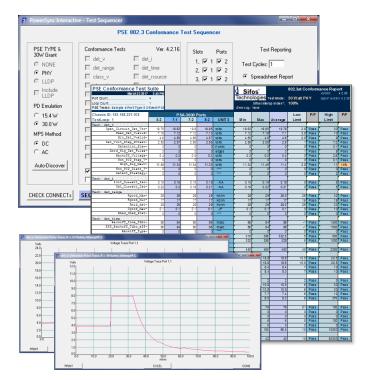


# PSA-CT PSE Conformance Test Suite

for the PSA-3000 PowerSync® Analyzer

# Product Overview







Now certified for EA PoE Logo Testing!

# **Key Features**

- □ Robust 802.3at (PoE+) PSE Compliance Testing
- ☐ Fully Automated Port Sequencing and Statistics
- ☐ Greater than 95% 802.3at PICS Coverage from 23 Tests Producing more than 75 IEEE 802.3at Test Parameters per Port
- ☐ Fully Emulates All Type-1 (PD Class 0, 1, 2, or 3) and Type-2 (PD Class 4) PD's Including PoE LLDP-Capable PD's
- Adapts to All Prevalent PSE Signaling and Power Behaviors
- Adapts to Prevalent Composite 802.3at and Proprietary Detection Signaling Behaviors
- Configurable Waveform Trace Diagnostic Generation and Retention to 10 Waveforms per Test
- □ Colorful and Informative Spreadsheet Reporting with Compliance (Pass/Fail) Notations and Parameter Statistics
- Run & Sequence from PSA Interactive GUI or PowerShell PSA Command Line

**Verification**, **Simplified**.

# IEEE 802.3 PSE's

Type-1/Type-2 End-Span Type-1/Type-2 Mid-Span PoE/PoE+ Connectors Power Injectors

# The Industry "Norm"

Unmatched 802.3at Specification Coverage Widely Used by PSE Silicon Manufacturers Supports EA PoE Logo Certification

# Fully Automated One-Button Testing

Automatic Adaptation to PSE Probing Techniques and Hybrid-Legacy Probing

Flexibly Sequence Tests and Test Ports

Pop-Up Spreadsheet Reporting with Statistics and Limit Evaluation

# Always Up-To-Date

Constantly Enhanced and Improved

Tracking Service Support Agreement

**Responsive Support** 

#### **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.

#### **Higher Power, Smarter Power with 802.3at**

Under the IEEE 802.3at standard, power delivered by a single PSE port to a Powered Device ranges up to 25.5 watts. PSE's must pack more electrical power and more processing power to manage that electrical power. Issues of safety and specification compliance are accentuated by the higher power delivery capabilities of each Ethernet Port. 802.3at also introduced standardized PoE Link Layer Discovery Protocol (LLDP) whereby new generation PD's can communicate power demand and PSE's can communicate power available to those PD's, allowing overall power budgeting with granularity of 0.1 watt per Ethernet port.

#### **Fully Automated Testing with Very High Test Coverage**

The PSE Conformance Test Suite for 802.3at produces between 75 and 112 IEEE 802.3at test parameters per PSE port depending upon PSE capabilities. These parameters are measured in 23 distinct tests that may be selected and sequenced across up to 24 PSE ports at a time. The test covers **over 95% of the PSE PICS** (conformance check list items) in the IEEE 802.3at specification\*. The PSE Conformance Test Suite is widely used throughout the internetworking community as the industry "norm" for PSE specification compliance.

#### **Certified for 1st Party EA Logo Testing**

The PSE Conformance Test Suite, in combination with the PowerSync Analyzer, has been qualified to fulfill all of the PSE testing required to obtain and maintain Ethernet Alliance PoE Logo marks for PSE's.

#### **Flexible PD and LLDP Emulation**

When the 802.3at standard replaced its 802.3af predecessor, interoperability between newer 802.3at and older 802.3af equipment had to be assured. The PSE Conformance Test Suite enables test cases required to assure backward compatibility of 802.3at PSE's working with both 802.3at and 802.3af PD's.

#### **Robust Diagnostics and Reporting**

The PSE Conformance Test Suite for 802.3at automatically sequences to a pop-up spreadsheet report with full color notations of parameter pass/fail status per port and cross-port statistics for each parameter. This report automatically adapts test limits to the test case that is sequenced. For diagnostic analysis, PSE Conformance Tests can optionally present graphical waveform traces obtained and analyzed during the course of a test. Each trace is individually notated with a description of the trace purpose or measurement parameter.

A specialized EA PoE Logo Certification Report is also provided for 1<sup>st</sup> Party Authorized Test Labs seeking EA PoE Logo certification for PSE's.

\* For 802.3at PICS Coverage, see Sifos application note: 802.3at PSE PICS Coverage.pdf



#### **PSE Conformance Tests & Parameters**

## **Detection Probing and Functional Tests**

#### det v Detection Pulse Waveform Parameters

Captures and analyzes PSE detection probe voltages with both valid and slightly non-valid detection

signatures.

 Voc
 Peak open circuit (disconnected) detection voltage

 Vvalid(Max)
 Maximum Detection Step Level with Valid Signature

 Vvalid(Min)
 Minimum Detection Step Level with Valid Signature

∆VtestDetection Step MagnitudeDetection SlewDetection step slew rate

Good\_Sig\_Det\_Pulse Number of Detection Signal transitions

Vbkoff Minimum Voltage during detection (ALT B) backoff

Non802\_Step\_V Level of any pre-detection signals

High\_Sig\_MaxV Maximum detection voltage with high detection signature

Non802\_Discr? Dependence upon Non-802 detection for validity. PSE's that use non-802.3

detection measurements to resolve a valid signature band will report "1".

Detect Strategy Reports PSE Detection as one of five known strategies including 802.3at

standard, proprietary pre-detection, etc.

#### det\_i Detection Current Limiting

Measures maximum current sourcing capability from a PSE during detection.

Isc(Init)

Max detection current at minimum detection voltage

Isc(Det) Max detection current during detection

#### det range Detection Passive Acceptance Range

Assesses the range of acceptable PD signatures and the reliability of valid detection given random connect timing and capacitive loading.

Rgood\_Max Maximum accepted detection resistance signature
Rgood\_Min Minimum accepted detection resistance signature

Rmid\_det MAX (or MIN) detection resistance given random connections

Cgood\_Max Maximum accepted detection capacitance signature

Rbad\_Cbad\_Stat Power-Up status given a 35Kohm (marginally high) resistive signature with the

lowest Capacitive signature rejected by the PSE.

#### det\_time Detection Timing

Measures detection backoff and detection probe timing parameters.

**Tdbo** Detection back-off time (between failed detections)

Tdbo\_eff Effective back-off time for PSE's that ignore rather than disable detection

measurements

**Tdet** 802.3at detection time duration

**Tdet tot**Total detection time including pre-detection measurements

Backoff\_Type Reports PSE Detection back-off as one of several known strategies including

802.3at standard, legacy, and 4-pair detection schemes

#### det\_rsource PSE Output Resistance during Detection

Measures effective source resistance of PSE port during detection.

Zout PSE estimated output impedance during detection

### Classification Signaling and Functional Tests

#### class\_v Classification Voltages

Captures and analyzes PSE classification voltage levels, focusing on only the final classification performed prior to power-up.

 Vclass
 Class Pulse Average Voltage with 1 mA class signature

 Vclass\_min
 Class Pulse Average Voltage with 45 mA class signature

 Vmark
 Mark Region Voltage with 4 mA mark signature load

## Classification Signaling and Functional Tests

Vmark\_min Minimum Port Voltage measured over both MARK regions until power-up

#### class\_time Classification Timing

Captures and analyzes PSE classification signal timing, focusing on only the final classification performed prior to power-up.

Event\_Count Count of class pulses

TpdcDuration of class pulse given Single-Event ClassificationTcle1Duration of first class pulse given 2-Event ClassificationTcle2Duration of second class pulse given 2-Event ClassificationTme1Duration of first mark interval given 2-Event Classification

Tme2 Duration from end of second class pulse to power-up given 2-Event

Classification

#### class\_err Classification Current Limiting

Evaluates any current limiting applied to classification signals by PSE as well as PSE powering behaviors following overloaded or illegal classification signatures.

Class\_limMaximum Class Current before PSE starts to limit Class CurrentVport\_CL\_limPower-Up response (as binary) following a current limited classificationVport\_CL\_err\_1Power-Up response (as binary) following a 55mA (invalid) classification loadMark\_limMinimum Mark Current Supported during 2-event Mark Region - tested at 5.5

mA and 105 mA given 2-Event Classification

**Vport\_CL\_err\_2** Power-Up response (as binary) following up to 3 successive class signatures

that changed from Event #1 to Event #2 (asymmetrical signature)

Treset Duration of PSE IDLE state following asymmetrical class signature

#### 

Assesses PSE LLDP basic protocol fields, protocol timing, and power request processing for both Type-1 and Type-2 PD's.

PSE\_Source\_Priority Bit Field for PSE Source, Priority, Reserved

PSE\_MDI\_Pwr\_Sup Bit Field from legacy TLV for Port Class, MDI Power Support, MDI Power

State, Pair Selection, and Reserved

PSE\_LLDP\_Time\_1 Time from Power-ON state until first PoE LLDP frame from PSE given Type-1

PD

PSE\_LLDP\_Type\_1 PSE Type advertised by a PSE given Class 0-3 PD signature
PSE\_Echo\_Time\_1 Time for PSE to echo back the PD Requested Power level

PSE\_Alloc\_Pwr\_1 Allocated Power in response to 8.1 W PD Request from a Class 0–3 PD

PSE\_Alloc\_Time\_1 Time to respond To 8.1 W PD Request with Power Allocated

PD\_Power\_Adjust\_1 Allocated Power in response to a Change Request from 8.1W to 13W

PSE\_Adjust\_Time\_1 Time to echo a PD 13 watt PD Change Request

PSE\_LLDP\_Time\_2 Time from Power-ON state until first PoE LLDP frame from PSE given Type-2

PD

PSE\_LLDP\_Type\_2 PSE Type advertised by PSE given Class 4 PD signature
PSE\_Echo\_Time\_2 Time for PSE to echo back the PD Requested Power level

PSE\_Alloc\_Pwr\_2 Allocated Power in response to 20.3W PD Request from a Class 4 PD

PSE\_Alloc\_Time\_2 Time to respond To 20.3 W PD Request with Power Allocated

PD\_Power\_Adjust\_2 Allocated Power in response to Change Request from 20.3W to 25.5W

PSE\_Adjust\_Time\_2 Time to echo a PD 25.5 watt PD Change Request

Link\_Down\_Shutdown\_? Indicates if power removed on Link Drop after LLDP negotiation

#### Power-Up Processes

#### pwrup\_time Power-Up Timing Parameters

Measures power-up rise time and time delay from completion of final detection until power applied.

**Trise** Rise Time from 10% to 90% of Vport

**Tpon** Time from end of detection until power-up, Tpon is measured from the final

complete detection probe preceding a power-up

## **Power-Up Processes**

#### pwrup inrush

#### **PSE Current Limiting Behaviors During Power-Up**

Evaluates PSE current limiting and inrush overload tolerance parameters. Assures compliance to 802.3at figure 33-14, Ilnrush current and timing limits in the POWER\_UP state.

Init\_InrushMaximum output current immediately after 1 msec of a severe inrush overloadMax\_Inrush\_c0Maximum output current in time interval from 1 to 75 msec given Class 0-3 PDMax\_Inrush\_c4Maximum output current in time interval from 1 to 75 msec given Class 4 PDMin\_InrushMinimum output current while current limiting in time interval from 1 to 50 msec

given 30V or higher port voltage

Tinrush Duration of current limiting until PSE removes power

Inrush\_45m Port voltage after 50msec following 45 msec current limiting inrush overload

Max\_Init\_Inrush Maximum output current up to 1 msec given a severe inrush overload

Vinrush Average Port Voltage - PSE current limiting, PSA foldback suppression applied Indicator if PSE uses "legacy\_powerup" exception and consequences thereof categorized into one of five possible outcomes

#### PSE Powered-On Performance and Processes

#### pwron v

#### Powered Port Voltage, Ripple, and Noise

Measures PSE port DC and AC voltages in response to minimum and maximum power loads.

Vport\_min\_NMin Port voltage with 0.5 Watt and Pport\_Max (PD Class) loadingVport\_max\_NMax Port voltage with 0.5 Watt and Pport\_Max (PD Class) loadingVpp\_ripple\_NPeak AC Ripple with 0.5 Watt and Pport\_Max (PD Class) loadingVpp\_noise\_NPeak AC Noise with 0.5 Watt and Pport\_Max (PD Class) loading

Vtrans\_max\_N Maximum Port Voltage measured during a 5msec load transient from 12mA

to Pport\_Max / Vport and back.

Vtrans\_min\_N Minimum Port Voltage measured during a 5msec load transient from 12mA

to Pport\_Max / Vport and back.

#### pwron\_pwrcap

#### **PSE Port Power Capacity**

Measures the maximum power delivery capability of a PSE port given various PD Classifications and LLDP power allocations.

Pcon c0= Maximum output power from PSE Port given Class 0 PD Maximum static output current relative to 802.3at Icon(Pclass\_0) Icon\_%\_c0= Pcon\_c1= Maximum output power from PSE Port given Class 1 PD Icon\_%\_c1= Maximum static output current relative to 802.3at Icon(Pclass\_1) Pcon\_c2= Maximum output power from PSE Port given Class 2 PD lcon\_%\_c2= Maximum static output current relative to 802.3at Icon(Pclass\_2) Pcon c3= Maximum output power from PSE Port given Class 3 PD Icon\_%\_c3= Maximum static output current relative to 802.3at Icon(Pclass\_3) Maximum output power from PSE Port given Class 4 PD Pcon\_c4= Icon % c4= Maximum static output current relative to 802.3at Icon(Pclass\_4) Verifies > 450 mA continuously available at 80 msec following 2-event Type-2\_Enable power-up for 2-event, Type-2 PSE's or verifies >450 mA is not available for

Pclass\_LLDP\_22.7 Indicator of PSE ability to deliver Pclass (Icon) given 22.7W power grant
Indicator of PSE ability to deliver Pclass (Icon) given 24.5W power grant

#### pwron maxi

#### **PSE Response to Maximum Overloads**

The pwron\_maxi test evaluates PSE characteristics with respect to the POWER\_ON state PI operating current templates in Figure 33-15 of the 802.3at specification.

Ilim\_Peak

Maximum output current tolerated by PSE in time frame of 8 to 75 msec

Ilim\_Min\_1

Minimum output current up to 50 msec with 402mA load pulse and foldback suppression applied to assure > 30VDC (Type-1 PD emulation)

Time to port shutdown in response to 400 mA overload given Type-1 PD

Vlim 1 Average port voltage coincident with Tlim 1 measurement

Ilim Max 1 Maximum output current from 1 to 75 msec given 700mA load pulse and

foldback suppression active given a Type-1 PD

Ilim\_Low\_V\_Tol\_1 Measures time-to-port-foldback given a Type-1 PD with extreme overload Ktran\_lo\_1 % excursion below 50V given 250usec (fast) overload transient (401 mA)

given a Type-1 PD (Type-2 PSE's only)

Tlim\_1

## Power-Up Processes

Ilim\_Min\_2 Minimum output current up to 50 msec with 686mA load pulse and foldback

suppression applied to assure > 30VDC given Type-2 PD emulation

Tlim 2 Time to port shutdown in response to 684 mA overload given Type-2 PD

Vlim\_2 Average port voltage coincident with Tlim\_2 measurement

Ilim Max 2 Maximum output current from 1 to 75 msec given 860mA load pulse and

foldback suppression active given a Type-1 PD

Ilim\_Low\_V\_Tol\_2 Essentially a measure of time-to-port-foldback given a Type-2 PD Ktran lo 2

% excursion below 50V given 250usec (fast) overload transient (686 mA)

given a Type-2 PD

#### pwron overld **PSE Response to Maximum PD Power Transients**

The pwron\_overld test assesses powered PSE port behaviors with respect to Ipeak, the maximum power overload allowed to a PD as defined in Equation 33-4 of the 802.3at standard.

%lpeak\_N Percent of required Ipeak current that is supported over 50msec duration

where Ipeak required is defined by Equation 33-4 given a Type-N PD -

maximum level verified is 125%

Vport\_lpeak\_N Min Port Voltage at Ipeak transient pulse given a Type-N PD

Min Port Voltage over 5 seconds with a quantity of 50 msec Ipeak pulse Vport\_5%DC\_N

transients separated by 1 second (5% duty cycle) given a Type-N PD

#### MPS Processes for Power Removal on PD Disconnect

#### mps\_ac\_pwrdn Power Timing and Load Current Impact on AC MPS PSE's

Evaluates power removal timing and DC load tolerance on an AC MPS PSE.

**Tmpdo** Disconnect power-down timing from disconnect event

I hold ac Maximum DC Load Current tolerated with AC MPS Disconnect Shutdown

#### **AC MPS Signaling Characteristics** mps\_ac\_vf

Measures AC MPS signaling characteristics during the Tmpdo interval.

V\_open Peak-Peak AC probing voltage following PD Disconnect V\_open\_%Vport Peak-Peak AC probing voltage expressed as a % Vport\_pse AC probing signal frequency following PD Disconnect Fp

AC\_MPS\_SR AC probing signal slew rate

Isac Signal current sourced by AC MPS signal generation resource

#### mps ac voff **AC MPS Peak Voltage Characteristics**

Measures voltage peaks following PD disconnect and power-down events given an AC MPS PSE.

V open1 Peak port voltage found after AC MPS power removal event

Vopen\_pk Peak port voltage following PD disconnect over a period of one second

#### mps dc valid **DC MPS Valid Signature Timing Characteristics**

Measures intermittent load tolerance thresholds of a DC MPS PSE.

**Tmps** Minimum valid signature ACTIVE time required for DC MPS validity Duty\_Cycle\_tol PSE power response to valid / invalid load cycling of 16.7% duty cycle

#### Power Timing and Threshold Assessment on DC MPS PSE's mps\_dc\_pwrdn

Evaluates power removal timing and DC load requirements on a DC MPS PSE.

Minimum current required to maintain power given DC MPS PSE **Tmpdo** Disconnect power-down timing from start of invalid signature

Vopen\_pk Peak port voltage following PD disconnect over a period of one second

#### PSE Power-Down Characteristics

#### pwrdn overld **PSE Response to Non-Current Limiting Overloads**

Evaluates PSE handling of non-current limiting overloads in the PSE discretionary region of the PI operating current templates in Figure 33-15 of the 802.3at specification.

Smallest load current of duration equal to Tcut Max, or 75 msec, that Icut N

causes immediate or delayed power removal given a Type-N (1 or 2) PSE.

Time from start of transient until power removal but not exceeding Tcut\_N 75msec, the duration of the applied load transient.

Smallest load current of duration equal to 2 seconds that causes

immediate or delayed power removal given a Type-N (1 or 2) PSE.

Tsoft N Time from start of transient until power removal but not exceeding 2

seconds, the duration of the applied load transient.

Isoft\_N

#### PSE Power-Down Characteristics

pwrdn time AC MPS Signaling Characteristics

Evaluates PSE disconnect discharge timing as well as output characteristics during power removal.

 Toff
 Power discharge time with hypothetical 320K $\Omega$  load.

 Cout
 PSE output capacitance during power discharge

 Rp
 PSE shunt output resistance during power discharge

pwrdn\_v AC MPS Peak Voltage Characteristics

Measures PSE post-power-removal characteristics following an overload shutdown condition.

Voff IDLE state voltage between detections after overload shutdown

Ted Time from overload condition shutdown until a detection probe leading to a

successful power-up

Ved Peak voltage over the Ted interval

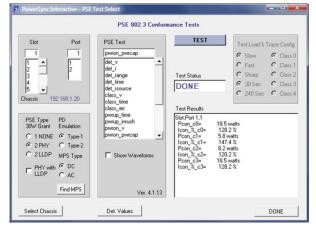
#### Configuring and Running the PSE Conformance Test Suite

The PSE Conformance Test Suite is accessed from either PSA Interactive Software (GUI) or PowerShell PSA, an extended TcI/Tk command line shell. PSA Interactive provides two menus with access to the PSE Conformance Test Suite: The **PSE Tests** menu and the **Sequencer** menu.

Within each of these menus, users perform 3 declarations that affect testing and test options:

- PD Emulation: Type-1 (15.4W) or Type-2 (30W)
- PD 30W Grant Type: NONE (Type-1 PSE), PHY (Type-2 2-Event PSE), or LLDP (Type-2 LLDP)
- PSE Disconnect Detection Method: AC MPS or DC MPS

The PSE Tests menu is geared to running a single test at a time and capturing results from that test. The menu



allows users to select a particular PSA test port (slot and port) and then execute a test. Users may optionally select to have any and all measurement waveforms that are used by a given test captured, labeled, and displayed as the test runs.

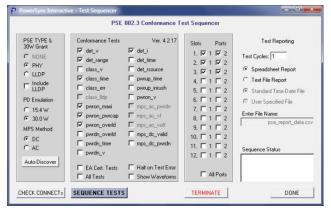
The **PSE Tests** menu also provides access to certain other specialized testing functions that include user specified loading profiles and LLDP traces.

The **Sequencer** menu allows users to select one or more tests that are to be automatically sequenced along with the PSA test ports that will also be sequenced.

PSA Interactive PSE Tests Menu

User's may also select one of several reporting options, the most common of which will produce a pop-up (Microsoft Excel) spreadsheet report that performs all test parameter limit checking and analysis.

Multi-Port PSE connections can rapidly be verified prior to testing from this menu and as with the PSE Tests menu, users may opt to have waveform traces produced by each test appear on screen as each test runs. Users may also choose to have the sequence terminate as soon as an error condition develops in any test on any port.



**PSA Interactive Sequencer Menu** 

## The PSE Conformance Test Suite Standard Report

The standard spreadsheet test report for the PSE Conformance Test Suite provides efficient feedback by clearly notating any specification compliance violations both by test parameter and by test (PSE) port. The report also

accumulates minimum, maximum, and average parameter values across PSE ports so that users can spot individual port deviations and assess performance to design goals. Multiple cycles of testing can be specified to produce one report page per sequence cycle.

All test limit processing automatically adapts to the mode of PD Emulation, the type of PSE (e.g. Type-1 or Type-2), and other factors that are specified before the sequence begins. Test limit tables are found on the **Limits** page of the report.

The report includes a **Notes** page with detailed explanations of each parameter of each test and an **Interop** page that rates the "Interop" Risks of any particular combination of specification violations. This leads to an aggregate **Interop Index** when a high percentage of available tests are run.

The report will automatically scale to the number of tested PSE ports.

Proceedings	PSE Conformance Test S	uite									₫ Sife	_ 0		802.3at C	onfom	ance Rep	ort
Change   Col.																version	4.2.06
### PROFESSION 1998   141   12		8									recnno	logies	Test Mode:	30 Watt L	LDP	report versio	an 4.2.0
Charles D. 20   Charles D. 2	PSE Tested: Sample 8-Port Type-2 LL	DP PSE									Error Log:	None None	opIndex*:	90%			
Testing 1					n.c	A 2000 I	) m miles							Leve	D/E	Winte	D/E
Note   Sept.		1.1	1.2	2.4				4.1	4.2	UNITS	Min	May	Average		F/F		F/F
Option Content Date   1-5		1-1	1-2	2-1	2.2	0-1	5-2	41	42	OHII O		IVIAA	Average	Link		Ciliit	_
Park															Pass		
Section   Property   4.28   4.1   4.11   4.11   3.3   3.8   3.8   3.8   3.8   3.8   4.11   4.11   4.11   3.8   3		8.08	8.08	8.13	8.14	7.92	7.93	7.89			7.89	8.14	8	3.8	Pass	10	Pass
Secretaring Florida   1000   00000   0000   0000   00000   00000   00000   00000   00000   00000   00000   00000   00000   000							4.01		3.97	voits			4			9	Pass
Gess fas far. Paints 2																	
Ashert Volkser   51		2	2	2	2	2	2	2	2		2	2	2	2 1	Pass	9	Pass
March   1.5   1.	Backoff Voltage=	0.1		0.1		0.1		0.1		volts		0.1			Pass	9	Pass
Part	Non_802_Step_V=	0		0		0		0				0				0.1	Pass
Exercise   Process   Pro	High_Sig_MaxV=	8.19	8.19	8.27		8.05	8.08	8.03		voits						11	Pass
Test   Ann.	Non_SU2_Discr_Y=	0	0	0		0	0	0									
Rest   Control Name	Test: det i														r		r
Rest   Control Name				1.19		1.23			1.2					0	Pass		
Speed Miles   20   20   70   72   72   73   73   73   73   73   73	Det Current Isc=	0.5	0.74	0.56	0.56	0.58	0.61	0.53	0.52	mA	0.5	0.74	0.58	0	Pass	5	Pass
### Part   1985   10   10   10   10   10   10   10   1	Test: det range									16.1				-			_
Rest   April			29			29 18		28						25	Fail	32	Pass
Crest Market   0.1   0				29		29										33	Pass
Basel Chee   Basel   Co.   C		0.1		0.1										0	Pass	10	Pass
Rest: det. time.   Rest: det.	Rbad Cbad Stat=	0		0		0		0								0	Pass
### Restrict Type - Get   1300	Test: det time	250		***													
Becker   Type   0	Backoff_Time_Tdbo=																
Particular John John   20 79 70 70 70 70 70 70 70 70 70 70 70 70 70	Eff_Backoff_Tdbo_eff=	1300	1200	309	1200	309	305	1300	309	msec				-1	Pass		
Total Des Tales   Sc. 78   76   76   76   76   78   77   78   77   78   78	Detection Time Ideas	82	78	78	78	78	78	78	78	msec				5	Pass	500	Pass
Test det _	Total Det Time=	82	78	76	76	78	78	78	80		78	82	78	5		1000	Pass
Fest: class of Vices Foots																	
Class Voltege Chases   175   176   176   175   176   175   176   175   176   175   176   175   176   176   177   1	Regulated Vstep Zout=	0	0	0	0	0	0	0	0	KOhm	0	0	0	0.1	Pass	12	Pass
Values   Misch   174   174   173   173   174   175   175   177   175   177   178   177   178   177   178		47.5				47.0	470	47.0	470		470					20.5	_
Test: class_line:   Class_line:   Display   Test: class_line:   Display   Display   Test: class_line:   Display   Disp	Class_Voltage_Vclass=	17.5	17.5	17.5		17.2		1/.2									
Chara Class lims* Toke   10-2   14-5   20-5   20-5   17-5   14-7   10-5   10   mass   14-5   23-8   17-4   0-988   75   Pass   Pass   class per   14-5   20-5   20-5   17-5   14-7   10-5   10   mass   14-5   23-8   17-4   0-988   75   Pass   Pass   class per   14-5   23-8   17-4   0-988   75   Pass   Pass   Class per   14-5   23-5   17-5   14-7   10-5   10-7   14-7   10-5   10-7   14-7   10-7   14-7   10-7   14-7   10-7   14-7   10-7   14-7		10.4	10.5	17.0	0.5	17.1	17.1	- "	17.1	Wits	- 17	0.5	17.2	10.0	1 005	20.0	1 0.55
Class Time Todge   152   145   205   238   176   147   158   16   masco   145   238   174   6   Pass   75   Pass   175   P		1	- 1	- 1	- 1	- 1	- 1	- 1	- 1		- 1	- 1	1	1	Pass	1	Pass
Test: class_time*	Class Time Tpdc=	15.2	14.5	20.5	23.8	17.6	14.7	16.8	16	msec	14.5	23.8	17.4	6		75	Pass
Perc   Cl.   Line	Test: class err																
Page				85		87		87		mA .							
Tests   Care   Care   Process   Pr	Pwr_C1_11m=	0	0	0		0	0	0	0								
## PSE Source Price Prices    PSE NIP Prices   0   0   0   0   0   0   0   0   0		·		·	•		-	·			•		-	<del></del>	1 000		1 0.00
## SET ALDS TIMES ## 27 2 4 7 7 2 4 2 4 24 5 7 0 8 80 2 4 8 33 0 Page 15 Page		0	0	0	0	0	0	0	0	•							
## FSE_LINP_Type_0.5	PSE MDI Pwr Sup=	0		0		0		0				0	0	0			Pass
PSE_Rice_Fire_2	PSE LLDP Time 2=	2.7	2.4	2.7		2.4	2.4	5.7	6	980							
PRE ALIGN PROF. 2 203 203 203 203 203 203 203 203 203 2		1.0	2 2 2	1.0		1.0	10	2.4	2	-							
PRIL Allor Line 2e 18 23 19 23 18 18 24 2 mec 19 24 21 0 Pass 30 Pass 2D Power Advant 2e 25 255 25 5 255 255 255 255 255 255	PSE_ECHO_Time_2=			20.3		20.3			20.3				20.3		Pass	25.5	Pass
### PD Press Minus 2		1.9	2.3	1.9	2.3	1.9	1.9	2.4	2		1.9	2.4		0	Pass	30	Pass
Limit Serve   Description   1	PD Power Adjust 2=	25.5		25.5		25.5	25.5	25.5		Watts	25.5			25.5	Pass	25.5	Pass
Test: percept lame    Pur-On-Dise; Time: Tries*   112				2.3		2.3		2		980							
Pro-Co. Rise Time Triver   111   104   103   107   48   50   40   48   50   40   48   50   40   50   50   50   50   50   50	Link Down Shutdown ?=	0	0	0	0	0	0	0	0		0	0	0	0	Pass	0	Pass
Power-On Jime June	Test: pwrup time	112	104	10.9	107	49	50	48	43	HEAD	43	112	77	15	Pace	50000	Page
Test: normal, Annuals			97.7	117.2	144.5		93.8				93.8	411.6	161.8	0			
This farmache	Test: pwrup inrush																
Min Tannambe   427.77   425.6   420.74   495.6   422.77   420.60   441.77   440.20   442.8   420.4   440.0   Pass   450.7   820.8   127.8	Init Iinrush=			423.25		425.63											
Tinnesh		424.13	427.63	423.25											Pass		
Internal Part   53.9   54   53.8   53.9   54   53.8   53.9   54   54   54   54   54   54   54   5	Min Iinrush=			420.75		422.75		418.75		mA				400	Pass	450	Pass
Instable Obligate   308   31   300   301   314   314   314   30		53.9	54		53.9	00.8 54	54 54		54		53.8	05.8 F4	54	50	Pass	/5 57	Pass
Mast List Introducts	Inrush Voltage=	30.8	31	30.6	30.5	31.6	31.4		31.4	Volts	30.5	31.6	31.1	30	Pass	57	Pass
Targeth Strategy etc	Max Init Inrush=			423.5	419		510		502.3		419		484	0	Pass	2000	Pass
Years min. 2e	Inrush Strategy c4=	0	0	0	0	0	0	0	0		0	0	0	0	Pass	1	Pass
Years man, 2	Test: pwron v					-											_
Vigorit principle 27	Vport min 2=	53.2	53.4	52.9	53.3	53.4	53.4	53.4		V	52.9	53.4	53.3			57	Pass
Vigority points 2	Vport_max_2=															57	Pace
Versam stat 2		160		145		147		148		mVpp						200	Pass
Vising same 2   042   043   041   042   044   043   043   043   043   043   043   043   043   043   043   044   043	Vtrans min 2=									V					Pass	57	Pass
Test: Person_merchap	Vtrans max 2=	54.2	54.3	54.1	54.2	54.4	54.3	54.3	54.3	V	54.1	54.4	54.3	50		57	Pass
Tens. 3_cfc   1052   1054   1038   1054   105   1052   1051   105   1051   105   1054   105   1054   105	Test: pwron_pwrcap																_
Type-1_Enables 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																	
Pelass 1107 24.5e 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		105.2	105.4	103.8	100.4	105	1052	105.3	105.1	76	103.8	105.4			Pass	9999	Pass
Poles IND 24.55 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Polass LLDP 22 7=	1	1	1	1	1	1	1	1		1	1	1	1	Pass	1	Pass
Test: parton_mass		1	1	1	1	1	1	1	1		1	1	1	1		1	Pass
Time Peaks 43 0.3 13 2.2 1.3 213.5 5.3 1873 mA 0.3 213.5 5.2 0 Pass 1750 Pass Time Min 2 057 608.6 603.3 607.2 654.5 608.5 605.4 606.4 mA 604.8 607.2 606.1 603 Pass 1750 Pass Time 2 598 67.8 554 508.0 50.5 67.8 55.6 56.0 mass 55.0 5.0 598 552.1 10 Pass 779 Pass Time Max 2 50.9 53.2 55.0 55.0 53.1 55.2 55.2 55.2 55.2 55.2 55.2 55.3 55.3																	
Ting 2e 598 578 594 580 580 580 580 580 580 580 580 580 580																	
Viim_2= 529 532 526 53 531 532 526 53 531 532 532 532 532 533 531 532 533 532 531 531 531 531 531 531 531 531 531 531												687.2	686.1		Pass	1750	Pass
Ilim Low V Tol 2= 2.3 3.9 5.9 6.3 4.3 2.7 6.3 5.9 msec 2.3 6.3 4.7 10 Info 9999 Past	Ilim Min 2=		57.8	59.4	58.6			58.6		msec					Pass	75	Pass
Ilim Low V Tol 2= 2.3 3.9 5.9 6.3 4.3 2.7 6.3 5.9 msec 2.3 6.3 4.7 10 Info 9999 Past	Ilim Min 2= Tlim_2=	59.8															
	Tlim Min 2= Tlim_2= Vlim_2=	52.9 830.5	53.2	52.6 820.5			53.2			mA.					Pass		
	Ilim Min 2= Tlim_2= Vlim_2= Ilim Max_2=	52.9 830.5 2.3	53.2 831.3	5.9	827.8	821.3 4.3	818	839.3	814.5 5.9		814.5 2.3	839.3 6.3	825.4 4.7	10	Pass	1750 9999	Pass

PSE Conformance Test Suite Standard Report (excerpt)

## **EA PoE Logo Certification**

The Ethernet Alliance (EA) introduced an industry program in 2017 to certify PSE's and powered devices (PD's) so that interoperability and safety factors associated with PoE network equipment could be better ensured across the industry. The certification program includes a PoE Logo, or mark, that can be applied to certified equipment and to associated literature. Additionally, the program includes a webbased registry describing all certified equipment.

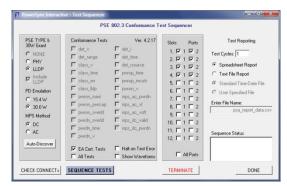


The EA PoE Logo Certification program allows that equipment (PSE's and PD's) seeking certification can be sent to an Authorized 3<sup>rd</sup> Party Test Lab for IEEE 802.3

PoE conformance testing and alternatively allows that network equipment manufacturers can perform in-house testing if they apply for and receive certification to operate as an **Authorized 1<sup>st</sup> Party Test Lab**. In order to operate as an Authorized 1<sup>st</sup> Party Test Lab, previously authorized test equipment and/or test systems must be deployed within that 1<sup>st</sup> Party Lab facility.

For producers of PoE equipment, the 1<sup>st</sup> Party alternative may offer *significant* benefits.

- Lower external costs to obtain and maintain EA logo certifications across a range of products
- Reduced engineering effort as testing normally performed to verify designs and design changes can also support the certification
- Faster turn-around time to obtain and update EA logo certifications
- Flexibility to routinely update products and to demonstrate certification compliance with no incremental effort
- Avoid effort and information disclosures required to justify multiple product versions (also referred to as "derivative product")



PSA Interactive Sequencer: EA Cert Test Mode

and the output of that testing will be a special EA approved spreadsheet report. PSE testing will use the specified PSE settings (PSE Type, PD Emulation, and MPS Method) and will run across the user-specified test ports. Testing may be performed on a single port although the EA certified product registry will note if testing was performed on all PSE ports, thus implying that this is advantageous.

The special EA Certification Test Report, unlike the standard PSE Conformance Test Report, will not allow any editing or manipulation of test data or test limits. The **PSA-3000** with the **PSE Conformance Test Suite** has been certified to perform a full range of PSE tests required for EA PoE Logo certification. The Ethernet Alliance, working with their contracted "auditor", UNH-IOL, maintains a separate online registry of certified test systems and equipment.

When EA certification testing is run using the PSE Conformance Test Suite, the list of tests and the reporting options are fixed such that a prescribed set of tests will be run

EAPoE Certification Tes February 17 20 11			Sifos 802.3at Conformance Report										
PortCourt						Techno	logies	Te et Mode :	30 Watt P	HY	report version	n 4.20	
Loop Court						EA Cartification:							
PSETested: Sample Type-2 PSE						Emor Log:			Pas	s			
Chassis ID: 192.168.221.84	EA		PSA-300	0 Ports						Low	P/E	High	P/E
TestLoop: 1	Te at ID	2-2	4-2	6-2	8-2	UNITS	Min	Max	Average	Limit		Limit	
Test: det v			- 1										
Open Circuit Det Voc-	12	5.97	5.83	6,15	5.78	uotts	5.78	6,15	5,93	2,8	Pass	30	Pas
Peak Det Venlide	1.3	6.85	6.84	6.91	6.87		6.84	6.91	6.9	3.8	Pass	10	Pas
Min Det Vwalid-	1.3	521	5.21	5.24	5.19		5.19	5.24	5.2	2.8	Pass	9	Pas
Det Volt Step dVtest-	1.3	1.64	1.63	1.67	1.68		1.63	1.68	1.7	1	Pass	7.2	Pas
Totastino Sieve	1.3	- 0	- 0	- 0	- 0		- 0			ė	Pass	0.1	Pas
Good Sig Det Pulse-	1.3	ĭ	1	1	1		Ĭ	1	1	1	Pass	9	Pas
Backoff Voltage-	1.9	0.1	0.1	0.1	0.1		0.1	0.1	0.1			2.8	Pas
Non 802 Sten Ve	1.0	2.13	2.16	2. 17	2.14	uoits	2.13	2.17	2.2	ő	PUSUU	0.1	Pater
High Sig MaxV-		9.35	9.36	9,39	934		9.34	9.39	9.1	3.8		11	
Non HD2 Discr 2-		9.30	9.20	9.39	9,34		9.34	9.09	9.4	0.0		, i	
Detect Strategue		Ť	1	- 0	1	****	1	1	1	0	_	2	
Test: det range		-	_				-				_	-	
Test: det range	1.4	27	27	27	28	Holm	27	28	27.3	26	Pass	32	Pass
Rgood Min-	1.4	16	16	16	18	Holm	16	18	16.5	16		19	Pass
Rmid dete	1.8	27	27	27	28		27	28	27.3	26		33	Pasi
	1.4	0.1	0.1	0.1	0.1	T.F.	0.1	0.1	0.1	20		10	Pass
Cgood_Max= Mbad_Cbad_Stat=	1.4	0.1	0.1	0.1	0.1	TP.	0.1	0.1	0.1	- 0	Pass	10	Pass
			- 0	- 0	- 0		- 0	- 0		- 0			
Test det time		2656	2637	26.56	2637		2637	2656	2546.5			1500	
Backoff Time Tdbo- Eff Backoff Tdbo eff-	1.9		2637			msec				-1	Pass	1500	Into
		2656	2637	26 56	2637 O	msec	2637	2656	2646.5	-1 0		1500	
Backoff_Type= Detection Time Tdet=	1.8	- 66	66	66	66		66	66	66	5		500	
Total Det Time-		145									Pass		Pass
	2.14	145	145	145	145	msec	145	145	145	5	Pass	1000	Pass
Test: class_v								17.8					
Class_Voltage_Vclass=	1.5	17.7	17.7	17.8	17.7	uotts	17.7		17.7	15.5		20.5	Pass
Volass_Min=	1.5	17.7	17.6	17.8	17.7	uoits	17.6	17.8	17.7	15.5	Pass	20.5	Pass
Mark_Voltage_Whark-	1.5	8.5	8.5	8.7	8.6	uoits	8.5	8.7	8.6	7	Pass	10	Pass
Mark Voltage Min-	1.5	8.5	8.5	8.4	8.5	uoits	8.4	8.5	8.5	7	Pass	10	Pass
Test: class time													
Event_Count=	1.7	2	2	2	2		2	2	2	2	Pass	3	Pass
Event1_Tole1-	1.6	23.3	23.4	23.4	23.8	msec	23.3	23.8	23.5	5.6		30	Pass
Event2 Tcle2-	1.6	23.3	25.3	24.2	23.8		23.3	25.3	24.2	5.6		30	Pass
Mark_Thel-	1.6	7.8	5.8		7	msec	5.8	7.8	6.9	5.6	Pass	12.4	Pass
Mark_Tine2-	1.6	169.2	249.2	89.6	9	msec	9	249.2	129.3	5.6	Pass	376	Pass
Test: class err													
Class_lim-	1.5	76	77	77	77	m A	76	77	77	51		100	Pass
Pkr_Cl_lim-	1.5	0	0	- 0	0	****	0	0	0	0		0	Pass
PWE_C1_55-	1.5	- 0	0	0	0		0	0	0	0		0	
Kark_lim=	1.5	- 6	6	- 6	6	m A	6	6	6	5	Pass	100	Pass
PWY_C1_Uneven-		0	0	0	0	****	0	0	0	0		0	
Treset-		398	398	398	398	msec	396	398	398	15		10000	
Test pwrup time													
Pwr-On Rise Time Trise-		58	99	93	48	tsec	48	99	75	15		50000	
Power-On Time Tpon-	2.13	224.6	30 4.7	144.5	62.5	msec	62.5	304.7	184.1	0	Pass	400	Pass

EA PoE Cert Test Report (excerpt)

# **Ordering Information**

PSA-CT\*, PSE Conformance Test Suite for 802.3at for One PSA Controller (Up to 24 Test Ports)

PSA-TS1, Tracking Service, 802.3at PSE Conformance Suite for One Year for One PSA Controller

PSA-TS2, Tracking Service, 802.3at PSE Conformance Suite for Two Years for One PSA Controller

PSA-QTD, PowerSync Analyzer Test Suite RackPack (e.g. PSA-3248) Discount

\*NOTE: PSA-CT requires one or more PSA-3x02 test blades, PSA-3x48 RackPack, or PSA-3x02 Compact PSA

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

Learn MORE about the PSE Conformance Test Suite. See the **PSE Conformance Test Suite Demo** video presentation at www.sifos.com.

