SDM3045X
Digital Multimeter

Service Manual

EN02D

SIGLENT TECHNOLOGIES CO.,LTD

Guaranty and Declaration

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Product Certification

SIGLENT guarantees this product conforms to the national and industrial standards in China as well as the ISO9001: 2015 standard and the ISO14001: 2015 standard. Other international standard conformance certification is in progress.

General Safety Summary

Review the following safety precautions to avoid personal injury and to prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

To Avoid Fire or Personal Injuries

Use Proper Power Cord.

Use only the power cord specified for this product and approved by the local regulating body.

Avoid Electric Shock.

To avoid injuries or losses of life, do not connect or disconnect probes or test leads while they are connected to a voltage source.

Ground the Product.

This product is grounded through the protective terra conductor of the power line. To avoid electric shock, the grounding conductor must be connected to the earth. Make sure the instrument is grounded correctly before connecting its input or output terminals.

Connect the Probe Properly.

Do not connect the probe ground lead to a high voltage since it has the isobaric electric potential as ground.

Observe All Terminal Ratings.

To avoid fire or shock hazard, observe all ratings and markers on the instrument and check your manual for more information about ratings before connecting.

Use Proper Fuse.

Use only the specified fuse.

Do Not Operate Without Covers.

Do not operate this instrument with covers or panels removed.

Avoid Circuit or Wire Exposed.

Do not touch exposed junctions and components when the unit is powered.

Do Not Operate With Suspected Failures.

If you suspect damage has occurred to this instrument, have it inspected by qualified service personnel before any further operation. Any maintenance, adjustment or replacement especially to the circuits or accessories should be performed by SIGLENT authorized personnel only.

Keep Product Surfaces Clean and Dry.

Do Not Operate in Wet/Damp Conditions.

To avoid electric shock, do not operate the instrument in wet or damp conditions.

Do Not Operate in an Explosive Atmosphere.

To avoid injuries or fire hazards, do not operate in an explosive atmosphere.

Safety Terms and Symbols

Terms on the Product. These terms may appear on the product:

DANGER:	Indicates an injury or hazard that may immediately happen.
WARNING:	Indicates that there is potential for an injury or hazard.
CAUTION:	Indicates damage to the instrument or other property may occur.

Symbols on the Product. These symbols may appear on the product:

Hazardous Voltage

Refer to Instructions

Protective Earth Ground

Chassis Ground

Test Ground

Contents

1 General Features and Specifications

The SDM3045X is a multimeter with 4½ digit reading resolution and dual-display suited for any application requiring high-precision, multifunction, and automated measurements. It features a combination of basic measurement, multiple math, and display functions, etc.

1.1 General Features

- Real 4½ digit reading resolution
- Up to 150 rdgs/S measurement speed
- True-RMS AC Voltage and AC Current measurements
- 1 Gb Nand Flash size, mass storage configuration files and data files
- Built-in cold terminal compensation for accurate thermocouple readings
- Includes EasyDMM PC software for easy control and data collection
- Built-in help system, convenient to acquire information
- Standard communication interfaces: USB Device, USB Host, LAN (Optional : USB-GPIB Adapter)
- USB & LAN remote interfaces support common SCPI commands.
- Compatible with other popular DMMs on the market

1.2Specifications

DC Characteristics

Accuracy ± (% of Reading + count) [1]

Function	Range [2]	Test current or Load voltage	Resolution	Accuracy (one year; 23℃±5℃)
DC Voltage	600 mV		0.01 mV	0.02+ 6
	6V		0.0001 V	0.02+ 6
	60 V		0.001 V	0.02+ 6
	600 V		0.01 V	0.02+ 6
	1000 V [4]		0.1 V	0.02+ 6
DC Current	600 μA	< 33 mV	0.01 μA	0.05+ 3
	6 mA	< 330 mV	0.0001 mA	0.05+ 3
	60 mA	< 0.05 V	0.001 mA	0.05+ 3
	600 mA	< 0.5 V	0.01 mA	0.12+ 6
	6 A	< 0.33 V	0.0001 A	0.20+ 5
	10 A [5]	< 0.6 V	0.001 A	0.25+ 4
Resistance [3]	600 Ω	1 mA	0.01 Ω	0.08+ 6
	6 kΩ	1 00 μA	0.0001 kΩ	0.04+ 6
	60 kΩ	10 μA	0.001 kΩ	0.04+ 6
	600 kΩ	1 μA	0.01 kΩ	0.08+ 6
	6 MΩ	200 nA	0.0001 MΩ	0.12+ 3
	60 MΩ	200 nA || 10 MΩ	0.001 MΩ	0.85+ 3
	100 MΩ	200 nA || 10 MΩ	0.01 MΩ	1.75+ 3
Diode Test [6]	0~2V	1 mA	0.0001 V	0.05+ 3
	2~4V	1 mA	0.0001 V	0.35+ 3
Continuity Test	2000 Ω	1 mA	0.1 Ω	0.05+ 3

Remarks:

[1] Specifications are for 0.5 Hour warm-up, “Slow” measurement rate and calibration temperature 18℃~28℃.

[2] 10% over range on all ranges except for DCV 1000 V, ACV 750 V, DCI 10 A and ACI 10A.

[3] Specifications are for 4-wire measure or 2-wire measure under “REF” operation.±0.2Ω of extra errors will be generated if perform 2-wire measure without “REF” operation.

[4] Plus 0.02 mV of error per 1 V after the first ±500 VDC.

[5] 30 seconds OFF after 30 seconds ON is recommend foe the continuous current that higher than DC 7 A or AC RMS 7 A.

[6] Accuracy specifications are only for voltage measuring at input terminal. The typical value of current under measure is 1 mA. Voltage drop at diode junction may vary with current supply. Adjustable voltage range: 0~4 V.

AC Characteristics

Accuracy ± (% of Reading + count) [1]

Function	Range [2]	Frequency Range	Resolution	Accuracy (one year; 23℃ ±5℃)
True-RMS AC Voltage [3]	600 mV	20 Hz – 45 Hz	0.01 mV	2.0 + 20
		45Hz – 100 Hz	0.01 mV	0.6 +10
		100 Hz – 20 kHz	0.01 mV	0.3 + 20
		20 kHz – 50 kHz	0.01 mV	2.0 + 40
		50kHz –100 kHz	0.01 mV	3.0 + 10
	6V	20 Hz – 45 Hz	0.0001 V	2.0 + 20
		45Hz – 100Hz	0.0001 V	0.6 + 10
		100 Hz – 20 kHz	0.0001 V	0.8 + 20
		20 kHz – 50 kHz	0.0001 V	2.0 + 40
		50 kHz –100 kHz	0.0001 V	3.0 + 40
	60 V	20 Hz – 45 Hz	0.001 V	2.0 + 20
		45 Hz – 100 Hz	0.001 V	0.6 +10
		100 Hz – 20 kHz	0.001 V	0.8 + 20
		20 kHz – 50 kHz	0.001 V	2.0 + 40
		50 kHz –100 kHz	0.001 V	3.0 + 40
	600 V	20 Hz – 45 Hz	0.01 V	2.0 + 20
		45 Hz – 100 Hz	0.01 V	0.6 + 10
		100 Hz – 20 kHz	0.01 V	0.8 + 20
		20 kHz – 50 kHz	0.01 V	2.0 + 40
		50 kHz –100 kHz	0.01 V	3.0 + 40
	750 V	20 Hz – 45 Hz	0.01 V	2.0 + 20
		45 Hz – 100 Hz [4]	0.01 V	0.6 + 10
		100 Hz – 20 kHz	0.01 V	0.8 + 20
		20 kHz – 50 kHz	0.01 V	2.0 + 40
		50 kHz –100 kHz	0.01 V	3.0 + 40
True-RMS AC Current [5]	60 mA	20 Hz – 45 Hz	0.001 mA	2.0 + 20
		45 Hz – 2 kHz	0.001 mA	0.5 + 20
		2 kHz – 10 kHz	0.001 mA	2.5 + 30
	600 mA	20 Hz – 45 Hz	0.01 mA	2.0 + 20
		45 Hz – 2 kHz	0.01 mA	0.5 + 20
		2 kHz – 10 kHz	0.01 mA	2.5 + 30
	6 A	20 Hz – 45 Hz	0.0001 A	2.0 + 20
		45 Hz – 2 kHz	0.0001 A	0.5 + 20
		2 kHz – 10 kHz	0.0001 A	2.5 + 20
	10 A [6]	20 Hz – 45 Hz	0.001 A	1.5 + 45
		45 Hz – 2 kHz	0.001 A	0.5 + 35
		2 kHz – 10 kHz	0.001 A	2.5 + 25

Additional wave crest factor error (not Sine) [7]	
Wave crest coefficient	**Error(% Range)**
1-2	0.05
2-3	0.3

Remarks:

[1] Specifications are for 0.5 Hour warm-up, “Slow” measurement rate and calibration temperature 18℃~28℃.

[2] 10% over range on all ranges except for DCV 1000 V, ACV 750 V, DCI 10 A and ACI 10 A.

[3] Specifications are for amplitude of sine wave input > 5% of range. For inputs from 1% to 5% of range and < 50 kHz, add 0.1% of range extra error. For 50 kHz to 100 kHz, add 0.1% of range extra error.

[4] Plus 0.025 V of error per 1 V after the first ±400 VAC.

[5] Specifications are for sine wave input > 5% of range. 0.1% errors will be added when the range of input sine wave is 1% to 5%.

[6] 30 seconds OFF after 30 seconds ON is recommend foe the continuous current that higher than DC 7 A or AC RMS 7 A.

[7] For inputs Frequency Range < 100Hz

Frequency and Period Characteristics

Accuracy ± (% of Reading + count) [1]

Function	Range	Frequency Range	Resolution	Accuracy (one year; 23℃ ±5℃)
Frequency /Period	600mV to 750V [2]	20 Hz – 2 kHz		0.01+3
		2 kHz – 20 kHz		0.01+2
		20 kHz – 200 kHz		0.01+2
		200 kHz–500 kHz		0.01+2

Remarks:

[1] Specifications are for 0.5 Hour warm-up.

[2] Except for special marks, the AC input voltage is 5% to 110% of range when <100 kHz and 10% to 110% of range when >100 kHz. 750 V range is limited to 750 Vrms.

The accuracy is 10 times % of Reading when the measurement range of AC voltage is in 600mV range.

Capacitance Characteristic

Accuracy ± (% of Reading +count) [1]

Function	Range [2]	Max Testing Current	Resolution	Accuracy (one year ;23℃ ±5 ℃)
Capacitance	2 nF	10 μA	0.001 nF	3+10
	20 nF	10 μA	0.01 nF	1+10
	200 nF	100 μA	0.1 nF	1+ 9
	2 μF	100 μA	0.001 μF	1+10
	20 μF	1 mA	0.01 μF	1+10
	200 μF	1 mA	0.1 μF	1+ 9
	10000 μF	1 mA	1 μF	2+50

Remarks:

[1] Specifications are for 0.5 Hour warm-up and “REF” operation. Using of non-film capacitor may generate additional errors.

[2] Specifications are for from 1% to 110% on 2 nF range and ranges from 10% to 110% on other ranges.

Temperature Characteristics

Accuracy ± (% of Reading) [1]

Function	Probe Type	Probe Model	Working Temperature Range	Accuracy (one year; 23℃ ±5℃)	Temperature coefficient 0℃~18℃ 28℃~50℃
Temperature	RTD [2]	α=0.00385	-200℃~660℃	0.16℃	0.09℃
	TC [3]	B	20℃~1820℃	0.76℃	0.14℃
		E	-270℃~1000℃	0.5℃	0.02℃
		J	-210℃~1200℃	0.5℃	0.02℃
		K	-270℃~1370℃	0.5℃	0.03℃
		N	-270℃~1300℃	0.5℃	0.04℃
		R	-50℃~1760℃	0.5℃	0.09℃
		S	-50℃~1760℃	0.6℃	0.11℃
		T	-270℃~400℃	0.5℃	0.03℃

Remarks:

[1] Specifications are for 0.5 Hour warm-up, not include probe error.

[2] Specifications are for 4-wire measure or 2-wire measure under “REF” operation.

[3] Built-in cold terminal compensation for thermocouple, accuracy is ±2℃.

2 Prepare Information

Before doing performance verifying or procedure adjusting, you should master the following operations to make the multimeter 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 use self-test routine
- How to recall factory Default settings

For more detailed information about multimeter operation, please refer to the User Guide for the SDM3045X.

2.1Functional check

This functional check covers three areas by which you can verify if the multimeter is working correctly.

2.1.1 Power-on Inspection

Before connecting the instrument to a power source, please select the AC voltage selector on the rear panel of your multimeter according to the power supply. Then connect the power line to the socket on the rear panel of the multimeter.

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

The boot screen will appear after pressing the power-on button. To restore the instrument configuration to factory default settings:

Press **[Shift] > [Utility] > Store/Recall >Set To Defaults**

2.1.2 Default Setup

After setting to defaults, the multimeter should be set to DC voltage measurements. Other default settings are shown in the following table

Default settings

Menu or System	Option	Default setting
DCV	Range	Auto
	Speed	Slow
	Filter	Off
	Rel	Off
Acquire	Trg Src	Auto
	Delay	Auto
	Samples/Trigger	1
	VMC Out	Pos
Math	Statistics	Hide
	Limits	Off
	dB/dBm	Off
	Ref Value	Off
Display	Display	Number
Hold	Probe Hold	Off

2.1.3 Self Test

The SDM3045X provides self-test functions, including Key Test, LCD Test, Beeper Test and Chip Test.

Operating Steps:

1. Press **[Shift] > [Utility] > Test /Admin > Board Test**
2. To test the keys:

   Select **Key** to enter the key test interface. The on-screen lathy rectangle shapes represent the keys on the front panel. Test all keys and knobs and you should also verify that all the backlit buttons illuminate correctly.
3. To test the LCD screen:

   Select **LCD** to enter the screen test interface, the screen shows the message:" Press 'Change' to change Press 'Done' to exit". Press **Change** to start the test and observe if the screen has any defects (missing pixels, for example).

4. To test the beeper:

   Press **Beeper** to test the beeper. Under regular circumstances, pressing **Beeper** once and the instrument will beep once.

5. Test the chips:

   Press **Chip > Start** to start chip test. Determine whether the chip test passes according to the interface message.

3 Performance Verification

Use the performance verification tests in this section to verify the measurement performance of the instrument using the instrument's specifications listed in the product data sheet.

Performance verification tests are recommended as an acceptance test when you first receive the instrument or after performing calibration. If the instrument fails performance verification, calibration adjustment or repair is required.

3.1 Performance verification test items

- Zero Offset Verification
- DC Voltage and DC Current Gain Verification
- Frequency Accuracy Verification
- AC Voltage and AC Current Verification High Current Verification
- Capacitance Verification

3.2 Recommended Test Equipment

The recommended test equipment for the performance verification and calibration is listed below. If the exact instrument is not available, substitute calibration standards of equivalent accuracy.

Application	Recommended Equipment
Zero Offset Verification	Keysight 34172B
DC Voltage and DC Current Gain Verification	Fluke 5522A
Frequency Accuracy Verification	Siglent SDG2000X Series Function/Arbitrary Waveform Generator
AC Voltage and AC Current Verification	Fluke 5522A
Capacitance Verification	Fluke 5522A

3.3Performance verification step

1. Connect the calibrator to the input terminals correctly.
2. Configure each function and range in the order shown in the table corresponding to the DMM model number. Provide the input shown in the table.
3. Make a measurement and return the result. Compare measurement results to the test limits shown in the table. (Be certain to allow for appropriate source settling time.)

3.4Test Considerations

- Ensure that the test ambient temperature is stable and between 18°C and 28°C. Ideally the calibration should be performed at 23°C± 2°C.
- Ensure ambient relative humidity is less than 80%.
- Allow a 30 minute warm– up period with a copper short connected.
- Ensure the measuring rate is set to “slow” for DCV, ACV, DCI, ACI and 2-Wire/ 4-Wire Resistance measurements.

3.5Zero Offset Verification

Input	Function	Range	Error from Nominal (1 year)
Open	DC Current	600 μA	±0.03 μA
		6 mA	±0.3 μA
		60 mA	±3 μA
		600 mA	±60 μA
		6 A	±500 μA
		10 A	±4 mA
Short	DC Volts	600 mV	±60 μV
		6 V	±600 μV
		60 V	±6 mV
		600 V	±60 mV
		1000 V	±600 mV
Short	4-wire Ohms	600 Ω	±60 mΩ
		6 kΩ	±600 mΩ
		60 kΩ	±6 Ω
		600 kΩ	±60 Ω

		6 MΩ	±300 Ω
		60 MΩ	±3 kΩ
		100 MΩ	±30 kΩ

3.6DC Voltage and DC Current Gain Verification

Input			Error from Nominal (1 years)
Voltage	Function	Range	
-600 mV	DC Volts	600 mV	±180 μV
600 mV			
-6 V		6V	±1.8 mV
6V			
10V		60V	±8 mV
-60V			±18 mV
60V			
-600V		600V	±180 mV
600V			
-500V		1000V	±700 mV
1000V			±800 mV

Input			Error from Nominal (1 years)
Current	Function	Range	
600 μA	DC Current	600μA	±0.33 μA
6 mA		6 mA	±3.3 μA
60 mA		60 mA	±33 μA
600 mA		600 Ma	±780 μA
6 A		6 A	±12.5 mA
10 A		10 A	±29 mA

3.74-wire Ohms and 2-wire Ohms Verification

Input			Error from Nominal (1 years)
Resistance	Function	Range	
600 Ω	4-wire Ohms	600Ω	±540 mΩ
6 kΩ		6 kΩ	±3 Ω
60 kΩ		60 kΩ	±30 Ω
600 kΩ		600 kΩ	±540 Ω
6 MΩ		6 MΩ	±7.3 kΩ
60 MΩ		60 MΩ	±513 kΩ
100 MΩ	2-wire Ohms	100 MΩ	±1.78 MΩ

3.8Frequency Accuracy Verification

Input			Error from Nominal (1 years)
Vrms	Frequency	Range	
60mV	490kHz	600mV	±50 Hz
0.3V	20Hz	6V	±0.2Hz

3.9AC Voltage and AC Current Verification

Input			Error from Nominal (1 years)
Vrms	Frequency	Range	
600mV	1kHz	600mV	±2mV
	50kHz		±12.4mV
	100 kHz		±18.1mV
6V	1kHz	6V	±50 mV
	50kHz		±124 mV
	100 kHz		±184 mV
0.6V	1kHz	60V	±84.8mV
6V	1kHz		±128 mV
60V	45kHz		±1.22V
	20kHz		±500 mV
	50kHz		±1.24V
	100kHz		±1.84V
300V	1kHz	600V	±5V
	50kHz		±12.4V
	100kHz		±18.4V
600V	1kHz		±5V
	10kHz		±12.4V
750V	1kHz	750V	±6.2V
250V	50kHz		±5.4V
75V	100kHz		±3.4V

Input			Error from Nominal (1 years)
Irms	Frequency	Range	
20mA	1kHz	60 mA	±0.12mA
	10kHz		±0.54 mA
2mA	1kHz	600 mA	±0.41 mA
200mA	1kHz		±1.2 mA
	10kHz		±5.4 mA
20mA	1kHz	6 A	±6.1 mA

2A	1kHz		±14 mA
	10kHz		±54 mA
200mA	1kHz	10 A	±26 mA
10A	1kHz		±65 mA
	10kHz		±270 mA

3.10 Capacitance Verification

Input		Error from Nominal (1 years)
Capacitance	Range	
2 nF	2 nF	±0.07 nF
20 nF	20 nF	±0.3 nF
200 nF	200 nF	±2.9 nF
2μF	2μF	±30 nF
20μF	20μF	±300 nF
200μF	200μF	±2.9 μF
10000μF	10000μF	±250 μF

4 Assembly Procedures

This chapter describes how to remove the major modules from the SDM3045X. To install the removed modules or replace new modules, please follow corresponding operating steps in reverse order.

4.1Security Consideration

Only qualified personnel should perform the disassembly procedures. Whenever possible, disconnect the power before removing or replacing. Otherwise, personal injuries or damages to the components may occur.

Avoid Electric Shock Hazardous voltages exist on the LCD module and power supply module. To avoid electrical shock, disconnect the power cord from the multimeter and then wait at least three minutes for the capacitors in the multimeter to discharge before beginning the disassembly.

Preventing ESD Almost all electrical components can be damaged by electrostatic discharge (ESD) during handling. Component damages can occur at electrostatic discharge voltages as low as 50 volts. The following guidelines will help preventing ESD damage when servicing the instrument or any electronic device.

- Disassemble instruments only in a static-free work area.
- Use a conductive work area to reduce static charges.
- Use a conductive wrist strap to reduce static charge accumulation.
- Minimize handling.
- Keep replacement parts in original static-free packaging.
- Remove all plastic, foam, vinyl, paper and other static-generating materials from the immediate work area.
- Use only anti-static solder suckers.

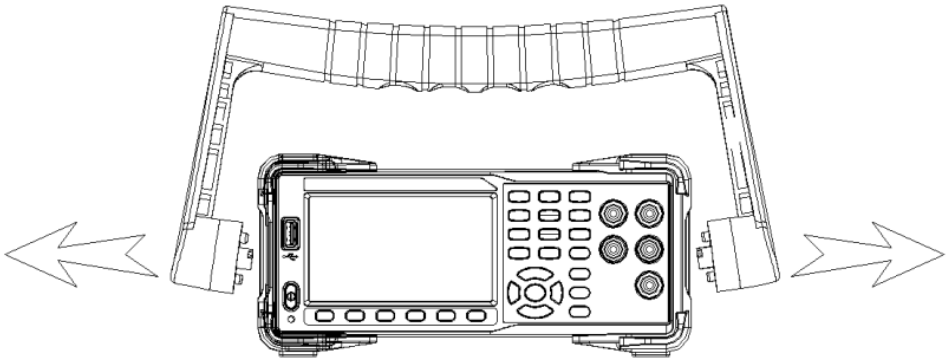
4.2Required Tools

Use these tools to remove or replace the modules in the multimeter:

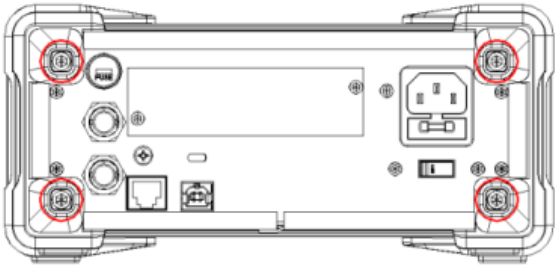
- T10 hexagon screwdriver
- 2# Phillips screwdriver
- Needle-nose pliers

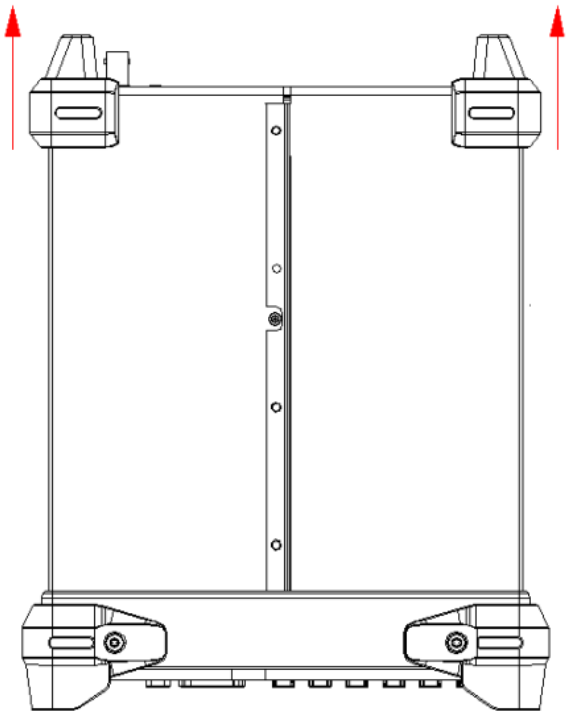
4.3Disassembly Procedures

1. Turn off the power and remove all measurement leads and other cables, including the power cord, from the instrument before continuing.
2. Rotate the handle to the upright position and remove it by pulling outward where it attaches to the case.

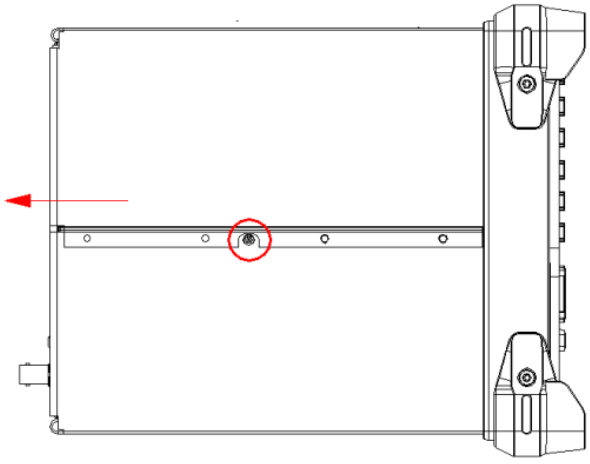


3. Unscrew the four captive screws in the rear bezel and remove the foot pads as indicated by the arrow shown below.

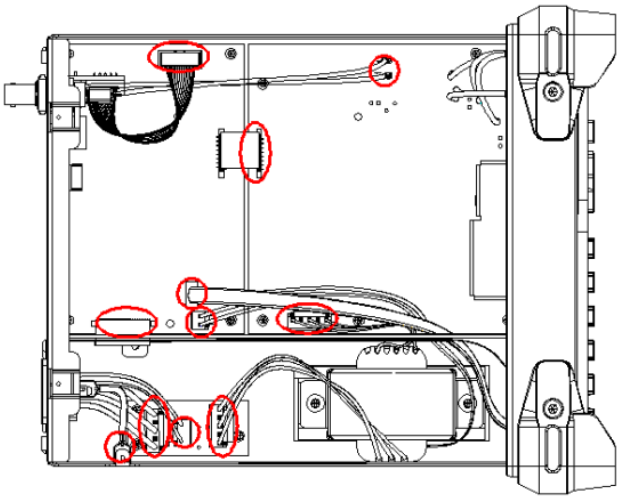




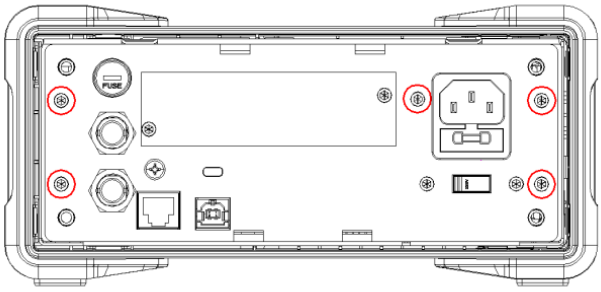
4. Remove the screw on the bottom of the instrument and place it in a safe location for re-assembly. Slide off the instrument cover as indicated by the arrow shown below.



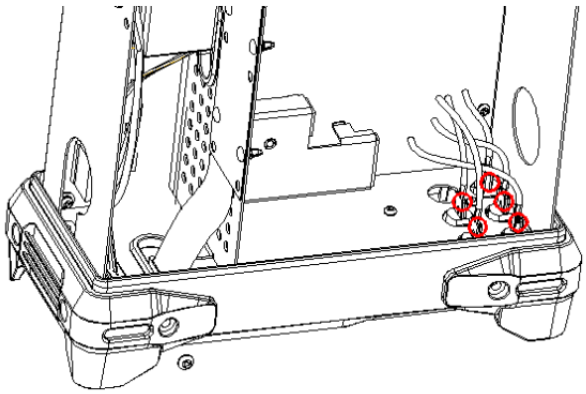
5. Remove the cable plug (in the red circle and yellow box shown below) connected to the main body.



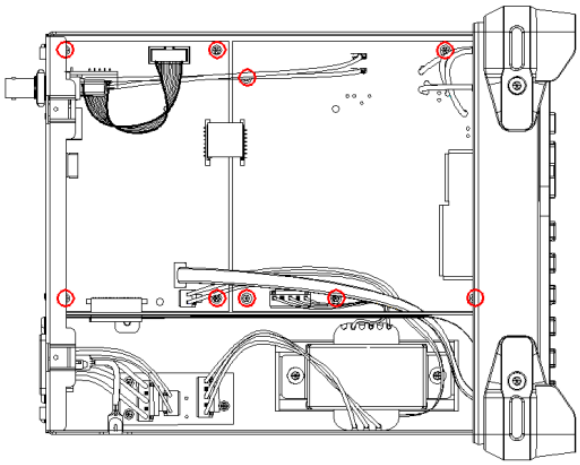
6. Unscrew the 5 captive screws in the rear metal cover and remove the rear metal cover.



7. Remove the cable plug connected to the front panel.



8. Remove the cable and unscrew all the screws then you can remove the PCBA.



This concludes the disassembly procedure. To re-assemble the instrument, reverse the procedure.

5 Troubleshooting

The internal structure of the multimeter consists of the analog board, main board and power supply board, key and LCD board, and interface board. They are linked through cables or connectors. This chapter explains the main procedures for checking the functionality of these three boards (mainly main board and analog board) by measuring the corresponding test points and checking the signals on specific connectors to help in determine the reason for the failure that has been encountered while operating the SDM3045X digital multimeter.

5.1 ESD Precautions

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

- Only handle circuit boards by the board edges. Do not touch components or the board surface with your fingers.
- 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.

5.2 Required Equipment

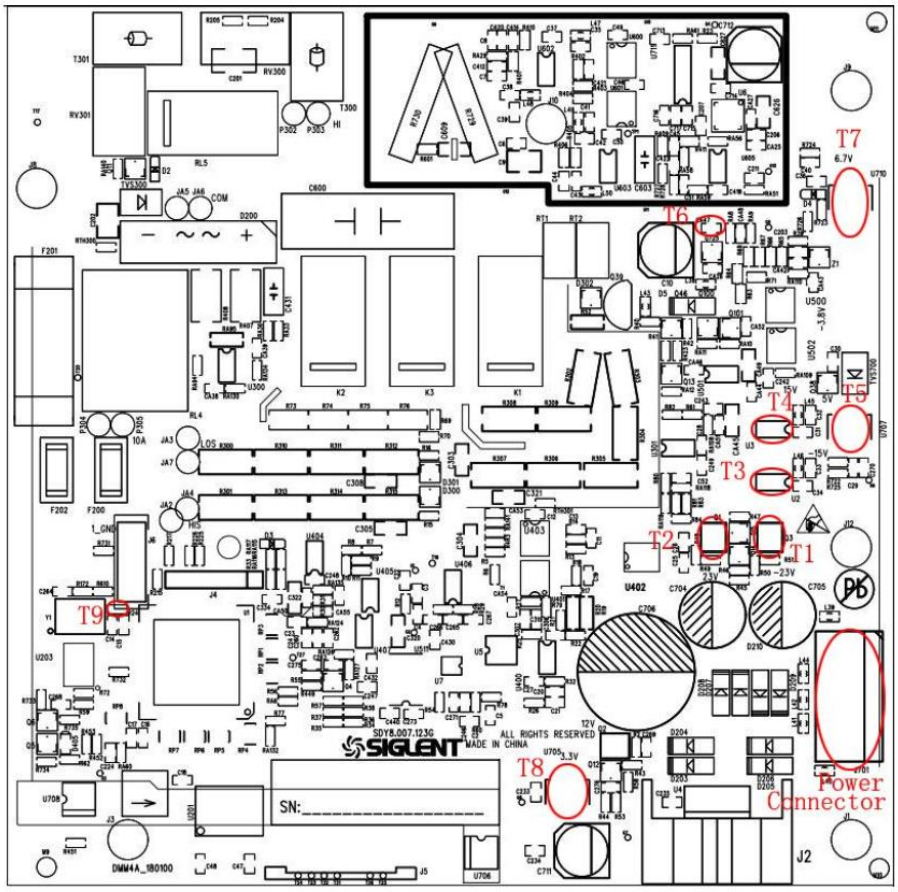
The equipment listed in the table is required to troubleshoot the multimeter.

Table 5-1 required equipment

Equipment	Critical Specifications	Example
Digital Multimeter	Accuracy ±0.05%; 1mV resolution	Siglent SDM3055
Oscilloscope	200 MHz Bandwidth	Siglent SDS2102X

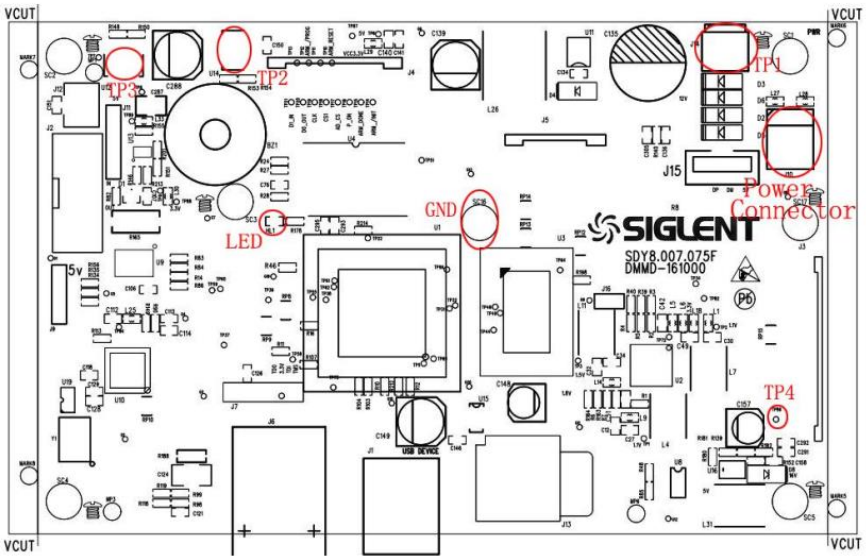
5.3Analog Board Drawing

The analog board is a signal sampling board that converts the analog input into a digital signal. It mainly works on signal processing such as AC is converted to DC in order to measure AC magnitude. Please refer to the following drawing to quickly locate the test points on the analog board for easy resolution of the failures you encounter.



5.4Main Board Drawing

The main board is used to control and manage the whole internal system of the multimeter. It completes the GUI function, controlling and configuration function for analog board as well as man-machine interactions. Please refer to the following drawing to quickly locate the test points on the main board for easy resolution of the failures you encounter.



5.5Check the Power Supply

There are two power connectors through which the analog board and main board can be supplied electricity. For the analog board, there are three voltage test points on its power connector. For the main board, there is one test point.

Before performing the power supply testing procedure, please make sure that the multimeter is grounded correctly through the protective lead of the power cord. Take care not to touch or even disassemble the power supply module without any safety precautions, or you may probably suffer from electric shock or burn. Here are procedures for testing the power supply:

1. Disconnect the power cord of the multimeter and then check whether the fuse has been burnt out.
2. Remove metal shell of the multimeter using a driver, and then disconnect the power connector connected to the main board.
3. Focus on the Power Connector for the analog board, which contains five pins from Pin 1 to Pin 5. You can test the adjacent pins that are marked with Blue, Brown, Yellow and White to check whether the AC voltage value is within the corresponding specified range using a digital multimeter. The voltage parameters to be tested are listed in table below:

Table 5-2 Test AC voltages for the analog board power connector

Pins	Voltage value (V)	Error limit (V)
Blue to Blue	8	±1
Yellow to Brown	16	±2
White to Yellow	16	±2

Table 5-3 Test AC voltage for the main board power connector

Pins	Voltage value (V)	Error limit (V)
Black to Black	8	±1

If each tested voltage value is within the corresponding spec range referring to the table above, then the power supply works normally. Otherwise, it proves to be faulted, please return it to the factory to have it repaired or contact **SIGLENT**.

Note: *The main power supply provides an input fuse to protect against the danger of fire in the event of a failure of the power supply circuitry. However, this fuse will not fail ("open" or "blow") in normal power supply operation except after a significant overload occurs. Replace the entire main power supply assembly if the input fuse fails.*

5.6 Check the Analog Board

If it is desired to remove the analog board from the metal shelf inside the multimeter, you'd better place it on a clean, insulated mat. Here are procedures for testing the analog board:

1. Several types of connectors are used on the analog board. Check to make certain that all of these are connected properly.
2. After checking these connectors, then connect the multimeter 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 table 5-3:

5.6.1 Voltage Check

Test the voltage points on the analog board in the table below. To locate the test points, please refer to the drawing of the analog board. If not each tested voltage value is within the corresponding spec range referring to table 5-4, it proves to be faulted, please return it to the factory to have it repaired or contact SIGLENT.

Table 5-4 Test DC voltages of the analog board

Test point	Name	Test pin	Voltage value (V)	Error limit(V)
T1	Q3	3	-22	±2
T2	Q1	3	+22	±2
T3	U2	1	-15	±0.5
T4	U3	1	+15	±0.5
T5	U707	4	+5	±0.3
T6	CA47	/	-3.8	±0.3
T7	U710	4	+6.7	±0.3
T8	U705	4	+3.3	±0.2
GND	U705	1		

5.6.2 Analog board Clock Check

Analog board clock is the internal system clock of the multimeter. To verify if the clock on the analog board works normally, please test the clock frequency listed below using an oscilloscope.

Table 5-5 Clock Source of the analog Board

Test point	Name	Pin	Frequency	Stability
T9	R24	1 or 2	12.8MHz	±50ppm

5.7 Check the Main Board

If the main board does need to be removed from the metal shelf located inside the multimeter, place it on a clean, insulated mat. Testing procedures for the main board are as follows:

1. Several types of connectors are located on the main board. Check if all these are connected

properly.

2. Make sure that the connectors on the main board are properly connected, then connect the multimeter to AC power and turn it on. Check if the voltage values at all test points are within the spec range using a digital multimeter. The voltage parameters to be tested are listed in table 5-6:

5.7.1 Voltage Check

Test the voltage points on the main board in the table below. To locate the test points, please refer to the drawing of the main board. If not each tested voltage value is within the corresponding spec range referring to table 5-6, it proves to be faulted, please return it to the factory to have it repaired or contact SIGLENT.

Table 5-6 Test DC voltages of the main board

Test point	Name	Pin	Voltage value (V)	Error limit(V)
TP1	J14	1 to 2	+8.6	±2
TP2	U14	4	+3.3	±0.1
TP3	U12	4	+5	±0.2
TP4	TP86	Solder	+16	±2
GND	SC16			

5.7.2 Microprocessor Check

Observe the LED light on the main board, which indicates the working state of microprocessor chip. If the light turns on, then the corresponding codes have been loaded successfully and the chip is in an operating state. Otherwise, there may be a problem with it.

5.8Quick 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 blown, please replace with a fuse of the same rating.
   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 keypad circuit board and 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 the connection between the keypad circuit board and the main board.
   2) If the instrument still does not work normally, please contact SIGLENT.

6 Maintenance

6.1 Maintenance 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.

6.2 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

7 Contact SIGLENT

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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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