方案简介

本方案由 VPS8702 和变压器 VPT72BD-01D 组合，结合必要的阻容元件以及 VPS2704 实现 5V±10%输入，12V/83mA 输出的隔离非稳压电源。原副边爬电距离≥16mm，隔离耐压不小于 5000VAC，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。

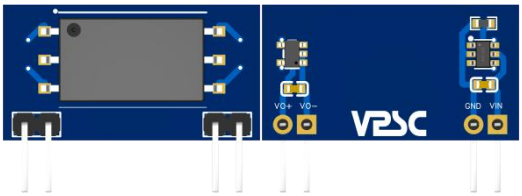
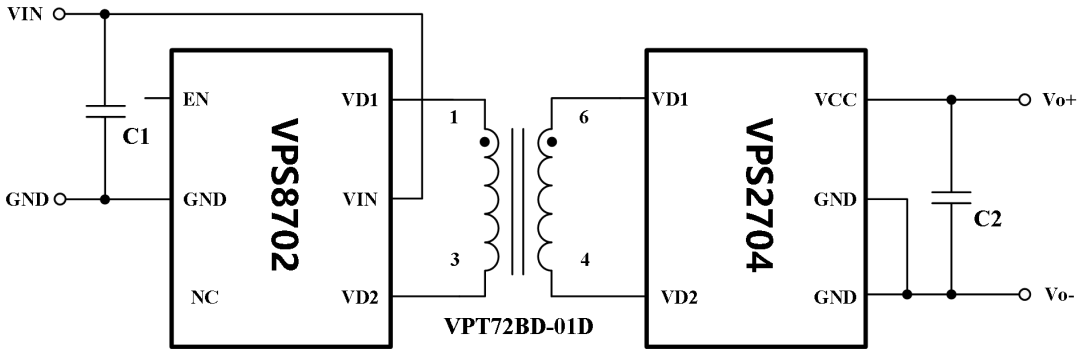


图 1: VPS8702 Demo 板(尺寸:27.4mm*14.5mm)

关键词：输入：4.5V-5.5V，输出 12V/1W，爬电距离：≥16mm，隔离电压：5000VAC，反馈方式：开环

原理图



物料清单

位号	参数	封装	选型建议
IC1	VPS8702	SOT23-6	---
IC2	VPS2704	SOT23-5	---
C1	1uF/10V	0603	电容量 1uF，耐压 10V 以上，X7R 材质
C2	4.7uF/25V	0805	电容量 4.7uF，耐压 25V 以上，X7R 材质
TR1	VPT72BD-01D	SMD-6	---

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=5V；Io=83mA/0A	10	---	222	mA
转换效率	Typ：VIN=5V，Io=83mA	---	87	---	%
纹波&噪声	VIN=5V；Io=83mA	---	30	70	mV
工作温度	---	-40	---	105	℃
绝缘电压	原边短接 VS 副边短接	5000	---	---	VAC
开关频率	VIN=5V	---	340	---	KHz
短路保护	VIN=5V；Io=83mA	可长期保护，即时自恢复			

关键性能指标测试结果

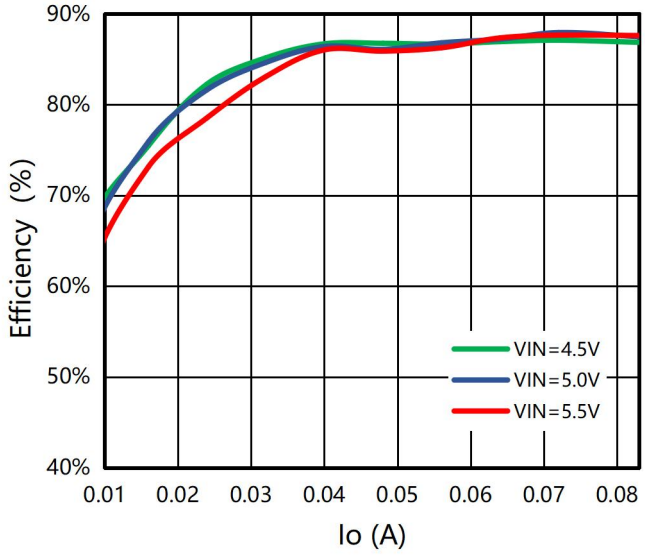


图 2: 效率 VS 输出电流(输出满载)

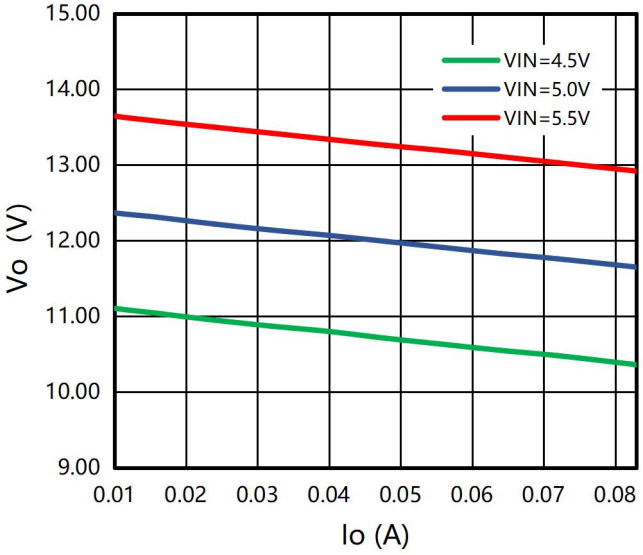


图 3: 输出电压 VS 输出电流

相关波形

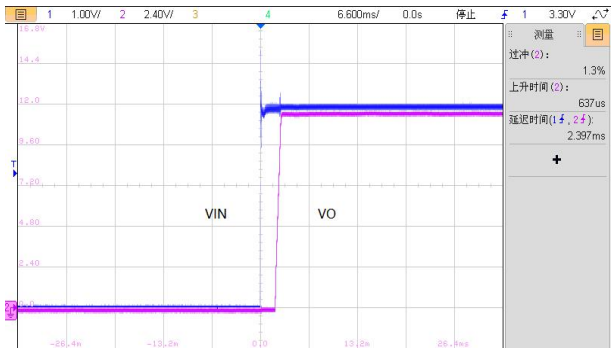


图 4: VIN=5V，满载启机波形

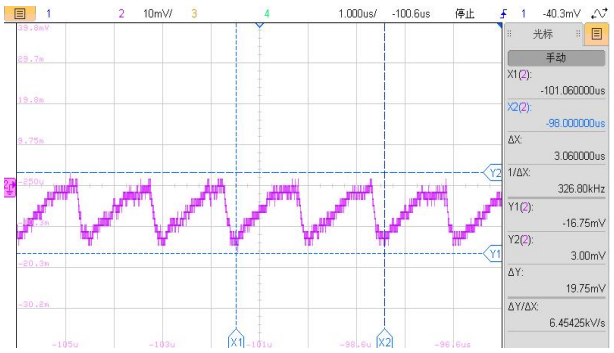
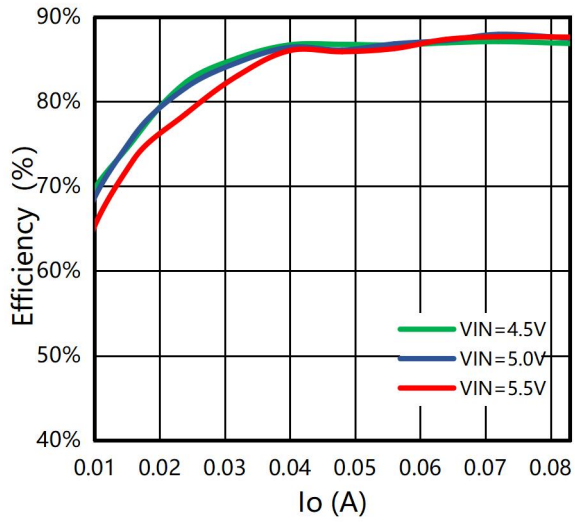


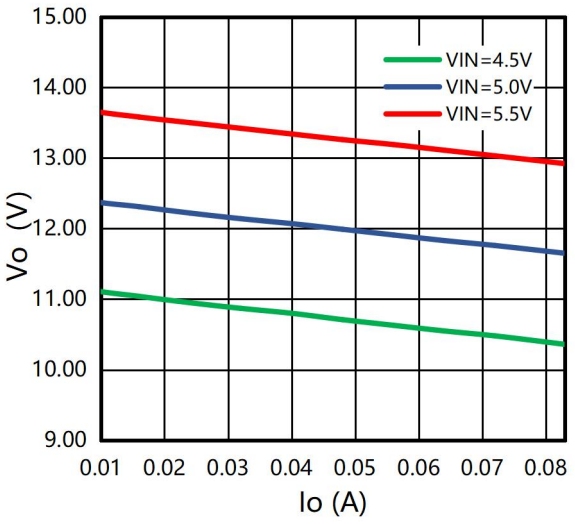
图 5: VIN=5V，满载输出电压纹波波形

详细测试数据

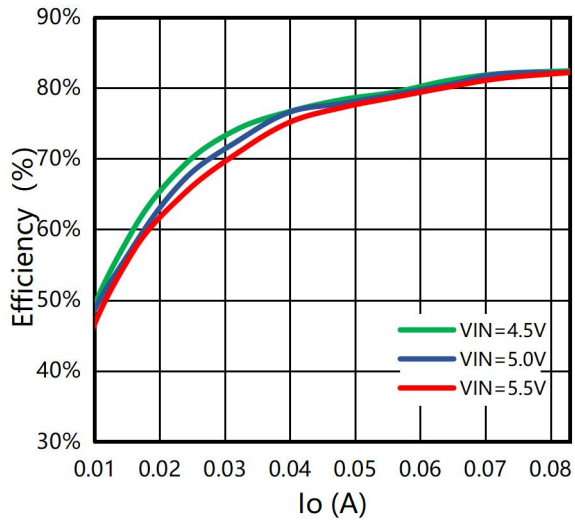
高低温测试曲线



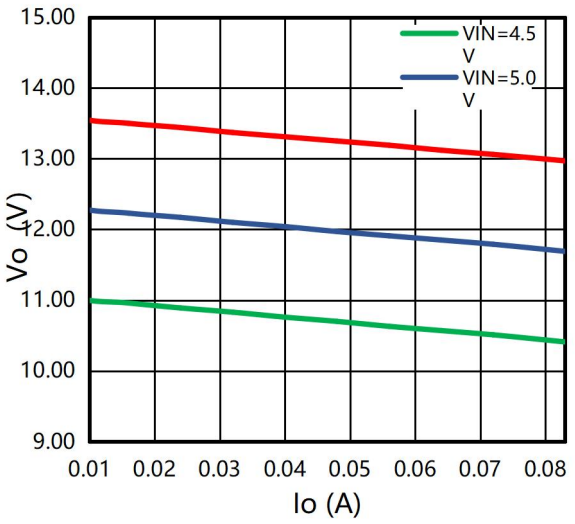
效率 VS 输出电流(25℃)



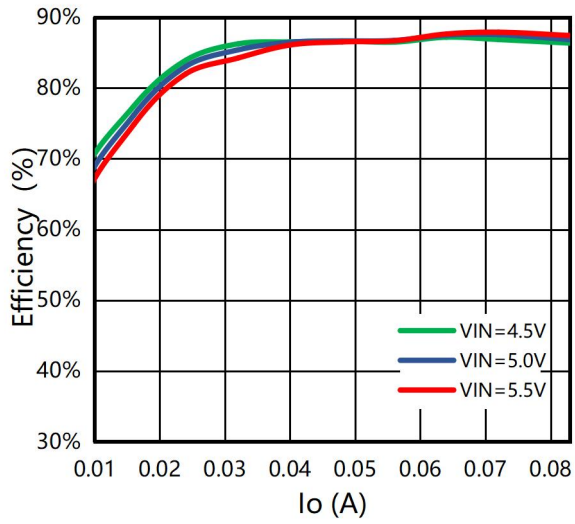
效率 VS 输入电压(输出满载@25℃)



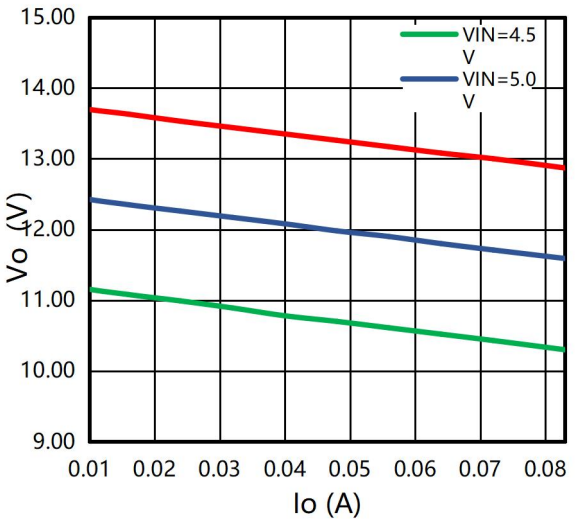
效率 VS 输出电流(-40℃)



效率 VS 输入电压(输出满载@-40℃)



效率 VS 输出电流(85℃)



效率 VS 输入电压(输出满载@85℃)

VIN=5V，Ta=25℃，输入、输出及效率数据：

VIN(V)	IIN(A)	VO(V)	IO(A)	η(%)
5.00	0.010	12.62	0.000	00.00%
5.00	0.031	12.40	0.008	64.00%
4.99	0.052	12.31	0.016	75.91%
4.99	0.072	12.22	0.024	81.63%
4.99	0.092	12.14	0.032	84.62%
4.99	0.112	12.07	0.040	86.39%
4.99	0.134	11.99	0.048	86.07%
4.99	0.154	11.91	0.056	86.79%
4.99	0.174	11.83	0.064	87.20%
4.99	0.193	11.76	0.072	87.92%
4.98	0.222	11.65	0.083	87.46%

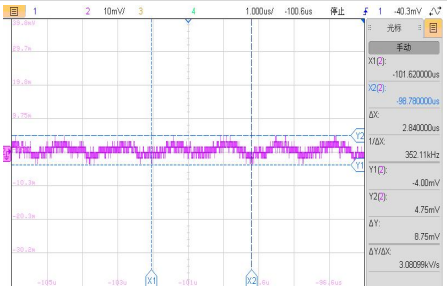
VIN=5V，Ta=-40℃，输入、输出及效率数据：

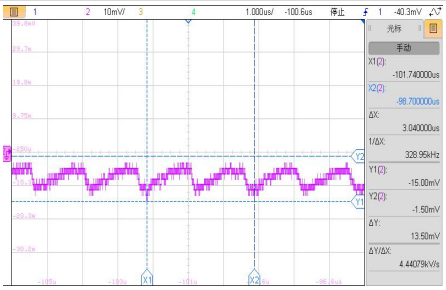
VIN(V)	IIN(A)	VO(V)	IO(A)	η(%)
5.00	0.026	12.74	0.000	00.00%
5.00	0.045	12.32	0.008	43.80%
4.99	0.068	12.23	0.016	57.67%
4.99	0.087	12.17	0.024	67.28%
4.99	0.107	12.10	0.032	72.52%
4.99	0.126	12.04	0.040	76.60%
4.99	0.148	11.97	0.048	77.80%
4.99	0.169	11.91	0.056	79.09%
4.99	0.189	11.85	0.064	80.41%
4.98	0.208	11.79	0.072	81.95%
4.98	0.237	11.69	0.083	82.21%

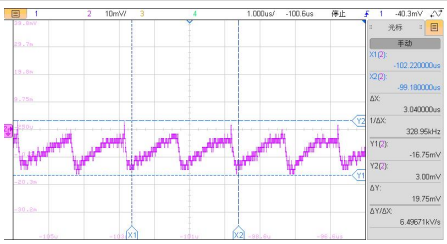
VIN=5V，Ta=85℃，输入、输出及效率数据：

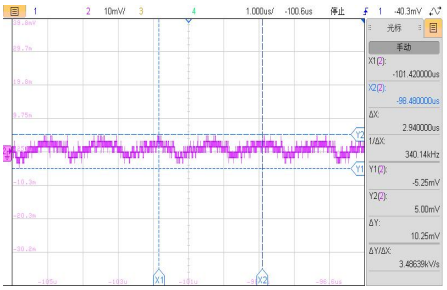
VIN(V)	IIN(A)	VO(V)	IO(A)	η(%)
5.00	0.009	12.67	0.000	00.00%
5.00	0.031	12.46	0.008	64.31%
4.99	0.052	12.35	0.016	76.15%
4.99	0.071	12.26	0.024	83.05%
4.99	0.091	12.17	0.032	85.39%
4.99	0.112	12.08	0.040	86.46%
4.99	0.133	11.98	0.048	86.65%
4.99	0.154	11.90	0.056	86.72%
4.99	0.173	11.80	0.064	87.48%
4.99	0.193	11.71	0.072	87.55%
4.99	0.222	11.59	0.083	86.84%

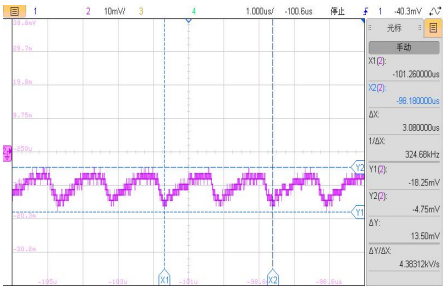
输出电压纹波波形


VIN=4.5V，轻载输出电压纹波波形


VIN=4.5V，半载输出电压纹波波形


VIN=4.5V，满载输出电压纹波波形


VIN=5.0V，轻载输出电压纹波波形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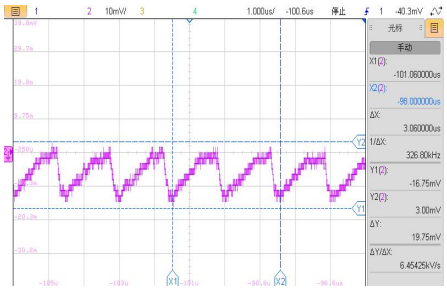
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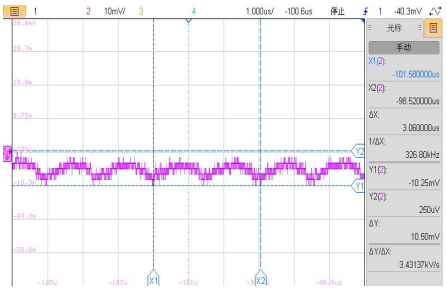
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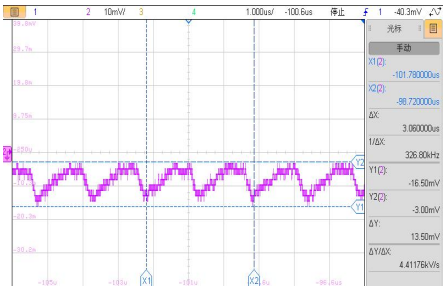
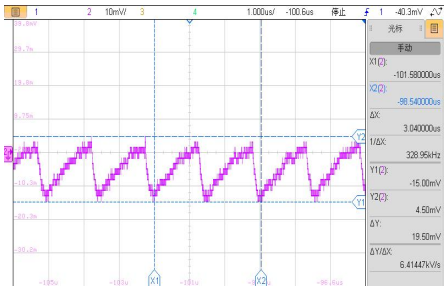
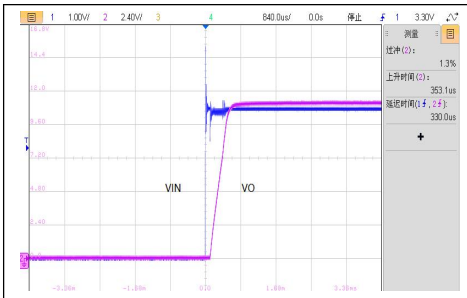
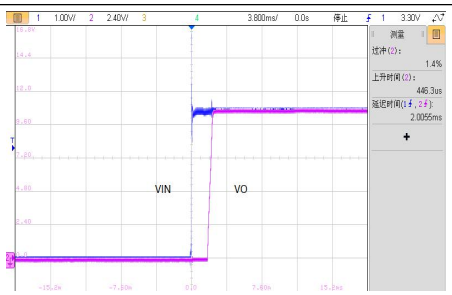

VIN=5.5V，半载输出电压纹波波形


VIN=5.5V，满载输出电压纹波波形

开关机波形



VIN=4.5V，空载启机波形



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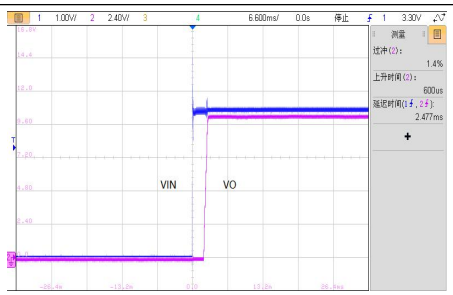

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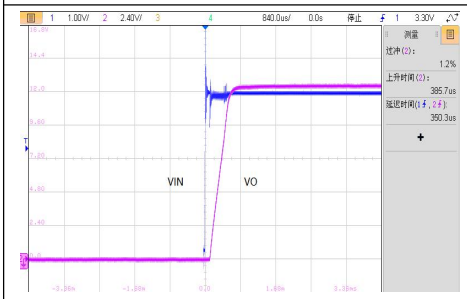

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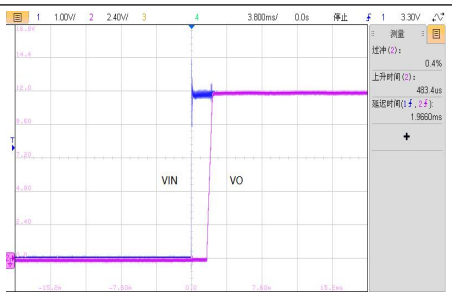

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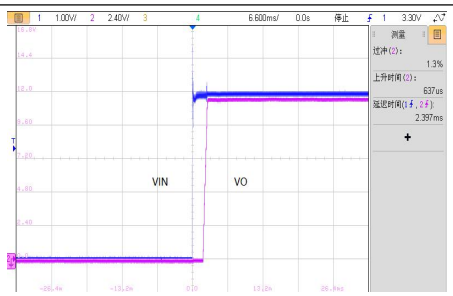
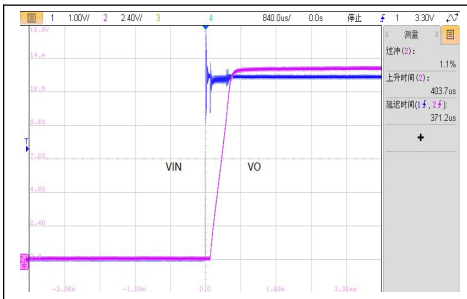
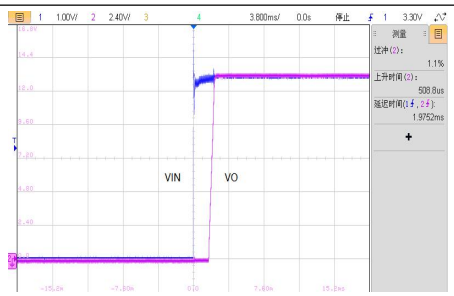


VIN=5.0V，满载启机波形



VIN=5.5V，空载启机波形



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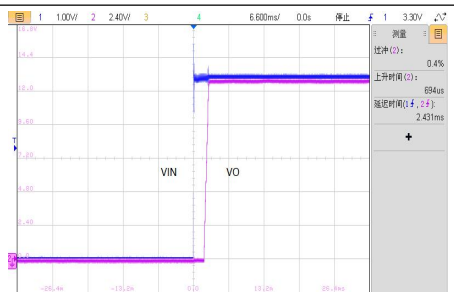

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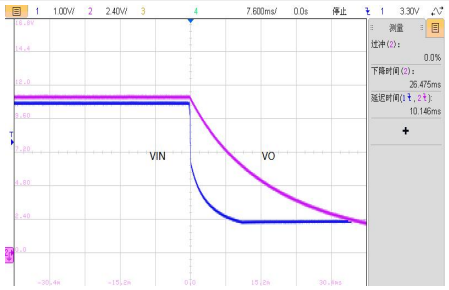

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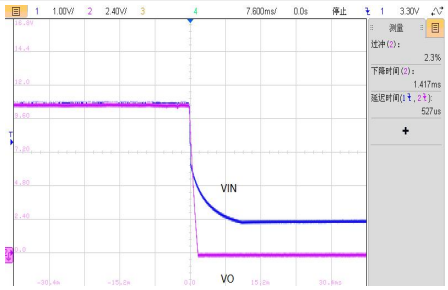

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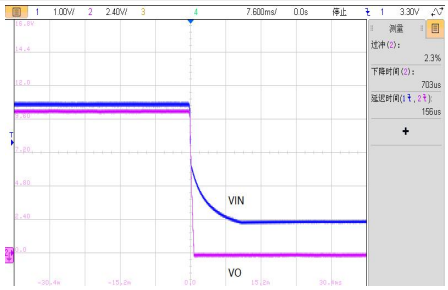

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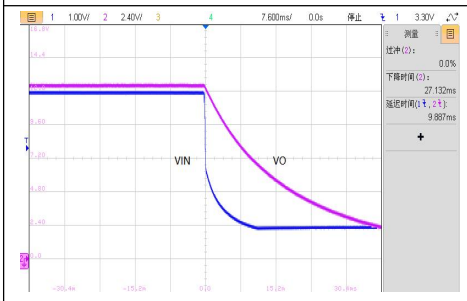

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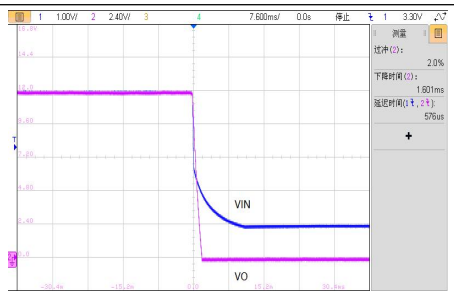
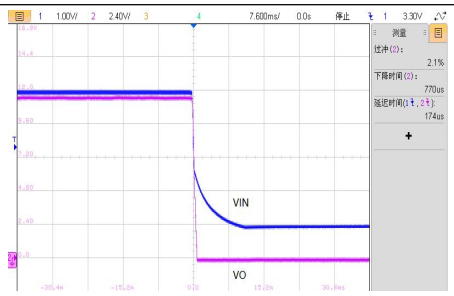
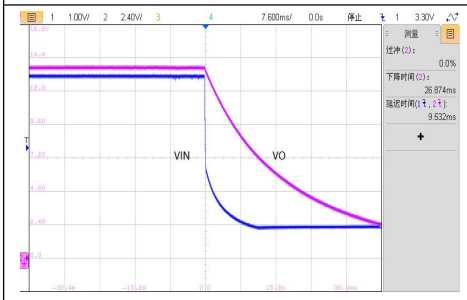


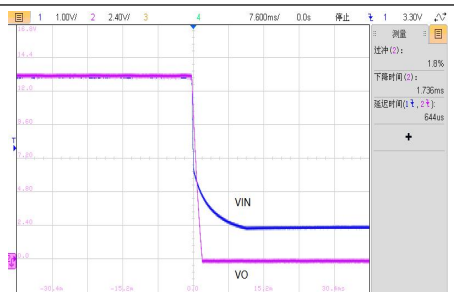
VIN=5.0V，半载关机波形



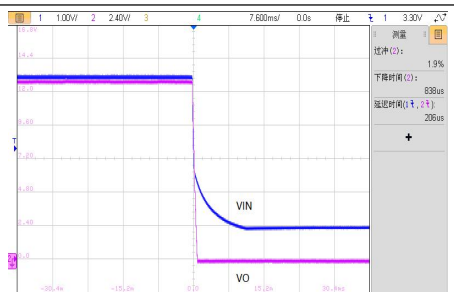
VIN=5.0V，满载关机波形



VIN=5.5V，空载关机波形

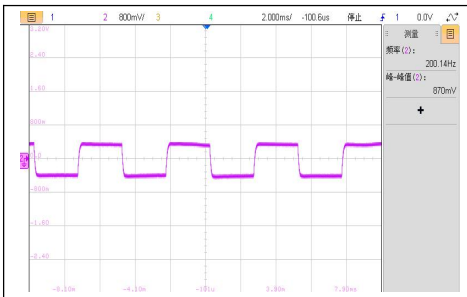


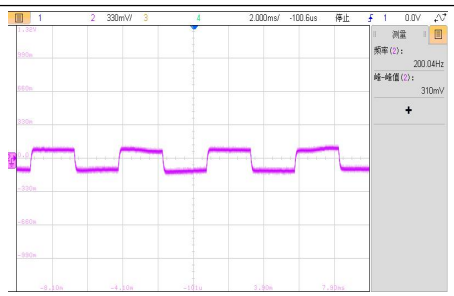
VIN=5.5V，半载关机波形

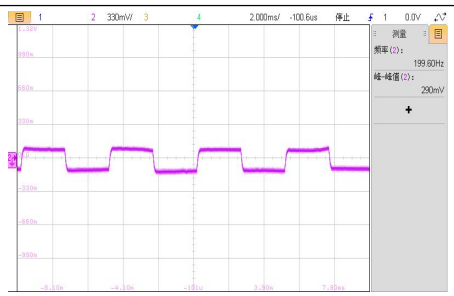


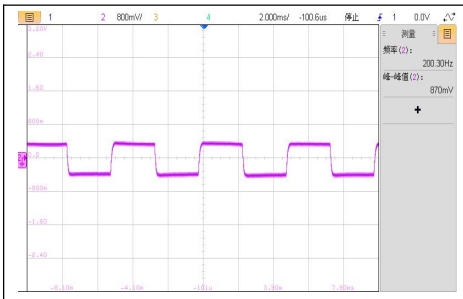
VIN=5.5V，满载关机波形

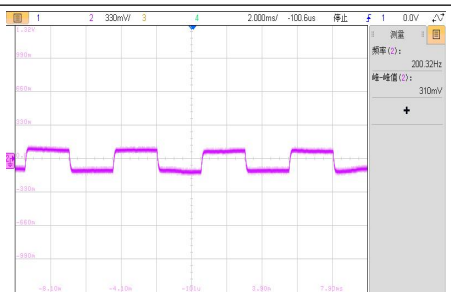
动态波形

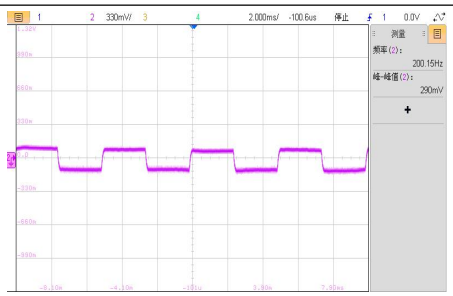

VIN=4.5V，100%-10%-100%Io 动态波形

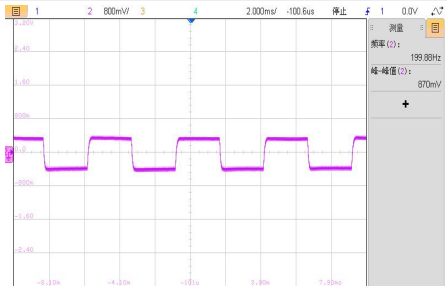

VIN=4.5V，75%-50%-75%Io 动态波形

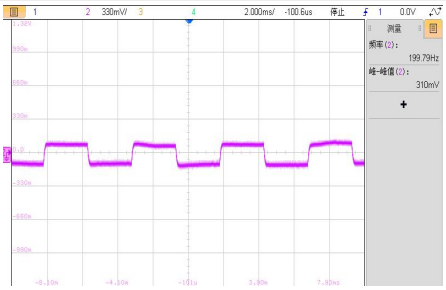

VIN=4.5V，50%-25%-50%Io 动态波形


VIN=5.0V，100%-10%-100%Io 动态波形


VIN=5.0V，75%-50%-75%Io 动态波形


VIN=5.0V，50%-25%-50%Io 动态波形


VIN=5.5V，100%-10%-100%Io 动态波形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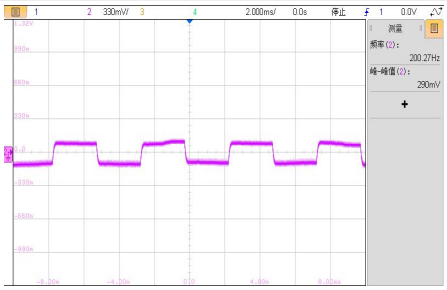
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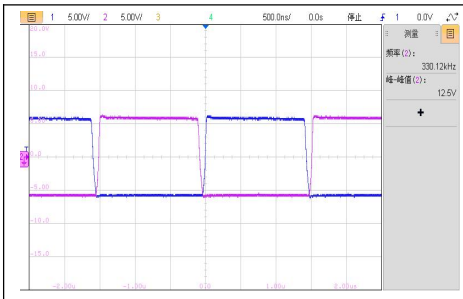
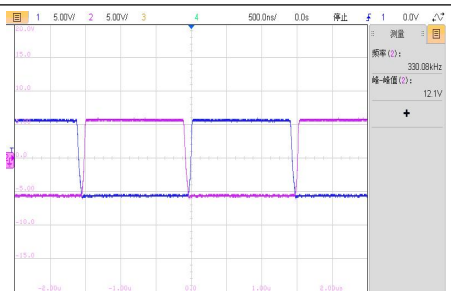
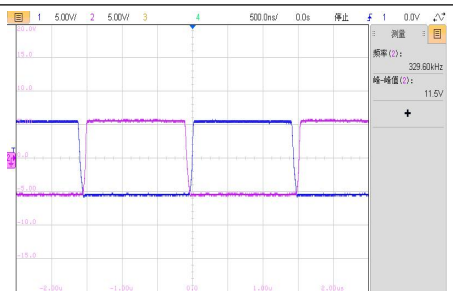
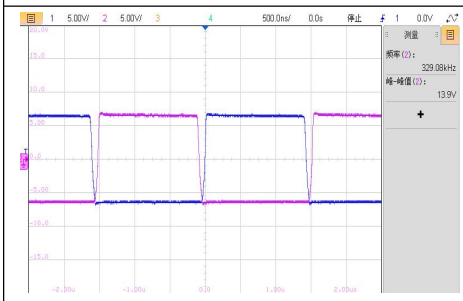
MOS 管电压应力波形-VPS2704


VIN=4.5V，空载 VDS 波形


VIN=4.5V，半载 VDS 波形


VIN=4.5V，满载 VDS 波形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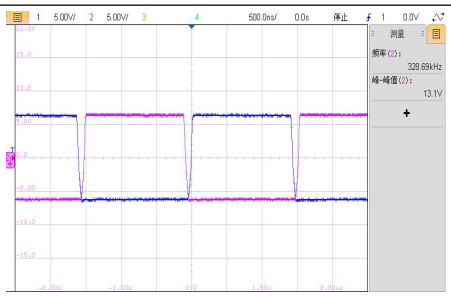
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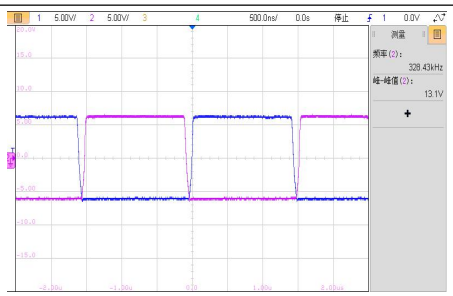
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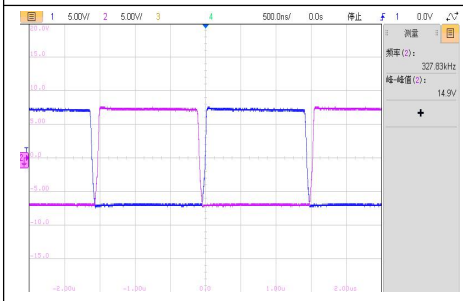
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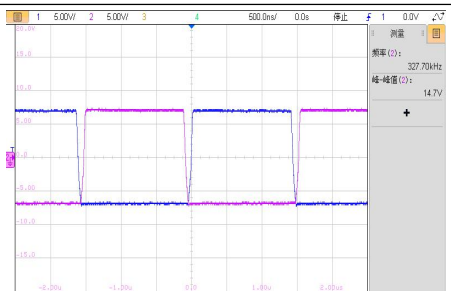
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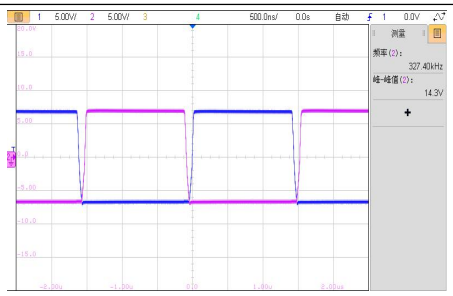
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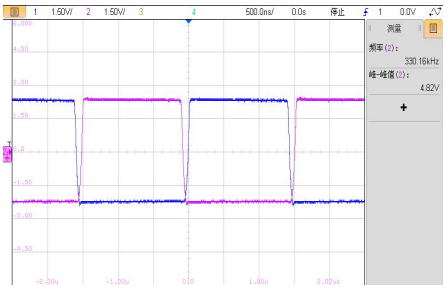
MOS 管电压应力波形-VPS8702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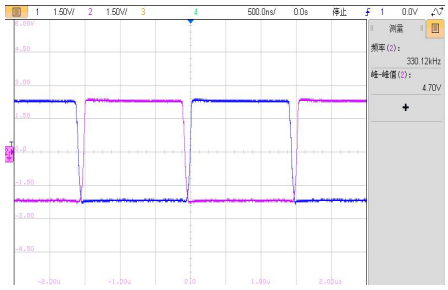
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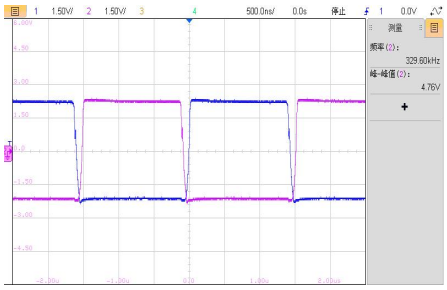
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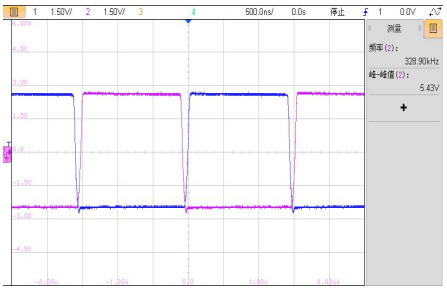
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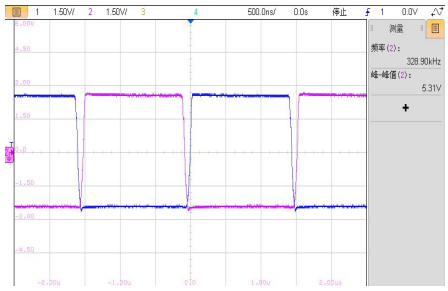
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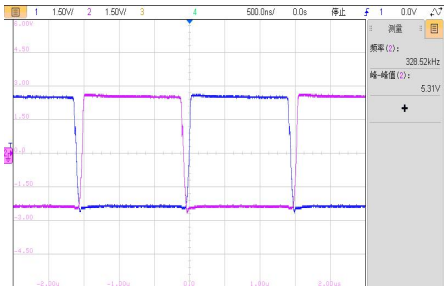
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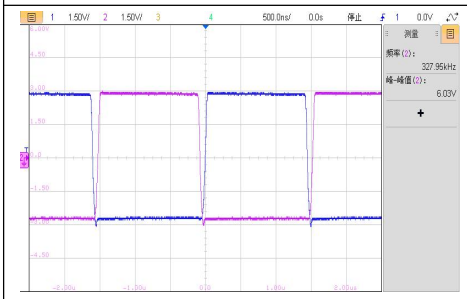
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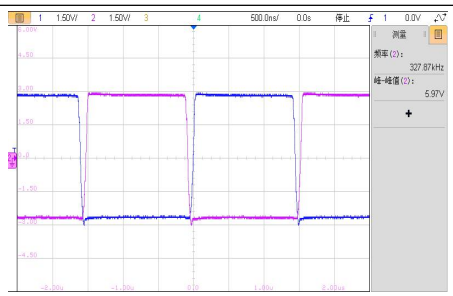
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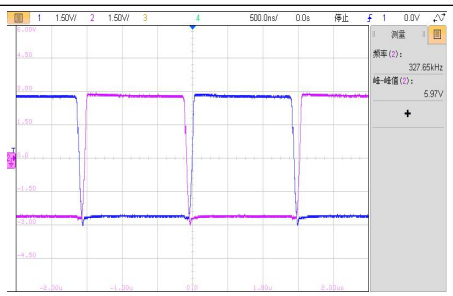
VIN=5.5V，满载 VDS 波形

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