Overview

The PowerSync Analyzer may be utilized today to test next generation **High-Powered** PSE's and associated product prototypes. A **High-Powered** PSE refers to a PSE that furnishes up to 30 watts of power delivered on 2 pairs to a PD. Sifos Technologies has incorporated into **PSA Software Release 3.1** capabilities to combine two physical test ports from a PSA test blade to serve as a single high power test port for the following purposes:

- PSE Conformance Testing Including 6 New High Power Overload Tests
- Active Loading to 1000 mA total load
- PD Emulation including Class 4
- DC Voltage, Current, and Power Measurements
- Packet Data Transmission Testing under Load
- Standardized Waveforms for High Power PSE Ports

With the anticipated release of IEEE 802.3at expected in 2008, first generation High-Power devices and Power Sourcing Equipment (PSE) are currently in active development throughout the networking industry. High power PSE's with capability to deliver well in excess of the 15.4 watt requirement of IEEE 802.3af PSE's are becoming available ahead of the IEEE standard.

IEEE 802.3at will specify a **High-Power** 2-pair solution for the delivery of up to 30 Watts of power to a Powered Device. PSE's will be required to deliver over 36 Watts of continuous DC power to fulfill this requirement. PSE's may range upwards of 39 Watts in continuous output capacity on a single PSE port delivered on either ALT A or ALT B (for a mid-span PSE) transmission pairs. DC currents will exceed 700mA and overload thresholds will approach 850 mA to 900 mA in many cases.

Hardware and Software Requirements

The only additional hardware required to enable **High-Power** PSE testing is a simple RJ-45 splitter available from Sifos as an integrated **Port Combiner** assembly. *Figure 1* depicts a 4-port high power configuration involving test slots 1-4. Figure 2 provides a schematic representation of the test port setup.

PowerSync Analyzer software version 3.1 offers full support of this test configuration. PSA Interactive adds a new **High Power** control to enable High-Power PSE Conformance Tests, active load control up to 1000 mA, PD Class 4 start-up emulation, and dual-port voltage, current, and power measurements. PowerShell adds several new commands to perform similar functions from the command line or from automated test scripts.

Figure 1. PSA Port Combiner Setup

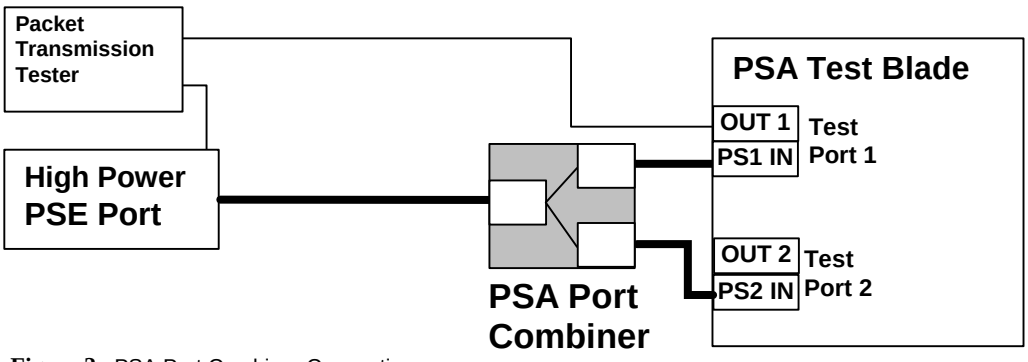

Figure 2. PSA Port Combiner Connections

PSE Conformance Testing – High Power PSE's

PSA Software Version 3.1 includes six new PSE Conformance Tests that are applicable to High Power PSE ports. These are:

Test Name	Test Description
pwrup_inrush_2	PSE Inrush Load Compliance test for PSE's with current limiting thresholds (I_{lim}) in the 600mA to 1000 mA band.
pwrup_pwrcap_2	PSE Port Power Capacity test for PSE's with output power capacity in the 20 to 38 Watt band.
pwrup_maxi_2	PSE Short Circuit Load Compliance test for PSE's with current limiting thresholds (I_{lim}) in the 600mA to 1000 mA band.
pwrup_overld_2	PSE Transient Load Response test for PSE's with maximum overload (I_{cut}) at or below 720 mA.
pwrdn_overld_2	PSE Overload Shutdown test for PSE's with overload cutoff currents (I_{cut}) in the range of 400 to 900 mA.
pwrdn_v_2	PSE Error Delay test for PSE's with current limiting thresholds (Ilim) in the 600mA to 1000 mA band.

Like existing PSE Conformance Tests, these tests can be run individually or sequenced automatically from the PSA Interactive GUI and from PowerShell. Each test produces output results and parameters that are exactly analogous to their corresponding 802.3af test counterparts. Each test, where applicable, supports display of voltage and current waveforms collected as part of the parametric analysis during testing (*see Figure 3*).

However, unlike existing 803.3af PSE Conformance Tests, firm test limits for certain parameters such as I_{cut} and I_{lim} do not exist at this time and will not exist until the completion of the IEEE 8802.3at (PoE Plus) standard. Nonetheless, PSE Conformance Testing can be sequenced to the standard Sifos 802.3af Conformance Test Report spreadsheet for limit checking and statistical analysis. Certain parameters outside the normal 802.3af limit boundaries will be flagged as "Info" while other parameters are tested to anticipated 803.3at limits.

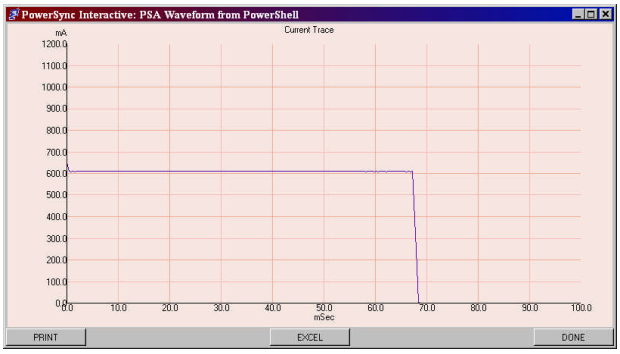

Figure 3. Ilim Current Trace from pwrup_maxi_2 Test.

Another key difference between the 802.3af tests and their High Power counterparts is the need within the High-Power tests to search for device-specific thresholds for cutoff current (I_{cut}) and overload limiting current (I_{lim}) thresholds. The tests will typically take longer to execute since these unspecified limit thresholds will vary according to PSE implementation and perhaps across PSE ports that are tested. Since the PSE Conformance Tests make no assumptions regarding these thresholds, the tests are ready to use with proprietary implementations of High-Power PSE's.

All other PSE Conformance Tests will run using the standard 802.3af version and are not affected by the differences between 802.3af compliant PSE's and pre-802.3at high power PSE's.

PSE Conformance Test Reporting

The standard PSE Conformance Test Report spreadsheet for the PowerSync Analyzer will report results from both normal 802.3af and High-Power PSE testing that is sequenced from PSA Interactive or PowerShell. Since several important test limits are not yet available, some parameters such as I_{cut} (Overload Cut-off Current), I_{inrush} (Inrush Overload Current), and I_{lim} (Short Circuit Overload Current) are tested to "best guess" specifications and are flagged either as "Pass" (within limit) or "Info" (out of limit) in the standard spreadsheet report. Other parameters, particularly those associated with timing such as T_{lim} and T_{ovld} will test with identical limits as 802.3af and should presumably meet those limit criteria.

Figure 4 shows a sampling of test results from a 4-port PSE running a full suite of PSE Conformance Tests including the six new high power tests utilizing PSA Port Combiners.

PSA TEST RESULTS
September 21 2007 9:00 PM
Port Count..... 15
Loop Count..... 1
PSE Tested: Prototype High Power PSE

Sifos Technologies
Sifos PSE Interop Index*: 79%

802.3af Conformance Report
version 3.1.20
report version 3.1

Chassis ID: 192.168.221.106 TestLoop: 1	PORTS 1-1	2-1	3-1	4-1	UNITS	Min	Max	Average	Low Limit	P/F	High Limit	P/F
Test: det_v												
Open_Circuit_Det_Voc=	11.6	11.7	11.6	11.7	volts	11.6	11.7	11.65	2.8	Pass	30	Pass
Peak_Det_Vvalid=	8.9	8.8	8.8	8.83	volts	8.8	8.9	8.8325	3.8	Pass	10	Pass
Min_Det_Vvalid=	4.42	4.41	4.39	4.41	volts	4.39	4.42	4.4075	2.8	Pass	9	Pass
Det_Volt_Step_dVtest=	4.48	4.39	4.4	4.42	volts	4.39	4.48	4.4225	1	Pass	7.2	Pass
Detection_Slew=	0.0138	0.0134	0.0141	0.0137	V/usec	0.0134	0.0141	0.01375	0	Pass	0.1	Pass
Good_Sig_Det_Pulse=	3	3	5	1	steps	1	5	3	1	Pass	9	Pass
High_Sig_dVtest=	4.47	4.42	4.43	4.49	volts	4.42	4.49	4.4525	1	Pass	8	Pass
High_Sig_MaxV=	8.88	8.82	8.8	8.9	volts	8.8	8.9	8.85	3.8	Pass	11	Pass
Non_802_Step_V=	0	0	0	0	volts	0	0	0	0	Pass	0.1	Pass
Test: det_i												
Init_Current_Isc=	0	0	0	0	mA	0	0	0	0	Pass	5	Pass
Det_Current_Isc=	0.63	3.85	4.23	3.59	mA	0.63	4.23	3.075	0	Pass	5	Pass
Test: det_range												
Rgood_Max=	29	30	30	29	Kohm	29	30	29.5	26	Pass	33	Pass
Rgood_Min=	17	17	17	17	Kohm	17	17	17	15	Pass	19	Pass
Cgood_Max=	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=	0	0	0	0	msec	0	0	0	-1	Pass	1500	Pass
Eff_Backoff_Tdbo_eff=	122.2	32.1	117.8	29.2	msec	29.2	122.2	75.325	-1	Pass	1500	Pass
Detection_Time_Tdet=	129.3	146.9	133.2	148.8	msec	129.3	148.8	139.55	5	Pass	500	Pass
Total_Det_Time=	129.3	146.9	133.2	148.8	msec	129.3	148.8	139.55	5	Pass	1000	Pass
Test: det_rsource												
Output_Impedance_Zout=	0.1	0.1	0	0	KOhm	0	0.1	0.05	45	Info	2000	Pass
Test: class_v												
Pk_Class_Voltage_Vclass=	17.9	17.9	17.9	17.9	volts	17.9	17.9	17.9	15.5	Pass	20.5	Pass
Test: class_time												
Class_Time_Tpdc=	18.8	18.8	19.5	18.8	msec	18.8	19.5	18.975	10	Pass	75	Pass
Test: pwrup_time												
Pwr-On_Rise_Time_Trise=	303	307	301	330	usec	301	330	310.25	15	Pass	50000	Pass
Power-On_Time_Tpon=	15.6	15.6	15.6	19.5	msec	15.6	19.5	16.575	0	Pass	400	Pass
Test: pwrup_inrush_2												
Init_Iinrush=	745.2	729.6	727.6	745.7	mA	727.6	745.7	737.025	720	Pass	1020	Pass
Max_Iinrush=	601	612.1	621.7	601.5	mA	601	621.7	609.075	60	Pass	810	Pass
Min_Iinrush=	596.5	606	606.5	596.5	mA	596.5	606.5	601.375	60	Pass	1020	Pass
Tlim_Inrush=	68.6	68.6	68.6	68.6	msec	68.6	68.6	68.6	50	Pass	75	Pass
Inrush_Voltage=	19.8	20.5	20.7	19.8	Volts	19.8	20.7	20.2	10	Pass	57	Pass
Powered_Vport=	47.4	47.3	47.4	47.4	Volts	47.3	47.4	47.375	50	Fail	57	Pass
Test: pwrup_v												
DC_Voltage_Vport=	47.6	47.5	47.6	47.6	volts	47.5	47.6	47.575	50	Fail	57	Pass
AC_Ripple_Vpp(low)=	4	4	4	4	mVolts	4	4	4	0	Pass	500	Pass
Test: pwrup_noise												
AC_Ripple_Vpp(noise)=	8	8	12	8	mVolts	8	12	9	0	Pass	200	Pass
Test: pwrup_pwr												
DC_Power_Pport=	2.4	2.3	2.4	2.4	watts	2.3	2.4	2.375	2.2	Pass	2.9	Pass
DC_Current_Iport=	51	50	50	51	mA	50	51	50.5	49	Pass	51	Pass
Test: pwrup_pwrcap_2												
Pport_Capacity=	25.7	26.1	25.8	25.7	watts	25.7	26.1	25.825	31.5	Info	41	Pass
Iport_Capacity=	564	572	564	564	mA	564	572	566	552	Pass	720	Pass
Port_Class=	4	4	4	4	None	4	4	4	0	Pass	4	Pass
Test: pwrup_maxi_2												
Init_Ilim=	644	655	652	643	mA	643	655	648.5	720	Info	1020	Pass
Max_Current_Limit_Ilim=	600	613	622	600	mA	600	622	608.75	720	Info	810	Pass
Min_Current_Limit_Ilim=	597	607	605	596	mA	596	607	601.25	720	Info	810	Pass
Short_Cir_Timeout_Tlim=	68.6	68.6	68.6	68.6	msec	68.6	68.6	68.6	50	Pass	75	Pass
Output_Voltage_V=	19.7	20.4	20.7	19.7	Volts	19.7	20.7	20.125	50	Info	57	Pass
25_msec_Short_Vport=	47.6	47.6	47.7	47.6	Volts	47.6	47.7	47.625	50	Info	57	Pass
Test: pwrup_overld_2												
Vport_Min=	46.4	46.1	46.3	45.9	volts	45.9	46.4	46.175	50	Info	57	Pass
Negative_Slew=	0.003	0.003	0.003	0.011	V/uSec	0.003	0.011	0.005	-1	Pass	3.5	Pass
Positive_Slew=	0.002	0.002	0.002	0.002	V/usec	0.002	0.002	0.002	-1	Pass	3.5	Pass
Power_Duration=	3080	3080	3080	3080	uSec	3080	3080	3080	2750	Pass	3250	Pass
Integr_Power_Out=	83.68	84.48	83.72	83.48	mW-Sec	83.48	84.48	83.84	108	Info	124	Pass
Test: mps_dc_valid												
Minimum_Valid_Imin2=	8	10	8	9	mA	8	10	8.75	5.5	Pass	10	Pass
Min_Valid_Time_Tmps=	30	60	20	20	msec	20	60	32.5	1	Pass	65	Pass
Test: mps_dc_pwrdn												
Max_Invalid_Imin1=	8	9	7	8	mA	7	9	8	5	Pass	9.5	Pass
Time-to-Shutdown_Tmpdo=	357	346	347	350	msec	346	357	350	300	Pass	400	Pass
Max_Voltage_Vopen_max=	0.1	1	0.6	0.6	volts	0.1	1	0.575	-1	Pass	30	Pass
Test: pwrdn_overld_2												
Class_4_Ovld_Current_Icut=	574	582	574	575	mA	574	582	576.25	552	Pass	720	Pass
Overld_Time_Limit_Tovld=	68	68	68	68	mSec	68	68	68	50	Pass	75	Pass
Test: pwrdn_time												
Turn-Off_Time_Toff=	96.1	98.2	96.7	97.1	mSec	96.1	98.2	97.025	0	Pass	500	Pass
Output_Cap_Cout=	0.25673	0.26543	0.25969	0.26222	uF	0.25673	0.26543	0.261018	-1	Pass	0.52	Pass
Output_Load_Rp=	240.1	235.7	238.2	235.8	Kohm	235.7	240.1	237.45	45	Pass	50000	Pass
Test: pwrdn_v_2												
Avg_Idle_Voff=	0.1	0.1	0.1	0.1	VDC	0.1	0.1	0.1	0	Pass	2.8	Pass
Error_Delay_Ted=	1250	1242.2	1242.2	1242.2	msec	1242.2	1250	1244.15	750	Pass	10000	Pass
Peak_Error_Delay_Ved=	0.5	0.5	0.6	0.5	VDC	0.5	0.6	0.525	0	Pass	20.5	Pass

Figure 4: High Power PSE Conformance Test Report

PSA Interactive Conformance Test Menus

With PSA Software version 3.1, the **PSE Tests** Menu under the PSE Conformance group has been modified to include a PSE Power Output option selection. When **High Power** is selected, a message box will appear prompting the user to connect the PSE Port Combiners described above in Figures 1 and 2.

Once **High Power** mode is set, the Slot-Port selection area reduces to just one single test **Port** per **Slot** (or per test blade in the PSA). Additionally, the six new tests required for high power PSE testing are installed in the PSE Test selection area in place of their 802.3af counterpart tests.

In the high power mode, all PSE Conformance Tests run only on Port 1 which now represents both test ports of a single PSA test blade. Any PSE Conformance Test can be run exactly as it is for **Normal AF** mode testing. Just as before, the **Show Traces** check button will cause any signal traces utilized by any of the tests to be displayed during the course of testing.

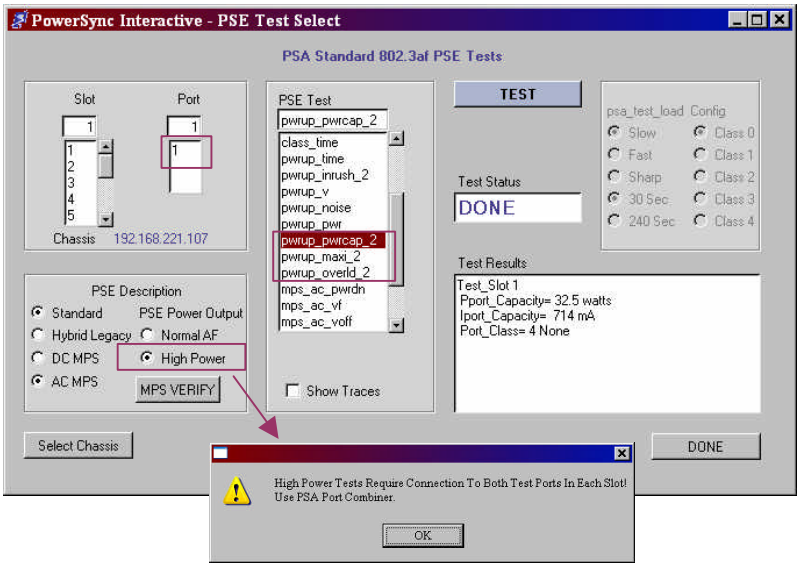

Figure 5. PSE Tests Menu for PSA Interactive 3.1

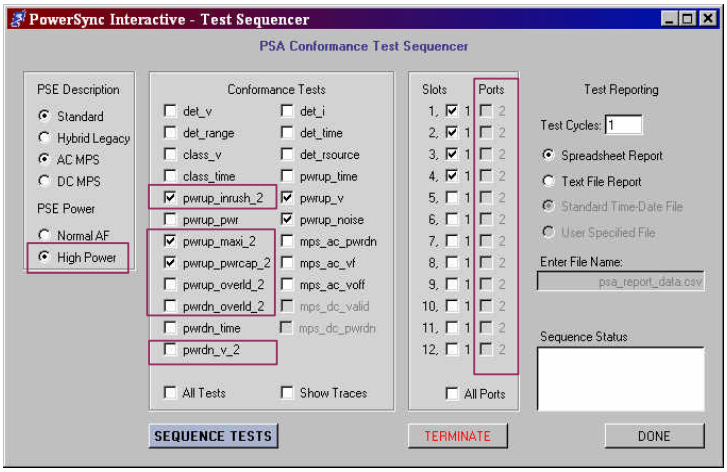

Figure 6. PSE Conformance Test Sequencer Menu

The PSE Conformance Test **Sequencer** menu also adds the PSE Power mode selection capability where users choose between **Normal AF** and **High Power**. Just as with the PSE Tests menu, the **High Power** selection will prompt for PSA Port Combiner connections with a message box. It will also disable all **Port** 2 check buttons and only enable selection of **Port 1** on each test **Slot**. The six PSE Conformance Tests that are specific to high power testing are installed in the **Conformance Tests** selection area in place of their 802.3af counterpart tests.

Sequencing PSE Conformance Tests from PowerShell

The PowerShell command **sequence** enables users to sequence PSE Conformance Tests from PowerShell. A new **-hp** argument is added to specify that testing is to be run on a High Power PSE using the Port Combiner configuration. All other arguments associated with sequence are identical to the PSE 3.0 version. In place of the **-hp** argument, a user may specify any of the high power tests in a **-t** argument test list by it's actual name (e.g. **pwrup_inrush_2**). However, the **-hp** argument is always required if the spreadsheet report is to apply modified test limits appropriate to High-Power PSE's.

Command	Command Parameters
sequence	<-**v**> <*loopCount*> <-**p** *slot_port_list*> <-**t** *testList*> <-**hp**> <-**c** | -**f** <-**n** *file_name*>>
	Performs standard conformance test sequencing over designated test list and selected ports with options for reporting to psa_report.xls spreadsheet or to a ascii file as designated by user. -**v** Verbose mode – this is useful for tracking the test steps within each conformance test. *loopCount* The number of test cycles to execute where one test cycle is all specified tests on all specified ports. Range is 1 to 99. Default is 1. -**p** Sub-command indicating that a user specified list of slot-ports will be provided. Default is ALL available test ports. *slot_port_list* A space delimited TCL list of slot-port identifiers. Example would be {1,1 1,2 2,1 2,2}. Must be in braces if more than one port is specified. -**t** Sub-command indicating that a user specified list of tests will be provided. Default is ALL available tests for the PSE Type (AC MPS or DC MPS). *testList* A space delimited TCL list of test identifiers. Example would be {det_v det_i det_time}. Must be in braces if more than one port is specified. -**hp** Sub-command indicating that testing is to be done on combined PSA test ports for high power PSE's. High Power versions of 6 PSE tests will be substituted in place of the normal 802.3af power versions of those tests. If this argument is provided, the test list will only include **Port 1** from each test slot. -**c** Sub-command to route test results to the psa_report.xls spreadsheet. -**f** Sub-command to route test results to an ASCII file where the default file will be a date and time-stamped file name placed in the \Results subdirectory. -**n** Sub-command to specify a file name and path that is different than the default for and ASCII report file *file_name* The absolute path and file name (excluding ".txt" extension) of ASCII formatted report. Use forward slashes in path input.

Each High-Power PSE Conformance Test can be run individually from PowerShell simply by using the associated High-Power test name as a command. An example would be:

pwrup_maxi_2 3,1

This command will run the Short Circuit Overload Compliance test for High-Power PSE's on test slot 3. Port 1 should always be specified with each individual test command.

PSA Interactive and High-Power PSE Testing

PSA Interactive fully supports testing of High-Power PSE's using the PSA Port Combiner configuration. There are 3 menus in PSA Interactive where **High Power** PSE Testing can be globally specified:

- Port Configuration Menu
- PSE Conformance "PSE Tests" Menu
- PSE Conformance "Sequencer" Menu

The latter two of these menus are described above where radio buttons are added to specify **Normal AF** or **High Power** PSE Testing mode. The Port Configuration menu adds a check button for this same purpose. As with the other two menus, when **High Power PSE** is selected, a dialog box will appear to remind the user that the PSE Port Combiners must be added to each PSA Test Blade. Similarly, the **Port** selection box drops down to a single PSA test port per blade, a feature that will be duplicated in all menus that allow Slot-Port selection.

One other feature of **High Power** PSE mode in PSA Interactive is that the **Copy Settings** sub-menu (Figure 8) will now be limited to Port 1 of each test slot only since PSA Slots (or test blades) are now considered to have only a ***single combined test port***.

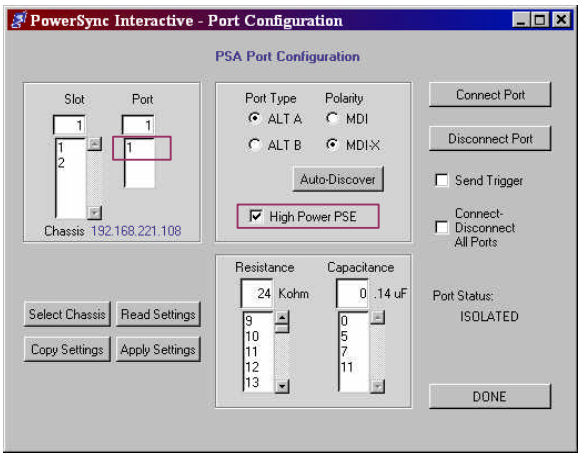

Figure 7. PSA 31. Port Configuration Menu

All other features of the **Port Configuration** and **Trigger Configuration** menus remained unchanged and will work with the PSE Test Blade just as if it had a single, High Power PSE test port per blade.

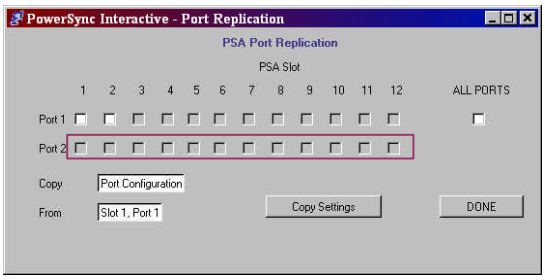

Figure 8. Port Replication Menu

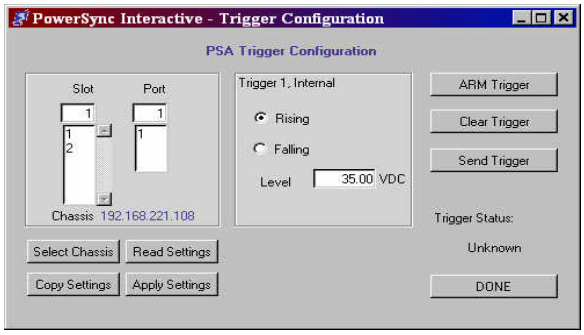

Figure 9. PSA 3.1 Trigger Configuration Menu

The PSA Interactive Load Configuration menu in Figure 10 also interacts with each PSA test slot as if it were a single, high power PSE test port. **Static Load Current** and **Transient Level** current can be programmed from 0 to 1022 mA when in the High Power PSE mode. Load transients may only be triggered using **Waveform** or **Event** triggering, however. The **Immediate** triggering mode is disabled. **Immediate** triggered load transients are still readily available by using the **Event** Trigger mode and then using the **Event Trigger** button in the Event Control Panel menu or the **Send Trigger** button in the Trigger menu. The progression to create an immediate transient in High Power PSE mode therefore is:

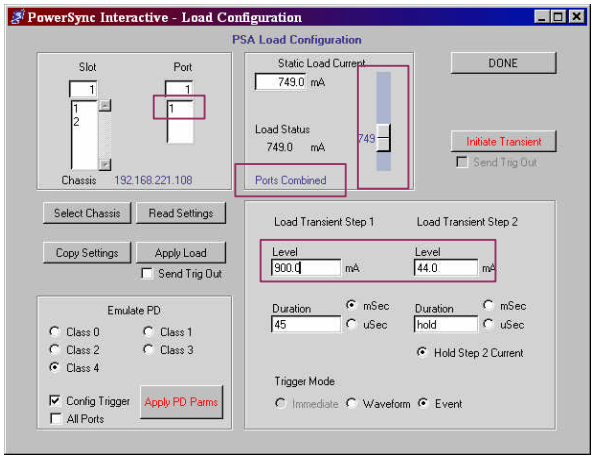

Figure 10. PSA 3.1 Load Configuration Menu

1. Configure the Transient, including **Event** trigger
2. **Initiate Transient**
3. Press **Send Trigger** or **Event Trigger** buttons

The Class 4 PD Emulation option will create the following load currents during a Class 4 emulated power-up:

- Class Current: 40 mA
- Inrush Current: 511 mA
- Steady State Current: 430 mA

The DC Meters menu is essentially unchanged except that again, only **Port 1** is available for measurements and a **Ports Combined** label indicates that the PSA software is working in the **High Power** PSE mode.

In the Ports Combined mode, all **DC Current** and **DC Power** measurements will interact with the combined PSA test ports and report total current flow. Each flavor of the DC Current Meter, **Average**, **Max Peak**, **Min Peak**, and **Trace** are available. All trigger modes are available as well.

DC Current measurements can range to over 1000 mA and **DC Power** measurements to over 40 watts when in the Ports Combined mode.

The **Event Control Panel** also provides an equivalent set of functions useful for managing PSE port state and facilitating trigger events under PSA Interactive. The only feature removed is the **Immediate** Transient Trigger mode, however, as stated above, the **Event Trigger** can serve an equivalent purpose for generating immediate triggers.

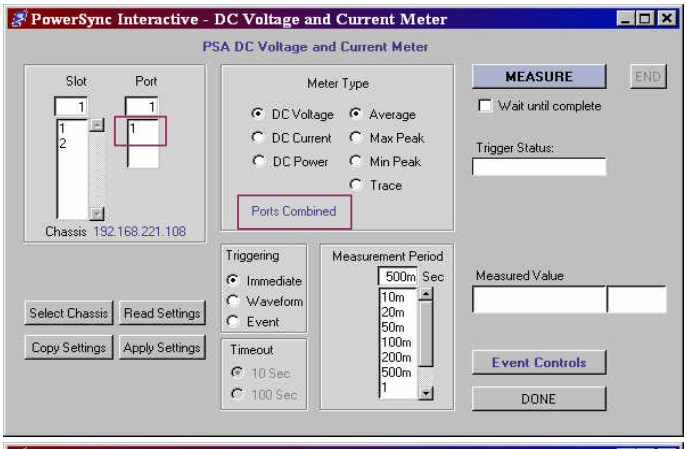

Figure 11. PSA 3.1 DC Meter & Event Control Menus

The AC Meter and Time Interval meter menus are largely the same for High Power PSE testing with PSA Port Combiners with the only difference being the limitation to a single test port per slot in the PSA.

The Waveforms Menu (Figure 12) fully supports High Power PSE analysis. As with the meter menus, it notes the **Ports Combined** status of PSA Software. It also adds **Class 4** PD Emulation which in turn will affect the **Classification**, **Power-Up Sequence**, and **Load Response** waveforms as well as the $\mathbf{I_{cut}}$ scanning range for the **Shutdown Overload** waveform.

Finally, when PSA Interactive is in the **High Power** PSE testing mode, the three Multi-Port menus will not be available since the Multi-Port Test Suite will not work with Port Combiners and High-Power PSE's.

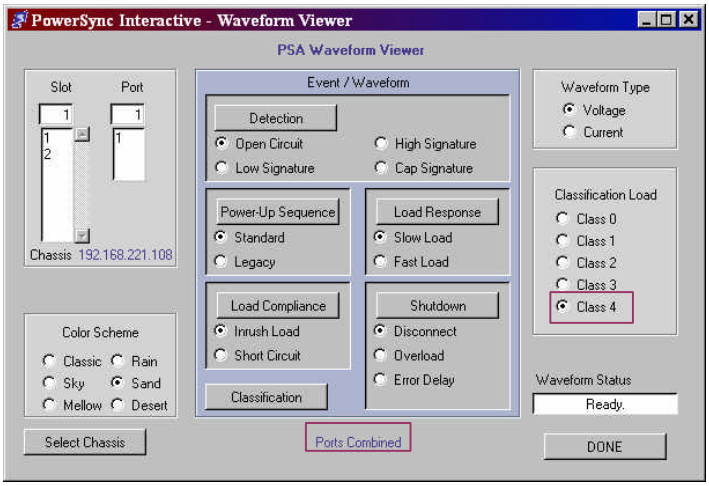

Figure 12. PSA 3.1 Waveform Menu

PowerShell Extensions for High-Power PSE Testing

PowerShell has also been extended to add several commands helpful for those writing test scripts to test High-Power PSE's using the PSA Port Combiners. Added commands are provided in primitive resource control, load and power measurements, and utility level functions as described in the tables below. All commands support the optional <slot,port> argument common to many other PowerShell commands, however the "port" should generally be specified as "1" for each of these commands since PSA test blades are considered to have just one High-Power test port.

Command	Command Parameters
iload_2	<*slot*,**1**> <**i** *current*> <**trigout**> <**stat** | **?**>
	Configures active load entity to a steady state current load. Option provided to generate a trigger out on each issuance of this command. **i** specifies current entry *current* is current load in units of mA. Current load has range of 0 to 1022 mA with 0.5 mA steps. **trigout**: Generate an event trigger coincident with static load change.
itrans_2	<*slot*,**1**> <**i1** *current1*> <**t1** *duration1*> <**i2** *current2*> <**t2** *duration2*> < **trig1** | **ext**> **trigout**
	Configures and launches current transients consisting of 2 sequential steps of current with specified durations. Optionally produces trigger out. Returns to "iload" current upon completion of transient. There is no memory of trigger mode – must be specified on each instance of usage. **i1, i2**: specify current entry for step 1 and 2 respectively. **t1, t2**: specify duration entry for step 1 and 2 respectively. *current1* is first current value in units of mA (0 to 1022 mA). *duration1* is first duration value (range 1m to 1000m or 200u to 1000u where "m" is mSec and "u" is µSec.) *current2* is second current value in units of mA (0 to 1022 mA). *duration2* is first duration value (range 1m to 1000m or 200u to 1000u where "m" is mSec and "u" is µSec.) *duration2* may also take the value "hold" causing the current load to sustain indefinitely at the *current2* value. **trig1** = start current transient on next trig1 event **ext** = start current transient on next ext trigger event **trigout** = generate hardware trigger on command execution

Command	Command Parameters
idcaverage_2	<*slot*,**1**> <**trig OFF** | **ON** | **EXT**> <**period** *interval*> <**timeout 10** | **100**> <**?** | **stat**>
	Configures and performs an Average DC Current measurement on a PoE Pair up to 1022 mA. **trig off** enables immediate execute of DC measurement when "stat" query is issued. **trig on** specifies that the measurement will be performed when the trigger condition specified on Trig1 is achieved. Trig1 will be armed automatically when "stat" query is issued. **trig ext** specifies that the measurement will be performed when the external input trigger is asserted. **period** specifies that an averaging period will be defined. *interval* specifies the averaging period as "Nm" where N is 10, 20, 50, 100, 200, 500 mSec or "Ns" where N is 1, 2, or 5 seconds. Default value is 100 mSec. **timeout 10** specifies that a hardware triggered measurement should time out if no trigger is found within 10 seconds following trigger arm. **timeout 100** specifies that a hardware triggered measurement should time out if no trigger is found within 100 seconds following trigger arm.
idcpeak_2	<*slot*,**1**> <**trig OFF** | **ON** | **EXT**> <**max** | **min**> <**period** *interval*> <**timeout 10** | **100**> <**?** | **stat**>
	Configures and performs a Peak DC Current measurement on a PoE Pair up to 1022 mA. **trig off** enables immediate execute of DC measurement when "stat" query is issued. **trig on** specifies that the measurement will be performed when the trigger condition specified on Trig1 is achieved. Trig1 will be armed automatically when "stat" query is issued. **trig ext** specifies that the measurement will be performed when the external input trigger is asserted. **period** specifies that an averaging period will be defined. *interval* specifies the averaging period as "Nm" where N is 10, 20, 50, 100, 200, 500 mSec or "Ns" where N is 1, 2, or 5 seconds. Default value is 100 mSec. **timeout 10** specifies that a hardware triggered measurement should time out if no trigger is found within 10 seconds following trigger arm. **timeout 100** specifies that a hardware triggered measurement should time out if no trigger is found within 100 seconds following trigger arm.
idctrace_2	<*slot*,**1**> <**trig OFF** | **ON** | **EXT**> <**period** *interval*> <**timeout 10** | **100**> <**?** | **stat**>
	Configures and performs a DC Current Trace measurement on a PoE Pair up to 1022 mA. **trig off** enables immediate execute of DC measurement when "stat" query is issued. **trig on** specifies that the measurement will be performed when the trigger condition specified on Trig1 is achieved. Trig1 will be armed automatically when "stat" query is issued. **trig ext** specifies that the measurement will be performed when the external input trigger is asserted. **period** specifies that an averaging period will be defined. *interval* specifies the averaging period as "Nm" where N is 10, 20, 50, 100, 200, 500 mSec or "Ns" where N is 1, 2, or 5 seconds. Default value is 100 mSec. **timeout 10** specifies that a hardware triggered measurement should time out if no trigger is found within 10 seconds following trigger arm. **timeout 100** specifies that a hardware triggered measurement should time out if no trigger is found within 100 seconds following trigger arm.
paverage_2	<*slot*,**1**> <**period** *interval*> **stat**
	Performs an immediate average power measurement and returns power in watts. Since this measurement function uses vdcaverage_2 and idcaverage_2, there is no memory for the configuration and the "?" query is not supported. "stat" must be specified on each execution of the command. **period** specifies that a sampling period will be defined. ***interval*** specifies the sampling period as "Nm" where N is 10, 20, 50, 100, 200, 500 mSec or "Ns" where N is 1, 2, or 5 seconds. Default value is 100 mSec.
psa_disconnect_2	<*slot*,**1**>
	Forces a PSE Port power-down to occur. Opens the port switch, sets DC current load to 0 mA.

Command	Command Parameters
power_port_2	<*slot*,**1**> <**p** *power* | **i** *load* | **c** *class* | **ci** *class_current*> <**dr** *resistance*> <**dc** *capacitance*>
	Simulates a PD connected to a PSE port to bring power up to a user-specified condition. If no command parameters are specified, the default power-up condition is a static load of 20 mA. Status of port is returned upon completion of command. **p** indicates that power draw of port will be specified. *power* is the power in watts that the port will power-up to. Regardless of power specified, classification will detect a "Class 0" PD. Range is .2 to 15.4 Watts. **i** indicates that current draw of port will be specified. *current* is the current draw in mA that the port will power-up with. Regardless of current specified, classification will detect a "Class 0" PD. Range is 0 to 350 mA. **c** indicates that classification of port will be specified. *class* is the port classification. Range is 0 to 4. Load currents implemented by classification are:

Class	Class Current	Power-Up Current
0	2 mA	140 mA
1	10 mA	44 mA
2	18 mA	108 mA
3	28 mA	202 mA
4	40 mA	324 mA

	ci indicates that the classification current to be applied will be specified. *class_current* is the classification current to apply during classification. Range is 0 to 45 mA. Power-up current will be determined **according the class-band of the specified classification current.** **dr** indicates that a non-default detection resistance should be used. *resistance* is the detection load resistance to use for the power-up. Range is 11 to 39KΩ. **dc** indicates that a non-default detection capacitance should be used. *capacitance* is the detection load resistance to use for the power-up. Range is 0, 5, 7, or 9 µF.
replicate_ports_2	<*slot*,**1**> *config_type {target_slots}*
	Replicate configuration of resources from one test slot to a number of other test slots for High-Power PSE testing with PSA Port Combiners. *config_type:* The type of configuration to be replicated from <port> to {target_ports}. Options are: port | trig | load | vdca | vdcp | vdct | idca | idcp | idct | acv | time | all. "all" will fully replicate all subsystem configurations. *target_slots*: A list of all slots to which the configuration is to be copied. Each slot is in the form as "*slot#*, **1**" and is space delimited in the list.

Test Configuration

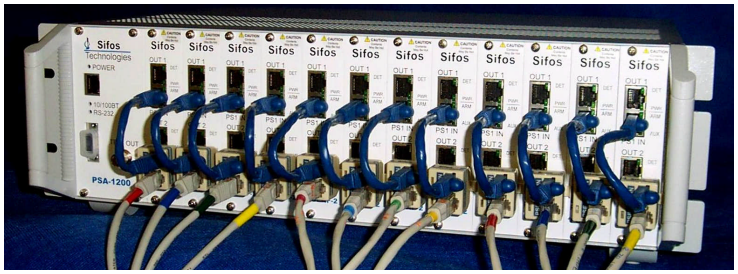

Figure 13: PSA with Port Combiners for High-Power PSE Testing.

For more information on the Sifos Technologies' Power over Ethernet test & measurement solutions look us up at:
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