SPD4000X Series

Programmable

Linear DC Power Supply

Service Manual

E01A



SIGLENT TECHNOLOGIES CO.,LTD

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1 Important Safety Information

This manual contains information and warnings that must be followed by the user for safe operation and to keep the product in a safe condition.

1.1 General Safety Summary

Please review the following safety precautions carefully to avoid personal injury or damage to this product or any product connected to it. To prevent potential danger, please use the instrument as specified.

To Avoid Fire or Personal Injury.

To avoid fire or personal injury, use the proper power cord.

Only use the state/locally approved power cord with the instrument.Sold to North America and other countries, it will be equipped with power cord meeting local requirements.

	**WARNING:** Do not use removable power cords with insufficient ratings.

Ground the Instrument.

The instrument grounds through the protective terra conductor of the power line. To avoid electric shock, the ground conductor must be connected to the earth. Make sure the instrument is grounded correctly before connect its input or output terminals.

Look over All Terminals' Ratings.

To avoid fire or electric shock, please look over all ratings and signed instructions of the instrument. Before connecting the instrument, please read the manual carefully to gain more information about the ratings.

Not Operate with Suspected Failures.

If you suspect that there is damage to the instrument, please let qualified service personnel check it. Do not operate in wet/damp conditions.

Do not operate in an explosive atmosphere.

Do not operate in wet/damp conditions.

Keep the surface of the instrument clean and dry.

Electrostatic Prevention.

Operate in an electrostatic-protected area environment to avoid damages induced by static discharge. Always ground both the internal and external conductors of the cable to release a static charge before connecting.

Do Not Operate Without Covers.

Do not operate the instrument with covers or panels removed.

Do not place heavy objects on SPD4000X.

Avoid severe impact or improper placement that may damage the power supply. Do not place heavy objects on the power supply.



WARNING:

All output terminals must meet the requirement of " ± 240 VDC MAX TO ⏚ " .

1. In normal condition and in single fault condition of the equipment, no accessible parts of the equipment and no accessible parts of an external circuit shall become hazardous live as a result of connecting the external circuit to the equipment. (According to IEC 61010-1 6.6 Connections to external circuits.)
2. Without meeting the requirements of point 1 above, there may be a risk of electric shock. If all output terminals cannot meet the requirement of " ± 240 VDC MAX TO ⏚ " , it may cause damage to the machine and may lead to risks such as breakdown and fire.

1.2 Safety Terms and Symbols

When the following symbols or terms appear on the front or rear panel of the instrument or in this manual, they indicate special care in terms of safety.

	This symbol is used to represent "Direct current, DC".
	This symbol is used to represent "Alternating current, AC".
	This symbol is used to represent "Earth (ground) TERMINAL".
	This symbol is used to represent "PROTECTIVE CONDUCTOR TERMINAL".
	This symbol is used to represent "Frame or chassis TERMINAL".
	This symbol warns of potential "Caution, possibility of electric shock".
	This symbol is used where caution is required. Refer to the accompanying information or documents to protect against personal injury or damage to the instrument.
	This symbol is used to represent the power switch.
	This symbol is used to represent "In position of a bi-stable push control".
	This symbol is used to represent "Out position of a bi-stable push control".
	This symbol shows that do not put electronic equipment as unsorted municipal waste management. Please separate collection or contact equipment suppliers.
CAUTION	The "**CAUTION**" symbol indicates a potential hazard. It calls attention to a procedure, practice, or condition which may be dangerous if not followed. Do not proceed until its conditions are fully understood and met.
WARNING	The "**WARNING**" symbol indicates a potential hazard. It calls attention to a procedure, practice, or condition which, if not followed, could cause bodily injury or death. If a **WARNING** is indicated, do not proceed until the safety conditions are fully understood and met.

1.3 Working Environment

This instrument is intended for indoor use and should be operated in a clean, dry environment.

- Relative Humidity: ≤ 80%
- Altitude: ≤ 2000m
- Ambient temperature: 0℃ ~ 40℃
- IP rating: IP20 (as defined in IEC 60529)
- Overvoltage category: CAT II
- Degree of pollution: II

Overvoltage category

This product is intended to be powered by MAINS that comply with Overvoltage Category II, which is typical of cord-and-plug connected equipment.

Note:

Measurement Category II. For measurements performed on circuits directly connected to the low-voltage installation.

Measurement Category III. For measurements performed in the building installation.

Measurement Category IV. For measurements performed at the source of low-voltage installation.

Only mains power supply circuits have an overvoltage category rating.

Degree of pollution

The power supply may be operated in environments of Pollution Degree II.

Note:

Degree of Pollution II refers to a working environment that is dry and non-conductive pollution occurs. Occasional temporary conductivity caused by condensation is expected.

Note: Direct sunlight, radiators, and other nearby heat sources should be taken into account when assessing the ambient temperature.

	**WARNING:** Do not operate equipment in explosive, dusty, or humid air.

1.4 Cooling requirements

This instrument relies on forced air cooling with internal fans and ventilation openings. Care must be taken to avoid restricting the airflow around the apertures (fan holes) at the back of the power supply. Please keep good ventilation when using, and regularly check the vents and fans.

Instructions not to position the equipment so that it is difficult to operate the disconnecting device.

	**WARNING:** Do not block the ventilation holes located on both sides of the scope. Do not allow any foreign matter to enter the scope through the ventilation holes, etc. No other objects are allowed 10cm behind the machine to ensure heat dissipation and easy operation of the disconnecting device.

1.5 Connect Power

Input Power Requirement

The SPD4000X allows a 50Hz/60Hz frequency, and four levels of AC power: 100V/120V/220V/230V±10%. You can select wanted power voltage with the "DIP Switch" at the rear panel according to the actual demand.

	**WARNING:** AC SELECTOR. To avoid damage to the machine, please select the appropriate voltage range before powering on.

	**WARNING:** DISCONNECT POWER CORD BEFORE ERPLACING FUSE. To switch to the wanted power voltage, please disconnect the power cord first.

Use proper fuse:

The fuse types:	SPD4323X	SPD4121X	SPD4306X
100V / 120V ±10%	T3.15A 250V	T3.15A 250V	T6.3A 250V
220V / 230V ±10%	T6.3A 250V	T10A 250V	T10A 250V

Make sure to use the correct type of fuse before turning on the instrument.

Do not connect the power cord before replacing the fuse.

Find out the reason why the fuse burned out before replacing the fuse.

Electrical Check

Please use the power cord provided as accessory and connects the instrument to AC power. Check the power as the following steps.

1. Connect the power supply

	**WARNING:** To avoid electric shock, please make sure that the instrument is grounded correctly.

2. Turn on the power switch

Press the power switch button to enter boot interface, and system return to the default settings after a while.

1.6 Cleaning

Clean only the exterior of the instrument, using a damp, soft cloth. Do not use chemicals or abrasive elements. Under no circumstances should you allow moisture to penetrate the instrument. To avoid electrical shock, unplug the power cord from the AC outlet before cleaning.

	**WARNING:** Electrical Shock Hazard! No operator serviceable parts inside. Do not remove covers. Refer servicing to qualified personnel.

1.7 Abnormal conditions

Only operate the instrument for the purposes specified by the manufacturer.

Do not operate the instrument if there are any visible signs of damage or if it has been subjected to severe transport stresses.

If you suspect the instrument's protection has been impaired, disconnect the power cord, and secure the instrument against any unintended operation.

Proper use of the instrument requires reading and understanding all of the instructions and labels.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

	**WARNING:** Any use of the instrument in a manner not specified by the manufacturer may impair the instrument's safety protection.

2 First Steps

2.1 Delivery Checklist

First, verify that all items listed on the packing list have been delivered. If you note any omissions or damage, please contact your nearest **SIGLENT** customer service center or distributor as soon as possible. If you fail to contact us immediately in case of omission or damage, we will not be responsible for replacement.

2.2 Quality Assurance

The oscilloscope has a 3-year warranty (1-year warranty for probes and accessories) from the date of shipment, during normal use and operation. **SIGLENT** can repair or replace any product that is returned to the authorized service center during the warranty period. We must first examine the product to make sure that the defect is caused by the process or material, not by abuse, negligence, accident, abnormal conditions, or operation.

SIGLENT shall not be responsible for any defect, damage, or failure caused by any of the following:

a) Attempted repairs or installations by personnel other than **SIGLENT**.

b) Connection to incompatible devices / incorrect connection.

c) For any damage or malfunction caused by the use of non-**SIGLENT** supplies. Furthermore, **SIGLENT** shall not be obligated to service a product that has been modified. Spare, replacement parts, and repairs have a 90-day warranty.

The oscilloscope's firmware has been thoroughly tested and is presumed to be functional. Nevertheless, it is supplied without warranty of any kind covering detailed performance. Products not made by **SIGLENT** are covered solely by the warranty of the original equipment manufacturer.

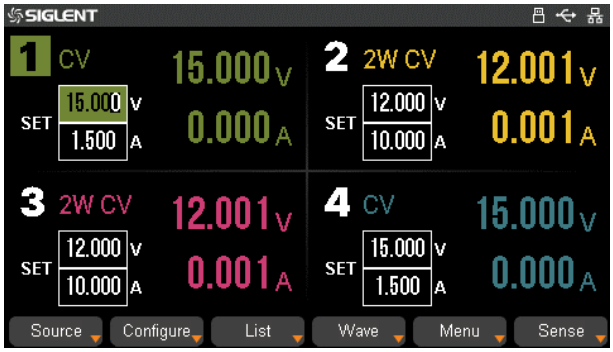
2.3 Maintenance Agreement

We provide various services based on maintenance agreements. We offer extended warranties as well as installation, training, enhancement and on-site maintenance, and other services through specialized supplementary support agreements. For details, please consult your local **SIGLENT** customer service center or distributor.

3 Document Conventions

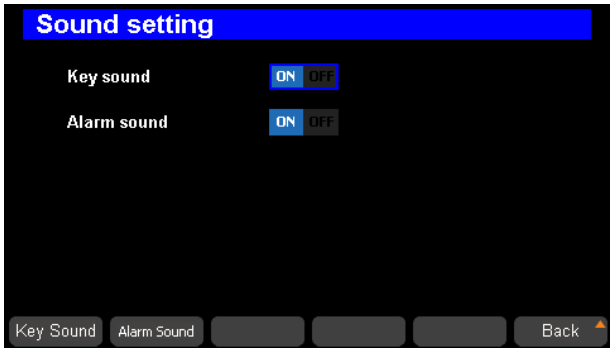
For convenience, text surrounded by a box border is used to represent the button of the front panel or the function button below the screen.

For example, Menu represents the "Menu" button below the screen.



Text with shading is used to represent selecting the item on the screen through the ◄ / ► or knob.

For example, Key sound represents selecting the " Key sound " on the screen:



For the operations that contain multiple steps, the description is in the form of " Step 1 > Step 2 >...". As an example, follow each step in the sequence to enter the upgrade interface:

Menu > System > Sound > Enter > Key sound > Enter

Press the Menu button below the screen as step 1, press the System button below the screen as step 2, selecting Sound on the screen through the ◄ / ► or knob as step 3, press the Enter button of the front panel as step 4, selecting Sound on the screen as step 5, finally press the Enter button of the front panel to open/close the Key sound.

4 Prepare Information

Before doing performance verifying, you should master the following operations to make the power work in a good state or deal with some simple functional problems. The following contents are included in this chapter:

- How to perform functional checks.
- How to test the interface working properly.

For more detailed information about Power operation, please refer to the User Manual.

4.1 Functional Check

The functional check details the types of checks used to determine if the power is operating properly.

4.1.1 Power-on Inspection

The standard power supply for the instrument is 100/120/220/230 V ±10%, 50/60 Hz. Please use the power cord provided with the instrument to connect it to AC power. Verify that the power supply is working by performing a power-on check. Before connect the instrument to a power source, please select the AC voltage selector on the rear panel of your power according to the power supply. Then connect the power line to the socket on the rear panel of the power.



Figure 1 Connect the power cord

⚠	**CAUTION:** To avoid electric shock, make sure that the instrument is correctly grounded to the earth before connecting AC power.

Press the Power button located at the lower-left corner of the front panel to start/close the power.

4.1.2 Output Inspection

The SPD4000X series power supply supports 4 channels of DC output, and any channel of any model can output 5V/1A.

Confirm that the calibration source is factory calibration. Home > Menu > Calibrate Device > Calibration source > Enter > Factory calibration .

Set each channel to 5V/1A, turn on all channels, and ensure that the read back voltage of any channel is visible at 5V ± 20mV and the read back current of any channel is visible at 0A ± 20mA. (See the UserManual or QuickStart for Output settings)

4.2 Interface test

The SPD4000X series power supply supports two standard interfaces: USB Device, USB Host and LAN interface. Through these interfaces, the power supply communicates with the outside world and implements some higher-level functions. To ensure that the power supply is working properly, perform the following interface tests.

USB Device test

Use EasyPower of the host computer software to test whether the USB Device interface is working properly.

Tools:

- One SPD4000X series power supply;
- One PC with USB interface;
- Standard USB cable (AB type);
- EasyPower of the PC software;

step:

1. Install the EasyPower on the PC and follow the prompts to install the driver.
2. Connect the power supply to the PC with a USB cable.



3. Run the EasyPower software. Double-click to open the software interface, click “Function” in the upper left corner of the interface, then the “control” drop-down option will pop up, click “control”, then the “Connect Type” window will pop up, continue to click the “USBTMC” option on the window, and pop up the information of the connected power device, click “Open” to complete the connection.

USB Host test

Use an U-disk with something inside to test whether the USB Host interface is working properly.

Tools:

- One SPD4000X series power supply;
- One U-disk with something inside;

step:

1. Make sure that the U-disk is functioning properly and not empty.
2. Connect the U-disk to the USB Host interface and confirm that the content can be viewed through Menu > System > Upgrade > Enter.



LAN Port test

Use EasyPower of the host computer software to test whether the LAN interface is working properly.

Tools:

- One SPD4000X series power supply;
- One PC with a network cable interface;
- One standard network cable;
- EasyPower of the PC software;

step:

1. Install the EasyPower on the PC and follow the prompts to install the driver.
2. Connect the power supply to the PC with a network cable.



3. Run the EasyPower software. Double-click to open the software interface, click the “Function” in the upper left corner of the interface, the “control” drop-down option will pop up, click “control”, the“ ConnectType” window will pop up, continue to click the “VXI11” option on the window, and then input the setted power supply IP address in the pop-up window, click “OK” to complete the connection. (See the UserManual or QuickStart for IP address settings)

5 Performance Test

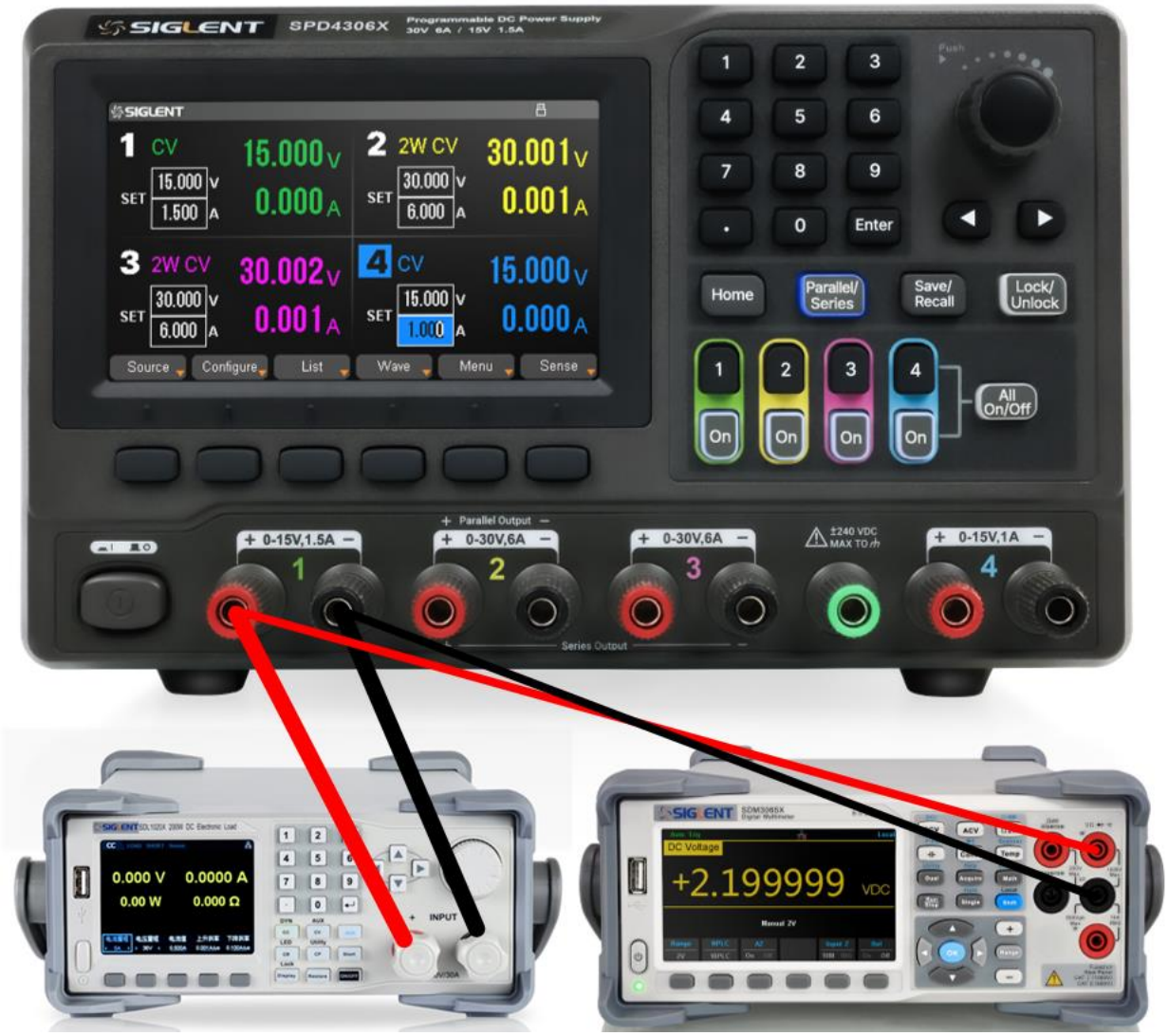
This chapter explains testing the power to verify performance specifications. To ensure the accuracy of the measurements, preheat all instruments for 30 minutes.

Here are the equipment needed to perform the test:

Description	Specification	Qty	Example
Digital multimeter	6-digit half precision	1	SDM3065X
Electronic load	Voltage and current power is greater than the power supply parameters	4	SDL1030X
Connection cable	Power supply cable, >10A	≥4	

The following is a schematic diagram of the connection between the electronic load and the power supply under test:

1. The connection method of testing the output voltage of each channel:



2. The connection method of testing the output current of each channel:



Verify Test Results

To verify whether or not a test passes (i.e. whether the readings are within the appropriate limits), it is necessary to record the readings in the Performance Test located in the Test Record.

5.1 To Verify Output Voltage

There are three models of SPD4000X, and each model has four relatively independent output channels. Each channel has its rated voltage and rated current, named Vrate, Irate, which are marked on the machine output terminals.

Model	SPD4323X	SPD4121X	SPD4306X	Unit
Vrate/Irate of CH1	6/3.2	15/1.5	15/1.5	V/A
Vrate/Irate of CH2	32/3.2	12/10	30/6	V/A
Vrate/Irate of CH3	32/3.2	12/10	30/6	V/A
Vrate/Irate of CH4	6/3.2	15/1.5	15/1	V/A

Voltage programming accuracy: ±(0.03% of reading+10) mV

Voltage readback accuracy: ±(0.03% of reading+10) mV

Set SPD4000X to independent mode (not parallel or series mode) and 2W mode, with each channel set to the maximum current.

Confirm that the calibration source is factory calibration. Home > Menu > Calibrate Device > Calibration source > Enter > Factory calibration .

Confirm that the OCP State is OFF and OV Protection is maximum. Home > Source > 1 or 2 or 3 or 4 > OVP Stage > OV Protection > 9 > 9 > Enter > Back .

Set SDL1030X to CC mode.

Set SDM3065X to DC voltage measurement mode.

According to ***1.The connection method of testing the output voltage of each channel***, connect SDL1030X and SDM3065X to each channel of SPD4000X.

The set voltages of the channel being tested and the set currents of SDL1030x are shown in the table below.

Record the voltage value measured by SDM3065X and the readback voltage value of SPD4000X.

SPD4000X model:		Vrate= Irate=	Vrate= Irate=	Vrate= Irate=	Vrate= Irate=
SPD set	SDL set	CH1	CH2	CH3	CH4
Vrate*0.1	0A/off	SDM: SPD:	SDM: SPD:	SDM: SPD:	SDM: SPD:
Vrate*0.1	Irate*0.5	SDM: SPD:	SDM: SPD:	SDM: SPD:	SDM: SPD:
Vrate*0.1	Irate	SDM: SPD:	SDM: SPD:	SDM: SPD:	SDM: SPD:
Vrate*0.5	0A/off	SDM: SPD:	SDM: SPD:	SDM: SPD:	SDM: SPD:
Vrate*0.5	Irate*0.5	SDM: SPD:	SDM: SPD:	SDM: SPD:	SDM: SPD:
Vrate*0.5	Irate	SDM: SPD:	SDM: SPD:	SDM: SPD:	SDM: SPD:
Vrate	0A/off	SDM: SPD:	SDM: SPD:	SDM: SPD:	SDM: SPD:

Vrate	Irate*0.5	SDM: SPD:	SDM: SPD:	SDM: SPD:	SDM: SPD:
Vrate	Irate	SDM: SPD:	SDM: SPD:	SDM: SPD:	SDM: SPD:

5.2 To Verify Output Current

Current programming accuracy: ±(0.03% of reading+10) mV

Current readback accuracy: ±(0.03% of reading+10) mV

Set SPD4000X to independent mode (not parallel or series mode) and 2W mode, with each channel set to 5V.

Confirm that the calibration source is factory calibration. Home > Menu > Calibrate Device > Calibration source > Enter > Factory calibration .

Confirm that the OCP State is OFF and OV Protection is maximum. Home > Source > 1 or 2 or 3 or 4 > OVP Stage > OV Protection > 9 > 9 > Enter > Back .

Set SDL1030X to CC mode and set current to Irate+1A.

Set SDM3065X to DC current measurement mode.

According to ***2.The connection method of testing the output current of each channel***, connect SDL1030X and SDM3065X to each channel of SPD4000X.

The set currents of the channel being tested are shown in the table below.

Record the current value measured by SDM3065X and the readback current value of SPD4000X.

SPD4000X model:	**Vrate= Irate=**	**Vrate= Irate=**	**Vrate= Irate=**	**Vrate= Irate=**
SPD set	**CH1**	**CH2**	**CH3**	**CH4**
Irate*0.1	SDM: SPD:	SDM: SPD:	SDM: SPD:	SDM: SPD:
Vrate*0.5	SDM: SPD:	SDM: SPD:	SDM: SPD:	SDM: SPD:
Vrate	SDM: SPD:	SDM: SPD:	SDM: SPD:	SDM: SPD:

5.3 To Verify 4W sense of CH2,CH3

The sense function can only be verified when both the output voltage and current of CH2 and CH3 are verified.

Set SPD4000X to independent mode (not parallel or series mode) and 4W sense mode. Home > Sense > CH2 Sense > CH3 Sense .

Confirm that the calibration source is factory calibration. Home > Menu > Calibrate Device > Calibration source > Enter > Factory calibration .

Confirm that the OCP State is OFF and OV Protection is maximum. Home > Source > 1 or 2 or 3 or 4 > OVP Stage > OV Protection > 9 > 9 > Enter > Back .

According to ***1.The connection method of testing the output voltage of each channel***, connect SDM3065X to CH2 or CH3 of SPD4000X.

Both CH2 and CH3 of SPD4000X are set to 5V,2A.

Set SDM3065X to DC voltage measurement mode.

Turn on the output of CH2 or CH3, the readback voltage will be 5V±20mV, the readback current will be 0~20mA, the voltage value measured by SDM3065X will be 5.1V~6V.

Measure the voltage between Sx+ and Sx- on the rear panel, which x is the 2 or 3, and the voltage should be 5V.

If not, there is a problem with the 4W sense of this channels.

5.4 To Verify Parallel of CH2,CH3

The parallel function can only be verified when both the output voltage and current of CH2 and CH3 are verified.

Confirm that the calibration source is factory calibration. Home > Menu > Calibrate Device > Calibration source > Enter > Factory calibration .

Confirm that the OCP State is OFF and OV Protection is maximum. Home > Source > 1 or 2 or 3 or 4 > OVP Stage > OV Protection > 9 > 9 > Enter > Back .

Set SPD4000X to parallel mode by Parallel or Home > Configure > Parallel > Back .

Set CH2 of SPD4000X to parallel rated voltage and maximum current.

Set SDL1030X to CC mode and set current to parallel rated current.

According to ***1.The connection method of testing the output voltage of each channel***, connect SDL1030X and SDM3065X to CH2 of SPD4000X.

Turn on the output of CH2 and SDL1030X, the readback voltage of CH2 and the voltage value measured by SDM3065X will be parallel rated voltage ±20mV.

CH2 operates in CV mode, while CH3 operates in CC mode.

According to ***2.The connection method of testing the output current of each channel***, connect SDL1030X and SDM3065X to CH2 of SPD4000X.

Turn on the output of CH2 and SDL1030X, the difference between the readback current of CH2 and the current value measured by SDM3065X should not exceed 20mA.

5.5 To Verify Series of CH2,CH3

The series function can only be verified when both the output voltage and current of CH2 and CH3 are verified.

Confirm that the calibration source is factory calibration. [Home] > [Menu] > [Calibrate Device] > Calibration source > [Enter] > [Factory calibration] .

Confirm that the OCP State is OFF and OV Protection is maximum. [Home] > [Source] > [1] or [2] or [3] or [4] > [OVP Stage] > OV Protection > [9] > [9] > [Enter] > [Back] .

Set SPD4000X to series mode by [Series] or [Home] > [Configure] > [Series] > [Back] .

Set CH2 of SPD4000X to series rated voltage and maximum current.

Set SDL1030X to CC mode and set current to series rated current.

According to ***1.The connection method of testing the output voltage of each channel***, connect SDL1030X and SDM3065X to the positive terminal of CH2 and the negative terminal of CH3.

Turn on the output of CH2 and SDL1030X, the readback voltage of CH2 and the voltage value measured by SDM3065X will be series rated voltage ±20mV.

CH2 and CH3 both operate in CV mode.

According to ***2.The connection method of testing the output current of each channel***, connect SDL1030X and SDM3065X to the positive terminal of CH2 and the negative terminal of CH3.

Turn on the output of CH2 and SDL1030X, the difference between the readback current of CH2 and the current value measured by SDM3065X should not exceed 20mA.

5.6 To Verify Over Current Protection

The OCP function can only be verified when both the output voltage and current are verified.

Confirm that OV Protection is maximum. [Home] > [Source] > [1] or [2] or [3] or [4] > OV Protection > [9] > [9] > [Enter] > [Back] .

Set the OCP State of this channel to On by [Home] > [Source] > [1] or [2] or [3] or [4] > [OVP Stage] , set the OC Protection to 0.5A, and set the OCP Delay to 5s, [Back] .

Set the channel to 5V,1A.

Set SDL1030X to CC mode and set current to 0.8A.

According to ***1.The connection method of testing the output voltage of each channel***, connect SDL1030X to the channel of SPD4000X.

Turn on the channel of SPD4000X.

Turn on SDL1030X, the channel of SPD4000X will read back 0.8A within 5 seconds, and the channel of SPD4000X will close after 5 seconds with ***"Warning! CHx over current protection!"*** , while ***"x"*** is the channel number.

5.7 To Verify Over Voltage Protection

The OVP function can only be verified when both the output voltage and current are verified.

Confirm that the OCP State is OFF. [Home] > [Source] > [1] or [2] or [3] or [4] > [OVP Stage] > [Back] .

Set the OV Protection to 4V. [Home] > [Source] > [1] or [2] or [3] or [4] > OV Protection > [4] > [Enter] > [Back] .

Set the channel to 5V,1A.

Turn on the channel of SPD4000X.

The channel of SPD4000X will close in no time with ***"Warning! CHx over voltage protection!"*** , while ***"x"*** is the channel number.

6 Disassembly Procedures

This chapter mainly describes how to unassemble and assemble the module units of the SPD4000X series power supply. Please refer to the given procedure to remove or replace the corresponding power unit.

The following are the main contents of this chapter:

- **Safety considerations** include safety factors to be considered when performing disassembly operations
- **Module unit** contains all detachable modular units of the power supply
- **Preparation tool** Contains the tools to be used during the disassembly process
- **Removal procedure** Contains specific removal steps

6.1 Safety prevention

Only professional technicians can perform this disassembly step. Be sure to disconnect all the power connections before operation, otherwise damage to the instrument components or personal injury may result.

Avoiding electric shocks

Because there is a dangerous voltage in the power module, be sure to disconnect the power supply before disassembling and wait for about three minutes until the internal capacitor of the power supply is discharged.

ESD Prevention

Electrostatic discharge (ESD) can cause damage to the electronics inside the power supply. Therefore, please use anti-static measures appropriately during the disassembly process. It is best to place the power supply on an antistatic mat and wear antistatic gloves.

6.2 Module Lists

All the module units of the power supply are listed in the order of disassembly as follows:

Module serial number	Module name
1	handle components
2	the metal plate
3	the handle support bone
4	the front shell component
5	the hardware components
6	back hardware components
7	hardware main component

Equipped with tools:

1. Anti-static gloves;
2. The multifunctional screwdriver or electric group;
3. The screwdriver or long nose pliers.

6.3 Disassembly Procedures

This chapter mainly introduces how to remove and install the power of each module unit, please follow the steps given in below the right operation.

Step 1: Remove the handle module

Remove the 2 PCS KM4 * 16 screw, and remove the Handle Fixed Tablet (2 PCS) and the Handle.

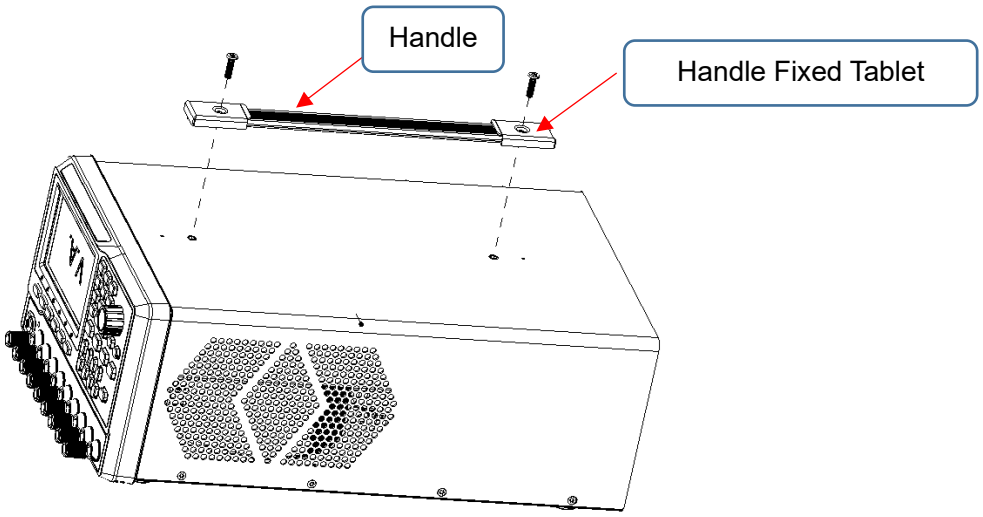


Figure 6-1 remove the handle module

Step 2: Remove the Metal Cover Plate

1、Remove 8 PCS KM3 * 6 on either side of the screw, then remove the Metal Cover Plate

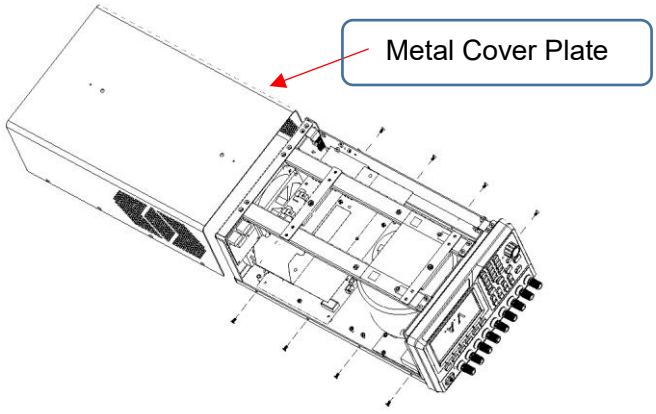


Figure 6-2 removed the Metal Cover Plate

Step 3: Remove the handle Support Bone

1、Remove as shown in the figure below 8 PCS KM3 * 6 screws,

2、Unplug the cables connected to the fan

3、Remove the arrow direction Support Bone referring to the following figure.

4、The Support Bone can be completely removed after performing step 4.

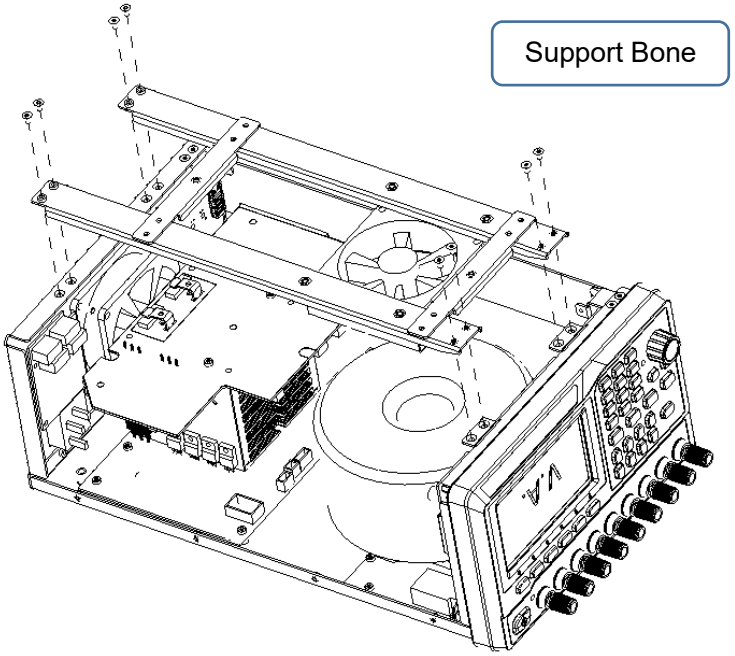


Figure 6-3 remove the handle Support Bone

Step 4: apart the Front Shell Module and the Metal Module

1、Unplug all cables connected to the Power Board

2、Remove the 4pcs KM3*6 screws on Fixed Metal and 2pcs PM3*6 screws on Intermediate Board

3、Remove Fixed Metal and Intermediate Board

4、Remove the 4 pcs KM3*6 screws on the Rear Metal Module and remove the Rear Metal Module

5、Remove the 4pcs KM3*6 screws on the Bottom Metal Module and Remove the Front Shell Module

6、Remove the Power Button

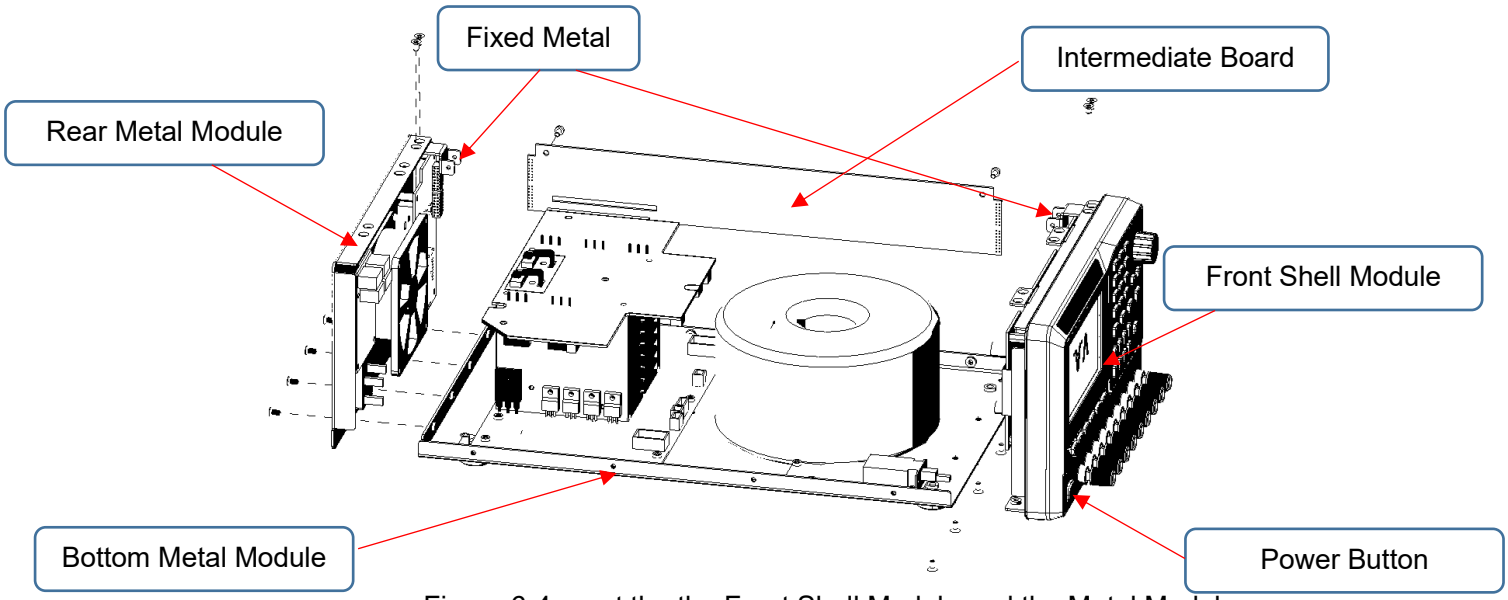


Figure 6-4 apart the the Front Shell Module and the Metal Module

Step 5: Disassemble the Front Shell Module

1、Remove the 5 PCS PM3 * 6 screws on the Main Control Board-1

2、Unplug the screen ribbon cable and then Remove the Main Control Board-1

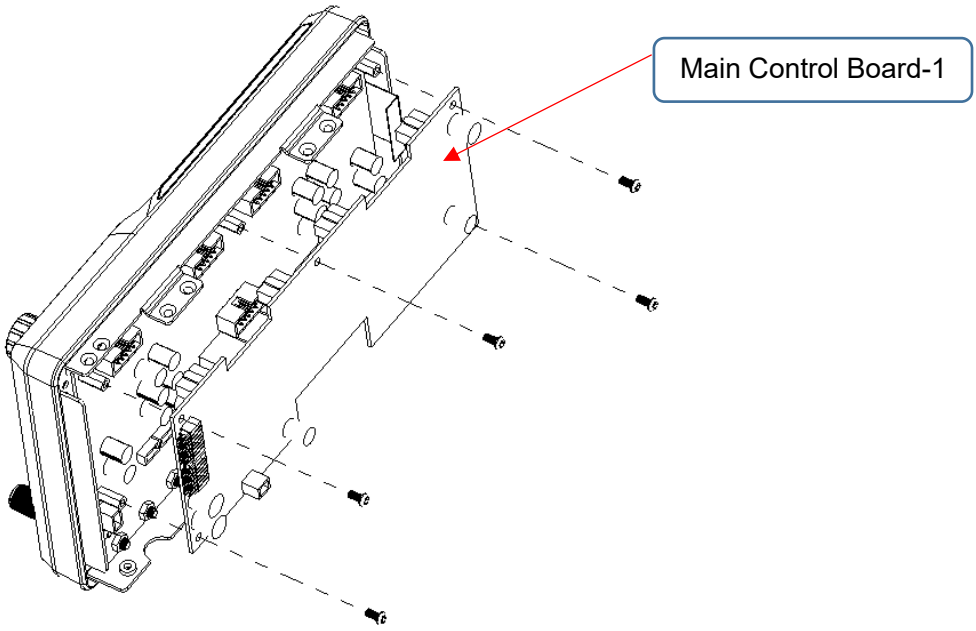


Figure 6-5 disassemble the Main Control Board-1

3、Remove the 5 PCS M3 coppers studs on the Main Control Board-2

4、Remove the 9 pcs M4 nuts and 3 pcs PM3*6 screws on the Front Metal and remove the Main Control Board-2

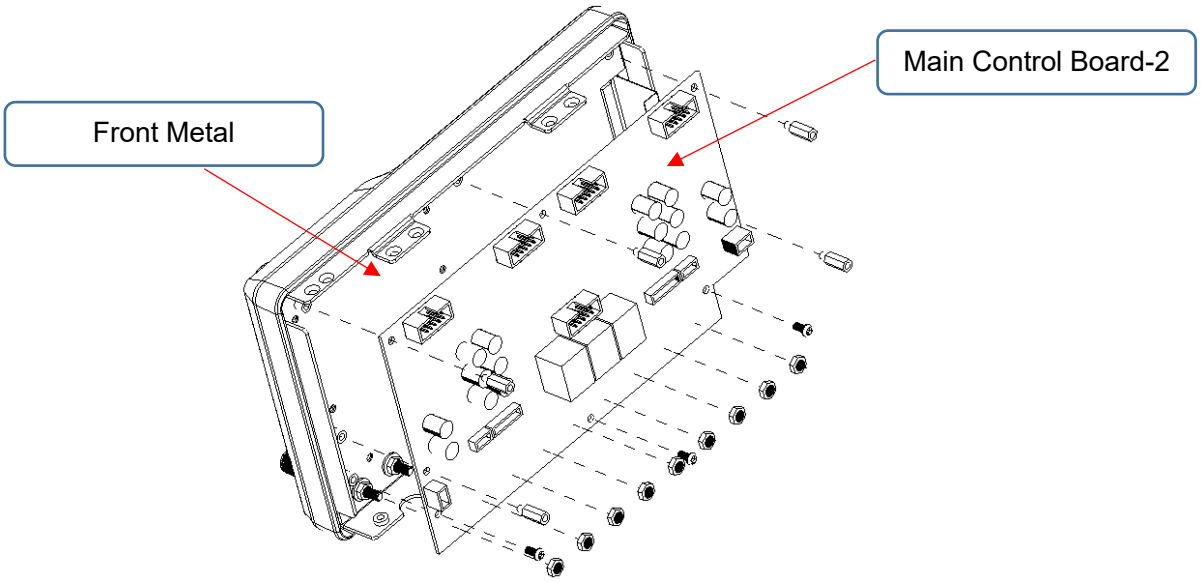


Figure 6-6 disassemble the Main Control Board-2

5、Remove the 9 pcs M4 nuts and 9 pcs plugs and 9 pcs PC3*6 screws on the Front Metal and remove the Front Metal

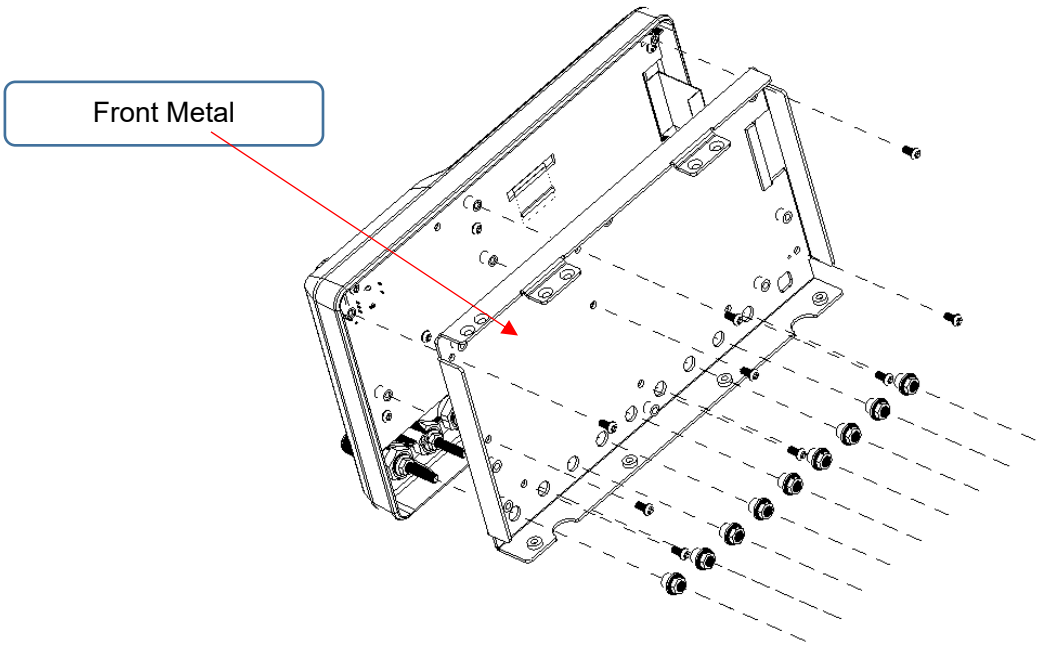


Figure 6-7 disassemble the Front Metal

6、Remove the 7 pcs PC3*6 screws and wave button cap ， then remove the Key Board

7、Remove the 9 pcs M10 nuts and the 9 pcs Terminals

8、Remove the Key Pad and Wave Button Cap

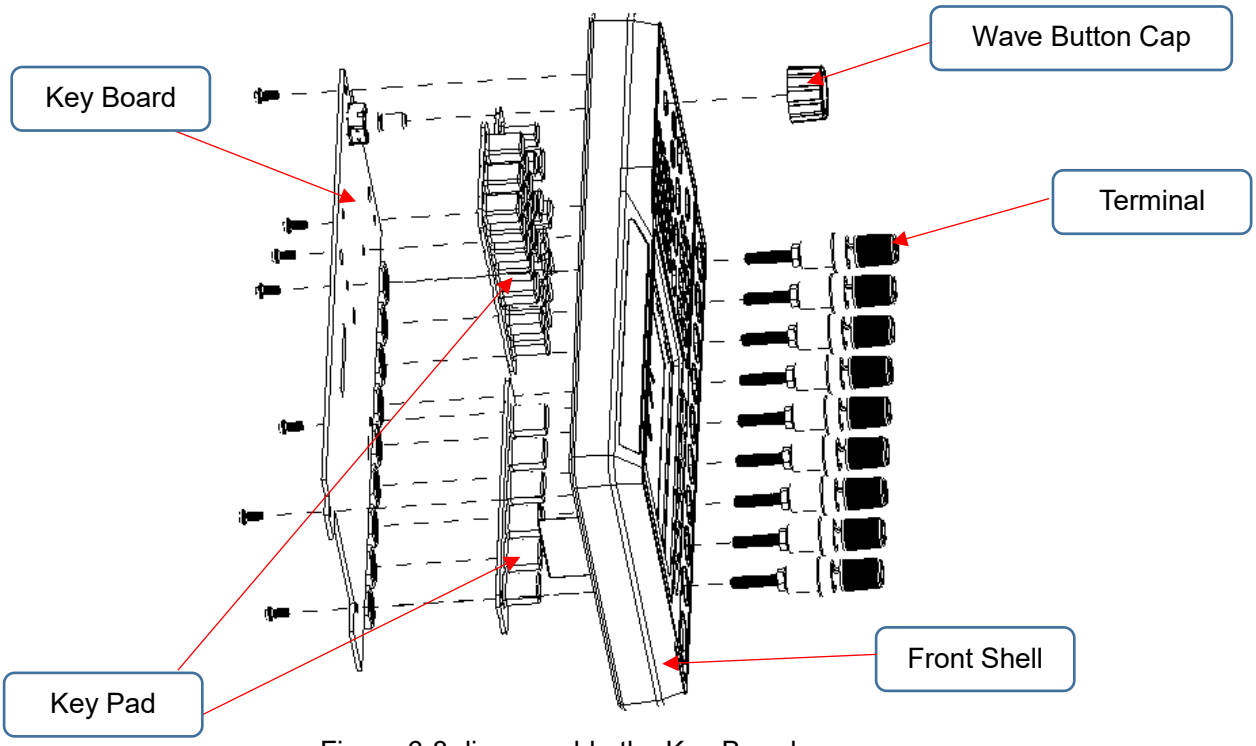


Figure 6-8 disassemble the Key Board

Step 6: Disassemble the Rear Metal Module

1、Remove the 4 PCS PM4 * 30 screw and remove the Fan

2、Tear off the Mask on the Rear Metal

3、Remove 4 PCS KM3 *6 screw on the Rear Metal and remove the Power AC Switch Board

4、Remove 4 PCS PM3 *6 screw on the USB Board and remove the USB Board

5、Remove the Power Inlet

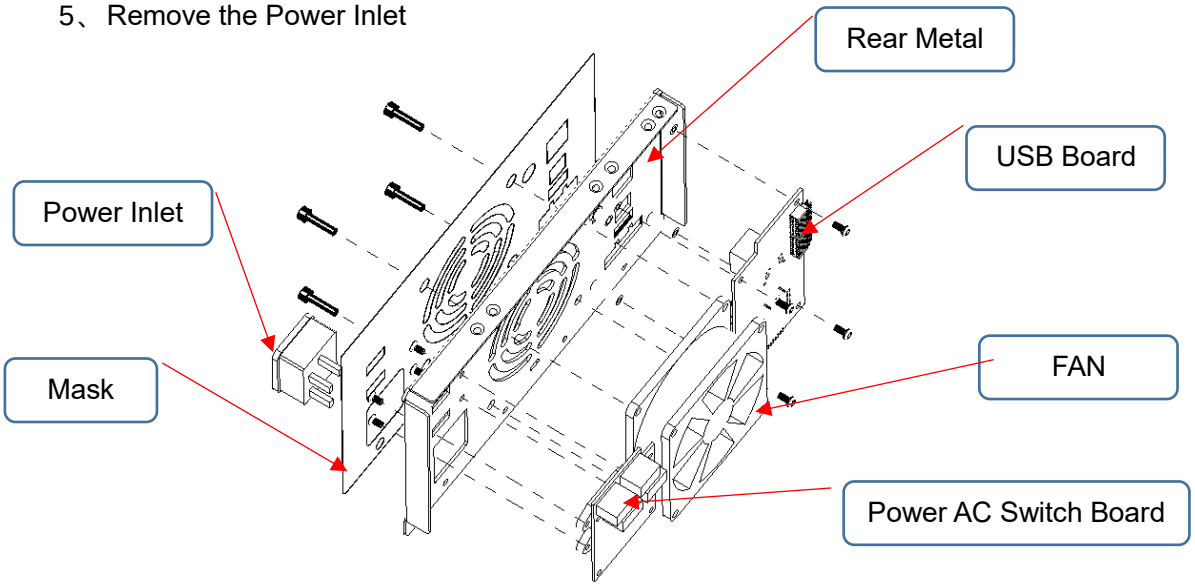


Figure 6-9 disassemble the Rear Metal module

Step 7: Disassemble the Bottom Metal Module

1、 Remove the 4 pcs PM4*10 screws on the foot and Remove the foot

2、 Remove the 4 PCS PM3 * 6 screws on the Power Switch Board and remove the Power Switch Board

3、 Remove the 6 PCS PM3 * 6 screws on the Power Board and remove the Power Board

4、 Remove the 1pcs M8 bolt on the transformer and remove the transformer

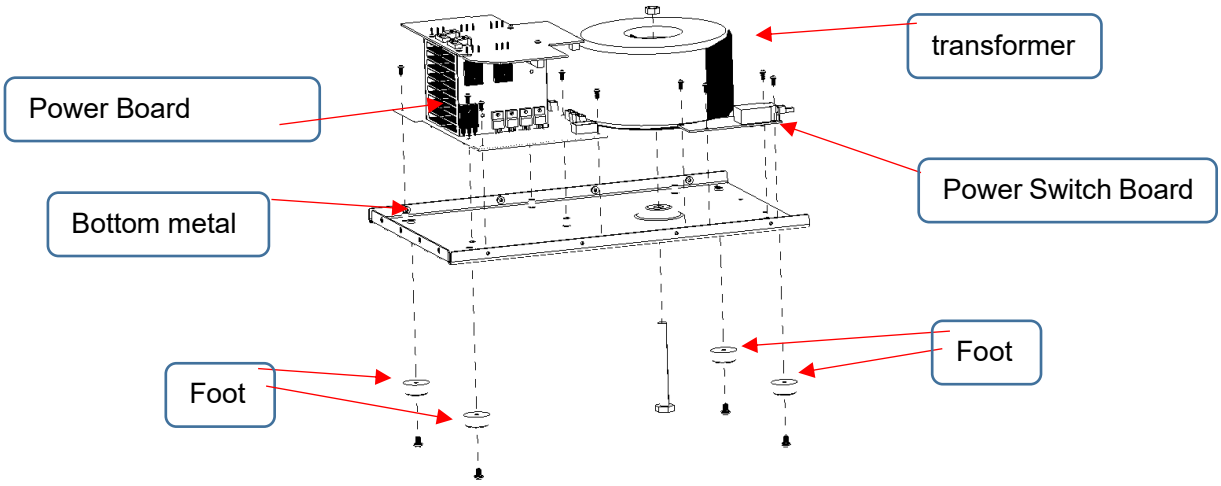


Figure 6-10 disassemble the Bottom Metal Module

Host assembly according to the above instead step!

7 Hardware troubleshooting

7.1 General

This chapter describes how to handle common hardware failures encountered during power operation. Before handling such fault, ensure that the power supply meets the following prerequisites.

1. If one voltage value is found to be different from the nominal value when measuring voltage, turn off the power immediately.
2. Turn off the power before unpacking the connecting wire of the mainboard and the screen backlight.
3. During the process of taking apart the instrument for measurement, take measures to prevent static electricity from damaging the internal components.

7.2 ESD prevention

While performing any internal test of the power supply, please refer to the following precautions to avoid damages to its internal modules or components result from ESD.

- Touch circuit boards by the edges as possible as you can.
- Reduce handling of static-sensitive modules when necessary.
- Wear a grounded antistatic wrist strap to insulate the static voltage from your body while touching these modules.
- Operate static-sensitive modules only at static-free areas. Avoid handling modules in areas that allow anything capable of generating or holding a static charge.

7.3 Required Equipments

The equipments listed in the table are required to troubleshoot the power.

Table 7-1 required equipments

equipment	specification	example
Digital Multimeter	Accuracy ±0.05% 1 mV resolution	Siglent SDM3065X
Oscilloscope	200MHz Bandwidth	Siglent SDS1202X-E

7.4 Main Board Drawing

Main board is used to control and manage the whole internal system of the power. Please refer to the following drawing to quickly locate the test points on the main board for easy resolution of the failures you encounter.

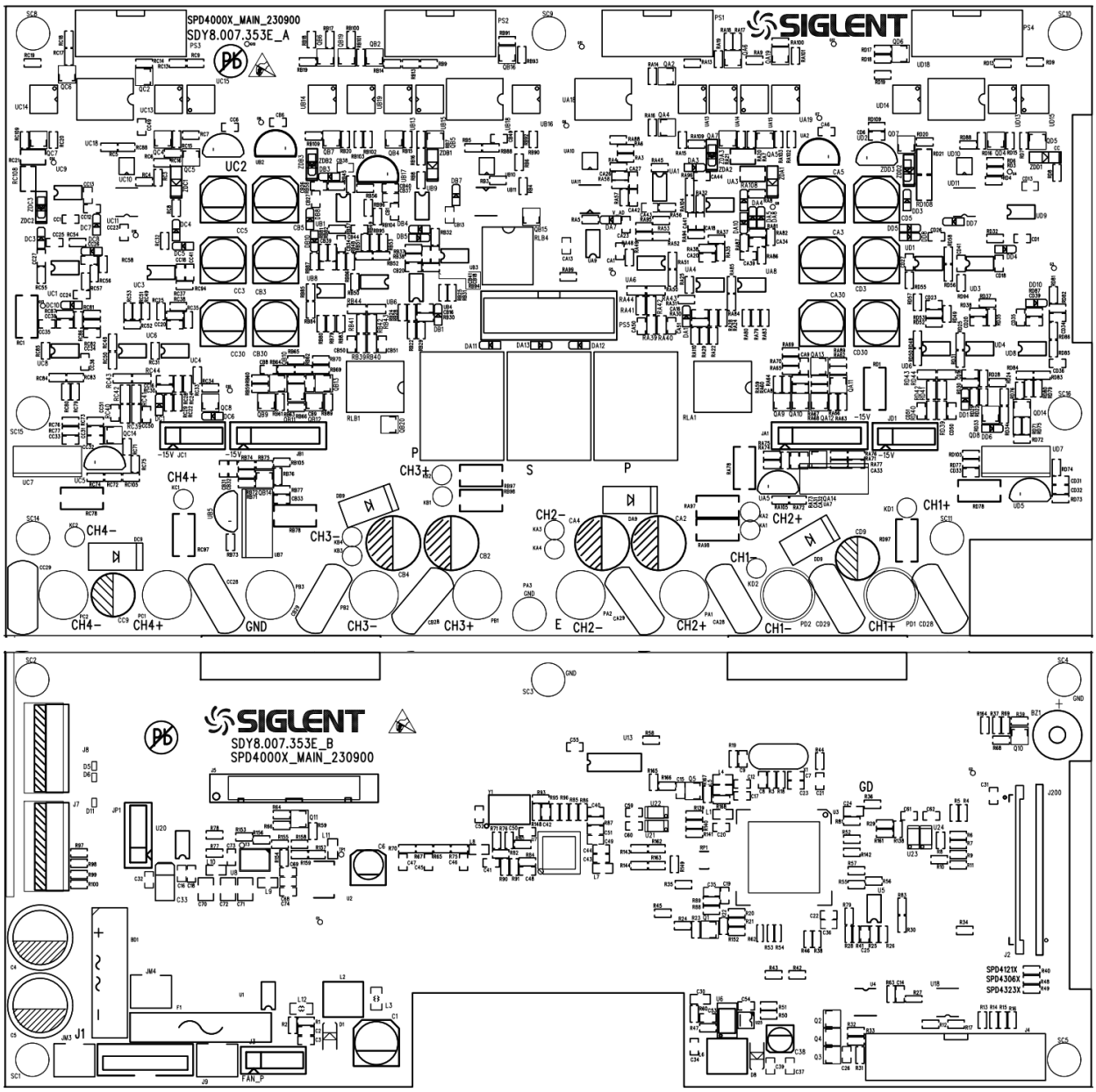


Figure 7-1 main board drawing

7.5 Power Board Drawing

Power board is used to provide various input voltages for the internal device and output voltage to the users. Please refer to the following drawing to quickly locate the test points on the main board for easy resolution of the failures you encounter.

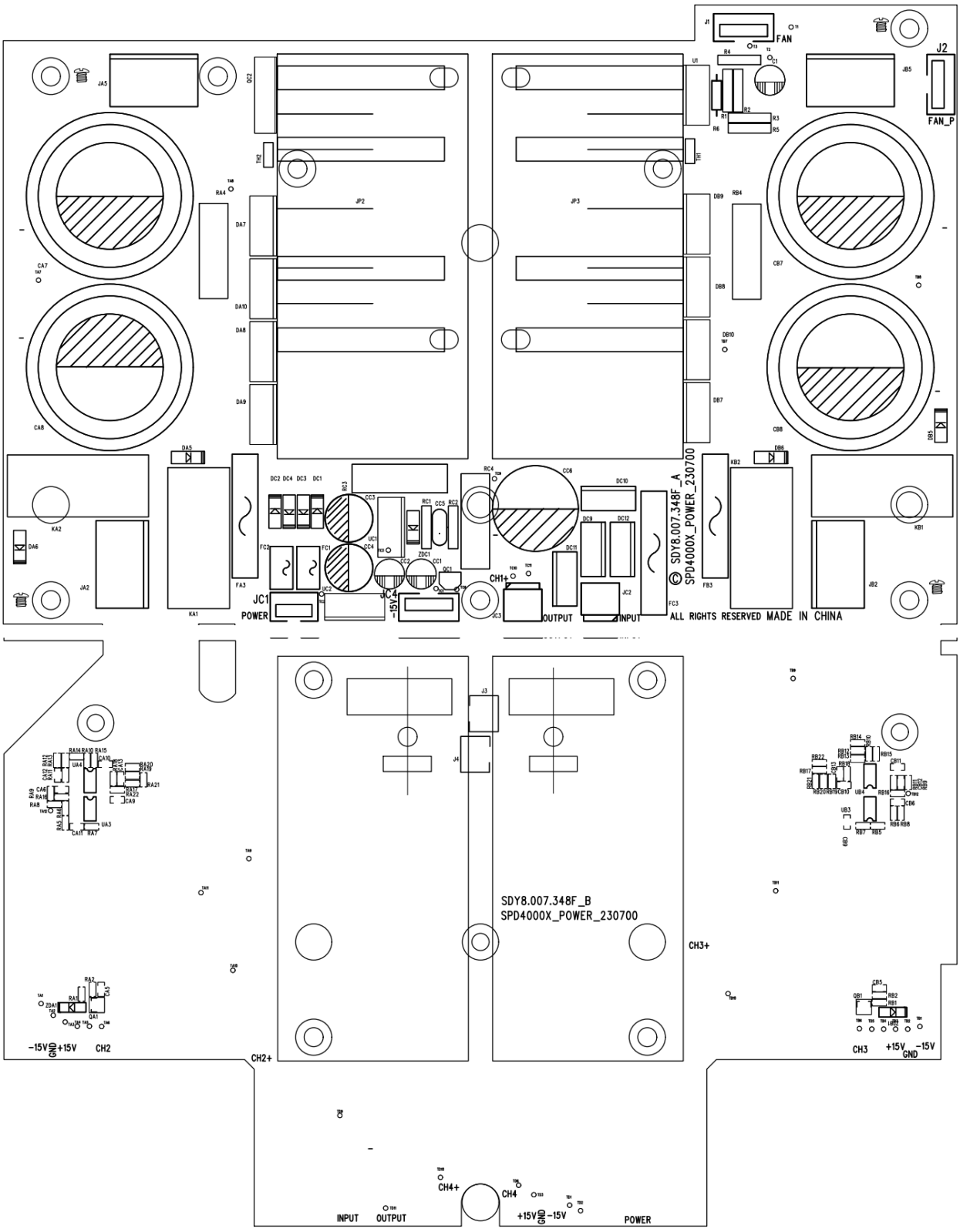


Figure 7-2 power board drawing

7.6 Troubleshooting flowchart

The following is a flow chart of the power hardware failure. The following figure can help you quickly

locate and handle related hardware failures.

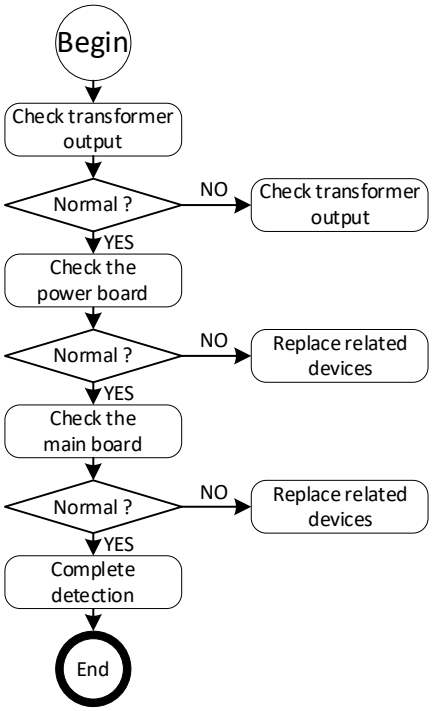


Figure 7-3 Troubleshooting flowchart

Check the power supply

Make sure that the power supply is properly grounded through the protective grounding end of the power cord. Be careful not to touch or disassemble the power board to avoid electric shock or burns. Please check the power supply as follows:

1. Disconnect the power cord, pry the groove out of the power socket, remove the fuse, and check if the fuse is burnt. If it burn out, please replace it in time.

2. After checking the fuse, reconnect the power cord and check if the transformer output voltage is normal.

3. View the voltage of the transformer output terminal on the power board. There are 2 groups of black, brown, red and orange 4Pin cables, 2 group of black and orange 2Pin cables, 4 groups of blue, white and blue 3Pin cables, and 1 group of brown and brown 2Pin cables. Use the digital multimeter of AC voltage gear to check whether the voltage output of the transformer is normal. The voltage parameters are as follows:

Table 7-2: Power supply voltage parameter table

Pin	No-load voltage(AC)	Load voltage(AC)	Error limit
black_brown _red_orange	SPD4306X: 0_5.7_20_33.57 V SPD4121X: 0_2.44_10.73_17.07 V SPD4323X: 0_5.85_20_34.15 V	SPD4306X: 0_5.4_19_31.9 V SPD4121X: 0_2.2_9.9_15.8 V SPD4323X: 0_5.4_18.6_31.6 V	±5% ±5% ±5%
black _orange	SPD4306X: 0_20 V SPD4121X: 0_20 V SPD4323X: 0_12.68 V	SPD4306X: 0_19 V SPD4121X: 0_18.7 V SPD4323X: 0_12.1 V	±5% ±5% ±5%

blue_white _blue	SPD4306X: 19.28_0_19.28 V SPD4121X: 19.02_0_19.02 V SPD4323X: 19.02_0_19.02 V	SPD4306X: 18.1_0_18.1 V SPD4121X: 17.8_0_17.8 V SPD4323X: 17.8_0_17.8 V	±5% ±5% ±5%
brown _ brown	SPD4306X: 0_12.14 V SPD4121X: 0_11.7 V SPD4323X: 0_11.7 V	SPD4306X: 0_11.5 V SPD4121X: 0_10.9 V SPD4323X: 0_10.9 V	±5% ±5% ±5%

If the measured voltage value is consistent with the corresponding parameter in the table, the transformer is working properly;

If the measured voltage value does not match the corresponding parameter in the table, proceed to the next step.

4. Disconnect the transformer from the power board and measure the output voltage of the transformer again according to the data in the above table. If the measured voltage value is consistent with the corresponding parameter in the table, it indicates that the power board is faulty, resulting in abnormal transformer output voltage, and further testing or replacing the power board;

If the measured voltage value does not match the corresponding parameter in the table, it indicates that the transformer is faulty and needs to replace a new transformer.

To ensure safety, do not disassemble the transformer and power board unauthorizedly.

7.7 Check the power board

After confirming that the transformer output voltage is normal, plug in the input power cord, turn on the power switch, and use the digital multimeter of DC voltage gear to check whether the voltage at each test point is normal. To ensure safety, do not disassemble the power board unauthorizedly.

The voltage parameters are shown in the following table:

Table 7-3: Voltage parameters on the power board

Test point	Voltage(DC)
JA6's pin2/3/6 to JA6's pin1/5 JA6's pin4/7/8 to JA6's pin2/3	>3V
QC2's pin2 to JC3's pin2 (CC6's pin1 to pin2) QD2's pin2 to JD3's pin2 (CD6's pin1 to pin2)	>5V
CA3's pin1 to pin2 CB3's pin1 to pin2 CC3's pin1 to pin2(DC1/DC2's pin2 to JC4's pin3) CD3's pin1 to pin2(DD1/DD2's pin2 to JD4's pin3)	+15V~+25V
CA4's pin2 to pin1 CB4's pin2 to pin1	-15V~-25V

CC4's pin2 to pin1(DC3/DC4's pin1 to JC4's pin3) CD4's pin2 to pin1(DC3/DC4's pin1 to JD4's pin3)	
JA4's pin6 to pin5 (TA1 to TA2) JB4's pin1 to pin2 (TB1 to TB2) JC4's pin4 to pin3 JD4's pin4 to pin3	-15V±1V (output)
JA4's pin4 to pin5 (TA3 to TA2) JB4's pin3 to pin2 (TB3 to TB2) JC4's pin2 to pin3 JD4's pin2 to pin3	+15V±1V (output)

7.8 Check the main board

After determining the normal output voltage of the transformer, remove the whole main board to a position that is suitable for measuring the voltage of the device, keep the connection, plug in the input power line, turn on the power switch, and use the digital multimeter of DC voltage gear to check whether the voltage of each test point is noraml.

The voltage parameters are shown in the following table:

Table 7-4: Voltage parameters on the main board

Test point	Voltage(DC)
JA1's pin6 to pin5 JB1's pin1 to pin2 JC1's pin1 to pin2 JD1's pin1 to pin2	-15V±1V (input)
JA1's pin4 to pin5 JB1's pin3 to pin2 JC1's pin3 to pin2 JD1's pin3 to pin2	+15V±1V (input)
CA5's pin1 to JA1's pin5 CB5's pin1 to JA1's pin5 CC5's pin1 to JC1's pin2 CD5's pin1 to JD1's pin2	+5V±1V
CA13's pin1 to JA1's pin5 CB13's pin1 to JB1's pin5 CC13's pin1 to JC1's pin5 CD13's pin1 to JD1's pin5	+2.5V±0.5V
JA3's pin1,2 to pin3,4	+6V~+25V

C1's pin1 to pin2	+5V±1V
J4's pin1,2 to pin4,6	+3.3V±0.5V
C38's pin1 to pin2	+12V±2V

If the measured voltage does not match the corresponding parameters in the above table, turn off the power immediately and cut off the power input to prevent some chips from being damaged due to improper operation. Then you need to replace a new main board;

If the measured voltage value exactly matches the corresponding parameter in the above table, please proceed to the next step.

8 Quick Guide for General Failures

The general hardware failures are described in the following. Reading the following information can help you quickly handle some easy hardware failures with more convenience.

1. No start-up after pressing the Power button:

(1) Check if the power cord is correctly connected.

(2) Check if the power button is usable.

(3) Check whether the fuse has been burned out. If the fuse is burnt out please replace with a fuse of the same rating after identifying and resolving the cause of the burnout.

(4) Check the connection between the power supply and the main board.

(5) If the instrument still does not work normally, please contact **SIGLENT**.

2. The instrument starts up with a dark screen:

(1) Check the connection between the screen backlight circuit board and the mainboard.

(2) If the instrument still does not work normally, please contact **SIGLENT**.

3. No response after pressing any button or abnormal display of the screen:

(1) Check the connection between the Screen backlight circuit board and the mainboard.

(2) If the instrument still does not work normally, please contact **SIGLENT**.

4. Constant voltage output is not normal

(1) Check if the output power of the power supply is satisfied.

(2) Check if there is a short circuit between the load and the power supply or contacted poorly.

(3) Check if the current setting value is low.

5. Constant current output is not normal

(1) Check if the output power of the power supply is satisfied.

(2) Check if the load and the power supply are open or connected poorly.

(3) Check if the voltage setting is low.

9 Service and Support

Maintain summary

SIGLENT warrants that the products it manufactures and sells are free from defects in materials and workmanship for a period of three years from the date of shipment from an authorized **SIGLENT** distributor. If a product proves defective within the respective period, **SIGLENT** will provide repair or replacement as described in the complete warranty statement.

To arrange for service or obtain a copy of the complete warranty statement, please contact your nearest **SIGLENT** sales and service office.

Except that as provided in this summary or the applicable warranty Statement, **SIGLENT** makes no warranty of any kind, express or implied, including without limitation the implied warranties of merchantability and fitness for a particular purpose. In no case shall **SIGLENT** be liable for indirect, special or consequential damages.

Repackaging for Shipment

If the unit needs to be shipped to **SIGLENT** for service or repair, be sure:

1. Attach a tag to the unit identifying the owner and indicating the required service or repair.
2. Place the unit in its original container with appropriate packaging material for shipping.
3. Secure the container with strong tape or metal bands.

If the original shipping container is not available, place your unit in a container which will ensure at least 4 inches of compressible packaging material around all sides for the instrument. Use static-free packaging materials to avoid additional damage to your unit.

About SIGLENT

SIGLENT is an international high-tech company, concentrating on R&D, sales, production and services of electronic test & measurement instruments.

SIGLENT first began developing digital oscilloscopes independently in 2002. After more than a decade of continuous development, SIGLENT has extended its product line to include digital oscilloscopes, isolated handheld oscilloscopes, function/arbitrary waveform generators, RF/MW signal generators, spectrum analyzers, vector network analyzers, digital multimeters, DC power supplies, electronic loads and other general purpose test instrumentation. Since its first oscilloscope was launched in 2005, SIGLENT has become the fastest growing manufacturer of digital oscilloscopes. We firmly believe that today SIGLENT is the best value in electronic test & measurement.

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