# PPH-1503(D)/PPH-1506D/PPH-1510D High Precision Dual Output DC Power Supply

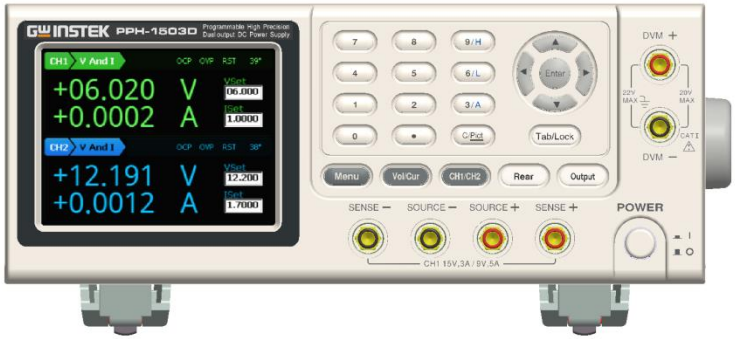
GW INSTEK

Made to Measure

固緯電子實業股份有限公司

# Agenda

- 1. Introduction of PPH-15xx(D)
- 2. Features
- 3. FAB
- 4. Comparison
- 5. Application



# Introduction of PPH-1503(D)

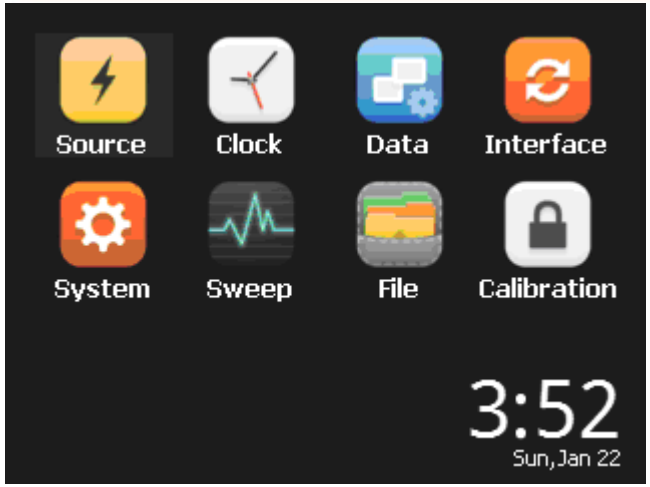
| PPH-1503D | CH1 | CH2 |
|---|---|---|
| **POWER** | 45W | 18W |
| Range 1 | 0 to 15V/ 0 to 3A | 0 to 12V/ 0 to 1.5A |
| Range 2 | 0 to 9V/ 0 to 5A | NA |

| PPH-1503 | CH1 |
|---|---|
| **POWER** | 45W |
| Range 1 | 0 to 15V/ 0 to 3A |
| Range 2 | 0 to 9V/ 0 to 5A |

# Introduction of PPH-1506D/PPH-1510D

| PPH-1506D | CH1 | CH2 |
|---|---|---|
| POWER | 45W | 36W |
| Range 1 | 0 to 15V/ 0 to 3A | 0 to 12V/ 0 to 3.0A |
| Range 2 | 0 to 9V/ 0 to 5A | NA |
| **PPH-1510D** | **CH1** | **CH2** |
| POWER | 45W<br>(Rear panel: 4.5V/10A) | 36W |
| Range 1 | 0 to 15V/ 0 to 3A | 0 to 12V/ 0 to 3.0A |
| Range 2 | 0 to 9V/ 0 to 5A | NA |

# Introduction of PPH-15xxD




Main Screen


Voltage/ Current setting and
Temperature Display


Pulse Current measurements


Long integration measurements

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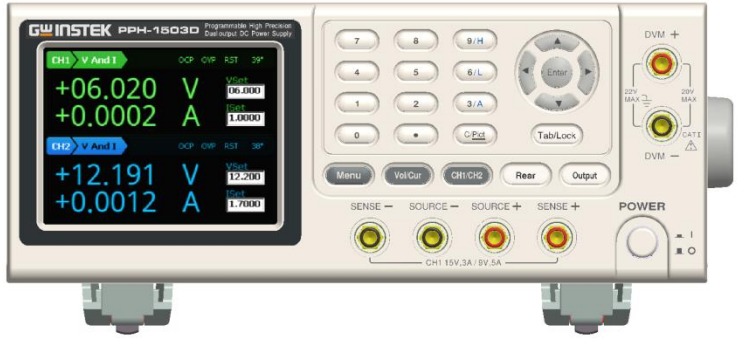
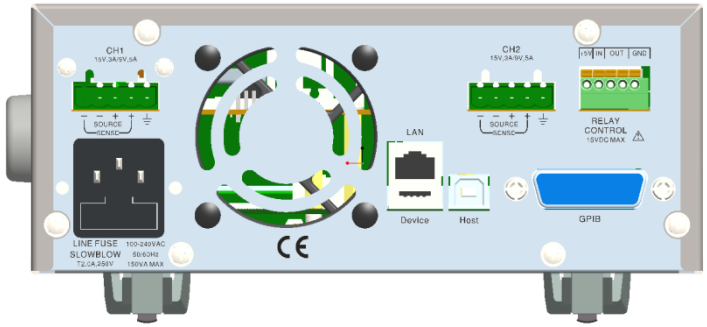
# Features

- Dual Channel DC Power Output
- 3.5 inch TFT LCD Display
- CV/ CC Operation
- Built-in DVM Measurement Function
- High Measurement Resolution (1mV/0.1μA for 5mA Range)
- Three Current Measurement Range & Setting
- Current Sink Function (Maximum : 3.5A)
- Pulse Current Measurement (Pulse width min: 33us)
- Long Integration Current Measurement
- Sweep Function (Sequential power output)
- Built-in Battery Simulation Function
- OTP & Temperature Display for Heat Sink
- Four Wire Output Open Protection
- Over Voltage Protection
- Support USB (Device& Host)/ GPIB/ LAN
- 5 Groups of Save/ Recall Setting
- KEY-LOCK Function
- External RELAY Control
- Hardcopy for Screenshot, Thermostatically Controlled Fan for Low Noise.



# Features

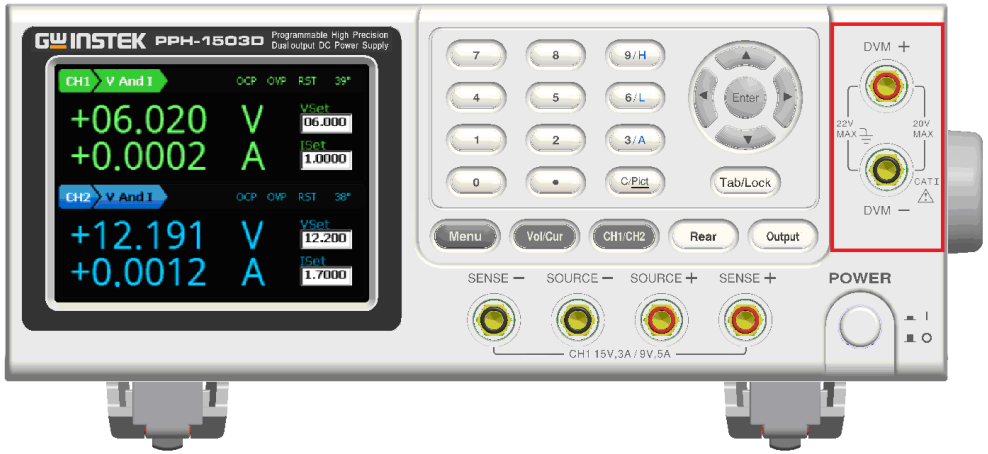
## Built-in Digital Voltmeter:

Dedicated input terminal: Located on the front panel

Measurement range: 0 to +20Vdc

Read back accuracy: ±(0.05%+3mV)

Read back resolution: 1mV




## Benefits:

Save the cost of purchasing an extra voltage meter.

# Features

## Three current ranges and settings:

| CH1 | PROGRAMMING ACCURACY | READBACK ACCURACY | PROGRAMMING RESOLUTION | READBACK RESOLUTION |
|---|---|---|---|---|
| **Voltage** | 0.05%+10mV | 0.05%+3mV | 1mV | 1mV |
| **Current (1.5A or 5A)** | 0.16%+5mA | 0.2%+400uA | 0.5mA | 0.1mA |
| **Current (500mA)** | 0.16%+0.5mA | 0.2%+100uA | 0.05mA | 0.01mA |
| **Current (5mA)** | 0.16%+5uA | 0.2%+1uA | 0.5uA | 0.1uA |

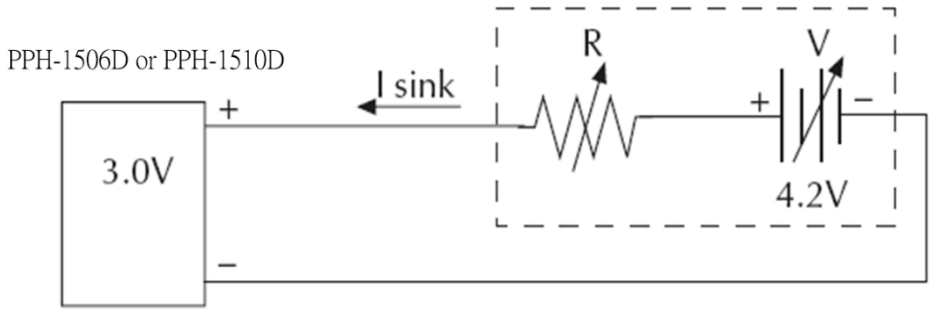
## Benefits:

It’s suitable to measure DUT’s standby current and power consumption at low current levels.

# Features

## Sink current function :

When connecting with an electric potential circuit and the output voltage of the tested electric potential circuit is greater than that of PPH-15xxD by approximately 0.3V to 2.5V, PPH-15xxD will automatically convert its power supply role to the sink current role acting as a load of voltage source. At this time, the voltage setting of PPH-15xxD can be regarded as the CV setting of an electronic load. ( CH1:3.5A, CH2:2A or 3A。)




## Benefits:

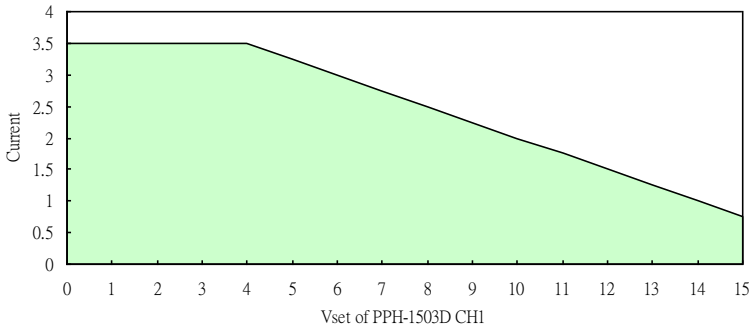
A single PPH-15xxD can be used to charge battery and to simulate battery's load to consume power without extra instruments. It is ideal for tests on battery and portable charger.

# Features

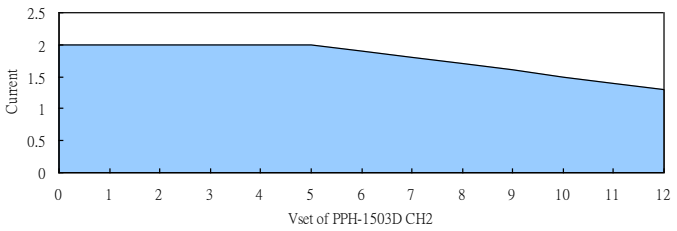
## Sink current ranges for PPH-1503D :

| CH1 | | CH2 | |
|---|---|---|---|
| **Programmed Supply voltage** | **Maximum allowable sink current** | **Programmed Supply voltage** | **Maximum allowable sink current** |
| 0~4V | 3.5A | 0~5V | 2.0A |
| 4~15V | 3.5A-(0.25A/V)*(Vset-4V) | 5~12V | 2.0A-(0.1A/V)*(Vset-5V) |

Allowable Sink Current for 3.5A



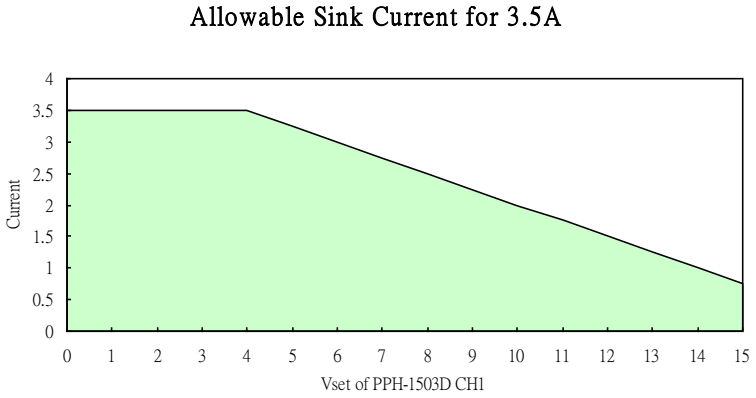

Allowable sink current for 2A

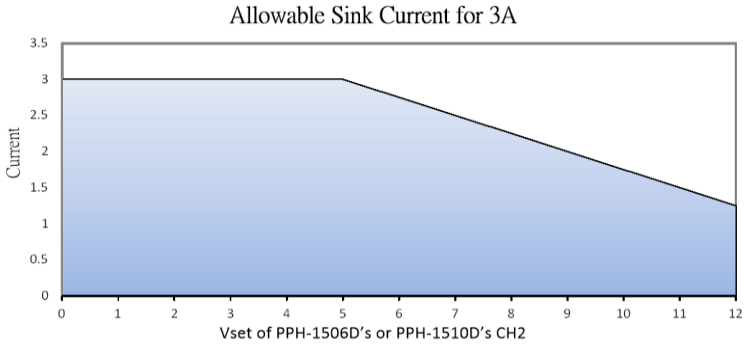


# Features

## Sink current ranges for PPH-1506D/PPH-1510D :

| CH1 | | CH2 | |
|---|---|---|---|
| **Programmed Supply voltage** | **Maximum allowable sink current** | **Programmed Supply voltage** | **Maximum allowable sink current** |
| 0~4V | 3.5A | 0~5V | 3.0A |
| 4~15V | 3.5A-(0.25A/V)*(Vset-4V) | 5~12V | 3.0A-(0.25A/V)*(Vset-5V) |

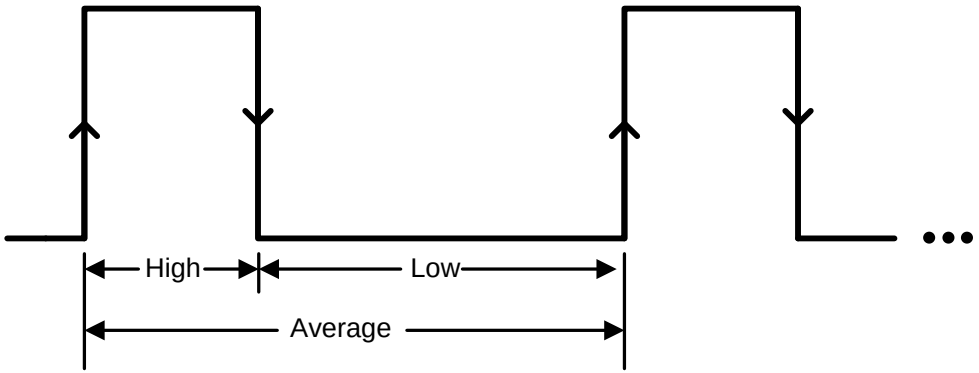


# Features

## Pulse current measurements (min: 33us):

Pulse current measurement is different from measuring average current of general power supplies. By trigger setting, it can measure instant power consumption when portable devices are in signal transmitting or receiving.



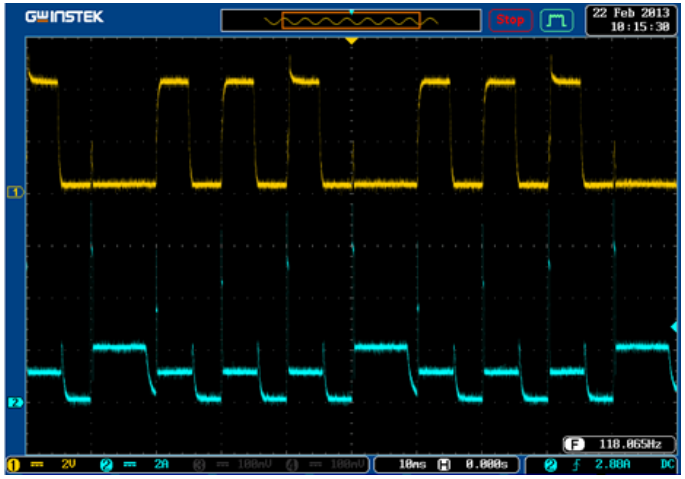

## Benefits:

It helps user to decide the required power supply allocation for portable devices such as RF modules, Bluetooth, Cell phone …etc.

# Features

## Long integration current measurement:

Long integration current measurement can be used to measuring average current for single or multiple pulse currents.




**Voltage and current waveforms of the receiving signals of a cellular phone**

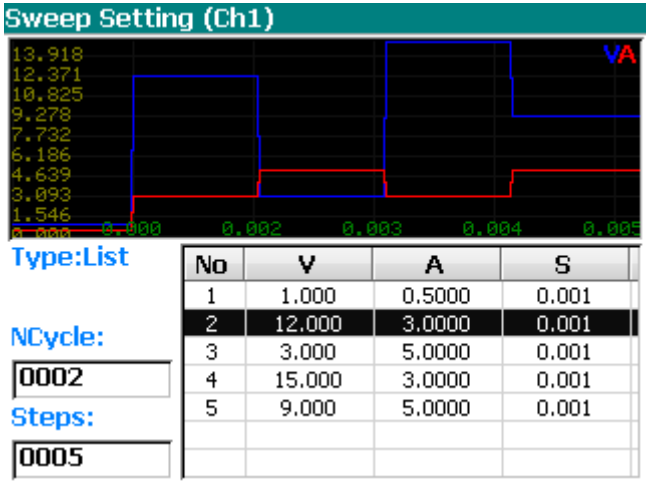
## Benefits:

Long integration current measurement is to analyze power consumption for a period of time. For instance, users can measure the average power consumption of a cellular phone in use to analyze its internal RF module parameters.

# Features

## Sequence Function:

For the practical usage, PPH-15xxD can be programmed to output a sequential voltage variation according to the requirements. There are 1000 steps for users to edit output voltage, current and execution time. Programmable execution time range is from 0.001 second to 3600 seconds and the resolution is 0.001 second. Programmable recurring frequency is from 1 to 9999 or it can be set to infinite execution (set recurring frequency to 0).



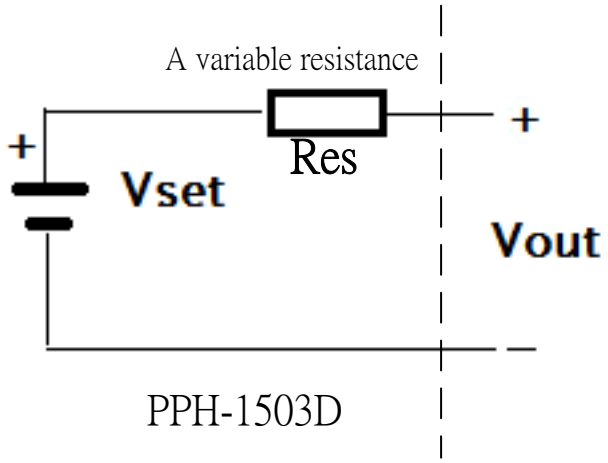

## Benefit:

Sequence function is ideal for simulating a sequential voltage variation power output to test DUT.

# Features

## Battery Simulation Function :

PPH-15xxD's battery simulation function is equivalent to a variable resistance circuit internally connected in series to simulate battery's output impedance. The function can also be regarded as a power supply with a variable internal resistor. The variable internal resistance range is from 0.000Ω to 1.000Ω and the resolution is 1mΩ.



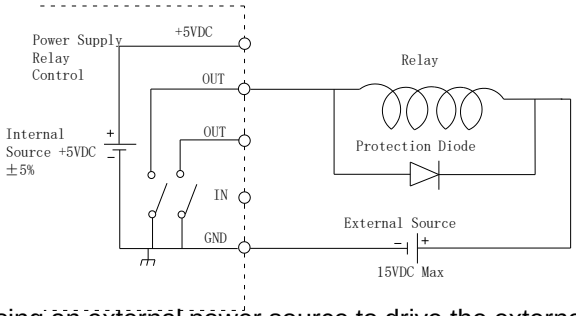

## Benefits:

PPH-15xxD can be utilized as a battery or an ideal voltage source Vset to be connected with variable resistance Res in series. The above diagram shows battery simulation to produce output voltage Vout.

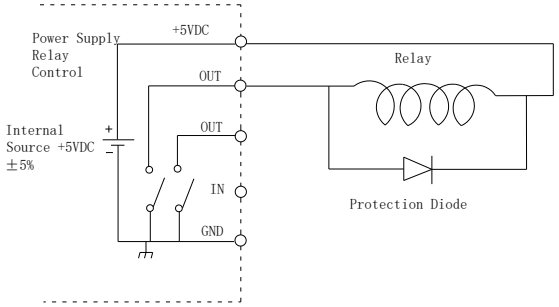
# Features

## External Relay Control:

PPH-15xxD provides four control modes, including Limit, Trip, Limit Relay and Trip Relay. Limit mode is to maintain CC output when output current reaches CC value. Trip mode is to turn off power output when output current reaches CC value. When output current reaches CC value, Limit Relay will maintain CC output and execute simultaneous Relay operation to control external device. When output current reaches CC value, Trip Relay mode will turn off power output and execute simultaneous Relay operation to control external device.




Using an external power source to drive the external relay




The external Control for using a PPH-1503D's +5Vdc Power

## Benefits:

Assist user to execute simultaneously control and peripherals.

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# FAB

| Features | Advantages | Benefits |
|---|---|---|
| CH1 provides dual operational ranges for voltage and current | Flexible voltage/current ranges to expand application ranges | Cover wide voltage/current ranges without purchasing an additional power supply. |
| There are three levels of current measurement settings. The smallest 5mA current level provides 0.1uA read back resolution. | Provide high precision/resolution current measurements | Accurately measure DUT's standby power and power consumption at low current levels to help designers evaluate DUT. |
| Sink current function | Provide dual channel sink current capability | It can be regarded as a voltage source with sink current capability. |
| Pulse current measurement to the smallest of 33.3us. | Analyze power consumption of pulse current | Measure pulse current without using an oscilloscope and a current probe |
| Long integration current measurement | Conduct average current measurements | Satisfy the measurement requirements of communications devices' average current |
| Sequence Function | The built-in sequence function can program a series of sequential voltage variation power output without using a PC. | 1000 sequential steps of voltage, current output, and each execution time can be self-defined. |
| Built-in battery simulation function | Simulate battery output behavior. | Allow PPH-15xxD to genuinely simulate portable devices' battery output characteristics. |
| Built-in DVM function | Provide voltage measurement function | Do not have to purchase an additional DVM. |
| Four Wire Output Open Protection | Trigger protection will be activated to shut down PPH-15xxD's output when output is disconnected with DUT. | Avoid measurements under incorrect conditions and protect DUT. |
| Front/rear panel output terminal | Selectable front panel output or rear panel output | Front panel is suitable for bench top and rear panel is ideal for production line, ATE system allocation. |

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# Comparison

| Brand | GWInstek | ITECH | Keithley | Keysight |
|---|---|---|---|---|
| FEATURES | PPH-1506/10D | IT6412 | 2306 | 66319B/D |
| Dual Range Output | V<br>0~15V/ 0~3A<br>0~9V / 0~5A | V<br>0~15V/ 0~3A<br>0~9V / 0~5A | X | X |
| Maximum Output Current | PPH-1506D: 5A<br>PPH-1510D: 10A | ±5A | 5A | 3A |
| Display | 3.5 Inch TFT LCD | LCD | 2-line × 16-character VFD | VFD |
| CC & CV operation | V | V | V | V |
| Built-in DVM measurement function | V | V | V | D: V<br>B: X |
| Pulse current measment | V | X | V | V |
| Long integration current measment | V(60s) | X | V(60s) | X |

# Comparison

| Brand | GWInstek | ITECH | Keithley | Keysight |
|---|---|---|---|---|
| Battery Simulation | V | V | V | V |
| Automated sequential ouptut | V(Sweep) | V(List) | V/I(SEQUENCE) | X |
| High Measurement Resolution(0.1uA) | V | V | V | V(0.6uA) |
| Sink Current Capability | V (Max : 3.5A) | V (Max : 5A) | V(MAX: 3A) | V(MAX: 2A) |
| Selectable Output from Front or Rear Panel | V | NA | X(Rear panel only) | X(Rear panel only) |
| Relay output control | V | V | V | V |
| Memory | 5 Sets | NA | 5 Sets | 4 Sets |
| High Speed Transient Recovery Time | V <40uS | V <50uS | V <40uS | V <20uS |
| Lock function | V | V | X | X |

# Comparison

| Brand | GWInstek | ITECH | Keithley | Keysight |
|---|---|---|---|---|
| Protection Function | OVP / OTP / OCP | OVP / OTP / OCP | OVP | OVP/OCP/OTP |
| Open sense lead detection | V | V | V | V |
| LabView Driver and PC Remote Control Software | V | NA | NA | NA |
| Standard Interface: LAN, USB, Analog Control Interface | GPIB | V | V | V |
| Relay output control | USB | V | V | X |
| Memory | LAN | V | V | NA |

# PPH-1503 vs. PPH-1503D vs. PPH-1506D vs. PPH-1510D

| Differences | PPH-1503 | PPH-1503D | PPH-1506D | PPH-1510D |
|---|---|---|---|---|
| Output channel | 1 | 2 | 2 | 2 |
| Ch1 (45W) | 0V~15V,0~3A or 0V~9V,0~5A | 0V~15V,0~3A or 0V~9V,0~5A | 0V~15V,0~3A or 0V~9V,0~5A | 0V~15V,0~3A or 0V~9V,0~5A |
| Ch2 | N/A | 0V~ 12V, 0~1.5A(18W) | 0V~ 12V, 0~3.0A(36W) | 0V~ 12V, 0~3.0A(36W) |
| Battery simulation function | N/A | Internal resistance can be set for Ch1 （0.001Ω~1.000Ω）Ch1。 | | |
| Current range | 2(5mA, 5A) | 3(5mA, 500mA, 5A) for Ch1 | 3(5mA, 500mA, 5A) for Ch1 | 3(5mA, 500mA, 5A) for Ch1 |
| Four wire output open protection | NO | YES | YES | YES |
| Heat sink temp display | NO | YES | YES | YES |
| USB host | NO | YES | YES | YES |
| Data sample rate | 60Kbits | 64Kbits | 64Kbits | 64Kbits |
| USB device protocol | CDC | TMC( 1 Upgrade communication speeds.<br>2 Compatible with WIN8 or higher version drivers.) | | |

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# Application

1. Pulse current measurement and battery simulation function are ideal for blue tooth, wearable device and mobile communications device.

2 Ideal for high precision low power consumption component applications such as current measurements for laser diode, IC with small power consumption.

3 Power supply and sink current functions are suitable for charge and discharge applications for battery, mobile power pack.

4 Sequence function is ideal for simulating a sequential voltage variation power output to test DUT

5 PPH-15xxD can simulate a battery or a charger to conduct charge and discharge tests on DUT

6 Ideal for industries with small current measurements especially electrochemistry such as electroplating and electrolyte parameters

7 Four Wire Output Open Protection can avoid product damages caused by automatic production line’s disconnection and probe’s bad connection