

# Optical Isolated Voltage Probe

(Powered by Battery)

OPB6015 (2.5V~5000V/150MHz)

OPB6035 (2.5V~5000V/350MHz)

OPB6050 (2.5V~5000V/500MHz)

OPB6080 (2.5V~5000V/800MHz)

OPB6100 ( 2.5V~5000V/1GHz )



Shenzhen Zhiyong Electronics Co., Ltd

## 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 the danger of electric shock and pay attention to highest input voltage.
- Do not operate in wet or combustible conditions.
- Make sure the circuit under test is turned off before access it to the probe.
- Turn off the circuit after the measurement, and then remove the probe.
- When BNC cables are connected to the oscilloscope or other devices, ensure the BNC terminal is well grounded.
- Check the probe skin and probe lead regularly. If there is any breakage, stop using it immediately.

## 1. Introduction

OPB6000 series is the latest optical isolated voltage probe with remarkably high CMRR. The CMRR of traditional differential probe decreases fast in high-frequency range, as a result, measuring the small voltage signal waveform (e.g., the driving voltage when measuring the upper MOSFET of the half-bridge circuit) under high CM interference voltage accurately become a extremely hard task. OPB6000 series applies optical isolation technologies and gains remarkably high CMRR in all working bandwidth, helping our customers to deal with these kinds of challenging measurement with low cost.

### Product Characteristics:

- 2 Chargeable batteries that can be replaced to keep the probe work continuously.
- Can be calibrated and zeroed online without disconnecting from the tested equipment.
- Automatic sleep function at the transmitting end (automatically wakes up when the receiving end is powered on; automatically sleeps 5 seconds after the receiving end is powered off)
- Multiple attenuators available, able to meet the measurement requirement of different voltage.
- Extremely high CMRR
- Bandwidth over 1GHz
- Isolation voltage over 60kV
- High accuracy and stability in wide temperature range
- Smaller size

## 2. Application

OPB6000 series can be widely applied in the R&D, debugging or maintenance of switching power supply, motor driver, new energy inverter, converter, LED power supply, household appliances and other electrical power devices.

- Floating signal test.
- Measure the gate voltage drive of power devices like Si/SiC/GaN .
- Small signal measurement of differential mode under high common mode voltage.

## 3. Electric Specification

Model	OPB6015	OPB6035	OPB6050	OPB6080	OPB6100			
Bandwidth (-3dB)	150MHz	350MHz	500MHz	800MHz	1GHz			
Rise time	≤ 2.3ns	≤ 1.0ns	≤ 0.7ns	≤ 0.43ns	≤ 0.35ns			
Terminal load	1MΩ	1MΩ	50Ω	50Ω	50Ω			
Output voltage range	±1.25V	±1.25V	±0.5V	±0.5V	±0.5V			
Typical values of host noise (Vrms)	2mV	2mV	1mV	1mV	1mV			
DC accuracy	≤±1%							
Isolation voltage (DC+Peak AC)	±60kV							
Standard configuration attenuator + host delay	15.3 ns (2-meter optical fiber)							
Battery specifications	Capacity		7.4V/950mA					
	Operating Time		About 8h					
	Standby time		About 30 days					
Power supply method	Rear end: USB 5V/2A							
Auto calibration	Yes							

## Attenuator specifications

Probe Model	Attenuator Model	Connector type	Attenuation ratio	Measurement range	Maximum undamaged voltage	Input impedance
OPB6015 OPB6035	CK-AT2X-1	SSMB	2:1	±2.5Vpk	2kVpp	1MΩ  28pF
	CK-AT5X-1	SSMB	5:1	±6.25Vpk	2kVpp	1MΩ  6pF
	CK-AT10X-1	SSMB	10:1	±12.5Vpk	2kVpp	10MΩ  6pF
	CK-AT20X-1	SSMB	20:1	±25Vpk	2kVpp	10MΩ  4pF
	CK-AT50X-1	SSMB	50:1	±62.5Vpk	3kVpp	10MΩ  2pF
	CK-AT100X-1	SSMB	100:1	±125Vpk	3kVpp	10MΩ  2pF
	CK-AT200X-1	2.54mm socket	200:1	±250Vpk	5kVpp	10MΩ  2pF
	CK-AT500X-1	2.54mm socket	500:1	±625Vpk	5kVpp	20MΩ  2pF
	CK-AT1000X-1	5.08mm socket	1000:1	±1250Vpk	6kVpp	20MΩ  2pF
	CK-AT2000X-1	5.08mm socket	2000:1	±2500Vpk	6kVpp	40MΩ  2pF
	CK-AT4000X-1	5.08mm socket	4000:1	±5000Vpk	12kVpp	40MΩ  2pF
OPB6050 OPB6080 OPB6100	CK-AT5X-2	SSMB	5:1	±2.5Vpk	2kVpp	1MΩ  28pF
	CK-AT10X-2	SSMB	10:1	±5Vpk	2kVpp	1MΩ  6pF
	CK-AT20X-2	SSMB	20:1	±10Vpk	2kVpp	5MΩ  6pF
	CK-AT50X-2	SSMB	50:1	±25Vpk	2kVpp	10MΩ  4pF
	CK-AT100X-2	SSMB	100:1	±50Vpk	3kVpp	10MΩ  2pF
	CK-AT200X-2	SSMB	200:1	±100Vpk	3kVpp	10MΩ  2pF
	CK-AT500X-2	2.54mm socket	500:1	±250Vpk	5kVpp	10MΩ  2pF
	CK-AT1000X-2	2.54mm socket	1000:1	±500Vpk	5kVpp	20MΩ  2pF
	CK-AT2000X-2	5.08mm socket	2000:1	±1000Vpk	6kVpp	20MΩ  2pF
	CK-AT5000X-2	5.08mm socket	5000:1	±2500Vpk	6kVpp	40MΩ  2pF
	CK-AT10000X-2	5.08mm socket	10000:1	±5000Vpk	12kVpp	40MΩ  2pF

PS: OPB6015/OPB6035 with standard CK-AT20X-1;

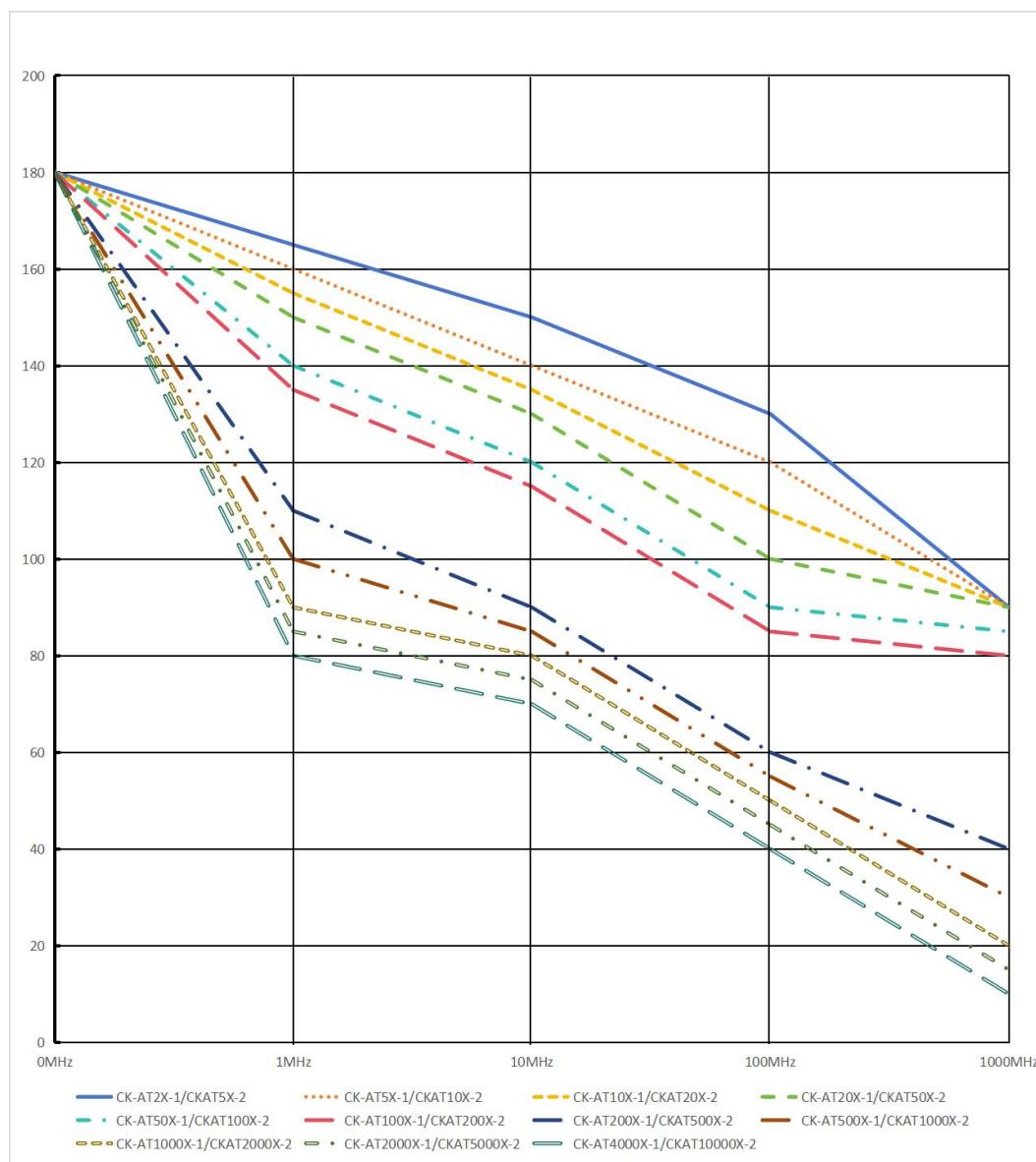
OPB6050/OPB6080/OPB6100 with standard CK-AT50X-2.;

If you need other attenuator, please purchase independently.

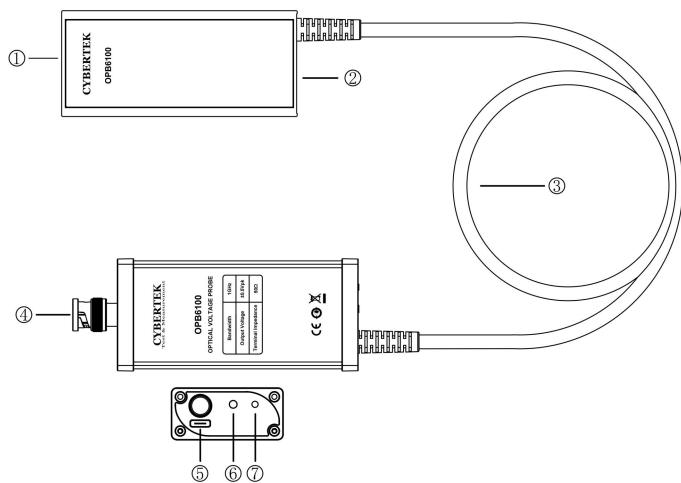
### Optional attenuator packing list

Connector type	SSMB	2.54mm socket	5.08mm socket
CK-201(2.54_2p)	-	5	-
CK-202 (5.08_2p)	-	-	5

## Common mode rejection ratio curve of different attenuators

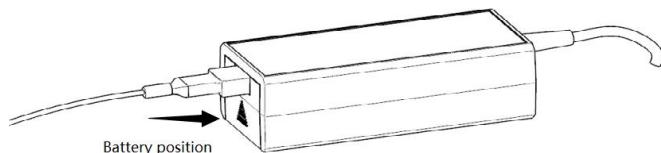


## 4. Probe instruction



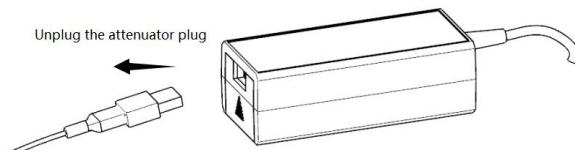
- ① Attenuator input connector: able to connect attenuator on both sides. Please do not forcefully insert the attenuator, or the connector may be damaged.
- ② Power supply indicator light: green light means sufficient power, red light means low power.
- ③ Optical fiber: do not press it heavily or bend it to 90 degrees, or the fiber will be broken.
- ④ Output connector: standard BNC output connector.
- ⑤ Power supply connector: please use adaptor and power supply cable of 5V/2A. This device may not work properly with insufficient power supply.
- ⑥ Dual color indicator light: the green light blinking means the auto-zero set is ongoing, and if there's three beeps and the green light remains, the adjustment is successfully done. However if the buzzer sound continuously for 1~2 sec with the green light on, the auto-zero setting is failed. If the red light is on, the probe is malfunctioned, you would probably need to send it back for maintenance.
- ⑦ Auto-zero set button: press it lightly to activate the auto-zero set function.

### Battery description

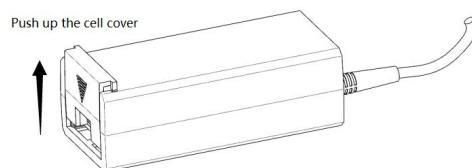


The standard configuration contains two 7.4V/950mAh lithium batteries. The battery installation position is shown in the above figure. In this design, after inserting the attenuator, the attenuator plays a limiting role and the battery cannot be removed. If you need to remove the battery for charging, refer to the following steps:

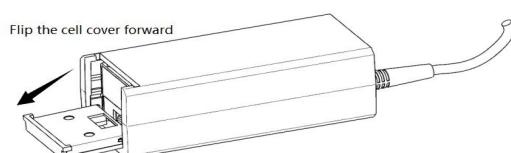
First of all:



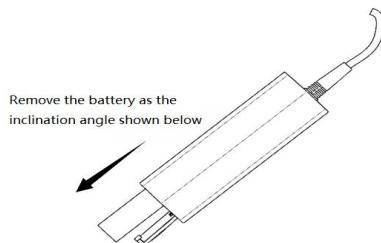
Secondly:



Thirdly:



Next:



**NOTE**

- Do not put heavy object (for instance, your chair) on the optical fiber, avoiding stress on the fiber is crucial to avoid malfunction.
- Do not squeeze, curl, or bend the optical fiber violently. The diameter of bending should be over 10 cm.
- Do not twist or tie the optical fiber. Do not pull or jerk the optical fiber, especially when there are twists or knots.
- Do not drop the probe, this could damage the inner optical component.
- Please store the probe in our standard case as we did when you don't need to use it.
- Please careful exam the optical fiber before usage, and if there's anything broken, please stop using it at once.

## 5. Operating Process

**Attention**

**Please use our standard adaptor and power supply cable.**

- Estimate the range of voltage under test and insert the proper attenuator.
- Connect the probe to the oscilloscope and power it up. Activate the auto-zero set, it will take about 20 sec depends on the environmental temperature and main component temperature.
- Set up the attenuation ratio of the oscilloscope accordingly, and adjust the sensitivity of the oscilloscope according to the voltage under test.
- Make sure the front end of the probe is elevated if possible, keeping it away from the high voltage pulse circuit can decrease the interference on the probe.
- The front end of the probe is directly connected with the high voltage circuit under test. Do not take the probe off before you turn off the circuit's power supply.

## 6. Mechanical Specifications

Model		Parameter
Probe dimensions	Front-end E/O transmitter	Around 102*45*33mm
	Rear-end O/E receiver	Around 106*49*23mm
Attenuator length		Around 200mm
Optical fiber length		2m
Probe Weight		Around 400g

## 7. Warranty

Please refer to the instruction on the warranty card.

## 8. Packing list

Name	OPB6015	OPB6035	OPB6050	OPB608 0	OPB610 0
Voltage Probe	1	1	1	1	1
20X attenuator (CK-AT20X-1)	1	1	-	-	-
50X attenuator (CK-AT50X-2)	-	-	1	1	1
SSMB male socket to DuPont cable connector (CK-321)	2	2	2	2	2
SSMB male socket (CK-23)	10	10	10	10	10
USB power supply cable TYPE-C 1.5m (CK-314A)	1	1	1	1	1
Power supply adaptor 5V/2A(CK-605)	2	2	2	2	2
OE transmitter support frame (CK-690A)	1	1	1	1	1
BNC male to SSMB male (CK-25)	1	1	1	1	1
Input extension cable (CK-322)	3	3	3	3	3
Output extension cable(CK-325)	1	1	1	1	1
Battery charger set (CK-691)	1	1	1	1	1
Instruction manual	1	1	1	1	1
Warranty card	1	1	1	1	1
Test report	1	1	1	1	1

**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](mailto:cybertek@cybertek.cn)

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

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