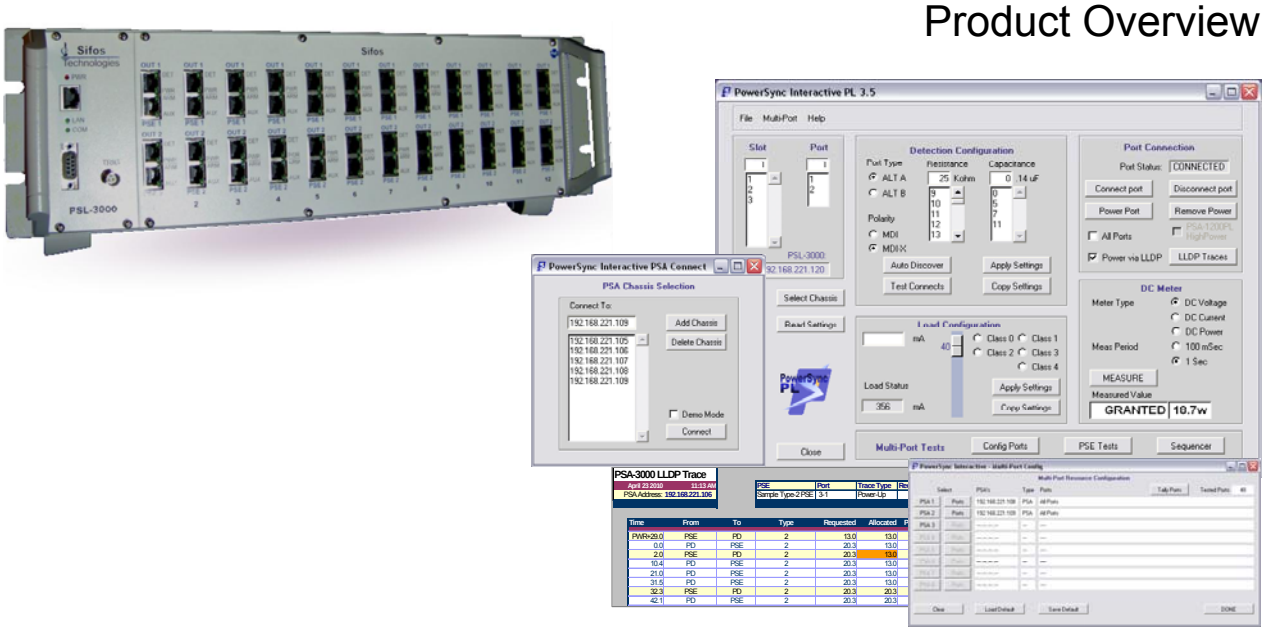
PSL-3000

PowerSync® Programmable Load

IEEE 802.3at Power over Ethernet

Product Overview



Key Features

- **Multi-Port Precise PSE Loading & Measurements**
- **Static PSE Loading > 42 Watts Per Port x 24 Ports**
- **DC Voltage, Current, and Power Metering**
- **Flexible Powered Device LLDP Emulation and LLDP Analysis**
- **Unique Fully Automated Multi-Port PSE System Analysis**
- **Scalable, Cost-Efficient Architecture**
- **PSA Interactive-PL Graphical User Interface**
- **Enables PSE Packet Transmission Testing with PoE Loads**
- **Smart Fan Control – Runs Cool and Quiet**
- **Flexible Script Automation and Graphical User Interface for Microsoft Windows and Linux PC's.**
- **Backward Compatible to Sifos PSA-1200-PL Programmable Loads**

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Overview

802.3at EndSpan and MidSpan PSE Testing with Commercial, Data-Sheeted Instrumentation

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 testing and analysis of **IEEE 802.3at** Power Sourcing Equipment (PSE) behaviors. Each test port inside a PowerSync 3000 Programmable Load is an autonomous and fully isolated instrument offering stimulus and measurement resources. Test ports are configured and controlled via a high level automation interface, **PowerShell PSA**, and may also be rapidly accessed and managed from an intuitive graphical user interface, **PSA Interactive PL**.

Easy Setup, Rapid PD Emulation, Testing in Minutes

LLDP Emulation

The IEEE 802.3at specification describes a new generation of PSE’s and Powered Devices (PD’s) that communicate highly resolved power needs and power allocations using Ethernet layer 2 (LLDP) link protocols. The PSA-3000 may be optioned via a license key to flexibly emulate PD’s and fully analyze the new power negotiation protocols between PSE’s and PD’s.

High Power Ready

The PSL-3000 offers independent and concurrent capable static load currents up to 750 mA on each test port up to a maximum of 24 test ports per chassis. Current loading is accurate from 0 to 750 mA with independent metering to assess actual loading seen by the PSE. Built-in PD emulation modes enable power-on emulation of PD’s ranging from Class 0 to Class 4.

PSE Functional and System Stressing and Verification….

Automated PSE System Testing

PSL-3000’s may also be optioned via software keys to run the one-of-a-kind **PSE Multi-Port System Performance Suite**. PSE Multi-Port automatically evaluates systems of up to 192 PSE ports simultaneously to assess overall power capacities, PSE system power budgeting, port power prioritization, and port state behavior independence. Users may specify PD emulation test conditions with full control of PD class and static loading.

Fully Automated Manufacturing Verification….

Cost Effective, Scaleable, and Backward Compatible

The PSL-3000 may be configured with 2 to 24 test ports, or with a fixed 24 test ports (**PSL-3024**) to further reduce per-port cost. Features such as LLDP and Multi-Port Test Suite can also be optioned into each PSL-3000 as needed. The PSL-3000 is Sifos’ second generation Programmable Load and offers full programming backward compatibility to the PSA-1200-PL, the first generation Programmable Load from Sifos Technologies. PSL-3000 test software will also run transparently with the PSA-3000 family of PowerSync Analyzers from Sifos Technologies.

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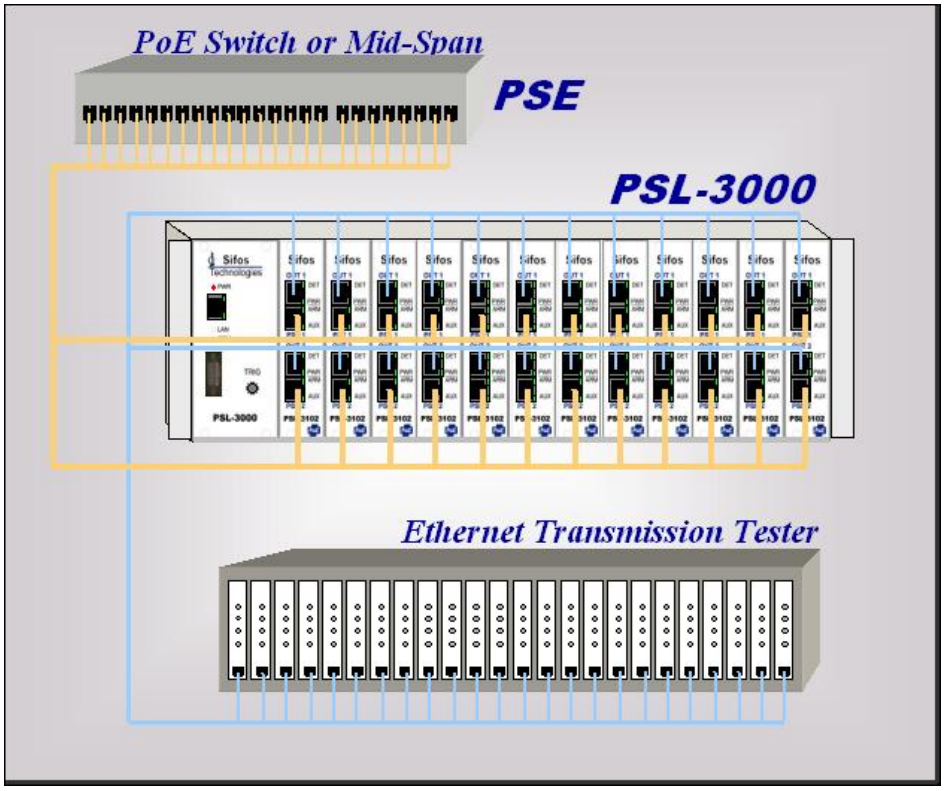
PowerSync Programmable Load Test Equipment Setup: PSE Testing



Flexible PD Emulation with Measurements

Alternative A/B Pair Configuration

Polarity Configuration

Configurable Detection Resistance

Configurable Detection Capacitance

Configurable PD Classification Emulation

Static DC Load Current to 750mA

Average DC Voltage Measurement

Average DC Current Measurement

Average DC Power Measurement

PSE Multi-Port Testing*

Fully Automated PSE System Testing and Analysis Up to 192 PSE Ports

Power Decisions & Management

Power Capacity & Load Stressing

Port Independence

Flexible PD Emulation

Automated Sequencing

Colorful Spreadsheet Reporting

* *Restricted to Type-1 (PD Classes 0 – 3) Emulations as of PSA 3.5 Software Release, April 2010. Extensions to PD Class 4 and LLDP Emulation planned in future releases.*

LLDP & LAN Test Support

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

Fully Automated LLDP Protocol Traces and Analysis including Colorful Spreadsheet Reporting

Test Port "Through" Channel for LAN Transmission Testing with or without PoE Port Power

Negligible Through-Channel LAN Impairment

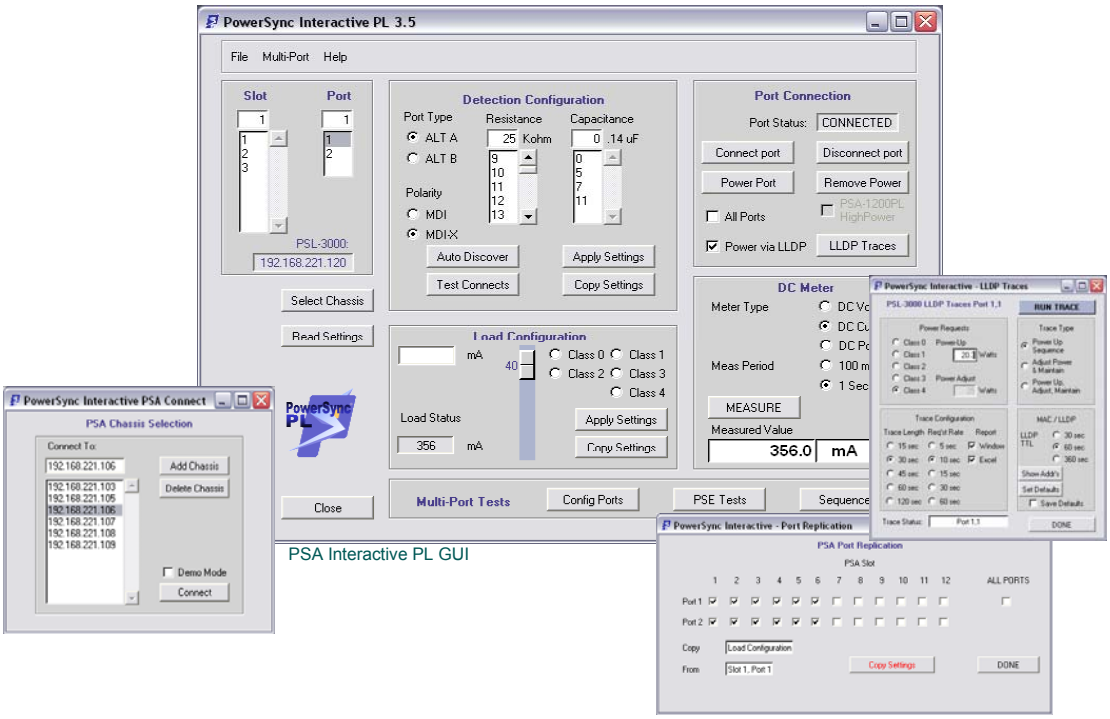
Powerful Software

PSA Interactive GUI for Rapid Setup and Intuitive Manual Testing

PowerShell Script Automation for Interactive Automated Test Development and Fast Test Execution

PSA Interactive Graphical User Interface

The PSA Interactive Programmable Load Graphical User Interface (GUI) is an intuitive tool designed to allow user quickly to setup load configurations and perform measurements on IEEE 802.3at compliant power sourcing equipment (PSE). The PSA Interactive Programmable Load GUI provides an intuitive view of the full range of testing resources available within the PowerSync Programmable Load. Users can quickly harness the flexibility and power of these resources to set up load configurations, perform measurements, and to prototype sequences that will eventually be automated in PowerShell PL scripts.



PSA Interactive PL GUI

The Sifos PSA Interactive Programmable Load GUI offers intuitive controls for:

- Chassis & Port Selection
- Replication of Settings Across Multiple Ports
- Port Configuration (ALT A/B, Polarity MDI/MDI-X, Detection Signatures)
- Automated ALT/Polarity Discovery
- Single or Multi-Port PD Connect, Disconnect, Power-Up, and Power-Down
- Static Load Control
- PD Classification and One Button Single or Multi-Port PD Power-Up Emulation
- One Button LLDP Power-Up Emulation
- Average DC Voltage, DC Current, and DC Power Measurements
- Access to Automated Multi-Port Test Suite and Automated LLDP Protocol Traces

PoE LLDP Emulation and Analysis

The PSL-3000 includes a subsystem designed to flexibly emulate LLDP capable PD's on a per test port basis. Fully automated applications allow in depth capture and analysis of protocol between the PSE and the PD.

See **Sifos Technologies, LLDP Emulation and Analysis Overview** for further information on this topic.

PSE Multi-Port (PL) System Test Suite

The unique and innovative PSE Multi-Port (PL) Test Suite is a library of fully automated and sequence-able tests that characterize system behaviors of PSE's as they deliver power to groups of many Powered Devices (PD). It enables flexible configuration of PD emulation characteristics and reports numerous system characteristics

including power capacities, power management decisions, port independence, and system stress or burn-in performance.

See **Sifos Technologies, Multi-Port Test Suite Product Overview** for further information regarding the Multi-Port Test Suite.

PowerShell PSA Tcl/Tk Interface

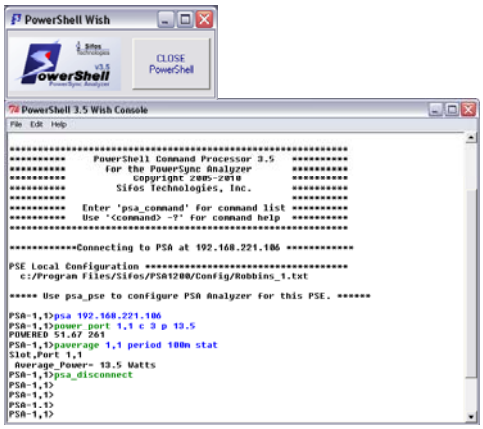
The PowerShell PSA Scripting Environment provides a high level, live-keyboard means to control and program automated test sequences for the PSL-3000 PowerSync Programmable Load. PowerShell PSA enables fully automated testing suites that span multiple ports, blades, and frames. Built upon the popular Tool Command Language (Tcl), it offers an extensive and extensible programming language.

PowerShell PSA provides a complete API for the PSL-3000 including high level commands that **emulate PD Power-Ups**, execute **LLDP Protocol Traces**, and execute or sequence **Multi-Port System** tests. PowerShell commands access all of the resources of the PSA-3000 and enable the rapid development of highly customized test scripts. PowerShell fully supports off-line script development and debug through its robust built-in demo mode.

PowerShell PSA libraries can be integrated into broader Tcl environments that interlace traditional network transmission tests with Power-over-Ethernet tests. This enables seamless integration of custom or standard PSE tests with existing Tcl-based test suites.

Other features offered by the PowerShell Tcl environment include:

- Interpretive command execution (no compilation, simple debug)
- Simple, intuitive PowerSync PL commands (API)
- Integrated command “help” tools
- Upward compatible to PSA-3000 platforms
- Fast test execution speeds
- Script-configured test report files
- AnyEdit Smart Editor for PowerShell PSA
- Traditional Tcl Console or Command-Knowledgeable Wish Console with PSA waveform viewer capability



PowerShell Wish Console

Technical Data: PSL-3000 & PSL-3024

LAN Interface Specifications			
Operating Mode	**Signal Path**	**Parameter**	**Specification**
Data Through Mode	PSE-# to OUT-#	Connections	RJ45
		Data Rates and Signaling	10/100/1000BaseT
		Latency	0 (Passively Coupled)
		Impedance	100Ω, Balanced
		Pair-Pair Isolation	≥ 36dB @ 100MHz
		Insertion Loss	≤ 2dB, 0.1MHz to 100 MHz
		Insertion Loss Variation	≤ 0.75dB, 0.1MHz to 100 MHz
		Return Loss (OUT pairs terminated into 100Ω)	≤ -24dB, 1MHz to 100MHz
Data Connect (LLDP Emulation) Mode	PSE-# to Blade Transceiver	Connection	RJ45
		Data Rate and Signaling	10BaseT
		Orientation	MDI End Point
		Protocol	802.1ab, 802.3bc, 802.3at
		Impedance	100Ω, Balanced
		Return Loss	≤-20dB, 1MHz to 100MHz

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	Connect to Port 2 (Port 1 bypassed)	Powered Pair	ALT-A (Port 2) and ALT-B (Port 1)
		Polarity	MDI or MDI-X for each pair

Detection and AC MPS Specifications			
Description	**Conditions**	**Parameter**	**Specification**
Detection Resistance	Vport = 2.5VDC - 12VDC, Port Connected	Range	9 KΩ to 39 KΩ
		Resolution	1 KΩ
		Accuracy ΔV / ΔI at 1 Volt Spacings	≤ 24KΩ, ± 250Ω > 24KΩ,, ± 400Ω
Detection Capacitance	Vport = 2.5VDC - 12VDC, Port Connected	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 Spacings	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 Pair	Range	0 to 750 mA
		Resolution	1.00 mA
		Accuracy	± 0.5% ± 0.25mA
		Slew Rates	> 4mA / μsec
		Activation Voltage	15V, Rising Vport
		De-Activation Voltage	14V, Falling Vport

DC Metering Specifications			
Description	**Conditions**	**Parameter**	**Specification**
Voltage Meter	Average	Voltage Range	0 - 60V
		Sample Averaging	256 Samples
		Sample Rate (100 msec Period) Sample Rate (1 sec Period)	390 msec 3.9 msec
		Resolution	.0625 V
		Accuracy[1]	± 2% ± 0.62.5 mV
Current Meter	Average	Current Range	0 – 1000 mA
		Sample Averaging	256 Samples
		Sample Rate (100 msec Period) Sample Rate (1 sec Period)	390 msec 3.9 msec
		Resolution	1.00 mA
		Accuracy[2]	± 2% ± 1.0 mA

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.

LED Indicators

LED Label	Parameter	Description
DET	Detection Enabled	**ON**: Valid Detection Signature Connected (R= 19 to 26 KΩ, C= 0μF) AND Port Switch Connected **BLINKING**: Configured for LAN Termination. Long on-time blink for LINK UP, short on-time blink for UNLINKED. **OFF**: Invalid or no PD Signature AND configured as through.
PWR	PSE Power On	**ON**: Indicates Power-Up with Vport > 36 **OFF**: Vport < 36 VDC
ARM	*(LED Not Utilized on PSL-3000)*	**OFF**: (*LED Not Utilized*)
AUX	Communications	**ON** or **BLINKING**: Indicates Communications to PSA Test Port

Programming and Control

Description	Specification
Interface	Ethernet 10/100BaseT
Host Requirements	PC running Microsoft Windows NT, 2000, XP, Vista, or Linux PC (Fedora, SUSE)
Control Environment	Sifos PowerShell PSA or PSA Interactive-PL
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-3102 Cards)
Power	100VAC-240VAC, 50-60 Hz, 1350mA Max.
Ambient Operating Temperature	0°C to 50°C (≤ 42.75 Watt loading per port)
Storage Temperature	-20°C to 85°C
Operating Humidity	5% to 95% RH, Non-Condensing.

Certifications

Description	Certifications
Emissions	FCC Part 15, Class A Meets EN55022 VCCI, AS/NZS 3548
Safety	CSA Listed (CSA22.2 No. 61010) Meets EN61010-1 CB Scheme IEC 61010-1
European Commission	Low Voltage Directive (73/23/EEC) Electromagnetic Compatibility Directive (89/336/EEC) 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.

Ordering Information

PSL-3000, PowerSync Programmable Load 3000 Chassis and Controller including PowerShell PSA and PSA Interactive-PL Software

PSL-3102, Dual Port PoE+ PSE Load Card for PSL-3000

PSL-3024, PowerSync Programmable Load 3000 Chassis and Controller including 12 PSL-3102 Load Cards, PowerShell PSA, and PSA Interactive-PL Software

PSL-LLPD, LLDP Emulation and Analysis Feature for One PSL-3000 Controller

PSL-MPT, PSE Multi-Port Test Suite for One PSA Controller (Up to 24 Test Ports)

PSL-3000U, PSA-1200-PL to PSL-3000 Chassis and Controller Upgrade

PSAEF-2L-PL-CREDIT, Credit for PSA-1200-PL Dual Port Test Card Trade-Up to PSL-3102

Accessories Included:

- Installation Guide & Configuration Chart
- PowerSync Analyzer Reference Manual (Binder and CD)
- Power Cord
- Cross-Over Ethernet Cable
- RS-232 Cable

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