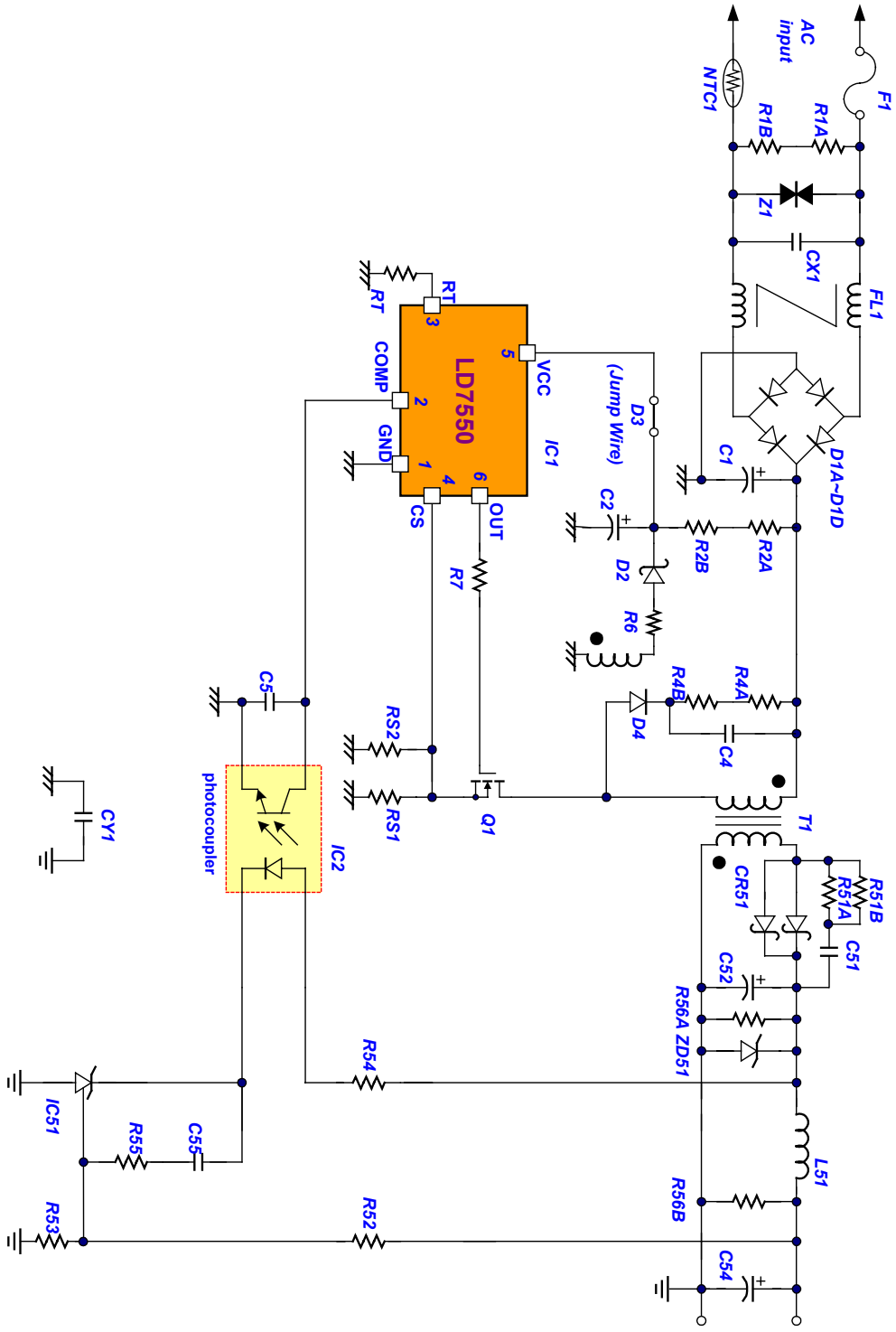
LD7550-B Evaluation Board

--- 10W (5V/2A) Adapter

Leadtrend Technology Corporation
LD7550-B-EVB#1-02 January 2005

Contents

Ⅰ. Schematic


AC input
NTC1
F1
R1B
R1A
Z1
CX1
FL1
RT
COMP
GND
CS
VCC
OUT
LD7550
IC1
D3
(Jump Wire)
C1
D1A~D1D
C2
R2B
R2A
D2
R6
R7
C5
R4B
R4A
D4
C4
RS2
RS1
Q1
T1
photocoupler
IC2
CY1
CR51
R51B
R51A
C51
C52
R56A ZD51
R54
IC51
R55
C55
L51
R56B
R53
R52
C54

Ⅱ. BOM

P/N	Component Value	Original
R1A	N/A	
R1B	N/A	
R2A	750KΩ, 1206	
R2B	750KΩ, 1206	
R4A	39KΩ, 1206	
R4B	39KΩ, 1206	
R6	10Ω, 1206	
R7	10Ω, 1206	
RS1	2.74Ω, 1206, 1%	
RS2	2.74Ω, 1206, 1%	
RT	100KΩ, 0805, 1%	
R51A	100Ω, 1206	
R51B	100Ω, 1206	
R52	2.49KΩ, 0805, 1%	
R53	2.49KΩ, 0805, 1%	
R54	220Ω, 0805	
R55	10KΩ, 0805	
R56A	510Ω, 1206	
R56B	N/A	
NTC1	5Ω, 3A	08SP005
FL1	20mH	UU9.8
T1	EI-22	
L51	2.7μH	

P/N	Component Value	Note
C1	22μF, 400V	L-tec
C2	10μF, 50V	L-tec
C4	1000pF, 1000V, 1206	Holystone
C5	0.01μF, 16V, 0805	
C51	1000pF, 50V, 0805	
C52	1000μF, 10V	L-tec
C54	470μF, 10V	L-tec
C55	0.01μF, 16V, 0805	
CX1	0.1μF	X-cap
CY1	2200pF	Y-cap
D1A	1N4007	
D1B	1N4007	
D1C	1N4007	
D1D	1N4007	
D2	PS102R	
D3	0Ω, 1206	Jump Wire
D4	1N4007	
Q1	2N60B	600V/2A
CR51	SB540	
ZD51	6V2C	
IC1	LD7550-B IL	SOT-26
IC2	EL817B	
IC51	TL431	1%
F1	250V, 1A	
Z1	N/A	

Ⅲ.Test Report

∗. EXECUTIVE SUMMARY

IC	LD7550-B
Model Name	LD-ADP-10W A
Version	01

TEST	Result	Comments
3. Turn On Delay Time	**Pass**	
4. Green Mode Power Consumption	**Pass**	
5. Operating Efficiency	**Pass**	
6. Load Regulation	**Pass**	
7. Output Dynamic Response	**Pass**	
8. Peak to Peak Output Ripple and Noise	**Pass**	
9. Over Current Protection	**Pass**	
10 Output Short Protection	**Pass**	

Test Condition ---

1. Input Voltage & Frequency

The unit shall be capable of operating as a universal AC input power supply accepting AC inputs. The power supply shall operate between the following two voltages (90V to 264V). The supply will be designed to operate for a Table 1.

Minimum	Normal	Maximum
90Vac	110Vac	264Vac

Table 1

2. Output Loads

The loads and regulation for each of the outputs are shown in Table. 2.

Parameter	Output Voltage			Output Current	
	Minimum	Typical	Maximum	Minimum	Maximum
+5V	4.75V	5.0V	5.25V	0A	2.0A
Load Regulation	/	/	±1%	0A	2.0A
Load Dynamic	4.75V	5.0V	5.25V	/	0~100%

Table 2

3. Turn On Delay Time

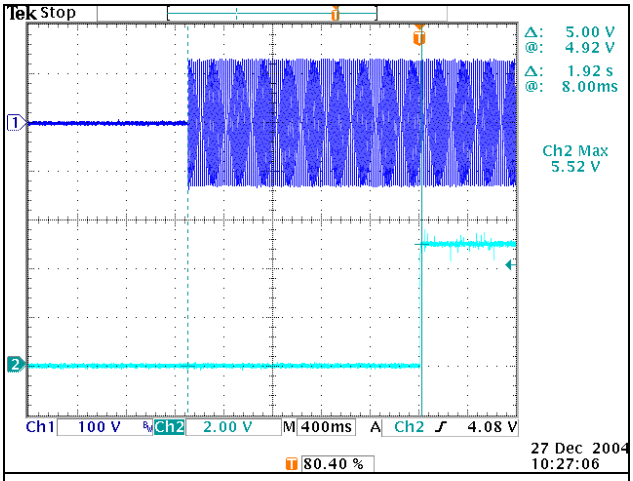
Turn on delay time will be less than 2.5 seconds at full load. Turn on delay time is measured as the delay between input voltage being applied at 0^{o} phase angle and when the outputs arrive within 10% of their operating value. Turn on delay time is measured using an input voltage of 90VAC(rms) and input frequency of 60Hz.

Test Conditions:
Input: 90Vac
Output: 2A
Ambient Temperature : 25℃

Test Result: PASS

Input	$T_{turn\ on\ delay}$ (s)
90Vac	1.92

Table 3



Turn on Time Test Fig.1
Vin : 90Vac
O/P: Max Load
CH1 : AC Input Voltage
CH2 : +5V
Reading : **1.92**s

4. Green Mode Consumption

The input power of power supply shall remain less than 500mW under output at no load conditions.

Test Condition:
Input : 90Vac/264Vac
Output : No Load
Ambient Temperature: 25℃

Test Result: Pass

V_{in} (Vac)	I_{in} (mA_{rms})	Pin (mW)	Vo (Vdc)
90	6.11	191.67	5.024
264	9.78	316.4	5.024

Table 4

5. Operating Efficiency

The operating efficiency is defined to be the percent ratio of the output power to the input power when the input and output (voltage and current) are within the min and max values as specified in tables 1 and table 2. Operating efficiency shall be calculated by measuring the output power of the supply and remain minimum 70%.

Test Condition:
Input: 90~264Vac
Output: 2A
Ambient Temperature: 25℃

Test Result: Pass

V_{in}(Vac)	I_{in}(mA)	P_{in}(W)	V_O(Vdc)	I_O(A)	P_O(W)	Efficiency(%)
90	219	13.3	5.018	2	10	75.46
110	184	13.2	5.018	2	10	76.03
220	116	12.9	5.018	2	10	77.80
264	103	13	5.017	2	10	77.18

Table 6

6. Load Regulation

Load regulation is defined to be the percent change in output voltage versus the nominal voltage due to a change in DC load. The supply shall maintain the specified line regulation throughout its specified operating range. Load regulation to be measured at Min. Typical and Max output voltages.

Test Conditions:
Input: 90Vac/264Vac (60Hz)
Output: +5V=0A/2A
Ambient Temperature : 25℃

Test Result: Pass

Output load(A)		V_O(Vdc) Reading	
		90Vac	264Vac
0		5.024	5.024
1.0		5.021	5.021
2.0		5.018	5.018
Reading Variation(%)	Max	0.06%	0.06%
	Min	0.06%	0.06%
Spec		±2%	

Table 7

7. Output Dynamic Response

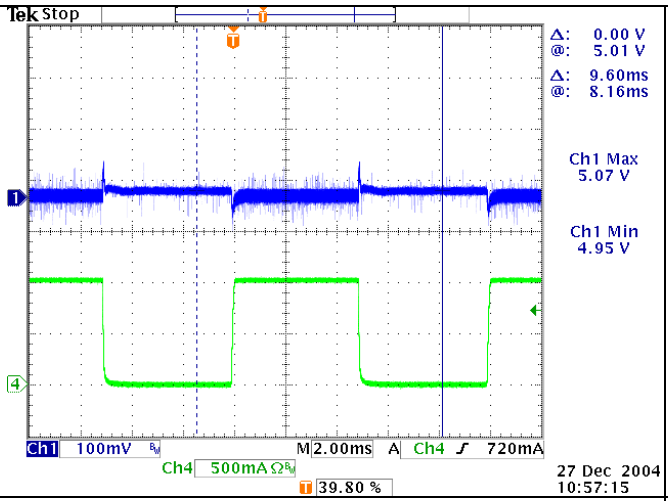
The dynamic of the output response refers to the change in output voltage to a step increase in the current of 50% & 100% load shall maintain the specified regulation. The current slew rate under output load dynamic shall be 1A/ μ s.

Test Conditions:
Input: 90Vac / 264Vac (60Hz)
Ambient Temperature : 25℃

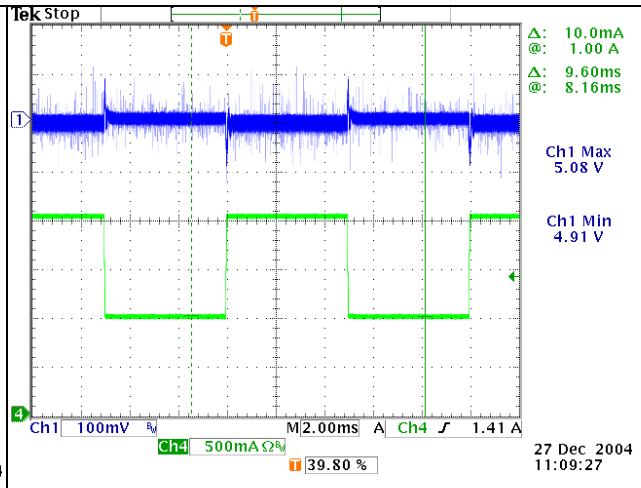
Test Result: Pass

Input	Output Dynamic	Output Voltage (V_{DC})	
		V_H	V_L
90Vac	0A→1A	5.07	4.95
	1A→2A	5.08	4.91
	0A→2A	5.14	4.88
264Vac	0A→1A	5.06	4.96
	1A→2A	5.07	4.91
	0A→2A	5.13	4.9
Reading	Max	5.14	4.96
	Min	5.06	4.88
SPEC	Max	5.25	
	Min	4.75	

Table 8

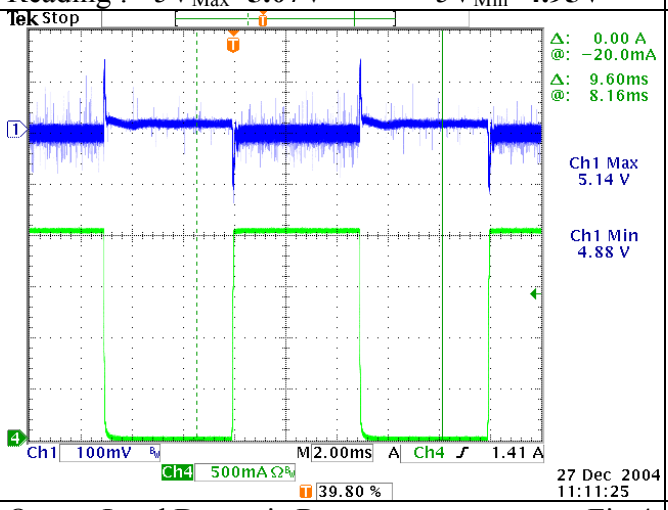


Output Load Dynamic Response Fig.2
Vin : 90Vac
O/P : +5V= 0A→1A
CH1 : V_{O_+5V} (offset 5V)
CH4 : $I_{O\ +5V}$



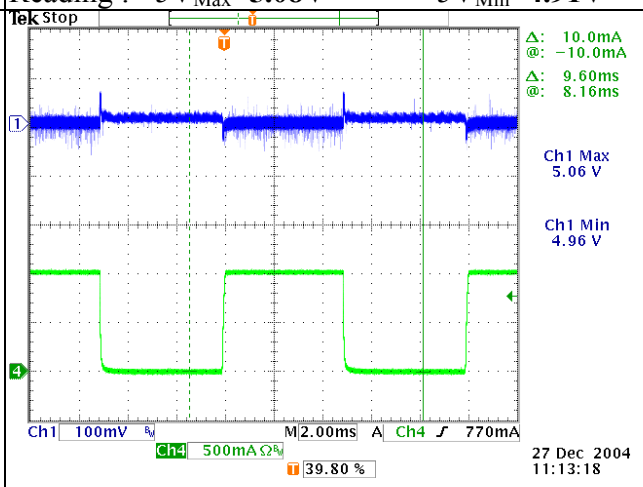
Output Load Dynamic Response Fig.3
Vin : 90Vac
O/P : +5V= 1A→2A
CH1 : V_{O_+5V} (offset 5V)
CH4 : $I_{O\ +5V}$

Reading : $+5V_{Max}$=**5.07**V $+5V_{Min}$=**4.95**V

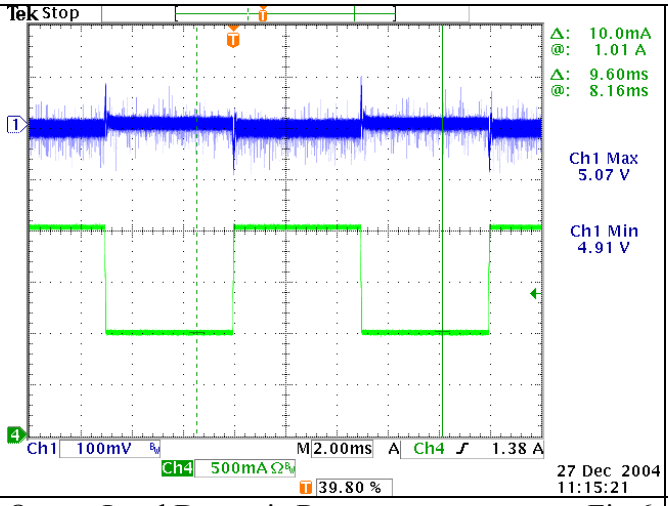


Output Load Dynamic Response Fig.4
Vin : 90Vac
O/P : +5V= 0A→2A
CH1 : V_{O_+5V} (offset 5V)
CH4 : I_{O_+5V}
Reading : $+5V_{Max}$=**5.14**V $+5V_{Min}$=**4.88**V

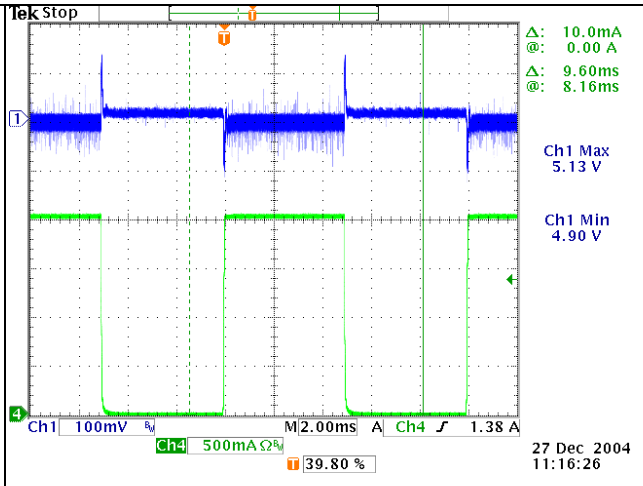
Reading : $+5V_{Max}$=**5.08**V $+5V_{Min}$=**4.91**V



Output Load Dynamic Response Fig.5
Vin : 264Vac
O/P : +5V= 0A→1A
CH1 : V_{O_+5V} (offset 5V)
CH4 : I_{O_+5V}
Reading : $+5V_{Max}$=5.06V $+5V_{Min}$=4.96V



Output Load Dynamic Response Fig.6
Vin : 264Vac
O/P : +5V= 1A→2A
CH1 : V_{O_+5V} (offset 10V)
CH4 : I_{O_+5V}
Reading : $+5V_{Max}$=**5.07**V $+5V_{Min}$=**4.91**V



Output Load Dynamic Response Fig.7
Vin : 264Vac
O/P : +5V= 0A→2A
CH1 : V_{O_+5V} (offset 10V)
CH4 : I_{O_+5V}
Reading : $+5V_{Max}$=**5.13**V $+5V_{Min}$=**4.90**V

8. Peak to Peak Output Ripple and Noise

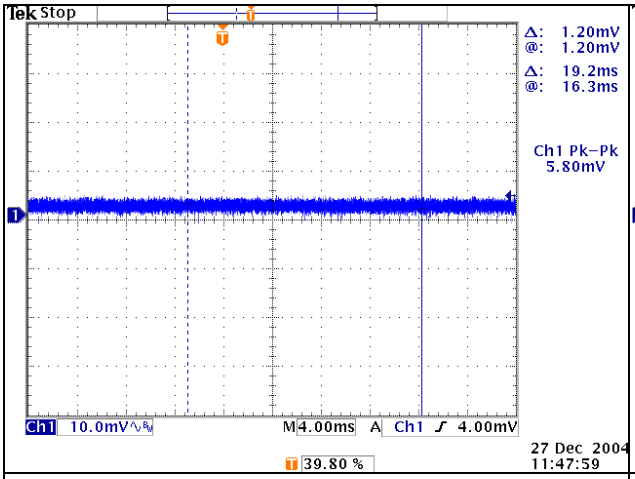
This refers to the peak-to-peak residual AC that remains on the DC power line after passing through all the filtering processes conducted within the power supply. The peak to peak output ripple and noise shall be considered to comprise of the complex envelope of the low frequency saw tooth voltage ripple and the high frequency switching noise. It shall be within 100mV and measured across output terminals using a single ended measurement with an oscilloscope (bandwidth limited to 20 MHz) and a high persistence display. Readings shall be made through the range of minimum to maximum load current.

Test Condition:
Input : 90Vac/264Vac (60Hz)
Output : Max/Min Load
Ambient Temperature : 25℃

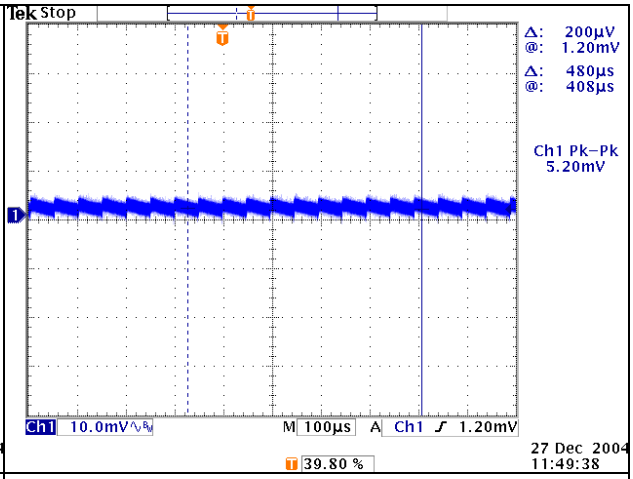
Test Result: Pass

Condition	Output load	90Vac	264Vac
Ripple Noise	Max	36.2mV	36.2mV
	Min	5.8mV	10.2mV
Noise	Max	34.0mV	35.0mV
	Min	5.2mV	11.2mV
SPEC	Max	50mV	

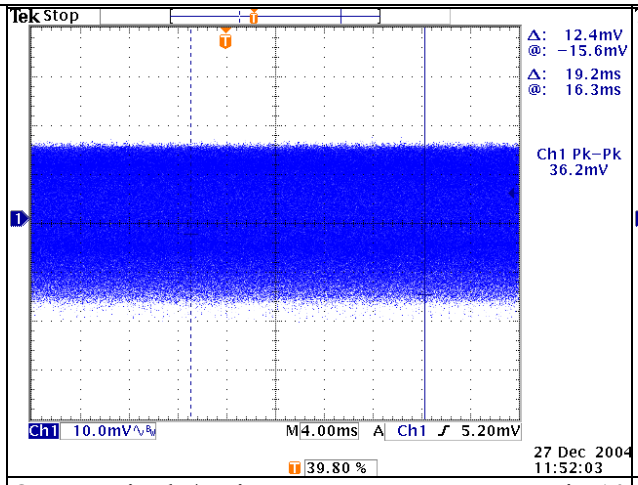
Table 7



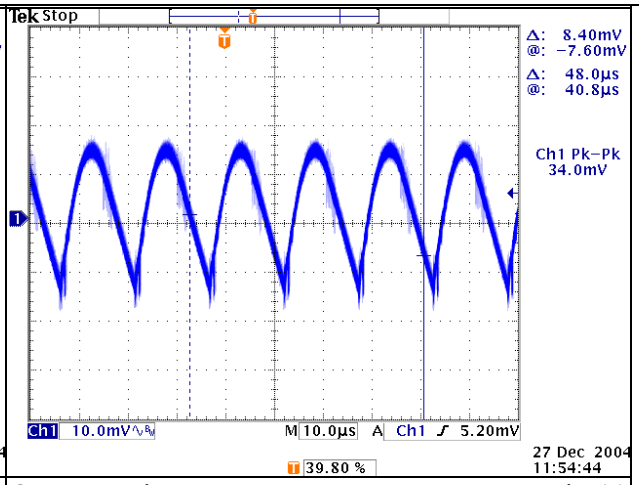
Output Ripple/Noise Test Fig.8
Vin : 90Vac
O/P: +5V=0A
CH1 : V_{P-P_+5V}
Reading :**5.8**mV



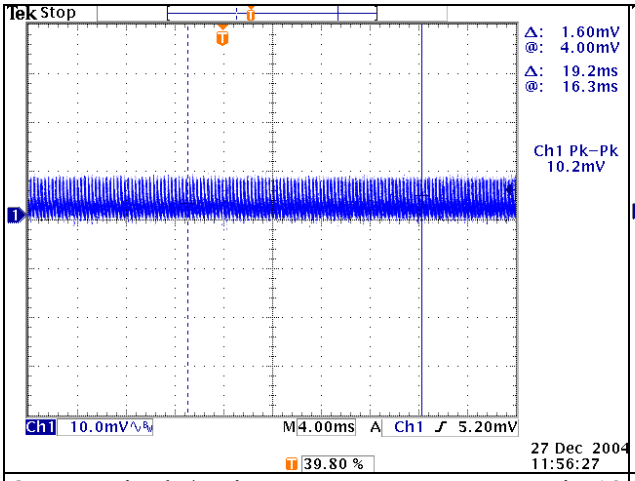
Output Noise Test Fig.9
Vin : 90Vac
O/P: +5V=0A
CH1 : V_{P-P_+5V}
Reading : **5.2**mV



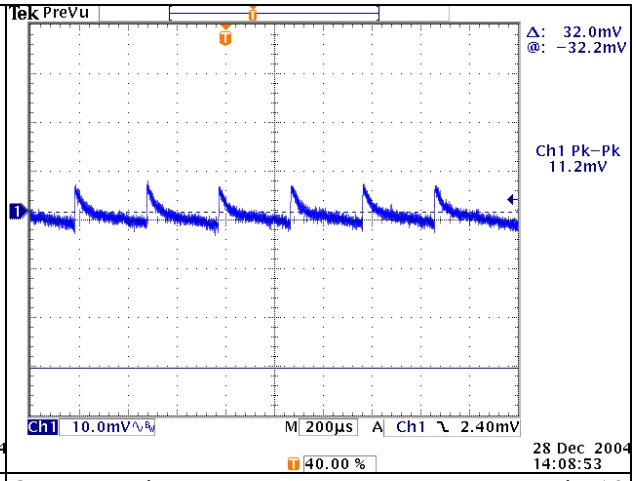
Output Ripple/Noise Test Fig.10
Vin : 90Vac
O/P: +5V=2A
CH1 : V_{P-P_+5V}
Reading : **36.2**mV



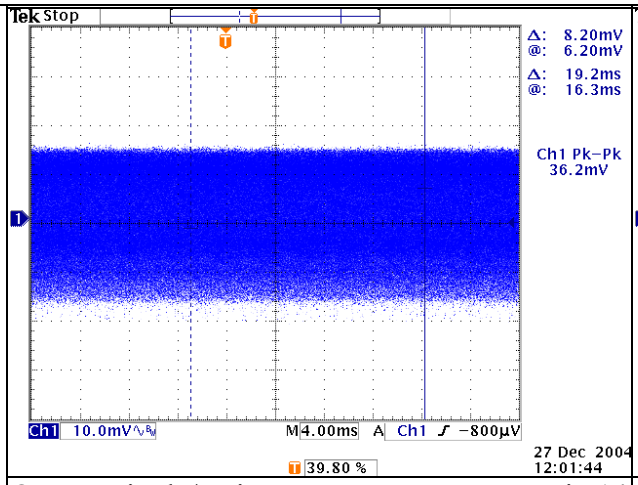
Output Noise Test Fig.11
Vin : 90Vac
O/P: +5V=2A
CH1 : V_{P-P_+5V}
Reading : **34.0**mV



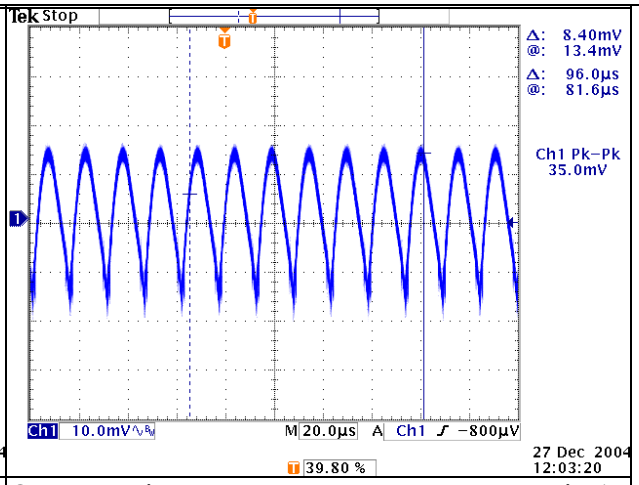
Output Ripple/Noise Test Fig.12
Vin : 264Vac
O/P: +5V=0A
CH1 : V_{P-P_+5V}
Reading : **10.2**mV



Output Noise Test Fig.13
Vin : 264Vac
O/P: +5V=0A
CH1 : V_{P-P_+5V}
Reading : **11.2**mV



Output Ripple/Noise Test Fig.14
Vin : 264Vac
O/P: +5V=2A
CH1 : V_{P-P_+5V}
Reading : **36.2**mV



Output Noise Test Fig.15
Vin : 264Vac
O/P: +5V=2A
CH1 : V_{P-P_+5V}
Reading : **35.0**mV

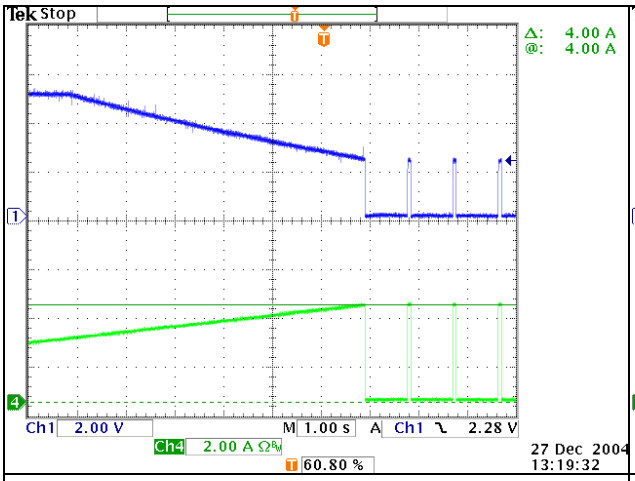
9. Over Current Protection

The supply shall be designed with appropriate output over current protection. This protection shall be activated in the event of a short or long-term condition during which one or more of the output current load increases such that the primary current exceeds a predetermined limit. The primary shall limit the total power without inflicting any damage to any internal supply components and shall be reversible pending removal of the cause of the condition and without any user intervention.

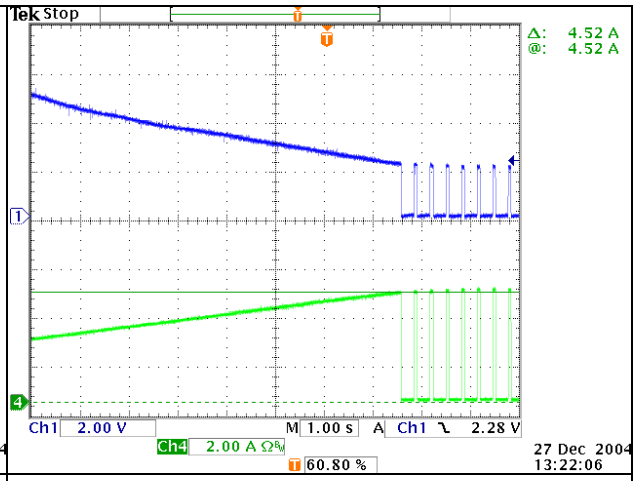
Test Conditions:
Input: 90Vac/265Vac (60Hz)
Ambient Temperature : 25℃

Test Result: Pass

Intput	Result (A)
90Vac	4.0
265Vac	4.5



Over Current Protection Fig.16
Vin : 90Vac
Output : +5V=Max→OCP
CH1 : V_{+5V}
CH4 : I_{+5V}
Reading : **4.0**A



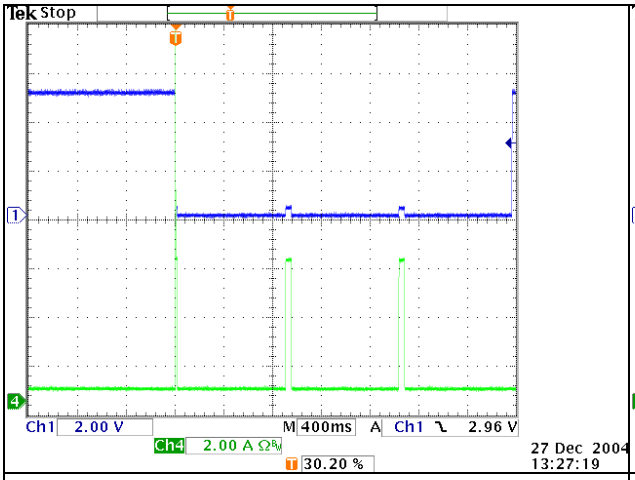
Over Current Protection Fig.17
Vin : 264Vac
Output : +5V=Max→OCP
CH1 : V_{+5V}
CH4 : I_{+5V}
Reading : **4.5**A

10. Output Short Protection

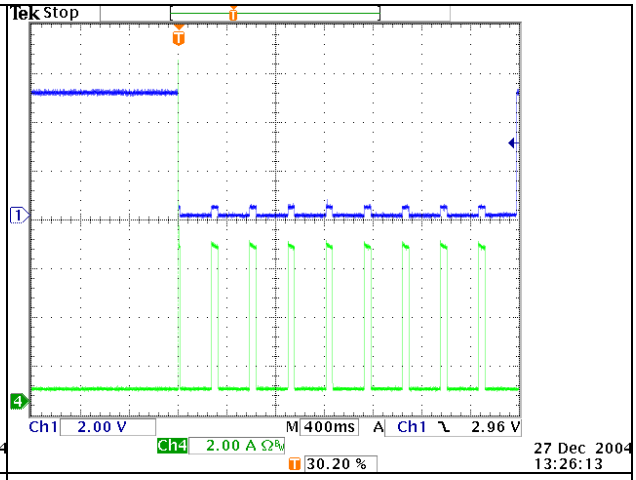
The supply shall be designed with appropriate output short circuit protection. This protection shall be activated in the event of a short or long-term condition happened. The primary shall limit the total power without inflicting any damage to any internal supply components and shall be reversible pending removal of the cause of the condition and without any user intervention.

Test Conditions:
Input: 90Vac/264Vac (60Hz)
Ambient Temperature : 25℃

Test Result: PASS



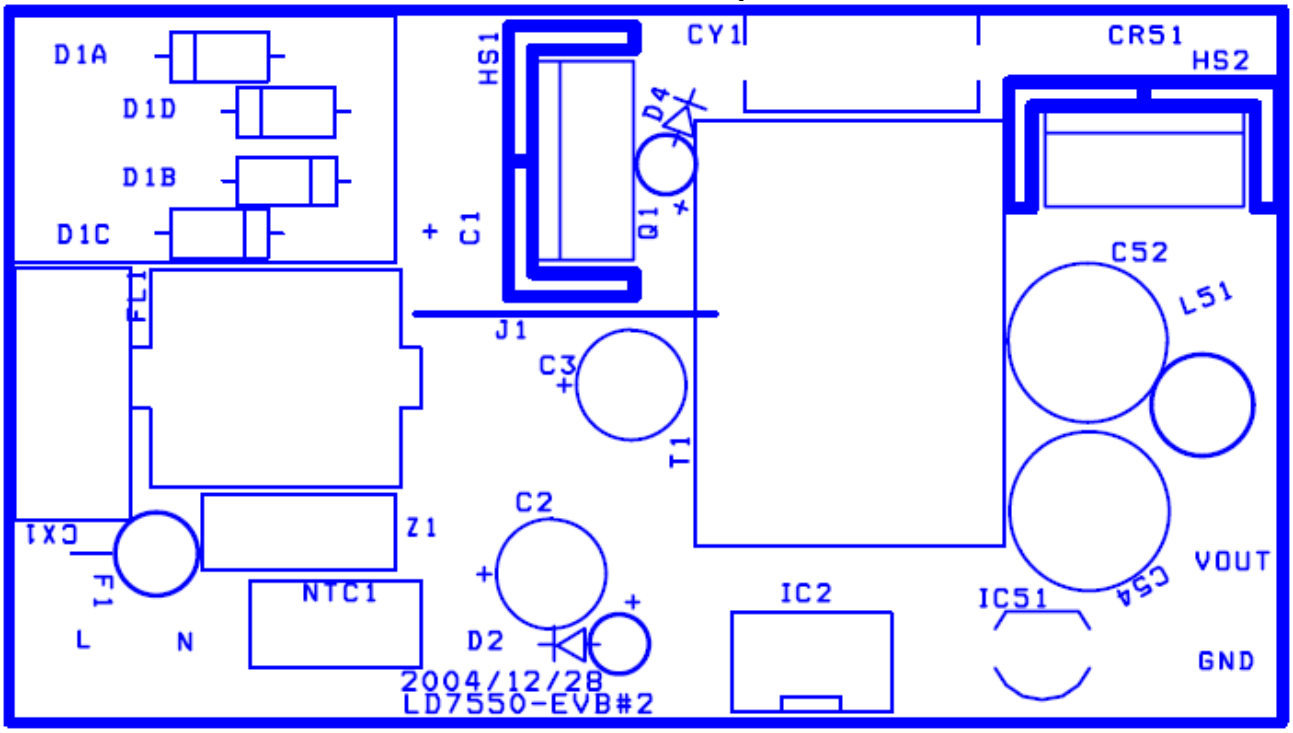
Output Short Protection Fig.18
Vin : 90Vac
Output : +5V=0A→Short
CH1 : V_{+5V}
CH4 : I_{+5V}



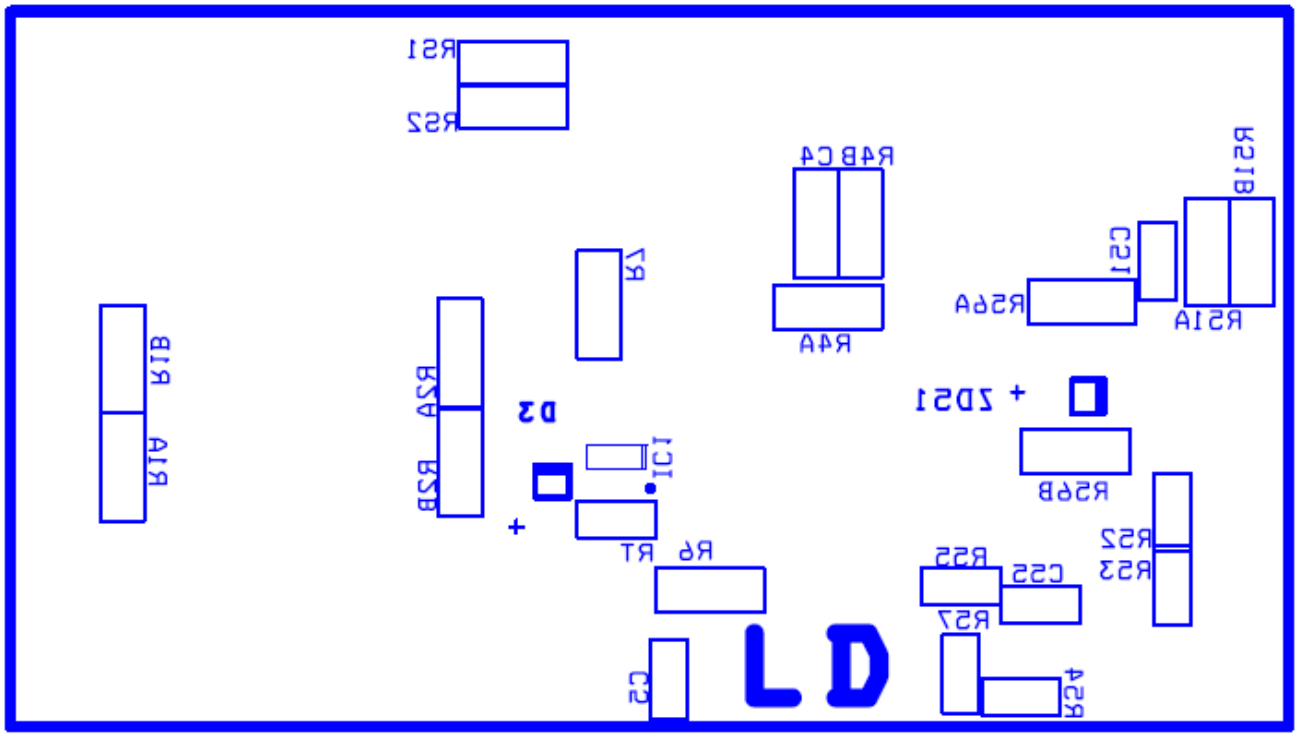
Output Short Protection Fig.19
Vin : 264Vac
Output : +5V=0A→Short
CH1 : V_{+5V}
CH4 : I_{+5V}

Ⅳ. Gerber file:

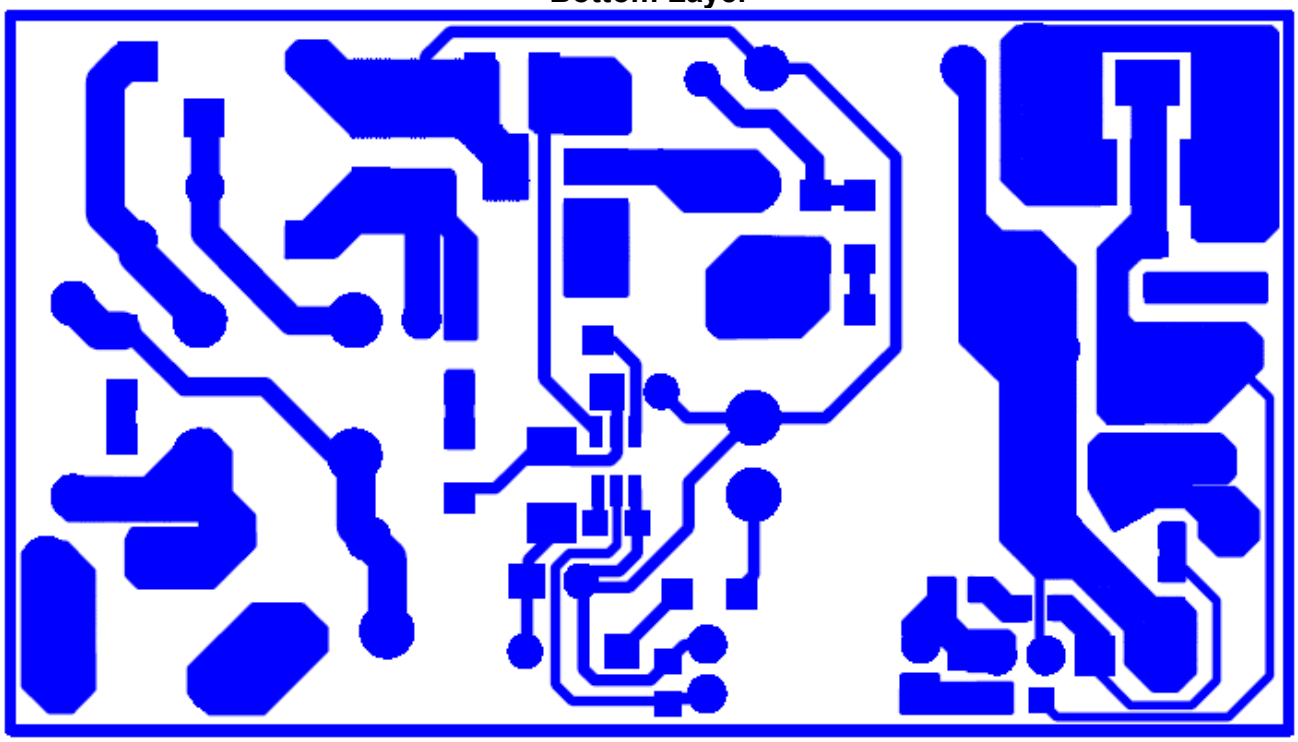
Silkscreen Top



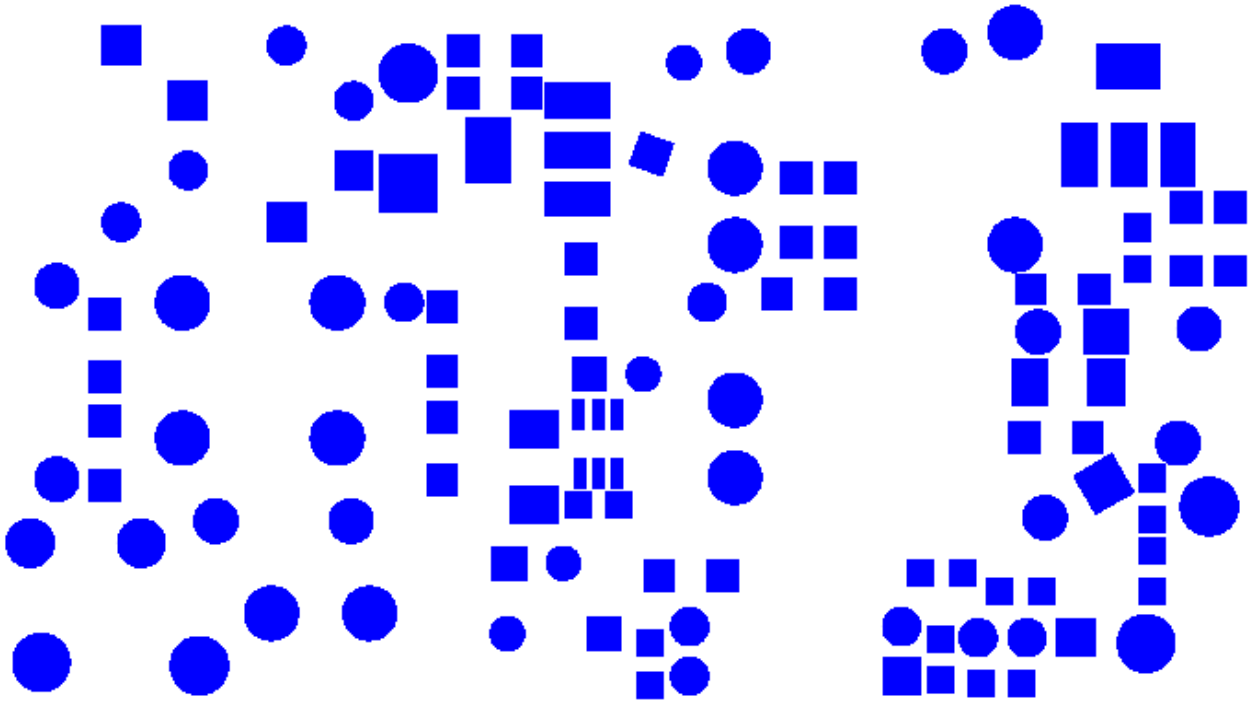
Silkscreen Bottom



Bottom Layer



Solder mask Bottom



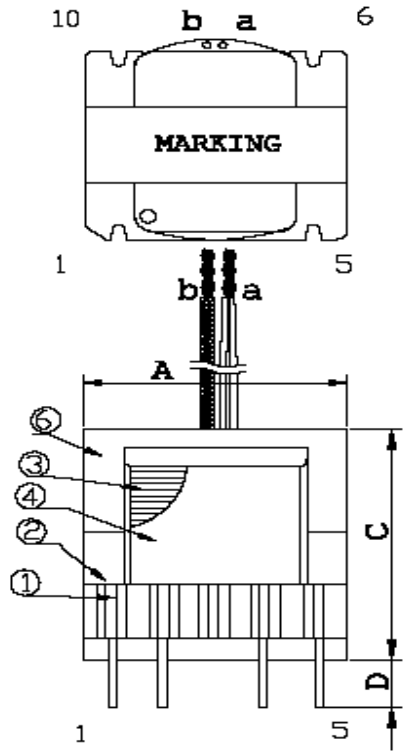
Ⅴ. Transformer specification:

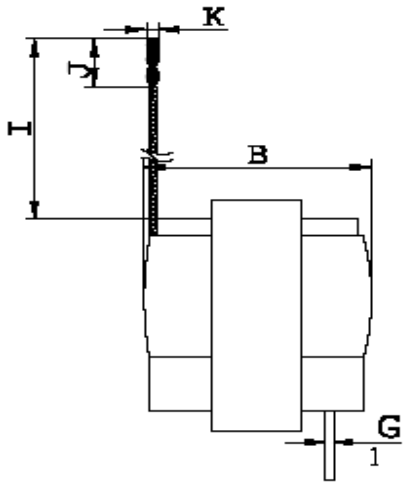
TAIWAN VOLT ELECTRONIC CO.,LTD
SPECIFCATION FOR APPROVAL

REV.A2 2/6

CUSTOMER	通嘉	CUSTOMER'S P/N	
ISSUE DATE	DEC-03-2004	OUR P/N	TF-EE220-013

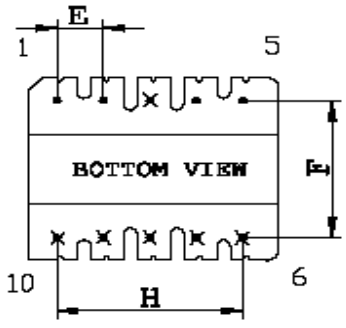
1.DIMENSION:





UNIT: mm

A	24.5 MAX
B	19.0 MAX
C	20.5 MAX
D	4.0± 0.5
E	4.0 ± 0.5
F	10.0± 0.5
G	0.8 ± 0.1
H	16.0± 0.5
I	40± 2.0
J	5.0± 1.0
K	2.2 MAX



NOTE:

1.飛線長度從BOBBIN邊緣量起.a飛線加透明套管,b飛線加黑色套管.

2.CORE包TAPE 2 TS

3.CUT OFF PIN3,6,7,8,9,10.

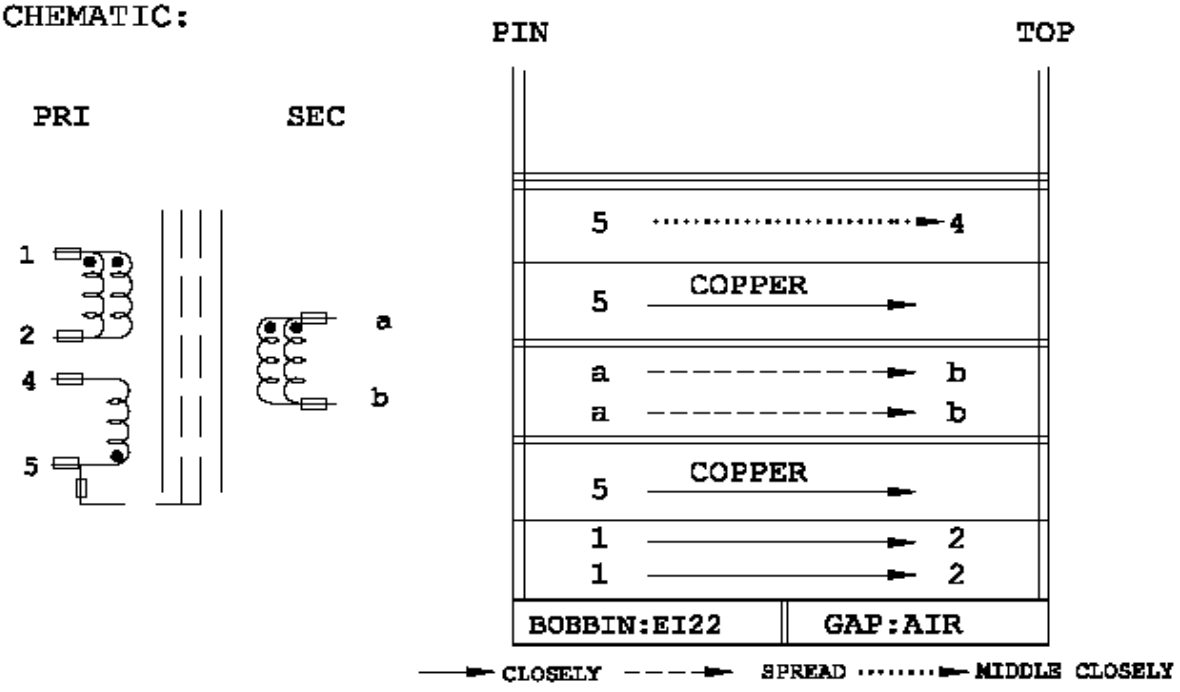
REPORTED BY		CHECKED BY		APPROVED BY	
	鄭 12.03.'04		胡 12.03.'04		周 12.03.'04

TAIWAN VOLT ELECTRONIC CO.,LTD
SPECIFICATION FOR APPROVAL

REV.A2 3/6

CUSTOMER	通嘉	CUSTOMER'S P/N	
ISSUE DATE	DEC-03-2004	OUR P/N	TF-EE220-013

2.SCHEMATIC:



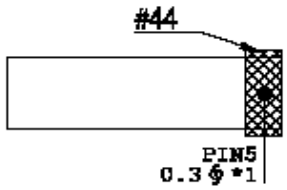
NO	WIRE SIZE	START	END	TURNS	LAYER	INSULATION	TEFLON	NOTE
N1	0.18mm*1	1	2	78	1	TAPE 1 TS	✓	兩組并繞
N2	0.18mm*1	1	2					
N3	COPPER 0.025mm/T*5mm/W	5	-	1	1	TAPE 2 TS	✓	引線焊0.3φ*1
N4	0.60mm*1	a	b	6	1		✓	疏繞
N5	0.60mm*1	a	b	6	1	TAPE 2 TS	✓	三層絕緣線
N6	COPPER 0.025mm/T*5mm/W	5	-	1	1	TAPE 1 TS	✓	引線焊0.3φ*1
N7	0.12mm*1	5	4	16	1	TAPE 3 TS	✓	中間密繞

NOTE:

1.N4,N5各疏繞一層,N4繞完后不加絕緣再繞N5.

2.a,b從PIN6-10側BOBBIN頂端出線,且兩出線与兩入線鍍錫部份須分別相校后再鍍錫.

3.N3,N6銅箔加工圖.



TAIWAN VOLT ELECTRONIC CO.,LTD
SPECIFICATION FOR APPROVAL

REV.A2 4/6

CUSTOMER	通嘉	CUSTOMER'S P/N	
ISSUE DATE	DEC-03-2004	OUR P/N	TF-EE220-013

3.ELECTRICAL CHARACTERISTICS:
TEMPERATURE AT 25 ℃ HUMIDITY AT 65 +/-20% RH

TEST INSTRUMENT	HP 4284A LCR CHEN HWA 3205B LCR		CHEN HWA 502A	CHEN HWA 310
ITEM / WINDING	3-1.INDUCTANCE: @ 10 KHz 1 V	3-2.Q VALUE: @	3-3. DC RESISTANCE:	3-4.VOLTAGE RATIO:
1---2	1000uH± 10%		1113mΩ MAX	
5---4			1.5Ω MAX	
a---b			13.0mΩ MAX	
3-5.LEAKAGE INDUCTANCE: @		SHORT:	LK:	TEST INSTRUMENT HP 4284A LCR CH 3205B

TEST INSTRUMENT	CHEN HWA 9072	CHEN HWA 9072	
ITEM / TERMINAL	3-6.HI-POT TEST: AC 60Hz 5mA 3SEC	3-7.INSULATION RESISTANCE: @ DC 500V 60 SEC	
P----S	3000 V	100 M OHMS MIN	
P----C	1500 V	100 M OHMS MIN	
S----C	1500 V	100 M OHMS MIN	

IF TESTING TIME 1 SEC VOLTAGE *1.2 ITEMS

TAIWAN VOLT ELECTRONIC CO.,LTD
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REV.A2 5/6

CUSTOMER	通嘉	CUSTOMER'S P/N	
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4.MATERIAL:

NO	ITEM	SIZE	MATERIAL	RATING	MANUFACTURER	UL FILE NO
1	BOBBIN	EE22	PLASTICS CP-J-6800 94V-0	150℃	HITACHI CO.,	E42956
2	CORE	EE22	P4 3C90 PC40 JPP-4		ACME CO., PHILIPS CO., TDK CO., A-CORE CO.,	
3	WIRE	0.18mm 0.30mm 0.12mm 0.60mm	POLYURETHANE ENAMELED WIRE(UEW TYPE:2) TRIPLE INSULATED WINDING WIRE TEX-E	130℃ 105℃	PACIFIC CO. TA YA CO. FURUKAWA CO.,	E84081 E84201 E206440
4	TAPE	0.025mm	#1350F 31CT	130℃ 130℃	3M CO. NITTO CO.,	E17385 E34833
5	SLEEVE		TEFLON TUBE TFE-TW-300	200℃	ZEUS CO.,	E64007
6	COPPER	0.025mm/T *5mm/W			ZHENG ZEXIANG CO.,	
7	VARNISH		WA-238A WF-265 WP-2952F-2G TVB-2180T TVB-2024	130℃ 130℃	HITACHI CO., KYOCERA CO.,	E72979 E83702