TECHMIZE by TONGHUI

OM

OPERATION MANUAL

TH2852 / TH2853 Series

RF Precision Impedance Analyzer (TH2852) & RF LCR Tester (TH2853), 1 MHz–5 GHz. Covers front-panel operation, user calibration, measurement setup and system configuration; see the separate TH2852/TH2853 Series SCPI Command Reference for the full remote-command set.

Techmize Electronic GmbH · Ismaning, Germany
Rev. 2026-09

TH2852 / TH2853 Series Operation Manual

RF Precision Impedance Analyzer & RF LCR Tester — 1 MHz to 5 GHz

This manual covers the Techmize TH2852 series (Precision Impedance Analyzer) and TH2853 series (RF LCR Tester). Functions that are specific to TH2852 are marked **TH2852 only** throughout; see §1.10 for the function comparison.

Part I — Operation	
1. Safety & Compliance	3 pages
2. Out of the Box	1 page
3. Getting to Know the Instrument	4 pages
4. User Calibration	3 pages
5. Point Measurement	3 pages
6. List Measurement	2 pages
7. Curve Sweep Measurement	5 pages
8. Save & Load Data	2 pages
9. System Setup	2 pages
10. Performance & Specifications	3 pages
Part II — Remote Control & Handler	
11. Remote Control Overview	2 pages
12. Handler Interface (Optional)	3 pages
Appendix — Terms, Symbols & Quick Reference	2 pages

The full SCPI command set (~300 commands) is documented separately in the TH2852/TH2853 Series SCPI Command Reference — see §11.

CHAPTER 1

Safety & Compliance

1.1 About this manual

This is the operation manual for the Techmize TH2852 series (Precision Impedance Analyzer) and TH2853 series (RF LCR Tester), covering the five frequency-range models in each series: **-050, -100, -200, -350** and **-500** (1 MHz–500 MHz up to 1 MHz–5 GHz). Where this manual and the instrument itself appear to disagree, or where a described function is not present on your particular model, contact Techmize or your authorized distributor using the details in §1.9 before relying on the instrument for measurement decisions.

Techmize continually improves the performance, features and construction of its instruments; content, specifications and accessories described here are subject to change without notice. This manual does not necessarily describe every optional accessory or every firmware revision.

1.2 Safety symbols used in this manual

The following symbols and signal words appear in this manual and on the instrument itself:

WARNING — a hazard that, if not avoided, could result in personal injury or death.

CAUTION — a hazard that, if not avoided, could damage the instrument or the device under test, or invalidate a measurement.

NOTE — supplementary information that helps with correct or efficient use, but is not itself a hazard.

Protective ground — this terminal must be connected to protective earth. Also printed on the instrument chassis ground terminal.

> **WARNING**
> To prevent electric shock or damage to the instrument, ensure the protective-earth conductor of the supply cable is reliably connected to ground before applying power.

1.3 Operating environment & fuse rating

Item	Requirement
Supply voltage	100–120 V AC or 198–242 V AC, selected by the rear-panel fuse-holder switch
Supply frequency	47–63 Hz
Power consumption	≤80 VA
Operating temperature / humidity	5–40°C, ≤75% RH (for rated accuracy)
Storage temperature / humidity	−20–60°C, ≤85% RH, in the original packaging or similar, away from corrosive contaminants and direct sunlight
Warm-up time	30 minutes before relying on the accuracy specifications in §10

> **WARNING**
> Confirm the fitted fuse matches the supply-voltage range selected on the rear-panel fuse holder before connecting power.

Avoid dusty, vibrating, or corrosive-gas environments and direct sunlight. Do not block the left/right ventilation openings on the rear panel — restricted airflow allows internal temperature to rise and can degrade accuracy. If mains conditions are noisy, fit a power-line filter ahead of the instrument. Keep test leads and the device under test away from strong electromagnetic fields, which can interfere with measurement.

1.4 Test fixtures & test leads

Use only Techmize-supplied test heads, fixtures and cables (see the datasheet or the Technical & Applications Guide §12 for the accessory list); user-made or third-party fixtures and cables can produce incorrect measurements. Keep the test fixture/cable and the leads of the device under test clean, so the device makes good contact with the fixture. For a device with a shielded enclosure, the shield may be connected to the instrument's chassis-ground terminal.

> **NOTE**
>
> With no test head or test fixture connected, the instrument displays an unstable measurement result — this is expected, not a fault.

1.5 Power switch & general handling

Use the front-panel power button to switch the instrument on and off. Do not disconnect the supply cable before the instrument has fully powered down — doing so can damage internal hardware and shorten the instrument's service life.

The instrument runs on an embedded PC platform. Installing additional third-party software on it is not recommended, as this can interfere with normal operation. If the instrument will be connected to the internet (e.g. via the rear-panel LAN port for remote control), installing antivirus software is recommended.

1.6 Touch screen care

The 10.1" touch screen is operated by finger touch. Do not press on the screen surface with a sharp object (a toothpick, pen tip, screwdriver, etc.) — this can damage the screen or create dead spots.

> **NOTE**
>
> A touch-screen active-pixel ratio above 99.998% is within specification; fewer than 0.002% dead pixels is not considered a screen defect.

1.7 WEEE — disposal of electrical and electronic equipment



This symbol indicates that the instrument must not be disposed of as unsorted municipal waste at the end of its service life. Within the European Union, return the instrument to Techmize, your distributor, or a designated collection point for electrical and electronic equipment, in accordance with the WEEE Directive (2012/19/EU) and its national transposition in your country.

1.8 Warranty

Techmize warrants this instrument to be free from defects in material and workmanship for a period of **two (2) years** from the date of delivery to the original purchaser. During the warranty period, Techmize will repair or replace, at its discretion, a product that proves defective, provided it has been used within the specified operating conditions.

This warranty does not cover: damage from misuse, accident, unauthorized modification or repair; consumable/wear items such as fuses and connectors; or damage from operation outside the environmental limits given in §1.3. Standard test heads, fixtures and cables are covered by their own applicable warranty terms.

1.9 Manufacturer & EU contact

Techmize Electronic GmbH

Office 125–126, Regus
Carl-Zeiss-Ring 15a, 85737 Ismaning, Germany
An international subsidiary of Changzhou Tonghui Electronic Co., Ltd. (China)

Contact

Mobile: +49 171 4981898
Email: dx.han@tonghui.com.cn
Web: en.tonghui.com.cn

Registration

Managing Director: Haohua Zhao
Register Court: Amtsgericht München
HRB 312530 · VAT ID DE463170824

1.10 Scope of models covered

This manual covers all ten models of the TH2852/TH2853 platform:

Series	Models	Role
TH2852	TH2852-050 / -100 / -200 / -350 / -500	Precision Impedance Analyzer — full analysis suite (curve-sweep cursors, statistics, equivalent-circuit analysis, Smith chart, curve trace comparison)
TH2853	TH2853-050 / -100 / -200 / -350 / -500	RF LCR Tester — point, list and fixed-grid curve-sweep measurement; the deeper curve-sweep analysis tools listed above are not available

Throughout this manual, a function marked **TH2852 only** is understood not to be available on TH2853. Everything else is described as common to both series. The suffix (-050/-100/-200/-350/-500) sets only the test-frequency ceiling (§10) and does not otherwise change instrument behaviour.

CHAPTER 2

Out of the Box

2.1 Unpacking

Check the contents of the shipping carton against your order before use. If the carton or its contents show signs of transport damage, do not power on the instrument — contact your carrier and your Techmize distributor before proceeding. If anything is missing, contact your Techmize distributor.

1× TH2852 or TH2853-series RF impedance instrument (model as ordered) · 1× EU power cable (Schuko, CEE 7/7) · 1× test head (TH2852-1, 0 m, standard with TH2852 models; TH2852-1A, 1 m, standard with TH2853 models) · spare fuse · test report · warranty certificate. This operation manual and the SCPI Command Reference are provided as PDF documents, not printed copies.

Keep the original packaging: it is the recommended way to store or return the instrument, and storage outside this packaging should still meet the environmental limits given in §1.3.

2.2 Connecting the power supply

Match the phase (L), neutral (N) and protective-earth (E) leads of the supply cable to the instrument's power inlet. Set the rear-panel fuse-holder switch to the supply range in use (100–120 V AC or 198–242 V AC) and confirm the fitted fuse matches that range before connecting, as described in §1.3.

2.3 Connecting the test head or fixture

Connect the test head or fixture to the front-panel test port before powering on and beginning measurement (§1.4). If you are using a fixture other than one from the standard Techmize selection, set it as TH2852-1 in the user-calibration menu and run a fixture calibration (§4) so the instrument's compensation model matches what is actually connected.

2.4 Warm-up

Allow at least **30 minutes** of warm-up before relying on the accuracy specifications in §10. Avoid switching the instrument on and off in quick succession, as this can leave internal data in an inconsistent state.

CHAPTER 3

Getting to Know the Instrument

3.1 Front-panel key groups

The front panel is organized into function-key groups, a numeric entry pad, a 10.1" capacitive touch screen and the RF test-port interface.

CHANNEL/TRACE — curve-sweep mode and channel/trace selection

- `Sweep` switches the display to curve-sweep mode.
- `Channel Prev` / `Channel Next` activate the previous/next channel in curve-sweep mode; only an activated channel's settings can be edited.
- `Trace Prev` / `Trace Next` activate the previous/next trace on the current channel.
- `Channel Max` toggles the active channel's display window between normal (all channels shown side by side) and maximized (the active channel fills the display; inactive channels keep measuring but are hidden).
- `Trace Max` does the same for the active trace within its channel window.

STIMULUS — sweep source & range (curve-sweep mode)

- `Sweep Setup` opens the sweep-setup menu (source parameters, sweep time, number of points).
- `Sweep Type` opens the sweep-mode menu for the active channel.
- `Start` / `Stop` / `Center` / `Span` open the sweep-range menu with the cursor positioned in the corresponding field.

MKR/ANALYSIS — cursors & curve analysis *(TH2852 only)*

- `Marker` opens cursor setup — up to 10 cursors per trace.
- `Marker Search` moves a cursor to a specific point on the curve (max/min, peak/valley, target value).
- `Marker Function` sets the sweep range from cursor positions and toggles statistics display.
- `Analysis` opens curve-sort (limit-line) setup and equivalent-circuit analysis/fitting.

RESPONSE — display & measurement response (curve-sweep mode)

- `Meas` sets each trace's measurement parameter and toggles the bias-monitor display.
- `Format` changes each trace's Y-axis parameter type; `Scale` sets Y-axis distribution/zoom (reference position, divisions).
- `Display` sets channel/trace display mode, number of traces, and value memory.
- `Avg` sets sweep speed and moving-average count/on-off; `Cal` opens user calibration.

LCR METER — point/list mode

- `LCR` switches the display to point-measurement mode.
- `Meas` opens measurement setup (frequency, trigger mode, source); `Display` opens the measurement-parameter menu (point or list mode).
- `Point/List` toggles between the point and list-sweep screens; `Cal` opens user calibration.
- `DC Bias` toggles the DC-bias output on/off (indicator lamp follows the state).

ENTRY — data entry

- Numeric keys [0]–[9] and [+/-] enter values and sign.
- [T/p], [G/n], [M/µ], [k/m], [x1] apply an order-of-magnitude unit — the instrument picks whichever of the key's two magnitudes fits the value entered; [x1] applies no unit.
- [Esc] cancels a long-running operation (e.g. calibration) or a value entry in progress; [BS←] backspaces.
- [Help] opens the on-instrument help; also used to unlock the front panel/screen after remote-control lock (§11).

INSTR STATE & TRIGGER

- [Save/Recall] opens the save/load menu for measurement setup and results (separate menus for LCR and sweep modes, §8).
- [System] opens system setup (§9); [Preset] restores the configured preset state after confirmation — factory defaults or a saved user state, as set in Reset Settings (§9.5).
- [Trigger Mode] opens trigger-mode setup; [Hold] holds the current measurement; [Trigger] issues one manual trigger.

JUDGEMENT indicators & navigation

Pass / **Fail** are indicator lamps (not buttons) showing the binning result. The direction keys and jog wheel move the entry cursor and adjust a value being entered — the wheel in fine steps, the up/down keys in coarse steps, left/right keys to move the entry position.

Power switch, touch screen, test port & USB

The power button lights when the instrument is on. The 10.1" capacitive touch screen displays readings, curves, scale graduations, settings and softkeys, and is operated by finger touch (see §1.6 for care instructions). The front-panel test port is the RF signal port for connecting the test head. Two front-panel USB ports accept a mouse, keyboard or storage device.

3.2 Rear panel

Item	Description
Mainboard interfaces	General-purpose embedded-PC connectors: USB, video output (mirrors the screen to an external display), audio in/out, LAN (network communication and remote control)
Ground terminal	Connected to the chassis, for protective/shield grounding
Power inlet	AC mains input
Fuse holder	Houses the fuse; switch selects 110 V / 220 V range
HANDLER interface	Handler signal input/output (§12)
Serial label	Manufacturing date, manufacturer and instrument serial number
USB Device port	Serial-style USB communication interface
RS-232 port	Serial communication interface
GPIB port	GPIB communication interface

3.3 Screen areas overview

The instrument offers a range of measurement and setup screens. The main ones are:

Group	Screen	Shows
Measurement	Point-measurement screen	The measured parameters and result for the current test point
	List-measurement screen	All list points and their results, in a table
	Sweep-measurement screen	The curve plotted from the sweep points and their results, on axes
Setup	User-calibration screen	All user calibration points and their calibration values, in a table
	Fixture-calibration screen	Step-by-step fixture calibration prompts
	Point-sort setup screen	Point-measurement binning settings
	List setup screen	All pending list points and their settings, in sequence
	List quick-edit screen	Fast batch-editing of list points
	List-sort setup screen	List-sweep binning settings
	Sweep-sort / sweep-segment setup screens	Curve-sweep binning parameters and segmented-sweep definitions

3.4 Point-measurement screen layout

Pressing LCR opens the point-measurement screen, which shows:

Channel numbers — up to 8 channels, each with its own test conditions and parameters; the active one is highlighted. Tap a channel number to switch.

Test conditions — frequency, speed, level, DC bias and averaging count for the active channel; tapping opens Measurement Setup at that field.

AC/DC monitor — live AC/DC current and voltage readings; the monitor mode is set from Measurement Setup.

Menu name / menu — the current softkey menu's title and its buttons; an arrow opens a submenu, a filled square marks the active choice.

Time display — current system date/time.

Measurement parameters & results — up to 4 parameters shown at once; tap to change which parameters are displayed.

Device-status indicators

Indicator	Meaning
Lock (red)	Front panel and screen are locked
User O·S·L (blue)	User open/short/load calibration is enabled
Bias (red)	DC bias output is on
Pass (green) / Fail (red)	Binning result
Fixture O·S·L (blue)	Fixture open/short/load calibration is enabled
Meas / Manual / External / Bus (blue)	Current trigger mode — internal (continuous), manual, external, or bus

CHAPTER 4

User Calibration

User calibration removes measurement error introduced by the test fixture, test leads and similar sources, and should be performed before starting measurement. Press Cal to open the calibration screen: the left side lists the calibration points (TH2852/TH2853 provide **20 user calibration points**, each independently switchable with its own frequency and calibration values); the right side is the calibration menu for full-range calibration and its on/off controls.

4.1 Selecting the test fixture

Set the calibration screen's fixture selection to match the fixture actually in use. The default is **TH2852-1**. If you are using a custom fixture, or one not in the selectable list, set the fixture to TH2852-1 and run a fixture calibration (§4.3) instead of relying on a preset fixture profile.

4.2 Full-range user calibration

Each of open, short and load calibration has its own on/off switch and its own full-range zeroing/calibration step:

Step	What it does
Open — switch	When off, the instrument's default open data is used; when on, your full-range and per-point open data is used instead
Open — full-range zero	Connect the open standard to the test head, then run the zero; it overwrites the existing full-range open data and switches the open calibration on automatically
Short — switch / full-range zero	Same logic as open, using the short standard
Load — switch	When off, load calibration is skipped entirely during measurement; when on, your full-range and per-point load data is used
Load — full-range calibration	Mount a characterized load standard with a known reference value (a traceable resistor/capacitor/inductor, not simply a component similar to the DUT) close in impedance to the device under test, then run the calibration

> **CAUTION**
>
> A full-range zero/calibration overwrites the existing full-range data for that step. Back up your existing calibration data first if you may need to restore it. Press Esc at any time during a zero/calibration step to abort.

4.3 Fixture calibration

Fixture calibration follows the same open/short/load logic as §4.2, but compensates for the test fixture itself rather than the test head — use it when the fixture in use is not one of the standard Techmize fixture profiles (§4.1).

4.4 Port extension

Port extension compensates for the electrical length of cabling between the calibration reference plane and the actual device under test — useful when the DUT cannot be reached directly at the test head. Set the port-extension value from the calibration menu.

4.5 DC resistance (DCR) calibration

DCR calibration zeroes the DC-resistance measurement path independently of the AC open/short/load calibration above: connect a short circuit at the test head and run it from the calibration menu (invoked as a "DCR measurement" in the underlying command — see SCPI Command Reference §3) when DCR is part of your measurement parameter set. The DCR on/off switch reverts to off automatically if no DCR calibration data exists yet.

4.6 Electrical-length setting

The electrical-length setting works together with automatic electrical-length measurement to extend accurate RF-IV impedance measurement out to the instrument's full frequency ceiling over a practical test-head cable length (see the datasheet and technical guide for background). Set or measure the electrical length from the calibration menu before relying on accuracy at the top of the frequency range.

4.7 User calibration points

Each of the 20 user calibration points can be configured independently:

- **On/off** — toggle whether that point participates in calibration.
- **Load parameters** — the model (R, C or L) and nominal value of the load standard used at that point.
- **Frequency** — the test frequency the point calibrates.
- **Load reference value** — the known reference value for the load standard at that point.
- **Open / short zero** — per-point open and short zeroing.
- **Load calibration** — per-point load calibration against the reference value above.

Per-point calibration is most useful when a handful of specific frequencies (for example, a crystal resonator's nominal test frequency) need the tightest possible accuracy, in addition to or instead of a full-range sweep calibration.

CHAPTER 5

Point Measurement

Point measurement is the default working mode: set a frequency, level and (optionally) DC bias, and the instrument continuously measures the selected parameters at that single point. Press [Preset] before starting if you want to restore the instrument's configured preset state; whether that is the factory default or a saved user state depends on the Reset Settings in §9.5, so check there first if you specifically need factory defaults.

5.1 Channels

The point-measurement screen provides **8 channels**; each can hold its own test conditions and parameter set, so several different measurement setups can be kept ready and switched between with a tap on the channel button.

5.2 Test conditions

Setting	How to set it
Frequency	Tap the frequency field (or [Meas] → Measurement Setup), then enter a value — e.g. [1] [G/n] for 1 GHz — or adjust with the arrow keys/jog wheel
Speed	Tap the speed field and choose a level; slower speeds average more and are more precise (§10.6)
Averaging count	Tap the averaging field and enter a count, e.g. [1] [x1] for 1
Level	Tap the level field; level can be entered as power, voltage or current depending on the selected source mode — the other two are computed and shown automatically
DC bias	Tap the bias field to set a voltage (default) or current bias value; press [DC Bias] or the on-screen bias switch to enable/disable it — the bias value only takes effect while the switch is on

Automatic level control (ALC)

ALC keeps the actual signal level at the DUT close to the set value despite varying DUT impedance. From the level menu, open ALC setup: toggle ALC on/off, set the maximum retry count (**2–10**), and set the accuracy target (**0.05–10%**).

5.3 Trigger

Trigger source	Behaviour
Internal	Continuous free-running trigger — the next measurement starts as soon as the previous one finishes
External	Triggered by the HANDLER interface (§12)
Manual	One measurement per press of the front-panel **Trigger** key
Bus	Triggered by a command received over GPIB/LAN/USB

Set the trigger source from **Trigger Mode**. A trigger delay can be set from Measurement Setup → Trigger Delay.

5.4 Measurement parameters

Up to 4 parameters can be shown at once. Open Measurement Setup → Measurement Parameters, select which of Parameter 1–4 to change, then choose from:

|Z|, |Y|	Impedance / admittance magnitude	θz, θy (rad/deg)	Impedance / admittance phase
Rs, Rp, Ls, Lp, Cs, Cp	Series/parallel equivalent-circuit R, L, C	R, G, X, B	Equivalent-circuit resistance, conductance, reactance, susceptance
Q, D	Quality factor, dissipation factor	Γx, Γy, |Γ|, θΓ	Reflection-coefficient real/imaginary/magnitude/phase
VSWR	Voltage standing-wave ratio	εr′, εr″, |εr|	Relative permittivity (dielectric-constant option, §10) — **TH2852 only**
μ′, μ″, tanδ	Relative permeability, loss tangent (permeability option, §10) — **TH2852 only**		

\|Y\|, Γ, Z, Y and VSWR are not available as measurement parameters on TH2853; the dielectric-constant and permeability parameters above are TH2852-only options regardless.

5.5 Result display mode

Each parameter can be shown as its direct measured value, or relative to a reference value (delta mode) — as a plain difference or as a percentage difference:

Mode	Displayed result
Off	Measured value
Delta	Measured value − reference value
Percent delta	(Measured value − reference value) × 100% / reference value

Set the mode and reference value per parameter from Measurement Setup → Measurement Parameters; "Data → Reference" copies the current reading in as the reference value.

5.6 Binning (sorting) by measurement result

Point measurement supports automatic binning against limits you define — 9 configurable bins (BIN1–BIN9) plus an OUT category for results that match no bin:

1. Choose which measurement parameter(s) drive the sort decision.
2. Set the operating mode (off / delta / percent-delta, §5.5) and reference value the limits are measured against.
3. Enter the high/low limit for each bin. Bins can be copied, pasted and cleared as a group to speed up setup across similar parts.
4. Switch individual bins on/off as needed, and designate which bin represents a failing/out-of-tolerance part.
5. Turn sorting on and switch to the sort-result display to run production testing; the Pass/Fail lamps and the bin-count display track results live.

A dedicated bin-count display accumulates pass/fail/per-bin counts across a production run, independent of the live measurement screen.

CHAPTER 6

List Measurement

List measurement runs point-style measurement across a table of up to **1,601 points**, each with its own frequency, level, DC bias and averaging conditions — useful for characterizing a component across several different operating points in a single triggered run. Settings largely mirror point measurement (Chapter 5); this chapter covers what is different.

6.1 Channels & adding points

Like point measurement, the list screen provides **8 channels**. Within a channel, add measurement points from the list-setup screen; each new point can be edited individually, or several points can be batch-edited from the list quick-edit screen for faster setup of long lists.

6.2 Per-point settings

Setting	Notes
Speed	One speed setting applies across the whole list sweep
Frequency	Set independently per point
Averaging count	Set independently per point
Level	Set independently per point (power/voltage/current, as in §5.2)
DC bias	Set independently per point

6.3 Trigger & measurement delay

List measurement uses the same four trigger sources as point measurement (§5.3): internal, external (HANDLER), manual and bus. Two measurement modes are available — sweep the whole list on each trigger, or step one point per trigger — and each point can carry its own measurement delay.

6.4 Measurement parameters

Parameter selection works as in point measurement (§5.4), with exactly the same TH2853 exclusions and TH2852-only option restrictions stated there.

6.5 Binning (sorting)

List-sweep binning follows the point-measurement model (§5.6), with one difference: bin outputs and the pass/fail decision apply once the complete list sweep has finished, not after each individual point — see the list-sweep entry in §12.1.1 for how this affects the HANDLER interface timing.

CHAPTER 7

Curve Sweep Measurement

Curve sweep plots measurement results against a swept stimulus — frequency, level or DC bias — across up to **4 channels**, each showing up to **4 traces** (16 curves in total), with 14 split-screen layouts for arranging them. Press Sweep to enter curve-sweep mode.

> NOTE
>
> TH2853 displays the same multi-channel, multi-trace sweep as a **fixed-grid** plot. Sections below marked **TH2852 only** are not available on TH2853, as marked individually in each heading.

7.1 Initializing a sweep

Three initialization modes are available from the sweep-setup menu, controlling how much of the current channel/trace configuration is reset when a new sweep is set up (full reset, partial reset keeping display settings, or no reset). Choose the mode that best fits whether you are starting a new measurement task or adjusting an existing one.

7.2 Channels & traces

Use Channel Prev/Next and Trace Prev/Next (§3.1) to select which channel and trace you are configuring — only the active channel/trace can be edited. Channel Max and Trace Max toggle maximized display for the active channel/trace; a channel or trace not currently shown keeps measuring in the background.

7.3 Sweep conditions

Setting	Options
Sweep mode	Linear frequency, logarithmic frequency, test level (voltage/current/power), DC bias (voltage/current), logarithmic DC bias (voltage/current), or segmented frequency (§7.4)
Sweep direction	Ascending or descending
Sweep range	Set via Start/Stop or Center/Span (§3.1)
Points	2 to 1,601
Sweep type	Continuous or single

Signal-source level, DC bias and trigger settings for curve sweep follow the same logic as point measurement (§5.2–§5.3), applied to the active channel.

7.4 Segmented frequency sweep

Segmented sweep scans several independently defined frequency segments within a single sweep cycle, each with its own level and bias, and displays the combined result graphically. It is the fastest way to characterize a component across multiple frequency bands of interest without also sweeping the ranges in between that carry no useful information.

> **NOTE**
>
> Typical use: a crystal resonator's resonant, anti-resonant and spurious frequencies need characterizing, but the spans between them do not — segmented sweep measures only the target ranges.

7.5 Display format

Setting	What it does
Measurement parameter	Selects which parameter each trace plots (§5.4 parameter list)
Y-axis format	Sets the Y-axis parameter type/scale for each trace
Curve zoom	Zooms the plotted curve
Curve compare & calculate	Compares traces and computes derived values between them
Source monitor	Monitors the actual signal-source output alongside the curve
Window display	Sets the channel/trace split-screen layout (§7.2)
Smith chart display *(TH2852 only)*	Overlays a Smith chart for impedance-matching visualization

7.6 Cursor analysis *(TH2852 only)*

Up to **10 cursors per trace** (including a reference cursor) can be placed via **Marker**. Each cursor has an excitation value (its X-axis position) and a response value (the corresponding Y-axis reading).

Function	Use
Direct read	Read a cursor's value as an absolute reading, or relative to the reference cursor
Cursor search	Move a cursor to the curve's max/min, to a peak/valley (nearest left, nearest right, or list all), or to a target value (nearest left, nearest right, or list all)
Statistics	Compute statistics (e.g. mean, spread) over the curve or a cursor-defined region
Cursor → range/scale	Set the sweep range or Y-axis scale directly from the current cursor position(s)

7.7 Bandwidth analysis *(TH2852 only)*

Bandwidth analysis locates a peak or notch on the curve and reports its bandwidth at a chosen level below/above the peak — typical for characterizing the resonant bandwidth of a filter or resonator curve.

7.8 Equivalent-circuit analysis *(TH2852 only)*

Real components can be modeled as one of a small set of idealized impedance networks. Equivalent-circuit analysis fits the measured curve to one of **7 basic models** — four three-parameter models and three four-parameter models — and compares the resulting fitted curve against the actual measured curve. Fitting can run automatically or from parameters you enter directly.

Model	Topology	Typically used for
A	L1 ‖ C1 ‖ R1 (parallel)	High-leakage inductors
B	C1 ‖ (L1 in series with R1)	Inductive resistors
C	L1 in series with (C1 ‖ R1)	High-value resistors
D	L1, C1, R1 all in series	Capacitors
E	C0 ‖ (L1, C1, R1 in series)	Resonators (crystal/piezoelectric devices)
F	R0 in series with (L1 ‖ C1 ‖ R1)	Inductor ESR
G	R0 in series with L1, in parallel with (C1 in series with R1)	Capacitors

The fitted model can be exported directly as a TXT file.

7.9 Curve data statistics *(TH2852 only)*

Computes statistical measures (e.g. mean, standard deviation, min/max) across all points of the active curve, for a quick view of measurement spread without exporting data to an external tool.

7.10 Curve sort (limit lines) *(TH2852 only)*

Pass/fail judgment can be applied to the whole scan curve or to selected regions of it, against limit lines you define — commonly used to screen resonance curves, such as verifying the resonant frequency of a piezoelectric device falls within tolerance.

7.11 Curve trace comparison *(TH2852 only)*

Curve trace comparison runs continuous measurement of the device under test, with every captured trace displayed in the same coordinate system. Two typical applications:

Application	What it shows
Multiple different DUTs	Compare curve traces captured under different measurement conditions; set frequency points to compute the measured value of every trace at those points
Same DUT, repeated	Compare repeatability across multiple measurements of the same DUT under identical conditions, using the same frequency-point method

7.12 Cursor sort *(TH2852 only)*

Extends curve sort (§7.10) to evaluate pass/fail directly at cursor positions, rather than only across a defined region — useful when the decision should hinge on the value at one or two specific points (e.g. a resonant peak) rather than the shape of the whole curve.

7.13 Binning (sorting) in curve sweep *(TH2852 only)*

Each of the up to 4 traces on a channel can be sorted independently — via limit lines (§7.10) or cursor sort (§7.12) — so different traces on the same sweep can apply different pass/fail criteria. Binning outputs on HANDLER follow the curve-sweep signal definition in §12.1.1. TH2853's fixed-grid curve sweep has no equivalent binning function.

CHAPTER 8

Save & Load Data

Press Save/Recall from any measurement mode to open the save/load menu (point/list and curve-sweep modes use separate menus).

8.1 Point & list measurement — save/load setup state

Slot	Behaviour
State 01–08	Saves the current setup into the corresponding numbered file
Auto-save	Saved to `SaveData\PointAutorec.sta`, overwritten each time; loaded automatically at startup when Startup Settings (§9) is set to Auto
User-save	Also selectable as the startup/preset source in System Setup (§9)
Save to file	Choose a custom location and file name

A slot button marked with an asterisk (*) already holds a saved file; saving again prompts for confirmation before overwriting. To load, open Load Setup and tap an available (non-greyed) slot, or Load File to browse for any file on disk.

8.2 Screen capture

From the save/load menu, Screen Capture opens a save dialog for the current screen (also reachable via System → Screen Capture). To capture the menu area as well as the measurement display, use the capture button at the top right of the screen — the image is saved automatically to `D:\PrintScreen`.

8.3 Exporting list-measurement data

Export List Data saves the current list's settings and measured results as a **CSV** file to a location and file name you choose.

8.4 Sort-setting files

From the sort (binning) list setup screen, **Export All** saves the current bin configuration as a `.pbi` file; **Import All** loads one back in — useful for keeping a library of binning setups per part number.

8.5 Curve sweep — save/load

Save mode	What is stored
State only	The curve-sweep setup (channels, traces, sweep conditions, display) only
State & curve	The setup plus the currently measured curve data for each channel/trace

Choose the save mode from the save/load menu before saving. You can also limit what is saved to all configured channels/traces, or only those currently displayed — saving only the displayed set reduces file size, but channels/traces left out are not available again on load.

8.6 Channel-state memory & curve-data export

Individual channel states can be stored to and recalled from internal memory slots, independent of the full save/load flow above — useful for quickly comparing two setups without leaving the sweep screen. Curve data itself can also be exported directly, in the same style as list-data export (§8.3), for analysis outside the instrument.

CHAPTER 9

System Setup

Press System to open system setup.

9.1 System calibration

System calibration is the factory-level calibration performed before shipment and directly affects the instrument's measurement accuracy. This screen is password-protected and is not intended for end-user access.

9.2 Device self-test

Test	What it checks
Front-panel test	Displays the front panel graphically; each key press marks a checkmark on that key's icon once confirmed working, and backlit keys flash in sequence during the test
HANDLER test	Toggles each HANDLER line high/low individually by tapping its indicator, or runs an automatic sequential test of every line

9.3 Reset (Preset)

Restores the instrument to its initial state — factory defaults or a saved user state, depending on the reset-source setting in §9.5.

9.4 System information & software update

Shows product name, test-frequency range, manufacturer, software version, serial number, MAC address and IP address (IP shows a valid value only once the LAN port is connected; otherwise it defaults to 127.0.0.1). Software updates are launched from the update link on this screen — select the update package without extracting it first; the instrument closes, updates and restarts automatically.

9.5 Other settings

Setting	What it does
GPIB address	Sets the instrument's GPIB address
Network settings	Enables/disables LAN and sets IP configuration; changes take effect after restarting the software
Serial-port settings	Sets the RS-232 baud rate (§11.3)
Reset settings	Chooses whether Preset restores factory defaults or a saved user state (if no user file exists, factory defaults are used), and whether a confirmation prompt is required
Startup settings	Loads factory defaults, the user-saved state, or the auto-save state at power-on; in auto mode the instrument periodically re-saves its state in the background. If the selected file is missing at startup, the instrument falls back to factory defaults
Startup screen	Chooses whether the instrument opens in point, list or curve-sweep mode at power-on
Keyboard lock	Temporarily locks the front panel/touch screen, e.g. to prevent accidental input during remote operation
HANDLER settings	Active-level polarity, level/pulse signal mode, pulse width (1–1000 ms), and internal/external interface voltage (§12)
Buzzer	Turns the key/button click sound on or off
Curve-sweep colour scheme	Normal or inverted colour display for the chart area, in curve-sweep mode

CHAPTER 10

Performance & Specifications

Specifications apply at 23°C±5°C after a 30-minute warm-up, and include guard-band for expected statistical distribution, measurement uncertainty and environmental variation, unless stated otherwise. *Typical* values describe expected performance for a general unit and are not warranted; *nominal* and *characteristic* values are descriptive only and do not imply a performance level.

10.1 Measurement parameters

Group	Parameters
Impedance	|Z|, θz, |Y|, θy, Cp, Cs, Lp, Ls, Rp, Rs, D, Q, R, X, G, B, DCR, Γx, Γy, |Γ|, θΓ, Γ, Z, Y, VSWR (Γ, Z, Y, VSWR not available on TH2853)
Level monitor	Vac, Iac, Vdc, Idc
Dielectric constant (option, module required — TH2852 only)	|εr|, εr′, εr″
Permeability (option, module required — TH2852 only)	μ′, μ″, tanδ

10.2 Signal source

Frequency	
Range	1 MHz–500 MHz (-050) · 1 MHz–1 GHz (-100) · 1 MHz–2 GHz (-200) · 1 MHz–3.5 GHz (-350) · 1 MHz–5 GHz (-500)
Resolution	1 mHz (TH2852) · 1 kHz (TH2853)
Relative accuracy	±50 ppm (23°C±5°C)

Level	
Power (50Ω load at test port)	−41 dBm to +1 dBm
Current (test port shorted)	0.08 mArms to 10.04 mArms
Voltage (test port open)	4 mVrms to 502 mVrms
Resolution	0.1 dB
Accuracy (power, into 50Ω)	±3 dB ≤1 GHz (23°C±5°C) · ±5 dB >1 GHz (5–40°C)
Output impedance	50Ω nominal

10.3 DC bias

Item	Voltage bias	Current bias
Range	0 to ±40 V (open circuit)	0 to ±100 mA (short circuit)
Resolution	1 mV	2 µA
Source accuracy	±[1% + 5 mV + 20Ω×|Imon|(mA)]	±[1% + 50 µA + |Vmon(V)|/10 kΩ]
Monitor accuracy	±[1% + 10 mV + 2Ω×|Imon|(mA)]	±[1% + 50 µA + |Vmon(V)|/40 kΩ]

Accuracy figures apply when the ambient temperature stays within 23±5°C. Series output impedance: 115 Ω (typical).

10.4 Sweep & trigger

Item	Options
Sweep mode	Continuous, single
Sweep conditions	Linear/log frequency; level (V/I/P); linear/log DC bias (V/I); segmented frequency
Sweep direction	Ascending, descending
Points	2 to 1,601
Trigger type	Continuous, single, averaging
Trigger source	Internal (auto), external (HANDLER), GPIB/USB/LAN (bus), manual (front panel)
Trigger event	Point trigger, sweep trigger

10.5 Measurement time & averaging

Item	Value
Speed levels	0 (fast) to 5 (precise), 6 steps
Averaging types	Point averaging, sweep moving average
Averaging factor	1–999 (integer)
Measurement time interval	0–9999 s

Speed	0	1	2	3	4	5
Time/point (typ., excl. comms)	0.4 ms	4 ms	26 ms	65 ms	130 ms	650 ms

10.6 Measurement accuracy

Item	Value
Reference conditions	23°C±5°C; accuracy plane at the test head's 7 mm connector; measured at the same points used for calibration
Basic accuracy (typical)	±0.3%
Impedance test range	100 mΩ–60 kΩ

Beyond the headline ±0.3% typical figure, detailed piecewise accuracy formulas apply for |Z|/|Y|/θ/D/Q under open-short-load and open-short-low-loss-capacitor calibration, varying by frequency band, test level and calibration type. These formulas involve multiple nested conditions and are not reproduced here in full; contact Techmize for the complete accuracy tables for a specific measurement condition.

10.7 Physical

Item	Value
Dimensions (W×H×D)	428 × 220 × 280 mm
Weight	14 kg

CHAPTER 11 · PART II — REMOTE CONTROL & HANDLER

Remote Control Overview

The instrument can be controlled remotely over any of four interfaces. Starting remote control locks the front panel and touch screen; press Help to unlock.

Interface	Typical use
GPIB	Connects an external controller per IEEE 488.1/488.2, IEC-625, JIS-C1901
LAN	SCPI over a SICL-LAN style connection; default port **5025**
USB	Used as a virtual serial communication interface through the rear-panel USB Device port. For driver and interface-class requirements, contact Techmize or your authorized distributor
RS-232	9-pin D-sub, standard PC serial pinout (§11.3)

11.1 LAN setup

1. Press System → Other Settings → Network Settings.
2. Enable the network connection and set the IP address.
3. Confirm — the instrument prompts to restart the software for the change to take effect.
4. On the controlling PC, set an IP address on the same subnet and connect to port **5025**.

11.2 USB/RS-232 setup

Press System → Other Settings → Serial-Port Settings to choose the baud rate: 9600 (factory default), 14400, 19200, 38400, 57600 or 115200 (9600–115200 supported overall). Confirm the controlling PC's programmable interface supports the rate you select.

11.3 RS-232 pinout (9-pin)

Signal	Symbol	Pin (9-pin)
Request to send	RTS	7
Clear to send	CTS	8
Data set ready	DSR	6
Data carrier detect	DCD	1
Data terminal ready	DTR	4
Transmit data	TXD	3
Receive data	RXD	2
Ground	GND	5

Data format: 8 data bits, 1 stop bit, no parity, terminator `<LF>` (0x0A). A simple 3-wire cable (under 1.5 m) can be made with shielded twin-core cable; on the PC connector, short pins 4–6 and 7–8 together.

> **WARNING**
> Power off before connecting or disconnecting the RS-232 cable. Do not short the output terminals to each other or to chassis.

11.4 SCPI command basics

Two command groups apply: **instrument commands**, arranged hierarchically as a command tree (colon-separated mnemonics), and **IEEE common commands** (prefixed with `*`, not hierarchical, e.g. `*IDN?`, `*RST`). A message terminator (e.g. newline) resets the current tree path to the root; a leading colon in a command also addresses from the root; a semicolon separates multiple commands in one message without changing path. A program message ends with `<newline>`, `<^END>`, or both — use `\n` (0x0A) as the terminator when programming. Separate a command from its first parameter with a space; separate multiple parameters with commas.

The full command set — around 300 commands across the correction/calibration, point & list, and curve-sweep subsystems — is documented in the separate **TH2852/TH2853 Series SCPI Command Reference**.

11.5 Automatic result return

In point and list measurement, when the trigger source is not internal, the instrument can automatically return the measurement result over a chosen external interface after each measurement — enable this from Measurement Setup → Auto Return Data and choose LAN, GPIB or USB as the return interface (SCPI Command Reference §4.5). Only one interface is active at a time.

CHAPTER 12

Handler Interface (Optional)

The rear-panel HANDLER interface outputs binning results and interface signals for use in an automatic component-sorting system. Signal definitions differ slightly by measurement mode (§12.1.1).

12.1 Signal definitions

Pin	Signal	Description
1–9	/BIN1–/BIN9	Binning result outputs
10	/OUT	Out-of-bin (no bin matched) output
11	/AUX	List-sweep sort result output (BIN10)
12–13	/EXT.TRIG	External trigger input — a rising edge triggers a measurement when trigger mode is set to external
14–15	EXT.DCV2	External DC supply for the opto-isolated control signals (/EXT.TRIG, /ALARM, /INDEX, /EOM, /KEY LOCK)
16–18	+5 V	Instrument-internal supply; if used, keep current draw under 0.3 A and keep the line away from interference sources
19	/PHI	List-sweep sort output (BIN11)
20	/PLO	List-sweep sort output (BIN12)
21	/SREJ	List-sweep sort output (BIN13)
22	/SHI	List-sweep sort output (BIN14)
23	/SIN	List-sweep sort output (BIN15)
24	/SLO	Invalid/out-of-range measurement result output
25	/KEY LOCK	Reserved input
26	NC	Not connected
27–28	EXT.DCV1	External pull-up DC supply for /BIN1–/BIN9, /AUX, /OUT, /PHI, /PLO, /SREJ
29	/ALARM	Asserted on power loss
30	/INDEX	Asserted once the analog measurement is complete and the next DUT can be connected (comparison result not yet valid until /EOM)
31	/EOM	End of measurement — asserted once measurement data and comparison result are valid
32–34	COM2	Reference ground for EXT.DCV2
35–36	COM1	Reference ground for EXT.DCV1

12.1.1 Signal definitions by measurement mode

Point measurement — Sort outputs: /BIN1–/BIN9, /OUT, /SLO (invalid result). Control outputs: /INDEX (analog measurement complete), /EOM (measurement + comparison complete), /ALARM (power-loss). Control input: /EXT.TRIG, /Keylock. Typical display time per page: component-measurement display ≈8 ms; sort display ≈5 ms; sort-count display ≈0.5 ms; typical comparison time ≈1 ms.

Timing	Min	Max
T1 — trigger pulse width	1 µs	—
T2 — measurement-start delay	200 µs	display time + 200 µs
T3 — wait after /EOM before next trigger	0 µs	—

List sweep — same sort-output pins as point measurement, plus /AUX(BIN10), /PHI(BIN11), /PLO(BIN12), /SREJ(BIN13), /SHI(BIN14), /SIN(BIN15); results are output once the whole list sweep finishes. /INDEX asserts when the last point's analog measurement completes; /EOM asserts once every point's sort result is valid. T1–T3 as above.

Curve sweep (TH2852 only, §7.13) — /BIN1–/BIN4 report pass for traces 1–4 of the active channel; /BIN5–/BIN8 report fail for the same four traces. /INDEX and /EOM behave as in list sweep, keyed to the last sweep point. Control input and timing as above.

12.2 Electrical characteristics

Signal group	Output LOW	Output HIGH	Max current	Reference ground
Sort signals (/BIN1–9, /AUX, /OUT, /PHI, /PLO)	≤0.5 V	+5 to +24 V	6 mA	Internal: instrument ground · External (EXTV1): COM1
Control signals (/INDEX, /EOM, /ALARM)	≤0.5 V	+5 to +24 V	5 mA	Internal: instrument ground · External (EXTV2): COM2

All DC outputs (pins 1–16) are opto-isolated, open-collector, with the output level set by a pull-up resistor on the HANDLER interface board — connected either to the instrument's internal +5 V or, via jumper, to an external supply (EXTV).

12.3 Setting up bin sorting via HANDLER

1. Define limits for the measurement in the relevant sort-setup screen (point: §5.6; list: §6.5; curve sweep: §7.13).
2. Turn comparison/sorting on.
3. Configure HANDLER polarity, signal mode and pulse width from System Setup (§9.5).
4. Run production testing from the sort-result or bin-count display; the handler reads the bin state once /EOM is asserted.

CAUTION

/INDEX asserts as soon as the analog measurement finishes — it is safe to remove/insert the next DUT at that point, but the bin outputs are not valid until /EOM asserts afterward.

NOTE

For fastest cycle time in a sorting application: lock the measurement range instead of using auto-range, turn off the Vm/Im signal monitors, and run from the bin-count display rather than the full measurement display.

APPENDIX

Terms, Symbols & Quick Reference

A.1 Terms and symbols

Symbol	Meaning	Symbol	Meaning
C	Capacitance	D	Dissipation factor
L	Inductance	Q	Quality factor
R	Resistance	θ	Phase angle
Z	Impedance	DCR	DC resistance
Y	Admittance	X	Reactance
G	Conductance	B	Susceptance
Γ	Reflection coefficient	VSWR	Voltage standing-wave ratio
Cp / Cs	Capacitance, parallel / series equivalent circuit	Lp / Ls	Inductance, parallel / series equivalent circuit
εr	Relative permittivity (dielectric constant)	μ	Relative permeability

A.2 Front-panel key quick reference

Key	Function
LCR	Opens point-measurement mode (§5)
Sweep	Opens curve-sweep mode (§7)
Point/List	Toggles the point/list display within LCR mode (§6)
Cal	Opens user calibration (§4)
DC Bias	Toggles DC bias output on/off (§5.2)
Trigger	Manual trigger (trigger mode = manual, §5.3)
Save/Recall	Opens save/load (§8)
System	Opens system setup (§9)
Preset	Restores factory/saved default state
Help	Opens help; unlocks the front panel after remote-control lock

A.3 Common remote commands

Task	Command
Identify the instrument	`*IDN?`
Reset to power-on state	`*RST`
Set frequency / level	`FREQuency <value>` · `VOLTage <value>`
Set averaging count	`AVERage:COUNt <n>`
Select measurement parameters	`FUNCtion:PARn:FORMat <fn>` (n = 1–4)
Trigger and read a result (bus trigger)	`TRIGger:SOURce BUS` then `*TRG` and read the response
Curve-sweep points / sweep range	`SENSe1:SWEep:POINts <n>` · `SENSe1:FREQuency:STARt/STOP <value>`
Read curve-sweep data	`CALCulate1:DATA:RDATa?`

See the TH2852/TH2853 Series SCPI Command Reference for the full command set, organized by subsystem.

A.4 Contact, warranty and support

Warranty: two years from delivery, per §1.8. For service, calibration or accessories, contact Techmize using the details below.

Techmize Electronic GmbH

Office 125–126, Regus
Carl-Zeiss-Ring 15a, 85737 Ismaning,
Germany
An international subsidiary of Changzhou
Tonghui Electronic Co., Ltd. (China)

Contact

Mobile: +49 171 4981898
Email: dx.han@tonghui.com.cn
Web: en.tonghui.com.cn

Registration

Managing Director: Haohua Zhao
Register Court: Amtsgericht München
HRB 312530 · VAT ID DE463170824