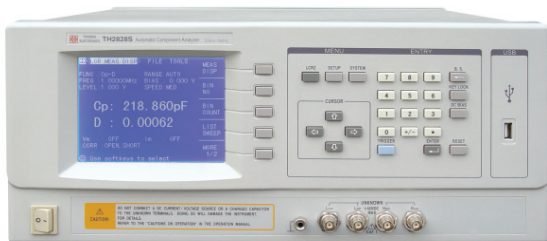


Component Parameter Test Instruments

A. TH2828/TH2828A Precision LCR Meter TH2828S Automatic Component Analyzer

Features

- Auto balancing bridge method with the widest impedance measurement range
- 4-terminal pair configuration to eliminate electromagnetic couple of test leads
- Basic accuracy: 0.05 % (TH2828/TH2828S), 0.1 % (TH2828A)
- Maximum test frequency up to 1 MHz
- AC test signal programmable to 20V (optional)
- Maximum measurement speed up to 30 meas/sec
- 6-digit display resolution
- 22 parameter combinations available
- Output signal Impedance: 30 Ω and 100 Ω selectable
- 10 points list sweep function
- Internal DC bias source $\pm 40V/100mA$ (optional)
- External DC bias 40A (optional two paralleled TH1776)
- Automatic level control function (ALC)
- Test signal level monitor function
- 20 control settings files can be saved in the internal non-volatile memory
- Built-in comparator:10-bins and bin counters
- RS232C, HANDLER, GPIB (option for TH2828A)
- 2m/4m cable length extension
- USB interface for external memory of set data
- 320 \times 240 dot-matrix large graphic LCD display
- Chinese and English language user interface selectable



TH2828/TH2828A/TH2828S

Brief Introduction

■ TH2828/TH2828A/TH2828S is a new generation impedance test instrument with the most advanced technique of auto balancing bridge in the world. It fulfills all the measurement needs for components and materials with its high basic accuracy (0.05%/0.1%), wide frequency range (from 20 Hz to 1MHz) and impedance range (up to 100M Ω). The instrument is especially suitable for low dissipation factor(D) capacitor and high quality factor (Q) inductor measurement. The high power measurement conditions of up to 20V test signal level and 40 A DC bias current and list sweep function make it easy to extend user's capability of component evaluation. Four-terminal pair terminal configuration which eliminates the electromagnetic coupling of test leads, extends the low impedance measurement range ten times down of the normal five-terminal configuration instrument. TH2828/TH2828A/TH2828S is a powerful tool for component design, component inspection, quality control and measurement on production line. It's also a powerful tool for design and research of circuit and materials (electronic material and non-electronic material).

With its excellent performance, TH2828/TH2828A/TH2828S is in conformity with commercial and military standards, for example IEC and MIL standards.

Specifications

Measurement function		
Test Parameters	Z , Y , C, L, X, B, R, G, D, Q, θ , ESR (equivalent series resistance), Rp (equivalent parallel resistance) 22 parameter combinations available	
Equivalent Circuit	Series and Parallel	
Math Function	Deviation and Percent Deviation	
Range	Mode	Auto, Hold, Manual
	Subsection	9 sects: 10 Ω , 30 Ω , 100 Ω , 300 Ω , 1k Ω , 3k Ω , 10k Ω , 30k Ω , 100k Ω
Trigger mode	Internal, Manual, External, BUS	
Measuring Time ($\geq 1kHz$)	Fast : 32ms (25ms@1MHz), Med: 90ms, Slow: 650ms	
Average Time	1—255	
Delay Time	0—60s, with step of 1ms	
Calibration Function	Open/Short frequency pint, full frequency correction, Load correction	
Measurement Terminal	4 terminal pair	
Test Cable Length	Standard: 0m, 1m Option: 2m, 4m	
Display mode	Direct, Δ , $\Delta\%$, bin No, bin counter, list sweep, V/I (voltage/current monitor)	
Display	320 \times 240 dot-matrix graphic LCD display	
Test signal		
Signal Frequency	TH2828	20 Hz – 1MHz 6000 selectable frequencies
	TH2828A	50Hz – 1MHz 44 selectable frequencies : 50Hz, 60Hz, 80Hz, 100Hz, 120Hz, 150Hz, 200Hz, 250Hz, 300Hz, 400Hz, 500Hz, 600Hz, 800Hz, 1kHz, 1.2kHz, 1.5kHz, 2kHz, 2.5kHz, 3kHz, 4kHz, 5kHz, 6kHz, 8kHz, 10kHz, 12kHz, 15kHz, 20kHz, 25kHz, 30kHz, 40kHz, 50kHz, 60kHz, 80kHz, 100kHz, 120kHz, 150kHz, 200kHz, 250kHz, 300kHz, 400kHz, 500kHz, 600kHz, 800kHz, 1MHz
	TH2828S	20Hz—1MHz, Resolution: 1mHz
	Accuracy	0.01%
Output Impedance	30 Ω and 100 Ω selectable	

Component Parameter Test Instruments

A. TH2828/TH2828A Precision LCR Meter TH2828S Automatic Component Analyzer

Measurement signal mode	Normal	voltage or current program selectable at the measurement terminals when they are opened or shorted, respectively	
	Constant level	Maintain selected voltage or current value at the DUT independent of component impedance change	
AC measurement level signal	Standard	Normal V Normal I	5mVrms — 2Vrms 50μArms — 20mArms
		Constant level V Constant level I	10mVrms — 1Vrms 100μArms — 10mArms
	Option TH10301	Normal V Normal I	5mVrms — 20Vrms 50μArms — 200mArms
		Constant V Constant I	10mVrms — 10Vrms 100μArms — 100mArms
DC bias	Standard	0V, 1.5V, 2V DC	
	TH10301 option	Range	Resolution
		±(0.000 — 4.000)V DC	1mV
		±(4.002 — 8.000)V DC	2mV
		±(8.005 — 20.000)V DC	5mV
Measurement Display Range			
Z , R, X	0.01mΩ — 99.9999MΩ		
Y , G, B	0.01nS — 99.9999S		
C	0.00001pF — 9.99999F		
L	0.01nH — 99.9999kH		
D	0.00001 — 9.99999		
Q	0.01 — 99999.9		
θ (DEG)	-179.999° — 179.999°		
θ (RAD)	-3.14159 — 3.14159		
Δ%	-999.999% — 999.999%		
List Sweep Function			
A maximum of 10 frequency or test signal level points can be swept. Single or continuous test mode can be performed. When Option 001 is installed, DC bias level points can also be swept.			
Comparator and interface			
Comparator	10-bin sorting and bin counter for measurement parameters IN/OUT judgment for sub parameters		
Bin counter	0—999999		

List sweep comparator	HIGH/IN/OUT decision output for each point in the list sweep table	
Input protection		
Internal circuit protection, when a charged capacitor is connected to the Unknown terminals. The maximum capacitor voltage can be calculated: $V_{max} = 1/\sqrt{C}$ where: $V_{max} \leq 200V$ C is in Farads		
Other Function		
Memory	20 instrument setting files can be stored/loaded from the internal non-volatile memory. 40 additional setting files can also be stored/loaded from USB disk(only TH2828S)	
GPIO, RS232C	All instrument control settings, measured values, comparator limits and list sweep tables can communicate with computer or other instruments through GPIO (optional for TH2828A) or RS232C.	
Options		
TH10301	Power amplifier/DC Bias Increasing AC test signal up to 20 Vrms/0.2 Arms. Extend bias voltage up to ±40V DC	
TH10401	2m/4m Cable Length Operation Extend test cable length capability. Adds 2m and 4m cable length operation.	
TH10202	Handler interface Nine pairs of High/Low limits can be input providing 10-bin sorting for L, C, or Z . The handler interface provides the interface with an automatic component sorting machine. All signals are optically isolated.	
Accuracy(For detail refer to operation manual)		
Test conditions	Warm up Time	≥30 minutes
	Ambient Temperature	23±5°C
	Test Signal Voltage	0.3Vrms — 1Vrms
	Correction	Open, Short
	Test cable length	0 m
Z , Y , C, L, X, B, R, G,	Ae = ±[A+(Ka+Kb+Kc)×100] (% of reading)	
	1. A is basic accuracy factor as in figure 1 and 2	
	2. Ka and Kb is impedance proportional factors Ka is use for impedances below 500Ω Kb is use for impedances below 500Ω	
	3. Kc is calibration interpolation. Direct correction frequencies: Kc=0, All Other frequencies :Kc=0.0003	
	4. D ≤ 0.1, for C, L, B measurement Q ≤ 0.1, for R, G measurement	
D	±[Ae/100] (direct reading of D) Here, A=[A+(Ka+Kb+Kc)×100]	
Q (Qx×De<0.1)	± $\left[\frac{Q_x^2 \times D_e}{1 + m(Q_x \times D_e)} \right]$ Here, Qx is measured Q value, De is the D's accuracy	
θ	DEG	±[Ae/100] (direct radian)
	RAD	±[(180/π)×(Ae/100)] (direct angle)

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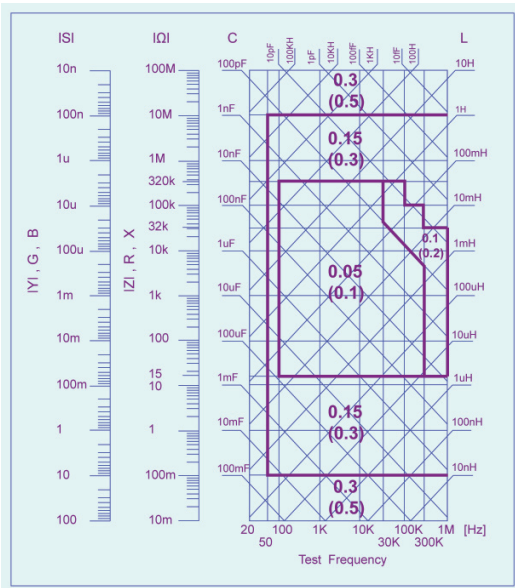


Figure 1: Basic accuracy factor A of TH2828/TH2828S

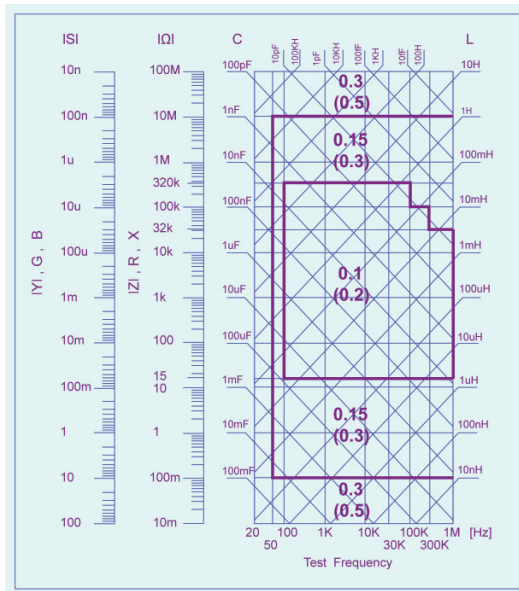


Figure 2: Basic accuracy factor A of TH2828A

Note: 1. Test signal level: 0.3Vrms-1Vrms, Out of this range, refer to user's manual.
2. Upper number: MEDIUM and SLOW integration
3. Lower number: SHORT integration.

General Specifications

Operation Temperature And Humidity		0°C - 40°C, ≤ 90%RH
Power Requirements	Voltage	99V-121V AC, 198V-242V AC
	Frequency	47.5Hz - 63Hz
Power Consumption		≤ 100VA
Dimensions (W×H×D)		430mm×185mm×490mm
Weight		Approx. 15 kg

Ordering Information

TH2828 Precision LCR Meter
TH2828A Wide-frequency LCR Meter
TH2828S Automatic Component Analyzer

Instrument Accessories

TH26005C 4 terminal test fixture
TH26011B 4 terminal pair Kelvin test clip leads
TH26010 Gilded shorting plate
TH10002 GPIB interface board (only TH2828S)
TH26025 USB interface board (only TH2828S)
TH26026 2GB USB disk (only TH2828S)

Options

TH26047 4 terminal test fixture
TH26048 4 terminal test fixture
TH26006 Axial component test module
TH26007A Core inductor test fixture
TH26008A SMD component test fixture
TH26009B SMD Kelvin test tweezers
TH10301 20Vrms/40V DC power amplifier /DC bias board
TH10401 2m/4m cable length operation
TH10002 GPIB interface board
TH10202 Handler/Scanner interface board
TH12019 TH2828 RS232C control software
TH12020 TH2828A RS232C control software