High Voltage Differential Probe

DPB1300 1300Vpk/50MHz

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.

Warning **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 be careful to get an electric shock, pay attention to the highest input voltage.
- Do not operate in wet/damp or combustible conditions.
- Make sure to close the circuit under test before access to the probe.
- Turn off the circuit after the measurement, and then remove the probe.
- While BNC lines connect to the oscilloscope or other devices, ensure the BNC terminal grounding.
- Please check the probe skin if there is any breakage, stop using it if happen.
- Select the product standard adapter power supply.

DPB1300 brief summary

Type	Max input differential voltage	Bandwidth	Attenuation ratio
DPB1300	1300V	50MHz	50X / 500X

Contents

1. Introduction

DPB1300 Series High Voltage Differential Probes are designed for the measurement of high voltage differential signal, to meet the demand for floating measurement.

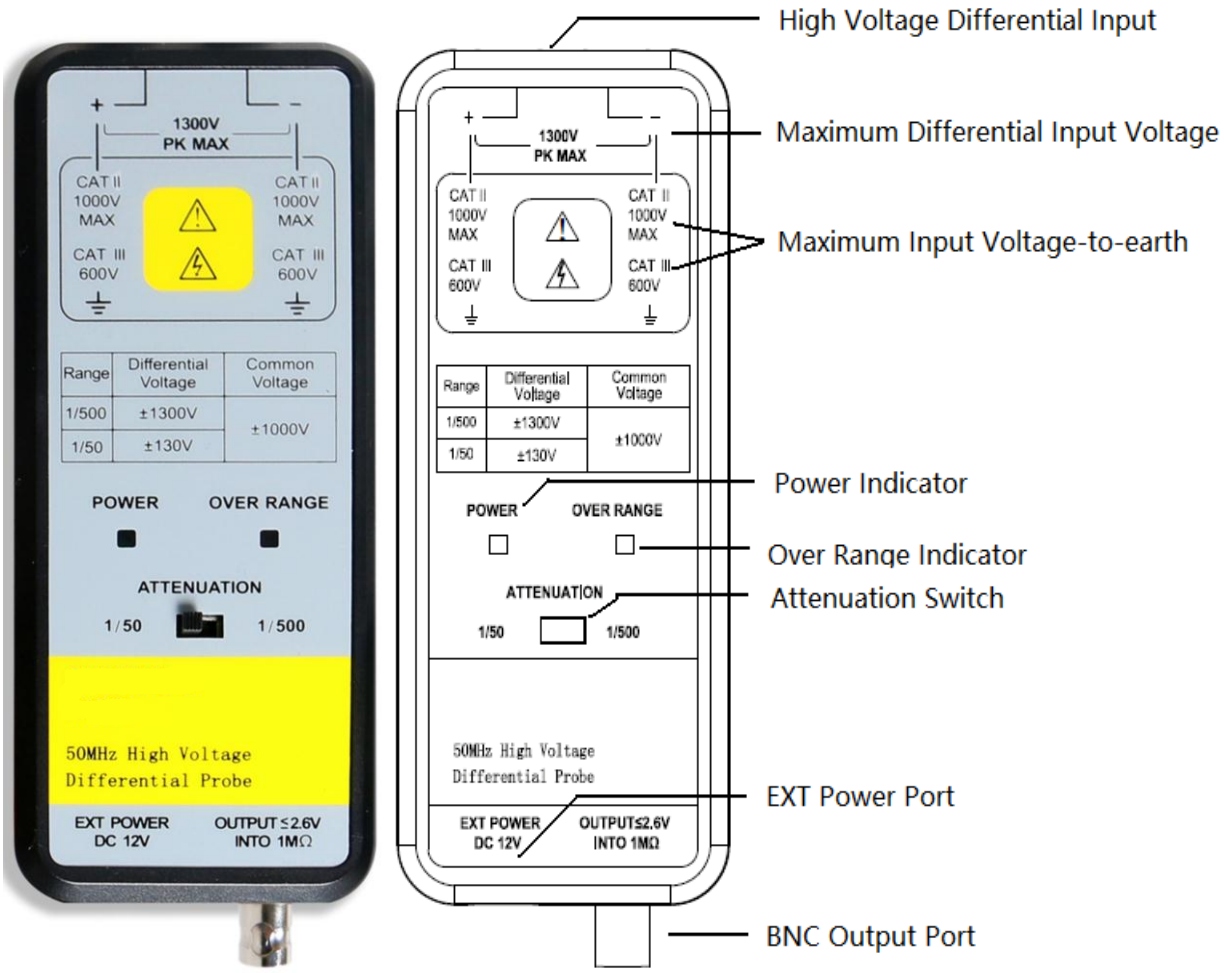
- ✧ The probe has a standard BNC port which can be connect to the oscilloscope of any brand.
- ✧ The probes have great CMRR which is very important in many power electronics applications.
- ✧ The probe can provide sound alarming function when the overload occurs.

2. Application

- Floating voltage measurement
- Inverter
- Switch Power Supply
- Welding, plating power supply
- Induction heating, electromagnetic oven
- Motor driver design
- Electronic ballast design
- CRT display design
- Inverting, UPS power supply
- Inverter appliance
- Power conversion and related design
- Experiment of electrical engineering
- Low voltage test
- Power electronics and power transmission experiment, etc.

3. Products and accessories

■ Main part of the probe



Detailed Instruction

✧ Input port: The red line is positive and black line is negative. When the connection is reversed, the output will be inversed.

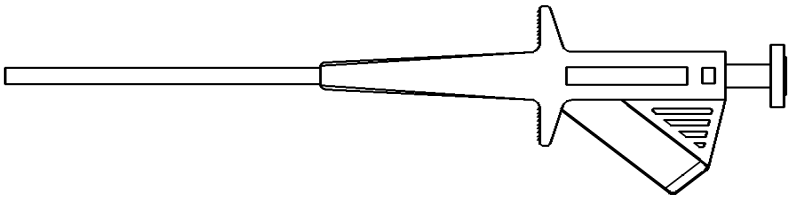
✧ Attenuation: Different attenuations symbolize different measurement range. 500X means the max measuring voltage is 1300V and 50X means 130V. The attenuation ratio setting of the Oscilloscope should be compatible with the attenuation of the probe.

✧ Over Range Indicator: The Indicator will be lighted red when the measurement is out of range.

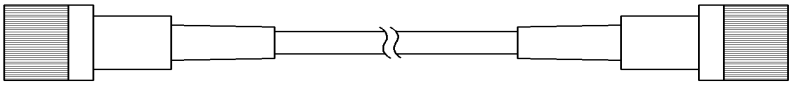
✧ Output port: The standard BNC output port can fit any kind of oscilloscope. But the Input Impedance of the oscilloscope should be 1MΩ, otherwise it can cause the attenuation of the output. For instance if the Impedance is 50Ω, the output will be 50% of the actual value.

✧ Power port: DC 12V port, able to be powered by standard DC adapter.

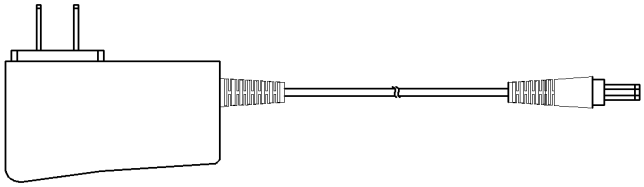
■ Accessories



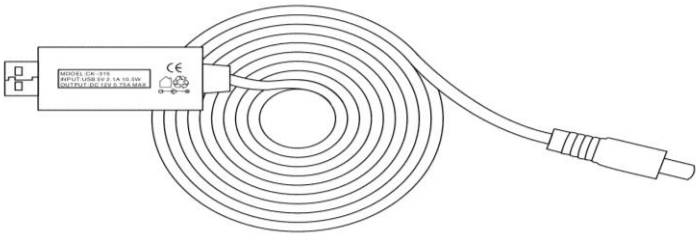
Pincer Clip (CK-281 One Pair of Red and Black)



BNC Output Line (CK-310)



Power Adapter (CK-612)



Optional: USB Boost Power line (CK-615A)

Product standard accessories description:

Type	Data
Pincer Clip(CK-281)	CATIII 1000V
Output Line(CK-310)	Double BNC Output Line：1m
Power Adaptor(CK-612)	DC 12V/1.2A
Optional: USB Boost Power line(CK-615A)	5V to 12V，isolated

4. Electronic specification

Type		DPB1300	
Bandwidth(-3dB)		50MHz	
Rise time		≤7ns	
Accuracy		±2%	
Attenuation		50X/500X	
Max differential measuring voltage (DC + Peak AC)		50X	±130V
		500X	±1300V
Common mode voltage (DC + Peak AC)		±1300V	
Max differential voltage versus frequency curve		Reference Figure 1	
Maximum input voltage-to-earth (Vrms)		600V CATIII 1000V CATII	
Input impedance	Single-ended to ground	5MΩ	
	Between inputs	10MΩ	
Input capacitor	Single-ended to ground	＜4pF	
	Between inputs	＜2pF	
CMRR	DC	＞80dB	
	100kHz	＞60dB	
	1MHz	＞50dB	
Noise (Vrms)		50X	＜50mV
		500X	＜300mV
Differential overvoltage detection level		50X	≥140V
		500X	≥1400V
Propagation time	Probe	about 10ns	
	BNC Line(1m)	about 5ns	
Overload indicator (red light）		Yes	
Terminate load		≥100kΩ	
Power adaptor		DC 12V/1.2A	

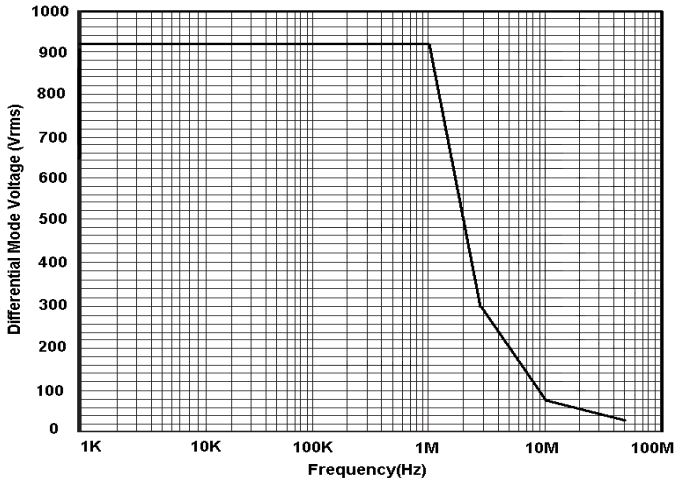


Figure 1：Max Differential Voltage versus Frequency Curve

5. Machine specification

Type	Data
Differential input line	24cm
Output line(CK-310)	1m
Clip CK-261	85*40*17mm
Size(Length*Width*Height)	145*58*24mm
Weight	165g

6. Environment characteristics

Working Temperature	0℃～50℃
Storing Temperature	-30℃～70℃
Working Humidity	≤85%RH
Storing Humidity	≤90%RH
Working Altitude	3000m
Storing Altitude	12000m

7. Operating steps

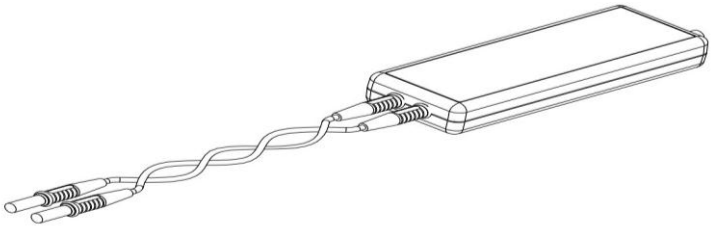
- ✧ You should estimate the tested voltage amplitude before testing, please do not use if exceeds the voltage range, because probably the probe will be damaged.
- ✧ Connect the input lead and output lead to the probe; and then connect the probe to oscilloscope or other instruments.
- ✧ Connect the power adapter to voltage probe, the power indicator light turns on green. Please select proper range based on the tested voltage; when the tested voltage exceeds range, the overload indicator light is on.
- ✧ Please set proper attenuation rate for the oscilloscope or other instruments according to the probe range; and adjust the oscilloscope sensitivity based on the tested voltage.
- ✧ Connect the probe clips 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.
- ✧ Turn off the probe power after the testing is completed, first disconnect the two inputs from the tested points, and then unplug the BNC plug from the oscilloscope.

8. Safety notices:

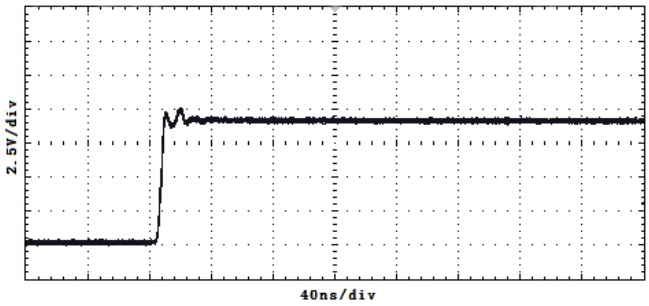
Note

1）Please try to wind the input leads when testing, which is better for eliminating lead-in inductance and external noise, to improve the ability of high frequency response and anti-interference.

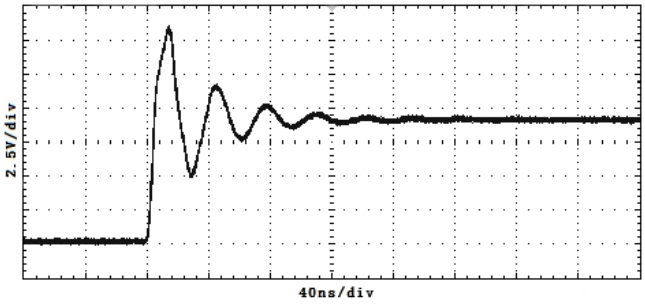
The winding method is shown below:



2）It is better not to extend input lead when testing; Otherwise it may introduce more noise. If extra extension lead is necessary, please ensure the extension leads are at same length, and the input frequency is under 5MHz, errors may exist if exceeds 5MHz output.



Without extender leads



With extender leads

9. Performance verification

The below operation is for performance verification of the electric specification, requirement for test equipment is shown below:

Equipment	Minimum Requirements	Usages
Oscilloscope	Bandwidth≥100MHZ; Accuracy≦1.5%, e.g. Tektronix MSO/DSO4000	Displays probe output
Standard signal generator; calibrator	Amplitude accuracy≤0.75%; rise time≤3ns e.g.: FLUKE/WAVETEK 9100	Test bandwidth; AC accuracy; common mode rejection ration
Digital multimeter	Accuracy of not less than 6 and a half e.g.：KEITHLEY 2000	Test the DC accuracy
Insulation pincer clips	Supplied in the accessories	Testing clips
BNC adapter 1	BNC-male-to-female-dual show as Figure 1	Test adapter
BNC adapter 2	BNC-male-to-dual binding post show as Figure 2	Test adapter
BNC adapter 3	BNC-female-to-dual binding post show as Figure 3	Test adapter
Load terminal	BNC-male-to 50Ω load show as Figure 4	Signal source load

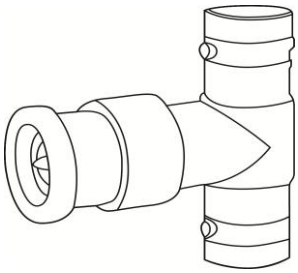


Figure 1 BNC-male-to-female-dual

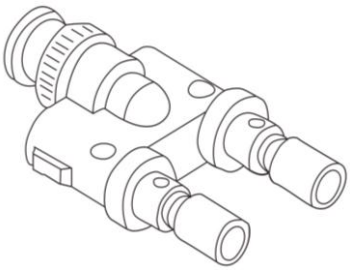


Figure 2 BNC-female-to-dual binding post

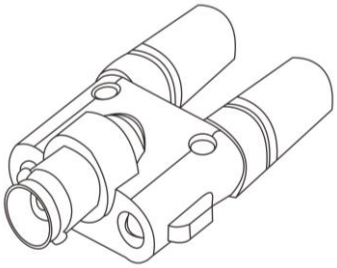


Figure 3 BNC-male-to-dual binding post

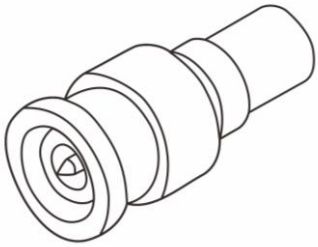


Figure 4 BNC-male-to 50 Ω load

9.1 Setup

- ✧ Connect power adapter to voltage probe, which turns on green light, to ensure accuracy, test the probe index after 20 minutes.
- ✧ Uncover the red black plastic cover of the BNC-male-to-dual binding post.

9.2 DC accuracy

- ✧ Connect the probe output to the BNC-female-to-dual binding post; plug the two input terminals of the digital multimeter into the binding post hole.
- ✧ Connect the probe input to insulation pincer clips, and then connect the calibrator output and the generator close, connect the red clip to the positive pole, black clip to negative pole.
- ✧ Set the probe attenuation factor in the first gear.
- ✧ Follow the chart below to set output values for the signal source.
- ✧ Enable the signal output, observe and record the output voltage for the attenuation.
- ✧ Turn off the signal source output.
- ✧ Switch the probe attenuation factor to the second gear.
- ✧ Repeat step 4~6, and calculate whether is within the accuracy ranges.

Type	Attenuation Ratio	Source Output Voltage	Expected Output Voltage of the Probe	Actual Output Voltage of the Probe
DPB1300	50X	5V	100mV ±2mV	
	500X	50V	100mV ±2mV	

9.3 Rise time

- ✧ Configure the fast rise output of the generator for a 50 Ω load. Attach a 50 Ω terminator to the generator fast-rise output and attach the modified BNC adapter to the terminator. Attach the differential probe input leads (without attachment accessories) by sliding the banana plug of the leads onto the binding posts metal sleeves on the modified BNC adapter.
- ✧ Connect the probe output to the oscilloscope, set attenuation factor in the first gear.

- ✧ Refer to the below stable to set standard signal generator.
- ✧ Enable signal source output and record the rise time.
- ✧ Turn off signal source output.
- ✧ Switch the probe attenuation factor to the second gear.
- ✧ Repeat step 3~5, and calculate whether is in the range.

Type	Attenuation Ratio	Setting of the Source Voltage and Frequency	Expected Rise Time of the Probe	Actual Rise Time of the Probe
DPB1300	50X	20Vp-p 200MHz	≤7ns	
	500X	20Vp-p 200MHz	≤7ns	

9.4 DC common mode rejection ration (CMRR)

- ✧ Set DPB1300 probes at low attenuation ration, respectively (50X).
- ✧ Set 500V DC voltage for signal source and turn off the voltage output.
- ✧ Connect the two probe inputs to 500V voltage.
- ✧ Connects the probe output to BNC-female- to- dual binding post (as shown in Figure 3), and plug into the two inputs of the digital multimeter.
- ✧ Enable signal source output, respectively record voltage output values; check with the following chart to calculate whether is within the ranges.
- ✧ Turn off the calibrator after completion of the test.

Type	Attenuation ratio	Expected output voltage of the probe	Actual output voltage of the probe
DPB1300	50X	≤1mV	

Note: High voltage 500 V is used during the testing, please pay attention to personal safety; to reduce voltage fluctuation, be sure to make the calibrator output 500 V high voltages after the completion of all connections.

9.5 Test record form

Test record form				
Product serial number:		Test temperature:		
Test date:		Test humidity :		
Test type:		Lower limit	Test result	Higher limit
DC accuracy	50X	98mV		102mV
	500X	98mV		102mV
Rise time	50X	--		7ns
	500X	--		7ns
DC CMMR	50X	-1mV		1mV

10. Care and maintenance

- ✧ Keep the probe clean and dry.
- ✧ Please wipe with soft dry cloth when clean needed, must not use chemicals to clean.
- ✧ Please put the probe in the package provided, and put it in cool, clean and dry places.
- ✧ Please put the probe in the package provided to prevent shock.
- ✧ Do not forcefully pull the input and output lead to prevent bending, twisted and folding.

11. Warranty

Please follow the instruction of the Warranty Card

12. Packing list

Packing List	
Differential voltage probe	1
Adaptor(CK-612)	1
Insulation pincer clip(CK-281)	1
Output line(CK-310)	1
High-level tool case	1
Instruction book	1
Warranty card	1
Testing report	1