RIGOL

Data Sheet

DS1000E, DS1000D Series Digital Oscilloscopes

DS1102E, DS1052E, DS1102D, DS1052D

Product Overview

The DS1000E, DS1000D series instruments are economical, high-performance digital oscilloscopes.

The DS1000E series scopes feature dual channels and 1 external trigger channel.

The DS1000D series scopes feature dual channels and 1 external trigger channel as well as a 16 channel logic analyzer.

Applications

- Electronic Circuit Test
- Circuit Functional Test
- Logical Signal Comparison
- Component R & D or Failure Analysis
- Mixed Signal Circuit Test
- Education & Training

Main Features

- Dual analog channels and 16 channels logic analyzer, 100MHz maximum bandwidth, 1GSa/s maximum real-time Sampling rate and 25GSa/s maximum equivalent Sample rate
- 5.6 inch, 64 k TFT color LCD makes the waveform display clear and vivid
- **Variety of** trigger types: Edge, Pulse Width, Video, Slope, Alternate, Pattern and Duration
- Unique, adjustable trigger sensitivity enables triggering in high noise signal environments
- Able to measure 20 types of wave parameters and track measurements with cursors automatically
- Unique waveform record and replay

Easy to Use Design

- Built-in help menu makes the features more convenient
- Multiple Language User Interface, support Chinese & English input
- Supports USB disk and local files storage
- Adjustable waveform intensity
- One-Button signal display with AUTO key
- Easy to read and access menus
- Powerful UltraScope PC application software
- Built-in FFT function
- Adjustable digital filter settings
- High resolution delayed scan function
- Pass/Fail detection function enables isolated output for production applications
- Math operations available to multiple waves
- Standard configuration interface: USB Device, USB Host , RS-232 and support USB disk storage and PictBridge printer standards
- "Key Lock" function meets the needs of industrial production
- Support for remote command control using VISA drivers via USB or RS-232 and standard SCPI instruction set

2010 Update
RIGOL Technologies USA, Inc.

Automatically Measure 20 Wave Parameters

Automatic measure

DS1000E & DS1000D series oscilloscopes provide 20 types of wave parameters for automatic measurements, which contain 10 voltage and 10 time parameters.

In cursor mode, users can easily measure and track signals. Additionally, 3 types of cursor measurements are available: Manual, Track and Auto.

Cursor Measure

FFT cursor measure

Multiple Trigger

Pattern trigger

Both DS1000E and DS1000D series scopes feature multiple trigger modes:
- Edge trigger, Pulse Width trigger, Video trigger, Slope trigger, Alternate trigger, Pattern trigger (DS1000D), Duration trigger (DS1000D)

The Duration trigger is a new trigger type combining pattern and pulse width triggering. The adjustable trigger sensitivity is ideal for ignoring noise in signals that would otherwise cause false triggering.

16 Channel Logic Analyzer

Equipped with a 16 channel logic analyzer, the DS1000D series mixed signal oscilloscopes achieve mixed signal measurements coordinated with the 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 adjust waveform size and threshold types or change the display positions on screen for the digital channels.
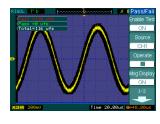

Digital channels setup

Waveform Recording

With the waveform recording function on the DS1000E and DS1000D series oscilloscopes, not only the outputs from the two channels can be recorded, but also the output of the Pass/Fail test. In total, up to 1000 frames of waves can be recorded. Additionally, users can view waves and independently recall or save specific waveforms for further analysis.

Waveform recording

Pass/Fail Testing

The Pass/Fail function monitors changes in a signal by comparing whether the input signal is within the pre-defined mask. The test results can be displayed on screen, output by isolated pass/fail port, and/or set to generate an alarm via the system speaker.

Pass/Fail testing

UltraScope Software

Measurement window

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

Specifications

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

- The instrument must have been operated continuously for 30 minutes under the specified operating temperature.
- 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 except 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, 200MSa/s[1]	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) [1]
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			
Record Length	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[2]	
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	
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 ≥16:** ± (DC Gain Accuracy× reading+0.1div+1mV) **When vertical displacement is not zero, and N ≥16:** ± [DC Gain Accuracy× (reading+vertical displacement)+(1% of vertical displacement) + 0.2div] 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 (Δ V) between any two points in the waves coming from the average of more than 16 waves have been acquired: ± (DC Gain Accuracy× reading + 0.05 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 fre**quency ≥50Hz**	
Edge Trigger		
Edge trigger slope	Rising, Falling, Rising + Falling	
Pulse WidthTrigger		
Trigger Condition	(>, <, =) Positive pulse width, (>, <, =) Negative[2] 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[1]	
Pattern Type	D0~D15 select H, L, X, ⌐, ⌐

Duration Trigger[1]	
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/ΔT)
	Track	Voltage value for Y-axis waveform Time value for X-axis waveform
	Auto	Cursors are visible when measure automatically
Auto Measure		Vpp, Vamp, Vmax, Vmin, Vtop, Vbase, Vavg, Vrms, Overshoot, Preshoot, Freq, Period, Rise Time, Fall Time, +Width, -Width, +Duty, -Duty, Delay1→2⌐, Delay1→2⌐

Remarks:

[1]   For DS1000D Series;
[2]   Only one channel is available when the Sample rate is 1GSa/s.

General Specifications

Display	
Display Type	5.7inch. (145mm) 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℃~ 40℃
	Non-operating -20℃~ +60℃
Cooling Method	forced cooling by fan
Humidity	below +35℃: ≤90% relative humidity
	+35℃~ +40℃: ≤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

- Probe× 2 (1.5m), (1:1 or 10:1 adjustable) Passive Probes
- Power Cord
- USB Cable
- A Data Cable (DS1000D series)
- An Active Logic Head (DS1000D series)
- 20 Logic Testing Clips (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
- RS232 Cable
- USB-GPIB Adapter
- DS1000E, DS1000D soft carrying case

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 replace as described in the complete warranty statement.

For the copy of complete warranty statement or other maintenance information, please contact us directly at our local **RIGOL** sales and service office.

RIGOL does not provide any other warranties except the one being provided by this summary and the warranty statement.

Contact Us

If you have any questions, concerns, or thoughts about our products, documentation, or services, please contact **RIGOL** Technologies USA, Inc. or your local distributor or representative.

To contact our US office:

Tel: (440) 232-4488
Toll Free: 877-4-RIGOL-1

Service & Support
8:30 am –5: 00 pm Eastern Time, Monday to Friday

Or by e-mail at:
info@rigol.com

Or mail to:
RIGOL Technologies USA, Inc.
7401 First Place Suite N
Oakwood Village, OH 44146

Outside of North America: Contact the local **RIGOL** distributors or sales office.
For the latest product information and service, visit our website: http://www.rigolna.com