

GW Instek

GPP Series Multi-Channel Programmable DC Power Supply

New Product Announcement



This document allows GW Instek's partners to quickly grasp product's main features, FAB and ordering information.

With the maximum output power of 217W, the GPP series, the multi-channel programmable DC power supply, includes four models: GPP-1326 (0~32V/0~6A) for single-channel output and GPP-2323 for dual-channel output (CH1:0~32V/0~3A, CH2:0~32V/0~3A), GPP-3323 for three-channel output (CH1:0~32V/0~3A, CH2:0~32V/0~3A, CH3: 1.8V, 2.5V, 3.3V, 5.0V/5A) and GPP-4323 for four-channel output (CH1:0~32V/0~3A, CH2:0~32V/0~3A, CH3:0~5V/0~1A, CH4: 0~15V/0~1A). This series not only provides



high program resolution (1mV/0.1mA) and read back resolution (0.1mV/0.1mA), but also features optimal low-ripple noise characteristics  $\leq 350\mu\text{Vrms}/\leq 2\text{mArms}$  and output transient recovery capability  $\leq 50\mu\text{s}$ . Independent output on-off switch is provided for each channel.

For series and parallel applications of CH1 and CH2, the tracking function of the GPP series utilizes the internal circuit to automatically switch the output to serial or parallel output without additional external wiring, providing users with convenience not only in operating procedures but also a more stable output. The tracking function design of other brands requires additional external wiring connections for the output in series or parallel. However, excessively long, thin or inconsistent external wiring may cause inaccurate voltage or current output.

The GPP Series offers a variety of display modes, including single or multi-channel setting values, measurement values, and waveform displays. The Monitor function of the GPP series allows users to set monitoring conditions according to requirements, sound alarms or stop output during the measurement process, and stop measurement and protect the customer's DUT. The GPP series provides output recorder function, which records the voltage/current of the output process to the internal memory, and the result can be stored as a (\*.REC) or (\*.CSV) file, which can then be transferred to the USB flash drive. The stored \*.CSV can be exported to the Excel to conduct the future analysis.

The CH1/CH2 of the GPP series are designed with the load function. A single power supply can set one channel as the power output, and one channel for the load function to consume the power of the DUT so as to meet the basic charging and discharging test requirements for battery. Channel 1 and channel 2 not only provide 32V/3A power output, but also feature built-in maximum 32V constant voltage load (CV), maximum 3.2A constant current load (CC) and maximum 1k $\Omega$  constant resistance load (CR) function.

The GPP series provides the sequential output function on Channel 1 and Channel 2. This function not only allows users to edit the power output waveform, but also allows users to set the sequential constant voltage (CV) or constant current (CC) load waveform, i.e. a serial power output or a simulation test of a dynamic load. In order to simplify the setting of waveform editing, the GPP series has 8 built-in Templet waveforms in the sequence output function for users to directly apply for output, including Sine, Pulse, Ramp, Stair Up, Stair Dn, Stair UpDn, Exp Rise, Exp Fall waveforms.

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The sound protection functions include OVP/OCP/OPP/OTP, in which the protection mechanism for OVP/OCP/OTP is implemented by hardware circuit that has the advantage of faster response time compared with competitors who adopt software to achieve protections. The OVP/OCP functions allow users to set the protection action point (except CH3 of GPP-3323) according to the conditions of the DUT. The OPP is only activated during the operation of the load function. The Delay Function sets the length of time during channel 1 or channel 2 power output on or during power output off.

In addition, the Trigger In/ Trigger Out functions synchronize external devices. The GPP-3323 channel 3 adds a 3A USB (Type A) output terminal for USB charging test. The intelligent temperature-controlled fan can adjust the speed according to the temperature of the power transistor so as to reduce unnecessary noise. The output value setting and the Sequence/Delay/Recorder functions provide 10 sets of internal memory for use, and can be loaded/stored using a USB flash drive. In addition to the standard RS-232 and USB remote interfaces, the GPP series also has an optional LAN or LAN+GPIB interface to facilitate different requirements. The commands of the GPP series conform to SCPI requirements and are compatible with the commands of the GPD-x303S series.

## Features

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- 4.3" TFT LCD Display
- Setting resolution: 1mV / 0.1mA;  
read back resolution: 0.1mV / 0.1mA
- Low ripple noise:  $\leq 350\mu\text{Vrms}$  /  $\leq 2\text{mA rms}$
- Transient response time:  $\leq 50\mu\text{s}$
- Load function (CC, CV, CR mode)
- Tracking series and parallel function without additional external wiring
- Utilizing hardware to realize over voltage protection / over current protection / over temperature protection
- Delay function / output monitoring function / output recorder function
- Supports setting value, measurement value and output waveform display
- Sequential output function and built-in 8 template waveforms
- The output recorder function records the output voltage & current parameters with a minimum recording interval of 1 second.
- Provides 10 sets of memory for each sequence/delay/Recorder/panel setting condition
- GPP-3323 supports a USB (Type A) output terminal
- Intelligent temperature control fan effectively reduces noise
- Standard: RS-232, USB, Ext I/O  
Optional(manufacturer installed only):  
LAN, GPIB+LAN
- Compatible with commands of GPD-x303S series

## Customers and Applications

### Customers

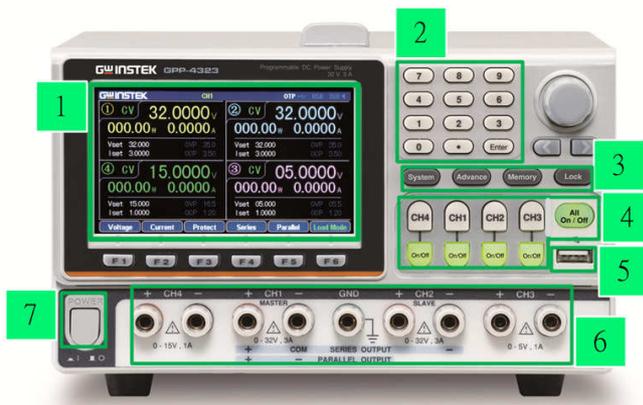
School and research institute  
 Energy storage device industry  
 Semiconductor industry  
 Consumer electronics industry

### Applications

Scientific research and experimental testing  
 Battery charging and discharging test  
 Electronic parts test  
 3C electronic product test

## Appearance

### Front panel



GPP-4323



GPP-3323



GPP-2323



GPP-1326

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## Rear panel



Front panel	Rear panel
1. LCD Display	9. AC Selector Switch
2. Number Pad	10. AC Input Socket and Line Fuse
3. Function Keys	11. RS-232 Port
4. Output Buttons	12. USB Device Port
5. USB Host	13. Ext I/O Port
6. Front Panel Output Terminals	14. GPIB Port
7. Power Button	15. LAN Port
8. Power Output Terminal(GPP-3323 only)	

## Important Information of Product Ordering

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### Key Dates for Product Announcement

1. NPI release and sample order (Sep 3, 2018)
2. Global Market Announcement (Sep 17, 2018)

### Service Policy

1. GPP Series Multi-Channel Programmable DC Power Supply carries one year warranty.
2. Contact GW Instek Service Department for maintenance information.

### Ordering Information

- GPP-1326 (32V/ 6A) Single-Channel Programmable DC Power Supply
- GPP-2323 (32V/3A \*2) Dual-Channel Programmable DC Power Supply
- GPP-3323 (32V/3A\*2; 1.8V or 2.5V or 3.3V or 5V/5A\*1) Three-Channel Programmable DC Power Supply
- GPP-4323 (32V/3A\*2; 5V/1A; 15V/1A) Four-Channel Programmable DC Power Supply

### Standard Accessories

CD (User Manua)

Power cord

Test Lead: GPP-1326:GTL-104Ax1, GTL-105Ax1

GPP-2323:GTL-104Ax2

GPP-3323:GTL-104Ax3

GPP-4323:GTL-104Ax2, GTL-105Ax2

### Optional Accessories

USB Cable GTL-246 USB 2.0 A-B type

### Optional Accessories (Manufacturer installed only)

LAN Interface

GPIB+LAN Interface

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## Detailed Product Information

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## Detailed Descriptions for Features

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### Operating Range

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Model Number	Number of Outputs	CH1	CH2	CH3	CH4
GPP-1326	1	0-32V/0-6A			
GPP-2323	2	0-32V/0-3A	0-32V/0-3A		
GPP-3323	3	0-32V/0-3A	0-32V/0-3A	1.8V/2.5V/3.3V/5V 5A	
GPP-4323	4	0-32V/0-3A	0-32V/0-3A	0-5V/0-1A	0-15V/0-1A

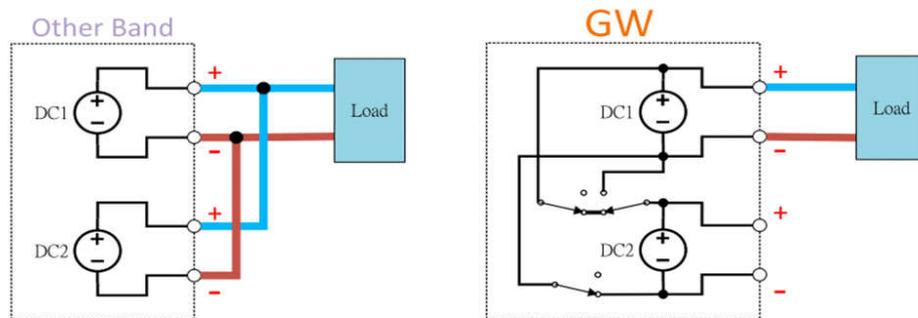
### Output Function List

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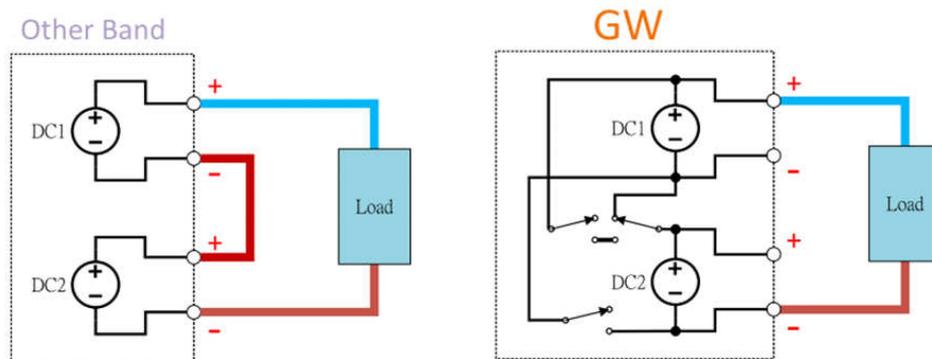
Models	GPP-4323			
	GPP-3323			
	GPP-2323			
	GPP-1326			
Functions	CH1	CH2	CH3	CH4
Sequence Output function	√	√		
Load Functions(CC, CV, CR mode)	√	√		
Output Delay function	√	√		
Output Monitoring Monitor(10 sets)	√	√	√(GPP-3323 not supported)	√
Output Recorder Function	√	√	√(GPP-3323 not supported)	√
Panel Save/ Recall	√	√	√	√

## Tracking Series and Parallel Function

For series and parallel applications of CH1 and CH2, the tracking function of the GPP series utilizes the internal circuit to automatically switch the output to serial or parallel output without additional external wiring, providing users with convenience not only in operating procedures but also a more stable output. The tracking function design of other brands requires additional external wiring connections for the output in series or parallel. However, excessively long, thin or inconsistent external wiring may cause inaccurate voltage or current output.

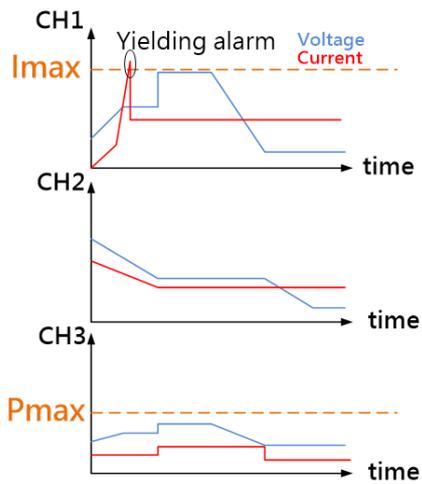


Output in parallel connections



Output in series connections

## Output Monitoring Function



Output monitoring

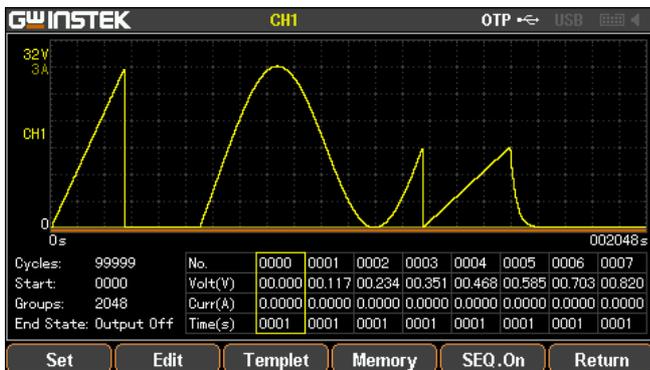


Monitoring function setting

The output monitoring function allows users to set the monitoring conditions according to the requirements, including the voltage, current, and power greater than or less than the setting and the logical relationship of AND, OR. It also allows users to sound alarms or stop the output during the measurement process, stop the measurement, and protect the customer's DUT. Each Channel could be monitored simultaneously as well.

\* Channel 3 of GPP-3323 does not support the output monitoring function

## Sequence Output Function



Output waveform of the GPP series

The GPP series provides a sequential output function on Channel 1 and Channel 2. This function not only allows users to edit the power output waveform, but also allows users to set the sequential constant voltage (CV) or constant current (CC) load waveform, i.e. a serial power output or a simulation test of a dynamic load. The maximum settable points for sequence function are 2048, and interval range of each point can be set from 1 to 300 seconds. In order to simplify the setting of waveform editing, the GPP series has 8 built-in Templet waveforms in sequence output function for users to directly apply for output, including Sine, Pulse, Ramp, Stair Up, Stair Dn, Stair UpDn, Exp Rise, and Exp Fall waveforms.

The editing data of the sequence output can be stored in the internal 10 sets of the memory, or to be saved by USB flash drive (Save/Recall) and saved as \*.SEQ or \*.CSV file; The stored \*.CSV can be exported into Excel for editing and analysis. The final edited file can be imported to (Save/Recall) of the power supply using a USB flash drive.

## Hardware Protection Function (OVP/OCP/OTP)

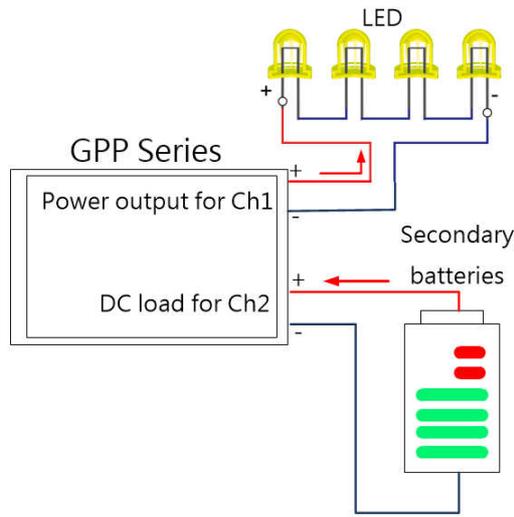
Hardware is utilized to realize the OVP function with fast response time. A real tested response time is 45ms.



The protection mechanism of OVP/OCP/OTP is implemented by hardware circuit, which has the advantage of faster response time than competitors who use software to achieve protection. When it is detected that the voltage of the DUT exceeds the setting value of the OVP, the output of the power supply can be stopped in a short time to achieve the purpose of protecting the DUT.

OVP trigger

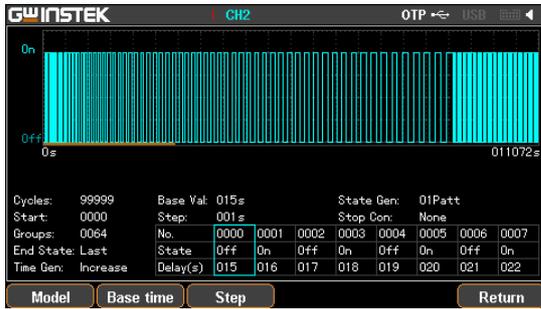
## Load Function



GPP series application

The CH1/CH2 of the GPP series is designed with the load function. A single power supply can meet the basic battery charging and discharging test requirements. It can provide 32V/3A power output in channel 1 and channel 2. The maximum 32V constant voltage load (CV), maximum 3.2A constant current load (CC) and maximum 1k $\Omega$  constant resistance load (CR) function are built-in to allow users do conduct discharging test without using an electronic load. In application, users can also set either that one channel of the single GPP series as the power output, one channel as the load function to consume the power of the DUT, or that both channels as load functions to consume the power of different loads simultaneously.

## Output Delay Function

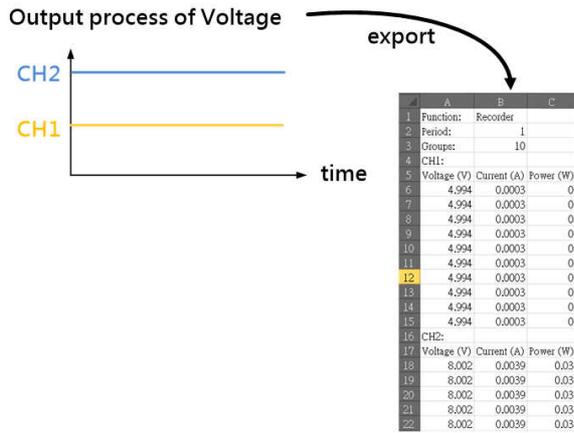


GPP series delayed waveform

Output delay function allows users to edit the timing waveform of the power output on/off when the front panel voltage and current settings are unchanged. In order to simplify the setting of waveform editing, the GPP series has three built-in timing modes in the delay output function, including Fixtime, Increase, Decline for users to apply directly.

The editing data of the output delay can be stored in the internal 10 sets of memory, or to be saved by USB flash drive (Save/Recall) and saved as \*.DLY or \*.CSV file. The stored \*.CSV can be exported into Excel for editing and analysis. The final edited file can be exported to (Save/Recall) of the power supply using a USB flash drive.

# Output Recorder Function



The output recorder function records the voltage & current parameters of the output process. The recording interval of each point can be set according to user's requirements, and the shortest interval is 1 second and the longest is 300 seconds. The results can be stored in \*.REC or \*.CSV format to the power supply or directly saved in the USB flash drive. The stored \*.CSV can be exported into Excel to conduct the future analysis. (\*.REC can be saved to 2048 records, \*.CSV can be saved to 614400 records)

Schematic diagram for output recorder function



Recorder function setting

\* Channel 3 of GPP-3323 does not support the output recorder function



Save as \*.REC

## Comparison

### Features, Advantages and Benefits

Features	Advantages	Benefits
CH1/CH2 are designed with the load function	A single GPP series can simultaneously set one channel as the power output, and one channel as the load function to consume the power of the DUT.	Power output and load test to be conducted by a single power supply
Linear power output characteristics	Low noise, low ripple power output	Applicable to DUTs requiring low noise power output
Sequence output function + 8 built-in Templet waveforms	Users edit (*.CSV) on a stand-alone power supply or the PC according to the requirements. Upload it to the power supply to generate a sequential power output or a dynamic load waveform.	Templet waveform simplifies the steps and time for users to edit sequential waveforms.
Delay output function + 3 built-in waveform timing modes	Users can edit (*.CSV) on a stand-alone power supply or the PC according to their needs and upload them to the power supply to generate different timing on/off output waveforms.	Three built-in timing modes are to simplify the steps and time for users to edit Delay output waveform.

Hardware wiring tracking function	Series Tracking or Parallel Tracking output of CH1 and CH2 do not need additional external wiring	Provides users not only convenience for operating procedures, but also a more stable output
Output monitoring function	Users set the monitoring conditions according to the requirements, sound an alarm or stop the output during the measurement process.	While measuring the DUT, it can also protect the DUT.
Output recorder function	The voltage & current parameters of the output process can be recorded as (*.CSV) files for users to export to Excel to conduct analysis.	It is convenient for users to record and analyze the measurement of the DUT.
Standard RS-232, USB, Ext I/O Optional: LAN, LAN+GPIB	Users can select the required communications interfaces according to their needs.	A variety of user interfaces facilitate users.
Compatible with the commands of the GPD-x303S series	Replace the GPD-x303S series. The program commands do not need to be rewritten	Save time and settings for users to replace the GPD-x303S series

# Features Comparison

Model		GPP-3323		SPD3303S(Siglent)		9131B(BK)		IT6300(ITech)
Channel		Ch1/Ch2	Ch3	Ch1/Ch2	Ch3	Ch1/Ch2	Ch3	Ch1/Ch2
Ripple & Noise	Voltage	≤350μVrms	≤2mVrms	≤0.5mVrms	≅1mVrms	≅1mVrms		≅3mVpp
	Current	≅2mArms		≅1mArms		≅5mArms	≅4mArms	≅5mArms
Program Resolution	Voltage	1mV		1mV		1mV		1mV
	Current	0.1mA		1mA		1mA		1mA
Read back Resolution	Voltage	0.1mV		1mV		1mV		1mV
	Current	0.1mA		1mA		1mA		1mA
Recovery Time		≤50μs		≤100μs		≅120μs	≅200μs	?
Display		4.3" TFT-LCD		4.3" TFT-LCD		VFD display		VFD display
DC Load Function		●						
Series Tracking		● ( Hardware )		●(Software)		●(Software)		●(Software)
Parallel Tracking		● ( Hardware )		●(Hardware)		●(Software)		●(Software)
Recorder function		● ( 10 sets )						
Sequence function		● ( 10 sets )		●				
Delay function		● ( 10 sets )						
Memory (front panel)		● ( 10 sets )		● ( 5 sets )		● ( 36 sets )		● ( 36 sets )
Monitor function		●						
Polarity Reverse Protection (PRP)			●					
Independent output ON/OFF			●	●				●
OVP		●(Hardware) (0.5V ~ 35V)	5.5V			●		●
OCP		●(Hardware) (50mA ~ 3.5A)	USB port:3.1A					
OTP			●			●		●
Power display		●		●				
USB Host		●						
USB Device		●		●		●(TMC)		●
RS-232		●				●		●
Digital IO		●						
LAN		●(option)		●				
GPIB+LAN		●(option)				●(option)		●(option)
Trigger function		●						
Thermostatically controlled fan			●	●				●

●: Excellent/●: Support/ □: No support

## Specifications

Model	GPP-4323				GPP-3323			GPP-2323		GPP-1326
<b>Output Mode</b>										
Number of Channel	CH1	CH2	CH3	CH4	CH1	CH2	CH3	CH1	CH2	CH1
Voltage	0~32V	0~32V	0~5V	0~15V	0~32V	0~32V	1.8/2.5/3.3/5.0V	0~32V	0~32V	0~32V
Current	0~3A	0~3A	0~1A	0~1A	0~3A	0~3A	5A	0~3A	0~3A	0~6A
Tracking Series Voltage	0~64V		----		0~64V		----		0~64V	
Tracking Parallel Current	0~6A		----		0~6A		----		0~6A	
<b>Constant Voltage Operation</b>										
Line Regulation	$\leq 0.01\%+3mV$									
Load Regulation	$\leq 0.01\%+3mV$ (rating current $\leq 3A$ ) $\leq 0.02\%+5mV$ (rating current $> 3A$ )									
Ripple & Noise(5Hz - 1MHz)	$\leq 350\mu V_{rms}$	$\leq 1mV_{rms}$	$\leq 350\mu V_{rms}$	$\leq 2mV_{rms}$	$\leq 350\mu V_{rms}$	$\leq 2mV_{rms}$	$\leq 350\mu V_{rms}$	$\leq 500\mu V_{rms}$	$\leq 500\mu V_{rms}$	$\leq 500\mu V_{rms}$
Recovery Time	$\leq 50\mu s$			$\leq 50\mu s$	$\leq 100\mu s$	$\leq 50\mu s$	$\leq 50\mu s$	$\leq 100\mu s$	$\leq 100\mu s$	$\leq 100\mu s$
<b>Constant Current Operation</b>										
Line Regulation	$\leq 0.2\%+3mA$									
Load Regulation	$\leq 0.2\%+3mA$									
Ripple & Noise	$\leq 2mArms$			$\leq 2mArms$	$\leq 2mArms$	$\leq 2mArms$	$\leq 2mArms$	$\leq 4mArms$	$\leq 4mArms$	$\leq 4mArms$
<b>Programming Resolution</b>										
Programming voltage resolution	1mV				1mV	-	1mV	1mV	1mV	1mV
Programming current resolution	0.1mA				0.1mA	-	0.1mA	0.1mA	0.2mA	0.2mA
<b>Tracking Operation(CH1,CH2)</b>										
Tracking Error	$\leq 0.1\%+10mV$ of Master(0~32V, No Load , with Load add load regulation $\leq 100mV$ )									
Parallel Regulation	Line: $\leq 0.01\%+3mV$ Load: $\leq 0.01\%+3mV$ (rating current $\leq 3A$ ) $\leq 0.02\%+5mV$ (rating current $> 3A$ )									
Series Regulation	Line: $\leq 0.01\%+5mV$ Load: $\leq 100mV$									
Ripple & Noise(5Hz - 1MHz)	$\leq 1mV_{rms}$									
<b>CH3 Operation for (3323)</b>										
Output Voltage	1.8V/2.5V/3.3V/5.0V, $\pm 5\%$									
Output Current	5A									
Line Regulation	$\leq 3mV$									
Load Regulation	$\leq 5mV$									
Ripple & Noise	2mVrms(5Hz~1MHz)									
Transient recovery time	100us									
USB Port Output	1.8V/2.5V/3.3V/5.0V, $\pm 0.35V$ , 3A									
<b>Meter</b>										
Voltage Resolution	0.1mV				0.1mV	-	0.1mV	0.1mV	0.1mV	0.1mV
Current Resolution	0.1mA				0.1mA	-	0.1mA	0.2mA	0.2mA	0.2mA
Setting Accuracy	$\leq \pm(0.03\% + 10mV)$				$\leq \pm(0.03\% + 10mV)$	-	$\leq \pm(0.03\% + 10mV)$			
	$\leq \pm(0.30\% + 10mA)$				$\leq \pm(0.30\% + 10mA)$	-	$\leq \pm(0.30\% + 10mA)$			
Readback Accuracy	$\leq \pm(0.03\% + 10mV)$				$\leq \pm(0.03\% + 10mV)$	-	$\leq \pm(0.03\% + 10mV)$			
	$\leq \pm(0.30\% + 10mA)$				$\leq \pm(0.30\% + 10mA)$	-	$\leq \pm(0.30\% + 10mA)$			
<b>DC load Characteristic</b>										
Channel	2		-	2	-	2	-	2	1	1
Display power	0~50.00W		-	0~50.00W	-	0~50.00W	-	0~50.00W	0~100.00W	0~100.00W
Display voltage	1~33.00V		-	1~33.00V	-	1~33.00V	-	1~33.00V	1~33.00V	1~33.00V
Display current	0~3.200A		-	0~3.200A	-	0~3.200A	-	0~3.200A	0~6.200A	0~6.200A

GPP series multi-channel programmable DC power supply

CV mode setting Range	1.500V ~ 33.00V	-	1.500V ~ 33.00V	-	1.500V ~ 33.00V	1.500V~33.00V
Resolution	10mV	-	10mV	-	10mV	10mV
Set Accuracy	≤0.1%+30mV	-	≤0.1%+30mV	-	≤0.1%+30mV	≤0.1%+30mV
Read Accuracy	≤0.1%+30mV	-	≤0.1%+30mV	-	≤0.1%+30mV	≤0.1%+30mV
CC mode setting Range	0 ~ 3.200A	-	0 ~ 3.200A	-	0 ~ 3.200A	0 ~ 6.200A
Resolution	1mA	-	1mA	-	1mA	1mA
Set Accuracy	≤0.3%+10mA	-	≤0.3%+10mA	-	≤0.3%+10mA	≤0.3%+10mA
Read Accuracy	≤0.3%+10mA	-	≤0.3%+10mA	-	≤0.3%+10mA	≤0.3%+10mA
CR mode setting Range	1 ~ 1K ohm	-	1 ~ 1K ohm	-	1 ~ 1K ohm	1 ~ 1K ohm
Resolution	1 ohm	-	1 ohm	-	1 ohm	1 ohm
Set Accuracy	≤0.3%+1 ohm(Voltage ≥ 0.1V, and current ≥ 0.1A)	-	≤0.3%+1 ohm(Voltage ≥ 0.1V, and current ≥ 0.1A)	-	≤0.3%+1 ohm(Voltage ≥ 0.1V, and current ≥ 0.1A)	≤0.3%+1 ohm(Voltage ≥ 0.1V, and current ≥ 0.1A)
Read Accuracy	≤0.3%+1 ohm(Voltage ≥ 0.1V, and current ≥ 0.1A)	-	≤0.3%+1 ohm(Voltage ≥ 0.1V, and current ≥ 0.1A)	-	≤0.3%+1 ohm(Voltage ≥ 0.1V, and current ≥ 0.1A)	≤0.3%+1 ohm(Voltage ≥ 0.1V, and current ≥ 0.1A)
<b>Insulation</b>						
Chassis and Terminal	20MΩ or above (DC 500V)					
Chassis and AC Cord	30MΩ or above (DC 500V)					
<b>Environment Condition</b>						
Operation Temp	0~40℃					
Storage Temp	-10~70℃					
Operating Humidity	≤80% RH					
Storage Humidity	≤70% RH					
<b>Other</b>						
External Control	Yes					
Interface	Std: RS-232/USB(CDC); Opt( manufacturer installed ):LAN/GPIB+LAN					
Power Source	AC100V/120V/220V/230V±10%; 50/60Hz					
Dimensions & Weight	213(W)x 145(H) x 312(D) mm ; Approx. 7.5kg					

Should you have any questions on the GPP series announcement, please don't hesitate to contact us.

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