility in project design.



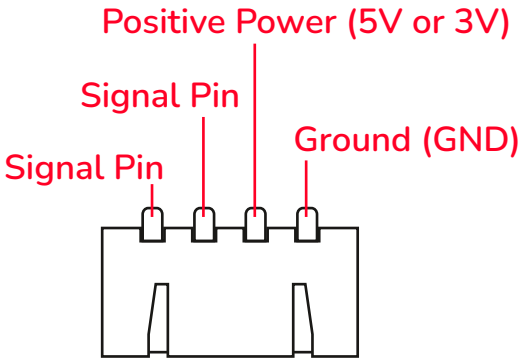
- **Addressable RGB LEDs**

The board is equipped with eight addressable RGB LEDs. These lights are controlled by the micro:bit via Pin 16 and can be programmed to display a wide range of colors and lighting effects.



Ports

All ports on the Bolt board are 4-pin XH connectors, designed for simplicity and reliability. The arrangement of the pins is standardized across all ports, with two pins dedicated to power (Positive and Ground) and two signal pins connected directly to the micro:bit.

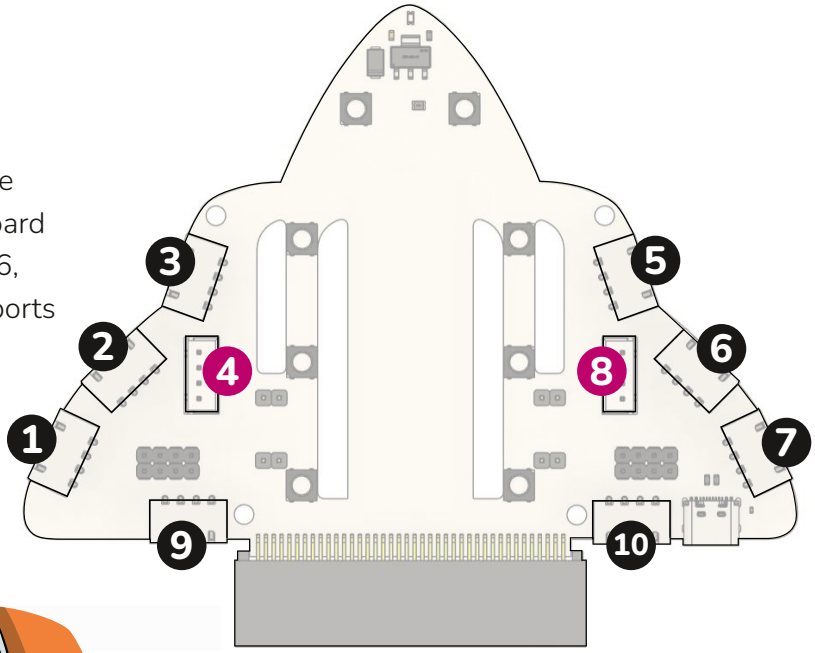


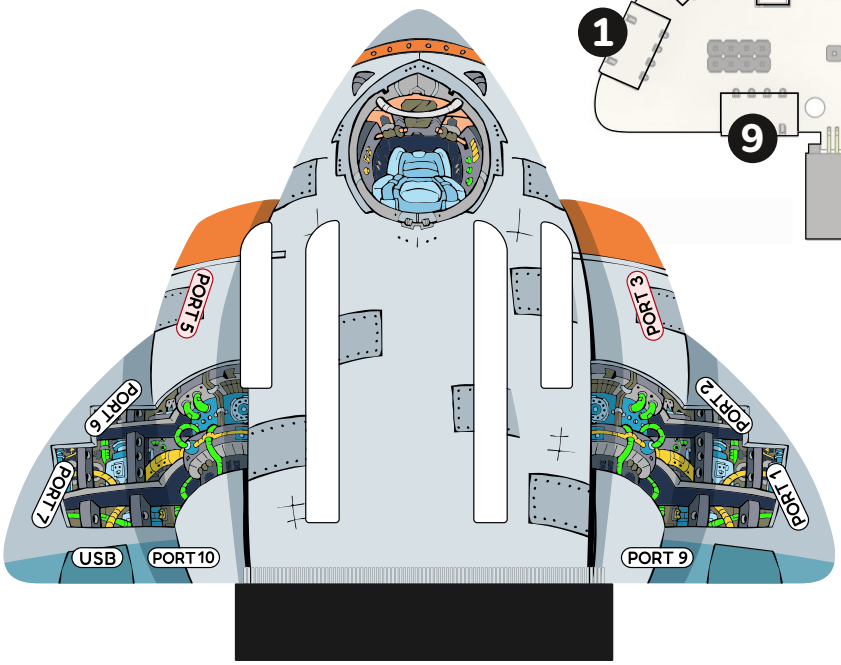
- **Port Structure and Function:**

Although all ports share the same physical structure, their function and power output can vary. It is important to read and understand the specific functions of each port to ensure correct operation and to avoid potential performance issues or damage to components.

- **Edge Ports and Center Ports:**

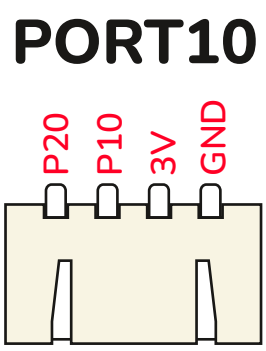
The Bolt board features a total of 10 ports, consisting of 8 Edge Ports (located on the perimeter of the board) and 2 Center Ports (positioned perpendicular to the board). The Edge Ports are labeled on the top of the board (PORT 1, PORT2, PORT 2, PORT 5, PORT 6, PORT 7, PORT 9 and PORT 10), while all ports are labeled on the underside.



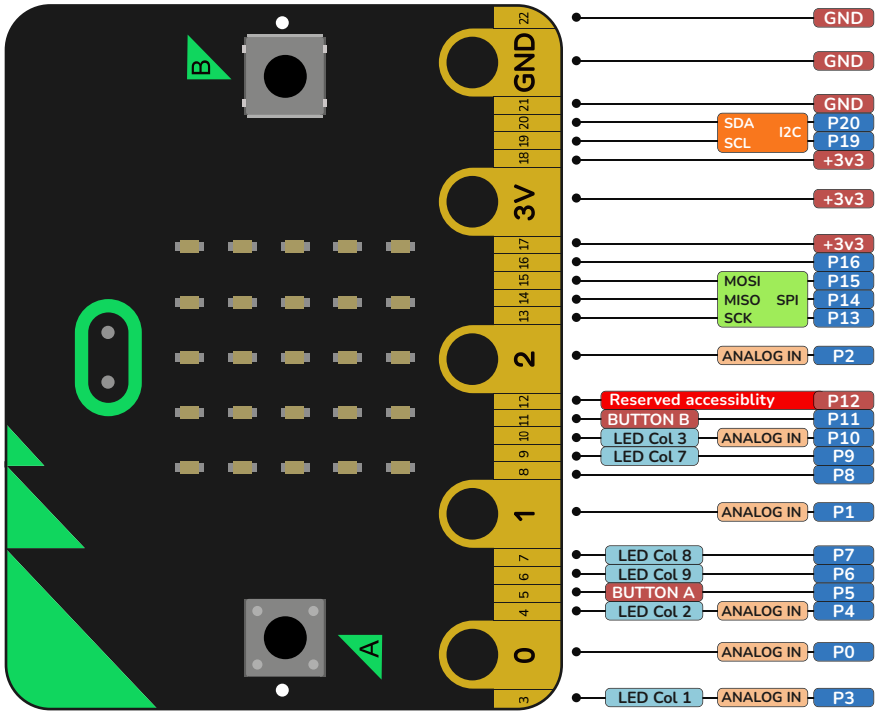


● General Purpose Ports

Many ports can be used interchangeably, but it is important to note that certain micro:bit pins have special functionality. For example, only pins P0, P1, and P2 can be used to detect touch, and only a select number of pins can read analog data. Therefore, while some modules will function regardless of the Bolt board port you use (provided your code is correct), others may need to be connected to a particular port to correspond with the specific functionality of the **micro:bit pin it is connected to. The micro:bit pin each port connects to is clearly labeled on the underside of the board.**



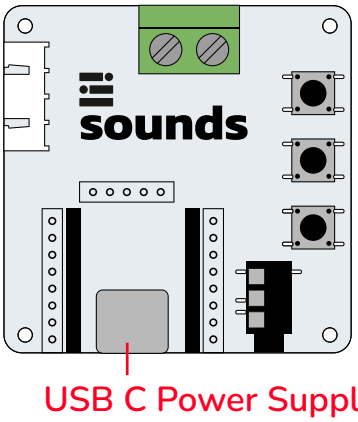
As you can see from the diagram, PORT 10 is connected to micro:bit pins P19 and P20. You can check the micro:bit pinout to see what special functionality the pins have.

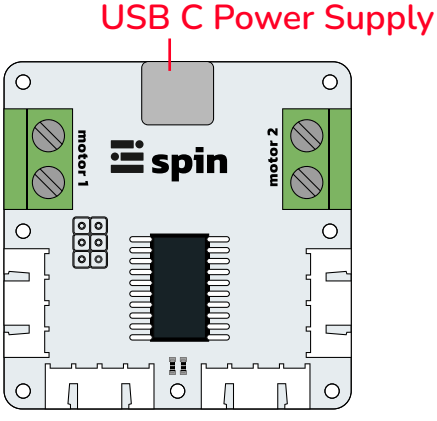


● Power Ports:

The labels for PORT 3 and PORT 5 on the top of the board are distinguished by a red circle, indicating that they are Power Ports. On the underside of the board, the positive power pin on these ports is labeled "5V," as opposed to "3.3V" on all other ports.

- Power Ports are designed for modules that require a higher voltage supply, such as the amomii Spin motor driver module.
- These ports can also be used to power the Bolt board. If a module with its own power source (e.g., the amomii Spin or amomii Sounds module) is connected, it can supply 5V to the board, which is then regulated to 3.3V for the micro:bit and other ports.

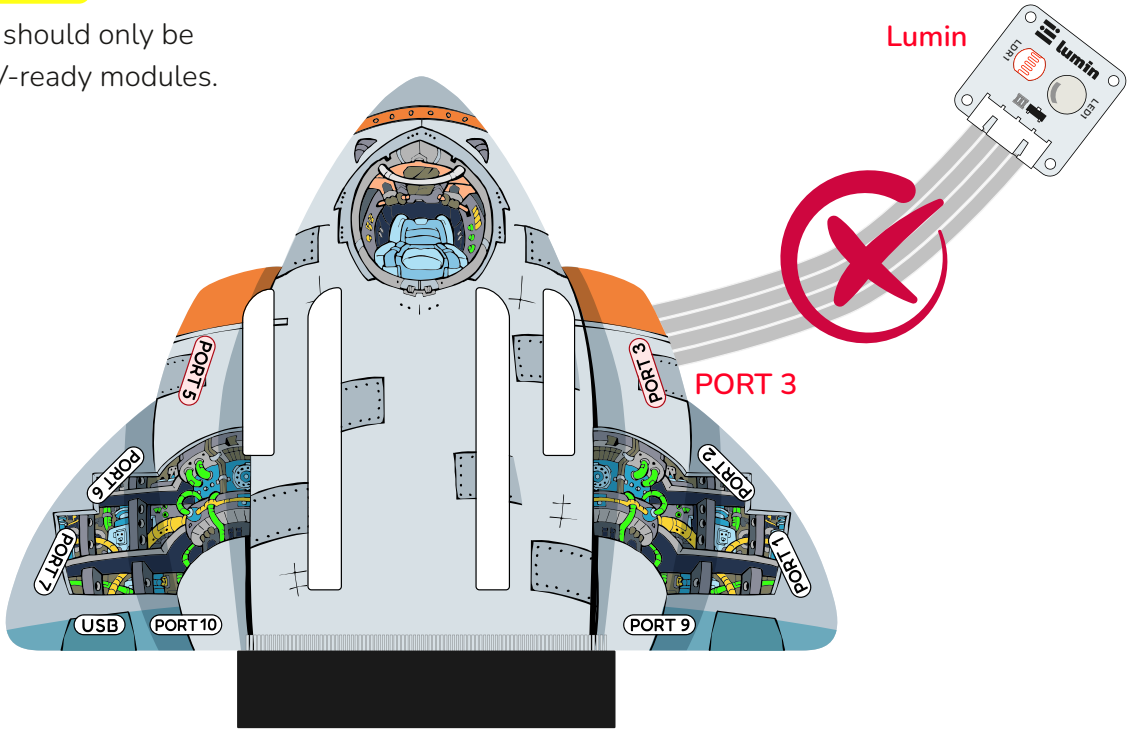




Important Notes on Power Ports:

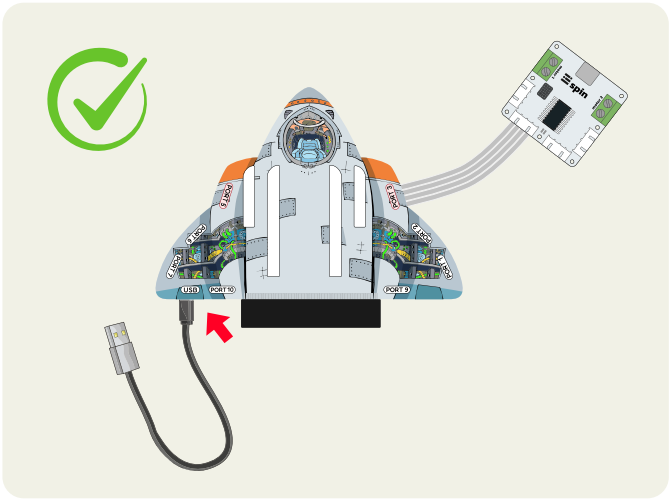
5V Modules Only

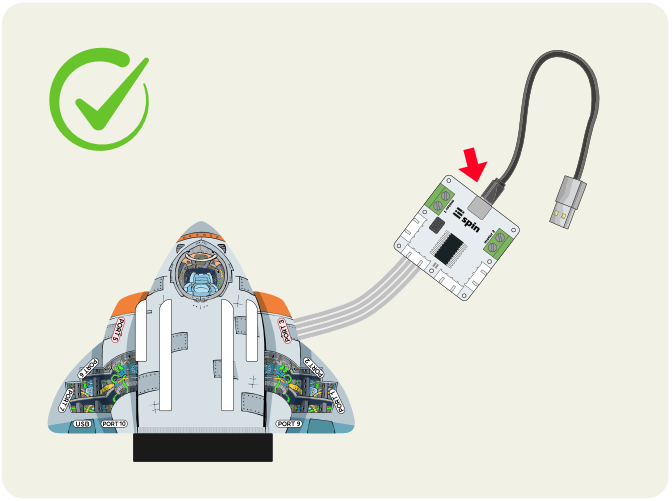
Power Ports should only be used with 5V-ready modules.

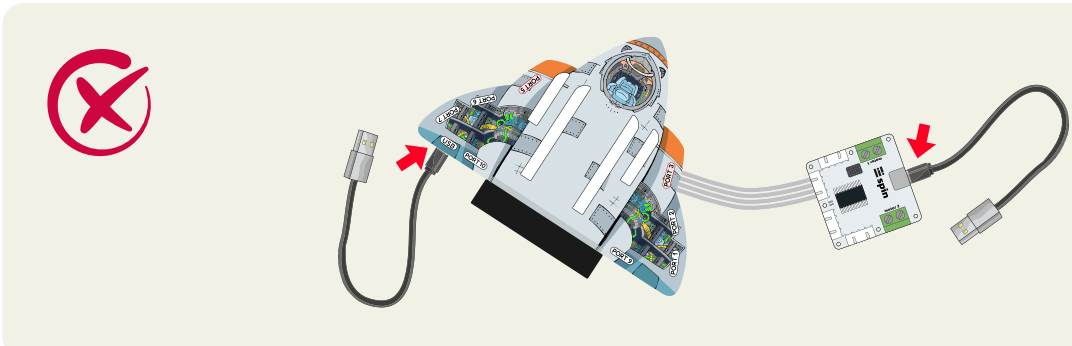


One Power Source Only

When a module with an independent power source is connected, only power the project via the Bolt board's USB-C port OR the module's power source. **Do not use both simultaneously.**





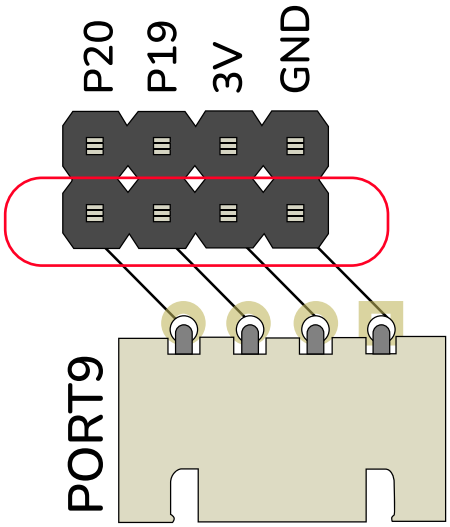


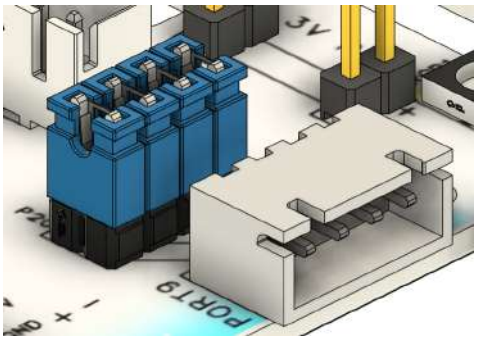
Free Port

The Free Port, labeled **PORT 9**, is reserved for advanced users and is not utilized in any of the standard projects within our teaching materials. This port provides a direct, unmediated connection to the micro:bit's pins, offering flexibility for custom projects. **Improper use of this port could result in damage to the board, the micro:bit, or connected modules.** It should only be used by an experienced user who fully understands the required connections and power requirements.

Connection to Header Pins:

This port is physically connected to the four header pins located directly in front of it.





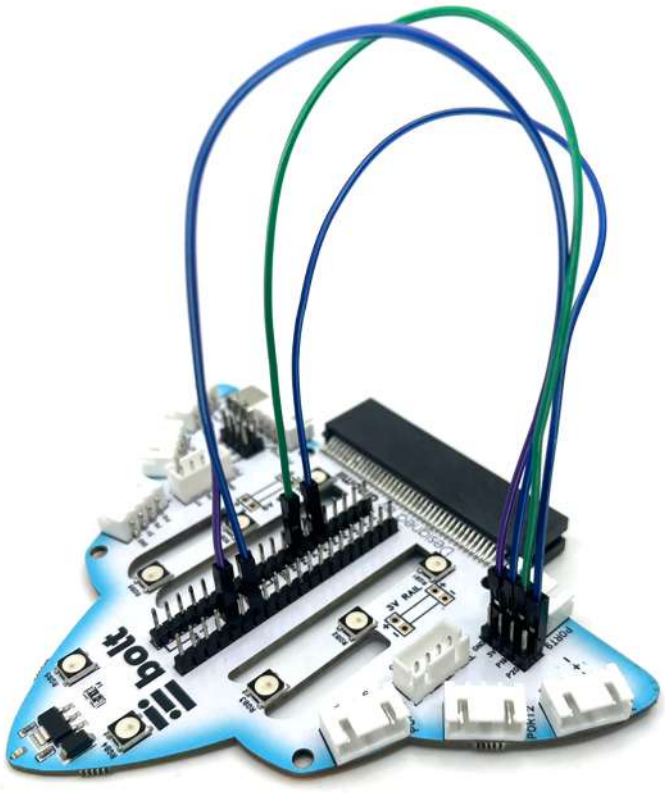
Jumpers:

Small pin connectors, known as jumpers (not included in the kit), can be used to connect PORT 9 to the 3.3V, GND, and micro:bit pins P19 and P20, similar to PORT 10.

I2C Protocol:

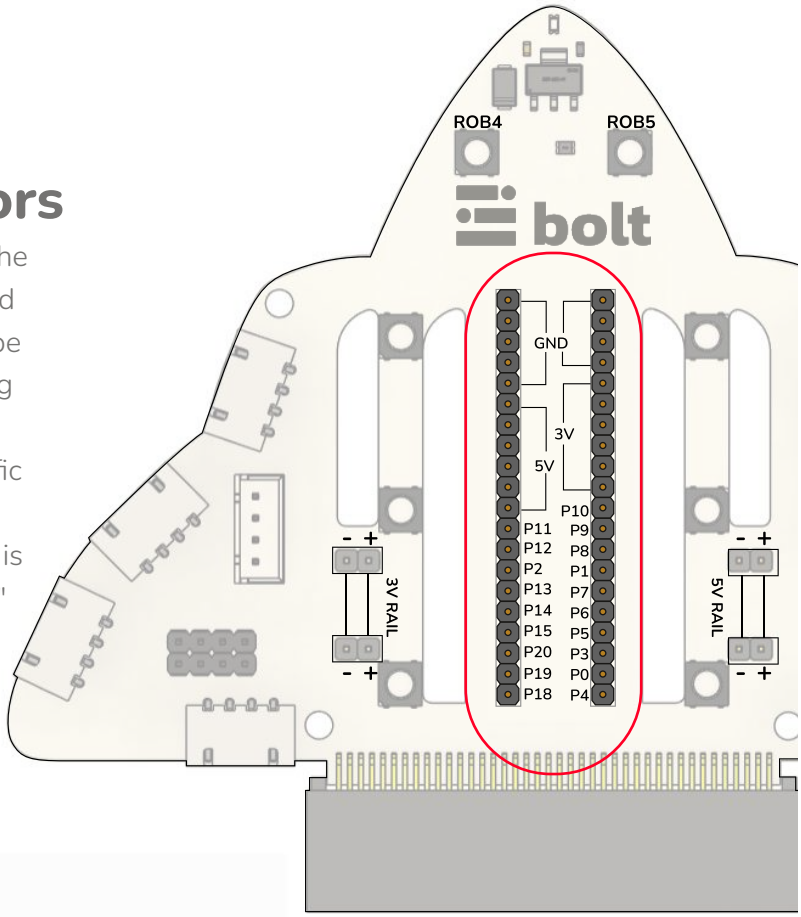
When the Free Port is connected to the micro:bit pins P19 and P20 is particularly useful for devices that use the I²C communication protocol. While this protocol is beyond the scope of this document, it allows both PORT 9 and PORT 10 to be used simultaneously with **I²C**-compatible devices. Details on the I²C protocol will be provided in our advanced documentation for any projects that utilize it.

If the jumper connectors are removed, jumper wires can be used to connect this port to any of the micro:bit pins via the Header Pin Connectors in the center of the board.



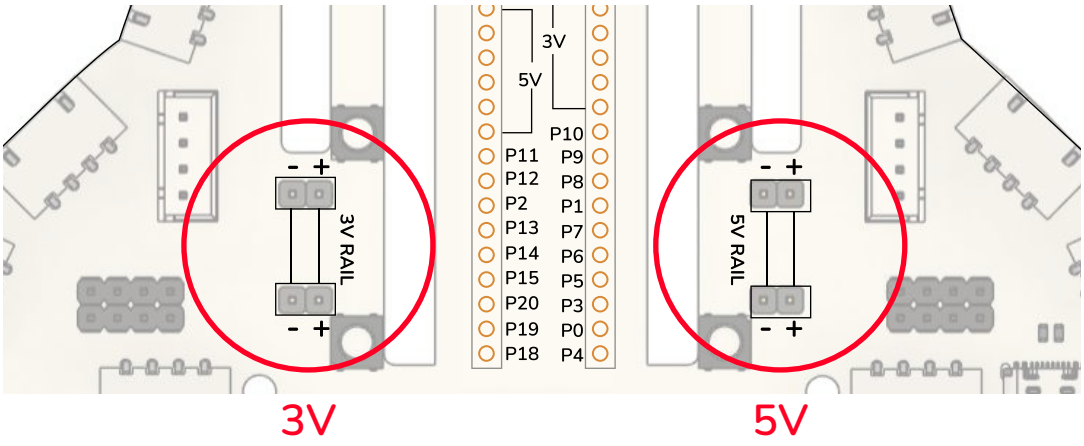
Header Pin Connectors

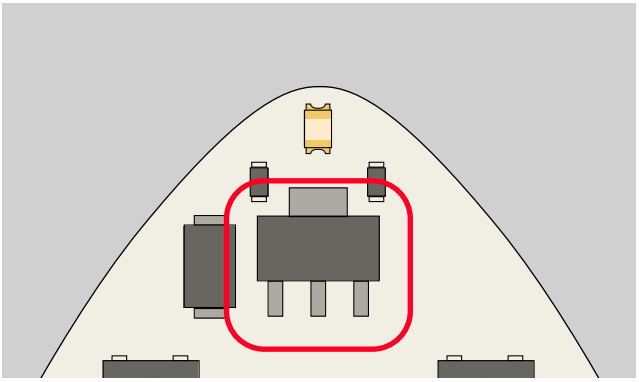
These pins provide a direct connection to the micro:bit's I/O pins, as well as to the 5V and regulated 3.3V power supplies. They can be used to connect external components using jumper wires. These are also used to connect the Free Port (Port 9) to any specific micro:bit pin and for connecting jumper wires to the micro:bit when the Bolt board is in Breadboard Mode (see the "Breadboard" section for more details).



Power Rail Pins

Typically reserved for experienced users, these pins are located on the board to provide power to external breadboard power rails. One set of pins provides a 3.3V supply, while the other set provides a 5V supply. Further details on their use can be found in the "Breadboard" section of this document.





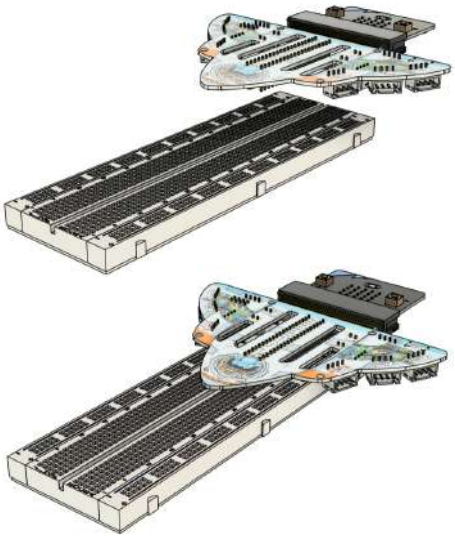
3V Regulator

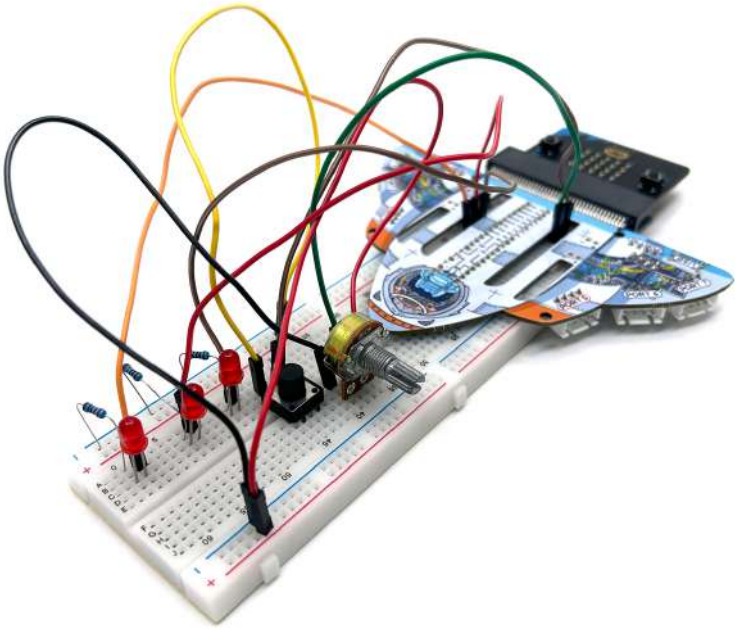
This component regulates the 5V supply from both the USB-C port and the power ports to a stable 3.3V, making it suitable for powering the micro:bit and any 3.3V modules connected to the regular ports on the Bolt board.

Breadboard Mode

The Bolt board can be used in "Breadboard Mode" to expand its capabilities for more advanced custom projects. The board is designed to be placed directly into a standard breadboard, with its Header Pin Connectors straddling the central channel.

The holes in the breadboard's body allow for access with jumper wires, enabling the use of a wide range of components, including those from other ecosystems like Arduino.





In this mode, the board's Power Rail Pins are aligned to power the positive and negative rails on the breadboard. One side provides a regulated 3.3V supply, while the other supplies a full 5V, allowing for the use of modules with different voltage requirements.
This advanced functionality is beyond the scope of this introductory datasheet but will be detailed in specific project guides when necessary.

• Important Notes for Use

To ensure reliable code uploads and to prevent potential warnings, it is recommended to disconnect the micro:bit from the Bolt board before connecting the micro:bit to a computer for programming. The micro:bit is designed to be powered from a single source at a time. When it is connected to the Bolt board, it is receiving external power, which can interfere with the data connection from your computer's USB port.

• Safety and Best Practices

The Bolt board is designed to encourage creativity and hands-on experimentation. However, it is essential to prioritize safety by following the instructions and recommendations outlined in this datasheet and all accompanying documentation. Always consult the appropriate documentation for any module to ensure its voltage and pin requirements are compatible with the board. Incorrect usage, particularly with power ports, can result in component damage or, in rare cases, overheating. **If you experience overheating, immediately unplug the power and allow time for the board to cool before inspection. If the cause is not clear, please contact amomii technical support for assistance at support@amomii.com.** By adhering to the recommended practices, you can ensure a safe and enjoyable learning experience.

Revision History

Date	Revision	Changes
August. 01. 2025	1	First release