RIGOL
Beyond Measure

No.1

2011

DS4000 Series Digital Oscilloscope

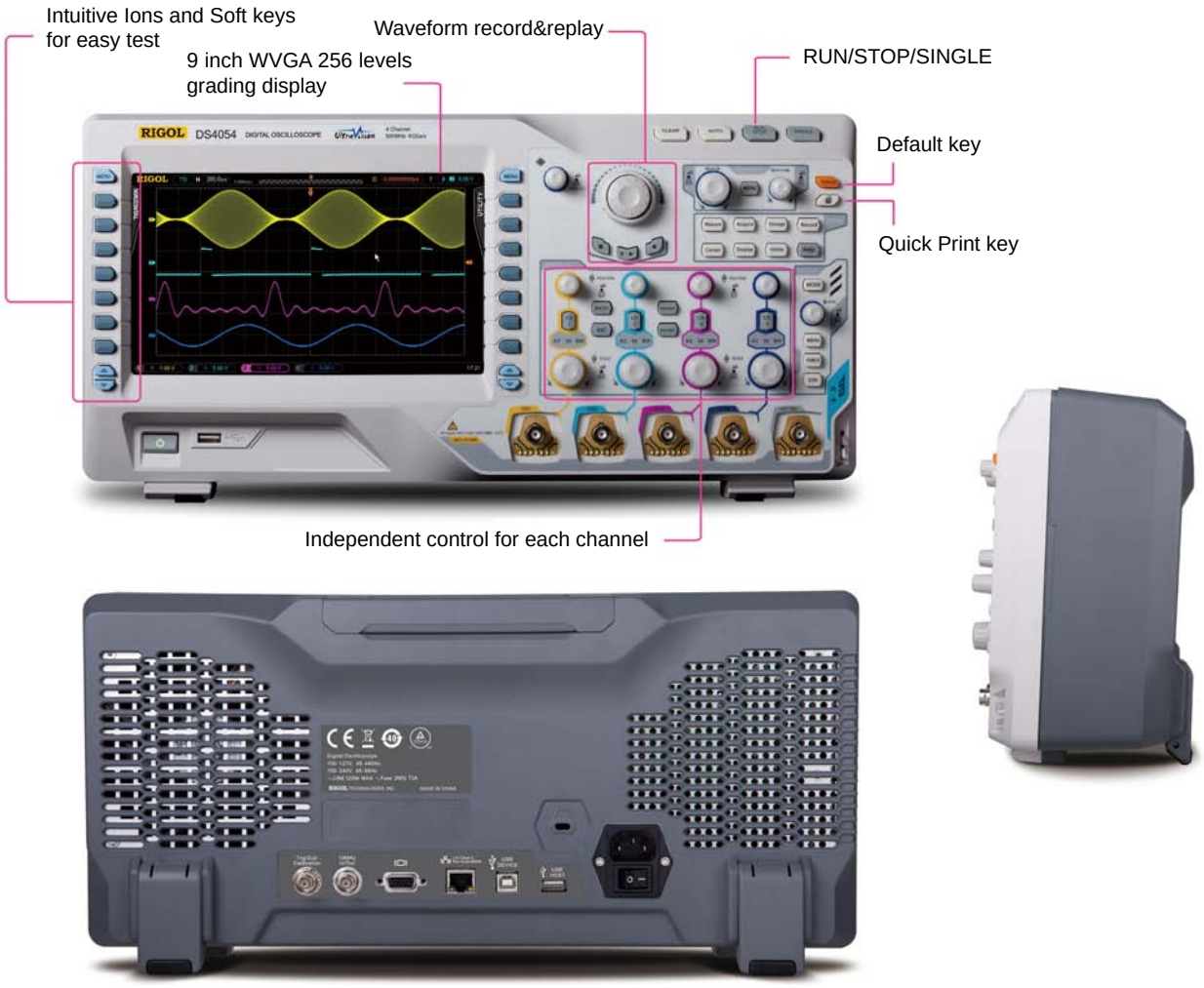
- Bandwidth 100MHz,200MHz,350MHz,500MHz
- Max. Sample Rate 4G Sa/s
- Standard Memory Depth 140Mpts
- 2 or 4 channels(DS40X2,DS40X4)
- Waveform capture rate up to 110,000 wfs/s
- Innovative "UltraVision" technology
- Hardware based real time waveform record and analysis function(Standard)
- A variety of trigger and serial bus decording functions
- 9 inch WVGA 256 level grading display
- Lower noise floor, the Min. vertical sensitivity is 1mV/div
- Standard connectivities (LAN,USB,VGA ...)
- Compact size, light weight, easy to use

UltraVision

DS4000 Series is the new mainstream digital scope to meet the customer's applications with its innovative technology,industry leading specifications,powerful trigger functions and broad analysis capabilities.

RIGOL TECHNOLOGIES, INC.

DS4000 Series Digital Oscilloscope



Product Dimensions: Width X Height X Depth = 456.0mm X 225.1 mm X 140.0 mm Weight：4.8 kg ± 0.2 kg (Without Package)

► Innovative UltraVision technology

- Deeper Memory Depth(Std.140M pts)
- Higher Waveform capture rate (Up to 110,000wfms/s)
- Real Time waveform record & replay(Up to 200,000 frames)
- Multi-level intensity grading display(Up to 256 levels)

► Models and key Specs

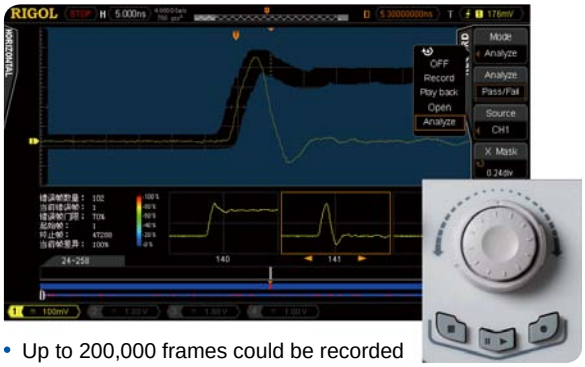
Models	DS4054	DS4052	DS4034	DS4032	DS4024	DS4022	DS4014	DS4012
Bandwidth	500 MHz		350 MHz		200 MHz		100 MHz	
Channels	4	2	4	2	4	2	4	2
Sample rate	4 GSa/s (Max.)							
Memory Depth	140 Mpts (Standard)							
Waveform Capture rate	110,000 wfms/s (Max.)							
Frames recorded	200,000 Frames (Max.)							
Standard probes	2 or 4 sets RP3500(500MHz BW probe) for DS40X2 or DS40X4							

➤ Features and Benefits

UltraVision: Up to 180K Waveforms/s Waveform capture rate

Find the infrequent problem easily

UltraVision: Realtime waveform record,replay, analysis function (std.)



- Up to 200,000 frames could be recorded
- “WaveFinder”-Dedicated data search knob
- Replay and analyze the recorded waveforms

UltraVision: Deeper Memory with Multi-Level intensity grading display

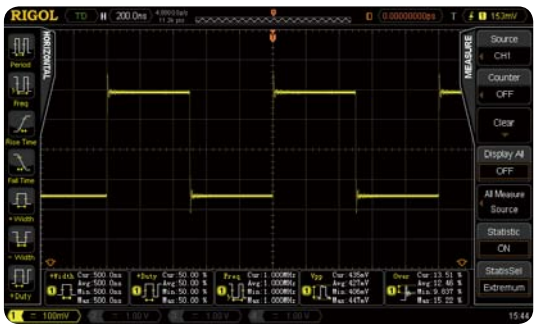
Provide the capability to see both the panorama and detail simultaneously

Advanced math function (user defined)

Mask test functions

User defined Mask,Pass/Fail counts,Stop on Fail,Fail Alarm

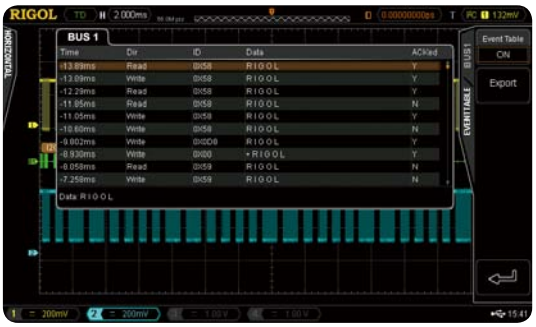
Automatic measurements with statistics



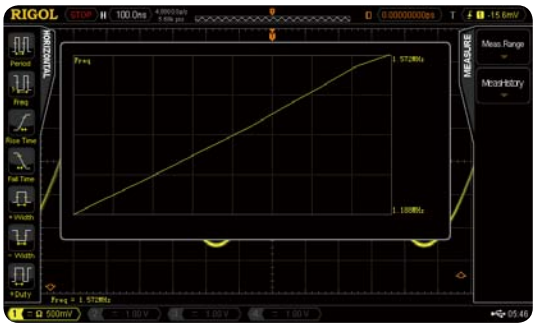
- Automatic measurements for Horizontal and vertical parameters
- Display up to 5 measurement items with statistics simultaneously
- Display all measurement items with the current value in the screen
- Intuitive icon and soft key operation for simplified testing

Serial bus decoding functions

I2C Decoding



Measurement History: Show the trend of the parameters



RS232/UART

Complete Connectivity

➤ The probes supported by DS4000 series:

Model Number	Attenuation Ratio	Bandwidth	Input R	Max.Input voltage	Recommended applications
RP2200	1:1 or 10:1	1X: DC~7 MHz	1X: 1MΩ ±2%	1X: CAT II 150 V AC	Small signal test (1X)
		10X:DC~150 MHz	10X: 10 MΩ±2%	10X: CAT II 300V AC	General purpose test
RP3300	1:1 or 10:1	1X: DC~8 MHz	1X: 1 MΩ ±2%	1X: CAT II 150 V AC	Small signal test (1X)
		10X:DC~350 MHz	10X: 10 MΩ±2%	10X: CAT II 300V AC	General purpose test
RP3500	10:1	DC~500 MHz	10 MΩ±2%	CAT II 300VAC	General purpose test
RP5600	10:1	DC~600 MHz	10 MΩ±2%	CAT II 300VAC	General purpose test
RP6150	10:1	DC~1.5 GHz	500 Ω±10 Ω	CAT I 10VAC	High frequency single ended small signal test
RP1300H	100:1	DC~300 MHz	100 MΩ	CAT I 2000V (DC+AC), CAT II 1500 V (DC+AC)	High voltage test
RP1050H	1000:1	DC~50 MHz	10 MΩ±0.5%	DC: 0~15KV DC AC: pulse <=30 KVp-p AC: sine wave <=10 KVrms	High voltage test
RP7150	10:1	DC~1.5 GHz	Differential mode: 50 kΩ ± 2% Single ended mode: 24 kΩ ± 2%	30V Peak, CAT I	Differential /Single ended high frequency signal test

RP2200 150MHz Passive Probe

RP3300 350MHz Passive Probe

RP6150 1.5GHz Passive Probe

RP3500 500MHz Passive Probe

RP5600 600MHz Passive Probe

- 600MHz Bandwidth
- 10:1 passive probe
- Shipped with probe positioner and its accessories
- Identified by DS6000 automatically

RP7150 1.5GHz Active Probe

- 1.5GHz Bandwidth
- Active probe supports both differential and single-ended measurements
- Shipped with the browser probe head
- Provides many kinds of probe connection accessories
- Identified by DS6000 automatically

RP1300H 300MHz High Voltage Probe

RP1050H 50MHz High Voltage Probe

► Specifications

All the specifications are guaranteed except the parameters marked with "Typical" and the oscilloscope needs to operate for more than 30 minutes under the specified operation temperature.

Sample	
Sample Mode	Real-time Sample
Real Time	4.0 GSa/s (single-channel)
Sample Rate	2.0 Gsa/s (dual-channel)
Peak Detect	250 ps (single-channel)
	500 ps (dual-channel)
Averaging	After all the channels finish N samples at the same time, N can be 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096 or 8192.
High Resolution	12 bits of resolution when ≥5 μs/div @ 4 GSa/s (or ≥10 μs/div @ 2 GSa/s).
Memory Depth	single-channel: Auto, 14k pts, 140k pts, 1.4M pts, 14M pts and 140M pts are available
	Dual-channel: Auto, 7k pts, 70k pts, 700k pts, 7M pts and 70M pts are available

Input	
Number of Channels	DS40X4: four channels DS40X2: two channels
Input Coupling	DC, AC or GND
Input Impedance	(1 MΩ±1%) || (14 pF±3 pF) or 50 Ω±1.5%
Probe	0.01X-1000X 1-2-5 step
Attenuation Coefficient	
Maximum Input Voltage (1MΩ)	Maximum Input Voltage of the Analog Channel CAT I 300 Vrms, CAT II 100 Vrms, Transient Overvoltage 1000V pk with RP2200 10:1 probe: CAT II 300 Vrms with RP3300 10:1 probe: CAT II 300 Vrms with RP3500 10:1 probe: CAT II 300 Vrms with RP5600 10:1 probe: CAT II 300 Vrms

Horizontal	
Time Base Scale	DS405x: 1 ns/div to 50 s/div
	DS403x: 1 ns/div to 50 s/div
	DS402x: 2 ns/div to 50 s/div
	DS401x: 5 ns/div to 50 s/div
Time Base Accuracy	≤ ± 4 ppm
Time Base Drift	≤ ± 2 ppm/Year
Delay Range	Pre-trigger (negative delay): ≥1 screen width
	Post-trigger (positive delay): 1 s to 1000 s
Time Base Mode	Y-T, X-Y, Roll, Delayed
Number of X-Ys	2 paths at the same time (four-channel model)
Waveform Capture Rate[1]	110,000 wfms/s (dots display)

Vertical	
Bandwidth (-3dB)	DS405x: DC to 500 MHz
	DS403x: DC to 350 MHz
	DS402x: DC to 200 MHz
	DS401x: DC to 100 MHz
Single Bandwidth	DS405x: DC to 500 MHz
	DS403x: DC to 350 MHz
	DS402x: DC to 200 MHz
	DS401x: DC to 100 MHz
Vertical Resolution	8bits, two channels sample at the same time
Vertical Scale	1 mV/div to 5 V/div (1 MΩ)
	1 mV/div to 1 V/div (50 Ω)
Offset Range	1 mV/div to 120 mV/div: ± 1.2V(50 Ω)
	125 mV/div to 1 V/div: ± 12V(50 Ω)
	1 mV/div to 225 mV/div: ± 2V(1M Ω)
	230 mV/div to 5 V/div: ± 40V (1MΩ)
Bandwidth Limit[2]	DS405x/ DS403x: 20 MHz/100MHz/200MHz
	DS402x: 20 MHz/100MHz
	DS401x: 20 MHz
Low Frequency Response (AC coupling -3dB)	≤5 Hz (on BNC)
Rise Time[2]	DS405x: 700ps
	DS403x: 1ns
	DS402x: 1.8ns
	DS401x: 3.5ns
DC Gain Accuracy	±2% full scale
DC Offset Accuracy	200 mV/div to 5 V/div: 0.1 div ± 2 mV±0.5 offset
	2 mV/div to 195 mV/div: 0.1 div ± 2 mV±1.5 offset
ESD Tolerance	±2 kV
Channel to Channel Isolation	DC to maximum bandwidth: >40 dB

Trigger		
Trigger Level Range	Internal	±6 div from the center of the screen
	EXT	± 0.8 V
Trigger Mode	Auto, Normal, Single	
Holdoff Range	100 ns to 10 s	
High Frequency Rejection[2]	50 kHz	
Low Frequency Rejection[2]	5 kHz	
Edge Trigger		
Edge Type	Rising, Falling, Rising&Falling	
Pulse Trigger		
Pulse Condition	Positive Pulse Width (greater than, lower than, within specified interval)	
	Negative Pulse Width (greater than, lower than, within specified interval)	
Pulse Width Range	4 ns to 4 s	
Slope Trigger		
Slope Condition	Positive Slope (greater than, lower than, within specified interval)	
	Negative Slope (greater than, lower than, within specified interval)	
Time Setting	10 ns to 1 s	
Video Trigger		
Signal Standard	Support standard NTSC, PAL and SECAM broadcasting standards	
	Support 480P, 576P, 720P, 1080P and 1080I HDTV standards	
Pattern Trigger		
Pattern Setting	H, L, X, Rising Edge, Falling Edge	
RS232/UART Trigger		
Trigger Condition	Start, Error, Check Error, Data	
Baud	2400bps, 4800bps, 9600bps, 19200bps, 38400bps, 57600bps, 115200bps, User	
Data Bits	5 bit, 6 bit, 7 bit, 8 bit	
I2C Trigger		
Trigger Condition	Start, Restart, Stop, Missing ACK, Address, Data, A&D	
Address Bits	7 bit, 10 bit	
Address Range	0 to 119, 0 to 1023	
Byte Length	1 to 5	

SPI Trigger	
Trigger Condition	CS, Timeout
Timeout Value	100 ns to 999 ns
Data Bits	4 bit to 32 bit
Data Line Setting	H, L, X
Clock Edge	Rising Edge, Falling Edge

CAN Trigger	
Signal Type	Rx, Tx, CAN_H, CAN_L, Differential
Trigger Condition	SOF, EOF, Frame Type, Frame Error
Baud	10kbps, 20kbps, 33.3kbps, 50kbps, 62.5kbps, 83.3kbps, 100kbps, 125kbps, 250kbps, 500kbps, 800kbps, 1Mbps, User
Sample Point	5% to 95%
Frame Type	Data, Remote, Error, OverLoad
Error Type	Bit Fill, Answer Error, Check Error, Format Error, Random Error
FlexRay Trigger	
Baud	2.5Mb/s, 5Mb/s, 10Mb/s
Trigger Condition	Frame, Symbol, Error, TSS
USB Trigger	
Signal Speed	Low Speed, Full Speed
Trigger condition	SOP, EOP, RC, Suspended, ExitSuspend

Measure		
Cursor	Manual mode	Voltage deviation between cursors (△V)
		Time deviation between cursors (△T)
		Reciprocal of △T (Hz) (1/△T)
	Track mode	Voltage and time values of the waveform point
	Auto mode	Allow to display cursors during auto measurement
Auto Measurement	Measurements of Maximum, Minimum, Peak-Peak Value, Top Value, Bottom Value, Amplitude, Average, Mean Square Root, Overshoot, Pre-shoot, Frequency, Period, Rise Time, Fall Time, Positive Pulse Width, Negative Pulse Width, Positive Duty Cycle, Negative Duty Cycle, Delay A~B↓, Delay A~B↑, Phase A~B↓, Phase A~B↑	
Number of Measurements	Display 5 measurements at the same time	
Measurement Range	Screen Region or Cursor Region	
Measurement Statistic	Average, Max, Min, Standard Deviation, Number of Measurements	
Counter	Hardware 6 bits counter (channels are selectable)	

Math	
Waveform Operation	A+B, A-B, A×B, A/B, FFT, Editable Advanced Operation, Logic Operation
FFT Window	Rectangle, Hanning, Blackman, Hamming
FFT Display	Split, Full Screen
FFT Vertical Scale	Linear RMS, dBV RMS
Logic Operation	AND, OR, NOT, XOR
Math Function	Intg, Diff, Log, Exp, Sqrt, Sine, Cosine, Tangent
Number of Buses for Decoding	2
Decoding Type	Parallel (standard), RS232 /UART (option), I2C (option), SPI (DS6XX4 option), CAN (option), FlexRay (option)

Display	
Display Type	9 inches (229 mm) TFT LCD display
Display Resolution	800 horizontal×RGB×480 vertical pixel
Display Color	160,000 color
Persistence Time	Min, 50ms, 100ms, 200ms, 500ms, 1 s, 2 s, 5 s, 10 s, 20 s, Infinite
Display Type	Dots, Vectors
Real-time Clock	Time and Date (user adjustable)

I/O	
Standard Ports	Dual USB HOST, USB DEVICE, LAN, VGA output, 10MHz input/output, Aux output (trigger output, quick edge, pass/fail, calibration, GND)

General Specifications

Probe Compensation		
Output Voltage[2]	About 3 V, peak-peak	
Frequency[2]	1 kHz	
Power		
Power Voltage	100-120 V/50Hz/60Hz/400Hz	
	100-240 V/50 Hz/60Hz	
Power	Maximum 120 W	
Fuse	3 A, T degree, 250 V	
Environment		
Temperature Range	In operation: 0 ℃ to +50 ℃	
	Out of operation: -20 ℃ to +70 ℃	
Cooling Method	Fan	
Humidity Range	Under +35 ℃: ≤90% relative humidity	
	+35 ℃ to +50 ℃: ≤60% relative humidity	
Altitude	In operation: under 3,000 meters	
	Out of operation: under 15,000 meters	
Mechanical		
Dimensions[3]	Width×Hight×Depth =440.0 mm× 218.0 mm×130.0 mm	
Weight[4]	Without package	4.8 kg ± 0.2 kg
	With package	7.1 kg ± 1.0kg

Adjustment Interval
The recommended calibration interval is one year.

Regulation Standards	
Electromagnetic Compatibility	2004/108/EC
	Execution standard EN 61326-1:2006 EN 61326-2-1:2006
Safety	UL 61010-1:2004; CAN/CSA-C22.2 NO. 61010-1-2004;
	EN 61010-1:2001; IEC 61010-1:2001

1. Maximum value. In single-channel mode, sine signal with 10 ns horizontal scale, 4 div input amplitude and 10 MHz frequency, edge trigger.
2. Typical.
3. Tilt tabs and handle folded, knob height included, front panel cover excluded.
4. DS4054 model, standard configuration.

Ordering Information

	Description	Order Number
Model	DS4012 (100MHz, 2-channel)	DS4012
	DS4014 (100MHz, 4-channel)	DS4014
	DS4022 (200MHz, 2-channel)	DS4022
	DS4024 (200MHz, 4-channel)	DS4024
	DS4032 (350MHz, 2-channel)	DS4032
	DS4034 (350MHz, 4-channel)	DS4034
	DS4052 (500MHz, 2-channel)	DS4052
	DS4054 (500MHz, 4-channel)	DS4054
Standard Accessories	Power Cord conforming to the standard of the country	-
	Front Panel Cover	FPC-DS-4
	USB Data Cable	CB-USB-150
	2 or 4 Passive Probes (500 MHz)	RP3500
	Quick Guide	-
	Resource CD (User's Guide and Application Software)	-
Optional Accessories	Active Differential Probe (1.5 GHz)	RP7150
	Rack Mount Kit	RM-DS-4
Decoding Options	RS232/UART Decoding Kit	SD-RS232-DS4
	I2C Decoding Kit	SD-I2C-DS4
	SPI Decoding Kit	SD-SPI-DS4 (Only for DS4XX4)
	CAN Decoding Kit	SD-CAN-DS4
	FlexRay Decoding Kit	SD-FlexRay-DS4

NOTE: All the options or accessories can be ordered from you local RIGOL Office.

RIGOL

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For further information, please contact
Rigol local Distributors

www.rigol.com