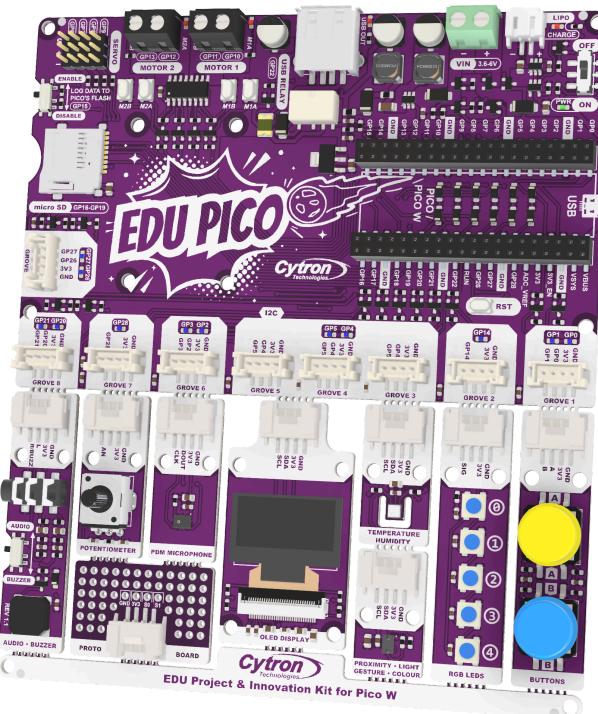




EDU PICO

EDU Project & Innovation Kit for Pico W



Datasheet

Rev 1.0
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1. INTRODUCTION

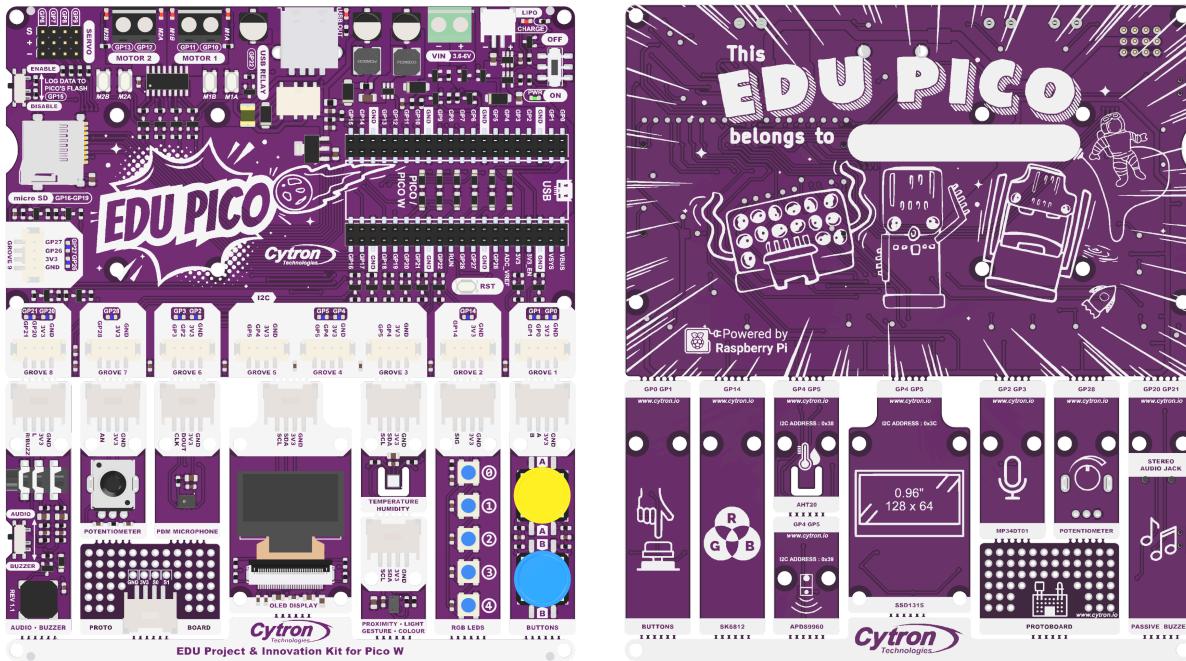


Figure 1: EDU-PICO Front View (Left), Back View (Right).

EDU PICO is designed to work seamlessly with the Raspberry Pi Pico W microcontroller. The board comes with various built-in modules and sensors, such as:

- OLED display
- Temperature and humidity sensor
- Proximity, light, gesture and colour sensor
- RGB LEDs
- Push buttons
- Potentiometer
- Buzzer and stereo audio jack
- PDM microphone
- Dual channel motor driver
- Servo ports
- USB relay
- Micro SD card socket

Besides, it can be powered by USB, 1-cell LiPo/Li-ion battery (with built-in charger), or external power source within 3.6 - 6V range. For more information on the board features can refer the [Board Layout & Function](#) section.

2. PACKING LIST

Please check the parts and components according to the packing list. If there are any parts missing, please contact us at sales@cytron.io immediately.



Figure 2: Included Items.

No.	ITEMS	QUANTITY
1	EDU PICO Board	1
2	Step-by-step Guidebook (English)	1
3	Raspberry Pi Pico W (not available in EDU-PICO-NB variant)	1
4	USB Micro B Cable	1
5	Grove 4 Pin Buckled 20cm Cable	8
6	Micro Servo with Servo Horns	1
7	DC2-6V Miniature Motor with 20cm Wire	1
8	Mini Phillips Head Screwdriver	1
9	DIY 4 Blades 56mm Motor Propeller (Blue)	1
10	USB LED Light Stick (Blue)	1

Table 1: EDU-PICO Packing List

3. BOARD LAYOUT & FUNCTION

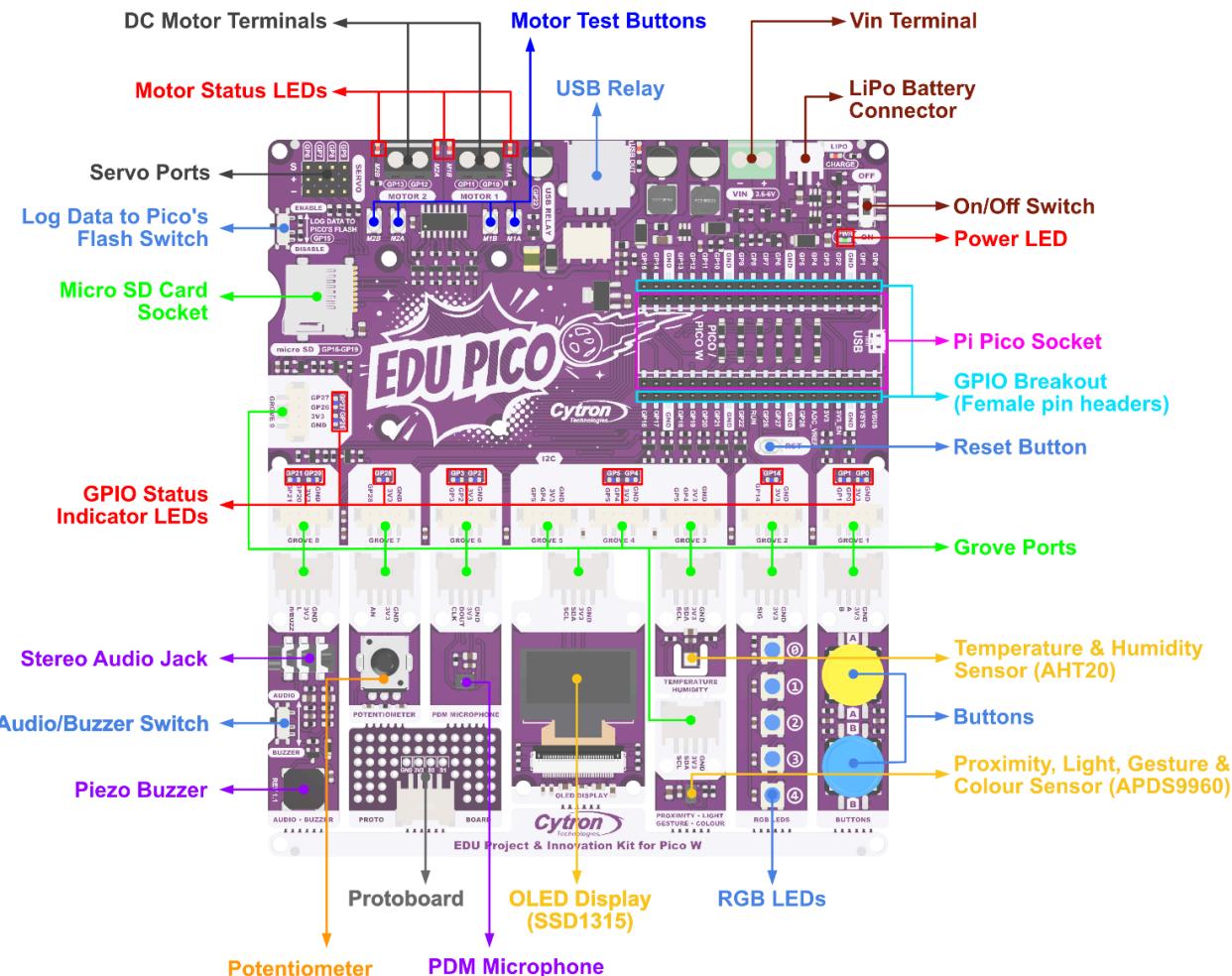


Figure 3: EDU-PICO Board Function

Function	Description										
Vin Terminal	Connect to any power source within 3.6 - 6V.										
LiPo Battery Connector	Connect to Single Cell (1-cell) LiPo / Li-Ion Battery The board comes with a built-in charger, and the battery is rechargeable via the USB port on the Raspberry Pi Pico / Pico W. <i>* 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.</i>										
LED Battery Charging Indicator	The LED will turn on when charging the LiPo / Li-ion battery. It will turn off when the battery is fully charged. This LED might also flicker if the battery is not connected, it's normal. <i>* But if it flickers frequently or turns on even when the battery is not connected, it's an indication the board has not received enough power from the USB port.</i>										
Power LED	Turn on when powered up.										
On/Off Switch	Turn on/off the power, including the Raspberry Pi Pico / Pico W.										
Reset Button	Press to reset the Raspberry Pi Pico or Pico W.										
Pi Pico Socket	Socket for Raspberry Pi Pico and Pico W.										
GPIO Breakout	Female Pin Headers Breakout of the Raspberry Pi Pico / Pico W GPIO pins.										
Status LEDs	LED indicators for Raspberry Pi Pico GPIOs on Grove Ports. Turn on when the GPIO state is high.										
Micro SD Card Socket	SPI connection between the SD Card socket and the Raspberry Pi Pico W. <table border="1"> <thead> <tr> <th>Raspberry Pi Pico W GPIO</th> <th>SD Card</th> </tr> </thead> <tbody> <tr> <td>GP16</td> <td>SDO</td> </tr> <tr> <td>GP17</td> <td>CSn</td> </tr> <tr> <td>GP18</td> <td>SCK</td> </tr> <tr> <td>GP19</td> <td>SDI</td> </tr> </tbody> </table>	Raspberry Pi Pico W GPIO	SD Card	GP16	SDO	GP17	CSn	GP18	SCK	GP19	SDI
Raspberry Pi Pico W GPIO	SD Card										
GP16	SDO										
GP17	CSn										
GP18	SCK										
GP19	SDI										
Log Data to Pico's Flash Switch	To enable writing to the filesystem on the Raspberry Pi Pico W using CircuitPython by setup boot.py file. The switch is connected to GP15. <ul style="list-style-type: none"> • Enable : Pulled Low • Disable : Pulled High <i>* You can also repurpose this switch for other functions.</i>										

Function	Description								
Grove Ports	The Grove Ports are already connected to the adjacent Grove Modules.								
	Grove Port	GPIO	PWM	SPI	I2C	UART	Analog	Connected Module	
	1	0	PWM0-A	SDI0	SDA0	TX0	-	Buttons	
		1	PWM0-B	CSn0	SCL0	RX0	-		
	2	X	-	-	-	-	-	RGB LEDs	
		14	PWM7-A	SCK1	SDA1	-	-		
	3, 4, 5	4	PWM2-A	SDI0	SDA0	TX1	-	AHT20, APDS9960, SSD1315	
		5	PWM2-B	CSn0	SCL0	RX1	-		
	6	2	PWM1-A	SCK0	SDA1	-	-	PDM Microphone	
		3	PWM1-B	SDO0	SCL1	-	-		
	7	X	-	-	-	-	-	Potentiometer	
		28	PWM6-A	-	-	-	ADC2		
	8	20	PWM2-A	-	SCL0	-	-	Audio & Buzzer	
		21	PWM2-B	-	SDA0	-	-		
	9	26	PWM5-A	-	SDA1	-	ADC0	-	
		27	PWM5-B	-	SCL1	-	ADC1		
Servo Ports	Connectors for 4 x RC servo motors. The signal pins are connected to GP6, GP7, GP8 and GP9. V+ voltage is equal to power source voltage.								
Motor Test Buttons	Press to test the functionality of the motor driver. Motor will run at full speed. <ul style="list-style-type: none">• MxA : Forward*• MxB : Backward*								
Motor Status LEDs	Turn on when the motor is running. <ul style="list-style-type: none">• MxA : Forward*• MxB : Backward*								
DC Motor Terminals	Connect to the motor terminal. Motor voltage at full speed is equal to power source voltage. <ul style="list-style-type: none">• M1A : GP10• M2A : GP12• M1B : GP11• M2B : GP13 <i>* Actual motor direction is dependent on the motor connection. Swapping the connections (MxA & MxB) will reverse the direction.</i>								
USB Relay	5V USB output only, controlled by a relay connected to GP22. Overcurrent protection for current draws greater than 500 mA.								

Function	Description
Buttons	Accessible from the user program. <ul style="list-style-type: none"> • Button A : GP0 • Button B : GP1
RGB LEDs	Five addressable RGB LED in series. SK6812-based RGB LEDs, compatible with WS2812B. Connected to GP14.
Temperature & Humidity Sensor	Temperature and Humidity sensor AHT20, I2C address 0x38. <ul style="list-style-type: none"> • I2C SDA : GP4 • I2C SCL : GP5 <p>* For accuracy, it is recommended to measure data every 2 seconds to reduce temperature rises due to high measurement frequency.</p>
Proximity, Light, Gesture, & Colour Sensor	Digital Proximity, Ambient Light, Gesture and Colour Sensor APDS9960, I2C address 0x39. <ul style="list-style-type: none"> • I2C SDA : GP4 • I2C SCL : GP5
OLED Display	0.96Inch 128x64 OLED white display SSD1315, I2C address 0x3C. <ul style="list-style-type: none"> • I2C SDA : GP4 • I2C SCL : GP5
PDM Microphone	MEMS audio sensor omnidirectional digital microphone MP34DT01, PDM output. <ul style="list-style-type: none"> • DOUT : GP2 • CLK : GP3
Potentiometer	Connected to GP28 (ADC2).
Protoboard	Protoboard with Grove port. Only the pins near the Grove port pins are connected.
Stereo Audio Jack	Non amplified audio output. Can be connected to an earphone or amplified speaker. <ul style="list-style-type: none"> • Right Channel : GP20 • Left Channel : GP21
Piezo Buzzer	Can be used to play tone or melody. Connected to GP21.
Audio/Buzzer Switch	Used to switch between left channel audio out and the piezo buzzer.

Table 2: EDU-PICO Board Functions

4. RASPBERRY PI PICO PINOUT DIAGRAM

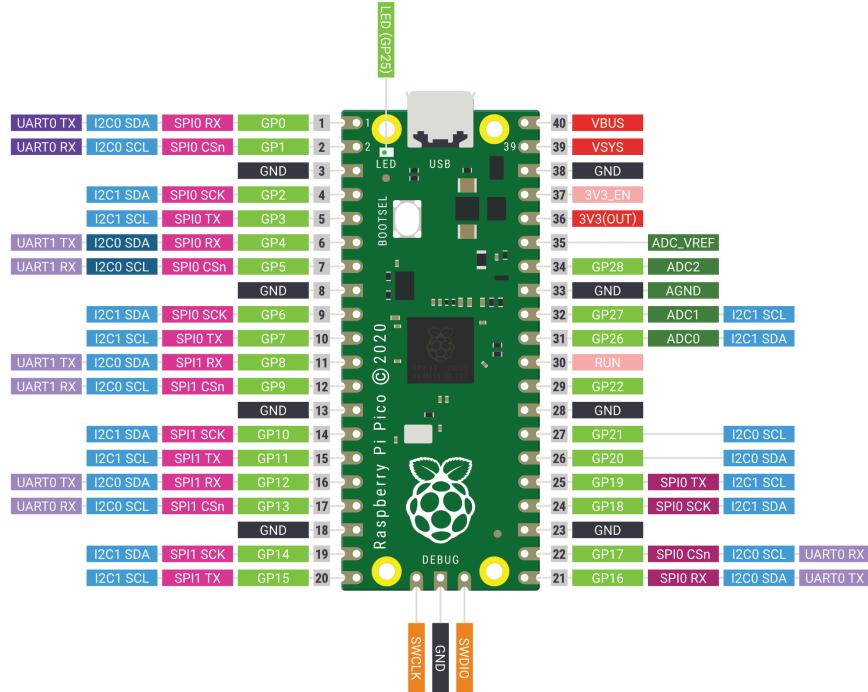


Figure 4: Raspberry Pi Pico Pinout Diagram

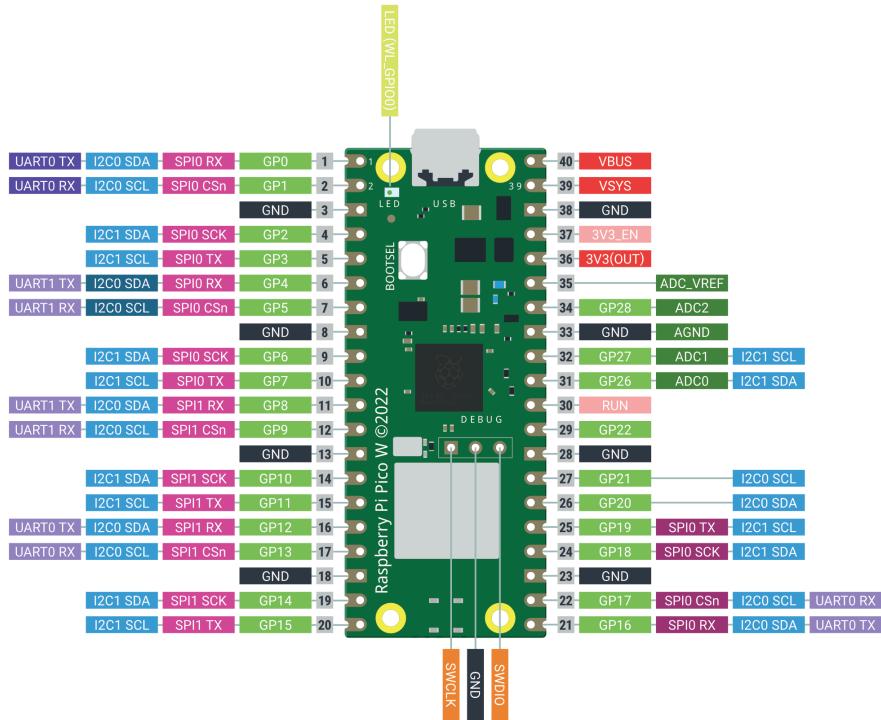


Figure 5: Raspberry Pi Pico W Pinout Diagram

5. PRODUCT SPECIFICATION

Absolute Maximum Rating of EDU-PICO:

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	USB Relay Output Voltage	-	5	V	
12	USB Relay Output Current	-	500	mA	
13	Total +3V3 Output Current (Grove Ports)	-	300	mA	
14	Operating Temperature	-20	85	°C	

Table 3: EDU-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.

6. 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 4: Motor Driver Truth Table

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

7. DIMENSION

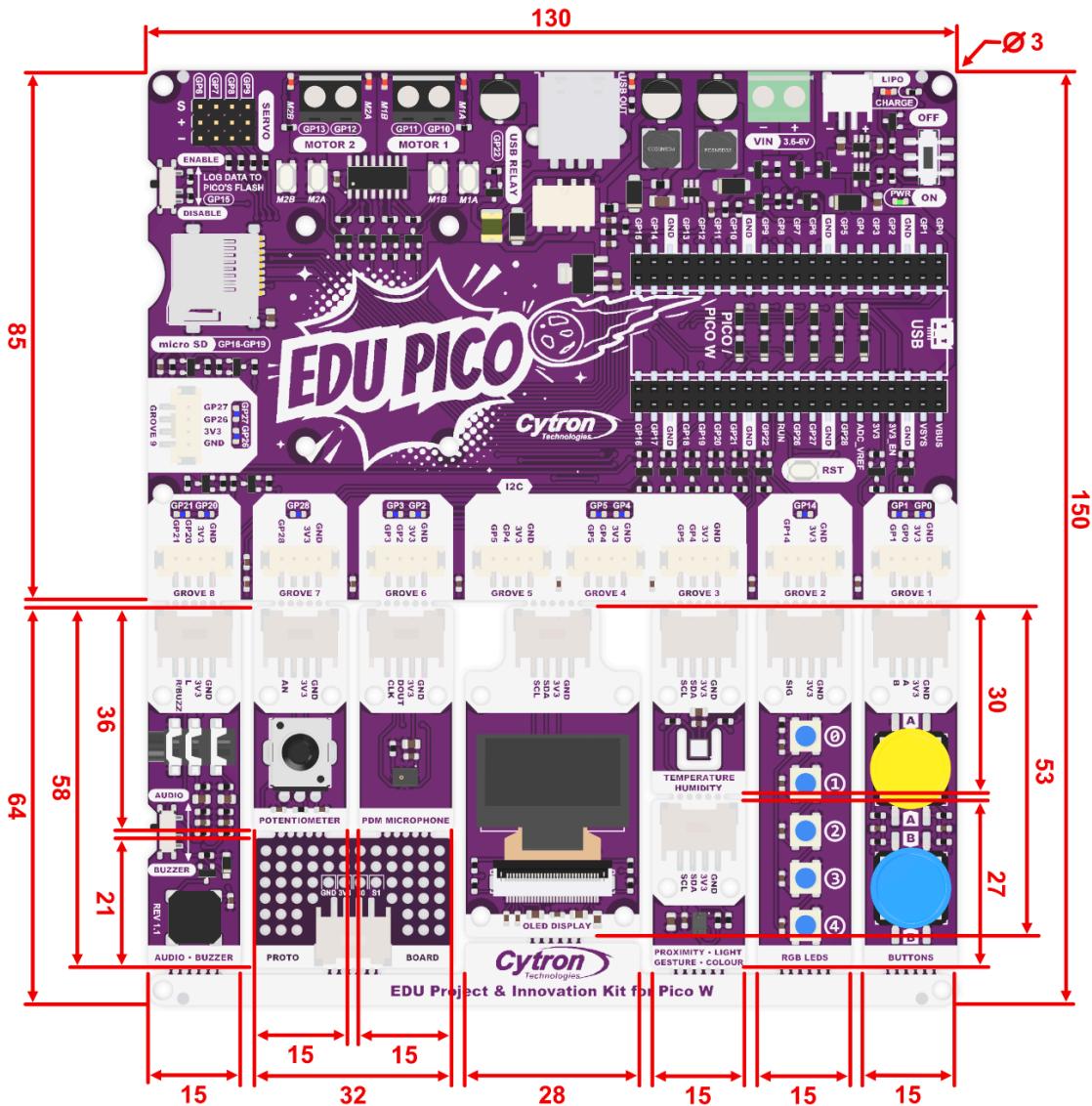


Figure 6: EDU-PICO Dimension (mm)

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