

BP8518F非隔离参考设计 (15V/250mA)

上海晶丰明源半导体股份有限公司
Shanghai Bright Power Semiconductor Co., Ltd.

系统应用部

时间：2020年7月

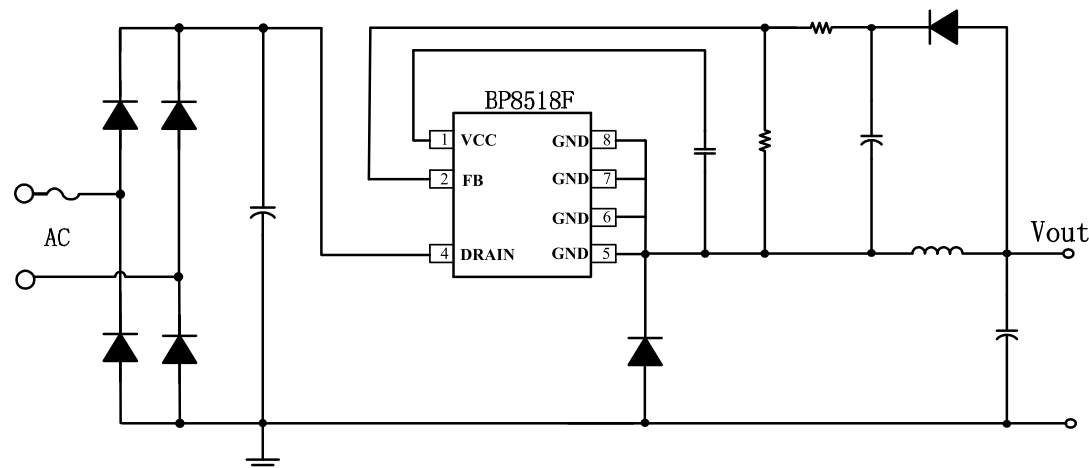
内容

- BP8518F简介
- 电源规格
- 电路及实物图
- BOM
- PCB Layout图
- 性能测试数据

BP8518F简介

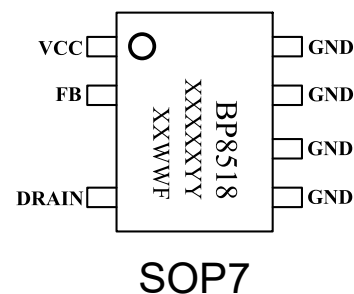
■ 产品特点:

- 集成 650V 高压 MOSFET
- PWM控制模式, 低输出纹波
- 内置软启动功能
- 集成高压启动、自供电电路
- 低音频噪声



■ 应用领域:

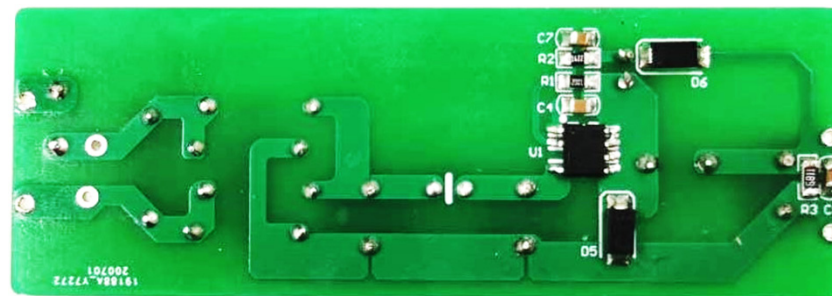
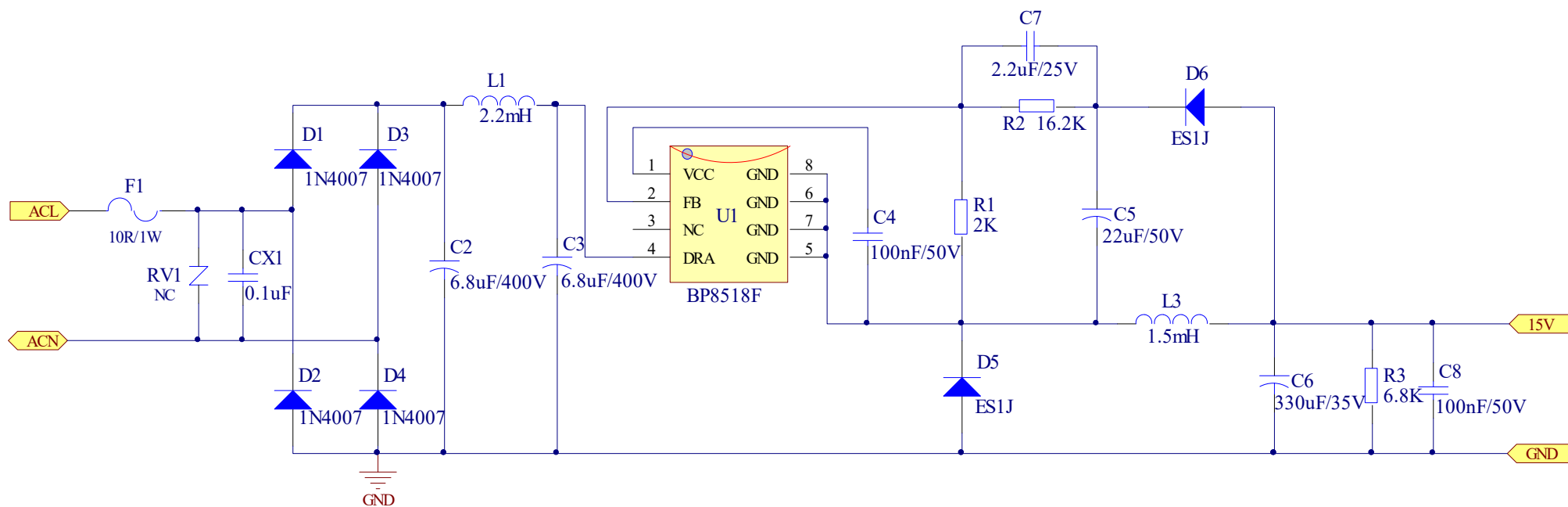
- 家用电器辅助电源
- 电机驱动辅助电源
- IOT/智能家居/智能照明
- 工业控制辅助电源



电源规格

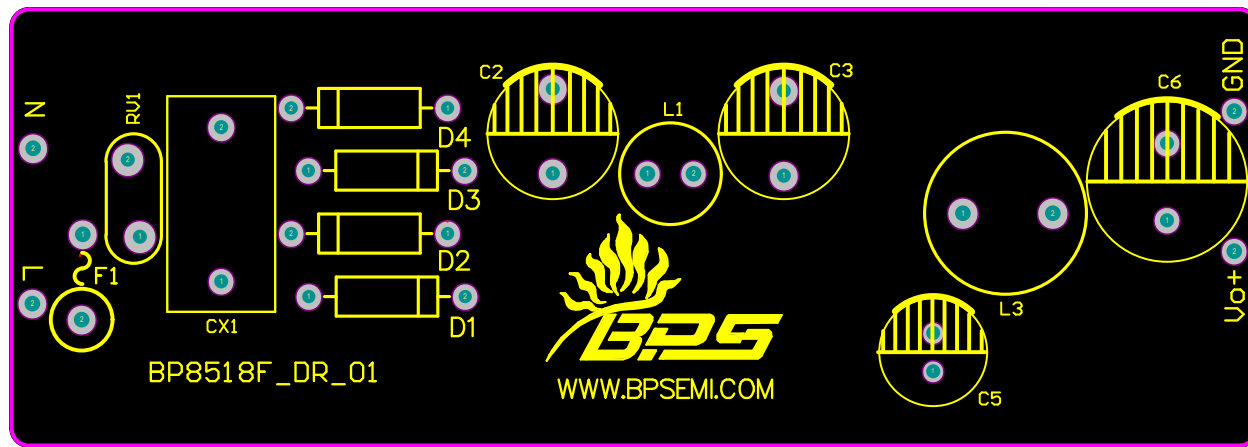
项目描述	符号	最小	典型	最大	单位	备注
输入						
电压	V_{IN}	85	115/230	264	V_{AC}	
频率	f_{LINE}	47	50/60	63	Hz	
输出						
输出电压	V_{OUT}	14.25	15	15.75	V	±5%
输出电流	I_{OUT}	0		250	mA	
输出电压纹波	V_{RIPPLE}			100	mV	20MHz带宽
连续输出功率	P_{OUT}		3.75		W	
效率						
待机功耗	P_{STDBY}			120	mW	230VAC,包含假负载
满载效率	η	74			%	
环境						
传导EMI		满足CISPR22/EN55022 Class B, 至少6dB 裕量				
Surge			2		kV	差模
EFT			4		kV	5kHz/100kHz/38kHz
ESD			15	20	kV	空气放电
工作环境温度	T_{AMP}	0		50	°C	

电路及实物图



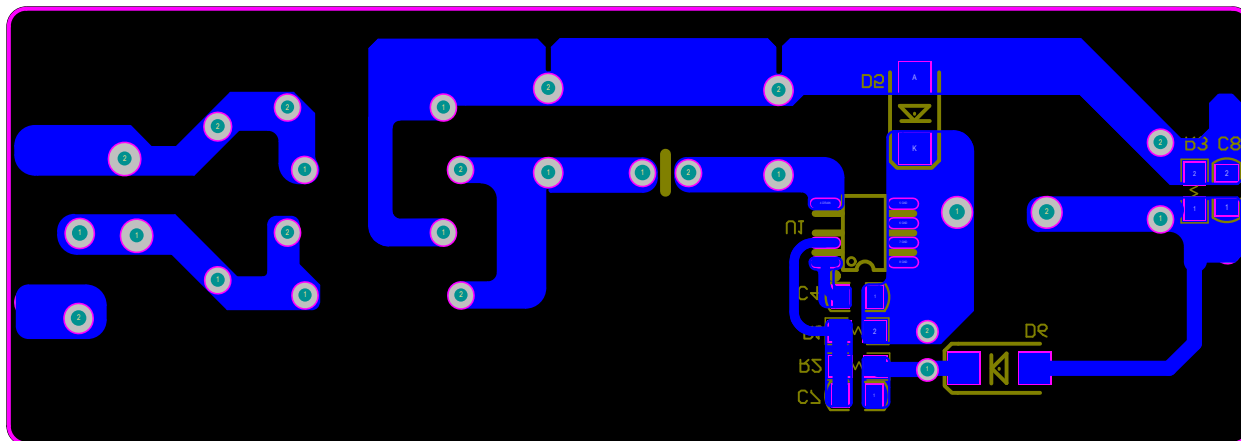
序号	元件标号	参数描述	封装尺寸	数量
1	PCB	CEM-1, 单面板	80mm*28mm	1
2	F1	1W, 10R保险丝电阻	DIP	1
3	CX1	X电容, 0.1uF/250VAC	12*6*12mm	1
4	D1,D2,D3,D4	1N4007, 1A/1000V	DO-41	4
5	D5,D6	ES1J, 1A/600V, trr=35ns	SMA	2
6	L1	2mH, 工字电感	∅6*8mm	1
7	L3	1.5mH, 工字电感, I _{RMS} =300mA	∅10*12mm	1
8	C2, C3	6.8uF/400V, 电解电容	∅8*12mm	2
9	C5	22uF/50V, 电解电容	∅5*12mm	1
10	C6	330uF/35V, 电解电容	∅10*16mm	1
11	C7	2.2uF/25V, X7R, 瓷片电容	SMD0805	1
12	C4, C8	100nF/50V, X7R, 瓷片电容	SMD0805	2
13	R1	2K, ±1%	SMD0805	1
14	R2	16.2K, ±1%	SMD0805	1
15	R3	6.8K, ±5%	SMD0805	1
16	U1	BP8518F, SOP7	SOP7	1
			Total	22

PCB Layout

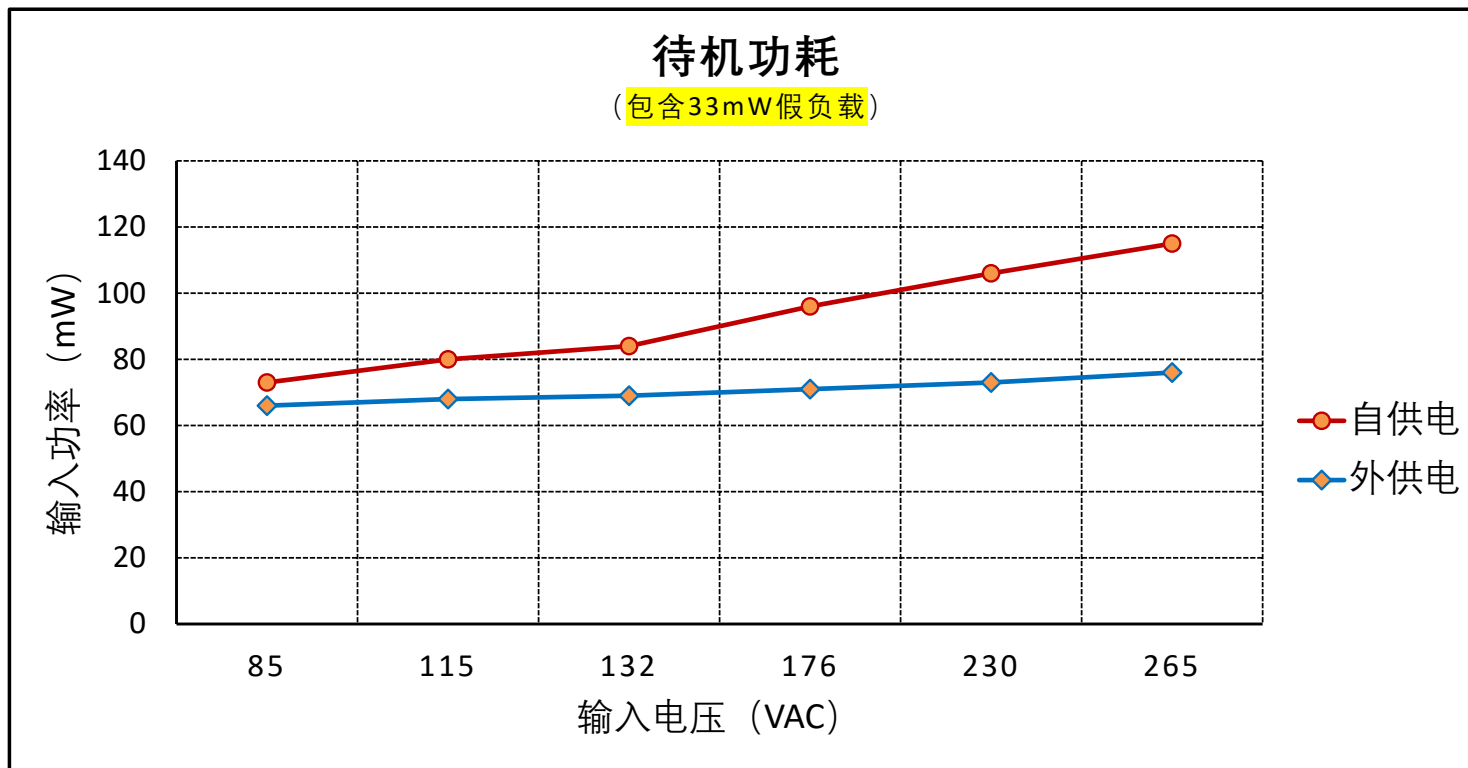


80.86681 (mm)

28.26218 (mm)

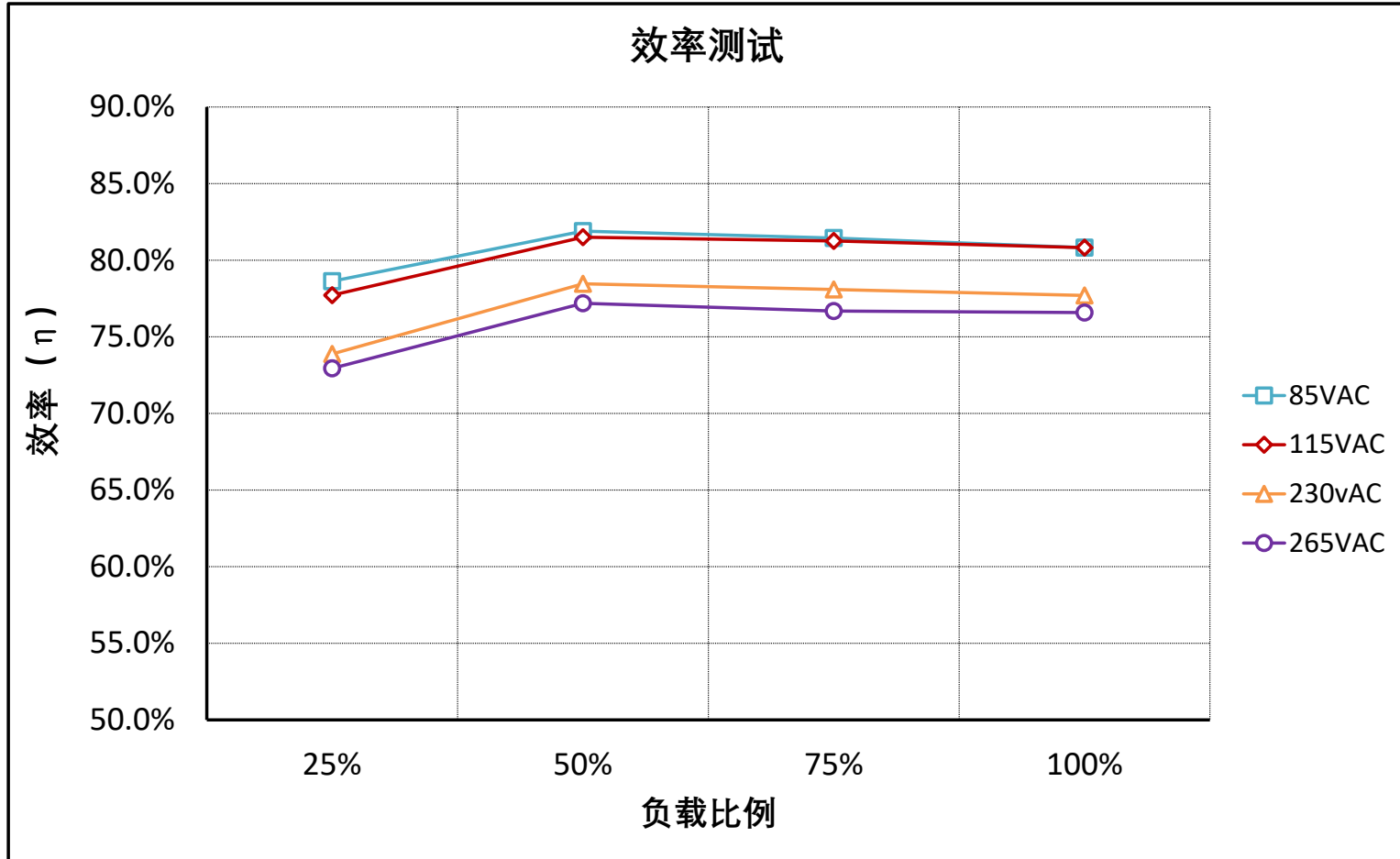


待机功耗



输入电压 (VAC)		85	115	132	176	230	265
输入功率 (mW)	自供电	73	80	84	96	110	120
	外供电	66	68	69	71	73	76

■ 外供电方法见附录 1

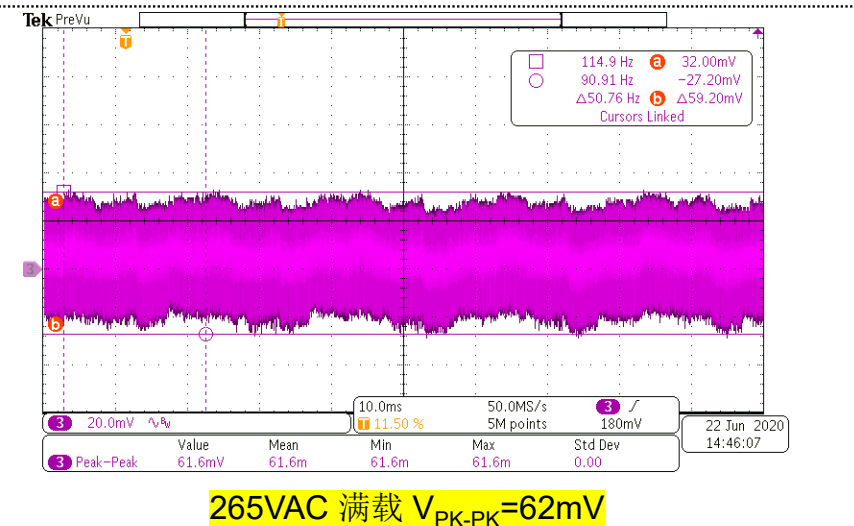
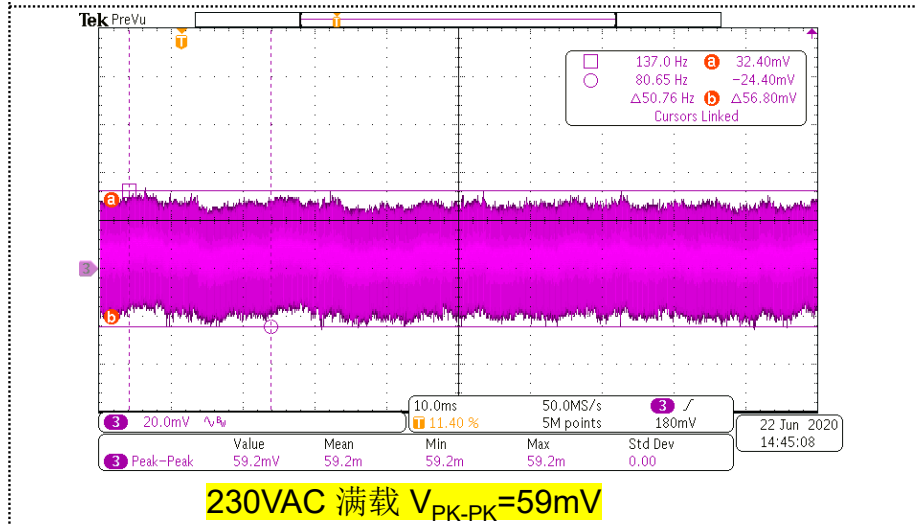
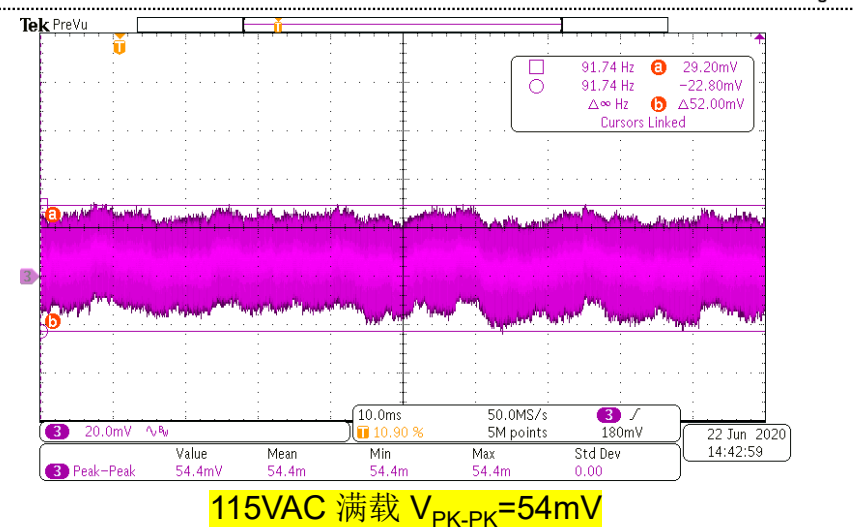
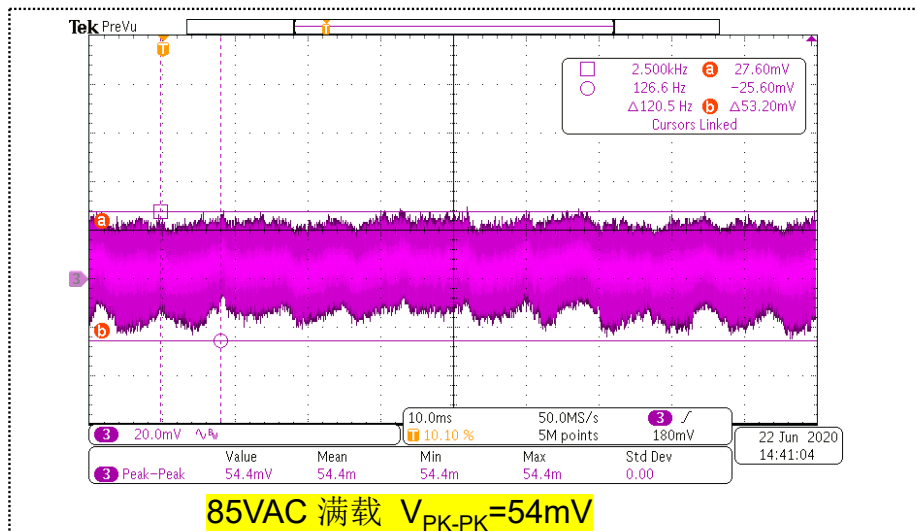


输出电压调整率

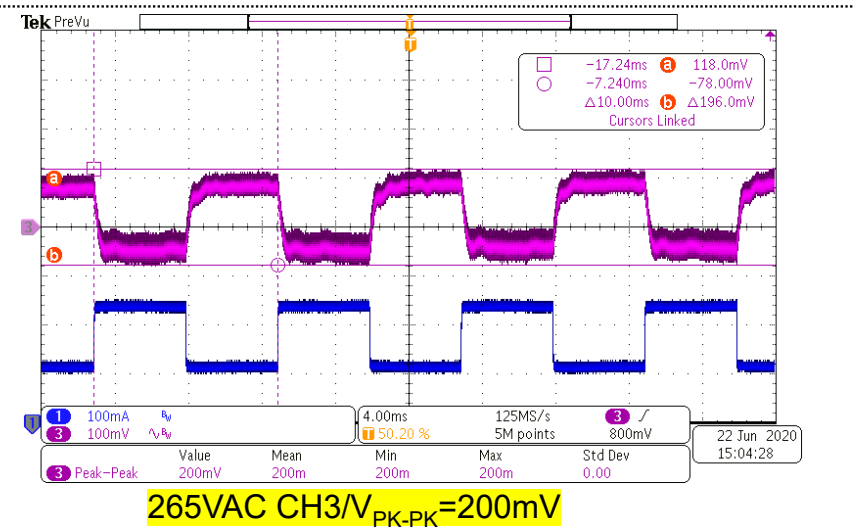
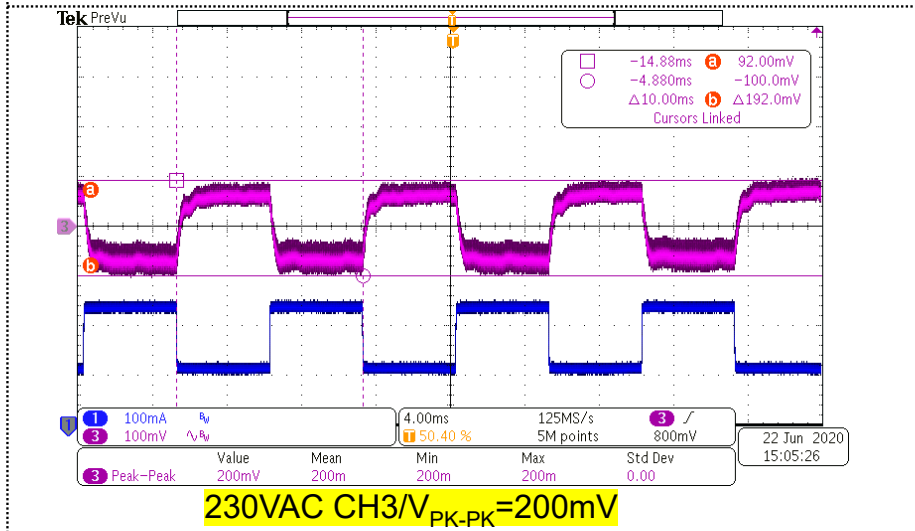
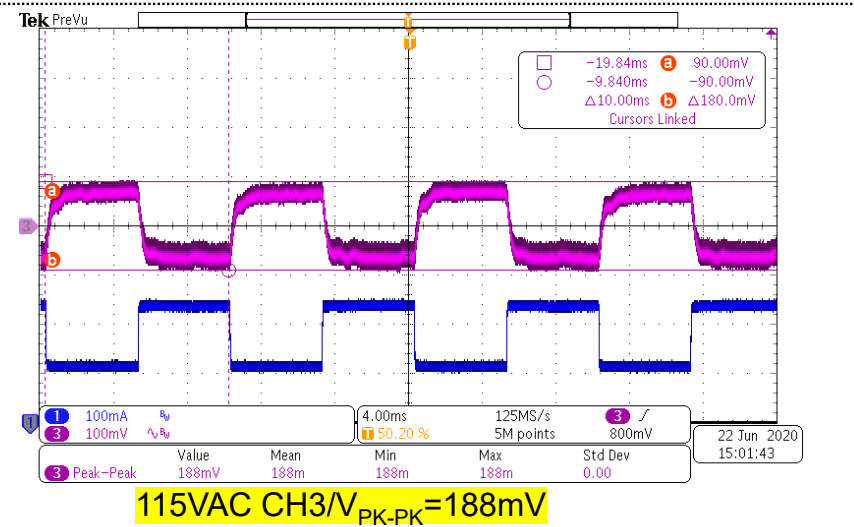
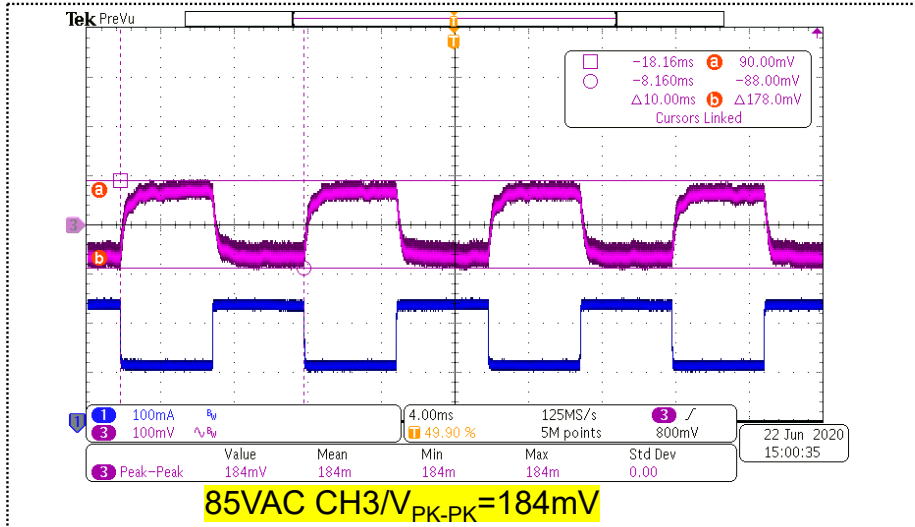
$V_{IN}(VAC)$ Load (%)	85	115	132	176	230	265	平均值	线调整率
0	15.27	15.26	15.26	15.26	15.27	15.27	15.27	0.07%
20%	14.82	14.83	14.82	14.82	14.82	14.82	14.82	0.07%
40%	14.78	14.78	14.79	14.79	14.78	14.78	14.78	0.07%
60%	14.8	14.81	14.82	14.82	14.81	14.81	14.81	0.14%
80%	14.83	14.84	14.84	14.84	14.84	14.84	14.84	0.07%
100%	14.86	14.86	14.87	14.87	14.86	14.86	14.86	0.07%
平均值	14.89	14.90	14.90	14.90	14.90	14.90		
负载调整率	3.29%	3.22%	3.15%	3.15%	3.29%	3.29%		

- 计算方法: 调整率=100%*(最大值-最小值)/平均值
- 测试条件: 带6.8kΩ假负载 (~33mW)

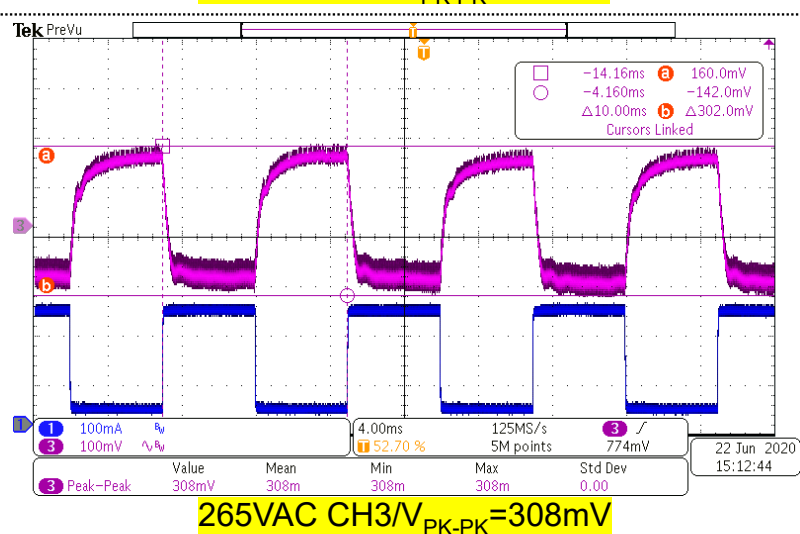
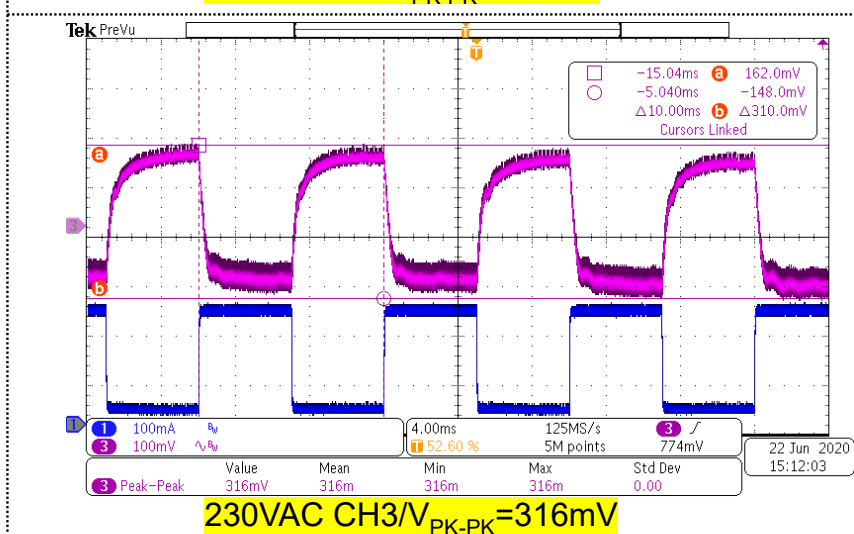
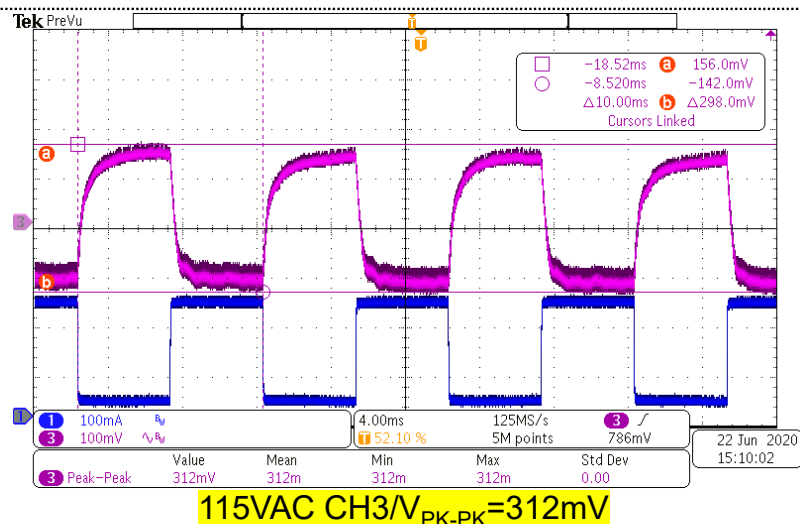
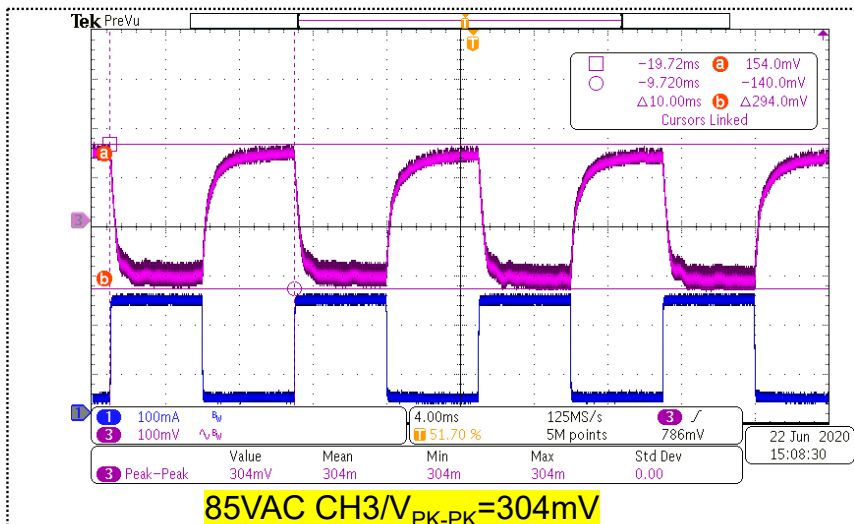
输出电压纹波



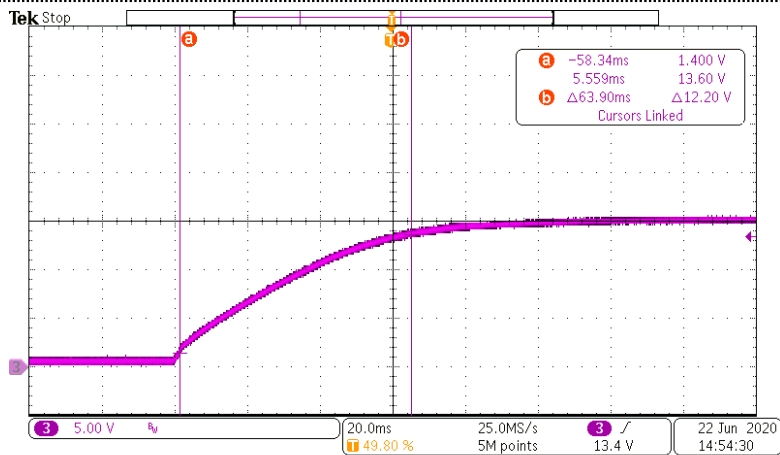
动态负载(50%-100%)



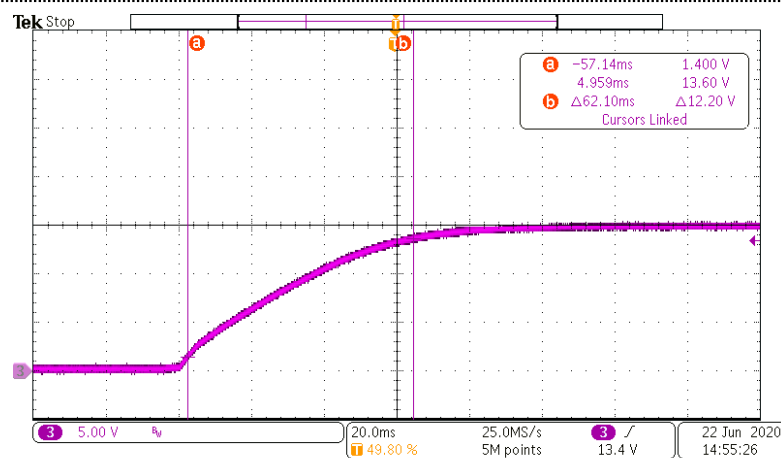
动态负载(10%-90%)



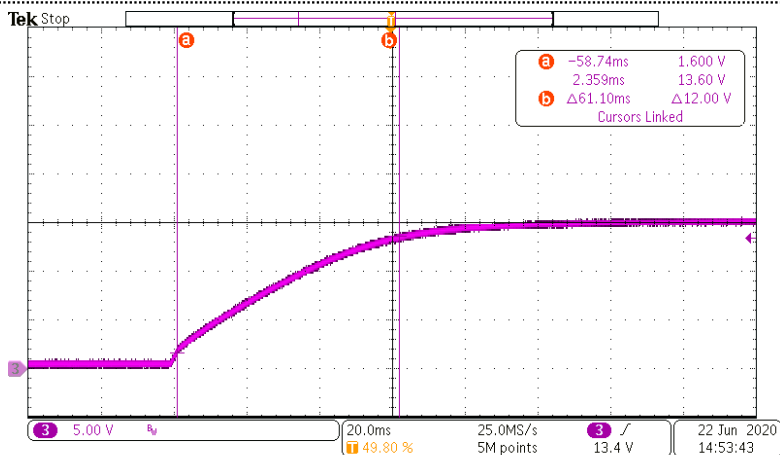
开机波形



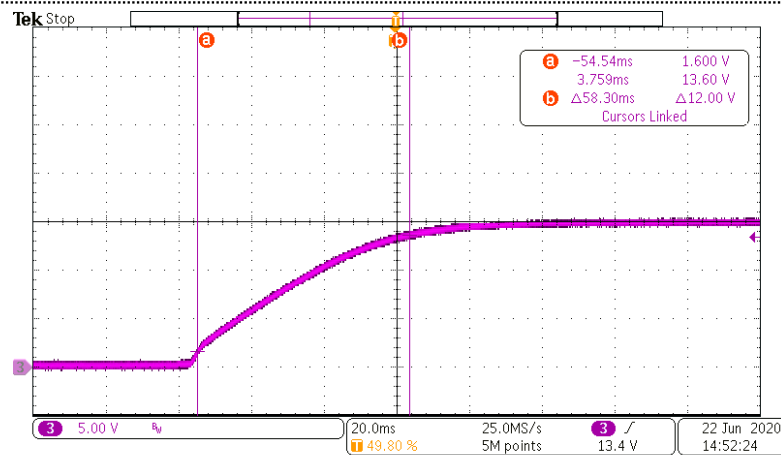
85VAC 空载开机



85VAC 满载开机

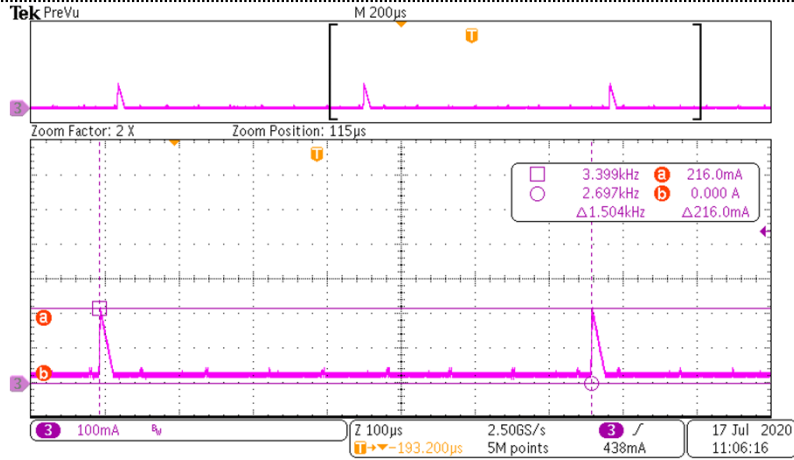


265VAC 空载开机

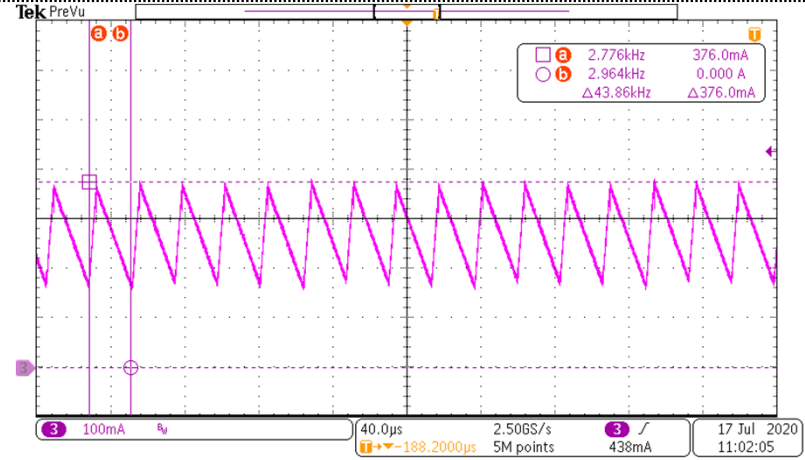


265VAC 满载开机

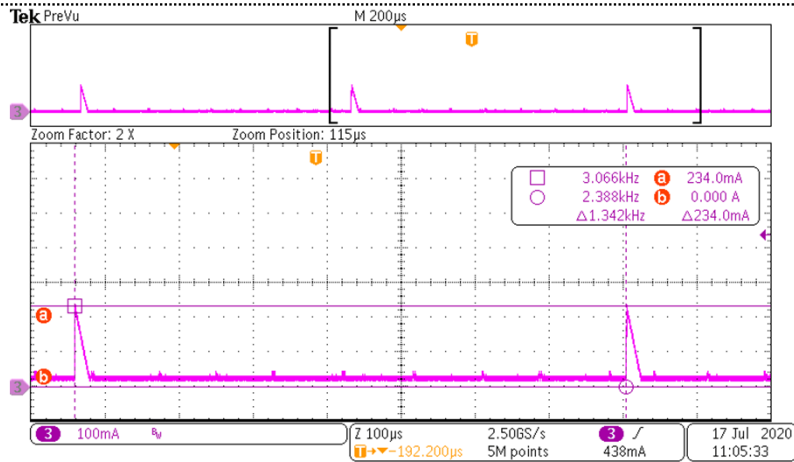
电感电流波形



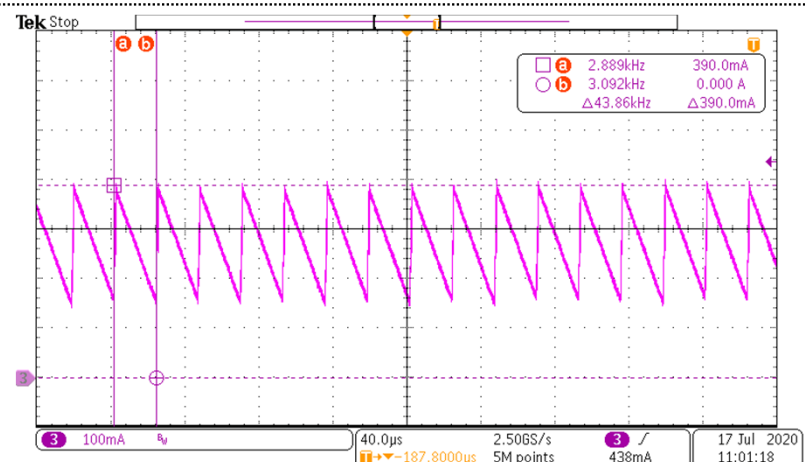
85VAC 空载



85VAC 满载

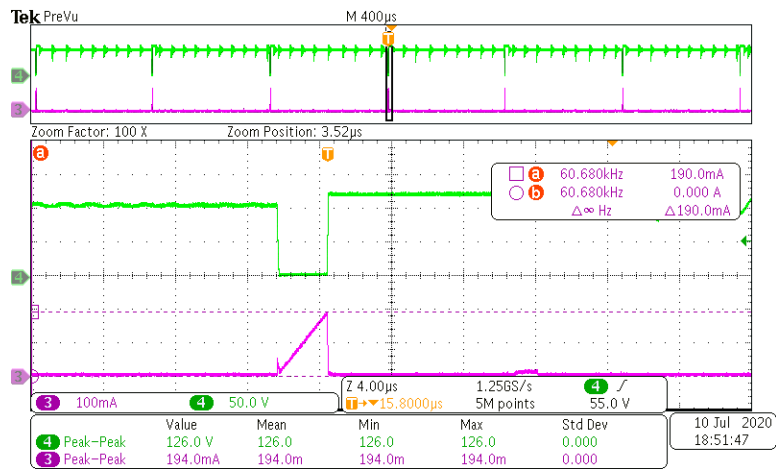


265VAC 空载

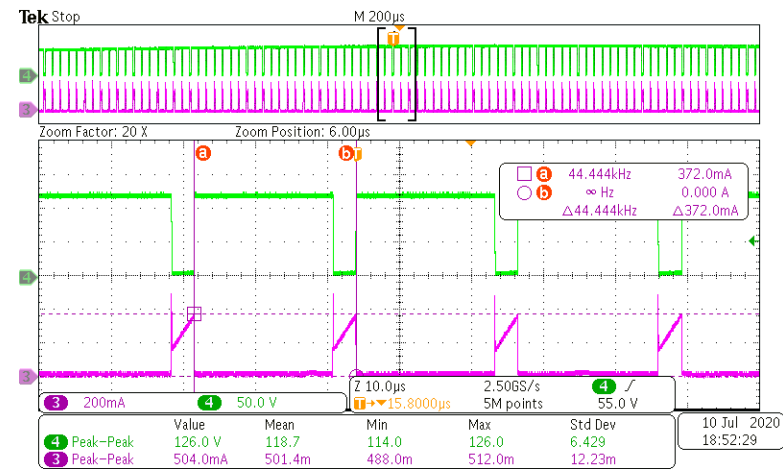


265VAC 满载

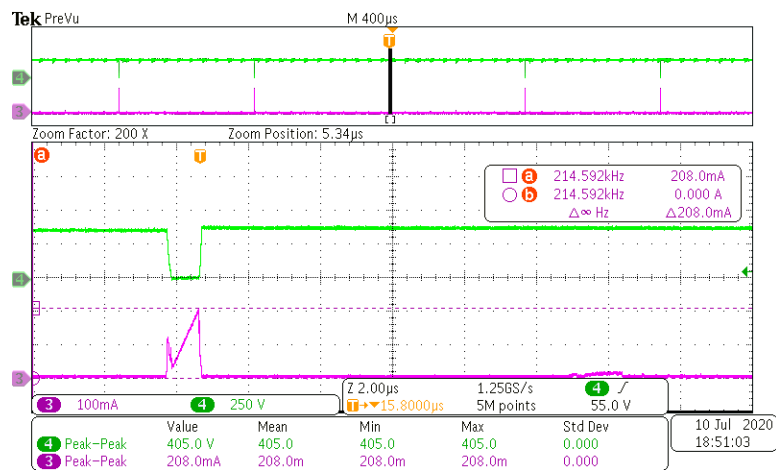
MOSFET波形



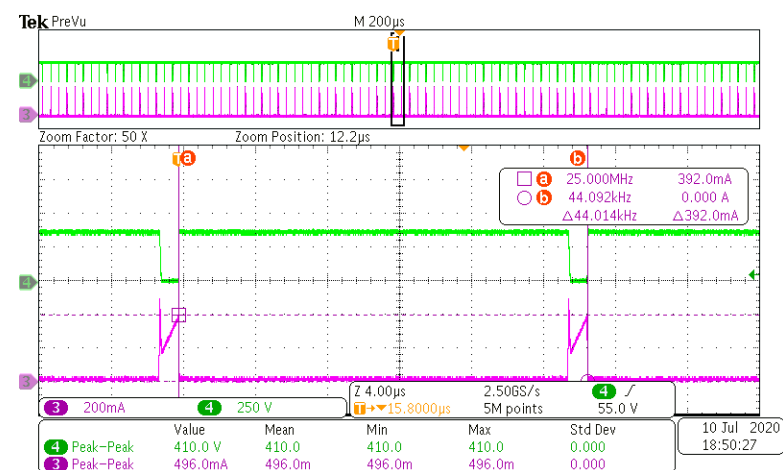
85VAC 空载



85VAC 满载

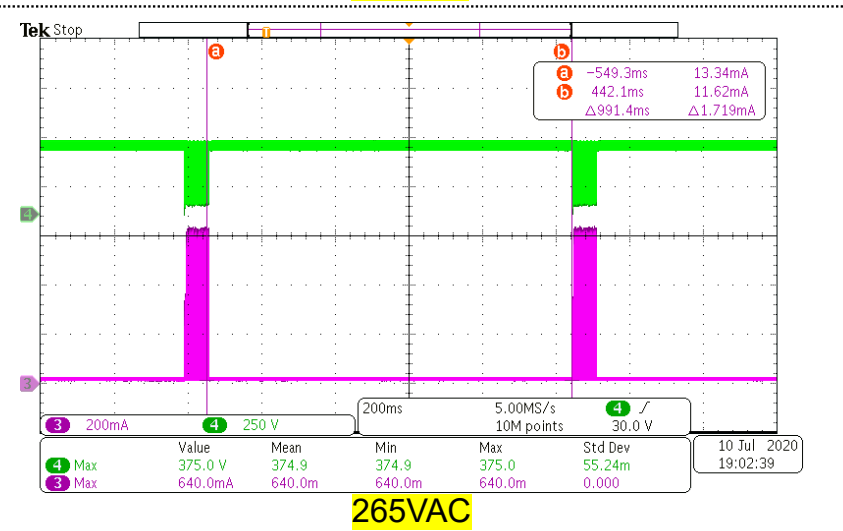
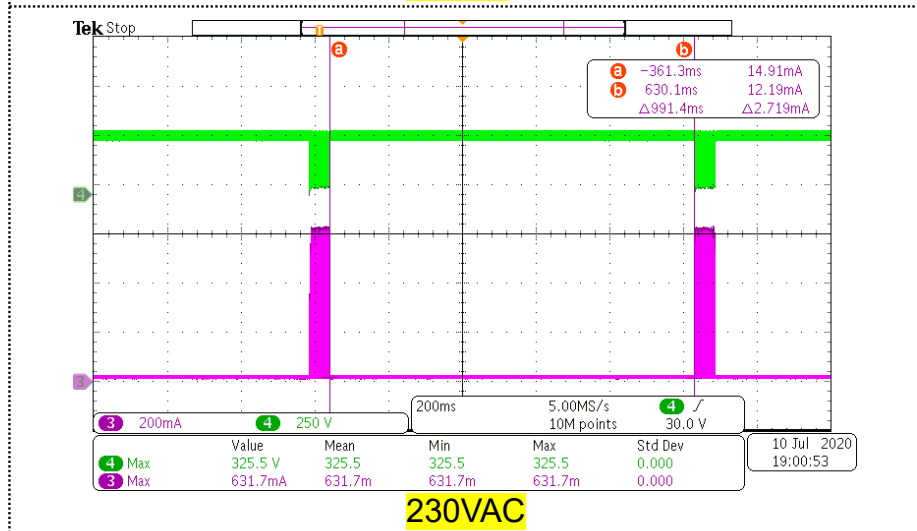
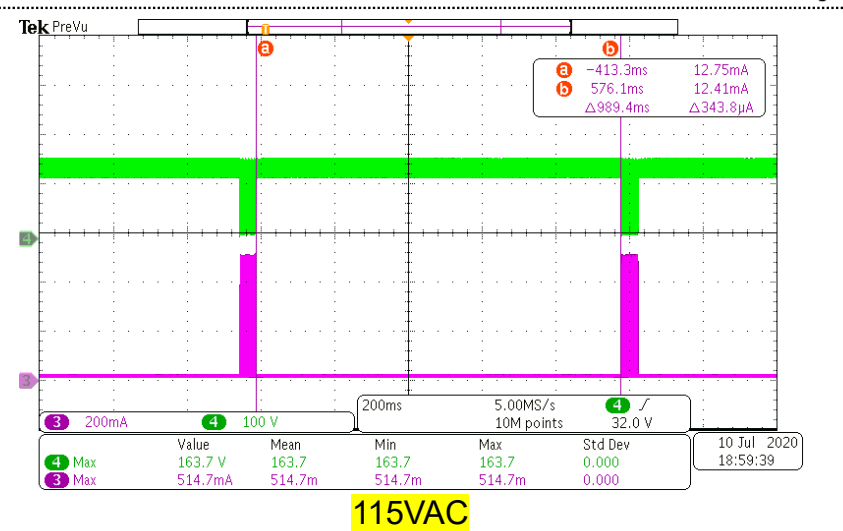
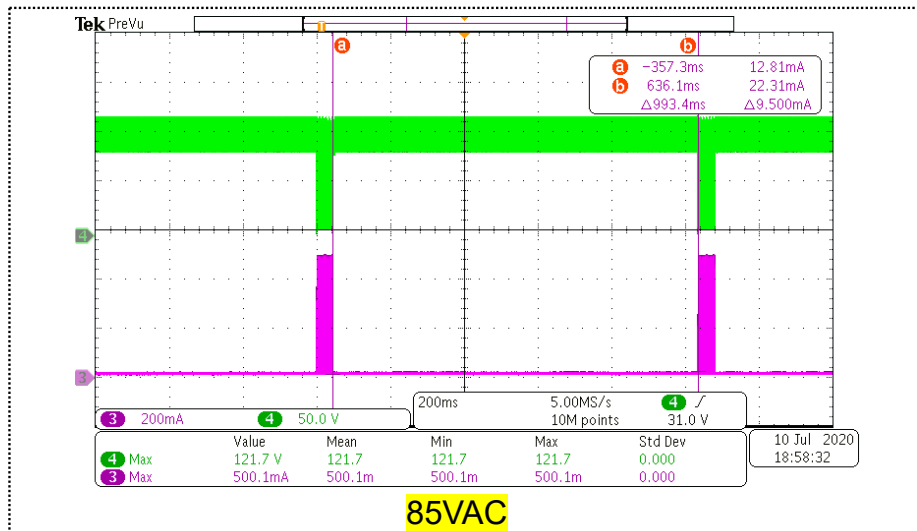


265VAC 空载



265VAC 满载

短路保护(MOSFET波形)



温升测试

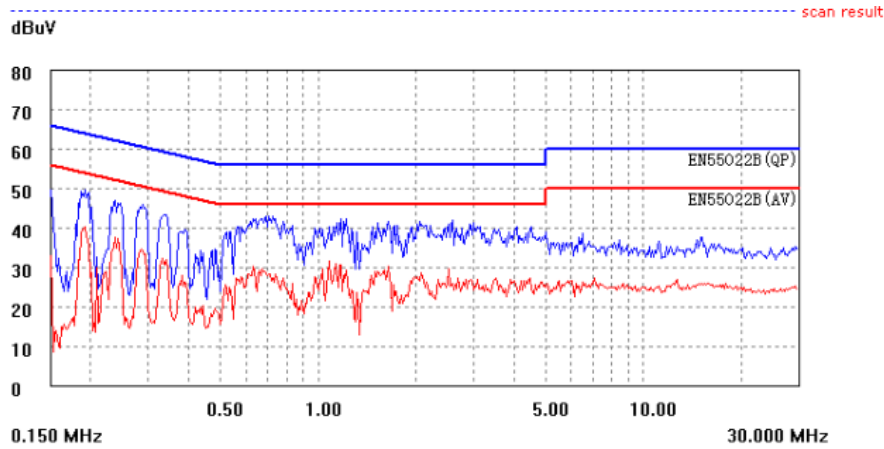
项目	温度 (°C)			
	85VAC	115VAC	230VAC	264VAC
环境温度	50	50	50	50
BP8518F (U1)	79.8	81.9	97.1	102.9
电感绕组 (L3)	69.3	70.6	76.2	78.1
电感磁芯 (L3)	67.6	68.9	73.8	75.6
续流二极管 (D5)	78.3	80	88.4	91.5
整流桥 (D1-D4)	56.3	55	53.8	53.9
输入电解电容 (C3)	55.7	55.1	55.4	55.9
输出电解电容 (C6)	60.2	60.6	53.4	51.8

■ 测试说明

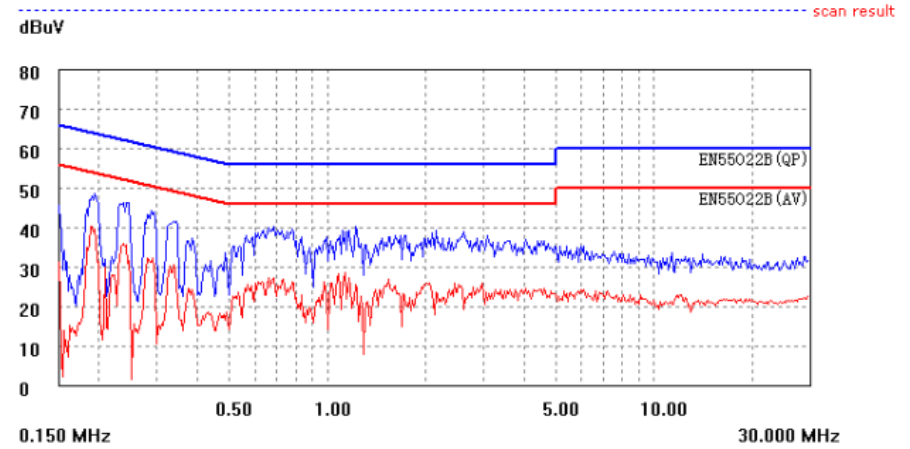
- 在温箱中进行测试, 电路板放在一个封闭的盒子内
- VCC自供电(外部供电可以降低高压输入下的温升10°C左右)
- 热电偶连接到各个测量点等测量点温度达到稳定后记录数据



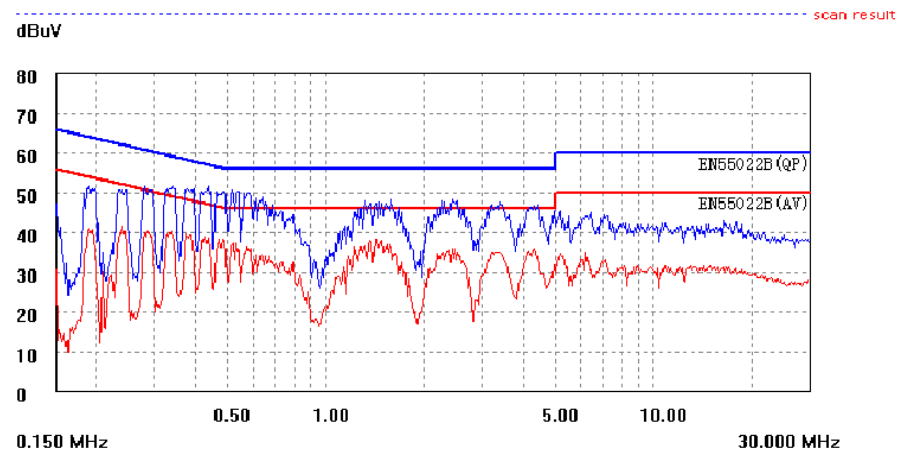
高低温试验箱



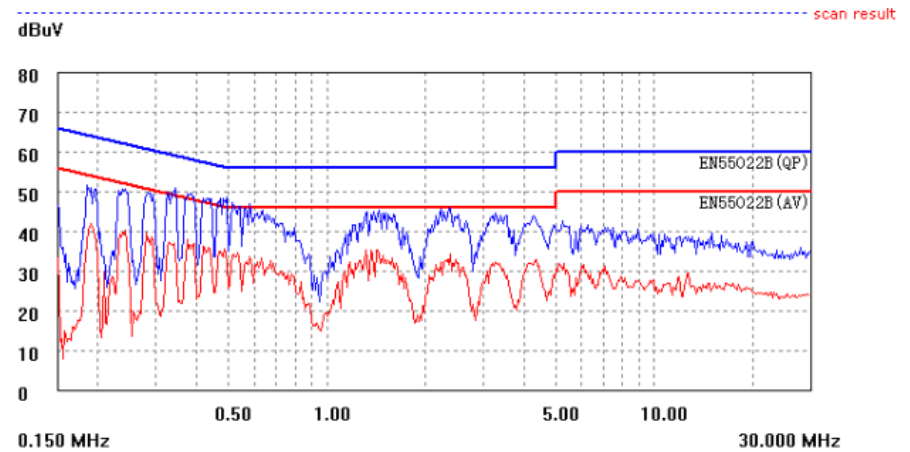
115VAC Line



115VAC Neutral



230VAC Line

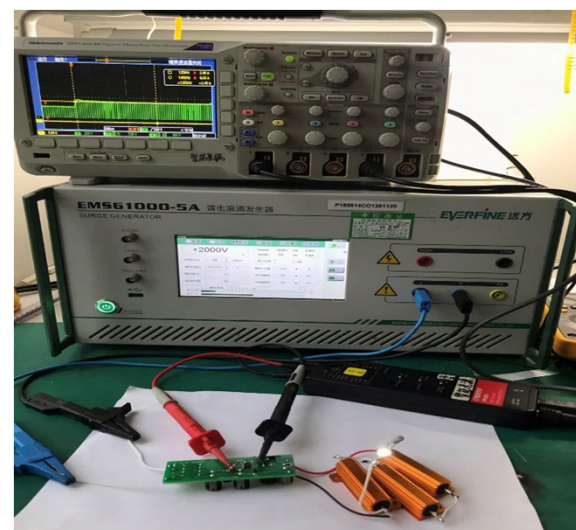


230VAC Neutral

差模	电压	相位角	发生器阻抗	测试次数	测试结果
L to N	+2kV	0	2	10	Pass
L to N	-2kV	0	2	10	Pass
L to N	+2kV	90	2	10	Pass
L to N	-2kV	90	2	10	Pass
L to N	+2kV	180	2	10	Pass
L to N	-2kV	180	2	10	Pass
L to N	+2kV	270	2	10	Pass
L to N	-2kV	270	2	10	Pass

测试说明

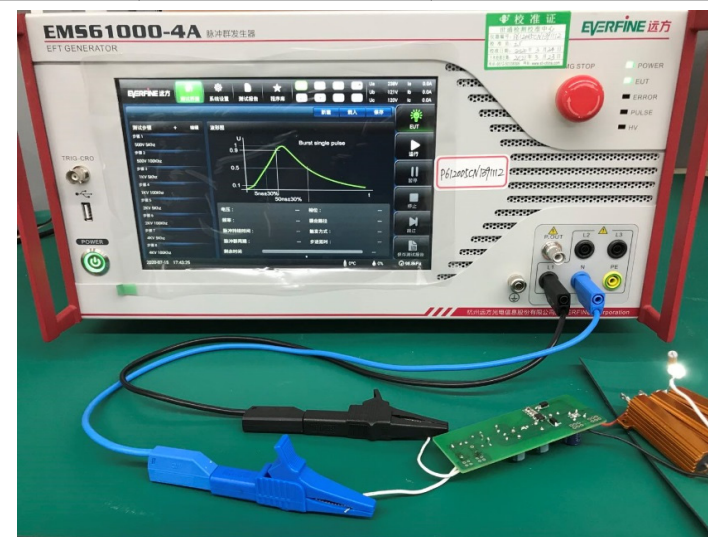
- 按照GB/T17626.5和IEC61000-4-5的最新版本要求进行测试
- 室温环境，230VAC输入，满载条件
- 输入1.2/50us组合波浪涌电压
- 每个测试点重复10次
- 每次间隔时间1分钟
- 试验时样机输出正常（符合A类标准）视为Pass



差模	电压	脉冲群持续时间	脉冲频率	测试时间	测试结果
L to N	+4kV	15ms	5kHz	120s	Pass
L to N	-4kV	15ms	5kHz	120s	Pass
L to N	+4kV	0.75ms	100kHz	120s	Pass
L to N	-4kV	0.75ms	100kHz	120s	Pass
L to N	+2kV	2ms	38kHz	120s	Pass
L to N	-2kV	2ms	38kHz	120s	Pass
L to N	+4kV	2ms	38kHz	120s	Pass
L to N	-4kV	2ms	38kHz	120s	Pass

测试说明

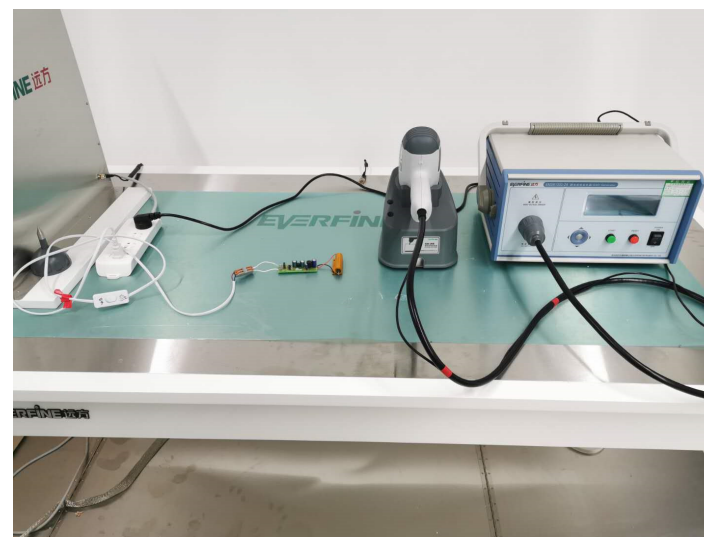
- 按照GB/T17626.4和IEC61000-4-4的最新版本要求进行测试
- 室温环境，230VAC输入满载条件
- 分别测试5kHz/100kHz/38kHz脉冲频率
- 脉冲群周期为300ms
- 每个测试条件测试时间120s
- 试验时样机输出正常（符合A类标准）视为Pass



测试点	电压(V)	放电类型	放电次数	测试结果
Vo	+15kV	空气放电	10	Pass
Vo	-15kV	空气放电	10	Pass
GND	+15kV	空气放电	10	Pass
GND	-15kV	空气放电	10	Pass
Vo	+20kV	空气放电	10	Pass
Vo	-20kV	空气放电	10	Pass
GND	+20kV	空气放电	10	Pass
GND	-20kV	空气放电	10	Pass

测试说明

- 按照GB/T17626.2和IEC61000-4-2的最新版本要求进行测试
- 室温环境，230VAC输入满载条件
- 每个测试点重复10次
- 分别对输出正端和地进行空气放电
- 试验时样机输出正常（符合A类标准）视为Pass



重要声明

- 本文档中的数据与信息仅供参考，不构成任何形式的建议、验收标准或保证。实际测试数据和结果可能同文档中列出的数据和结果存在差异，请用户自行确认产品的适用性。

谢谢!!

THANK YOU
FOR WATCHING



附录1：外部供电

