

RIGOL

Data Sheet

DS1000E, DS1000D Series Digital Oscilloscopes

DS1102E, DS1052E, DS1102D, DS1052D

Product Overview

DS1000E, DS1000D series are kinds of economical digital oscilloscope with high-performance.

DS1000E series are designed with dual channels and 1 external trigger channel.

DS1000D series are designed with dual channels and 1 external trigger channel as well as 16 channels logic analyzer.



Applications

- Electronic Circuit Test
- Circuit Functional Test
- Logical Relation Between Signals Verification
- Circuit of Mixed Signal Test
- Education & Training

Easy to Use Design

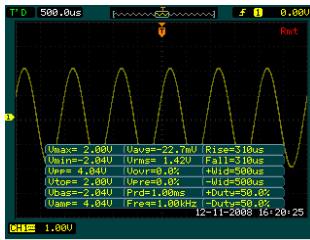
- Built-in help menu enables information getting more convenient
- Multiple Language User Interface, support Chinese & English input
- Support U disk and local files storage
- Waveform intensity can be adjusted
- To display a signal automatically by **AUTO**
- Pop-up menu makes it easy to read and use

Main Features

- Dual analog channels and 16 channels logic analyzer, 100MHz maximum bandwidth, 1GSa/s maximum real-time Sample rate and 25GSa/s maximum equivalent Sample rate
- 5.6 inch and 64 k TFT LCD make the waveform displays more clear and vivid
- Abundant trigger types: Edge, Pulse Width, Video, Slope, Alternate, Pattern and Duration
- Unique adjustable trigger sensitivity enables to meet different demands
- Enable to measure 20 types of wave parameters and track measurements via cursor automatically
- Unique waveform record and replay function
- Fine delayed scan function
- Built-in FFT function, hold practical digital filters
- Pass/Fail detection function enables to output testing results
- Math operations available to multiple waves
- Powerful PC application software UltraScope
- Standard configuration interface: USB Device, USB Host, RS-232 and support U disk storage and PictBridge print standards
- The new function "Key Lock" can meet the needs of industrial production
- Support for remote command control

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RIGOL Technologies, Inc.

➤ Automatically Measure 20 Wave Parameters

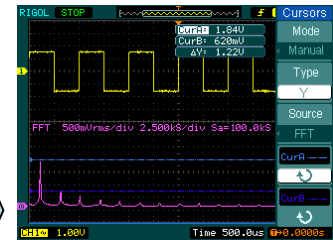


Automatic measure

DS1000E, DS1000D series oscilloscopes provide 20 types of wave parameters for automatically measuring, which contains 10 Voltage and 10 Time parameters.

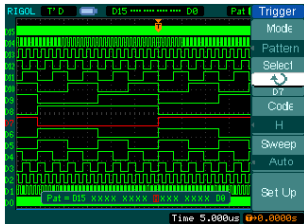
In cursor mode, users can easily measure by moving cursor. Besides, 3 types of cursor measurement are optional: Manual, Track and Auto.

➤ Cursor Measure



FFT cursor measure

➤ Multiple Trigger



Pattern trigger

Both DS1000E and DS1000D series contain abundant triggers:

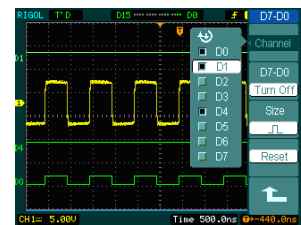
- Edge trigger, Pulse Width trigger, Video trigger, Slope trigger
- Alternate trigger, Pattern trigger (DS1000D), Duration trigger (DS1000D)

Especially the duration trigger is a new type from perfect combination of patten and pulse width trigger. Unique function of adjustable trigger sensitivity is good for filtering possible noise from signal in order to avoid false triggers.

➤ 16 Channels Logic Analyzer

Being equipped with 16 channels logic analyzer, DS1000D series mixed signal oscilloscopes achieve mixed signal measure coordinating with 2 analog channels.

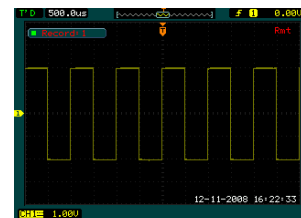
Each channel can be turned on or off independently, or in groups of 8(D7-D0 and D15-D8); also, you can set waveform size and threshold types or change the display position on screen for digital channel.



Digital channels setup

➤ Waveform Recording

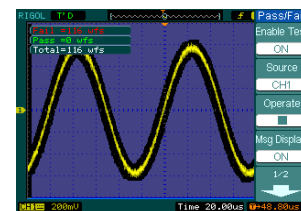
In virtue of waveform recording function from DS1000E and DS1000D, not only the outputs from two channels could be recorded, but also the waves outputted by Pass/Fail test could be easily recorded. Totally, up to 1000 frames of waves are available to record. Besides, users can analyze waves according to reall or save transient waves so as to get more exact datum.



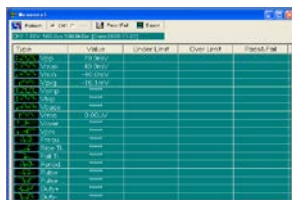
Waveform recording

➤ Pass/Fail Testing

The Pass/Fail function monitors the changes of signals by comparing whether the input signal is within the pre-defined mask. The testing results not only can be displayed on screen or output by isolated pass/fail port, but also can be alarmed according to turn on system sound.



Pass/Fail testing



Measurement window

➤ UltraScope Software

RIGOL provides powerful PC application software: UltraScope, which enables to: Capture and measure wave; Perform local or remote operation; Save waves as ".bmp" format; Save files as ".txt" or ".xls" format; Print waveforms.



Key Lock function

➤ Key Lock

This function is widely used in most productions. All keys are locked except F1 to F5 and MENU ON/OFF in this mode.

To lock the keyboard, use menu; to unlock, correct code has to be input. Also, you can reset a new code if necessary.

Specifications

All specifications apply to DS1000E, DS1000D Series Oscilloscopes unless where noted. To come up to these specifications, two conditions must be met firstly:

- The instrument must have been operated continuously for 30 minutes under the specified operating temperature.
- Do perform Self-Calibration operation through the Utility menu if the range of operating temperature variations up to or more than 5°C.

NOTE: All specifications are guaranteed unless where marked "typical".

Specifications

| Bandwidth | | | | |
|--|---|-------------------|-----------------------|----------------------------|
| DS1102E | DS1052E | DS1102D | DS1052D | |
| 100MHz | 50MHz | 100MHz | 50MHz | |
| Acquisition | | | | |
| Sample Modes | Real-Time Sample | Equivalent Sample | | |
| Sample Rate | 1GSa/s ^[1] , 500MSa/s | DS1102X | DS1052X | |
| | | 25GSa/s | 10GSa/s | |
| Averages | The waveform will be displayed one time while all the channels finish N times Sample, N could be selectable from 2, 4, 8, 16, 32, 64, 128 and 256 | | | |
| Inputs | | | | |
| Input Coupling | DC, AC, GND | | | |
| Input Impedance | 1MΩ±2%, the input capacity is 18pF±3pF | | | |
| Probe Attenuation Factors | 1X, 5X, 10X, 50X, 100X, 500X, 1000X | | | |
| Maximum Input Voltage | 400V (DC+AC Peak, 1MΩ input impedance) | | | |
| | 40V (DC+AC Peak) ^[2] | | | |
| Time Delay between Channel (typical) | 500ps | | | |
| Horizontal | | | | |
| Sample Rate Range | Real-Time: 13.65Sa/s-1GSa/s Equivalent: 13.65Sa/s-25GSa/s | | | |
| Waveform Interpolation | Sin(x)/x | | | |
| Memory Depth | Channel Mode | Sample rate | Memory Depth (normal) | Memory Depth (long memory) |
| | Single channel | 1GSa/s | 16kpts | N.A. |
| | Single channel | 500MSa/s or lower | 16kpts | 1Mpts |
| | Dual channel | 500MSa/s or lower | 8kpts | N.A. |
| | Dual channel | 250MSa/s or lower | 8kpts | 512kpts |
| Scanning Speed Range (Sec/div) | 2ns/div~50s/div, DS1102X 5ns/div~50s/div, DS1052X 1-2-5 Sequence | | | |
| Sample Rate and Delay Time Accuracy | ±50ppm (any interval ≥1ms) | | | |
| Delta Time Measurement Accuracy (Full Bandwidth) | Single: ±(1 Sample interval + 50ppm × reading + 0.6 ns) >16 averages: ±(1Sample interval + 50ppm × reading + 0.4 ns) | | | |

| Vertical | | |
|---|--|---|
| A/D Converter | 8-bit resolution, all channels sample simultaneously | |
| Volts/div Range | 2mV/div~10V/div (at the input terminal connecting to BNC) | |
| Maximum Input | Maximum input voltage on analog channel CAT I 300Vrms, 1000Vpk; instantaneous overvoltage 1000Vpk CAT II 100Vrms, 1000Vpk RP2200 10:1: CAT II 300Vrms RP3200 10:1: CAT II 300Vrms RP3300 10:1: CAT II 300Vrms | |
| Offset Range | ±40V (250mV/div~10V/div) ±2V (2mV/div~245mV/div) | |
| Analog Bandwidth | 100MHz (DS1102D, DS1102E) 50MHz (DS1052D, DS1052E) | |
| Single-shot Bandwidth | 100MHz (DS1102D, DS1102E) 50MHz (DS1052D, DS1052E) | |
| Selectable Analog Bandwidth Limit (typical) | 20MHz | |
| Lower Frequency Response (AC -3dB) | ≤5Hz (at input BNC) | |
| Rise Time at BNC (typical) | <3.5ns, <7ns, respectively at 100MHz, 50MHz | |
| Dynamic range | ±5div | |
| DC Gain Accuracy | 2mV/div-5mV/div: ±4% (In Normal or Average acquisition mode) 10mV/div-10V/div: ±3% (In Normal or Average acquisition mode) | |
| DC Measurement Accuracy, Average Acquisition Mode | When vertical displacement is zero, and $N \geq 16$: $\pm(\text{DC Gain Accuracy} \times \text{reading} + 0.1 \text{ div} + 1 \text{ mV})$ When vertical displacement is not zero, and $N \geq 16$: $\pm[\text{DC Gain Accuracy} \times (\text{reading} + \text{vertical displacement}) + (1\% \text{ of vertical displacement}) + 0.2 \text{ div}]$ When vertical scale is between 2mV/div and 245mV/div, add 2mV more for setting value. When vertical scale is between 250mV/div and 10V/div, add 50mV more for setting value. | |
| Delta Volts Measurement Accuracy (Average Acquisition Mode) | Under same setting and condition, the voltage difference (ΔV) between any two points in the waves coming from the average of more than 16 waves have been acquired: $\pm(\text{DC Gain Accuracy} \times \text{reading} + 0.05 \text{ div})$ | |
| Trigger | | |
| Trigger Sensitivity | 0.1div~1.0div (adjustable) | |
| Trigger Level Range | Internal | ±6 divisions from center of screen |
| | EXT | ±1.2V |
| Trigger Level Accuracy (typical) applicable for the signal of rising and falling time ≥20ns | Internal | ±(0.3div × V/div)(±4 divisions from center of screen) |
| | EXT | ±(6% of setting + 200 mV) |
| Trigger Offset | In Normal mode: pre-trigger (memory depth/ 2*Sample rate), delayed trigger 1s | |
| | In Slow Scan mode: pre-trigger 6div, delayed trigger 6div | |
| Trigger Holdoff Range | 500ns~1.5s | |
| Set Level to 50% (typical) | When input signal frequency ≥50Hz | |
| Edge Trigger | | |
| Edge trigger slope | Rising, Falling, Rising + Falling | |
| Pulse Width Trigger | | |

| | | |
|--|--|---|
| Trigger Condition | (>, <, =) Positive pulse width, (>, <, =) Negative pulse width | |
| Pulse Width Range | 20ns ~10s | |
| Video Trigger | | |
| Video Standard Line Frequency | Support for standard NTSC, PAL and SECAM broadcast systems. Line number range: 1~525 (NTSC) and 1~625 (PAL/SECAM) | |
| Slope Trigger | | |
| Trigger Condition | (>, <, =) Positive slope, (>, <, =) Negative slope | |
| Time Setting | 20ns~10s | |
| Alternate Trigger | | |
| Trigger on CH1 | Edge, Pulse Width, Video, Slope | |
| Trigger on CH2 | Edge, Pulse Width, Video, Slope | |
| Pattern Trigger ^[2] | | |
| Pattern Type | D0~D15 select H, L, X, \bar{f} , \bar{e} | |
| Duration Trigger ^[2] | | |
| Pattern Type | D0~D15 select H, L, X | |
| Qualifier | >, <, = | |
| Time Setting | 20ns~10s | |
| Measurements | | |
| Cursor | Manual | Voltage difference between cursors (ΔV) Time difference between cursors (ΔT) Reciprocal of ΔT in Hertz ($1/\Delta T$) |
| | Track | Voltage value for Y-axis waveform Time value for X-axis waveform |
| | Auto | Cursors are visible for Automatic Measurement |
| Auto Measure | Vpp, Vamp, Vmax, Vmin, Vtop, Vbase, Vavg, Vrms, Overshoot, Preshoot, Freq, Period, Rise Time, Fall Time, +Width, -Width, +Duty, -Duty, Delay1→2 \bar{f} , Delay1→2 \bar{e} | |

Remarks:

[1] Only one channel is available when the Sample rate is 1GSa/s.

[2] For DS1000D Series.

General Specifications

| Display | | |
|--|--|-------|
| Display Type | 145mm (5.6 inch) diagonal TFT Liquid Crystal Display | |
| Display Resolution | 320 horizontal ×RGB×234 vertical pixels | |
| Display Color | 64k color | |
| Display Contrast (typical) | 150:1 | |
| Backlight Brightness (typical) | 300 nit | |
| Probe Compensator Output | | |
| Output Voltage (typical) | Approximately 3Vpp (peak to peak value) | |
| Frequency (typical) | 1kHz | |
| Power Supply | | |
| Supply Voltage | 100 ~ 240VAC _{RMS} , 45~440Hz, CAT II | |
| Power Consumption | Less than 50W | |
| Fuse | 2A, T level, 250 V | |
| Environmental | | |
| Ambient Temperature | Operating 10°C ~ 40°C | |
| | Non-operating -20°C ~ +60°C | |
| Cooling Method | fan cooling | |
| Humidity | below +35°C: ≤90% relative humidity | |
| | +35°C ~ +40°C: ≤60% relative humidity | |
| Altitude | Operating at 3,000 m or below | |
| | Non-operating at 15,000 m or below | |
| Mechanical | | |
| Dimensions | Width | 303mm |
| | Height | 154mm |
| | Depth | 133mm |
| Weight | Without package | 2.3kg |
| | Packaged | 3.5kg |
| IP Protection | | |
| IP2X | | |
| Calibration Interval | | |
| The recommended calibration interval is one year | | |

Ordering Information

Name of Product

RIGOL DS1000E, DS1000D series oscilloscopes

Standard Accessories

- Probex×2 (1.5m), (1:1 or 10:1 adjustable) Passive Probes
- A Power Cord that fits the standard of destination country
- A USB Cable
- A Data Cable (DS1000D series)
- An Active Logic Head (DS1000D series)
- 20 Logic Testing Nips (DS1000D series)
- 20 Logic Testing leads (DS1000D series)
- A CD-ROM (including User's Guide and Application Software)
- A Quick Guide

Optional Accessories

- BNC Cable
- USB Data Cable
- RS232 Cable
- USB-GPIB Adapter
- DS1000E, DS1000D soft carrying case

Contact Us

If you have any problem or requirement when using our products, please contact RIGOL Technologies, Inc. or your local distributors, or visit: www.rigol.com.

Warranty

Thank you for choosing **RIGOL** products!

RIGOL Technologies, Inc. warrants that this product will be free from defects in materials and workmanship from the date of shipment. If a product proved defective within the respective period, **RIGOL** will provide repair or replacement as described in the complete warranty statement.

For the copy of complete warranty statement or maintenance, please contact with your nearest **RIGOL** sales and service office.

RIGOL do not provide any other warranty items except the one being provided by this summary and the warranty statement. The warranty items include but not being subjected to the hint guarantee items related to tradable characteristic and any particular purpose.

RIGOL will not take any responsibility in cases regarding to indirect, particular and ensuing damage.