Service Manual

LCD Monitor Acer
P221W/P223W

Service Manual Versions and Revision

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1	1.0	2007/06/08	Initial Release

Acer P221W/P223W Service Manual

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Chapter 1- PRECAUTIONS & SAFETY NOTICES

1. SAFETY PRECAUTIONS

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 are 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. 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.

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.

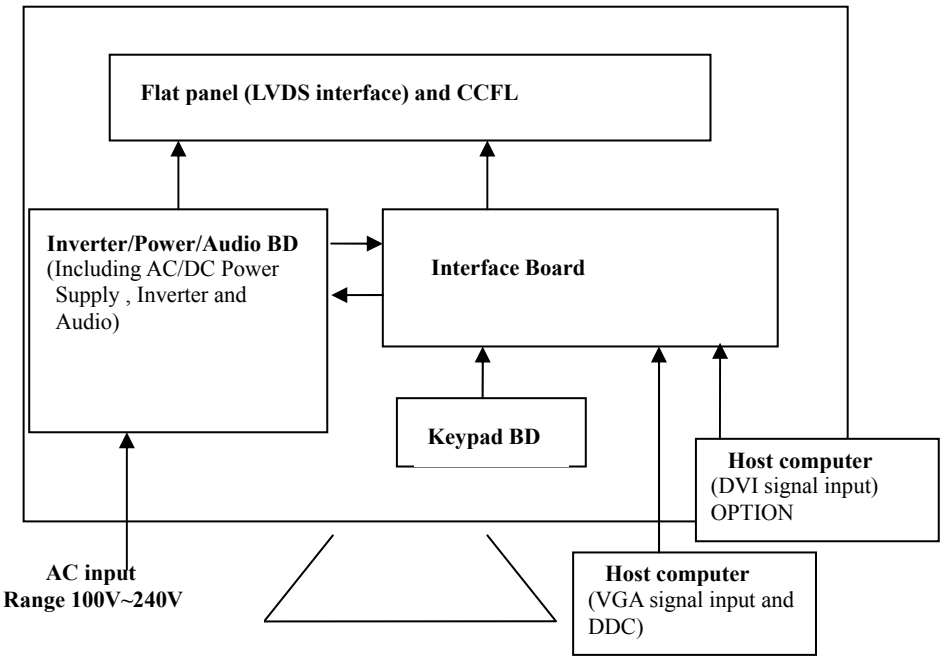
Chapter 2- SERVICE TOOLS & EQUIPMENT REQUIRED

1. SIGNAL GENERATOR
2. MULTIMETER
3. SCREW DRIVER
4. OSCILLOSCOPE
5. Soldering IRON
6. SOLDER
7. VGA Cable (15pins point to point)
8. DVI Cable(DVI-D 24+1 pin)
9. Audio cable
10. Color Analyzer
11. Myson412 ISP Board
12. EDID Board
13. EDID program file

Chapter 3- CIRCUIT THEORY

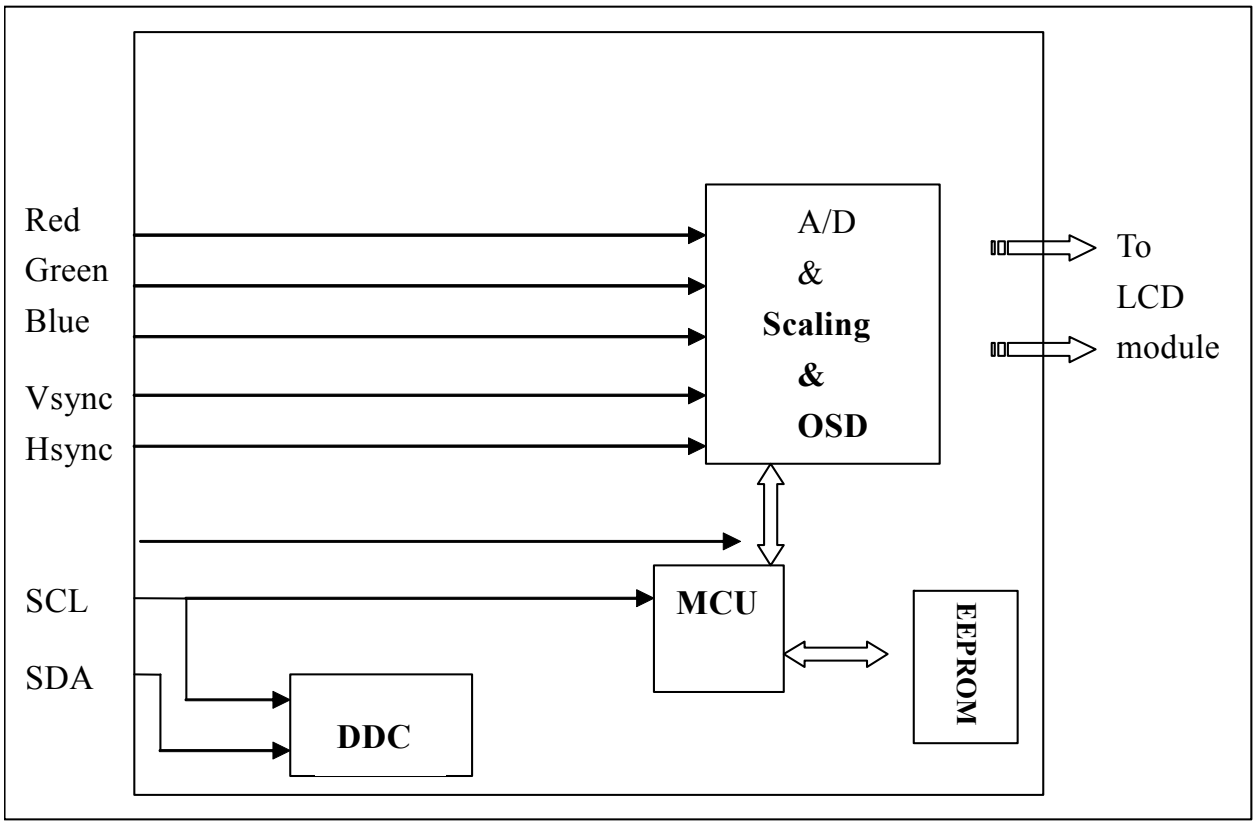
1. Monitor Block Diagram

The LCD Monitor contains an interface board, and inverter/power/Audio board, keypad board and flat panel. In Inverter/power/Audio board, power section supplies +14V & +5V for Inverter/Audio and Interface board used. The inverter section drives the backlight of panel and the DC-DC conversion. The Audio section drives speaker (2 x1W).



2. Interface BOARD DIAGRAM

Interface Board



3. Electronic Circuit Theory

3.1 Switching Mode Power Supply

3.1.1 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. R820 and R821 joined between two inputting main circuit to prevent man from shock. L801 is used to clear up low frequency wave. C801 and C806 are used to discharge the waves that L801 produced. High frequency waves are damped by C801 and C806. D801 is a rectifier which composed of 4 build-in diodes, it inverts AC to DC.

3.1.2 High Voltage to Low Voltage Control Circuit

C805 is used to smooth the wave from rectifier. IC802 is a highly integrated PWM controller which build-in power MOSFET. When rectified DC high voltage is applied to the DRAIN pin during start-up, the MOSFET is initially off, and the CONTROL pin capacitor is charged through a switched high voltage current source connected internally between the DRAIN and CONTROL pins. When the CONTROL pin voltage Vc reaches approximately 5.8V, the control circuitry is activated and the soft-start begins. The soft-start circuit gradually increases the duty cycle of the MOSFET from zero to the maximum value over approximately 10ms. If no external feedback/supply current is fed into the CONTROL pin by the end of the soft-start, the high voltage current source is turned off and the CONTROL pin will start discharging in response to the supply current drawn by the control circuitry.

Resistor R803, R807, R824 and R825 are for line over voltage shutdown(OV) and line under-voltage detection(UV).

Resistors R801, R805, R822, R823 are for external current limit adjustment. And used to reduce the current limit externally to a value close to the operating peak current of primary about 1.35A. The mean is power will protected when the primary current over about 1.35A.

When PWM is turned off, the main current flow will be consumed through D804, and ZD802, This will prevent MOSFET which built-in IC802 from being damaged under large current impulse and voltage spike.

D806 and C815 to provide internal Auxiliary current to CONTROL pin during normal operation. Otherwise, error amplifier and feedback current input the CONTROL pin for duty cycle control.

3.1.3 DC_5V and DC_14V Output Circuit

For DC 5V, D805 is used to rectify the inducted current. R806 and C811 are used to store energy when current is reversed. The parts including C814, C814, C822, C821, B801 and L803 are used to smooth the current waves.

For DC 14V, D803 is used to rectify the inducted current. R802 and C802 are used to store energy when current is reversed. The parts including C808, C810 and L802 are used to smooth the current waves.

3.1.4 Feedback and OVP Protect Circuit

Pin R of IC803 is supplied 2.5-v stable voltage. It connects to 5V and 14V output through R811, R810 and R818. R811, R810 and R818 are output sampling resistor. When the sampling voltage more than 2.5V or less than 2.5V, current of FB IC802 will change, this can change the voltage from T801.

For 5VDC output OVP, ZD803 is a Zener Diode, when 5 voltage up to 5.6V, the zener current cause R819 voltage to ground is up to 0.7V, Q801 being triggered and OVP working. For 14VDC output OVP, ZD804 is a Zener Diode, when 14 voltage up to 18V, the Zener current cause R819 voltage to groung is up to 0.7V, Q801 being triggered and OVP working. The current of potential is used to make build-in diode light. Current of FB to IC802 will be changed, this can change the voltage from T801.

Q802, R827, R828 and ZD801 make up of dummy loading circuit. For start-up sequence, during 5V output take place high loading first, this dummy loading circuit operated to insure 14V not be increased.

3.2 I/F Board Circuit

3.2.1 RGB CAPTURE

- Signal RED,GREEN,BLUE input through CN103 #1,#2,#3, Stop DC via C110, C112 and C114, and then enter into U103 (RTD2553VH) analog input terminal #36,#33,#31, and then RTD2553VH deals with signal internally. EP106, EP107, EP108 are ESD protector to prevent U103 from ESD.
- Signal DDC_SCL (series clock) inputs via CN103#15, and then passes through EP101 for ESD

protection, goes into U102(RTD2120) #5.
- Signal DDC_SDA (series data) inputs via CN103#12, and then passes through EP104 for ESD protection, goes into U102(RTD2120) #8.
- Signal TTL vertical sync. (Vsync) inputs via CN103 #14, and then clamped by EP102, passes through R164, and then goes into IC U103 (RTD2553VH) #40.
- Signal TTL horizontal sync. (Hsync) inputs via CN103 #13, and then clamped byEP103, passes through FB104,R166, and then goes into IC U103 (RTD2553VH) #39.
- CN103#5 is defined as cable detect pin, this detector realize passes through R159 Pull hight, go into U102#24.
- U103 power is supplied by PC via CN103#9, or supplied by Monitor self.
- U105 is an EEPROM IC which is memory and OSD data saved in it.

3.2.2 Buttons Control

- Button "Power" on right side bezel connects to U102(RTD2120) #9 through R105, via CN101#8.
- Button "Left" "Right "is ADC key,when press "Left" key, U102(RTD2120)#21 detect about 1.0~1.5V, then U102(RTD2120) know it is "Left" been pressed; when press "right" key, U102(RTD2120)#21 detect 0V, then U102(RTD2120) know it is "Right" been pressed;

"MENU" "AUTO" on left side bezel connects to U102(RTD2120) #14,#22 through R110,R201, via CN101 #1, #3.

- LED Indicator on Front Bezel
  a. When press button "power", U102(RTD2120) #1 sends out a low potential, via R106, flow to CN901#4 on keypad, LED amber on until "ACER" logo over,then U102(RTD2120) #1 sends out a high potential, LED amber off .and then U102(RTD2120) #48 sends out a low potential,LED green on.
  b. When in "Suspend" mode, U102(RTD2120) #1 sends out a low potential, via R106, flow to CN901#4 on keypad ,LED amber on.

3.2.3 Realtek CHIP U103 (RTD2553VH)**&** U102(RTD2120)

- U103 (RTD2553VH)**)** #73~#82 output 8 bit even LVDS digital data to panel control circuit through CN105.
- U103 (RTD2553VH)**)** #85~#94 output 8 bit odd LVDS digital data to panel control circuit through CN105.
- U102(RTD2120) #44 outputs Brightness "PWM" signals to control CCFL brightness.
- U102(RTD2120) #39 output PPWR "H" potential to make Q114 conducted, and then make Q112 conducted, +5V flow to CN105#1~#3 as Panel VDD .
- U102(RTD2120) #46 output CCFL_ON/OFF "L" or "H" potential to control Inverter on/off.
- TCLK by Crystal 24MHz input to U102(RTD2120) #15,#16.

Please refer to RTD2120 Pin Assignments table in page.

3.2.4 Regulator Circuit

- +5V is from switching mode power supply for Panel used.
- +3.3V generates from +5V through C102 and C104 filtering and U101 which is output +3.3V LDO for U102&U103 and U105 used.
- +1.8V generates from 3.3V through C101 and C103 filtering and Q106&Q107 which is output +1.8V, for U103 used.

3.2.5 Audio circuit

- Audio Signal R,L,GND input through P701,#2,#5,#1, Stop DC via C704, C706, and then enter into U701 (TDA8496L) analog input terminal #5,#1.
- U701 (TDA8496L) #14,#12 output R,L audio data to Speaker through CN701.
- U102(RTD2120) #47 output MUTE "H" potential to control U701on/off.
- U102(RTD2120) #45 outputs Volume "PWM" signals to control U701 Volume.

4. Inverter circuit

4.1 Low voltage to high voltage circuit

14VDC provides the power for IC501; the control signals Brightness and ON/OFF come from I/F board. ON/OFF signal connect to pin8 of IC501 and makes IC501 enable. Brightness signal connect to pin7 of IC501 and regulates the panel brightness, R526, D515, R529, C505 make up a network of delaying time circuit and R523, R524 make up a divided voltage network, C504 is used to dump noise. The operation frequency is determined by the external Resistor R522 and capacitor C529 connected to pin5 of IC501. BURST MODE dimming pulse frequency and duty is regulated by I/F board. C503 is used for soft start and compensation, C502, C528 are used for dump noise.

The output drives, include NDR4, NDRV2, PDRV3, PDRV1 (pins1, 3, 15, 16 respectively) output square pulses to drive MOSFET U501, U502, and each of U501, U502 is consist of a N channel MOSFET and a P channel MOSFET. U501 and U502 work as full-bridge topology, it is high efficient, zero voltage switching.

During start up, VSEN (pin9) senses the voltage at the transformer secondary. When VSEN reaches 3.0V, the output voltage is regulated. If no current is sensed approximately 1.5 seconds IC501 shunt off.

The current flowing through CCFL is sensed and regulated through sense resistor R509, R511. The feedback voltage through R506, R507, C508 connected to Pin11 (ISEN), then compared with a reference voltage (1.5V) via a current amplifier, resulting in PWM drive outputs to full-bridge switches.

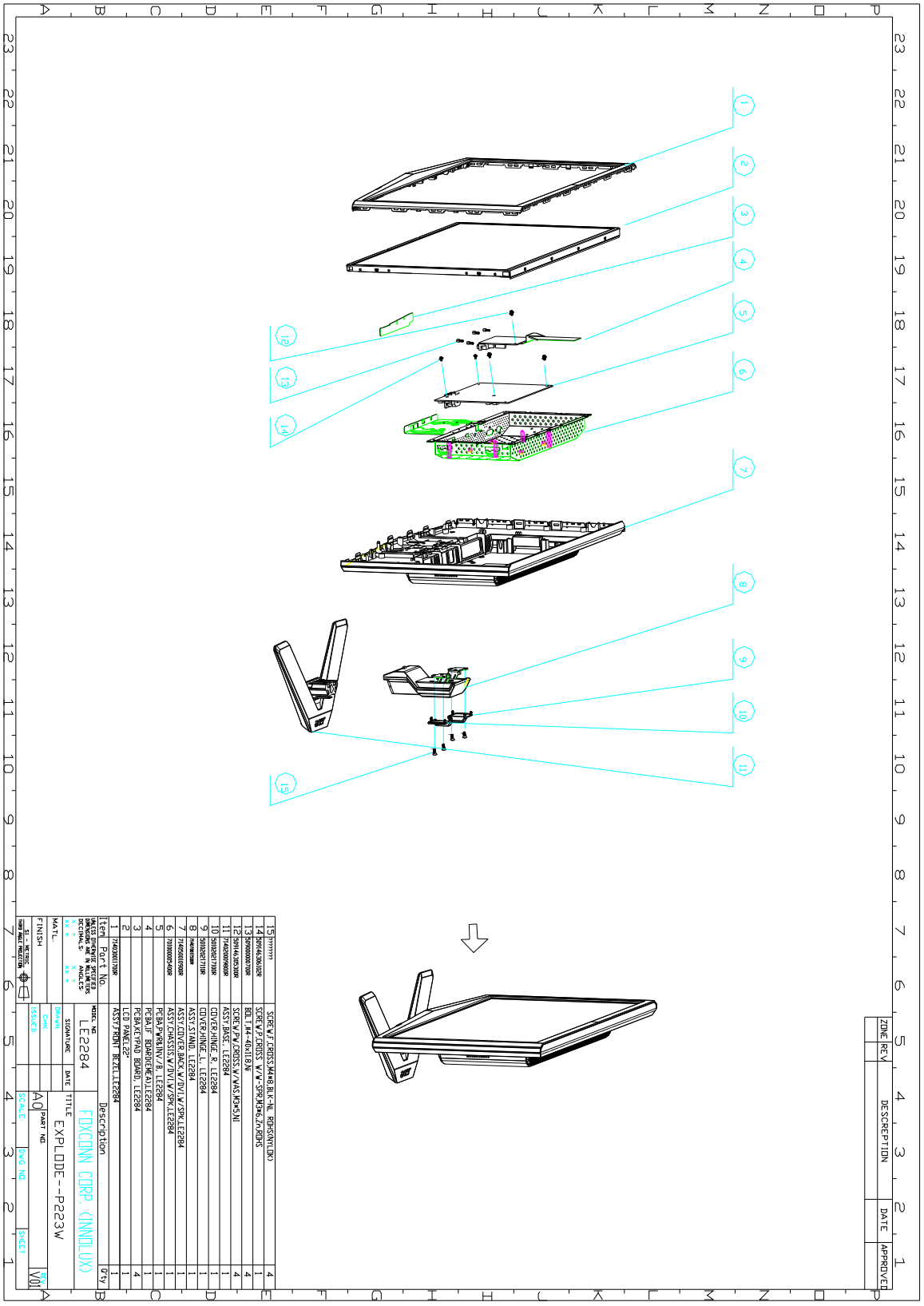
4.2 Protection circuit

Over Voltage Protection: R501and R502 are connected in high voltage output connector, the divided AC voltage is inverted DC voltage through D508, R505 and C507are used to rectify wave & dump noise. Then the voltage signal reaches Pin9 VSEN of IC501, when the voltage changes, build-in PWM of IC501 will adjust output voltage.

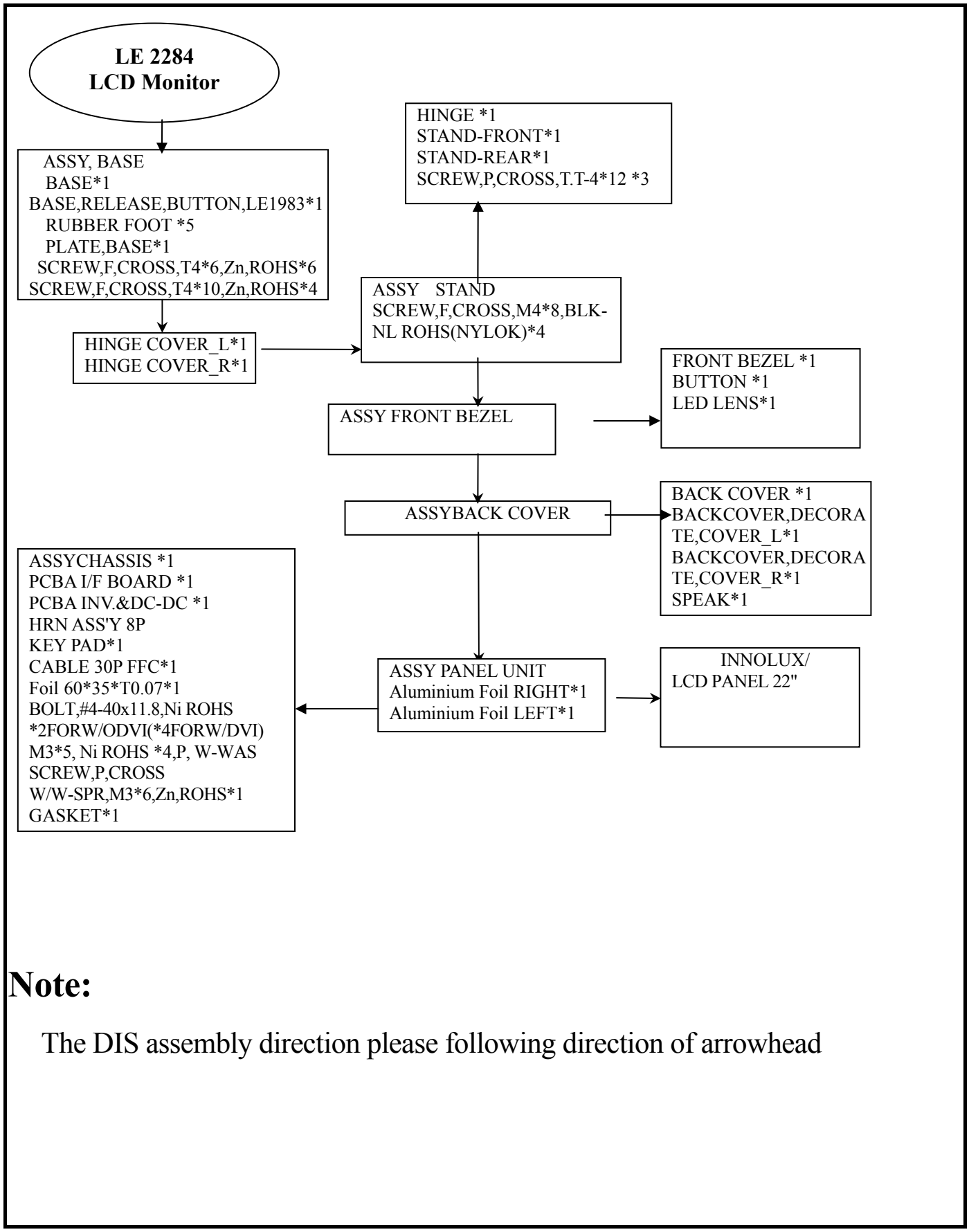
Open Lamp Protection: In normal operation, the resistors R510, R511, R512, R509 are sensed a high level AC voltage, the AC signal OP1 invert DC voltage through D509, R515, C533, and the high level DC voltage reaches the gate pin of Q502, similarly, the gate pin of Q503, Q504, Q505 has high level DC voltage. So the gate pin of Q501 has a low level voltage, and the IC501 is normal operation. Once one of signal OP1, OP2, OP3, and OP4 is low, the voltages of Q501 gate pin is high level, and make the voltage of ISEN low level, the IC501 will be shunt down.

Chapter 4- Disassembly & Assembly

1. Exploded Diagram



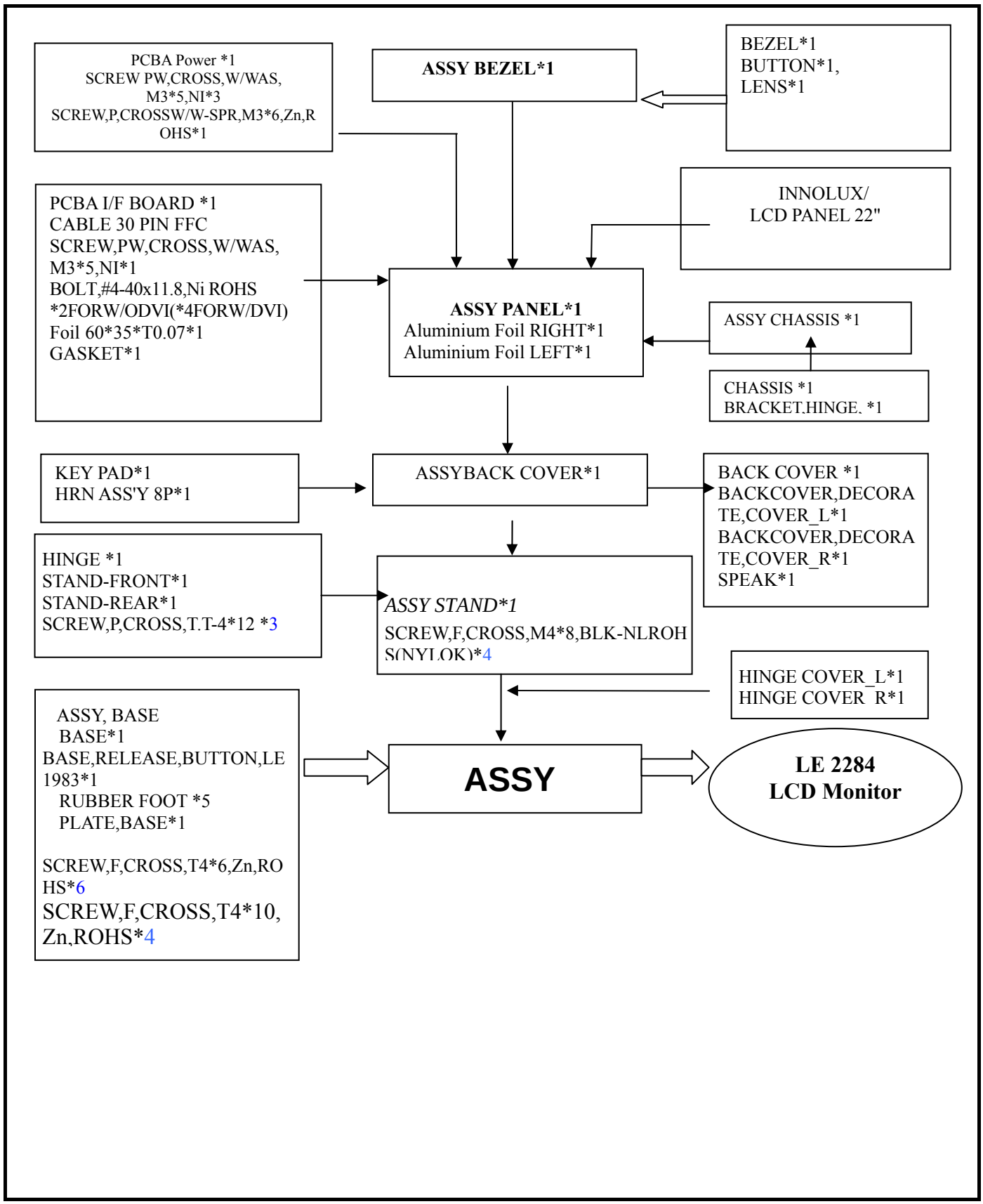
2. Disassembly Block



Note:

The DIS assembly direction please following direction of arrowhead

3. Assembly Block



Chapter 5- TEST AND ADJUSTMENT

1. GENERAL POINTS

1.1 Test Equipment or Tool

1.1.1 Test pattern generator: PC or video pattern generator (Chroma-2326/2160/2130)
1.1.2 Color analyzer: Chroma-7120
1.1.3 Power meter: AC Source Chroma-6408
1.1.4 Electrical safety tester: Chroma (Zentech) 9032A
1.1.5 Stereo source: Music or signal generator input
1.1.6 Auto shock fixture
1.1.7 Temperature and humidity sensor
1.1.8 DDC interface card and EDID file

1.2 Preset Test Pattern

1.2.1 Crosshatch (General-1)
1.2.2 Gray Bar (16 & 32 levels)
1.2.3 Full White
1.2.4 Aging (Burn-in) Pattern: Full Red, Green, Blue, White, and Black

1.3 AC input

All measurements mentioned hereafter are carried out at a normal mains voltage (90 - 264 V_{AC} for the model with full range power supply, unless otherwise stated)

1.4 Observation Distance

1.4.1 Observation distance from eyes to panel is defined as 50cm
1.4.2 Visual distance from instrument to panel is defined as 20cm

1.5 Key Function Description

1.5.1 Control buttons on the front bezel

[AUTO]	A. When OSD un-displays, press [AUTO] to perform auto-adjustment B. When OSD displays, press [AUTO] to return to previous level menu C. When **"e Color OSD"** OSD displays, press **[AUTO]** to exit the OSD
[MENU]	A. When OSD isn't shown on screen, press [MENU] to enter OSD interface.The OSD **interface uses "ACER eColor Management" and "User" to instead "Contrast" and "Brightness" separately.When press "ACER eColor Management" to show "e Color OSD",and press "User" to show OSD interface before. The translations of "ACER eColor Management" and "User" are always English.** B. When OSD displays, press [MENU] to perform function of menu icon that is highlight or enter next level menu
[►], [◄]	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 **"Audio" OSD** and increase the volume, press [►] to show "**Audio**" OSD and decrease the volume .
[e Color]	A. When OSD un-displays, press **[e Color**] to show **"e Color OSD"**,and press again the OSD can not disappear,but the time of "e Color OSD"disappearing is reseted 10 second again. B.When OSD disappear not including **"e Color OSD",press [e Color**] to show **"e Color OSD" OSD,the OSD before disappears,but the parameters of it should be saved**
[POWER]	Power on or power off the monitor

1.5.2 Hot Key Operation

FUNCTION	HOT KEY OPERATION					DESCRIPTION
	AUTO	◄	►	MENU	POWER	
FACTORY MODE	●			●	ON	Press [AUTO] & [MENU] at the same time, and then press [POWER] for DC power on. OSD menu will be shown with "F" on the left top. Select "F" for entering factory mode.

1.6 Burn-in (Aging) Pattern

1.6.1 Burn-in patterns are: full Red, Green, Blue, White and Black
1.6.2 Stop burn-in pattern by providing with video signal from D-sub or DVI-D connector
1.6.3 Enter or exit burn-in mode by setting "burn-in" to be "on" or "off" in the factory mode

1.7 Warm Up

All test units have to be done warm up after at least 2 hours in a room with temperature of 40±5°C. (Except particular requirement)

2. INPUT SIGNAL

2.1 Video Signal Input

2.1.1 VESA Analog

The video input consists of red, green, and blue signals. The video signals are analog levels, where 0V corresponds to black and 700mV is the maximum signal amplitude. Input impedance of video pins is 75 ohm ±1%.

Sync signal input

The capability of sync signal inputs shall include separate sync. Input impedance: 2k2 ohms the signals are defined as follow:

Separate sync TTL level, Positive/Negative

2.1.2 Input signal mode

PRESET TEST MODE TIMING

VESA MODES							
Mode	Resolution	Total	Horizontal		Vertical		Nominal Pixel Clock (MHz)
			Nominal Frequency +/-0.5KHz	Sync Polarity	Nominal Frequency +/-1Hz	Sync Polarity	
VGA	640*480@60Hz	800*525	31.469	N	59.941	N	25.175
	640*480@72Hz	832*520	37.861	N	72.809	N	31.500
	640*480@75Hz	840*500	37.500	N	75.000	N	31.500
SVGA	800*600@56Hz	1024*625	35.156	P	56.250	P	36.000
	800*600@60Hz	1056*628	37.879	P	60.317	P	40.000
	800*600@72Hz	1040*666	48.077	P	72.188	P	50.000
	800*600@75Hz	1056*625	46.875	P	75.000	P	49.500
XGA	1024*768@60Hz	1344*806	48.363	N	60.004	N	65.000
	1024*768@70Hz	1328*806	56.476	N	70.069	N	75.000
	1024*768@75Hz	1312*800	60.023	P	75.029	P	78.750
	1152*864@75Hz	1600*900	67.500	P	75.000	P	108.000
	1280*960@60Hz	1800*1000	60.000	P	60.000	P	108.000

	1152*720@60Hz	1488*748	44.859	N	59.972	P	66.750
SXGA	1280*1024@60Hz	1688*1066	63.981	P	60.020	P	108.000
	1280*1024@75Hz	1688*1066	79.976	P	75.025	P	135.000
SXGA+	1400x1050@60Hz	1864*1089	65.317	N	59.978	N	121.75
UXGA	1600*1200@60Hz	2160*1250	75.000	P	60.000	P	162.000
WXGA	1360*768@60Hz	1792*795	47.712	P	60.015	P	85.5
WXGA+	1440*900(Red)@60Hz	1600*926	55.469	P	59.901	N	88.75
	1440*900@75Hz	1936*942	70.635	N	74.984	P	136.75
WSXGA+	1680*1050@60Hz	2240*1089	65.290	N	59.954	N	146.250
IBM MODES							
EGA	640*350@70Hz	800*449	31.469	P	70.087	N	25.175
	720x400@70Hz	900*449	31.469	N	70.087	P	28.322
MAC MODES							
VGA	640*480@66.7Hz	864*525	35.000	P	66.667	P	30.240
SVGA	832*624@75Hz	1152*667	49.725	N	74.550	N	57.283
XGA	1024*768@75Hz	1328*804	60.241	N	74.927	N	80.000
	1152*870@75Hz	1456*915	68.681	N	75.062	N	100.00
Other MODES							
XGA	1024*768@72Hz	1360*800	57.669	N	72.086	N	78.434
SXGA	1280*1024@70Hz	1696*1072	74.882	P	69.853	P	127.000

2.1.3 VGA signal cable

15 pin D-sub VGA connector of signal cable.

2.1.4 Interface

Analog signal: The input signals are applied to display through D-sub cable.
Length: 1.8 m +/- 50 mm (fixed)
Connector type: D-sub male.
With DDC_2B pin assignments.
Blue connector thumb-operated jack screws

Pin Assignment:

PIN No.	SIGNAL	PIN No.	SIGNAL
1	Red video input	9	VGA +5V
2	Green video input	10	Cable detect
3	Blue video input	11	GND
4	GND	12	Serial data line (SDA)
5	Cable detect	13	H. Sync / H+V
6	Red video GND	14	V. Sync
7	Green video GND	15	Data clock line (SCL)
8	Blue video GND		

3. FUNCTION CHECK

3.1 OSD Function Test

3.1.1 Test mode: 1680x1050 @ 60 Hz

3.1.2 Test pattern: pattern #1 of crosshatch (GENERAL-1)

3.1.3 Check single key function and hot key function about key “Power”, “Menu”,” ►”, “◄ “, “Exit/Auto”, it should operate normally

3.2 Screen Picture Check

3.2.1 Test mode: 1680x1050 @ 60 Hz

3.2.2 Test pattern: pattern #1 of crosshatch (GENERAL-1)

3.2.3 Select OSD menu to execute 'Auto' function, screen picture shouldn't appear abnormal phenomenon and picture on screen should fit in with active display screen.

3.3 Auto Color Balance

3.3.1 Test mode: 640x480 @ 60 Hz

3.3.2 Test pattern: pattern #42 of 5-MOSAIC

3.3.3 Enter "Factory Mode" pressing "Auto color" key, and execute "AUTO".

3.4 Timing Check

3.4.1 Test mode: Refer to preset timing table and power saving mode

3.4.2 Test pattern: pattern #1 of crosshatch (GENERAL-1)

3.4.3 After change above timing and execute "Auto" function automatically, picture should fit in with active display screen.

3.4.4 Under power saving mode, LED lamp on the key board should be orange

3.5 Power Consumption Function Test

3.5.1 Test mode: 1680x1050 @ 60 Hz

3.5.2 Test pattern: pattern #41 of "WHITE"

3.5.3 Adjusting both brightness value to maximum,

3.5.4 Measure power consumption as the following

Status	Power Consumption	LED Display
Normal	< 45W(with audio)	Green
Standby (No H/V sync)	< 2W	Orange
Power off	< 1W	No display

3.6 VGA Cable Detect Test

If VGA cable of LCD monitor isn't connected to video pattern generator or PC, "NO SIGNAL" should be shown on screen.

3.7 Hi-Pot test

Test condition:

a. high voltage 2.3KV(DC)

b. leakage current 10mA

c. rising time 1 sec.

d. test time 3 sec.

3.8 Grounding Test

Test condition:

a. test current 30A / 2 sec

b. impedance < 0.1Ω

3.9 Bumping Test

3.9.1 Test mode: 1680x1050 @ 60 Hz;

3.9.2 Test pattern: pattern #1 of crosshatch (GENERAL-1)

3.9.3 To shock LCD monitor lightly at the center of rear cover and edges with 1~2kg/cm2 force for three times, no abnormal phenomenon is found on panel screen.

4. DISPLAY CHECK

4.1 Panel Flicker Check

Connect LCD monitor to PC, set LCD monitor to be timing of 1680x1050@60 Hz, adjust brightness to be default value (brightness at maximum), execute "Auto" function, and then check picture of shut down

under windows 98 operating system, or flicker-pattern of pixel on-off. It should be that no flicker be found on panel screen.

4.2 Panel Defect Inspection

4.2.1 Test mode: 1680x1050@60Hz

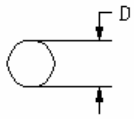
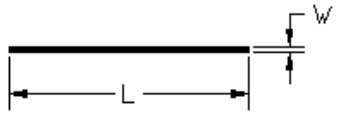
4.2.2 Test pattern: Crosshatch/Full white/Red/Green/Blue/Black/16 color bar/64 gray bars

4.2.3 Display quality must be (according to DIN 13406-2 pixel fault class II)

Defect Type	Specification	Major	Minor
Bright dot defect	THD		□
Dark dot defect	THD		□
Total bright and dark dots	THD		□
Bright Dots – 2 Adjacent B	THD		□
Bright Dots – 3 or more Adjacent	THD		□
Black Dots – 2 Adjacent B	THD		□
Black Dots – 3 or more Adjacent	THD		□
Distance between defect dots	THD		□
Distance between Dark dots	THD		□

Note 1: Dot defect is defined as the defective area is not larger than 50% of the dot area. Bright Dot is defined 5% transmission ND filter.

Note 2: Light Leakage: There shall not be visible light around the customer's bezel after assembly in normal View angle.

Defect Type		Specification Size	Count (N)	Major	Minor
Dot Shape(Particle□Scratch and Bubbles in Display area or on The Polarizer) 		Black spots which appear when B/L operating 0.15mm ≤ D ≤ 0. 5 mm	N ≤ 3		●
Line Shape (Particles□Scratch□Fiber and Bubbles in display area or on The Polarizer) 		L ≤ 0.5mm and W ≤ 0.05 mm	Ignored		
		0.5mm < L ≤ 5mm and 0.05mm < W ≤ 0.1mm	N ≤4		●
		L > 5mm or W > 0.1mm	N = 0		
Display non-uniformity		There should be non-uniformity through 5% transparency of filter or judge by limit sample if necessary.			●
Bezel	Scratch	No harm			●
	Dirt				●
	Wrap	No harm			●
	Sunken	No harm			●
Label	No label	No			●
	Invert label				●
	Broken				●
	Dirt	Word can be read.			●
	Not clear				●
	Word out of				●
	Mistake	No			●
	Position	Be attached on right position			●
Screw	Not enough	No			●
	Limp	No			●
Connecto	Connection	No bend on pins and damage			●
FPC/FFC	Broken	No			●

5. PICTURE CHECK

5.1 Check brightness uniformity

5.1.1 Test mode: 1680x1050 @ 60 Hz
5.1.2 Test pattern: pattern #41 of “WHITE”
5.1.3 Test tool: Color Analyzer Chroma7120

5.1.4 Set brightness and contrast to be maximum, apply pattern as Fig.3, it should be the following requirement:

$$\frac{\text{Min. luminance of nine points (backlight)}}{\text{Max. luminance of nine points (backlight)}} \geq 75\%$$

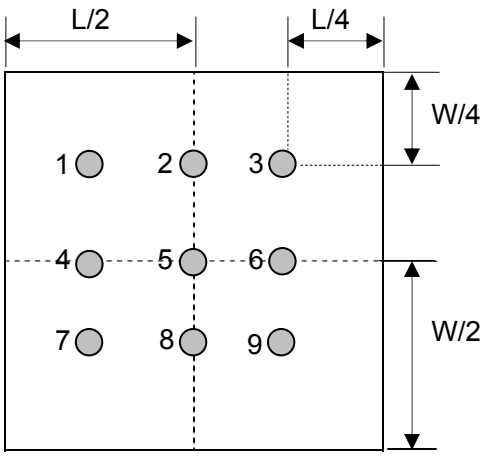


Fig. 3

5.2 Color Temperature Check

5.2.1 Test mode: 1680x1050 @ 60 Hz
5.2.2 Test pattern: pattern #41 of "WHITE"
5.2.3 Test tool: Color Analyzer Chroma7120
5.2.4 Set brightness to be maximum and contrast to be 50%, measure color coordinate and luminance by color analyzer as the following:

Mode	Chromaticity Coordinate	
	x	y
9300K	0.283 ± 0.030	0.298 ± 0.030
USER	/	/
6500K	0.313 ± 0.030	0.329 ± 0.030

5.3 Brightness Out (Video signal input 700mV ± 2%)

5.3.1 Test mode: 1680x1050 @ 60 Hz
5.3.2 Test pattern: pattern #41 of "WHITE"
5.3.3 Test tool: Color Analyzer Chroma7120
Set brightness and contrast to be maximum with white pattern, to measure the screen center, the light output shall be >= BL cd/m^2

Mode	BL (cd/cm^2)	Remark
MT170EN01 V7	300	TYP

5.4 DDC Data Check

5.4.1 EDID program
5.4.2 Execute main program for EDID writing (refer to model type), using scanner for barcode download.
5.4.3 If writing EEPROM is successful, and then shows text "PASS" on screen; if writing EEPROM is failure, then shows text "FAIL".

5.4.4 EDID data: (For example)

P223 Analog

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	04	72	0D	00	00	00	00	00
1	00	00	01	03	08	2F	1E	78	EA	DE	95	A3	54	4C	99	26
2	0F	50	54	BF	EF	90	A9	40	71	4F	81	40	8B	C0	95	00
3	95	0F	90	40	01	01	21	39	90	30	62	1A	27	40	68	B0
4	36	00	DA	28	11	00	00	19	00	00	00	FD	00	38	4D	1F
5	54	11	00	0A	20	20	20	20	20	20	00	00	00	FF	00	30
6	30	30	30	30	30	30	30	30	30	30	30	0A	00	00	00	FC
7	00	50	32	32	33	57	0A	20	20	20	20	20	20	20	00	EE

P223 DVI

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	04	72	0D	00	00	00	00	00
1	00	00	01	03	80	2F	1E	78	EA	DE	95	A3	54	4C	99	26
2	0F	50	54	BF	EF	90	A9	40	71	4F	81	40	8B	C0	95	00
3	95	0F	90	40	01	01	21	39	90	30	62	1A	27	40	68	B0
4	36	00	DA	28	11	00	00	19	00	00	00	FD	00	38	4D	1F
5	54	11	00	0A	20	20	20	20	20	20	00	00	00	FF	00	30
6	30	30	30	30	30	30	30	30	30	30	30	0A	00	00	00	FC
7	00	50	32	32	33	57	0A	20	20	20	20	20	20	20	00	EE

6. AUDIO CHECK

6.1 Audio Sound Check

6.1.1.1. Apply audio source of test program, (1)voice ”LEFT” and “RIGHT” ;(2)500mVrms sine wave that sweep from 200Hz to 20 KHz, into audio input (light blue), it should be that L speaker sounds while “LEFT” and R speaker sounds while “RIGHT”

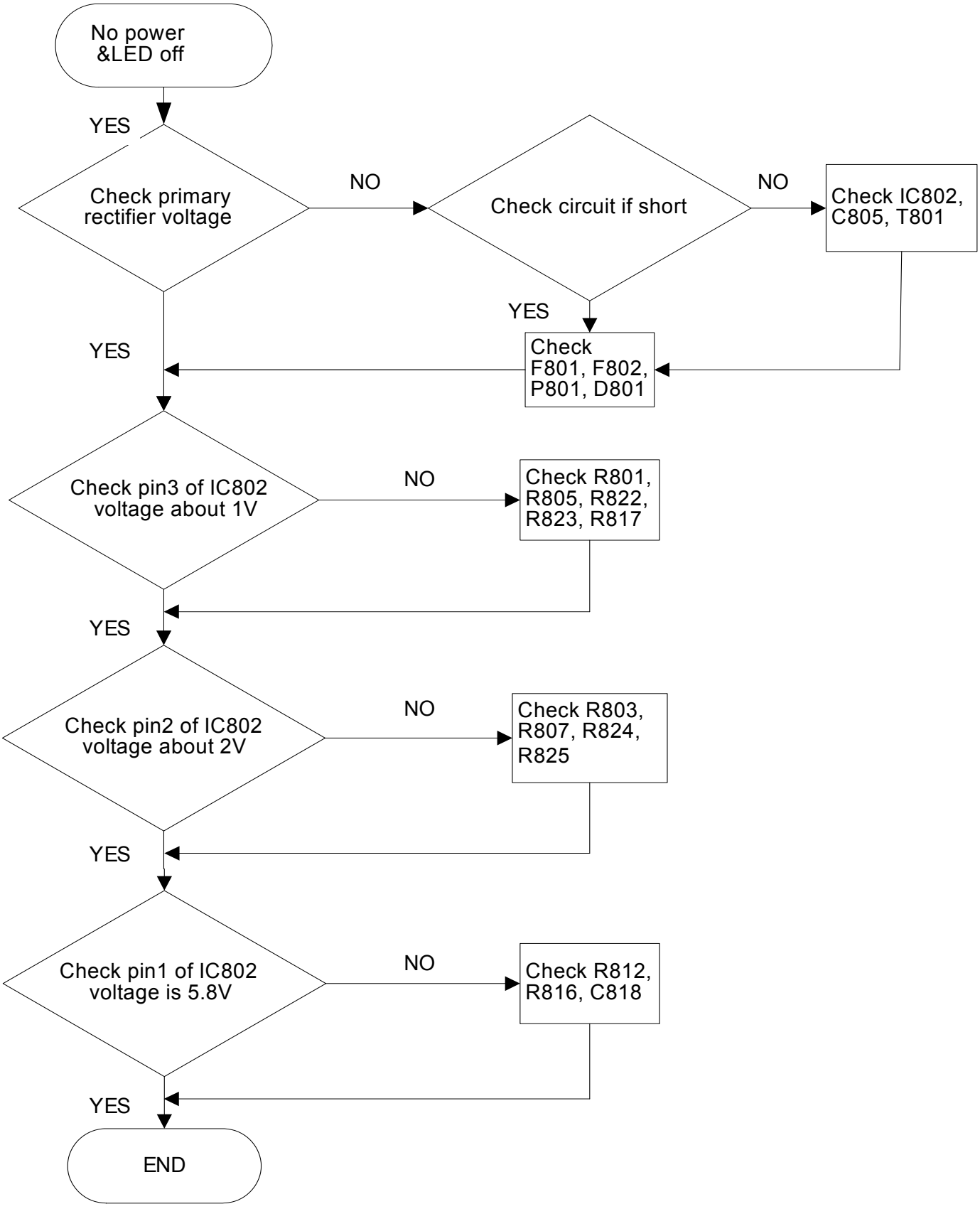
6.1.1.2. Set the volume control (on OSD) at max (100%). It should be that no buzz or rattling sound occurs over the sweep frequency range.

6.2 Audio control test

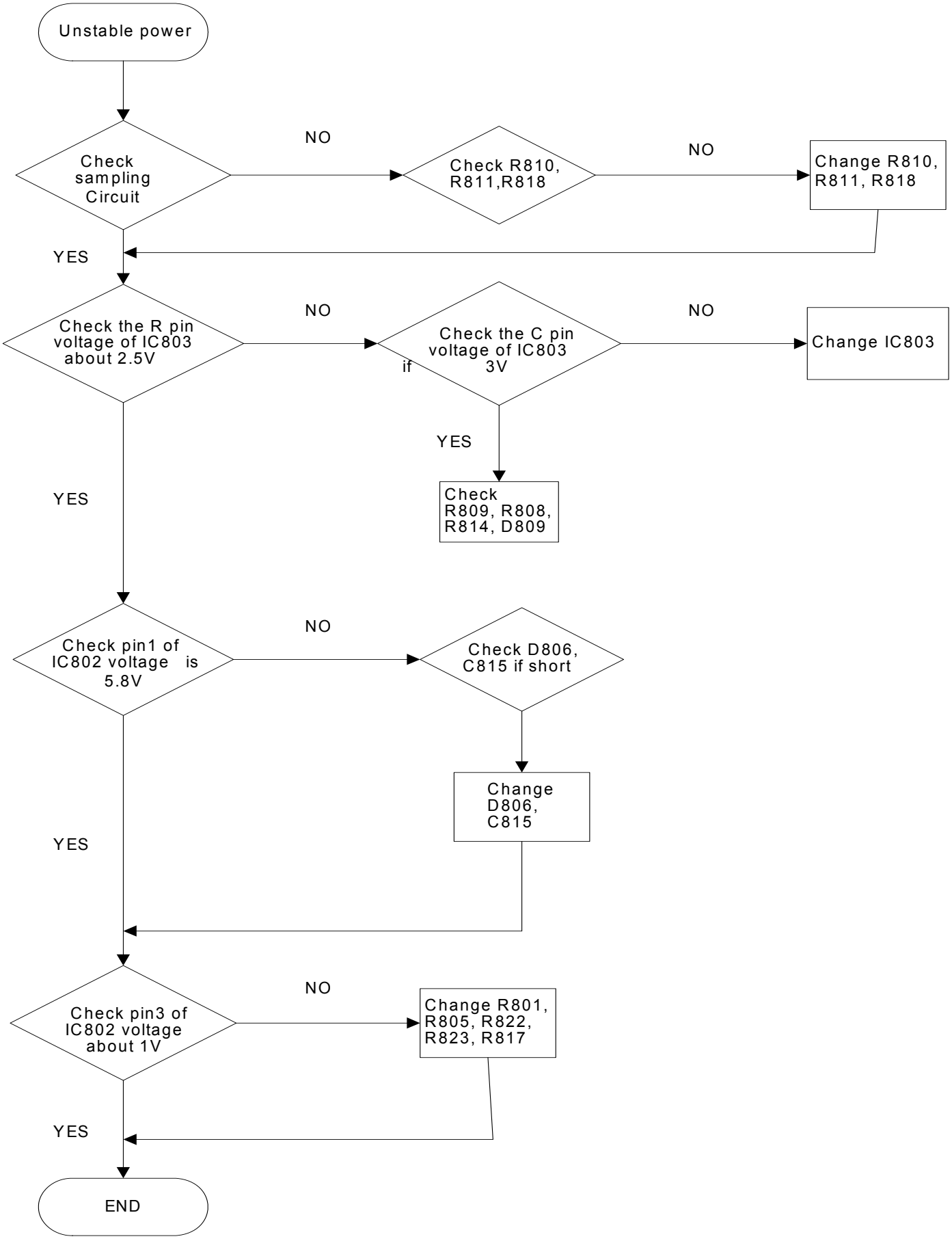
6.2.1.1 When OSD is not on screen, press key ” ►”or “◄ “, volume adjustment bar appears on screen and value will grow or decrease and sound volume of speakers should be changed.
If the functional test had been passed, adjust volume bar to be at 90% before exit OSD.
After inspection, set the audio control out of OSD.

Chapter 6- TROUBLE SHOOTING

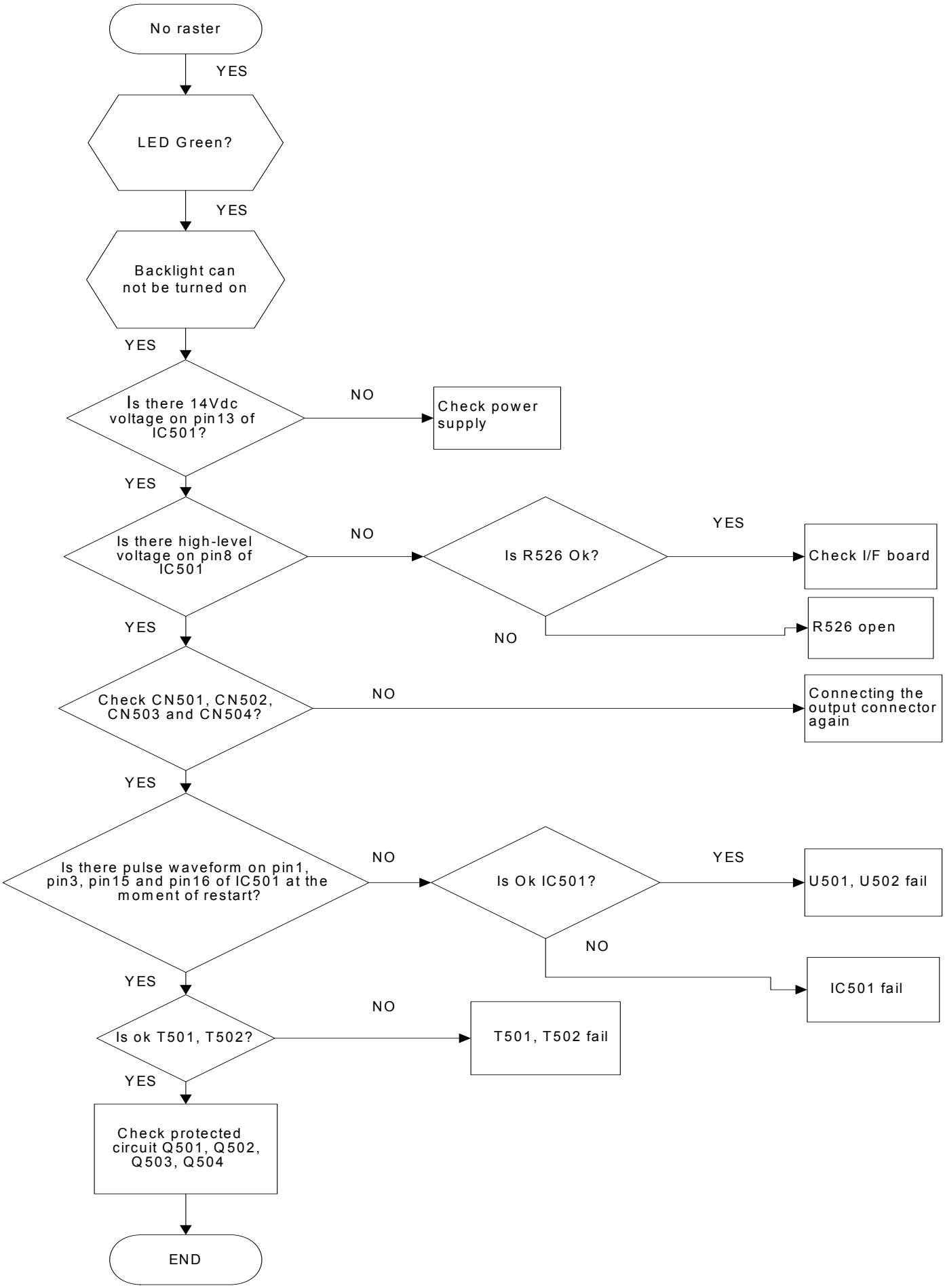
1. No Power & LED Off



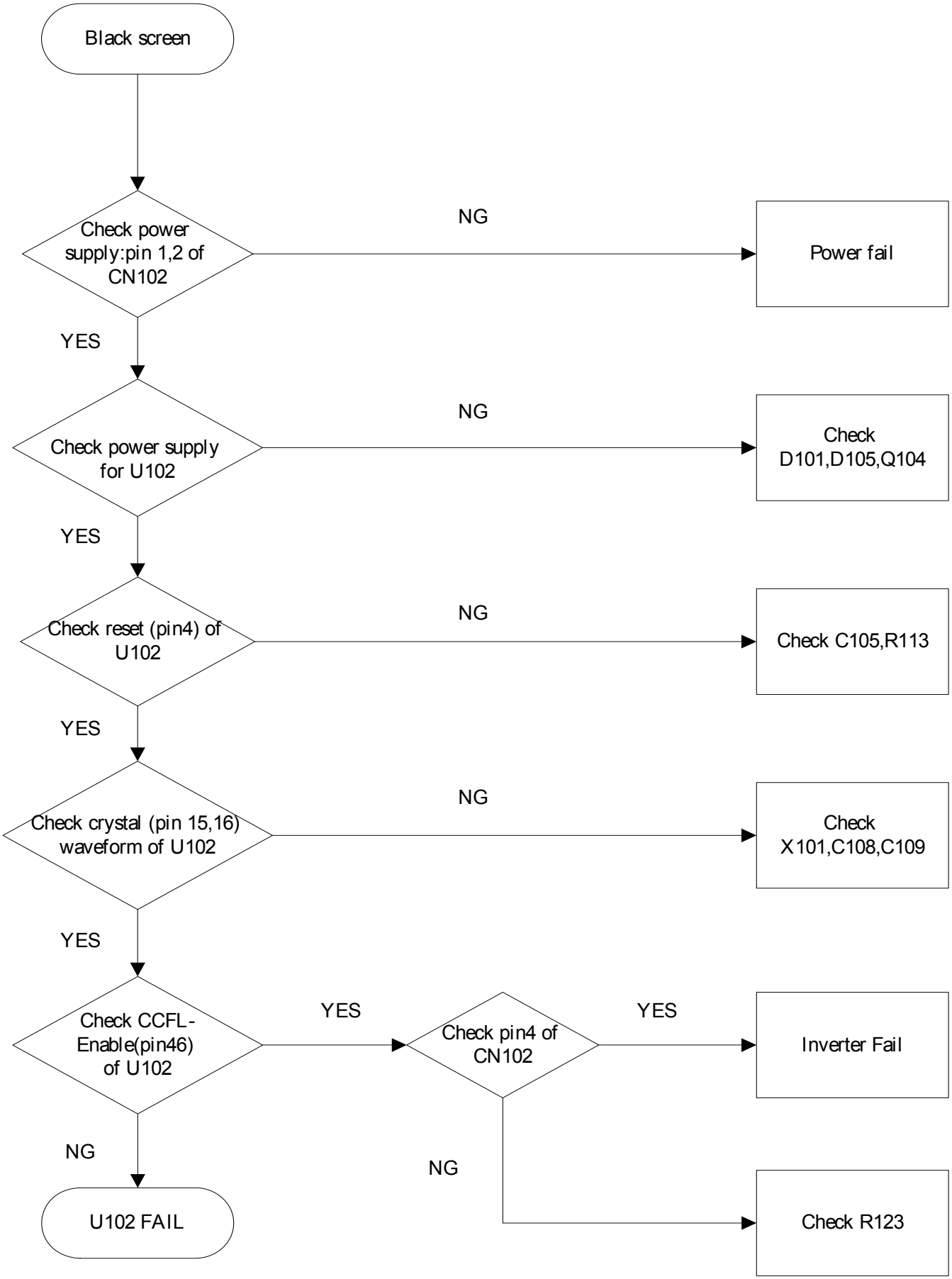
2. Unstable Power



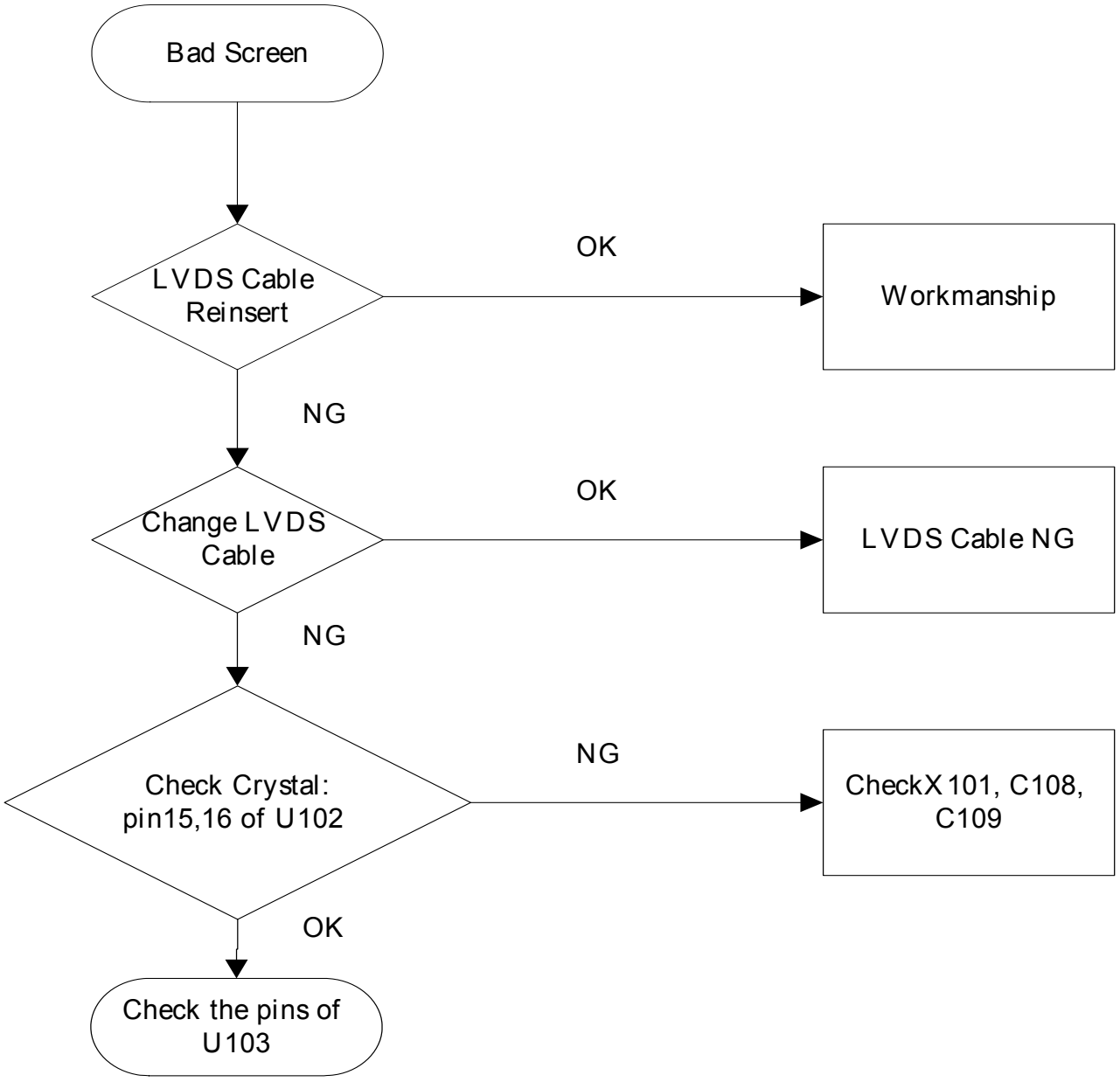
3. No raster


No raster
YES
LED Green?
YES
Backlight can not be turned on
YES
Is there 14Vdc voltage on pin13 of IC501?
NO
Check power supply
YES
Is there high-level voltage on pin8 of IC501
NO
Is R526 Ok?
YES
Check I/F board
NO
R526 open
YES
Check CN501, CN502, CN503 and CN504?
NO
Connecting the output connector again
YES
Is there pulse waveform on pin1, pin3, pin15 and pin16 of IC501 at the moment of restart?
NO
Is Ok IC501?
YES
U501, U502 fail
NO
IC501 fail
YES
Is ok T501, T502?
NO
T501, T502 fail
YES
Check protected circuit Q501, Q502, Q503, Q504
END

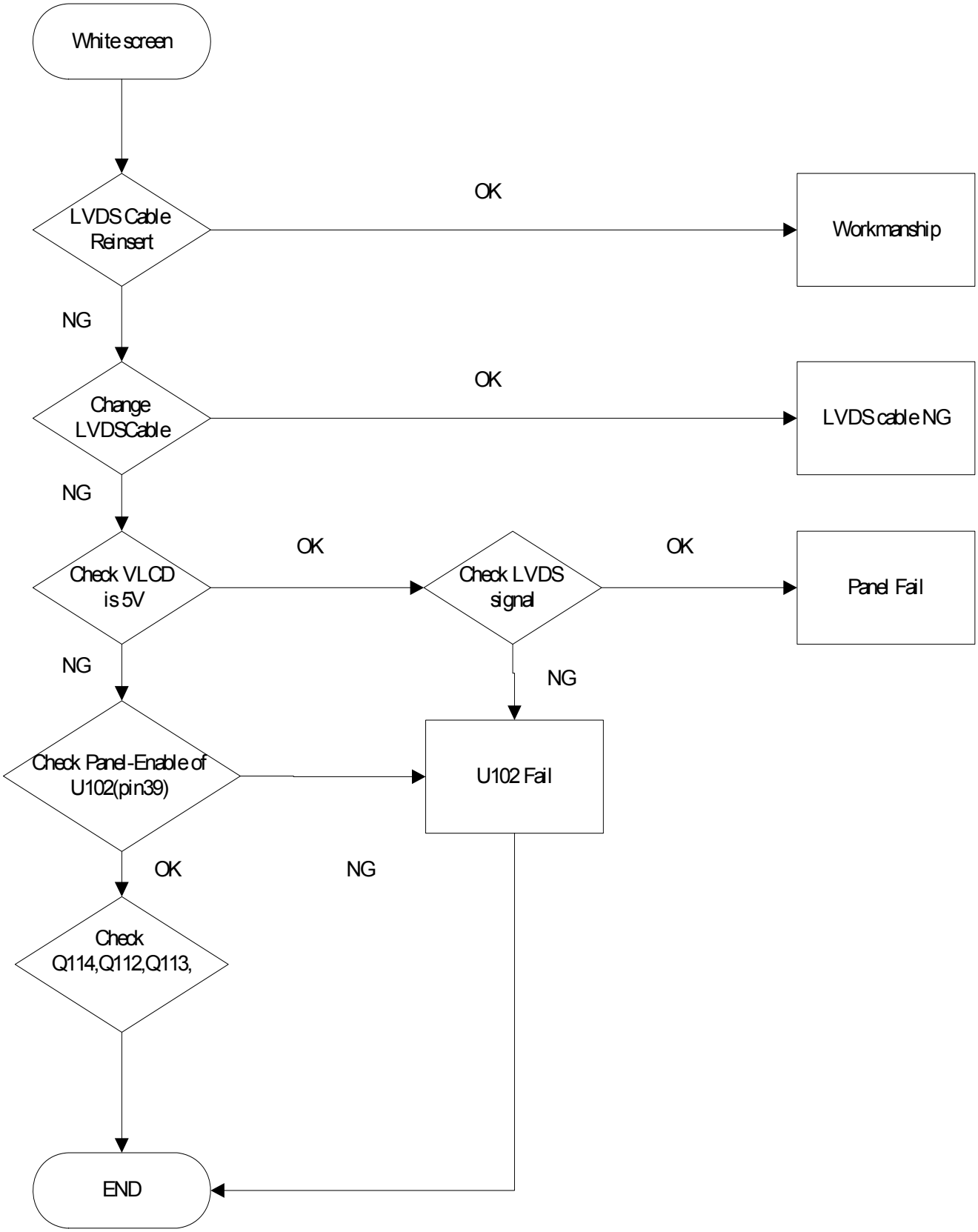
4. Black screen



5. Bad Screen


Bad Screen
LVDS Cable Reinsert
OK
Workmanship
NG
Change LVDS Cable
OK
LVDS Cable NG
NG
Check Crystal: pin15,16 of U102
NG
CheckX101, C108, C109
OK
Check the pins of U103

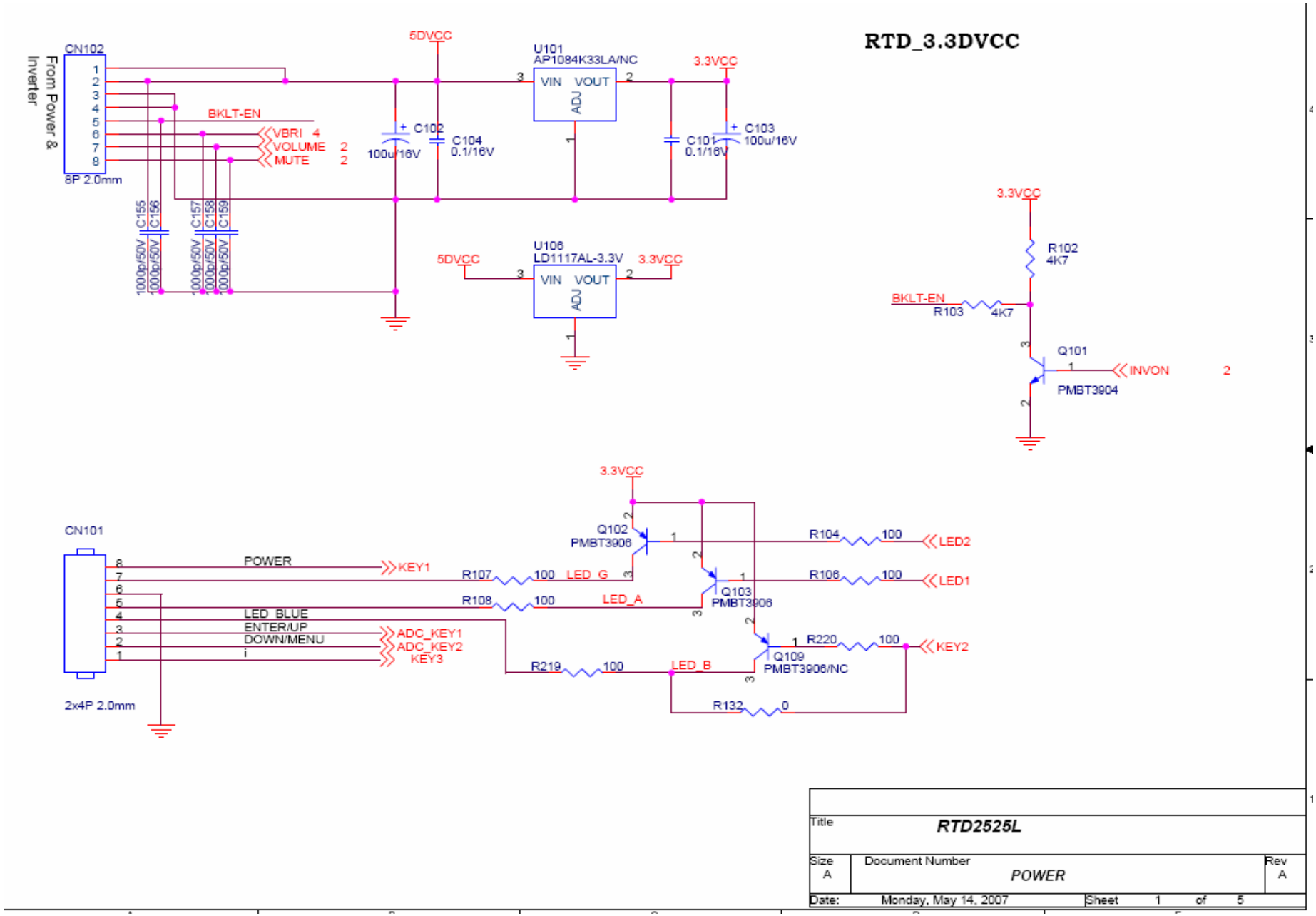
6. White screen

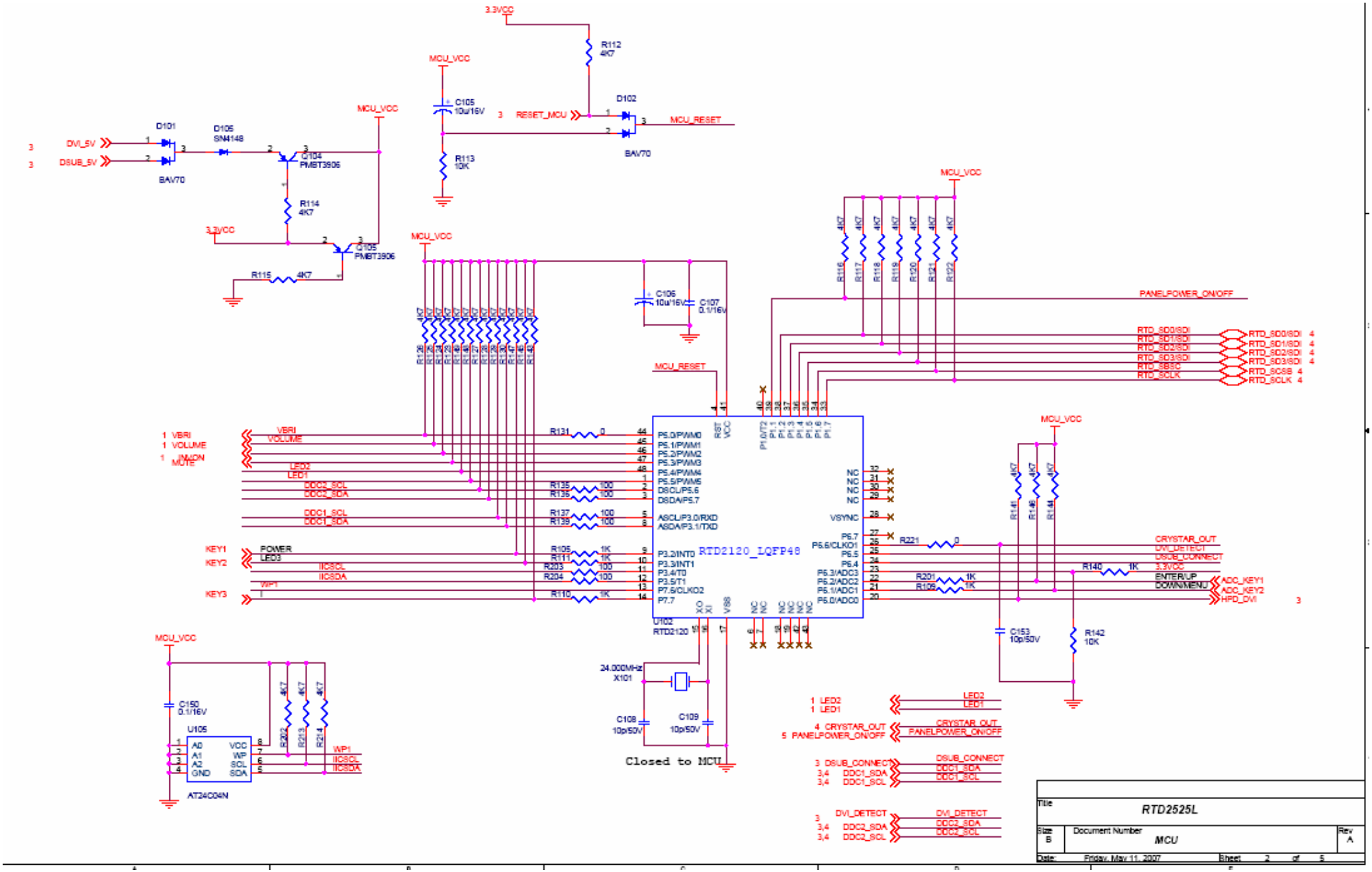


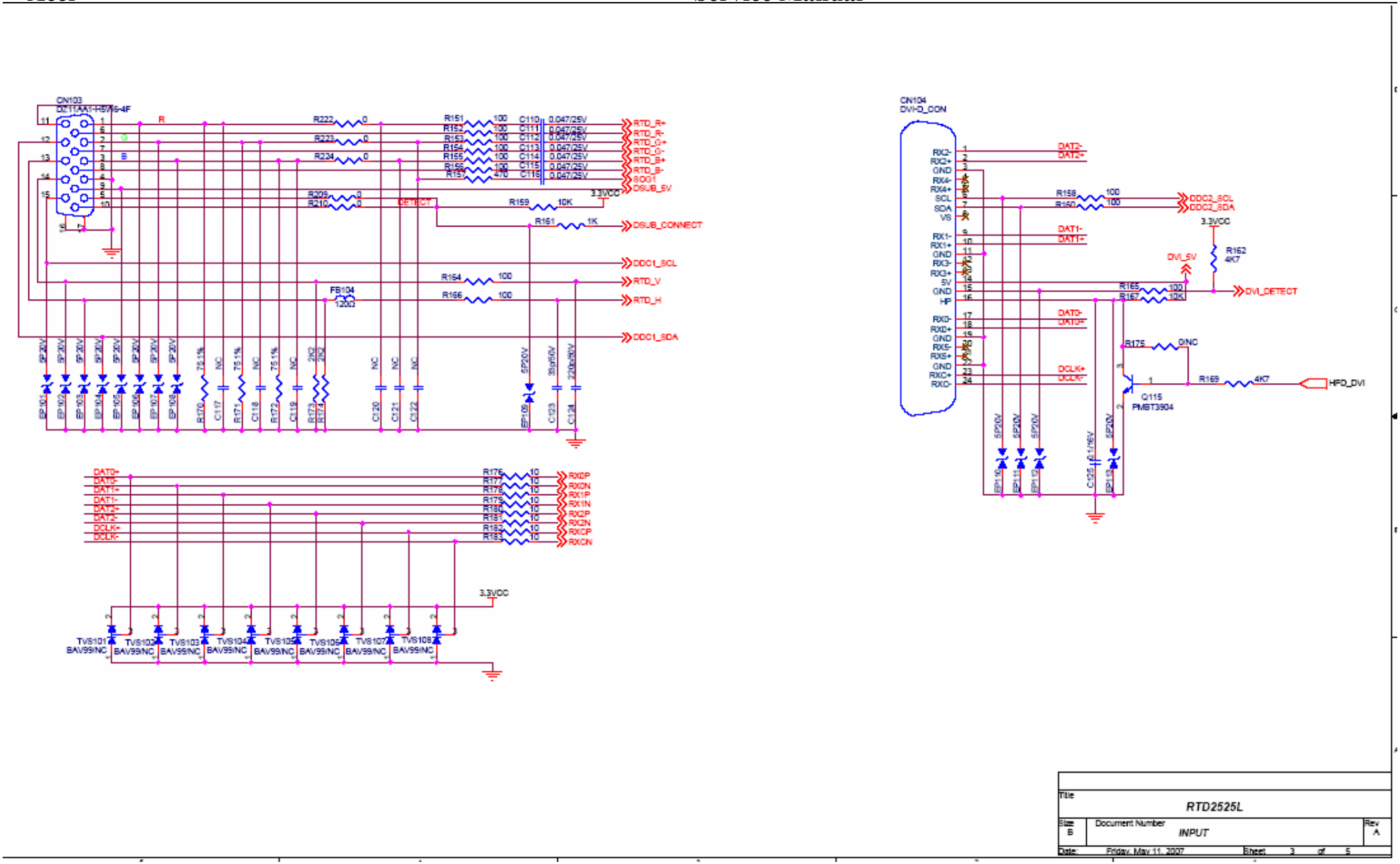
Attachment 1- Bill of Material

OEM PART NO	DESCRIPTION	UNIT PRICE (US$) FOB HK	ET.LAW0C.014	ET.LAV0C.001
790051300600R	PCBA,I/F BOARD(V1,EMEA),LE2284-612 W/SPK	9.45	1	1
790051500000R	PCBA,KEYPAD BOARD,LE2284-X12 ROHS	1.31	1	1
790921400600R	PCBA,P/I BOARD,LE2262-612 ROHS	23.52	1	1
430303001200R	HRN LVDS FFC 30P 158mm RoHS	1.02	1	1
430300801350R	HRN ASS'Y 8P 193mm UL1571#28 ROHS	0.42	1	1
453070800210R	PWR CORD 16A/250V BLK 6FT VDE H05VV-F 3G	2.11	1	1
453030300120R	CABLE AUDIO 1P 6FT BLACK/GREEN CP03B06P0	0.76	1	1
453010100310R	CABLE D-SUB 15P MALE 6FT BLACK/BLUE ROH	2.60	1	1
453030300180R	CABLE DVI-D 18+1P MALE 6FT PC99(BLACK)SA	4.43	1	1
714030011700R	ASSY,FRONT BEZEL,LE2284	4.94	1	1
714030011800R	ASSY,FRONT BEZEL,LE2291	4.94	1	1
714070011500R	ASSY,STAND, LE2284	11.57	1	1
714020009800R	ASSY,BASE, LE2284	5.44	1	1
631102220131R	LCP 22"MT220WW01-V1-G1,AM2200001101(INNO	200.00	1	0
631102220091R	LCP 22"MT220WW01-V0-G1,AM2200001001(INNO	200.00	0	1

Attachment 2- Schematic




3.3VCC
MCU_VCC
R112 4K7
C105 10u/16V
RESET_MCU
D102
MCU_RESET
BAV70
R113 10K
D101
D105 SN4148
DVI_5V
DSUB_5V
BAV70
Q104 PMBT3906
R114 4K7
Q105 PMBT3906
R115 4K7
C106 10u/16V
C107 0.1/16V
PANELPOWER_ON/OFF
RTD_SD0/SDI
RTD_SD1/SDI
RTD_SD2/SDI
RTD_SD3/SDI
RTD_SBSC
RTD_SCLK
RTD_SCSB
VBRI
VOLUME
MUTE
LED2
LED1
DDC2_SCL
DDC2_SDA
DDC1_SCL
DDC1_SDA
KEY1
KEY2
KEY3
POWER
LED3
IICSCL
IICSDA
WP1
R131 0
R135 100
R136 100
R137 100
R139 100
R105 1K
R111 1K
R203 100
R204 100
R110 1K
RST
VCC
P5.0/PWM0
P5.1/PWM1
P5.2/PWM2
P5.3/PWM3
P5.4/PWM4
P5.5/PWM5
DSCL/P5.6
DSDA/P5.7
ASCL/P3.0/RXD
ASDA/P3.1/TXD
P3.2/INT0
P3.3/INT1
P3.4/T0
P3.5/T1
P7.5/CLKO2
P7.7
RTD2120_LQFP48
NC
VSYNC
P5.7
P5.6/CLKO1
P5.5
P5.4
P5.3/ADC3
P5.2/ADC2
P5.1/ADC1
P5.0/ADC0
R221 0
R140 1K
R201 1K
R106 1K
CRYSTAR_OUT
DVI_DETECT
DSUB_CONNECT
3.3VCC
ENTER/UP
DOWN/MENU
ADC_KEY1
ADC_KEY2
HPD_DVI
C153 10p/50V
R142 10K
U102
RTD2120
24.000MHz
X101
C108 10p/50V
C109 10p/50V
Closed to MCU
C150 0.1/16V
U105
A0
A1
A2
GND
VCC
WP
SCL
SDA
AT24C04N
R202 4K7
R213 4K7
R214 4K7
LED2
CRYSTAR_OUT
PANELPOWER_ON/OFF
DSUB_CONNECT
DDC1_SDA
DDC1_SCL
DVI_DETECT
DDC2_SDA
DDC2_SCL
Title
RTD2525L
Size B
Document Number
MCU
Rev A
Date: Friday, May 11, 2007
Sheet 2 of 5


CN103
DZ11AAT-H5W6-4F
R222 0
R223 0
R224 0
R151 100
R152 100
R153 100
R154 100
R155 100
R156 100
R157 470
C110 0.047/25V
C111 0.047/25V
C112 0.047/25V
C113 0.047/25V
C114 0.047/25V
C115 0.047/25V
C116 0.047/25V
RTD_R+
RTD_R-
RTD_G+
RTD_G-
RTD_B+
RTD_B-
SOG1
DSUB_5V
R205 0
R210 0
DETECT
3.3VDD
R159 10K
R161 1K
DSUB_CONNECT
DDC1_SCL
R164 100
R166 100
RTD_V
RTD_H
FB104
1206Ω
DDC1_SDA
EP101 5P20V
EP102 5P20V
EP103 5P20V
EP104 5P20V
EP105 5P20V
EP106 5P20V
EP107 5P20V
EP108 5P20V
R170 75.1%
C117 NC
R171 75.1%
C118 NC
R172 75.1%
C119 NC
R173 2K2
R174 2K2
C120 NC
C121 NC
C122 NC
EP109 5P20V
C123 39pF/50V
C124 220p/50V
DAT0+
DAT0-
DAT1+
DAT1-
DAT2+
DAT2-
DCLK+
DCLK-
R176 10
R177 10
R178 10
R179 10
R180 10
R181 10
R182 10
R183 10
RX0P
RX0N
RX1P
RX1N
RX2P
RX2N
RXCP
RXCN
3.3VDD
TVS101 BAV99/NC
TVS102 BAV99/NC
TVS103 BAV99/NC
TVS104 BAV99/NC
TVS105 BAV99/NC
TVS106 BAV99/NC
TVS107 BAV99/NC
TVS108 BAV99/NC
CN104
DVI-D_CON
RX2-
RX2+
GND
RX4-
RX4+
SCL
SDA
VS
RX1-
RX1+
GND
RX3-
RX3+
5V
GND
HP
RX0-
RX0+
GND
RX5-
RX5+
GND
RXC+
RXC-
DAT2-
DAT2+
DAT1-
DAT1+
DAT0-
DAT0+
DCLK+
DCLK-
R158 100
R160 100
DDC2_SCL
DDC2_SDA
3.3VDD
R162 4K7
DVI_5V
R165 100
R167 10K
DVI_DETECT
R175 0/NC
R169 4K7
HPD_DVI
Q115
PMBT3904
EP110 5P20V
EP111 5P20V
EP112 5P20V
C125 0.1/16V
EP113 5P20V
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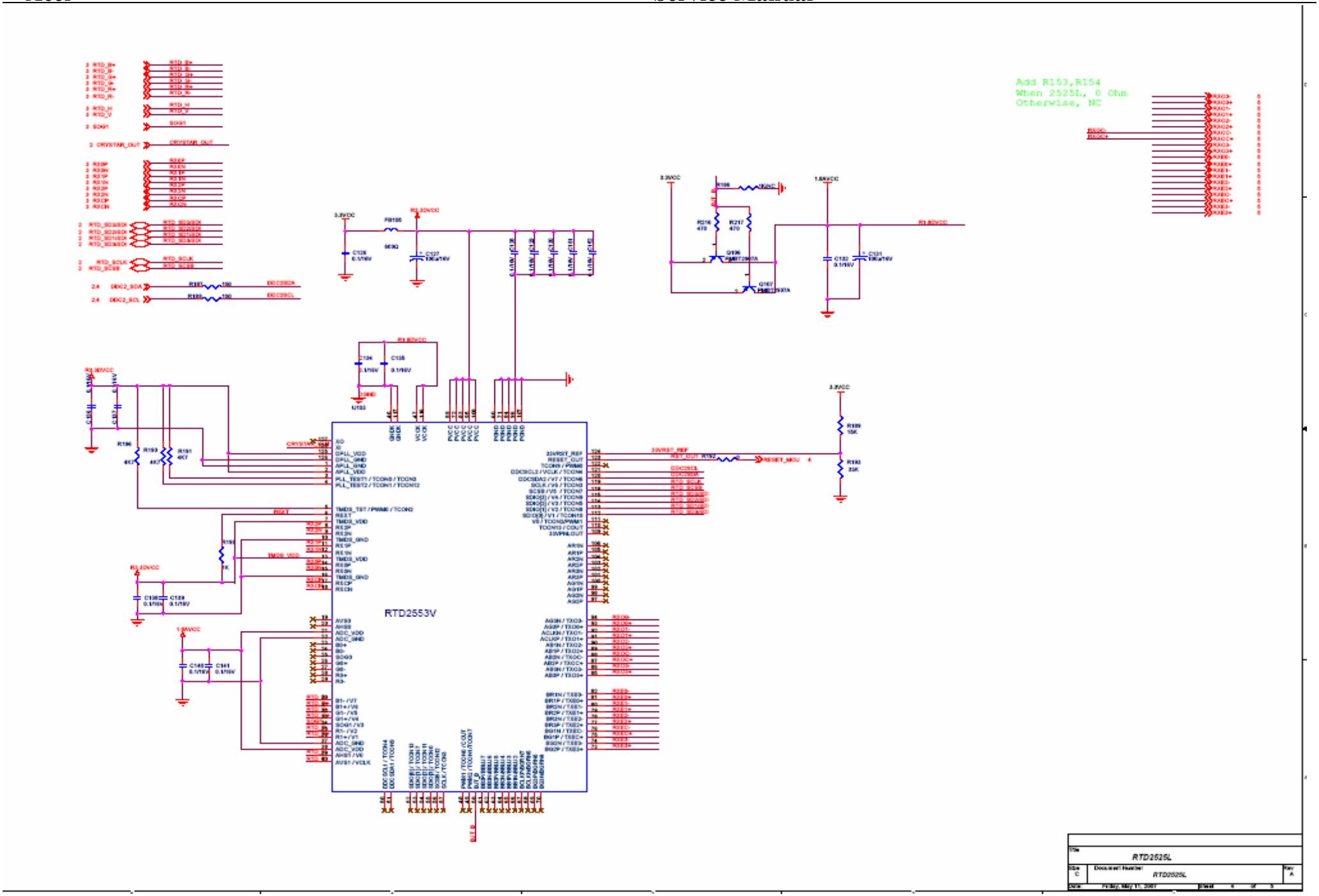
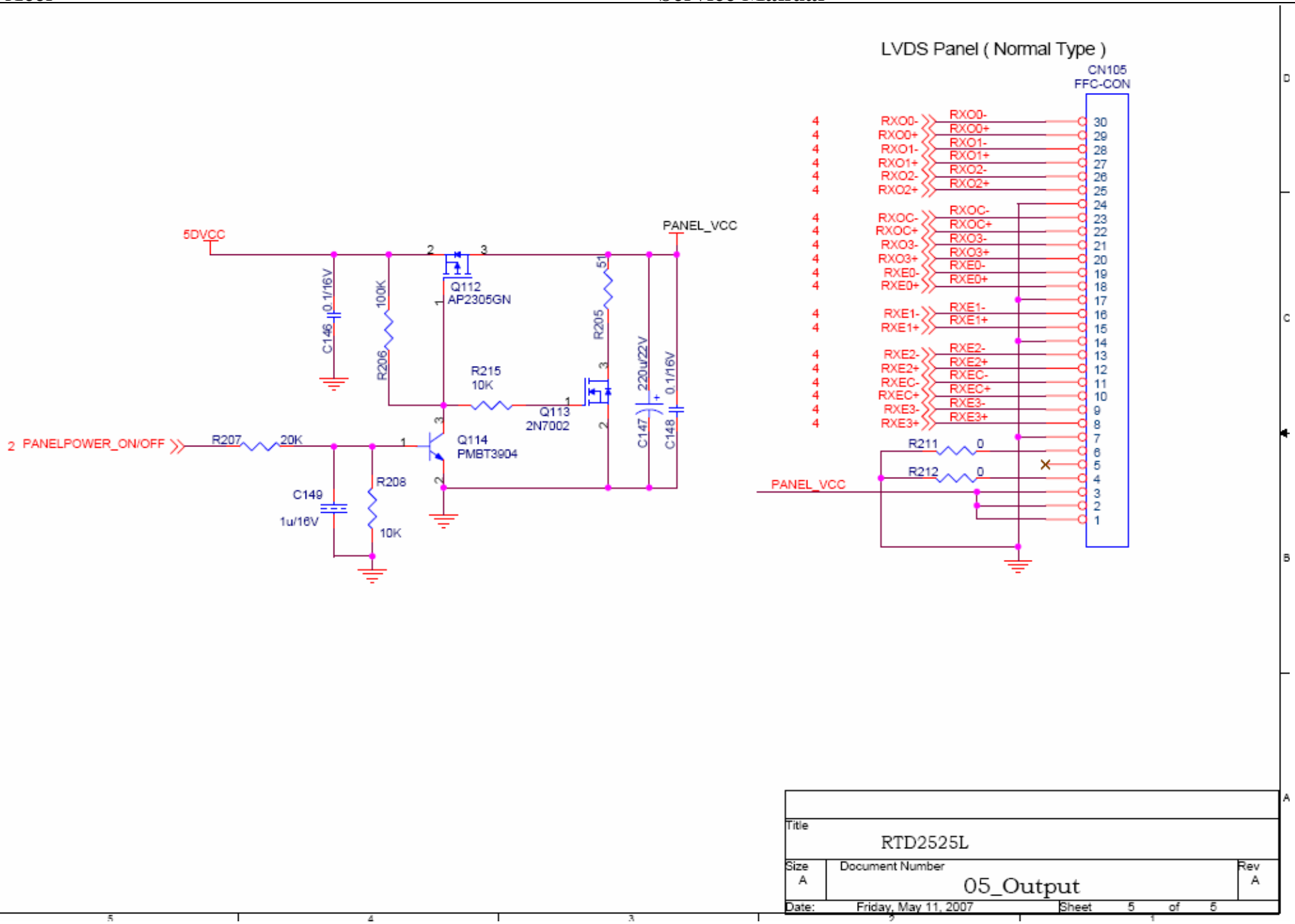
RTD2525L
Size B
Document Number
INPUT
Rev A
Date: Friday, May 11, 2007
Sheet 3 of 5


Add R153,R154
When 2525L, 0 Ohm
Otherwise, NC
RTD2553V
RTD2525L


LVDS Panel (Normal Type)
CN105
FFC-CON
5DVCC
PANEL_VCC
Q112
AP2305GN
Q113
2N7002
Q114
PMBT3904
R205
R206
R207
R208
R211
R212
R215
10K
20K
100K
51
0
C146
0.1/16V
C147
220u/22V
C148
0.1/16V
C149
1u/16V
2 PANELPOWER_ON/OFF
PANEL_VCC
RXO0-
RXO0+
RXO1-
RXO1+
RXO2-
RXO2+
RXOC-
RXOC+
RXO3-
RXO3+
RXE0-
RXE0+
RXE1-
RXE1+
RXE2-
RXE2+
RXEC-
RXEC+
RXE3-
RXE3+
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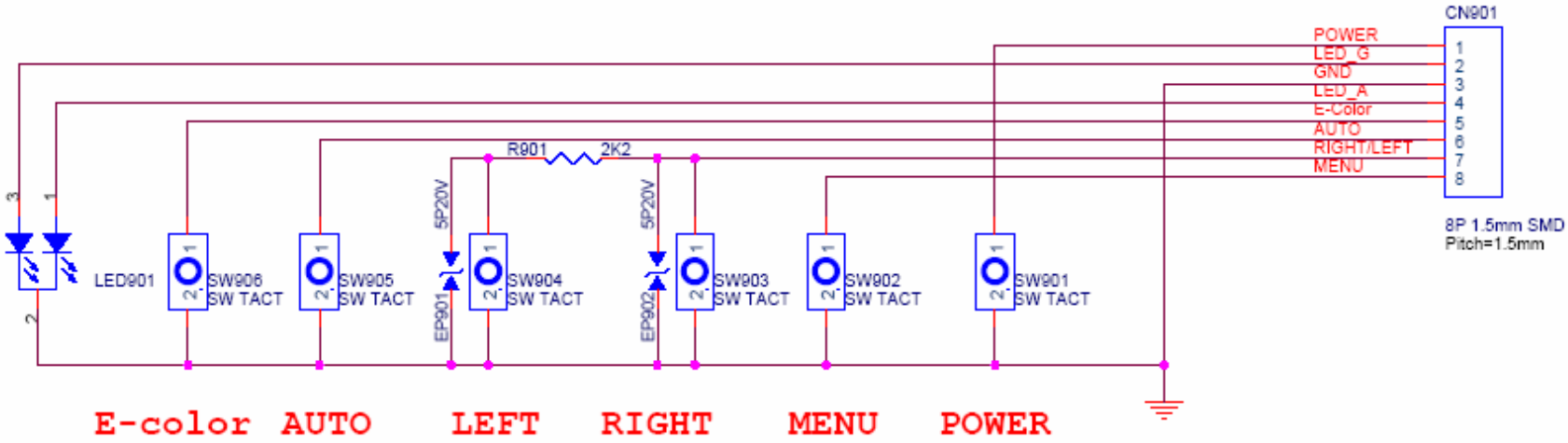
Size
A
Document Number
05_Output
Rev
A
Date:
Friday, May 11, 2007
Sheet
5
of
5



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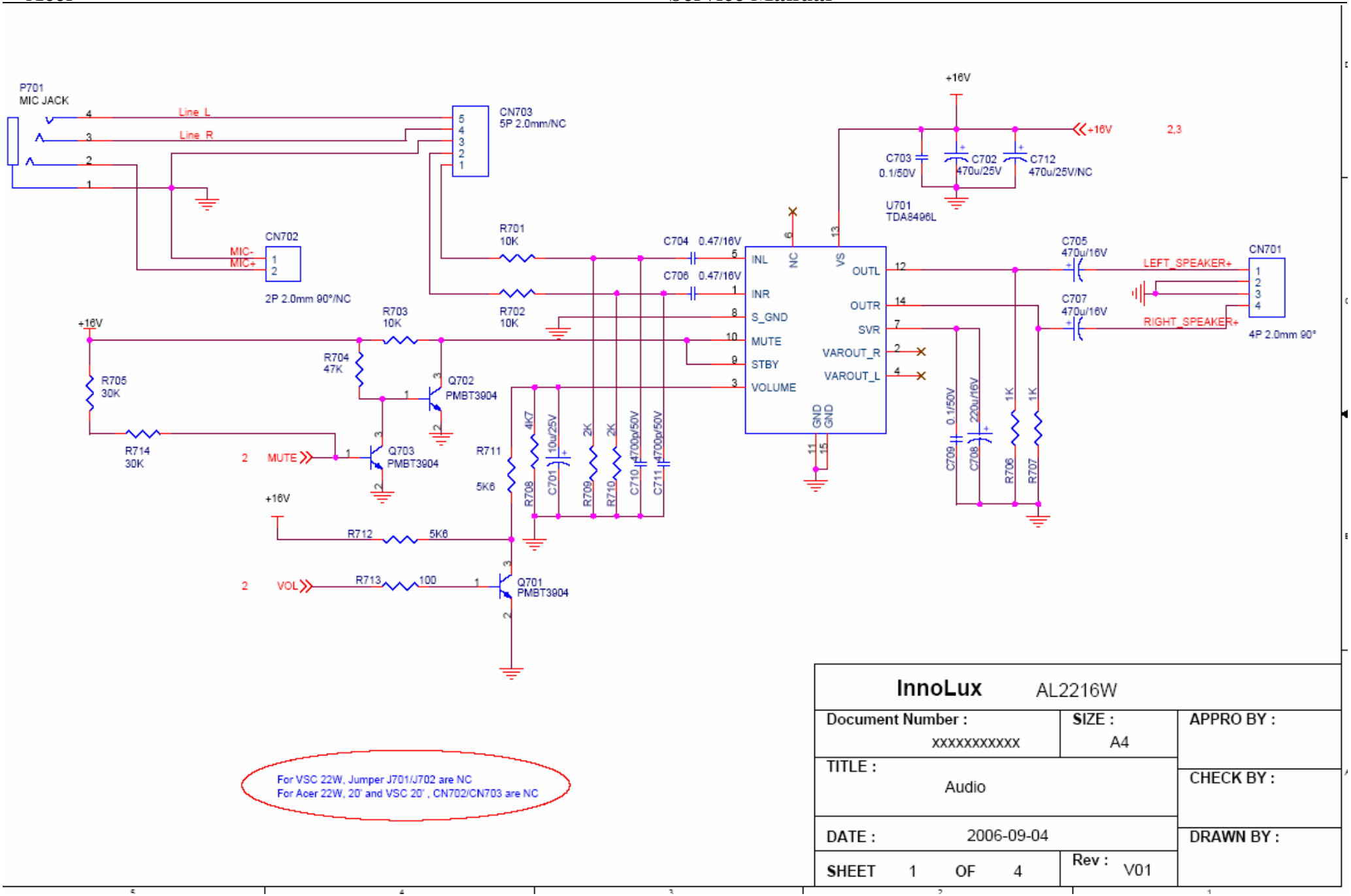
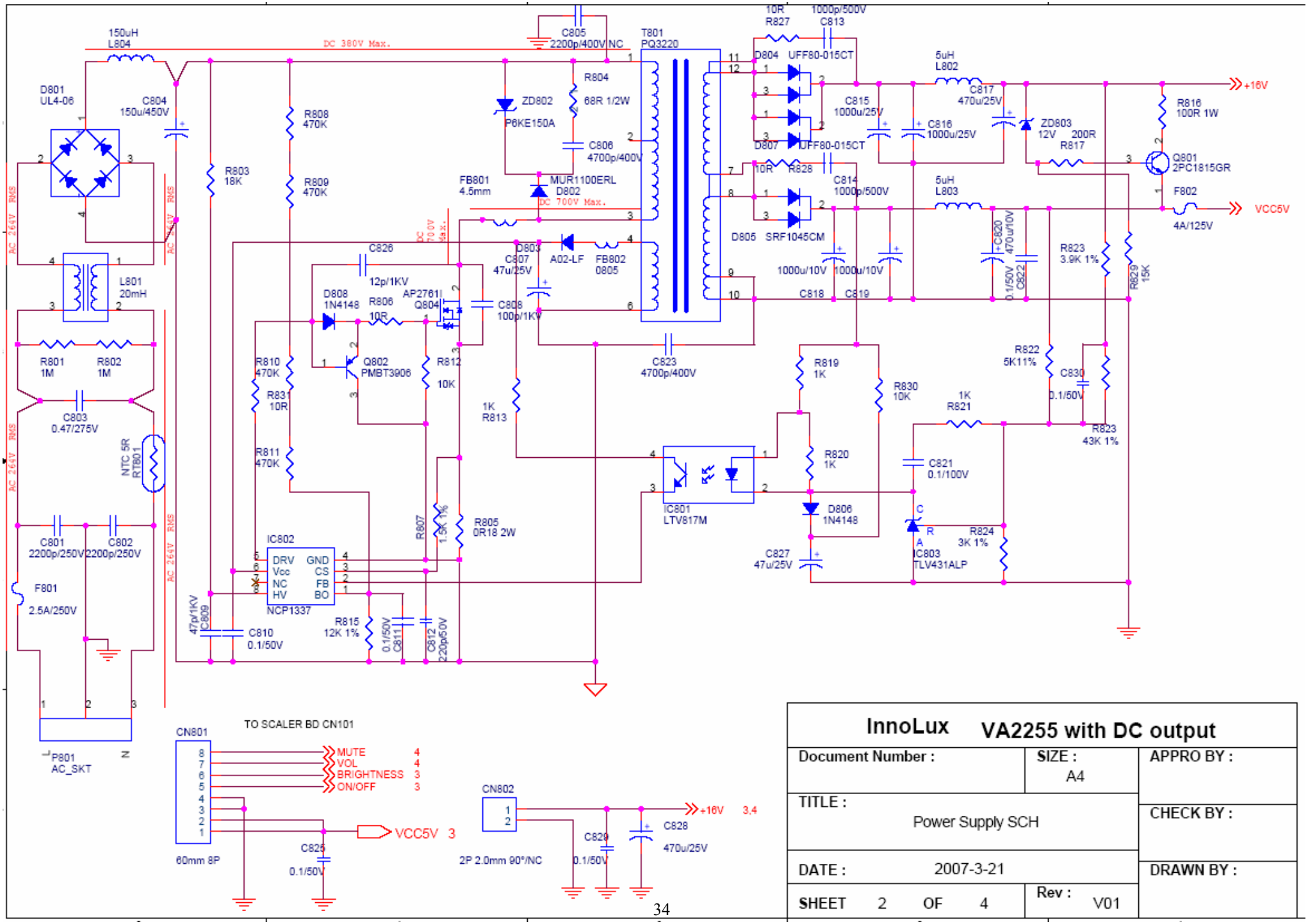
DATE : 2007-04-05		DRAWN BY :
SHEET 2 OF 2	Rev : V01	


P701
MIC JACK
Line_L
Line_R
CN703
5P 2.0mm/NC
CN702
MIC-
MIC+
2P 2.0mm 90°/NC
+16V
C703
0.1/50V
C702
470u/25V
C712
470u/25V/NC
U701
TDA8496L
R701
10K
R702
10K
R703
10K
C704 0.47/16V
C706 0.47/16V
INL
INR
S_GND
MUTE
STBY
VOLUME
NC
VS
OUTL
OUTR
SVR
VAROUT_R
VAROUT_L
GND
GND
C705
470u/16V
C707
470u/16V
LEFT_SPEAKER+
RIGHT_SPEAKER+
CN701
4P 2.0mm 90°
R704
47K
R705
30K
R714
30K
Q702
PMBT3904
Q703
PMBT3904
MUTE
R711
5K6
R712
5K6
R713
100
Q701
PMBT3904
VOL
4K7
10u/25V
2K
2K
4700p/50V
4700p/50V
C709
0.1/50V
C708
220u/16V
R706
1K
R707
1K
For VSC 22W, Jumper J701/J702 are NC
For Acer 22W, 20' and VSC 20' , CN702/CN703 are NC
InnoLux
AL2216W
Document Number :
xxxxxxxxxxx
SIZE :
A4
APPRO BY :
TITLE :
Audio
CHECK BY :
DATE :
2006-09-04
DRAWN BY :
SHEET 1 OF 4
Rev : V01



InnoLux VA2255 with DC output		
Document Number :	SIZE : A4	APPRO BY :
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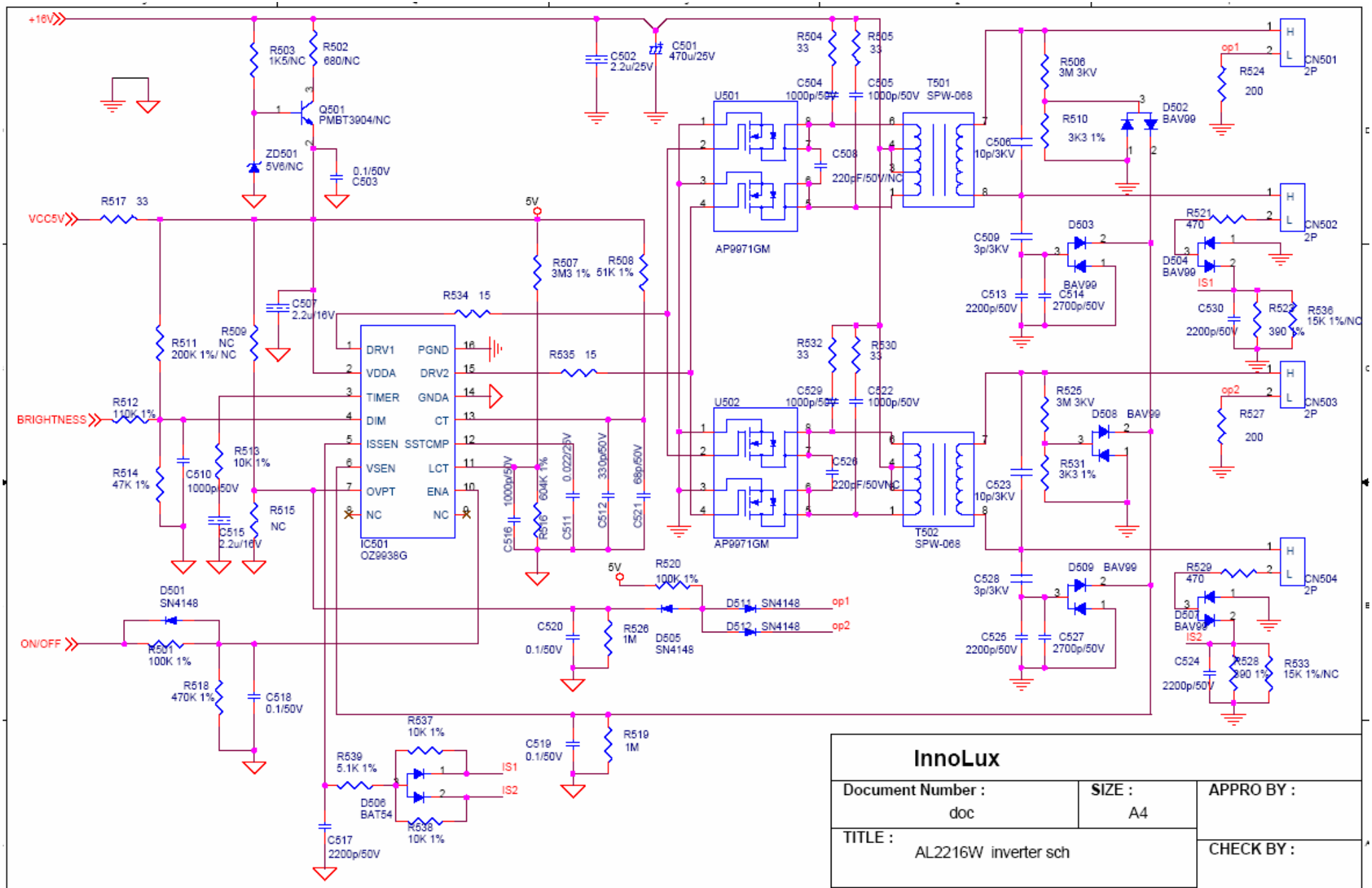
DATE : 2007-3-21		DRAWN BY :
SHEET 2 OF 4	Rev : V01	



InnoLux		
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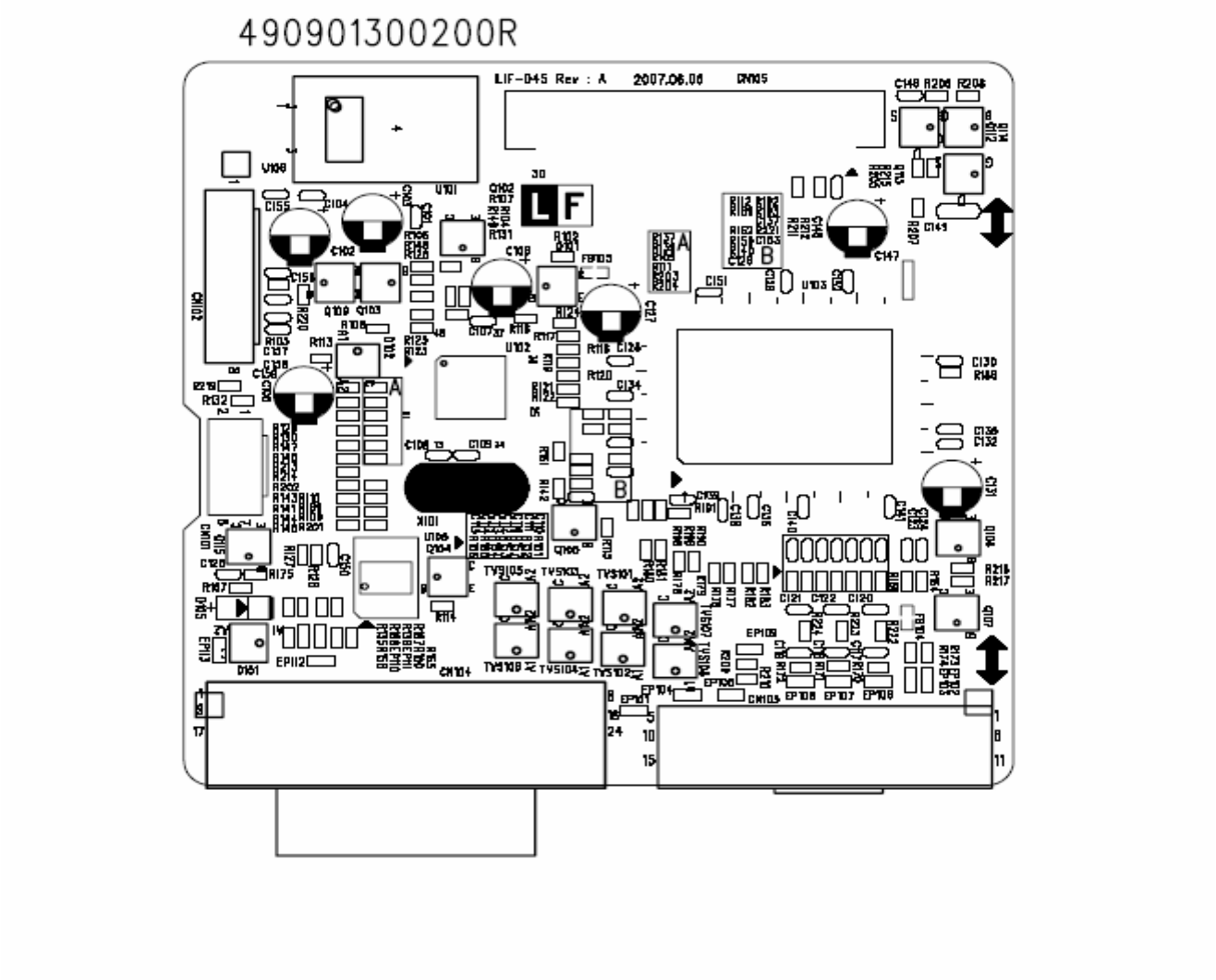
DATE : 2006-09-12		DRAWN BY :
SHEET 3 OF 4	Rev : V01	

Attachment 3- PCB Layout



LAYER	SILKSCREEN TOP			
PCB NO :	490901300200R	REV :	A	DESIGNER: Eva Wu
FILE NAME :	ILIF-045. PCB	DATE :	2007.06.06	