RIGOL

DS80000 Series

Digital Oscilloscope

Data Sheet

DSA38100-1110

Sept. 2024

Product Overview

DS80000 series high-bandwidth real-time digital oscilloscope is the 8th generation of RIGOL's self-developed oscilloscopes. It provides 13 GHz analog bandwidth, 40 GSa/s real-time sample rate, 4 Gpts memory depth. It supports the compliance analysis of various protocols, helping you locate the problem in high-speed design and address the verification problem.

Customer Value

High Performance

- Up to 13 GHz analog bandwidth, powerful high-speed signal analysis;
- Up to 40 Gsa/s real-time sample rate on each channel, powerful signal acquisition capability;
- Up to 4 Gpts memory depth, allowing signal details to be presented clearly.

High Availability

- The tilt of the 15.6-inch high-definition large touch screen can be electronically adjusted with one button, supporting gesture-enabled operation, multi-pane windowing;
- High-definition smart and quick-responsive shortcut menu display can be extended as a secondary display with user-defined quick operation menu;
- Control with the SCPI command sets;
- Provides USB/LAN/HDMI® interfaces to meet diversified test application scenarios.

Powerful Analysis Capability

Various advanced analysis functions, compliance analysis tests of various protocols, jitter analysis, etc.

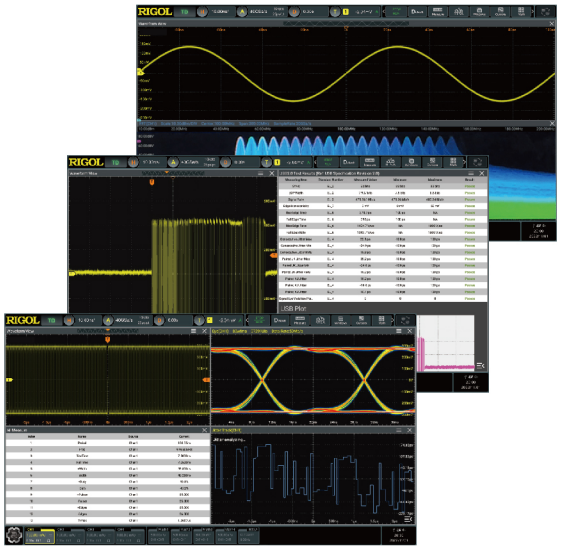
Typical Application

❶ High-Speed Signal Protocol Compliance Analysis

With the 13 GHz bandwidth and 40 Gsa/s real- time sample rate, the DS80000 series digital oscilloscope can cover more high-speed signal protocol compliance analysis application scenarios, providing more compliance analysis tests such as PCIe, and USB2.0.

❷ High-Speed Components and System Performance Validation

DS80000 series provides advanced jitter and eye diagram analysis functions, which can be widely applied to the following scenarios such as complex embedded system debugging, high-speed serial and parallel bus performance test, clock jitter, signal integrity, and PLL performance validation.



Product Features

Product Features

- Built on RIGOL's brand new core module
- 4 analog channels, 1 EXT channel
- Analog channel bandwidth: Max. 13 GHz
- Up to 40 GSa/s sample rate
- Max. 2 Gpts or 4 Gpts memory depth (opt.)
- Max. waveform capture rate: 250,000 wfms/s
- Vertical resolution: 8-16 bits adjustable
- Vertical sensitivity range: 1 mV/div ~ 1 V/div (50Ω)
- Timebase range: 20 ps/div~1 ks/div
- N-in-1 instrument, including digital oscilloscope, digital voltmeter, 8-digit frequency counter and totalizer, and protocol analyzer (option)
- Various trigger functions: Zone trigger, Edge trigger, Pulse trigger, Slopetrigger, Video trigger, Pattern trigger, Duration trigger, Timeout trigger, Runttrigger, Window trigger, Delay trigger, Setup/Hold trigger, Nth Edge trigger, RS232/UART, I2C, SPI, CAN, FlexRay, LIN, I2S, and MIL-STD-1553
- Various serial bus decodings (opt.): RS232/UART, I2C, SPI, CAN, CAN-FD,FlexRay, LIN, I2S, MIL-STD-1553, USB2.0; 4 decode channels
- Support Ethernet, USB2.0, and other protocol compliance analysis functions
- Auto measurement of 41 waveform parameters; full-memory hardware measurement function
- Various math operations: A+B, A-B, A×B, A/B, FFT, A&&B, A||B, A^B, !A, Intg, Diff, Sqrt, Lg, Ln, Exp, Abs, AX+B, LowPass, HighPass, BandPass, and BandStop built-in peak search functions
- Real-time eye diagram and and jitter analysis (opt.)
- Recording and playback functions for a maximum of 2,000,000 frames of hardware real-time and ceaseless waveforms
- Multiple interfaces available: USB HOST&DEVICE, LAN(LXI), HDMI, AUX OUT; Web Control supported
- 15.6'' HD capacitive multi-touch screen with one-button electronic tilt; multi-pane windowing
- The photoelectric encoder operating knob prolongs its service life, guaranteeing more than 100,000 times of pressing operation and 1 million times of rotation operation, greatly improving its service life
- High-definition smart and quick-responsive shortcut menu display
- Support online upgrade

DS80000 series high-bandwidth real-time digital oscilloscope is the 8th generation of RIGOL's self-developed oscilloscopes. It provides 13 GHz analog bandwidth, 40 GSa/s real-time sample rate, 4 Gpts memory depth, and up to 250,000 wfms/s capture rate. It supports the compliance analysis of various protocols, helping you locate the problem in high-speed design and address the verification problem.

Overview of RIGOL's Medium and High-end Series Products

	MSO8000/A	DS70000	DS80000
Analog Channel	4	4	4
Digital Channel	16	N/A	N/A
Analog Bandwidth	600 MHz to 3 GHz	3 GHz to 5 GHz	6 GHz to 13 GHz
Max. Sample Rate	10 GSa/s	20 GSa/s	40 GSa/s
Max. Memory Depth	500 Mpts	2 Gpts (option)	2 Gpts or 4 Gpts (option)
Waveform Capture Rate	>600,000 wfms/s	>1,000,000 wfms/s	> 250,000 wfms/s
Max. Frames of Waveform Recording	450,000	2,000,000	2,000,000
LCD	10.1'' capacitive multi-touch screen	15.6'' capacitive multi-touch screen with one-button electronic tilt	15.6'' Capacitive multi-touch screen with one-button electronic tilt
Hardware Mask Test	Standard	Standard	Standard
Arbitrary Waveform Generator	2 CH, 25 MHz (opt.)	N/A	N/A
Digital Voltmeter	Standard	Standard	Standard
Hardware Counter	6-digit frequency counter + totalizer	8-digit frequency counter + totalizer	8-digit frequency counter + totalizer
Search and Navigation	Support table display	N/A	Support table display
Power Analysis	Built-in UPA (opt.) + PC	N/A	N/A
Real-time Eye Diagram	Option	Option	Option
Jitter Analysis	Option	Option	Option
Protocol Compliance Analysis	N/A	USB2.0 (opt.), LAN (opt.)	USB2.0 (opt.), LAN (opt.)
Serial Protocol Analysis (Option)	RS232/UART, I2C, SPI, CAN, LIN, FlexRay, I2S, and MIL-STD-1553	RS232/UART, I2C, SPI, CAN, CAN-FD, LIN, FlexRay, I2S, and MIL-STD-1553	RS232/UART, I2C, SPI, CAN, CAN-FD, LIN, FlexRay, I2S, MIL-STD-1553 and USB2.0
Waveform Color Persistence	Standard	Standard	Standard
Histogram	Standard	N/A	Standard
FFT	FFT, standard	FFT, standard	FFT, standard

	MSO8000/A	DS70000	DS80000
MATH	Displays 4 functions at the same time	Displays 4 functions at the same time	Displays 4 functions at the same time
Connectivity	Standard: USB, LAN, and HDMI	Standard: USB, LAN, and HDMI	Standard: USB, LAN, and HDMI

RIGOL Probe Adapters Supported

Probe Adapter

Name	Type	Description
BNC Adapter Input 50Ω	BNC Adapter	50 Ω to 3.5 mm (F)-BNC(F) Connector
High Impedance Adapter	High-impedance Probe Adapter	3.5 mm to BNC (1 MΩ)

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.

Overview of the DS80000 Series Technical Specifications

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Model	DS80604	DS80804	DS81004	DS81304
No. of Analog Channels	4	4	4	4
Max. Analog Bandwidth[1]	6 GHz	8 GHz	10 GHz	13 GHz
Total Sample Rate	160 GSa/s			
Channel Sample Rate	40 GSa/s[1]			
Max. Memory Depth	Standard: 500 Mpts Option: 2 Gpts or 4 Gpts[1]			
Sampling Mode	Real-time sampling			
Rise Time	≤73 ps (6 GHz); ≤55 ps (8 GHz); ≤44 ps (10 GHz); ≤33 ps (13 GHz) (50 Ω impedance, 10%-90%, typ.)			
Max. Waveform Capture Rate	250,000 wfms/s			
Vertical Resolution	8-16 bits; selectable			
Max. Frames of Recording	Max. 2,000,000 frames			
Peak Detection	Captures 100 ps glitches			
LCD	Main display: 15.6'' capacitive multi-touch screen with one-button electronic tilt Secondary display: 3.5'' capacitive multi-touch screen with user-defined shortcut key menu, supporting quick-responsive touch operation with vibration			
Display Resolution	Main display: 1920x1080; secondary display: 480x320			

Vertical System--Analog Channel

Vertical System--Analog Channel		
Input Impedance		50 Ω ± 3%
Input Coupling		DC[2]
Probe Attenuation Coefficient	Probe Ratio	0.0001X, 0.0002X, 0.0005X, 0.001X, 0.002X, 0.005X, 0.01X, 0.02X, 0.05X, 0.1X, 0.2X, 0.5X, 1X, 2X, 5X, 10X, 20X, 50X, 100X, 200X, 500X, 1000X, 2000X, 5000X, 10000X, 20000X, and 50000X
	Attenuation Ratio	±60 dB
Maximum Input Voltage	50 Ω	≤10 mV/div Scale: 2 V_{rms} >10 mV/div Scale: 5 V_{rms}
	Remarks	The probe allows a higher voltage test technically. Transient overvoltage is not allowed whether the probe is used or not. Please use the instrument dedicated for the specified measurement category (not applicable to CAT II, III, and IV)
Vertical Resolution		8 bits 9-16 bits (selectable) (high-resolution mode)
Vertical Sensitivity Range[3]	50 Ω	1 mV/div to 1 V/div
Offset Range	50 Ω	±0.6 V (≤60 mV/div) ±2.5 V (>60 mV/div, ≤200 mV/div) ±4 V (>200 mV/div, ≤1 V/div)
Dynamic Range		±5 div (8-bit)
Bandwidth Limit (Typical)	50 Ω	500 MHz, 1 GHz, 2 GHz, 3 GHz, 4 GHz, 5 GHz, 6 GHz, 7 GHz, 8 GHz, 9 GHz, 10 GHz, 11 GHz, and 12 GHz; independently selectable for each channel[4] The bandwidth limit is automatically set to 500 MHz when the vertical scale is smaller than 5 mV.
DC Gain Accuracy[3]		± 2% of full scale
DC Offset Accuracy		≤200 mV/div (±0.1 div ± 2 mV ± 1.5% of offset value)
		>200 mV/div (±0.1 div ± 2 mV ± 1.0% of offset value)
Channel-to-Channel Isolation		≥60 dB

Horizontal System--Analog Channel

Horizontal System--Analog Channel					
Range of Time Base		6 GHz	8 GHz	10 GHz	13 GHz
		100 ps/div to 1 ks/div	50 ps/div to 1 ks/div	50 ps/div to 1 ks/div	20 ps/div to 1 ks/div
		Fine			
Time Base Resolution		1 ps	0.5 ps	0.5 ps	0.2 ps
Time Base Accuracy		±0.2 ppm (initial calibration accuracy) ± 1 ppm/year (aging rate)			
Time Base Delay Range	Pre-trigger	-5 div			
	Post-trigger	Acquisition Time for the Max. Memory Depth			
Time Interval (ΔT) Measurement (using Cursor)		±(Time Base Accuracy x Readout) ± (0.001 x Screen Width) ± 20 ps			
Inter-channel Offset Correction Range		±100 ns, Accuracy±1 ps			
Analog Channel-to-Channel Skew (Typical)		≤50 ps [5]			
Horizontal Mode	YT	Default			
	XY	Channel 1/2/3/4			
	SCAN	Time base ≥200 ms/div			
	ROLL	Time base ≥50 ms/div, available to enter or exit the ROLL mode by adjusting the horizontal timebase knob			

Acquisition System

Acquisition System	
Max. Sample Rate of Analog Channel	40 GSa/s[1]
Max. Memory Depth of Analog Channel	Standard: 500 Mpts Option: 2 Gpts or 4 Gpts[1]

Acquisition System		
Acquisition Mode	Normal	Default
	Peak Detection	Captures 100 ps glitches
	Average Mode	2, 4, 8, 16...65536 are available for you to choose
	High Resolution	9-16 bits

Vertical Resolution

Vertical Resolution (@40 GSa/s)					
Effective Resolution (bitN)	9-bit	10-bit	12-bit	14-bit	16-bit
High-Resolution Bandwidth (BW_bitN) (Typical)[6]	4 GHz	2 GHz	800 MHz	500 MHz	200 MHz

Trigger System

Trigger System		
Trigger Source		Analog channel (CH1~CH4), EXT TRIG
Trigger Mode		Auto, Normal, Single
Trigger Coupling	DC	DC coupling trigger
	AC	AC coupling trigger
	High Frequency Rejection (Low Pass Filter)	High frequency rejection, cut-off frequency~75 kHz (internal trigger only)
	High Frequency Rejection (High Pass Filter)	Low frequency rejection, cut-off frequency~75 kHz (internal trigger only)
Noise Rejection		Increases delay for the trigger circuit (internal trigger only), On/Off

Trigger System		
Trigger Bandwidth	Internal Trigger	Analog Bandwidth
	External Trigger	200 MHz
Trigger Sensitivity	Internal Trigger	3 div, ≤ 2 mV/div 1.5 div, 2 mV/div to 5 mV/div 1 div, 5 mV/div to 50 mV/div 0.5 div, ≥ 50 mV/div 0.75 div or 0.8 div, @500mV/div
	External Trigger	500 mVpp (DC to 200 MHz)
EXT TRIG	Input Impedance	1 MΩ ± 1%, SMA connector
	Trigger Jitter (Typical)	≤1 ns_{rms} Normal acquisition, Edge trigger, trigger level located near 50% of EXT input signal
Trigger Level Range	Internal Trigger	± 5 div from the center of the screen
	External Trigger	±4 V

Trigger Type

Trigger Type	
Trigger Type	Standard: Edge trigger, Pulse trigger, Slope trigger, Video trigger, Pattern trigger, Duration trigger, Timeout trigger, Runt trigger, Window trigger, Delay trigger, Setup/Hold trigger, Nth Edge trigger Option: RS232/UART, I2C, SPI, CAN, FlexRay, LIN, I2S, and MIL-STD-1553
Edge	Triggers on the threshold of the specified edge of the input signal. The types can be Rising, Falling, or Either Source channel: CH1 to CH4, or EXT
Pulse	Triggers on the positive or negative pulse with a specified width. The pulse width is greater or smaller than a certain value or within a certain time range. Source channel: CH1 to CH4

Trigger Type	
Slope	Triggers on the positive or negative slope of the specified time. The slew time is greater or smaller than a certain value or within a certain time range (200 ps to 10 s). Source channel: CH1 to CH4
Video	Triggers on all lines, specified line, add field, or even field that conforms to the video standards. The supported video standards include NTSC, PAL/SECAM, 480p/60Hz, 576p/50Hz, 720p/60Hz, 720p/50Hz, 720p/30Hz, 720p/25Hz, 720p/24Hz, 1080p/60Hz, 1080p/50Hz, 1080p/30Hz, 1080p/25Hz, 1080p/24Hz, 1080i/60Hz, and 1080i/50Hz Source channel: CH1 to CH4
Pattern	Identifies a trigger condition by searching for a specified pattern. The pattern is a combination of multiple selected channel sources. The logic pattern of each channel is H, L, X, Rising, and Falling Source channel: CH1 to CH4
Duration	Triggers when the specified pattern meets the specified duration condition. The pattern is a combination of multiple selected channel sources. The logic pattern of each channel is H, L, and X. The duration is greater or smaller than a certain value, or within a certain time range, or outside a certain time range. Source channel: CH1 to CH4
Timeout	Triggers when duration of a certain event exceeds the specified time (200 ps to 10 s). The event can be specified as Rising, Falling, or Either. Source channel: CH1 to CH4
Runt	Triggers when the pulses pass through one threshold but fail to pass through another threshold. Source channel: CH1 to CH4
Window	Triggers in a specified window state when the rising edge of the signal crosses the upper threshold or the falling edge crosses the lower threshold. The window state can be Enter, Exit, or Time. Source channel: CH1 to CH4
Delay	Triggers when the time difference between the specified edges of Source A and Source B meets the preset time. Delay is greater or smaller than a certain value, or within a certain time range, or outside a certain time range. Source channel: CH1 to CH4
Setup/Hold	When the setup time or hold time between the input clock signal and the data signal is smaller than the specified time (200 ps to 10 s). Source channel: CH1 to CH4

Trigger Type	
Nth Edge	Triggers on the Nth edge that appears after the specified idle time. The edge can be specified as Rising or Falling. Source channel: CH1 to CH4
RS232/UART (Option)	DS80000-EMBDA option Triggers on the Start, Error, Check Error, or Data frame of the RS232/UART bus (up to 20 Mb/s). Source channel: CH1 to CH4
I2C (Option)	DS80000-EMBDA option Triggers on the Start, Stop, Restart, MissedACK, Address (7 bits, 8 bits, or 10 bits), Data, or Address Data of the I2C bus. Source channel: CH1 to CH4
SPI (Option)	DS80000-EMBDA option Triggers on the specified pattern of the specified data width (4~32) of SPI bus. CS and Timeout are supported. Source channel: CH1 to CH4
CAN (Option)	DS80000-AUTOA option Triggers on the start of a frame, end of a frame, Remote ID, Overload, Frame ID, Frame Data, Data&ID, Frame Error, Bit Fill, Answer Error, Check Error, Format Error, and Random of the CAN signal (up to 5 Mb/s). The supported CAN bus signal types include CAN_H, CAN_L, TX/RX, and DIFF. Source channel: CH1 to CH4
FlexRay (Option)	DS80000-AUTOA option Triggers on the specified position (TSS End, FSS_BSS End, FES End, DTS End), frame (null, Sync, Start, All), symbol (CAS/MTS and WUS), error (Head CRC Err, Tail CRC Err, Decode Err, and Random Err) of the FlexRay signal (up to 10 Mb/s). Source channel: CH1 to CH4
LIN (Option)	DS80000-AUTOA option Triggers on the Sync, ID, Data (length settable), Data&ID, Wakeup, Sleep, and Error frame of the LIN bus signal (up to 20 Mb/s). Source channel: CH1 to CH4

Trigger Type	
I2S (Option)	DS80000-AUDIOA option Triggers on 2's complement data of audio left channel, right channel, or either channel (=, ≠, >, <, <>, ><). The available alignment modes include I2S, LJ, and RJ. Source channel: CH1 to CH4
MIL-STD-1553 (Option)	DS80000-AEROA option Triggers on Sync (Data Sync, Cmd/Status Sync, and All Sync), Data, RTA, RTA+11Bit, and Error (Sync Error and Check Error) of the MIL-STD-1553 bus. Source channel: CH1 to CH4

Waveform Measurement

Waveform Measurement		
Cursor	Number of Cursors	2 pairs of XY cursors
	Manual Mode	Voltage deviation between cursors (ΔY) Time deviation between cursors (ΔX) Reciprocal of ΔX (Hz) (1/ΔX)
	Track Mode	Fix Y-axis to track X-axis waveform point's voltage and time values Fix X-axis to track Y-axis waveform point's voltage and time values
	Auto Measurement	Allows to display cursors during auto measurement
	XY Mode	Measures the voltage parameters of the corresponding channel waveforms in XY time base mode. X = Channel 1, Y = Channel 2

Waveform Measurement		
Auto Measurement	Number of Measurements	41 auto measurements; and up to 14 measurements can be displayed at a time.
	Measurement Source	CH1 to CH4, Math1 to Math4
	Measurement Mode	Normal (realized by software) and Precision (W); for Precision, only supported by analog channel
	Measurement Range	Main, Zoom, Cursor, Full-memory
	All Measurement	Displays 41 measurement items for the current measurement channel; the measurement results are updated continuously; you can switch the measurement channel.
	Vertical	Vmax, Vmin, Vpp, Vtop, Vbase, Vamp, Vupper, Vmid, Vlower, Vavg, VRMS, Per. VRMS, Overshoot, Preshoot, Area, and Period Area.
	Horizontal	Period, Frequency, Rise Time, Fall Time, +Width, -Width, +Duty, -Duty, Positive Pulse Count, Negative Pulse Count, Rising Edge Count, Falling Edge Count, Tvmax, Tvmin, +Slew Rate, and -Slew Rate
	Others	Delay(A↑-B↑), Delay(A↑-B↓), Delay(A↓-B↑), Delay(A↓-B↓), Phase(A↑-B↑), Phase(A↑-B↓), Phase(A↓-B↑), and Phase(A↓-B↓)
	Analysis	Frequency counter, DVM, histogram, zone trigger, eye diagram (option), and jitter analysis (option)
	Statistics	Items: Current, Average, Max, Min, Standard Deviation, Count Max. 1,000 times statistics supported

Waveform Calculation

Waveform Calculation	
No. of Math Functions	4, 4 math functions available to be displayed at one time
Operation	A+B, A-B, A×B, A/B, FFT, A&&B, A||B, A^B, !A, Intg, Diff, Sqrt, Lg, Ln, Exp, Abs, AX+B, LowPass, HighPass, BandPass, and BandStop
Color Grade	Supporting FFT

Waveform Calculation		
FFT	Record Length	Max. 10 Mpts
	Window Type	Rectangular, Blackman-Harris, Hanning (default), Hamming, Flattop, and Triangle.
	Peak Search	A maximum of 15 peaks, determined by the user-defined threshold and offset threshold

Waveform Analysis

Waveform Analysis		
Waveform Recording	Stores the signal under test in segments according to the trigger events, that is, saves all the sampled waveform data as a segment to the RAM for each trigger event. The maximum number of the sampled segments is2,000,000	
	Source	All enabled analog channels
	Analysis	Supports playing frame by frame or continuous playing; capable of calculating, measuring, and decoding the played waveforms
Pass/Fail Test	Compares the signal under test with the user-defined mask to provide the test results: the number of successful tests, failed tests, and the total number of tests. The pass/fail event can enable immediate stop, beeper, and the screenshot.	
	Source	Any analog channel
Histogram	The waveform histogram provides a group of data, showing the number of times a waveform hits within the defined region range on the screen. The waveform histogram not only shows the distribution of hits but also the ordinary measurement statistics.	
	Source	Any analog channel
	Type	Horizontal and vertical
	Measure	Sum, Peaks, Max, Min, Pk_Pk, Mean, Mode, Bin width, Sigma, and XScale
Color Grade	Provide a dimensional view for color grade waveforms, color grade >16, 256-level color scale display	
	Source	Any analog channel
	Color Theme	Temperature and intensity
	Mode	Supports all modes

Waveform Analysis		
Real-time Eye Diagram (Option)	Makes measurements for the clock or data signal over time, analyze the variance of the technical specifications.	
	Source	Any analog channel
	Clock Recovery	Clock recovery for software, constant clock, first-order PLL, second-order PLL, and explicit clock
	Type	Fully automatic, semi automatic, and manual
	Eye Measurement Item	one level, zero level, eye height, eye width, eye amplitude, crossing percentage, Q Factor, extinction ration, DCD (duty cycle distortion), rise time, fall time, bit rate, etc.
Jitter Analysis (Option)	Makes measurements for the clock or data signal over time, analyzes the variance of the technical specifications.	
	Source	Any analog channel
	Clock Recovery	Constant, PLL, and Explicit
	Type	Fully automatic, semi automatic, and manual
	Jitter Measurement	TIE, Cycle to Cycle, +Width to +Width, –Width to -Width, Pk_Pk, 6-sigma, and RMS
	Jitter Analysis	Jitter separation, including TJ (Total Jitter), RJ (Random Jitter), DJ (Deterministic Jitter), PJ (Periodic Jitter), DDJ (Data Dependent Jitter), DCD (Duty Cycle Distortion), ISI (Inter-symbol Interference), and BR (Bit Ratio). Jitter analysis source: TIE, Cycle to Cycle, +Width to +Width, and –Width to -Width
	Measurement Display	Trend, Spectrum, Histogram, and BathCurve

Search&Navigation

Search, Navigation, and Table	
Type	Edge, Pulse
Source	Analog channel
Copy	Copies the search settings from or to the trigger settings mutually, including threshold setting and search condition settings

Search, Navigation, and Table	
Result Display	Displays the result in the form of the mark table in the multi-pane window. The search results such as the time, pulse width, data, and address of each event can be exported to the external storage device or internal memory as a file suffixed with "*.csv".
Navigation	Time navigation: navigates to view the acquired waveforms in time order.
	Event navigation: uses the navigation keys to scroll through the event search results and navigates to the specified event.

Serial Decoding

Serial Decoding	
Number of Decodings	Four protocol types can be decoded and enabled at the same time
Decoding Type	Standard: GPIO Option: RS232/UART, I2C, SPI, CAN, CAN-FD, FlexRay, LIN, I2S, MIL-STD-1553, USB2.0
GPIO	Up to 4 bits of Parallel decoding, supporting any analog channel; supports user-defined clock and auto clock settings. Source channel: CH1 to CH4
RS232/UART (Option)	DS80000-EMBDA option Decodes the RS232/UART (up to 20 Mb/s) bus's TX/RX data (5-9 bits), parity (Odd, Even, or None), and stop bits (1-2 bits). Source channel: CH1 to CH4
I2C (Option)	DS80000-EMBDA option Decodes the address (with or without the R/W bit), data, and ACK of the I2C bus. Source channel: CH1 to CH4
SPI (Option)	DS80000-EMBDA option Decodes the MISO/MOSI data (4-32 bits) of the SPI bus. CS and Timeout are supported. Source channel: CH1 to CH4

Serial Decoding	
CAN (Option)	DS80000-AUTOA option Decodes the remote frame (ID, byte number, CRC), overload frame, and data frame (standard/extended ID, control domain, data domain, CRC, and ACK) of the CAN bus (up to 5 Mb/s). The supported CAN bus signal types include CAN_H, CAN_L, TX/RX, and DIFF. Supports 10 Mb/s CAN-FD baud. Source channel: CH1 to CH4
FlexRay (Option)	DS80000-AUTOA option Decodes the frame ID, PL (payload), Header CRC, Cycle Count, Data, Tail CRC, and DTS of the FlexRay bus (up to 10 Mb/s). The supported signal types include BP, BM, and RX/TX. Source channel: CH1 to CH4
LIN (Option)	DS80000-AUTOA option Decodes the protocol version (1.X or 2.X) of the LIN bus (up to 20 Mb/s). The decoding displays sync, ID, data, and check sum. Source channel: CH1 to CH4
I2S (Option)	DS80000-AUDIOA option Decodes I2S audio bus left channel data and right channel data, supporting 4-32 bits. The alignment modes include I2S, LJ, and RJ. Source channel: CH1 to CH4
MIL-STD-1553 (Option)	DS80000-AEROA option Decodes the MIL-STD-1553 bus signal's data word, command word, and status word (address+last 11 bits). Source channel: CH1 to CH4
USB2.0 (Option)	Decodes the data frame such as SNYC, PID, and data packets, and completes the CRC check. Source channel: CH1 to CH4

Protocol Compliance Analysis

Protocol Compliance Analysis (Option)		
Protocols	USB 2.0	DS80000-USBC option Test Item: sync width, EOP width, signal rate, rise time, fall time, edge monotonicity, rise edge rate, fall edge rate, paired JK jitter, paired KJ jitter, consecutive jitter, eye diagram
	100Base-T	DS80000-ENETC option Test Item: Output Voltage, Amplitude Symmetry, Rise/Fall Time, Rise/Fall Time Symmetry, Overshoot, Distortion Based on Duty Cycle, Eye, and Jitter
	1000Base-T	DS80000-ENETC option Test Item in Test Mode1: Template/Volt/Droop Test Item in Test Mode2: Master Mode Jitter Test Item in Test Mode3: Slave Mode Jitter Test Item in Test Mode4: Transmitter Distortion and Common-mode Output Voltage
Report	Measurement data include: test item, test results, data range, reference standards, pass/fail test results; supporting exporting the report in HTML format	

Auto

Auto	
AutoScale	Min. voltage > 10 mVpp, duty cycle > 1% (35 Hz to 10 GHz period signal)

Digital Voltmeter

Digital Voltmeter	
Source	Any analog channel
Function	DC, AC+DC_{rms}, AC_{rms}
Resolution	ACV/DCV: 3-digit
Limits Beeper	Sounds an alarm when the voltage value is within or outside of the limit range
Range Measurement	Displays the latest measurement results in the form of a diagram, and display the extrema over the last 3 seconds; support Trend

High-precision Frequency Counter

High-Precision Frequency Counter		
Source		Any analog channel
Measure		Frequency, period, totalizer
Counter	Resolution	3-8 bits, user-defined
	Max. Frequency	Max. analog bandwidth
Totalizer		64-bit totalizer
		Counts the number of the rising edges
Time Reference		Internal reference

Command Set

Command Set	
Common Commands Support	IEEE488.2 Standard
Error Message Definition	Error messages
Support Status Report Mechanism	Status Reporting
Support Syn Mechanism	Synchronization

Display

Display	
LCD	15.6'' capacitive multi-touch screen with one-button electronic tilt, supports gesture-enabled operation
Resolution	1920x1080 (Screen Region) 16:9
Graticule	(10 horizontal divisions) x (8 vertical divisions)
Persistence	Off, Infinite, variable persistence (100 ms to 10 s)
Brightness	256 intensity levels (LCD, HDMI)

Processor System

Processor System	
Processor	Dual-core Cortex-A72 up to 1.8 GHz

Processor System	
System Memory	4 GB RAM
Operating System	Android
Internal Non-volatile Memory	128 GB

I/O

I/O		
USB3.0 Host		2 (1 on the front panel and 1 on the rear panel)
USB3.0 Device		1 on the rear panel
LAN		1 on the rear panel, 1000 Base-T, supporting LXI-C
Web Remote Control		Supports Web Control interface (input the IP address of the oscilloscope into the Web browser to display the operation interface of the oscilloscope)
AUX Out		Front-panel SMA output connector Vo (H) ≥ 2.5 V open circuit, ≥1.0 V 50 Ω to GND Vo (L) ≤ 0.7 V to load ≤ 4 mA, ≤0.25 V 50 Ω to GND
	Rise Time	≤1 ns
10 M In/Out	Input Interface	1, SMA connector on the rear panel
	Output Interface	1, SMA connector on the rear panel
	Input Interface	50 Ω, with the amplitude 130 mVpp to 4.1 Vpp (-10 dBm, 20 dBm), frequency 10 MHz ± 1 ppm
	Output Interface	50 Ω, 1.5 Vpp sine waveform
HDMI Video Output		1 on the rear panel, HDMI 1.4, A plug; used to connect to an external monitor or projector
Probe Compensation Output		1 kHz, 3 Vpp square waveform

Power Supply

Power Supply	
Power Voltage	100 V-127 V, 200 V- 240 V; 50/60 Hz

Power Supply	
Power	Max. 2000 W (connect to various interfaces, USB, active probes)

Environment

Environment		
Temperature Range	Operating	0℃~+50℃
	Non-operating	-30℃~+70℃
Humidity Range	Operating	below +30℃: ≤90% RH (without condensation)
		+30℃ to +40℃, ≤75% RH (without condensation)
		+40℃ to +50℃, ≤45% RH (without condensation)
	Non-operating	below 65℃: ≤90% RH (without condensation)
Altitude	Operating	below 3,000 meters
	Non-operating	below 15,000 meters

Warranty and Calibration Interval

Warranty and Calibration Interval	
Warranty	Three years for the mainframe, excluding the probes and accessories.
Recommended Calibration Interval	18 months

Regulations

Regulations		
Electromagnetic Compatibility	Compliant with EMC DIRECTIVE 2014/30/EU, compliant with or higher than the standards specified in IEC 61326-1:2013/EN 61326-1:2013 Group 1 Class A	
	CISPR 11/EN 55011	
	IEC 61000-4-2:2008/EN 61000-4-2	±4.0 kV (contact discharge), ±8.0 kV (air discharge)
	IEC 61000-4-3:2002/EN 61000-4-3	3 V/m (80 MHz to 1 GHz); 3 V/m (1.4 GHz to 2 GHz); 1 V/m (2.0 GHz to 2.7 GHz)
	IEC 61000-4-4:2004/EN 61000-4-4	1 kV power line
	IEC 61000-4-5:2001/EN 61000-4-5	0.5 kV (phase-to-neutral voltage); 1 kV (phase-to-earth voltage); 1 kV (neutral-to-earth voltage)
	IEC 61000-4-6:2003/EN 61000-4-6	3 V, 0.15-80 MHz
	IEC 61000-4-11:2004/EN 61000-4-11	Voltage dip: 0% UT during half cycle; 0% UT during 1 cycle ; 70% UT during 25 cycles short interruption: 0% UT during 250 cycles
Safety	EN 61010-1:2019 EN 61010-031:2015 IEC 61010-1:2016 IEC 61010-2-030:2017 UL 61010-1:2012 R7 UL 61010-2-31:2017 R2 CAN/CSA-22.2 No. 61010-1-12:2017 CAN/CSA-22.2 No. 61010-2-30:2018 CAN/CSA-22.2 No. 61010-031-07:201	
Vibration	Meets GB/T 6587; class 2 random Meets MIL-PRF-28800F and IEC60068-2-6; class 3 random	

Regulations	
Shock	Meets GB/T 6587-2012; class 2 random Meets MIL-PRF-28800F and IEC 60068-2-27; class 3 random In non-operating conditions: 30 g, half-sine wave, 11 ms duration, 3 shocks along the main axis, total of 18 shocks

Mechanical Characteristics

Mechanical Characteristics		
Dimensions	448 mm (W)×310 mm (H)×522.6 mm (D)	
Rack Mount Kit	7U	
Weight[7]	Package excluded: 28 kg	
	Package included: 29.5 kg	

Non-volatile Memory

Non-volatile Memory		
Data/File Storage	Setup/Image	setup (*.stp), image (*.png, *.bmp, *.jpg)
	Waveform Data	CSV waveform data (*.csv), binary waveform data (*.bin,), list data (*.csv), and reference waveform data (*.ref, *.csv, *.bin)
Internal Capacity		125 GB
Reference Waveform		Displays 10 internal waveforms
Setting		Storage is limited by the capacity
USB Capacity		Supports the USB storage device that conforms to the industry standard

NOTE:

[1]: CH1, CH2, CH3, and CH4 channels are independent of each other. Whatever one or multiple channels are enabled, the maximum specifications of the instrument can be reached.

[2]: Only DC is available for input coupling under the input impedance of 50 Ω.

[3]: 1 mV/div and 2 mV/div are a magnification of 4 mV/div setting. For vertical accuracy calculations, use full scale of 32 mV for 1 mV/div and 2 mV/div sensitivity setting.

[4]: The following table shows the available bandwidth limits under different bandwidths.

Bandwidth	BW Limit
6 GHz	500 MHz, 1 GHz, 2 GHz, 3 GHz, 4 GHz, and 5 GHz
8 GHz	500 MHz, 1 GHz, 2 GHz, 3 GHz, 4 GHz, 5 GHz, 6 GHz, and 7 GHz
10 GHz	500 MHz, 1 GHz, 2 GHz, 3 GHz, 4 GHz, 5 GHz, 6 GHz, 7 GHz, 8 GHz, or 9 GHz

Bandwidth	BW Limit
13 GHz	500 MHz, 1 GHz, 2 GHz, 3 GHz, 4 GHz, 5 GHz, 6 GHz, 7 GHz, 8 GHz, 9 GHz, 10 GHz, 11 GHz, and 12 GHz

[5]: For any two channels, with input impedance 50 Ω, DC-coupled, under the same vertical scale, the Volts/div setting is the same for 100 mV/div and 200 mV/div.

[6]: Formula of the high-resolution bandwidth@sample rates other than 40 GSa/s: BW_D = BW_bitN x Fs / 40 G. Wherein, Fs indicates the new sample rate (downsampling); BW_D indicates the new bandwidth.

[7]: Standard configuration.

Order Information and Warranty Period

Order Information

Order Information	Order No.
Model	
6 GHz, 40 GSa/s, 4-CH	DS80604
8 GHz, 40 GSa/s, 4-CH	DS80804
10 GHz, 40 GSa/s, 4-CH	DS81004
13 GHz10 GHz, 40 GSa/s, 4-CH	DS81304
Standard Accessory	
Power Cord Conforming to the Standard of the Destination Country	— —
USB Cable x1	— —
Precision BNC Adapter, 3.5 mm to BNC (50 Ω) x2	BNC Adapter Input 50Ω
Adapter Option	
High-impedance Probe Adapter, 3.5 mm to BNC (1 MΩ)	High Impedance Adapter
Upgrade Option	
2 Gpts Memory Depth Upgrade Option	DS80000-RLU-20
4 Gpts Memory Depth Upgrade Option	DS80000-RLU-40
Measurement and Analysis Option	
Advanced Eye Diagram and Jitter Analysis Option	DS80000-JITTA
Pre-compliance Test Option	
100M/1000M Ethernet Compliance Test	DS80000-ENETC
USB2.0 Compliance Test	DS80000-USBC
Serial Protocol Decoding Options	
Embedded Serial Bus Trigger and Decoding (RS232/UART, I2C, and SPI)	DS80000-EMBDA
Auto Serial Bus Trigger and Decoding (CAN, CAN-FD, LIN, FlexRay)	DS80000-AUTOA
Audio Serial Bus Trigger and Decoding (I2S)	DS80000-AUDIOA
MIL-STD-1553 Serial Bus Triggers and Decodings	DS80000-AEROA

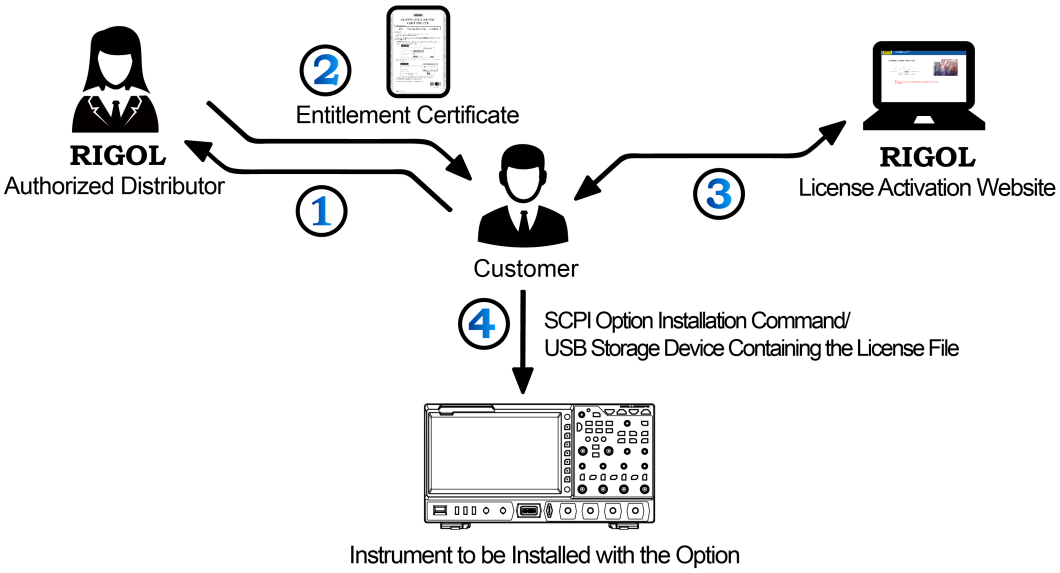
NOTE:

For all the mainframes, accessories, and options, please contact the local office of RIGOL.

Warranty Period

Three years for the mainframe, excluding the probes and accessories.

Option Ordering and Installation Process



1. According to the usage requirements, please purchase the specified function options from **RIGOL Sales Personnel**, and provide the serial number of the instrument that needs to install the option.
2. After receiving the option order, the **RIGOL** factory will mail the paper software product entitlement certificate to the address provided in the order.
3. Log in to **RIGOL** official website for registration. Use the software key and instruments serial number provided in the entitlement certificate to obtain the option license code and the option license file.
4. Install the option by running the SCPI command concerning the option installation. You can also save the option license file to the root directory of the USB storage device. Then insert it to the instrument. After being recognized, follow the instructions to install the option.

NOTE:

If any problems occur during the option installation process, please contact **RIGOL** technical team.

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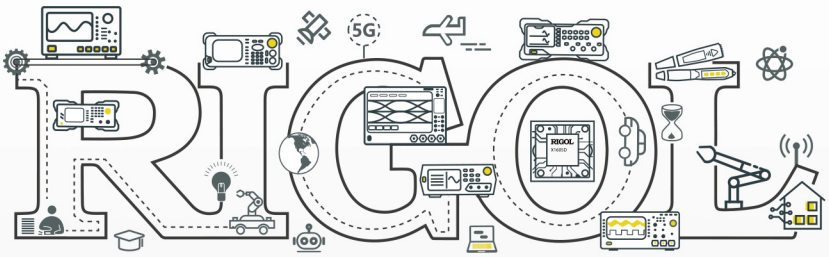

Communication

System Integration

New Energy

- Cellular-5G/WIFI
- UWB/RFID/ ZIGBEE
- Digital Bus/Ethernet
- Optical Communication

- Digital/Analog/RF Chip
- Memory and MCU Chip
- Third-Generation Semiconductor
- Solar Photovoltaic Cells

- New Energy Automobile
- PV/Inverter
- Power Test
- Automotive Electronics

Provide Testing and Measuring Products and Solutions for Industry Customers

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