

HIGH VOLTAGE DIFFERENTIAL PROBE

高電壓差動測試棒



DP-60K

60 KVp-p / 60 MHz

INSTRUCTION MANUAL

使用說明書

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DP-60K

HIGH VOLTAGE DIFFERENTIAL PROBE

Differential Voltage Probe,

Read the instructions before using the instrument:

1. Must acquire a differential voltage probe & get the best service from instrument.
2. Read carefully the USER MANUAL.
3. Respect the safety precautions.

SAFETY PRECAUTIONS

Warning, Risk of Electric Shock,

Respect the max input voltages.

1. Max differential voltage: ± 30 KV (DC+AC peak) or 21 KV RMS
2. Max voltage between each input terminal and ground:
15 KV (DC+AC peak) or 10.6 KV RMS



Do not use the probe in damp environment or where there is risk of explosion.

Do not use the probe with its case open.

Disconnect the inputs and outputs of the probe before opening the case.



When measuring ± 10 KV (DC+AC peak) or over 5 KV RMS high voltage, it is mandatory to check ground cable is connected properly and doing measurements.

It is to protect oscilloscope without any damages.

TO ORDER Differential Voltage Probe and Accessories:

- An Insulated BNC/BNC lead and two $\Phi 4$ mm, length 100 cm (BP-250)
- Supplied an Adapter preset 9 V DC [115V(SP-115H) or 230V(SP-230H)]
- 2 x High voltage IC clips (BP-266N)
- 2 x Banana to Banana high voltage plug 30 KV DC/ 50 CM (BP-567).
- 2 x Alligator plug, 1 KV CAT III (BP-276N)
- 2 x High voltage extension cable, length is 1 meter / 30 KV DC (ETL-3100)
- 1 x Ground extension cable, length is 1 meter / 6 KV DC (ETG-6100)

FEATURES:

- DP-60K is a differential voltage probe to provide an insulation instrument for all oscilloscopes using.
- It converts the high differential voltage (≤ 60 KV peak) into a low voltage (≤ 6.0 V) with reference to the earth for display on the oscilloscopes. Its frequency is up to 60 MHz, it is designed especially for high voltage using.
- The BNC output is designed to operate on an input with an impedance of 1 M Ω . It is 2 times of the 50 Ω .
- DP-60K can observe more exact measured testing voltage from DMM. (Oscilloscope accuracy is 3%, and DMM is 10 times.



When measuring ± 10 KV DC or over 5 KVrms high voltage, it is mandatory to check ground cable is connected properly and doing measurements.

SPECIFICATIONS:

(1) Bandwidth:

DC - to 60 MHz (-3 dB) for X500

DC - to 20 MHz (for attenuation X5000)

(2) Attenuation: x 500, or X5000

(3) Accuracy: $\pm 2\%$

(4) Voltage Input Ranges (DC+AC peak to peak):

≤ 30 KV DC for X5000, (i.e about 21 KVRms or 30 KV DC)

≤ 3 KV DC for X500, (i.e about 2.1 KVRms or 3 KV DC)

(5) Permitted Max Input Voltage

Max differential voltage: 60 KVp-p (DC+AC peak to peak)

Max voltage between each input terminal and ground: 10.6 KVRms

(6) Input Impedance:

Differential: $160\text{ M}\Omega // 3\text{ pF}$

Between terminals and ground: $320\text{ M}\Omega // 1.5\text{ pF}$

(7) Output: $\leq \pm 6\text{ V}$

(8) Output Impedance: $50\text{ }\Omega$

(9) Rise Time: 5.8 ns for X500; 17.5 ns for X5000

(10) Rejection Rate on Common Mode:

60 Hz: $>60\text{ dB}$, 100 Hz: $>50\text{ dB}$, 1 MHz: $>40\text{ dB}$

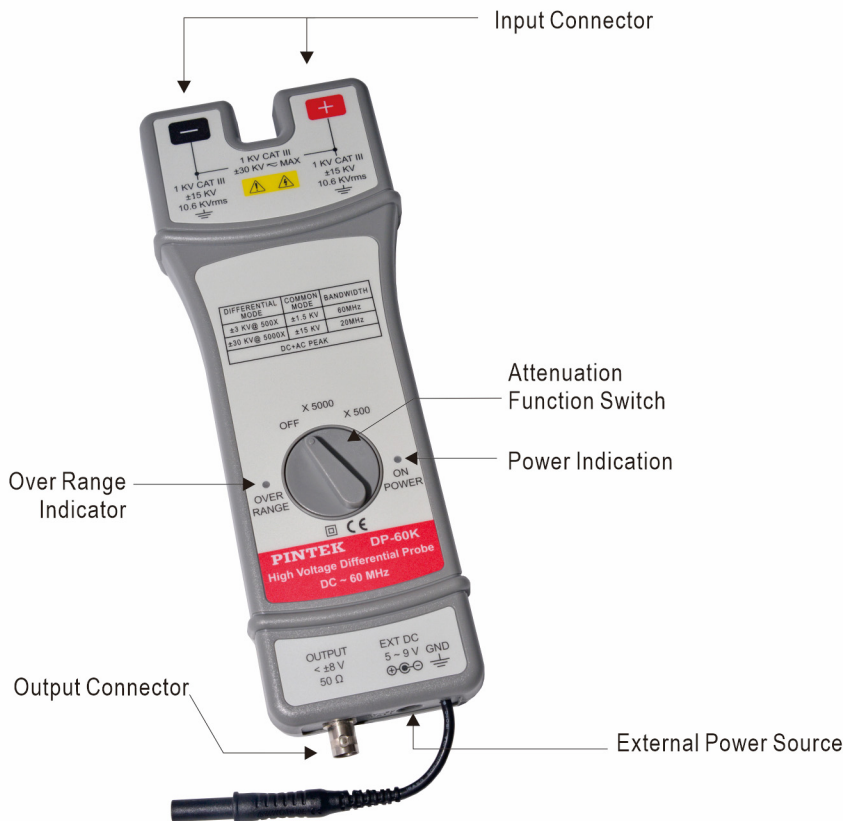
(11) Power Supply:

9 VDC power supply (customized, only can use the one attached)

(12) Consumption: 120 mA max (1.1 WATT)

*****The banana plugs of the extension wires can only withstand 1 KV.
Please ensure they are kept at a safe distance from each other
(approximately 1 cm per 1 KV).*****

PANEL DESCRIPTION:



OPERATING ENVIRONMENTAL CONDITIONS:

	Reference	Use	Storage
Temperature	+20°C ...+30°C	0°C ...+50°C	-30°C ...+70°C
Relative Humidity	≤ 70 % RH	10 % ... 85 % RH	10 % ...90 % RH

(1) Dimensions and Weight:

275 x 147 x 34 mm; 488 g

(2) Electrical Safety to IEC 1010-1:

- Dual Insulation
- Installation Category III
- Degree of Pollution 2
- Rated Voltage or Max Live-Earth: 10.6 KVRms

(3) CE Mark:

Conforms to EN 50081-1 and 50082-1 standards

OPERATING PROCEDURE:

- Connect to leads to the input and place the wire-grip on the circuit to be tested.
- Connect the probe to the oscilloscope with the insulated BNC/BNC lead.
- Adjust the vertical zero adjustment of the oscilloscope if necessary.
- Select the attenuation ratio* and the vertical deviation of the oscilloscope in accordance with the conversion table below.



When measuring ± 10 KV DC or over 5 KVRms high voltage, it is mandatory to check ground cable is connected properly and doing measurements.

The conversion table gives the real vertical deviation.

Attenuation	X5000	X500
MAX Voltage Input Range (DC+AC Peak)	60 KVp-p	6 KVp-p
DC MAX INPUT	± 30 KV	± 3 KV
AC RMS MAX INPUT	21 KVRms	2.1 KVRms

Vertical Deviation on the Oscilloscope in V/div	Real Deviation In V/div	
	X5000 Range	X500 Range
1	5 KV	500 V
0.5	2.5 KV	250 V
0.2	1 KV	100 V
0.1	500 V	50 V
50 m	250 V	25 V
20 m	100 V	10 V
10 m	50 V	5 V
5 m	25 V	2.5 V
2 m	10 V	1 V

[NOTE]

The real vertical deviation in V/div is equal to the attenuation factor multiplied by the range of vertical deviation selected on the oscilloscope. It will be doubled in the case of use of a 50 Ω load.

Example:

With the probe on factor x 500, the oscilloscope on 1 V/div, the real vertical deviation is $500 \times 1 \text{ V/div} = 500 \text{ V/div}$.

With a 50 Ω load on the input of the oscilloscope the deviation becomes: $500\text{V/div} \times 2 = 1\text{KV/div}$.

EXT. POWER SOURCE:

- Power consumption of the probe is 120 mA, thus it not suits for battery, please use the accessory adapter only.
- If there are any damage on the adaptor, please contact us and use the adaptor supply by us only.

MAINTENANCE:

For maintenance, only use specified spare parts.

The manufacturer can not be held responsible for any accident arising following a repair made other than its after sales service or approved repairers.

CLEANING:

This probe does not require any particular cleaning. If necessary, clean the case with a cloth slightly moistened with soapy water.

WARRANTY:

Unless notified to the misusing, our instruments are guaranteed against any manufacturing defect or material defect. They do not bear the specification known as the safety specification. Our guarantee, which may not under any circumstances exceed the amount of the invoiced price, goes no further than the repair of our faulty equipment, carriage paid to our workshops.

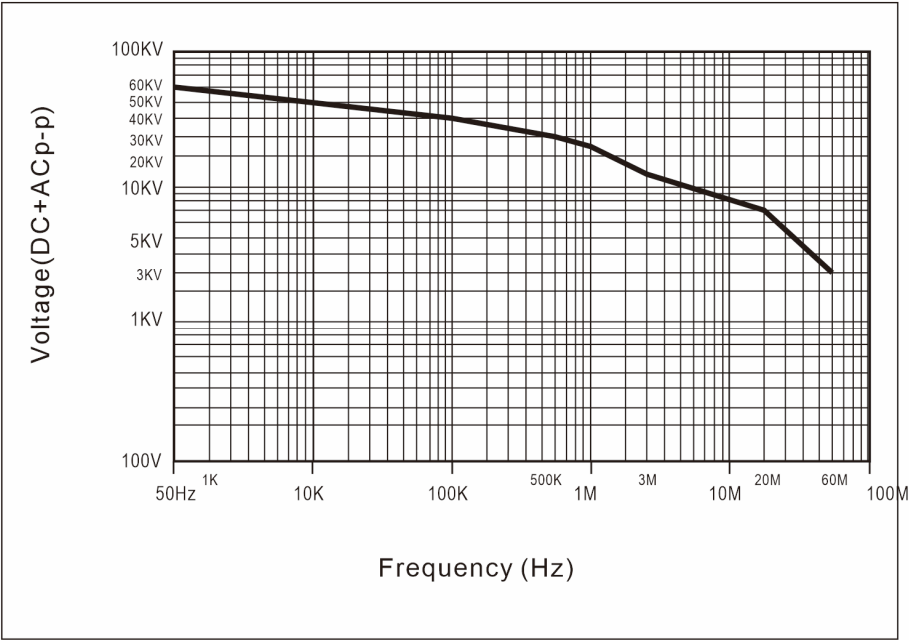
REPAIR:

Maintenance, repairs under or out of guarantee. Please return to product to your distributor.

DERATING CURVE:

The derating curve of the absolute maximum input voltage in common mode is show as follows:

50 Hz / 60 KVp-p, 100 KHz / 40 KVp-p, 500 KHz / 30 KVp-p, 1 MHz / 25 KVp-p, 3 MHz /15 KVp-p, 20 MHz / 7 KVp-p, 60 MHz / 3 KVp-p



Note:

When measuring Plus Voltage, the peak voltage should be divided by 2.

※ *Specification is subject to change as required by our company. Our website information shall be updated immediately if any change is done. Instruction booklet can be downloaded on our website.*

DP-60K

高電壓差動測試棒

使用前請詳細閱讀使用說明：

1. 請先獲得一支差動測試棒。
2. 從使用說明取得最佳維修及服務。
3. 請詳讀使用者操作手冊，並請注意安全注意事項。

安全注意事項：

- 請小心注意觸電!
- 請注意最高輸入電壓!
- 最高差動電壓: ± 30 KV(DC+AC peak) 或 21 KVrms
- 輸入端及接地端間的最大電壓: ± 15 KV(DC+AC peak) 或 10.6 KVrms
- 請勿使用此產品在潮濕的環境下或有易爆的風險下操作!
- 請勿使用此產品，當此產品的盒蓋被打開!
- 當打開此產品的盒蓋時，請將輸出及輸入端切斷!



測量 ± 10 KV(DC+AC peak), 或 5 KVrms 以上的高電壓，必須強制檢查接地引線是否已接妥再進行測量，以避免示波器遭受損壞。

訂購差動測試棒時內含：

- 雙端 BNC 接頭的測試纜線, 長度 100 公分(BP-250)
- 一個 9 V DC 轉換器[需指定規格 115 V(SP-115H)或 230 V(SP-230H)]
- 一對高電壓專用的 IC 夾(BP-266N)
- 一對指定規格的雙端香蕉插頭高電壓傳輸線, 50 KV DC/60 公分(BP-567)
- 一對高電壓專用的鱷魚夾, 1KV CAT III(BP-276N)
- 一對高電壓延長線, 長度 1 公尺/30 KV DC(ETL-3100)
- 一條接地延長線, 長度 1 公尺/6 KV DC(ETG-6100)

高電壓延長線的香蕉接頭耐電壓僅 1 KV, 使用時 2 個接頭請勿靠近(1 KV 間隔 1 公分距離), 以避免危險。

簡述：

- DP-60K 差動測試棒提供一個安全的絕緣儀器給所有的示波器使用，它可以轉換由高輸入的差動電壓(≤ 60 KV peak) 進入一個低電壓(≤ 6.0 V)，並且顯示波形在示波器上，使用頻率高達 60 MHz，是高電壓專用型。
- 差動測試棒輸出標示是設計在操作示波器 $1\text{ M}\Omega$ 的輸入阻抗的相對衰減量，當使用 $50\text{ }\Omega$ 匹配器時衰減量剛好為 2 倍量。
- DP-60K 差動測試棒，也建議在數字電表上觀測更精確的實際測試電壓值(示波器精確度為 3%，數字電表約精準 10 倍)。



測量 $\pm 10\text{ KV(DC+A peak)}$ ，或 5 KVrms 以上的高電壓，接地引線必須強制接妥。

規格：

(1) 頻寬:

DC - 60 MHz (-3dB) for X500 檔

DC - 20 MHz (-3dB) for X5000 檔

(2) 衰減: X500, 或 X5000

(3) 精確度: $\pm 2\%$

(4) 輸入電壓範圍 (DC+AC peak to peak)

$\leq 30\text{ KV DC}$ for X5000, (約 21 KVrms 或 30 KV DC)

$\leq 3\text{ KV DC}$ for X500, (約 2.1 KVrms 或 3 KV DC)

(5) 允許最高輸入電壓:

最高差動電壓: $60\text{ KVp-p (DC+AC peak to peak)}$

輸入端及接地端間最高電壓: 10.6 KVrms

(6) 輸入阻抗:

差動: $160\text{ M}\Omega // 3\text{ pF}$

單端到接地端間的輸入阻抗: $320\text{ M}\Omega // 1.5\text{ pF}$

(11) 電源: 指定外接 9 V DC 電源(必須使用本公司指定品)

操作環境及狀況：

	一般狀態	使用操作中	儲存
溫 度	+20°C ...+30°C	0°C ...+50°C	-30°C ...+70°C
濕 度	≤ 70 % RH	10 % ... 85 % RH	10 % ... 90 % RH

(1) 尺寸及重量::

275 x 147 x 34 mm; 488 g

(2) 電子安全規範 IEC 1010-1:

- 雙絕緣
- 安裝類目 III
- 污染程度 2
- 相關電壓或最大接地: 10.6 KVrms
- CE: EN50081-1 及 50082-1

操作環境及狀況：

- 將附件 BP-567 與 BP-266N (或 BP-276N) 接起來後插入 DP-60K 的輸入端，並將 BP-266N (或 BP-276N) 與測量物接觸。
- 將 BP-250 與 DP-60K 的輸出端連接，並與示波器連結。
- 如有需要先調整示波器上的垂直開關。
- 將示波器上的衰減率及垂直開關調整到一致的位置，如下表。

 注意:

測量 10 KV(DC+A peak), 或 5 KVrms 以上的高電壓，接地引線必須強制接受。

衰 減	X5000	X500
最大輸入電壓 (DC+AC Peak)	60 KVp-p	6 KVp-p
DC 最大輸入	± 30 KV	± 3 KV
AC RMS 最大輸入	21 KVrms	2.1 KVrms

示波器上的 垂直偏向(V/DIV)	換算實際偏向(V/DIV)	
	X5000 檔	X500 檔
1	5 KV	500 V
0.5	2.5 KV	250 V
0.2	1 KV	100 V
0.1	500 V	50 V
50 m	250 V	25 V
20 m	100 V	10 V
10 m	50 V	5 V
5 m	25 V	2.5 V
2 m	10 V	1 V

[注意]

實際的垂直偏向是等於衰減乘上示波器上所選擇的垂直偏向。如果另外使用 50 Ω 負載端子時，實際電壓值剛好是 2 倍量。

例如:

測試棒是 x 500，示波器的垂直偏向在 1 V/div，其實際的垂直偏向為：

$$500 \times 1 \text{ V/div} = 500 \text{ V/div}$$

示波器輸入的負載是 50 Ω ，偏向就為：

$$500 \text{ V/div} \times 2 = 1 \text{ KV/div}$$

外接電源：

- 本產品因耗電量高達 120mA，因此指定使用電源轉接器 115 V 專用(SP-115H) 或 230V 專用(SP-230H)。
- 請勿使用非本公司指定品，若因此造成任何損毀，本公司概不負責。

維護：

保養此產品時請使用原廠指定的工具，原廠將不負任何責任由其他不被認可的維修人員所做的維修。

清潔：

此產品不需要任何特定的清潔，如有需要，請用輕軟乾淨的布沾上微量的清潔液輕輕的在產品外觀擦拭。

保固：

除了在人爲上的特意損壞，本產品是受保固並可以維修的，並不包含在安全規範的責任。

保固是以不超出發票上的金額，零件的更換及運送的費用。

保固是僅在正常操作下而造成的損壞，並不包含任何刻意的損壞，操作上的錯誤，機械上的操作不當，保養不當，負載或過壓。

原廠的保固僅包含有限的單純更換損壞的零件，使用者將不可歸據直接或間接的責任在原廠。

原廠的保固是賣出後的 12 個月內，如有任意的非原廠的維修或更換零件，原廠保固將自然取消。

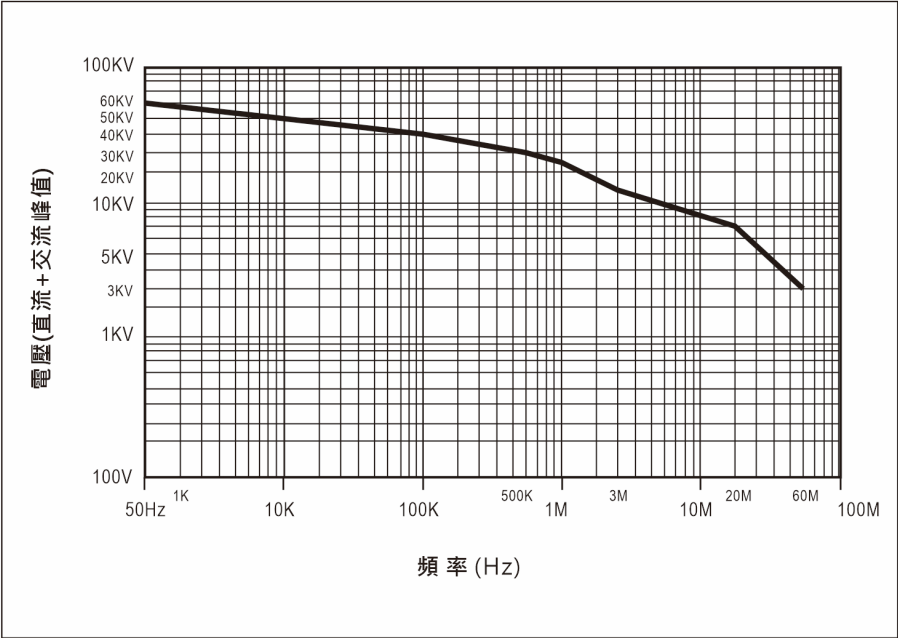
維修：

有任何的維修，保養或更換零件是在保固以外，請將產品退回原廠維修。

高頻耐電壓曲線參考圖：

(在共同模式下最大輸出電壓與頻率的相對應曲線參考圖)

50 Hz / 60 KVp-p, 100 KHz / 40 KVp-p, 500 KHz / 30 KVp-p, 1 MHz / 25 KVp-p,
3 MHz / 15 KVp-p, 20 MHz / 7 KVp-p, 60 MHz / 3 KVp-p



[註] 單向脈波時，最大峰值電壓僅有 1/2 值。

*本公司保留變更規格的權利，若有規格版別之更動將直接更新網站資料；歡迎上網下載說明書！

Accessories / 附件：



BP-276N
(1 KV CAT III)



BP-266N
(8 KV CAT III)



BP-567
(50KV DC/ 60CM)



BP-250
(300V DC/ 100CM)



ETL-3100
(30KV DC/ 100CM)



ETG-6100
(6 KV DC/ 100CM)



ADP-110 (Adapter)
115V: SP-115H
230V: SP-230H

