

6050-1

USB PD Single Test System



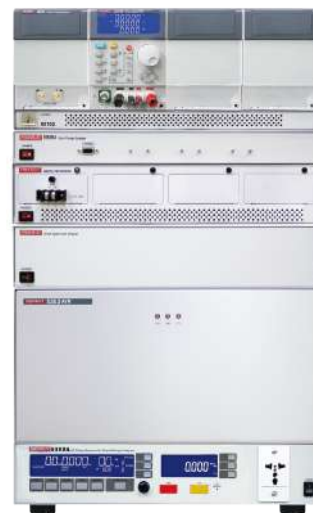
Basic version



Standard version



Value version



Complete version

Feature

- Select the required device configuration version (Basic / Standard / Value / Complete version) according to product testing requirements
- In addition to supporting USB PD, also supports QC2.0 / QC3.0 / PE+ / PE+2.0
- Highly cost-effective, fully functional modular design test system
- Operating environment of Windows 7 or higher (included)
- Open architecture software platform
 1. Support related hardware expansion
 2. Edit test item function
 3. Edit test program function
 4. Edit statistical analysis report function
 5. Online instrument control function
 6. User authorization settings
 7. Support Bar Code Reader

6050 USB PD ATE Test System

USB PD Test items and equipment configuration table

Test items	Instrument Equipment							
	5302A AC Source	9922-R QC Controller	99094 QC Controller	3310F DC Load	4031-PD Timing & Noise	4015A Power Meter	5060 OVP Source	5303 AVR
USB PD USB PD Performances								
USB PD Source / Sink Profile	✓	✓	✓	✓				
USB PD Power Data Object (PDO)	✓	✓	✓	✓				
Positive Voltage Transitions	✓	✓	✓	✓	✓			
Negative Voltage Transitions	✓	✓	✓	✓	✓			
Hard Reset	✓	✓	✓	✓	✓			
USB Type C Cable unplug	✓		✓	✓	✓			
Output Performances								
Output Voltage	✓	✓	✓	✓				
Output Current	✓	✓	✓	✓				
Dynamic Load (Vpeak +/-)	✓	✓	✓	✓	✓			
Average Efficiency	✓	✓	✓	✓				
Ripple Voltage	✓	✓	✓	✓	✓			
Input Characteristics								
Input RMS Current	✓	✓	✓	✓		✓		
Input Frequency	✓	✓	✓	✓		✓		
Input Power	✓	✓	✓	✓		✓		
No Load Power Consumption	✓	✓	✓	✓		✓		
Input Power Factor	✓	✓	✓	✓		✓		
Input Voltage Sag	✓	✓	✓	✓	✓	✓		
Current Harmonics	✓	✓	✓	✓		✓		
Input Inrush Current	✓	✓	✓	✓		✓		✓
Regulation Tests								
Line Regulation	✓	✓	✓	✓				
Load Regulation	✓	✓	✓	✓				
Combine Regulation	✓	✓	✓	✓				
Timing & Transient								
Turn ON (Set-Up) Time	✓	✓	✓	✓	✓			
Turn OFF (Hold-Up) Time	✓	✓	✓	✓	✓			
Rise Time	✓	✓	✓	✓	✓			
Fall Time	✓	✓	✓	✓	✓			
Protection Tests								
Short Circuit	✓	✓	✓	✓				
OV Protection	✓	✓	✓	✓			✓	
OC Protection	✓	✓	✓	✓				
OP Protection	✓	✓	✓	✓				

USB PD Single test system quick selection table

Test items	6050 USB PD test system quick selection table			
	6050-1-A Basic version	6050-1-B Standard version	6050-1-C Value Version	6050-1-D Complete version
USB PD USB PD Performances				
USB PD Source / Sink Profile				
USB PD Power Data Object (PDO)				
Positive Voltage Transitions				
Negative Voltage Transitions				
Hard Reset				
USB Type C Cable unplug				
Output Performances				
Output Voltage				
Output Current				
Dynamic Load (Vpeak +/-)				
Average Efficiency				
Ripple Voltage				
Input Characteristics				
Input RMS Current				
Input Frequency				
Input Power				
No Load Power Consumption				
Input Power Factor				
Input Voltage Sag				
Current Harmonics				
Input Inrush Current				
Regulation Tests				
Line Regulation				
Load Regulation				
Combine Regulation				
Timing & Transient				
Turn ON (Set-Up) Time				
Turn OFF (Hold-Up) Time				
Rise Time				
Fall Time				
Protection Tests				
Short Circuit				
OV Protection				
OC Protection				
OP Protection				

△ Only provide Input Voltage Sag capability

6050-1-A Single Output USB PD USB PD basic version : the single-group test system architecture is as shown in the table, 5302A AC Source, 3302F + 3310F series and 9922-R Quick Charge Controller.

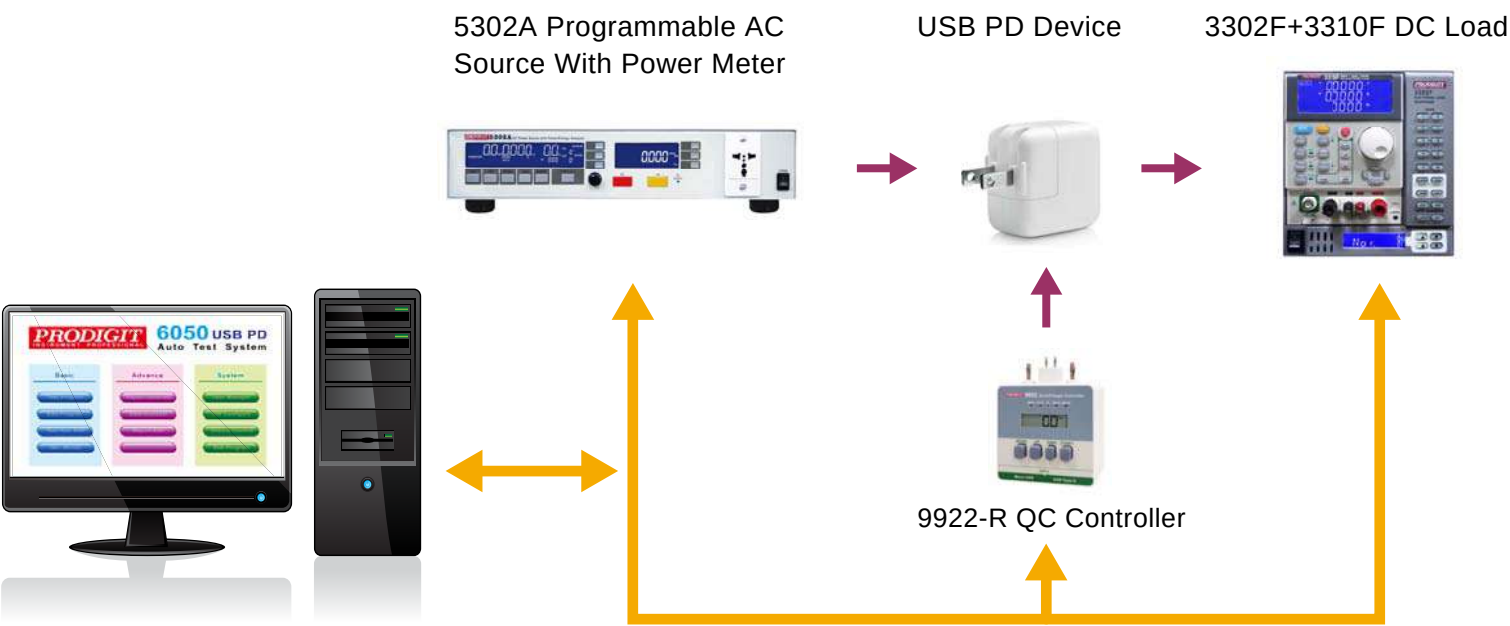
The composition is shown below.



3302F + 3310F DC Load

5302A AC Source (include Power Meter)

6050-1-A Block diagram of 6050-1-A system



6050-1-A Single Channel Test System Configuration

6050-1-A The testable items of basic version is as follows

USB PD USB PD Performances
USB PD Source / Sink Profile
USB PD Power Data Object (PDO)

Output Performances
Output Voltage
Output Current
Average Efficiency

Regulation Tests
Line Regulation
Load Regulation
Combine Regulation

Input Characteristics
Input RMS Current
Input Frequency
Input Power
No Load Power Consumption
Input Power Factor

Protection Tests
Short Circuit
OC Protection
OP Protection

6050-1 Basic version equipment configuration table

6050-1-A Basic version equipment configuration table	
Model	Quantity
5302A AC Power Source with Power / Energy Analyzer	1
3302F 1CH Mainframe	1
3310F 60V/30A/150W DC Load Module	1
9922-R Quick Charger Controller with RS-232	1
6050 system software	1
System Controller (PC)	1
CP-104EL-A 1:4 High Speed RS-232 Card	1
Uport 1410 USB to RS-232 4 Port For Note Book	0
System Specifications (PC or Note Book)	
CPU	i5-3470(3.2GHz) or faster
SRAM	256KB
DRAM	4GB or higher
Hard Driver	500GB or higher
CD-ROM	40X or faster
Monitor	22"
KeyBoard	101 Keys
I/O	Mouse/Print Port
System Interface	RS-232
System I/O	1:4 or 1:8 High Speed RS-232 Card
○ The system device should use this interface when using Note Book.	

OS : Windows 7.0 or latest version

6050-1-B Standard version (Basic version + USB PD characteristics and timing and transient testing + input and output characteristics) : adding 4031-PD Timing & Noise Meter and 99094-1 Single Channel Quick Charger Controller can increase USB PD characteristics and timing and transient testing + input and output characteristics test. The composition is shown below.

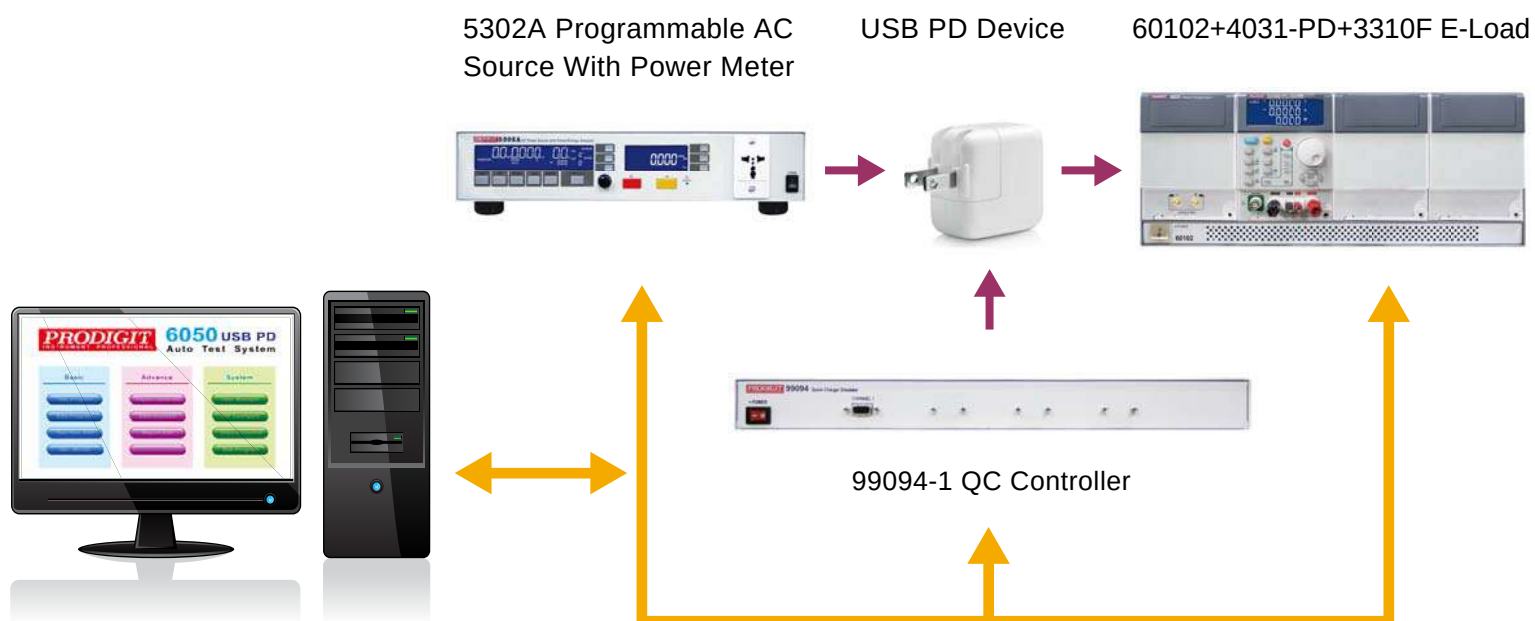


60102 + 4031-PD+ 3310F DC Load

99094-1 QC Controller

5302A AC Source (include power Meter)

6050-1-B Block diagram of standard version



6050-1-B Single Channel Test System Configuration

6050-1-B Standard version adding 4031-PD and 99094-1 can increase the test items as shown in the orange block below.

USB PD Performances
Positive Voltage Transitions
Negative Voltage Transitions
Hard Reset
USB Type C Cable unplug

Timing & Transient
Turn ON (Set-Up) Time
Turn OFF (Hold-Up) Time
Rise Time
Fall Time

Output Performances
Dynamic Load ($V_{peak} \pm$)
Ripple Voltage

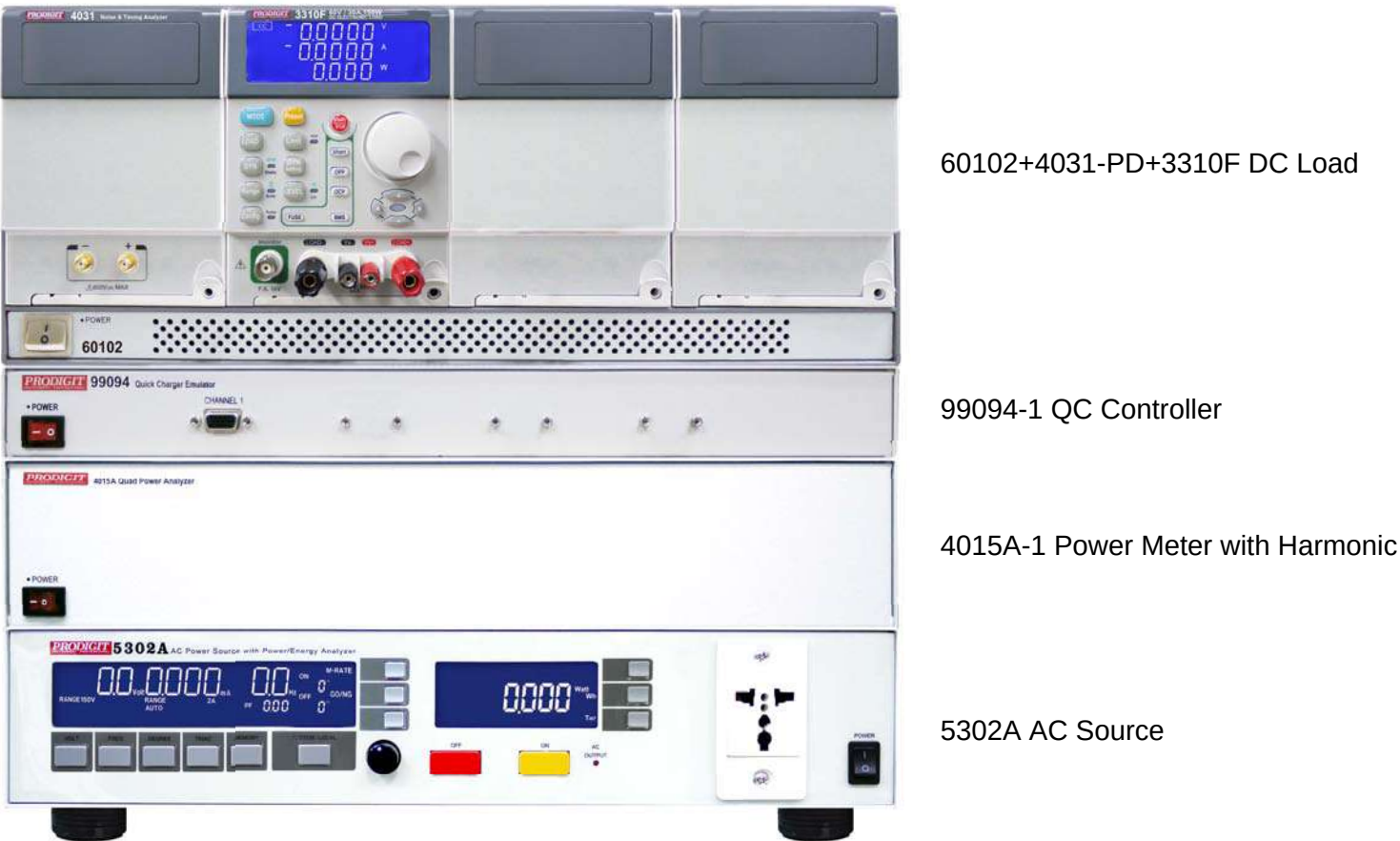
Input Characteristics
Input Voltage Sag

6050-1-B Standard version equipment configuration table

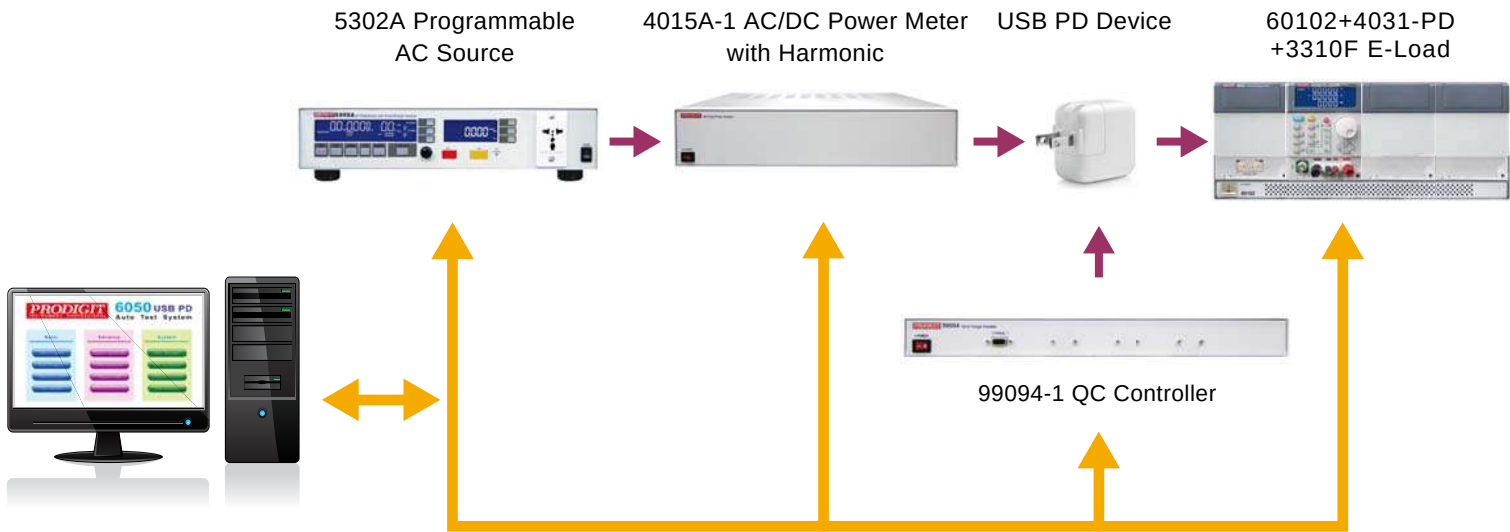
6050-1-B Standard version equipment configuration table	
Model	Quantity
5302A AC Power Source with Power/Energy Analyzer	1
60102 2CH Mainframe; Ch1 for 4031-PD, Ch2 for 3310F	1
3310F 60V/30A/150W DC Load Module	1
4031-PD Timing & Noise Meter for PD	1
99094-01 Quick Charger Controller (single Channel)	1
6050 system software	1
System Controller (PC)	1
CP-104EL-A 1:4 High Speed RS-232 Card	1
Uport 1410 USB to RS-232 4 Port For Note Book	0
System Specifications (PC or Note Book)	
CPU	i5-3470(3.2GHz) or faster
SRAM	256KB
DRAM	4GB or higher
Hard Driver	500GB or higher
CD-ROM	40X or faster
Monitor	22"
KeyBoard	101 Keys
I/O	Mouse / Print Port
System Interface	RS-232
System I/O	1:4 or 1:8 High Speed RS-232 Card
O The system device should use this interface when using Note Book.	

OS : Windows 7.0 or latest version

6050-1-C Value version (Standard version + Input current harmonic) : adding 4015-1 single channel power meter can increase the current harmonic Harmonics test.
The composition is shown below.



6050-1-C Block diagram of Value version



6050-1-C Single Channel Test System Configuration

6050-1-C Value version adding 4015A-1 can increase the test items as shown in the following green block

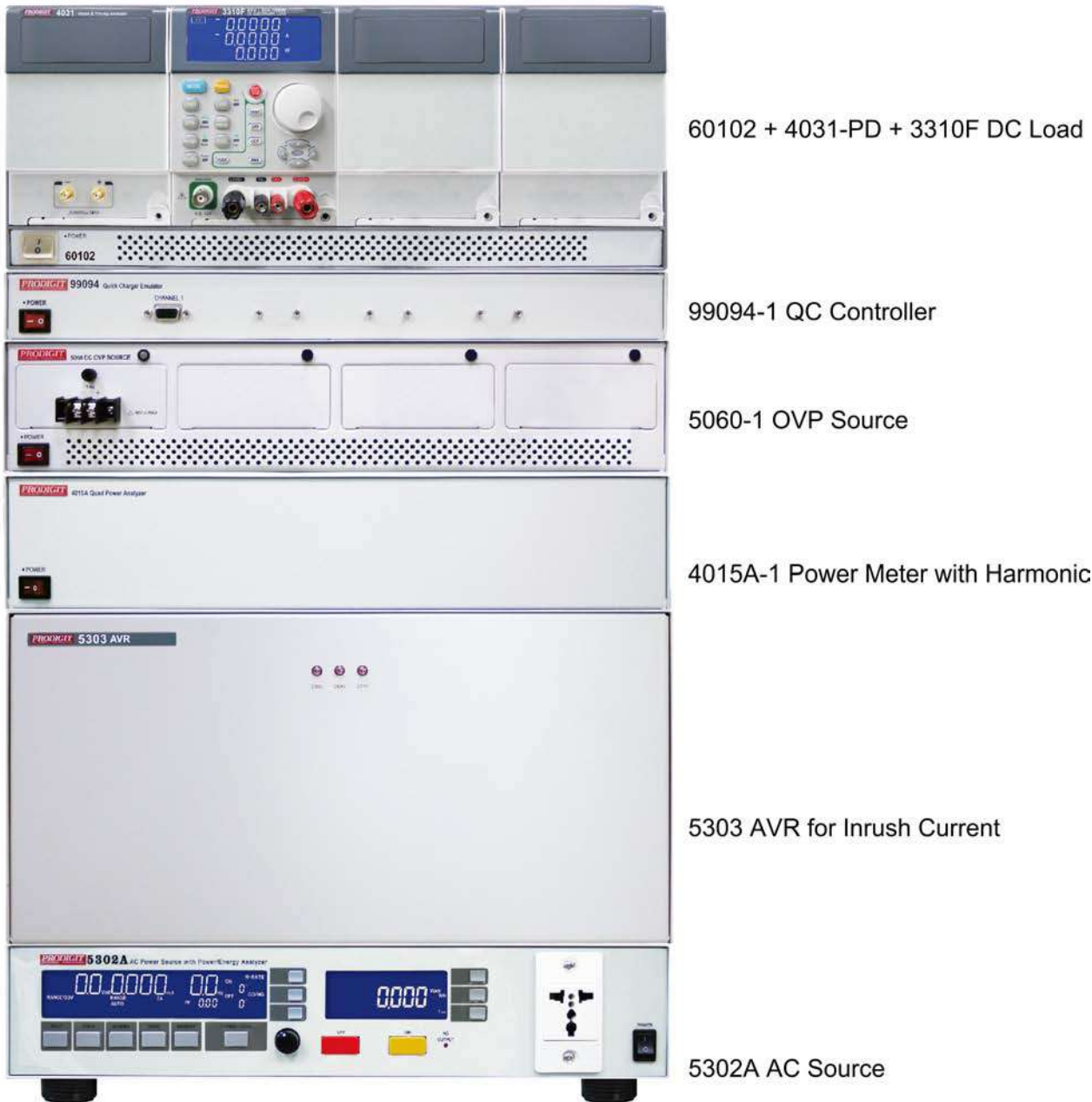
Input Characteristics
Current Harmonics

6050-1-C Value version equipment configuration table

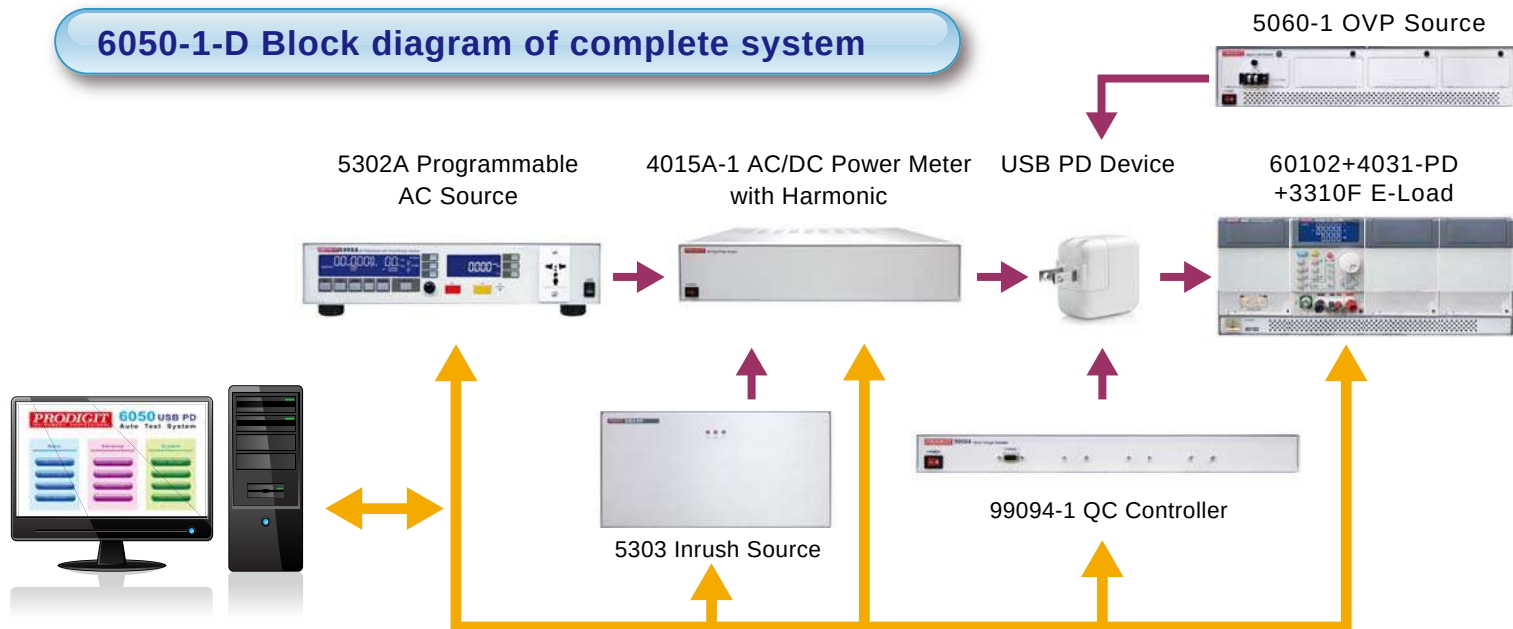
6050-1-C Value version equipment configuration table	
Model	Quantity
5302A AC Power Source with Power/Energy Analyzer	1
60102 2CH Mainframe; Ch1 for 4031-PD, Ch2 for 3310F	1
3310F 60V/30A/150W DC Load Module	1
4031-PD Timing & Noise Meter for PD	1
4015A-1 Power Meter with Harmonic (single Channel)	1
99094-1 Quick Charger Controller (single Channel)	1
6050 system software	1
System Controller (PC)	1
CP-104EL-A 1:4 High Speed RS-232 Card	1
Uport 1410 USB to RS-232 4 Port For Note Book	0
System Specifications (PC or Note Book)	
CPU	i5-3470(3.2GHz) or faster
SRAM	256KB
DRAM	4GB or higher
Hard Driver	500GB or higher
CD-ROM	40X or faster
Monitor	22"
KeyBoard	101 Keys
I/O	Mouse / Print Port
System Interface	RS-232
System I/O	1:4 or 1:8 High Speed RS-232 Card
○ The system device should use this interface when using Note Book.	

OS : Windows 7.0 or latest version

6050-1-D The Complete version (standard version + input inrush current + over voltage protection) : adds 5303 AVR and 5060-1 single channel OVP Source to increase Input Inrush Current and over voltage protection tests. The composition is shown below.



6050-1-D Block diagram of complete system



6050-1-D Single Channel Test System Configuration

6050-1-D Complete added 5303 and 5060-1The following items can be added to the test item

Input Characteristics

Input Inrush Current

Protection Tests

OV Protection

6050-1-D Complete version equipment configuration table

6050-1-D Complete version equipment configuration table	
Model	Quantity
5302A AC Power Source with Power/Energy Analyzer	1
60102 2CH Mainframe; Ch1 for 4031-PD, Ch2 for 3310F	1
3310F 60V/30A/150W DC Load Module	1
4031-PD Timing & Noise Meter for PD	1
4015A-1 Power Meter with Harmonic (single Channel)	1
5060-1 OVP Source (single Channel)	1
5303 3KVA AVR	1
99094-1 Quick Charger Controller (single Channel)	1
6050 system software	1
System Controller (PC)	1
CP-104EL-A 1:4 High Speed RS-232 Card	1
Uport 1410 USB to RS-232 4 Port For Note Book	0
System Specifications (PC or Note Book)	
CPU	i5-3470(3.2GHz) or faster
SRAM	256KB
DRAM	4GB or higher
Hard Driver	500GB or higher
CD-ROM	40X or faster
Monitor	22"
KeyBoard	101 Keys
I/O	Mouse / Print Port
System Interface	RS-232
System I/O	1:4 or 1:8 High Speed RS-232 Card
O The system device should use this interface when using Note Book.	

OS : Windows 7.0 or latest version

Function and specification of each instrument

5302A AC Power Source with Power/Energy Analyzer List of Specification and applicable features

Model	5302A AC Power Source with Power / Energy Analyzer
Applicable test function	
1. Input RMS Current 2. Input Frequency 3. Input Power 4. No Load Power Consumption 5. Input Power Factor 6. Input Voltage Sag 7. Line Regulation 8. A voltage ON/OFF angle (0 ~ 360°) Can be programmed	
Specifications	
Power Rating	270VAmx
Voltage Rating	10~150Vrms / 160~300Vrms
Current Rating	2.0Arms / 1.0Arms
Frequency	40~70Hz
Triac Mode	Leading / Trailing Edge
Angle(ON/OFF)	0~360°
PQT <IEC 61000-4-11 >	DIP, Interrupt, Variation
Measurements	
ACV meter(Vrms)	150V / 300V
ACA meter(Arms)	10mA / 20mA / 200mA / 2000mA (Auto range for AC Source) / 200A(for Inrush)
ACW meter	1.5W / 3W / 6W / 30W / 60W / 300W / 600W
DCW meter	Same as 3310F series
PF meter	±0.01~1.00
Frequency meter	40~70 Hz
Interface	RS-232
External AC Source	300Vrms / 2A / 600VA

For USB PD Sag

Duration Time	Dip Voltage (Vin=110Vac/60Hz)			Dip Voltage (Vin=230Vac/50Hz)		
	25%	50%	100%	25%	50%	100%
0.5 Cycle	S	S	S	S	S	S
1 Cycle	S	S	S	S	S	S
5 Cycle	S	R	R	S	R	R
10 Cycle	S	R	R	S	R	R

* S means that the output must meet specifications

* R means the output can be automatically restored to 5V output

Table 1 – Preferred test level and durations for voltage dips

Class ^a	Test level and durations for voltage dips (t_s) (50 Hz/60 Hz)				
Class 1	Case-by-case according to the equipment requirements				
Class 2	0 % during ½ cycle	0 % during 1 cycle	70 % during 25/30 ^c cycles		
Class 3	0 % during ½ cycle	0 % during 1 cycle	40 % during 10/12 ^c cycles	70 % during 25/30 ^c cycles	80 % during 250/300 ^c cycles
Class X ^b	X	X	X	X	X

^a Classes as per IEC 61000-2-4; see Annex B.

^b To be defined by product committee. For equipment connected directly or indirectly to the public network, the levels must not be less severe than Class 2.

^c "25/30 cycles" means "25 cycles for 50 Hz test" and "30 cycles for 60 Hz test".

Table 2 – Preferred test level and durations for short interruptions

Class ^a	Test level and durations for short interruptions (t_s) (50 Hz/60 Hz)
Class 1	Case-by-case according to the equipment requirements
Class 2	0 % during 250/300 ^c cycles
Class 3	0 % during 250/300 ^c cycles
Class X ^b	X

^a Classes as per IEC 61000-2-4; see Annex B.

^b To be defined by product committee. For equipment connected directly or indirectly to the public network, the levels must not be less severe than Class 2.

^c "250/300 cycles" means "250 cycles for 50 Hz test" and "300 cycles for 60 Hz test".

Table 3 – Timing of short-term supply voltage variations

Voltage test level	Time for decreasing voltage (t_d)	Time at reduced voltage (t_s)	Time for increasing voltage (t_i) (50 Hz/60 Hz)
70 %	Abrupt	1 cycle	25/30 ^b cycles
X ^a	X ^a	X ^a	X ^a

^a To be defined by product committee.

^b "25/30 cycles" means "25 cycles for 50 Hz test" and "30 cycles for 60 Hz test".

3310F DC E-Load List of Specification and applicable features

Model	3310F DC E-Load	
Applicable test function		
1. Output Voltage	5. Average Efficiency	
2. Output Current	6. Short Circuit	
3. Dynamic Load	7. OC Protection	
4. Efficiency	8. OP Protection	
Specifications		
Power	150W	
Current	30A	
Voltage	60V	
Constant Current Mode		
Range	0 ~ 3A	0 ~ 30A
Constant Resistance Mode		
Range	2 ~120KΩ	0.02Ω ~ 2Ω
Constant Voltage Mode		
Range	0 ~ 6V	0 ~ 60V
Constant Power Mode		
Range	0 ~ 15W	0 ~ 150W
Dynamic Mode		
Timing		
Thigh & Tlow	0.050~9.999 / 99.99 / 999.9 / 9999mS	
Resolution	0.001 / 0.01 / 0.1 / 1mS	
Slew rate	2.0 ~ 125mA/uS	20 ~ 1250mA/uS
Accuracy	± (5% of Setting) ±10uS	
Measurement		
Voltage Read Back		
Range (5 Digital)	6V	60V
Current Read Back		
Range (5 Digital)	3A	30A
Resolution	0.0001A	0.001A
Current Monitor	FULL SCALE 10V	
Current Programming Input	FULL SCALE 10V	
Programmable Short	BUILT-IN	
Load ON Voltage	0.1 ~ 25V	
Accuracy	1% of (Setting + Range)	
Load OFF Voltage	0 ~ 25V	
Accuracy	0.025% of (Setting + Range)	
Typical Short Resistance	0.02Ω	
Maximum Short Current	30 A	
Operating range		
Temperature	0~+40℃	
Humidity	20~85%rh	

4031-PD List of Specification and applicable features

Model		4031-PD Noise & Timing Analyzer Module	
Applicable test function			
1. Positive Voltage Transitions 2. Negative Voltage Transitions 3. Hard Reset 4. USB Type C Cable Unplug 5. Ripple Voltage 6. Dynamic Load Vpeak +/- Measure		7. Input Voltage Sag 8. Turn ON(Set-Up) Time 9. Turn OFF(Hold-Up) Time 10. Rise Time 11. Fall Time	
Specifications			
No. of input channel		1	
Timing Measurement		Ripple Measurement	
Set-up / Hold-up / Rise / Fall Time		Band Width	0 ~ 100 KHz
Voltage range	0 ~ 10 / 30 Vdc	Voltage range	0 ~ 10/30 Vdc
Current range	*(1/4F.S.)/(F.S.)Adc	Measurement range	0 ~ 0.4/1 Vp-p
Timing range	1 Sec/2 Sec/4 Sec/8 Sec/16 Sec	Resolution	0.001/0.01V
Resolution	1 uS/2uS/4uS/8uS/16uS	Current range	*(1/4F.S.)/(F.S.) Adc
Vth1 / Vth2		Measurement range	*(1/8F.S.)/(1/2F.S.) Ap-p
Voltage range	5% ~ 95% of reading	Resolution	0.001/0.01A
Resolution	0.01 V/0.01V, 0.001A/0.01A	Accuracy	±5% of (Reading + Range)
Accuracy	±2% of (Reading + Range)	Sampling Rate	100KHz
Noise Measurement		Update Rate	50~1000 mS
Low Pass Filter	up to 20 MHz	Resolution	1mS
Voltage range	0.6 / 3Vp-p	Dimming Measurement	
Resolution	1mV	Band Width	100KHz
Accuracy	±2% OF reading + 5mV	Current range	*(1/8F.S.)/(1/2F.S.) Adc
Over Shoot Measurement		Resolution	0.001/0.01A
Band Width	0 ~ 100 KHz	Accuracy	±5% of (Reading + Range)
Voltage range	0 ~ 10 / 30 Vdc	Sampling Rate	100KHz
Measurement range	0 ~ 10 / 30 Vdc	Update Rate	50~1000 mS
Resolution	0.01 Vdc	Resolution	1mS
Current range	*(1/4F.S.)/(F.S.)Adc	Frequency range	10Hz~35KHz
Measurement range	*(1/4F.S.)/(F.S.)Adc	Resolution	1Hz
Resolution	0.001 / 0.01A	Accuracy	±1% of (Reading + Range)
Accuracy	±1% of (Reading + Range)	Duty(Ton) Range	3uS~90mS
Sampling Rate	100KHz	Resolution	1uS
Update Rate	50~1000 mS	Accuracy	±1% of (Reading + Range)
Resolution	1mS		
Vpeak Measurement		USB PD Timing Measurement	
Vpeak+/Vpeak-		PVT/NVP/Hard Reset/Output Voltage Falling Time	
Band Width	0 ~ 100 KHz	Va/Vb/Vc/Vd	
Voltage range	0 ~ 10/30 Vdc	Voltage range	0 ~ 10/30 Vdc
Measurement range	0 ~ 10/30 Vdc	Resolution	0.01 V
Resolution	0.01Vdc	Accuracy	1% of (Reading + Range)
Accuracy	±1% of (Reading + Range)	Timing range	3 Sec
Sampling Rate	100KHz	Resolution	10 uS
Update Rate	50~1000 mS		
Resolution	1mS		

99094-1 List of Specification and applicable features

Model	99094-1 Quick Charge Controller	
Applicable test function		
1. USB PD Source / Sink Profile 2. USB PD Power Data Object (PDO) 3. USB PD Output Voltage Change 4. USB Type C Cable Unplug		
Specifications		
No. of Test Channel	1	
Support Quick Charge	QC2.0, QC3.0, PE+, PE+2.0, USB PD	
Terminal of Charger	D-sub 15Pin for ChxA, ChxB	

9922-R List of Specification and applicable features

Model	9922-R Quick Charge Controller	
Applicable test function		
1. USB PD Source / Sink Profile 2. USB PD Power Data Object (PDO) 3. USB PD Output Voltage Change		
Specifications		
Support Quick Charge	QC2.0, QC3.0, PE+, PE+2.0, USB PD 2.0	
Terminal of Charger	micro USB, USB Type C	
Input Power	5V, 150mA	

4015A-1 List of Specification and applicable features

Model		4015A-1 Power Meter		
No. of Input Channel		1		
Applicable test function				
1. Current Harmonic				
Specifications				
ACV meter (Vrms)	Range	15V / 0.001V, 30V / 0.001V, 50V / 0.01V 150V / 0.01V, 300V / 0.01V, 500V / 0.1V		
	Accuracy	±0.1% of (Reading + Range)		
ACA meter (Arms)	Range	20mA / 0.001mA, 500mA / 0.01mA, 10A / 1mA 50mA / 0.001mA, 2A / 0.1mA, 20A / 1mA 200mA / 0.01mA, 5A / 0.1mA, 200A peak / 0.01A		
	Accuracy	±0.1% of (Reading + Range)		
		±2% of (Reading + Range, for Inrush)		
ACW meter	Range	0.3W / 0.01mW 0.75W / 0.1mW 3W / 0.1mW 7.5W / 1mW 30W / 1mW 75W / 1mW 150W / 10mW 300W / 10mW	0.6W / 0.01mW 1.5W / 0.1mW 6W / 0.1mW 15W / 1mW 60W / 1mW 150W / 10mW 300W / 10mW 600W / 10mW	1W / 0.1mW 2.5W / 0.1mW 10W / 1mW 25W / 1mW 100W / 10mW 250W / 10mW 500W / 10mW 1000W / 0.1W
	Accuracy	±0.1% of (Reading + Range)		
DCV	Range	Same as AC		
	Accuracy	Same as AC		
DCA	Range	Same as AC		
	Accuracy	Same as AC		
DCW	Range	Same as AC		
	Accuracy	Same as AC		
PF meter	Range	±0.001~1.000 / 0.001		
	Accuracy	1% of (Reading + Range, Corresponds to V and A)		
Frequency meter	Range	40~70 / 0.1Hz		
	Accuracy	± 0.1 Hz		
V/A	Number	1~50 th / Same as ACV, ACA meter		
Harmonic	Accuracy	±0.5% of (Reading + Range)		
V/A THD	Range	0%~255% / 0.001%		
	Accuracy	±0.5% of (Reading + Range)		
Inrush Delay/Period		0~100ms		
Low Pass Filter(V & A)		50KHz		
Interface		RS-232		

5303 List of Specification and applicable features

Model	5303 AVR
Applicable test function	
1. Input Inrush Current	
Specifications	
Power Rating	3KVA
Maximum Capacity	CF > 7
Input Voltage Rating	230Vrms +/- 10%
Output Voltage Rating	230,264,277Vrms Selectable
Accuracy	±2.5Vrms
Interface	RS-232 remote control only

5060-1 List of Specification and applicable features

Model	5060-1 OVP Source
Applicable test function	
1. Over Voltage Protection	
Specifications	
Power Rating	80W ^{*1}
Voltage range	0~20V / 40V
Resolution	0.001V
Current range	0~4A / 2A
Resolution	0.1mA
Ton Step time	0~6.5 Sec.
Resolution	0.1 mSec.
Slew rate	0.02V / uS
Protection	OCP, OTP

*1 The maximum power apply for 1 Sec. at 50% duty cycle.

Order Information



Basic version

6050-1-A

USB PD Single Test System



Standard version

6050-1-B

USB PD Single Test System



Value version

6050-1-C

USB PD Single Test System



Complete version

6050-1-D

USB PD Single Test System