

PICO V3.0 Product Overview

PICO is a tiny development board based on the

ATmega32u4 Microcontroller ([datasheet](#)). It is considered as the world's smallest Arduino compatible board with its 0.6"x0.6" dimensions with a native USB port. It has 12 digital IO pins (of which 4 can be used as PWM output or analog input based on the sketch, D3 and D11 on 980Hz, D10 and D13 on 490Hz) and 3 analog inputs, a 16 MHz crystal oscillator, a micro USB port (native port), an ICSP pads at the bottom of the board, addressable RGB LED (WS2812) connected to pin 13, and a reset button. It



contains everything needed to support the microcontroller; simply connect it to a computer with a micro USB cable or power it with a AC-to-DC adapter or battery to get started.

PICO differs from all other boards in that the ATmega32u4 has built-in USB communication, eliminating the need for a secondary processor. This allows PICO to appear to the connected computer as a mouse and keyboard, in addition to a virtual (CDC) serial / COM port. It also has other implications for the behavior of the board; these are detailed at the end of this document.

PICO has been designed to maintain ease into small sized projects and applications development, with its plug and play capability, while keeping the size factor optimized. Also, PICO has been renovated to include a built-in RGB LED for visual effects, visual-technical diagnoses, and many other things Makers can think of, while again!.. Maintaining the size factor optimized.

For Reference on the old version of PICO (PICO V1.0) You can get into the "Archived Section on mellbell.cc, or reach out to learn@mellbell.cc



MellBell Electronics LLC

52 Q. Rania Street
Amman, Jo 11942
+(962) 79 659 1640
electronics@mellbell.cc

Table of Contents

Product Technical Specifications	3
Product Dimensions	5
Product Component Mapping	6
Product Pin Mapping	8
Product Schematics	10
OSHW: Schematics (Microcontroller)	10
OSHW: Schematics (Power, USB, I/Os)	11
Programming	12
Power	12
Memory	13
Input and Output	12
Communication	13
Warnings	14
Product Warranty And Testing	15
MANUFACTURING	15
SAFETY	15
FCC COMPLIANCE	15
TESTING	15
Product Feedback	16



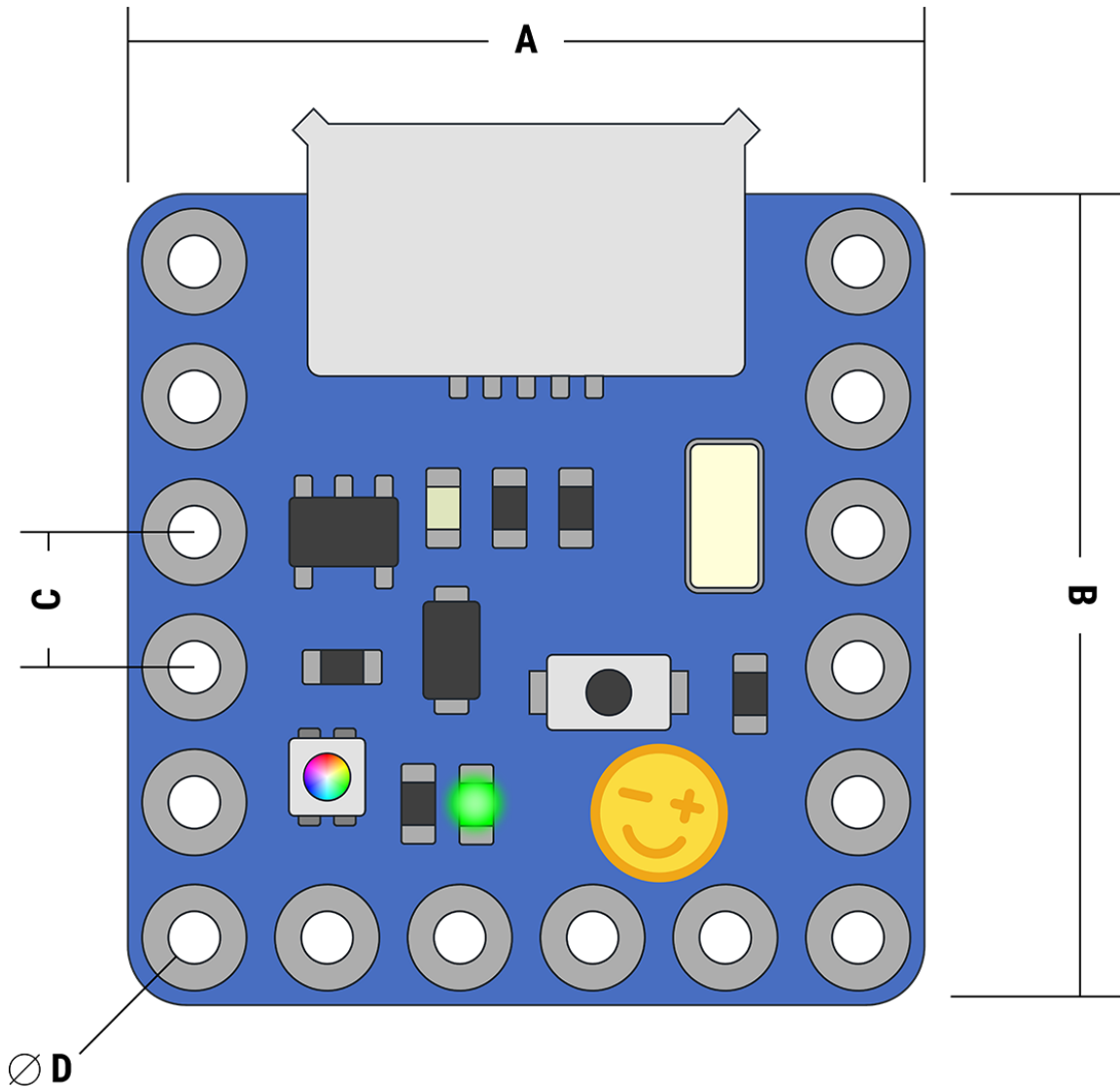
Product Technical Specifications

Product Version	PICO V3.0 (No Half Hole Rear Pins, RGB LED)
Microcontroller	<u>ATMEGA32U4</u>
Operating Voltage	5V
Input Voltage using Vin pin (recommended)	7-12V
Input Voltage using Vin pin (Max)	6-16V
Digital I/O Pins	12 (of which 4 (D3, D10, D11, D13) provide PWM output, and 3 Pads for SPI)
PWM Digital I/O Pins	4 (D3, D10, D11, D13)
Analog Input Pins	4
Analog Input Pins Resolution	10-bit resolution
I2C Pins	Pin D2 & Pin D3
DC Current per I/O Pin	20 mA
DC Current for 5V Pin	50 Ma
Flash Memory	32 KB (Atmega32u4) (of which 4 KB used by the Bootloader)
SRAM	2.5 KB (Atmega32u4)

MellBell Electronics LLC

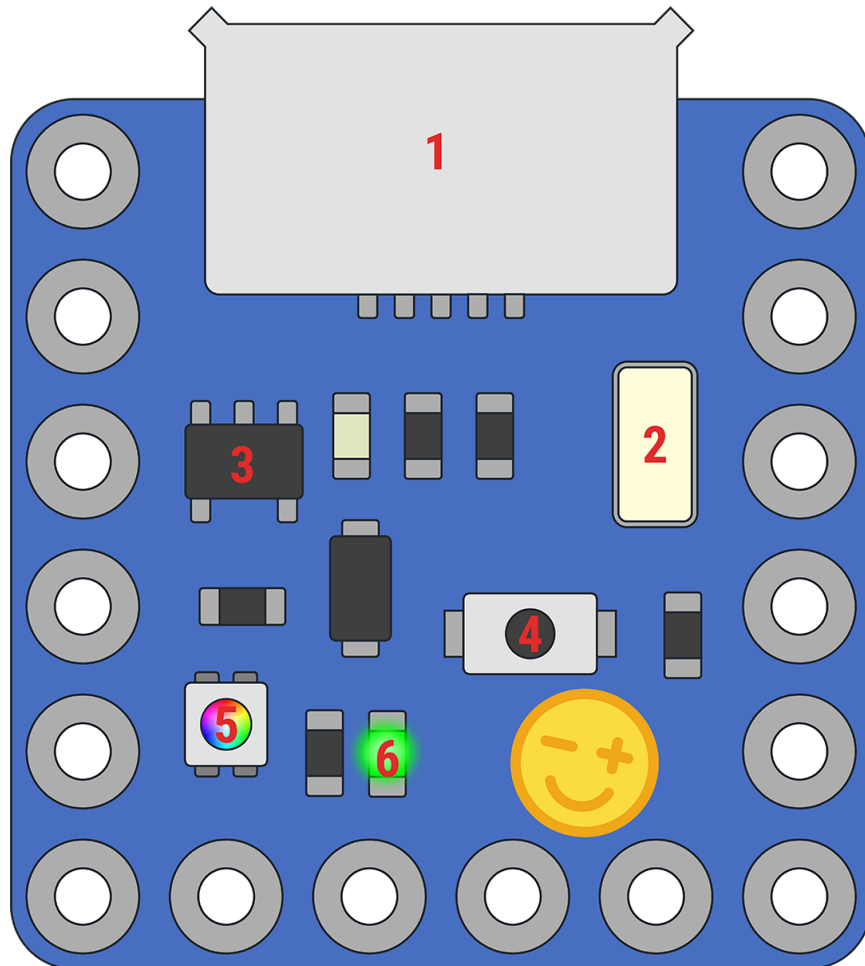
EEPROM	1 KB (Atmega32u4)
Clock Speed	16 MHz
Length	15.24 mm (0.6")
Width	15.24 mm (0.6")
Weight	1g
Bootloader	Arduino® Leonardo Bootloader

Product Dimensions

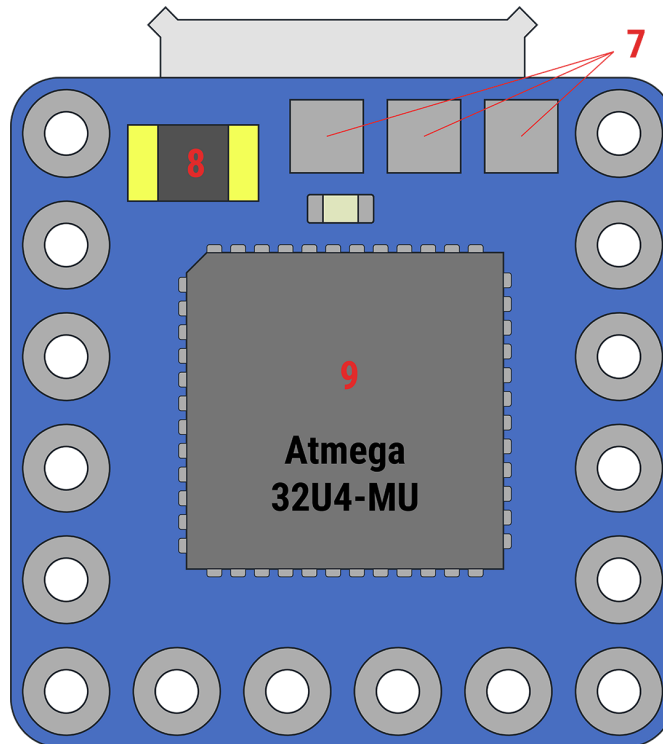


A	15.24 mm	0.6"
B	15.24 mm	0.6"
C	2.54 mm	0.1"
D	1.016 mm	0.04"

Product Component Mapping

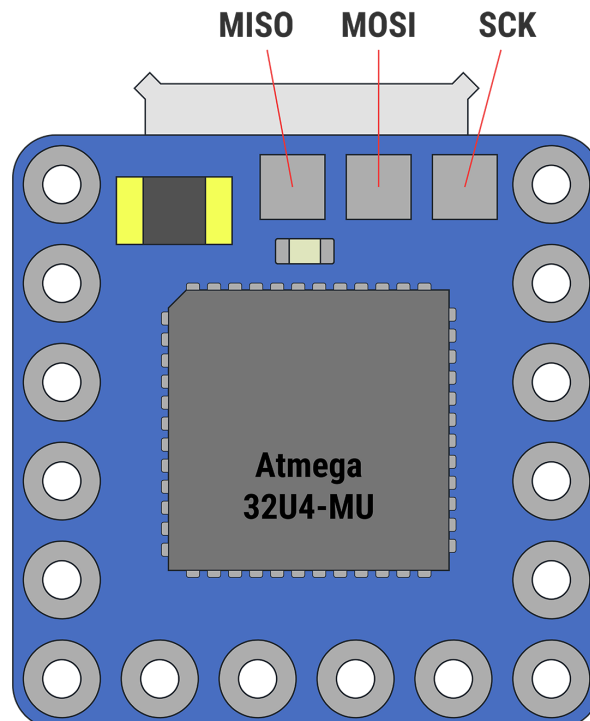
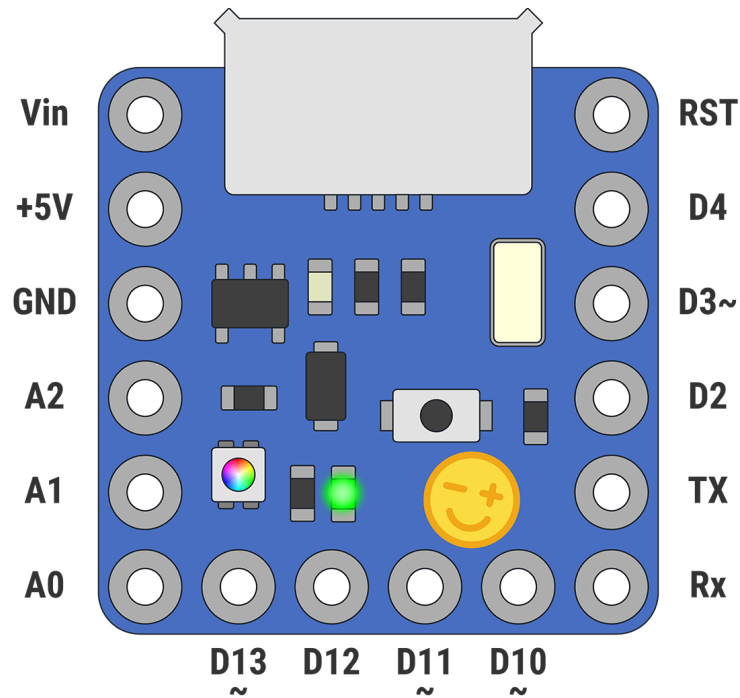


1	Micro USB port
2	16MHz ceramic resonator
3	Voltage Regulator
4	Reset Button
5	RGB Addressable LED (connected to pin 13)
6	Power indication LED

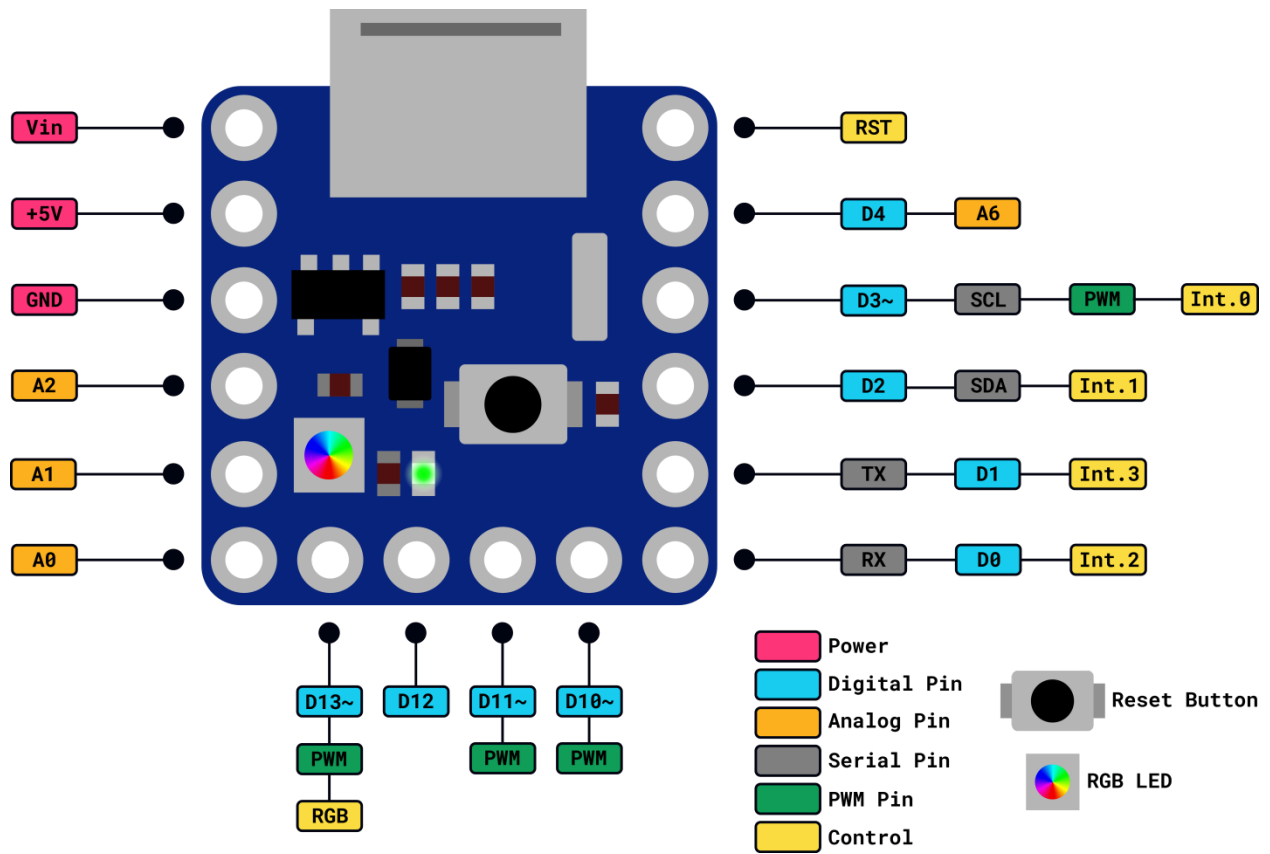


7	ICSP Pads (Detailed in PIN Mapping)
8	Resettable fuse
9	Microcontroller

Product Pin Mapping

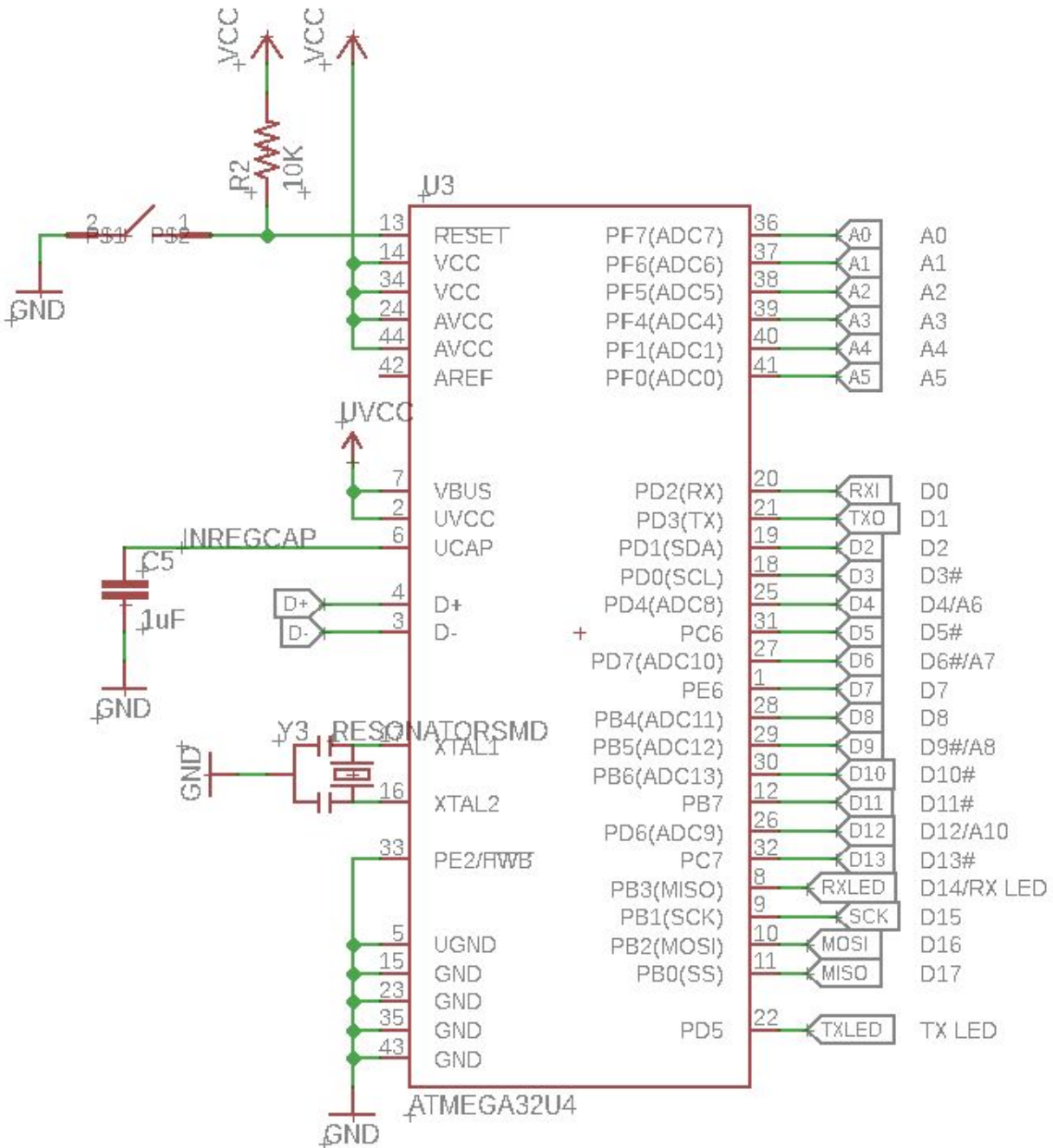


MellBell Electronics LLC



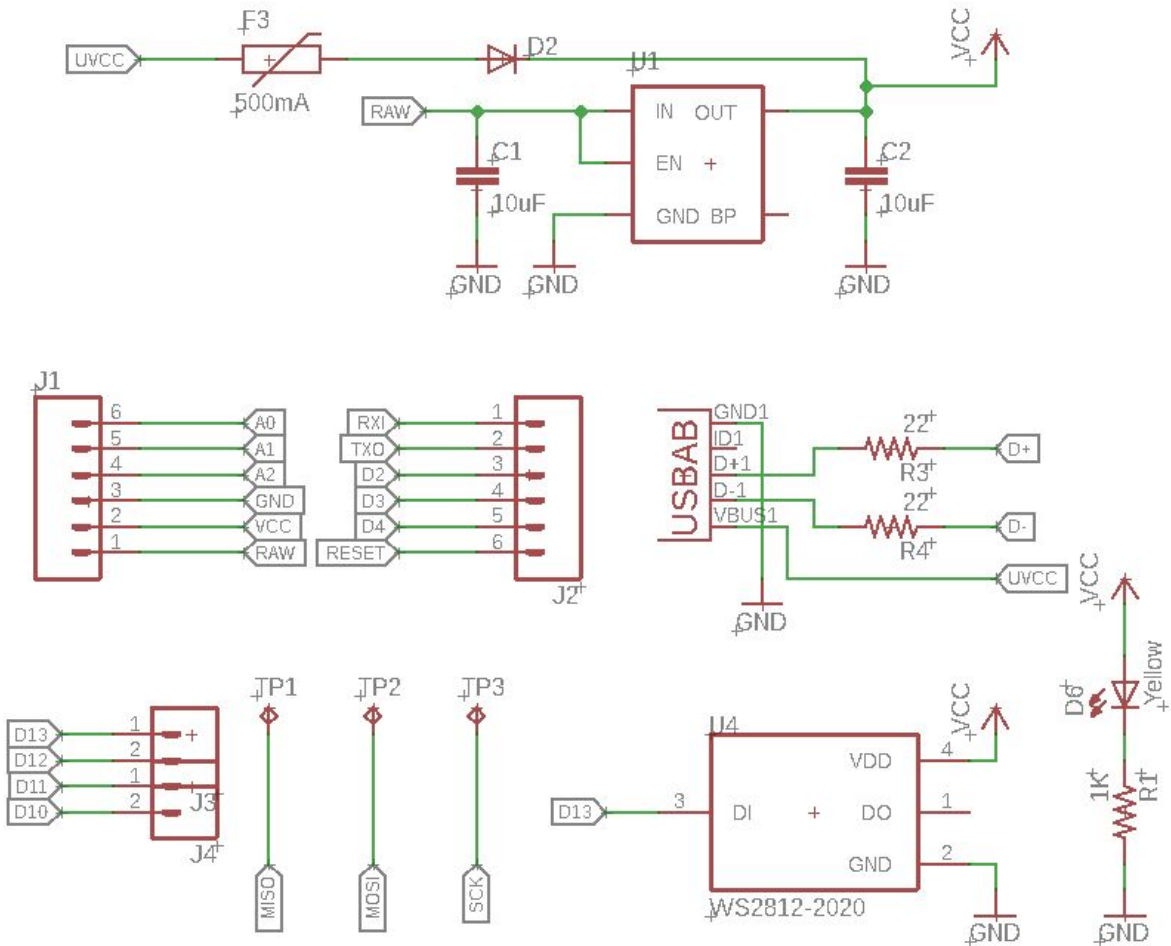
Product Schematics

OSHW: Schematics (Microcontroller)



MellBell Electronics LLC

OSHW: Schematics (Power, USB, I/Os)



Product Programming

PICO can be programmed with the [Arduino IDE](#). Select Arduino Leonardo from the Tools > Board menu (Pick Arduino® Leonardo Board). The ATmega32U4 on PICO comes burnt with a [bootloader](#) that allows you to upload new code to it without the need to prior programming, without the use of an external hardware programmer. It communicates using the AVR109 protocol. You can also bypass the bootloader and program the microcontroller through the ICSP pads which is located at the bottom of the board using [Arduino® ISP](#), [AVR STUDIO](#) or similar.

Product Input and Output

Each of the 5 digital i/o pins on the PICO can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms. In addition, some pins have specialized functions:

- **Serial:** 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data using the ATmega32U4 hardware serial capability. Note that on the PICO, the Serial class refers to USB (CDC) communication; for TTL serial on pins 0 and 1, use the Serial1 class.
- **TWI:** 2 (SDA) and 3 (SCL). Support TWI communication using the Wire library (I2C Protocol).
- **External Interrupts:** 3 (interrupt 0), 2 (interrupt 1), 0 (interrupt 2), and 1 (interrupt 3). These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attachInterrupt() function for details on Arduino's website.
- **PWM:** 3, 10, 11, and 13. Provide 8-bit PWM output with the analogWrite() function.
- **SPI:** on the ICSP pads at the bottom of the board (three pads, MOSI, MISO, and SCK). These pads support SPI communication using the SPI library. Note that the SPI pads are not connected to any of the digital I/O pins as they are on some of the other development boards, They are only available on the ICSP pads.
- **Analog Inputs:** A0, A1, A2, and A6 (on digital pin 4). The PICO has 4 analog inputs, labeled A0 through A2, all of which can also be used as digital i/o. Input A6 is on digital i/o pin 4. Each analog

MellBell Electronics LLC

input provide 10 bits of resolution (i.e. 1024 different values). By default the analog inputs measure from ground to 5 volts.

- **Reset.** Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which could block the one on the board.
- **Built In RGB LED:** The built in 5V RGB LED can be controlled by the Digital PWM pin number 13 (Check PICO's Hookup guide for examples)

Product Power Up

PICO can be powered via the micro USB connection or with an external power supply.

External (non-USB) power can come either from an AC-to-DC adapter or battery. The adapter or Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

The power pins are as follows:

- **VIN.** The input voltage to the PICO board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin. This pin can accept from 7V-13.5V input.
- **5V.** The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply through the pin directly. The 5V pin can take from 3V-5.5V as an input.

Communication

The PICO has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega32U4 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). The 32U4 also allows for serial (CDC) communication over USB and appears as a virtual com port to software on the computer. The chip also acts as a full speed USB 2.0 device, using standard USB COM drivers. On Windows, a .inf file is required. The [Arduino software](#) includes a serial monitor which allows simple textual data to be sent to and from the PICO board. A SoftwareSerial library

MellBell Electronics LLC

allows for serial communication on any of PICO's digital pins. The ATmega32U4 also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify the use of the I2C bus. For SPI communication, the SPI library should be used. The PICO appears as a generic keyboard and mouse, and can be programmed to control these input devices using the Keyboard and Mouse classes.

Product Memory

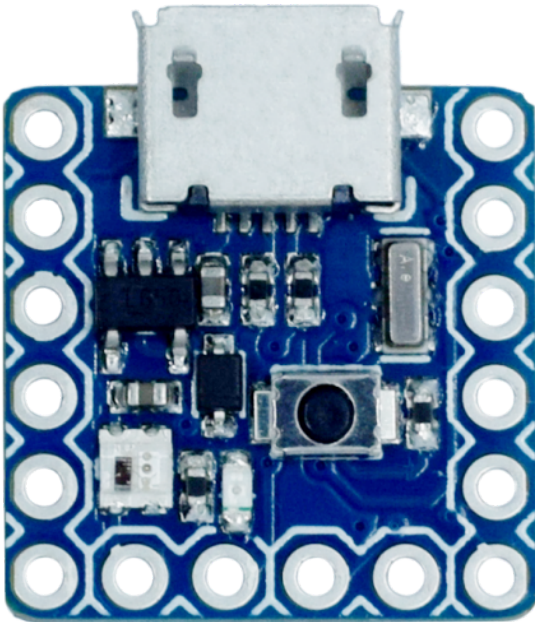
The ATmega32u4 has 32 KB (with 4 KB used for the bootloader). It also has 2.5 KB of SRAM and 1 KB of EEPROM (which can be read and written with the [EEPROM library](#)).

Warnings

The PICO has a resettable polyfuse that protects the computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

Product Warranty and Testing

MANUFACTURING



All components and solder alloys used in this product comply with the RoHS Directive. The RoHS Directive prevents all new electrical and electronic equipment placed on the market in the European Economic Area from containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE).

SAFETY

All boards meet the electromagnetic compatibility standards set in their respective jurisdictions. Max Planck Electronic Design LLC products meet the essential requirements of EU Directive 2001/95/CE General directive on products safety and Directive 93/68/CE.

FCC COMPLIANCE

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

TESTING

Products are subject to triple testing to make sure they are not faulty:

- First, printed circuit boards are thoroughly tested for short circuits and open connections.



52 Q. Rania Street
Amman, Jo 11942
+ (962) 79 659 1640
electronics@mellbell.cc

MellBell Electronics LLC

- Then, boards are powered (and, in products containing a microcontroller, the bootloader is programmed) to check there are no macroscopic problems preventing the board from turning on.
- Finally, the most in-depth test: the board is placed into a custom bed of nails tester, and programmed by a test program, which checks its overall functionality.

Product Feedback

IF you have any product feedback, or product documentation feedback, please feel free to contact Electronics@mellbell.cc

Sincerely,
Team MellBell,

