TECHMIZE

2025

TH2851 Series

130MHz Precision Impedance Analyzer

Data Manual

Website

Youtube Channel

https://en.tonghui.com.cn

CHANGZHOU TONGHUI ELECTRONIC CO.,LTD.

TH2851Series

130MHz Ultra-high Frequency Precision Impedance Analyzer

1. TH2851-015 Testing frequency 10Hz - 15MHz
2. TH2851-030 Testing frequency 10Hz - 30MHz
3. TH2851-050 Testing frequency 10Hz - 50MHz
4. TH2851-080 Testing frequency 10Hz - 80MHz
5. TH2851-130 Testing frequency 10Hz - 130MHz

130MHz Ultra-high Frequency Precision Impedance Analyzer

- Basic accuracy **0.08%**
- Automatic balancing bridge technology

Based in Windows 10. It supports mouse, keyboard,LAN, VGA and HDMI.

The fastest testing speed of 2.5 ms

- Equivalent circuit analysis
- Graphic scanning
- Crystal oscillator analysis

Multi-parameter list scanning function with 1,601 points.

- 1280x800 touch screen

- Dielectric constant analysis (option)
- Magnetic permeability analysis (option)

Z

25mΩ～40MΩ Impedance testing range

Bin

LCR mode
Ten-grade sorting

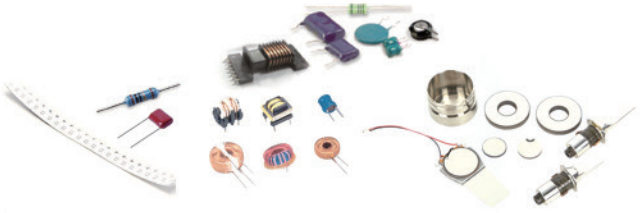
SCPI

SCPI supportable.
Labview compatible.

* The parameters are subject to change without prior notice. Please refer to the latest information.

Application fields

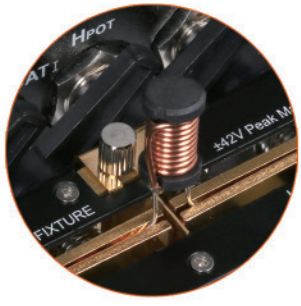
- Passive components
- Semiconductor components
- Other components
- Dielectric materials
- Magnetic materials
- Semiconductor materials



Test resistance

Test capacitance

Test inductance



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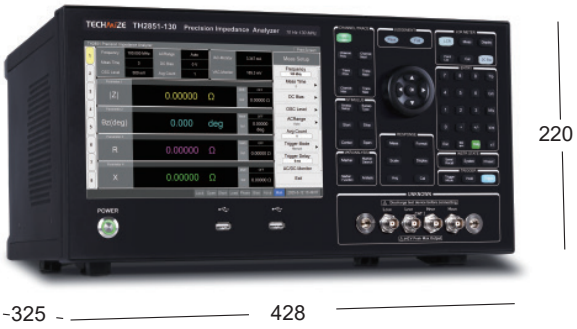
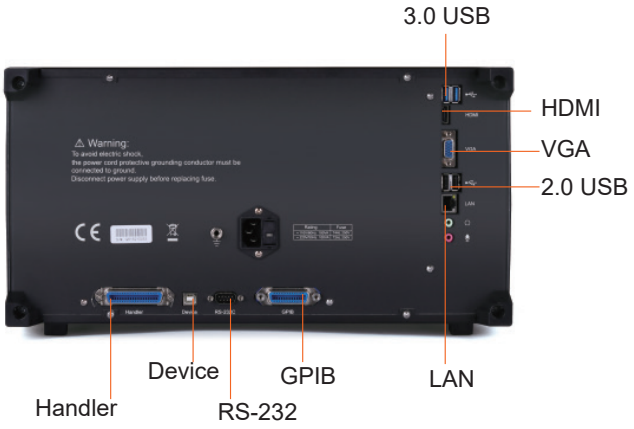
Dimensions and interfaces

01 Dimensions



unit:mm

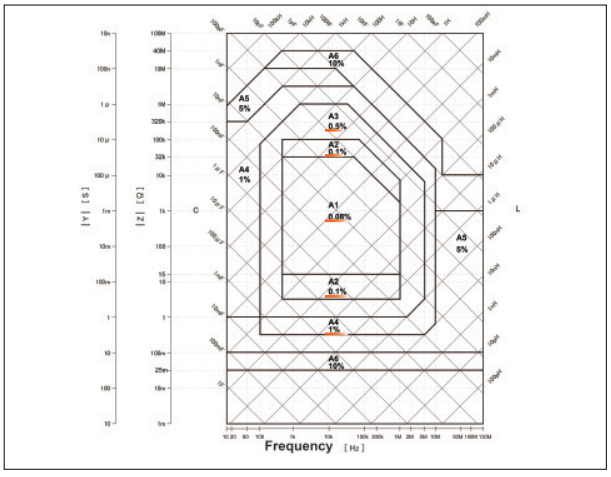
02 Interfaces



Functional features

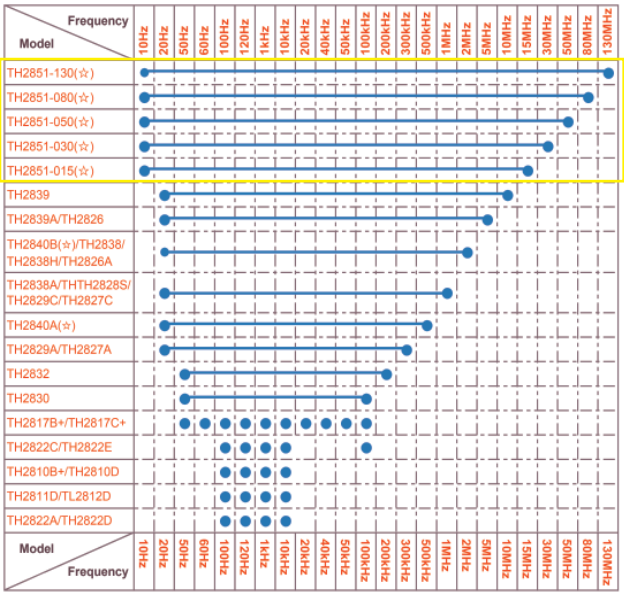
01 High precision

Using broadband auto-zeroing balance bridge technology, a measurement accuracy of 10% is achievable across a frequency range of 10Hz to 130MHz and an impedance range of 25mΩ to 40MΩ, with a peak accuracy of 0.08%—far surpassing that of RF reflectionbased impedance and network analyzers.



02 Frequency distribution

- Only solid dots represent specific frequency points.
- The solid line shows that the signal frequency is continuous in this range, with a resolution of ≤ 10mHz.



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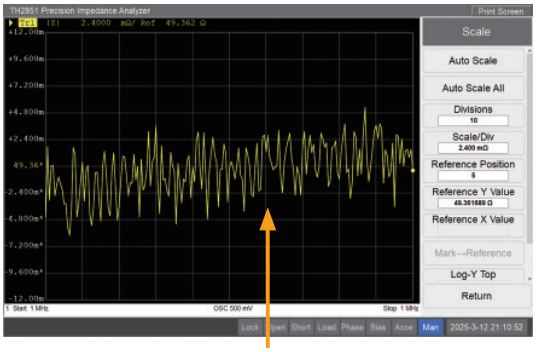
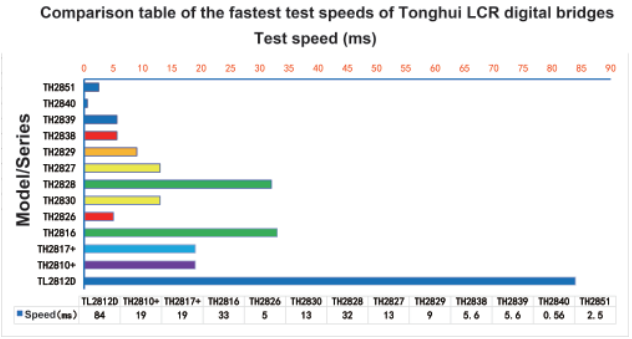
03 High stability and high consistency

The graph shows the curve of measuring a 100Ω resistor at a speed of 5 and 1MHz test frequency. The trajectory noise is ≤ 0.003% (≤ ±0.0015Ω).



the trajectory noise is ≦0.003%

04 High speed



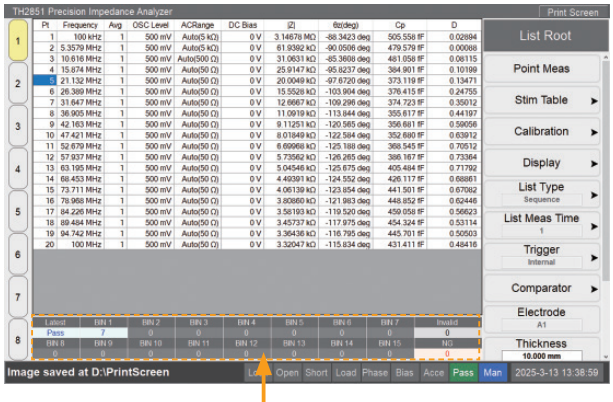
05 The 10.1 - inch touch screen, along with four measurement parameters, shows every detail clearly.

The 10.1-inch capacitive touch screen, with a 1280*800 resolution, runs on Windows 10. Supporting keyboard, mouse, LAN, VGA/HDMI interfaces, it provides great operational convenience.

This large screen has more benefits. All test parameters, sorting parameters, sorting results, function selections, and other parameters can be shown on one screen without looking cluttered. Also, four measurement parameters can be displayed and adjusted freely. The buttons on the screen's left side enable quick selection of 8 sets of test parameters.

06 Enhanced list scanning function

Set a list scan of up to 1,601 points, each with separately - set test conditions like frequency, voltage, and DC bias.



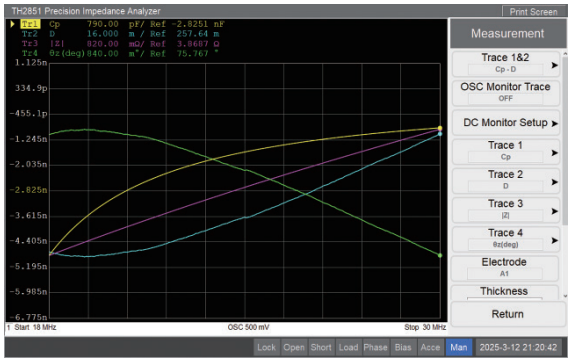
Ten levels of sorting, and the sorting results are displayed on the main interface.

* The parameters are subject to change without prior notice. Please refer to the latest information.

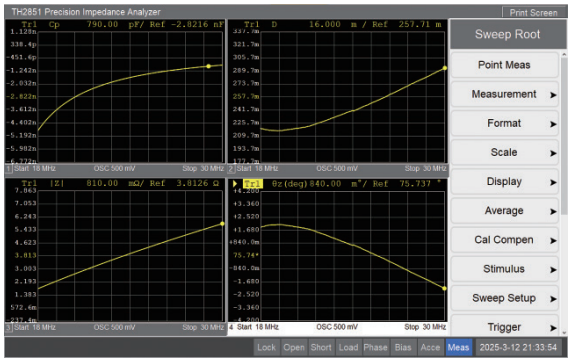
07 Powerful analytical graphical user interface

It can display up to 4 channels at once, with each channel showing a maximum of 4 curves. There are 14 split-screen display modes for both channels and curves.

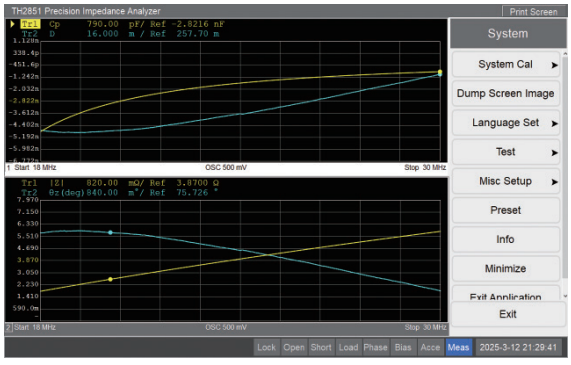
Channel	Display window	Different scanning conditions can be set for a single window.
Curve	Measurement parameter	Each window can be configured to display 4 curves.



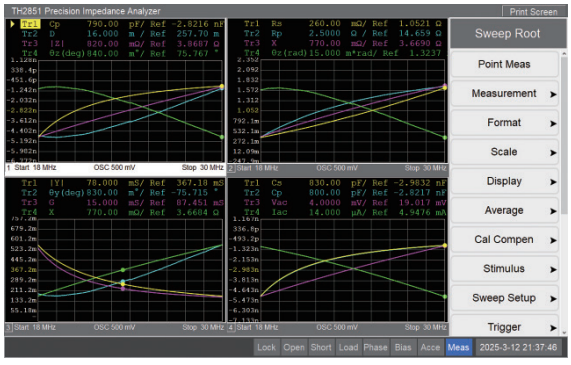
Single-channel, four-curve display



Single-channel, single-curve display



Dual-channel, two-curve display

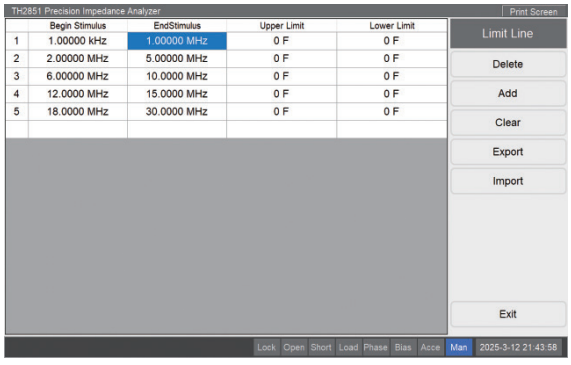


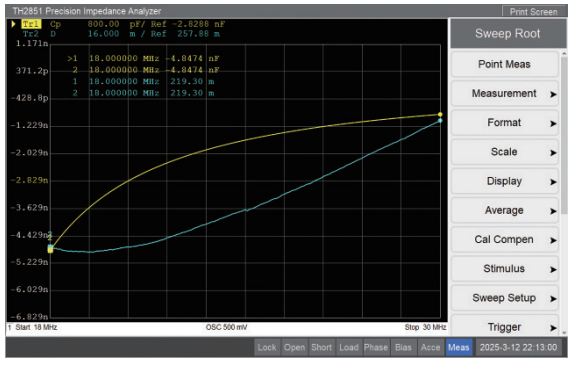
Four-channel, four-curve display

08 Segmented scanning function

Segmented scanning lets you set different frequency segments for scanning in one cycle. During scanning, different levels and offsets can be set, and results are shown graphically, meeting the need to quickly screen parameters across multiple frequency segments.

For instance, when testing a crystal resonator, to measure nominal resonance/anti - resonance and spurious frequencies, the segmented scanning function allows scanning within a specific range, avoiding scanning of irrelevant frequencies.





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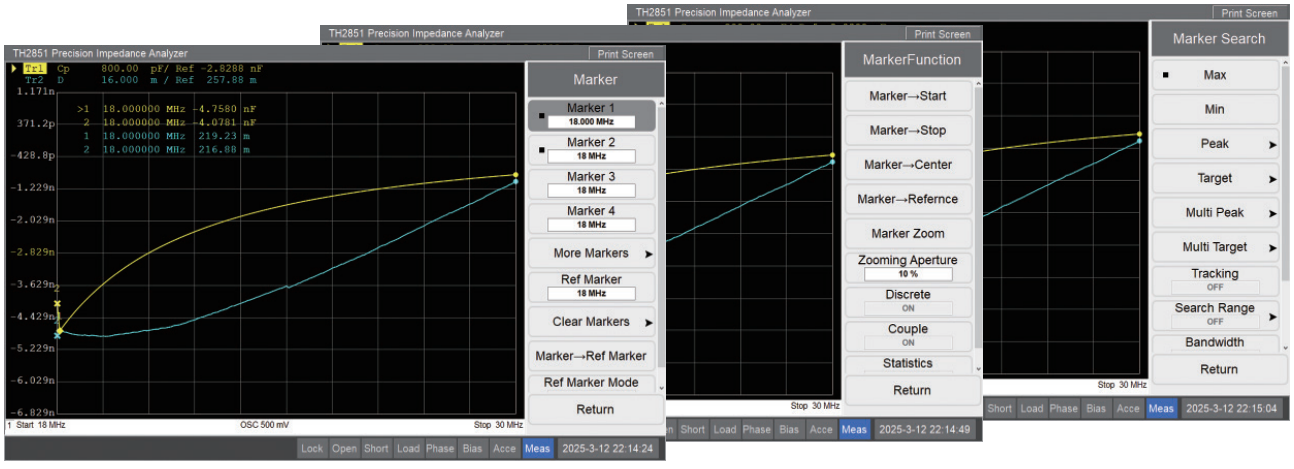
09 Powerful cursor analysis capability

TH2851 has powerful cursor analysis. With cursors, you can:

1. Read measured values (either absolute or relative to a reference point).
2. Locate specific points on the curve via cursor search.
3. Analyze curve measurement results and compute statistical data.
4. Adjust the scanning range and scale the ordinate with cursor values.
5. The TH2851 can show 10 cursors (including the reference cursor) on each curve. Each cursor has an excitation value (X-axis value) and a response value (Y-axis value). The cursor search function helps find measurement points that meet the following conditions:

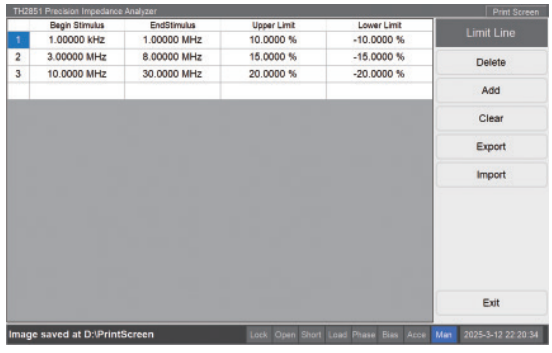
- Maximum and minimum values.
- Peak and valley values: Peaks (maxima), valleys (minima), the nearest peak/valley to the left/right of the cursor, and multiple peak-valley values.
- Target values: The target value closest to the cursor, the nearest target value to the left/right of the cursor, and multiple target values.

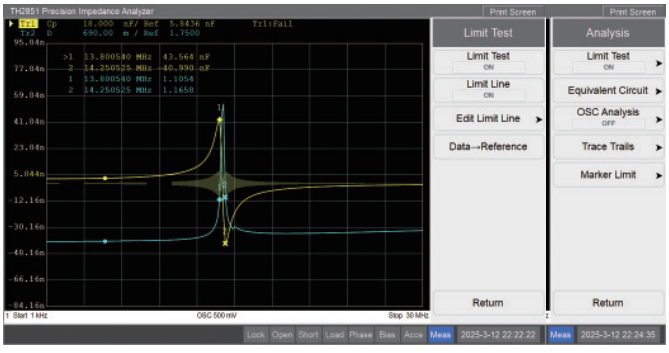


10 Powerful graphical analysis function

1） Curve sorting function

It can judge pass/fail for test values in all or part of scanned curve areas. This is useful for screening resonance curves, like those of piezoelectric element resonance frequencies.





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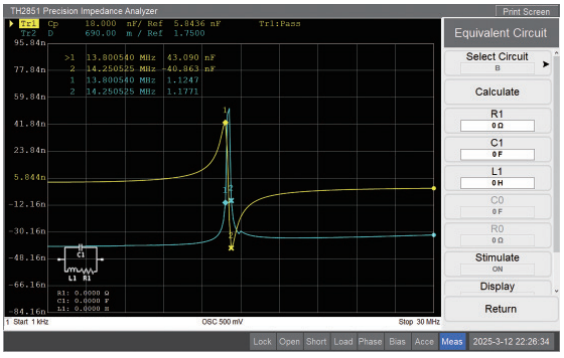
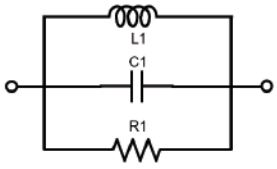
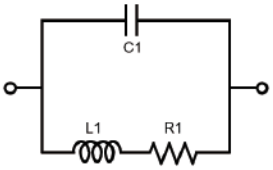
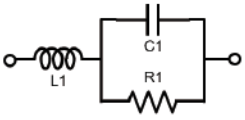
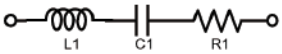
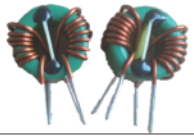
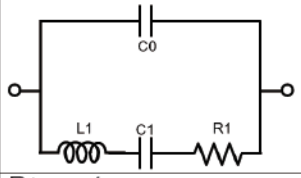
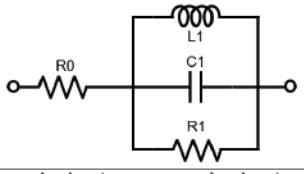
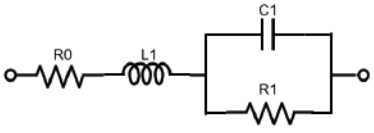
2） Equivalent circuit analysis

In real - world scenarios, different devices can be modeled as impedance devices, with four three - parameter and three four - parameter models. The equivalent - circuit analysis and testing function offers 7 basic circuit models for this purpose.

You can compare the impedance fitting curve from simulated equivalent - circuit parameter values with the measured impedance curve. Additionally, fitting can be done based on a selected model using user - input parameters.

These equivalent - circuit models can be directly exported as TXT files for users' easy saving and utilization.

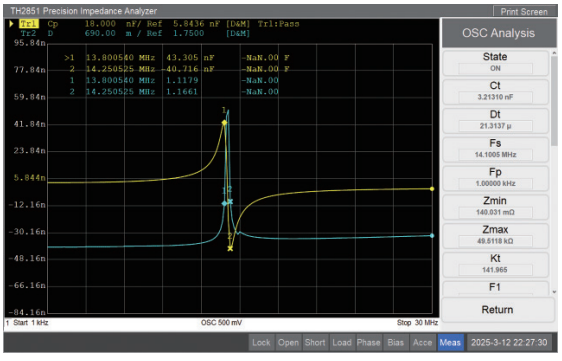


Model	Three parameters			
	A 	B 	C 	D 
Fitting object	High magnetic leakage inductance 	Inductive resistance 	High resistance value resistor 	Capacitance 
Model	Four parameters			
	E 	F 	G 	
Fitting object	Resonator 	Inductance equivalent series resistance 	Capacitance 	

3） Crystal oscillator analysis (Piezoelectric device analysis)

Measure and analyze crystal oscillator performance. Calculate to obtain key crystal parameters like resonant frequency, anti-resonant frequency, and quality factor.

For other piezoelectric devices (e.g., piezoelectric ceramic filters, notch filters, discriminators, transformers, high - power ultrasonic generators, transducers/vibrators, surface acoustic wave devices, electro - acoustic devices), test parameters such as static capacitance, loss, resonant/anti - resonant frequencies, and mechanical coupling coefficient.



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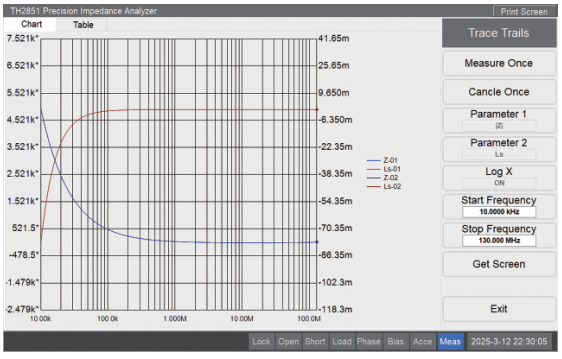
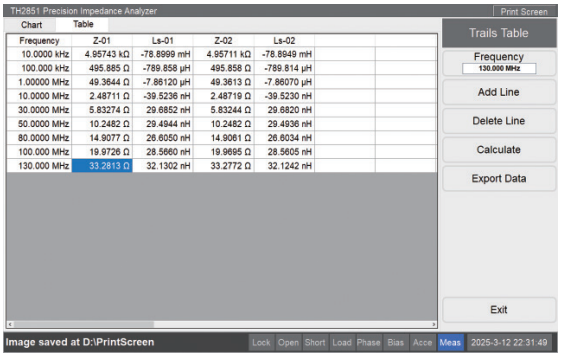
4） Comparison of curve trajectories

Curve trajectory comparison enables continuous measurement of the device under test, with all curves shown in the same coordinate system. It has two applications::

a) For multiple DUTs:
Compare curve trajectories under different measurement conditions.
Set different frequency points and calculate all curves' measured values at these points.

b) For a single DUT:
Compare repeatability of multiple measurement results under the same condition.
Set different frequency points and calculate all curves' measured values at these points.
Note: "DUT" is a common abbreviation for "Device Under Test".





11 Dielectric constant analysis (Optional accessory)

TH2851 can analyze the dielectric constant and loss of dielectric materials. But you must buy the test fixture and analysis software separately.

1） Configuration

Serial number	Model	Mandatory option
1	TH2851 Main unit of impedance analyzer	√
2	TH26077 Test fixture for dielectric materials	√
3	TH2851 Dielectric constant testing software	√

2） TH26077 Test fixture for dielectric materials

The TH26077 Test Fixture for Dielectric Materials is for accurately measuring the dielectric constant and loss on the TH2851. It uses the parallel - plate method to measure solid materials' dielectric constant, eliminating stray capacitance.

A. Appearance structure

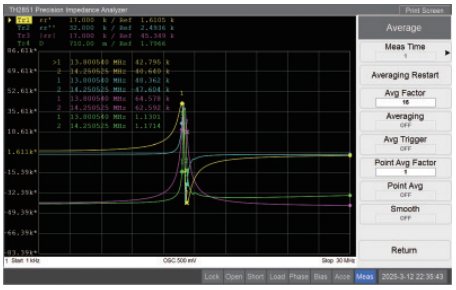
* The parameters are subject to change without prior notice. Please refer to the latest information.

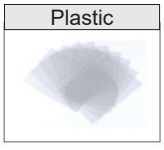
B. Basic parameters

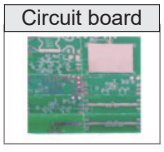
Test frequency	DC-30MHz		
Measurement parameters	Capacitance (C), Dissipation factor (D), Dielectric constant （ε_r', ε_r''）		
Test electrode	Electrode type	Diameter of the material under test	Thickness of the material under test
	Shielded electrode A1	40mm - 56mm	≤10mm
	Shielded electrode A2	10mm - 56mm	≤10mm
Test principle	Parallel plate measurement method		
Zeroing	Open circuit, Short circuit		

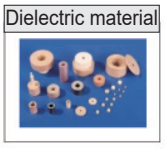
3） Dielectric constant analysis software

This optional software, once activated, lets you directly select corresponding parameters on the TH2851 interface for single measurement, list scanning, and curve scanning. The figure below shows the curve - scanning interface.









11 Permeability analysis (optional)

The TH2851 can measure the magnetic permeability of magnetic materials. You can optionally choose a test fixture and magnetic permeability analysis software based on the main unit. Here's the specific configuration:

1） Configuration

Serial Number	Model	Mandatory Option
1	TH2851 Main Unit of Impedance Analyzer	√
2	TH26086 Base of Test Fixture	√
3	TH26088 Magnetic Permeability Test Fixture	√
4	TH2851 Magnetic Permeability Test Software	√
5	TH260866_CAL, Fixture Calibration Kit	√

* The parameters are subject to change without prior notice. Please refer to the latest information.

2） Test fixture

1）TH26086 Adapter Base

The TH26086 converts a 4 - terminal pair to an N - type 7mm base and is compatible with fixtures like the TH26088 Magnetic Permeability Test Fixture. It's a must have; without it, the TH26088 can't measure accurately.

2）TH26088 Magnetic Permeability Test Fixture

The TH26088 can accurately measure the magnetic permeability of toroidal magnetic materials. Its single - turn toroidal coil fixture (without magnetic flux leakage) eliminates the need for extra winding wires. With wide frequency coverage, it offers both small and large fixtures to fit different sizes, making it an ideal solution for magnetic material measurement.

Technical parameters

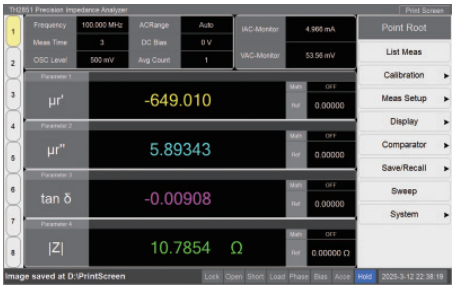
Test frequency	DC - 130MHz
Maximum voltage	±42V Peak value（AC+DC）
Operating temperature	0° C - 40° C

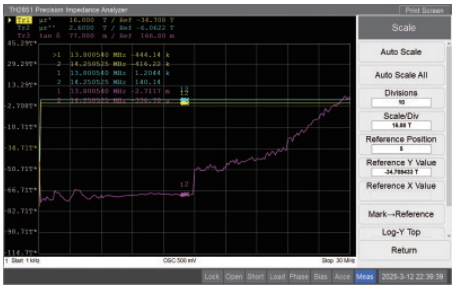
Technical parameters

Test frequency	1kHz - 1GHz		
Sample size	Height h	Inner diameter range b (Diameter)	Outer diameter range c (Diameter)
For small components	≤ 3 mm	≥ 3.1 mm	≤ 8 mm
For large components	≤ 8.5 mm	≥ 5 mm	≤ 20 mm

3） Magnetic permeability analysis software

After activating the Magnetic Permeability Analysis Software, you can directly select magnetic permeability parameters during single measurement, list scanning, or curve scanning. The test results will be shown on the screen.





Ferrite magnetic material	Amorphous magnetic material
	

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12 Standard accessories

TH26047A Four-terminal Pair Test Fixture

TH26005D Four-terminal Pair Test Fixture

- Operating frequency: DC - 120 MHz
- Maximum DC bias: ±42 V

TH26082A 100Ω Standard Component

TH26010 Gold-plated Short-circuit Board

❶TH26061D_P1 Calibration Kit
❷AR05TTS1000N Chip Resistor

13 Optional accessories

TH26007A Magnetic Ring Test Fixture

- Operating frequency: DC - 120 MHz
- Maximum DC bias: ±42 V
- Application: Single-turn inductance measurement test for small magnetic rings, and the size can be customized.

TH26008A SMD Component Test Fixture

- Operating frequency: DC - 120 MHz
- Maximum DC bias: ±42 V
- Application: For SMD devices, especially high - frequency small capacitors ≤3 pF or small inductors ≤1 μH. The test frequency is ≥100kHz.

TH26009B SMD Component Test Clamp

- Operating frequency: DC - 15 MHz
- Maximum DC bias: ±42 V
- Application: Used for testing various SMD devices.

TH26062A Four-terminal Pair Test Fixture

- Operating frequency: DC - 100kHz
- Maximum DC bias: ±42V
- Application: Testing large-capacity DC_LINK film capacitors used in electric vehicles.

TH26063 Four-terminal Pair Test Fixture

- Operating frequency: DC - 100 kHz
- Maximum DC bias: ±42 V
- Application: Testing bolt capacitors and DC_LINK capacitors.

TH26048B Four-terminal Pair Test Fixture

- Operating frequency: DC - 13 MHz
- Maximum DC bias: ±42 V
- Application: Used for various through-hole axial and radial impedance devices.

TH26077 Dielectric Test Fixture

- Operating frequency: DC - 30 MHz
- DUT (Device Under Test) size: 10mm – 56mm
- DUT thickness: ≤10mm
- Application: Dielectric analysis of solid materials

TH26086 TH2851-7mm Fixture

- Operating frequency: DC - 130 MHz
- Application: Conversion from four-terminal pair interface to 7mm interface

TH26088 TH2851 Magnetic Permeability Test Fixture

- Operating frequency: DC - 130 MHz
- DUT (Device Under Test) size: ≤20 mm
- DUT thickness: ≤8.5 mm
- Application: Analysis of the complex magnetic permeability of magnetic materials

TH26086 - CAL 7mm Fixture Calibration Kit

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Technical Parameters

Display		10.1 Inches TFT LCD Display 1280×RGB×800, Touch Screen
AC Parameter		Cp/Cs，Lp/Ls，Rp/Rs，|Z|，|Y|，R，X，G，B，θ，D，Q，V_{AC}，I_{AC}
DC Parameter		V_{DC}，I_{DC}，DCR
Test Frequency	Resolution	1mHz
	Relative frequency tolerance	±0.007% ±1 MHz (typical value, over the temperature range of 5 to 40°C)
Test Level	AC Voltage	5mV—2Vrms
	Resolution	1mV
	AC Current	50uA—20mArms
	Resolution	10uA
DC Bias	Voltage	0V-±40V
	Resolution	1mV
	Current	0mA-±100mA
	Resolution	40μA
Test terminal configuration		Four Terminal Pair
Output impedance		25Ω / 100Ω
Typical Test time (Speed)		Five Shift: 1(Fast)—5(Accuracy) 1: 2.5ms 2: 10ms 3: 40ms 4: 80ms 5: 400ms (Does not include the arithmetic average of the communication time, each frequency test speed will be slightly different)
Max Accuracy		1kHz ：0.08% 1MHz ：0.08% 2MHz ：0.5% 10MHz ：1% 130MHz：5.0%
Test Range		a 1×10^{-18}； E 1×10^{18}
Cs，Cp		±1.00000 aF - 999.999 EF
Ls，Lp		±1.00000 aH - 999.999 EH
D		±0.00001 - 9.99999
Q		±0.01 - 9999.99
R，Rs，Rp，X，Z，R_{DC}		±1.00000 aΩ - 999.999 EΩ
G，B，Y		±1. 00000 aS - 999.999 ES
Vdc		±1.00000 aV - 999.999 EV
Idc		±1.00000 aA - 999.999 EA
θ_r		±1.00000 rad - 3.14159 rad
θ_d		±0.0001 deg - 180.000 deg
Δ%		±0.0001% - 999.999%
Multi-function parameter list scan		1601 points, each point can be set to average, and each point can be sorted separately Sweep parameters: measurement parameters, test frequency, AC voltage, AC current, DC BIAS voltage, DC BIAS current
Graphic scan	Parameter	Frequency，ACV，ACI，DCV，DCI
	Types	Logarithmic, linear, frequency segmentation
	Points	2-1601
	Number of channels	4
	Number of curves	4 Per Channel
	Split Screen	14 split-screen methods, 16 curves
Equivalent circuit analysis		3-element model: 4, 4-element model: 3
Sorting		10 levels of sorting in LCR mode; each curve in scan mode is sorted individually
Interface		RS232C，USB HOST，USB DEVICE，LAN，GPIB，HANDLER，VGA，HDMI
Power-on warm-up time		60 Minutes
Input Voltage		100-120VAC/198-242VAC Option, 47-63Hz
Power consumption		Max 150VA
Dimension（WxHxD）mm		428x220x325
Weight		14.5kg

* The parameters are subject to change without prior notice. Please refer to the latest information.

Company Highlights

- Established in 1994 with a registered capital of 163 million CNY
- National High-Tech Enterprise
- National-level specialized and innovative “Little Giant” enterprise
- China’s leading company in electronic component measuring instruments
- The 1st batch listed on BSE
- 300 employees, of which 28% R&D personnel. Annual R&D investment accounts for more than 18%.
- The factory at No. 1, Xinzhu Road covers an area of 30,000m^2 and has a construction area of 30,000m^2





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