

方案简介

本方案由 VPS8702 和隔离变压器 VPTSIAA-01B 组合，结合必要的整流二极管以及阻容元件实现 3.13V-3.63V 输入，3.3V/50mA 输出的隔离非稳压电源。原副边隔离耐压不小于 2500VAC，可长期短路保护并自恢复。主要应用于电路板上分布式电源系统中需要产生一组与输入隔离以达到安全和（或）抗干扰的场合。

关键词：输入：3.13V-3.63V，输出 3.3V/50mA，隔离电压：2500VAC，反馈方式：开环

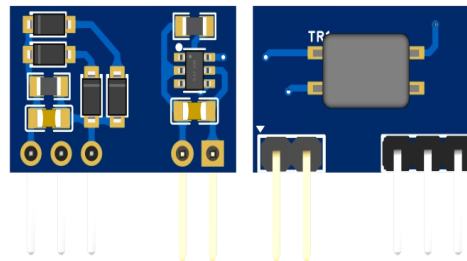
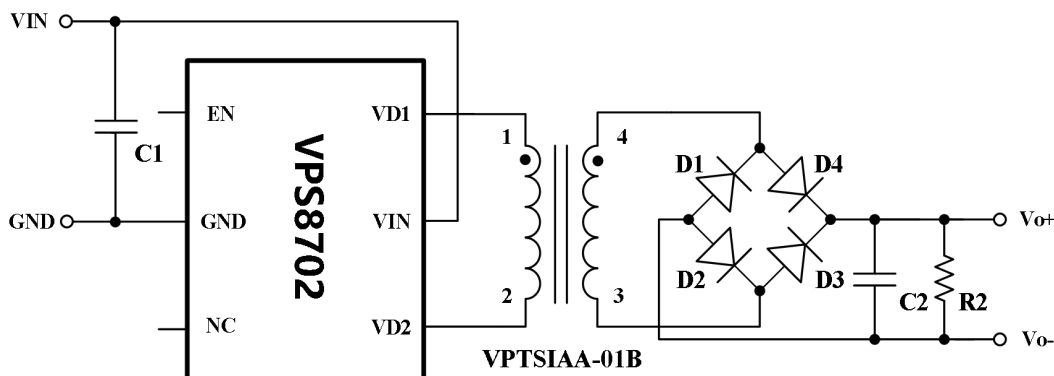


图 1: VPS8702 Demo 板(尺寸:19mm*12mm)

编号	功能
1	VIN
2	GND
3	VO-
4	NC
5	VO+

注: ▽ 为 1 脚

原理图



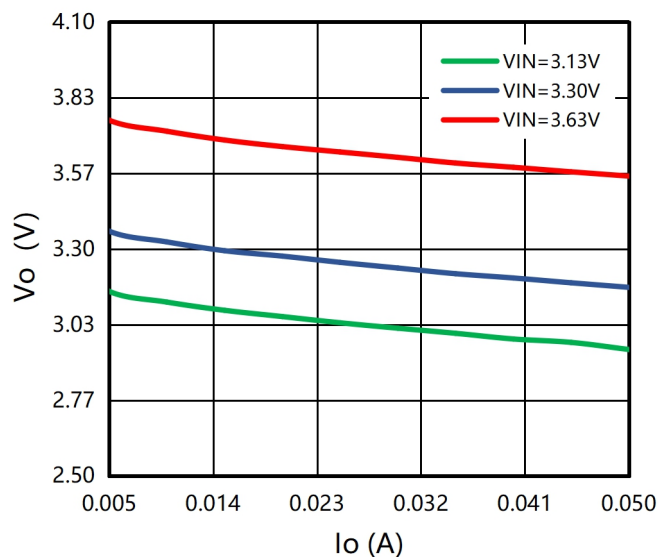
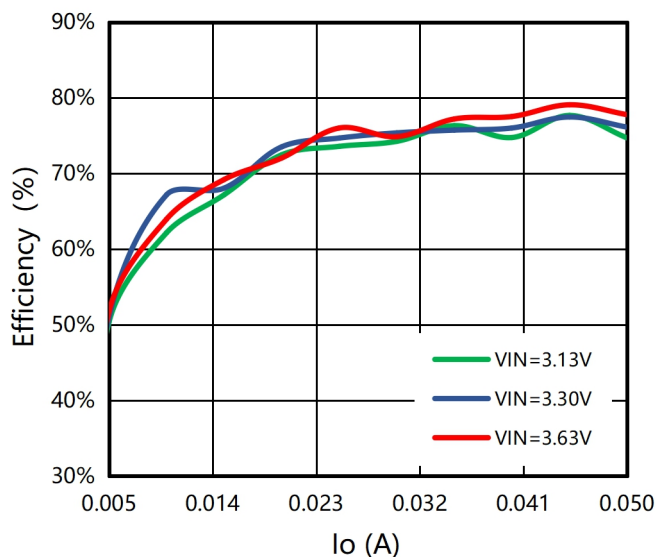
物料清单

位号	参数	封装	选型建议
IC1	VPS8702	SOT23-6	---
C1/C2	4.7uF/10V	0603	电容量 4.7uF，耐压 10V 以上，X7R 材质
R2	4.7KΩ	0603	4.7KΩ，精度±1%
D1/D2/D3/D4	RB160M-30TR	SOD-123	平均电流 1A，耐压 30V 以上 不重复浪涌峰值电流 3A 以上（短路保护）
TR1	VPTSIAA-01B	SMD-4	---

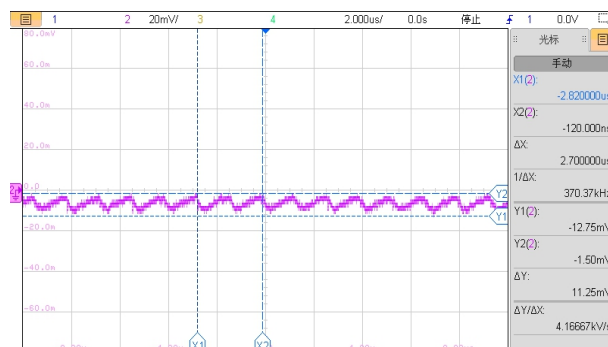
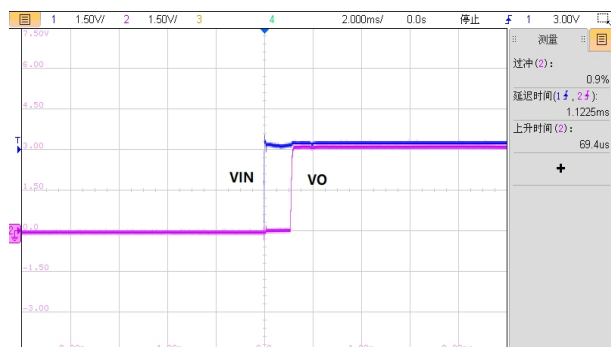
总体性能一览表

性能指标	测试条件	Min	Typ	Max	Unit
输入电流 (满载/空载)	VIN=3.3V; Io=50mA/0A	3	---	63	mA
转换效率	Typ: VIN=3.3V, Io=50mA	---	76	---	%
纹波&噪声	VIN=3.3V; Io=50mA	---	15	55	mV
线性调节率	VIN=3.13/3.63V; Io=50mA	---	1.22	---	%
负载调整率	VIN=3.3V; Io=50mA	---	6.26	---	%
工作温度	---	-40	---	85	°C
绝缘电压	原边短接 VS 副边短接	2500	---	---	VAC
开关频率	VIN=3.3V	---	340	---	KHz
短路保护	VIN=3.3V; Io=50mA	可长期保护，即时自恢复			

关键性能指标测试结果

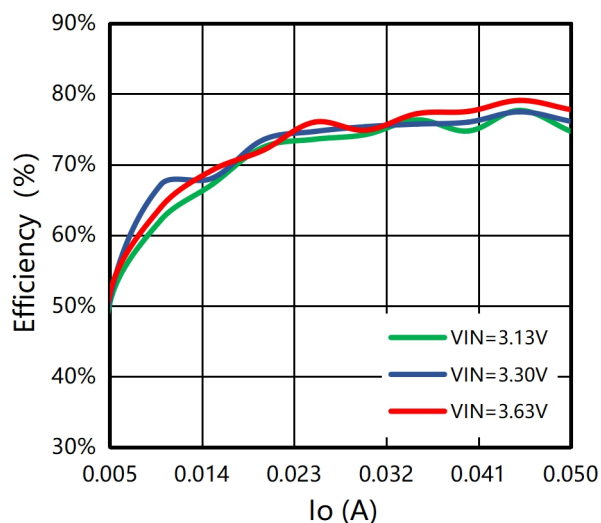


相关波形

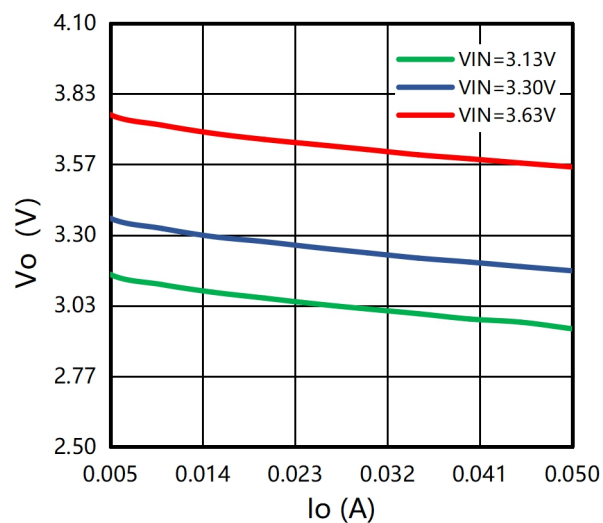


详细测试数据

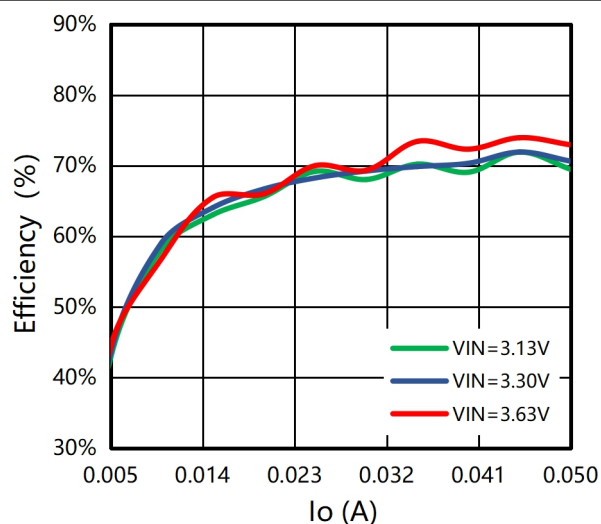
高低温测试曲线



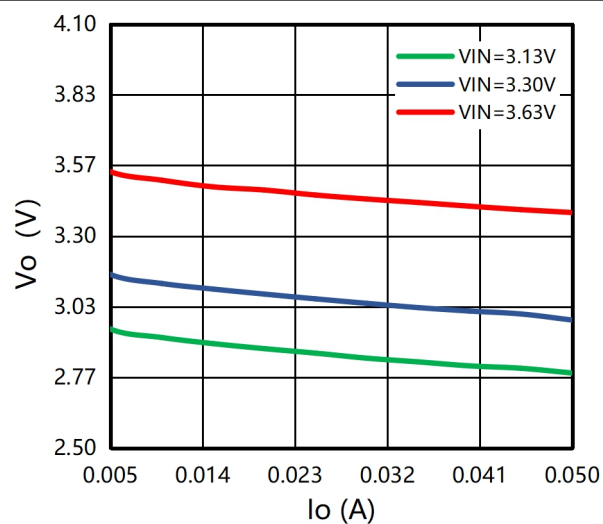
效率 VS 输出电流(25°C)



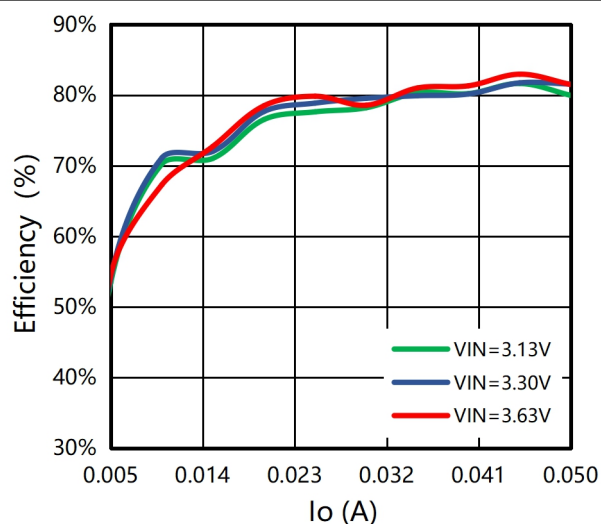
输出电流 VS 输出电压 (25°C)



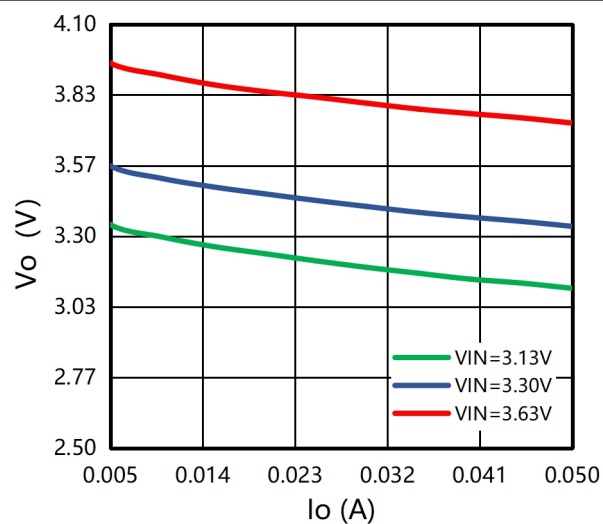
效率 VS 输出电流(-40°C)



输出电流 VS 输出电压(-40°C)



效率 VS 输出电流(85°C)



输出电流 VS 输出电压(85°C)

VIN=3.3V, Ta=25°C, 输入、输出及效率数据:

VIN(V)	IIN(A)	VO(V)	IO(A)	η (%)
3.30	0.003	3.49	0.000	0.00%
3.30	0.010	3.36	0.005	50.95%
3.30	0.015	3.33	0.010	67.17%
3.30	0.022	3.29	0.015	68.06%
3.30	0.027	3.28	0.020	73.51%
3.30	0.033	3.25	0.025	74.68%
3.30	0.039	3.23	0.030	75.36%
3.30	0.045	3.21	0.035	75.73%
3.30	0.051	3.20	0.040	76.01%
3.30	0.056	3.18	0.045	77.46%
3.30	0.063	3.17	0.050	76.12%

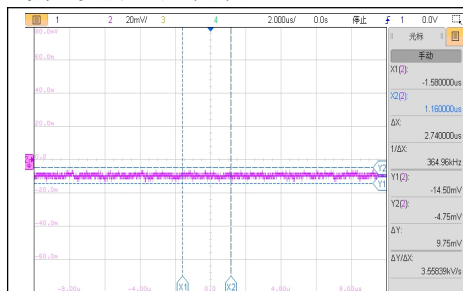
VIN=3.3V, Ta=-40°C, 输入、输出及效率数据:

VIN(V)	IIN(A)	VO(V)	IO(A)	η (%)
3.30	0.003	3.27	0.000	0.00%
3.30	0.011	3.16	0.005	43.46%
3.30	0.016	3.12	0.010	59.11%
3.30	0.022	3.10	0.015	64.05%
3.30	0.028	3.08	0.020	66.69%
3.30	0.034	3.06	0.025	68.25%
3.30	0.040	3.05	0.030	69.23%
3.30	0.046	3.03	0.035	69.86%
3.30	0.052	3.02	0.040	70.33%
3.30	0.057	3.01	0.045	71.91%
3.30	0.064	2.98	0.050	70.62%

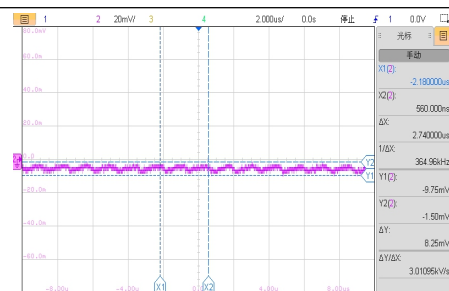
VIN=3.3V, Ta=85°C, 输入、输出及效率数据:

VIN(V)	IIN(A)	VO(V)	IO(A)	η (%)
3.30	0.002	3.71	0.000	0.00%
3.30	0.010	3.57	0.005	54.02%
3.30	0.015	3.52	0.010	71.09%
3.30	0.022	3.49	0.015	72.02%
3.30	0.027	3.46	0.020	77.67%
3.30	0.033	3.44	0.025	78.86%
3.30	0.039	3.41	0.030	79.53%
3.30	0.045	3.39	0.035	79.90%
3.30	0.051	3.37	0.040	80.14%
3.30	0.056	3.36	0.045	81.72%
3.30	0.062	3.34	0.050	81.55%

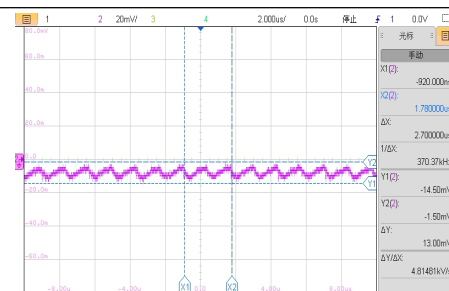
输出电压纹波波形



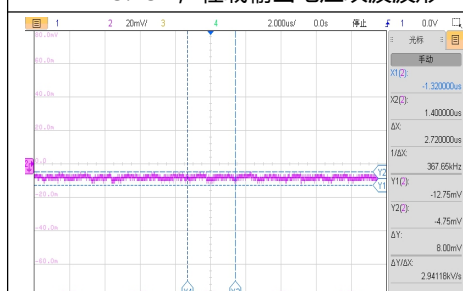
VIN=3.13V, 轻载输出电压纹波波形



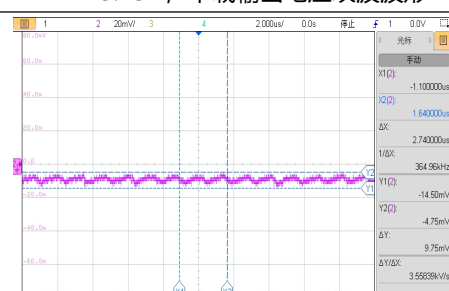
VIN=3.13V, 半载输出电压纹波波形



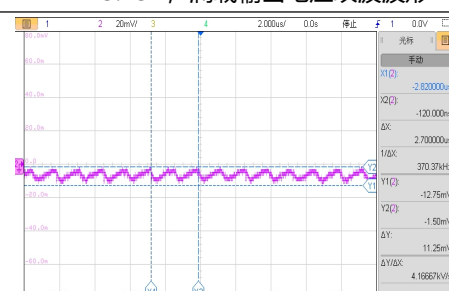
VIN=3.13V, 满载输出电压纹波波形



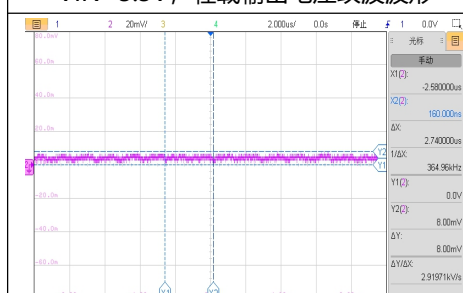
VIN=3.3V, 轻载输出电压纹波波形



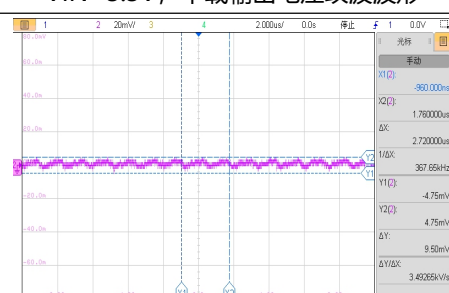
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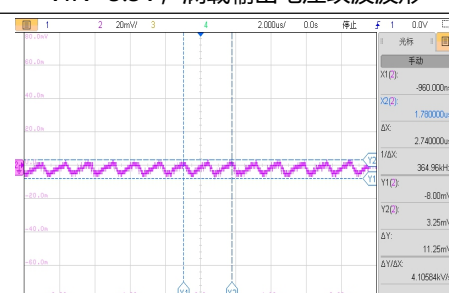
VIN=3.3V, 满载输出电压纹波波形



VIN=3.63V, 轻载输出电压纹波波形

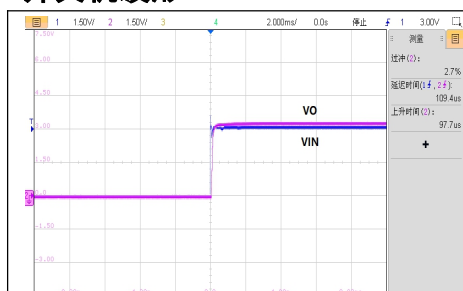


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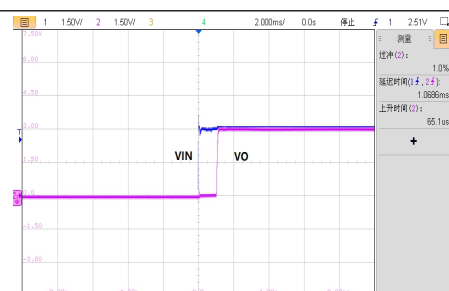


VIN=3.63V, 满载输出电压纹波波形

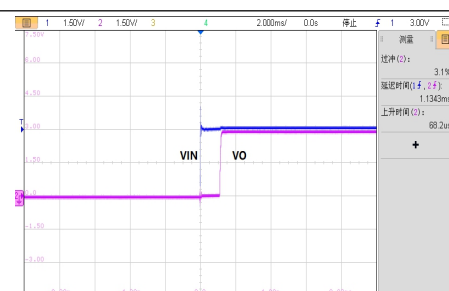
开关机波形



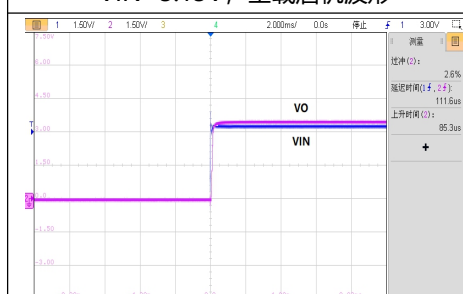
VIN=3.13V, 空载启机波形



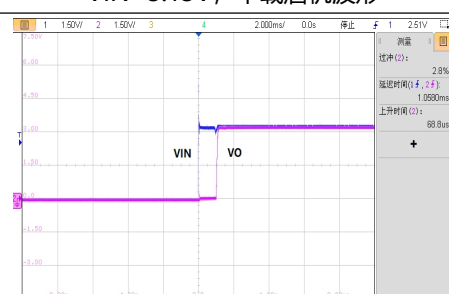
VIN=3.13V, 半载启机波形



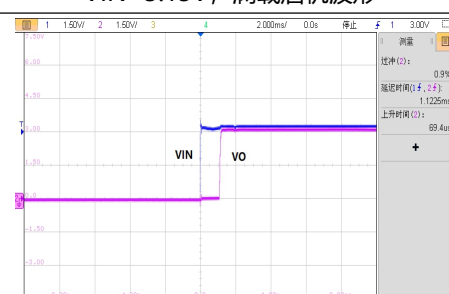
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VIN=3.3V, 空载启机波形



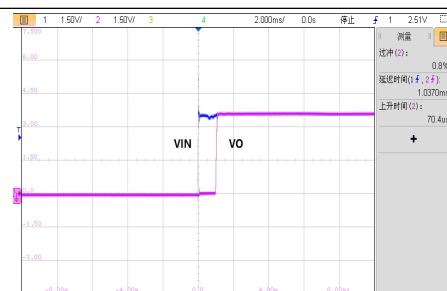
VIN=3.3V, 半载启机波形



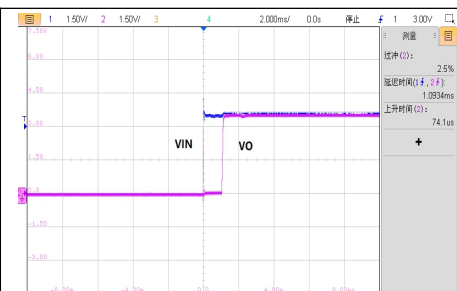
VIN=3.3V, 满载启机波形



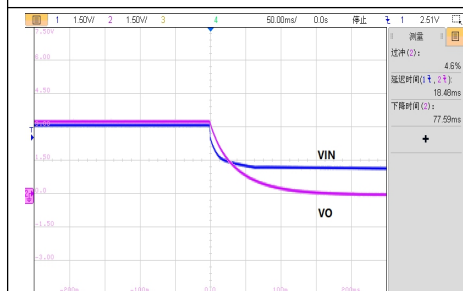
VIN=3.63V, 空载启机波形



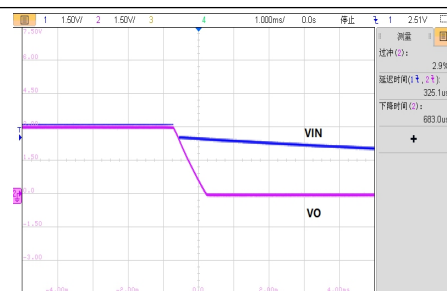
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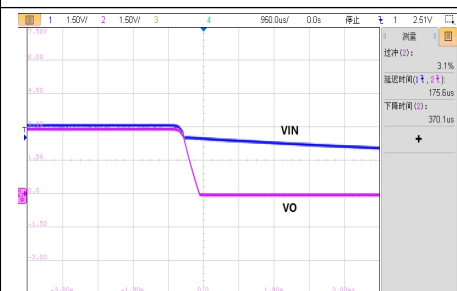
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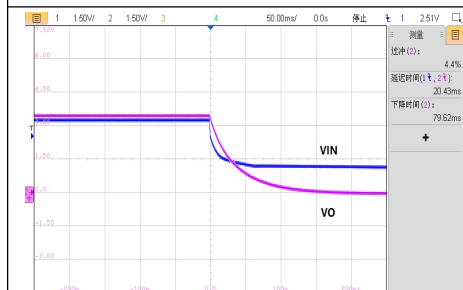
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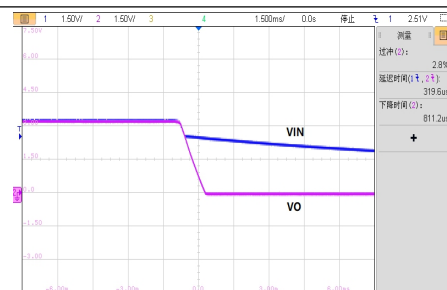
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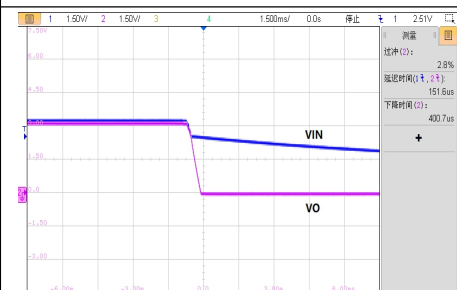
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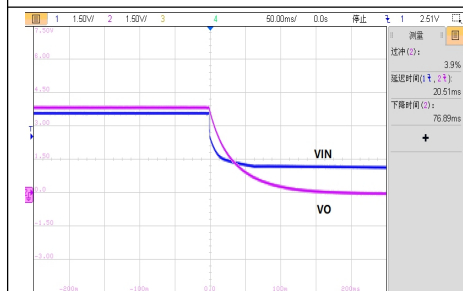
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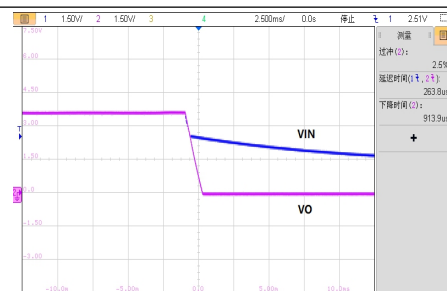
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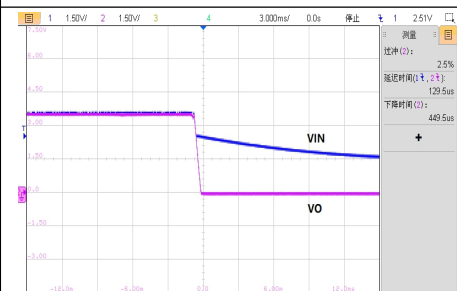
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VIN=3.63V, 空载关机波形

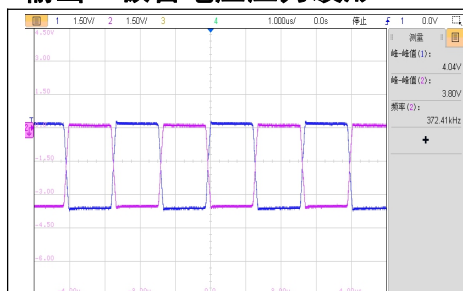


VIN=3.63V, 半载关机波形

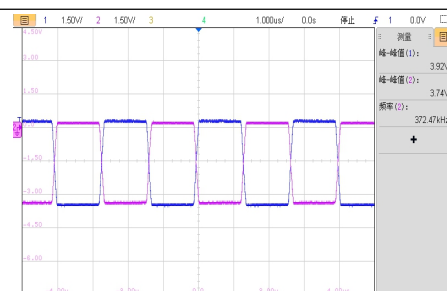


VIN=3.63V, 满载关机波形

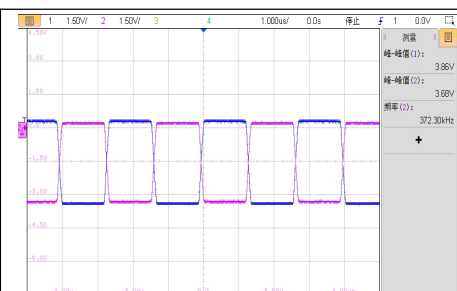
输出二极管电压应力波形



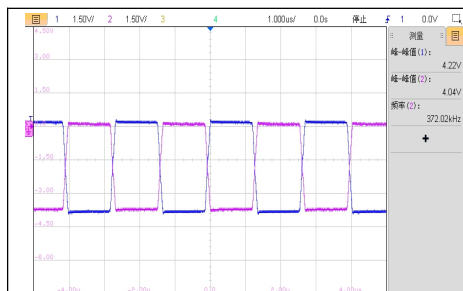
VIN=3.13V, 空载工作电压波形



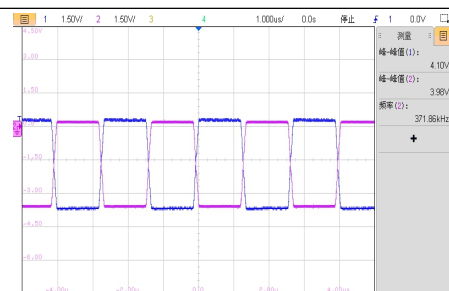
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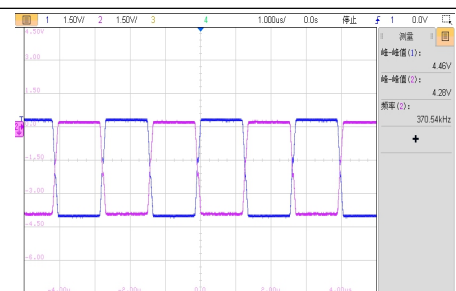
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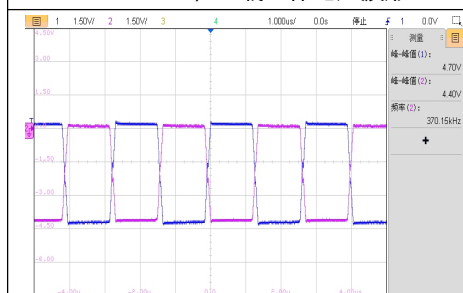
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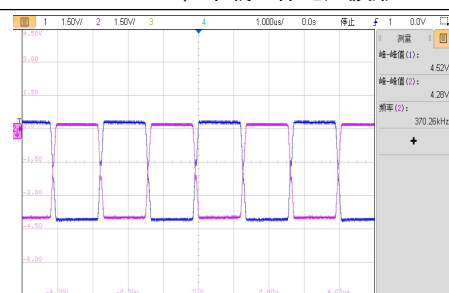
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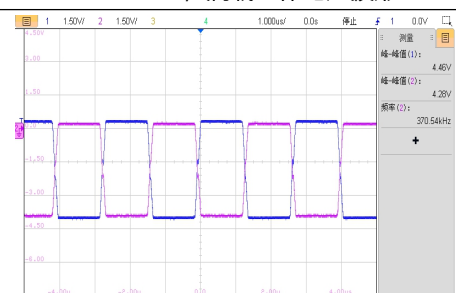
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VIN=3.63V, 空载工作电压波形

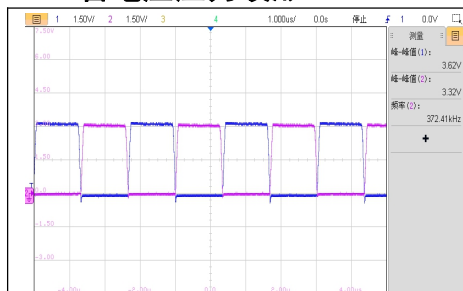


VIN=3.63V, 半载工作电压波形

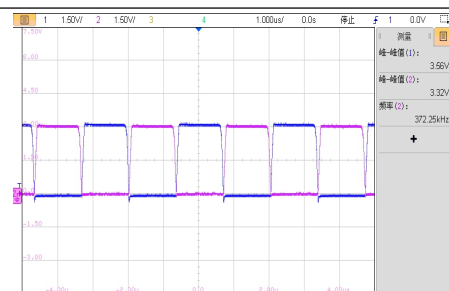


VIN=3.63V, 满载工作电压波形

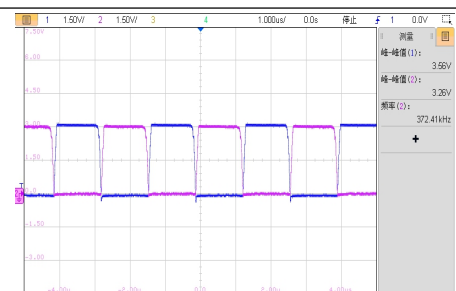
MOS 管电压应力波形-VPS8702



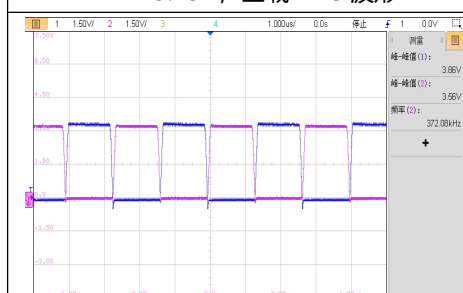
VIN=3.13V, 空载 VDS 波形



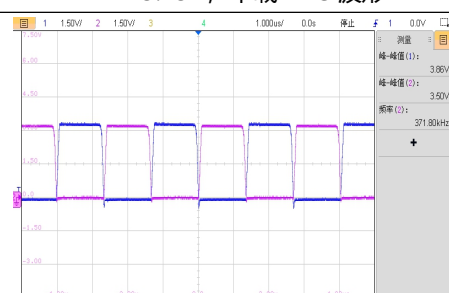
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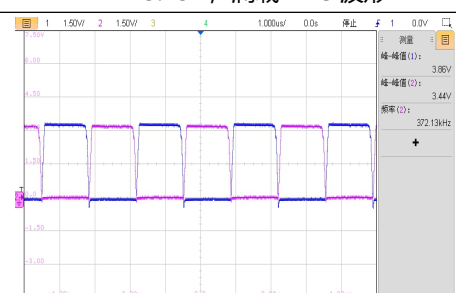
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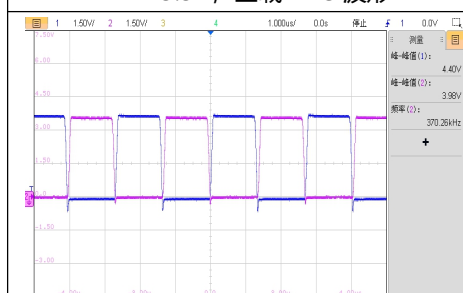
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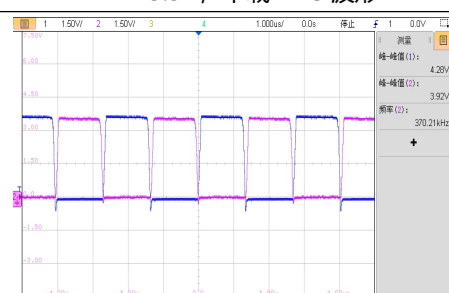
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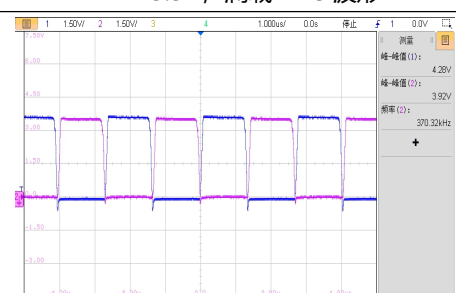
VIN=3.3V, 满载 VDS 波形



VIN=3.63V, 空载 VDS 波形



VIN=3.63V, 半载 VDS 波形



VIN=3.63V, 满载 VDS 波形

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