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LCD MONITOR TV
SERVICE MANUAL

CHASSIS : LD93H

MODEL : M2241A M2241A-PTN

CAUTION
BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.

P/NO : MFL62477324(1102-REV00)

Printed in Korea

CONTENTS

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 soft material. (Cleaning with a dirty or rough cloth may damage the panel.)

⚠ CAUTION

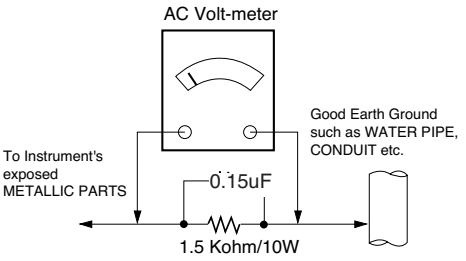
Please use only a plastic screwdriver to protect yourself from shock hazard during service operation.

⚠WARNING

BE CAREFUL ELECTRIC SHOCK !

- If you want to replace with the new backlight (CCFL) or inverter circuit, must disconnect the AC adapter 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) is opropyl alcohol (90%-99% strength)
   CAUTION: This is a flammable mixture.
   Unless specified otherwise in this service manual, lubrication of contacts in 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 500ºF to 600ºF.
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. (500ºF to 600ºF)
   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 (500ºF to 600ºF)
   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.

SPECIFICATION

1. Application Range.

This spec sheet is applied to the 58 cm(23 inch) LCD Monitor TV used LH92H chassis.

2. Specification

Each part is tested as below without special appointment

2.1 Temperature : 25 °C ± 5 °C (77 °F ± 9 °F),
CST : 40 °C ± 5° C
2.2 Relative Humidity : 65 % ±10 %
2.3 Power Voltage : Standard input voltage
(100 V - 240 V ~, 50 / 60 Hz)
• Standard Voltage of each products is marked by models
2.4 Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM .
2.5 The receiver must be operated for about 5 minutes prior to the adjustment.

3. Test method

3.1 Performance : LGE TV test method followed.
3.2 Demanded other specification
Safety : CE, IEC specification
EMC : CE, IEC

Safety : IEC/EN60065
EMI : EN55013
EMS : EN55020

4. Module Specification

LGD, LM215WF1-TLE1 (P/N: EAJ61327601)

No	Item	Specification	Unit	Remark
1	Type	TFT Color LCD Module		
2	Diagonal Size	546.86mm (21.53 inch) diagonal		
3	Active Display area	476.64(H) x 268.11(V)	mm	
4	Outline Dimension	495.6(H) x 292.2(V) x 14.5(D)	mm	Typ.
5	Aspect Ratio	16:9		
6	Pixel Number	1920 x RGB x 1080	pixel	pixel
7	Pixel Pitch	0.248(H) x 0.248(V)	mm	
8	Color arrangement	RGB vertical Stripe		
9	Color Depth	16.7M color (6bit with A-FRC)		
10	Electrical Interface	LVDS		
11	Surface Treatment	Hard coating(3H) & Anti-glare		
12	Operating Mode	Normally White		
13	Backlight Unit	2 CCFLs (2 lamps)		
14	Response Time	Rising Time : 1.3 + Falling Time : 3.7	ms	Typ.
15	Color Gamut	Normal 72% Panel(CIE1931)		

5. General Specification

5.1 RGB - PC

No	Item			Specification				Remarks
1	Supported Sync. Type			Separate Sync.(RGB),SOG				
2	Operating Frequency			Analog	Horizontal	30 ~ 69kHz		
					Vertical	56 ~ 61 Hz		
				Digital	Horizontal	-		
					Vertical	-		
3	Resolution			Analog	Max.	1920x1080 @ 60Hz		
					Recommend	1920x1080 @ 60Hz		
				Digital	Max.	-		
					Recommend	-		
4	Input Voltage			Voltage :100 – 240 Vac, 50 or 60Hz				
5	Inrush Current			Cold Start : 50 A Hot : 120 A				
6	Operating Condition			Sync (H/V)	Video	LED	Wattage	
	Power S/W On	On mode	Max.	On/On	Active	Blue	50W	
			Typ.	On/On	Active	Blue	30W	M2241A
			Max.	On/On	Active	Blue	70W	
			Typ.	On/On	Active	Blue	35W	M2341A
		Sleep mode		Off/On	Off	Blanking	1W	RGB
				On/Off				
	Power S/W Off	Off mode		-	Off	Off	0.5W	Just operate power key and remote controller power button
7	MTBF			50,000 HRS with 90% Confidence level				Lamp Life: 50,000 Hours(min)
8	Using Altitude			5,000 m (for Reliability) 3,000m(for FOS)				
9	Operating Environment			Temp : 10°C ~ 35°C Humidity : 20 % ~ 80 %				
10	Storage Environment			Temp : -10°C~60°C non condensing Humidity : 5 % ~ 90 % non condensing				

5.2 TV - Non EU

No	Item	Specification			Remarks	
1	Market	Non-EU				
2	Broadcasting system	PAL B/G/DK, I/ NTSC - M				
3	Receiving system	BAND	PAL	NTSC	China(DK)	Australia(BG)
		VHF/UHF	C1 ~ C69	2 ~ 78	C1~C62	C1~C75
		CATV	S1 ~ S41	14 ~ 69	S1~S41	S2~S44
4	Receiving system	Upper Heterodyne				
5	CVBS Input (1EA)	PAL, SECAM, NTSC			4 System(Rear) :PAL50, SECAM, NTSC, PAL60	
6	RGB Input	RGB-PC			Analog(D-SUB 15Pin)	
7	HDMI Input (1EA)	HDMI1-DTV			HDMI version 1.3 , Support HDCP	
8	Audio Input (1EA)	CVBS			L/R Input	

5.3 TV - Central and South America

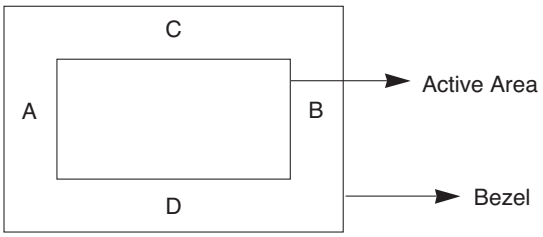
No	Item	Specification		Remarks
1	Market	Central and South America		
2	Broadcasting system	NTSC, PAL-M/N		
3	Receiving system	BAND	NTSC	
		VHF	2 ~ 13	
		UHF	14 ~ 69	
		CATV	1 ~ 125	
4	Receiving system	Upper Heterodyne		
5	CVBS Input (1EA)	NTSC, PAL- M, PAL- N		3 System(Rear) : NTSC, PAL-M, PAL-N
6	RGB Input	RGB-PC		Analog(D-SUB 15Pin)
7	HDMI Input (1EA)	HDMI1-DTV		HDMI version 1.3 , Support HDCP
8	Audio Input (1EA)	CVBS		L/R Input

6. Chroma & Brightness

No.	Item	Specification		Min.	Typ.	Max.	Remark
1	Viewing Angle[CR>10]	Right/Left		70/70	85/85	-	CR >10
		Up/Down		60/70	75/85		
2	Luminance	Luminance (cd/m^2)		200	250	-	RGB Vivid, 6500K Full white(100IRE)
		Variation(%)		75			Min/ Max
3	Contrst Ratio	CR		700	1000		Full white/Full black
4	Color Coordinates [CIE1931]	White	W_X		0.313		
			W_Y	Typ.	0.329	Typ.	
		RED	X_r	-0.03	0.646	+0.03	RGB
			Y_r		0.334		Vivid, 6500K
		Green	X_g		0.303		Full white(100IRE)
			Y_g		0.616		
		Blue	X_b		0.147		
			Y_b		0.067		

0 * Optical Test Condition
- Surrounding Brightness Level : dark
- Surrounding Temperature : 25 °C ± 5 °C
- warm-up Time : 30 min
- Contrast, Brightness : Outgoing condition
- *Incase of Vivid Mode, high level saturation may be occurred. Check gray linearity at standard mode.

* Active area
1. Active area of LCD PANEL is in bezel of cabinet.
2. Interval between active area and bezel
   |A-B|<1.0 mm , |C-D|<1.0 mm
   A: Interval between left of active area and bezel
   B: Interval between right of active area and bezel
   C: Interval between top of active area and bezel
   D: Interval between bottom of active area and bezel



7. SET Optical Feature

7.1 PC Mode (Measurement Condition: Full white/ Standard/6500k) --> Measure the black luminance after 30 seconds.)

No	Item	module	Luminance (cd/m²)			C/R		Remark
			Min	Typ	Max	Min	Typ	
1 2	22 inch 23 inch	LGD LGD	150 200	180 230		500:1 500:1	700:1 700:1	

7.2 AV Mode
(Measurement Condition: Full white(100IRE)/ Vivid) ? Measure the black luminance after 30 seconds.

No	Item	module	Luminance (cd/m²)			C/R(min)	Remark
			Min	Typ	Max	RF,AV, HDMI	
1 2	22 inch 23 inch	LGD LGD	120 170	150 200		500 : 1 500 : 1	RF,AV, HDMI

7.3 Special feature(DFC)
-DFC Working Condition : Full Black Pattern(All Black, No pattern(MSPG Pattern#2)) signal in D-sub

No	Item	Min	Typ	Max	Remark
1	M2241A	40000:1	50000:1		PC Mode(D-sub) For Checking Black Luminance,
2	.....M2341A	40000:1	50000:1		wait for over 1 minute.

8. RGB Input (PC)

No.	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel clock(MHz)	Remark
1	640*480	31.469	59.94	25.175	
2	800*600	37.879	60.317	40.0	
3	1024*768	48.363	60.0	65.0	
4	1152*864	54.34	60.05	80	
5	1280*960	60	60	108.0	
6	1280*1024	63.981	60.02	108.0	
7	1680*1050	64.674	59.883	119.0	
8	1680*1050	65.290	59.954	146.25	
9	1920*1080	67.5	60	148.5	

9. HDMI Input (DTV)

No.	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel clock(MHz)	Proposed
1	720*480	15.75	60.00	13.514	SDTV, DVD 480I(525I)
2	720*480	15.73	59.94	13.500	SDTV, DVD 480I(525I)
3	720*576	15.625	50.00	13.500	SDTV, DVD 576I(625I) 50Hz
4	7Z20*480	31.47	59.94	27.000	SDTV 480P
5	720*480	31.50	60.00	27.027	SDTV 480P
6	720*576	31.25	50.00	27.000	SDTV 576P 50Hz
7	1280*720	44.96	59.94	74.176	HDTV 720P
8	1280*720	45.00	60.00	74.250	HDTV 720P
9	1280*720	37.50	50.00	74.25	HDTV 720P 50Hz
10	1920*1080	33.72	59.94	74.176	HDTV 1080I
11	1920*1080	33.75	60.00	74.250	HDTV 1080I
12	1920*1080	28.125	50.00	74.250	HDTV 1080I 50Hz
13	1920*1080	67.432	59.94	148.350	HDTV 1080P
14	1920*1080	67.5	60	148.5	HDTV 1080P
15	1920*1080	56.250	50	148.5	HDTV 1080P 50Hz

10. Mechanical specification

<table>
<tr><th>No.</th><th colspan="2">Item</th><th colspan="5">Content</th><th>Unit</th><th>Remark</th></tr>
<tr><td rowspan="3">1.</td><td rowspan="3">Product Dimension</td><td></td><td>Width(W)</td><td colspan="2">Length(D)</td><td>Height(H)</td><td>mm</td><td>With Stand</td></tr>
<tr><td>Before Packing</td><td>520.8</td><td colspan="2">166.4</td><td>422.7</td><td>mm</td><td></td></tr>
<tr><td>After Packing</td><td>592</td><td colspan="2">140</td><td>472</td><td>mm</td><td></td></tr>
<tr><td rowspan="2">2.</td><td rowspan="2">Product Weight</td><td>Only SET</td><td colspan="5">3.6</td><td>Kg</td><td></td></tr>
<tr><td>With BOX</td><td colspan="5">5.4</td><td>Kg</td><td></td></tr>
<tr><td rowspan="3">3.</td><td rowspan="3">Container Loading Quantity</td><td rowspan="3">Individual or Palletizing</td><td colspan="2">20ft</td><td colspan="3">40ft</td><td></td><td></td></tr>
<tr><td>Indi.</td><td>Wooden</td><td>Indi.</td><td colspan="2">Wooden</td><td></td><td></td></tr>
<tr><td>720</td><td>600</td><td>1520</td><td colspan="2">1320</td><td></td><td></td></tr>
<tr><td rowspan="5">4.</td><td rowspan="5">Stand Assy</td><td>Type</td><td colspan="5">Detachable, No Tilt</td><td></td><td></td></tr>
<tr><td>Size(W x D x H)</td><td colspan="5">226.4 x 99.9 x 166.5</td><td></td><td></td></tr>
<tr><td>Tilt Degree</td><td colspan="5">-</td><td></td><td></td></tr>
<tr><td>Tilt force</td><td colspan="5">-</td><td></td><td></td></tr>
<tr><td>Set Degree</td><td colspan="5">-1~+2</td><td></td><td></td></tr>
<tr><td>5.</td><td>Appearance</td><td>General</td><td colspan="5">Refer to Standard of LG(56)G2-1011</td><td></td><td></td></tr>
</table>

ADJUSTMENT INSTRUCTION

1. Application Range

This document is applied to LD93H chassis LCD Monitor TV which is manufactured in TV (or Monitor) Factory or is produced on the basis of this data.

2. Specification

1) The adjustment is according to the order which is designated and which must be followed, according to the plan which can be changed only on agreeing.
2) Power Adjustment: Free Voltage
3) Magnetic Field Condition: Nil.
4) Input signal Unit: Product Specification Standard
5) Reserve after operation: Above 5 Minutes (Heat Run)
   Temperature : at 25 °C ± 5 °C
   Relative humidity : 65% ±10 %
   Input voltage : 100V - 240V, 50 Hz/ 60 Hz
6) Adjustment equipment: Color Analyzer (CA-210 or CA-110), Pattern Generator (MSPG-925L or Equivalent), DDC Adjustment Jig equipment, SVC remote controller

3. Adjustment items

PCB assembly adjustment items
1) Download the MSTAR main software (IC603, Mstar ISP Utility)
2) Auto Color Balance(ADC) - RGB
3) Auto Color Balance(ADC) – Component
4) Input Tool-Option/Area option.
5) Check SW Version.

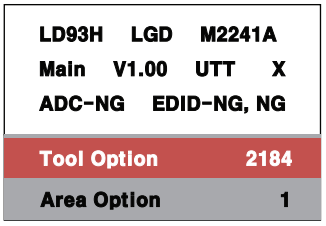
SET assembly adjustment items
1) DDC Data input.
2) HDCP data input
3) Adjustment of White Balance.
4) Preset CH information
5) Factoring Option Data input.

4. PCB assembly adjustment method

4.1 Input Tool-Option, Area Option

Option adjustment following BOM (Tool Option 1, Area Option)
* Required Equipments
- Remote controller for adjustment
* Profile : Must be changed the option value because being different with some setting value depend on module maker, inch and market.

Adjustment method
The input methods are same as other chassis.(Use IN-START Key on the Adjust Remocon.)



1) Push the IN-START key in the Adjust R/C.
2) Input the Option Number that was specified in the BOM, into the Shipping area.
3) Select “Tool Option/ Area Option” by using ▼/▲(CH+/-) key , and press the number key(0~9) consecutively

ex) If the value of Tool Option1 is 7, input the data using number key “7”

(If not changed the option, the input menu can differ from the model spec.)

* Refer to Job Expression of each main chassis ass’y (EBTxxxxxxxx) for Option value

* Before PCB check, you have to change the Tool option, Areaoption and have to AC off/on (Plug out and in)

(If missing this process, set can operate abnormally)

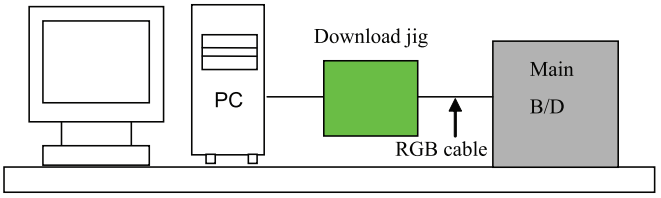
* Never push the IN-STOP KEY after completing the function inspection.

4.2 S/W program download

Profile : This is for downloading the s/w to the flash memory of IC603

Equipment
1) PC
2) MTK_tool program
3) Download jig
4) USB

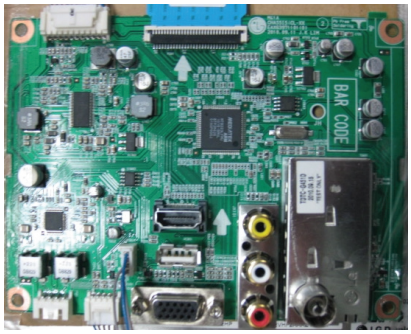
Connection structure



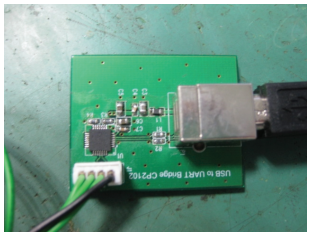
Connection condition
1) IC name and circuit number : Flash Memory and IC603
2) Tact time : about 2min

4.2.1 Download method 1

- Preliminary steps (PCB Ass'y)



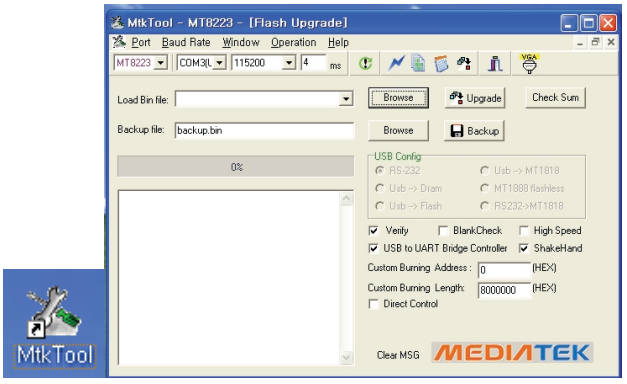
1) Connect the download jig to D-sub jack



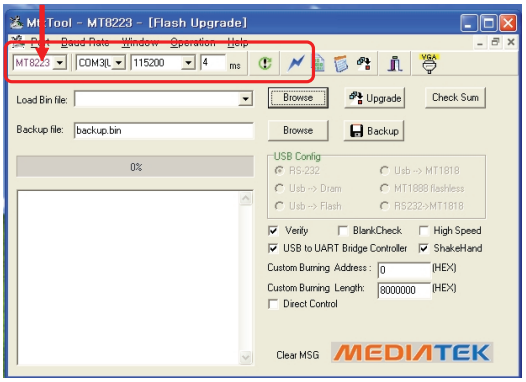
2) Connect the PC to USB jack

Download Steps

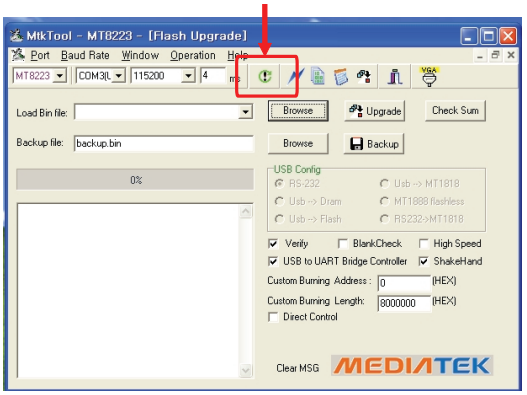
(1) Execute 'ISP Tool' program in PC, then a main window will be opened



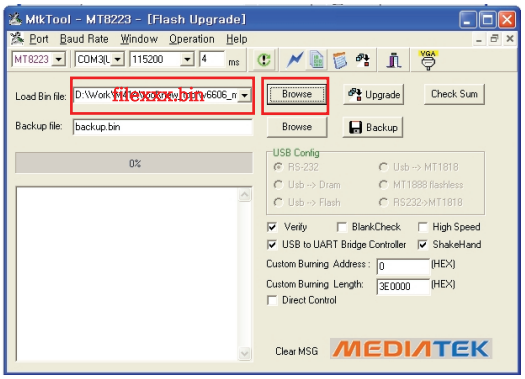
(2) Click the Config and Change speed
(MT8223, Using Port, 115200, 4ms).



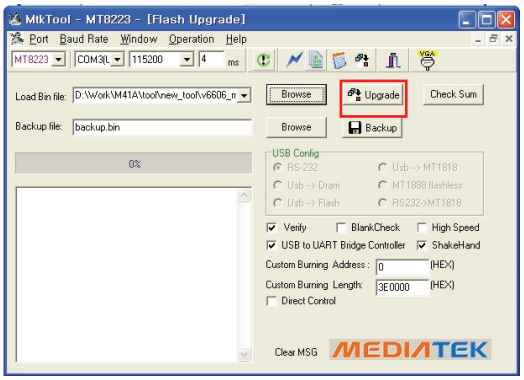
(3) Click the connect button and confirm



(4) Read and write bin file
Click "(1)Read" tab, and then load download file(XXXX.bin) by clicking "Read".



(5) Click "Auto(2)" tab and set as below



(6) After downloading, AC Power OFF and ON.

4.2.2 Download method 2

1) Connection USB memory for upgrade.(File name : mtk.bin)
2) Press the IN START button.
3) Select the "Upg Fw" menu
4) Press the ▶button and wait
5) If the progressive bar 100% will be completed

- Notice: Do not plug out USB during upgrading.

4.3. ADC Process

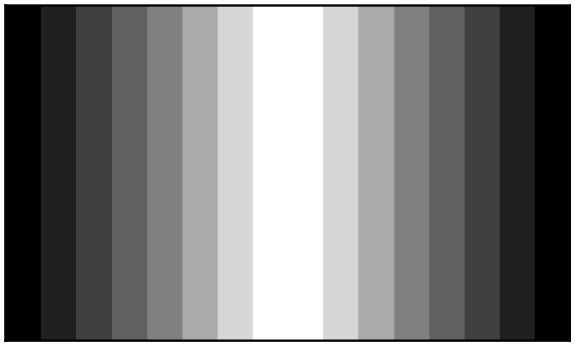
4.3.1 ADC calibration

* MSPG-925
- RGB: Model : 60(1024X768@60Hz)

4.3.2 PC input ADC

4.3.2.1 Auto RGB Gain/Offset Adjustment

- Convert to PC in Input-source
- Signal equipment displays
  Output Voltage: 700 m Vp-p
  Impress Resolution XGA (1024 x 768 @ 60Hz)
  Model : 60 in Pattern Generator
  Pattern : 29 in Pattern Generator (MSPG-925 SERIES)



Adjustment pattern (RGB PC)

- Adjust by commanding AUTO_COLOR_ADJUST (0xF1) 0x00 0x02 instruction.

4.3.2.2 Confirmation

- We confirm to address “0xF1” in page “0x0E” of EEPROM the value is “0xAA’ or not.
- If the value is not “0xAA”, we adjust once more.
- We can write the ADC values from “0x00~0x05” addresses in a page “0x0E”.0

*Manual ADC process using Service Remocon. After enter Service Mode by pushing "ADJ" key, execute "Auto-RGB" by pushing "▶ " key at "Auto-RGB".

5. Check EDID and Write HDCP key

***: year ex) when year 2008 : input “12”
**** : CHECK SUM (deferent along week, year)

5.1 This model is no need to write. EDID data is in Program source

5.2 EDID data

No.	Item	content	16bit Data
1	Manufacturer ID	GSM	1E6D
2	ProductID	22578(Analog) 22579(HDMI)	5831 5832
3	Year	2010	14
4	Version	Analog : 1 Digital : 1	 1
5	Revision	Analog : 3 Digital : 3	 3
6	Model Name	M2341A	

5.2.1. RGB EDID Data

	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	2F	58	01	01 *	01	01
10	01 **	14 *	01	03	68	30	1B	78	EA	AB	D5	A5	55	4D	9D	25
20	11	50	54	A1	08	00	B3	00	81	80	81	C0	71	40	A9	C0
30	95	00	90	40	81	00	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	DC	0C	11	00	00	1E	00	00	00	FD	00	38	3D	1E
50	45	0F	00	0A	20	20	20	20	20	20	00	00	00	FC	00	4D
60	32	32	34	31	41	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	C8 ****

5.2.2. HDMI EDID Data

	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	30	58	01	01 *	01	01
10	01 **	14 **	01	03	80	30	1B	78	E8	AB	D5	A5	55	4D	9D	25
20	11	50	54	21	08	00	B3	00	81	80	71	40	81	C0	81	00
30	95	00	90	40	A9	C0	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	FD	1E	11	00	00	1E	21	39	90	30	62	1A	27	40
50	68	B0	36	00	FD	1E	11	00	00	1C	00	00	00	FD	00	38
60	3D	1E	45	0F	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4D	32	32	34	31	41	0A	20	20	20	20	20	20	01	F3 ****

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	19	F1	4A	90	04	03	01	14	12	05	1F	10	13	23
10	09	07	07	65	03	0C	00	10	00	02	3A	80	18	71	38	2D
20	40	58	2C	45	00	DC	0C	11	00	00	1A	01	1D	80	18	71
30	1C	16	20	58	2C	25	00	DC	0C	11	00	00	9E	01	1D	00
40	72	51	D0	1E	20	6E	28	55	00	DC	0C	11	00	00	1E	01
50	1D	80	D0	72	1C	16	20	10	2C	25	80	C4	8E	21	00	00
60	9E	02	3A	80	D0	72	38	2D	40	10	2C	45	20	DC	0C	11
70	00	00	1E	00	00	00	00	00	00	00	00	00	00	00	00	F5 ****

- All data are HEXA
- Adjustable Data :
  **: week

6.Write HDCP key

1) Connect D-sub Signal Cable to D-Sub Jack
2) Input HDCP key with HDCP-key- in-program
3) HDCP Key value is stored on Main MTK IC (MTK8223) which is 0x80~0xA0 Addresses of 0x00~0x01 page (EEPROM MAP PAGE0~PAGE1 / START Addr: A0 80)
4) AC off/on and on HDCP button of MSPG925 and confirm whether picture is displayed. Or not of using MSPG925
5) HDCP Key value is different among the sets

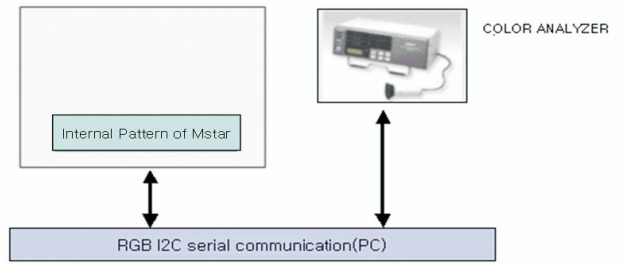
7.Adjustment of White Balance

RGB_Gains are fixed data for each model.
Insert D-sub jack (I2C) which is connected with PC for White Balance or equivalent device.
-->Total Assembly line should be check whether the color coordinate(x, y) data
Refer to below table were meet or not.

7.1 Required Equipment

- Remote controller for adjustment
- Color Analyzer : CA-210
- CH : 09 (LCD MNT, Normal)
- PC (for communication through RGB)
- Pattern Generator (MSPG-925FS series.)

7.2 Connecting diagram of equipment for measuring (For Automatic Adjustment) (Method 1, using IIC, You connect RGB Cable)

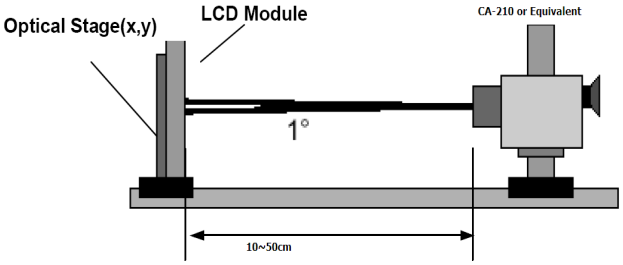


(Standard color coordinate and temperature when using the CA210 equipment)

RGB_Gains are fixed data for each model

Color Temperature	Cool		9,300k		°K	X=0.283 (±0.03) Y=0.298 (±0.03)	M2241A M2341A	<Test Signal> PC Mode only Full White (100IRE)
	Warm		6,500k		°K	X=0.313 (±0.03) Y=0.329 (±0.03)		
Color Temperature	Cool		9,300k		°K	X=0.283 (±0.03) Y=0.298 (±0.03)	M2241A M2341A	<Test Signal> RF/AV/HDMI Inner pattern (216gray,85IRE)
	Medium		8,000k		°K	X=0.295 (±0.03) Y=0.305 (±0.03)		
	Warm		6,500k		°K	X=0.313 (±0.03) Y=0.329 (±0.03)		
Luminance (cd/㎡)	Cool		Min : 120			Typ : 150	M2241A	<Test Signal> (Full white, 100IRE)
	Medium		Min : 120			Typ : 150		
	Warm		Min : 120			Typ : 150		
	Cool		Min : 170			Typ : 200	M2341A	
	Medium		Min : 170			Typ : 200		
	Warm		Min : 170			Typ : 200		

*When doing Adjustment, Please make circumstance as below.



8.Function Check

8.1 Check display and sound

* Check Input and Signal items. (cf. work instructions)
1. TV
2. AV (CVBS)
3. COMPONENT (1080i)
4. RGB (PC : 1920 x 1080 @ 60hz)
5. HDMI
6. PC Audio In

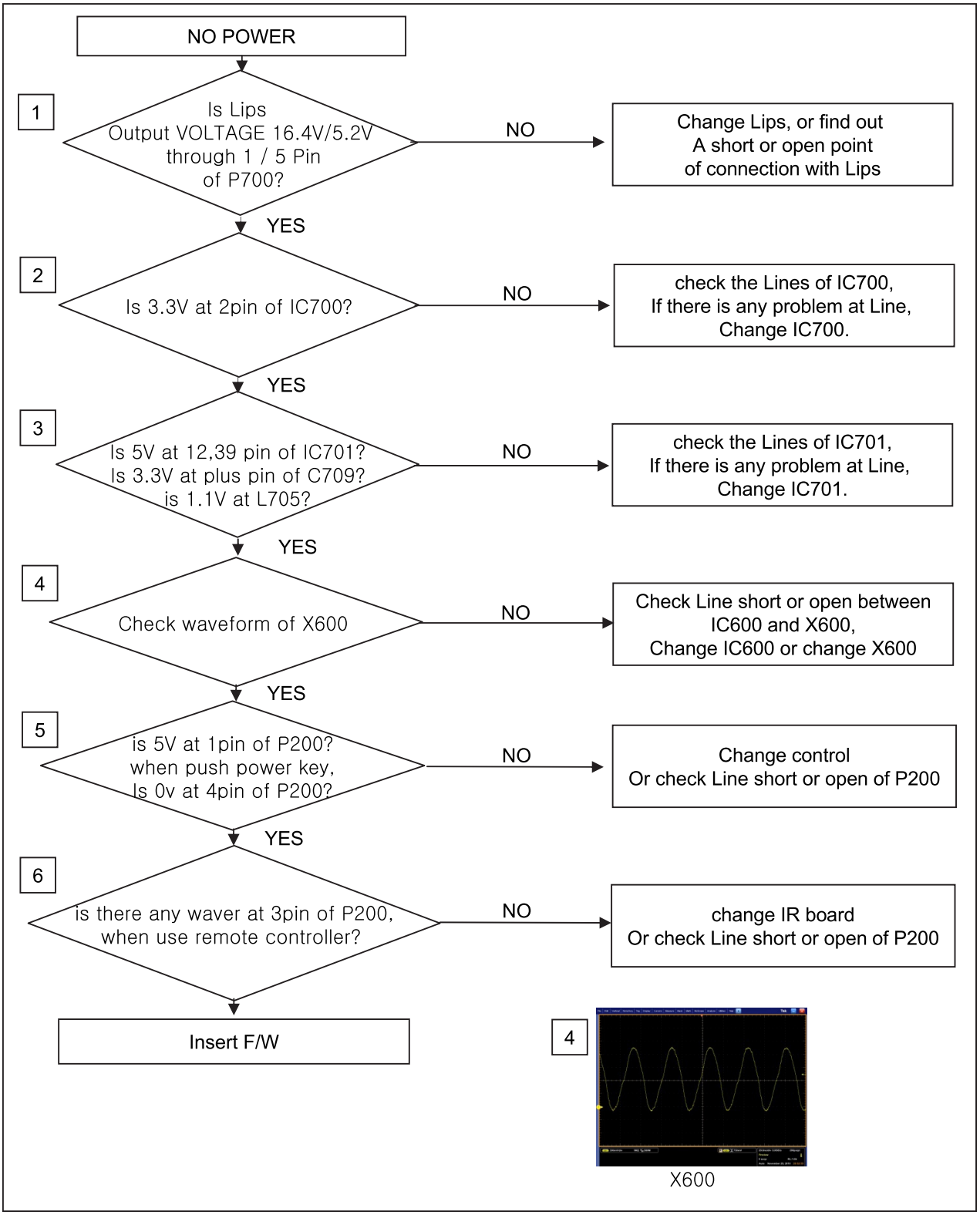
* Display and Sound check is executed by Remote controller.

9. Preset CH write condition

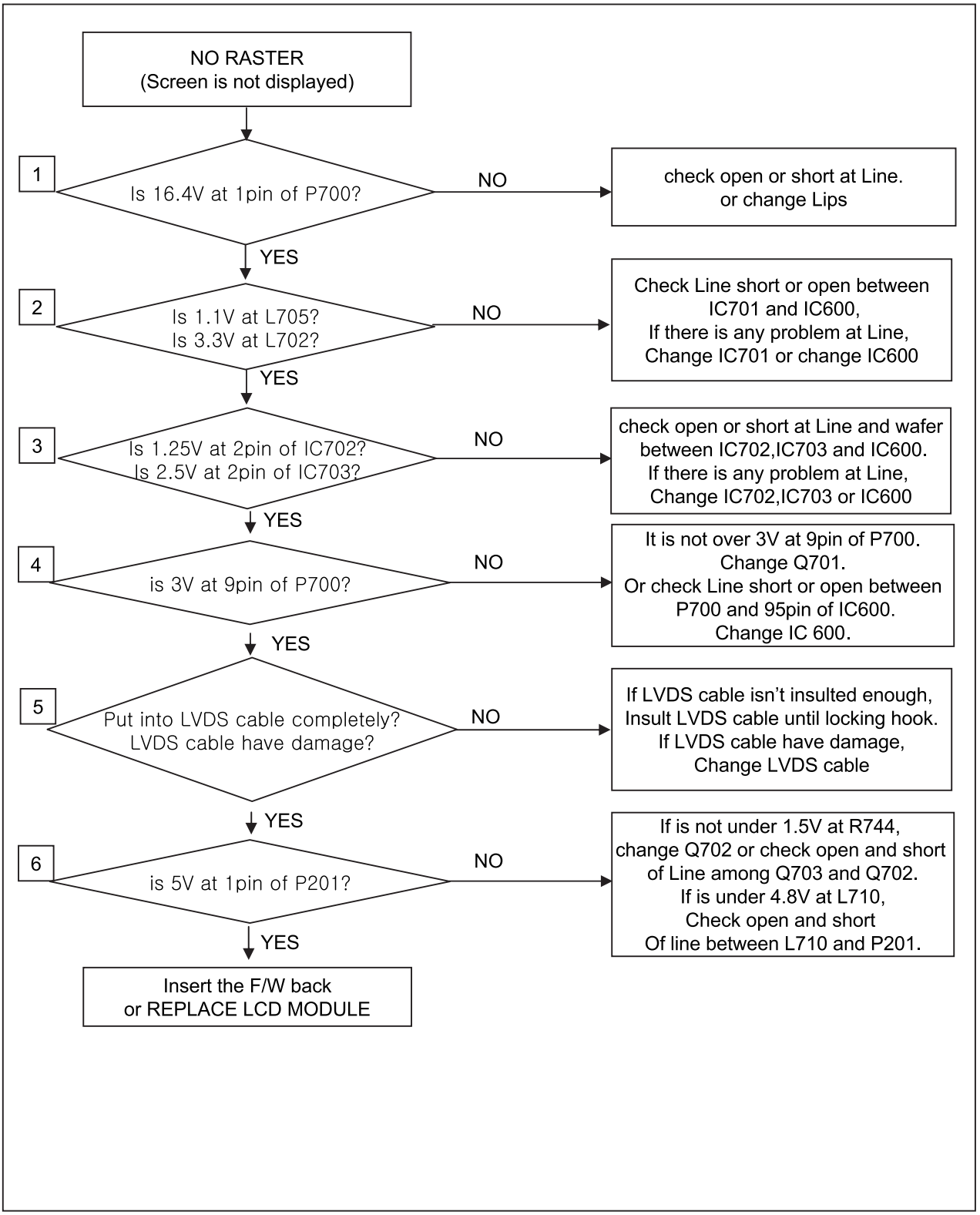
1. AC on time on only one after assembled automatically
2. CH recover on SVC OSD manually

TROUBLESHOOTING

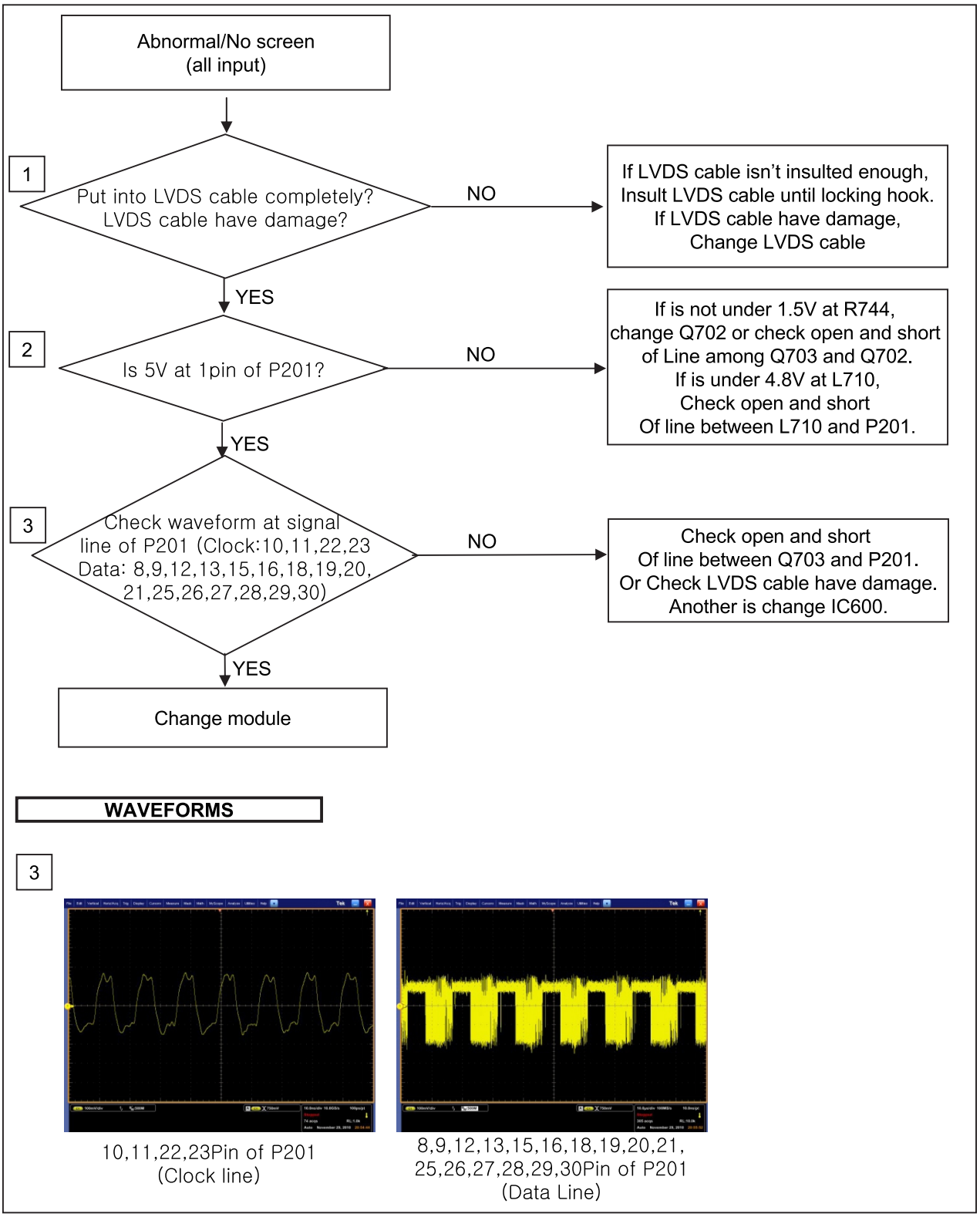
1. NO POWER-Main PCBA



2. No raster (Power LED blue, black screen)-Lips PCBA



3. Abnormal/No screen (All input)-Main PCBA



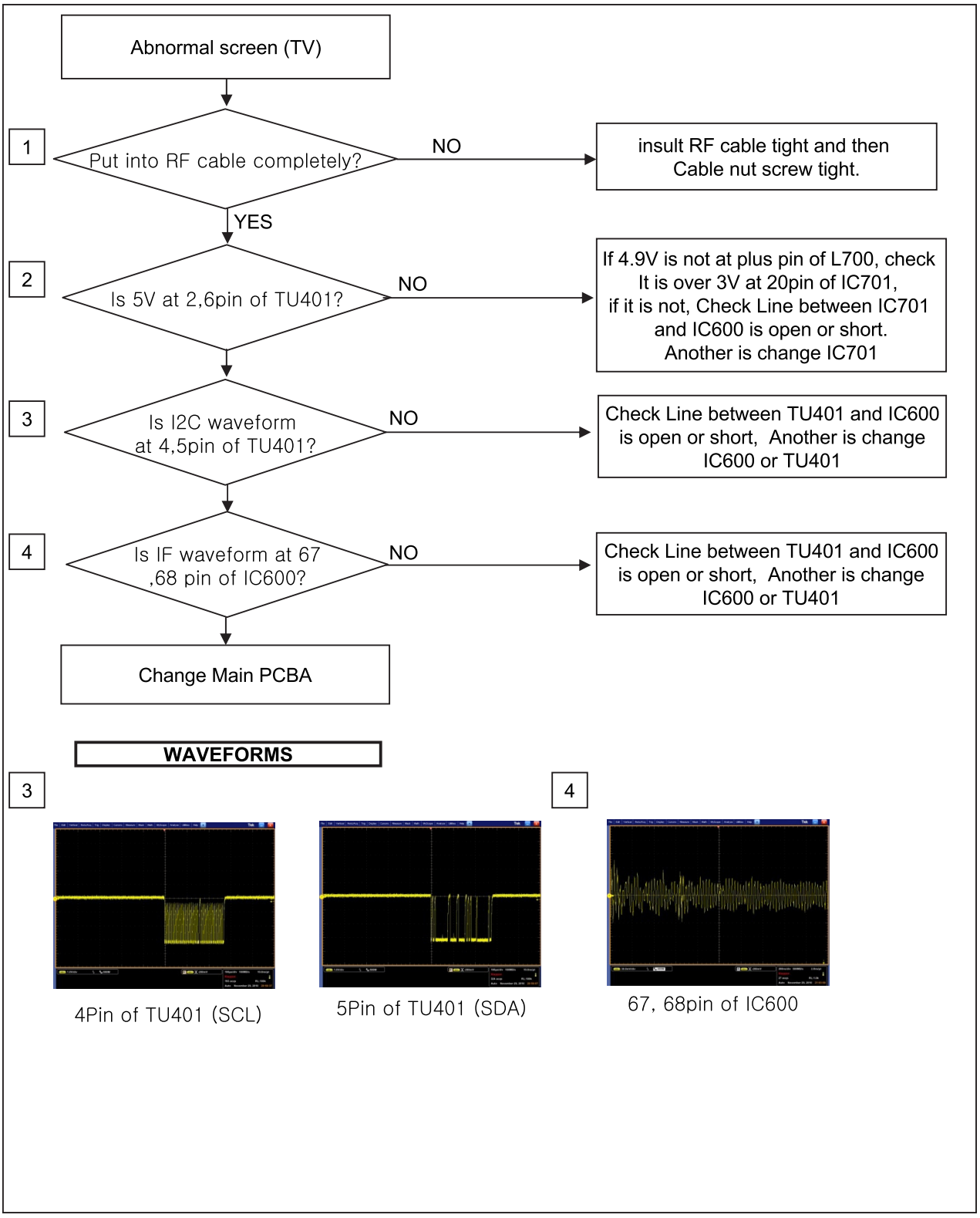
WAVEFORMS

3

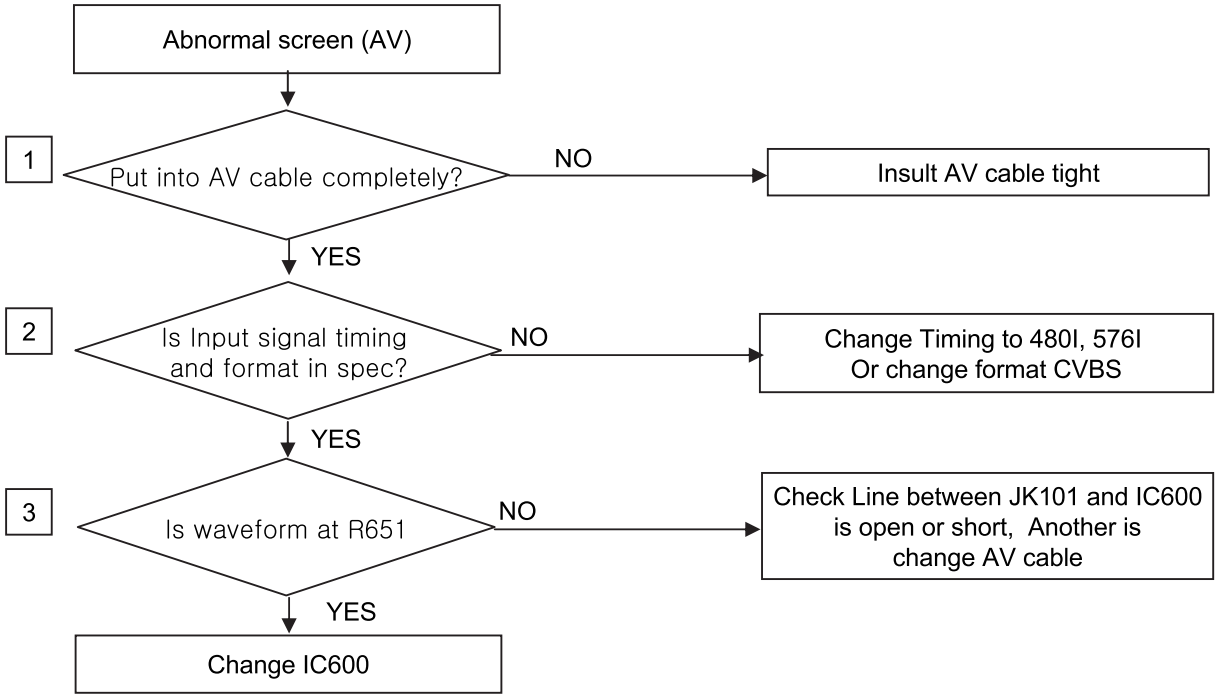
10,11,22,23Pin of P201
(Clock line)

8,9,12,13,15,16,18,19,20,21,
25,26,27,28,29,30Pin of P201
(Data Line)

4. Abnormal screen (TV)-Main PCBA

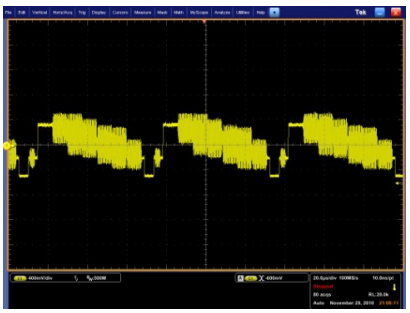


5. Abnormal screen (AV)-Main PCBA



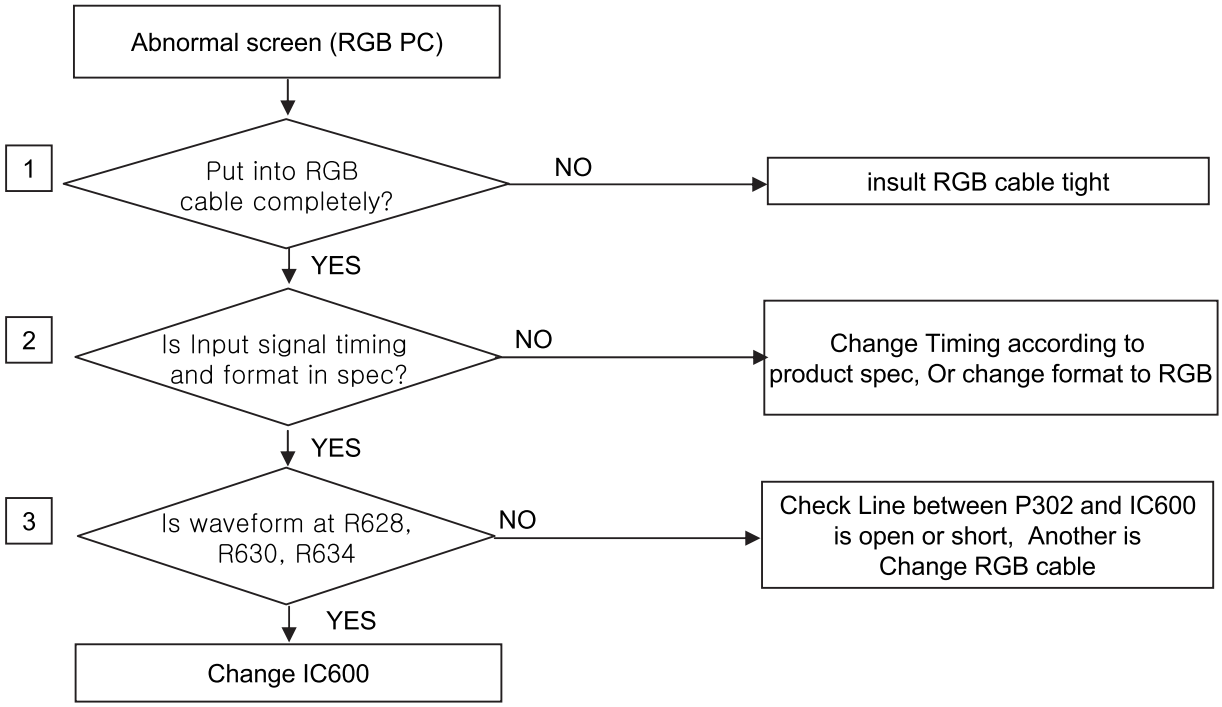
WAVEFORMS

3



R651 (CVBS)

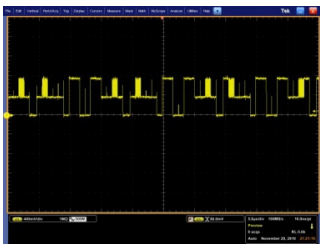
6. Abnormal screen (RGB PC)-Main PCBA



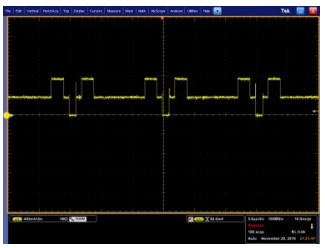
WAVEFORMS

3

R630(G)

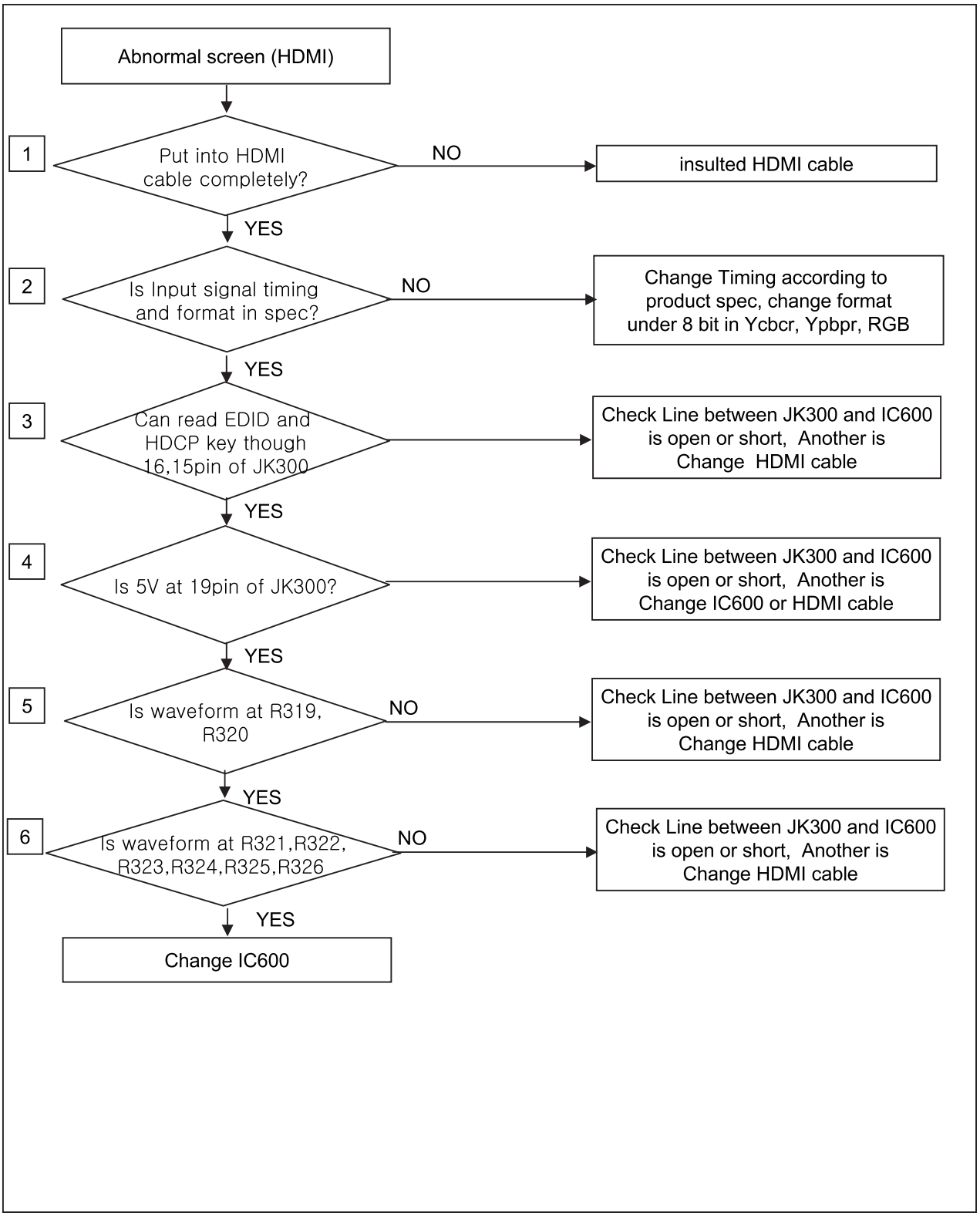


R634(R)

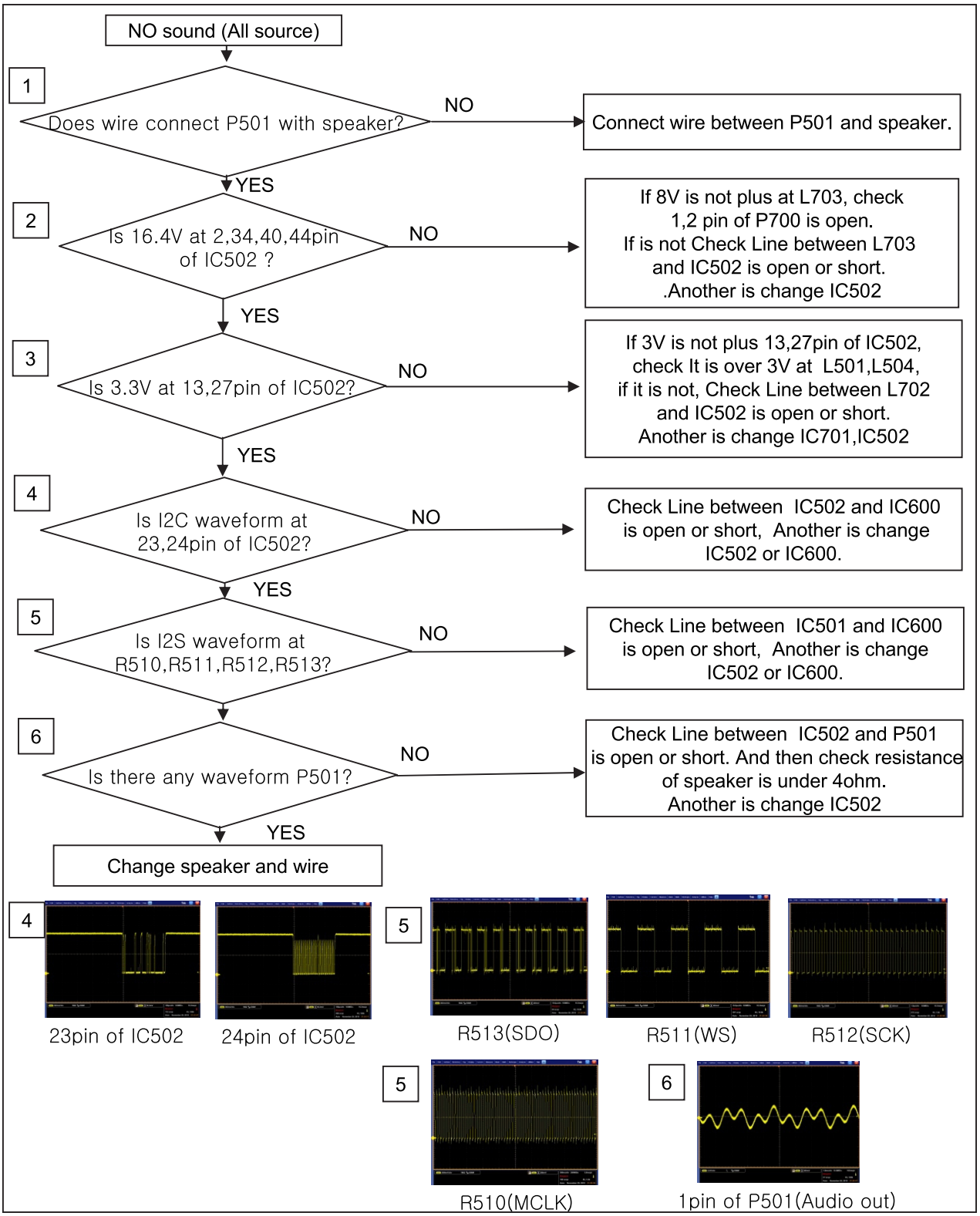


R628(B)

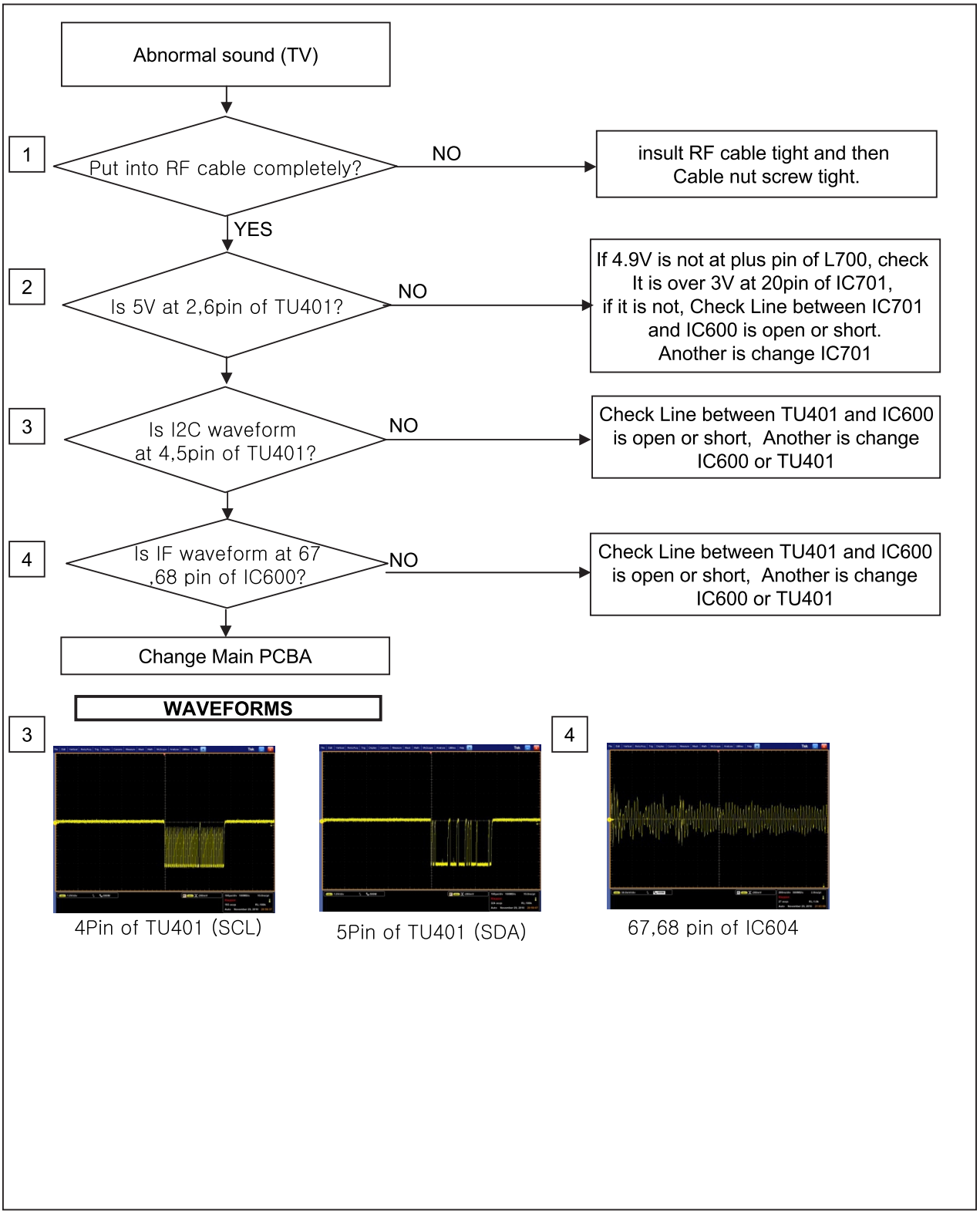
7. Abnormal screen (HDMI)-Main PCBA



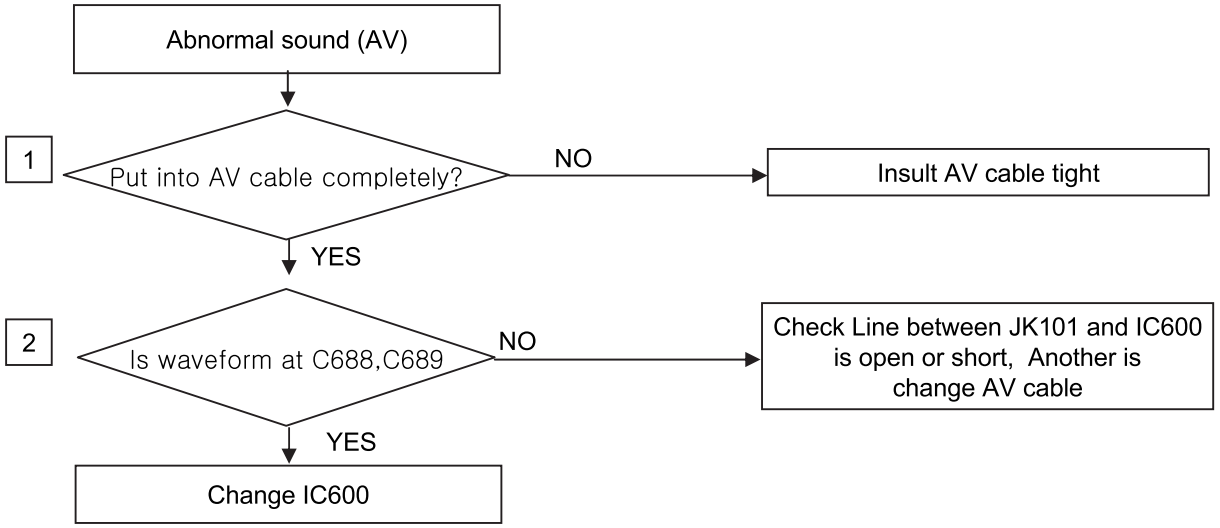
8. No sound (all source)-Main PCBA



9. Abnormal sound (TV)-Main PCBA

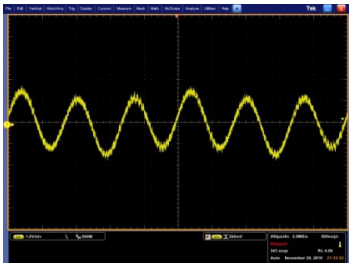


10. Abnormal sound (AV)-Main PCBA



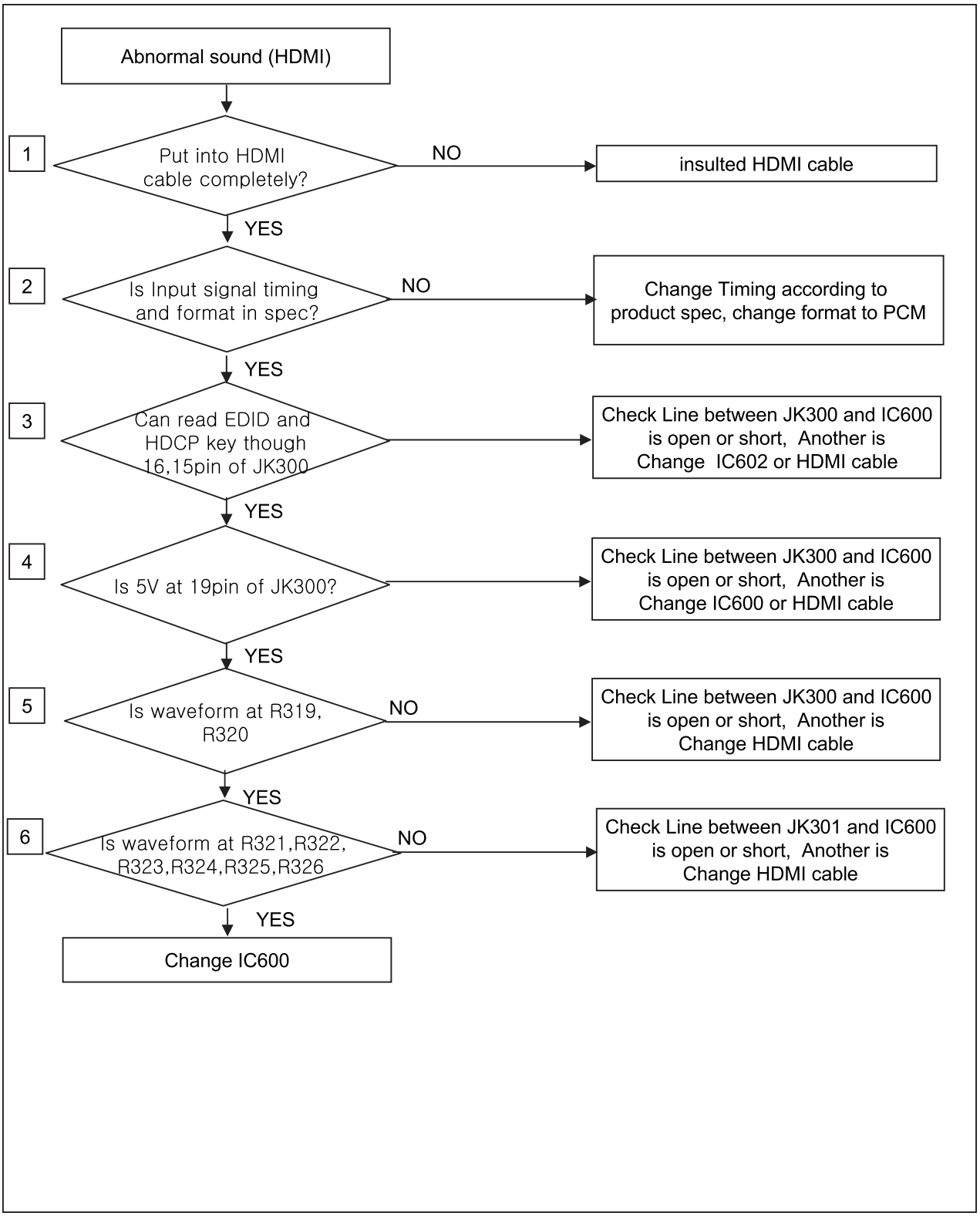
WAVEFORMS

2

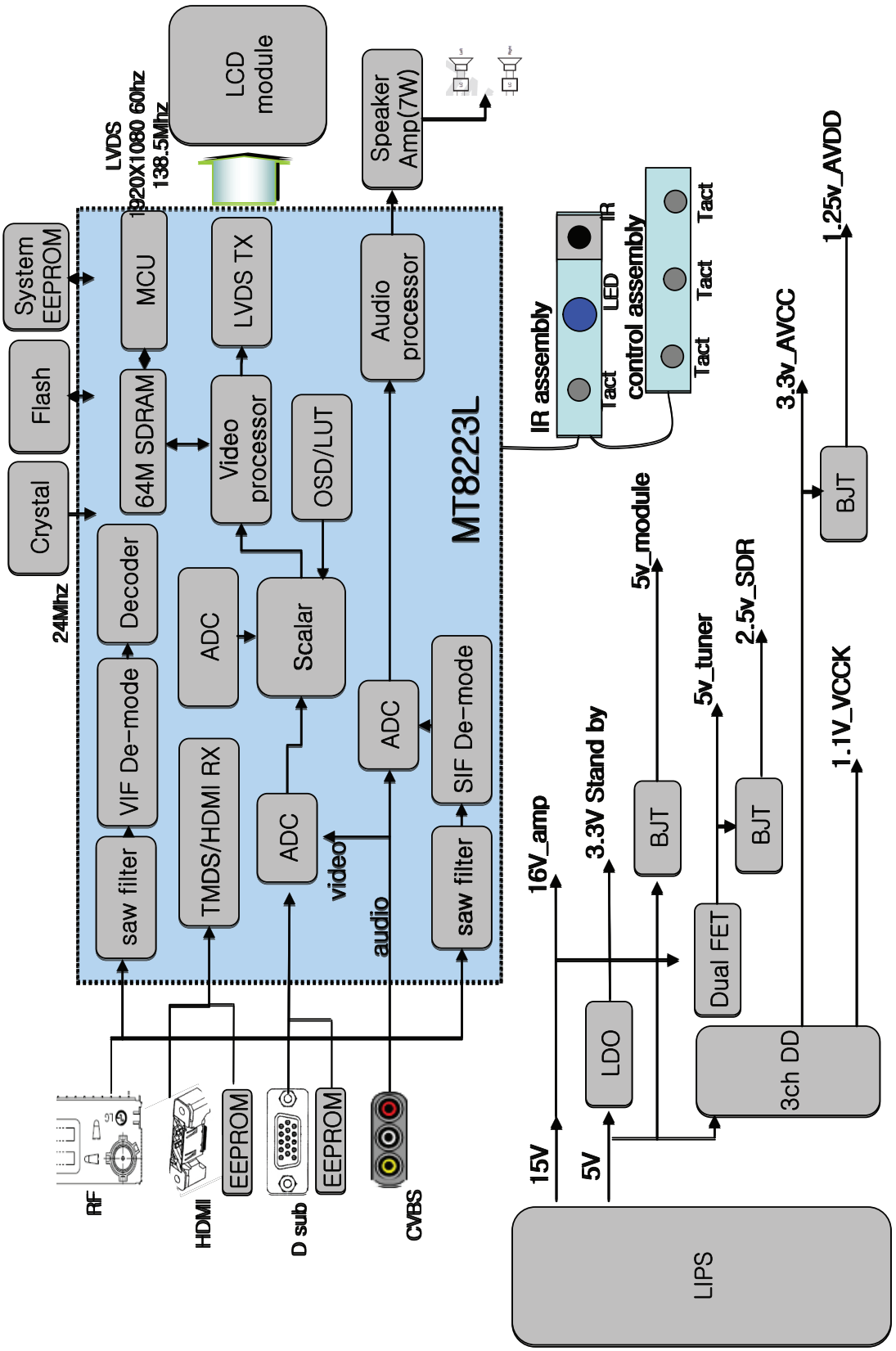


C688,C689 (audio in)

11.Abnormal sound (HDMI)-Main PCBA



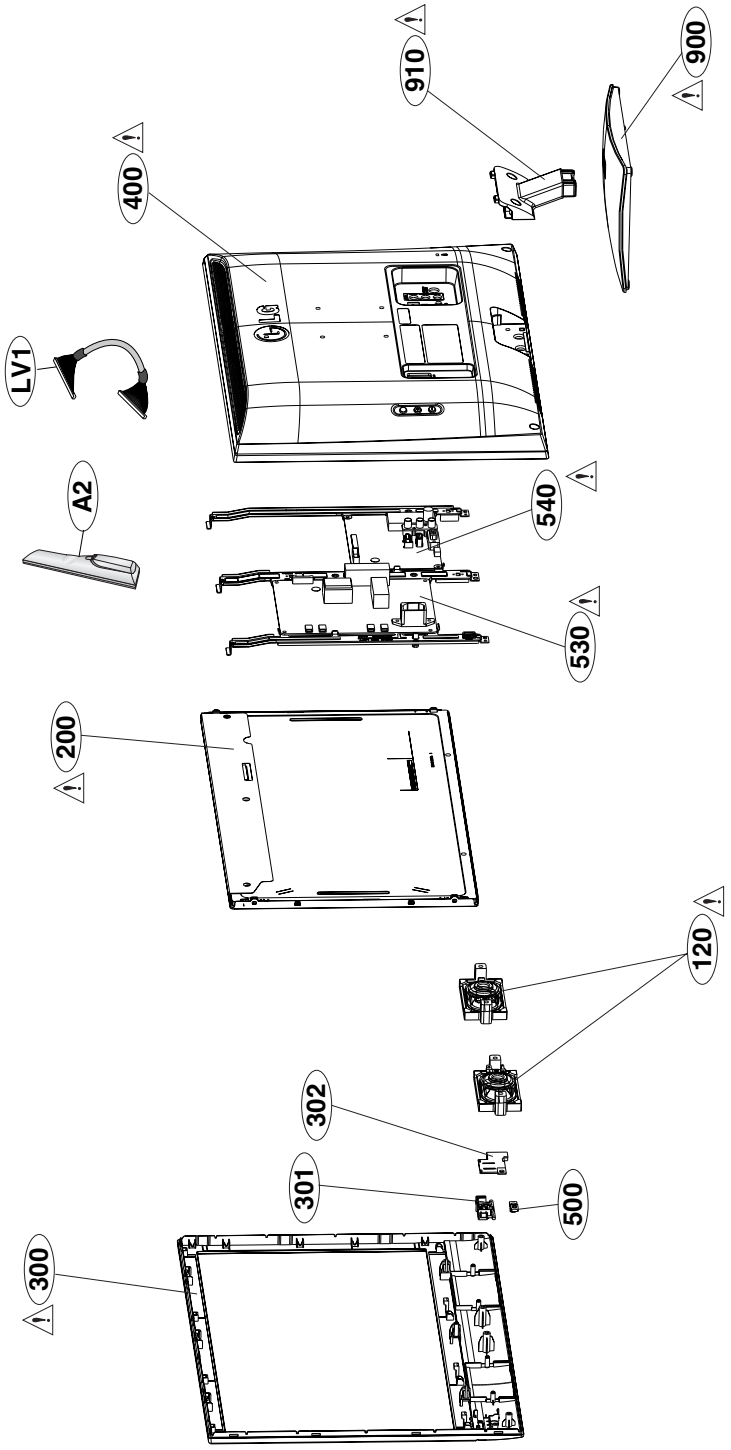
BLOCK DIAGRAM



EXPLODED VIEW

IMPORTANT SAFETY NOTICE

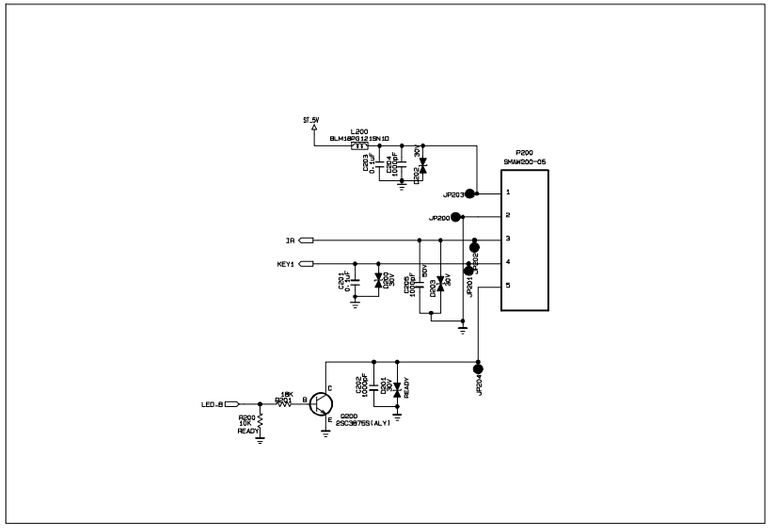
Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and EXPLODED VIEW.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.

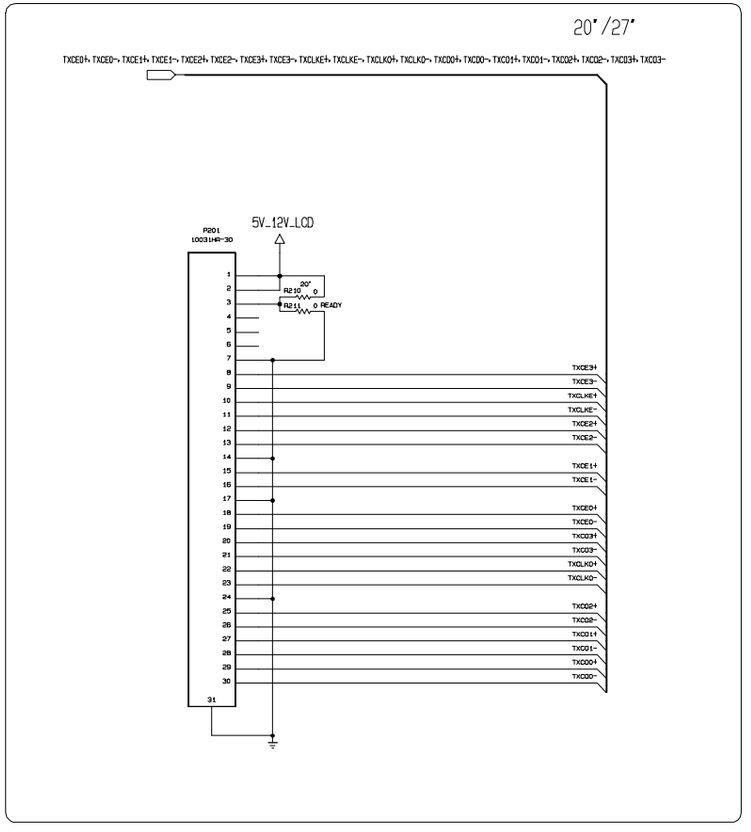


LVDS/IR

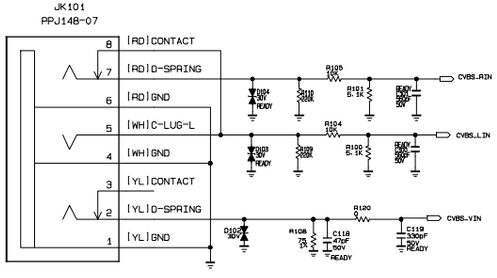
CONTROL Key
IR & LED

Zener Diode is
close to wafer





CVBS IN



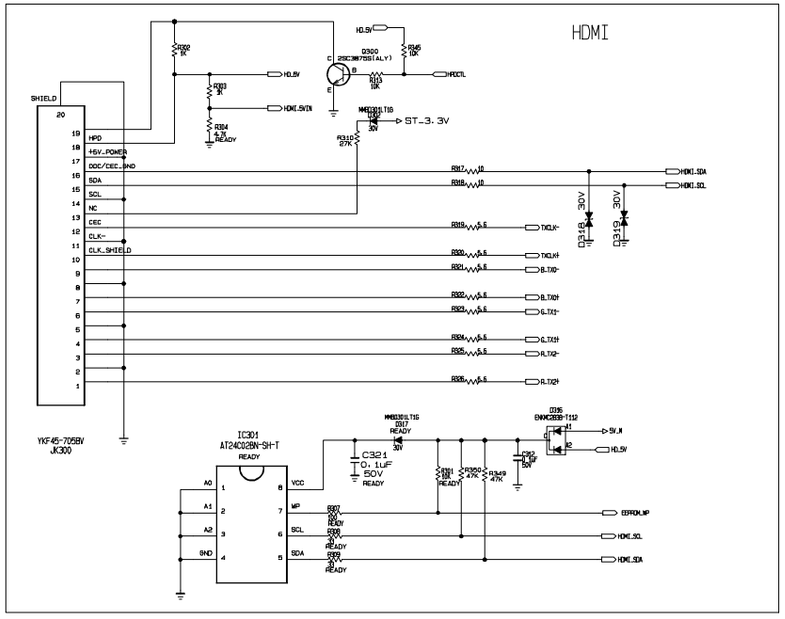
THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

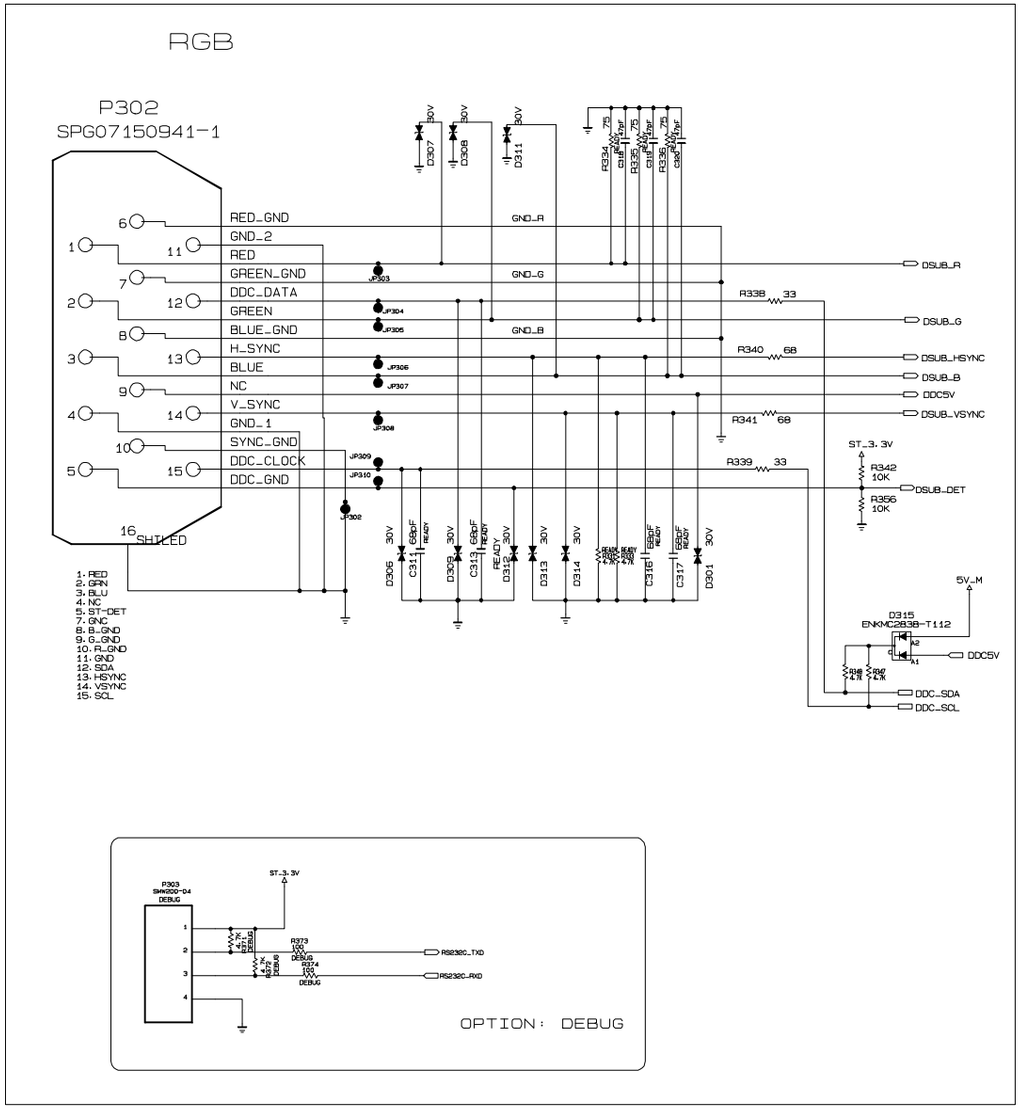
SECRET
LGElectronics

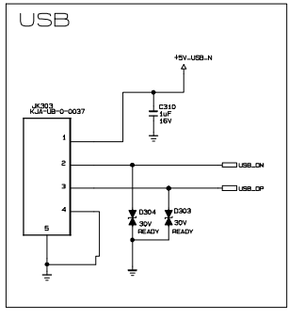
LG ELECTRONICS

MODEL	EAX63971101_6	DATE	2010/12/09
BLOCK	LVDS/IR	SHEET	1/6

INTERFACE







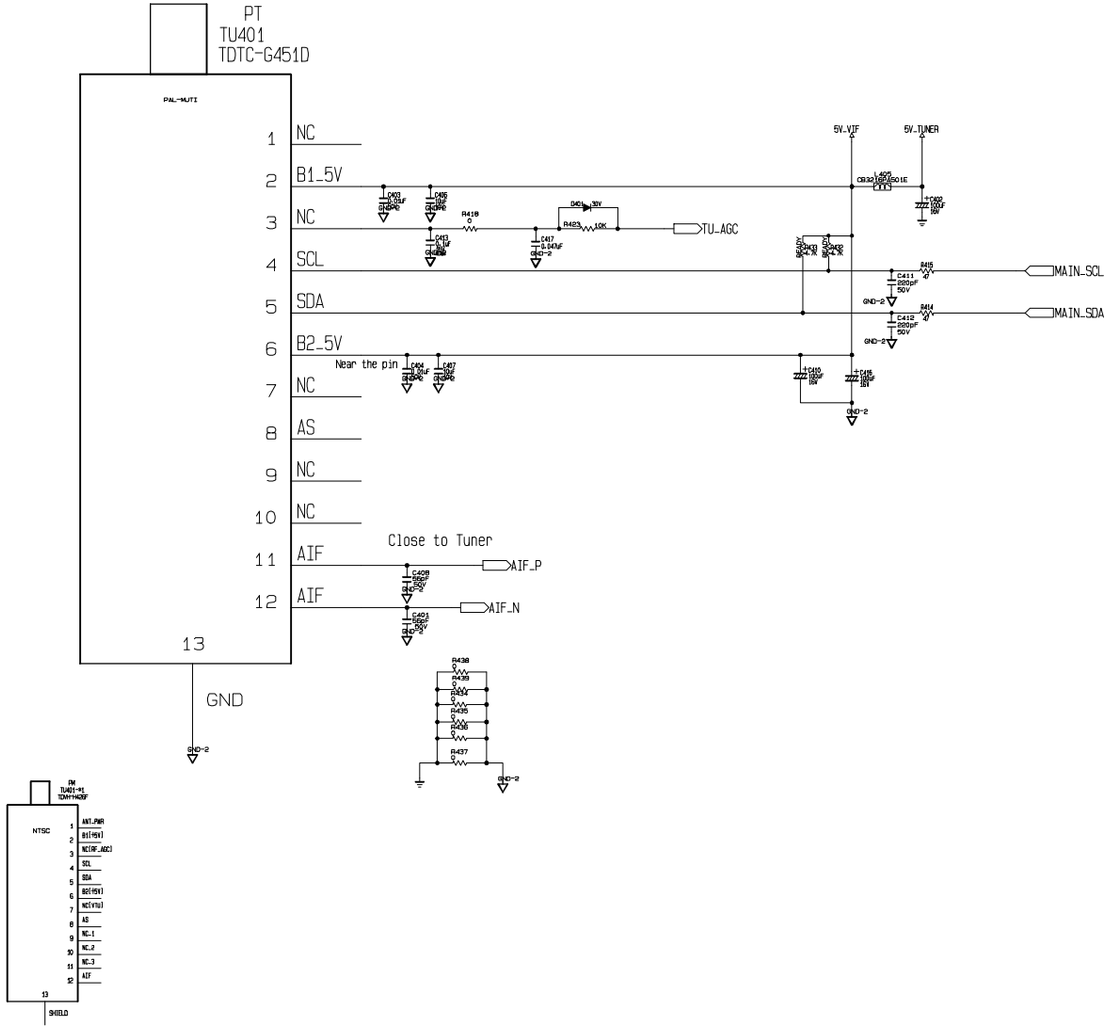
THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LGElectronics

LG ELECTRONICS

MODEL	EAX63971101_6	DATE	2010/12/09
BLOCK	HDMI/RGB	SHEET	2/6

TUNER



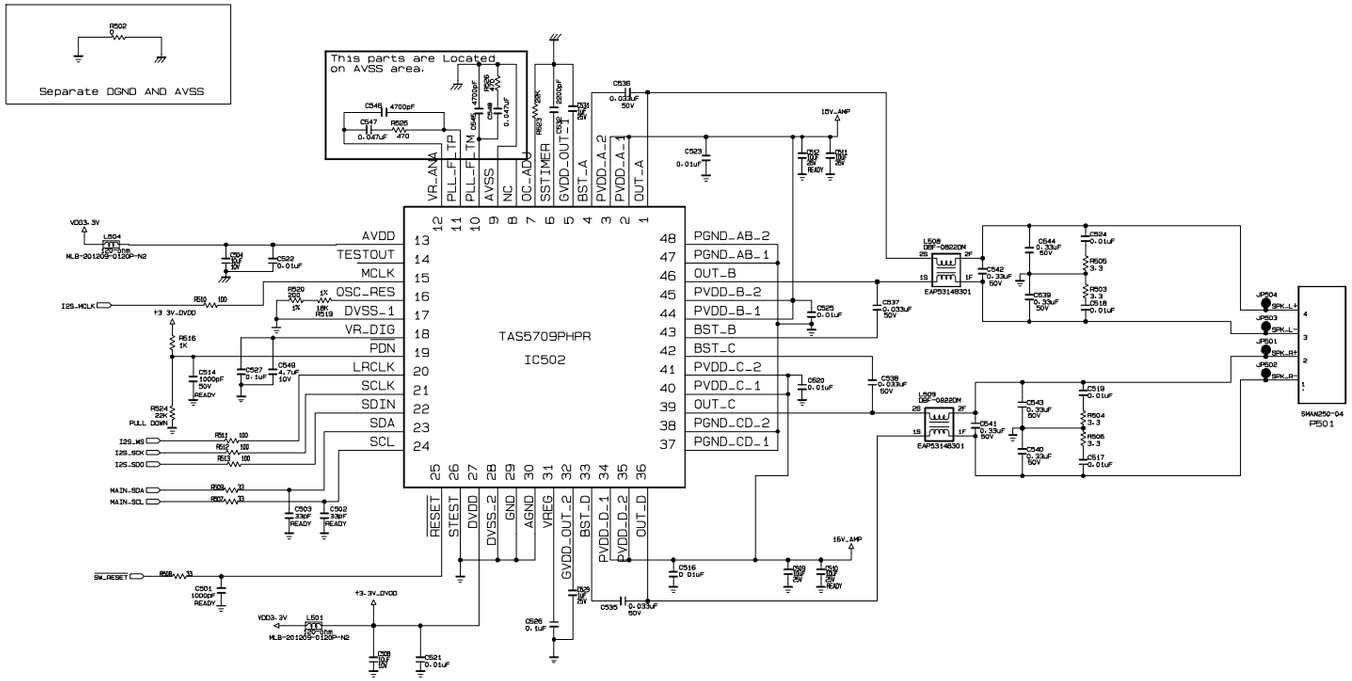
THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LGElectronics

LG ELECTRONICS

MODEL	EAX63971101_6	DATE	2010/12/09
BLOCK	TUNER	SHEET	3/6

AUDIO



THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

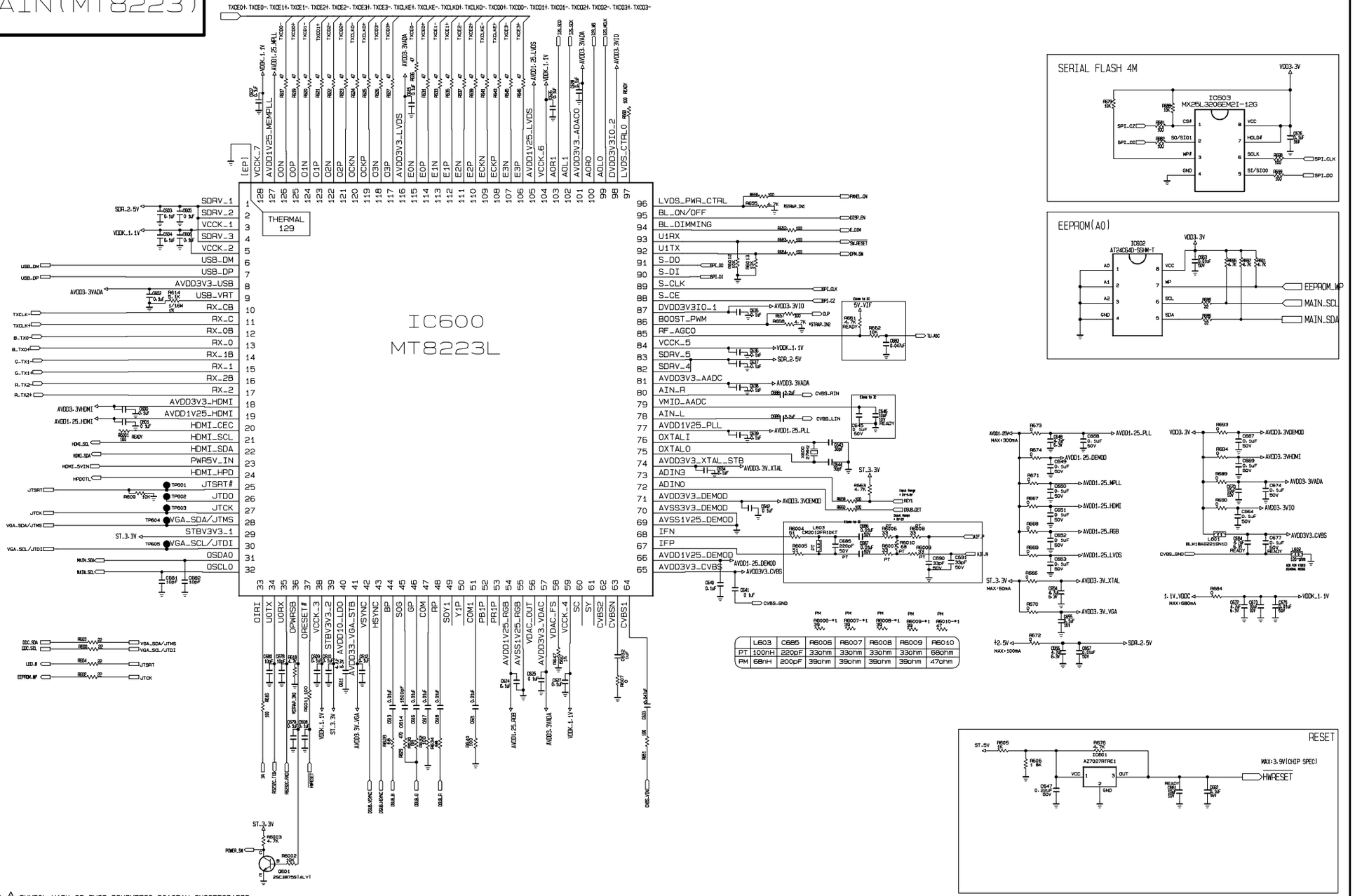
SECRET

LGElectronics

LG ELECTRONICS

MODEL	EAX63971101_6	DATE	2010/12/09
BLOCK	AUDIO	SHEET	4/6

MAIN(MT8223)

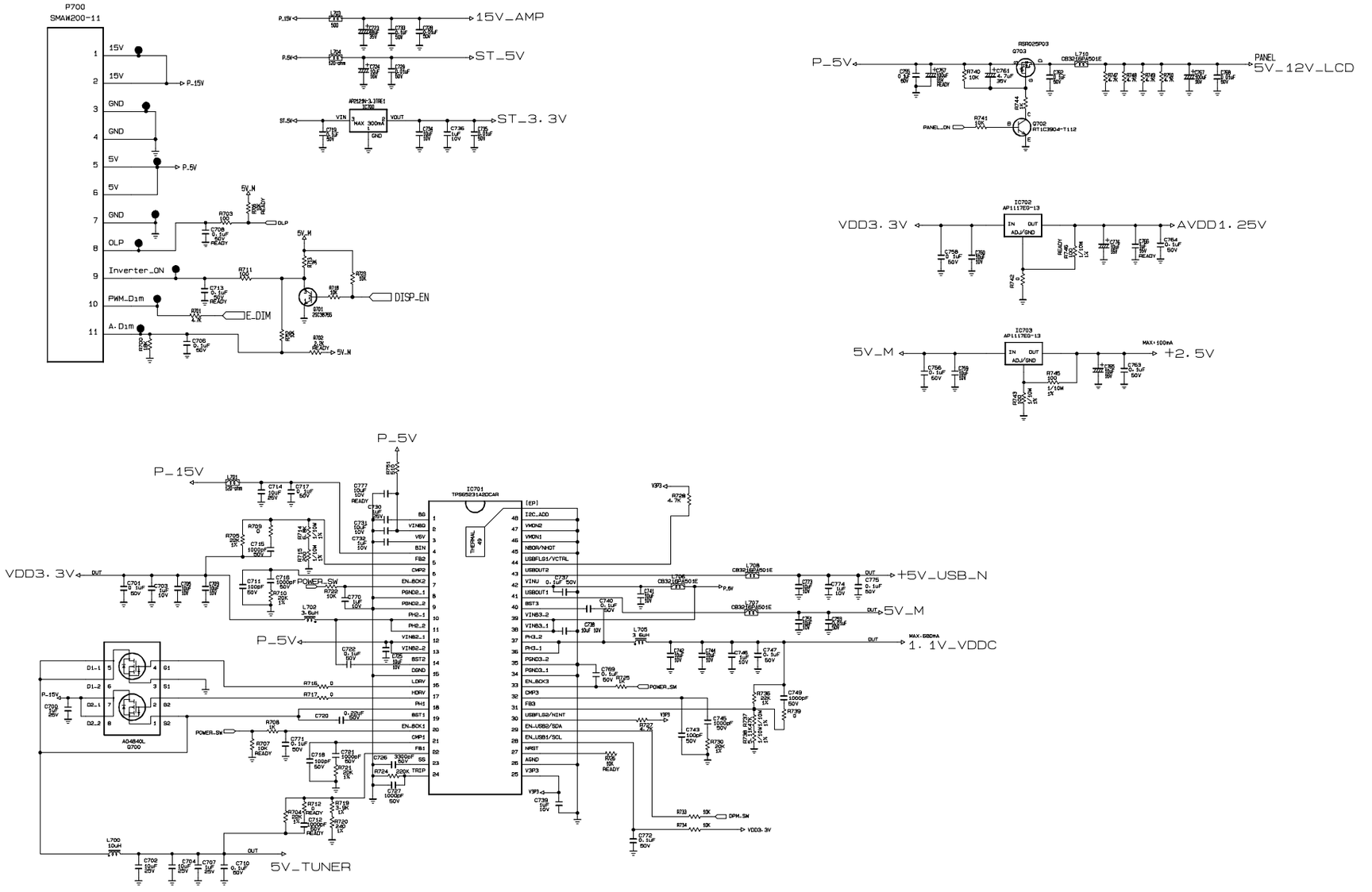


THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LGElectronics

LG ELECTRONICS

MODEL	EAX63971101_6	DATE	2010/12/09
BLOCK	MTK8223L	SHEET	5/6



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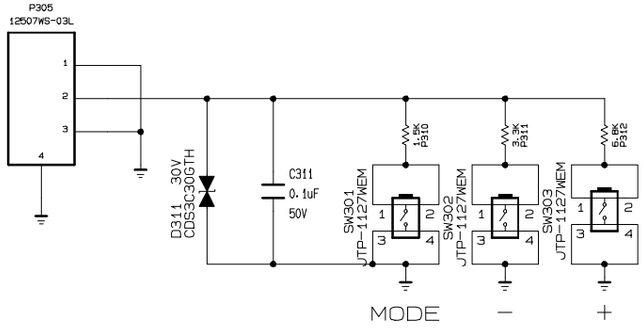
MODEL	EAX63971101_6	DATE	2010/12/09
BLOCK	POWER	SHEET	6 / 6



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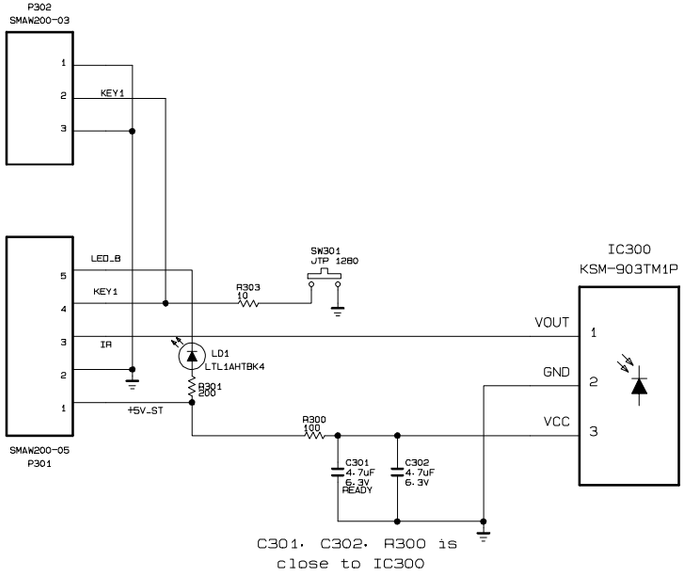
LG ELECTRONICS

MODEL	EAX64140901_0	DATE	2010.11.29
BLOCK	CONTROL	SHEET	1 / 1



C301. C302. R300 is close to IC300

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SECRET

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LG ELECTRONICS

MODEL	M41A_KEY IR	DATE	2010. 11. 29
BLOCK		SHEET	/


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