Embest DSO2300

Feature

General Description:

DSO2300 is an intelligent two-channel PC based USB digital storage oscilloscope with high performance. It runs on any USB1.1 or USB2.0 equipped PC using Windows 98/2000/XP. The device connects to your PC with the included USB cable for both data transfer and power, so no external power supply is needed.

The device combines the functions of Oscilloscope, Spectrum analyzer, Voltmeter, Frequency meter and Logic analyzer all in a single instrument with up to 100Ms/s real-time sampling rate and 50MHz bandwidth. All oscilloscope functions are controlled through a point-and-click PC software interface.

It is a portable handheld device that is idea for engineers, students and anyone looking for an easy-to-use, low-cost and powerful oscilloscope. Detailed features of DSO2300 oscilloscope are as below.

- Size: 144x88x38(mm) (excluding cable and probes)
- Weight: <0.35kg (excluding accessories)
- Metal case and PnP (Plug and Play)
- USB power supply directly and no external power supply required
- Multi-functions: frequency spectrum analyser, waveform recorder, signal generator, cymometer, voltmeter, acoustic analysis graphic instrument, mathematical related graphic instrument voltage meter, digital storage oscilloscope, etc.
- Record and play. The computer can not only save current waveform on the screen, but also record continuous waveform. The operations of the record and playback are just as to operate DVD.
- The data can be led in by the formats Excel, Word or Notepad which would be convenient for report forms coming into being and taking full use of the powerful diagram functions of Excel.
- Zoom features with active cursors to drag the edges of the waveform window and waveform can be saved as a .jpg file.
- Capable of providing intuitionistic professional diagram like FFT waveform / Lissajous pattern (X-Y PLOT) waveform / S MAP / C MAP.
- The variables of input signal can be calculated and displayed. User can adjust the displayed location and color. All variables can be copied to Excel, Word, etc.
- On-line auto calibration.
- Trigger settings allow horizontal trigger position settings and vertical trigger position settings.
- The two channels can be the trigger of each other.
- Waveform is able to print on-line.
- Menu styles are able to change. Knobs can be selected with 3D solid style or plane style.
- Simple logic analyzer enables analyzing logic relationships and serial signals between the two channels.

- Easy to use with various color settings and a point-and-click PC software interface.
- Intelligent waveform searching and tracing function.
- Simple Copy and Paste into other applications such as Word, Excel.
- Channel interactive mathematical operations.
- User can save and restore the settings.
- One PC can work with several DSO2300 oscilloscopes so that more channels can be observed.
- Inherits the advantage of traditional instrument with friendly human-machine interface and easy to use.
- Capable of running on Windows 98/2000/XP OS.

Installation And Uninstall

DSO2300 Software:

- DSO2300 software is no need to install and can run directly.
- If the directory, which the software located, is deleted, the software is uninstalled.
- The application is DSO2300.EXE.

Device Driver:

- While the USB oscilloscope is used for the first time, the computer will prompt to install device driver.
- Before installing device drivers, please disconnect your PC from the Internet temporarily to avoid any information disturbance.
- The device driver and installation guide are under the directory \DRIVER.
- Different Operating Systems have different device drivers (DSO2300 device driver is from vendor FTDI LTD.)

Operating System	Directory And File Name	Driver Version
Windows XP Windows Server 2003 Windows 2000	\Driver\Win_XP_2000\FTDIBUS.INF	2.00.00
Windows XP x64 Windows Server 2003 x64	\Driver\Win_XP_2003_x64\FTDIBUS.INF	2.00.00
Windows 98 Windows ME	\Driver\Win98\ftd2xx.inf	3.01.04

- Detailed installation guide as below:

Operating System	Document
Windows XP	\Driver\Windows_XP_Installation_Guide.pdf
Windows 2000	\Driver\Windows_2000_Installation_Guide.pdf
Windows 98 Windows ME	\Driver\Windows_98_Installation_Guide.pdf

- Under windows 2000 and XP, if user wants to speed up the operating system detection

when DSO2300 is connected to PC, user can connect DSO2300 to PC and don't run the DSO2300 application, then disable "Load VCP" shown as below:

(Connect DSO2300 to PC and don't run the DSO2300 application, open the "Device Manager" which is located under "Control Panel\System". Then select the "Hardware" tab and click "Device Manger…", choose "USB Serial Converter" and double click, this window will be shown. Under this window, choose "Advanced", the above tab will be shown.)

Oscilloscope:

- Small size with metal case.
- USB power supply with plug and play function and no need other power supply.
- The application can automatically search and identify the device model.
- Each DSO2300 has a device model number. When it's connected to PC successfully, the number will be shown on "ABOUT" and "TOOL|VIEW CALIBRATION" windows.
- One computer can be worked with several oscilloscopes. But the oscilloscopes are controlled by different software.

Config Requirement:

- If the application can run in DEMO mode, the computer can work with one or more USB oscilloscopes.
- Monitor resolution: at least 800*600. The best resolution: 1024*768.
- RAM: at least 128M.

How To Use

1. Operations

A. Click

- All menus/buttons operations
- Operations of TIMEBASE, VOLT/DIV, POSITION and TRIG LEVEL
- Color and option button operations
- Left or right move of time domain waveform
- Right click and select "Save As JPG" to save waveform as a .jpg file.

B. Double Click

- Double Click the parameter area to prompt the measurement window and color setting window.

A: Vpp= 4.902 V　　　　B: Vpp= 4.902 V

- We can change the displayed content and color.

C. Right click

- Click right button on waveform, a menu will appear.
- Setup Main Window, Print Setup, Print Main Window, Copy and Save As JPG functions will be listed on the menu for selection.

D. Drag

- Move the cursors of the time domain waveform or frequency spectrum analyzing waveform
- Move the trigger indicator to adjust horizontal and vertical trigger position settings
- Operations of TIMEBASE, VOLT/DIV, POSITION and TRIG LEVEL
- Change the height and width of the time domain waveform or frequency spectrum analyzing waveform.
- Left or right move of time domain waveform

E. Default, Abort and OK buttons on the Setting window

- Default: Restore to factory settings
- Abort: Close the setting window without save
- OK: Save or Close the setting window

F. Hot key

- Functions are available through the Hot keys with the words underlined.

G. Auto calibration

- Before using a new device at the first time, the device should run Auto Calibrate under Setup menu once, and the calibration result should be saved. The calibration data is stored on PC. You may find under the directory "setup" for file "cali_xxxx".
- Run Auto Calibrate function and operate according to the prompt information. Exit directly after calibration and the result can be ignored. Result can also be save to assure more accurate result.
- Makesure the USB oscilloscope is well connected and probes are unplugged before Auto Calibrate.
- Restart the oscilloscope software or connect USB oscilloscope to PC once again after exiting Auto Calibrate function.
- If the device has been calibrated, the application will show the dialog box as below.
- System will get calibration parameters of each oscilloscope and clue to oscilloscope without calibration.
- System will not prompt clew on oscilloscope without calibration after ran Auto Calibrate function one time and saved the result.
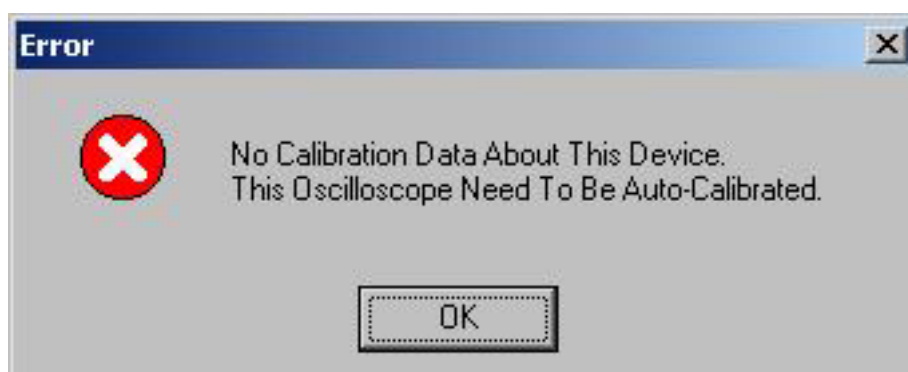
If the device has been calibrated, the application will not show the dialog box above.

H. Selected

- The selected fonts or lines will show colored. Otherwise, it appears black or grey.

2. Menu Items

A. Main window FILE menu

- FILE | OPEN: Open the saved file to display the saved data waveform
- FILE | SAVE: Save current data waveform
- FILE | PRINT SETUP: Printer settings
- FILE | PRINT: Print current data waveform
- FILE | BATCH DELETE: Delete oscilloscope data files
- FILE | EXIT: Exit program

B. Main window VIEW menu

- VIEW | FFT (Open/Close frequency spectrum analyser)
- VIEW | S MAP (Open/Close acoustic analysis graph)
- VIEW | C MAP (Open/Close mathematical related graph)
- VIEW | X-Y PLOT (Open/Close Lissajous pattern graph)
- VIEW | CURSOR (Open/Close cursor function)
- VIEW | MENU SWITCH (Switch menu styles)
- VIEW | TOOL BAR (Open/Close tool bar)
- VIEW | Maximize Main View
- VIEW | Minimize Control Panel
- VIEW | Normalize Control Panel
- VIEW | Minimize Measurement Panel
- VIEW | Normalize Measurement Panel

C. Main window SETUP menu

- SETUP | PROBE
- SETUP | MAIN WINDOW
- SETUP | FFT WINDOW
- SETUP | X-Y PLOT
- SETUP | PLAYBACK
- SETUP | LANGUAGE
- SETUP | AUTO CALIBRATE (Enter into auto calibration procedure. When use the new oscilloscope the first time, the oscilloscope should be calibrated once.)

D. Main window RECORDER menu

Recorder: Record as the oscilloscope file that can be playback by USB oscillscope.

- Record waveform. Enter into RECORDER mode, the recorder color operation bar and the recorder time bar will appear.
- Buttons are: Pause | Exit record | start to record.
- When record, time bar turns colored and start count.

- Record will be correct and without repeat .

E. Main window PLAYBACK menu

- Playback recorded waveform. Enter into PLAYBACK mode, the colored playback bar and the schedule bar will appear.
- ▶ | ❙❙ | ■ | ❙▶ | ◀❙ | ▲ Buttons are: Playback | Pause | Exit PLAYBACK | Next frame | Previous frame | Return to the first frame
- Playback schedule bar displays the playback section. User can change the playback section while in Pause status.
- The playback speed can be set under SETUP| PLAYBACK.

F. Main window Tools menu

- Tools | Mode Save (Save all the current settings as a file)
- Tools | Mode Restore (Use saved mode files for special observance)
- Tools | Multimeter Module (User can observe current and voltage)
- Tools | Real-Time Record As Standard Format (Real-time record waveform using the oscilloscope file format that can be playback)
- Tools | Real-Time Record As TXT(Real-time record waveform in Excel, Word, Notepad formats)
- Tools | Low-Speed Real-Time Record As TXT (Real-time record waveform in Excel, Word, Notepad formats with Low speed)
- Tools | Real-Time Record Setting (Set the parameters for real-time Recorder)
- Tools | Low-Speed Real-Time Record Setting (Set the parameters for low speed real-time recorder)

G. Main window A+/-B menu

- Switch A+B, A-B and close A+/-B.

H. Main window Cursor, FFT, S Map, C Map, X-Y Plot menus

- Switch functions: Open/Close the cursor, FFT, S Map, C Map, X-Y Plot.

I. Main window HELP menu

- HELP | User Manual
- HELP | Homepage
- HELP | About

3. Buttons

A. AUTO

- Enter into AUTO mode

B. NORMAL

- Enter into NORMAL mode

C. SINGLE

- Enter into SINGLE mode

D. HOLD

- Enter into HOLD mode

E. PLAYBACK

- Enter into PLAYBACK mode

F. DEMO

- Enter into DEMO mode. System is in offline status when in the DEMO mode.

G. DC

- DC coupling
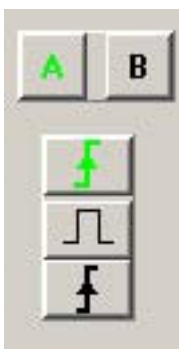
H. GND

- Display GND location

I. AC

- AC coupling

J. TRIG A and TRIG B

- Select the trigger source: Channel A or Channel B

K. TRIG mode

- Select trigger mode: rising edge, level or falling edge. The trigger button with a pulse is level mode trigger. When input voltage equals to the set trigger voltage, the trigger will happen.

L. FA

- Frequency searching and tracing of Channel A

- If user wants to search and trace channel A, please select FA button. The DSO will automatically change the settings of TIMEBASE and the position of Y-axis. And show the signals of A channel around the center of the screen and present several cycles which would be convenient for observation.

M. FB

- Frequency searching and tracing of Channel B

N. NFT

- Close frequency searching and tracing function.
- If user wants to adjust the settings himself for observation, he may need NFT function to close the automatical tracing function. The system default status is NFT status.

O. ▣ Reset Buttons
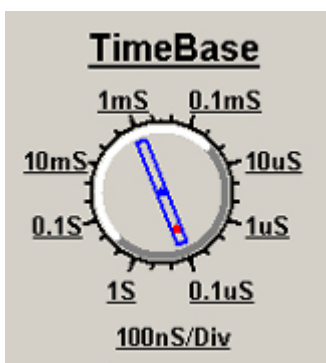
- Click the reset buttons to reset the voltage level

P. Up/Down Buttons

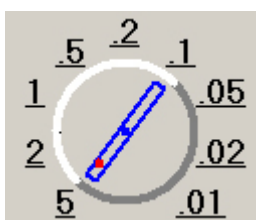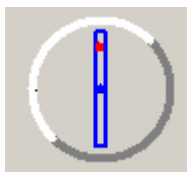- Click the up-down buttons to adjust the voltage levels

4. Knobs

A. TIMEBASE

- Click or drag can change timebase and frequency division.

B. VOLT/DIV

- Click or drag can change channel voltage settings.
- The voltage list box below this button can change the voltage selections directly.

C. POSITION

- Click or drag can change the vertical position of the Channel A, Channel B and trigger levels.
- The list box can change the vertical position of the Channel A, Channel B and trigger levels directly.
- The buttons can also adjust the vertical position of the Channel A, Channel B and trigger levels directly.
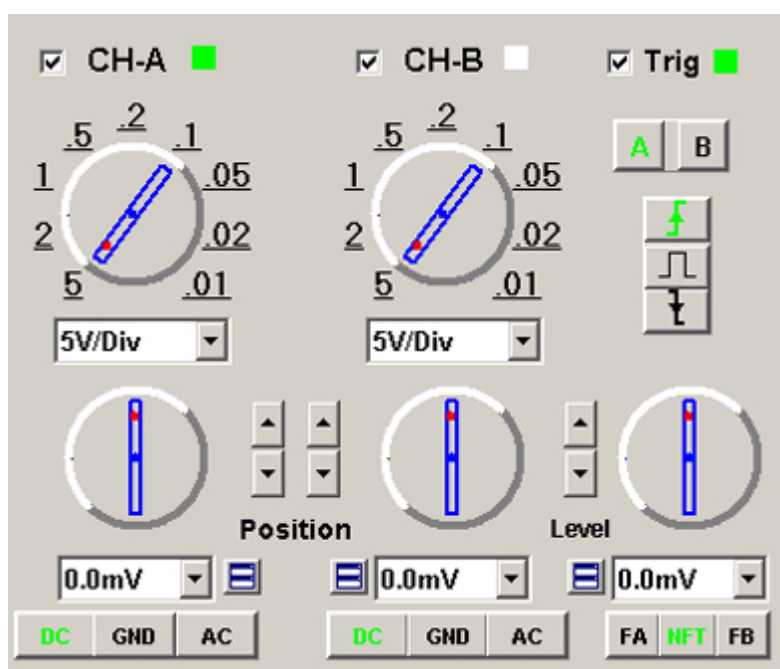
5. Suggestion

- If the voltage of the BNC input signals less than twice the full scale of voltage division, more precise waveform will be captured. For an example, twice of the 1V/Div full scale is 20V.
- Generally, probes setting at 1X (1:1) will limit the bandwidth of the instrument to 6MHz. To use the full bandwidth of the oscilloscope, the probe should be set to 10X (1:10). The top grade probe (such as Tektronix P2200) will improve the instrument performance.

6. Warning

- Because the metal case of the USB oscilloscope is connected with the PC ground lead, the desktop computer customers should assure the computer be grounded.
- To void damage of the oscilloscope and the probes, please do not put them in the foggy

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environment, liquid or liquor. Do not put them in the environment with conductive pollution.

DSO2300 Logic Analyzer

Function:

The DSO2300 has simple logic analyzer function, which is capable of analyzing logic relationship and serial signal between the two channels.

System Definition:

Logic Boundary: The DSO2300 takes the center horizontal line of the time-domain Y-T waveform area of the standard oscilloscope as the logic boundary. Above the boundary is logic "1" and below the boundary is logic "0".

External Clock: The logic analyzer function is capable of using internal clock or external clock. When using external clock mode, the system limits the Channel A to be the input channel of external clock.

Operation Steps:
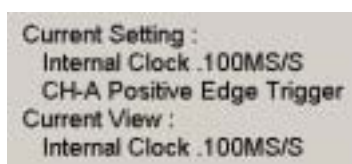
1.User can observe and adjust waveform under the Y-T frame of the standard oscilloscope. Please note: the middle line of the Y-T waveform area is logic boundary. When switching into the logic analyzer function, signals above the logic boundary is regarded as logic "1" and below the logic boundary is regarded as logic "0".

2.After adjusting the waveform well, the oscilloscope can be switched into logic analyzer function.

3.User can switch logic data display formats (Binary/Hexadecimal/Off) , setting the running mode and others under the logic analyzer function.

Main Menu:

A. SETUP Menu

- SETUP| LOGIC can be used to set Trigger Source, Enable Edge (Only valid when selecting Ext L/H on Sampling Setting dial), Trigger Mode, Trigger Byte (Trigger Byte is invalid when Trigger Mode is Edge Source).
- PREFERENCE can be used to set display style of logic data and open or close displayed setting information of logic analyzer.

Setting information of logic analyzer includes current user settings and parameters of current displaying logic diagram.

```
Current Setting :
  Internal Clock .100MS/S
  CH-A Positive Edge Trigger
Current View :
  Internal Clock .100MS/S
```

When under "HOLD" mode, current user settings and parameters of current displaying logic diagram can be different.

B. SAVE/OPEN Menu

Save/Open logic data files.

Main Buttons:

A. Button AUTO

- Enter into AUTO mode, handle trigger waveform if has waveform trigger, handle the newest data if has no waveform trigger.

B. Button NORMAL

- Enter into NORMAL mode and catch the trigger waveform continuously.
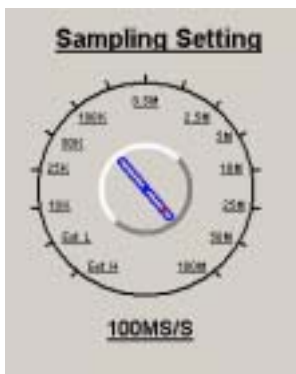
C. Button SINGLE

- Enter into SINGLE mode and catch one frame trigger waveform.

D. Button HOLD

- Data waveform will be locked when entering into HOLD mode. User can observe and analyze waveform and data statically in HOLD status.

Knob:

- The knob can be clicked and dragged. When selecting sample between 10KS/S and 100MS/S, system is using internal clock. When selecting Ext L or Ext H, system is using external clock. Ext L is used when external clock is less than 200KHz and Ext H is used when external clock is more than 200KHz.

Probe Compensation Adjustment

- Before using probe at 1:10 or 1:100, the compensation capacitor of probe should be adjusted.
- Set the timebase to 1ms/div. Connect probe terminal with 1KHz compensation terminal. Connect the probe ground lead with the oscilloscope metal case.
- To adjust the compensation capacitor of the probe at 1:1, set the voltage devision to 0.5V/div. To adjust the compensation capacitor of the probe at 1:10 or 1:100, set the voltage devision to 0.05V/div.
- Adjust the compensation capacitor of probe until 1KHz waveform appears the normal square waveform.

Normal	Too much	Too little

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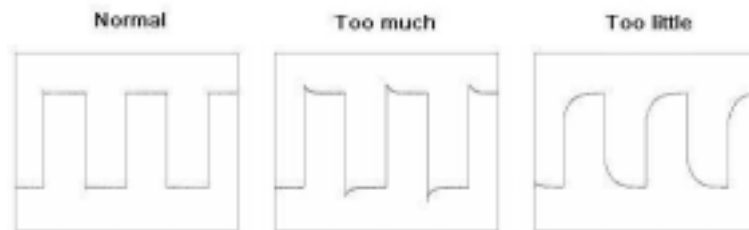
DSO2300 Specification

Input:

- Max. Sample rate: Real-time sampling: 100MS/s for every channel using one or two channels.
- Channel: 2
- Bandwidth: 50 MHz (-3dB)
- Vertical resolution: 8 bits/channel
- Gain range:
  10mV~5V/div @ x1 probe (10mV, 20mV, 50mV, 100mV, 200mV, 500mV, 1V, 2V, 5V/div l-2-5 sequence)
  100mV~50V/div @ x10 probe
  1V~500V/ div @ x100 probe
  10V~5KV/div @ x1000 probe
- Range: 10 divisions
- Offset level: +/-5 divisions
- Coupling: AC, DC, GND
- Offset Increments: 0.04 div
- Impedance: 1M ohm
- DC accuracy: +/-3%
- Input protection: 50 Vpk (DC + peak AC < 10 kHz, without external attenuation)
- Display Mode: Y-T, X-Y

Timebase:

- Timebase range: 20ns/div ~ 1s/div (20ns, 50ns, 100ns, 200ns, 500ns, 1us, 2us, 5us, 10us, 20us, 50us, 100us, 200us, 500us, 1ms, 2ms, 5ms, 10ms, 20ms, 50ms, l00ms, 200ms, 500ms, 1s/div 1-2-5 sequence)
- Acquisition: Realtime sampling: 20ns/div ~ 1s/div
- Range: 10 divisions
- Pre/Post trigger: 0 %-1000%
- Buffer size: 6KBytes (3KBytes for each channel)

Trigger:

- Type: Rising edge, Falling edge, Voltage Level
- Mode: Auto. Normal and Single
- Intelligent Trace: Yes
- Range: 10 divisions
- Trigger level: +/-5 divisions
- Settabillity: 0.04 div increments

Math:

- Measurements: Vp-p, Vmax, Vmin, Vrms, Vavg, Freqency.
- Cursor: Time/frequency difference, voltage difference, both Frequency and voltage in FFT mode
- Math: Addition, subtraction

- FFT: 2048 Samples
- Voltage/Current View: Yes.

Logic Analyzer:

- Channel: 2
- Trigger: Rising edge, Falling edge and Byte.
- Clock: Internal or External Clock.
- Data display: Binary or Hexdecimal
- Screen: Zoom In/Out.
- Cursor: Frequency difference.

Physical:

- Interface: Universal Serial Bus (USB)
- Power: No external power source required. Bus-powered from USB.
- Dimensions: 144x 88 x38mm

Software:

- Interface: User-friendly Graphic User Interface (GUI)
   Microsoft Windows standard interface
- Display Screen size: user can adjust it to large or small.
                         Color and monochrome.
                         User color setting: Yes
- File management: Image save: JPG file.
                         Data save: DAT /TXT for Oscilloscope
                         GDA for Logic Analyzer.
                         OLE (Object Linking and Embedding)
                         Automation: Data generation for Microsoft Excel / Word
                         Setting save/load
- PlayBack Function: Capacity > 50Gbytes.
- Print: Yes

Others

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PC software and driver upgrade:

- The software is able to upgrade without charges.
- Any update or upgrade information about this product will be noticed on our website.

Hardware (include firmware) upgrade:

- Generally, products of the same series can be upgraded to the high-grade types.
- Please give us an Email to confirm before hardware upgrading.

Website homepage:

- http://www.embedinfo.com
- http://www.armkits.com