

High Voltage Differential Probe

HDP6153A 15kV_{pk}/100MHz

Product User Manual

Preface

First of all, thank you for purchasing our products, this instruction manual is the description about the function, usage, operation attention points, etc. Before use, please read the instructions carefully and use correctly.

Manual annotation will use the following symbols to distinguish.



This symbol means it is harmful to the machine and human body; you must strictly follow the instruction manual to operate.

Warn

In the case of wrong operation, the user risk injury. The content under this mark records the relevant matters needing attention to avoid such dangers.

Notice

The user may suffer minor injuries and material damage with the wrong operation. To avoid such situation, the matters under this mark need attention.

Note

This symbolizes important note about how to use the machine.

To the safely use the machine, you must abide by the following safety precautions strictly. The violation against the manual is likely to damage the protective function of the machine. In addition, the company is not responsible for any safety problem caused by the violation of matters needing attention in operation.



- Please watch out the shock danger, do not use the probe to measure voltage out of range.
- Do not use the probe in damp environment or under explosive risk.
- Make sure the circuit under test is not under high voltage before using the probe.
- After the measurement is done, make sure the circuit under test is not under high voltage before removing the probe.
- Make sure the oscilloscope and other devices used are nicely grounded.
- Please check the probe and accessories before usage, stop immediately if you find any broken parts or exposed conductor.

HDP6153A Briefing

Model	Maximum input differential voltage V _p	Maximum input differential voltage peak to peak value V _{p-p}	Bandwidth	Attenuation ratio
HDP6153A	±15000V	30000V	100MHz	200X/2000X

1. Summary

HDP6153A is the super high voltage high frequency differential probe with floating ground measurement function. It can reach up to differential voltage of 15000Vpk and bandwidth of 100MHz, and the typical accuracy of 1% can fulfill the need for most measurement system. With the standard BNC output connector, this model can operate with oscilloscope of any brand.

HDP6153A has USB communication function, and it can interact with the Smart Probe Adaptor of our company, adjusting the parameter including model, voltage type, attenuation ratio and delay corresponding to the smart probe connected. This device solved the trouble of manually setting up parameter when using a third party probe on oscilloscope and provide the same experience as those probes of certain brands.

Product Characteristics

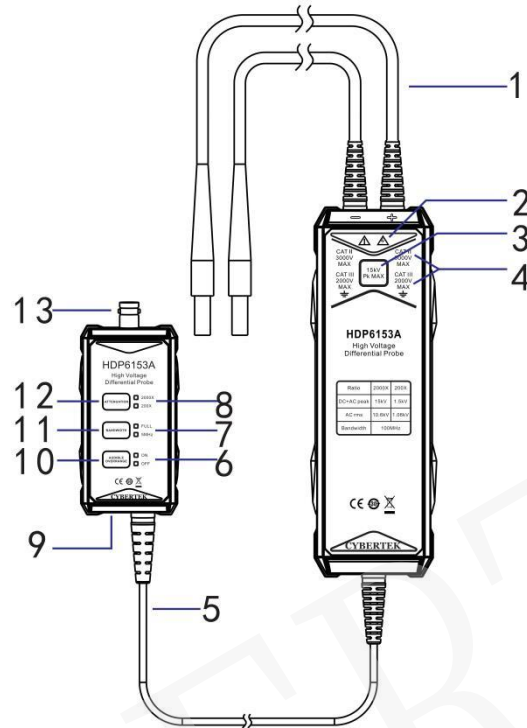
- Maximum measurable differential voltage up to 15000Vpk
- The new benchmark for low distortion waveform measurement technology
- The new benchmark for high stability high CMRR technology
- The internationally authoritative German SGS safety certification.
- Standard Type-C power supply connector.
- 5MHz bandwidth limit function.
- Over voltage alarm function.

2. Application

- ◆ Floating ground voltage measurement
- ◆ Inverter and UPS power supply
- ◆ Electrical experiment
- ◆ High-power electric testing and development
- ◆ Power electronics and power transmission experiments, etc

3.Product and accessories

■ Instruction about the probe body



Detailed instruction:

- Differential input cable(280mm):** The end of differential input cable is standard 4mm banana plug. You can connect it to various standard probe clamp or connect it on an extension cable (around 1m) to increase the length of input cable. Please be aware that the high frequency performance will degrade with extension cable, and there will be waveform oscillation due to the decreasing of bandwidth.
- Safety Alarm Symbol.**
- Maximum differential input voltage symbol.**
- The maximum input to ground voltage under CAT level environment.**
- Signal and power transmission cable:** 1.2m.
- Overload indicator light:** ON means sound alarm activated, OFF means sound alarm deactivate.
- Bandwidth indicator:** Corresponding indicator will be lighted green for your choice.
- Attenuation ratio indicator:** Corresponding indicator will be lighted green when switching attenuation ratio.
- Standard Type-C power supply connector:** can be used for power supply through USB adaptor/oscilloscope/USB portable power supply.
- Overload alarm function(AUDIBLE OVERRANGE):** When the measurement is over range, there will be sound alarm, and this button controls the buzzer sound alarm function. Set to ON will activate sound alarm, set to OFF will deactivate the sound alarm.
- BANDWIDTH Button:** Choose 5MHz bandwidth limit function can neutralize the interference of high frequency signal.
- ATTENUATION Button:** Different attenuation ratio correspond to different range, for instance, 2000X corresponds to maximum differential voltage of 15000V, and the maximum differential voltage of 200X is 1500V. For you oscilloscope to display voltage value correctly, please set up the attenuation ratio accordingly.
- Standard BNC signal output connector:** can be connected with oscilloscope of any brand.

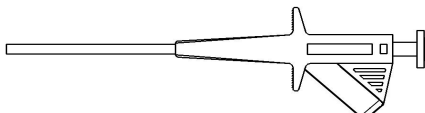
■ Instruction about the accessories



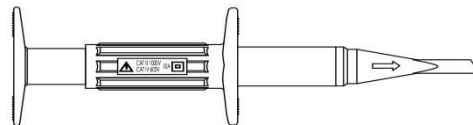
Alligator clip(CK-261 R&B one pair)



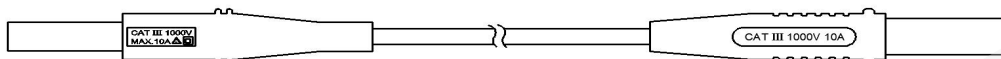
Alligator clip(CK-262 R&B one pair)



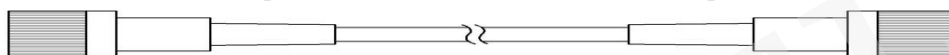
Piston probe clamp (CK-281 R&B one pair)



Test hook (CK-284A R&B one pair)



Input extension cable (CK-301 R&B one pair)



Coaxial output cable (CK-310)



USB cable (CK-314B 1.2m)



Banana head female socket (CK-293)



Adapter (CK-605A) USB 5V/2.4A

Data sheet of standard accessories

Model	HDP6153A
Alligator clip (CK-261)	--
Alligator clip (CK-262)	CATIII 1000V CATIV 600V
Piston probe clamp (CK-281)	CATIII 1000V
Test hook (CK-284A)	CATIII 1000V
Input extension cable (CK-301)	CATIII 1000V
Banana head female socket (CK-293)	Φ4mm
USB Cable (CK-314B)	1.2m
Adapter (CK-605A)	USB 5V/2.4A

P. S. The "--"means this model doesn't contain this accessories.

4. Electronics Specifications

Model		HDP6153A	
Bandwidth(-3dB)		100MHz	
Rise time		$\leq 3.5\text{ns}$	
Accuracy (% of the reading)		Typical accuracy $\pm 1\%$ ($\leq$ Full range 80%) $\pm 2\%$ ($>$ Full range 80%)	
Range option (attenuation ratio)		200X/2000X	
Maximum differential measurement voltage (DC + Peak AC)		200X	$\pm 1500\text{V}$
		2000X	$\pm 15000\text{V}$
Common mode voltage (DC + Peak AC)		$\pm 15000\text{V}$	
Maximum differential mode voltage vs frequency curve		Refer to Fig. 1	
Maximum input-to-ground voltage (Vrms)		2000V CATIII 3000V CATII	
Input impedance	Single end to ground	50M Ω	
	Two input terminals	100M Ω	
Input capacity	Single end to ground	$< 10\text{pF}$	
	Two input terminals	$< 5\text{pF}$	
CMRR	DC	$> 80\text{dB}$	
	100kHz	$> 60\text{dB}$	
	1MHz	$> 50\text{dB}$	
Noise (Vrms)		200X	$< 580\text{mV}$
		2000X	$< 1.3\text{V}$
Threshold value of voltage overload indication		200X	$\geq 1500\text{V}$
		2000X	$\geq 15000\text{V}$
Delay time	Probe body	200X	13.7ns
		2000X	12.2ns
	BNC cable (1m)	5ns	
Bandwidth limit(5MHz)		$\geq -3\text{dB}@5\text{MHz}$	
Overload alarm sound		Yes (Optional)	
Auto-save function		Yes	
Bias adjustment function		Yes (under test mode)	
Terminal load requirement		$\geq 100\text{k}\Omega$	
Power supply		USB 5V/2A adaptor	
Safety standards		IEC 61010-031: 2022, EN IEC 61010-031: 2023	
EMC standard		EN IEC 61326-1:2021 EN IEC 61000-3-2:2019+A1:2021+A2:2024 EN 61000-3-3:2013+A1:2019+A2:2021	

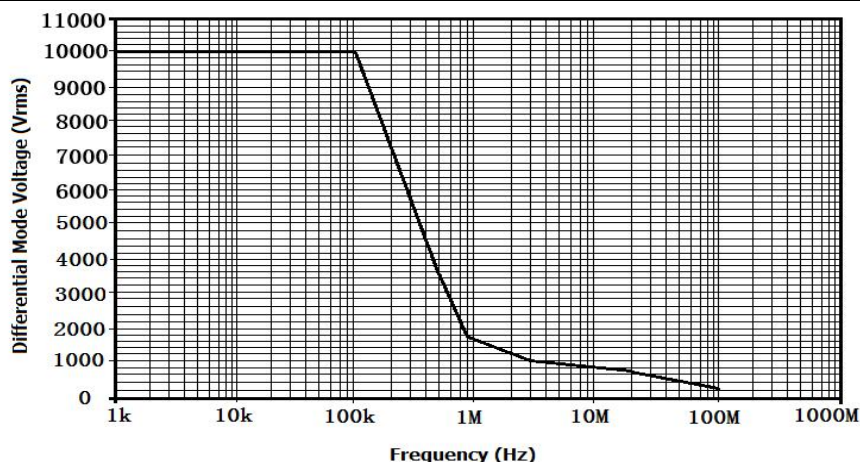


Figure 1: Maximum differential mode voltage of HDP6153A vs. Frequency

5. Mechanical Specifications

Model	Parameter
Differential input cable	280mm
Input extension cable (CK-301)	1m
Crocodile clip (CK-261)	85*40*17mm
Crocodile clip (CK-262)	106*43*16mm
Piston probe clamp (CK-281)	152*50*13mm
Test hook (CK-284A)	121*37*20mm
USB cable (CK-314B)	1.2m
Banana socket (CK-293)	Φ4mm, 31*5.5mm
Probe input size	185*63*26mm
Probe output size	96*50*25mm
Probe weight	480g

6. Environmental Specifications

Model	Parameter
Operating temperature	0°C~45°C
Storage temperature	-30°C~70°C
Operating humidity	≤85%RH
Storage humidity	≤90%RH
Operating altitude	3000m
Storage altitude	12000m

7. Operating Steps

- ✧ Before testing, always estimate the amplitude of the common mode voltage and differential voltage being measured. Exceeding the limits may cause personal injury or damage to the probe.
- ✧ Choose the proper probe clamp and connect it to the circuit under test, connect the output cable to the oscilloscope or other measurement devices.
- ✧ Connect the power supply of the probe.
- ✧ Choose the proper attenuation ratio according to the voltage need to measure. The over-voltage indicator will be lighted and buzzer will be activated when the voltage exceed the range.
- ✧ Set up the attenuation ratio of the oscilloscope or other measurement devices according to the attenuation ratio of the probe. Adjust the vertical gear of the oscilloscope according to the voltage measured.
- ✧ Move the probe body as far as possible from the high voltage pulse circuit to decrease the interference during testing.
- ✧ Switch off the power supply of the circuit under test before removing the probe after testing.

8.Steps for test mode (bias setting)

Users can enter the test mode and adjust the bias as needed. After a long period of use, the probe may experience misalignment issues and may not be in the zero position after startup. The adjustment method is as follows:

Press   both buttons, and short the input connector.

Plug in the power supply and turn on the probe. It will enter test mode, and the ON/OFF indicator light of the overload alarm function will start flashing. Release the two buttons.

This is the high attenuation multiple bias adjustment, press  button, the bias will increase;

press  button, the bias will decrease.

After the adjustment, press , this will switch to the low attenuation multiple gear bias adjustment, press  button, the bias will increase; press  button, the bias will decrease.

After the adjustment, press  button to exit test mode and the bias adjustment process is over. The overload alarm ON indicator will be lighted and enter the normal operate mode.

9.Matters need to pay attention during usage:

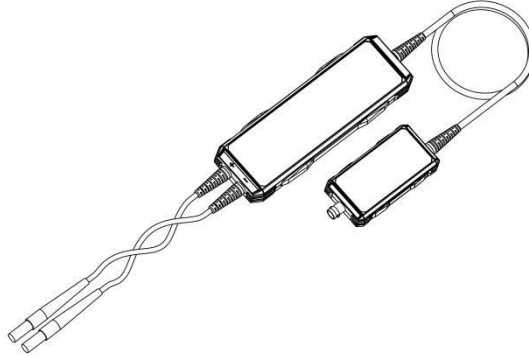
Note

9.1 The input impedance of the probe and oscilloscope must be paired to receive the correct measurement result.

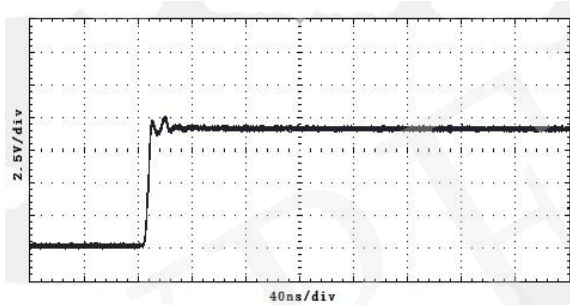
		High end oscilloscope (over 350M)		Low end oscilloscope (below 200M)	
		50Ω	1MΩ	1MΩ	External through type 50Ω load (CK-50B)
Probe	50Ω	Correct	The signal amplitude is twice normal. The waveform oscillates.	The signal amplitude is twice normal. The waveform oscillates.	Correct
	1MΩ	The output signal amplitude is half of the normal.	Correct	Correct	

9.2 During measurement, try to minimize the area encircled by two input cable, such as double line parallel or twisted pair. This will help decrease the inductance to ensure bandwidth, and decrease the environmental EM interference.

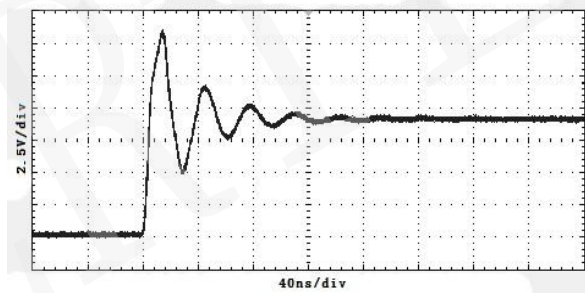
What a twisted pair looks like:



Please be aware that the high frequency characteristics will worsen if the extension cable is applied. The bandwidth will decrease and cause oscillation as shown below:



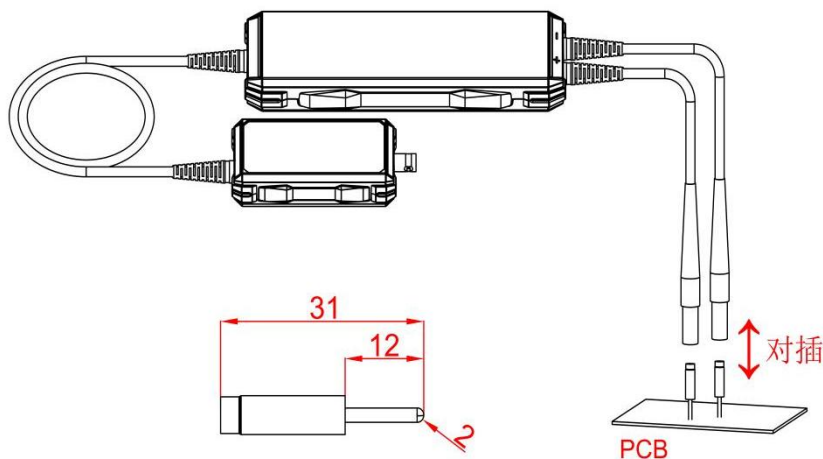
Waveform without extension cable



Waveform with extension cable(CK-301)

9.3 To fully utilize the high-frequency performance (100MHz) of this probe and achieve maximum bandwidth while reducing waveform oscillation. You can use the banana head socket that comes with the factory to connect to the tested circuit.

As shown in the picture below:



■ Optional: Smart Probe Adaptor



The Smart Probe Adaptor can automatically identify the smart probe connected and set up parameters including voltage/current type, attenuation ratio and delay time on oscilloscope. Please refer to the instruction manual of the OT7001 for more detail.

10. Packing List

Name	HDP6153A
Voltage probe body	1
USB 5V/2.4A adapter (CK-605A)	1
Crocodile Clip (CK-261)	--
Crocodile Clip (CK-262)	1
Insulated piston probe clamp (CK-281)	1
Test hook (CK-284A)	1
BNC output cable (CK-310)	1
Input extension cable (CK-301)	1
Banana socket (CK-293)	2
USB cable (CK-314B)	1
Instruction manual	1
Warranty card	1
CALIBRATION CERTIFICATE	1

P. S. The "--" means this model doesn't contain this accessories.

CYBERTEK

SHENZHEN ZHIYONG ELECTRONICS CO., LTD.

Addr: Room A1702, Building 4, TianAn Cyber Park, HuangGe Road, LongGang
District, ShenZhen City, China

Tel: (86) 400 852 0005 / (86 755) 86628000

Q Q: 400 852 0005

Email: cybertek@cybertek.cn

Url: <http://www.cybertek.cn>

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