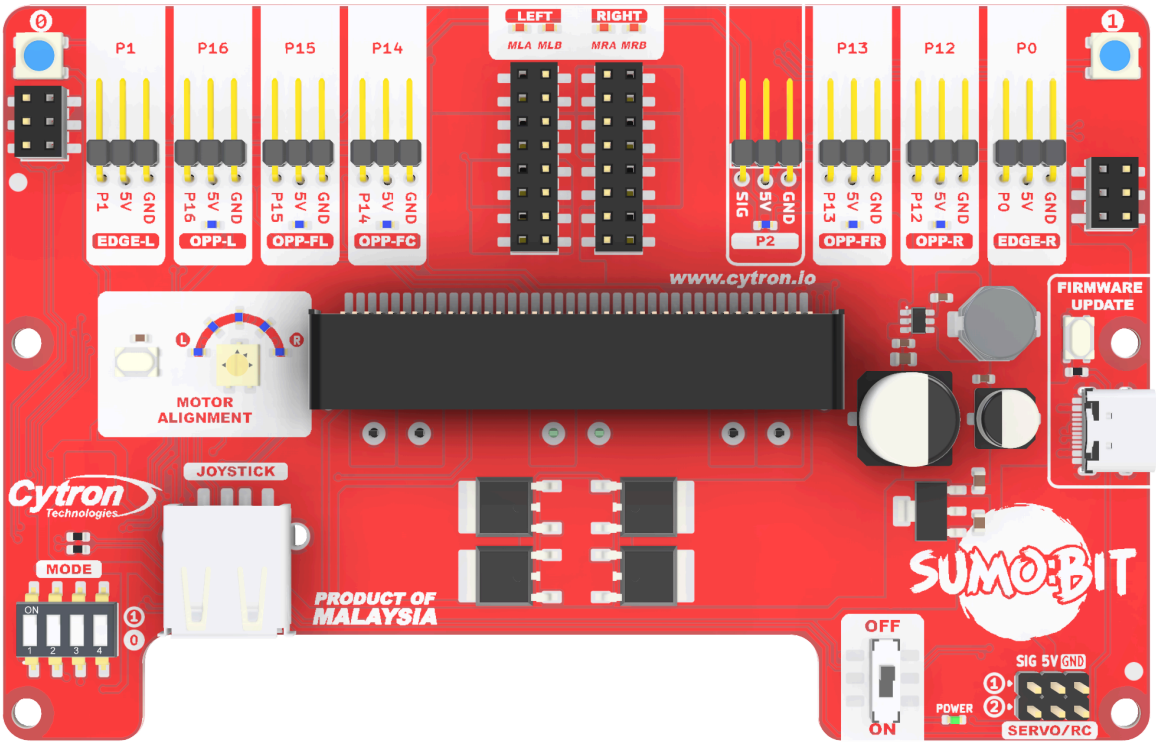
SUMO:BIT



Datasheet

Rev 1.0
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1. INTRODUCTION

SUMO:BIT is a sumo robot expansion board designed for the BBC micro:bit. This board leverages the educational focus and user-friendly coding environment of the micro:bit to simplify sumo robot projects or competition for learners of all ages.

This board is designed to be used with external motor driver boards (MD13S). The motor drivers can be easily stacked into the board and removed in case of failure.

Feature summary:

- A micro:bit based sumo robot board
- VBAT input range: 7V to 25V, with reverse polarity protection
- Vibration proof on/off switch with MOSFET latching circuit.
- Battery voltage can be monitored programmatically
- 5x Opponent sensor input ports pulled up to 5V with status LEDS
- 2 Edge sensor input ports
- 1x General Purpose input output port (Analog/Digital)
- 2x sockets for external MD13S motor driver boards
- **13A continuous, 30A peak (<10 second)***
- 2x motor current sensors, one for each motor channel
- 4x Motor Status LEDs
- USB-A port for wireless joystick connection
- Motor Alignment Module for balancing the relative speed of the motors
- 1x 4-Ways DIP switch for mode selection
- 2x Servo Ports that can also be as RC pins
- 2x RGB LEDs

** The current ratings are based on the assumption that the SUMO:BIT is connected to the MD13S*

2. BOARD LAYOUT AND FUNCTION

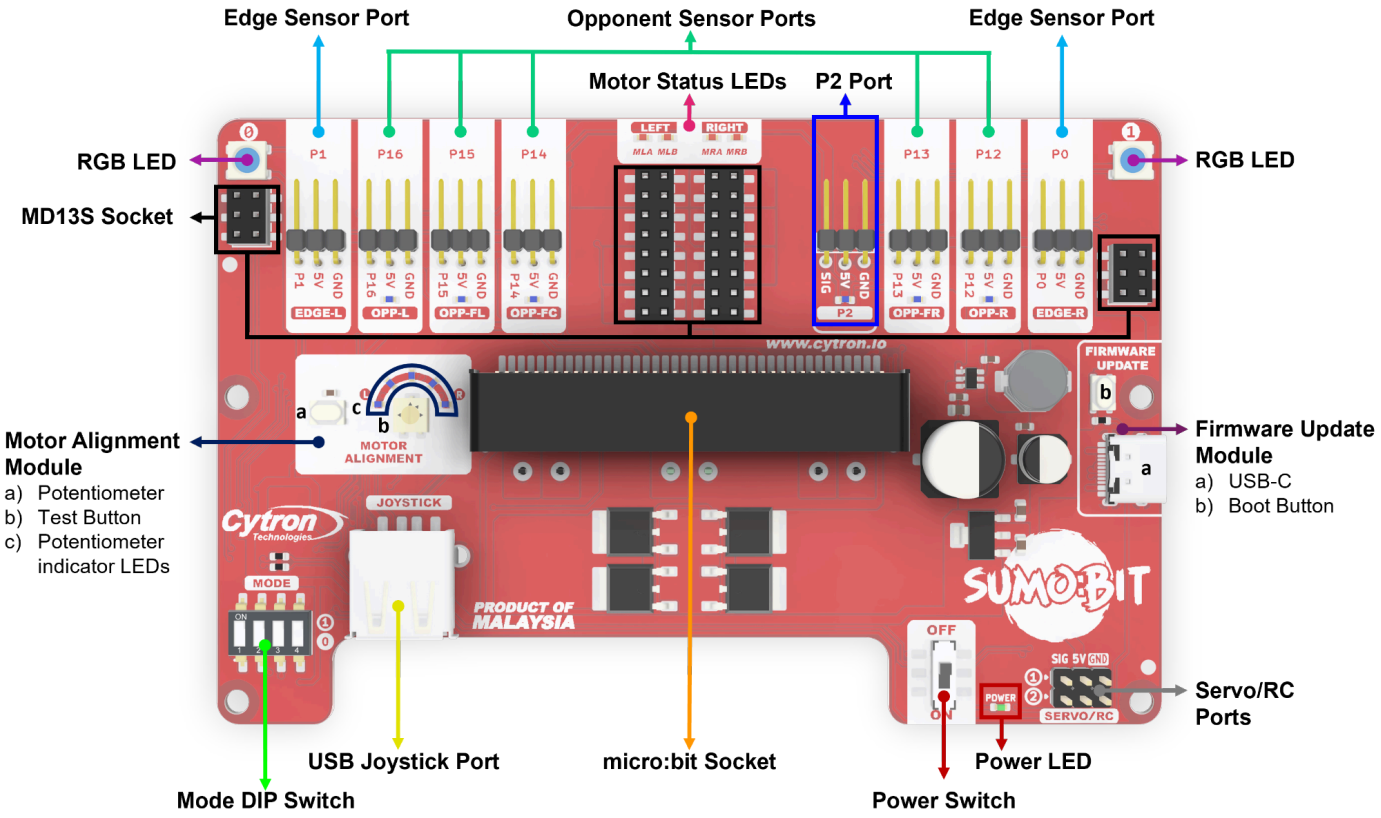

Figure 1: SUMO-BIT Board Functions (TOP VIEW)

Function	Description
Power Switch	• Slide switch with MOSFET latching circuit • Turn on/off the power to the board and motor drivers
Power LED	• Green LED to indicate power status • Turns on when the board is powered up
micro:bit socket	• Vertical micro:bit edge connector • Plug in the micro:bit here ⚠ *Make sure that the micro:bit is inserted with the LED matrices facing upwards*
USB Joystick Port	• USB-A Port used to plug in the Joystick Receiver
Mode DIP Switch	• 4-Ways DIP switch provides up to 16 configuration • Can be used to select different tactic/mode for competition

Function	Description
Opponent Sensor Ports	• Male headers with +5V **internal pull-ups** for Maker Object sensors connection. (or any other digital sensors) • Internally connected to the micro:bit digital pins • Equipped with voltage divider to protect the micro:bit pins
Opponent Sensor Status LEDs	• LEDs to indicate the status of opponent sensors • Turn on when the signal is low (active low) • For MAKER-OBJECT, LEDs turn on when opponent is detected
Edge Sensor Ports	• Male headers for Maker Reflect connection (or any other analog sensors) • Internally connected to the micro:bit digital pins • Equipped with voltage divider to adjust the output Voltage
P2 Port	• Male header for general purpose input/output connection • Connected to P2 pin of the micro:bit and can be used as a digital input/output or analog input • Equipped with active low status LED • Signal pin is connected to a voltage divider circuit to reduce from 5V to ~3V
Motor Alignment Module	
a) Potentiometer	• Variable resistor used to modify the relative speed of the left and right motor • Use this feature when the motors used have unbalanced speeds, causing the robot to be unable to move in a straight line
b) Test Button	• Push button used to test the motor alignment modification. • Press this button after adjusting the potentiometer; the motor will move forward for 1 seconds. Observe whether the robot moves in a straight line
c) Potentiometer indicator LEDs	• Group of LEDs used to indicate the current potentiometer position
Firmware Update Module	
USB-C port	• Use a USB-C cable to connect to a computer for uploading new firmware to the board ⚠ *This port is not intended to be used for programming*
Boot Button	• Button used to enter bootloader mode
RGB LEDs	• User programmable WS2812B RGB LED.

<table>
<tr><th>Function</th><th>Description</th></tr>
<tr><td>Motor Status LEDs</td><td>

Red LEDs to indicate which motor is running
Turn on when the motor is running

<table>
<tr><td>MLA/MRA</td><td>Forward</td></tr>
<tr><td>MLB/MRB</td><td>Backward</td></tr>
</table>
</td></tr>
<tr><td>Servo/RC Ports</td><td>

Male headers for servos or RC receiver connection

</td></tr>
<tr><td>MD13S Socket</td><td>

Female socket for the MD13S board connection

⚠ The MD13S should be inserted from the bottom side of the PCB, NOT THE FRONT.
</td></tr>
</table>

Table 1: SUMO:BIT Board Functions

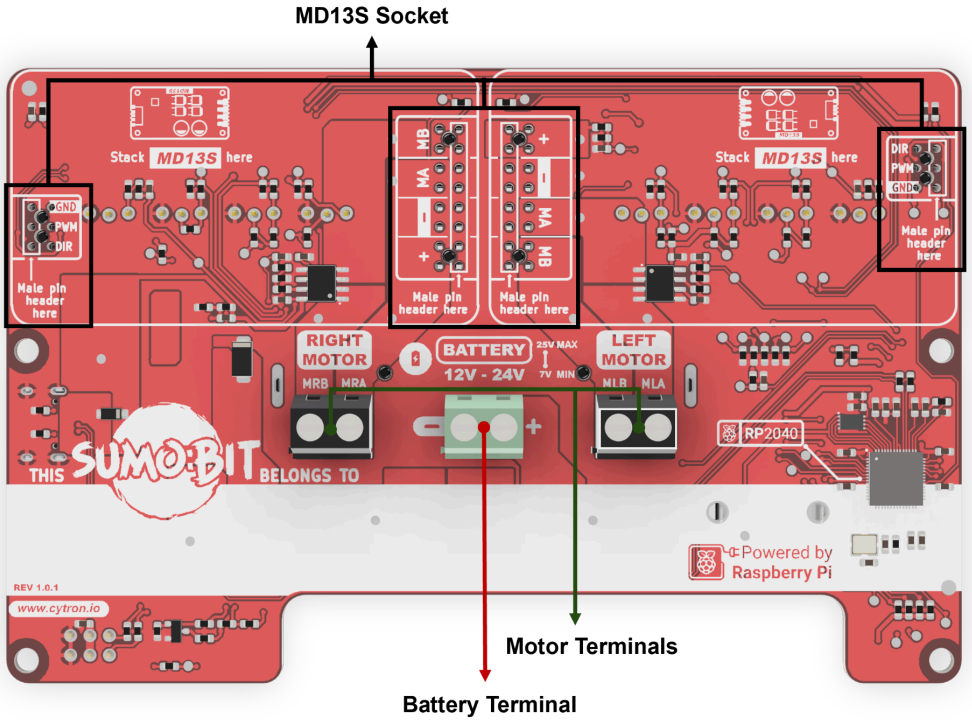

Figure 2: SUMO:BIT (Bottom view)

Function	Description
Battery Terminal	• Terminal block for Battery connection • The positive terminal is connected to analog input via voltage and the voltage can be read by the microcontroller **+** : Positive | **-** : Negative/ground
Motor Terminals	• Terminal block for Motor connection *Please refer to subtopic connection guide for further information on how to connect the motors*
MD13S Socket	• Socket to stack/plug in the MD13S ⚠ *Please make sure that the MD13S is connected accordingly* *Please refer to subtopic connection guide for further information*

Table 2: SUMO:BIT Board Functions (Bottom view)

3. SPECIFICATION

No	Parameters	Min	Max	Unit
1	Power Input Voltage (LiPo Battery)	7	25	V
2	Motor PWM Frequency* ***when connected with MD13S***	-	20	KHz
3	Maximum DC Motor Current each Channel* ***when connected with MD13S***	-	13	A
4	Peak Motor Current each Channel* ***when connected with MD13S*** ⚠️must not exceed 10 seconds⚠️	-	30	A
5	USB Host Output Voltage	-	5	V
6	USB Host Output Current	-	600	mA
7	Servo Voltage	-	5	V
8	+5V Output Maximum Current (Total)	-	600	mA

Table 4: SUMO-BIT Absolute Maximum Ratings

*Note:

This board is designed to be used with the MD13S motor driver. *These maximum ratings are based on the assumption that the SUMO:BIT is connected to the MD13S motor driver boards.* You may refer to the MD13S motor driver user manual for further information.

4. DIMENSION

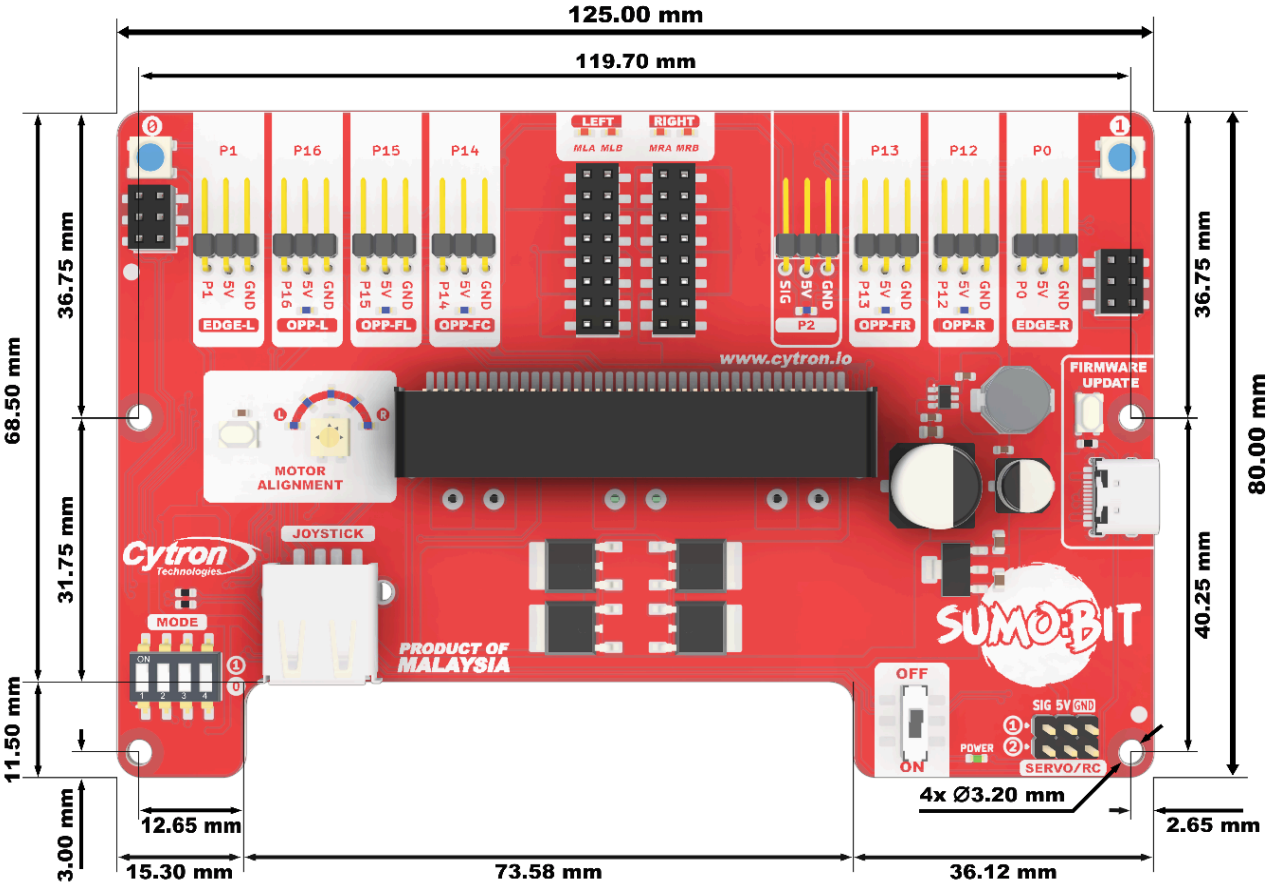

Figure 4: SUMO-BIT Dimension (Top View)

For any inquiries or further assistance, join our dedicated Telegram support group:

SUMO:BIT Support Group

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