PSLab Data Sheet
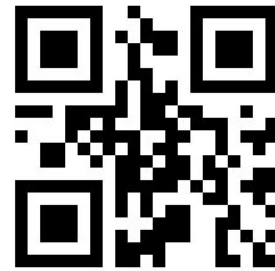
Data Sheet Version: 0.92

Name: Pocket Science Lab
Abbreviation: PSLab
Hardware Version No.: 5.01
Website: https://pslab.io
License: GPL v.3.0, Apache 2.0

Product Description

PSLab is a small USB powered hardware extension for your Android phone or PC that lets you measure all kinds of things. PSLab comes with a built-in Oscilloscope, Multimeter, Wave Generator, Logic Analyzer, Power Source, and we are constantly adding more digital instruments. PSLab is many devices in one. Simply connect two wires to the relevant pins and start measuring. You can use our Open Source Android or desktop apps to view and collect the data. You can also plug in hundreds of compatible I2C standard sensors to the PSLab pin slots. It works without the need for programming. So, what experiments you do is just limited to your imagination! PSLab is developed by FOSSASIA and OpnTec in collaboration with a global community of Open Source developers.
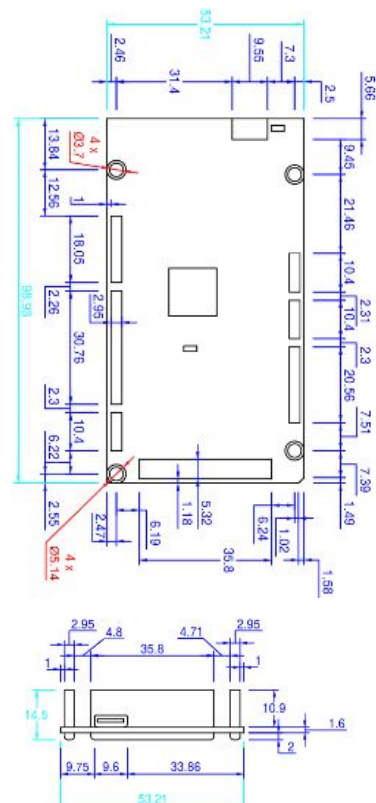
Top View
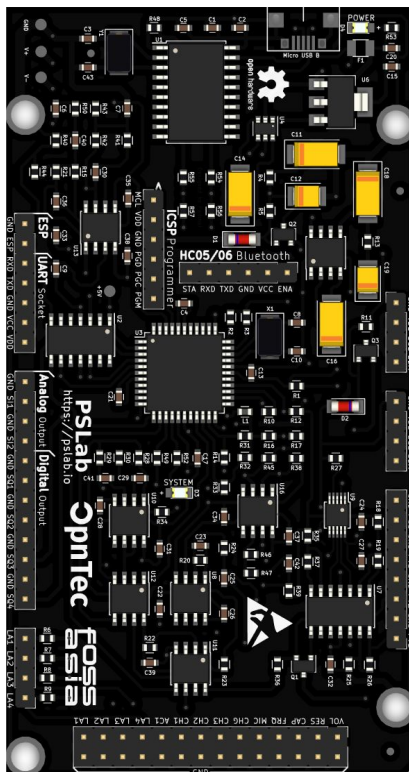
Bottom View
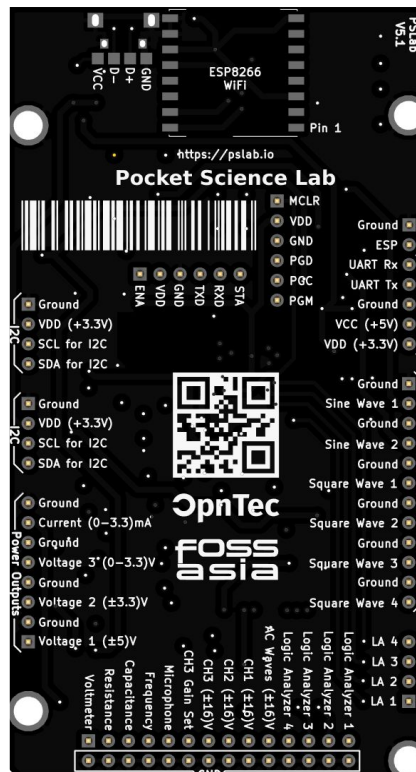
Schematic Drawings

Features

Oscilloscope	4-Channel up to 2MSPS. Software selectable amplification stages. Ability to monitor analog inputs at maximum of 2 million samples per second. Includes controls such as triggering, and gain selection.
Frequency Counter	Up to 2 MHz
Voltmeter	12-bit analog inputs (function as voltmeters) with programmable gain. Input ranges from +/- 16 V with 10 mV resolution
Voltage Source	3 x 12-bit Programmable, +/-3.3 V, +/-5 V, 0-3 V. (PV1, PV2, PV3)
Current Source	12-bit Programmable. 0-3.3 mA (Maximum current 3.3 mA subject to load resistance)
Logic Analyzer	4-Channel, 4 MHz with 15 nS resolution
Waveform Generator	2x Sine/Triangular arbitrary wave generators. 5 Hz to 5 KHz. Manual amplitude control for SI1, SI2, +/-3 Volts
Pulse Width Modulation (PWM)	4x phase correlated PWM generators. 15 nS resolution, nano second duty cycle. Up to 8 MHz, maximum frequency 32 MHz, phase difference control.
Capacitance	Measurement range pF to uF
Sensors	Connect any I2C standard sensor and do experiments in physics, chemistry, biology, chemistry and medicine.

Applications

PSLab is a scientific device for measurements. Application areas range from physics and electronics experiments and measurements to biological and chemicals measurements. You are student or scientist and want to conduct experiments, a hardware developer designing new devices, or a technician fixing digital electronic devices? Use PSLab!

USB Powered / OTG Data Connection with Phone or PC

Pocket Science Lab is directly powered through the USB connection. It doesn't need any other external power source. All you need to do is to attach it to the phone via a USB OTG cable if you are using the mobile app or directly to your laptop's USB port if you are using the desktop app.

WiFi and Bluetooth

PSLab has slots for ESP and Bluetooth chips. The functionalities are already implemented in the firmware. Solder the chips to the dedicated slots. For the WiFi functionality also don't forget to install the relevant packages on the ESP WiFi chip and you are ready to go. Devices can be powered through an external battery when they are accessed through Bluetooth or WiFI.

Connectors/Slots

USB	USB 2.0 Micro B Type
GPIO Connector	2.54 mm Female Headers
UART	UART data buses for Accel/gyros/humidity/temperature modules
WiFI	ESP8266 WiFi extension slot
Bluetooth	Bluetooth extension slot
I2C	8 x I2C Digital pins for sensors
ICSP Programmer	PICkit3 compatible programmer slot

Technical Specifications

Microcontroller	PIC24EP256GP204
Operating Voltage	+/-3.3V
Input Voltage (recommended)	5-15V
Input Voltage (max. limit) V	20V
I/O pins	Analog: 8, Digital: 4
DC current I/O pin	20 mA
DC current 3.3V pin	50 mA
DC current 5.0V pin	250 mA
Clock Speed	12 MHz
Length	101 mm
Width	53 mm
Height	13 mm
Weight	30 g

Components List

Main uC	PIC24EP256GP204
Programmable Gain Amplifier	MCP6S21

4 channel DAC	MCP4728
Charge Pump voltage inverter	TC7660
Charge Pump voltage doubler	TC1240A
2 channel Op-Amp	TL082
4 channel Op-Amp	LM324
3.3 V regulator	LM1117
USB-UART Bridge	MCP2200
UART-TCP bridge	ESP8266 (ESP-12E)
0.5 A Fuse	0ZCJ0025FF2E
Assorted Resistors, Capacitors, Inductors and Diodes	0603 and MiniMELF

Fixing

Standoffs	2.5mm nuts

Software

Firmware

C++ source code developed on MPLab IDE compiled with MicroChip x16 compiler

Download GitHub
github.com/fossasia/pslab-firmware

Android App

Native Android application, Version: 2.0.6
Instruments:

- ❏ Oscilloscope
- ❏ Multimeter
- ❏ Logic Analyzer
- ❏ Wave Generator
- ❏ Power Source

Download Playstore:
play.google.com/store/apps/details?id=io.pslab
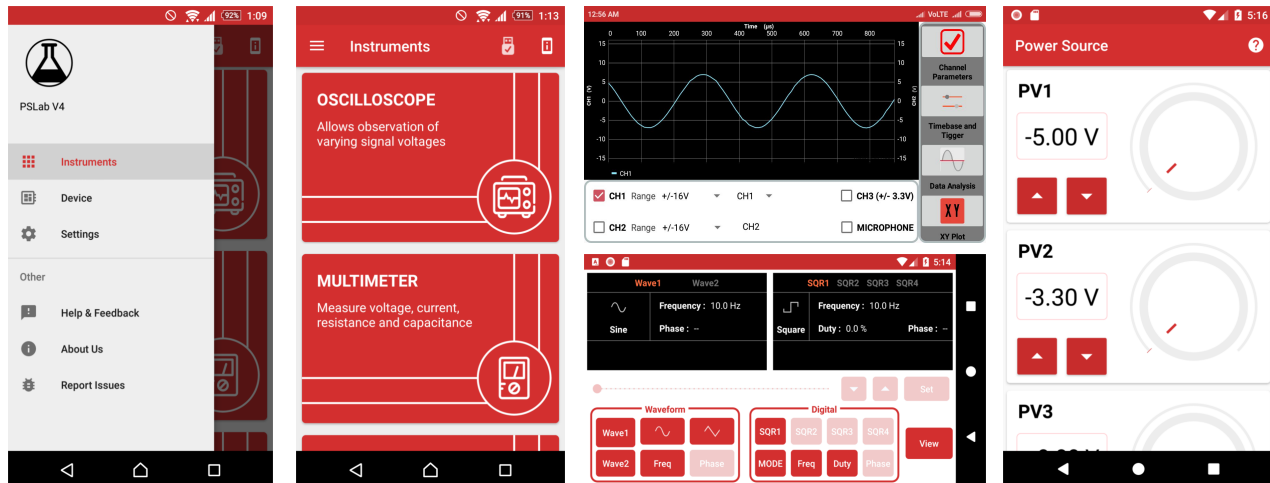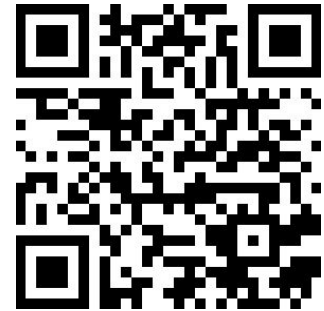
Download Fdroid
f-droid.org/en/packages/io.pslab/

- ❏ Lux Meter
- ❏ Accelerometer
- ❏ Barometer
- ❏ Compass

Compatible Android versions:
- ❏ Minimum: API Level 16 (4.1)
- ❏ Maximum: API Level 27 (8.1)

Other:
- ❏ Phone USC connections needs to support OTG

Desktop

Python Desktop Application

Download Github
github.com/fossasia/pslab-desktop

Recommended Sensors

Diode	1N4007	https://www.onsemi.com/pub/Collateral/1N4001-D.PDF
Diode	1N4148	https://www.vishay.com/docs/81857/1n4148.pdf
Moisture Sensor	FR-04	https://www.instructables.com/id/Arduino-Modules-Rain-Sensor/
Light Dependent Resistor	GL5528	https://pi.gate.ac.uk/pages/airpi-files/PD0001.pdf

Microphone	KY-037	http://www.datasheetcafe.com/ky-038-pdf-arduino/
Magnetic	KY-003	https://cdn-reichelt.de/documents/datenblatt/A300/SEN-KY003-DATASHEET.pdf
Temperature	LM-35	http://www.ti.com/lit/ds/symlink/lm35.pdf
Gas Sensor	MQ135	https://www.olimex.com/Products/Components/Sensors/SNS-MQ135/resources/SNS-MQ135.pdf

A list with more compatible sensors on the website at https://pslab.io/sensors/

Recommended Extras

Capacitors	0.1 µF, 68 µF, 470 µF
Diodes	1N4007, 1N4148
Light Emitting Diode	Green, Orange, Red
Resistors	100 Ω, 200 Ω, 560 Ω, 1K Ω, 2.2K Ω, 5.1K Ω, 10K Ω, 100K Ω, 180K Ω, 300K Ω
Transistors (NPN, PNP)	2SC945, S9012

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Seeed Studio](#):
  [102991151](#)