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COMMAND REFERENCE

TH530 Series

Semiconductor Device Avalanche Energy Tester

Companion document to the TH530 Series Operation Manual (mainframe). Full SCPI command set over RS-232C, LAN and the optional GPIB interface, covering display-page control, element setup, test setup, test-mode configuration, data storage and measurement-result retrieval.

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TH530 Series Command Reference

TH530-25100A/B, TH530-25200A/B (UIS / avalanche energy tester)

This document lists the full SCPI command set for the TH530 series semiconductor device avalanche energy (UIS) tester. It is the companion reference to the *TH530 Series Operation Manual*. The command set is available over RS-232C, LAN, and the optional OPTIONAL GPIB interface; the same commands apply on every interface, used one at a time (not simultaneously).

Section	
1. Conventions	1 page
2. DISPlay Subsystem	1 page
3. FUNCtion:SOURce — Element Setup	2 pages
4. FUNCtion:PACKage — Test Setup	1 page
5. FUNCtion:MODE — Test Mode Parameters	3 pages
6. PROG, MMEMory — Start & File Operations	1 page
7. FETCh — Measurement Results	1 page
8. System & Identification	1 page

Commands only describe the characters sent or received; all characters are ASCII. Every command string must be terminated with a line-feed character (`0x0A`, `NL^END`) on every interface. This document presents the same command set as Chapter 7 of the Operation Manual, grouped by subsystem and expanded with full parameter detail.

SECTION 1

Conventions

1.1 Syntax rules

- SCPI commands are tree-structured, up to three levels deep, separated by a colon (`:`) — for example `FUNC:SOUR:STEP1:dv`. The top level is called the subsystem command. This instrument's subsystem commands are: `DISPlay`, `FUNCtion`, `SYSTem`, `MMEMory` and `FETCh`.
- All command characters are ASCII; enter them as upper-case English text.
- A parameter's data format is an integer or a floating-point value printed as an ASCII string, marked `<???>` below. The unit is implicit (not written in the command string) and is given per command in the tables that follow.
- Every command string must end with a terminator (`NL^END`): without it, the instrument does not parse the command. The default terminator is a single-byte line-feed character, decimal 10 / hexadecimal `0x0A` (`\n`); carriage return (`\r`) is also accepted as a print control character.
- A query command ends in `?` and returns an ASCII-encoded result, also terminated with the line-feed character.

1.2 Command-set overview & debugging sequence

Example	Meaning
`*IDN?`	Query instrument identification
`FUNC:DISP:PAGE?`	Query the currently displayed page
`DISP:PAGE WAVE`	Switch to the Waveform display page
`FUNC:SOUR:STEP1:dv?`	Query Element Setup #1's source (drain) voltage
`FUNC:SOUR:STEP1:pki 20.1`	Set Element Setup #1's peak current to 20.1 A
`FUNC:STAR`	Start the test
`FETC?`	Query the test result
`DISP:PAGE MODE1`	Switch to the Test Mode 1 display page

RS-232C mode: 9600 baud, 8 data bits, no parity, 1 stop bit. Allow sufficient time for the instrument to respond to each command before sending the next — commands sent faster than the instrument can process are lost. During a test, command response is delayed and may desynchronize the instrument's test timing; avoid sending commands while a test is in progress.

> **NOTE — DEBUGGING SEQUENCE**
>
> (1) Become familiar with the command set below. (2) Check the instrument's baud rate, operating mode and control-line connection. (3) Configure the host computer to match, and verify the port is correct. (4) Send `*IDN?` — the instrument returns its model and firmware version, confirming communication (note the character format and terminator). (5) Switch to the required display page, then send the matching setting commands. `*IDN?` is valid in any instrument state.

SECTION 2

DISPlay Subsystem

Used for display-page setting and query.

Command	Details
`DISPlay:COPY`	Captures the current screen to a USB flash drive inserted in the front-panel USB Host port. No query form.
`DISPlay:PAGE<pagename>`	Switch the instrument's displayed page. `<pagename>`: see table below.
`DISPlay:PAGE?`	Query the currently displayed page. Example: set `DISP:PAGEMEAS`, then `DISP:PAGE?` returns `TestSpec`.

2.1 `DISPlay:PAGE` page names

Page name	Switches display to	Page name	Switches display to
`MAINPAG`	Main page	`RESULT`	Test Results 1
`MEAS`	Element Setup	`RESULT2`	Test Results 2
`MODE1`	Test Mode 1	`WAVE`	Waveform display
`MODE2`	Test Mode 2	`UTILIT`	Utilities
`MODE3`	Test Mode 3	`INTERVOLT`	Internal Voltage
`MODE4`	Test Mode 4	`SIDE`	Side Panel
`MODE5`	Test Mode 5	`SELFTEST`	Self-Test
`PACK`	Test Setup	`COM`	Communication Setup
`EDIT`	Package Edit		
`SYST`	System Setup		

Page names are sent exactly as shown, immediately following `DISPlay:PAGE` with no separating space (e.g. `DISP:PAGEWAVE`).

SECTION 3

FUNCtion:SOURce — Element Setup

Sets and queries the test parameters for one of up to 10 stored element-setup slots, addressed by `<sn>` (1–10). Syntax: `FUNC:SOUR:STEP<sn>:<param><value>` to set, `FUNC:SOUR:STEP<sn>:<param>?` to query. Matches Operation Manual §4.2.

Command	Range / step / unit	Parameter
`FUNC:SOUR:STEP<sn>:dv`	10.0–150.0 V, 0.1 V step	Source (drain) voltage
`FUNC:SOUR:STEP<sn>:gonv`	2.0–28.0 V, 0.1 V step	Gate turn-on voltage
`FUNC:SOUR:STEP<sn>:goffv`	2.0–28.0 V, 0.1 V step	Gate turn-off voltage. Gate turn-on + turn-off voltage sum must not exceed 30 V (each has its own 28 V ceiling, and the two also share this combined limit)
`FUNC:SOUR:STEP<sn>:leakv`	2.0–50.0 V, 0.1 V step	Leakage test voltage
`FUNC:SOUR:STEP<sn>:pki`	0.1–100.0 A (100 A-tier models) or 0.1–200.0 A (200 A-tier models), 0.1 A step	Peak current
`FUNC:SOUR:STEP<sn>:rv`	5 V to the avalanche voltage set via `FUNC:MODE:overv` (§5; 10–2500 V), 1 V step	Rated voltage (BVDSS)
`FUNC:SOUR:STEP<sn>:t1`	0.1–100,000.0 µs, 0.1 µs step	Charge time (T1). Settable only with T1/T2 calculation (`FUNC:MODE:tcacl`) disabled
`FUNC:SOUR:STEP<sn>:t2`	0.1–100,000.0 µs, 0.1 µs step	Discharge time (T2). Settable only with T1/T2 calculation disabled
`FUNC:SOUR:STEP<sn>:ev`	1.0–5000.0 mJ, 0.1 mJ step	Energy. Settable only with the energy switch (`enen`, below) enabled
`FUNC:SOUR:STEP<sn>:indi`	0.01–159.0 mH, 0.01 mH step	Inductance. Settable only with the energy switch disabled

`<sn>`: integer, 1–10. All commands above also have a query form, e.g. `FUNC:SOUR:STEP1:dv?`.

Command	Range / step / unit	Parameter
`FUNC:SOUR:STEP<sn>:mnum`	2–1,000,000, step 1	Pulse count
`FUNC:SOUR:STEP<sn>:chan`	`n` / `p`	Channel type: N-channel or P-channel
`FUNC:SOUR:STEP<sn>:mpen`	`0` = disable, `1` = enable	Multi-pulse enable
`FUNC:SOUR:STEP<sn>:laeken`	`0` = off, `1` = pre-test, `2` = post-test, `3` = both	Leakage test type
`FUNC:SOUR:STEP<sn>:enen`	`0` = disable, `1` = enable	Energy switch. Enabled: energy (`ev`) is used. Disabled: inductance (`indi`) is used

Example — configure Element Setup #1

```
FUNC:SOUR:STEP1:dv 65.6
FUNC:SOUR:STEP1:gonv 12
FUNC:SOUR:STEP1:goffv 12.6
FUNC:SOUR:STEP1:pki 20.6
FUNC:SOUR:STEP1:rv 60
FUNC:SOUR:STEP1:indi 4.80
FUNC:SOUR:STEP1:chann
FUNC:SOUR:STEP1:mnum 6
```

Sets Element Setup #1 to: 65.6 V source voltage, 12 V gate turn-on / 12.6 V gate turn-off, 20.6 A peak current, 60 V rated voltage, 4.80 mH inductance, N-channel, 6-pulse multi-pulse count.

> **NOTE — RATED VOLTAGE (BVDSS) UPPER BOUND**
>
> `rv`'s upper bound is whatever avalanche voltage is currently set via `FUNC:MODE:overv` (§5.2), rather than a fixed figure — in practice 10–2500 V, per Techmize's confirmed range for `overv`.

SECTION 4

FUNCtion:PACKage — Test Setup

Sets and queries how many packages are connected and how they are tested. Matches Operation Manual §4.3.

Command	Range / step	Parameter
`FUNC:PACK:packnum`	1–32, step 1	Package count
`FUNC:PACK:testtype`	`0` = device, `1` = package, `2` = all	Test type
`FUNC:PACK:packsele`	1–10, step 1	Select package
`FUNC:PACK:testdev`	`0` = single, `1` = dual, `2` = triple, `3` = quad	Select device (devices per package)
`FUNC:PACK:packtype`	`0` = single, `1` = dual, `2` = triple, `3` = quad	Package type
`FUNC:PACK:testport`	`1` or `2`	Test port — assigns the package to side-panel Test Port 1 or Test Port 2

SECTION 5

FUNCtion:MODE — Test Mode Parameters

Sets and queries the Test Mode 1–5 parameters (auto-start, destructive test, waveform/sorting, calculation/fault determination, clamp and stop-condition settings). Syntax: `FUNC:MODE:<param><value>` to set, `FUNC:MODE:<param>?` to query. Matches Operation Manual §4.4–4.5.

Command	Range	Parameter
`FUNC:MODE:sren`	`0` = disable, `1` = enable	Auto start
`FUNC:MODE:refen`	`0` = disable, `1` = current, `2` = inductance	Destructive test
`FUNC:MODE:inci`	0.1–200.0 A, 0.1 A step	Current increment
`FUNC:MODE:incl`	0.01–159.0 mH, 0.01 mH step	Inductance increment
`FUNC:MODE:maxi`	(peak current + current increment)–200.0 A, 0.1 A step	Current limit
`FUNC:MODE:maxl`	(inductance + inductance increment)–159.99 mH, 0.01 mH step	Inductance limit
`FUNC:MODE:dicy`	1–60,000 ms, 1 ms step	Device period
`FUNC:MODE:recy`	50–60,000 ms, 1 ms step	Relay period
`FUNC:MODE:ducy`	0.001–99.999%, 0.001% step	Duty cycle
`FUNC:MODE:muxcy`	10–60,000 ms, 1 ms step	Multiplex period
`FUNC:MODE:caen`	`0` = disable, `1` = enable	Capture
`FUNC:MODE:coen`	`0` = disable, `1` = enable	Collapse
`FUNC:MODE:sten`	`0` = disable, `1` = waveform, `2` = peak, `3` = DL	Store
`FUNC:MODE:cven`	`0` = waveform max, `1` = rated voltage	Collapse voltage reference

All commands above also have a query form, e.g. `FUNC:MODE:sren?`.

Command	Range	Parameter
`FUNC:MODE:copv`	5–90%, step 1	Collapse ratio
`FUNC:MODE:t2pv`	0–75%, step 1	T2 delay ratio
`FUNC:MODE:hand`	`0` = disable, `1` = enable	Interface power
`FUNC:MODE:gateen`	`0` = disable, `1` = enable	Gate check
`FUNC:MODE:pol`	`0` = high level, `1` = low level	Interface polarity
`FUNC:MODE:osen`	`0` = disable, `1` = enable	Open/short
`FUNC:MODE:calc`	`0` = raw, `1` = corrected, `2` = ideal	Calculation type
`FUNC:MODE:tcacl`	`0` = disable, `1` = enable	T1/T2 calculation
`FUNC:MODE:fail`	`0` = stop, `1` = continue	First fail
`FUNC:MODE:aval`	`0` = T2 time, `1` = VDS collapse	Avalanche (fault determination method)
`FUNC:MODE:ttype`	`0` = signal waveform, `1` = hardware comparator	T1/T2 type
`FUNC:MODE:t1min`	1–100%, step 1 (default 5%)	T1 minimum time
`FUNC:MODE:t2min`	1–100%, step 1 (default 1%)	T2 minimum time
`FUNC:MODE:trig`	`0` = T1, `1` = T2, `2` = start-stop, `3` = S/E	Trigger mode

Command	Range	Parameter
`FUNC:MODE:vdsmin`	10–100%, step 1 (default 10%)	VDS minimum ratio
`FUNC:MODE:vdsmax`	100–1000%, step 1 (default 200%)	VDS maximum ratio
`FUNC:MODE:vdsprov`	`0` = disable, `1` = single point, `2` = all points	Min/max ratio (fault determination). Mutually exclusive with VDS-collapse fault determination (`aval`)
`FUNC:MODE:t1mode`	`0` = original, `1` = strict, `2` = extended	T1 type
`FUNC:MODE:crowset`	`0` = disable, `1` = enable	Clamp setup (Test Mode 4 — optional avalanche-clamp circuit only)
`FUNC:MODE:crowmode`	`0` = off, `1` = on	Clamp mode
`FUNC:MODE:threv`	10–500 V, step 1	Threshold voltage
`FUNC:MODE:overv`	10–2500 V, step 1	Avalanche voltage
`FUNC:MODE:fyield`	`0` = disable, `1` = enable	Fail-ratio stop enable
`FUNC:MODE:monsize`	10–100, step 1	Monitor count
`FUNC:MODE:passprov`	60.0–99.0%, 0.1% step	Pass-ratio limit
`FUNC:MODE:stopsail`	`0` = disable, `1` = enable	Consecutive-fail stop enable
`FUNC:MODE:failsize`	5–10, step 1	Consecutive-fail limit (count)
`FUNC:MODE:hssen`	`0` = off, `1` = on	HSS (high-speed switch) sync enable
`FUNC:MODE:hdelay`	2–10,000 µs, step 1	HSS delay

SECTION 6

PROG, MMEMory — Start & File Operations

6.1 Test control

Command	Details
`FUNC:STAR`	Starts the test, when the instrument is on a test display page (Test Mode 1–5, Element Setup or Test Setup). No query form.

6.2 MMEMory — element-setup file storage

`MMEM:STOR:STAT<file number>[,<file name>]`	Saves the currently active element-setup parameters to an external parameter file. `<file number>`: integer, 1–10. `<file name>`: optional string, 1–15 characters. No query form.
`MMEM:LOAD:STAT<file number>`	Loads the element-setup parameters from the specified file number into the currently active setup. `<file number>`: integer, 1–10. No query form.

NOTE

These commands store/recall only the Element Setup parameters (§3) to/from one of the instrument's internal file slots — not a USB flash drive, and not the Test Setup, Test Mode or clamp parameters.

SECTION 7

FETCh — Measurement Results

Command	Details
`FETCh?`	Returns the instrument's complete current measurement result, as a semicolon-separated list of `field:value;` pairs (table below). Terminator: line feed (`0x0A`).

7.1 `FETCh?` full-result field list

Field	Meaning
`state`	State code
`result`	Test result (e.g. `Pass`)
`meas_t1`	Measured T1 time, µs
`meas_t2`	Measured T2 time, µs
`actual_c`	Actual current, A
`actual_e`	Actual energy, mJ
`vds_maxv`	Collapse maximum voltage, V
`vds_minv`	Collapse minimum voltage, V
`meas_prov`	Collapse voltage ratio, %
`meas_t`	Test time, µs

Result fields are separated by `;`. On a test failure, `result` returns one of: `Sourc_KelvinFail`, `Drain_KelvinFail`, `Gate_KelvinFail`, `Pre_LeakFail`, `Osc_FlagFail`, `PeakIFail`, `Post_LeakFail`, `AvalancheFail`, `CollapseFail`.

7.2 Retrieving a single field

Command	Returns
`FETC:result`	Test result, e.g. `Pass`
`FETC:meas_t1`	Measured T1 time, e.g. `0.0us`
`FETC:meas_t2`	Measured T2 time, e.g. `0.0us`
`FETC:actual_c`	Actual current, e.g. `0.1A`
`FETC:actual_e`	Actual energy, e.g. `1.0mJ`
`FETC:vds_maxv`	Collapse maximum voltage, e.g. `0V`
`FETC:vds_minv`	Collapse minimum voltage, e.g. `0V`
`FETC:meas_prov`	Collapse voltage ratio, e.g. `0.0%`
`FETC:meas_t`	Test time, e.g. `0.0us`

SECTION 8

System & Identification

Command	Details
`*IDN?`	Queries the instrument identification string. Returns, terminator-separated: `<manufacturer>` (manufacturer name — Tonghui), `<model>` (instrument model, e.g. `TH530_25200B`), `<firmware>` (firmware version, e.g. `Version1.0.0`).
`SYST:update`	Puts the instrument into firmware-update mode. Requires a USB flash drive holding the update file (`.sec` extension) inserted in the front-panel USB Host port before sending this command. No query form.

Contact, support & related documents

This command reference is the companion to the *TH530 Series Operation Manual* (front-panel operation, module architecture, performance specifications) and the *TH530 Series Datasheet*. For the optional TH530-01 programmable inductive load box, see the separate *TH530-01 Operation Manual*. For questions about any command's exact behaviour, or to report a discrepancy against your instrument's firmware, contact Techmize using the details below.

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