

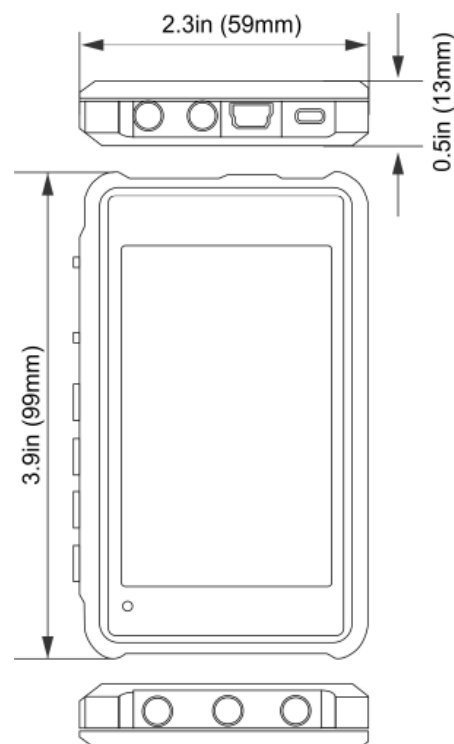
Description

This unit is a 5-trace 4-channel digital oscilloscope for common electronic engineering tasks. Its CPU is based on ARM Cortex M3, adopting FPGA to manage the control & data buffering of ADC. A built-in 2MB USB disk enables users to store waveforms & upgrade firmware. It also provides 4 application areas, convenient for users to load & upgrade at most 4 kinds of application firmware.



Specification

Temperature	Operating Condition	+0°C to +50°C
	Non-operating Condition	-20 °C to +60 °C
Humidity	Operating Condition: high temperature	40 °C to 50 °C, 0% to 60% RH
	Operating Condition: low temperature	0 °C to 40 °C, 10 to 90%RH
	Non-operating Condition: high temperature	40 °C to 60 °C, 5 to 60% RH
	Non-operating Condition: low temperature	0 °C to 40 °C, 5 to 90% RH
Parameters	Max transient-withstanding voltage is ± 400 V peak value. Measure voltage range Measure frequency range Max input voltage of logic probe is ± 15 V peak value.	



General safety rules

To ensure your safety & avoid any damage to the device/connected products, please read the follow precautions carefully. To avoid any possible dangers, please use this product according to the rules.

Avoid fire & physical injury.

Use appropriate power cord. Please use dedicated power cord which is certified in the country/region.

Connect & disconnect properly. Do not plug/unplug when the probe(s)/test lead(s) is connected to the voltage source. Before you plug/unplug current probes, please disconnect power to the circuit-under-test.

Observe all terminal ratings. To avoid fire/electric shock, please observe ratings & symbols on the product. Please read the user's manual carefully to know detailed info of the ratings before connecting the device.

Do not operate in humid environment.

Do not operate in inflammable/explosive environment.

Please keep the surface of the product clean & dry.

Major functions

Pocket-size oscilloscope helps you test, adjust & present electronic designs. Its functions include:

- ▼ 8M Hz bandwidth, 8-bit precision
- ▼ 2 analog channels: (CH_A, CH_B), 2 digital channels (CH_C, CH_D)
- ▼ Calculation channels: [CH_A]+[CH_B], [CH_A]-[CH_B], [CH_C][CH_D], [CH_C]&[CH_D], REC_A, REC_B, REC_C, REC_D
- ▼ Sampling rate of any analog channel can reach 72 MS/s
- ▼ Record length of any channel can reach 4096 bits
- ▼ Users can save waveforms and upgrade firmware with a built-in 2M USB disk.

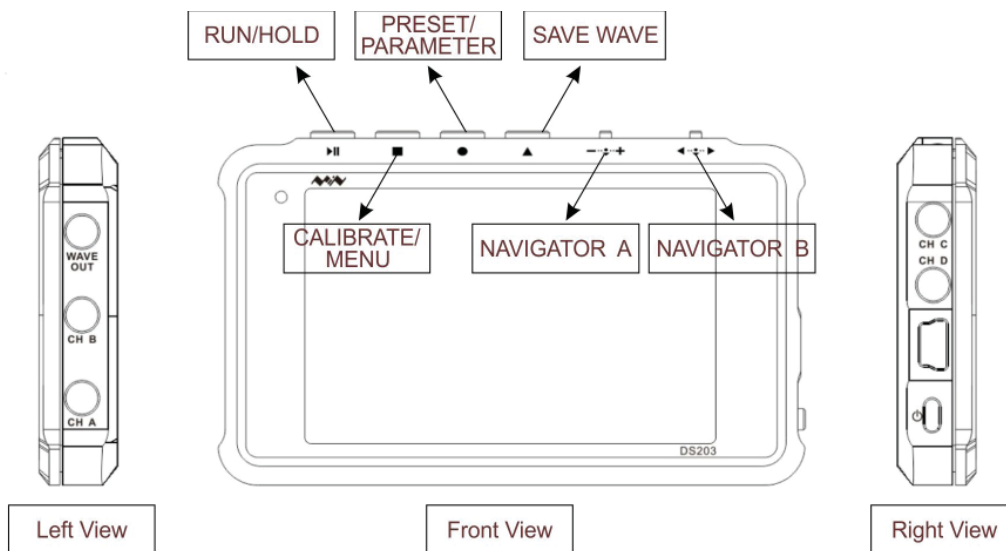
Introduction

1. Interfaces & buttons

▼ Front view, left→right: RUN/HOLD(▶||), CALIBRATE (■), PRESET (●), SAVE WAVE(▲), NAVIGATOR A(-...+), NAVIGATOR B(◀...▶).

▼ Left view, top→bottom: Wave output[WAVE OUT], analog channel B[CH_B], analog channel A[CH_A].

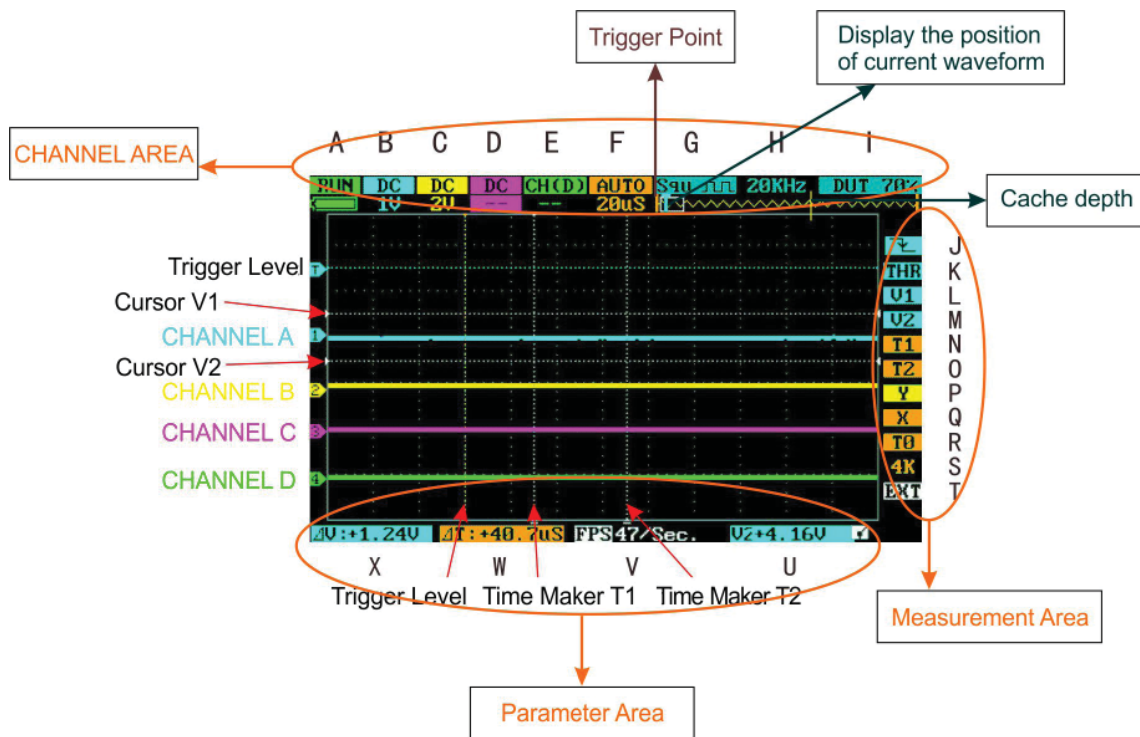
▼ Right view, top→bottom: Digital channel C [CH_C], digital channel D [CH_D], USB port, power



2. Screen

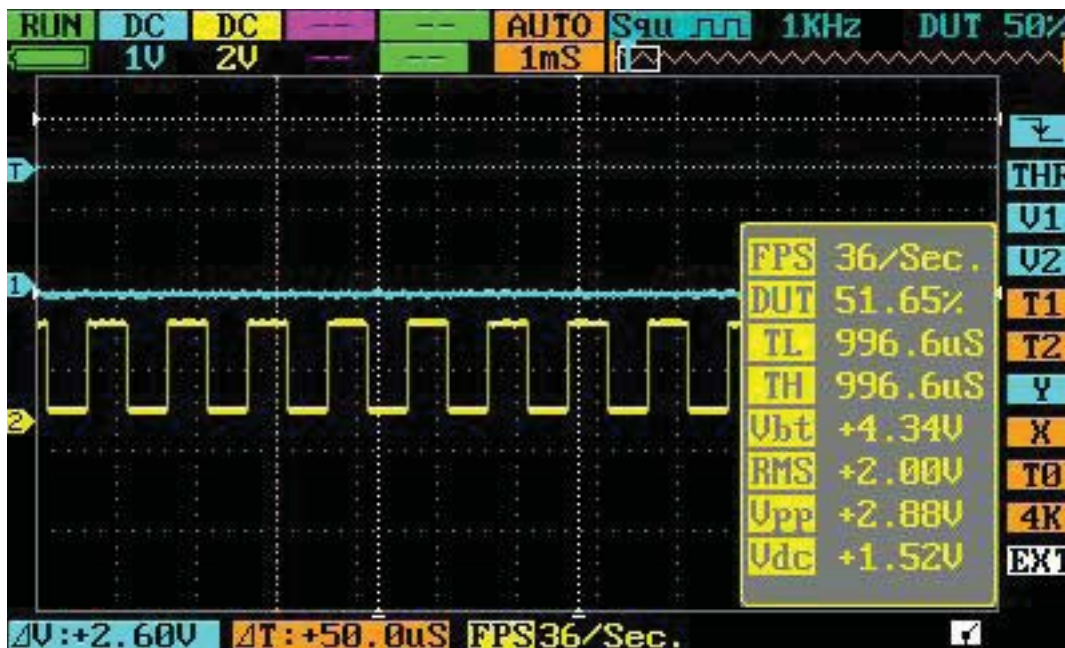
Horizontally A—I is channel area; vertically J—T is measurement area. You can move cursor within A—G by scrolling (◀...▶); change selection by scrolling (-...+); move cursor between upper & lower menus by pressing (-...+). When cursor is in G Position, press (-...+) to move it within G—I; and press (▲) to move cursor between channel area & measurement area. Each menu has the same color as its corresponding channel: Channel A (blue), Channel B(yellow), Channel C(purple), Channel D(green), Common menu is orange.

U—X is parameter area, U position shows parameters for THR, V1 & V2 to choose; V position is the preferred parameter of (●) button; W position is $\Delta T = T_2 - T_1$, X position is $\Delta V = V_1 - V_2$



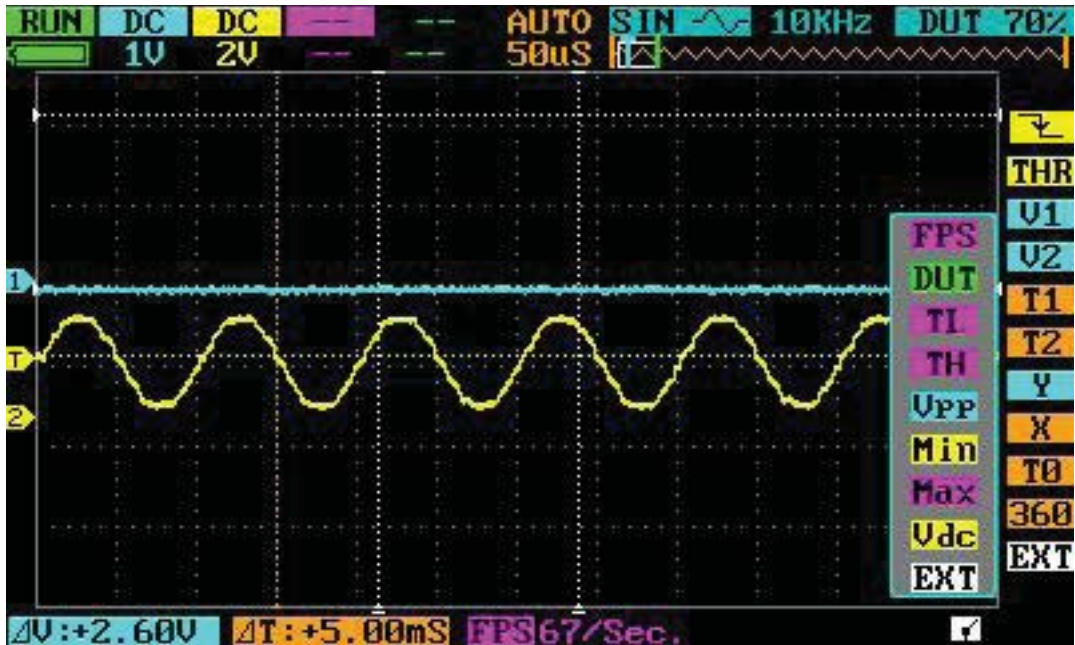
2.1 Parameters

As in figure below, adjust G—I, output 1KHz from [WAVE OUT], input square waveform of 50% duty factor into CH_B, short press (●) to display current parameter. Annotations of parameters are shown in the table below.



FPS	Frames Per Second
Vpp	Peak-to-Peak Voltage
Vdc	Direct Current Voltage
RMS	Average Value of Voltage
Max	Maximum Voltage
Min	Minimum Voltage
FRQ	Signal Frequency
CIR	Signal Cycle
DUT	Duty factor
TH	Monocycle High Level Time
TL	Monocycle Low Level Time
Vbt	Battery Voltage

There are 12 parameters; Short press(●) shows only 8 parameters; Press(●) longer and scroll (-...+) to select parameter, press (-...+) to choose color (channel), press (◀...▶) or choose EXT to exit; as below:



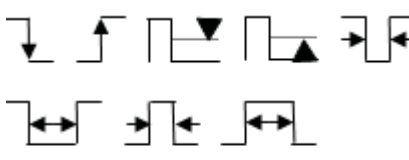
2.2 Functions of Channel Area

The table below shows the detailed introduction of the functions of menus in channel area:

Menu	Item	Function(Operate: Scroll(-...++))
A	RUN/HOLD	(Running Mode) RUN/HOLD, show voltage
B	AC/DC/--	(Channel A)AC coupling/DC coupling/hide
	50mV—10V (stepping in 1-2-5 mode)	voltage per grid
C	AC/DC/--	(Channel B)AC coupling/DC coupling/hide
	50mV—10V (stepping in 1-2-5 mode)	voltage per grid
D	DC/--	(Channel C) DC coupling/hide
	--	----
E	CH_(D)/(A+B)/(A-B)/(C&D)/(C D)/ REC_A/ REC_B/ REC_C/ REC_D	thru CH_D: Input(A+B), waveforms of CH_A & CH_B sync (A-B): get subtraction of waveforms of CH_A & CHA_B (C&D): get and operation of CH_C & CH_D (C D): get or operation of CH_C & CH_D REC_A: reload the last waveform saved in CH_A Same for REC_B, REC_C & REC_D
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F	AUTO/NORM/	(Trigger M)Auto/Norm/Sgl/slow scan/instant scan
	0.1uS—1S (stepping in 1-2-5 mode)	Unit per second
G	Squ/Sin/Tri/Saw ($\approx 2.8V_{pp}$)	(Waveform output)squ/sin/tri/sawtooth
H	(Squ)10Hz—8MHz	<1MHz, stepping in 1-2-5mode
	(Sin/Tri/Saw) 10Hz—20KHz	>1MHz, stepping in 2-4-6-8mode
I	(Squ)50%—90% ($\pm 10\%$)	adjust duty factor

2.3 Functions of Detection Area

The table below shows detailed illustrations of functions of menus in detection area:

Menu	Item	Function	Operating Instruction
J		Trigger mode: falling edge trigger, rising edge trigger, (>, <) trigger, (<, >) negative pulse width, (<, >) positive pulse width	Scroll(-...+) to choose trigger mode, press (-...+) to choose channel (different colors)
K	THR	Trigger level	Scroll (-...+) to adjust trigger level (U position shows trigger level), press (-...+) to choose channel (CH_A/CH_B/hide)
L	V1	Cursor V1: top limit of visible trigger level	croll (-...+) to select top limit of trigger level, and press (-...+) to choose channel(CH_A/CH_B/CH_C/CH_D/hide)

M	V2	Cursor V2: bottom limit of visible trigger level	Scroll (-...+) to adjust bottom limit of trigger level(in X position, shows $\Delta V=V1-V2$), press (-...+) to choose channel (CH_A/CH_B/CH_C/CH_D/hidden)
N	T1	Time Marker T1	Scroll (-...+) to adjust time marker T1, and press (-...+) to hide time marker
O	T2	Time Marker T2	Scroll (-...+) to adjust time marker T2 (in W position shows $\Delta T=T1-T2$), press (-...+) to hide time marker T2.
P	Y	Horizontal Level of each channel	Scroll(-...+)to adjust horizontal level, press(-...+) to choose channel(CH_A/CH_B/CH_C/CH_D)
Q	X	Choose the window to display waveforms	Scroll(-...+) to choose waveforms of different positions to display on current window
R	T0		
S	360-4K	Memory depth	Scroll (-...+) to choose memory depth
T	EXT/SAV		

2.4 Menus

On screen, press (■) to access the menu, press again to exit. Detailed instructions are listed below:

Item (Up→Down)	Function	Operating Instruction
Save Param	Save current parameter settings	Press (-...+) to confirm, scroll (◀...▶) to the next menu
Save Dat	Save dat file to the built-in USB disk	Press (-...+) to confirm, scroll (-...+) to choose file no., scroll (◀...▶) to next menu
Save Buf	Save buf file (sample data in buffering area) to built-in USB disk	Press (-...+) to confirm, scroll (-...+) to choose file no., scroll (◀...▶) to next menu
Save Bmp	Save bmp file (waveform image) to the built-in USB disk.	Press (-...+) to confirm, scroll (-...+) to choose file no., scroll(◀...▶) to next menu.
Save Csv	Save csv file (export sampling data of buffering area) to built-in USB disk	Press (-...+) to confirm, scroll (-...+) to choose file no., scroll(◀...▶) to next menu.
Load Dat	Load dat file	Press (-...+) to confirm, scroll (-...+) to choose file no., scroll (◀...▶)to next menu.
Load Buf	Load buf file	Press (-...+) to confirm, scroll (-...+) to choose file no., scroll (◀...▶)to next menu.
BackLight	Adjust backlight brightness	Press (-...+) to confirm, scroll (-...+) to adjust backlight brightness, scroll (◀...▶) to next menu.
Buzzer	Adjust buzzer volume	Press (-...+) to confirm, scroll (-...+) to adjust buzzer volume, scroll (◀...▶) to next menu.
Standby	Choose screensaver	Press (-...+) to confirm, scroll (-...+) to choose file no., scroll (◀...▶) to next menu.
Calibrat	Instrument calibration (make sure CH_A is ground connected)	Press (-...+) to confirm, press (■) to calibrate.

Operation Example

1. Example one: Measure RS485 signal

- 1) Connect the probe of CH_A/CH_B to the detection point of the circuit, CH_A to RS485+, CH_B to RS-, two clips to RS485 GND.
- 2) Set CH_A to DC 2V, set CH_B to DC 2V, set CH_D to A-B, set squ waveform output.
- 3) Save the waveform, click menu key, press(◀ ... ▶)to choose save bmp.

Here following figure of HUM-D RS485 network signal

