Product Service Manual

Service Manual for BenQ:
G2220HD&G2220HDA
P/N: 9H.L07LN.IXX

Applicable for All Regions

Version: 001
Date:2009/12/18

Notice:

- For RO to input specific “Legal Requirement” in specific NS regarding to responsibility and liability statements.

- Please check BenQ’s eSupport web site, http://esupport.benq.com, to ensure that you have the most recent version of this manual.

First Edition (July, 2008)

Content Index

1. About This Manual

This manual contains information about maintenance and service of BenQ products. Use this manual to perform diagnostics tests, troubleshoot problems, and align the BenQ product.

1.1 Trademark

The following terms are trademarks of BenQ Corporation:

Importance

Only trained service personnel who are familiar with this BenQ Product shall perform service or maintenance to it. Before performing any maintenance or service, the engineer MUST read the “Safety Note”

2. Precautions & Safety Notices

2.1 Safety Precaution

This monitor is manufactured and tested on a ground principle that a user's safety comes first. However, improper used or installation may cause damage to the monitor as well as to the user.

WARNINGS:

- This monitor should be operated only at the correct power sources indicated on the label on the rear of the monitor. If you're unsure of the power supply in you residence, consult your local dealer or Power Company.
- Do not try to repair the monitor by yourself, as it contains no user-serviceable parts. This monitor should only be repaired by a qualified technician.
- Do not remove the monitor cabinet. There is high-voltage parts inside that may cause electric shock to human bodies.
- Stop using the monitor if the cabinet is damaged. Have it checked by a service technician.
- Put your monitor only in a lean, cool, dry environment. If it gets wet, unplug the power cable immediately and consult your closed dealer.
- Always unplug the monitor before cleaning it. Clean the cabinet with a clean, dry cloth. Apply non-ammonia based cleaner onto the cloth, not directly onto the class screen.
- Do not place heavy objects on the monitor or power cord.

2.2 Product Safety Notice

Many electrical and mechanical parts in this chassis have special safety visual inspections and the protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Before replacing any of these components read the parts list in this manual carefully. The use of substitute replacement parts, which do not have the same safety characteristics as specified in the parts list, may create shock, fire, or other hazards.

2.3 Service Notes

- When replacing parts or circuit boards, clamp the lead wires around terminals before soldering.
- Keep wires away from high voltage, high temperature components and sharp edges.
- Keep wires in their original position so as to reduce interference.
- Adjustment of this product please refers to the user' manual.

3. Product Overview

3.1 Power Supply

Items	Condition	Spec	Note
AC Input Voltage range	Universal input full range	90~264Vac	
AC Input Voltage rating	Universal input full range	100~240Vac	
AC input frequency range	90~264Vac	47~63Hz	
AC input frequency rating	100~240Vac	50~60Hz	
AC Input Current	100Vac	1.5A(max)	
	240Vac	0.8A(max)	
Inrush Current	100Vac,cold star,25°C	40A (max)	See Note2
	240Vac,cold star,25°C	60A(max)	
AC-DC power Efficiency	DC output full loading	≥75%	

Note2. Before each test, the buck capacitors need to be discharged.
Before each test, it must be 10 minutes at least after the latest test.
Hot star not component be damaged.

3.2 Signal Interface

Input Connector	Analog : D-sub 15
Video Cable Strain Relief	Equal to twice the weight of the monitor for five minutes
Video Cable Connector DB-15 Pin out	Compliant DDC 2B
Video Signals	Video RGB (Analog)
Video Impedance	75 Ohms (Analog)
Maximum PC Video Signal	950 mV with no damage to monitor
Maximum Mac Video Signal	1250 mV with no damage to monitor
Sync Signals	TTL
DDC 1/2B	Compliant with Revision 1.3s
Sync Compatibility	Separate Sync / Composite Sync / Sync on Green
Video Compatibility	Shall be compatible with all PC type computers, Macintosh computers, and after market video cards

3.3 Scan Range

Item	Condition	Specification
Horizontal	Sync polarity: (+) or (-)	24kz~83KHz
Vertical	Sync polarity: (+) or (-)	50Hz~76Hz
Out of Range	Sync don't in the range: Horizontal: 24kz~83KHz or Vertical : 50Hz~76Hz	Message "Out of Range!" on screen

Cable not connect	No VGA cable or DVI cable	Message ‘’No cable connected !” on screen

3.4 Support Timings

BenQ customer preset Timings are as below:

P: Preset Mode

NP: Non Preset Mode

FS: Fail Save Mode (shows “Out of Range”, but still can see picture)

O: Out of Range (only show “Out of Range”, without picture)

No.	Pixel Format	Horz Freq (kHz)	Horz Polarity	Vert Freq (Hz)	Vert Polarity	Pixel Clk (MHz)	Mode
1	640x350	31.47	+	70.09	-	25.18	Preset
2	640x350	37.86	+	85.08	-	31.50	Fail Safe Mode
3	640x400	31.47	-	70.09	+	25.18	Non Preset
4	640x400	37.86	-	85.08	+	31.5	Fail Safe Mode
5	640x480	35.00	-	66.67	-	30.24	Non Preset
6	640x480	31.47	-	59.94	-	25.17	Preset
7	640x480	37.86	-	72.81	-	31.50	Non Preset
8	640x480	37.50	-	75.00	-	31.50	Preset
9	640x480	43.27	-	85.01	-	36.00	Fail Safe Mode
10	640x500	31.00	-	57.76	-	25.25	Non Preset
11	720x400	31.47	-	70.08	+	28.32	Preset
12	720x400	37.93	-	85.04	+	35.5	Fail Safe Mode
13	832x624	49.71	-	74.53	-	57.27	Preset
14	800x600	35.16	+	56.25	+	36.00	Non Preset
15	800x600	37.88	+	60.32	+	40.00	Preset
16	800x600	48.08	+	72.19	+	50.00	Non Preset
17	800x600	46.88	+	75.00	+	49.50	Preset
18	800x600	53.67	+	85.06	+	56.25	Fail Safe Mode
19	848x480	31.02	+	60.00	+	33.75	Non Preset
20	848x480	29.83	-	59.66	+	31.50	Non Preset
21	848x480	35.00	-	70.00	+	37.52	Non Preset
22	848x480	36.07	-	72.00	+	39.25	Non Preset
23	848x480	37.68	-	74.77	+	41.00	Non Preset
24	720x576	35.910	-	59.950	+	32.71	Non Preset
25	1024x768-**I**	35.52	+	43.48	+	44.9	Fail Safe Mode
26	1024x768	48.36	-	60.00	-	65.00	Preset
27	1024x768	56.48	-	70.07	-	75.00	Non Preset
28	1024x768	57.67	-	72.00	+	78.43	Non Preset
29	1024x768	60.24	-	74.93	-	80.00	Preset
30	1024x768	60.02	+	75.03	+	78.75	Preset
31	1024x768	68.68	+	85.00	+	94.50	Fail Safe Mode
32	1152x720	44.86	-	60	+	66.75	Preset
33	1152x864	63.85	+	70.01	+	94.50	Non Preset
34	1152x864	67.50	+	75.00	+	108.00	Non Preset
35	1152x864	77.09	-	85.00	+	119.651	Fail Safe Mode
36	1152x870	68.68	-	75.06	-	100.00	Preset
37	1152x900	61.80	-	65.95	-	92.94	Preset
38	1152x900	71.73	-	76.07	-	105.59	Non Preset
39	1280x720	45.00	-	59.94	+	74.25	Preset
40	1280x720	44.77	-	59.86	+	74.50	Preset
41	1280x720	56.46	-	74.78	+	95.75	Preset
42	1280x768-**R**	47.40	+	60.00	-	68.25	Preset
43	1280x768	47.78	-	59.87	+	79.50	Preset
44	1280x768	60.29	-	74.89	+	102.25	Non Preset
45	1280x768	68.63	-	84.84	+	117.50	Fail Safe Mode
46	1280x800	49.31	+	59.91	+	71	Non Preset
47	1280x800	49.702	-	59.81	+	83.50	Preset
48	1280x800	58.3	-	70	+	88.25	Non Preset
49	1280x800	60.048	-	72	+	102.8	Non Preset
50	1280x800	62.795	-	74.934	+	106.6	Preset
51	1280x800	71.55	-	84.88	+	122.5	Fail Safe Mode
52	1280x960	60.00	+	60.00	+	108.00	Preset
53	1280x960	85.94	+	85.00	+	148.50	Fail Safe Mode
54	1280x1024	63.98	+	60.02	+	108.00	Preset
55	1280x1024	74.88	+	69.85	+	126.99	Non Preset
56	1280x1024	74.40	-	70.00	-	124.90	Non Preset
57	1280x1024	77.90	+	72.00	+	134.60	Non Preset

58	1280x1024	79.98	+	75.02	+	135.00	Preset
59	1280x1024	81.18	-	76.16	-	135.09	Non Preset
60	1280x1024	91.15	+	85.02	+	157.50	Fail Safe Mode
61	1360x768	47.71	+	60.01	+	85.50	Preset
62	1366x768	47.71	+	59.79	+	85.50	Preset
63	1400x1050-R	64.74	+	59.95	-	101.00	Non Preset
64	1400x1050	65.32	-	59.98	+	121.75	Non Preset
65	1400x1050	82.28	-	74.87	+	156.00	Non Preset
66	1400x1050	93.88	-	84.96	+	179.50	Fail Safe Mode
67	1440x900-R	55.496	+	59.901	-	88.75	Preset
68	1440x900	55.935	-	59.887	+	106.5	Preset
69	1440x900	70.6	-	75	+	136.75	Preset
70	1600x1000-R	61.648	+	59.910	-	108.5	Preset
71	1600x1000	62.14	-	59.87	+	132.25	Non Preset
72	1600x1000	78.356	-	74.83	+	169.25	Non Preset
73	1600x1200-R	74.01	+	59.92	-	130.25	Non Preset
74	1600x1200	75.00	+	60.00	+	162.00	Preset
75	1600x1200	81.25	+	65.00	+	175.50	Non Preset
76	1600x1200	87.50	+	70.00	+	189.00	Non Preset
77	1600x1200	93.75	+	75.00	+	202.50	Non Preset
78	1600x1200	106.25	+	85.00	+	229.50	Out of Range
79	1680x1050-R	64.67	+	59.88	-	119.00	Non Preset
80	1680x1050	65.29	-	59.95	+	146.25	Preset
81	1680x1050	82.306	-	75	+	187	Preset
82	1600x1280	79.5	-	59.9	+	171.75	Non Preset
83	1792X1344	83.57	-	59.9	+	203.25	Fail Safe Mode
84	1792X1344	105.290	-	75.00	+	257.75	Out of Range
85	1856X1392	86.485	-	59.934	+	217.25	Out of Range
86	1856X1392	109	-	74.918	+	277.5	Out of Range
87	1800x1440	89.4	-	59.9	+	218.25	Out of Range
88	1920x1080-R	66.587	+	59.934	-	138.5	Preset
89	1920x1080	67.158	-	59.963	+	173	Preset
90	1920x1080	67.5	+	60	+	148.5	Preset
91	1920X1200-R5	61.418	+	49.974	-	127.750	Fail Safe Mode
92	1920X1200-R	74.04	+	59.95	-	154.00	Fail Safe Mode
93	1920X1200	74.56	-	59.89	+	193.25	Fail Safe Mode
94	1920X1200	94.04	-	74.93	+	245.25	Out of Range
95	1920X1440-R	88.822	+	59.9	-	184.75	Fail Safe Mode
96	1920X1440	89.532	-	59.968	+	233.500	Out of Range
97	1920X1440	112.50	-	74.9	+	298	Out of Range
98	2048x1152-R	70.992	+	59.9	-	156.75	Out of Range
99	2048x1152	71.584	-	59.9	+	197	Out of Range
100	2048x1536-R	94.7	+	59.9	-	209.25	Out of Range
101	2048x1536	95.4	-	59.9	+	267.25	Out of Range
102	2560x1600-R	98.713	+	59.972	-	268.5	Out of Range
103	2560x1600	99.4	-	59.9	+	348.5	Out of Range

Remark :

default mode : 1920x1080P 60Hz

3.5 Operational & Function Specification

3.5.1 Video Performance

* All Spec. of monitor need to warm up at lease 1hr

Supplier	AUO	CMO
Model name	AUO M215HW01 V0:	M216H1-L01

Display Area	476.64(H)x268.11(V)	477.504(H)x268.596(V)
Pixel Pitch	0.248(H)x0.248(V)	0. 248(H)x0.248(V)
Display Colors	16.7M(6 Bit+Hi-FRC)	
Number of Pixel	1,920(H) X 1,080(V),	
Brightness	Min: 240cd/m^2; Typical: 300cd/m^2	Min: 250cd/m^2; Typical: 300cd/m^2
Contrast Ratio	Min: 600:1 Typical: 1000:1	Min: 700:1 Typical: 1000:1
Viewing Angle	Hor: 170°, Ver: 160° (Typical, CR=10)	Hor: 170°, Ver: 160° (Typical, CR>10)
Display Mode	Normally White	
Frame rate	50~75Hz	50~75Hz
Response Time	Typical: 5ms; Max: 8ms	Typical: 5ms; Max: 8ms
Surface Treatment	Anti-glare, 3H	Hard coating (3H), AG(Haze25%)
Lamp	4 CCFL	
Outline Dimension	495.6 (W) X 292.2 (H) X 16.35 (D) (typ.)	499.5 (W) X 292.6 (H) X 17 (D) (typ.)
Brightness uniformity	Min: 75%; Typical: 80% / 9 points.	Min: 75% / 9 points.

3.5.2 Brightness Adjustable Range

The test to verify specifications in this section shall be performed under the following standard conditions unless otherwise noted.

Temperature : 25 ± 5°C
Test pattern : white
Video Resolution : 1920 x 1080@60HZ
Video input level : 700 mV ± 2%
Warm-up time : 30 minutes

Item	Condition	SPEC
Luminance Range	Brightness=0%	NA
	Contrast = 0%	
	Brightness=100%	AUO ≥ 240 cd/m^2 CMO ≥ 250 cd/m^2
	Contrast = 100%	
	Brightness=90%	NA
	Contrast = 50%	

3.5.3 Environment

Operating	Specification
Temperature range	0°C to 50°C
Relative humidity	5% to 90%
Altitude	0 to 10000 feet
Storage	
Temperature range	-20°C to 60°C
Relative humidity	5% to 90%
Altitude	0 to 30000 feet

3.5.4

Speaker : 1.5W 12Ω X 2

Input impedance : ≥ 10K ohm

Frequency response range : 500Hz – 20 kHz

Signal to noise ratio : ≥ 75 dB ±3

Output power : 1.0 W + 1.0 W (Typical) @5%THD (Input sine wave signal: 1 KHz/0.7Vrms)

3.5.5 Electrostatic discharge Requirements

Item	Condition	Spec		Remark
Electrostatic Discharge	InnoLux SPEC	Contact discharge : 4KV	●	D-sub cable pin need test 4KV and DVI cable test 4KV
		Contact discharge : 8KV		
		Air discharge : 8KV	●	
		Air discharge : 15KV		

3.5.6 Reliability

Items	Condition	Spec	Note
MTBF	95% Confidence	≧ 60,000 Hours	
CCFL Life time	Luminance becomes 50%	≧ 40,000 Hours at 7.5mA (min)	Note1

Note1. Display an all white field at mid Brightness and Contrast settings.

3.5.7 Audio performance

Items	Specification
Speaker	1.5W 12Ω X 2
Input impedance	≥ 10K ohm

Frequency response range	500Hz – 20kHz
Signal to noise ratio	≥ 70 dB±3
Output power	1.0 W + 1.0 W (Typical) @5%THD (Input sine wave signal:1KHz/0.7Vrms)

3.6 LCD Characteristics

3.6.1 The physical definition &technology summary of LCD panel

Supplier	AUO	CMO
Model name	AUO M215HW01 V0:	M216H1-L01
Display Area	476.64(H)x268.11(V)	477.504(H)x268.596(V)
Pixel Pitch	0.248(H)x0.248(V)	0. 248(H)x0.248(V)
Display Colors	16.7M(6 Bit+Hi-FRC)	
Number of Pixel	1,920(H) X 1,080(V),	
Brightness	Min: 240cd/m^2; Typical: 300cd/m^2	Min: 250cd/m^2; Typical: 300cd/m^2
Contrast Ratio	Min: 600:1 Typical: 1000:1	Min: 700:1 Typical: 1000:1
Viewing Angle	Hor: 170°, Ver: 160° (Typical, CR=10)	Hor: 170°, Ver: 160° (Typical, CR>10)
Display Mode	Normally White	
Frame rate	50~75Hz	50~75Hz
Response Time	Typical: 5ms; Max: 8ms	Typical: 5ms; Max: 8ms
Surface Treatment	Anti-glare, 3H	Hard coating(3H),AG(Haze25%)
Lamp	4 CCFL	
Outline Dimension	495.6 (W) X 292.2 (H) X 16.35 (D) (typ.)	499.5 (W) X 292.6 (H) X 17 (D) (typ.)
Brightness uniformity	Min: 75%; Typical: 80% / 9 points.	Min: 75% / 9 points.

3.7 User Controls

User's hardware control definition:

3.8 Mechanical Characteristics

3.8.1Dimension

Dimension (Monitor with Stand)	Spec
Width	509.6mm
Height	392.9mm

Depth	175mm
Monitor Weight	4.3±0.5 Kg (Net) 6.1±0.5Kg(Gross / with packing)

3.8.2 Weight

Item	condition	Spec	OK	Remark
Monitor (Net)		4.3±0.5 Kg (Net)		
Monitor with packing(Gross)		6.1±0.5Kg(Gross / with packing)		

3.8.3 Plastic

Item	TEXTURE No.	COLOR No.	Material
Front Bezel	HIGH GLOSSY(光澤度95)POLISHING 6000 & MT11000 & MT11006	BCS-7015A(Black)	ABS+PMMA
Back cover	HIGH GLOSSY(光澤度95)POLISHING 6000 & POLISHING 2000 & MT11020&MT11006	BCS-7015A(Black)	ABS
Arm rear	HIGH GLOSSY(光澤度95)POLISHING 6000 & T11006 & MT11000	BCS-7015A(Black)	ABS+PMMA
Arm front	HIGH GLOSSY(光澤度95)POLISHING 6000	BCS-7015A(Black)	ABS+PMMA
Base	HIGH GLOSSY(光澤度95)POLISHING 6000 & MT11000 & 放電花	BCS-7015A(Black)	ABS+PMMA
Function key	HIGH GLOSSY(光澤度95)POLISHING 6000	BCS-7015A(Black)	ABS+PMMA
Led lens	HIGH GLOSSY(光澤度95)POLISHING 6000	Clear	PC

3.8.4 Carton

Carton:Item	condition	Spec	OK	NA	Remark
Color					按照客戶提供的色板來做
Material		C Flute	√		A Flute For JP
Compression strength		200 KGF	√		JP:250 KGF
Burst strength		16 KGF/cm2	√		JP:19.4 KGF/cm2
Stacked quantity		4 Layers	√		4 Layers

3.9Pallet & Shipment

3.9.1 Container Specification

Stowing Type	Containter	Quantity of Produces (sets) (Every container)	Quantity of Produces (sets) (Every Pallet)	Quantity of Pallet (sets) (Every container)

With Pallet	20'SEA	784	Pallet A: 88 Pallet B:72	Pallet A:4 Pallet B:6
	40'SEA	1656	Pallet A:88 Pallet B:72	Pallet A:9 Pallet B:12
	20'AIR	528	Pallet A:60 Pallet B:48	Pallet A:4 Pallet B:6
	40'AIR	1116	Pallet A:60 Pallet B:48	Pallet A:9 Pallet B:12
Without Pallet				
	40'	N/A	N/A	N/A

3.9.2 Specification

Product:

Net Weight (Kg)	Gross Weight(Kg)	Dimension w/o Base LxWxH (mm)	Dimension w/ Base LxWxH (mm)
4.8±0.3 Kg (Net)	6.1±0.5Kg	---	509.6*175*392.9mm

Package:

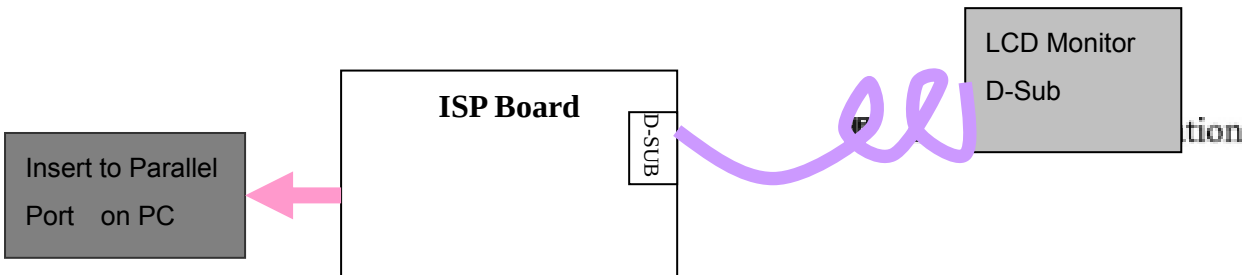
Items	Spec
Packaging	Refer to ME PACKING SPEC
Ink	The ink shall not rub off after a suitable drying time
Shipping Carton Type	One Piece Construction
Shipping Carton Handholds	Yes
Length	570m
Height	458m
Width	125
Gross Weight	6.1kg+/-0.5
Units per Pallet	88 sets / pallet A 72 sets / pallet B

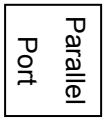
4 Level 1 Cosmetic / Appearance / Alignment Service

4.1 Software / Firmware Upgrade Process

Upload firmware to Flash ROM via VGA Cable

1. Connect ISP board between monitor and PC as below configuration.





2. Select the Flash ROM type which is used in this monitor, then select the ISP button, and then choose corresponding firmware, and load them to Flash ROM.

4.2 Alignment Procedure (for function adjustment)

4.2.1 Preparation:

1. Setup input timing VESA to 1920*1080@60Hz,32-Grays pattern.

2. Setup units and keep it warm up for at least 30 minutes.

4.2.2 Timing adjustment

1. Enter to factory mode setting area (by pressing "ENTER"+ "MENU" + "POWER" at the same time during power off).

2. Check the settings to following values:

contrast =50;

brightness=90;

3. Then turn off the monitor power.

4.2.3 Function key Definitions

4.2.3.1 Control buttons on the rear side of monitor

CONTROL KEY	KEYS FUNCTION
[MENU]	A. When OSD displays, press [MENU] to return to previous level menu B. When OSD isn't shown on screen, press [MENU] to enter OSD interface C. Press [MENU] to enter Service Page When OSD isn't shown on screen in Service Page Mode
[Enter]	A. When OSD displays, press [Enter] to perform function of menu icon that is highlight or enter next level menu B. When OSD isn't shown on screen, press[Enter] to change input source
[◄], [►]	A. When "MENU OSD" displays, press these keys to change the contents of an adjustment item, or change an adjustment value B. When "MENU OSD" un-displays, press [►] to show Brightness/contrast Menu press [◄] to Show Picture Mode Menu.
[POWER]	Power on or power off the monitor
[Auto]	press [Auto] to perform auto-adjustment

4.2.3.2 Hot Key Operation

FUNCTION	HOT KEY OPERATION	DESCRIPTION

	MENU	□	□	Enter	Auto	**POWER**	
FACTORY MODE	●			●		●	Press[MENU], [Enter]& [**POWER**] at the same time, when Monitor is Power On OSD menu will be shown with “F” on the left top. Select “F” for entering factory mode.
Picture Mode			●				To Show & Change Picture Mode Menu
Auto Adjustment					●		press [Auto] to process, Auto Adjustment
Service Page	●					●	Press [MENU] + [POWER] to Enter Service Page Mode when power off
Input Source				●			Press [Enter] to change Input Source when OSD isn’t Display.

Note: Picture Mode Standard <(Movie <(Dynamics <(Photo <(sRGB <(Standard

Auto Power on/off function in service mode:

Default is “off”, Monitor will remember the last status before AC off. And monitor would always be off while AC off->on in “off” mode.

4.2.3.3 OSD Control

The On-Screen Display (OSD) shall be an easy to use icon based menu through keypad OSD buttons or remote control unit. The unit shall leave the factory with all OSD controls set to their default values.

First level	Second level	Third level	Fourth level	Default
DISPLAY	Auto Adjustment	-	-	-
	H. Position	(0~100)	-	50
	V. Position	(0~100)	-	50
	Pixel Clock	(0~100)	-	50
	Phase	(0~63)	-	-
PICTURE	Brightness	(0~100)	-	90
	Contrast	(0~100)	-	50
	Sharpness	(1~5)	-	3
	Color	*Color temperature	Normal	Normal
			Bluish	-
			Reddish	-
			User Mode ➢ Red (0~100) ➢ Green (0~100) ➢ Blue (0~100)	100
		Reset Color	(YES/NO)	
	Dynamic Contrast	*Dynamic Contrast	(0,1,2,3,4,5)	
PICTURE ADVANCED	**Picture Mode	Standard		Standard
		Movie	Sharpness 不可调节	1.任一项模式下 Senseye Demo 设

		Dynamics	Sharpness 不可调节	为 ON 另外两个模式下的 Senseye Demo 自动变为 ON 2. Senseye Demo 处于 ON 时,做 Auto 自动变为 OFF	
		Photo	Sharpness 不可调节		
		sRGB	Sharpness 不可调节		
	Senseye Demo	(ON/OFF)			OFF
	Display Mode	Full			full
		Aspect			
SYSTEM	Input（DVI　Model）	D-sub/DVI			D-sub
	OSD Settings	Language	17 languages English/日本語/简体中文/繁體中文 /Français/Deutsch/Italiano/Español/Polski/ Česky/Magyar/(SiCG/BiH/CRO)/Română/Nederlands/Русский/Svenska /Português		English
		H. Position	(0~100)		50
		V. Position	(0~100)		50
		Display Time	(5, 10, 15, 20, 25, 30)		15
		OSD Lock	(ON/OFF)（按 Menu 鍵 15s 即可解除鎖定）		OFF
	DDC/CI	(ON/OFF)	-		ON
	Information	-	-		
	Reset All	(YES/NO)	-		

4.2.3.4. Factory Mode Introduction

Press[MENU], [Enter]& [POWER] at the same time, when Monitor is Power On OSD menu will be shown with "F" on the left top. Select "F" for entering factory mode.

AUTO Level: Automatically calibrate chip ADC parameter by using chip internal DAC.

GAIN: ADC gain value

OFFSET: ADC offset value

C1-Blue: Set color temperature 9300K

C2-Red: Set color temperature 5800K

C3-Normal: Set color temperature 6500K

C5-User: Set user preferred color temperature

Lang type: 17

Reset BL Hr: the time of backlight

Reset Total Hr: the total time when connect power

Return: Escape from Factory menu.

4.2.3.5After repair, to ensure the quality you should do the following test and adjustment

Item	Content	Equipment
Test OSD function	1.Signal is set as 1920×1080@60Hz under General-1 2.Checking whether each single function key and compound function key can be worked.	Chroma Signal Generator

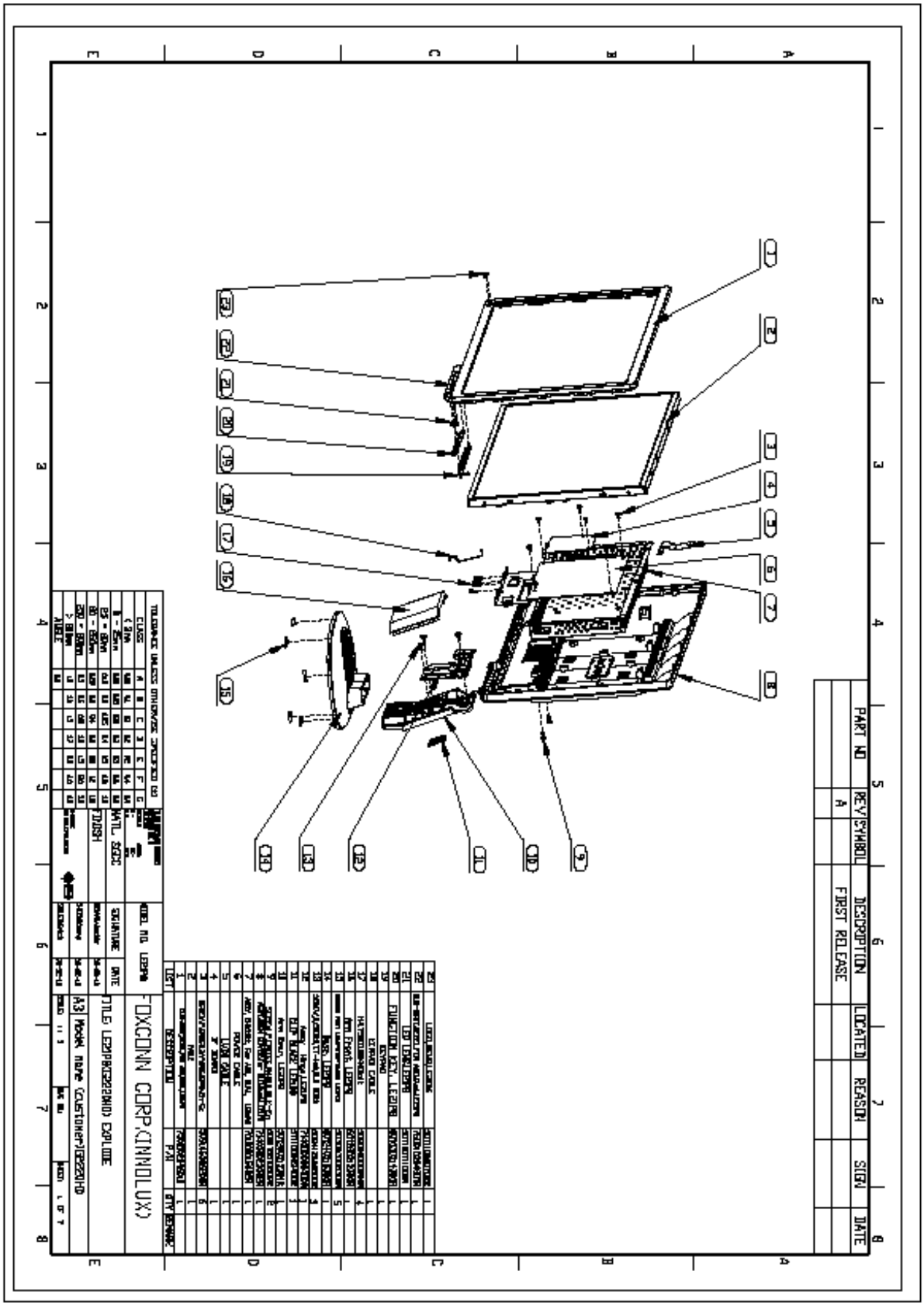
Contrast Check	1. Set input mode to 1920×1080@60Hz 2. Set Pattern to 32 gray shades 3. Set brightness/contrast to the max. The brightest 4~8 shades brightness cannot be distinguished.			Chroma Signal Generator
Color Temperature	1. Do “Auto Color Balance” at 1920×1080@60Hz, 32gray shades 2. Measure color temperature, check it complies with the following temperature : 5800K x=0.326 +/- 0.02, y = 0.342+/-0.02 6500K x = 0.313 +/- 0.02, y = 0.329+/-0.02 9300K x = 0.283 +/- 0.02, y = 0.297+/-0.02			Chroma Signal Generator and color analyzer
Modes switching check	1. Use Chroma Pattern Generator to make sequence. VESA (640x480 800x600 1024x768 1440x900 1920x1080), And power saving signal,etc. 2. Confirm the above timing modes must be full screen and the picture must be normal.			Chroma Signal Generator
VGA cable detector	When VGA cable is not plugged, the monitor will work in power saving mode.			Visual check Chroma Signal Generator
Panel Flicker check	1. Mode: 1920×1080@60Hz 2. Set Brightness& contrast to default value 3. Do “Auto Adjustment” 4. Shut down PC to check whether there’s glitter on the center of the picture.			Chroma signal generator & PC
Power saving	1.Mode: 1920×1080@60Hz 2. Pattern: full white 3. Brightness: Max. 4. Contrast: Default	at each mode		Chroma signal generator

Status	H-sync	V-sync	Video	Power	LED
Power On	on	on	active	≤ 48W	Green
Power Saving	off	on	blanked	< 2W	Amber+blue
	on	off	blanked	< 2W	Amber+blue
	off	off	blanked	< 2W	Amber+blue

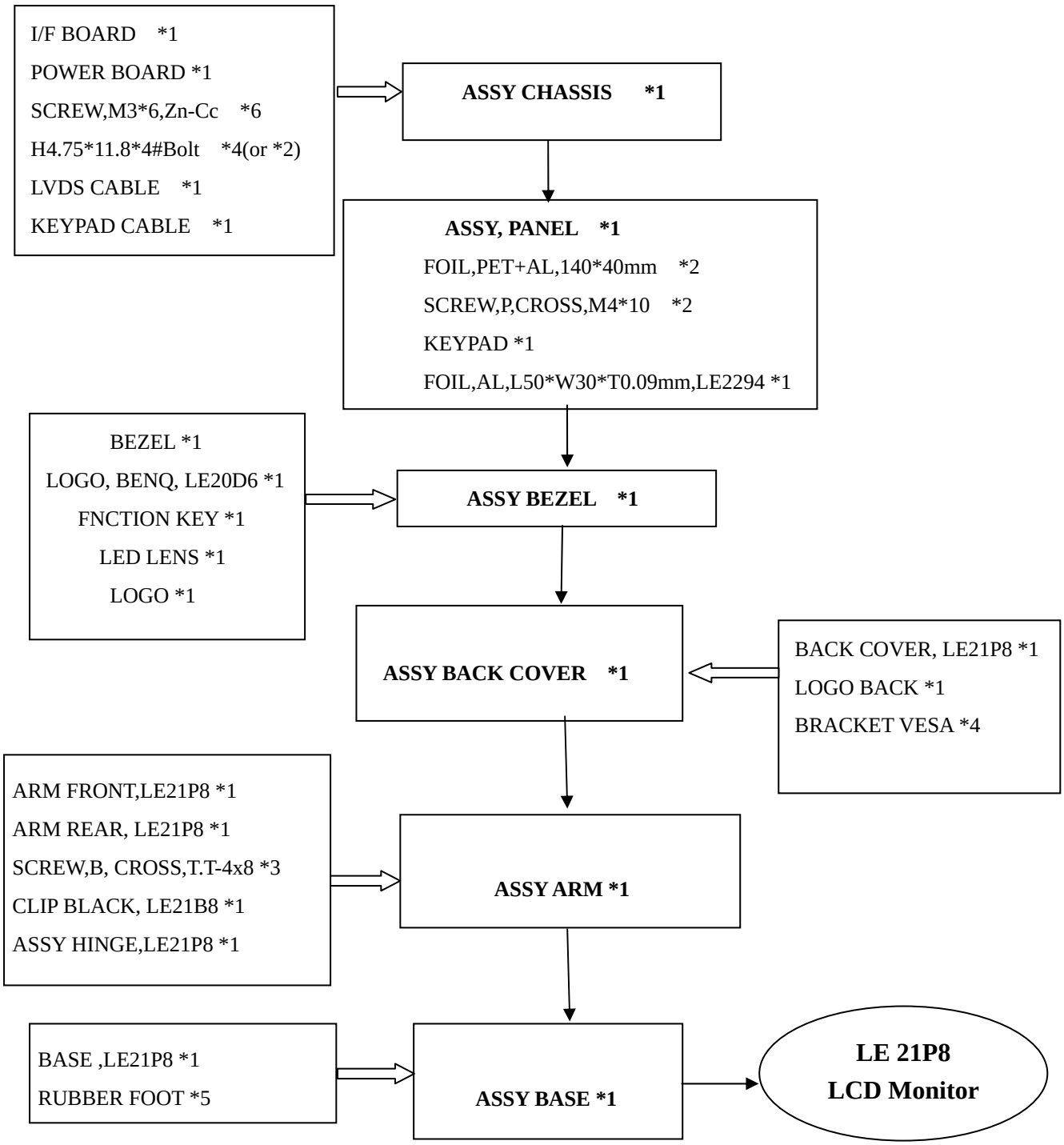
Power Off	--	--	-	< 1W	Off

5. Level 2 Disassembly/Assembly/Circuit Board/Standard Parts Replacement

5.1 Exploded Diagram

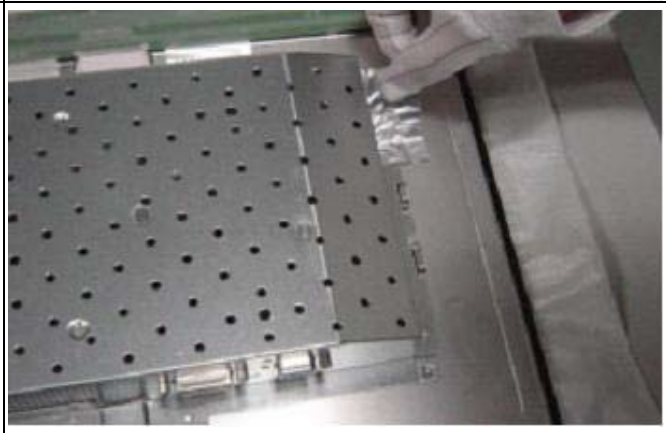
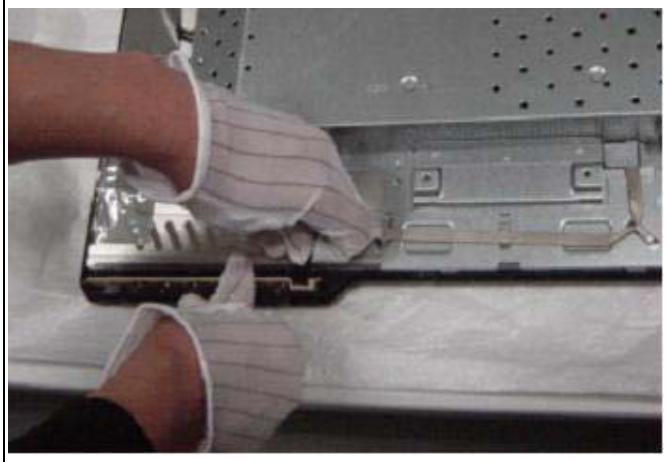


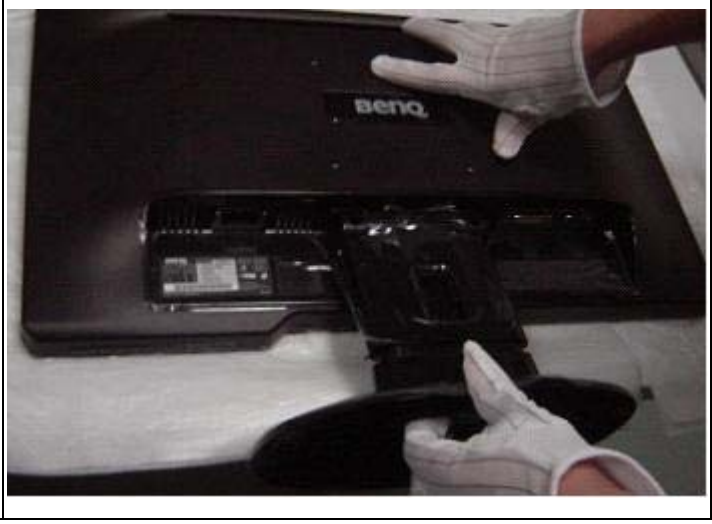
5.2 Assembly Block



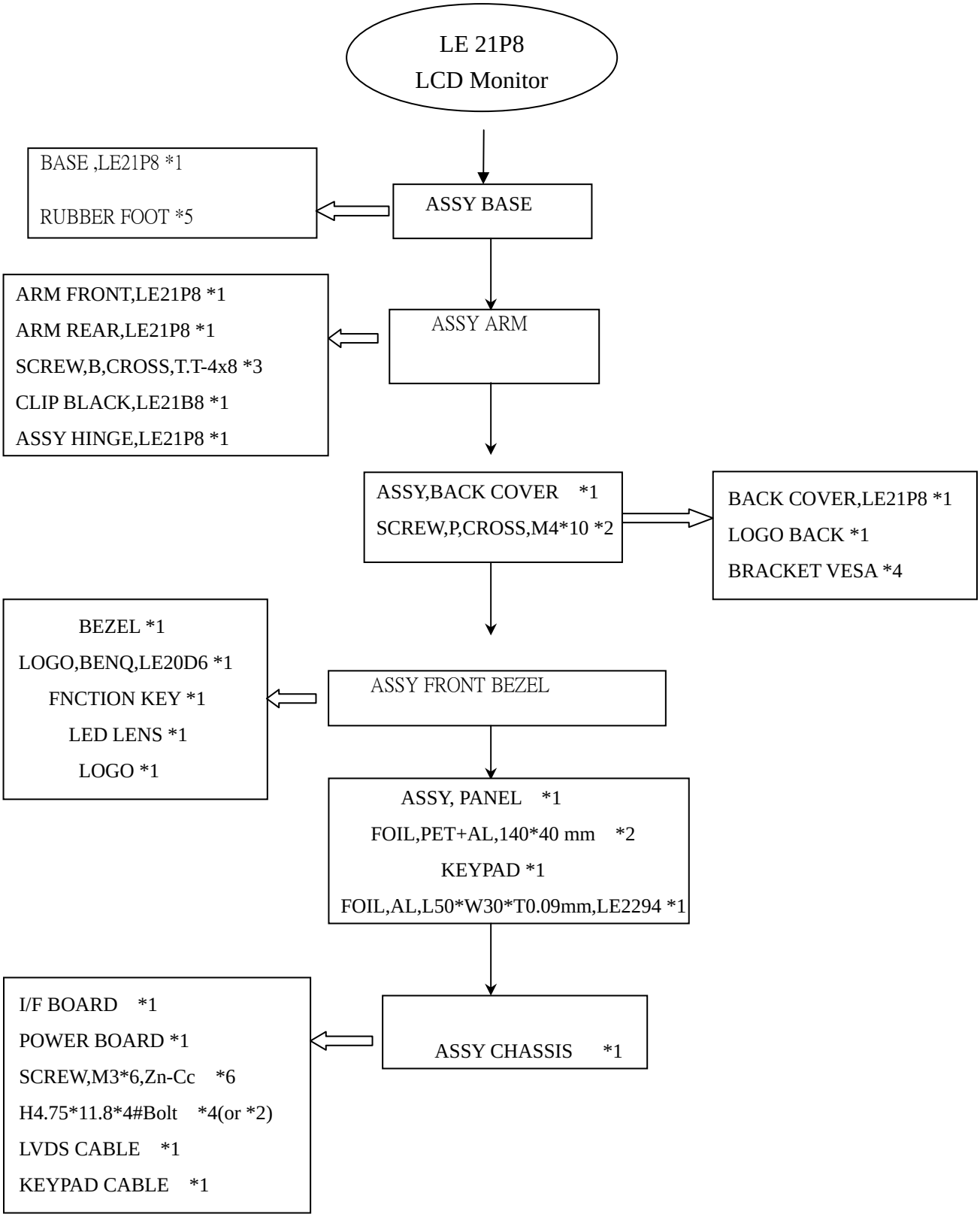
Note: The assembly direction please following direction of arrowhead

1	Assemble the keypad		
2	Assemble the panel with front-bezel		
3	Assemble chassis & Plug in the LVDS		
4	Plug in the lamp lines		

5	Stick the foil		
6	Stick the foil		
7	Plug in the keypad cable		
8	Assemble the back-cover		

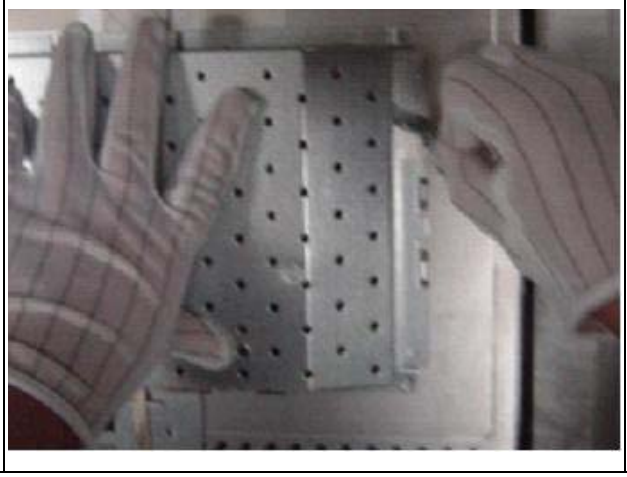
9	Assemble the stand and screw the screws		
10	Assemble the base		

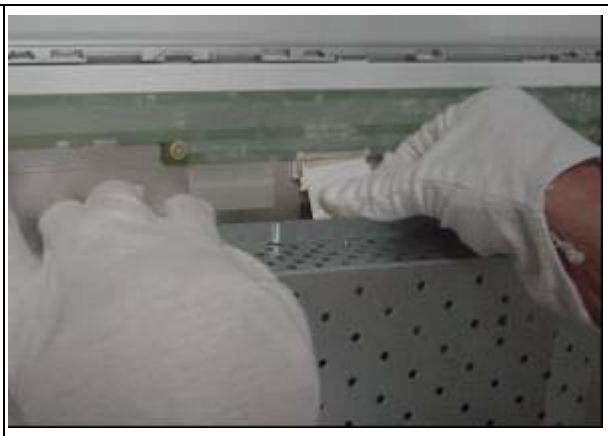
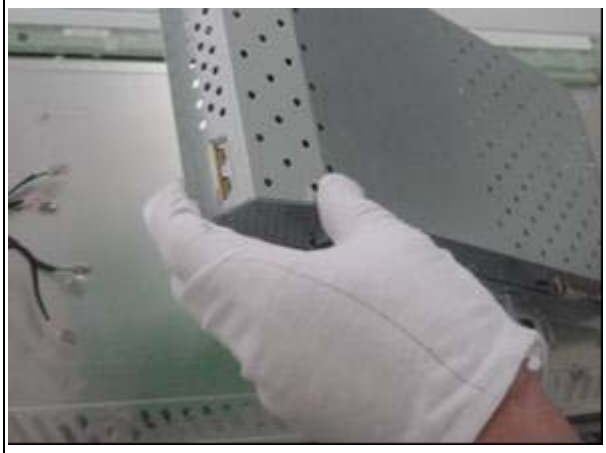
5.3 Disassembly Block



Note: The disassembly direction please following direction of arrowhead

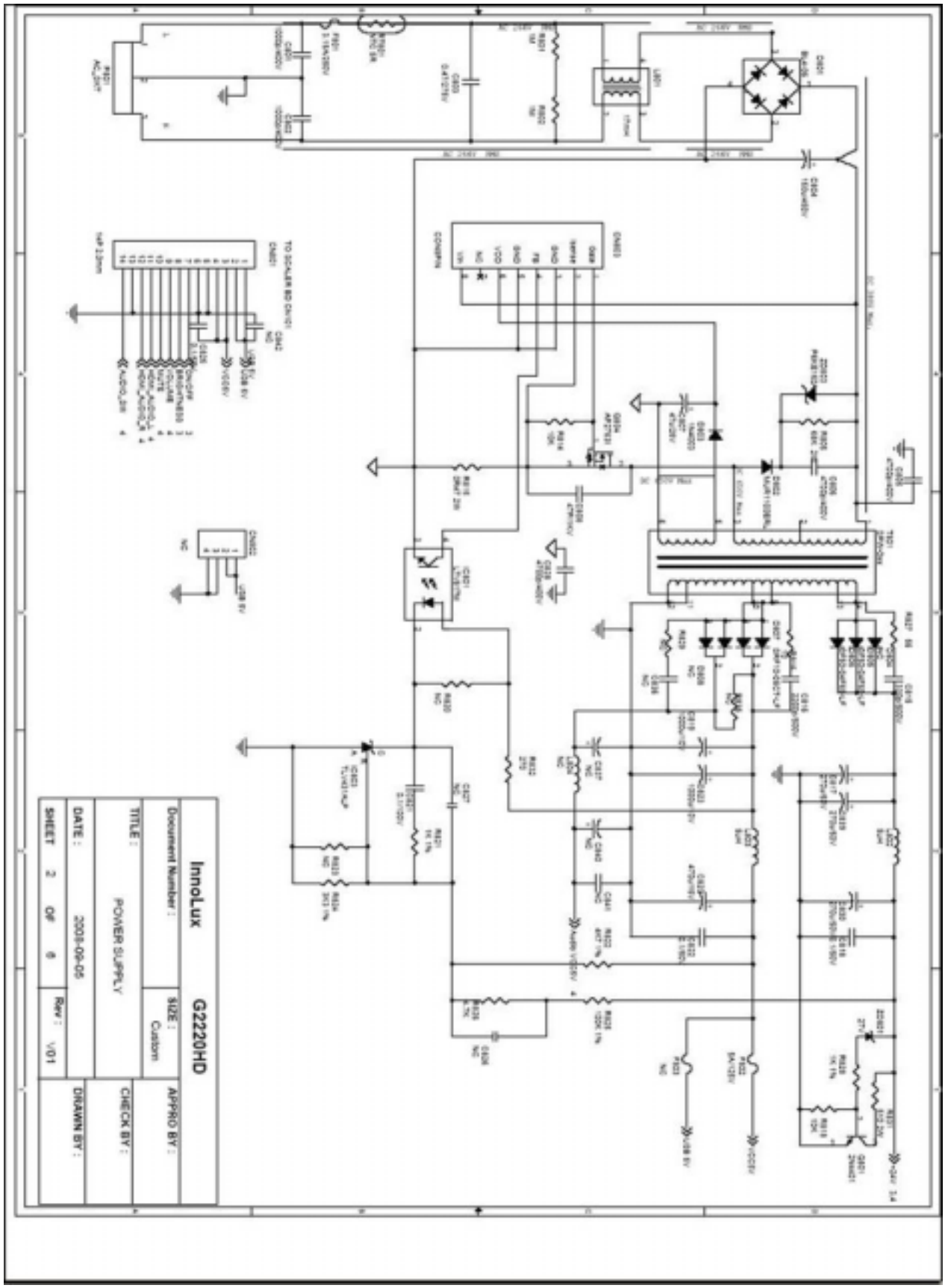
1	Disassemble the base		
2	Unscrew the screws and disassemble the stand		
3	Disassemble the front bezel		
4	Disassemble the back-cover		

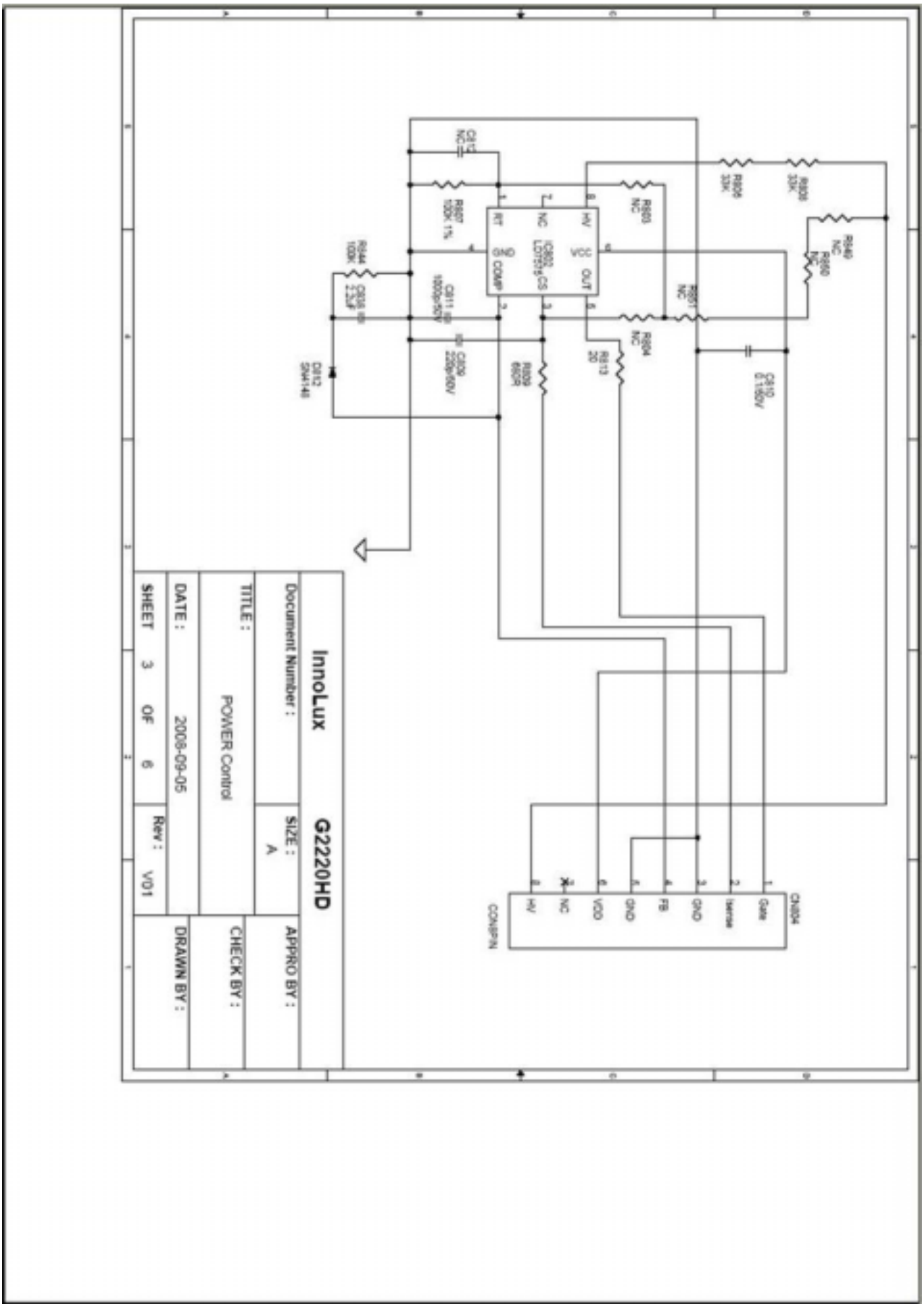
5	Remove the keypad cable		
6	Pull out the lamp wire		
7	Remove the foil		
8	Remove the foil		

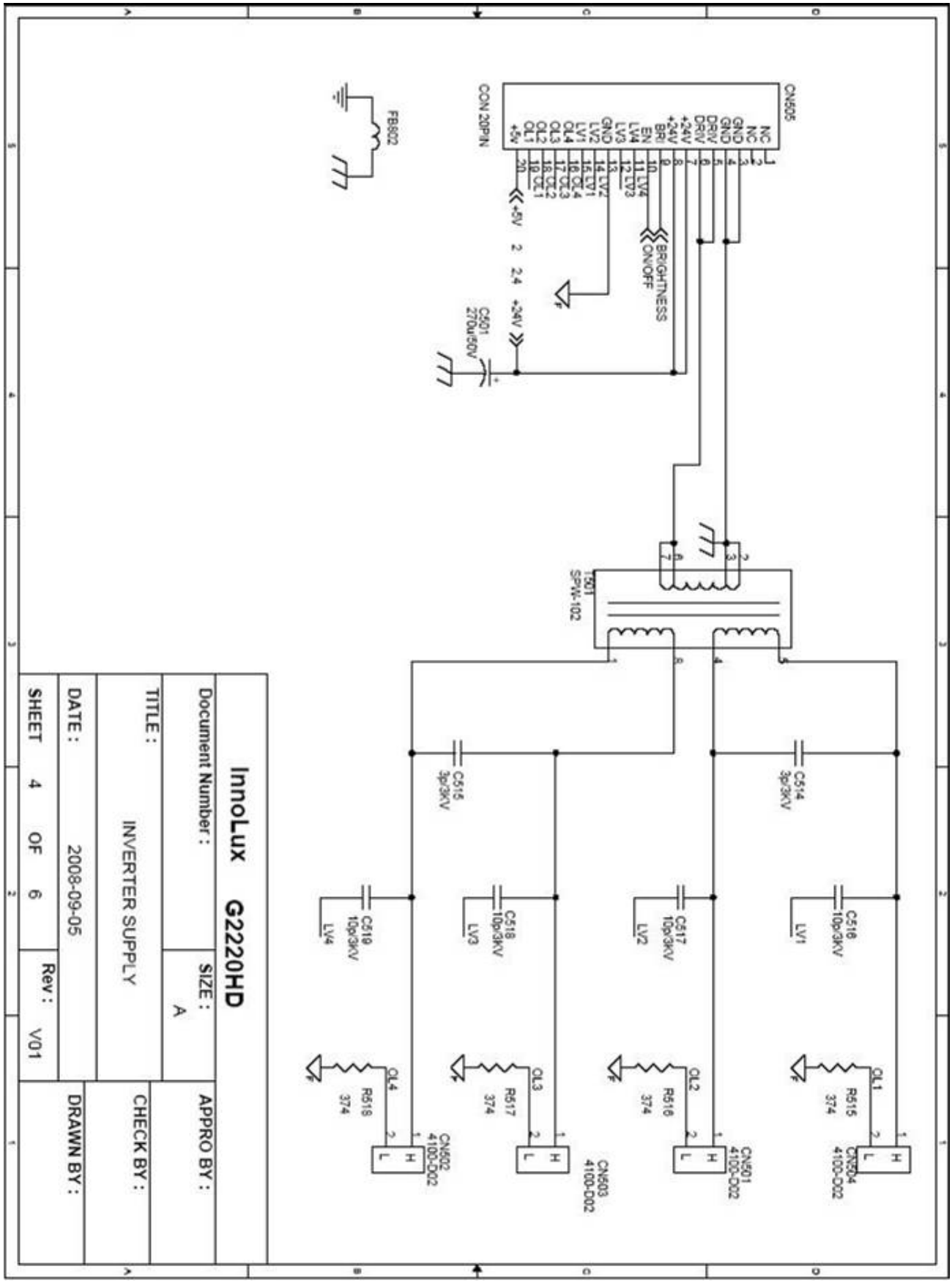
9	Pull out the LVDS		
10	Remove the chassis		
11	Remove the keypad		
12	Remove the panel		

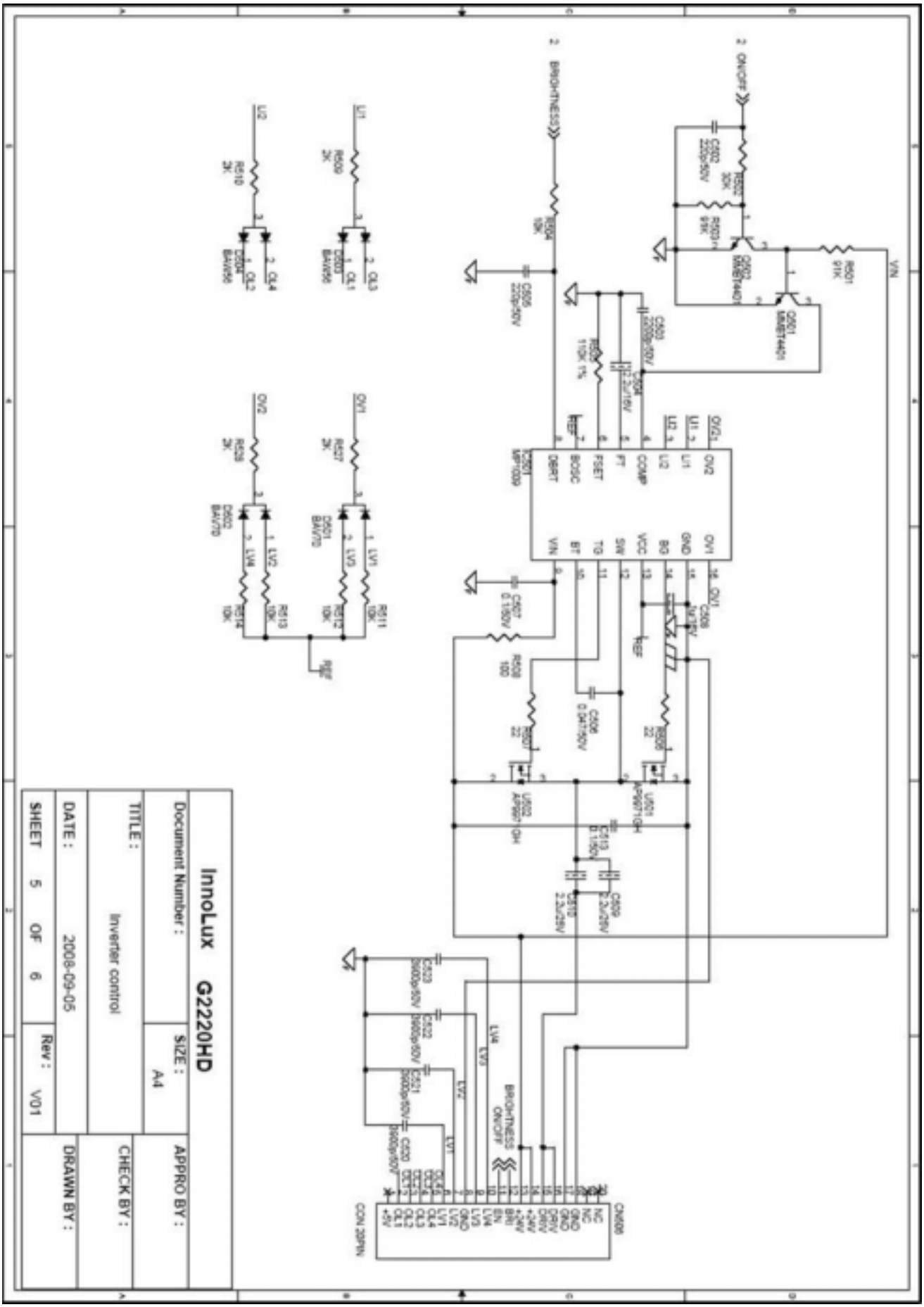
5.4 Block diagram

Power Board

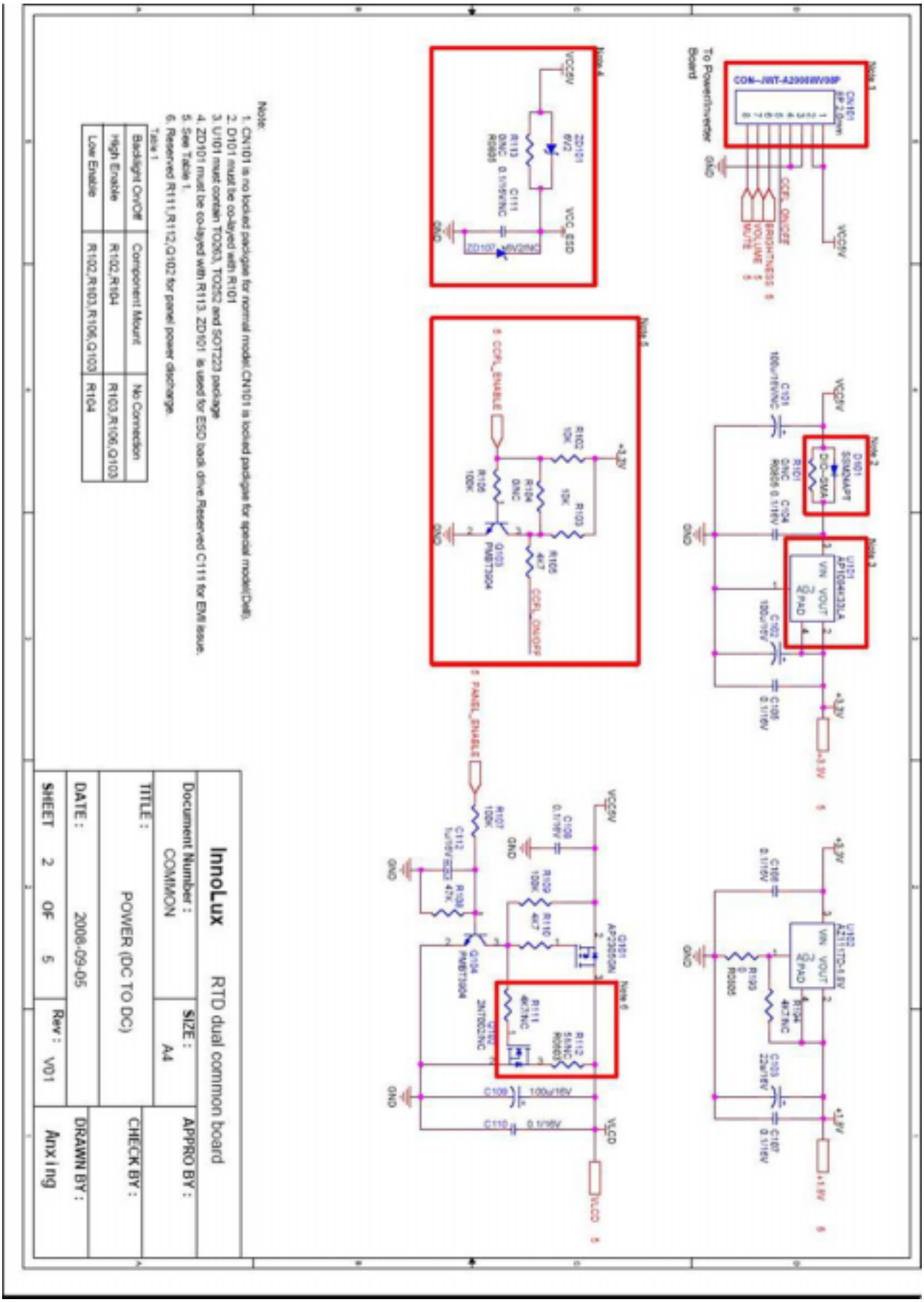


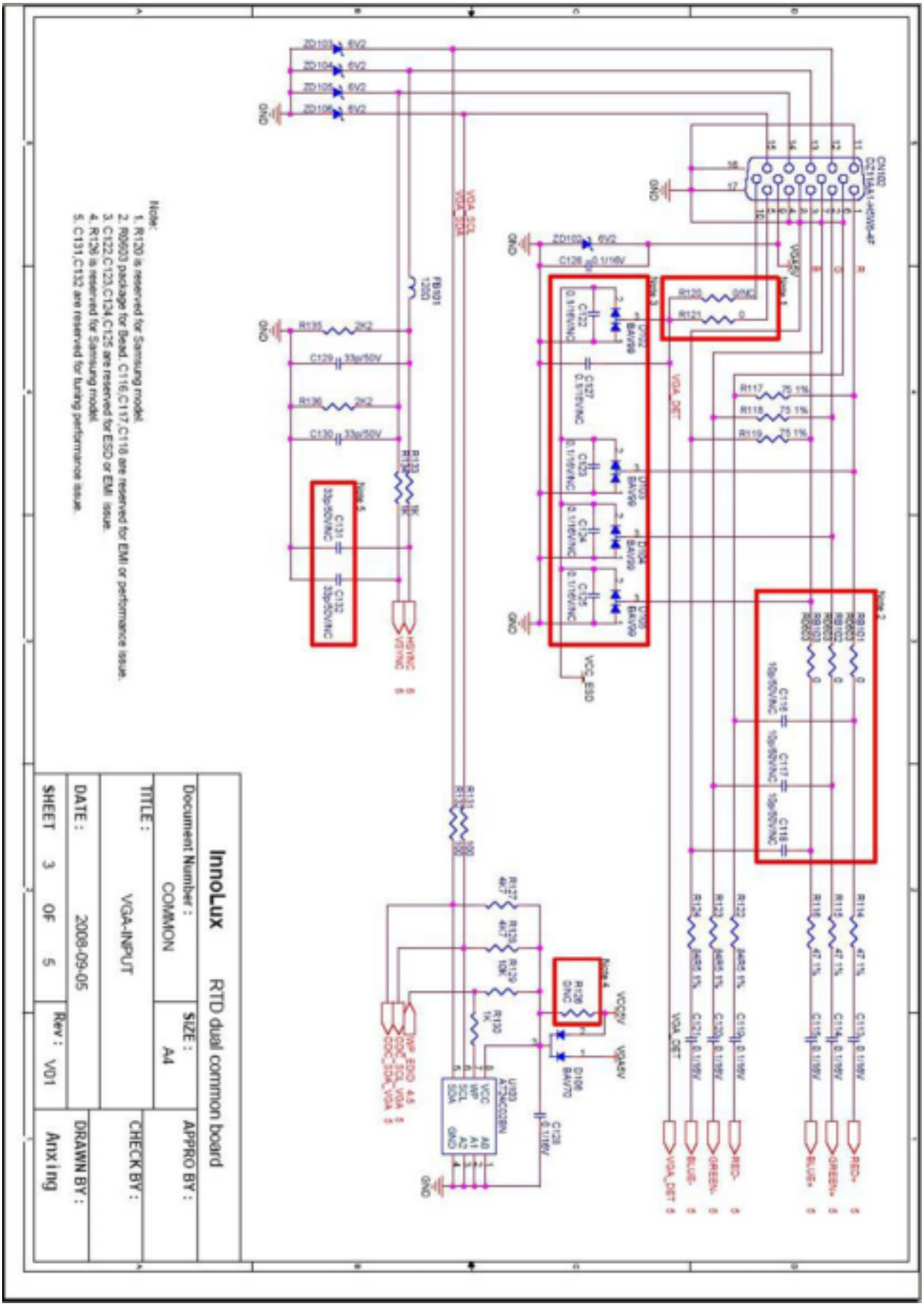

InnoLux
G2220HD
Document Number :
SIZE :
A
TITLE :
POWER Control
DATE :
2008-09-05
SHEET
3
OF
6
Rev :
V01
DRAWN BY :
CHECK BY :
APPRO BY :
CN804
CONSPN
HV
NC
VDD
GND
FB
GND
Isense
Gate

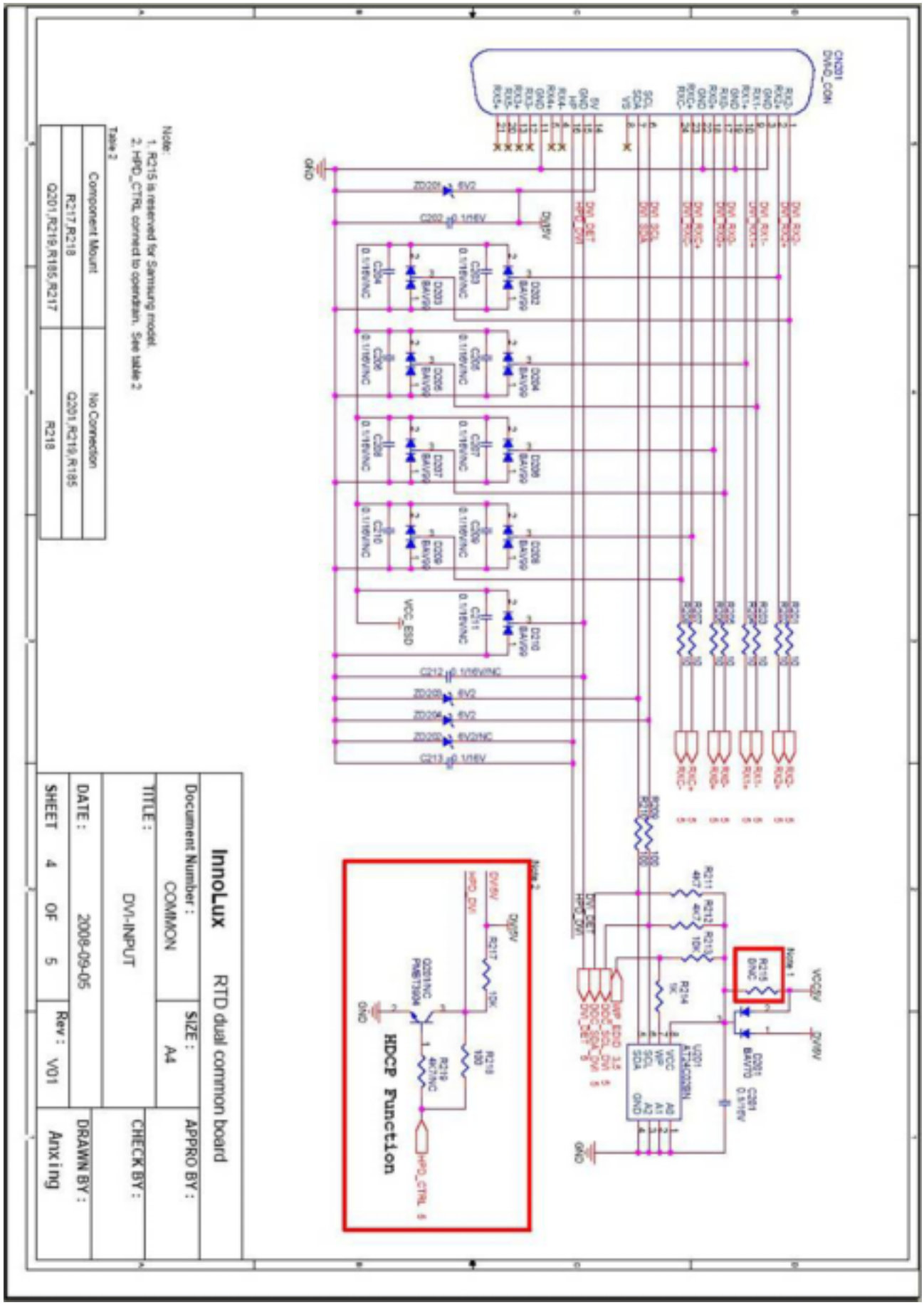

InnoLux G2220HD
Document Number :
SIZE : A
APPRO BY :
TITLE : INVERTER SUPPLY
CHECK BY :
DATE : 2008-09-05
DRAWN BY :
SHEET 4 OF 6
Rev : V01
CN505
CON 20PIN
FB502
C501 270u/50V
BRIGHTNESS
ON/OFF
T501 SPW-102
C514 3p/3KV
C515 3p/3KV
C516 10p/3KV
C517 10p/3KV
C518 10p/3KV
C519 10p/3KV
R515 374
R516 374
R517 374
R518 374
CN504 4100-002
CN501 4100-002
CN503 4100-002
CN502 4100-002

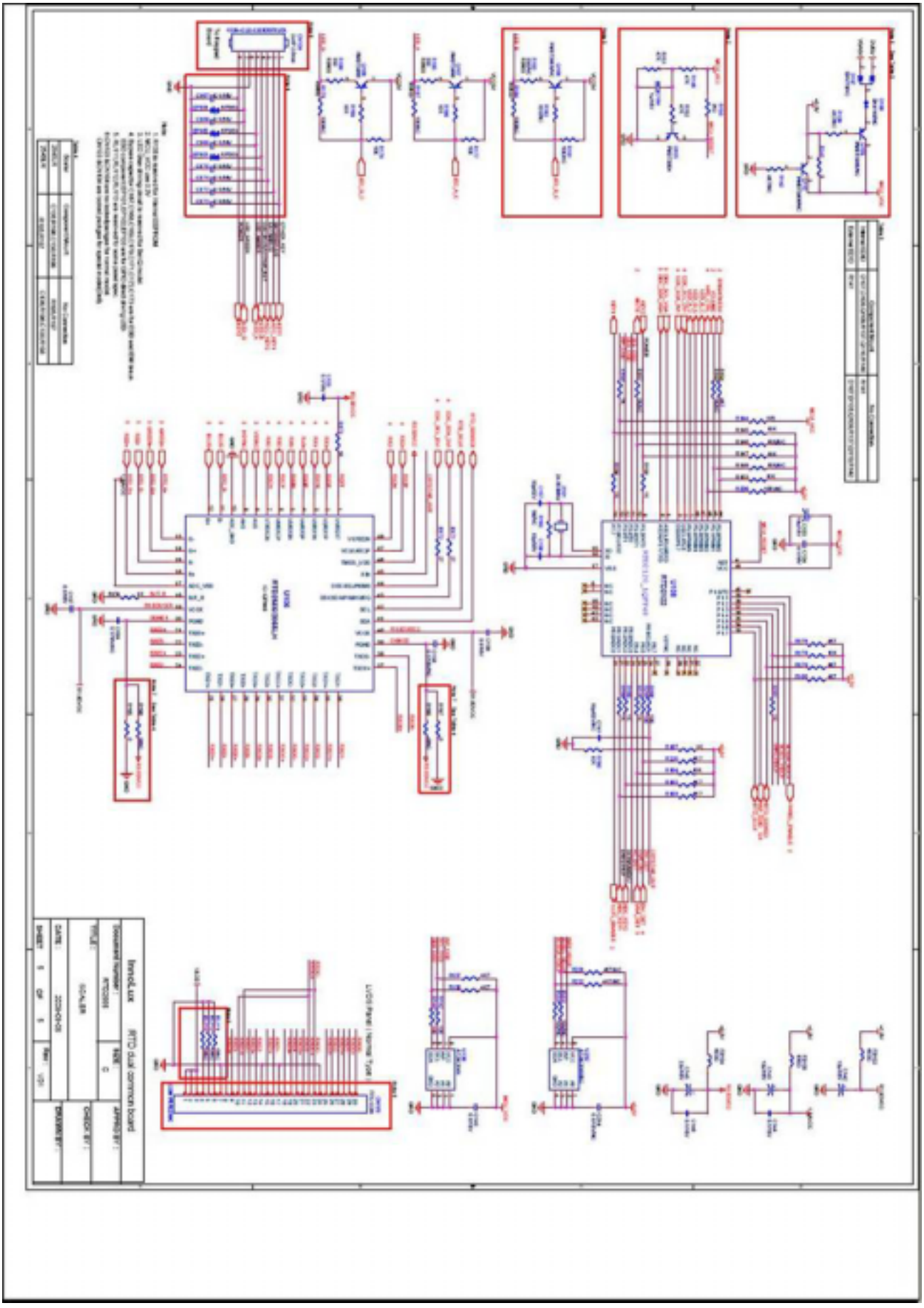

InnoLux G2220HD
Document Number :
SIZE : A4
APPRO BY :
TITLE : Inverter control
CHECK BY :
DATE : 2008-09-05
DRAWN BY :
SHEET 5 OF 6
Rev : V01
VIN
ON/OFF
BRIGHTNESS
CN606
CON 20PIN

IF Board


To Power/Inverter Board
CON-J8ST-A2300BV08P
VCC5V
GND
DCR_ENABLE
BRIGHTNESS
VOLUME
MUTE
VCC_ESD
ZD101
6V2
CCFL_ENABLE
CCFL_ON/OFF
PANEL_ENABLE
+3.3V
VLCD
Note:
1. CN101 is no locked package for normal model.CN101 is locked package for special model(Dell).
2. D101 must be co-layed with R101
3. U101 must contain TO263, TO252 and SOT223 package
4. ZD101 must be co-layed with R113. ZD101 is used for ESD back drive.Reserved C111 for EMI issue.
5. See Table 1.
6. Reserved R111,R112,Q102 for panel power discharge.
Table 1
Backlight On/Off | Component Mount | No Connection
High Enable | R102,R104 | R103,R106,Q103
Low Enable | R102,R103,R106,Q103 | R104
InnoLux RTD dual common board
Document Number : COMMON
SIZE : A4
APPRO BY :
TITLE : POWER (DC TO DC)
CHECK BY :
DATE : 2008-09-05
DRAWN BY : Anxing
SHEET 2 OF 5
Rev : V01


InnoLux RTD dual common board
Document Number : COMMON
SIZE : A4
APPRO BY :
TITLE : VGA-INPUT
CHECK BY :
DATE : 2008-09-05
Rev : V01
DRAWN BY : Anxing
SHEET 3 OF 5
Note:
1. R120 is reserved for Samsung model.
2. R0603 package for Bead. C116,C117,C118 are reserved for EMI or performance issue.
3. C122,C123,C124,C125 are reserved for ESD or EMI issue.
4. R126 is reserved for Samsung model.
5. C131,C132 are reserved for tuning performance issue.


Note:
1. R215 is reserved for Samsung model.
2. HPD_CTRL connect to scantain. See table 2
Table 2
Component Mount
No Connection
R217,R218
Q201,R219,R185
Q201,R219,R185,R217
R218
InnoLux RTD dual common board
Document Number : COMMON
SIZE : A4
APPRO BY :
TITLE : DVI-INPUT
DATE : 2008-09-05
Rev : V01
CHECK BY :
SHEET 4 OF 5
DRAWN BY : Anxing
HDCP Function
CN201
DVI-D_CON
GND
DVI_DET
HPD_DVI
VCC_ESD
VCC5V
DVI5V
HPD_CTRL

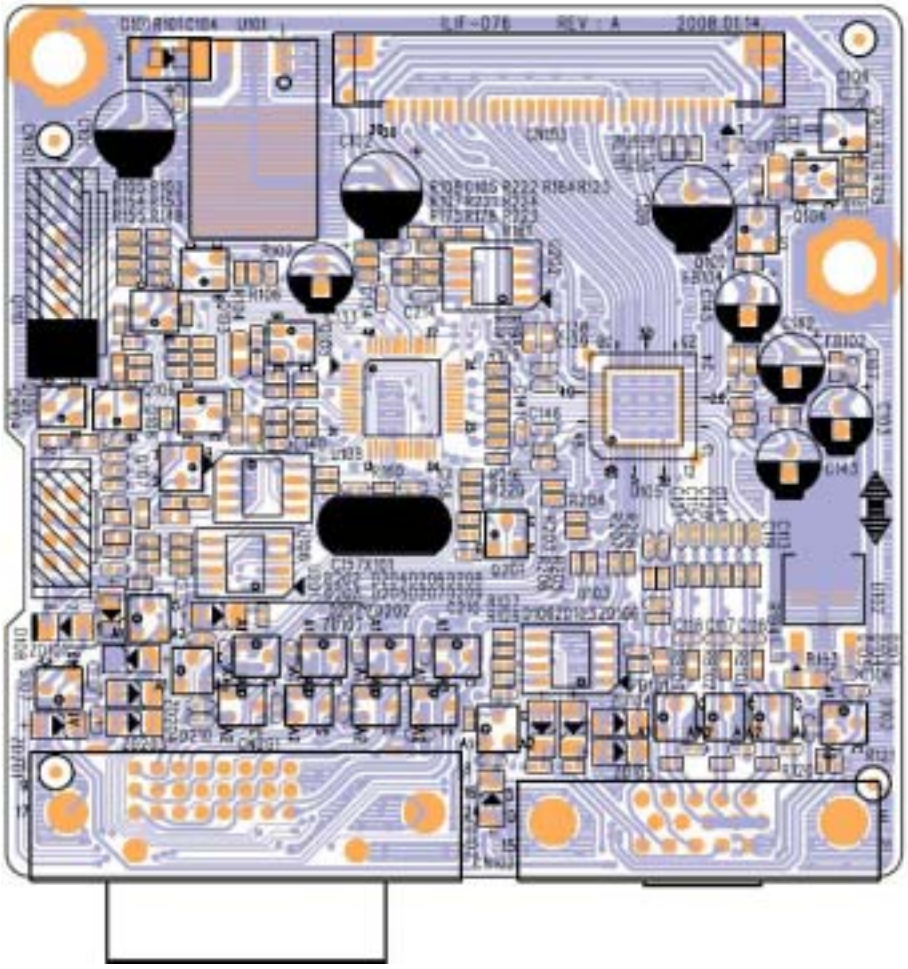


5.5 Lay out

5.5.1 IF board lay out

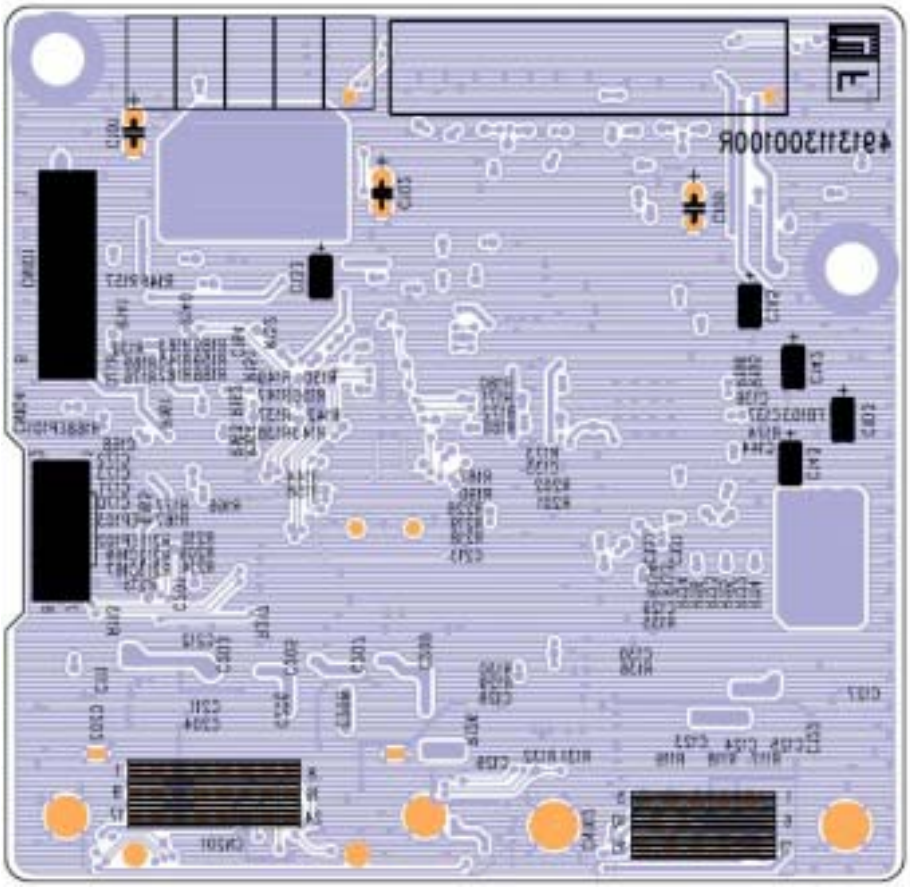
LAYER	SILKSCREEN TOP			
PCB NO :	ILIF-076	REV :	A	DESIGNER: LIU HUA
FILE NAME :	ILPI-076.PCB	DATE :	2008.01.14.	

491311300100R



LAYER	SILKSCREEN BOTTOM			
PCB NO :	ILIF-076	REV :	A	DESIGNER: LIU HUA
FILE NAME :	ILPI-076.PCB	DATE :	2008.01.14.	

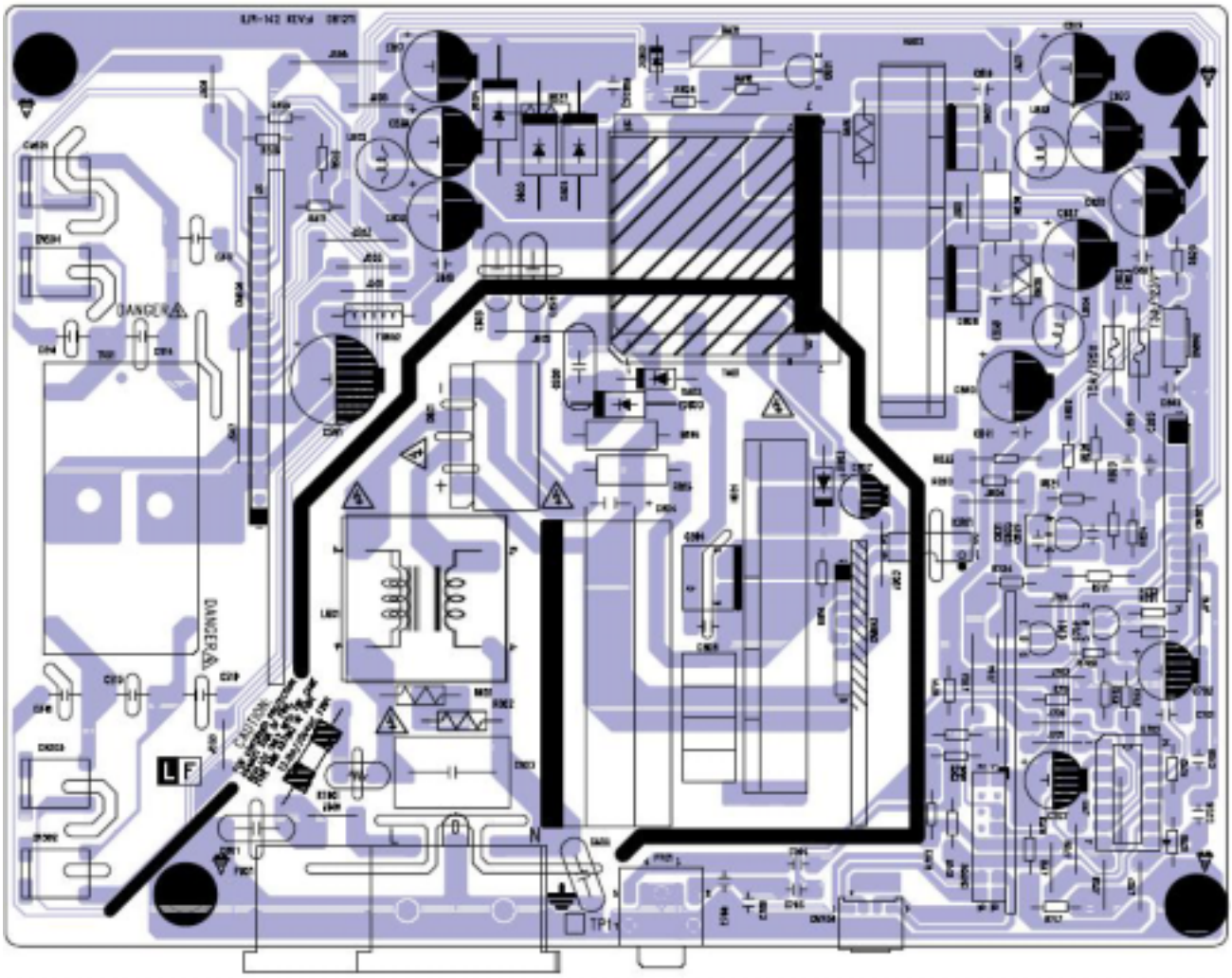
491311300100R



5.5.2 P/I Board lay out

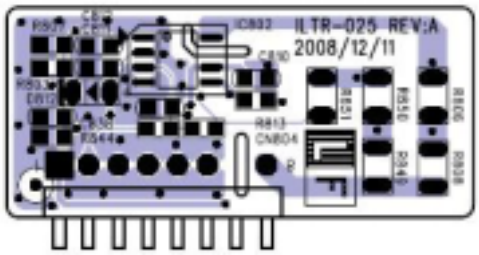
LAYER	SILKSCREEN TOP			
PCB NO :	492241400100R	REV :	A	DESIGNER:HLM
FILE NAME :	ILPI-142.PCB	DATE :	2008.12.11	

492241400100R



LAYER	SILKSCREEN TOP			
PCB NO :	ILTR-025	REV :	A	DESIGNER: ChenSX
FILE NAME :	ILTR-025.PCB	DATE :	2008.11.21	

492242000000R



5.6 Circuit operation theory

5.6.1. Low voltage to high voltage circuit

24V DC provides the power for IC501; the control signals Brightness and ON/OFF come from I/F board. ON/OFF signal connect to R502 to control The Q502 and Q501 To finished control pin4 of IC501 and makes IC501 enable. Brightness signal connect to pin8 of IC501 and regulates the panel brightness. Delaying time circuit is setting by the IC501 internal; C505 is used to dump noise. The operation frequency is determined by the external Resistor R505 connected to pin6 of IC501. BURST MODE regulated dimming frequency is control from the IF Baord.C503 is used for soft start and compensation, C502, C507 are used for dump noise.

The output drives, include TG, BG (pins11,14 respectively) output square pulses to drive MOSFET U501, U502, and each of U501, U502 , is consist of single N channel MOSFET. U501,and U502 work as Half bridge-topology, it is high efficient, PWM switching. During start up, C520, C521, C522, C523 senses the voltage at the transformer secondary. When OV1 OR OV2 reaches 13V Level, the output voltage is regulated. If no current is sensed approximately 2seconds IC501 shut off.

The current flowing through CCFL is sensed and regulated through sense resistor R515, R516, R517, R518. The feedback voltage connected to Pin2, and Pin3 (LI), then compared with a reference voltage via a current amplifier, resulting in PWM drive outputs to Half-bridge switches.

5.6.2 Power board diagram:

Operation theory

AC Current Input Circuit

P801 is a connector for connecting AC Power. F801 is a fuse to protect all the circuit. AC input voltage is from 90v to 264V. R801 and R802 joined between two inputting main circuit to prevent man from shock. L801 is used to clear up low frequency wave. C801 and C802 are used to discharge the waves that L801 produced. High frequency waves are damped by C801 and C802. D801 is a rectifier which composed of 4 build-in diodes, it inverts AC to DC.

High Voltage to Low Voltage Control Circuit

C804 is used to smooth the wave from rectifier. IC802 is a highly integrated PWM controller. When rectified DC high voltage is applied to the HV pin during start-up, the MOSFET Q804 is initially off, and the Vcc pin capacitor is charged. When the Vcc pin voltage reaches approximately 16.0V.

When PWM is turned off, the main current flow will be consumed through R805,C806 and D802, This will prevent MOSFET Q804 from being damaged under large current impulse and voltage spike.

D803 and C807 to provide internal Auxiliary voltage to Vcc pin during normal operation.

DC_5V and DC_24V Output Circuit

For DC VCC 5V, D807 is used to rectify the inducted current. R816 and C816 are used to store energy when current is reversed. The parts including C819, C820, C822, L803, and C823 are used to smooth the current waves.

For DC 24V, D805,D806 is used to rectify the inducted current. R827 and C815are used to store energy when current is reversed. The parts including C817, C818, C830, C839, L802 is used to smooth the current waves.

Feedback Circuit

Pin R of IC803 is supplied 2.5V stable voltage. It connects to 5V and 24V output through R822, R825, R826 and There are output voltage sampling resistor. When the sampling voltage more than 2.5V or less than 2.5V, current of COMP IC802 will change, this can change the voltage from T801.

5.6.3. RGB CAPTURE

- Signal RED,GREEN,BLUE input through CN102 #1,#2,#3, Stop DC via R114&C113, R115&C114 and R116&C115 and then enter into U105 (scaler) analog input terminal #16,#14,#12, and then scaler deals with signal internally.
- Signal DDC_SCL (series clock) inputs via CN102#15, and then passes through R131, goes into U108#2.
- Signal DDC_SDA (series data) inputs via CN102#12, and then passes through R132, goes into U108 #3
- Signal TTL vertical sync. (Vsync) inputs via CN102 #14, and then clamped by ZD105 Zener, passes through R134, and then goes into IC U105 (scaler) #8.
- Signal TTL horizontal sync. (Hsync) inputs via CN102 #13, and then clamped by ZD104 Zener, passes through FB101,R133, and then goes into IC U105 (scaler) #9
- CN102#5 is defined as cable detect pin, this detector realize passes through R125 Pull high, go into U108#24.

5.6.4 Buttons Control

- Button “Power” in right of bezel connects to U108 #9 through R156, via CN104#8.
- Button “UP” “DOWN ““MENU” “ENTER” in the bottom of bezel connects to U108 #21,#22, through R188,R189, via CN104 #3,#2
- U106 is an EEPROM IC which memory OSD setting and save the value adjusted by user.

- LED Indicator on Front Bezel

a. When press button “power”, U108 #48 sends out a low potential, via R169, flow to CN104 #7 on keypad, LED Green ON.

b. When in “Suspend” mode, U108 #1 sends out a low potential, via R166, flows to CN104 #5 on keypad, LED Amber ON.

5.6.5 REALTEK CHIP U105 (scaler)

- U105 (RTD2555L) #21~#38 output 8 bit LVDS digital data to panel control circuit through CN103.
- U105 (RTD2555L) #44 outputs Brightness “PWM” signals to control CCFL brightness.
- U105 (RTD2555L) #39 output PANEL_ENABLE to make Q104 conducted, and then make Q101 conducted, +5V flow to CN103#1~#3 as Panel VDD .
- U105 (RTD2555L) #20 output CCFL_ON/OFF ”H” and “L” potential to control Inverter on/off.

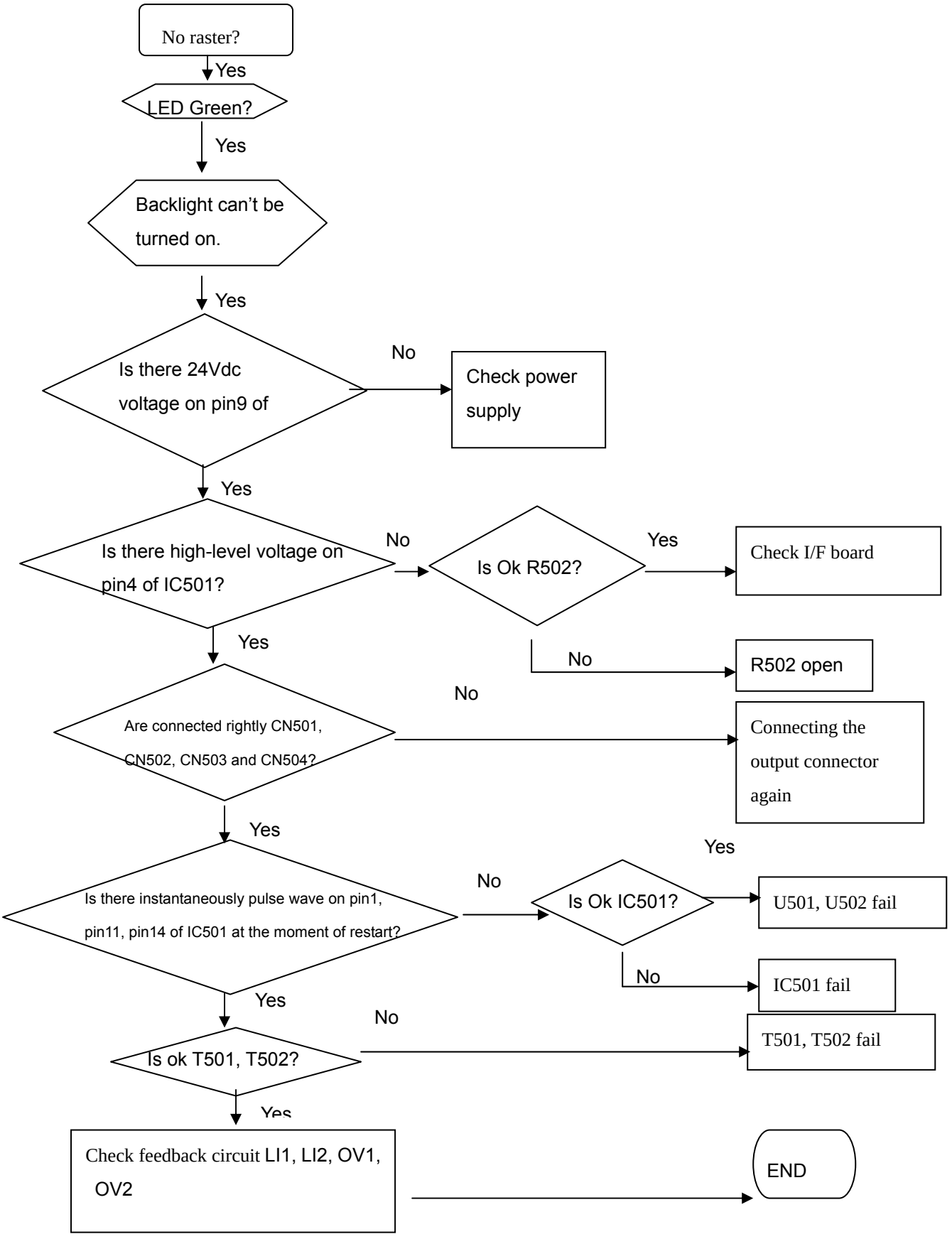
Please refer to RTD2555L Pin Assignments table in page

5.6.6 Regulator Circuit

- +5V is from switching mode power supply for Panel used.
- +3.3V generates from +5V through C101 filtering and U101 which is output +3.3V LDO for U102 ,U105 and U108 used.
- +1.8V generates from +3.3V through C102 filtering and U102 which is output +1.8V LDO.

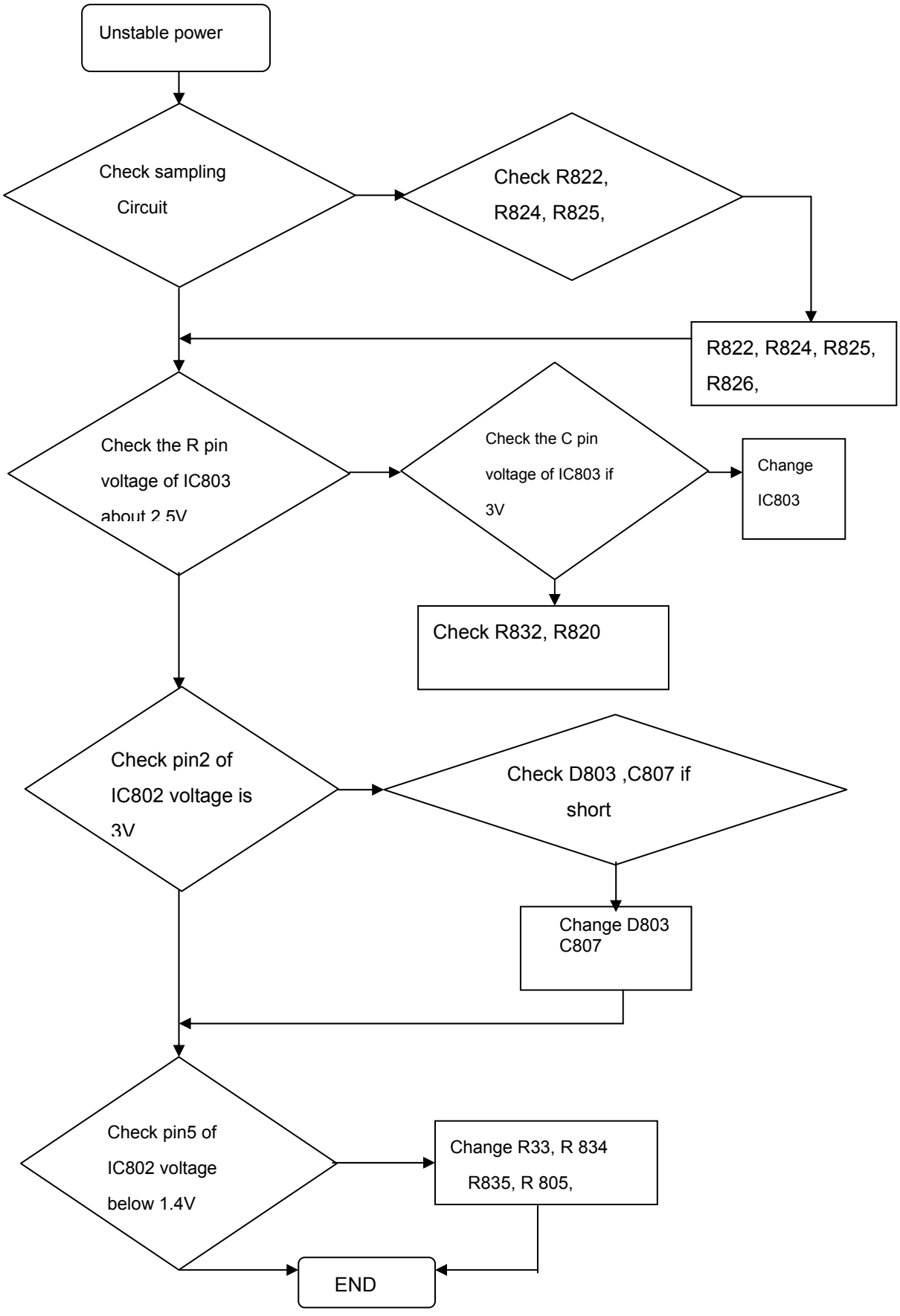
5.7 Trouble Shooting Guide

Backlight can't be turned on

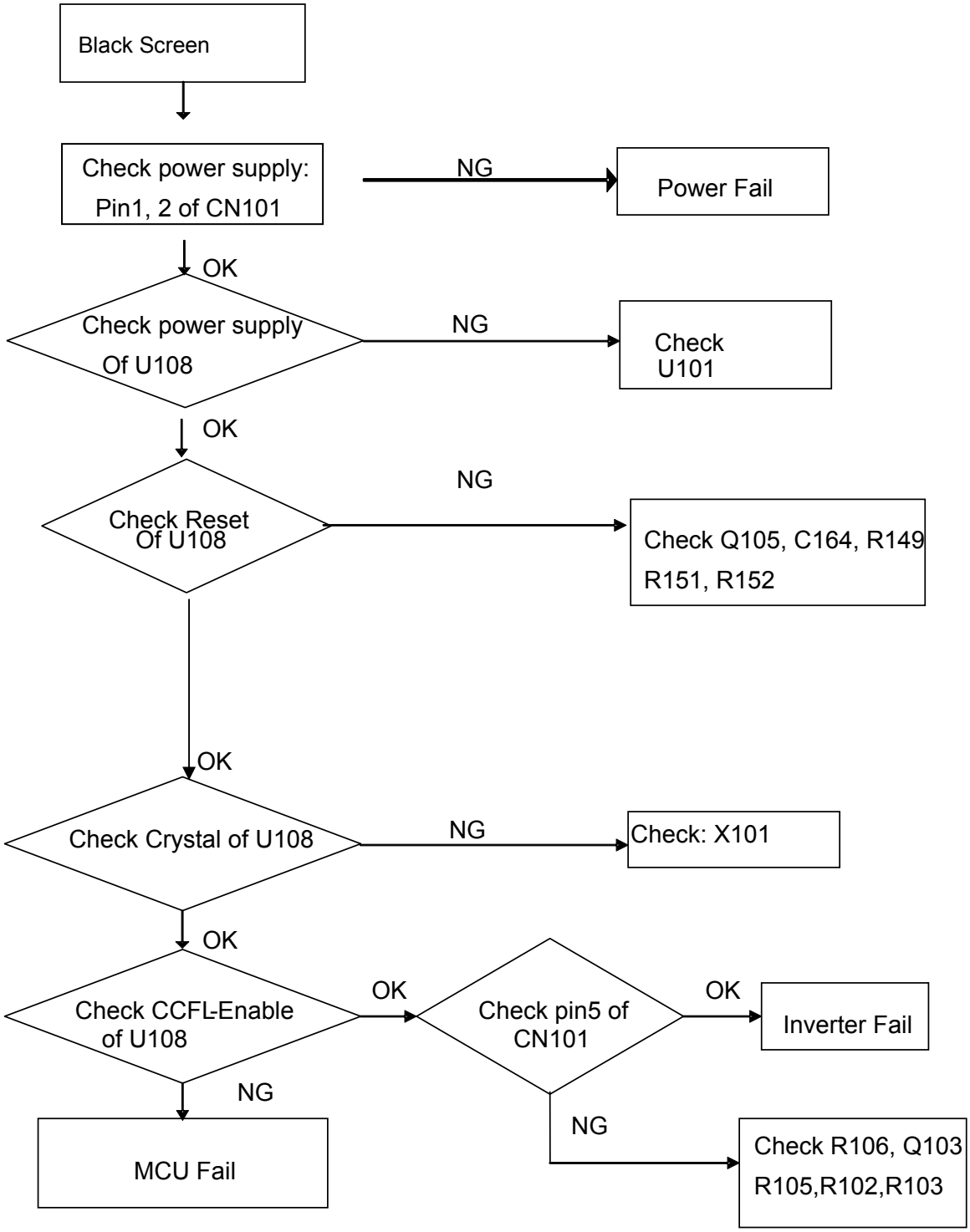


No Power & LED Off

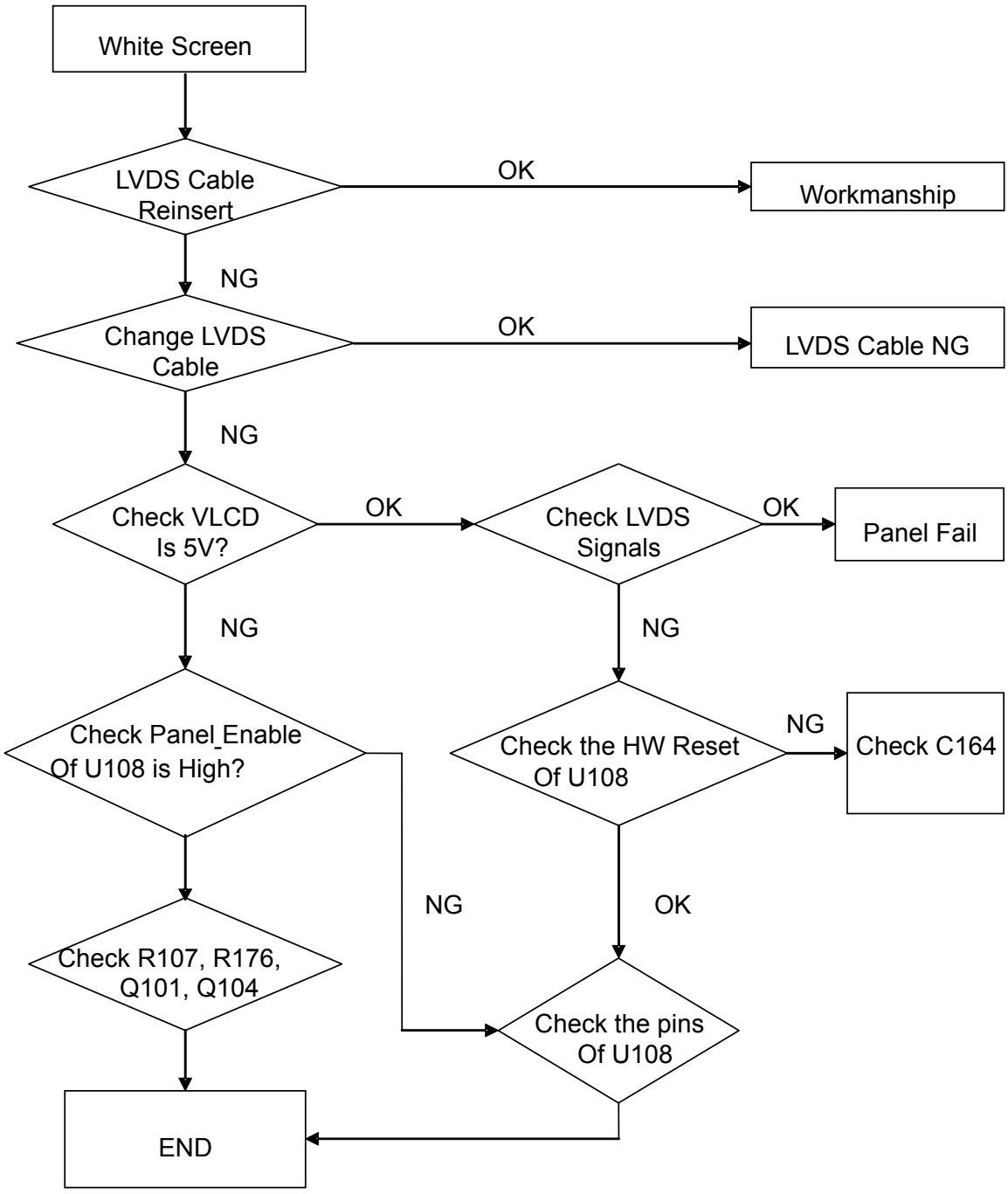
2. Unstable Power



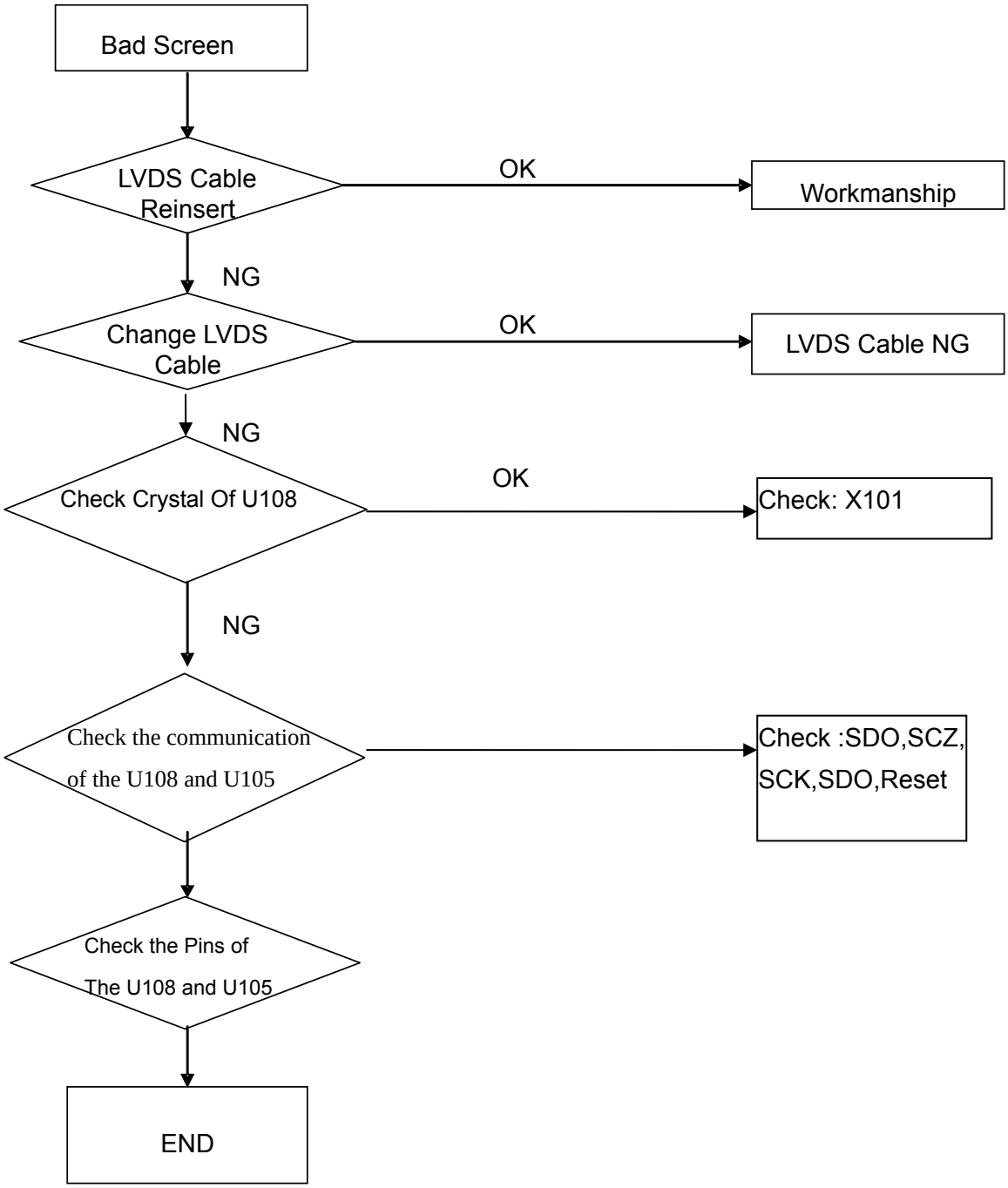
3. Black Screen



4. White Screen



5. Bad Screen


Bad Screen
LVDS Cable Reinsert
OK
Workmanship
NG
Change LVDS Cable
OK
LVDS Cable NG
NG
Check Crystal Of U108
OK
Check: X101
NG
Check the communication of the U108 and U105
Check :SDO,SCZ, SCK,SDO,Reset
Check the Pins of The U108 and U105
END

6. Dimmession Drawing