TEA1723BT Demo Board for Air-conditioner Power Spec（V1.0）

Type Number	Control IC	Description
AAPI8WA-NXP	NXP TEA1723BT	8W Power Supply

AVNET BD TEAM (POWER)

2013.01.28

CLASS NO.		Switching Mode Power Supply		NXP TEA1723BT				
NAME	Solomon Wan	SUPERS.		17	2013S001 — 1	10		A4
TY		CHECK		DATE	2013-01-28	Property of	Avnet Logistics(Shenzhen)Ltd	

CONTENTS/目录

1 Introduction/简介

The TEA1723 is a small and low cost module Switched Mode Power Supply (SMPS)controller IC for power applications (up to 11 W) and operates directly from the rectified universal mains input. The device includes a high voltage power switch (700 V) and has been optimized for flyback converter topologies to provide high-efficiency over the entire load range with ultra-low power consumption in the no-load condition. It provides a circuit for start-up directly from the rectified mains voltage without any external bleeder circuits.

The converter operates as a regulated voltage source from no-load up to the maximum output current and operates as current source that delivers the maximum current over a broad output voltage range. Using the TEA1723, a low power converter can be built at minimum cost and with the minimum number of external components.

The controller regulates the output voltage with primary-side sensing which eliminates the need for an additional secondary feedback circuitry and simplifies the design. At higher power levels, a frequency and current control mode is used. It operates with Burst mode control at low power levels and no-load condition. The burst mode minimizes audible noise and provides an energy saver state which reduces the power consumption in no-load condition. The Burst mode frequency of 905 Hz enables no-load power consumption < 25 mW at 230 V (AC) mains input.

TEA1723 是一款小型低成本离线式开关电源控制 **IC**，内置 **700V MOSFET** 开关管，输出功率可达 **11W**，全负载范围内效率可做到最佳，空载功率非常低。启动 **PIN** 直接到主电源回路，可节省分压泄放电阻，以降低成本及空载功耗。

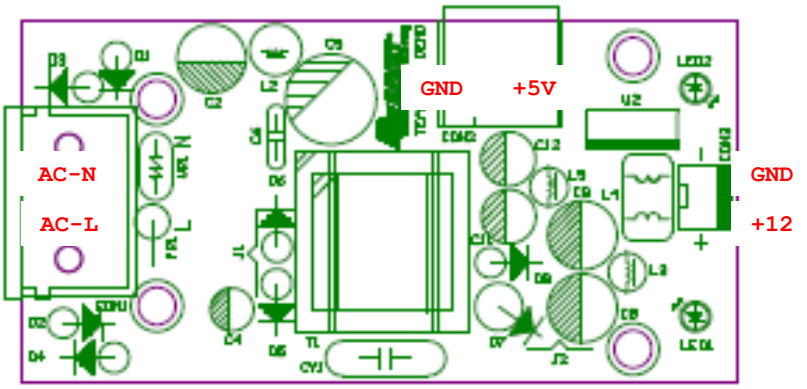
TEA1723 在负载电流范围内为一个稳压源；在电流递加到引起输出电压变低的情况下，作为一个电流源，以防止电流太大，引起严重故障。使用 **TEA1723** 可达到较低的成本较少的元件数量。

TEA1723 为原边反馈控制器，可节省副边反馈回路以简化设计。在高 **Levels** 电源设计要求下，**TEA1723** 具有 **Burst** 工作模式，在空载时，可减小噪声及功耗。

2 Connecting the board/板接口

The board is designed for 90-264V (60/50 Hz) mains supply. It is designed to work with SMPS within a total working current & voltage of 200mA for 5V output and 600Ma for 12V output. The output voltage is constant mode.

此电路板主要适用于交流 90-264V（60/50Hz）市电输入，输出电流/电压范围为 5V/200mA 及 12V/600mA 以内的开关电源，输出为恒压模式。



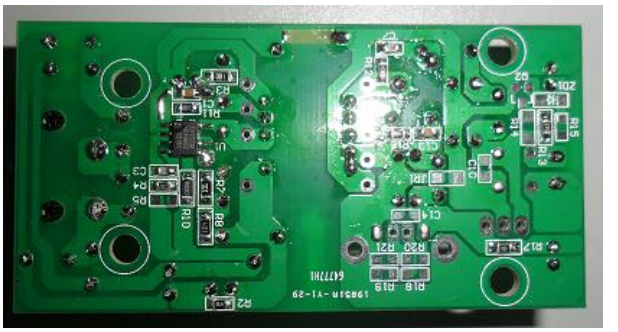
AC-L and AC-N can be used to attach 90-264V(60/50Hz). +5V&+12V and GND can be used to attach loads.

AC-L 和 AC-N 接市电输入，+5V&+12V 和 GND 接负载。

3 Board photographs/板图片

Front/正面

Back/背面



CLASS NO.	**Switching Mode Power Supply**	**NXP TEA1723BT**				
NAME Solomon Wan	SUPERS.	17	2013S001 — 4	10		A4
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4 Specifications/规格参数

4.1 Specification /规格

Parameter	Value	Comment
AC line input voltage	90V to 264V (AC)	board has been optimized for 100-240V ±10 % variation
Input frequency	47Hz to 63Hz	
Output voltage (Loading voltage)	5V(DC) 12V(DC)	**constant voltage accuracy is +/-3%** at full load
Output open loop protection	Open loop	
Output current (Loading current)	200mA for 5V 600mA for 12V	
Output voltage /load current dependency	<±5 %/Volt in regulated	
Maximum output power (LED power)	8W	
Efficiency	**>=75%**	at T_{amb} = 25℃ average efficiency and meet Energy Star 2.0 requests
Standby power loss	**0.26W** (less than the required 0.3W)	
Switching frequency	22.5KHz to 50.5KHz	
Board dimensions	82.5mm×42mm×20mm	L×W×H
Operating temperature	0℃ to +40℃	
Storage temperature	-20℃ to +80℃	
Isolation voltage	2.0 kV	

4.2 Parameter Test/参数测试

Test condition: All measurements performed at room temperature and 50Hz input frequency.

测试条件：所有测试是在室温和输入频率为 **50Hz** 的条件下进行。

4.2.1 Efficiency Test

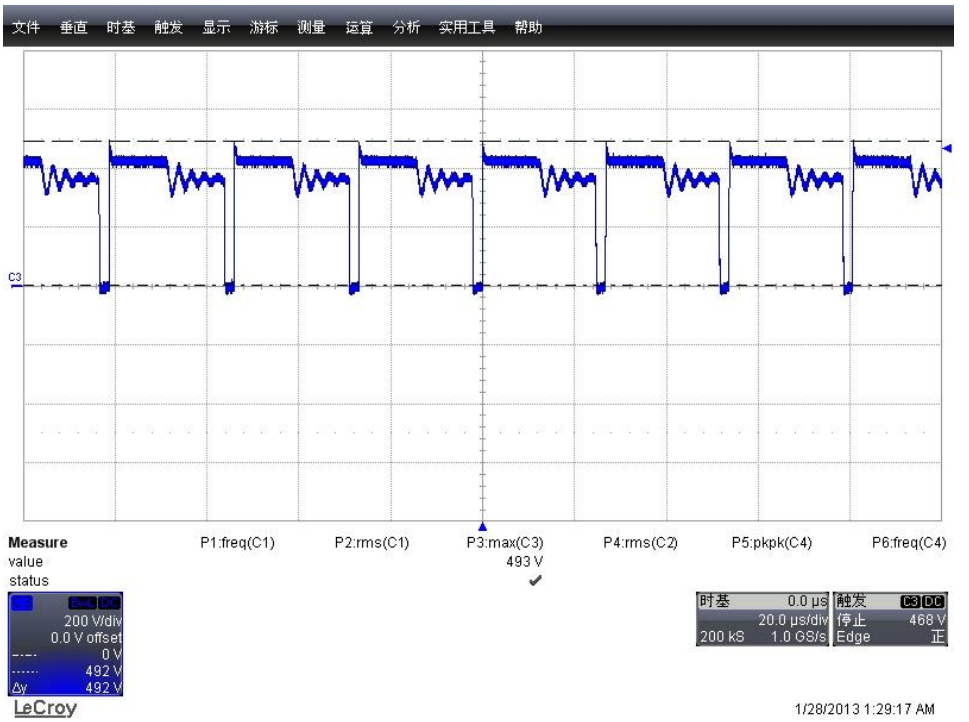
Input (V)	Pin (W)	Vout1 (V)	Vout2 (V)	Iout1 (A)	Iout2 (A)	Pout (W)	Efficiency(%)	Standby Power Loss(W)
90	10.52	5.04	11.67	0.20	0.60	8.010	76	0.21
100	10.26	5.05	11.68	0.20	0.60	8.018	78	0.22
240	10.26	5.04	11.67	0.20	0.60	8.010	78	0.27
264	10.37	5.04	11.65	0.20	0.60	7.998	77	0.26

4.2.2 Cross Load Regulation

Input(V)		100Vac		240Vac	
Vout(V)		5V Port	12V Port	5V Port	12V Port
Cross Load	5V/20mA 12V/0mA	5.02 V	11.79 V	5.02 V	11.80 V
	5V/100mA 12V/0mA	5.02 V	11.55 V	5.02 V	11.55 V
	5V/200mA 12V/0mA	4.93 V	11.49 V	4.93 V	11.46 V
	5V/200mA 12V/600mA	5.00 V	11.44 V	5.00 V	11.43 V
	5V/100mA 12V/600mA	5.02 V	11.41 V	5.01 V	11.40 V
	5V/20mA 12V/600mA	5.13 V	11.40 V	5.13 V	11.40 V

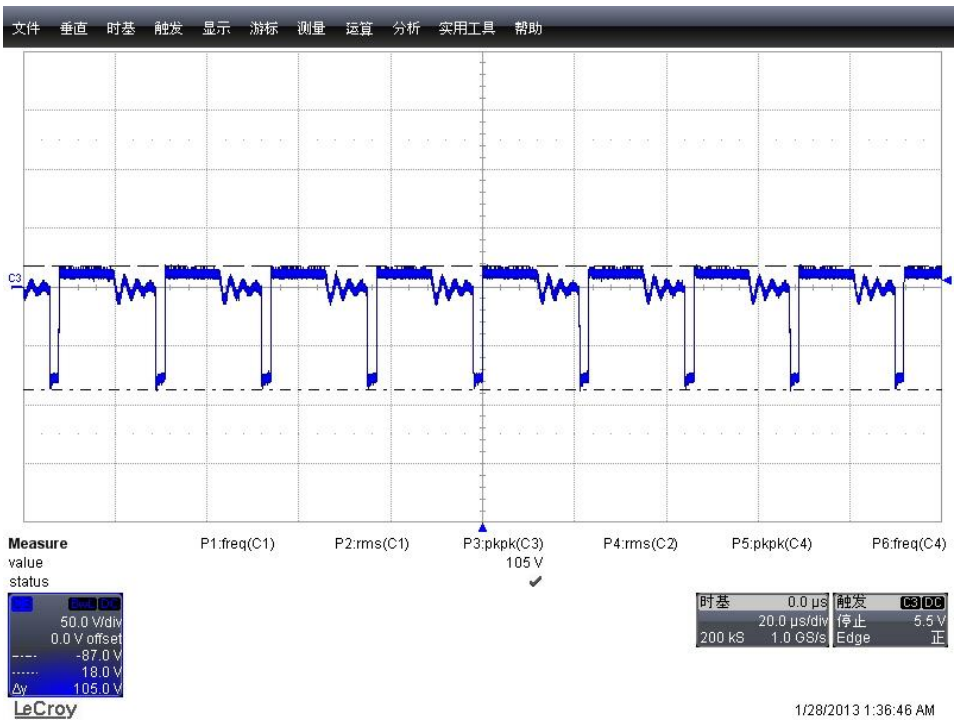
5 Waveform Test/波形测试

5.1 Vin=264V, Vds waveform



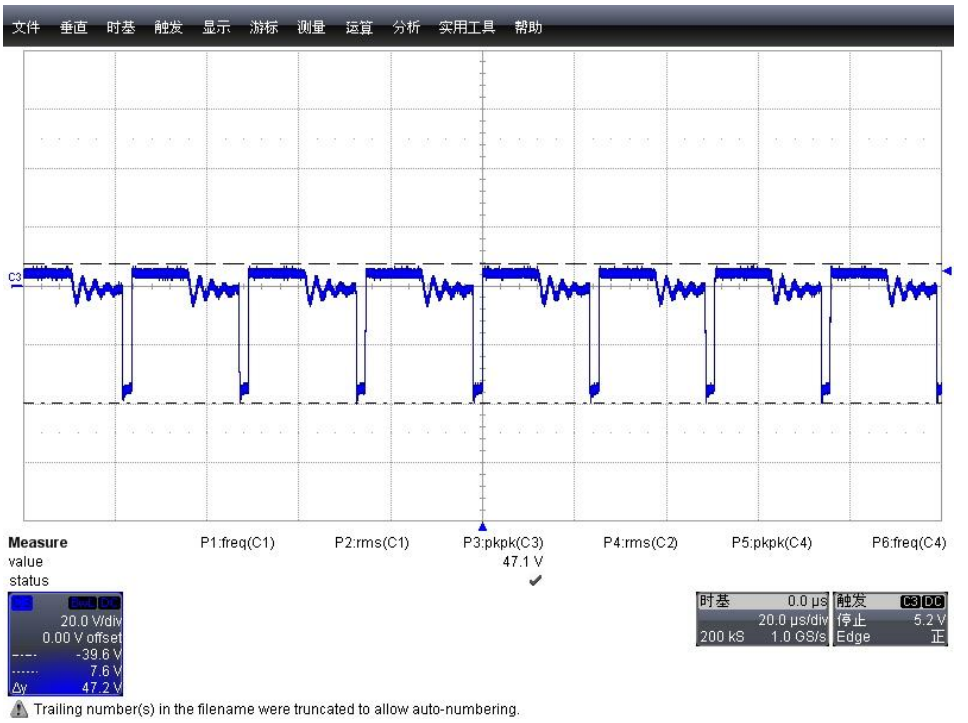
CH3: Vds

5.2 Vin=264V, 12V winding voltage waveform



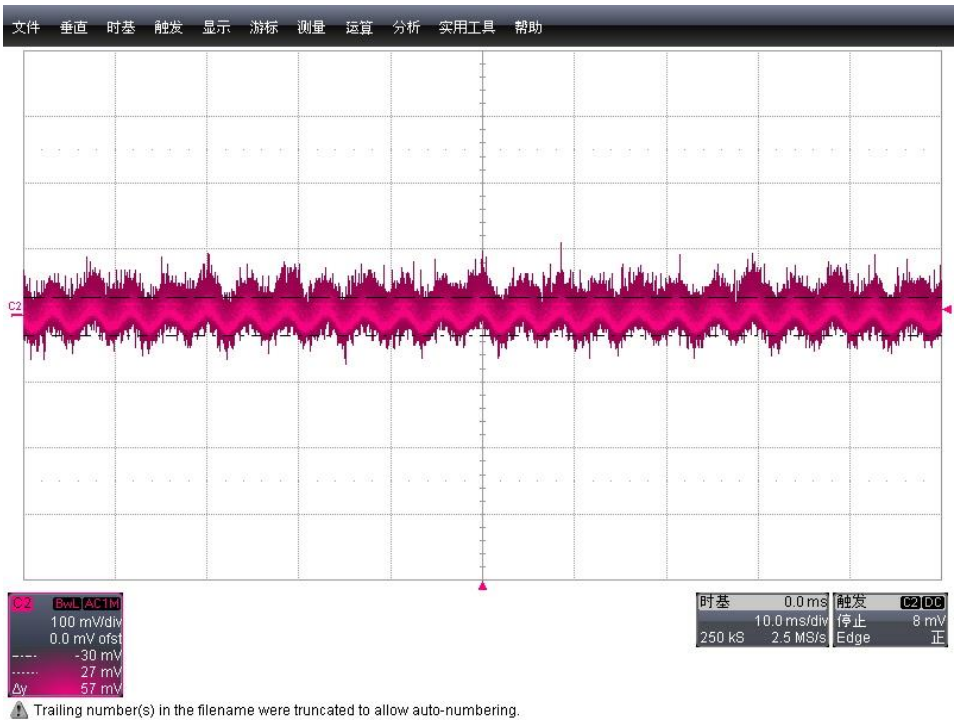
CH3: V_{12V}winding

5.3 Vin=264V, 5V winding voltage current waveform



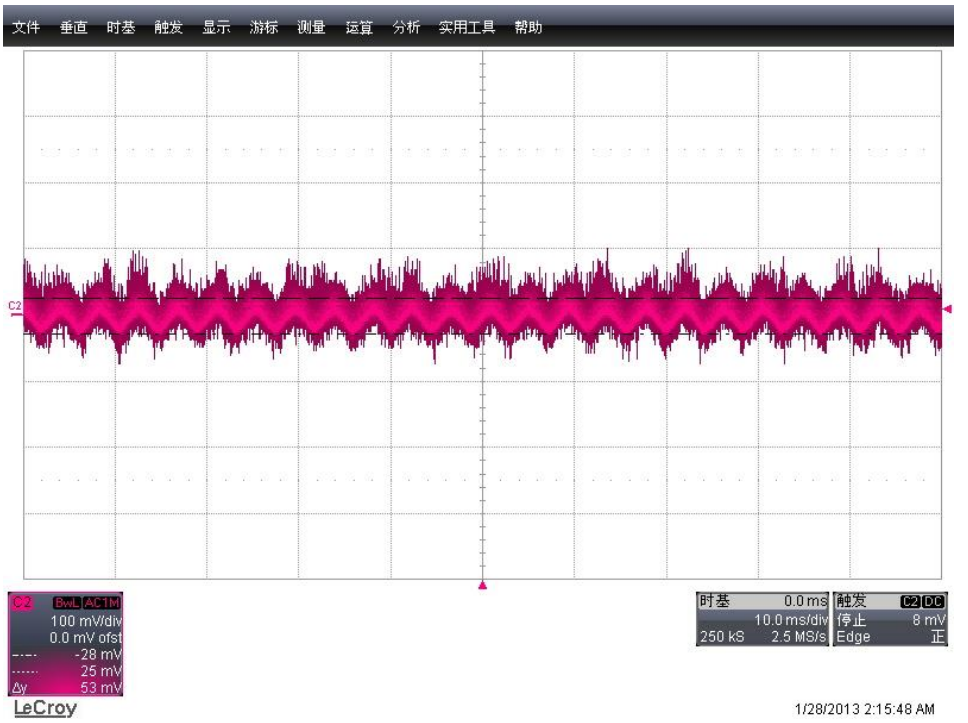
CH3: V5vwinding

5.4 Vin=100V, 12V output ripple waveform



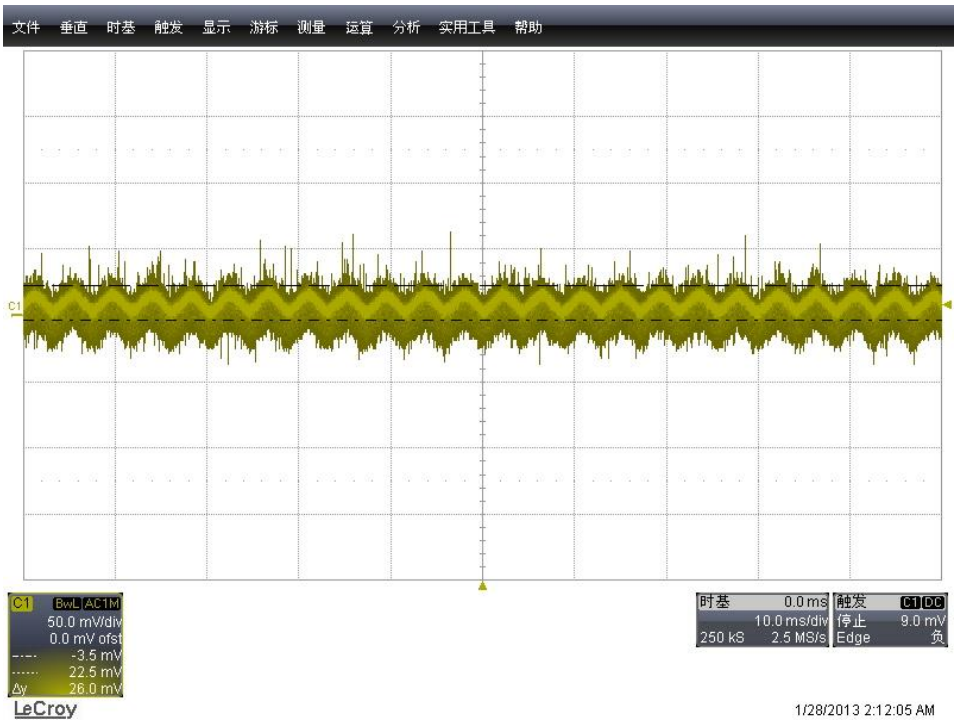
CH2: Vout12V

5.5 Vin=240V, 12V output ripple waveform



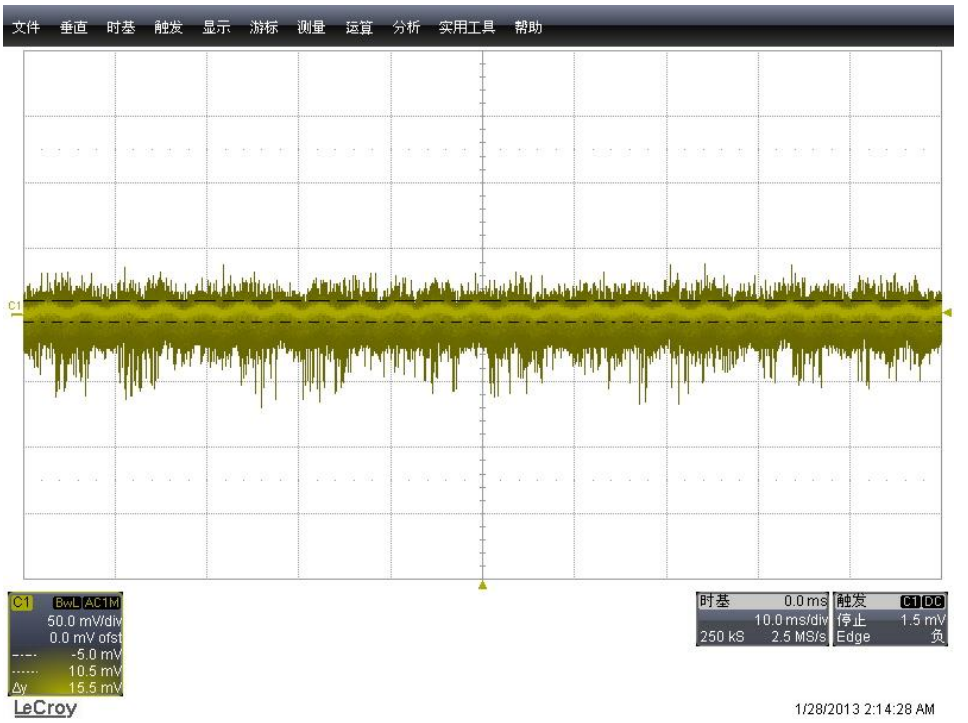
CH2: Vout12V

5.6 Vin=100V, 5V output ripple waveform



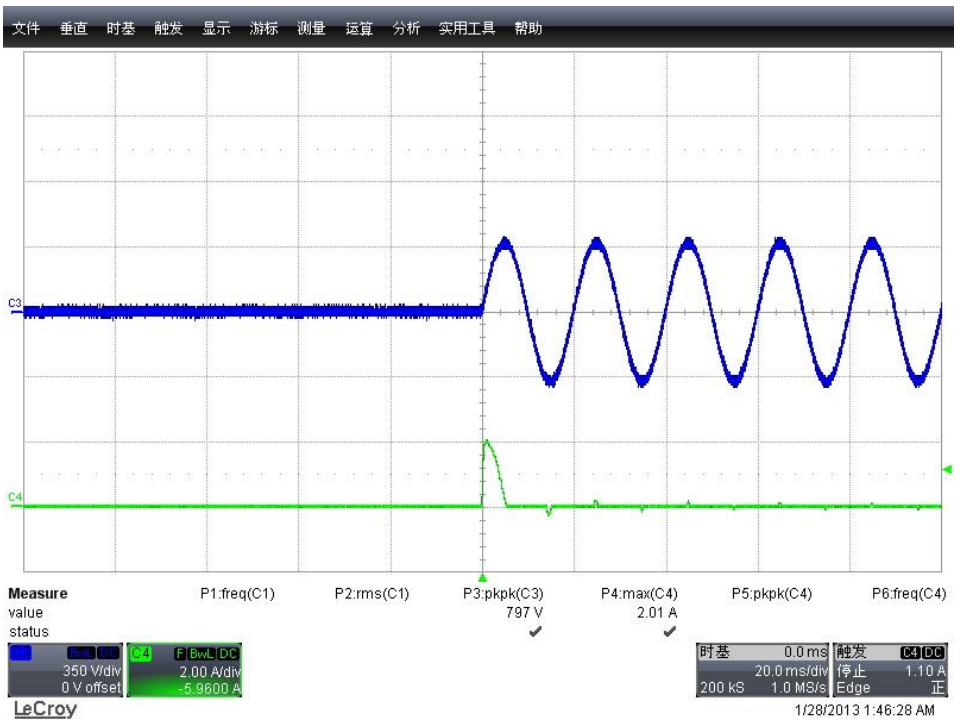
CH1: Vout5V

5.7 Vin=240V, 5V output ripple waveform



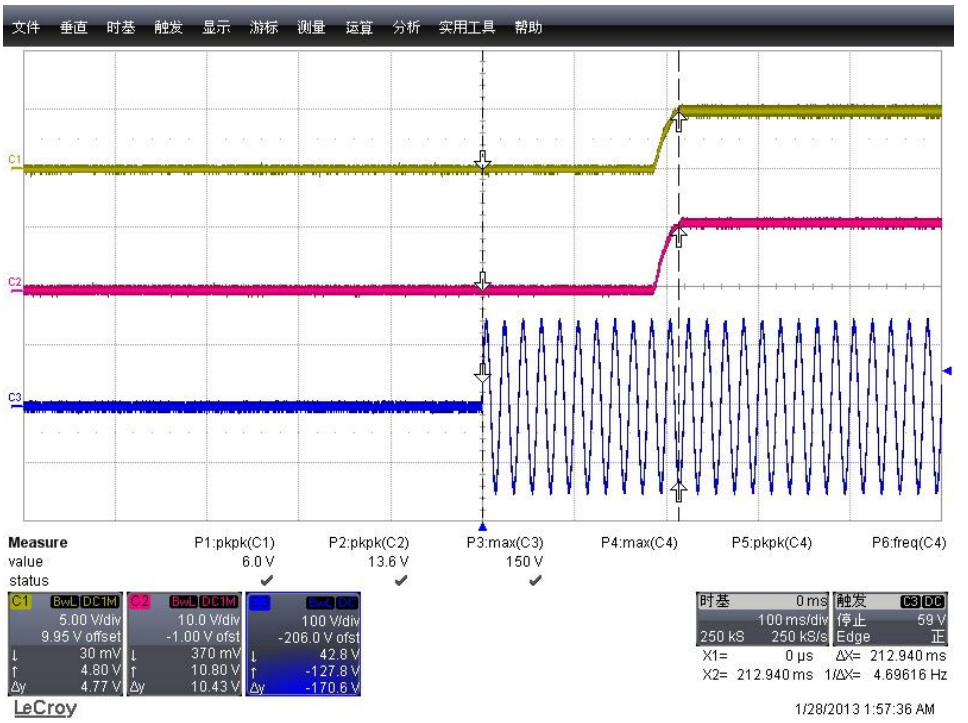
CH1: Vout5V

5.8 Vin=264V, inrush current waveform



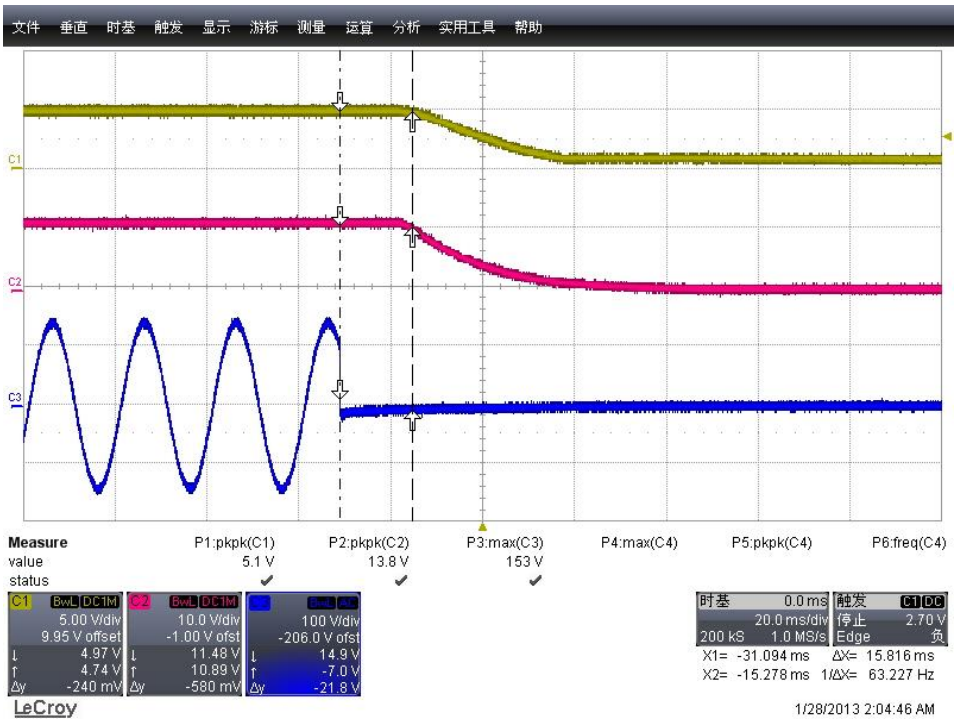
CH3: Vin ; CH4: Iin

5.9 Vin=100V, start time waveform



CH1: Vout5V ; CH2: Vout12V ; CH3: Vin

5.10 Vin=100V, hold time waveform



CH1: Vout5V ; CH2: Vout12V ; CH3: Vin

6 Input Characteristics/输入特性

6.1 Input Voltage & Frequency/输入电压与频率

The range of input voltage is from 90Vac to 264Vac single phase.

输入电压范围：从 **90Vac** 到 **264Vac,** 单相输入.

	Minimum/最小	Nominal/额定值	Maximum/最大
Input Voltage/输入电压	90Vac	100-240Vac	264Vac
Input Frequency/输入频率	47Hz	60Hz/50Hz	63Hz

6.2 Input AC Current/AC 输入电流

0.2Amax. @100-240Vac input & Full load/满载

6.3 Inrush Current (cold start)/浪涌电流(冷启动)

2Amax. @ 240Vac input /输入电压

7 Output Characteristics/输出特性

7.1 Turn - on Delay Time/开机延迟时间

250mS max. @ 115Vac input & Full load/满载

7.2 Efficiency (Normal)/效率(额定输入)

76% min. @ Nominal input & 25-100%/额定输入&25-100%负载

7.3 Output Voltage Ripple /输出电压纹波

30mVmax.for 5V @ Full load /满载

60mVmax.for 12V @ Full load /满载

7.4 Turn - off Hold Time/关机维持时间

15mS min. @ 115Vac input & Full load/满载

7.5 Standby Power loss/待机功率损耗

0.27W max. @ 240Vac input

8 Protection Requirements/保护要求

8.1 Over Current Protection/过流保护

The output shall hiccup when the over currents applied to the output rail, and shall be self-recovery when the fault condition is removed

当过电流时,输出将进入打嗝模式,当过流情况解除后,产品将会自动恢复正常

8.2 Short Circuit Protection/短路保护

The input power shall decrease when the output rail short, the power supply shall no damage, and shall be self-recovery when the fault condition is removed

当输出短路时,产品输入功率降低且不会损伤,当短路情况解除后,产品将会自动恢复正常

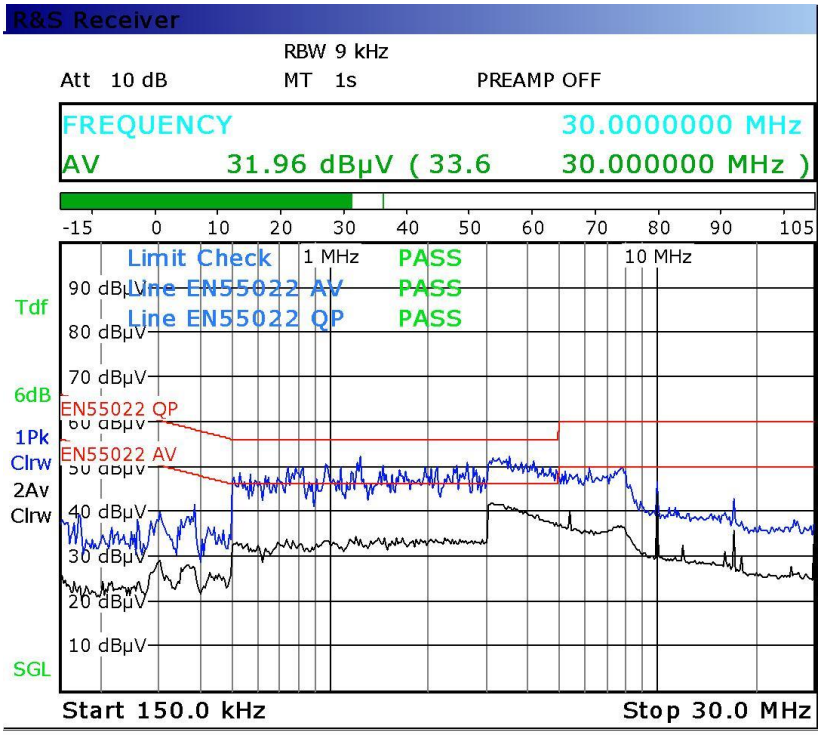
8.3 Over voltage Protection /过压保护

The protection when the output over voltage.(the power supply shall damage)

当输出过压时保护.(产品可能会损伤)

9 EMI Performance/EMI 性能

9.1 Vin=230V L PK&AV scan:



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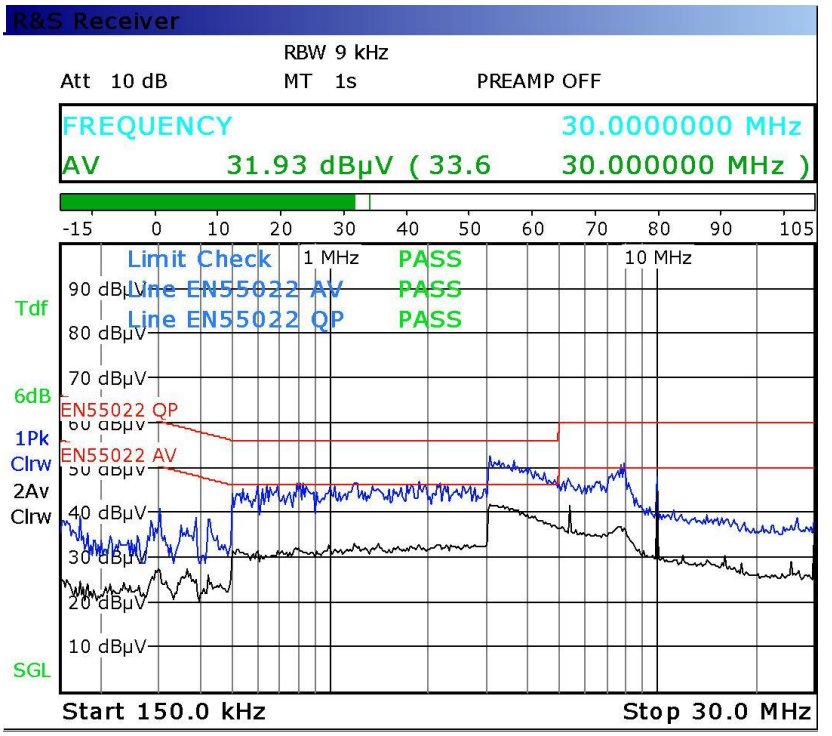
9.2 Vin=230V N PK&AV scan:



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10 EMI/EMS Standards/EMI/EMS 标准

The following standards is reference:

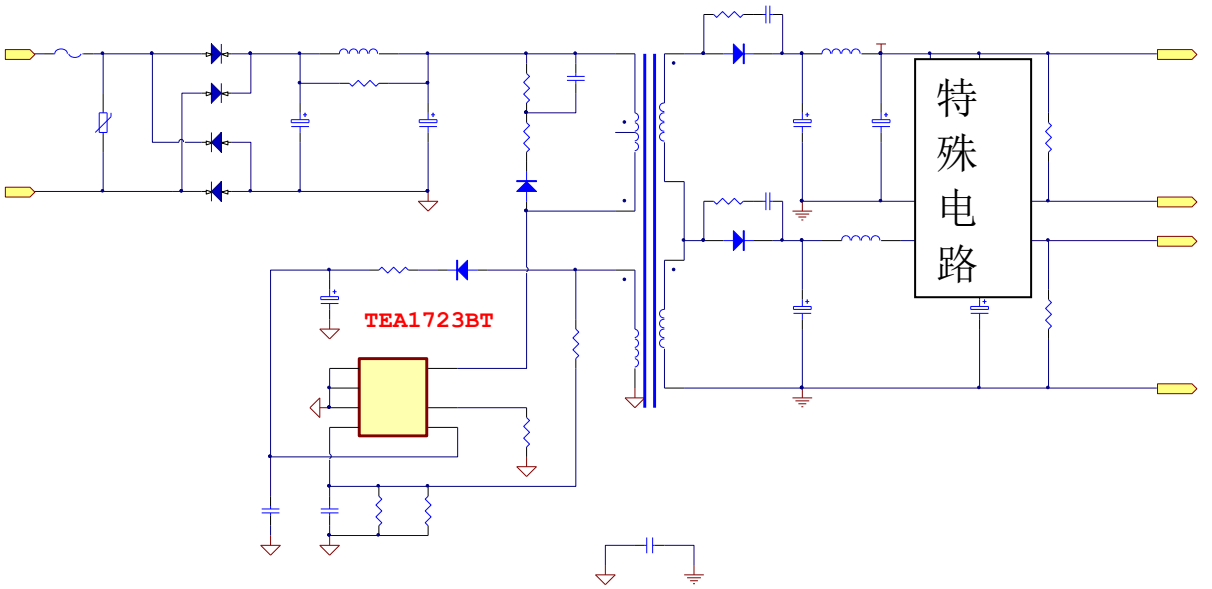
以下标准供参考：

EN (IEC) 61558.2.6:2009

EN (IEC) 61204.1.2003

EN (IEC) 55022:2006

11 Circuit Diagram Drawing /线路图



12 BOM

Item	Part ref	Qty	Value	Description	Vender
1	C1	1	100nF/50V	100nF 50V 0805 X7R Capacitor	Sumsung
2	C2, C5	2	10uF/400V	10uF 400V Φ10*16 Electrolytic Capacitor	Manyue
3	C3	1	22pF/50V	22pF 50V 0805 X7R Capacitor	Sumsung
4	C4	1	10uF/50V	10uF 50V Φ5*11 Electrolytic Capacitor	Manyue
5	C6	1	102/1KV	1nF 1KV Φ5 Ceramic Capacitor	Murata
6	C7, C13	2	470pF/200V	470pF 200V 0805 X7R Capacitor	Sumsung
7	C8, C9	2	470uF/16V	470uF 16V Φ8*12 Low ESR Electrolytic Capacitor	Manyue
8	C11	1	330uF/10V	330uF 10V Φ6.3*12 Low ESR Electrolytic Capacitor	Manyue
9	C12	1	100uF/16V	100uF 16V Φ6.3*12 Low ESR	Manyue

				Electrolytic Capacitor	
10	CY1	1	2.2nF/400V	2.2nF 400V Y1 Capacitor	Murata
11	D1, D2, D3, D4, D6	5	1N4007	1A 1000V DO-41 Rectifier Diode	Vishay
12	D5	1	FR107	1A 1000V DO-41 Fast Recovery Diode	Vishay
13	D7	1	SR3100	3A 100V DO-15 Schottky Diode	Vishay
14	D8	1	SR260	2A 60V DO-15 Schottky Diode	Vishay
15	FR1	1	10R1W	10R 5% 1W Resistor	
16	L2	1	3.3mH 6*8	3.3mH 0.1A Φ6*8 Difference Inductor	
17	L3, L5	2	3.3uH 3*12	3.3uH 1A Φ3*12 Difference Inductor	
18	L4	1	Jump*2	Φ0.6 Jump*2	
19	Q3	1	8050	0.5A 40V SOT23 NPN Transistor	
20	R2	1	4.7K	4.7K 5% 0805 Resistor	
21	R3	1	10R 1206	10R 5% 1206 Resistor	
22	R4	1	3.9K 1%	3.9K 1% 0805 Resistor	
23	R5	1	51K 1%	51K 1% 0805 Resistor	
24	R7	1	100R 1206	100R 5% 1206 Resistor	
25	R8	1	100K 1206	100K 5% 1206 Resistor	
26	R10	1	0.82R 1206 1%	0.82R 1% 1206 Resistor	
27	R11	1	22K 1%	22K 1% 0805 Resistor	
28	R12, R16	2	47R	47R 5% 0805 Resistor	
29	R13	1	2.2K 1206	2.2K 5% 1206 Resistor	
30	R22	1	1K	1K 5% 0805 Resistor	
31	R17	1	1K 1206	1K 5% 1206 Resistor	
32	R23	1	33R1W	33R 5% 1W Resistor	
33	T1	1	EE16	5V 200mA&12V 500mA EE16 Transformer	
34	U1	1	TEA1723x	TEA1723BT SO-8 IC	NXP
35	VR1	1	7D471K	470V Φ7 Voltage Dependent Resistor	
36	ZD2	1	5.6V	5.6V SOD80 Zener Diode	NXP

13 PCB

Dimension: 82.5mm x42mm x 1.6mm (L x W x T)