

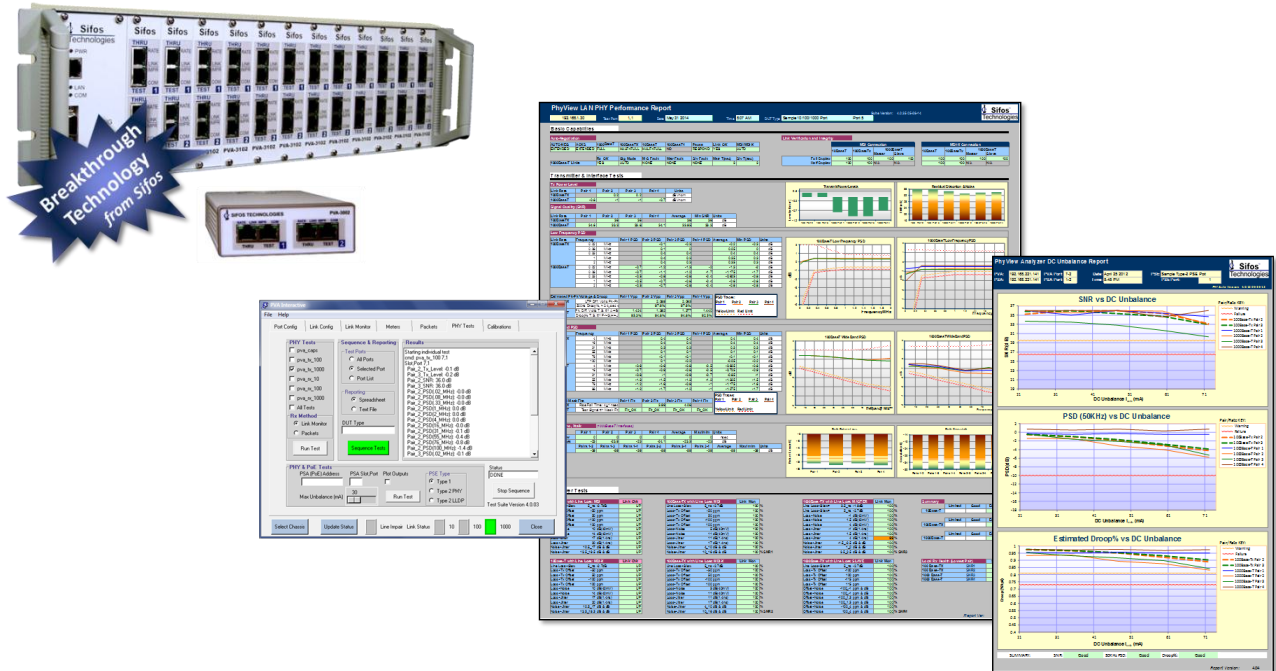


PVA-PTS

PHY Performance Test Suite

for the PhyView® Analyzer

Product Overview



Key Features

- ☐ **Comprehensive 10/100/1000 Physical Layer Analysis Simplified**
Just Plug.....Run.....Analyze
- ☐ **Automatically Sequence Up To 24 DUT Ports per PVA-3000 Chassis**
That's 96 Gigabit Pairs and 48 10/100BaseT Pairs!
- ☐ **Automatically Examine All PHY Performance Margins**
Transmitted Signal Integrity
Receiver Performance Under Stress
Physical Interface Characteristics
- ☐ **No Scopes, Fixtures, Probes, Generators, Test Modes, or Cable Spools!**
Test Any LAN Interface, Anywhere
- ☐ **Fully Automated PSE DC Unbalance Analysis**
Assess PSE Tolerance of DC Unbalance Levels
Integrated With Sifos PowerSync Analyzers
- ☐ **Colorful and Graphical Pop-Up Spreadsheet Reporting**
- ☐ **Supported on the PVA-3000 and PVA-3002 Instruments**

Verification, Simplified.

Any Port 10/100/1000

Switches/Hubs
Routers/Gateways
PSE's
WAP's
NIC's
Phones,
Repeaters...



Overview

The PHY Performance Test Suite for the PhyView Analyzer* establishes a **new standard** for automated physical layer evaluation and qualification of 10/100/1000Base-T Ethernet Ports. The combination of the PhyView



Analyzer and the PHY Performance Test Suite represents the only commercial solution for plug'n play analysis of Ethernet 10/100/1000 interfaces at the physical, or electrical signaling layer including both transmission and receiver performance analysis. No other solution offers the ease of use and degree of automation provided by the PHY Performance Test Suite.

Assure **high confidence** of 10/100/1000Base-T interface interoperability over **all** possible connection environments

The PHY Performance Test Suite performs true physical layer testing on a 10/100/1000Base-T interface. Testing at the physical layer is the only viable method for assessing the performance of an Ethernet interface in all possible connection environments that are allowed under IEEE 802.3 standards. The transmission and receiver performance tests with in the PHY Performance Test Suite go well beyond simple functional assessments to describe quantitative performance metrics and to characterize headroom relative to minimum compliance requirements. Stated simply, a 10/100/1000Base-T interface that achieves the top category in each of the PHY Performance Suite tests is an interface that will function properly across all conceivable 802.3 compliant link environments.

Identify Design or Manufacturing Defects that would evade ordinary Packet Flow testing

Ethernet packet flow testing, whether implemented using a commercial packet generator instrument or simply using other uncharacterized product ports, is largely insensitive to many potential physical layer defects that would disrupt link performance under more extreme conditions. Defects in connection paths, magnetics, terminations, PHY devices, and PHY support circuits manifest in many ways that are only mildly disruptive to interface performance. Some defects only appear in one configuration mode, e.g. MDI or gigabit SLAVE, but not in any other configuration modes. The PHY Performance Test Suite automatically scans critical configuration modes and assesses performance in each of those modes with full sensitivity to both mild and severe defects.

Expose Hidden Defects

Find Defects That
Packet Testing Will
Never See!

Comprehensive Performance Analysis **WITHOUT**

Scopes & Probes
Fixtures & Test Modes
Packet Analyzers
Generators & Network
Analyzers

Full Automation

Sequence Pairs and
Ports with One Button
Transmitter, Interface, &
Receiver Tests
Colorful, Graphical
Spreadsheet Reporting
& Analysis

Ethernet 10/100/1000 PHY Expertise....**Not Required**

10/100/1000Base-T physical layer characteristics are complex and are governed by an array of IEEE 802.3 standards. Traditional physical layer testing as defined by those standards is laborious and requires considerable expertise in order to obtain reasonable accuracies and to interpret measurement results. 802.3 standards are vague and indirect regarding receiver testing methods and acceptance criteria thus imposing even greater burden on test expertise. With the PHY Performance Test Suite and the PhyView Analyzer, 10/100/1000Base-T testing is simple: *Plug....Start Test...Read Report* on one or more ports. Test reports clearly indicate any problem areas, delineating and categorizing defects into transmitter versus passive interface versus receiver, and marginal versus severe magnitudes.

Verification, Simplified.

* For further information about the PhyView Analyzer, see the Sifos PVA-3000 datasheet.

PHY Performance Test Suite Coverage

The PHY Performance Test Suite automatically scans one or more ports-under-test to assess link capabilities and basic link stability, signal transmission characteristics, passive interface characteristics, and receiver performance. Signal transmission characteristics include **wideband signal power**, **residual distortion**, **power spectral distortion**, and pair **timing skew** along with derivative estimates of **peak-peak voltage**, **droop**, **rise/fall time**, and **pulse mask fit**. Passive interface characteristics evaluated include **wideband return loss** (or impedance match) and **wideband crosstalk** between wire pairs. Receiver performance involves the automatic insertion of various **physical impairments** modeling worst-case link characteristics followed by the assessment of receiver function in the presence of those physical impairments.

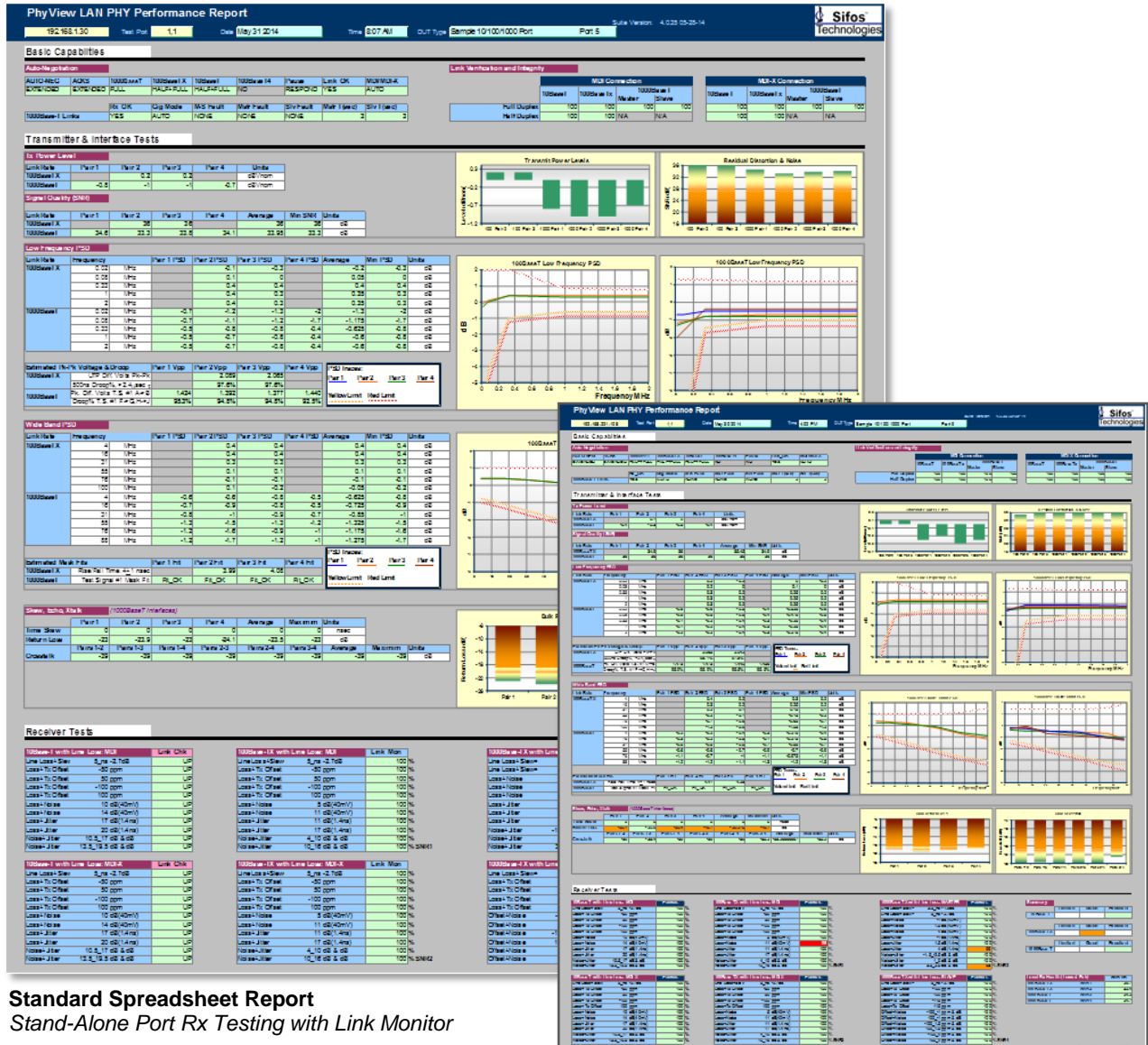
The PHY Performance Test Suite consists of the following tests:

PHY Test	Description	Reported Parameters
PHY Capabilities	Assesses PHY advertised capabilities for 100Base-Tx and 1000Base-T. Assesses Auto-MDI/MDI-X & MASTER/SLAVE resolution. Verifies each of these modes with link stability measurements.	Auto-Negotiation Parameters (10BaseT, 100BaseTx & 1000BaseT) Link Stability Count (10BaseT, 100BaseTx, 1000BaseT, Full vs Half Duplex, MDI vs MDI-X, Master vs Slave).
100Base-Tx Transmission Analysis	Evaluates Transmitted Signal Characteristics of a 100BaseTx transmitter both in MDI and MDI-X configurations. Standard spreadsheet report utilizes correlation formulas to estimate per-pair IEEE 802.3 Parameters Vpk-pk , Droop , and Rise/Fall Time .	Wideband Power (Rx Pair 2, 3) SNR (Residual Distortion) (Pair 2, 3) Low Frequency PSD (20KHz-2MHz, Pair 2, 3) Wide Band PSD (4MHz – 100MHz, Pair 2, 3)
1000Base-T Transmission & Interface Analysis	Evaluates Transmitted Signal and Interface Characteristics of a 1000BaseT transmitter. Standard spreadsheet report utilizes correlation formulas to accurately estimate per-pair IEEE 802.3 Parameters Vpk-pk (Test Signal #1 Pt A to Pt B), Droop% , and Pulse Mask Fit (Test Signal #1 Pts A & Pt B).	Wideband Power (Pairs 1-4) SNR (Pairs 1-4) Low Frequency PSD (20KHz-2MHz, Pairs 1-4) Wide Band PSD (4MHz – 100MHz, Pairs 1-4) Time Skew (Pairs 1-4) Wideband Return Loss (Pairs 1-4) Crosstalk (Pairs 1-2, 1-3, 1-4, 2-3, 2-4, 3-4)
10Base-T Receiver Analysis	Subjects DUT Receiver to IEEE worst case insertion loss impairment combined with minimum Tx level and slew, transmit frequency offsets, additive random noise, transmit frequency jitter, and combinations of random noise and jitter. Measures Link Viability or Packet Transmission (switches and hubs). Packet transmission requires 2 bridged DUT ports unless DUT supports MAC-side loopback.	Link Viability: “UP” or “DOWN” (Based on 400 link samples and 3 re-links over 20 seconds per impairment) OR Packet Transmission % (Based on line rate transmission of 128,000 (default) packets to a switch or hub DUT)
100Base-Tx Receiver Analysis	Subjects DUT Receiver to IEEE worst case insertion loss impairment combined with minimum Tx level and slew, maximum transmit frequency offsets, additive random noise, transmit frequency jitter, and combinations of random noise and jitter. Measures Link Viability , Link Stability , or Packet Transmission . Packet transmission requires 2 bridged DUT ports unless DUT supports MAC-side loopback. If not using Packet Transmission, Link Stability is reported only if DUT drops link and/or falls back to 10BaseT given >100% packet loss. Otherwise Link Viability is reported.	Link Viability: “UP” or “DOWN” (Based on 400 link samples and 3 re-links over 20 seconds per impairment) OR Link Stability: Link “UP” % (Based on 400 link samples and 3 re-links over 20 seconds per impairment) OR Packet Transmission % (Based on line rate transmission of (default) 1,024,000 (default) packets to a switch or hub DUT)
1000Base-T Receiver Analysis	Subjects DUT Receiver to IEEE worst case insertion loss impairment combined with minimum Tx level and slew, maximum transmit frequency offsets (slave), additive random noise (master), transmit frequency jitter (master), combinations of random noise and jitter (master), and combinations of frequency offset / random noise (slave). Measures Link Stability or Packet Transmission (switches and hubs). Packet transmission requires 2 bridged DUT ports	Link Stability: Remote Rx “OK” % (Based on 1000 link samples 20 seconds per impairment. If DUT remote_rx_status is defective, will report Link Viability - see 100BaseTx test.) OR Packet Transmission % (Based on line rate transmission of 10,240,000 (default) packets to a switch or hub DUT)

The PhyView Standard Test Report

The PhyView Performance Suite produces a pop-up Microsoft Excel spreadsheet report that adds graphical presentations of test results and colorized annotations of test limit excursions. Unlike a strict compliance test, many of the parameters captured by the PhyView Performance Suite are evaluated to “soft limits” that describe performance in one of three ranges: **Green** (or “Excellent”), **Yellow** (or “Acceptable”), and **Red** (or “Marginal”). A **green** result typically indicates headroom relative to 802.3 requirements, a **yellow** result indicates performance at the edge of the specification limits, and a **red** result indicates a probable failure relative to one or more 802.3 requirements.

The report is structured such that each port-under-test tested creates a specific workbook tab dedicated to that port. Sequencing a 24 port switch would therefore cause a 24 tab workbook to automatically appear upon completion.



Standard Spreadsheet Report
Stand-Alone Port Rx Testing with Link Monitor

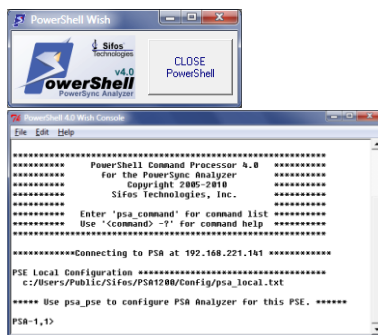
Standard Spreadsheet Report
Bridged Ethernet Port Rx Testing with Packet Flow

One-Button Testing from PVA Interactive Software

Using **PVA Interactive** software that comes with the PhyView Analyzer, the PHY Performance Test Suite is accessed through the **PHY Tests** menu tab. Within this menu, users have the option to run individual tests or to sequence a selected group of tests on a selected range of ports to a standard spreadsheet or text-based report file. Sequencing up to 24 ports of physical layer testing can thus be accomplished very easily with as little as a single mouse click of the **Sequence Tests** button!

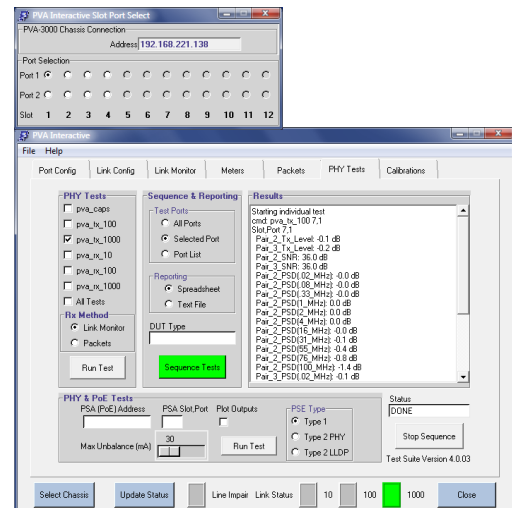
Users are also given flexibility to specify information about the DUT type and ports that are being tested so that report headers will present that information.

The PhyView Analyzer also includes a script automation environment, **PowerShell PSA**. Sequencing the PHY Performance Test Suite within PowerShell PSA is accomplished with a single command.



PowerShell PSA

Multiple test sequences can readily be scheduled from PowerShell PSA when testing more than a single DUT using one or more PhyView Analyzers.



PVA Interactive Graphical User Interface

PhyView Analyzer test port calibrations are required occasionally to insure accuracy in measurements of power spectral distortion, wideband return loss, and wideband crosstalk. Those calibrations are also fully automatic and can be sequenced from PVA Interactive or PowerShell PSA software.

PHY Performance Test Suite: DC Unbalance Testing of PSE's

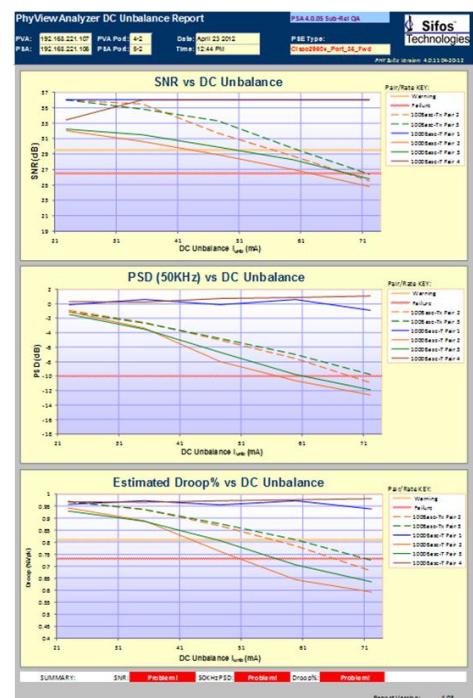
A prime concern to developers of Power Sourcing Ethernet (PSE) ports is the tolerance of Ethernet magnetics to varying degrees of DC unbalance. DC Unbalance, that is the uneven split of DC current between both conductors of a wired pair, can occur for many reasons beyond the control of the PSE. Those reasons include unbalanced cabling, RJ-45 connection problems and powered device magnetic unbalance. Historically, the assessment of DC Unbalance tolerance has been extremely challenging to perform and therefore is often overlooked as a critical PSE performance characteristic.

The PHY Performance Test Suite includes a specialized application that combines a PhyView Analyzer test port with a Sifos PowerSync Analyzer test port to automatically survey and plot DC Unbalance Tolerance characteristics of any PSE port, including ports that require PoE LLDP to negotiate higher power levels. DC Unbalance tolerance testing includes the measurements of **Residual Distortion (SNR)** and **Low Frequency PSD** combined with the estimate of **Pulse Droop%** all performed as a function of DC Unbalance current magnitude. Measurements can be performed with bi-directional DC unbalance on either ALT-A and/or ALT-B pairs with DC unbalance magnitudes ranging from 30mA to 80mA as the PSE delivers power levels up to 20 watts or more. Further information on the DC



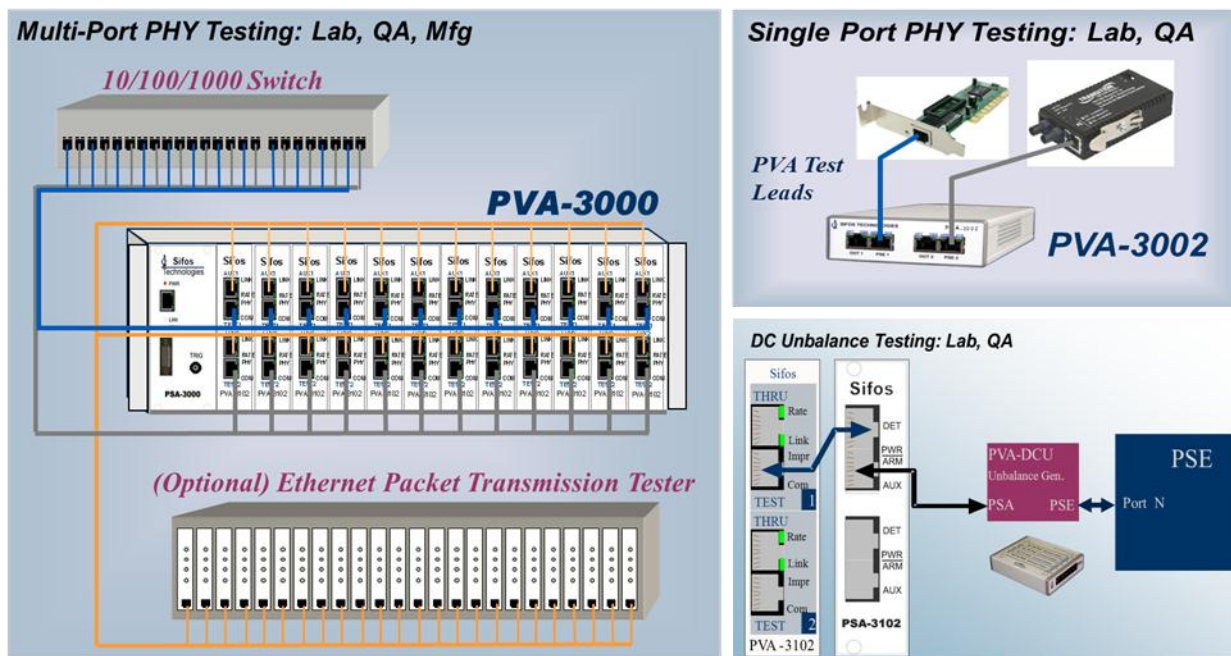
Automated DC Unbalance Setup

Unbalance Test is available in Sifos application note **DC Unbalance Tolerance in PSE's**.



DC Unbalance Spreadsheet Report

PHY Performance Test Suite: Test Configurations



Ordering Information

The PHY Performance Test Suite is available as an instrument-specific security key code for the PVA-3000 and PVA-3002 instruments. The test suite may be activated at any time following the purchase of this security key code.

- PVA-3000-PTS** PhyView Performance Test Suite for a PSA-3000 / PSA-1200 Chassis
- PVA-3002-PTS** PhyView Performance Test Suite for PVA-3002 Compact PhyView Analyzer
- PVA-PL4** In-Line Quad Passive Loss Module (1, 2, 4, & 8 dB)
- PVA-LI4** In-Line Quad Line Impairment Module (3 Mismatches, 1 Crosstalk)
- PVA-DCU** In-Line DC Unbalance Generator Unit (ALT A/B, Forward and Reverse Channels)

For further information concerning the PhyView Analyzer, see the Sifos Technologies datasheet **PhyView Analyzer 3000 Product Overview**. For further information concerning the PowerSync Analyzer, see the Sifos Technologies datasheet **PowerSync Analyzer 3000 Product Overview**.

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See a video demonstration of the PHY Performance Test Suite testing a 24-port Ethernet Switch at www.sifos.com.

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