RIGOL

Data Sheet

DS1000CA Series Digital Oscilloscopes

DS1302CA, DS1202CA, DS1102CA, DS1062CA

Product Overview

DS1000CA series are designed with dual analog channels and 1 external trigger channel. The powerful trigger and 2000wfms/s waveform capture rate make it easier to capture the transient signal precisely. Clear LCD displays and math operations enable users to view and analyze signal faster and more clearly.

Applications

- Electronic Circuit Designing and Testing
- 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

Main Features

- Dual analog channels, 300MHz maximum bandwidth, 2GSa/s maximum real-time Sample rate, 50GSa/s maximum equivalent Sample rate
- The waveform capture rate is up to 2000wfms/s
- 64K color TFT LCD make the waveform displays more clear
- Abundant trigger types: Edge, Pulse width, Slope, Video, Alternate triggers
- Unique adjustable trigger sensitivity enables to meet different demands
- Enable to measure 20 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 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，support U disk storage and USB print
- Built-in hardware frequency counter
- ultra-thin design and small size to reduce desk area
- Support for remote command control

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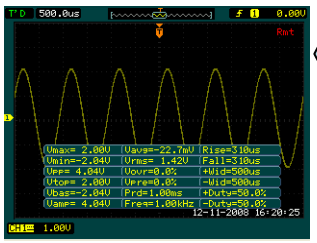
Automatically Measure 20 Wave Parameters

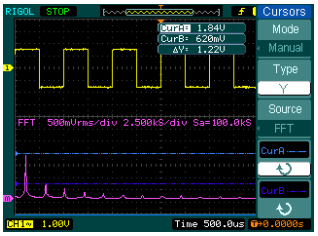


Automatic measure

DS1000CA series oscilloscopes provide 20 types of wave parameters for automatically measuring which contains 10 Voltage and 10 Time parameters.

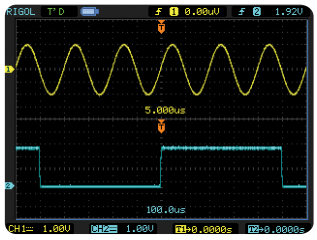
In cursor mode, users can easily measure by moving cursor. Besides, 3 types of cursor measurement are optional: Manual, Track and Auto.

Cursor Measure



FFT cursor measure

Multiple Trigger



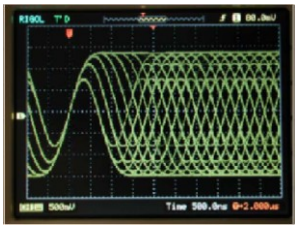
Alternate trigger

DS1000CA series digital oscilloscopes contain abundant triggers: Edge, Pulse Width, Slope, Video, Alternate triggers. Especially the alternative trigger is the repearence in digital oscilloscope from analog oscilloscope, which can use different timebase to observe signal simultaneously.

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

High-Speed Refresh Rate

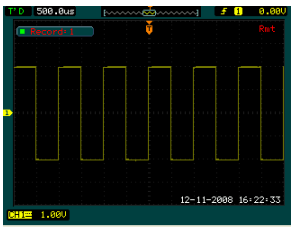
The waveform capture rate of DS1000CA series digital oscilloscopes is up to 2000wfms/s.The high-speed refresh rate makes the instrument easier to capture the precise transient signal precisely, specially used for capturing dynamic complex signals and abnormal waveforms.



High-Speed Refresh Rate

Waveform Recording

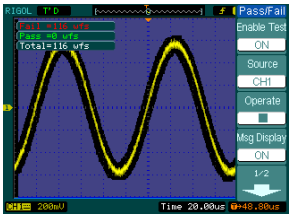
In virtue of waveform recording function from DS1000CA series, not only the outputs from two channels could be recorded, but also the waves outputted by Pass/Fail test could be easily recorded. Totally, up to 1000 frames of waves are available to record. Besides, users can analyze waves according to reall or save transient waves so as to get more exact datum.



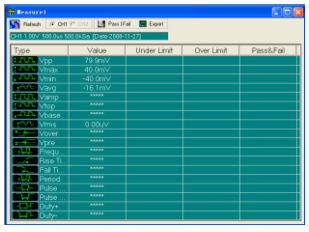
Waveform recording

Pass/Fail Testing

The Pass/Fail function monitors 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 relevant system sound settings.



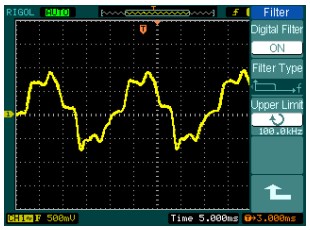
Pass/Fail testing



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.



Digital filters

Digital Filters

DS1000CA series digital oscilloscopes provide 4 kinds of practical digital filter: LPF、HPF、BPF and BRF, which can achieve very good filtering effect by setting up the range of filter bandwidth.

Specifications

All specifications apply to the DS1000CA 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℃.

NOTES:

- All the vertical value is under the condition which Probe attenuation is 1X.
- All specifications are guaranteed unless noted "typical".

Specifications

Acquisition		
Sample Modes	Real-Time Sample	Equivalent Sample
Sample Rate	2GSa/s (single channel) [1] 1GSa/s (each channel)	50GSa/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	1MΩ±2%, in parallel with 15pF±3pF 50Ω±2%[3]
Probe Attenuation Factors	1X, 5X, 10X, 50X, 100X, 500X, 1000X
Maximum Input Voltage	300V (DC＋AC Peak, 1MΩ input impedance，10X)
	5V (DC+AC Peak, 50Ω input impedance，BNC) [3]
Time Delay between Channel (typical)	500ps
50Ω	
Provided	DS1302CA、DS1202CA
Not Provided	DS1062CA、DS1102CA

Horizontal	
Sample Rate Range	1Sa/s-2GSa/s (Real-Time), 50GSa/s (Equivalent) [2]
Waveform Interpolation	Sin(x)/x
Record Length	10k samples for single channel, 5k samples for each channel
Scanning Speed Range (Sec/div)	1ns/div-50s/div, DS1302CA 2ns/div-50s/div, DS1102CA, DS1202CA 5ns/div-50s/div, DS1062CA 1-2-5 Sequence
Sample Rate and Delay Time Accuracy	±50ppm (any time interval≥1ms)
Delta Time Measurement Accuracy (Full Bandwidth)	Single-shot: ±(1 sample interval + 50ppm × reading + 0.6 ns) >16 averages: ±(1sample interval + 50ppm × reading + 0.4 ns)

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 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↓, Delay1→2→	
Vertical		
A/D Converter	8-bit resolution, all channel samples simultaneously	
Volts/div Range	1mV/div-10V/div (at the input terminal connecting to BNC)	
Offset Range	±40V(500mV/div-10V/div), ±800mV(1mV/div-200mV/div)	
Analog Bandwidth	60MHz(DS1062CA) 100MHz(DS1102CA) 200MHz(DS1202CA) 300MHz(DS1302CA)	
Single-shot Bandwidth	60MHz(DS1062CA) 100MHz(DS1102CA) 200MHz(DS1202CA) 300MHz(DS1302CA)	
Selectable Analog Bandwidth Limit (typical)	20MHz	
Lower Frequency Response (AC -3dB)	≤5Hz (at input BNC)	
Rise Time at BNC (typical)	<1.2ns, <1.7ns, <3.5ns, <5.8ns, On (300MHz) (200MHz) (100MHz) (60MHz) respectively	
Dynamic Range	±5div	
DC Gain Accuracy	1mV/div: ±8% (Sample or Average acquisition mode) 2mV/div-5mV/div: ±4% (Sample or Average acquisition mode) 10mV/div-10V/div: ±3% (Sample 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 at zero, and N≥16: ±[DC Gain Accuracy×(reading+ vertical position)+(1% of vertical position)+0.2div] Add 1mV for settings from 1mV/div to 200 mV/div Add 50mV for settings >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)	
Overshoot	<20%	
Trigger		
Trigger Sensitivity	0.1div-1.0div (adjustable)	
Trigger Level Range	Internal	±6 divisions from center of screen
	EXT	±1V
	EXT/5	±3V
Trigger Level Accuracy (typical) applicable for the signal of rising	Internal	±(0.3div×V/div) (±4 divisions from center of screen)

and falling time ≥20ns	EXT	±(6% of setting + 40 mV)
	EXT/5	±(6% of setting + 200 mV)
Trigger Offset	Normal mode: pre-trigger(262144/ Sample rate), delayed trigger 1s	
	Slow Scan mode: pre-trigger 6div, delayed trigger 6div	
Trigger Holdoff Range	100ns-1.5s	
HF Reject	120kHz±20%	
LF Reject	8kHz±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	
Range of Pulse Width	20ns – 10s	
Video Trigger		
Video Standard Line Frequency	Support 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	

Remarks:

[1] Only one input channel is available when Sample rate is at 2GSa/s.

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

DS1302CA: 50GSa/s

DS1202CA, DS1102CA: 25GSa/s

DS1062CA: 10GSa/s

[3] For DS1302CA and DS1202CA only.

General Specifications

Display		
Display Type	5.7 inch. (145 mm) 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)	3 Vp-p into ≥1 MΩ load	
Frequency (typical)	1kHz	
Power Supply		
Supply Voltage	100 ~ 240 VAC_{RMS}, 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	303mm
	Height	154mm
	Depth	133 mm
Weight	Without package	2.4 kg
	Packaged	3.8 kg
IP Degree		
IP2X		
Calibration Interval		
The recommended calibration interval is one year		

Ordering Information

Name of Product

RIGOL DS1000CA series digital oscilloscopes

Model	Bandwidth	Equivalent Sample Rate
DS1302CA:	300MHz	50Ga/s
DS1202CA:	200MHz	25Ga/s
DS1102CA:	100MHz	25Ga/s
DS1062CA:	60 MHz	10 Ga/s

Standard Accessories

- Probe×2 (1.5m), 1:1, (10:1) Passive Probes
- A Power Cord that fits the standard of destination country
- An User's Guide

Optional Accessories

- DS1000CA soft carrying case

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.

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