N210102b

CITEL

SPT–203
Intelligent SPD Tester

User Manual






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Chapter 1 Preface

1.1 Product Serial Number

Dear customer, thank you for purchasing the intelligent SPD tester produced by Citel.

Obtaining your product serial number in advance will ensure you to engage efficient and superior customer service.

The serial number is on the product label, as shown in Figure 1-1.



Figure 1-1 Intelligent SPD tester label

1.2 Declaration

Dear customer,

This User Manual describes the testing procedures, and operation of this product. Before using the product, please read the Manual carefully and keep the Manual properly. By reading the Manual thoroughly, you will know how to operate the major functions of this product and get the most out of your product. CITEL does not undertake any obligation if the product is damaged due to your improper operation. We have done our best to avoid human errors and provide you with correct and reliable information in this Manual, but we do not guarantee absolutely right under the following circumstances: 1. Errors that are not discovered before printing; 2. Incomplete information due to uncontrollable printing, binding, and distribution mistakes. If you have any question, please contact our Customer Service. To improve the performance and reliability of our parts and the main unit, we retain the right to implement minor adjustment toward our software and hardware configurations, which may cause inconsistency between practical product configuration and the Manual, but your use of the product will not be affected. If there is inconsistency between the image and the actual product, the actual product shall govern.

Thank you!

Shanghai Citel Electronics Co, Ltd.

Chapter 2 Tester Overview

2.1 Packing List

The following components are included in our product packet. If any of the components is not delivered, please contact our Customer Service.



Figure 2-1 Packing list

2.2 Front view



Figure 2-2 Front view of the tester

No.	Component Name
①	Display
②	High-voltage indicator
③	Power indicator
④	Test cable connector
⑤	Terminals for test modules
⑥	Arrow keys and confirmation key
⑦	Reset

2.3 Top view



Figure 2-3 Top view of the tester

No.	Component Name
①	Charger port
②	Ground cable port
③	Power switch

2.4 Side view



Figure 2-4 Side view of the tester

No.	Component Name
①	USB port

Chapter 3 Components

3.1 Indicator

- **The high-voltage indicator is red when high voltage is generated, and off under other circumstances.**
- The power indicator is orange when power is sufficient. It turns green when the tester runs for a long time and turns red when the power is insufficient.

3.2 Main display

- 7-inch TFT true-color display that delivers legible and bright text and graphics.
- Supporting touch-screen operations

3.3 Operation Keyboard

- The operation keyboard includes arrow keys and function keys.

- The arrow keys include the up, down, left, and right keys for controlling the movement of the cursor.
- The function keys include the confirmation key and reset key for confirming an operation or resetting the system.

3.4 Power switch

- The power switch is a rocker switch used to start and shut down the tester.

3.5 Charger port

- It is used to connect to a power adapter to charge the tester.

Chapter 4 How to Use the Tester

4.1 Startup, Shutdown, and Reset

- **Startup**: Press the protrusion of the rocker switch to "On" position to turn on the tester. The tester will start in around 30s.
- **Shutdown**: Press the protrusion of the rocker switch to "Off" to shut down the tester.
- **Reset**: When the tester is on and software is running, press the reset button to return to the home screen.

4.2 Connecting the Test interface

- There are several ways to test a surge protective device (SPD):

  1. **Auto Test Mode** with direct plugging on the Test Interface for the pluggable SPDs (DAC & DS series) . See figure 4.1 (1) and (2)

  2. **Auto Test Mode** through wires connected on the Test interface for the non-pluggable SPDs . See figure 4.1 (3)

  3. **Manual Test Mode** through wires connected on the Test interface for the non-pluggable and "unknown" SPDs or Components . See figure 4.1 (4)

Now we have two kinds of module for automatic test with different position of pin, as below picture①and②shows.

Auto test mode			Manual test mode
① 	② 	③ 	④ 
For pluggable DS series modules	For pluggable DAC series modules	For unpluggable modules	Connecting to test cable connector

Figure 4-1 Connection with test module

4.3 Replace the Test Module

The test module as 4.2 described for DS series and DAC Series can be replaced follow the instructions as below.



4.4 Charge

Connect the power adapter to the charger port on the tester before connecting the power adapter to the main power supply. If the sequence is reversed, the tester will not be charged.

When the tester is being charged, the power indicator is steady red, and the charge indicator blinks orange. After the charging is completed, the power indicator and charge indicator are steady on. The charging period is around 4 to 5 hours.

Note: Before using the tester, make sure that the battery has sufficient power. The tester cannot be charged when it is on. Turn off the power switch before the charging. Before connecting the power adapter to the 220 V AC power supply, ensure that the tester is properly connected to the power adapter.

Chapter 5 Application Software

5.1 Function

By adopting the wizard operating procedure, the tester offers concise and easy-to-use interfaces for both automatic and manual test.

5.2 Test Process

5.2.1 Startup

Press the power switch to start the tester. The screen lights up and displays a progress bar, as shown in Figure 5-1.



Figure 5-1 Startup screen of the tester

After the system starts, the welcome screen is displayed, as shown in Figure 5-2.



Figure 5-2 Welcome screen of the tester

5.2.2 Test Mode

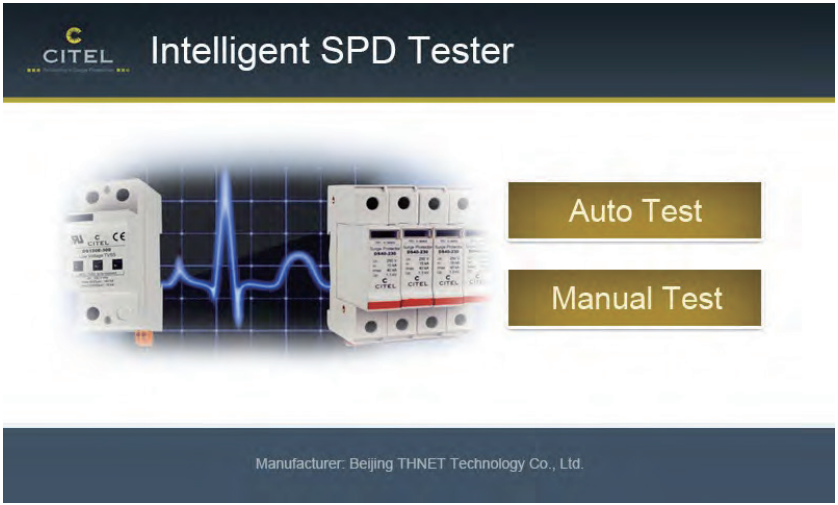


Figure 5-3 Test mode selection screen

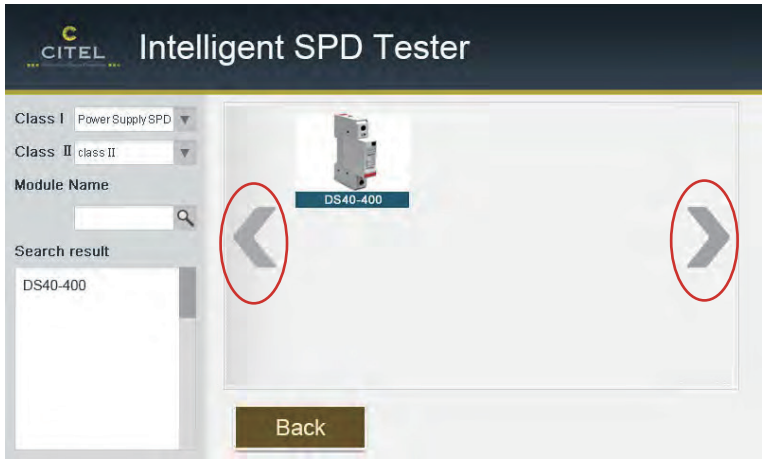
Select Auto Test or Manual Test on the screen, as shown in Figure 5-3. Select Auto Test when the model of the test module is obtained. Select Manual Test when the type of the test component is obtained.

5.2.3 Auto Test Mode

- Select the "Auto Mode Test" and the SPD selection screen is displayed.

Select the SPD model by Classification or Search function. If the current does not show the model of the tested device, flip the model selection screen by using the left and right arrows (red circles in Figure 5.4).

If the tested SPD model cannot be found ("unknown SPD"), switch to Manual Mode or update software version (to update the product database).



5-4 SPD Selection Screen

Press the model to be tested. The zoom-in figure of the selected module is displayed, as shown in Figure 5-5.



Figure 5-5 Model display screen

Tap Next and plug the test module to the corresponding area on the tester, as shown is Figure 5-6.



Figure 5-6 Testing a plug-in module

Confirm that the model of the module displayed in the figure is consistent with the actual one, and tap Start Testing. A warning shown in Figure 5-7 pops up. Check again and press OK to start the test. High voltage will be generated during the test. Do not touch any terminal or the metallic area for connecting cables.

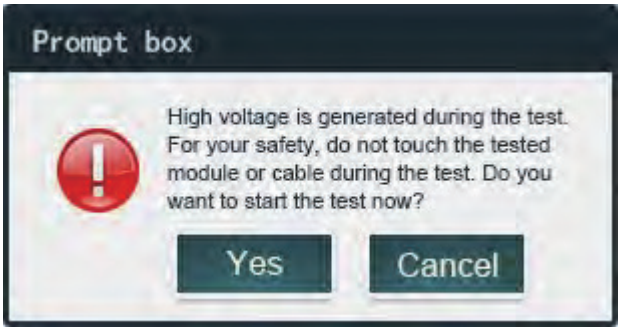


Figure 5-7 Model display screen

When the module is being tested, a schematic drawing of the tested pin is displayed in the display area, indicating from left to right parameters that include Test Step, Tested Pin, Test Type, Normal Voltage, Normal Leakage Current, Tested Voltage, Tested Leakage Current, and Test Result. If the data output is in black, containing the word Normal, the test result meets requirements and the tested pin is normal. If the data is in red, or Open or Shorted is displayed, with the word Abnormal in red shown in the test result, the test value does not meet requirements and the module has been damaged. The test screen is shown in Figure 5-8.

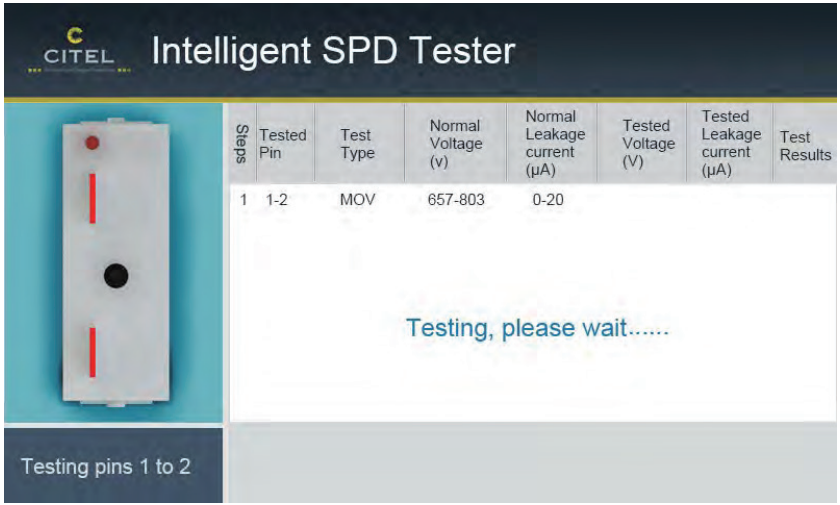


Figure 5-8 Module test screen

After the test is completed, the Completed and Continue icons are displayed in the operation area, as shown in Figure 5-9. Tap Continue. The system returns to the module type selection screen, as shown in Figure 5-4. Tap Completed, the system returns to the test mode selection screen, as shown in Figure 5-3.

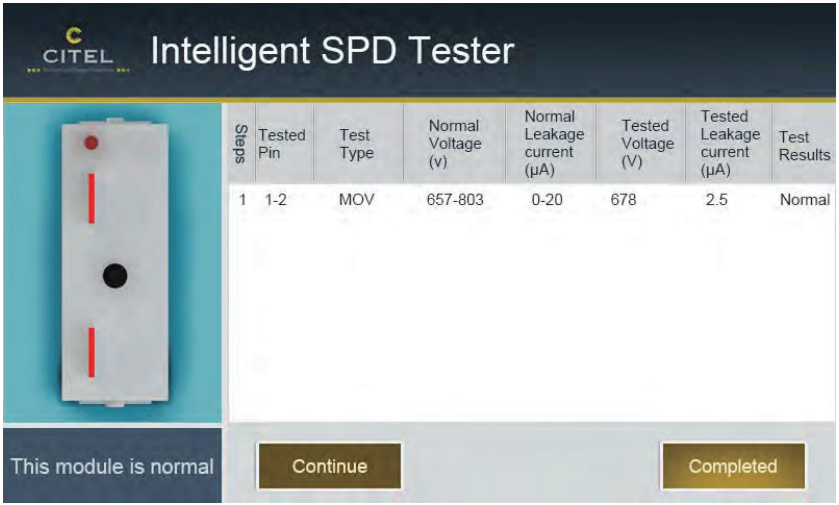


Figure 5-9 Screen displayed after the test is completed

5.2.4 Manual Mode description

The way for SPT-203 to analyze the measurement results on different component tests please refer to the below table.

Summary Table for different Component Tests			
Component	Measurement displayed	Measurement Analysis	Typical bad results
MOV	Voltage display = Voltage @ 1mA (V1mA)	Voltage value displayed must be equal the V@1mA declared by the MOV manufacturer, in a range of +/- 10%	1. Current display : 300 μA approx means short-circuited component 2. Error message with no voltage/current displayed: «NC/SC» means open -circuited
	Current display = Leakage current @75%*V1mA	Current value displayed must be equal or lower than the Leakage current declared by the MOV manufacturer	
GDT	Voltage display= d.c. Sparkover Voltage (100V/s)	Voltage value displayed must be equal to d.c. sparkover voltage declared by the GDT manufacturer,in the range of declared tolerance	Error message with no voltage displayed: «NC/SC» means open-circuit or short -circuited component (or bad measurement connection)
TVS Diode	Breakdown Voltage V_{BR} @5mA	Voltage value displayed must be equal to UBR declared by the diodes manufacturer, in the range of declared tolerance	1. Voltage display : 1V approx means short -circuited component. 2. Error message with no voltage displayed: «NC/SC» means open-circuit component (or bad measurement connection).

Then we begin to describe the procedure on how to proceed the test step by step. If you select Manual Test on the mode selection screen, the manual test type selection screen is displayed, as shown in Figure 5-6.



Figure 5-10 Manual test type selection screen

Select metal oxide varistor (MOV), gas discharge tube (GDT), or TVS diode according to the type of the tested component. If you proceed to the next operation without selecting a test type, the following prompt pops up.

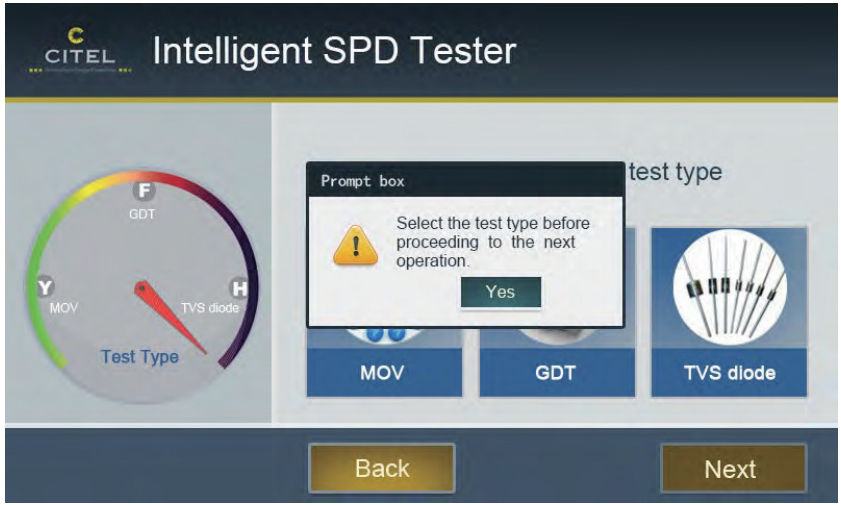


Figure 5-11 Pop-up prompt without a selected test type

If you select MOV, the pointer on the test type gauge points at the Y position, as shown in Figure 5-12.

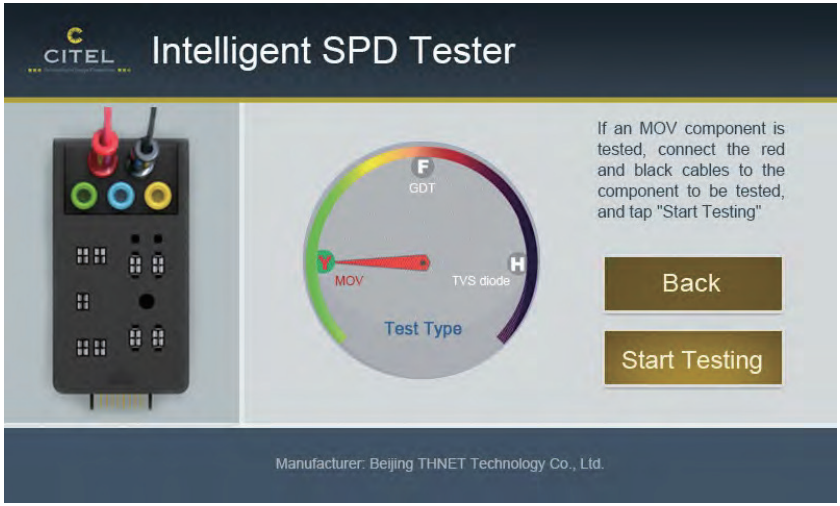


Figure 5-12 Display of the screen for confirming the manual test type

Tap Start Testing, and a warning prompt is displayed, as shown in Figure 5-13.



Figure 5-13 Display of the test result for a manual test type

Connect the red and black test cables to the corresponding connectors on the tester, and tap OK to start the test. High voltage will be generated during the test. Do not touch any terminal or the metallic area for connecting cables. After the test is completed, the Completed and Continue icons are displayed in the operation area, as shown in Figure 5-14. Tap Continue, and the system returns to the module type selection screen, as shown in Figure 5-10. Tap Completed, the system returns to the test mode selection screen, as shown in Figure 5-3.

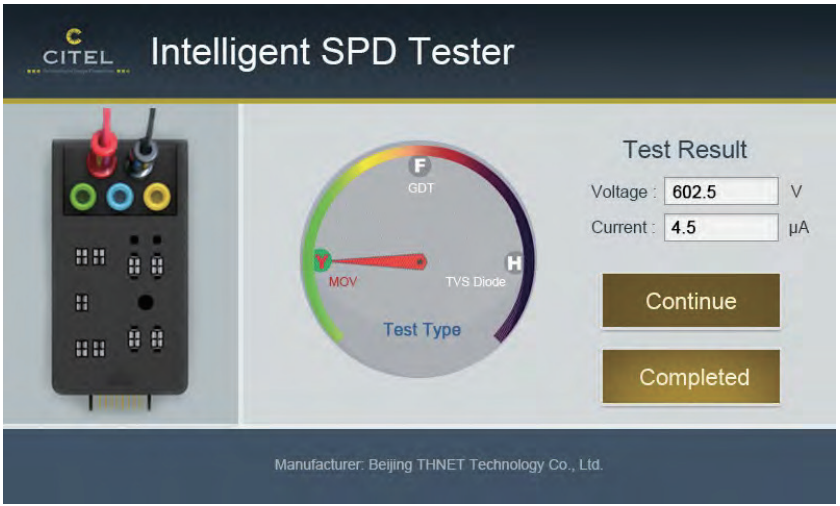


Figure 5-14 Display of the test result for a manual test type

5.3 Software and database update

For better operation, the SPT-203 testing device must be updated (software and internal product database) if current version is not the latest by checking the system information as shown in Figure 5-15. The latest version can be found in the welcome screen.

It is only possible to update the internal database and test software by returning the tester to Citel. Please contact your nearest office for further details.

Chapter 6 Troubleshooting

6.1 Startup

- If the tester does not start after you press the power switch, the battery is low or has run out. Charge the battery and restart the tester.

6.2 Display

- If the display of the home screen is erratic, reset the system and try again.

6.3 Keyboard

- If the keyboard does not function, restart the system and try again.

6.4 Abnormal program

- If the program is abnormal or the system crashes, press the reset button. If it does not work, turn off the tester and restart the system.

Chapter 7 Precautions

7.1 Warning

To avoid electric shock or personal injury, you must know the following issues:

- High voltage is generated during the test, so do not touch the test component and test area.
- After starting a test, do not leave the test site until the test result is output, to avoid personal injury or any damage to equipment caused by long-time high voltage output when abnormality occurs during the test.
- After a test is started, the high voltage cannot be output for over 70s. If the period exceeds 70s, stop the test to avoid damage to the tester.
- Do not test a GDT without selecting the GDT test, or the tester may be damaged.
- Do not perform any test without connecting any module.

7.2 Tester Protection

- Do not place the tester in an environment at temperature higher than 50°C.
- Do not clash the tester and prevent falls.
- Do not splash liquid on the tester.
- Do not disassemble the tester.

7.3 Storage

- Temperature: 20°C to 50°C
- Humidity: 10% to 80% RH, non-condensing

7.4 Cleanliness

- Clean the enclosure and display using alcohol swab or soft cloth. Do not immerse the tester in water. Do not use corrosive cleaning agent to avoid damage to the enclosure.

Chapter 8 Appendix: Technical Specifications

SPT-203 Intelligent SPD Tester	
Test Type	MOV GDT, solid discharge tube, TVS diode (transient diode)
Charge voltage	AC 220 V
Power	≤ 16 W
Dimensions	240 mm x 175 mm x 60 mm

MOV measurement precision		
V1mA measurement range		1 V to 2000 V
Leakage current measurement range		0 μA to 120 μA
Measurement Precision	Voltage measurement error	± (2% rdg + 5 dgt) (V ≤ 200 V)
		± (1% rdg + 5 dgt) (V > 200 V)
	Leakage current measurement error	± (5% rdg + 1 μA)
Display Precision	Voltage	One digit after the decimal point
	Leakage current	One digit after the decimal point

TVS diode (transient diode) measurement precision	
Voltage measurement range	0 to 500 V
Measurement precision	± (2% rdg + 5 dgt) (V ≤ 200 V)
	± (1% rdg + 5 dgt) (V > 200 V)
Display precision	One digit after the decimal point

Gas and solid discharge measurement precision	
DC ignition voltage	1 V to 2000 V
Measurement precision	± (2% rdg + 5 dgt) (V ≤ 200 V)
	± (1% rdg + 5 dgt) (V > 200 V)
Display precision	One digit after the decimal point



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