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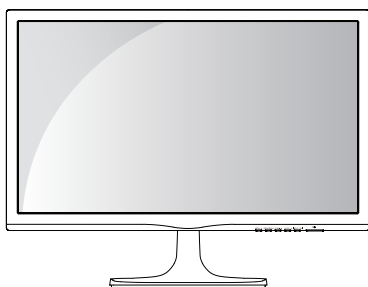
COLOR MONITOR SERVICE MANUAL

CHASSIS NO. : LM14A

MODEL : FLATRON 24MP55D

CAUTION

BEFORE SERVICING THE UNIT,
READ THE **SAFETY PRECAUTIONS** IN THIS MANUAL.




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PRECAUTION

WARNING FOR THE SAFETY-RELATED COMPONENT.

- There are some special components used in LCD monitor that are important for safety. **These parts are marked  on the schematic diagram and the Exploded View.** It is essential that these critical parts should be replaced with the manufacturer's specified parts to prevent electric shock, fire or other hazard.
- Do not modify original design without obtaining written permission from manufacturer or you will void the original parts and labor guarantee.

TAKE CARE DURING HANDLING THE LCD MODULE WITH BACKLIGHT UNIT.

- Must mount the module using mounting holes arranged in four corners.
- Do not press on the panel, edge of the frame strongly or electric shock as this will result in damage to the screen.
- Do not scratch or press on the panel with any sharp objects, such as pencil or pen as this may result in damage to the panel.
- Protect the module from the ESD as it may damage the electronic circuit (C-MOS).
- Make certain that treatment person's body are grounded through wrist band.
- Do not leave the module in high temperature and in areas of high humidity for a long time.
- The module not be exposed to the direct sunlight.
- Avoid contact with water as it may a short circuit within the module.
- If the surface of panel become dirty, please wipe it off with a softmaterial. (Cleaning with a dirty or rough cloth may damage the panel.)

CAUTION

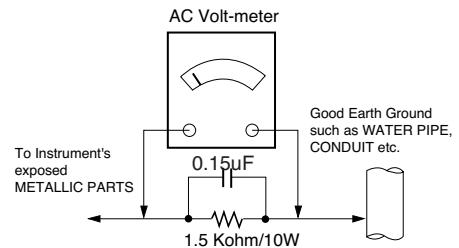
Please use only a plastic screwdriver to protect yourself from shock hazard during service operation.

WARNING

BE CAREFUL ELECTRIC SHOCK !

- If you want to replace with the new backlight (CCFL) or LIPS part, must disconnect the AC power because high voltage appears at inverter circuit about 650Vrms.
- Handle with care wires or connectors of the inverter circuit. If the wires are pressed cause short and may burn or take fire.

Leakage Current Hot Check Circuit



When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1 Ω

*Base on Adjustment standard

SERVICING PRECAUTIONS

CAUTION: Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the **SAFETY PRECAUTIONS** on page 3 of this publication.

NOTE: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions. Remember: Safety First.

General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;
 - a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
 - b. Disconnecting or re-connecting any receiver electrical plug or other electrical connection.
 - c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.**CAUTION:** A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.

2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe. Do not test high voltage by "drawing an arc".
3. Do not spray chemicals on or near this receiver or any of its assemblies.
4. Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10% (by volume) Acetone and 90% (by volume) isopropyl alcohol (90%-99% strength)
CAUTION: This is a flammable mixture.
Unless specified otherwise in this service manual, lubrication of contacts is not required.
5. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
6. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
7. Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.
Always remove the test receiver ground lead last.
8. Use with this receiver only the test fixtures specified in this service manual.
CAUTION: Do not connect the test fixture ground strap to any heat sink in this receiver.

Electrostatically Sensitive (ES) Devices

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

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.

2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static type solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, 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 bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

General Soldering Guidelines

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range or 500°F to 600°F.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25cm) brush with a metal handle. Do not use freon-propelled spray-on cleaners.
5. Use the following unsoldering technique
 - a. Allow the soldering iron tip to reach normal temperature. (500°F to 600°F)
 - b. Heat the component lead until the solder melts.
 - c. Quickly draw the melted solder with an anti-static, suction-type solder removal device or with solder braid.
CAUTION: Work quickly to avoid overheating the circuit board printed foil.
6. Use the following soldering technique.
 - a. Allow the soldering iron tip to reach a normal temperature (500°F to 600°F)
 - b. First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
 - c. Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.
CAUTION: Work quickly to avoid overheating the circuit board printed foil.
- d. Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.

IC Remove/Replacement

Some chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

Removal

1. Desolder and straighten each IC lead in one operation by gently prying up on the lead with the soldering iron tip as the solder melts.
2. Draw away the melted solder with an anti-static suction-type solder removal device (or with solder braid) before removing the IC.

Replacement

1. Carefully insert the replacement IC in the circuit board.
2. Carefully bend each IC lead against the circuit foil pad and solder it.
3. Clean the soldered areas with a small wire-bristle brush. (It is not necessary to reapply acrylic coating to the areas).

"Small-Signal" Discrete Transistor Removal/Replacement

1. Remove the defective transistor by clipping its leads as close as possible to the component body.
2. Bend into a "U" shape the end of each of three leads remaining on the circuit board.
3. Bend into a "U" shape the replacement transistor leads.
4. Connect the replacement transistor leads to the corresponding leads extending from the circuit board and crimp the "U" with long nose pliers to insure metal to metal contact then solder each connection.

Power Output, Transistor Device Removal/Replacement

1. Heat and remove all solder from around the transistor leads.
2. Remove the heat sink mounting screw (if so equipped).
3. Carefully remove the transistor from the heat sink of the circuit board.
4. Insert new transistor in the circuit board.
5. Solder each transistor lead, and clip off excess lead.
6. Replace heat sink.

Diode Removal/Replacement

1. Remove defective diode by clipping its leads as close as possible to diode body.
2. Bend the two remaining leads perpendicular y to the circuit board.
3. Observing diode polarity, wrap each lead of the new diode around the corresponding lead on the circuit board.
4. Securely crimp each connection and solder it.
5. Inspect (on the circuit board copper side) the solder joints of the two "original" leads. If they are not shiny, reheat them and if necessary, apply additional solder.

Fuse and Conventional Resistor Removal/Replacement

1. Clip each fuse or resistor lead at top of the circuit board hollow stake.
2. Securely crimp the leads of replacement component around notch at stake top.
3. Solder the connections.

CAUTION: Maintain original spacing between the replaced component and adjacent components and the circuit board to prevent excessive component temperatures.

Circuit Board Foil Repair

Excessive heat applied to the copper foil of any printed circuit board will weaken the adhesive that bonds the foil to the circuit board causing the foil to separate from or "lift-off" the board. The following guidelines and procedures should be followed whenever this condition is encountered.

At IC Connections

To repair a defective copper pattern at IC connections use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections).

1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the out-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area and clip off any excess jumper wire.

At Other Connections

Use the following technique to repair the defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.

1. Remove the defective copper pattern with a sharp knife. Remove at least 1/4 inch of copper, to ensure that a hazardous condition will not exist if the jumper wire opens.
2. Trace along the copper pattern from both sides of the pattern break and locate the nearest component that is directly connected to the affected copper pattern.
3. Connect insulated 20-gauge jumper wire from the lead of the nearest component on one side of the pattern break to the lead of the nearest component on the other side. Carefully crimp and solder the connections.
CAUTION: Be sure the insulated jumper wire is dressed so the it does not touch components or sharp edges.

SPECIFICATIONS

1. General Specification

No	Item		Content	Remark
1	Customer		BRAND	
2	User Model Name		24MP55D	
3	Sale region		Refer to Suffix standard	
4	Feature		24" Wide LCD MONITOR	
5	Chassis Name		LM14A	
6	General Scope	External SW & Adj.	Menu, READER, Func., Auto, input/Exit, Power	
		Function	OSD, DDC2B, DDC2AB, HDCP, Control Lock, Original Ratio / Wide, Black level, Super Energy Saving	
7	Power Cord		Length : 1.5±0.05 M Shape : Wall-out Color : Black	Refer to Suffix standard and power cord table
8	Cable	Signal Cable (D-SUB)	Length : 1.5m Shape : Detachable Type Color : Black Pin : Triple Row, 15 Pin D-Sub	Refer to Suffix standard
		DVI	Length : 1.5m Shape : Detachable Type Color : Black Pin : Triple Row, 18-Position DVI-D	Refer to Suffix standard
		Audio	Length : , Shape : , Color: , Pin	Do not Support
		TV	Length : , Shape : , Color: , Pin	Do not Support
9	Power		Input: AC100~240V 50~60Hz, 19V, 1.6A Output: DC 19V 1.7A	Refer to Suffix standard
10	Applying module list		P/No	Specification
			EAJ62509701(*S*EAJ62509702)	LM238WF1-SLE1

2. Mechanical specification

No	Item		Content			Remark
1	Product Dimension		Width (W)	Length (D)	Height (H)	
		Before Packing	56.7cm	18.8cm	44.8cm	With stand
			56.7cm	6.2cm	34.4cm	Without stand
2	Product Weight	Only SET	3.3			
		With BOX	4.9kg			
3	Container Loading Quantity	Individual or Palletizing	20ft		40ft / 40ft HC	W/Wide (NON EU)
			Indi.	Pallet	Indi.	Pallet
			918	680	1890/205	1496/1672
4	Stand Assy	Type	Base detachable			
		Size (W x D x H)	24.3cm x 18.8cm x 4.3cm			Only stand base
		Tilt Degree	-3° (+ 3°/-7°) ~ +20° (+5°/-0°)			
		Tilt force	0.8~1.3kgf			
		Folding Degree	None			
5	Appearance	General	Refer to Standard of LG(56)G2-1011			

3. Optical Character

No	Item		Criteria				Remark
1	Viewing Angle <CR≥10>		Horizontal(R/L) : 178° (Typ.)				
			Vertical(Top/Bottom) : 178° (Typ.)				
2	Luminance(휘도)		Average Luminance (cd/m ²)	200(min), 250 (Typ.) (Full white pattern, 0.7V)			Warm (6500K)
			Average Luminance (cd/m ²)	150 (min) (Full white pattern, 0.7V)			Medium (8000K)
			Average Luminance (cd/m ²)	150(min) (Full white pattern, 0.7V)			Cool (9300K)
			Luminance Uniformity	75%(min),			
3	Contrast Ratio(명암 비)		600(MIN), 1000(TYP), DFC->5,000,000:1(Typ.)				
4	Response Time		Gray to Gray: 14ms(Average),				
5	Paper mode	Reader1	X: 0.3650 ± 0.015	Y: 0.3605 ± 0.015	Luminance(cd/m2): 80 ± 20	Contrast Ratio: (60 ~ 100:1)	
		Reader2	X: 0.3530 ± 0.015	Y: 0.3670 ± 0.015	Luminance(cd/m2): 80 ± 20	Contrast Ratio: (60 ~ 100:1)	

4. Engineering Specification

1	Supported Sync. Type	Separate Sync., Digital				
2	Operating Frequency	Analog/ Digital	Horizontal	30 ~ 83kHz		
			Vertical	56 ~ 75 Hz		
3	Resolution	Analog/ Digital	Max.	1920×1080 @ 60Hz		
			Recommend	1920×1080 @ 60Hz		
4	Input Voltage	Voltage :100 – 240 Vac, 50				
5	Inrush Current	Cold Start : 50 A Hot : 120 A				
6	Operating Condition	Sync (H/V)	Video	LED	Wattage	Test condition 1.1920x1080@60 Hz 2. burst pattern 3. 100~240V 4. After aging 30min
	On Mode	On/On	Activ e	white	22MP55D/HQ:24W(typ)	
					23MP55HQ/H/D:26W(typ)	
					24MP55D/HQ:30W(typ)	
					27MP55HQ:30W(typ)	
		On/On	Activ e	white	22MP55D/HQ:28W(max)	
					23MP55HQ/H/D:29W(ma x)	
					24MP55D/HQ:34W(max)	
					27MP55HQ:35W(max)	
	Sleep Mode (D-SUB , DVI)	Off/On On/Off Off/Off	Off	white Blinki ng	≤ 0.3W	
Off Mode (Power switch off)	-	-	Off	≤ 0.3 W(Typ.)		
Super Energy Saving	High/Low/off	High Low	white	SES low:10%~20% SES high:20%~30%		
EPA6.0				22MP55D/HQ:<20W/H 23MP55D/H/HQ:<21W/H 24MP55D/HQ:<22W/H 27MP55HQ:<25W/H		
7	MTBF	30,000 HRS with 90% Confidence level		Lamp Life : 30,000 Hours(Min)		
8	Using Altitude	5,000 m (for Reliability) 3,000m(for FOS)				

9	Environ ment Conditio n	Operatin g	Temperature	10 °C ~ 35 °C			
			Humidity	10% ~ 80%			
		Storage	Temperature	-20 °C ~ 60 °C			
			Humidity	5% ~ 90% non-condensing			
	OSD MENU	MENU (Monitor block)	BRIGHTNESS	0 ~ 100		17 Language: English, Germanic, French, Spanish, Italian, Swedish, Finnish, Portuguese Brazilian Portuguese, Polish, Russian, Greek, Chinese, Japanese, Korean, Ukrainian Hindi	
			COLOR TEMP	PRESET	WARM		
					MEDIUM		
					COOL		
				USER	RED		
					GREEN		
					BLUE		
			ORIGINAL RATIO	WIDE			
				ORIGINAL			
			BLACK LEVEL	▶ HIGH / LOW (BLACK LEVEL enable at HDMI input)			
			LANGUAGE	▶ ENGLISH			
			FACTORY RESET	▶ NO(/YES)			
		MENU (AV/TV block)	CHANNEL	CHANNEL 2~69(AIR) / 1 ~ 125(CABLE)		Function Support: No	
				ADD/DEL CH	ADD/DELETE		
				AUTO CHANNEL	ON/OFF		
				SELECT	AIR/CABLE		
				FINE TUNE	0 ~ 100		
			ADJUSTMENT	CONTRAST	0~100		Function Support: No
				BRIGHTNES S	0~100		
				SHARPNESS	0~100		
				COLOR	0~100		
				TINT	0~100		
			AUDIO	VOLUME	0~100		Function Support: No
				BASS	0~100		
				TREBLE	0~100		
				MUTE	ON/OFF		
				SOUND			
				MONO/STEREO			
			SETUP	LANGUAGE▶ English/German/French/Esperanto Italian/Korean...		Function Support: No	
				IMAGE SIZE ▶ FULL/1:1			
				OSD POSITION			
				TRANSPAREN CY	0~100		

5. Applying module Character

No	Item			Content			Remark	
1	LCD Module Feature	Maker		LGD				
		Type		TFT				
		Active Display Area		23.8inches(60.4cm) diagonal				
		Pixel Pitch [mm]		0.2745 mm x 0.2745 mm				
		Electrical Interface		2ch-LVDS				
		Color Depth		6-bit with A-FRC, 16.7M colors				
		Size (Outline) [mm]		543.0(H) x 317.4(V) x 11.2(D) mm (Typ.)				
		Surface Treatment		Hard coating(3H), Anti-glare treatment of the front polarizer				
		Operating Mode		Transmissive mode, normally Black				
		Back light Unit		White LED				
		R/T	Typical	14ms				
			Max.	25ms				
2	CIE Color Coordinates (색 좌표)			Minimum	Normal	Maximum		
		White	W _x	Typ-0.03	0.283	Typ+0.03	Cool (9300K)	
			W _y		0.298			
		White	W _x	Typ-0.03	0.301	Typ+0.03	Medium (8000K)	
			W _y		0.310			
				W _x	Typ-0.03	0.313	Typ+0.03	Warm (6500K)
				W _y		0.329		
		Red	R _x	Typ-0.03	0.650	Typ+0.03	Warm (6500K)	
			R _y		0.338			
		Green	G _x		0.320			
			G _y		0.613			
		Blue	B _x		0.154			
			B _y		0.061			

(1) Standard Measurement Condition

- Ambient Luminance Level : dark (< 10 lux)
- Ambient Temperature : Normal Temperature(10°C ~ 25°C)
- warm-up Time : More than 30 min (at Full White Pattern)
- Input Signal : VESA 1920 X 1080 @ 60 Hz
- Contrast : 70 (But, the contrast is 100 when we check response time)
- Brightness : Max. 100
- Color Temp : CUSTOM
- Clock/Clock Phase : The Best Setting

(2) Another Spec.: Product Specification Standard(LG(55)G1-1034)

(3) Cosmetic Spec. : LCD Module IIS Spec.

5.1 Display Area

1) Active Display Area of the LCD Monitor Should be within Cabinet's Bezel.

2) Distance Difference between Active Area and Bezel

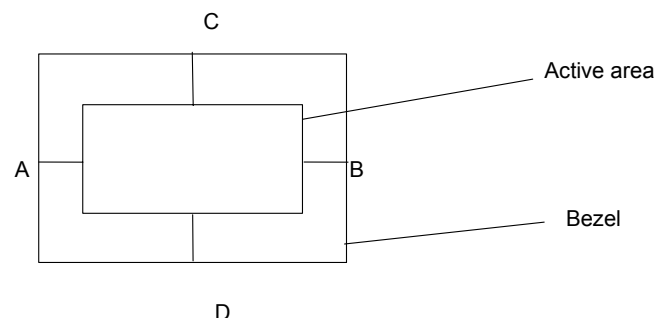
| A-B|<1.0 mm , | C-D|<1.0 mm

A: The Distance from The Left of Active Area to the Bezel

B: The Distance from The Right of Active Area to the Bezel

C: The Distance from The Top of Active Area to the Bezel

D: The Distance from The Bottom of Active Area to the Bezel



6. EDID

6.1 24MP55D

No	Item	Content	16진 Data
1	Manufacturer ID	GSM	1E 6D
2	Product ID	(Analog) (DVI) (HDMI)	23070 (5A 1E) 23071 (5A 1F) 23072 (5A 20)
3	Year	2013	
4	Version	1	01
5	Revision	Analog : 3 DVI : 3 HDMI:3	03
6	Serial Number	*	*
7	Week	**	**
8	Model Name	24MP55	--
9	Check Sum	****	****
10	Special Item	Need to Input Serial Number	

** Protocol : DDC 2AB

6.2 EDID Ver. 1.3 FOR ANALOG

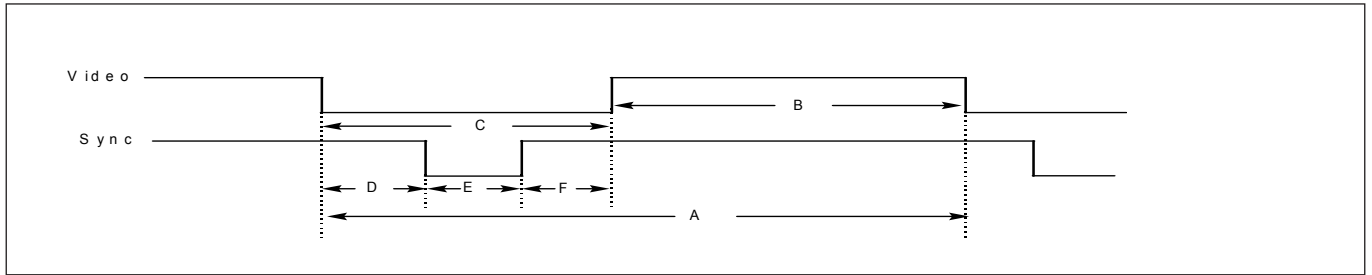
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	1E	5A	01	01	01	01
10	0B	17	01	03	6C	33	1D	78	EA	62	75	A3	55	4F	A0	27
20	12	50	54	A7	6B	80	71	4F	81	C0	81	00	81	80	95	00
30	90	40	A9	C0	B3	00	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	FE	22	11	00	00	1E	00	00	00	FD	00	38	4B	1E
50	53	0F	00	0A	20	20	20	20	20	20	00	00	00	FC	00	32
60	34	4D	50	35	35	0A	20	20	20	20	20	20	00	00	00	FF
70	00	0A	20	20	20	20	20	20	20	20	20	20	20	20	00	02

6.3 EDID Ver. 1.3 FOR DVI (128Byte)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	1F	5A	01	01	01	01
10	0B	17	01	03	80	33	1D	78	EA	62	75	A3	55	4F	A0	27
20	12	50	54	A7	6B	80	71	4F	81	C0	81	00	81	80	95	00
30	90	40	A9	C0	B3	00	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	FE	22	11	00	00	1E	00	00	00	FD	00	38	4B	1E
50	53	0F	00	0A	20	20	20	20	20	20	00	00	00	FC	00	32
60	34	4D	50	35	35	0A	20	20	20	20	20	20	00	00	00	FF
70	00	0A	20	20	20	20	20	20	20	20	20	20	20	20	00	ED

TIMING CHART

(1) Signal(Video & Sync)



(2) H/V Timing

MODE	CLASSIFICATION	Polarity	DOT CLOCK [MHz]	Frequency [kHz]/ [Hz]	Total Period (E)	Display (A)	Front Porch (D)	Sync. (C)	Back Porch (B)	Resolution
1	H(Pixels)	-	28.321	31.468	900	720	18	108	54	720 X 400
	V(Lines)	+		70.08	449	400	12	2	35	
2	H(Pixels)	-	25.175	31.469	800	640	16	96	48	640 x 480
	V(Lines)	-		59.94	525	480	10	2	33	
3	H(Pixels)	-	31.5	37.5	840	640	16	64	120	640 x 480
	V(Lines)	-		75	500	480	1	3	16	
4	H(Pixels)	+	40.0	37.879	1056	800	40	128	88	800 x 600
	V(Lines)	+		60.317	628	600	1	4	23	
5	H(Pixels)	+	49.5	46.875	1056	800	16	80	160	800 x 600
	V(Lines)	+		75.0	625	600	1	3	21	
6	H(Pixels)	-	65.0	48.363	1344	1024	24	136	160	1024 x 768
	V(Lines)	-		60.0	806	768	3	6	29	
7	H(Pixels)	+	78.75	60.023	1312	1024	16	96	176	1024 x 768
	V(Lines)	+		75.029	800	768	1	3	28	
8	H(Pixels)	+	108.0	67.500	1600	1152	64	128	256	1152 x 864
	V(Lines)	+		75.000	900	864	1	3	32	
9	H(Pixels)	+	108.0	63.981	1688	1280	48	112	248	1280 x 1024
	V(Lines)	+		60.02	1066	1024	1	3	38	
10	H(Pixels)	+	135.0	79.976	1688	1280	16	144	248	1280 x 1024
	V(Lines)	+		75.035	1066	1024	1	3	38	
11	H(Pixels)	-	146.25	65.290	2240	1680	104	176	280	1680 x 1050
	V(Lines)	+		59.954	1089	1050	3	6	30	
12	H(Pixels)	+	148.50	67.50	2200	1920	88	44	148	1920 x 1080
	V(Lines)	+		60	1125	1080	4	5	36	

- D-SUB/DVI DTV Mode is not supported (interlace mode)

ADJUSTMENT

1. Coverage

Apply to 60.4 cm (23.8 inch) Wide monitor made in Monitor Factory (Gumi Korea) or made in accordance with the standard of Gumi Factory process.

2. Appointment

2.1 Adjustment must be done as fixed sequence, and adjustment sequence can be modified after agreement with the responsible R&D engineer considering mass-production condition.

2.2 Power : AC 100 - 240 Voltage (Free)

2.3 Input signal:

2.3.1 RGB Input: As Product Standard (Signal ROM : LB800K Ver1.6)

2.3.2 RJ-45 input : As Product Standard (Ethernet connection through network from Host PC)

* PC spec for MK(Minikey) Loader (TBD): CPU - Dual core 2.0 GHz▲, Memory - 2 GByte▲

* PC spec for Host PC (TBD): CPU - Dual core 2.0 GHz▲, Memory - 2 GByte▲

2.4 Warm-up Time: Over than 30 minutes

2.5 Adjustment equipment : White balance equipment (CA-110), Display adjust equipment, VG-813(or VG819), Oscilloscope, PC (More than 486 computer) & White balance adjust program.

3. Adjustment

3.1 Overview

Use factory automation equipment and adjust automatic movement. But, do via passivity adjust in error occurrence.

3.2 Adjustment order

(refer to the Adjustment standard and adjustment command table)

3.2.1 Board Assembly Line

3.2.1.1 15pin D-sub (RGB)

- Connect input signal to 15pin D-sub.
- Check the firmware version & model name. And write the firmware code to the serial Flash ROM by ISP.
- Ready for adjustment : check whether adjustment command works normally or not and the operating state of each mode.
- Check the display state of gray color when 256 gray scale patterns is embodied.
- Read by EEPROM Read Command to check whether initial value is correct or not.

3.2.1.2 MK(Minikey) Loading

- Open MK Loader Tool on MK Loader PC.
- (* MK Loader PC should be connected Internet)
- Connect input signal to RJ-45 input with LAN cable connected network devices such as routers.
- Turn on the Monitor set.
- Click the box when the "empty port" box is changed to "write mini-key" in MK Loader Tool.

3.2.1.2 RJ-45 input

- Connect input signal to RJ-45 input with LAN cable connected network devices such as routers.
- Check USB 1.1 Port (Keyboard/ Mouse) : @RJ-45 input
- Check USB 2.0 Port (USB Memory Stick 2port) : @RJ-45 input
- Check Audio (Ear-phone out/ Mic in/ Speaker) : @RJ-45 input,

PC audio volume : MAX

* LAN cable

* Router

* PC: vSpace S/W for N+ (Ver 4.5.xx.xx) --- Caution: Ver 4.4.xx.xx for N1742L family

3.2.2 Total Assembly Line

- Ready : Heat-run during 5 minutes in the state with signal
- Connect input signal to D-sub.
- Default value before adjustment : Contrast "70" , Brightness "100(Max)"

3.2.3 Adjustment of Horizontal/Verticality screen position, Clock and Clock Phase at each Mode.

- There is no special factory mode adjustment. Writing initial value of EEPROM in Board Assembly line is adjusting Preset Mode and Reset mode. (EEPROM is initialized when AC Power is ON first.)
- If the change of FOS data is needed after M.P, it is possible by writing Mode Data with EEPROM write command or modifying the Mode Data in MICOM itself.

3.2.4 Color coordinates adjustment and Luminance adjustment.

3.2.4.1 Color coordinates adjustment

- Monitor Contrast / Brightness
 - Contrast : 70
 - Brightness : 100(Max)
- CA-110: Set "channel 9"
- Signal Generator : At cut-off and drive --> 16 step pattern for ADC (Program No.: 31)
 - Output Voltage : 700 mVp-p
 - Output Mode : Mode 12 (SXGA 60 Hz) mode Setting.

3.2.4.2 Adjustment : Board Assembly Line

- Select RGB mode
- Input 16 step pattern for ADC (Program No.31 (Mode 12, Pattern 11)). (Video level : 700 mVp-p)
- Adjust by commanding AUTO_COLOR_ADJUST
- Confirm "Success" message in Screen or Check the data of 0xFE, 0xFF address of EEPROM(0xA6) is 0xAA after waiting 5 seconds.
- If there is "FAULT" message or the data of 0xFE, 0xFF address of EEPROM(0xA6) is not 0xAA, do adjust again.
- If all Adjustment is completed, the values of 6500K, User Color and 9300K are saved automatically.
- Select RGB mode
- Input 16 step pattern for ADC (Program No.31 (Mode 12, Pattern 11)). (Video level : 700mVp-p)
- Adjust by commanding AUTO_COLOR_ADJUST
- Confirm "Success" message in Screen or Check the data of 0xFE, 0xFF address of EEPROM(0xA6) is 0xAA after waiting 5 seconds.

3.2.4.3. Confirm at Total Assembly Line: adjustment

- Check the data of 0xFE, 0xFF address of EEPROM(0xA6) is 0xAA.
- If the data of 0xFE, FF address of EEPROM(0xA6) is not 0xAA, do adjust again by 3.2.4.2.

3.2.4.4. Confirm PRESET 6500K Color coordinates and Adjust PRESET 9300K Color coordinates .

- Set as Aging mode ON, by commanding AGING_ON/OFF command code.
- Select Module that is being used in present production by commanding MODULE SELECT. (It is not needed so far. However, it will be needed to apply other modules)
- Send SYSTEM RESET command to set Module data.
- Input Full White Pattern (Video level : 700 mVp-p)
- Set as 9300K by commanding COLOR_MODE_CHANGE Command code.
- Check to meet $x = 0.283 \pm 0.03$, $y = 0.298 \pm 0.03$, and confirm.
- Only if it does not meet, adjust as below steps.
- Adjust to meet $x = 0.283 \pm 0.01$, $y = 0.298 \pm 0.01$ in 5 minutes. and confirm.
- Save 9300K Color by commanding COLOR SAVE Command code.
- Set as 6500K by commanding COLOR_MODE_CHANGE Command code.
- Check to meet $x = 0.313 \pm 0.03$, $y = 0.329 \pm 0.03$, and confirm.
- Only if it does not meet, adjust as below steps.
- Adjust to meet $x = 0.313 \pm 0.01$, $y = 0.329 \pm 0.01$, and confirm.
- Save 6500K Color by commanding COLOR SAVE Command code.
- Set as sRGB by commanding COLOR_MODE_CHANGE Command code.
- Adjust to meet $Y = 150 \pm 50$, and confirm.
- Save sRGB Color by commanding COLOR SAVE Command code.

3.2.4.5. Confirm User color coordinates .

- Confirm Whether User color is saved same as 6500K.
- After confirming Color coordinates, Must return to 6500K

3.2.5 Confirm Operation state.

3.2.5.1 Operation mode : Confirm whether each appointed mode operate correctly or not.

3.2.5.2 Confirmation of Adjustment condition and operation : Confirm whether it meet Auto/Manual equipment Adjustment standard or not.

- Confirm Analog screen state : Confirm screen state at below mode.

Appointment mode (RGB input):

640*480 @60Hz (Mode 1),

800*600@75Hz(Mode 5),

1024*768@60Hz(Mode 8),

1280*1024@60Hz(Mode 12),

SMPTE pattern(Check 0%,5%,95%,100%)

—Mode can be added.

3.2.5.3. Confirm Auto adjustment operation.

- Input Analog 1 Dot on/off & Rectangle Pattern at Mode 12(1280x1024@60 Hz)
- Confirm adjustment operation by changing Clock, Phase, H/V Position.
- Check Clock, Phase by pressing AUTO Key.
- Confirm first set of new lot by periods

3.2.5.4 Other quality

- Confirm that each items satisfy under standard condition that was written product spec.
- Confirm Applying Module & MICOM Setting --> Confirm with Service OSD
 - Confirm at Service OSD by "Menu + Power key" on .(from Power off)
 - Confirm first set of new lot by periods, and confirm periodically

when there is Process change or Adjustment setting change.

3.2.5.5. OSD & Adjustment device Confirmation : Confirm operation mentioned as product spec.

- Vary Brightness and Contrast and confirm the variation of Luminance and display status.
- Operate the f-engine function and confirm variation of Luminance.
- Make sure to do FACTORY RESET after confirmation of OSD function.

3.2.5.6. Confirm the display state by inputting 8 color Bar Pattern & 256 Gray Scale pattern.

3.2.5.7. DPM operation confirmation : Check if Power LED Color and Power Consumption operates as standard.

- Measurement Condition : 230 V@ 50 Hz (Analog)
- Confirm DPM operation at the state of screen without Video Signal.

3.2.5.8. RJ-45 input

- Connect input signal to RJ-45 input with LAN cable connected network devices such as routers.
- Check USB 1.1 Port (Keyboard/ Mouse) : @RJ-45 input
- Check USB 2.0 Port (USB Memory Stick 2port) : @RJ-45 input
- Check Audio (Ear-phone out/Mic in/Speaker) : @RJ-45 input, PC audio volume : MAX
- * LAN cable
- * Router
- * PC: vSpace S/W for N+ (Ver 4.5.xx.xx) --- Caution: Ver 4.4.xx.xx for N1742L family

3.2.5.9. DDC EDID Write

(Set as Aging mode ON, by commanding AGING_ON/OFF command code.)

1) SUFFIX: xxxxxPN

- Connect analog Signal Cable to D-sub wafer.
- Write EDID DATA to EEPROM(24C08) by using DDC2AB protocol.
- Check whether written EDID data is correct or not. (refer to Product spec).

--> After writing EDID, send Elapsed Time Clear command.

(Elapsed time should not be displayed, after EDID writing)

: Confirm periodically (in the first set of new lot, process change) whether module name and aging time disappeared on the self-diagnostics OSD with signal cable disconnected.

--> If Elapsed Time Clear command isn't executed, module name, aging time and TCO word appear on the self-diagnostics OSD.(Module name and aging time should not appear after writing EDID)

--> Make sure to do FACTORY RESET at the final process.

3.2.5.10. Shipping condition

- Contrast : 70
- Power Switch : Off
- Brightness : "100(Max)"
- Color Select : Preset (6500K)
- Language Select : Refer to product spec.
- OSD Position : Center
- Power indicator : ON
- Flatron f-engine : Normal

4.Standard of Auto/Manual equipment adjustment

No	Category	Class(Type)	Rule	Remark
1	Safety	UL	UL60950-1	YES
		CSA (cUL)	CSA C22.2 No.60950-1-03	YES
		TUV-GS(TUV-Type)	EN60950-1	TUV-Type
		SEMKO	EN60950-1	No
2	EMC	FCC CLASS B	FCC 47 CFR Part 15 Class B	YES
		CE	EN55022B, EN55024, EN61000-3-2, 3	YES
3	X-Ray (CRT only)	DHHS	DHHS Rule 21 CFR Subchapter J	N/A
		HWC	HWC Radiation Emitting Device ACT	N/A
4	Low Radiation	MPR II	MPR 1990:8; MPR 1990::01	NO
5	TCO	TCO6.0	Emission, Ergonomics, Ecology, Energy saving	YES
6	Ergonomics	ISO9241 (CRT)	ISO9241-3, 7, 8	NO
		ISO13406-2 (LCD)	ISO13406-2,ISO9241-307	NO
7	Etc (Korea)	KC(SAFETY)	Electric Supplies Safety Rule (K60950)	No
		KC(EMC)	MIC Ordinance 825 MIC Notice 100,Class B, Electric Article Technical Standard III	YES
8	Etc (China)	CCC	GB4943, GB9254, GB17625.1	YES
9	Test	Hi-Pot	1500 V ac or 2121Vdc, 1 sec, under 10mA	No
		Earth Continuity	25 A, 1 sec, under 0.1 ohm	No
10	EPA 6.0	EnergyStar 6.0	Energy Star Display Version 6.0	Yes

*Check items No. 2, 3, 4, 5 and 7 at RGB input.

5. Pattern for Adjustment

Pattern 0 : FULL BLACK (State of without video signal)

Pattern 1 : FULL WHITE (Don't display other Character except for White Pattern)

Pattern 3 : FULL WHITE

Pattern 4 : Cross hatch pattern (Horizontal 10Line, Vertical 8Line) & Rectangle Pattern

Pattern 5 : 1 Dot on, 1 Dot off & Rectangle Pattern

Pattern 6 : Vertical Sync only input (Use signal cable of which Pin #5 is GND)

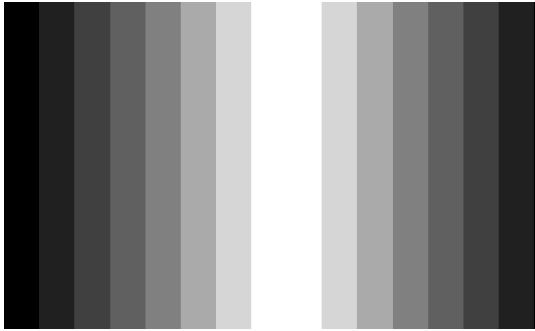
Pattern 7 : Horizontal Sync only input (Use signal cable of which Pin #5 is GND)

Pattern 8 : State of without Vertical/Horizontal Sync and Video Signal. (Use signal cable of which Pin #5 is GND)

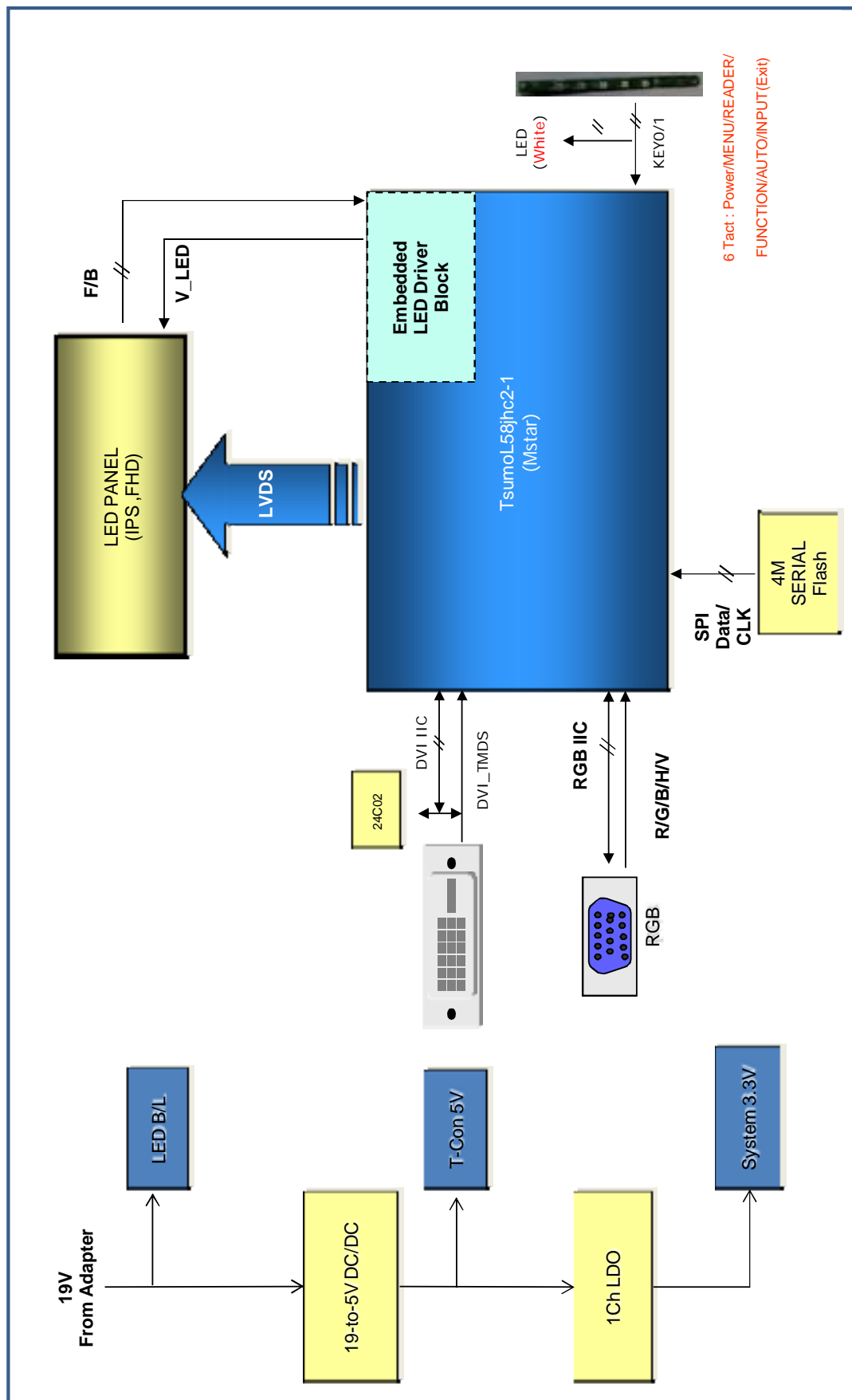
Pattern 9 : 8 Color Bar Pattern + 16 Gray Level Pattern

Pattern 10 : SMPTE Pattern

Pattern 11 : 16 Gray Step Pattern (700mV)

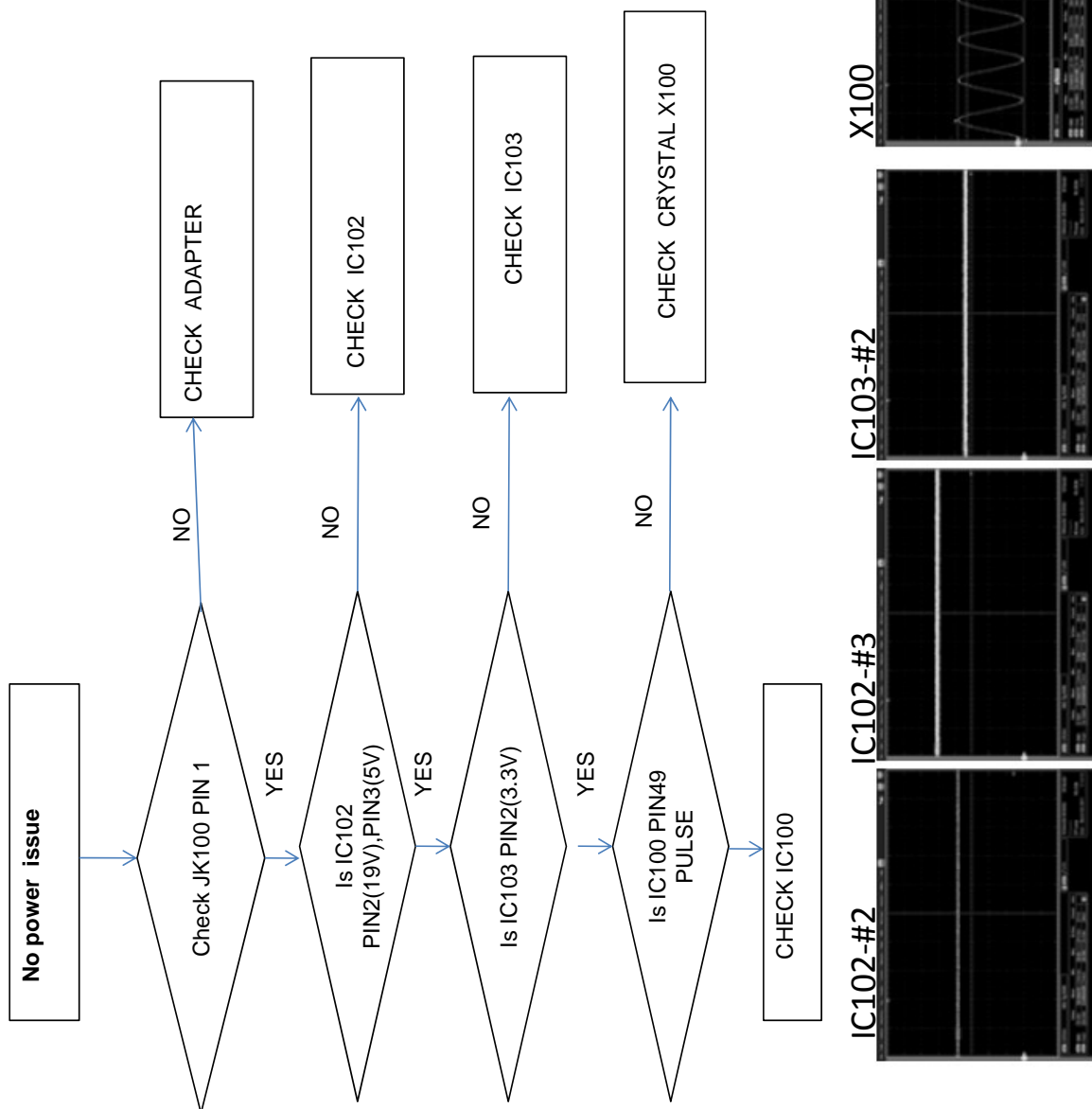


BLOCK DIAGRAM (Main)

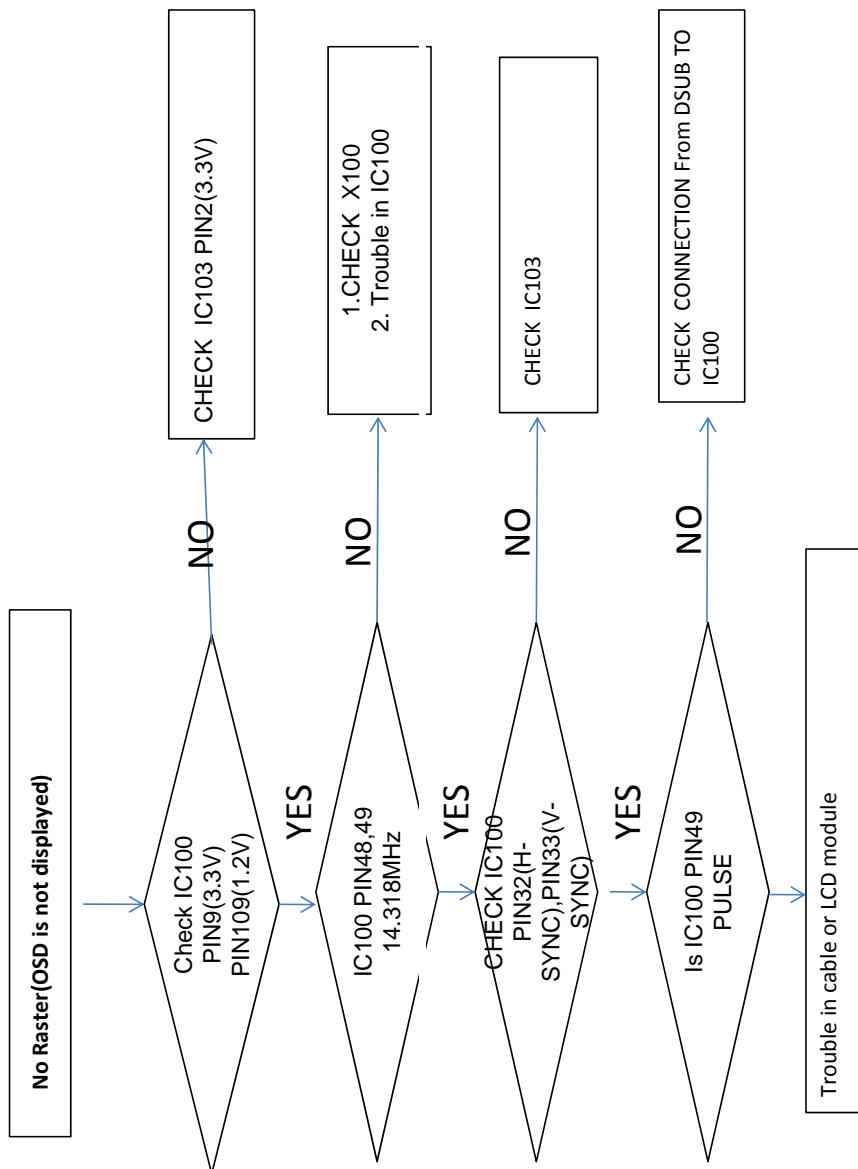


TROUBLESHOOTING GUIDE

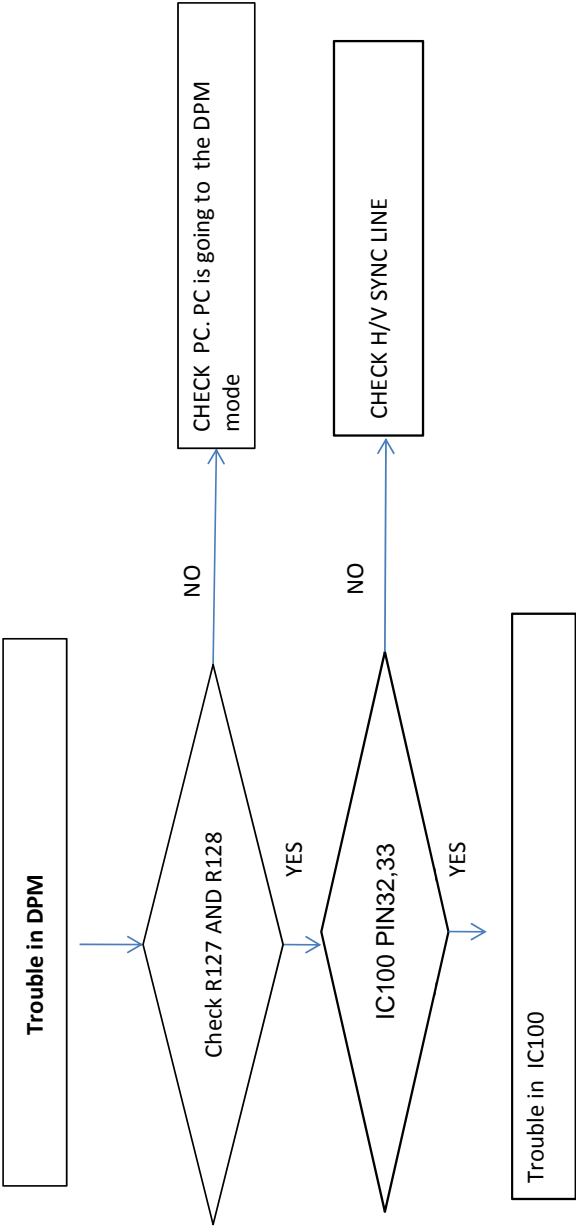
1. NO POWER



2. NO RASTER (OSD IS NOT DISPLAYED) – MAIN

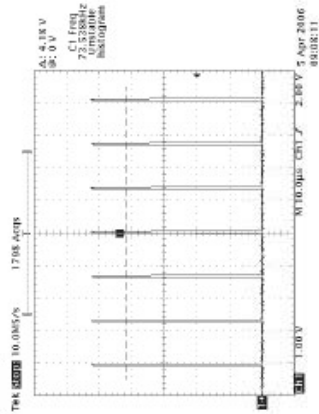


3. TROUBLE IN DPM

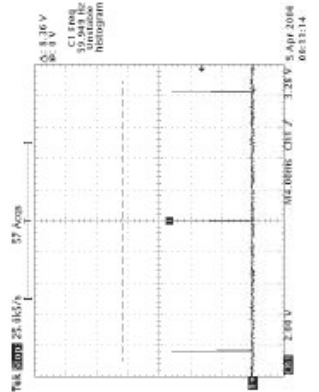


WAVEFORMS

1 H-SYNC



2 V-SYNC



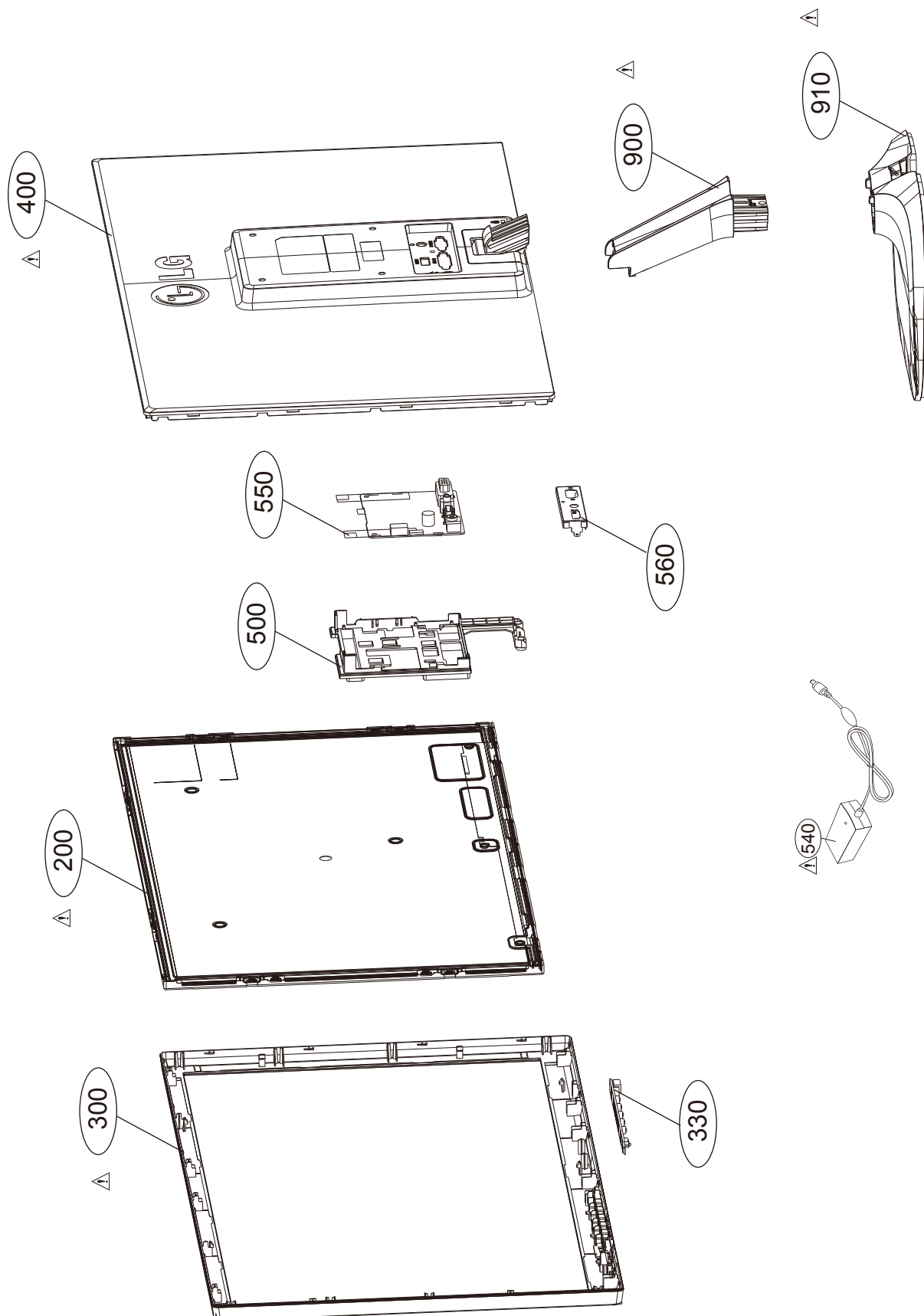
EXPLODED VIEW

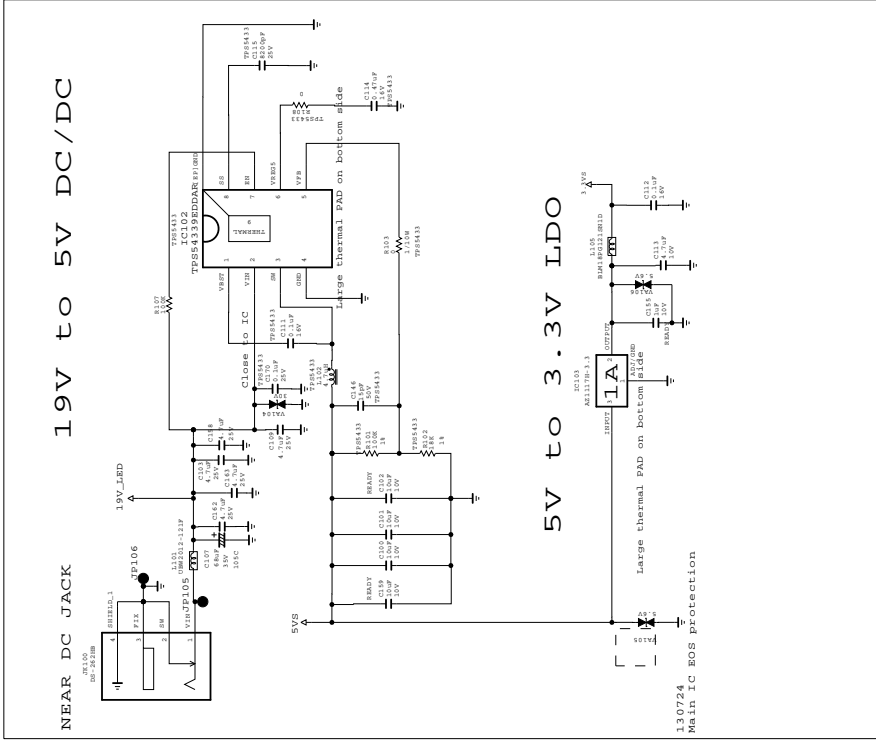
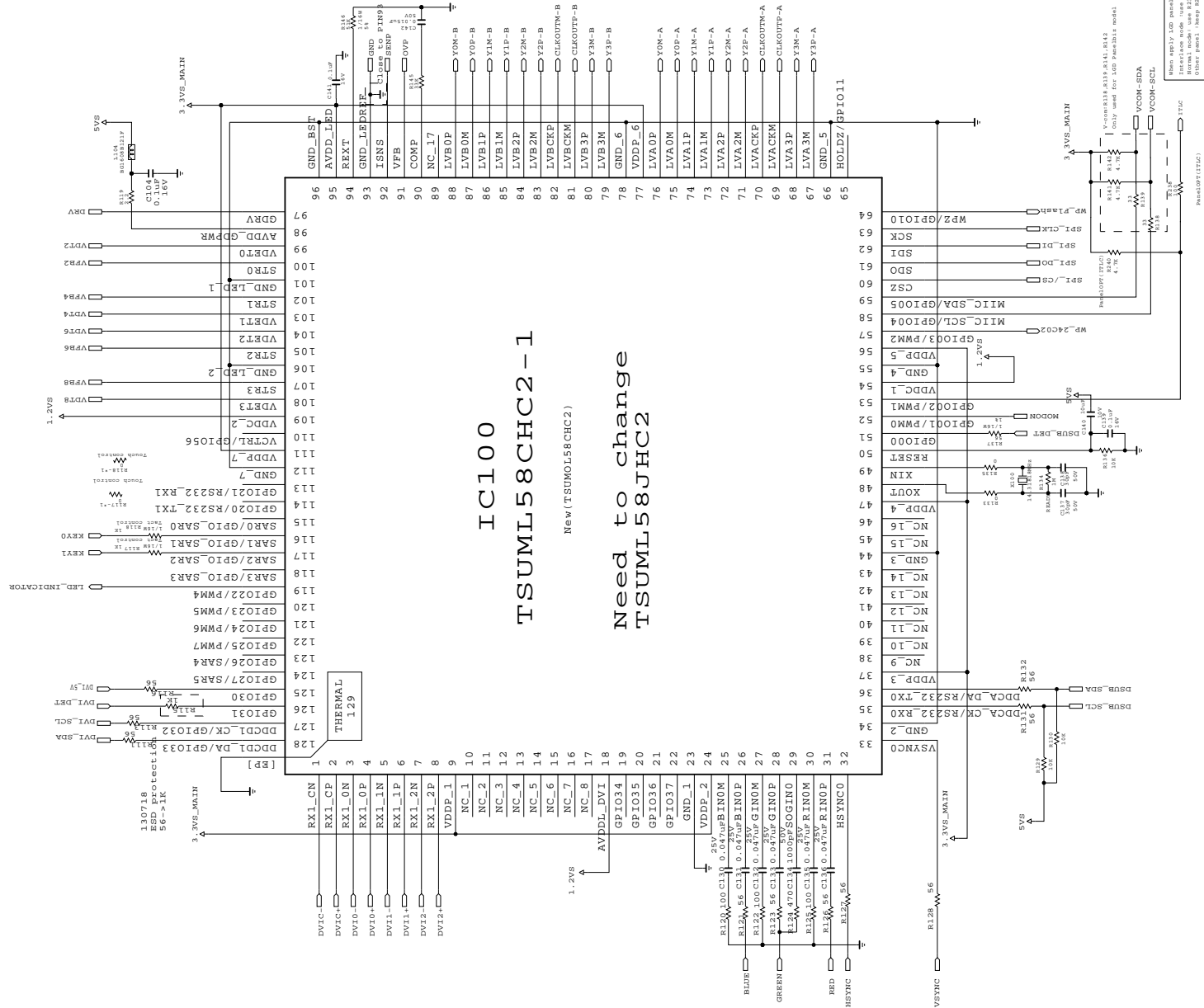
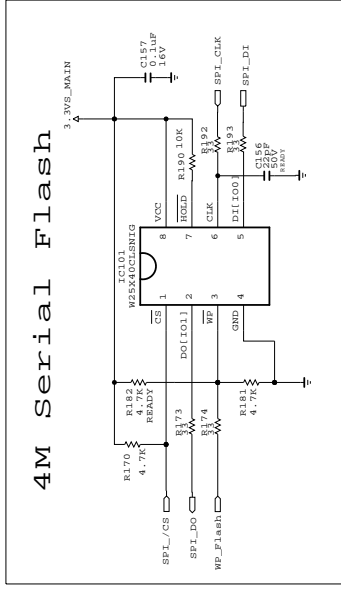
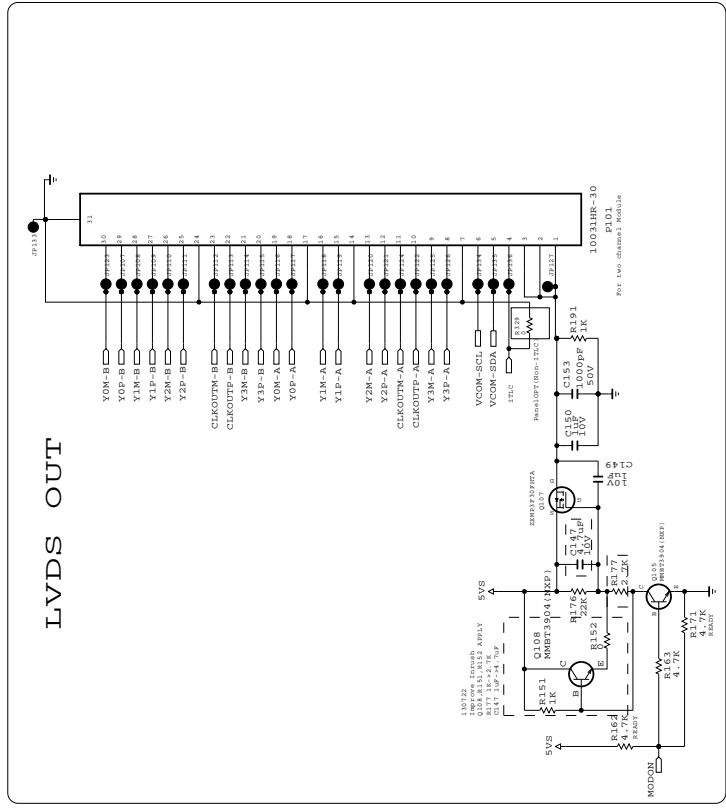
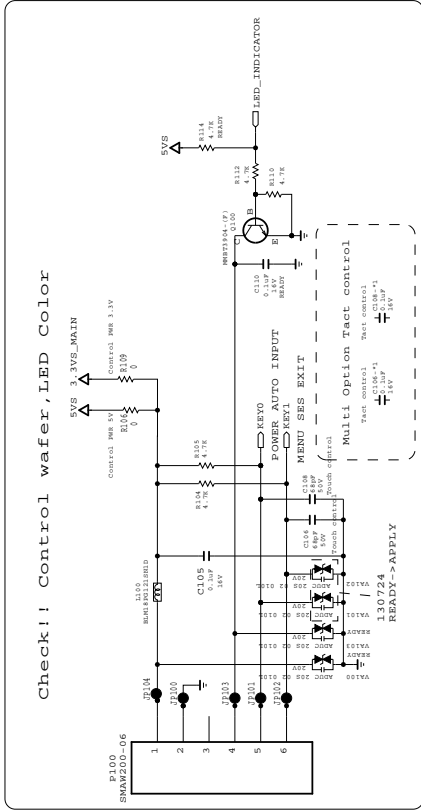
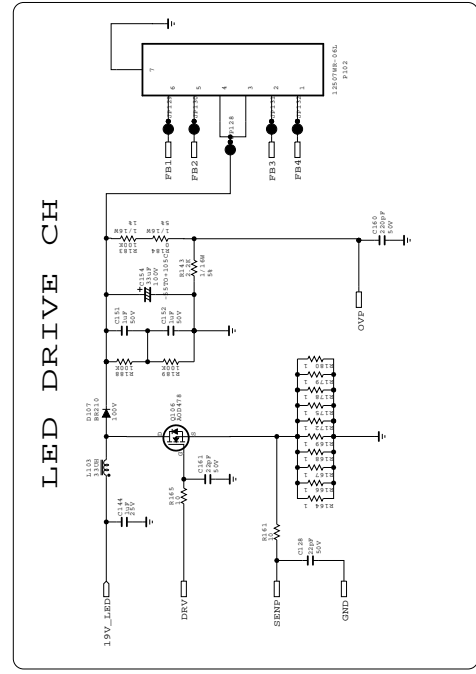
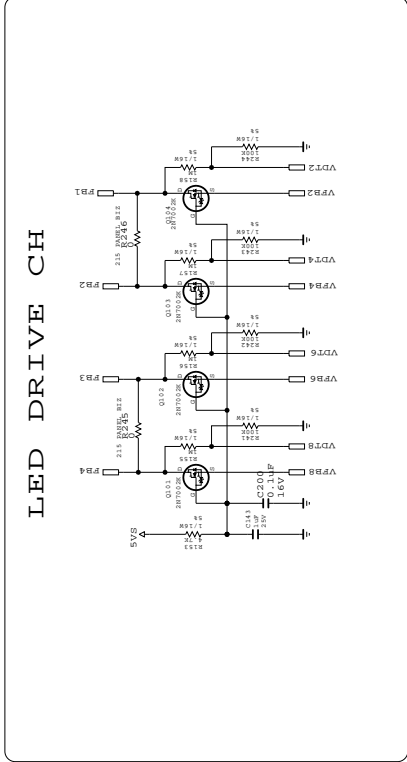
IMPORTANT SAFETY NOTICE

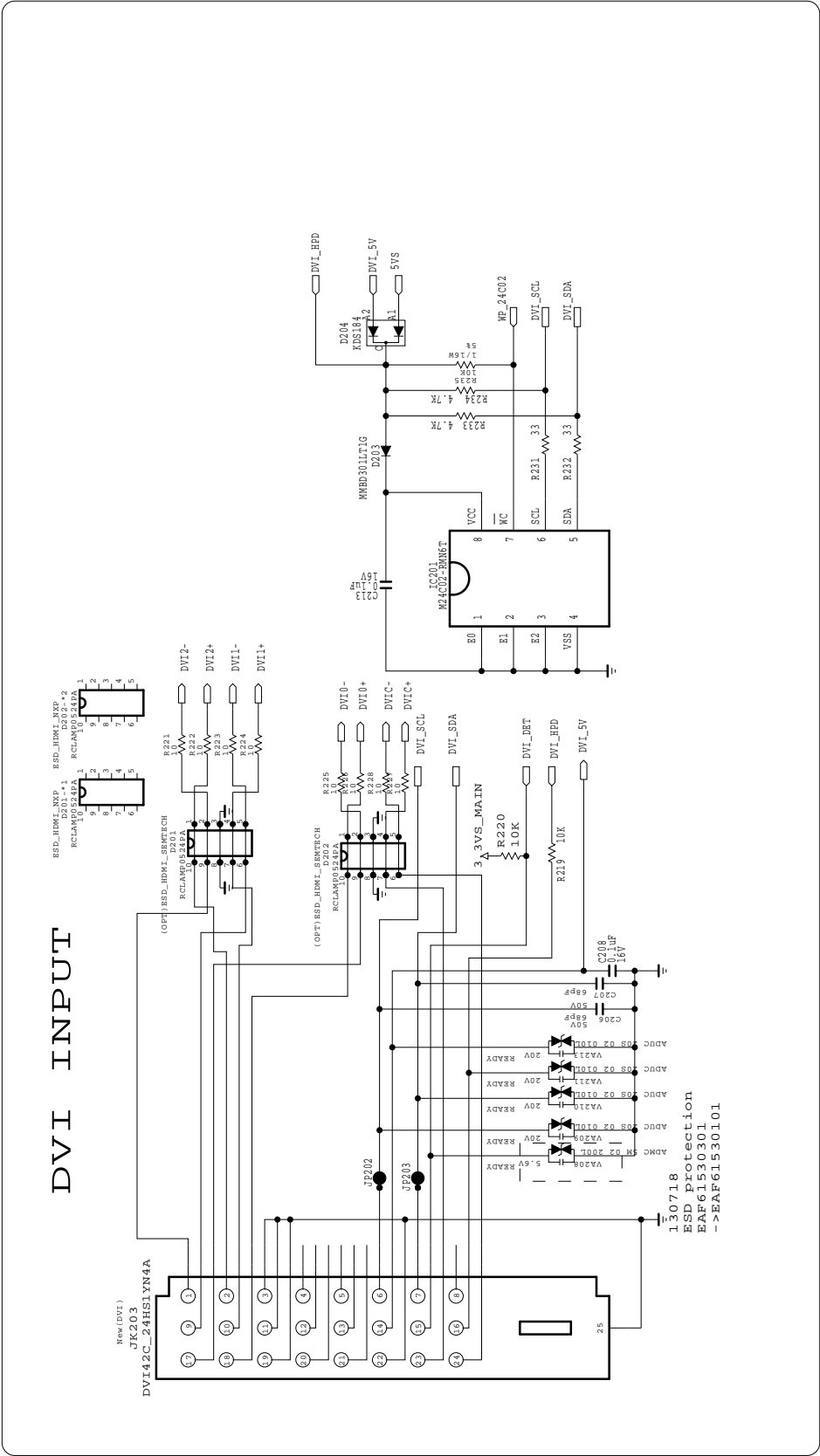
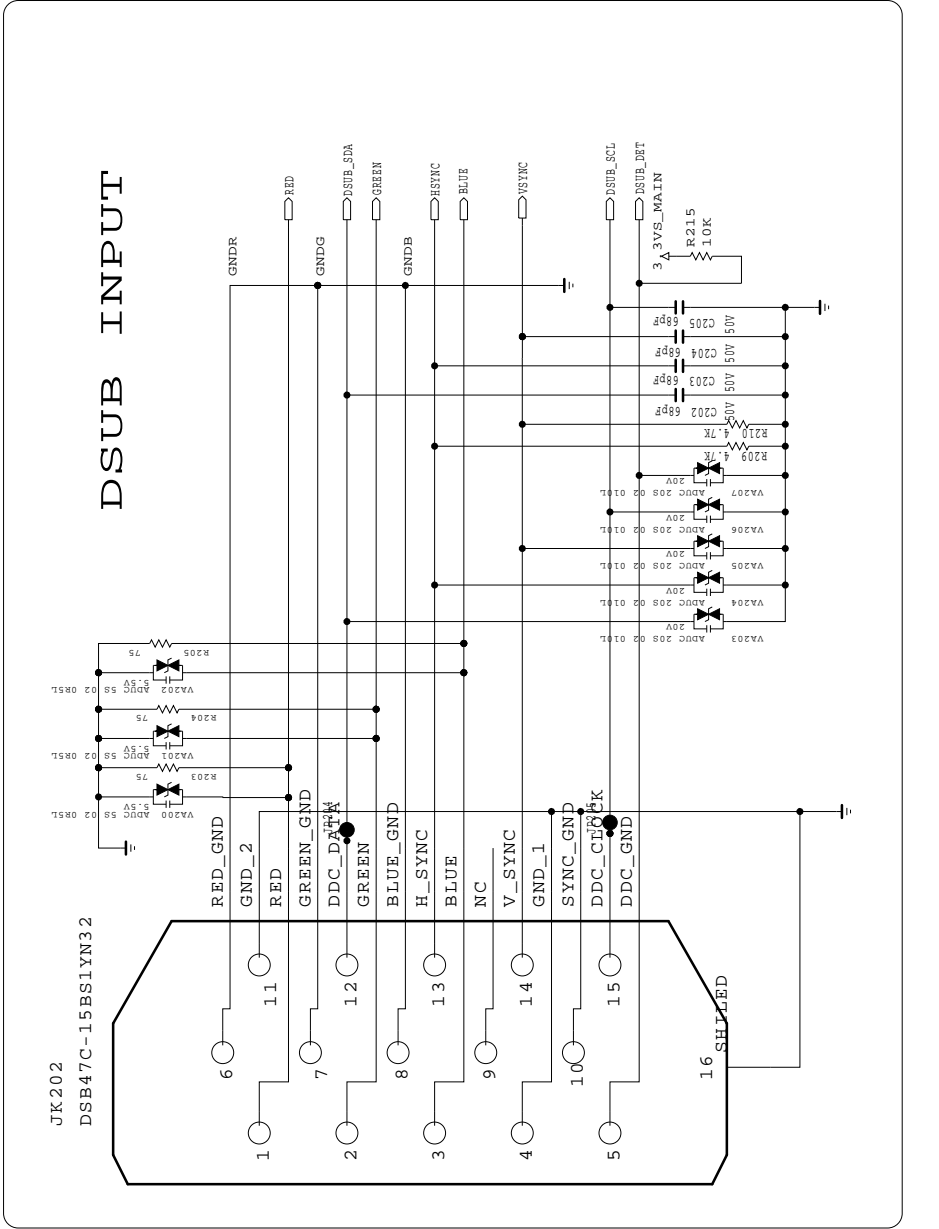
Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and EXPLODED VIEW.

It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards.

Do not modify the original design without permission of manufacturer.









Need to Swap shield P/N for DVI+RGB

MGJ63763401: HDMI+RGB
MGJ63763402: DVI+RGB

THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

