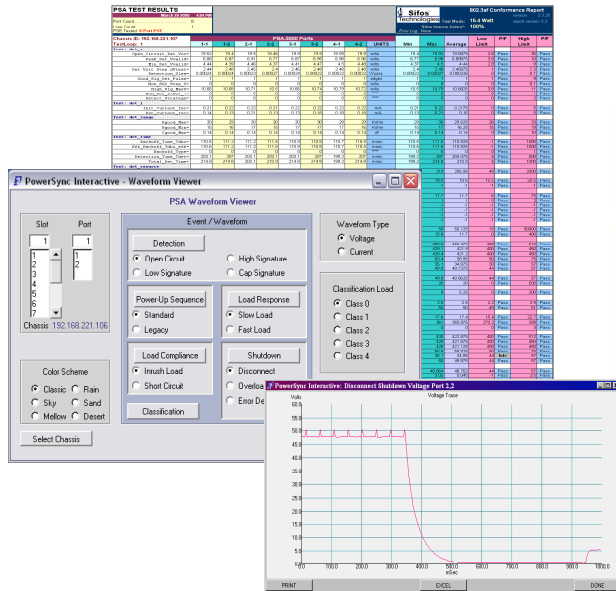# PSA-3000
PowerSync® Analyzer
IEEE 802.3at Power over Ethernet

Product Overview

Key Features

- **Industry Leading IEEE 802.3 PoE PSE Conformance Tests**

- **Unique Fully Automated Multi-Port PSE System Analysis**

- **Static PSE Loading > 42 Watts Per Port x 24 Ports**

- **Powered Device Flexible LLDP Emulation and Analysis***

- **Replaces All General Purpose Test Equipment & Fixtures**

- **Highly Scaleable and Upgradeable Test Ports and Features**

- **Flexible and Accurate Measurements of Voltage, Current, Noise**

- **Noise Immune Triggering and Time Interval Measurements**

- **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 Analyzers**

real **Power** from *Sifos*

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 many 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 and overall compliance to the **IEEE 802.3at** specification.   Each test port inside a PowerSync Analyzer is an autonomous and fully isolated instrument offering a rich set of stimulus and measurement resources. Test ports are configured and controlled via a high level automation interface, **PowerShell PSA**, and may also be accessed and managed from an intuitive graphical user interface, **PSA Interactive**.

Automated PSE Conformance Testing
The PSA-3000 may be optioned via a software key to run the world's most advanced **PSE Conformance Test Suite**.   This fully automated application applies the PowerSync Analyzer's diverse resources to assess over 60 IEEE 802.3at specification parameters presented in easily readable spreadsheet reports with multi-port statistics and clearly notated pass/fail limit analysis.

Automated PSE System Testing
PSA-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 evaluates systems of up to 192 PSE ports simultaneously to assess overall power capacities, multi-port event responses, PSE system decision making and power budgeting, and inter-port interactions and couplings.

LLDP Emulation
The IEEE 802.3at specification describes new types of PSE's and Powered Devices (PD's) that communicate power needs and power grants using Ethernet layer 2 (LLDP) link protocols.   The PSA-3000 is designed with resources to flexibly emulate PD LLDP functions and to analyze LLDP interactions with the PSE.   *LLDP emulation may be activated via software keys and will be available via software update from Sifos in the mid-2009 time frame.
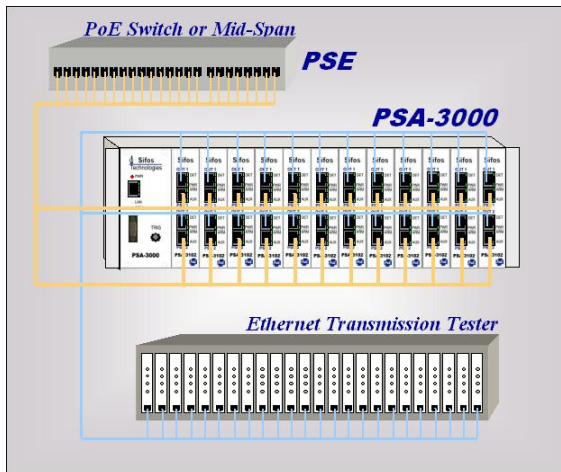
Second Generation PoE Solution from Sifos
The PSA-3000 family is a second generation family of products from Sifos specifically developed to address the IEEE 802.3at specification. First generation PSA-1200 products established Sifos as the industry standard world-wide for comprehensive PSE testing and analysis. The PSA-3000 family fully supports test procedures and automation developed for PSA-1200 analyzers while offering increased static and transient load stimuli, higher set point and measurement accuracies, higher resolutions, reliable noise-immune triggering, LLDP emulation, active load foldback suppression, and many other advantages relative to the first generation PowerSync Analyzers from Sifos Technologies.

802.3at End-Span PSE, Mid-Span PSE, PSE Controller, and Integrated Modular Connector Development….

Versatile IEEE 802.3at Compliance and DV Test….

PSE Functional Stressing and Verification….

Fully Automated Manufacturing Verification….

real Power from Sifos

 www.sifos.com

PowerSync Analyzer Test Equipment Setup: PSE Testing

PowerSync Analyzer Test Equipment Setup: PoE Service Analysis
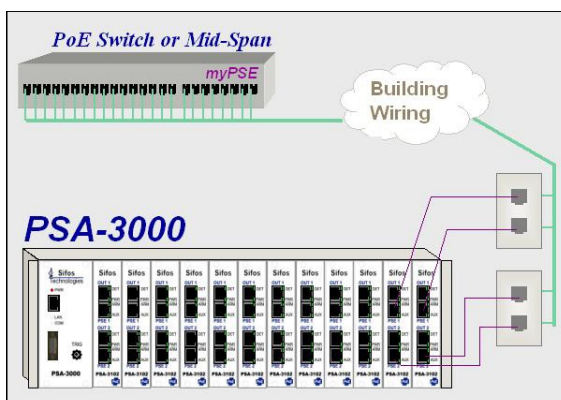
Per-Port PSE Test Resources

Flexible PD Detection & Class Emulation

Flexible Loads and Load Transients

Event or Noise-Immune Edge Triggering of Load Transients & Measurements

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

Standard One-Button Waveform Library for Rapid PSE Analysis and Conformance Troubleshooting

Flexibly Triggered, Noise-Immune Time Intervals / Slew Rates

O-Scope Graphical Waveforms

Concurrent Packet Transmission and PoE Load Testing

External Trigger Input/Output

PSE Conformance Suite

High Coverage, Fully Automated IEEE 802.3af PSE Compliance Testing and Analysis

Over 20 PSE Tests Producing Over 65 PSE Parameters Per Port

Automated Test and Port Sequencing with Comprehensive, Colorful Spreadsheet Reporting

Automatically Adapts to PSE Device Technologies

Updated with Sifos Tracking Service Agreements

New IEEE 802.3at PSE Conformance Test Suite (*including LLDP Emulation options***)   (*Expected Mid-2009*)**

PSE Multi-Port Testing

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

Power Decisions & Management

Power Capacity & Load Stressing

Port Isolation & Independence

PSE Group Timing Behaviors

Flexible PD Emulation

Automated Sequencing

Colorful Spreadsheet Reporting

New IEEE 802.3at PSE Multi-Port Test Suite (*including LLDP Emulation options***)   (*Future Release*)**

LLDP & LAN Test Support

Flexible, Programmable PD LLDP Emulation for PoE* with control of payloads, timing, and message synchronicity

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

Negligible Through-Channel LAN Impairment

Powerful Software

PSA Interactive GUI

**PowerShell PSA Script Automation**

PoE Service Analyzer

Comprehensive Evaluation of PoE Service at a PD Interface

PoE Service Interoperability Analysis

                   www.sifos.com

PSA Interactive Graphical User Interface

The Sifos PSA Interactive Graphical User Interface (GUI) is a flexible and powerful tool designed to allow user to quickly configure and perform both standard and user-defined measurements on IEEE 802.3 compliant power sourcing equipment (PSE). PSA Interactive provides an intuitive view of the full range of testing resources available within the PSA-3000 PowerSync Analyzer. Users can quickly harness the flexibility and power of these resources to perform design verification and diagnostic measurements or to prototype sequences that will eventually be automated in PowerShell PSA scripts.

PSA Interactive organizes PSA-3000 resources and testing features into twelve distinct subsystems*:

- Port Detection Configuration
- Trigger Configuration
- Load and Load Transient Configuration and Activation
- DC Meters (Average, Max Peak, Min Peak, and Trace Voltage and Current meters)
- AC Peak Voltage Meter
- Time Interval / Slew Rate Meter
- PSE Conformance Tests
- PSE Conformance Test Sequencer
- Standard Waveform Viewer
- Multi-Port, Multi-Chassis Configuration
- PSE Multi-Port Tests
- PSE Multi-Port Test Sequencer
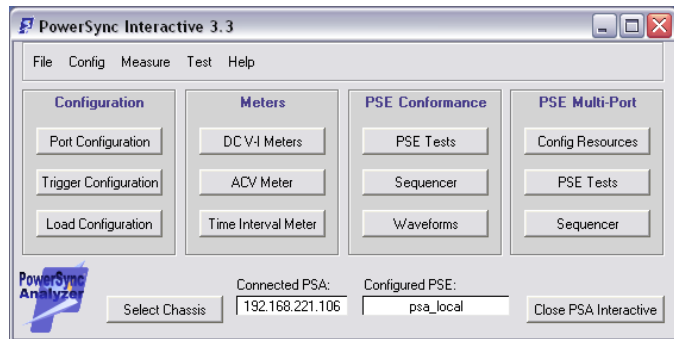
PSA Interactive Main Menu

PSA Interactive enables rapid multi-port configurations and one-button testing and analysis through intuitive subsystem dialogs that flexibly address test ports and PSA chassis'.
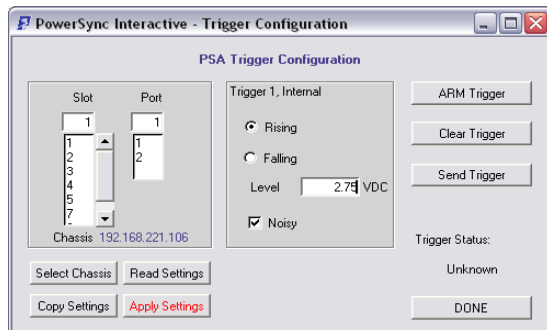
Waveform Trigger Configuration Menu

One-Button Waveform Capture & Analysis

PSE Conformance Selected Test Menu

*Note: A new subsystem will be added for LLDP Emulation support when it is available from Sifos.

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 PSA-3000 PowerSync Analyzer. PowerShell 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.
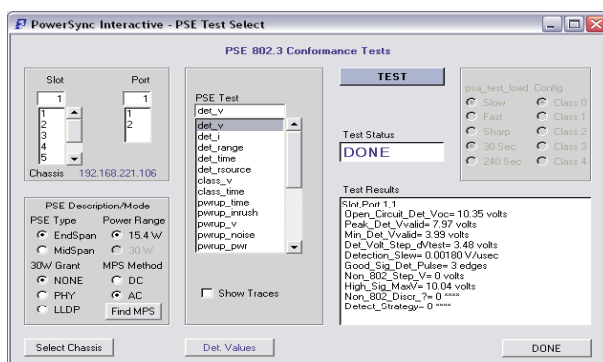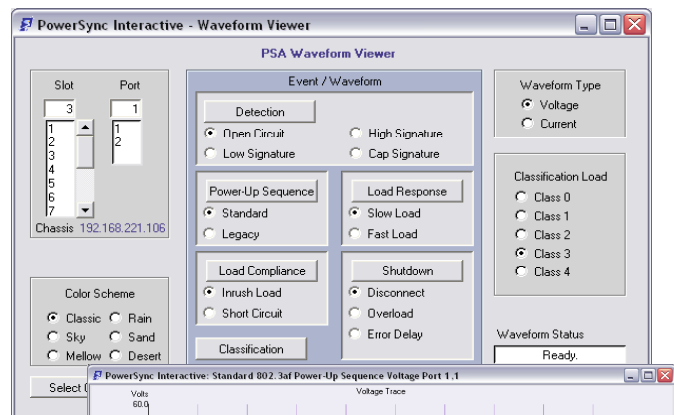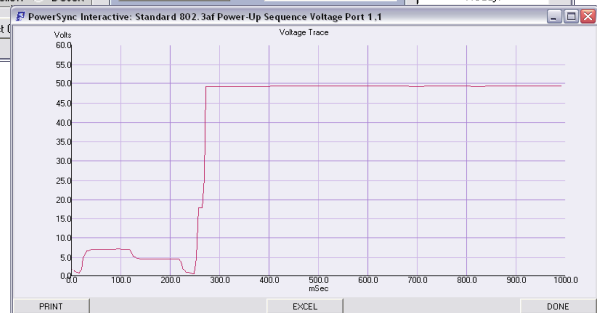
PowerShell PSA provides a complete API for the PSA-3000 including high level commands that execute and sequence standard **802.3 PSE Conformance** and **Multi-Port System** test suites. PowerShell commands access all of the resources of the PSA-3000 and enable the rapid development of highly customized test scripts. PowerShell fully supports off-line script development and debug through its robust built-in emulation 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 Analyzer commands (API)
- Integrated command "help" tools
- Full access to PSA triggering and signal synchronizing features
- Fast test execution speeds
- Script-configured test report files
- Use in tandem with PSA Interactive GUI
- AnyEdit Smart Editor for PowerShell PSA
- Traditional Tcl Console or Command-Knowledgeable Wish Console with PSA waveform viewer capability

PowerShell Wish Console
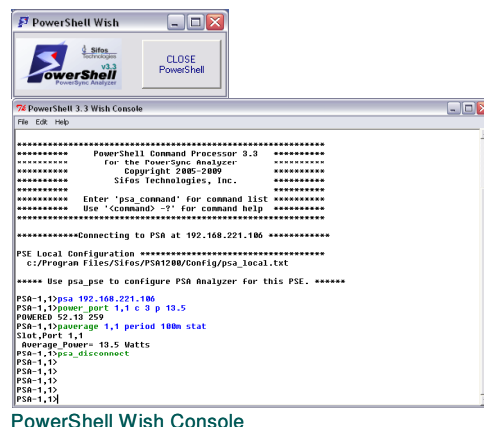
PSE Multi-Port System Performance Test Suite

The unique and innovative PSE Multi-Port Test Suite is a library of **fully automated** and **flexibly sequenced** tests that characterize system behaviors of PSE's as they deliver power to groups of many (up to 192) Powered Devices (PD). It enables highly flexible configuration of **PD emulation** characteristics and reports numerous system characteristics including power capacities, power management decisions, port independence and isolation characteristics, port timing characteristics, and stress or burn-in performance.

See **Sifos Technologies Multi-Port Test Suite** overview for further information regarding the Multi-Port Test Suite.

IEEE 802.3 PSE Conformance Test Suite

The IEEE 802.3 PSE Conformance Test Suite is a library of **fully automated, flexibly sequenced,** and **self-adapting** tests that provide a high degree of specification compliance testing on PSE ports without the need for any external instrumentation. These tests are accessible to both PSA Interactive (GUI) and to PowerShell.

The **PSE Conformance Test Suite** consists of the following modules for testing **802.3af compliant** (or **802.3at "Type-1"**) PSE's:

- Detection Voltages
- Detection Current Compliance
- Detection Acceptance Range (R and C)
- Detection Timing
- PSE Source Resistance
- Classification Voltage
- Classification Timing
- Power-Up Turn-On and Rise Time
- Power-Up Inrush Compliance
- PSE Voltage and Ripple
- PSE Noise

- PSE Power Capacity
- Short Circuit Compliance
- Overload Transient Response
- DC MPS Validity
- DC MPS Shutdown
- AC MPS Shutdown
- AC MPS Signal Characteristics
- Overload Shutdown
- Turn-Off Time
- Turn-Off Voltage
- PSE Output Capacitance & Shunt Resistance

Each test captures and reports one or more parameters that are directly related to the IEEE 802.3 specification. Under sequencer control, multiple PSE tests can automatically sequence across multiple PSE ports in accordance with user selections.

The 802.3 **PSE Conformance Test Suite** includes several report generation options including automatic Microsoft Excel spreadsheet that reports test results, test statistics, test limits, and pass/fail results on one or more cycles of testing. An example of a **PSE Conformance Test Suite** test report is shown below:

PSA TEST RESULTS														802.3af Conformance Report			
March 29 2009 4:04 PM									Sifos Technologies				Test Mode: **15.4 Watt**		version 3.3.20		
Port Count.................... 8													Sifos Interop Index*: **100%**		report version 3.3		
Loop Count................... 1													*Error Log:* None				
PSE Tested: **8 Port PSE**																	
Chassis ID: 192.168.221.107					PSA-3000 Ports									Low Limit	P/F	High Limit	P/F
TestLoop: 1	1-1	1-2	2-1	2-2	3-1	3-2	4-1	4-2	UNITS	Min	Max	Average					
Test: det_v																	
Open_Circuit_Det_Voc=	19.52	19.4	19.5	19.45	19.9	19.9	19.90	19.9	volts	19.4	19.90	19.6075	2.0	Pass	30	Pass
Peak_Det_Vvalid=	6.88	6.87	6.91	6.77	6.87	6.95	6.98	6.96	volts	6.77	6.98	6.89875	3.8	Pass	10	Pass
Min_Det_Vvalid=	4.44	4.39	4.46	4.37	4.41	4.47	4.5	4.48	volts	4.37	4.5	4.44	2.8	Pass	9	Pass
Det_Volt_Step_dVtest=	2.44	2.48	2.45	2.4	2.46	2.48	2.48	2.48	volts	2.4	2.48	2.45875	1	Pass	7.2	Pass
Detection_Slew=	0.00024	0.00024	0.00023	0.00027	0.00024	0.00022	0.00022	0.00022	V/usec	0.00022	0.00027	0.000235	0	Pass	0.1	Pass
Good_Sig_Det_Pulse=	1	1	1	1	1	1	1	1	edges	1	1	1	1	Pass	9	Pass
Non_802_Step_V=	0	0	0	0	0	0	0	0	volts	0	0	0	0	Pass	0.1	Pass
High_Sig_MaxV=	10.66	10.68	10.71	10.5	10.66	10.74	10.79	10.72	volts	10.5	10.79	10.6825	3.8	Pass	11	Pass
Non_802_Discr_?=	0	0	0	0	0	0	0	0	****	0	0	0	0	Pass	1	Pass
Detect_Strategy=	0	0	0	0	0	0	0	0	****	0	0	0	0	Pass	2	Pass
Test: det_i																	
Init_Current_Isc=	0.21	0.22	0.22	0.21	0.22	0.22	0.22	0.22	mA	0.21	0.22	0.2175	0	Pass	5	Pass
Det_Current_Isc=	0.14	0.13	0.21	0.13	0.13	0.18	0.18	0.18	mA	0.13	0.21	0.16	0	Pass	5	Pass
Test: det_range																	
Rgood_Max=	30	29	30	30	30	30	29	29	Kohm	29	30	29.625	26	Pass	33	Pass
Rgood_Min=	15	16	17	15	17	17	17	16	Kohm	15	17	16.25	15	Pass	19	Pass
Cgood_Max=	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	uF	0.14	0.14	0.14	0	Pass	10	Pass
Test: det_time																	
Backoff_Time_Tdbo=	110.6	111.2	111.2	111.5	110.9	110.8	110.7	110.5	msec	110.5	111.5	110.925	-1	Pass	1500	Pass
Eff_Backoff_Tdbo_eff=	110.6	111.2	111.2	111.5	110.9	110.8	110.7	110.5	msec	110.5	111.5	110.925	-1	Pass	1500	Pass
Backoff_Type=	0	0	0	0	0	0	0	0	****	0	0	0	0	Pass	1	Pass
Detection_Time_Tdet=	203.1	207	203.1	203.1	203.1	207	199.2	207	msec	199.2	207	204.075	5	Pass	500	Pass
Total_Det_Time=	214.8	214.8	203.1	210.9	214.8	214.8	199.2	214.8	msec	199.2	214.8	210.9	5	Pass	1000	Pass
Test: det_rsource																	
Output_Impedance_Zout=	212.9	186	215.9	199.1	215.9	211.8	219	195	KOhm	186	219	206.95	45	Pass	2000	Pass
Test: class_v																	
Class_Voltage_Vclass=	18.5	18.3	18.4	18.3	18.8	18.8	18.9	18.8	volts	18.3	18.9	18.6	15.5	Pass	20.5	Pass
Mark_Voltage_Vmark=	-1	-1	-1	-1	-1	-1	-1	-1	volts	-1	-1	-1	-1	Pass	-1	Pass
Test: class_time																	
Class_Time_Tpdc=	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	msec	11.7	11.7	11.7	6	Pass	75	Pass
Event_Count=	1	1	1	1	1	1	1	1	****	1	1	1	0	Pass	2	Pass
Event1_Tcle1=	-1	-1	-1	-1	-1	-1	-1	-1	msec	-1	-1	-1	-1	Pass	-1	Pass
Event2_Tcle2=	-1	-1	-1	-1	-1	-1	-1	-1	msec	-1	-1	-1	-1	Pass	-1	Pass
Mark_Tme1=	-1	-1	-1	-1	-1	-1	-1	-1	msec	-1	-1	-1	-1	Pass	-1	Pass
Mark_Tme2=	-1	-1	-1	-1	-1	-1	-1	-1	msec	-1	-1	-1	-1	Pass	-1	Pass
Test: pwrup_time																	
Pwr-On_Rise_Time_Trise=	49	50	49	59	49	47	49	49	usec	47	59	50.125	15	Pass	50000	Pass
Power-On_Time_Tpon=	11.7	11.7	11.7	7.8	15.6	11.7	11.7	11.7	msec	7.8	15.6	11.7	0	Pass	400	Pass
Test: pwrup_inrush																	
Init_Iinrush=	415.1	418.1	420.3	420.8	425.4	423.6	426.9	429.6	mA	415.1	429.6	422.475	400	Pass	512	Pass
Max_Iinrush=	414.3	417.3	419.6	420.6	425.1	423.1	426.1	429.1	mA	414.3	429.1	421.9	400	Pass	450	Pass
Min_Iinrush=	413.6	416.8	419.1	419.8	424.4	422.1	425.4	428.4	mA	413.6	428.4	421.2	400	Pass	450	Pass
Tlim_Iinrush=	59.2	60.4	58.8	60.4	57.6	57.6	60.4	57.2	msec	57.2	60.4	58.95	50	Pass	75	Pass
Inrush_Voltage=	34.7	34.5	34.8	34.8	35.1	34.9	35.1	35.1	Volts	34.5	35.1	34.875	30	Pass	57	Pass
Powered_Vport=	49.9	49.6	49.0	49.6	49.0	49.7	49.9	49.6	Volts	49.0	49.9	49.7375	44	Pass	57	Pass
Test: pwrup_v																	
DC_Voltage_Vport=	49.8	49.5	49.7	49.5	49.7	49.7	49.8	49.6	volts	49.5	49.8	49.6625	44	Pass	57	Pass
AC_Ripple_Vpp(low)=	22	23	23	25	1	23	22	21	mVolts	1	25	20	0	Pass	500	Pass
Test: pwrup_noise																	
AC_Ripple_Vpp(noise)=	5	8	2	6	1	5	7	8	mVolts	1	8	5.25	0	Pass	200	Pass
Test: pwrup_pwr																	
DC_Power_Pport=	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	watts	2.5	2.5	2.5	2.2	Pass	2.9	Pass
DC_Current_Iport=	50	50	50	50	50	50	50	50	mA	50	50	50	49	Pass	51	Pass
Test: pwrup_pwrcap																	
Pport_Capacity=	17.6	16.8	16.8	17.6	17.6	17.6	17.6	17.6	watts	16.8	17.6	17.4	15.4	Pass	22.7	Pass
Iport_Capacity=	359	344	343	361	360	360	359	361	mA	343	361	355.875	270.2	Pass	399	Pass
Port_Class=	0	0	0	0	0	0	0	0	****	0	0	0	0	Pass	3	Pass
Test: pwrup_maxi																	
Init_Ilim=	416	418	421	421	426	424	427	430	mA	416	430	422.875	400	Pass	512	Pass
Max_Current_Limit_Ilim=	414	417	420	421	425	423	426	429	mA	414	429	421.875	400	Pass	450	Pass
Min_Current_Limit_Ilim=	414	417	419	420	424	422	425	428	mA	414	428	421.125	400	Pass	450	Pass
Short_Cir_Timeout_Tlim=	56.8	59.6	60.4	57.6	59.6	59.2	60.4	56.8	msec	56.8	65.8	59.925	50	Pass	75	Pass
Output_Voltage_V=	34.7	34.5	34.8	34.7	35.1	34.9	35.1	35	Volts	34.5	35.1	34.85	44	Info	57	Pass
25_msec_Short_Vport=	49.7	49.9	49.8	49.8	49.9	49.9	50	49.8	Volts	49.7	50	49.875	44	Pass	57	Pass
Test: pwrup_overld																	
Vport_Min=	48.864	48.528	48.768	48.592	48.736	48.656	48.816	48.656	volts	48.528	48.864	48.702	44	Pass	57	Pass
Negative_Slew=	0.05	0.04	0.05	0.04	0.05	0.04	0.04	0.05	V/uSec	0.04	0.05	0.045	-1	Pass	3.5	Pass
Positive_Slew=	0	0	0	0	0	0	0	0	V/usec	0	0	0	-1	Pass	3.5	Pass
Power_Duration=	3040	3040	3040	3040	3040	3040	3040	3040	uSec	3040	3040	3040	2750	Pass	3250	Pass
Integr_Power_Out=	60.35	60.13	60.24	60.07	60.27	60.27	60.19	60.16	mW-Sec	60.07	60.35	60.21	52.5	Pass	69.3	Pass
Test: mps_dc_valid																	
Minimum_Valid_Imin2=	9	7	10	8	9	9	10	8	mA	7	10	8.75	5.5	Pass	10	Pass
Min_Valid_Time_Tmps=	10	10	10	10	10	10	10	10	msec	10	10	10	1	Pass	65	Pass
Test: mps_dc_pwrdn																	
Max_Invalid_Imin1=	7	6	9	7	8	7	9	7	mA	6	9	7.5	5	Pass	9.5	Pass
Time-to-Shutdown_Tmpdo=	350	357	352	356	352	350	350	356	msec	350	357	352.875	300	Pass	400	Pass
Max_Voltage_Vopen_max=	19.536	19.376	19.488	19.408	19.888	19.904	19.936	19.856	volts	19.376	19.936	19.674	-1	Pass	30	Pass
Test: pwrdn_overld																	
Class_0_Ovld_Current_Icut=	365	360	360	365	365	370	365	370	mA	360	370	365	271	Pass	400	Pass
Overld_Time_Limit_Tovld=	59.6	60.5	59.3	59.4	58.3	57.6	58.4	57	mSec	57	60.5	58.7625	50	Pass	75	Pass
Test: pwrdn_time																	
Turn-Off_Time_Toff=	62.4	58.8	60.8	60.3	55.7	61.3	59.2	54.1	mSec	54.1	63.1	59.3	0	Pass	500	Pass
Output_Cap_Cout=	0.08028	0.07445	0.07773	0.07685	0.07015	0.08115	0.07555	0.06768	uF	0.06768	0.08115	0.07548	-1	Pass	0.52	Pass
Output_Load_Rp=	9999	9999	9999	9999	9999	9999	9999	9999	Kohm	9999	9999	9999	45	Pass	50000	Pass
Test: pwrdn_v																	
Avg_Idle_Voff=	0.1	0	0.1	0.1	0	0.1	0.1	0.1	VDC	0	0.1	0.075	0	Pass	2.8	Pass
Error_Delay_Ted=	9492.2	9453.1	9257.8	9492.2	9375	9335.9	9296.9	9453.1	msec	9257.8	9492.2	9394.525	750	Pass	10000	Pass
Peak_Error_Delay_Ved=	0.4	0.4	7.3	0.4	0.4	0.4	0.4	0.4	VDC	0.4	7.3	1.2625	0	Pass	20.5	Pass

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.

See **Sifos Technologies, PoE Service Analyzer Product Overview** for further information regarding the PoE Service Analyzer.

Technical Data: PSA-3000

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 and ALT-B
		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, Transition Current Load = 0	Range	9 KΩ to 39 KΩ
		Resolution	1 KΩ
		Accuracy	≤ 24KΩ, $\pm$ 250Ω
		$\Delta V / \Delta I$ at 1 Volt Spacings	> 24KΩ, $\pm$ 400Ω
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 $\pm$ 2%
AC MPS Signature	Vport = 12VDC - 60VDC, Port Connected	AC Impedance	24KΩ ‖ (0.1µF + 330Ω)
		Resistance Accuracy $\Delta V / \Delta I$ at 2 Volt Spacings	22.8KΩ, $\pm$ 250Ω
	Port Isolated	AC Impedance ($\leq$ 500 Hz) AC Impedance ($\leq$ 120 Hz)	$\geq$ 1.1 MΩ $\geq$ 3.0 MΩ

Current Load Specifications

Description	Conditions	Parameter	Specification
Load Current	Per Powered Pair	Range	0 to 750 mA
		Resolution	0.25 mA
		Accuracy	$\pm$ 0.5% $\pm$ 0.25mA
		Slew Rates	> 4mA / µsec
		Activation Voltage	15V, Rising Vport
		De-Activation Voltage	14V, Falling Vport

Current Load Specifications

Transition Current	Load Current Active, Per Powered Pair	Range	0 to 400 mA
		Resolution	0.25 mA
		Accuracy	$\pm$ 0.5% $\pm$ 0.25mA
		Slew Rates	> 4mA / µsec
		Activation Voltage	14V, Falling Vport
		De-Activation Voltage	6V, Falling Vport
Configurable Load Transient	Vport > 15VDC	Load Step 1 Range	0 to 2000 mA
		Load Step 2 Range	0 to 750 mA
		Resolution (0 – 1023 mA)	0.25 mA
		Resolution > 1023 mA	0.50 mA
		Accuracy	$\pm$ 1% $\pm$ 0.5mA
		Slew Rates	> 4mA / µsec
		Steps	2
		Load Step 1 Duration < 1024 mA	200 µsec to 1 sec
		Load Step 1 Duration > 1023 mA	200 µsec to 80 msec
		Load Step 2 Duration	20 µsec to 1 sec (or persist)
		Step Resolution	100 µs
		Saturated Load Eff. Resistance	37 Ω
		Foldback Suppression Minimum Port Voltage (@ 400mA PSE Current Limiting)	33 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
		Trace Length	256 Samples
		Sample Rates	39.1 µsec – 39.1 msec (10msec -- 10sec traces)
		Resolution	0.025 V
		Accuracy[1]	$\pm$ 0.5% $\pm$15.6 mV
		Measurement Triggers	Immediate, Edge, Event
Current Meter	Average, Max-Peak, Min-Peak, Scope Trace	Current Range	0 – 2000 mA
		Trace Length	256 Samples
		Sample Rates	39.1 µsec – 39.1 msec (10 msec -- 10sec traces)
		Resolution (0 – 1023 mA)	0.25mA
		Resolution (1024 – 2000 mA)	0.5mA
		Accuracy[2]	$\pm$ 0.5% $\pm$ 0.5mA
		Triggers	Immediate, Edge, Event

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.

AC Metering Specifications

Description	Conditions	Parameter	Specification
AC Peak-Peak Meter	Low Band	3dB Bandwidth	16Hz – 500Hz
	High Band	3dB Bandwidth	1500Hz – 300kHz
	Full Band	3dB Bandwidth	16Hz – 300kHz
	All Bands	Resolution	1mV
		Accuracy	2% $\pm$ 8mV
		Range	1Vp-p

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 usec
		Time Accuracy	± 2 μsecs
		Min. Resolvable Time Interval	~ 4 μsecs
	Millisecond scale	Time Range	2-6550 ms
		Time Resolution	0.1 msec
		Time Accuracy	± 1 msec
		Min. Resolvable Time Interval	2 msec
	Second Scale	Time Range	0.1 – 16.1 sec
		Time Resolution	0.1 sec
		Time Accuracy	± 0.05 sec
		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

LED Label	Parameter	Description
DET	Detection Enabled	**ON**: Valid Detection Signature Connected (R= 19 to 26 KΩ, C= 0μF) AND Port Switch Connected **BLINKING**: Receiving or Transmitting a Layer 2 LLDP message. **OFF**: Port Switch Open OR Invalid PD Signature
PWR	PSE Power On	**ON**: Indicates Power-Up with Vport > 36 VDC (Regardless of Trigger State) **OFF**: Vport < 36 VDC
ARM	Trigger ARM	**ON**: Trigger 1 in the ARMED State **OFF**: Trigger 1 NOT in the ARMED State
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 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-3102 Cards)
Power	100VAC-240VAC, 50-60 Hz, 2A Max.
Ambient Operating Temperature	0℃ to 50℃ (≤ 42.75 Watt loading per port)
Storage Temperature	-20℃ to 85℃
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

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

PSA-3102, Dual Port PoE+ PSE Test Card for PSA-3000

PSA-CT, PSE Conformance Test Suite for One PSA Controller (Up to 24 Test Ports)

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

PSA-TS1, PSE Automated Test Suite Tracking Service for One Year for One PSA Controller

PSA-TS2, PSE Automated Test Suite Tracking Service for Two Years for One PSA Controller

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

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

PSA-LLPD, LLDP Emulation and Analysis Feature for One PSA-3000 Controller (*future activation key availability*)

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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