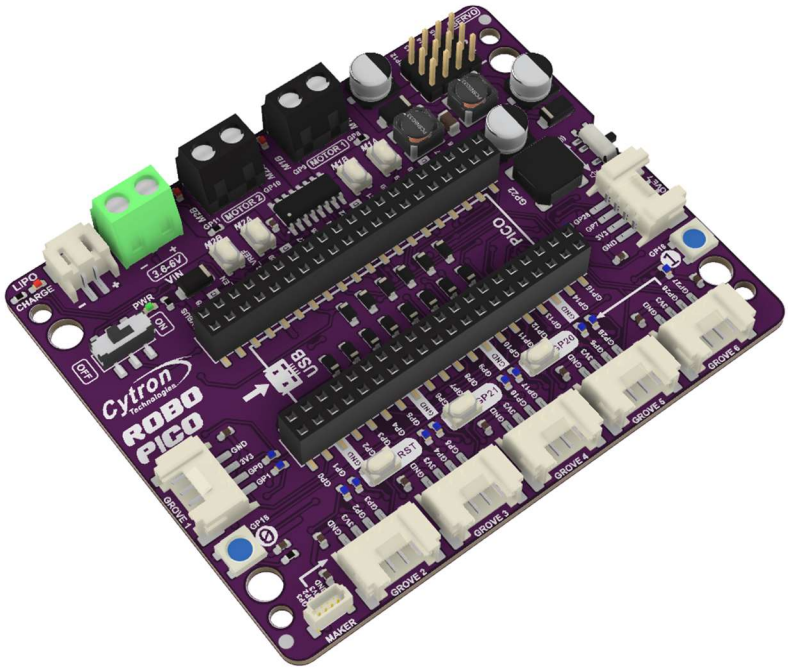
ROBO PICO

Simplifying Robotics with Raspberry Pi® Pico / Pico W



Datasheet

Rev 1.0
April 2023

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1. BOARD LAYOUT & FUNCTION

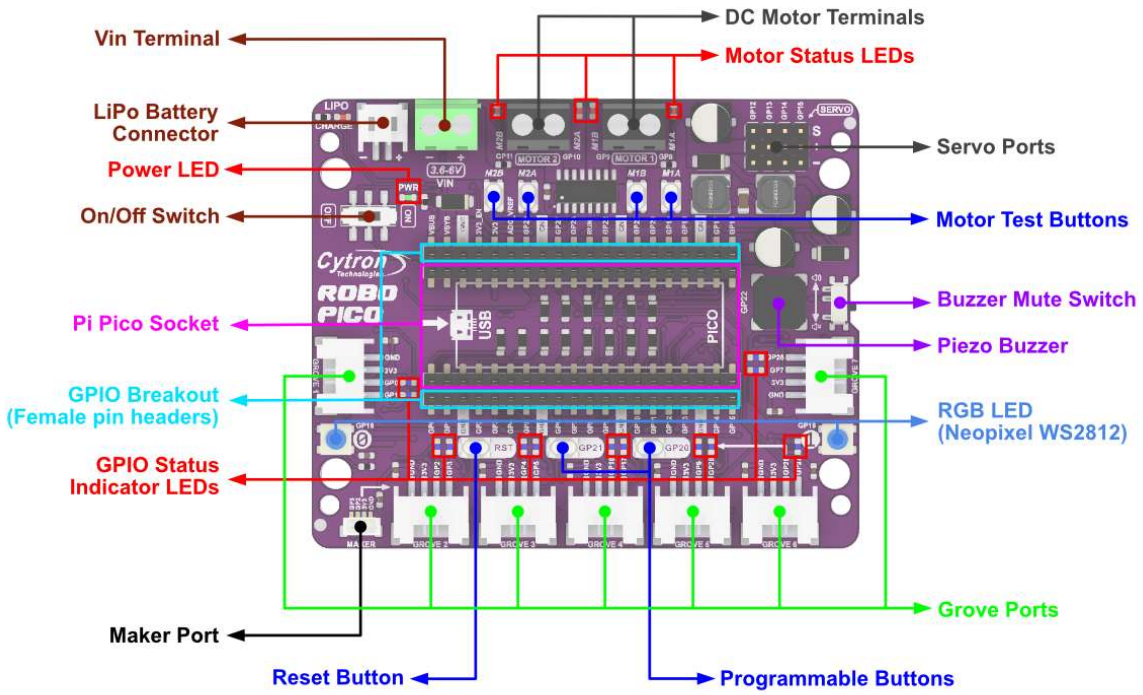

Figure 1: ROBO-PICO Board Functions

Function	Description
Vin Terminal	Connect to any power source within 3.6 - 6V.
LiPo Battery Connector	Connect to Single Cell LiPo / Li-Ion Battery The battery is rechargeable via USB port on the Raspberry Pi Pico / Pico W. * *The battery is protected from overcharged and over discharged. If the board cannot be turned on when the battery is connected, please charge the battery to activate the battery protection circuit.*
Power LED	Turn on when powered up.
On/Off Switch	Turn on/off the power, including the Raspberry Pi Pico.
Reset Button	Press to reset the Raspberry Pi Pico or Pico W.
GPIO Breakout	Female Pin Headers Breakout of the Raspberry Pi Pico or Pico W GPIO pins.

<table>
<tr><th>Function</th><th>Description</th></tr>
<tr><td>Grove Ports</td><td>Connect to external Grove modules.
<table>
<tr><th>Grove Port</th><th>GPIO</th><th>PWM</th><th>SPI</th><th>I2C</th><th>UART</th><th>Analog</th></tr>
<tr><td rowspan="2">1</td><td>0</td><td>PWM0-A</td><td>SDI0</td><td>SDA0</td><td>TX0</td><td>-</td></tr>
<tr><td>1</td><td>PWM0-B</td><td>CSn0</td><td>SCL0</td><td>RX0</td><td>-</td></tr>
<tr><td rowspan="2">2</td><td>2</td><td>PWM1-A</td><td>SCK0</td><td>SDA1</td><td>-</td><td>-</td></tr>
<tr><td>3</td><td>PWM1-B</td><td>SDO0</td><td>SCL1</td><td>-</td><td>-</td></tr>
<tr><td rowspan="2">3</td><td>4</td><td>PWM2-A</td><td>SDI0</td><td>SDA0</td><td>TX1</td><td>-</td></tr>
<tr><td>5</td><td>PWM2-B</td><td>CSn0</td><td>SCL0</td><td>RX1</td><td>-</td></tr>
<tr><td rowspan="2">4</td><td>16</td><td>PWM0-A</td><td>SDI0</td><td>SDA0</td><td>TX0</td><td>-</td></tr>
<tr><td>17</td><td>PWM0-B</td><td>CSn0</td><td>SCL0</td><td>RX0</td><td>-</td></tr>
<tr><td rowspan="2">5</td><td>6</td><td>PWM3-A</td><td>SCK0</td><td>SDA1</td><td>-</td><td>-</td></tr>
<tr><td>26</td><td>PWM5-A</td><td>-</td><td>SDA1</td><td>-</td><td>ADC0</td></tr>
<tr><td rowspan="2">6</td><td>26</td><td>PWM5-A</td><td>-</td><td>SDA1</td><td>-</td><td>ADC0</td></tr>
<tr><td>27</td><td>PWM5-B</td><td>-</td><td>SCL1</td><td>-</td><td>ADC1</td></tr>
<tr><td rowspan="2">7</td><td>7</td><td>PWM3-B</td><td>SDO0</td><td>SCL1</td><td>-</td><td>-</td></tr>
<tr><td>28</td><td>PWM6-A</td><td>-</td><td>-</td><td>-</td><td>ADC2</td></tr>
</table></td></tr>
<tr><td>Maker Port</td><td>Compatible with QWIIC / Stemma QT / Grove (with conversion cable).
* The pins are shared with the Grove 2 port (GPIO 2, 3).</td></tr>
<tr><td>NeoPixel RGB LEDs</td><td>User programmable NeoPixel RGB LED. Connected to GP18.</td></tr>
<tr><td>Programmable Buttons</td><td>Accessible from the user program. Connected to GP20 and GP21</td></tr>
<tr><td>Piezo Buzzer</td><td>Can be used to play tone or melody. Connected to GP22.</td></tr>
<tr><td>Buzzer Mute Switch</td><td>Used to mute the piezo buzzer.</td></tr>
<tr><td>Status LEDs</td><td>LED indicators for Raspberry Pi Pico GPIOs on Grove Ports.
Turn on when the GPIO state is high.</td></tr>
<tr><td>Motor Test Buttons</td><td>Press to test the functionality of the motor driver.
Motor will run at full speed.
● MxA : Forward*
● MxB : Backward*</td></tr>
<tr><td>Servo Ports</td><td>Connectors for 4 x RC servo motors.
Signal is connected to GP12, GP13, GP14 and GP15.
V+ voltage is equal to power source voltage.</td></tr>
<tr><td>Motor Status LEDs</td><td>Turn on when the motor is running.
● MxA : Forward*
● MxB : Backward*</td></tr>
</table>

Function	Description
DC Motor Terminals	Connect to the motor terminal. Motor voltage at full speed is equal to power source voltage. Motor direction is dependent on the polarity. ● M1A : GP8 ● M2A : GP10 ● M1B : GP9 ● M2B : GP11
VBAT Sense	Solder the jumper on the back of the board to allow voltage measurement of the VBAT via GP-28-ADC2. VADC2 = VBAT / 2 (VBAT = VIN or VUSB or VLiPo whichever is higher)
Pi Pico Socket	Socket for Raspberry Pi Pico and Pico W.

Table 1: ROBO-PICO Board Functions

* *Actual motor direction is dependent on the motor connection.*
Swapping the connection (MxA & MxB) will reverse the direction.

2. RASPBERRY PI PICO PINOUT DIAGRAM

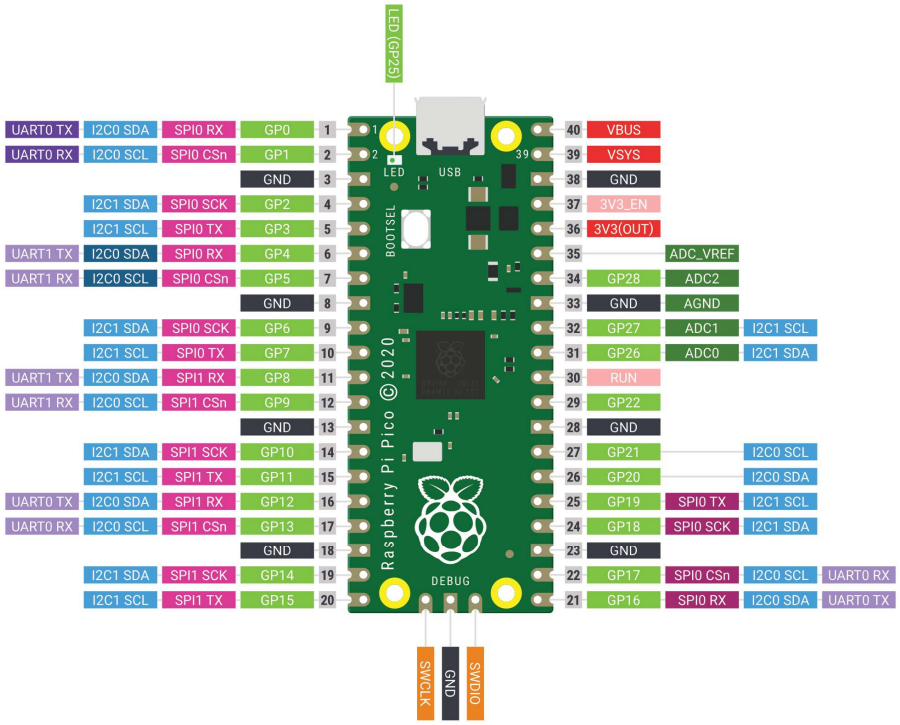

Figure 2: Raspberry Pi Pico Pinout Diagram

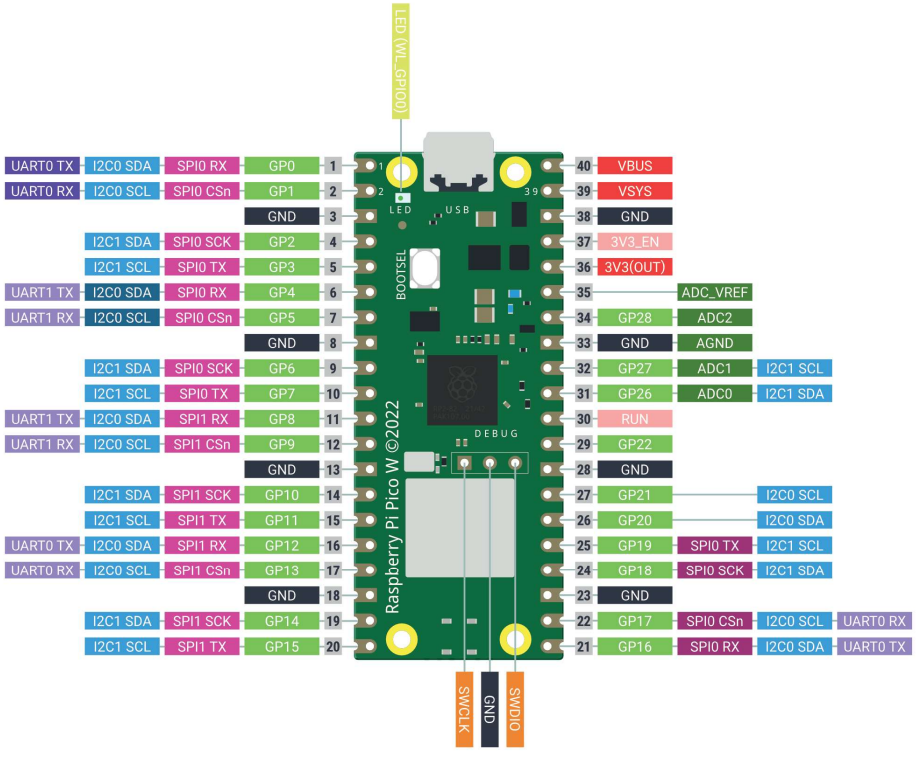

Figure 3: Raspberry Pi Pico W Pinout Diagram

3. SPECIFICATIONS

No	Parameters		Min	Max	Unit
1	Power Input Voltage (USB, LiPo or VIN) *		3.6	6	V
2	Digital Input Voltage	Low Level	-0.3	0.8	V
		High Level	2.0	3.6	V
3	Digital Output Voltage	Low Level	0	0.5	V
		High Level	2.6	3.3	V
4	Analog Input Voltage		0	3.3	V
5	Vmotor & Vservo (Only USB is connected)		VUSB - 0.4		V
6	Vmotor & Vservo (Only either one of LiPo or VIN is connected)		VLiPo or VIN		V
7	Vmotor & Vservo (USB and LiPo are connected)		VUSB - 0.4		V
8	Vmotor & Vservo (USB and VIN are connected)	VIN < VUSB	VUSB - 0.4		V
		VIN > VUSB and VIN - VUSB < 0.6	VIN - 0.4		V
		VIN - VUSB > 0.6	VIN		V
9	Maximum DC Motor Current (Per Channel)	Continuous	-	1	A
		Peak (< 5 seconds)	-	1.5	A
10	DC Motor Driver PWM Frequency		-	20	kHz
11	Total +3V3 Output Current (Grove Ports)		-	300	mA
12	Operating Temperature		-20	85	℃

Table 2: ROBO-PICO Absolute Maximum Ratings

* *Voltage for the DC motor and servo is equal to power input voltage.*
* *It's not recommended to connect both LiPo and VIN at the same time. Although it's perfectly safe to do so.*

4. MOTOR DRIVER TRUTH TABLE

Input A (GP8 / GP10)	Input B (GP9 / GP11)	Output A (M1A / M2A)	Output B (M1B / M2B)	Motor
Low	**Low**	Low	Low	Brake
High	**Low**	High	Low	Forward*
Low	**High**	Low	High	Backward*
High	**High**	Hi-Z (Open)	Hi-Z (Open)	Coast

Table 3: Motor Driver Truth Table

* *Actual motor direction is depending on the motor connection.*
Swapping the connection (MA & MB) will reverse the direction.

5. DIMENSION

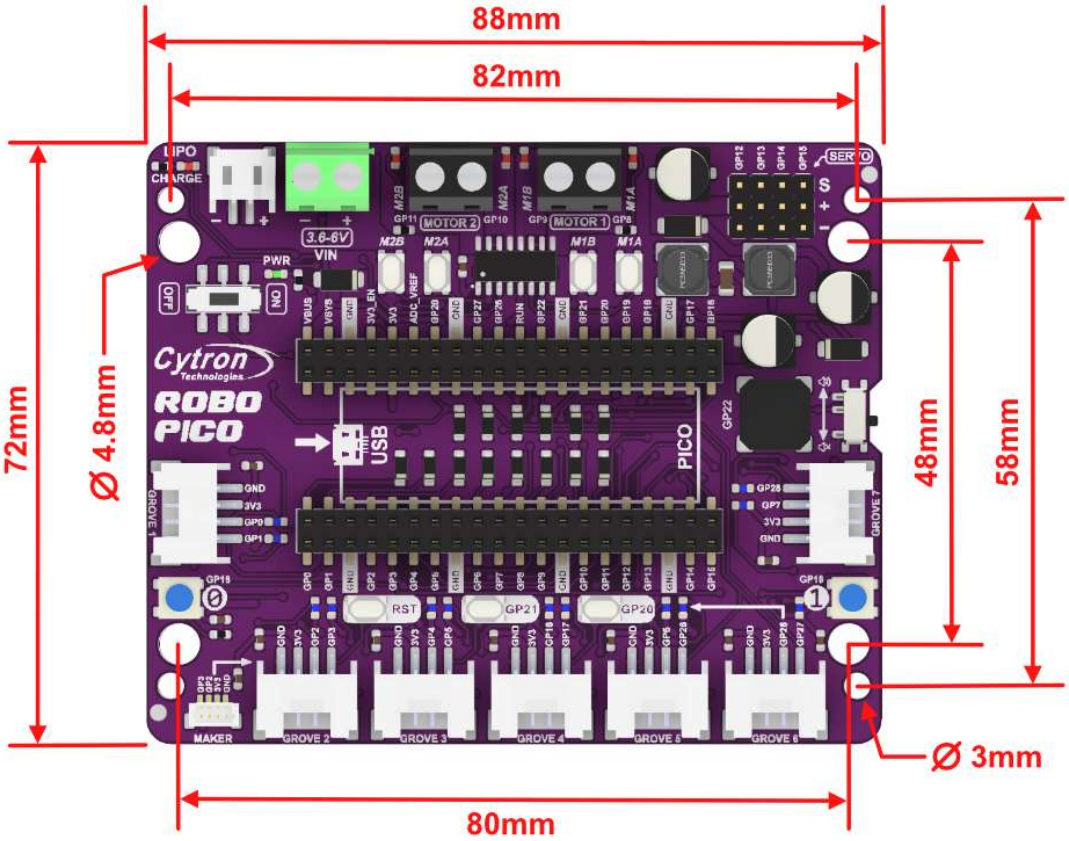

Figure 4: ROBO-PICO Dimension

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