

Service Manual

ViewSonic VG721m-2

Model No. VS11353

17" Color TFT LCD Display

(VG721m-2_SM Rev. 1b Jan. 2007)

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Revision History

Revision	SM Editing Date	ECR Number	Description of Changes	Editor
1a	10/2/2006		Initial Release	Jamie Chang
1b	01/04/2007	VS-E060414	Phase in INL MT170EN01 V9 panel as backup.	Jamie Chang

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1. Precautions and Safety Notices

1. SAFETY PRECAUTIONS

This monitor is manufactured and tested on a ground principle that a user's safety comes first. However, improper use 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 your residence, consult your local dealer or Power Company.
- Use only the special power adapter that comes with this monitor for power input.
- Do not try to repair the monitor by yourself, as it contains no user-serviceable parts. Only the qualified technician can repair it.
- 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 glass screen.
- Do not place heavy objects on the monitor or power cord.

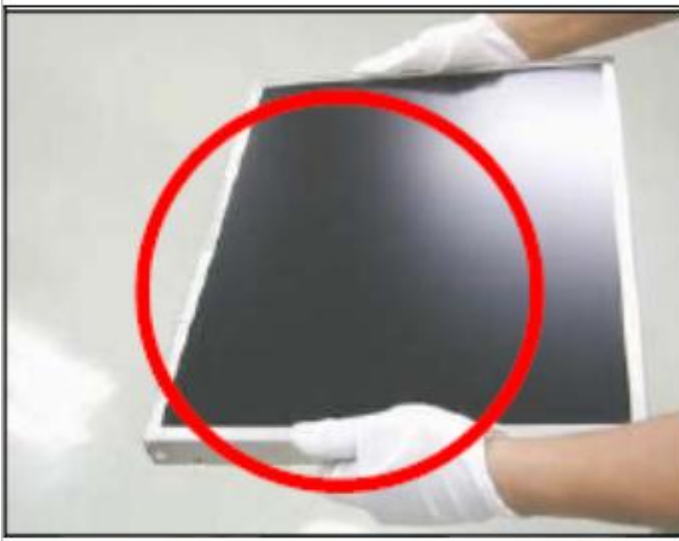





2. PRODUCT SAFETY NOTICE

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's manual.

4. Handling and Placing Methods

Correct Methods:	Incorrect Methods:
<p data-bbox="113 197 794 331">Only touch the metal frame of the LCD panel or the front cover of the monitor. Do not touch the surface of the polarizer</p>	<p data-bbox="801 197 1487 331">Surface of the LCD panel is pressed by fingers and that may cause "Mura"</p>
	
	
<p data-bbox="113 1433 794 1496">Take out the monitor with cushions</p>	<p data-bbox="801 1433 1487 1496">Taking out the monitor by grasping the LCD panel. That may cause "Mura"</p>
	

Place the monitor on a clean and soft foam pad.



Placing the monitor on foreign objects. That could scratch the surface of the panel or cause "Mura"



The panel is placed facedown on the lap. That may cause "Mura".



2. Specification

1. INTRODUCTION

Product Name	ViewSonic VG721m
Oracle item#	VG721M-2
Model Number	VS11353
OSD Languages	English, French, German, Italian, Spanish, Finnish, Japanese, Traditional Chinese, Simplified Chinese
TFT LCD Panel and Model #	1 st Source: Innolux MT170EN01 V.7 2 nd Source: Innolux MT170EN01 V.9
Scalar	MST TSUM56AL-LF-1
Input Signal	Analog x1
Sync Compatibility	Separate Sync / Composite Sync / SOG
Adapter	Internal Power Board
Power Cable	Yes, refer to APPENDIX B: Power Cable
Analog Cable (1.8 m, black), with PC 2001 and Hot Plug Detect &DDC	Yes (Detached cable; refer the Appendix A)
DVI-D Cable(1.8m, black) with PC 2001	No
Audio Cable(1.8m, black) with PC 2001	Yes
MIC Cable(1.8m, black) with PC 2001	No
USB Cable (V2.0)	No
ViewSonic CD Wizard	Arabic, English, Finnish, Spanish, German, Italian, Japanese, Swedish, Polish, Korean, Portuguese, Russian, Turkish , French, Czech, Hungarian, Simplified Chinese, Traditional Chinese
ViewSonic Quick Start Guide	
PerfectSuite CD	No
Screen Protector Mylar	Yes
Foot Protector plastic	No
Service Insert	For Region code = M units only
Response Time Sticker	For Region code = M/E/U/G units only
Warranty Sticker	For Region code = G units only
Warranty Card	For Region code = G units only
Carton Sticker	For Region code = G units only
PE bag of Carton	For Region code = G units only

2 GENERAL specification

Test Resolution & Frequency	1280x1024@60Hz
Test Image Size	Full Size
Contrast and Brightness Controls	Factory Default: Contrast = 70%, Brightness = 100%

3 VIDEO INTERFACE

Analog Input Connector	DB-15 (Analog), refer the appendix A
Video Cable Strain Relief	Equal to twice the weight of the monitor for five minutes
Video Cable Connector DB-15 Pin out	Compliant DDC 1/2B
Video Signals	Video RGB (Analog) – Separate Sync/Composite Sync/ SOG,
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
DDC 1/2B	Compliant with Revision 3
Sync Compatibility	Separate Sync/Composite Sync/ SOG,
Video Compatibility	Shall be compatible with all PC type computers, Macintosh computers, and after market video cards
Resolution Compatibility	640 x 350, 640 x 400, 640 x 480, 720 x 400, 720 x 480, 800 x 600, 832 x 624, 1024 x 768, 1152 x 864, 1152 x 870, 1152 x 900, 1280 x 768, 1280 x 960, 1280 x 1024, 1440x900
Exclusions	Not compatible with interlaced video

4 POWER SUPPLY

Internal Power Supply	Part Number: ILPI-023
Input Voltage Range	90 to 264 VAC
Input Frequency Range	47 to 63 Hertz
Short Circuit Protection	Output can be shorted without damage
Over Current Protection	5.0 A typical at 14.0 VDC
Leakage Current	3.5mA (Max) at 254VAC / 60Hz
Efficiency	80% typical at 115VAC Full Load
Fuse	Internal and not user replaceable
Power Output	38 Watts (typ)
Max Input AC Current	1.5 Arms @ 90VAC, 0.75 Arms @ 180VAC
Inrush Current (Cold Start)	50 A @ 115VAC, 90 A (max) @ 230VAC
Power Supply Cold Start	Shall start and function properly when under full load,

	with all combinations of input voltage, input frequency, and operating temperature
Power Supply Transient Immunity	Shall be able to withstand an ANSI/IEEE C62.41-1980 2000V 200 ampere ring wave transient test with no damage
Power Supply Line Surge Immunity	Shall be able to withstand 1.5 times nominal line voltage for one cycle with no damage
Power Supply Missing Cycle Immunity	Shall be able to function properly, without reset or visible screen artifacts, when ½ cycle of AC power is randomly missing at nominal input
Power Supply Acoustics	The power supply shall not produce audible noise that would be detectable by the user. Audible shall be defined to be in compliance with ISO 7779 (DIN EN27779:1991) Noise measurements of machines acoustics. Power Switch noise shall not be considered
US Type Power Cable	Separate 3-prong NEMA 5-15P type plug. Length = 1.8m. Connects to display. Color = Black
European Type Power Cable	Schuko CEE7-7 type plug. Length = 1.8m, Connects to display. Color = Black
CCC Type Power Cable	Separate 3-prong type plug. Length = 1.8m. Connects to display. Color = Black
PSE Type Power Cable	Separate 2-prong NEMA 1-15P type plug. Length = 1.8m. Connects to display. Color = Black
Power Saving Operation(Method)	VESA DPMS Signaling
Power Consumption	On Mode <42 W (max) Off Mode < 1W
Recovery Time	On Mode = N/A, Active Off < 3 sec

5 ELECTRICAL REQUIREMENT

Horizontal / Vertical Frequency

Horizontal Frequency	24 – 82 kHz
Vertical Refresh Rate	50 – 75* Hz.
Maximum Pixel Clock	135 MHz
Sync Polarity	Independent of sync polarity.

Timing Table

Item	Timing				Analog			Digital - TMDS	Remark
					Separated	Composite	SOG		
1	640 x 350	@	70 Hz,	31.5 KHz	✓	✓	✓		DMT
2	640 x 400	@	60 Hz,	31.5 KHz	✓	✓	✓		
3	640 x 400	@	70 Hz,	31.5 KHz	✓	✓	✓		
4	640 x 480	@	50 Hz,	24.7 KHz					
5	640 x 480	@	60 Hz,	31.5 KHz	✓	✓	✓		DMT
6	640 x 480	@	67 Hz,	35 KHz	✓	✓	✓		For MAC
7	640 x 480	@	72 Hz,	37.9 KHz	✓	✓	✓		DMT
8	640 x 480	@	75 Hz,	37.5 KHz	✓	✓	✓		DMT
9	720 x 400	@	70 Hz,	31.5 KHz	✓	✓	✓		
10	720 x 480	@	60 Hz,	31.5 KHz	✓	✓	✓		DTV
11	720 x 576	@	50 Hz,	31.3 KHz					DTV
12	800 x 600	@	56 Hz,	35.1 KHz	✓	✓	✓		DMT
13	800 x 600	@	60 Hz,	37.9 KHz	✓	✓	✓		DMT
14	800 x 600	@	72 Hz,	48.1 KHz	✓	✓	✓		DMT
15	800 x 600	@	75 Hz,	46.9 KHz	✓	✓	✓		DMT
16	832 x 624	@	75 Hz,	49.7 KHz	✓	✓	✓		MAC
17	1024 x 768	@	50 Hz,	39.6 KHz					
18	1024 x 768	@	60 Hz,	48.4 KHz	✓	✓	✓		DMT
19	1024 x 768	@	70 Hz,	56.5 KHz	✓	✓	✓		DMT
21	1024 x 768	@	75 Hz,	60 KHz	✓	✓	✓		DMT
23	1152 x 864	@	75 Hz,	67.5 KHz	✓	✓	✓		DMT
24	1152 x 870	@	75 Hz,	68.7 KHz	✓	✓	✓		For MAC
25	1152 x 900	@	67 Hz,	62.5 KHz	✓	✓	✓		For SUN
26	1280 x 720	@	50 Hz,	37.5 KHz					DTV
27	1280 x 720	@	60 Hz,	45 KHz					DTV
28	1280 x 768	@	50 Hz,	39.6 KHz					
29	1280 x 768	@	60 Hz,	47.8 KHz	✓	✓	✓		DMT;
30	1280 x 768	@	75 Hz,	60.3 KHz	✓	✓	✓		DMT;
31	1280 x 960	@	50 Hz,	49.4 KHz					
32	1280 x 960	@	60 Hz,	59.7 KHz	✓	✓	✓		DMT
33	1280 x 960	@	75 Hz,	75.2 KHz	✓	✓	✓		
34	1280 x 1024	@	50 Hz,	52.7 KHz					
35	1280 x 1024	@	60 Hz,	64 KHz	✓	✓	✓		DMT
36	1280 x 1024	@	75 Hz,	80 KHz	✓	✓	✓		DMT
37	1440 x 900	@	60 Hz	55.9 KHz	✓	✓	✓		DMT

*1. Tolerance $\geq \pm 2\text{KHz}$ (if no overlapping issue)

*2. Any timing not in the list, it should display as normal or show on "OUT OF RANGE" OSD message without blanking.

*3. The image quality of 85Hz mode might be worse than 75Hz.

Primary Presets

1280x1024 @ 60Hz

User Presets

Number of User Presets (recognized timings) Available: 10 presets total in FIFO configuration

Changing Modes

- Maximum Mode Change Blank Time for image stability : 5 seconds (Max), excluding "Auto Adjust" time
- Under DOS mode (640 x 350, 720 x 400 & 640 x 400), it should recall factory setting when execute "Auto Adjust"
- The monitor needs to do "Auto Adjust" the first time a new mode is detected (see section "0-Touch™ Function Actions")
- While running Change Mode, Auto Adjust or Memory Recall, the image shall blank

6 FRONT PANEL CONTROLS AND INDICATORS

Front Panel Hardware Controls

Power Switch (Front Head)	Power Control, soft Power Switch.
Power LED (Front Head)	Blue – ON Orange – Power Saving Mode Dark = Soft Power Switch OFF
Front Panel Controls (Head) [⏻] [1] [2] [▲] [▼]	[M] Mute [⏻] Power [1] BUTTON 1 [2] Button 2 [▲] UP ARROW BUTTON [▼] DOWN ARROW BUTTON Note: Power Button, Button 1 and Button 2 must be one-shot logic operation. (i.e. there should be no cycling)
Reaction Time	OSD must fully appear within 0.5s after pushing Button 1

Short Cuts Function from the button(s)

[1]	Main Menu
[2]	Auto Image Adjust
[▼]	Brightness adjust

[▲]	Contrast adjust
[▼] + [▲]	recall both of Contrast and Brightness to default
[1] + [2]	toggle 720x400 and 640x400 mode when input 720x400 or 640x400 mode
[1] + [▼] + [▲]	White Balance. (Not shown on user's guide)
[1] + [▼]	Power Lock
[1] + [▲]	OSD Lock
No signal + [2] + [⏻]	Burning mode
Signal + [2] + [⏻]	Factory Mode
Remark : All the short cuts function are only available while OSD off	

7 TFT LCD PANEL

Panel Characteristics :

1st Source Panel

Model number	Innolux MT170EN01 V.7
Type	Active Matrix TFT, TN technology
Active Size	17" (337.9mm x 270.3mm)
Pixel Arrangement	RGB Vertical Stripe
Pixel Pitch	0.264 mm
Glass Treatment	Anti-Glare, Hard coating (3H)
# of Backlights	4 CCFL
Backlight Life	50000 Hrs (Min)
Luminance (Center) – CT = 6500K, Contrast/ Brightness = Max	280 cd/m2 (Typ after 30 minute warm up) 250 cd/m2 (Min after 30 minute warm up)
Brightness Uniformity (13 points)	80 % (Typ) / 75 % (Min)
Contrast Ratio	600 :1 (Typ) 500 : 1 (Min)
Color Depth	16.2 million colors (6+2 bit panel)
Horizontal Viewing Angle	150 degrees (Typ) / 130 degrees (Min) @ CR>10 170 degrees (Typ) / 150 degrees (Min) @ CR>5
Vertical Viewing Angle	135 degrees (Typ) / 115 degrees (Min) @ CR>10 155 degrees (Typ) / 135 degrees (Min) @ CR>5
Response Time	On-Off
10%-90% @ Ta=25°C	8ms (Typ) / 16ms (Max)
Mercury	3.0 mg per lamp
Panel Defects	Please see Panel Quality Specifications.

*Over 50% units of shipment shall be equal or better than the Typical value above.

2nd Source Panel

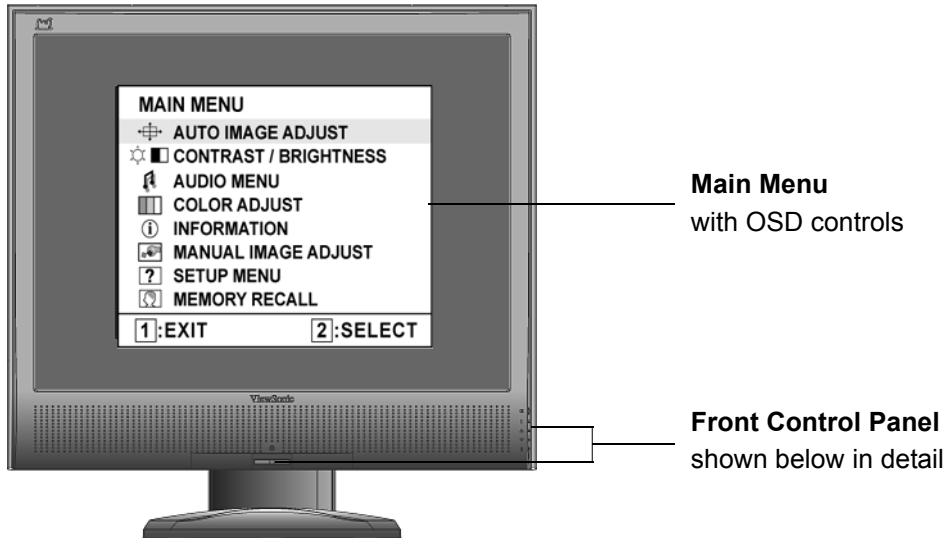
Model number	Innolux MT170EN01 V.9
Type	Active Matrix TFT, TN technology
Active Size	17" (337.9mm x 270.3mm)
Pixel Arrangement	RGB Vertical Stripe
Pixel Pitch	0.264 mm
Glass Treatment	Anti-Glare, Hard coating (3H)
# of Backlights	4 CCFL
Backlight Life	50000 Hrs (Min)
Luminance (Center) – CT = 6500K, Contrast/ Brightness = Max	300 cd/m2 (Typ after 30 minute warm up) 250 cd/m2 (Min after 30 minute warm up)
Brightness Uniformity (13 points)	80 % (Typ) / 75 % (Min)
Contrast Ratio	800 :1 (Typ) 600 : 1 (Min)
Color Depth	16.7 million colors (6 bit + Hi-FRC)
Horizontal Viewing Angle	160 degrees (Typ) / 140 degrees (Min) @ CR>10 170 degrees (Typ) / 150 degrees (Min) @ CR>5
Vertical Viewing Angle	160 degrees (Typ) / 140 degrees (Min) @ CR>10 170 degrees (Typ) / 150 degrees (Min) @ CR>5
Response Time 10%-90% @ Ta=25°C	On-Off 5ms (Typ) / 10ms (Max)
Mercury	3.0 mg per lamp
Panel Defects	Please see Panel Quality Specifications.





*Over 50% units of shipment shall be equal or better than the Typical value above.

3. Front Panel Function Control Description

Adjusting the Screen Image

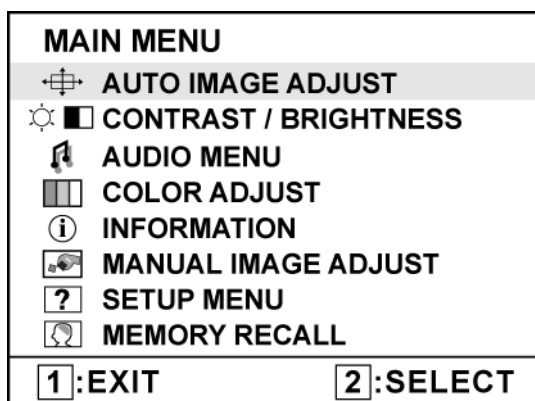
Use the buttons on the front control panel to display and adjust the OSD controls which display on the screen. The OSD controls are explained at the top of the next page and are defined in “Main Menu Controls” on page 10.



-  Standby Power On/Off
Power light
Blue = ON
Orange = Power Saving
-  Audio Mute button turns the sound off
- 1 Displays the Main Menu or exits the control screen and saves adjustments.
-   Scrolls through menu options and adjusts the displayed control.
Also a shortcut to display the Contrast adjustment control screen.
- 2 Displays the control screen for the highlighted control.
Also toggles between two controls on some screens.

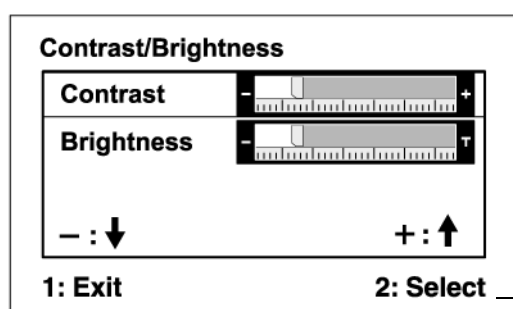
Do the following to adjust the display setting:

1. To display the Main Menu, press button [1].



NOTE: All OSD menus and adjustment screens disappear automatically after about 15 seconds. This is adjustable through the OSD timeout setting in the setup menu.

2. To select a control to adjust, press ▲ or ▼ to scroll up or down in the Main Menu.
3. After the desired control is selected, press button [2]. A control screen like the one shown below appears.



The command line at the bottom of the control screen tells what to do next from this screen. You can toggle between control screens, adjust the selected option, or exit the screen.






4. To adjust the setting, press the up ▲ or down ▼ buttons.
5. To save the adjustments and exit the menu, press button [1] *twice*.

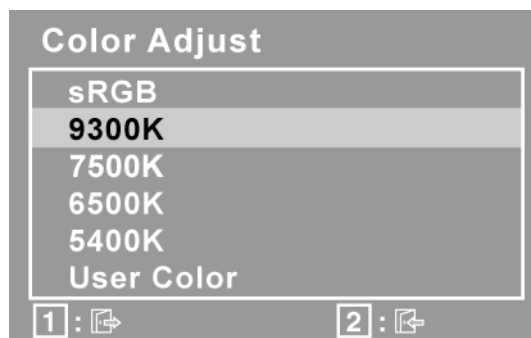
The following tips may help you optimize your display:

- Adjust the computer's graphics card so that it outputs a 1280 x 1024 @ 60Hz video signal to the LCD display. (Look for instructions on “changing the refresh rate” in the graphics card's user guide.)
- If necessary, make small adjustments using H. POSITION and V. POSITION until the screen image is completely visible. (The black border around the edge of the screen should barely touch the illuminated “active area” of the LCD display.)

Main Menu Controls

Adjust the menu items shown below by using the up ▲ and down ▼ buttons.

Control	Explanation
	Auto Image Adjust sizes and centers the screen image automatically.
	Contrast adjusts the difference between the image background (black level) and the foreground (white level).
	Brightness adjusts background black level of the screen image.
	Audio Adjust Volume increases the volume, decreases the volume, and mutes the audio. Mute temporarily silences audio output.
	Color Adjust provides several color adjustment modes, including preset color temperatures and a User Color mode which allows independent adjustment of red (R), green (G), and blue (B). The factory setting for this product is 6500K (6500 Kelvin).



sRGB-This is quickly becoming the industry standard for color management, with support being included in many of the latest applications. Enabling this setting allows the LCD display to more accurately display colors the way they were originally intended. Enabling the sRGB setting will cause the Contrast and Brightness adjustments to be disabled.

9300K-Adds blue to the screen image for cooler white (used in most office settings with fluorescent lighting).

7500K-Adds blue to the screen image for cooler white (used in most office settings with fluorescent lighting).

6500K-Adds red to the screen image for warmer white and richer red.

5400K-Adds green to the screen image for a darker color.

User Color Individual adjustments for red (R), green (G), and blue (B).

1. To select color (R, G or B) press button [2].

2. To adjust selected color, press▲and▼.

Important: If you select RECALL from the Main Menu when the product is set to a Preset Timing Mode, colors return to the 6500K factory preset.



Information displays the timing mode (video signal input) coming from the graphics card in the computer, the LCD model number, the serial number, and the ViewSonic® website URL. See your graphics card's user guide for instructions on changing the resolution and refresh rate (vertical frequency).

NOTE: VESA 1280 x 1024 @ 60Hz (recommended) means that the resolution is 1280 x 1024 and the refresh rate is 60 Hertz.

Information		
H. Frequency:	XX	kHz
V. Frequency:	XX	Hz
Resolution:	XXX	
Pixel Clock:	XXXXXXXXX	MHz
Serial Number: XXXXXXXXXXXX		
Model Number: XXXXXXXXXXXX		
www.ViewSonic.com		1: Exit



Manual Image Adjust

Manual Image Adjust	
	H. Size
	H./V. Position
	Fine Tune
	Sharpness
1: Exit	
2: Select	



























H. Size (Horizontal Size) adjusts the width of the screen image.



H./V. Position (Horizontal/Vertical Position) moves the screen image left or right and up or down.

H./V. Position	
H. Position	
V. Position	
- : ↓	+ : ↑
1: Exit	
2: Select	

Control	Explanation										
	<p>Fine Tune sharpens the focus by aligning text and/or graphics with pixel boundaries.</p> <p>NOTE: Try Auto Image Adjust first.</p>										
	<p>Sharpness adjusts the clarity and focus of the screen image.</p>										
	<p>Setup Menu displays the menu shown below:</p> <div data-bbox="389 595 925 949"> <p>Setup Menu</p> <table> <tr> <td></td> <td>Language Select</td> </tr> <tr> <td></td> <td>Resolution Notice</td> </tr> <tr> <td></td> <td>OSD Position</td> </tr> <tr> <td></td> <td>OSD Time Out</td> </tr> <tr> <td></td> <td>OSD Background On/Off</td> </tr> </table> <p>1: Exit 2: Select</p> </div>		Language Select		Resolution Notice		OSD Position		OSD Time Out		OSD Background On/Off
	Language Select										
	Resolution Notice										
	OSD Position										
	OSD Time Out										
	OSD Background On/Off										
	<p>Language Select allows the user to choose the language used in the menus and control screens.</p>										
	<p>Resolution Notice allows the user to enable or disable this notice.</p> <div data-bbox="389 1162 903 1402"> <p>Resolution Notice</p> <table> <tr> <td colspan="2"></td> </tr> <tr> <td><input checked="" type="radio"/> On</td> <td><input type="radio"/> Off</td> </tr> <tr> <td colspan="2"></td> </tr> </table> <p>1: Exit</p> </div> <p>If you enable the Resolution Notice shown above and your computer is set at a resolution other than 1280 x 1024, the following screen appears.</p> <div data-bbox="395 1538 909 1720"> <p>Resolution Notice</p> <p>For best picture quality, change the resolution to 1280 x 1024</p> <p>Press "1" to Clear Message. Press "2" to Disable Message.</p> </div>			<input checked="" type="radio"/> On	<input type="radio"/> Off						
<input checked="" type="radio"/> On	<input type="radio"/> Off										
	<p>OSD Position allows the user to move the OSD menus and control screens.</p>										
	<p>OSD Timeout sets the length of time the OSD screen is displayed. For example, with a "30 second" setting, if a control is not pushed within 30 seconds, the display screen disappears.</p>										

Control	Explanation
	OSD Background allows the user to turn the OSD background On or Off.
	Memory Recall returns the adjustments back to factory settings if the display is operating in a factory Preset Timing Mode listed in the Specifications of this manual.

4. Circuit Description

Electronic Circuit Theory

2.1 Switching Mode Power Supply

Switching Mode Power Supply

2.1.1 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.

2.1.2 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 V_c 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.

2.1.3 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

2. 2 Inverter Circuit

2.2.1 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 pin10 of IC501 and makes IC501 enable. Brightness signal connect to pin4 of IC501 and regulates the panel brightness, R526, 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 pin13 of IC501. BURST MODE regulated dimming frequency is determined by the external resistor R527 and capacitor C506 connected to pin11 of IC501. C508 is used for soft start and compensation, C507, C505 are used for dump noise. The output drives, include DRV1, DRV2 (pins1,15 respectively) output square pulses to drive MOSFET U501, U502, and each of U501, U502, is consist of a N channel MOSFET. U501,OR U502 work as Push-Pull-topology, it is high efficient, PWM switching.

During start up, VSEN (pin6) senses the voltage at the transformer secondary. When VSEN reaches 3.0V, 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 R509, R534. The feedback voltage connected to Pin5 (ISEN), then compared with a reference voltage (1.5V) via a current amplifier, resulting in PWM drive outputs to PUSH-PULL switches.

2.2.2. Protection circuit

Over Voltage Protection and over-current protection are monitored by the voltage on VSEN(Pin 6) During normal operation, if a CCFL is damaged or removed, the voltage at VSEN (Pin6) increases. Once the voltage at VSEN exceeds 2.0V (OVPT Setting) the driver output duty cycle is regulated and the shutdown delay timer is activated. OVPT set the overall protection threshold voltage that is lower than 3V (VSEN threshold). Once the voltage at TIMER pin reached about 3v, the IC will shut down and latch. R501, R503, C525, C527 are connected in high voltage output connector, the divided AC voltage is inverted DC voltage through D503, D504, D507, D508, R530 and C516 are used to rectify wave & dump noise. Then the voltage signal reaches Pin6 VSEN of IC501, when the voltage changes, build-in PWM of IC501 will adjust output voltage.

Open Lamp Protection: In normal operation, R509 are sensed a high level DC voltage, If a CCFL is removed or damaged during normal, the voltage at SSTCMP(Pin12) rises rapidly. When the voltage at SSTCMP reaches a threshold of approximately 2.5V, a current source charges the capacitor(C511) connected to TIMER(Pin3). Once the voltage level at the TIMER pin reaches a threshold of approximately 3v, The drive outputs shut down and latch.

2.2 I/F Board Circuit

2.2.1 Power Input

+5V is from the power board and supply for U101(LD1117AL-3.3V), and panel. +3.3V output is generated from +5V through C101 and C103 filtering, and U101 outputs. +3.3V is used for U105 (MCU & Scaler: TSUM56AL). +1.8V output is generated from +3.3V through U102 outputs. +1.8V is only used for U105.

2.2.2 MCU & Scaler(TSUM16AL)

The frequency of XTAL1 is 14.318MHz. U105 # 48 is defined as panel-enable. When the I/O port is high, Q101 and Q103 are conducted. And then after C108 and C109 filtering, obtain the voltage of VLCD, which will be connected to CN104. U105 # 85 is defined as CCFL-enable. When the I/O port is low, Q106 is pulled up and the backlights are on; When the I/O port is high, Q106 is conducted and the backlights are off. U105 # 35 is defined as DET-VGA, connected with CN103 #5. U105 # 84 is a pin of hardware reset. U105 # 54-# 55, # 58-# 65, # 67-# 74, # 77-# 78 output LVDS digital data of 8 bit to panel control circuit through CN104. U105 # 86 generates a PWM waveform by regulating the duty to control the brightness of the backlights.

U103 is EEPROM used for saving EDID data, which is connected by SCL and SDA pins with # 31 and # 30 of TSUM56AL.

U106 is a flash memory, U106 # 2, # 1, # 6, # 5 are the communications with U105 # 37-# 40.

U108 is EEPROM used for saving user's OSD setting. U108 is connected by SCL and SDA pin with # 44 and # 43 of TSUM56AL.

2.2.3 VGA Input

Signal R, G, B input through CN103 #1, #2, #3, and pass through C112, C113 and C114 going into U105.

Signal HSYNC and VSYNC input through CN103 #13 and #14, and C125, C126, filtering. Then the analog

signal enters U105, and then U105 deals with it internally. In addition, TVS101, TVS102, TVS103, TVS104

(the four are BAV99), ZD101, ZD105, ZD106, ZD107, ZD108(they are constant voltage diode of 5V6) are ESD

protector. Signal DDC-SCL inputs via CN103 #15, and then passes through ZD101 for ESD protection, goes

into EDID EEPROM IC U103. Signal DDC-SDA inputs via CN103 #12, and then passes through ZD107 for

ESD protection, goes into EDID EEPROM IC U103. CN103 #5 is defined as cable detect pin, this detector

realizes via R124 and U105 # 35, The PC-5V of U103 is supplied by PC via CN103 #9 with D103 for ESD

protection, or supplied by Monitor self via D103. U103 is an EEPROM IC, which is a kind of memory and used for saving EDID data.

2.2.4 Button Control

Button "Key-Power" is defined as power on/off, which is connected to U105 # 90 through CN105 # 4.

Button "Key-2" is defined as two functions of selecting and adjustment, which is connected to U105 #88 through CN105 # 6.

Button "Key-Up" is defined as plus, which is connected to U105 # 89 through CN105 # 5.

Button "Key-Down" is defined as minus, which is connected to U105 # 88 through CN105 # 6.

Button "Key-1" is defined as two functions of menu and exit, which is connected to U105 # 91 through CN105 # 8.

LED indicator on the front bezel is defined as follows:

a. When press button "Key-Power", U105 # 41 is pulled down and U105 # 42 is pulled high, so Q102 is conducted and the LED indicator is blue.

b. When in power-saving mode, U105 # 41 is pulled high and U105 # 42 is pulled down, so Q105 is conducted and the LED indicator is orange.

FACTORY PRESET TIMING TABLE

VESA MODES						
Resolution	Total	Horizontal		Vertical		Nominal Pixel Clock (MHz)
		Nominal Frequency +/-0.5KHz	Sync Polarity	Nominal Frequency +/-1Hz	Sync Polarity	
640*480@60Hz	800*525	31.469	N	59.940	N	25.175
640*480@50Hz	800*494	24.700	N	50.000	N	19.760
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
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
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
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
IBM MODES						
640 * 400 @ 70Hz	800*449	31.469	N	70.086	N	25.175
720 *400@70Hz	900*449	31.469	N	70.087	P	28.322
MAC MODES						
832*624@75Hz	1152*667	49.725	N	74.550	N	57.283
1152*870@75Hz	1456*915	68.681	N	75.062	N	100.000
OTHER MODES						
640*350@70Hz	800*449	31.469	P	70.086	N	25.175
1024 *768@72Hz	1360*800	57.700	N	72.125	N	78.472
640*480@67Hz	864*525	35.000	N	66.667	N	30.240
640*400@60Hz	800*525	31.469	N	59.940	N	25.175
1280*720@60Hz	1664*746	44.697	N	59.915	P	74.375

4. Power On/Off Sequence

4.1 Hardware Power ON

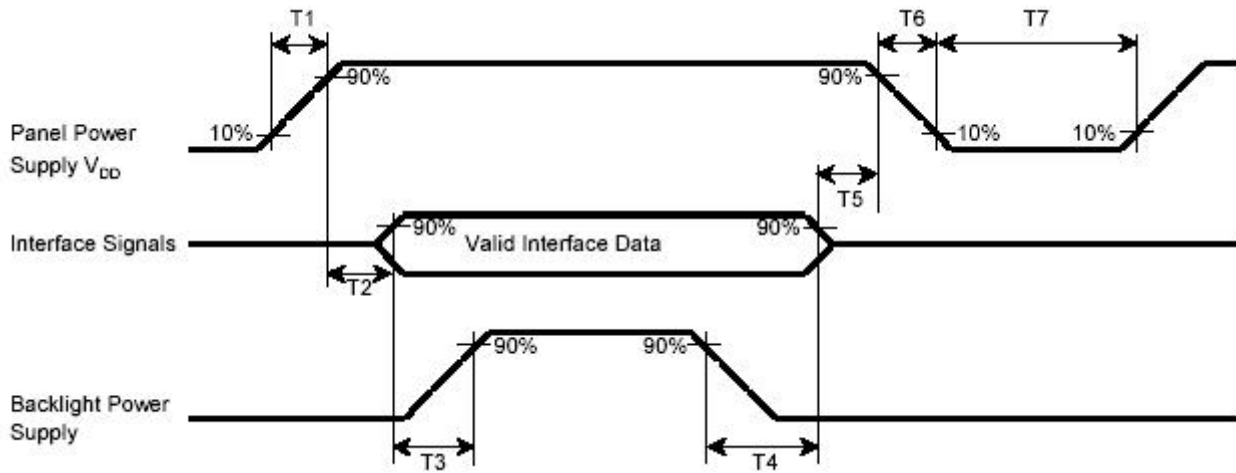
When power cord is plugged into AC socket, SMPS starts work and provides U105 with VCC5V. When VCC5V inputs, U105 resets circuit active, sets U105 all registers to preset modes, and then monitor goes into stand-by mode. That means hardware power on has been completed.

4.2 Software Power ON/OFF

When press power key, U105 # 90 recieves low pulse,and then U105 will do the power on/off.

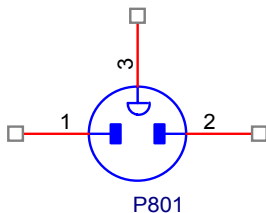
- If Power ON, U105 # 91(LED_Green) will send out Low potential, and then LED green on.
- If Power OFF, U105 # 91(LED_Green) will send out High potential, and then LED Off.

The Panel_Vcc, Backlight_En, CLK/DATA output to panel will follow the following sequency.



T1 (ms)	T2 (ms)	T3 (ms)	T4 (ms)	T5 (ms)	T6 (ms)	T7 (ms)
0.1~10	0 ~10	>200	>100	0~50	0.1~25	>1000

5. AC Outlet Pin Assignment



Pin	Symbol	Description
1	L	Live
2	N	Neutral
3	E	GND

6. Inner Connector Pin Assignment

6.1 CN501, CN502, CN503, CN504 (Connect to Panel Backlight, SM02B-BHSS-1-TB or equivalent)

Pin	Symbol	Description
1	H.V.	High voltage for lamp
2	L.V.	Low voltage for lamp

6.2 CN101 (Power BD to Interface BD)

Pin No.	Symbol	Description
1	VCC5V	+5.1V INPUT
2	VCC5V	+5.1V INPUT
3	GND	GND
4	ON/OFF	CCFL on/off control
5	BRIGHTNESS	Panel luminance control (CCFL brightness)
6	GND	Ground
7	VOL	Volume control input
8	MUTE	Mute control input

6.3 CN105 (Interface BD to Keypad) DC power on/off control

Pin No.	Symbol	Description
1	LED_ B	Blue LED lighting control
2	LED_ O	Orange LED lighting control
3	GND	Ground
4	KEY_POWER	DC power on/off control,
5	KEY_MUTE&▲	OSD “▲” control to adjust value to increase,
6	KEY_▼&2	Select control and auto adjustment control,
7	GND	OSD “▼” control to adjust value to decrease
8	KEY_1	OSD menu and exit

6.4 CN104 (Connect I/F BD to panel, FI-X30S-H or Equivalent)

Pin No.	Symbol	Function
1	RX00-	minus signal of odd channel 0(LVDS)
2	RX00+	plus signal of odd channel 0(LVDS)
3	RX01-	minus signal of odd channel 1(LVDS)
4	RX01+	plus signal of odd channel 1(LVDS)
5	RX02-	minus signal of odd channel 2(LVDS)
6	RX02+	plus signal of odd channel 2(LVDS)

7	GND	Ground
8	RXOC-	minus signal of odd clock channel (LVDS)
9	RXOC+	plus signal of odd clock channel (LVDS)
10	RXO3-	minus signal of odd channel 3(LVDS)
11	RXO3+	plus signal of odd channel 3(LVDS)
12	RXE0-	minus signal of even channel 0(LVDS)
13	RXE0+	plus signal of even channel 0(LVDS)
14	GND	Ground
15	RXE1-	minus signal of even channel 1(LVDS)
16	RXE1+	plus signal of even channel 1(LVDS)
17	GND	Ground
18	RXE2-	minus signal of even channel 2(LVDS)
19	RXE2+	plus signal of even channel 2(LVDS)
20	RXEC-	minus signal of even clock channel (LVDS)
21	RXEC+	plus signal of even clock channel (LVDS)
22	RXE3-	minus signal of even channel 3(LVDS)
23	RXE3+	plus signal of even channel 3(LVDS)
24	GND	Ground
25	GND	Ground
26	GND	Ground or Open
27	GND	Ground
28	VCC	Power supply (5.0 V)
29	VCC	Power supply (5.0 V)
30	VCC	Power supply (5.0 V)

6.5 CN103 (D-SUB Connector)

Pin	Symbol	Pin	Symbol	Pin	Symbol
1	Red video input	6	Red GND	11	GND
2	Green video input	7	Green GND	12	Serial data (SDA)
3	Blue video input	8	Blue GND	13	H / H+V SYNC
4	GND	9	+5V(from PC)	14	VS SYNC
5	Cable Detect	10	GND	15	Data clock line (SCL)

7. Key Parts Pin Assignment

7.1 IC802 (TOP245Y or TOP246Y, Power Control IC)

Pin	Symbol	I/O	Description
1	C	I	Control
2	L	I	Line Sense

3	X	I	External Current Limit
4	S	O	Source of MOSFET(GND)
5	F	I	Frequency
6	D	I	Drain of MOSFET

7.2 IC501 (OZ9938GN, CCFL inverter controller IC)

Pin No.	Symbol	I/O	Description
1	DRV1	O	Drive output
2	VDDA	I	Supply voltage input
3	TIMER	I	Timing capacitor to set striking time and shut down delay time
4	DIM	I	Analog dimming or Internal LPWM dimming or external PWM pulse input for dimming function
5	ISEN	I	Current sense feedback
6	VSEN	I	Voltage sense feedback
7	OVPT	I	Over-voltage/over-current protection threshold setting pin
8	NC		
9	NC		
10	ENC	I	ON/OFF control of IC
11	LCT	I	Timing capacitor to set internal PWM dimming frequency and also a pin for analog dimming selection
12	SSTCMP	I	Capacitor for soft start time and loop compensation
13	CT	I	Timing resistor and capacitor for operation and striking frequency
14	GNDA		Ground for analog signals
15	DRV2	O	Drive output
16	PGND		Ground for power paths

7.3 U105(TSUM56AL)

Pin	Symbol	I/O	Description
1	DDCD_SCL	I	DDC Clock for DVI Interface
2	GND		Ground
3	R+	I	DVI Input Channel + RED
4	R-	I	DVI Input Channel - RED
5	GND		Ground
6	G+	I	DVI Input Channel + GREEN
7	G-	I	DVI Input Channel - GREEN
8	AVDD_DVI	I	3.3V Power
9	B+	I	DVI Input Channel + BLUE
10	B-	I	DVI Input Channel - BLUE
11	GND		Ground
12	CK+	I	DVI Input Clock Pair +
13	CK-	I	DVI Input Clock Pair -

14	AVDD_DVI	I	DVI Power
15	REXT		External resistor 390 ohm to AVDD_ADC
16	AVDD_PLL	I	PLL Power
17	BIN0M	I	Reference ground for analog blue input
18	BIN0P	I	Analog blue input
19	GIN0M	I	Reference ground for analog green input
20	GIN0P	I	Analog green input
21	SOGIN0	I	Sync-on-green input
22	RIN0M	I	Reference ground for analog red input
23	RIN0P	I	Analog red input
24	AVDD_ADC	I	ADC Power
25	REFM		Internal ADC bottom de-coupling pin
26	REFP		Internal ADC top de-coupling pin
27	HSYNC0	I	Analog HSYNC input
28	VSYNC0	I	Analog VSYNC input
29	GND		Ground
30	DDCA_SDA/RS232_TX	I/O	DDC Data for Analog Interface; 4mA driving strength/UART Transmitter/GPIO
31	DDCA_SCL/RS232_RX	I/O	DDC Clock for Analog Interface/UART Receiver/GPIO
32	VDDP	I	Digital Output Power
33	GND		Ground
34	VDDC	I	Digital Core Power
35	GPIO_P15/PWM0	I/O	General Purpose Input/Output; 4mA driving strength/Pulse Width Modulation Output; 4mA driving strength
36	NC		Not Connected
37	SDO	I	SPI Flash Serial Data Output
38	SCZ	O	SPI Flash Chip Select
39	SCK	O	SPI Flash Serial Clock
40	SDI	O	SPI Flash Serial Data Input
41	GPIO_P23	I/O	General Purpose Input/Output; 4mA driving strength
42	GPIO_P22	I/O	General Purpose Input/Output; 4mA driving strength
43	GPIO_P11/I2C_MDA	I/O	General Purpose Input/Output; 4mA driving strength/I2C Master Data
44	GPIO_P10/I2C_MCL	I/O	General Purpose Input/Output; 4mA driving strength/I2C Master Clock
45	NC		Not Connected
46	NC		Not connected
47	PWM2/GPIO_P24	I/O	Pulse Width Modulation Output; 4mA driving strength/General Purpose Input/Output; 4mA driving strength
48	GPIO_P27/PWM1	I/O	General Purpose Input/Output; 4mA driving strength/Pulse Width Modulation Output; 4mA driving strength
49	VDDP	I	Digital Output Power
50	GND		Ground
51	VDDC	I	Digital Core Power

52	MODE[0]	I	Chip Configuration Input
53	MODE[1]	I	Chip Configuration Input
54	LVA3P	O	A-Link Positive LVDS Differential Data Output
55	LVA3M	O	A-Link Negative LVDS Differential Data Output
56	VDDP	I	Digital Output Power
57	GND		Ground
58	LVACKP	O	A-Link Positive LVDS Differential Clock Output
59	LVACKM	O	A-Link Negative LVDS Differential Clock Output
60	LVA2P	O	A-Link Positive LVDS Differential Data Output
61	LVA2M	O	A-Link Negative LVDS Differential Data Output
62	LVA1P	O	A-Link Positive LVDS Differential Data Output
63	LVA1M	O	A-Link Negative LVDS Differential Data Output
64	LVA0P	O	A-Link Positive LVDS Differential Data Output
65	LVA0M	O	A-Link Negative LVDS Differential Data Output
66	VDDC	I	Digital Core Power
67	LVB3P	O	B-Link Positive LVDS Differential Data Output
68	LVB3M	O	B-Link Negative LVDS Differential Data Output
69	LVBCKP	O	B-Link Positive LVDS Differential Clock Output
70	LVBCKM	O	B-Link Negative LVDS Differential Clock Output
71	LVB2P	O	B-Link Positive LVDS Differential Data Output
72	LVB2M	O	B-Link Negative LVDS Differential Data Output
73	LVB1P	O	B-Link Positive LVDS Differential Data Output
74	LVB1M	O	B-Link Negative LVDS Differential Data Output
75	VDDP	I	Digital Output Power
76	GND		Ground
77	LVB0P	O	B-Link Positive LVDS Differential Data Output
78	LVB0M	O	B-Link Negative LVDS Differential Data Output
79	GND		Ground
80	BYPASS		For External Bypass Capacitor
81	NC		Not connected
82	VDDC	I	Digital Core Power
83	GND		Ground
84	RST	I	Chip Reset; High Reset
85	GPIO_P12	I/O	General Purpose Input/Output; 4mA driving strength
86	PWM1/GPIO_P25	I/O	Pulse Width Modulation Output; 4mA driving strength/General Purpose Input/Output; 4mA driving strength
87	RSTN	I	Chip Reset; Low Reset
88	GPIO_P00/SAR1	I/O	General Purpose Input/Output; 4mA driving strength/SAR ADC Input
89	GPIO_P01/SAR2	I/O	General Purpose Input/Output; 4mA driving strength/SAR ADC Input

90	GPIO_P02/SAR3	I/O	General Purpose Input/Output; 4mA driving strength/SAR ADC Input
91	GPIO_P06	I/O	General Purpose Input/Output; 6/12mA programmable driving strength
92	GPIO_P07	I/O	General Purpose Input/Output; 6/12mA programmable driving strength
93	PWM0/GPIO_P26	I/O	Pulse Width Modulation Output; 4mA driving strength/General Purpose Input/Output; 4mA driving strength
94	GPIO_P13	I/O	General Purpose Input/Output; 4mA driving strength
95	GPIO_P14	I/O	General Purpose Input/Output; 4mA driving strength
96	XIN	I	Crystal Oscillator Input
97	XOUT	O	Crystal Oscillator Output
98	AVDD_MPLL	I	MPLL Power
99	GPIO_P16/PWM2	I/O	General Purpose Input/Output; 4mA driving strength/ Pulse Width Modulation Output; 4mA driving strength
10	DDCD_SDA	I/O	DDC Data for DVI interface; 4mA driving strength

5. Adjustment Procedure

1. Key Function Description

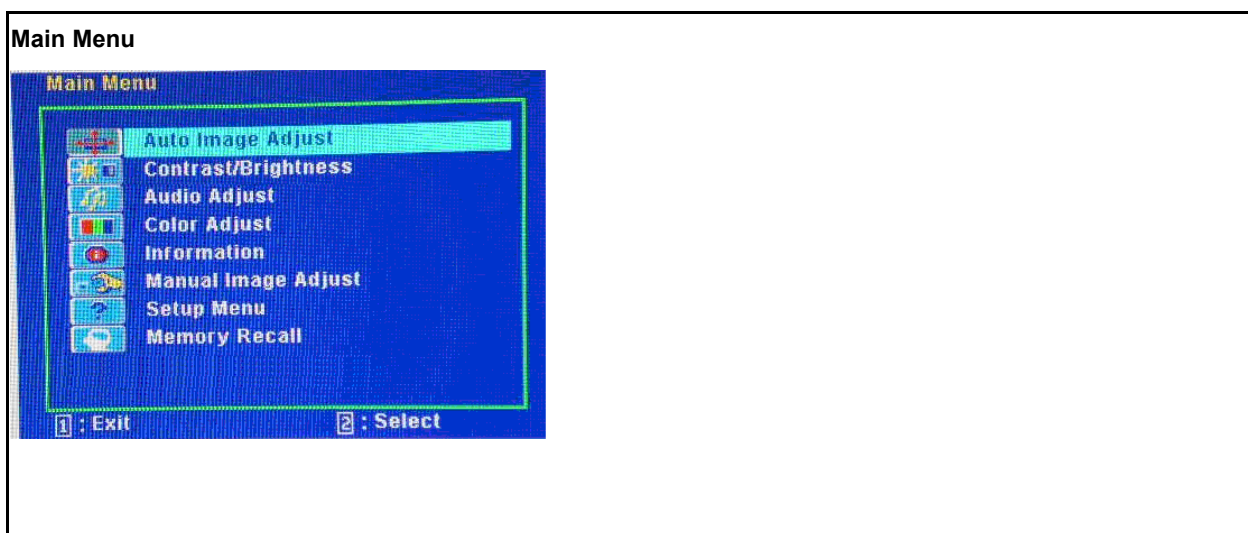
CONTROL KEY	KEYS FUNCTION
[AUTO] [2]	By pressing [AUTO] key, "Auto Image Adjust" is performed
[MENU] [1]	By pressing [MENU] key, Main menu display
[▼] [▲]	A. When "MENU OSD" display, press these keys to change the contents of an adjustment item, or change an adjustment value B. When "MENU OSD" is un-display, press these keys to change brightness and contrast
[POWER]	Power on or power off the monitor

2. Hot Key Operation

[1]	Main Menu
[2]	Auto Image Adjust
[▼]	Brightness adjust
[▲]	Contrast adjust
[▼]+[▲]	recall both of Contrast and Brightness to default
[1] + [2]	toggle 720x400 and 640x400 mode when input 720x400 or 640x400 mode
[1] + [▼] + [▲]	White Balance. (Not shown on user's guide)
[1] + [▼]	Power Lock
[1] + [▲]	OSD Lock
No signal + [2] + [⏻]	Burning mode
Signal + [2] + [⏻]	Factory Mode
Remark : All the short cuts function are only available while OSD off	

3. OSD Control

3.1 OSD table



Level 1	Level 2	Level 3
Auto Image Adjust *1		
Contrast/Brightness	Contrast *3,4	
	Brightness *3,4	
Audio Adjust	Volume	
	Mute	
Color Adjust	sRGB	
	9300K	
	7500K	
	6500K	
	5400K	
	User Color	Red
		Green
		Blue
Information	H.Frequency	
	V.Frequency	
	Resolution	
	Pixel Clock	
	Serial Number	
	Model Number	
Manual Image Adjust	Horizontal Size	
	H./V.Position	H.Position
		V.Position
	Fine Tune	
	Sharpness *2	
Setup Menu	Language Select	English
		French
		German
		Spanish
		Italian
		Finnish
		Japanese
		Simplified Chinese
		Traditional Chinese
	Resolution Notice	On

		Off
	OSD Position	H Position
		V Position
	OSD Time Out	5
		15
		30
		60
	OSD Background	
Memory Recall		

*1 These functions are not available in Digital Mode

*2 These functions are not available under Native Resolution Mode

*3 These functions setting can be recalled to default by [Up] + [Dn]

*4 These functions should be disabled and setting to default in sRGB Mode

*5 The description changing follows the rule below,

Selected	Description
R	[2]: Green
G	[2]: Blue
B	[2]: Red

*6 When Resolution Notice/OSD Background/OSD Pivot is selected, the description will change to
“[2]: ☒/□”

*7 Both of automatically and manually OSD pivot should be available.

3.2 OSD lock Menu function

OSD Lock Menu Function Check		
Item	Method	Phenomenon
Activate OSD lock	[1] + [▲] 10S	Press any of buttons "1", "▼", "▲", "2" will appear "OSD Locked" 3s
Deactivate OSD lock:	[1] + [▲] 10S(again)	
NOTICE: When the OSD is locked will lock all functions. Status bar indicating OSD Lock or Unlock is in progress and when complete it will indicate "OSD Locked" OSD Lock should not lock Power Button and Power Lock function		

3.3 Power lock Menu function

Power Lock Menu Function Check		
Item	Method	Phenomenon

Activate Power Lock	[1] + [▼] 10S	Can not turn off the LCD; Press the power button will appear "Power Button Locked" OSD 3s; LCD would automatically turn back "On" when power is restored after a power failure
Deactivate Power Lock	[1] + [▼] 10S(again)	
NOTICE: Status bar indicating Power Button lock or unlock is in progress and when complete it will indicate "Power Button Locked" Power should only be lockable in the "On State"		

3.4 Resolution notice function

Resolution Notice Menu		
Item	Method	Phenomenon
Activate Resolution Notice Menu	Resolution Notice OSD should show on screen after changing to non-native mode for 30 sec, And it should disappear after 10s or by pushing button [1] or [2]	-----
Deactivate Resolution Notice Menu	Push button [2] under Resolution Notice OSD, select Disable	-----

3.5 Factory Mode Introduction

When input the signal, press "power key" to turn off the monitor. Press" Signal + [2] + [U] "at the same time so as to enter factory mode. After power on, press "Menu[1]" key, you can see the Factory menu.

INL-V0 : Currently using panel model name
V4 060804 : Currently using firmware version information.
Auto Color : Automatically calibrate chip ADC parameter by using chip internal DAC
Color Temperature : The R, G, B of 9300K and 6500K and 5400K and User Mode
Colors are all generated from scaling back end.

4. Burn-in pattern

1. Burn-in patterns are: full Red, Green, Blue, Black and White
2. Stop burn-in pattern by providing with video signal from D-sub or DVI connector, or by pressing [U] to off mode, then power on

5. Auto Color (Automatically calibrate chip ADC parameter by using chip

internal DAC)

If it is a new-built set and it is first time to do the “auto color”, please confirm the following steps:

- Connect the VGA cable with the standard video pattern generator and display 16-gray pattern on the monitor.
- Press “Power” to power off the monitor.
- Press” Signal + [2] + [↻] “simultaneously to enter factory mode.
- Press “Menu[1]”, then press “Auto[2]” to execute Auto color item.
- After the “Auto Color” process finished, please press “Power” to restart monitor.

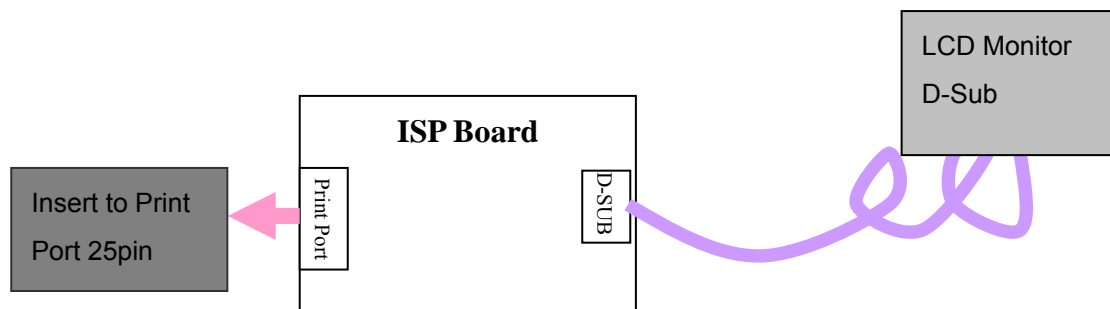
6. EDID (Rewrite EDID data to EEPROM)

If we need to rewrite the EEPROM data, please confirm the following steps.

1. Plug in VGA Cable; we can rewrite the EDID data to EEPROM by using “EDID Rewrite” program.
2. If the “EDID Rewrite” process finished, please pull out VGA cable and press “2”+”▲” at the same time.
3. Pull out AC power cable or press power key to restart.

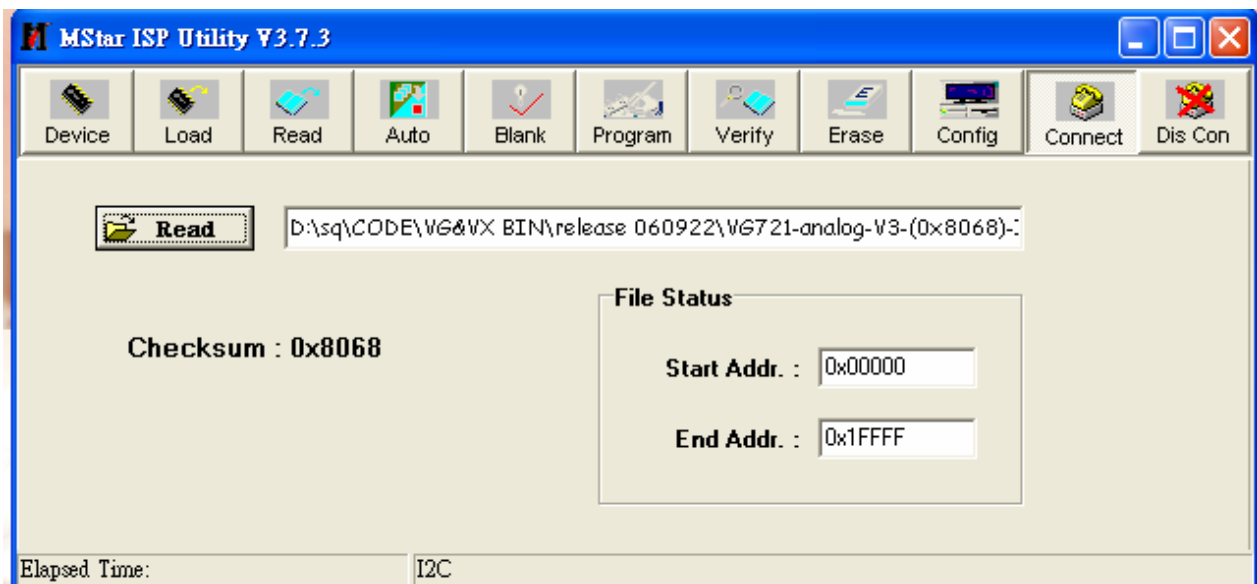
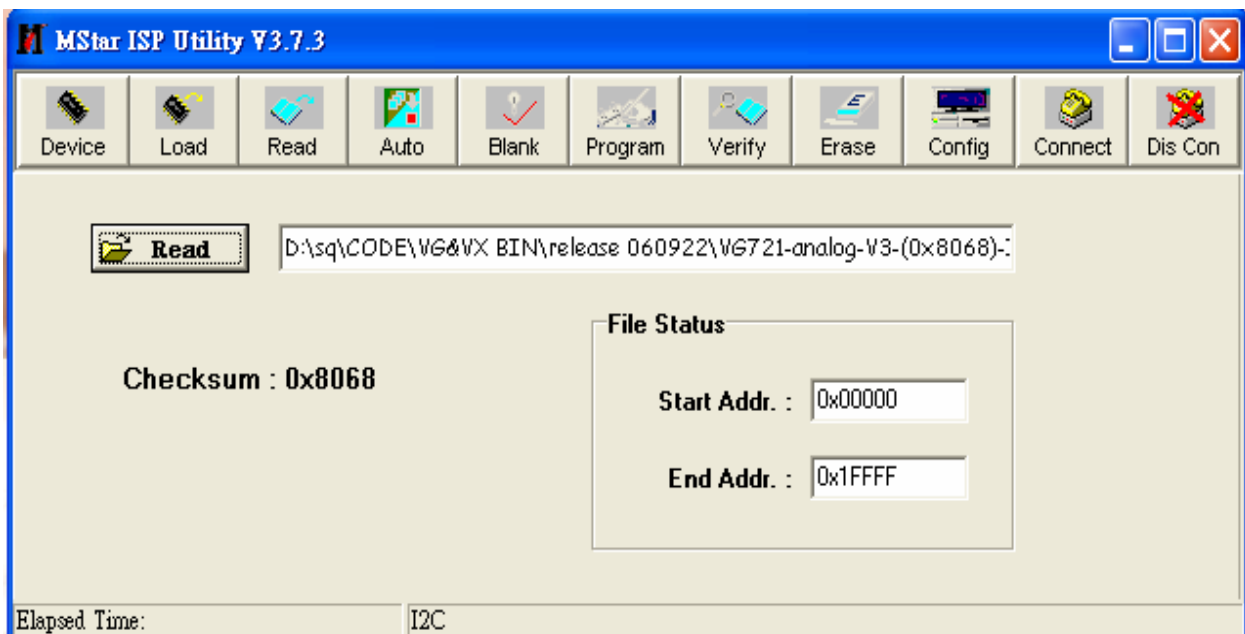
7. Upload firmware to MCU via VGA Cable

7.1 Connect ISP board between monitor and PC as below configure

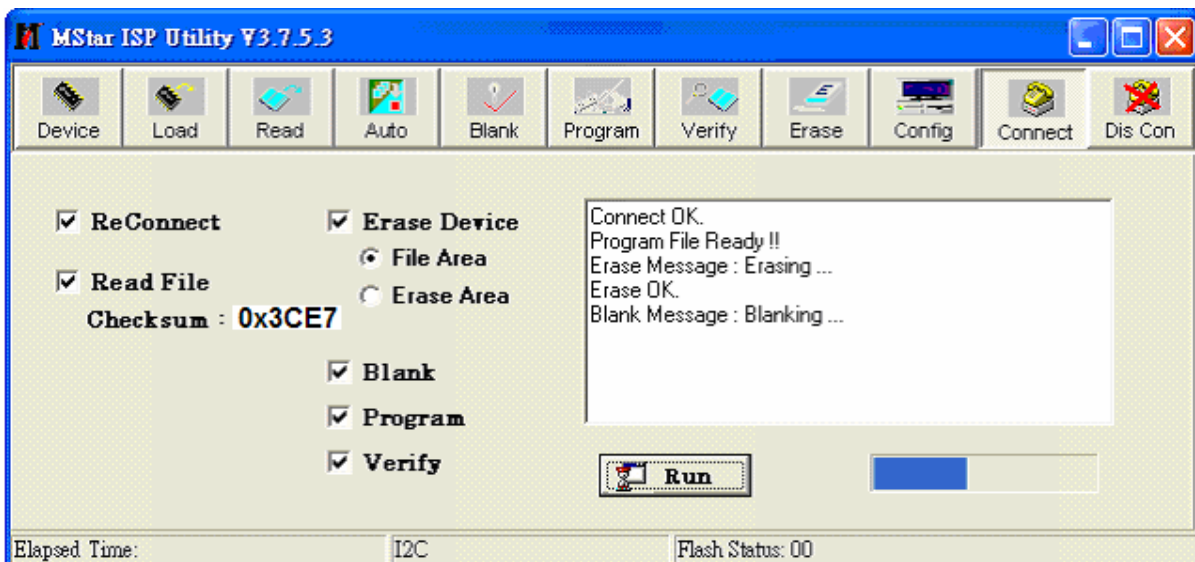


7.2 Using mStar ISP Tool Update FW:

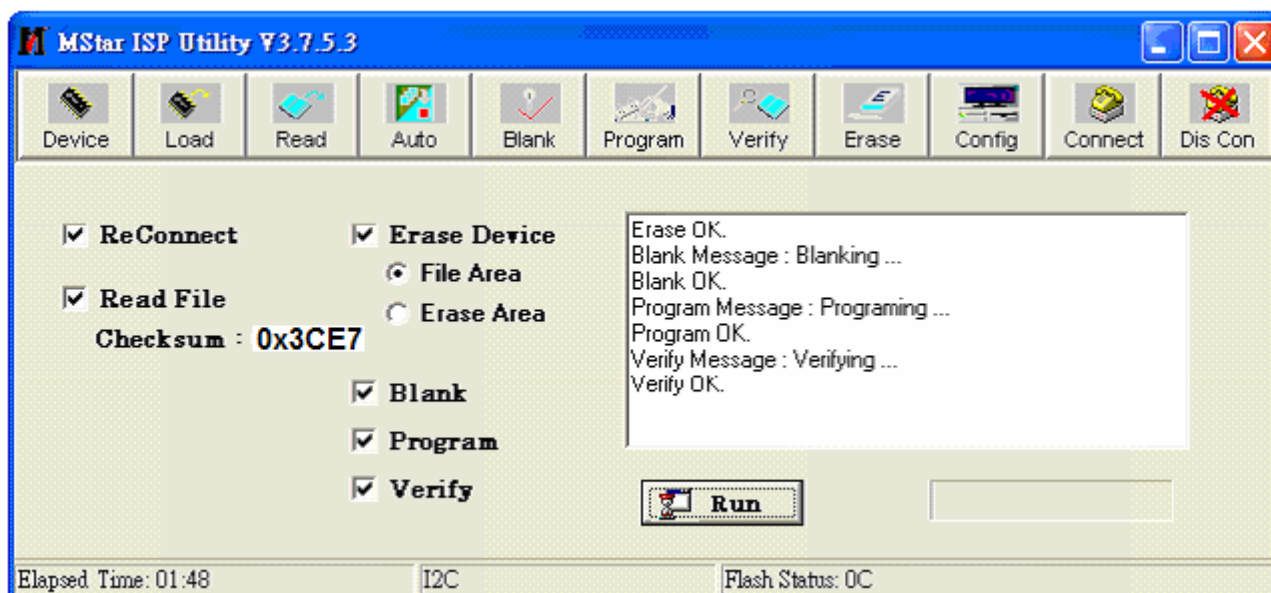
- (1). Select “Read”, Choose the corresponding firmware, load to MCU.
- (2). Select “Connect”, auto connect for ISP.



(3). Select “Run”, start ISP.



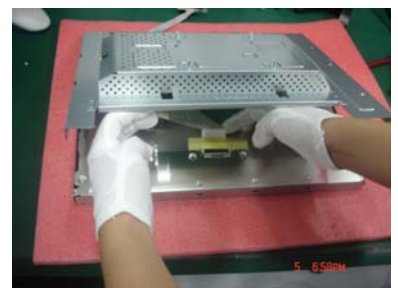
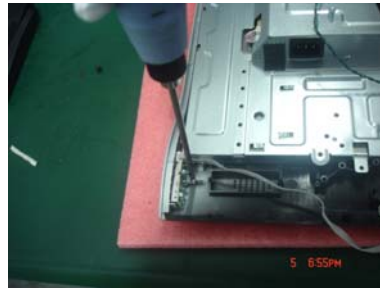
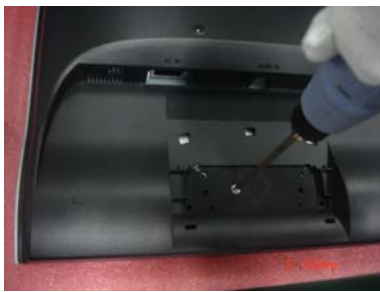
(4). When the picture show “Verify OK”, ISP finished.

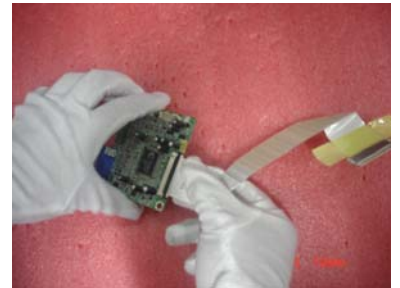
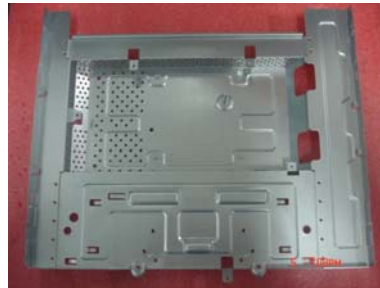


8 After repair, to ensure the quality you should do the following test and adjustment

Item	Content	Equipment
Test OSD function	1.Signal is set as 1280x1024@60Hz 2. LCM button are from left to right, checking whether each single function key and compound function key can be worked.	Chroma Signal Generator
Contrast Check	1. Set input mode to 1280x1024@60Hz 2. Set Pattern to 32 gray shades 3. Set contrast to the max. The brightest 6~8 shades brightness cannot be distinguished.	Chroma Signal Generator
Color Temperature	1. Do “Auto color” at 640 x 480@60Hz, 5-Mosaic pattern 2. Measure color temperature, check it complies with the following temperature: 5400K x=0.335 +/- 0.02, y=0.350 +/- 0.02 6500K x=0.313 +/- 0.02, y=0.329 +/- 0.02 9300K x=0.283 +/- 0.02, y=0.298 +/- 0.02	Chroma Signal Generator and color analyzer
Modes switching check	1. Use Chroma Pattern Generator to make sequence. VESA (640x480 800x600 1024x768 1280x1024), MAC 832x624 DOS (640x350 720x400), the detail supported modes and power saving signal. 2. Confirm the above timing modes must be full screen and the picture must be normal. 3. LED is Orange at power saving mode.	Chroma Signal Generator
Y measurement at default setting	1. Set brightness to default value 100 and contrast to default value 70 at 6500K 2. At full white patter, Measure Y, which should be $\geq 250\text{cd/m}^2$	Chroma Signal Generator and Color Analyzer
Panel Flicker check	1. Mode: 1280x1024@60Hz 2. Set Brightness& contrast to default value 3. Do “Auto Image Adjust” 4. Shut down PC to check whether there's glitter on the center of the picture.	Equipment:: Chroma Signal Generator & PC

Power saving	1. Mode: 1440X900@60Hz			Chroma signal generator and Power meter AC input: 230V/50Hz
	2. Pattern: full white			
	3. Brightness: Max.			
	4. Contrast: Default			
	5. Check power consumption at each modes			
	State	Power Consumption	LED color	
	Normal	≤ 42W	Green	
	Stand By	< 2W	Orange	
	Power Key Off	< 1W	No	





Packing procedure

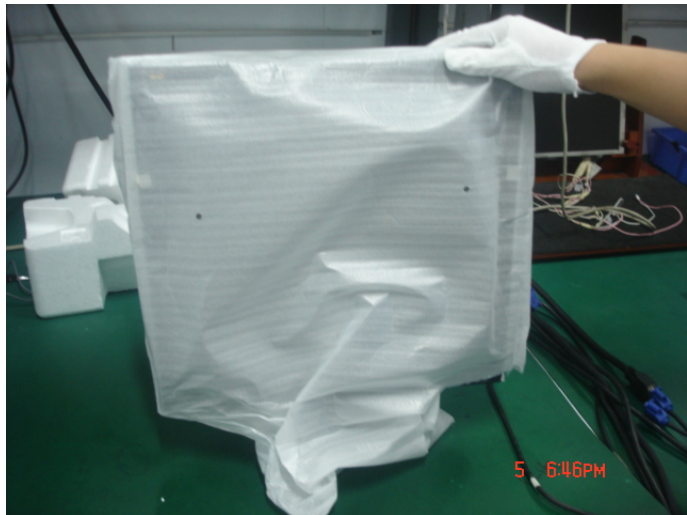


Figure 1

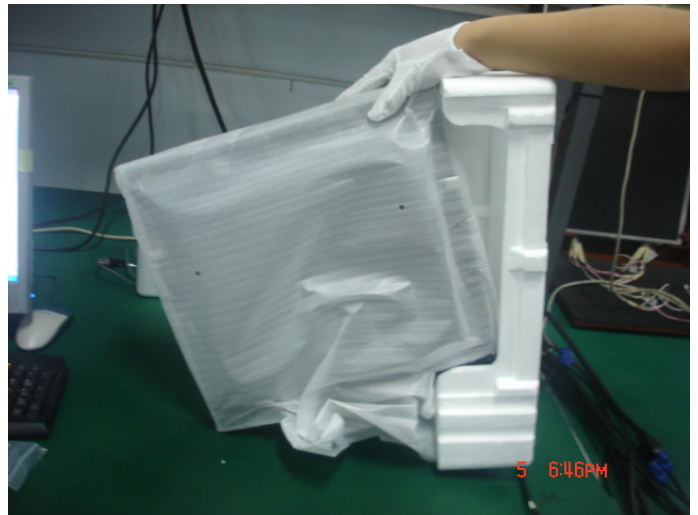


Figure 2



Figure 3



Figure 4

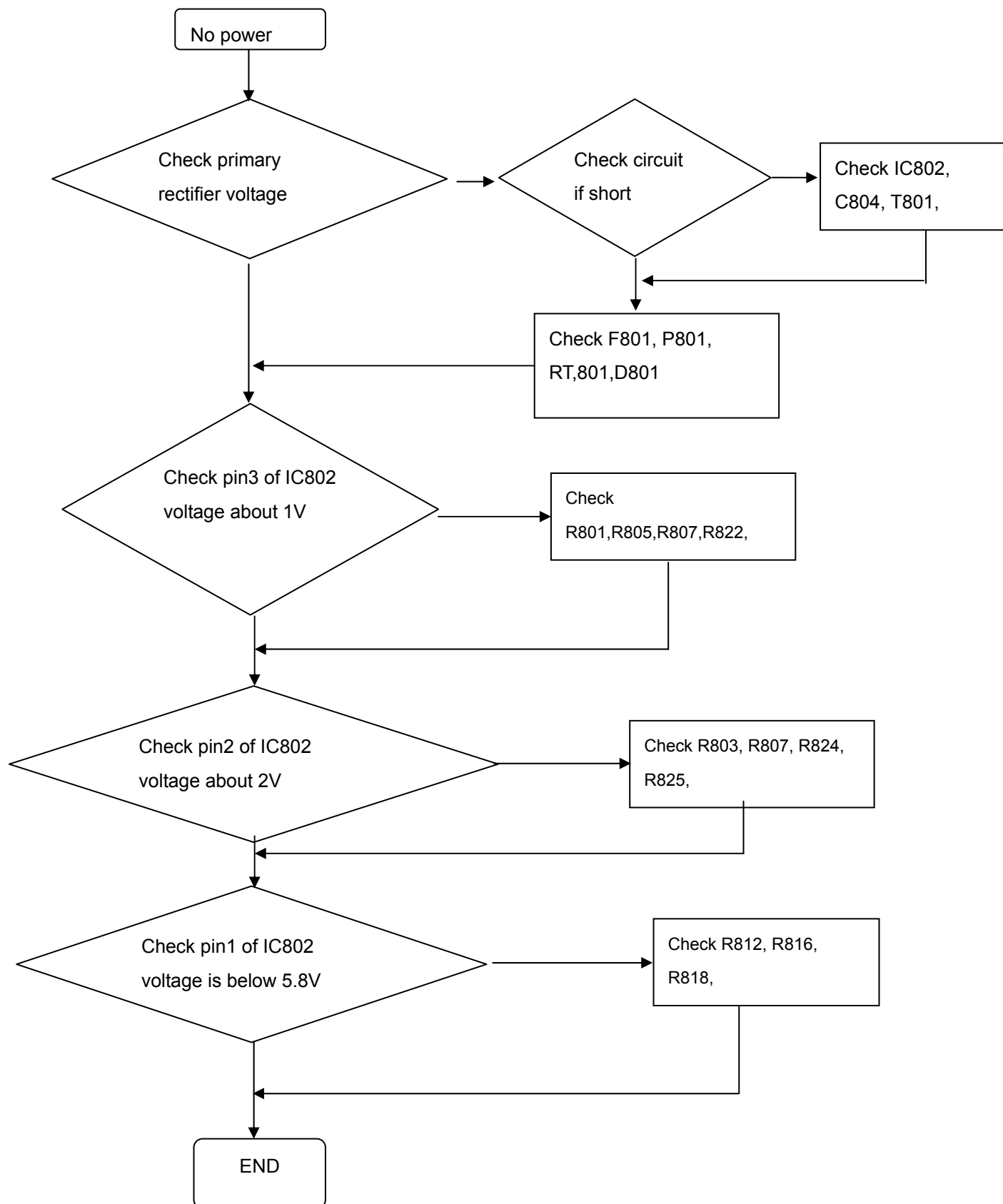


Figure 5

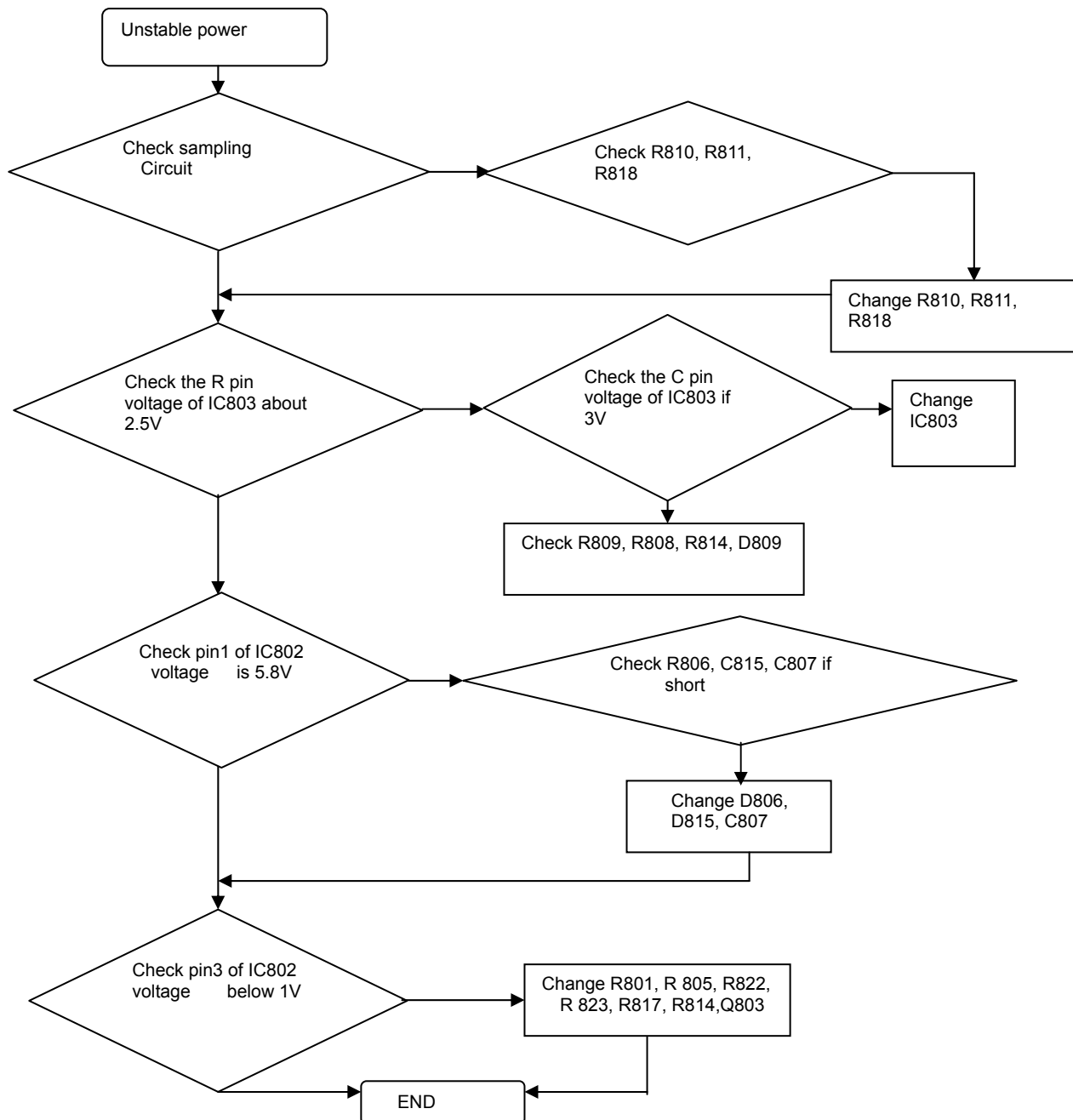
6. Troubleshooting Flow Chart

Common Acknowledge

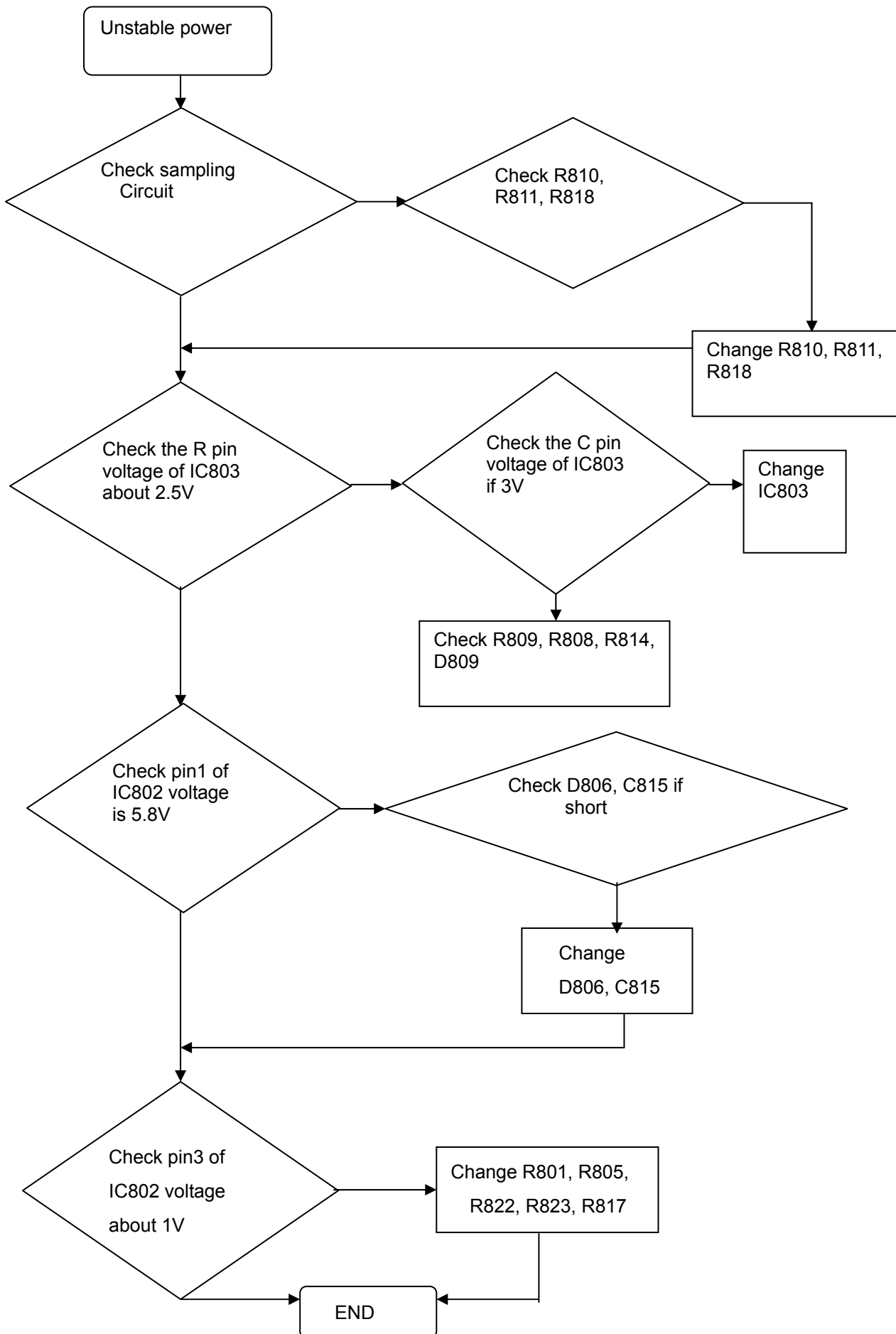
- If you change the interface board, be sure that the U103, U105, U106 and U108 these three components also changed to the new I/F board because there was program inside. If not, please re-write EDID and upload firmware into U106 via VGA Cable.
- If you adjust clock and phase, please do it at the condition of Windows shut down pattern.
- If you confirm the R.G.B. color is normal or not, please do it under 16-grey scalar pattern.
- This LCM is analog interface. So if the entire screen is an abnormal color that means the problem happen in the analog circuit part, if only some scale appears abnormal color that stand the problem happen in the digital circuit part.
- If you check the H/V position, please use the crosshatch pattern.
- This LCM support more than 30 timing modes, if the input timing mode is out of specification, the picture may appears abnormally.
- If brightness uneven, repairs Inverter circuit or change a new panel.
- If you find the vertical line or horizontal line lost on the screen, please change panel.
- If you find the speaker don't working, please don't plug in audio cable, unless change new speaker.



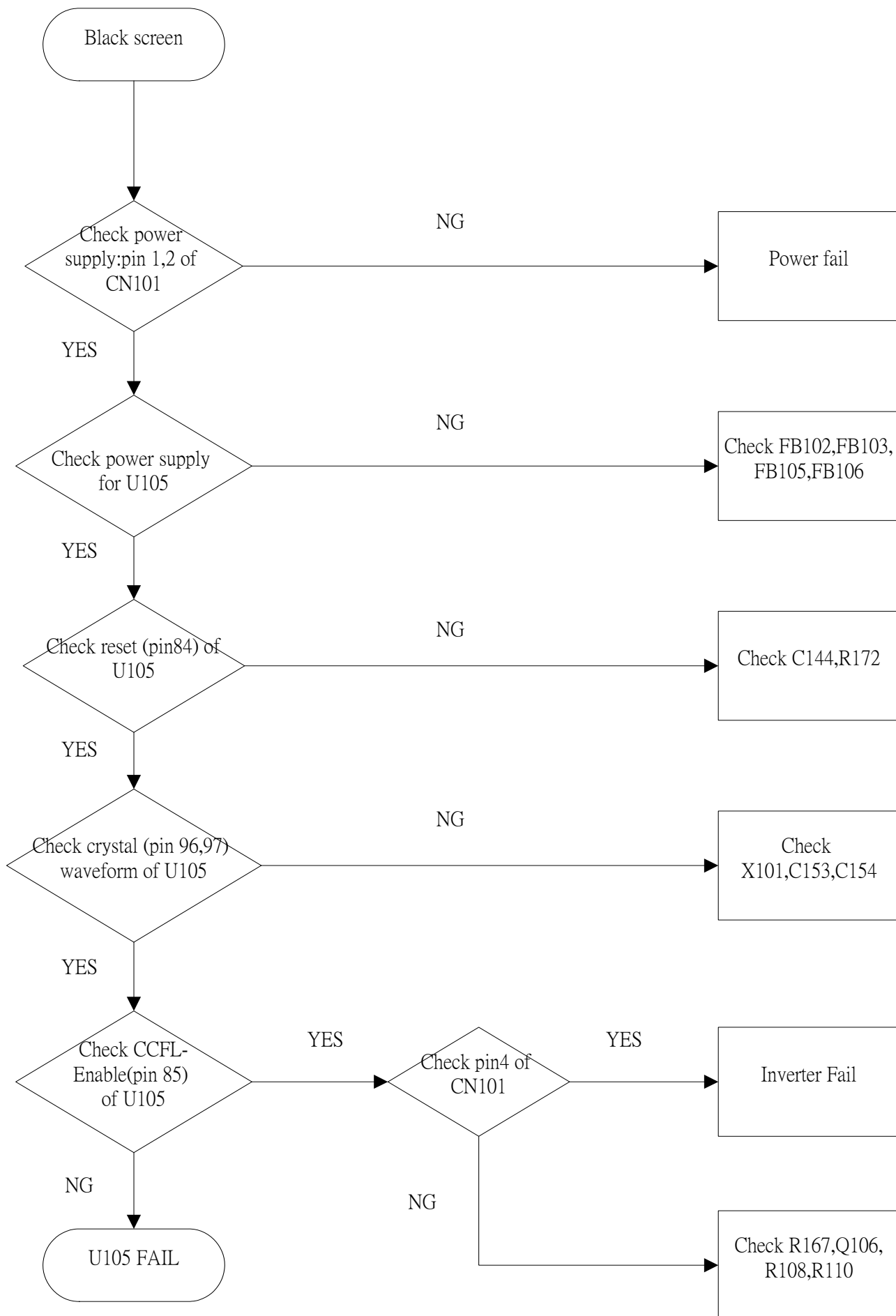
DC output voltage is unstable



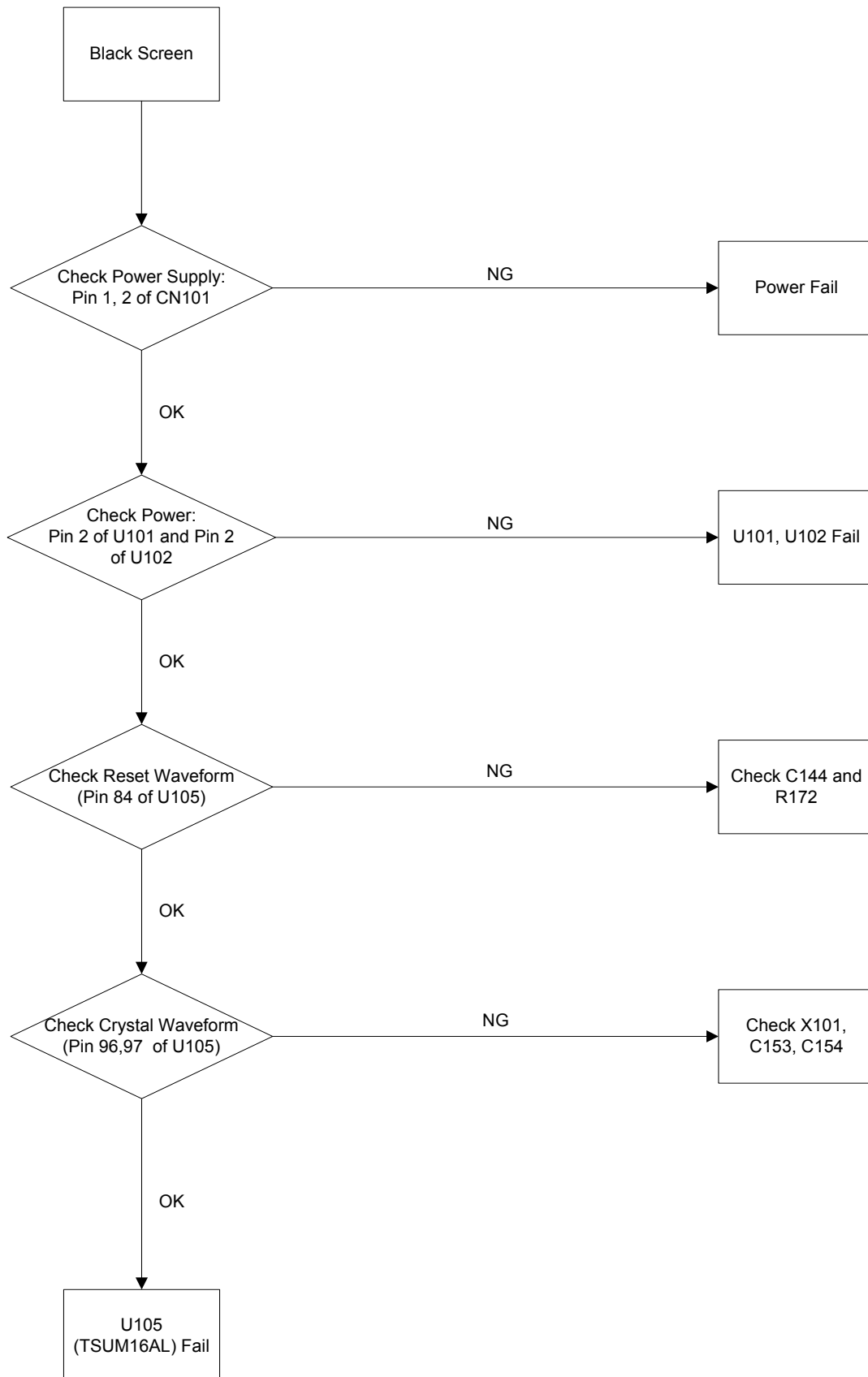
Output power is unstable



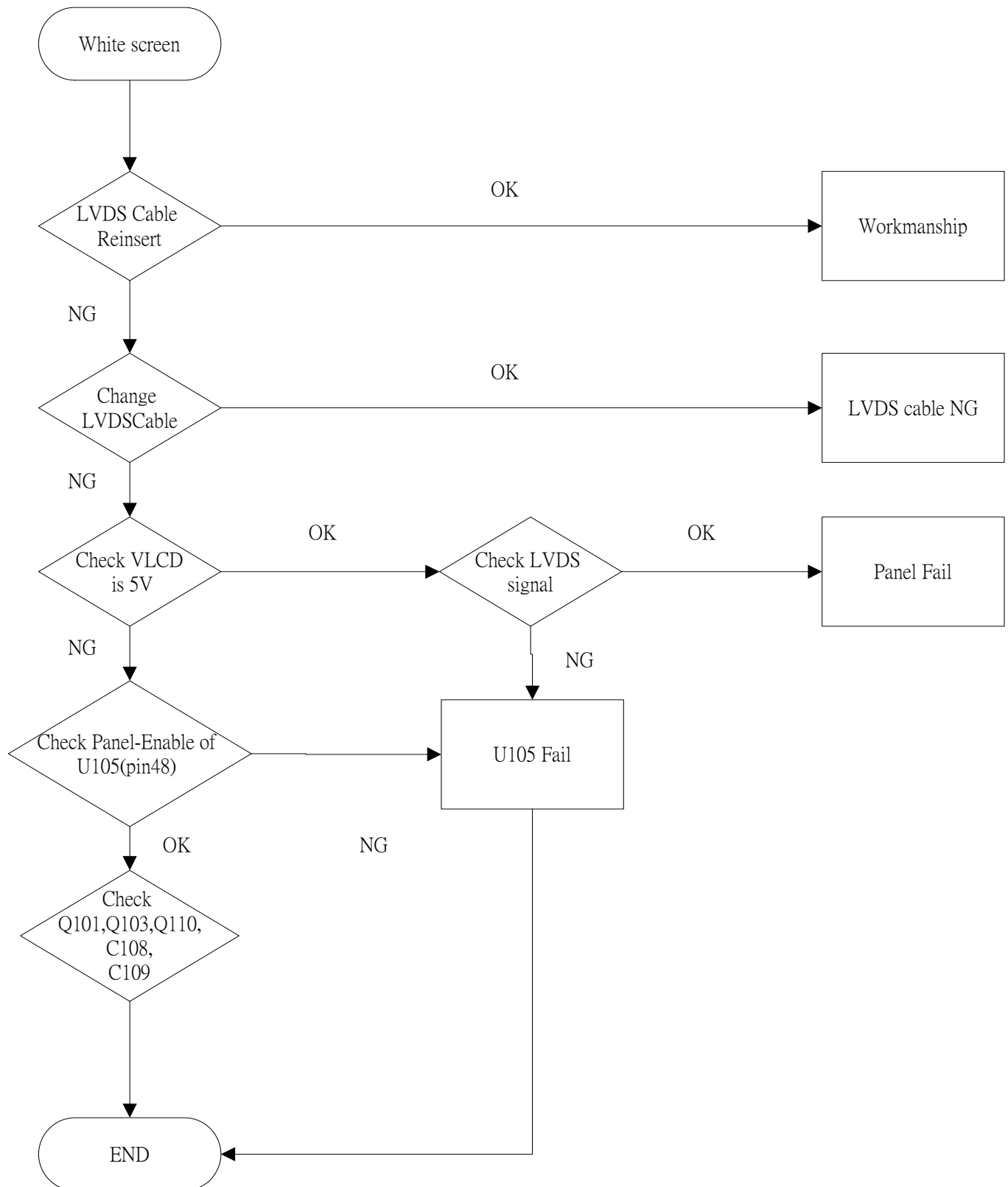
Backlight can't be turned on



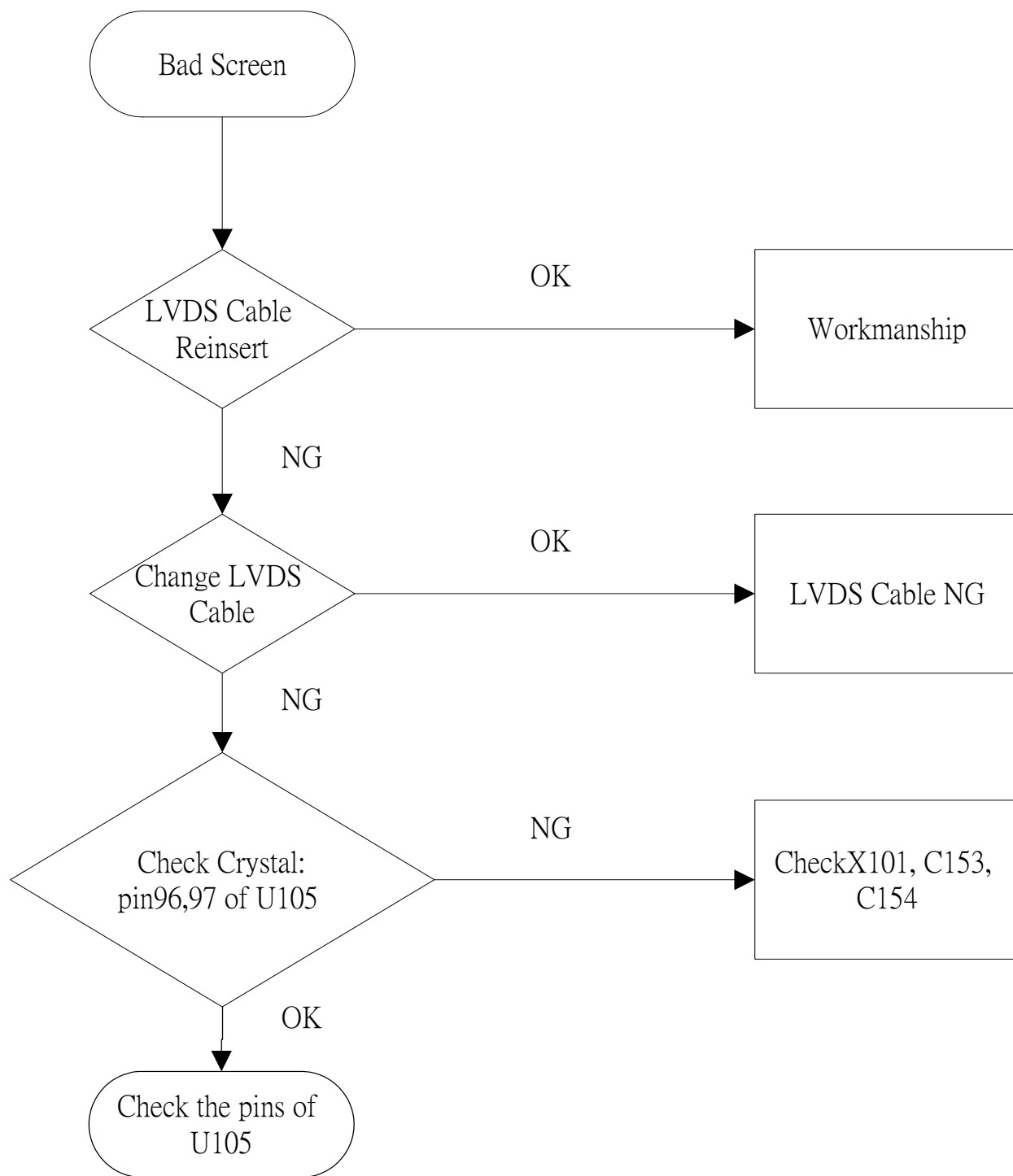
Black Screen and backlight turn on



White Screen



Bad Screen



7. Recommended Spare Parts List

RECOMMENDED SPARE PARTS LIST (VG721m-2)

ViewSonic Model Number: VS11353

Serial No. Prefix: QAM

Rev: 1b

Item	Description	ECR/ECN	ViewSonic P/N	Ref. P/N	Location	Universal number#
1	Accessories:					
2	[Adapter, Remote Control]					
3	Power Cord 10A/250V BLK 6FT UL/CSA RoHS		A-00006679	453070800250R		
4	Power Cord 10A/250V BLK 6FT China	Added on 12/15/06	A-00005255	453070800170R		
5	Power Cord 16A/250V BLK 6FT Europe	Added on 12/15/06	A-00003674	453070800210R		
6	Power Cord 7A/125V BLK 6FT CNS,VCTF Taiwan	Added on 12/15/06	A-00006733	453070800480R		
7	Power Cord 10A/250V BLACK 6FT SAA Australia	Added on 12/15/06	A-00003671	453070800420R		
8	Power Cord 16A/250V BLK 6FT KTL Korea	Added on 12/15/06	A-00006734	453070800500R		
9	Power Cord 5A/250V BLK 6FT Singapore	Added on 12/15/06	A-00003675	453070800230R		
10	Kit Accessory,INL-V7		A-00008050	703000003200R		
11	Key Board		B-00008024	790691501000R		
12	Led Board		B-00008025	790682201000R		
13	Power Supply Board		B-00008122	790731400600R		
14	Interface Board (V7)		B-00008123	790731300610R		
15	Base Assembly		C-00008036	714020007200R		
16	Front Panel		C-00008148	714030007300R		
17	Cover - Hinge STD		C-00008149	501020209800R		
18	Flat Cable (FFC 30P 234mm,RoHS)		CB-00006726	430303000570R		
19	D-Sub Cable (Black)		CB-00008009	453010100150R		
20	Audio Cable - 1P 6FT W/Core		CB-00008045	453030300150R		
21	Wire - HRN 8P 270mm UL2651#28 RoHS		CB-00008046	430300800790R		
22	Wire - HRN 4P 200mm UL2651#28 RoHS		CB-00008047	430300400130R		
23	Speaker - 1.5W 16? 260mm,R/B,W/Case		E-00008094	618100101100R		
24	Speaker - 1.5W 16? 260mm,R/B,W/Case RoHS	Added on 12/15/06	E-00008266	618100100070R		
25	LCD PANEL 17" MT170EN01-V9,AM17000059	Added on 12/15/06	E-00008263	631102072110R		
26	LCD Panel - 17" MT170EN01- V7, AM17000057		E-00008095	631102071710R		
27	PE Bag +EPE, L590xW480xT0.6mm		P-00005272	506120300400R		
28	PE BAG, L280xW300xT0.05mm		P-00006720	506120003420R		
29	Craft Box		P-00008147	506020012400R		
30	Craft Foam - EPS Left		P-00008148	506040010000R		
31	Craft Foam - EPS Right		P-00008149	506040010010R		
32	Generic Foam Set		P-00001347	30833		
33	Generic Box		P-00002515	20653		
34	Plastics:					
35	Pedestal (Stand)		PL-00008034	714010007300R		

Remark 1: Above listed items are examples, supplier can expand the rows to add more necessary items.

Remark 2: All revised RSPLs with newly added items or any change made should be highlighted and correlated with the ECN/ECR approved by ViewSonic Corporation. This is to eliminate repeated cross checks of each item between this version and prior versions.

BOM LIST (VG721m-2)

ViewSonic Model Number: VS11353

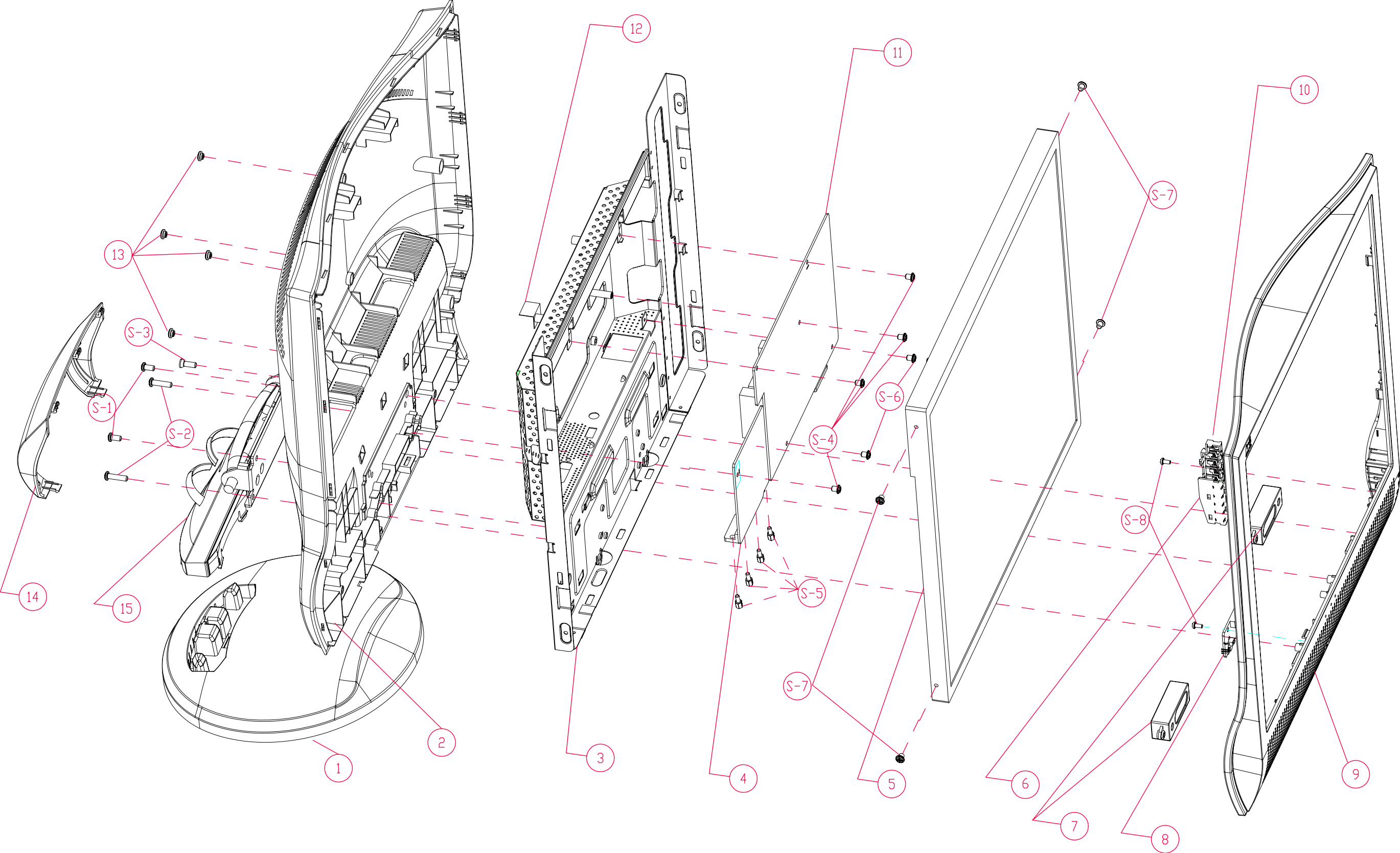
Rev: 1b

Serial No. Prefix: QAM

Item	ViewSonic P/N	Ref. P/N	Description	Location	Universal number#	Q'ty
1	N/A	506380002100R	TAPE,WRAPPING TYPE(VIEWSONIC),50mmx75M,L			0.513
2	N/A	506431000300R	FILM,PE 500mmx900M ROHS			0.05
3	P-00008147	506020012400R	CARTON,VIEWSONIC(VG721), LE1741			100
4	N/A	506039007400R	CORNER PAPER,2025x50x50xT5mm, LE1729			7.143
5	N/A	506039005400R	CORNER PAPER,800x50x50xT5mm,LE1512			7.143
6	P-00005272	506120300400R	BAG,PE+EPE,L590xW480xT0.6mm(PRINTED)LE19			100
7	P-00006720	506120003420R	BAG,PLASTIC,L280xW300xT0.05mm,LE1734			100
8	A-00006679	453070800250R	PWR CORD 10A/125V BLK 6FT UL/CSA,SVT 18x			100
9	CB-00008045	453030300150R	CABLE,AUDIO 1P 6FT W/CORE,B/GCP03B06P03-			100
10	CB-00008009	453010100150R	CABLE,D-SUB 15P MALE 6FT BLACK,SZ4120955			100
11	P-00008148	506040010000R	CUSHION,EPS-L,VG721, LE1741			100
12	P-00008149	506040010010R	CUSHION,EPS-R,VG721, LE1741			100
13	N/A	506150001201R	PALLET,1140x910x120mm, LE1741			1.786
14	N/A	506037006000R	CARDBOARD,COVER,L1140xW910xH100mm,LE1741			3.571
15	N/A	505040203600R	INSULATOR,PET,355x292x0.1mm, LE1709			100
16	N/A	506440002300R	LABEL,BLANK,76.2x76.2mm,LE1709(UPC)			100
17	N/A	506440002400R	LABEL,BLANK,50x25mm,LE1709(S/N)			100
18	N/A	506390000600R	LABEL,HI-POT PASS, LE1709			100
19	N/A	506390500100R	LABEL,ENERGY STAR, LE1709			100
20	N/A	506250010400R	LBL,AGENCY,VG721M, LE1741			100
21	N/A	506440002600R	LABEL,BLANK,210x65mm,LE1709(PALLET)			3.57
22	N/A	506390210100R	LABEL,CARTON(8ms), LE1709,L89xW58mm			100
23	A-00008050	703000003200R	KIT,ACCESSORY,INL-V7, LE1741			100
24	N/A	714078261400R	ASSY,FINAL(B+S,V9/G1,2,3),W/SPK,LE1741-6			100
25	N/A	714078261400R	ASSY,FINAL(B+S,V9/G1,2,3),W/SPK,LE1741-6			
26	N/A	509116608510R	SCREW,P,CROSS,M4*8,BLACK,NL(NYLOK)			200
27	N/A	509112616500R	SCREW,P,CROSS,T.T-4*16,BLK-Zn,ROHS			200
28	E-00008266	618100100070R	SPEAKER 1.5W 8Ω 260mm,R/B/G,W/CASE, ROH			100
29	N/A	501030204400R	BUTTON,FUNCTION KEY, LE1941			100
30	N/A	509112306100R	SCREW,P,CROSS,T.T-3*6,ZnROHS			200
31	N/A	506381000700R	TAPE,ACE,45mmx30M(PC=10x45mm),LE1709 ROH			200
32	N/A	503040000310R	RUBBER,COVER(B), LE1534			400
33	N/A	506380001200R	TAPE,MYLAR,66000x20xT0.05			0.12
34	N/A	509212612100R	SCREW,F,CROSS,T.T-4*12,Zn			100
35	C-00008149	501020209800R	COVER,HINGE,STD,VG721, LE1741			100
36	C-00008148	714030007300R	ASSY,BEZEL,VG721, LE1741			100
37	PL-00008034	714010007300R	ASSY,STAND,VG721, LE1741			100
38	C-00008036	714020007200R	ASSY,BASE(B), LE1941			100
39	N/A	714050007300R	ASSY,BACK COVER,W/O DVI, LE1741			100
40	N/A	714088261400R	ASSY,PANEL(V9/G1,2,3),W/SPK,LE1741-6H0			100
41	C-00008148	714030007300R	ASSY,BEZEL,VG721, LE1741			
42	N/A	501010207600R	BEZEL,VG721, LE1741			100
43	N/A	501030204500R	BUTTON,POWER, LE1741			100
44	N/A	501120104400R	LENS, LE1941			100
45	N/A	506102000400R	LOGO PLATE,VIEWSONIC, LE1709(THREE BIRDS			100
46	N/A	506102000300R	LOGO PLATE,VIEWSONIC, LE1709			100
47	PL-00008034	714010007300R	ASSY,STAND,VG721, LE1741			
48	N/A	501260203400R	STAND,REAR(B), LE1941			100
49	N/A	501260203300R	STAND,FRONT(B), LE1941			100
50	N/A	502060003200R	HINGE, LE1741			100
51	N/A	509112608100R	SCREW,P,CROSS,T.T-4*8,Zn ROHS			400
52	N/A	501040200200R	CLIP,CABLE,UP, LE1941			100
53	N/A	501040200300R	CLIP,CABLE,DOWN, LE1941			100
54	C-00008036	714020007200R	ASSY,BASE(B), LE1941			
55	N/A	501240204600R	BASE(B), LE1941			100
56	N/A	502170301900R	PLATE,BASE, LE1941			100
57	N/A	503060004300R	GASKET,EMI,W13xH10xL17.5mm,LE1737			100
58	N/A	503020002710R	RUBBER,FOOT,L14.8*W9.6*T3.5mm,(PATTERN)R			400
59	N/A	509112306100R	SCREW,P,CROSS,T.T-3*6,ZnROHS			100
60	N/A	714050007300R	ASSY,BACK COVER,W/O DVI, LE1741			
61	N/A	501020209710R	COVER,BACK,W/O DVI, LE1741			100
62	N/A	506430300003R	FILM,PET,L115xW30xT0.05mm, LE1741			100
63	N/A	714088261400R	ASSY,PANEL(V9/G1,2,3),W/SPK,LE1741-6H0			
64	E-00008263	631102072110R	LCD PANEL 17" MT170EN01-V9-G1,AM17000059			100
65	N/A	631102072112R	LCP 17" MT170EN01-V9-G2,AM1700005902(INN			
66	N/A	631102072403R	LCP 17"MT170EN01-V9-G3,AM1700005903(INNO			
67	B-00008123	790731300610R	PCBA,I/F BOARD(V7), LE1741-6H0			100
68	B-00008122	790731400600R	PCBA,P/I BOARD, LE1741-6H2			100
69	B-00008024	790691501000R	PCBA,KEYPAD BOARD, LE1941			100
70	B-00008025	790682201000R	PCBA,LED BOARD, LE1941			100
71	HW-00005269	509146305300R	SCREW,PW,CROSS,W/WAS,M3*5,NI			400
72	N/A	509146306102R	SCREW,P,CROSS W/W-SPR,M3*6,Zn,ROHS			200
73	N/A	509146304100R	SCREW,P,CROSS W/WAS,M3*4,Zn ROHS			400

Item	ViewSonic P/N	Ref. P/N	Description	Location	Universal number#	Q'ty
74	HW-00005270	509000000700R	BOLT,#4-40x11.8,Ni FOR D-SUB/DVI CONN.RO			200
75	N/A	505040503100R	INSULATOR,PP,22x20x12X0.3mm,GLUE(3M), LE			100
76	CB-00006726	430303000570R	HRN LVDS FFC 30P 221mm,RoHS			100
77	CB-00008046	430300800790R	HRN ASS'Y 8P 270mm UL2651#28 ROHS			100
78	CB-00008047	430300400130R	HRN ASS'Y 4P 200mm UL2651#28 ROHS			100
79	N/A	502090304310R	CHASSIS,W/O DVI, LE1741			100

8. Exploded Diagram and Exploded Parts List

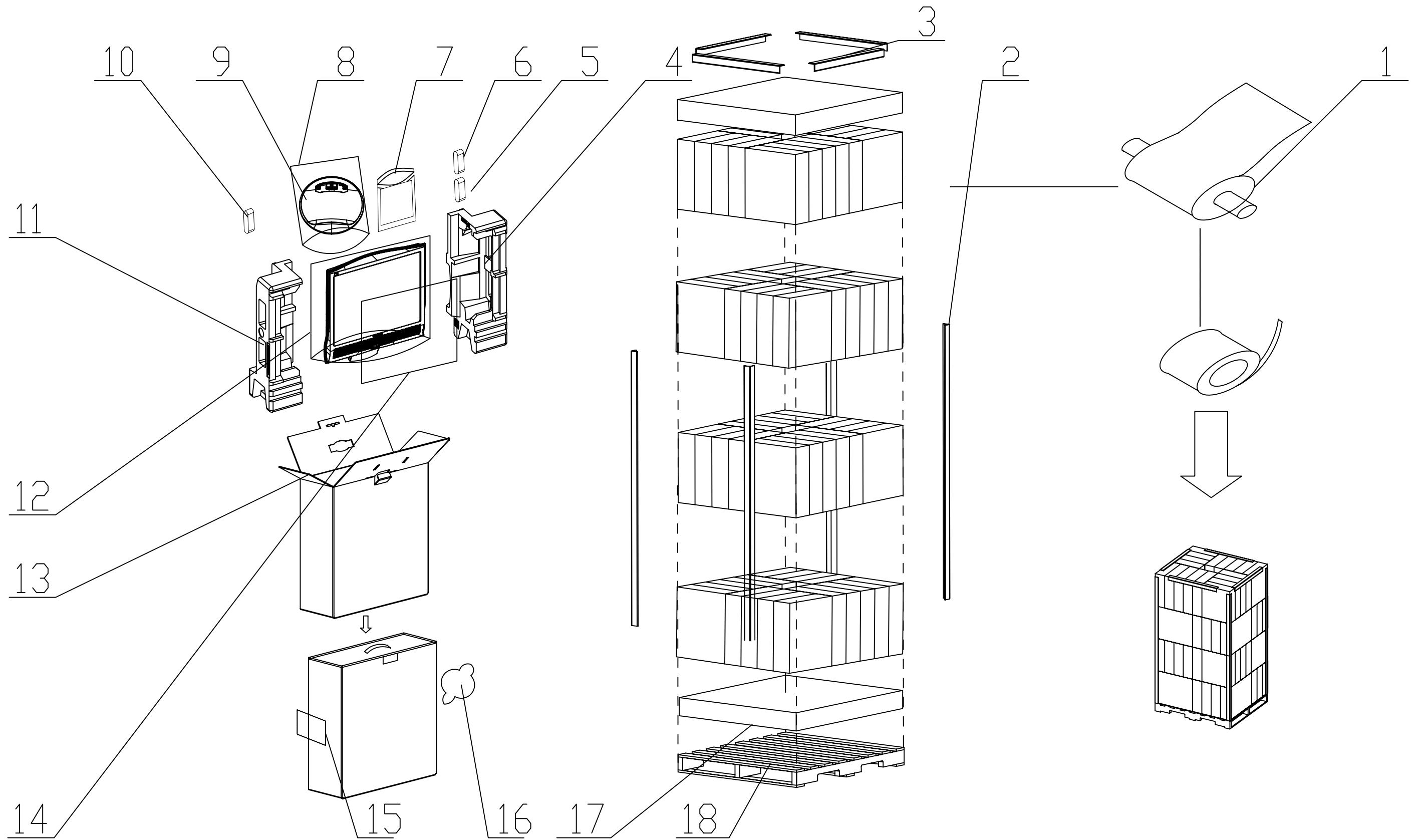


EXPLODED PARTS LIST (VG721m-2)

ViewSonic Model Number: VS11353

Rev: 1a

Item	ViewSonic P/N	Ref. P/N	Description	Q'ty
1	C-00008036	714020007200R	ASSY, BASE(B), LE1941	1
2	N/A	714050007300R	ASSY, BACK COVER, W/O DVI, LE1741	1
3	N/A	502090304310R	CHASSIS, W/O DVI, LE1741	1
4	B-00008122	790731400600R	PCBA, P/I BOARD, LE1741-6H2	1
5	E-00008006	631102071910R	LCD PANEL 17" MT170EN01-V7-G1	1
6	B-00008024	790691501000R	PCBA, KEYPAD BOARD, LE1941	1
7	N/A	618100101300R	SPEAKER 1.5W 220mm, R/B	1
8	B-00008025	790682201000R	PCBA, LED BOARD, LE1941	1
9	C-00008148	714030007300R	ASSY, BEZEL, VG721	1
10	N/A	501030007300R	BUTTON, POWER, LE1741	1
11	B-00008121	790731300600R	PCBA, I/F BOARD, LE1741-6H2	1
12	N/A	505040503100R	INSULATOR, PP, 22x20x12x0.3mm, LE1718	1
13	N/A	503060000310R	RUBBER, COVER	4
14	C-00008147	501020209850R	COVER, HINGE, HSD, VG730, LE1741	1
15	PL-00008034	714010007300R	ASSY, STAND, VG721, LE1741	1
S-1	N/A	509116608100R	SCREW, P, CROSS, M4x8, Zn, ROHS	2
S-2	N/A	509112616500R	SCREW, P, CROSS, T.T-4x16, BLK-Zn, ROHS	2
S-3	N/A	509212612100R	SCREW, F, CROSS, T.T-4x12, Zn	1
S-4	HW-00005269	509146305300R	SCREW, PW, CROSS, W/WAS, M3*5, NI	4
S-5	HW-00005270	509000000700R	BOLT, #4-40x11.8, Ni	4
S-6	N/A	509146306102R	SCREW, P, CROSS W/W-SPR, M3x6, Zn, ROHS	2
S-7	N/A	509112305100R	SCREW, P, CROSS, W/WAS, M3x4, Zn, ROHS	4
S-8	N/A	509112306100R	SCREW, P, CROSS, T.T-3x6, Zn, ROHS	2



PACKING PART LIST (VG721m-2)

ViewSonic Model Number: VS11353

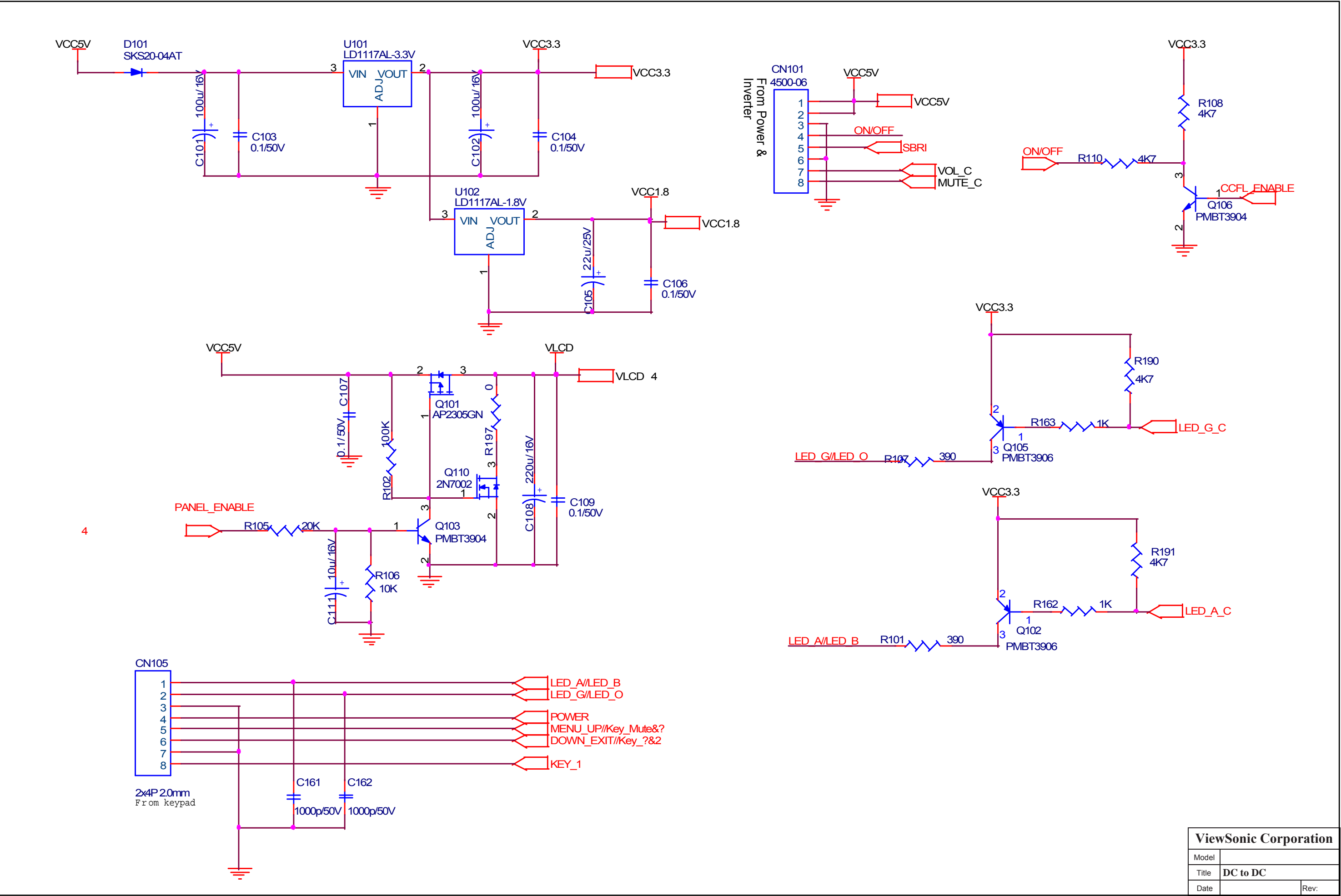
Rev: 1a

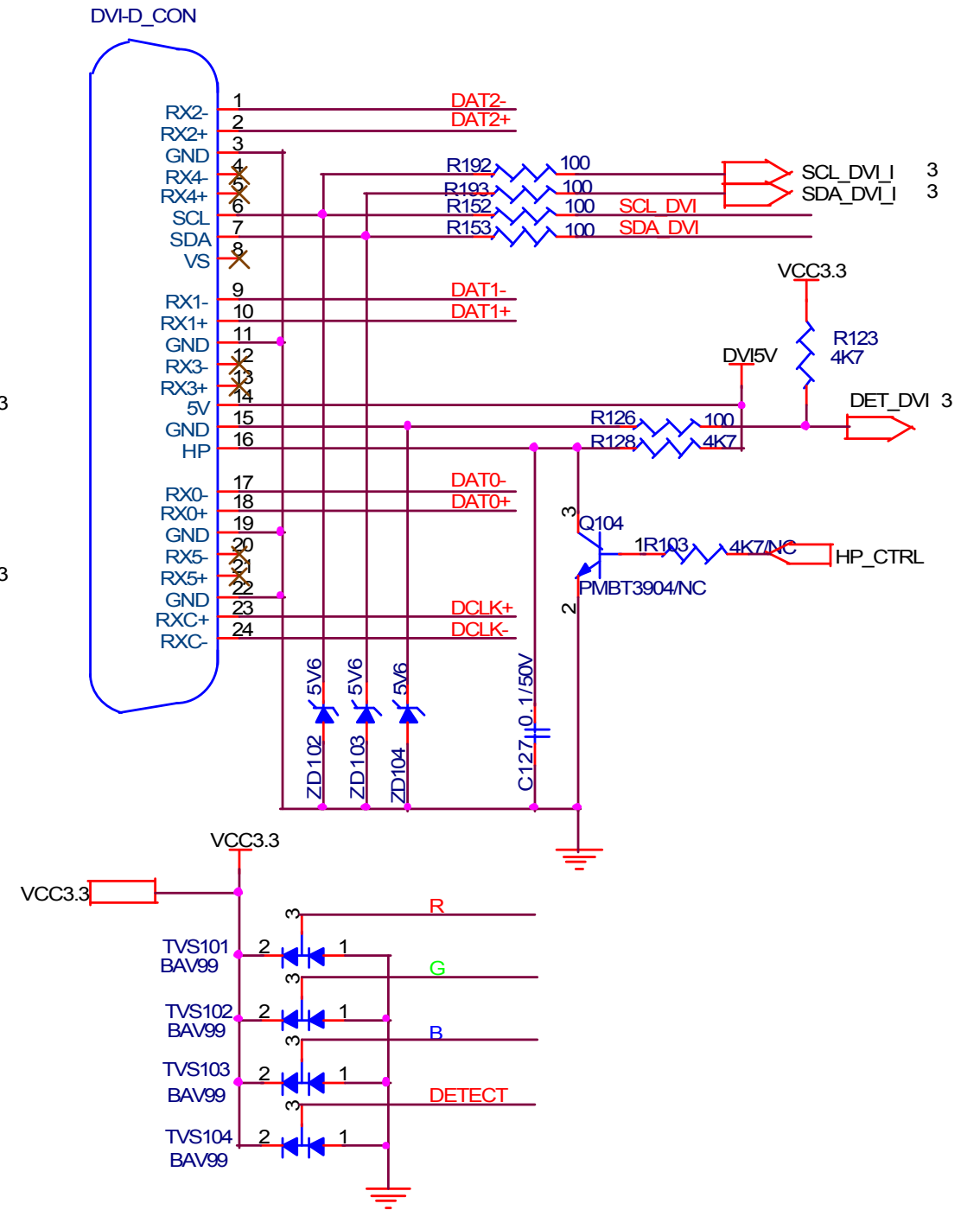
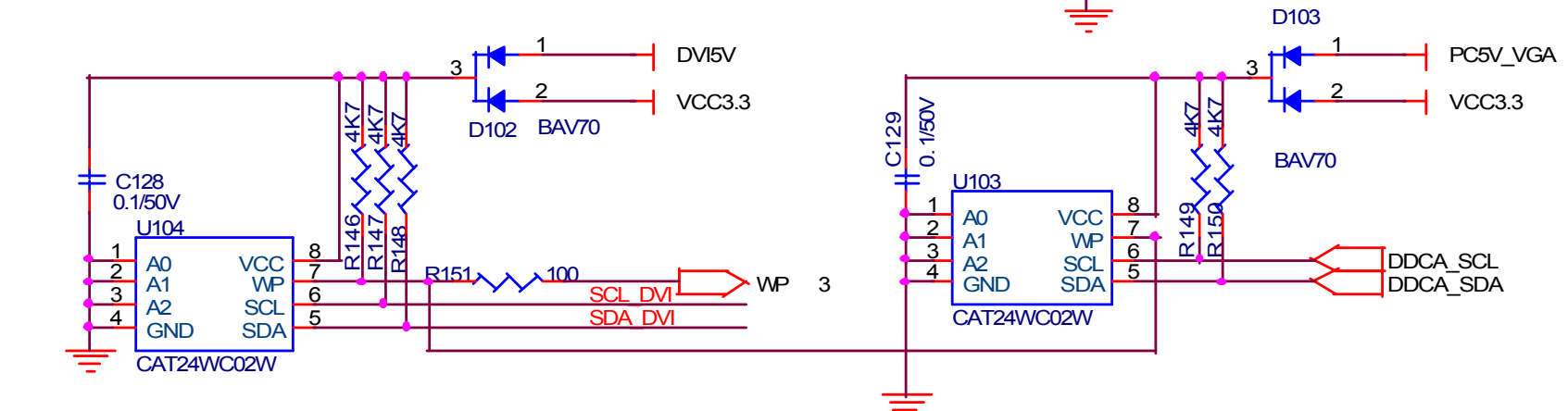
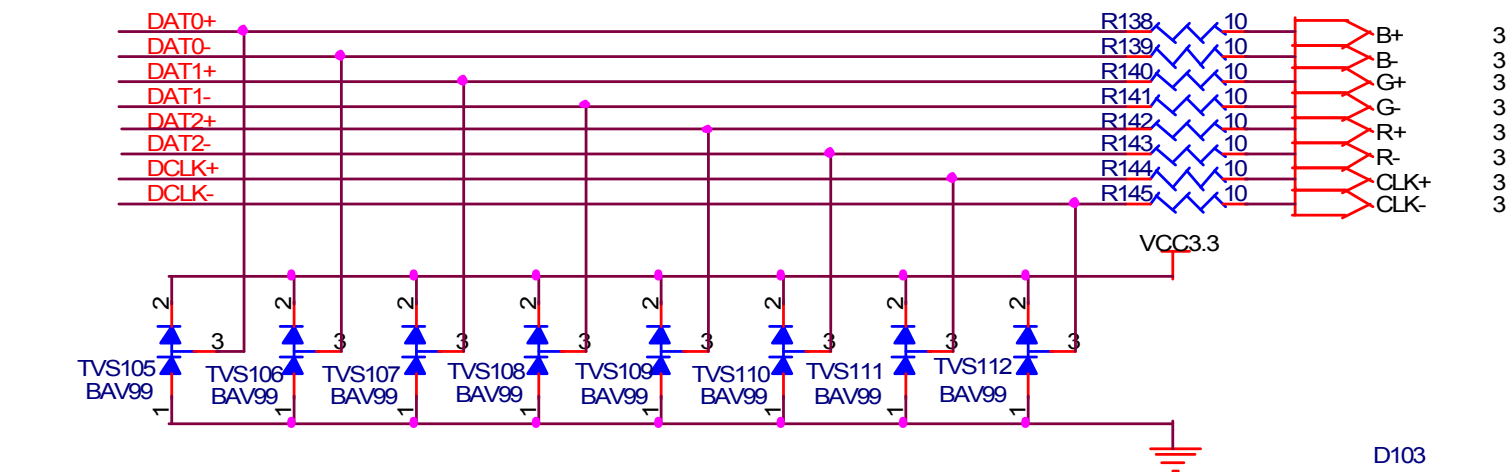
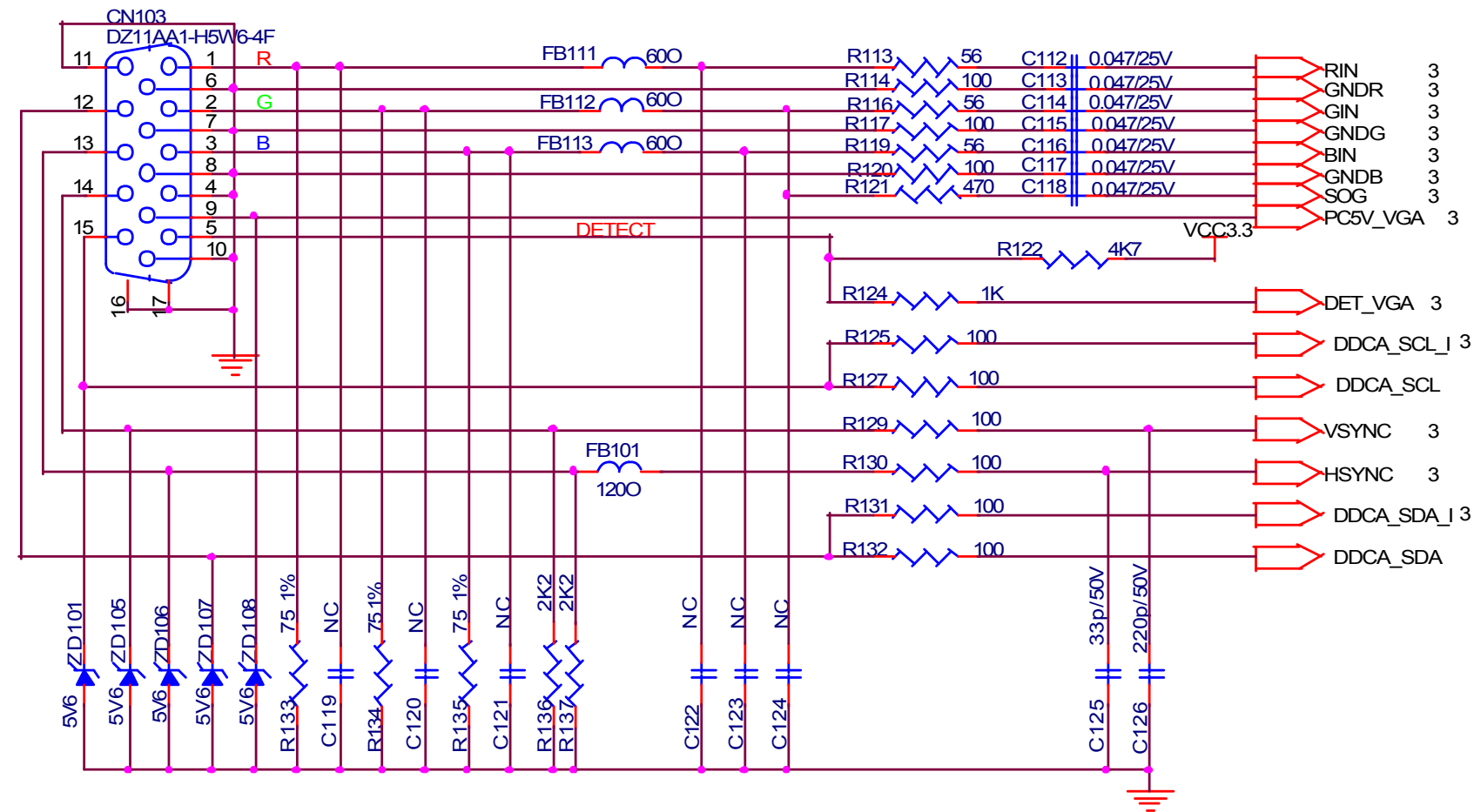
Item	ViewSonic P/N	Ref. P/N	Location	Q'ty
1	N/A	506431000300R	FILM, PE 500mmx900mm ROHS	0.0005
2	N/A	506039000900R	CORNER PAPER, 1900x50x50mm ROHS	4/56
3	N/A	506039005400R	CORNER PAPER, 800x50x50mm ROHS	4/56
4	P-00008149	506040010010R	CUSHION, EPS-R, VG721, LE1741	1
5	CB-00008002	453030300120R	CABLE, AUDIO 1P 6FT BLACK/GREEN CP03B06P0	1
6	CB-00005254	453010100100R	CABLE, D-SUB 15P MALE 6FT BLACK/BLUE, SZ40	1
7	A-00008050	703000003200R	KIT, ACCESSORY, INL-V7, LE1741	1
8	P-00006720	506120003420R	BAG, PLASTIC, W300xL280xT0.05mm, LE1734	1
9	C-00008036	714020007200R	ASSY BASE, BLACK, LE1941	1
10	A-00005255	453070800170R	PWR CORD 10A/125V BLK 6FT UL/CSA, SVT 18x	1
11	P-00008148	506040010000R	CUSHION, EPS-L, VG721, LE1741	1
12	P-00005272	506120300400R	BAG, PE+EPE, L590*W480*T0.6mm(PRINTED), LE1922	1
13	P-00008147	506020012400R	CARTON, VG721, LE1741	1
14	N/A	505040203600R	INSULATOR, PET, 335*292*0.1mm, LE1709	1
15	N/A	506440002300R	CARTON, LABEL, LE1709	1
16	N/A	506390210100R	LABEL, CARTON(8ms), PRC, LE1709	1
17	N/A	506037006000R	CARD BOARD COVER, L1140*W910*H100mm, LE1741	1
18	N/A	506150001201R	PALLET L114*W910*H120mm, LE1741	1

LE1741 (VG721/VG730) Block Diagram

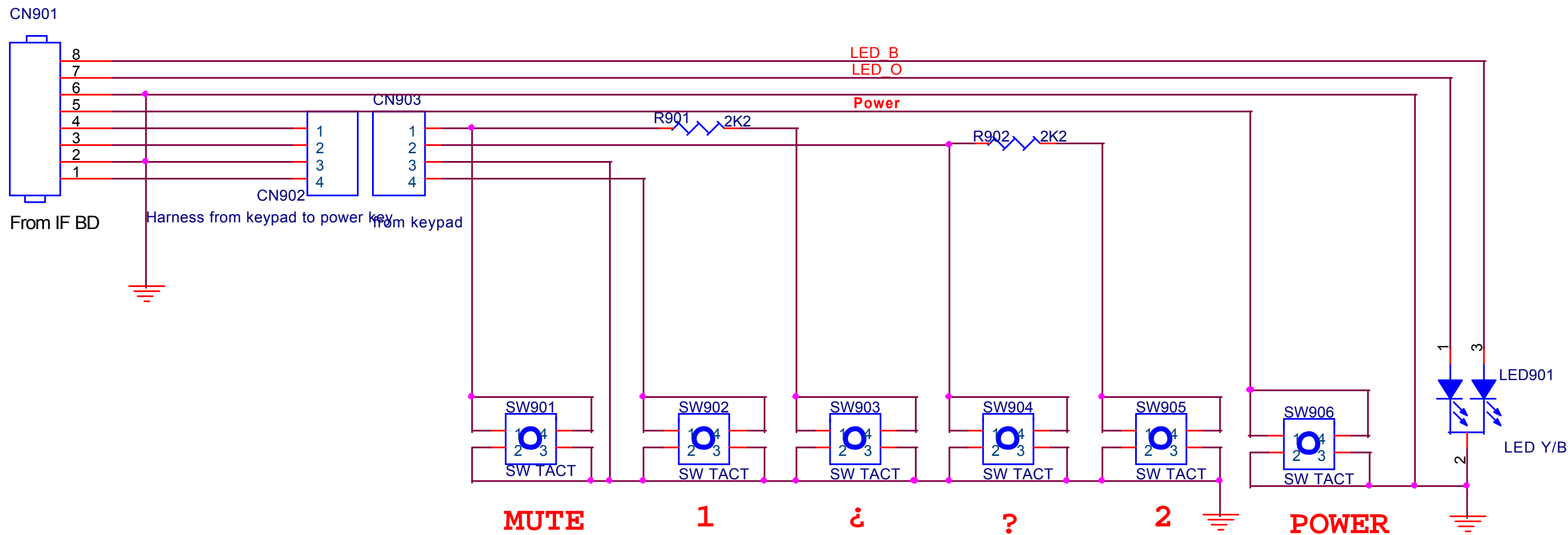


10. Schematic Diagrams

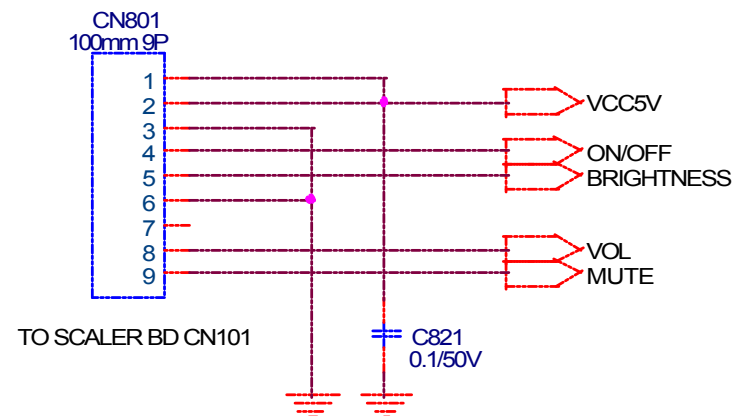
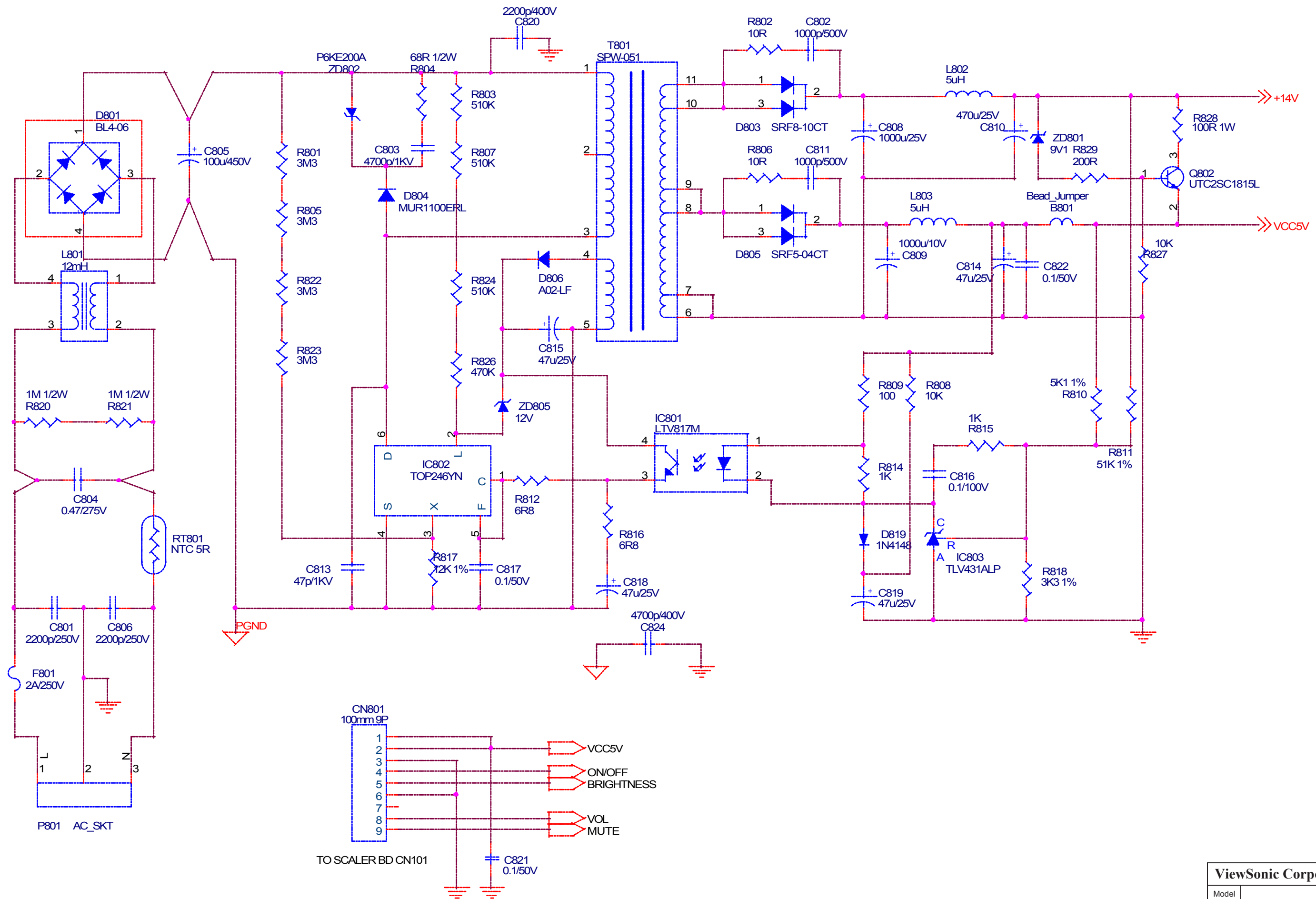




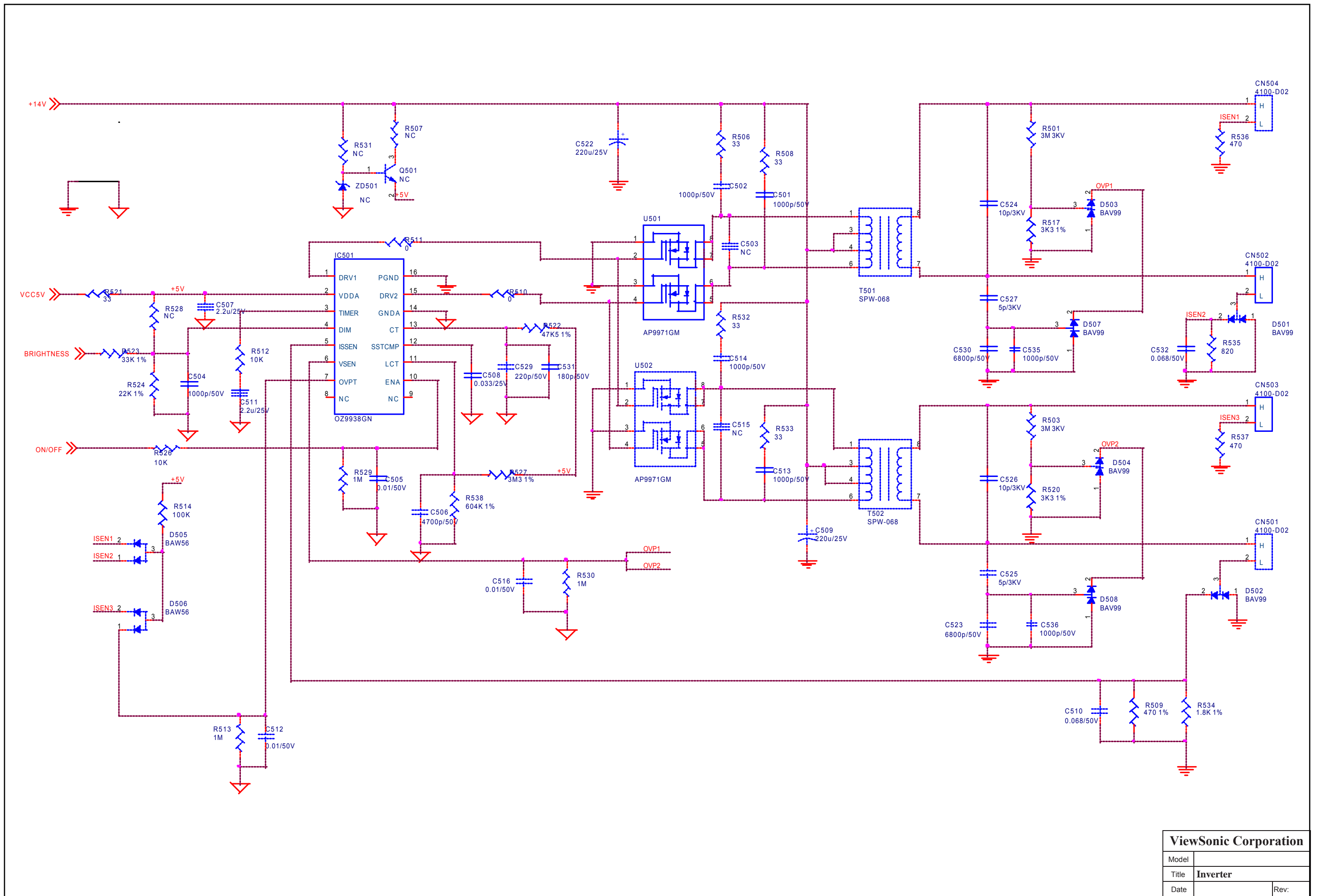
ViewSonic Corporation		
Model		
Title	INPUT	
Date		Rev:



ViewSonic Corporation		
Model		
Title	Keypad & Power key	
Date		Rev:

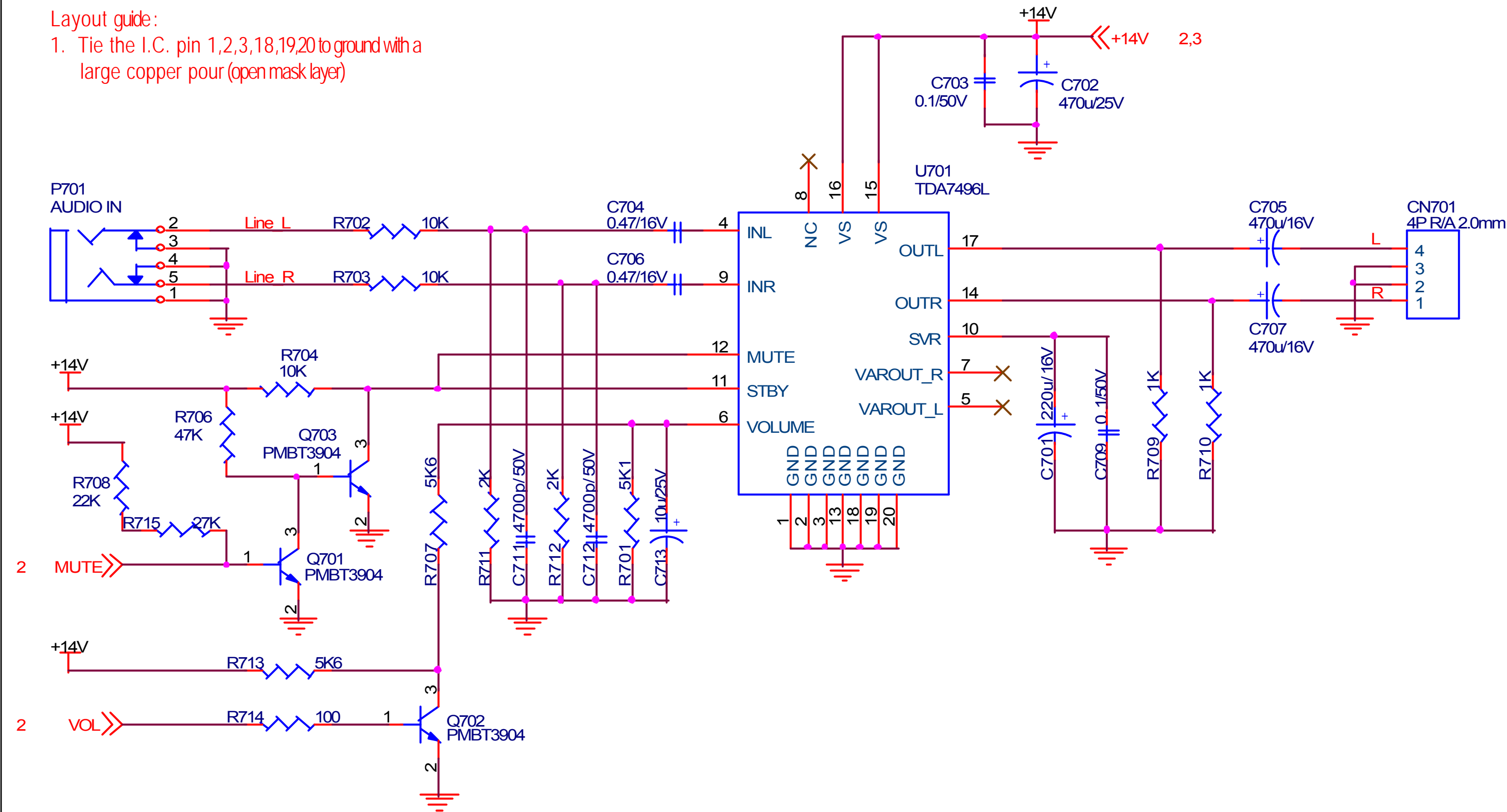


ViewSonic Corporation		
Model		
Title	POWER SUPPLY	
Date		Rev:



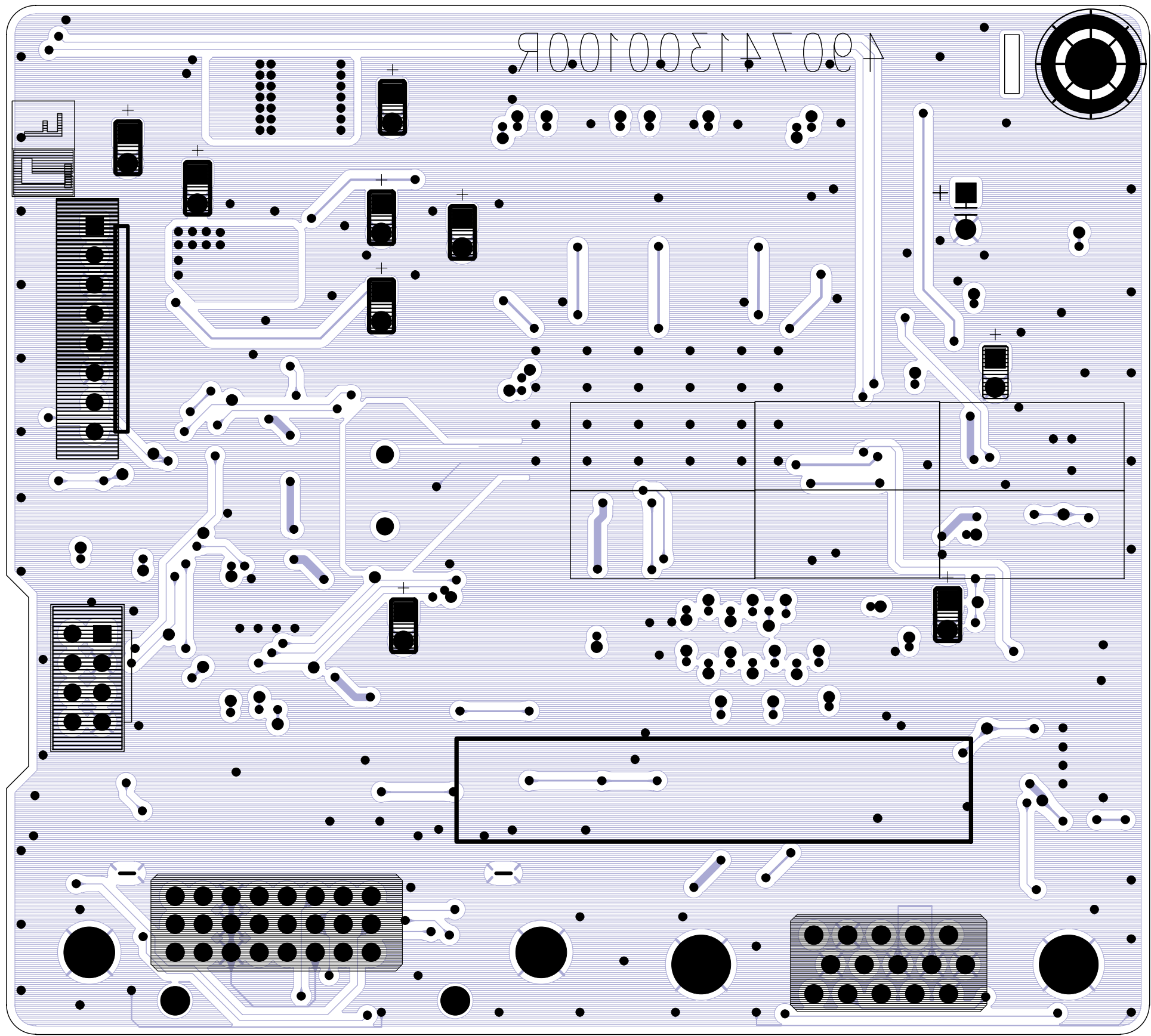
Layout guide:

1. Tie the I.C. pin 1,2,3,18,19,20 to ground with a large copper pour (open mask layer)



ViewSonic Corporation		
Model		
Title	TDA7496L	
Date		Rev:

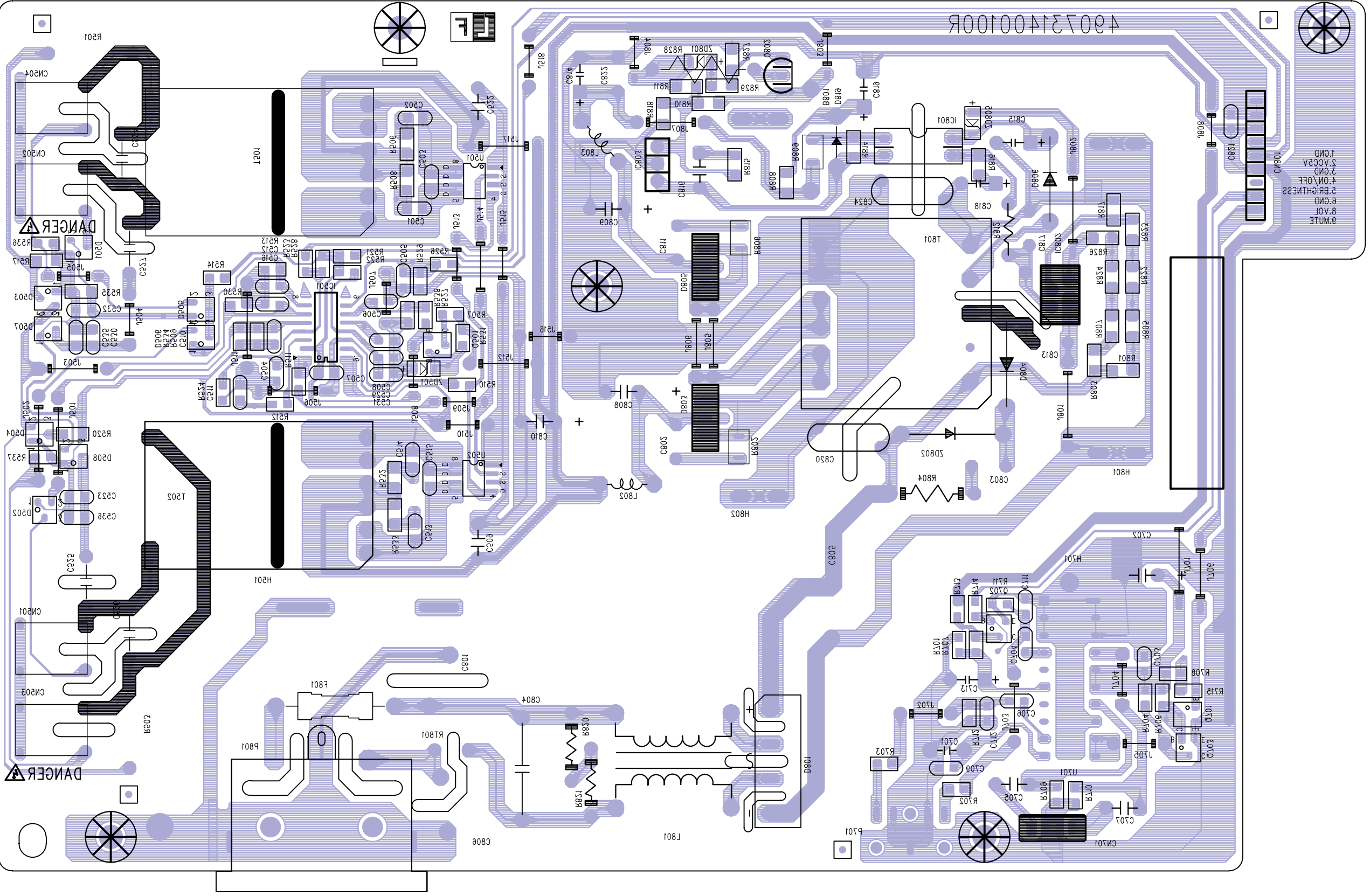
I/F BOARD BOTTOM



ViewSonic Corporation		
Model		
Title	I/F BOARD BOTTOM	
Date		Rev:

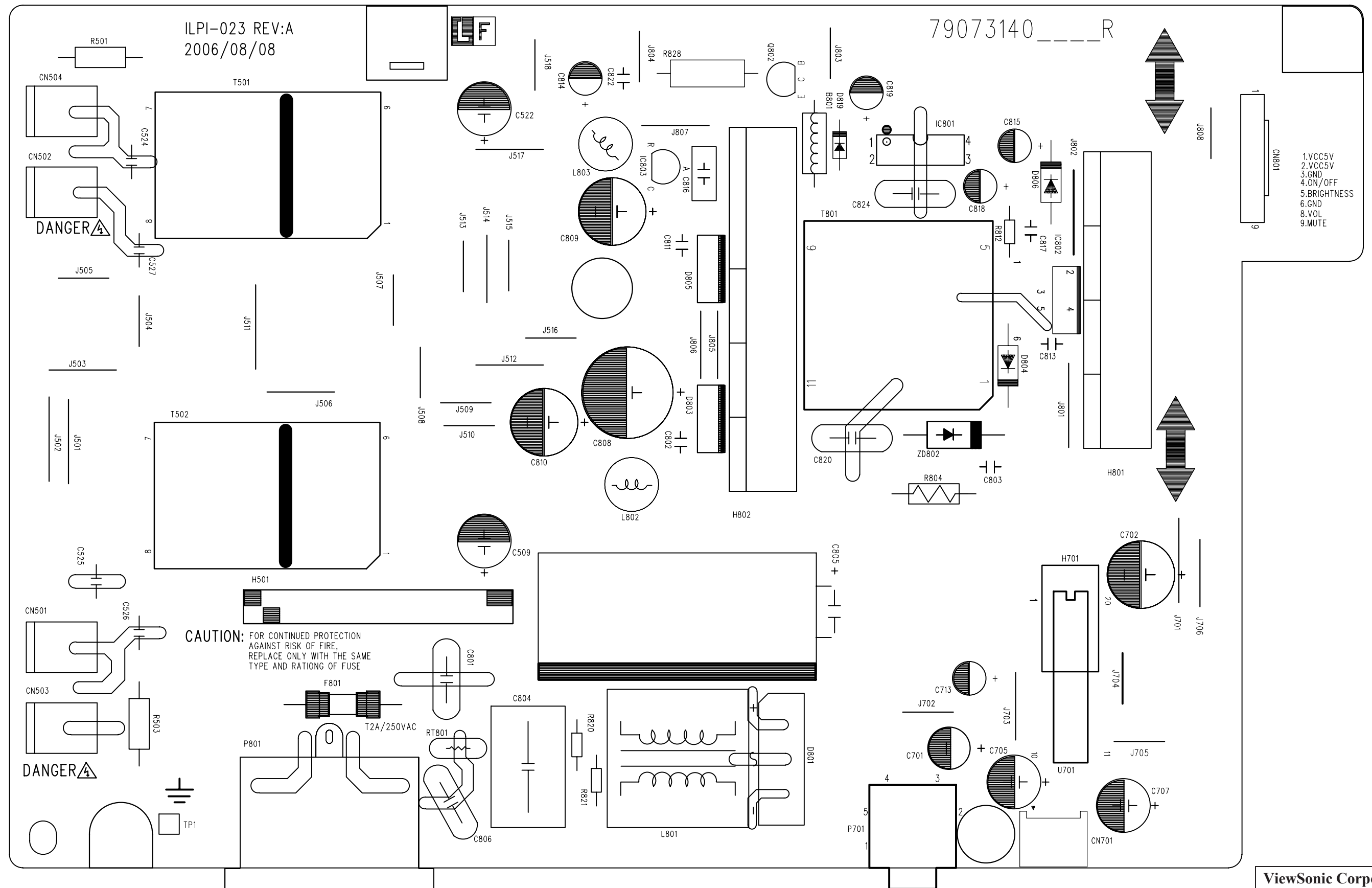
Rev:

BOTTOM



ViewSonic Corporation			
Model			
Title	PI BD BOTTOM		
Date		Rev:	

TOP



ViewSonic Corporation		
Model		
Title	PI BD TOP	
Date		Rev:

*** Reader's Response***

Dear Readers:

Thank you in advance for your feedback on our Service Manual, which allows continuous improvement of our products. We would appreciate your completion of the Assessment Matrix below, for return to ViewSonic Corporation.

Assessment

A. What do you think about the content of this Service Manual?

<i>Unit</i>	<i>Excellent</i>	<i>Good</i>	<i>Fair</i>	<i>Bad</i>
1. Precautions and Safety Notices				
2. Specification				
3. Front Panel Function Control Description				
4. Circuit Description				
5. Adjustment Procedure				
6. Troubleshooting Flow Chart				
7. Recommended Spare Parts List				
8. Exploded Diagram and Exploded Parts List				
9. Block Diagrams				
10. Schematic Diagrams				
11.PCB Layout Diagrams				

B. Are you satisfied with this Service Manual?

<i>Item</i>	<i>Excellent</i>	<i>Good</i>	<i>Fair</i>	<i>Bad</i>
1. Service Manual Content				
2. Service Manual Layout				
3. The form and listing				

C. Do you have any other opinions or suggestions regarding this service manual?

Reader's basic data:

Name:		Title:	
Company:			
Add:			
Tel:		Fax:	
E-mail:			

After completing this form, please return it to ViewSonic Quality Assurance in the USA at facsimile 1-909-839-7943. You may also e-mail any suggestions to the Director, Quality Systems & Processes (marc.maupin@viewsonic.com)