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Troubleshooting

The internal structure of the electronic load consists of the main board and the keyboard and they are linked through cables or connectors. This chapter explains the main troubleshooting procedures for the main board by measuring the rated test points on them. This will help to determine the reason for the failure encountered while operating SDL1020X.

ESD Precautions

While performing any internal test of the electronic load, please refer to the following precautions to avoid damages to its internal modules or components resulting from ESD.

- Touch circuit boards by the edges whenever possible.
- Limit handling of static-sensitive modules whenever possible.
- Wear a grounded antistatic wrist strap to help drain the static voltage from your body while touching these modules.
- Operate static-sensitive modules only in static-free areas. Avoid handling modules in areas that allow anything capable of generating or holding a static charge.

Required Equipment

The equipment listed in the following table are required to troubleshoot the electronic load.

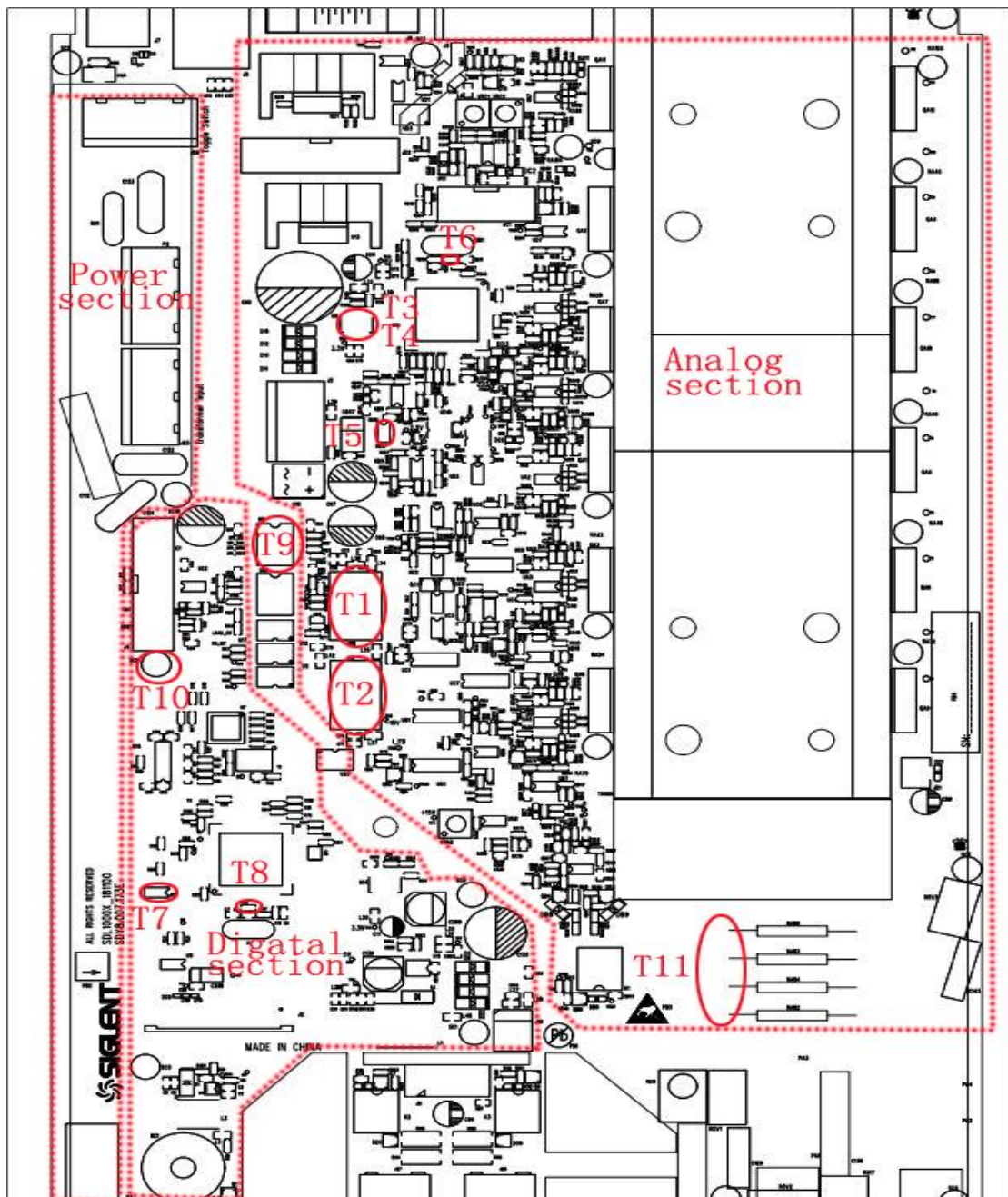
Table 5-1 required equipments

Equipment	Critical Specifications	Example
Digital Multimeter	Accuracy $\pm 0.05\%$ 1 mV resolution	SDM3055
Oscilloscope	200 MHz Bandwidth	SDS2102X

Main Board Drawing

The main board consists of power, analog and digital sections:

- 1)、Power section: 110/220 V is converted to a low voltage to supply the analog and digital sections.
- 2)、Analog section: Used primarily in the functions of CC、CV、CR、CP, etc.
- 3)、Digital section: Responsible for data processing, function control、and LCD display control.



Check the Power Supply

Both the analog and digital sections have a power connector and we can check whether the input voltage is within the rated specification. Before performing the power supply testing procedure, please make sure that the electronic load is grounded correctly through the protective ground lead of the power cord. Take care not to touch or even disassemble the power supply module without following safety precautions, or electric shock or burn may occur. Following are the procedures for testing the power supply:

1. Disconnect the power cord of the electronic load and then check whether the fuse has been burned out.
2. Remove metal shell of the electronic load using a driver, and then disconnect the power connector.
3. Locate the power connector for the analog section, which contains five pins, from Pin 1 to Pin 5. You can test the adjacent pins, using a digital multimeter, that are marked with blue, brown, yellow and white to check whether the AC voltage values are within the corresponding specified range. The voltage parameters to be tested are listed in table below:

Table 5-2: Test AC voltages on the analog section power connector

Pins	Voltage (V)	Error (V)
blue to blue	8	±1
Yellow to brown	16	±2
White to yellow	16	±2

Table 5-3: Test AC voltage for the digital section power connector

Pins	Voltage (V)	Error (V)
Black to black	12	±2

If each tested voltage value is within the corresponding spec range, as listed in the table above, then the power supply is operating normally. If not, it is most likely defective. Please return it to the factory for repair or contact SIGLENT.

Note: *The main power supply is protected by an input fuse in order to guard the unit if any major failure was to occur. However, this fuse will not fail ("open" or "blow") in normal power supply operation except when and if a significant overload occurs. Replace the entire main power supply assembly if the input fuse fails.*

Check the Analog Section

To prevent any components or assemblies on the main board from being damaged or overheated it is essential to cool the main board whenever possible using a fan. Here are procedures for testing the main board:

1. Several kinds of connectors including the Fan Connector, Power Connector and Keypad Connector are located on the main board. Check to make certain all these connectors are connected properly.
2. Make sure that the connectors on the channel board are properly connected, then connect the electronic load to AC power and power it on. Check if the voltage values at all test points are within the specified range using a digital multimeter. The voltage parameters to be tested are listed in the table below:

Voltage Checking

Test the voltage points in the analog section and compare to the table below. If each tested voltage value is within the corresponding specified range then the analog section is operating normally. If not, it is most likely defective, Please return it to the factory for repair or contact SIGLENT.

Table 5-3 Test DC voltages of the analog board

Test point	Name	Test pin	Voltage (V)	Error (V)
T1	U18	3	+15	±1
T2	U19	3	-15	±1
T3	U9	3	+5	±0.25
T4	U9	2 or 4	+3.3	±0.065
T5	UB11	6	+2.5	±0.0025
T11	AGND	1	0	/

Analog Section Clock Checking

The Analog section clock is the internal system clock for the electronic load. To verify if the clock on the analog section is working normally, please test the clock frequency listed below using an oscilloscope.

Test point	Name	Pin	Frequency	Stability
T6	RD60	1 or 2	25 MHz	±50 ppm

MCU Checking

Look at the LED light on the analog section. It indicates the working state of the MCU. If the light flashes at a certain frequency, then the corresponding codes have been loaded successfully and the MCU is operating correctly. If not, it may be defective.

Check the Digital Section

Voltage Checking

Test the voltage points in the digital section to the table below. If each tested voltage value is within the corresponding specified range then the digital section is operating normally. If not, it is most likely defective. Please return it to the factory for repair or contact SIGLENT.

Test point	Name	Test pin	Voltage (V)	Error (V)
T7	U5	8	3.3	±0.065

Digital section Clock Checking

To verify if the clock in the digital section is working correctly, please test the clock frequency and compare to the value listed below using an oscilloscope.

Test point	Name	Pin	Frequency	Stability
T8	R18	1 or 2	25 MHz	±50 ppm

CPU Checking

There is no status light in the digital section to indicate the working status of the CPU. We can check if the CPU and MCU are communicating. If so, the CPU is operating normally. Please view the communication signals listed below using an oscilloscope.

Test point	Name	Pin	Signal
T9	U6	3	SPI_CS
		4	SPI_SCK
		5	SPI_MOSI
		6	SPI_MISO
T10	SC8	1	DGND

Quick Guide for General Failures

Three general hardware failures are described in the following list. Referring to this information can help you quickly locate some of the more readily diagnosed failures.

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 working correctly.
- (3) Check whether the fuse has been burned out. If the fuse needs to be replaced please contact SIGLENT as soon as possible and return the instrument to the factory to have it repaired by qualified personnel.
- (4) Check if the power connector is properly connected to 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 if the power connector is properly connected to the main board.
- (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 if the two ends of the connector between the keypad circuit board and the main board are properly seated.
- (2) If the instrument still does not work normally, please contact SIGLENT.