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## Table of contents

|   |           |
|---|-----------|
| <b>Safety Information</b>                     | <b>1</b>  |
| <b>Chapter 1 Introduction</b>                 | <b>3</b>  |
| 1.1 The JDSdigital storage oscilloscope (DSO) | 4         |
| 1.2 Specifications                            | 5         |
| 1.3 The UDS-5202 packing list                 | 13        |
| 1.4 The UDS-02S packing list                  | 14        |
| 1.5 System Requirement                        | 15        |
| <b>Chapter 2 Installation</b>                 | <b>16</b> |
| 2.1 Installation Procedures                   | 17        |
| 2.2 Probe calibration                         | 21        |
| 2.3 UDS-5202 series Calibration               | 23        |
| <b>Chapter 3 Operations</b>                   | <b>24</b> |
| 3.1 Window                                    | 25        |
| 3.2 Operation                                 | 26        |
| 3.2.1 Channel Switch Button                   | 26        |
| 3.2.2 VOLTS/DIV Knob                          | 26        |
| 3.2.3 TIME/DIV Knob                           | 26        |
| 3.2.4 Threshold                               | 27        |
| 3.2.5 Channel                                 | 27        |
| 3.2.6 Trigger Position                        | 27        |
| 3.2.7 Scroll Bar                              | 27        |
| 3.2.8 Panel Sizing Knob                       | 28        |
| 3.2.9 Waveform operation                      | 28        |
| 3.2.10 Main Function Button                   | 29        |




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|                  |                                   |           |
|------------------|-----------------------------------|-----------|
| <b>Chapter 4</b> | <b>How to stack multiple DSOs</b> | <b>53</b> |
| 4.1              | How to stack multiple DSOs        | 54        |
| 4.2              | APPENDIX                          | 56        |
| 4.2.1            | Probe Specification               | 56        |
| 4.2.2            | Install Windows 8 driver          | 56        |

## Safety Information

Please review the following safety information to avoid injury and prevent damage to the DSO or any products connected to it.

Symbol definitions:

|  |  |
|--|--|
|                   | This symbol indicates that the manual should be referred to.   |
|  <b>WARNING</b>   | “WARNING” denotes that, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning until the indicated conditions are fully understood and met.               |
|  <b>CAUTION</b> | “CAUTION” denotes that, if not correctly performed or adhered to, could result in damage to or destruction of DSO. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met. |
| <b>NOTE</b>  | “NOTE” denotes that refer to the manual, which provides operational information of which the user should be aware.   |

### **WARNING**

#### ■ Do not operate without cover(s).

Do not operate the DSO with any cover(s) removed. This may result in electric shock or fire hazard if any part(s) inside is touched.

#### ■ Use USB2.0 power only

The DSO **should be** powered by the PC’s USB2.0 port. Use **only** the DSO USB cable to connect to the PC’s USB2.0 port.

#### ■ Do not operate in wet or damp conditions.

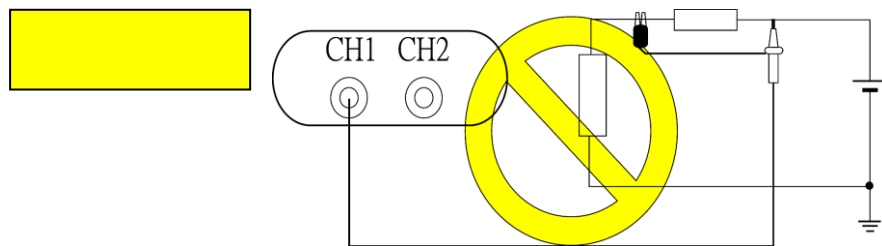
#### ■ Do not modify or operate the DSO if there was any suspected damage, have it

inspected by qualified service personnel.

## ■ Connect the Probe Properly

Connect the ground lead of the probe to earth ground only. Do not connect the ground lead to an elevated voltage.

Do not connect or disconnect probes or test leads while they are probed to a voltage source.



## ⚠ CAUTION

### ■ Observe ALL Terminal Ratings.

To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

### ■ Do not operate in the following installation location

- In direct sunlight.
- In extremely hot and/or humidity areas.
- With always mechanical vibrations.
- Around areas with strong lines of magnetic forces or impulse voltage.

### ■ Remove the USB cable from the DSO if it is not being used.

### ■ The temperature of the DSO increases after being used for a while.


### ■ Use original USB cable.

## **Chapter 1 Introduction**

## **1.1 The JDSdigital storage oscilloscope (DSO)**

|                      | <b>UDS-5202 series</b> | <b>UDS-02S series</b> |
|----------------------|------------------------|-----------------------|
| <b>Sample rate</b>   | 100MS/s , 200MS/s      | 1GS/s                 |
| <b>Bandwidth</b>     | 200MHz                 | 200MHz                |
| <b>Record length</b> | 500–64K sampies        | 10K – 64M sampies     |
| <b>ADC bits</b>      | 8 bits                 | 8 – 16 bits           |

## 1.2 Specifications

|   |   |
|---|---|
| <b>UDS-5202 series</b>  |   |
| <b>Acquisition</b>  |   |
| <b>Mode</b>   | Sample, Equivalent, Average, Envelop, Peak Detect     |
| <b>Sampling rate</b>  | 200MS/s @ 1 ch  |
|   | 100MS/s @ 2 ch  |
| <b>Equivalent Sampling</b>  | 5GS/s   |
| <b>Record length</b>  | 500 samples to 64k samples                            |
| <b>Input</b>  |   |
| <b>Input Channels</b>   | 2 channels  |
| <b>Input Coupling</b>   | AC, DC, GND   |
| <b>Input Impedance</b>  | 1M $\Omega$ $\pm$ 1% // 21pF $\pm$ 5%                 |
|  <b>Max. Input Voltage</b> | 42Vpk (DC + AC peak)                                  |
| <b>Vertical</b>   |   |
| <b>Bandwidth</b>  | DC to 200MHz; Single shot bandwidth: 40MHz            |
| <b>Resolution</b>   | 9 bits /channel @ 5mV/DIV- 10V/DIV (8 bits @ 2mV/DIV) |
| <b>Scale range</b>  | 2mv/DIV to 10V/DIV (as 2-5-10 step)                   |
| <b>Range</b>  | $\pm$ 4 divisions                                     |
| <b>DC accuracy</b>  | $\pm$ 3%  |
| <b>BW Limit</b>   | Approx. 20MHz   |
| <b>Horizontal</b>   |   |
| <b>Time scale range</b>   | 5ns/DIV to 10s/DIV (as 1- 2-5 step)                   |
| <b>Time Resolution</b>  | 200ps   |
| <b>Accuracy</b>   | 100ppm  |

|                                      |  |
|--------------------------------------|--|
| <b>Range</b>                         | 10 Divisions   |
| <b>Delay Trigger</b>                 | 0 ~ 100%   |
| <b>Trigger</b>                       |  |
| <b>Mode</b>                          | Auto, Normal and Single (with RUN/STOP hardware button on the DSO device)  |
| <b>Source</b>                        | CH1, CH2, Ext-Trig   |
| <b>Trigger range</b>                 | $\pm 4$ divisions  |
| <b>Sensitivity</b>                   | 5mV/DIV~10V/DIV=1div, 2mV/DIV=1.5div   |
| <b>Type</b>                          | Rising, Falling, Delay-Trigger, TV-Trigger   |
| <b>Level increments</b>              | 0.1 division   |
| <b>Measurement and Processing</b>    |  |
| <b>Special function</b>              | Autoset, Logger  |
| <b>Measurement</b>                   | Frequency, Period, Vpp, Vmax, Vmin, Vamp, Vhigh, Vlow, Vmean, Vrms, Duty, Rise time, Fall time, Positive overshoot, Negative overshoot, Pulse Width, Mid, Cycle Vrms, Cycle Mean |
| <b>Cursor</b>                        | Time difference, Voltage difference  |
| <b>Math</b>                          | +, -, x, $\div$ , XY,  A , $\sqrt{A}$ , Log(A), Ln(A), $\int Adt$ , $e^A$  |
| <b>FFT</b>                           | Rectangular, Blackman, Hann, Hamming, Harris, Triangularm, Cosine, Lanczos, Gaussian (Vertical scale: dBm RMS, dbV RMS, Linear RMS)  |
| <b>Export Data</b>                   | WORD, EXCEL, CSV, TEXT, HTML, Clipboard, Hardcopy, Preview, MATLAB, TSV  |
| <b>External Trigger Input/Output</b> |  |
| <b>EXT-TRIG Input Limitation</b>     | TTL Level  |



|                                       |   |
|---------------------------------------|---|
| <b>EXT-TRIG<br/>Acknowledge Level</b> | 1.6V to 5V, rising/falling edge   |
| <b>EXT-TRIG<br/>Acknowledge Freq.</b> | “>10ns” and “>0.1 TIME/DIV”   |
| <b>TRIG-OUT</b>                       | 3.3v plus, 20ns delay after trigger ( for the UDS-5202 DSO<br>stack function) |
| <b>Stack</b>                          |   |
| <b>Max. channel expand</b>            | 12 channels (1 Master & 5 Slaves)   |
| <b>Trigger source</b>                 | Master DSO  |
| <b>Skew</b>                           | ±200 ps in Master-DSO;<br>±10 ns in Slave-DSO                                 |

| UDS-02S series         |  |
|------------------------|--|
| Acquisition            |  |
| Mode                   | Sample, Average, Envelope, Peak Detect, High Resolution  |
| Sampling rate          | 8 bits: 1 GS/s @ 1 Ch; 500 MS/s @ 2 Ch<br>12 bits: 500 MS/s @ 1Ch; 250MS/s @2 Ch<br>14/15 bits: 100 MS/s @2 Ch<br>16 bits: 100 MS/s @ 1Ch; |
| Record length          | UDS-02S-10K: 10K samples;<br>UDS-02S-64M:<br>8 bits: 128MS/ch @ 1 Ch; 64MS/ch @ 2 Ch<br>12/14/15/16 bits: 32MS/ch                          |
| Input                  |  |
| Input channels         | 2  |
| Input coupling         | AC/DC  |
| Input impedance        | 1M $\Omega$    18pF  |
| Overvoltage protection | $\pm 100V$ (DC + AC Peak)  |
| Ch-Ch skew             | 100 ps between two channels with the same scale & coupling settings  |
| Vertical               |  |
| Bandwidth              | 200 MHz @ 1-channel;<br>100 MHz @ 2-channels   |
| Rise Time              | 1.75 ns @ 200 MHz;<br>3.5 ns @ 100 MHz   |

|                             |  |
|-----------------------------|--|
| <b>Resolution</b>           | 8 bits<br>12, 14, 15, 16 bits (UDS-1G02S-HR)   |
| <b>Input scale</b>          | 2 mV/div to 10 V/div (Full Scale: $\pm 4$ div/screen, $\pm 1$ div beyond screen)                               |
| <b>Position range</b>       | $\pm 4$ divisions  |
| <b>Offset range</b>         | $\pm 150$ V @ 2, 5, 10 V/div;<br>$\pm 15$ V @ 0.2, 0.5, 1 V/div;<br>$\pm 1.5$ V @ 2, 5, 10, 20, 50, 100 mV/div |
| <b>DC accuracy</b>          | $\pm 3\%$ of full-scale  |
| <b>Bandwidth limit</b>      | 20 MHz, 100 MHz or Full  |
| <b>Horizontal</b>           |  |
| <b>Time scale</b>           | 2 ns/div to 10 s/div (10 div/screen)   |
| <b>Time resolution</b>      | 40 ps  |
| <b>Time accuracy</b>        | $\pm 10$ ppm   |
| <b>Delay range</b>          | Pre-trigger 0 to 100% of 1 screen; Post-trigger up to 50 sec.  |
| <b>Trigger</b>              |  |
| <b>Trigger mode</b>         | Auto, Normal, Single, Untriggered-Roll (@ Time scale $\geq 200$ ms/div)  |
| <b>Source</b>               | Ch1, Ch2, External (TTL only)  |
| <b>Coupling</b>             | DC, AC, LF reject (50KHz), HF reject (50KHz), Noise reject   |
| <b>Trigger range</b>        | $\pm 4$ div from window center   |
| <b>Vertical sensitivity</b> | 1 div or 5 mV @ $< 10$ mV/div;<br>0.6 div @ $\geq 10$ mV/div   |
| <b>Holdoff time</b>         | $\sim 60$ ns to 10 sec.  |
| <b>Trigger type</b>         | Edge, Video/TV, Pulse Width  |

|                               |   |
|-------------------------------|---|
| <b>Basic trigger</b>          | Rising, Falling, Alternate, Either  |
| <b>Advanced trigger</b>       |   |
| <b>Edge</b>                   | A-trigger   |
| <b>Video/TV</b>               | NTSC, PAL, SECAM, Field, Scan Line  |
| <b>Width</b>                  | Positive/Negative/Any <, >, =, $\neq$<br>Range from 8 ns to 50 sec  |
| <b>Runt</b>                   | Positive/Negative/Runt+Pulse Width Range from 8 ns to 50 sec  |
| <b>Pattern</b>                | AND, OR, NAND, NOR  |
| <b>State</b>                  |   |
| <b>Timeout</b>                | Positive/Negative/Any<br>Range from 8 ns to 50 sec  |
| <b>Measurement/Processing</b> |   |
| <b>Special Function</b>       | Autoset, Logger   |
| <b>Measurement</b>            | Frequency, Period, Vpp, Vmax, Vmin, Vamp, Vhigh, Vlow, Vmean, Vrms, Duty, Rise time, Fall time, Positive overshoot, Negative overshoot, Pulse Width, Mid, Cycle Vrms, Cycle Mean. |
| <b>Cursor</b>                 | Trigger difference, Voltage difference  |
| <b>Math</b>                   | Add, Sub, Multiplication, Division, XY  |
| <b>Cursor</b>                 | Time difference, Voltage difference   |
| <b>Math</b>                   | +, -, x, $\div$ , XY,  A , $\sqrt{A}$ , Log(A), Ln(A), $\int A dt$ , $e^A$  |
| <b>FFT</b>                    | Rectangular, Blackman, Hann, Hamming, Harris, Triangular, Cosine, Lanczos, Gaussian.(Vertical Scale: dBm RMS, dBV RMS, Linear RMS)  |
| <b>Export Data</b>            | WORD, EXCEL, CSV, TEXT, HTML, Clipboard,  |

|                               |   |
|-------------------------------|---|
|                               | Hardcopy, Preview, MATLAB, TSV  |
| <b>I/O port</b>               |   |
| <b>Trig-In</b>                | TTL 3.3V level (Rising/ Falling)  |
| <b>Trigger pulse approval</b> | > 8 ns  |
| <b>Trig-Out</b>               | TTL 3.3 V   |
| <b>Stack</b>                  |   |
| <b>Max. channels expand</b>   | 12 channels (6 x UDS-02S, 1 Master & 5 Slaves)  |
| <b>Trigger source</b>         | Only available for Master scope   |
| <b>Skew between devices</b>   | $\pm 8$ ns between Master and Slave channels  |
| <b>Function Generator</b>     |   |
| <b>Output channels</b>        | 2 (Gen. 1, Gen. 2)  |
| <b>Output impedance</b>       | 600 $\Omega$  |
| <b>Frequency</b>              | DC to 1 MHz   |
| <b>Amplitude</b>              | 0 V to 2.5 V (to 1M $\Omega$ load) $\pm$ 50mV   |
| <b>Offset</b>                 | Fixed at 0 V @ Dual channel mode<br>-1.25 V to 1.25 V @ Single channel mode (Gen. 2 only) |
| <b>FG mode</b>                | Sine, Square, Pulse, Triangle, Ramp (Sawtooth), DC  |
| <b>Modulation</b>             | AM, FM, PM, ASK, FSK, PSK   |
| <b>Others</b>                 | Sweep, Burst  |



### 1.3 The UDS-5202 packing list





|    | Contents               | The UDS-5202 series |
|----|------------------------|---------------------|
| 1. | DSO device             | 1                   |
| 2. | 250MHz probes (1x/10x) | 2                   |
| 3. | Probe accessory pack   | 2                   |
| 4. | USB A-B cable          | 1                   |
| 5. | Installation CD        | 1                   |
| 6. | Quick menu             | 1                   |
| 7. | Soft case              | 1                   |

| 1.  | 2.  | 3.  | 4.  |
|---|---|---|---|
|  |  |  |  |



## 1.4 The UDS-02S packing list

|    | Contents             | The UDS-02S series |
|----|----------------------|--------------------|
| 1. | DSO device           | 1                  |
| 2. | 250MHz probes        | 2                  |
| 3. | Probe accessory pack | 2                  |
| 4. | USB A-B cable        | 1                  |
| 5. | Installation CD      | 1                  |
| 6. | Quick menu           | 1                  |
| 7. | Soft case            | 1                  |

| 1.  | 2.  | 3.  | 4.  |
|---|---|---|---|
|  |  |  |  |





## **1.5 System Requirement**

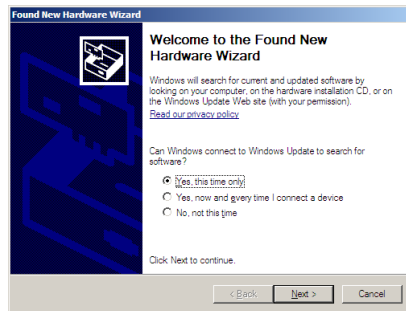
- USB2.0 port.
- Windows XP/Vista/7/8 (x86/x64).

## **Chapter 2 Installation**

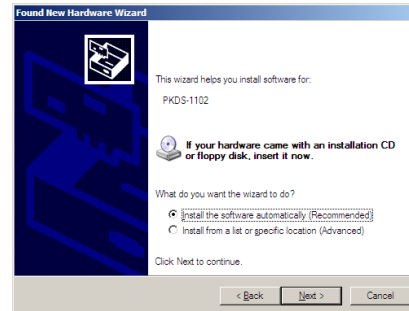
## 2.1 Installation Procedures

### 2.1.1 Driver Installation for Windows XP

- (1) Insert the installation CD and connect the UDS with your PC.
- (2) Enter the hardware wizard when the Windows OS find an USB device (Figure 1) and check “yes. This time only”.

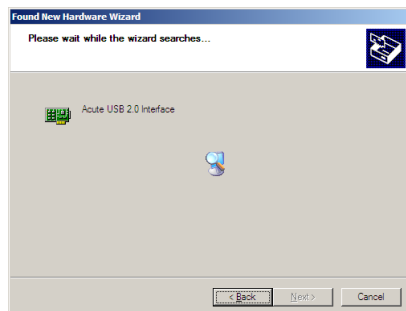


**Figure 1**

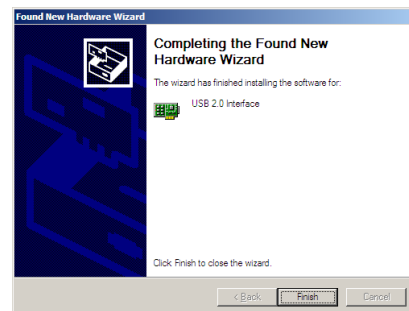


**Figure 2**

- (3) Choose “Install the software automatically” (Recommended) to find the proper driver automatically (Figure 2). Click “Next”.
- (4) Click “Next” when a driver is found.

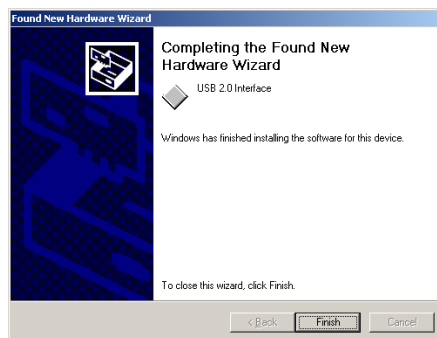


**Figure 3**

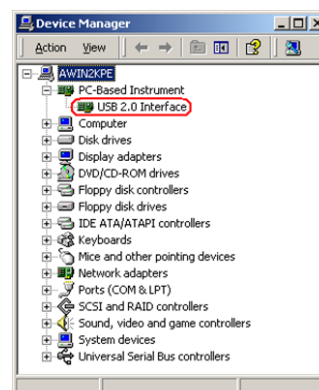


**Figure 4**

- (5) You will see the “PC-Based Instrument USB 2.0 Interface” in the Device Manager (Figure 6).



**Figure 5**



**Figure 6**

## 2.1.2 Install the driver manually

- (1) Insert the installation CD and connect the UDS with your PC. Choose “Add Device” in the Control panel (Figure 1).

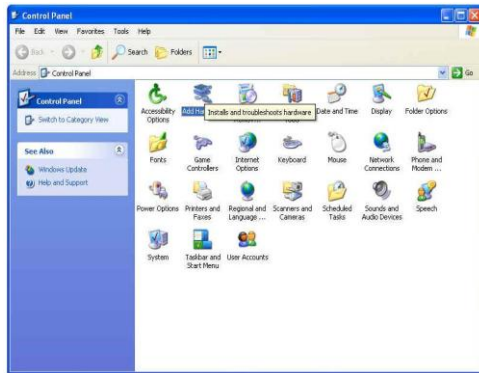


Figure 1



Figure 2

- (2) Choose “Install from a list or specific location (Advanced)” (Figure 2) and click “Next”.
- (3) Choose “Search for the best driver in these locations” (Figure 3); select the DSO directory and click “Next”.

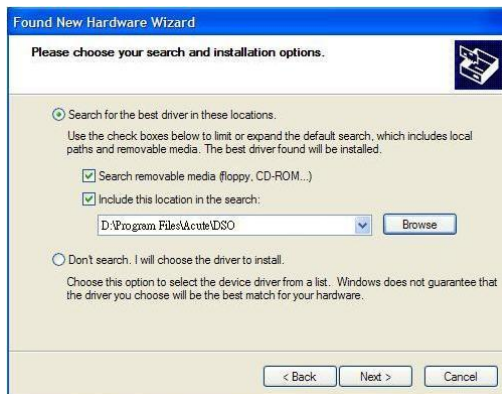
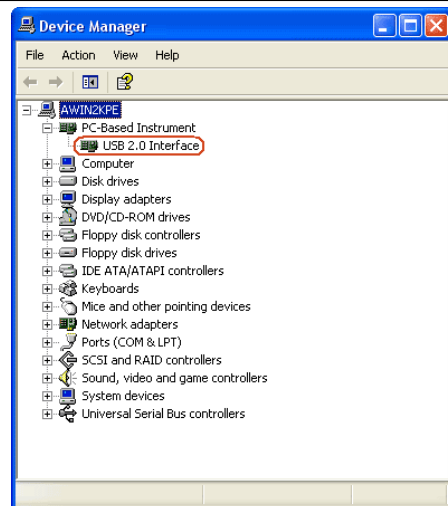


Figure 3




Figure 4

- (4) Click “Continue Anyway” (Figure 4) to continue the installation procedure.
- (5) Click “Finish” (Figure 5) after the DSO driver is installed. You may see the “PC-Based Instrument USB 2.0 Interface” in Device Manager (Figure 6).

**Figure 5****Figure 6**

You will see the “PC-Based Instrument USB 2.0 Interface” in the Device Manager (Figure 6).

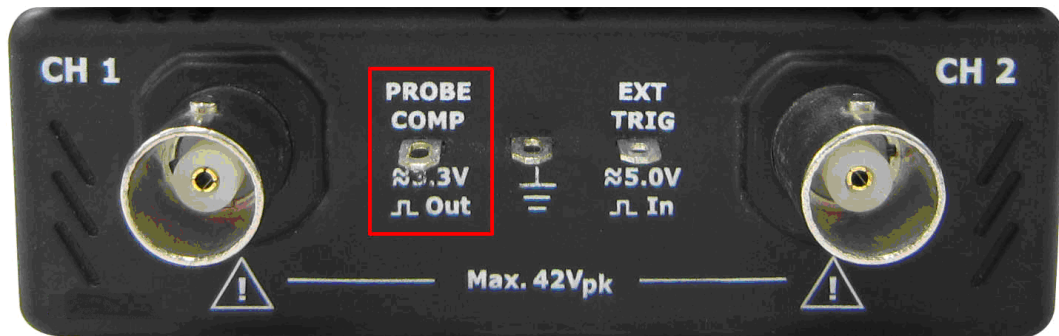
### **2.1.3 Install the DSO software**

- (1) Insert the installation CD into your PC.
- (2) Double click the auto-installation procedure. Run setup.exe at the CD-ROM root directory if the auto-installation does not work. The DSO software will enter DEMO mode if the DSO is not connected with the PC.
- (3) You will find the DSO software icon () after the installation.
- (4) If the DSO software enters “DEMO Mode” when the DSO is connected with your PC, please check the USB cable or e-mail us at [service@acute.com.tw](mailto:service@acute.com.tw).

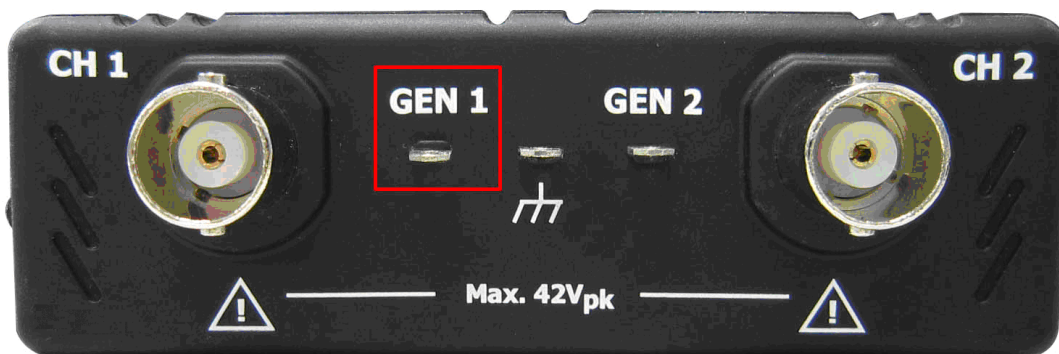
## 2.2 Probe calibration

Please calibrate the two probes at the first time use.

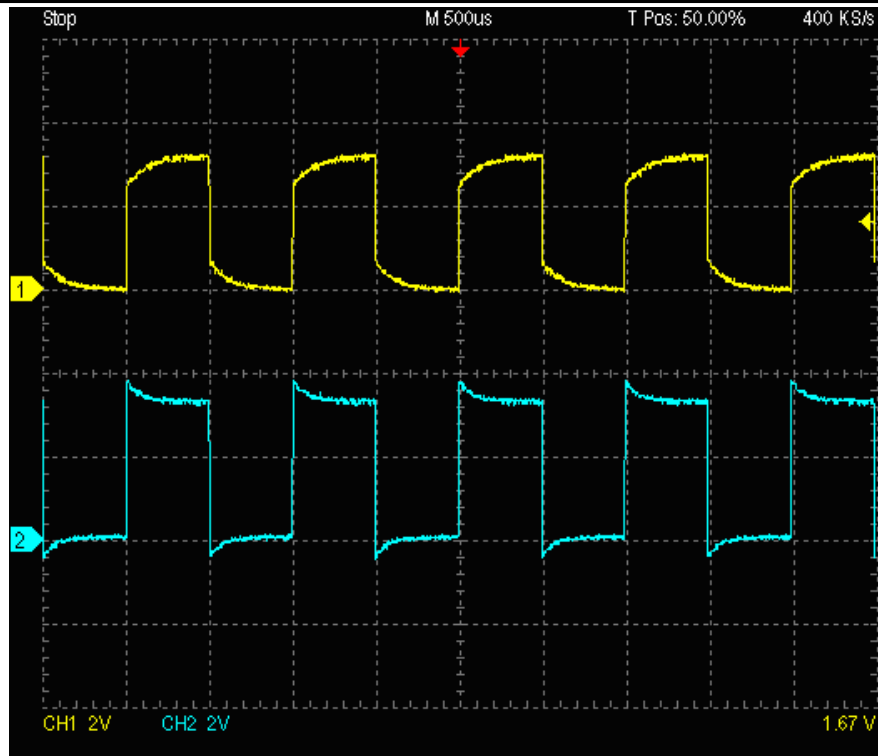
- (1) Connect the two probes with DSO's 2 channels.
- (2) Switch the Probe to "x10".
- (3) Connect two probe ground pins with the DSO's ground terminator.
- (4) **UDS-5202:** Connect two probes with the "Probe Comp. (3.3V)" pin.



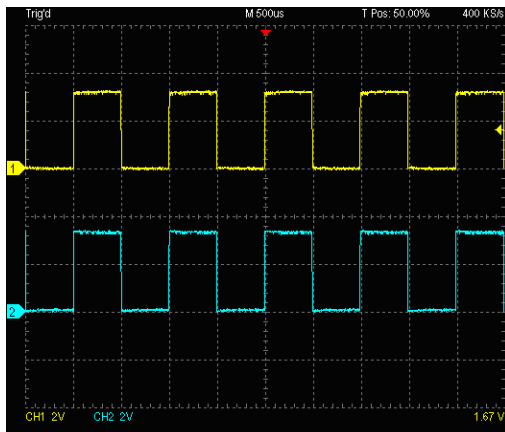
**UDS-02S:** Connect two probes with the "GEN 1" pin.



- (5) Run the DSO software.
- (6) Set the Volt/Div = 2v and the Time/Div = 500us.
- (7) If you see the waveforms below, please follow step (8).



(8) Adjust the trimmer near the probe's BNC connector and modify the waveform to the following shapes.





## **2.3 UDS-5202 series Calibration**

(1) Please calibrate the UDS-5202 whenever the DSO connected with a different PC.

Connect the two probes with DSO's 2 channels.

(2) Switch the Probe to "x10".

(3) Connect two probes with the DSO's ground terminator.

(4) UDS-5202: Connect two probes with the "Probe Comp. (3.3V)" pin.

(5) Switch the Probe to "REF" position.

(6) Push the "Utility" button.

(7) Push "Calibration" of Function Button.

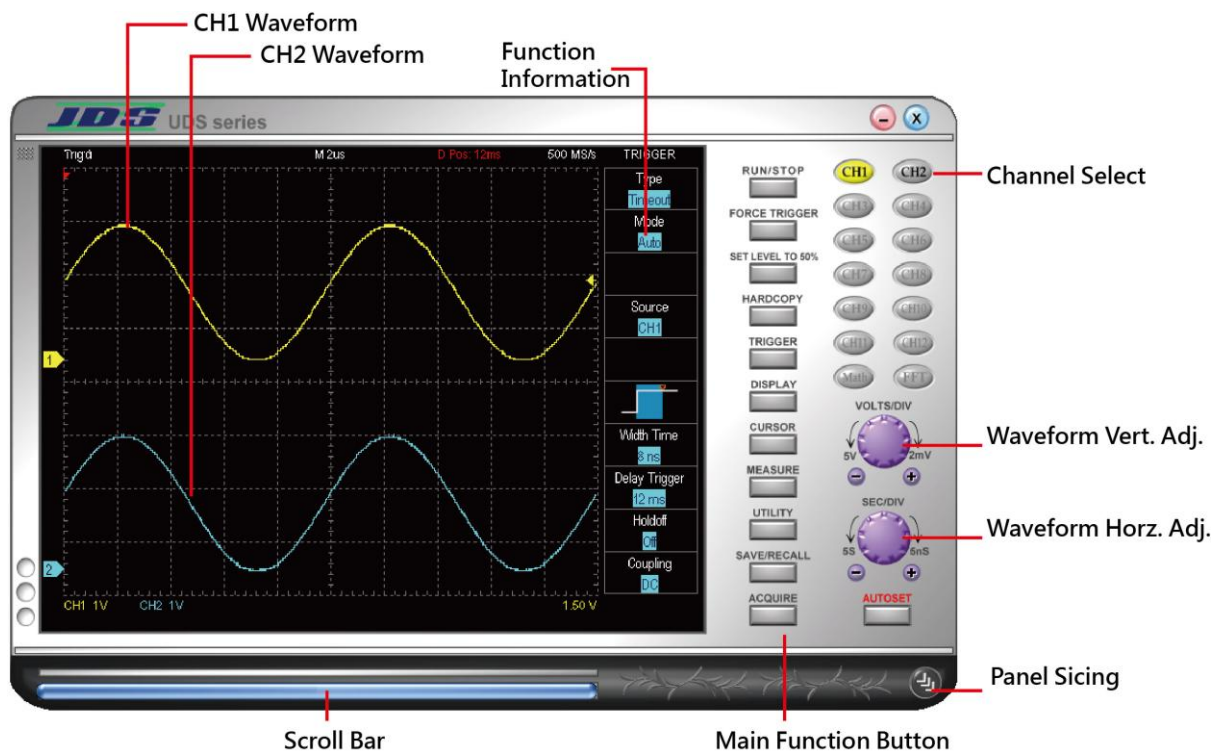
(8) The calibration software will ask you to switch the Probe to "x10".

(9) You can change the time base or vertical division after the calibration to check the result.

(10) You need to calibrate the DSO again each time you use a different PC because the calibration information is stored in the PC.

## **Chapter 3 Operations**

### 3.1 Window



You can use the mouse wheel to zoom in and zoom out the waveform on the screen and use the left mouse button to drag and flicker the waveform. You can also use the mouse right amount of measured specific area of the waveform.

## 3.2 Operation

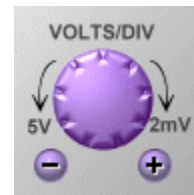
### 3.2.1 Channel Switch Button

There are 12 channel buttons (CH1, CH2..., CH12) on the upper right of the DSO software window. When you use one DSO, only CH1 and CH2 are available and the rest channel buttons will be disabled in gray color. CH1, with gray button and black fonts, is available but not activated; CH2 is in blue color when activated. Each activated channel button has its own color which is identical to that of its waveform. Click the channel button will turn on the display of the channel on the waveform window and right-click to turn it off.



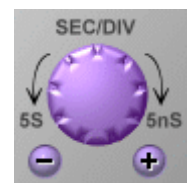
### 3.2.2 VOLTS/DIV Knob

The VOLTS/DIV knob is used to change the voltage scale. There are 8 vertical divisions for the voltage scale on the software window and the voltage scale is shown on the window's lower-left corner.. For example, the window will display "CH1 2.00V" if the voltage scale is 2 Volts for each vertical division and the total voltage of all 8 vertical divisions are 16 Volts. There are two small buttons under the VOLTS/DIV knob, one is "-" (zoom out) and the other is "+" (zoom in). The mouse wheel can be used to adjust the voltage scale faster.



### 3.2.3 TIME/DIV Knob

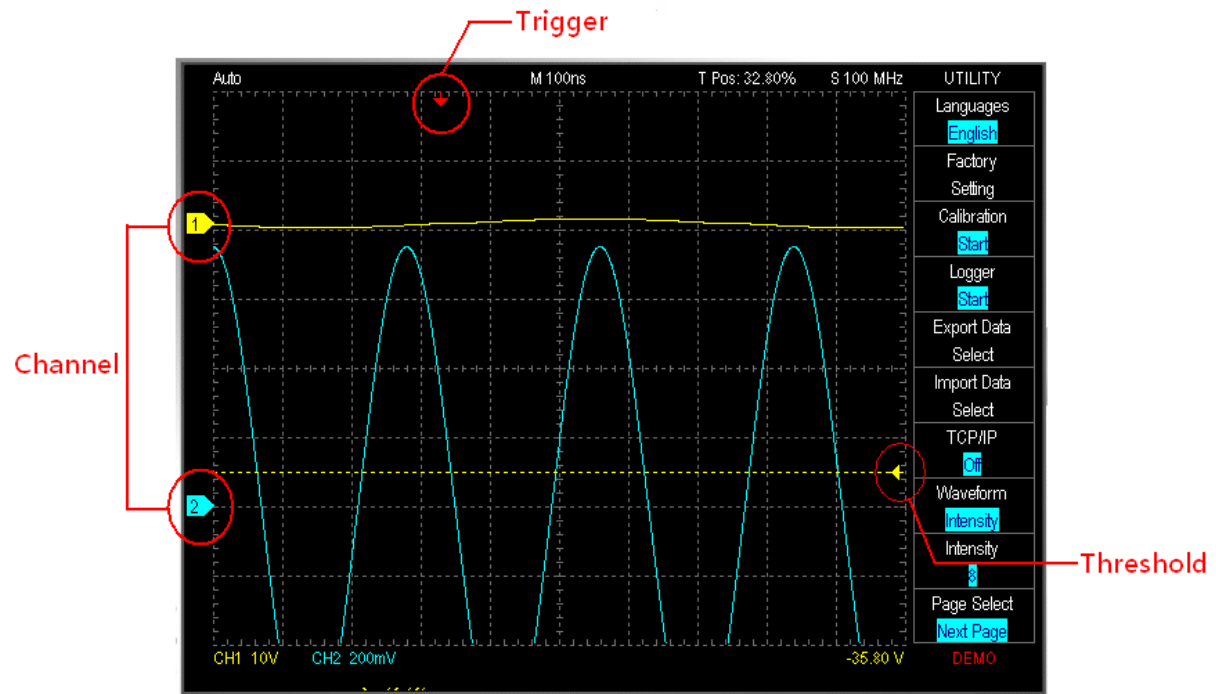
The TIME/DIV knob is used to change the time scale. There are 10 horizontal time divisions on the waveform window. When the TIME/DIV shows "M 50us", it means each horizontal division is 50us. There are two small buttons under the TIME/DIV knob, one is "-" (zoom out) and the other is "+" (zoom in) to change the time scale, or use the mouse wheel to zoom in / zoom out.



The waveform can be drag and flicker by mouse left button.

. The mouse wheel can be used to adjust the time scale faster.

## 3.2.4 Threshold



Threshold is an arrow sign on the right of the waveform window. You can move the arrow to adjust the threshold value that is shown on the lower right of the waveform window.

## 3.2.5 Channel

The channel numbers are shown on the left of the waveform window; you may move the channel to adjust its threshold.

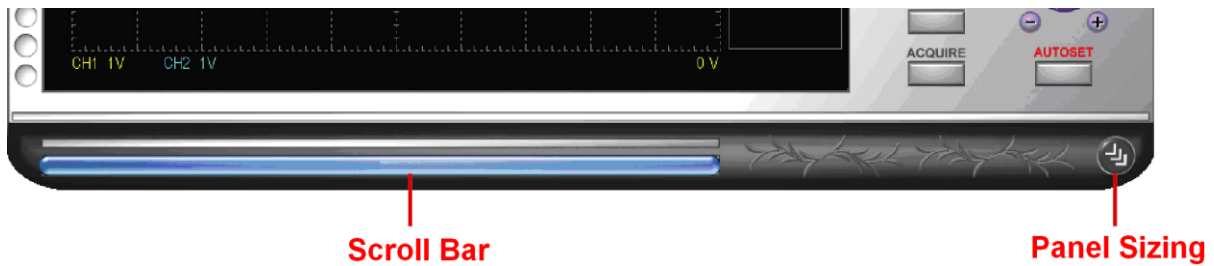
## 3.2.6 Trigger Position

The trigger is a red arrow sign on the top of the waveform window; you can drag the trigger sign to adjust its time.

## 3.2.7 Scroll Bar

The scroll bar is a light blue line under the waveform window. You can move the

waveform or the scroll bar to see the waveforms in different time or you can double click the scroll bar to move the waveforms to the center (50%) of the time

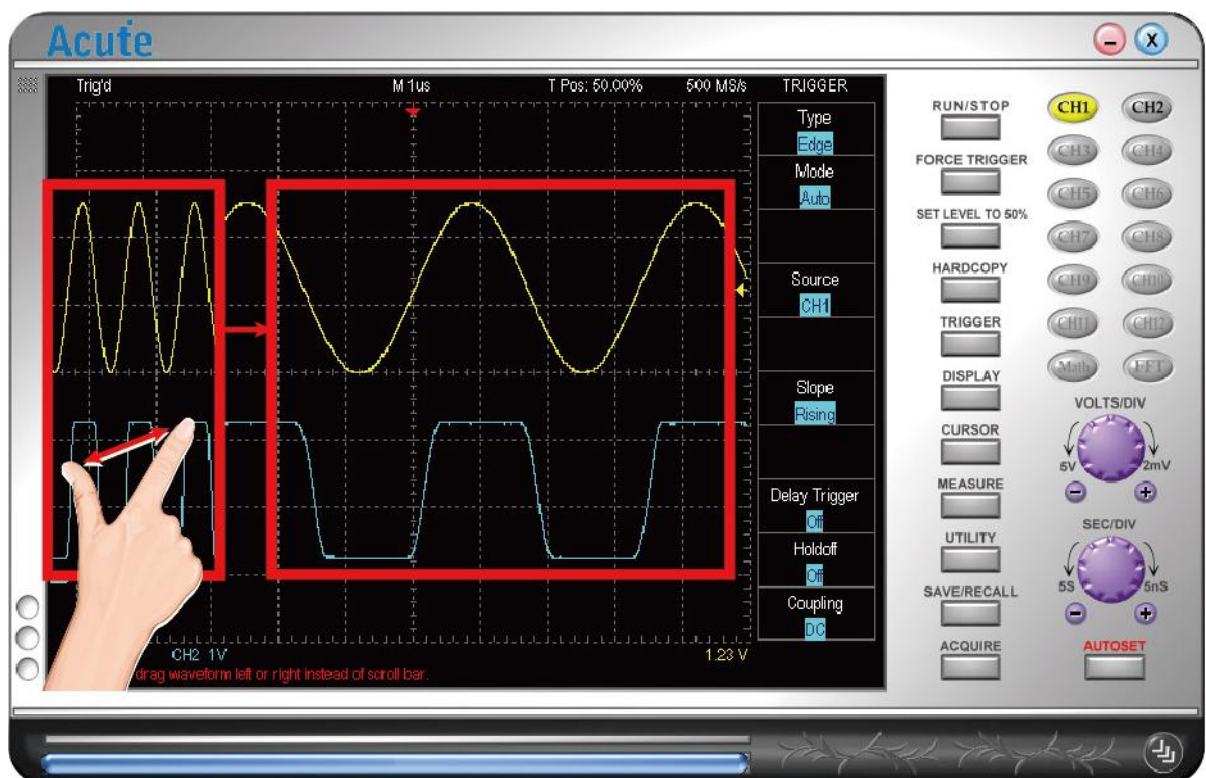


### 3.2.8 Panel Sizing Knob

You can move the panel sizing knob on the lower right of the panel to adjust the size of the panel.

### 3.2.9 Waveform operation

- Support multi touch.



- Easy display of the waveform

You may drag the waveforms or roll the mouse wheel to zoom in/out the waveforms.

- Fast measurements

Right-click the selected waveform area for its measurements.

- Fast voltage offset

Right-click the selected waveform area for its voltage offset

### **3.2.10 Main Function Button**

You may click each sub function button to activate the function.

#### **1. RUN/STOP**



RUN/STOP icon starts/stops the acquisition process. The DSO also has a black hardware RUN/STOP button which does the same function.

#### **2. FORCE TRIGGER**



When the DSO can not trigger in the Normal or Single Shot trigger mode, then press the “FORCE TRIGGER” button to force the DSO to trigger the signal.

#### **3. SET LEVEL TO 50%**



Click the “SET LEVEL to 50%” button to set the threshold to the mean of the signal’s  $V_{pp}$ .

#### **4. HARDCOPY**



Click the “HARDCOPY” button to print the waveforms. Select “Utility” → “export” to preview the waveform.

## 5. TRIGGER



| Type \ Model  | UDS-5202 | UDS02S |
|---------------|----------|--------|
| Edge          | ●        | ●      |
| Video         | ●        | ●      |
| Width         |          | ●      |
| Runt          |          | ●      |
| Pattern       |          | ●      |
| State         |          | ●      |
| Timeout       |          | ●      |
| Delay trigger |          | ●      |
| Holdoff       |          | ●      |
| Coupling      |          | ●      |

- **Trigger Type**

- **edge**

Trigger on Rising/Falling/Either/Alternate signals

- **Video**

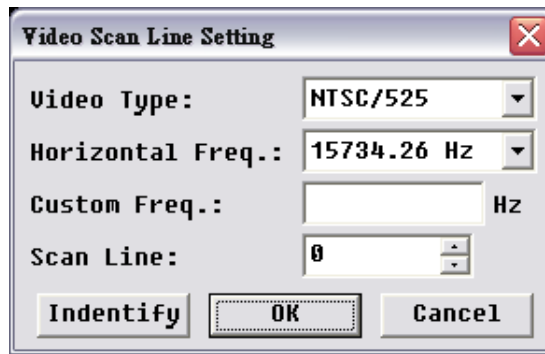
Trigger on video signals like NTSC、PAL or SECAM.

**Related operations:**

Move cursor to “Line #” and use the mouse wheel to set the scan line.

“Video Trigger On” sets the trigger to One Field, Odd Field, Even Field, or a Scan Line.








### Steps:

- You can choose the numbers of the scan line.
- Right-click and choose the video type, horizontal frequency or scan line.
- **Video Type:** MTSC, PAL or SECAM.
- **Horizontal Freq.:** Adjust the frequency according to the tested signal
- **Identify:** Click **Identity** to automatically identify the video type and horizontal frequency.
- Click the “Cursor” button to set the Horizontal Unit as IRE will make the video measurement easier.

### • Width

Trigger when the pulse width matches the following:

#### • Mode:

| Icon  | Mode           |
|---|----------------|
|  | Positive pulse |
|  | Negative pulse |
|  | Any pulse      |

- **Width time:** From 1ns to 50s depending upon different width mode and sampling rate.

If the width time condition is set “=” or “≠”, the range is  $\pm 5\%$ .







For example: Set the width time = ( $\neq$ ) 100 ms, then the DSO will trigger when the pulse width = ( $\neq$ ) 95~105 ms.

- **Runt**

Defined by pulses that enter and exit between two defined amplitude thresholds.

A runt can also be time qualified with a pulse width between 8 ns and 50 s. A runt polarity of Positive, Negative, or Either can be selected.

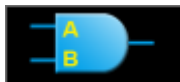

- **Mode:**



| Runt Mode   | Width Time | Descript                                   |
|---|------------|--|
|    |            | Positive pulse                             |
|   |            | Negative pulse                             |
|  |            | Positive or negative pulse                 |
|  | 1ns ~ 50s  | Positive pulse with different width        |
|  | 1ns ~ 50s  | Negative pulse with different width        |
|  | 1ns ~ 50s  | Positive or negative pulse different width |

**Width time:** The same as the Width trigger

- **Pattern**

- **Mode:**

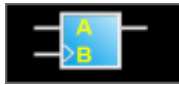
| Icon  | Mode |
|---|------|
|  | AND  |
|  | OR   |

|   |      |
|---|------|
|  | NAND |
|  | NOR  |

Trigger on any logic combination of 2 channels.(AND/OR/NAND/NOR)

**Width time:** The same as the Width trigger.




- **State**



Trigger when the logic input(Source B) to be true and clock input(Source A) is rising.

- **Timeout**

- **Mode:**

| Icon  | Mode   |
|---|--------|
|  | High   |
|  | Low    |
|  | Either |

Trigger when no pulse for a period of time, range from 1ns to 50s

**Width time:** The same as the Width trigger.

- **Source**

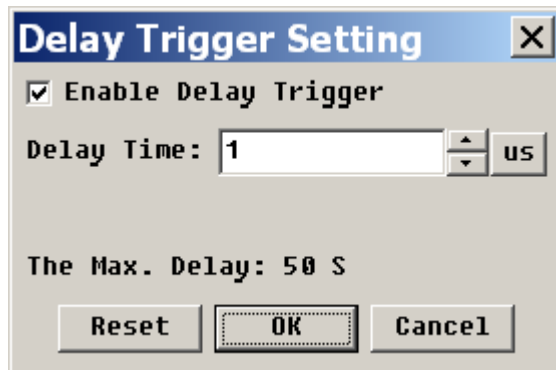
The channel signal is to be specified as the trigger source..

- **Mode**

Three trigger modes: Auto, Normal or Single Shot. The record length are adjustable

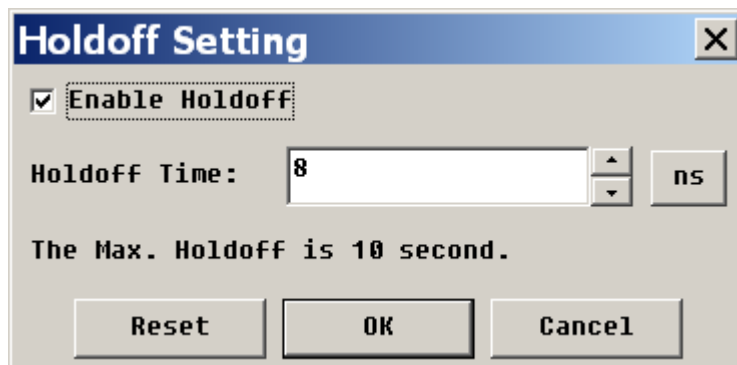
|                 | DSO Series  | Record length |
|-----------------|-------------|---------------|
| UDS-5202 series |             | 500S – 64KS   |
| UDS-02S series  | UDS-02S-10K | 10KS          |
|                 | UDS-02S-64M | 10KS – 64MS   |

- **Delay trigger**

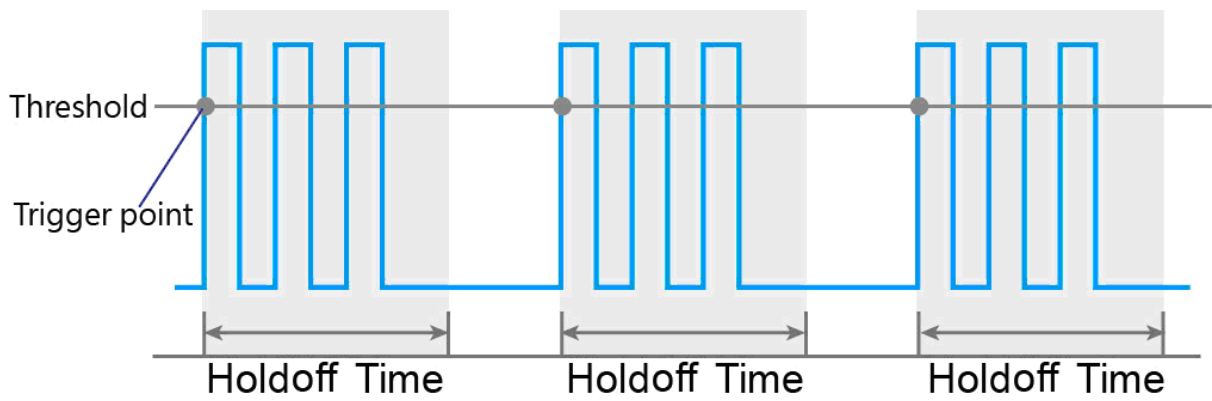


The DSO can delay the trigger up to 50 seconds after the trigger condition is matched. The Delay time icon is D Pos: 1us

- **Holdoff Time**



Stop trigger function during the holdoff time from 8ns to 150s after the trigger condition is matched



- **Coupling**

Use high frequency reject (H.F. Rej.), low frequency reject (L.F. Rej.) or noise reject (Noise Rej.) to filter noises near the trigger point.

## 6. DISPLAY



### 1. Display(1/3):

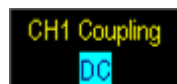


- **CH Display**



Turn on/off to display the channel.

- **CH Coupling**



AC, DC or GND.

- **CH Invert**



Invert the waveform.

- **CH Offset (UDS-02S only)**



Move the waveform vertically on this button or right-click the waveform area to set the offset parameter.

| Offset | Volts/Div                  |
|--------|----------------------------|
| ±150V  | 2, 5, 10V/div              |
| ±15V   | 0.2, 0.5, 1V/div           |
| ±1.5V  | 2,5, 10, 20, 50, 100mV/div |

- **CH Probe**



The probe option (current, x2000, x1000, 200, x100, x10 or x1) on the DSO software window must be identical with the probe.

- **CH Bandwidth**



This is a bandwidth limitation; if selected then the signal higher than 20 MHz (or 100 MHz) will be filtered.

## 2. Display(2/3):



- **Draw Type**



Draw the waveform by dots (Dot) or in line (Line).

- **Interpolation**



Use the Sinc interpolation sample points to connect the DSO waveform.


- **Persistent**



Display the new waveforms while keeping the old waveforms on the window to see the maximum difference between the waveforms

- **Persistence** 

Clear the old waveform on the window.

3. **Math (3/3):**  :

- **Math** 

XY, A+B, A-B, A x B, A / B, |A|,  $\sqrt{A}$ , Log(A), Ln(A),  $e^A$ ,  $\int A dt$  is the mathematical result.

“X-Y” is the Lissajous figure.

- **FFT** 

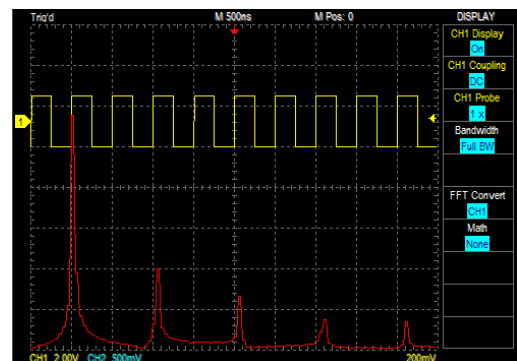
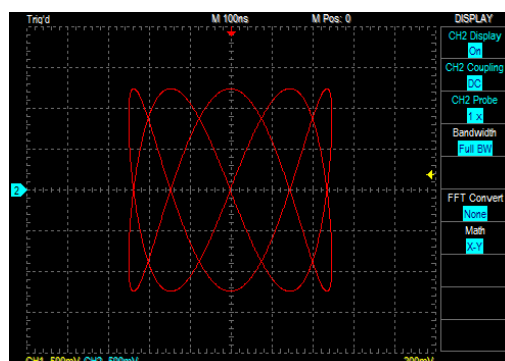
The selected channel can be transformed as FFT.

- **FFT Scale** 

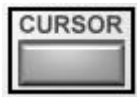
The FFT Scale has three modes: Linear RMS, dBV RMS, dBm Rms.

- **FFT Window** 

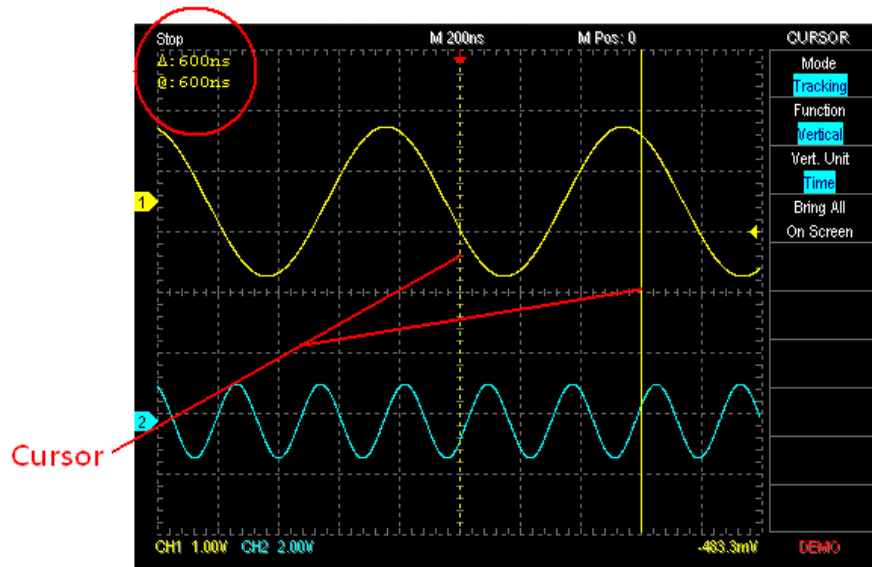
The FFT window includes “Triangular”, “Cosine”, “Lanczos”, “Gaussian”, “Rectangular”, “Blackman”, “Hann”, “Hamming” and “Harris”.



## 7. CURSOR



### Cursor Information



There are two cursors: the Time cursor (vertical line) and Voltage cursor (horizontal line). The two lines can be displayed in one yellow solid line (when being dragged) and one yellow dashed line or both not to be displayed. There are two cursor icons: “@” and “Δ”.

“@” means the difference of time or voltage between the cursor and the Trigger point.

“Δ” means the difference of time or voltage between two cursors. Independent mode: Cursors can be moved separately.

Tracking mode: Cursors can be moved together.

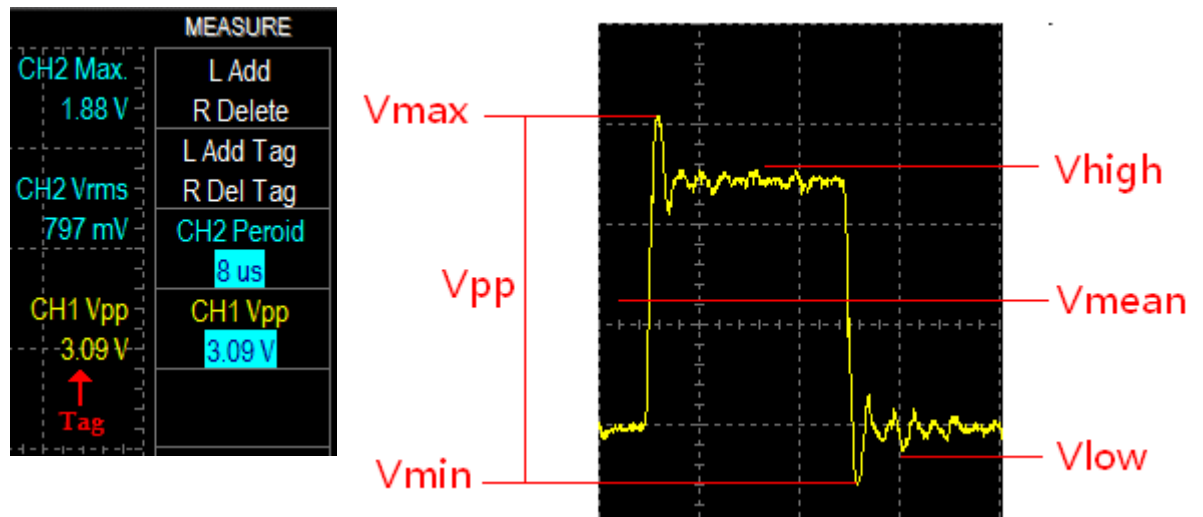
When the cursor(s) is(are) out of the window, you may click the “bring all on screen” button to bring all cursors back to the window.

## 8. MEASURE





Click “Item Select” under Measurement and you will see a pull-down menu with the items listed below. Measurement can be displayed in the Data window or the Waveform window. “Add” and “Delete” buttons are used in the Data window to add or delete the measurement value. “Add Tag” and “Del Tag” buttons are used in the Waveform window to add or delete the measurement value.



| Item             | Description  |
|------------------|--|
| <b>Frequency</b> | The time required to complete the first cycle in the waveform                                |
| <b>Period</b>    | The frequency of the first cycle in the waveform   |
| <b>Max.</b>      | The most positive peak voltage of the waveform.  |
| <b>Min.</b>      | The most negative peak voltage of the waveform   |
| <b>High</b>      | It can be calculated using the histogram method, the most common value found above the mean. |
| <b>Low</b>       | It can be calculated using the histogram method, the most common value found above the mean. |
| <b>Vpp</b>       | The absolute difference between the maximum and minimum amplitude in the entire waveform.    |
| <b>Amplitude</b> | The high value less the low value measured over  |

|                   |   |
|-------------------|---|
|                   | the entire waveform.  |
| <b>Vrms</b>       | The true Root Mean Square voltage over the entire waveform  |
| <b>Mean</b>       | The arithmetic mean over the entire waveform  |
| <b>+Duty</b>      | The ratio of the positive pulse width to the signal period expressed as a percentage. The duty cycle is measured on the first cycle in the waveform |
| <b>-Duty</b>      | The ratio of the negative pulse width to the signal period expressed as a percentage. The duty cycle is measured on the first cycle in the waveform |
| <b>+Width</b>     | The time between the mid reference amplitude points of a positive pulse. The measurement is made on the first pulse in the waveform.                |
| <b>-Width</b>     | The time between the mid reference amplitude points of a negative pulse. The measurement is made on the first pulse in the waveform                 |
| <b>Rise Time</b>  | The time for the first rising edge from low reference value(10%) to high reference value(90%).  |
| <b>Fall Time</b>  | The time for the first falling edge from high reference value(90%) to low reference value(10%).   |
| <b>+Overshoot</b> | $((\text{Max.} - \text{High}) / \text{Amplitude}) \times 100\%$ in the first rising edge.   |
| <b>-Overshoot</b> | $((\text{Low} - \text{Min.}) / \text{Amplitude}) \times 100\%$ in the first   |

|                   |   |
|-------------------|---|
|                   | falling edge.   |
| <b>Mid</b>        | $(V_{high} + V_{low}) / 2$                              |
| <b>Cycle Vrms</b> | The RMS of the first cycle in the waveform.             |
| <b>Cycle Mean</b> | The arithmetic mean of the first cycle in the waveform. |

## 9. UTILITY



- **Languages**



The software supports English, Spanish, French, Simplified Chinese or Traditional Chinese.

- **Factory Setting**



Click the “Factory Setting” button to resume all the setup values back to the factory origins.

- **Calibration**

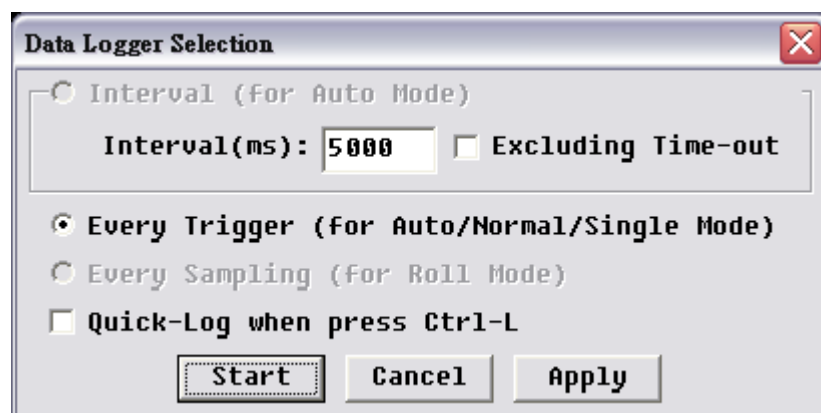


Click the “Calibration” to calibrate the DSO.

- **Logger**



“Logger” logs the waveform data into the hard disk of the computer; “Logger” has three sub functions: Interval, Every Trigger, and Every Sampling.



- **Interval (Auto Mode only)**

“Interval” saves the waveform data in an interval (in tens of milli-seconds at

least) that can be defined in setting box and only works in “Auto” mode.

“Interval” logs the waveform data whatever in trigger-activated or time-out periods. You may only log trigger-activated waveform by clicking “excluding time-out”.

- **Every Trigger (Auto/Normal/Single Mode)**

“Every Trigger” saves the waveform data when the trigger is activated in either of “Auto”, “Normal” or “Single” mode.

- **Every Sampling (Roll Mode only)**

“Every Sampling” only works in “Roll” mode (when Time/Div  $\geq$  200ms) and repeatedly saves the waveform if the hard disk has enough memory depth.

- **Quick-Log when press Ctrl-L**

This is a hot key for logger.

There are two file formats: “\*.dsow” and “\*.log” for “Logger” .

“\*.dsow” is saved as the reference waveform in the QuickSave folder under the installation directory and available for “Interval” or “Every Trigger”; “\*.dsow” can be retrieved from the “Save/Recall” function. The Waveform Viewer/Waveform Album software should be used to browse and view multi-“\*.dsow” files at the same window.. “\*.log” works for “Every Sampling” and can only be retrieved in “Import data” function.

- **Export data**

A rectangular button with a black background and white text. The text is arranged in two lines: "Export Data" on the top line and "Select" on the bottom line.

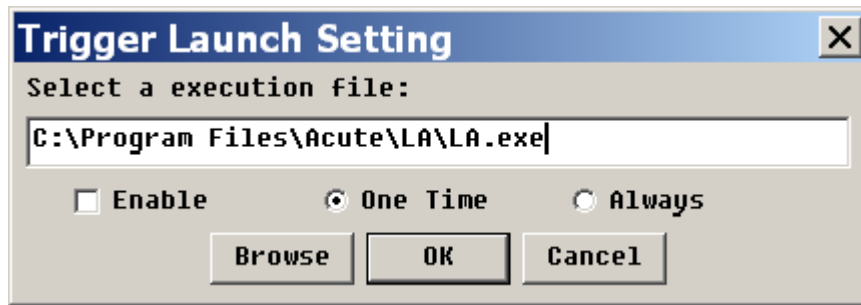
“Export data” exports the waveform with its setups parameters like Time/Div, Volt/Div, Channel number and Threshold. The waveform information can be exported in different formats like print out, preview, Word, Excel, CSV, text, Html, clipboard, MATLAB, TSV.

- **Import data**

A rectangular button with a black background and white text. The text is arranged in two lines: "Import Data" on the top line and "Select" on the bottom line.

“Import data” imports the waveform with its setup parameters. The import waveform can be in different formats like print out, preview, Word, Excel, text or clipboard.

- **Launch**



Launch Setting is a sub function under Trigger; it is to launch an external execution file when trigger(s) is activated. Under “Trigger”, click “Trigger Launch Setting” and “Enable” to enable this sub function. There are two options for launch setting; “One Time”, or “Always”. “One Time” means an external execution file will be launched but only one time when the first trigger is activated. “Always” means an external file will be launched every time whenever trigger(s) is activated. Nevertheless, “Always” could result in computer crashed because too many launched external files will take too much memory resources from your PC.

- **Page Select**



It shows the rest of sub functions in “Utility”.

- **Product Information**



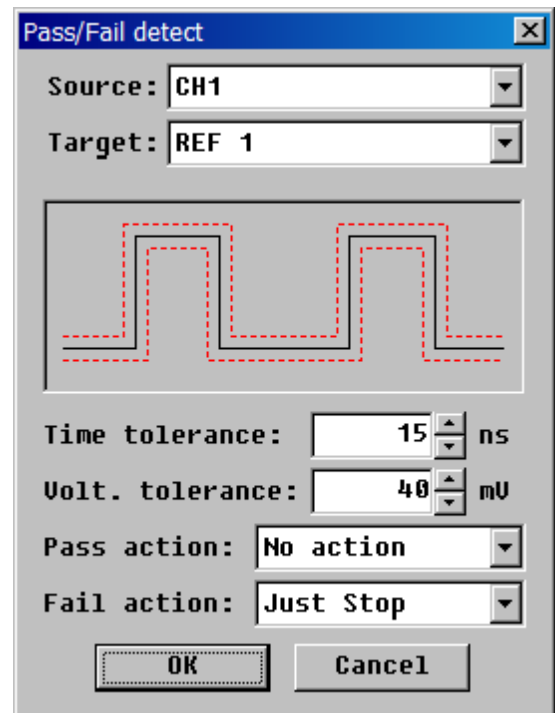
It contains information regarding the DSO hardware, software, firmware and production date which are useful in technical support.

- **Pass/Fail Setting**



“Pass/Fail” (“Go/No Go”) is for auto-test purpose. Use a waveform as reference and set the tolerance range of time and voltage to create a waveform “tunnel”, then any waveform is (not) able to goes through the “tunnel” is “Pass” (“Fail”). Setting procedure is as below:

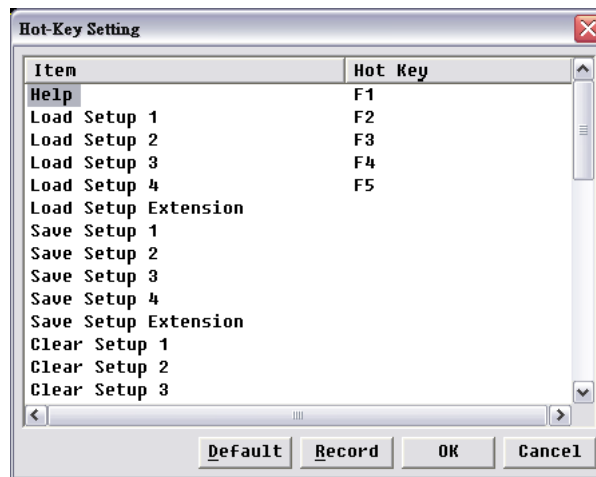
- Use “Save/Recall” to show the reference waveform (see “[Save/Recall](#)” section).
- Enter “Pass/Fail” dialog box.
- Input benchmark tolerance levels for time and voltage.
- Set action for “Pass” or “Fail”. Sometimes, too many untrue “Fail” events may happen due to unstable (noise) waveforms. You may use the “Average” function or turns on the 20MHz bandwidth limit to filter the unexpected noises.



- **Hot Key Setting**



“Hot Key Setting” is for the production line workers who need to operate the DSO for production purpose. You can undo by CTRL+Z. In the “Hot-Key Setting” dialogue box, you may create “Hot Key” with function(s) or sub-function(s) in “define” list or you can delete “Hot Key” be pressing “Escape”. Please be noted that not any function key can be defined as “Hot Key”.



- VISA Monitor



VISA is an interface to set or get DSO information and function.

- Online Update



The DSO supports online software update. Show in the bottom of main function button.

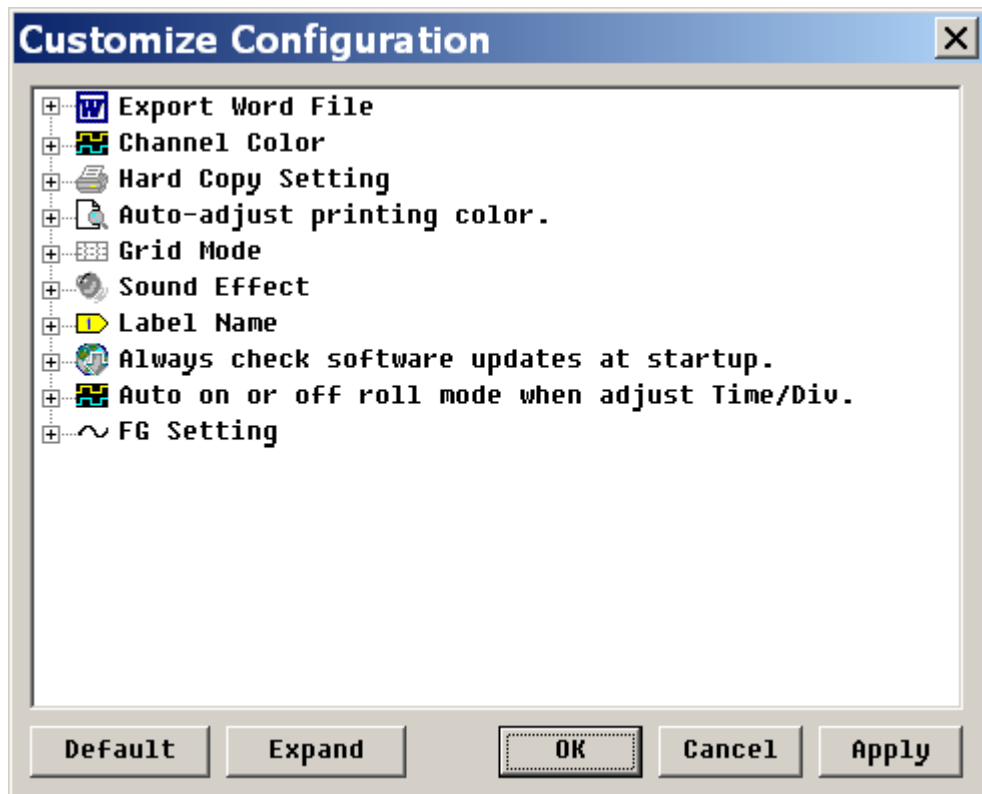


- Customize Configuration



Set the DSO environments like “Channel Color”, “Grid Mode” or “FG setting” etc.





- **Export Word File**

Set the background color (white/black) for the exported Word file.

- **Channel Color**

Set the channel color

- **Hard Copy Setting**

Set the background color (white/black/auto-adjust) for the printed waveform.

- **Auto-Adjust printing color**

Set the background color (white/black/auto-adjust) for the printed waveform.

- **Grid Mode**

There are three types: Dot line, Solid Line or Hide Grid.

- **Sound Effect**

Beep when the trigger succeeds.

- **Label Name**

Enter the channel name.

- **Always check software updates at startup**

Check if there is any newer version software for online upgrade.

- **Auto on or off roll mode when adjust Time/Div.**

Check if the sample rate is under 25KS/s, then turn into the roll mode.

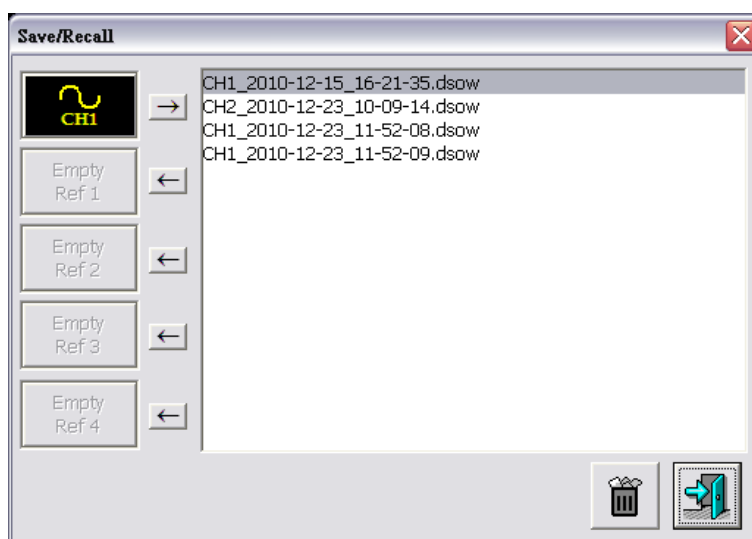
- **FG Setting**

The FG will generate square waveform or the type of waveform set in last time.

## 10. SAVE/RECALL

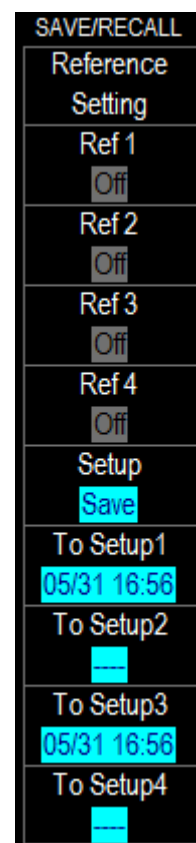


“Save/Recall” saves/recalls the waveform into/from a file or save/recall/delete the “Setup” keys.



You may save many waveforms into files (as the figure above), but only up to four waveforms can be recalled to be the reference waveforms at the same time.

“Save/Recall” can also be used to set up parameters like “Time/Div”, “Volt/Div”, “Ground Offset”, Threshold or “Focus Channel”, ... etc. in the four “Setup” keys (hot keys). There are four “Setup” with their own time tag on the software window (see the figure on the right top), but 35



more can be set up in “Hot Key Setting”, “Export data” or “Import data”.

**Press '1' - '9' or 'A' - 'Z' ...**

An easy way is to set F7 as the “Save Setup Extension” key in the “Hot Key Setting”, F8 as “Load Setup Extension” and F9 as “Clear Setup Extension”, then you can press F7 to save your setup with 35 choices (1, 2, ..., 9, A, B, ..., Z) to store it, press F8 to load your setup(s) or press F9 to clear the setups.

## **11. ACQUIRE**



### **(1) Acquire**

- **Sample:** Create a waveform by saving one sample point during each waveform interval.
- **Average:** Like Sample, except waveform points from consecutive acquisitions are averaged together to produce the final displayed waveform.
- **Envelope:** Similar to Peak Detect, except the minimum and maximum waveform points from multiple acquisitions are combined to form a waveform that shows min/max accumulation over time.
- **Peak Detect:** Save the minimum and maximum value sample points taken during two waveform intervals and uses these samples as the two corresponding waveform points.
- **Hi-Res:** Multiple samples taken within one waveform interval are averaged together to produce one waveform point to have a decrease in noise and an improvement in resolution for low-speed signals.

### **(2) ADC Bits (UDS-1G02S-HR only)**

|         | Channels | MAX. sample rate<br>S/s(1Ch/2Chs) | Record length (points) |
|---------|----------|-----------------------------------|------------------------|
| 8 bits  | 2        | 1G / 500M                         | 64M                    |
| 12 bits | 2        | 500M / 250M                       | 32M                    |
| 14 bits | 2        | 100M / 100M                       | 32M                    |
| 15 bits | 2        | 100M / 100M                       | 32M                    |
| 16 bits | 1        | 100M                              | 32M                    |

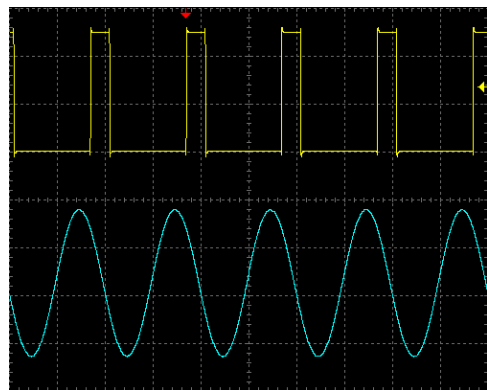
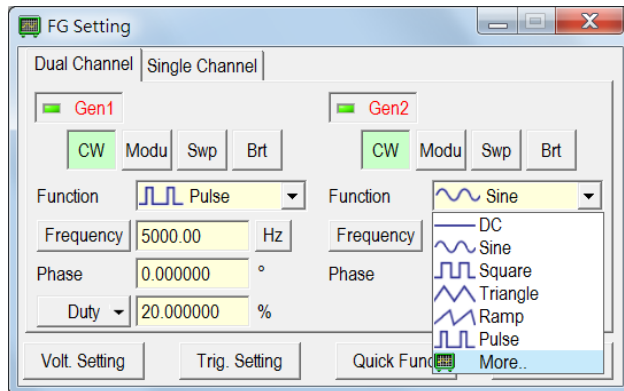
PS: Hi-Res will not work in ADC 16 bits mode.

### (3) Roll Mode

The sampling rate for the UDS-5202 series is 1KS/s. and for the UDS-02S series is 25KS/s.

### (4) FG Setting

The UDS-02S has a two-channels (Gen1, Gen2) embedded function generator



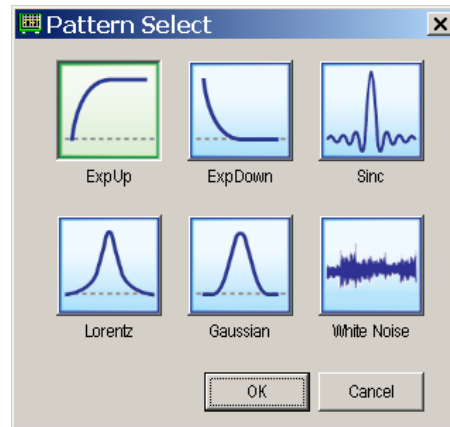
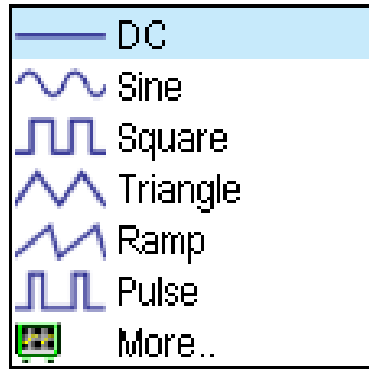
Dual/Single Channel:

Dual Channel: Gen1 and Gen2 voltage output range is 0 ~ 2.5 V.

Single Channel: Gen1 disabled, Gen2 voltage output range is -2.5 ~ 2.5 V.

Gen1/Gen2 button: Enable or disable the output.

- Function: Select the signal pattern.



- **CW (Continuous Waveform):**  
Transmit the signal continuously.
- **Modu (Modulation):**  
Generate the analog and digital modulation signal.
- **Swp (Sweep):**  
Vary the frequency of a signal over a specified time period.

## Mode:

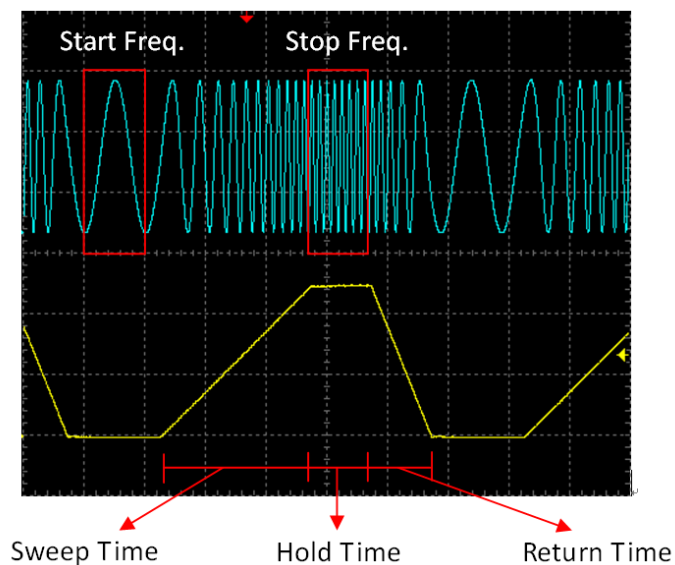
Repeat Mode: Repeat sweep signals.

Trig. Mode: Sweep a signal after trigger.

## Type:

Linear: Sweep a signal in linear frequency.

Log: Sweep a signal in exponential frequency.

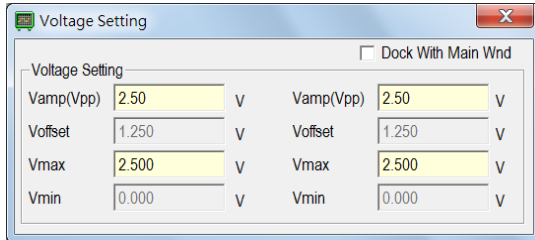


|                         |   |
|-------------------------|---|
| Trig. Info :            |   |
| INT. Interval = 1000 us |   |
| Mode                    | <input type="button" value="Repeat"/> <input checked="" type="button" value="Trig."/> |
| Type                    | <input checked="" type="button" value="Linear"/> <input type="button" value="Log"/>   |
| Start Freq              | 1000.00 Hz  |
| Stop Freq               | 2000.00 Hz  |
| Sweep                   | 200 us  |
| Hold                    | 300 us  |
| Return                  | 500 us  |

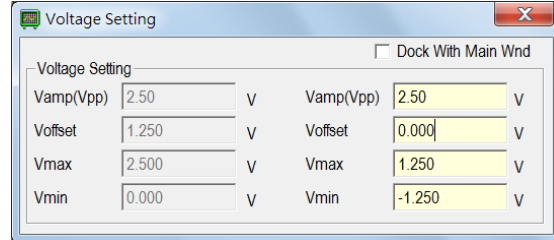
- **Brt (Burst):**

Send Burst signal from time to time.

Voltage Setting:



(Dual Channel Mode)



(Single Channel Mode)

- **Trigger Setting:**

Trig. Source: Internal or external trigger source which depends on “Swp” and “Brt”.

- **Quick Func:**

Save and load the preset waveform.

- **Sync:**

Synchronize the two channels (Gen1, Gen2).

(5) **Clock Src.**

You can use the external clock to synchronize DSOs. Plug in the clock source into each DSO’s REF-CLK port and set the external clock.

## 12. AUTOSET

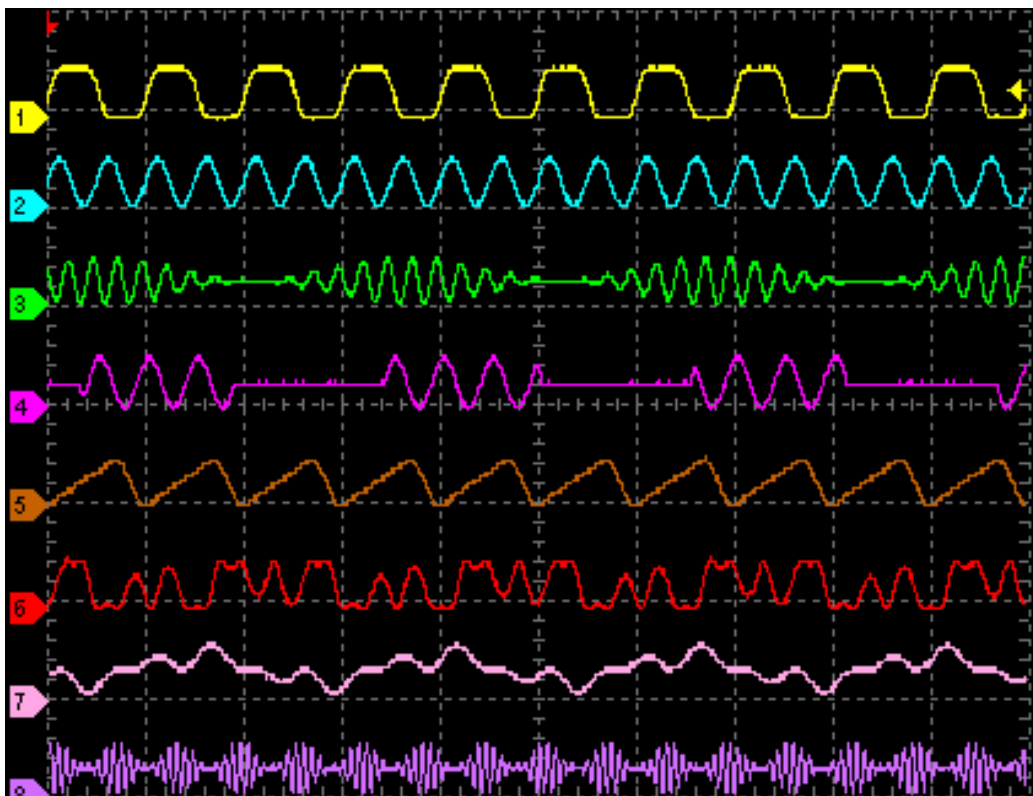


The “AUTOSET” automatically adjust the voltage, time and trigger parameters to test and measure signal and display the waveform more quickly. “AUTOSET” button, when pushed, will find the parameters of the channel being activated. For example, if the “Channel Switch” button is on CH1, then, the Volt, Time, and Trigger of CH1 signal will be benchmark parameters for “AUTOSET” function.

## **Chapter 4 How to stack multiple DSOs**

## 4.1 How to stack multiple DSOs

You can stack multiple DSOs as a multi channels oscilloscope. Use the stack (MCX-MCX) cable to connect the Trigger Output of the master DSO to the Trigger Input of the second (slave) DSO and the same for the second DSO to the third (slave) DSO as shown below. The stack dialogue box displays the serial numbers of the stacked DSOs; CH1, CH2 have been assigned to the master DSO, and the other channels are for the slave DSOs.



**Limitations in the stack mode:**



| UDS-5202 Series        |  |
|------------------------|--|
| <b>Mode</b>            | “Roll Mode” is only available for the master DSO.  |
| <b>Sampling Rate</b>   | Real time sampling: the same as an individual unit.<br><br>Equivalent time sampling: only available for the master DSO.                    |
| <b>Time Base Range</b> | 5ns/DIV to 100ms/DIV (1-2-5 step) is available for all DSOs.<br><br>200ms/DIV to 10s/DIV (Roll mode) is only available for the master DSO. |
| <b>Trigger source</b>  | CH1, CH2 or Ex-Trig is only available for the master DSO.  |
| <b>Jitter</b>          | +/- 200ps is available for the master DSO; +/- 10ns for the slave DS-1000(s).  |

| UDS-02S Series              |  |
|-----------------------------|--|
| <b>Sample rate</b>          | Maximum sample rate is 1GS/s for each 1 channel used for each DSO.                         |
| <b>Trigger mode</b>         | No pulse width/Video trigger for slave DSOs  |
| <b>Trigger source</b>       | CH1 , CH2 , Ext-Trig (only master)   |
| <b>Skew between devices</b> | ±2ns between master and slave DSOs.  |
| <b>Other</b>                | When different UDS-02S models are stacked, only those UDS-02S-10K functions are available. |

## 4.2 APPENDIX

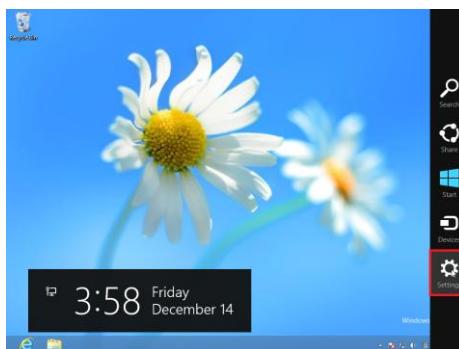
### 4.2.1 Probe Specification

|                   | Position X 1                          | Position X 10  |
|-------------------|---------------------------------------|--|
| Attenuation Ratio | 1:1                                   | 10:1   |
| Bandwidth         | DC to 6MHz                            | DC to 250MHz   |
| Rise Time         | 58ns                                  | 1.4ns  |
| Input Resistance  | 1M Ohm                                | 10M Ohm when used with<br>oscilloscope with 1M Ohm input |
| Input Capacitance | 47pF plus oscilloscope<br>capacitance | Approx. 17pF   |

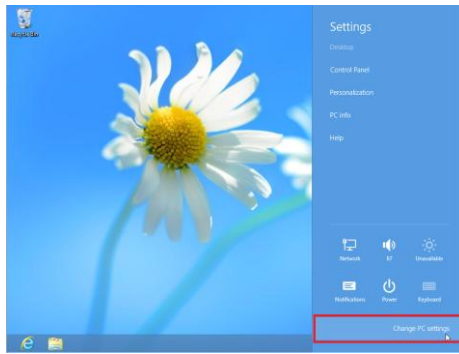
### 4.2.2 Install Windows 8 driver

Please follow the steps:

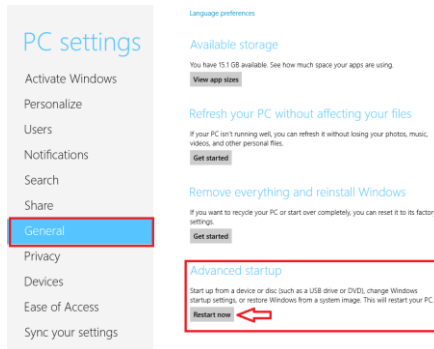
- a. Double click “Settings”.



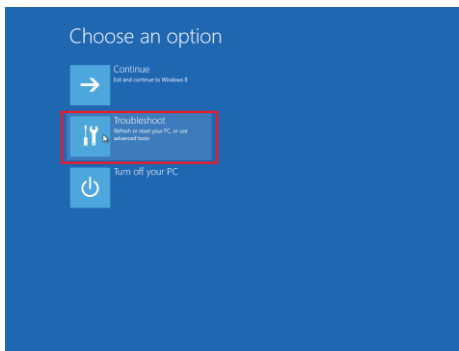
- b. Select “Change PC setting”.



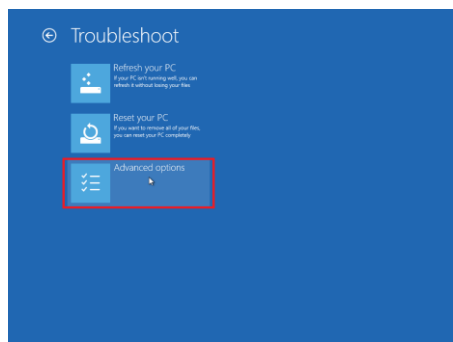
c. Select “General” in PC settings and “Restart now” in Advanced startup.



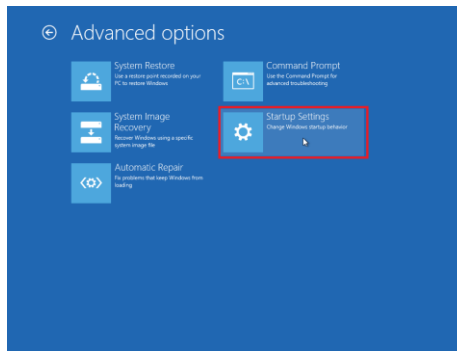
d. Select “Troubleshoot” in Choose an option.



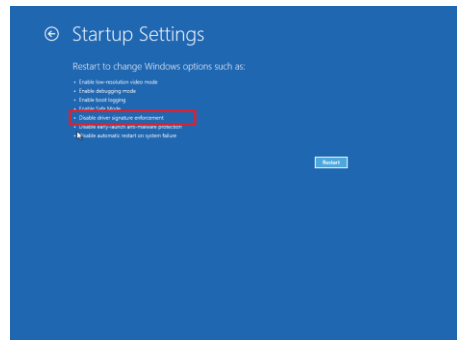
e. Select “Advanced Options”.



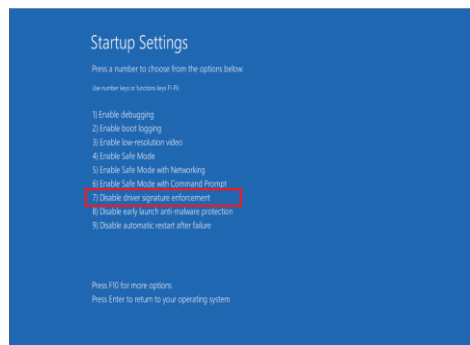
f. Select “Startup Settings”.



g. Click “Disable driver signature enforcement” and “Restart”.



h. When PC restarts, select “Disable driver signature enforcement”



Please reboot your PC and re-activate the driver signing after the driver is installed..