Service Manual

SDM3055 Series Digital Mulimeter

SM06035-E01A

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Product Certification

SIGLENT guarantees this product conforms to the national and industrial standards in china as well as the ISO9001: 2008 standard and the ISO14001: 2004 standard. Other international standard conformance certification is in progress.

General Safety Summary

Review the following safety precautions to avoid personal injuries and prevent damages 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 local state.

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 occurs to this instrument, have it inspected by qualified service personnel before further operation. Any maintenance, adjustment or replacement especially to the circuits or accessories should be performed by SIGLENT authorized personnel.

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 condition.

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 an injury or hazard may be accessible potentially.
CAUTION: Indicates damage to the instrument or other property may occur.

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

Catalog

General Features and Specifications

SDM3055 is a 5½ dual-display instrument designed with 5½ digits readings resolution and dual-display, especially fitting to the needs of high-precision, multifunction, and automation measurements. It realized a combination of basic measurement functions, multiple math functions, and display functions, etc.

General Features

- 4.3 inch color TFT-LCD display screen with 480*272 high resolutions
- Real 5½ digits readings resolution
- Up to 150rdgs/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 thermocouple
- Support standard SCPI and control software on PC, compatible with commands of main stream multimeters
- Supports dual-display function, Chinese and English menu
- Built-in help system, convenient to acquire information
- Support USB Device, USB Host, LAN, and USB-GPIB (only for SDM3055A) interfaces
- Configuration and measured data can be imported or exported via VXI 11, USBTMC and USB flash drive, which is convenient for users to modify, view and backup

Specifications

DC Characteristic

Accuracy±（% of Reading + % of Range）[1]

Function	Range[2]	Test current or Load voltage	1 Year 23℃±5℃	Temperature coefficient 0℃～18℃ 28℃～50℃
DC Voltage	200 mV		0.015+ 0.004	0.0015+ 0.0005
	2 V		0.015+ 0.003	0.0010+ 0.0005
	20 V		0.015+ 0.004	0.0020+ 0.0005
	200 V		0.015+ 0.003	0.0015+ 0.0005
	1000 V[4]		0.015+ 0.003	0.0015+ 0.0005
DC Current	200 μA	< 8 mV	0.055+ 0.005	0.003+ 0.001
	2 mA	< 80 mV	0.055+ 0.005	0.002+ 0.001
	20 mA	< 0.05 V	0.095+ 0.020	0.008+ 0.001
	200 mA	< 0.5 V	0.070+ 0.008	0.005+ 0.001
	2 A	< 0.1 V	0.170+ 0.020	0.013+ 0.001
	10 A[5]	< 0.3 V	0.250+ 0.010	0.008+ 0.001
Resistance[3]	200 Ω	1 mA	0.030+ 0.005	0.0030+ 0.0006
	2 KΩ	1 mA	0.020+ 0.003	0.0030+ 0.0005
	20 KΩ	100 μA	0.020+ 0.003	0.0030+ 0.0005
	200 KΩ	10 μA	0.020+ 0.010	0.0030+ 0.0005
	2 MΩ	1 μA	0.040+ 0.004	0.0040+ 0.0005
	10 MΩ	200 nA	0.250+ 0.003	0.0100+ 0.0005
	100 MΩ	200 nA || 10 MΩ	1.75+ 0.004	0.2000+ 0.0005
Diode Test	4.0 V[6]	1 mA	0.05+ 0.01	0.0050+ 0.0005
Continuity Test	2000 Ω	1 mA	0.05+ 0.01	0.0050+ 0.0005

Remarks:

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

[2] 20% over range on all ranges except for DCV 1000 V, ACV 750 V, DCI 10 A and ACI 10 A.

[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 sepcifications 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.

AC Characteristic

Accuracy±（% of Reading + % of Range）[1]

Function	Range[2]	Frequency Range	1Year 23℃±5℃	Temperature coefficient 0℃～18℃ 28℃～50℃
True-RMS AC Voltage [3]	200 mV	20 Hz – 45 Hz	1.5 + 0.10	0.01 + 0.005
		45 Hz – 20 KHz	0.2 + 0.05	0.01 + 0.005
		20 KHz – 50 KHz	1.0 + 0.05	0.01 + 0.005
		50 KHz –100 KHz	3.0 + 0.05	0.05 + 0.010
	2 V	20 Hz – 45 Hz	1.5 + 0.10	0.01 + 0.005
		45 Hz – 20 KHz	0.2 + 0.05	0.01 + 0.005
		20 KHz – 50 KHz	1.0 + 0.05	0.01 + 0.005
		50 KHz –100 KHz	3.0 + 0.05	0.05 + 0.010
	20 V	20 Hz – 45 Hz	1.5 + 0.10	0.01 + 0.005
		45 Hz – 20 KHz	0.2 + 0.05	0.01 + 0.005
		20 KHz – 50 KHz	1.0 + 0.05	0.01 + 0.005
		50 KHz –100 KHz	3.0 + 0.05	0.05 + 0.010
	200 V	20 Hz – 45 Hz	1.5 + 0.10	0.01 + 0.005
		45 Hz – 20 KHz	0.2 + 0.05	0.01 + 0.005
		20 KHz – 50 KHz	1.0 + 0.05	0.01 + 0.005
		50 KHz –100 KHz	3.0 + 0.05	0.05 + 0.010
	750 V	20 Hz – 45 Hz	1.5 + 0.10	0.01 + 0.005
		45 Hz – 20 KHz	0.2 + 0.05	0.01 + 0.005
		20 KHz – 50 KHz	1.0 + 0.05	0.01 + 0.005
		50 KHz –100 KHz	3.0 + 0.05	0.05 + 0.010
True-RMS AC Current [4]	20 mA	20 Hz – 45 Hz	1.5 + 0.10	0.015 + 0.015
		45 Hz – 2 KHz	0.50 + 0.10	0.015 + 0.006
		2 KHz – 10 KHz	2.50 + 0.20	0.015 + 0.006
	200 mA	20 Hz – 45 Hz	1.5 + 0.10	0.015 + 0.005
		45 Hz – 2 KHz	0.50 + 0.10	0.015 + 0.005
		2 KHz – 10 KHz	2.50 + 0.20	0.015 + 0.005
	2 A	20 Hz – 45 Hz	1.5 + 0.20	0.015 + 0.005
		45 Hz – 2 KHz	0.50 + 0.20	0.015 + 0.005
		2 KHz – 10 KHz	2.50 + 0.20	0.015 + 0.005
	10 A[5]	20 Hz – 45 Hz	1.5 + 0.15	0.015 + 0.005
		45 Hz – 2 KHz	0.50 + 0.15	0.015 + 0.005
		2 KHz – 10 KHz	2.50 + 0.20	0.015 + 0.005

Additional wave crest factor error (not Sine) [6]	
Wave crest coefficient	**Error（% Range）**
1-2	0.05
2-3	0.2

Remarks:

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

[2] 20% 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] Specifications are for sine wave input > 5% of range. 0.1% errors wills be added when the range of input sine wave is 1% to 5% .

[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] Specifications are for frequency of input < 100Hz

Frequency and Period Characteristic

Accuracy±（% of Reading + % of Range）[1]

Function	Range	Frequency Range	1 Year 23℃±5℃	Temperature coefficient 0℃～18℃ 28℃～50℃
Frequency /Period	200 mV to 750 V[2]	20 Hz – 2 KHz	0.01+0.003	0.002+0.001
		2 KHz – 20 KHz	0.01+0.003	0.002+0.001
		20 KHz – 200 KHz	0.01+0.003	0.002+0.001
		200 KHz –1 MHz	0.01+0.006	0.002+0.002

Remarks:

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

[2]Except for special marks, the AC input voltage is 15% to 120% of range when <100 kHz and 30% to 120% of range when >100 kHz. 750 V range is limited to 750 Vrms.

Capacitance Characteristic

Accuracy±（% of Reading + % of Range）[1]

Function	Range[2]	Max Testing Current	1 Year 23℃±5℃	Temperature coefficient 0℃～18℃ 28℃～50℃
Capacitance	2 nF	200 nA	3+1.0	0.08+0.002
	20 nF	200 nA	1+0.5	0.02+0.001

	200 nF	2 μA	1+0.5	0.02+0.001
	2 μF	10 μA	1+0.5	0.02+0.001
	200 μF	100 μA	1+0.5	0.02+0.001
	10000 μF	1 mA	2+0.5	0.02+0.001

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 120% on 2 nF range and ranges from 10% to 120% on other ranges.

Temperature Characteristic

Accuracy±（% of Reading + % of Range）[1]

Function	Probe Type	Probe Model	Working Temperature Range	1Year 23℃±5℃	Temperature coefficient 0℃～18℃ 28℃～50℃
Temperature	RTD[2]	α=0.00385	-200℃至 660℃	0.16℃	0.08+0.002
	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℃.

Prepare Information

Before doing performance verifying or procedure adjusting, you should master the following operations to make the mulimeter 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

Fore more detailed information about oscilloscope operation, please refer to you Quick Guide for SDM3055.

Functional checking

This functional checking covers three kinds of checks, by which you can verify whether the mulimeter is working correctly.

Power-on Inspection

Before connect 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 mutimeter.

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

The boot screen appears after pressing the power-on button.Then perform following operation, the intrument can be restored to factory default settings:

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

Default Setup

After setting to defaults, multimeter is 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

Self Test

SDM3055 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. 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. Test the LCD screen:
   Selec **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 severe color or other display error.
4. Test the beeper:
   Press **Beeper** to test the beeper. Under regular circumstance, press **Beeper** one time and the instrument will beep one time.
5. Test the chips:
   Press **Chip > Start** to start chip test. Determine whether the chip test pass according to the interface message.

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.

Performance verification test items

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

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 SeriesFunction/Arbitrary Waveform Generator
AC Voltage and AC Current Verification	Fluke 5522A
Capacitance Verification	Fluke 5522A

Performance 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.)

Test 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 measurement.

Zero Offset Verification

Input	Function	Range	Error from Nomina (1 years)l
Open	DC Current	200μA	±0.01μA
		2mA	±0.1μA
		20mA	±4μA
		200mA	±16μA
		2A	±400μA
		10A	±1mA
Short	DC Volts	200mV	±8μV
		2V	±100μV
		20V	±800μV
		200V	±6mV
		1000V	±30mV
Short	4-wire Ohms	200Ω	±10mΩ
		2kΩ	60mΩ
		20kΩ	600mΩ
		200kΩ	6Ω
		2MΩ	80Ω
		20MΩ	300Ω
		100MΩ	4kΩ

DC Voltage and DC Current Gain Verification

Input			Error from Nominal (1 years)
Voltage	Function	Range	
-200mV	DC Volts	200mV	±38μV
200mV			
-2V		2V	±400μV
2V			
10V		20V	±2.3mV
-20V			±3.8mV
20V			
-200V		200V	±36mV
200V			
-500V		1000V	±110mV
1000V			±180mV

Input			Error from Nominal (1 years)
Current	Function	Range	
200μA	DC Current	200μA	±0.12μA
2 mA		2mA	±1.2μA
20mA		20mA	±23μA
200mA		200mA	±158μA
2A		2A	±3.8mA
10A		10A	±26mA

Input			Error from Nominal (1 years)
Resistance	Function	Range	
200Ω	4-wire Ohms	200Ω	±70mΩ
2kΩ		2kΩ	±460mΩ
20kΩ		20kΩ	±4.6Ω
200kΩ		200kΩ	±46Ω
2 MΩ		2 MΩ	±880Ω
10 MΩ		10 MΩ	±25.3kΩ
100MΩ	2-wire Ohms	100MΩ	±1.754 MΩ

Frequency Accuracy Verification

Input			Error from Nominal (1 years)
Vrms	Frequency	Range	
60mV	500kHz	200mV	±50Hz
0.3V	20Hz	2V	±0.2Hz

AC Voltage and AC Current Verification

Input			Error from Nominal (1 years)
Vrms	**Frequency**	**Range**	
200mV	1kHz	200mV	±500μV
	50kHz		±2.1mV
	100kHz		6.1mV
2V	1kHz	2V	±5 mV
	50kHz		±21 mV
	100kHz		±61 mV
0.2V	1kHz	20V	±30.4mV
2V	1kHz		±34mV
20V	45Hz		±320mV
	20kHz		±50mV
	50kHz		±210mV
	100kHz		±610mV
200V	1kHz	200V	±500mV
	50kHz		±2.1V
	100kHz		±6.1V
750V	1kHz	750V	±1.88V
250V	50kHz		±2.88V
75V	100kHz		±3.6V

Capacitance Verification

Input		Error from Nominal (1 years)
Capacitance	Range	
2nF	2nF	±0.08nF
20nF	20nF	±0.3nF
200nF	200nF	±3nF
2μF	2μF	±30nF
20μF	20μF	±300nF
200μF	200μF	±3μF
10000μF	10000μF	±250μF

Calibration Adjusting Procedures

This chapter explains how to adjust the SDM3055 series digital mulimeter for optimum operating performance. Only qualified personnel should perform this procedure.

Calibration Adjustment Interval

The instrument should be calibrated on a regular interval determined by the accuracy requirements of your application. A 1-year interval is adequate for most applications. Accuracy specifications are warranted only if calibration is made at regular calibration intervals. Siglent Technologies never recommends calibration adjustment intervals beyond two years.

Calibration is Recommended

Whatever calibration interval you select, Siglent Technologies recommends that complete re-calibration should always be performed at the calibration interval. This ensures that the instrument will remain within specifications for the next calibration interval and provides the best long-term stability.
Performance data
measured during performance verification tests does not mean that the instrument will remain within these limits unless the calibration adjustments are performed.

Automating Calibration Procedures

The complete adjust procedures can be automated with the use of appropriate automated test instrumentation. The complete instrument configurations specified for each adjustment may be programmed via the remote interface.

The instrument can also be adjusted from the remote interface. Remote adjustment is similar to the local front-panel procedure. A PC can be used to perform the adjustment by first selecting the required function and range. The adjustment command is sent to the instrument and then the adjustment is initiated over the remote interface.

Calibration Adjustment items

- DC Voltage Calibration
- DC Current Calibration
- AC Voltage Calibration
- AC Current Calibration

- 2-Wire Ohms Calibration
- 4-Wire Ohms Calibration
- Capacitance Calibration

Recommended Test Equipment

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

Instrument	Requirements	Recommended Model
Calibrator	Provide the source of DCV,DCI,ACV,ACI,2-Wire Ohms, 4-Wire Ohms and Capacitance	Fluke 5522A

Software Environment

1. Easytest

Make sure you have installed Easytest software in your computer.

2. NI VISA

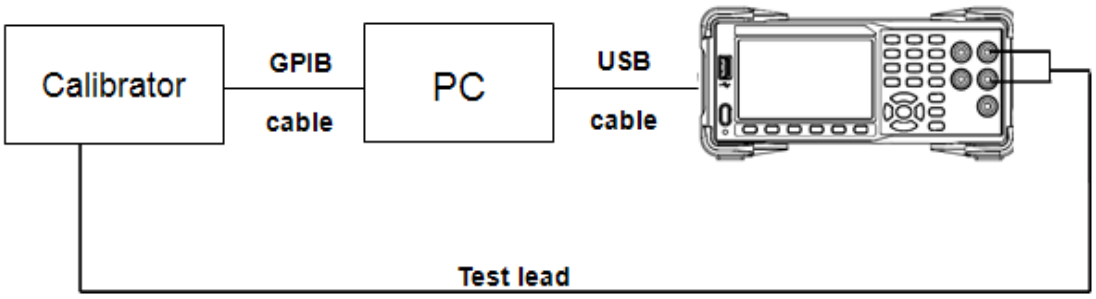
The communication between computer and instrument is based on VISA I/O library which can be derived from NI VISA.

Test 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.

Calibration Adjustment step

1. Connect the Calibrator, PC and SDM3055 digital mulimeter as shown below:



2. Open the EasyTest software.
3. Click “open” under the “file” menu, and then select the corresponding Tcl script.
4. Click the “test” button to perform the adjusting procedures.
5. Change the connection method betweeen Calibrator and mulimeter according to the prompt message.

Note: The adjusting procedures include 7 items as the following:

DCV_Adjust : indicates DC Voltage Calibration
DCI_Adjust : indicates DC Current Calibration
ACV_Adjust : indicates AC Voltage Calibration
ACI_Adjust : Indicates AC Current Calibration
2 Wire Ohms_Adjust : indicates 2-Wire Ohms Calibration
4 Wire Ohms_Adjust : indicates 4-Wire Ohms Calibration
Capacitance_Adjust : indicate Capacitance Calibration

Assembly Procedures

This chapter describes how to remove the major modules from the SDM3055 series generator. To install the removed modules or replace new modules, please follow corresponding operating steps in reverse order.

Security 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 generator, and then wait at least three minutes for the capacitors in the generator 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.

Required Tools

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

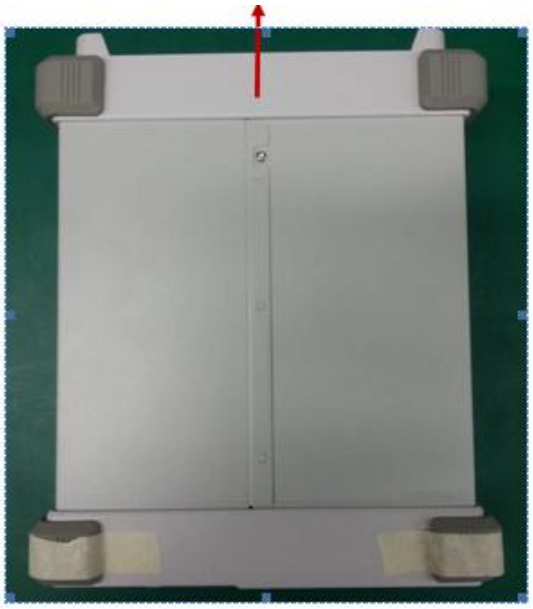
- T10 Torx screwdriver
- 2# phillipss crewdriver
- needle-nose pliers

Disassembly Procedures

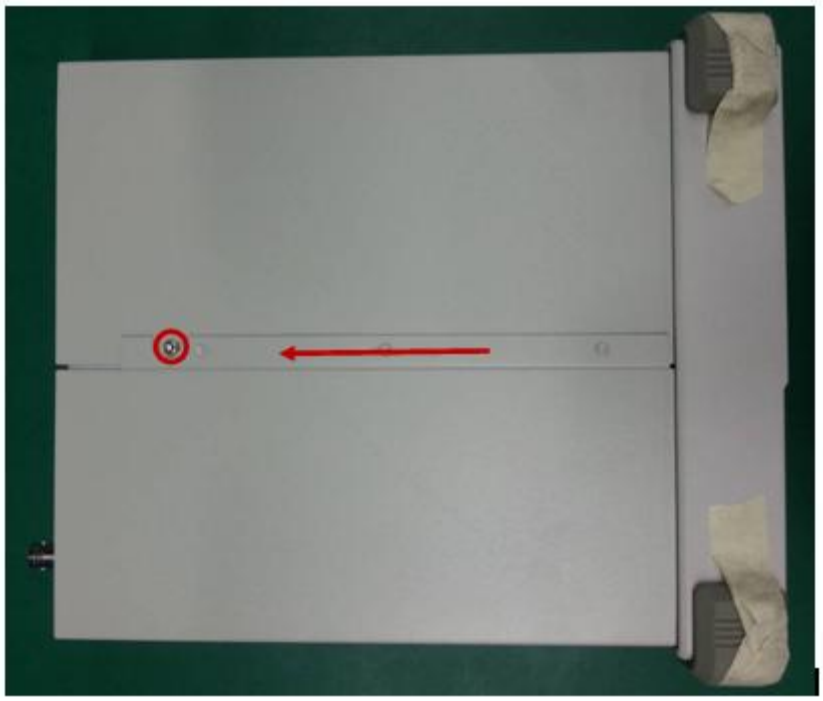
1. Turn off the power and remove all measurement leads and other cables, including the power cord, from the instrument before continuing.

2. Rotate the handle to the upright position and remove it by pulling outward where it attaches to the case.

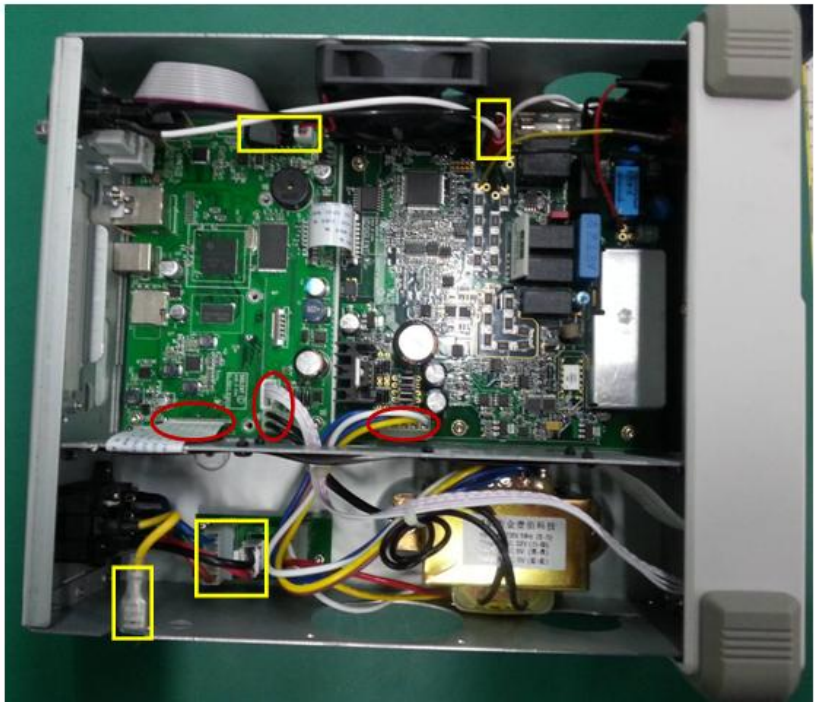
3. Unscrew the two captive screws in the rear bezel and remove the rear bezel as indicated by the arrow shown below



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

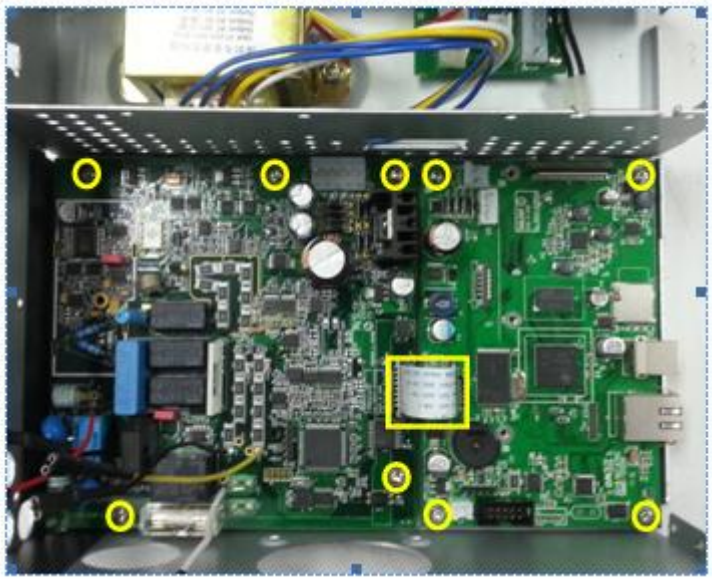


6. Unscrew the 5 captive screws in the rear metal cover and remove the rear metal cover.

7. Unscrew the 4 screws and remove the fan.

8. Remove the cable plug connected to the front pannel.

9. Remove the cable and unscrew all the screws,then you can remove thePCBA.



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

Troubleshooting

The internal structure of the multimeter consists of 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 checking procedures for these three boards (mainly main board and analog board) by measuring the corresponding test points and checking the signals of connectors on them, thus to help in determining the reason for the failure that has been encountered while operating the SDM3055 series digital mulimeter.

ESD Precautions

While performing any internal test of the multimeter, 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.

Required Equipments

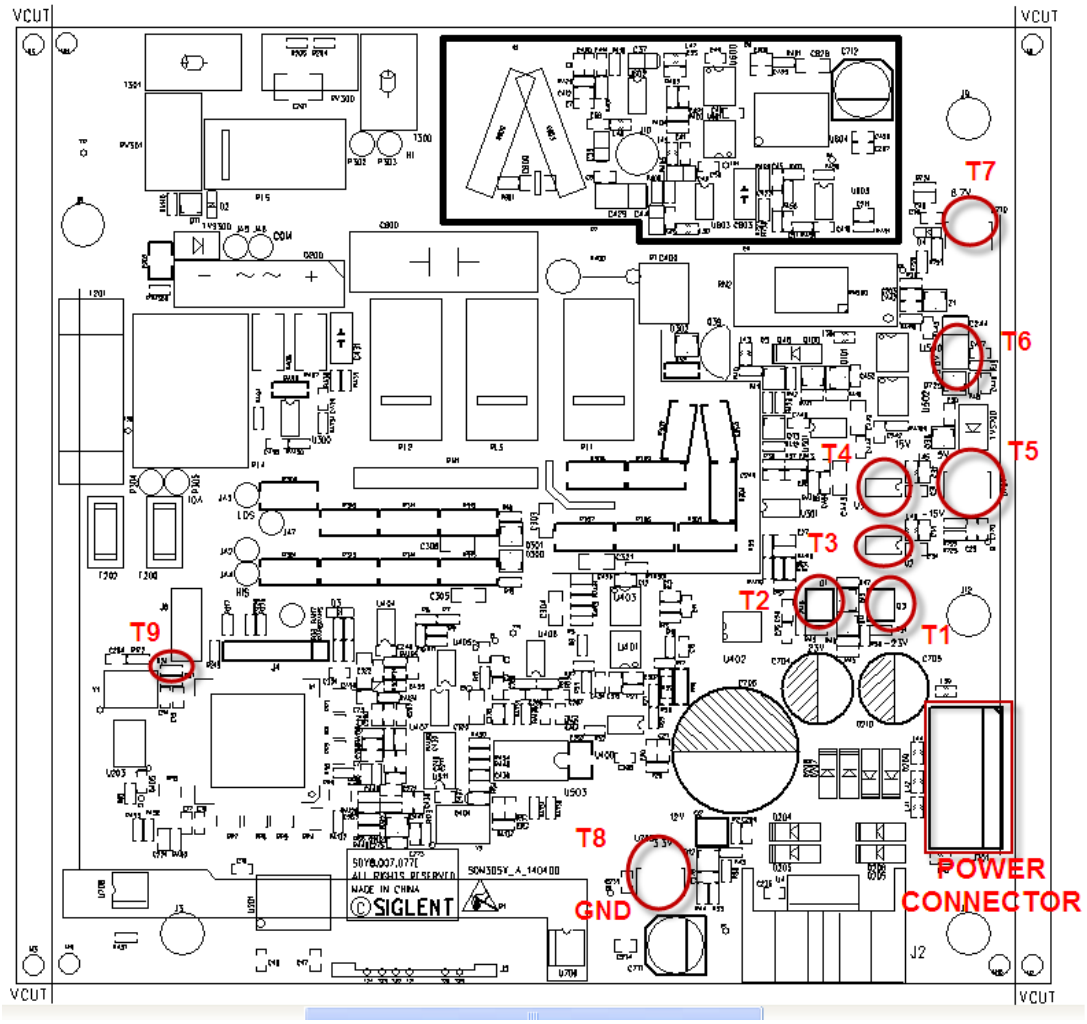
The equipments listed in the table are required to troubleshoot the multimeter.

Table 6-1 required equipments

Equipment	Critical Specifications	Example
Digital Multimeter	Accuracy ±0.05% 1 mV resolution	Siglent SDM3045X
Oscilloscope	200MHz Bandwidth	Siglent SDS2102X

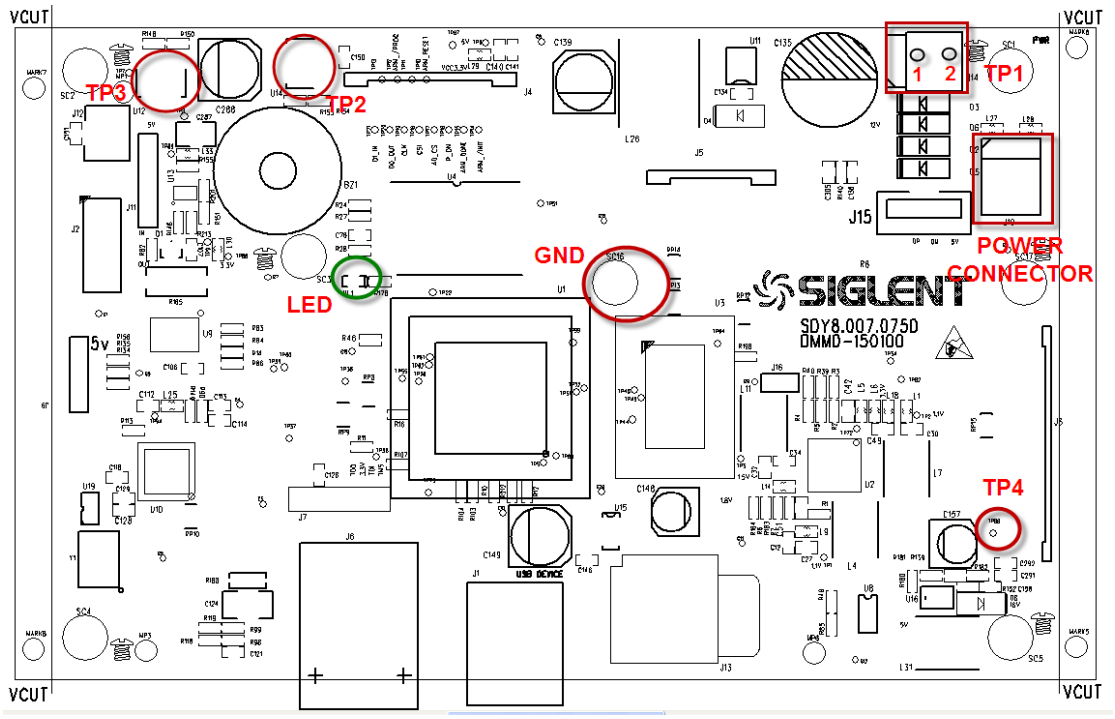
Analog Board Drawing

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



Main Board Drawing

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 interaction. Please refer to the following drawing to quickly locate the test points on the main board for easy resolution of the failures you encounter.



Check 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 analog board, which contains five pins from Pin1 to Pin5. 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 6-2 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 6-3 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 that a significant overload occurs. Replace the entire main power supply assembly if the input fuse fails.

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 generator 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:

Voltage Checking

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 6-4 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	C244	cathode	-3.8	±0.3
T7	U710	4	+6.7	±0.3
T8	U705	4	+3.3	±0.2
GND	U705	1		

Analog board Clock Checking

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 6-5 Clock Source of the analog Board

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

Check the Main Board

If the main board does need to be removed from the metal shelf located inside the generator, 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:

Voltage Checking

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 6-6 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			

Microprocessor Checking

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.

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 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.

Maintenance

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.

Contact SIGLENT

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