RIGOL

MHO900

Digital Oscilloscope

Performance Verification Guide

Sept. 2025

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1 Safety Requirement

1.1 General Safety Summary

Please review the following safety precautions carefully before putting the instrument into operation so as to avoid any personal injury or damage to the instrument and any product connected to it. To prevent potential hazards, please follow the instructions specified in this manual to use the instrument properly.

- **Use Proper Power Cord.**

  Only the power cord designed for the instrument and authorized for use within the local country could be used.

- **Ground the Instrument.**

  The instrument is grounded through the Protective Earth lead of the power cord. To avoid electric shock, connect the earth terminal of the power cord to the Protective Earth terminal before connecting any input or output terminals.

- **Connect the Probe Correctly.**

  If a probe is used, the probe ground lead must be connected to earth ground. Do not connect the ground lead to high voltage. Improper way of connection could result in dangerous voltages being present on the connectors, controls or other surfaces of the oscilloscope and probes, which will cause potential hazards for operators.

- **Observe All Terminal Ratings.**

  To avoid fire or shock hazard, observe all ratings and markers on the instrument and check your manual for more information about ratings before connecting the instrument.

- **Use Proper Overvoltage Protection.**

  Ensure that no overvoltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the operator might be exposed to the danger of an electric shock.

- **Do Not Operate Without Covers.**

  Do not operate the instrument with covers or panels removed.

- **Do Not Insert Objects into the Air Outlet.**

  Do not insert objects into the air outlet, as doing so may cause damage to the instrument.

- **Use Proper Fuse.**

  Please use the specified fuses.

- **Avoid Circuit or Wire Exposure.**

  Do not touch exposed junctions and components when the unit is powered on.

- **Do Not Operate With Suspected Failures.**

  If you suspect that any damage may occur to the instrument, have it inspected by RIGOL authorized personnel before further operations. Any maintenance, adjustment or replacement especially to circuits or accessories must be performed by RIGOL authorized personnel.

- **Provide Adequate Ventilation.**

  Inadequate ventilation may cause an increase of temperature in the instrument, which would cause damage to the instrument. So please keep the instrument well ventilated and inspect the air outlet and the fan regularly.

- **Do Not Operate in Wet Conditions.**

  To avoid short circuit inside the instrument or electric shock, never operate the instrument in a humid environment.

- **Do Not Operate in an Explosive Atmosphere.**

  To avoid personal injuries or damage to the instrument, never operate the instrument in an explosive atmosphere.

- **Keep Product Surfaces Clean and Dry.**

  To avoid dust or moisture from affecting the performance of the instrument, keep the surfaces of the instrument clean and dry.

- **Prevent Electrostatic Impact.**

  Operate the instrument in an electrostatic discharge protective environment to avoid damage induced by static discharges. Always ground both the internal and external conductors of cables to release static before making connections.

- **Proper Use of Battery.**

  Do not expose the battery (if available) to high temperature or fire. Keep it out of the reach of children. Improper change of battery (note: lithium battery) may cause explosion. Use the RIGOL specified battery only.

- **Handle with Caution.**

  Please handle with care during transportation to avoid damage to keys, knob interfaces and other parts on the panels.

1.2 Safety Notices and Symbols

Safety Notices in this Manual:

WARNING

Indicates a potentially hazardous situation or practice which, if not avoided, will result in serious injury or death.

CAUTION

Indicates a potentially hazardous situation or practice which, if not avoided, could result in damage to the product or loss of important data.

Safety Notices on the Product:

- **DANGER**

  It calls attention to an operation, if not correctly performed, could result in injury or hazard immediately.

- **WARNING**

  It calls attention to an operation, if not correctly performed, could result in potential injury or hazard.

- **CAUTION**

  It calls attention to an operation, if not correctly performed, could result in damage to the product or other devices connected to the product.

Safety Symbols on the Product:

Hazardous Voltage	Safety Warning	Protective Earth Terminal	Chassis Ground	Test Ground

2 Specifications

This chapter lists the technical specifications of the MHO900 series oscilloscope.

MHO900 series digital oscilloscope achieves 4 GSa/s sample rate, a fast waveform capture rate of 1,000,000 wfms/s[1], up to 500 Mpts (option) memory depth, 12-bit vertical resolution, all combined with excellent noise floor performance and vertical accuracy to meet your requirements for more accurate measurements.

To meet specifications, these conditions must be met:

- The instrument must have been calibrated in an ambient temperature between 18°C and 28°C.
- The instrument must be operating within the environmental limits. (For the specific environment requirements, refer to MHO900 Data Sheet).
- The instrument must be powered from a source that meets the requirement for the power supply. (For the power specifications, refer to MHO900 Data Sheet).
- The instrument must have been operating continuously for at least 30 minutes within the specified operating temperature range.

The following table shows some of the technical specifications of MHO984, MHO954, and MHO934. For other technical specifications of MHO900, please refer to MHO900 Data Sheet.

Table 2.1 Specifications

Overview of the MHO900 Series Technical Specifications			
Model	MHO984	MHO954	MHO934
Analog Bandwidth (50 Ω, -3 dB)	800 MHz	500 MHz	350 MHz
Analog Bandwidth (1 MΩ, -3 dB)	500 MHz	500 MHz	350 MHz
No. of Input Channels	4 analog channel inputs, 16 digital channel inputs		
Input Coupling	DC, AC, or GND		
Input Impedance	50 Ω ± 1%, 1 MΩ ± 1%		
Sampling Mode	Real-time sampling		
Bandwidth Limit (Typical)	20 MHz, 250 MHz, FULL; selectable for each channel • When the vertical scale is lower than or equal to 500 μV, the bandwidth limit is fixed at 250 MHz. • When the vertical scale is lower than or equal to 200 μV, the bandwidth limit is fixed at 20 MHz.		

Overview of the MHO900 Series Technical Specifications	
Max. Analog Channel Sample Rate	4 GSa/s (single channel[2]) 2 GSa/s(half channel[3]) 1 GSa/s(all channels[4])
Max. Memory Depth	Standard: 100 Mpts (single channel[2]); 50 Mpts (half channel[3]); 25 Mpts (all channels[4]) Optional（with the 500 Mpts memory depth option installed): 500 Mpts (single channel[2]); 250 Mpts (half channel[3]); 125 Mpts (all channels[4])
Max. Waveform Capture Rate	30,000 wfms/s (vector mode) 1,000,000 wfms/s[1]
Vertical Resolution	12-bit (4096 digitalizing level)
DC Gain Accuracy	±1% (≥5mV/div) ±2% (<5mV/div)
Time Base Accuracy Test Record Form	±1.5 ppm ± 1 ppm/year
Trigger Source	Analog channels (CH1 to CH4), digital channels (D0 to D15)

NOTE

[1]: Single-channel mode, recording mode, 20 ns/div, 1 kpts memory depth (or Auto memory depth).

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

[3]: Half-channel mode: If any two channels are enabled, it is called half-channel mode.

[4]: All-channel mode: If all of the channels are enabled or any three of the channels are enabled, it is called all-channel mode.

3 Document Overview

This manual is designed to guide you to properly test the performance specifications of RIGOL MHO900 series digital oscilloscope. For the operation methods mentioned in the test procedures, refer to User Guide of this product.

TIP

For the latest version of this manual, download it from the official website of RIGOL (*http://www.rigol.com*).

Publication Number

PVA46100-1110

Software Version

Software upgrade might change or add product features. Please acquire the latest version of the manual from RIGOL website or contact RIGOL to upgrade the software.

Format Conventions in this Manual

1. Key

The front panel key is denoted by the menu key icon. For example, DEFAULT indicates the "DEFAULT" key.

2. Menu

The menu item is denoted by the format of "Menu Name (Bold) + Character Shading" in the manual. For example, **Setup** indicates the "Setup" sub-menu under the "Utility" function menu. You can click or tap **Setup** to access the "Setup" menu.

3. Operation Procedures

The next step of the operation is denoted by ">" in the manual. For example, > **Storage** indicates that first clicking or tapping the icon , then clicking or tapping **Storage**.

4. Connector

The front/rear panel connector is denoted by "Brackets + Connector Name (Bold)", for example, **[AUX OUT]**.

4 Overview

4.1 Test Preparations

Before the test, make the following preparations.

1. Self-test
2. Warm-up (make sure that the instrument has been running for at least 30 minutes)
3. Self-calibration

Self-test

After the instrument is connected to the power source, press the power key at the lower-left corner of the front panel to power on the instrument. You can also click or tap > **Utility** > **Setup**. Then select "Switch On" for the **Power status** menu. After the instrument is connected to power source, it will start directly.

During the start-up process, the instrument performs a series of self-tests. After the self-test, the splash screen is displayed.

If the oscilloscope cannot start normally, refer to the "Troubleshooting" chapter in MHO900 User Guide to locate the problem and resolve it. Do not perform self-calibration or performance tests until the instrument passes the self-test.

Self-calibration

The self-calibration program can quickly make the oscilloscope work in an optimal state to get the precise measurement results. You can perform self-calibration at any time, especially when the changes of the ambient temperature reach or above 5℃. Make sure that the oscilloscope has been warmed up or operating for more than 30 minutes before the self-calibration.

1. Disconnect all the input channels.
2. In "Utility" menu, click or tap **SelfCal**. The self-calibration interface will be displayed as shown below.

Figure 4.1 Self-calibration Menu

- Click or tap **Start**, and then the oscilloscope will start to execute the self-calibration program.
- After starting the self-calibration program, you can click or tap **Exit** to cancel self-calibration operation at any time.

3. After completing the self-calibration, restart the oscilloscope. In the **Horizontal** menu, select "Average" for the **Acquisition** item. Then click or tap the input field of the Averages item to set the number of averages to 16 with the pop-up numeric keypad.
4. Set the vertical scale of each channel to 2 mV/div and view the offset of the waveform of each channel. If the offset is greater than 0.5 div, check whether there are interference signals around you and whether the power source is well grounded. After that, perform self-calibration again.
5. Click or tap **Close** to close the self-calibration information window.

4.2 Test Result Record

Record and keep the test result of each test. In the final chapter of this manual, a test result record form is provided. The form lists all the test items and their corresponding performance limits as well as spaces for users to record the test results.

TIP

It is recommended that users photocopy the test record form before each test and record the test results in the copy so that the form can be used repeatedly.

4.3 Specifications

The specification of each test item is provided in this manual. For other technical parameters, refer to MHO900 Data Sheet (download it from RIGOL website: *www.rigol.com*).

TIP

All the specifications are valid only when the oscilloscope has been warmed up for more than 30 minutes within the specified operating temperature range (18℃ to 28℃).

5 Performance Verification Test

This chapter takes MHO984 as an example to illustrate the performance verification test methods and procedures of MHO900 series digital oscilloscope. This manual recommends the following test devices. You can also use other devices that fulfill the "Specification" in *Table 5.1 Test Devices* .

Table 5.1 Test Devices

Device	Specification	Recommended Model
Oscilloscope Calibrator	DC: ±1 mV to ±200 V, ± (0.025% + 25 μV) Steady-state Sinusoidal Wave: (5 mV to 5 V) @ (0.1 Hz to 3.2 GHz), ± 1.5% Impedance: ±0.1% Capacitance: 1 pF to 35 pF, ± 2% ± 0.25 pF	Fluke 9500B

TIP

1. Make sure that the oscilloscope passes the self-test and the self-calibration is performed before executing the performance verification tests.
2. Make sure that the oscilloscope has been warmed up for at least 30 minutes before executing any of the following tests.
3. Please reset the instrument to the factory setting before or after executing any of the following tests.

5.1 Random Noise Test

This test tests the random noise for each channel in the Normal acquisition mode.

5.1.1 Specification

Random Noise

Random Noise RMS at 50 Ω input (800 MHz bandwidth)	
200 μV/div (20 MHz Bandwidth limit)	66 μV_{rms}
500 μV/div (250 MHz Bandwidth limit)	74.4 μV_{rms}
1 mV/div	139.2 μV_{rms}
2 mV/div	136.8 μV_{rms}

Random Noise RMS at 50 Ω input (800 MHz bandwidth)	
5 mV/div	145.2 μV_{rms}
10 mV/div	406.8 μV_{rms}
20 mV/div	465.6 μV_{rms}
50 mV/div	694.8 μV_{rms}
100 mV/div	1152 μV_{rms}
200 mV/div	4.92 mV_{rms}
500 mV/div	7.2 mV_{rms}
1 V/div	11.52 mV_{rms}

Random Noise RMS at 1 MΩ Input (500 MHz Bandwidth)	
1 mV/div	130.8 μV_{rms}
2 mV/div	127.2 μV_{rms}
5 mV/div	160 μV_{rms}
10 mV/div	270 μV_{rms}
20 mV/div	331.2 μV_{rms}
50 mV/div	614.4 μV_{rms}
100 mV/div	3 mV_{rms}
200 mV/div	3.6 mV_{rms}
500 mV/div	12.84 mV_{rms}
1 V/div	16.08 mV_{rms}
2 V/div	24.36 mV_{rms}
5 V/div	117.84 mV_{rms}
10 V/div	156.36 mV_{rms}

5.1.2 Test Connection Diagram

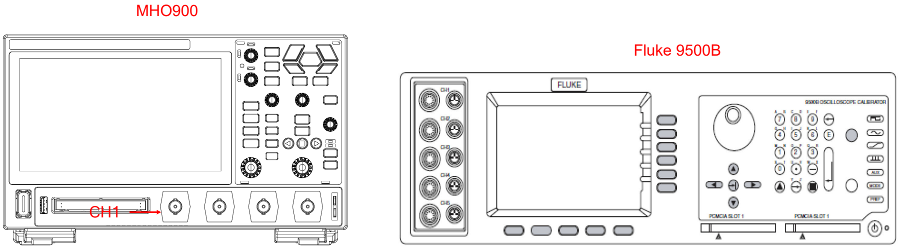

Figure 5.1 Random Noise Test Connection Diagram

5.1.3 Test Procedures

TIP

Before test, disconnect the instrument from all the signal generators and keep the noise sources away from the instrument.

1. Press the front-panel  key to restore the oscilloscope to the default settings.
2. Click or tap the channel label at the bottom of the screen to activate CH1. The "Vertical" system menu is displayed. Click or tap to select 50 Ω for **Impedance** to set the input impedance of CH1 to 50 Ω. By default, the probe ratio is "1X".
3. Set the vertical scale to 200 μV/div, and the bandwidth limit will be enabled automatically to 20 MHz.
4. By default, the acquisition mode is "Normal", the sample rate is 4 GSa/s, the horizontal time base is 20 μs/div, and the memory depth is 1 Mpts.
5. Click or tap the trigger label at the top of the screen. Set the trigger source to CH1. Set the trigger level to the maximum to prevent the signals from being triggered by mistake.
6. In the **Measure** menu, click or tap **Vertical** measurement item to select "AC.RMS". The AC.RMS measurement result list is displayed at the right section of the screen.
7. Click or tap the result list, then select **Setting**. Set **Count** to 100.
8. When the statistics count in the "Result" sidebar shows 100, read and record the statistics average value.
9. For the parameter setting, refer to *Test Record From*. Repeat Step 1-8 and test the AC.RMS value for different vertical scale, bandwidth, and impedance. The test results should be less than the max. value in the record form.

5.1.4 Test Record From

Vertical Scale	Bandwidth	Test Result	Limit	Pass/Fail
50 Ω				
200 μV/div	20 MHz		66 μV_{rms}	
500 μV/div	250 MHz		74.4 μV_{rms}	
1 mV/div	Full BW		139.2 μV_{rms}	
2 mV/div			136.8 μV_{rms}	
5 mV/div			145.2 μV_{rms}	
10 mV/div			406.8 μV_{rms}	
20 mV/div			465.6 μV_{rms}	
50 mV/div			694.8 μV_{rms}	
100 mV/div			1152 μV_{rms}	
200 mV/div			4.92 mV_{rms}	
500 mV/div			7.2 mV_{rms}	
1 V/div			11.52 mV_{rms}	
1 MΩ				
1 mV/div	Full BW		130.8 μV_{rms}	
2 mV/div			127.2 μV_{rms}	
5 mV/div			153.6 μV_{rms}	
10 mV/div			270 μV_{rms}	
20 mV/div			331.2 μV_{rms}	
50 mV/div			614.4 μV_{rms}	
100 mV/div			3 mV_{rms}	
200 mV/div			3.6 mV_{rms}	
500 mV/div			12.84 mV_{rms}	
1 V/div			16.08 mV_{rms}	
2 V/div			24.36 mV_{rms}	
5 V/div			117.84 mV_{rms}	
10 V/div			156.36 mV_{rms}	

5.2 Impedance Test

5.2.1 Specification

Input Impedance	
Analog Channel	1 MΩ: 0.99 MΩ to 1.01 MΩ
	50 Ω: 49.5 Ω to 50.5 Ω

5.2.2 Test Connection Diagram

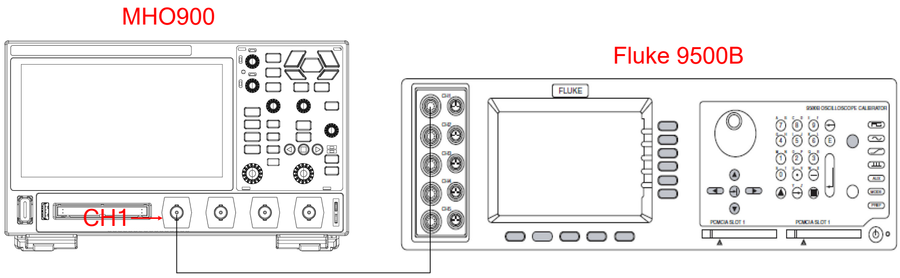

Figure 5.2 Impedance Test Connection Diagram

5.2.3 Test Procedures

WARNING

Before connecting, disconnecting, or moving the test hookup, disable the output of the signal generator to avoid causing the dangerous voltage.

Impedance test when the input impedance is 1 MΩ

1. Connect the active head of Fluke 9500B to CH1 of the oscilloscope, as shown in *Test Connection Diagram*.
2. Configure the oscilloscope:

   a. To enable the channel, perform any of the following operations:

      - Click or tap the channel status label at the bottom of the screen to enable CH1.
      - Press the front-panel 1 key to enable the channel.
      - In the **Vertical** menu, select the CH1 tab. Select **ON** for the **Display** item to turn CH1 on.

   b. In the **Vertical** menu, select 1 MΩ under **Impedance** to set the input impedance of CH1 to 1 MΩ.

   c. Set the vertical scale of CH1 to 50 mV/div.
3. Turn on Fluke 9500B; set its impedance to 1 MΩ and select the resistance measurement function. Read and record the resistance measured.
4. Adjust the vertical scale of CH1 to 500 mV/div; read and record the resistance measured.
5. Turn off CH1. Measure the resistance of CH2, CH3, and CH4 respectively using the method above and record the measurement results.

Impedance test when the input impedance is 50 Ω

1. Connect the active head of Fluke 9500B to CH1 of the oscilloscope, as shown in *Test Connection Diagram*.
2. Configure the oscilloscope:
   a. Use the method illustrated above to turn on CH1.
   b. Set the input impedance of CH1 to 50 Ω.
   c. Set the vertical scale of CH1 to 100 mV/div.
3. Turn on Fluke 9500B; set its impedance to 50 Ω and select the resistance measurement function. Read and record the resistance measured.
4. Adjust the vertical scale of CH1 to 500 mV/div; read and record the resistance measured.
5. Turn off CH1. Measure the resistance of CH2, CH3, and CH4 respectively using the method above and record the measurement results.

5.2.4 Test Record From

1 MΩ Input Impedance

Channel	Vertical Scale	Test Result	Limit	Pass/Fail
CH1	50 mV/div		0.99 MΩ to 1.01 MΩ	
	500 mV/div			
CH2	50 mV/div			
	500 mV/div			
CH3	50 mV/div			
	500 mV/div			
CH4	50 mV/div			
	500 mV/div			

50 Ω Input Impedance

Channel	Vertical Scale	Test Result	Limit	Pass/Fail
CH1	50 mV/div		49.5 Ω to 50.5 Ω	
	500 mV/div			
CH2	50 mV/div			
	500 mV/div			
CH3	50 mV/div			
	500 mV/div			
CH4	50 mV/div			
	500 mV/div			

5.3 Input Capacitance Test

5.3.1 Specification

Input Capacitance	
Specification	18 pF ± 3 pF

5.3.2 Test Connection Diagram

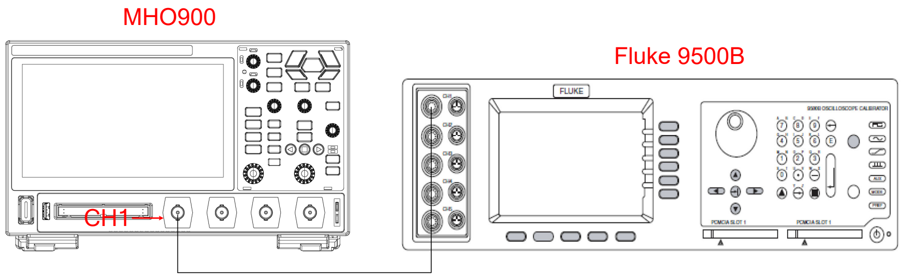

Figure 5.3 Input Capacitance Test Connection Diagram

5.3.3 Test Procedures

WARNING

Before connecting, disconnecting, or moving the test hookup, disable the output of the signal generator to avoid causing the dangerous voltage.

1. Connect the active head of Fluke 9500B to CH1 of the oscilloscope, as shown in *Test Connection Diagram*.

2. Configure the oscilloscope:

a. Enable CH1.

- Click or tap the channel status label at the bottom of the screen to enable CH1.
- Press the front-panel 1 key to enable the channel.
- In the **Vertical** menu, select the CH1 tab. Select **ON** for the **Display** item to enable CH1.

b. Set the vertical scale of CH1 to 50 mV/div.

3. Turn on Fluke 9500B; set its impedance to 1 MΩ and select the capacitance measurement function. Read and record the capacitance measured.

4. Adjust the vertical scale of CH1 to 500 mV/div; read and record the capacitance measured.

5. Turn off CH1. Measure the capacitances of CH2, CH3, and CH4 respectively using the method above and record the measurement results.

5.3.4 Test Record From

Channel	Vertical Scale	Test Result	Limit	Pass/Fail
CH1	50 mV/div		18 pF ± 3 pF	
	500 mV/div			
CH2	50 mV/div			
	500 mV/div			
CH3	50 mV/div			
	500 mV/div			
CH4	50 mV/div			
	500 mV/div			

5.4 DC Gain Accuracy Test

5.4.1 Specification

DC Gain Accuracy	
Specification[1]	± 1% (≥ 5 mV/div, full scale) ± 2% (< 5 mV/div, full scale)

NOTE

[1]: 200 μV/div and 500 μV/div are a magnification of 1 mV/div setting. For vertical accuracy calculations, use full scale of 8 mV.

5.4.2 Test Connection Diagram

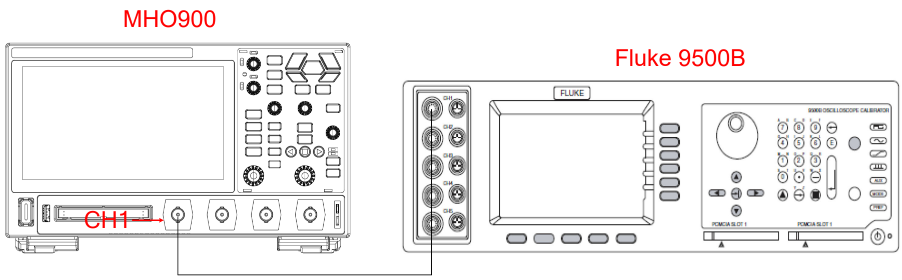

Figure 5.4 DC Gain Accuracy Test Connection Diagram

5.4.3 Test Procedures

WARNING

Before connecting, disconnecting, or moving the test hookup, disable the output of the signal generator to avoid causing the dangerous voltage.

DC gain accuracy test when the input impedance is 1 MΩ

1. Connect the active head of Fluke 9500B to CH1 of the oscilloscope, as shown in *Test Connection Diagram*.
2. Set the impedance of Fluke 9500B to 1 MΩ.
3. Output a DC signal with +3 mVdc voltage (Vout1) via Fluke 9500B. Configure the oscilloscope:
4.
   a. Enable CH1.
   - Click or tap the channel status label at the bottom of the screen to enable CH1.
   - Press the front-panel 1 key to enable the channel.
   - In the **Vertical** menu, select the CH1 tab. Select **ON** for the **Display** item to enable CH1.

   b. Click or tap the channel status label at the bottom of the screen. Then the **Vertical** menu is displayed. Click or tap the drop-down list of the probe ratio to set the probe attenuation ratio to "1X".

   c. In the **Vertical** menu, select 1 MΩ under **Impedance** to set the input impedance of CH1 to 1 MΩ.

   d. Set the vertical scale to 1 mV/div.

   e. Set the horizontal time base to 1 μs/div.

   f. Set the vertical offset to 0.

   g. In the **Horizontal** menu, select "Average" for the **Acquisition** item. Then click or tap the input field of **Averages** to set the number of averages to 32 with the pop-up numeric keypad.

   h. Adjust the trigger level to prevent the signals from being triggered by mistake.
5. In the **Measure** menu, click or tap **Vertical** measurement item to select "Vavg". The Vavg result is displayed in the "Result" sidebar at the right side of the screen. Read and record the measurement result of Vavg1.
6. Adjust Fluke 9500B to make it output a DC signal with -3 mVdc voltage (Vout2).

7. Enable the average measurement function. Read and record Vavg2.

8. Calculate the relative error of this vertical scale: |(Vavg1 - Vavg2) - (Vout1 - Vout2)|/Full Scale × 100%.

9. Keep the other settings of the oscilloscope unchanged.

   a. Set the vertical scale to 2 mV/div, 5 mV/div, 10 mV/div, 20 mV/div, 50 mV/div, 100 mV/div, 200 mV/div, 500 mV/div, 1 V/div, 2 V/div, 5 V/div, and 10 V/div.

   b. Adjust the output voltage of Fluke 9500B to (3 x the current vertical scale) and (-3 x the current vertical scale) respectively.

   c. Repeat Step 3-7 and record the test results.

   d. Calculate the relative error of this vertical scale: |(Vavg1 - Vavg2) - (Vout1 - Vout2)|/Full Scale × 100%.

10. Turn off CH1. Test the relative error of each scale of CH2, CH3, and CH4 respectively using the method above and record the test results.

DC gain accuracy test when the input impedance is 50 Ω

1. Connect the active head of Fluke 9500B to CH1 of the oscilloscope, as shown in *Test Connection Diagram*.

2. Turn on Fluke 9500B and set its impedance to 50 Ω.

3. Output a DC signal with +3 mV voltage (Vout1) via Fluke 9500B.

4. Configure the oscilloscope:

   a. Enable CH1.

   b. Set the probe attenuation ratio to "1X".

   c. Set the input impedance of CH1 to 50 Ω.

   d. Set the vertical scale to 1 mV/div.

   e. Set the horizontal time base to 1 μs/div.

   f. Set the vertical offset to 0.

   g. In the **Horizontal** menu, select "Average" for the **Acquisition** item. Then click or tap the input field of **Averages** to set the number of averages to 32 with the pop-up numeric keypad.

   h. Adjust the trigger level to prevent the signals from being triggered by mistake.

5. Test the relative error of each scale of CH1 (except the tests of 2 V/div, 5 V/div, and 10 V/div) according to Step 5-9 specified in *DC gain accuracy test when the input impedance is 1 MΩ* and record the test results.

6. Turn off CH1. Test the relative error of each scale of CH2, CH3, and CH4 respectively using the method above and record the test results.

5.4.4 Test Record From

50 Ω Input Impedance

Channel	Vertical Scale	Test Result			Limit	Pass/Fail
		Vavg1	Vavg2	Calculation Result[1]		
CH1	1 mV/div				≤2%	
	2 mV/div					
	5 mV/div				≤1%	
	10 mV/div					
	20 mV/div					
	50 mV/div					
	100 mV/div					
	200 mV/div					
	500 mV/div					
	1 V/div					
CH2	1 mV/div				≤2%	
	2 mV/div					
	5 mV/div				≤1%	
	10 mV/div					
	20 mV/div					
	50 mV/div					
	100 mV/div					
	200 mV/div					
	500 mV/div					
	1 V/div					
CH3	1 mV/div				≤2%	
	2 mV/div					
	5 mV/div				≤1%	
	10 mV/div					
	20 mV/div					
	50 mV/div					
	100 mV/div					
	200 mV/div					
	500 mV/div					
	1 V/div					
CH4	1 mV/div				≤2%	
	2 mV/div					
	5 mV/div				≤1%	
	10 mV/div					

Channel	Vertical Scale	Test Result			Limit	Pass/Fail
		Vavg1	Vavg2	Calculation Result[1]		
	20 mV/div					
	50 mV/div					
	100 mV/div					
	200 mV/div					
	500 mV/div					
	1 V/div					

1 MΩ Input Impedance

Channel	Vertical Scale	Test Result			Limit	Pass/Fail
		Vavg1	Vavg2	Calculation Result[1]		
CH1	1 mV/div				≤2%	
	2 mV/div					
	5 mV/div				≤1%	
	10 mV/div					
	20 mV/div					
	50 mV/div					
	100 mV/div					
	200 mV/div					
	500 mV/div					
	1 V/div					
	2 V/div					
	5 V/div					
	10 V/div					
CH2	1 mV/div				≤2%	
	2 mV/div					
	5 mV/div				≤1%	
	10 mV/div					
	20 mV/div					
	50 mV/div					
	100 mV/div					
	200 mV/div					
	500 mV/div					
	1 V/div					
	2 V/div					
	5 V/div					
	10 V/div					
CH3	1 mV/div				≤2%	
	2 mV/div					
	5 mV/div				≤1%	

Channel	Vertical Scale	Test Result			Limit	Pass/Fail
		Vavg1	Vavg2	Calculation Result[1]		
	10 mV/div					
	20 mV/div					
	50 mV/div					
	100 mV/div					
	200 mV/div					
	500 mV/div					
	1 V/div					
	2 V/div					
	5 V/div					
	10 V/div					
CH4	1 mV/div				≤2%	
	2 mV/div					
	5 mV/div				≤1%	
	10 mV/div					
	20 mV/div					
	50 mV/div					
	100 mV/div					
	200 mV/div					
	500 mV/div					
	1 V/div					
	2 V/div					
	5 V/div					
	10 V/div					

NOTE

[1]: The calculation formula is |(Vavg1 - Vavg2) - (Vout1 - Vout2)|/Full Scale x 100%; wherein, Vout1 is 3 x the current vertical scale and Vout2 is -3 x the current vertical scale.

5.5 DC Offset Accuracy Test

5.5.1 Specification

DC Offset Accuracy	
Specification	≤200 mV/div (±0.1 div ± 2 mV ± 1.5% of the offset value) >200 mV/div (±0.1 div ± 2 mV ± 1.0% of the offset value)

5.5.2 Test Connection Diagram

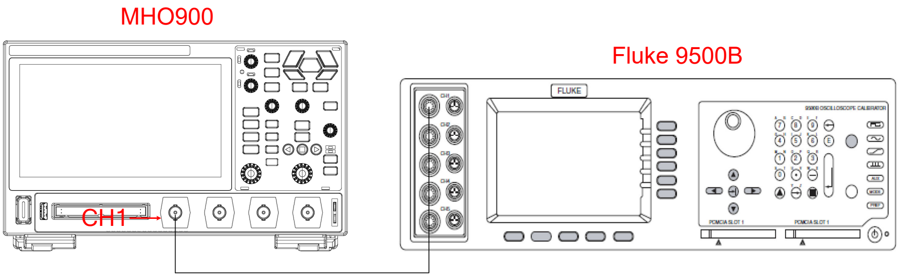

Figure 5.5 DC Offset Accuracy Test Connection Diagram

5.5.3 Test Procedures

WARNING

Before connecting, disconnecting, or moving the test hookup, disable the output of the signal generator to avoid causing the dangerous voltage.

1. Connect the active head of Fluke 9500B to CH1 of the oscilloscope, as shown in *Test Connection Diagram*.

2. Set the impedance of Fluke 9500B to 1 MΩ.

3. Configure the oscilloscope:

   a. Press the front-panel DEFAULT key to restore the oscilloscope to the default settings.

   b. Click or tap the channel status label at the bottom of the screen. The **Vertical** menu is displayed. Select 1 MΩ for **Impedance** to set the input impedance of CH1 to 1 MΩ.

   c. Set the vertical scale to 10 mV/div.

   d. Click or tap the **BW Limit** drop-down button to select "20 M".

   e. Set the offset to 1 V, as shown in *Test Record From*. Close the Vertical menu.

   f. Click or tap the horizontal label at the top of the screen. Then the **Horizontal** menu is displayed. In this menu, set the time base to 1 ms/div. Select "Average" for the **Acquisition** item. Then click or tap the input field of the **Averages** item to set the number of averages to 16 with the pop-up numeric keypad. Close the Horizontal menu.

   g. Click or tap the trigger label at the top of the screen. Set the trigger source to AC Line.

   h. Adjust the trigger level to prevent the signals from being triggered by mistake.

4. Set the output of Fluke 9500B to -1 V.

5. In the **Measure** menu, click or tap **Vertical** measurement item to select "Vavg". The Vavg result is displayed in the "Result" sidebar at the right side of the screen. Read and record the measurement result.

6. Set the vertical offset of the oscilloscope to 0 V.

7. Set the output of Fluke 9500B to 0 V. Read the value from the "Result" sidebar and record the measurement result.

8. Repeat Step 2-7. Measure and record the average results of different impedances, vertical scales and offsets according to *Test Record From*.

5.5.4 Test Record From

Channel Setting	Vertical Scale	Offset	Test Result	Min.	Max.
CH1, 1 MΩ, 20 MHz BW	10 mV/div	1 V		-1.02 V	-0.98 V
	10 mV/div	0 V		-3.00 mV	3.00 mV
	10 mV/div	-1 V		0.98 V	1.02 V
	200 mV/div	10 V		-10.17 V	-9.83 V
	200 mV/div	0 V		-22.00 mV	22.00 mV
	200 mV/div	-10 V		9.83 V	10.17 V
	1 V/div	20 V		-20.30 V	-19.70 V
	1 V/div	0 V		-102.00 mV	102.00 mV
	1 V/div	-20 V		19.70 V	20.30 V
	5 V/div	100 V		-101.50 V	-98.50 V
	5 V/div	0 V		-502.00 mV	502.00 mV
	5 V/div	-100 V		98.50 V	101.50 V
CH1, 50 Ω, 20 MHz BW	100 mV/div	1 V		-1.03 V	-0.97 V
	100 mV/div	0 V		-12.00 mV	12.00 mV
	100 mV/div	-1 V		0.97 V	1.03 V
	200 mV/div	4 V		-4.08 V	-3.92 V
	200 mV/div	0 V		-22.00 mV	22.00 mV
	200 mV/div	-4 V		3.92 V	4.08 V
CH2, 1 MΩ, 20 MHz BW	10 mV/div	1 V		-1.02 V	-0.98 V
	10 mV/div	0 V		-3.00 mV	3.00 mV
	10 mV/div	-1 V		0.98 V	1.02 V
	200 mV/div	10 V		-10.17 V	-9.83 V
	200 mV/div	0 V		-22.00 mV	22.00 mV
	200 mV/div	-10 V		9.83 V	10.17 V
	1 V/div	20 V		-20.30 V	-19.70 V
	1 V/div	0 V		-102.00 mV	102.00 mV
	1 V/div	-20 V		19.70 V	20.30 V

Channel Setting	Vertical Scale	Offset	Test Result	Min.	Max.
	5 V/div	100 V		-101.50 V	-98.50 V
	5 V/div	0 V		-502.00 mV	502.00 mV
	5 V/div	-100 V		98.50 V	101.50 V
CH2, 50 Ω, 20 MHz BW	100 mV/div	1 V		-1.03 V	-0.97 V
	100 mV/div	0 V		-12.00 mV	12.00 mV
	100 mV/div	-1 V		0.97 V	1.03 V
	200 mV/div	4 V		-4.08 V	-3.92 V
	200 mV/div	0 V		-22.00 mV	22.00 mV
	200 mV/div	-4 V		3.92 V	4.08 V
CH3, 1 MΩ, 20 MHz BW	10 mV/div	1 V		-1.02 V	-0.98 V
	10 mV/div	0 V		-3.00 mV	3.00 mV
	10 mV/div	-1 V		0.98 V	1.02 V
	200 mV/div	10 V		-10.17 V	-9.83 V
	200 mV/div	0 V		-22.00 mV	22.00 mV
	200 mV/div	-10 V		9.83 V	10.17 V
	1 V/div	20 V		-20.30 V	-19.70 V
	1 V/div	0 V		-102.00 mV	102.00 mV
	1 V/div	-20 V		19.70 V	20.30 V
	5 V/div	100 V		-101.50 V	-98.50 V
	5 V/div	0 V		-502.00 mV	502.00 mV
	5 V/div	-100 V		98.50 V	101.50 V
CH3, 50 Ω, 20 MHz BW	100 mV/div	1 V		-1.03 V	-0.97 V
	100 mV/div	0 V		-12.00 mV	12.00 mV
	100 mV/div	-1 V		0.97 V	1.03 V
	200 mV/div	4 V		-4.08 V	-3.92 V
	200 mV/div	0 V		-22.00 mV	22.00 mV
	200 mV/div	-4 V		3.92 V	4.08 V
CH4, 1 MΩ, 20 MHz BW	10 mV/div	1 V		-1.02 V	-0.98 V
	10 mV/div	0 V		-3.00 mV	3.00 mV
	10 mV/div	-1 V		0.98 V	1.02 V
	200 mV/div	10 V		-10.17 V	-9.83 V
	200 mV/div	0 V		-22.00 mV	22.00 mV
	200 mV/div	-10 V		9.83 V	10.17 V
	1 V/div	20 V		-20.30 V	-19.70 V
	1 V/div	0 V		-102.00 mV	102.00 mV
	1 V/div	-20 V		19.70 V	20.30 V
	5 V/div	100 V		-101.50 V	-98.50 V
	5 V/div	0 V		-502.00 mV	502.00 mV
	5 V/div	-100 V		98.50 V	101.50 V

Channel Setting	Vertical Scale	Offset	Test Result	Min.	Max.
CH4, 50 Ω, 20 MHz BW	100 mV/div	1 V		-1.03 V	-0.97 V
	100 mV/div	0 V		-12.00 mV	12.00 mV
	100 mV/div	-1 V		0.97 V	1.03 V
	200 mV/div	4 V		-4.08 V	-3.92 V
	200 mV/div	0 V		-22.00 mV	22.00 mV
	200 mV/div	-4 V		3.92 V	4.08 V

5.6 Bandwidth Test

5.6.1 Specification

Bandwidth			
Amplitude Loss[1]	MHO934	350 MHz	-3 dB
	MHO954	500 MHz	-3 dB
	MHO984	800 MHz	-3 dB

NOTE

[1]: Amplitude Loss (dB) = 20 x lg (Vrms2/Vrms1); wherein, Vrms1 is the measurement result of amplitude effective value at 1MHz and Vrms2 is the measurement result of amplitude effective value at full bandwidth.

5.6.2 Test Connection Diagram

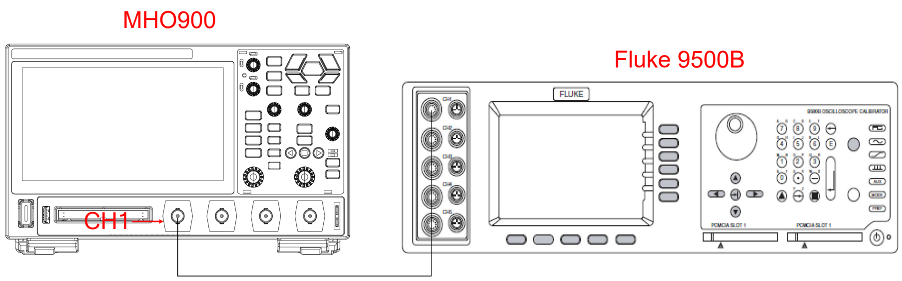

Figure 5.6 Analog Bandwidth Test Connection Diagram

5.6.3 Test Procedures

WARNING

Before connecting, disconnecting, or moving the test hookup, disable the output of the signal generator to avoid causing the dangerous voltage.

Bandwidth test when the input impedance is 1 MΩ

1. Connect the active head of Fluke 9500B to CH1 of the oscilloscope, as shown in *Test Connection Diagram*.
2. Turn on Fluke 9500B and set its impedance to 1 MΩ.
3. Configure the oscilloscope:
   - **a.** Enable CH1.
     - Click or tap the channel status label at the bottom of the screen to enable CH1.
     - Press the front-panel 1 key to enable the channel.
     - In the **Vertical** menu, select the CH1 tab. Select **ON** for the **Display** item to enable CH1.
   - **b.** Click or tap the channel status label of CH1 at the bottom of the screen. Then the **Vertical** menu is displayed. Click or tap the probe ratio list to set the probe attenuation ratio to "1X".
   - **c.** In the **Vertical** menu, select 1 MΩ under **Impedance** to set the input impedance of CH1 to 1 MΩ.
   - **d.** Set the vertical scale to 50 mV/div.
   - **e.** Set the vertical offset to 0 V. Then close the **Vertical** menu.
   - **f.** Click or tap the horizontal label at the top of the screen. Then the **Horizontal** menu is displayed. In this menu, you can set the horizontal time base to 500 ns/div.
   - **g.** Set the horizontal position to 0 s. Close the **Horizontal** menu.
   - **h.** Set the trigger level to 0 V.
4. Output a Sine signal with 1 MHz frequency and 6 div amplitude (e.g. 50/div vertical scale, 300 mVpp amplitude Sine signal) via the Fluke 9500B. Adjust the horizontal time base to display five cycles of the waveforms on the screen.
5. In the **Measure** menu, click or tap **Vertical** measurement item to select "AC.RMS". The AC.RMS measurement result is displayed in the "Result" sidebar at the right section of the screen. Read the value and record the measurement result as Vrms1.
6. Use the Fluke 9500B to output a Sine signal with the maximum bandwidth of the oscilloscope and 6 div amplitude. The bandwidth frequency differs for different oscilloscope models. For details, please refer to *Specification*. Adjust the horizontal time base to display five cycles of the waveforms on the screen.
7. Check the AC.RMS "Result" sidebar at the right section of the screen. Read and record the data as Vrms2.

8. Calculate the amplitude loss with the following formula: Amplitude Loss (dB) = 20 x lg (Vrms2/Vrms1).
9. Repeat Step 2-7. Measure Vrms1 and Vrms2, and calculate the amplitude loss of 500 mV/div vertical scale.
10. Turn off CH1. Measure CH2, CH3, and CH4 respectively using the method above and record the measurement results.

Bandwidth test when the input impedance is 50 Ω

1. Connect the active head of Fluke 9500B to CH1 of the oscilloscope, as shown in *Test Connection Diagram*.
2. Turn on Fluke 9500B and set its impedance to 50 Ω.
3. Configure the oscilloscope:

   a. Enable CH1.

   - Click or tap the channel status label at the bottom of the screen to enable CH1.
   - Press the front-panel 1 key to enable the channel.
   - In the **Vertical** menu, select the CH1 tab. Select **ON** for the **Display** item to enable CH1.

   b. Click or tap the channel status label of CH1 at the bottom of the screen. Then the **Vertical** menu is displayed. Click or tap the probe ratio list to set the probe attenuation ratio to "1X".

   c. In the **Vertical** menu, click or tap 50 Ω under **Impedance** to set the input impedance of CH1 to 50 Ω.

   d. Set the vertical scale to 100 mV/div.

   e. Set the vertical offset to 0 V. Then close the **Vertical** menu.

   f. Click or tap the horizontal menu at the top of the screen. Then the **Horizontal** system menu is displayed. In this menu, you can set the horizontal timebase to 500 ns/div.

   g. Set the horizontal position to 0 s. Close the **Horizontal** menu.

   h. Set the trigger level to 0 V.

4. Output a Sine signal with 1 MHz frequency and 6 div amplitude (e.g. 100/div vertical scale, 600 mVpp amplitude Sine signal) via the Fluke 9500B. Adjust the horizontal time base to display five cycles of the waveforms on the screen.

5. In the **Measure** menu, click or tap **Vertical** measurement item to select "AC.RMS". The AC.RMS measurement result is displayed in the "Result" sidebar at the right section of the screen. Read the value and record the measurement result as Vrms1.
6. Use the Fluke 9500B to output a Sine signal with the maximum bandwidth of the oscilloscope and 6 div amplitude. The bandwidth frequency differs for different oscilloscope models. For details, please refer to *Specification*. Adjust the horizontal time base to display five cycles of the waveforms on the screen.
7. Check the AC.RMS "Result" sidebar at the right section of the screen. Read and record the data as Vrms2.
8. Calculate the amplitude loss with the following formula: Amplitude Loss (dB) = 20 x lg (Vrms2/Vrms1).
9. Repeat Step 2-7. Measure Vrms1 and Vrms2, and calculate the amplitude loss of 500 mV/div vertical scale.
10. Turn off CH1. Measure CH2, CH3, and CH4 respectively using the method above and record the measurement results.

5.6.4 Test Record From

50 Ω Input Impedance

Channel	Vertical Scale	Test Result			Limit	Pass/Fail
		Vrms1	Vrms2	Amplitude Loss[1]		
CH1	100 mV/div				-3 dB to 3 dB	
	500 mV/div					
CH2	100 mV/div					
	500 mV/div					
CH3	100 mV/div					
	500 mV/div					
CH4	100 mV/div					
	500 mV/div					

1 MΩ Input Impedance

Channel	Vertical Scale	Test Result			Limit	Pass/Fail
		Vrms1	Vrms2	Amplitude Loss[1]		
CH1	50 mV/div				-3 dB to 3 dB	
	500 mV/div					
CH2	50 mV/div					
	500 mV/div					
CH3	50 mV/div					
	500 mV/div					
CH4	50 mV/div					

Channel	Vertical Scale	Test Result			Limit	Pass/Fail
		Vrms1	Vrms2	Amplitude Loss[1]		
	500 mV/div					

NOTE

[1]: Amplitude Loss (dB) = 20 x lg (Vrms2/Vrms1). Wherein, Vrms1 is the measurement result of amplitude effective value at 1 MHz and Vrms2 is the measurement result of amplitude effective value at full bandwidth.

5.7 Time Base Accuracy Test

5.7.1 Specification

Timebase Accuracy	
Specification	±(1.5 ppm + 1 ppm/year[1]× number of years that the instrument has been used[2])

NOTE

[1]: Calculation Result = Test Result ΔT/1 ms.

[2]: For the number of years that the instrument has been used, please calculate it according to the date in the verification certificate provided when the instrument leaves factory.

5.7.2 Test Connection Diagram

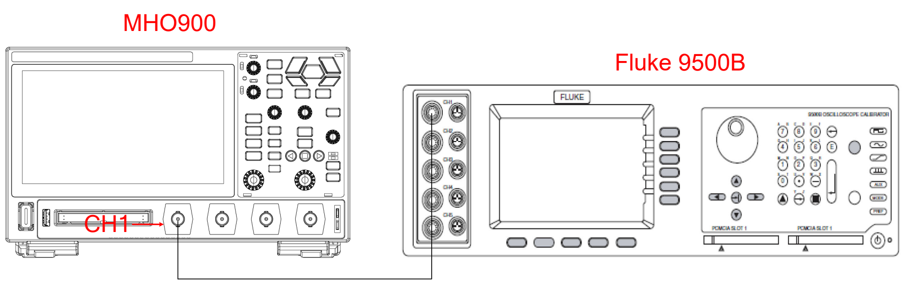

Figure 5.7 Time Base Accuracy Test Connection Diagram

5.7.3 Test Procedures

WARNING

Before connecting, disconnecting, or moving the test hookup, disable the output of the signal generator to avoid causing the dangerous voltage.

1. Connect the active head of Fluke 9500B to CH1 of the oscilloscope, as shown in *Test Connection Diagram*.
2. Output a Sine signal with 10 MHz frequency and 1 Vpp amplitude via Fluke 9500B.
3. Configure the oscilloscope:
   a. Press the front-panel DEFAULT key to restore the oscilloscope to the default settings.
   b. Enable CH1.
      - Click or tap the channel status label at the bottom of the screen to enable CH1.
      - Press the front-panel 1 key to enable the channel.
      - In the **Vertical** menu, select the CH1 tab. Select **ON** for the **Display** item to enable CH1.
   c. Click or tap the channel status label of CH1 at the bottom of the screen. Then the **Vertical** menu is displayed. Click or tap the probe ratio list to set the probe attenuation ratio to "1X".
   d. In the **Vertical** menu, select 1 MΩ under **Impedance** to set the input impedance of CH1 to 1 MΩ.
   e. Set the vertical scale to 200 mV/div.
   f. Set the vertical offset to 0 V. Then close the **Vertical** menu.
   g. Click or tap the horizontal label at the top of the screen. Then the **Horizontal** menu is displayed. In this menu, you can set the horizontal time base to 1 ns/div.
   h. Set the horizontal position to 1 ms. Close the **Horizontal** menu.
   i. Click or tap the trigger label at the top of the screen. Set the trigger level to 0 V.
4. Click or tap > **Cursor**. Then the "Result" sidebar is displayed at the right section of the screen. Click or tap the "Result" sidebar and select **Setting** in the pop-up window. In the **Mode** item, select **Manual** to enable the manual cursor measurement function. Then measure the offset (ΔT) of the middle point of the signal (namely the crossing point of the rising edge of the current signal and the trigger level line) relative to the screen center and record the measurement result.
5. Calculate the time base accuracy, namely the ratio of ΔT to the horizontal position of the oscilloscope. For example, if the offset measured is 1 ns, then the time base accuracy is 1 ns/1 ms = 1 ppm.
6. Calculate the timebase accuracy limit by using the formula ±(1.5 ppm + 1 ppm/year × number of years that the instrument has been used).

5.7.4 Test Record From

Channel	Test Result ΔT	Calculation Result[1]	Limit	Pass/Fail
CH1			± (1.5 ppm + 1 ppm/year[1] × number of years that the instrument has been used[2])	

NOTE

[1]: Calculation Result = Test Result ΔT/1 ms.

[2]: For the number of years that the instrument has been used, please calculate it according to the date in the verification certificate provided when the instrument leaves factory.

6 Appendix: Test Record Form

RIGOL MHO900 Series Digital Oscilloscope Performance Verification Test Record Form

Model: ____________ **Tested by:** ____________ **Test Date:** ____________

Random Noise Test Record Form

Vertical Scale	Bandwidth	Test Result	Limit	Pass/Fail
50 Ω				
200 μV/div	20 MHz		66 μV_{rms}	
500 μV/div	250 MHz		74.4 μV_{rms}	
1 mV/div	Full BW		139.2 μV_{rms}	
2 mV/div			136.8 μV_{rms}	
5 mV/div			145.2 μV_{rms}	
10 mV/div			406.8 μV_{rms}	
20 mV/div			465.6 μV_{rms}	
50 mV/div			694.8 μV_{rms}	
100 mV/div			1152 μV_{rms}	
200 mV/div			4.92 mV_{rms}	
500 mV/div			7.2 mV_{rms}	
1 V/div			11.52 mV_{rms}	
1 MΩ				
1 mV/div	Full BW		130.8 μV_{rms}	
2 mV/div			127.2 μV_{rms}	
5 mV/div			153.6 μV_{rms}	
10 mV/div			270 μV_{rms}	
20 mV/div			331.2 μV_{rms}	
50 mV/div			614.4 μV_{rms}	
100 mV/div			3 mV_{rms}	
200 mV/div			3.6 mV_{rms}	
500 mV/div			12.84 mV_{rms}	
1 V/div			16.08 mV_{rms}	
2 V/div			24.36 mV_{rms}	
5 V/div			117.84 mV_{rms}	
10 V/div			156.36 mV_{rms}	

Impedance Test Record From: 1 MΩ Input Impedance

Channel	Vertical Scale	Test Result	Limit	Pass/Fail
CH1	50 mV/div		0.99 MΩ to 1.01 MΩ	
	500 mV/div			
CH2	50 mV/div			
	500 mV/div			
CH3	50 mV/div			
	500 mV/div			
CH4	50 mV/div			
	500 mV/div			

Impedance Test Record Form: 50 Ω Input Impedance

Channel	Vertical Scale	Test Result	Limit	Pass/Fail
CH1	50 mV/div		49.5 Ω to 50.5 Ω	
	500 mV/div			
CH2	50 mV/div			
	500 mV/div			
CH3	50 mV/div			
	500 mV/div			
CH4	50 mV/div			
	500 mV/div			

Input Capacitance Test Record Form

Channel	Vertical Scale	Test Result	Limit	Pass/Fail
CH1	50 mV/div		18 pF ± 3 pF	
	500 mV/div			
CH2	50 mV/div			
	500 mV/div			
CH3	50 mV/div			
	500 mV/div			
CH4	50 mV/div			
	500 mV/div			

DC Gain Accuracy Test Record Form: 1 MΩ Input Impedance

Channel	Vertical Scale	Test Result			Limit	Pass/Fail
		Vavg1	Vavg2	Calculation Result[1]		
CH1	1 mV/div				≤2%	
	2 mV/div					
	5 mV/div				≤1%	

Channel	Vertical Scale	Test Result			Limit	Pass/Fail
		Vavg1	Vavg2	Calculation Result[1]		
	10 mV/div					
	20 mV/div					
	50 mV/div					
	100 mV/div					
	200 mV/div					
	500 mV/div					
	1 V/div					
CH2	1 mV/div				≤2%	
	2 mV/div					
	5 mV/div				≤1%	
	10 mV/div					
	20 mV/div					
	50 mV/div					
	100 mV/div					
	200 mV/div					
	500 mV/div					
	1 V/div					
CH3	1 mV/div				≤2%	
	2 mV/div					
	5 mV/div				≤1%	
	10 mV/div					
	20 mV/div					
	50 mV/div					
	100 mV/div					
	200 mV/div					
	500 mV/div					
	1 V/div					
CH4	1 mV/div				≤2%	
	2 mV/div					
	5 mV/div				≤1%	
	10 mV/div					
	20 mV/div					
	50 mV/div					
	100 mV/div					
	200 mV/div					
	500 mV/div					
	1 V/div					

NOTE

[1]: The calculation formula is |(Vavg1 - Vavg2) - (Vout1 - Vout2)|/Full Scale x 100%; wherein, Vout1 is 3 x the current vertical scale and Vout2 is -3 x the current vertical scale.

DC Gain Accuracy Test Record Form: 50 Ω Input Impedance

Channel	Vertical Scale	Test Result			Limit	Pass/Fail
		Vavg1	Vavg2	Calculation Result[1]		
CH1	1 mV/div				≤2%	
	2 mV/div					
	5 mV/div				≤1%	
	10 mV/div					
	20 mV/div					
	50 mV/div					
	100 mV/div					
	200 mV/div					
	500 mV/div					
	1 V/div					
	2 V/div					
	5 V/div					
	10 V/div					
CH2	1 mV/div				≤2%	
	2 mV/div					
	5 mV/div				≤1%	
	10 mV/div					
	20 mV/div					
	50 mV/div					
	100 mV/div					
	200 mV/div					
	500 mV/div					
	1 V/div					
	2 V/div					
	5 V/div					
	10 V/div					
CH3	1 mV/div				≤2%	
	2 mV/div					
	5 mV/div				≤1%	
	10 mV/div					
	20 mV/div					
	50 mV/div					
	100 mV/div					

Channel	Vertical Scale	Test Result			Limit	Pass/Fail
		Vavg1	Vavg2	Calculation Result[1]		
	200 mV/div					
	500 mV/div					
	1 V/div					
	2 V/div					
	5 V/div					
	10 V/div					
CH4	1 mV/div				≤2%	
	2 mV/div					
	5 mV/div				≤1%	
	10 mV/div					
	20 mV/div					
	50 mV/div					
	100 mV/div					
	200 mV/div					
	500 mV/div					
	1 V/div					
	2 V/div					
	5 V/div					
	10 V/div					

NOTE

[1]: The calculation formula is |(Vavg1 - Vavg2) - (Vout1 - Vout2)|/Full Scale x 100%; wherein, Vout1 is 3 x the current vertical scale and Vout2 is -3 x the current vertical scale.

DC Offset Accuracy Test Record Form

Channel Setting	Vertical Scale	Offset	Test Result	Min.	Max.
CH1, 1 MΩ, 20 MHz BW	10 mV/div	1 V		-1.02 V	-0.98 V
	10 mV/div	0 V		-3.00 mV	3.00 mV
	10 mV/div	-1 V		0.98 V	1.02 V
	200 mV/div	10 V		-10.17 V	-9.83 V
	200 mV/div	0 V		-22.00 mV	22.00 mV
	200 mV/div	-10 V		9.83 V	10.17 V
	1 V/div	20 V		-20.30 V	-19.70 V
	1 V/div	0 V		-102.00 mV	102.00 mV
	1 V/div	-20 V		19.70 V	20.30 V
	5 V/div	100 V		-101.50 V	-98.50 V
	5 V/div	0 V		-502.00 mV	502.00 mV
	5 V/div	-100 V		98.50 V	101.50 V

Channel Setting	Vertical Scale	Offset	Test Result	Min.	Max.
CH1, 50 Ω, 20 MHz BW	100 mV/div	1 V		-1.03 V	-0.97 V
	100 mV/div	0 V		-12.00 mV	12.00 mV
	100 mV/div	-1 V		0.97 V	1.03 V
	200 mV/div	4 V		-4.08 V	-3.92 V
	200 mV/div	0 V		-22.00 mV	22.00 mV
	200 mV/div	-4 V		3.92 V	4.08 V
CH2, 1 MΩ, 20 MHz BW	10 mV/div	1 V		-1.02 V	-0.98 V
	10 mV/div	0 V		-3.00 mV	3.00 mV
	10 mV/div	-1 V		0.98 V	1.02 V
	200 mV/div	10 V		-10.17 V	-9.83 V
	200 mV/div	0 V		-22.00 mV	22.00 mV
	200 mV/div	-10 V		9.83 V	10.17 V
	1 V/div	20 V		-20.30 V	-19.70 V
	1 V/div	0 V		-102.00 mV	102.00 mV
	1 V/div	-20 V		19.70 V	20.30 V
	5 V/div	100 V		-101.50 V	-98.50 V
	5 V/div	0 V		-502.00 mV	502.00 mV
	5 V/div	-100 V		98.50 V	101.50 V
CH2, 50 Ω, 20 MHz BW	100 mV/div	1 V		-1.03 V	-0.97 V
	100 mV/div	0 V		-12.00 mV	12.00 mV
	100 mV/div	-1 V		0.97 V	1.03 V
	200 mV/div	4 V		-4.08 V	-3.92 V
	200 mV/div	0 V		-22.00 mV	22.00 mV
	200 mV/div	-4 V		3.92 V	4.08 V
CH3, 1 MΩ, 20 MHz BW	10 mV/div	1 V		-1.02 V	-0.98 V
	10 mV/div	0 V		-3.00 mV	3.00 mV
	10 mV/div	-1 V		0.98 V	1.02 V
	200 mV/div	10 V		-10.17 V	-9.83 V
	200 mV/div	0 V		-22.00 mV	22.00 mV
	200 mV/div	-10 V		9.83 V	10.17 V
	1 V/div	20 V		-20.30 V	-19.70 V
	1 V/div	0 V		-102.00 mV	102.00 mV
	1 V/div	-20 V		19.70 V	20.30 V
	5 V/div	100 V		-101.50 V	-98.50 V
	5 V/div	0 V		-502.00 mV	502.00 mV
	5 V/div	-100 V		98.50 V	101.50 V
CH3, 50 Ω, 20 MHz BW	100 mV/div	1 V		-1.03 V	-0.97 V
	100 mV/div	0 V		-12.00 mV	12.00 mV
	100 mV/div	-1 V		0.97 V	1.03 V
	200 mV/div	4 V		-4.08 V	-3.92 V
	200 mV/div	0 V		-22.00 mV	22.00 mV

Channel Setting	Vertical Scale	Offset	Test Result	Min.	Max.
	200 mV/div	-4 V		3.92 V	4.08 V
CH4, 1 MΩ, 20 MHz BW	10 mV/div	1 V		-1.02 V	-0.98 V
	10 mV/div	0 V		-3.00 mV	3.00 mV
	10 mV/div	-1 V		0.98 V	1.02 V
	200 mV/div	10 V		-10.17 V	-9.83 V
	200 mV/div	0 V		-22.00 mV	22.00 mV
	200 mV/div	-10 V		9.83 V	10.17 V
	1 V/div	20 V		-20.30 V	-19.70 V
	1 V/div	0 V		-102.00 mV	102.00 mV
	1 V/div	-20 V		19.70 V	20.30 V
	5 V/div	100 V		-101.50 V	-98.50 V
	5 V/div	0 V		-502.00 mV	502.00 mV
	5 V/div	-100 V		98.50 V	101.50 V
CH4, 50 Ω, 20 MHz BW	100 mV/div	1 V		-1.03 V	-0.97 V
	100 mV/div	0 V		-12.00 mV	12.00 mV
	100 mV/div	-1 V		0.97 V	1.03 V
	200 mV/div	4 V		-4.08 V	-3.92 V
	200 mV/div	0 V		-22.00 mV	22.00 mV
	200 mV/div	-4 V		3.92 V	4.08 V

Analog Bandwidth Test Record Form: 1 MΩ Input Impedance

Channel	Vertical Scale	Test Result			Limit	Pass/Fail
		Vrms1	Vrms2	Amplitude Loss[1]		
CH1	100 mV/div				-3 dB to 3 dB	
	500 mV/div					
CH2	100 mV/div					
	500 mV/div					
CH3	100 mV/div					
	500 mV/div					
CH4	100 mV/div					
	500 mV/div					

NOTE

[1]: Amplitude Loss (dB) = 20 x lg (Vrms2/Vrms1); wherein, Vrms1 is the measurement result of amplitude effective value at 1MHz and Vrms2 is the measurement result of amplitude effective value at full bandwidth.

Analog Bandwidth Test Record Form: 50 Ω Input Impedance

Channel	Vertical Scale	Test Result			Limit	Pass/Fail
		Vrms1	Vrms2	Amplitude Loss[1]		
CH1	50 mV/div				-3 dB to 3 dB	
	500 mV/div					
CH2	50 mV/div					
	500 mV/div					
CH3	50 mV/div					
	500 mV/div					
CH4	50 mV/div					
	500 mV/div					

NOTE

[1]: Amplitude Loss (dB) = 20 x lg (Vrms2/Vrms1); wherein, Vrms1 is the measurement result of amplitude effective value at 1MHz and Vrms2 is the measurement result of amplitude effective value at full bandwidth.

Time Base Accuracy Test Record Form

Channel	Test Result ΔT	Calculation Result[1][1]	Limit	Pass/Fail
CH1			± (1.5 ppm + 1 ppm/ year[1]× number of years that the instrument has been used[2])	

NOTE

[1]: Calculation Result = Test Result ΔT/1 ms.

[2]: For the number of years that the instrument has been used, please calculate it according to the date in the verification certificate provided when the instrument leaves factory.

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