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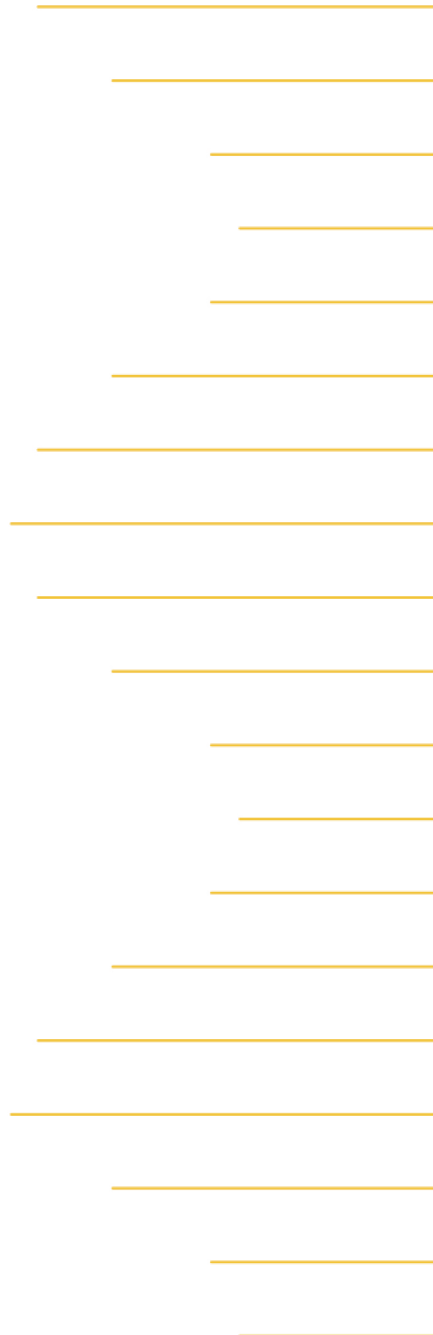
# DHO1000 Series

Digital Oscilloscope

DataSheet

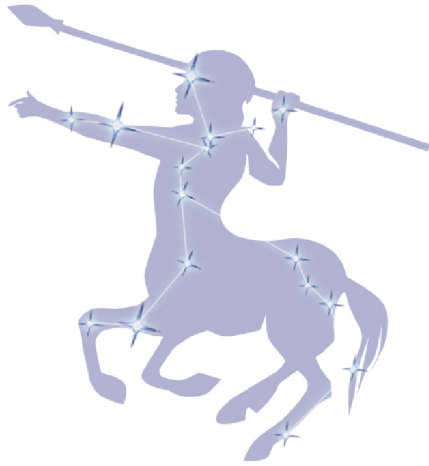
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# DHO1000 Series

## Digital Oscilloscope



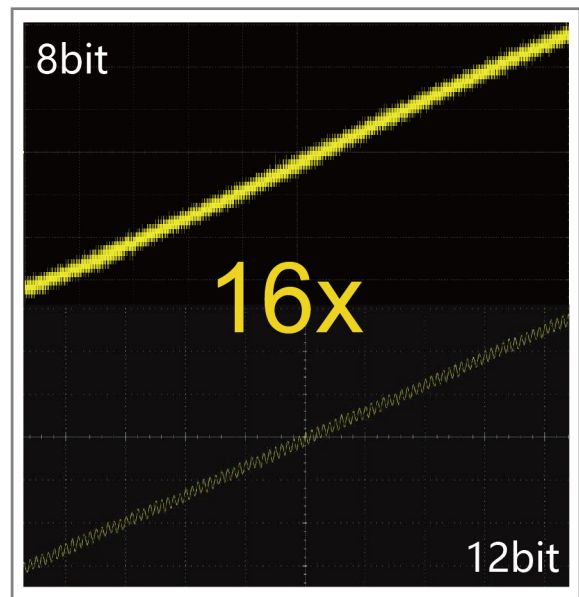
Adopting RIGOL's  
**Brand New**  
**Self-developed**  
Chipset "Centaurus"

### Highlights

- Ultra-low noise floor for cleaner signals, measuring small signals more accurately
- 12-bit resolution ( $2^{12}=4096$ ) to see the most signal detail
- Up to 2 GSa/s real-time sample rate
- A maximum of 100 Mpts memory depth, capturing more detailed signals over longer time spans
- Standard serial decoding: SPI, I2C, RS232/UART, CAN, and LIN
- 10.1-inch large HD touch display (1280 x 800) designed for better touch interactions
- Front-panel Flex Knobs, bringing smoother interaction and easier measurements







**Entry Level**  
 High Resolution  
 Digital Oscilloscope,  
 Best Budget Oscilloscope  
 for Beginners

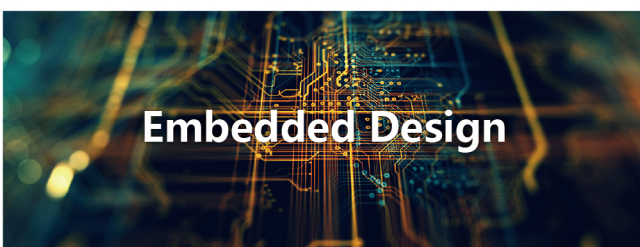
## Applications



An oscilloscope is an important tool for making power supply measurements. With up to 12-bit vertical resolution, the DHO1000 series makes it easy for you to perform ripple measurement and quality test.



**Education**  
 This series redefines what you can expect in an entry-level oscilloscope by providing excellent noise performance and 12-bit high resolution, providing basic functionality for higher education.



**Embedded Design**  
 The 10.1-inch large HD touch display enables better view of signals. Large memory depth and the Autoscale function make it ready for testing of embedded system designs.



**Automotive Electronics**  
 With standard CAN and LIN serial decoding functions, it provides a more affordable solution for automotive electronics testing.

# Product Features

## Product Features

- Brand-new chipset "Centaurus" developed by RIGOL
- Ultra-low noise floor for cleaner signals, measuring small signals accurately
- 12-bit vertical resolution<sup>[1]</sup>
- 70/100/200 MHz analog bandwidth (selectable), 2/4 analog channels, and 1 EXT channel
- Up to 2 GSa/s real-time sample rate
- Max. memory depth: 100 Mpts (optional)
- Vertical sensitivity range: 500  $\mu$ V/div to 10 V/div
- Up to 1,500,000 wfms/s waveform capture rate with the UltraAcquire mode
- 10.1" 1280\*800 HD touch display
- User-friendly Flex Knobs, bringing smoother interaction
- Standard photoelectric encoder operating knobs, effectively prolonging its service life
- Standard USB Device & Host, LAN, and HDMI interfaces






DHO1000 series digital oscilloscope is designed to meet the designing, debugging, and testing requirements of the mainstream oscilloscope market. Adopting the brand-new chipset "Centaurus" developed by RIGOL, this series achieves a fast waveform capture rate of 1,500,000 wfms/s with the UltraAcquire mode, 100 Mpts memory depth, 12-bit vertical resolution, all combined with excellent noise floor performance and vertical accuracy to meet your requirements for more accurate measurements, bringing extraordinary T&M experience for you.








### NOTE:

[1]: 16 bits in High Resolution mode.






# RIGOL Probes and Accessories Supported by the Series




## RIGOL Passive Probes

| Model  | Type                 | Description  |
|--|----------------------|--|
| <b>High-impedance Probe</b>  |                      |  |
|  <p>PVP2150</p>   | High-impedance Probe | <ul style="list-style-type: none"> <li>Attenuation: 10:1/1:1</li> <li>1X BW: DC~35 MHz</li> <li>10X BW: DC~150 MHz</li> <li>Compatibility: All models of RIGOL's digital oscilloscopes</li> </ul>  |
|  <p>PVP2350</p>   | High-impedance Probe | <ul style="list-style-type: none"> <li>Attenuation: 10:1/1:1</li> <li>1X BW: DC~35 MHz</li> <li>10X BW: DC~350 MHz</li> <li>Compatibility: All models of RIGOL's digital oscilloscopes</li> </ul>  |
|  <p>PVP3150</p> | High-impedance Probe | <ul style="list-style-type: none"> <li>Attenuation: 10:1/1:1</li> <li>1X BW: DC~20 MHz</li> <li>10X BW: DC~150 MHz</li> <li>Compatibility: All models of RIGOL's digital oscilloscopes</li> </ul>  |
|  <p>RP3500A</p> | High-impedance Probe | <ul style="list-style-type: none"> <li>Attenuation: 10:1</li> <li>BW: DC~500 MHz</li> <li>Compatibility: MSO/DS4000, DS6000, MSO/DS7000, MSO8000, DHO4000/1000, and DS70000 series</li> </ul>  |
| <b>High Voltage Single-ended Probe</b>   |                      |  |
|  <p>RP1010H</p> | High Voltage Probe   | <ul style="list-style-type: none"> <li>Attenuation: 1000:1</li> <li>BW: DC~40 MHz</li> <li>DC: 0~10 kV DC</li> <li>AC: pulse <math>\leq 20</math> kV<sub>p-p</sub></li> <li>AC: sine <math>\leq 7</math> kV<sub>rms</sub></li> <li>Compatibility: All models of RIGOL's digital oscilloscopes</li> </ul> |

| Model  | Type                            | Description   |
|--|---------------------------------|---|
|  <p>RP1018H</p>   | High Voltage Probe              | <ul style="list-style-type: none"> <li>• Attenuation: 1000:1</li> <li>• BW: DC~150 MHz</li> <li>• DC+AC<sub>Peak</sub>: 18 kV CAT II</li> <li>• AC<sub>rms</sub>: 12 kV CAT II</li> <li>• Compatibility: All models of RIGOL's digital oscilloscopes</li> </ul> |
|  <p>RP1300H</p>   | High Voltage Single-ended Probe | <ul style="list-style-type: none"> <li>• Attenuation: 1000:1</li> <li>• BW: DC~300 MHz</li> <li>• CAT I 2000 V (DC+AC)</li> <li>• CAT II 1500 V (DC+AC)</li> <li>• Compatibility: All models of RIGOL's digital oscilloscopes</li> </ul>                        |
| <b>High Voltage Differential Probe</b>   |                                 |   |
|  <p>PHA0150</p>  | High Voltage Differential Probe | <ul style="list-style-type: none"> <li>• BW: DC~70 MHz</li> <li>• Max. voltage ≤ 1500 Vpp</li> <li>• Compatibility: All models of RIGOL's digital oscilloscopes</li> </ul>  |
|  <p>PHA1150</p> | High Voltage Differential Probe | <ul style="list-style-type: none"> <li>• BW: DC~100 MHz</li> <li>• Max. voltage ≤ 1500 Vpp</li> <li>• Compatibility: All models of RIGOL's digital oscilloscopes</li> </ul>   |
|  <p>PHA2150</p> | High Voltage Differential Probe | <ul style="list-style-type: none"> <li>• 50X BW: DC~160 MHz</li> <li>• 500X BW: DC~200 MHz</li> <li>• Max. voltage ≤ 1500 Vpp</li> <li>• Compatibility: All models of RIGOL's digital oscilloscopes</li> </ul>  |
|  <p>RP1025D</p> | High Voltage Differential Probe | <ul style="list-style-type: none"> <li>• BW: DC~25 MHz</li> <li>• Max. voltage ≤ 1400 Vpp (DC + AC P-P)</li> <li>• Compatibility: All models of RIGOL's digital oscilloscopes</li> </ul>  |
|  <p>RP1050D</p> | High Voltage Differential Probe | <ul style="list-style-type: none"> <li>• BW: DC~50 MHz</li> <li>• Max. voltage ≤ 7000 Vpp (DC + AC P-P)</li> <li>• Compatibility: All models of RIGOL's digital oscilloscopes</li> </ul>  |



| Model  | Type                            | Description   |
|--|---------------------------------|---|
|  <p>RP1100D</p>   | High Voltage Differential Probe | <ul style="list-style-type: none"> <li>BW: DC~100 MHz</li> <li>Max. voltage <math>\leq 7000</math> Vpp (DC + AC P-P)</li> <li>Compatibility: All models of RIGOL's digital oscilloscopes</li> </ul>   |
| <b>Current Probe</b>   |                                 |   |
|  <p>RP1001C</p>   | Current Probe                   | <ul style="list-style-type: none"> <li>BW: DC~300 kHz</li> <li>Maximum Input</li> <li>AC: <math>\pm 100</math> A</li> <li>AC P-P: 200 A</li> <li>AC RMS: 70 A</li> <li>Compatibility: All models of RIGOL's digital oscilloscopes</li> </ul>                              |
|  <p>RP1002C</p>  | Current Probe                   | <ul style="list-style-type: none"> <li>BW: DC~1 MHz</li> <li>Maximum Input</li> <li>AC: <math>\pm 70</math> A</li> <li>AC P-P: 140 A</li> <li>AC RMS: 50 A</li> <li>Compatibility: All models of RIGOL's digital oscilloscopes</li> </ul>                                 |
|  <p>RP1003C</p> | Current Probe                   | <ul style="list-style-type: none"> <li>BW: DC~50 MHz</li> <li>Maximum Input</li> <li>AC P-P: 50 A (non-continuous)</li> <li>AC RMS: 30 A</li> <li>Compatibility: All models of RIGOL's digital oscilloscopes</li> <li>Required to order RP1000P power supply.</li> </ul>  |
|  <p>RP1004C</p> | Current Probe                   | <ul style="list-style-type: none"> <li>BW: DC~100 MHz</li> <li>Maximum Input</li> <li>AC P-P: 50 A (non-continuous)</li> <li>AC RMS: 30 A</li> <li>Compatibility: All models of RIGOL's digital oscilloscopes</li> <li>Required to order RP1000P power supply.</li> </ul> |

| Model   | Type             | Description   |
|---|------------------|---|
| <br>RP1005C  | Current Probe    | <ul style="list-style-type: none"> <li>• BW: DC~10 MHz</li> <li>• Maximum Input<br/>AC P-P: 300 A (non-continuous), 500 A (@pulse width ≤ 30 us)</li> <li>• AC RMS: 150 A</li> <li>• Compatibility: All models of RIGOL's digital oscilloscopes</li> <li>• Required to order RP1000P power supply.</li> </ul> |
| <br>RP1006C  | Current Probe    | <ul style="list-style-type: none"> <li>• BW: DC~2 MHz</li> <li>• Maximum Input<br/>AC P-P: 700 A peaks, non-continuous</li> <li>• AC RMS: 500 A</li> <li>• Compatibility: All models of RIGOL's digital oscilloscopes</li> <li>• Required to order RP1000P power supply.</li> </ul>                           |
| <br>RP1000P | 4CH Power Supply | Four-channel power adapter for RP1003C, RP1004C, RP1005C, and RP1006C Current Probes.   |



# 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 DHO1000 Series Technical Specifications

| Overview of the DHO1000 Series Technical Specifications |   |         |         |         |          |          |
|---|---|---------|---------|---------|----------|----------|
| Model   | DHO1072   | DHO1074 | DHO1102 | DHO1104 | DHO1202  | DHO1204  |
| Analog Bandwidth (-3 dB)                                | 70 MHz  | 70 MHz  | 100 MHz | 100 MHz | 200 MHz  | 200 MHz  |
| Input Channels  | 2+EXT   | 4+EXT   | 2+EXT   | 4+EXT   | 2+EXT    | 4+EXT    |
| Rise Time (10% to 90%, typical)                         | ≤5 ns   | ≤5 ns   | ≤3.5 ns | ≤3.5 ns | ≤1.75 ns | ≤1.75 ns |
| Sampling Mode   | Real-time sampling  |         |         |         |          |          |
| Max. Sample Rate of Analog Channels                     | 2-channel model: 2 GSa/s (single channel <sup>[1]</sup> ), 1 GSa/s (all channels <sup>[3]</sup> )<br>4-channel model: 2 GSa/s (single channel <sup>[1]</sup> ), 1 GSa/s (half channels <sup>[2]</sup> ), 500 MSa/s (all channels <sup>[3]</sup> ) |         |         |         |          |          |
| Standard Memory Depth                                   | 2-channel model: 50 Mpts (single channel <sup>[1]</sup> ), 25 Mpts (all channels <sup>[3]</sup> )<br>4-channel model: 50 Mpts (single channel <sup>[1]</sup> ), 25 Mpts (half channels <sup>[2]</sup> ), 12.5 Mpts (all channels <sup>[3]</sup> ) |         |         |         |          |          |
| Optional Memory Depth                                   | 2-channel model: 100 Mpts (single channel <sup>[1]</sup> ), 50 Mpts (all channels <sup>[3]</sup> )<br>4-channel model: 100 Mpts (single channel <sup>[1]</sup> ), 50 Mpts (half channels <sup>[2]</sup> ), 25 Mpts (all channels <sup>[3]</sup> ) |         |         |         |          |          |
| Max. Waveform Capture Rate                              | 50,000 wfms/s (Vector Mode)<br>1,500,000 wfms/s (UltraAcquire Mode)   |         |         |         |          |          |
| Vertical Resolution                                     | 12 bits   |         |         |         |          |          |
| Hardware Real-time Waveform Recording and Playing       | Up to 500,000 frames  |         |         |         |          |          |
| Peak Detect   | Capture glitches as narrow as 2 ns  |         |         |         |          |          |

## Overview of the DHO1000 Series Technical Specifications

Display Size and Type 10.1-inch capacitive multi-touch display

Display Resolution 1280×800

## Vertical System Analog Channels

### Vertical System Analog Channels

|  |  |
|--|--|
| Input Coupling                           | DC, AC, or GND   |
| Input Impedance                          | 1 MΩ ± 1%  |
| Input Capacitance                        | 19 pF ± 3 pF   |
| Probe Attenuation Ratio                  | 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  |
| Maximum Input Voltage                    | CAT I 300 V <sub>rms</sub> , 400 V <sub>pk</sub> (DC + V <sub>peak</sub> )<br><br>No transient overvoltage allowed whether the probe is used or not.<br><br>Remarks Use this instrument only for measurements within its specified measurement category (not rated for CAT II, III, IV). |
| Vertical Resolution                      | 12 bits  |
| Effective Number of Bits (ENOB, Typical) | > 8  |
| Input Sensitivity Range <sup>[4]</sup>   | 500 μV/div to 10 V/div   |
| Offset Range                             | ± 1 V ( ≤65 mV/div )<br>± 10 V ( >65 mV/div, ≤270 mV/div )<br>± 20 V ( >270 mV/div, ≤2.75 V/div )<br>± 100 V ( >2.75 V/div, ≤10 V/div )  |
| Dynamic Range                            | ±4 div (12 bits)   |
| Bandwidth Limit (Typical)                | 20 MHz, FULL; selectable for each channel  |

## Vertical System Analog Channels

|  |   |
|--|---|
| DC Vertical Gain Accuracy <sup>[4]</sup> | $\pm 2\%$ full scale  |
| DC Vertical Offset Accuracy              | $\leq 200$ mV/div ( $\pm 0.1$ div $\pm 2$ mV $\pm 1.5\%$ of offset setting)<br>$> 200$ mV/div ( $\pm 0.1$ div $\pm 2$ mV $\pm 1.0\%$ of offset setting) |
| Channel-to-channel Isolation             | $\geq 100:1$  |
| ESD Tolerance                            | $\pm 8$ kV (for input BNC)  |

## Horizontal System Analog Channels

### Horizontal System Analog Channels

|   |   |  |
|---|---|--|
| Time Base Range                           | 2 ns/div to 1 ks/div<br>Time base fine adjustment setting available           |  |
| Time Base Resolution                      | 400 ps  |  |
| Time Base Accuracy                        | $\pm 1.5$ ppm $\pm 1$ ppm/year  |  |
| Time-base Delay Time Range                | Pre-trigger   | -5 div   |
|   | Post-trigger  | 1 s or 100 div, whichever is greater   |
| $\Delta$ Time Accuracy                    | $\pm$ (time base accuracy x reading) $\pm$ (0.001 x screen width) $\pm 50$ ps |  |
| Channel-to-channel Deskew                 | Channel-to-channel deskew range: $\pm 100$ ns, accuracy: $\pm 1$ ps           |  |
| Analog Channel-to-Channel Delay (Typical) | $\leq 2$ ns <sup>[5]</sup>  |  |
| Horizontal Mode                           | YT  | Default mode   |
|   | XY  | On channel 1/2/3/4   |
|   | SCAN  | Time base $\geq 200$ ms/div  |
|   | ROLL  | Time base $\geq 50$ ms/div or $\geq 100$ ms/div (selectable), available to enter or exit the ROLL mode by turning the horizontal timebase knob |

## Acquisition System

| Acquisition System                   |  |
|--------------------------------------|--|
| Max. Sample Rate of Analog Channels  | 2-channel model: 2 GSa/s (single channel <sup>[1]</sup> ), 1 GSa/s (all channels <sup>[3]</sup> )<br>4-channel model: 2 GSa/s (single channel <sup>[1]</sup> ), 1 GSa/s (half channels <sup>[2]</sup> ), 500 MSa/s (all channels <sup>[3]</sup> )  |
| Max. Memory Depth of Analog Channels | 2-channel model (standard): 50 Mpts (single channel <sup>[1]</sup> ), 25 Mpts (all channels <sup>[3]</sup> )<br>2-channel model (optional): 100 Mpts (single channel <sup>[1]</sup> ), 50 Mpts (all channels <sup>[3]</sup> )<br>4-channel model (standard): 50 Mpts (single channel <sup>[1]</sup> ), 25 Mpts (half channels <sup>[2]</sup> ), 12.5 Mpts (all channels <sup>[3]</sup> )<br>4-channel model (optional): 100 Mpts (single channel <sup>[1]</sup> ), 50 Mpts (half channels <sup>[2]</sup> ), 25 Mpts (all channels <sup>[3]</sup> ) |
| Acquisition Mode                     | Normal      Default mode   |
|                                      | Peak Detect      Capture glitches as narrow as 2 ns  |
|                                      | Average      Selectable from 2, 4, 8, 16...to 65,536   |
|                                      | High Resolution      14 bits, 16 bits  |
|                                      | UltraAcquire      Up to 1,500,000 wfms/s waveform capture rate   |

## Trigger System

| Trigger System   |  |
|------------------|--|
| Trigger Sources  | Analog channel (1~4), EXT TRIG, AC Line  |
| Trigger Mode     | Auto, Normal, and Single   |
| Trigger Coupling | DC      DC coupled trigger   |
|                  | AC      AC coupled trigger   |
|                  | HF Reject      High frequency reject, cutoff frequency ~75 kHz (internal trigger only) |
|                  | LF Reject      Low frequency reject, cutoff frequency ~75 kHz (internal trigger only)  |

## Trigger System

|                       |  |   |
|-----------------------|--|---|
| Noise Rejection       | Increase delay for the trigger circuit (internal trigger only), on/off |   |
| Trigger Holdoff Range | 8 ns to 10 s   |   |
| Trigger Bandwidth     | Internal   | Analog bandwidth  |
|                       | External   | 200 MHz   |
| Trigger Sensitivity   | Internal   | 0.50 div, $\geq 50$ mV/div<br>0.7 div (with noise rejection enabled)  |
|                       | External   | 200 mVpp, from DC to 100 MHz<br>500 mVpp, from 100 MHz to 200 MHz   |
| EXT TRIG              | Input Impedance  | 1 M $\Omega$ $\pm$ 1%, BNC connector  |
|                       | Trigger Jitter (Typical)   | < 1 ns <sub>rms</sub><br>Normal acquisition, Edge trigger, trigger level located near 50% of EXT input signal |
| Trigger Level Range   | Internal   | $\pm 5$ div from center screen  |
|                       | External   | $\pm 5$ V   |
|                       | AC Line  | fixed 40%-60%   |

## Trigger Type

### Trigger Type

|              |  |
|--------------|--|
| Trigger Type | 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, I2C, SPI, RS232/UART, CAN, LIN |
| Edge         | Triggers on the threshold of the specified edge of the input signal. The edge types can be Rising, Falling, or Either.<br>Source channel: CH1~CH4, EXT, or AC Line   |
| Pulse Width  | Triggers on the positive or negative pulse, whose time duration is less than a value, greater than a value, or inside a time range.<br>Source channel: CH1~CH4   |



## Trigger Type

|            |  |
|------------|--|
| Slope      | <p>Triggers on the positive or negative slope of the specified time, whose time is less than a value, greater than a value, or inside a time range.</p> <p>Source channel: CH1~CH4</p>   |
| Video      | <p>Trigger on all lines, specified line, odd/even fields that conform 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/25Hz, 1080p/24Hz, 1080i/60Hz, and 1080i/50Hz.</p> <p>Source channel: CH1~CH4</p> |
| Pattern    | <p>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, or Falling.</p> <p>Source channel: CH1~CH4</p>  |
| Duration   | <p>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 less than a value, greater than a value, inside a time range, or outside a time range.</p> <p>Source channel: CH1~CH4</p>    |
| Timeout    | <p>Triggers when duration of a certain event exceeds the specified time. The event can be specified as Rising, Falling, or Either.</p> <p>Source channel: CH1~CH4</p>  |
| Runt       | <p>Triggers when the pulses pass through one threshold but fail to pass through another threshold.</p> <p>Source channel: CH1~CH4</p>  |
| Window     | <p>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.</p> <p>Source channel: CH1~CH4</p>   |
| Delay      | <p>Triggers when the time difference between the specified edges of Source A and Source B meets the preset time. The delay time is less than a value, greater than a value, inside a time range, or outside a time range.</p> <p>Source channel: CH1~CH4</p>   |
| Setup/Hold | <p>When the setup time or hold time between the input clock signal and the data signal is smaller than the specified time.</p> <p>Source channel: CH1~CH4</p>  |
| Nth Edge   | <p>Triggers on the Nth edge after the specified idle time. The edge can be specified as Rising or Falling.</p> <p>Source channel: CH1~CH4</p>  |

## Trigger Type

|            |   |
|------------|---|
| RS232/UART | Triggers on the Start, Error, Check Error, or Data frame of the RS232/UART bus (up to 20 Mb/s).<br>Source channel: CH1~CH4  |
| I2C        | Triggers on the Start, Stop, Restart, MissedACK, Address (7 bits, 8 bits, or 10 bits), Data, or Address Data of the I2C bus.<br>Source channel: CH1~CH4   |
| SPI        | Triggers on the specified pattern of the specified data width (4 to 32) of SPI bus. CS and Timeout are supported.<br>Source channel: CH1~CH4  |
| CAN        | 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.<br>Source channel: CH1~CH4 |
| LIN        | Triggers on the Sync, ID, Data (length settable), Data&ID, Wakeup, Sleep, and Error of the LIN bus signal (up to 20 Mb/s).<br>Source channel: CH1~CH4   |

## Search & Navigate

### Search & Navigate

|                |   |
|----------------|---|
| Type           | Edge, pulse width   |
| Source         | Analog channels   |
| Copy           | Copy to/from trigger; independent settings including threshold and trigger condition setup      |
| Result Display | Event lister or be exported to external/internal memory   |
| Navigate       | Time: view acquired waveforms in time order   |
|                | Event: use the navigation controls to go to found search events                                 |
|                | Segment: use the navigation controls to play through the acquired segments in UltraAcquire mode |

# Waveform Measurement

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

## Waveform 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 Range      | Main, Zoom   |
|                  | All Measurements       | Displays 33 measurement items (vertical and horizontal) for the current measurement channel; the measurement results are updated continuously.   |
| Auto Measurement | Vertical               | Vmax, Vmin, Vpp, Vtop, Vbase, Vamp, Vupper, Vmid, Vlower, Vavg, VRMS, Per. VRMS, Overshoot, Preshoot, Area, Period Area, and AC RMS.   |
|                  | 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↓)   |
|                  | Statistics             | Items: Current, Average, Max, Min, Standard Deviation, Count<br>Statistical times settable   |

## Waveform Math

### Waveform Math

|  |                          |   |
|--|--------------------------|---|
|  | Number of Math Functions | 4, displays 4 math functions simultaneously   |
|  | Arithmetic               | A+B, A-B, A×B, A/B, FFT, A&&B, A  B, A^B, !A, Intg, Diff, Lg, Ln, Exp, Sqrt, Abs, AX+B, LowPass, HighPass, BandPass, and BandStop |
|  | Color Grade              | FFT supported   |

## Waveform Math

|     |             |  |
|-----|-------------|--|
|     | Record Size | Up to 1 Mpts   |
| FFT | Window Type | Rectangular, Blackman-Harris, Hanning (default), Hamming, Flattop, and Triangle              |
|     | Peak Search | A maximum of 15 peaks, confirmed by the settable threshold and offset threshold set by users |

## Waveform Analysis

### Waveform Analysis

|                    |             |   |
|--------------------|-------------|---|
|                    |             | Store the signal under test in segments according to the trigger events, i.g. save all the sampled waveform data as a segment to the RAM for each trigger event. The maximum number of the sampled segments reaches 500,000.                  |
| Waveform Recording | Source      | All enabled analog channels   |
|                    | Analysis    | Support playing frame by frame or continuous playing; capable of calculating, measuring, and decoding the played waveforms  |
| Pass/Fail Test     |             | Compare 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  |
| Color Grade        |             | 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        | All modes available   |

## Serial Decoding

### Serial Decoding

|                  |  |
|------------------|--|
| No. of Decodings | 4, decodes and enables/disables four protocol types simultaneously |
| Decoding Type    | Standard: Parallel, RS232/UART, I2C, SPI, LIN, CAN                 |



## Serial Decoding

|            |   |
|------------|---|
| Parallel   | Up to 4 bits of Parallel decoding, available for any analog channel User-defined clock and auto clock settings are supported.<br>Source channel: CH1~CH4  |
| RS232/UART | Decodes the RS232/UART (up to 20 Mb/s) bus's TX/RX data (5 to 9 bits), parity (Odd, Even, or None), and stop bits (1 to 2 bits)<br>Source channel: CH1~CH4  |
| I2C        | Decodes the address (with or without the R/W bit) of the I2C bus, data, and ACK.<br>Source channel: CH1~CH4   |
| SPI        | Decodes the MISO/MOSI data (4 to 32 bits) of the SPI bus. Timeout and CS are supported.<br>Source channel: CH1~CH4  |
| CAN        | 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.<br>Source channel: CH1~CH4 |
| LIN        | 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.<br>Source channel: CH1~CH4   |

## Auto

### Auto

|           |  |
|-----------|--|
| AutoScale | Minimum voltage greater than 10 mVpp, duty cycle greater than 1%, and frequency over 35 Hz |
|-----------|--|

## Digital Voltmeter

### Digital Voltmeter

|               |  |
|---------------|--|
| Source        | Any analog channel   |
| Function      | DC, AC+DC <sub>rms</sub> , AC <sub>rms</sub>   |
| Resolution    | ACV/DCV: 4 bits  |
| Limits Beeper | Support Upper/lower limit settings; sounds an alarm when the voltage value is inside or outside of the limit range |

## Precision Counter

| Precision Counter |                |                                       |
|-------------------|----------------|---------------------------------------|
| Source            |                | Any analog channel and EXT            |
| Measurement       |                | Frequency, period, totalize           |
| Totalizer         | Resolution     | 3 to 6 digits, user-defined           |
|                   | Max. Frequency | Maximum analog bandwidth              |
| Totalizer         |                | 48-bit totalizer                      |
|                   |                | Counts the number of the rising edges |
| Time Reference    |                | Internal Reference                    |

## Command Set

| Command Set                     |                        |
|---------------------------------|------------------------|
| Common Commands Support         | Standard SCPI commands |
| Error Message Definition        | Error Message          |
| Support Status Report Mechanism | Status Reporting       |
| Support Sync Mechanism          | Synchronization        |

## Display

| Display     |  |
|-------------|--|
| LCD         | 10.1-inch capacitive multi-touch gesture-enabled display |
| Resolution  | 1280×800 (Screen Region) 16:9                            |
| Graticule   | 10 vertical divisions x 8 horizontal divisions           |
| Persistence | Off, Infinite, variable persistence (100 ms to 10 s)     |
| Brightness  | 256 intensity levels (LCD, HDMI)                         |

## Processor System

| Processor System |                                |
|------------------|--------------------------------|
| Processor        | Cortex-A72, 1.8 GHz, hexa-core |
| System Memory    | 4 GB RAM                       |

## Processor System

Operating System                      Android

Internal Non-volatile Memory        8 GB

## I/O

### I/O

USB3.0 Host                              2 on the front panel

USB3.0 Device                           1 on the rear panel

LAN Port                                 1 on the rear panel, 10/100/1000 Base-T, supporting LXI-C

Web Control                              Support Web Control interface (input the IP address of the oscilloscope into the Web browser to display the operation interface of the oscilloscope)

BNC output on the rear panel

$V_o(H) \geq 2.5\text{ V}$  open circuit,  $\geq 1.0\text{ V } 50\ \Omega$  to GND

$V_o(L) \leq 0.7\text{ V}$  to load  $\leq 4\text{ mA}$ ;  $\leq 0.25\text{ V } 50\ \Omega$  to GND

AUX Out                                    Trig Out                                    Output a pulse signal when the oscilloscope is triggered

Pass/Fail                                 Output a pulse signal when a pass/fail event occurs.  
Support user-defined pulse polarity and pulse time (10 ns to 10 ms)

Rise Time                                 $\leq 1.5\text{ ns}$

10 MHz Reference                        Input Interface                         1, BNC connector on the rear panel

Clock                                        Output Interface                        1, BNC connector on the rear panel

In/Out                                        Input Mode                                 $50\ \Omega$ , with the amplitude 130 mVpp to 4.1 Vpp (-10 dBm, 20 dBm), frequency  $10\text{ MHz} \pm 10\text{ ppm}$

Output Mode                                $50\ \Omega$ , 1.5 Vpp sine waveform

HDMI                                         1 on the rear panel, HDMI 1.4, A plug; used to connect an external monitor or projector

Probe                                        1 kHz frequency, 0 to 3 V amplitude, Square  
Compensation                              Output

## Power

| Power         |  |
|---------------|--|
| Power Voltage | AC 100 to 240 V, 50 to 60 Hz   |
| Power         | 400 VA maximum (connect various interfaces, USB storage device, and active probes) |
| Fuse          | 3.15 A, T degree, 250 V  |

## Environment

| Environment       |               |  |
|-------------------|---------------|--|
| Temperature Range | Operating     | 0°C to +50°C                                   |
|                   | Non-operating | -30°C to +60°C                                 |
| Humidity Range    | Operating     | below +30°C: ≤90% RH (without condensation)    |
|                   |               | +30°C to +40°C, ≤75% RH (without condensation) |
|                   |               | +40°C to +50°C, ≤45% RH (without condensation) |
|                   | Non-operating | below 60°C: ≤90% RH (without condensation)     |
| Altitude          | Operating     | Below 3,000 m                                  |
|                   | Non-operating | Below 15,000 m                                 |

## 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                       |  |   |
|-----------------------------------|--|---|
|                                   | 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  |   |
| Electromagnetic Compatibility     | 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<br>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

|       |   |
|-------|---|
|       | Meets GB/T 6587-2012; class 2 random  |
| Shock | 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 | 358.14 mm (W)×214.72 mm (H)×120.62 mm (D) |
|------------|---|

|                |    |
|----------------|----|
| Rack Mount Kit | 4U |
|----------------|----|

|                       |                   |
|-----------------------|-------------------|
| Weight <sup>[6]</sup> | Net: 3.8 kg       |
|                       | Shipping: 5.37 kg |

## Non-volatile Memory

### Non-volatile Memory

|                    |               |   |
|--------------------|---------------|---|
|                    | Setup/Image   | setup (*.stp), image (*.png, *.bmp, *.jpg)  |
| Data/File Storage  | Waveform Data | CSV waveform data (*.csv), binary waveform data (*.bin), list data (*.csv), and reference waveform data (*.ref, *.csv, *.bin) |
| Internal Capacity  |               | 8 GB  |
| Reference Waveform |               | Displays 10 internal waveforms  |
| Setting            |               | Limited by size of USB drive  |
| USB Capacity       |               | Industry standard flash drives  |

### NOTE:

[1]: If any one of the channels is enabled, it is called single channel mode.

[2]: For 4-channel models, if two of the channels are enabled, it is called half channels mode.

[3]: For 2-channel models, if two channels are enabled, it is called all channels mode. For 4-channel models, if any three channels or all four channels are enabled, it is called all channels mode.

[4]: 500  $\mu$ V/div is a magnification of 1 mV/div setting. For vertical accuracy calculations, use full scale of 8 mV for sensitivity setting.

[5]: For any channel, under the same input impedance with DC-coupled, the Volts/div setting is the same for 100 mV/div and 200 mV/div setting.

[6]: Standard configuration.

# Order Information and Warranty Period

## Order Information

| Order Information  | Order No.        |
|--|------------------|
| <b>Model</b>   |                  |
| 70 MHz, 2 GSa/s, 50 Mpts, 2CH DHO  | DHO1072          |
| 70 MHz, 2 GSa/s, 50 Mpts, 4CH DHO  | DHO1074          |
| 100 MHz, 2 GSa/s, 50 Mpts, 2CH DHO   | DHO1102          |
| 100 MHz, 2 GSa/s, 50 Mpts, 4CH DHO   | DHO1104          |
| 200 MHz, 2 GSa/s, 50 Mpts, 2CH DHO   | DHO1202          |
| 200 MHz, 2 GSa/s, 50 Mpts, 4CH DHO   | DHO1204          |
| <b>Standard Accessories</b>  |                  |
| Power cord (based on destination country)  | — —              |
| USB Cable  | — —              |
| 4 Passive HighZ Probes (350 MHz) Standard for DHO1204, 2 Passive HighZ Probes (350 MHz) Standard for DHO1202 | PVP2350          |
| 4 Passive HighZ Probes (150 MHz), Standard for DHO1104/ DHO1074  | PVP3150          |
| 2 Passive HighZ Probes (150 MHz), Standard for DHO1102/ DHO1072  | PVP3150          |
| <b>Bandwidth Upgrade Option</b>  |                  |
| 70 MHz to 100 MHz Upgrade Option   | DHO1000-BWU7T10  |
| 70 MHz to 200 MHz Upgrade Option   | DHO1000-BWU7T20  |
| 100 MHz to 200 MHz Upgrade Option  | DHO1000-BWU10T20 |
| <b>Memory Depth Upgrade Option</b>   |                  |
| 100 Mpts Memory Depth Upgrade Option   | DHO1000-RLU-01   |

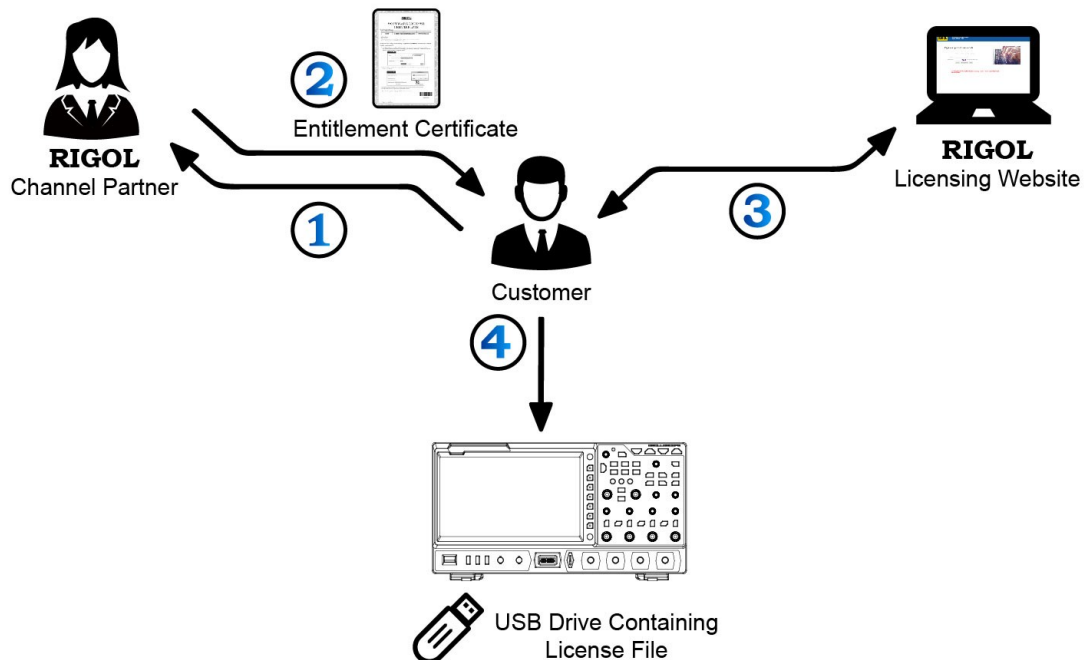
### NOTE:

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. Download the option license file to the root directory of the USB storage device, and connect the USB storage device to the instrument properly. After the USB storage device is successfully recognized, the **Option install** menu is activated. Press this menu key to start installing the option.

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