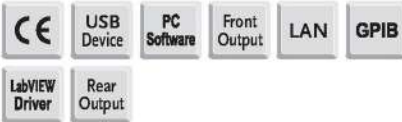


Programmable High Precision D.C. Power Supply



PPH-1503



PPH-1503D/1506D/1510D



PPH-Series high precision measurement capability achieves the maximum resolution of 1mV/0.1μA and the smallest pulse current width of 33μs 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-Series is equipped with the excellent transient recovery time, which can, in less than 40μs, 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-15xxD 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-15xxD 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-15xxD, 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%+1μA (equals to 11μA) at 5mA range, and the read back resolution is 0.1μA 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 μs to dozens of ms when in use. PPH-15xxD, different from general power supplies, has the characteristics of fast transient recovery time. While simulating battery to output pulse current, PPH-15xxD can quickly compensate the voltage drop caused by pulse current. PPH-15xxD's 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-15xxD to accurately simulate battery's real behavior pattern so as to conduct product tests.

PPH-15xxD 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-15xxD to simulate a voltage source with the sink current capability. The maximum sink current of PPH-15xxD's CH1 is 3.5A and for CH2 is 3A. 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 pulse current measurement range of CH1 is 5A and for CH2 is 3A. 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-15xxD 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-15xxD's usability. PPH-Series supports test requirements of Profile1, Profile2 and Profile3 from USB Power Delivery(PD) constructed by USB-IF association.

FEATURES

- * 3.5" TFT LCD Display
- * High Measurement Resolution: 1mV/0.1μA for 5mA range.
- * Transient Recovery Time: ≤40μs within 100mV; <80μs within 20mV
- * Current Sink Function
- * Pulse Current Measurement (Pulse width min.: 33μs)
- * Long Integration Current Measurement
- * Built-in DVM Measurement Function
- * Sequence Function (Sequence power output)
- * Built-in Battery Simulation Function (CH1 of PPH-15xxD)
- * OVP, OCP, OTP & Temperature Display for Heat Sink
- * Support USB (Device & Host)/GPIB/LAN
- * Five Groups of Save/Recall Setting
- * External Relay Control

PPH-1503 Rear Panel



PPH-1503D/1506D/1510D Rear Panel



SELECTION GUIDE

Model	PPH-1503	PPH-1503D	PPH-1506D	PPH-1510D
Channel	1	2	2	2
Dual Range Output	Channel 1: 0-15V/0-3A or 0-9V/0-5A Channel 2: NA	0-15V/0-3A or 0-9V/0-5A 0-12V/0-1.5A	0-15V/0-3A or 0-9V/0-5A 0-12V/0-3.0A	0-15V/0-3A or 0-9V/0-5A Rear Terminal: 0-10A(0-4.5V) 0-12V/0-3.0A
Display	3.5 Inch TFT LCD	3.5 Inch TFT LCD	3.5 Inch TFT LCD	3.5 Inch TFT LCD
Current Measurement Range	5A/5mA	5A/500mA/5mA(CH1)	5A/500mA/5mA(CH1)	10A/500mA/5mA(CH1)
CV&CC	✓	✓	✓	✓
Built-in DVM Measurement Function	✓	✓ (CH2)	✓ (CH2)	✓ (CH2)
Pulse Current Measurement	✓	✓	✓	✓
Long integration Current Measurement	✓	✓	✓	✓
Battery Simulation	NA	✓ (CH1)	✓ (CH1)	✓ (CH1)
Automated Sequential Output	✓	✓ (CH1)	✓ (CH1)	✓ (CH1)
High Measurement Resolution	✓ (1mV/0.1 μA)	✓ (1mV/0.1 μA)	✓ (1mV/0.1 μA)	✓ (1mV/0.1 μA)
Sink Current Capability	✓ (Max : 2A)	✓ (Max : 3.5A)	✓ (Max : 3.5A)	✓ (Max : 3.5A)
Selectable Output From Front or Rear Panel	✓	✓	✓	✓
Relay Output Control	✓	✓	✓	✓
Memory	5 Sets	5 Sets	5 Sets	5 Sets
Sample Rate	60K	64K	64K	64K
Lock Function	✓	✓	✓	✓
Protection Function	OVP/OTP/OCP	OVP/OTP/OCP	OVP/OTP/OCP	OVP/OTP/OCP
Four Wire Output Open Circuit Protection	NA	✓	✓	✓
Temperature Display for Heat Sink	NA	✓	✓	✓
Standard Interface:	GPIB	✓	✓	✓
LAN, USB, Analog Control	USB	✓ (CDC)	✓ (TMC)	✓ (TMC)
Interface	LAN	✓	✓	✓

ORDERING INFORMATION

PPH-1503	(0-15V/0-3A or 0-9V/0-5A)High Precision DC Power Supply
PPH-1503D	(CH1:0-15V/0-3A or 0-9V/0-5A;CH2:0-12V/0-1.5A)High Precision Dual Channel Output DC Power Supply
PPH-1506D	(CH1:0-15V/0-3A or 0-9V/0-5A;CH2:0-12V/0-3A)High Precision Dual Channel Output DC Power Supply
PPH-1510D	(CH1:0-15V/0-3A or 0-9V/0-5A,0-4.5V/0-10A(Rear terminal);CH2:0-12V/0-3A)High Precision Dual Channel Output DC Power Supply

ACCESSORIES :

CD (User manual x1, Quick start manual x1), Power cord (Region dependent), Test lead GTL-207A x 1, GTL-203A x 1, GTL-204A x 1

OPTIONAL ACCESSORIES

GTL-246 USB Cable (USB 2.0, A-B Type)

SPECIFICATIONS								
Model	PPH-1503		PPH-1503D		PPH-1506D		PPH-1510D	
OUTPUT RATING								
Number of Output Channel	1		2		2		2	
Channel No.	Ch 1		Ch 1		Ch 1		Ch 1	
Power	45W		45W		45W		45W	
Voltage	0 ~ 15V or 0 ~ 9V		0 ~ 15V or 0 ~ 9V		0 ~ 15V or 0 ~ 9V		0 ~ 15V or 0 ~ 9V	
Current	0 ~ 3A or 0 ~ 5A		0 ~ 3A or 0 ~ 5A		0 ~ 3A or 0 ~ 5A		0 ~ 3A or 0 ~ 5A	
Output Voltage Rising Time	0.15ms (10% ~ 90%)		0.20ms (10% ~ 90%)		0.20ms (10% ~ 90%)		0.20ms (10% ~ 90%)	
Output Voltage Falling Time	0.65ms (90% ~ 10%)		0.30ms (90% ~ 10%)		0.30ms (90% ~ 10%)		0.30ms (90% ~ 10%)	
STABILITY								
Voltage	0.01%+0.5mV		0.01%+3.0mV		0.01%+3.0mV		0.01%+3.0mV	
Current	0.01%+50 μ A		—		—		—	
REGULATION (CV)								
Load	0.01%+2mV		0.01%+2mV		0.01%+2mV		0.01%+2mV	
Line	0.5mV		0.5mV		0.5mV		0.5mV	
REGULATION (CC)								
Load	0.01%+1mA		0.01%+1mA		0.01%+1mA		0.01%+1mA	
Line	0.5mA		0.5mA		0.5mA		0.5mA	
RIPPLE & NOISE (20Hz~20MHz)								
CV p-p	8mV		\leq 5A : 8mVp-p(20Hz~ 20MHz)		\leq 5A : 8mVp-p(20Hz~ 20MHz)		\leq 5A : 8mVp-p(20Hz~ 20MHz)	
CV rms	1mV		3mV(0~1MHz)		3mV(0~1MHz)		3mV(0~1MHz)	
CC rms	—		—		—		—	
PROGRAMMING ACCURACY								
Voltage	0.05%+10mV		0.05%+10mV		0.05%+10mV		0.05%+10mV	
Current(Ch1:5A,10A/CH2:1.5A,3A)	0.16%+5mA		0.16%+5mA(5A/1.5A)		0.16%+5mA(5A/3A)		0.16%+5mA(5A/3A)	
Current (500mA)	—		0.16%+0.5mA		0.16%+0.5mA		0.16%+0.5mA	
Current (5mA)	—		0.16%+5 μ A		0.16%+5 μ A		0.16%+5 μ A	
READBCK ACCURACY								
Voltage	0.05%+3mV		0.05%+3mV		0.05%+3mV		0.05%+3mV	
Current(Ch1:5A,10A/CH2:1.5A,3A)	0.2%+400 μ A(5A)		0.2%+400 μ A(5A)		0.2%+400 μ A(5A)		0.2%+400 μ A(5A)	
Current (500mA)	—		0.2%+100 μ A		0.2%+100 μ A		0.2%+100 μ A	
Current (5mA)	0.2%+1 μ A		0.2%+1 μ A		0.2%+1 μ A		0.2%+1 μ A	
RESPONSE TIME								
Transient Recovery Time (Response to 1000% Load Change)	<40 μ S(within 100mV) <80 μ S(within 20mV)		<40 μ S(within 100mV, Rear) <50 μ S(within 100mV,Front) <80 μ S(within 20mV)		<40 μ S(within 100mV, Rear) <50 μ S(within 100mV,Front) <80 μ S(within 20mV)		<40 μ S(within 100mV, Rear) <50 μ S(within 100mV,Front) <80 μ S(within 20mV)	
PROGRAMMING RESOLUTION								
Voltage	2.5mV		2.5mV		2.5mV		2.5mV	
Current (5A range)	1.25mA		1.25mA(5A)		1.25mA(5A)		1.25mA	
Current (500mA range)	—		0.125mA		0.125mA		0.125mA	
Current (5mA range)	—		1.25 μ A		1.25 μ A		1.25 μ A	
READBCK RESOLUTION								
Voltage	1mV		1mV		1mV		1mV	
Current (5A range)	0.1mA		0.1mA(5A)		0.1mA(3A)		0.1mA(5A)	
Current (500mA range)	—		0.01mA		—		0.01mA	
Current (5mA range)	0.1 μ A		0.1 μ A		0.1 μ A		0.1 μ A	
PROTECTION FUNCTION								
OVP Accuracy	50mV		Ch1: 0.8V		Ch2: 50mV		Ch1: 0.8V	
OVP Resolution	10mV		10mV		10mV		10mV	
DVM								
DC Readback Accuracy(23 $^{\circ}$ C \pm 5 $^{\circ}$ C)	\pm 0.05%+3mV		—		\pm 0.05%+3mV		\pm 0.05%+3mV	
Readback Resolution	1mV		—		1mV		1mV	
Input Voltage Range	0 ~ 20VDC		—		0 ~ 20VDC		0 ~ 20VDC	
Maximum Input Voltage	—		-3V, +22V		-3V, +22V		-3V, +22V	
Input Resistance and Capacitance	100000M Ω		20M Ω		20M Ω		20M Ω	
PROGRAMMABLE OUTPUT RESISTANCE								
Range	—		0.001 Ω ~ 1.000 Ω		0.001 Ω ~ 1.000 Ω		0.001 Ω ~ 1.000 Ω	
Programming Accuracy	—		0.5% + 10 m Ω		0.5% + 10 m Ω		0.5% + 10 m Ω	
Resolution	—		1m Ω		1m Ω		1m Ω	
PULSE CURRENT MEASUREMENT								
Trigger Level	5mA ~ 5A, 5mA/Step		5mA ~ 5A, 5mA/Step		5mA ~ 5A, 5mA/Step		5mA ~ 5A, 5mA/Step	
High Time/low Time/Average Time	33.3 μ s ~ 833ms, 33.3 μ s/Step		33.3 μ s ~ 833ms, 33.3 μ s/Step		33.3 μ s ~ 833ms, 33.3 μ s/Step		33.3 μ s ~ 833ms, 33.3 μ s/Step	
Trigger Delay	0 ~ 100ms,10 μ s/Steps		0 ~ 100ms,10 μ s/Steps		0 ~ 100ms,10 μ s/Steps		0 ~ 100ms,10 μ s/Steps	
Average Readings	1 ~ 100		1 ~ 100		1 ~ 100		1 ~ 100	
Long Integration Pulse Time	1S ~ 63S		1S ~ 63S		1S ~ 63S		1S ~ 63S	
Long Integration Measurement Time	850ms(60Hz)/840ms(50Hz)~60s, or Auto time		850ms(60Hz)/840ms(50Hz)~60s, or Auto time		850ms(60Hz)/840ms(50Hz)~60s, or Auto time		850ms(60Hz)/840ms(50Hz)~60s, or Auto time	
Long Integration Trigger Mode	Rising, Falling, Neither		Rising, Falling, Neither		Rising, Falling, Neither		Rising, Falling, Neither	
OTHERS								
Output Terminal	Front/Rear Panel		Front/Rear Panel		Front/Rear Panel		Front/Rear Panel	
DVM Input	Front/Rear Panel		—		Front Panel		—	
Relay Control Connector	150mA/15V, 5V output, 100mA		150mA/15V, 5V output, 100mA		150mA/15V, 5V output, 100mA		150mA/15V, 5V output, 100mA	
Operation Temperature	0 ~ 40 $^{\circ}$ C		0 ~ 40 $^{\circ}$ C		0 ~ 40 $^{\circ}$ C		0 ~ 40 $^{\circ}$ C	
Operation Humidity	\leq 80%		\leq 80%		\leq 80%		\leq 80%	
Storage Temperature	-20 $^{\circ}$ C ~ 70 $^{\circ}$ C		-20 $^{\circ}$ C ~ 70 $^{\circ}$ C		-20 $^{\circ}$ C ~ 70 $^{\circ}$ C		-20 $^{\circ}$ C ~ 70 $^{\circ}$ C	
Storage Humidity	< 80%		< 80%		< 80%		< 80%	
PC REMOTE INTERFACES								
Standard	GPIB/USB/LAN		GPIB/USB/LAN		GPIB/USB/LAN		GPIB/USB/LAN	
CURRENT SINK CAPACITY								
Sink Current Rating	2A(Vout \leq 5V); 2A-0.1*(Vout-5) (Vout>5V)		Ch1:0~4V:3.5A; 4~15V:3.5A-(0.25A/V) *(Vset-4V)		Ch1:0~4V:3.5A; 4~15V:3.5A-(0.25A/V) *(Vset-4V)		Ch1:0~4V:3.5A; 4~15V:3.5A-(0.25A/V) *(Vset-4V)	
MEMORY								
Save/Recall	5 Sets		5 Sets		5 Sets		5 Sets	
POWER								
Input Power	90 ~ 264VAC ; 50/60Hz		90 ~ 264VAC ; 50/60Hz		90 ~ 264VAC ; 50/60Hz		90 ~ 264VAC ; 50/60Hz	
Power Consumption	150W		160W		160W		160W	
DIMENSIONS & WEIGHT								
	222(W)x86(H)x363(D)mm; Approx 4.2kg		222(W)x86(H)x363(D)mm; Approx 4.5kg		222(W)x86(H)x363(D)mm; Approx 4.5kg		222(W)x86(H)x363(D)mm; Approx 4.5kg	