Customer Name : ㈜ 하이디스플레이 Date : 2011. 02. 22.

SPECIFICATION FOR APPROVAL

Part Name : CCFL INVERTER
Customer Part No. :
DS-Plus Part No. : DS-1309WB (Voltage Dimming Control)

Approval Sign

Please Return 1 Copy After Approved

DS -Plus Inc.

PREPARED	APPROVAL

Table of content

1. Revision history

No.	DATE	REVISION	DESCRIPTION

2. General Descriptions

The 6 output Inverter module ideal for desktop and Industrial applications.

This module designed to drive 6 lamps and targeted for use with desktop LCD Display and Industrial LCD Panel for 20.1 inches in near 7.0 mArms of each lamp current operation.

New parallel synchronize operating technology

This CCFL- Inverter module drive 6 lamps under the condition of same frequency and same phase with new parallel operating technology in order to reduce EMI and spurious noise.

Wide range of input voltage operation

This module can be operated under the condition of wide input voltage from 10.8V to 13.2V in terms of included voltage regulator.

3. Features

- High efficiency
- Drive 6 lamps with one module
- Nominal current 7.0 mArms for each lamp
- 10.8~ 13.2V input voltage operation
- Automatically balancing of both side lamp current
- Accurate and stable output current regulation
- Voltage dimming control : No influence to power ripple
- Long lamp life with soft start
- Single sided PCB layout
- Built- in fuse
- Low EMI and spurious noise

4. Applications

- 20.1" desk top LCD monitors
- Industrial LCD panel

5. Absolute maximum ratings

Input supply voltage (V_{IN})	- 0.3V to 14.0V
Output voltage, no load	Internally limited to zero volt
Output current (I_O)	9.0mArms
Output power (per lamp)	8.0W
Sleep & Bright adjust signal voltage (V_{SLEEP} , V_{BRT})	- 0.3V to V_{IN}
Ambient operating temperature	0 °C to 50 °C
Storage temperature range	- 30 °C to 80 °C
Operating & storage humidity	10 % to 85 %

6. Recommended operating conditions (R.C.)

Parameter	Symbol	Recommendation			Units
		Min	R.C.	Max	
Input supply voltage	V_{IN}	10.8	12.0	13.2	V
Full bright lamp current	$I_{O(MAX)}$	6.5	7.0	7.5	mArms
Brightness control voltage range	V_{BRT}	0		5.0	V
Lamp on/off control voltage	V_{SLEEP}	3.0	5.0	7.0	V
Lamp operating voltage(reference)	V_O		800		Vrms
Operating ambient temperature range	T_A	0		50	°C

7. Electrical characteristics

Parameter	Symbol	Conditions*	Specification*			Unit
			Min	Typ	Max	
Input supply voltage	V_{IN}		10.8	12.0	13.2	V
Input current	I_{IN}	V_{IN}=12V, V_{BRT}=0V	2.5	3.0	3.5	A
Full bright lamp current	$I_{O(MAX)}$	V_{IN}=12V, V_{BRT}=0V	6.0	7.0	8.0	mArms
Minimum lamp current	$I_{O(MIN)}$	V_{IN}=12V, V_{BRT}=5.0V	2.0	3.0	4.0	mArms
Operating frequency	F_O	V_{IN}=12V, V_{BRT}=0V	43	48	53	KHz
Open lamp output voltage	V_O	1 or more lamp open	-	-	0	Vrms
Dimming ratio(voltage cont)		V_{IN}=12V, V_{BRT}=0 to 5.0V		2 :1		
Sleep current	I_{IN}	V_{IN}=12V, V_{SLEEP}=0V			10	μA
Efficiency		V_{IN}=12V, V_{BRT}=0V	80	88		%

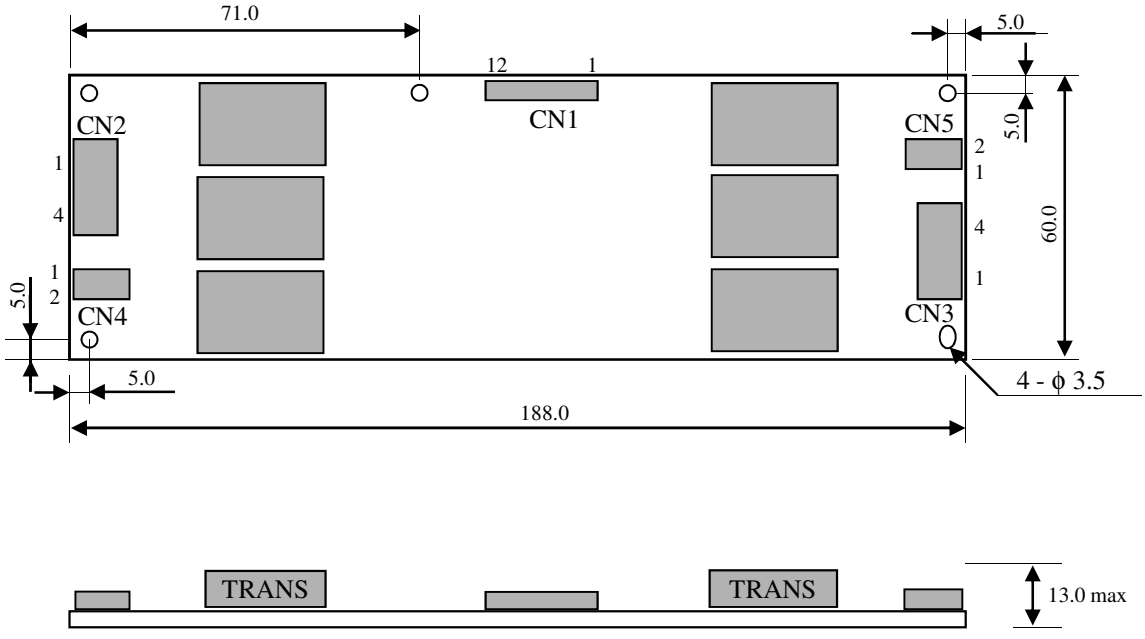
* At the reference 20.1" LCD-Module(LM201U03) of LG-Philips

8. Connector and functional pin description

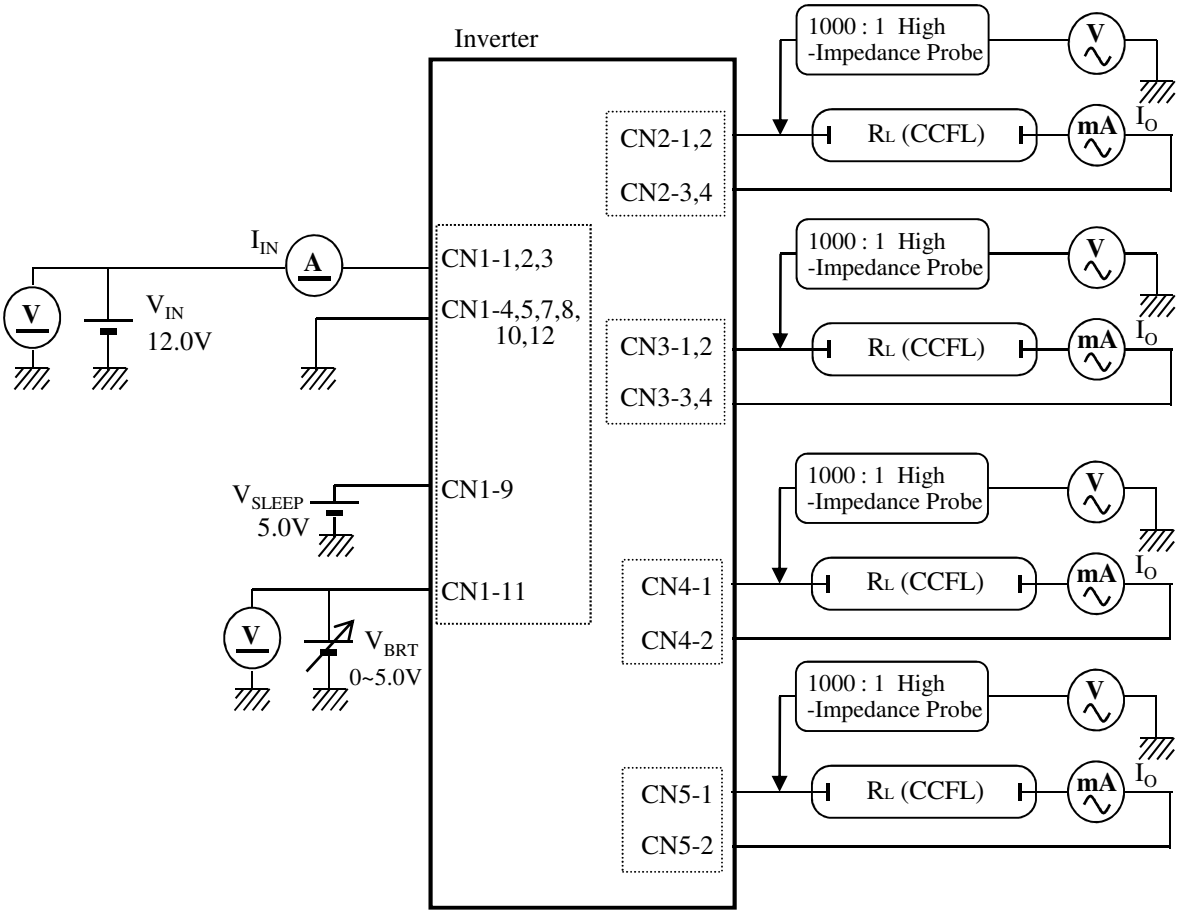
CN1 Connector	:	12505WR- 12A00(YEONHO or Equivalent)
CN1- 1,2,3		V_{IN} (DC Input ; 12.0V)
CN1- 4,5,7,8,10,12		G_{ND} (Power supply return)
CN1- 9		V_{SLEEP} (Lamp On/Off control ; Off at Low, On at High)
CN1- 11		V_{BRT} (Bright adjust ; 0 to 5.0V)
CN1- 6		N.C
CN2,3 Connector	:	20015WR- 09A00 (YEONHO or Equivalent)
CN2,3 - 1,2		High voltage
CN2,3 - 3,4		Lamp current return
CN4,5 Connector	:	35001WR- 02A00 (YEONHO or Equivalent)
CN4,5 - 1		High voltage
CN4,5 - 2		Lamp current return

9. Mechanical dimensions

Tolerance : ± 0.5
Unit : mm

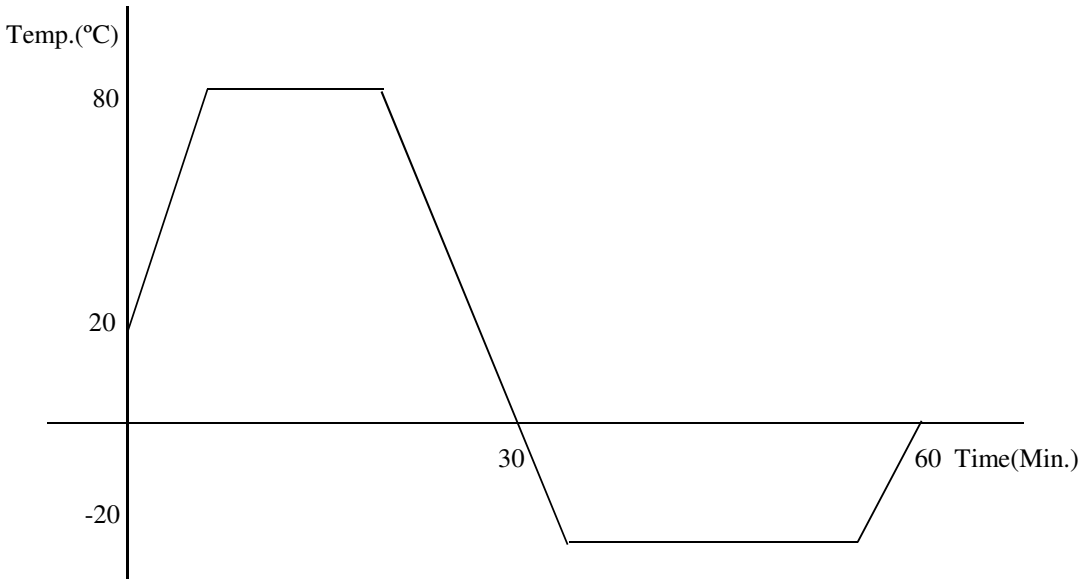


10. Test circuit



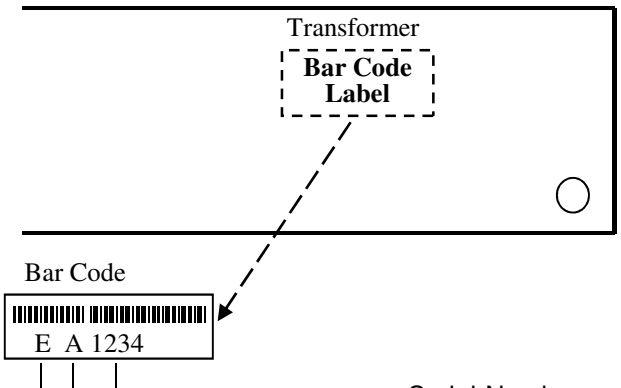
11. Heat shock test

20 cycles of test



12. Notation of lot number

Bar code label position : Bottom of PWB



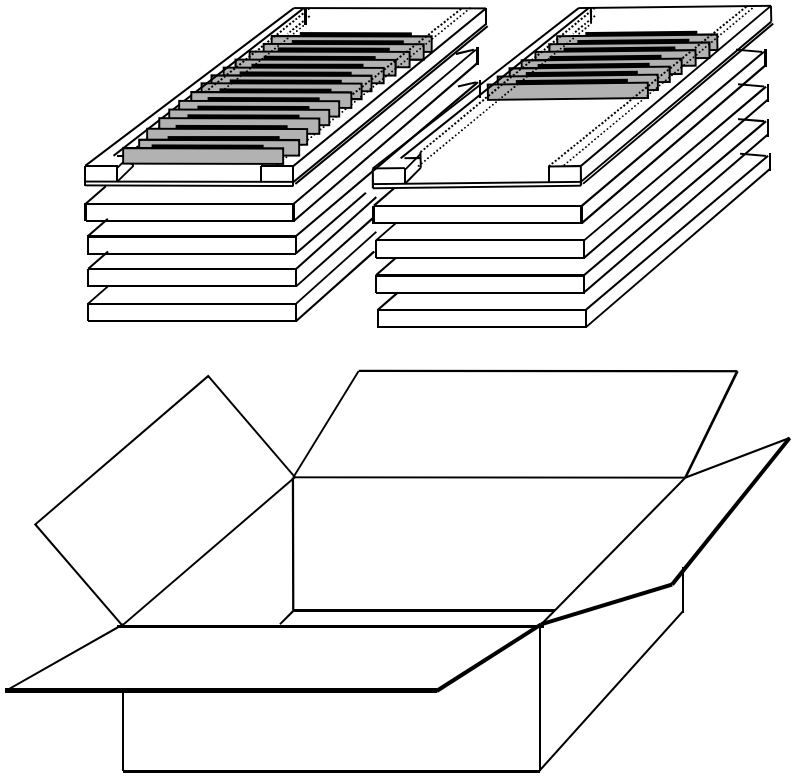
Serial Number

Month of product : A, B, C, D, E, F, G, H, I, J, K, L
(01,02,03,04,05,06,07,08,09,10,11,12)

Year of product : A, B, C, - - - -
(01, 02, 03, - - - -)

13. Packing

1 Box = 160 Pieces (20 Ea × 4 layer × 2 Row)



14. Parts List (Voltage- Dimming)

2008-07-22

NO	SYMBOL	TYPE	MAIN		ALTERNATIVE	
			TYPE	MAKER	TYPE	MAKER
1	IC1	IC	BIT3501	Bitek		
2	UA1,2,3,4	Dual-channel FET	TM8958	Tech mos	Equivalent	
3	D8,9,10,11,12,13	Diode(series connection)	EDS7000	S&E	〃	
4	D14,15,16	Diode(Annode common)	EDS2836	S&E	〃	
5	D4,5,6,7	Diode	1SS355	Rohm	〃	
6	D1,2,3	Zener	MM3Z5V1T1	Onsemi	〃	
7	C21,22,23,24,33,34	CC 15pF/3kV-J	4520	Maruwa	〃	
8	C29,30	MLCC, 1.0uF/50V-J	3216	Walsin	〃	
9	C2	MLCC, 820pF/50V-J	1608	Walsin	〃	
10	C1,16,17,19,20,31,32	MLCC, 0.01㎌/50V-K	1608	Walsin	〃	
11	C3,4,5,7,9,14,15	MLCC, 0.1㎌/50V-Z	1608	Walsin	〃	
12	C6	MLCC, 1.0㎌/16V-Z	1608	Walsin	〃	
13	C8	MLCC, 2.2㎌/10V-Z	1608	Walsin	〃	
14	C12,13	Electrolytic Capacitor	330uF/35V/105℃	Samyoung	〃	
15	R4,9	Resistor 470J	3216	Walsin	〃	
16	R23	Resistor 100KJ	3216	Walsin	〃	
17	R10,11,12,13	Resistor 100J	1608	Walsin	〃	
18	R15,16,18,19,35,36	Resistor 680F	1608	Walsin	〃	
19	R21,22,24,25,34,37	Resistor 1KJ	1608	Walsin	〃	
20	R6	Resistor 7.5KJ	1608	Walsin	〃	
21	R7,8,17,27,28,30,31,39,40	Resistor 22KJ	1608	Walsin	〃	
22	R5	Resistor 36KJ	1608	Walsin	〃	
23	R1	Resistor 100KJ	1608	Walsin	〃	
24	R2	Resistor 220KJ	1608	Walsin	〃	
25	F1	Fuse,7A	3216TD	COOPER BUSSMANN	〃	
26	T1,2,3,4,5,6	Transformer	DS-2823	Dong Heung	〃	
27	CN1	Connector,12P	12505WR-12A00	YEONHO	〃	
28	CN2,3	Connector	20015WR-09A00	YEONHO	〃	
29	CN4,5	Connector	35001WR-02A00	YEONHO	〃	
30	PWB	PWB, 1.2t(RoHS)	DS-1309WB	E-RE Electronics	〃	

15. Circuit Diagram

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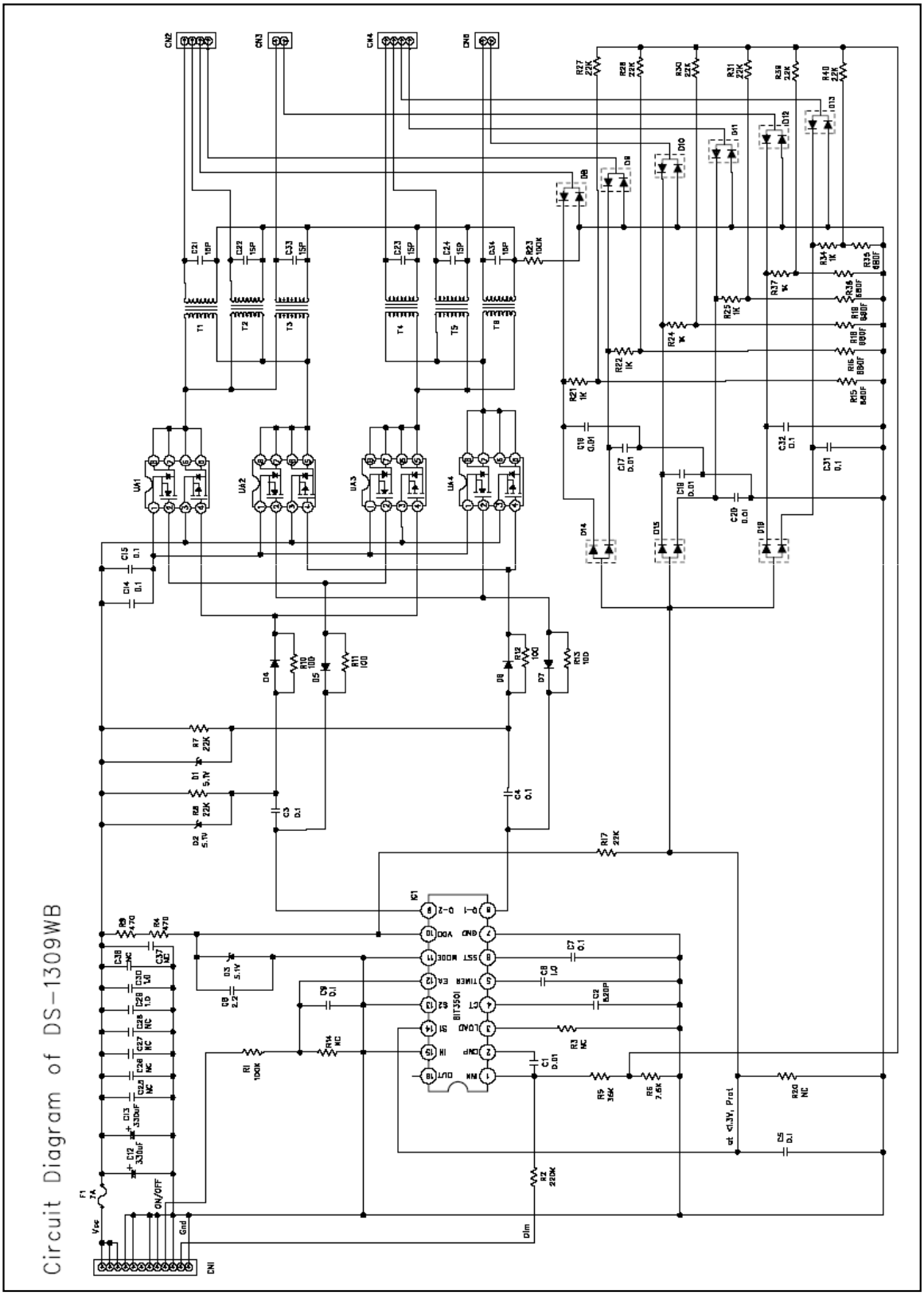
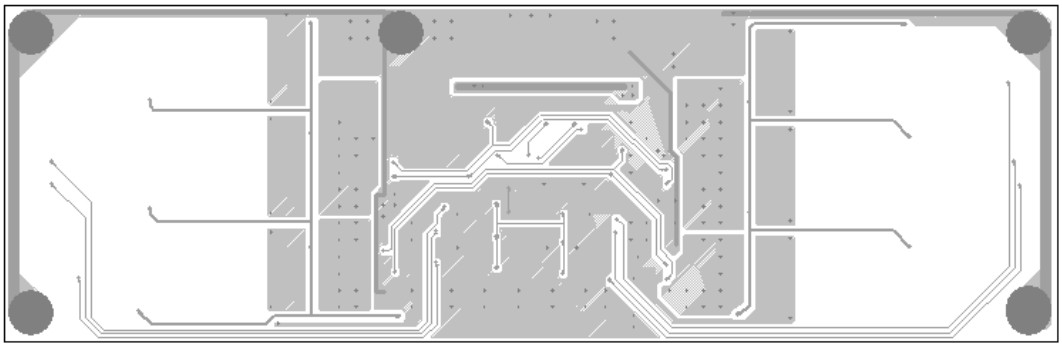


16. PCB Lay- Out



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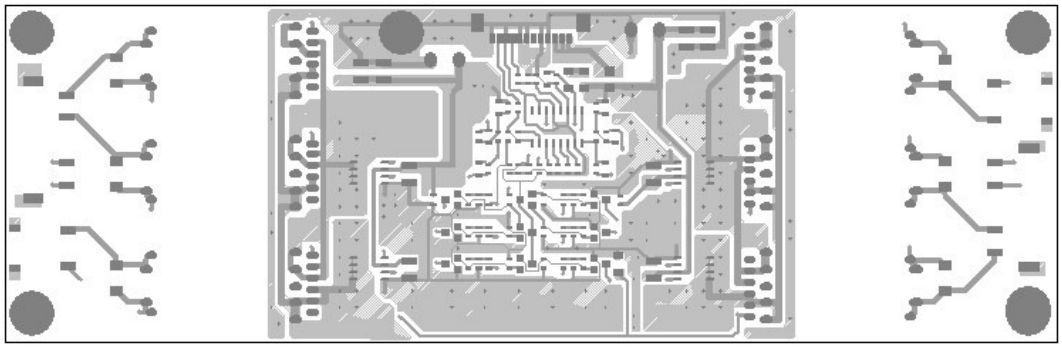

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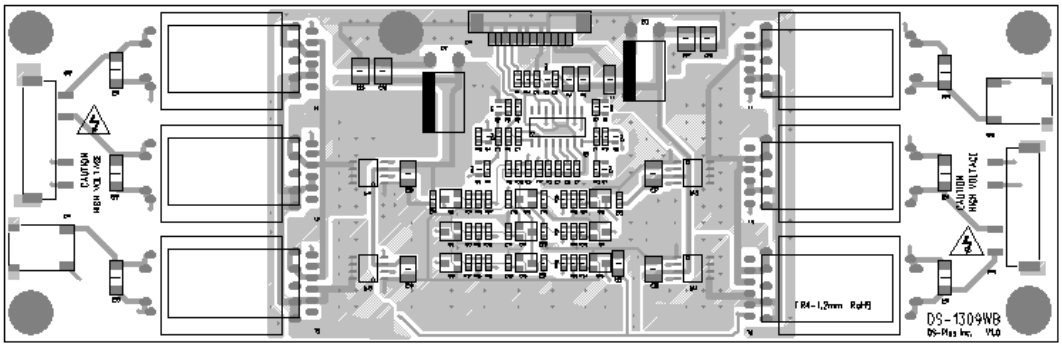

< Components Lay-Out >

17. Material List

Symbol	Component	Type No.	Manufacture	Description
	PCB		E-RE Electronics or Equivalent	UL File No.-E213562
CN1	Connector	12505WR-12A00 53261-1290	YEONHO MOLEX or Equivalent	UL File No.-E108706 UL File No.-E29179
CN2,3	Connector	20015WR-09A00	YEONHO or Equivalent	UL File No.-E108706
CN4,5	Connector	35001WR-02A00 68176-0217	YEONHO MOLEX or Equivalent	UL File No.-E108706 UL File No.-E29179
⚠ T1,2,3,4,5,6	Transformer	DS-2823	Dong Heung	See Specification