RIGOL

DS70000 Series

Digital Oscilloscope

Performance Verification

Jun.2022

Guaranty and Declaration

Copyright

Trademark Information

Notices

- RIGOL products are covered by P.R.C. and foreign patents, issued and pending.
- RIGOL reserves the right to modify or change parts of or all the specifications and pricing policies at the company's sole decision.
- Information in this publication replaces all previously released materials.
- Information in this publication is subject to change without notice.
- RIGOL shall not be liable for either incidental or consequential losses in connection with the furnishing, use, or performance of this manual, as well as any information contained.
- Any part of this document is forbidden to be copied, photocopied, or rearranged without prior written approval of RIGOL.

Product Certification

RIGOL guarantees that this product conforms to the national and industrial standards in China as well as the ISO9001:2015 standard and the ISO14001:2015 standard. Other international standard conformance certifications are in progress.

Contact Us

If you have any problem or requirement when using our products or this manual, please contact RIGOL.

E-mail: service@rigol.com

Website: *http://www.rigol.com*

Section	Description	Page

List of Tables III

1 Safety Requirement 1
1.1 General Safety Summary 1
1.2 Safety Notices and Symbols 2
2 Specification 4
3 Document Overview 6
4 Overview 8
4.1 Test Preparations 8
4.2 Test Result Record 9
4.3 Specifications 10
5 Performance Verification Test 11
5.1 Impedance Test 11
5.1.1 Specification 11
5.1.2 Test Connection Diagram 12
5.1.3 Test Procedures 12
5.1.4 Test Record Form 13
5.2 DC Gain Accuracy Test 14
5.2.1 Specification 14
5.2.2 Test Connection Diagram 14
5.2.3 Test Procedures 14
5.2.4 Test Record Form 17
5.3 DC Offset Accuracy Test 20
5.3.1 Specification 20
5.3.2 Test Connection Diagram 20
5.3.3 Test Procedures 20
5.3.4 Test Record Form 21
5.4 Bandwidth Test 23
5.4.1 Specification 23
5.4.2 Test Connection Diagram 23
5.4.3 Test Procedures 24
5.4.4 Test Record Form 25
5.5 Timebase Accuracy Test 25
5.5.1 Specification 25

5.5.2 Test Connection Diagram........ 26
5.5.3 Test Procedures........ 26
5.5.4 Test Record Form........ 27
5.6 Random Noise Test........ 27
5.6.1 Test Procedures........ 28
5.6.2 Test Record Form........ 28
6 Appendix: Test Record Form........ 30

List of Tables

Table 2.1 Specifications 4

Table 5.1 Test Devices 11

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.**

  Please use the specified fuses. Avoid Circuit or Wire Exposure.

- **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 Symbols on the Product:

- **DANGER**

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

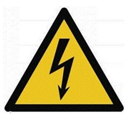
- **WARNING**

  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.

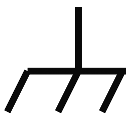
Safety Symbols on the Product:



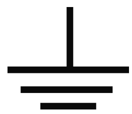
Hazardous Voltage

Safety Warning

Protective Earth Terminal



Chassis Ground



Test Ground

2 Specification

This chapter lists the technical specifications of the DS70000 series oscilloscope.

The maximum sample rate of DS70000 series digital oscilloscope is 20 GSa/s, the highest bandwidth is 5 GHz. RIGOL's brand new UltraVison III technical platform guarantees the specifications to reach the advanced level in the industry, with the capture rate up to 1,000,000 wfms/s, 2 Gpts memory depth, and 8 bit ~ 16 bit adjustable resolution.

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 DS70000 Datasheet).
- The instrument must be powered from a source that meets the requirement for the power supply (For the power specifications, refer to DS70000 Datasheet).
- 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 DS70504 and DS70304. For other technical specifications of DS70000, please refer to *DS70000 Datasheet*.

Table 2.1 Specifications

Overview of the DS70000 Series Technical Specifications		
Model	DS70504	DS70304
No. of Input Channels	4 analog channel inputs 1 EXT channel input	
Input Coupling	DC, AC, or GND	
Input Impedance	1 MΩ ± 1%, 50 Ω ± 2.5%	
Analog bandwidth (50 Ω, -3 dB) [1]	5 GHz	3 GHz
Analog bandwidth (1 MΩ, -3 dB)	500 MHz	
Bandwidth Limit	1 MΩ	20 MHz, 250 MHz
	50 Ω	20 MHz, 250 MHz, 1 GHz or 2 GHz

Overview of the DS70000 Series Technical Specifications	
Sampling Mode	Real-time sampling
Max. Analog Channel Sample Rate	half-channel[1]: 20 GSa/s full-channel[2]: 10 GSa/s
Max. Memory Depth	Standard: 500 Mpts Option: 2 Gpts (half-channel[1]), 1 Gpts (full-channel[2])
Max. Waveform Capture Rate[3]	>1,000,000 wfms/s
Vertical Resolution	8-16 bits (selectable)
DC Gain Accuracy	± 2% Full Scale
Timebase Accuracy	±0.5 ppm ± 1 ppm/year
Trigger Source	Analog channel (1-4), EXT TRIG, and AC Line

NOTE

[1]: 5 GHz bandwidth is only applicable to half-channel mode; 4 GHz for full-channel mode. CH1 and CH2 are considered as a group; CH3 and CH4 are considered as another group. If one of the two channels in each group is enabled, it is called half-channel mode.

[2]: CH1 and CH2 are considered as a group; CH3 and CH4 are considered as another group. If two channels in either one group or four channels are all enabled, it is called full-channel mode.

[3]: Maximum value. Half channel, 5 ns horizontal time base, set a sine wave signal with 1 kpts memory depth, 4 div input amplitude, 10 MHz frequency. Others are default settings.

3 Document Overview

This manual is designed to guide you to properly test the performance specifications of RIGOL DS70000 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

PVA29100-1110

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 clicking or tapping the "Setup" sub-menu under the "Utility" function menu to view the basic setting configuration items.

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 connectors on the front or rear panel are usually denoted by the format of "Connector Name (Bold) + Square Brackets (Bold)". For example, **[RF OUTPUT 50Ω]**.

Content Conventions in this Manual

DS70000 series includes the following models. Unless otherwise specified, this manual takes DS70504 as an example to illustrate the methods for the performance verification of DS70000 series.

Model	Max. Analog Bandwidth	No. of Analog Channels
DS70504	5 GHz	4
DS70304	3 GHz	4

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 "Troubleshooting" section in *DS70000 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 to 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 following self-calibration interface is 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, click you can or tap **Exit** to cancel self-calibration operation at any time.

3. After completing the self-calibration, restart the oscilloscope. In the **Horizontal** system menu, select "Average" for the **Acquisition** menu. Then click or tap the input field for the Averages menu item to set it by using the pop-up numeric keypad. Set the number of averages to 16.
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. If yes, 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 last 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 *DS70000 DataSheet* (available to download them from RIGOL website: *http://www.rigol.com*).

TIP

All the specifications are only valid when the oscilloscope has been warmed up for more than 30 minutes.

5 Performance Verification Test

This chapter takes DS70504 as an example to illustrate the performance verification test methods and procedures of DS70000 series digital oscilloscope. The recommended test devices in this manual is shown below. You can also use other devices that fulfill the "Specification" in the following table.

Table 5.1 Test Devices

Device	Specification	Recommended Model
DC Votage Source	3 mV to 4 V, ±0.1% accuracy	Fluke 9500B
RF Signal Generator	10 kHz to 5 GHz	RIGOL DSG3000B Series RF Signal Generator (with the OCXO-B08 option)
Power Meter	1 MHz to 5 GHz, ±3% accuracy	-
Power Sensor	1 MHz to 5 GHz, ±3% accuracy	-
Power Splitter	Full-scale accuracy ≤ 0.2 dB	-

TIP

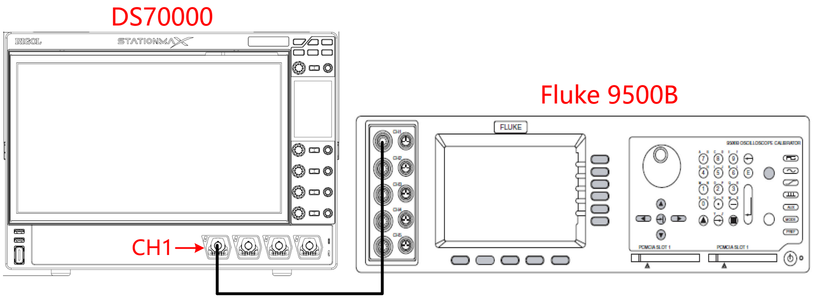
1. Make sure that the oscilloscope passes the self-test and self-calibration is performed before executing the performance verification tests.
2. Make sure that the oscilloscope has been warmed up for at least 30 minutes before executing any of the following tests.
3. Please reset the instrument to the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

5.1 Impedance Test

5.1.1 Specification

Input Impedance	
Analog Channel	1 MΩ: 0.99 MΩ to 1.01 MΩ
	50 Ω: 48.75 Ω to 51.25 Ω

5.1.2 Test Connection Diagram



5.1.3 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 the figure above.

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 the channel.
- Press the front-panel key 1 to enable the channel, and the backlight of this key and the corresponding channel key is illuminated.
- In the **Vertical** menu, select the CH1 tab. Select **ON** for the **Display** menu to turn CH1 on.

b. In the **Vertical** system menu, click or tap 1 MΩ under **Impedance** to set the input impedance of CH1 to 1 MΩ.

c. Set the vertical scale of CH1 to 100 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 of the oscilloscope to 500 mV/div; read and record the resistance measured.
5. Turn off CH1. Measure the resistances 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 the figure above.
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 of the oscilloscope to 500 mV/div; read and record the resistance measured.
5. Turn off CH1. Measure the resistances of CH2, CH3, and CH4 respectively using the method above and record the measurement results.

5.1.4 Test Record Form

1 MΩ Input Impedance

Channel	Vertical Scale	Test Result	Limit	Pass/Fail
CH1	100 mV/div		0.99 MΩ to 1.01 MΩ	
	500 mV/div		0.99 MΩ to 1.01 MΩ	
CH2	100 mV/div		0.99 MΩ to 1.01 MΩ	
	500 mV/div		0.99 MΩ to 1.01 MΩ	
CH3	100 mV/div		0.99 MΩ to 1.01 MΩ	
	500 mV/div		0.99 MΩ to 1.01 MΩ	
CH4	100 mV/div		0.99 MΩ to 1.01 MΩ	
	500 mV/div		0.99 MΩ to 1.01 MΩ	

50 Ω Input Impedance

Channel	Vertical Scale	Test Result	Limit	Pass/Fail
CH1	100 mV/div		48.75 Ω to 51.25 Ω	
	500 mV/div		48.75 Ω to 51.25 Ω	
CH2	100 mV/div		48.75 Ω to 51.25 Ω	
	500 mV/div		48.75 Ω to 51.25 Ω	
CH3	100 mV/div		48.75 Ω to 51.25 Ω	
	500 mV/div		48.75 Ω to 51.25 Ω	
CH4	100 mV/div		48.75 Ω to 51.25 Ω	
	500 mV/div		48.75 Ω to 51.25 Ω	

5.2 DC Gain Accuracy Test

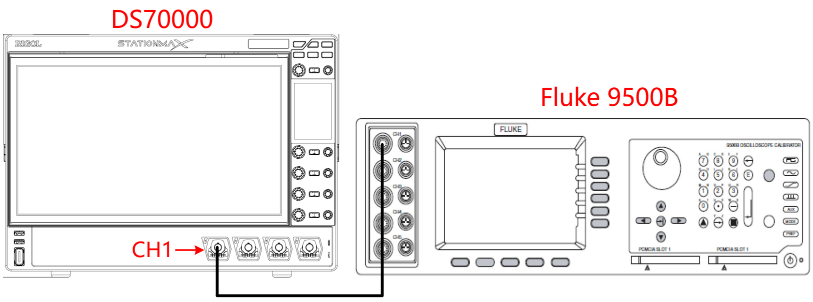
5.2.1 Specification

DC Gain Accuracy	
Specification	±2% of Full Scale[1]

NOTE

[1]: Full scale = 8 × Current Vertical Scale. 1 mV/div and 2 mV/div are a magnification of 4 mV/div setting. For vertical accuracy calculations, use full scale of 32 mV for 1 mV/div and 2 mV/div vertical sensitivity setting.

5.2.2 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.

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 the figure above.
2. Set the impedance of Fluke 9500B to 1 MΩ.
3. Output a DC signal with +3 mV_{DC} voltage (Vout1) via Fluke 9500B.
4. Configure the oscilloscope:

   a. Press the front-panel key  to enable CH1.

   b. Click or tap the channel status label at the bottom of the screen. Then the **Vertical** menu is displayed. Then click or tap **Probe** to enter the **Probe** setting menu. Set the probe attenuation ratio to "1X".

   c. In the **Vertical** system menu, click or tap 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 timebase to 1 μs/div.

   f. Set the vertical offset to 0 V.

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

   h. Adjust the trigger level to avoid that the signals are being triggered by mistake.
5. In the **Measure** menu, click or tap **Vertical** measurement item to select "Vavg". The Vavg measurement result list is displayed at the right section of the screen. Read the value from the "result" list and record the measurement result of Vavg1.
6. Adjust Fluke 9500B to make it output a DC signal with -3 mV_{DC} 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 respectively.

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

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

d. Calculate the relative error of each 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 the figure above.
2. Turn on Fluke 9500B; set its impedance to 50 Ω.
3. Output a DC signal with +3 mV_{DC} voltage (Vout1).
4. Configure the oscilloscope:

    a. Turn on 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 timebase to 1 μs/div.

    f. Set the vertical offset to 0.

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

    h. Adjust the trigger level to avoid that the signals are 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.

5.2.4 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				≤2%	
	5 mV/div				≤2%	
	10 mV/div				≤2%	
	20 mV/div				≤2%	
	50 mV/div				≤2%	
	100 mV/div				≤2%	
	200 mV/div				≤2%	
	500 mV/div				≤2%	
	1 V/div				≤2%	
	2 V/div				≤2%	
	5 V/div				≤2%	
	10 V/div				≤2%	
CH2	1 mV/div				≤2%	
	2 mV/div				≤2%	
	5 mV/div				≤2%	
	10 mV/div				≤2%	
	20 mV/div				≤2%	
	50 mV/div				≤2%	
	100 mV/div				≤2%	
	200 mV/div				≤2%	
	500 mV/div				≤2%	
	1 V/div				≤2%	
	2 V/div				≤2%	
	5 V/div				≤2%	
	10 V/div				≤2%	
CH3	1 mV/div				≤2%	
	2 mV/div				≤2%	

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

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				≤2%	
	5 mV/div				≤2%	
	10 mV/div				≤2%	
	20 mV/div				≤2%	
	50 mV/div				≤2%	
	100 mV/div				≤2%	
	200 mV/div				≤2%	
	500 mV/div				≤2%	
	1 V/div				≤2%	
CH2	1 mV/div				≤2%	

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

NOTE

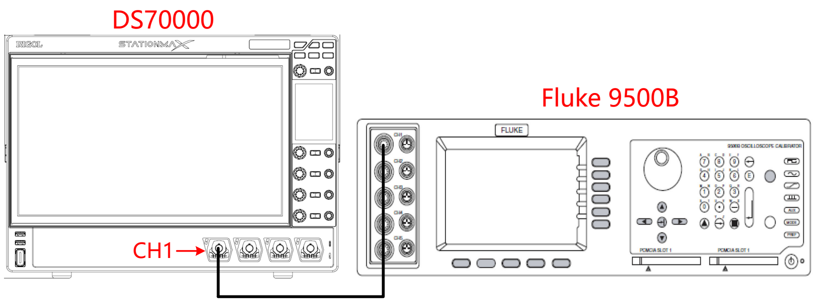
[1]: The calculation formula is |(Vavg1 - Vavg2) - (Vout1 - Vout2)|/Full Scale × 100%; wherein, Vout1 and Vout2 are 3 × the current vertical scale and -3 × the current vertical scale respectively.

5.3 DC Offset Accuracy Test

5.3.1 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)

5.3.2 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 the figure above.

2. Set the impedance of Fluke 9500B to 50 Ω.

3. Configure the oscilloscope:

a. Press **Default** on the front panel to restore the oscilloscope to the default settings.

b. Click or tap the channel status label at the bottom of the screen. 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.

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

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

e. Set the offset to 1 V, as shown in the test record form. Close the Vertical system menu.

f. Click or tap the horizontal menu ("D" icon) at the top of the screen. Then the **Horizontal** system menu is displayed. In this menu, set the timebase to 1 ms/div. Select "Average" for the **Acquisition** menu. Then click or tap the input field for the **Averages** menu item to set it by using the pop-up numeric keypad. Set the number of averages item to 16. Close the Horizontal system menu.

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

h. Adjust the trigger level to avoid that the signals are 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 measurement result list is displayed at the right section of the screen. Read the value from the "result" list 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" list and record the measurement result.
8. Repeat Step 7-9. Measure and record the results according to *Test Record Form*.

5.3.4 Test Record Form

Channel Setting	Vertical Scale	Offset	Test Result	Min.	Max.
CH1, 1 MΩ, 20 MHz BW	1 mV/div	1 V		-1.0171 V	-982.90 mV
	1 mV/div	0 V		-2.1000 mV	2.1000 mV
	1 mV/div	-1 V		982.90 mV	1.0171 V
	200 mV/div	30 V		-30.472 V	-29.528 V
	200 mV/div	0 V		-22.000 mV	22.000 mV
	200 mV/div	-30 V		29.528 V	30.472 V
	500 mV/div	100 V		-101.05 V	-98.948 V
	500 mV/div	0 V		-52.000 mV	52.000 mV

Channel Setting	Vertical Scale	Offset	Test Result	Min.	Max.
	500 mV/div	-100 V		98.948 V	101.05 V
CH1, 50 Ω, 20 MHz BW	1 mV/div	1 V		-1.0171 V	-982.90 mV
	1 mV/div	0 V		-2.1000 mV	2.1000 mV
	1 mV/div	-1 V		982.90 mV	1.0171 V
	200 mV/div	4 V		-4.0820 V	-3.9180 V
	200 mV/div	0 V		-22.000 mV	22.000 mV
	200 mV/div	-4 V		3.9180 V	4.0820 V
CH2, 1 MΩ, 20 MHz BW	1 mV/div	1 V		-1.0171 V	-982.90 mV
	1 mV/div	0 V		-2.1000 mV	2.1000 mV
	1 mV/div	-1 V		982.90 mV	1.0171 V
	200 mV/div	30 V		-30.472 V	-29.528 V
	200 mV/div	0 V		-22.000 mV	22.000 mV
	200 mV/div	-30 V		29.528 V	30.472 V
	500 mV/div	100 V		-101.05 V	-98.948 V
	500 mV/div	0 V		-52.000 mV	52.000 mV
	500 mV/div	-100 V		98.948 V	101.05 V
CH2, 50 Ω, 20 MHz BW	1 mV/div	1 V		-1.0171 V	-982.90 mV
	1 mV/div	0 V		-2.1000 mV	2.1000 mV
	1 mV/div	-1 V		982.90 mV	1.0171 V
	200 mV/div	4 V		-4.0820 V	-3.9180 V
	200 mV/div	0 V		-22.000 mV	22.000 mV
	200 mV/div	-4 V		3.9180 V	4.0820 V
CH3, 1 MΩ, 20 MHz BW	1 mV/div	1 V		-1.0171 V	-982.90 mV
	1 mV/div	0 V		-2.1000 mV	2.1000 mV
	1 mV/div	-1 V		982.90 mV	1.0171 V
	200 mV/div	30 V		-30.472 V	-29.528 V
	200 mV/div	0 V		-22.000 mV	22.000 mV
	200 mV/div	-30 V		29.528 V	30.472 V
	500 mV/div	100 V		-101.052 V	-98.948 V
	500 mV/div	0 V		-52.000 mV	52.000 mV
	500 mV/div	-100 V		98.948 V	101.052 V
CH3, 50 Ω, 20 MHz BW	1 mV/div	1 V		-1.0171 V	-982.90 mV
	1 mV/div	0 V		-2.1000 mV	2.1000 mV
	1 mV/div	-1 V		982.90 mV	1.0171 V
	200 mV/div	4 V		-4.0820 V	-3.9180 V
	200 mV/div	0 V		-22.000 mV	22.000 mV
	200 mV/div	-4 V		3.9180 V	4.0820 V
CH4, 1 MΩ, 20 MHz BW	1 mV/div	1 V		-1.0171 V	-982.90 mV
	1 mV/div	0 V		-2.1000 mV	2.1000 mV
	1 mV/div	-1 V		982.90 mV	1.0171 V
	200 mV/div	30 V		-30.472 V	-29.528 V

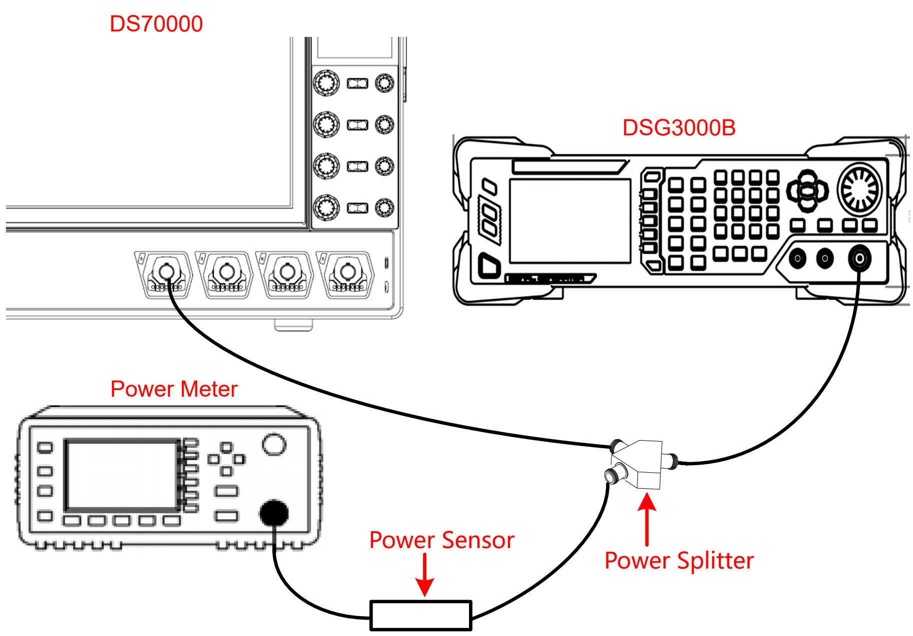
Channel Setting	Vertical Scale	Offset	Test Result	Min.	Max.
	200 mV/div	0 V		-22.000 mV	22.000 mV
	200 mV/div	-30 V		29.528 V	30.472 V
	500 mV/div	100 V		-101.05 V	-98.948 V
	500 mV/div	0 V		-52.000 mV	52.000 mV
	500 mV/div	-100 V		98.948 V	101.05 V
CH4, 50 Ω, 20 MHz BW	1 mV/div	1 V		-1.0171 V	-982.90 mV
	1 mV/div	0 V		-2.1000 mV	2.1000 mV
	1 mV/div	-1 V		982.90 mV	1.0171 V
	200 mV/div	4 V		-4.0820 V	-3.9180 V
	200 mV/div	0 V		-22.000 mV	22.000 mV
	200 mV/div	-4 V		3.9180 V	4.0820 V

5.4 Bandwidth Test

5.4.1 Specification

Model	Bandwidth	Limit
DS70304	3 GHz (50 Ω)	-3 dB, all-channel mode
DS70504	5 GHz (50 Ω)	-3 dB, half-channel

5.4.2 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.

1. The connection diagram is shown in the above figure:

a. Connect the **[RF OUTPUT 50 Ω]** connector of DSG3000B to the input of the power splitter by using the N(M)-N(M) cable.

b. Connect the power meter probe (power sensor) to the output of the power splitter.

c. Connect the other splitter output to CH1 of the oscilloscope by using the N(M)-BNC(M) cable.

2. Set up the power meter: set the power meter to display measurements in watts.

3. Configure the oscilloscope:

a. Press the front-panel key  to enable CH1.

b. In the **Vertical** system menu, click or tap 50 Ω under **Impedance** to set the input impedance of CH1 to 50 Ω. Set the vertical scale to 100 mV/div.

c. In the **Horizontal** system menu, set the horizontal timebase to 500 ns/div.

4. Output a Sine with 1 MHz frequency and 6 div amplitude (e.g. 5 mV/div vertical scale, 30 mVpp Sine signal). Adjust the timebase 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 list is displayed at the right section of the screen. Read the value from the "result" list and record the measurement result as $Vout_{1\ MHz}$.

6. Record the power meter reading $P_{1\ MHz}$, and convert the power to V according to the following formula.

$$Vin_{1MHz} = \sqrt{P_{1MHz} \times 50\Omega}$$

7. Set the signal generator output frequency to the maximum bandwidth frequency of the oscilloscope. For the maximum bandwidth frequency of the oscilloscope, refer to *Specification*.
8. Adjust the horizontal timebase of the oscilloscope.
9. Check the "AC.RMS" result list at the right section of the screen. Read and record the data as $Vout_{max}$.
10. Record the power meter reading P_{max}, and convert the power to V according to the following formula.

$$Vin_{max} = \sqrt{P_{max} \times 50\Omega}$$

11. Calculate the test results by using the formula below:

$$\text{Test Result}\,(\mathrm{d}B) = 20\lg\left(\frac{Vout_{max} / Vin_{max}}{Vout_{1MHz} / Vin_{1MHz}}\right)$$

12. The above result should be greater than -3 dB.
13. Repeat Step 3-12 according to the test record form and calculate the test results.

5.4.4 Test Record Form

Model	Limit	CH1	CH2	CH3	CH4
DS70304 (3 GHz)	-3 dB				
DS70504 (5 GHz)	-3 dB				

5.5 Timebase Accuracy Test

5.5.1 Specification

Timebase Accuracy[1]	
Specification	±(0.5 ppm + 1 ppm[2]/year × Number of Years that the Instrument Has Been Used[3])

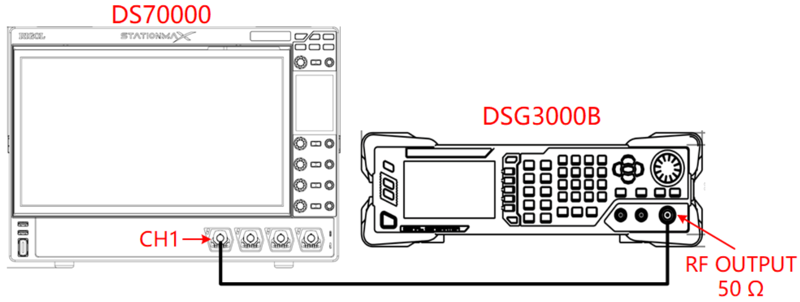
NOTE

[1]: Typical.

[2]: Clock Drift.

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

5.5.2 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 **[RF OUTPUT 50]** connector of the RF signal generator DSG3000B (installed with the OCXO-B08 option) to CH1 of the oscilloscope, as shown in the figure above.

2. Output a Sine with 10 MHz frequency and 1 Vpp amplitude via DSG3000B.

3. Configure the oscilloscope:

a. Press the front-panel key 1 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. Then click or tap **Probe** to enter the **Probe** setting menu. Set the probe attenuation ratio to "1X".

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

d. Set the vertical scale to 200 mV/div.

e. Set the vertical offset to 0 V. Then close the **Vertical** system 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 1 ns/div.

g. Set the horizontal position to 1 ms. Close the **Horizontal** system menu.

h. Click or tap the trigger information label at the top of the screen. Set the trigger level to 0 V.

4. Click or tap  > **Cursor**. The "Result" list window is displayed at the right section of the screen. Click or tap the result list window, select Setting. Under the **Mode** menu item, select "Manual" to enable the manual mode of cursor measurement. 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 using manual cursor measurement and record the measurement result.

5. Calculate the timebase accuracy; namely the ratio of ΔT to the horizontal position of the oscilloscope. For example, if the offset measured is 1 ns, then the timebase accuracy is 1 ns/1 ms=1 ppm.

6. Calculate the timebase accuracy limit by using the formula ±(0.5 ppm + 1 ppm/year × Number of Years that the Instrument Has Been Used).

5.5.4 Test Record Form

Timebase Accuracy[1]Limit: ±(0.5 ppm + 1 ppm[2]/year × Number of Years that the Instrument Has Been Used[3])				
Channel	**Test Result ΔT**	**Calculation Result[4]**	**Limit**	**Pass/Fail**
CH1				

NOTE

[1]: Typical.

[2]: Clock Drift.

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

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

5.6 Random Noise Test

This test checks the random noise for each channel at the normal sampling mode.

5.6.1 Test Procedures

TIP

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

1. Press **Default** on the front panel 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 1 mV/div, and the bandwidth limit will be enabled automatically to 20 MHz.
4. By default, the acquisition mode is Normal; the horizontal timebase is 5 ns/div; the memory depth is 10 Kpts.
5. Click or tap the trigger information label at the top of the screen. Set Source to CH1.
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 list shows 100, read and record the AC.RMS value.
9. For the parameter setting, refer to *Test Record Form*. Repeat Step 1-7 and test the AC.RMS value for different vertical scale, bandwidth, and impedance. The test results should be smaller than the max. value in the record form.

5.6.2 Test Record Form

Vertical Scale	Bandwidth	Test Result	Max.	
			DS70304	DS70504
50 Ω				
1 mV/div	20 MHz		400 μV	500 μV
2 mV/div	20 MHz		400 μV	500 μV

Vertical Scale	Bandwidth	Test Result	Max.	
			DS70304	DS70504
5 mV/div	Full BW		600 μV	800 μV
10 mV/div	Full BW		680 μV	900 μV
20 mV/div	Full BW		1.40 mV	2.00 mV
50 mV/div	Full BW		3.50 mV	5.00 mV
100 mV/div	Full BW		5.60 mV	8.00 mV
200 mV/div	Full BW		15.0 mV	20.0 mV
500 mV/div	Full BW		28.0 mV	40.0 mV
1 V/div	Full BW		35.0 mV	60.0 mV
1 MΩ, all models				
1 mV/div	20 MHz		500 μV	
2 mV/div	20 MHz		500 μV	
5 mV/div	Full BW		600 μV	
10 mV/div	Full BW		900 μV	
20 mV/div	Full BW		2.00 mV	
50 mV/div	Full BW		4.00 mV	
100 mV/div	Full BW		8.00 mV	
200 mV/div	Full BW		25.0 mV	
500 mV/div	Full BW		30.0 mV	
1 V/div	Full BW		60.0 mV	
2 V/div	Full BW		110 mV	
5 V/div	Full BW		300 mV	
10 V/div	Full BW		600 mV	

6 Appendix: Test Record Form

RIGOL DS70000 Series Digital Oscilloscope Performance Verification Test Record Form

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

Impedance Test Record Form: 1 MΩ Input Impedance

Channel	Vertical Scale	Test Result	Limit	Pass/Fail
CH1	100 mV/div		0.99 MΩ to 1.01 MΩ	
	500 mV/div		0.99 MΩ to 1.01 MΩ	
CH2	100 mV/div		0.99 MΩ to 1.01 MΩ	
	500 mV/div		0.99 MΩ to 1.01 MΩ	
CH3	100 mV/div		0.99 MΩ to 1.01 MΩ	
	500 mV/div		0.99 MΩ to 1.01 MΩ	
CH4	100 mV/div		0.99 MΩ to 1.01 MΩ	
	500 mV/div		0.99 MΩ to 1.01 MΩ	

Impedance Test Record Form: 50 Ω Input Impedance

Channel	Vertical Scale	Test Result	Limit	Pass/Fail
CH1	100 mV/div		48.75 Ω to 51.25 Ω	
	500 mV/div		48.75 Ω to 51.25 Ω	
CH2	100 mV/div		48.75 Ω to 51.25 Ω	
	500 mV/div		48.75 Ω to 51.25 Ω	
CH3	100 mV/div		48.75 Ω to 51.25 Ω	
	500 mV/div		48.75 Ω to 51.25 Ω	
CH4	100 mV/div		48.75 Ω to 51.25 Ω	
	500 mV/div		48.75 Ω to 51.25 Ω	

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				≤2%	
	5 mV/div				≤2%	
	10 mV/div				≤2%	
	20 mV/div				≤2%	
	50 mV/div				≤2%	

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

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

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				≤2%	
	5 mV/div				≤2%	
	10 mV/div				≤2%	
	20 mV/div				≤2%	
	50 mV/div				≤2%	
	100 mV/div				≤2%	
	200 mV/div				≤2%	
	500 mV/div				≤2%	
	1 V/div				≤2%	
CH2	1 mV/div				≤2%	
	2 mV/div				≤2%	
	5 mV/div				≤2%	
	10 mV/div				≤2%	
	20 mV/div				≤2%	
	50 mV/div				≤2%	
	100 mV/div				≤2%	
	200 mV/div				≤2%	
	500 mV/div				≤2%	
	1 V/div				≤2%	
CH3	1 mV/div				≤2%	
	2 mV/div				≤2%	
	5 mV/div				≤2%	
	10 mV/div				≤2%	
	20 mV/div				≤2%	
	50 mV/div				≤2%	
	100 mV/div				≤2%	
	200 mV/div				≤2%	

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

NOTE

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

DC Offset Accuracy Test Record Form

Channel Setting	Vertical Scale	Offset	Test Result	Min.	Max.
CH1, 1 MΩ, 20 MHz BW	1 mV/div	1 V		-1.0171 V	-982.90 mV
	1 mV/div	0 V		-2.1000 mV	2.1000 mV
	1 mV/div	-1 V		982.90 mV	1.0171 V
	200 mV/div	30 V		-30.472 V	-29.528 V
	200 mV/div	0 V		-22.000 mV	22.000 mV
	200 mV/div	-30 V		29.528 V	30.472 V
	500 mV/div	100 V		-101.05 V	-98.948 V
	500 mV/div	0 V		-52.000 mV	52.000 mV
	500 mV/div	-100 V		98.948 V	101.05 V
CH1, 50 Ω, 20 MHz BW	1 mV/div	1 V		-1.0171 V	-982.90 mV
	1 mV/div	0 V		-2.1000 mV	2.1000 mV
	1 mV/div	-1 V		982.90 mV	1.0171 V
	200 mV/div	4 V		-4.0820 V	-3.9180 V
	200 mV/div	0 V		-22.000 mV	22.000 mV
	200 mV/div	-4 V		3.9180 V	4.0820 V
CH2, 1 MΩ, 20 MHz BW	1 mV/div	1 V		-1.0171 V	-982.90 mV
	1 mV/div	0 V		-2.1000 mV	2.1000 mV
	1 mV/div	-1 V		982.90 mV	1.0171 V
	200 mV/div	30 V		-30.472 V	-29.528 V

Channel Setting	Vertical Scale	Offset	Test Result	Min.	Max.
	200 mV/div	0 V		-22.000 mV	22.000 mV
	200 mV/div	-30 V		29.528 V	30.472 V
	500 mV/div	100 V		-101.05 V	-98.948 V
	500 mV/div	0 V		-52.000 mV	52.000 mV
	500 mV/div	-100 V		98.948 V	101.05 V
CH2, 50 MΩ, 20 MHz BW	1 mV/div	1 V		-1.0171 V	-982.90 mV
	1 mV/div	0 V		-2.1000 mV	2.1000 mV
	1 mV/div	-1 V		982.90 mV	1.0171 V
	200 mV/div	4 V		-4.0820 V	-3.9180 V
	200 mV/div	0 V		-22.000 mV	22.000 mV
	200 mV/div	-4 V		3.9180 V	4.0820 V
CH3, 1 MΩ, 20 MHz BW	1 mV/div	1 V		-1.0171 V	-982.90 mV
	1 mV/div	0 V		-2.1000 mV	2.1000 mV
	1 mV/div	-1 V		982.90 mV	1.0171 V
	200 mV/div	30 V		-30.472 V	-29.528 V
	200 mV/div	0 V		-22.000 mV	22.000 mV
	200 mV/div	-30 V		29.528 V	30.472 V
	500 mV/div	100 V		-101.052 V	-98.948 V
	500 mV/div	0 V		-52.000 mV	52.000 mV
	500 mV/div	-100 V		98.948 V	101.052 V
CH3, 50 MΩ, 20 MHz BW	1 mV/div	1 V		-1.0171 V	-982.90 mV
	1 mV/div	0 V		-2.1000 mV	2.1000 mV
	1 mV/div	-1 V		982.90 mV	1.0171 V
	200 mV/div	4 V		-4.0820 V	-3.9180 V
	200 mV/div	0 V		-22.000 mV	22.000 mV
	200 mV/div	-4 V		3.9180 V	4.0820 V
CH4, 1 MΩ, 20 MHz BW	1 mV/div	1 V		-1.0171 V	-982.90 mV
	1 mV/div	0 V		-2.1000 mV	2.1000 mV
	1 mV/div	-1 V		982.90 mV	1.0171 V
	200 mV/div	30 V		-30.472 V	-29.528 V
	200 mV/div	0 V		-22.000 mV	22.000 mV
	200 mV/div	-30 V		29.528 V	30.472 V
	500 mV/div	100 V		-101.05 V	-98.948 V
	500 mV/div	0 V		-52.000 mV	52.000 mV
	500 mV/div	-100 V		98.948 V	101.05 V
CH4, 50 Ω, 20 MHz BW	1 mV/div	1 V		-1.0171 V	-982.90 mV
	1 mV/div	0 V		-2.1000 mV	2.1000 mV
	1 mV/div	-1 V		982.90 mV	1.0171 V
	200 mV/div	4 V		-4.0820 V	-3.9180 V
	200 mV/div	0 V		-22.000 mV	22.000 mV
	200 mV/div	-4 V		3.9180 V	4.0820 V

Analog Bandwidth Test Record Form

Model	Limit	CH1	CH2	CH3	CH4
DS70304 (3 GHz)	-3 dB				
DS70504 (5 GHz)	-3 dB				

Timebase Accuracy Test Record Form

Timebase Accuracy[1]Limit: ±(0.5 ppm + 1 ppm[2]/year × Number of Years that the Instrument Has Been Used[3])				
Channel	**Test Result ΔT**	**Calculation Result[4]**	**Limit**	**Pass/Fail**
CH1				

NOTE

[1]: Typical.

[2]: Clock Drift.

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

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

Random Noise Test Record Form

Vertical Scale	Bandwidth	Test Result	Max.	
			DS70304	**DS70504**
50 Ω				
1 mV/div	20 MHz		400 μV	500 μV
2 mV/div	20 MHz		400 μV	500 μV
5 mV/div	Full BW		600 μV	800 μV
10 mV/div	Full BW		680 μV	900 μV
20 mV/div	Full BW		1.40 mV	2.00 mV
50 mV/div	Full BW		3.50 mV	5.00 mV
100 mV/div	Full BW		5.60 mV	8.00 mV
200 mV/div	Full BW		15.0 mV	20.0 mV
500 mV/div	Full BW		28.0 mV	40.0 mV
1 V/div	Full BW		35.0 mV	60.0 mV
1 MΩ, all models				
1 mV/div	20 MHz		500 μV	
2 mV/div	20 MHz		500 μV	
5 mV/div	Full BW		600 μV	
10 mV/div	Full BW		900 μV	
20 mV/div	Full BW		2.00 mV	
50 mV/div	Full BW		4.00 mV	

Vertical Scale	Bandwidth	Test Result	Max.	
			DS70304	DS70504
100 mV/div	Full BW		8.00 mV	
200 mV/div	Full BW		25.0 mV	
500 mV/div	Full BW		30.0 mV	
1 V/div	Full BW		60.0 mV	
2 V/div	Full BW		110 mV	
5 V/div	Full BW		300 mV	
10 V/div	Full BW		600 mV	

HEADQUARTER

RIGOL TECHNOLOGIES CO., LTD.
No.8 Keling Road, New District, Suzhou,
JiangSu, P.R.China
Tel: +86-400620002
Email: info@rigol.com

EUROPE

RIGOLTECHNOLOGIES EU GmbH
Carl-Benz-Str.11
82205 Gilching
Germany
Tel: +49(0)8105-27292-0
Email: info-europe@rigol.com

NORTH AMERICA

RIGOLTECHNOLOGIES, USA INC.
10220 SW Nimbus Ave.
Suite K-7
Portland, OR 97223
Tel: +1-877-4-**RIGOL**-1
Fax: +1-877-4-**RIGOL**-1
Email: info@rigol.com

JAPAN

RIGOLTECHNOLOGIES JAPAN, LLC
501, LATORRETTA, 2-37-1,
Numabukuro,
Nakano-Ku, Tokyo, Japan
Tel: +81-3-6262-8932
Fax: +81-3-6262-8933
Email: info-japan@rigol.com