

## 使用 THX202 设计 5V/1A 反激式开关电源适配器

### 【简介】

反激式开关变换器因为简洁的电路结构、输出无需储能电感、体积较小等优点而被广泛应用在 100W 以下的许多场合。尤其输出无需续流二极管，使它在高压输出的场合应用也很便利。通过使用合适的变压器匝比，可以很容易使其工作于 AC85-265V 的电网范围而无需转换开关，从而可以使用于世界各地。

随着欧盟新的节能法规指令的公布实施，对开关电源的低功耗要求越加严格了，目前设计一款电源首当其冲将优先符合最新的节能标准。

利用 THX202 可以容易的实现一个反激开关电源的应用，其待机功耗低于 0.25W。THX202 用于反激式变换器的典型应用如下图所示：

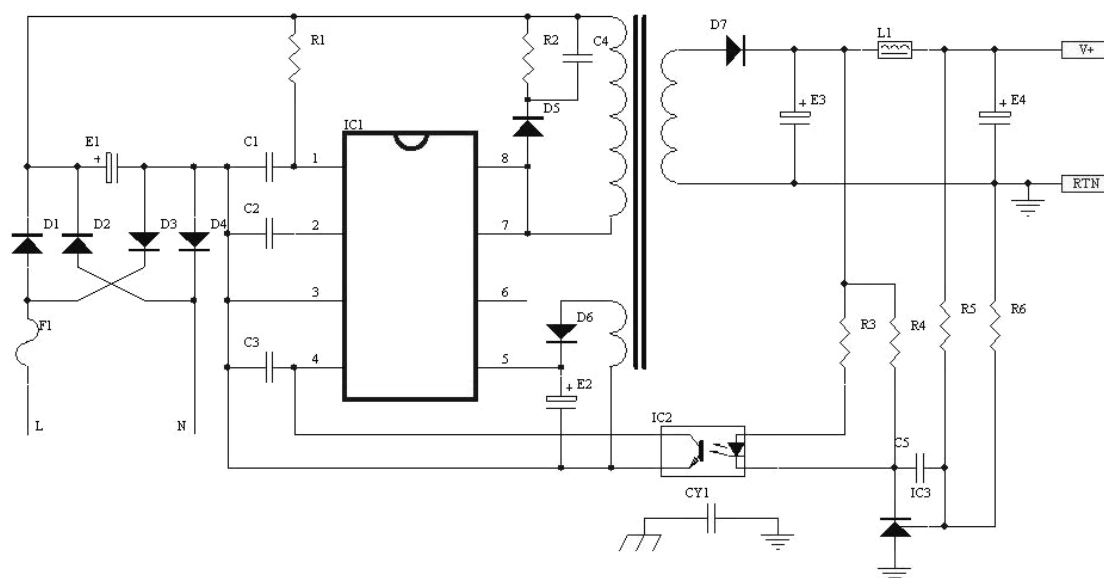


图 1. THX202 的典型应用

### 【参数设计】

本文将以一个额定输出为 5V 1A 的电源为例，提供相关的电路图、变压器参数、测试数据等。

#### 一、输入输出规格：

项目	最小值	额定值	最大值	单位
输入电压	85	-	265	Vac
输入频率	47	-	63	Hz
输出电压	4.75	5.0	5.25	Vdc
输出电流	0	1.0	-	A
输出纹波	-	-	50	mV
输出噪声	-	-	100	mV
效率	70%	-	-	
无输出功耗	-	-	0.25	W

二、电路原理图：

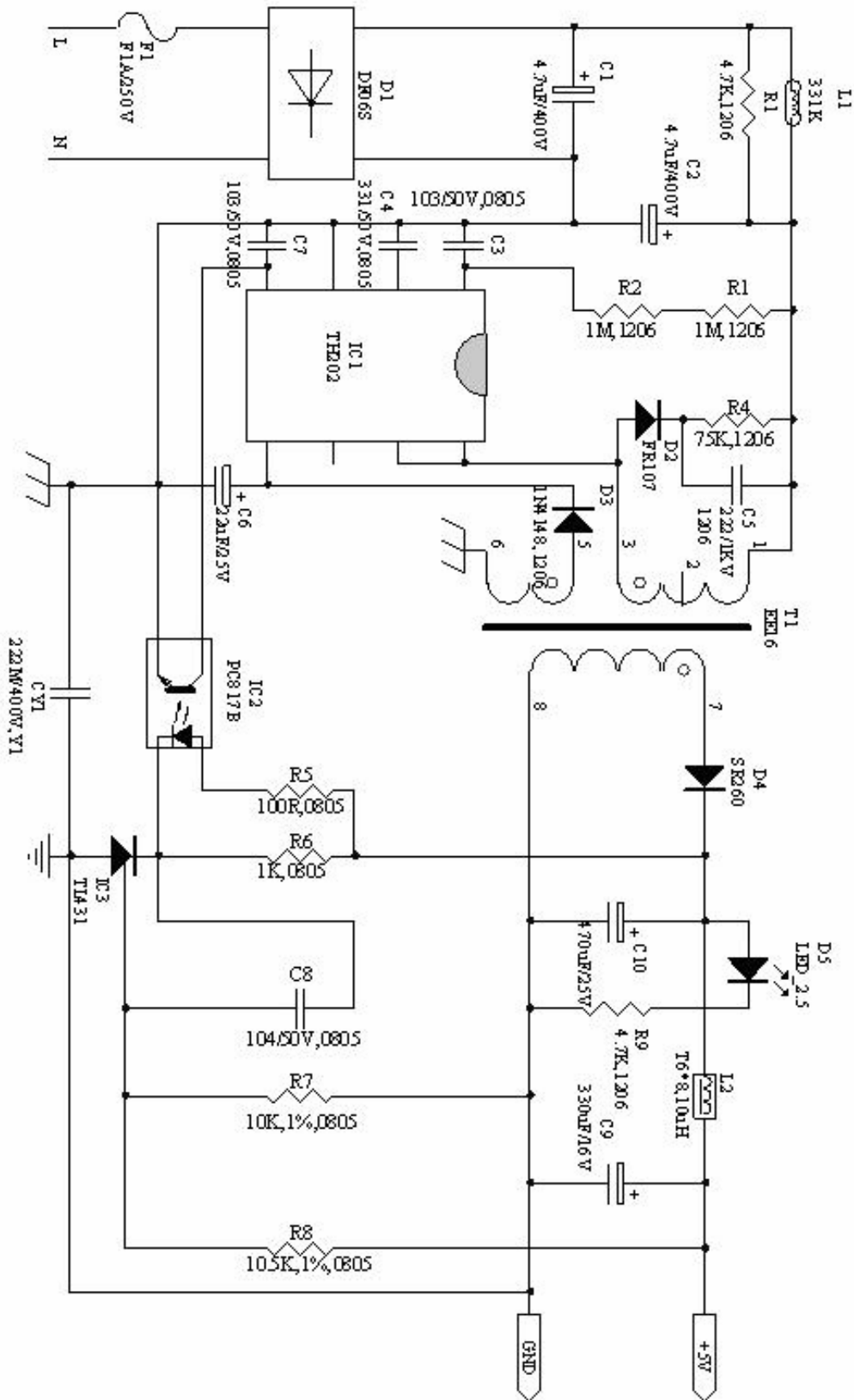


图 2. 5V 1A 电路原理图

三、印制电路板图：

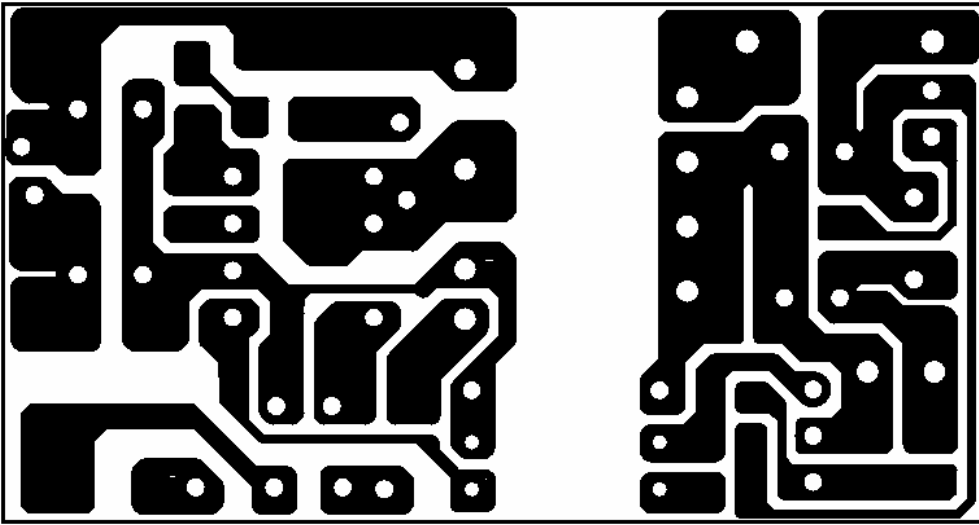


图 3. PCB Layout

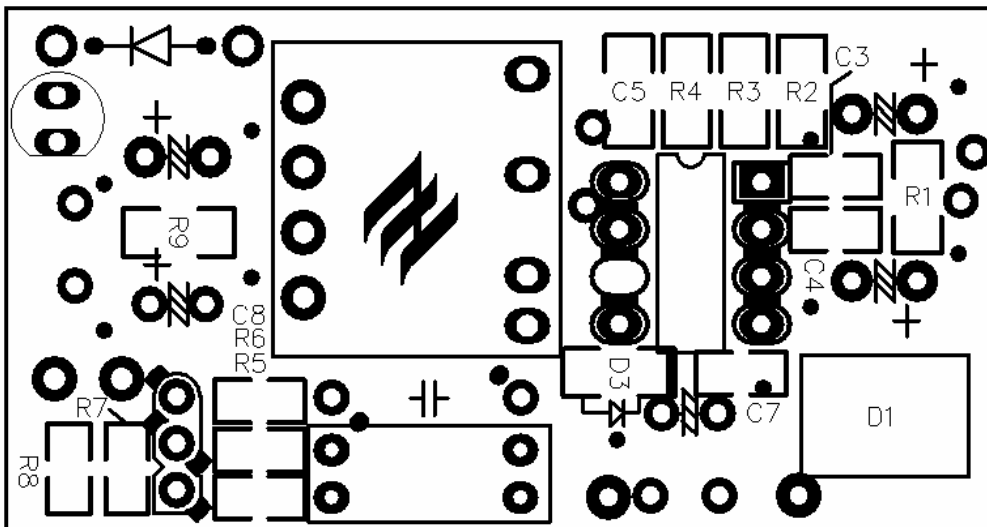
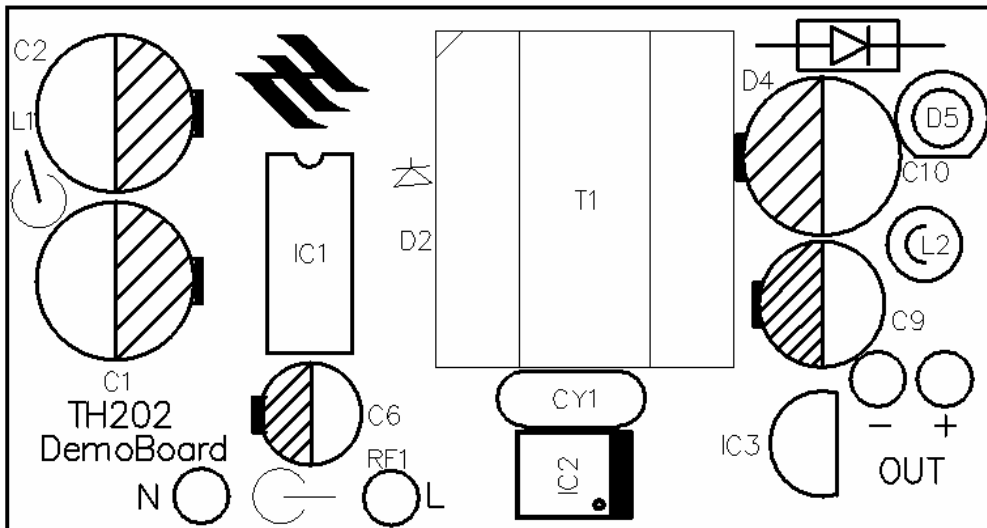


图 4,图 5. PCB TopOverlay and Bottom Overlay

**四、元件清单：**

序号	规格	封装/厂商	数量	编号				
1	100R,1/8W	0805	1	R5				
2	1K,1/8W	0805	1	R6				
3	10K,1/8W,1%	0805	1	R7				
4	10.5K,1/8W,1%	0805	1	R8				
5	4.7K,1/4W	1206	2	R1	R9			
6	75K,1/4W	1206	1	R4				
7	1M,1/4W	1206	2	R2	R3			
8								
9	331/50V,5%	0805	1	C4				
10	103/50V	0805	2	C3	C7			
11	104/50V	0805	1	C8				
12	222/1KV	1206	1	C5				
13	222M,AC400V	CT7	1	CY1				
14								
15	4.7uF/400V	CD8*13,JEE	2	C1	C2			
16	22uF/16V	CD5*11,SAMXON	1	C6				
17	470uF/16V	CD8*13,SAMXON	2	C9	C10			
18								
19	1N4148	1206	1	D3				
20	FR107	DO41	1	D2				
21	SR260	DO41	1	D4				
22	DF06S	SMD	1	D1				
23	LED	LED2.5	1	D5				
24								
25	THX202	DIP8, Tonghua	1	IC1				
26	PC817B	DIP4, Sharp	1	IC2				
27	TL431AZ	TO92, Frirchild	1	IC3				
28								
29	332K,150mA	DR4*8	1	L1				
30	DR6*8,10uH	DR6*8	1	L2				
31	EE16	EE16,PC40,4+6PIN	1	T1				
32								
33	F1A/250V	4*10,引线立式	1	F1				
34								
35	PCB	53mm × 28mm	1					
36								
37								
38								

## 五、设计要点：

### 1、反激电压：

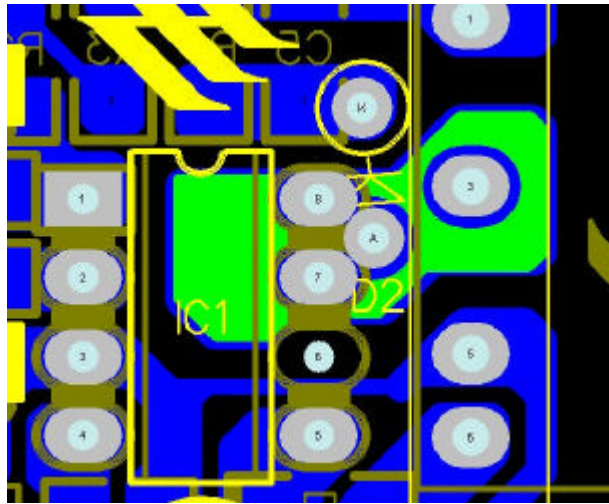
反激电压理论值应小于最小输入直流电压，因此，推荐 85-265Vac 时反激电压值为 80V 左右。反激电压越高，输出峰值输出功率越大；反激电压越低，输出纹波越小。

### 2、最大占空比：

在最低输入电压、最大输出功率情况下产生，依据反激电压推荐值，最大占空比应小于 50%，而且不易出现谐波振荡。

### 3、额定输出功率：

由于采用防过载防饱和技术，额定输出功率可以略小于峰值输出功率；但是，如环境温度太高，THX202 热保护起作用，则峰值输出功率和额定输出功率将下降；因此必须在布线时考虑 IC 的散热问题，推荐如下方式布线，并将铜皮上锡处理(绿色区域)。



### 4、Ct 定时电容：

开关频率 66KHz (Ct=330PF) 比较适合 THX202 的特性，推荐使用；太高时，开关边沿损耗增加，温升较高，散热难度增加；可以再低，如 50KHz；但变压器绕组增加较多，同时输出滤波要求也较高。在低功率输出时 THX202 将降低工作频率，THX202 选择输出功率约 1/4 峰值输出功率时开始降频，输出功率越低工作频率越低，以降低输入功率。

### 5、Cb 反馈电容：

Cb 取值在 10nF-47nF 比较合适；过大则输出动态特性较差；过小则峰值输出功率时纹波较大。

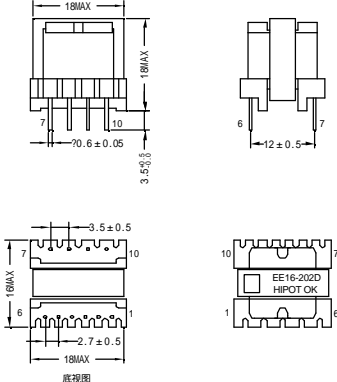
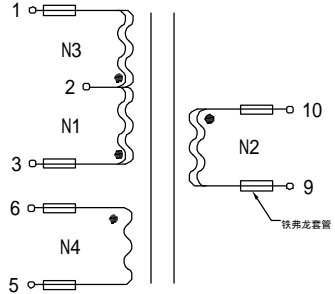
### 6、变压器匝数：

变压器初级匝数及变压器匝比的设定应保证适当的工作磁通密度和峰值反压，通常可将峰值反压控制在最大输入时约 500V 左右，将最大磁通密度控制在 0.25T 以下，以避免过载及反复通断电冲击的条件下出现过电压或变压器饱和现象。

### 10、变压器绕制：

推荐变压器采用三明治的绕法，按约 1/2 主绕组、输出绕组、1/2 主绕组、参考绕组的顺序绕制，且将主绕组密绕，输出与参考绕组疏绕，里层的约 1/2 主绕组以刚好绕满整层为佳，可得到最低的漏感值；主绕组和参考绕组的耦合的降低，也有利于正确实施输出短路保护和输出过压保护。在确定主绕组、输出绕组后，参考绕组匝数按 5.5-6V 电压设计，整流二极管按 1N4148 设计，短路保护时如果短路电流较大，可适当降低参考绕组电压。

六、变压器参数：

DESCRIPTION:	TRANSFORMER EE-16立式 3.10mH(T)	PART NO.	TH202Demo				
1. OUTLINE DIMENSION: (UNIT: mm)		2. SCHEMICAL:					
							
<p>NOTE:</p> <ol style="list-style-type: none"> <li>PIN4拔取处理, PIN4剪掉2/3.</li> <li>标签贴于磁心顶部, 字朝PIN 1-6边.</li> <li>磁心研磨中柱, 气隙0.17mm(参考值).</li> <li>所有PIN套铁甫龙套管.</li> </ol>							
3. WINDING:							
NO.	WINDING	MATERIAL	START	FINISH	TURNS	TAPE	REMARK
01	N1	2UEW ?0.20*1C	3	2	80Ts	3Ts	密绕2层
02	N2	2UEW ?0.50*1C	10	9	11Ts	3Ts	均匀绕
03	N3	2UEW ?0.20*1C	2	1	80Ts	3Ts	密绕2层
04	N4	2UEW ?0.20*1C	6	5	13Ts	3Ts	均匀绕
05							
06							
07							
4. ELECTRICAL CHARACTERISTICS: (TEMPERATURE: 25 ° C)							
NO.	TEST	CONDITIONS	WINDING	REQUIREMENTS			
01	INDUCTANCE	1KHz/1V	1-3	3.10mH ± 10%			
02	DC RESISTANCE	/	1-3	1.0ohm MAX			
03	LEAKAGE INDUCTANCE	1KHz/1V	1-3 SEC. SHORT	200uH MAX			
04	DIELECTRIC WITHSTANDING	AC60Hz/5mA, ONE MINUTE	P-S	3.0KV			
			P-C	3.0KV			
			S-C	3.0KV			
05	INSULATION RESISTANCE MEGAOHM	0.5KV DC	P-S	100mohm			
			P-C	100mohm			
			S-C	100mohm			
5. MATERIAL LIST:							
NO.	ITEM	MATERIAL	SUPPLIER OF THE MATERIAL				
01	BOBBIN	VALOX 420-SEO 94V0	FW ELECTRONIC CO;LTD				
02	CORE	PC40	TDK ELECTRONIC CO;LTD				
		2500B	TOKIN ELECTRONIC CO;LTD				
		B3	KAWATETSU ELECTRONIC CO;LTD				
		PL-3	SAMHWA ELECTRONIC CO;LTD				
		MZ2	HIMAG ELECTRONIC CO;LTD				
03	MAGNET WIRE	POLYURE THANE 2UEW ENAMELLED COPPER WIRES 2UEW 130 ° C	PACIFIC ELECTRIC WIRE & CABLE CO;LTD HUNG KUANG WIRE NFRE NFG CO;LTD TOTOKU ELECTRIC CO;LTD				
04	TAPE	3M1350#	3M CO;LTD FOUR POLLARS ENTERPRISE CO;LTD				
05	VARNISH	BC-346A	UOIN C DOLPH CO;LTD				
APPROVED		CHECKED	DRAWN				

七、输出的 CC/CV 的控制参考电路：

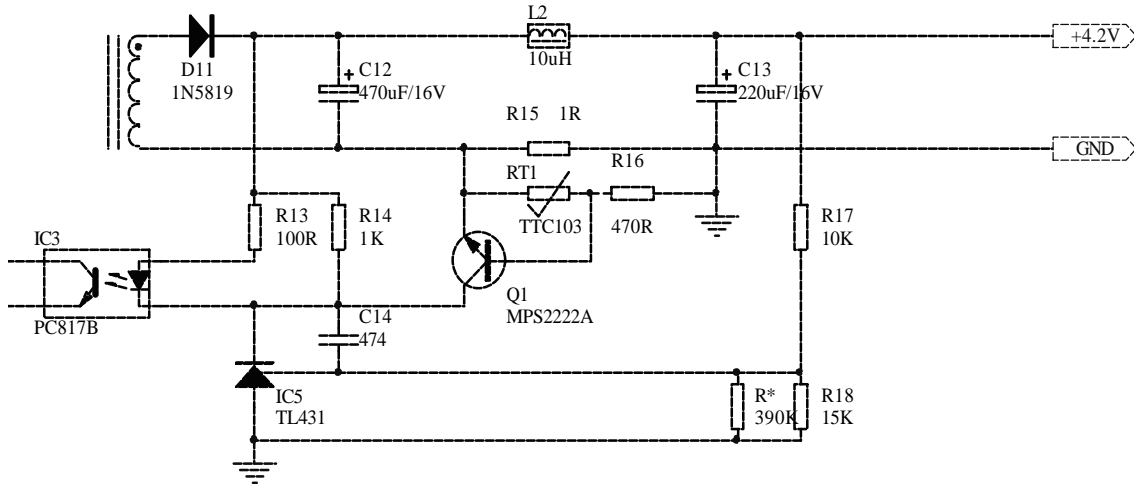


图 6 , CC/CV 控制方式 1

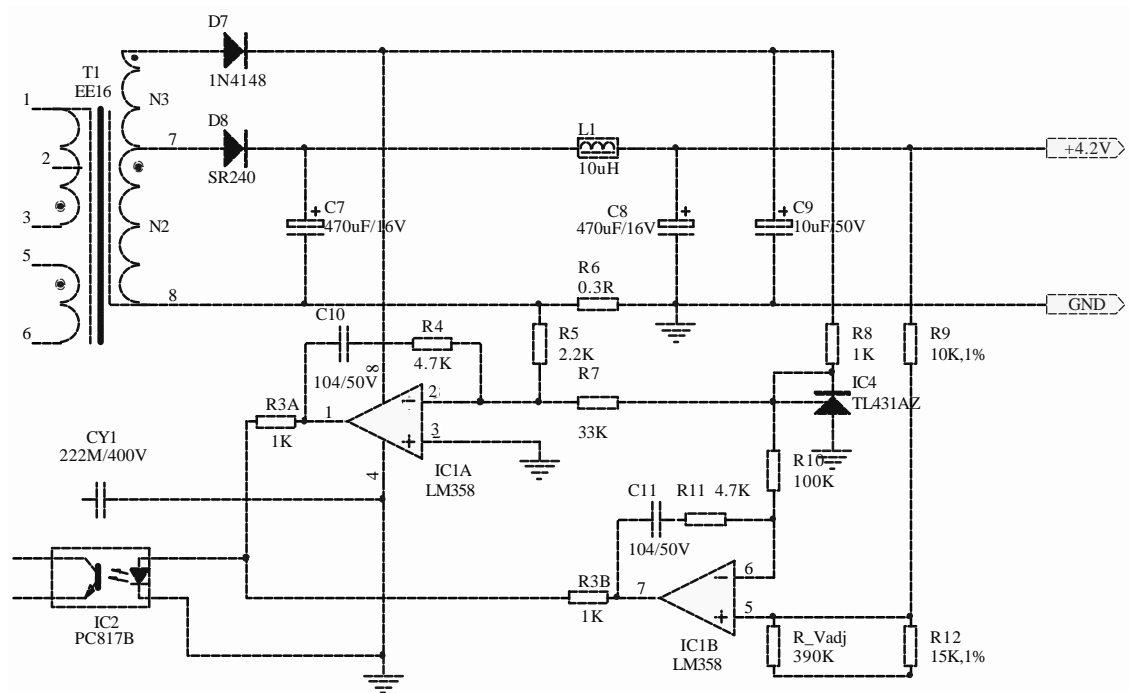
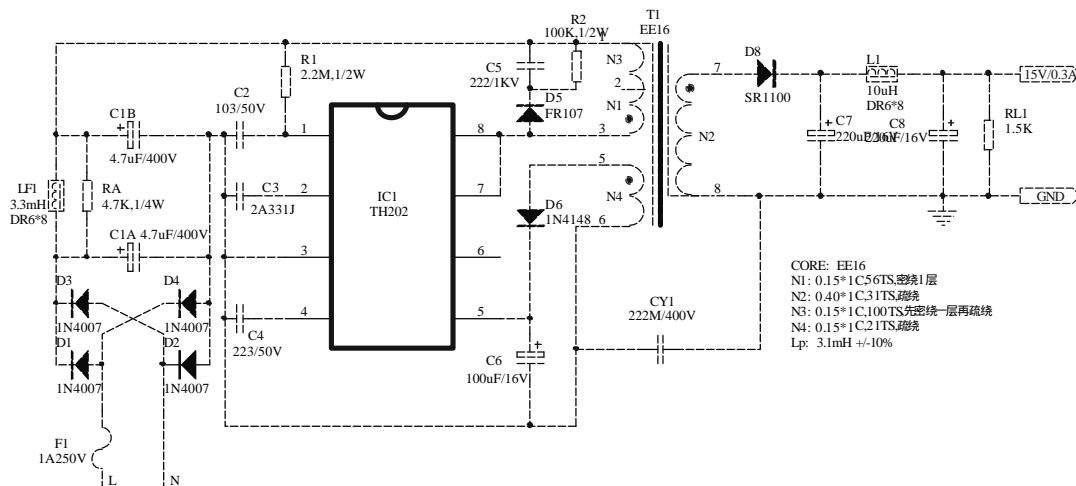


图 7 , CC/CV 控制方式 2

### 八、其它的相关应用介绍

#### 1. 输出精度要求不高的无光耦应用：

(1) 参考原理图 ( Input:85-265Vac,Output:15V0.3A, ± 10% )：



(2) 变压器参数：

CORE: EE16

N1: 0.15\*1C,56TS,密绕层

N2: 0.40\*1C,31TS,疏绕

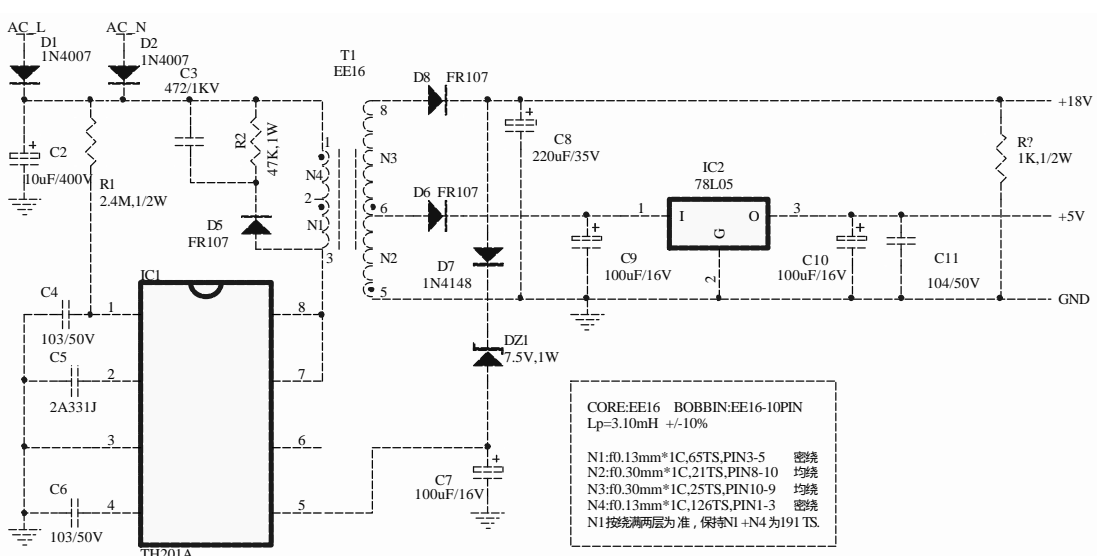
N3: 0.15\*1C,100TS,先密绕一层再疏绕

N4: 0.15\*1C,21TS,疏绕

Lp: 3.1mH +/-10%

#### 2、非隔离电源的应用：

(1) 参考原理图 ( Input:150-270Vac,Output:18V0.3A,5V0.03A )：





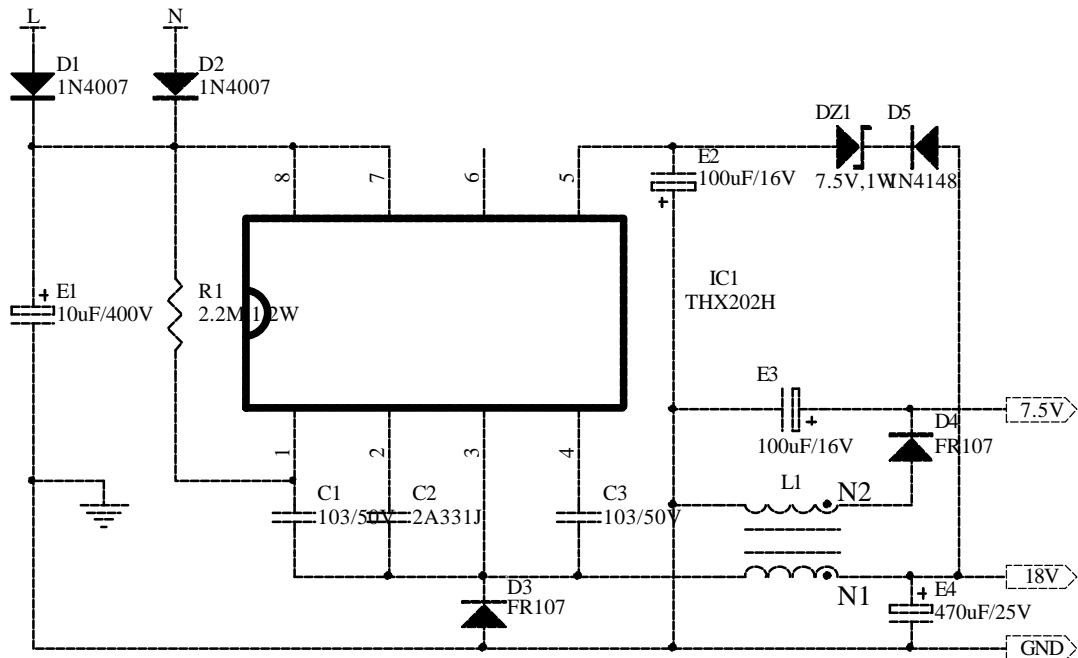
(2) 变压器参数：

CORE:EE16 BOBBIN:EE16-10PIN  
 $L_p=3.10\text{mH} \pm 10\%$

N1:f 0.13mm\*1C,65TS,PIN3-5 密绕  
 N2:f 0.30mm\*1C,21TS,PIN8-10 均绕  
 N3:f 0.30mm\*1C,25TS,PIN10-9 均绕  
 N4:f 0.13mm\*1C,126TS,PIN1-3 密绕  
 N1按绕两层为准,保持N1+N4为191TS.

3、非隔离、无变压器的BUCK电源的应用：

(1) 参考原理图 (Input:150-270Vac,Output:18V0.2A,5V0.03A)：



(2) 线圈 L1 参数：

Core: DR10\*15  $A_e=20\text{mm}^2$   $A_l=45\text{nH/N}^2$   
 N1: 0.15mm, 200 TS  
 N2: 0.15mm, 93 TS  
 $L_p: 1.80\text{mH} \pm 10\%$

八、测试数据：

1. 电压(V)、电流(A)与输出纹波(mV) / 噪声(mV)：

输出 / 负载		输入电压					
		85Vac	110Vac	130Vac	180Vac	220Vac	265Vac
0A	电压	5.15V	5.15V	5.15V	5.15V	5.15V	5.15V
	纹波/噪声	11 / 20	14 / 19	15 / 22	20 / 24	23 / 24	26 / 25
0.3A	电压	5.145V	5.145V	5.145V	5.145V	5.145V	5.145V
	纹波/噪声	8 / 38	8 / 42	8 / 44	10 / 52	13 / 54	15 / 60
0.6A	电压	5.14V	5.14V	5.14V	5.14V	5.14V	5.14V
	纹波/噪声	8 / 48	9 / 44	10 / 40	11 / 42	12 / 46	12 / 52
1A	电压	5.13V	5.13V	5.13V	5.13V	5.13V	5.13V
	纹波/噪声	12 / 42	11 / 36	11 / 44	11 / 36	10 / 40	11 / 46

注：测试纹波时在示波器探头并接 0.1uF/50V 高频电容和 10uF/50V 电解电容各一只，不使用探头地环线，如下图所示：

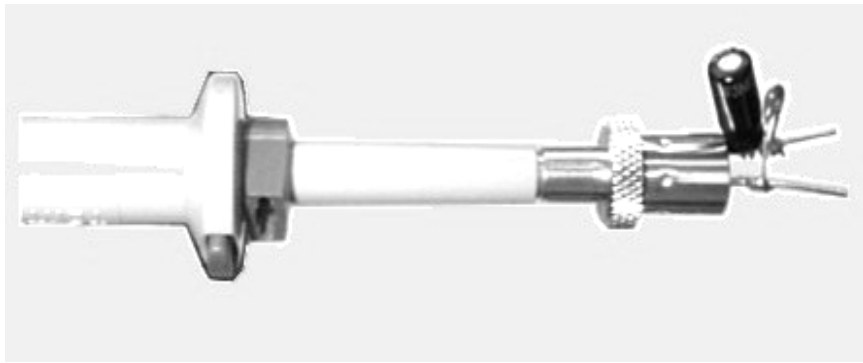


图 7. 示波器探头接法

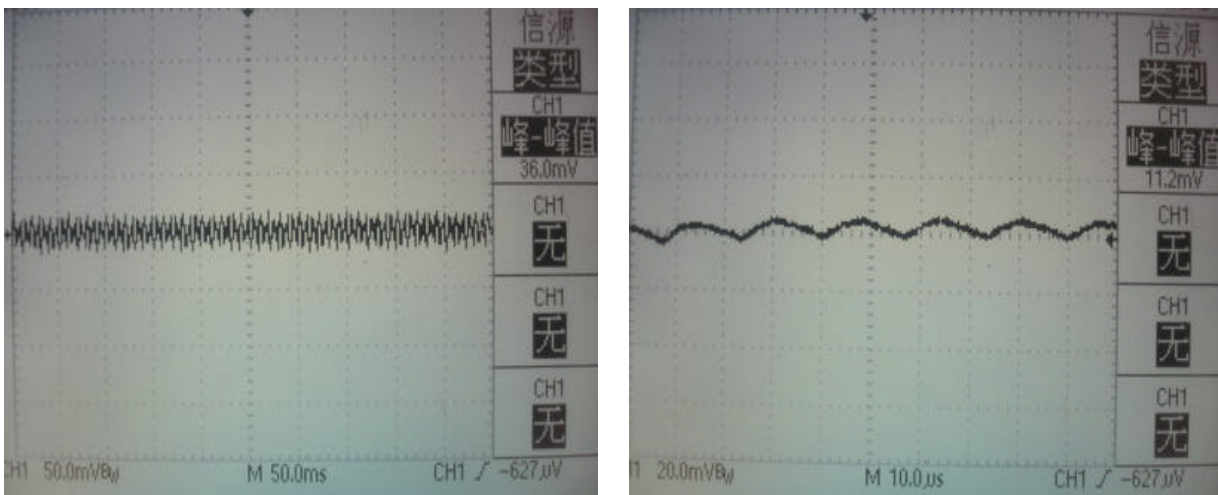


图 8. 输出纹波 / 噪声 @ 5V 1A OUT AND 110V IN

2. 功率开关的电压波形：

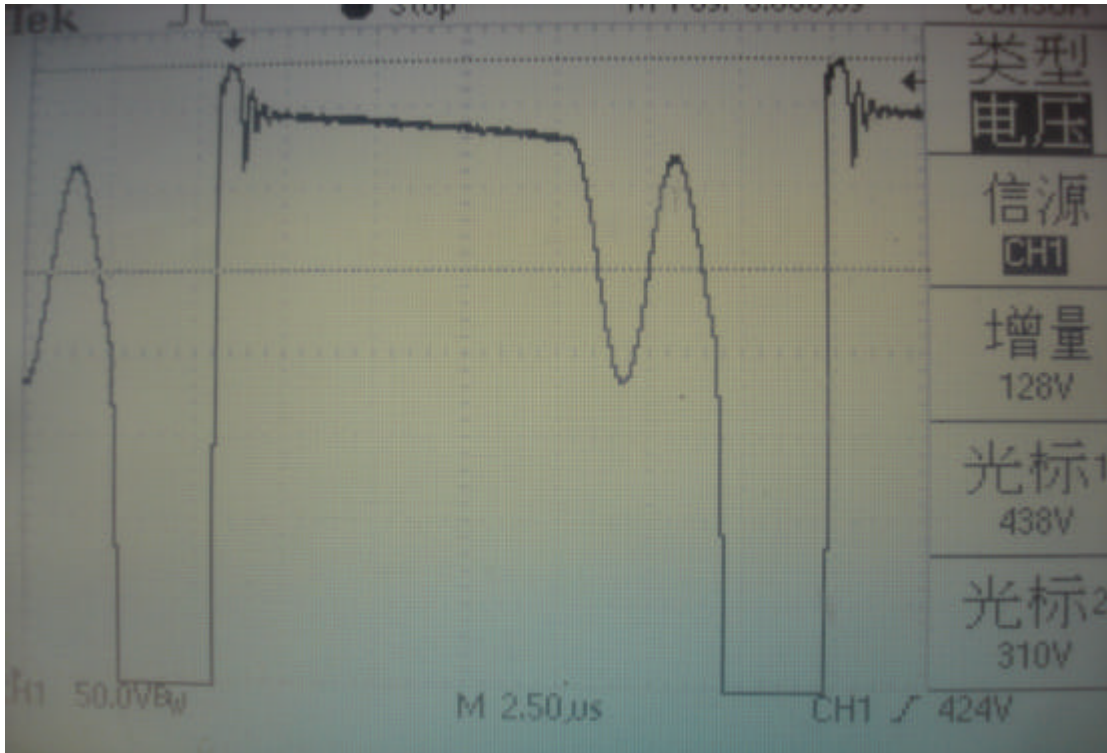


图 13. 开关波形 @220V INPUT and 5V 1A OUTPUT

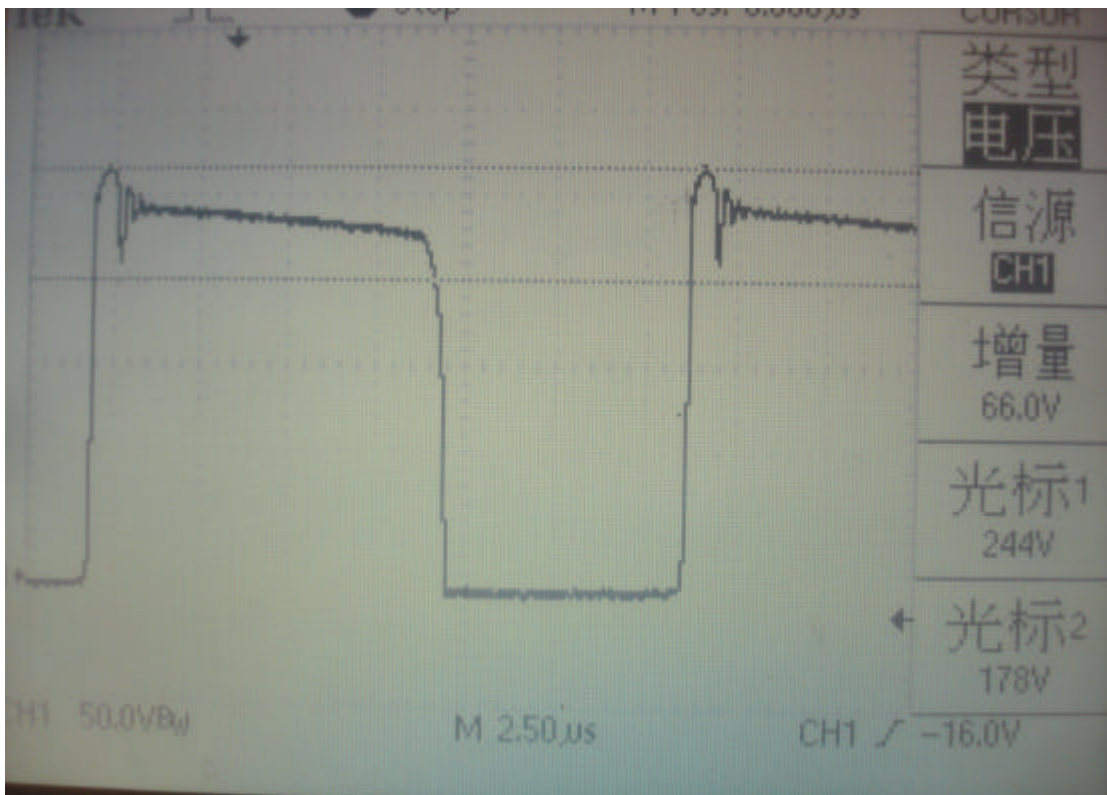
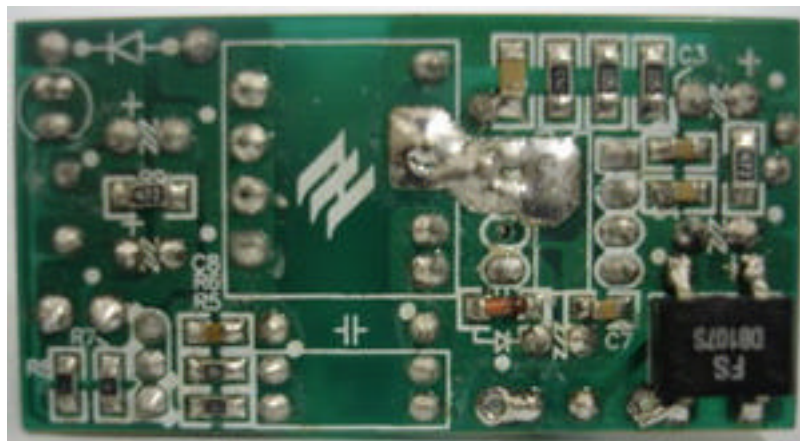


图 14. 开关波形 @110V INPUT and 5V 1A OUTPUT

5. 附件：使用 Chroma ATS6000 测试系统完成的测试报告。



外观正视图



外观底视图

## 九、版本信息：

日期	版本	注释	作者	
2005.5.10	V1.0	初版	James	

## 十、产品链接：

THX202H: [规格书点击下载](#)

其它产品：

THX201: [规格书点击下载](#)

THX101: [规格书点击下载](#)

THX102: [规格书点击下载](#)

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# Report Test 1

## General Information

Model Name: 5V1A adp Customer: 5V1A Serial No: 0000000001  
Order No.: Lot No.: Total Load No.: 1  
Environment: 20oC,67%RH Inspector: Q6  
MM\_DD\_YY: 2005-12-08 Begin Time: 13:07:39 End Time: 13:09:04

-----  
SEQ.1: Set Up Function (START) ----- PASS

Vin\_Port (1-4) = 2 Vin type = AC  
ON Phase (mS) = 0.000 OFF Phase = 0.000  
Setup off(Sec) = 0.100 PAUSE function= N  
Display Message= PLEASE PRESS ENTER

Relay status: Pre value-1 = 00 Pre value-2 = 00  
TTL status : Pre value-1 = 0000 Pre value-2 = 0000  
Change state delay: For relay = 0 For TTL = 0  
Ext. device GPIB address = \* GPIB EOS byte = 1  
Message for ext. device = V10

Load Name	MODE	I fs	V fs	Meas	BITS
1.	5V	I	50	10	UUT 0000

-----  
SEQ.2: Static Test (1A LOAD) ----- PASS

Vin = 220.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 5.077

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	1.000	*	*	0.993	*	0.006

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.113	0.050	*	0.034

-----  
SEQ.3: Static Test (0.9A LOAD) ----- PASS

Report Test 1

General Information

Model Name: 5V1A adp Customer: 5V1A Serial No: 000000002  
Order No.: Lot No.: Total Load No.: 1  
Environment: 20oC,67%RH Inspector: Q6  
MM\_DD\_YY: 2005-12-08 Begin Time: 13:26:31 End Time: 13:27:53

-----  
SEQ.1: Set Up Function (START) ----- PASS

Vin\_Port (1-4) = 2 Vin type = AC  
ON Phase (mS) = 0.000 OFF Phase = 0.000  
Setup off(Sec) = 0.100 PAUSE function= N  
Display Message= PLEASE PRESS ENTER

Relay status: Pre value-1 = 00 Pre value-2 = 00  
TTL status : Pre value-1 = 0000 Pre value-2 = 0000  
Change state delay: For relay = 0 For TTL = 0  
Ext. device GPIB address = \* GPIB EOS byte = 1  
Message for ext. device = V10

Load Name	MODE	I fs	V fs	Meas	BITS
1.	5V	I	50	10	UUT 0000

-----  
SEQ.2: Static Test (1A LOAD) ----- PASS

Vin = 110.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 5.084

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	1.000	*	*	0.993	*	0.010

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.120	0.050	*	0.045

-----  
SEQ.3: Static Test (0.9A LOAD) ----- PASS



Vin = 110.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 4.560

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.900	*	*	0.890	*	0.009

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.124	0.050	*	0.039

-----  
SEQ.4: Static Test (0.8A LOAD) ----- PASS

Vin = 110.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 4.052

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.800	*	*	0.790	*	0.008

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.130	0.050	*	0.034

-----  
SEQ.5: Static Test (0.7A LOAD) ----- PASS

Vin = 110.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 3.543

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.700	*	*	0.690	*	0.007

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.130	0.050	*	0.034

1. 5.250 4.750 5.136 0.050 \* 0.035

-----  
SEQ.6: Static Test (0.6A LOAD) ----- PASS

Vin = 110.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 3.033

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.600	*	*	0.590	*	0.007

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.141	0.050	*	0.027

-----  
SEQ.7: Static Test (0.5A LOAD) ----- PASS

Vin = 110.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 2.537

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.500	*	*	0.493	*	0.005

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.148	0.050	*	0.026

-----  
SEQ.8: Static Test (0.4A LOAD) ----- PASS

Vin = 110.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 2.009

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.400	*	*	0.390	*	0.005

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.153	0.050	*	0.028

-----  
 SEQ.9: Static Test (0.3A LOAD) ----- PASS

Vin = 110.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 1.496

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.300	*	*	0.290	*	0.006

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.160	0.050	*	0.026

-----  
 SEQ.10: Static Test (0.2A LOAD) ----- PASS

Vin = 110.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 0.981

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.200	*	*	0.190	*	0.006

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.165	0.050	*	0.024

-----  
 SEQ.11: Static Test (0.1A LOAD) ----- PASS

Vin = 110.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von	BITS
-----------	------	------	------	-------	------------	--------------	-----	------

1. 5V I 50 10 UUT 300 300 70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 0.465

Ld Rise I/R Idc Max Idc Min Idc Read Vn Max Vn Read  
1. 0.050 0.100 \* \* 0.090 \* 0.006

Ld Vdc Max Vdc Min Vdc Read Vpp Max Vpp Min Vpp Read  
1. 5.250 4.750 5.171 0.050 \* 0.025

-----  
SEQ.12: Static Test (0A LOAD) ----- PASS

Vin = 110.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name MODE I fs V fs Meas. Vdc Filter Noise Filter Von BITS  
1. 5V I 50 10 UUT 300 300 70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 0.015

Ld Rise I/R Idc Max Idc Min Idc Read Vn Max Vn Read  
1. 0.050 0.000 \* \* 0.003 \* 0.002

Ld Vdc Max Vdc Min Vdc Read Vpp Max Vpp Min Vpp Read  
1. 5.250 4.750 5.176 0.050 \* 0.014

-----  
SEQ.13: Combine Regulation Test (COM\_LOAD) ----- PASS

Vin Port-1 = 2 Vin Port-2 = 1 Vin Port-3 = 3  
Vin-1 = 110.000 Vin-2 = 135.000 Vin-3 = 90.000  
Fac = 50.0 Fac-2 = 63.0 Fac-3 = 47.0  
Delay Time = 1.000 Meas. Time = 1.000

Load Name MODE I fs V fs Meas. Vdc Filter Noise Filter Von  
1. 5V I 50 10 UUT 300 300 70.000%

Ld BITS-1 BITS-2 BITS-3 SLEW Rate I/R-1 I/R-2 I/R-3  
1. 0000 0000 0000 0.050 0.500 1.000 0.000

Ld Vdc Max Vdc Min Vdc-1 RD Vdc-2 RD Vdc-3 RD  
1. 5.250 4.750 5.148 5.120 5.176

Ld Vpp Max Vpp Min Vpp-1 RD Vpp-2 RD Vpp-3 RD

1. 0.050 \* 0.025 0.042 0.015

Ld dV(+) Max dV(-) Max dV-21 RD dV-31 RD  
1. \* \* -0.028 0.028

Ld Vn Max Vn-1 Read Vn-2 Read Vn-3 Read  
1. \* 0.005 0.020 0.002

-----  
SEQ.14: Input/Output Test (STANDBY @110V) ----- PASS

Vin = 110.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	BITS	Vdc Filter	Noise Filter	Von	
1.	5V	I	50	10	UUT	0000	300	300	70.000%

	Max	Min	Reading		Max	Min	Reading
I inrms	*	*	0.007	I inpk+	*	*	0.042
Pin	0.500	*	0.093	I inpk-			0.033
Pdc	*	*	0.000	Pf	*	*	0.131
Eff	*	*	0.000	Vin	*	*	100.875

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.000	*	*	0.000	*	0.002

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.176	0.050	*	0.014

-----  
SEQ.15: Input/Output Test (STANDBY @0.1A110V) ----- PASS

Vin = 110.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	BITS	Vdc Filter	Noise Filter	Von	
1.	5V	I	50	10	UUT	0000	300	300	70.000%

	Max	Min	Reading		Max	Min	Reading
I inrms	*	*	0.015	I inpk+	*	*	0.050
Pin	1.000	*	0.781	I inpk-			0.037
Pdc	*	*	0.465	Pf	*	*	0.507
Eff	*	*	59.539	Vin	*	*	102.625

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.100	*	*	0.090	*	0.006

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.171	0.050	*	0.024

-----

SEQ.16: Set Up Function (INPUT 90V) ----- PASS

Vin\_Port (1-4) = 1 Vin type = AC  
 ON Phase (mS) = 0.000 OFF Phase = 0.000  
 Setup off(Sec) = 0.100 PAUSE function= N  
 Display Message= PLEASE PRESS ENTER

Relay status: Pre value-1 = 00 Pre value-2 = 00  
 TTL status : Pre value-1 = 0000 Pre value-2 = 0000  
 Change state delay: For relay = 0 For TTL = 0  
 Ext. device GPIB address = \* GPIB EOS byte = 1  
 Message for ext. device = V10

Load Name	MODE	I fs	V fs	Meas	BITS
1.	5V	I	50	10	UUT 0000

-----

SEQ.17: Input/Output Test (STANDBY @ 90V) ----- PASS

Vin = 90.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	BITS	Vdc Filter	Noise Filter	Von	
1.	5V	I	50	10	UUT	0000	300	300	70.000%

	Max	Min	Reading		Max	Min	Reading
I <sub>inrms</sub>	*	*	0.006	I <sub>inpk+</sub>	*	*	0.049
P <sub>in</sub>	0.500	*	0.125	I <sub>inpk-</sub>			0.037
P <sub>dc</sub>	*	*	0.015	P <sub>f</sub>	*	*	0.251
Eff	*	*	12.000	V <sub>in</sub>	*	*	82.987

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.000	*	*	0.003	*	0.002

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.176	0.050	*	0.012

-----

SEQ.18: Input/Output Test (STANDBY @0.1A 90V) ----- PASS

Vin = 90.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	BITS	Vdc Filter	Noise Filter	Von	
1.	5V	I	50	10	UUT	0000	300	300	70.000%

	Max	Min	Reading		Max	Min	Reading
Iinrms	*	*	0.006	Iinpk+	*	*	0.047
Pin	1.000	*	0.093	Iinpk-			0.037
Pdc	*	*	0.015	Pf	*	*	0.184
Eff	*	*	16.129	Vin	*	*	83.925

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.000	*	*	0.003	*	0.002

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.176	0.050	*	0.012

-----  
SEQ.19: Set Up Function (INPUT 135V) ----- PASS

Vin\_Port (1-4) = 3 Vin type = AC  
ON Phase (mS) = 0.000 OFF Phase = 0.000  
Setup off(Sec) = 0.100 PAUSE function= N  
Display Message= PLEASE PRESS ENTER

Relay status: Pre value-1 = 00 Pre value-2 = 00  
TTL status : Pre value-1 = 0000 Pre value-2 = 0000  
Change state delay: For relay = 0 For TTL = 0  
Ext. device GPIB address = \* GPIB EOS byte = 1  
Message for ext. device = V10

Load Name	MODE	I fs	V fs	Meas	BITS	
1.	5V	I	50	10	UUT	0000

-----  
SEQ.20: Input/Output Test (STANDBY @135V) ----- PASS

Vin = 135.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	BITS	Vdc Filter	Noise Filter	Von	
1.	5V	I	50	10	UUT	0000	300	300	70.000%

	Max	Min	Reading		Max	Min	Reading
Iinrms	*	*	0.005	Iinpk+	*	*	0.045

Pin	0.500	*	0.062	Iinpk-			0.037
Pdc	*	*	0.000	Pf	*	*	0.103
Eff	*	*	0.000	Vin	*	*	119.612

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.000	*	*	0.000	*	0.002

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.176	0.050	*	0.015

-----

SEQ.21: Input/Output Test (STANDBY @0.1A135V) ----- PASS

Vin = 135.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	BITS	Vdc Filter	Noise Filter	Von
1.	5V	I	50	10	UUT	0000	300	70.000%

	Max	Min	Reading		Max	Min	Reading
Iinrms	*	*	0.013	Iinpk+	*	*	0.055
Pin	1.000	*	0.750	Iinpk-			0.042
Pdc	*	*	0.465	Pf	*	*	0.479
Eff	*	*	62.000	Vin	*	*	120.275

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.100	*	*	0.090	*	0.007

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.171	0.050	*	0.028

-----

SEQ.22: Set Up Function (INPUT 110V) ----- PASS

Vin\_Port (1-4) = 2 Vin type = AC  
 ON Phase (mS) = 0.000 OFF Phase = 0.000  
 Setup off(Sec) = 0.100 PAUSE function= N  
 Display Message= PLEASE PRESS ENTER

Relay status: Pre value-1 = 00 Pre value-2 = 00  
 TTL status : Pre value-1 = 0000 Pre value-2 = 0000  
 Change state delay: For relay = 0 For TTL = 0  
 Ext. device GPIB address = \* GPIB EOS byte = 1  
 Message for ext. device = V10



Load Name	MODE	I fs	V fs	Meas	BITS
1.	5V	I	50	10	UUT 0000

-----  
 SEQ.23: Input/Output Test (EFF TEST@1A OUT) ----- PASS

Vin = 110.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	BITS	Vdc Filter	Noise Filter	Von
1.	5V	I	50	10	UUT 0000	300	300	70.000%

	Max	Min	Reading		Max	Min	Reading
Iinrms	*	*	0.103	Iinpk+	*	*	0.454
Pin	*	*	7.062	Iinpk-			0.434
Pdc	*	*	5.084	Pf	*	*	0.680
Eff	*	68.000	71.991	Vin	*	*	100.762

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	1.000	*	*	0.993	*	0.009

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.120	0.050	*	0.045

-----  
 SEQ.24: Input/Output Test (EFF TEST@0.5A OUT) ----- PASS

Vin = 110.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	BITS	Vdc Filter	Noise Filter	Von
1.	5V	I	50	10	UUT 0000	300	300	70.000%

	Max	Min	Reading		Max	Min	Reading
Iinrms	*	*	0.048	Iinpk+	*	*	0.265
Pin	*	*	3.531	Iinpk-			0.271
Pdc	*	*	2.522	Pf	*	*	0.723
Eff	*	68.000	71.425	Vin	*	*	101.650

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.500	*	*	0.490	*	0.005

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.148	0.050	*	0.024

-----

SEQ.25: Input/Output Test (EFF TEST@0.3A OUT) ----- PASS

Vin = 110.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	BITS	Vdc Filter	Noise Filter	Von	
1.	5V	I	50	10	UUT	0000	300	300	70.000%

	Max	Min	Reading		Max	Min	Reading
I inrms	*	*	0.029	I inpk+	*	*	0.087
Pin	*	*	2.187	I inpk-			0.072
Pdc	*	*	1.511	Pf	*	*	0.742
Eff	*	68.000	69.090	Vin	*	*	101.575

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.300	*	*	0.293	*	0.005

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.160	0.050	*	0.024

-----  
 SEQ.26: Line Regulation Test (LINE REG) ----- PASS

Vin Port-1 = 2      Vin Port-2 = 1      Vin Port-3 = 3  
 Vin-1 = 110.000      Vin-2 = 135.000      Vin-3 = 90.000  
 Fac = 50.0      Fac-2 = 63.0      Fac-3 = 47.0  
 Delay Time = 1.000      Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von	
1.	5V	I	50	10	UUT	300	300	70.000%

Ld	BITS-1	BITS-2	BITS-3	SLEW Rate	I/R
1.	0000	0000	0000	0.050	0.500

Ld	Vdc Max	Vdc Min	Vdc-1 RD	Vdc-2 RD	Vdc-3 RD
1.	5.250	4.750	5.148	5.148	5.147

Ld	Vpp Max	Vpp Min	Vpp-1 RD	Vpp-2 RD	Vpp-3 RD
1.	0.050	*	0.024	0.028	0.024

Ld	dV(+) Max	dV(-) Max	dV-21 RD	dV-31 RD
1.	*	*	0.000	0.000

Ld	Vn Max	Vn-1 Read	Vn-2 Read	Vn-3 Read
1.	*	0.005	0.005	0.006

-----  
SEQ.27: OLP Test (PEAK\_OUT) ----- PASS

Vin = 110.000 Fin = 50.0 Test on LOAD : 1  
Delay Time = 1.000 Step Time = 0.100 UUT OFF Time = 3.000  
I/R Start = 0.900 I/R End = 2.000 I/R Step = 0.050  
I/R Recovery = 0.000 Volp = 4.750 Vrec = \*

Load Name	MODE	Ifs	Vfs	Meas.	BITS	Von	Rise	I/R	
1.	5V	I	50	10	UUT	0000	70.000%	0.050	0.900

	Max	Min	Reading
Trip Point	*	*	1.350
Trip Time	*	*	10.480
Recovery Time	*	*	-----

-----

Vin = 220.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 4.556

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.900	*	*	0.890	*	0.006

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.120	0.050	*	0.036

-----  
SEQ.4: Static Test (0.8A LOAD) ----- PASS

Vin = 220.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 4.048

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.800	*	*	0.790	*	0.006

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.125	0.050	*	0.032

-----  
SEQ.5: Static Test (0.7A LOAD) ----- PASS

Vin = 220.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 3.555

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.700	*	*	0.693	*	0.006

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.125	0.050	*	0.032

1. 5.250 4.750 5.130 0.050 \* 0.032

-----  
SEQ.6: Static Test (0.6A LOAD) ----- PASS

Vin = 220.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I <sub>fs</sub>	V <sub>fs</sub>	Meas.	V <sub>dc</sub> Filter	Noise Filter	V <sub>on</sub>	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 3.030

Ld	Rise	I/R	I <sub>dc</sub> Max	I <sub>dc</sub> Min	I <sub>dc</sub> Read	V <sub>n</sub> Max	V <sub>n</sub> Read
1.	0.050	0.600	*	*	0.590	*	0.006

Ld	V <sub>dc</sub> Max	V <sub>dc</sub> Min	V <sub>dc</sub> Read	V <sub>pp</sub> Max	V <sub>pp</sub> Min	V <sub>pp</sub> Read
1.	5.250	4.750	5.136	0.050	*	0.032

-----  
SEQ.7: Static Test (0.5A LOAD) ----- PASS

Vin = 220.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I <sub>fs</sub>	V <sub>fs</sub>	Meas.	V <sub>dc</sub> Filter	Noise Filter	V <sub>on</sub>	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 2.519

Ld	Rise	I/R	I <sub>dc</sub> Max	I <sub>dc</sub> Min	I <sub>dc</sub> Read	V <sub>n</sub> Max	V <sub>n</sub> Read
1.	0.050	0.500	*	*	0.490	*	0.006

Ld	V <sub>dc</sub> Max	V <sub>dc</sub> Min	V <sub>dc</sub> Read	V <sub>pp</sub> Max	V <sub>pp</sub> Min	V <sub>pp</sub> Read
1.	5.250	4.750	5.142	0.050	*	0.031

-----  
SEQ.8: Static Test (0.4A LOAD) ----- PASS

Vin = 220.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I <sub>fs</sub>	V <sub>fs</sub>	Meas.	V <sub>dc</sub> Filter	Noise Filter	V <sub>on</sub>	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 2.023

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.400	*	*	0.393	*	0.006

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.148	0.050	*	0.031

-----  
 SEQ.9: Static Test (0.3A LOAD) ----- PASS

Vin = 220.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I <sub>fs</sub>	V <sub>fs</sub>	Meas.	Vdc Filter	Noise Filter	Von	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 1.494

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.300	*	*	0.290	*	0.007

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.154	0.050	*	0.032

-----  
 SEQ.10: Static Test (0.2A LOAD) ----- PASS

Vin = 220.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I <sub>fs</sub>	V <sub>fs</sub>	Meas.	Vdc Filter	Noise Filter	Von	BITS
1.	5V	I	50	10	UUT	300	300	70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 0.980

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.200	*	*	0.190	*	0.007

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.160	0.050	*	0.034

-----  
 SEQ.11: Static Test (0.1A LOAD) ----- PASS

Vin = 220.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I <sub>fs</sub>	V <sub>fs</sub>	Meas.	Vdc Filter	Noise Filter	Von	BITS
-----------	------	-----------------	-----------------	-------	------------	--------------	-----	------

1. 5V I 50 10 UUT 300 300 70.000% 0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 0.464

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.100	*	*	0.090	*	0.008

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.166	0.050	*	0.033

-----  
SEQ.12: Static Test (0A LOAD) ----- PASS

Vin = 220.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von	BITS
1.	5V	I	50	10 UUT	300	300	70.000%	0000

Pdc Max = \* Pdc Min = \* Pdc Reading = 0.015

Ld	Rise	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.000	*	*	0.003	*	0.003

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.171	0.050	*	0.018

-----  
SEQ.13: Combine Regulation Test (COM\_LOAD) ----- PASS

Vin Port-1 = 2 Vin Port-2 = 1 Vin Port-3 = 3  
Vin-1 = 220.000 Vin-2 = 264.000 Vin-3 = 180.000  
Fac = 50.0 Fac-2 = 63.0 Fac-3 = 47.0  
Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von
1.	5V	I	50	10 UUT	300	300	70.000%

Ld	BITS-1	BITS-2	BITS-3	SLEW Rate	I/R-1	I/R-2	I/R-3
1.	0000	0000	0000	0.050	0.500	1.000	0.000

Ld	Vdc Max	Vdc Min	Vdc-1 RD	Vdc-2 RD	Vdc-3 RD
1.	5.250	4.750	5.142	5.113	5.171

Ld	Vpp Max	Vpp Min	Vpp-1 RD	Vpp-2 RD	Vpp-3 RD
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1. 0.050 \* 0.030 0.028 0.019

Ld dV(+) Max dV(-) Max dV-21 RD dV-31 RD  
1. \* \* -0.029 0.029

Ld Vn Max Vn-1 Read Vn-2 Read Vn-3 Read  
1. \* 0.006 0.006 0.004

-----  
SEQ.14: Input/Output Test (STANDBY @220V) ----- PASS

Vin = 220.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	BITS	Vdc Filter	Noise Filter	Von	
1.	5V	I	50	10	UUT	0000	300	300	70.000%

	Max	Min	Reading		Max	Min	Reading
Iinrms	*	*	0.007	Iinpk+	*	*	0.017
Pin	0.500	*	0.156	Iinpk-			0.019
Pdc	*	*	0.015	Pf	*	*	0.098
Eff	*	*	9.615	Vin	*	*	226.250

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.000	*	*	0.003	*	0.003

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.171	0.050	*	0.017

-----  
SEQ.15: Input/Output Test (STANDBY @0.1A220V) ----- PASS

Vin = 220.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	BITS	Vdc Filter	Noise Filter	Von	
1.	5V	I	50	10	UUT	0000	300	300	70.000%

	Max	Min	Reading		Max	Min	Reading
Iinrms	*	*	0.011	Iinpk+	*	*	0.080
Pin	1.000	*	0.937	Iinpk-			0.051
Pdc	*	*	0.480	Pf	*	*	0.372
Eff	*	*	51.227	Vin	*	*	228.687

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.100	*	*	0.093	*	0.008



Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.166	0.050	*	0.031

-----

SEQ.16: Set Up Function (INPUT 180V) ----- PASS

Vin\_Port (1-4) = 1 Vin type = AC  
 ON Phase (mS) = 0.000 OFF Phase = 0.000  
 Setup off(Sec) = 0.100 PAUSE function= N  
 Display Message= PLEASE PRESS ENTER

Relay status: Pre value-1 = 00 Pre value-2 = 00  
 TTL status : Pre value-1 = 0000 Pre value-2 = 0000  
 Change state delay: For relay = 0 For TTL = 0  
 Ext. device GPIB address = \* GPIB EOS byte = 1  
 Message for ext. device = V10

Load Name	MODE	I fs	V fs	Meas	BITS
1.	5V	I	50	10	UUT 0000

-----

SEQ.17: Input/Output Test (STANDBY @180V) ----- PASS

Vin = 180.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	BITS	Vdc Filter	Noise Filter	Von	
1.	5V	I	50	10	UUT	0000	300	300	70.000%

	Max	Min	Reading		Max	Min	Reading
I inrms	*	*	0.005	I inpk+	*	*	0.033
Pin	0.500	*	0.156	I inpk-			0.021
Pdc	*	*	0.015	Pf	*	*	0.167
Eff	*	*	9.615	Vin	*	*	186.781

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.000	*	*	0.003	*	0.003

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.171	0.050	*	0.015

-----

SEQ.18: Input/Output Test (STANDBY @0.1A180V) ----- PASS

Vin = 180.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	BITS	Vdc Filter	Noise Filter	Von	
1.	5V	I	50	10	UUT	0000	300	300	70.000%

	Max	Min	Reading		Max	Min	Reading
Iinrms	*	*	0.005	Iinpk+	*	*	0.037
Pin	1.000	*	0.156	Iinpk-			0.023
Pdc	*	*	0.015	Pf	*	*	0.166
Eff	*	*	9.615	Vin	*	*	187.968

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.000	*	*	0.003	*	0.003

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.171	0.050	*	0.015

-----  
SEQ.19: Set Up Function (INPUT 265V) ----- PASS

Vin\_Port (1-4) = 3 Vin type = AC  
ON Phase (mS) = 0.000 OFF Phase = 0.000  
Setup off(Sec) = 0.100 PAUSE function= N  
Display Message= PLEASE PRESS ENTER

Relay status: Pre value-1 = 00 Pre value-2 = 00  
TTL status : Pre value-1 = 0000 Pre value-2 = 0000  
Change state delay: For relay = 0 For TTL = 0  
Ext. device GPIB address = \* GPIB EOS byte = 1  
Message for ext. device = V10

Load Name	MODE	I fs	V fs	Meas	BITS	
1.	5V	I	50	10	UUT	0000

-----  
SEQ.20: Input/Output Test (STANDBY @265V) ----- PASS

Vin = 264.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	BITS	Vdc Filter	Noise Filter	Von	
1.	5V	I	50	10	UUT	0000	300	300	70.000%

	Max	Min	Reading		Max	Min	Reading
Iinrms	*	*	0.006	Iinpk+	*	*	0.047

Pin	0.500	*	0.156	Iinpk-			0.023
Pdc	*	*	0.000	Pf	*	*	0.097
Eff	*	*	0.000	Vin	*	*	267.250

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.000	*	*	0.000	*	0.004

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.171	0.050	*	0.020

-----

SEQ.21: Input/Output Test (STANDBY @0.1A265V) ----- PASS

Vin = 265.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	Ifs	Vfs	Meas.	BITS	Vdc Filter	Noise Filter	Von
1.	5V	I	50	10	UUT	0000	300	70.000%

	Max	Min	Reading		Max	Min	Reading
Iinrms	*	*	0.011	Iinpk+	*	*	0.081
Pin	1.000	*	0.859	Iinpk-			0.048
Pdc	*	*	0.464	Pf	*	*	0.295
Eff	*	*	54.016	Vin	*	*	264.562

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.100	*	*	0.090	*	0.009

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.166	0.050	*	0.036

-----

SEQ.22: Set Up Function (INPUT 220V) ----- PASS

Vin\_Port (1-4) = 2 Vin type = AC  
 ON Phase (mS) = 0.000 OFF Phase = 0.000  
 Setup off(Sec) = 0.100 PAUSE function= N  
 Display Message= PLEASE PRESS ENTER

Relay status: Pre value-1 = 00 Pre value-2 = 00  
 TTL status : Pre value-1 = 0000 Pre value-2 = 0000  
 Change state delay: For relay = 0 For TTL = 0  
 Ext. device GPIB address = \* GPIB EOS byte = 1  
 Message for ext. device = V10

Load Name	MODE	I fs	V fs	Meas	BITS
1.	5V	I	50	10	UUT 0000

-----

SEQ.23: Input/Output Test (EFF TEST@1A OUT) ----- PASS

Vin = 220.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	BITS	Vdc Filter	Noise Filter	Von
1.	5V	I	50	10	UUT 0000	300	300	70.000%

	Max	Min	Reading		Max	Min	Reading
Iinrms	*	*	0.055	Iinpk+	*	*	0.300
Pin	*	*	6.796	Iinpk-			0.304
Pdc	*	*	5.061	Pf	*	*	0.547
Eff	*	68.000	74.470	Vin	*	*	225.593

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	1.000	*	*	0.990	*	0.006

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.113	0.050	*	0.028

-----

SEQ.24: Input/Output Test (EFF TEST@0.5A OUT) ----- PASS

Vin = 220.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	BITS	Vdc Filter	Noise Filter	Von
1.	5V	I	50	10	UUT 0000	300	300	70.000%

	Max	Min	Reading		Max	Min	Reading
Iinrms	*	*	0.031	Iinpk+	*	*	0.117
Pin	*	*	3.593	Iinpk-			0.096
Pdc	*	*	2.519	Pf	*	*	0.514
Eff	*	68.000	70.109	Vin	*	*	225.156

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.500	*	*	0.490	*	0.006

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.142	0.050	*	0.028

-----

SEQ.25: Input/Output Test (EFF TEST@0.3A OUT) ----- PASS

Vin = 220.000 Fin = 50.0 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	BITS	Vdc Filter	Noise Filter	Von
1.	5V	I	50	10	UUT	0000	300	300 70.000%

	Max	Min	Reading		Max	Min	Reading
I inrms	*	*	0.021	I inpk+	*	*	0.111
Pin	*	*	2.265	I inpk-			0.077
Pdc	*	*	1.494	Pf	*	*	0.494
Eff	*	68.000	69.960	Vin	*	*	218.343

Ld	RISE	I/R	Idc Max	Idc Min	Idc Read	Vn Max	Vn Read
1.	0.050	0.300	*	*	0.290	*	0.007

Ld	Vdc Max	Vdc Min	Vdc Read	Vpp Max	Vpp Min	Vpp Read
1.	5.250	4.750	5.154	0.050	*	0.031

-----  
 SEQ.26: Line Regulation Test (LINE REG) ----- PASS

Vin Port-1 = 2 Vin Port-2 = 1 Vin Port-3 = 3  
 Vin-1 = 220.000 Vin-2 = 265.000 Vin-3 = 180.000  
 Fac = 50.0 Fac-2 = 63.0 Fac-3 = 47.0  
 Delay Time = 1.000 Meas. Time = 1.000

Load Name	MODE	I fs	V fs	Meas.	Vdc Filter	Noise Filter	Von
1.	5V	I	50	10	UUT	300	300 70.000%

Ld	BITS-1	BITS-2	BITS-3	SLEW Rate	I/R
1.	0000	0000	0000	0.050	0.500

Ld	Vdc Max	Vdc Min	Vdc-1 RD	Vdc-2 RD	Vdc-3 RD
1.	5.250	4.750	5.142	5.142	5.142

Ld	Vpp Max	Vpp Min	Vpp-1 RD	Vpp-2 RD	Vpp-3 RD
1.	0.050	*	0.029	0.026	0.032

Ld	dV(+) Max	dV(-) Max	dV-21 RD	dV-31 RD
1.	*	*	0.000	0.000

Ld	Vn Max	Vn-1 Read	Vn-2 Read	Vn-3 Read
1.	*	0.006	0.005	0.006

-----  
SEQ.27: OLP Test (PEAK\_OUT) ----- PASS

Vin = 220.000 Fin = 50.0 Test on LOAD : 1  
Delay Time = 1.000 Step Time = 0.100 UUT OFF Time = 3.000  
I/R Start = 0.900 I/R End = 2.000 I/R Step = 0.050  
I/R Recovery = 0.000 Volp = 4.750 Vrec = \*

Load Name	MODE	Ifs	Vfs	Meas.	BITS	Von	Rise	I/R	
1.	5V	I	50	10	UUT	0000	70.000%	0.050	0.900

	Max	Min	Reading
Trip Point	*	*	1.650
Trip Time	*	*	3.509
Recovery Time	*	*	-----

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