



PSL-3424M

PowerSync® Programmable Load

IEEE 802.3at & 802.3bt Power over Ethernet

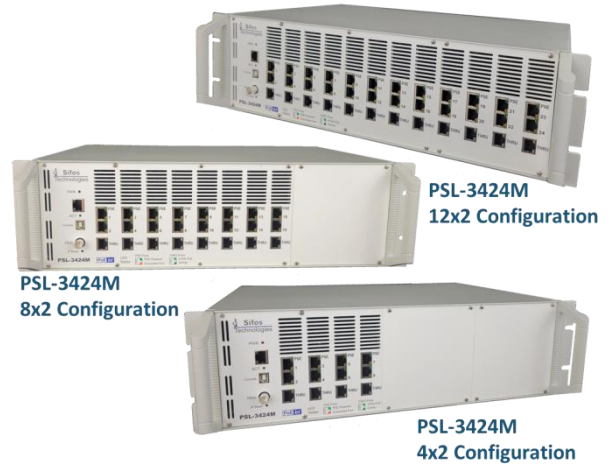
Product Overview

PowerShell PSA Editor

```
1 # Connect Slot 1 Multiplexer to Port 1
2 psl_setup p1 single
3
4 # Configure PD Emulation
5 passive p1 r 24
6 class p1 7
7 load p1 1 495 s 256
8
9 # Connect PD
10 port p1 connect
11
12 # Recover Power Status
13 st_wait 2
14 set status [pstatus p1 stat]
15
16 # Verify Power and Assigned Class
17 if ([lindex $status 3] == "ON" && [lindex $status 5] == "READY")
18 {
19   set asgnClass [lindex $status 9]
20   puts "PSE Powered, Assigned Class = $asgnClass"
21 }
22
23 # Arm Peak Current Measurement
24 idcpeak p1 trig ext period 100m max stat
25
26 # Apply Transient Load and Measure Peak Current
27 ptrans p1 1 1240 mid arm
28 trigout p0
29 set status [idcpeak p1 stat]
```

PowerShell PSA Console

```
PSA-1,1->psl_setup p1 single
PSA-1,1->passive p1 r 24
PSA-1,1->class p1 7
PSA-1,1->load p1 1 495 s 256
PSA-1,1->port p1 connect
PSA-1,1->
PSA-1,1-># Recover Power Status
PSA-1,1->st_wait 2
PSA-1,1->set status [pstatus p1 stat]
Port 1
Power_A: ON
Power_B: ON
PSE_TYPE: BT
ASGN_CLASS: 7
PSA-1,1->idcpeak p1 trig ext period 100m
max stat
Port 1
ARMED
-99 mA
PSA-1,1-># Apply Transient Load and
Measure Peak Current
PSA-1,1->ptrans p1 1 1240 mid arm
PSA-1,1->trigout p0
PSA-1,1->set status [idcpeak p1 stat]
Port 1
READY
1239.3 mA
PSA-1,1->
```



Key Features

- Connect up to **24 (2-Pair and/or 4-Pair) PSE ports**
- Simultaneously Load up to **12 PSE ports**
- Programmable Per-Port Loading to **over 100W per Port**
- Scalable:** Configure as **4x2 (8) Ports, 8x2 (16) Ports, or 12x2 (24) Ports**
- Emulate **Class 0 – Class 8 PD's**
- LAN Data **THRU port** for packet and/or PHY testing under PoE Load
- ESD/EFT/Surge Hardened** – Supports IEC 61000-4 Compliance Testing
- Automation** Development Environment with PowerShell PSA
- Pairset Voltage Metering and Power Detection
- Load Current Configuration and Metering
- Programmable **Load Transients and Inrush Loading**
- Smart and Quiet** Thermal Management
- Embedded Power Supply

Verification, Simplified.

Industrial and Commercial PoE Switches

2-Pair Powering PSE's
4-Pair Powering PSE's
802.3at / 802.3bt Support

Automate QA, Manufacturing

High Level Automation Development Environment
Per-Blade Multiplexing Handles Up to 24 Ports
Control via Ethernet
Support Packet Test, PHY Test, Snaked Data Setups

Safety/Compliance QA of PSE's

IEC61000-4 Level 3 Protected Test Ports
Low RF Emissions
CSA Listing

Cost Effective PSE Loading

Sifos' Lowest Cost PSE Test Platform
Scalable from 8 to 24 Ports

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, Low Cost Solution

Sifos Technologies offers **one-box platforms** to facilitate analysis of Power Sourcing Equipment (PSE) behaviors. The **PSL-3424M** is Sifos' lowest cost, multi-port PSE test instrument supporting PSE loading and power stressing. Depending upon configuration, up to 12 ports can simultaneously load over 1200 combined watts, emulating 802.3at and 802.3bt single signature PD's advertising Class 0 to Class 8. With per-slot multiplexing, up to 24 PSE ports can be connected enabling automated test strategies covering 24, 16, or 8 port PSE's.

Perfect Fit for Industrial PSE Testing

PSL-3424M test ports are ESD/Surge/EFT protected to IEC 61000-4 Level 3 standards allowing multi-port connections to PSE's while they go through safety/compliance test procedures. Test ports provide flexible PD class emulation and power loading up to 100W per port. The instrument scales from 8 multiplexed PSE ports to 24 multiplexed PSE ports allowing lower cost solutions to smaller port-count applications.

Automation Ready

The PSL-3424M is provided with Sifos' PowerShell PSA scripting environment that includes a variety of commands and utilities to make short work of evaluating PSE ports. Automation test strategies can utilize the 2:1 test port multiplexing to scan more PSE ports or connect multiple PSE's to a single test instrument.

Features of Sifos High-End Testers

The PSL-3424M is managed over the LAN just like other members of the Sifos PSA-3000 family of PSE test instruments. The PSL-3424M runs cooling fans only when test port heating calls for it. An efficient cooling system then expels up to 1200 Watts without irritating, high frequency fans. The PSL-3424M is rack friendly and will tolerate equipment immediately on top and below the 3U sized instrument.

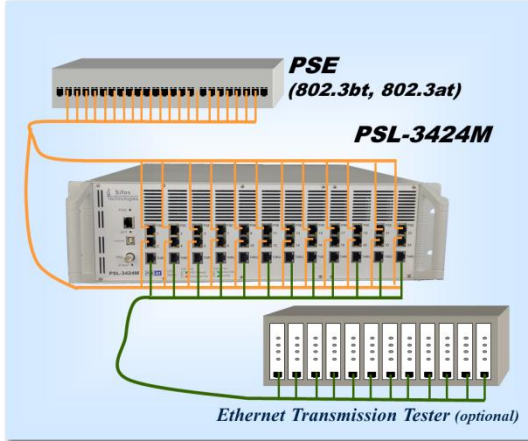
Commercial Grade Test Equipment

Like all Sifos test equipment, the PSL-3424M is safety (CSA) and environmentally (CE mark) certified. The PSL-3424M will support packet traffic up to 10GBase-T rates on DC isolated THRU ports. All technical capabilities are fully specified in technical datasheets.

Verification, Simplified.

Example Applications

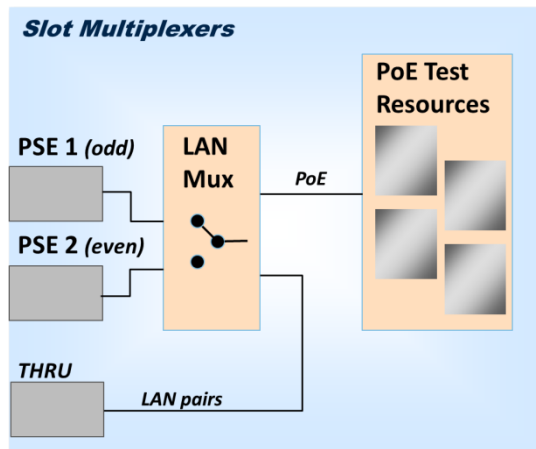
Data Link Testing with Full PoE Loading



Industrial PSE PoE Qualification



LAN Port Multiplexing



PD Emulation with Measurements (per Port)

Flexible 2-Pair & 4-Pair PD Detection & Class Emulation of (Single Signature) Class 0 – 8 PD's

1 Valid & 1 Invalid Detection Signatures

Static Load Current to 975mA per pairset (1.95A total)

Average and Peak (Min/Max) DC Voltage Measurement

Average and Peak (Min/Max) DC Current Measurement

Average DC Power Measurement

Metering Apertures of 100msec or 1sec

Programmable Transients (5.5msec, 45msec, 100msec)

Synchronized Metering and Load Transients

Programmable Inrush Current

Export / Import Hardware (Event) Trigger

Test Automation Ready

PowerShell PSA Wish and Tcl Consoles

Convenient LAN Control Port – Manage Across Network

Robust I/O Management – No Drivers Required

Interactive Command Environment

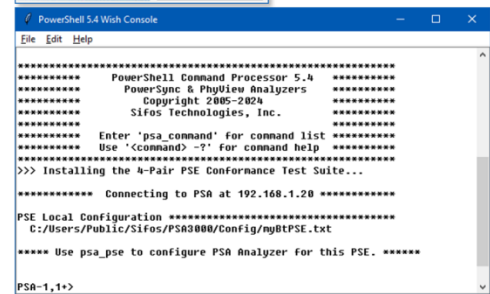
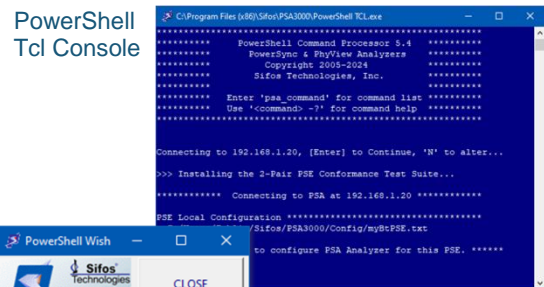
Interactive Debugging

Intuitive Commands with Comprehensive Help Menus

Powerful Utility Commands

Supported on Windows and Linux Platforms

Notepad++ PowerShell PSA Editor (Windows only)



PowerShell
Wish
Console

Slot Multiplexer

Form Automated Strategies that Test Ports in Groups

Test Two or More PSE's with One Physical Test Setup

Multiplex LAN Data Lines

Low Impairment Multiplexing

PowerShell PSA Tcl/Tk Interface

PowerShell PSA provides a complete and extensible API for the PSL-3424M instrument including a robust command set that ranges from elemental resource configurations to high level utilities. 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** PSE testing). Built upon the powerful and extensible Tool Command Language (Tcl/Tk), PowerShell PSA offers an effective programming language well suited for automated testing.

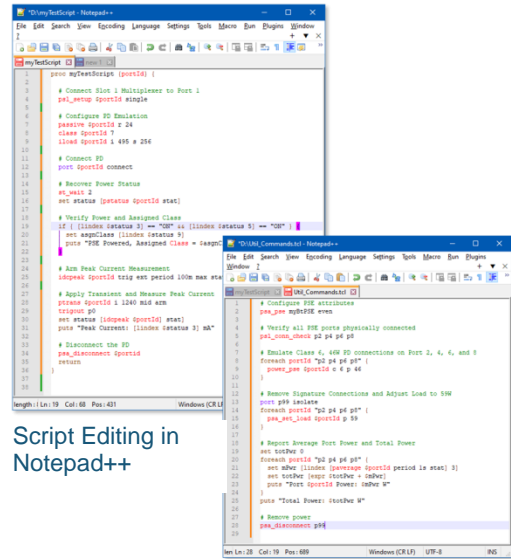
PowerShell PSA can be integrated into broader Tcl environments that interlace traditional network transmission tests with Power-over-Ethernet tests. This enables seamless integration of custom or standard PSE tests with existing Tcl-based test suites.

Other features offered by the PowerShell PSA environment include:

- Interpretive command execution (no compilation, easy debug)
- Simple, intuitive PSA/PSL-3000 family commands (API)
- Integrated and extensive command “help” features
- Low level resource management commands embedding all I/O management functions
- Mid-level and high level utility commands such as flexibly emulated power-ups, multi-port connection checking, power load adjustment, etc.
- Fast test execution speeds
- Smart prompt that tracks selected test port configuration
- Command-Knowledgeable Wish Console
- Notepad++ Editor Extension for PowerShell PSA script editing and debugging
- Flexible test suite sequencing including compound sequences
- Traditional Tcl Command Console
- Extensive PowerShell PSA command documentation
- Supported on Microsoft Windows and Linux



PSL-3424M Command Stack



Script Editing in Notepad++

Technical Data: PSL-3424M

LAN Interface Specifications			
Multiplexer Setting	THRU Port	Parameter	Specification
Connected to Odd test port	DC Isolated Connection to Odd Numbered test port	Connections	RJ45
		Data Rates and Signaling	10/100/1000Base-T/ 2.5GBase-T/5GBase-T/ 10GBase-T
		Latency	None - Passively Coupled
		Impedance	100Ω, Balanced
Connected to Even test port	DC Isolated Connection to Even Numbered test port	Pair-Pair Isolation	≥ 30dB @ 100MHz
		Insertion Loss	≤ 2.5dB, 1MHz to 100 MHz
		Insertion Loss Variation	≤ 1dB, 1MHz to 100 MHz
		Return Loss (OUT pairs terminated into 100Ω)	≤ -16dB, 1MHz to 100MHz

PoE Port Connections			
Operating Mode	Test Ports	Configuration	Specification
2-Pair PSE Loading	Any Port 1-24	ALT-A	Polarity MDI or MDI-X
		ALT-B	Polarity MDI or MDI-X
4-Pair PSE Loading	Any Port 1-24	Single Signature	ALT-A, MDI or MDI-X and ALT-B, MDI or MDI-X
All	Any Conductor referenced to Any Other Conductor	Maximum Continuous Input Voltage*	±60 VDC
	Any Conductor referenced to RJ-45 Shield	Maximum Continuous Input Voltage*	±60 VDC

* PSL-3424M PSE test ports are designed to tolerate ±1KV surge and EFT impulses.

Detection Specifications			
Description	Conditions	Parameter	Specification
Detection Resistance	2-Pair and 4-Pair Dual Signature Vport = 2.5VDC - 10VDC $\Delta V / \Delta I$ at 4.5 Volt Spacing below 9.25V Port "Connected"	Valid Signatures	24 K Ω
		Invalid Signatures	12 K Ω
		Valid Signature Accuracy (12K Ω)	12.0K Ω ±240 Ω
		Valid Signature Accuracy (24K Ω)	24.0K Ω ±480 Ω
		Cut-Out Voltage	13V ± 4%
Detection Capacitance	Vport = 2.5VDC – 57VDC	Pairset Capacitance	0.1 μ F
		Accuracy	±20%

Classification Specifications			
Description	Conditions	Parameter	Specification
Classification Signatures	PSE Voltage Vport = 13 – 22.5 VDC	2-Pair Classes	0, 1, 2, 3, or 4
		4-Pair (Single Signature) Classes	1, 2, 3, 4, 5, 6, 7, or 8
Class Events	PSE Voltage Vport = 13 – 22.5 VDC	Class 0 current	2.5 ± 0.4mA
		Class 1 current	10.5 ± 0.4mA
		Class 2 current	18.5 ± 0.4mA
		Class 3 current	28.5 ± 0.7mA
		Class 4 current	40 ± 0.8mA
		Class Stability Timing	≤ 1 msec
Mark Event Load	PSE Voltage Vport = 4 – 12VDC Following Class Events	Resistance per Pairset	9.0K Ω ± 3.0K Ω
Class Reset		Reset Threshold	3.9 ± 0.9 VDC
		Minimum Time Duration	< 1 msec

Current Load Specifications			
Description	Conditions	Parameter	Specification
Static Load Current	2-Pair PSE Loading	Range	0 to 975 mA
		Resolution	2.00 mA
	4-Pair PSE Loading	Range	0 to 1950 mA
		Resolution	2.00 mA
	2-Pair or 4-Pair PSE Loading	Slew Rates (100mA Step)	> 2.5mA / μ sec
		Activation Voltage	39.2 ± 0.2 V, Rising Vport
		De-Activation Voltage	9.8 ± 0.1 V, Falling Vport
		Maximum 0mA Load Current	1 mA
		Default Inrush Current at Power-Up	40 mA per Pairset (80mA 4-Pair)
		Inrush Duration at Power-Up	100msec ± 1msec
Inrush Current Range		0 to 975 mA per Pairset	
Transient Load Current	2-Pair PSE Loading	Range	0 to 975 mA
		Resolution	1.00 mA
	4-Pair PSE Loading	Range	0 to 1950 mA
		Resolution	2.00 mA

Current Load Specifications			
Description	Conditions	Parameter	Specification
	2-Pair or 4-Pair PSE Loading	Trigger Mode	Immediate or Event Trigger ¹
		Duration = "Short"	5.5 msec
		Duration = "Mid"	45 msec
		Duration = "Long"	100 msec
		Duration = "Hold"	Indefinite

¹ Event Trigger is used to synchronize transient loads across test ports and also with meter measurements

DC Metering Specifications			
Description	Modes	Parameter	Specification
Voltage Meter	Average, Max. Peak, or Min. Peak each Pairset	Voltage Range	0 - 58V
		Measurement Apertures	100 msec, 1 sec
		Sample Rate (100 msec aperture)	390 μ sec
		Sample Rate (1 sec aperture)	3.9 msec
		Resolution	30 mV
		Accuracy: \geq 5 VDC ¹	\pm (0.6% reading + 0.25 V)
		Accuracy: < 5VDC	\pm 2.0% reading -0.25V, + 0.5 V
		Trigger Modes	Immediate or Event Trigger ²
Current Meter	2-Pair or Pairset Average, Max. Peak, or Min. Peak	Current Range	0 – 975 mA
		Resolution	0.5 mA
	4-Pair Average, Max. Peak, or Min. Peak	Current Range	0 – 1950 mA
		Resolution	0.5 mA
	Average, Max. Peak, or Min. Peak 2-Pair or 4-Pair	Measurement Apertures	100 msec, 1 sec
		Sample Rate (100 msec aperture)	390 μ sec
		Sample Rate (1 sec aperture)	3.9 msec
		Accuracy – 4 to 20 mA	\pm (10% reading – 0.8mA)
		Accuracy – 21 to 200 mA	\pm (3.1% reading – 1.1mA)
		Accuracy – 201 to 1950 mA	\pm (0.5% reading – 1.1mA)
Trigger Modes	Immediate or Event Trigger ²		
Power Meter	2-Pair Average	Range	0 – 57 W
		Resolution	0.1 W
	4-Pair Average	Range	0 – 113 W
		Resolution	0.1 W
Power Meter	2-Pair or 4-Pair Average	Measurement Apertures	100 msec, 1 sec
		Sample Rate (100 msec aperture)	390 μ sec
		Sample Rate (1 sec aperture)	3.9 msec
		Accuracy	\pm (2% reading + 0.1W)
		Trigger Mode	Immediate

¹ Does not include Voltage drop due to cable losses and 0.3 Ω maximum test port input resistance.
² Event Trigger is used to synchronize meter measurements across test ports and also with transient loads

LED Indicators		
LED	Parameter	Description
PSE Ports: Upper LED	PSE Power Status	GREEN: Port Powered OFF: Port Not Powered
PSE Ports: Lower LED	PSE Power Status	AMBER: Port Connected by Multiplexer OFF: Port Not Connected by Multiplexer
THUR Ports: Upper LED	Powered Pair Configuration	GREEN: PoE Resources Configured for 4-Pair PSE OFF: PoE Resources Configured for 2-Pair PSE
THUR Ports: Lower LED	Port Activity	GREEN (blinking): Active Communications with Test Port OFF: No Communications with Test Port

Programming and Control	
Description	Specification
Interface	Ethernet 10/100BaseT NOTE: The Console interface is for IP Address config only.
Host Requirements	PC running Microsoft Windows XP, Vista, 7, 8, 10, 11, or Linux PC (Fedora, SUSE, Debian)
Control Environment	Sifos PowerShell PSA or PSA Interactive PL
Recommended Network Latency:	< 50 msec

Physical and Environmental	
Description	Specification
Dimensions	19"W x 5.25"H x 12"L (3U Rack Mount)
Weight (<i>with all 12 slots populated</i>)	19.6 lbs.
Power	100VAC-240VAC, 50-60 Hz, 1.35A Max.
Ambient Operating Temperature	0°C to 40°C (≤ 100W per test port)
Max Fan Air Flow	~100 CFM (8-Port config.), ~200 CFM (16-Port config.), ~300 CFM (24-Port config.)
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)	EN61010-2 (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) EN61326-1.2020 (Lab Equipment) RoHS 2 Directive (2011/65/EU) CE Marking Directive (93/68/EEC)
<p>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.</p>		

Ordering Information

PSL-3424M-24, PowerSync Multiplexed Programmable Load Chassis and Controller including 24 multiplexed test ports and PowerShell PSA Software

PSL-3424M-16, PowerSync Multiplexed Programmable Load Chassis and Controller including 16 multiplexed test ports and PowerShell PSA Software

PSL-3424M-8, PowerSync Multiplexed Programmable Load Chassis and Controller including 8 multiplexed test ports and PowerShell PSA Software

Accessories Included:

- Installation Guide & Configuration Chart
- PSA Software (CD, USB Stick)
- PowerSync Analyzer Reference Manual (Hardcopy, CD, USB Stick)
- Power Cord
- Cross-Over Ethernet Cable
- USB Cable

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