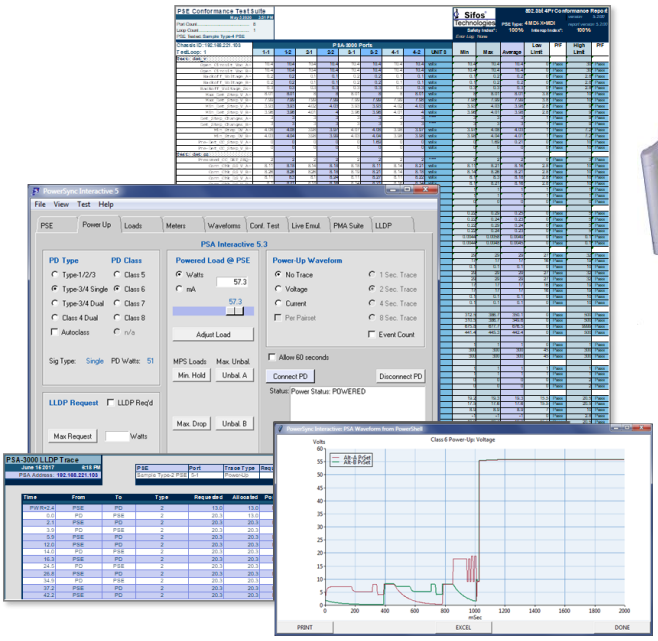
PSA-3000
PowerSync® Analyzer
IEEE 802.3at & 802.3bt Power over Ethernet

Product Overview



Key Features

- ❑ **Connect up to 24 802.3at / 802.3bt (4-Pair and 2-Pair) PSE Ports**
- ❑ **Continuous 2-Pair Loading > 47 Watts Per PSE Port x 24 Ports**
- ❑ **Continuous 4-Pair Loading > 99 Watts Per PSE Port x 12 Ports**
- ❑ **Industry Leading IEEE 802.3bt and 802.3at PoE PSE Conformance Tests**
- ❑ **Flexible 802.3at / 802.3bt Powered Device Emulation Including PoE LLDP**
- ❑ **Unique, Fully Automated Multi-Port PSE System Analysis for 2-Pair PSE's**
- ❑ **One-Click 2-Pair and 4-Pair PSE Waveform Analysis**
- ❑ **Automated PoE LLDP Protocol Analysis**
- ❑ **Highly Scalable and Upgradeable Test Ports and Features**
- ❑ **High Level Script Automation and Powerful Graphical User Interface**
- ❑ **Flexible and Accurate Measurements of Voltage, Current, Power, & Noise**
- ❑ **Noise Immune Triggering and Flexible Load Transients**
- ❑ **Supports PSE Packet Transmission Testing with PoE Loads**
- ❑ **Smart Fan Control – Runs Cool and Quiet**

Verification, *Simplified.*

IEEE 802.3at and 802.3bt PSE's

2-Pair Powering PSE's

4-Pair Powering PSE's

Endspan & Midspan PSE's

Fully Automated 4-Pair & 2-Pair PSE Conformance Test

Comprehensive Hardware / Firmware DV Testing

Device Qualification

LLDP Protocol Analysis

Interoperability Analysis

Quality Assurance

Fully Automated PSE System Power Management Test

2-Pair PSE Power Management Evaluation

System Stability Analysis including PoE LLDP

PSE Administrative Responses up to 192* 802.3at PD's

High Throughput QA, Manufacturing

Multi-Port Automation

Ready-to-Use, High Throughput Test Scripts

High Defect Coverage

Overview

Power-over-Ethernet (PoE) challenges design and test engineers to evaluate multi-channel, "intelligent" DC power sources that are activated and deactivated through signaling protocols operating over several power delivery and polarity configurations. The application and management of DC power over multiple local area network connections must be completely transparent and non-disruptive to the traditional data transmission functions of those network connections.

One Box Solution

Sifos Technologies provides a **one-box solution** to facilitate complete testing and analysis of Power Sourcing Equipment (PSE) behaviors including overall compliance to all **IEEE 802.3at** and **802.3bt** specifications. Each PowerSync Analyzer test port is an autonomous and fully isolated instrument offering a rich set of stimulus and measurement resources for **2-Pair** PSE testing. Each test slot can be configured as an autonomous and fully isolated instrument for testing **802.3bt** and pre-standard **4-Pair** PSE's from either test port in that slot.

Automated 802.3bt & 802.3at PSE Conformance Testing

The PSA-3000 may be optioned via license keys to run the industry's most advanced PSE Conformance Test Suites for **802.3bt 4-Pair** PSE's and **802.3bt/802.3at 2-Pair** PSE's. These **fully automated** test applications apply the PowerSync Analyzer's diverse resources to assess over 340 4-Pair and over 70 2-Pair specification parameters per port (up to 24 ports), presented in easily readable spreadsheet reports with multi-port statistics and clearly notated pass/fail limit analysis.

The PowerSync Analyzer and the 2-Pair PSE Conformance Test Suite may be used to qualify PSE's for the Ethernet Alliance PoE Logo under the Ethernet Alliance PoE Certification Program.

Analyzing & Troubleshooting 4-Pair and 2-Pair PSE's

The PSA-3000 provides extensive resources under control of PSA Interactive graphical user interface software and PowerShell PSA scripting software to facilitate insights into many PSE behaviors and performance parameters. Easily emulate a wide range of 802.3at and 802.3bt PD's while evaluating PSE responses to user-defined PD behaviors. A rich set of standardized **one-click waveforms** and **one-button test loads** make swift work of exposing both 4-Pair and 2-Pair PSE's to the vast array of PD's and connection environments described under the 802.3bt and 802.3at standards.

Automated 2-Pair PSE System Testing

PSA-3000's may be optioned via a license key to run the one-of-a-kind **2-Pair PSE Multi-Port Suite**. This software offers flexible, programmable, simultaneous **Live PD Emulation** of up to 192 independent Powered Devices including 802.3at Type-2, LLDP capable devices. The fully automated **Power Management Analyzer Suite** for 2-pair PSE's evaluates PSE power allocation decisions and power management behaviors in response to multi-port PD loads including Type-2 PD's that negotiate power using PoE LLDP. Results are presented in colorful graphical reports.

LLDP Emulation for 802.3at and 802.3bt

The IEEE 802.3at and 802.3bt specifications describe PSE's and Powered Devices (PD's) that communicate precise power demands and allocations using Ethernet layer 2 (LLDP) protocols. The PSA-3000 may be optioned via a license key to flexibly emulate PD's and to analyze the power negotiation protocols between PSE's and PD's.

**Assumes up to 8 PSA-3000's combined into a Multi-Port Resource Configuration.*

Verification, Simplified.

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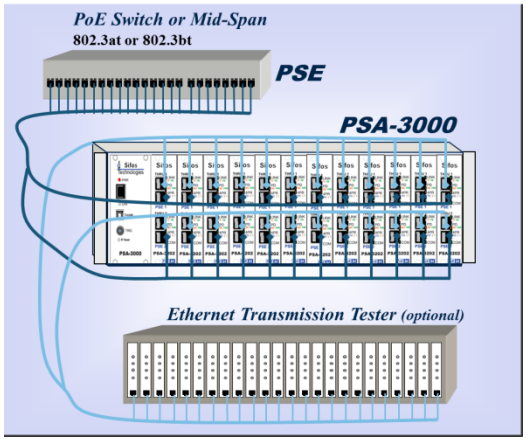
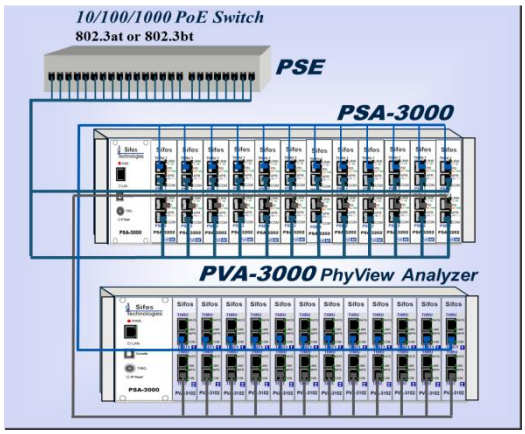
PowerSync Analyzer Test Equipment Setups

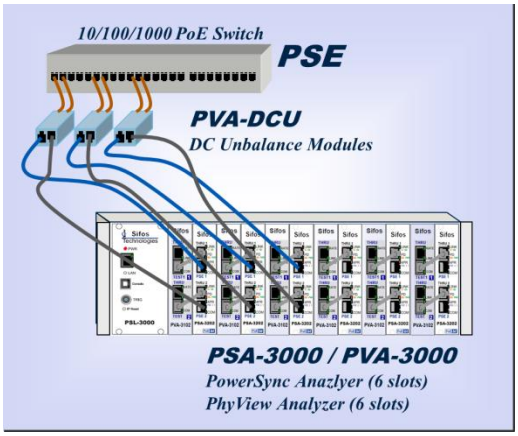
PSE DV, System, or Mfg. Test



PSE PoE & 10/100/1000 Physical Layer Analysis



PSE Magnetic Bias Tolerance



Per-Port PSE Test Resources

Flexible 2-Pair and 4-Pair PD Detection & Class Emulation including all 802.3bt PD Types

Flexible Loads and Load Transients including 4-Pair PSE Loads to > 99 Watts on Either Test Port

Event or Edge Triggering of Load Transients & Measurements

Average, Peak (Min/Max), and Trace Measurements of Port Voltage and Load Current with Flexible Sampling Apertures

Standard One-Click Waveforms for Rapid PSE Analysis and Conformance Troubleshooting

Flexibly Triggered, Noise-Immune Time Intervals / Slews

LAN Termination, LLDP Protocol Emulation and Tracing

Concurrent Packet Transmission and PoE Load Testing

PSE Conformance Suites* 802.3bt / 802.3at

High Coverage, Fully Automated 802.3bt 4-Pair Testing and Analysis (including LLDP*) with 26 Tests Producing over 340 Parameters per PSE Port (up to 24 ports)

High Coverage, Fully Automated 802.3bt/802.3at 2-Pair Testing and Analysis (including LLDP*) with 23 Tests Producing over 70 Parameters per PSE Port (up to 24 ports)

Automated Test and Port Sequencing with Comprehensive, Colorful Spreadsheet Reporting

Automatically Adapts to PSE Device Technologies

> 90% 802.3bt 4-Pair PSE PICS Coverage

> 95% 802.3at 2-Pair PSE PICS Coverage

Regularly Updated with Sifos Tracking Service

Approved for Ethernet Alliance 1st Party (self) Certification Testing of 802.3at PSE's

EA Certified™

2-Pair PSE System & Multi-Port Testing*

Fully Automated Power Management Analyzer Suite for 2-Pair PSE's, including Type-2/3 LLDP capable PSE's up to 192 PSE Ports Covering:

- **Power Administration by PD Class and Port Group Subsets**
- **Group Power-Up, Power Negotiation, and Disconnect Timing**
- **Static Power Capacity by PD Type**
- **Transient Reserve Capacity by PD Type**
- **PD Power Budget Uncertainty by PD Class**
- **Group Overload Response and Timing**
- **Power Stress Tolerance**

Programmable Live PD Emulation Up to 192 Simultaneous 802.3at PD's (Type-1, Type-2, Type-2 LLDP), 34W per port

802.3at LLDP*, PHY, Packet Test Support

Flexible, Per-Port, Programmable PD LLDP Emulation for PoE with Payload, Timing, & Synchronization Control

Fully Automated LLDP Protocol Traces and Analysis

Emulate 802.3at and 802.3bt LLDP Protocols

Test Port "THRU" Channel for 10/100/1000 PHY Testing (*using the Sifos PVA-3000*) and Packet Transmission Testing

Negligible Thru-Channel Impairment (10/100/1000/2.5GBase-T)

Powerful Software

PSA Interactive Graphical User Interface

PowerShell PSA Script Automation

Sample High Throughput, Multi-Port PSE Test Script

* *Available as an optional feature to the PSA-3000. See feature-specific data sheet.*

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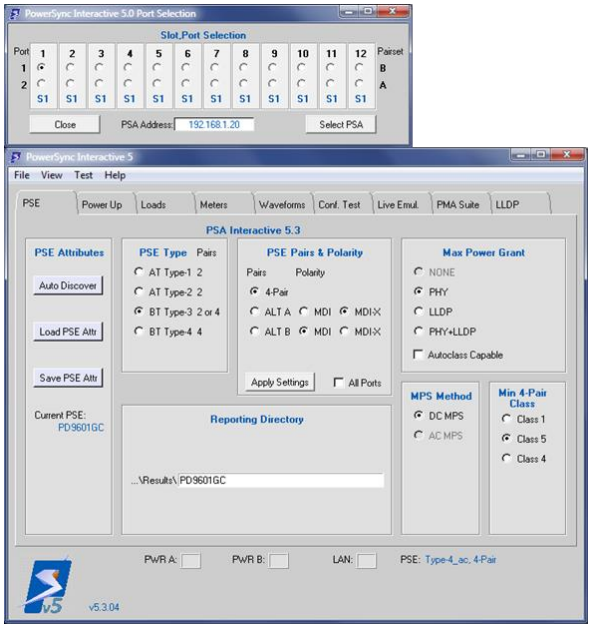
PSA Interactive Graphical User Interface

The Sifos **PSA Interactive** graphical user interface (GUI) is a flexible and powerful tool that enables users to access and manage many of the resources and testing functions available in a PSA-3000 instrument. **PSA 5.x** software introduces a second generation of PSA Interactive offering the following key features:

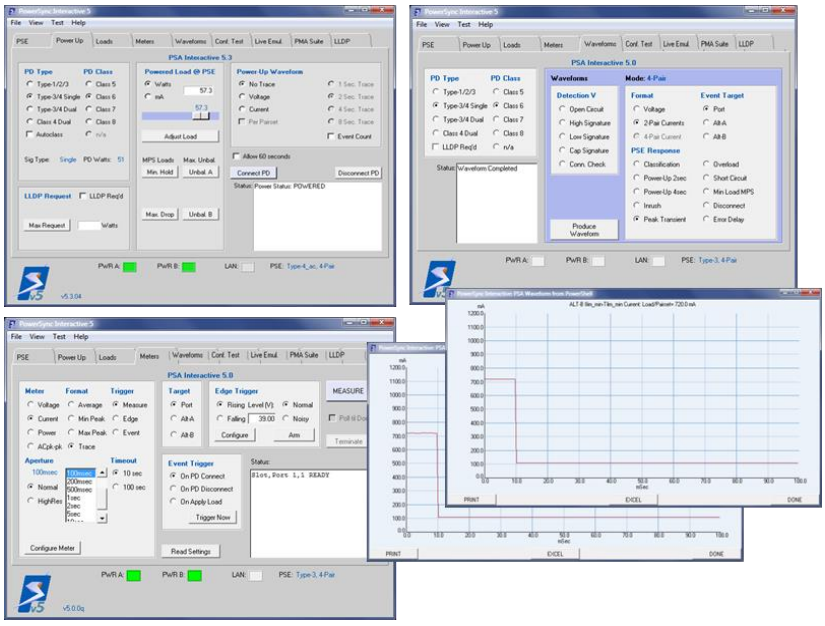
- Intelligent Management of 2-Pair and 4-Pair PSE Connections
- Seamless Integration Between 802.3at and 802.3bt PSE Testing Processes
- Seamless Integration of Newer PSA-3202 Test Blades and Older PSA-3102 Test Blades
- Ergonomic Tab Menu Scheme
- Highly Flexible PD Emulations and PSE Stimulus-Response Assessments
- Full Support for All 802.3bt Automated Test Suites
- Full Support for All 802.3at Automated Test Suites
- Adaptive behaviors respond to PSE Attributes

Included in the second generation PSA Interactive GUI is an intelligent **Slot-Port Selection Panel** and a tab menu window with nine tab menus:

- **PSE**: Learn, Declare, Load, and Save **PSE Attributes** that are essential to test port configuration and to automated test functions and utilities
- **Power Up**: Flexibly emulate and then connect **802.3at**, **802.3bt**, and **proprietary 4-Pair PD's** while observing PSE behaviors and responses to those PD connections
- **Loads**: Select and apply elemental signatures, static DC loads, and flexible load transients to **2-Pair** and **4-Pair** PSE's
- **Meters**: Configure and perform a wide variety of measurements on **2-Pair** and **4-Pair** PSE's with a variety of triggering options
- **Waveforms**: Configure and capture a wide variety of one-click waveforms that perform stimulus-response evaluations of **802.3at** and **802.3bt** PSE's. Flexibly emulate **802.3at**, **802.3bt**, and **proprietary 4-pair** PD's



PSA Interactive Tab Menu and Slot-Port Panel



PSA Interactive Menus for Power Up Emulation, Measurements & Triggering, and One-Click Waveforms

Conf. Test: Configure and sequence either the **4-Pair** or **2-Pair** PSE Conformance Test Suite from an adaptive user interface that responds to PSE attributes defined in the PSE tab menu

- **Live Emul***: Configure and emulate between 1 and 192 **802.3at** user-defined PD's including LLDP emulation
- **PMA Suite***: Configure and run the **802.3at** (**2-Pair**) PSE Power Management Analyzer Suite
- **LLDP**: Configure and run **802.3bt** or **802.3at** LLDP protocol traces while emulating any 802.3 PD type including 802.3bt dual signature PD's.

* *See Sifos **PSL-3424** literature for Live PD Emulation and Power Management Analyzer Suite covering 802.3at (2-Pair) and 802.3bt (4-Pair) PSE's.*

PowerShell PSA Tcl/Tk Interface

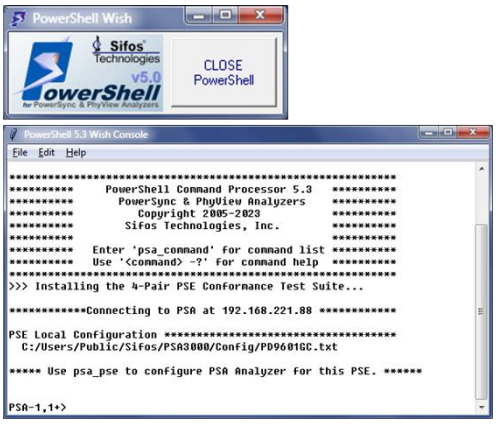
The PowerShell PSA Scripting Environment provides a high level, interactive means to control and program automated test sequences for the PSA-3000 PowerSync Analyzer. PowerShell PSA enables fully automated testing suites that span multiple ports, blades, and instruments. Built upon the powerful and extensible Tool Command Language (Tcl), it offers an effective programming language well suited for automated testing.

PowerShell PSA provides a complete API for the PSA-3000 instrument including an extensive command set that ranges from elemental resource configurations to high level automated tests and test sequencers. Starting with PSA software version 5.0, PowerShell PSA seamlessly manages transitions between 802.3at (2-Pair) PSE testing and 802.3bt (4-Pair) PSE testing. Many PowerShell PSA commands and utilities automatically take on personalities governed by test port configurations (for example, **2-Pair** versus **4-Pair** and 4-Pair signature type).

PowerShell PSA can be integrated into broader Tcl environments that combine network transmission and Power-over-Ethernet tests.

Other features offered by the PowerShell PSA environment include:

- Interpretive command execution (no compilation, easy debug)
- Simple, intuitive PowerSync Analyzer commands (API)
- Integrated and extensive command "help" features
- Smart prompt that tracks selected test port configuration
- Command-Knowledgeable Wish Console with PSA waveform viewer capability
- Notepad++ Editor for PowerShell PSA script editing & debugging
- Flexible test suite sequencing including compound sequences
- Traditional Tcl Command Console
- Extensive PowerShell PSA command documentation



PowerShell PSA Wish Console

IEEE 802.3bt & 802.3at PSE Conformance Test Suites

The PSA-3000 may be licensed for fully automated conformance testing of **4-Pair** (802.3bt) PSE's and/or **2-Pair** (802.3bt, 802.3at) PSE's. The PSE Conformance Test Suites are libraries of **fully automated, flexibly sequenced,** and **self-adapting** tests that provide a high degree of specification compliance testing of PSE ports without the need for any external instrumentation. Each PSE Conformance Test Suite fully assesses interoperability of one or more PSE ports given a single button press or single command. Colorful Microsoft Excel spreadsheet reports analyze all test results relative to the applicable IEEE 802.3 specification parameters, flagging failures and compiling statistics.

The PSE Conformance Test Suites from Sifos serve as de facto industry standards for PSE specification compliance. Testing can be completed without deep, internal knowledge of the 802.3 PoE standards and without high expertise in PSA-3000 capabilities. Test coverage **exceeds 90%** of 802.3bt and **95%** of 802.3at PSE PICS. See Sifos datasheets, **PSE 4-Pair Conformance Test Suite Overview** and **PSE 2-Pair Conformance Test Suite Overview**.

PSE Multi-Port Suite for 2-Pair 802.3bt & 802.3at PSE's

While IEEE 802.3 standards describe a PSE as a single port device, most PSE's are multi-port systems such as Ethernet switches. This fact leads to the need for system test methods and tools to assess PSE behavior across a multitude of ports. The licensed optioned **PSE Multi-Port Suite** offers two fundamental testing capabilities that address this need.

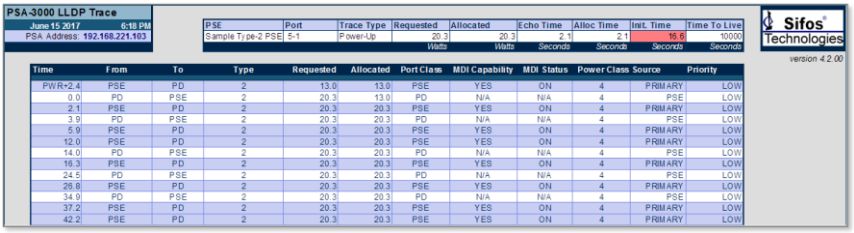
2-Pair Multi-Port PD Emulation turns every PSA-3000 test port into an emulated 802.3at Powered Device where behaviors such as static power load, PD classification, line power loss, and even PoE LLDP protocol characteristics are modeled simultaneously across as many as 192 PSA ports. Virtually any 802.3at PD may be emulated. See Sifos datasheet, **Multi-Port Live PD Emulation Overview**, for further information on Live PD Emulation.

The **Power Management (PM) Analyzer Suite** is a set of fully automated tests and reporting that takes the PSA-3000 into the realm of fully automated 2-Pair PSE System Power Management and Multi-Port Stimulus-Response testing. The PM Analyzer Suite assesses system-wide behaviors only observable when many IEEE 802.3at PD's are powered by a PSE. The test suite will acquire and distill information regarding key behaviors of a PSE including **class-based power administration**, multi-port **LLDP granting**, power-up and LLDP grant timing, **static power** capacity, **transient reserve** capacity, power down timing, power-per-port **uniformity and uncertainty**, and power **stress test** analyses. Results are presented in colorful, graphical spreadsheet reports. See Sifos datasheet, **PSE PM Analyzer Suite for PSA,PSL-3000 Overview**.

802.3bt & 802.3at PoE LLDP Emulation and Analysis

The PSA-3000 includes a license optioned subsystem designed to flexibly emulate all **802.3bt** and **802.3at** LLDP capable PD's on a per test port basis. Fully automated tools enable capture and analysis of protocol and protocol timing between the PSE and the PD.

See Sifos datasheet**, LLDP Emulation & Analysis for the PowerSync Analyzer**.



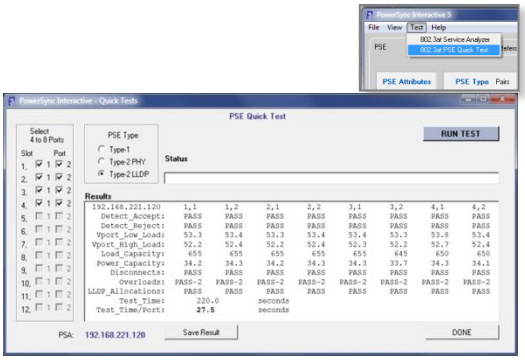
LLDP Protocol Trace

2-Pair Multi-Port High Throughput PSE Verification

The PSA-3000 is provided with a sample PSE automated test script, **psa_quick_test**, that recovers several important parameters from 2-Pair (802.3at or 802.3bt) PSE ports with an effective test throughput of less than 15 seconds per tested port. This application can be used in both QA and manufacturing test to *rapidly* qualify PSE functional performance.

Important features of the **psa_quick_test** include:

- **Source Code Provided**: May be used as is, may be modified, or may be used as template script
- Scans 4 to 8 PSE ports per test cycle
- Tests **Type-1, Type-2** (**2-event**), and **Type-2** (**LLDP***) PSE's
- Validates PoE **Detection Acceptance** and **Rejection** Ranges
- Measures PSE **Port Voltage** at min. and max. load conditions
- Determines **Power Capacity** in Watts and mA
- Assesses **Disconnect Power Removal** response and timing
- Assesses **Overload Power Removal** and **Power-Type Threshold**
- Assesses **LLDP Power Allocations*** and associated timing



PSA Quick Test Menu in PSA Interactive

Typical test times will range from 8 to 14 seconds per port tested including tests of Type-2 LLDP capable PSE's.

```
PSA-1,1>psa_quick_test 1,1 1,2 2,1 2,2 3,1 3,2 4,1 4,2  type-2 lldp
TESTING WITH 192.168.221.106 ON PORTS 1,1 1,2 2,1 2,2 3,1 3,2 4,1 4,2
EVALUATING DETECTION REJECT SIGNATURES...
EVALUATING DETECTION ACCEPT, LOW LOAD Vport, AND DISCONNECTS...
EVALUATING DETECTION ACCEPT, HIGH LOAD Vport, CAPACITY, & OVERLOADS...
ASSESSING LLDP POWER-UPS...
REQUESTING FULL TYPE-2 POWER...
ASSESSING LLDP ALLOCATIONS...

    192.168.221.106     1,1      1,2      2,1      2,2      3,1      3,2      4,1      4,2
     Detect_Accept:    PASS     PASS     PASS     PASS     PASS     PASS     PASS     PASS
     Detect_Reject:    PASS     PASS     PASS     PASS     PASS     PASS     PASS     PASS
    Vport_Low_Load:    55.7     55.8     55.8     55.8     55.7     55.7     56.0     55.9
   Vport_High_Load:    54.9     54.9     54.9     55.0     54.8     54.8     55.2     55.1
     Load_Capacity:     645      650      650      650      655      645      645      640
    Power_Capacity:    35.4     35.7     35.7     35.7     35.9     35.3     35.6     35.3
       Disconnects:    PASS     PASS     PASS     PASS     PASS     PASS     PASS     PASS
         Overloads:  PASS-2   PASS-2   PASS-2   PASS-2   PASS-2   PASS-2   PASS-2   PASS-2
  LLDP_Allocations:    PASS     PASS     PASS     PASS     PASS     PASS     PASS     PASS
         Test_Time:       101.0          seconds
    Test_Time/Port:       12.6          seconds
```

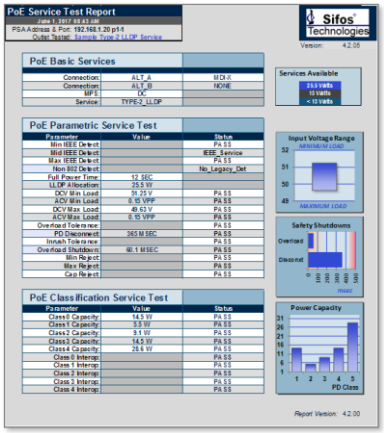
Automated Manufacturing/QA PowerShell Test Script, **psa_quick_test**

***Note:** *LLDP testing requires PoE LLDP Emulation and Analysis feature*.

PoE Service Analyzer Application

The PoE Service Analyzer is a special automated test and reporting application to enable comprehensive parametric and interoperability analysis at any PD connection point in a PoE enabled wiring plant. The testing supports **802.3at** Type-1 and Type-2, including Type-2 with LLDP, PoE services.

See Sifos datasheet, **PoE Service Analyzer Product Overview**.



Service Analyzer Report

Technical Data: PSA-3000

LAN Interface Specifications

Operating Mode	Signal Path	Parameter	Specification
Data Through Mode	PSE # to THRU #	Connections	RJ45
		Data Rates and Signaling	10/100/1000/2.5G/5G/10GBase-T
		Latency	None - Passively Coupled
		Impedance	100Ω, Balanced
		Insertion Loss	≤ 2dB (0.1 to 100MHz) ≤ 7dB (0.1 to 500MHz)
		Pair to Pair Isolation	≥30dB (0.1 to 100MHz) ≥15dB (0.1 to 500MHz)
		Equivalent Length Cat6A Cable / Test Port	~ 15 Meters (typical)*
Data Connect (LLDP Emulation) Mode	PSE # to Blade Transceiver	Connection	RJ45
		Data Rate and Signaling	10/100Base-T
		Orientation	MDI End Point
		Protocol	802.1ab, 802.3bc, 802.3at, 802.3bt
		Impedance	100Ω, Balanced
		Return Loss	≤-20dB, 1MHz to 100MHz

* This figure should be doubled for snaked data path testing with PoE using test port pairs. Does not account for potential impairments introduced with PoE DC currents on long cables such as effects of DC Unbalance on link partner magnetics.

PoE Port Connections

Operating Mode	Dependency	Parameter	Selections
2-Pair Power	Port 1 and Port 2 operate independently	Powered Pair	ALT-A or ALT-B
		Polarity	MDI or MDI-X
4-Pair Power: **PSA-3202**	Connect to Port 1 (*Port 2 disabled*) or Connect to Port 2 (*Port 1 disabled*)	ALT-A Polarity (Port 2)	MDI or MDI-X
		ALT-B Polarity (Port 1)	MDI or MDI-X
		Detection Signature Type	**Single** (Port 1) or **Dual** (Port 1 and Port 2)
4-Pair Power: **PSA-3102** or **PSA-3002**	Connect to Port 2 (*Port 1 disabled*)	ALT-A Polarity (Port 2)	MDI or MDI-X
		ALT-B Polarity (Port 1)	MDI or MDI-X
All	Any Conductor referenced to Any Other Conductor	Maximum Input Voltage	±60 VDC
	Any Conductor referenced to RJ-45 Shield	Maximum Input Voltage	±60 VDC

Detection and AC MPS Specifications

Description	Conditions	Parameter	Specification
Detection Resistance	Vport = 2.5VDC - 12VDC, Port Connected, Transition Current Load = 0	Range	9 KΩ to 39 KΩ
		Resolution	1 KW
		Accuracy vs Setting ΔV / ΔI at 4.5 Volt Spacing	±1.75% + 300Ω
Detection Capacitance	Vport = 2.5VDC - 12VDC, Port Connected, Transition Current Load = 0	Range	0.14, 5, 7, 11μF
		Accuracy	±15%
Detection Signature Cut-Off Threshold	Port Connected	Vport	12V ± 2%
AC MPS Signature	Vport = 12VDC - 60VDC, Port Connected	AC Impedance	24KΩ || (0.1μF + 330Ω)
		Resistance Accuracy ΔV / ΔI at 2 Volt Spacing	22.8KΩ ± 250Ω
	Port Isolated	AC Impedance (< 500 Hz) AC Impedance (< 120 Hz)	> 1.1 MΩ > 3.0 MΩ

Current Load Specifications

Description	Conditions	Parameter	Specification
Load Current	Per Powered (or classifying) Pairset	Range	**PSA-3202**: 0 to 950 mA **PSA-3102**: 0 to 750 mA
		Resolution	0.25 mA
		Accuracy	± (0.5% setting + 0.25mA)
		Slew Rates	> 4mA / µsec
		Activation Voltage	15V, Rising Vport
		De-Activation Voltage	14V, Falling Vport
Transition (Mark Region) Current	Load Current Activated, Per Powered (or classifying) Pairset	Range	0 to 400 mA
		Resolution	0.25 mA
		Accuracy	± (1.0% setting + 0.5mA)
		Slew Rates	> 4mA / µsec
		Activation Voltage	14V, Falling Vport
		De-Activation Voltage	PSA-3202: 4.5V, Falling Vport PSA-3102: 6V, Falling Vport
Multi-Event Classification (*Not available to **PSA-3102***)	Multi-Event Activated, Vport > 15VDC	802.3bt Signatures Emulated	Single Signature Class 5 - 8
			Dual Signature Class 1 - 5
		Non-Standard Signatures	Class Current per Event
		802.3bt Auto-Class	2mA @ 80msec of LCE1
		Multi-Event Activation	**psa_connect** or **mclass**
		Multi-Event Deactivation	**psa_disconnect** or **mclass**
		Multi-Event Timeout	100 msec @ > 15V
		Event Start Glitch De-bounce	150µsec
		Mark and Idle Transition Glitch De-bounce	500µsec
		Event Count Reset Condition	< 4.5V for > 500µsec
		Power-On Expiration (default)	115 msec
Configurable Load Transient	Vport > 15VDC, Per Powered Pairset	Sequential Load Steps	2
		Transient Sequence Repeats	1 to 6 cycles
		Load Step 1 Range	0 to 1800 mA
		Load Step 2 Range	**PSA-3202**: 0 to 950 mA **PSA-3102**: 0 to 750 mA
		Resolution (0 – 950 mA) Resolution > 950 mA	0.25 mA 0.50 mA
		Accuracy (0 – 25 mA) Accuracy (> 25 mA)	± (2% setting + 0.5mA) ± (1% setting + 1mA)
		Slew Rate	< 10mA / µsec
		Step 1 Duration ≤ 950 mA	200 µsec to 1 sec
		Step 1 Duration > 950 mA	200 µsec to 80 msec
		Step 2 Duration Load Step 1 ≤ 950 mA Load Step 1 > 950 mA	 200 µsec to 1 sec (or persist) 1 sec
		Step Resolution	100 µs
		Trigger Modes: ≤ 950 mA > 950 mA	Immediate, Edge, Event Immediate
		Active Load Resistance	37 Ω
		Foldback Suppression Min. Port Voltage (@ 400mA)	30 VDC
		Foldback Suppression Duration	Step 1 + Step 2 Duration

DC Metering Specifications

Description	Conditions	Parameter	Specification
Voltage Meter	Average, Max-Peak, Min-Peak, Scope Trace	Voltage Range	0 - 60V
		Aperture or Trace Length	256 Samples (10ms, 20ms, 0ms…10s)
		Extended Trace Length[3]	1024 Samples (200ms, 2s, 4s, 8s, 20s)
		Sample Rates	39.1 µsec - 39.1 msec (1,2,5 steps)
		Resolution	16 mV

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DC Metering Specifications

Description	Conditions	Parameter	Specification
Voltage Meter (con'd)		Displayed Resolution	Avg & Peak: 2 decimal places O-scope Traces: 25 mV
		Accuracy[1]	> 30VDC: ± (1.5% reading + 16mV) < 30VDC: ± (2.0% reading + 16 mV)
		Measurement Triggers	Immediate, Edge, Event, Power-Up (*traces only*)
Current Meter	Average, Max-Peak, Min-Peak, Scope Trace	Current Range	0 – 2000 mA
		Aperture or Trace Length	256 Samples (10ms, 20ms, 50ms…10s)
		Extended Trace Length[3]	1024 Samples (200ms, 2s, 4s, 8s, 20s)
		Sample Rates	39.1 µsec - 39.1 msec (1,2,5 steps)
		Resolution (0– 1023 mA)	0.25mA
		Resolution (1024–2000 mA)	0.5mA
		Accuracy[2]	± (0.5% reading + 0.5mA)
		Triggers	Immediate, Edge, Event, Power-Up (*traces only*)

1. Does not include Voltage drop due to cable losses and 0.45Ω maximum test port input resistance.
2. Does not include Port-Connected MPS current, which is approximately (Vport - 12V)/24kΩ.
3. Scope Traces only

AC Metering Specifications

Description	Conditions	Parameter	Specification
AC Peak-Peak Meter	Low Band, VDC= 40-57V	Accuracy, 25Hz – 325Hz Accuracy, 50Hz – 300Hz	-15%, +11% -7.5%, +11%
	High Band, VDC= 40-57V	Accuracy, 2.5KHz – 250KHz Accuracy, 20KHz – 250KHz	-15%, +7% -6%, +7%
	Full Band, VDC= 40-57V	Accuracy, 50Hz – 250KHz	-7.5%, +8.5%
	All Bands, VDC= 40-57V	Resolution	1mV
		Range	1Vp-p
		Input Impedance	0.05µF[1]

1. Input impedance models the lowest possible PD input capacitance – measurements are therefore affected by the effective source impedance of the PSE, including any frequency specific variations in that source impedance.

Triggering Specifications

Description	Conditions	Parameter	Specification
Edge & Event Triggers	All Modes	Range	0.25V - 59.5V
		Resolution	0.125 mV
		Accuracy (relative to DC Meter)	± 0.0625 mV
		Trig1 to Meter or Transient Latency	~ 50 µsecs
		Event Trigger Latency	< 500 µsecs
	Trigger Noise Immunity	Pre-Trigger Qualification Time (Voltage below Rising threshold or above Falling threshold)	1.5 msec
		Normal Mode Edge Noise Rejection	125 mV
		Noisy Mode Edge Noise Rejection	500 mV

Time Interval Metering Specifications

Description	Conditions	Parameter	Specification
Time Interval Meter	Microsecond scale	Time Range	4 – 26200 µs
		Time Resolution	1 µsec
		Time Accuracy	± 2 µsecs
		Min. Resolvable Time Interval	~ 4 µsecs
	Millisecond scale	Time Range	2-6550 msec
		Time Resolution	0.1 msec
		Time Accuracy	± 1 msec
		Min. Resolvable Time Interval	2 msec

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Time Interval Metering Specifications

Description	Conditions	Parameter	Specification
Time Interval Meter (con'd)	Second Scale	Time Range	0.1 – 16.1 sec
		Time Resolution	0.1 sec
		Time Accuracy	± 50 msec
		Min. Resolvable Time Interval	0.1 sec
	Triggering & Noise Immunity	Start Trigger	Edge or Event
		Stop Trigger	Edge
		Normal Mode Edge Noise Rejection	125 mV
		Noisy Mode Edge Noise Rejection	500 mV

LED Indicators – PSA-3202

LED Label	Parameter	Description
LINK	LLDP Link Status & Activity	**GREEN:** Linked at 100Base-Tx for LLDP, Blink with Activity **AMBER**: Linked at 10Base-T for LLDP, Blink with Activity **OFF**: Unlinked (or Disconnected)
PD	PoE Power Status	**GREEN**: PSE powered with Vport > 36 VDC **AMBER**: Valid 802.3 Detection Signature Connected (No PSE Power) **OFF**: PSE not powered & PD signature not connected
4PR	Test Port Mode	**GREEN:** Test port configured for 4-Pair powering **AMBER**: Opposite test port configured for 4-Pair powering **OFF:** Test port configured for 2-Pair powering
COM	Communications	**ON**: Indicates active communications with test port
*For **PSA-3102** LED Indicators, see Section 3 of PSA-3000 Technical Reference Manual.*		

Programming and Control

Description	Specification
Interface	Ethernet 10/100BaseT (*Telnet Port 23 protocols*) **NOTE**: The **Console** interface is for IP Address config only.
Host Requirements	PC running Microsoft Windows XP, Vista, 7, 8, 10, or Linux PC (Fedora, SUSE, Debian)
Control Environment	Sifos PowerShell PSA or PSA-Interactive
Recommended Network Latency:	< 5 msec

Physical and Environmental

Description	Specification
Dimensions	19"W x 5.25"H x 12"L (3U Rack Mount)
Weight	20.4 lbs. (Fully Populated with PSA-3x02 Cards)
Power	100VAC-240VAC, 50-60 Hz, 1.35A Max.
Ambient Operating Temperature	0°C to 40°C (≤ 100W combined PoE loading per test blade or 50W per test port)
Storage Temperature	-20°C to 85°C
Operating Humidity	5% to 95% RH, Non-Condensing.

Certifications

Description	North America	Europe & International
Safety	**CSA Listed** (CSA22.2 No. 61010)	EN61010-1 (Test & Measurement Equipment)
Emissions	FCC Part 15, Class A ICES-001	EN55011 (Class A Radiated Emissions) EN61326-1 (EMC) VCCI, AS/NZS 3548
European Commission		Low Voltage Directive (2014/35/EU) Electromagnetic Compatibility Directive (2014/30/EU) RoHS 2 Directive (2011/65/EU) **CE Marking** Directive (93/68/EEC)

FCC Statement: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

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Ordering Information

PSA-3000, PowerSync Analyzer 3000 Chassis & Controller, PowerShell PSA, and PSA Interactive Software

PSA-3202, Dual Port PSE Test Blade for IEEE 802.3at, IEEE 802.3bt, & Pre-802.3bt 4-Pair Testing

PSA-LLDP, IEEE 802.3at/802.3bt LLDP Emulation & Analysis Feature for One PSA Address (*Up to 24 Test Ports*)

PSA-CT4P*, 4-Pair PSE Conformance Test Suite for One PSA Address (Up to 24 Test Ports)

PSA-CT2P*, 2-Pair PSE Conformance Test Suite for One PSA Address (Up to 24 Test Ports)

PSA-3000-MPT, PSE Multi-Port Suite for 2-Pair powering PSE's including Multi-Port Live PD Emulation and the Power Management Analyzer Suite for one **PSA-3000** Address* (*up to 24 test ports*)

HCopy-Manual, Hardcopy of PSA-3000 Technical Reference Manual

* **NOTE:** *See PSE Conformance Test Datasheets for all part numbers and descriptions associated with the 4-Pair and 2-Pair PSE Conformance Test Suites.*

Accessories Included:

- PSA Software (CD, USB Stick)
- PSA Installation Guide (Hardcopy, CD, USB Stick) & Quick Start Guide for Phone
- PSA-3000 Technical Reference Manual (Softcopy, CD and USB Stick)
- Power Cord
- Cross-Over Ethernet Cable
- USB 2.0 Cable

Sifos Technologies, Inc.
1 Tech Drive, Suite 100
Andover, MA 01810
+1 (978) 975-2100
www.sifos.com
sales@sifos.com

Verification, Simplified.

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