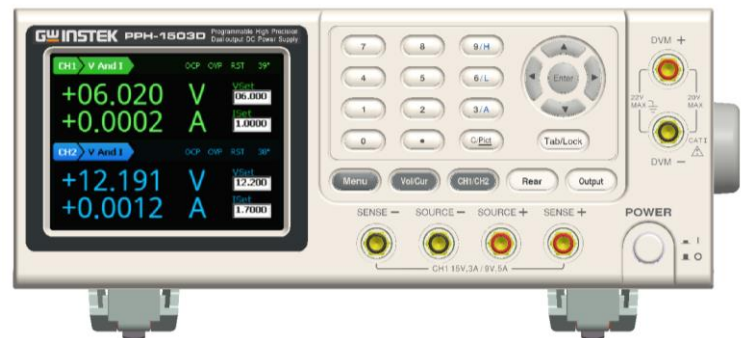


## **PPH-1503D Programmable High Precision Dual-Channel DC Power Supply** **New Product Announcement**

GW Instek introduces new PPH-1503D programmable high precision dual-channel DC power supply. PPH-1503D's CH1 provides dual operational ranges for voltage and current and its total power output is 45W. The dual operational ranges are 0 to 15V/0 to 3A or 0 to 9V/0 to 5A. CH2 provides 0 to 12V/0 to 1.5A with 18W power output.



PPH-1503D's high precision measurement capability achieves the maximum resolution of 1mV/0.1uA and the smallest pulse current width of 33us that satisfy customers' measurement application requirements of high resolution and pulse current. Fast load current variation will result in voltage sag for general power supplies that will have an impact on DUT's internal circuit operation. PPH-1503D is equipped with the excellent transient recovery time, which can, in less than 40us, recover the output voltage to within 100mV of the previous voltage output when the current level changes from 10% to 100% of the full scale. Furthermore, conventional power supplies do not have sufficient response speed to promptly respond to set voltage value once the set voltage is changed. PPH-1503D has a rise time of 0.2ms and a fall time of 0.3ms, which are 100 times faster than that of conventional power supplies. Therefore, PPH-1503D can provide DUT with a stable output voltage even when DUT is operating under large transient current output. The internal high-speed sampling circuit design of PPH-1503D, with the sample rate of 64K, can conduct pulse current measurement without using a current probe and oscilloscope. The current read back accuracy is 0.2%+1uA (equals to 11uA) at 5mA range, and the read back resolution is 0.1uA that allow DUT to be measured with a high accuracy level. Unlike battery, general power supplies, which do not have the characteristics of fast transient recovery time, can not maintain a stable power supply for cellular phone, wireless device, and wearable device which produce large transient pulse current load for hundreds of  $\mu$ s to dozens of ms when in use. PPH-1503D, different from general power supplies, has the characteristics of fast transient recovery time. While simulating battery to output pulse current, PPH-1503D can quickly compensate the voltage drop caused by pulse current. CH1 has the built-in battery simulation function, which can define output impedance settings so as to accurately simulate battery's impedance characteristics during battery discharge. Fast transient recovery time and built-in battery simulation function together facilitate PPH-1503D to accurately simulate battery's real behavior pattern so as to conduct product tests.

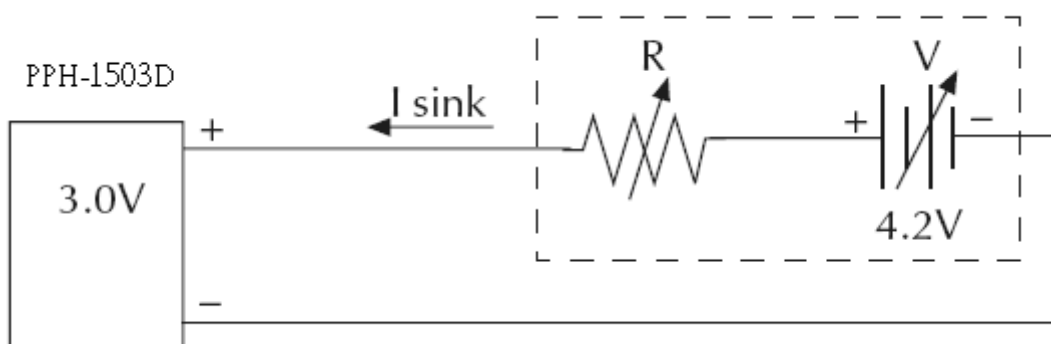
PPH-1503D is not only suitable for simulating battery, charger and supplying power to DUT, but also ideal for simulating an electronic load to conduct discharge tests with its sink current capability. The sink current function allows PPH-1503D to simulate a voltage source with the sink current capability. The maximum sink current of

PPH-1503D's CH1 is 3.5A and for CH2 is 2A. Long integration current measurement can be utilized to conduct average current measurement for periodical pulse current in a long period of time that is applied to analyze power consumption for a period of time. One of the applications is to measure the average power consumption of a cellular phone in use so as to conduct the internal RF module parameter analysis. The maximum current measurement range of CH1 is 5A and for CH2 is 1.5A. The built-in sequence function of CH1 provides users with 1000 steps to edit sequential outputs, including voltage, current and execution time. The built-in DVM function of CH2 has a voltage range from 0 to +20VDC that saves users the cost of purchasing an additional voltage meter.

PPH-1503D provides OTP function and shows heat sink temperature on the upper right corner of the display screen. Other than that, features such as five sets of system setting values for the SAVE/RECALL function, 10 sets of Power On Setup Settings, Key-Lock function to prevent unauthorized inputs, temperature-controlled fan to reduce noise, hardcopy to save screen information, and external relay control device together augment PPH-1503D's usability. PPH-1503D supports test requirements of Profile1, Profile2 and Profile3 from USB Power Delivery(PD) constructed by USB-IF association.

### Sink current function

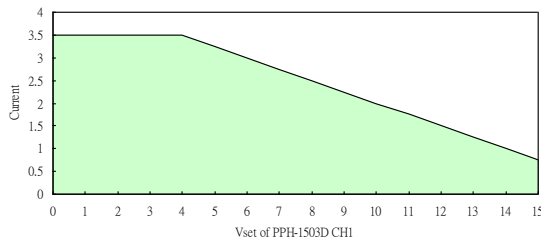
When connecting with an electric potential circuit and the output voltage of the tested electric potential circuit is greater than that of PPH-1503D by approximately 0.3V to 2.5V, PPH-1503D will automatically convert its power supply role to the sink current role acting as a load of voltage source. At this time, the voltage setting of PPH-1503D can be regarded as the CV setting of an electronic load. A single PPH-1503D 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.



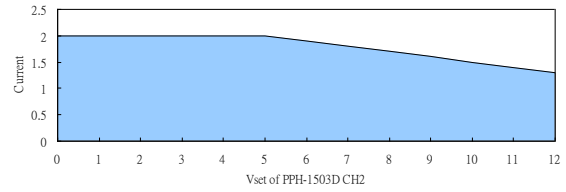
Connection diagram for PPH-1503D and an electrical potential circuit

The following diagrams show voltage setting values and allowable sink current for CH1 and CH2 of PPH-1503D:

Allowable Sink Current for 3.5A



Allowable sink current for 2A



## Pulse Current Measurements

While measuring pulse current, users can set trigger levels to avoid measuring noise. Trigger level setting range is from 0.005A to 5A. Signals, noises, transients below trigger levels will be ignored during measurement processes. The appropriate measurement integration time can be set by system or manual setting from 33.3us to 833ms. Pulse current measurements facilitate designers to decide the required power supply allocation for DUT at the preliminary stage. Applications include batteries for portable RF module, blue tooth and cellular phone.



Pulse Current Measurement

## Long Integration Current Measurement

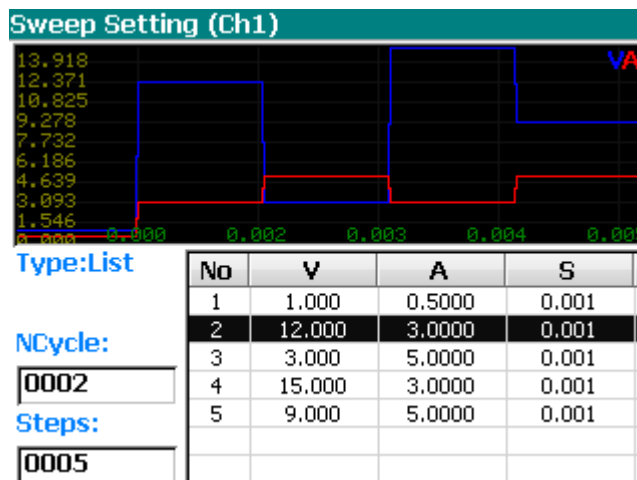
Long integration current measurement is to measure the average current of periodical pulse current in a long period of time. The measured pulse must be a complete periodical waveform or multiple complete periodical waveforms. The total measurement time is up to 60 seconds. Measurements can be taken from pulse's positive edge trigger or negative edge trigger. Users can also take measurements from the beginning of power output. 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.



Long Integration Current Measurement

### SEQUENCE FUNCTION

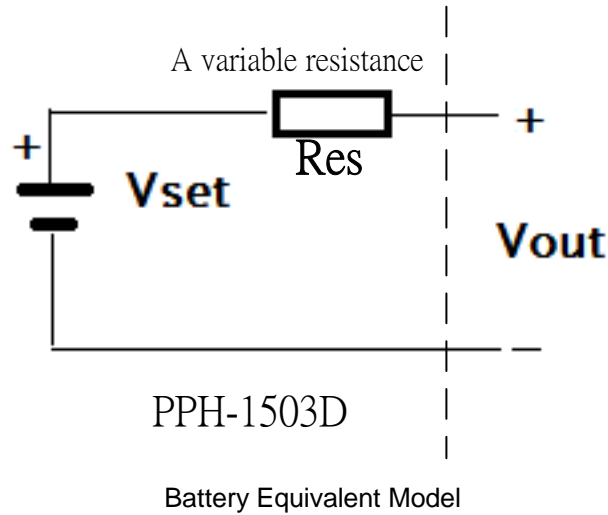
For the practical usage, PPH-1503D can be programmed to output a sequential voltage variation according to the requirements. There are 1000 steps for users to edit output voltage, current and execution time. Programmable execution time range is from 0.001 second to 3600 seconds and the resolution is 0.001 second. Programmable recurring frequency is from 1 to 9999 or it can be set to infinite execution (set recurring frequency to 0).



Functional Setting Page for Sequence Function

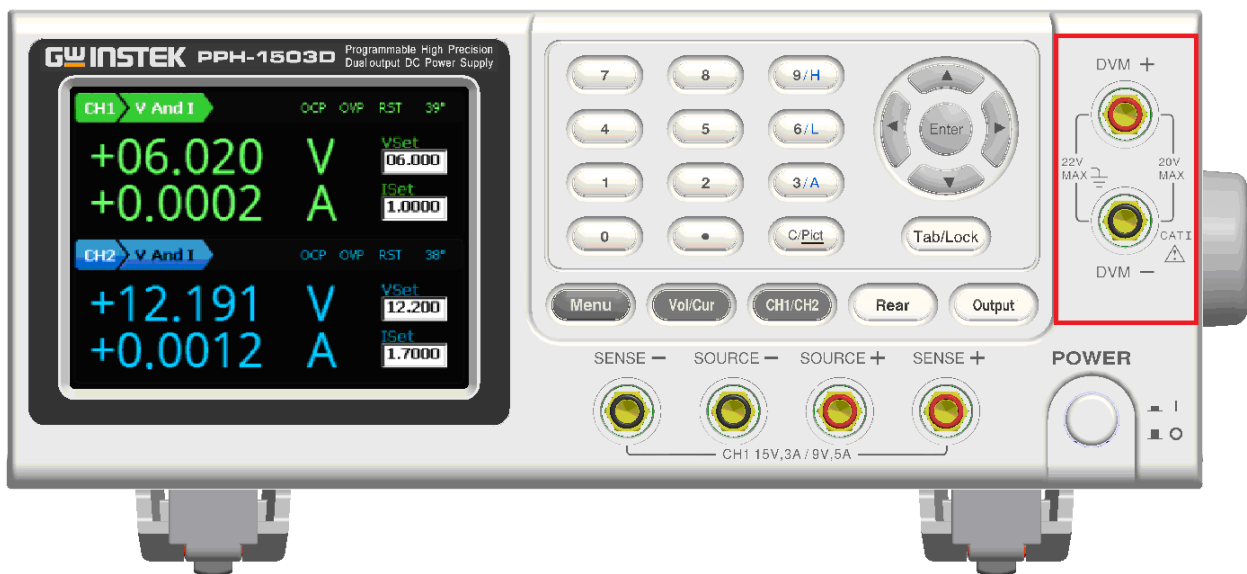
### Battery Simulation Function

PPH-1503D'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. PPH-1503D can be utilized as a battery or an ideal voltage source Vset to be connected with variable resistance Res in series. The following diagram shows battery simulation to produce output voltage Vout.



### Built-in Digital Voltmeter

PPH-1503D's built-in Digital Volt-Meter (DVM) has a dedicated input terminal located on the front panel. With the DC voltage measurement range from 0 to +20VDC, PPH-1503 not only provides power supply for DUT but also measures the voltage on DUT. The read back accuracy reaches  $\pm(0.05\%+3mV)$  and read back resolution is 1mV. Users are able to save the cost of purchasing an extra voltage meter. Furthermore, DVM measurements can be remotely controlled by SCPI commands via a PC.



DVM Input Terminal

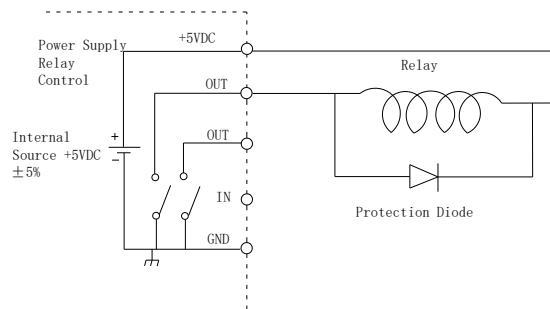
### Mobile communications applications

The battery simulation function and pulse current measurement function of PPH-1503D are ideal for mobile communications measurements, including tests of cellular phone, wireless, blue tooth peripheral and wearable

device. Monitoring pulse current of cellular phone in use is a very important test, which can be done by using one channel to simulate battery and the other channel to simulate USB charging device. By so doing, charging and measuring current changes can be achieved at the same time.

### External Relay Control

PPH-1503D 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.



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

### Features, Advantages and Benefits

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-1503D 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-1503D'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.

### Target Markets and Associated Features

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-1503D 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

### Feature Competition

	<b>GW INSTEK</b>	<b>Keithley</b>	<b>KEYSIGHT</b>
	<b>PPH-1503D</b>	<b>2306</b>	<b>66319B/D</b>
<b>Dual range output</b>	V (CH1) 0~15V / 0~3A 0~9V / 0~5A	X	X
<b>Built-in DVM measurement function</b>	V	V	V(D) X(B)
<b>Pulse current measurement</b>	V	V	V
<b>Long integration current measurement</b>	V(60s)	V(60s)	X
<b>Battery Simulation</b>	V	V	V

Automated sequential output	V/I (SEQUENCE)	V/I(SEQUENCE)	X
Sink Current Capability	V(MAX: 3.5A)	V(MAX: 3A)	V(MAX: 2A)
High Speed Transient Recovery Time	V <40uS	V <40uS	V <20uS
Lock function	V	X	X
Protection Function	OVP / OTP / OCP	OVP	OVP/OCP/OTP
Communication	GPIB/USB/LAN	GPIB	GPIB

### Key Dates for Product Announcement

1. Distributor Announcement & Demo Unit order and Shipping : 1st of Aug. 2016
2. Global Market Announcement & Mass Quantity Order Fulfillment: 1st of Sep. 2016

### Ordering Information

PPH-1503D High Precision Dual Channel Output DC Power Supply

### Accessories

CD (User manual x1), Quick Start manual x1

Power cord (Region dependent)

Test lead GTL-117 x1,

GTL-203A x1,

GTL-204A x1

### Optional Accessories

GTL-246 USB cable, Type A – Type B

### Service Policy

- 1 One(1) year warranty. PPH-1503D programmable high precision dual-channel DC power supply carries a standard warranty for year.
- 2 Service Support. The service instructions in Service Manual will help distributors repair damaged units promptly. Parts-swapping service support is provided by Good Will Instrument to facilitate repair jobs done at the distributor's site.



## Specifications

Brand	GWInstek	
Model	PPH-1503D	
<b>OUTPUT RATING</b>		
Number of output channel	ch1	ch2
Voltage	0 ~ 15V	0 ~ 12V
Current	0 ~ 5A (9V)	0 ~ 1.5A
	0 ~ 3A (15V)	
Power	45W	18W
Output Voltage Rising Time	0.20ms (10% ~ 90%)	
Output Voltage Falling Time	0.30ms (90% ~ 10%)	
<b>STABILITY</b>		
Voltage	0.01%+3.0mV	
Current	NA	
<b>REGULATION (CV)</b>		
Load	0.01%+2mV	
Line	0.5mV	
<b>REGULATION (CC)</b>		
Load	0.01%+1mA	
Line	0.5mA	
<b>RIPPLE &amp; NOISE</b>		
CV p-p (20Hz - 20MHz)	8mV	8mV
CV rms(0 - 1MHz)	3mV	3mV
CC rms	NA	NA
<b>PROGRAMMING ACCURACY</b>		
Voltage	0.05%+10mV	0.05%+3mV
Current ( 1.5A & 5A)	0.16%+5mA	0.16%+2mA
Current ( 500mA)	0.16%+0.5mA	NA
Current ( 5mA )	0.16%+5uA	
<b>READBACK ACCURACY</b>		
Voltage	0.05%+3mV	0.03%+3mV
Current ( 1.5A & 5A)	0.2%+400uA	0.2%+400uA
Current ( 500mA)	0.2%+100uA	NA
Current ( 5mA )	0.2%+1uA	0.2%+1uA
<b>RESPONSE TIME</b>		
Transient recovery time	1000% Load Change	

	$< 40\mu\text{S} (<100\text{mV, Rear})$ $< 50\mu\text{S} (<100\text{mV, Front})$ $< 80\mu\text{S} (<20\text{mV})$	
<b>PROGRAMMING RESOLUTION</b>		
Voltage	1mV	
Current	0.5mA(range: 1.5A & 5A)	0.5mA(range: 1.5A )
Current	0.05mA( 500mA)	NA
Current	0.5uA( 5mA )	
<b>READBACK RESOLUTION</b>		
Voltage	1mV	
Current	0.1mA ( 5A Range)	0.1mA(range: 1.5A )
Current	0.01mA( 500mA Range)	NA
Current	0.1uA( 5mA Range)	0.1uA(range: 5mA )
<b>PROTECTION FUNCTION</b>		
OVP Accuracy	CH1:0.8V	CH2:50mV
<b>DVM</b>		
DC Readback Accuracy ( 23 °C ± 5°C)	NA	0.05%+3mV
Readback Resolution		1mV
Input Voltage range		0 ~ 20VDC
Maximum Input Voltage		-3V, +22V
Input Resistance and Capacitance		20MΩ
<b>Programmable output resistance</b>		
Range	1 mΩ to +1 Ω	
Programming accuracy	0.5% + 10 mΩ	
Resolution	1mΩ	
<b>PULSE CURRENT MEASUREMENT</b>		
TRIGGER LEVEL	5mA ~ 5A, 5mA/step	5mA ~ 1.5A, 5mA/step
HIGH TIME/LOW TIME/AVERAGE TIME	33.3us to 833ms, 33.3us/step	
TRIGGER DELAY	0 ~ 100ms, 10us/steps	
AVERAGE READINGS	1 ~ 100	
LONG INTEGRATION PULSE TIMEOUT	1S ~ 63S	
LONG INTEGRATION MEASUREMENT TIME	850ms(60Hz)/840ms(50Hz) ~ 60s,or AUTO time 16.7ms/steps(60Hz), 20ms/steps(50Hz)	
LONG INTEGRATION TRIGGER MODE	Rising, Falling, Neither	
<b>OTHERS</b>		
Output Terminal	Front / Rear Panel	Rear Panel

DVM Input	NA	Front Panel
RELAY CONTROL CONNECTOR	150mA/15V , 100mA/5(inter power)	
Operation temperature	0 ~ 40°C	
Operation Humidity	≤ 80%	
Storage Temperature	-20°C ~ 70°C	
Storage Humidity	< 80%	
<b>PC REMOTE INTERFACES</b>		
(Standard)	GPIB / USB / LAN	
<b>CURRENT SINK CAPACITY</b>		
Sink Current Rating	3.5A(Vout ≤ 4V); 3.5A-0.25*(Vout-4)(Vout > 4V)	2A(Vout ≤ 5V); 2A-0.1*(Vout-5)(Vout > 5V)
<b>Memory</b>		
Save / Recall	5 Sets	
<b>Power</b>		
Input Power	90-264VAC ; 50/60Hz	
<b>POWER CONSUMPTION</b>	160W	
<b>DIMENSIONS &amp; WEIGHT</b>		
Dimensions	222(W) x 86(H) x 363(D) mm	
Weight	Approx 4.5Kg	

Specifications subject to change without notice

**Should you have any questions on the PPH-1503D announcement, please don't hesitate to contact us**

Sincerely yours,

Overseas Sales Department  
 Good Will Instrument Co., Ltd  
 No. 7-1, Jhongsing Road, Tucheng City,  
 Taipei County, 236, Taiwan  
 Email: [marketing@goodwill.com.tw](mailto:marketing@goodwill.com.tw)



[www.gwinstek.com](http://www.gwinstek.com)



[www.facebook.com/GWInstek](https://www.facebook.com/GWInstek)