茂睿芯
MERAKI INTEGRATED

MK361X 电路设计指导

单口 IEEE 802.3 af/at PSE 协议控制器

Nine Liu (技术 支持)

微信

MK361X选型表

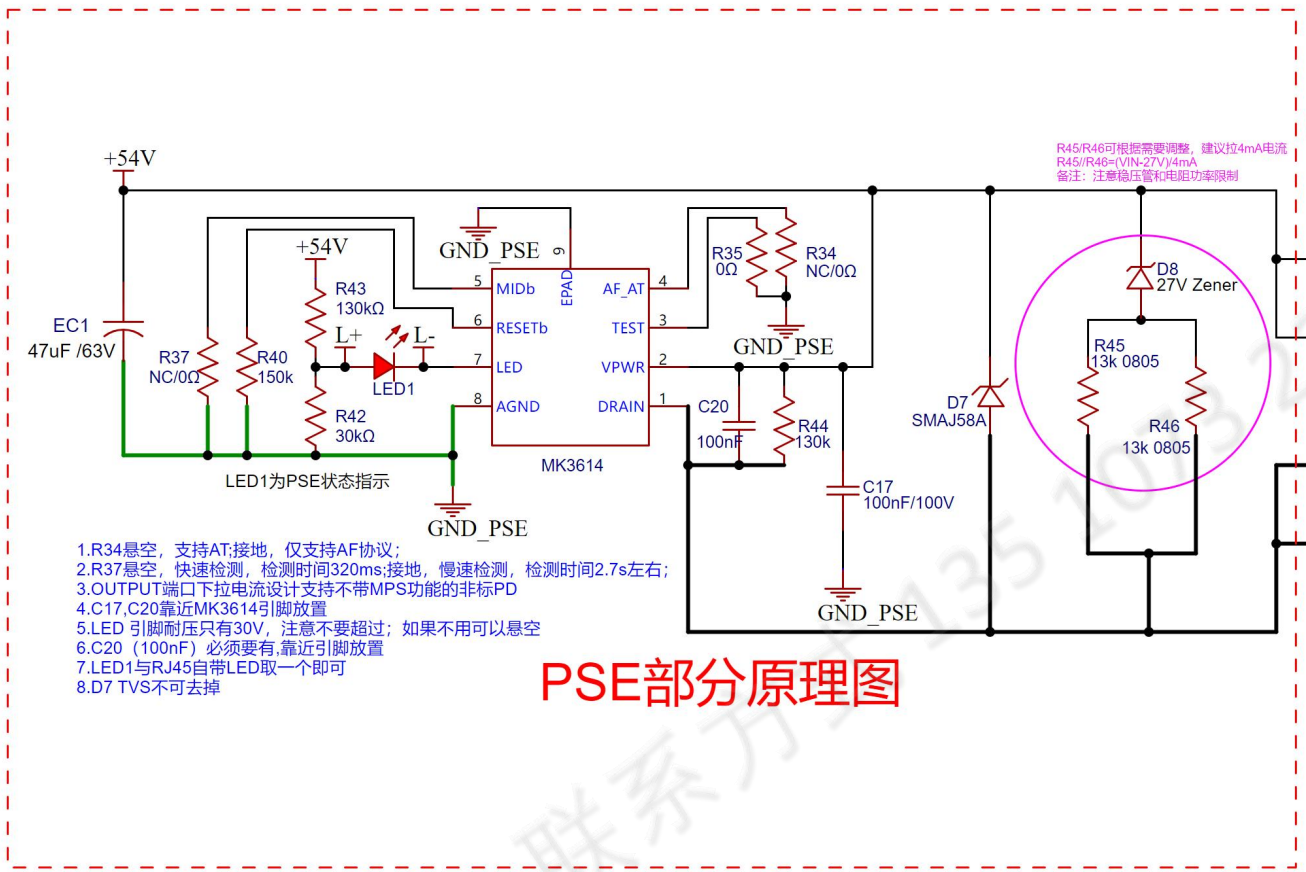
订购型号和脚位

简称	订货型号	封装	LED状态	ICUT	功率等级	t_{MPS}
MK3614	MK3614GAD	ESOP-8	7种	Icut=370mA for af Icut=640mA for at	15W、30W	2.8ms
MK3614H	MK3614HGAD	ESOP-8	3种	Icut=555mA for af Icut=970mA for at	25W、50W	2.8ms
MK3614T	MK3614TGAD	ESOP-8	3种	Icut=370mA for af Icut=640mA for at	15W、30W	2.8ms
MK3614A	MK3614AXAD	ESOP-8	3种	Icut=370mA for af Icut=640mA for at	15W、30W	100us
MK3614E	MK3614EXAD	ESOP-8	3种	Icut=410mA for af Icut=700mA for at	18W、35W	100us
MK3614P	MK3614PXAD	ESOP-8	3种	Icut=740mA for af Icut=1250mA for at	35W、60W	100us
MK3616	MK3616XAD	ESOP-8	7种	Icut=370mA for af Icut=640mA for at	15W、30W	100us
MK3616T	MK3616TXAD	ESOP-8	2种	Icut=370mA for af Icut=640mA for at	15W、30W	100us

订购前请尽量和工程师先沟通 常用Part

MK3614 典型电路

千兆网PSE



PSE部分原理图

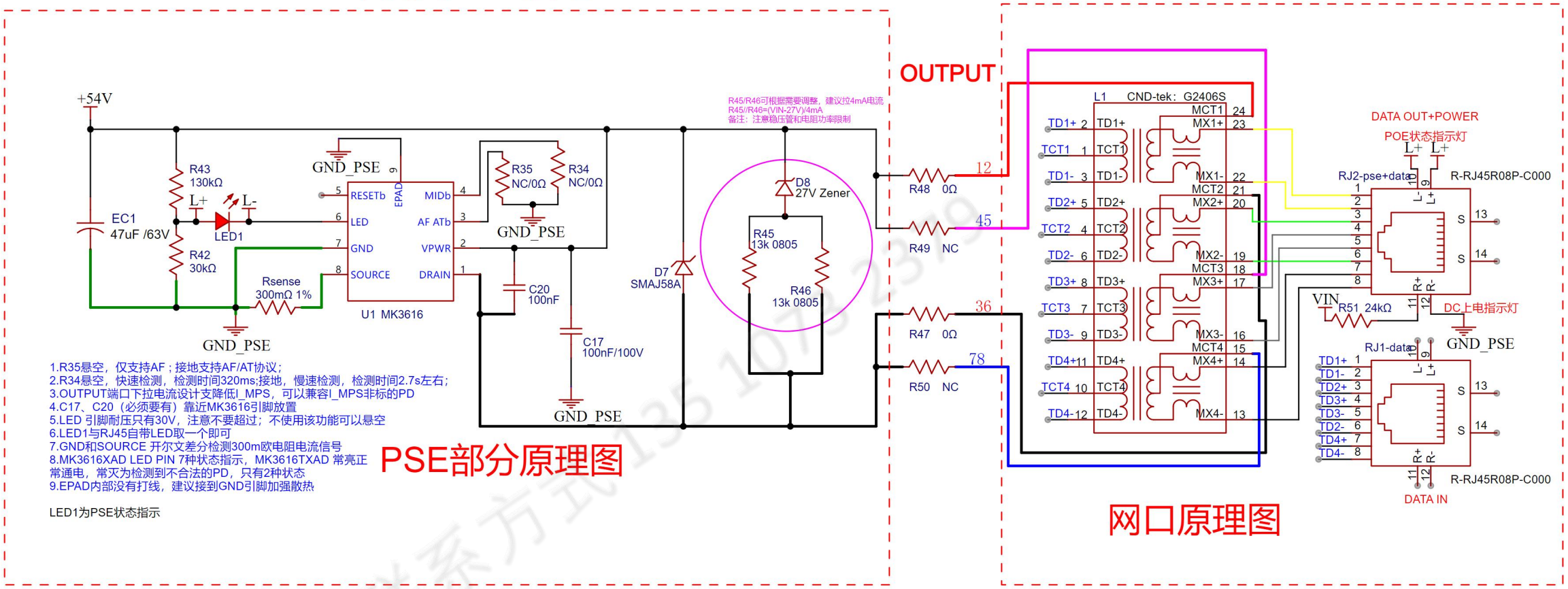
OUTPUT

网口原理图

推荐电路设计（MK3614/MK3614T/MK3614H R40、R44必须贴上，其它型号去掉）

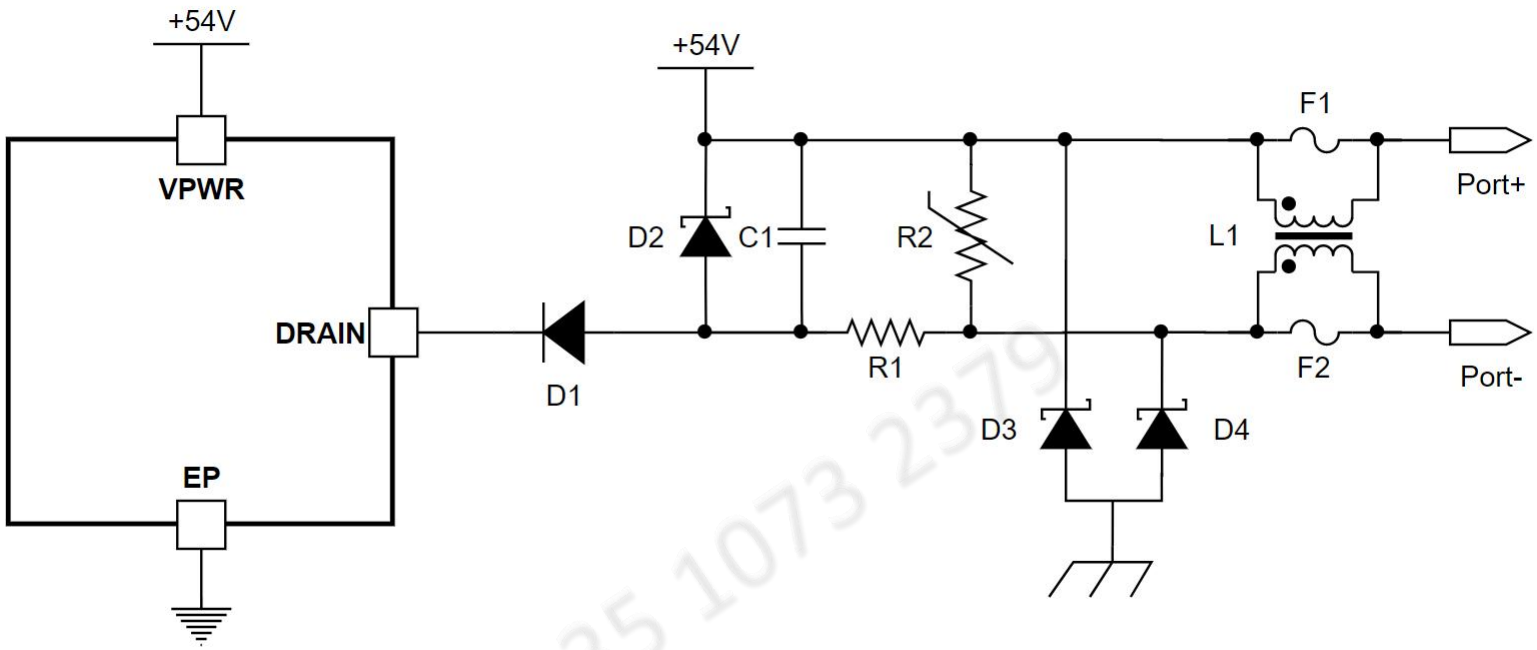
MK3616 典型电路

千兆网PSE供电



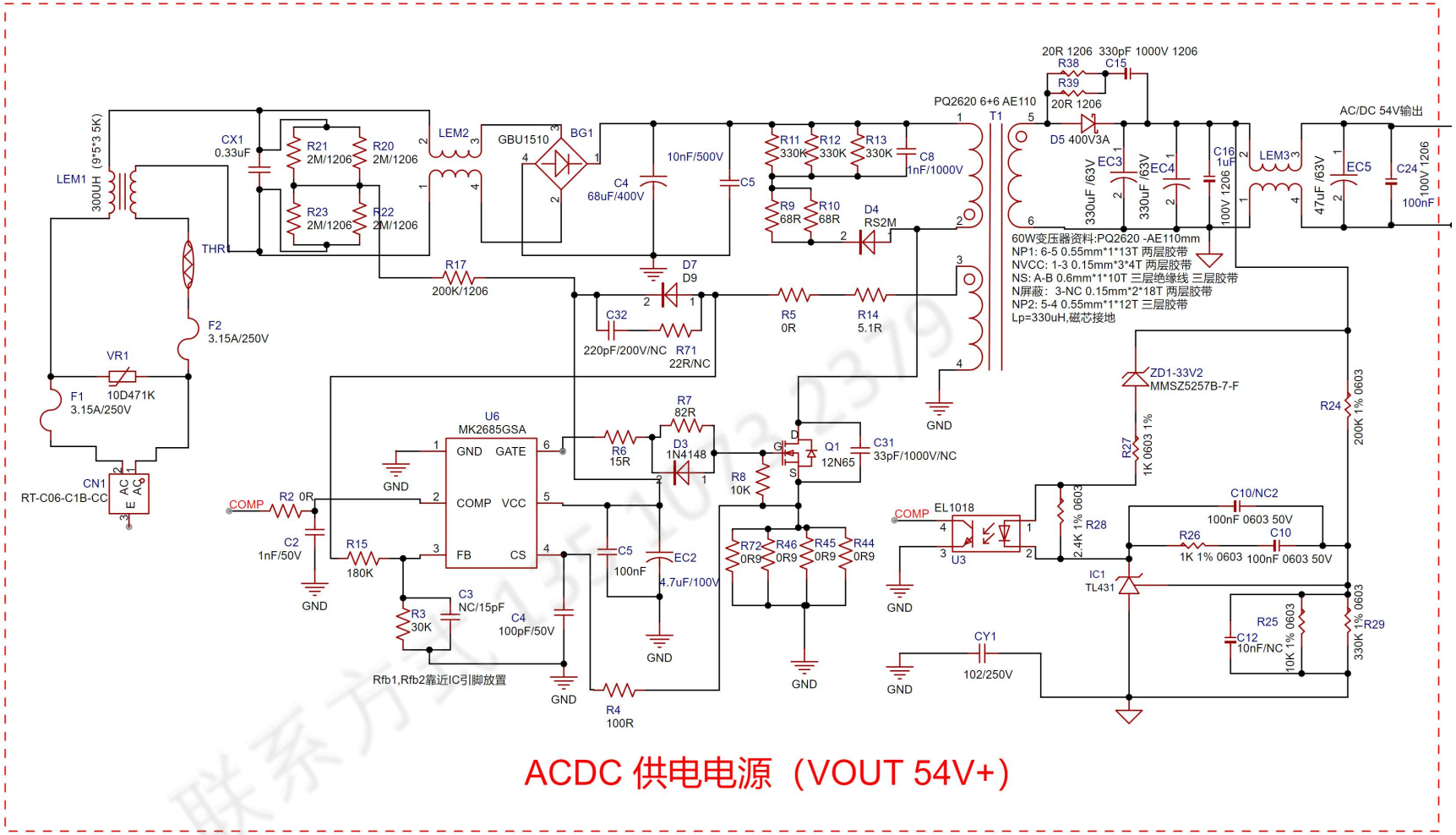
推荐电路设计：MK3616如果做非标设计，可以减小Rsense电阻实现超80W功率应用

芯片网口端防浪涌推荐电路设计



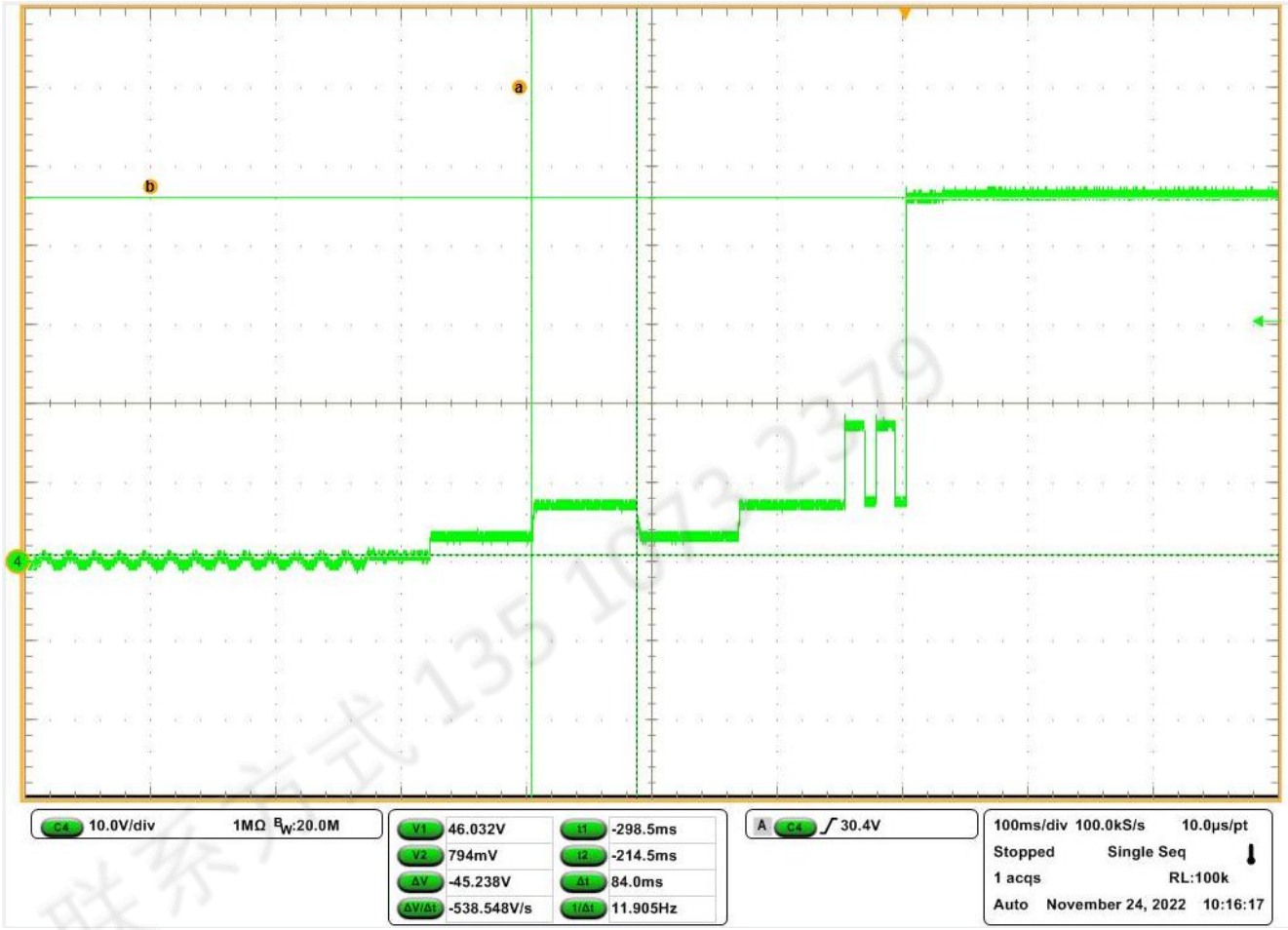
D1: 可选，200V普通二极管(不要使用肖特基)，并预留一个**并联的0Ω电阻**;
D2-D4: SMCJ58A, **不能使用双向TVS**; D3，D4并联Y电容可提高浪涌防护等级
R1: 3.3Ω//3.3Ω，1206或2512封装
R2: 压敏电阻，如1500V
C1: 100nF/100V;
F1、F2: 保险丝
L1： 共模电感

POE 适配器电路 54V输出



本设计采用MK2685GSA控制器，输出功率65W

MK361X上电波形



详细状态波形可参考规格书

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Sifos

PSE Conformance Test Suite			Sifos Technologies		802.3at Conformance Report				
October 23 2024 5:37 PM								version 5.4.09	
Port Count 1			Test Mode: 15.4 Watt					report ver. 5.4.03	
Loop Count 1			Sifos Interop Index*: 100%					S/N: 30002068A	
PSE Tested: Unspecified Type-1 15.4W			Error Log: None						
Chassis ID: 192.168.221.105	PSA-3000 Ports								
TestLoop: 1	1-1	UNITS	Min	Max	Average	Low Limit	P/F	High Limit	P/F
Test: det_v									
Open_Circuit_Det_Voc=	10.15	V	10.15	10.15	10.15	2.8	Pass	30	Pass
Peak_Det_Vvalid=	8.7	V	8.7	8.7	8.7	3.8	Pass	10	Pass
Min_Det_Vvalid=	4.65	V	4.65	4.65	4.7	2.8	Pass	9	Pass
Det_Volt_Step_dVtest=	4.05	V	4.05	4.05	4.1	1	Pass	7.2	Pass
Detection_Slew=	0.007	V/usec	0.007	0.007	0.007	0	Pass	0.1	Pass
Good_Sig_Det_Pulse=	3	edges	3	3	3	1	Pass	9	Pass
Backoff_Voltage=	0.1	V	0.1	0.1	0.1	0	Pass	9	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=	1.45	mA	1.45	1.45	1.45	0	Pass	5	Pass
Det_Current_Isc=	1.43	mA	1.43	1.43	1.43	0	Pass	5	Pass
Test: det_range									
Rgood_Max=	31	Kohm	31	31	31	26	Pass	32	Pass
Rgood_Min=	17	Kohm	17	17	17	16	Pass	19	Pass
Rmid_det=	31	Kohm	31	31	31	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
4Pair_Pwr_?=	0	****	0	0	0	0	Pass	0	Pass
Test: det_time									
Backoff_Time_Tdbo=	320	msec	320	320	320	-1	Pass	1500	Pass
Eff_Backoff_Tdbo_eff=	320	msec	320	320	320	-1	Pass	1500	Pass
Backoff_Type=	0	****	0	0	0	0	Pass	0	Pass
Detection_Time_Tdet=	322	msec	322	322	322	5	Pass	500	Pass
Total_Det_Time=	324	msec	324	324	324	5	Pass	1000	Pass
Test: det_rsource									
PSE_Detect_Source=	0	****	0	0	0	0	Pass	1	Pass
Output_Impedance_Zout=	0	Kohm	0	0	0	45	Pass	2000	Pass
Test: class_v									
Vclass_Max=	19.3	V	19.3	19.3	19.3	15.5	Pass	20.5	Pass
Vclass_Min=	19.2	V	19.2	19.2	19.2	15.5	Pass	20.5	Pass
Test: class_time									
Class_0_Count=	1	****	1	1	1	0	Pass	1	Pass
Class_4_Count=	1	****	1	1	1	0	Pass	1	Pass
Class_Time_Tpdc=	14.8	msec	14.8	14.8	14.8	6	Pass	75	Pass
Test: class_err									
Class_lim=	71	mA	71	71	71	51	Pass	100	Pass
Pwr_Cl_lim=	0	****	0	0	0	0	Pass	1	Pass
Pwr_Cl_55=	0	****	0	0	0	0	Pass	1	Pass
Test: pwrup_time									
Power-On_Trise_c0=	41	usec	41	41	41	15	Pass	50000	Pass
Power-On_Tpon_c0=	15.6	msec	15.6	15.6	15.6	0	Pass	400	Pass
Test: pwrup_inrush									
Init_Iinrush=	428.5	mA	428.5	428.5	428.5	400	Pass	450	Pass
Max_Iinrush_c0=	425.88	mA	425.88	425.88	425.9	400	Pass	450	Pass
Min_Iinrush=	421.13	mA	421.13	421.13	421.1	400	Pass	450	Pass
Tinrush=	61.5	msec	61.5	61.5	61.5	50	Pass	75	Pass
Inrush_45m=	54.1	V	54.1	54.1	54.1	44	Pass	57	Pass
Inrush_Voltage=	30.9	V	30.9	30.9	30.9	30	Pass	57	Pass
Inrush_Strategy_c0=	0	****	0	0	0	0	Pass	1	Pass
LowV_Inrush=	359.8	mA	359.8	359.8	360	60	Pass	450	Pass

Test: pwron_v									
Vport_min=	53.7	V	53.7	53.7	53.7	44	Pass	57	Pass
Vport_max=	54.2	V	54.2	54.2	54.2	44	Pass	57	Pass
Vport_ripple=	6	mVpp	6	6	6	0	Pass	500	Pass
Vport_noise=	105	mVpp	105	105	105	0	Pass	200	Pass
Vtrans_min=	53.6	V	53.6	53.6	53.6	44	Pass	57	Pass
Vtrans_max=	54.3	V	54.3	54.3	54.3	44	Pass	57	Pass
Test: pwron_pwrcap									
Pcon_c0=	18.5	W	18.5	18.5	18.5	14.2	Pass	22.7	Pass
Icon_%_c0=	128.6	%	128.6	128.6	128.6	100	Pass	9999	Pass
Pcon_c1=	18.5	W	18.5	18.5	18.5	3.9	Pass	22.7	Pass
Icon_%_c1=	467.4	%	467.4	467.4	467.4	100	Pass	9999	Pass
Pcon_c2=	18.5	W	18.5	18.5	18.5	6.8	Pass	22.7	Pass
Icon_%_c2=	270.9	%	270.9	270.9	270.9	100	Pass	9999	Pass
Pcon_c3=	18.5	W	18.5	18.5	18.5	14.2	Pass	22.7	Pass
Icon_%_c3=	128.6	%	128.6	128.6	128.6	100	Pass	9999	Pass
Pcon_c4=	18.5	W	18.5	18.5	18.5	14.2	Pass	22.7	Pass
Icon_%_c4=	128.3	%	128.3	128.3	128.3	100	Pass	9999	Pass
Test: pwron_maxi									
Ilim_Peak_1=	366	mA	366	366	366	0	Pass	1750	Pass
Ilim_Min_1=	403	mA	403	403	403	400	Pass	1750	Pass
Tlim_1=	61.7	msec	61.7	61.7	61.7	50	Pass	75	Pass
Vlim_1=	53.4	V	53.4	53.4	53.4	44	Pass	57	Pass
Ilim_Max_1=	424.5	mA	424.5	424.5	424.5	400	Pass	1750	Pass
Ktran_lo_1=	-1	%	-1	-1	-1	-1	Pass	-1	Pass
Test: pwron_overld									
%Ipeak_1=	125	%	125	125	125	100	Pass	125	Pass
Vport_Ipeak_1=	53.6	V	53.6	53.6	53.6	44	Pass	57	Pass
Vport_5%DC_1=	53.6	V	53.6	53.6	53.6	44	Pass	57	Pass
Test: mps_dc_valid									
Min_Valid_Time_Tmps=	10	msec	10	10	10	1	Pass	60	Pass
Duty_Cycle_tol=	1	****	1	1	1	1	Pass	1	Pass
Test: mps_dc_pwrdn									
Min_Valid_I_hold=	7	mA	7	7	7	5	Pass	10	Pass
Time-to-Shutdown_Tmpdo=	353	msec	353	353	353	300	Pass	400	Pass
Test: pwrdn_overld									
Icut_1=	390.5	mA	390.5	390.5	390.5	-1	Pass	1750	Pass
Tcut_1=	61.5	msec	61.5	61.5	61.5	50	Pass	9999	Pass
Isoft_1=	-1	mA	-1	-1	-1	-1	Pass	399	Pass
Tsoft_1=	-1	msec	-1	-1	-1	-1	Pass	2000	Pass
Test: pwrdn_time									
Turn-Off_Time_Toff=	10.6	msec	10.6	10.6	10.6	0	Pass	500	Pass
Output_Cap_Cout=	0.0501	uF	0.0501	0.0501	0.05	-1	Pass	0.52	Pass
Output_Load_Rp=	95.9	Kohm	95.9	95.9	96	45	Pass	50000	Pass
Test: pwrdn_v									
Avg_Idle_Voff=	0.1	V	0.1	0.1	0.1	0	Pass	2.8	Pass
Error_Delay_Ted=	1640.6	msec	1640.6	1640.6	1641	750	Pass	10000	Pass
Peak_Error_Delay_Ved=	0.8	V	0.8	0.8	0.8	0	Pass	20.5	Pass
Test Port Model Number:	3202								
Test Port Hardware Version:	9								
Test Port Firmware Version:	4.19 lc19								

MK3616 Sifos测试报告（5.4.09）：AF 通过

茂睿芯
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Sifos

PSE Conformance Test Suite

October 23 2024 4:00 PM

Port Count..... 1
Loop Count..... 1
PSE Tested: Unspecified Type-2 30W

Sifos Technologies — **802.3at Conformance Report** version 5.4.09

Test Mode: 30 Watt PHY — report ver. 5.4.03
Sifos Interop Index*: 100% — S/N: 30002068A
Error Log: None

Chassis ID: 192.168.221.105
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=	10.07	V	10.07	10.07	10.07	2.8	Pass	30	Pass
Peak_Det_Vvalid=	8.71	V	8.71	8.71	8.7	3.8	Pass	10	Pass
Min_Det_Vvalid=	4.65	V	4.65	4.65	4.7	2.8	Pass	9	Pass
Det_Volt_Step_dVtest=	4.06	V	4.06	4.06	4.1	1	Pass	7.2	Pass
Detection_Slew=	0.006	V/usec	0.006	0.006	0.006	0	Pass	0.1	Pass
Good_Sig_Det_Pulse=	3	edges	3	3	3	1	Pass	9	Pass
Backoff_Voltage=	0.1	V	0.1	0.1	0.1	0	Pass	2.8	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=	1.41	mA	1.41	1.41	1.41	0	Pass	5	Pass
Det_Current_Isc=	1.4	mA	1.4	1.4	1.4	0	Pass	5	Pass
Test: det_range									
Rgood_Max=	30	Kohm	30	30	30	26	Pass	32	Pass
Rgood_Min=	16	Kohm	16	16	16	16	Pass	19	Pass
Rmid_det=	30	Kohm	30	30	30	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
4Pair_Pwr_?=	0	****	0	0	0	0	Pass	0	Pass
Test: det_time									
Backoff_Time_Tdbo=	316	msec	316	316	316	-1	Pass	1500	Pass
Eff_Backoff_Tdbo_eff=	316	msec	316	316	316	-1	Pass	1500	Pass
Backoff_Type=	0	****	0	0	0	0	Pass	0	Pass
Detection_Time_Tdet=	322	msec	322	322	322	5	Pass	500	Pass
Total_Det_Time=	324	msec	324	324	324	5	Pass	1000	Pass
Test: det_rsource									
PSE_Detect_Source=	0	****	0	0	0	0	Pass	1	Pass
Output_Impedance_Zout=	0	Kohm	0	0	0	45	Pass	2000	Pass
Test: class_v									
Vclass_Max=	19.3	V	19.3	19.3	19.3	15.5	Pass	20.5	Pass
Vclass_Min=	19.2	V	19.2	19.2	19.2	15.5	Pass	20.5	Pass
Mark_Voltage_Vmark=	9.2	V	9.2	9.2	9.2	7	Pass	10	Pass
Mark_Voltage_Min=	8.7	V	8.7	8.7	8.7	7	Pass	10	Pass
Test: class_time									
Class_0_Count=	1	****	1	1	1	1	Pass	2	Pass
Class_Time_Tpdc=	14.8	msec	14.8	14.8	14.8	6	Pass	75	Pass
Class_4_Count=	2	****	2	2	2	2	Pass	2	Pass
Event1_Tcle1=	15.2	msec	15.2	15.2	15.2	6	Pass	30	Pass
Event2_Tcle2=	15	msec	15	15	15	6	Pass	30	Pass
Mark_Tme1=	9	msec	9	9	9	6	Pass	12	Pass
Mark_Tme_Last=	9.2	msec	9.2	9.2	9.2	6	Pass	376	Pass
Mark_Tme1_LowI=	9	msec	9	9	9	6	Pass	12	Pass
Test: class_err									
Class_lim=	71	mA	71	71	71	51	Pass	100	Pass
Pwr_Cl_lim=	0	****	0	0	0	0	Pass	0	Pass
Pwr_Cl_55=	0	****	0	0	0	0	Pass	0	Pass
Mark_lim=	6	mA	6	6	6	5	Pass	100	Pass
Pwr_Cl_Uneven=	0	****	0	0	0	0	Pass	0	Pass
Treset=	324	msec	324	324	324	15	Pass	10000	Pass
Test: pwrup_time									
Power-On_Trise_c0=	41	usec	41	41	41	15	Pass	50000	Pass
Power-On_Tpon_c0=	15.6	msec	15.6	15.6	15.6	0	Pass	400	Pass
Power-On_Trise_c4=	45	usec	45	45	45	15	Pass	50000	Pass
Power-On_Tpon_c4=	48.8	msec	48.8	48.8	48.8	0	Pass	400	Pass

Test: pwrup_inrush									
Init_Iinrush=	428.13	mA	428.13	428.13	428.1	400	Pass	450	Pass
Max_Iinrush_c0=	425.13	mA	425.13	425.13	425.1	400	Pass	450	Pass
Max_Iinrush_c4=	425.88	mA	425.88	425.88	425.9	400	Pass	450	Pass
Min_Iinrush=	421.13	mA	421.13	421.13	421.1	400	Pass	450	Pass
Tinrush=	61.5	msec	61.5	61.5	61.5	50	Pass	75	Pass
Inrush_45m=	54	V	54	54	54	50	Pass	57	Pass
Inrush_Voltage=	30.9	V	30.9	30.9	30.9	30	Pass	57	Pass
Inrush_Strategy_c0=	0	****	0	0	0	0	Pass	1	Pass
Inrush_Strategy_c4=	0	****	0	0	0	0	Pass	1	Pass
LowV_Inrush=	357.3	mA	357.3	357.3	357	60	Pass	450	Pass
Test: pwron_v									
Vport_min=	53.1	V	53.1	53.1	53.1	50	Pass	57	Pass
Vport_max=	54.2	V	54.2	54.2	54.2	50	Pass	57	Pass
Vport_ripple=	7	mVpp	7	7	7	0	Pass	500	Pass
Vport_noise=	121	mVpp	121	121	121	0	Pass	200	Pass
Vtrans_min=	53	V	53	53	53	50	Pass	57	Pass
Vtrans_max=	54.2	V	54.2	54.2	54.2	50	Pass	57	Pass
Test: pwron_pwrcap									
Pcon_c0=	18.5	W	18.5	18.5	18.5	14.2	Pass	22.7	Pass
Icon_%_c0=	134.4	%	134.4	134.4	134.4	100	Pass	9999	Pass
Pcon_c1=	18.5	W	18.5	18.5	18.5	3.9	Pass	22.7	Pass
Icon_%_c1=	472.5	%	472.5	472.5	472.5	100	Pass	9999	Pass
Pcon_c2=	18.5	W	18.5	18.5	18.5	6.8	Pass	22.7	Pass
Icon_%_c2=	276.1	%	276.1	276.1	276.1	100	Pass	9999	Pass
Pcon_c3=	18.5	W	18.5	18.5	18.5	14.2	Pass	22.7	Pass
Icon_%_c3=	134.4	%	134.4	134.4	134.4	100	Pass	9999	Pass
Pcon_c4=	34.1	W	34.1	34.1	34.1	28.7	Pass	38.9	Pass
Icon_%_c4=	116.4	%	116.4	116.4	116.4	100	Pass	9999	Pass
Type-2_Enable=	1	****	1	1	1	1	Pass	1	Pass
Test: pwron_maxi									
Ilim_Peak_1=	366	mA	366	366	366	0	Pass	1750	Pass
Ilim_Min_1=	403	mA	403	403	403	400	Pass	1750	Pass
Tlim_1=	61.7	msec	61.7	61.7	61.7	10	Pass	9999	Pass
Vlim_1=	53.4	V	53.4	53.4	53.4	50	Pass	57	Pass
Ilim_Max_1=	425.3	mA	425.3	425.3	425.3	400	Pass	1750	Pass
Ktran_lo_1=	106.6	%	106.6	106.6	106.6	92.4	Pass	115	Pass
Ilim_Peak_2=	678.5	mA	678.5	678.5	678.5	0	Pass	1750	Pass
Ilim_Min_2=	686.5	mA	686.5	686.5	686.5	683	Pass	1750	Pass
Tlim_2=	62.1	msec	62.1	62.1	62.1	10	Pass	75	Pass
Vlim_2=	52.8	V	52.8	52.8	52.8	50	Pass	57	Pass
Ilim_Max_2=	764.3	mA	764.3	764.3	764.3	683	Pass	1750	Pass
Ktran_lo_2=	105.3	%	105.3	105.3	105.3	92.4	Pass	115	Pass
Test: pwron_overld									
%Ipeak_1=	125	%	125	125	125	100	Pass	125	Pass
Vport_Ipeak_1=	53.6	V	53.6	53.6	53.6	50	Pass	57	Pass
Vport_5%DC_1=	53.6	V	53.6	53.6	53.6	50	Pass	57	Pass
%Ipeak_2=	122.5	%	122.5	122.5	122.5	100	Pass	125	Pass
Vport_Ipeak_2=	52.9	V	52.9	52.9	52.9	50	Pass	57	Pass
Vport_5%DC_2=	52.9	V	52.9	52.9	52.9	50	Pass	57	Pass
Test: mps_dc_valid									
Min_Valid_Time_Tmps=	10	msec	10	10	10	1	Pass	60	Pass
Duty_Cycle_tol=	1	****	1	1	1	1	Pass	1	Pass
Test: mps_dc_pwrdn									
Min_Valid_I_hold=	7	mA	7	7	7	5	Pass	10	Pass
Time-to-Shutdown_Tmpdo=	353	msec	353	353	353	300	Pass	400	Pass
Test: pwrdn_overld									
Icut_1=	390.5	mA	390.5	390.5	390.5	-1	Pass	1750	Pass
Tcut_1=	61.3	msec	61.3	61.3	61.3	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
Icut_2=	655	mA	655	655	655	-1	Pass	1750	Pass
Tcut_2=	61.4	msec	61.4	61.4	61.4	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=	11.9	msec	11.9	11.9	11.9	0	Pass	500	Pass
Output_Cap_Cout=	0.0518	uF	0.0518	0.0518	0.05	-1	Pass	0.52	Pass
Output_Load_Rp=	107	Kohm	107	107	107	45	Pass	50000	Pass
Test: pwrdn_v									
Avg_Idle_Voff=	0.1	V	0.1	0.1	0.1	0	Pass	2.8	Pass
Error_Delay_Ted=	1640.6	msec	1640.6	1640.6	1641	750	Pass	10000	Pass
Peak_Error_Delay_Ved=	0.8	V	0.8	0.8	0.8	0	Pass	20.5	Pass
Test Port Model Number:	3202								
Test Port Hardware Version:	9								
Test Port Firmware Version:	4.19 lc19								

MK3616 Sifos测试报告（5.4.09）：AT 通过

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