

# MINI PC SCOPE PCSU01

## User manual

### Features

- test leads
- software download
- USB cable
- design enclosure

### Specifications

- oscilloscope:
  - bandwidth: DC to 200 kHz  $\pm$  3 dB
  - input impedance: 100 k $\Omega$  / 20 pF
  - maximum input voltage: 30 V (AC + DC)
  - time base: 10  $\mu$ s to 500 ms per division
  - input range: 100 mV to 5 V/division
  - input sensitivity: 3 mV display resolution
  - readouts: true RMS, dBV, dBm, p to p, Duty cycle, Frequency...
  - record length: 1k samples
  - sampling frequency: 62.5 Hz to 1.5 MHz
  - sample history function
  - auto set-up function
  - pre-trigger function: on 0.1 ms/div .. 500 ms/div ranges
  - persistence options: colour graded, Variable and Infinite
- spectrum analyser:
  - frequency range: 0 .. 150 Hz to 75 kHz
  - operating principle: FFT (Fast Fourier Transform)
  - FFT resolution: 512 lines
- transient recorder:
  - timescale: 20 ms/div to 2000 s/div
  - max. recording time: 9.4 h/screen
  - automatic storage of data
  - record and display of screens
  - max. number of samples: 100/s
  - min. number of samples: 1 sample/20 s
- general information:
  - markers for: amplitude/voltage and frequency/time
  - input coupling: DC and AC
  - 8 bit resolution
  - storage of display and data
  - dimensions: 85 x 40 x 14 mm
- minimum system requirements:
  - Windows® XP, Vista, 7, 8, 10
  - mouse (or mouse pad)
  - free USB port 1.1 or 2.0

### Software installation

Download the latest software version from [www.velleman.eu](http://www.velleman.eu).  
Type PCSU01 in the search box and check the download section.

- Download the PCSU01\_setup.zip file
- Unzip the files in a folder on your drive
- Double click the "setup.exe" file

An install wizard will guide you through the complete installation

procedure. Shortcuts to the PCSU01 software can be installed.

**Note:** You will need local Administrator privileges to successfully complete the installation, contact your system administrator for assistance. See also the “ReadME” file in the installed folder.

#### Starting the software:

Locate and run the PCSU01 software.

At first time, the oscilloscope will be calibrated automatically.

\*Microsoft Windows™ XP/Vista/7/8/10 (\*) are registered trademarks.

## SAFETY and WARNINGS



Important safety information!

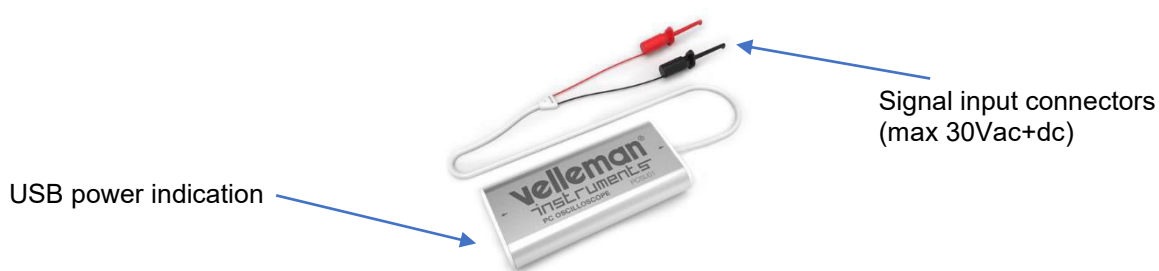
Instruments grounds are interconnected and connected to PC ground. Max. voltage between probe tip and ground: 30V AC+DC at all times!

Before performing any measurement, make sure that the circuit is galvanically separated from the AC power (mains)! If necessary, use a safety isolation transformer.

## Warranty

This product is guaranteed against defects in components and construction from the moment it is purchased and for a period of ONE YEAR starting from the date of sale. This guarantee is only valid if the unit is submitted together with the original purchase invoice. VELLEMAN Ltd. limits its responsibility to the reparation of defects or, as VELLEMAN Ltd. deems necessary, to the replacement or reparation of defective components. Costs and risks connected to the transport, removal or placement of the product, or any other costs directly or indirectly connected to the repair, will not be reimbursed by VELLEMAN Ltd. VELLEMAN Ltd. will not be held responsible for any damages caused by the malfunctioning of a unit.

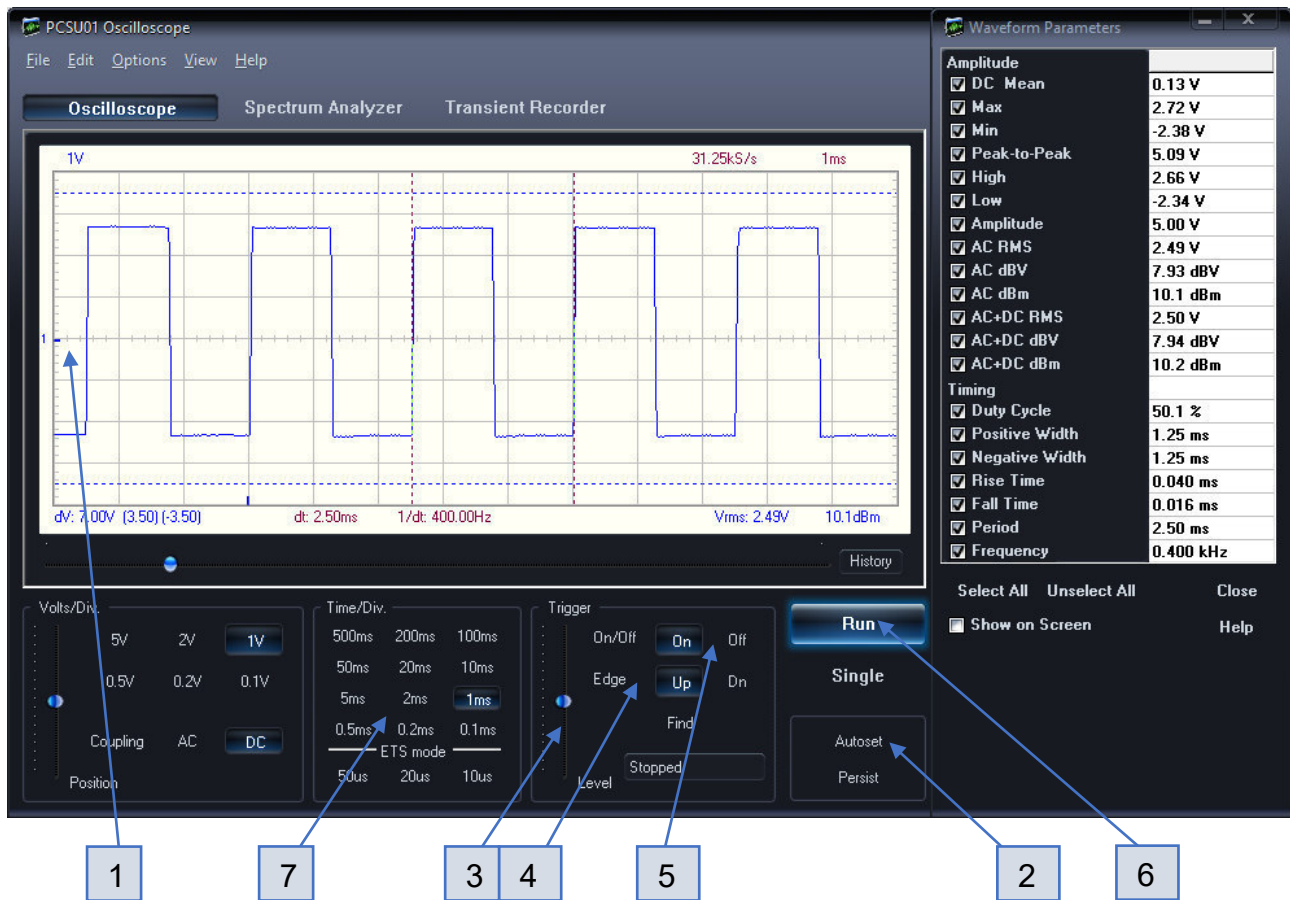
## Connections



The unit is connected to the USB port of the computer, using a USB cable.

## The Oscilloscope module

What ? :The Oscilloscope module offers a feature-packed, easy to use digital storage oscilloscope.



How ? :

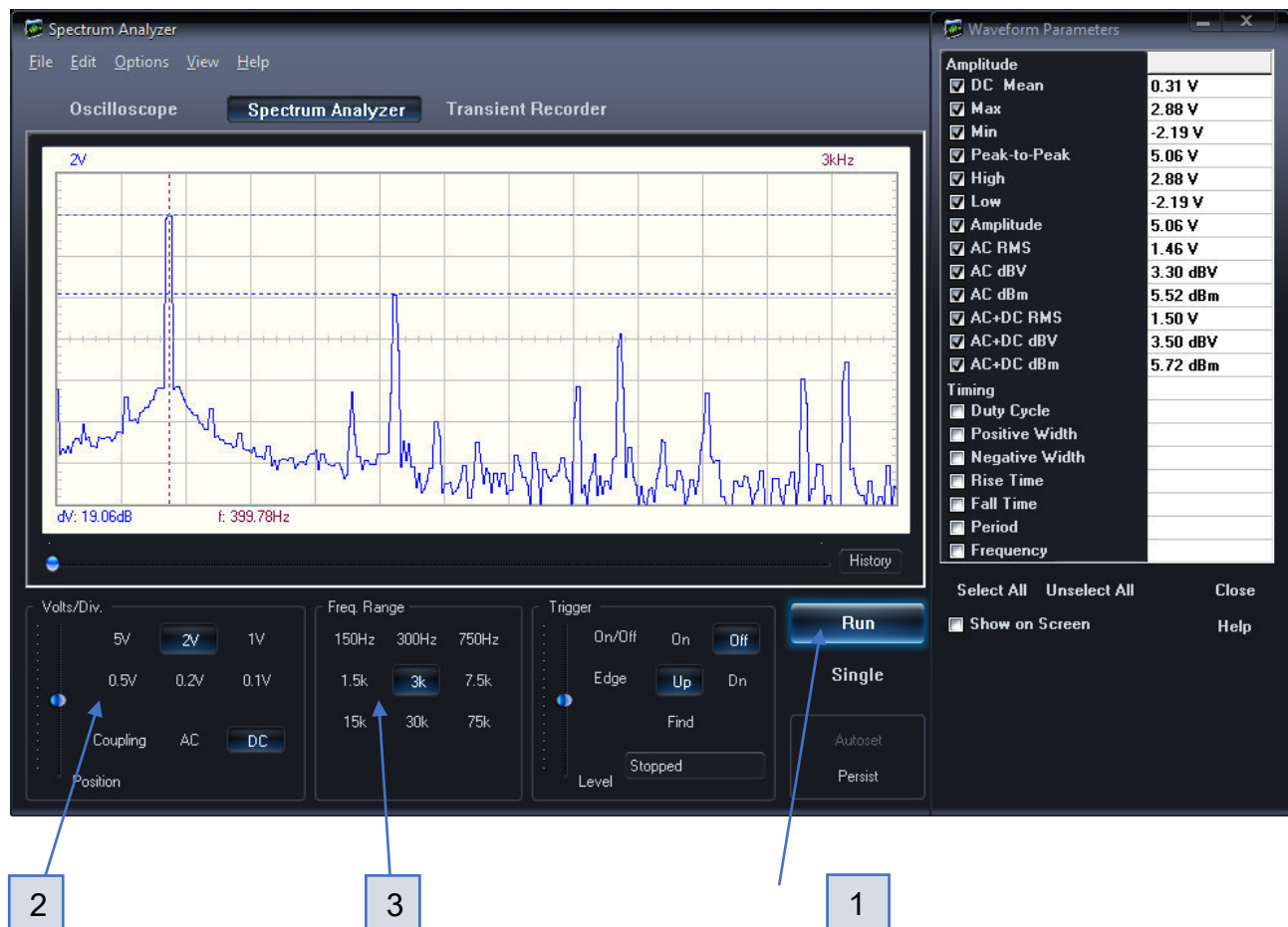
- Connect the circuit under test to the scope input (observe the max. input rating of the scope!).
- Start measuring with “trigger off” (5).
- Press ‘RUN’ (6).
- Choose the desired volts/div setting or press “Auto-set” (2).
- Choose the appropriate time/div setting (7).

To enable triggering :

- Select trigger edge (4).
- Set trigger to ‘ON’ (5).
- Set trigger level by sliding (3). The trigger mark is displayed on the left hand side of the signal display (1).

## The Spectrum Analyzer Module

**What?:** Powerful feature which allows visualization of the frequency spectrum of a signal, using FFT (Fast Fourier Transform) analysis.

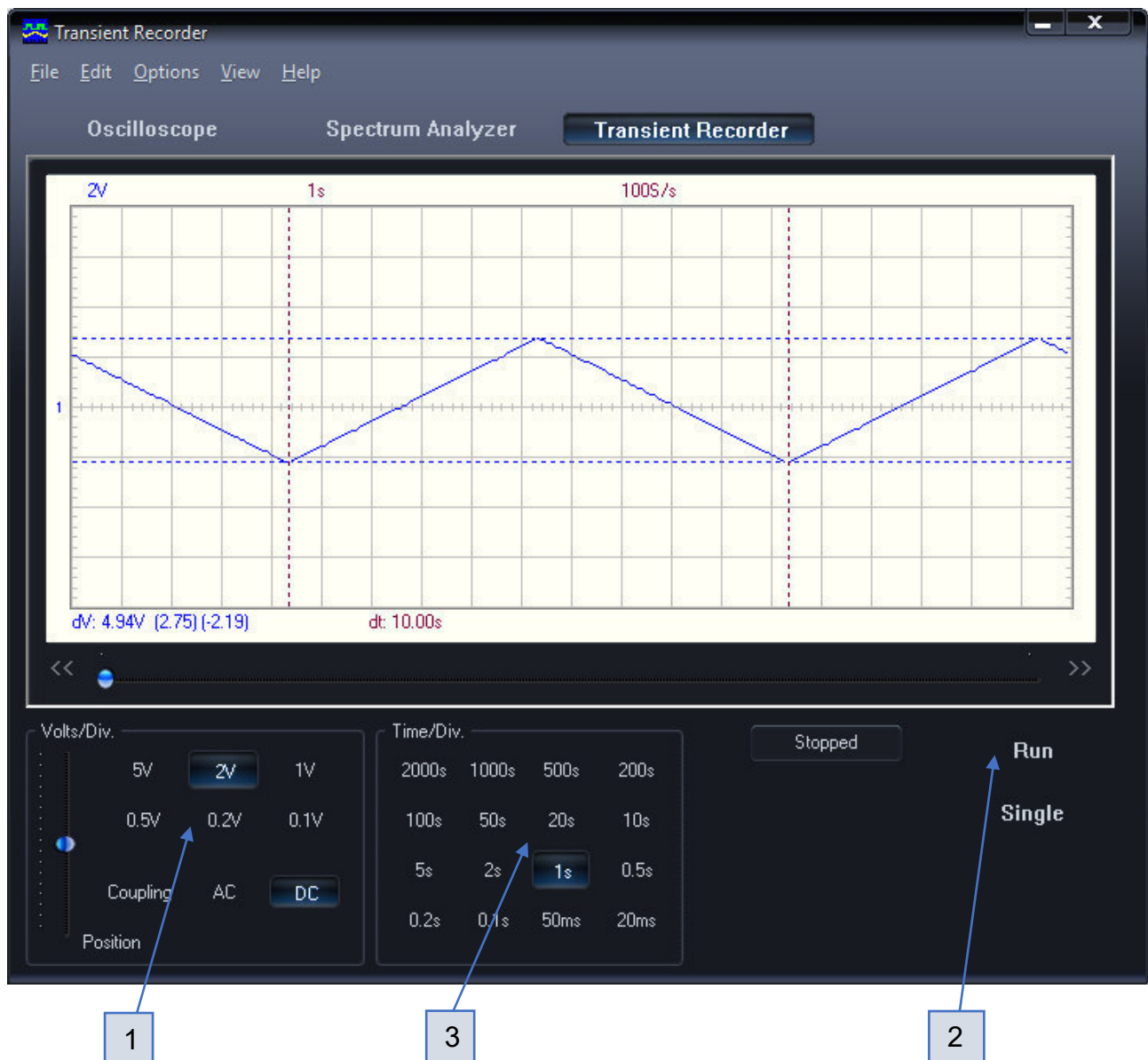


**How?:**

- Connect the scope input to the circuit under test. (observe the max. input rating of the scope!).
- First observe the signal on the scope screen (see previous page).
- Check that the signal is not over the maximum of the screen.
- Start the spectrum analyzer.
- Press 'RUN' (1).
- Select the appropriate frequency range. Make sure your setting will capture any signal change of interest (3).
- If wanted, set the appropriate volts/div setting (2).

## The Transient Recorder Module

**What?:** Record occasional events and log slow changing processes automatically, e.g. battery charge cycles, temperature changes,... or track intermittent faults in electronic circuits. Automatic data storage allows over one year of continuous recording!



**How?:**

- Connect the scope input to the circuit under test.
- Select the appropriate volts/div setting (1).
- Select the appropriate time/division setting (3).
- Press RUN (2) to start recording.

**\*\* Press RUN again, to stop the measurement, or use the "Single" button to make a single screen measurement.**

For continuous recording with auto-save to your HD, select 'AutoSave Data' from the 'File'-menu.

Notes:

- During recording the screen can differ from the actual measurement.
- Events happening between two sample acquisitions will be missed if a too slow time/div is set.

# Controls

## Oscilloscope mode

### **VOLTS/DIV**

Selected value indicates the peak-to-peak voltage required to produce a peak-to-peak deflection of one major division on the screen.

### **Coupling**

**AC:** the input signal is capacitive coupled to the input amplifier/attenuator. Only the AC components are measured.

**DC:** the input signal is directly connected to the input amplifier/attenuator. Both AC and DC voltage are measured.

### **TIME/DIV**

Selects the time setting for the beam to sweep one major division on the screen

By selecting different TIME/DIV settings it is possible to **zoom** the frozen waveform on the screen.

"Equivalent Time Sampling" **ETS mode** is in use on 50us/div, 20us/div and 10us/div ranges.

Triggering is set ON to get stable waveform images.

This mode is usable only for repetitive signals.

There is no pre-trigger option in this mode.

In this sampling mode the oscilloscope uses successive triggering occurrences to gather the data to construct a picture of a repetitive signal.

### **TRIGGER On/Off**

Selects free run mode or triggered mode.

### **TRIGGER Level**

Selects the signal level at which the sweep is triggered.

Triggering reference mark is displayed with the horizontal line on the left side of the screen.

### **TRIGGER Edge**

Selects the triggering slope:

Up: Trigger occurs when triggering signal crosses trigger level in a positive going direction.

Dn: Trigger occurs when triggering signal crosses trigger level in a negative going direction.

### **TRIGGER Find**

Resets the triggering x-position reference point. Triggering reference mark is displayed with the vertical line on the bottom of the screen.

### **RUN**

Selects recurrent display update mode (RUN). Pressing the button again freezes the display.

### **SINGLE**

When button is depressed and the trigger level is reached, refreshment of the display takes place only once.

### **Persist**

When this button is down the scope captures many acquisitions of a signal to the screen. Record points accumulate until you release the button.

### **Autoset**

Automatic setup for the Volts/div, Time/div, and Trigger level to produce a stable waveform of usable size.

The trigger will be set on if the wave amplitude on the screen is more than 0.5 divisions.

The signal should be repetitive for proper autoset function: Amplitude 100mV to 30V; frequency above 50Hz; duty cycle greater than 10%.

### **X-POSITION SCROLLBAR** (Below the waveform display)

Positions the trace horizontally on the screen. Triggering reference point is displayed with the vertical line on the bottom of the screen.

### **History Waveform Display**

Click the "History" button at the bottom of the waveform screen to get access to the history slider.

The history slider allows you to recall and display acquired data from up to 1000 previous acquisitions.

Use the mouse wheel or arrow keys to display the saved waveforms one-by-one.

Performing waveform parameters measurements of old waveforms is possible.

**Note:** Do not change the scope settings (Time/div, Volts/div or the vertical position) when doing any measurements.

**Note:** The scope settings are not stored to the history data.

Right-click the history scrollbar to view the history menu.

The history menu options are:

**Clear History**

**Save History**

**Open History**

**Hide History Bar**

**Show Hint**

## **Spectrum analyzer mode**

### **FREQ. RANGE**

Sets the frequency range of the display.

## **Menu options**

### **File menu**

Note: Default folder Documents\My PCSU01 for image and data files is created when the program is run for the first time.

#### **Open Image**

Opens an image file and displays it on the screen.

#### **Open DSO Data**

Opens and displays the waveform data saved in text format using the Save DSO Data option.

#### **Save Image**

Saves the image to a file in PNG or Windows Bitmap (BMP) format.

#### **Save DSO Data**

Saves the waveform data in text format. All captured data (4096 points/channel) is saved.

#### **Save FFT Data**

Saves the FFT data in text format. Only the portion of the data displayed on the screen is saved (250 points).

#### **Print**

Prints the image in color.

You can edit the image caption.

#### **Print Setup**

Selects a printer and sets printer options before printing. The available options depend on the printer you select.

**Exit**

Terminates the program.

**Restore Default Settings & Exit**

Use this option to restore all values to their default factory settings.

The calibration values will be reset.

Use this option if the oscilloscope's calibration fails repeatedly.

Note: Software reinstallation does not reset the oscilloscope settings - you have to use this menu option to restore default settings.

## Edit menu

**Copy**

Copies the image to the Windows' clipboard.

**Paste**

Pastes the image residing in Windows' clipboard to the screen.

## Options menu

**FFT Window**

Set the window function used to taper the original signal before calculating the FFT.

**FFT Options**

- Maximum

Maximum value of each frequency is displayed in Run mode.

- RMS Average

Use this averaging mode to reduce signal fluctuations.

- Vector Average

Use this averaging mode to reduce random or uncorrelated noise in the synchronous signal you want to display.

**Hardware setup**

Select the hardware.

**Colors**

Select the display colors.

**Skins**

Give the software a new look by applying a different skin.

**Persistence Options**

Select the persistence settings.

**Trigger Options**

- Noise Reject

Select this option to get stable triggering on noisy signals.

This option works only in the Run mode and only in the Real-time Sampling mode.

**Average**

The Average mode can be used to remove random noise from the waveform and to improve measurement accuracy at the cost of slower display response.

The averaged waveform is a running average over a specified number of acquisitions.

Averages selectable from 2, 4, 8, 16, 32, 64 and 128.



**Calibrate**

Makes the oscilloscope calibration and saves the calibration values to the PCSU01.INI file.  
This option performs following operations:

1. The fine adjustment of the trace Y-position (offset) on different Volt/Div and Time/Div scales.
2. Sets the trace labels (on the left side of the screen) to correspond the trace GND level.
3. Sets the triggering level mark to correspond the triggering level.

**Save/Recall Last Oscilloscope Settings**

Saves the oscilloscope settings at program exit and restores the settings when the program is next time run.

## View menu

**RMS value**

Displays AC RMS value of the signal

**dBm Value**

Displays AC dBm value of the signal

**Sample Rate**

Displays the sampling rate on the top of the screen.

**Waveform Parameters**

Software automatically calculates various voltage and time parameters of a signal, such as DC mean, amplitude, rise time etc.

These parameters are displayed in a separate window. Use the check boxes in the window to select the parameters you which to be displayed.

**Markers**

Displays Markers on the screen.

**Bright Grid**

Brightens the signal grid on the screen.

**Dot Join**

On: The dots of the acquired waveform data are connected by lines.

Off: Only the dots of the acquired waveform data are displayed.

**Clear Display on Run/Single Click**

The old traces are cleared when Run or Single button is pressed.

This makes it easier to see the data update on the screen.

**Infinite Persistence**

Select Infinite Persistence mode.

**Color Graded Persistence**

Select Color Graded Persistence mode.

**Variable Persistence**

Select Variable Persistence mode

## Help Menu

**Oscilloscope Help**

Displays the help file

**About**

Displays information of the program version

## Move the markers

- Place the mouse pointer over a dashed marker line.
- Press and hold the left mouse button.
- The marker line turns solid.
- Drag the marker to the appropriate position.

## Add comment text on the signal screen

For explanation and documentation, each measurement can be supplied with a comment text.

This text will be saved together with the waveform data to the disk file.

### To enter the text:

1. Right click on the screen.
2. Text box will open, to write your comment.
3. Click **Add Text on Screen** or **Remove** to remove previously inserted text.
4. Right click on the screen to position your text.
5. Click **Close**.

You may also click the **Get Waveform Parameters** button.

When this button is pressed the text edit window is cleared and the selected waveform parameters data replaces the text.

**Tip:** You can use Ctrl+A, Ctrl+C and Ctrl+V shortcuts in the text edit window.

To make the text transparent with the background, check **Transparent text**.

The text will have the same color as the vertical time/frequency markers.

## Troubleshooting

### No signal on the oscilloscope display

- No communication with the computer (check that the cable is connected to the USB port)
- If USB cable is connected, close the program. Disconnect and reconnect the USB cable and run the program again.
- RUN button is not ON.
- TIME/DIV switch is in the wrong setting.
- TRIGGER is ON, set TRIGGER OFF
- Y position is wrongly adjusted.
- Input amplitude is too large, adjust VOLTS/DIV setting.

If the above tips have no effect, then test on a different computer or different USB port.

Note. Close the program before disconnecting the USB cable.