LCD-Monitor

Model

2220WM

SERVICE Manual

LCD Monitor

Fashion Feature

- WXGA Display (1680 x1050)
-Response Time: 5ms
-Connectivity: Analog (15P D-sub)
-Power Consumption: 22''W (52W)
-DPMS: under 1W (240Vac)

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Contents

1 Precautions

Follow these safety, servicing and ESD precautions to prevent damage and to protect against potential hazards such as electrical shock.

1-1 Safety Precautions

1-1-1 Warnings

1. For continued safety, do not attempt to modify the circuit board.
2. Disconnect the AC power and DC power jack before servicing.

1-1-2 Servicing the LCD Monitor

1. When servicing the LCD Monitor, Disconnect the AC line cord from the AC outlet.
2. It is essential that service technicians have an accurate voltage meter available at all times. Check the calibration of this meter periodically.

1-1-3 Fire and Shock Hazard

Before returning the monitor to the user, perform the following safety checks:

1. Inspect each lead dress to make certain that the leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the monitor.
2. Inspect all protective devices such as nonmetallic control knobs, insulating materials, cabinet backs, adjustment and compartment covers or shields, isolation resistor- capacitor networks, mechanical insulators, etc.
3. Leakage Current Hot Check (Figure 1-1):

   WARNING : Do not use an isolation transformer during this test.

   Use a leakage current tester or a metering system that complies with American National Standards Institute (*ANSI C101.1, Leakage Current for Appliances*), and Underwriters Laboratories (*UL Publication UL1410, 59.7*).

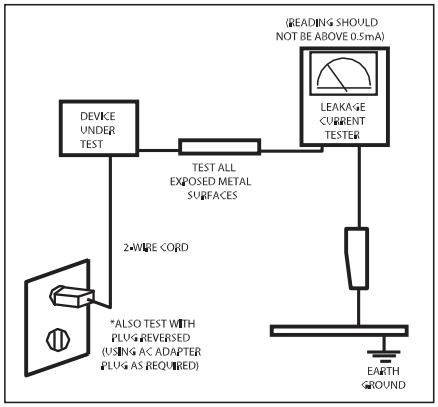


Figure 1-1. Leakage Current Test Circuit

4. With the unit completely reassembled, plug the AC line cord directly into a 120V AC outlet. With the unit's AC switch first in the ON position and then OFF, measure the current between a known earth ground (metal water pipe, conduit, etc.) and all exposed metal parts, including: metal cabinets, screw heads and control shafts. The current measured should not exceed 0.5 milliamp. Reverse the power-plug prongs in the AC outlet and repeat the test.

1-1-4 Product Safety Notices

Some electrical and mechanical parts have special safety- related characteristics which are often not evident from visual inspection. The protection they give may not be obtained by replacing them with components rated for higher voltage, wattage, etc. Parts that have special safety characteristics are identified by ⚠ on schematics and parts lists. A substitute replacement that does not have the same safety characteristics as the recommended replacement part might create shock, fire and/or other hazards. Product safety is under review continuously and new instructions are issued whenever appropriate.

1-2 Servicing Precautions

WARNING: An electrolytic capacitor installed with the wrong polarity might explode.

Caution: Before servicing units covered by this service manual, read and follow the Safety Precautions section of this manual.

Note: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions, always follow the safety precautions.

1-2-1 General Servicing Precautions

1. Always unplug the unit's AC power cord from the AC power source and disconnect the DC Power Jack before attempting to:
   (a) remove or reinstall any component or assembly, (b) disconnect PCB plugs or connectors, (c) connect a test component in parallel with an electrolytic capacitor.
2. Some components are raised above the printed circuit board for safety. An insulation tube or tape is sometimes used. The internal wiring is sometimes clamped to prevent contact with thermally hot components. Reinstall all such elements to their original position.
3. After servicing, always check that the screws, components and wiring have been correctly reinstalled. Make sure that the area around the serviced part has not been damaged.
4. Check the insulation between the blades of the AC plug and accessible conductive parts (examples: metal panels, input terminals and earphone jacks).
5. Insulation Checking Procedure: Disconnect the power cord from the AC source and turn the power switch ON. Connect an insulation resistance meter (500 V) to the blades of the AC plug.

   The insulation resistance between each blade of the AC plug and accessible conductive parts (see above) should be greater than 1 mega-ohm.
6. Always connect a test instrument's ground lead to the instrument chassis ground before connecting the positive lead; always remove the instrument's ground lead last.

1-3 Static Electricity Precautions

Some semiconductor (solid state) devices can be easily damaged by static electricity. Such components are commonly called Electrostatically Sensitive Devices (ESD). Examples of typical ESD are integrated circuits and some field-effect transistors. The following techniques will reduce the incidence of component damage caused by static electricity.

1. Immediately before handling any semiconductor components or assemblies, drain the electrostatic charge from your body by touching a known earth ground. Alternatively, wear a discharging wrist-strap device. To avoid a shock hazard, be sure to remove the wrist strap before applying power to the monitor.
2. After removing an ESD-equipped assembly, place it on a conductive surface such as aluminum foil to prevent accumulation of an electrostatic charge.
3. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ESDs.
4. Use only a grounded-tip soldering iron to solder or desolder ESDs.
5. Use only an anti-static solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ESDs.
6. Do not remove a replacement ESD from its protective package until you are ready to install it. Most replacement ESDs are packaged with leads that are electrically shorted together by conductive foam, aluminum foil or other conductive materials.
7. Immediately before removing the protective material from the leads of a replacement ESD, touch the protective material to the chassis or circuit assembly into which the device will be installed.

   Caution: Be sure no power is applied to the chassis or circuit and observe all other safety precautions.
8. Minimize body motions when handling unpackaged replacement ESDs. Motions such as brushing clothes together, or lifting your foot from a carpeted floor can generate enough static electricity to damage an ESD.

1-4 Installation Precautions

1. For safety reasons, more than two people are required for carrying the product.

2. Keep the power cord away from any heat emitting devices, as a melted covering may cause fire or electric shock.

3. Do not place the product in areas with poor ventilation such as a bookshelf or closet. The increased internal temperature may cause fire.

4. Bend the external antenna cable when connecting it to the product. This is a measure to protect it from being exposed to moisture. Otherwise, it may cause a fire or electric shock.

5. Make sure to turn the power off and unplug the power cord from the outlet before repositioning the product. Also check the antenna cable or the external connectors if they are fully unplugged. Damage to the cord may cause fire or electric shock.

6. Keep the antenna far away from any high-voltage cables and install it firmly. Contact with the high- voltage cable or the antenna over may cause fire or electric shock.

7. When installing the product, leave enough space (10cm) between the product and the wall for ventilation purposes. A rise in temperature within the product may cause fire.

2 Product Specifications

2-1 Fashion Feature

- WXGA Display (1680 x 1050)

- Black Color Variation

2-2 Specifications

Features	Specifications
Maximum resolution	1680(H)*1050(V)
Back light system	4 CCFL (top & bottom edge side)
Actual Resolution display	WSXGA+(1680x1050)
Pixel pitch	0.282(H) x 0.282(V)
Display area	473.76 (H) x 296.1 (V) , 22” diagonal
Contrast ratio	700:1(Min.) 1000:1 (typ.) (INL: MT220WW01 v.0&INL: MT220WW01 V2 & CMO: M220Z1-L03)
Response time (Tr +Tf)	5ms (typ.) 10ms(Max) (INL V0 & V2 panel) 5ms (typ.) 8ms(Max) (CMO panel)
Viewing angle	85°(L)/ 85°(R), 80°(U)/80°(D) typ. CR≧10 (INL V0 & V2 panel) 85°(L)/ 85°(R), 80°(U)/80°(D) typ. CR≧10 (CMO)
Input interface	Analog(D-sub 15 pin) & DVI-D
Power management	Compatible with Energy Star
Plug & Play	VESA DDC 2B
University AC power supply	100V – 240V AC, 50Hz – 60Hz,0.8—1.6A
OSD language	English,German,Spanish,French,Italian,Swedish,Russian,Portuguese,Turkish

3 Alignments and Adjustments

This section of the service manual explains how to use the DDC Manager JIG.
This function is needed for AD board change and program memory (U105) change.

3-1 Required Equipment

The following equipment is necessary for adjusting the monitor:

- Computer with Windows 95, Windows 98, Windows 2000, Windows XP, or Windows NT.

3-2 Automatic Color Adjustment

To input video, use 16 gray or any pattern using black and white.

1. Select English for OSD language.
2. Press the (Enter/Source) key for 5 seconds.

3-3 DDC EDID Data Input

1. Input DDC EDID data when replacing AD PCB.
2. Receive/Download the proper DDC file for the model from HQ quality control department. Install the below jig (Figure 1) and enter the data.

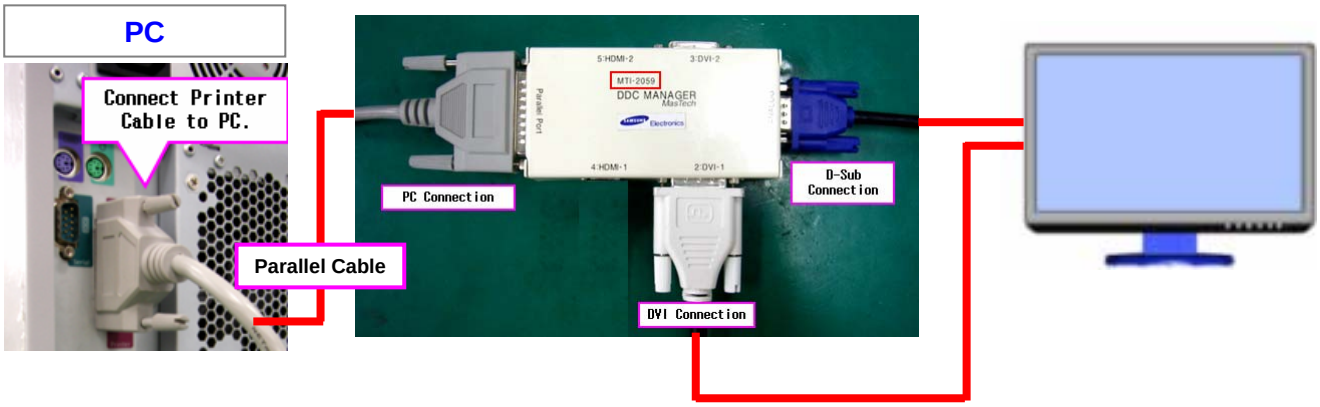


Figure 1.

3-4 EDID table

VGA

	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	4C	2D	1F	03	XX	XX	XX	XX
1	XX	XX	01	03	6C	2F	1E	78	2A	DC	51	A3	59	48	9E	24
2	11	50	54	BF	EF	80	B3	00	81	80	81	40	71	4F	01	01
3	01	01	01	01	01	01	21	39	90	30	62	1A	27	40	68	B0
4	36	00	DA	28	11	00	00	1C	00	00	00	FD	00	38	4B	1E
5	51	0F	00	0A	20	20	20	20	20	20	00	00	00	FC	00	53
6	79	6E	63	4D	61	73	74	65	72	0A	20	20	00	00	00	FF
7	00	48	31	41	4B	35	30	30	30	30	30	0A	20	20	00	XX

Byte(Hex)	Field Name and Comments	Description	EDID
00~07h	Head Information		00,FF,FF,FF,FF,FF,FF,00
08~09h	ID Manufacturer Name	SAM	4C,2D
0A~0Bh	Product ID Code	031F	1F,03
0C~0Fh	Last 5 Digits of Serial Number	0	XXXXXXXXXX
10h	Week of Manufacture	1	XX
11h	Year of Manufacture	2007	XX
12h	EDID Version Number	1	01
13h	EDID Revision Number	3	03
14h	Video Input Definition	Analog Signal Level	6C
		0.700, 0.000 (0.700Vp-p)	
		No Blank -to-black Setup	
		Separate Syncs. Supported	
		Composite Sync. Supported	
		No Sync. on Green Supported	
		No Serration Required	
15h	Max Horizontal Image Size	47	2F
16h	Max Vertical Image Size	30	
17h	Display Gamma	2.2	78
18h	Power Management and Supported Feature(s)	No Standby	2A
		No Suspend	
		Active Off/Very Low Power	
		RGB Color Display	
		No sRGB Color Space	
		Preferred Timing Mode	
		No Default GTF Supported	
19~22h	Chroma Info	R (x, y) 0.640, 0.349	DC,51,A3,59,48,9E,24,11,50,54
		G (x, y) 0.284, 0.617	
		B (x, y) 0.142, 0.067	
		W (x, y) 0.313, 0.329	
23h	Established Timing I	720 x 400 @ 70Hz	BF
		720 x 400 @ 88Hz (N/A)	
		640 x 480 @ 60Hz	

		640 x 480 @ 67Hz	
		640 x 480 @ 72Hz	
		640 x 480 @ 75Hz	
		800 x 600 @ 56Hz	
		800 x 600 @ 60Hz	
24h	Established Timing II	800 x 600 @ 72Hz	EF
		800 x 600 @ 75Hz	
		832 x 624 @ 75Hz	
		1024 x 768 @ 87Hz(I) (N/A)	
		1024 x 768 @ 60Hz	
		1024 x 768 @ 70Hz	
		1024 x 768 @ 75Hz	
		1280 x 1024 @ 75Hz	
25h	Manufacturers Reserved Timings	1152 x 870 @ 75Hz	80
		800 x 600 @ 85Hz (N/A)	
		1024 x 768 @ 85Hz (N/A)	
		1280 x 1024 @ 60Hz (N/A)	
		1280 x 1024 @ 85Hz (N/A)	
		1600 x 1024 @ 60Hz (N/A)	
		1600 x 1200 @ 75Hz (N/A)	
		1600 x 1200 @ 85Hz (N/A)	
26~35h	Standard Timing Identification	1680 x 1050 @ 60Hz 16: 10	B3,00
		1280 x 1024 @ 60Hz 5: 4	81,80
		1280 x 960 @ 60Hz 4: 3	81,40
		1152 x 864 @ 75Hz 4: 3	71,4F
		No Application	01,01
		No Application	01
		No Application	01
		No Application	01
36~47h	Detailed Timing / Descriptor Block 1	1680x1050 @ 60Hz	21,39,90,30,62,1A,27,40,68, B0, 36,00,DA,28,11,00,00,1C
		146.25 MHz	
5A~6Bh	Detailed Timing / Descriptor Block 2	Monitor Name: SyncMaster	00,00,00,FC,00,53,79,6E,63, 4D,61,73,74,65,72,0A,20,20
48~59h	Detailed Timing / Descriptor Block 3	Min. Vertical Frequency: 56 Hz	00,00
		Max. Vertical Frequency: 75 Hz	00,FD
		Min. Horizontal Frequency: 30 KHz	00,38
		Max. Horizontal Frequency: 81 KHz	4B,1E
		Max. Pixel Clock: 150 MHz	51,0F,00,0A,20,20, 20,20, 20,20,
6C~7Dh	Detailed Timing / Descriptor Block 4	Monitor Serial Number: H1AK500000	00,00,00,ff,00,48,31,41,4B,3 5,30,30,30,30,30,0A,20,20
7Eh	Extension flag		00
7Fh	Checksum		XX

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	4C	2D	20	03	XX	XX	XX	XX

1	XX	XX	01	03	80	2F	1E	78	2A	DC	51	A3	59	48	9E	24
2	11	50	54	BF	EF	80	B3	00	81	80	81	40	71	4F	01	01
3	01	01	01	01	01	01	21	39	90	30	62	1A	27	40	68	B0
4	36	00	DA	28	11	00	00	1C	00	00	00	FD	00	38	4B	1E
5	51	0F	00	0A	20	20	20	20	20	20	00	00	00	FC	00	53
6	79	6E	63	4D	61	73	74	65	72	0A	20	20	00	00	00	FF
7	00	48	31	41	4B	35	30	30	30	30	30	0A	20	20	00	XX

Byte(Hex)	Field Name and Comments	Description	EDID
00~07h	Head Information		00,FF,FF,FF,FF,FF,FF,00
08~09h	ID Manufacturer Name	SAM	4C,2D
0A~0Bh	Product ID Code	0320	20,03
0C~0Fh	Last 5 Digits of Serial Number	0	XXXXXXXXXX
10h	Week of Manufacture	1	XX
11h	Year of Manufacture	2007	XX
12h	EDID Version Number	1	01
13h	EDID Revision Number	3	03
14h	Video Input Definition	Analog Signal Level	80
		0.700, 0.000 (0.700Vp-p)	
		No Blank -to-black Setup	
		Separate Syncs. Supported	
		Composite Sync. Supported	
		No Sync. on Green Supported	
		No Serration Required	
15h	Max Horizontal Image Size	47	2F
16h	Max Vertical Image Size	30	
17h	Display Gamma	2.2	78
18h	Power Management and Supported Feature(s)	No Standby	2A
		No Suspend	
		Active Off/Very Low Power	
		RGB Color Display	
		No sRGB Color Space	
		Preferred Timing Mode	
		No Default GTF Supported	
19~22h	Chroma Info	R (x, y) 0.640, 0.349	DC,51,A3,59,48,9E,24,11,50,54
		G (x, y) 0.284, 0.617	
		B (x, y) 0.142, 0.067	
		W (x, y) 0.313, 0.329	
23h	Established Timing I	720 x 400 @ 70Hz	BF
		720 x 400 @ 88Hz (N/A)	
		640 x 480 @ 60Hz	
		640 x 480 @ 67Hz	
		640 x 480 @ 72Hz	
		640 x 480 @ 75Hz	
		800 x 600 @ 56Hz	
		800 x 600 @ 60Hz	
24h	Established Timing II	800 x 600 @ 72Hz	EF
		800 x 600 @ 75Hz	

		832 x 624 @ 75Hz	
		1024 x 768 @ 87Hz(I) (N/A)	
		1024 x 768 @ 60Hz	
		1024 x 768 @ 70Hz	
		1024 x 768 @ 75Hz	
		1280 x 1024 @ 75Hz	
25h	Manufacturers Reserved Timings	1152 x 870 @ 75Hz	80
		800 x 600 @ 85Hz (N/A)	
		1024 x 768 @ 85Hz (N/A)	
		1280 x 1024 @ 60Hz (N/A)	
		1280 x 1024 @ 85Hz (N/A)	
		1600 x 1024 @ 60Hz (N/A)	
		1600 x 1200 @ 75Hz (N/A)	
		1600 x 1200 @ 85Hz (N/A)	
26~35h	Standard Timing Identification	1680 x 1050 @ 60Hz 16: 10	B3,00
		1280 x 1024 @ 60Hz 5: 4	81,80
		1280 x 960 @ 60Hz 4: 3	81,40
		1152 x 864 @ 75Hz 4: 3	71,4F
		No Application	01,01
		No Application	01
		No Application	01
		No Application	01
36~47h	Detailed Timing / Descriptor Block 1	1680x1050 @ 60Hz	21,39,90,30,62,1A,27,40,68, B0, 36,00,DA,28,11,00,00,1C
		146.25 MHz	
5A~6Bh	Detailed Timing / Descriptor Block 2	Monitor Name: SyncMaster	00,00,00,FC,00,53,79,6E,63, 4D,61,73,74,65,72,0A,20,20
48~59h	Detailed Timing / Descriptor Block 3	Min. Vertical Frequency: 56 Hz	00,00
		Max. Vertical Frequency: 75 Hz	00,FD
		Min. Horizontal Frequency: 30 KHz	00,38
		Max. Horizontal Frequency: 81 KHz	4B,1E
		Max. Pixel Clock: 150 MHz	51,0F,00,0A,20,20, 20,20, 20,20,
6C~7Dh	Detailed Timing / Descriptor Block 4	Monitor Serial Number: H1AK500000	00,00,00,ff,00,48,31,41,4B,3 5,30,30,30,30,30,0A,20,20
7Eh	Extension flag		00
7Fh	Checksum		XX

Remark:

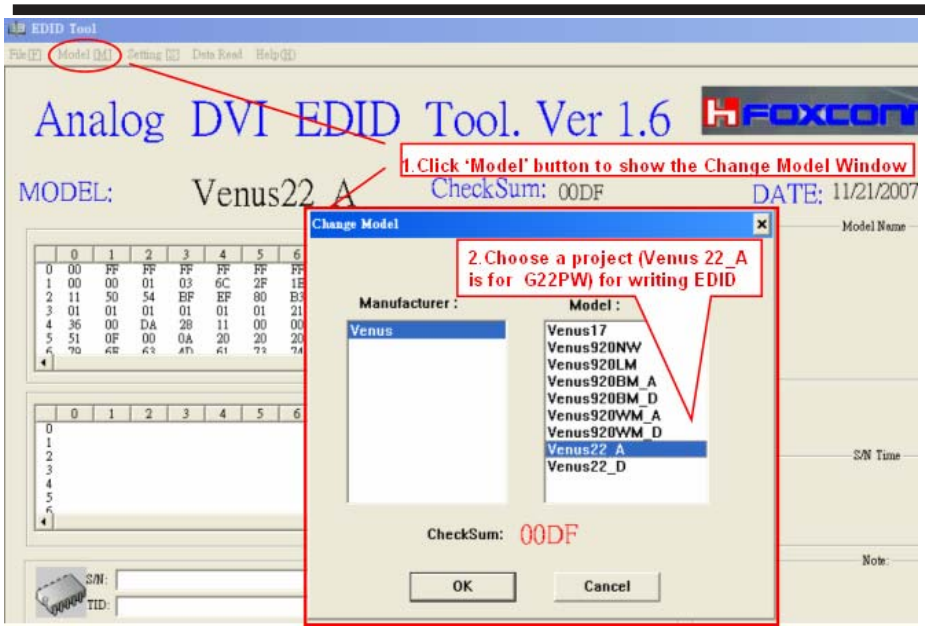
Notes1: Get SerialNumber(10----14Digit) from BarCode and transfer it to HEX

Notes2: Week(1---53),

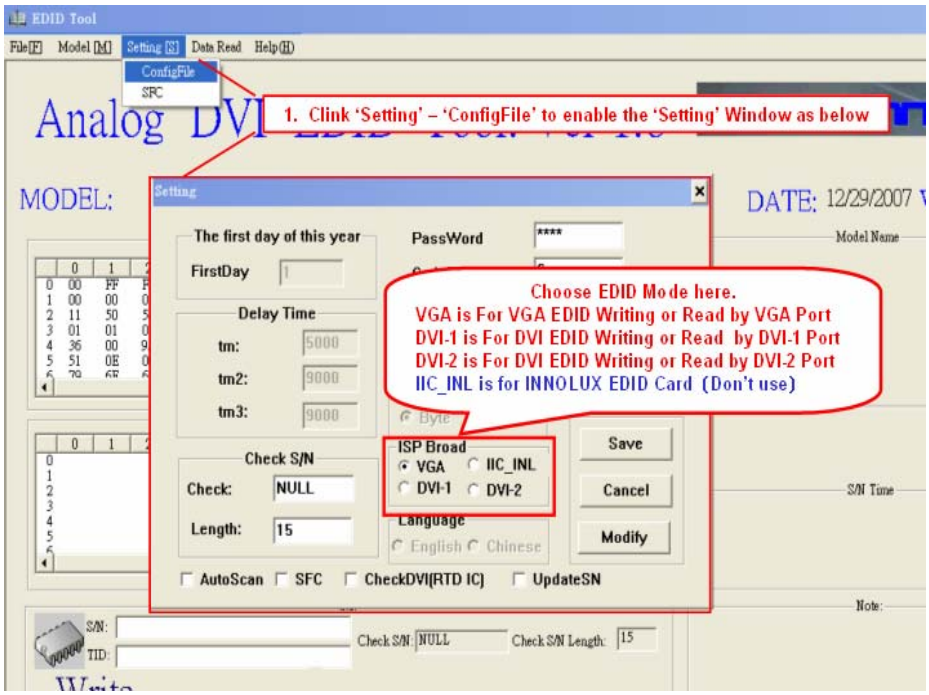
Notes3: Year , HEX(Year-1990) ,

Notes4: Get Barcode(5----14Digit)， and save as ASCII

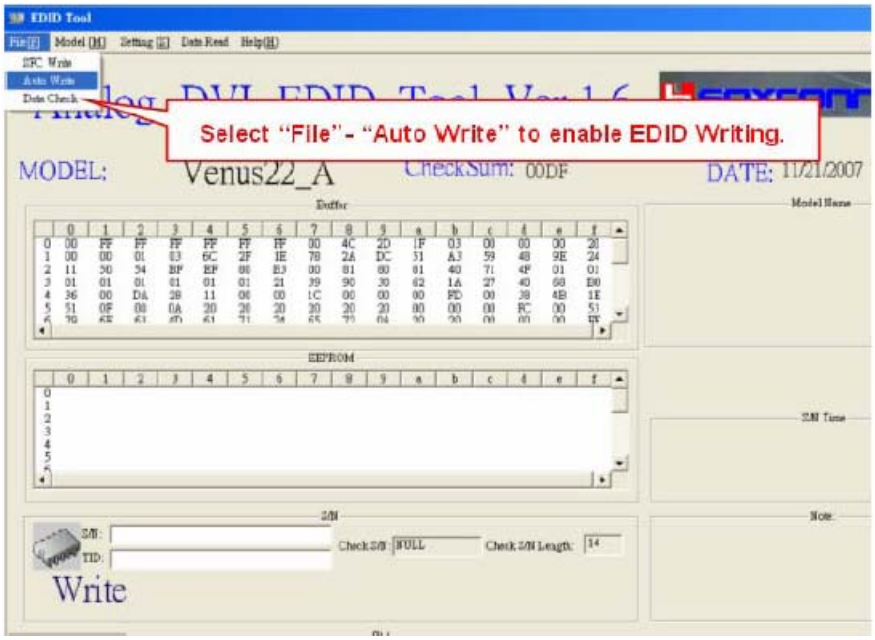
3-5 How to execute DDC



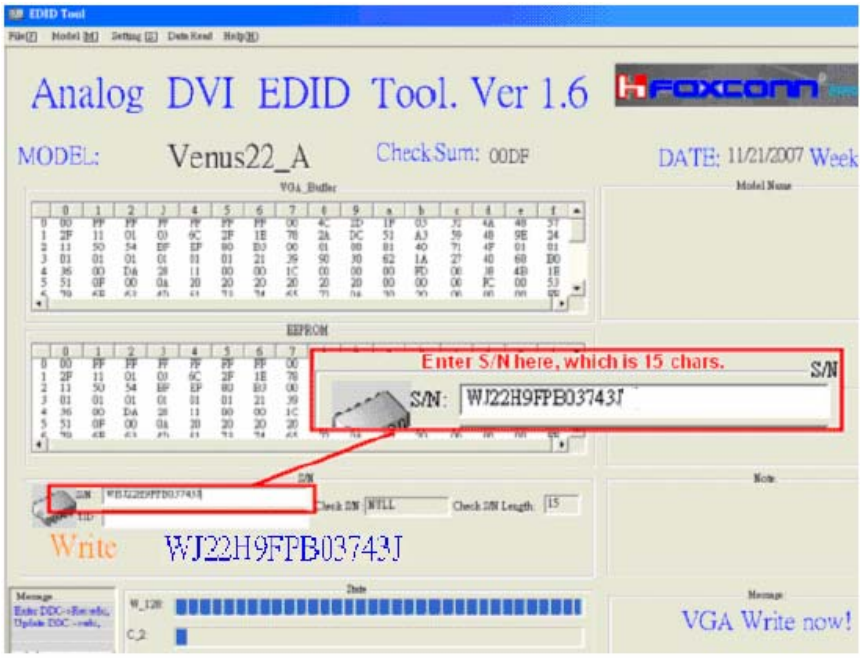
1. Install Analog DVI EDID Tool Program
2. Click the Analog DVI EDID Tool icon.
3. Then Select the model which you want to write EDID.

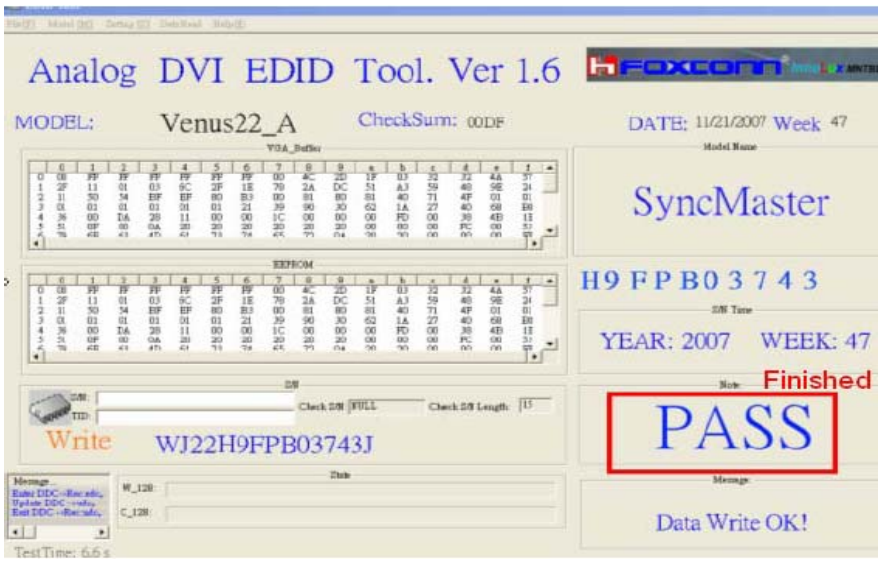


4. Select VGA EDID or DVI EDID:
Click 'Setting' --- 'Config File' to enable the 'Setting' Window Then choose a port for EDID writing or read in this Window.



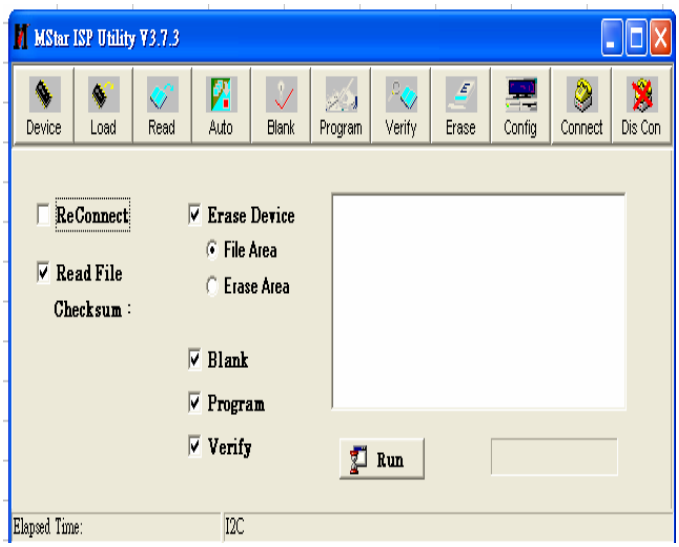
5. Write EDID:
Select "File"- "Auto Write" to enable EDID Writing.
It will auto write when you enter a S/N which i Successful EDID written when it shows'PASS' Logo

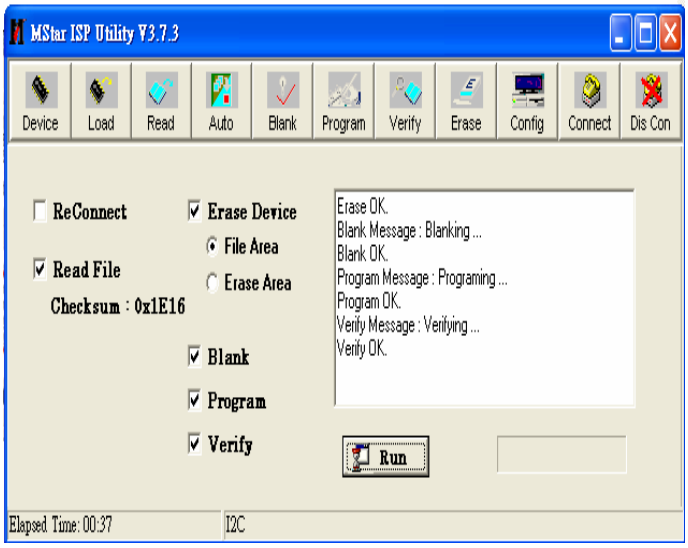




3-6 How to execute MCU Code

1. Set the options.
-. Manufacture : MSTAR
-. Device Type : TSUM16_ROM128K_ext_flash
-. Communication Port : DSUB15 (Analog)
-. External Memory: PM25LV010E





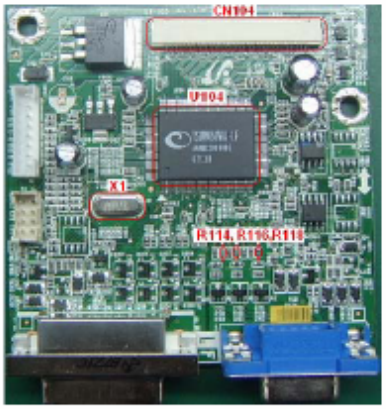
5. If Program and Verify is OK, turn off the hard power and than turn on again.

4 Troubleshooting

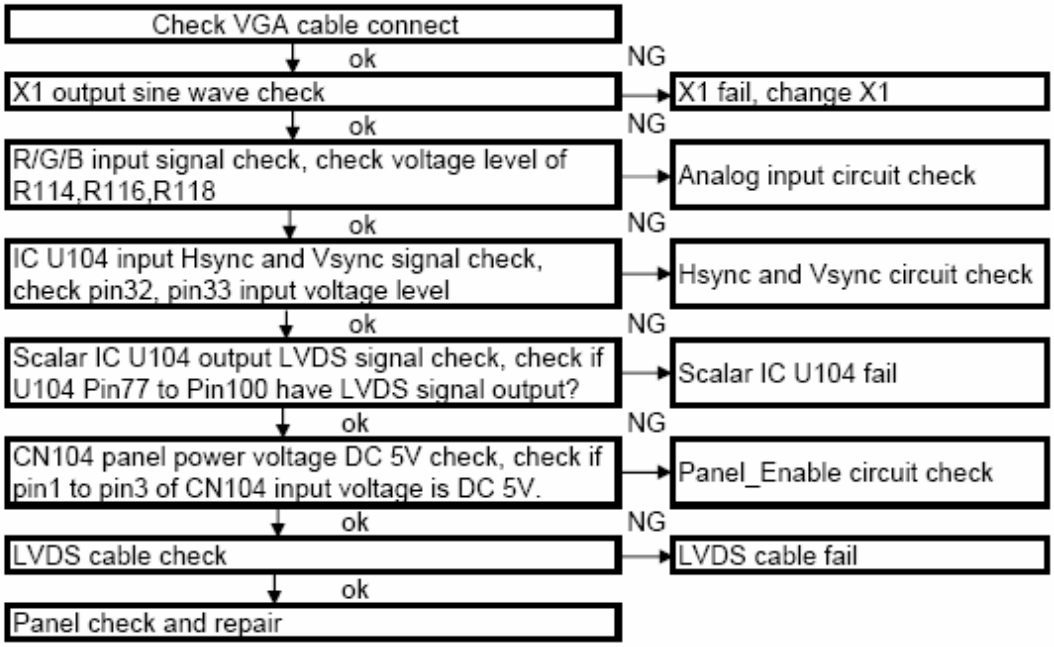
4-1 Common Acknowledge

- If you change the interface board, be sure that the U104 and U105 these two components also changed to the new I/F board because there was program inside. If not, please re-write EDID or upload firmware into Flash memory 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.

4-2 No Picture (VGA Mode)

Troubleshooting Guide	
Issue Name	- No Picture(VGA Mode)
Phenomenon	- LED light, VGA cable connected but no picture
Check List	- LED light, VGA cable connected but no picture - Check if D-Sub cable connect to monitor well - Check if LVDS cable connect to panel well - Check if panel lamp connector connect IP board well
Photo	

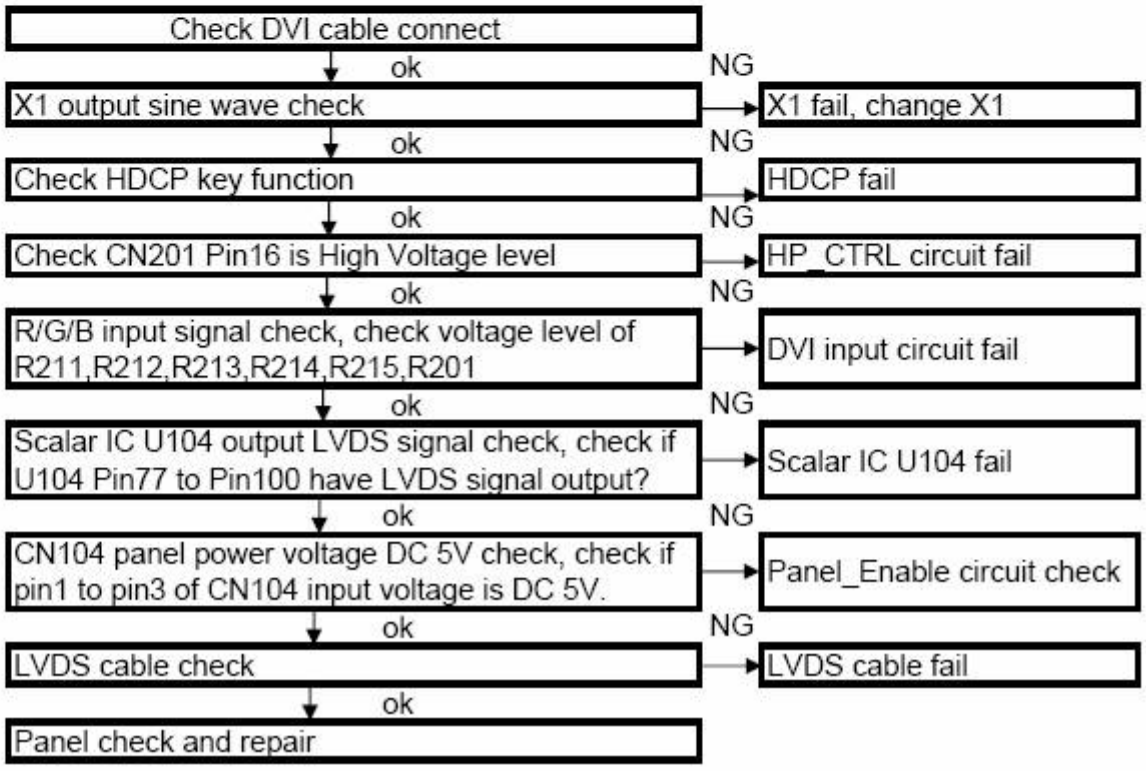
Issue Check Flow Chart



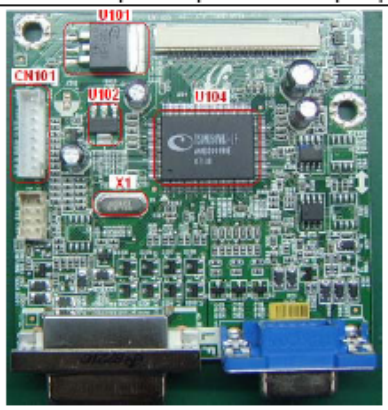
4-3 No Picture (DVI Mode)

Troubleshooting Guide	
Issue Name	- No Picture (DVI Mode)
Phenomenon	- LED light, DVI cable connected but no picture
Check List	- LED light, DVI cable connected but no picture - Check if DVI cable connect to monitor well - Check if LVDS cable connect to panel well - Check if panel lamp connector connect IP board well
Photo	

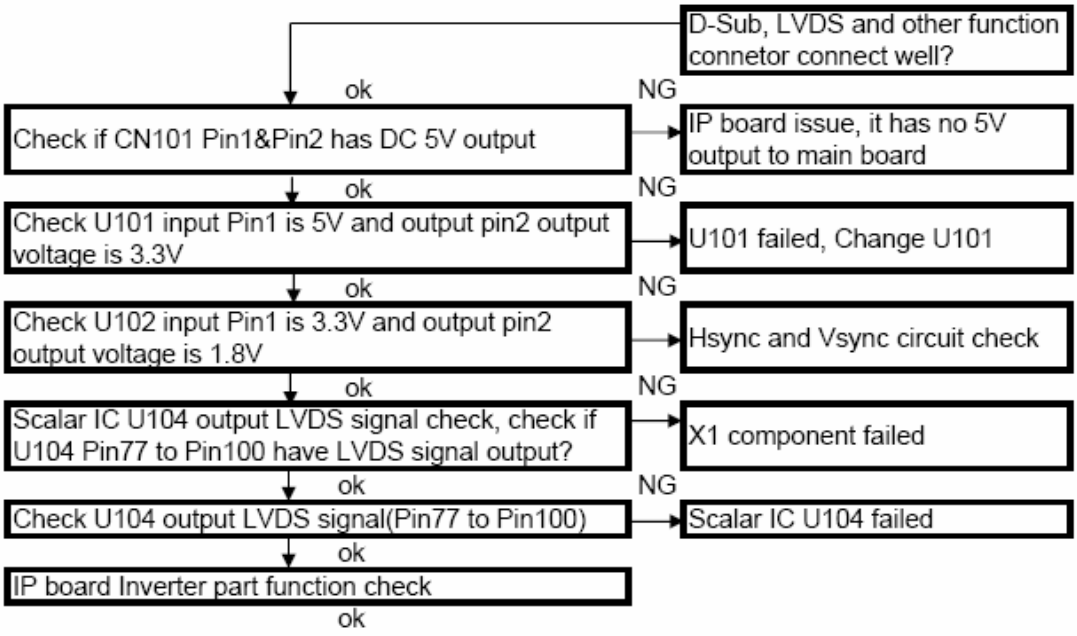
Issue Check Flow Chart



4-4 No Power

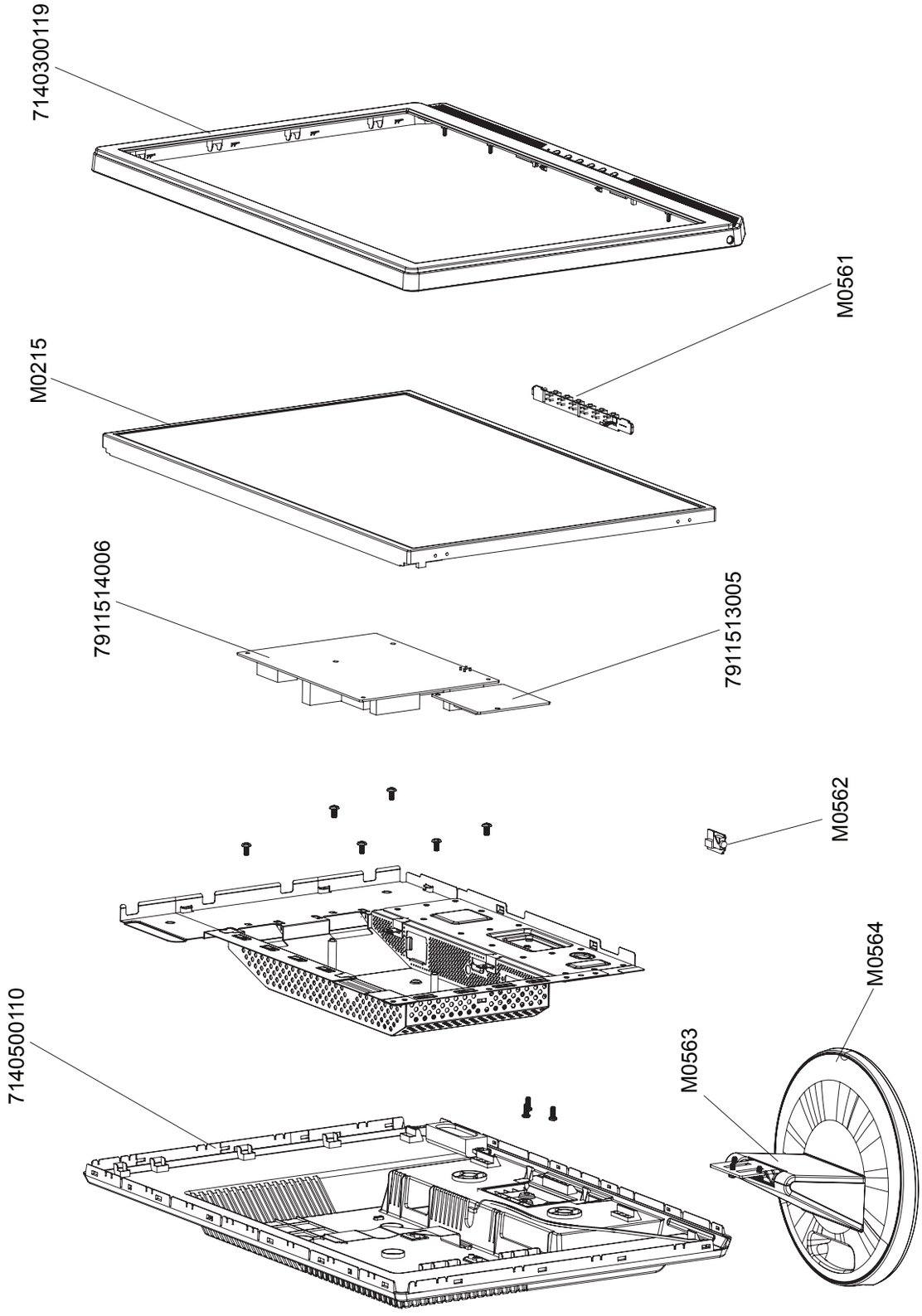
Troubleshooting Guide	
Issue Name	- No Power
Phenomenon	- Power cable connected well, push power key, but no led display
Check List	- Power cable connected well, push power key, but no led display
	- Check if IP-Board Fuse fail or not/Check if IP-Board has correct output DC voltage
	- Check if IP-Board conneted well to Main board
	- Check if power part and output part of Main Board work well.
Photo	

Issue Check Flow Chart



5. Exploded View & Part List

5-1. LS22WJWKBJUXAA Exploded View



5-1-1. LS22WJWKBJUXAA Parts List

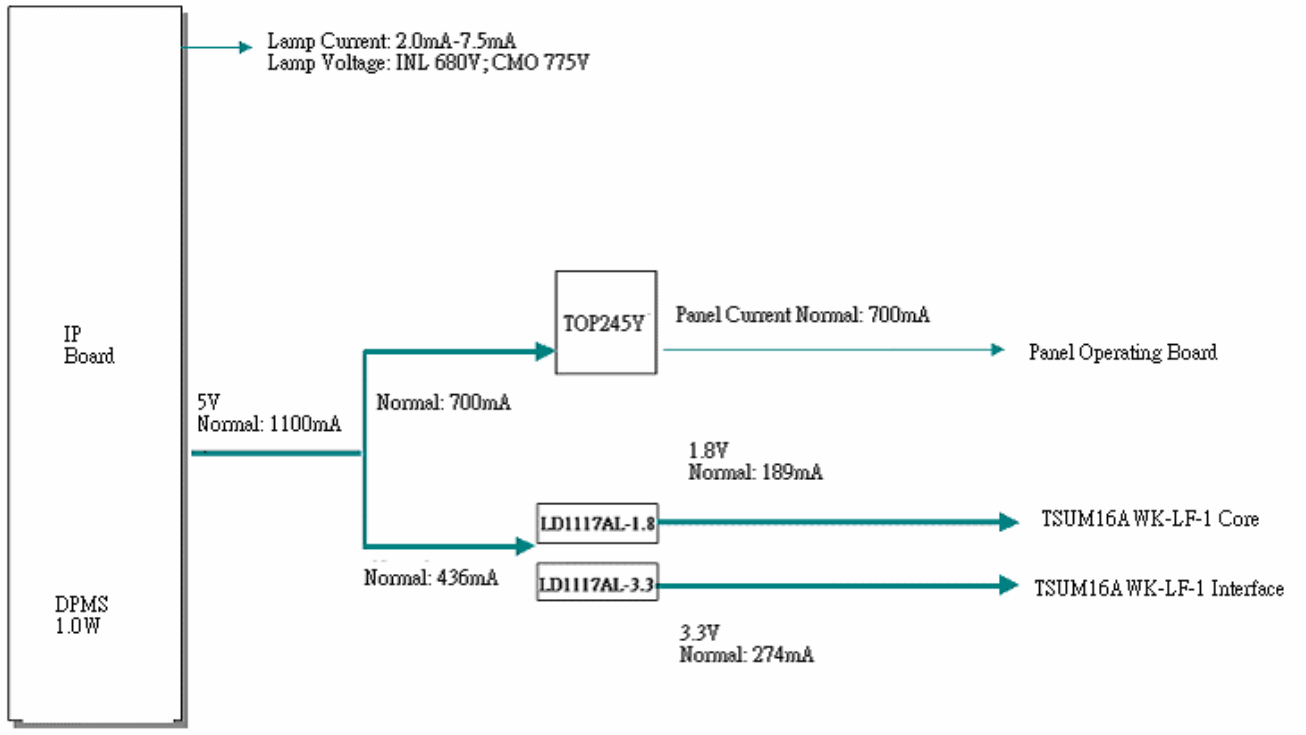
Location No.	Code No.	Description & Specification	Q'ty	SA/SNA	Remark
7140300119	BN82-00278A	A/S ASSY-COVER FRONT;714030011900R	1	S.A	
7140500110	BN82-00275A	A/S ASSY-COVER REAR;714050011000R	1	S.A	
7911513005	BN81-01270A	A/S-PCBA I/F;791151300510R,-,-,-,-,-,-	1	S.A	
7911514006	BN81-01275A	A/S-PCBA P/I;791151400610R,-,-,-,-,-,-	1	S.A	
M0215	BN07-00427A	LCD-PANEL;M220Z1-L03	1	S.A	
M0561	BN81-01095A	A/S-PCBA,KEYPAD BOARD;LE1969,KEY FUNCTIO	1	S.A	
M0562	BN81-01096A	A/S-PCBA EARPHONE;790240400000R,-,-,-,-,	1	S.A	
M0563	BN82-00273A	A/S ASSY-ARM;714000003500R	1	S.A	
M0564	BN82-00254A	A/S ASSY-BASE;714020003500R	1	S.A	

5-2. LS22WJWKBJUXAA Parts List

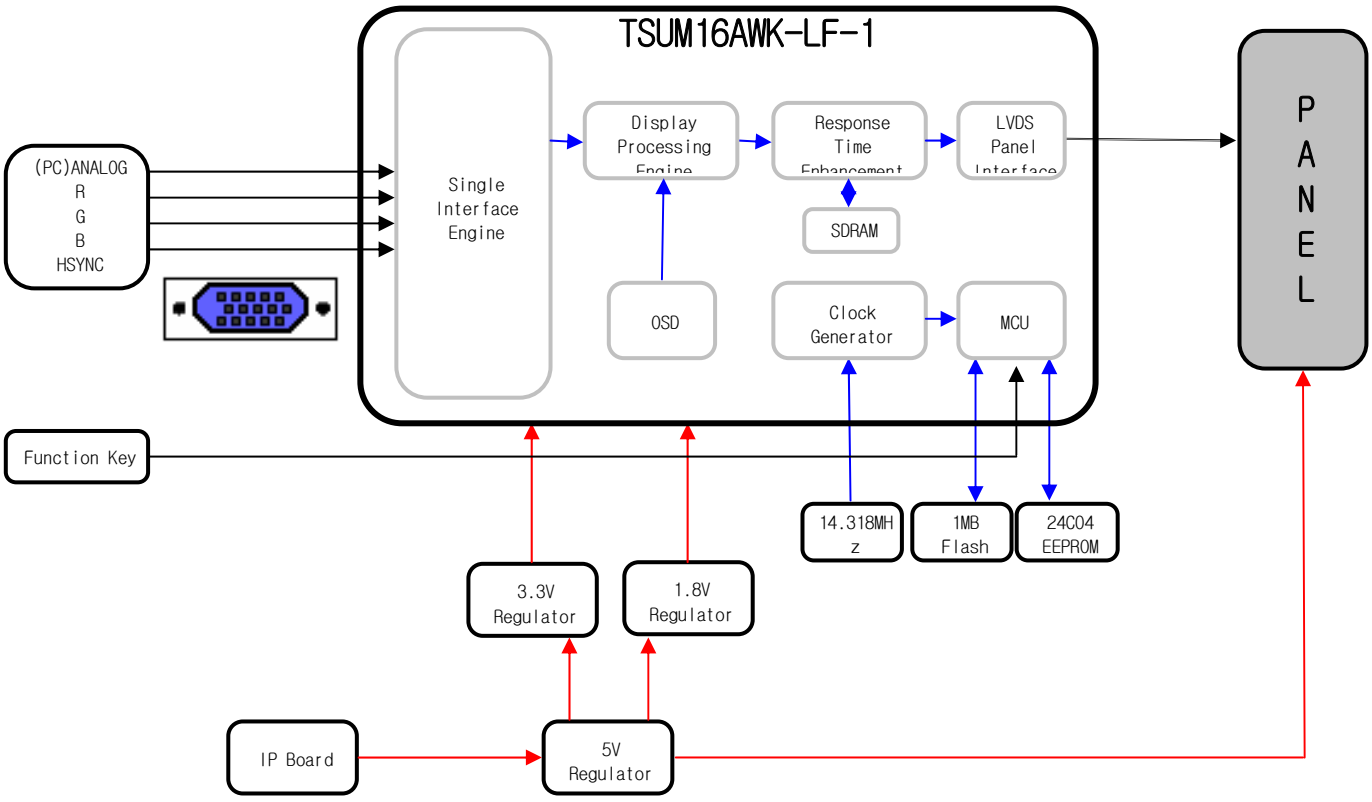
Level	Location No.	Code No.	Description & Specification	Q'ty	SA/SNA	Remark
		LS22WJWKBJUXAA	BRIGHTNESS 300CD/M2 CONTRAST RATIO 1000:			
0.1	M0215	BN07-00427A	LCD-PANEL;M220Z1-L03	1	S.A	
0.1	M0560	BN81-00549A	A/S-PWR CORD;BLK 6FT UL/CSA,10A/ 125V,453	1	S.A	
0.1	M0561	BN81-01095A	A/S-PCBA,KEYPAD BOARD;LE1969,KEY FUNCTIO	1	S.A	
0.1	M0562	BN81-01096A	A/S-PCBA EARPHONE;790240400000R,-,-,-,-,	1	S.A	
0.1	4530303001	BN81-01254A	A/S-CABLE AUDIO;453030300120R,-,-,-,-,-,	1	S.A	
0.1	4530303001	BN81-01256A	A/S-CABLE DVI-D;453030300161R,-,-,-,-,-,	1	S.A	
0.1	4530101003	BN81-01257A	A/S-CABLE D-SUB;453010100380R,-,-,-,-,-,	1	S.A	
0.1	5060200170	BN81-01259A	A/S-CARTON;506020017000R,-,-,-,-,-,-	1	S.N.A	
0.1	5060600069	BN81-01262A	A/S-CUSHION;506060006900R,-,-,-,-,-,-	1	S.N.A	
0.1	5060600069	BN81-01263A	A/S-CUSHION;506060006910R,-,-,-,-,-,-	1	S.N.A	
0.1	4303008012	BN81-01264A	A/S-HRN;430300801280R,-,-,-,-,-,-	1	S.A	
0.1	4303006003	BN81-01266A	A/S-HRN;430300600310R,-,-,-,-,-,-	1	S.A	
0.1	4303030013	BN81-01267A	A/S-HRN;430303001310R,-,-,-,-,-,-	1	S.A	
0.1	7030000090	BN81-01269A	A/S-KIT ACCESSORY;703000009000R,-,-,-,-,	1	S.A	
0.1	7911513005	BN81-01270A	A/S-PCBA I/F;791151300510R,-,-,-,-,-,-	1	S.A	
0.1	7911514006	BN81-01275A	A/S-PCBA P/I;791151400610R,-,-,-,-,-,-	1	S.A	
0.1	M0564	BN82-00254A	A/S ASSY-BASE;714020003500R	1	S.A	
0.1	M0563	BN82-00273A	A/S ASSY-ARM;714000003500R	1	S.A	
0.1	7140500110	BN82-00275A	A/S ASSY-COVER REAR;714050011000R	1	S.A	
0.1	7140300119	BN82-00278A	A/S ASSY-COVER FRONT;714030011900R	1	S.A	

6 Block Diagram

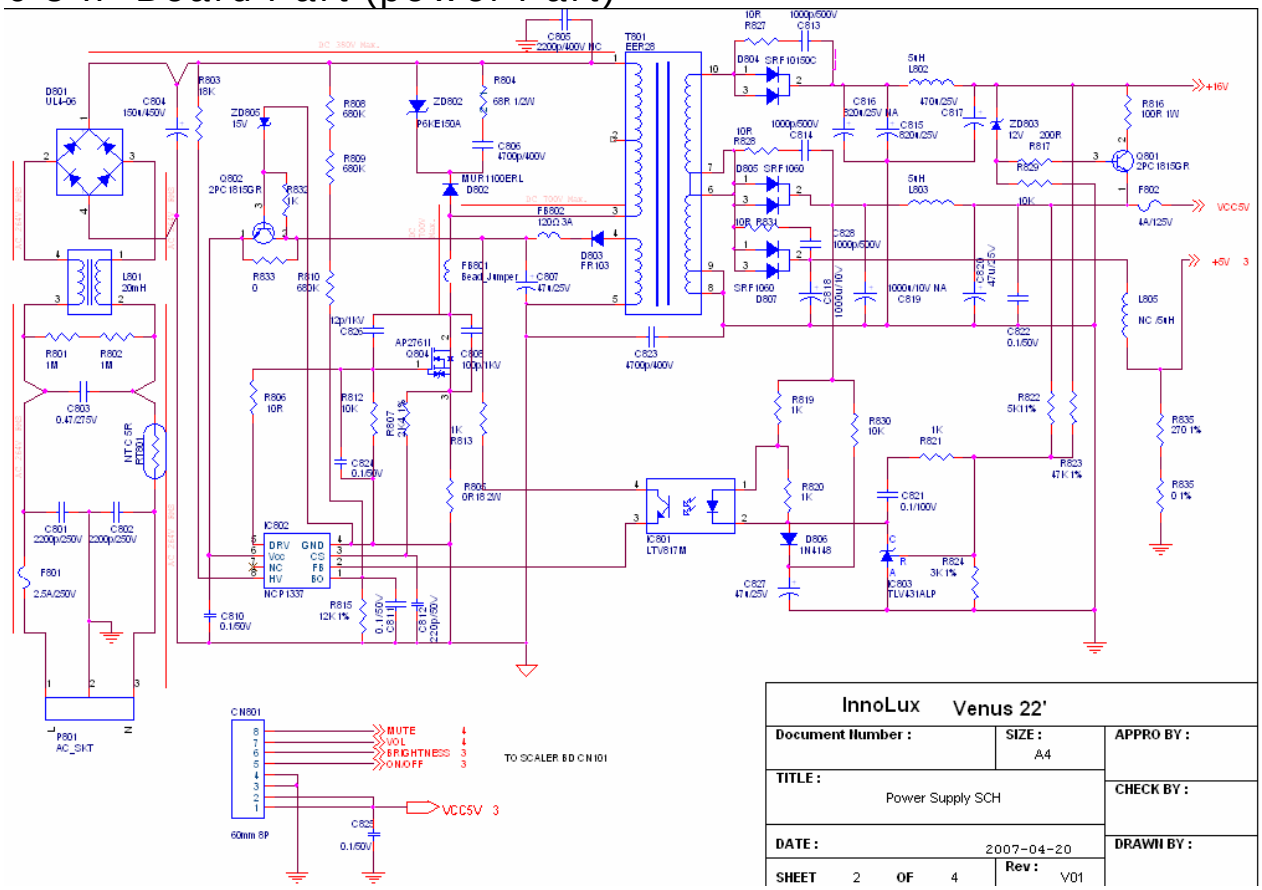
6-1 Power Tree



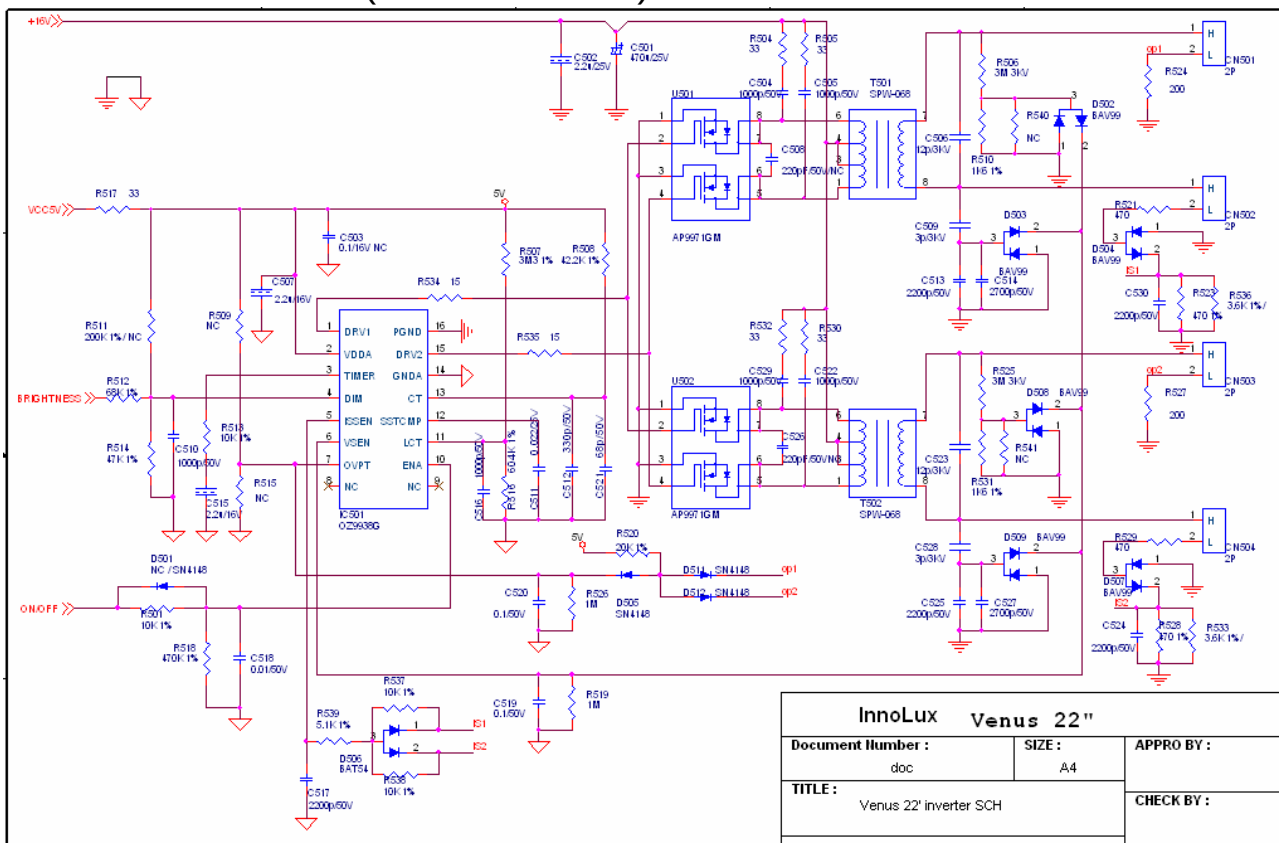
6-2 Main Board Part



6-3 IP Board Part (power Part)



6-4 IP Board Part (Inverter Part)



7 Wiring Diagram

4	ON/OFF
3	Brightness
2	VCC5V
1	VCC5V

30	VLCD5V
29	VLCD5V
28	VLCD5V
27	NC
26	NC
25	NC
24	GND
23	RXE3+
22	RXE3-
21	RXEC+
20	RXEC-
19	RXE2+
18	RXE2-
17	GND
16	RXE1+
15	RXE1-
14	GND
13	RXE0+
12	RXE0-
11	RXO3+
10	RXO3-
9	RXOC+
8	RXOC-
7	GND
6	RXO2+
5	RXO2-
4	RXO1+
3	RXO1-
2	RXO0+
1	RXO0-

CN104 (Connected with LVDS Cable)

6	GND
5	GND
4	ON/OFF
3	Brightness
2	VCC5V
1	VCC5V

CN101(Connected with the Inverter Cable)

(Connected with function wire) CN102

1	2	3	4	5
Led	Power	Key Right	Key Left	GND

Main board

CN201

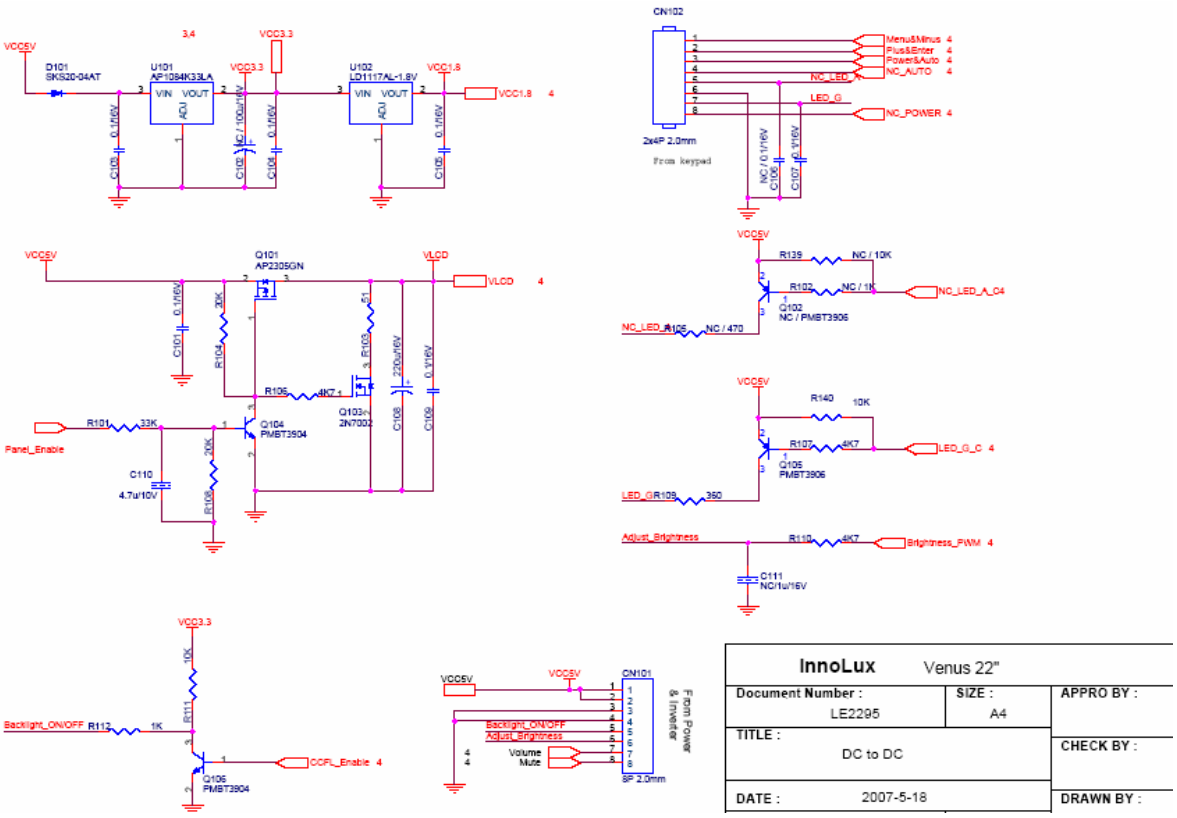
Pin	Symbol
1	RX2-
2	RX2+
3	GND
4	RX4-
5	RX4+
6	SCL
7	SDA
9	RX1-
10	Rx1+
11	GND
12	RX3-
13	RX3+
14	+5V Power
15	GND
17	RX0-
18	RX0+
19	GND
20	RX5-
21	RX5+
22	GND
23	RXC+

CN103 ' Connected with the D-Sub Cable)

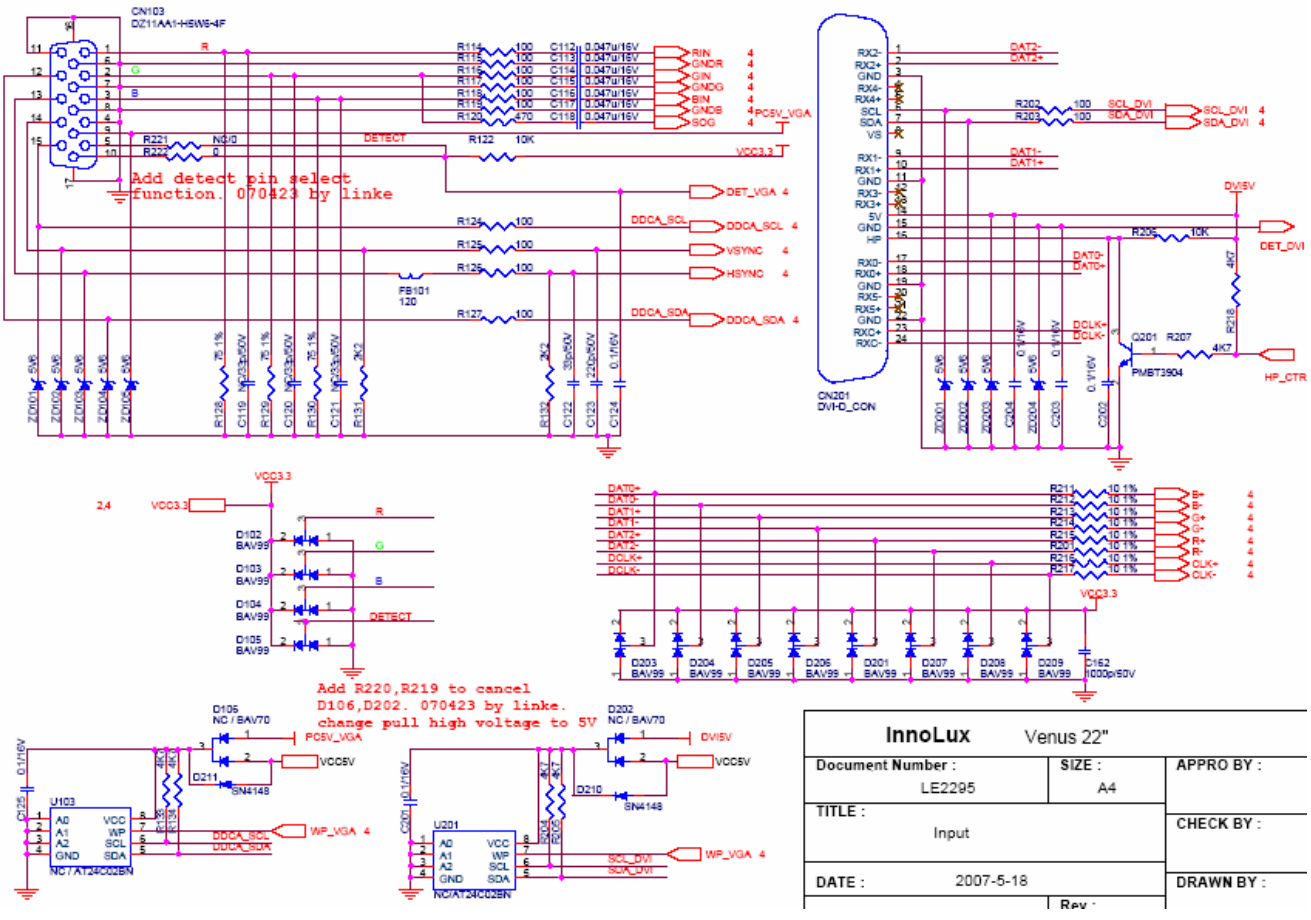
Data clock line (SC	15
VSYNC	14
H / H+V SYNC	13
Serial data (SDA)	12
NC	11
Cable Detect	10
NC	9
Blue GND	8
Green GND	7
Red GND	6
GND	5
NC	4
Blue video input	3
Green video input	2
Red video input	1

8 Schematic Diagram

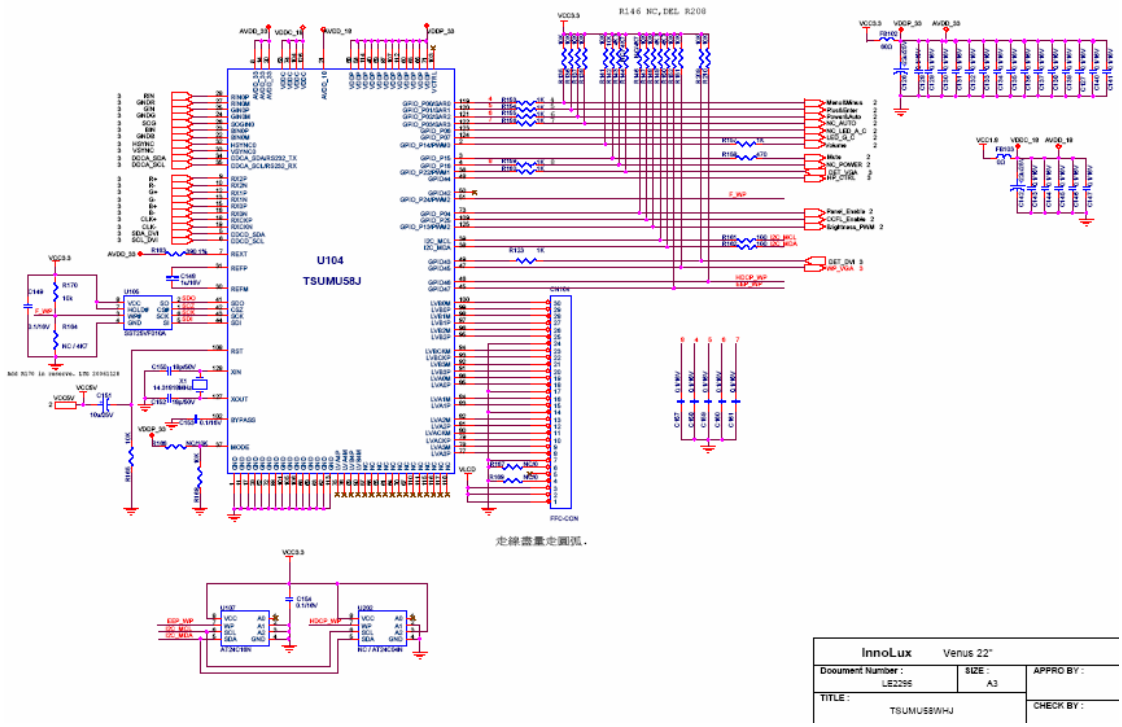
8- 1 DC-DC



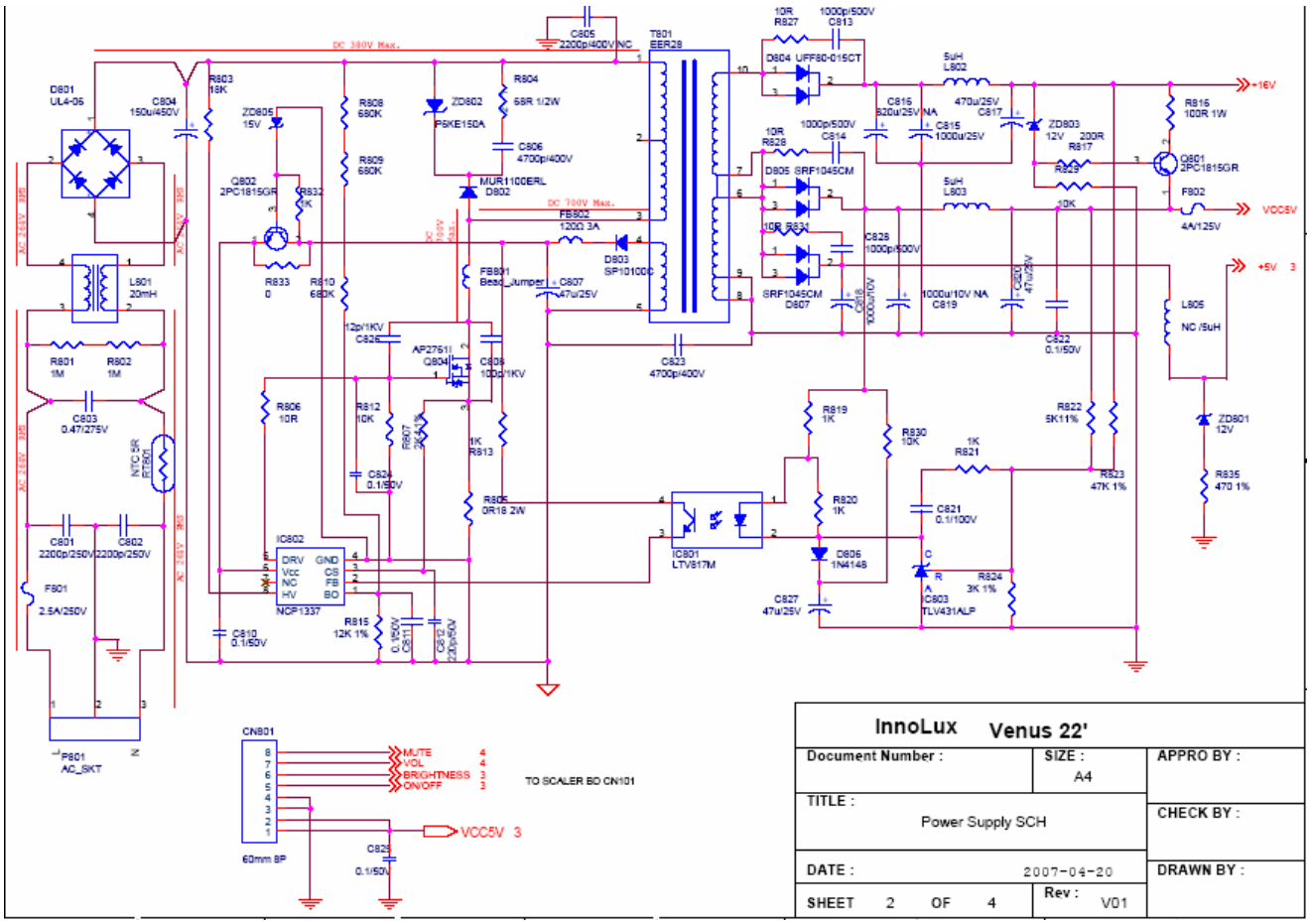
8- 2 Input



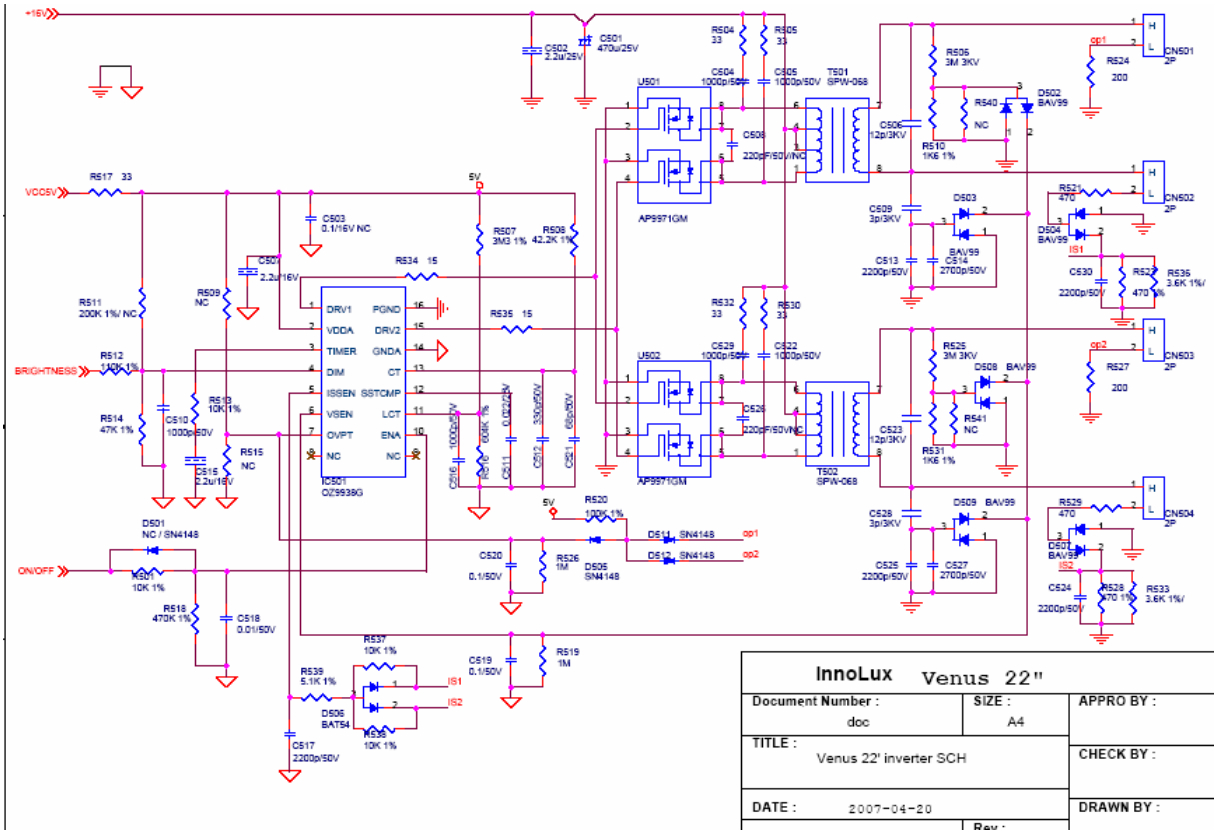
8- 3 TSUMU58WHJ



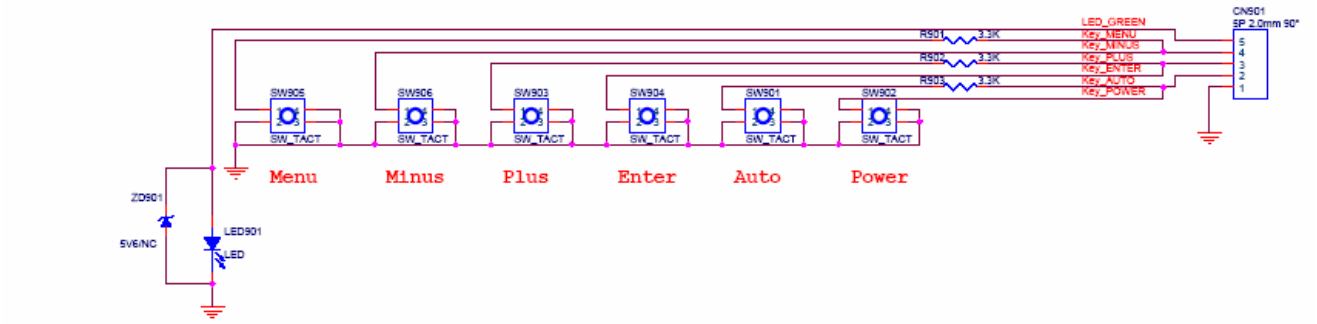
8- 4 Power



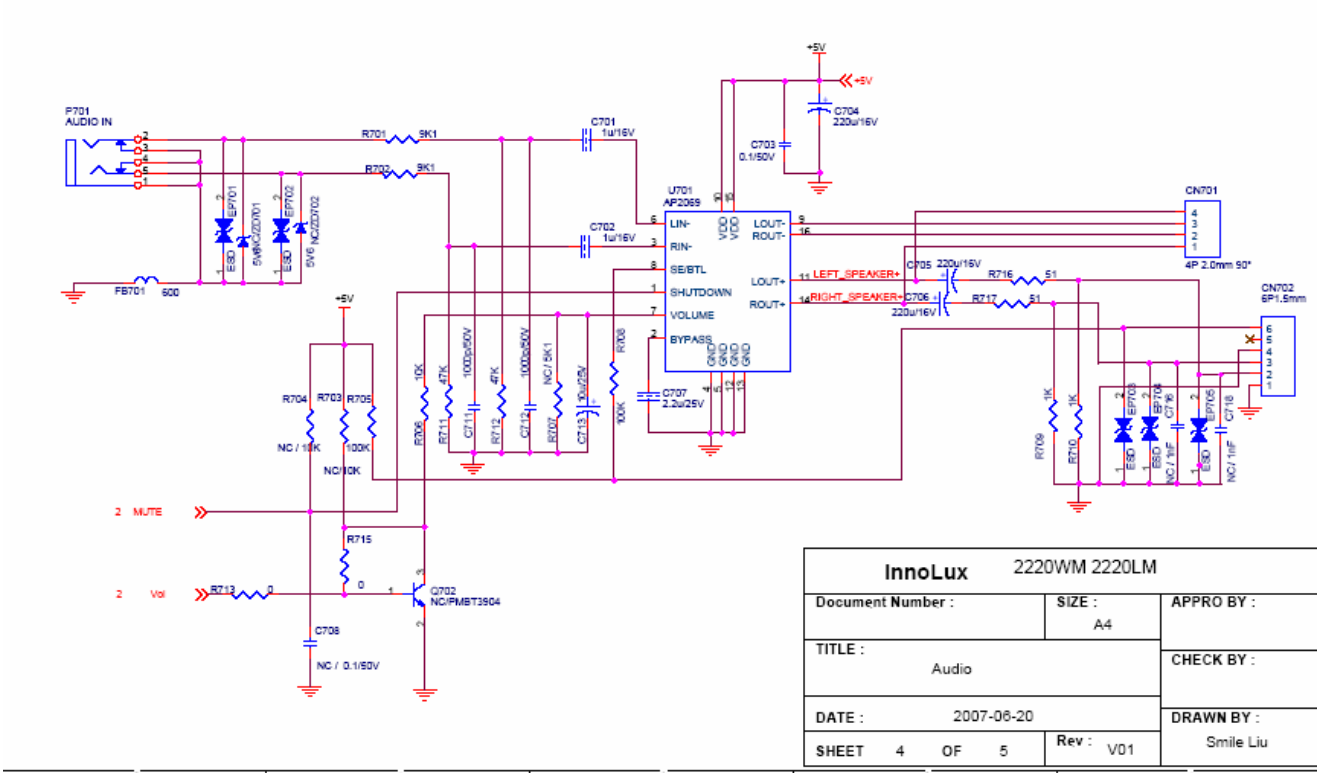
8- 5 Inverter



8- 6 Keypad

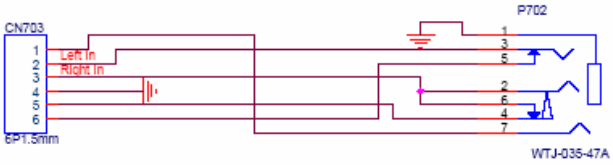


8- 7 Audio



InnoLux	2220WM 2220LM		
Document Number :		SIZE : A4	APPRO BY :
TITLE : Audio			CHECK BY :
DATE : 2007-06-20			DRAWN BY : Smile Liu
SHEET 4 OF 5		Rev : V01	

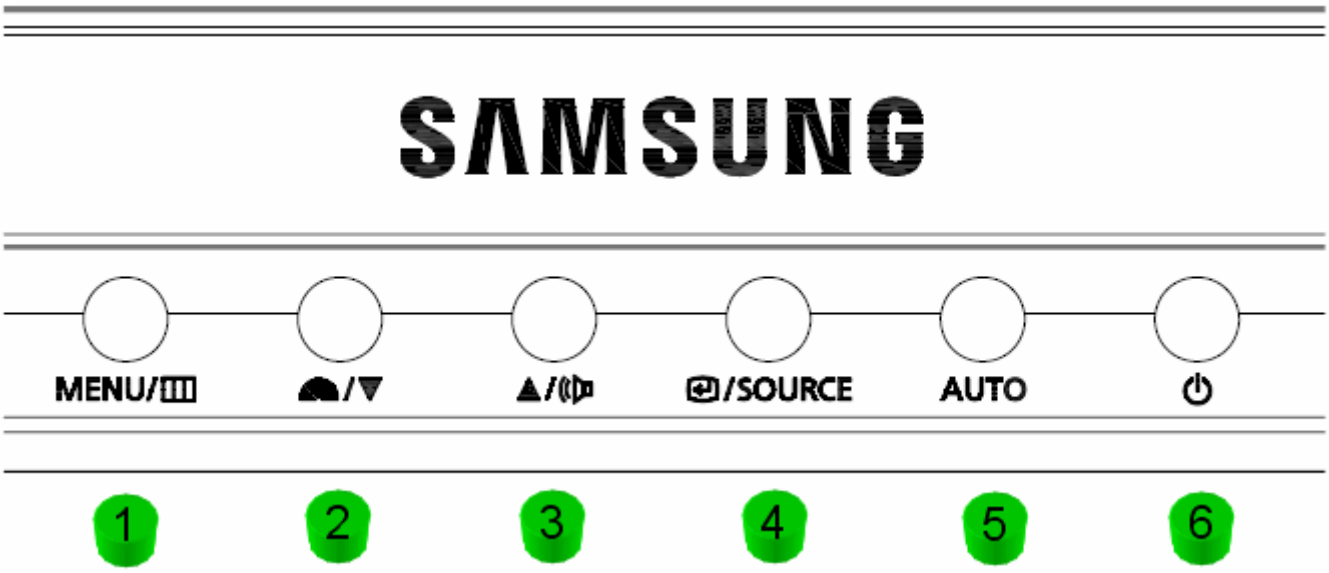
8- 8 Ear Phone



InnoLux	Vers2220WM 2220LM		
Document Number : ?		SIZE : A	APPRO BY :
TITLE : Ear Phone			CHECK BY :

9 Operating Instructions and Installation

9-1 Front



1. Menu button
Opens the OSD menu. Also use to exit the OSD menu or return to the previous menu.

2. MagicBright button
MagicBright is a new feature providing optimum viewing environment depending on the contents of the image you are watching. Currently four different modes are available: Custom, Text, Internet, Game , Sport and Movie. Each mode has its own pre-configured brightness value. You can easily select one of four settings by simply pressing MagicBright control buttons.

3. Volume button
When OSD is not on the screen, push the button

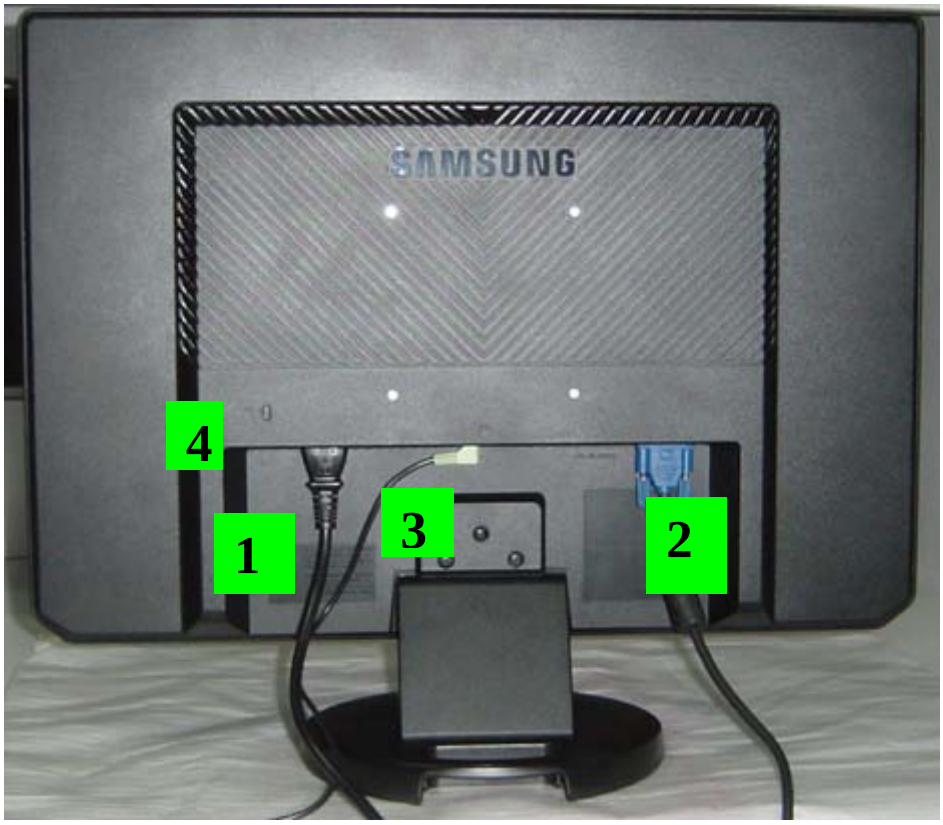
2&3. Adjust buttons Adjust items in the menu.

4. Enter button
Activates a highlighted menu item.

5. Auto button
Use this button for auto adjustment.

6. Power button / Power indicator
Use this button for turn the monitor on and off.
/This light glows green during nomal operation, and blinks green once as the monitor saves your adjustments..

9-2 Rear



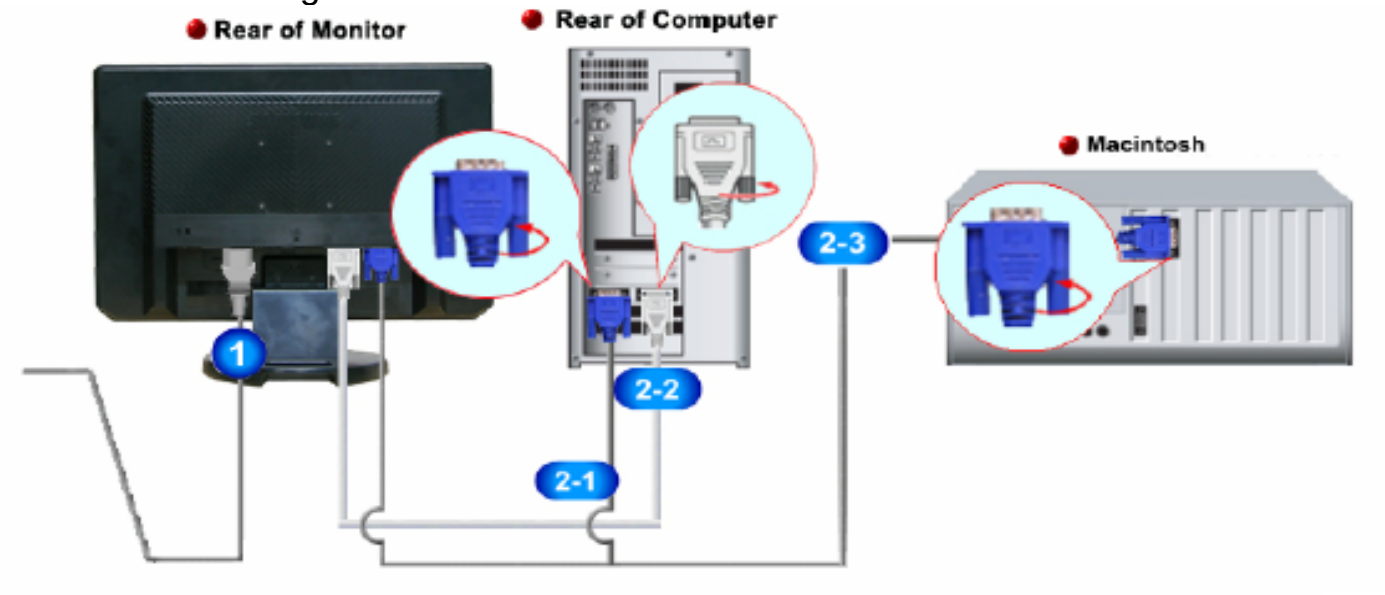
1. Power port
Connect the power cord for your monitor to the power port on the back of the monitor.

2. D-sub 15-pin port
Connect the signal cable to the 15-pin, D-sub connector on the back of your monitor.

3. Audio port
Connect the audio cord for your monitor to the audio port on the back of the monitor

4. Kensington Lock
The Kensington lock is a device used to physically fix the system when using it in a public place.
(The locking device has to be purchased separately.)
To get the information on using the Kensington Lock, contact an aurhorized dealer

9-3 Connecting the Monitor



1. Connect the power cord for your monitor to the power port on the back of the monitor.
   Plug the power cord for the monitor into a nearby outlet.

2. Use appropriate connection for your computer.

   2-1. Using the D-sub (Analog) connector on the video card.
   Connect the signal cable to the 15-pin, D-sub port on the back of your monitor.

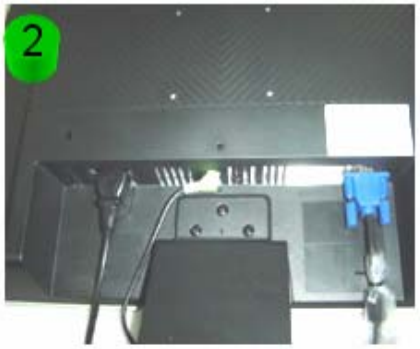
    **[RGB IN]**

   2-2. Using the DVI (Digital) connector on the video card.
   Connect the DVI Cable to the DVI IN (HDCP) Port on the back of your Monitor.

    **[DVI IN (HDCP)]**

   2-3. Connected to a Macintosh.
   Connect the monitor to the Macintosh computer using the D-sub connection cable.

9-4 Monitor Assembly



9-5 Attaching a Base

- This monitor accepts a 100mm x 100mm VESA-compliant mounting interface pad.

A. Monitor

B. Mounting Interface Pad

1. Turn off your monitor and unplug its power cord.

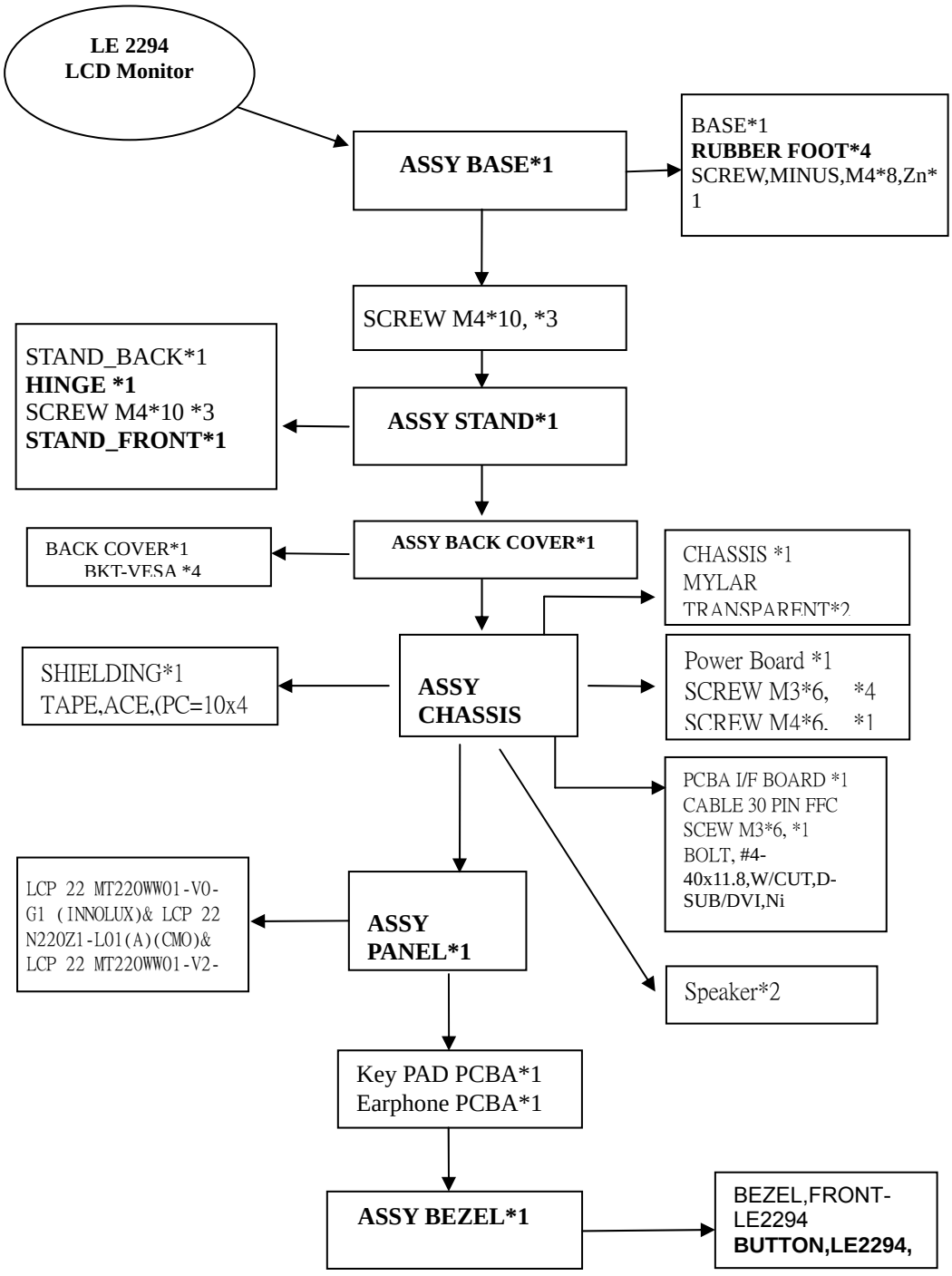
2. Lay the LCD monitor face-down on a flat surface with a cushion beneath it to protect the screen.

3. Remove four screws and then remove the stand from the LCD monitor.

4. Align the mounting interface Pad with the holes in the rear cover mounting pad and secure it with four screws that came with the arm-type base, wall mount hanger or other base.

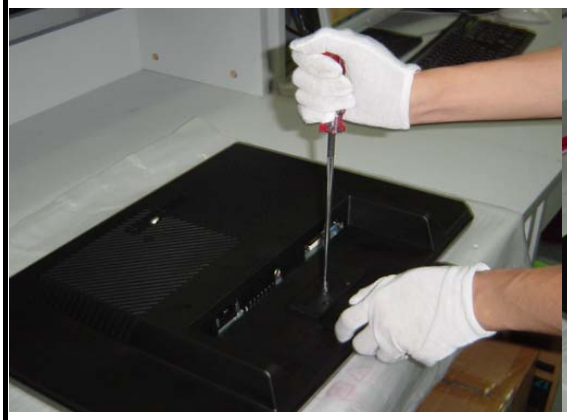
10 Disassembly and Reassembly

10-1 Disassembly Block



Note: The disassembly direction please following direction of arrowhead

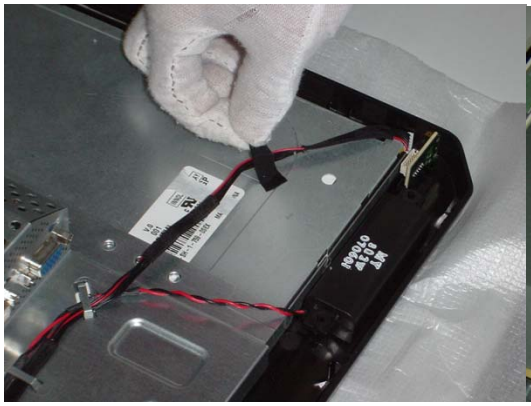

1.unscrew the manual scerw and remove the base




2.unscrew the stand screws and remove the stand


3.Lift the back cover and use jig remove the lamp shielding


4.Disconnect lamp wire and earphone wire

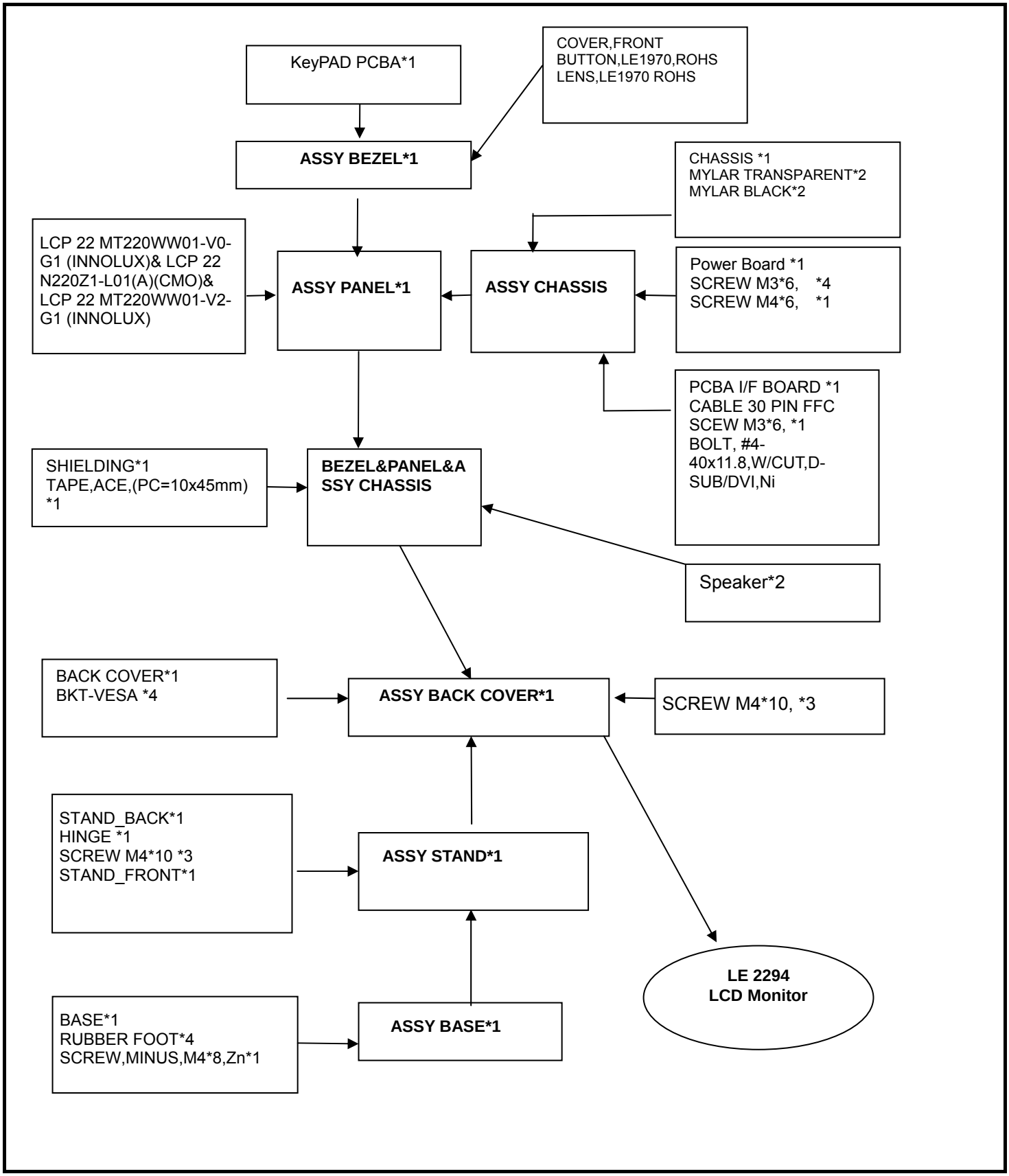



5.Tear the adhesive tape and disconnect keypad wire


6.Disconnect the speaker and LVDS wire


7.Remove chassis assembly and lift up the panel

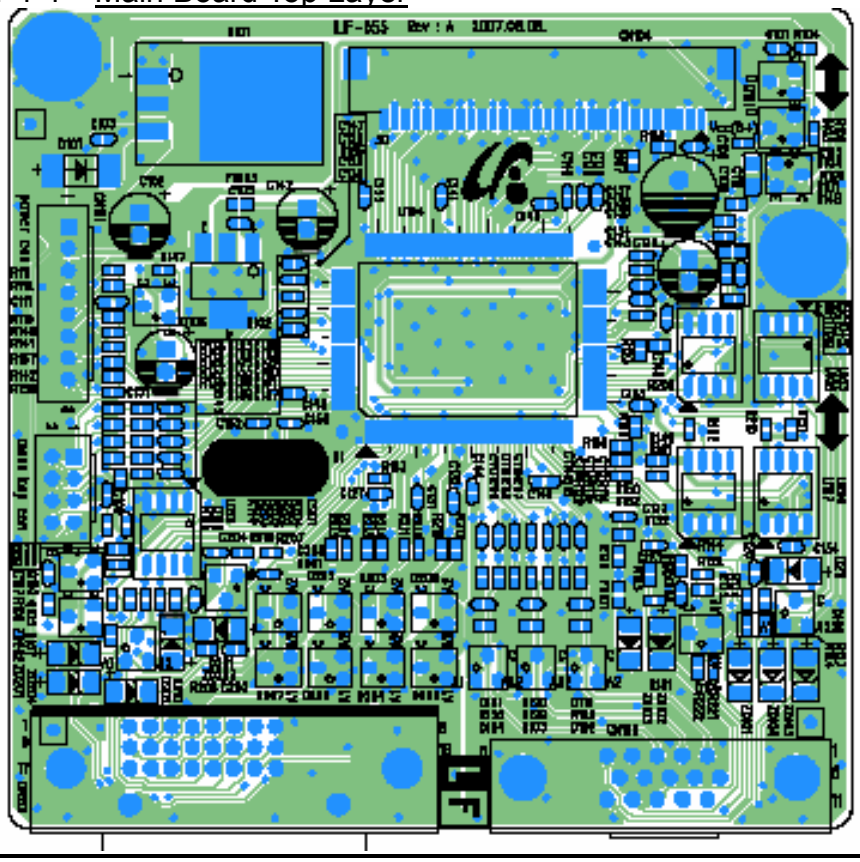
10-2 Reassembly Block



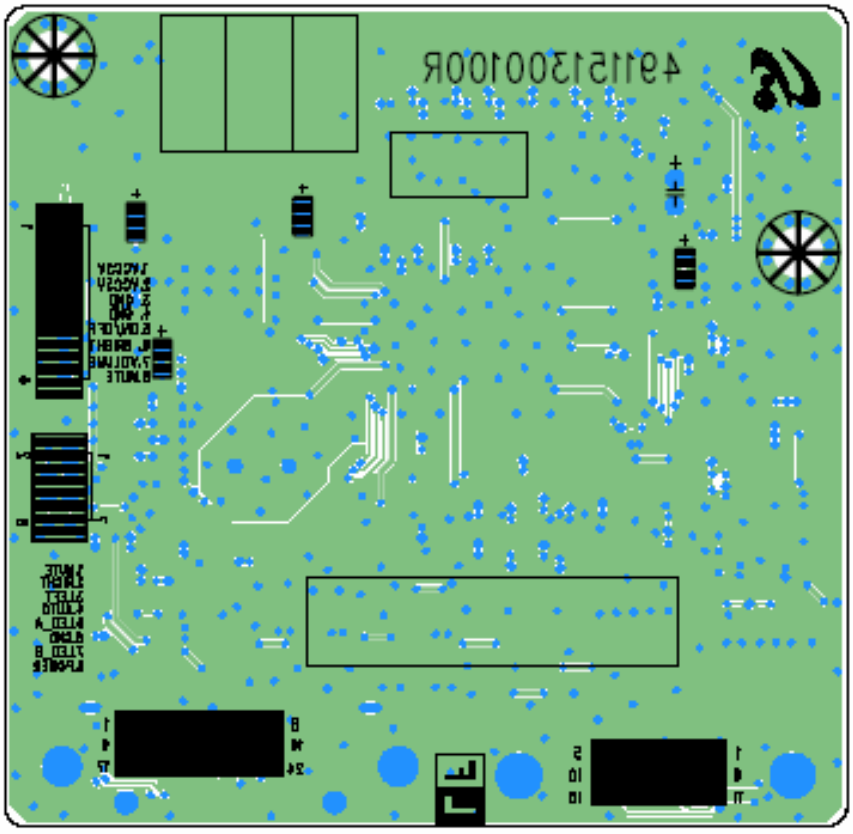
11 PCB Diagram

11-1 Main Board

11-1-1 Main Board Top Layer

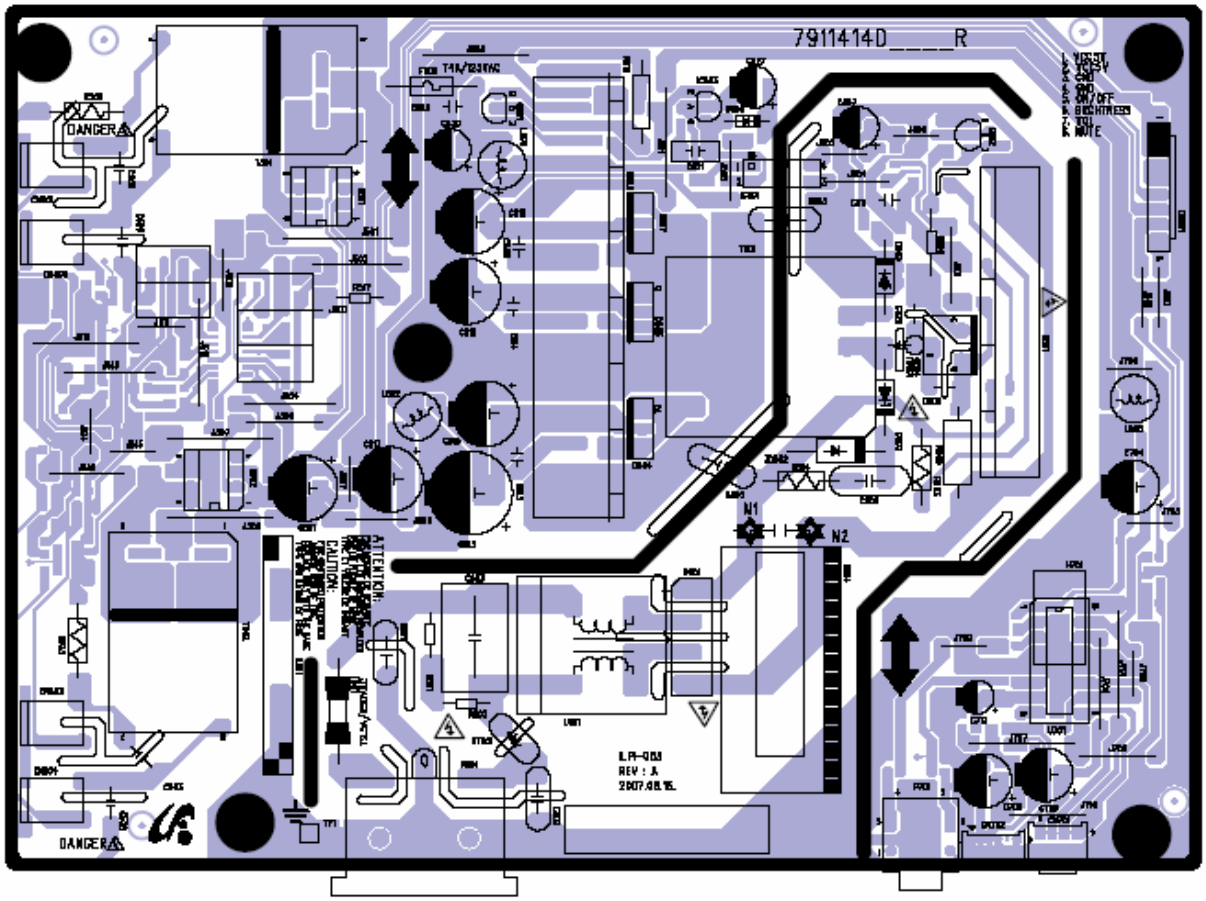


11-1-2 Main Board Bottom Layer

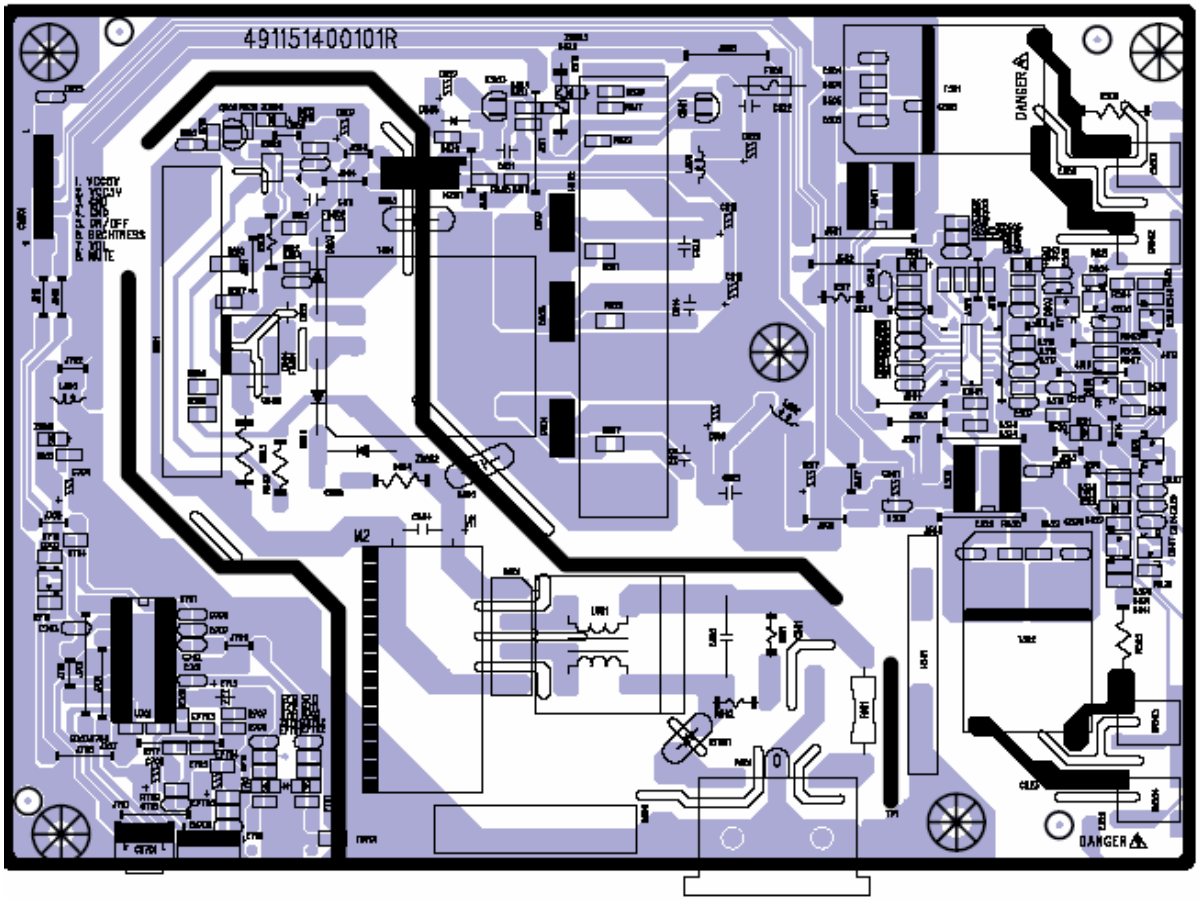


11–2 Power Board

11-2-1 Power Board TOP Layer



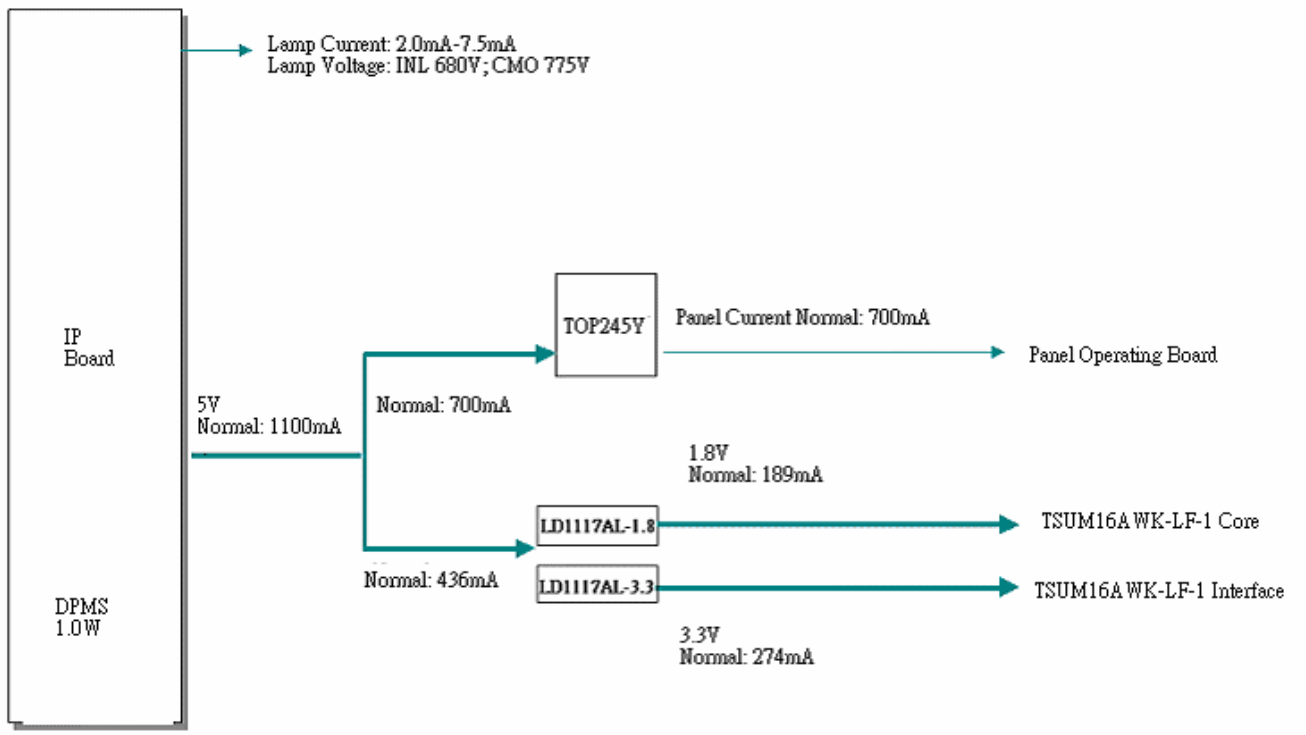
11-2-2 Power Board BOTTOM Layer



12 Circuit Descriptions

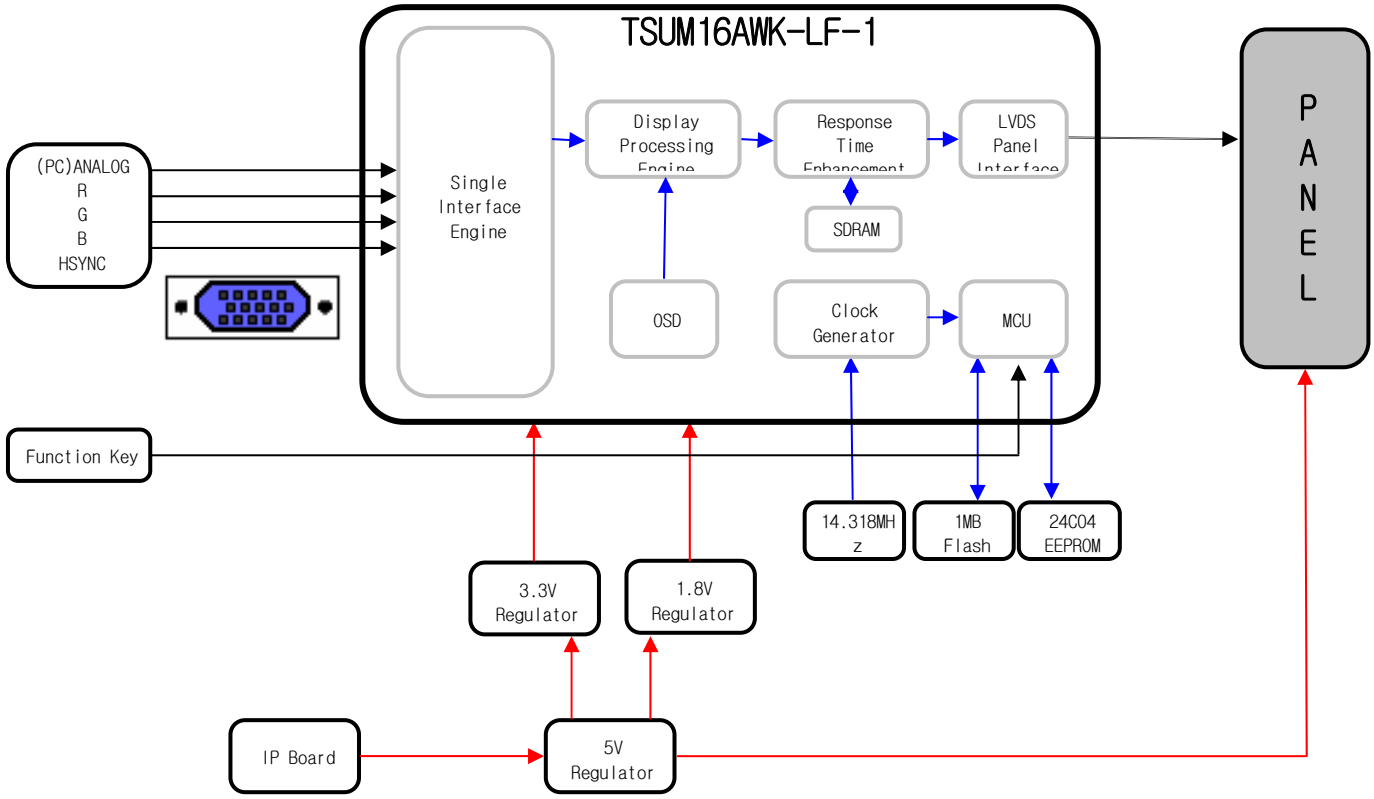
12-1 Overall Block Structure

12-1-1 Power Tree



1. When the AD board is in DPMS state:
   1.1 The IP has been designed so that it operates with a power consumption of less than 0.8W of.
   1.2 The Scaler consumes power up to 37mA
   1.3 The power to the panel is switched off
2. When the AD board is operating normally:
   2.1 The maximum power consumption of the panel lamps is described below (It may vary depending on the panel manufacturer)
   INL: 4*(7.0mA*680Vrms)=4* 4.76W=19W CMO: 4*(7.0mA*775Vrms)=4* 5.43W=21.7W
   2.2 The power consumption of the Panel Control board is as follows: 5V*700mA=3.50W
   2.3 The power consumption of the Scaler is as follows: 3.3V*274mA + 1.8V*145mA = 1.24W

12-1-2 Main board Parts



1. Inverter: A conversion device that converts DC rated voltage/current to high ones necessary for the panel lamp.

2. DC/DC(Regulator): General term for DC to DC converting devices.
   The IP board receives 5V and outputs 1.8 or 3.3V that is supplied to the scaler (TSUM16AWK-LF-1).

3. Power MosFET: The IP board receives 5V and outputs a lower voltage in DPMS mode and supplies the whole 5V for the panel operating board in normal conditions. In that case, the switching of Power MosFET is controlled by Micom.

4. Scaler: Receives the analog R,G,B signals and convert them to proper reso- lutions using up- or down-scaling that are transferred to the panel in the LDVS formats.

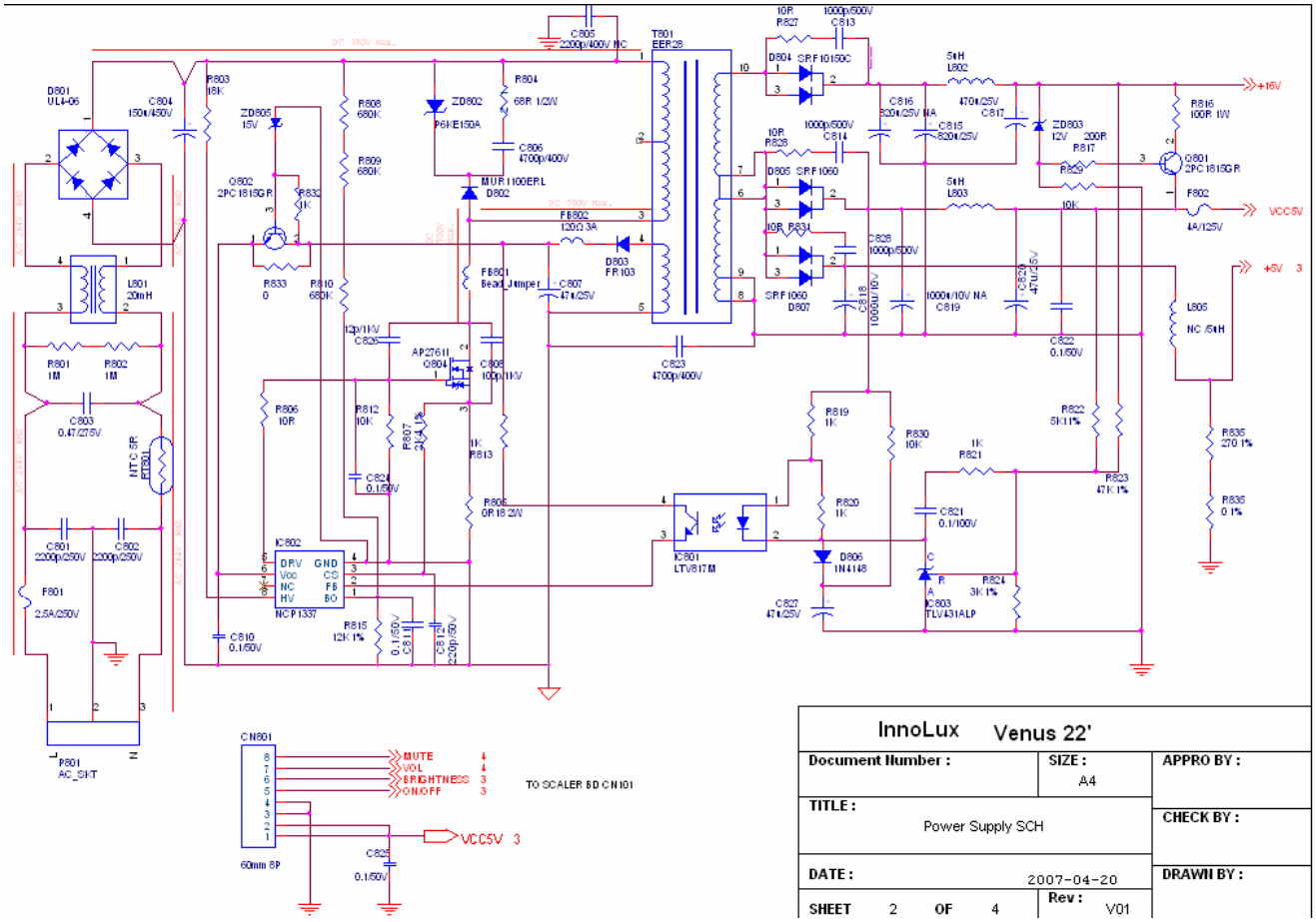
5. Crystal(Oscillator): Use one 14.318MHz oscillator externally to supply power to both MCU and Scaler at the same time.

6. Scaler & EEPROM: I2C is a two-way serial bus of two lines that supports communications across the integrated circuits as well as between FLASH and EEPROM.
   In particular, MCU(TSUM16AWK-LF-1) and use the SDR direct bus for mutual communications, which is an effective, speedy system because it allows 4 additional address/data lines com- pared to the old serial systems.

7. Function Key: A certain keystroke generates a certain electrical potential, which is transferred into ADC input port of the MCU and then con- verted to a digital value by the A/D converter of the chip. The digital value (data) is a clue to which key is entered.

12-2 IP Board Part(Power) Schematic Diagrams

Power



Switching Mode Power Supply

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. R801 and R802 joined between two inputting main circuit to prevent man from shock. L801 is used to clear up low frequency wave. C801 and C802 are used to discharge the waves that L801 produced. High frequency waves are damped by C801 and C802. D801 is a rectifier which composed of 4 build-in diodes, it inverts AC to DC.

1.2 High Voltage to Low Voltage Control Circuit

C804 is used to smooth the wave from rectifier. IC802 is a highly integrated PWM controller. When rectified DC high voltage is applied to the HV pin during start-up, the MOSFET Q804 is initially off, and the Vcc pin capacitor is charged. When the Vcc pin voltage reaches approximately 10V, 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 4ms. If no external feedback/supply current is fed into the FB pin by the end of the soft-start, the current Setpoint will be above the fault level, FAULT flag is raised, if the FAULT duration exceeds 80ms, the output controller disable

Resistor R808, R809, R810, R811 are for line over voltage shutdown(OVP)

When PWM is turned off, the main current flow will be consumed through R804 and D802, This will prevent MOSFET Q804 from being damaged under large current impulse and voltage spike.

D803 and C807 to provide internal Auxiliary voltage to Vcc pin during normal operation. Otherwise, error amplifier and feedback current input the FB pin for duty cycle control.

1.3 DC_5V and DC_14V Output Circuit

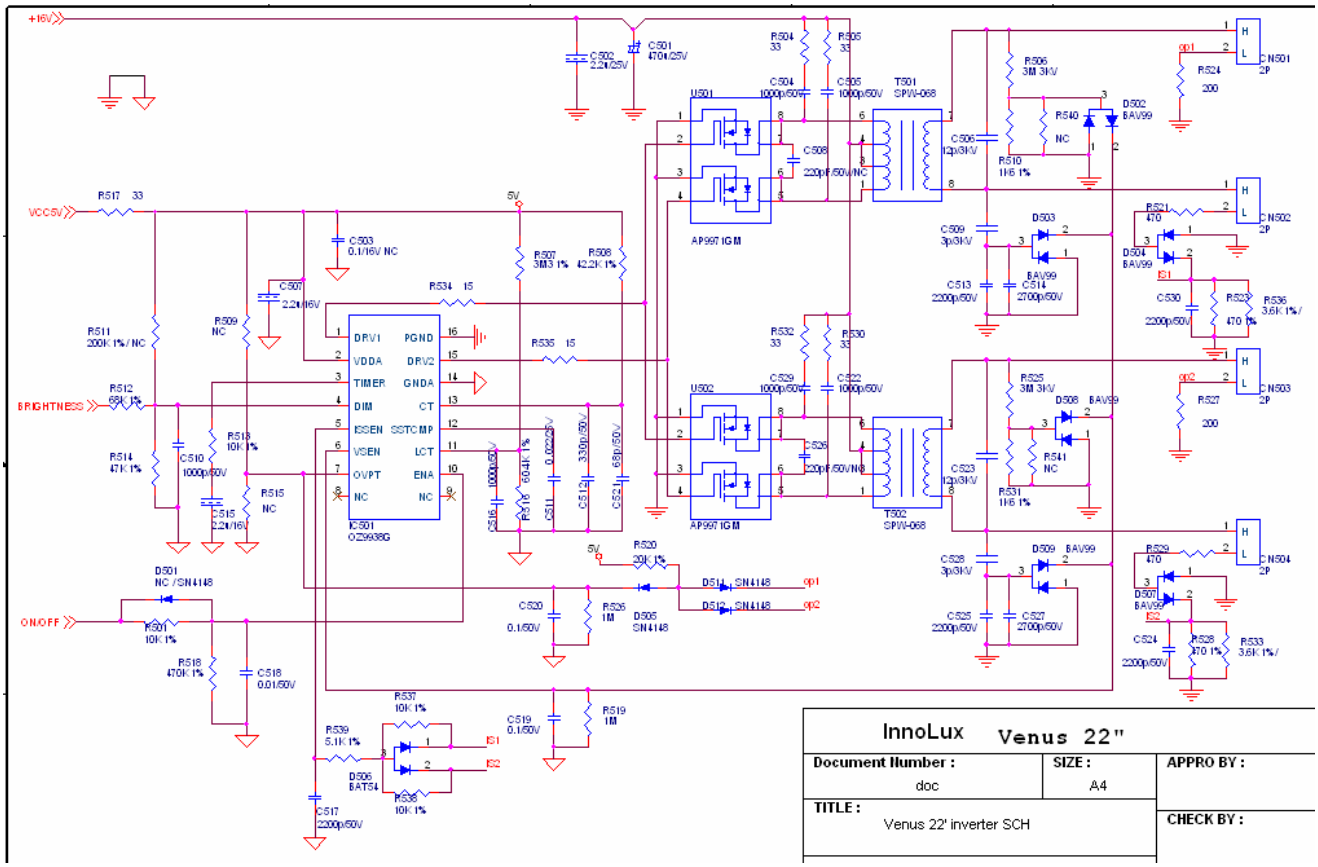
For DC 5V, D805 is used to rectify the inducted current. R828 and C814 are used to store energy when current is reversed. The parts including C818, C822, C820,L803 are used to smooth the current waves.

For DC 14V, D803 is used to rectify the inducted current. R827 and C813 are used to store energy when current is reversed. The parts including C815, C817 and L802 are used to smooth the current waves.

3.1.4 Feedback

Pin R of IC803 is supplied 2.5-v stable voltage. It connects to 5V and 14V output through R822, R823 and R824. R822, R823 and R824 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.

12-3 IP Board Part(Inverter Part)



Inverter Circuit

1. R503, ZD501, R502, Q501 components convert +14V voltage into +5.0V voltage, and the voltage supply to IC501. The extra PWM pulse signal (BRIGHTNESS signal) input to control IC through R512, R514, C510, The LCT pin is set to a DC voltage of 0.7V by using a resistor divider(R507, R516), change the duty of PWM pulse, will regulate the lamp current. The ON/OFF voltage connect to pin10 of IC501 through D501, R501, A voltage of 2V to pin10 of IC501 enables the IC and activates the striking timer. The SSTCMP pin of IC501 performs the soft function, the C511 set the time of SST. The operation frequency determined by external capacitor C512, C521 and resistor R508 connected at CT pin of IC501. C515 connect the TIMER pin of IC501, the capacitor to set striking time and shunt down delay time. DRV!, DRV2 output for power MOSFET U501, U502.
2. OZ9938 provides two drive signals for U501, U502, and they work in push pull topology driving, two transformers are connected in parallel with each transformer driving two lamps in series. Turning each N-Channel MOSFET “on/off” complementarily, produces an alternating current through the transformer primary and secondary. The “on” duration of the switches determines the amount of energy delivered to the CCFLs. R504, C504, R505, C505, R532, C529, R530, C522 are snubber networks, they suppress Voltage transient spike in drain of power MOSFET.
3. R506, R510, C509, C513, C514, R525, R531, C528, C525, and C527 are connected between high voltage output connector and ground, the divided AC voltage is inverted DC voltage through D502, D503, D508, and D509. The sense voltage feed back to VSEN (pin 6 of IC501) for an over voltage/over current condition during normal operation. R528, R533 are current sense resistor, current sense signal feed back to Isense (pin 5 of IC501) for lamp “ON” detection.

13 Reference Information

13-1 Technical Terms

-TFT-LCD
Thin film Transistor Liquid Crystal Display

-ADC(Analog to Digital Converter)
This is a circuit that converts from analog signal to digital signals.

-PLL(Phase Locked Loop)
During progressing ADC, Device makes clock synchronizing HSYNC with Video clock

-Inverter
Device that supplies Power to LCD panel lamp. This device generates about 1,500~2,000V.

AC Adapter
Device that converts AC(90V~240V) to DC(+12V or 14V)

-SMPS(Switching Mode Power Supply)
Switching Mode Power supply. This design technology is used to step up/down the input power by switching on/off

-FRC(Frame Rate Controller)
Technology that changes the number of frames displayed on screen per second.
TFT-LCD panel requires 60 frames per second. This technology is needed to convert input image to 60 frames per second regardless input frame quantity.

-Image Scaler
Technology that convert various input resolution to other resolution.(ex. 640* 480 to 1024*768)

-Auto Configuration(Auto adjustment)
This is an algorithm to adjust monitor to optimum condition by pushing one key.

-OSD(On Screen Display)
Customers can easily control the screen settings using the OSD.

-FINE
The "Fine" adjustment is used to adjust visibility by controlling phase difference.

-COARSE
This adjustment adjusts the display by tuning Video clock and PLL clock.

-L.V.D.S.(Low Voltage Differential Signaling)
A kind of transmission method for Digital. It can be used from Main PBA to Panel.

-DDC(Display data channel)
It is a communication method between a Host Computer and related equipment. It enables Plug and Play between PC and
Monitor.

-EDID
Extended Display Identification Data PC can recognize monitor information, such as Product data, Product name, Display mode, Serial number, Signal source, etc. Data is recognized via DDC Line linking PC and Monitor.

-Dot Pitch
The image on a monitor is composed of red, green and blue dots. The closer the dots, the higher the resolution. The distance between two dots of the same color is called the 'Dot Pitch'. Unit: mm

-Vertical Frequency
The screen must be redrawn several times per second in order to create and display an image for the user. The frequency of this repetition per second is called Vertical Frequency or Refresh Rate. Unit: Hz
Example: If the same light repeats itself 60 times per second, this is regarded as 60 Hz.

-Horizontal Frequency
The time to scan one line connecting the right edge to the left edge of the screen horizontally is called Horizontal Cycle. The inverse number of the Horizontal Cycle is called Horizontal Frequency. Unit: kHz

-Interlace and Non-Interlace Methods
Showing the horizontal lines of the screen from the top to the bottom in order is called the Non-Interlace method while showing odd lines and then even lines in turn is called the Interlace method. The Non-Interlace method is used for the majority of monitors to ensure a clear image. The Interlace method is the same as that used in TVs.

-**Plug & Play**
This is a function that provides the best quality screen for the user by allowing the computer and the monitor to exchange information automatically. This monitor follows the international standard VESA DDC for the Plug & Play function.

-Resolution
The number of horizontal and vertical dots used to compose the screen image is called 'resolution'. This number shows the accuracy of the display. High resolution is good for performing multiple tasks as more image information can be shown on the screen.

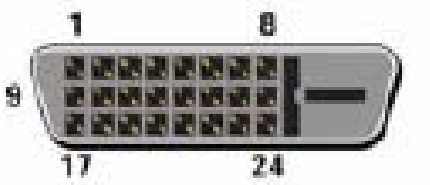
Example: If the resolution is 1680 x 1050 , this means the screen is composed of 1680 horizontal dots (horizontal resolution) and 1050 vertical lines (vertical resolution).

13-2 Pin Assignments

VGA

Sync Type / Pin No.	15-Pin D-Sub Signal Cable Connector	
	Separate	Sync-on-green
1	Red	Red
2	Green	Green + H/V Sync
3	Blue	Blue
4	NC	NC
5	DDC Return(GND)	DDC Return(GND)
6	GND-R	GND-R
7	GND-G	GND-G
8	GND-B	GND-B
9	NC	NC
10	Cable Detect	Cable Detect
11	NC	NC
12	Bi-Dr Data (SDA)	Bi-Dr Data (SDA)
13	H-Sync	Not Used
14	V-Sync	Not Used
15	DDC Clock(SCL)	DDC Clock(SCL)

DVI-D



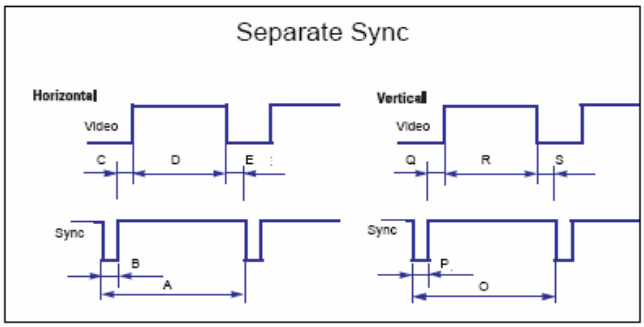
Pin	Symbol	Pin	Symbol	Pin	Symbol
1	RX2-	9	RX1-	17	RX0-
2	RX2+	10	Rx1+	18	RX0+
3	GND	11	GND	19	GND
4	RX4-	12	RX3-	20	RX5-
5	RX4+	13	RX3+	21	RX5+
6	SCL	14	+5V Power	22	GND
7	SDA	15	GND	23	RXC+

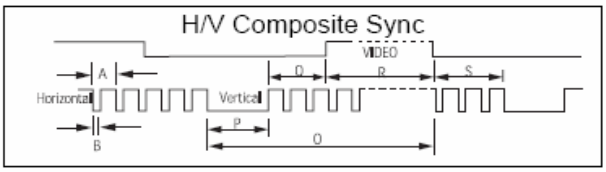
13-3 Timing Chart

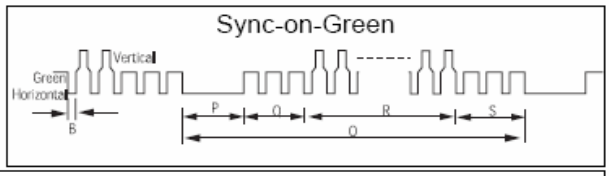
This section of the service manual describes the timing that the computer industry recognizes as standard for computer- generated video signals. Through D-SUB connectors, this unit can support FH= 30~81 KHz, Fv=56~75Hz and WXGA+ display modes as below:

Table 1. Timing Chart

NO.	Name	dot_clk (MHz)	out_hs	out_vs	htotal	h_disp	h_bp	h_sync	vtotal	v_disp	v_bp	v_sync	h_freq (kHz)	v_freq (Hz)
1	640X350-70	25.175	+	-	800	**640**	48	96	449	**350**	60	2	31.469	**70.086**
2	640X400-60VESA	25.175	-	-	800	**640**	48	96	525	**400**	73	2	31.469	**59.940**
3	640X400-70IBM	25.175	-	-	800	**640**	48	96	449	**400**	33	2	31.469	**70.086**
4	VGA50-CVT	19.750	-	-	800	**640**	80	64	497	**480**	10	4	24.688	**49.673**
5	VGA60VESA	25.175	-	-	800	**640**	40	96	525	**480**	25	2	31.469	**59.940**
6	VGA67	30.240	-	-	864	**640**	96	64	525	**480**	39	3	35.000	**66.667**
7	VGA72VESA	31.500	-	-	832	**640**	128	40	520	**480**	28	3	37.861	**72.809**
8	VGA75VESA	31.500	-	-	840	**640**	120	64	500	**480**	16	3	37.500	**75.000**
9	720X400-70IBM	28.322	-	+	900	**720**	54	108	449	**400**	35	2	31.469	**70.087**
10	720X480-60GTF	26.719	-	+	896	**720**	88	72	497	**480**	13	3	29.820	**60.001**
11	720x576-50	27.000	-	-	864	**720**	60	64	625	**576**	39	5	31.250	**50.000**
12	SVA56	36.000	+	+	1,024	**800**	128	72	625	**600**	22	2	35.156	**56.25**
13	SVGA60VESA	40.000	+	+	1,056	**800**	88	128	628	**600**	23	4	37.879	**60.317**
14	SVGA72VESA	50.000	+	+	1,040	**800**	64	120	666	**600**	23	6	48.077	**72.188**
15	SVGA75VESA	49.500	+	+	1,056	**800**	160	80	625	**600**	21	3	46.875	**75.000**
16	832X624-75MAC	57.283	-	-	1,152	**832**	224	64	667	**624**	39	3	49.725	**74.550**
17	XGA50-CVT	52.000	-	+	1,312	**1,024**	144	104	793	**768**	18	4	39.634	**49.980**
18	XGA60VESA	65.000	-	-	1,344	**1,024**	160	136	806	**768**	29	6	48.363	**60.004**
19	XGA70VESA	75.000	-	-	1,328	**1,024**	144	136	806	**768**	29	6	56.476	**70.069**
20	XGA72-GTF	78.434	-	-	1,360	**1,024**	168	112	801	**768**	29	3	57.672	**72.000**
21	XGA75VESA	78.750	+	+	1,312	**1,024**	176	96	800	**768**	28	3	60.023	**75.029**
22	1152X864-75VESA	108.000	+	+	1,600	**1,152**	256	128	900	**864**	32	3	67.500	**75.000**
23	1152X870-75MAC	100.000	-	-	1,456	**1,152**	144	128	915	**870**	39	3	68.681	**75.062**
24	1152x900-67GTF	96.223			1,536	**1,152**	192	120	935	**900**	31	3	62.645	**67.000**
25	1280X720-50CVT	60.500	-	+	1,632	**1,280**	176	128	744	**720**	16	5	37.071	**49.827**
26	1280X720-60CVT	74.500	-	+	1,664	**1,280**	192	128	748	**720**	20	5	44.772	**59.855**
27	1280X768-50CVT	65.250	-	+	1,648	**1,280**	184	128	793	**768**	15	7	39.593	**49.929**
28	1280X768-60	79.500	-	+	1,664	**1,280**	192	128	798	**768**	20	7	47.776	**59.870**
29	1280X768-75 VESA	102.250	-	+	1,696	**1,280**	208	128	805	**768**	27	7	60.289	**74.893**
30	1280X960-50CVT	83.000	-	+	1,680	**1,280**	200	128	991	**960**	24	4	49.405	**49.853**
31	1280X960-60VESA	108.000	+	+	1,800	**1,280**	312	112	1,000	**960**	36	3	60.000	**60.000**
32	1280x960-75	130.000	-	+	1,728	**1,280**	224	136	1,005	**960**	38	4	75.231	**74.857**
33	SXGA50CVT	88.500	-	+	1,680	**1,280**	200	128	1,057	**1024**	23	7	52.679	**49.838**
34	SXGA60VESA	108.000	+	+	1,688	**1,280**	248	112	1,066	**1024**	38	3	63.981	**60.020**
35	SXGA75VESA	135.000	+	+	1,688	**1,280**	248	144	1,066	**1024**	38	3	79.976	**75.025**
36	1360X768-60	85.500	+	+	1,792	**1,360**	256	112	795	**768**	18	6	47.712	**60.015**
37	1400X1050-50CVT	100.000	-	+	1,848	**1,400**	224	144	1,083	**1050**	26	4	54.113	**49.965**
38	1400X1050-60	121.750	-	+	1,864	**1,400**	232	144	1,089	**1050**	32	4	65.317	**59.978**
39	1440X900-60	106.500	-	+	1,904	**1,440**	232	152	934	**900**	25	6	55.935	**59.887**
40	1440X900-75	136.750	-	+	1,936	**1,440**	248	152	942	**900**	33	6	70.635	**74.984**
41	UXGA60VESA	162.000	+	+	2,160	**1,600**	304	192	1,250	**1200**	46	3	75.000	**60.000**
42	1680X1050-60	146.250	-	+	2,240	**1,680**	280	176	1,089	**1050**	30	6	65.290	**59.954**







A : Line time total B : Horizontal sync width O : Frame time total P : Vertical sync width

C : Back porch D : Active time Q : Back porch R : Active time

E : Front porch S : Front porch