

# DSO 112 Digital Oscilloscope

## User Manual

Rev. 02

### Panel and Connectors

- Attention**
1. Battery voltage must be within 3.7V - 5V range.
  2. Maximum input voltage is 50Vpk.
  3. Do not attempt to measure live power directly.

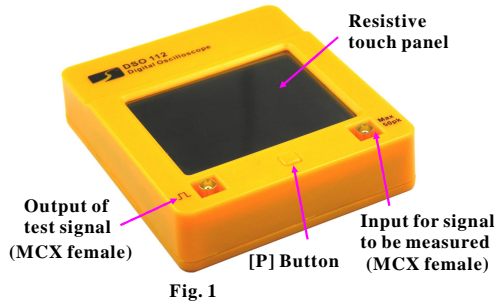


Fig. 1



Fig. 2

- Packing List**
- 1x DSO112 oscilloscope
  - 2x MCX - clip cables
  - 1x USB cable
  - 1x 3.7V/1200mAh battery (optional)

**Tip:** It is recommended to charge battery for more than 10 hours before first time use.

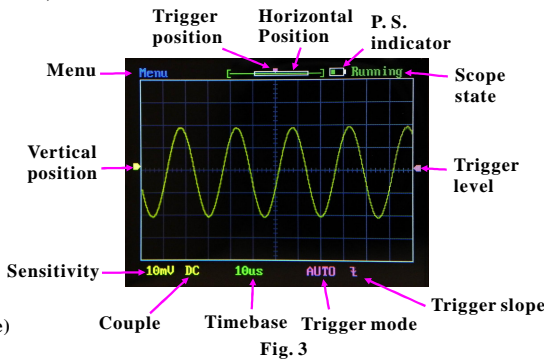


Fig. 3

### 4. Use the Scope

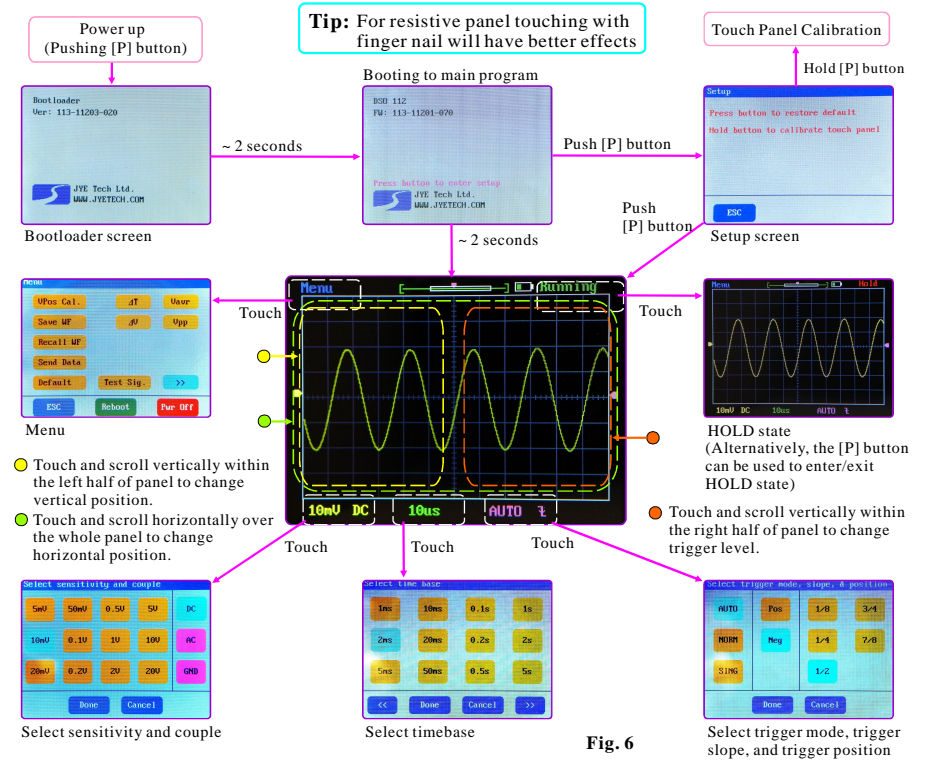


Fig. 6

### Basic Operations

#### 1. Power Supply

- DSO112 is powered by a 3.7V/1200mAh Li-ion battery (optional).
- DSO112 can also be powered externally via the USB socket. External power supply must not exceed 5V.

#### 2. Power On/Off

- **Power-on** Short press [P] button will turn DSO112 on.
- **Power-off** There are three ways to turn the unit off.
  - 1) Enter Menu and touch [Pwr Off] button.
  - 2) Hold [P] button for about 3 seconds under Running or Hold state.
  - 3) Hold [P] button for about 15 seconds under any state.

#### 3. Connecting to Signal to Be Viewed

- Connect DSO112 to signal to be viewed as illustrated in Fig. 4. The black clip should be connected to the reference (ground) of circuit under test. The red clip should be connected to the point of interest.

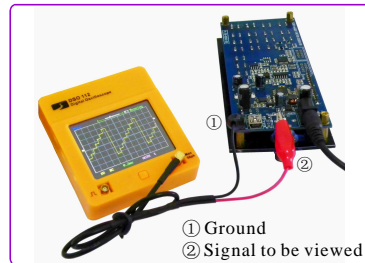


Fig. 4



Fig. 5

#### Quick Check

You can quickly check the functioning of scope/cables by connecting the test signal to the scope input (Fig. 5).  
**Tip:** It is a good learning exercise by playing with various parameters using this setup.

#### 5. Menu

Buttons	Functions	Remarks
VPos Cal.	Align VPos indicator to 0V trace.	10 - 30mV remaining difference is normal and does not affect performance.
Save WF	Save captured waveform data to internal EEPROM. The last captured data will be saved no matter this function is executed in Running state or Hold state.	Data in EEPROM are retained after power off and overwritten at next save operation.
Recall WF	Recall saved waveform data from EEPROM. The parameters used for the data will also be recalled.	Recalled waveform is always displayed in Hold state.
Send Data	Send waveform data via serial connection (virtual COM port on USB). The data captured right before this function is executed will be sent.	Waveform data are sent in CSV file format. XModem protocol is used for the transfer. USB driver for CP2102 is required (refer to the section "USB Connection").
Default	Restore factory default settings for various parameters.	Press [P] button at Setup screen will also perform the same function.
Test Sig.	Bring up "Test Signal Frequency" screen where test signal frequency can be changed.	Test signal frequency was set to 1KHz by factory default.
ΔT	Turn Δ T cursor On/Off.	
ΔV	Turn Δ V cursor On/Off.	
Vavr	Turn Vavr (average voltage) read-out On/Off.	
Vpp	Turn Vpp (peak-to-peak voltage) read-out On/Off.	
Auto Off	Bring up "Auto Power-off Time" screen where auto power-off time can be selected.	Auto power-off time was set to 2 minutes by factory default.

## Advanced Operations

### USB Connection

In order to use USB function the host which DSO 112 is to communicate with is required to install driver supporting the USB-Uart bridge CP2102. Please use the following link to download driver and install it (referring to documents accompanying).

[www.silabs.com/products/mcu/pages/usbtouartbridgevcpdrivers.aspx](http://www.silabs.com/products/mcu/pages/usbtouartbridgevcpdrivers.aspx)

### Serial Port Parameters

For the main firmware serial port parameters are fixed to 115200 bps and 8-N-1.

For the bootloader serial port parameters are fixed to 9600 bps and 8-N-1.

### Waveform Data Upload

Please refer to the article “Capture Uploading and Waveform File Format” for detailed instructions. The article is available at

[www.jyetech.com/Products/LcdScope?CaptureUploadingAndWaveformFileFormat.pdf](http://www.jyetech.com/Products/LcdScope?CaptureUploadingAndWaveformFileFormat.pdf)

### Δ T cursors

Δ T cursors can be turn on or off by entering Menu and touching  $\Delta T$  button.

To change cursor position touch the cursor you want to change. It will be highlighted. Then touch anywhere of the panel and scroll horizontally. You will see the highlighted cursor moves. Δ T and corresponding frequency (which is  $1/\Delta T$ ) readouts at screen top also change accordingly. (Fig. 7)

### Δ V cursors

Δ V cursors can be turn on or off by entering Menu and touching  $\Delta V$  button.

To change cursor position touch the cursor you want to change. It will be highlighted. Then touch anywhere of the panel and scroll vertically. You will see the highlighted cursor moves. Δ V readout at screen top-left corner also changes accordingly. (Fig. 8)

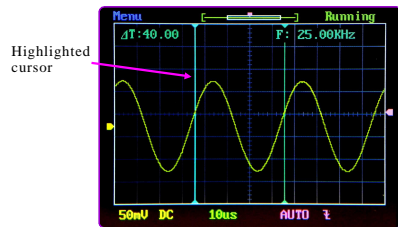


Fig. 7

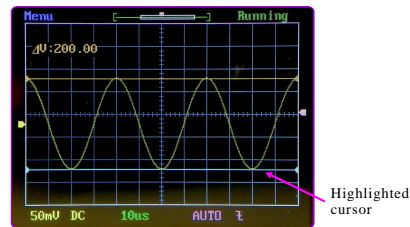


Fig. 8

**Note:** The unit of Δ T readout is the same as the current unit of timebase.  
The unit of Δ V readout is the same as the current unit of sensitivity.

## Maintenance

### Charging the Battery

DSO112 contains a built-in smart Li-ion battery charger. Simply connect the unit to USB power supply charging will start automatically. A red LED will light up (which can be seen from outside) indicating charge is undergoing. The charger will stop automatically once the battery is fully charged. (Fig. 9)

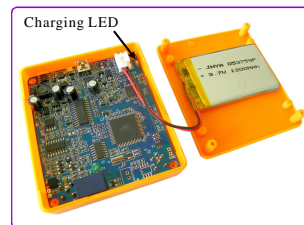


Fig. 9

### Touch Panel Calibration

The touch panel has been calibrated before shipping. In case of the touch panel doesn't work properly it can be re-calibrated. Please follow the steps below to perform touch panel calibration.

- 1) Power up the scope. At the main booting screen push [P] button to enter Setup mode.
- 2) Hold [P] button in Setup mode to enter touch panel calibration state, as shown in Fig. 10.
- 3) Use a pointed object to touch the center of each cross 8 times, as accurately as you can. You will see three crosses, one after another. Note that do not touch more than 8 times for each cross.
- 4) After you finish the third cross touch anywhere of the panel to verify. You should see a small green cross follows the points you touch with some error (the error is usually smaller than 1mm). If you see the errors larger than 2mm you can re-do the calibration.
- 5) Exit calibration by holding [P] button.

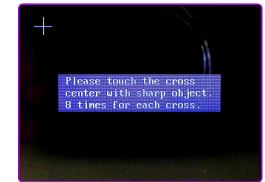


Fig. 10

### Upgrading Firmware

New firmware can be downloaded to DSO112 by the pre-installed Bootloader. Please follow the steps below to perform firmware change.

- 1) Download new firmware (it is a file with “.hex” extension) to you computer.
- 2) Download **avrubd.exe** at <http://www.jyetech.com/Support/avrubd.rar> and install it to your computer.
- 3) Connect DSO112 to PC via USB and power up the oscilloscope.
- 4) Start avrubd. At Option - System tab of select “Lite XModem” as communication protocol and set maximum connect count to 100 (see Fig. 11).
- 5) At Option - Comport tab select the com port number corresponding to your scope and set parameters to 9600 baudrate, 8 data bits, 1 stop bit, and no parity (see Fig. 12).

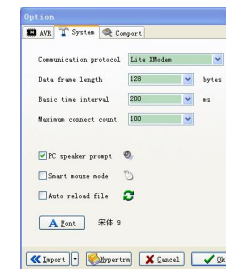


Fig. 11

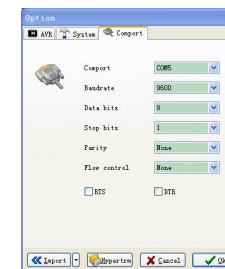


Fig. 12

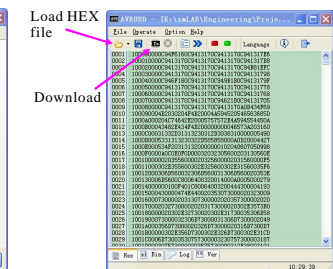


Fig. 13

- 6) Click on the Open File icon to load into avrubd the new firmware you have downloaded. Click on the download icon to start downloading (see Fig. 13). You should see avrubd is talking to oscilloscope by sending connection key continuously.
- 7) At DSO112 enter Menu and touch the button **[Reboot]**. Bootloader will be entered and answer to avrubd. If successful you should see download starts and progresses in avrubd. After all data have been downloaded the scope re-starts and upgrading is done.

### Specifications

- \* Analog bandwidth: 0 – 2MHz
- \* Max sampling rate: 2.5Mps
- \* Sensitivity range: 5mV/Div – 20V/Div
- \* Sensitivity error: < 5%
- \* Timebase range: 10μs/Div – 50s/Div
- \* Max input voltage: 50Vpk
- \* Record length: 512/1024 points
- \* Input impedance: 1MΩ
- \* Current consumption: ~300mA (@3. 7V)
- \* Dimension: 80 x 70 x 18 mm