TIDA-00465 Test Report

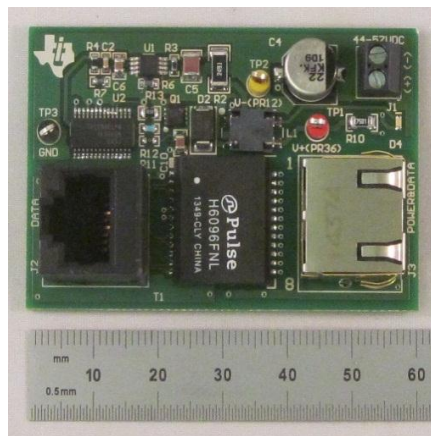*Eric Wright*   *LP/PI*

Abstract

TI design TIDA-00465 is an application using TPS23861 as a single port, type 2, PoE auto-mode PSE in a small form factor. Input voltage to the unit is 44V-57V using any commonly available 40W AC-DC power supply. The design will inject power onto any Ethernet cable for PoE powered loads up to 30W.

The circuit is placed on a 1.6" x 2.4" PCB with the key TPS23861 circuit occupying only 0.35 in^2.

The TIDA-00465 is derived from application design PR2207. Both numbers may appear in documentation but refer to a single common design.

Figure 1. TIDA-00465 Photo

Document History

Version	Date	Author	Notes
1.0	January 2015	Eric Wright	First release

System Connection Diagram

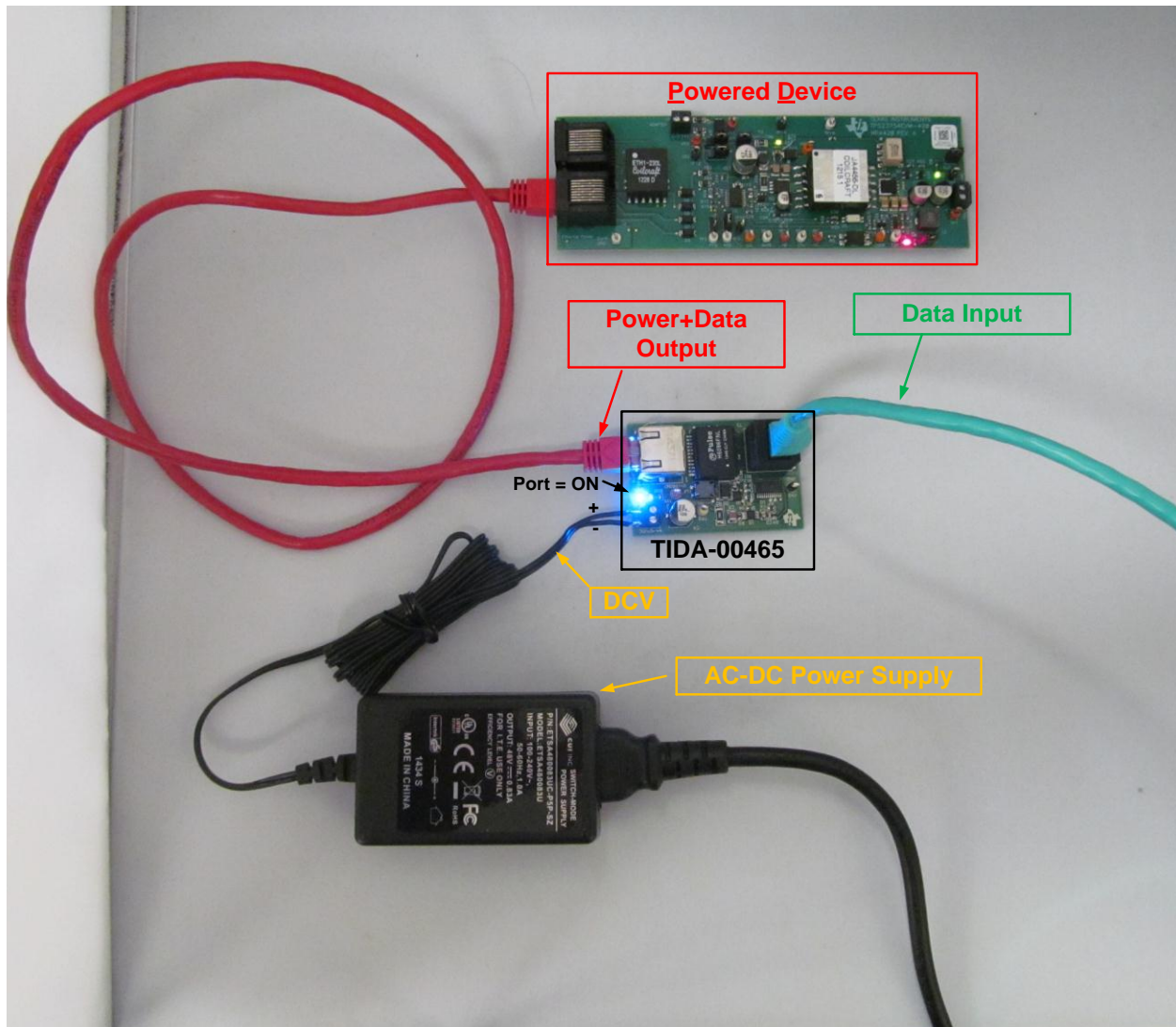**Figure 2 System Connection Diagram**

![Texas Instruments logo]

Test Report
January 2015

Schematic

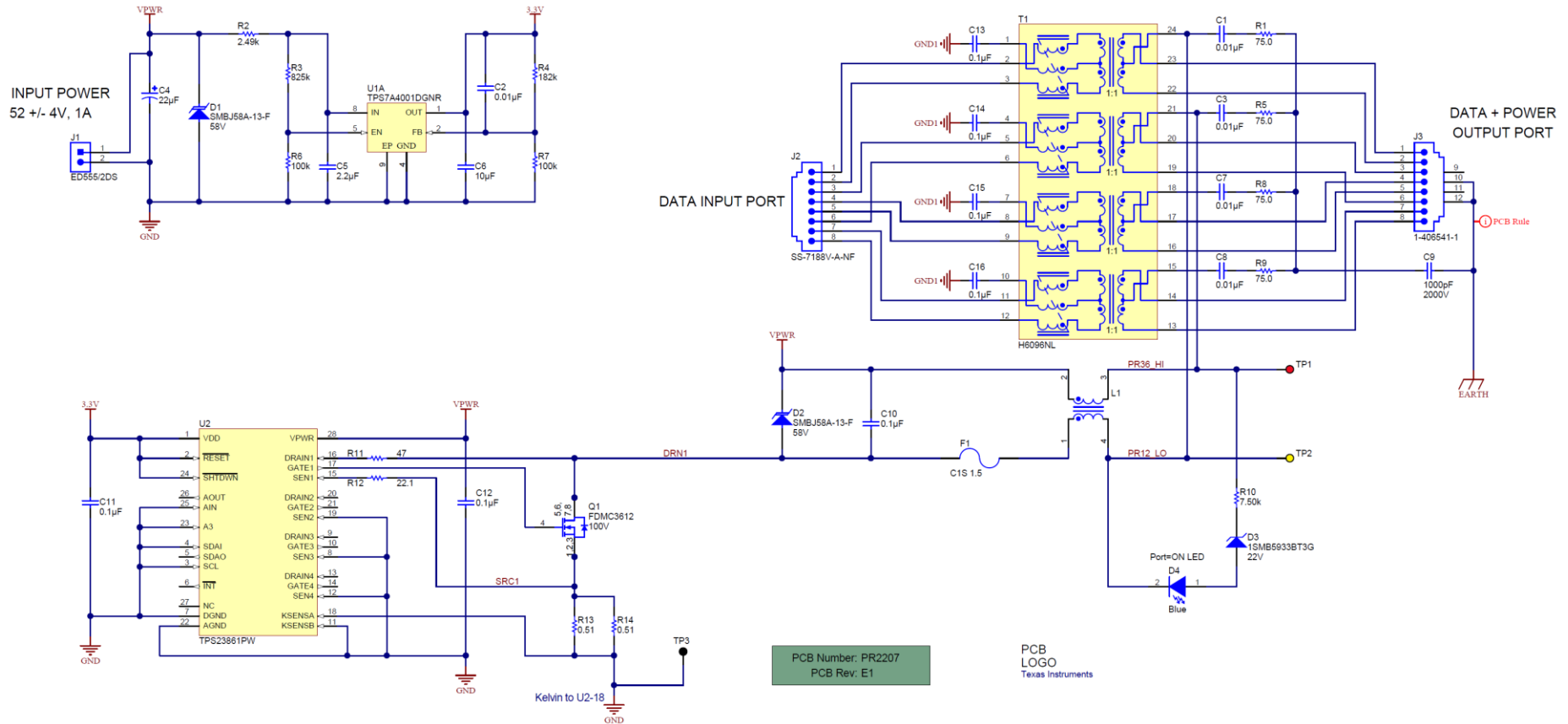- The TIDA-00465 schematic is shown in Figure 3.

Figure 3 TIDA-00465 Schematic

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Test Results

- Figure 4 shows typical start up behavior for a type 2 PD. TPS23861 automatically performs four point detection, two-event physical classification of type 2 PDs, and inrush protected power ramp up.
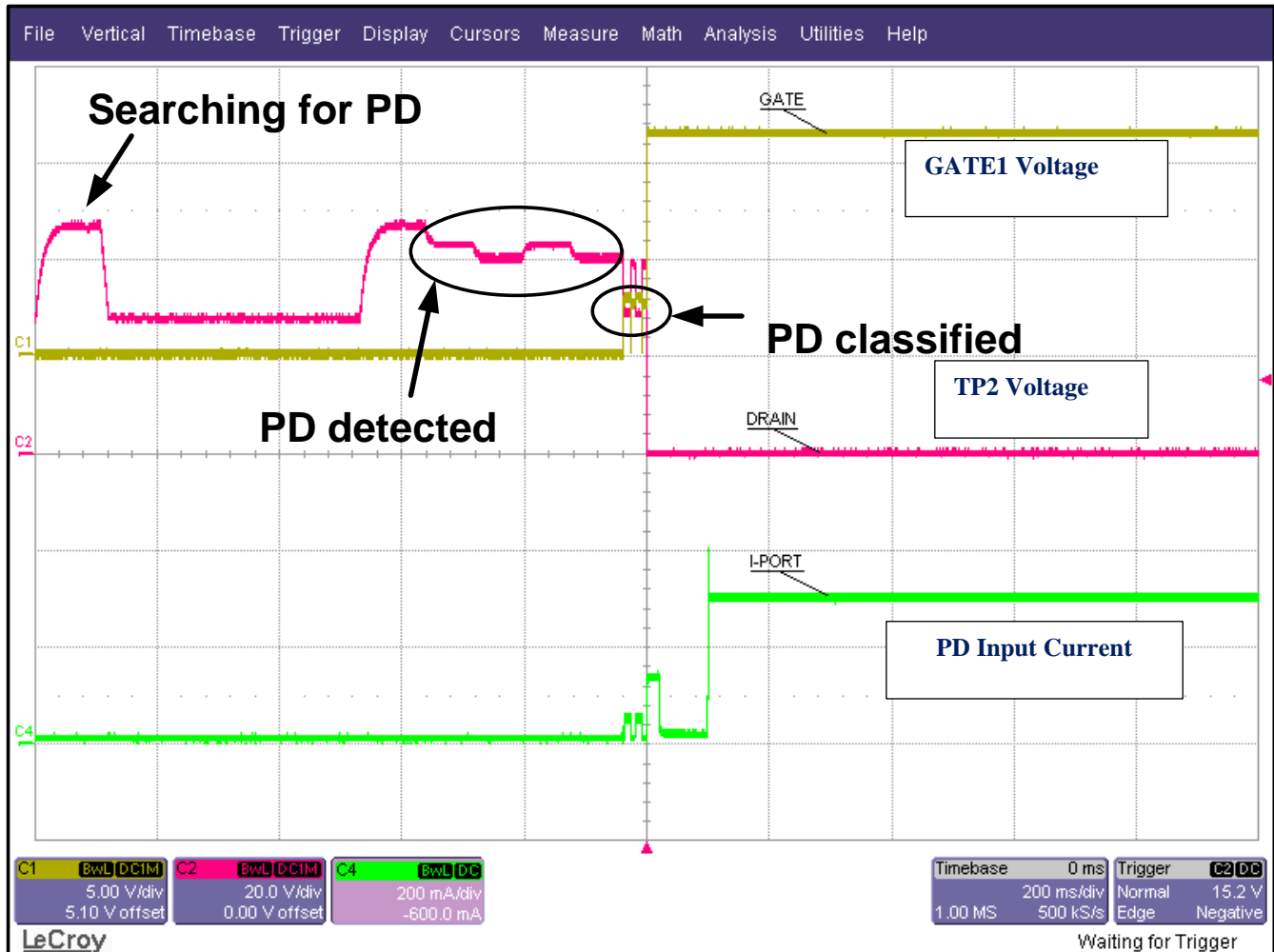

Figure 4 Start Up type 2 PD load

- Table 1 documents the IEEE 802.3at conformance test results using the Sifos[TM] Technologies PSA-3000 test suite for a 30W PSE. Table 2 documents the IEEE 802.3at conformance test results using the Sifos[TM] Technologies PSA-3000 test suite for a 15.4W PSE.

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Table 1. IEEE 802.3at Conformance Report; 30W PSE

PSA TEST RESULTS

February 9 2015	9:55 AM
Port Count…………………………………	1
Loop Count……………………………...	10
PSE Tested: PortBang Type-2	

Sifos Technologies

802.3at Conformance Report
version 4.0.77

Test Mode: **30 Watt PHY**   *report version 4.0.13*

Sifos Interop Index*: **100%**

Error Log: C:/Users/Public/Sifos/PSA1200/Results/PortBang/psa_error_log.txt

Chassis ID: 158.218.10.73 TestLoop: 1	PSA-3000 Ports 1-1	UNITS	Min	Max	Average	Low Limit	P/F	High Limit	P/F
Test: det_v									
Open_Circuit_Det_Voc=	19.85	volts	19.85	19.85	19.85	2.8	Pass	30	Pass
Peak_Det_Vvalid=	7.09	volts	7.09	7.09	7.09	3.8	Pass	10	Pass
Min_Det_Vvalid=	4.56	volts	4.56	4.56	4.56	2.8	Pass	9	Pass
Det_Volt_Step_dVtest=	2.53	volts	2.53	2.53	2.53	1	Pass	7.2	Pass
Detection Slew=	0	V/usec	0	0	0	0	Pass	0.1	Pass
Good_Sig_Det_Pulse=	3	edges	3	3	3	1	Pass	9	Pass
Backoff_Voltage=	0.3	volts	0.3	0.3	0.3	0	Pass	2.8	Pass
Non_802_Step_V=	0	volts	0	0	0	0	Pass	0.1	Pass
High_Sig_MaxV=	10.99	volts	10.99	10.99	10.99	3.8	Pass	11	Pass
Non_802_Discr_?=	0	****	0	0	0	0	Pass	0	Pass
Detect_Strategy=	0	****	0	0	0	0	Pass	2	Pass
Test: det_i									
Init_Current_Isc=	0.18	mA	0.18	0.18	0.18	0	Pass	5	Pass
Det_Current_Isc=	0.21	mA	0.21	0.21	0.21	0	Pass	5	Pass
Test: det_range									
Rgood_Max=	28	Kohm	28	28	28	26	Pass	32	Pass
Rgood_Min=	17	Kohm	17	17	17	16	Pass	19	Pass
Rmid det=	28	Kohm	28	28	28	26	Pass	33	Pass
Cgood_Max=	0.1	uF	0.1	0.1	0.1	0	Pass	10	Pass
Rbad_Cbad_Stat=	0	****	0	0	0	0	Pass	0	Pass
Test: det_time									
Backoff_Time_Tdbo=	86	msec	86	86	86	-1	Pass	1500	Pass
Eff_Backoff_Tdbo_eff=	86	msec	86	86	86	-1	Pass	1500	Pass
Backoff_Type=	0	****	0	0	0	0	Pass	0	Pass
Detection Time Tdet=	313	msec	313	313	313	5	Pass	500	Pass
Total_Det_Time=	316	msec	316	316	316	5	Pass	1000	Pass
Test: det_rsource									
Output_Impedance_Zout=	450	KOhm	450	450	450	45	Pass	2000	Pass
Test: class_v									
Class_Voltage_Vclass=	18.6	volts	18.6	18.6	18.6	15.5	Pass	20.5	Pass
Vclass Min=	18.6	volts	18.6	18.6	18.6	15.5	Pass	20.5	Pass
Mark Voltage Vmark=	8.4	volts	8.4	8.4	8.4	7	Pass	10	Pass
Mark Voltage Min=	8.4	volts	8.4	8.4	8.4	7	Pass	10	Pass
Test: class_time									
Event_Count=	2	****	2	2	2	2	Pass	3	Pass
Event1_Tcle1=	11.3	msec	11.3	11.3	11.3	6	Pass	30	Pass
Event2_Tcle2=	10.9	msec	10.9	10.9	10.9	6	Pass	30	Pass
Mark Tme1=	7.4	msec	7.4	7.4	7.4	6	Pass	12	Pass
Mark Tme2=	9	msec	9	9	9	6	Pass	376	Pass
Test: class_err									
Class_lim=	75	mA	75	75	75	51	Pass	100	Pass
Vport_CL_lim=	14.7	V	14.7	14.7	14.7	0	Pass	20.5	Pass
Vport_CL_err_1=	18.6	V	18.6	18.6	18.6	0	Pass	20.5	Pass
Mark_lim=	6	mA	6	6	6	5	Pass	100	Pass
Vport_CL err 2=	3	V	3	3	3	0	Pass	20.5	Pass
Treset=	92	msec	92	92	92	15	Pass	10000	Pass

Table 1-continued

Test	Value	Units				Min		Max	
Test: pwrup_time									
Pwr-On_Rise_Time_Trise=	88	usec	88	88	88	15	Pass	50000	Pass
Power-On_Time_Tpon=	35.2	msec	35.2	35.2	35.2	0	Pass	400	Pass
Test: pwrup_inrush									
Init_Iinrush=	421.13	mA	421.13	421.13	421.13	400	Pass	450	Pass
Max_Iinrush_c4=	421	mA	421	421	421	400	Pass	450	Pass
Min_Iinrush=	420.75	mA	420.75	420.75	420.75	400	Pass	450	Pass
Tinrush=	60.7	msec	60.7	60.7	60.7	50	Pass	75	Pass
Inrush_45m=	51.9	Volts	51.9	51.9	51.9	50	Pass	57	Pass
Inrush_Voltage=	30.6	Volts	30.6	30.6	30.6	30	Pass	57	Pass
Max_Init_Inrush=	421	mA	421	421	421	0	Pass	2000	Pass
Inrush_Strategy=	0	****	0	0	0	0	Pass	0	Pass
Test: pwron_v									
Vport_min_2=	51	V	51	51	51	50	Pass	57	Pass
Vport_max_2=	52	V	52	52	52	50	Pass	57	Pass
Vport_ripple_2=	2	mVpp	2	2	2	0	Pass	500	Pass
Vport_noise_2=	21	mVpp	21	21	21	0	Pass	200	Pass
Vtrans_min_2=	51	V	51	51	51	50	Pass	57	Pass
Vtrans_max_2=	52.1	V	52.1	52.1	52.1	50	Pass	57	Pass
Test: pwron_pwrcap									
Pcon_c4=	31.4	watts	31.4	31.4	31.4	30	Pass	38.9	Pass
Icon_c4=	614	mA	614	614	614	526.3	Pass	683	Pass
Type-2_Enable=	1	****	1	1	1	1	Pass	1	Pass
Test: pwron_maxi									
Ilim_Peak=	98.3	mA	98.3	98.3	98.3	0	Pass	1750	Pass
Ilim_Min_2=	685.5	mA	685.5	685.5	685.5	683	Pass	1750	Pass
Tlim_2=	61.3	msec	61.3	61.3	61.3	10	Pass	75	Pass
Vlim_2=	50.8	V	50.8	50.8	50.8	50	Pass	57	Pass
Ilim_Max_2=	859.5	mA	859.5	859.5	859.5	0	Pass	1750	Pass
Ilim_Low_V_Tol_2=	60.2	msec	60.2	60.2	60.2	10	Pass	9999	Pass
Ktran_lo_2=	101.5	%	101.5	101.5	101.5	92.4	Pass	115	Pass
Test: pwron_overld									
%Ipeak_2=	125	%	125	125	125	0	Pass	125	Pass
Vport_Ipeak_2=	50.8	V	50.8	50.8	50.8	50	Pass	57	Pass
Vport_5%DC_2=	50.9	V	50.9	50.9	50.9	50	Pass	57	Pass
Test: mps_dc_valid									
Min_Valid_Time_Tmps=	50	msec	50	50	50	1	Pass	60	Pass
Duty_Cycle_tol=	1	****	1	1	1	1	Pass	1	Pass
Test: mps_dc_pwrdn									
Min_Valid_I_hold=	5	mA	5	5	5	5	Pass	10	Pass
Time-to-Shutdown_Tmpdo=	364	msec	364	364	364	300	Pass	400	Pass
Max_Voltage_Vopen_max=	19.9	volts	19.9	19.9	19.9	-1	Pass	30	Pass
Test: pwrdn_overld									
Icut_2=	641	mA	641	641	641	-1	Pass	683	Pass
Tcut_2=	63.5	msec	63.5	63.5	63.5	10	Pass	9999	Pass
Isoft_2=	-1	mA	-1	-1	-1	-1	Pass	683	Pass
Tsoft_2=	-1	msec	-1	-1	-1	-1	Pass	2000	Pass
Test: pwrdn_time									
Turn-Off_Time_Toff=	15.5	mSec	15.5	15.5	15.5	0	Pass	500	Pass
Output_Cap_Cout=	0.0643	uF	0.0643	0.0643	0.0643	-1	Pass	0.52	Pass
Output_Load_Rp=	116.8	Kohm	116.8	116.8	116.8	45	Pass	50000	Pass
Test: pwrdn_v									
Avg_Idle_Voff=	0.1	VDC	0.1	0.1	0.1	0	Pass	2.8	Pass
Error_Delay_Ted=	1406.3	msec	1406.3	1406.3	1406.3	750	Pass	10000	Pass
Peak_Error_Delay_Ved=	0.8	VDC	0.8	0.8	0.8	0	Pass	20.5	Pass

Table 2. IEEE 802.3at Conformance Report; 15.4W PSE

PSA TEST RESULTS									
February 9 2015 7:55 AM									
Port Count……………………………… 1									
Loop Count…………………………… 10									
PSE Tested: PortBang Type-1									

Sifos Technologies — 802.3at Conformance Report — version 4.0.77 — report version 4.0.13
Test Mode: **15.4 Watt** — Sifos Interop Index*: **100%** — Error Log: None

Chassis ID: 158.218.10.73 TestLoop: 1	PSA-3000 Ports 1-1	UNITS	Min	Max	Average	Low Limit	P/F	High Limit	P/F
Test: det_v									
Open_Circuit_Det_Voc=	19.85	volts	19.85	19.85	19.85	2.8	Pass	30	Pass
Peak_Det_Vvalid=	7.1	volts	7.1	7.1	7.1	3.8	Pass	10	Pass
Min_Det_Vvalid=	4.55	volts	4.55	4.55	4.55	2.8	Pass	9	Pass
Det_Volt_Step_dVtest=	2.55	volts	2.55	2.55	2.55	1	Pass	7.2	Pass
Detection_Slew=	0	V/usec	0	0	0	0	Pass	0.1	Pass
Good_Sig_Det_Pulse=	3	edges	3	3	3	1	Pass	9	Pass
Backoff_Voltage=	0.3	volts	0.3	0.3	0.3	0	Pass	9	Pass
Non_802_Step_V=	0	volts	0	0	0	0	Pass	0.1	Pass
High_Sig_MaxV=	10.99	volts	10.99	10.99	10.99	3.8	Pass	11	Pass
Non_802_Discr_?=	0	****	0	0	0	0	Pass	0	Pass
Detect_Strategy=	0	****	0	0	0	0	Pass	2	Pass
Test: det_i									
Init_Current_Isc=	0.18	mA	0.18	0.18	0.18	0	Pass	5	Pass
Det_Current_Isc=	0.2	mA	0.2	0.2	0.2	0	Pass	5	Pass
Test: det_range									
Rgood_Max=	28	Kohm	28	28	28	26	Pass	32	Pass
Rgood_Min=	17	Kohm	17	17	17	16	Pass	19	Pass
Rmid_det=	28	Kohm	28	28	28	26	Pass	33	Pass
Cgood_Max=	0.1	uF	0.1	0.1	0.1	0	Pass	10	Pass
Rbad_Cbad_Stat=	0	****	0	0	0	0	Pass	0	Pass
Test: det_time									
Backoff_Time_Tdbo=	86	msec	86	86	86	-1	Pass	1500	Pass
Eff_Backoff_Tdbo_eff=	86	msec	86	86	86	-1	Pass	1500	Pass
Backoff_Type=	0	****	0	0	0	0	Pass	0	Pass
Detection_Time_Tdet=	313	msec	313	313	313	5	Pass	500	Pass
Total_Det_Time=	316	msec	316	316	316	5	Pass	1000	Pass
Test: det_rsource									
Output_Impedance_Zout=	450	KOhm	450	450	450	45	Pass	2000	Pass
Test: class_v									
Class_Voltage_Vclass=	18.9	volts	18.9	18.9	18.9	15.5	Pass	20.5	Pass
Vclass_Min=	18.7	volts	18.7	18.7	18.7	15.5	Pass	20.5	Pass
Test: class_time									
Event_Count=	1	****	1	1	1	0	Pass	3	Pass
Class_Time_Tpdc=	11.3	msec	11.3	11.3	11.3	6	Pass	75	Pass
Test: class_err									
Class_lim=	75	mA	75	75	75	51	Pass	100	Pass
Vport_CL_lim=	14.9	V	14.9	14.9	14.9	0	Pass	57	Pass
Vport_CL_err_1=	18.5	V	18.5	18.5	18.5	0	Pass	57	Pass
Test: pwrup_time									
Pwr-On_Rise_Time_Trise=	40	usec	40	40	40	15	Pass	50000	Pass
Power-On_Time_Tpon=	11.7	msec	11.7	11.7	11.7	0	Pass	400	Pass
Test: pwrup_inrush									
Init_Iinrush=	423	mA	423	423	423	400	Pass	450	Pass
Max_Iinrush_c0=	421.63	mA	421.63	421.63	421.63	400	Pass	450	Pass
Min_Iinrush=	420.88	mA	420.88	420.88	420.88	400	Pass	450	Pass
Tinrush=	60	msec	60	60	60	50	Pass	75	Pass
Inrush_45m=	51.9	Volts	51.9	51.9	51.9	44	Pass	57	Pass
Inrush_Voltage=	30.6	Volts	30.6	30.6	30.6	30	Pass	57	Pass
Max_Init_Inrush=	616.3	mA	616.3	616.3	616.3	0	Pass	2000	Pass
Inrush_Strategy=	0	****	0	0	0	0	Pass	0	Pass

Table 2-continued

Test: pwron_v									
Vport_min_1=	51.5	V	51.5	51.5	51.5	50	Pass	57	Pass
Vport_max_1=	52	V	52	52	52	50	Pass	57	Pass
Vport_ripple_1=	2	mVpp	2	2	2	0	Pass	500	Pass
Vport_noise_1=	14	mVpp	14	14	14	0	Pass	200	Pass
Vtrans_min_1=	51.5	V	51.5	51.5	51.5	50	Pass	57	Pass
Vtrans_max_1=	52.1	V	52.1	52.1	52.1	50	Pass	57	Pass
Test: pwron_pwrcap									
Pcon_c0=	18.2	watts	18.2	18.2	18.2	15.4	Pass	22.7	Pass
Icon_c0=	353	mA	353	353	353	270.2	Pass	399	Pass
Pcon_c1=	17.6	watts	17.6	17.6	17.6	4	Pass	22.7	Pass
Icon_c1=	341	mA	341	341	341	70.1	Pass	399	Pass
Pcon_c2=	17.6	watts	17.6	17.6	17.6	7	Pass	22.7	Pass
Icon_c2=	341	mA	341	341	341	122.8	Pass	399	Pass
Pcon_c3=	18.2	watts	18.2	18.2	18.2	15.4	Pass	22.7	Pass
Icon_c3=	353	mA	353	353	353	270.2	Pass	399	Pass
Test: pwron_maxi									
Ilim Peak=	97.8	mA	97.8	97.8	97.8	0	Pass	1750	Pass
Ilim Min_1=	401.5	mA	401.5	401.5	401.5	400	Pass	1750	Pass
Tlim_1=	62.1	msec	62.1	62.1	62.1	50	Pass	9999	Pass
Vlim_1=	51.3	V	51.3	51.3	51.3	50	Pass	57	Pass
Ilim Max_1=	98.8	mA	98.8	98.8	98.8	0	Pass	1750	Pass
Ilim_Low_V_Tol_1=	59.4	msec	59.4	59.4	59.4	50	Pass	9999	Pass
Ktran lo 1=	102.6	%	102.6	102.6	102.6	92.4	Pass	115	Pass
Test: pwron_overld									
%Ipeak_1=	125	%	125	125	125	100	Pass	125	Pass
Vport_Ipeak_1=	51.5	V	51.5	51.5	51.5	50	Pass	57	Pass
Vport_5%DC_1=	51.5	V	51.5	51.5	51.5	50	Pass	57	Pass
Test: mps_dc_valid									
Min_Valid_Time_Tmps=	50	msec	50	50	50	1	Pass	60	Pass
Duty Cycle tol=	1	****	1	1	1	1	Pass	1	Pass
Test: mps_dc_pwrdn									
Min_Valid_I_hold=	5	mA	5	5	5	5	Pass	10	Pass
Time-to-Shutdown_Tmpdo=	365	msec	365	365	365	300	Pass	400	Pass
Max_Voltage_Vopen_max=	19.9	volts	19.9	19.9	19.9	-1	Pass	30	Pass
Test: pwrdn_overld									
Icut_1=	373.3	mA	373.3	373.3	373.3	-1	Pass	683	Pass
Tcut_1=	62.6	msec	62.6	62.6	62.6	50	Pass	9999	Pass
Isoft_1=	-1	mA	-1	-1	-1	-1	Pass	683	Pass
Tsoft_1=	-1	msec	-1	-1	-1	-1	Pass	2000	Pass
Test: pwrdn_time									
Turn-Off_Time_Toff=	16.5	mSec	16.5	16.5	16.5	0	Pass	500	Pass
Output_Cap_Cout=	0.0708	uF	0.0708	0.0708	0.0708	-1	Pass	0.52	Pass
Output Load Rp=	111.7	Kohm	111.7	111.7	111.7	45	Pass	50000	Pass
Test: pwrdn_v									
Avg_Idle_Voff=	0.1	VDC	0.1	0.1	0.1	0	Pass	2.8	Pass
Error_Delay_Ted=	1390.6	msec	1390.6	1390.6	1390.6	750	Pass	10000	Pass
Peak_Error_Delay_Ved=	0.4	VDC	0.4	0.4	0.4	0	Pass	20.5	Pass

References

1. Data Sheet: TPS23861 IEEE 802.3at Quad Port Power-over-Ethernet PSE Controller (SLUSBX9A)

IMPORTANT NOTICE FOR TI REFERENCE DESIGNS