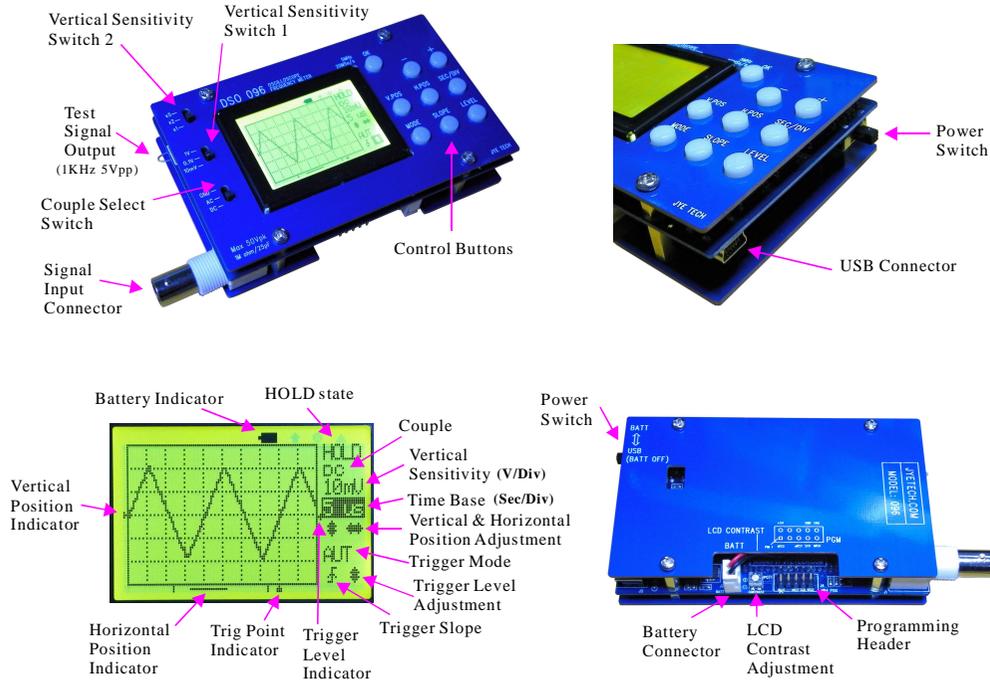
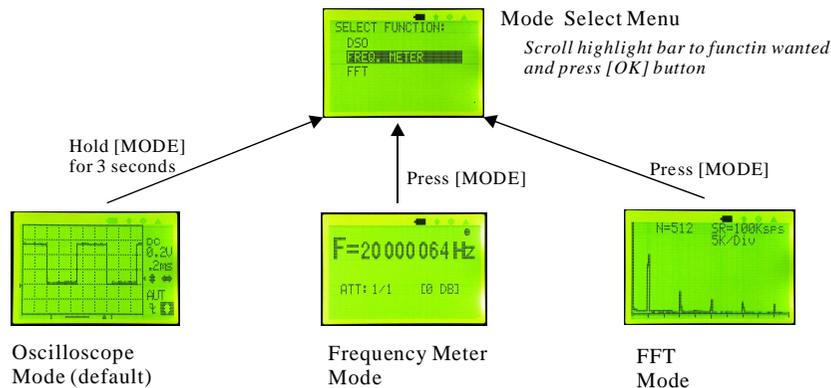


For detailed documents please visit www.jyotech.com

Panel & Connectors



Mode Navigating



Button Function Summary

Please note that button functions are mode and state dependent. The following charts list button functions under various modes and states.

1. Oscilloscope Mode

RUN State	
Button & SW	Functions
[VPOS]	Select VPOS
[HPOS]	Select HPOS
[SEC/DIV]	Select TIME-BASE
[MODE]	Select trigger mode
[SLOPE]	Select trigger slope
[LEVEL]	Select trigger level
[+]	Adjust the selected param.
[-]	Adjust the selected param.
[OK]	Enter HOLD state
[VPOS] hold	VPOS alignment
[MODE] hold	Enter Function Select menu
[SLOPE] hold	Turn LCD backlight on/off
[LEVEL] hold	Enter Setting Select menu
[OK] hold	Turn off device
V.Sen 1 & V.Sen 2	Change vertical sensitivity
Couple	Change couple method

HOLD State	
Button & SW	Functions
[VPOS]	Select VPOS
[HPOS]	Select HPOS
[SEC/DIV]	Save waveform to buffer
[MODE]	Select trigger mode
[SLOPE]	Display buffer
[LEVEL]	Send screen
[+]	Adjust the selected param.
[-]	Adjust the selected param.
[OK]	Exit HOLD state

2. Frequency Meter Mode

Button & SW	Functions
[MODE]	Enter Function Select menu
[+]	Change sampling rate
[HPOS]	Change FFT size
V.Sen 1 & V.Sen 2	Change sensitivity
Couple	Change couple method

3. FFT Mode

Button & SW	Functions
[MODE]	Enter Function Select menu
[+]	Change sampling rate
[HPOS]	Change FFT size
V.Sen 1 & V.Sen 2	Change sensitivity
Couple	Change couple method

Basic Operations

1. Powering ON/OFF the Device

Note: Battery is disconnected for transportation. Connect it at back if you are the first time powering up the device.

- If battery is connected and external power supply (USB) is not used setting power switch to "BATT" position will turn the oscilloscope on. Setting the switch to "USB" position will turn the unit off.
- If USB is connected ALWAYS keep the power switch at "USB" position and use plugging/unplugging to power on/off the unit.
- If you un-intentionally placed the switch at "BATT" position while USB is connected you may find the unit can not be power on no matter by the switch or by plugging in USB cable. In this case unplug USB cable and set the switch to "USB" position. Wait for 10 - 30 seconds or longer then turn it on by switch or plugging in USB cable. **[Note: This situation won't happen if the built-in battery charger was disconnected. For how to disconnect battery charger please see explanation below]**

2. Setting Parameters

- Vertical - Sensitivity, Position, and Coupling**
 - Use the top two slide switches to set sensitivity
 - Use [VPOS] and [+] [-] buttons to change waveform vertical position
 - Use the bottom slide switches to select coupling
- Horizontal - Timebase and Position**
 - Use [Sec/Div] and [+] [-] buttons to set timebase
 - Use [HPOS] and [+] [-] to change waveform horizontal position
- Trigger - Mode, Slope, and Level**
 - Use [MODE] and [+] [-] buttons to select trigger mode
 - Use [SLOPE] and [+] [-] buttons to select trigger slope
 - Use [LEVEL] and [+] [-] buttons to change trigger level

3. Backlight ON/OFF

Holding down [SLOPE] button for 2 - 3 seconds will toggle LCD backlight ON or OFF.

Advanced Operations

Rolling Mode

When Timebase is set to 0.1s/Div or slower DSO 096 enter *rolling* display mode. In this mode the trace shifts from right to left, simulating time elapsing.

Equivalent-Time Sampling (ETS)

When time-base is set to 2us/DIV or faster Equivalent-Time Sampling (ETS) technique is automatically used. By ETS the displayed waveforms are actually re-constructed from samples taken at multiple cycles. In order to make ETS work the following two conditions must be met.

- 1) The signal to be observed must be periodical.
- 2) Trig must be generated. This is because the trig points serve as the reference for re-constructing waveforms.

As a result if you don't see waveform updates when timebase is set to 2us/DIV or faster you should try to adjust trigger level so that trig can be generated and waveform display updates..

Please note that under ETS the trigger point indicator does not have meaning.

Vertical Position Alignment

Sometimes you may find the vertical position indicator is not aligned to 0V level trace. This difference can be removed by:

- 1) Set couple switch to GND position.
- 2) Press [VPOS] and hold it down for about 3 seconds.

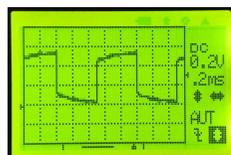
When the button is released you should see 0V line is aligned to the vertical indicator.

You may need to do the alignment by placing V.Sen.2 switch at X1, X2, and X5 respectively.

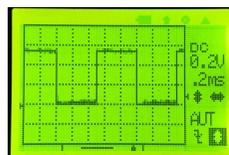
10X Probe Calibration

In order to correctly display signals the 10X probe needs to be calibrated. This can be done using the built-in 1KHz test signal.

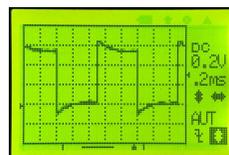
- 1) Place probe handle switch at "10X" position
- 2) Set oscilloscope timebase to 0.2ms/Div and sensitivity to 0.2V/Div
- 3) Place probe tip onto the test signal terminal ring (see photo at right). If display is not stable adjust trigger level to make it stable
- 4) Tune the cap trimmer close to BNC connector with a small screw driver until waveform similar to the center photo below is obtained.



Not enough



Right



Too much

Alternative Battery and Running Time

The standard configuration of 096 uses one 3.7V 1200mAh Li-ion battery, which can run the unit continuously for about 4 hours when fully charged.

Since 096 can accept battery voltage from 2V - 5V alternative batteries can be used. Two cells of 1.2V AA size Ni-MH batteries, for example, are ideal for the unit. Two cells 2000mAh Ni-MH batteries can run the unit for about 5 hours continuously if fully charged.

The Built-in Battery Charger

The built-in charger is specifically for 3.7V Li-ion battery. The charge current is programmed to about 100mA. As a result to fully charge a 1200mAh battery 12 hours are required.

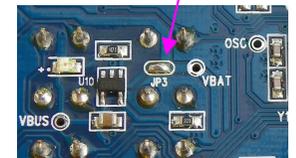
You may want to disconnect the charger if batteries other than Li-ion are used. Please see below for how to disconnect the charger.

How to Disconnect Battery Charger

For "F" version PCB when batteries other than Li-ion is used the charger can be disconnected by removing the solder on JP3 with a iron (see photo).

For "E" version PCB desolder the charger board which was attached to the main PCB.

Disconnect JP3



Firmware Upgrade

From time to time you may need to upgrade firmware for new functions or improved performance. This can be done by the built-in bootloader. For how the bootloader works and how to use it please refer to www.jyotech.com/Products/LedScope/e096.php

If hardware programmer is used to re-program the MCU please see the complete manual for details. (Fuse bit default factory setting: *extended byte - 0x03, high byte - 0xC0, low byte - 0xAE*)

USB Connection

To use USB connection PC driver for CP2102 needs to be installed. The driver can be downloaded at www.silabs.com/products/mcu/pages/usbtouartbridgevcpdrivers.aspx. Windows driver is also available at www.jyotech.com/Products/LedScope/e096.php.

Save Captured Waveform

Enter HOLD state and press [SEC/DIV] button. Follow screen instructions.

Recall Saved Waveform

Enter HOLD state and press [SLOPE] button. Follow screen instructions.

Send Screen as Bitmap File

- 1) Connect USB cable. Run a PC application that can handle XModem Protocol. Set communication format to 38400bps, 8 data bits, 1 stop bit, no parity, no flow control and make it ready to receive files.
- 2) Enter HOLD state. Adjust waveform position so that interested portion is on screen.
- 3) Press [LEVEL] button and follow screen instructions.

Restore Factory Default Settings

Hold down [LEVEL] button for 3 seconds to enter Setting Select menu. Select "RESTORE DEFAULT" and press [OK].