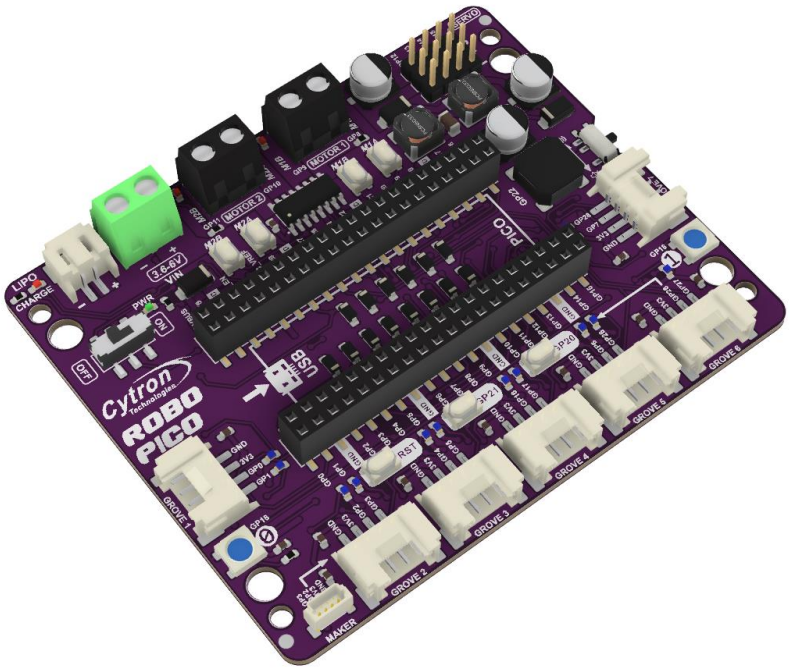
# ROBO PICO

## Simplifying Robotics with Raspberry Pi® Pico / Pico W




# Datasheet

Rev 1.0
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# 1. BOARD LAYOUT & FUNCTION

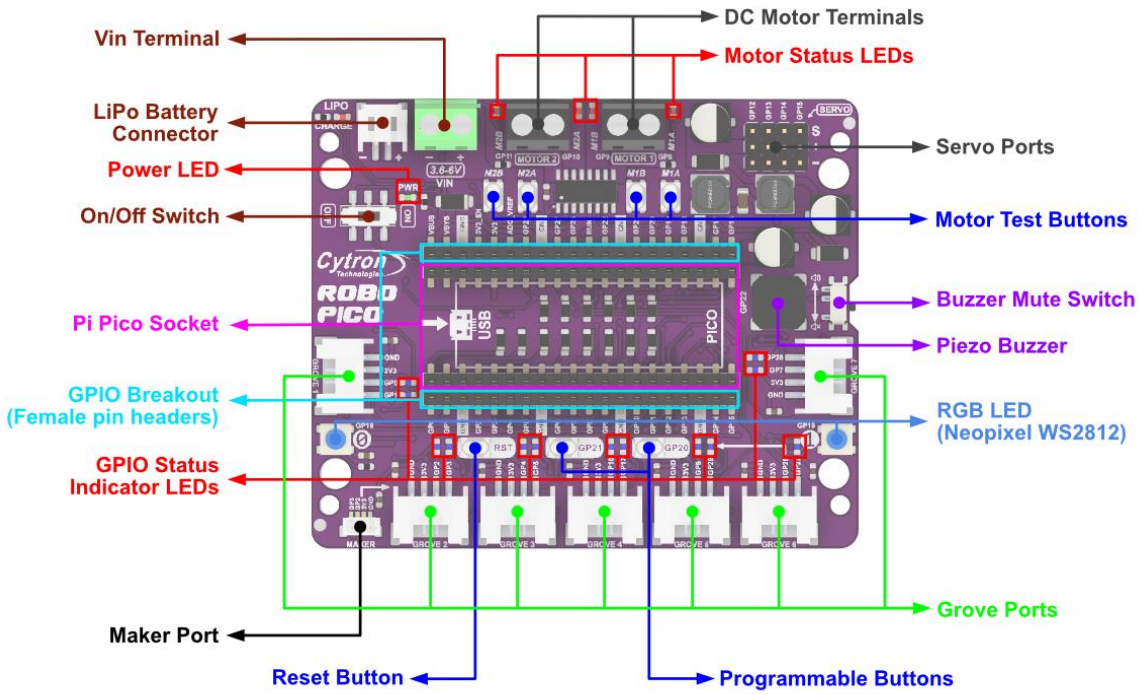



*Figure 1: ROBO-PICO Board Functions*

| Function | Description |
|---|---|
| **Vin Terminal** | Connect to any power source within 3.6 - 6V. |
| **LiPo Battery Connector** | Connect to Single Cell LiPo / Li-Ion Battery<br>The battery is rechargeable via USB port on the Raspberry Pi Pico / Pico W.<br><br>* *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).<br>* 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.<br>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.<br>Motor will run at full speed.<br>● MxA : Forward*<br>● MxB : Backward*</td></tr>
<tr><td>Servo Ports</td><td>Connectors for 4 x RC servo motors.<br>Signal is connected to GP12, GP13, GP14 and GP15.<br>V+ voltage is equal to power source voltage.</td></tr>
<tr><td>Motor Status LEDs</td><td>Turn on when the motor is running.<br>● MxA : Forward*<br>● MxB : Backward*</td></tr>
</table>

| Function | Description |
|---|---|
| **DC Motor Terminals** | Connect to the motor terminal.<br>Motor voltage at full speed is equal to power source voltage.<br>Motor direction is dependent on the polarity.<br>● M1A : GP8 ● M2A : GP10<br>● 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.<br>VADC2 = VBAT / 2<br>(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

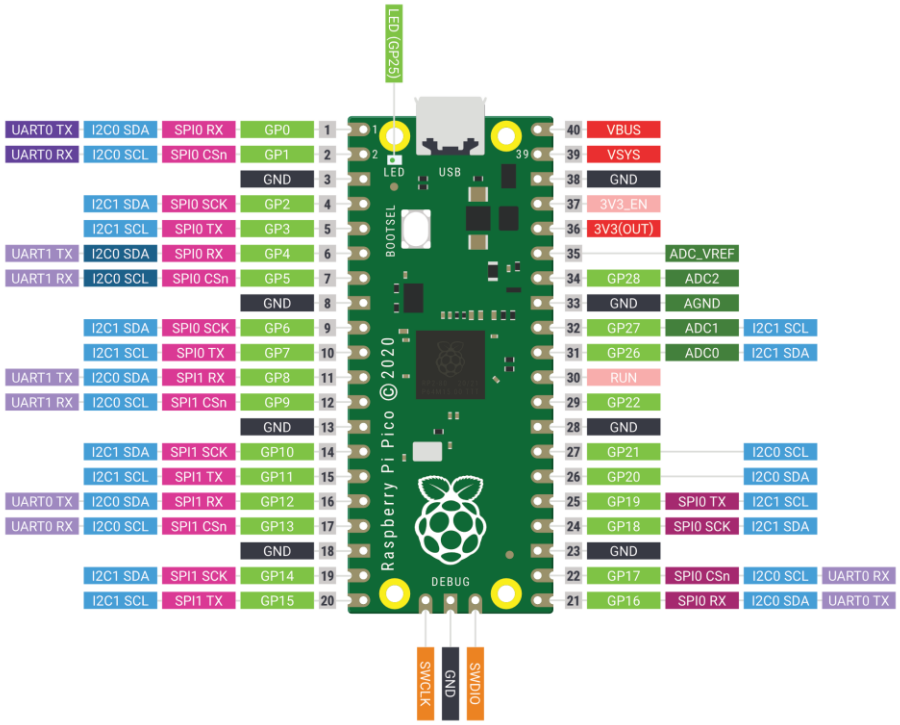



*Figure 2: Raspberry Pi Pico Pinout Diagram*

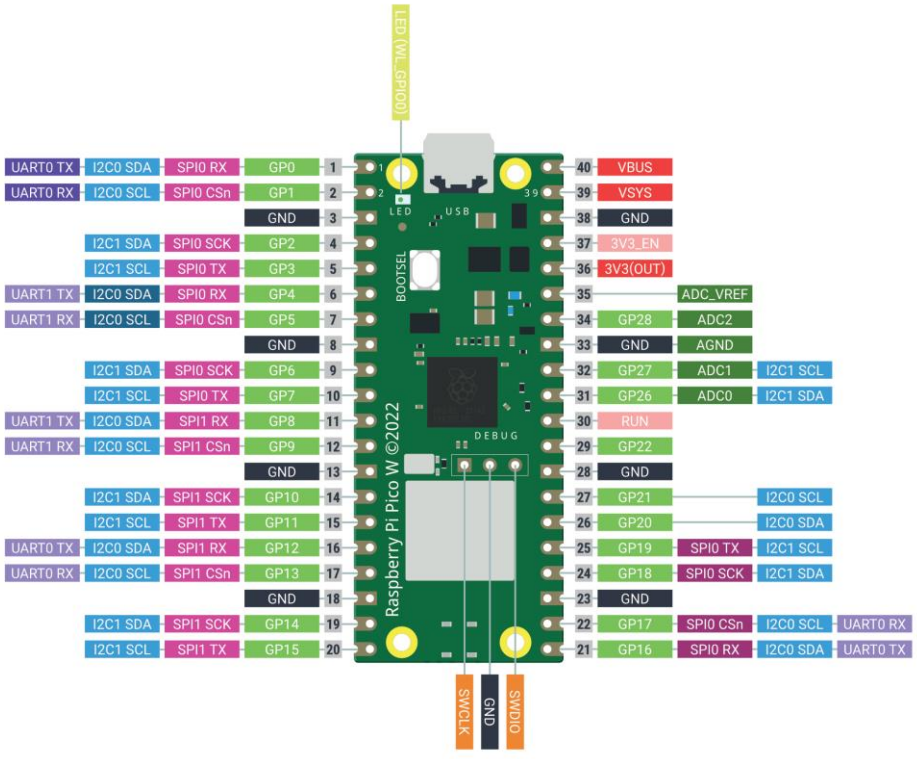



*Figure 3: Raspberry Pi Pico W Pinout Diagram*

# 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<br>(USB and VIN are connected) | VIN < VUSB | VUSB - 0.4 | | V |
| | | VIN > VUSB<br>and<br>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

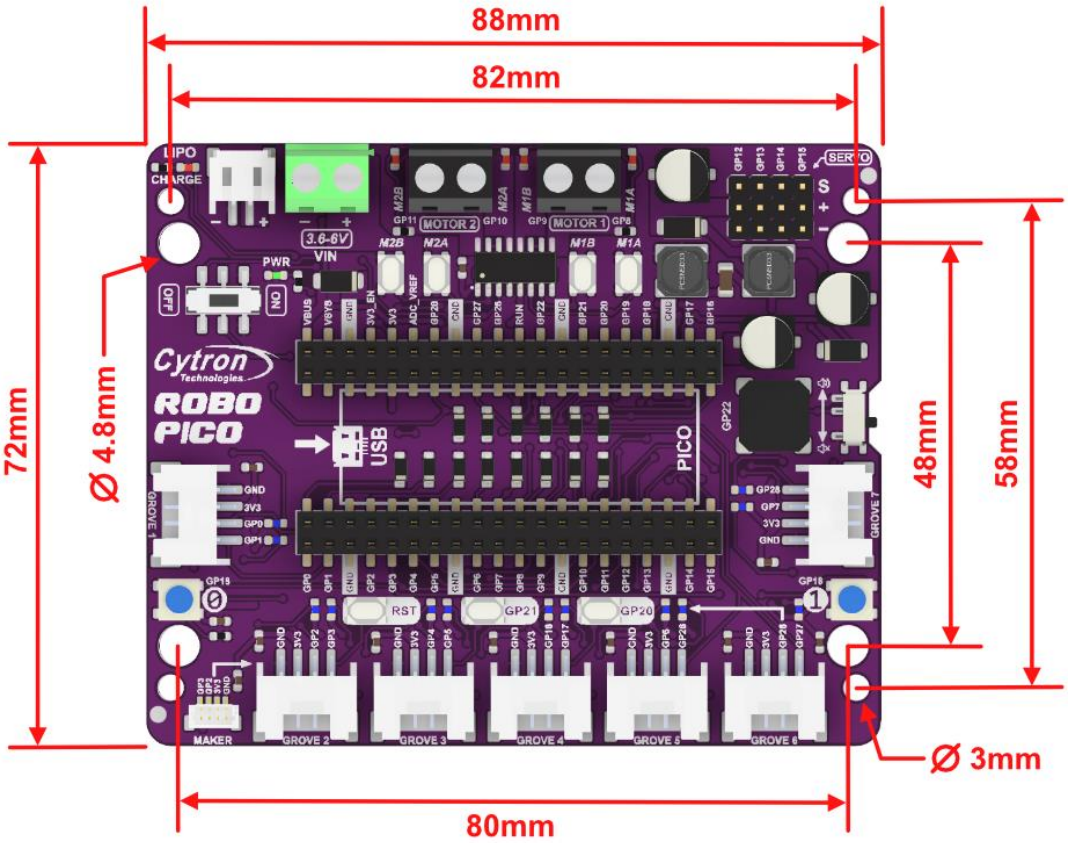



*Figure 4: ROBO-PICO Dimension*

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