

Tonghui LCR Measurement Instrument Guide

As one of the biggest professional LCR measurement instrument manufacturers, Tonghui provides complete low-frequency LCR measurement instruments to meet requirements of R&D, manufacturing, quality inspection, automatic measurement, etc. Our products have about 20 varieties, ranging from 20Hz to 1MHz, which satisfy you whether in accuracy, practicability, measurement speed, price, or measurement object and requirement. And this guide will help you have comprehensive acquaintance with these products and select the instrument you need most by briefly introducing and comparing our LCR instruments.

Since every product has its own characteristics, the guide will describe the instruments in the following specifications and functions:

1. Product profile
2. Test frequency comparison
3. Display mode
4. Measurement accuracy
5. Measurement speed
6. Test level configuration & characteristics
7. Interface
8. Measurement accessories (Refer to Instrument Accessories & Options at website or instrument introduction sample.)

About LCR Meter and Automatic Component Analyzer

Now Tonghui defines component measurement instruments into two series: LCR meter and automatic component analyzer, which mainly differ in their functions. Besides general component measurement abilities that LCR meter has, automatic component analyzer has some other advanced measurement abilities and functions, which are:

1. High-resolution graphic LCD display with more than 320*240 dot-matrix
2. Continuous test signal frequency with resolution less than 10mHz
3. Component's frequency response analyzing, AC voltage characteristic analyzing, DC bias voltage/current characteristic analyzing, corresponding component parameter calculating ability, such as syntonics component's syntonics frequency in serial/parallel connection, static capacitance, etc., which can be displayed on screen in the form of graph.

4. Different interface communication functions, such as GPIB, RS232C, etc., and corresponding analyzing software provided
5. Other measurement functions, like transformer measurement.

I. Product Profile

TH2828/TH2828A Precision LCR Meter

Measurement principle: Auto Balance Bridge

Test frequency:

TH2828: 20Hz-1MHz, totally 6,400 points

TH2828A: 20Hz-1MHz, totally 44 points

Basic accuracy: 0.05%/0.1%

0.1%/0.2% @1MHz

Measurement speed:

32ms/time, 90 ms/time, 650ms/time @1kHz

26ms/time, 77ms/time, 650ms/time @1MHz

Test terminal: four-terminal pair

Signal source output impedance: 30Ω, 100Ω

Signal level: 5mVrms—2Vrms

Constant level: 10mVrms—1Vrms

With 10301 option: signal level 5mVrms—20Vrms,

DC bias: 0—40Vdc, 100μA—100mA

List sweep: 10 points, frequency, level, DC bias

Interface: RS232C, GPIB (TH2828A option), Handler, USB disk to store data (only for TH2828)

2m/4m extension cable (optional only for TH2828)



TH2828S Automatic Component Analyzer

Measurement principle: Auto Balance Bridge

Test frequency: 20Hz-1MHz randomly set with the smallest resolution of 1mHz

Analyzing function:

Frequency response analyzing: used to analyze component's frequency response, such as microphone, oscillator, inductor, etc.

Signal voltage/current analyzing: used to analyze components which are sensitive to signal level, such as ceramic capacitor, LCD display, etc.

DC bias voltage analyzing: used to analyze components which are sensitive to DC bias, such as transfiguration diode, inductor, 10301 option, etc.

DC bias current analyzing: used to analyze bias of inductor and transformer with 10301 option or TH1773/TH1775 inductance bias source.



The other functions: same as TH2828

TH2818 Automatic Component Analyzer

Test frequency: 20Hz-300kHz randomly set with the smallest resolution of 10mHz

Basic accuracy: 0.05%

Measurement speed:

32ms/time, 90ms/time, 650ms/time @1kHz

Signal output impedance: 30Ω, 100Ω

Signal level: 5mVrms—2Vrms

Constant level: 10mVrms—1Vrms

List sweep: 10 points, frequency, level, DC bias

Frequency response analyzing: used to analyze component's frequency response, such as microphone, oscillator, inductor, etc.

Transformer measurement: Besides general LCR measurement parameters, DC resistance, turns ratio, phase and so on can be measured as well.

Interface: RS232C, GPIB (option), Handler (option), USB disk to store data (option)

TH1802A 100mV/10V bias current/voltage board

TH1802B 1A bias current board



TH2825/TH2825A High-speed LCR Meter

Test frequency: totally 10 points: 50Hz, 60Hz, 100Hz, 120Hz, 1kHz, 10kHz, 20kHz, 40kHz, 50kHz, 100kHz

Basic accuracy: 0.1%

Measurement speed: ultra-high speed

15ms/time, 66ms/time, 500ms/time ≥100Hz

Signal output impedance: 25Ω, 100Ω, 25Ω/100Ω, C.V.

Signal level: 10mVrms—1Vrms

Inner bias source: 0—50mA (when resistance is 100Ω)

0—200mA (when resistance is 25Ω)

List sweep: 4 points, frequency, level list sweep

Transformer measurement: only for TH2825A

Besides general LCR measurement parameters, primary and secondary DC resistance, turns ratio, turns, phase, primary and secondary inductance, mutual inductance and so on can be measured as well.

Interface: RS232C, GPIB (option), Handler



TH2819 Precision LCR Meter

Test frequency: 20Hz-200kHz randomly set with the smallest resolution of 10mHz

Basic accuracy: 0.05%

Measurement speed: 32ms/time, 90ms/time,



650ms/time @1kHz
 Signal output impedance: 30Ω, 100Ω
 Signal level: 5mVrms—2Vrms
 List sweep: 10 points, frequency, level list sweep
 Interface: RS232C, GPIB (option), Handler (option), USB disk to store data (option)
 TH1802A 100mV/10V bias current/voltage board (option)
 TH1802B 1A bias current board (option)

TH2816A/TH2816B/TH2817A Precision LCR Meter

Test frequency:
 TH2816A totally 12,000 frequency points from 50Hz to 200kHz
 TH2816B totally 37 typical frequency points from 50Hz to 200kHz
 TH2817A totally 16 typical frequency points from 50Hz to 200kHz
 Basic accuracy:
 TH2816A/TH2817A 0.05%
 TH2816B 0.1%
 Measurement speed:
 33ms/time, 100ms/time, 660ms/time @1kHz
 Signal source output impedance: 30Ω, 100Ω
 Signal level: 10mVrms-2Vrms
 List sweep: 4 points, frequency, level, DC bias list sweep
 (only for TH2816A/TH2817A)
 Comparator: 10-bin (TH2816A/TH2816B)
 4-bin (TH2817A)
 Interface: RS232C, GPIB (option), Handler (option)



TH2817B/TH2817C LCR Meter

Test frequency: 50Hz, 60Hz, 100Hz, 120Hz, 1kHz, 10kHz, 20kHz, 40kHz, 50kHz, 100kHz, totally 10 points
 Basic accuracy: 0.1%
 Measurement speed:
 50ms/time, 125ms/time, 500ms/time @1kHz
 Signal source output impedance: 30Ω, 100Ω
 Signal level: 0.1Vrms, 0.3Vrms, 1Vrms
 Inner DC bias: only for TH2817C
 Voltage source -5VDC+5VDC
 Current source -50mA+50mA
 Transformer measurement: only for TH2817C
 Primary and secondary DC resistance, primary inductance, mutual inductance
 List sweep: 4 points, frequency, level list sweep
 Besides general LCR measurement parameters, primary and secondary DC resistance, turns ratio, turns, phase, primary and secondary inductance, mutual inductance and so on can be measured as well.



Interface: RS232C, GPIB (option), Handler

★ TH2817B: the instrument to replace TH2817

TH2817 LCR Meter

Test frequency: 100Hz, 120Hz, 1kHz, 10kHz, 40kHz, 100kHz, totally 6 points

Basic accuracy: 0.05%

Measurement speed: 50ms/time, 200ms/time, 670ms/time @1kHz

Signal source output impedance: dependant on measurement range, 30Ω, 100Ω, 1kΩ, 10kΩ, 82kΩ

Signal level: 0.1Vrms, 0.3Vrms, 1Vrms

Comparator: 4-bin

Interface: RS232C, Printer, Handler



TH2810D/TH2811D LCR Meter

Test frequency: 100Hz, 120Hz, 1kHz, 10kHz, totally 4 points

Basic accuracy: TH2810D 0.1%

TH2811D 0.2%

Measurement speed: 84ms/time, 200ms/time, 400ms/time

Signal source output impedance: 30Ω, 100Ω

Signal level: TH2810D 0.1Vrms, 0.3Vrms, 1Vrms

TH2811D 0.3Vrms, 1Vrms

Comparator: 4-bin (only for TH2810D)

Interface: RS232C, Handler (only for TH2810D)

★ TH2810D: the instrument to replace TH2810B

★ TH2811D: the instrument to replace TH2811C/TH2812C/TH2820



TH2810B LCR Meter

Test frequency:

100Hz, 120Hz, 1kHz, 10kHz, totally 4 points

Basic accuracy: 0.1%

Measurement speed: 67ms/time, 220ms/time

Signal source output impedance: 30Ω, 100Ω

Signal level: 0.1Vrms, 0.3Vrms, 1Vrms

Comparator: 4-bin

Interface: RS232C, Handler



TH2811C LCR Meter

Test frequency: 100Hz, 1kHz, 10kHz, totally 3 points

Basic accuracy: 0.25%

Measurement speed: 200ms/time

Signal level: 0.3Vrms



Signal source output impedance: dependant on measurement range

TH2820 LCR Meter

Test frequency: 100Hz, 120Hz, 1kHz, totally 3 points

Basic accuracy: 0.3%

Measurement speed: 330ms/time

Signal level: 0.3Vrms

Signal source output impedance: dependant on measurement range

Comparator: 4-bin



TH2821/TH2821A/TH2821B Portable LCR Meter

the exclusive portable LCR meter in China

Test frequency:

TH2821A: 100Hz, 120Hz, 1kHz, 10kHz, totally 4 points

TH2821/TH2821B: 100Hz, 120Hz, 1kHz, totally 3 points

Basic accuracy: 0.3%

Measurement speed: 330ms/time

Signal level: 0.3Vrms

Signal source output impedance: dependant on measurement range

Test terminal: 5-terminal

D, Q resolution: 0.0001

Comparator: 4-bin (only for TH2821/TH2821A)

Display: LCD, main and sub parameters synchronously displayed

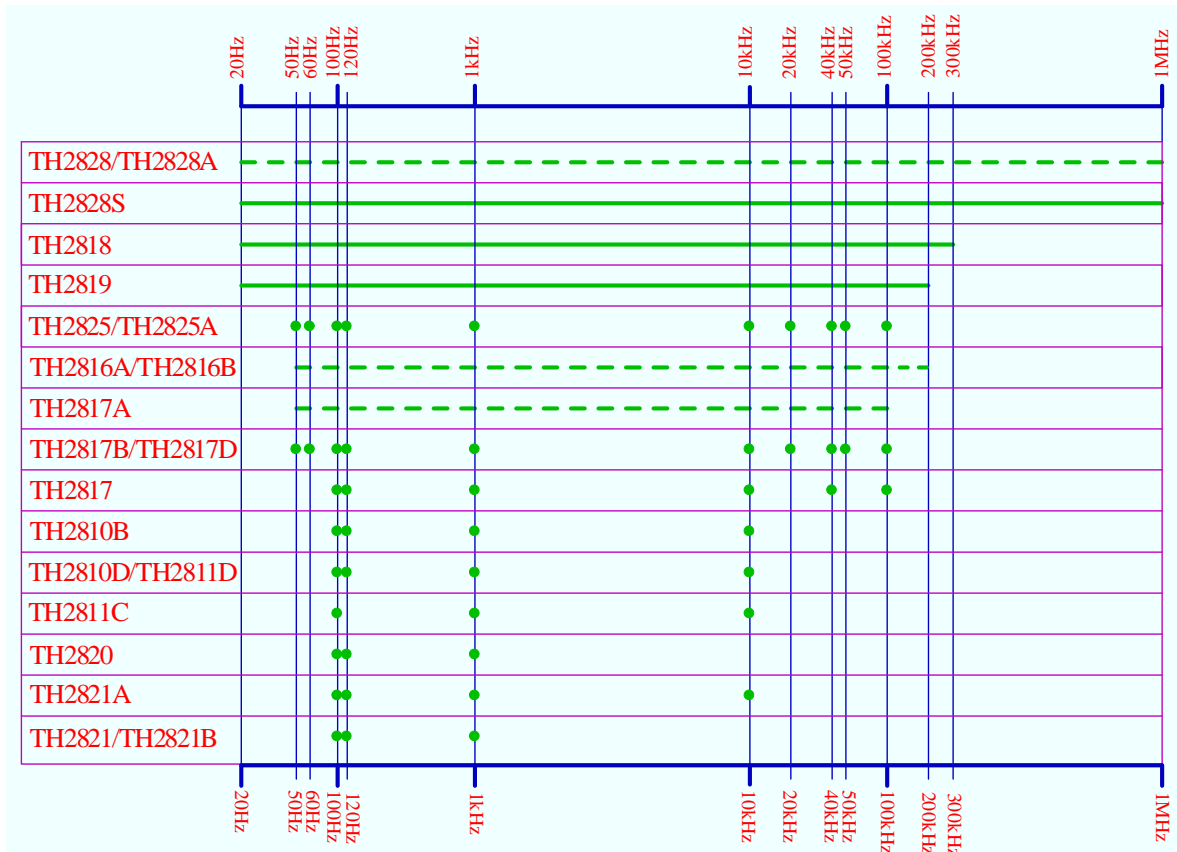
TH2821/TH2821A Direct, Δ , $\Delta\%$

TH2821B: Direct



II. Component Measurement Instrument Frequency Comparison

Tonghui component measurement instrument (LCR meter and automatic component analyzer) frequency distribution is shown in the next figure.



Note: Real line means the frequency is continuous in the area, and frequency resolution $\leq 10\text{mHz}$.

Broken line means the frequency is discrete in the area, and frequency total ≥ 16 points.

Full point means frequency point.

III. Measurement parameter, signal level, measurement accuracy, measurement speed

Model	Measurement parameters	Signal level (Vrms)	Constant level	Basic accuracy (%)	Measurement speed (ms/time)
TH2828/S	Z, Y, C, L, X, B, R, G, D, Q, θ	5m—2	✓	0.05	32, 90, 650
TH2828A		With option: 5m—20	✓	0.1	
TH2818	Z, Y, C, L, X, B, R, G, D, Q, θ , Lk, Tr, Ps, DCR	5m—2	✓	0.05	
TH2819	Z, Y, C, L, X, B, R, G, D, Q, θ	10m—1	✓	0.05	15, 66, 500
TH2825	Z, C, L, X, B, R, G, D, Q, θ		✓	0.1	
TH2825A	Z, C, L, X, B, R, G, D, Q, θ , DCR, DCR2, M, N, 1/N, L2	10m—2	✗	0.05	33, 100, 660
TH2816A	Z, C, L, X, B, R, G, D, Q, θ		✗	0.1	
TH2816B			✗	0.05	
TH2817A			✗	0.1	
TH2817B	Z, C, L, X, R, D, Q, θ	0.1, 0.3, 1	✗	0.1	50, 125, 500

TH2817C	Z,C,L,X, R, D,Q,θ, CR,DCR2, M,N,1/N,L2		×		
TH2817	Z,C,L,R,D,Q		×	0.05	50, 200, 670
TH2810B			×	0.1	67, 220
TH2810D			×	0.1	84, 200, 400
TH2811D			0.1, 0.3	×	
TH2811C	C,L,R,D,Q	0.3	×	0.25	200
TH2820	Z,C,L,R,D,Q		×	0.3	330
TH2821/A/B			×	0.3	

IV. General Function and Configuration





Model	Display	Correction	V, I inspection	Comparator	Source resistance	Test terminal	Display mode
TH2828/S	320x240 dot-matrix LCD	short, open, load	√	10-bin	30Ω, 100Ω	4-terminal pair	direct, Δ, Δ%
TH2828A							
TH2818							
TH2819							
TH2825	240x64 dot-matrix LCD	short, open	√	9-bin	25Ω, 100Ω, 25Ω/100Ω, C.V.	5-terminal	
TH2825A							
TH2816A				10-bin	30Ω, 100Ω		
TH2817A				4-bin			
TH2816B	10-bin	30Ω, 100Ω					
TH2817B	character LCD		×				
TH2817C	character LCD	×	×	4bin	dependant on measurement range	5-terminal	
TH2817	LED	√	×				
TH2810B	character LCD	short, open	×	5-bin	30Ω, 100Ω	5-terminal	direct, Δ%
TH2810D							×
TH2811D	LED	short, open	×	4-bin	dependant on measurement range	5-terminal	direct
TH2811C	×						
TH2820	character LCD	short, open	×	4-bin	dependant on measurement range	5-terminal	direct, Δ, Δ%
TH2821/A							×
TH2821B	×	×	×	×	dependant on measurement range	5-terminal	direct








V. Advanced Function and Interface Configuration





Model	File stored	Analyzing function	List sweep	Transformer measurement	HANDLER	GPIB	RS-232C	DC bias	USB
TH2828S	√	√	√	×	√	√	√	√	√
TH2828	√	×	√	×	√	√	√	√	√
TH2828A	√	×	√	×	√	√	√	√	×
TH2818	√	√	√	√	√	√	√	√	√
TH2819	√	×	√	×	√	√	√	√	√
TH2825	√	×	√	×	√	√	√	√	×

TH2825A	✓	×	✓	✓	✓	✓	✓	✓	×
TH2816A	✓	×	✓	×	✓	✓	✓	×	×
TH2817A	✓	×	✓	×	✓	✓	✓	×	×
TH2816B	✓	×	×	×	✓	✓	✓	×	×
TH2817B	✓	×	×	×	✓	✓	✓	×	×
TH2817C	✓	×	×	✓	✓	✓	✓	✓	×
TH2817	×	×	×	×	✓	×	✓	×	×
TH2810B	×	×	×	×	✓	×	✓	×	×
TH2810D	×	×	×	×	✓	×	✓	×	×
TH2811D	×	×	×	×	×	×	×	×	×
TH2811C	×	×	×	×	×	×	×	×	×
TH2820	×	×	×	×	×	×	×	×	×
TH2821/A	×	×	×	×	×	×	×	×	×
TH2821B	×	×	×	×	×	×	×	×	×

VI. Measurement Accessories (Test Fixture or Lead)

No.	Model & Name	Note	
1	TH26001 4-terminal test fixture	Used to measure 2-terminal axial components	
2	TH26004-1 4-terminal Kelvin low-ohm test clip leads	Not used for 4-terminal instruments, such as TH2828, TH2828A, TH2828S	
3	TH26004E-1 inductance bias source connection lead	Used to connect all LCR instruments and Tonghui inductance bias source, such as TH1772A, TH1772B, TH1773, TH1775	
5	TH26005 4-terminal test fixture	Used to measure 2-terminal axial components, and used to measure axial components with TH26006 together Be cautious to use it to TH2828, TH2828A, and TH2828S.	

6	TH26005-1 4-terminal axial pair test fixture	Used to measure 2-terminal axial components, and used to measure axial components with TH26006 together, especially for TH2828, TH2828A, TH2828S, and TH2818	
7	TH26006 axial component test fixture	Should be used with TH26005, TH26005-1 together	
8	TH26007 core inductor test fixture	Used to measure small magnetic-loop inductance with one turn, and could be customized according to requirements.	
9	TH26008 SMD component test fixture	SMD component test fixture, especially used for small high-frequency capacitance or inductance When frequency $\geq 100\text{kHz}$, capacitance $\leq 3\text{pF}$, or inductance $\leq 1\mu\text{H}$, this SMD test fixture is the best choice.	
10	TH26009 SMD Kelvin test tweezers	Used to measure SMD components	
11	TH26010 gilded shorting plate	Used to perform short correction of LCR measurement instruments	
12	TH26011 4-terminal Kelvin test clip leads	Not used for instruments with 4-terminal pair, such as TH2828, TH2828A, and TH2828S	

13	TH26011A 4-terminal pair Kelvin test clip leads	Used for instruments with 4-terminal pair, such as TH2828, TH2828A, and TH2828S Better measurement result obtained if used for other LCR instruments	
14	TH2602 4-terminal Kelvin test clip leads	Particularly used for TH2821, TH2821A, TH2821B portable LCR meters	
15	TH26029 SMD component test fixture	Particularly used for TH2821, TH2821A, TH2821B portable LCR meters to measure SMD components	
16	TH26029A SMD component test tweezer	Simple SMD component test tweezer	

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