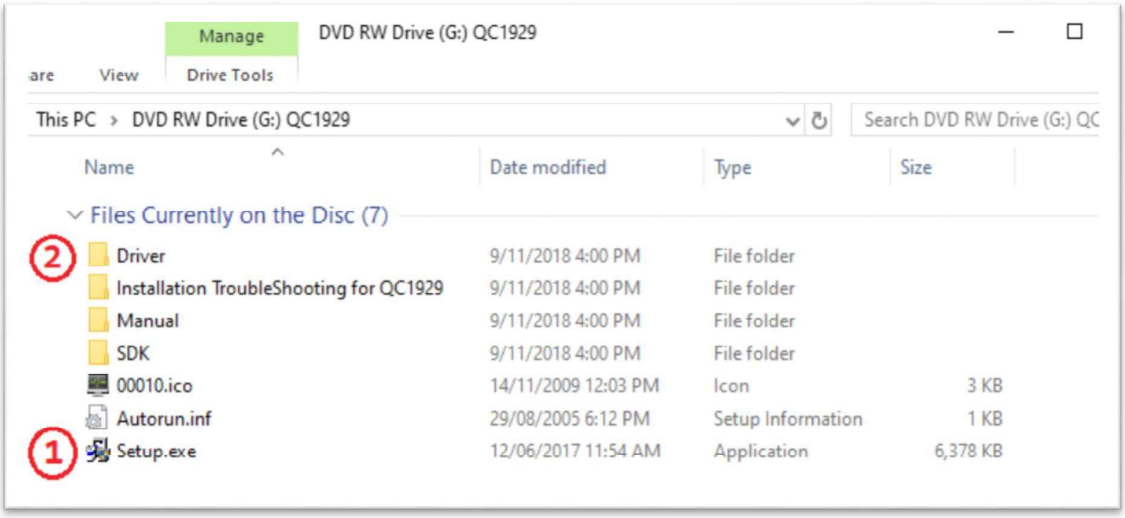
QC1929 Software Guide

Installing the Digital Oscilloscope Software

When you first insert the CD you might be asked to automatically run setup.exe; if not, click on “Computer / Explorer” and navigate to the Disk drive, then run `setup.exe`



When you first install the software, it is possible that it cannot determine drivers for your device, however the software will still run, without connecting to the oscilloscope.

Installing the Drivers

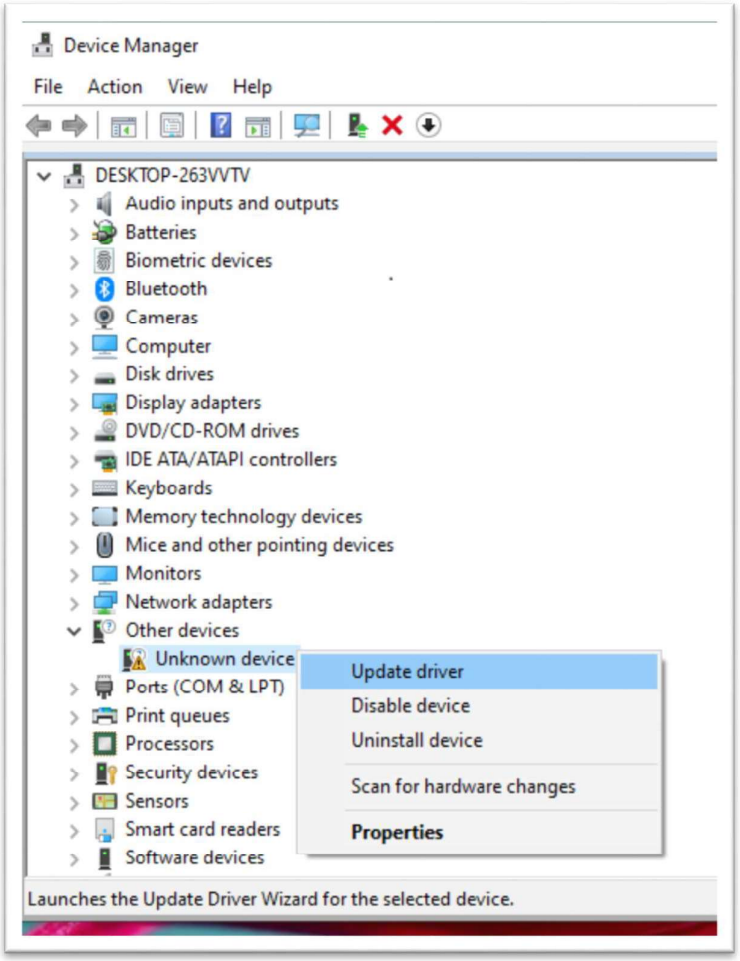
If you find this to be the case, open up the Device manager by pressing the Windows key and typing in “Device Manager”

In the resulting window, you should find “Unknown Device” in the “Other Devices” folder; right-click this and select “update driver.”

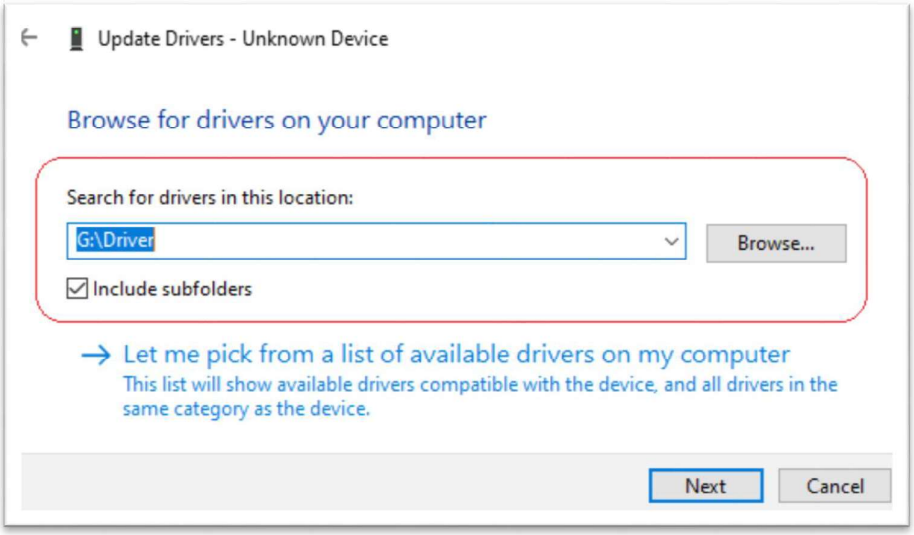
Australia
www.jaycar.com.au
techstore@jaycar.com.au
1800 022 888

New Zealand
www.jaycar.co.nz
techstore@jaycar.co.nz
0800 452 922

QC1929 Software Guide



When the wizard shows up, select “Let me browse for drivers” then change the search location to be the “drivers” folder of the CD-ROM. This will pick the correct driver for you.



DIGITECH

20MHz USB Oscilloscope with Spectrum Analyser (FFT)

QC-1929

User' Manual

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General Safety Summary

Review the following safety precautions carefully before operate the device to avoid any personal injuries or damages to the device and any products connected to it. To avoid potential hazards use the device as specified by this user's guide only.

Chapter 1 Getting Start

The oscilloscope is small, lightweight, no external power required, portable oscilloscopes! The oscilloscopes is ideal for production test, research and design and all of the applications involving analog circuits test and troubleshooting, as well as education and training.

In addition to the list of general features on the next page, this chapter describes how to do the following tasks:

1.1 System Requirement

To run the oscilloscope software, the needs of computer configuration are as follows:

Minimum System Requirements

Operating System

Window XP/Vista/Win7/Win8/Win10

Processor

Upwards of 1.00G processor

Memory

128M byte

Disk Space

500M disk free space

Screen resolution

800 x 600

Recommended Configuration

Windows XP SP2 System

2.4G Processor

512M Byte Memory

80G Disk Space

1024 x 768 or 1280 x 1024 resolution

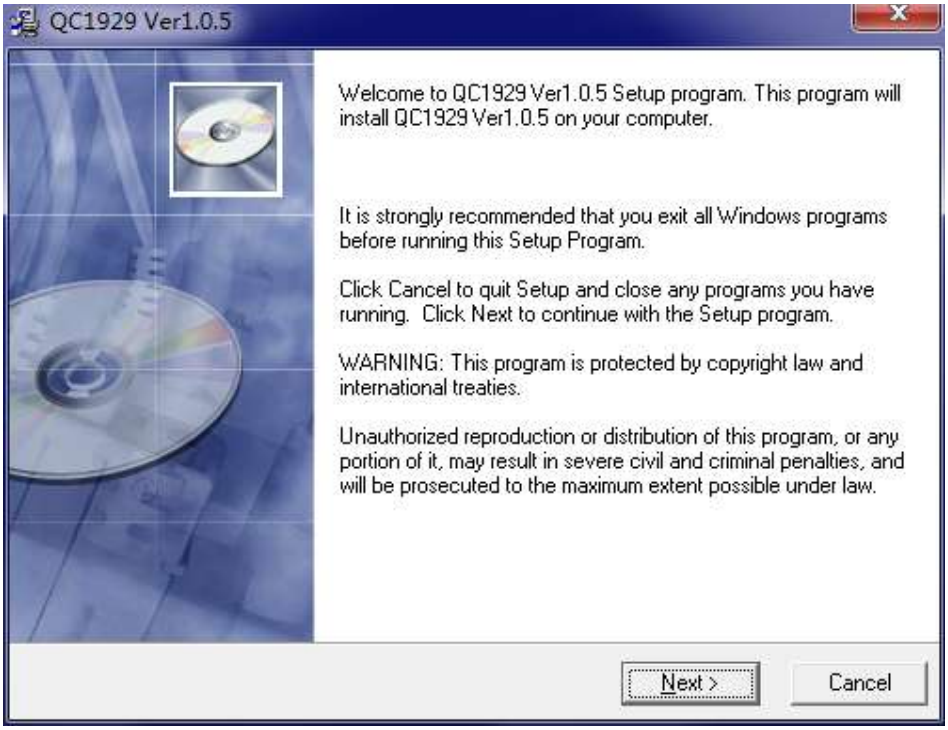
DPI Setting: Normal Size (96DPI)

1.2 Install Software

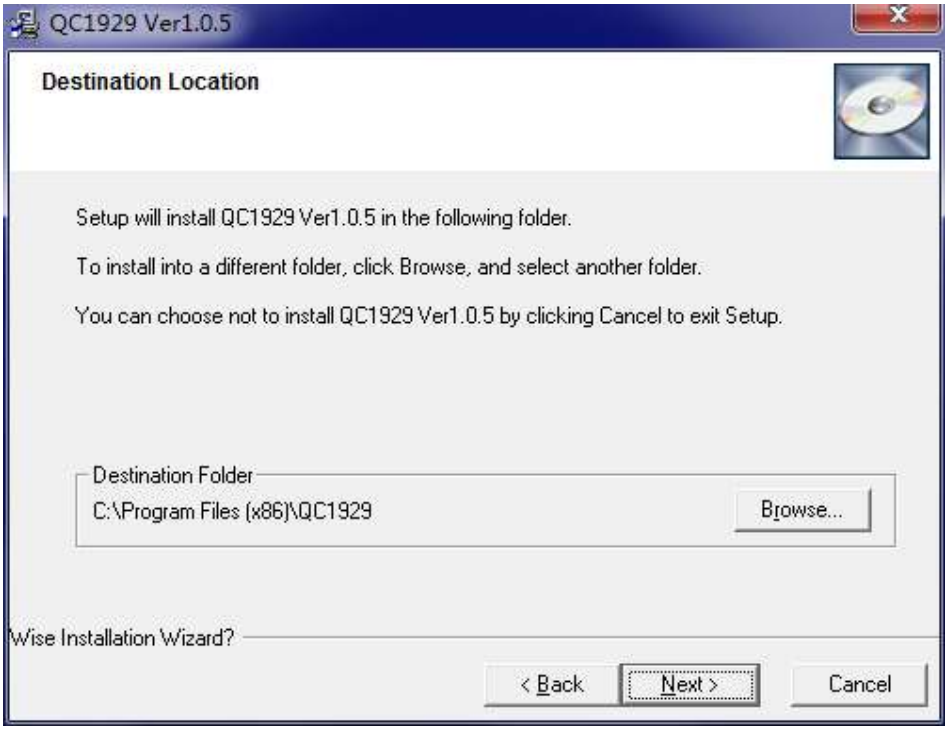
Caution: You must install the software before using the oscilloscope.

1. While in Windows, insert the installation CD into the CD-ROM drive.
2. The installation should start up automatically. Otherwise in Windows Explorer, switch to the CD-ROM drive and run Setup.exe.

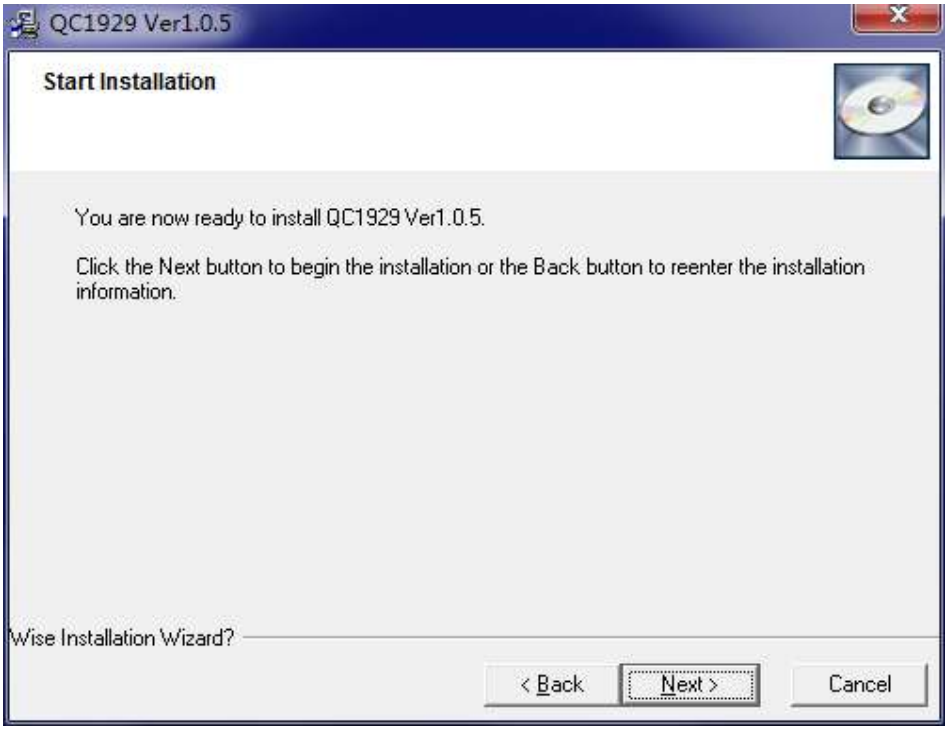
3. The software Installation is started. Click 'Next' to continue.



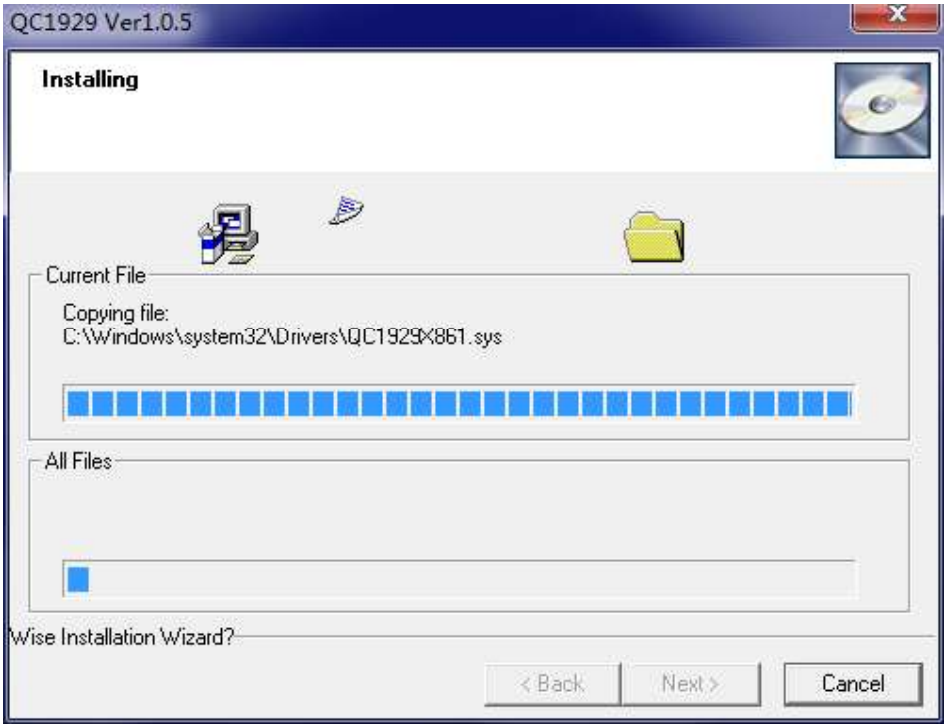
4. Choose a destination directory. Click 'Next' to continue.



5. Check the setup information. Click Next to start copying of files.

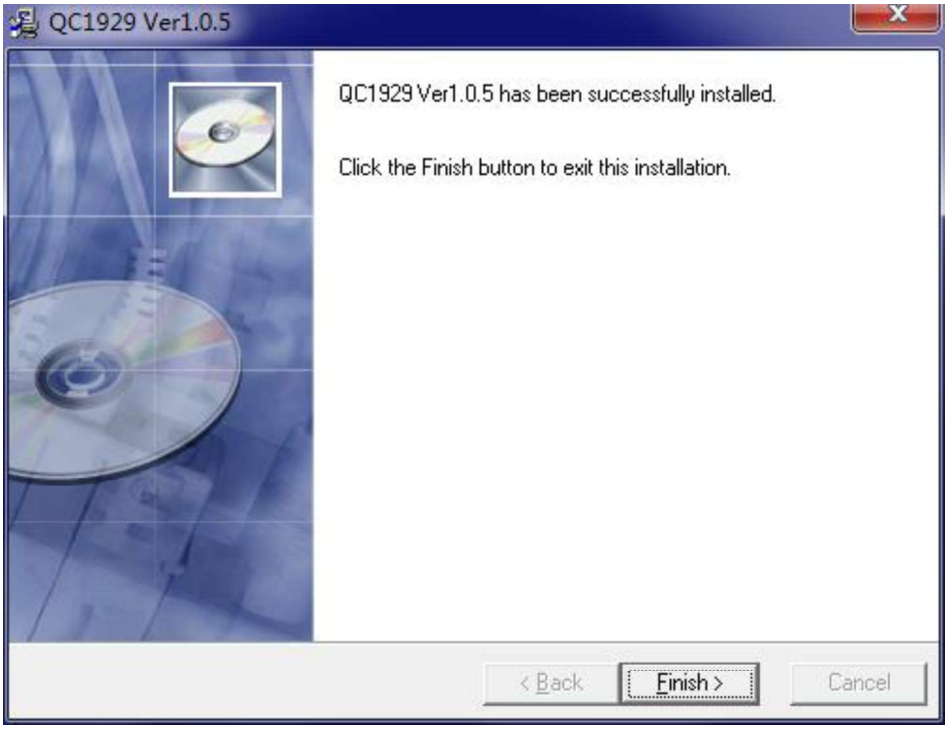


6. This Status dialog is displayed during copying of files.



7. Updating Your System Configuration.

8. The installation is complete.



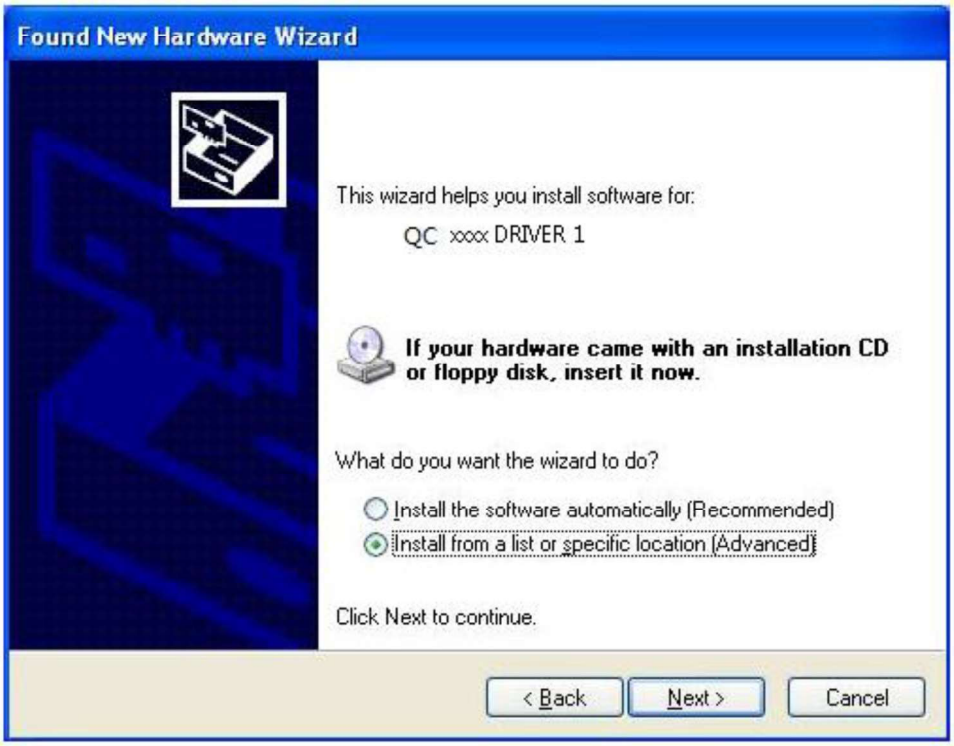
1.3 Install Driver

1. Connect the A-Type Plug of USB cable to your PC'S USB port.

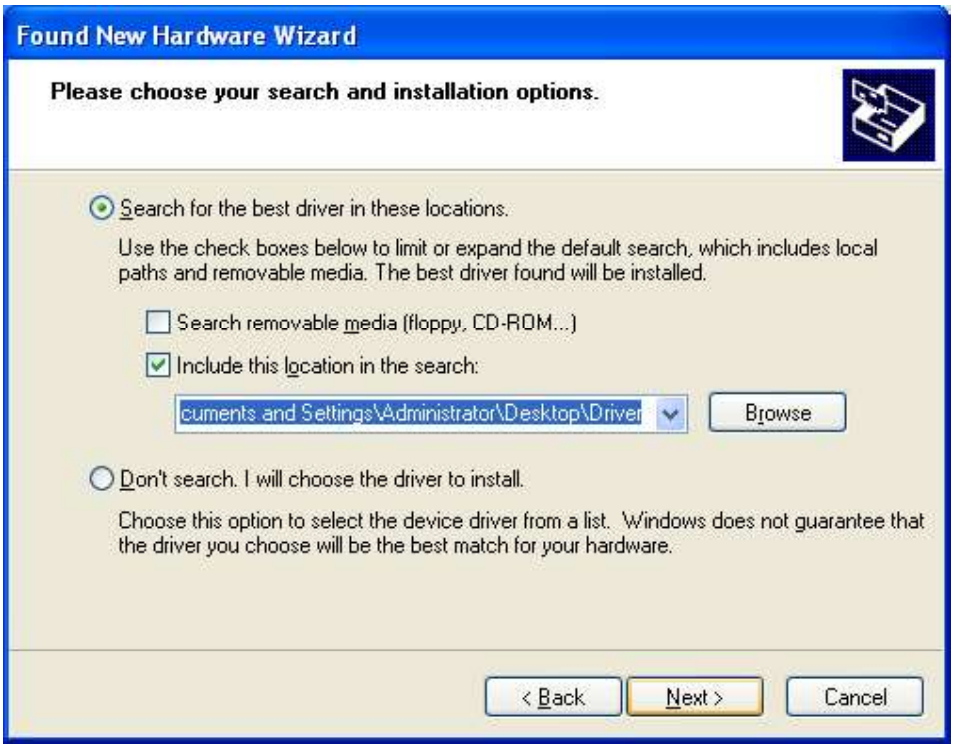
2. Connect the B-Type Plug of USB cable to USB port.

3. New hardware is found.

4. New hardware search wizard starts.



5. New hardware search wizard starts to search the driver.

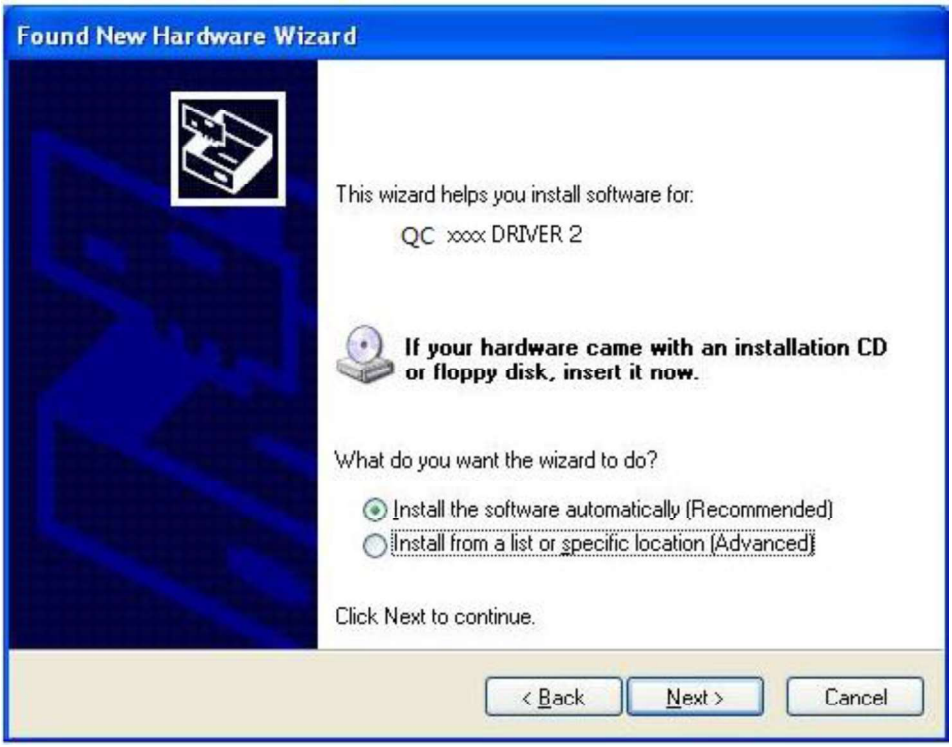


6. New hardware wizard installs “DRIVER”.

7. The wizard has finished installing for “DRIVER”.

8. New hardware is found.

9. Found new hardware Wizard. Select “Install the software automatically”.



10. New hardware wizard installs software and finish new hardware search wizard.

11. Your new hardware is installed and ready to use.

1.4 General Features

1.7 Function Check

Perform this functional check to verify that your oscilloscope is operating correctly.

3. Inspect CH2 with the same method. Repeat steps 2 and 3.

1.8 Self Calibration

The self calibration routine lets you optimize the oscilloscope signal path for maximum measurement accuracy. You can run the routine at any time but you should always run the routine if the ambient temperature changes by 5℃ or more. For accurate calibration, power on the oscilloscope and wait twenty minutes to ensure it is warmed up. To compensate the signal path, disconnect any probes or cables from the input connectors. Then, click "**Menu -> Utility -> Calibration**" to do self calibration.

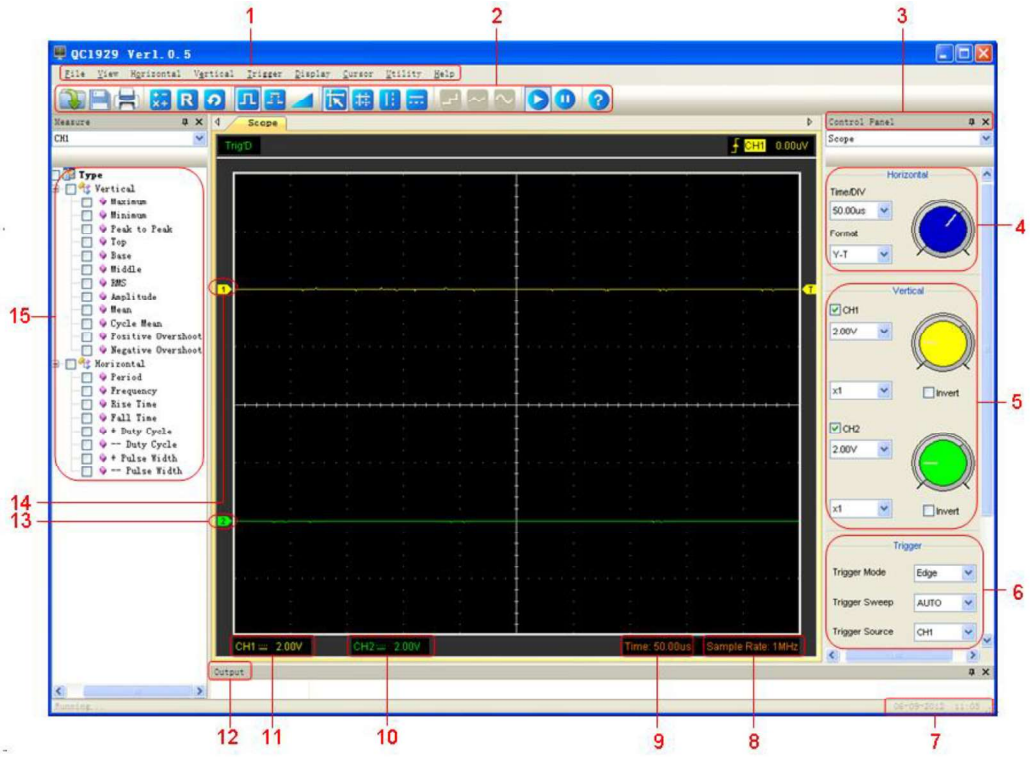
1.9 Accessories

All the accessories listed below are standard accessories for the oscilloscope:

Chapter 2 Operating Basics

2.1 The User's Interface

Click the software icon on the desk after you finished the software setting and equipment connecting. Then a user interface will be showed as follows:



In addition to displaying waveforms, the display area is filled with many details about the waveform and the oscilloscope control settings.

1. **The Main Menu**

   All settings can be found in the main menu.

2. **The Toolbar**
3. **Control Panel**
4. **The Horizontal Panel**

   The user can change Time/Div, format in the panel.

5. **The Vertical Panel**

   The user can turn on/off the CH1/CH2. Also the user can change the CH1/CH2 volt/div, coupling and probe attenuation.

6. **The Trigger Panel**

   In this panel, the user can change the trigger mode, sweep, source and slope.

7. **Displays the system time.**
8. **Displays Sample Rate**
9. **Displays the main time base setting.**
10. **Displays the CH2 information**

Readouts show the coupling of the channels.

Readouts show the vertical scale factors of the channels.

A “B” icon indicates that the channel is bandwidth limited.

11. **Displays the CH1 information**

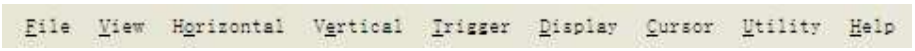
    Readouts show the coupling of the channels.

    Readouts show the vertical scale factors of the channels.

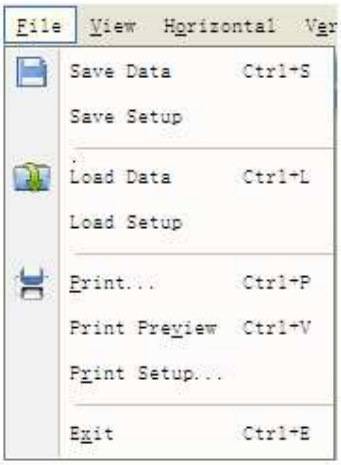
12. **Displays Output Window**
13. **The markers show the reference points of the displayed waveforms. If there is no marker, the channel is not displayed.**
14. **The same as 13.**
15. **Measure Window.**

2.2 The Menu System

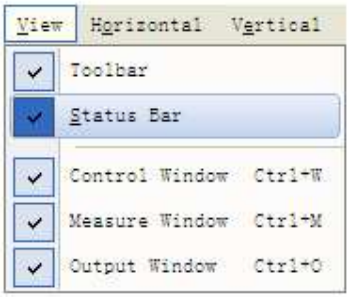
The Main Menu



1. **File:** Load or Save data, setup

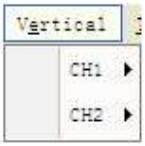


2. **View:** Change the user interface

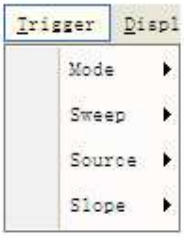


3. **Horizontal:** Set the horizontal system

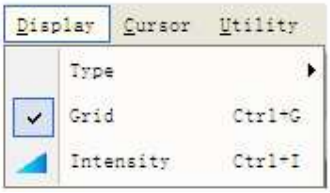
4. **Vertical:** Set the vertical system



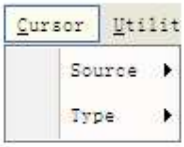
5. **Trigger:** Set the trigger system



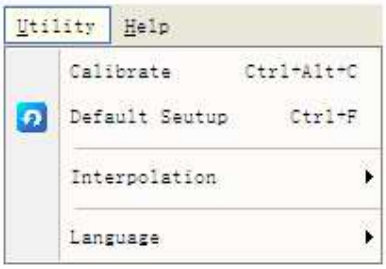
6. **Display:** The waveform display setup



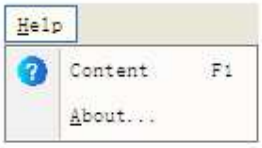
7. **Cursor:** Cursor measure setup



8. **Utility:** Utility setting



9. **Help:** Turn on help file



2.3 The Vertical System

Click “**Vertical**” in main menu

The following figure shows the vertical system menu. It shows the vertical parameters setting.

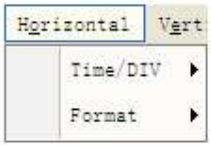
1. **CH1**: Leads to the setting of the **CH1** parameters
2. **CH2**: Leads to the setting of the **CH2** parameters

Use the left mouse button to dragging the channel icon to set the vertical position offset precisely.

2.4 The Horizontal System

Click “**Horizontal**” in main menu

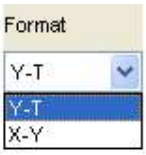
The following figure shows the Horizontal System window. It shows the horizontal parameters settings.



1. **Time/DIV**: leads the setting of the time base parameters
2. **Format**: leads the setting of the horizontal format parameters

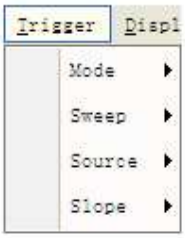
The time base ranges of the oscilloscope is listed as follows. The horizontal scan speed is from 4ns/div to 1hour/div.

In the “**Format**” menu of the “**Horizontal**” menu, select the display mode to **Y-T, X-Y.**



2.5 The Trigger System

Click “**Trigger**” in main menu.



Mode: Sets the trigger mode to **Edge** trigger

Sweep: Selects the trigger sweep mode to **AUTO**, **NORMAL** or **SINGLE**

Source: Selects the trigger source to **CH1, CH2.**

Slope: Selects the edge trigger slope to **Positive** or **Negative** slope

The user can drag the trigger icon to adjust the trigger level and the trigger level will be displayed on the top right corner.

2.6 Input Connectors

CH 1/CH 2: Input connectors for waveform display.
GND.: a ground terminal
USB PORT: Connect the B-Type Plug of USB cable to this port.
CAL.: Probe compensation output.

Chapter 3 Understanding Function

3.1 Set Oscilloscope

Save Setup

The oscilloscope software saves the current setup before you close the oscilloscope software. The oscilloscope recalls this setup the next time you run the software. You can use the "**Save Setup**" menu to permanently save up to several different setups.

Load Setup

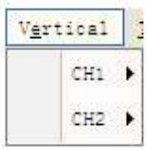
The oscilloscope can recall the last setup before the oscilloscope software was running, any saved setups, or the factory setup. You can use the "**Load Setup**" menu to permanently recall a setup.

Factory Setup

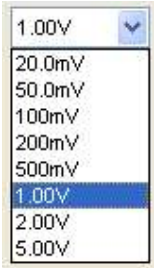
The oscilloscope software is set up for normal operation when it is shipped from the factory. This is the factory setup. To recall this setup, push the "**Utility->Default Setup**" menu.

3.2 Set Vertical Systems

Click "**Vertical**" in main menu



The Vertical Menu function:

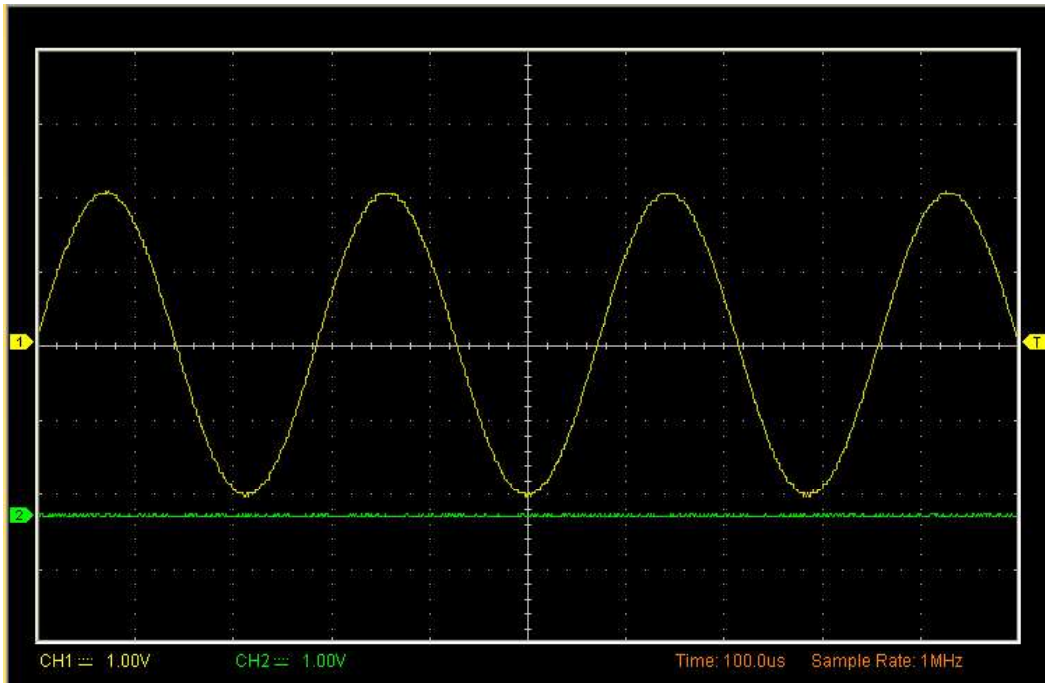


You can left click and drag the mouse on the green knob or the yellow knob to change the voltage.

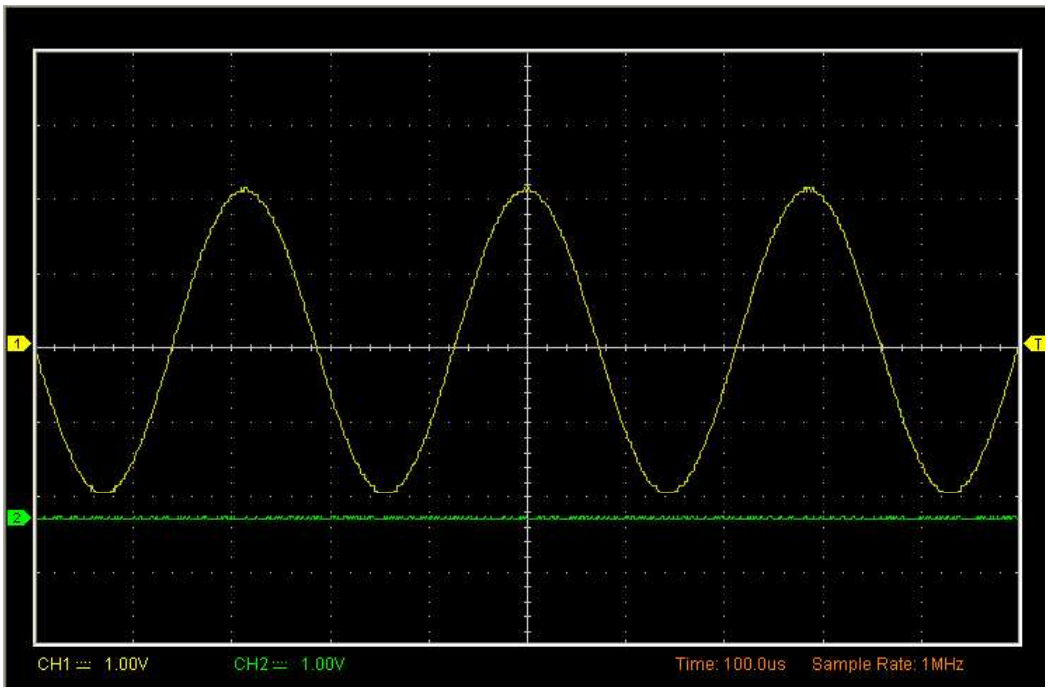
Turn off invert

Turn on invert

The following picture shows the waveform before inversion:



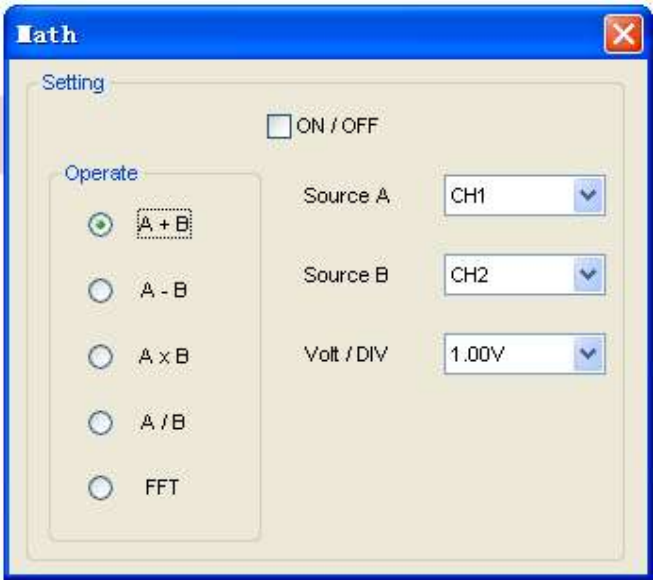
The following picture shows the waveform of inversion:



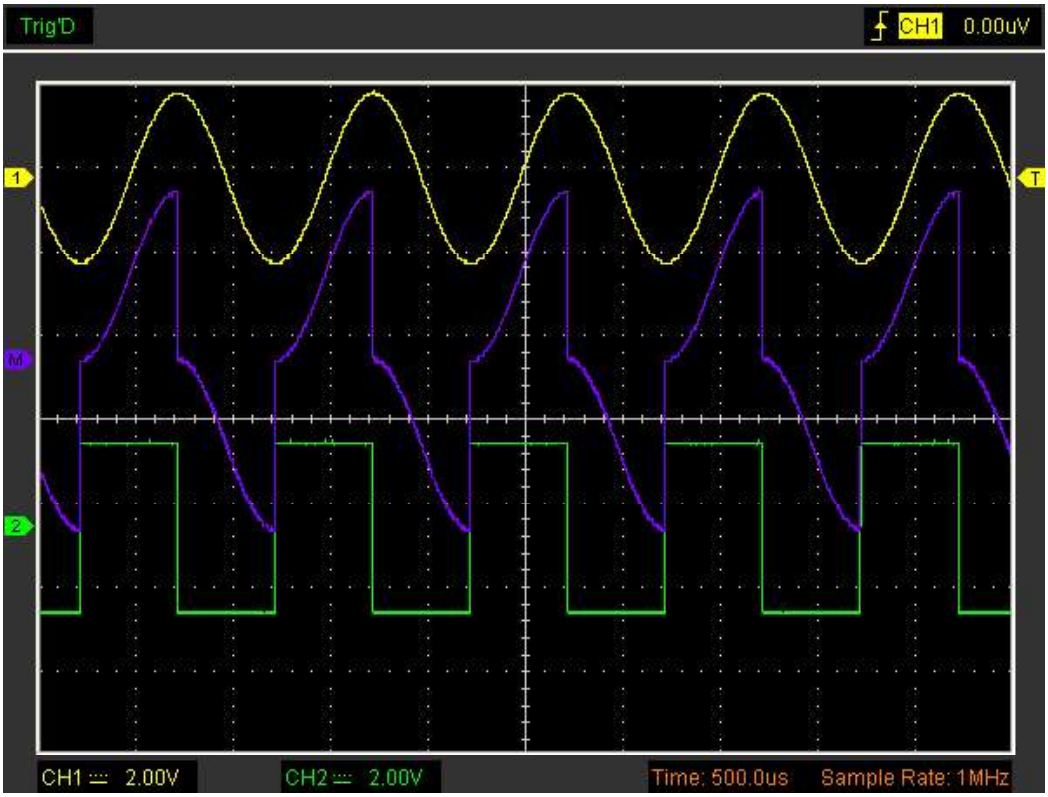
3.2.1 Set Math

Click in Toolbar.

The **MATH** Menu:



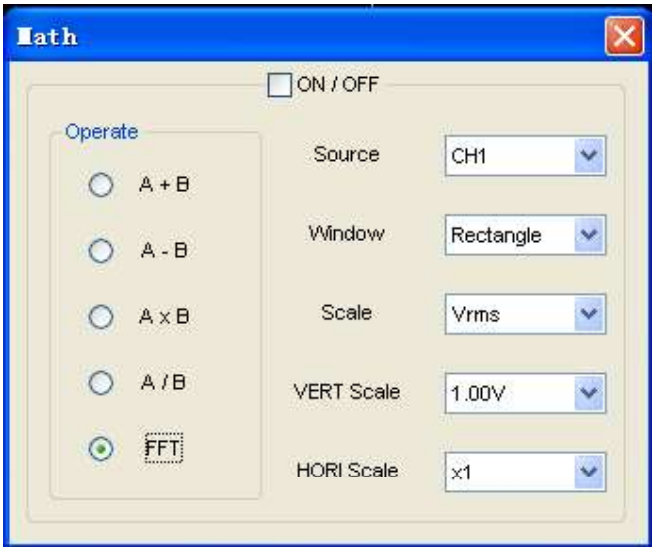
The Math Function Display:



Fast Fourier Transform Function

To use the FFT mode, you need to click in Toolbar to open the FFT setup window.

The FFT setup window:



You can select the Source channel, Window algorithm, FFT number, and FFT Zoom factor. It displays only one FFT spectrum at a time.

Source:

Selects the channel used as the FFT source

Window:

Selects the FFT window type

Scale:

Selects the vertical scale units

Vert Scale：

Selects the vertical scale

HORI Scale:

Selects the FFT zoom factor

Sets horizontal scale, If the information is more than the quantity displayed to the display window, more information is displayed by using scroll bar.

You can click the “ON/OFF” button to start FFT math, also you can click this button to stop FFT math.

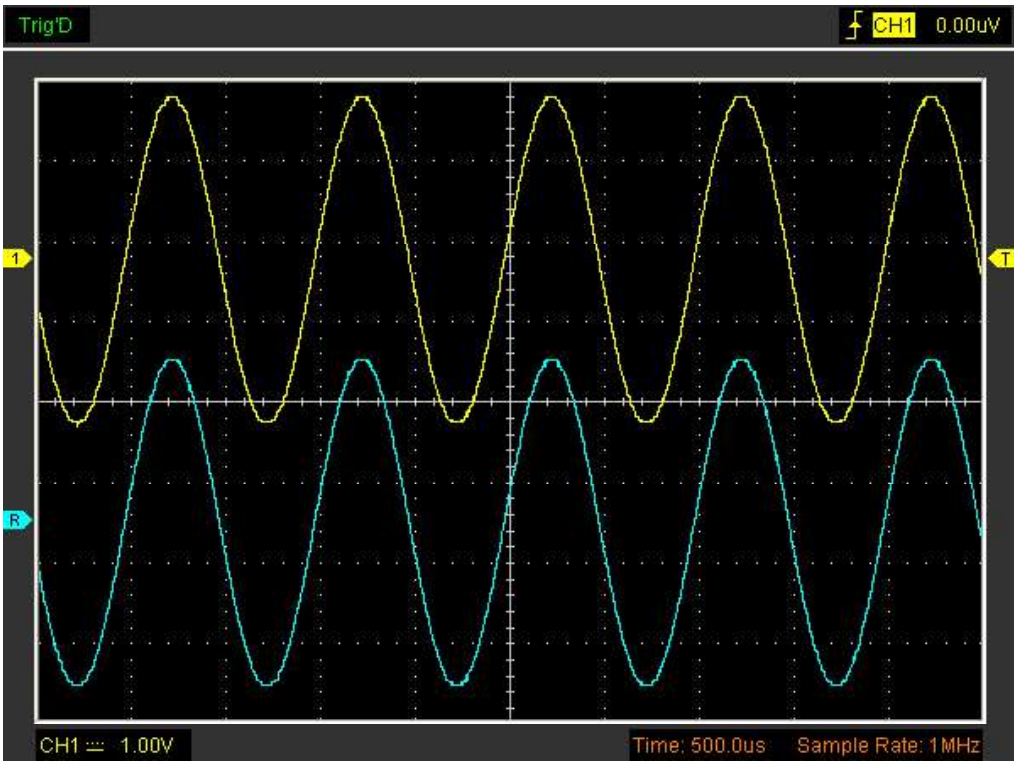
3.2.2 Set Reference

Click “ ” in Toolbar to set REF.

The Reference Channel Function:

You can change the vertical scale of a waveform. The waveform display will contract or expand relative to the reference level.

The Reference Waveform Display Window:



Note: If you turn on the "**Reference**" channel, the load file window will appear.

3.3 Set Horizontal System

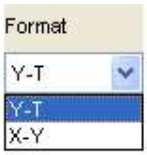
The following figure shows the Horizontal System window. It shows the horizontal parameters settings.

1. **Time/DIV**: leads the setting of the time base parameters

2. **Format**: leads the setting of the horizontal format parameters

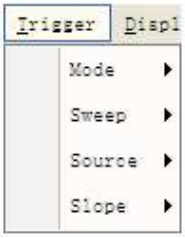
The time base ranges of the oscilloscope is listed as follows. The horizontal scan speed is from 4ns/div to 1hour/div.

In the "**Format**" menu of the "**Horizontal**" menu, select the display mode to **Y-T, X-Y.**



3.4 Set Trigger System

Click "**Trigger**" in main menu.



The trigger determines when the oscilloscope starts to acquire data and display a waveform. When a trigger is set up properly, it can convert unstable displays or blank screens into meaningful waveforms.

If the oscilloscope wants to acquire a waveform, it collects enough data so that it can draw the waveform to the left of the trigger point. The oscilloscope continues to acquire data while waiting for the trigger condition to occur. The oscilloscope continues to acquire enough data so that it can draw the waveform to the right of the trigger point after it detects a trigger.

The **Edge** trigger determines whether the oscilloscope finds the trigger point on the rising or the falling edge of a signal. Select **Edge** trigger mode to trigger on **Rising** edge or **Falling** edge.

Mode: Select the trigger mode.

The oscilloscope only provides edge trigger mode.

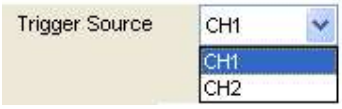
Sweep: Set the sweep mode to **Auto**, **Normal** or **Single**.

Auto: Acquire waveform even no trigger occurred

Normal: Acquire waveform when trigger occurred.

Single: Acquire waveform when trigger occurred then stop

Source: You can use the trigger source options to select the signal that the oscilloscope uses as a trigger.



CH1: Select CH1 as trigger signal

CH2: Select CH2 as trigger signal

Slope: Set the slope to **Rising (+)** or **Falling (-)**.

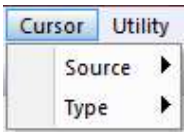
Rising: Trigger on rising edge

Falling: Trigger on falling edge

3.5 Measure Signal

3.5.1 Cursor

Click "**Cursor**" in main menu.

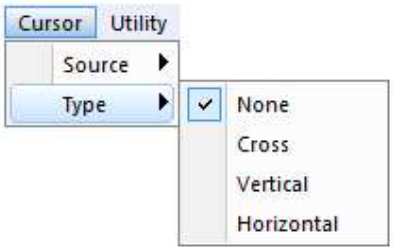


This method allows you to take measurements by moving the cursors

1. **Source**

The user can set the source to **CH1**, **CH2.**

2. **Type**

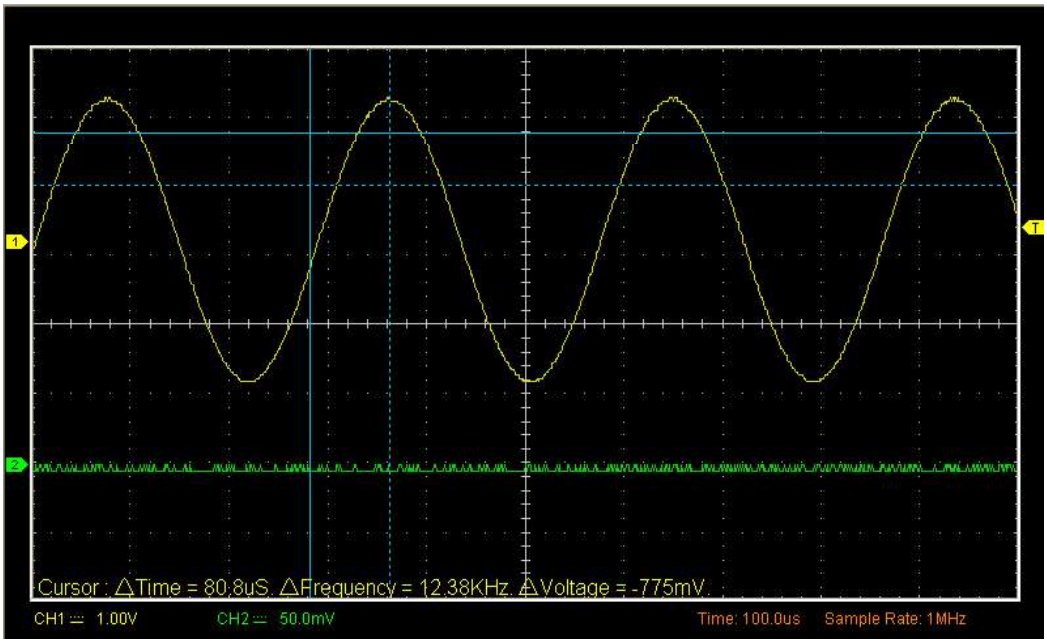


There are four types of cursors: **Cross**, **Vertical** and **Horizontal.**

1) **Cross**

The **Cross** cursors appear as cross lines on the display and measure the vertical and horizontal parameters.

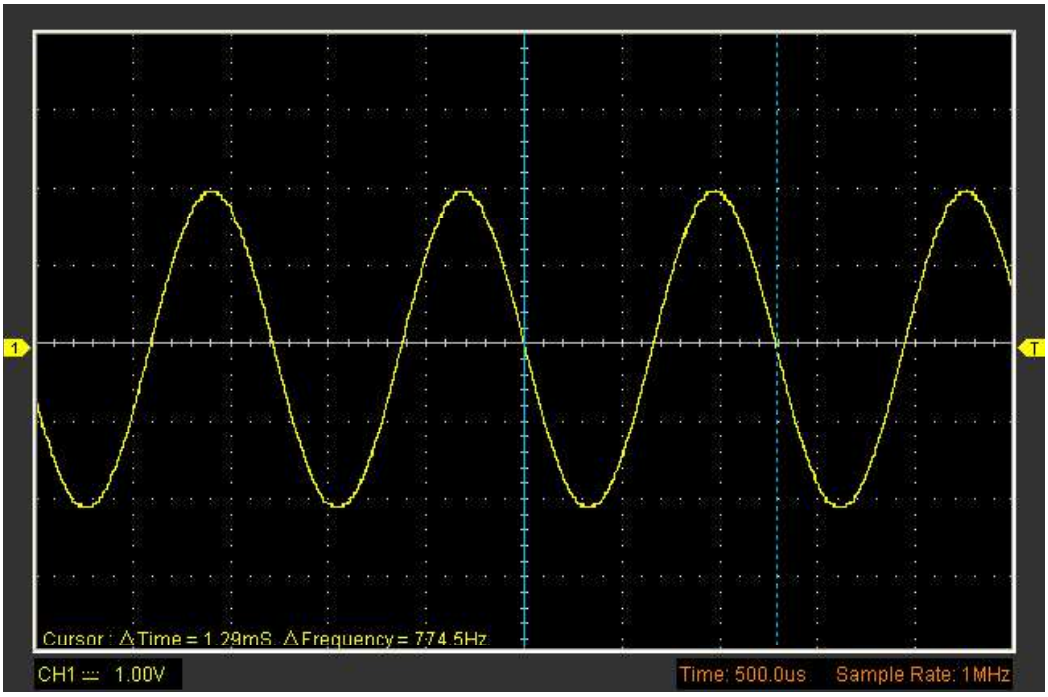
The **Cross** cursor display window:



2) **Vertical**

The **Vertical** cursors appear as vertical lines on the display and measure the vertical parameters.

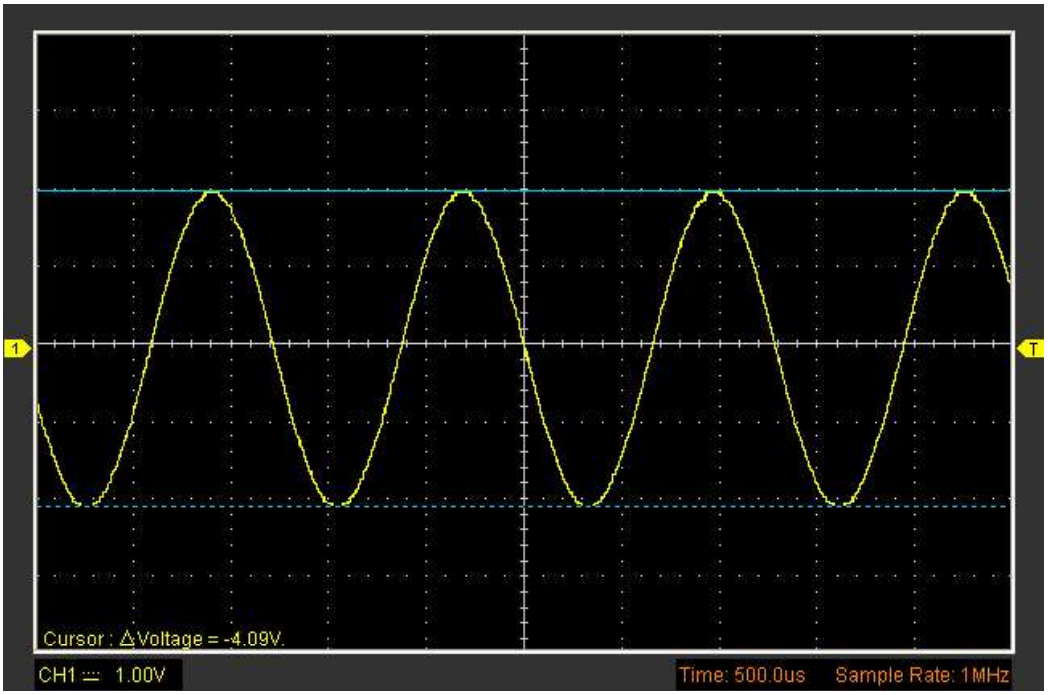
The **Vertical** cursor display window:



3) **Horizontal**

The **Horizontal** cursors appear as horizontal lines on the display and measure the horizontal parameters.

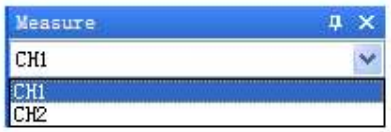
The **Horizontal** cursor display window:



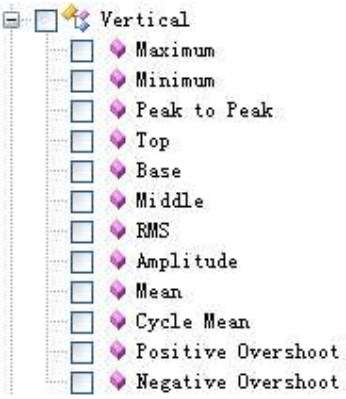
3.5.2 Measure

Click “**Measure**” in main menu.

The oscilloscope provides 20 parametric auto measurements (12 voltage and 8 time measurements).



1. **Vertical**



Maximum: Voltage of the absolute maximum level, Measured over the entire waveform

Minimum: Voltage of the absolute minimum level, Measured over the entire waveform

Peak To Peak: Peak-to-peak = Max – Min, Measured over the entire waveform

Top: Voltage of the statistical maximum level, Measured over the entire waveform

Base: Voltage of the statistical minimum level, Measured over the entire waveform

Middle: Voltage of the 50% level from base to top

RMS: The Root Mean Square voltage over the entire waveform

Amplitude: Amp = Base – Top, Measured over the entire waveform

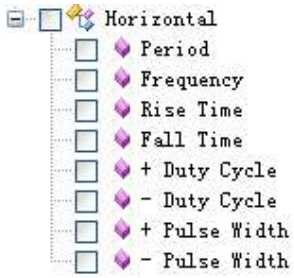
Mean: The arithmetic mean over the entire waveform

Cycle Mean: The arithmetic mean over the first cycle in the waveform

Preshoot: Positive Overshoot = (Max - Top)/Amp x 100 %, Measured over the entire waveform

Overshoot: Negative Overshoot = (Base - Min)/Amp x 100 %, Measured over the entire waveform

2. **Horizontal**



Period: Time to take for the first signal cycle to complete in the waveform

Frequency: Reciprocal of the period of the first cycle in the waveform

Rise Time: Time taken from lower threshold to upper threshold

Fall Time: Time taken from upper threshold to lower threshold

+**Duty Cycle**: Positive Duty Cycle = (Positive Pulse Width)/Period x 100%, Measured of the first cycle in waveform

-**Duty Cycle**: Negative Duty Cycle = (Negative Pulse Width)/Period x 100%, Measured of the first cycle in waveform

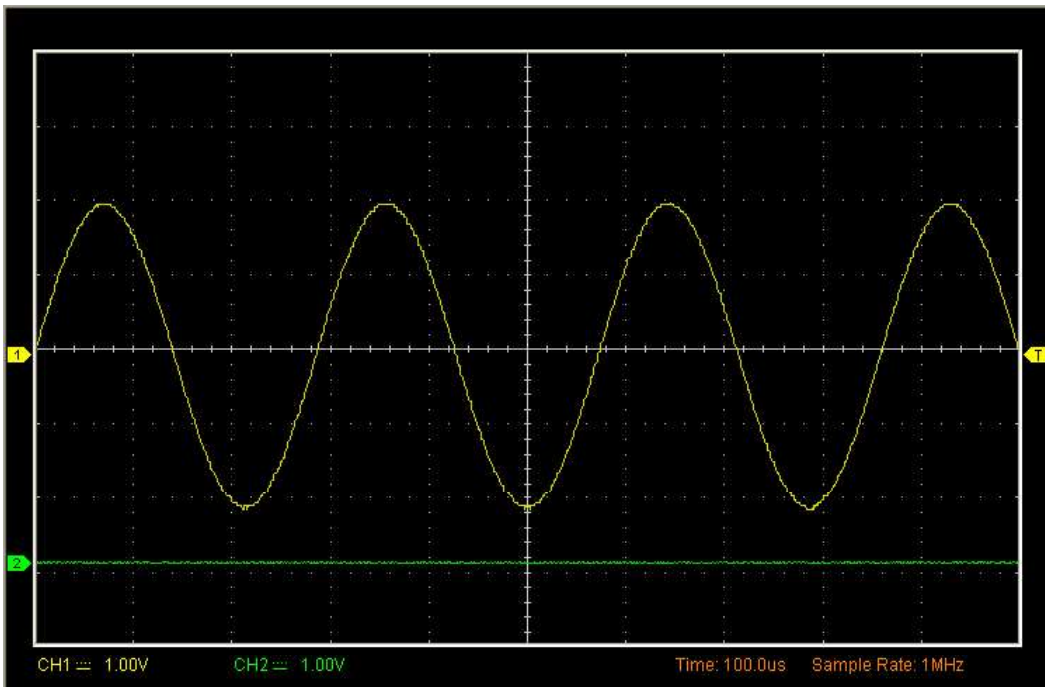
+**Pulse Width**: Measured of the first positive pulse in the waveform. The time between the 50% amplitude points

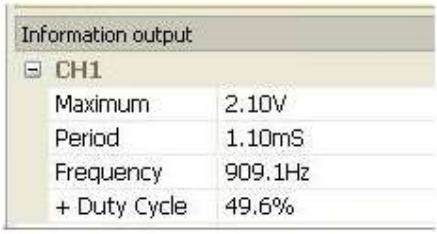
-**Pulse Width**: Measured of the first negative pulse in the waveform. The time between the 50% amplitude points

3. **Clear Measure**

Clear all measure items on display screen.

The **Measure** Display Window:

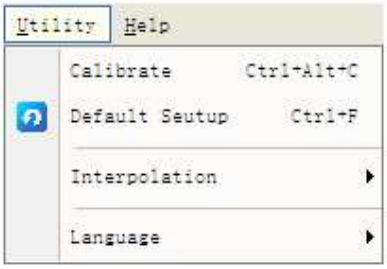




Note: The results of the automatic measurements will be displayed on the bottom of the screen. Maximum 8 results could be displayed at the same time. When there is no room, the next new measurement result will make the previous results moving left, out of screen.

3.6 The Utility Function

Click the "**Menu -> Utility**" to get into the "**Utility**" menu.

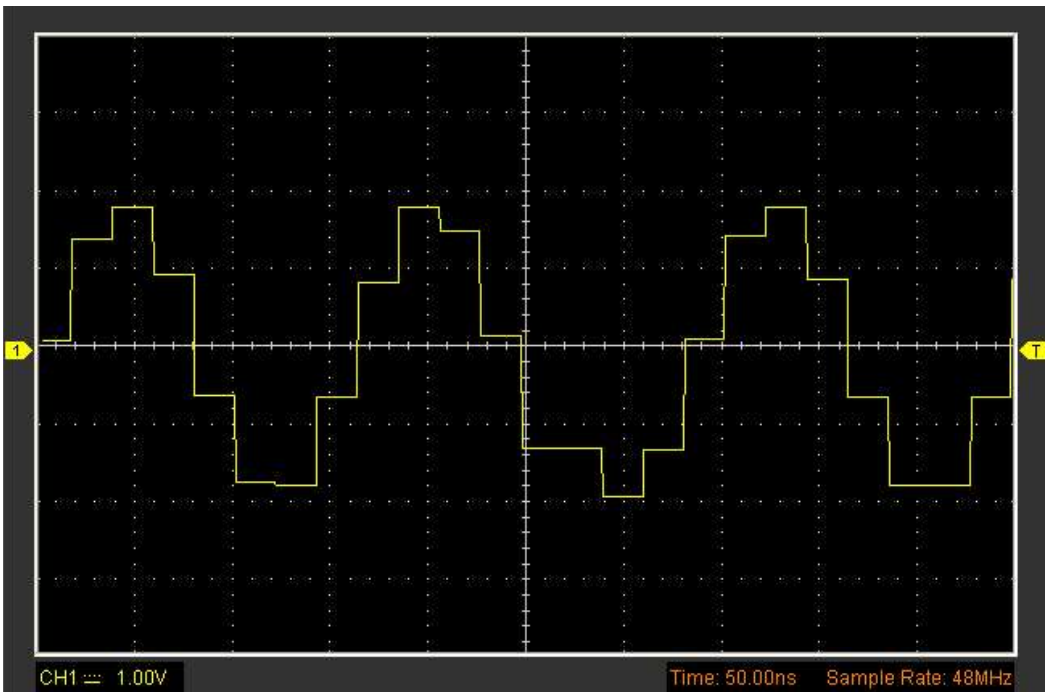


The "**Utility**" Functions:

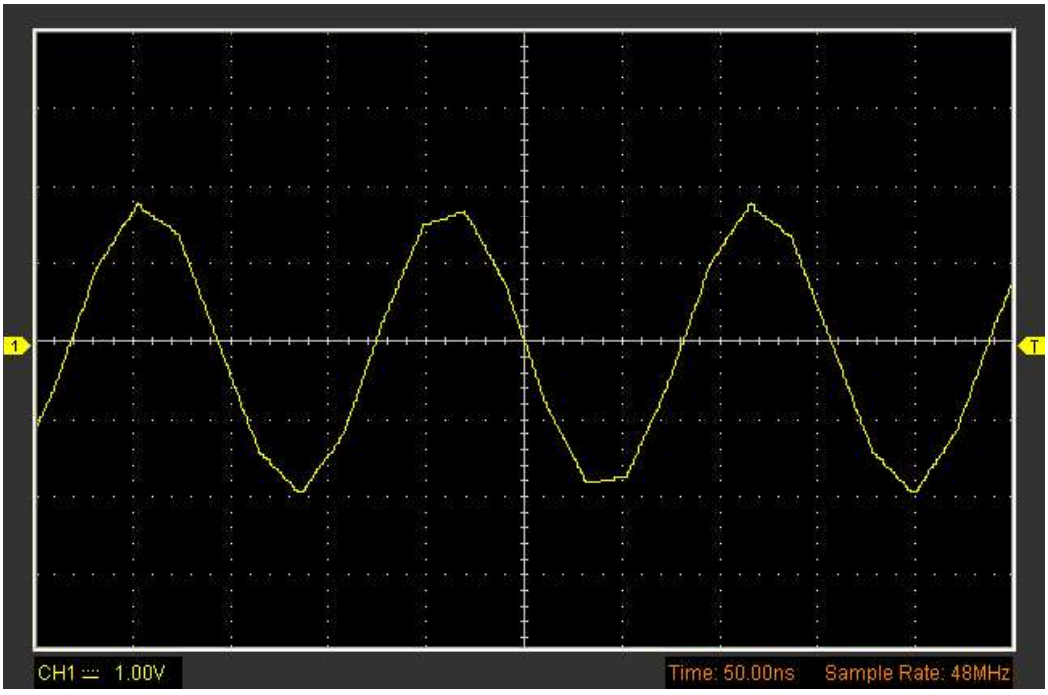
be recalled at anytime by user.

The Factory Setup function does not reset the following settings:

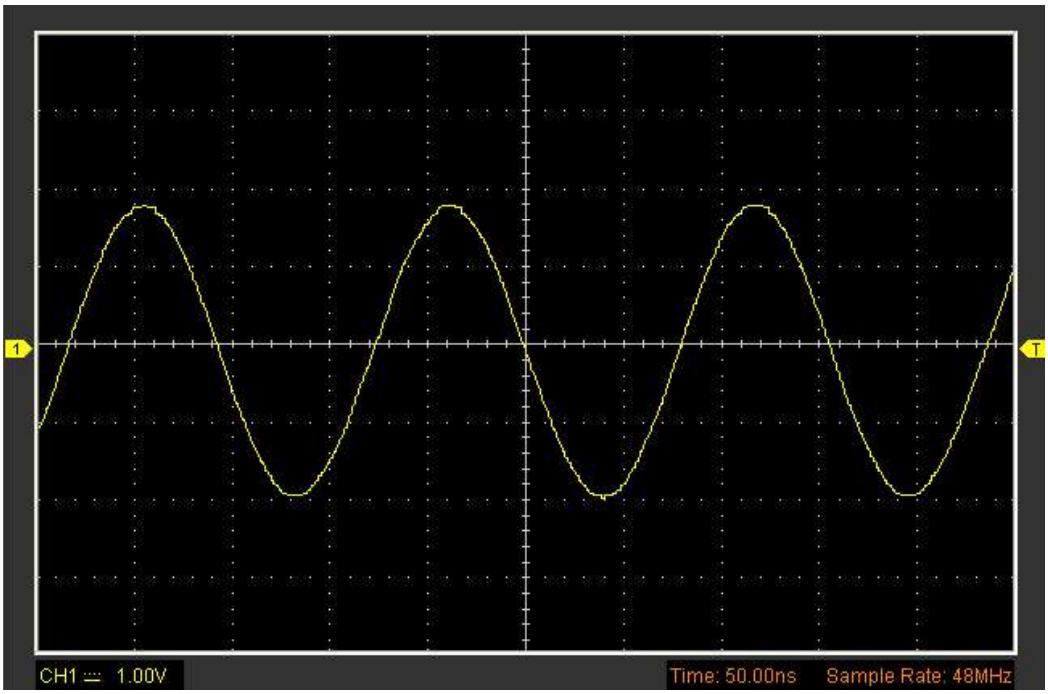
The **Step** Interpolation:



The **Linear** Interpolation:



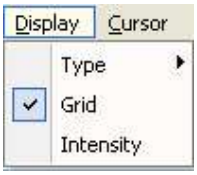
The **Sin(x)/x** Interpolation:



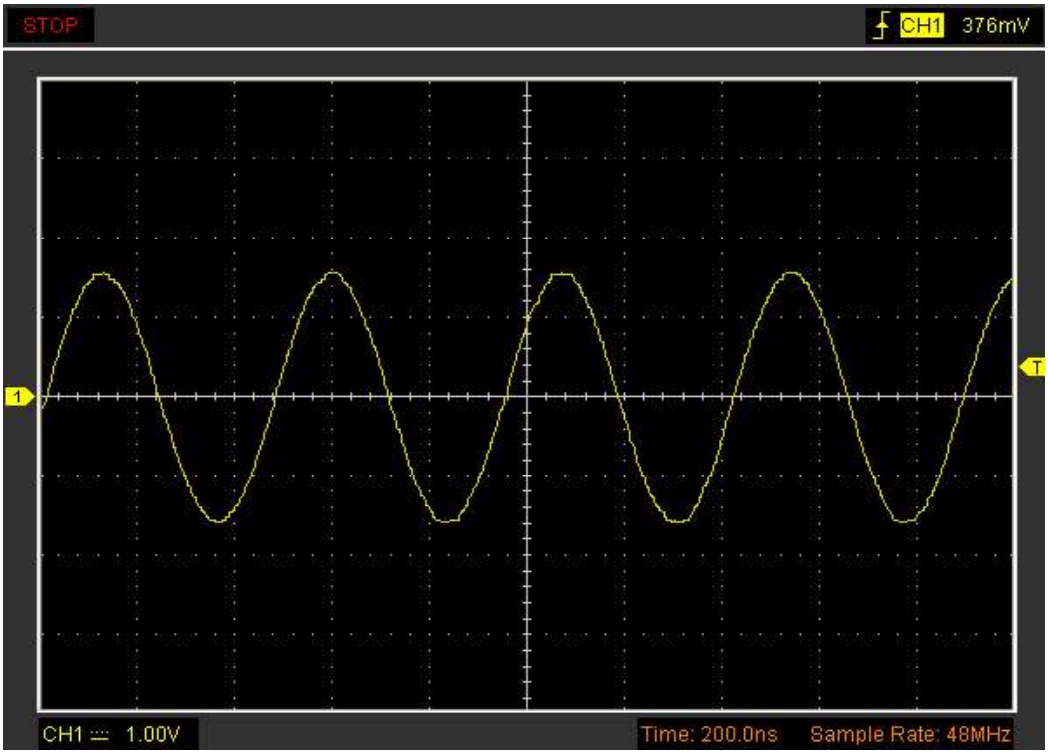
Note: The default interpolation mode is Sin(x)/x.

3.7 The Display System

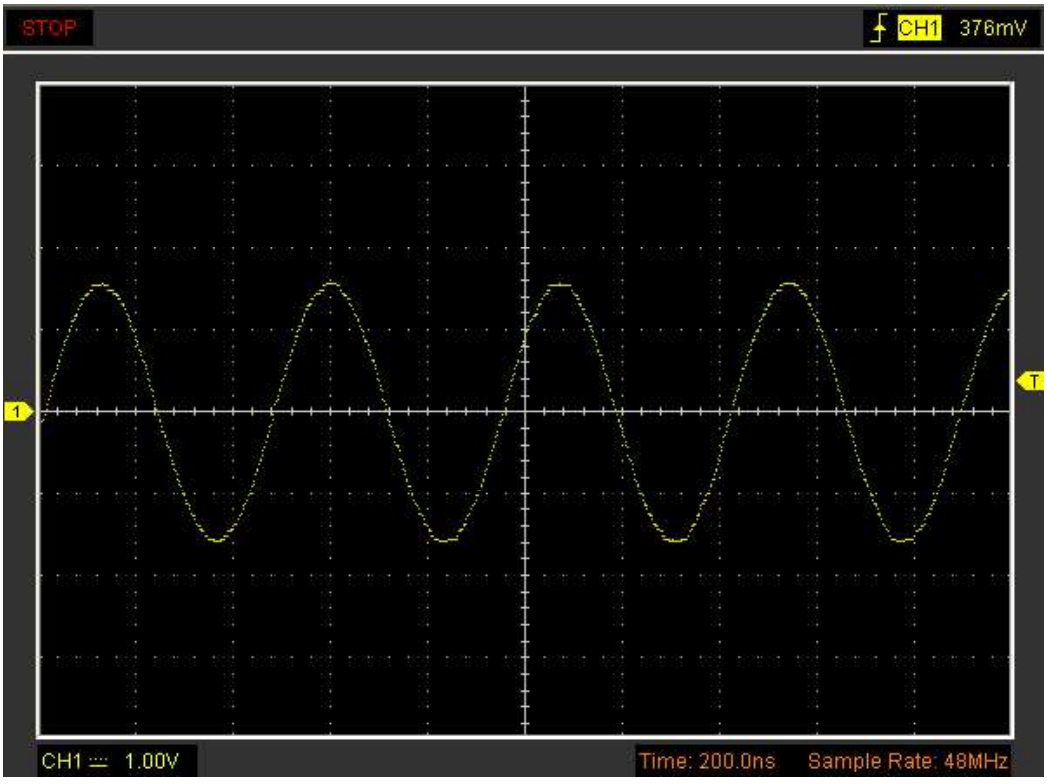
Click "**Display**" in main menu.
The following figure shows the display system menu. Displays parameters setting.



If the **Vectors** type mode is selected, the waveform will be displayed as following figure.

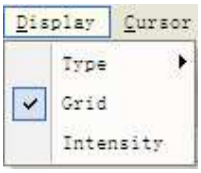


If the **Dots** type mode is selected, the waveform will be displayed as following figure.

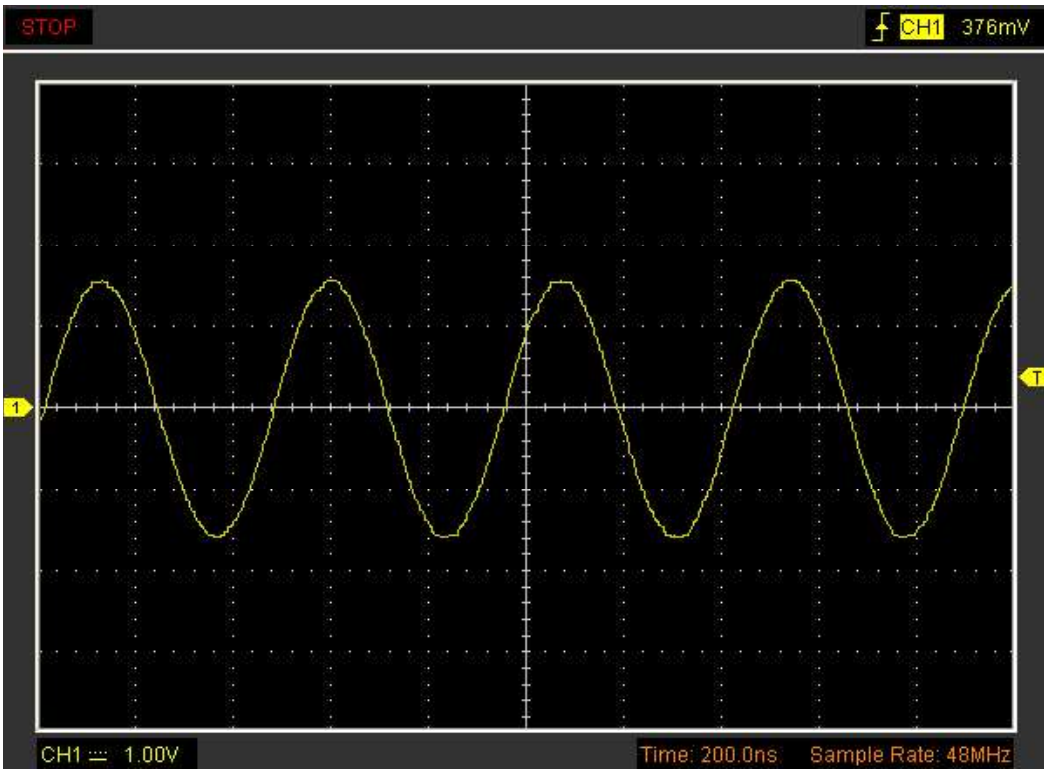


3.7.2 Grid

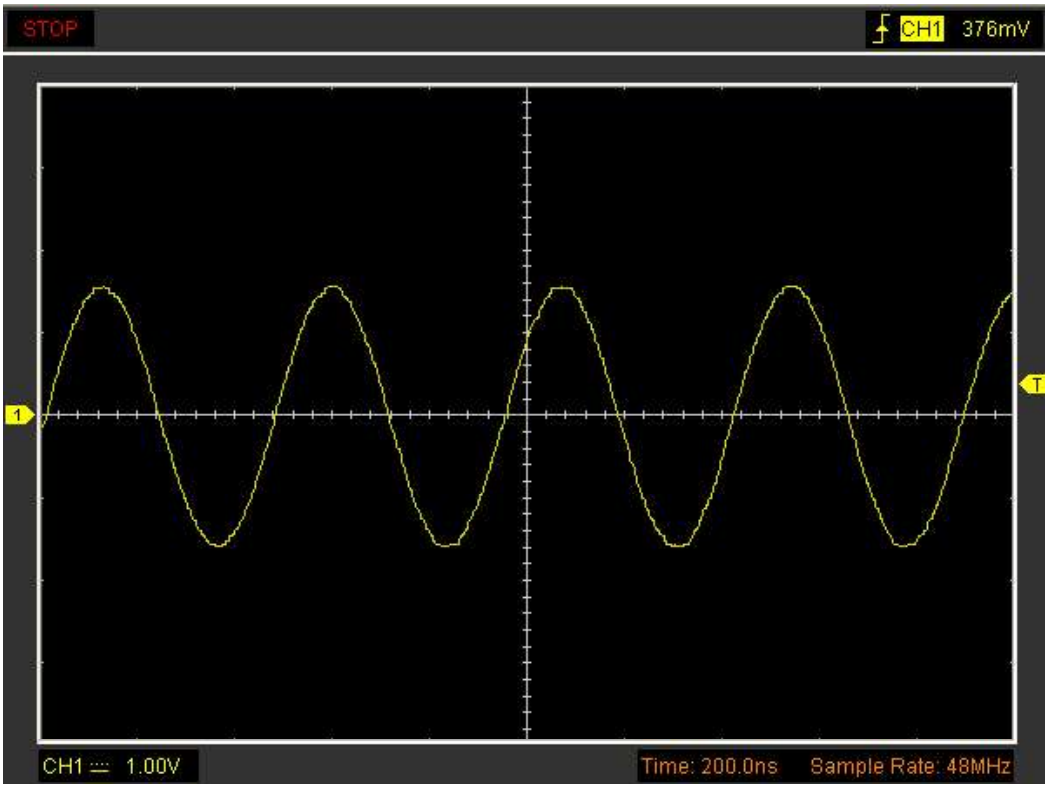
Click “**Display**” in main menu.



The grid shows:



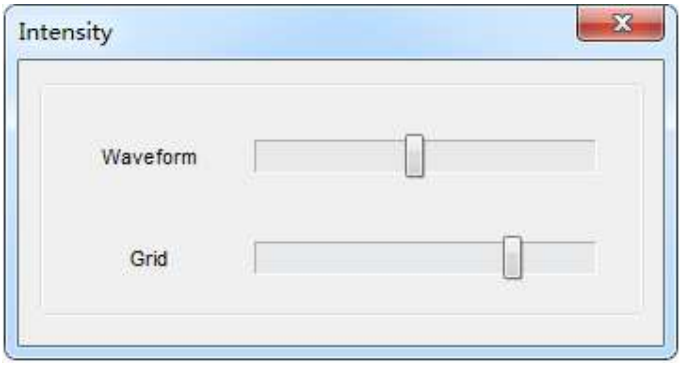
Without the grid show:



3.7.3 Intensity

Click “**Display->Intensity**” in main menu

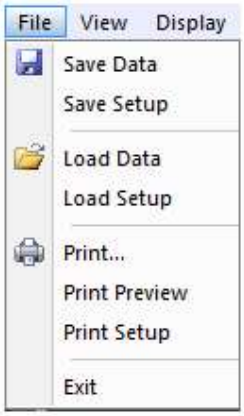
The following figure shows the intensity dialog. It shows the display parameters setting.



You can change the grid and waveform color intensity in this dialog.

3.8 Save/Load Menu

Click “**File**” in main menu to save waveform, setups and screen



1. **Save Data**

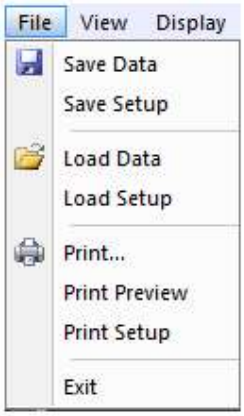
   Save waveform data

2. **Save Setups**

   Save the current oscilloscope setups to file

Load Menu

Click “**File**” in main menu to recall saved waveform, setup



1. **Load Data**

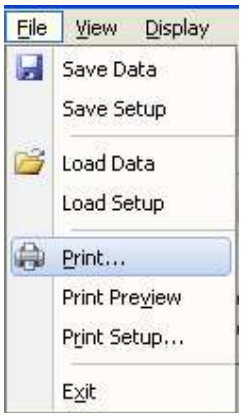
   Load the waveform

2. **Load Setup**

   Load the instrument that had saved

3.9 Print

Click “**Print**” in File.



1. Click “**Print**” in “**File**” menu to set the printer to print the current waveform.
2. Click the “**Print Preview**” in “**File**” menu to get into the Preview window.

In “**Print Preview**” window, use the button to change the size of the waveform graph. Click the “**Close**” button to turn this window off and click the “**Print**” button to print the report.

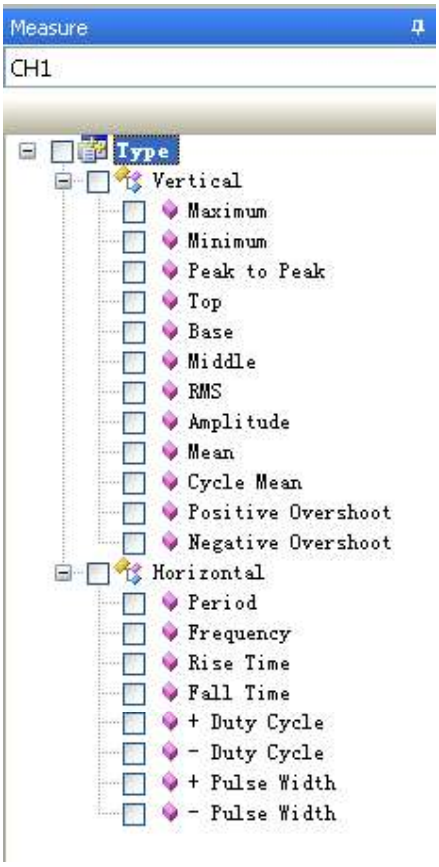
Chapter 4 Application Example

4.1 Simple Measurement

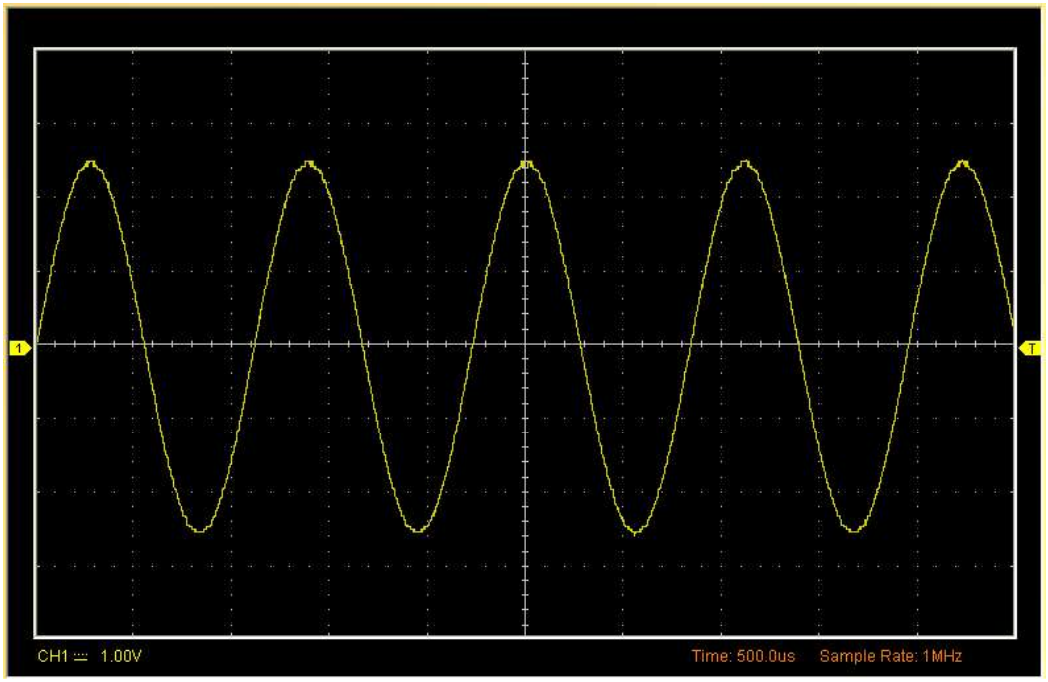
To acquire and display a signal, please do the steps as follows:

Connect signal to **CH1** by using probe

The oscilloscope set the vertical, horizontal, and triggers controls at the best status automatically. Also, you can adjust the controls to meet your measurement to optimize the waveform display.



1. To measure the frequency and "**Vpp**", you can do these steps as follows:
2. Click the ☐ Frequency button, the frequency of the signal display on the bottom of the waveform interface.
3. Click the ☑ Peak to Peak button, the "**Vpp**" of the signal will also display on the bottom of the waveform interface.
4. To clear the measurement on the waveform interface, click the ☑ button.



The results of measure display in Information output.

Information output	
⊟ CH1	
Peak to Peak	5.11V
- Pulse Width	554uS

4.2 Capturing a Single-Shot Signal

To capture a single event, it needs to gather some pre-test knowledge of the signal in order to set up the trigger level and slope correctly. For example, if the event is derived from 3.3V COMS logic, a trigger level of 1.2 or higher Volts should work on a rising edge.

Do these steps as follows:

1. Set the probe and the channel attenuations to X 10.
2. Set up the trigger in the Trigger Menu, or in the Trigger Setting window.
    1) Adjust the Trigger Mode to Edge.
    2) Set the Trigger Sweep to Single.
    3) Set the Trigger Source to CH1.
    4) Set the Trigger Slope to “+” which means you select the rising edge.
    5) Adjust the Volts/Div and the time base in a proper range for the signal.

6) Drag the trigger level sign on the waveform display screen to proper position. It's usually higher a little above the normal level.

7) When the trigger conditions are met, data appears on the display representing the data points that the oscilloscope obtained with one acquisition.

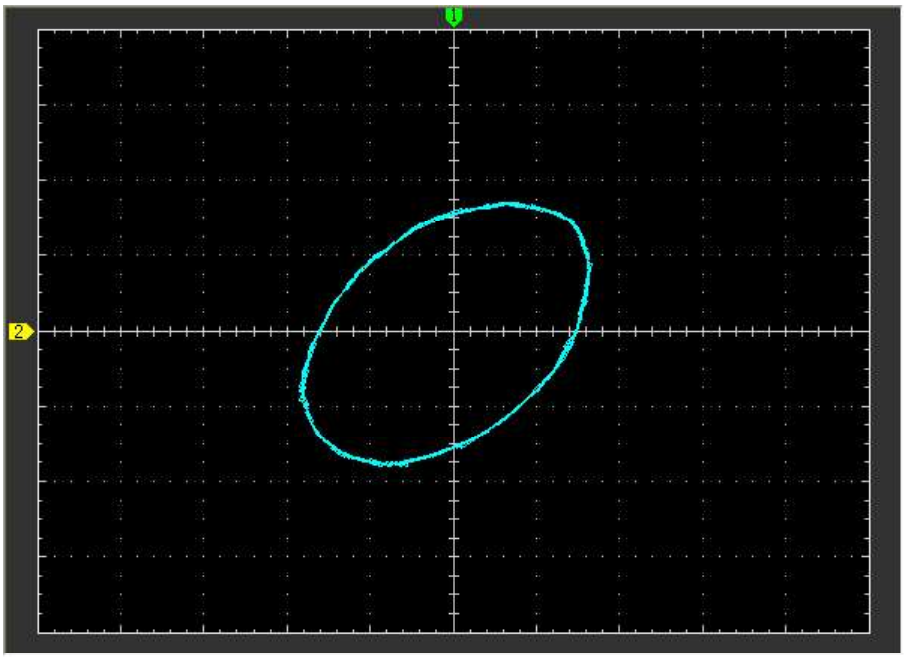
4.3 The Application of the X-Y

X-Y Plot acts to analyze correlation of data of two channels. Lissajous diagram is displayed in the screen when you use **X-Y** Plot, which enables to compare frequencies, amplitudes and phases of counterpart waveform against the reference waveform. This makes it possible to compare and analyze frequency, amplitude and phase between input and output.

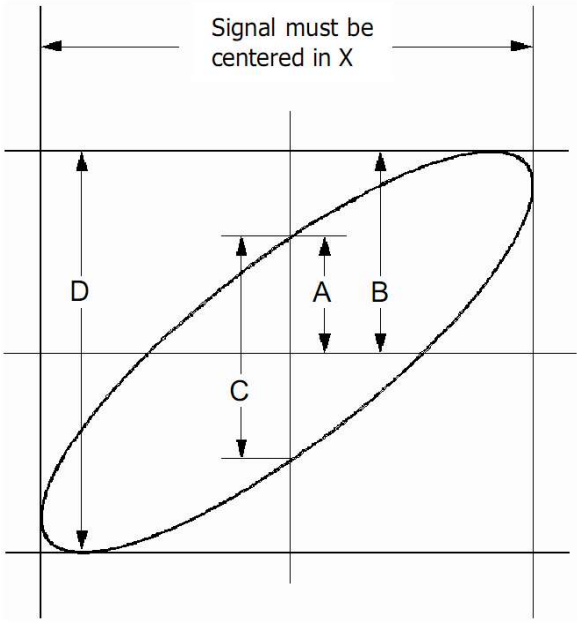
Do these steps as follows:

1. Set the probe attenuation to "**x10**". Set the switch to "**x10**" on the probes.
2. Connect the CH1 probe to the input of the circuit, and connect the CH2 probe to the output of the circuit.
3. Adjust the vertical scale and offset to display approximately the same amplitude signals on each channel.
4. Select X-Y format at Horizontal window. The oscilloscope will displays a Lissajous pattern representing the input and the output characteristics of the circuit.
5. Adjust the scale and offset of the horizontal and vertical to a desirable waveform display. The following picture shows a typical example.
6. Apply the Ellipse Method to observe the phase difference between the two channels.

Signal in X-Y Format:



Instruction of the Ellipse Method



Sinθ = A/B or C/D, where θ = phase shift (in degrees) between the two signals.

From the formula above:

θ = ±arcsine (A/B) or ±arcsine (C/D)

θ must be in the range of (0~π/2) or (3π/2~2π) if the main axis of the ellipse is between I and III quadrant, . If the main axis is at II and IV quadrant, θ must be in the range of (π/2~π) or (π~3π/2).

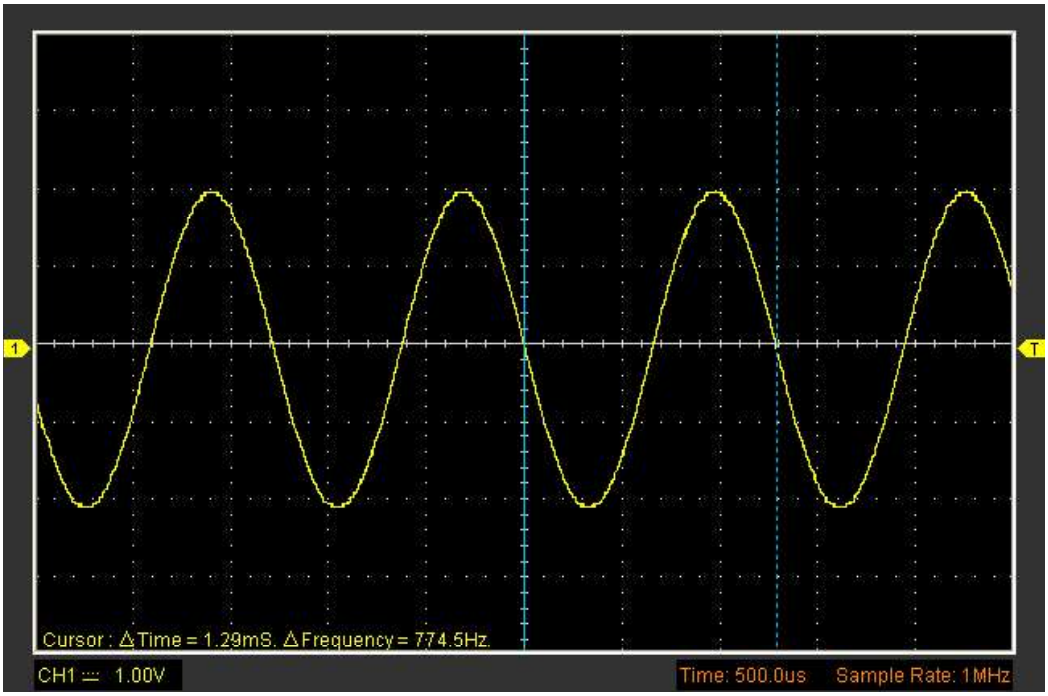
4.4 Taking Cursor Measurements

Use cursors to make time and amplitude measurements on a waveform quickly.

Measure the Peak Frequency or Time of the First Sine Waveform

Do these steps:

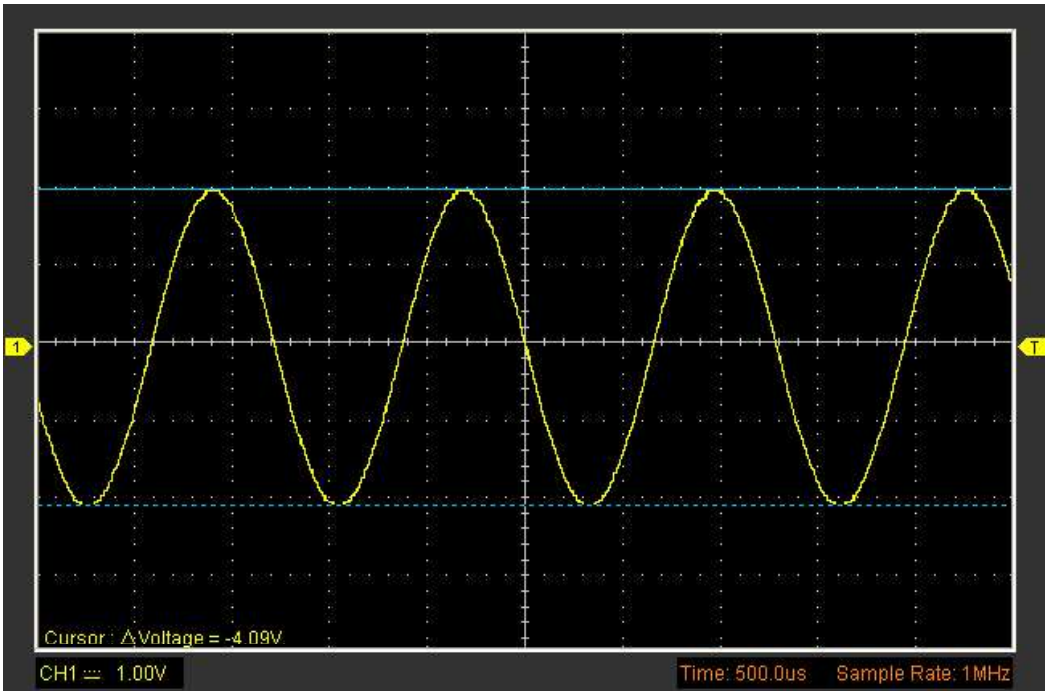
1. Click "**Cursor->Source**", select CH1 (select CH2 if you want measure CH2).
2. Click "**Cursor->Type**", select Vertical.
3. Push left mouse button, and the vertical lines appear.
4. Drag the mouse button to the point you want to measure.
5. Release the left mouse button, the frequency difference and time difference will be shown at the status bar.



Measure the Amplitude of the First Waveform Peak of the Waveform

Do these steps:

1. Click "**Cursor->Source**", select CH1 (select CH2 if you want measure CH2).
2. Click "**Cursor->Type**", select Horizontal.
3. Push left mouse button, and the Horizontal lines appear.
4. Drag the mouse button to the point you want to measure.
5. Release the left mouse button, the voltage difference will be shown at the status bar.



Note: Click "**Cursor->Type**", select "**Cross**", you can measure time and amplitude at one time.

Appendix

Appendix A: Specification

Specifications Table:

Input	
Max. sample rate	Real-time sampling:48MSa/s
Channels	2 Channels
Bandwidth	20MHz (-3dB)
Vertical resolution	8 bits/channel
Gain range	20mV～5V/div@x1 probe(20mV,50mV,100mV,200mV, 500mV,1V,2V,5V/div 1,2,5 sequence) 200mV～50V/div@x10 probe 2V～500V/div@x100 probe 20V～5KV/div@x1000 probe
Range	8 divisions
Offset level	+/-4 divisions
Coupling	DC
Offset increments	0.02 div
Impedance	1M ohm
DC accuracy	+/-3%(200mV, 500mV, 1V, 2V, 5V) +/-6%(20mV, 50mV, 100mV)
Max. Input	+/- 5V
Input protection	35Vpk(Without external attenuation DC + peak AC < 10kHz)
Display mode	Y-T, X-Y
Timebase	
Timebase range	1ns/div～5000s/div(1ns,2ns,5ns,10ns,20ns,50ns,100ns,200ns, 500ns,1us,2us,5us,10us,20us,50us,100us,200us,500us, 1ms,2ms,5ms,10ms,20ms,50ms,100ms,200ms,500ms,1s,2s, 5s,10s,20s,50s,100s,200s,500s,1000s,2000s,5000s/div 1,2,5 sequence)
Range	10 divisions
Buffer Size	MAX.1M samples
Trigger	
Type	Edge trigger: Rising edge, Falling edge
Mode	Auto, Normal and Single
Autoset	Yes
Range	8 divisions
Trigger level	+/-4 divisions
Settabillity	0.02 div increments
Math	
Measurements	Vp-p, Vmax, Vmin, Vmean, Vrms, Vamp, Vtop, Vbase, Vmid,positive overshoot, negative overshoot, cycle mean, cycle RMS, period, frequency, positive pulse width, negative pulse

	width, rise time (10%~90%), fall time (10%~90%), positive duty cycle, negative duty cycle
Math	Addition, Subtraction, Multiplication, Division
FFT	Rectangular, Hanning, Hamming, Blackman Window
Physical	
Interface	Universal Serial Bus(USB 2.0)
Power	No external power source required. Bus-powered from USB

Appendix B: General Maintenance

General Care

Do not store or leave the oscilloscope where the device will be exposed to direct sunlight for long periods of time.

Caution

To avoid damages to the device or probes, do not expose them to sprays, liquids or solvents.
To avoid damages to the surface of the device or probes not use any abrasive or chemical cleaning agents.

Cleaning

Inspect the device and probes as often as operating conditions require. Make sure the device disconnect form all power sources.
To clean the exterior surface, perform the following steps:
1. Remove loose dust on the outside of the oscilloscope and probes with a lint-free cloth. Use care to avoid scratching the clear glass display filter.
2. Use a soft cloth dampened with water to clean the device.

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