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SCPI COMMAND REFERENCE

TH510 Series

Companion document to the TH510 Series Operation Manual — TH511 / TH512 / TH513 semiconductor C-V analyzers. Full remote-control SCPI command set, organized by subsystem.

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TH510 Series SCPI Command Reference

Semiconductor C-V Analyzer — TH511 / TH512 / TH513

This document lists the full remote-control SCPI command set for the TH510 series (TH511, TH512, TH513). It is the companion reference to the *TH510 Series Operation Manual*, which covers front-panel operation, the physical remote interfaces and general command-syntax conventions.

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Commands conform to the SCPI standard. Short (capitalized) or long form may be sent; this reference uses short form in command syntax lines.

SECTION 1

Conventions & Reference Tables

1.1 Syntax conventions

- Commands are ASCII, hierarchical (tree-structured); related commands share a root, forming a subsystem (e.g. all `CVMeas:...` commands).
- Commands may be sent in short (capitalized) or long form; this reference uses the short form in the syntax lines.
- `{ }` — parameter options; not sent with the command. `|` — separates alternative parameter values. `< >` — a value you must supply. `[ ]` — an optional, omissible node, channel index or parameter position (defaults apply if omitted).
- A query form ends in `?` and returns the current value; the same root without `?`, followed by a parameter, sets the value.
- Many CVMeas/CVList/CVTrace commands accept several comma-separated values in one call to set multiple parameter positions or scan points at once (see examples throughout).

1.2 CV measurement parameter reference

The 4 parameter positions of the CV Measurement and CV List pages take any of the following parameter names:

Value	Meaning
`CISS`	Input capacitance
`COSS`	Output capacitance
`CRSS`	Reverse transfer capacitance
`RG-DSO`	Gate input resistance (D-S open)
`RG-DSS`	Gate input resistance (D-S shorted)
`CISS-VGS`	Input capacitance – gate input voltage

The CV List page additionally allows two per-point function assignments not available in CV Measurement: `OPSH` (open/short contact test) and `CONTACT` (contact check test); see §6.5.

1.3 CV curve (CVTrace) model reference

Referenced by `:CVTrace:DEMO` (§7.2):

Model	Meaning
`CISS` / `COSS` / `CRSS`	Ciss / Coss / Crss vs. Vd
`RGCISS`	Rg + Ciss vs. Vd
`MOSCAP`	Ciss + Coss + Crss vs. Vd
`CSVD`	Cs vs. Vd
`CSFREQ`	Cs vs. frequency
`MOSCAPFREQ`	Ciss + Coss + Crss vs. frequency

1.4 Channel reference

`CH1–CH6` address a measurement channel (1–6); which channels are actually fitted depends on the channel board installed. TH511/TH512 are dual-channel; TH513 uses a dedicated rear-panel channel configuration (see Operation Manual §3.1.1).

SECTION 2

IEEE488.2 Common Commands & DISPlay Subsystem

2.1 IEEE488.2 common commands

Command	Details
`*RST`	Reset the instrument to factory-default settings.
`*TRG`	Trigger a measurement and return the result, in the same format as `:FETCh?` (§10.1).
`*IDN?`	Query instrument identification. Returns 4 comma-separated fields: `<model>,<firmware>,<sn>,<date>` — model (e.g. TH510), firmware version (e.g. V1.0.0), serial number (e.g. sn12345678), firmware release date (e.g. 2022-08-01).

2.2 DISPlay subsystem

Controls display-page switching.

Command	Details
`:DISPlay:PAGE?` `:DISPlay:PAGE <PageName>`	Query/switch the active display page. Example: `:DISP:PAGE CVM` (enter the measurement display), `:DISP:PAGE CVMS` (enter the measurement setup page), `:DISP:PAGE?` (return the currently displayed page).

PageName	Meaning	Query returns
`SYST`	System setup	`SYSTem`
`FLIS`	File list	`FLISt`
`CVM`	CV measurement display	`CVMeas`
`CVL`	CV list display	`CVList`
`CVT`	CV curve display	`CVTrace`
`CVMS`	CV measurement setup	`CVMeasSet`
`CVLS`	CV list setup	`CVListSet`
`CVTS`	CV curve setup	`CVTrace`
`CVBS`	CV bin (limit) setup	`CVBinSet`
`CVTOOL`	CV tool setup	`CVTOOL`
`HAND`	Handler interface setup	`HANDler`

SECTION 3

TRIGger Subsystem

Controls the instrument's trigger source and lets the host confirm that a test has finished before polling for results.

Command	Details
`:TRIG`	Trigger the instrument to perform one measurement.
`:TRIGger:SOURce?` `:TRIGger:SOURce <CONTinue|SINGle>`	Trigger source mode: `CONT` (continuous — the instrument re-triggers automatically) or `SING` (single — one trigger per `:TRIG`/`*TRG`/front-panel Trigger key/bus command). Example: `:TRIG:SOUR SING`.
`:TRIGger:STATus?`	Query the trigger/run state. Returns `RUN 0` (idle, or test finished) or `RUN 1` (test in progress, not yet finished). Useful for a long test: poll this after triggering and only read the result once it returns `RUN 0`.
`:TRIGger:ReSet`	Abort the test currently in progress.

SECTION 4

CVMeas Subsystem

Controls the 4 parameters of the CV Measurement page: channel, test speed, the 4 parameter functions and their individual settings (frequency, level, bias, delay, deviation, reference, load correction, averaging), plus the open/short contact test and contact-check test.

4.1 Channel & speed

Command	Details
`:CVMeas:CHannel?` `:CVMeas:CHannel <1|2|3|4|5|6>`	Query/set the measurement channel. Example: `:CVM:CH 1`.
`:CVMeas:SPEED?` `:CVMeas:SPEED <str>`	Test speed. `str`: `FAST+`, `FAST` (default), `MED`, `SLOW`. Example: `:CVM:SPEED FAST`.

4.2 Parameter function & switch

Command	Details
`:CVMeas:FUNCtion[1|2|3|4]?` `:CVMeas:FUNCtion[1|2|3|4] <str>`	Query/set the measurement function for parameter position 1–4; the plain form (no index) sets consecutive positions starting at 1 from a comma-separated list. `str`: parameter name (§1.2). Example: `:CVM:FUNC CISS,COSS,CRSS,RG-DSO` (sets all 4 at once); `:CVM:FUNC2 COSS` (sets position 2 only); `:CVM:FUNC?` (returns all 4 names).
`:CVMeas:SWitch[1|2|3|4]?` `:CVMeas:SWitch[1|2|3|4] <0|1|ON|OFF>`	Query/set the on/off state of parameter position 1–4. Example: `:CVM:SW 1,0,0,1` (positions 1–4 on/off/off/on); `:CVM:SW1 1` (position 1 on); `:CVM:SW?` (returns all 4 states).

4.3 Frequency

Command	Details

`:CVMeas:FREQuency[1|2|3|4]?`
`:CVMeas:FREQuency[1|2|3|4]`
`<float|MIN|MAX>`
	Test frequency for parameter position 1–4. Example: `:CVM:FREQ 1M,1M,1M,1M` (all 4 at once); `:CVM:FREQ2 100K` (position 2 only); `:CVM:FREQ?` (returns all 4).

> **NOTE — INDEXING PATTERN USED THROUGHOUT THIS SUBSYSTEM**
>
> All CVMeas parameter-position commands (function, switch, frequency, level, Vg, Vd, delay, deviation, reference, load, average) follow the same pattern: the plain command (no index) sets consecutive positions from a comma-separated list starting at position 1 (1–4 values accepted); `<root>1` – `<root>4` set one position individually; the query form (with or without an index) returns the current value(s).

4.4 Level, bias & delay

Command	Details
`:CVMeas:LEVel[1|2|3|4]?` `:CVMeas:LEVel[1|2|3|4] <float|MIN|MAX>`	Test signal level for parameter position 1–4. Example: `:CVM:LEV 30m,30m,30m,30m`; `:CVM:LEV2 30m`.
`:CVMeas:VG[1|2|3|4]?` `:CVMeas:VG[1|2|3|4] <float|MIN|MAX>`	Vg bias voltage for parameter position 1–4. Example: `:CVM:VG 5V,5V,5V,5V`; `:CVM:VG1 5V`.
`:CVMeas:VD[1|2|3|4]?` `:CVMeas:VD[1|2|3|4] <float|MIN|MAX>`	Vd bias voltage for parameter position 1–4. Example: `:CVM:VD 20,20,20,0`; `:CVM:VD1 25V`.

`:CVMeas:DELay[1|2|3|4]?`
`:CVMeas:DELay[1|2|3|4] <float|MIN|MAX>`
`:CVMeas:DELay[1|2|3|4]:AUTO?`
`:CVMeas:DELay[1|2|3|4]:AUTO <0|1|ON|OFF>`
	Delay time (seconds) for parameter position 1–4, and its auto mode. Example: `:CVM:DEL 10m,10m,10m,10m`; `:CVM:DEL:AUTO 1,1,1,1` (automatic delay for all 4 positions).

4.5 Deviation & reference

Command	Details
`:CVMeas:DEViation[1|2|3|4]?` `:CVMeas:DEViation[1|2|3|4] <OFF|PERcent|ABSolute>`	Deviation display mode for parameter position 1–4: off, Δ% (percentage), or Δ (absolute). Example: `:CVM:DEV OFF,ABS,OFF,OFF`; `:CVM:DEV1 ABS`.
`:CVMeas:REFerence[1|2|3|4]?` `:CVMeas:REFerence[1|2|3|4] <float>`	Deviation reference value for parameter position 1–4. Example: `:CVM:REF 1p`; `:CVM:REF2 5m`.

4.6 Load correction & averaging

Command	Details
`:CVMeas:LOAD[1|2|3|4]?` `:CVMeas:LOAD[1|2|3|4] <float>`	Load-correction value for parameter position 1–4. Example: `:CVM:LOAD 0.1,1m` (positions 1–2); `:CVM:LOAD3?`.
`:CVMeas:LOAD:SWitch?` `:CVMeas:LOAD:SWitch <0|1|ON|OFF>`	Load-correction on/off, applied to all 4 positions. Example: `:CVM:LOAD:SW 1`.
`:CVMeas:LOAD:MEAS`	Execute one load-correction value update (measure and recalculate the correction value).
`:CVMeas:AVG[1|2|3|4]?` `:CVMeas:AVG[1|2|3|4] <int>`	Average count for parameter position 1–4, 1–32. Example: `:CVM:AVG 1,3,4,6`; `:CVM:AVG2 1`.

4.7 Open/short contact test (OPSH)

The open/short conduction test described here is the OPSH function also selectable as a CV List per-point function (§6.5); it tests that the DUT contacts properly before the CV measurement.

Command	Details
`:CVMeas:OPSH:SW?` `:CVMeas:OPSH:SW <0|1|OFF|ON>`	Open/short conduction test on/off. Example: `:CVM:OPSH:SW ON`.
`:CVMeas:OPSH:VG?` `:CVMeas:OPSH:VG <float>`	Vg bias for the conduction test, −20–20 V. Example: `:CVM:OPSH:VG 5V`.
`:CVMeas:OPSH:VD?` `:CVMeas:OPSH:VD <float>`	Vd bias for the conduction test, 5–20 V. Example: `:CVM:OPSH:VD 5`.

`:CVMeas:OPSH:DELay?`
`:CVMeas:OPSH:DELay <float>`
`:CVMeas:OPSH:DELay:AUTO?`
`:CVMeas:OPSH:DELay:AUTO <0|1|ON|OFF>`
	Delay time for the conduction test, and its auto mode. Example: `:CVM:OPSH:DEL 0.005`; `:CVM:OPSH:DEL:AUTO 1`.

4.8 Contact check test

Command	Details
`:CVMeas:CONTactSW?` `:CVMeas:CONTactSW <0|1|OFF|ON>`	Contact check test on/off. Example: `:CVM:CONTSW ON`.
`:CVMeas:CONTactMAX?` `:CVMeas:CONTactMAX <float>`	Contact check resistance limit, 0–100 Ω. Example: `:CVM:CONTMAX 1.2` (sets the limit to 1.2 Ω).

SECTION 5

COMParator Subsystem

Controls the bin-comparator function used on the CV Measurement page: enabling comparison and pass/fail counting, setting bin tolerance limits, and enabling individual bins — the settings that drive the HANDLER interface bin outputs (§9).

Command	Details
`:COMParator?` `:COMParator <0|1|ON|OFF>`	Comparator (bin compare) function on/off. Example: `:COMP ON`.
`:COMParator:COUNt?` `:COMParator:COUNt <0|1|ON|OFF>`	Bin-count function on/off. Example: `:COMP:COUN ON`.
`:COMParator:COUNt:DATA?`	Query the bin count results.
`:COMParator:COUNt:CLEar`	Clear all bin count results.
`:COMParator:CLRar`	Clear all bin tolerance/limit data in the limit-setup table.

`:COMParator:TOLerance:BIN<n>?`
`:COMParator:TOLerance:BIN<n>`
`<lowA,highA>[…][,lowD,highD]`
	Tolerance-mode upper/lower limits for bin n (1–10), given as low/high pairs for parameter positions 1–4 in sequence (only valid when the bin limit mode is set to tolerance). Example: `:COMP:TOL:BIN1 1,2` (bin 1, parameter-1 limits only); `:COMP:TOL:BIN10 1,2,3,4,5,6,7,8` (bin 10, all 4 parameters' limits); `:COMP:TOL:BIN1?` (returns bin 1's limits for all 4 parameters).

`:COMParator:BIN<n>:SW?` `:COMParator:BIN<n>:SW <0|1|ON|OFF>`	Enable/disable comparison for bin n (1–10). Example: `:COMP:BIN1:SW 0` (disable bin 1); `:COMP:BIN10:SW?`.

SECTION 6

CVList Subsystem

Controls the list-scan test: number of scan points, scan mode, per-point comparison, and the per-point test settings (function, channel, frequency, level, bias, delay, average, limits, reference, load correction).

6.1 Scan setup

Command	Details
`:CVList:TOTAL?` `:CVList:TOTAL <int>`	Total number of scan points, 1–30. Example: `:CVL:TOTAL 8`.
`:CVList:MODE?` `:CVList:MODE <SEQuence|STEPped>`	Scan mode: `SEQ` (continuous scan of all points) or `STEP` (single-step, one point per trigger). Example: `:CVL:MODE SEQ`.
`:CVList:CLEar [n|ALL]`	Clear the setup data of scan point `n` (1–30), or all points with `ALL` (or with no argument). Example: `:CVL:CLE 5` (clears point 5 only); `:CVL:CLE ALL`.
`:CVList:COMP?` `:CVList:COMP <0|1|ON|OFF>`	CV List comparator (bin compare) function on/off. Example: `:CVL:COMP ON`.

6.2 Per-point function & channel

The per-point commands below set a contiguous run of points starting at point `n`; the index is omissible on the query form (returns all points) but required when setting a specific starting point for anything beyond point 1.

Command	Details
`:CVList:FUNCtion<n>?` `:CVList:FUNCtion<n> <str>[,<str>]…`	Function assigned to scan point(s) starting at `n` (1–20). `str`: the CV parameter names (§1.2) plus `OPSH` (open/short conduction test) and `CONTACT` (contact check test). Example: `:CVL:FUNC4 COSS` (point 4 only); `:CVL:FUNC4 COSS,CISS,CRSS` (points 4–6, recommended multi-point form); `:CVL:FUNC5?` (query point 5).
`:CVList:CHannel<n>?` `:CVList:CHannel<n> <1|2|3|4|5|6>[,…]`	Measurement channel for scan point(s) starting at `n`. Example: `:CVL:CH2 1` (point 2 → channel 1); `:CVL:CH4 1,1,3,5` (points 4–7); `:CVL:CH6?`.

6.3 Per-point test conditions

All commands below take the same form: `:CVList:<root>[n]?` to query (point `n`, or all points if omitted) and `:CVList:<root>[n] <fₙ>[,fₙ₊₁][,fₙ₊₂]…` to set a contiguous run of points starting at `n`.

Command root	Details
`:CVList:FREQuency`	Scan-point test frequency. Example: `:CVL:FREQ6 20,30,40,1k,2k` (points 6–10); `:CVL:FREQ20 20k` (point 20 only).
`:CVList:LEVel`	Scan-point test level. Example: `:CVL:LEV 1,2,3` (points 1–3); `:CVL:LEV5 20,20,20,20` (points 5–8).
`:CVList:VG` · `:CVList:VD`	Scan-point Vg / Vd bias voltage. Example: `:CVL:VG6 1,2,3,4,5` (points 6–10); `:CVL:VD 1,2,3,4,5` (points 1–5).
`:CVList:DELay`	Scan-point delay time. Example: `:CVL:DEL 0.01,20m,30m` (points 1–3); `:CVL:DEL6 1m,2m,3m,4m,5m` (points 6–10).
`:CVList:AVG`	Scan-point average count, 1–32. Example: `:CVL:AVG 1,5,2,4` (points 1–4); `:CVL:AVG6 2,8,4,6` (points 6–9).
`:CVList:REF`	Scan-point deviation reference value (load-correction reference; see §4.6). Example: `:CVL:REF 1,2,3` (points 1–3); `:CVL:REF5 20` (point 5 only).
`:CVList:LOAD`	Scan-point load-correction value. Example: `:CVL:LOAD 1,2,3` (points 1–3); `:CVL:LOAD5 20`.

6.4 Per-point limits & load-correction switch

Command	Details

`:CVList:LOw[n]?`
`:CVList:LOw[n] <fₙ>[,…]`
`:CVList:HIgh[n]?`
`:CVList:HIgh[n] <fₙ>[,…]`
	Scan-point lower/upper limit (tolerance-mode comparison), same contiguous-run form as §6.3. Example: `:CVL:LO6 1,2,3,4,5` (points 6–10 lower limit); `:CVL:HI6 1,2,3,4,5` (points 6–10 upper limit); `:CVL:LO2?` (point 2 lower limit).

`:CVList:BAND<n>?`
`:CVList:BAND<n> OFF`
`:CVList:BAND<n> <lo,hi>`
	Set or clear the limit data for scan point `n` (1–50) in one call: `OFF` clears it, `<lo,hi>` sets both bounds. Example: `:CVL:BAND1 OFF` (clear point 1's limit data); `:CVL:BAND2 1,2` (set point 2's lower/upper limit); `:CVL:BAND9?` (return point 9's limits).

`:CVList:LOAD<n>:SW?` `:CVList:LOAD<n>:SW <0|1|ON|OFF>`	Load-correction on/off for scan point(s) starting at `n`. Example: `:CVL:LOAD:SW 1,1,0,0` (points 1–4); `:CVL:LOAD5:SW 1` (point 5 only).

SECTION 7

CVTrace Subsystem

Controls the CV curve-scan test: measurement channel, curve model (§1.3), which sub-curves of a model are displayed, and the scan's frequency/level/Vg/Vd conditions.

7.1 Channel & curve model

Command	Details
`:CVTrace:CHannel?` `:CVTrace:CHannel <1|2|3|4|5|6>`	Query/set the measurement channel. Example: `:CVT:CH 1`.
`:CVTrace:DEMO?` `:CVTrace:DEMO <str>`	Query/set the curve model (§1.3). Example: `:CVT:DEMO COSS`.

7.2 Sub-curve display switches

Each curve model has 3–4 sub-curves (parameters); these commands enable or disable their display without changing the measurement itself.

Command	Details
`:CVTrace:RGCISS:SWitch?` `:CVTrace:RGCISS:SWitch <s1,s2,s3>`	Display on/off for the RGCISS model's 3 sub-curves, in order Rg-DSO, Rg-DSS, Ciss-Vgs (`0|OFF`, `1|ON` each). Example: `:CVT:RGCISS:SW 0,0,1` (Rg-DSO off, Rg-DSS off, Ciss-Vgs on).
`:CVTrace:MOSCAP:SWitch?` `:CVTrace:MOSCAP:SWitch <s1,s2,s3>`	Display on/off for the MOSCAP model's 3 sub-curves, in order Ciss, Coss, Crss. Example: `:CVT:MOSCAP:SW 0,0,1` (Ciss off, Coss off, Crss on).
`:CVTrace:CSVD:PARA?` `:CVTrace:CSVD:PARA <trace>`	Which curve(s) the CSVD model shows. `trace`: `CSD` (both Cs and D), `CS` (Cs only), `D` (D only). Example: `:CVT:CSVD:PARA CSD`.
`:CVTrace:MOSCAPFREQ:SWitch?` `:CVTrace:MOSCAPFREQ:SWitch <s1,s2,s3,s4>[,para]`	Display on/off for the MOSCAPFREQ model's 4 sub-curves, in order Ciss, Coss, Crss, CissVgs, plus an optional secondary Z-value curve selector (`para`: `ZCISS`, `ZCOSS`, `ZCRSS`, `ZCISSVGS`, or `OFF` to disable the secondary curve). Example: `:CVT:MOSCAPFREQ:SW 0,1,0,1,ZCISS`.

7.3 Frequency & level

Command	Details
`:CVTrace:FREQuency?` `:CVTrace:FREQuency <f>`	Fixed test frequency, used when the curve model scans vs. Vd or Vg. Example: `:CVT:FREQ 1M`.
`:CVTrace:FREQuency:SWEEP?` `:CVTrace:FREQuency:SWEEP <start,stop,points,line>[,ch,demo]`	Frequency-sweep setup, used by the CSFREQ/MOSCAPFREQ models. `start`/`stop`: sweep range (float); `points`: number of frequency points (int); `line`: `LINEAR` or `LOG`; optional `ch`: channel; optional `demo`: curve model (§1.3). Example: `:CVT:FREQ:SWEEP 1k,8k,101,LOG,1,CISS` (channel 1, Ciss model, 1–8 kHz, 101 points, log spacing).
`:CVTrace:LEVel?` `:CVTrace:LEVel <f>`	Test signal level. Example: `:CVT:LEV 0.03`.

7.4 Cyclic trigger

Command	Details
`:CVTrace:TRIGger:SW?` `:CVTrace:TRIGger:SW <0|1>`	Cyclic (repeated) trigger on/off for the curve scan. Example: `:CVT:TRIG:SW 0`.
`:CVTrace:TRIGger:COUNT?` `:CVTrace:TRIGger:COUNT <value>`	Number of cyclic triggers, 1–999. Example: `:CVT:TRIG:COUNT 8`.

7.5 Vg bias range & steps

Command	Details
`:CVTrace:VG:RANGe?` `:CVTrace:VG:RANGe <start,stop>`	Vg bias sweep range. Example: `:CVT:VG:RANG 0,2` (0–2 V).
`:CVTrace:VG:NOS?` `:CVTrace:VG:NOS <number>`	Number of scan steps within the Vg range. Range depends on the active curve model: 1–8 for CISS/COSS/CRSS, 51–1001 for RGCISS, fixed at 1 (only value accepted) for MOSCAP/CSVD/CSFREQ/MOSCAPFREQ. Example: `:CVT:VG:NOS 4`.

7.6 Vd bias range, steps, delay & axis format

Command	Details
`:CVTrace:VD:RANGE?` `:CVTrace:VD:RANGE <start,stop>`	Vd bias sweep range. Example: `:CVT:VD:RANGE 1V,50V`.
`:CVTrace:VD:NOS?` `:CVTrace:VD:NOS <number>`	Number of scan steps within the Vd range, 1–1001. Example: `:CVT:VD:NOS 8`.
`:CVTrace:VD:DELay?` `:CVTrace:VD:DELay <time>`	Delay time at each Vd scan step. Example: `:CVT:VD:DEL 100m` (100 ms).
`:CVTrace:VD:FMT?` `:CVTrace:VD:FMT <LINEAR|LOG>`	Vd-axis step spacing: linear or logarithmic. Example: `:CVT:VD:FMT LOG`.
`:CVTrace:YaxisForMaT?` `:CVTrace:YaxisForMaT <LINEAR|LOG>`	Y-axis display spacing: linear or logarithmic. Example: `:CVT:YFMT LOG`.

> **NOTE**
> `:CVTrace:FREQuency` / `:LEVel` (§7.3) apply to models that sweep vs. Vd or Vg; `:CVTrace:VG:RANGe` / `:NOS` and `:VD:RANGE` / `:NOS` / `:DELay` / `:FMT` (§7.5–7.6) apply only to the models that sweep the corresponding axis — see §1.3 for which models sweep Vd, Vg, or frequency.

SECTION 8

CVCORR Subsystem

Controls the user-correction functions: cable length compensation, and the open/short zeroing used to remove fixture parasitics before a measurement. (Load correction is set per-parameter under CVMeas — see §4.6 — and per-scan-point under CVList — see §6.3/§6.4.)

8.1 Cable length

Command	Details
`:CVCORR:LENGth?` `:CVCORR:LENGth <0|2>`	Test-cable length compensation: 0 or 2 meters. Example: `:CVCORR:LENG 2`.

8.2 Open-circuit zeroing

Command	Details
`:CVCORR:OPEN?` `:CVCORR:OPEN <0|1|ON|OFF>`	Open-circuit zeroing function on/off. Example: `:CVCORR:OPEN 1`.
`:CVCORR:OPENMeas`	Execute an open-circuit zeroing measurement on the current page (CV Measurement, CV List, or CV Trace — whichever is active).

8.3 Short-circuit zeroing

Command	Details
`:CVCORR:SHORT?` `:CVCORR:SHORT <0|1|ON|OFF>`	Short-circuit zeroing function on/off. Example: `:CVCORR:SHORT 1`.
`:CVCORR:SHORTMeas`	Execute a short-circuit zeroing measurement on the current page (CV Measurement, CV List, or CV Trace).

8.4 Open/short zeroing data: read and write

These commands read back or directly load the open/short zeroing data for each of the 3 test pages, instead of (or in addition to) running `:CVCORR:OPENMeas` / `:SHORTMeas`.

Command	Details
`:CVCORR:OPENDATA:MEAS?` `:CVCORR:OPENDATA:MEAS <ch,R1,X1,R2,X2…R1',X1',R2',X2'…>`	Open-zeroing data for the CV Measurement page. `ch`: channel number, 0–5. `R`/`X`: measured open-circuit real/imaginary part at the current test frequency; `R'`/`X'`: the Plus-compensated real/imaginary part. Query returns, set loads, 16 floats (one channel's data). Example: `:CVCORR:OPENDATA:MEAS 0,<16 floats>`.
`:CVCORR:OPENDATA:LIST?` `:CVCORR:OPENDATA:LIST <pt,R,X,R',X'>`	Open-zeroing data for one CV List scan point. `pt`: point index, 0–50. Query returns, set loads, 4 floats for that point. Example: `:CVCORR:OPENDATA:LIST 0,<4 floats>` (point 0's data).
`:CVCORR:OPENDATA:TRACE?` `:CVCORR:OPENDATA:TRACE <Ra,Xa,Ra',Xa',Rb,Xb,Rb',Xb'…>`	Open-zeroing data for the CV Trace page: 16 floats, covering the 4 sub-curve lines' real/imaginary and compensated real/imaginary parts.

Command	Details
`:CVCORR:SHORTDATA:MEAS?` `:CVCORR:SHORTDATA:MEAS <ch,R1,X1,R2,X2…R1',X1',R2',X2'…>`	Short-zeroing data for the CV Measurement page — same 16-float layout as `OPENDATA:MEAS`, for the short-circuit measurement.
`:CVCORR:SHORTDATA:LIST?` `:CVCORR:SHORTDATA:LIST <pt,R,X,R',X'>`	Short-zeroing data for one CV List scan point — same layout as `OPENDATA:LIST`.
`:CVCORR:SHORTDATA:TRACE?` `:CVCORR:SHORTDATA:TRACE <Ra,Xa,Ra',Xa',Rb,Xb,Rb',Xb'…>`	Short-zeroing data for the CV Trace page — same 16-float layout as `OPENDATA:TRACE`.

SECTION 9

HANDler Subsystem

Controls the HANDLER interface's output-pin mode and bin-to-pin assignment, for automated sorting equipment (see the Operation Manual's Handler Interface chapter for the physical pinout and electrical characteristics).

Command	Details
`:HANDler:STATe?` `:HANDler:STATe <0|1|2|OFF|ON|BUS>`	HANDLER output mode: `OFF` (default assignment), `ON` (custom assignment), `BUS` (bus-controlled high/low output). Example: `:HAND:STAT ON`.

`:HANDler:STATe:OFfLO <bins>`
`:HANDler:STATe:OFfHI <bins>`
`:HANDler:STATe:LVLO <bins>`
`:HANDler:STATe:LVHI <bins>`
`:HANDler:STATe:PUHI <bins>`
`:HANDler:STATe:PULO <bins>`
	Custom output assignment (only meaningful when `:HANDler:STATe` = `ON`): assigns the given bin indices to a fixed-low output, fixed-high output, active-low level output, active-high level output, active-high pulse output, or active-low pulse output respectively. `bins`: a comma-separated list of bin table indices (e.g. `1,2,4,7,14,20`) corresponding to the positions shown on the instrument's bin table. Example: `:HAND:STAT:OFLO 1,3,5,9` (assigns bins 1, 3, 5, 9 to fixed-low); `:HAND:STAT:PUHI 1,3,5,9` (assigns them to active-high pulse instead).

`:HANDler:OUTPut:LVHI <bins>` `:HANDler:OUTPut:LVLO <bins>`	In bus-controlled mode (`:HANDler:STATe BUS`), directly drive the given bin outputs high or low. `bins`: comma-separated bin table indices, same convention as above. Example: `:HAND:OUTP:LVHI 1,3,5,9` (drive bins 1, 3, 5, 9 high); `:HAND:OUTP:LVLO 1,3,5,9` (drive them low).

SECTION 10

FETCh Subsystem

Reads back the measurement result of the currently active test page. The return format depends on which page (CV Measurement, CV List, or CV Trace) is active.

10.1 General query — `:FETCh?`

Command	Details
`:FETCh?`	Returns the result of the most recent measurement on the currently active test page. Format depends on the page — see below.

10.1.1 CV Measurement page

Returns up to 4 comma-separated segments, present only when the corresponding function is enabled:

1. **4 parameter results** (always present): `val1,val2,val3,val4` — a disabled parameter position returns an empty field. Example: `9.33199E-09,1.32473E-08,2.62153E-09,1.76975E-08`.
2. **Bin result** (only if the comparator, §5, is on): `bin,cmp1,cmp2,cmp3,cmp4` — `bin`: 0 = out of tolerance, 1–10 = bin 1–10; `cmp1–cmp4`: each parameter's compare result, 0 = not compared, 1 = pass, ≥2 = fail.
3. **Open/short conduction-test result** (only if OPSH, §4.7, is on): `opsh,<0|1|2|3>` — 0 = not tested, 1 = pass, 2 = short-test fail, 3 = open-test fail.
4. **Contact-check result** (only if the contact check, §4.8, is on): `contact,<0|1|2|3|4>` — 0 = not tested, 1 = pass, 2 = G-pin contact fail, 3 = D-pin contact fail, 4 = S-pin contact fail.

> **NOTE**
> If the contact-check or open/short conduction test fails, the 4 parameter results still return the previous measurement's values, which are not meaningful in that case.

10.1.2 CV List page

Single-step mode: returns the current point's result as `point_index,result,compare` (e.g. `2,1.12345E2,1`); `compare`: 0 = not compared, 1 = pass, other = fail. Sequence mode: after the full scan completes, returns all points' data in the same per-point format, concatenated.

10.1.3 CV Trace page

After the full curve scan completes, returns all scanned points' data; the exact field layout depends on the active curve model (§1.3) and which sub-curves are enabled, and differs for models that scan vs. Vd, vs. Vg, or vs. frequency.

10.2 Named-parameter FETCh

Command	Details
`:FETCh <para>`	Returns the named parameter's value directly (an alternative to parsing the full `:FETCh?` response). `para`: any value from the CV parameter reference (§1.2).

10.3 Automatic result push

Command	Details
`:FETCh:AUTO?` `:FETCh:AUTO <0|OFF|1|ON|2>`	Automatic-return mode (not retained across power cycles). `0|OFF`: off (the default; the host must poll `:FETCh?`). `1|ON`: after each trigger completes, the instrument automatically sends the result in the same format as `:FETCh?`. `2`: after each trigger completes, the instrument sends only the end-of-test marker string `Trig Eom\n`, without the measurement data itself. Example: `:FETCh:AUTO 1`.

10.4 CV List result by point

Command	Details
`:FETCh:CVList[n]?`	Returns the 4-parameter result and compare result for scan point `n` (1–50), or for all points if `n` is omitted. Example: `:FETCh:CVList?` → `1,val1,cmp1,2,val2,cmp2,3,…` (all points); `:FETCh:CVList5?` (point 5 only).
`:FETCh:CVList[n]:CMP?`	Returns only the compare result for scan point `n`, or for all points if omitted. Example: `:FETCh:CVList:CMP?` (all points); `:FETCh:CVList4:CMP?` (point 4 only).

SECTION 11

MassMEMory Subsystem

Saves and loads the instrument's complete settings to/from a file, on internal storage or a connected USB drive.

Command	Details
`:MMEMory:LOAD?` `:MMEMory:LOAD <file>`	Load a previously saved settings file. `file`: either a fixed internal-file index (1–50, see table below) or a relative file path. Example: `:MMEM:LOAD 1` (loads `CV.cv`); `:MMEM:LOAD sss.cv` (loads `files/sss.cv`); `:MMEM:LOAD usb/sss.cv` (loads from a connected USB drive); `:MMEM:LOAD?` (returns the path of the currently loaded file).
`:MMEMory:STORe <n>[,file]`	Save the current instrument settings to a file. `n`: used together with the default file-naming index (same index/file mapping as `:MMEMory:LOAD` when `file` is omitted). `file`: optional explicit file name/path, overriding the default name for index `n`. Example: `:MMEM:STOR 1` (saves as `CV.cv`); `:MMEM:STOR 5,sss.cv` (saves as `files/sss.cv`); `:MMEM:STOR 5,usb/sss.cv` (saves to a connected USB drive).

Index	Default internal file
1	`CV.cv` (internal `files` root directory)
2	`CV2.cv`
3	`CV3.cv`
...	... (indices 1–50 map to `CV.cv`, `CV2.cv` ... `CV50.cv`)

SECTION 12

SYSTem Subsystem

System-level settings: communication bus mode, beeper, date/time, and the RS232/LAN interface configuration.

12.1 Bus mode & beeper

Command	Details
`:SYSTem:BUSMODE?` `:SYSTem:BUSMODE <RS232|LAN|USBTMC|USBCDC|AUTO>`	Communication-interface mode. `AUTO`: the instrument selects automatically; any other value locks the interface to that fixed mode. Example: `:SYST:BUSMODE LAN`.
`:SYSTem:BEEPer?` `:SYSTem:BEEPer <OFF|ON|0|1>`	Key-press beeper on/off. Example: `:SYST:BEEP OFF`.
`:SYSTem:BEEPer:PASS?` `:SYSTem:BEEPer:PASS <OFF|TwoShort|LowLong|HighShort|HighLong>`	Pass-result beeper tone: off, or one of the 4 tone patterns (two-short / low-long / high-short / high-long beep). Example: `:SYST:BEEP:PASS TS` (two-short).
`:SYSTem:BEEPer:FAIL?` `:SYSTem:BEEPer:FAIL <OFF|TwoShort|LowLong|HighShort|HighLong>`	Fail-result beeper tone, same 4 tone patterns as above. Example: `:SYST:BEEP:FAIL HL` (high-long).

12.2 Date & time

Command	Details
`:SYSTem:DATETIME?` `:SYSTem:DATETIME <year,month,date,hour,minute,sec>`	Query/set the full system date and time in one command. `year`: 2018–2999. Example: `:SYST:DATETIME 2021,11,08,12,35,56` → 2021-11-08 12:35:56.

12.3 RS232

Command	Details
`:SYSTem:RS232:BAUDrate?` `:SYSTem:RS232:BAUDrate <4800|9600|19200|38400|57600|115200>`	Serial baud rate. Example: `:SYST:RS232:BAUD 19200`.
`:SYSTem:RS232:ADDR?` `:SYSTem:RS232:ADDR <1–32>`	Instrument bus address. Example: `:SYST:RS232:ADDR 2`.
`:SYSTem:RS232:MODE?` `:SYSTem:RS232:MODE <RS232|EXT485|EXTGPIB>`	Serial physical-layer mode. Example: `:SYST:RS232:MODE RS232`.

12.4 LAN

Command	Details
`:SYSTem:LAN:PORT?` `:SYSTem:LAN:PORT <int>`	LAN port number, 1–65536 recommended; factory default **45454**. Example: `:SYST:LAN:PORT 45454`.
`:SYSTem:LAN:UDhcPc`	Trigger a one-time DHCP request (auto-obtain network configuration).
`:SYSTem:LAN:IPADdress?` `:SYSTem:LAN:IPADdress <X.X.X.X>`	LAN IP address. Example: `:SYST:LAN:IPAD 192.168.22.209`.
`:SYSTem:LAN:GATeway?` `:SYSTem:LAN:GATeway <X.X.X.X>`	LAN gateway address. Example: `:SYST:LAN:GAT 192.168.22.1`.
`:SYSTemLAN:SMASK?` `:SYSTem:LAN:SMASK <X.X.X.X>`	LAN subnet mask. Example: `:SYST:LAN:SMASK 255.255.255.0`.
`:SYSTem:LAN:DNS?` `:SYSTem:LAN:DNS <primary>, <secondary>`	Primary/secondary DNS server address. Example: `:SYST:LAN:DNS 255.23.12.0,255.23.14.1`.
`:SYSTem:LAN:MAC?`	Query-only: returns the instrument's LAN MAC address.

12.5 Firmware update

Command	Details
`:SYSTem:UPDATE APP`	Instruct the instrument to update firmware from the default update file on a connected USB drive. The host may alternatively push an update file directly and then issue this command; the pushed file is stored internally (e.g. `update510.sec`) and may grow in size release over release — periodically delete old update files if storage space is a concern.

Contact, support & related documents

This command reference is the companion to the *TH510 Series Operation Manual* (front-panel operation, remote-interface wiring, Handler interface) and the *TH510 Series Datasheet* (specifications). 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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