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# LED TV

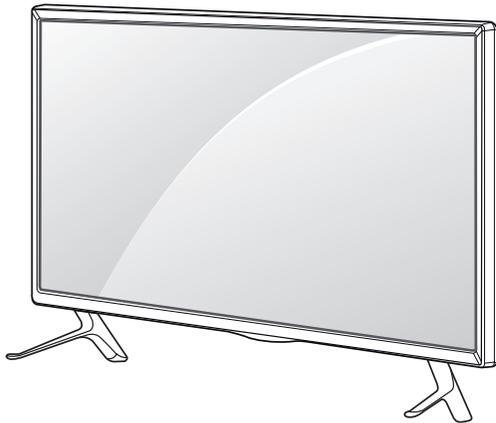
# SERVICE MANUAL

CHASSIS : LA57H

MODEL : 32LF5600 32LF5600-UB

## CAUTION

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



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# SAFETY PRECAUTIONS

## IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by  $\triangle$  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 Shock, Fire, or other Hazards.

Do not modify the original design without permission of manufacturer.

### General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and its components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1 W), keep the resistor 10 mm away from PCB.

Keep wires away from high voltage or high temperature parts.

### Before returning the receiver to the customer,

always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

### Leakage Current Cold Check(Antenna Cold Check)

With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.

If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1 M $\Omega$  and 5.2 M $\Omega$ .

When the exposed metal has no return path to the chassis the reading must be infinite.

An other abnormality exists that must be corrected before the receiver is returned to the customer.

### Leakage Current Hot Check (See below Figure)

Plug the AC cord directly into the AC outlet.

### Do not use a line Isolation Transformer during this check.

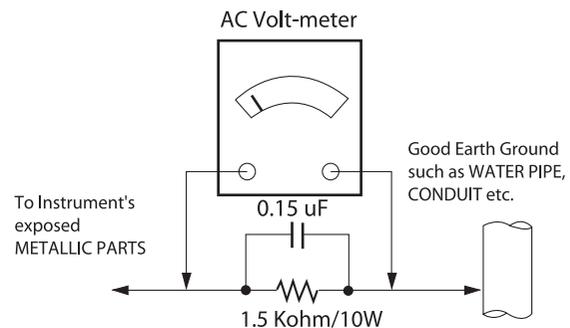
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.

Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which corresponds to 0.5 mA.

In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

### Leakage Current Hot Check circuit



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

\*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 reconnecting 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 1.25 cm) 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.

# SPECIFICATION

NOTE : Specifications and others are subject to change without notice for improvement.

## 1. Application range

This spec sheet is applied LED TV with LA57H chassis

## 2. Test condition

Each part is tested as below without special notice.

- 1) Temperature :  $25\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ ( $77 \pm 9\text{ }^{\circ}\text{F}$ ) , CST :  $40\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$
- 2) Relative Humidity:  $65\% \pm 10\%$
- 3) Power Voltage

Market	Input voltage	Frequency	Remark
USA	100~240V	50/60Hz	Standard Voltage of each product is marked by models

- 4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM
- 5) The receiver must be operated for about 20 minutes prior to the adjustment

## 3. Test method

- 1) Performance: LGE TV test method followed
- 2) Demanded other specification  
Safety : UL, CSA, IEC specification  
EMC: FCC, ICES, IEC specification

## 4. General Specification

No	Item	Specification	Result		Remark	
1.	Receiving System	ATSC / NTSC-M / 64 & 256 QAM				
2.	Available Channel	1) VHF : 02~13 2) UHF : 14~69 3) DTV : 02-69 4) CATV : 01~135 5) CADTV : 01~135				
3.	Input Voltage	AC 100 ~ 240V 50/60Hz			Mark : 110V, 60Hz (N.America)	
4.	Market	NORTH AMERICA				
5.	Screen Size	32/42/43/49/55 inch Wide (1920 × 1080)	FHD / 60Hz		32LF5600-Ux 42LF5500-Ux 42LF5600-Ux 43LF5400-Ux 49LF5500-Ux 49LF5400-Ux 55LF5500-Ux	
		32 inch Wide (1366 × 768)	HD / 60Hz		32LF560B-Ux	
6.	Aspect Ratio	16:9				
7.	Tuning System	FS				
8.	Module	Direct	LC320DXE-MGA3	LGD	HD / 60Hz	32LF560B-Ux
		HC320DXN-ABHS3	BOE	HD / 60Hz	32LF560B-Ux	
		LC320DUE-MGA3	LGD	FHD / 60Hz	32LF5600-Ux	
		NC320DUN-VBBP3	BOE	FHD / 60Hz	32LF5600-Ux	
		LC420DUE-MGA3	LGD	FHD / 60Hz	42LF5600-Ux	
		NC420DUN-VUBP5	AUO	FHD / 60Hz	42LF5600-Ux	
		LC420DUE-MGA6	LGD	FHD / 60Hz	42LF5500-Ux	
		NC420DUN-VUBP8	AUO	FHD / 60Hz	42LF5500-Ux	
		LC490DUE-MGA6	LGD	FHD / 60Hz	49LF5500-Ux	
		LC550DUE-MGA6	LGD	FHD / 60Hz	55LF5500-Ux	
		NC430EUN-AACR1	LGD	FHD / 60Hz	43LF5400-Ux	
NC490EUN-AACR1	LGD	FHD / 60Hz	49LF5400-Ux			
9.	Operating Environment	1) Temp : 0 ~ 40 deg 2) Humidity : ~ 80 %				
10.	Storage Environment	1) Temp : -20 ~ 60 deg 2) Humidity : ~ 85 %				

## 5. Supported video resolutions

### 5.1. Component input(Y, CB/PB, CR/PR)

No	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed
1	720*480	15.73	59.94	13.50	SDTV ,DVD 480I
2	720*480	15.73	60.00	13.5135	SDTV ,DVD 480I
3	720*480	31.47	59.94	27.00	SDTV 480P
4	720*480	31.50	60.00	27.027	SDTV 480P
5	1280*720	44.96	59.94	74.176	HDTV 720P
6	1280*720	45.00	60.00	74.25	HDTV 720P
7	1920*1080	33.72	59.94	74.176	HDTV 1080I
8	1920*1080	33.75	60.00	74.25	HDTV 1080I
9	1920*1080	26.97	23.976	74.176	HDTV 1080P
10	1920*1080	27.00	24.00	74.25	HDTV 1080P
11	1920*1080	33.71	29.97	74.176	HDTV 1080P
12	1920*1080	33.75	30.00	74.25	HDTV 1080P
13	1920*1080	67.432	59.94	148.352	HDTV 1080P
14	1920*1080	67.50	60.00	148.50	HDTV 1080P

## 5.2. HDMI Input (DTV / PC)

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	Remarks
DTV						
1	640*480	31.46	59.94	25.125	SDTV 480P	
2	640*480	31.5	60.00	25.125	SDTV 480P	
3	720*480	15.73	59.94	13.500	SDTV 480I	Spec-Out. (Just Display)
4	720*480	15.75	60.00	13.514	SDTV 480I	Spec-Out. (Just Display)
5	720*480	31.47	59.94	27.00	SDTV 480P	
6	720*480	31.5	60.00	27.027	SDTV 480P	
7	1280*720	44.96	59.94	74.176	HDTV 720P	
8	1280*720	45	60.00	74.25	HDTV 720P	
9	1920*1080	33.72	59.94	74.176	HDTV 1080I	
10	1920*1080	33.75	60.00	74.25	HDTV 1080I	
11	1920*1080	26.97	23.97	74.176	HDTV 1080P	
12	1920*1080	27.00	24.00	74.25	HDTV 1080P	
13	1920*1080	33.71	29.97	74.176	HDTV 1080P	
14	1920*1080	33.75	30.00	74.25	HDTV 1080P	
15	1920*1080	67.43	59.94	148.352	HDTV 1080P	
16	1920*1080	67.5	60.00	148.50	HDTV 1080P	
PC						
1	640*350 @70Hz	31.46	70.09	25.17	EGA	X
2	720*400 @70Hz	31.46	70.08	28.32	DOS	O
3	640*480 @60Hz	31.46	59.94	25.17	VESA(VGA)	O
4	800*600 @60Hz	37.87	60.31	40.00	VESA(SVGA)	O
5	1024*768 @60Hz	48.36	60.00	65.00	VESA(XGA)	O
6	1152*864 @60Hz	54.34	60.05	80.002	VESA	O
7	1280*1024 @60Hz	63.98	60.02	108.0	VESA (SXGA)	O FHD only
8	1360*768 @60Hz	47.71	60.01	85.50	VESA (WXGA)	O
9	1920*1080 @60Hz	67.5	60.00	148.5	WUXGA(CEA 861D)	O FHD only

# ADJUSTMENT INSTRUCTION

## 1. Application

This spec. sheet applies to LA57H Chassis applied LED TV all models manufactured in TV factory

## 2. Specification

- (1) Because this is not a hot chassis, it is not necessary to use an isolation transformer. However, the use of isolation transformer will help protect test instrument.
- (2) Adjustment must be done in the correct order.
- (3) The adjustment must be performed in the circumstance of  $25 \pm 5^\circ\text{C}$  of temperature and  $65 \pm 10\%$  of relative humidity if there is no specific designation
- (4) The input voltage of the receiver must keep 100~240V, 50/60Hz
- (5) At first Worker must turn on the SET by using Power Only key.
- (6) The receiver must be operated for about 5 minutes prior to the adjustment when module is in the circumstance of over  $15^\circ\text{C}$   
In case of keeping module is in the circumstance of  $0^\circ\text{C}$ , it should be placed in the circumstance of above  $15^\circ\text{C}$  for 2 hours  
In case of keeping module is in the circumstance of below  $-20^\circ\text{C}$ , it should be placed in the circumstance of above  $15^\circ\text{C}$  for 3 hours.

### ※ Caution

When still image is displayed for a period of 20 minutes or longer (especially where W/B scale is strong. Digital pattern 13ch and/or Cross hatch pattern 09ch), there can some afterimage in the black level area

## 3. Adjustment items

### 3.1. Main PCBA Adjustments

- (1) ADC adjustment: Component 480i, 1080p / RGB-PC 1080p
- (2) EDID download: HDMI and RGB-PC

- Above adjustment items can be also performed in Final Assembly if needed. Adjustment items in both PCBA and final assembly tags can be checked by using the INSTART Menu(1.ADJUST CHECK)  
Component 1080p and RGB-PC Adjust will be calculated by 480i adjust value.

### 3.2. Final assembly adjustment

- (1) White Balance adjustment
- (2) RS-232C functionality check
- (3) Factory Option setting per destination
- (4) Shipment mode setting (In-Stop)
- (5) GND and HI-POT test

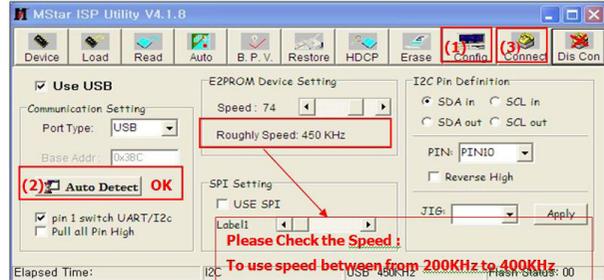
### 3.3. Appendix

- (1) Shipment conditions
- (2) Tool option menu
- (3) USB Download (S/W Update, Option and Service only)
- (4) Preset CH Information

## 4. MAIN PCBA Adjustments

### \* Download

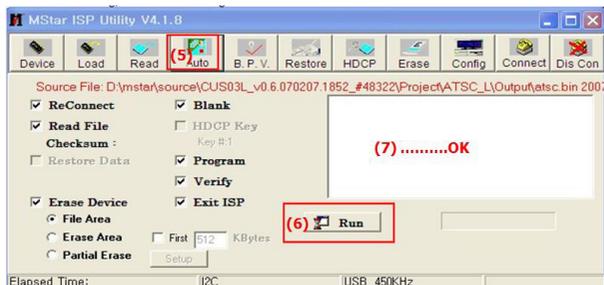
- (1) Execute ISP program "Mstar ISP Utility" and then click "Config" tab.
- (2) Set as below, and then click "Auto Detect" and check "OK" message. If display "Error", Check connect computer, jig, and set.
- (3) Click "Connect" tab. If display "Can't ", Check connect computer, jig, and set.



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



- (5) Click "Auto" tab and set as below
- (6) Click "Run".
- (7) After downloading, check "OK" message.



### 4.1. ADC Calibration

#### 4.1.1. Overview

- ADC adjustment is needed to find the optimum black level and gain in Analog-to-Digital device and to compensate RGB deviation
- ADC adjustment is OTP (Auto ADC)



## 5. Final Assembly Adjustment

### 5.1. White Balance Adjustment

#### 5.1.1. Overview

##### 5.1.1.1. W/B adj. Objective & How-it-works

- (1) Objective: To reduce each Panel's W/B deviation
- (2) How-it-works: When R/G/B gain in the OSD is at 192, it means the panel is at its Full Dynamic Range. In order to prevent saturation of Full Dynamic range and data, one of R/G/B is fixed at 192, and the other two is lowered to find the desired value.
- (3) Adj. condition: normal temperature
  - Surrounding Temperature: 25±5 °C
  - Warm-up time: About 5 Min
  - Surrounding Humidity: 20% ~ 80%
  - Before White balance adjustment, Keep power on status, don't power off

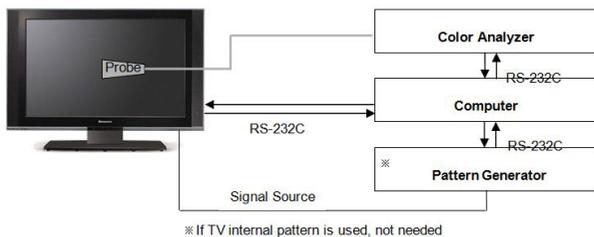
##### 5.1.1.2. Adj. condition and cautionary items

- (1) Lighting condition in surrounding area surrounding lighting should be lower 10 lux. Try to isolate adj. area into dark surrounding.
- (2) Probe location: Color Analyzer (CA-210) probe should be within 10cm and perpendicular of the module surface (80°~ 100°)
- (3) Aging time
  - After Aging Start, Keep the Power ON status during 5 Minutes.
  - In case of LCD, Back-light on should be checked using no signal or Full-white pattern.

#### 5.1.2. Equipment

- (1) Color Analyzer: CA-210 (NCG: CH 9 / WCG: CH12 / LED: CH14)
- (2) Adj. Computer (During auto adj., RS-232C protocol is needed)
- (3) Adjust Remocon
- (4) Video Signal Generator MSPG-925F 720p/204-Gray (Model: 217, Pattern: 49)
  - Only when internal pattern is not available
  - ※ Color Analyzer Matrix should be calibrated using CS-1000

#### 5.1.3. Equipment connection



- When you connect the RS232 to set Phone jack, please use 3pin phone jack cable.

#### 5.1.4. Adjustment Command (Protocol)

(1) RS-232C Command used during auto-adj.

RS-232C COMMAND			Explanation
CMD	DATA	ID	
Wb	00	00	Begin White Balance adj.
Wb	00	ff	End White Balance adj. (internal pattern disappears )

Ex) wb 00 00 -> Begin white balance auto-adj.  
 wb 00 10 -> Gain adj.  
 ja 00 ff -> Adj. data  
 jb 00 c0

...  
 ...  
 wb 00 1f -> Gain adj. complete  
 \*(wb 00 20(start), wb 00 2f(end)) -> Off-set adj.  
 wb 00 ff ->End white balance auto adj.

#### (2) Adjustment Map

	Adj. item	Command (lower case ASCII)		Data Range (Hex.)		Default (Decimal)
		CMD1	CMD2	MIN	MAX	
Cool	R Gain	j	g	00	C0	172
	G Gain	j	h	00	C0	172
	B Gain	j	i	00	C0	192
	R Cut					128
	G Cut					128
	B Cut					128
Medium	R Gain	j	a	00	C0	192
	G Gain	j	b	00	C0	192
	B Gain	j	c	00	C0	192
	R Cut					128
	G Cut					128
	B Cut					128
Warm	R Gain	j	d	00	C0	192
	G Gain	j	e	00	C0	192
	B Gain	j	f	00	C0	172
	R Cut					128
	G Cut					128
	B Cut					128

### 5.1.5. Adjustment method

#### 5.1.5.1. Auto WB calibration

- (1) Set TV in ADJ mode using P-ONLY key (or POWER ON key)
  - (2) Place optical probe on the center of the display  
- It need to check probe condition of zero calibration before adjustment.
  - (3) Connect RS-232C Cable
  - (4) Select mode in ADJ Program and begin a adjustment.
  - (5) When WB adjustment is completed with OK message, check adjustment status of pre-set mode (Cool, Medium, Warm)
  - (6) Remove probe and RS-232C cable.
- W/B Adj. must begin as start command "wb 00 00" , and finish as end command "wb 00 ff", and Adj. offset if need

#### 5.1.5.2. Manual adjustment

- (1) Set TV in Adj. mode using POWER ON
- (2) Zero Calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10cm of the surface..
- (3) Press ADJ key → EZ adjust using adj. R/C → 6. White-Balance then press the cursor to the right (KEY▶).  
(When KEY(▶) is pressed 204 Gray(80IRE) internal pattern will be displayed)
- (4) One of R Gain / G Gain / B Gain should be fixed at 192, and the rest will be lowered to meet the desired value.
- (5) Adj. is performed in COOL, MEDIUM, WARM 3 modes of color temperature.

※ CASE

First adjust the coordinate far away from the target value(x, y).B

- (1) x, y >target
  - i) Decrease the R, G.
- (2) x, y < target
  - i) First decrease the B gain,
  - ii) Decrease the one of the others.
- (3) x >target , y < target
  - i) First decrease B, so make y a little more than the target.
  - ii) Adjust x value by decreasing the R
- (4) x < target , y >target
  - i) First decrease B, so make x a little more than the target.
  - ii) Adjust x value by decreasing the G

▶ How to adjust

- (1) Fix G gain at least 172 :  
Adjust R, B Gain ( In Case of Mostly Blue Gain Saturation )
- (2) When R or B Gain > 255, Release Fixed G Gain and Readjust

※ CASE : Medium / Warm mode

First adjust the coordinate far away from the target value(x, y).

- (1) x, y >target
  - i) Decrease the R, G.
- (2) x, y < target
  - i) First decrease the B gain,
  - ii) Decrease the one of the others.
- (3) x >target , y < target
  - i) First decrease B, so make y a little more than the target.
  - ii) Adjust x value by decreasing the R
- (4) x < target , y >target
  - i) First decrease B, so make x a little more than the target.
  - ii) Adjust x value by decreasing the G

### 5.1.6. Reference (White Balance Adj. coordinate and color temperature)

- Luminance: 204 Gray, 80IRE

\*\* (normal line) LGD Cell (LF56xx, LF55xx, LF54xx)

- Standard color coordinate and temperature using CA-210(CH-14) – by aging time

L15	Aging time (Min)	Cool		Medium		Warm	
		X	Y	X	Y	X	Y
		271	270	286	289	313	329
1	0-2	281	285	296	304	323	344
2	3-5	280	284	295	303	322	343
3	6-9	279	282	294	301	321	341
4	10-19	277	279	292	288	319	338
5	20-35	275	275	290	294	317	334
6	36-49	273	273	288	292	315	332
7	50-79	272	272	287	291	314	331
8	80-119	271	270	286	289	313	329
9	Over 120	271	270	286	289	313	329

\*\* (Aging chamber) LGD Cell (LF56xx, LF55xx, LF54xx)

- Standard color coordinate and temperature using CA-210(CH-14) – by aging time

L15	Aging time (Min)	Cool		Medium		Warm	
		X	Y	X	Y	X	Y
		271	270	286	289	313	329
1	0-5	280	285	295	304	319	340
2	6-10	276	280	291	299	315	335
3	11-20	272	275	287	294	311	330
4	21-30	269	272	284	291	308	327
5	31-40	267	268	282	287	306	323
6	41-50	266	265	281	284	305	320
7	51-80	265	263	280	282	304	318
8	81-119	264	261	279	280	303	316
9	Over 120	264	260	279	279	303	315

\*\* For INX,AUO,SHARP,CSOT Module.( In the case of , the color temperature spec of cool mode is 13000K)

L15	cool		med		warm	
	x	y	x	y	x	y
spec	271	270	286	289	313	329
target	276	277	291	296	318	336

## 5.2. Option selection per country

### 5.2.1. Overview

- (1) Tool option selection is only done for models in Non-USA North America due to rating
- (2) Applied model: LA57H Chassis applied to CANADA and MEXICO

### 5.2.2. Country Group selection

- (1) Press ADJ key on the Adj. R/C, and then select Country Group Menu
- (2) Depending on destination, select US, then on the lower Country option, select US, CA, MX.  
Selection is done using +, - KEY
- (3) Using DFT(Auto)
  - ※ PC (for communication through RS-232C) -> UART Baud rate : 115200 bps  
Command : ah 00 00 DATA(Area Number(hexadecimal))

ITEM	DATA(Area Number)	AREA
AREA OPTION1	0	USA
	1	CANADA
	2	MEXICO

### 5.2.3. Tool Option inspection

- Press Adj. key on the Adj. R/C, then select Tool option.

Model	2,3th Suffix	4th Suffix	Module	Tool 1	Tool 2	Tool 3	Tool 4
32LF560B-Ux	-	M	Sharp	13074	13314	41036	28768
32LF550B-Ux	CC/US	M	Sharp	13074	17410	53324	24672
	WM	M	Sharp	13074	17410	53316	24672
	CC/US	F	BOE	21266	17410	53324	24672
	WM	F	BOE	21266	17410	53316	24672
	CC/US	Y	LGD	785	17410	49228	24672
	WM	Y	LGD	785	17410	49220	24672
32LF5600-Ux	CC/US	Y	LGD	785	1030	45132	28768
	WM	Y	LGD	785	1030	45124	28768
32LF5600-Ux	CC/US	F	BOE	21264	1030	49228	20576
	WM	F	BOE	21264	1030	49220	20576
42LF5600-Ux	CC/US	Y	LGD	1553	1030	49228	28768
	WM	Y	LGD	1553	1030	49220	28768
	CC/US	D	AUO	9744	1030	49228	24672
	WM	D	AUO	9744	1030	49220	24672
42LF5500-Ux	CC/US	Y	LGD	1553	5126	49228	28768
	WM	Y	LGD	1553	5126	49220	28768
	CC/US	D	AUO	9744	5126	49228	24672
	WM	D	AUO	9744	5126	49220	24672
49LF5500-Ux	CC/US	Y	LGD	2321	5126	49228	24672
	WM	Y	LGD	2321	5126	49220	24672
55LF5500-Ux	CC/US	Y	LGD	2833	5126	53324	24672
	WM	Y	LGD	2833	5126	53316	24672

※ Tool option can be reconstructed by Software

## 6. GND and HI-POT Test

### 6.1. GND & HI-POT auto-check preparation

- (1) Check the POWER CABLE and SIGNAL CABLE insertion condition

### 6.2. GND & HI-POT auto-check

- (1) Pallet moves in the station. (POWER CORD / AV CORD is tightly inserted)
- (2) Connect the AV JACK Tester.
- (3) Controller (GWS103-4) on.
- (4) GND Test (Auto)
  - If Test is failed, Buzzer operates.
  - If Test is passed, execute next process (Hi-pot test).  
(Remove A/V CORD from A/V JACK BOX)
- (5) HI-POT test (Auto)
  - If Test is failed, Buzzer operates.
  - If Test is passed, GOOD Lamp on and move to next process automatically.

### 6.3. Checkpoint

- (1) Test voltage
  - GND: 1.5KV/min at 100mA
  - SIGNAL: 3KV/min at 100mA
- (2) TEST time: 1 second
- (3) TEST POINT
  - GND Test = POWER CORD GND and SIGNAL CABLE GND.
  - Hi-pot Test = POWER CORD GND and LIVE & NEUTRAL.
- (4) LEAKAGE CURRENT: At 0.5mA

## 7. AUDIO output check

### 7.1. Audio input condition

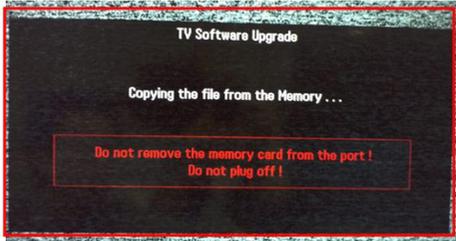
- (1) RF input: Mono, 1KHz sine wave signal, 100% Modulation
- (2) CVBS, Component: 1KHz sine wave signal (0.4Vrms)
- (3) RGB PC: 1KHz sine wave signal (0.7Vrms)

### 7.2. Specification

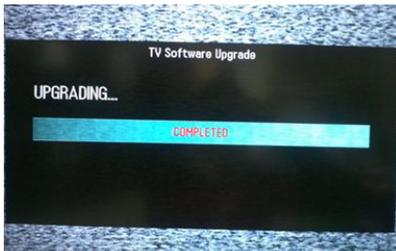
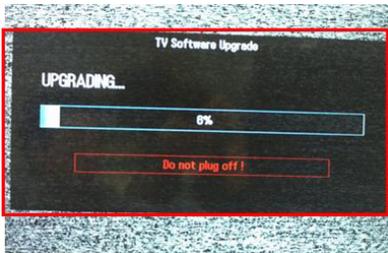
No	Item	Min	Typ	Max	Unit	Remark
1	Audio practical max Output, L/R (Distortion=10% max Output)	4.5 6.0	5.0 6.3	6.0 6.9	W Vrms	(1) Measurement condition - EQ/AVL/Clear Voice: Off (2) Speaker (8Ω Impedance) (3) LF55 Series
2	Audio practical max Output, L/R (Distortion=10% max Output)	9.0 8.5	10.0 8.9	12.0 9.8	W Vrms	(1) Measurement condition - EQ/AVL/Clear Voice: Off (2) Speaker (8Ω Impedance) (3) LF56 Series

## 8. USB S/W Download (optional, Service only)

- (1) Put the USB Stick to the USB socket
- (2) Automatically detecting update file in USB Stick
  - If your downloaded program version in USB Stick is lower than that of TV set, it didn't work. Otherwise USB data is automatically detected.
- (3) Show the message "Copying files from memory"



- (4) Updating is starting.



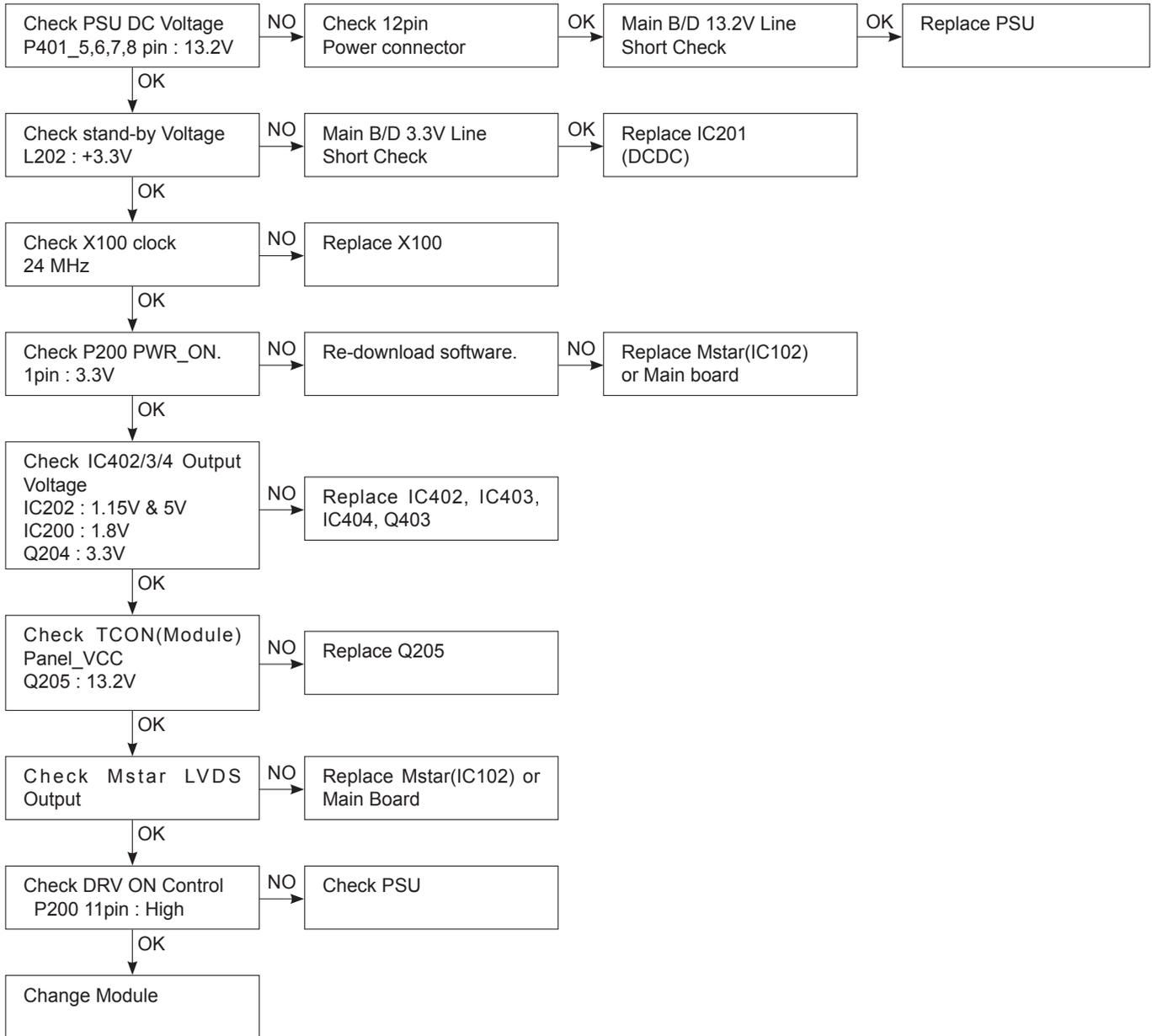
- (5) Updating Completed, The TV will restart automatically
  - (6) If your TV is turned on, check your updated version and Tool option.
- \* If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel recover. If all channel data is cleared, you didn't have a DTV/ ATV test on production line.

\* After downloading, TOOL OPTION setting is needed again.

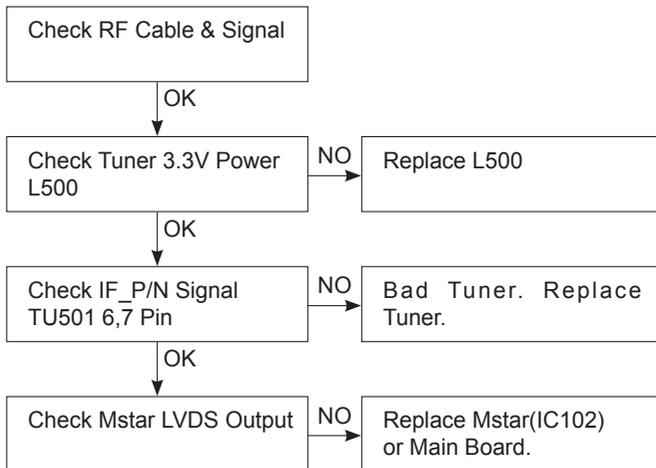
- (1) Push "IN-START" key in service remote controller.
- (2) Select "Tool Option 1" and Push "OK" button.
- (3) Punch in the number. (Each model has their number.)

# TROUBLE SHOOTING

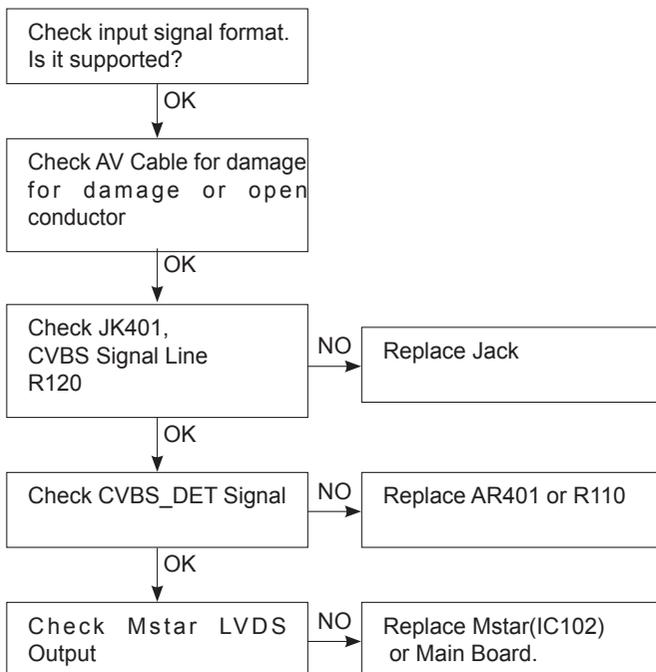
## 1. Power-up boot check



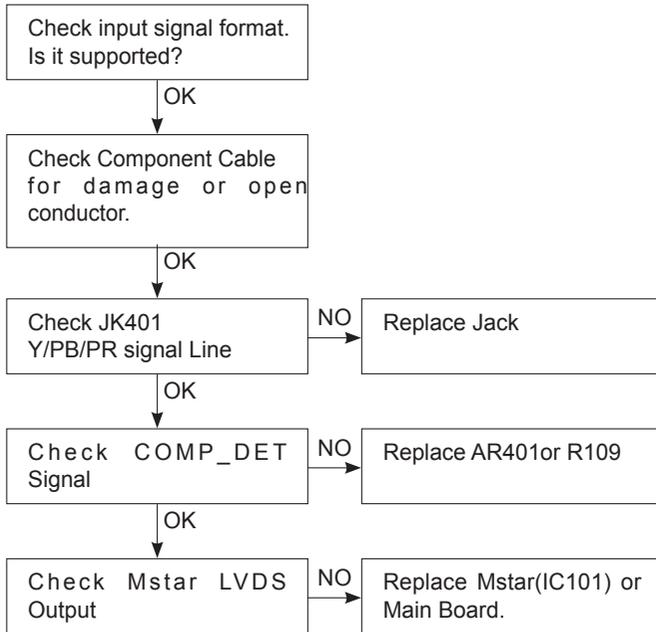
## 2. Digital / Analog TV Video



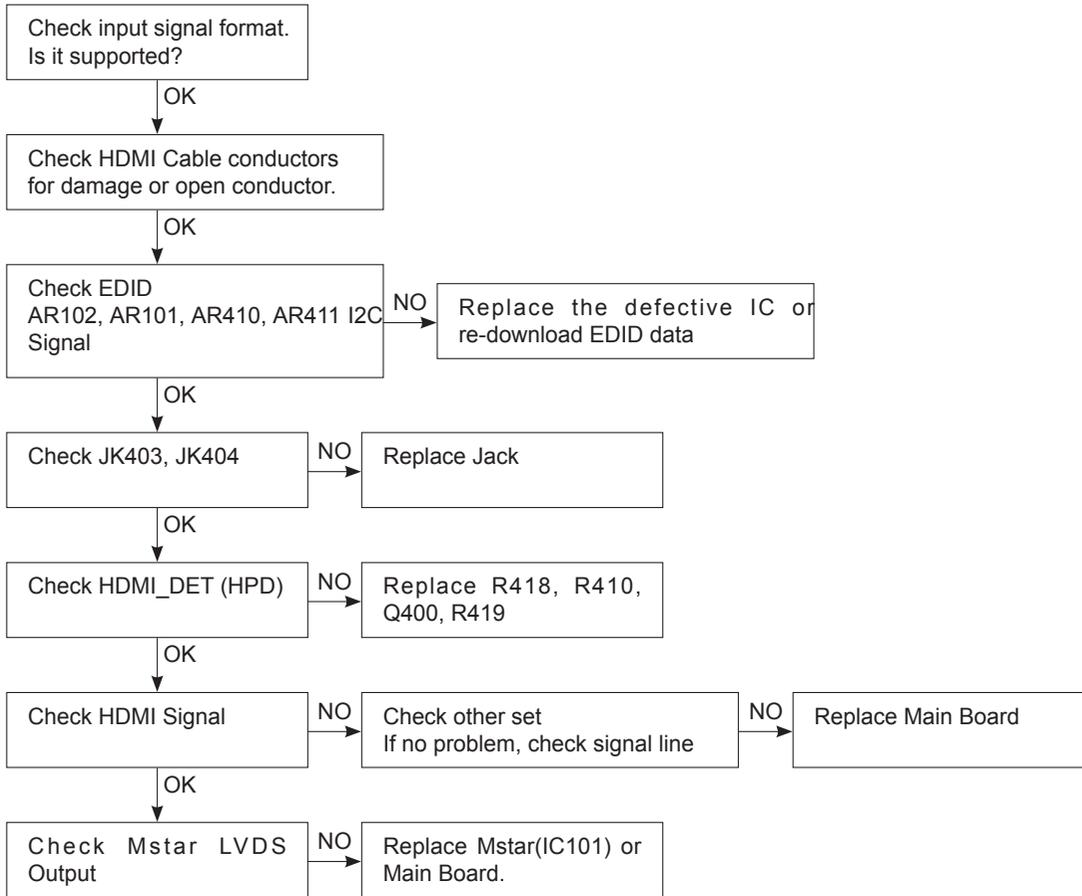
## 3. AV Video



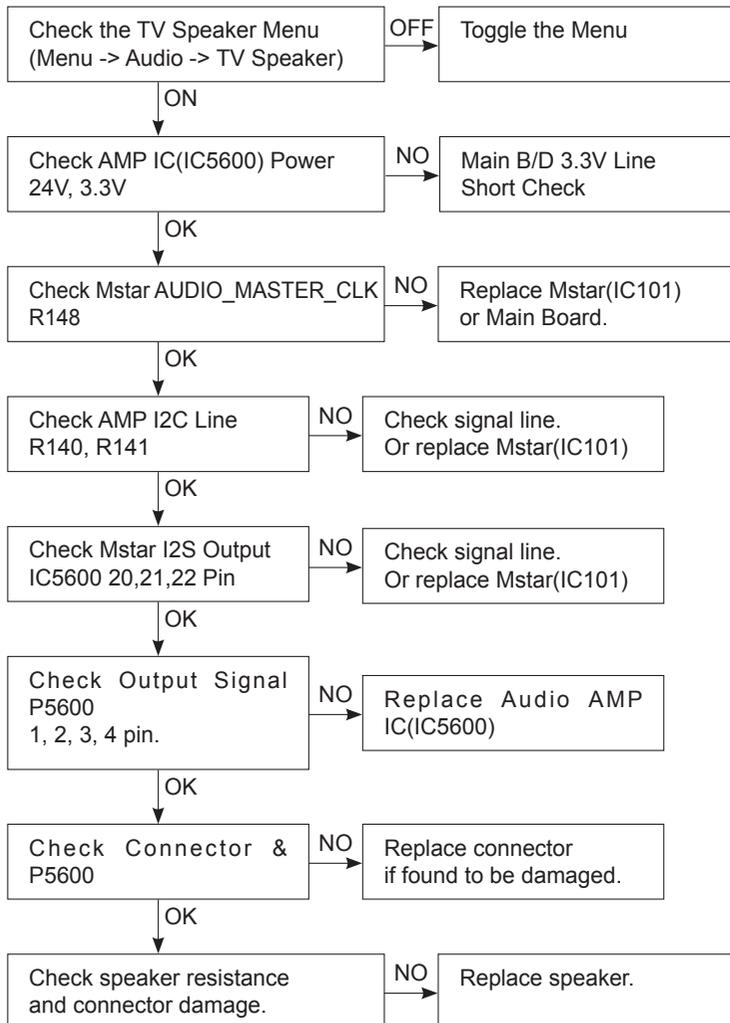
## 4. Component Video



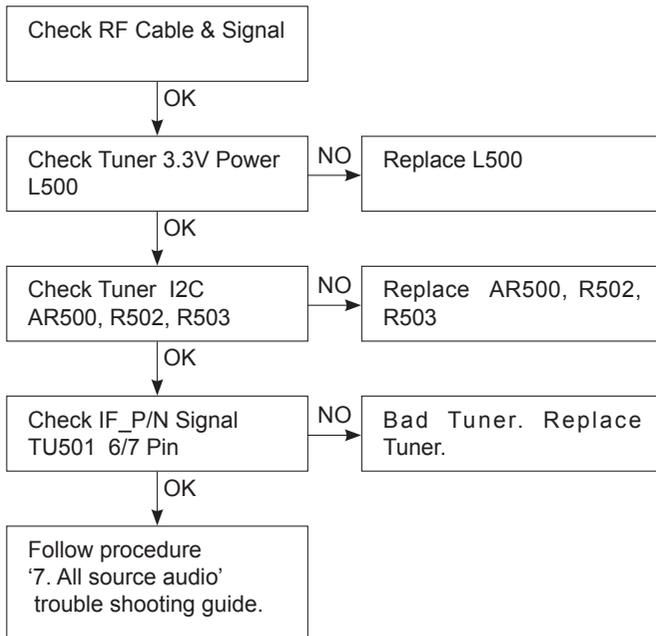
## 5. HDMI Video



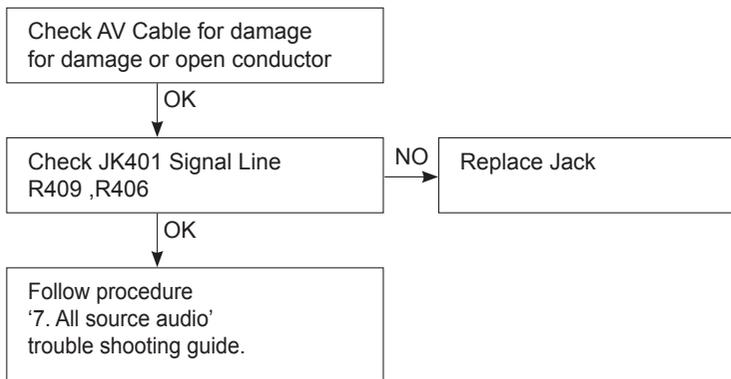
## 6. All Source Audio



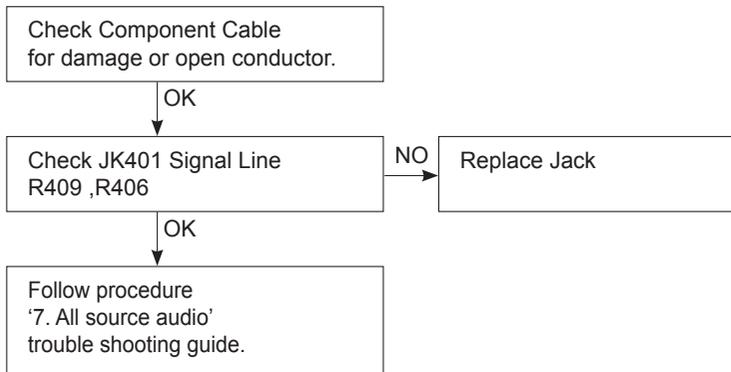
## 7. Digital / Analog TV Audio



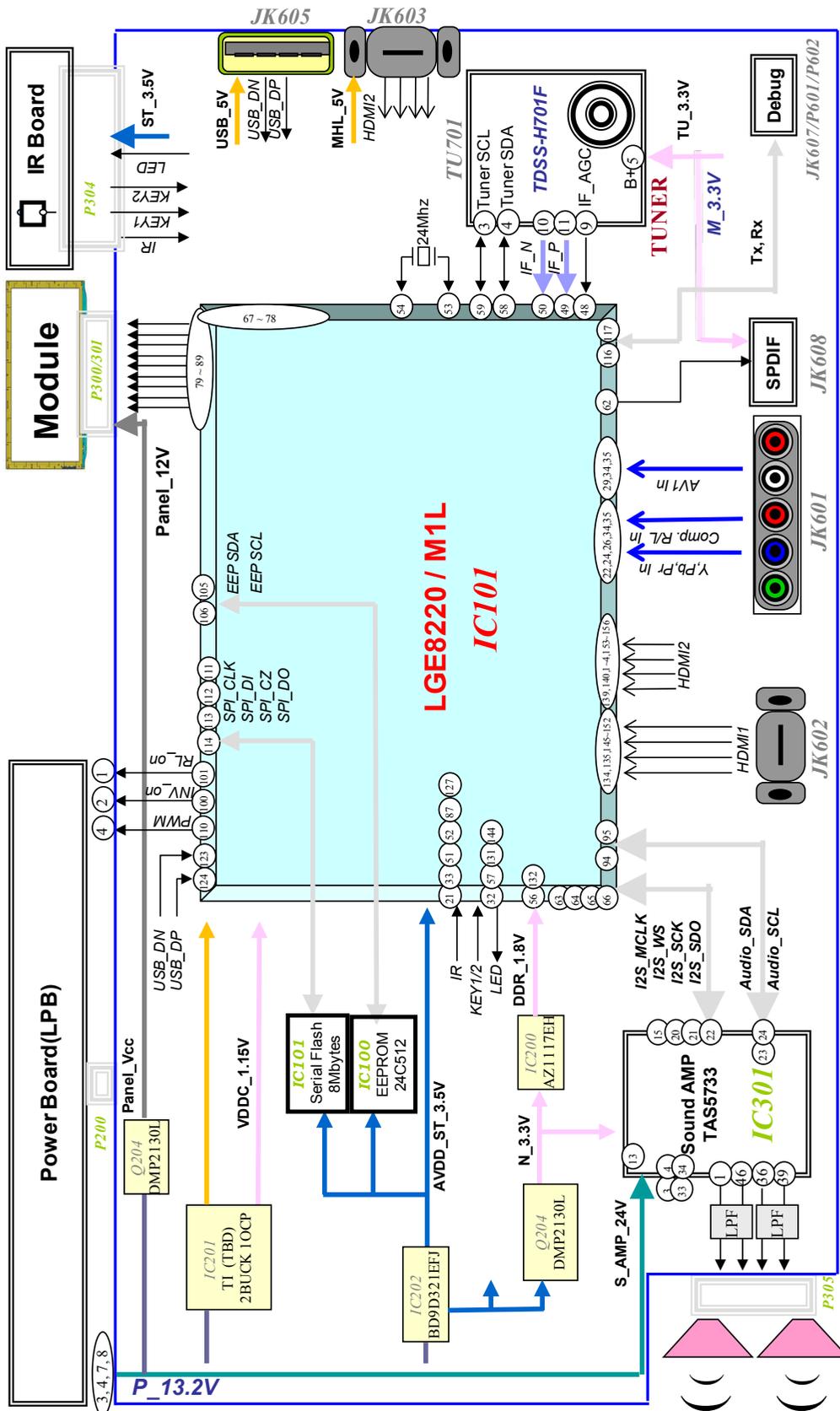
## 8. AV Audio



## 9. Component Audio



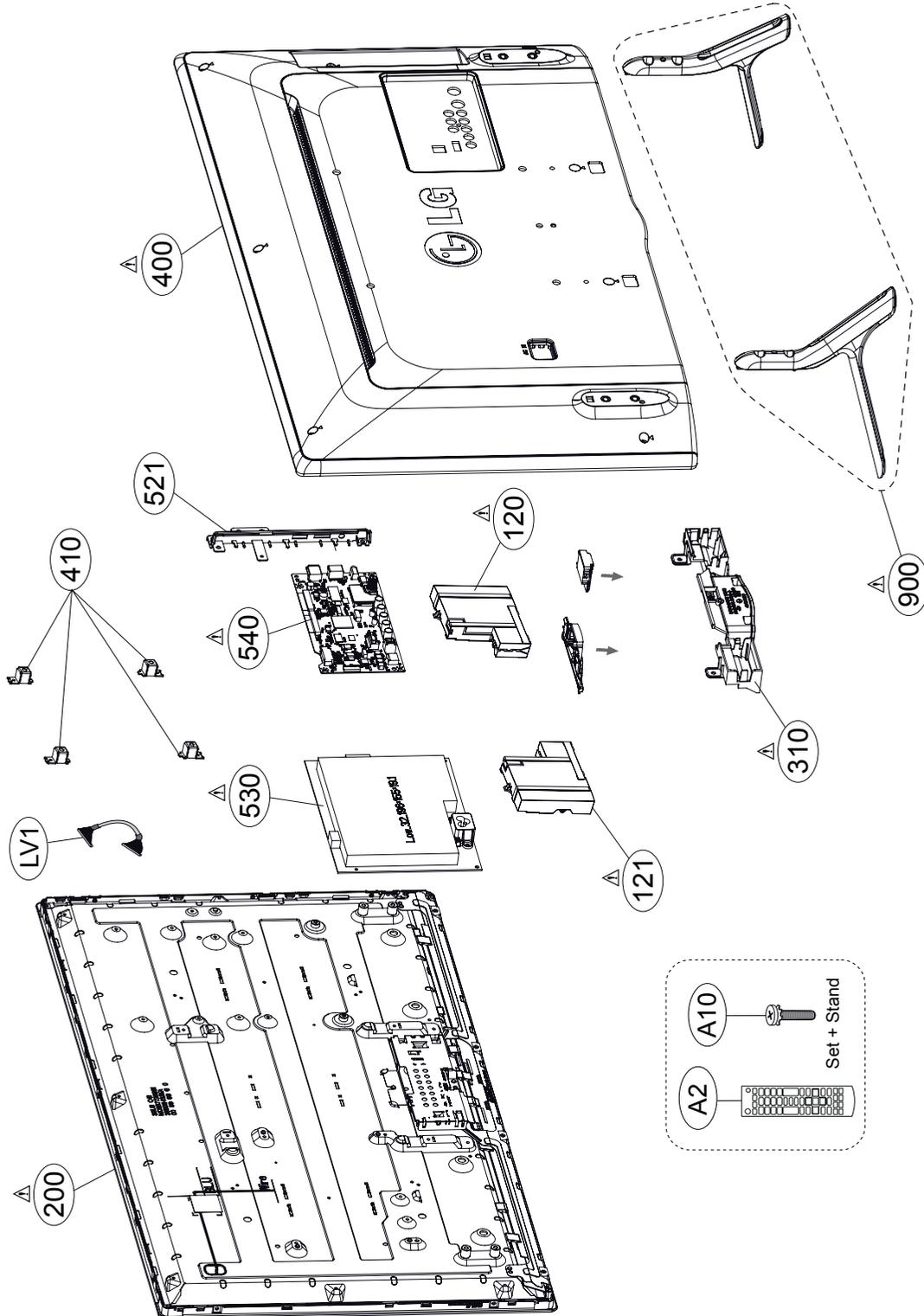
# BLOCK DIAGRAM

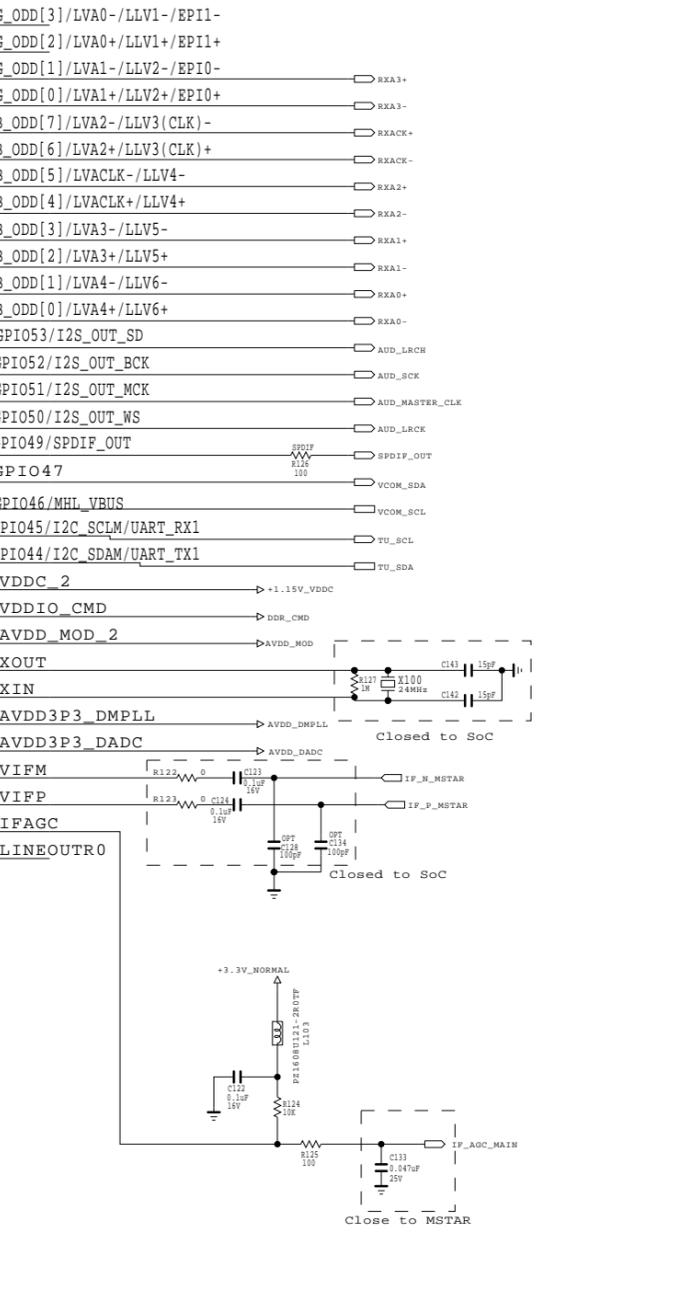
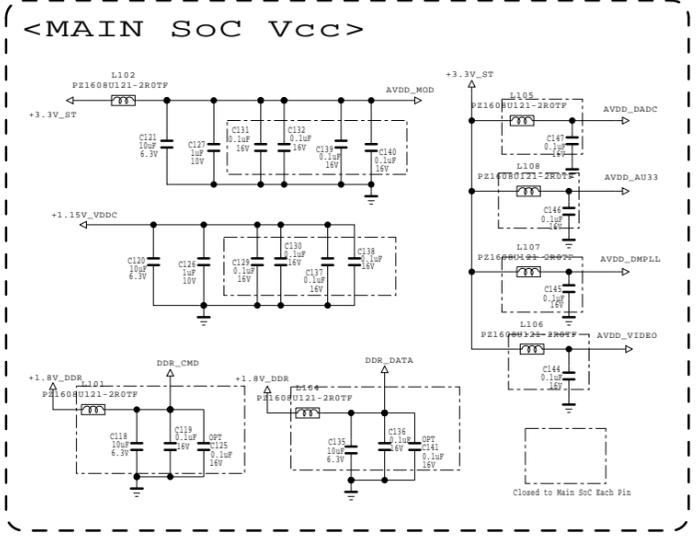
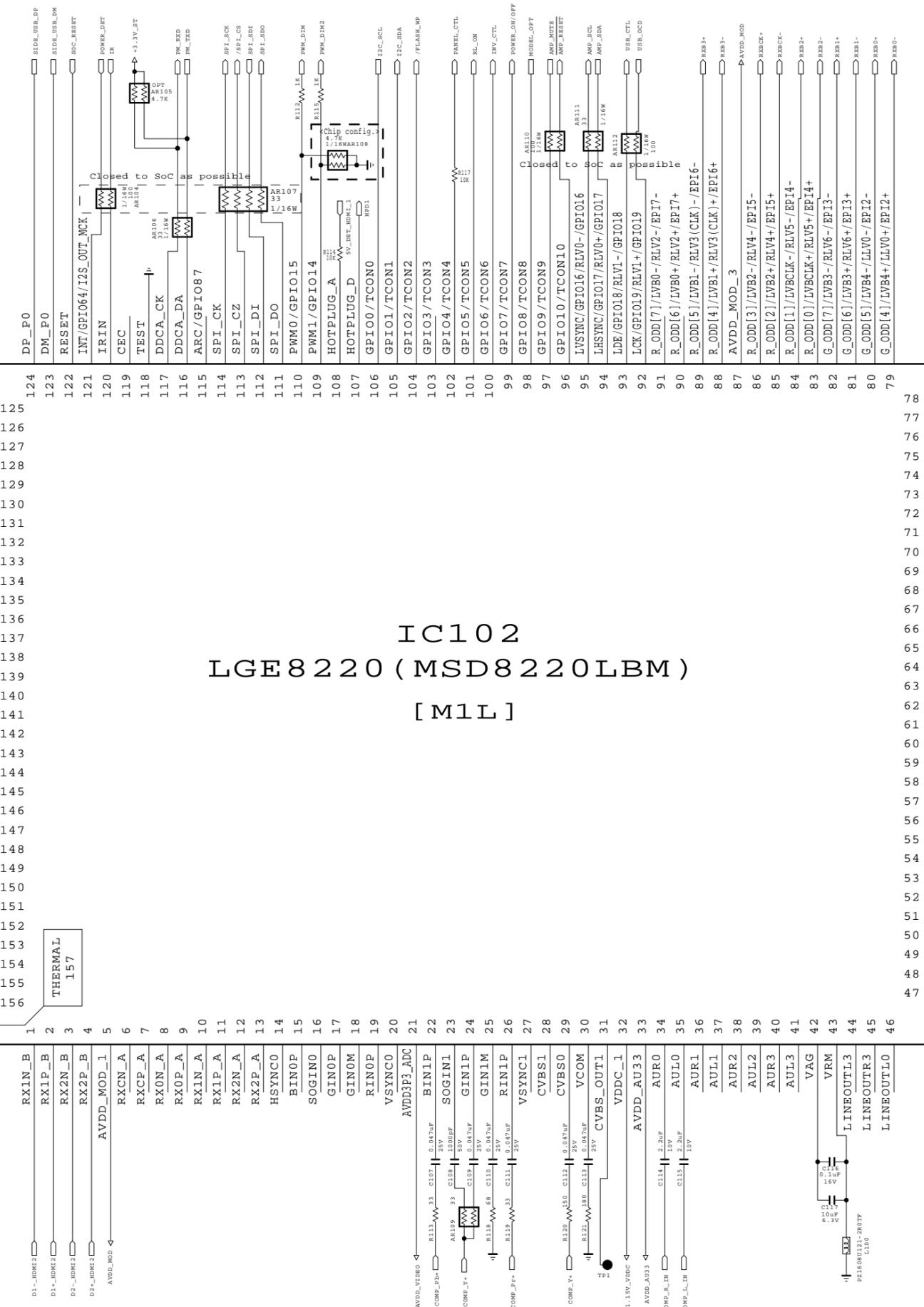
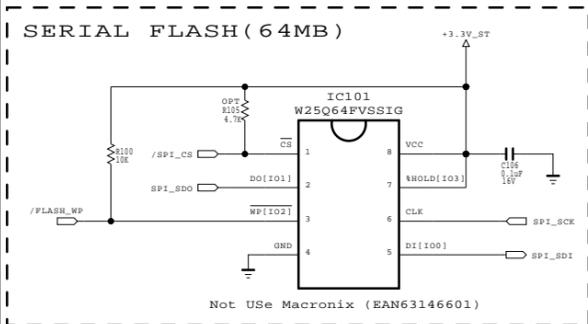
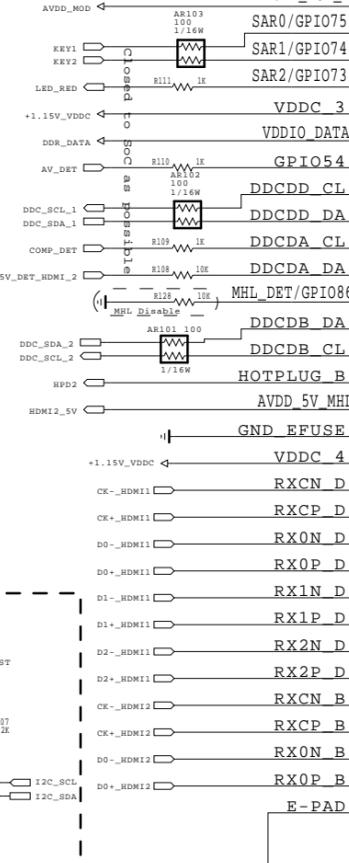
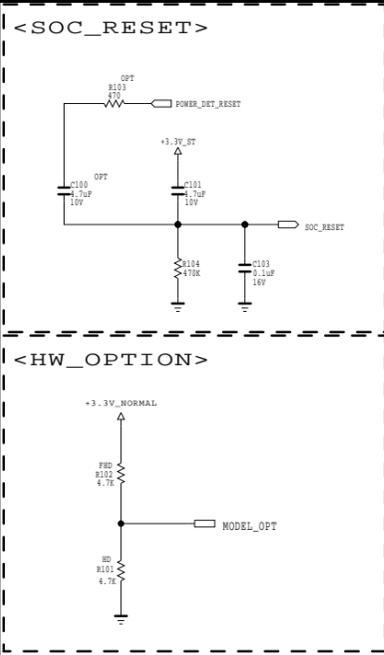


# EXPLODED VIEW

## IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by  $\Delta$  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 Shock, Fire, or other Hazards. Do not modify the original design without permission of manufacturer.





THE  $\Delta$  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 MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  $\Delta$  SYMBOL MARK OF THE SCHEMATIC.

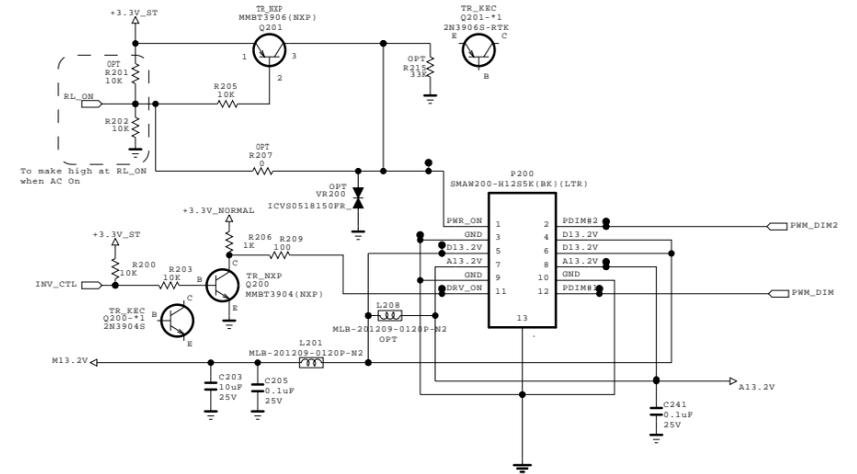
**SECRET**  
LGElectronics



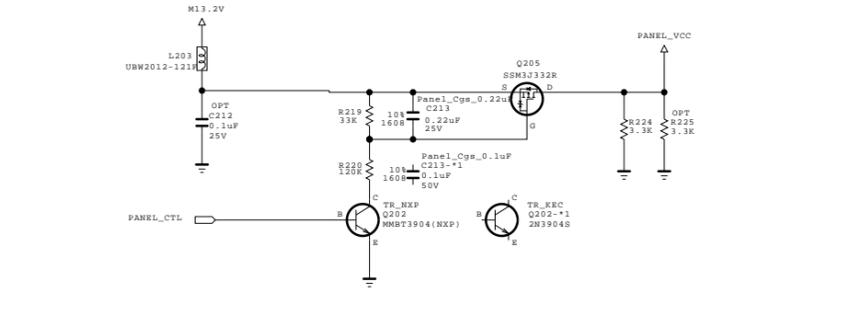
MODEL	L15_M1L	DATE	140822
BLOCK	MAIN	SHEET	1 / 5

# L15 NA POWER BLOCK

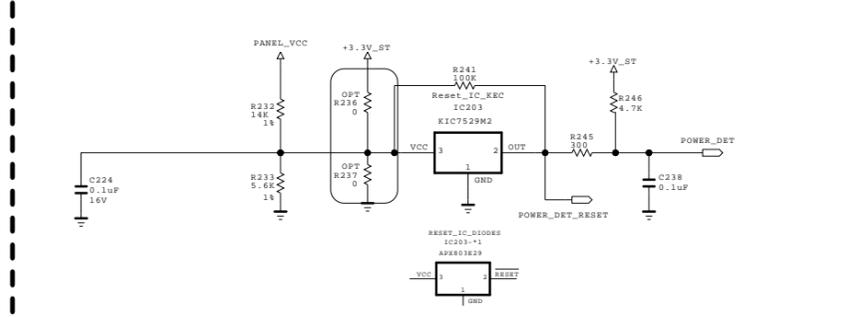
## FROM LIPS or POWER B/D



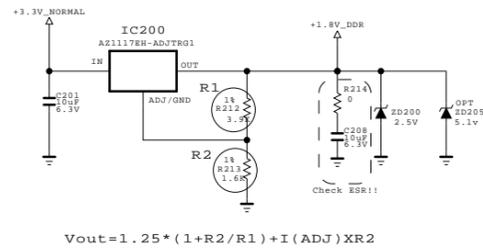
## PANEL\_Vcc



## Power\_DET

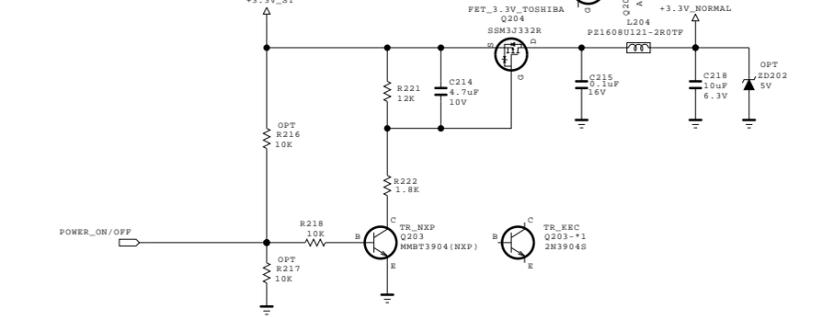


## +1.8V\_DDR

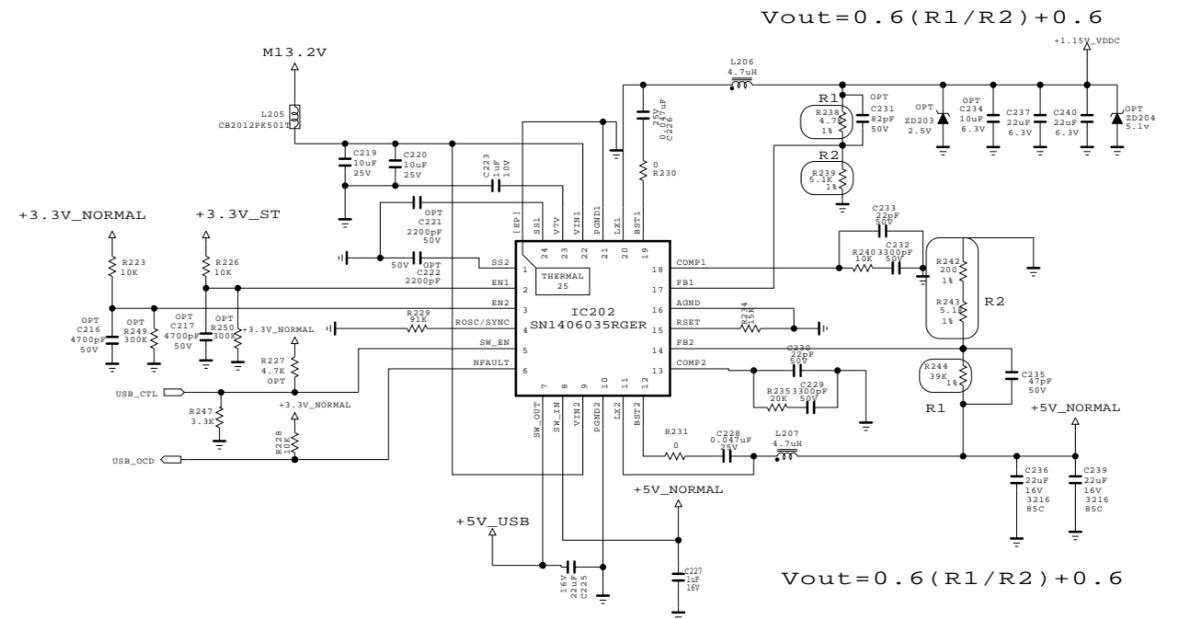


$$V_{out} = 1.25 * (1 + R2/R1) + I(ADJ)XR2$$

## +3.3V\_Normal



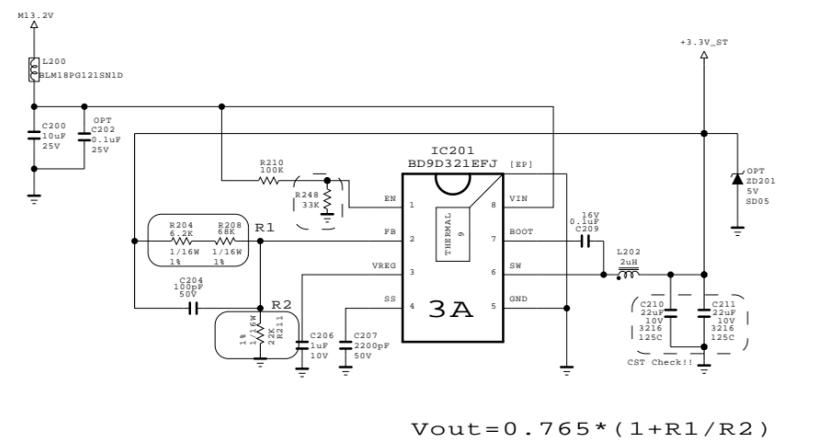
## +5V\_Normal & +1.15V\_VDDC



$$V_{out} = 0.6 * (R1/R2) + 0.6$$

$$V_{out} = 0.6 * (R1/R2) + 0.6$$

## +3.3V\_STANDBY



$$V_{out} = 0.765 * (1 + R1/R2)$$

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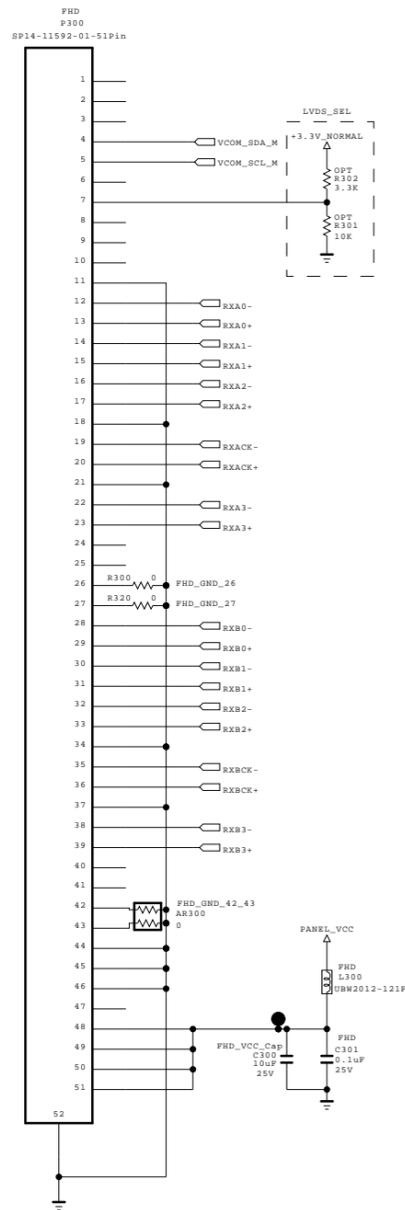


MODEL	L15_M1L	DATE	141020
BLOCK	POWER	SHEET	2 / 5

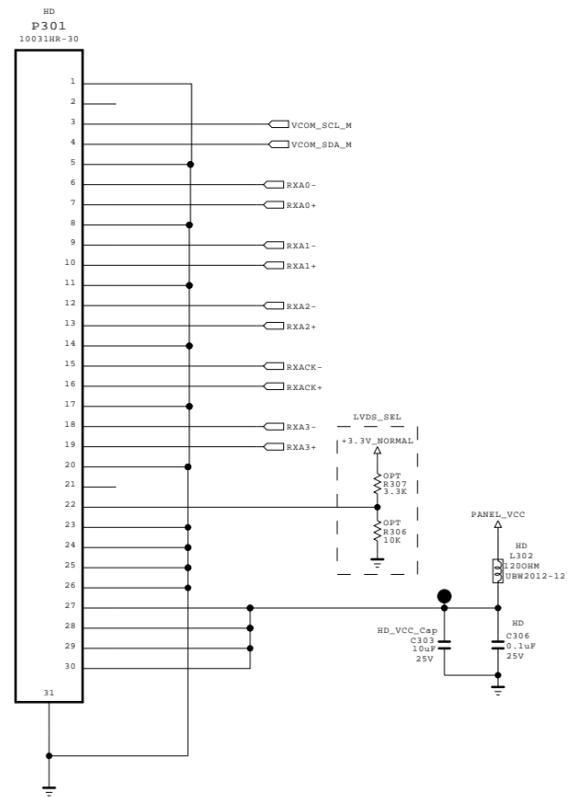
# AUDIO AMP (TI) / LVDS / IR

## IR

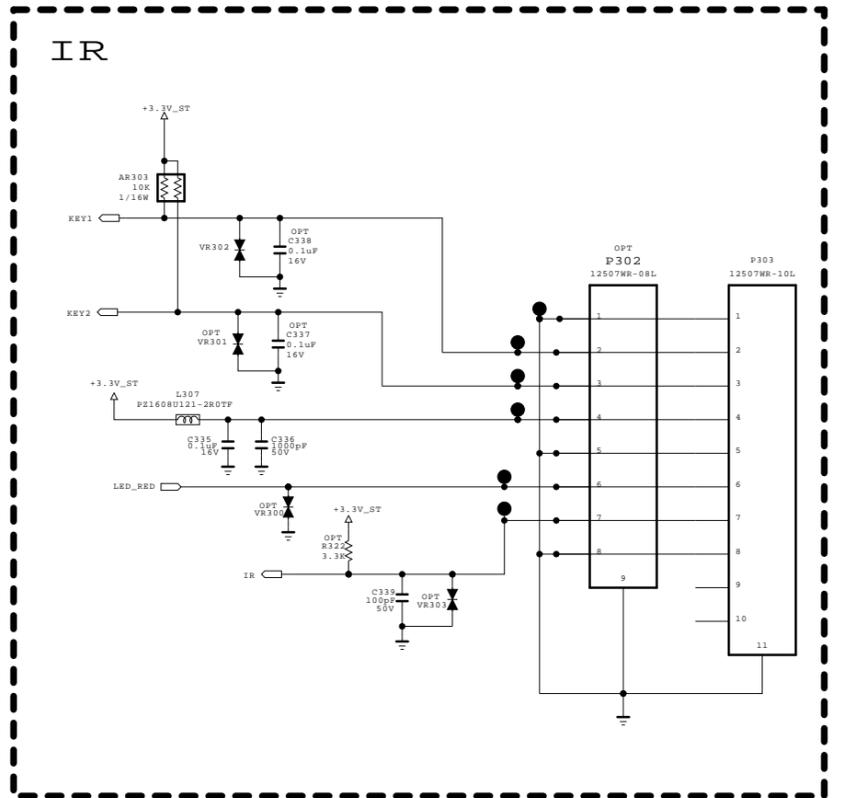
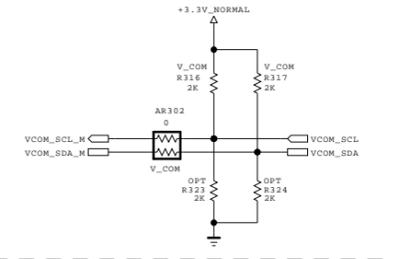
[51Pin LVDS Connector]  
(For FHD 60Hz)



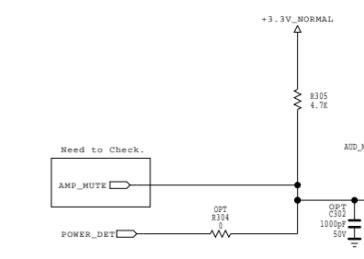
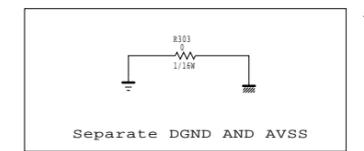
[30Pin LVDS Connector]  
(For HD 60Hz\_Normal)



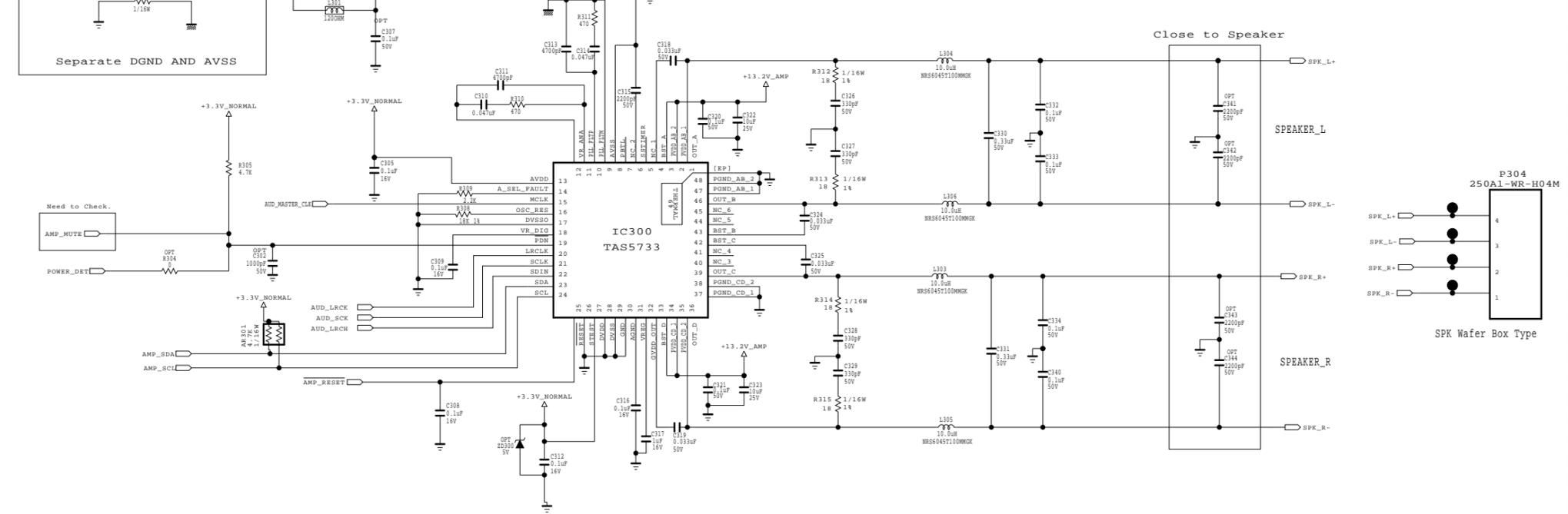
V-COM I2C or GPIO(Tuner)



## AUDIO AMP (TI)



This parts are Located on AVSS area.



THE  $\Delta$  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  $\Delta$  SYMBOL MARK OF THE SCHEMATIC.

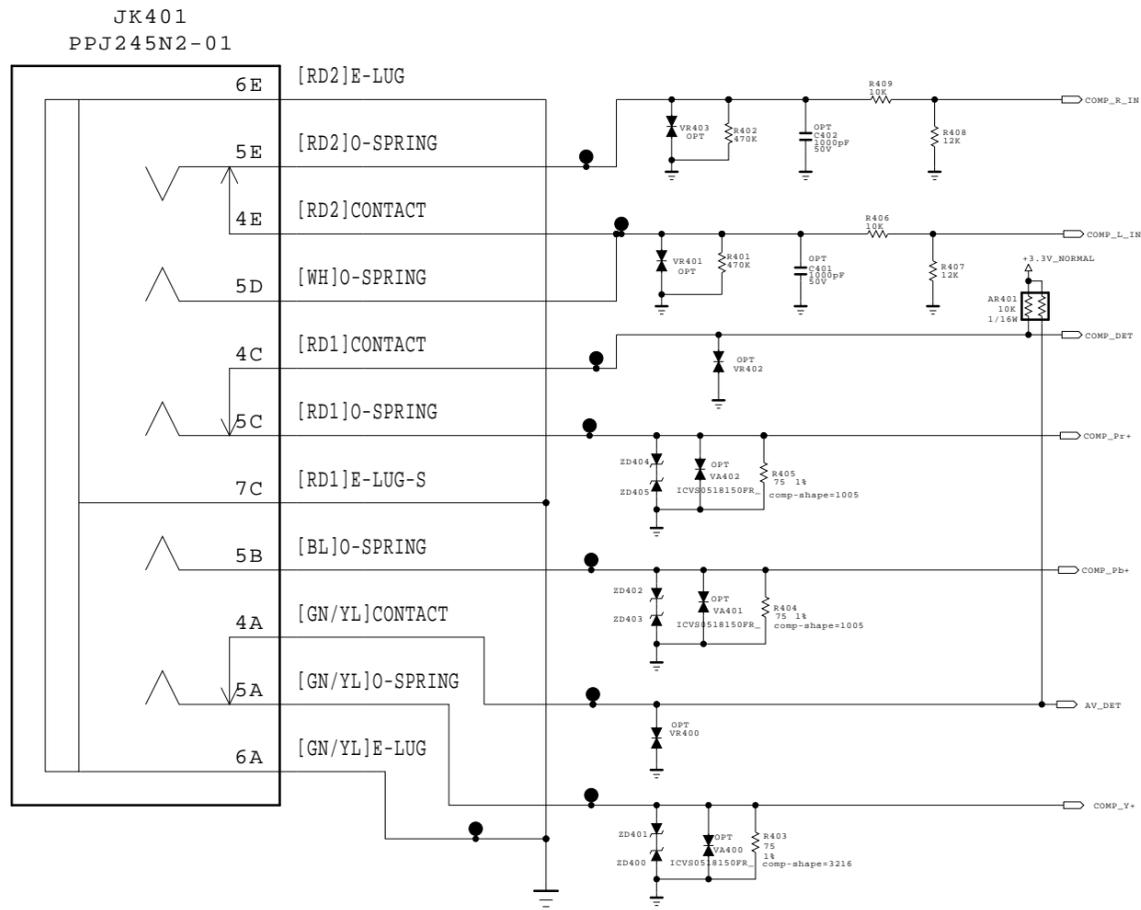
SECRET  
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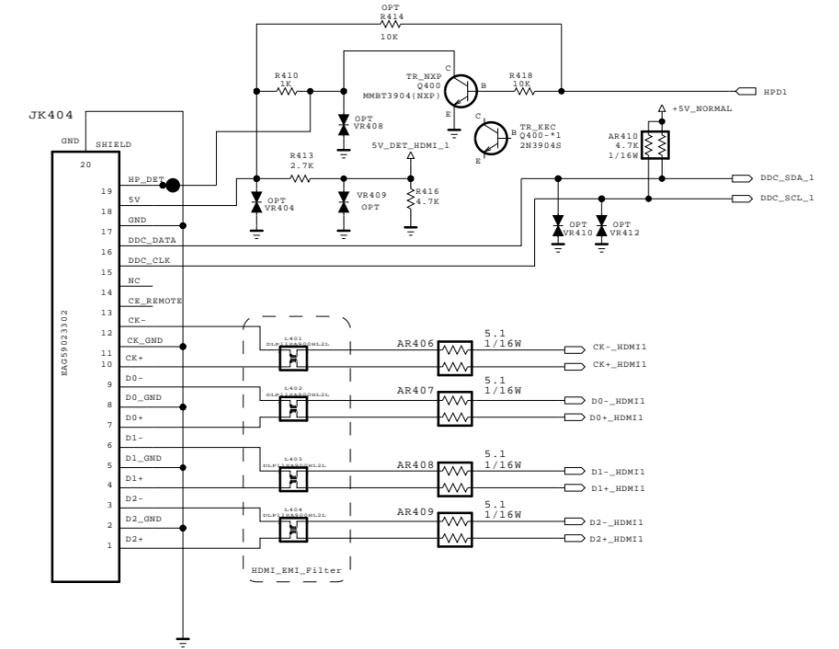
MODEL	L15_M1L	DATE	140828
BLOCK	LVDS/S_AMP/IR	SHEET	3 / 5

# EXTERNAL INTERFACE

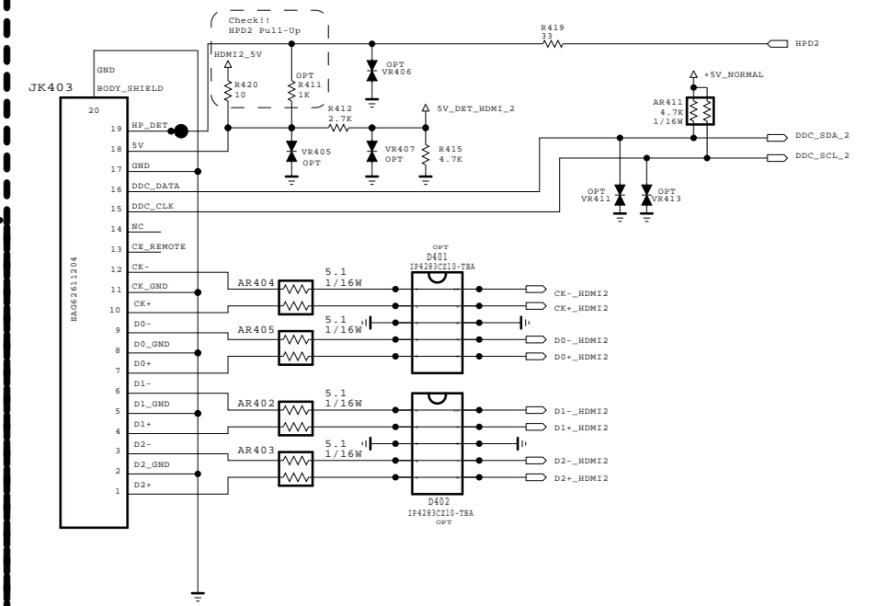
## AV / COMPONENT



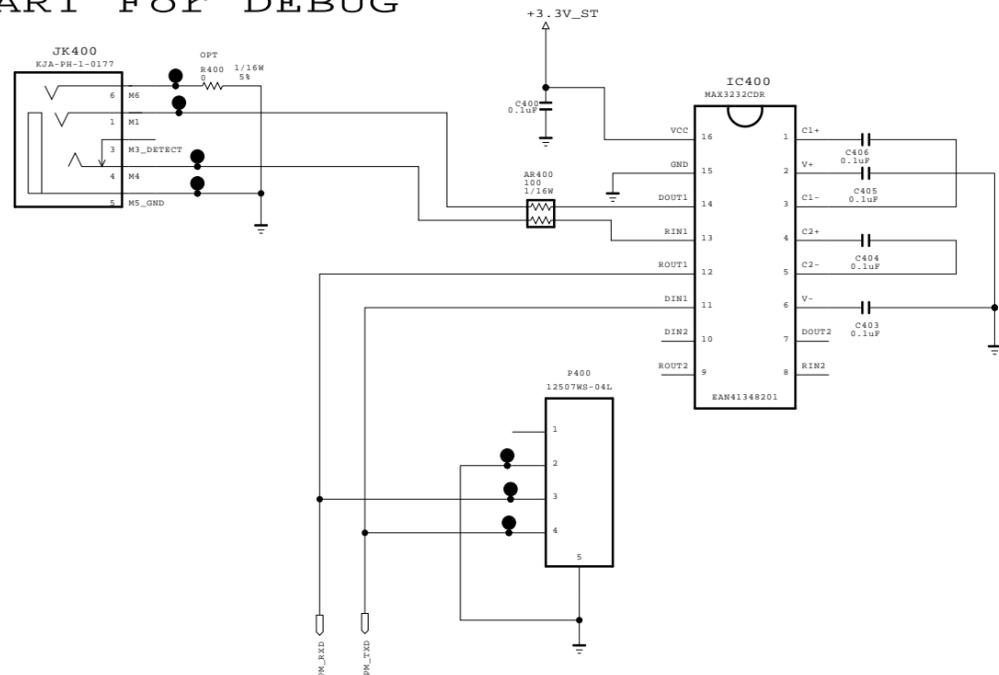
## HDMI\_1 (REAR)



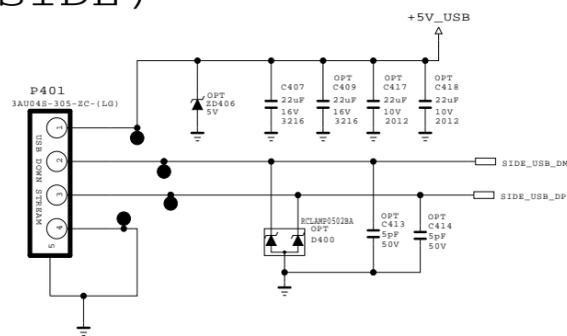
## HDMI\_2 (SIDE)



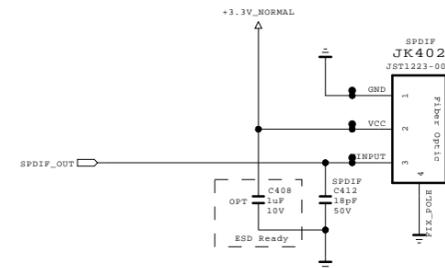
## UART For DEBUG



## USB (SIDE)



## SPDIF OPTIC JACK



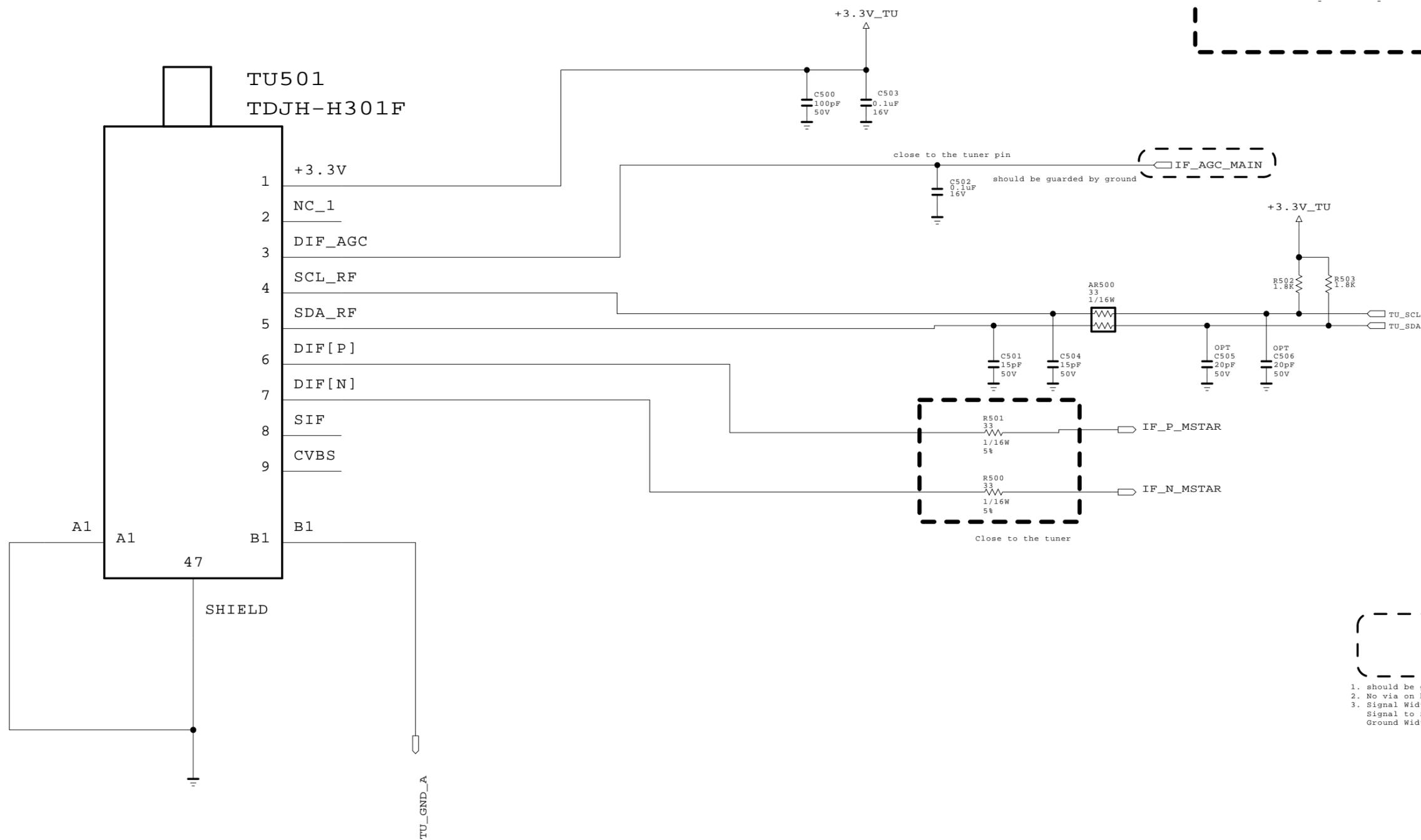
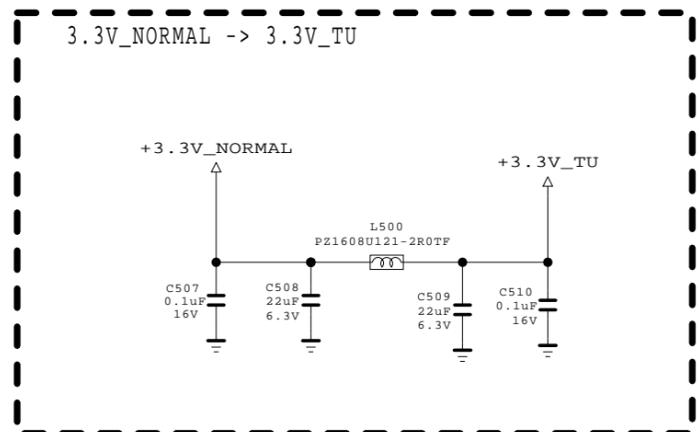
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

**SECRET**  
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LG ELECTRONICS

MODEL	L15_M1L	DATE	141020
BLOCK	COMP/USB/SPDIF	SHEET	4 / 5

# TUNER for ATSC W/O Isolator



- 1. should be guarded by ground
- 2. No via on both of them
- 3. Signal Width >= 12mils  
Signal to Signal Width = 12mils  
Ground Width >= 24mils

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 MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

SECRET	LG ELECTRONICS
LGElectronics	

MODEL	L15_M1L	DATE	140822
BLOCK	TUNER	SHEET	5 / 5

