RIGOL

# Data Sheet

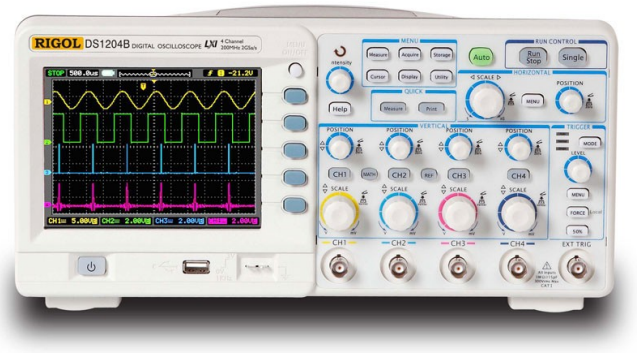
## DS1000B Series Digital Oscilloscopes

### DS1062/4B, DS1102/4B, DS1202/4B

### Product Overview

DS1000B series oscilloscopes are designed with dual/four analog channels and 1 external trigger channel, which can capture multi-channel signal simultaneously and meet industrial needs.

The powerful trigger and analyzer abilities make it easy to capture and analyze waves. Clear LCD displays and math operations enable users to view and analyze signal faster and more clearly.




### Applications

- Electronic Circuit Design and Test
- View Transient Signal
- Manufacturing Test and Quality Control
- Education & Scientific Research
- Industry Control
- Design & Analysis of Mechanical and Electrical Products

### Easy to Use Design

- Built-in help menu enables information getting more convenient
- Multiple Language menus, 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
- Provide a key measure, a key store/print shortcut keys

### Main Features

- Four analog channels, 200MHz maximum bandwidth, 2GSa/s maximum real-time sample rate, 50GSa/s maximum equivalent sample rate
- 5.7 inch, QVGA (320×240), 64K colors TFT LCD and LED backlight sorce technology enable the wave displays more vivid with lower power dissipation and longer life
- Conform to LXI consortium instrument standard class C, which enable to creat and reset testing system fast, economically and efficiently
- Abundant trigger types: Edge, Pulse Width, Video, Pattern and Alternative triggers
- Unique adjustable trigger sensitivity enables to meet different demands
- Enable to measure 22 types of wave parameters and track measurements via cursor automaticlly
- Unique waveform record and replay function
- Fine delayed scan function
- Built-in FFT function, hold practical digital filters
- Pass/Fail detection function
- Math operations available to multiple waves
- Powerful PC application software UltraScope
- Standard configure interface: USB Device, Dual USB Host, LAN, support U disk storage and PictBridge print standard
- Support for remote command control

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## 4 Analog Channels

**4 analog channels**

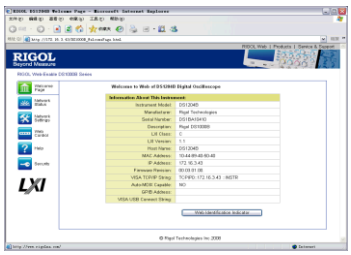
Users can view multi-channel signal simultaneously via the 4 analog channels, which can be operated independently. Each channel button, corresponding channel mark on screen and waveform will be separated by specific colors.

## PictBridge Standard

**PictBridge print standard**

DS1000B series offer standard configure interface and support PictBridge print standard, there are two modes are available: "PictBridge" and "Normal", you can select the mode and setup corresponding parameters to finish printing operation.

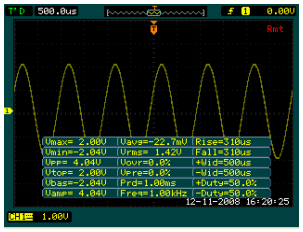
## LXI Standard, Class C



**LXI standard, class C**

**RIGOL** DS1000B series digital oscilloscopes conform to LXI consortium instrument standard class C, which enable to creat and reset testing system fast, economically and efficiently, in addition, the system integration function will be achieve more easily.

## Automatically Measure 22 Wave Parameters

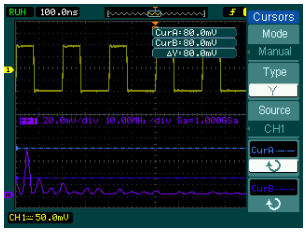


**Automatic measure**

DS1000B series oscilloscopes provide 22 types of wave parameters for automatically measuring which contains 10 Voltage and 12 Time parameters.

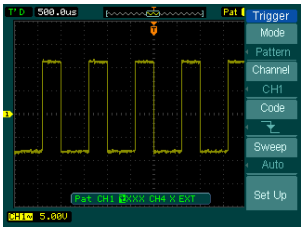
In cursor mode, users can easily measure by moving cursor. Besides, 3 types of cursor measurement are optional: Manual, Track and Auto.

## Cursor Measure



**FFT cursor measure**

## Multiple Trigger



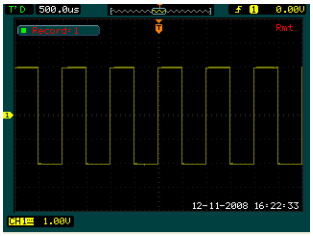
**Pattern trigger**

DS1000B contain abundant triggers: Edge, Pulse Width, Video, Pattern and Alternative triggers. Especially the pattern tigger achieve trigger operation according to the logic relationship among channels, which can capture special digital information.

Unique function of adjustable trigger sensitivity is good for filtering possible noise from signal in order to avoid false triggers.

## Waveform Recording

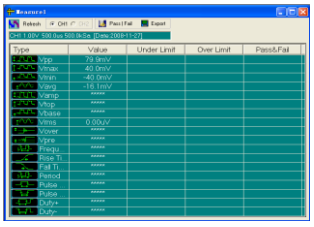
In virtue of waveform recording function from DS1000B series, not only the outputs from four channels could be recorded, but also the waves outputted by Pass/Fail test could be easily recorded. Totally, up to 1000 frames of waves are available to record. Besides, users can analyze waves according to reall or save transient waves so as to get more exact datum.



**Waveform recording**

## 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.



**Measurement window**

# Specifications

All specifications apply to the DS1000B Series Oscilloscopes and a probe with the Attenuation switch set to 10X unless noted otherwise. To meet these specifications, two conditions must first be met:

- The instrument must have been operating continuously for thirty minutes within the specified operating temperature.
- Must perform Self Calibration operation, accessible through the Utility menu, if the operating temperature changes by more than 5°C.

**Note:**

- All specifications are guaranteed unless noted "typical".

## Specifications

| **Acquisition** | | |
|---|---|---|
| Sample Modes | Real-Time Sample | Equivalent Sample |
| Sample Rate | 2 GSa/s (half channel [1])<br>1 GSa/s (each channel) | 50 GSa/s[2] |
| Averages | A 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 | 1M ohms +/-2.0%<br>(at DC coupling, AC coupling 250mV ~ 5V/div)<br>1.2M ohms +/-2.0%<br>(at AC coupling 2mV ~ 254mV/div)<br>The input capacity is 18pF±3pF | |
| Probe Attenuation Factors | 0.001X, 0.01X, 0.1X, 1X, 2X, 5X, 10X, 20X, 50X, 100X, 200X, 500X, 1000X | |
| Maximum Input Voltage | Maximum Input Voltage of the analog channel:<br>CAT I 300Vrms, 1000Vpk; transient overvoltage 1000Vpk<br>CAT II 100Vrms, 1000Vpk<br>RP2200 10:1, CAT II 300Vrms<br>RP3200 10:1, CAT II 300Vrms<br>RP3300 10:1, CAT II 300Vrms | |
| Time Delay between Channel (typical) | 500ps | |
| **Horizontal** | | |
| Sample Rate Range | 3.65Sa/s-2GSa/s (Real-Time), 3.65Sa/s-50GSa/s (Equivalent-time) | |
| Waveform Interpolation | Sin(x)/x | |
| Record Length | 16k samples for half channel[1]<br>8k samples for each channel | |
| Scanning Speed Range (Sec/div) | 1ns/div~50s/div, DS1202/4B<br>2ns/div~50s/div, DS1102/4B<br>5ns/div~50s/div, DS1062/4B<br>1-2-5 Sequence | |
| Sample Rate and Delay Time Accuracy | ±50ppm (any time interval ≥1ms) | |
| Delta Time Measurement Accuracy (Full Bandwidth) | Single: ±(1 sample interval + 50ppm × reading + 0.6 ns)<br>>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 input BNC | |

| | | |
|---|---|---|
| Offset Range | ±40V(245mV/div~10V/div)<br>±2V(2mV/div~245mV/div) | |
| Equivalent Bandwidth | 60MHz(DS1062/4B)<br>100MHz(DS1102/4B)<br>200MHz(DS1202/4B) | |
| Single-shot Bandwidth | 60MHz(DS1062/4B)<br>100MHz(DS1102/4B)<br>200MHz(DS1202/4B) | |
| Selectable Analog Bandwidth Limit (typical) | 20MHz | |
| Lower Frequency Response (AC -3dB) | ≤5Hz (at input BNC) | |
| Rise Time at BNC (typical) | <1.75ns, <3.5ns, <5.8ns,<br>On 200MHz, 100MHz, 60MHz respectively | |
| DC Gain Accuracy | 2mV/div~5mV/div: ±4% (Sample or Average acquisition mode)<br>10mV/div~10V/div: ±3% (Sample or Average acquisition mode) | |
| DC Measurement Accuracy Average Acquisition Mode | When vertical displacement is zero, and N ≥16:<br>±(DC Gain Accuracy×reading+0.1div+1mV)<br>When vertical displacement is not zero, and N ≥16:<br>±[DC Gain Accuracy×(reading+ vertical position)+(1% of vertical position)+0.2div]<br>Add 2mV for settings from 1mV/div to 200 mV/div<br>Add 50mV for settings from >200mV/div to 10V/div | |
| Delta Volts Measurement Accuracy (Average Acquisition Mode) | Under same setting and condition, the voltage difference (△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 |
| | EXT/5 | ±6V |
| 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 + 40 mV) |
| | EXT/5 | ±(6% of setting + 200 mV) |
| Trigger Offset | In Normal mode: pre-trigger(storage depth/(2×sample) rate), delayed trigger 1s | |
| | In Slow Scan mode: pre-trigger 6div, delayed trigger 6div | |
| Trigger Holdoff Range | 100ns~1.5s | |
| HF Rejection | 100kHz ±20% | |
| LF Rejection | 10kHz ±20% | |
| 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, (>, <, =) Negative pulse | |
| Pulse Width Range | 20ns ~10s | |
| **Video Trigger** | | |
| Video Standard Line Frequency | Support for standard NTSC, PAL and SECAM broadcast systems.<br>Line number range: 1~525 (NTSC) and 1~625 (PAL/SECAM) | |
| **Pattern Trigger** | | |
| Pattern setup | H, L, X,  ,  | |
| **Alternate Trigger** | | |

| | | |
|---|---|---|
| Trigger on CH1, CH2, CH3, CH4 | | Edge, Pulse Width, Video |
| **Measurements** | | |
| Cursor | Manual | Voltage difference between cursors (ΔV)<br>Time difference between cursors (ΔT)<br>Reciprocal of ΔT in Hertz (1/ΔT) |
| | Track | Voltage value for Y-axis waveform<br>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, Delay A→B↓, Delay A→B↑, Phase A→B↓,Phase A→B↑ | |

**Remarks:**

[1] Half channel indicates selecting one of the channels in CH1 and CH2, or in CH3 and CH4.

[2] This is the highest specification, the specific specifications are as follows:

DS1202/4B: 50GSa/s

DS1102/4B: 25GSa/s

DS1062/4B: 10GSa/s

## General Specifications

| | | |
|---|---|---|
| **Display** | | |
| Display Type | 5.7 inch. (145 mm) diagonal TFT Liquid Crystal Display | |
| Display Resolution | 320 horizontal ×RGB×240 vertical pixels | |
| Display Color | 64k color | |
| Display Contrast (typical) | 150:1 | |
| Backlight Brightness (typical) | 300 nit | |
| **Probe Compensator Output** | | |
| Output Voltage (typical) | Amplitude, ~3Vpp | |
| Frequency (typical) | 1kHz | |
| **Power Supply** | | |
| Supply Voltage | AC，100~240 V, 45~440Hz, CAT II | |
| Power Consumption | Less than 50VA | |
| Fuse | 2A, T rating, 250 V | |
| **Environmental** | | |
| Ambient Temperature | Operating 10℃~ 40℃ | |
| | Non-operating -20℃~ +60℃ | |
| Cooling Method | Fan force air flow | |
| Humidity | +35℃ or below: ≤90% relative humidity | |
| | +35℃~ +40℃: ≤60% relative humidity | |
| Altitude | Operating 3,000 m or below | |
| | Non-operating 15,000 m or below | |
| **Mechanical** | | |
| Dimensions | Width | 325mm |
| | Height | 159mm |
| | Depth | 133 mm |
| Weight | Without package | 3kg |
| | Packaged | 4.3 kg |
| **IP Degree** | | |
| IP2X | | |
| **Calibration Interval** | | |
| The recommended calibration interval is one year | | |

# Ordering Information

## Name of Product

**RIGOL** DS1000B series digital oscilloscopes

## Standard Accessories

- Probe×4 or Probe×2, 1:1, (10:1) Passive Probes
- A Power Cord that fits the standard of destination country
- An USB Cable
- A CD-ROM (including《User's Guide》an application software)
- A Quick Guide

## Optional Accessories

- BNC Cable
- RS232 Cable
- DS1000B special convenient soft bag

# Warranty

Very 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.

# Contact Us

If you have any problem or requirement during using our products, please contact **RIGOL** Technologies, Inc. or the local distributors.

Domestic: Please call

Tel: (86-10) 8070 6688
Fax: (86-10) 8070 5070

**Service & Support Hotline: 800 810 0002**
9:00 am –5: 00 pm from Monday to Friday

Or by e-mail:
**Service@rigol.com**

Or mail to:
**RIGOL** Technologies, Inc.
156# CaiHe Village, ShaHe Town, ChangPing District, Beijing, China
Post Code: 102206

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