TH521 Series

Power Device Analyzer

The TH521 Series Power Device Analyzer is a modular characterization platform that helps power-electronics engineers select and qualify power semiconductors for real operating conditions. A mainframe plus plug-in extender combine source-measure units to deliver IV parametrics (breakdown voltage, on-resistance, leakage), three-terminal FET/IGBT capacitance, gate-charge and power-loss analysis — with a complete curve-tracer function — across 16 models spanning 200 V–3500 V and 20 A–1800 A.

Host: 430(W) × 311(H) × 600(D) mm, approx. 34.5–35 kg · Extender: 425(W) × 365(H) × 590(D) mm, approx. 22 kg (20 A models) / 33.5 kg (200/600/1800 A models)



- Wide operating range up to **3.5 kV / 1800 A** across the TH521 family
- Fully automated fast thermal testing from **−50 °C to +250 °C**
- Automated IV measurement of R_{on}, BV, leakage, V_{th} and V_{sat} for packaged and on-wafer devices
- Narrow IV pulse width (min. 10 µs) limits self-heating for accurate device performance testing
- Oscilloscope (time-domain) view for monitoring actual voltage/current pulse waveforms
- Flexible current configuration — 20 A, 200 A, 600 A or 1800 A — with optional CV (10 MHz) and Qg
- Measures C_{iss}/C_{oss}/C_{rss} (C_{ies}/C_{oes}/C_{res}) and gate resistance R_g up to 3.5 kV
- Gate-charge (Qg) curve measurement for packaged devices
- Power-loss calculation — conduction, drive and switching losses
- Python test-script environment with AI-assisted script generation and automatic data-sheet recording

Applications

Semiconductor power devices

Diodes, transistors, MOSFETs, IGBTs, thyristors, integrated circuits and optoelectronic chips — parasitic capacitance testing and C-V characteristic analysis.

Semiconductor & LC materials

Wafer cutting and C-V characteristic analysis; liquid-crystal elastic-constant analysis and LC-material cutting.

Capacitor components

Capacitor C-V characteristic testing and analysis; capacitive-sensor testing and analysis.

16 models, one platform

Model code TH521-VV-CC(C): VV = maximum drain/collector voltage tier (02 = 200 V, 35 = 3500 V); CC = maximum pulsed drain/collector current tier (20 / 200 / 600 / 1800 A); a trailing "C" adds capacitance (CV, up to 10 MHz) and gate-charge (Qg) measurement to the base IV kit.

Model	Max current	CV / Qg
TH521-02-20	200 V / 20 A	—
TH521-02-20C	200 V / 20 A	10 MHz + Qg
TH521-02-200	200 V / 200 A	—
TH521-02-200C	200 V / 200 A	10 MHz + Qg
TH521-02-600	200 V / 600 A	—
TH521-02-600C	200 V / 600 A	10 MHz + Qg
TH521-02-1800	200 V / 1800 A	—
TH521-02-1800C	200 V / 1800 A	10 MHz + Qg

Model	Max current	CV / Qg
TH521-35-20	3500 V / 20 A	—
TH521-35-20C	3500 V / 20 A	10 MHz + Qg
TH521-35-200	3500 V / 200 A	—
TH521-35-200C	3500 V / 200 A	10 MHz + Qg
TH521-35-600	3500 V / 600 A	—
TH521-35-600C	3500 V / 600 A	10 MHz + Qg
TH521-35-1800	3500 V / 1800 A	—
TH521-35-1800C	3500 V / 1800 A	10 MHz + Qg

Measurement functions

Function	Description
I/V	Fully automatic IV curve tracing — ID-VDS, ID-VGS, VGS(th), RDS(on)-ID, VDS-VGS, RDS(on)-VGS, IDSS, IGSS, IS-VSD and the equivalent IGBT/BJT/diode curve sets
C/V	Ciss/Coss/Crss (Cies/Coes/Cres) and gate resistance Rg, on C-models only
Qg	Gate-charge curve and derived parameters (Qgs, Qgd/Qgc, Vgs(pl)/Vge(pl)), on C-models only
Power loss	Conduction, drive and switching loss calculation from measured or imported device parameters, for inductive or resistive loads
Test Script Builder	Python-based scripting with AI-assisted script writing for custom automated test sequences

Source-measure building blocks

Each TH521 model combines precision source-measure units (SMUs) selected to match its voltage and current tier. The gate/base step generator (MCSMU + MPSMU) is common to every model; the drain/collector supply and, on C-models, the CV/Qg unit are added according to the table below.

Module	Role	Voltage range	Current range	Best accuracy
MPSMU	Gate/base bias source; drain supply on low-current 200 V-tier models	±100 V	±100 mA	±(0.06% + 0.14 mV + 0.05%×I_O); min. current 10 fA
HPSMU	Drain/collector supply, 200 V-tier models	±200 V	±1 A	±(0.06% + 0.14 mV + 0.05%×I_O); min. current 10 fA
MCSMU	Gate/base step generator (all models)	±30 V	±1 A	±(0.06% + 0.14 mV + 0.05%×I_O); min. current 10 pA
HCSMU	Drain/collector supply, 20 A-tier models	±40 V	±20 A pulsed (±1 A DC)	±(0.06% + 0.6 mV + 0.05%×I_O); min. current 10 pA
UHCU	Drain/collector supply, 200/600/1800 A-tier models	60 V (6 V measure-only)	200 / 600 / 1800 A pulsed	±(0.6–0.8% + 0.3–0.9 A + 0.01–0.02×V_O)
HVSMU	Drain/collector supply, 3500 V-tier models	±3500 V	8 mA	±(0.03% + 40 mV); min. current 10 fA
MFCMU	CV / Qg measurement unit (C-models)	DC bias 0–±25 V	AC level 0–1 V	0.1% max. capacitance accuracy; 1 kHz–10 MHz, 0.00001 pF–9.99999 F
HVMCU (optional)	Pulsed high-voltage/current source for capacitive-load (HVMCU) switching tests	±1500 V / ±2200 V	2.5 A / 1.1 A pulsed	Peak power 900 W / 600 W; available in slots 9–10 as a factory option

Measurable device types

Device type	Key parameters
MOSFET	BVDSS, IDSS, IGSS, VGS(th), gfs, RDS(on), VDS(on), VSD, Rg, Ciss/Coss/Crss, Qg/Qgs/Qgd
IGBT	BVCES, ICES, IGES, VGE(th), gfs, VF, Rg, Cies/Coes/Cres, Qg/Qgs/Qgc
BJT	ICEO, IEBO, hFE, VCE(sat), VBE(sat)/VBE(on), V(BR)CEO, V(BR)EBO
Diode	VDC, VF, IR, C; forward/reverse and C-V curves
Inductors / resistors / shunts	L, RDC; resistance at specified voltage or current
Capacitors	C, C(biased), leakage current, insulation resistance, C-V curve
Connectors / cables	Contact resistance, withstand voltage, leakage, insulation resistance & capacitance
Relays / SSRs / optocouplers	Contact & coil resistance, pull-in/drop-out voltage, operating current, LED VF/IR, isolation resistance & capacitance

Interfaces

RS232	LAN	GPIB	USB Host	USB Device	Digital I/O	SCPI
standard	standard	standard	standard	standard	standard	standard

VGA and HDMI monitor outputs, plus SYNCLK and external-trigger connectors for multi-unit synchronization, are also provided. English-language UI only.

Standard accessories

Item	Description
—	EU power cable (Schuko, CEE 7/7) ×2
—	Tri-axial test cable ×12
—	High-voltage tri-axial test cable ×1
—	Digital I/O cable ×1
—	Keyboard / mouse
TH521-1	Three-terminal device test fixture

Optional accessories

Item	Description
TH521-5	MFCMU connection cable
TH521-3	Ceg test fixture

More fixtures available on request — ask your Techmize contact or authorized distributor.

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