

DS2000A Series Digital Oscilloscope

UltraVision

- Wider vertical range(500uV/div ~ 10V/div), lower noise floor, Better for small signal capturing
- Bandwidth 70MHz,100MHz,200MHz,300MHz,standard 50Ω input
- Max. Sample Rate 2G Sa/s
- Standard Memory Depth up to14Mpts,Optional Memory Depth up to 56Mpts
- Innovative "UltraVision" technology
- Waveform capture rate up to 50,000 wfs/s
- Up to 256 Levels intensity grading waveform display
- Up to 65,000 frames Hardware based Real Time waveform, Record, Replay & Analysis functions(Std.)
- A variety of trigger and serial bus decoding functions(RS232,I2C,SPI,CAN)
- Built-in 2 Ch Waveform generator (DS2000A-S)
- Complete connectivities: USB Host& Device, LAN(LXI), AUX
- Compact size, light weight, easy to use
- 8 inch TFT (800x480) WVGA

DS2000A 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.



DS2000A Series Digital Oscilloscope



Product Dimensions: Width X Height X Depth=361.6 mm×179.6 mm×130.8 mm Weight: 3.9 kg ± 0.2 kg(Without Package)

► Innovative UltraVision technology



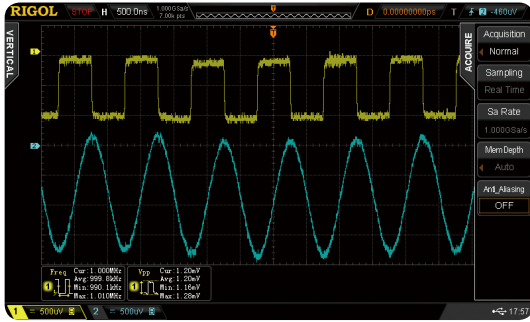
- Deeper Memory Depth (Std.14Mpts,Opt.56Mpts)
- Higher Waveform Capture Rate (Up to 50,000 wfms/s)
- Realtime Waveform Record,Replay & Analysis (Up to 65,000 frames)
- Multi-level Intensity Grading Display (Up to 256 Levels)

► Models and Key Specifications

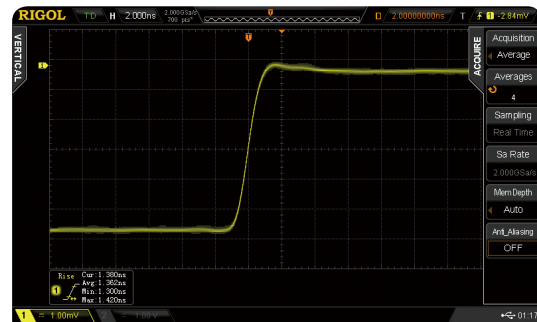
| Model Number | DS2072A | DS2072A-S | DS2102A | DS2102A-S | DS2202A | DS2202A-S | DS2302A | DS2302A-S |
|---|--|-----------|---------|-----------|---------|-----------|---------|-----------|
| Analog BW | 70 MHz | | 100MHz | | 200 MHz | | 300 MHz | |
| Channels | 2 | | | | | | | |
| Max. Sample rate | 2GSa/s (Single-channel)、 1GSa/s(Dual-channel) | | | | | | | |
| Max. Memory Depth | 14Mpts (std.) 、 56Mpts (option) | | | | | | | |
| Max. Waveform Capture rate | 50,000 wfms/s | | | | | | | |
| Real Time waveform Record, Replay and Analysis function | Up to 65, 000 Frames | | | | | | | |
| Std. Probes | RP3300A 350MHz BW Passive Probe:2 sets | | | | | | | |
| Built-in 2Ch 25MHz Source | No | Yes | No | Yes | No | Yes | No | Yes |

► Features and Benefits

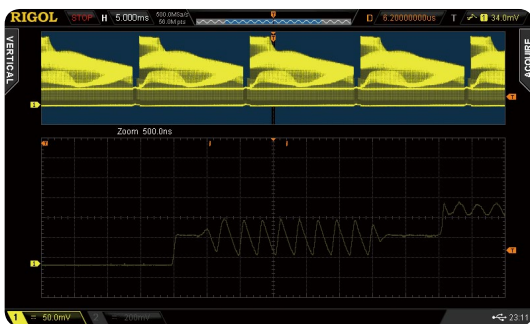
Wider Vertical range(500uV/div~10V/div),Lower noise floor, Better for small signal capturing



Full bandwidth,Lower Overshoot, Perfect frequency response design



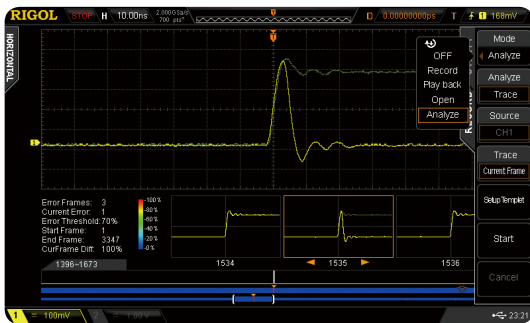
UltraVision: Deeper memory(Std.14Mpts,Opt.56Mpts)



UltraVision: Up to 50,000 wfms/s Waveform capture rate



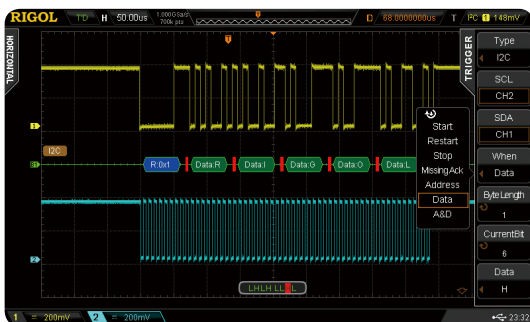
UltraVision:Realtime waveform record,replay,analysis function (std.)



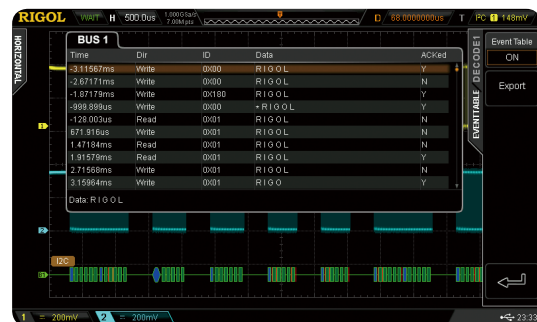
UltraVision: Deeper Memory with Multi-Level intensity grading display(Up to 256 levels)



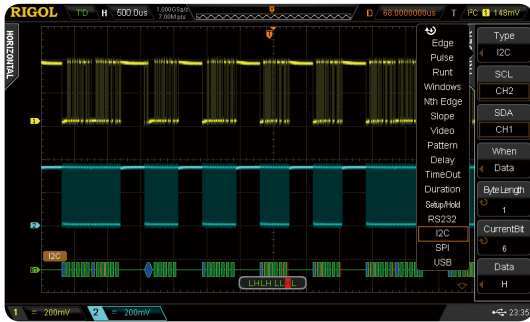
Std. serial bus trigger functions(RS232,I2C,SPI)



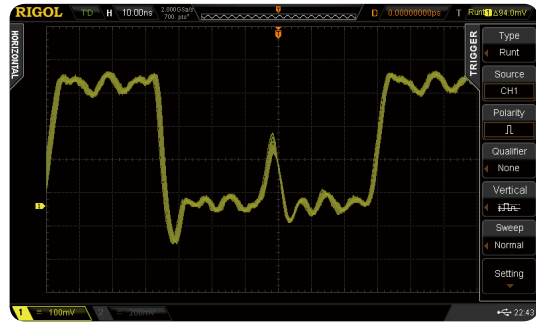
Optional Serial bus decoding function with listing display



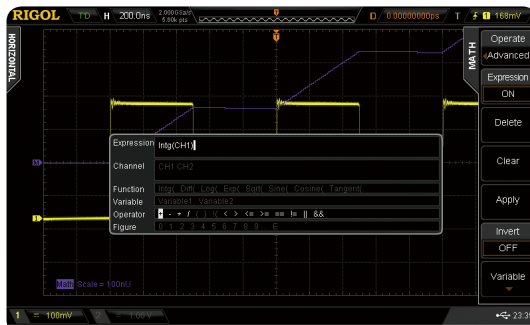
Versatile Trigger Functions(Runt, Nth Edge,Setup/Hold ...)



Runt Trigger



Std. Advanced Math Function



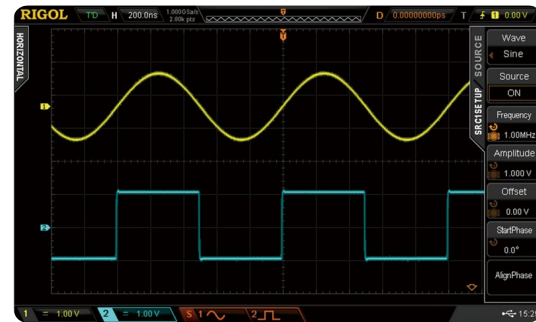
Std. Mask Test Function



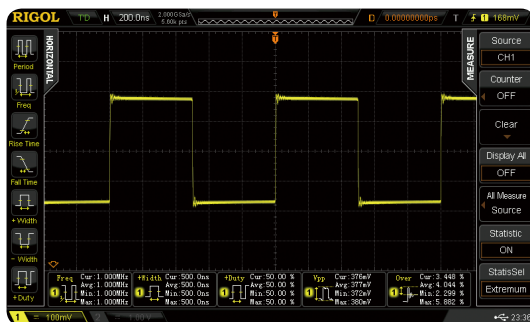
Built-in 2CH Source(DS2000A-S)



Arb function of the Built-in 2CH Source (DS2000A-S)



Automatic measurements with statistics








Complete Connectivity(USB Host,USB Device,LAN,AUX)







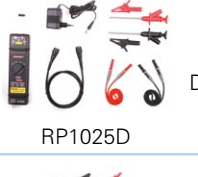




RIGOL Probes supported by DS2000A Series:

► RIGOL Passive Probes

| Model Number | Type | Description |
|--|--------------------|--|
|  RP2200 | High Z Probe | 1X: DC~7MHz 10X:DC~150MHz Compatibility: All RIGOL Scopes. |
|  RP3300A | High Z Probe | 1X: DC~8MHz 10X:DC~350MHz Compatibility: All RIGOL Scopes. |
|  RP3500A | High Z Probe | DC~500MHz Compatibility: All RIGOL Scopes. |
|  RP1300H | High Voltage Probe | DC~300MHz CATI 2000V(DC+AC), CATII 1500 V(DC+AC) Compatibility: All RIGOL Scopes. |
|  RP1050H | High Voltage Probe | DC~50MHz DC:0~15KV DC,AC:pulse <=30KVp-p, AC:sine wave <=10KVrms Compatibility: All RIGOL Scopes. |

► RIGOL Active & Current Probes

| Model Number | Type | Description |
|---|---------------------------------|--|
|  RP1001C | Current Probe | BW:DC~300kHz, Max.DC: ± 100A, AC P-P:200A,AC RMS:70A Compatibility: All RIGOL Scopes. |
|  RP1002C | Current Probe | BW:DC~1MHz, Max.DC: ± 70A, AC P-P:140A,AC RMS:50A Compatibility: All RIGOL Scopes. |
|  RP1003C | Current Probe | BW:DC~50MHz, Max.AC RMS:30A AC Peak:50A(Noncontinuous) Compatibility: All RIGOL Scopes. Must order RP1000P Power supply. |
|  RP1004C | Current Probe | BW:DC~100MHz, Max. AC RMS:30A, AC Peak:50A(Noncontinuous) Compatibility: All RIGOL Scopes. Must order RP1000P Power supply. |
|  RP1005C | Current Probe | BW:DC~10MHz, Max. 150 A rms, 300 A peak (Noncontinuous), 500 A peak (@pulse width <=30 ms) Compatibility: All RIGOL Scopes. Must order RP1000P Power supply. |
|  RP1000P | Power Supply | Power supply for RP1003C,RP1004C,RP1005C, support 4 channels. |
|  RP1025D | High Voltage Differential Probe | BW:25MHz; Max. Voltage ≤ 1400Vpp Compatibility: All RIGOL Scopes. |
|  RP1050D | High Voltage Differential Probe | BW:50MHz; Max. Voltage ≤ 7000Vpp Compatibility: All RIGOL Scopes. |
|  RP1100D | High Voltage Differential Probe | BW:100MHz; Max. Voltage ≤ 7000Vpp Compatibility: All RIGOL scopes |

► Specifications

All the specifications are guaranteed except 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 Sample Rate | 2 GSa/s (single-channel) 1 GSa/s (dual-channel) |
| Peak Detect | 500 ps (single-channel) 1 ns (dual-channel) |
| Averaging | After both 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 $\geq 5 \mu\text{s}/\text{div}$ @ 1 GSa/s (or $\geq 10 \mu\text{s}/\text{div}$ @ 500 MSa/s). |
| Memory Depth | single-channel: Auto, 14k pts, 140k pts, 1.4M pts, 14M pts and 56M pts (option) are available dual-channel: Auto, 7k pts, 70k pts, 700k pts, 7M pts and 28M pts (option) are available |

Input

| | |
|--------------------------------------|--|
| Number of Channels | Two channels |
| Input Coupling | DC, AC or GND |
| Input Impedance | ($1\text{M}\Omega \pm 1\%$) ($16 \text{ pF} \pm 3 \text{ pF}$) or $50 \Omega \pm 1.5\%$ |
| Probe Attenuation Coefficient | 0.01X to 1000X, in 1-2-5 step |
| Maximum Input Voltage (1M Ω) | Maximum Input Voltage of the Analog Channel CAT I 300 Vrms, CAT II 100 Vrms, Transient Overvoltage 1000 Vpk with RP2200 10:1 probe: CAT II 300 Vrms with RP3300A 10:1 probe: CAT II 300 Vrms with RP3500A 10:1 probe: CAT II 300 Vrms |

Horizontal

| | |
|------------------------------------|--|
| Timebase Scale | DS2302A: 1 ns/div to 1000 s/div DS2202A: 2.000 ns/div to 1000 s/div DS2102A/DS2072A : 5.000 ns/div to 1000 s/div |
| Timebase Accuracy ¹ | $\leq \pm 25 \text{ ppm}$ |
| Clock Drift | $\leq \pm 5 \text{ ppm/year}$ |
| Max Delay Range | Pre-trigger (negative delay): ≥ 1 screen width Post-trigger (positive delay): 1 s to 100,000 s |
| Timebase Mode | Y-T, X-Y, Roll, Delayed Sweep |
| Number of XYs | 1 |
| Waveform Capture Rate ² | 50,000 wfms/s (dots display) |

Vertical

| | |
|---|---|
| Bandwidth (-3dB) | DS2302A: DC to 300 MHz DS2202A: DC to 200 MHz DS2102A: DC to 100 MHz DS2072A: DC to 70 MHz |
| Single-shot Bandwidth | DS2302A: DC to 300 MHz DS2202A: DC to 200 MHz DS2102A: DC to 100 MHz DS2072A: DC to 70 MHz |
| Vertical Resolution | 8bit |
| Vertical Scale | 500 $\mu\text{V}/\text{div}$ to 1 V/div (50 Ω) 500 $\mu\text{V}/\text{div}$ to 10 V/div (1M Ω) |
| Offset Range | 500 $\mu\text{V}/\text{div}$ to 50 mV/div: $\pm 2 \text{ V}$ 51 mV/div to 200 mV/div: $\pm 10 \text{ V}$ 205 mV/div to 2 V/div: $\pm 50 \text{ V}$ 2.05 V/div to 10 V/div: $\pm 100 \text{ V}$ |
| Bandwidth Limit ¹ | DS2302A/DS2202A : 20 MHz/100 MHz DS2102A/DS2072A : 20 MHz |
| Low Frequency Response (AC Coupling, -3dB) | $\leq 5 \text{ Hz}$ (on BNC) |
| Calculated Rise Time ¹ | DS2302A: 1.2ns DS2202A: 1.8 ns DS2102A: 3.5 ns DS2072A: 5 ns |
| DC Gain Accuracy | $\pm 2\%$ full scale |

| | |
|------------------------------|---|
| DC Offset Accuracy | $\pm 0.1 \text{ div} \pm 2 \text{ mV} \pm 1\% \text{ offset value}$ |
| Channel to Channel Isolation | DC to maximum bandwidth: >40 dB |

Trigger

| | | |
|---------------------------------------|--|--|
| Trigger Level Range | Internal EXT | $\pm 5 \text{ div}$ from center of the screen $\pm 4 \text{ V}$ |
| 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 is enabled) 0.3 div (above 10 mV and noise rejection is disabled) | |
| Edge Trigger | | |
| Edge Type | Rising, Falling, Rising&Falling | |
| Pulse Trigger | | |
| Pulse Condition | Positive Pulse Width (greater than, lower than, within specific interval) Negative Pulse Width (greater than, lower than, within specific interval) | |
| Pulse Width Range | 2 ns to 4 s | |
| Runt Trigger | | |
| Pulse Width Condition | None, >, <, <> | |
| Pulse Polarity | Positive, Negative | |
| Pulse Width Range | 2 ns to 4 s | |
| Windows Trigger (Option) | | |
| Windows Type | Rising, Falling, Rising&Falling | |
| Trigger Position | Enter, Exit, Time | |
| Windows Time | 16 ns to 4 s | |
| Nth Edge Trigger (Option) | | |
| Edge Type | Rising, Falling | |
| Idle Time | 16 ns to 10 s | |
| Edge Number | 1 to 65535 | |
| Slope Trigger | | |
| Slope Condition | Positive Slope (greater than, lower than, within specific interval) Negative Slope (greater than, lower than, within specific interval) | |
| Time Setting | 2 ns to 4 s | |
| Video Trigger (HDTV Option) | | |
| 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, Falling | |
| Delay Trigger (Option) | | |
| Edge Type | Rising, Falling | |
| Delay Type | >, <, <>, >< | |
| Delay Time | 2 ns to 4 s | |
| TimeOut Trigger (Option) | | |
| Edge Type | Rising, Falling, Rising&Falling | |
| Timeout time | 16 ns to 4 s | |
| Duration Trigger (Option) | | |
| Pattern | H, L, X | |
| Trigger Condition | >, <, <> | |
| 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/UART Trigger | | |
| Polarity | Normal, Invert | |
| Trigger Condition | Start, Error, Check Error, Data | |
| Baud Rate | 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps, 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, 8 bit, 10 bit | |
| 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 bit to 32 bit |
| Data Line Setting | H, L, X |
| CAN Trigger | |
| 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, OverLoad |
| Error Type | Bit Fill, Answer Error, Check Error, Format Error, Random Error |
| USB Trigger (Option) | |
| Signal Speed | Low Speed, Full Speed |
| Trigger condition | SOP, EOP, RC, Suspend, Exit Suspend |

Measure

| | | |
|------------------------|--|---|
| Cursor | Manual Mode | Voltage Deviation between Cursors (ΔV) Time Deviation between Cursors (ΔT) Reciprocal of ΔT (Hz) ($1/\Delta T$) |
| | 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, Area, Period Area, Frequency, Period, Rise Time, Fall Time, Positive Pulse Width, Negative Pulse Width, Positive Duty Cycle, Negative Duty Cycle, Delay A→B \overline{f} , Delay A→B \overline{t} , Phase A→B \overline{f} , Phase A→B \overline{t} |
| Number of Measurements | Display 5 measurements at the same time. | |
| Measurement Range | Screen or cursor. | |
| Measurement Statistic | Average, Max, Min, Standard Deviation, Number of Measurements | |
| Frequency Counter | Hardware 6 bits frequency counter (channels are selectable) | |

Math Operation

| | |
|------------------------------|---|
| Waveform Operation | A+B, A-B, A×B, A/B, FFT, 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, Log, Exp, Sqrt, Sine, Cosine, Tangent |
| Number of Buses for Decoding | 2 |
| Decoding Type | Parallel (standard), RS232/UART (option), I2C (option), SPI (option) |

Display

| | |
|--------------------|---|
| Display Type | 8.0 inches (203 mm) TFT LCD display |
| Display Resolution | 800 Horizontal ×RGB×480 Vertical Pixel |
| Display Color | 160,000 Color (TFT) |
| 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) |

Signal Source (DS2000A-S)

| | | |
|---------------------|--|-----------------------------|
| | 2 | |
| Sample Rate | 200 MSa/s | |
| Vertical Resolution | 14 bits | |
| Max. Frequency | 25 MHz | |
| Standard Waveform | Sine, Square, Pulse, Ramp, Noise, DC | |
| Arbitrary Waveform | Sinc, ExpRise, ExpFall, ECG, Gauss, Lorentz, Haversine | |
| Sine | Frequency Range | 0.1 Hz to 25 MHz |
| | Flatness | ±0.5 dB (relative to 1 kHz) |
| | Harmonic Distortion | -40 dBc |
| | Spurious (non-harmonic) | -40 dBc |
| | THD | 1% |
| | SNR | 40 dB |

| | | |
|--------------------|----------------------------|---|
| Square/Pulse | Frequency Range | 0.1 Hz to 15 MHz |
| | Rise Time/Fall Time | <15 ns |
| | Overshoot | <5% |
| | Duty Cycle | 10% to 90% |
| | Duty Cycle Resolution | 1% or 10 ns (the larger one) |
| | Minimum Pulse Width | 20ns |
| | Pulse Width Resolution | 10 ns or 5 bits (the larger one) |
| Ramp | Jitter | 500 ps |
| | Frequency Range | 0.1 Hz to 100 kHz |
| | Linearity | 1% |
| Noise | Symmetry | 0 to 100% |
| Built-in Waveform | Bandwidth | 25 MHz (typical) |
| Arbitrary Waveform | Frequency Range | 0.1 Hz to 1 MHz |
| | Frequency Range | 0.1 Hz to 10 MHz |
| | Length | 2 to 16 kpts |
| Frequency | Internal Storage Locations | 10 |
| | Accuracy | 100 ppm (<10 kHz) 50 ppm (>10 kHz) |
| | Resolution | 0.1 Hz or 4 bits (the larger one) |
| Amplitude | Output Range | 20 mVpp to 5 Vpp, HighZ 10 mVpp to 2.5 Vpp, 50 Ω |
| | Resolution | 100 μV or 3 bits (the larger one) |
| | Accuracy | 2% (1 kHz) |
| DC Offset | Range | ±2.5 V, HighZ ±1.25 V, 50 Ω |
| | Resolution | 100 μV or 3 bits (the larger one) |
| | Accuracy | ±2% of Offset setting |

Interface

| | |
|-----------------------|---|
| Standard Ports | USB HOST (support USB-GPIB), USB DEVICE, LAN, Aux Output (TrigOut/PassFail) |
| Printer Compatibility | PictBridge |

General Specifications

| | |
|----------------------------------|---|
| Probe Compensation Output | |
| Output Voltage ¹ | About 3 V, peak-peak |
| Frequency ¹ | 1 kHz |
| Power | |
| Power Voltage | 100 to 240 V, 45 to 440 Hz |
| Power | Maximum 50 W |
| Fuse | 2 A, T Degree, 250 V |
| Environment | |
| Temperature Range | Operating: 0°C to +50°C Non-operating: -20°C to +70°C |
| Cooling Method | fan cooling |
| Humidity Range | 0°C to +30°C : ≤95% Relative Humidity +30°C to +40°C : ≤75% Relative Humidity +40°C to +50°C : ≤45% Relative Humidity |
| Altitude | Operating: under 3,000 meters Non-operating: under 15,000 meters |

Mechanical Specifications

| | | |
|---------------------|--|-----------------|
| Size ³ | Width×Height×Depth = 361.6 mm× 179.6 mm×130.8 mm | |
| Weight ⁴ | Package Excluded | 3.9 kg ± 0.2 kg |
| | Package Included | 4.5 kg ± 0.5 kg |

Calibration Interval

The recommended calibration interval is one year.

Regulatory Information

| | |
|-------------------------------|---|
| 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 |

Note: 1 Typical.

2 Maximum value with 20 ns, single-channel, dots display and auto memory depth.

3 Supporting legs and handle folded, knob height included.

4 Standard configuration.

► Ordering Information

| Model | Description | Order Number |
|----------------------------|---|---------------------|
| | 70MHz,2-channel | DS2072A |
| | 70MHz,2-channel + 2-channel Signal Source | DS2072A-S |
| | 100MHz,2-channel | DS2102A |
| | 100MHz,2-channel + 2-channel Signal Source | DS2102A-S |
| | 200MHz,2-channel | DS2202A |
| | 200MHz,2-channel + 2-channel Signal Source | DS2202A-S |
| | 300MHz,2-channel | DS2302A |
| | 300MHz,2-channel + 2-channel Signal Source | DS2302A-S |
| Standard Accessories | Power Cord conforming to the standard of the country | - |
| | USB Data Cable | CB-USBA-USBB-FF-150 |
| | 2 Passive Probes (350 MHz) | RP3300A |
| | Quick Guide | - |
| | Resource CD (User's Guide and Application Software) | - |
| Optional Accessories | Rack Mount Kit | RM-DS2000A |
| Deep Memory Option | 56Mpts(single channel)/28Mpts(dual channel) | MEM-DS2000A |
| Advanced trigger functions | Windows, Nth Edge,HDTV,Delay, Time Out, Duration, USB | AT-DS2000A |
| Decoding Options | RS232,I2C,SPI Decoding Kit | SD-DS2000A |
| | CAN Analysis kit(Trigger+Decoding) | CAN-DS2000A |

Warranty

Three-year warranty,excluding probes and accessories.



Headquarter

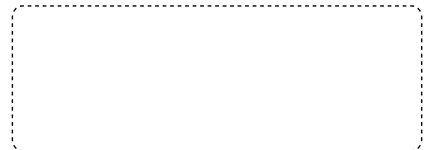
RIGOL TECHNOLOGIES, INC.
No.156,Cai He Village,
Sha He Town,
Chang Ping District, Beijing,
102206 P.R.China
Tel:+86-10-80706688
Fax:+86-10-80705070
Email: info@rigol.com

USA

RIGOL TECHNOLOGIES
USA,INC.
7401 First Place,Suite N
Oakwood Village
OH 44146,USA
Tel/Fax: 440-232-4488
Toll free: 877-4-RIGOL-1
Email: info@rigol.com

Europe

RIGOL TECHNOLOGIES EU,
GmbH
Lindbergh str. 4
82178 Puchheim, Germany
Tel: +49(0)89-8941895-0
Email: info-europe@
rigoltech.com



RIGOL® is the registered trademark of RIGOL Technologies, Inc. Product information in this document subject to update without notice. For the latest information about RIGOL's products, applications and services, please contact local RIGOL office or access RIGOL official website:

www.rigol.com