SAP2500D
Differential Probe
User Manual

EN01A

SIGLENT TECHNOLOGIES CO.,LTD

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1 Safety Instructions

Carefully read the following safety precautions to avoid personal injury and prevent damage to the instrument and any products connected to it. To avoid potential hazards, please use the instrument as specified.

This section contains instructions that must be observed to keep this oscilloscope accessory operating in a correct and safe condition. You are required to follow generally accepted safety procedures in addition to the precautions specified in this section. The overall safety of any system incorporating this accessory is the responsibility of the assembler of the system.

Connect and disconnect properly. Connect the probe to the measurement instrument before connecting the test leads to a circuit/signal being tested.

Use only within the operational environment listed. Do not use in wet or explosive atmospheres.

Ground the product. This product is indirectly grounded through the grounding conductor of the mainframe power cord. To avoid electric shock, the grounding conductor must be connected to the earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Use indoors only.

Keep product surfaces clean and dry.

Be careful with sharp tips. The tips may cause bodily injury if not handled properly.

Do not operate with suspected failures. Do not use the probe if any part is damaged. Cease operation immediately and sequester the probe from inadvertent use.

1.1 Symbols

These symbols may appear on the probe body or in this manual to alert you to important safety considerations.

	**CAUTION.** Potential for damage to probe or instrument it is connected to. Attend to the accompanying information to protect against personal injury or damage. Do not proceed until conditions are fully understood and met

1.2 Operating Environment

The accessory is intended for indoor use and should be operated in a clean, dry environment. Before using this product, ensure that its operating environment is maintained within these parameters:

Temperature: 5°C to 40°C.

Humidity: **The** maximum relative humidity is 80 % for temperatures up to 30 °C decreasing linearly to 50 % relative humidity at 40° C.

Altitude: Up to 10,000 ft (3,048 m).

	**WARNING:** Do not operate this product in explosive, dusty or humid air.

	**CAUTION:** Do not exceed the specified maximum input voltage. See technical data for details.

1.3 Calibration

The recommended calibration interval is one year from the time the probe is put into service.

1.4 Cleaning

The exterior of the probe and cable should be cleaned, using a soft cloth moistened with water. The use of abrasive agents, strong detergents, or other solvents may damage the probe. Always ensure that the input leads are free of debris.

	**CAUTION:** The probe case is not sealed and should never be immersed in any fluid.

1.5 Abnormalities

This probe should only be used for the purpose specified by the manufacturer. The probe may be damaged when it exhibits visible damage or is subjected to

severe transportation pressure. If you suspect that the probe is damaged, immediately disconnect the probe from the oscilloscope. To use the probe correctly, all instructions and markings should be read carefully.

	**WARNING:** Using the probe in a manner not specified by the manufacturer may damage the probe. This probe and related accessories should not be directly connected to the human body or used for patient monitoring.

2 First Steps

2.1 Delivery Checklist

First, verify that all items listed on the packing list have been delivered. If you note any omissions or damage, please contact your nearest SIGLENT customer service center or distributor as soon as possible. If you fail to contact us immediately in case of omission or damage, we will not be responsible for replacement.

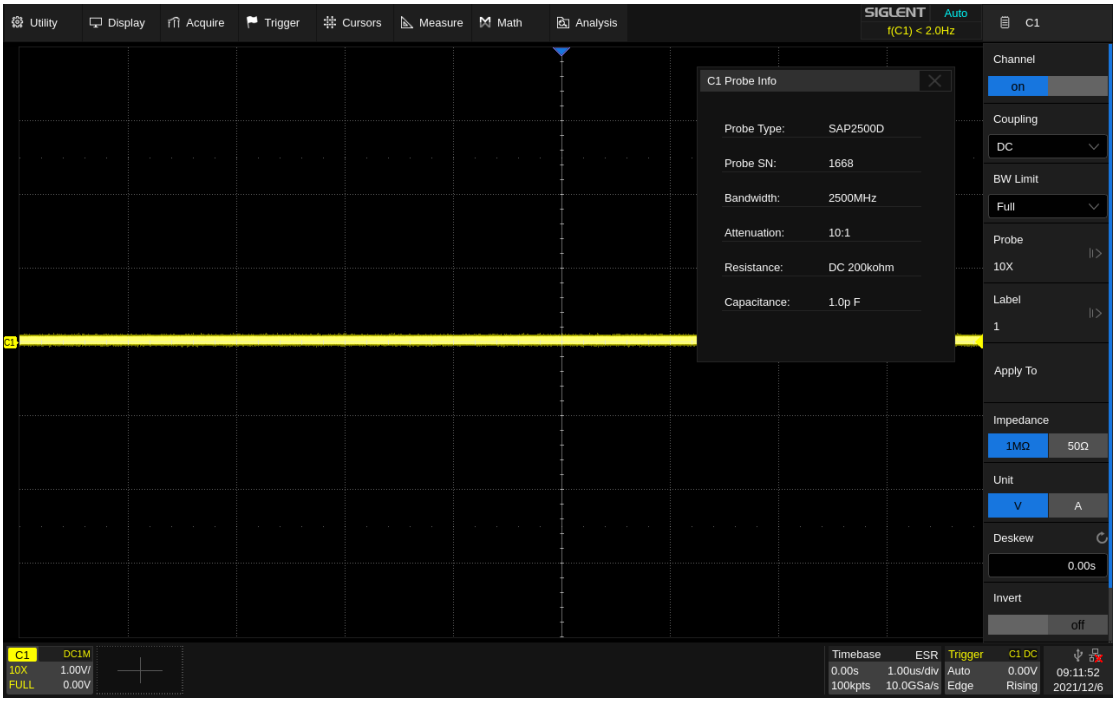
Figure 1 SAP2500D Differential Probe

2.2 Functional Check

The function check needs to use an oscilloscope that supports the SIGLENT SAPBus interface. This is currently the SIGLENT SDS5000X and SDS6000A series of oscilloscopes. Please follow the steps below to check the probe

function.

1. Turn on the oscilloscope and warm-up for 20 minutes.
2. Connect the active probe to channel 1 of the oscilloscope.
3. Open the parameter bar of channel 1 and check the probe information, including probe model, serial number, bandwidth, impedance, capacitance and attenuation ratio.
4. Select the channel to which the probe is connected. Set the oscilloscope scale factor to 1 V/div. Set the oscilloscope offset factor to 0 V.
5. Measure the average voltage of channel 1, and the reading range should be within ± (1.5%* full-screen reading +10 mV). If the reading is beyond the range, the check will not pass.
6. Change the scale factor of channel 1 to 500 mV/div, 200 mV/div, 100 mV/div, 50 mV/div, 20 mV/div, 10 mV/div, and repeat Step 5 to check the average voltage reading at each scale.



2.3 Quality Assurance

Probes and accessories have a 1-year warranty from the date of shipment, during normal use and operation. SIGLENT can repair or replace any product that is returned to the authorized service center during the warranty period. We must first examine the product to make sure that the defect is caused by the process or material, not by abuse, negligence, accident, abnormal conditions, or operation.

SIGLENT shall not be responsible for any defect, damage, or failure caused by any of the following:

a) Attempted repairs or installations by personnel other than SIGLENT.

b) Connection to incompatible devices/incorrect connection.

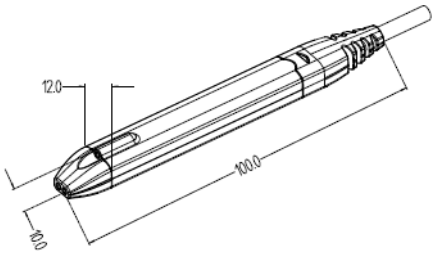
c) For any damage or malfunction caused using non-SIGLENT supplies. Furthermore, SIGLENT shall not be obligated to service a product that has been modified. Spare, replacement parts, and repairs have a 90-day warranty.

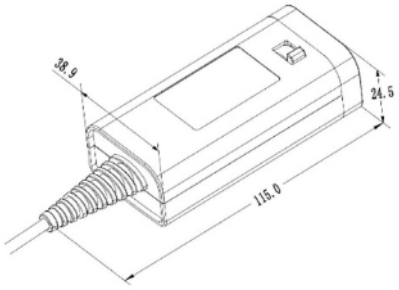
2.4 Maintenance Agreement

We provide various services based on maintenance agreements. We offer extended warranties as well as installation, training, enhancement and on-site maintenance, and other services through specialized supplementary support agreements. For details, please consult your local SIGLENT customer service center or distributor.

3 Mechanical Dimension

Characteristic	Description
SAPBus interface box	115.0 mm × 38.9 mm × 24.5 mm
Probe head	100.0 mm x 12.0 mm x 10.0 mm
Tip Pitch	2.54mm
Cable length	1.3 m (from the probe head to the compensation box)





4 Accessories

The SAP2500D Differential probes are provided with numerous features and accessories to make probing and connecting to different test points easier than ever.

Standard Accessory	Part Number	Quantity	Unit
Straight Tip	2.74.70.12.003	5	pcs
Pogo Tip	2.74.70.12.004	5	pcs
Swivel Tip	2.74.70.10.018	2	pcs
Tip Saver	2.74.70.10.019	2	pcs
Y Lead Adapter	2.52.42.11.026	2	pcs
Right Angle Pin Lead 5 cm	2.52.42.11.016	1	pcs
Straight Pin Lead 6 cm	2.52.42.11.017	1	pcs
Straight Pin Lead 12 cm	2.52.42.11.019	1	pcs
Spring-loaded Ground (Short)	2.52.42.11.025	2	pcs
Spring-loaded Ground (Long)	2.52.42.11.028	2	pcs
Solder-in Lead	2.52.42.11.027	2	pcs
Channel ID Clips (Set of 4 colors)	2.75.23.10.003	2	set

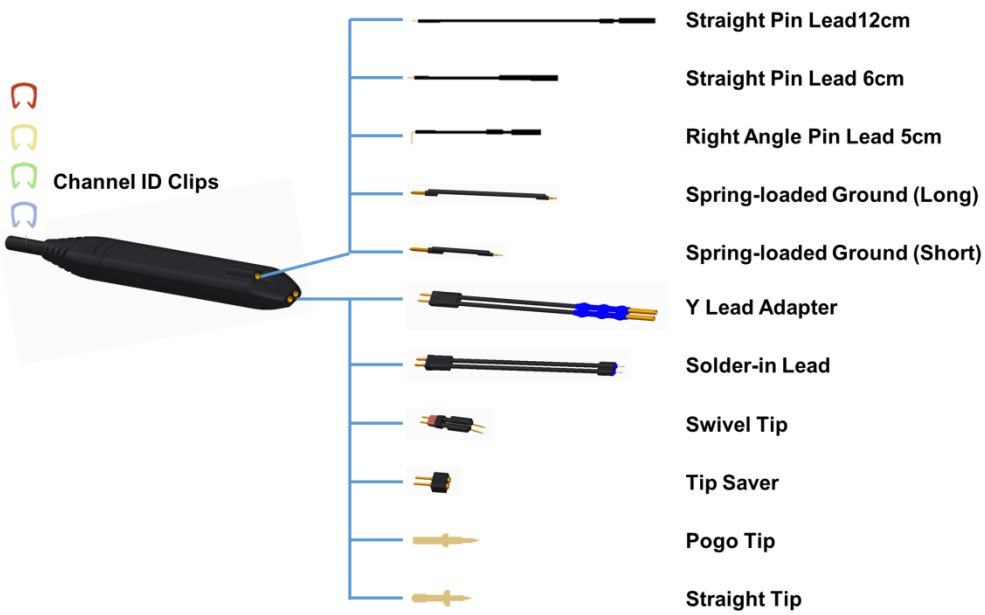
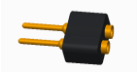


Figure 2 Accessories

Straight Tip (Part Number 2.74.70.12.003)：The straight tip is rugged and designed for general probing. Fits in either probe socket.

Pogo Tip (Part Number 2.74.70.12.004)：The pogo tip provides z axis compliance. The tip can fit into a socket or via and onto an IC leg.

Swivel Tip (Part Number 2.74.70.10.018)：The swivel tip adapter features adjustable tip spacing to reach test points. A 20 Ω damping resistor is included to reduce inductive peaking.



Tip Saver (Part Number 2.74.70.10.019)：To prevent wear out on the probe

input leads.

Y Lead Adapter (Part Number 2.52.42.11.026)：This lead is used for both ground and input lead simultaneously. It has two sockets on one end and two square pins on the other and may be used for general purpose probing.

Straight Pin Leads (Part Number 6 cm 2.52.42.11.017 / 12 cm 2.52.42.11.019)：These leads have a socket on one end and a square pin on the other to connect to the input or ground socket of the probe body, and may be used for general purpose probing.

Right Angle Pin Leads (Part Number 2.52.42.11.016)**:** These leads have a socket on one end with a right angle and a square pin on the other to connect to the input or ground socket of the probe body, and may be used for general purpose probing.

Spring-loaded Ground (Part Number Short 2.52.42.11.025 / Long

2.52.42.11.028): Spring-loaded ground leads are bendable. They are designed to be attached to the offset ground socket or be attached to either socket of the probe head.

Solder-in Lead (Part Number 2.52.42.11.027)：This lead is designed to be soldered directly to the test points for a secure connection. A damping 56.2 Ω resistor is included to reduce inductive peaking.

Channel ID Clips (Part Number 2.75.23.10.003)：They are used to distinguish the oscilloscope channel that the probe is connected to.

5 Probe Operation

The SAP series probe is a precision test instrument accessory. Exercise care when handling and storing the probe. Always handle the probe by the probe body or compensation box. Avoid putting excessive strain or exposing the probe cable to sharp bends.

	**ESD Sensitive**: The tips of the probes are sensitive to Electrostatic Discharge (ESD). Avoid causing damage to the probe by always following anti-static procedures (wear wrist strap, etc.) when using or handling the probe.

5.1 Connecting the Probe to an Oscilloscope

The SAP2500D differential probes have been designed for use with Siglent's SDS5000X and SDS6000A platforms equipped with the SAPBus interface. When you attach the probe output connector to the oscilloscope's input connector, the oscilloscope recognizes the probe and provides proper termination.

5.2 Connecting the Probe to the Test Circuit

To maintain the high-performance capability of the probe in measurement applications, care must be exercised in connecting the probe to the test circuit.

Increasing the parasitic capacitance or inductance in the input paths may introduce a “ring” or slow the rise time of fast signals. Input leads that form a large loop area will pick up any radiated electromagnetic field which passes through the loop and may induce noise into the probe input.

Using one of the available accessories makes the SAP2500D probe with its small profile and low mass head ideally suited for applications in dense circuitry.

The amplifier inside the probe has a limited linear working range. To ensure that the input linearity error is less than 3%, the amplitude of the input signal needs to be limited to ± 4 V. The probe has a DC offset adjustment function, which can adjust the DC offset to eliminate the DC component in the test signal and maximize the performance of the probe. The DC offset adjustment range is ± 8 V.

6 Specifications

The SAP2500D is a compact, high impedance differential probe designed to meet today's increasing demand for measurements on a variety of test points. With low input capacitance and high input resistance, circuit loading is minimized.

With the SAPBus interface, the SAP2500D becomes an integral part of the oscilloscope measurement circuit. The probe can be controlled from the oscilloscope's front panel. The oscilloscope provides power to the probe, so there is no need for a separate power supply or batteries.

Key Benefits

- Bandwidth

  DC ~ >2.5 GHz

- 100 kΩ Single-ended Input Resistance
- 200 kΩ Differential Input Resistance
- 10X Attenuation
- 1 pF Differential Input Capacitance
- ±4 Volts Dynamic Range with ±8 Volts offset capability
- SAPBus interface

The specifications of the probe need to meet the following conditions:

1. The probe is within the validity period of calibration.
2. The ambient temperature is within 25℃±5℃.
3. The probe is correctly connected to the oscilloscope.
4. The probe and oscilloscope are in a thermally stable environment, and the probe and oscilloscope should be warmed up for at least 20 minutes.

Warranted characteristics:

Characteristics	SAP2500D
Bandwidth (probe only)	> 2.5 GHz
Bandwidth (with scope)	2 GHz (SDS6204A)
Differential Input capacitance	1 pF
Differential Input resistance	200 kΩ
Single-ended Input resistance	100 kΩ
Offset range	±8 V
Attenuation ratio (DC)	÷10
Offset accuracy	< 3%
DC gain accuracy	< 3%
Input dynamic range	± 4 V
Maximum input voltage (non-destructive)	20 V
Cable length	130 cm

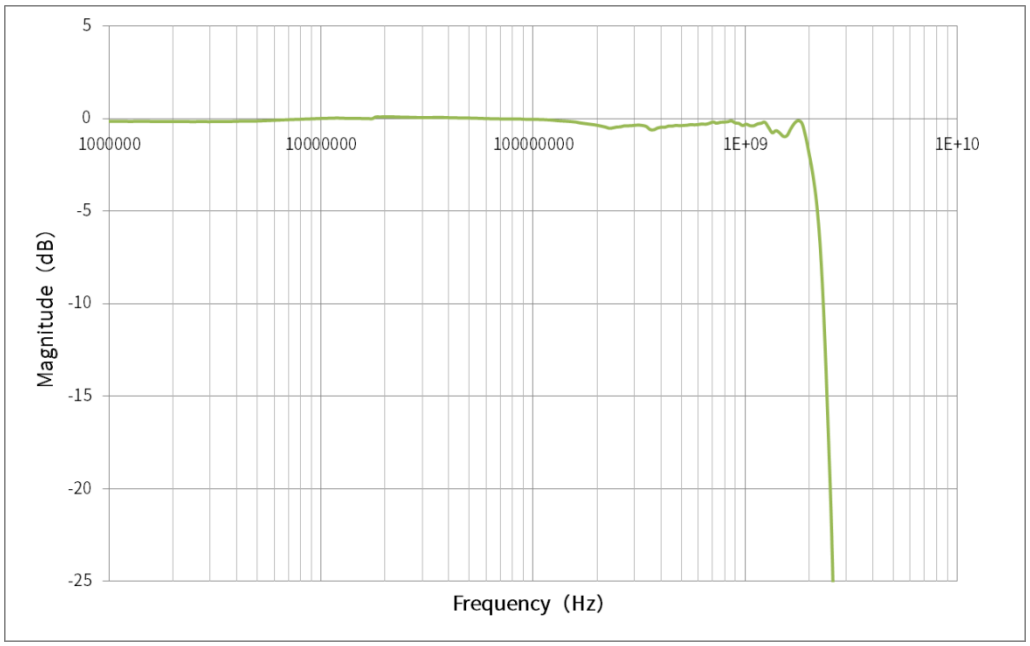


Figure 3 Typical system frequency response of the SAP2500D and an SDS6204A

About SIGLENT

SIGLENT is an international high-tech company, concentrating on R&D, sales, production and services of electronic test & measurement instruments.

SIGLENT first began developing digital oscilloscopes independently in 2002. After more than a decade of continuous development, SIGLENT has extended its product line to include digital oscilloscopes, isolated handheld oscilloscopes, function/arbitrary waveform generators, RF/MW signal generators, spectrum analyzers, vector network analyzers, digital multimeters, DC power supplies, electronic loads and other general purpose test instrumentation. Since its first oscilloscope was launched in 2005, SIGLENT has become the fastest growing manufacturer of digital oscilloscopes. We firmly believe that today SIGLENT is the best value in electronic test & measurement.

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