



**"SPE Testing Made Easy"**

## **Model 4950-P01 SPE Multifunction Probe**

**Single Pair Ethernet Testing Solution  
For use with the Model 4950 Channel Emulator**



*Model 4950-P01 Front View*

The Telebyte 4950-P01 SPE Multifunction Probe test instrument is designed specifically for testing Single Pair Ethernet (SPE) 10BASE-T1L with Power over Dataline (PoDL) as defined in the Ethernet-APL Data Test Specification v1.5, Power Test Specification v1.2 and the IEEE 802.3-2022 standard.

This specialized instrument is used with the Model 4950 Channel Emulator to test a wide range of Power Source Ports (PSE) and Powered Device (PD or Load) ports in applications such as Auto-Negotiation Tests, Transmitter Tests, BER Receiver Test, Power coupling and decoupling, noise generation (including background and impulsive noise), noise capture to replicate field environments in the lab, Power Spectral Density (PSD) and power level measurements, Transmitter clock frequency, distortion and jitter measurements, Voltage Droop, MDI Return Loss, PoDL / SPoE measurements and more.

This physical layer compliance test solution ensures interoperability between different designs and applications offered by hardware vendors. It features a variety of functions designed to enable and simplify automation of a universal test setup with no manual changes of patch cables or test fixtures (e.g., jigs, baluns) in the test setup.

The Model 4950-P01 SPE Probe is used with the Telebyte Model 4950 SPE Cable Emulator (see separate datasheet). This test suite facilitates multivendor interoperability, performance testing on different twisted pair cable lengths and noise environments, and compliance testing using the Ethernet-APL Worst Case Communication Channels for Trunk or Spur ports.



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## Highlights

- Coupling and Decoupling of Power
  - Use the Probe to replace baluns or other voltage (or current clamping) test fixtures
  - Calibrated and precise signal output
  - Voltage Sense lines for Programmable Power Supply or Programmable Load accuracy
  
- Signal / Noise Generation
  - Arbitrary Wave Form Generator (AWG) path to DUT
  - Import real-world noise from capture card
  - Generate sinusoidal 1Vpp 1MHz signal for transmitter distortion test
  - Generate PAM3 signals for Physical Coding Sublayer (PCS) testing
  
- Digital Analyzer
  - Connect to Digital Storage Oscilloscope
  - 100ohm to 50ohm characteristic impedance change
  - Protect Test Instruments from voltage and current
  - 0dB or 20dB signal attenuation
  - Testing on both sides of network simultaneously
  
- \* DUT Connection
  - Three Position Terminal Block
  
- \* Multifunction Features
  - High Impedance Probe
  - Coupling / Decoupling DC Power
  - VNA Connections
  - Voltage Remote Sense Connection
  - Termination – 100ohm
  - Distortion Circuit
  - PCS Link Partner via SPE connector and AWG
  - DC Power Supply Input
  - Bandwidth 100kHz to 100MHz
  
- \* Controlled by Test Automation Software via the Model 4950 on USB 2.0

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## Probe Modes

Mode	Function
1	High Impedance Probe, Terminate 100ohms, Voltage binding post enabled, Sense measurement enabled
2	VNA path enabled, Voltage binding post enabled, Sense measurement enabled
3	Distortion Test Circuit, Voltage binding post enabled, Sense measurement enabled
4	High Impedance Probe, Sense measurement enabled
5	Data pass through
6	High Impedance Probe, Sense measurement enabled, 20dB attenuator enabled
7	PCS path enabled
8	High Impedance Probe
9	Cascaded Trunk Power, Voltage binding post enabled, Sense measurement enabled

## Specifications

<b>4950-P01: Single-Channel Differential Mode Probe</b>	
<b>Max. Signal Level (In Band)</b>	+/- 5 Vpp 0 dB attenuation, +/- 50 Vpp 20 dB attenuation
<b>Max. DC Voltage</b>	60 VDC
<b>Max. DC Current</b>	2.0 A
<b>Input Impedance</b>	> 4K-ohms Balanced
<b>Attenuation</b>	0 dB or 20 dB
<b>Output Noise Floor</b>	Below -145 dBm/Hz over Band
<b>Bandwidth</b>	100 kHz to 100 MHz
<b>Connectors</b>	Input: 2, 3 pos terminal block for inserting DUT into line and channel emulator AWG Input / Output: 50 ohms SMA connector VNA Return Loss: 50 ohs SMA connector
<b>Power</b>	+5 V provided from USB connection or optional external modular supply

Specifications subject to change without notice.

## Ordering Options

Model Number	Description
<b>4950-P01</b>	Multifunction Single-Channel Differential Mode Probe 100 MHz

Must be purchased with 4950 Channel Emulator



*Model 4950-P01 Back View*