

**PP-CONTROL**  
**Pulse picker and regenerative amplifier**  
**synchronization board**

**User manual**

## Description

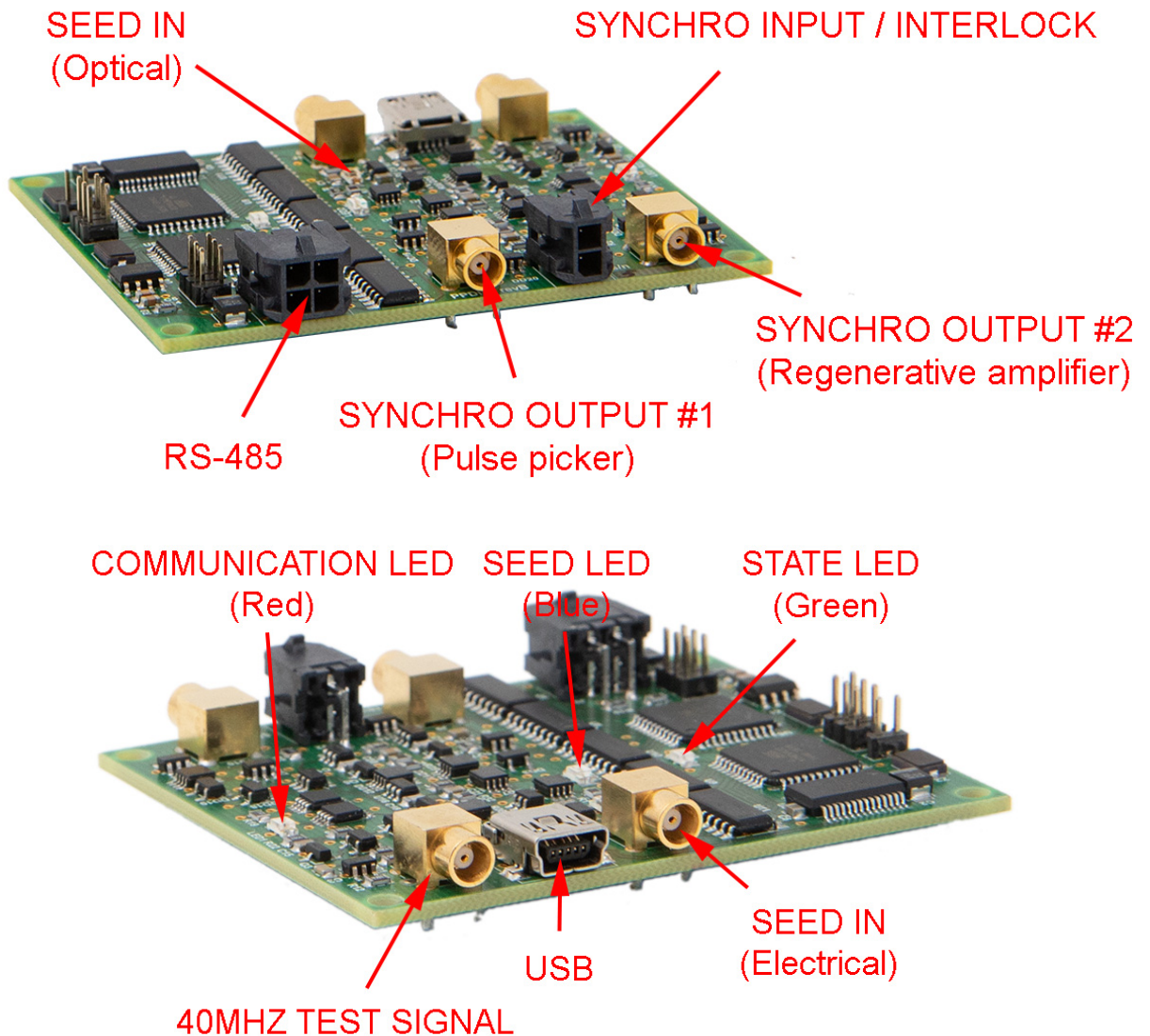
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PP-CONTROL synchronizes the control of pulse picking device and/or regenerative amplifier with incoming optical (electrical) pulse train. Can be supplied either as printed board (PCB) or as enclosed module.

Once the device is powered and enabled it generates at its outputs TTL pulses precisely aligned relatively to SEED IN incoming signal. Parameters of output pulses are set via software and stored in device's memory.

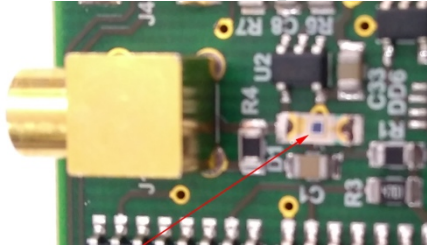
## Interface, interface signals

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SEED IN (Optical) – fast photodiode to apply the beam sample

- *PCB location – D1 photodiode close to J1 connector:*



- *example of use – 80MHz seed oscillator, 1064nm wavelength, 1.5W average power, 1.2mm beam diameter ( $1/e^2$ ), uncoated glass sample used as beam splitter – seed detection OK*

SEED IN (Electrical) – if the customer prefers to use his own photodiode, the amplified output of customer's photodiode can be applied here

- *input signal*

- *recommended amplitude – 1V, acceptable amplitude – 0.5V-3V*

40MHZ TEST SIGNAL – internal simulator of seed-oscillator pulse train. One can connect this output to SEED IN (Electrical) to test the functionality of PP-CONTROL and software by simple means

SYNCHRO OUTPUT #1 (Pulse picker) – short pulse with reduced repetition rate and precise synchronization to the main pulse train goes out from here

- *5V output*

- *adjusted with D1 delay*

SYNCHRO OUTPUT #2 (Regenerative amplifier) – long pulse with adjustable pulse width (or two short pulse with adjustable delay) and reduced repetition rate and precise synchronization to the main pulse train goes out from here

- *5V output*

- *adjusted with D2, DL, D3 delays and AMP mode*

USB – is used for powering and controlling of PP-CONTROL

SYNCHRO INPUT / INTERLOCK

4	3
2	1

- *signals – 5V TTL*

- *pin 1 – Synchro Input, pin 3 – Synchro Input return*

- *pin 2 – Interlock, pin 4 – GND (=Interlock return)*

SYNCHRO INPUT – in external synchronization mode PP-CONTROL produces output pulses on customer's demand by following incoming TTL signal applied to this pin

INTERLOCK – all outputs of PP-CONTROL are forcibly blocked when TTL high level is applied to this pin

RS-485 – one or two HVSW-03 (HVSW-04) can be controlled by PP-CONTROL via RS-485 interface

4	3
2	1

- pin 1 – A, pin 2 – B, pins 3 and 4 – GND

STATE LED (**green**) – shows power up status and enable status

- is on if PP-CONTROL is powered and enabled

- blinks if PP-CONTROL is powered, but not enabled

SEED LED (**blue**) – is on if and only if seed oscillator is detected

COMMUNICATION LED (**red**) – blinks if data packet is sent to PP-CONTROL

## Operations

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[Pre-configuration]

1. Install software following software installation guide
2. Assemble your experimental setup
3. Run software

[Operations]

1. Deliver a sample of laser beam coming from the seed oscillator to the photodiode (SEED IN Optical)
2. Turn on seed threshold autosearch. Once pulse train coming from seed oscillator is detected, SEED LED turns on.
3. Once seed oscillator is detected, set the desired output parameters (D1, D2, DL, D3) and ENABLE the synchro outputs.

## Software description

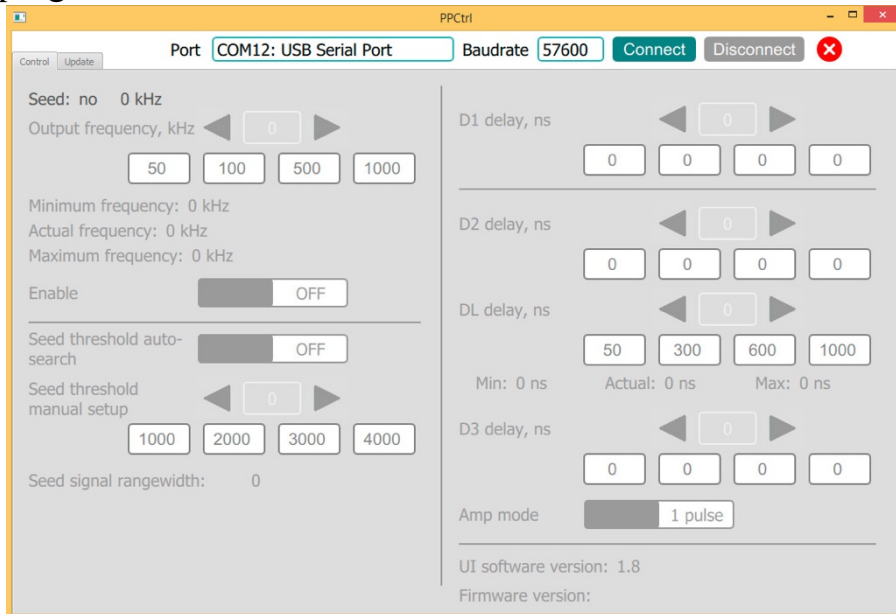
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### 1. Installing the software

Follow software installation guide supplied together with PP-CONTROL.

### 2. First run

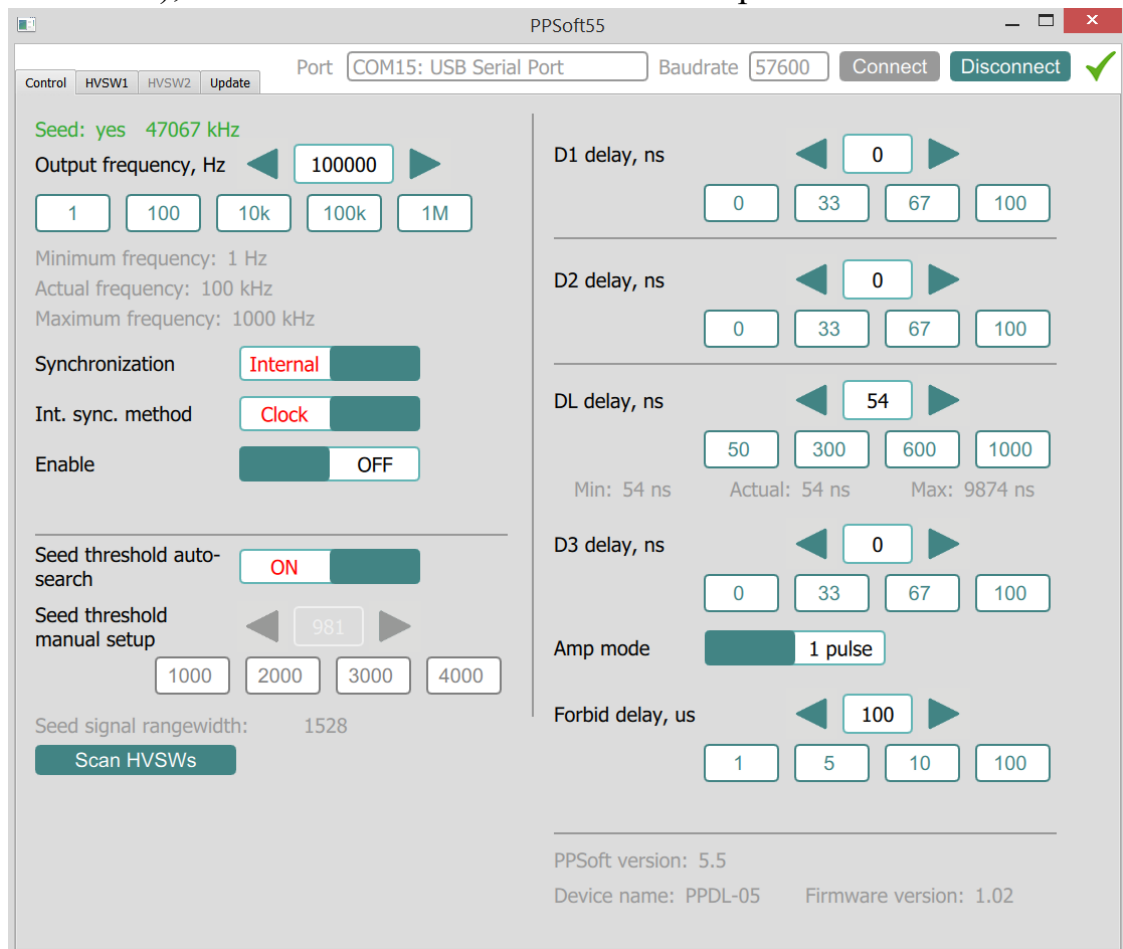
Plug the PP-CONTROL device into the USB port (green LED will start blinking), and run program PPSoftXX.exe. On some computers program may not start or have some problems with graphics, in this case copy opengl32.dll file from OpenGL folder to the program folder and restart the program.



Select “USB Serial port” in the combo-box on the top, and press “Connect” button. Program will connect to the PP-CONTROL device and the interface will become enabled.

### 3. Description (main screen)

The software has a few screens. The first screen sets parameters of PP-CONTROL, two next screens set parameters of HVSW-03/04 (if connected), the last screen allows the firmware update of PP-CONTROL.



**Output frequency** – sets repetition rate of pulses at SYNCHRO OUTPUT #1 and SYNCHRO OUTPUT #2 outputs in Internal synchronization mode. In External synchronization mode, pulses at SYNCHRO OUTPUT #1 and SYNCHRO OUTPUT #2 outputs follow the synchronization pulses applied to SYNCHRO INPUT connector.

**Enable** – enables the output.

**Synchronization** – switches PP-CONTROL between Internal synchronization mode and External synchronization mode.

**Int. sync. method** – in Internal synchronization mode switches PP-CONTROL between two method of synchronization (**Div** – by dividing seed frequency – better rep.rate jitter, worse rep.rate accuracy, **Clock** – by using MCU internal clock – worse rep.rate jitter, better rep.rate accuracy)

**D1** – sets SYNCHRO OUTPUT #1 rising edge delay, **D2** – sets SYNCHRO OUTPUT #2 rising edge delay, **DL** and **D3** – set SYNCHRO OUTPUT #2 falling edge delay (DL is a coarse delay always equal a multiple of inter-pulse interval of seed oscillator, D3 is a fine delay)

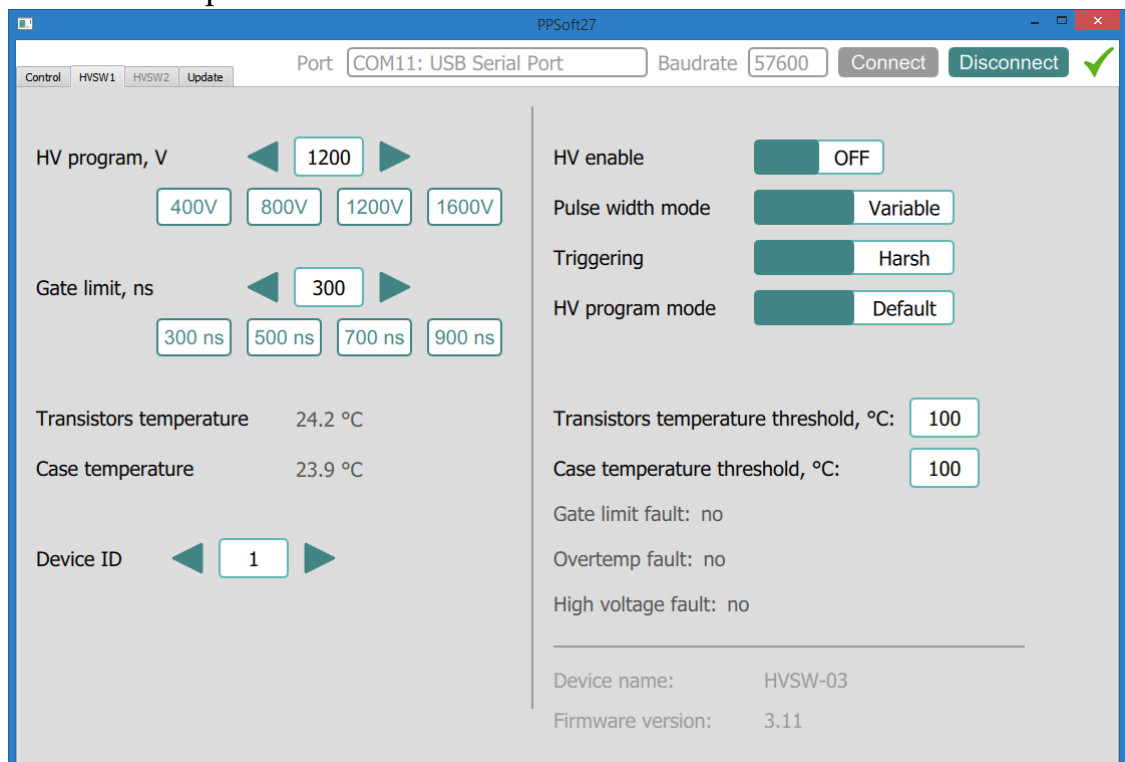
**Amp mode** – when **Amp mode** is set to 2 pulses at SYNCHRO OUTPUT #2 output, two short pulses are produced instead of the only long pulse

**Forbid delay** –PP-CONTROL has capability to protect regenerative amplifier against unstable behavior of seed oscillator. Once the output pulse is initiated (doesn't matter in External synchronization mode or in Internal synchronization mode) **Forbid delay** is the maximal time PP-CONTROL waits for incoming pulse from seed oscillator until it stops the operations and rises Fault state.



#### 4. Description (HVSWx screens)

Please follow user manual of HVSW-03 (HVSW-04) high voltage switches for the description of these screens.

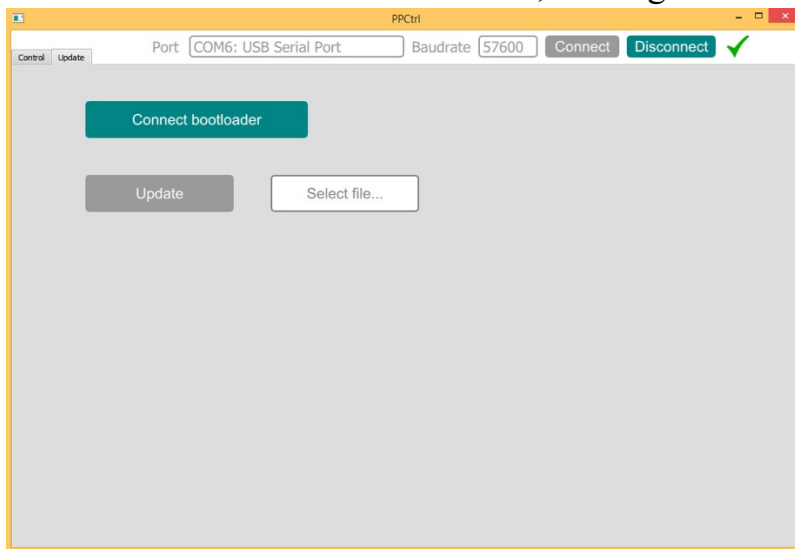


*Example: HVSW1 screen when HVSW-03 is connected to PP-CONTROL*

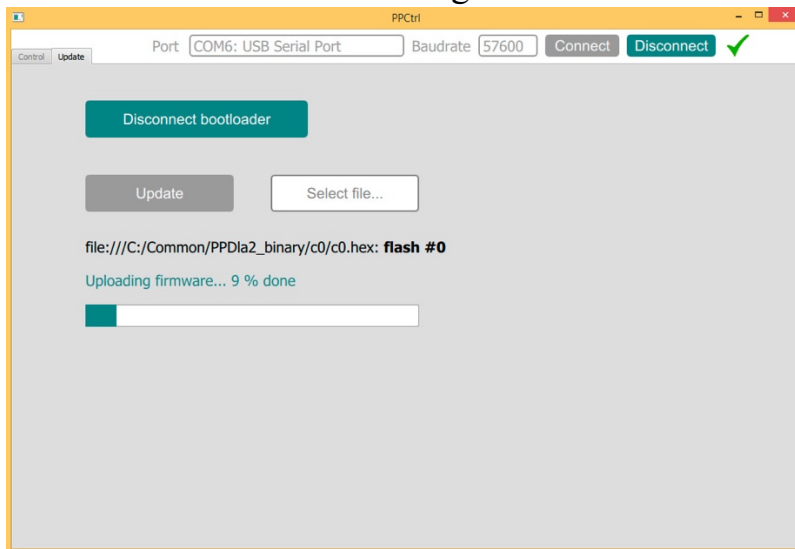
If you use two HVSW-03 (HVSW-04) switches, please ensure they have different Device ID.

## 5. Updating the firmware

Run PPCtrl.exe and connect to the PP-CONTROL device. Select “Update” tab and click “Connect bootloader” button. In bootloader mode, both blue and red LEDs become double blink, while green LED is either on or off.

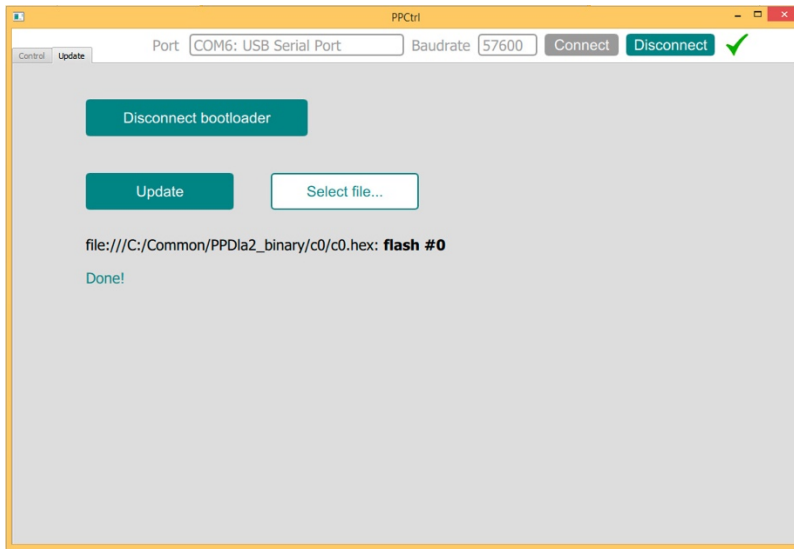


Click “Select file” button and select c0.hex or c1.hex file, provided by the manufacturer. Click “Update” button to start update routine. While updating, all three LEDs will be blinking.



If update succeeds, the inscription will read “Done”. User may click “Disconnect bootloader” button or just unplug and plug back the device





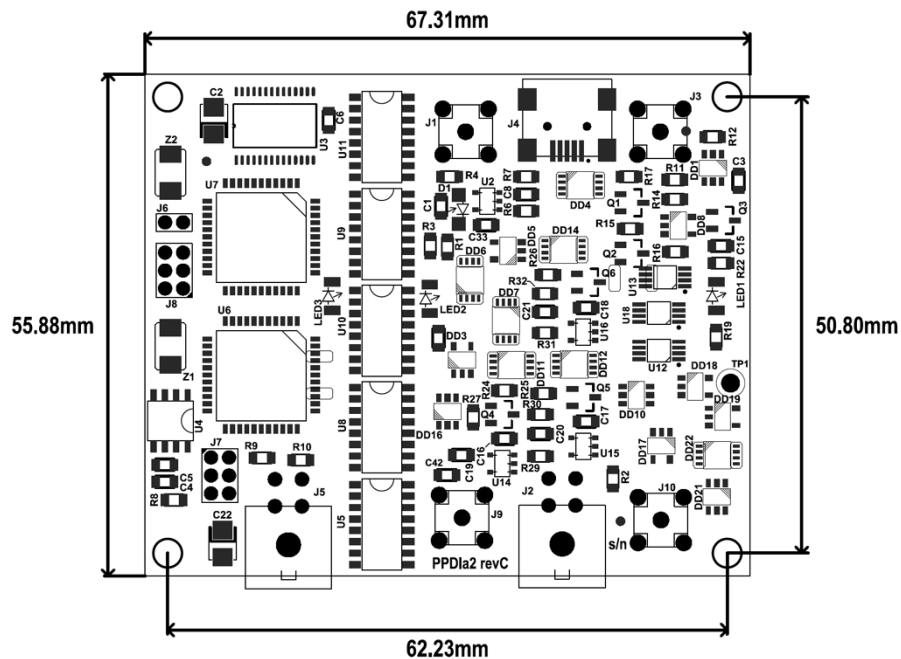
# Specifications

## ELECTRICAL SPECIFICATION

INPUTS	
Power	5V (via USB), 1A max
SEED IN (optical)	High speed PIN photodiode (SFH 2701 by Osram by default, other photodiodes e.g. for 1.5um or 2um lasers are available on request)
SEED IN (electrical)	1V recommended, 0.5-3.0V acceptable 20-100MHz by default, other on request
OUTPUTS	
Synchro output #1 (Pulse picker)	5V TTL, 1-1000kHz
Synchro output #2 (Regenerative amplifier)	5V TTL, 1-1000kHz, approx. 100ns to approx. 1100ns (with 100MHz input train), other on request
Delays	D1, D2, D3 – approx 0-100ns DL – approx 0-1000ns
Jitter	D1, D2, D3 < +/-250ps
INTERFACES	
USB	+

## MECHANICAL SPECIFICATION

Dimensions	67.3 x 55.9mm
Weight	<0.2kg



# Enclosed version

