

TWO-CHANNEL FRA • FREQUENCY RESPONSE + PDN ANALYSIS

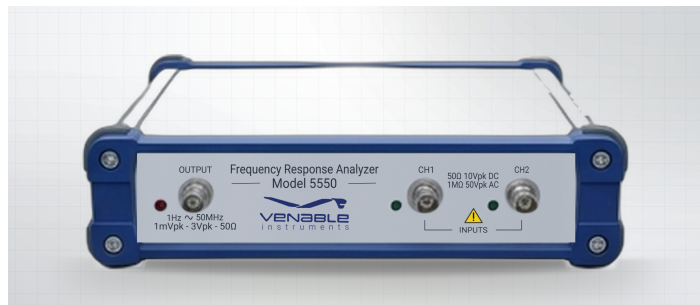
The Only FRA Built to See Your Power Distribution Network

Integrated PDN impedance measurement — a capability only the Venable Instruments Model 5550 provides.

The Model 5550 pairs a 1 Hz – 50 MHz sine-wave generator with two independent, auto-ranging analyzer channels, using the same narrowband DFT measurement engine found in Venable's laboratory-grade families. USB-powered and five pounds, it brings 120 dB of dynamic range — and milliohm-resolution PDN impedance measurement — to the everyday bench, teaching lab, or second-site assignment. Driven by the StabilityExpress + Z application, every sweep is plotted point-by-point as it is acquired.

DEFINED • FREQUENCY RESPONSE ANALYZER

A **frequency response analyzer (FRA)** injects a swept or single-frequency sine wave into a control loop and measures the resulting gain and phase at each point. The result — a Bode plot — reveals crossover frequency, gain margin, and phase margin, the core metrics engineers use to verify closed-loop stability in power supplies, servo loops, and analog control systems.



AT A GLANCE

1-50 MHz FREQUENCY RANGE	120 dB DYNAMIC RANGE
mΩ PDN IMPEDANCE MEASUREMENT	2 CH ANALYZER INPUTS
USB 2.0 PC INTERFACE	NIST Cal FACTORY CALIBRATION

VENABLE EXCLUSIVE

PDN Impedance Measurement

A **PDN measurement** characterizes the impedance of a Power Distribution Network to verify it delivers stable, low-noise power to every component — critical to the performance and reliability of high-speed digital systems. The 5550 resolves **milliohm-level rail impedance** directly, from 1 Hz to 50 MHz — no vector network analyzer required.

WHY IT MATTERS

- ◆ **Stability** — power rails hold consistent voltage under load
- ◆ **Noise reduction** — minimizes fluctuations that reach sensitive parts
- ◆ **Validation** — confirms target impedance across operating conditions

HOW IT WORKS

- ◆ **2-port shunt-through** — the standard PDN technique, run on CH1/CH2
- ◆ **Careful calibration** guards against impedance-mismatch error
- ◆ **Multi-rail PDNs** profiled rail-by-rail with repeatable sweeps

01 GENERATOR

FREQUENCY RANGE

1 Hz-50 MHz sine only

AC AMPLITUDE

1 mV to 3 Vpk

DC BIAS

None

SWEEP MODES

Single Frequency, Linear, Log

SWEEP POINTS

0.1-2000 steps/decade (log) • 1 Hz-50 MHz step (linear)

OUTPUT IMPEDANCE

50 Ω

OUTPUT CONFIGURATION

Single-ended, grounded

ISOLATION FROM CHASSIS

None

SOURCE ARCHITECTURE

The direct-digital sine source holds amplitude flat across the full 1 Hz – 50 MHz span, with output level programmable at each sweep point — preserving small-signal conditions near crossover while overcoming noise elsewhere.

LOOP INJECTION • RECOMMENDED ACCESSORY

For control-loop measurements, pair the grounded 50 Ω source with a Venable **WB or LF Bode Box** isolation injection transformer to couple the stimulus into the feedback loop with minimum distortion — without disturbing the operating point.

02 ANALYZER

MEASUREMENT RANGE

1 Hz-50 MHz

PDN MEASUREMENT

2-port shunt-through • mΩ resolution

INPUT CONFIGURATION

Single-ended, grounded

INPUT IMPEDANCE

50 Ω or 1 MΩ selectable

MEASUREMENT ACCURACY

< ±0.05 dB* • < ±0.5°*

MEASUREMENT TECHNIQUE

Narrowband DFT • delay 0-100 s • integration 20 ms-1 ks • 1-999 cycles

INPUT COUPLING

DC and AC default

INPUT RANGE

10 mV-10 Vpk FS • 7 ranges, 10 dB steps • auto-ranging

DYNAMIC RANGE

120 dB

CMRR / IMRR

None

MAX INPUT

3 Vpk

MAX WITHSTAND VOLTAGE

DC/50Ω: ±6 Vpk • AC: ±50 Vpk

OVER-RANGE ALARM

LED indicator, per channel

03 SYSTEM

PC INTERFACE

USB 2.0

AUXILIARY OUTPUT

None

APPLICATION SOFTWARE

StabilityExpress + Z Win 10/11

REAL-TIME DISPLAY

Each point plotted as acquired

DATA ANALYSIS

Polar (mag dB, phase, gain/phase margin) • Nyquist • Impedance R,L,C,Z (mag & phase) • Smith • PDN impedance profile

POWER REQUIREMENTS

18-24 VDC in 2.1×5.5 mm • 100-240 VAC ±10%, 50/60 Hz, 24 W supply

WEIGHT / DIMENSIONS

5 lbs • 10"×10"×2.6"

MEASUREMENT APPLICATIONS

Loop gain & phase margin • power-supply crossover verification • PSRR • input / output impedance • component R, L, C characterization • filter and network transfer functions • **PDN rail-impedance profiling** across operating conditions.

CALIBRATION & SUPPORT

Every unit ships factory-calibrated, traceable to **NIST**. Application guidance, software downloads, and the technical library live at venableinstruments.com; engineering support: 512.949.3100.

*Preliminary — calibration accuracy figures (TBD) pending final characterization at release. All other values reflect the current preliminary specification and are subject to change.