
# Shaft Voltage Tester™ Digital Oscilloscope

## AEGIS-OSC-9100

# USER MANUAL

Electro Static Technology™
An ITW Company

# *AEGIS®*
# *Shaft Voltage Tester™*
# *Digital Oscilloscope*

# *User Manual*

**V1.2**

# Declaration

1. Copyright Electro Static Technology, 2016. All rights reserved.

2. The information in this manual replaces all previously published information.

3. The contents of this manual may not be copied, extracted or translated without permission by the company.

# *Safety Information*

Carefully read the following safety information before using your oscilloscope.

Specific warning and caution statements appear throughout the manual, wherever they apply.

**A "Warning" identifies conditions and actions that pose hazard(s) to the user. A "Caution" identifies conditions and actions that the user should notice.**

The following international symbols are used on the oscilloscope and in this manual:

**Hazardous Voltage**

**Protective Earth Ground**

**Warning**

**Earth Ground**

**Power Switch**

- **Use only insulated voltage probes, test leads and adapters supplied with the oscilloscope, or accessories recommended by Electro Static Technology.**
- **Before use, inspect voltage probes, test leads, and accessories for mechanical damage and replace when damaged.**
- **Always connect the battery charger to the AC outlet *before* connecting it to the oscilloscope.**
- **Do not apply voltages higher than 600 V from earth ground to any input when using scope ports in a CAT Ⅲ environment. Do not apply voltages higher than 1000 V from earth ground to any input when using scope ports in a CAT Ⅱ environment.**
- **Do not apply input voltages above the rating of the instrument. Use caution when using 1:1 test leads because the probe tip voltage will be directly transmitted to the oscilloscope.**
- **Do not apply voltages that higher than 300 V from earth ground to any input when using multimeter ports in a CAT Ⅲ environment. Do not apply voltages that higher than 600 V from earth ground to any input when using multimeter ports in a CAT Ⅱ environment.**
- **Do not apply voltages that higher than 300 V from earth ground to the isolated inputs when using multimeter ports in a CAT Ⅲ environment. Do not apply voltages that higher than 600 V from earth ground to the isolated inputs when using multimeter ports in a CAT Ⅱ environment.**

- **Do not insert metal objects into connectors.**

  Use of the oscilloscope in a manner not specified may impair the protection provided by the equipment. Before use, always inspect the test leads for mechanical damage and replace damaged test leads!

  Whenever it is likely that safety has been compromised, the oscilloscope must be turned off and disconnected from the line power. The matter should then be referred to qualified personnel.

## ⚠ Warning:

Standard probe 10:1 supports CAT Ⅱ 400V.

Optional probe supports CAT Ⅱ 1000V and CAT Ⅲ 600V

# *Safe Operation of the Battery*

The AEGIS-OSC-9100 can be used to test floating signal when running on battery. When using both channels to test floating signal, both channels should be connected to the same earth ground, because the ground of the two channels is connected.

⚠ Warning:

Do not connect the ground spring to voltages higher than 42 V peak or 30Vrms from earth ground.

# Introduction to the AEGIS-OSC-9100

The AEGIS-OSC-9100 is a high performance handheld digital oscilloscope with a range of advantages. It is small and easy to carry, has a long battery life, and boasts AEGIS® One-Touch™ screen capture capability. It is more than adequate to the needs of measurement in the field.

## Function Characteristics

- The AEGIS-OSC-9100 combines the functions of dual-channel oscilloscope, multimeter, and recorder with trend plots.
- Each channel can handle voltages as high as CAT II 300V and CAT III 150V.
  Standard probe: 10X CATII 400V
  Optional probe: 10X CAT II 1000V and 10X CAT III 600V
  Oscilloscope and multimeter safety grade is CAT II 600V and CAT III 300V
- 5.7 inches color TFT LCD.
- Maximal bandwidth 100MHz, real time sampling rate 50GSa/s, and memory depth 2Mpts.
- Multimeter display resolution of 6000 points; can measure voltage, current, resistance, capacitance, diode, and continuity.
- Produces oscilloscope and multimeter trendplots, scope includes waveform recorder.
- 3 types of trigger mode: auto, normal and single; 5 types of trigger type: edge, pulse, video, slope and alternative.
- 32 types of auto-measurement function and 3 types of cursor measure mode.
- 5 kinds of digital filter mode: +, -, *, /, FFT.
- Unique digital filter function and waveform recording function.
- 2 groups of reference waveform, 20 groups of common waveform, 10 groups of settings inside Save/Recall; settings, CSVs, and images (.BMP) can be saved to and retrieved from USB flash drive.
- Standard configuration interface: USB Device, USB Host.
- With its lithium battery and small size, the scope is easy to carry and work with in the field

# Accessories

- Quick Start Guide
- A product guaranty card
- A certification
- Two 1:1/10:1 probes
- An AC adapter
- Meter pens for multimeter
- USB probe calibration dongle

## Optional Probe

- 100MHz high-voltage safety probe CAT II 1000V,CAT III 600V
- 200MHz high-voltage safety probe CAT II 1000V,CAT III 600V

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# Chapter 1 Introduction

## About this Chapter

This chapter will help you:

- Understand the front panel and user interface
- Perform a quick function check
- Calibrate the probe (compensation)

## Introduction to the Front Panel and User Interface

The first step is to get an understanding of the front panel before you operate the scope. The following figures will introduce you to the buttons and ports of the AEGIS-OSC-9100.

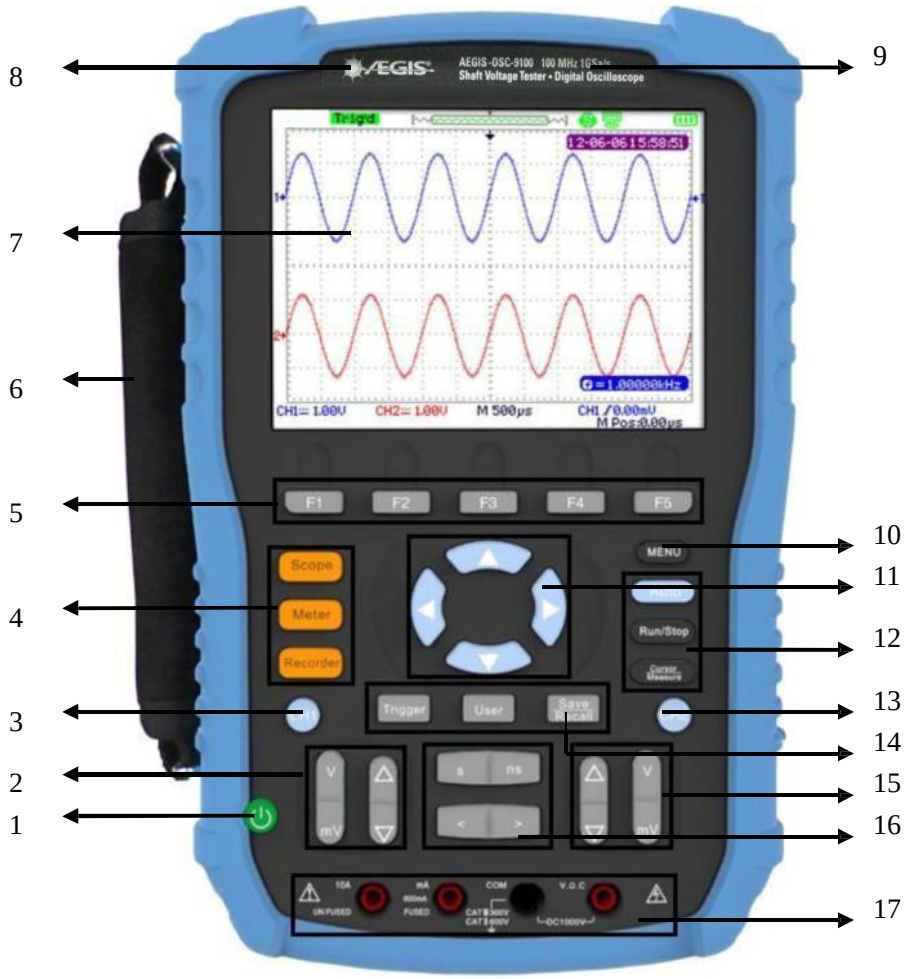



**Figure 1-1 Front Panel**

**Description**

1. power on/off key
2. CH1 vertical range and position key
3. CH1 on /off key
4. Scope, Meter, Recorder function keys
5. option keys
6. Handle
7. LCD
8. LOGO
9. BW and sample rate
10. menu on/off key
11. arrow keys
12. Auto, Run/Stop, Cursor/Measure function keys
13. CH2 on/off key
14. Trigger, User, Save/Recall function keys
15. CH2 vertical range and position keys
16. time base and horizon position keys
17. multimeter input ports

**Notes:**

The arrow keys include these functions: direction keys, moving trigger level, setting the trigger level to zero, choosing menu, setting horizontal position to zero, moving cursor. **Note**: When navigating through the scope's menus, the blue right arrow key acts as an "enter" button to finalize your selection.


**Figure 1-2 Side Panel**

**Description**

1. USB Device
2. USB Host
3. power input port

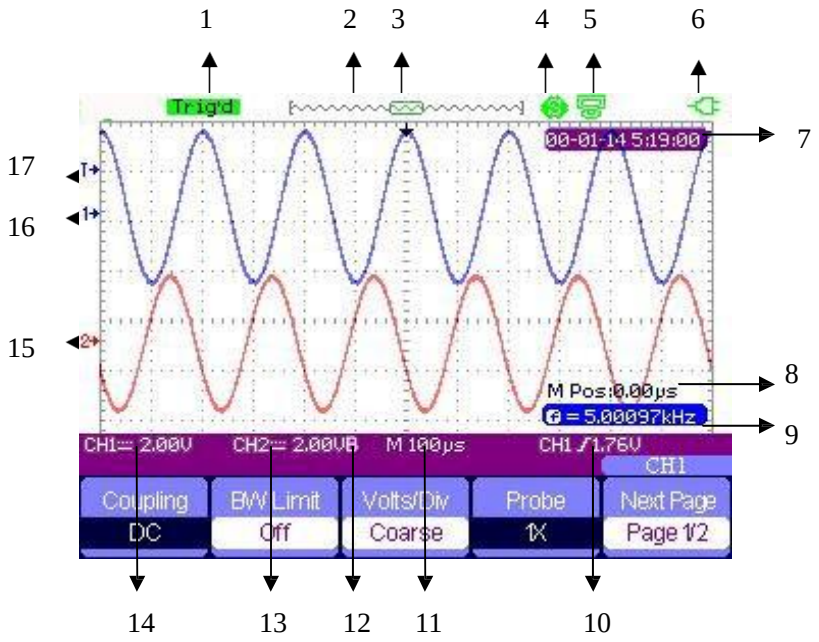



**Figure 1-3 User Interface**

**Description**

1. Trigger state

   **Armed**: The scope is acquiring pre-trigger data. It will ignore all triggers in this state.

   **Ready**: The scope has sampled all pre-trigger data and is ready to accept atrigger.

   **Trig'd**: The scope has been triggered and is acquiring post-trigger data.

   **Stop**: The scope stops sampling data. (Activate/deactivate with Run/Stop button.)

   **Auto**: The scope is sampling data with no trigger under automatic mode. (Activate with the Auto button.)

   **Scan**: The scope samples and displays waveform under scan mode.

2. Shows location of current waveform in the memory
3. Shows the trigger position in the memory
4. **: Print Key** option set to **print figure**

   : **Print Key** option set to **save figure**

5. : **USB Device** option set to **computer**

   : **USB Device** option set to **printer**

6. Shows power state
7. Shows current time
8. Horizontal position
9. Frequency Counter
10. Shows the trigger level
11. Shows the time base
12. "**B"** indicates bandwidth limit is activated
13. Channel's vertical range (volts/div)
14. Channel's coupling state (AC, DC…)
15. "**2**" indicates Channel 2
16. "**1**" indicates Channel 1
17. **"T** "shows the trigger level

# *Function Check and Probe Calibration*

### *Function Check*

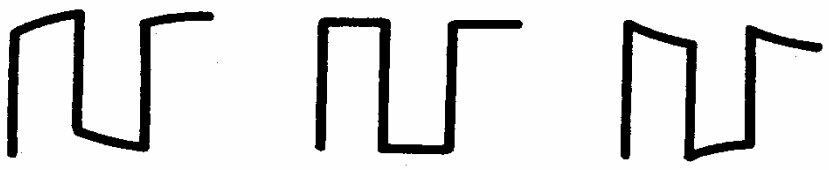
A function check can be done to make sure the scope is working normally. To do this, follow these steps:

1. Turn on the scope. It performs several self-checks
2. Connect the probe to the **CH1** of the product. Align the slot of the probe connector with the bump on the CH1 BNC, push down, and twist right to lock the probe
3. Plug the probe calibration dongle into the small USB port on the scope, and connect the probe tip and reference lead to its prongs
4. Press **[Auto].** Within a few seconds, you should see a series of square waves with 1 kHz frequency and ~3V amplitude peak-peak.
5. Press **[CH1]** twice to turn off Channel 1, then press **[CH2]** to display Channel 2. Repeat steps 2 and 3 to ensure Channel 2 is also working properly.

## *Probe Calibration (compensation)*

When you connect a probe to your scope for the first time, please make the following calibration to adjust the probe to the scope's channel. Probes without compensation or compensation warp may lead to imprecise or falsemeasurements.
You can perform these adjustments manually to match your probe with the input channels.

1. Set the probe option attenuation in the channel menu to 10X and connect the probe to channel 1 on the scope. If you use the probe hook-tip, make sure that the hook-tip is fixed on the probe firmly.
2. Attach the probe tip to the **Probe Comp∼3V** connector and the reference lead to the **Probe Comp Ground** connector. Display the channel and then push **[Auto]**
3. Check the shape of the waveform displaying on the screen.



**Under-Compensated** **Correctly Compensated** **Over-Compensated**

4. Please adjust your probe or repeat all the operations above if necessary.

## *Multimeter Probe Caution*

To avoid damaging your multimeter, you must use the correct input jack when making current, voltage, or other measurements. For voltage, resistance, and capacitance measurements, **always use the right-most jack.**

# Chapter 2 Using the Scope

## About this Chapter

This chapter provides a step-by-step introduction to the oscilloscope functionality of the AEGIS-OSC-9100. This introduction gives basic examples to show how to use the menus and perform basic operations without covering all of the scope's capabilities.

In order to use the scope effectively, you need to know about its buttons, menus, and functions, including menu and control buttons, connector and control, auto-settings, Scope, measurement system, trigger system, storage system and utility system.

## Menu and Control Buttons

**Table 2-1 Function Menu**

| | |
|---|---|
| CH1, CH2 | Channel menu |
| Acquire | Sample menu |
| Display | Display menu |
| Math | Math menu |
| Horizon | Horizon menu |
| Ref | Reference waveform menu |
| MENU | Open/close current menu |
| Auto | Automatic setting control menu |
| Run/Stop | Pause/unpause data collection |
| Cursor | Cursor menu |
| Measure | Automatic measurement menu |
| Trigger | Trigger menu |
| Save/Recall | Save/Recall menu & One-Touch™ screen capture |
| User | Utility menu |

## *Automatic Settings*

When measuring unknown signals of unknown voltage and frequency, you can use the automatic setting function.

***Example: Automatic Setting Application***

1. Input a signal to CH1 or CH2 and then press **[Auto]**.
2. The scope adjusts its settings automatically to display the best peak-peak, average, period, frequency and other information according to the characteristics of the signals.
3. If necessary, you can manually adjust the time base and voltage range to obtain a better view of a waveform.

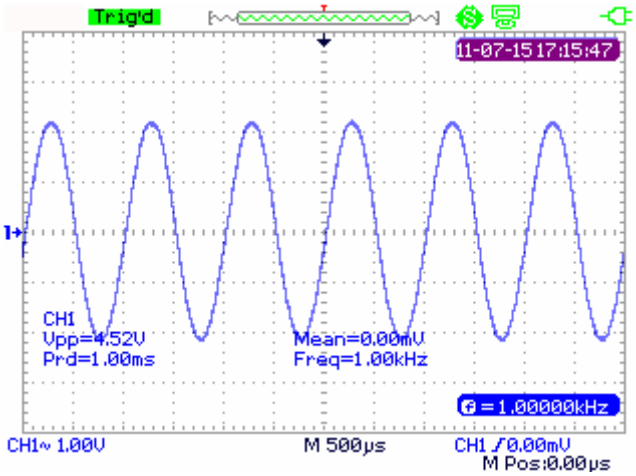



**Figure 2-1 Automatic Setting**

## *CH1/CH2 Channel Functions*

Press **[CH1]**/ **[CH2]** to enter CH1/CH2 channel menu.


**Figure 2-2 Channel Menu 1**

**Table 2-2 CH1/CH2 function Menu 1**

| Option | Setting | Instruction |
|---|---|---|
| Coupling | DC | DC passes both AC and DC components of the input signal. |
| | AC | AC blocks the DC component of the input signals and attenuates signals below 10 Hz. |
| | GND | GND disconnects the input signal. |
| BW Limit | On<br>Off | Limit the bandwidth above 20M to reduce display noise; filter the signals to reduce noise and other unwanted high frequency components. |
| V/div | Coarse | Change the range of voltage by .1-2-5 sequence. |
| | Fine | Fine changes the resolution by small steps under the coarse settings. |
| Probe | 1X, 5X, 10X, 50X, 100X, 500X, 1000X | Set to match the type of probe you are using to ensure correct vertical readouts. |
| Next Page | Page1/2 | Enter the second page of CH1/CH2 menu. |


**Figure 2-3 Channel Menu 2**

**Table 2-3 CH1/CH2 Function Menu 2**

| Option | Setting | Instruction |
|---|---|---|
| Invert | On/Off | Turn on/off invert function. |
| Filter | | Enter the **FILTER** menu. |
| To Zero | | Set waveform vertical position and trigger level to zero. |
| Next Page | Page 2/2 | Return to the first page of CH1/CH2 menu. |


**Figure 2-4 Digital Filter Function Menu**

**Table 2-4 Digital Filter Function Menu**

| Option | Setting | Introduction |
|---|---|---|
| Digital Filter | On | Turn on the digital filter. |
| | Off | Turn off the digital filter. |
| Type | | Setup as LPF (Low Pass Filter).<br>Setup as HPF (High Pass Filter).<br>Setup as BPF (Band Pass Filter).<br>Setup as BRF (Band Reject Filter). |
| Upp_Limit | | Use the up and down arrow keys to set Upp_Limit. |
| Low_Limit | | Use the up and down arrow keys to set Low_Limit. |
| Return | | Return to the CH1 or CH2 menu. |

***Example: Digital Filter***

1. Input a signal to CH1 and press **[AUTO]**.
2. Press **[CH1]** to enter CH1 menu.
3. Press **F5** to enter the second page of the CH1 menu.
4. Press **F3** to enter the digital **Filter** function.
5. Press **F2** to choose a filter type. For example: input a signal with BW 20M and choose **Upp_Limit**.
6. Use up and down arrow keys to set the filter range.
7. Press **F1** to turn on the filter

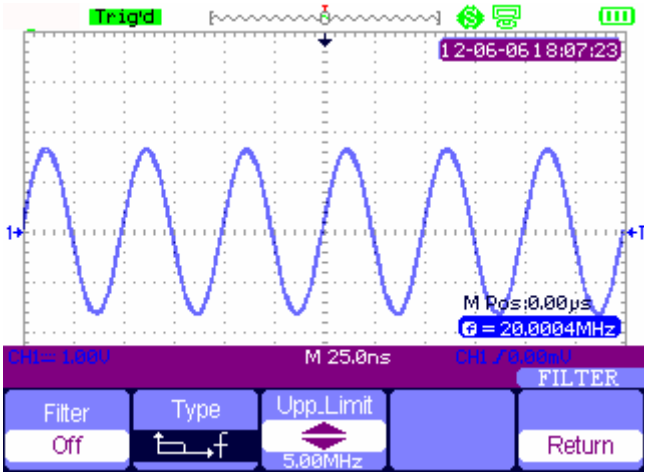



**Figure 2-5 Before Turning On Digital Filter**

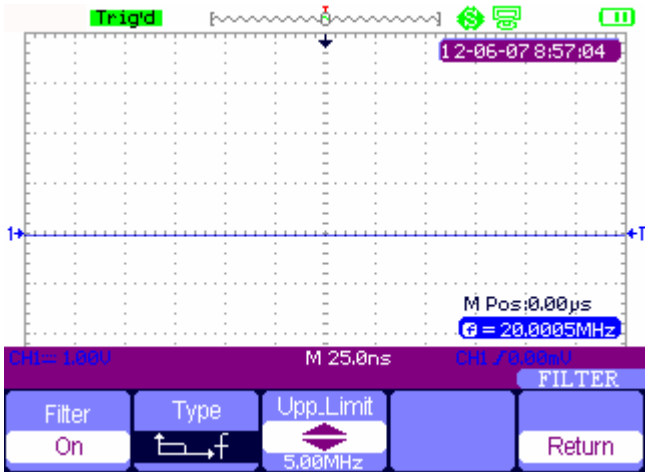



**Figure 2-6 After Turning On Digital Filter**

## *Scope Function Menu*

The **[Scope]** button includes the following functions:

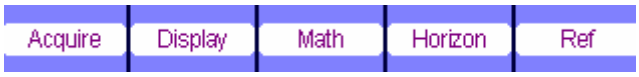



**Figure 2-7 Scope Function Menu**

## *Signal Acquisition*

Press **[Scope]** and choose **Acquire** to choose a signal collection method (Fig. 2-8).

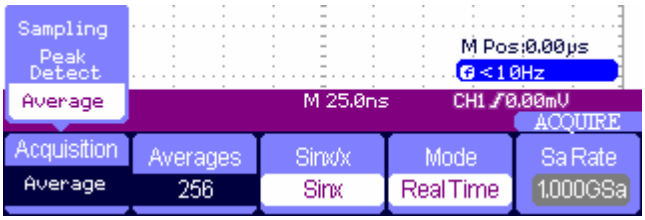



**Figure 2-8 Acquire Signals system function menu**

**Table 2-5 Signal Acquisition Menu**

| Option | Setting | Introduction |
|---|---|---|
| Acquisition | Sampling | Sampling displays most waveforms accurately |
| | Peak Detect | Detect burr and reduce false wave phenomena |
| | Average | Reduce random and irrelevant noise |
| Averages | (4, 16, 32, 64,128,256) | Select a number of points to average together |
| Sinx/x | sinx | Use sin interpolation – gives smoother waveforms |
| | x | Use linear interpolation – more jagged waveforms |
| Mode | Equ time<br>Real time | Set the Sampling mode to Equ time<br>Set the Sampling mode to Real time |
| Sa Rate | | Display system sampling rate |

**Sampling**: The scope constructs a waveform based on a sample of the probe input.

**Peak Detect**: The scope uses the maximum and minimum values of the signal in every interval to construct the waveform.

**Average**: The scope acquires several waveforms, averages them, and displays the final waveform. The more times averaged, the smoother of the waveform.

**Equivalent Time Sampling**: This mode is good for observing repetitive period waveforms. The sampling rate is up to 50GSa/s.

**Real Time Sampling**: The scope has the highest real-time sampling rate up to 1GSa/s.

***Example: Interpolation with Sinx/x***

1. Press **[Scope]**and choose **Acquire** to enter the acquisition menu.
2. Press **[F4]** to choose **Real Time**.
3. Press **[F3]** to choose **Sinx/x**.

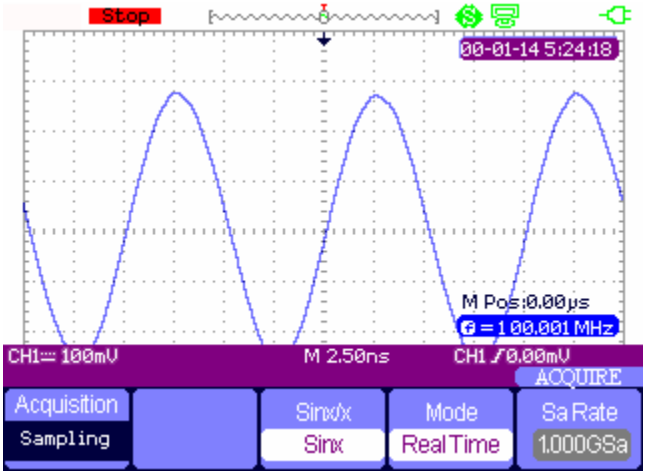



**Figure 2-9 Sinx Interpolation**

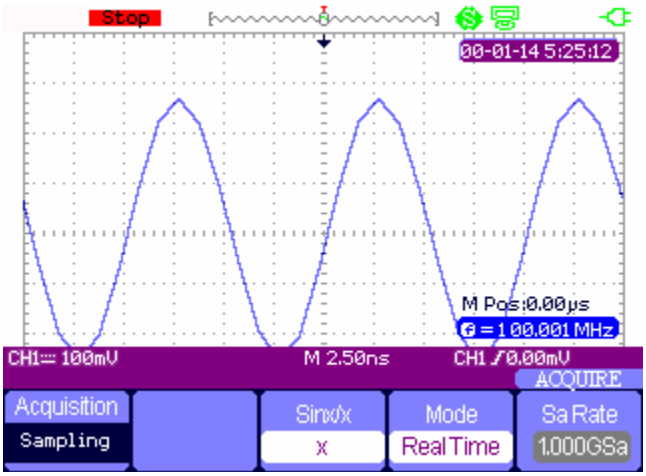



**Figure 2-10 X Interpolation**

## *Display System*

Press **[Scope]** and choose **Display** to enter the display menu. See Figure 2-6.


**Figure 2-11 Display Menu 1**

**Table 2-6 Display System Function Menu**

| Option | Setting | Introduction |
|---|---|---|
| Type | Vectors | Vectors fill the space between adjacent sample points in the display |
| | Dots | Dots: display sample points directly |
| Persist | Off<br>1 sec<br>2 sec<br>5 sec<br>Infinite | Sets the length of time each displayed sample point remains displayed |
| Intensity | ◆ <Intensity> | Set waveform intensity |
| Brightness | ◆ <Brightness> | Set grid brightness |
| Next Page | Page 1/2 | Enter the second page of DISPLAY menu |


**Figure 2-12 Display Menu 2**

**T7 Display system function menu 2:**

| Option | Setting | Introduction |
|---|---|---|
| Format | YT | YT format displays the voltage on the y-axis (vertical) and time on the x-axis |
| | XY | XY format has CH1 input on the x-axis and CH2 input on the y-axis |
| Screen | Normal | Set to normal mode |
| | Inverted | Set to invert color display mode |
| Grid | ⊞<br>▭ | Display grids and axes on the screen<br>Turn off the grids<br>Turn off the grids and axes |
| Menu Display | 2sec, 5sec, 10sec, 20sec, Infinite | Set how long menus display onscreen |
| Next Page | Page 2/2 | Return to the first page of DISPLAY menu |

***Example: XY Waveform Application***

1. Input 2 sine signals to the channels, with the same frequency and range, and phase difference of 90 degrees, then press the **[Auto]** button.
2. Press **[Scope]** and choose **Display** to enter the display system.
3. Press **[Next Page]** to enter the second page of DISPLAY menu.
4. Press **[F1]** to choose XY mode.
5. Adjust the vertical range of CH 1 and CH 2 to obtain the best XY waveform.

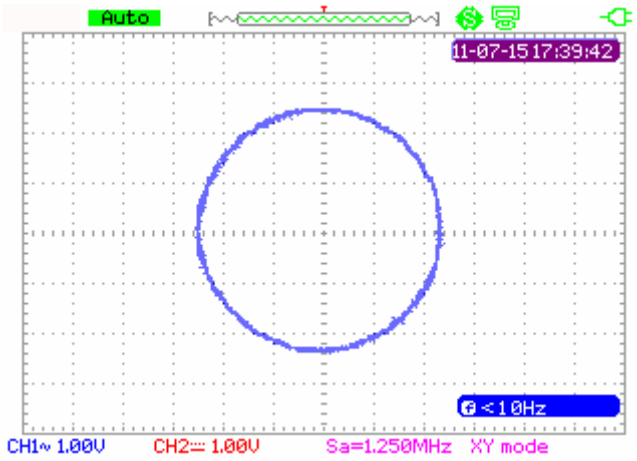



**Figure 2-13 XY Waveform**

## *Math Waveform*

Press **[Scope]** and choose **Math** to enter the math waveform function menu.


**Figure 2-14 MATH Menu**

**Table 2-8 Math Menu Function**

| Option | Setting | Instruction |
|---|---|---|
| Operation | ＋ | CH1+CH2 |
| | — | CH1-CH2, CH2-CH1 |
| | * | CH1*CH2 |
| | / | CH1/CH2, CH2/CH1 |
| | FFT | Fast Fourier Transform |
| Invert | On | Invert the waveform |
| | Off | Turn off the invert function |
| Next Page | Page1/2 | Enter the second page of MATH menu |


**Figure 2-15 MATH Function Menu**

**Table 2-9 Addition operation**

| Option | Setting | Instruction |
|---|---|---|
| | | Use arrow keys to move the waveform up |
| | | Use arrow keys to adjust the scale of math waveform |
| Waveform Math Switch | On | Turn on the math waveform |
| | Off | Unique key turn off the math waveform |
| Next page | Page2/2 | Return to the first menu off math waveform |

***Example: Waveform Math Application***

1. Input two signals to the channels and press **[Auto]**
2. Press **[Scope]** and choose **Math**.
3. Press **[F1]** to choose "+" operation.
4. Press **[F5]** to enter the second page of waveform operation menu.
5. Use and functions keys and the arrow keys to change the parameters to display the best waveform.
6. Press **[F4]** to turn off the math operation.

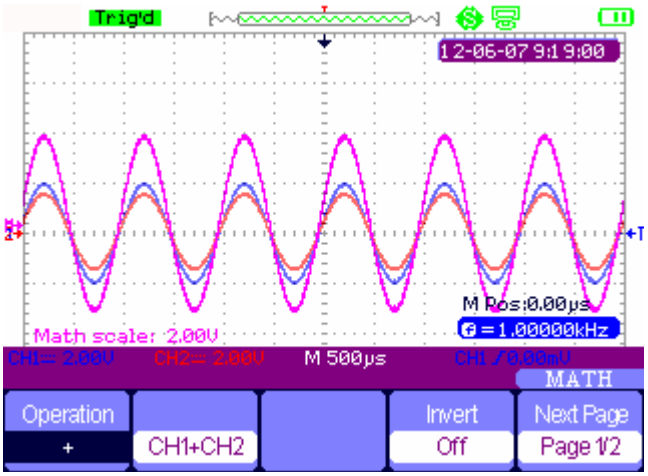



**Figure 2-16 Result of Two Waveforms Add**

**About Fast Fourier Transform (FFT)**

The FFT math operation translates a time domain signal into the frequency domain.


**Figure 2-17 FFT Function Menu 1**


**Figure 2-18 FFT Function Menu 2**

**Table 2-10 FFT Window Function**

| Window | Characteristic | Best to Use with… |
|---|---|---|
| Rectangular | The best frequency resolution but the worst magnitude resolution. Essentially the same as no window. | Symmetric transients or bursts. Equal-amplitude sine waves with fixed frequencies. Broadband random noise with a relatively slowly varying spectrum. |
| Hanning | Better frequency, poorer magnitude accuracy than rectangular. | Sine, periodic, and narrow-band random noise. |
| Hamming | Hamming has a slightly better frequency resolution than Hanning. | Transient or burst pulses. The ranges of the signals have great difference from before to after. |
| Blackman | Best magnitude resolution but worst frequency resolution. | Single frequency waveforms, to find higher order harmonics. |

**FFT Zoom:** zoom in FFT waveform vertically by 1X, 2X, 5X and 10X.

**Scale:** choose **dBVrms** or **Vrms** as unit of measurement.

**Display: Split** shows both the unprocessed signal and its transform; **Full Screen** shows only the transformed signal.

***Example: FFT***

1. Input a signal to **CH1** and press **[Auto]**.
2. Press **[Scope]** and choose **Math**.
3. Press **[F1]** to choose **FFT**.
4. Press **[F5]** to enter the second page of the menu and adjust the setups.
5. Adjust the channel vertical scale and complete FFT waveform's vertical position and vertical scale settings.

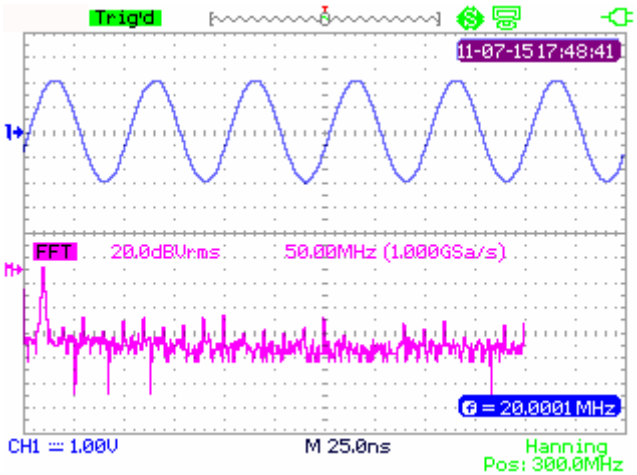



**Figure 2-19 FFT Waveform**

## *Horizontal System*

Press **[Scope]** and then choose **Horizontal** to enter the horizontal function menu.


**Figure 2-20 Horizontal System Menu**

**Delay scan:** zoom in the waveform being chosen.

**Memory depth:** normal memory and long memory.

***Example: Delay Scan***

1. Input a waveform to **CH1** or **CH2**.
2. Adjust time scale to display the best waveform.
3. Press **[Scope]** and then choose **Horizontal** to enter horizontal system.
4. Press **[F1]** to turn on delayscan.
5. Change time base and choose a window of waveform to zoom in and analyze.
6. Press **[F1]** to turn off delay scan.

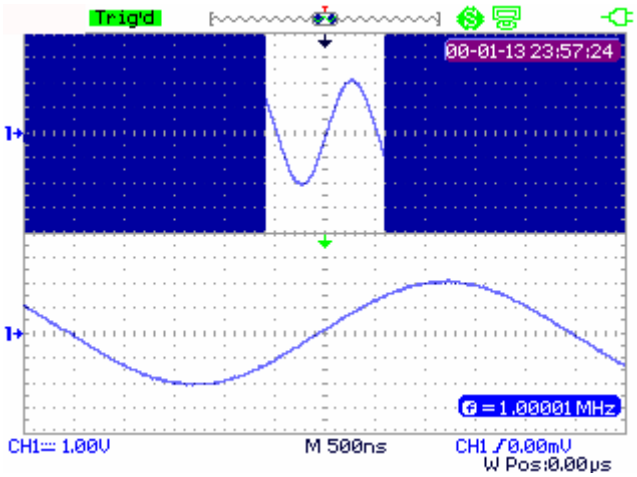



**Figure 2-21 Delay Scan Waveform**

***Example: Normal Memory and Long Memory under Real Time Sample Application***

1. Input a sine signal with 100M bandwidth and 4V Vpp to CH1 or CH2, adjust time base to 50nS. The common storage sampling rate will be 1GSa/s while the long storage is 500MSa/s at this time.
2. Press **[Run/Stop]** while using normal storage or long storage.
3. Change time scale to let the whole waveform display on the screen.
4. Count memory depth: Sampling Points=Sampling Rate *Sampling Time

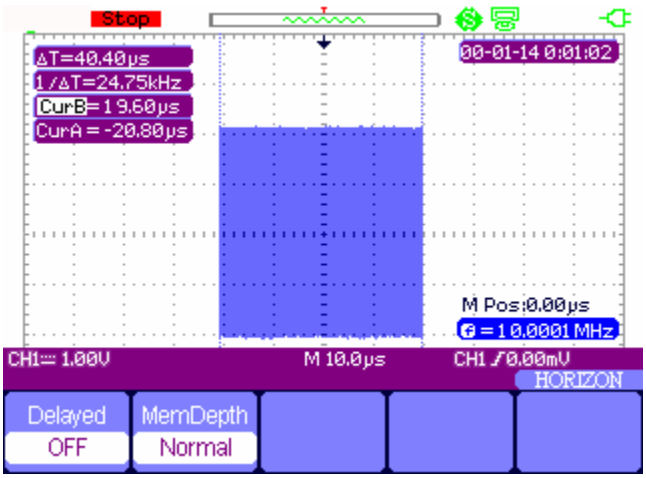



**Figure 2-22 Normal Memory**

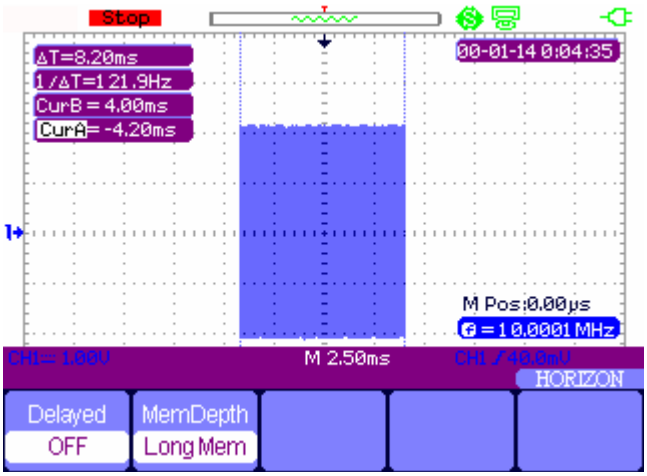



**Figure 2-23 Long Memory**

## *Reference waveform*

Press **[Scope]** and choose **Ref** to enter the reference waveform function menu.


**Figure 2-24 Reference Waveform Menu**

**Table 2-11 REF Waveform Function Menu**

| Function | Setting | Instruction |
|---|---|---|
| Signal | CH1/CH2 | Choose the waveform to be saved |
| Ref A/Ref B | | Choose to save or recall the reference position of the waveform |
| Save | | Save the source waveform to the selected reference position |
| Ref A/Ref B | On<br>Off | Display the reference waveform on the screen.<br>Clear the reference waveform from the screen |

***Example: Reference Waveform***

1. Input a waveform to **CH1** or **CH2**.
2. Adjust time base to display the best waveform.
3. Press **[Scope]** and choose **Ref** to enter horizontal system.
4. Choose the reference waveform need to save and press **[F4]** to save.
5. Press **[F5]** to show the reference waveform.
6. Press **[F5]** to clear the reference waveform.

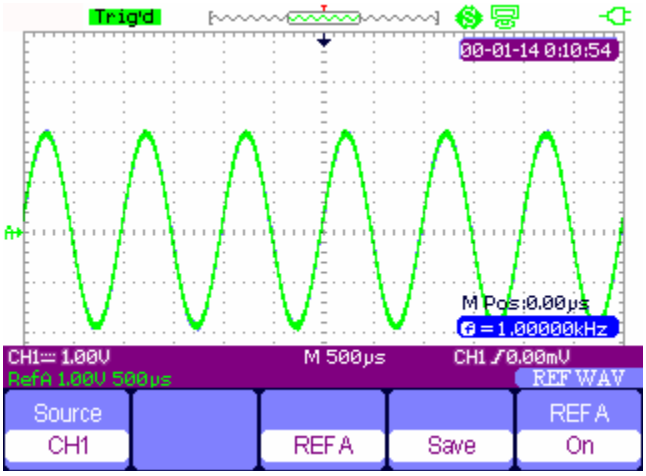



**Figure 2-25 Reference Waveform**

# *Cursor and Measure System*

## *Cursor measure*

Press **[Cursor/Measure]**once to enter the cursor measure system. There are three modes of measure: manual, track, automatic.

**Manual mode**: two horizontal or vertical cursors appear and we use them to measure voltage or time parameters. The space between the cursors can beadjusted.


**Figure 2-26 Manual Cursor Measurement**

**Table 2-12 Manual Mode Function Menu**

| Option | Setting | Description |
|---|---|---|
| Cursor Mode | Manual | Use manual cursor measure |
| Type | Voltage<br>Time | Use cursors to measure voltage<br>Use cursors to measure time |
| Source | CH1, CH2<br>MATH ,<br>REFA,REFB | Choose the signal to be measured by cursors. |
| Cur A | | Use arrow keys to adjust position of cursor A. |
| Cur B | | Use arrow keys to adjust position of cursor B. |

**Track mode**: In this mode, the screen displays two cross cursors. The cross cursor sets the position on the waveform automatically. You can manually adjust their position on the waveform with the arrow keys. The oscilloscope displays the values on the top of the right screen.


**Figure 2-27 Cursor Trace Menu**

**Table 2-13 Track Mode Function Menu**

| Option | Setting | Descriptio |
|---|---|---|
| Cursor Mode | Track | In this mode, set track cursor measure. |
| Cursor A | CH1, CH2<br>NONE | Set the input signal channel that the Cursor A will measure. |
| Cursor B | CH1, CH2<br>NONE | Set the input signal channel that the Cursor B will measure. |
| Cur A | | Use arrow keys to adjust the position of cursor A. |
| Cur B | | Use arrow keys to adjust the position of cursor B. |

***Example: Track Mode***

1. Press **[Cursor/Measure]** once to enter cursor system.
2. Press **[F1]** to choose **Track** mode.
3. Adjust Cursors A and B to trace waveform with arrow keys.

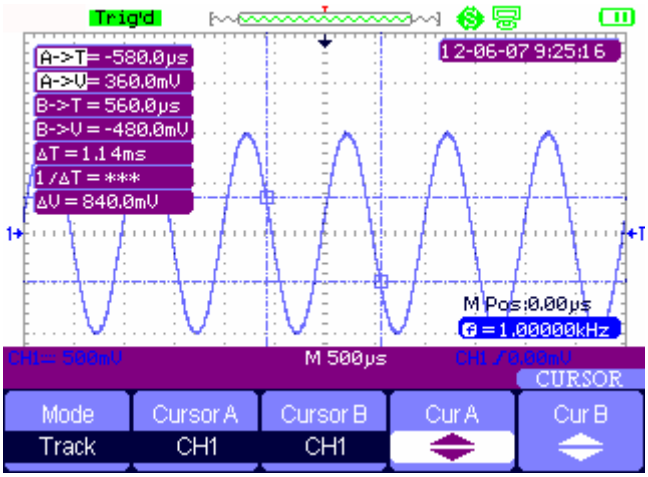



**Figure 2-28 Cursor Trace Menu**

**Automatic measure mode**: This mode will take effect with automatic measurements. The oscilloscope will display cursors while measuring parameters automatically. These cursors demonstrate the physical meanings of these measurements.

***Example: Automatic Measure with Cursors***

1. Press **[Cursor/Measure]** once to enter cursor system.
2. Press **[F1]** to choose **Auto** mode.
3. Press **[Cursor/Measure]** again and choose parameter types to be measured.

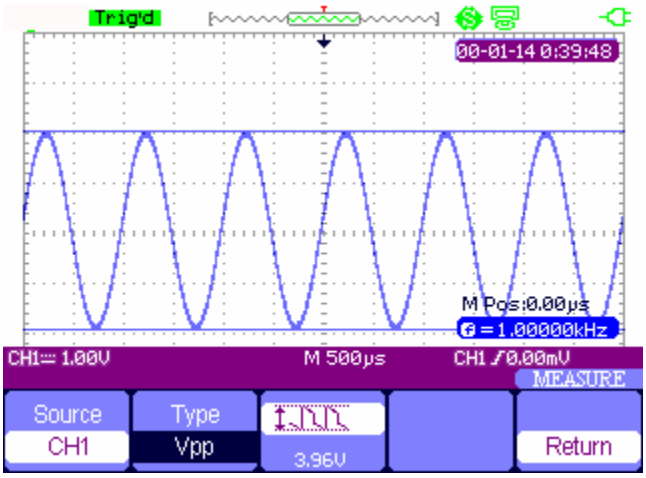



**Figure 2-29 Auto Measure**

## *Measuring other Parameters*

Press **[Cursor/Measure]** twice and any key from **F1** ～ **F5** to enter parameter measurement system.


**Figure 2-30 Parameter Measure Function Menu**

**Table 2-14 Parameter Measure Function**

| Option | Description |
|---|---|
| Voltage | Press this button to enter the Voltage measure menu. |
| Time | Press this button to enter the Time measure menu. |
| Delay | Press this button to enter the Delay measure menu. |
| All Mea | Press this button to enter the All Measurement menu. |
| Return | Return to the home page of MEASURE menu. |

### Voltage Parameter Measurements


**Figure 2-31 Parameter Measure Function Menu**

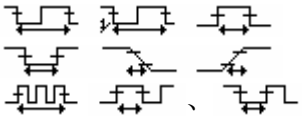
**Table 2-15 Voltage Measure Function**

| Option | Setting | Description |
|---|---|---|
| Source | CH1,CH2 | Select input signal source for voltage measurement |
| Type | Vpp, Vmax, Vmin, Vamp, Vtop, Vbase, Vavg, Mean, Vrms, FOV, FPRE, ROV, RPRE , | Press **F2** or use the arrow keys to select voltage measurement |
| Icon |  | Display the corresponding icon and measured value of your selected voltage measurement |
| Return | | Return to the MEASUREMENT menu home page |

## Time Parameter Measurements


**Figure 2-32 Time Measure Function Menu**

**Table 2-16 Time Measure Function**

| Option | Setting | Description |
|---|---|---|
| Source | CH1, CH2 | Select input signal source for Time measurement |
| Type | Period, Freq, +Wid, -Wid, Rise Time, Fall Time, BWid, +Dut, -Dut | Press F2 or use the arrow keys to select time measurement |
| |  | Display the corresponding icon and measured value of the selected time measurement |
| Return | | Return to the MEASURE menu home page |

## Delay Parameter Measurement

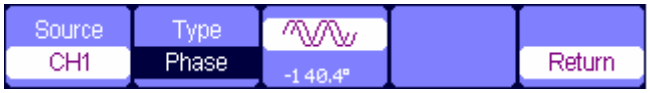



**Figure 2-33 Delay Measure Function Menu**

**Table 2-17 Delay Measure Function**

| Option | Setting | Description |
|---|---|---|
| Source | CH1, CH2 | Select input signal source for delay measurement |
| Type | Phase、FRR、FRF、FFR、FFF、LRR、LRF、LFR、LFF | Press the "Type" button or use arrow keys to select delay measurement to make |
| | | Display the corresponding icon and measure value of your selected Delay measurement |
| Return | | Return to the home page of MEASURE menu |

## All Parameters Measurements


**Figure 2-34 All Measure Function Menu**

**Table 2-18 All Measure Function Menu**

| Option | Setting | Description |
|---|---|---|
| Source | CH1<br>CH2 | Select input signal channel |
| Voltage | On/Off | Turn on/off all voltage parameter measurements |
| Time | On/Off | Turn on/off all time parameter measurements |
| Delay | On/Off | Turn on/off all delay parameter measurements |
| Return | | Return to the "All Measure main menu" |

**Table 2-19 All Measure Function Menu**

| Measure Type | Introduction |
|---|---|
| Vmax | The positive peak voltage. |
| Vmin | The negative peak voltage. |
| Vpp | The absolute difference between positive peak voltage and negative peak voltage. |
| Vtop | The maximal voltage during the measure. |
| Vbase | The minimal voltage during the measure. |
| Vamp | The difference between the Vtop and the Vbase voltage. |
| Vavg | The arithmetic mean over the first cycle of the waveform. |

| | |
|---|---|
| Mean | The arithmetic mean over the entire waveform. |
| Crms | Virtual value: the true Root Mean Square voltage of the first cycle in the waveform. |
| Vrms | The true Root Mean Square voltage over the entire waveform. |
| ROVShoot | Defined as (Vmax-Vhig)/Vamp after the waveform rises. |
| FOVShoot | Defined as (Vmin-Vlow)/Vamp after the waveform falls. |
| RPREshoot | Defined as (Vmin-Vlow)/Vamp before waveform rises. |
| FPREshoot | Defined as (Vmax-Vhig)/Vamp before waveform falls. |
| Rise Time | The time between the first voltage level rising from 10% to 90%. |
| Fall Time | The time between the first voltage level falling from 90% to 10% |
| BWid | The duration of a burst over the entire waveform. |
| + Wid | The time between the first rising edge and the next falling edge of 50% voltage level. |
| - Wid | The time between the first falling edge and the next rising edge of 50% voltage level. |
| + Duty | The ratio between the first positive pulse width and the period. |
| - Duty | The ratio between the first negative pulse width and the period. |
| Phase | The phase difference between two waveforms. |
| FRR | The time between the first rising edge of source 1 and the first rising edge of source 2. |
| FRF | The time between the first rising edge of source 1 and the first falling edge of source 2. |
| FFR | The time between the first falling edge of source 1 and the first rising edge of source 2. |
| FFF | The time between the first falling edge of source 1 and the first falling edge of source 2. |
| LRR | The time between the first rising edge of source 1 and the last rising edge of source 2. |
| LRF | The time between the first rising edge of source 1 and the last falling edge of source 2. |
| LFR | The time between the first falling edge of source 1 and the last rising edge of source 2. |
| LFF | The time between the first falling edge of source 1 and the last falling edge of source 2. |

***Example: Parameter Measurement***

1. Press **[Cursor/Measure]** twice and any key of **F1～F5** to enter parameter measurement system.
2. Choose any key out of **F1～F5** to choose measure type. For example: **Voltage.**
3. Press **[F2]** to choose measure parameter. For example: **Vpp**.
4. Press **[F5]** to return.

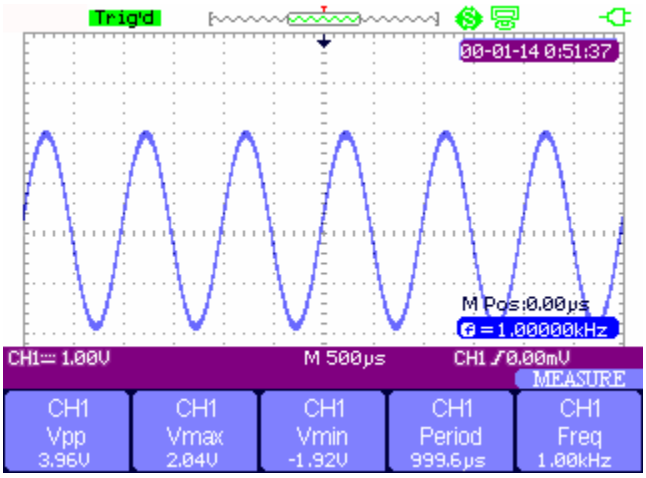



**Figure 2-35 All Measure Function Menu**

***Example: Measuring All 32 Parameters***

1. Input two sine signals respectively to CH1 and CH2, with the same frequency and amplitude but different phases.
2. Adjust time base and vertical scale to obtain the best waveform.
3. Press **[Cursor/Measure]** and choose **All**.
4. Turn on **Voltage**, **Time**, and **Delay**. All 32 parameters will be displayed.

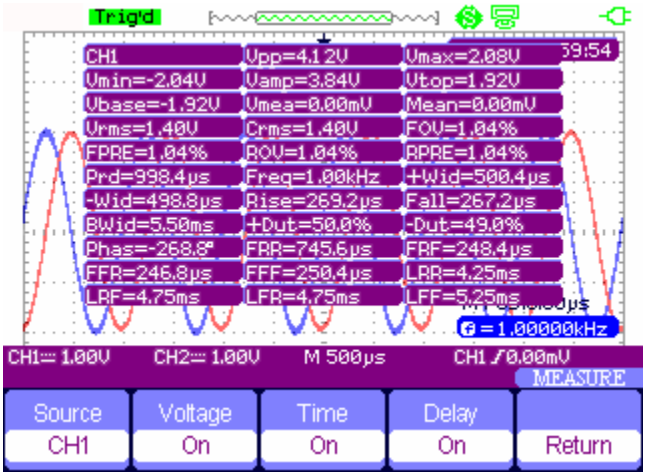



**Figure 2-36 32 Types of Parameter Measurement**

# *Trigger System*

There are 5 kinds of trigger function: edge, pulse, video, slope, alternative. Press **[Trigger]** to enter the trigger system.

## Edge Trigger


**Figure 2-37 Edge Trigger Function Menu**

**Table 2-20 Edge Trigger Function Menu**

| Option | Setting | Description |
|---|---|---|
| Type | Edge | Trigger on the rising or falling edge of the input signal. |
| Source | CH1, CH2 | Set CH1 or CH2 as a trigger source. |
| Slope | ↑<br>↓<br>↑↓ | Trigger on rising edge of the trigger signal.<br>Trigger on falling edge of the trigger signal.<br>Trigger on rising and falling edge of the trigger signal. |
| Mode | Auto | Use this mode to let the acquisition free-run in the absence of a valid trigger. This mode allows an un-triggered, scanning waveform at 100 ms/div or slower time base settings. |
| | Normal | Use this mode when you want to see the valid trigger waveforms only; the scope will not acquire waveform until satisfied trigger. |
| | Single | The setup detects a trigger and acquires waveform, then stop. |
| Setting | | Enter the “Trigger Setup Menu”. |

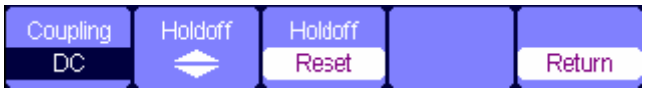



**Figure 2-38 32 Trigger Setting Function Menu**

**Table 2-21 Trigger Setting Menu**

| Option | Setting | Description |
|---|---|---|
| Coupling | DC | Passes all components of the signal |
| | AC | Blocks DC components and attenuates signals below 170Hz |
| | HF Reject | Attenuates the high-frequency components above 140kHz |
| | LF Reject | Blocks the DC component and attenuates the low-frequency components below 7 kHz |
| Hold off ◆ | | Using the arrow keys to adjust hold off time(sec)，the hold off value is displayed |
| Hold off Reset | | Reset hold off time to 100ns |
| Return | | Return the first page of the menu |

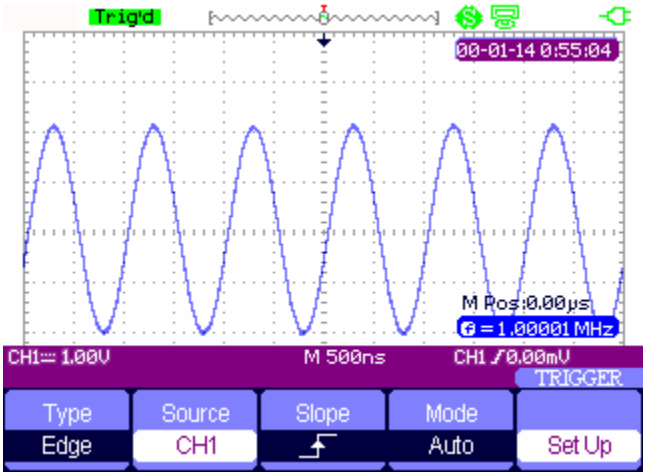



**Figure 2-39 Signal Rise Trigger Menu**

## Pulse Trigger


**Figure 2-40 Pulse Trigger Function Menu 1**

**Table 2-22 Pulse Trigger Function Menu 1**

| Option | Setting | Description |
|---|---|---|
| Type | Pulse | Make the pulse trigger match the (regular) trigger condition |
| Source | CH1, CH2 | Select input signal source |
| Condition | (Positive pulse width less than pulse width set)<br>(Positive pulse width larger than pulse width setting)<br>(Positive pulse width equal to pulse width setting)<br>(Negative pulse width less than pulse width setting)<br>(Negative pulse width larger than pulse width setting)<br>(Negative pulse width equal to pulse width setting) | Set the pulse trigger condition - It triggers as soon as the condition is met |
| Set Width | 20.0ns～10.0s | Selecting this option can turn the arrow keys to set up the pulse width. |
| Next Page | Page 1/2 | Enter the second page of the menu. |


**Figure 2-41 Pulse Trigger Function Menu 2**

**Table 2-23 Pulse Trigger Function Menu 2**

| Option | Setting | Description |
|---|---|---|
| Type | Pulse | Select the pulse to trigger the pulse match the trigger condition |
| Mode | Auto<br>Normal<br>Single | Select the type of triggering; Normal mode is best for most Pulse Width trigger applications |
| Setup | | Enter the “Trigger setup menu” |
| Next Page | Page 2/2 | Return to the first page of the menu |

***Example: Pulse Trigger Application***

1. Input a pulse signal.
2. Press **[Trigger]** to enter trigger menu.
3. Press **[F1]** to choose **pulse** trigger.
4. Press **[F3]** to set pulse trigger conditions.
5. Press **[F4]** and use arrow keys to set pulse width.
6. Move trigger level line with the up and down arrow keys. The scope will trigger as soon as the signal meets the trigger conditions.

**Notes:**

We can't adjust the trigger level line under the **SetWidth** menu as we use the up and down arrow keys to set both the pulse width and trigger level line. If you want to adjust the trigger level, you must first exit the **SetWidth** menu.

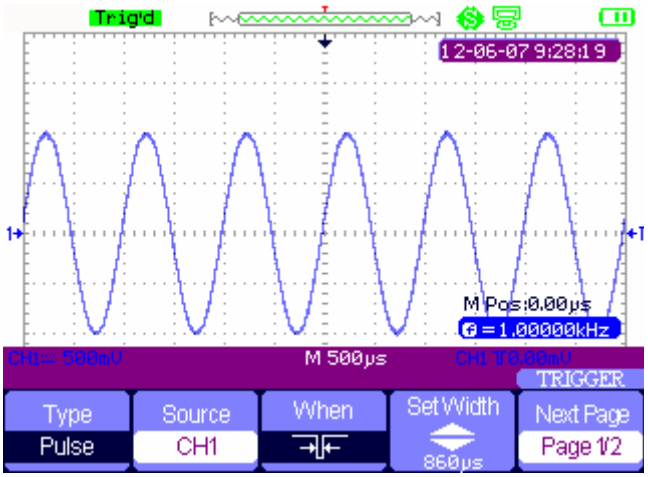



**Figure 2-42 Pulse Trigger**

## Video Trigger


**Figure 2-43 Video Trigger Menu 1**

**Table 2-24 Pulse Trigger Function Menu 2**

| Option | Setting | Description |
|---|---|---|
| Type | Video | Select the video type with AC coupling, and you can trigger on NTSC, PAL and SECAM video signal |
| Source | CH1, CH2 | Select the input source to be the trigger |
| Polarity | ⊓(Normal) | Normal triggers on the negative edge of the sync pulse |
| | ⊔(Inverted) | Inverted triggers on the positive edge of the sync pulse |

| | | |
|---|---|---|
| Sync | All Lines<br>Line Num<br>Odd Field<br>Even Field | Select appropriate video sync |
| Next Page | Page 1/2 | Enter the second page of “Video trigger menu” |


**Figure 2-44 Video Trigger Menu 2**

**Table 2-25 Pulse Trigger Function Menu 2**

| Option | Setting | Description |
|---|---|---|
| Type | Video | Select the video type with AC coupling, and you can trigger on NTSC, PAL and SECAM video signal |
| Standard | NTSC, PAL/SECAM | Select the video standard for sync and line number count |
| Mode | Auto | Use this mode to let the acquisition free-run in the absence of a valid trigger; This mode allows an un-triggered, scanning waveform at 100 ms/div or slower time base settings |
| | Normal | Use this mode when you want to see only valid triggered waveforms; when you use this mode, the oscilloscope does not display a waveform until after the first trigger |
| | Single | When you want the oscilloscope to acquire a single waveform, press the “SINGLE ”button |
| Set up | | Enter the “Trigger setup menu” |
| Next Page | Page 2/2 | Return the first page of “Video Trigger menu” |

***Example: Video Trigger***

1. Input a video signal.
2. Press **[Trigger]** to enter trigger menu.
3. Press **[F1]** to choose **Video.**
4. Press **[F5]** to enter the second page of video trigger menu.
5. Press **[F2]** to choose **PAL/SECAM** or **NTSC** meeting with the input signal.
6. Press **[F5]** to return to the first page of video trigger menu.
7. Press **[F5]** to choose the type of **Sync.** If you choose Line Number, use the up and down arrow keys to set the line number.
8. Move trigger level line with the up and down arrow keys to set the trigger position.

**Notes:**

As with pulse triggers, we can't adjust the trigger level line under the **Line Number** menu as we use the up and down arrow keys to set both the pulse width and trigger level line. If you want to adjust the trigger lever, you must first exit the **Line Number** menu.

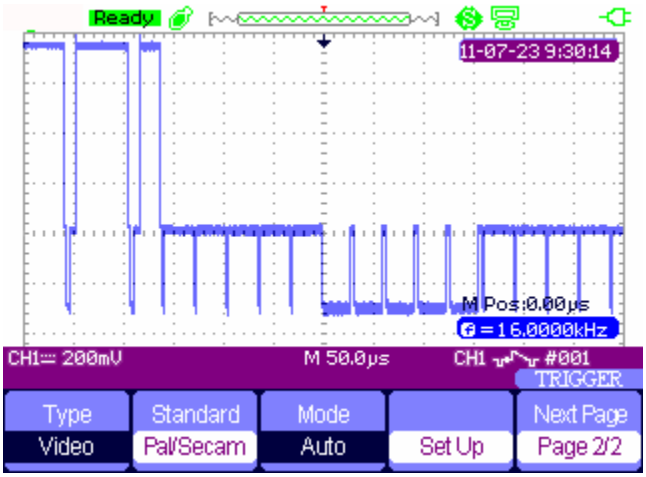



**Figure 2-45 Video Trigger**

## Slope trigger


**Figure 2-46 Slope Trigger 1**

**Table 2-26 Slope Trigger Function Menu 1**

| Option | Setting | Description |
|---|---|---|
| Type | Slope | Trigger on positive slope of negative slope, depending on settings |
| Source | CH1, CH2 | Select trigger source |
| Condition | | Select trigger conditions |
| Time | 〈Set time〉 | Use the arrow keys to set slope time - Time setup range is 20ns-10s |
| Next Page | Page 1/2 | Enter the second page of the slope trigger menu |

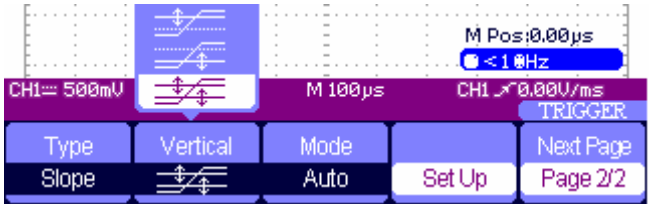



**Figure 2-47 Slope Trigger 2**

**Table 2-27 Slope Trigger Function Menu 2**

| Option | Setting | Description |
|---|---|---|
| Type | Slope | Trigger on positive slope of negative slope |
| Vertical | | Select the trigger level that can be adjusted with the "LEVEL" button. You can adjust "LEVEL A" or "LEVEL B", or adjust them at the same time. |
| Mode | Auto | Use this mode to let the acquisition free-run in the absence of a valid trigger; This mode allows an un-triggered, scanning waveform at 100 ms/div or slower time base settings |
| | Normal | Use this mode when you want to see only valid triggered waveforms; when you use this mode, the oscilloscope does not display a waveform until after the first trigger |
| | Single | When you want the oscilloscope to acquire a single waveform, press the "SINGLE " button |
| Set up | | Enter the "Trigger setup menu" |
| Next Page | Page 2/2 | Return to the first page of slope trigger |

## Alternative trigger

The trigger signal comes from two vertical channels when you use alternative trigger. In this mode, you can observe two unrelated signals at the same time. You can select different trigger types for two vertical signals, including edge, pulse, video and slope triggers. Trigger information for the two channel signals display on the bottom right of the screen.


**Figure 2-48 Alternative Trigger Menu**

**Table 2-28 Alternative Trigger Function Menu**

| Option | Setting | Description |
|---|---|---|
| Type | Alternative | The trigger signal comes from two vertical channels when you use alternative trigger |
| Source | CHX<br>CHY | Set trigger type information for CHX signal Set trigger type information for CHY signal |
| Mode | Edge<br>Pulse<br>Video<br>Slope | Set trigger type of the vertical channel signal |
| Slope | ↑<br>↓<br>↑↓ | Triggering on rising edge<br>Triggering on falling edge<br>Triggering on rising edge and falling edge |
| Set up | | Enter the “Trigger setup menu” |

# *Save and Recall System*

The AEGIS-OSC-9100 can save 2 groups of reference waveforms, 20 groups of setups and 10 groups of waveforms in its internal memory. There is a USB Host plug on the right side of the scope and you can save setup data, waveform data, waveform interface images, and .CSV files to a USB flash drive. The filename suffix of setup data is .SET while waveform data is .DAV. Waveform data can be re-displayed on the current or another AEGIS-OSC-9100. Figure data and .CSV file can’t be recalled to the scope itself, but it can be opened on the computer through the appropriate software. .CSV files can be opened by EXCEL or other spreadsheet software.

## Saving Setups

### Saving Setups to Device

All setups are stored in nonvolatile memory. To recall setups, first press **[Save/Recall]**.


**Figure 2-49 Saving Setups to Device Menu**

**Table 2-29 Saving Setups to Device Function Menu**

| Option | Setting | Description |
|---|---|---|
| Type | Setups | Menu for Save/Recall settings |
| Save to | Device | Save setups to the scope's internal memory |
| Setup | No.1 to No.20 | Choose the position number to save/recall setups |
| Save | | Save the current setup |
| Recall | | Recall a saved setup |

### Saving Setups to USB Flash Drive


**Figure 2-50 Saving Setups to USB Flash Drive Menu**

**Table 2-30 Saving Setups to USB Flash Drive Function Menu**

| Option | Setting | Description |
|---|---|---|
| Type | Setup | Used to save/recall a scope setup |
| Save to | File | Save the setup data of the product to USB flash drive |
| Save | | Enter the waveform save/recall interface |

## Saving waveform

### Saving a Waveform to Internal Memory

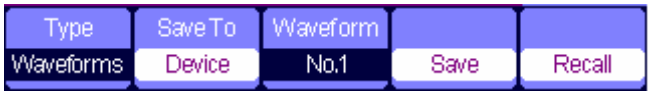



**Figure 2-51 Saving Waveform to Device Menu**

**Table 2-31 Saving a Waveform to Internal Memory Menu**

| Option | Setup | Introduction |
|---|---|---|
| Type | Waveforms | Menu for the Storage/Recall of waveforms |
| Save To | Device | Save waveforms to the product's internal memory |
| waveform | No.1 to No.10 | Choose the position number to save/recall waveforms |
| Save | | Save the current waveform |
| Recall | | Recall a stored waveform |

### Saving a Waveform to USB Flash Drive


**Figure 2-52 Saving Waveform to USB Flash Drive Menu**

**Table 2-32 Saving Waveform to USB Flash Drive Function Menu**

| Option | Setup | Description |
|---|---|---|
| Type | Waveforms | Menu for the Storage/Recall of waveforms |
| Save to | File | Save waveforms to USB flash drive |
| Save | | Execute the Save action |

## Saving Picture

Waveform interface image can be saved to USB flash drive, but they can't be recalled. You can view them with the appropriate software on a computer.


**Figure 2-53 Saving Picture Menu**

**Table 2-33 Saving Picture Function Menu**

| Option | Setting | Description |
|---|---|---|
| Type | Picture | Menu for the Storage/Recall waveform interface |
| Print Key | Print Picture<br><br>Save Picture | Choose Print Picture option and press Save/Recall for 4 seconds to print the picture while the product connects to the printer<br>Choose Save Picture option and press Save/Recall for 4 seconds to save the picture while you insert an USB flash driver to the product |
| Save | | Go to the Save/Recall interface |

## Saving CSV


**Figure 2-54 Saving CSV Menu**

| Option | Setting | Description |
|---|---|---|
| Type | CSV | Menu for Storing CSV on USB flash drive |
| Data Depth | Displayed<br>Maximum | Set to store displayed waveform data to CSV file<br>Set to store maximum waveform data to CSV file |
| Para Save | On/Off | Set whether store parameters to CSV file or not |
| Save | | Go to the Save/Recall interface |

## Recall Factory Setups

By pressing **Recall** you can recall factory setups.

**Table 2-35 Factory Setups Function Menu**

| Option | Setting | Description |
|---|---|---|
| Type | Factory | To view the Factory setup |
| | Load | Recall the Factory setup |

***Example: Save/Recall Waveform to USB Flash Drive***

1. Press **[Save/Recall]** and then **[F1] (Type)** to choose **Waveforms**.
2. Insert USB flash drive to USB port (you will get the message: **USB flash driver connects successfully**!).
3. Press **[F2] (Save to)** to choose **File**.
4. Press **[F4] (Save)** to enter save/recall interface.
5. Press **[F1] (Modify)** to choose **File.**
6. Press **[F2] (New File)** and input the name of the file, following the prompts. Then press **Confirm.**

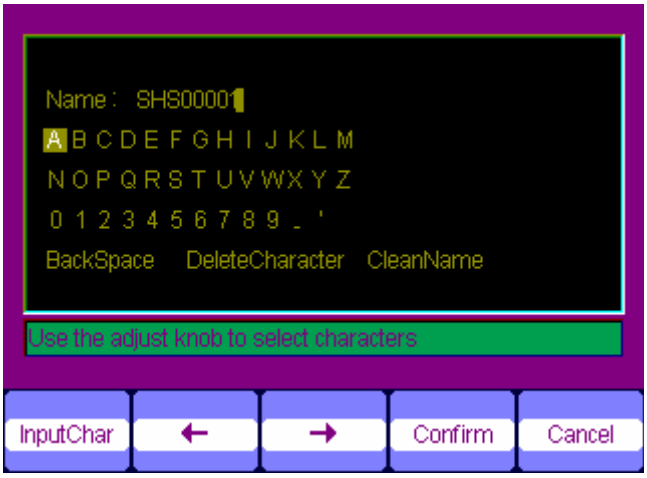



**Figure 2-55 Input the Name of the File**

7. A notification will appear when the file is successfully saved.

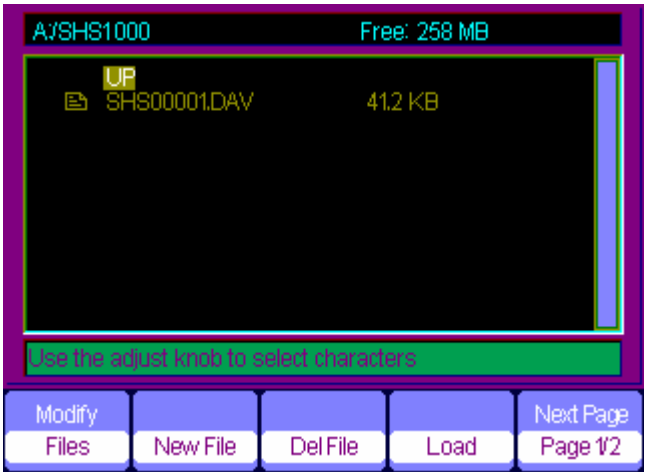



**Figure 2-56 File Saves Successfully**

**Recalling a file:**

Choose the file to be recalled and press **Recall** at the memory interface, which you complete the recalling operation.

**Notes:**

Saved images with a .BMP file suffix can't be recalled on the scope itself, but you can open it in computer with the appropriate software.

## *Utility System*

Press **[User]** to enter the utility system menu.


**Figure 2-57 Utility System Menu 1**

**Table 2-36 Utility System Function Menu 1**

| Option | Setting | Description |
|---|---|---|
| System Status | | Displays the main information of the product. |
| Sound | | Sound on<br>Sound off |
| Counter | On/Off | Turn on/off the frequency counter |
| Language | Simplified Chinese, English, Traditional Chinese, Arabic, French, German, Russian, Spanish, Portuguese, Japanese, Korean, Italian | Select the interface language. |
| Next Page | Page 1/4 | Enter the next page of the menu. |

**Table 2-37 Utility System Function Menu 2**

| Option | Setting | Description |
|---|---|---|
| Do self Cal | | Do a self calibration to calibrate the channels. |
| Do Self Test | Screen Test<br>Keyboard Test | Run the screen detect program<br>Run the keyboard detect program |
| Print Setup | | Enter the print setup menu to set print options |
| USB Device | Printer | Under development |
| | Computer | Under development |
| Next Page | Page 2/4 | Enter the third page of the menu |


**Figure 2-58 Utility System Menu 2**


**Figure 2-59 Utility System Print Setup**


**Figure 2-60 Utility System Menu 3**

**Table 2-38 Utility System Function Menu 3**

| Option | Setting | Descriptio |
|---|---|---|
| Update Firmware | | You can update the product by using USB flash driver (takes about two minutes) |
| Record | | Press this button to enter the waveform record menu |
| Next Page | Page 3/4 | Enter the fourth page of the menu |


**Figure 2-61 Utility System Menu 4**

**Table 2-39 Utility System Function Menu 4**

| Option | Setting | Descr |
|---|---|---|
| Screen saver | 1min 2min<br>5min 10min<br>15min 30min<br>1hour<br>2hour | Set the idle time (without any buttons being pressed) after which the screen dims |
| Date/Time | | Set the date and time in the scope |
| Next Page | Page4/4 | Return to the first page of the menu |

## Self Calibration

Self Calibration is required periodically to prevent errors in measurement. If the operating temperature changes by or more than 9 degrees F (5 C) or the instrument runs for more than thirty minutes, you should run a self calibration. Before self calibration, you should disconnect all probes and leads. Then press the **[User]** button and choose **Do self cal** to show the self calibration menu, follow the prompts to self-calibrate the scope.

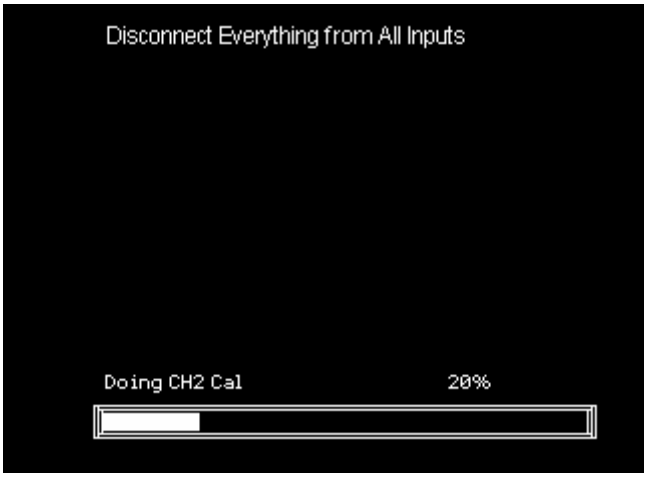



**Figure 2-62 Self Calibration**

## Print Setting

The scope can be used with PictBridge compatible printers. You can connect the side USB Device of the product to the USB Device of the PictBridge compatible printer through a USB cable. After setting the print settings, press **[Save/Recall]** button for 4 seconds to complete the print operation.


**Figure 2-63 Print Setting Menu 1**

**Table 2-40 Print Setup Function Menu 1**

| Option | Setting | Description |
|---|---|---|
| Ink Saver | On<br>Off | Print the screen image on a white background when you select **On**. |
| Layout | Portrait/Landscape | The output direction of the printer. |
| Paper Size | Set the type of the paper. | Displays settings available on your PictBridge compatible printer. |

| | | |
|---|---|---|
| Print Key | Print Picture | Choose **Print Picture** option and press **Save/Recall** for 4 seconds to print the picture while the scope connects to the printer. |
| | Save Picture | Choose **Save Picture** option and press **Save/Recall** for 4 seconds to save the picture while you insert an USB flash driver to the product. |
| Next Page | Page 1/2 | Enter the second page of the menu. |


**Figure 2-64 Print Setting Menu 2**

**Table 2-41 Print Setting Function Menu 2**

| Option | Setting | Description |
|---|---|---|
| Image Size | Set the type of the paper. | Set the paper size available to the PictBridge compatible printer. |
| Paper Type | Default, Plain, Photo,FastPhoto | |
| Print Quality | Default, Normal, Draft, Fine | |
| ID Print | Default, On, Off | |
| Next Page | Page 2/2 | Return to the first page of the menu. |

## Waveform Record

The AEGIS-OSC-9100 can record a waveform with a designated time interval between frames. **Note: The recorder requires a time interval of 100ms or more, which is too long a scale to detect shaft voltages accurately.**

When recording CH1 or CH2 waveform, users can set the interval between frames. The recorder can record 2500 frames of a waveform.


**Figure 2-65 Waveform Record Menu**

**Table 2-42 Waveform Record Menu**

| Option | Setting | Description |
|---|---|---|
| Mode | Record<br>Replay<br>Off | Use recorder<br>Replay recordings<br>Turn off waveform record |
| Source | CH1, CH2 | Choose signal source |
| Interval | ◆ | Set frame interval |
| End Frame | ◆ | Set how many frames to record |
| Operate | ● （record） | Start to record |
| | ■ （stop） | Stop recording |


**Figure 2-66 Waveform Play Back Menu 1**

**Table 2-43 Waveform Play Back Function Menu 1**

| Option | Setting | Description |
|---|---|---|
| Mode | Play Back | Set up playback |
| Operate | ▶ （Run）<br>■ （Stop） | Press to start playback<br>Press to stop playing. |
| Play Mode | ⟲<br>▶→■ | Play back on loop<br>Play back once |
| Interval | ◆ | Set interval between frames |
| Next Page | Page 1/2 | Enter the second page of the menu |


**Figure 2-67 Waveform Play Back Menu 2**

**Table 2-44 Waveform Play Back Function Menu 2**

| Option | Setting | Description |
|---|---|---|
| Start Frame | ◆ | Set start frame |
| Curr_Frame | ◆ | Select current frame to be played |
| End Frame | ◆ | Set end frame |
| Return | | Press to return to the waveform recorder main menu |
| Next Page | Page 2/2 | Return to the first page of Play Back function menu |

***Example: Recording a Waveform***

1. Input a waveform to be recorded.
2. Press **[User]** to enter utility system.
3. Press **[F5]** to enter the third page of the menu and enter waveform recording menu.
4. Press **[F1]** to choose **Record** mode.
5. Use up and down arrow keys to set **[Interval]** and **[End Frame]**.
6. Press **[F5]** to begin recording.

***Example: Playing Back a Waveform***

1. Press **[F1]** to choose **Replay** mode.
2. Press **[F5]** to enter the second page of the menu.
3. Set the **Start Frame**, **Curr_frame**, **End Frame** to replay, and return to the first page of the menu.
4. Set **[Replay] Mode**, **Interval** and press **[F2]** to replay the waveform.
5. Press **[F1]** to choose **Off** mode to turn off Waveform Record/Replay.

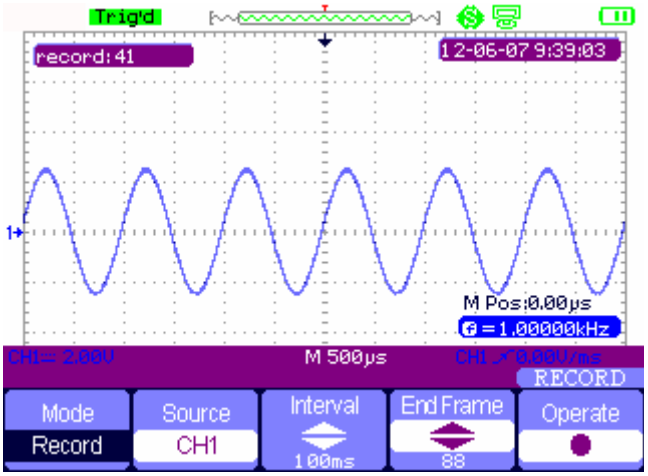



**Figure 2-68 Waveform Record**

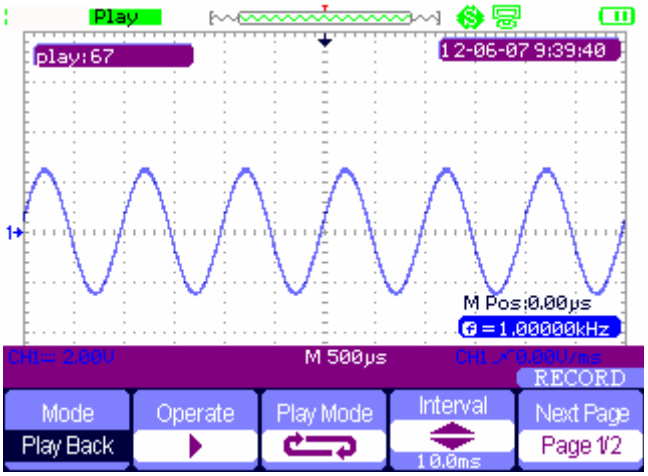



**Figure 2-69 Waveform Play Back**

# Chapter 3 Using the Multimeter

## About this Chapter

This chapter provides a step-by-step introduction to the multimeter functions of the AEGIS-OSC-9100. It will give basic examples to show how to use the menus and perform basic operations.

The digital multimeter can measure the following quantities: DC voltage, AC voltage, resistance, diode, continuity, capacitance, DC current, and AC current.

**Notes:**

1. You must use the multimeter with the correct connections as shown onscreen.
2. As with the oscilloscope, the **[Run/Stop]** key freezes the screen.

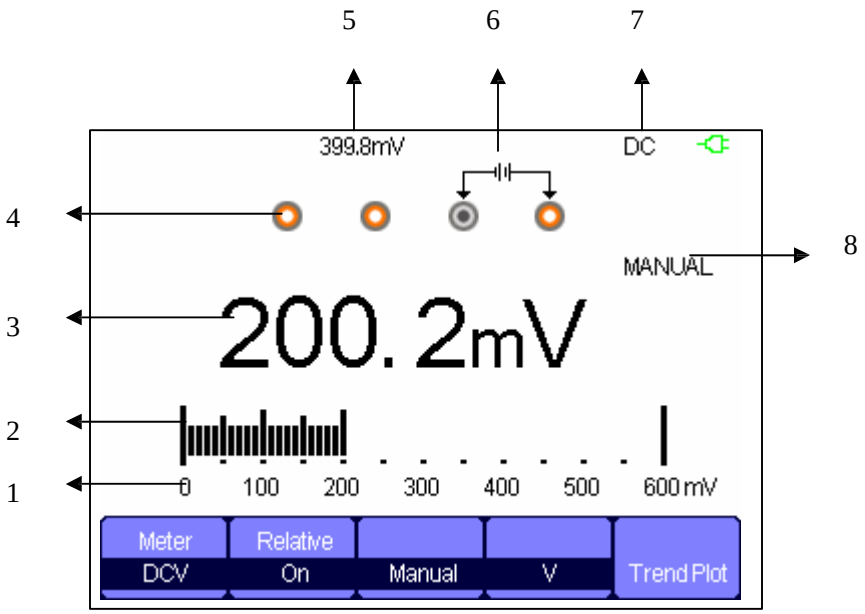



**Figure 3-1 Multimeter User Interface**

1. The range/scale of the multimeter
2. Graphical measurement
3. Measured value
4. Input ports
5. Relative value
6. Correct inport connection – **Be sure the leads are plugged in here!**
7. Test type
8. Operation type

## *Making DC and AC Voltage Measurement*

**Table 3-1 DC and AC Function Menu**

| Option | Setting | Description |
|---|---|---|
| Relative Value | On | Save the current input value as a reference and record again. Real value equals relative value plus measurement value |
| | Off | Real value equals measurement value |
| Mode | Auto | Choose the best measurement scale automatically |
| | Manual | Choose measurement scale manually |
| Scale | Auto | Choose the best measurement scale to the automatically according measured value |
| | Manual | Choose measurement scale manually – A warning will display over the scale |
| Trend Plot | On | Plot the measurements according to time |

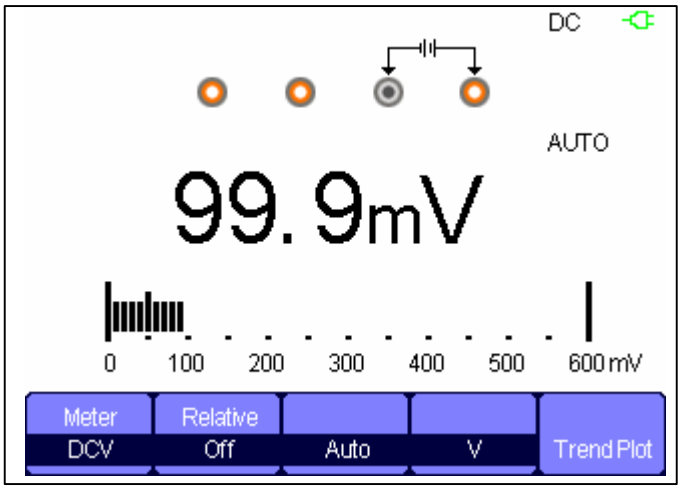



**Figure 3-2 DC Voltage Measurement**

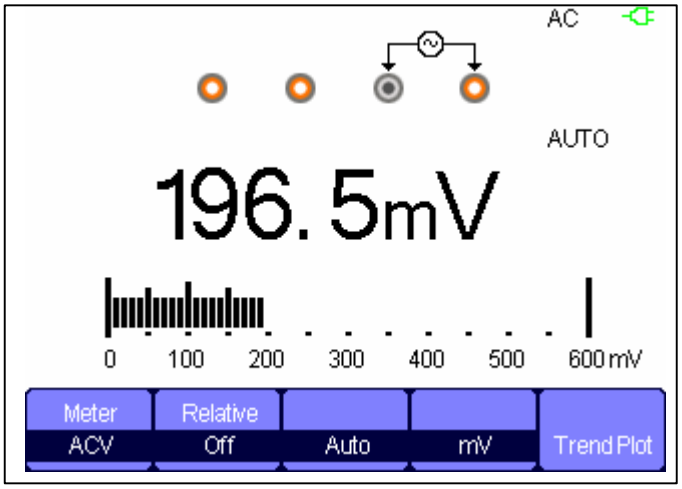



**Figure 3-3 AC Voltage Measurement**

1. Press **[Meter]** to enter multimeter mode, then **[F1]** to choose **DCV** or **ACV** measurement.
2. Insert the red probe to the **V.Ω.C** banana jack input and the black probe to the **COM**. Connect the other end of probes to the power or load to bemeasured.
3. Turn the **Relative** option on or off as desired.
4. Choose **Manual** or **Auto** as desired.
5. Read voltage value.

## *Making Resistance Measurements*

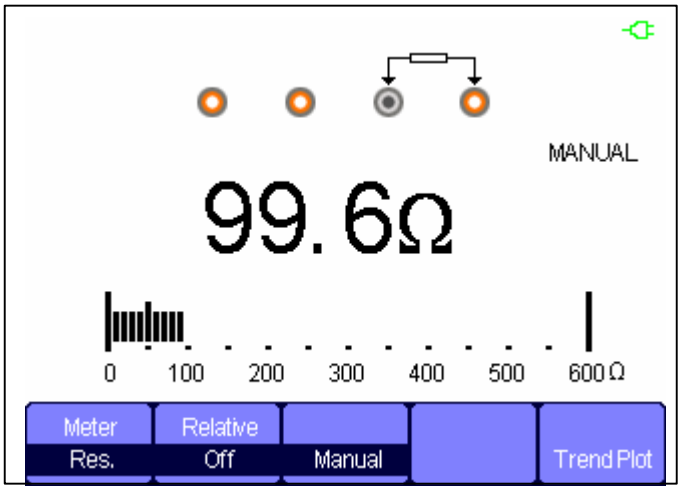



**Figure 3-4 Resistance Measurement**

1. Press **[Meter]** to enter multimeter mode, then **[F1]** to choose **Res.** measurement.
2. Insert the red probe to the **V.Ω.C** banana jack input and the black probe to the **COM**. Connect the other end of the probes to the power or load to be measured.
3. Turn the **Relative** option on or off as desired.
4. Choose **Manual** or **Auto** as desired.
5. Read resistance value.

**Note:**
When measuring resistance, ensure that the circuit is powered off and any capacitance is discharged to avoid damage to the multimeter.

## *Making Diode Measurements*

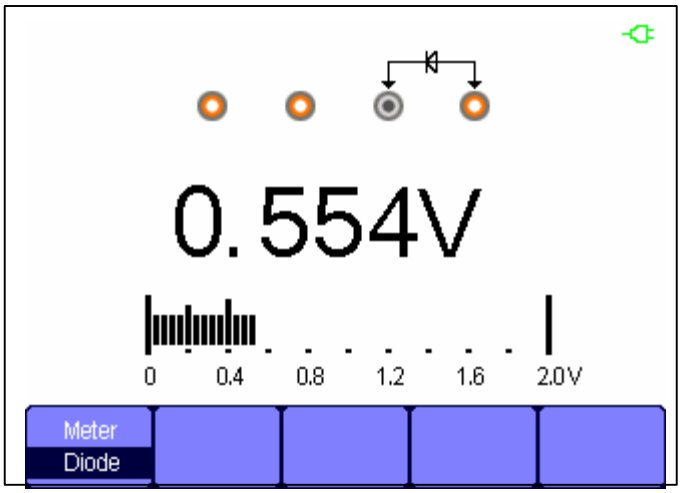



**Figure 3-5 Diode Measurement**

1. Press **[Meter]** to enter multimeter mode, then **[F1]** to choose **Diode** measurement.
2. Insert the red probe to the **V.Ω.C** banana jack input and the black probe to the **COM**. Connect the other end of probes to the diode to be measured.
3. Read the value.

## *Making Continuity Measurements*

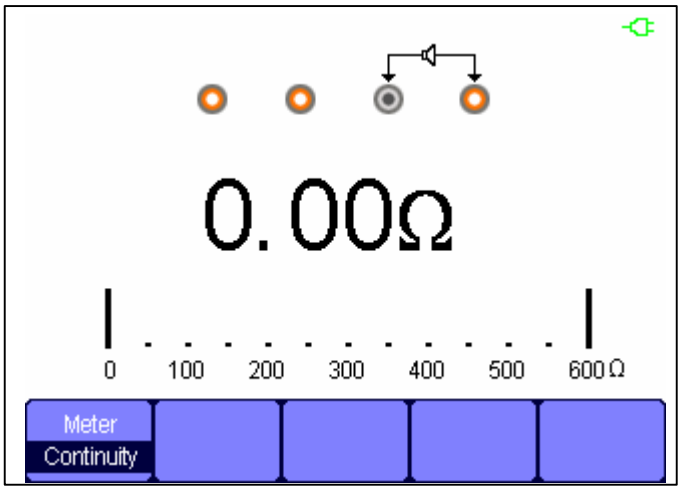



**Figure 3-6 Continuity Measurement**

1. Press **[Meter]** to enter multimeter mode, then **[F1]** to choose **Continuity** measurement.
2. Insert the red probe to the **V.Ω.C** banana jack input and the black probe to the **COM**. Connect the other end of probes to the object to be measured.
3. When the measured object is under 50 Ω, the multimeter will beep and display the value of the resistance.
4. When the measured object is above 50 Ω, the multimeter will not beep

## *Making Capacitance Measurements*

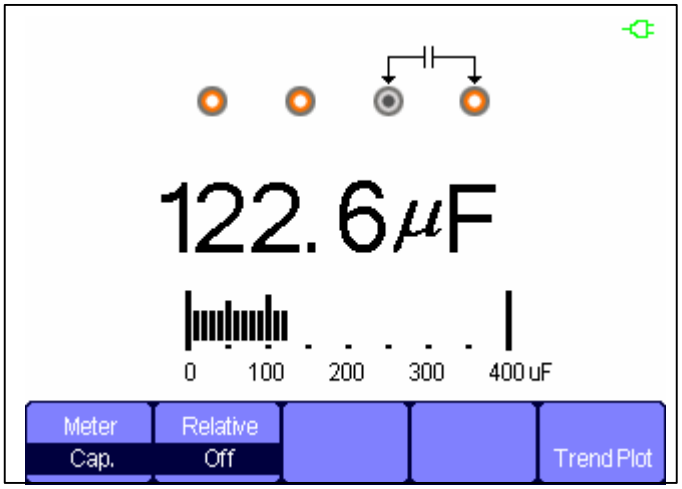



**Figure 3-7 Capacitance Measurement**

1. Press **[Meter]** to enter multimeter mode, then **[F1]** to choose **Cap.** measurement.
2. Insert the red probe to the **V.Ω.C** banana jack input and the black probe to the **COM**. Connect the other end of the probes to the measured object.
3. Turn the **Relative** option on or off as desired.
4. Read measurement value.

## *Making DC and AC Current Measurements*

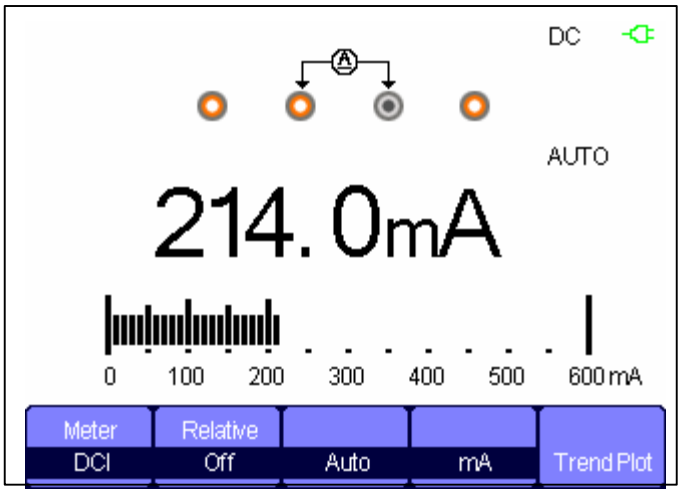



**Figure 3-8 DC Current "mA" Measurement**

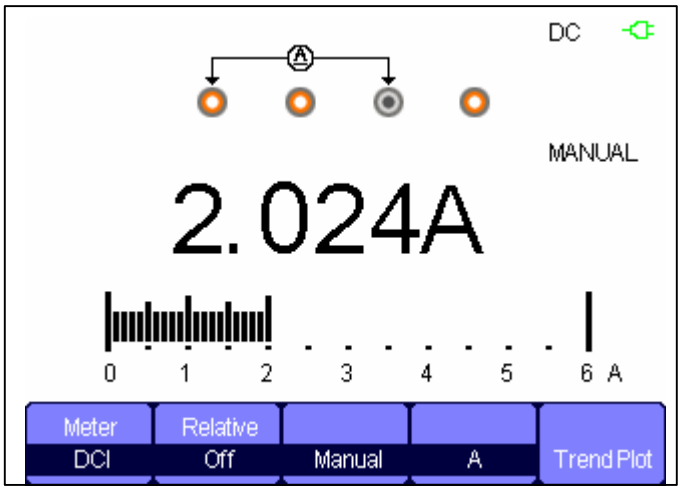



**Figure 3-9 DC Current "A" Measurement**

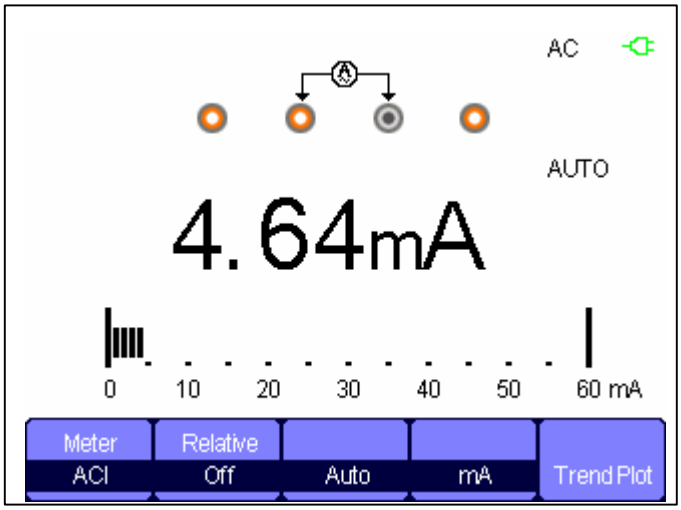



**Figure 3-10 AC Current "mA" Measurement**

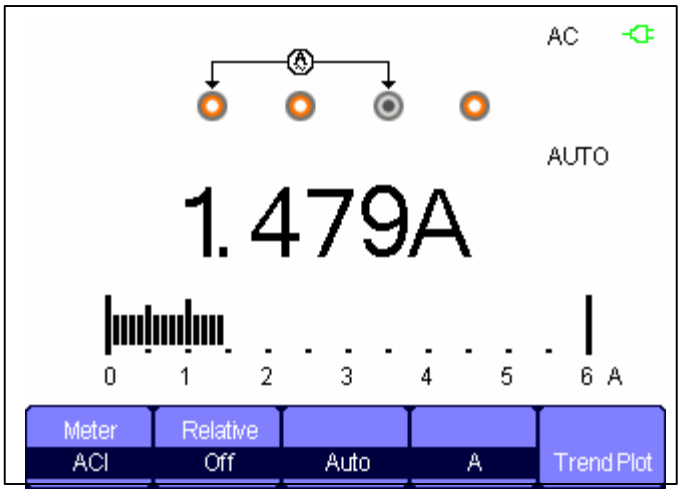



**Figure 3-11 AC Current "A" Measurement**

1. Press **[Meter]** to enter multimeter mode, then **[F1]** to choose **DCI/ACI** measurement.
2. Insert the black probe to the **COM** multimeter input. For currents < 600 mA, plug the red probe into the mA input (Figures 3-8, 3-10). For currents over 600 mA but under 10A, plug the probe into the A input (Figures 3-9, 3-11). The multimeter cannot handle currents over 10 A. These multimeter jacks are fused, and an overcurrent will blow the fuse.
3. Connect the other end of the probes in series with the circuit to bemeasured.
4. Turn on /off the **relative** as desired.
5. Choose **Manual** or **Auto** as desired.
6. Read current value.

# Chapter 4 Using the Recorder Functions

## About this Chapter

This chapter provides a step-by-step introduction to the recorder functions of the AEGIS-OSC-9100, giving basic examples to show how to use the menus and perform basic operations.

The recorder mainly includes the following functions:

**Trend Plot**: This saves the measurements in scope memory and then plots a graph of Scope or Meter measurements as a function of time.

**Waveform Recorder:** Record real time waveform without gaps or spaces. The scope records all captured waveform data and can replay it. The maximum recording length of the waveform recorder is 7M data points.

## *Oscilloscope Trend Plot*

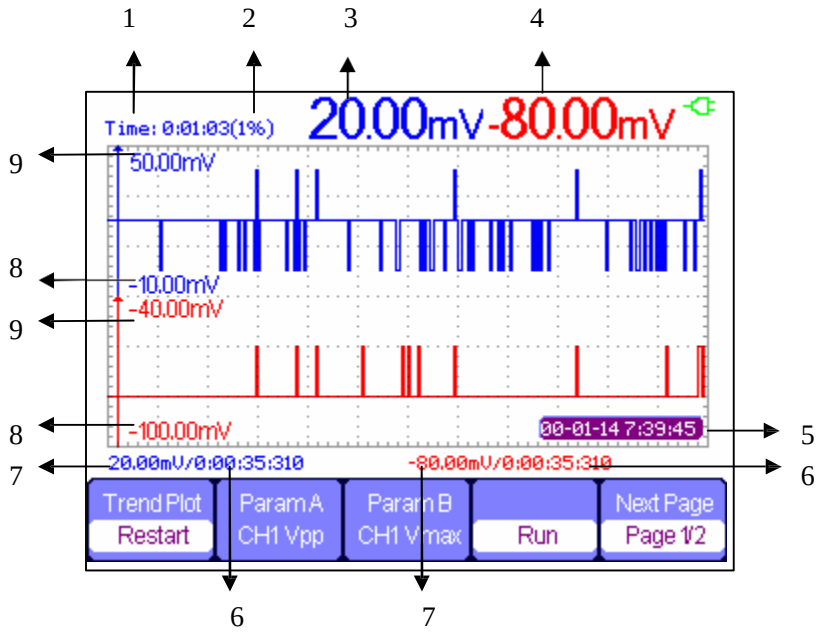



**Figure 4-1 Scope trend plot user interface**

1. Current recorded time
2. Percentage of recorded data vs. the total amount of memory
3. Value of the latest recorded data point A
4. Value of the latest recorded data point B
5. Real time
6. Sampling time of the cursor point
7. Parameter measurement of the cursor point
8. Vertical scale (lower limit)
9. Vertical scale (upper limit)


**Figure 4-2 Scope Trend plot Function Menu 1**

**Table 4-1 Scope Trend plot Function Menu 1**

| Option | Setting | Description |
|---|---|---|
| Trend Plot | Restart | Discard the current data set and start a new one |
| Parameter A/B | Choose the parameter to be measured. | Voltage, time, or delay measurements |
| Run/Stop | | Pause or continue recording data |
| Next Page | Page 1/2 | Enter the second page of the menu |


**Figure 4-3 Scope Trend plot Function Menu 2**

**Table 4-2 Scope Trend plot Function Menu 2**

| Option | Setting | Description |
|---|---|---|
| Display Mode | Normal | Display the data up to the minute |
| | View all | Display all data, compressed to fit |
| Manual | Off | Record data automatically |
| | On | Record data manually. Pressing **[Record]** records a data point |
| Waveforms | | Save data from memory to USB storage device |
| Return | | Return to the oscilloscope interface |
| Next Page | Page 2/2 | Return to the first page of the menu |

First choose a measurement in scope or meter mode. You can choose the recorder functions from the waveform recorder main menu. For more details, see the following examples:


**Figure 4-4 Recorder Function Main Menu**

## *Scope Trend Plot*

**Open trend plot function**

1. Input a signal to CH1 or CH2.
2. Press **[Recorder]** to enter the recorder main menu.
3. Press **[F1]** and choose **Scope Plot.**
4. Choose **Parameter A/B** to measure and start recording the trend plot.
5. Press **[F5]** to pause or resume recording data.

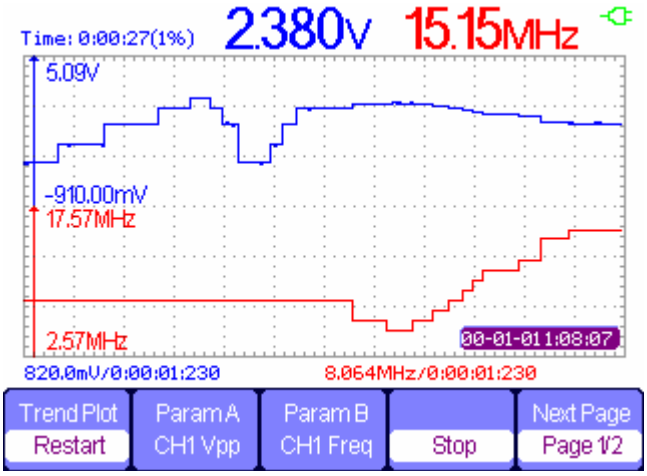



**Figure 4-5 Trend Plot record Curve**

**Display recorded data**

6. Press **[F5]** to enter the second page of trend plot menu.
7. Press **[F1]** to choose data display mode.

   **Normal**: the screen displays the data up to the minute.

   **View All**: the screen displays all data in the memory.
8. Zoom function: under full screen mode, press time base to zoom in or out.
9. Data analysis: move cursor, analyzing data over time.

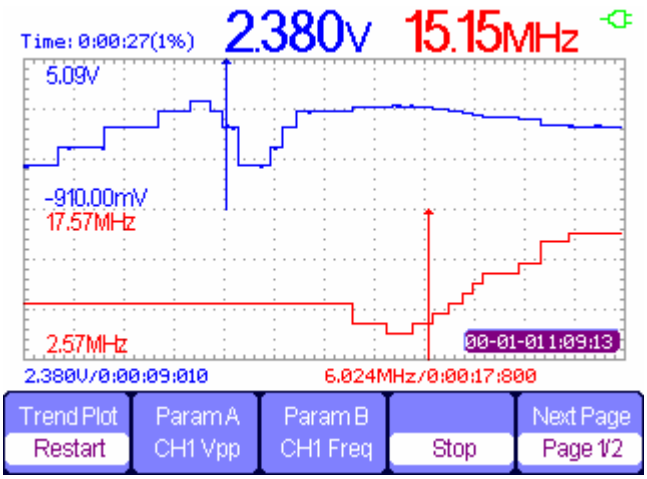



**Figure 4-6 Analyzing Trend Plot**

10. Save waveform: save the recorded waveform to a USB storage device to make more detailed analysis.
11. Press **Return** to exit trend plot.

## *Waveform Recorder*

Press **[Recorder]** to enter the main recorder menu under scan time base, then press **[F2]** to choose Scope recorder.


**Figure 4-7 Waveform Recorder Menu**

**Table 4-3 Waveform Recorder Function Menu**

| Option | Description |
|---|---|
| Record | Record waveform without gap |
| Replay | Replay the recorded waveform |
| Option | Set the parameters of the waveform recorder |
| Return | Exit waveform recorder function |


**Figure 4-8 Waveform Recorder Saving Mode Menu**

**Table 4-4 Waveform Recorder Saving Mode Function Menu**

| Option | Description |
|---|---|
| Start | Begin to record waveform (record waveform for under 100ms and above scan time base) |
| Replay | Replay the recorded waveform |
| Copy | Copy the waveform saved in the memory to a USB flash disk. |
| Save mode | Choose a place to save, including USB flash disk. USB flash driver saves only under 2.5s/div and above time base |
| Return | Exit the submenu and return to the waveform recorder main menu |


**Figure 4-9 Waveform Recorder Replaying Mode Menu**

**Table 4-5 Waveform Recorder Replaying Mode Function Menu**

| Option | Description |
|---|---|
| Stop/Continue | Pause or resume playing waveform automatically - you can change the time base to observe the waveform in the memory |
| Restart | Replay the waveform |
| Previous | Back up the waveform and then resume play |
| Next | Speed up the waveform replaying |
| Return | Exit the replaying menu |


**Figure 4-10 Waveform Recorder Setting Menu**

**Table 4-6 Waveform Recorder Setting Menu**

| Option | Setting | Description |
|---|---|---|
| Viewer mode | Full screen | Record and replay channel waveform with full screen |
| | Split | Record and replay channel waveform with divided screen. The upper half of the screen displays CH1 and the lower half displays CH2 |
| Record mode | Continuous | Record circularly: when the waveform recorder is full, the later data will overwrite the earlier |
| | Single | Stop recording when the waveform recorder memory is full |
| Replay mode | By Point | When replaying, the screen waveform updates every dot from left to right |
| | By Frame | When replaying，the screen waveform updates the whole screen according to the time of every frame's sampling |
| Return | | Exit the recorder setup interface |

### *Waveform Recorder Example*

**Startup the waveform recorder function:**

1. Use 100ms or larger time base.
2. Press **[Recorder]** to open the main menu.
3. Press **[F2]** to choose **scope recorder.**
4. Press **[F3]** to set the waveform recorder.
5. Press **[F5]** to return to the waveform recorder main menu.
6. Press **[F1]** to enter record interface.
7. Press **[F4]** to set storage mode. Interior and USB flash disk storage mode.

8. Press **[F1]** to start recording data.
   The waveform will not move right and the recorded data will be saved to memory. The recorded time will be different according to the time base. You can pause or stop at any time.

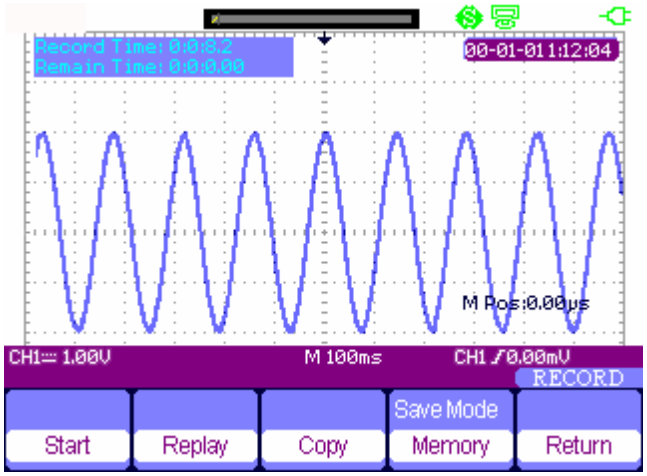



**Figure 4-11 Waveform Recorder Interface**

**Waveform Replay**

9. Press **[F2]** to replay waveform.
   You can replay the recorded waveform any number of times, and you can advance or rewind at any time.
10. Press **[F5]** to exit the waveform recorder.

## *Multimeter Trend Plot*

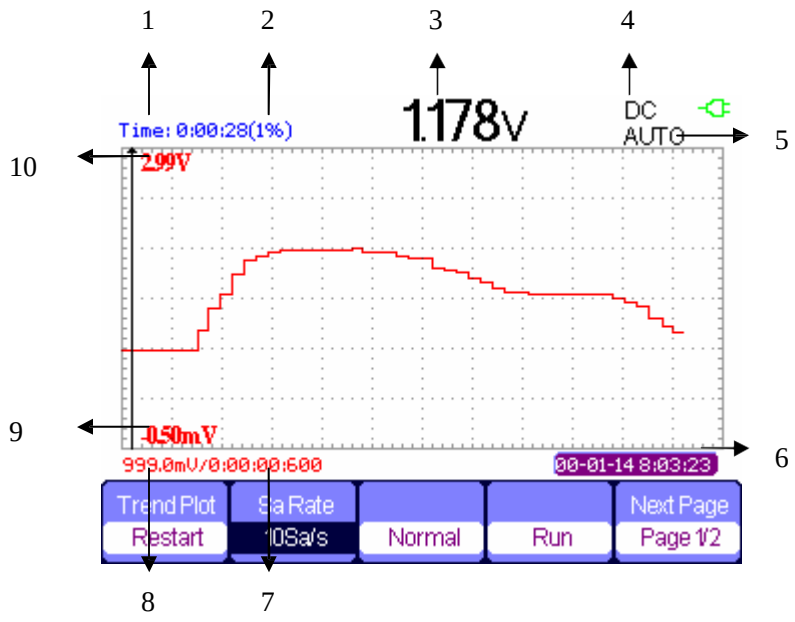



**Figure 4-12 Multimeter Trend Plot User Interface**

1. Current recorded time
2. Percentage of the whole memory used by the current data
3. Current value of the parameter of interest
4. DC/AC
5. Manual/Auto
6. Real current time
7. Sample time at the cursor point
8. Measured parameter value at the cursor point
9. Vertical scale (minimum)
10. Vertical scale (maximum)


**Figure 4-13 Multimeter Trend Plot Menu 1**

**Table 4-6 Multimeter Trend Plot Function Menu 1**

| function | setting | Description |
|---|---|---|
| Restart | | Discard the current data set and start a new one |
| Sa Rate | 10Sa…0.005Sa | Set sampling rate |
| Display mode | normal | Display the recorded data up to the minute |
| | All view | Display all dots |
| Record | Run | Record data automatically |

| | | |
|---|---|---|
| Mode | Stop | Stop recording data |
| Next Page | Page1/2 | Enter the second page of the menu. |


**Figure 4-14 Multimeter Trend Plot Menu 2**

**Table 4-7 Multimeter Trend Plot Function Menu 2**

| Function | Setting | Description |
|---|---|---|
| Waveform storage | | Save data from memory onto a USB storage drive |
| Record manually | Off | Record data automatically |
| | On | Record data manually - pressing **Record** saves a measurement |
| Return | | Return to the multimeter function state |
| Next Page | Page2/2 | Return to the first page |

## *Multimeter Trend Plot*

**Start plot function**

1. Input a measured signal correctly. See **Chapter 3 Using the Multimeter.**
2. Press **[F5]**to enter Trend Plot at the multimeter main menu.
   The multimeter will record the measured value of the input port continuously and plot measurements over time.

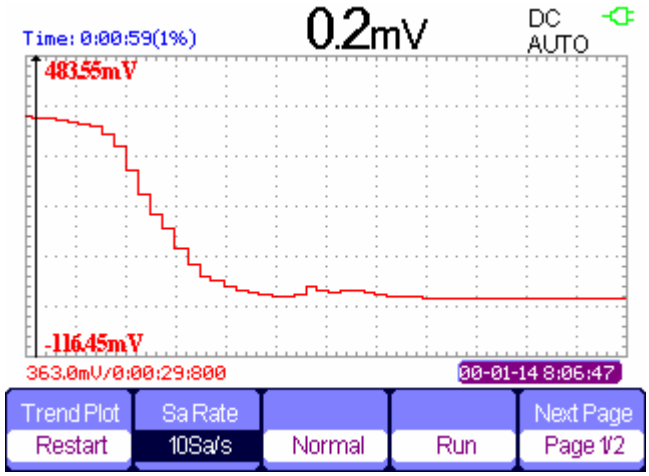



**Figure 4-15 Multimeter Trend Plot Recording Curve**

3. Press **[F4]**to pause or resume recording data.
4. On the second page of the menu you can choose manual or auto mode to record data.

**Replay Recorded Data**

5. Press **[F3]** to choose data display mode.
   Normal mode: the screen displays the data up to the minute, before they are stored in memory.
   Full view mode: the screen display all recorded data in memory.
6. Zoom function: under full screen mode, press time base to zoom in or zoom out.
7. Data analysis: move cursor, analyzing data over time.

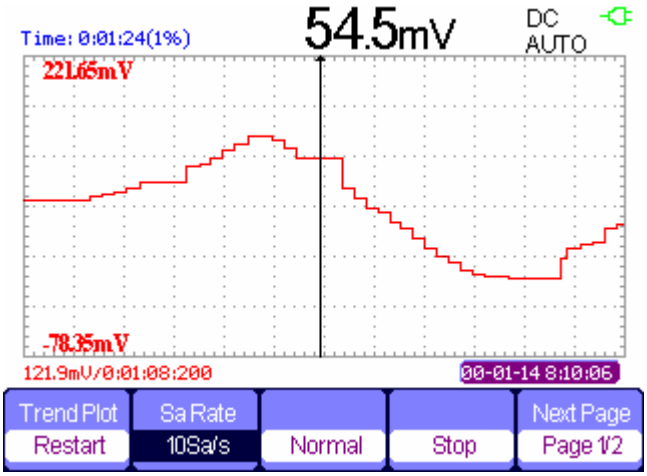



**Figure 4-16 Analysis Trend Plot Data**

8. Save waveform: save the recorded waveform to a USB storage device to make more detailed analysis.
9. Press **Return** to exit Trend Plot.

# Chapter 5 Prompts and Troubleshooting

## About this Chapter

This chapter gives a detailed instruction of every system prompt in the scope, as well as some basic troubleshooting.

## System Prompt Messages

- **Trig level at limit!** : Triggering has limitations- you can only set a trigger so high (or low), and this prompt means you've reached such a limit.
- **Horizon position at limit!** : The horizontal position is at a limit.
- **Volts/Div at limit!** : The voltage scale can only go down to 2 mV/div or up to 100V/div.
- **Volts position at limit!** : The current view is at the maximum or minimum voltage viewable.
- **Sec/Div at limit!** : The time scale is at its minimum (2.5 ns/div) or maximum (50 s/div).
- **Holdoff time at limit!** : Allowable holdoff times are 100 ns to 1.5 s.
- **Function isn't useable!** : Under some particular modes, some functions may not be accessible.
- **No signal!** : When using **Auto**, the signal may be too faint or non-periodic for the **Auto** function to choose display parameters for it.
- **Adjust at limit!** : You can only adjust pulse width down to a minimum of 20.0 ns or maximum of 10.0 s.
- **Location Empty!** : If you have no stored waveforms or setups at a given location, the scope will display this alert if you try to **Recall** from that location.
- **USB Flash Drive Plug In!** : This appears when you invert a USB flash drive to the USB Host port.
- **USB Flash Drive Pull Out!** : This appears when you remove a USB flash drive.
- **Store Data Success!** : This lets you know that a save of setup data, waveform data, or Figure data to the scope's memory or a USB drive succeeded.

- **Read Data Success!** : Setup or waveform data from the internal memory or a USB drive was successfully read.
- **Please set USB Device to printer!** : This alert means that the “Print Key” option is set to “Print Figure” but the “USB Device” option is set to “Computer.” Set the “USB Device” option to “Printer.”
- **USB Flash Drive isn’t connected!** : This error occurs when the “Save To” option is set to “File” or the “Print Key” option is set to “Save Figure” in “Save/Recall” menu, and the “Save” option button or the “s/div” button is pressed before a USB drive is plugged in.
- **Record Wave Success!** ： This message will appears when you finish recording waveforms.

# *Troubleshooting*

1. **After the scope is powered on, if the screen remains dark:**
   - **1)** Check the power cable connection.
   - **2)** Ensure the power switch is turned on.
   - **3)** After the above checks, restart the scope.
   - **4)** If the scope still does not operate, contact Electro Static Technology.
2. **If there is no signal wave on the screen while collecting signal:**
   - **1)** Ensure that the probe is in contact with the signal cable.
   - **2)** Ensure that the signal cable is connected to the BNC connector.
   - **3)** Ensure that the probe is in contact with the object to be tested.
   - **4)** Check whether the tested object is producing a signal (is it on?).
   - **5)** Try to measure the signal again.
3. **If the value of the tested voltage is 10 times higher/lower than what it should be:**

   Check whether the probe and the oscilloscope are both set to the same attenuation (1X, 10X, …).
4. **If a waveform is displayed, but it is not steady:**
   - **1)** Ensure that the trigger interface is set to monitor the correct channel for triggering signals.
   - **2)** Check the trigger mode: normal signal should use the “edge” trigger mode. Video signals should use the “Video” Trigger mode. The signal should display steadily if the right trigger mode is used.
   - **3)** Change the “coupling” setting to “HF Reject” or “LF Reject”, so that high or low frequency noise disturbing the trigger will be filtered out.
5. **If you press the “RUN/STOP” button, but there’s no wave displayed:**

   Check whether the trigger mode, on the trigger interface, is in “normal” or “single”, and check the whether the trigger level is above the wave range. If yes, put the trigger level to the middle position or set the trigger mode to the “Auto” position. Alternately, you could choose the “Auto” button to set up automatically.

6. **If the signal is displayed as a ladder-like waveform:**

   **1)** This phenomenon may be normal. The time base may be too slow. Adjusting s/div to increase the horizontal resolution may improve the display.

   **2)** The display Type may be set to “Vectors”. Using “Dots” mode may improve the display.

7. **If the multimeter measurements aren’t correct:**

   **1)** Check that if the range of the scope matches with the expected range of signal from the measured object.

   **2)** Check whether the multimeter is beyond its calibration date. if the measurements and the real values are beyond the relevant precision, please contact with the calibration site warranted by our company to calibrate the product .

   **3)** If you can’t use the product normally all the same, please contact with servicing center, we will provide service for you.

8. **For other problems: contact Electro Static Technology.**

## ⚠ Warning

**Persons not authorized by Electro Static Technology should not disassemble the AEGIS-OSC-9100 for inspection. Such disassembly will nullify the warranty.**

# Appendix A: Specifications

The following specifications apply to 10X probe attenuation when the following conditions are met:

- The oscilloscope must have been operating continuously for thirty minutes within the specified operating temperature
- The **Do Self Cal** operation, accessible through the **[User]** menu, must be performed if the operating temperature changes by or more than 5°C
- The oscilloscope must be within the factory calibration interval
- The oscilloscope should be calibrated once every year

All specifications are guaranteed except those noted **"typical"**.

## Oscilloscope Specifications

| **Input System** | | |
|---|---|---|
| Input Coupling | AC, DC, GND | |
| Input Impedance | 1MΩ±2% \|\| 18pf±3pf | |
| Probe Attenuation | 1X, 10X | |
| Meter Attenuator Factors | 1X, 5X, 10X, 50X, 100X, 500X, 1000X | |
| BNC Maximal Input Voltages (refer to BNC crust ) | Overvoltage Classes | Maximal Voltages |
| | CAT II | 300Vrms |
| | CAT III | 150Vrms |
| Probe | Overvoltage Classes | Maximal Voltages |
| Standard Probe 10X | CAT II | 400Vrms |
| Optional Probe 10X | CAT III | 600Vrms |
| Multimeter Floating Voltages | Overvoltage Classes | Maximal Voltages |
| | CAT II | 600Vrms |
| | CAT III | 300Vrms |
| Channel Common Mode Rejection | >100:1 50MHz | |
| Isolation Degree between Channels | >35dB | |

| **Acquisition System** | | | | |
|---|---|---|---|---|
| Sample Types | Real time, Equivalent time | | | |
| Memory Depth | Channel Mode | Sampling Rate | Common Storage | Deep Storage |
| | Single Channel | 1GSa/s | 40kpts | Don't support |
| | Single Channel | 500MSa/s or below | 20kpts | 2Mpts |
| | Double Channels | 500MSa/s or below | 20kpts | 1Mpts |
| Sample Mode | Sample, Peak Measure, Average | | | |
| Averages | 4, 16, 32, 64, 128, 256 | | | |

| **Vertical System** | |
|---|---|
| Vertical Sensitivity | 2mV/div - 100V/div(1-2-5 order) |
| Channel Voltage Offset Range | 2mV ～200mV ： ±1.6V<br>206mV ～10V ： ±40V<br>10.2V ～100V ： ±400V |
| Vertical Resolution | 8 bit |
| Channels | 2 |
| Bandwidth | 100 MHz |
| Lower Frequency Limit (AC -3dB) | ≤10Hz |
| DC Gain Accuracy | 5mV/div-100V/div:≤±3% 2mV/div:≤±4% |
| DC Measurement Accuracy:<br>All Gain settings≤200mv/div | ±[3% x（\|reading\|+\|offset\|） +1% x \|offset\|<br>+0.2div+2mv] |
| DC Measurement Accuracy:<br>All Gain Settings＞200mv/div | ±[3% x（\|reading\|+\|offset\|） +1% x \|offset\|<br>+0.2div+100mv] |
| Rise Time (BNC value) | <1.7ns (200MHz）<br><2.3ns (150MHz)<br><3.5ns (100MHz）<br><5.8ns (60MHz) |
| Math Operation | +, -, *, /, FFT |
| FFT | Window Modes: Hanning, Hamming, Blackman, Rectangular |
| | Sampling points: 1024 |
| Bandwidth Limiter | 20MHz (-3dB) |

| **Horizontal System** | |
|---|---|
| Real Time Sampling Rate | Single channel below 50ns/div:1GSa/s;<br>double channel: 500MSa/s |
| Equivalent Sampling Rate | < 50GSa/S |
| Measure Display Modes | MAIN, WINDOW, WINDOW ZOOM, SCAN , X-Y |
| Time Base Accuracy | ±50ppm measured over 1ms interval |
| Horizontal Scan Range | 2.5 ns/div ～50 s/div （100MHz）<br>Scan: 100mS/div ～50S/div (1-2.5-5 order) |

| **Trigger System** | |
|---|---|
| Trigger Types | Edge, Pulse Width, Video, Slope, Alternative |
| Trigger Source | CH1,CH2 |
| Trigger Modes | Auto, normal, Single |
| Trigger Coupling | AC, DC, LF reject, HF reject |
| Trigger Level Range | CH1,CH2: ±6 divisions from the center of the screen |
| Trigger Displacement | Pre-trigger: (Memory depth /（2*sampling）),<br>Delay Trigger: 268.04 div |
| Holdoff Range | 100ns ～1.5s |
| Edge Trigger | Edge type: Rising, Falling, Rising and Falling |
| Pulse Width Trigger | Trigger Modes: (>,<, =)Positive Pulse Width, (>, <, =)Negative Pulse Width |
| | Pulse Width Range: 20ns ～10s |
| Video Trigger | Support Signal Formats: PAL/SECAM, NTSC |
| | Trigger Conditions: odd field, even field, all lines, pointed line |
| Slope Trigger | (>,<, =) Positive slope, (>,<, =) Negative slope |
| | Time: 20ns～10s |
| Alternative Trigger | CH1 trigger types: Edge, Pulse, Video, Slope |
| | CH2 trigger type: Edge, Pulse, Video, Slope |

| **X-Y Mode** | |
|---|---|
| X-pole Input / Y-pole Input | Channel 1 (CH1) / Channel 2 (CH2) |
| Sampling Frequency | 25KSa/s ～ 250MSa/s (1-2.5-5 order) |

| **Cursor\|Measure** | |
|---|---|
| Auto Measure (32 types) | Vpp, Vmax, Vmin, Vamp, Vtop, Vbase, Vavg, Mean,Crms, Vrms, ROVShoot, FOVShoot, RPREShoot, FPREShoot, Rise, Fall, Freq, Prd, +Wid, -Wid, +Dut, -Dut, BWid, Phas, FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF |
| Cursor Measure | Manual mode, Track mode and Auto mode |

| **Control Panel Function** | |
|---|---|
| Auto Set | Auto adjusts the vertical and horizontal scale and triggers to fit current signal |
| Save/Recall | Support 2 groups of referenced Waveforms, 20 groups of setups, 10 groups of captured waveforms internal storage/recall functions and USB flash driver storage function. |

| **Hardware Frequency Counter** | |
|---|---|
| Reading resolution | 1Hz |
| Range | DC coupling, 10Hz to maximal bandwidth |
| Signal Types | All trigger signals (except pulse width and video trigger) |

# *Digital Multimeter Specifications*

**Environment Temperature: 73±9 F (23±5 C) Relative Humidity:＜75%**

| | |
|---|---|
| Max. Display | 6000 counts |
| Measure Function | DC voltage, AC voltage, resistance, diode, continuity, capacitance, DC current, AC current |
| Max. Input Voltage | AC (virtual value): 750V (AC Frequency:20Hz~1kHz)<br>DC:1000V |
| Max. Input Current | AC (virtual value): 10A (AC Frequency:20Hz~1kHz)<br>DC:10A |
| Input Impedance | 10M |

| **DC Voltage** | | |
|---|---|---|
| Range | Resolution | Definition |
| 60mV | 10uV | ±(1%+15digit) |
| 600mV | 100uV | ±(1%+5digit) |
| 6V | 1mV | |
| 60V | 10mV | |
| 600V | 100mV | |
| 1000V | 1V | |

| **AC Voltage** | | |
|---|---|---|
| Range | Resolution | Definition |
| 60mV | 10uV | ±(1%+15digit) |
| 600mV | 100uV | ±(1%+5digit) |
| 6V | 1mV | |
| 60V | 10mV | |
| 600V | 100mV | |
| 750V | 1V | |

| **Resistance** | | |
|---|---|---|
| Range | Resolution | Definition |
| 600Ω | 0.1Ω | ±(1%+5digit) |
| 6K | 1Ω | |
| 60K | 10Ω | |
| 600K | 100Ω | |
| 6M | 1KΩ | |
| 60M | 10KΩ | |

| **Diode and Continuity Measure** | |
|---|---|
| Name | Range |
| Diode | 0～2V |
| Continuity | <50Ω alarm |

| **Capacitance** | | |
|---|---|---|
| Range | Resolution | Definition |
| 40nF | 10pF | ±（3%+10digit）measurements＞5nF |
| 400nF | 100pF | ±（4%+5digit ） |
| 4uF | 1nF | |
| 40uF | 10nF | |
| 400uF | 100nF | |

| **DC Current** | | |
|---|---|---|
| Range | Resolution | Definition |
| 60mA | 10uA | ±(1%+5digit) |
| 600mA | 100uA | |
| 6 A | 1mA | ±(1.5%+5digit) |
| 10A | 10mA | |

**“A “range: measure period≤10 seconds, interval period≥15 minutes.**

| **AC Current** | | |
|---|---|---|
| Range | Resolution | Definition |
| 60mA | 10uA | ±(1%+5digit) |
| 600mA | 100uA | |
| 6 A | 1mA | ±(1.5%+5digit) |
| 10A | 10mA | |

**“A “range: measure period≤10 seconds, interval period≥15 minutes.**

# *Recorder Specifications*

**Total: 7M original points Single channel: 7M Double channel: each 3.5M**

| **Scope Trend Plot** | |
|---|---|
| Display Mode | full view and normal |
| Record Length | 800K points，＞18 hours |
| Record Channel Num. | 2 |
| Cursor and Zoom | support |
| Record Manual | support |

| **Multimeter Trend Plot** | |
|---|---|
| Display Mode | full view and normal |
| Record Length | 1.2 M points |
| Record Channel Number | 1 |
| Cursor and Zoom | Support |
| Record Manual | Support |

## *Generic Specification*

| **Display** | |
|---|---|
| Display Mode | Color TFT 5.7 inches(145mm) diagonal Liquid Crystal Display |
| Resolution | TFT 5.7 inches :320 (horizontal) pixels * 234 (vertical )pixels |
| Display Color | 24 bits |
| Display Contrast（typical） | 150:1 |
| Backlight Intensity（typical） | 300 nit |
| Waveform Display Range | TFT 5.7 inches 8 x 12 div |
| Wave Display Mode | Dots, Vectors |
| Persist | Off, 1 sec, 2 sec, 5 sec, Infinite |
| Menu Display | 2 sec, 5 sec, 10 sec, 20 sec, Infinite |
| Screen Saver | Off, 1 min, 2 min, 5 min, 10 min, 15 min, 30 min, 1 hour, 2 hour, 5 hour |
| Skin | Classical, Modern, Traditional, Succinct |
| waveform Interpolation | Sin(x)/x, Linear |
| Color model | Normal , Invert |
| Language | Simplified Chinese, Traditional Chinese, English, Arabic, French, German, Russian, Spanish, Portuguese, Japanese, Korean, Italian |

| **Power** | | |
|---|---|---|
| Adapter Supply Power | Input Voltage | 100-240 V 50/60Hz |
| | Output Voltage | 9V 4A |
| Battery Supply Power | 5000mAh, 7.4VDC, persisting 5 hours | |
| Charging time | About 4 hours | |

| **Environments** | |
|---|---|
| Temperature | Work: 32～105 F (0～40 C) |
| | Storage: -4～160 F (-20 C～70 C) |
| Cooling | Natural Cool |
| Humidity | 85%RH, 105 F (40 C) |
| Height | 3000m |

| **Mechanical** | | |
|---|---|---|
| Dimension | Length | 259.5mm |
| | Width | 163.2mm |
| | Height | 53.3mm |
| Weight | 1.5 kg | |

# *Appendix B: Default Setup*

| Menu or system | Options, Knobs or Buttons | Default setup |
|---|---|---|
| CH1, CH2 | Coupling | DC |
| | BW Limit | Off |
| | Volts/div | Coarse |
| | Probe | 1X |
| | Invert | Off |
| | Filter | Off |
| | Volts/div | 1.00V |
| MATH | Operation | CH1+CH2 |
| | CH1 Invert | Off |
| | CH2 Invert | Off |
| | FFT Operation: | |
| | Source | CH1 |
| | Window | Hanning |
| | FFT Zoom | 1X |
| | Scale | dBVrms |
| | Display | Split |
| HORIZONTAL | Window | Main Time Base |
| | Position | 0.00µs |
| | Sec/div | 500µs |
| | Window Zone | 50.0µs |
| | Trigger knob | Level |
| CURSOR | Type | Off |
| | Source | CH1 |
| | Horizontal (voltage) | +/-3.2divs |
| | Vertical (time) | +/-5divs |
| MEASURE | Source | CH1 |
| | Type | Average |
| ACQUIRE | Three Mode Options | Sampling |
| | Averages | 16 |
| | Sampling Method | Real Time |
| DISPLAY | Type | Vectors |
| | Persist | off |
| | Grid | |
| | Intensity | 60% |
| | Brightness | 40% |
| | Format | YT |
| | Menu Display | Infinite |

| | | |
|---|---|---|
| SAVE/RECALL | Type | Setups |
| | Save To | Device |
| | Setup | No.1 |
| REF | Source | CH1 |
| | REFA | Off |
| | REFB | Off |
| UTILITY | Sound | On |
| | Frequency Counter | On |
| | Side USB | Computer |
| | Record | Off |
| TRIGGER (Edge) | Type | Edge |
| | Source | CH1 |
| | Slope | Rising |
| | Mode | Auto |
| | Coupling | DC |
| | Level | 0.00V |
| TRIGGER (Pulse) | Type | Pulse |
| | Source | CH1 |
| | Condition | = |
| | Set Pulse Width | 1.00ms |
| | Mode | Auto |
| | Coupling | DC |
| TRIGGER (Video) | Type | Video |
| | Source | CH1 |
| | Polarity | Normal |
| | Sync | All Lines |
| | Standard | NTSC |
| | Mode | Auto |
| TRIGGER (Slope) | Type | Slope |
| | Source | CH1 |
| | Condition | |
| | Time | 1.00ms |
| | Mode | Auto |
| TRIGGER (Alternative) | Type | Alternative |
| | Source | CH1 |
| | Mode | Edge |
| | Coupling | DC |
| | Slope | Rise |

# *Appendix C: Battery Installation*

The battery of the product is unplugged from the scope. To install the battery:

1. Unscrew the two screws from the battery cap with a screwdriver (Figure 1).
2. Draw back the scope's "leg" and remove the battery cap (Figure 2).
3. Set the battery snugly into the battery compartment (Figure 3).
4. Connect the white connectors between the battery and the scope.
5. Replace the battery cap over the battery, and retighten the screws.

Notes:
The battery plug is designed so the battery cannot be attached with the wrong polarity.
Note that the battery cap has an "up" side and a "down" side. The serial number will be upside down if the cap is reattached upside down.
If the scope will not turn on on normally after correctly installation, it is likely that the battery is totally discharged. Plug the scope into AC power to recharge it.

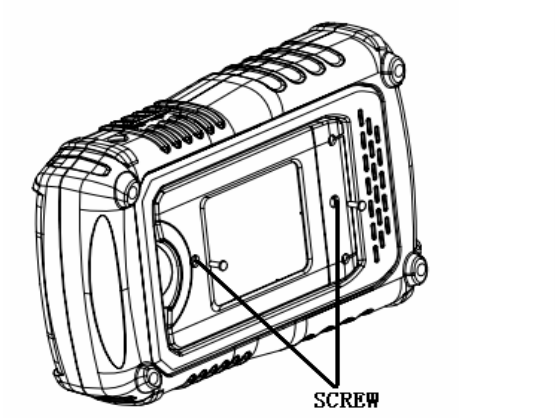



Figure 1

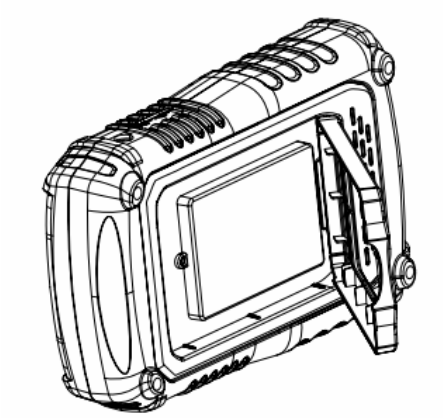


Figure 2

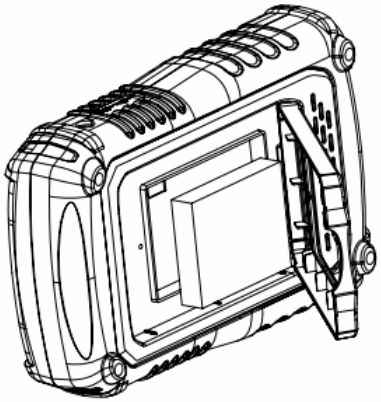


Figure 3

# *Appendix D: Daily Maintaining and Cleaning*

## Daily Maintaining

Do not let the LCD exposed in the sun directly for a long period when storing or placing the product.

**CAUTION**: To avoid damage to the instrument or probes, do not expose them to sprays, liquids, or solvents

## Cleaning

Check the instrument and the probes according to daily use situation. Please do the following steps to clean the surface of the instrument.

To clean the exterior surface, perform the following steps:

1. Remove loose dust on the outside of the instrument and probes with a lint-free cloth. Use care to avoid scratching the clear plastic display filter.
2. Use a soft cloth dampened with water to clean the instrument. Please disconnect it from all power sources firstly.

**Note:**

1. To avoid damage to the surface of the instrument or probes, do not use any abrasive or chemical cleaning agents
2. To avoid water causing electric short circuit or body hurt, Make sure the instrument is completely dry before reconnecting it to a power source



# Options and Accessories

### Included with Model AEGIS-OSC-9100 MB-W2:

- Probe Holder
- Probe Tips (3)
- Magnetic Base
- 2-Year Warranty

### Additional Available Accessories:

- 9 V, 4 A power adaptor
- 1X / 10X oscilloscope probes (2)
- Test leads for multimeter (2)
- Probe calibration accessory
- Rechargeable/replaceable 5-hour battery
- USB flash drive with user manual
- AEGIS® Bearing Protection Handbook

For more information, contact:

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