Evaluation Board for LD7575

--- 50W (12V, 4.2A) Adapter

Tested by	Reviewed by	Approved by
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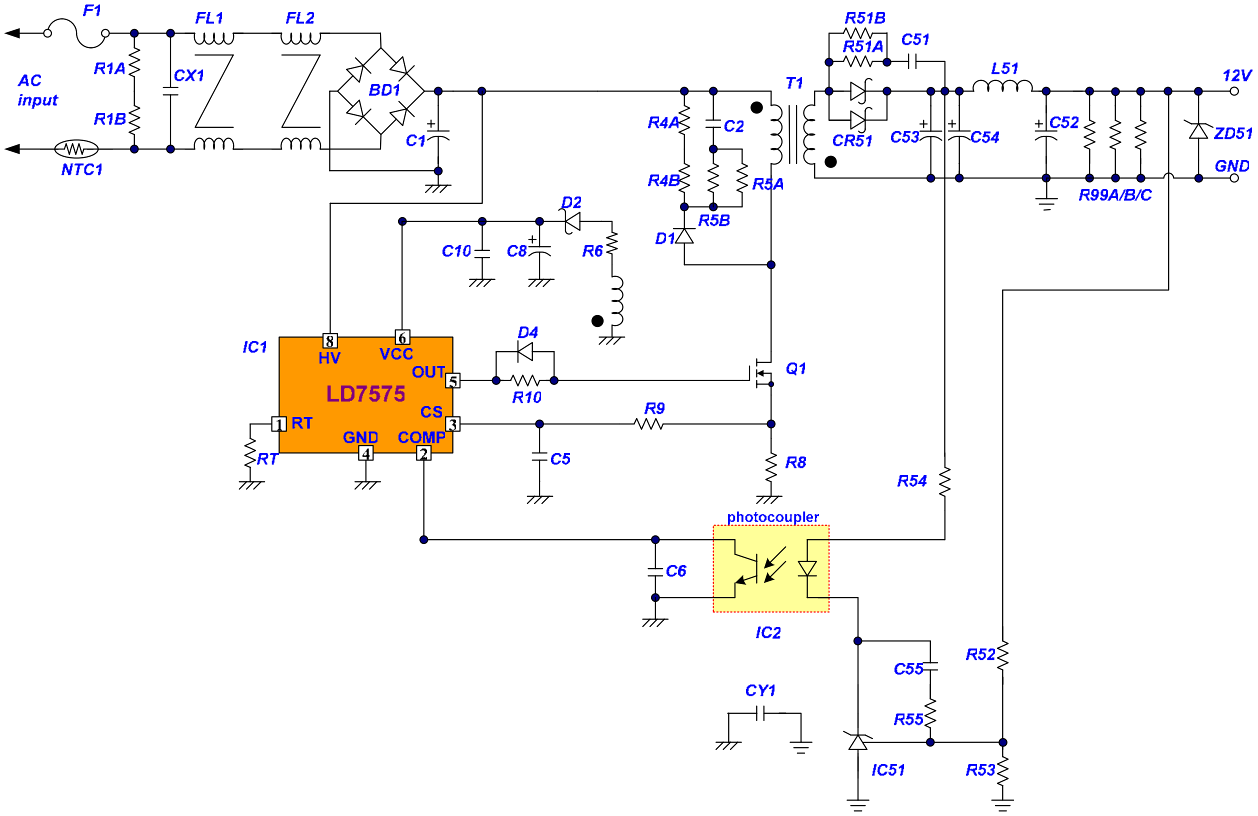
Total pages	Revision	Date
19	01	Aug 01,'05

Contents

Ⅰ. Schematic


F1
FL1
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AC
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R1B
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BD1
C1
R51B
R51A
C51
L51
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Ⅱ. BOM

P/N	Component Value	Original
R1A	1MΩ, 1206	
R1B	1MΩ, 1206	
R4A	100KΩ, 1206	
R4B	100KΩ, 1206	
R5A	100Ω, 1206	
R5B	100Ω, 1206	
R6	3.3Ω, 1206	
R8	0.43Ω, 2W	
R9	220Ω, 0805	
R10	10Ω, 1206	
RT	100KΩ, 0805,1%	
R51A	100Ω, 1206	
R51B	100Ω, 1206	
R52	9.53KΩ, 0805, 1%	
R53	2.49KΩ, 0805, 1%	
R54	510Ω, 0805	
R55	1KΩ, 0805	
R99A	10KΩ,	
R99B	N/C	
R99C	N/C	
NTC1	SCK053	
FL1	Leadtrend's Design	
FL2	Leadtrend's Design	
T1	Leadtrend's Design	
L51	Leadtrend's Design	

P/N	Component Value	Note
C1	100µF, 400V	L-tec
C2	1000pF, 1000V, 1206	X7R
C5	100pF, 50V, 0805	X7R
C6	0.022uF, 50V, 0805	X7R
C8	22uF, 50V	L-tec (LZG)
C10	0.1uF, 50V, 0805	X7R
C51	1000pF, 250V, 1206	
C52	470uF, 16V	L-tec (LZG)
C53	1000uF, 16V	L-tec (LZG)
C54	1000uF, 16V	L-tec (LZG)
C55	0.1uF, 50V, 0805	X7R
CX1	0.22uF,X-cap	
CY1	2200pF,Y-cap, class2	
D1	1N4007	
D2	PS102R	
D4	1N4148	
Q1	8A, 600V	FPQF8N60C
BD1	2A, 600V	2KBP06M
CR51	10A, 100V	Y1010DN
IC1	LD7575 CS	Leadtrend
IC2	EL817B	EVERLIGHT
IC51	TL431, 1%	
F1	250V,T2A	Walter

III. EXECUTIVE SUMMARY

Office	Taipei
Model Name	LD7575-EVB#3-01
Version	01

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

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
+12V	11.4V	12V	12.6V	0	4.2A
Line Regulation	/	/	±1%	/	4.2A
Load Regulation	/	/	±2%	0A	4.2A

Table 2

3. Green Mode Power Consumption

The input power of power supply shall remain less than 300mW under output at no load condition.

Test Condition:
Input: 90Vac/240Vac/264Vac
Output: No Load
Ambient Temperature: 25℃

Test Result: PASS

V_{in} (Vac)	I_{in} (mA_{rms})	Pin (mW)
90	7.97	133.6
240	19.03	200.1
264	21.61	220.5

Table 3

4. & 5. Line/Load Regulation

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

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. and Max output voltages.

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

Test Result: PASS

Output current		12Vout Reading					
		90Vac	110Vac	130Vac	180Vac	230Vac	264Vac
0A		12.046	12.047	12.046	12.046	12.045	12.045
4.2A		12.044	12.045	12.044	12.043	12.042	12.042
Reading	Max	12.047					
	Min	12.042					

Table 4

6. Output Dynamic Response

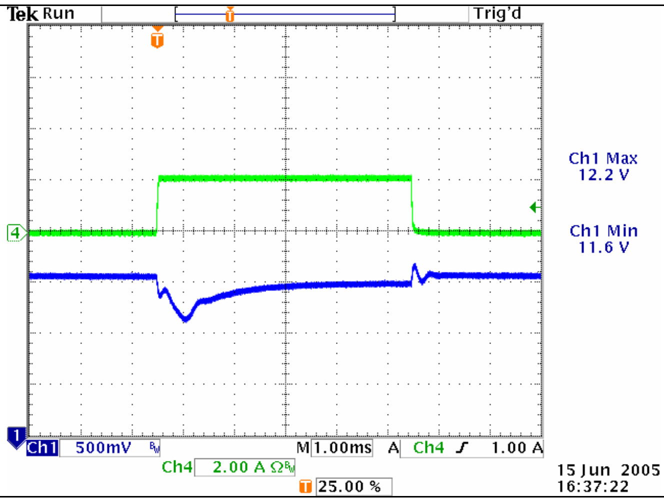
The dynamic of the output response refers to the change in output voltage to a step increase in the current of 50% & 100% load shall maintain ±10% of specified regulation.

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

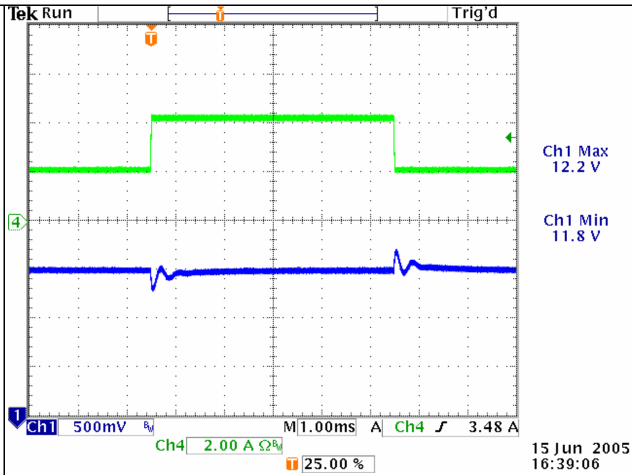
Test Result: PASS

Input	Output Dynamic	Output Voltage (V_{DC})	
		V_H	V_L
90Vac	0A→2.1A	12.2	11.6
	4.2A→2.1A	12.2	11.8
	0A→4.2A	12.4	11.3
264Vac	0A→2.1A	12.2	11.7
	4.2A→2.1A	12.2	11.8
	0A→4.2A	12.3	11.4
Reading	Max	12.4	
	Min	11.3	
SPEC	Max	13.2	
	Min	10.8	

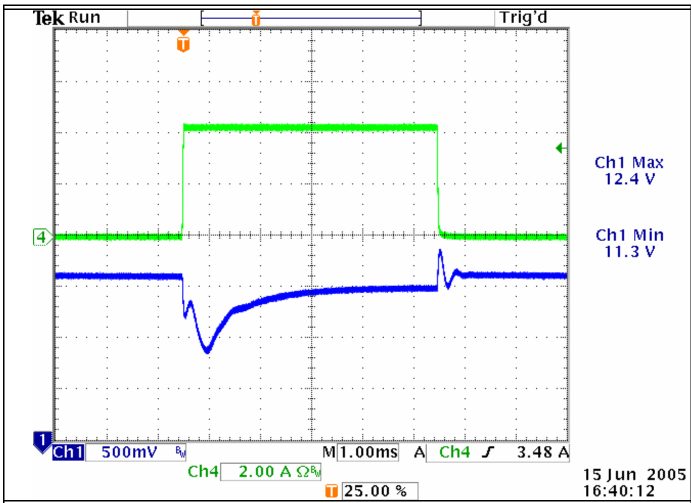
Table 5



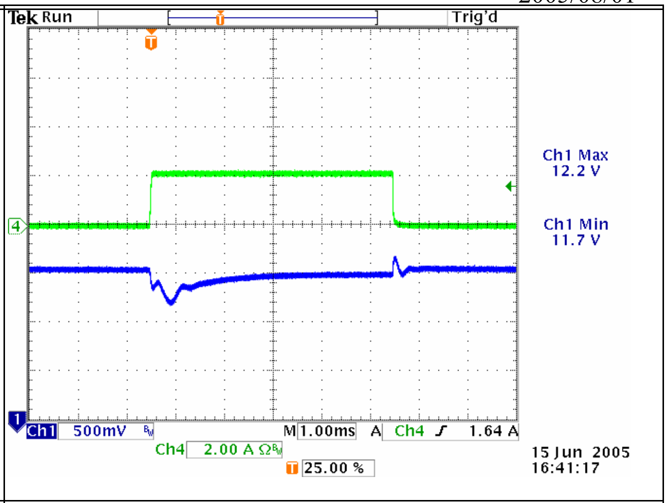
Output Load Dynamic Response Fig.1
Vin: 90Vac
O/P : +12V= 0A→2.1A
CH1: V_{O_+12V} (offset 10V)
CH4: I_{O_+12V}
Reading: +12V_{Max}=**12.2**V +12V_{Min}=**11.6**V



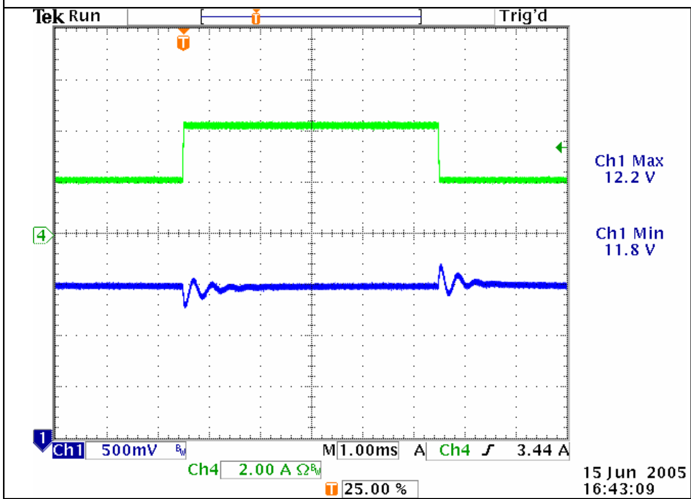
Output Load Dynamic Response Fig.2
Vin: 90Vac
O/P : +12V= 2.1A→4.2A
CH1: V_{O_+12V} (offset 10V)
CH4: I_{O_+12V}
Reading: +12V_{Max}=**12.2**V +12V_{Min}=**11.8**V



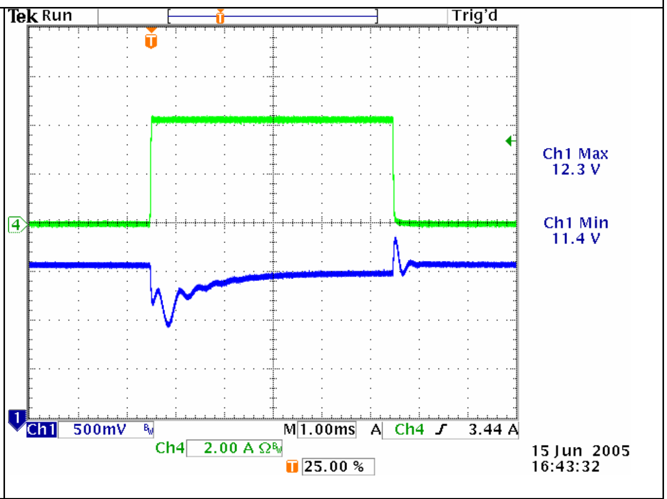
Output Load Dynamic Response Fig.3
Vin: 90Vac
O/P : +12V= 0A→4.2A
CH1: V_{O_+12V} (offset 10V)
CH4: I_{O_+12V}
Reading: +12V$_{Max}$=**12.4**V +12V$_{Min}$=**11.3**V



Output Load Dynamic Response Fig.4
Vin: 264Vac
O/P : +12V= 0A→2.1A
CH1: V_{O_+12V} (offset 10V)
CH4: I_{O_+12V}
Reading: +12V$_{Max}$=**12.2**V +12V$_{Min}$=**11.7**V



Output Load Dynamic Response Fig.5
Vin: 264Vac
O/P : +12V= 2.1A→4.2A
CH1: V_{O_+12V} (offset 10V)
CH4: I_{O_+12V}
Reading: +12V$_{Max}$=**12.2**V +12V$_{Min}$=**11.8**V



Output Load Dynamic Response Fig.6
Vin: 264Vac
O/P : +12V= 0A→4.2A
CH1: V_{O_+12V} (offset 10V)
CH4: I_{O_+12V}
Reading: +12V$_{Max}$=**12.3**V +12V$_{Min}$=**11.4**V

7. Peak to Peak Output Ripple and Noise

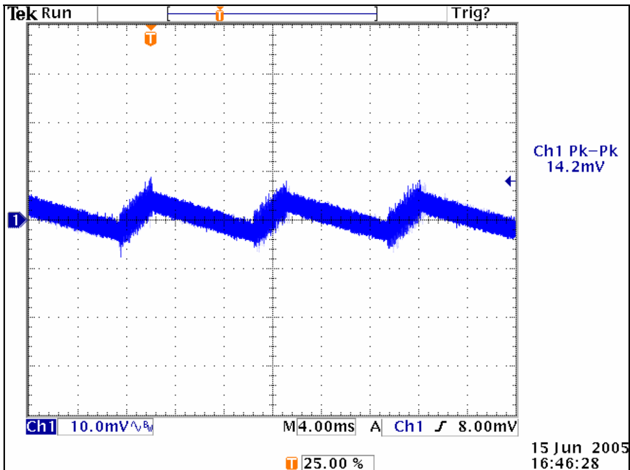
This refers to the peak-to-peak residual AC that remains on the DC power line after passing through all the filtering processes conducted within the power supply. The peak to peak output ripple and noise shall be considered to comprise of the complex envelope of the low frequency saw tooth voltage ripple and the high frequency switching noise. It shall be 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 and within 120mV.

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

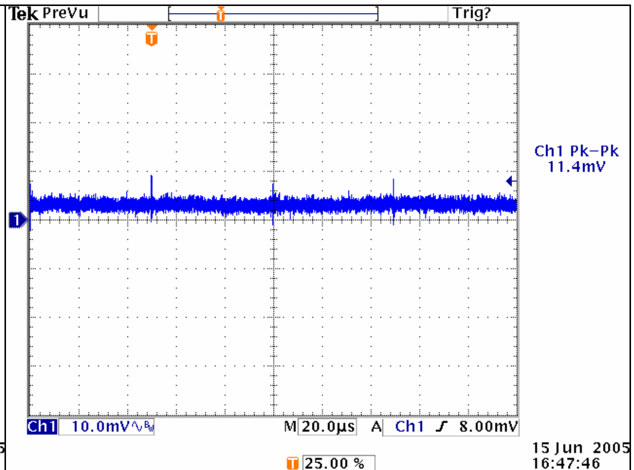
Test Result: PASS

Input	Load	12Vout Voltage (V_{DC})	
		$V_{ripple(mV)}$	$V_{noise(mV)}$
90Vac	0A	14.2	11.4
	4.2A	35.2	23.4
264Vac	0A	24.6	18.6
	4.2A	33.6	31.2
Reading	Max	35.2	31.2
	Min	14.2	11.4
SPEC		120.0	

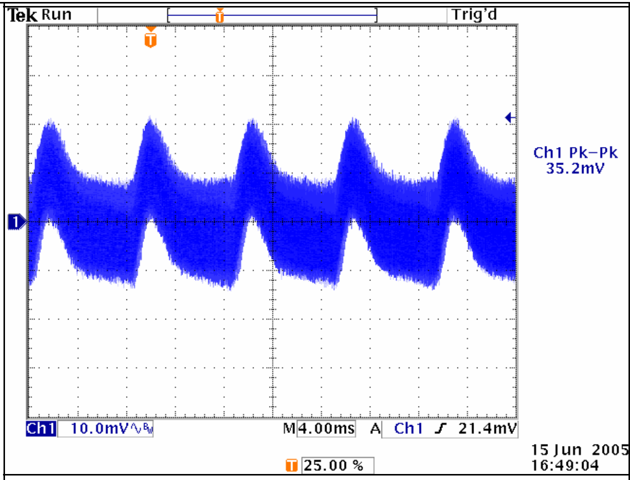
Table 6



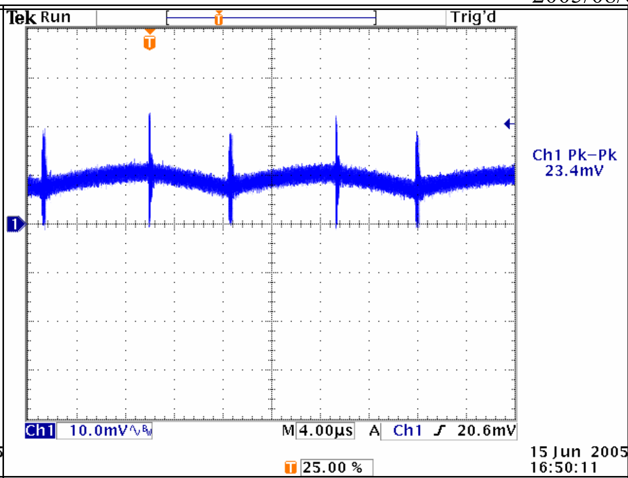
Output Ripple/Noise Test Fig.7
Vin: 90Vac
O/P: +12V=0A
CH1: V_{P-P_+12V}
Reading: **14.2mV**



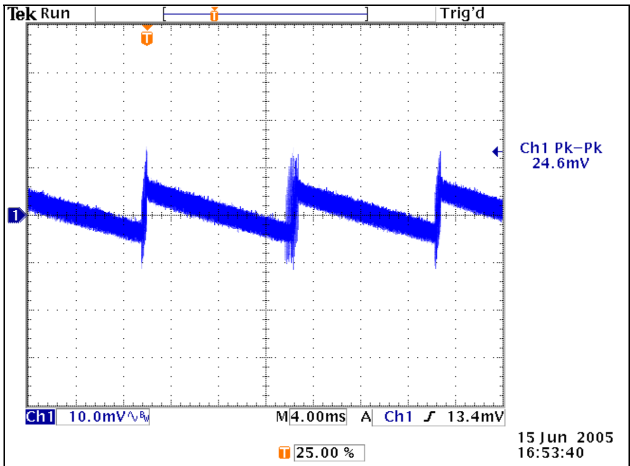
Output Noise Test Fig.8
Vin: 90Vac
O/P: +12V=0A
CH1: V_{P-P_+12V}
Reading: **11.4**mV



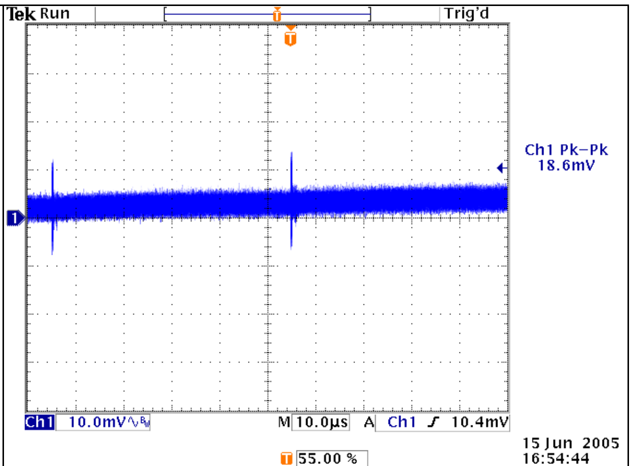
Output Ripple/Noise Test Fig.9
Vin: 90Vac
O/P: +12V=4.2A
CH1: $V_{P\text{-}P\_+12V}$
Reading: **35.2**mV



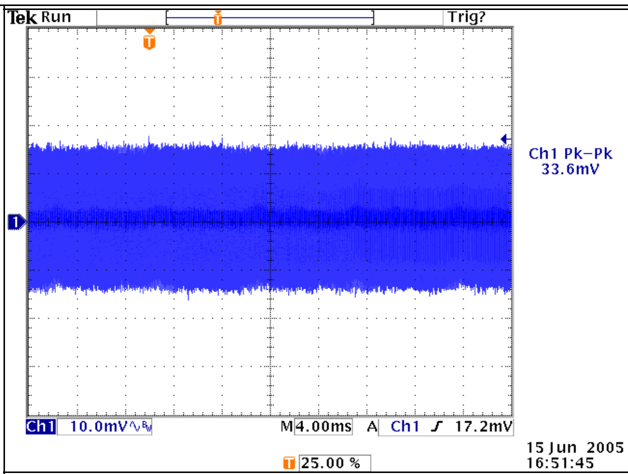
Output Noise Test Fig.10
Vin: 90Vac
O/P: +12V=4.2A
CH1: $V_{P\text{-}P\_+12V}$
Reading: **23.4**mV



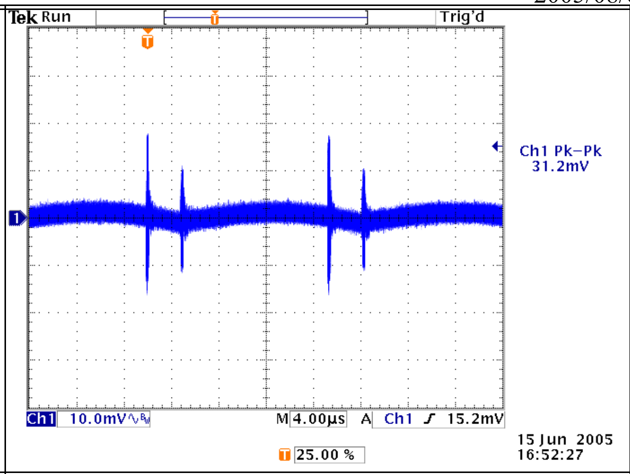
Output Ripple/Noise Test Fig.11
Vin: 264Vac
O/P: +12V=0A
CH1: $V_{P\text{-}P\_+12V}$
Reading: **24.6**mV



Output Noise Test Fig.12
Vin: 264Vac
O/P: +12V=0A
CH1: $V_{P\text{-}P\_+12V}$
Reading: **18.6**mV



Output Ripple/Noise Test Fig.13
Vin: 264Vac
O/P: +12V=4.2A
CH1: $V_{P\text{-}P\_+12V}$
Reading: **33.6**mV



Output Noise Test Fig.14
Vin: 264Vac
O/P: +12V=4.2A
CH1: $V_{P\text{-}P\_+12V}$
Reading: **31.2**mV

8. Turn On Delay Time

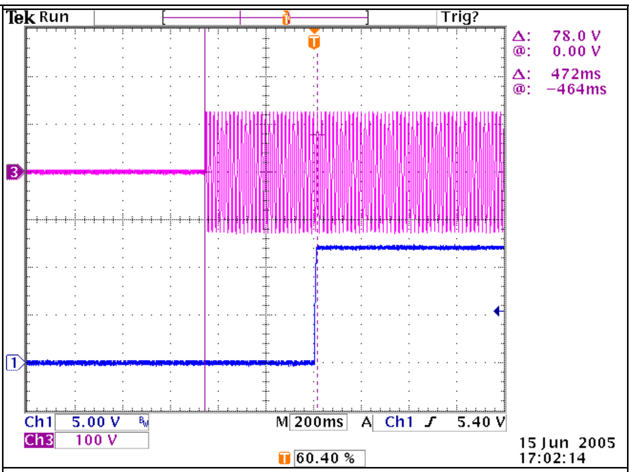
Turn on delay time will be less than 2 seconds at full load. Turn on delay time is measured as the delay between input voltage being applied at 0^{o} phase angle and when the outputs arrive within 10% of their operating value. Turn on delay time is measured using an input voltage of 90VAC(rms) and input frequency of 60Hz.

Test Conditions:
Input: 90Vac
Output: Max Load
Ambient Temperature : 25℃

Test Result: PASS

Input	$T_{\text{turn on delay}}$
90Vac	472ms

Table 7



Turn on Time Test Fig.15
Vin: 90Vac
O/P: Max Load
CH1: +12V
CH3: AC Input Voltage
Reading: 472ms

9. Holdup Time

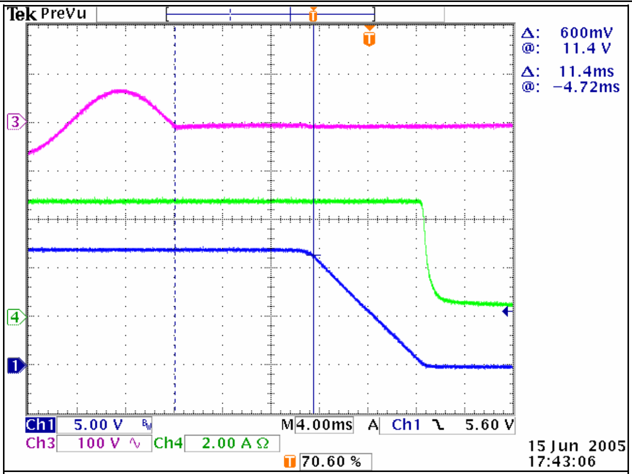
Holdup time refers to the time it takes for a loss of input voltage to propagate through the power supply and affect the output voltages. Holdup time spec must be met at 100Vac input line voltage and maintain minimum half AC cycle. Holdup time shall be measured by monitoring the output voltages and measuring the time it takes for the first affected output voltage to pass through the lower bound of the regulation threshold after input power to the converter is removed. The initial conditions of loading and input voltage are max load and minimum operational line input. The holdup time is measured by triggering an oscilloscope on the loss of input voltage while monitoring the conditions of the output voltages.

Test Conditions:
Input: 100Vac / 50Hz
Output: Max Load
Ambient Temperature : 25℃

Test Result: PASS

Input	$T_{hold\ on}$
100Vac	11.4ms

Table 8



Hold-up Time Test Fig.16
Vin: 100Vac
O/P: Max Load (4.2A)
CH1: +12V(Vout) ;CH3: AC Input Voltage
CH4: +4.2A(Iout)
Reading: **11.4**ms

10. 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. This protection shall be activated within 200% of maximum load.

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

Test Result: PASS

Intput	OCP
90Vac	5.48A
264Vac	6.53A

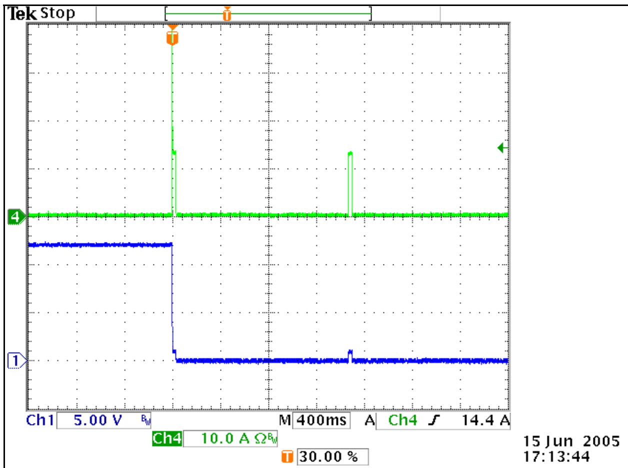
Table 9

11. Output Short Protection

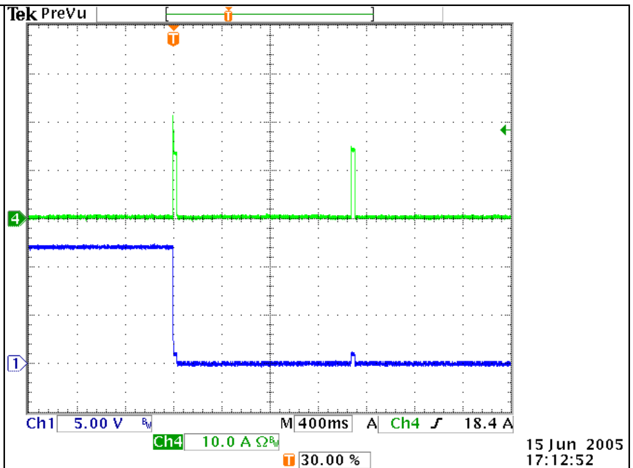
The supply shall be designed with appropriate output short circuit protection. This protection shall be activated in the event of a short or long-term condition happened. The primary shall limit the total power without inflicting any damage to any internal supply components and shall be reversible pending 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.19
Vin: 90Vac
Output : +12V=0A→Short
CH1: V_{+12V}
CH4: I_{+12V}



Output Short Protection Fig.20
Vin: 264Vac
Output : +12V=0A→Short
CH1: V_{+12V}
CH4: I_{+12V}

12. Efficiency Test

The efficiency of power supply shall be measured throughout its specified operating input range and at output maximum load conditions. It should remain 75% minimum.

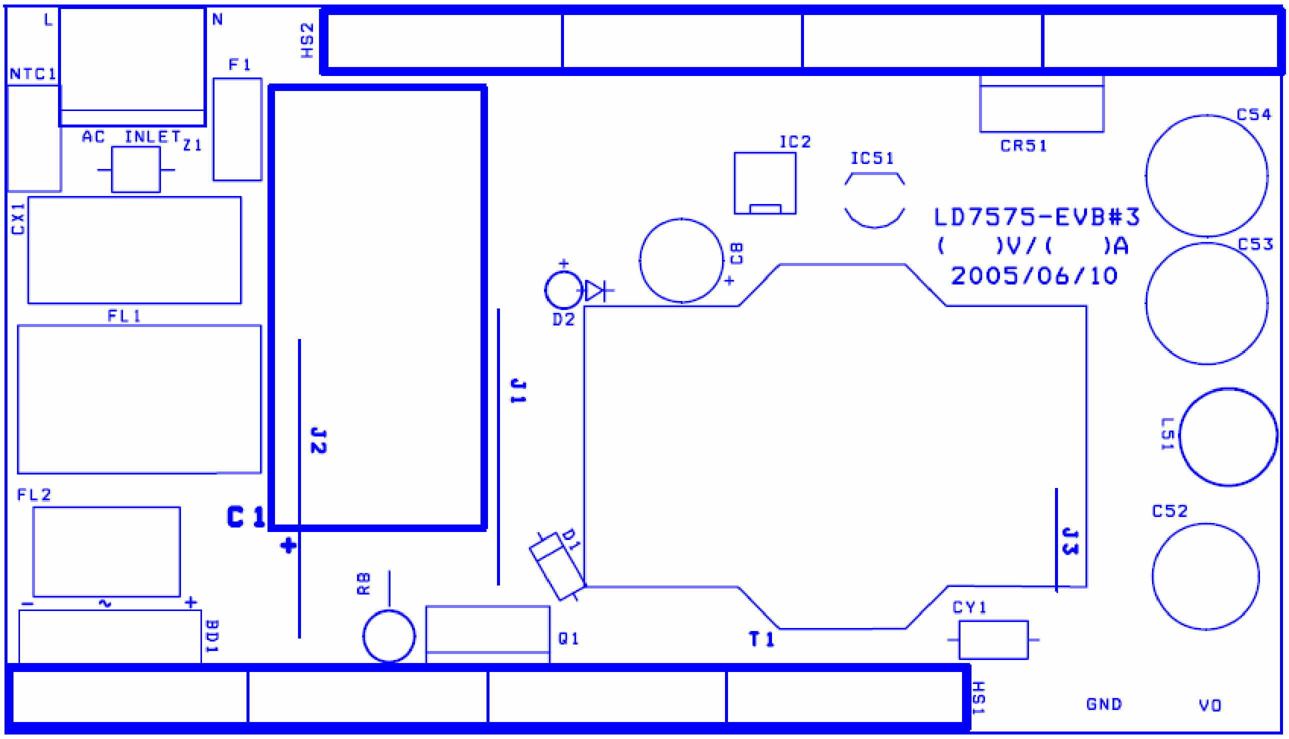
Test Condition:
Input: 90Vac~264Vac
Output: Max. Load
Ambient Temperature: 25℃
Test Result: PASS

$V_{in}(V_{ac})$	$I_{in}(mA_{rms})$	$P_{in}(W)$	V_{+12V}	I_{+12V}	$P_O(W)$	Eff η(%)
90	970.0	59.74	12.036	4.20	50.551	84.62%
110	794.0	58.76	12.037	4.20	50.555	86.04%
130	690.4	58.73	12.038	4.20	50.560	86.09%
180	545.9	57.95	12.039	4.20	50.564	87.25%
230	451.1	58.02	12.040	4.20	50.568	87.16%
264	402.8	58.12	12.042	4.20	50.576	87.02%

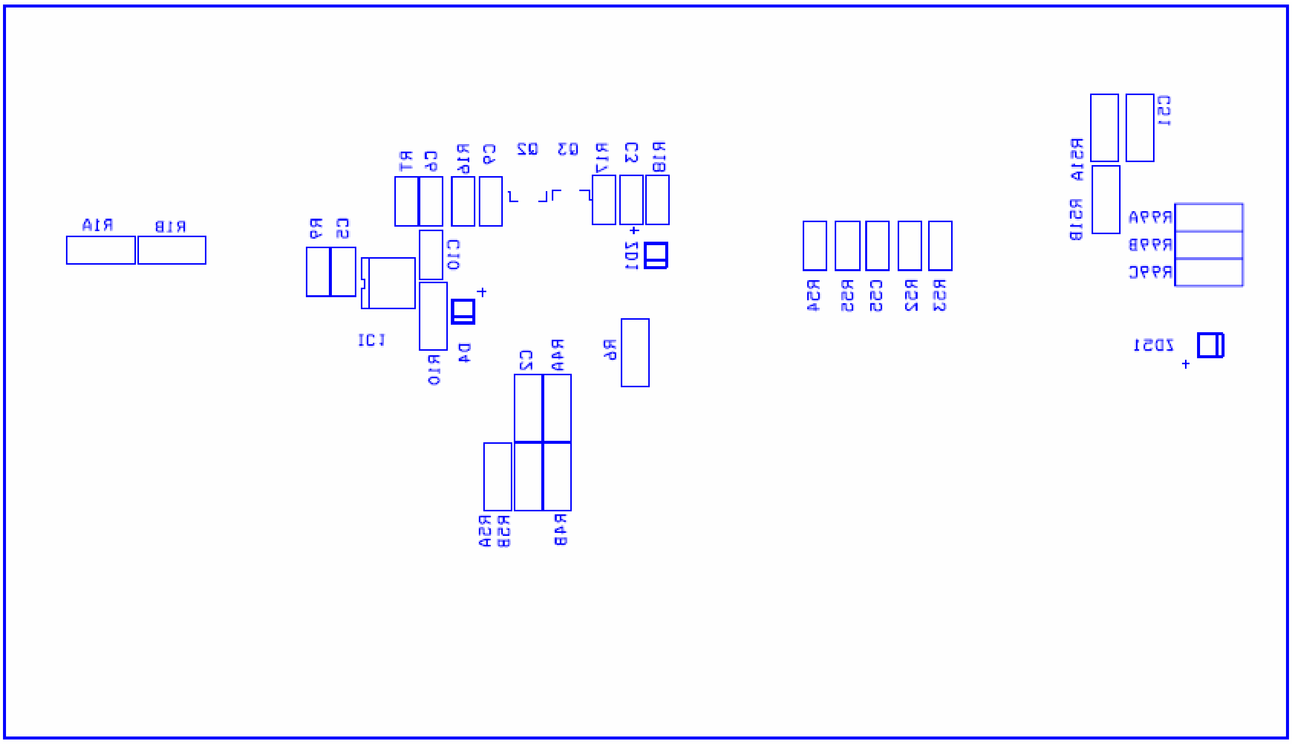
Table 10

IV. Gerber File:

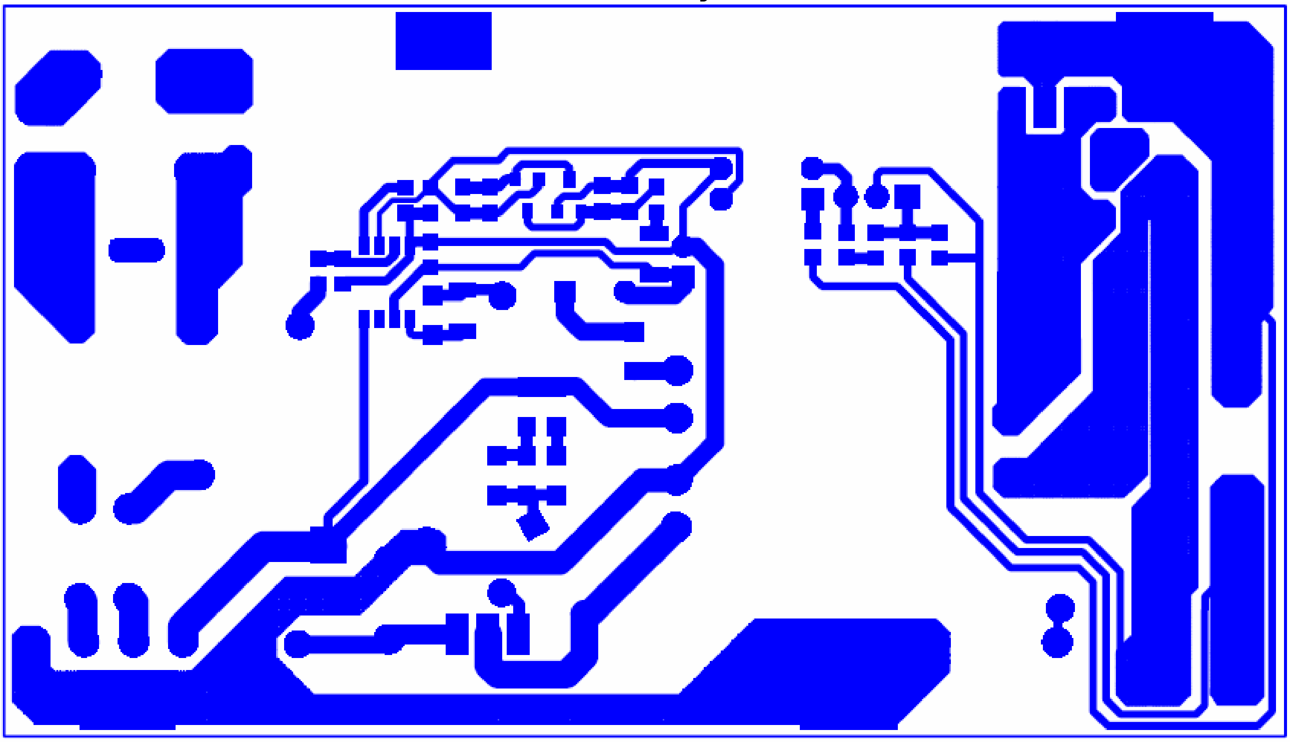
Silkscreen TOP



Silkscreen Bottom



Bottom Layer



Solder mask Bottom