Evaluation Board for RS2051
--- 36W (12V, 3A) Adapter

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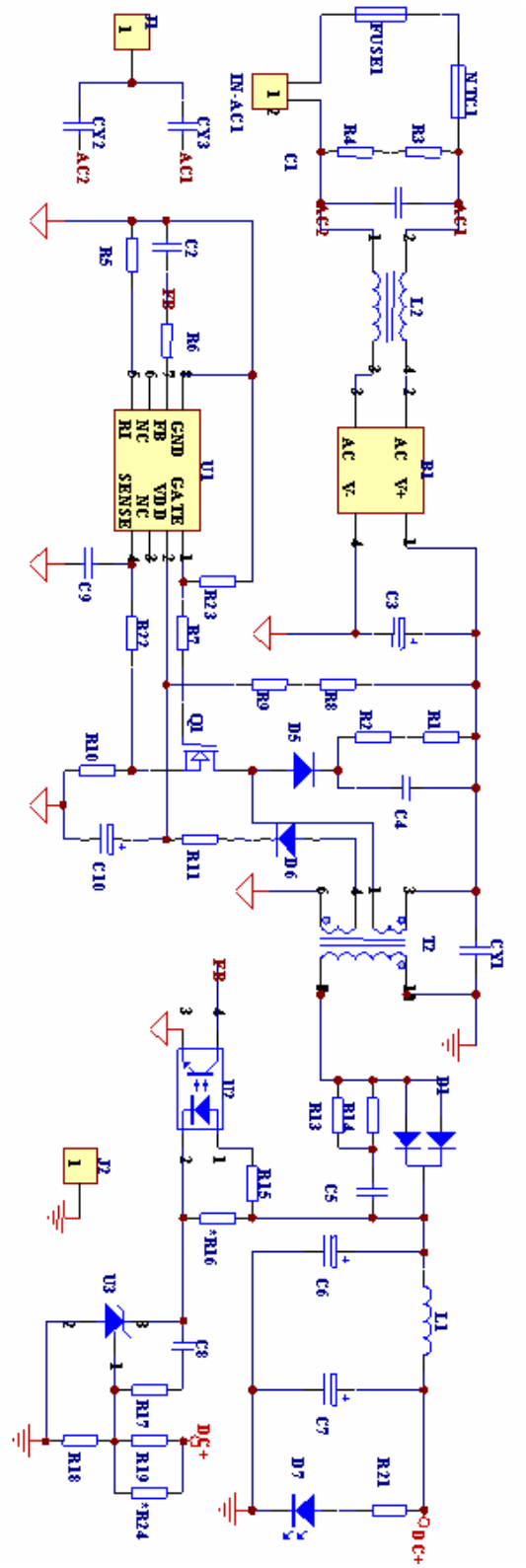
Ⅰ. Schematic

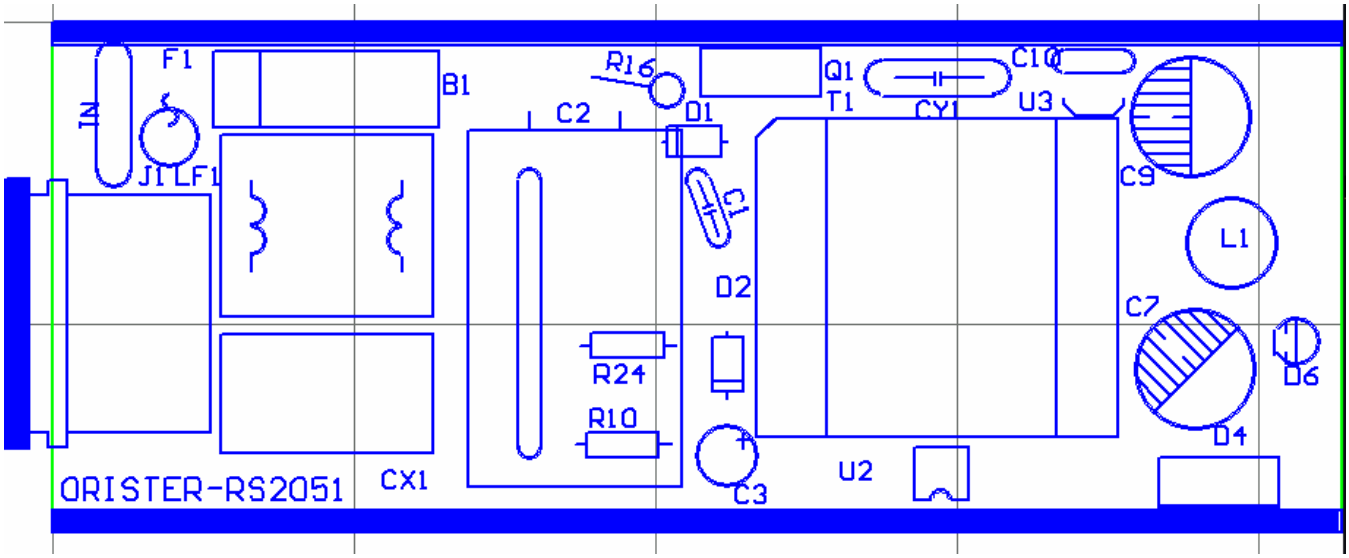

FUSE1
NTC1
IN-AC1
CY2
CY3
AC2
AC1
C1
R4
R3
L2
R5
C2
FB
R6
GND
FB
NC
RI
GATE
VDD
NC
SENSE
U1
AC
V+
AC
V-
B1
C9
R23
C3
R22
R7
R9
R8
R2
R1
Q1
D5
R10
C4
C10
R11
D6
T2
CY1
U2
R13
R14
B1
J2
R15
C5
*R16
C6
U3
C8
L1
R17
C7
R18
R19
*R24
D7
R21
D C+

Ⅱ. BOM

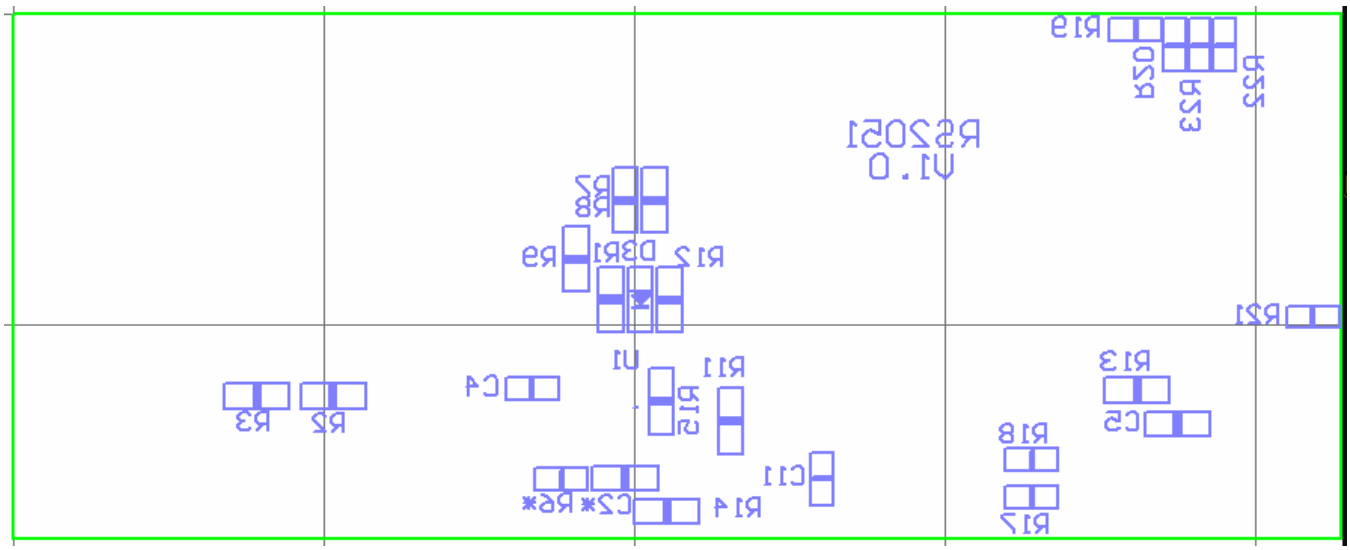
DESIGNATOR	DESCRIPTION	NOTE		DESIGNATOR	DESCRIPTION	NOTE
B1	KBP406	BRIGE		R1	47K	1206
C1	0.1u/~275V	RAD0.6-0.3		R2	47K	1206
C2	103/63V	18*6*12(L*W*H)		R3	750K	1206
C3	82uF/400V	Φ18*33		R4	750K	1206
C4	103/1KV			R5	100K	1/4W
C5	102	0805		R6	680R	1206
C6	1000uF/25V	松下银字 Φ10*20		R7	47R	1206
C7	1000uF/25V	松下银字 Φ10*20		R8	750K	1206
C8	104	0805		R9	750K	1206
*C9	101	OPEN 0805		R10	0R75	2W
C10	22uF/50V	Φ5*12		R11	10R	1206
CY1	222/1KV			R13	47R	1206
*CY2	223/1KV	OPEN		R14	47R	1206
*CY3	223/1KV	OPEN		R15	3.3K	0805
D1	Y2010	TO220		*R16	2K2	OPEN 0805
D5	FR107	DIODE		R17	10K	0805
D6	FR102	DIODE		R18	10K	0805
D7	LED	Φ3		R19	39K	1/4W
FUSE1	F2A/250V	FUSE		R21	3K3	0805
IN-AC1	CON2	POWER_ACIN		R22	510R	1/4W
*J1	CON1	PAD		R23	100K	1206
*J2	CON1	PAD		*R24	1.5M	OPEN 1/4W
L1	10uH	Φ8*12/2.5A		T2	EPQ2620	EPQ26-20
L2	20mH /1A	18*16*20(L*W*H)		U1	RS2051	DIP8/SOT6
NTC1	5D-9	NTC		U2	PC817B	DIP4
Q1	5N60	TO220		U3	RS431	TO92

Ⅳ. Gerber file:

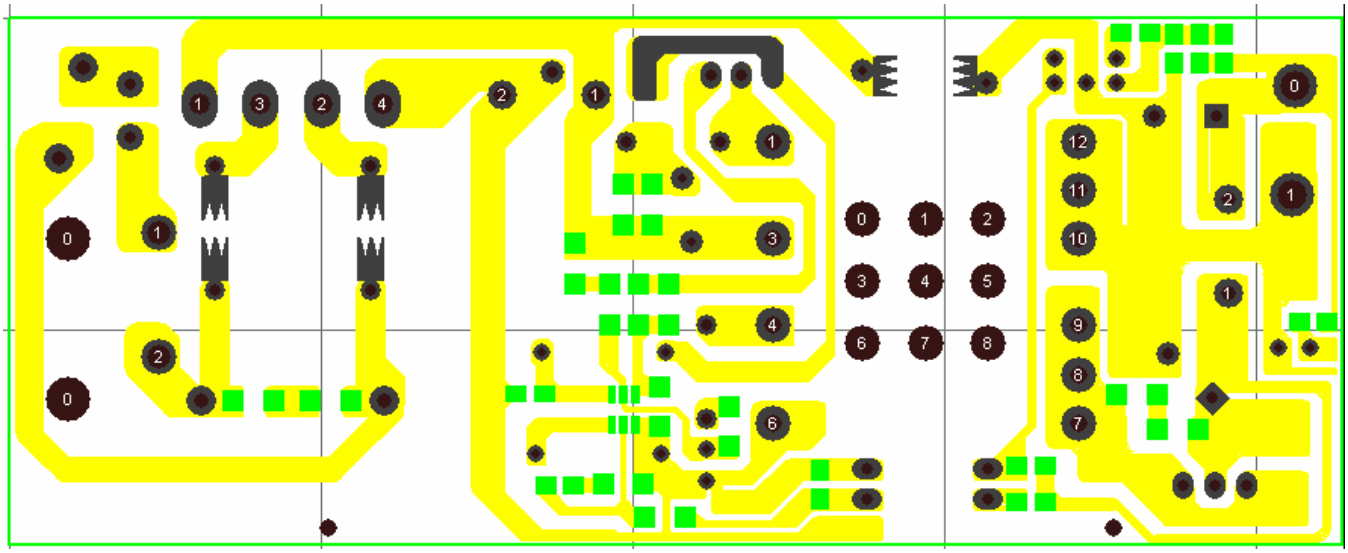
Silkscreen Top



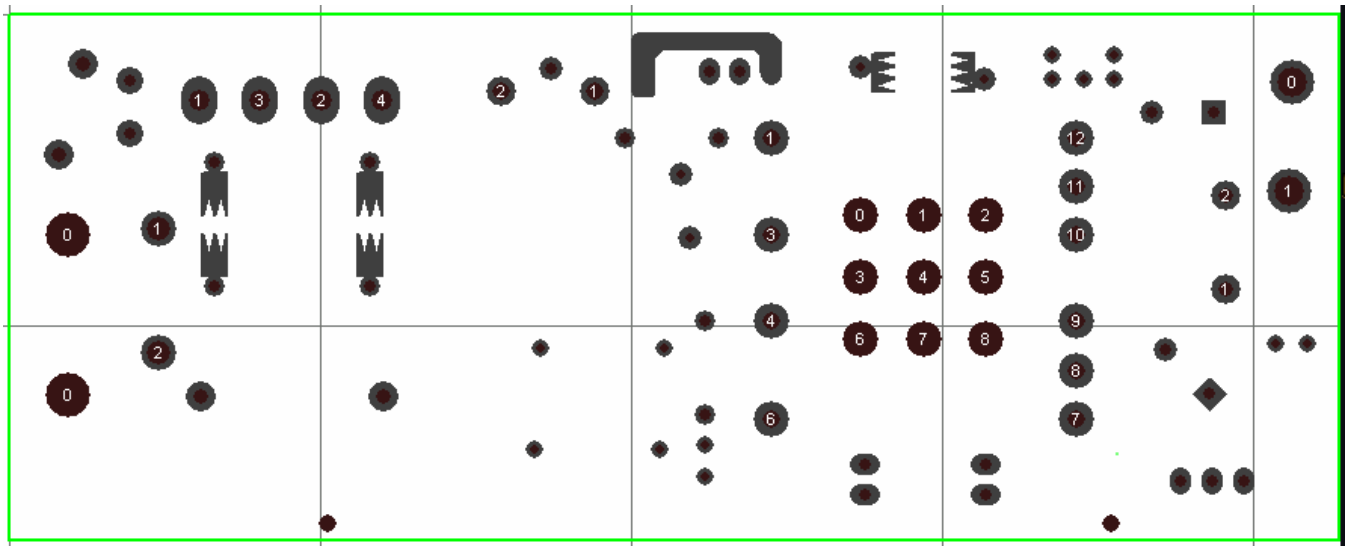
Silkscreen Bottom



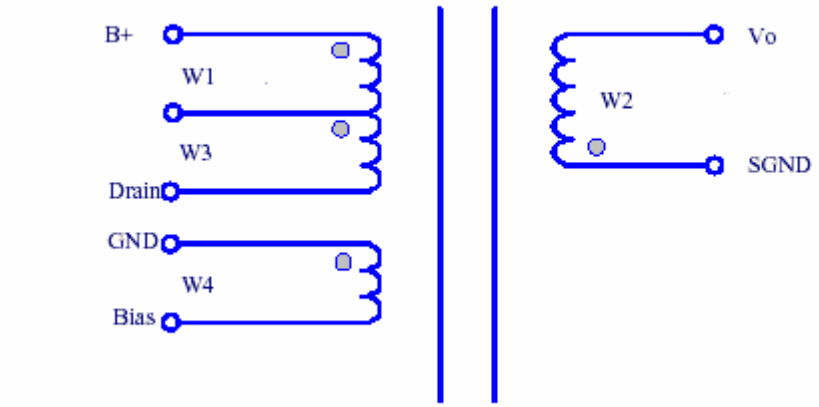
Bottom Layer



Solder mask Bottom



Ⅴ. Transformer specification:



Core & Bobbin	Winding	Wire Gauge(mm)	Turns
PQ26-20	W1	0.38*2	20
	W2	**0.41*3**	7
	W3	0.38*2	20
	W4	0.18*1	9

NOTE: N1(W1+W3) inductance=850uH

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Ⅰ. EXECUTIVE SUMMARY

TEST	Result	Comments
Turn On Delay Time	**Pass**	
Green Mode Power Consumption	**Pass**	
Operating Efficiency	**Pass**	
Line/Load Regulation	**Pass**	
Output Dynamic Response	**Pass**	
Peak to Peak Output Ripple and Noise	**Pass**	
Over Current Protection	**Pass**	
Output Short Protection	**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	242Vac

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	Normal	Maximum	Minimum	Maximum
+12V	11. 5V	12.0V	12.5	0A	3A
Load Regulation	/	/	±1%	0A	3A
Load Dynamic	11.5V	12.0V	12.5	/	0~100%

3. Turn On Delay Time

Turn on delay time will be less than 4 seconds at full load. Turn on delay time is measured as the delay between input voltage being applied at 0o 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:

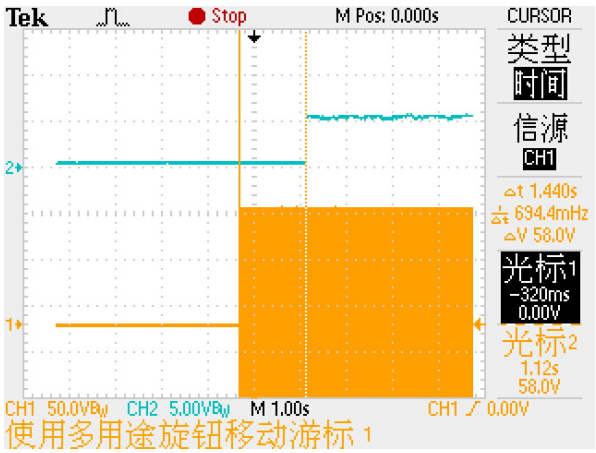
Input: 90Vac

Output: 2.5A

Ambient Temperature : 25℃

Test Result: PASS

Input	$T_{turn\ on\ delay}$ (s)
90Vac	1.44



4. Green Mode Consumption

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

Test Condition:

Input : 90Vac/242Vac

Output : No Load

Ambient Temperature: 25℃

Test Result: PASS

V_{in} (Vac)	Pin (mW)	Vo (Vdc)
90	110	12.272
242	240	12.269

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 85%.

Test Condition:

Input: 90~242Vac

Output: 3A

Ambient Temperature: 25℃

Test Result: PASS

V_{in}(Vac)	P_{in}(W)	V_O(Vdc)	I_O(A)	P_O(W)	Efficiency(%)
90	41.92	12.092	3	36.29	86.6
110	41.67	12.091	3	36.29	86.9
220	40.16	11.955	3	35.87	87.0
242	40.12	11.934	3	35.81	89.2.

6. Line/Load Regulation

Line/Load regulation is defined to be the percent change in output voltage versus the nominal voltage due to a change in DC load within Hi/Lo line operating range. Line/Load regulation to be measured at Min. Typical and Max output voltages.

Test Conditions:

Input: 90Vac/242Vac (60Hz)

Output: +5V=0A/1A/2A
Ambient Temperature : 25℃
Test Result: PASS

Output load(A)		Vo(Vdc) Reading	
		90Vac	242Vac
0		12.272	12.276
0.75		12.203	12.204
1.5		12.178	12.182
2.25		12.123	12.110
3		12.092	11.934
Reading Variation(%)	Max	0.18	0.342
	Min		
Spec		±2.8%	

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 / 242Vac (60Hz)
Ambient Temperature : 25℃
Test Result: PASS

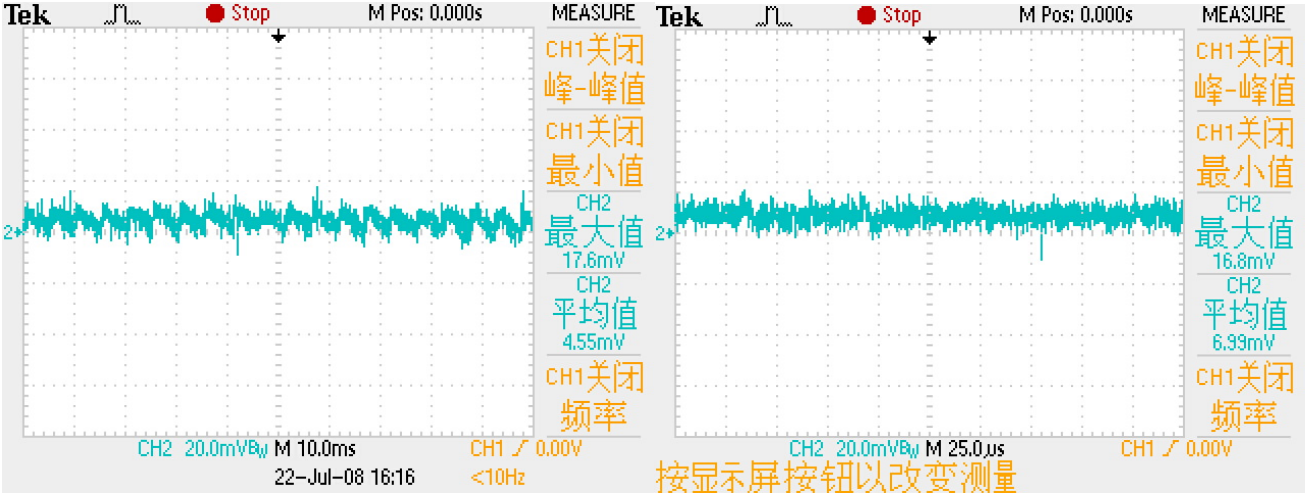
8. Peak to Peak Output Ripple and Noise

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/242Vac (60Hz)

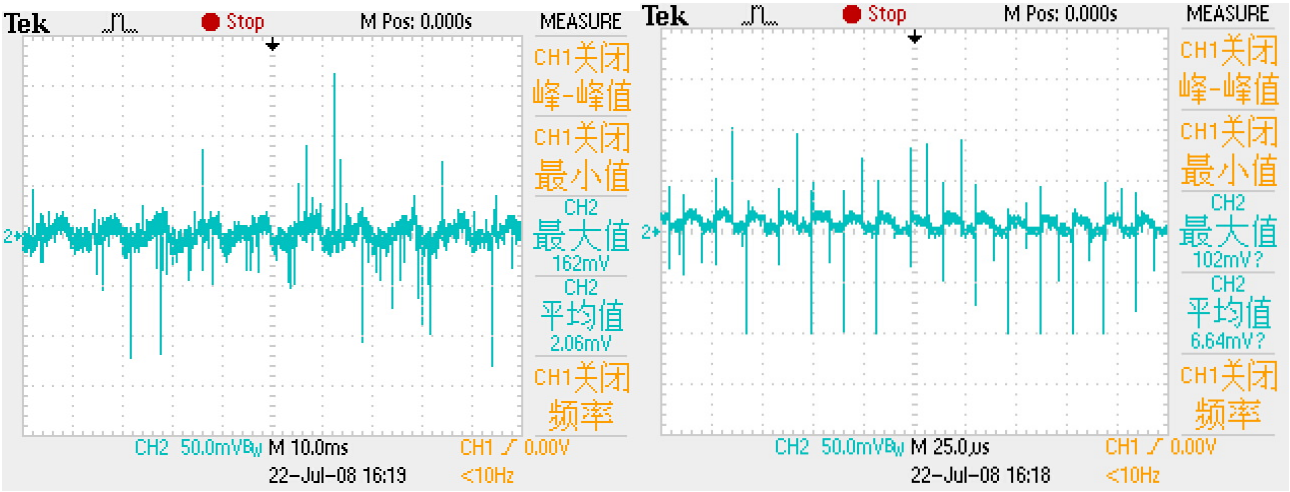
RS2051

Output : Max/Min Load
Ambient Temperature : 25℃
Test Result: PASS



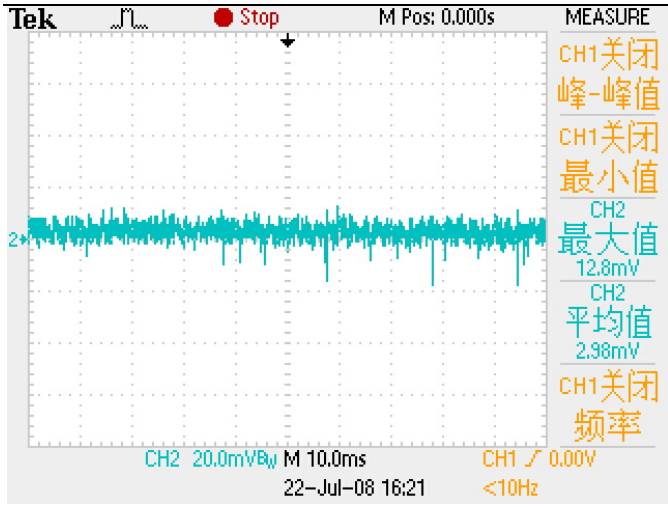
Output Ripple/Noise Test
Vin : 90Vac
O/P: +12V=0A
CH2 : V_{P-P_+12V}
Reading :**17.6**mV

Output Noise Test
Vin : 90Vac
O/P: +12V=0A
CH2 : V_{P-P_+12V}
Reading :**16.8**mV

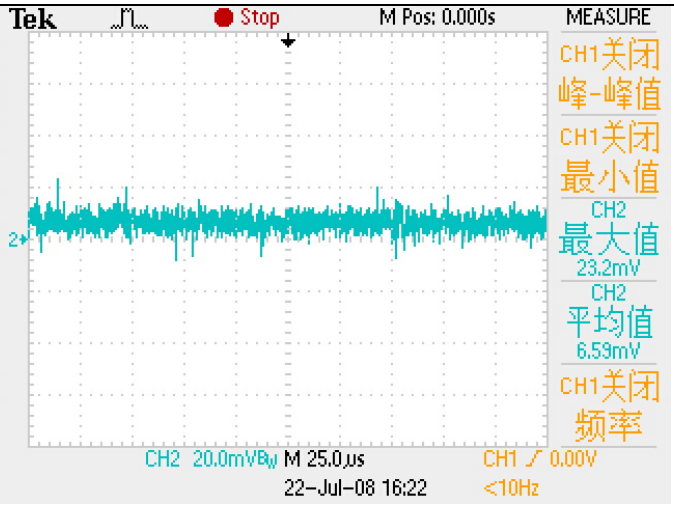


Output Ripple/Noise Test
Vin : 90Vac
O/P: +12V=3A
CH2 : V_{P-P_+12V}
Reading :**162**mV

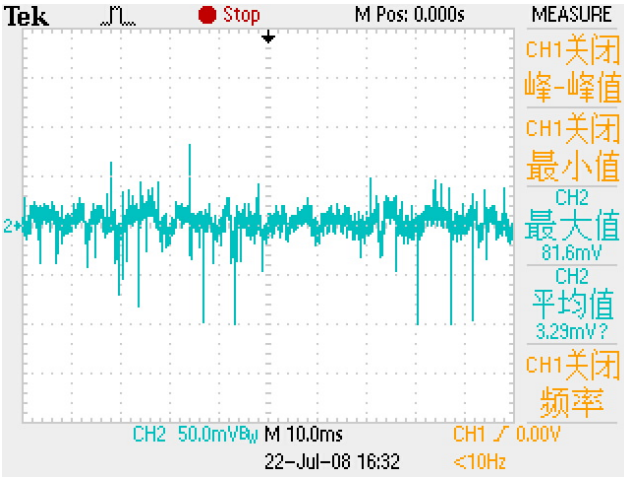
Output Noise Test
Vin : 90Vac
O/P: +12V=2.5A
CH2 : V_{P-P_+12V}
Reading :**102**mV



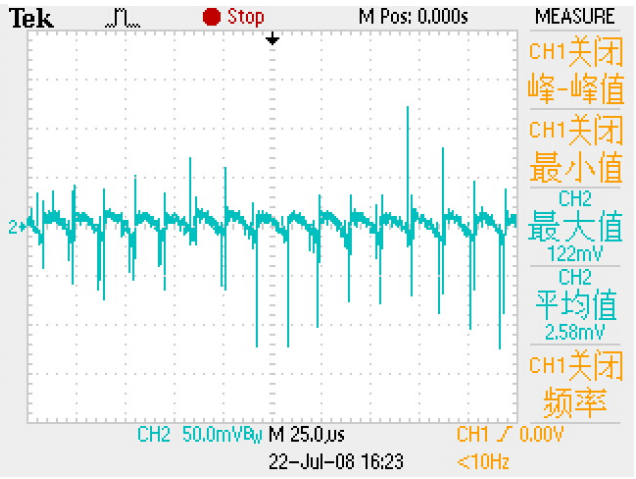
Output Ripple/Noise Test
Vin : 242Vac
O/P: +12V=0A
CH2 : V_{P-P_+12V}
Reading :**12.8**mV



Output Noise Test
Vin : 242Vac
O/P: +12V=0A
CH2 : V_{P-P_+12V}
Reading :**23.2**mV



Output Ripple/Noise Test
Vin : 242Vac
O/P: +12V=3A
CH2 : V_{P-P_+12V}
Reading :**81.6**mV



Output Noise Test
Vin : 242Vac
O/P: +12V=3A
CH2 : V_{P-P_+12V}
Reading :**122**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/242Vac (60Hz)
Ambient Temperature : 25℃
Test Result : PASS

Input	Result (A)
90Vac	3.6
242Vac	3.4

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/242Vac (60Hz)
Ambient Temperature : 25℃
Test Result: PASS