Scientech

Digital Oscilloscope

DS2000E Series

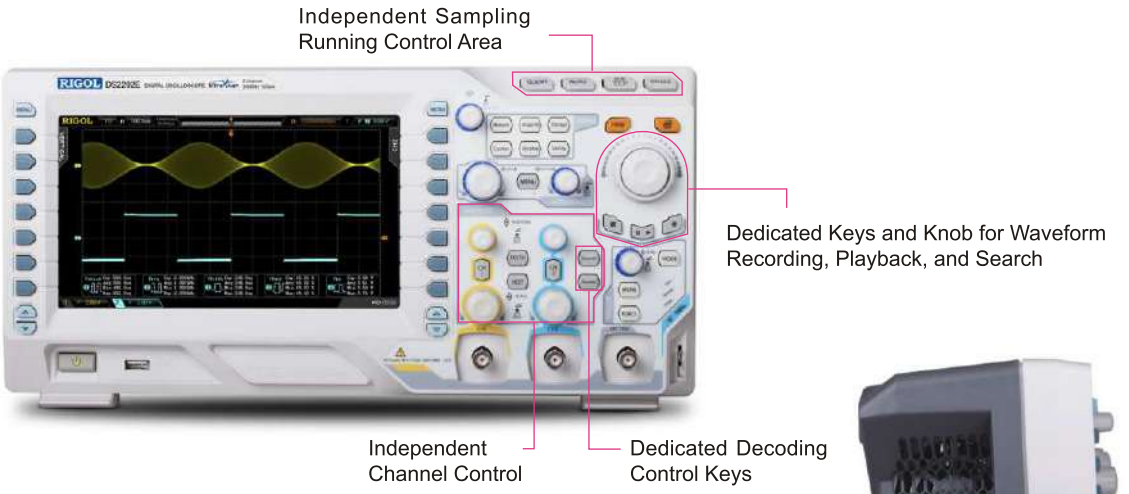
RIGOL
Innovation or nothing

UltraVision

- 100 MHz and 200 MHz bandwidth models
- 2 analog channels, 50 Ω input impedance (standard)
- Vertical range: 5 00 μV/div ~ 10 V/div
- Real-time sample rate: up to 1 GSa/s on both channels
- Memory depth: up to 28 Mpts on both channels
- Waveform capture rate: up to 50,000 wfms/s
- Real-time hardware waveform recording, playback, and analysis of up to 65,000 captured frames
- Various serial trigger and decode (RS232/UAR T, I2C, SPI, CAN and LIN)
- Complete connectivity: USB DEVICE, USB Host, LAN, and optional GPIB
- 8-inch WVGA (800×480), 256-leve l intensity grading display

Engineers and technicians needing higher performance test solutions for more advanced debug tasks will appreciate the unique price/performance attributes of the DS2000E. Based on our UltraV ision technology the DS2000E delivers advanced performance and analysis capabilities, a large intensity graded display , and a proven and reliable hardware platform at an unprecedented price point.

DS2000E Series Digital Oscilloscope



Dimensions: W×H×D = 361.6 mm×179.6 mm×130.8 mm
Weight: 3.9 kg±0.2 kg (Package Excluded)

▶ Unique UltraVision technology

UltraVision

- High memory depth (up to 28 Mpts on both channels)
- High waveform capture rate (up to 50,000 waveforms per second)
- Real-time waveform recording, playback, and analysis functions (up to 65,000 frames)
- Multi-level intensity grading display (up to 256-level)

▶ Models and Specifcations

Model	DS2102E	DS2202E
Analog Bandwidth	100 MHz	200 MHz
No. of Analog Channels	2	
Max. Real-time Sample Rate	1 GSa/s (for both channels)	
Max. Memory Depth	28 Mpts (for both channels)	
Max. Waveform Capture Rate	50,000 wfms/s	
Hardware Real-time and Ceaseless Waveform Recording, Playback, and Analysis Functions	Up to 65,000 frames can be recorded.	
Standard Probe	All the models include two PVP2350 350 MHz passive high-impedance probes.	

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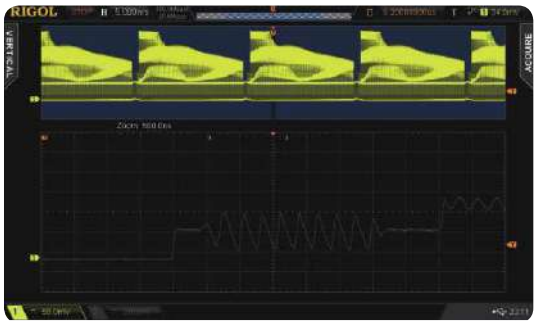
➤ Features and Benefits

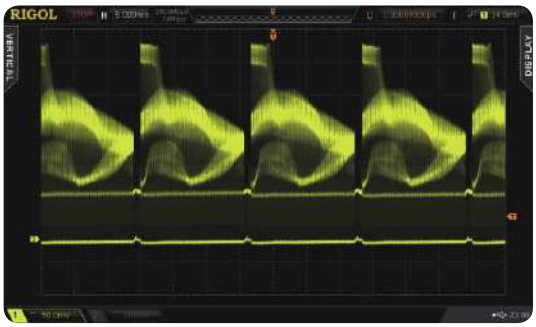
Wide range (500 μV/div~10 V/div), low noise foor , clearly capture the low-level signals

UltraVision: waveform capture rate up to 50,000 wfms/s

UltraVision: high memory depth up to 28 Mpts on both channels



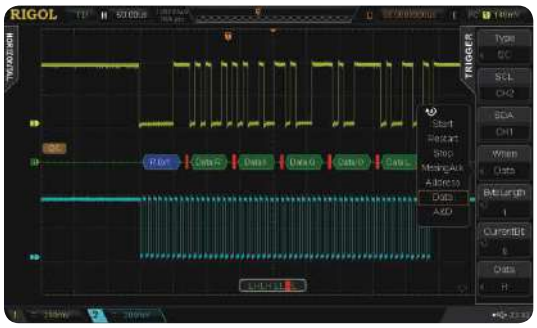
UltraVision: multi-level intensity grading display (256-level)



UltraVision: real-time and ceaseless waveform recording, playback, and analysis functions

Abundant advanced triggering functions (e.g. Runt Trigger , Setup/Hold Trigger , and Nth Edge Trigger)

Serial bus trigger and decoding functions (supporting RS232/UART, I2C, SPI, CAN and LIN)



RIGOL Probes and Accessories Supported by the DS2000E Series

RIGOL Passive Probes

Model	Type	Description
 PVP2150	High-impedance Probe	1X: DC to 35 MHz 10X: DC to 150 MHz Compatibility: All models of **RIGOL**'s digital oscilloscopes
 PVP2350	High-impedance Probe	1X: DC to 35 MHz 10X: DC to 350 MHz Compatibility: All models of **RIGOL**'s digital oscilloscopes
 RP3500A	High-impedance Probe	DC to 500 MHz Compatibility: All models of **RIGOL**'s digital oscilloscopes
 RP1300H	High-voltage Probe	DC to 300 MHz CAT I 2000 V (DC+AC), CAT II 1500 V (DC+AC) Compatibility: All models of **RIGOL**'s digital oscilloscopes
 RP1010H	High-voltage Probe	DC to 40 MHz DC: 0 to 10 kV DC, AC: pulse ≤ 20 kVpp, AC: sine wave ≤7 kVrms Compatibility: All models of **RIGOL**'s digital oscilloscopes
 RP1018H	High-voltage Probe	DC to 150 MHz DC+AC Peak: 18 kV CAT II AC RMS: 12 kV CAT II Compatibility: All models of **RIGOL**'s digital oscilloscopes

RIGOL Active & Current Probes

Model	Type	Description
 RP1001C	Current Probe	BW: DC to 300 kHz Maximum Input DC: ±100 A, AC P-P: 200 A, AC RMS: 70 A Compatibility: All models of **RIGOL**'s digital oscilloscopes
 RP1002C	Current Probe	BW: DC to 1 MHz Maximum Input DC: ±70 A, AC P-P: 140 A, AC RMS: 50 A Compatibility: All models of **RIGOL**L's digital oscilloscopes
 RP1003C	Current Probe	BW: DC to 50 MHz Maximum Input AC P-P: 50 A (non-continuous), AC RMS: 30 A Compatibility: All models of **RIGOL**'s digital oscilloscopes Required to order RP1000P power supply.
 RP1004C	Current Probe	BW: DC to 100 MHz Maximum Input AC P-P: 50 A (non-continuous), AC RMS: 30 A Compatibility: All models of **RIGOL**'s digital oscilloscopes Required to order RP1000P power supply.
 RP1005C	Current Probe	BW: DC to 10 MHz Maximum Input AC P-P: 300 A (non-continuous), 500 A (@pulse width ≤ 30 us), AC RMS: 150 A Compatibility: All models of **RIGOL**'s digital oscilloscopes Required to order RP1000P power supply.
 RP1000P	Power Supply	Power supply for RP1003C, RP1004C and RP1005C, supporting 4 channels.
 RP1025D	High-voltage Differential Probe	BW: 25 MHz Max. voltage ≤ 1400 Vpp Compatibility: All models of **RIGOL**'s digital oscilloscopes
 RP1050D	High-voltage Differential Probe	BW: 50 MHz Max. voltage ≤ 7000 Vpp Compatibility: All models of **RIGOL**'s digital oscilloscopes
 RP1100D	High-voltage Differential Probe	BW: 100 MHz Max. voltage ≤ 7000 Vpp Compatibility: All models of **RIGOL**'s digital oscilloscopes

Specifcations

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

Sample

Sample Mode	Real-time Sampling
Real-time Sample Rate	1 GSa/s on both channels
Peak Detection	500 ps
Averaging	After all the channels have reached N times of sampling at the same time, N can be 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, or 8192.
High Resolution	12-bit resolution when ≥5 μs/div @ 1 GSa/s
Memory Depth	Auto, 7 kpts, 70 kpts, 700 kpts, 7 Mpts, and 28 Mpts

Input

Number of Channels	2 analog channels
Input Coupling	DC, AC or GND
Input Impedance	(1 MΩ±1%)||(16 pF±3 pF) or 50 Ω±1.5%
Probe Attenuation Coeffcient	0.01X-1000X, at 1-2-5 step
Maximum Input Voltage (1 MΩ)	CAT I 300 Vrms, CAT II 100 Vrms, Transient Overvoltage 1000 Vpk

Horizontal

Timebase Scale	DS2102E: 5.000 ns/div to 1.000 ks/div DS2202E: 2.000 ns/div to 1.000 ks/div
Channel to Channel Skew	1 ns (typical), 2 ns (maximum)
Max. Record Length	28 Mpts on both channels
Timebase Accuracy[1]	≤±25 ppm
Clock Drift	≤±5 ppm/year
Max. Delay Range	Negative Delay: ≥1 screen width Positive Delay: 1 s to 100 ks
Timebase Mode	Y-T, X-Y, Roll
Number of X-Ys	1 path
Waveform Capture Rate[2]	50,000 wfms/s (dots display)

Vertical

Bandwidth (-3 dB) (50 Ω)	DS2102E: DC to 100 MHz DS2202E: DC to 200 MHz
Single-shot Bandwidth (50 Ω)	DS2102E: DC to 100 MHz DS2202E: DC to 200 MHz
Vertical Resolution	8 bit
Vertical Scale[3]	When the input impedance is 50 Ω: 500 μV/div to 1 V/div When the input impedance is 1 MΩ: 500 μV/div to 10 V/div
Offset Range	When the input impedance is 50 Ω: 500 μV/div to 50 mV/div: ±2 V 51 mV/div to 200 mV/div: ±10 V 205 mV/div to 1 V/div: ±12 V When the input impedance is 1 MΩ: 500 μV /div to 50 mV/div: ±2 V 51 mV/div to 200 mV/div: ±10 V 205 mV/div to 2 V/div: ±50 V 2.05 V/div to 10 V/div: ±100 V
Bandwidth Limit[1]	DS2102E: 20 MHz DS2202E: 20 MHz/100 MHz
Low Frequency Response (AC Coupling, -3 dB)	≤5 Hz (on BNC)
Calculated Rise Time[1]	DS2102E: 3.5 ns DS2202E: 1.8 ns
DC Gain Accuracy[3]	±2% of full scale
DC Offset Accuracy	±0.1 div±2 mV±1% of offset value
Channel to Channel Isolation	DC to maximum bandwidth: >40 dB

Trigger

Trigger Level Range	Internal	± 5 div from the center of the screen
	EXT	±4 V
Trigger Mode	Auto, Normal, Single	
Holdoff Range	100 ns to 10 s	
High Frequency Rejection[1]	75 kHz	
Low Frequency Rejection[1]	75 kHz	
Trigger Sensitivity	1 div (below 10 mV or noise rejection enabled) 0.3 div (above 10 mV and noise rejection disabled)	
Edge Trigger		
Edge Type	Rising, Falling, Rising/Falling	
Pulse Trigger		
Pulse Condition	Positive Pulse Width (greater than, smaller than, within a specifc range) Negative Pulse Width (greater than, smaller than, within a specifc range)	
Pulse Width	2 ns to 4 s	
Runt Trigger		
Pulse Condition	None, >, <, <>	
Pulse Polarity	Positive, Negative	
Pulse Width Range	2 ns to 4 s	
Windows Trigger (Optional)		
Windows Type	Rising, Falling, Rising/Falling	
Trigger Position	Enter, Exit, Time	
Windows Time	16 ns to 4 s	
Nth Edge Trigger (Optional)		
Edge Type	Rising, Falling	

Idle Time	16 ns to 4 s
Number of Edges	1 to 65535
Slope Trigger	
Slope Condition	Positive Slope (greater than, smaller than, within a specifc range) Negative Slope (greater than, smaller than, within a specifc range)
Time Setting	10 ns to 1 s
Video Trigger	
Polarity	Positive, Negative
Synchrony	All Lines, Line Num, Odd Field, Even Field
Standard	standard: NTSC, PAL/SECAM, 480P, 576P optional: 720P, 1080P, 1080I
Pattern Trigger	
Pattern Setting	H, L, X, Rising Edge, Falling Edge
Delay Trigger (Optional)	
Edge Type	Rising, Falling
Delay Type	>, <, <>, ><
Delay Time	2 ns to 4 s
TimeOut Trigger (Optional)	
Edge Type	Rising, Falling, Rising/Falling
Timeout Time	16 ns to 4 s
Duration Trigger (Optional)	
Pattern Setting	H, L, X
Trigger Criteria	>, <, <>
Duration Time	2 ns to 4 s
Setup/Hold Trigger	
Edge Type	Rising, Falling
Data Type	H, L
Setup Time	2 ns to 1 s
Hold Time	2 ns to 1 s
RS232 Trigger	
Polarity	Normal, Invert
Trigger Condition	Start, Error, Check Error, Data
Baud	2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps, 230400 bps, 460800 bps, 921600 bps, 1 Mbps, and 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 bits, 8 bits, 10 bits
Address Range	0 to 127, 0 to 255, 0 to 1023
Byte Length	1 to 5
SPI Trigger	
Trigger Condition	Timeout
Timeout Value	100 ns to 1 s
Data Bits	4 bits to 32 bits
Data Setting	H, L, X
CAN Trigger (Optional)	
Signal Type	Rx, Tx, CAN_H, CAN_L, Differential
Trigger Condition	SOF, EOF, Frame Type, Frame Error
Baud	10 kbps, 20 kbps, 33.3 kbps, 50 kbps, 62.5 kbps, 83.3 kbps, 100 kbps, 125 kbps, 250 kbps, 500 kbps, 800 kbps, 1 Mbps, User
Sample Point	5% to 95%

Frame Type	Data, Remote, Error, Over Load
Error Type	Bit Fill, Answer Error, Check Error, Format Error, Random Error
USB Trigger (Optional)	
Baud	Low Speed, Full Speed
Trigger Condition	SOP, EOP, RC, Suspend, Exit Suspend
LIN Trigger (Optional)	
Version	1.X, 2.X, Both
Trigger Condition	Sync, Identifer, Data, ID&Data, Wakeup, Sleep, Error
ID Range	0 to 63
Data Comparison	=, ≠, <, >, ≤, ≥
Data Length	1 to 8
Data Level	H, L
Baud Rate	19200 bps, 10417 bps, 9600 bps, 4800 bps, 2400 bps, 1200 bps, User
Error Type	Sync, Even-Odd, Checksum

Measure

Marker	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	Allows to display cursors during auto measurement
Auto Measurement	Maximum, Minimum, Peak-Peak Value, Top Value, Bottom Value, Amplitude, Average, Vrms-N, Vrms-1, Overshoot, Pre-shoot, Area, Period Area, Frequency, Period, Rise Time, Fall Time, Positive Pulse Width, Negative Pulse Width, Positive Duty Cycle, Negative Duty Cycle, Delay A₣ÆB₣, Delay A₹ÆB₹, Delay A₣ÆB₹, Delay A₹ÆB₣, Phase A₣ÆB₣, Phase A₹ÆB₹, Phase A₣ÆB₹, Phase A₹ÆB₣	
Number of Measurements	Displays 5 measurements at the same time	
Measurement Range	Screen region or cursor region	
Measurement Statistics	Current, Average, Max, Min, Standard Deviation, Number of Measurements	
Frequency Counter	Hardware 6-bit frequency counter (channels are selectable)	

Math Operation

Waveform Operation	A+B, A-B, A×B, A÷B, FFT, Digital Filter, Editable Advanced Operation, Logic Operation
FFT Window Function	Rectangle, Hanning, Blackman, Hamming
FFT Display	Split, Full screen
FFT Vertical Scale	Vrms, dB
Logic Operation	AND, OR, NOT, XOR
Math Function	Intg, Diff, Lg, Exp, Sqrt, Sine, Cosine, Tangent
Number of Buses for Decoding	2
Decoding Type	Parallel (standard), RS232/UART (optional), I2C (optional), SPI (optional), CAN (optional), LIN (optional)

Display

Display Type	8.0-inch (203 mm) TFT LCD
Display Resolution	800 Horizontal ×RGB×480 Vertical Pixel
Display Color	160,000 Color (TFT)
Persistence Time	Min, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 20 s, Infnite
Display Type	Dots, Vectors
Real-time Clock	Time and Date (adjustable for users)

I/O

Standard Ports	USB Host (USB-GPIB supported), USB Device, LAN, Aux Output (TrigOut/PassFail)

General Specifcations

Probe Compensation Output		
Output Voltage[1]	About 3 V, peak-peak	
Frequency[1]	1 kHz	
Power		
Power Voltage	100 V to 240 V, 45 Hz to 440 Hz	
Power	Maximum 50 W	
Fuse	2 A, T degree, 250 V	
Environment		
Temperature Range	Operating: 0□ to +50□	
	Non-operating: -40□ to +70□	
Cooling Method	Fan cooled	
Humidity Range	0□ to +30□ : ≤95%RH	
	+30□ to +40□ : ≤75%RH	
	+40□ to +50□ : ≤45%RH	
Altitude	Operating: below 3,000 m	
	Non-operating: below 15,000 m	
Physical Characteristics		
Dimensions[4]	Width×Height×Depth = 361.6 mm×179.6 mm×130.8 mm	
Weight[5]	Package Excluded	3.9 kg±0.2 kg
	Package Included	4.5 kg±0.5 kg
Calibration Interval		
The recommended calibration interval is 18 months.		
Electromagnetic Compatibility and Safety		
EMC	complies with EMC Directive 2014/30/EU, complies with or above the standard specifed in IEC61326-1:2013/EN61326-1:2013 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
	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 to 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	complies with IEC 61010-1:2010 (Third Edition)/EN 61010-1:2010, UL 61010-1:2012 R4.16 and CAN/CSA-C22.2 No. 61010-1-12+ GI1+ GI2	

Note[1]: Typical.
Note[2]: Maximum value. 10 ns, dots display, auto memory depth.
Note[3]: 500 μV/div is a magnifcation of 1 mV/div. When calculating the DC Gain Accuracy, the full scale should be considered as 8 mV (calculated based on 1 mV/div).
Note[4]: Supporting legs and handle folded, knob height included.
Note[5]: Standard confguration.

Order Information

	Description	Order No.
Model	DS2102E (100 MHz, 2 analog channels)	DS2102E
	DS2202E (200 MHz, 2 analog channels)	DS2202E
Standard Accessories	Power Cord conforming to the standard of the destination country	-
	USB Cable	CB-USBA-USBB-FF-150
	2 Passive Probes (BW: 350 MHz)	PVP2350
	Quick Guide (hard copy)	-
Optional Accessories	Rack Mount Kit	RM-DS2000A
	Passive Probe (500 MHz)	RP3500A
	USB-GPIB Interface Converter	USB-GPIB
	A Portable Bag	BAG-G1
High Memory Depth Option	28 Mpts/CH memory (offering the offcial option for free)	-
Advanced Trigger Option	Windows Trigger, Nth Edge Trigger, Delay Trigger, TimeOut Trigger, Duration Trigger, USB Trigger	AT-DS2000A
Decoding Options	RS232/UART, I2C, SPI Decoding Kit	SD-DS2000A
	CAN/LIN Protocol Analysis Kit (Trigger + Decoding)	CAN-DS2000A
Bundle Option	Include all the advanced trigger options and decoding options	BND-DS2000A

Note: For all the accessories and options, please contact the local offce of **RIGOL**.

Warranty Period

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

Subject to Change

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