DPB6150 Series
SDP6150 Series
High Voltage Differential Probe

Instruction Manual

EN02B

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Contents

Preface

This instruction manual introduces the operation method and technical specifications of DPB6150 and SDP6150 series high-voltage differential probes. The safety requirements, functions, features, and operating steps of the two series of probes are similar, which will be introduced in the front part of the manual, and the technical specifications, maintenance, and upkeep of the probes will be introduced in the later part.

General Safety Summary

This instruction manual contains information and warnings that users must follow to ensure safe operation and product safety. Please make sure to use the product according to the regulations. Read the following safety precautions in detail to avoid personal injury and prevent damage to this product or any products connected to this product. Carefully read all instructions. Keep this instruction manual for future reference. In addition to the safety precautions specified in this manual, you must also comply with recognized safety procedures.

- The product is only for use by trained personnel.
- Only qualified personnel who understand the relevant hazards can carry out open cover repairs, maintenance, or adjustments.
- Before use, please make sure to check if the product comes from a known source to ensure proper operation.
- This product is not suitable for detecting dangerous voltages.
- If there is exposure of hazardous live conductors, please use personal protective equipment to prevent electric shock and arc explosion injuries.
- When using the product, you may be using accompanying equipment. For warnings and precautions regarding the operation of such equipment, please read the safety section of their manuals.
- When integrating this probe into a system, the security of the system is the responsibility of the system's assembler.

To avoid electric shock and fire hazards, the following requirements should be followed:

- Correct connection and disconnection. Do not plug or unplug the probe or test wire when connected to the voltage source.
- Follow all terminal ratings. To avoid fire or electric shock hazards, please follow all ratings and labeling instructions of the product.
- Do not open the cover. Do not operate this product with the outer cover or panel removed or the casing open. There may be dangerous voltage exposure.
- Stay away from exposed circuits. Do not touch exposed connectors and components after the power is turned on.
- Do not operate in wet/damp conditions. Please note that if a unit is moved from a cold location to a warm location, condensation may be generated.
- Do not operate in the explosive conditions.
- Keep the surface of the instrument clean and dry.
- Turn off the circuit under test before connecting it to the probe.

- After measurement, turn off the circuit first and then remove the probe.
- Before use, please check whether the exterior of the probe is damaged. If damaged, stop using it.
- Before detecting the signal, please connect the probe to the oscilloscope first.
- Do not operate the product if you suspect a malfunction. If you suspect damage to the probe, have it inspected by qualified service personnel.

Safety Terms and Symbols

When the following symbols or terms appear on the probe or in this manual, they indicate special care in terms of safety.

This symbol is used where caution is required. Refer to the accompanying information or documents to protect against personal injury or damage to the instrument.

Abnormal Conditions

- The probe should only be used for the purpose specified by the manufacturer.
- The probe may be damaged if there is any visible sign of damage or if it has been subjected to severe transport stresses.
- If you suspect the probe has been damaged, disconnect the probe from the oscilloscope immediately.
- Proper use of the probe depends on the careful reading of all instructions and labels.

⚠ WARNING Any use of the probe in a manner not specified by the manufacturer may impair the probe's safety protection. This probe and accessories should not be directly connected to human subjects or used for patient monitoring.

Safety Compliance

IEC/EN 61010-031: Safety requirements for hand-held probe assemblies for electrical measurement and test.

Degree of Pollution

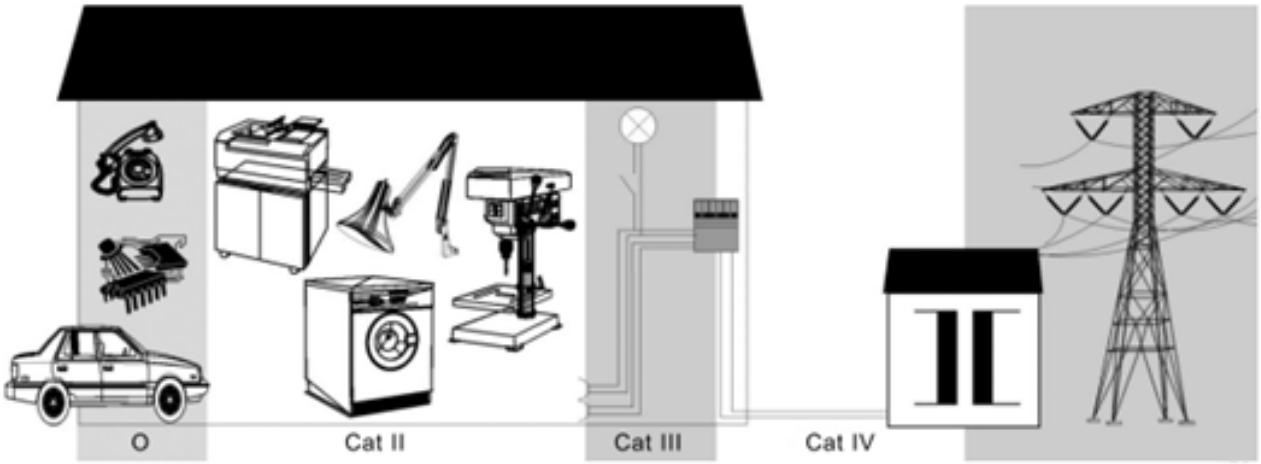
The probes may be operated in environments of Pollution Degree II.

IP Rating

IP20 (as defined in IEC 60529).

Installation (Overvoltage) Category

- CAT II: It is used for measurements installed in buildings, such as household appliances, portable tools and equipment permanently connected to fixed installations.
- CAT III: It is used for measurements installed in buildings, such as junction boxes, circuit breakers, distribution boards and equipment that are connected to a distributed power supply.
- CAT IV: It is used for measuring at the source of low-voltage devices, such as electricity meters and primary overcurrent protection devices.



Introduction

DPB6150 and SDP6150 series high-voltage differential probes can measure up to 1500 Vpk voltage and have a maximum bandwidth of 400 MHz, meeting the needs of most testing systems; provide two ranges for selection, and its differential measurement voltage range can meet the requirement of most measurement circuit; have sound and light alarm function. DPB6150 series output cable is connected to a power supply module and BNC interface, which provide power to the probe and can be adapted to various types of oscilloscopes. SDP6150 series is equipped with SAPBUS output interface, which can be used in conjunction with SIGLENT oscilloscopes. It can automatically recognize on oscilloscopes with SAPBUS interface and configure the probe range and other functions through the oscilloscope UI. If the probe experiences zero offset during long-term use, it can be adjusted through offset settings, and the SDP6150 series can also zero the probe through the oscilloscope UI. DPB6150 and SDP6150 series probes have good CMRR, with high input impedance and low capacitance at the input end, which can accurately and quickly measure differential voltage signals. It can be widely used in the research and development, debugging, or maintenance of switching power supplies, frequency converters, electronic ballasts, variable frequency household appliances, and other electrical power devices.

Operating Process

1. Estimate the tested voltage amplitude before test. Please do not use if exceeds the voltage range, or the probe would be damaged.
2. Connect the input leads and output cable to the probe, and then connect the output end of the probe to oscilloscope.
3. Please select proper range based on the tested voltage. When the tested voltage exceeds range, the overload indicator light will turn on.
4. Set the probe ratio and vertical scale of the oscilloscope according to the selected probe range and the tested voltage.
5. Connect the probe clamps based on needs, start after connecting to the circuits to be tested. When testing, the probe body should keep away from high voltage pulse circuits to reduce interference to the probe.
6. After the measurement is completed, first turn off the power supply of the tested circuit, then turn off the power supply of the probe, and finally disconnect the two input terminals from the tested point, and unplug the probe from the oscilloscope.

Probe Body Instruction

Taking DPB6150A and SDP6150A as examples, the voltage and range may vary for different models.

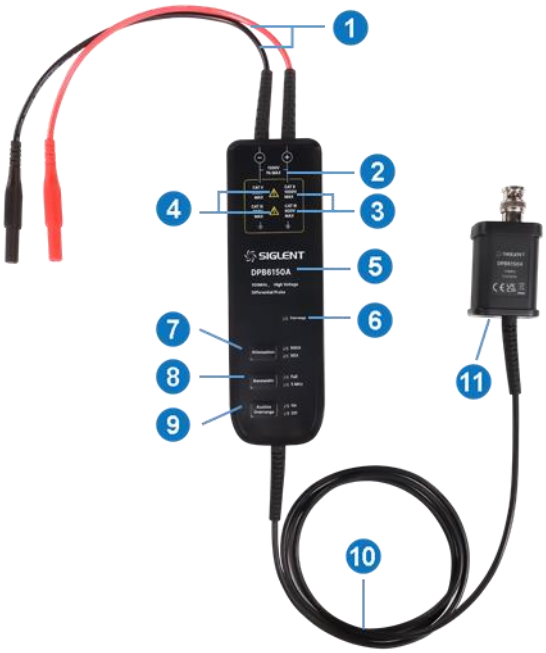


Figure 1 DPB6150A Probe View

Figure 2 SDP6150A Probe View

1 Input leads: The red line is positive and the black line is negative, when connected in reverse, the output will be reversed; The integral input leads extend 28 cm from the probe body, used to measure the input voltage signal after connecting it to the probe clamps. It can be extended with the extender leads (approx. 1.2 m). When using the extender leads, the frequency of the signal under test should be below 5 MHz

2 Maximum differential mode input voltage

3 Maximum input voltage to earth

4 High voltage danger, pay attention to safety

5 Probe model information

6 Overrange indicator

7 Attenuation: Different attenuation indicates different ranges. For DPB6150A: 500X indicates the maximum test voltage is 1500 V, 50X indicates the maximum test voltage is 150 V. For DPB6150D: 1000X indicates the maximum test voltage is 1500 V, 100X indicates the maximum test voltage is 150 V

8 Bandwidth: The series products have bandwidth selection function, and the default is full bandwidth (Full) of the product. When testing low frequency signal, you can choose 5 MHz bandwidth limit to prevent being interfered by high frequency signal

9 Audible overrange: When the measuring range exceeds the range, an audible and visual alarm will occur, this function controls whether to turn on the audible alarm function, ON is to turn on the audible alarm; OFF is to turn off the audible alarm.

10 Output cable: The DPB6150 series output terminal is connected to a power supply module and a BNC interface. The SDP6150 series output terminal is the SAPBUS interface unique to SIGLENT oscilloscopes, which provides power to the probe and communicates with the oscilloscope. When SDP6150 probe is connected to an oscilloscope with adapted software, the probe can be directly set on the oscilloscope screen

11 Adapter interface: USB Type-C 5 V/1 A (only DPB6150 series)

Accessories Instruction

Figure 3 DPB6150 Series Probe and Accessories

Figure 4 SDP6150 Series Probe and Accessories

Product standard accessories instruction:

Accessory	DPB6150A	DPB6150D	SDP6150A	SDP6150D
Power adapter	5 V/1 A		/	
Adapter	American standard, British standard, Australian standard, European standard		/	
USB-Type C line	1 m		/	
Alligator clip	CAT III 1000 V; CAT IV 600 V			
Test bar	CAT III 1000 V; CAT IV 600 V; 10 A			
Hook clips	CAT III 1000 V; CAT IV 600 V; 10 A			
Clamp (Y-shaped)	CAT III 1000 V; CAT IV 600 V; 5 A			
Extender lead	1.2 m; CAT III 1000 V; CAT IV 600 V; 10 A			

Note: The above "/" refers to non-standard accessory of this model.

Electric Specifications

Model		DPB6150A		DPB6150D	
Bandwidth (-3 dB)		100 MHz		400 MHz	
Rise time		≤3.5 ns		≤1 ns	
DC accuracy		±2%		±2%	
Attenuation ratio		50X/500X		100X/1000X	
Maximum differential test voltage		50X	±150 V	100X	±150 V
		500X	±1500 V	1000X	±1500 V
Maximum differential mode voltage VS frequency curve		Refer to Figure 6			
Maximum input voltage to earth		1000 V CAT II 600 V CAT III			
Input impedance (Refer to Figure 5)	Single-ended to ground	5 MΩ			
	Between inputs	10 MΩ			
Input capacitance	Single-ended to ground	<4 pF			
	Between inputs	<2 pF			
CMRR (Typical)	DC	80 dB			
	100 kHz	60 dB			
	1 MHz	40 dB			
Noise (Vrms)		50X	<60 mV	100X	<200mV
		500X	<300 mV	1000X	<420 mV
Overrange voltage threshold indicator		50X	≥150 V	100X	≥150 V
		500X	≥1500 V	1000X	≥1500 V
Delay		14 ns			
Bandwidth limit (5 MHz)		≥-3 dB @ 5 MHz			
Overrange indicator		Yes			
Audible overrange alarm		Yes (Can be turned on or off)			
Zero adjustment		Yes (Can be adjusted manually)			
Terminal load requirement		1 MΩ		50 Ω	
Safety standard		IEC/EN 61010-031:2014+AMD1:2018			
EMC standard		EN61326-1:2013 EN61000-3-2:2006+A1:2009+A2:2009 EN61000-3-3-3:2013			

Model		SDP6150A		SDP6150D	
Bandwidth (-3 dB)		100 MHz		400 MHz	
Rise time		≤3.5 ns		≤1 ns	
DC accuracy		±2%		±2%	
Attenuation ratio		50X/500X		100X/1000X	
Maximum differential test voltage		50X	±150 V	100X	±150 V
		500X	±1500 V	1000X	±1500 V
Maximum differential mode voltage VS frequency curve		Refer to Figure 6			
Maximum input voltage to earth		1000 V CAT II 600 V CAT III			
Input impedance (Refer to Figure 5)	Single-ended to ground	5 MΩ			
	Between inputs	10 MΩ			
Input capacitance	Single-ended to ground	<4 pF			
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CMRR (Typical)	DC	80 dB			
	100 kHz	60 dB			
	1 MHz	40 dB			
Noise (Vrms)		50X	<60 mV	100X	<200 mV
		500X	<300 mV	1000X	<420 mV
Overrange voltage threshold indicator		50X	≥150 V	100X	≥150 V
		500X	≥1500 V	1000X	≥1500 V
Delay		14 ns			
Bandwidth limit (5 MHz)		≥-3 dB @ 5 MHz			
Overrange indicator		Yes			
Audible overrange alarm		Yes (Can be turned on or off)			
Zero adjustment		Yes (Manual setting or automatic adjustment through oscilloscope)			
Terminal load requirement		1 MΩ		50 Ω	
Compatible oscilloscope model		SIGLENT SDS3000X HD/SDS5000X/SDS5000X HD/ SDS5000L/SDS6000A/SDS6000L/SDS7000A			
Safety standard		IEC/EN 61010-031:2014+AMD1:2018			
EMC standard		EN61326-1:2013 EN61000-3-2:2006+A1:2009+A2:2009 EN61000-3-3-3:2013			

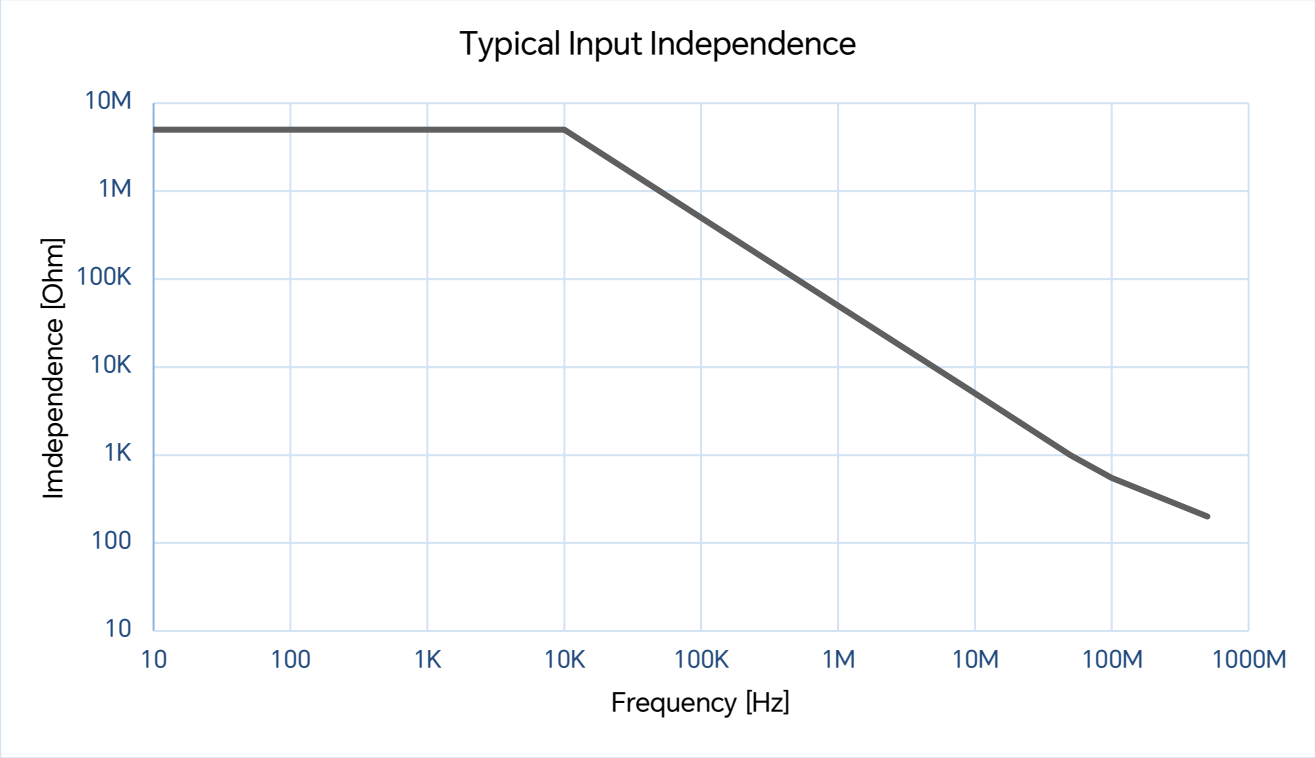


Figure 5 Typical Input Independence (Single-ended)

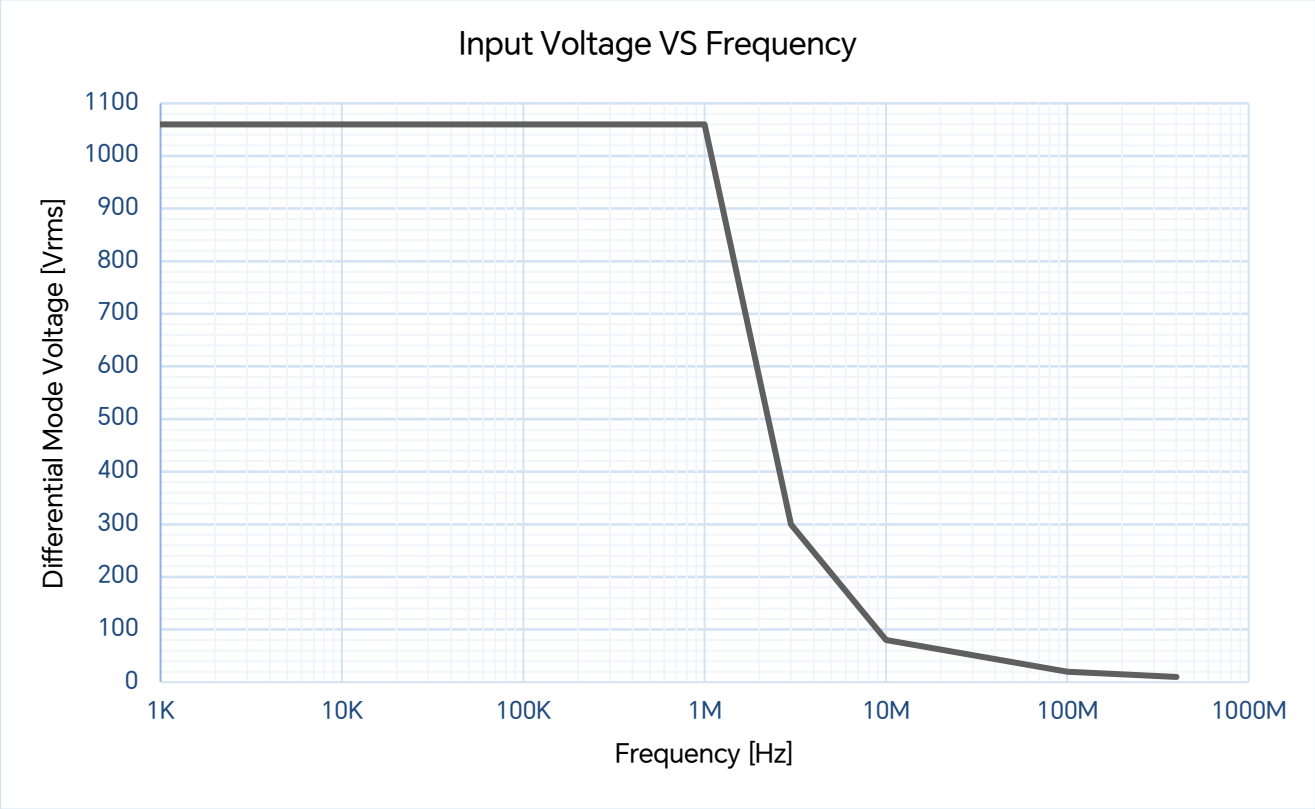


Figure 6 Differential Mode Voltage VS Frequency

Mechanical Specifications

Model	DPB6150A	DPB6150D	SDP6150A	SDP6150D
Differential input lead	290 mm			
Output cable	1370 mm			
Alligator clips dimension	85*48*17 mm			
Hook clip	182*54*13 mm			
Test bar	127*ϕ21 mm			
Clamp (Y-shaped)	185*52*13 mm			
Extender lead	1.2 m			
Probe body dimension	184*57*25 mm			
SAPBUS interface dimension	/		93*39*27 mm	
Probe body weight	300 g			

Working Environment

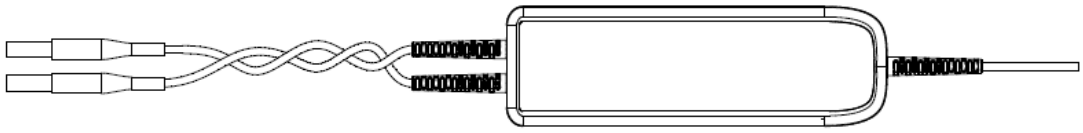
The probe is only suitable for indoor operation. Before using this probe, please confirm that the operating environment remains within the following parameter range:

Operating temperature	0℃~50℃
Storage temperature	-30℃~70℃
Operating humidity	≤85% RH
Storage humidity	≤90% RH
Operating altitude	3000 m
Storage altitude	12000 m

Note: Direct sunlight, radiators, and other heat sources should be taken into account when assessing the ambient temperature.

Precautions During Measurement

- When used in environments sensitive to EMI interference, the input leads can be twisted to help eliminate noise induced in the input leads in high EMI environments. The twisting method is shown in the figure below:



- Common Mode Rejection Ratio (CMRR) indicates the specified ability of a probe to suppress signals shared by two input terminals. More precisely, CMRR is the ratio of differential mode gain to common mode gain. The higher this ratio, the stronger the probe's ability to suppress common mode signals. The common mode rejection ratio decreases as the input frequency increases.
- When the probe end contacts the circuit element, new resistors, capacitors, and inductors are introduced into this circuit. The frequency and impedance of the signal source determine how much load the probe brings to the measured circuit. As the frequency of the signal source increases from 1 kHz, the input impedance of the probe begins to decrease.

Offset Setting

1. Short circuit the input ends of the probe and connect the output end to the oscilloscope, then set the bias of the oscilloscope to 0 V and adjust oscilloscope to the appropriate vertical scale.
2. Press “Attenuation” button to switch the attenuation rate that requires zero bias adjustment.
3. Simultaneously press and hold “Bandwidth” button and “Attenuation” button until the light of “Overrange” starts flashing. Then release the buttons simultaneously to enter zero adjustment mode.
4. Press “Attenuation” button or “Bandwidth” button to adjust the bias position until it reaches the 0 position.
5. Press “Audible Overrange” button to save the adjustment results and exit zeroing mode.

Offset Setting Reset

1. Short circuit the input ends of the probe and connect the output end to the oscilloscope, then set the bias of the oscilloscope to 0 V and adjust oscilloscope to the appropriate vertical scale.
2. Press “Attenuation” button to switch the attenuation rate that requires zero bias adjustment.

3. Simultaneously press and hold “Bandwidth” button and “Attenuation” button until the light of “Overrange” starts flashing and hold for 3 to 4 seconds. Then release the buttons simultaneously. The probe has been reset to the default state and enter zero adjustment mode.
4. Press “Attenuation” button or “Bandwidth” button to adjust the bias position, or skip this step to save the default state in step 5.
5. Press “Audible Overrange” button to save the adjustment results and exit zeroing mode.

Care and Maintenance

- Keep the probe clean and dry. Under no circumstances should moisture penetrate the probe.
- Please wipe with soft dry cloth when clean needed, must not use chemicals to clean. To avoid damaging the probe, disconnect the oscilloscope from the probe before cleaning.
- When not in use, please put the probe in the packing box provided, and put it in cool, clean and dry places.
- When transporting, please put the probe in the packing box provided to prevent shock.
- Do not forcefully pull the lead and cable to prevent bending, twisted and folding.

Warranty

Please refer to the instruction on the warranty card.

Packing List

Items	DPB6150A	DPB6150D	SDP6150A	SDP6150D
Voltage probe	1 pcs	1 pcs	1 pcs	1 pcs
Power adapter	1 pcs	1 pcs	/	/
Adapter	1 set	1 set	/	/
USB-Type C line	1 pcs	1 pcs	/	/
Accessory kit (5 types of accessories included)	1 set	1 set	1 set	1 set
Probe packing box	1 pcs	1 pcs	1 pcs	1 pcs
Instruction manual	1 pcs	1 pcs	1 pcs	1 pcs

Note: The above “/” refers to non-standard accessory of this model.

Headquarters:

SIGLENT Technologies Co., Ltd

Add: Bldg No.4 & No.5, Antongda Industrial Zone,

3rd Liuxian Road, Bao'an District,

Shenzhen, 518101, China

Tel: + 86 755 3688 7876

Fax: + 86 755 3359 1582

Email: sales@siglent.com

Website: int.siglent.com

North America:

SIGLENT Technologies NA, Inc

Add: 6557 Cochran Rd Solon, Ohio 44139

Tel: 440-398-5800

Toll Free:877-515-5551

Fax: 440-399-1211

Email: support@siglentna.com

Website: www.siglentna.com

Europe:

SIGLENT Technologies Germany GmbH

Add: Staetzlinger Str. 70

86165 Augsburg, Germany

Tel: +49(0)-821-666 0 111 0

Fax: +49(0)-821-666 0 111 22

Email: info-eu@siglent.com

Website: www.siglenteu.com

Malaysia:

SIGLENT Technologies (M) Sdn.Bhd

Add: NO.6 Lorong Jelawat 4

Kawasan Perusahaan Seberang Jaya

13700, Perai Pulau Pinang

Tel: 006-04-3998964

Email: sales@siglent.com

Website: int.siglent.com

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