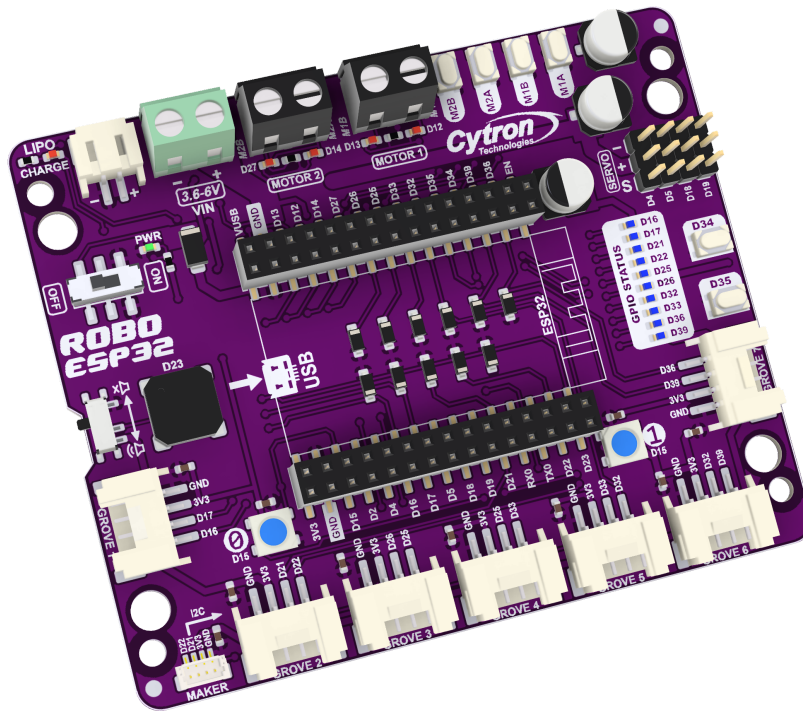




ROBO ESP32

Simplifying Robotics with ESP32



Datasheet

Rev 1.0
May 2025

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1. BOARD LAYOUT & FUNCTION

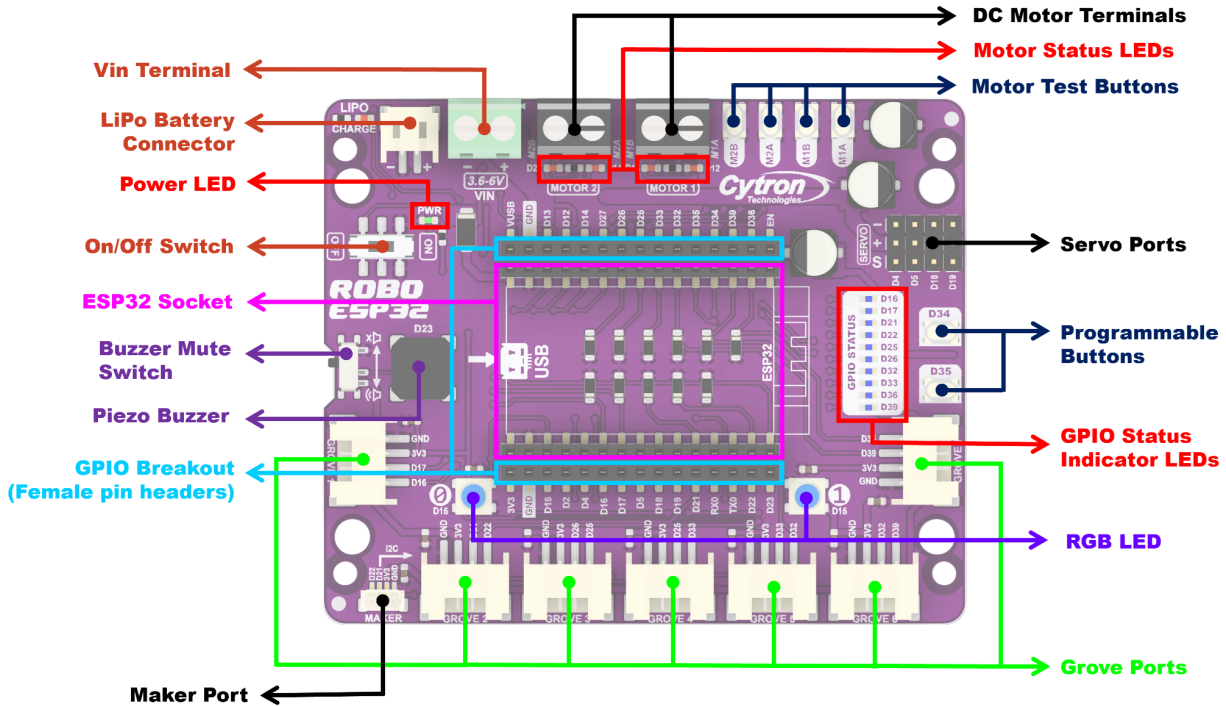


Figure 1: ROBO-ESP32 Board Functions

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 NodeMCU ESP32 * 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 NodeMCU ESP32
GPIO Breakout	Female Pin Headers Breakout of the NodeMCU ESP32 GPIO pins.

Function	Description																																																																																																																	
Grove Ports	Connect to external Grove modules.																																																																																																																	
	<table><tr><th>Grove Port</th><th>GPIO</th><th>DAC</th><th>TOUCH</th><th>I2C</th><th>UART</th><th>Analog</th><th>RTC</th></tr><tr><td rowspan="2">1</td><td>17</td><td>-</td><td>-</td><td>-</td><td>TX2</td><td>-</td><td>-</td></tr><tr><td>16</td><td>-</td><td>-</td><td>-</td><td>RX2</td><td>-</td><td>-</td></tr><tr><td rowspan="2">2</td><td>21</td><td>-</td><td>-</td><td>SDA</td><td>-</td><td>-</td><td>-</td></tr><tr><td>22</td><td>-</td><td>-</td><td>SCL</td><td>-</td><td>-</td><td>-</td></tr><tr><td rowspan="2">3</td><td>26</td><td>DAC2</td><td>-</td><td>-</td><td>-</td><td>*ADC2_9</td><td>RTC_GP7</td></tr><tr><td>25</td><td>DAC1</td><td>-</td><td>-</td><td>-</td><td>*ADC2_8</td><td>RTC_GP6</td></tr><tr><td rowspan="2">4</td><td>25</td><td>DAC1</td><td>-</td><td>-</td><td>-</td><td>*ADC2_8</td><td>RTC_GP6</td></tr><tr><td>33</td><td>-</td><td>Touch 8</td><td>-</td><td>-</td><td>ADC1_5</td><td>RTC_GP8</td></tr><tr><td rowspan="2">5</td><td>33</td><td>-</td><td>Touch 8</td><td>-</td><td>-</td><td>ADC1_5</td><td>RTC_GP8</td></tr><tr><td>32</td><td>-</td><td>Touch 9</td><td>-</td><td>-</td><td>ADC1_4</td><td>RTC_GP9</td></tr><tr><td rowspan="2">6</td><td>32</td><td>-</td><td>Touch 9</td><td>-</td><td>-</td><td>ADC1_4</td><td>RTC_GP9</td></tr><tr><td>39*</td><td>-</td><td>-</td><td>-</td><td>-</td><td>ADC1_3</td><td>RTC_GP0</td></tr><tr><td rowspan="2">7</td><td>39*</td><td>-</td><td>-</td><td>-</td><td>-</td><td>ADC1_3</td><td>RTC_GP0</td></tr><tr><td>36*</td><td>-</td><td>-</td><td>-</td><td>-</td><td>ADC1_0</td><td>RTC_GP3</td></tr></table>	Grove Port	GPIO	DAC	TOUCH	I2C	UART	Analog	RTC	1	17	-	-	-	TX2	-	-	16	-	-	-	RX2	-	-	2	21	-	-	SDA	-	-	-	22	-	-	SCL	-	-	-	3	26	DAC2	-	-	-	*ADC2_9	RTC_GP7	25	DAC1	-	-	-	*ADC2_8	RTC_GP6	4	25	DAC1	-	-	-	*ADC2_8	RTC_GP6	33	-	Touch 8	-	-	ADC1_5	RTC_GP8	5	33	-	Touch 8	-	-	ADC1_5	RTC_GP8	32	-	Touch 9	-	-	ADC1_4	RTC_GP9	6	32	-	Touch 9	-	-	ADC1_4	RTC_GP9	39*	-	-	-	-	ADC1_3	RTC_GP0	7	39*	-	-	-	-	ADC1_3	RTC_GP0	36*	-	-	-	-	ADC1_0	RTC_GP3
	Grove Port	GPIO	DAC	TOUCH	I2C	UART	Analog	RTC																																																																																																										
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	<i>*Analog ADC2 pins don't work when Wi-Fi is enabled. If your project uses Wi-Fi, it's better to use the ADC1 pins instead.</i>																																																																																																																	
	<i>* Pin D36 and D39 are Input-only pins.</i>																																																																																																																	
Maker Port	Compatible with QWIIC / Stemma QT / Grove (with conversion cable). <i>* The pins are shared with the Grove 2 port (D21, D22).</i>																																																																																																																	
NeoPixel RGB LEDs	User programmable NeoPixel RGB LED. Connected to D15.																																																																																																																	
Programmable Buttons	Accessible from the user program. Connected to D34 and D35																																																																																																																	
Piezo Buzzer	Can be used to play tone or melody. Connected to D23.																																																																																																																	
Buzzer Mute Switch	Used to mute the piezo buzzer.																																																																																																																	
Status LEDs	LED indicators for ESP32 GPIOs on Grove Ports. Turn on when the GPIO state is high.																																																																																																																	
Motor Test Buttons	Press to test the functionality of the motor driver. Motor will run at full speed. ● MxA : Forward* ● MxB : Backward*																																																																																																																	
Servo Ports	Connectors for 4 x RC servo motors. Signal is connected to D4, D5, D18 and D19. V+ voltage is equal to power source voltage.																																																																																																																	
Motor Status LEDs	Turn on when the motor is running. ● MxA : Forward* ● MxB : Backward*																																																																																																																	

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 : D12 • M2A : D14 • M1B : D13 • M2B : D27
ESP32 Socket	Socket for NodeMCU ESP32.

Table 1: ROBO-ESP32 Board Functions

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

2. ESP32 PINOUT DIAGRAM

ESP32 DEVKIT V1 – DOIT version with 30 GPIOs

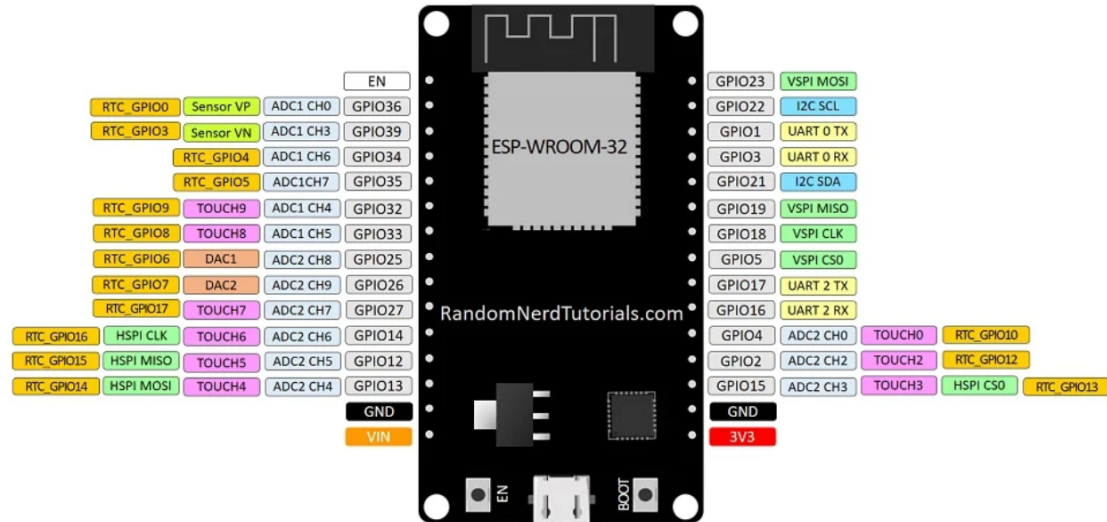


Figure 2: NodeMCU ESP32 Pinout Diagram

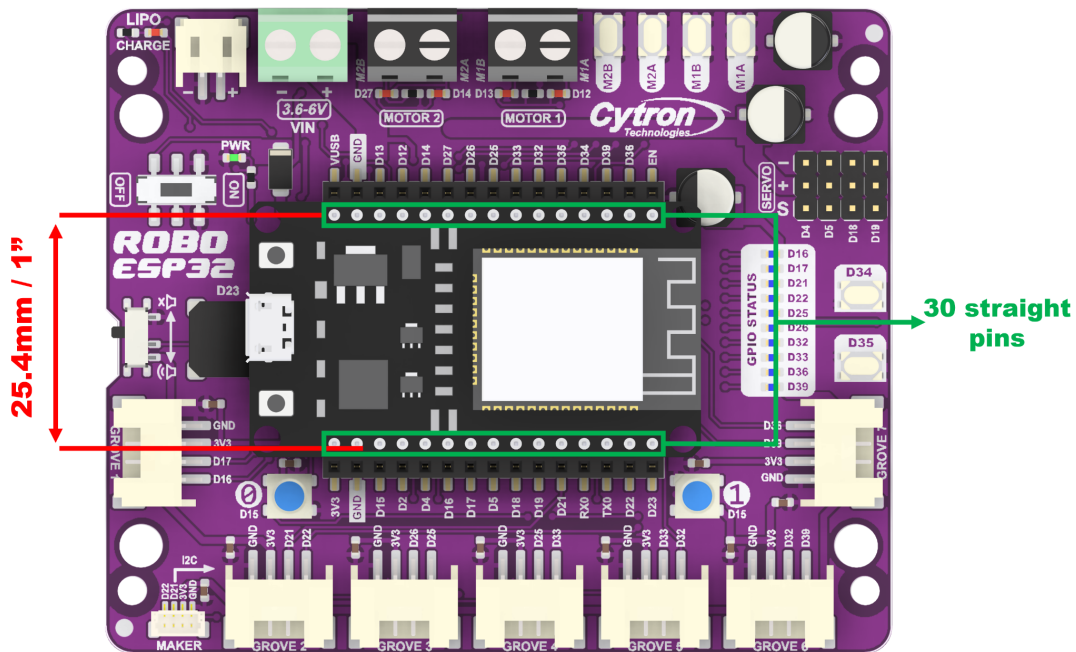


Figure 3: Robo ESP32 board with 30-pin NodeMCU ESP32

* Only compatible with 30-pin straight header NodeMCU ESP32

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	2.5	3.6	V
3	Digital Output Voltage	Low Level	0	0.3	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	°C

Table 2: ROBO-ESP32 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 (D12 / D13)	Input B (D14 / D27)	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

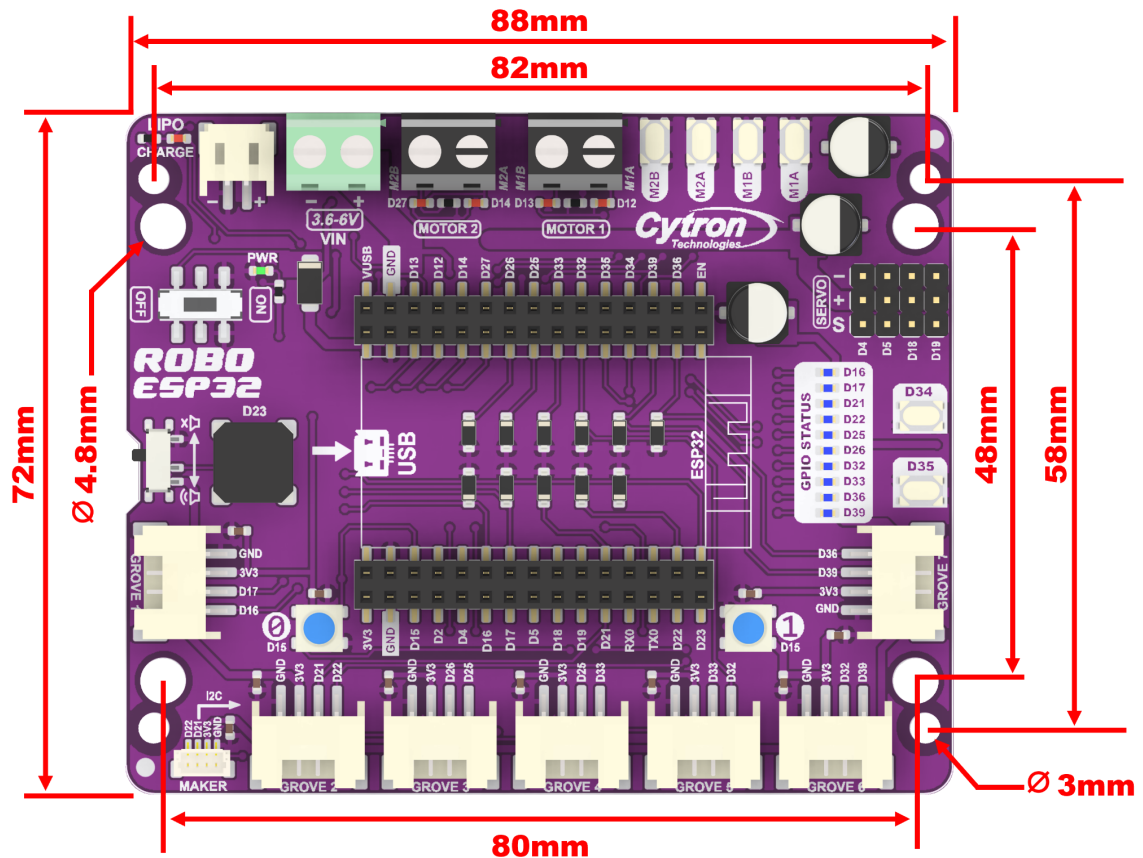
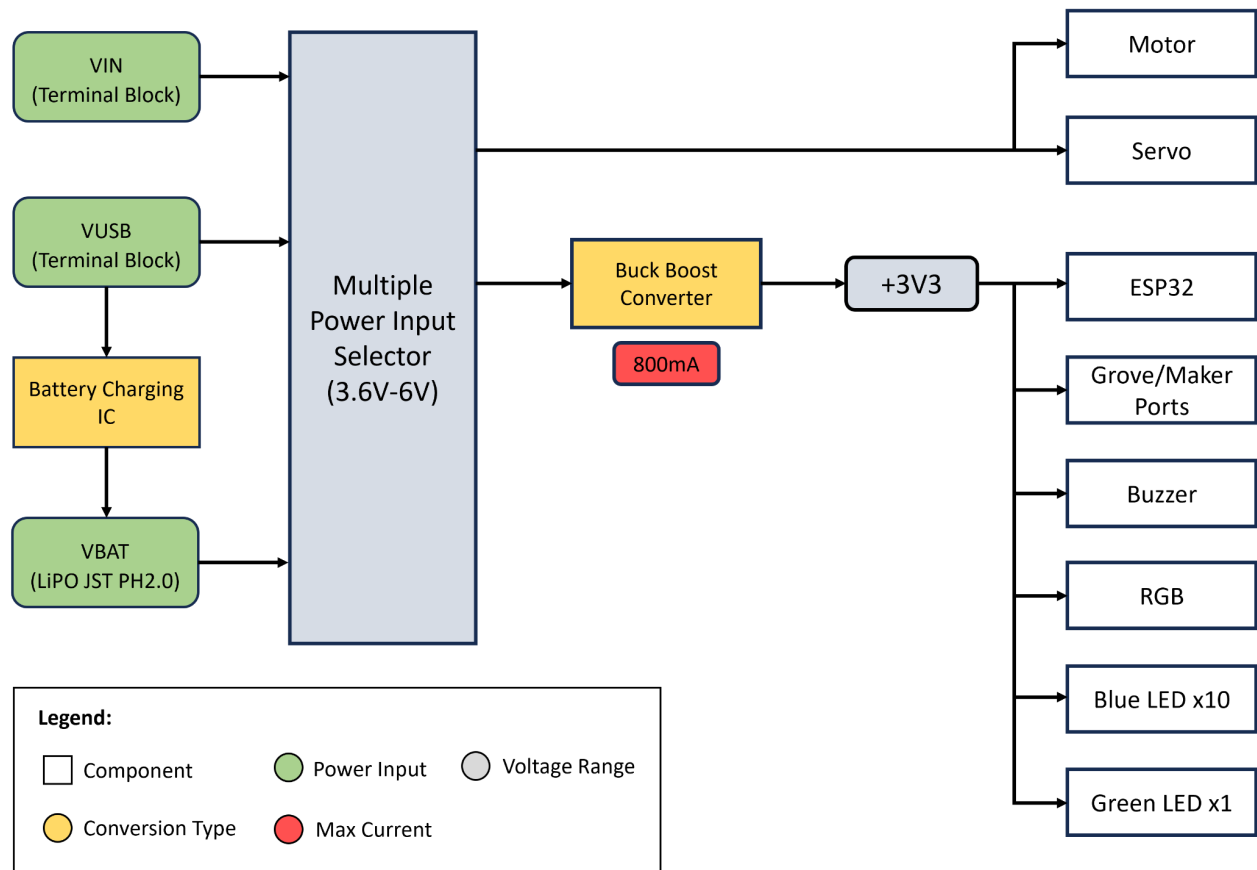


Figure 4: ROBO-ESP32 Dimension

6. POWER TREE



Note:
Multiple Power Input Selector will select the highest voltage input as the input

Figure 5: ROBO-ESP32 Power Tree

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