

LED TV

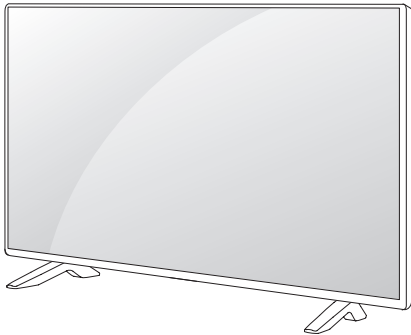
SERVICE MANUAL

CHASSIS : UJ65S

MODEL : 43/49UH61 43/49UH61**-SF/J**
43/49UH6030 43/49UH6030-SB
43/49UH6100 43/49UH6100-PB

CAUTION

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



P/NO : MFL69493001 (1607-REV02)

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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 Ω and 5.2 M Ω .

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.

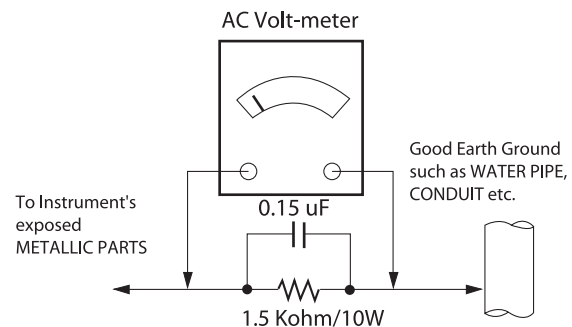
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 μ F capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

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 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 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 of 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 to the LED TV used UJ65S chassis

3. Test method

- (1) Performance: LGE TV test method followed
- (2) Demanded other specification
 - Safety : CE, IEC specification
 - EMC: CE, IEC

2. Test condition

Each part is tested as below without special notice.

- (1) Temperature : 25 °C ± 5 °C(77 °F ± 9 °F), CST: 40 °C ± 5 °C
- (2) Relative Humidity: 65 % ± 10 %
- (3) Power Voltage
 - Standard input voltage (100~240V@ 50/60Hz)
 - * Standard Voltage of each products 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.

4. Model Specification

No	Item		Specification	Remark
1	Market		Central and South AMERICA	
2	Broadcasting system		Digital : SBTVD Analog : NTSC / PAL-M / PAL-N	
3	Available Channel		BAND	NTSC
			VHF	2 ~ 13
			UHF	14 ~ 69
			DTV	2 ~ 69
			CATV	1 ~ 135
4	Receiving system		Digital : SBTVD / Analog : NTSC-M / PAL-M / PAL-N	
5	Video Input		NTSC / PAL-M / PAL-N	
6	Component Input		Y/Cb/Cr, Y/ Pb/Pr	Rear RCA
7	HDMI Input	HDMI 3	PC / DTV format, Support HDCP2.2	Side
		HDMI 2	PC / DTV format, Support HDCP2.2	Rear(with ARC)
		HDMI 1	PC / DTV format, Support HDCP2.2	Rear
8	Audio Input		Component / AV Audio / DVI audio	L/R Input ; Rear Component and av and DVI use same jack ;
9	SPDIF out(1EA)		Optical Audio out	Rear (1EA),
10	USB Input(3EA)		EMF, DivX HD, For SVC (download)	Side JPEG, MP3, DivX HD

5. External Input Support Format

5.1. Component input(Y, C_B/P_B, C_R/P_R)

No	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock	Proposed
1	720*480i	15.73	59.94	13.500	SDTV, DVD 480I(525I)
2	720*480i	15.73	60.00	13.514	SDTV, DVD 480I(525I)
3	720*576i	15.625	50.00	13.500	SDTV, DVD 576I(625I) 50Hz
4	720*480p	31.47	59.94	27.000	SDTV 480P
5	720*480p	31.50	60.00	27.027	SDTV 480P
6	720*576p	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	45.00	50.00	74.250	HDTV 720P 50Hz
10	1920*1080	28.125	50.00	74.250	HDTV 1080I 50Hz,
11	1920*1080	33.72	59.94	74.176	HDTV 1080I
12	1920*1080	33.75	60.00	74.25	HDTV 1080I
13	1920*1080	56.25	50	148.5	HDTV 1080P
14	1920*1080	67.5	60.00	148.5	HDTV 1080P

5.2. HDMI Input (PC)

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock	Proposed	Remarks
1	640*350	31.468	70.09	25.17	EGA	
2	720*400	31.469	70.08	28.32	DOS	
3	640*480	31.469	59.94	25.17	VESA(VGA)	
4	800*600	37.879	60.31	40	VESA(SVGA)	
5	1024*768	48.363	60.00	65	VESA(XGA)	
6	1360*768	47.712	60.015	84.75	VESA(WXGA)	
7	1152*864	54.348	60.053	80	VESA	Support to HDMI-PC
8	1280*1024	63.981	60.020	109.00	SXGA	
9	1920*1080	67.5	60	158.40	WUXGA(Reduced Blank-ing)	
10	3840*2160	54	24.00	297.00	UDTV 2160P	Only UD Model
11	3840*2160	56.25	25.00	297.00	UDTV 2160P	Only UD Model
12	3840*2160	67.5	30.00	297.00	UDTV 2160P	Only UD Model
13	4096*2160	53.95	23.97	296.703	UDTV 2160P	Only UD Model
14	4096*2160	54	24	297	UDTV 2160P	Only UD Model

5.3. HDMI Input (DTV)

No	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remark
1	640*480	31.469	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, DVD 480I(525I)	Spec. out but display
4	720*480	15.75	60.00	13.514	SDTV, DVD 480I(525I)	
5	720*576	15.625	50.00	13.500	SDTV, DVD 576I(625I) 50Hz	
6	720*480	31.47	59.94	27	SDTV 480P	
7	720*480	31.5	60.00	27.027	SDTV 480P	
8	720*576	31.25	50.00	27	SDTV 576P (DVB)	
9	1280*720	44.96	59.94	74.176	HDTV 720P	
10	1280*720	45	60.00	74.25	HDTV 720P	
11	1280*720	37.5	50.00	74.25	HDTV 720P(DVB)	
12	1920*1080	28.125	50.00	74.25	HDTV 1080I (DVB)	
13	1920*1080	33.72	59.94	74.176	HDTV 1080I	
14	1920*1080	33.75	60.00	74.25	HDTV 1080I	
15	1920*1080	26.97	23.976	63.296	HDTV 1080P	
16	1920*1080	27.00	24.000	63.36	HDTV 1080P	
17	1920*1080	33.71	29.97	79.120	HDTV 1080P	
18	1920*1080	33.75	30.00	79.20	HDTV 1080P	
19	1920*1080	56.25	50.00	148.5	HDTV 1080P (DVB)	
20	1920*1080	67.432	59.94	148.350	HDTV 1080P	
21	1920*1080	67.5	60.00	148.50	HDTV 1080P	
22	3840*2160	53.95	23.98	296.703	UDTV 2160P	
23	3840*2160	54	24.00	297.00	UDTV 2160P	
24	3840*2160	56.25	25.00	297.00	UDTV 2160P	
25	3840*2160	61.43	29.97	296.703	UDTV 2160P	
26	3840*2160	67.5	30.00	297.00	UDTV 2160P	
27	3840*2160	112.5	50.00	594	UDTV 2160P	
28	3840*2160	135	59.94	593.407	UDTV 2160P	
29	3840*2160	135	60.00	594	UDTV 2160P	
30	4096*2160	53.95	23.98	296.703	UDTV 2160P	
31	4096*2160	54	24.00	297	UDTV 2160P	
32	4096*2160	56.25	25.00	297	UDTV 2160P	
33	4096*2160	61.43	29.97	296.703	UDTV 2160P	
34	4096*2160	67.5	30.00	297	UDTV 2160P	
35	4096*2160	112.5	50.00	594	UDTV 2160P	
36	4096*2160	134.86	59.94	593.407	UDTV 2160P	
37	4096*2160	135	60.00	594	UDTV 2160P	

ADJUSTMENT INSTRUCTION

1. Application Range

This spec. sheet applies to UJ65S Chassis applied 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) The receiver must be operated for about 5 minutes prior to the adjustment when module is in the circumstance of over 15°C
-
- In case of keeping module is in the circumstance of 0°C , it should be placed in the circumstance of above 15°C for 2 hours
 - In case of keeping module is in the circumstance of below -20°C , it should be placed in the circumstance of above 15°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 PCB check process

- MAC Address Download
- ADC adjustment : 480i Comp1, 1920*1080 Comp1
- EPID/DDC download

Above adjustment items can be also performed in Final Assembly if needed. Both Board-level and Final assembly adjustment items can be check using In-Start Menu 1.AJUST CHECK.

3.2. Final assembly adjustment

- White Balance adjustment
- RS-232C functionality check
- PING Test
- Factory Option setting per destination
- Ship-out mode setting (In-Stop)

3.3. Etc.

- Ship-out mode
- Service Option Default
- USB Download(S/W Update, Option, Service only)
- ISP Download (Option)

4. Automatic Adjustment

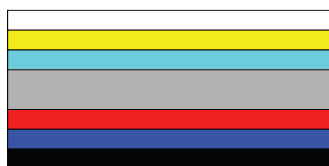
4.1. ADC Adjustment

- (1) Enter the ADC Calibration in ADJ Menu
- (2) Check the 'Internal' at ADC Type and push Start button.
- (3) Check ' OK '



4.1.1. Equipment & Condition

- (1) USB to RS-232C Jig
- (2) MSPG-925 Series Pattern Generator(MSPG-925FA, pattern -65)
 - Resolution : 480i Comp1
1080P Comp1
 - Pattern : Horizontal 100% Color Bar Pattern
 - Pattern level : 0.7 ± 0.1 Vp-p
 - Image



4.1.2. Adjustment method

- Using USB, adjust items listed in 3.1 in the other shown in “4.1.3.3”

4.1.2. Adjustment method

Protocol	Command	Set ACK
Enter adj. mode	aa 00 00	a 00 OK00x
Source change	xb 00 40 xb 00 60	b 00 OK04x (Adjust 480i, 1080p Comp1) b 00 OK06x (Adjust 1920*1080 RGB)
Begin adj.	ad 00 10	
Return adj. result		OKx (Case of Success) NGx (Case of Fail)
Read adj. data	(main) ad 00 20 (sub) ad 00 21	(main) 000000000000000000000000000000007c007b006dx (Sub) 000000007000000000000000000000007c00830077x
Confirm adj.	ad 00 99	NG 03 00x (Fail) NG 03 01x (Fail) NG 03 02x (Fail) OK 03 03x (Success)
End adj.	ad 00 90	a 00 OK90x

(Ref.) ADC Adj. RS232C Protocol Ver1.0

Adj. order

- aa 00 00 [Enter ADC adj. mode]
- xb 00 04 [Change input source to Component1(480i&1080p)]
- ad 00 10 [Adjust 480i&1080p Comp1]
- xb 00 06 [Change input source to RGB(1024*768)]
- ad 00 10 [Adjust 1920*1080 RGB]
- aa 00 90 End adj.

4.2. MAC address, ESN, Widevine, HDCP2.0 key D/L

4.2.1. Equipment & Condition

- (1) Play file: keydownload.exe

4.2.2. Communication Port connection

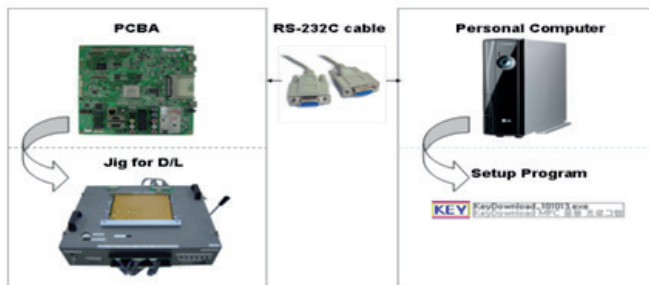
- (1) Key Write: Com 1,2,3,4 and 115200 (Baudrate)
- (2) Barcode: Com 1,2,3,4 and 9600 (Baudrate)

4.2.3. Download process

- (1) Select the download items.
- (2) Mode check: Online Only
- (3) Check the test process : DETECT -> MAC -> Widevine
- (4) Play: START
- (5) Check of result: Ready, Test, OK or NG

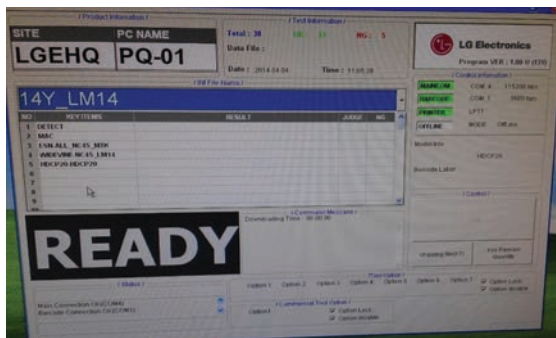
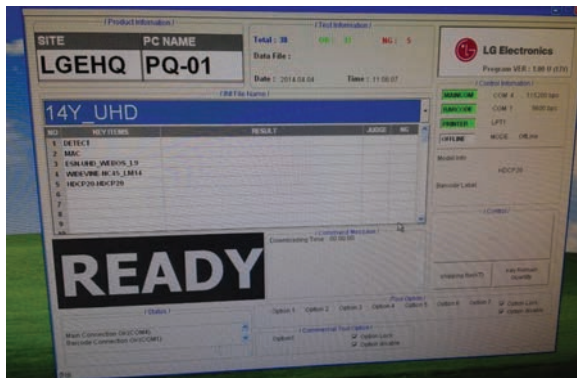
4.2.4. Communication Port connection

- (1) Connect: PCBA Jig -> RS-232C Port == PC -> RS-232C Port



4.2.5. Download

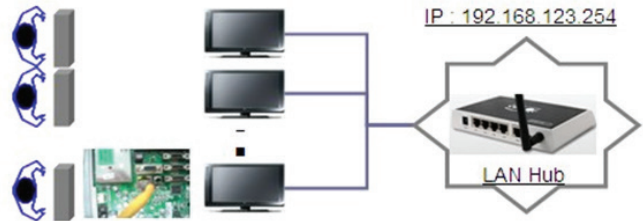
- (1) TW/CO Models (15Y LCD TV + MAC + Widevine + ESN + HDCP2.0)



4.3. LAN Inspection

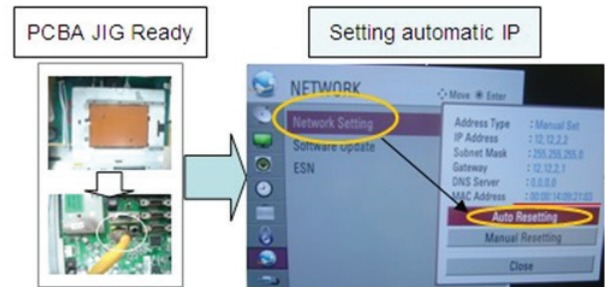
4.3.1. Equipment & Condition

- Each other connection to LAN Port of IP Hub and Jig



4.3.2. LAN inspection solution

- LAN Port connection with PCB
- Network setting at MENU Mode of TV
- Setting automatic IP
- Setting state confirmation
- If automatic setting is finished, you confirm IP and MAC Address.



4.3.3. LAN PORT INSPECTION (PING TEST)

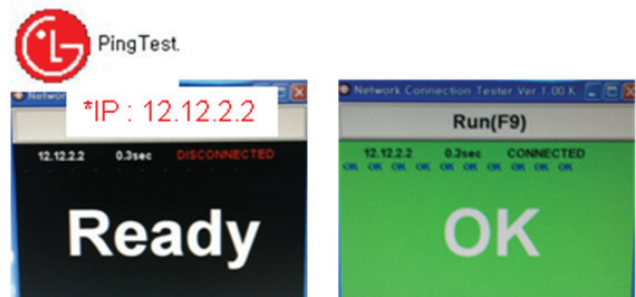
- (1) Play the LAN Port Test PROGRAM.
- (2) Input IP set up for an inspection to Test Program.
* IP Number : 12.12.2.2.

Connect: SET-> LAN Port == PC-> LAN Port



4.3.4. LAN PORT inspection (PING TEST)

- (1) Play the LAN Port Test Program.
- (2) connect each other LAN Port Jack.
- (3) Play Test (F9) button and confirm OK Message.
- (4) remove LAN CABLE



4.4. Model name & Serial number Download

4.4.1. Model name & Serial number D/L

- Press "Power on" key of service remocon.(Baud rate : 115200 bps)
- Connect RS-232C Signal to USB Cable to USB.
- Write Serial number by use USB port.
- Must check the serial number at Instart menu.

■ Method & Notice

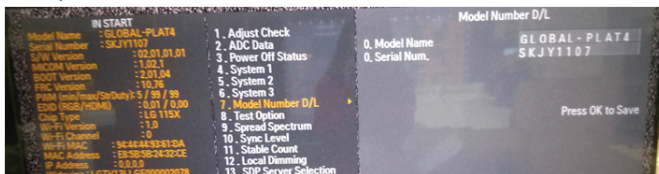
- A. Serial number D/L is using of scan equipment.
- B. Setting of scan equipment operated by Manufacturing Technology Group.
- C. Serial number D/L must be conformed when it is produced in production line, because serial number D/L is mandatory by D-book 4.0

* Manual Download (Model Name and Serial Number)

If the TV set is downloaded By OTA or Service man, sometimes model name or serial number is initialized. (not always)

It is impossible to download by bar code scan, so It need Manual download.

- a. Press the 'INSTART' key of ADJ remote control.
- b. Go to the menu '7. Model Number D/L' like below photo.
- c. Input the Factory model name or Serial number like below photo.



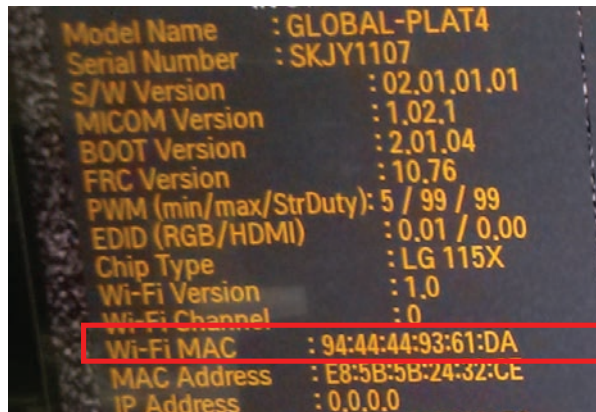
- d. Check the model name INSTART menu -> Factory name displayed
- e. Check the Diagnostics (DTV country only) -> Buyer model displayed

4.5. WIFI MAC ADDRESS CHECK

4.5.1. Using RS232 Command

	Command	Set ACK
Transmission	[A][I][Set ID][20][Cr]	[O][K][x] or [N][G]

■ Check the menu on in-start



5. Manual Adjustment

5.1. ADC adjustment is not needed because of OTP (Auto ADC adjustment)

5.2. EDID

(The Extended Display Identification Data) / DDC (Display Data Channel) download

5.2.1. Overview

It is a VESA regulation. A PC or a MNT will display an optimal resolution through information sharing without any necessity of user input. It is a realization of "Plug and Play".

5.2.2. Equipment

- Since embedded EDID data is used, EDID download JIG, HDMI cable and D-sub cable are not need.
- Adjust remocon

5.2.3. Download method

- (1) Press Adj. key on the Adjust remocon, then select "12.EDID D/L".
By pressing Enter key, enter EDID D/L menu
- (2) Select [Start] button by pressing Enter key, HDMI1 / HDMI2 / HDMI3 / HDMI4 are Writing and display OK or NG.



5.2.4. EDID DATA

- Reference
- HDMI1 ~ HDMI3
- In the data of EDID, bellows may be different by Input mode

	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	a			b		
01	c		01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
02	0F	50	54	A1	8	00	31	40	45	40	61	40	71	40	81	80
03	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
04	45	00	40	84	63	00	00	1E	66	21	50	B0	51	00	1B	30
05	40	70	36	00	40	84	63	00	00	1E	00	00	00	FD	00	3A
06	3E	1E	53	10	00	0A	20	20	20	20	20	20		d		
07															01	e1
00	02	03	3A	F1	4E	10	9F	04	13	05	14	03	02	12	20	21
01	22	15	01	29	3D	06	C0	15	07	50				f		
02																
03		f		10	28	10	E3	05	03	01	02	3A	80	18	71	38
04	2D	40	58	2C	45	00	40	84	63	00	00	1E	01	1D	80	18
05	71	1C	16	20	58	2C	25	00	40	84	63	00	00	9E	01	1D
06	00	72	51	D0	1E	20	6E	28	55	00	40	84	63	00	00	1E
07	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	e

- Product ID
- Serial No: Controlled on production line.
- Month, Year: Controlled on production line:
ex) Monthly : '01' -> '01'
Year : '2016' -> '1A'
- Model Name(Hex): LGTV
- Checksum(LG TV): Changeable by total EDID data.
- Vendor Specific(HDMI)

5.2.4.1. EDID

HDMI 1(C/S : 9F 79) – 3G
EDID Block 0, Bytes 0-127 [00H-7FH]

	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	01	00	01	01	01	01
10	01	1A	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	08	E8	00	30	F2	70	5A	80	B0	58
40	8A	00	40	84	63	00	00	1E	02	3A	80	18	71	38	2D	40
50	58	2C	45	00	40	84	63	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	88	3C	00	0A	20	20	20	20	20	20	20	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	9F

EDID Block 1, Bytes 128-255 [80H-FFH]

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	3C	F1	54	5D	10	1F	04	13	05	14	03	02	12	20
10	21	22	15	01	5E	5F	62	63	64	29	3D	06	C0	15	07	50
20	09	57	07	6E	03	0C	00	10	00	B8	3C	20	00	80	01	02
30	03	04	E5	0E	60	61	65	66	E3	06	07	01	01	1D	80	18
40	71	1C	16	20	58	2C	25	00	40	84	63	00	00	9E	66	21
50	50	B0	51	00	1B	30	40	70	36	00	40	84	63	00	00	1E
60	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	79

HDMI 1(C/S : 9F 47) – 6G
EDID Block 0, Bytes 0-127 [00H-7FH]

	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	01	00	01	01	01	01
10	01	1A	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	08	E8	00	30	F2	70	5A	80	B0	58
40	8A	00	40	84	63	00	00	1E	02	3A	80	18	71	38	2D	40
50	58	2C	45	00	40	84	63	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	88	3C	00	0A	20	20	20	20	20	20	20	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	9F

EDID Block 1, Bytes 128-255 [80H-FFH]

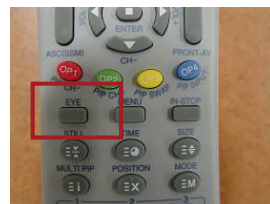
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	4B	F1	58	61	60	10	1F	04	13	05	14	03	02	12
10	20	21	22	15	01	5D	5E	5F	65	66	62	63	64	29	3D	06
20	C0	15	07	50	09	57	07	6E	03	0C	00	10	00	B8	3C	20
30	00	80	01	02	03	04	67	D8	5D	C4	01	78	80	03	E3	05
40	C0	00	E4	0F	03	00	18	E3	06	07	01	01	1D	80	18	71
50	1C	16	20	58	2C	25	00	40	84	63	00	00	9E	66	21	50
60	B0	51	00	1B	30	40	70	36	00	40	84	63	00	00	1E	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	47

* Checksum (HDMI 1/2/3/4)

	FFH (Checksum)			
	3G		6G(HDMI Deep Color)	
HDMI1	9F	79	9F	47

5.3. Green Eye Inspection Guide

- (Step 1) Turn on the TV set.
- (Step 2) Press “EYE” button on the Adjustment remote controller.



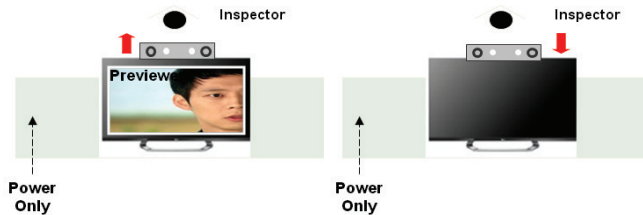
- (Step 3) Block the Intelligent Sensor module on the front C/A about 6 seconds. When the “Sensor Data” is lower than 20, you can see the “OK” message
=> If it doesn't show “OK” message, the Sensor Module is defected one. You have to replace that with a good one.



- (Step 4) After check the “OK” message come out, take out your hand from the Sensor module.
=> Check “Backlight” value change from “0” to “100” or not. If it doesn't change the value, the sensor is also defected one. You have to replace it.

5.4. Camera Port Inspection

- (1) Objective : To check how it connects between Camera and PCBA normally, and their Function
- (2) Test Method : This Inspection is available only Power-Only Status.
 - 1) Push Camera Up
 - 2) Camera's Preview picture appears on TV Set
 - 3) Push Camera Down



(3) RS-232C Command

RS-232C COMMAND			Explanation
CMD	DATA	ID	
Ai	00	23	Camera Function Start.
Ai	00	24	Camera Function End.

5.5. White Balance Adjustment

5.5.1. Overview

5.5.1.1. 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.

[Test condition]

Temperature : 20 ± 5°C

Heat run mode : Vivid

Measurement mode : Adjust > White Balance mode

Measurement Point : center

Measurement Device : CA-210 / CA-310

Heat run time : continue 24 hours(for new-born module)

2 hours(for module UTT is over 24 hrs)

[Spec]

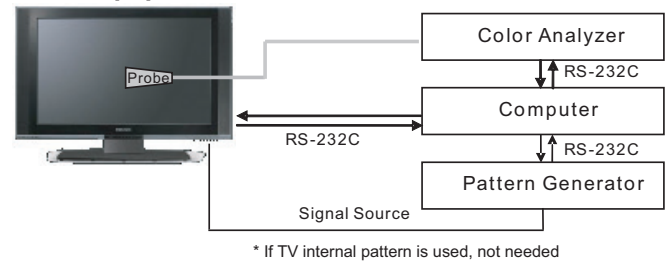
- Color coordinate x, y ± 0.015 (after 24 hours aging)

- Color coordinate x ± 0.020, y ± 0.030 (within 24 hours aging)

5.5.2. Equipment

- (1) Color Analyzer: CA-210 (LED Module : CH 14)
 - (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)
- ※ Color Analyzer Matrix should be calibrated using CS-1000

5.5.3. Equipment connection MAP



5.5.4. Adj. Command (Protocol)

<Command Format>

START 6E A 50 A LEN A 03 A CMD A 00 A VAL A CS A STOP

- LEN: Number of Data Byte to be sent
 - CMD : Command
 - VAL : FOS Data value
 - CS : Checksum of sent data
 - A : Acknowledge
- Ex) [Send: JA_00_DD] / [Ack: A_00_okDDX]

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

RS-232C COMMAND			Explanation
CMD	DATA	ID	
wb	00	00	Begin White Balance adj.
wb	00	10	Gain adj.(internal white pattern)
wb	00	1f	Gain adj. completed
wb	00	20	Offset adj.(internal white pattern)
wb	00	2f	Offset adj. completed
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(endc)) -> Off-set adj.

wb 00 ff -> End white balance auto adj.

(2) Adjustment Map
Applied Model : ALL MODELS

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

5.5.5. Adjustment method

5.5.5.1. Auto WB calibration

- (1) Set TV in adj. mode using POWER ONNY key
 - (2) Zero calibrate probe then place it on the center of the Display
 - (3) Connect Cable (RS-232C to USB)
 - (4) Select mode in adj. Program and begin adj.
 - (5) When adj. is complete (OK Sign), check adj. status pre mode(Warm, Medium, Cool)
 - (6) Remove probe and RS-232C to USB cable to complete adj.
- W/B Adj. must begin as start command "wb 00 00", and finish as end command "wb 00 ff", and Adj. offset if need

5.5.5.2. Manual adj. method

- (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 -> 7. White-Balance then press the cursor to the right (KEY▶).
(When KEY(▶) is pressed 216 Gray 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.

** G-fix adjustment

Adjust modes (Cool), Fix the G gain to 172 (default data) and change the others (G/B Gain).

Adjust two modes(Medium / Warm), Fix the one of R/G/B gain to 192 (default data) and decrease the others.

- If internal pattern is not available, use RF input. In EZ Adj. menu 7.White Balance, you can select one of 2 Test-pattern: ON, OFF. Default is inner(ON). By selecting OFF, you can adjust using RF signal in 216 Gray pattern.

▪ 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
- LCD : Color Analyzer (CA-210) probe should be within 10cm and perpendicular of the module surface (90+/-2.5°)
- (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.

5.5.6. Reference (White Balance Adj. coordinate and color temperature)

- Luminance: 206 Gray
- Standard color coordinate and temperature using CS-1000 (over 26 inch)

Mode	Coordinate		Temp	△uv
	X	Y		
Cool	0.271	0.270	13000K	0.0000
Medium	0.286	0.289	9300K	0.0000
Warm	0.313	0.329	6500K	0.0000

- Standard color coordinate and temperature using CA-210 (CH 14)

Mode	Coordinate		Temp	△uv
	X	Y		
Cool	0.271±0.002	0.270±0.002	13000K	0.0000
Medium	0.286±0.002	0.289±0.002	9300K	0.0000
Warm	0.313±0.002	0.329±0.002	6500K	0.0000

5.5.7. EDGE & IOL LED White balance table(TBD)

- Edge & ALEF LED module change color coordinate because of aging time
- apply under the color coordinate table, for compensated aging time

(Normal line) Edge & ALEF LED White balance table

- gumi & Global

Model : (normal line) – UH75, UH65, UH63

webOS	Aging time (Min)	Cool		Medium		Warm	
		X	Y	X	Y	X	Y
		271	270	286	289	313	329
1	0-2	282	289	297	308	324	348
2	3-5	281	287	296	306	323	346
3	6-9	279	284	294	303	321	343
4	10-19	277	280	292	299	319	339
5	20-35	275	277	290	296	317	336
6	36-49	274	274	289	293	316	333
7	50-79	273	272	288	291	315	331
8	80-119	272	271	287	290	314	330
9	Over 120	271	270	286	289	313	329

Model : (normal line) LGD – TBD

webOS	Aging time (Min)	Cool		Medium		Warm	
		X	Y	X	Y	X	Y
		271	270	286	289	313	329
1	0-2	285	296	300	315	327	355
2	3-5	284	294	299	313	326	353
3	6-9	283	293	298	312	325	352
4	10-19	283	292	298	311	325	351
5	20-35	281	288	296	307	323	347
6	36-49	279	286	294	305	321	345
7	50-79	278	284	293	303	320	343
8	80-119	277	282	292	301	319	341
9	Over 120	271	270	286	289	313	329

(*) AUO, INX, Sharp, CSOT, BOE(Cool 1300K)

webOS	Cool		Medium		Warm	
	x	y	x	y	x	y
	271	270	285	293	313	329
Target	278	280	293	299	320	339

5.6. Local Dimming Function Check

(Step 1) Turn on TV

(Step 2) At the Local Dimming mode, module Edge Backlight moving right to left

Back light of IOP module moving

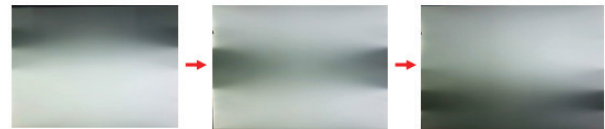
(Step 3) confirm the Local Dimming mode

(Step 4) Press “exit” Key

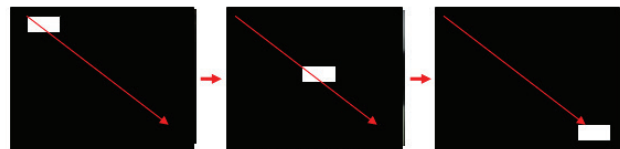


Local Dimming Demo

(For Horizontal Edge/Direct Model)



Local Dimming Demo
(Edge LED Model)



Local Dimming Demo
(ALEF Model)

5.7. Option selection per country

5.7.1. Overview

- Option selection is only done for models in AJ/JA/IL

5.7.2. Method

- (1) Press ADJ key on the Adj. R/C, then select Country Group Meun
- (2) Depending on destination, select Country Group Code or Country Group then on the lower Country option, select US, CA, MX. Selection is done using +, - or ►◄ KEY

5.8. HDMI ARC Function Inspection

5.8.1. Test equipment

- Optic Receiver Speaker
- MSHG-600 (SW: 1220 ↑)
- HDMI Cable (for 1.4 version)

5.8.2. Test method

- (1) Insert the HDMI Cable to the HDMI ARC port from the master equipment (HDMI1)



- (2) Check the sound from the TV Set



- (3) Check the Sound from the Speaker or using AV & Optic TEST program (It's connected to MSHG-600)

5.9. Ship-out mode check (In-stop)

- After final inspection, press In-Stop key of the Adj. R/C and check that the unit goes to Stand-by mode.

6. GND and Internal Pressure check

6.1. Method

- (1) GND & Internal Pressure auto-check preparation
 - Check that Power Cord is fully inserted to the SET. (If loose, re-insert)
- (2) Perform GND & Internal Pressure auto-check
 - Unit fully inserted Power cord, Antenna cable and A/V arrive to the auto-check process.
 - Connect D-terminal to AV JACK TESTER
 - Auto CONTROLLER(GWS103-4) ON
 - Perform GND TEST
 - If NG, Buzzer will sound to inform the operator.
 - If OK, changeover to I/P check automatically. (Remove CORD, A/V form AV JACK BOX)
 - Perform I/P test
 - If NG, Buzzer will sound to inform the operator.
 - If OK, Good lamp will lit up and the stopper will allow the pallet to move on to next process.

6.2. Test Condition

(1) TEST Spec.(at Product Line)

Products / Model			TV
Country			ALL
Hi-Pot	2 Poles (Class II)	Other	3000Vac or 4242Vdc/1sec
	3 Poles (Class I)	Other	1500Vac or 2121Vdc/1sec
	Cut off Current		not exceed 100mA
Insulation Resistance(500V)			≥ 4MΩ
Earth Continuity TEST [3Poles(Class I) only]			≤ 0.1Ω at 25A/1sec

• Note

- (1) Cutoff current setting of Electric Strength Tester – the cut off current should not exceed 100 mA.
- (2) The specification of factory test for OEM product can be changed according to OEM customer's direction.
- (3) DC product using external AC/DC adapter may be exempt from the above requirements.

▪ TEST Spec.(at OQA Samplign Test)

Products / Model			TV
Country			ALL
Insulation Distance	Pri.-Sec.		6.0mm
	Pri-Accessible metal		6.0mm (Metal is not connected to GND) 3.0mm (Metal is connected to GND)
	Pri.-GNDt		3.0mm(3 Poles)
	L - N		3.0mm
Hi-Pot	2 Poles (Class II)	Other	3000Vac or 4242Vdc/1min
	3 Poles (Class I)	Other	1500Vac or 2121Vdc/1min(GND) 3000Vac or 4242Vdc/1min(+)
	Cut off Current		not exceed 100mA
Insulation Resistance(500V)			≥ 4MΩ
Leakage current(Touch Current)			UL : ≤ 0.5mA _{rms} Other U1: ≤35V _{peak} U2: ≤0.35V _{peak}
Power Consumption/Current			≤ +10%
Power Cord Length			≥ 1.5m (UL only)
Earth Continuity TEST			≤0.1Ω at 40A/2min(UL, CSA) ≤0.1Ω at 25A/1min(Other)

▪ TEST POINT

- GND TEST = POWER CORD GND & SIGNAL CABLE METAL GND
- Internal Pressure TEST = POWER CORD GND & LIVE & NEUTRAL

▪ LEAKAGE CURRENT: At 0.5mArms

7. AUDIO output check

No	Item	Min	Typ	Max	Unit	Remark
1	Audio practical max Output, L/R (Distortion=10% max Output)		10.0 8.10	12.0 10.8	W Vrms	EQ Off AVL Off Clear Voice Off
2	Speaker (8Ω Impedance)		10	12	W	EQ On AVL On Clear Voice On

* Measurement condition:

- (1) RF input: Mono, 1KHz sine wave signal, 100% Modulation
- (2) CVBS

8. USB S/W Download

(optional, Service only)

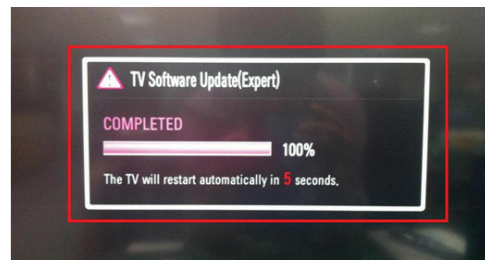
- (1) Put the USB Stick to the USB socket
- (2) Automatically detecting update file in USB Stick
- If your downloaded program version in USB Stick is lower than that of TV set, it didn't work. Otherwise USB data is automatically detected.
- (3) Show the message "Copying files from memory"



- (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.

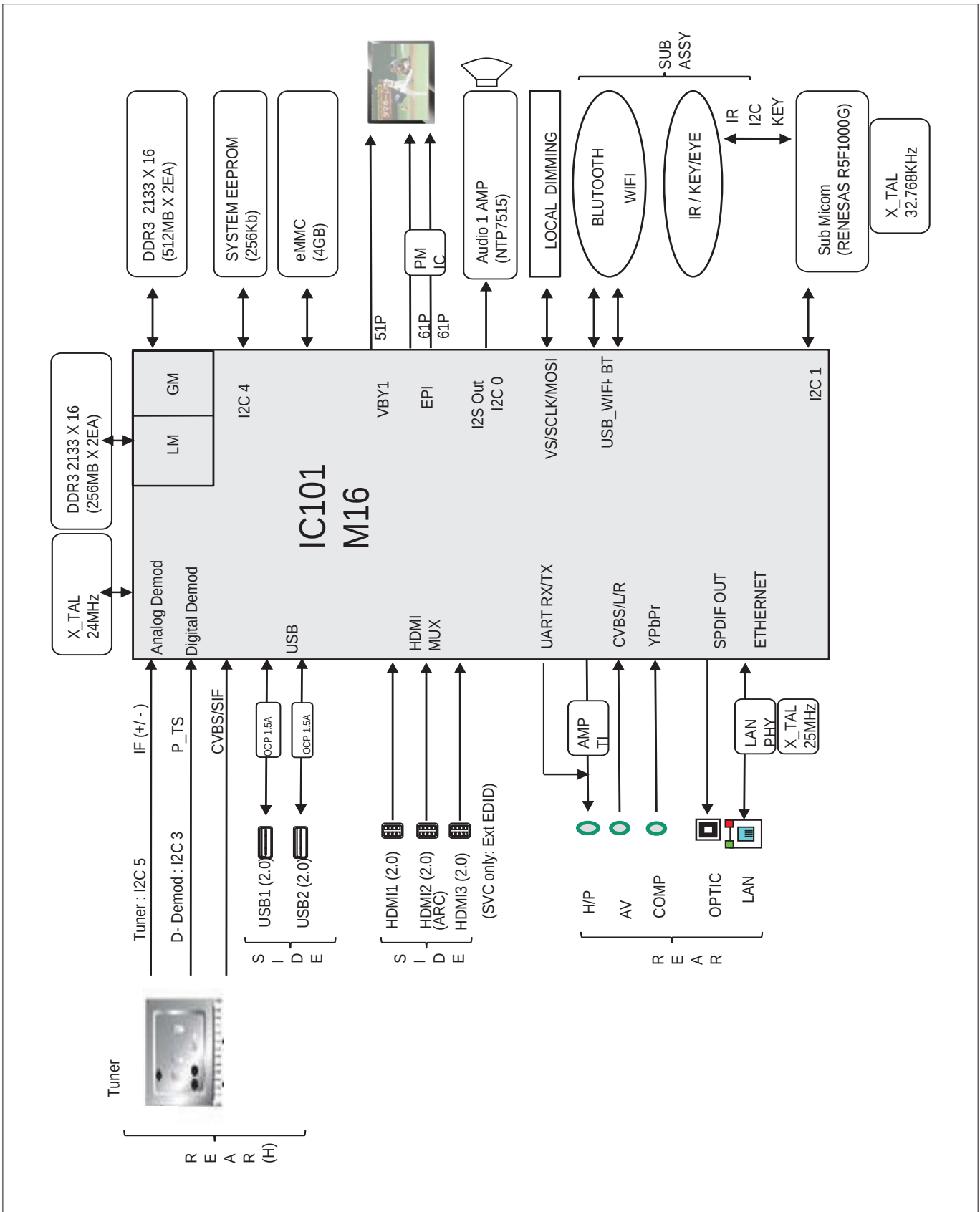
* If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel recover. If all channel data is cleared, you didn't have a DTV/ ATV test on production line.

* After downloading, TOOL OPTION setting is needed again.

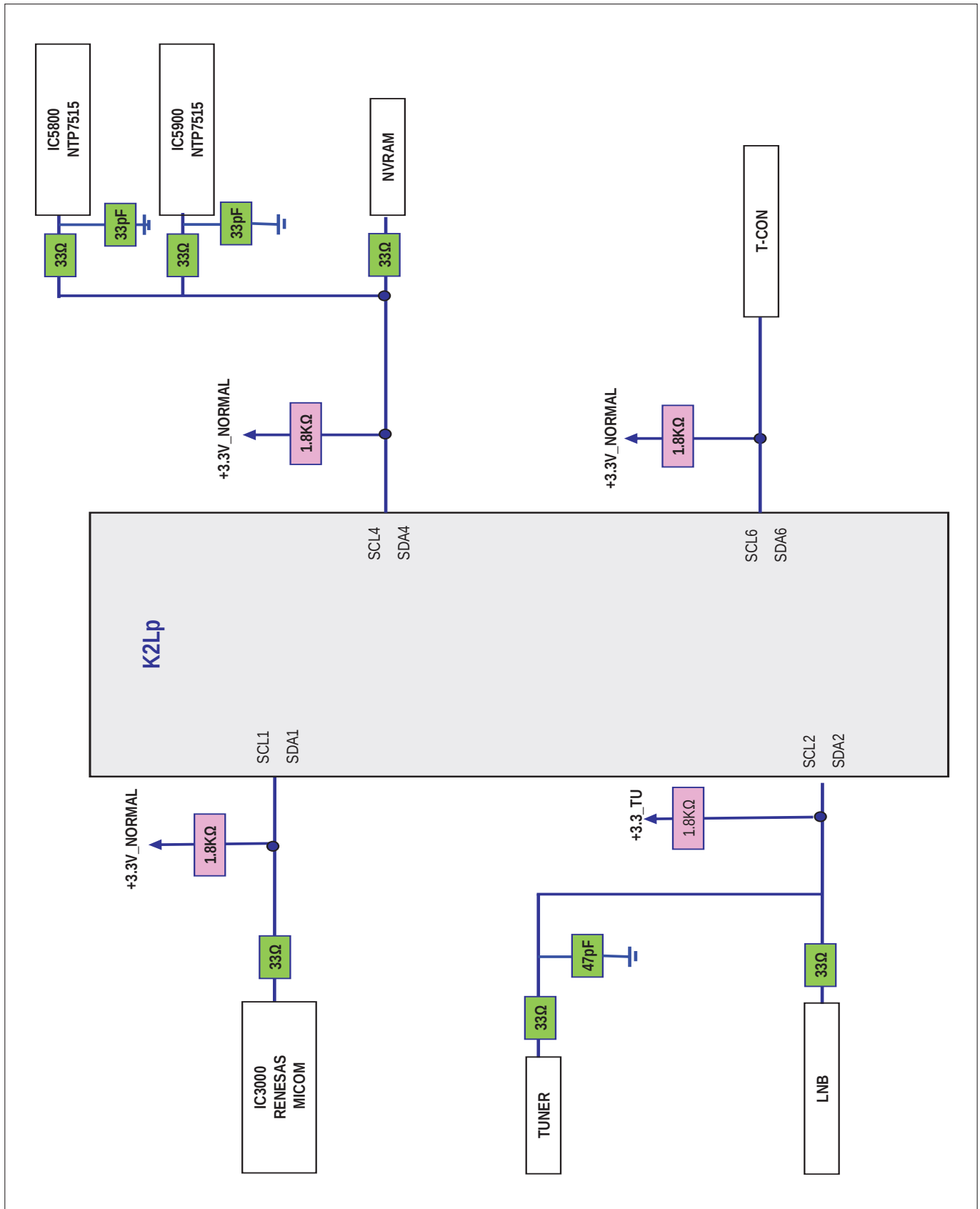
- (1) Push "IN-START" key in service remote controller.
- (2) Select "Tool Option 1" and Push "OK" button.
- (3) Punch in the number. (Each model has their number.)

Block Diagram

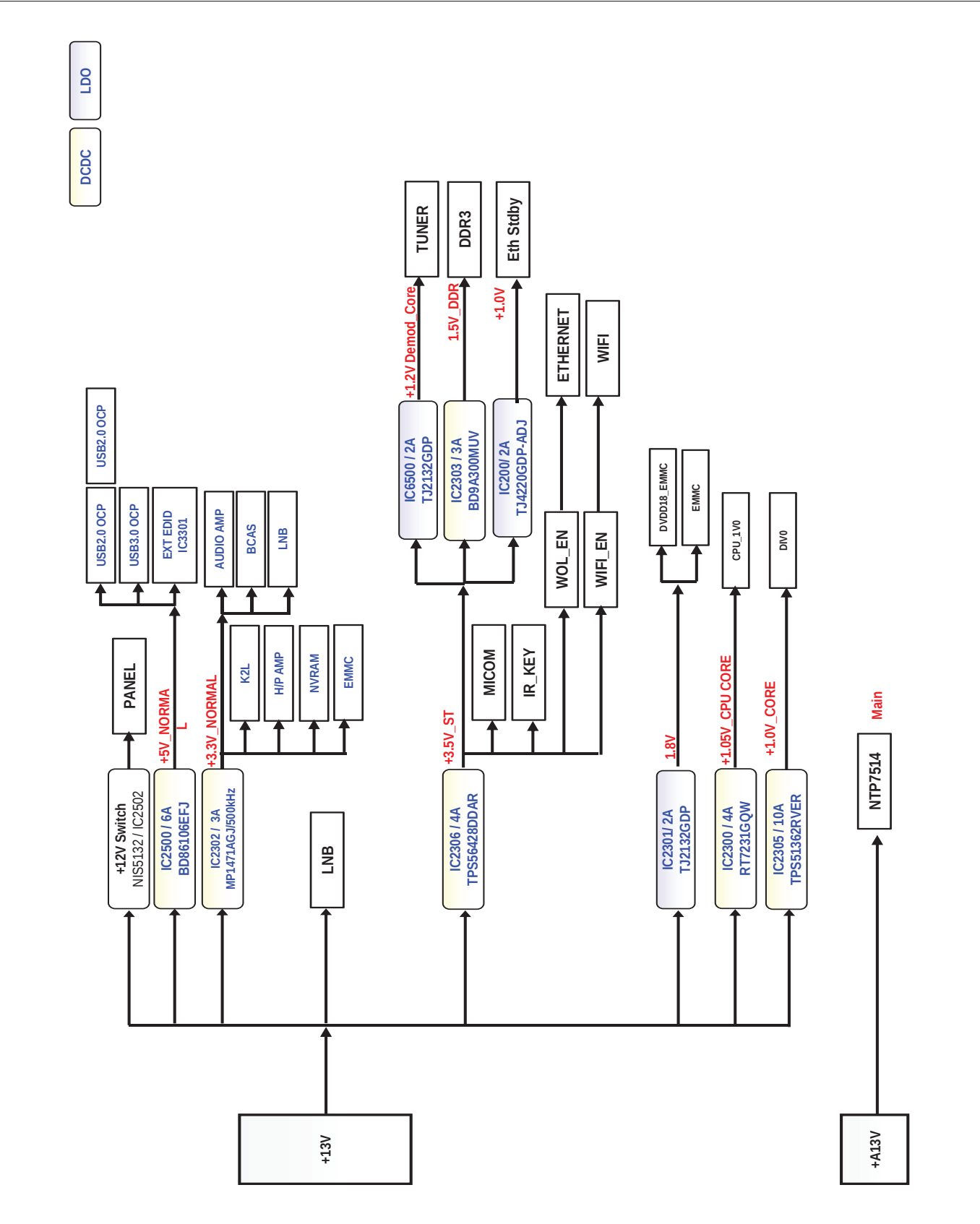
1. K2Lp Circuit Block Diagram



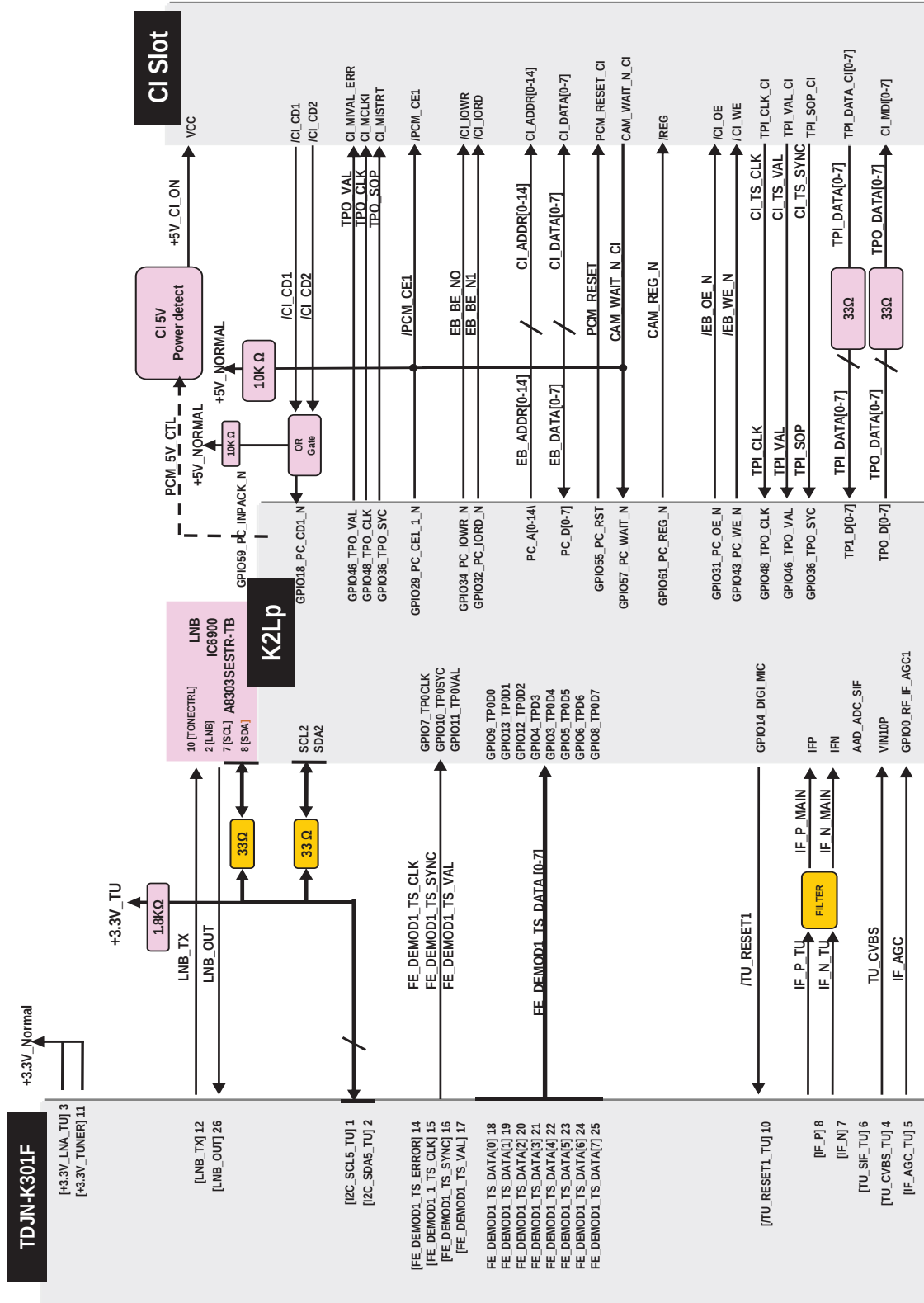
2. K2Lp I2C Block Diagram



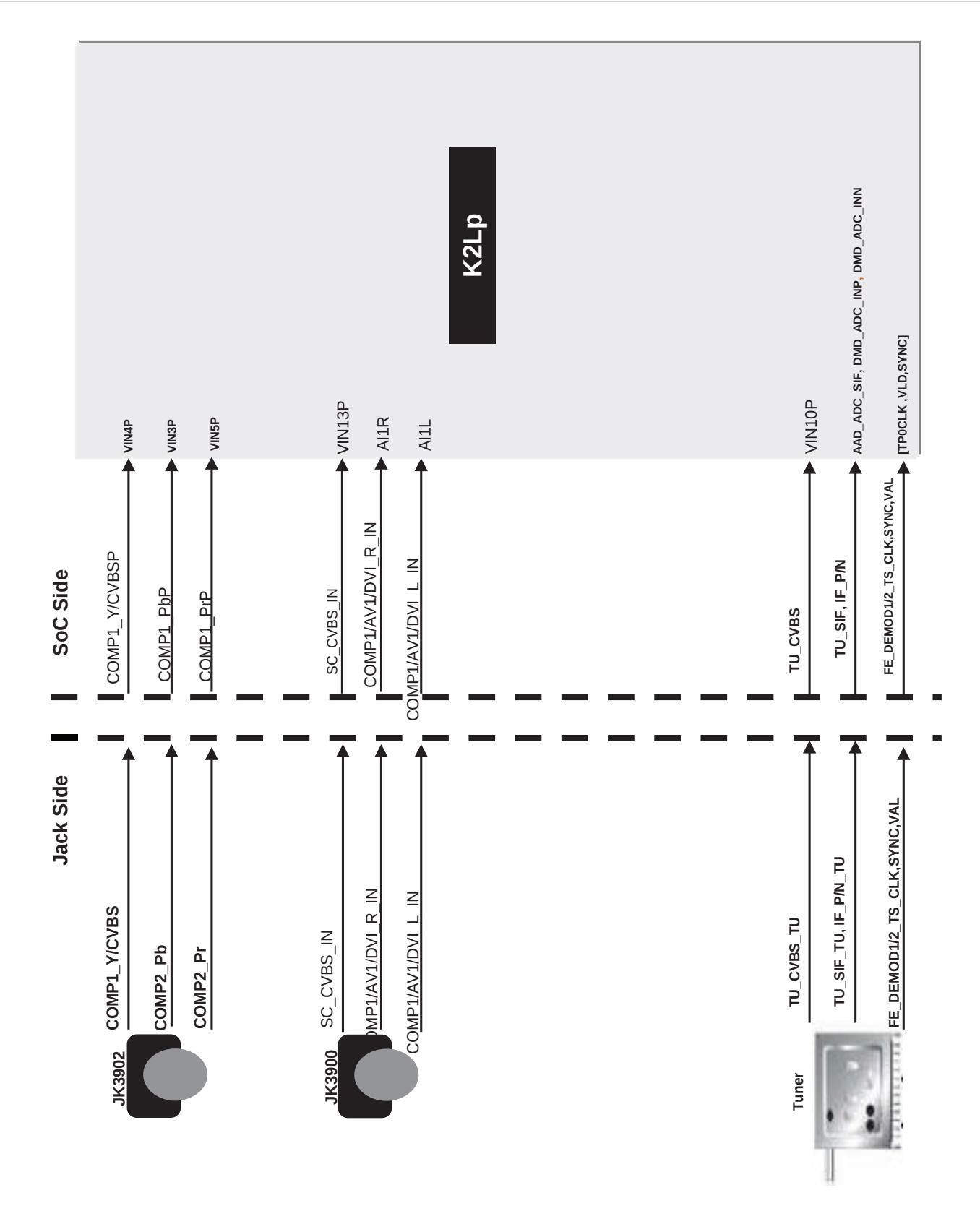
3. K2Lp Power Block



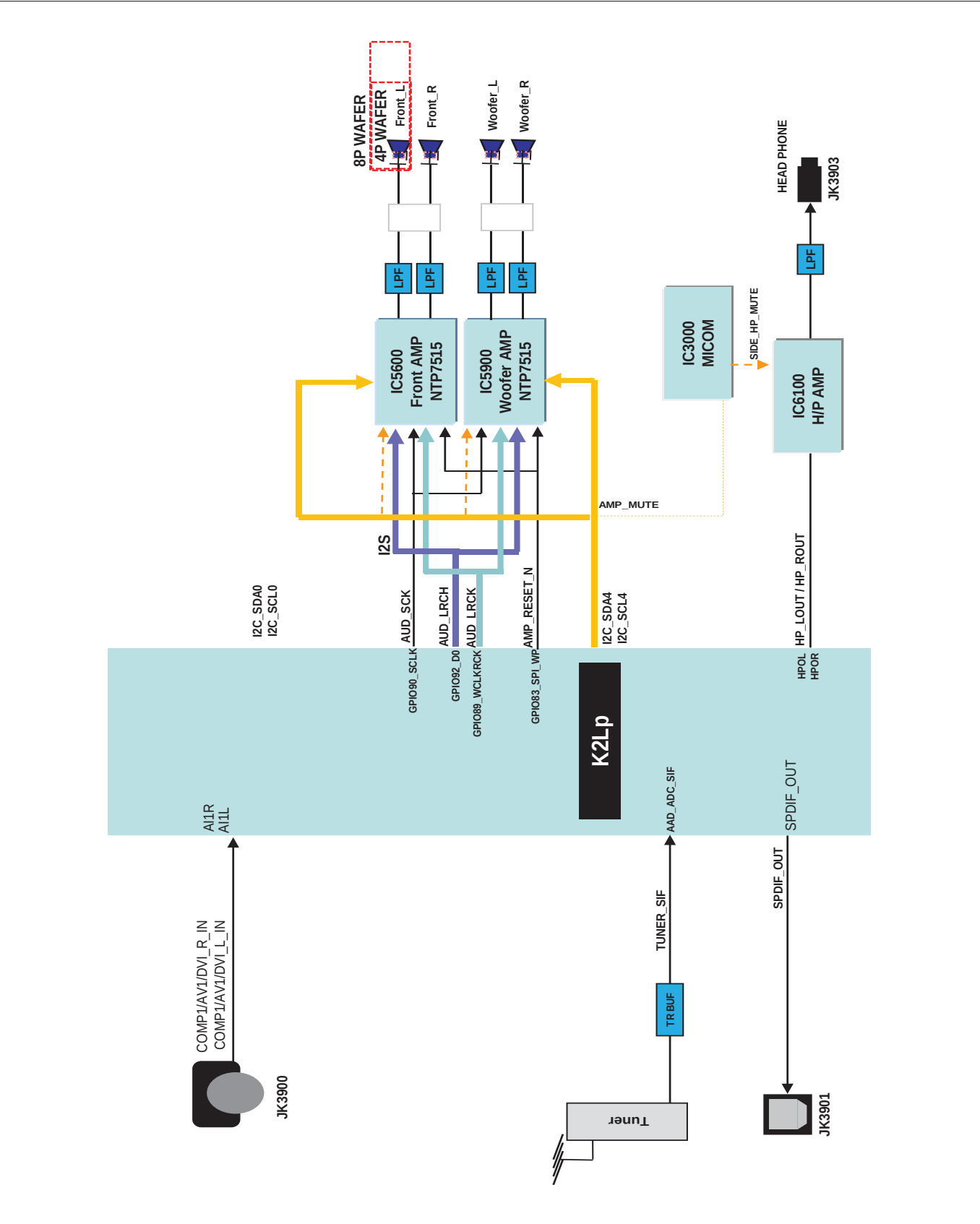
4. Tuner/CI Block Diagram



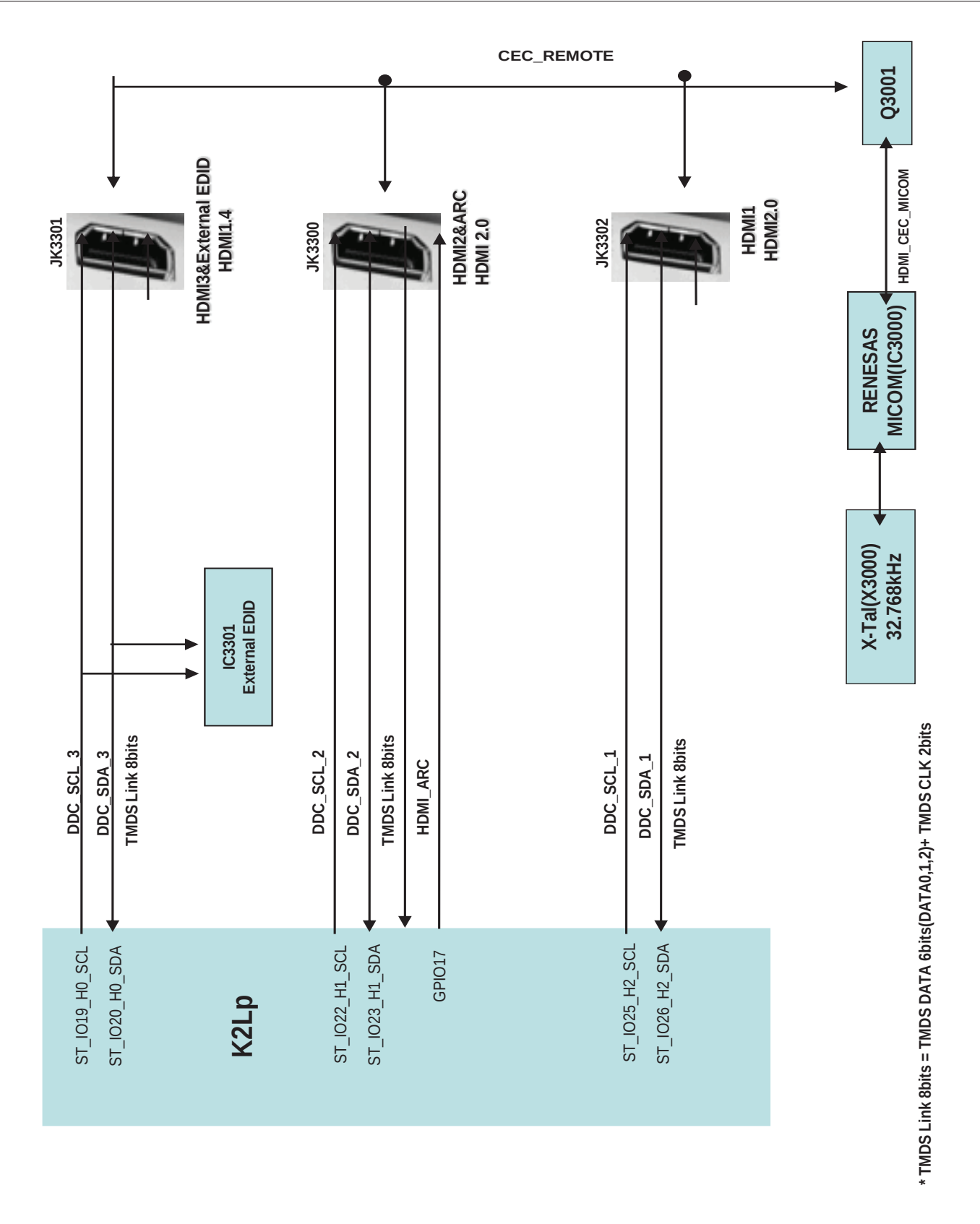
5. Video/Audio In Block Diagram



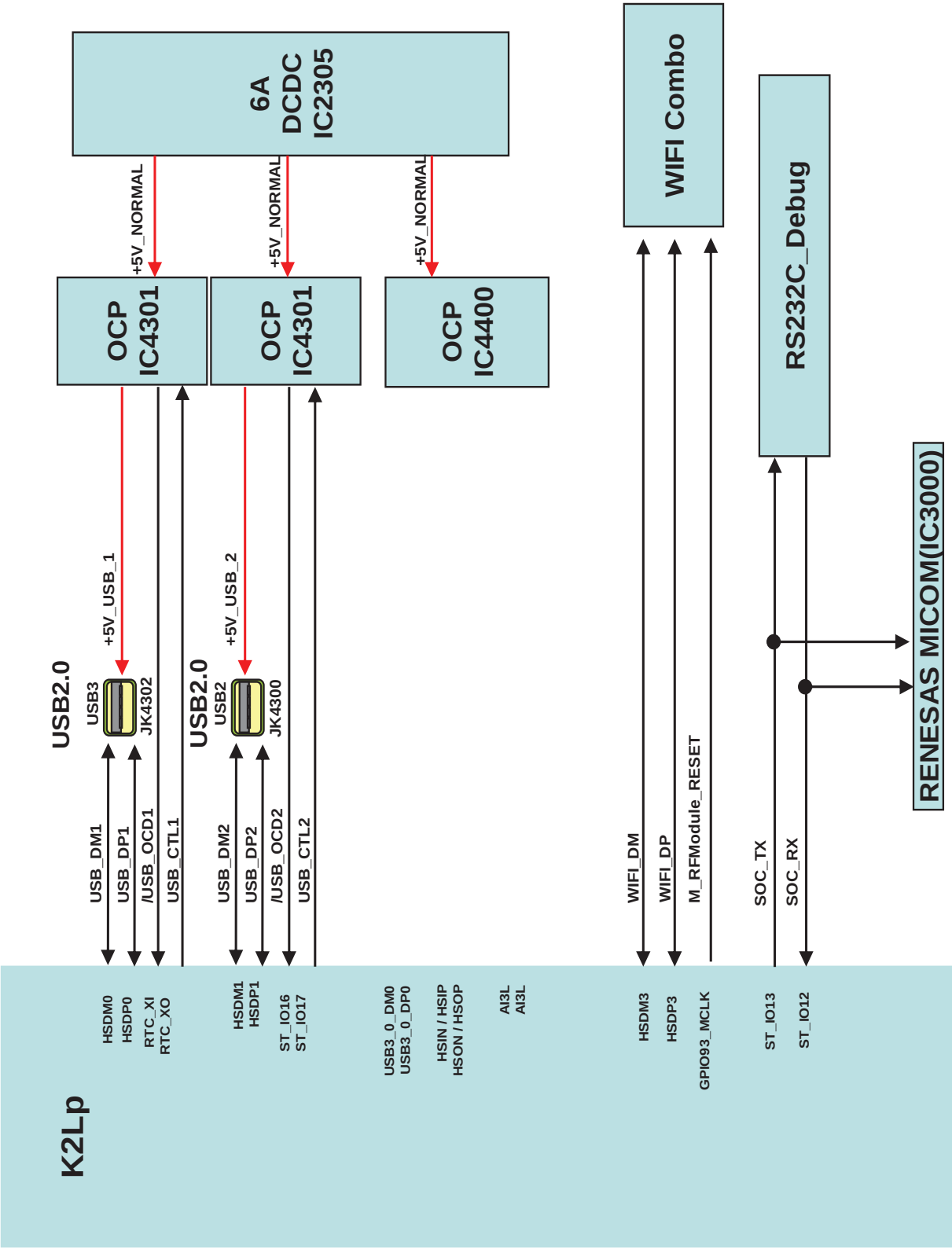
6. Audio Out Block Diagram



7. HDMI



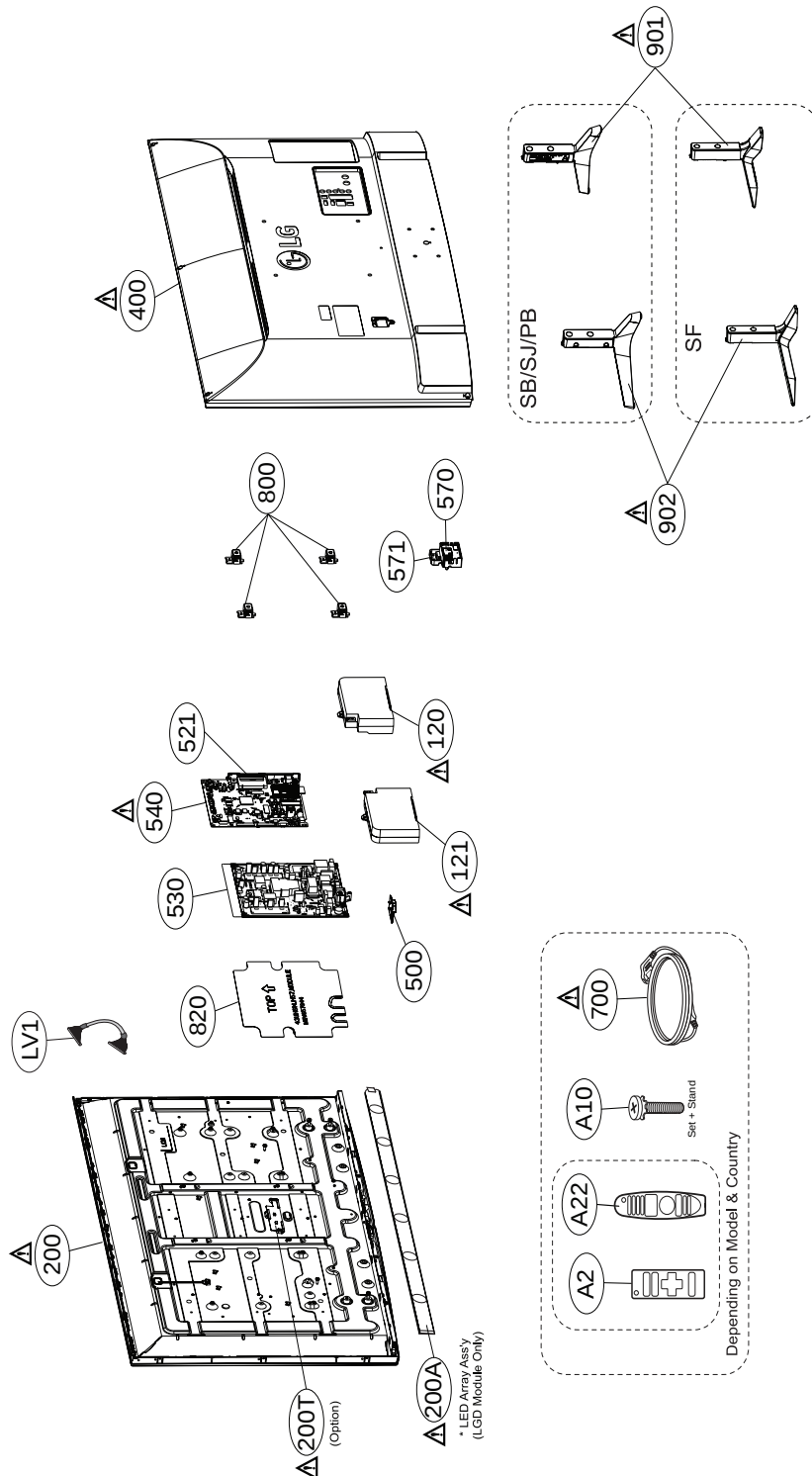
8. USB / WIFI / M-REMOTE / UART



EXPLODED VIEW

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by Δ 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.





TROUBLE SHOOTING GUIDE

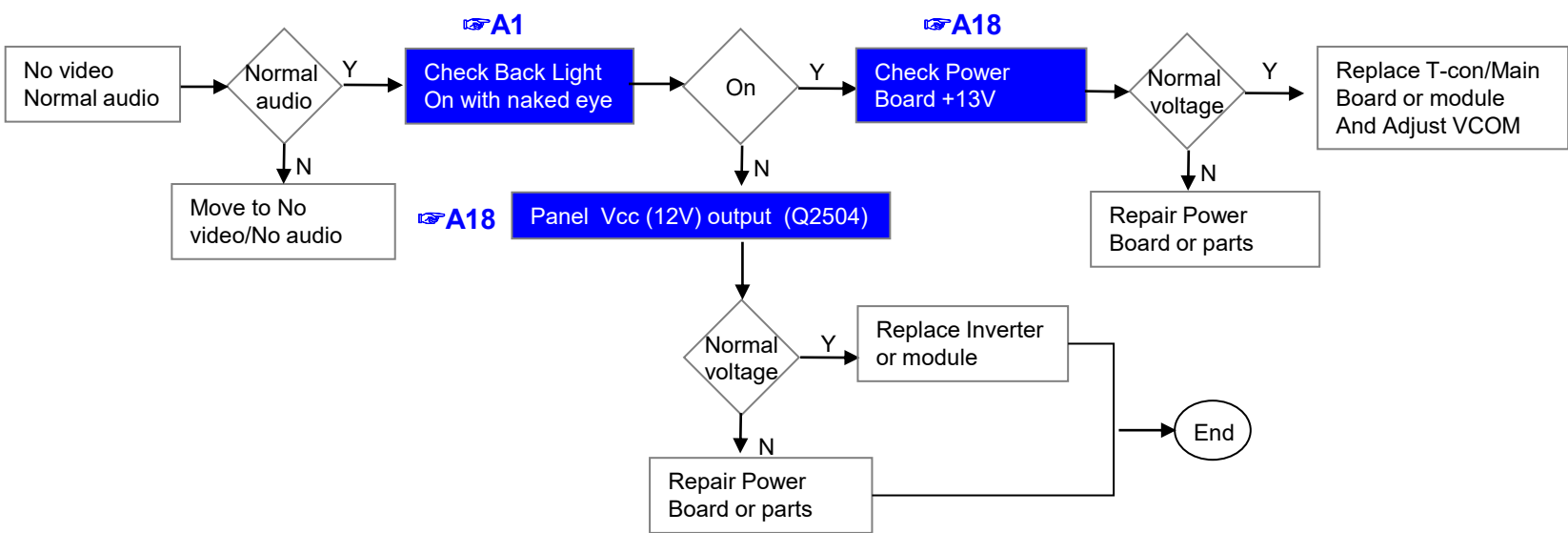
Contents of Standard Repair Process

No.	Error symptom (High category)	Error symptom (Mid category)	Page	Remarks
1	A. Video error	No video/Normal audio	1	
2		No video/No audio	2	
3		Picture broken/ Freezing	3	
4		Color error	4	
5		Vertical/Horizontal bar, residual image, light spot, external device color error	5	
6	B. Power error	No power	6	
7		Off when on, off while viewing, power auto on/off	7	
8	C. Audio error	No audio/Normal video	8	
9		Wrecked audio/discontinuation/noise	9	
10	D. Function error	Remote control & Local switch checking	10	
11		MR15 operating checking	11	
12		Wifi operating checking	12	
13		Camera operating checking	13	Not used
14		External device recognition error	14	
15	E. Noise	Circuit noise, mechanical noise	15	
16	F. Exterior error	Exterior defect	16	

First of all, Check whether there is SVC Bulletin in GSCS System for these model.

	Error symptom	A. Video error	Established date		
		No video/ Normal audio	Revised date		1/16

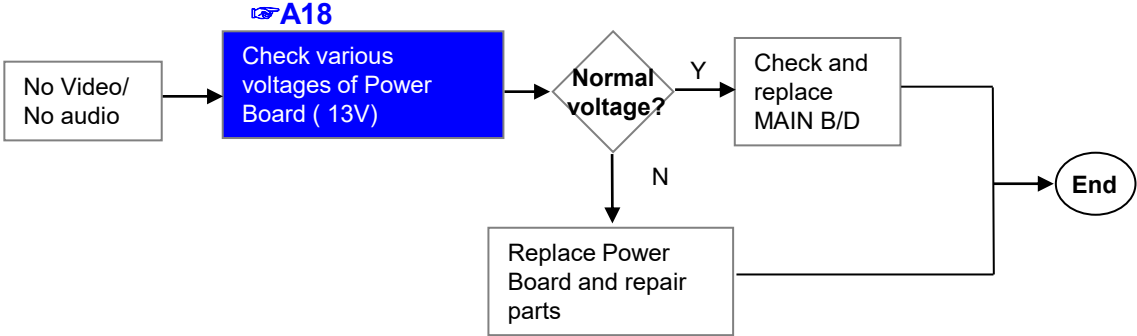
First of all, Check whether all of cables between board is inserted properly or not.
(Main B/D↔ Power B/D, VX1 Cable, Speaker Cable, IR B/D Cable,,,)



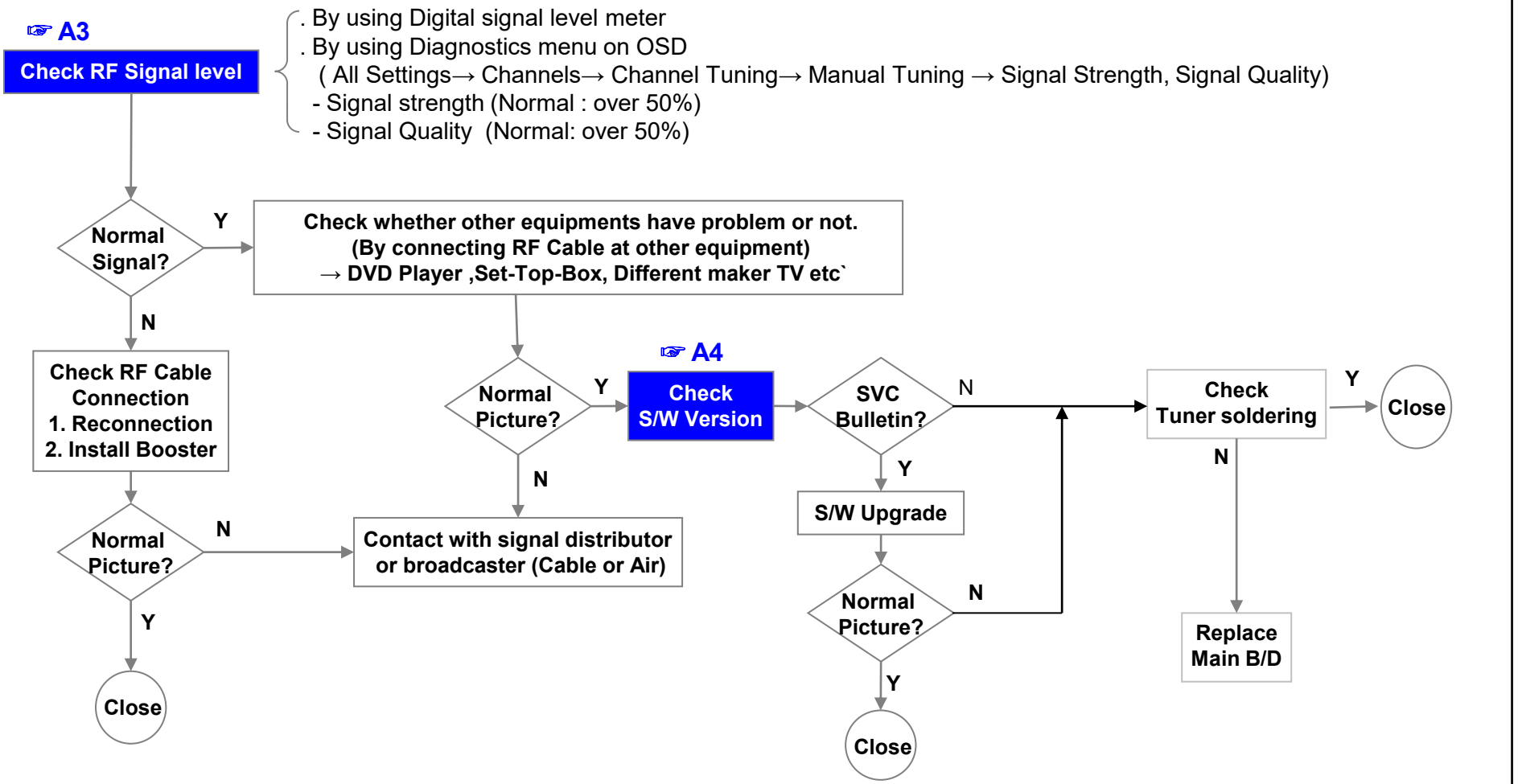
※Precaution A4 & A2



	Error symptom	A. Video error	Established date		
		No video/ No audio	Revised date		2/16



	Error symptom	A. Video error	Established date		
		Picture broken/ Freezing	Revised date		3/16



	Error symptom	A. Video error	Established date		
		Color error	Revised date		4/16

A6

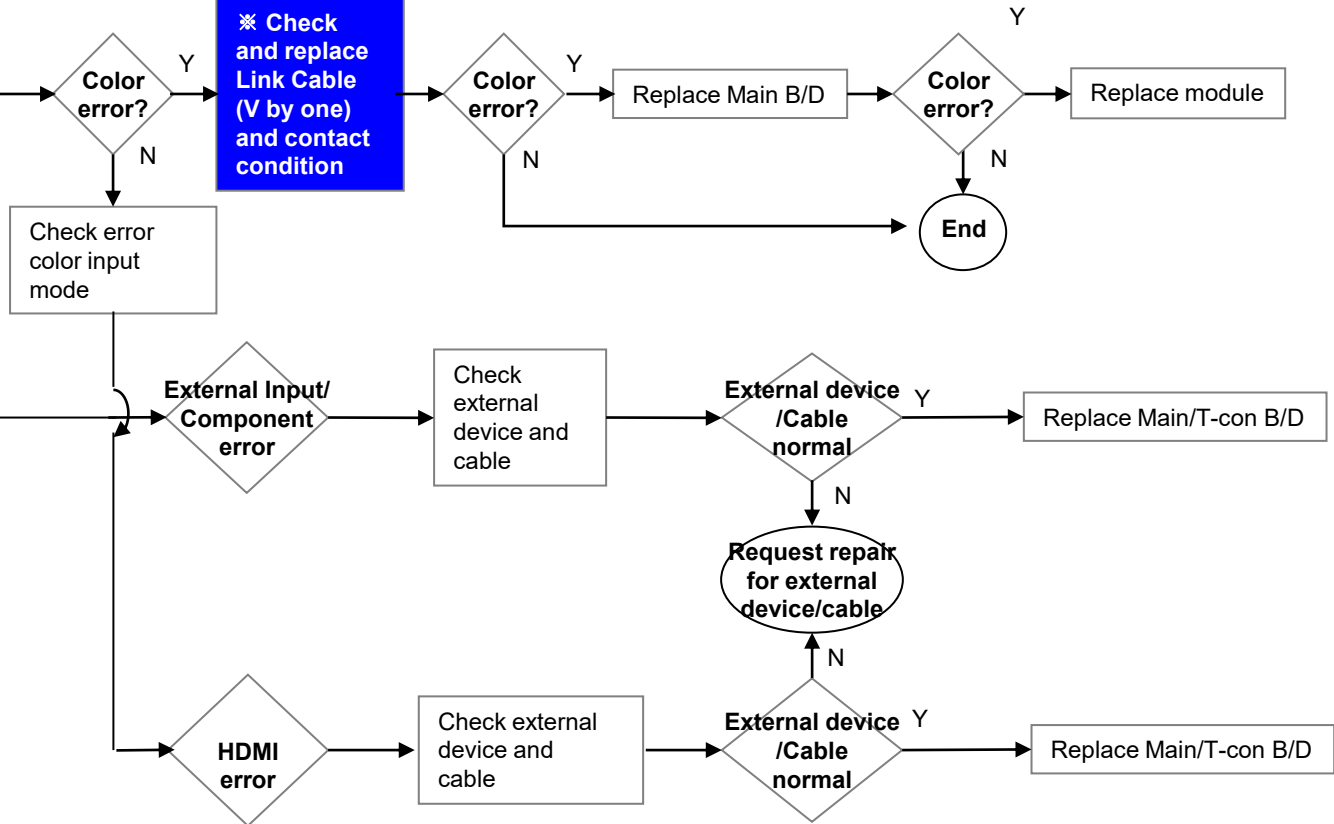
Check color by input
-External Input
-COMPONENT
-AV
-HDMI

A7

※ Check and replace Link Cable (V by one) and contact condition

A8

Check Test pattern



	Error symptom	A. Video error	Established date		
		Vertical / Horizontal bar, residual image, light spot, external device color error	Revised date		5/16

Vertical/Horizontal bar, residual image, light spot

A6

Check color condition by input
-External Input
-Component
-HDMI

A8

Check Test pattern

Screen normal?

Y
N

Replace module

Check external device connection condition

Normal?

Y
N

Request repair for external device

A7

Check and replace Link Cable

Screen normal?

Y
N

End

Replace Main/T-con B/D (adjust VCOM)

For LGD panel

Replace Main B/D

For other panel

Screen normal?

Y
N

End

Replace Module

External device screen error-Color error

Check S/W Version

Check version

Y
N

S/W Upgrade

Normal screen?

Y
N

End

Check screen condition by input
-External Input
-Component
-HDMI

External Input error

Component error

HDMI/DVI

Connect other external device and cable
(Check normal operation of External Input, Component, and HDMI by connecting Jig, pattern Generator, Set-top Box etc.)

Connect other external device and cable
(Check normal operation of External Input, Component, and HDMI by connecting Jig, pattern Generator, Set-top Box etc.)

Screen normal?

Y
N

Replace Main/T-con B/D

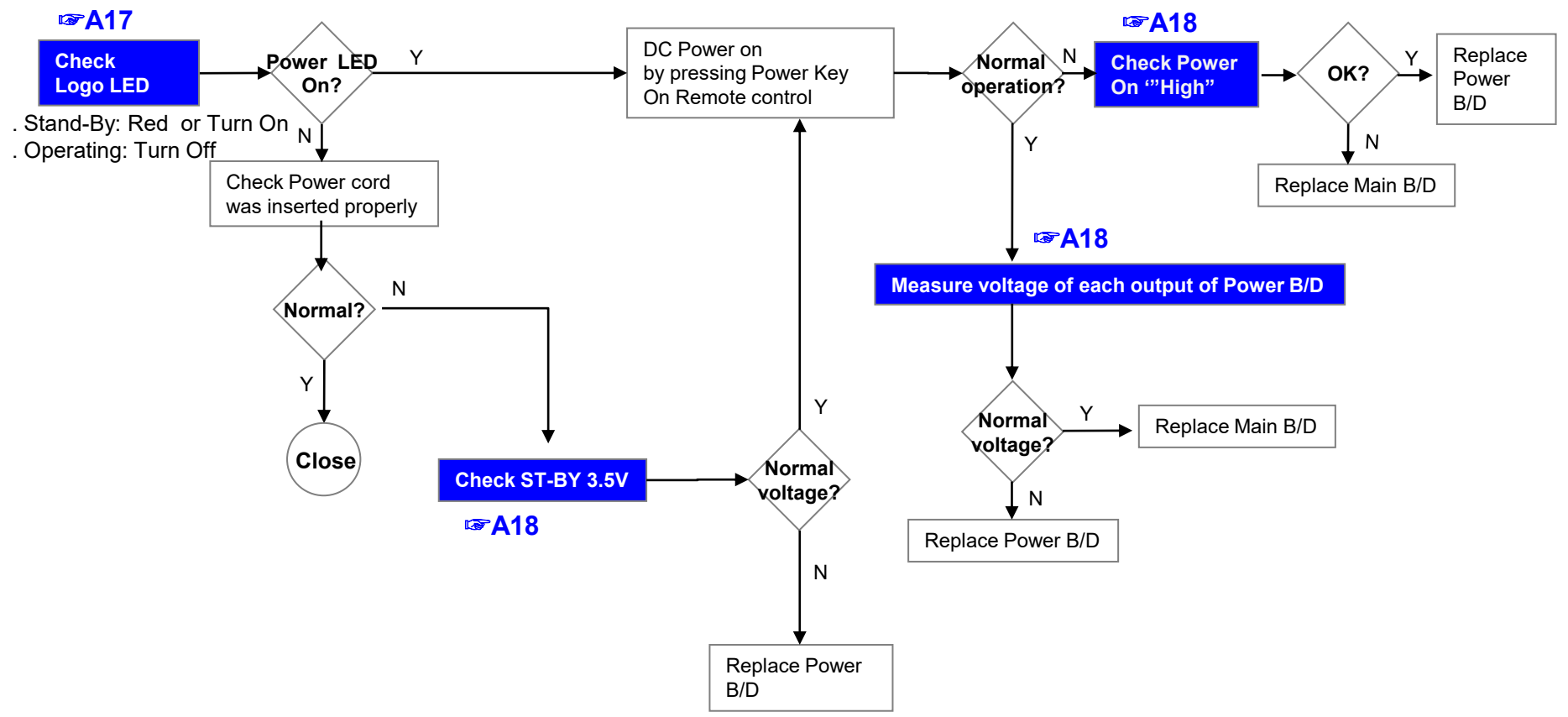
Request repair for external device

Screen normal?

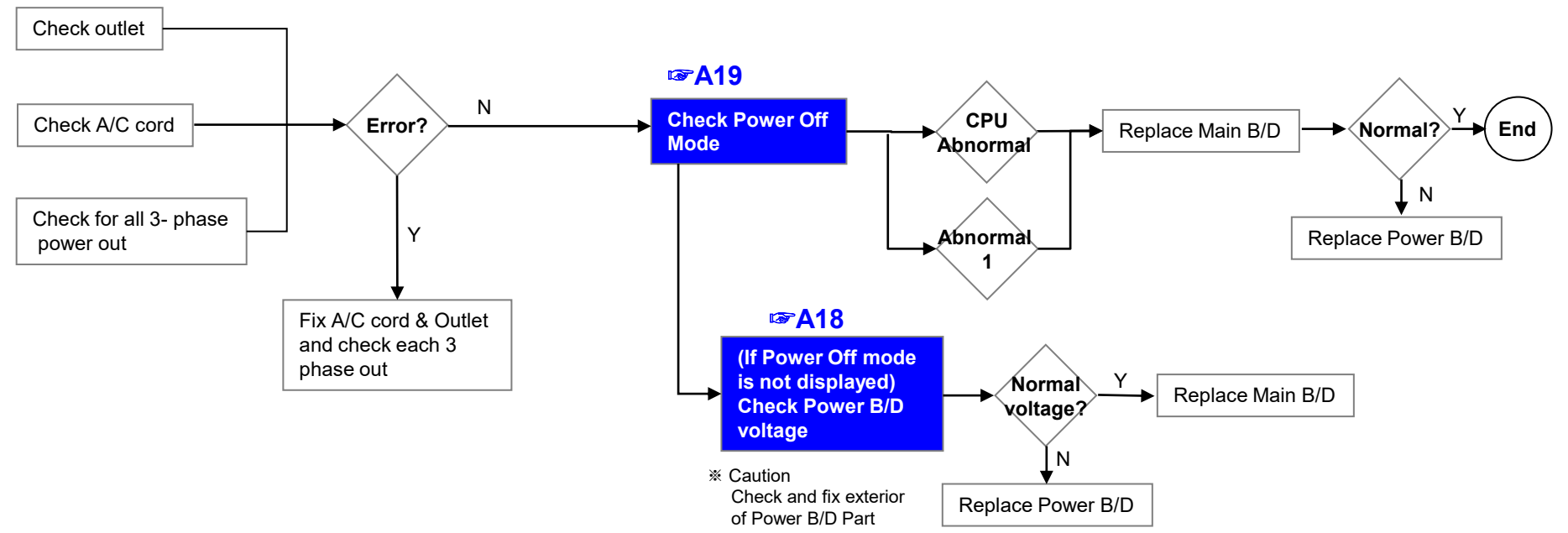
Y
N

Replace Main /T-con B/D

	Error symptom	B. Power error	Established date		
		No power	Revised date		6/16



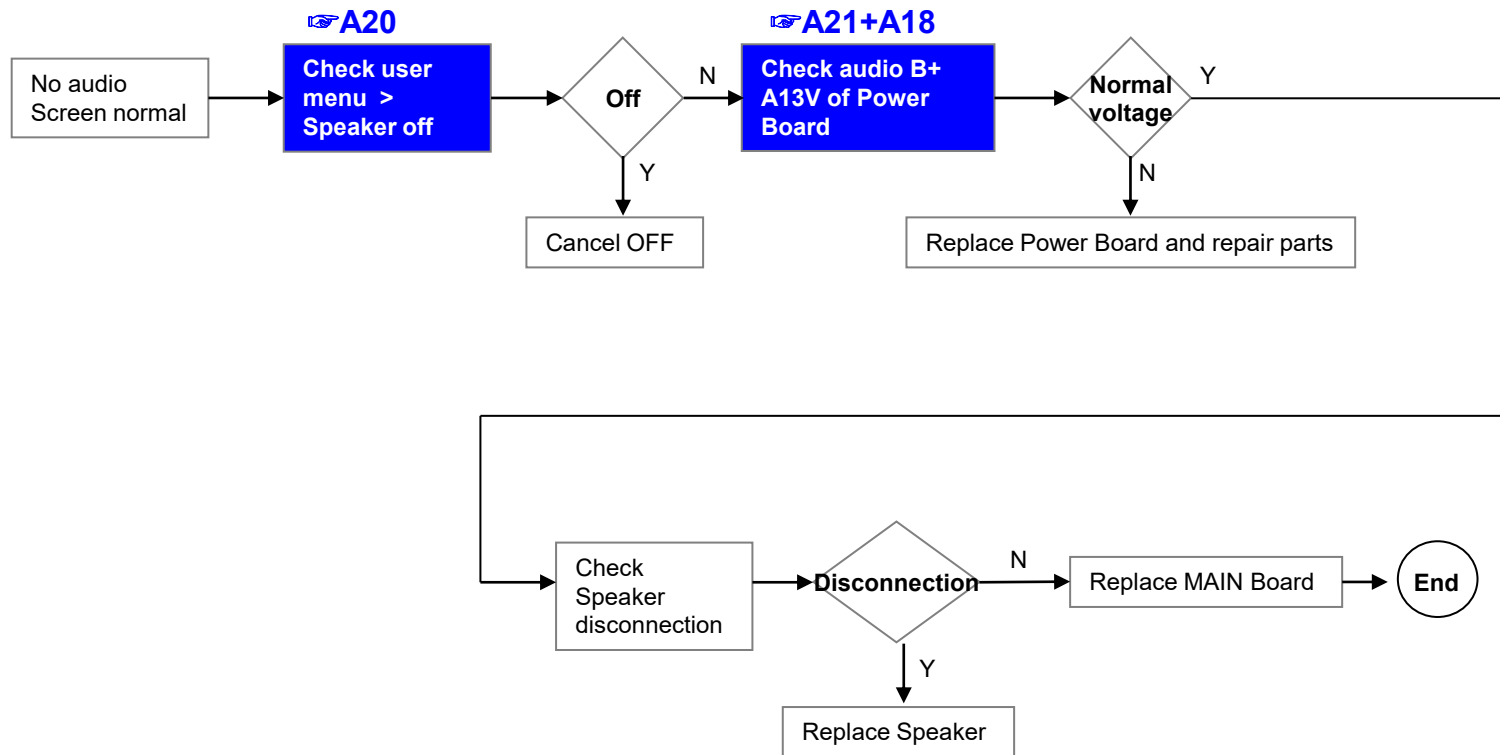
	Error symptom	B. Power error	Established date		
		Off when on, off while viewing, power auto on/off	Revised date		7/16



* Please refer to the all cases which can be displayed on power off mode.

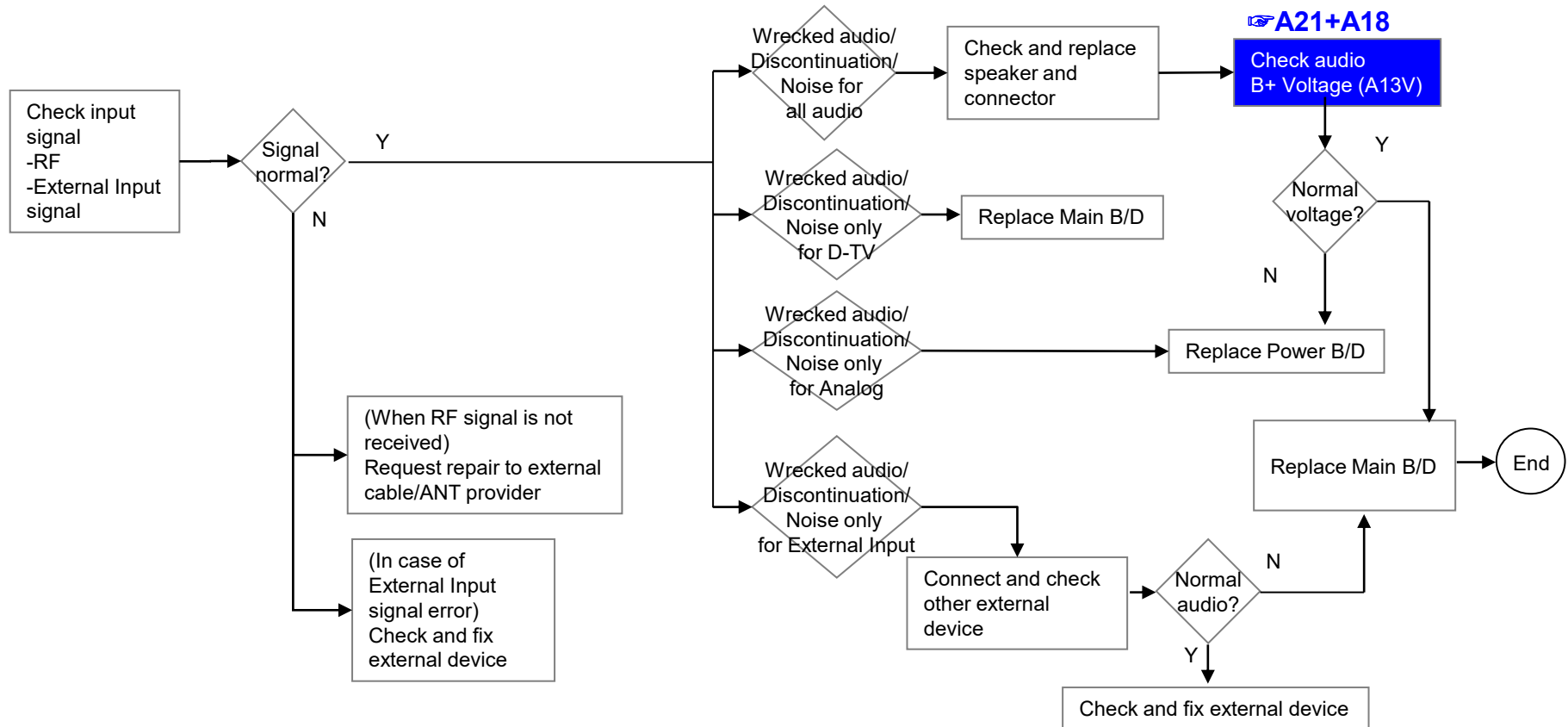
Status	Power off List	Explanation
Normal	"POWEROFF_REMOTEKEY"	Power off by REMOTE CONTROL
	"POWEROFF_OFFTIMER"	Power off by OFF TIMER
	"POWEROFF_SLEEPTIMER"	Power off by SLEEP TIMER
	"POWEROFF_INSTOP"	Power off by INSTOP KEY
	"POWEROFF_AUTOOFF"	Power off by AUTO OFF
	"POWEROFF_ONTIMER"	Power off by ON TIMER
	"POWEROFF_RS232C"	Power off by RS232C
	"POWEROFF_RESREC"	Power off by Reserved Record
	"POWEROFF_RECEND"	Power off by End of Recording
	"POWEROFF_SWDOWN"	Power off by S/W Download
	"POWEROFF_UNKNOWN"	Power off by unknown status except listed case
Abnormal	"POWEROFF_ABNORMAL1"	Power off by abnormal status except CPU trouble
	"POWEROFF_CPUABNORMAL"	Power off by CPU Abnormal

	Error symptom	C. Audio error	Established date		
		No audio/ Normal video	Revised date		8/16



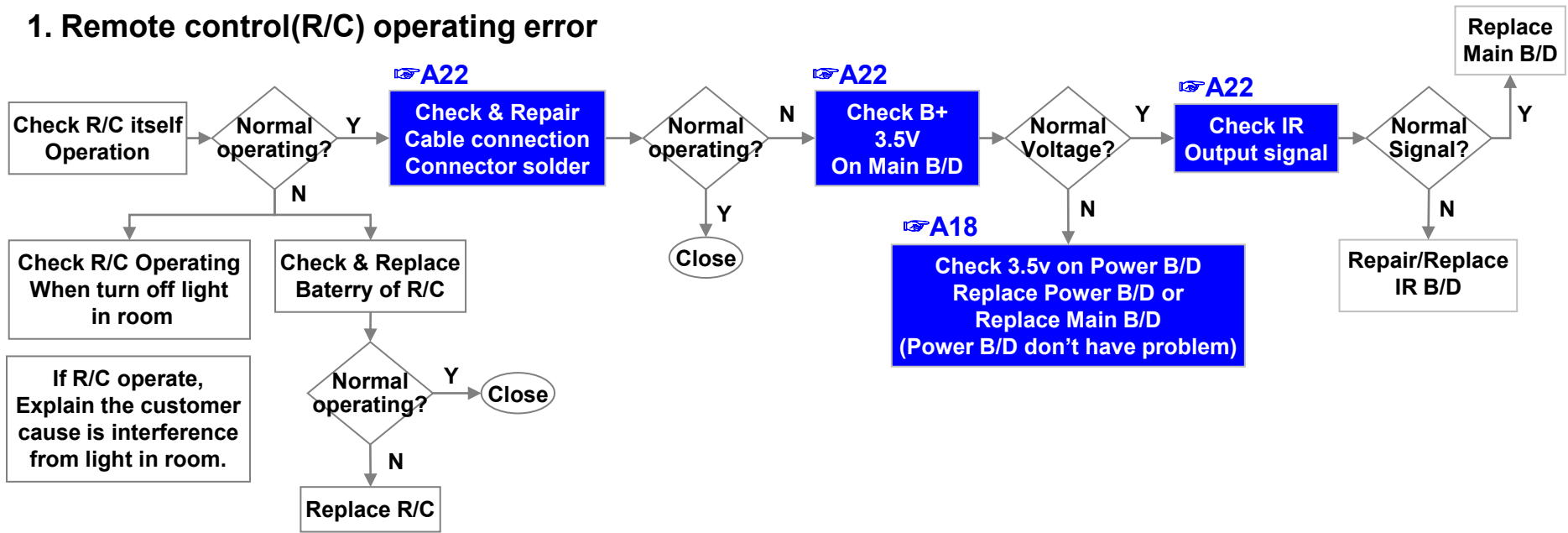
	Error symptom	C. Audio error	Established date		
		Wrecked audio/ discontinuation/noise	Revised date		9/16

→ Abnormal audio/discontinuation/noise is same after “Check input signal” compared to No audio



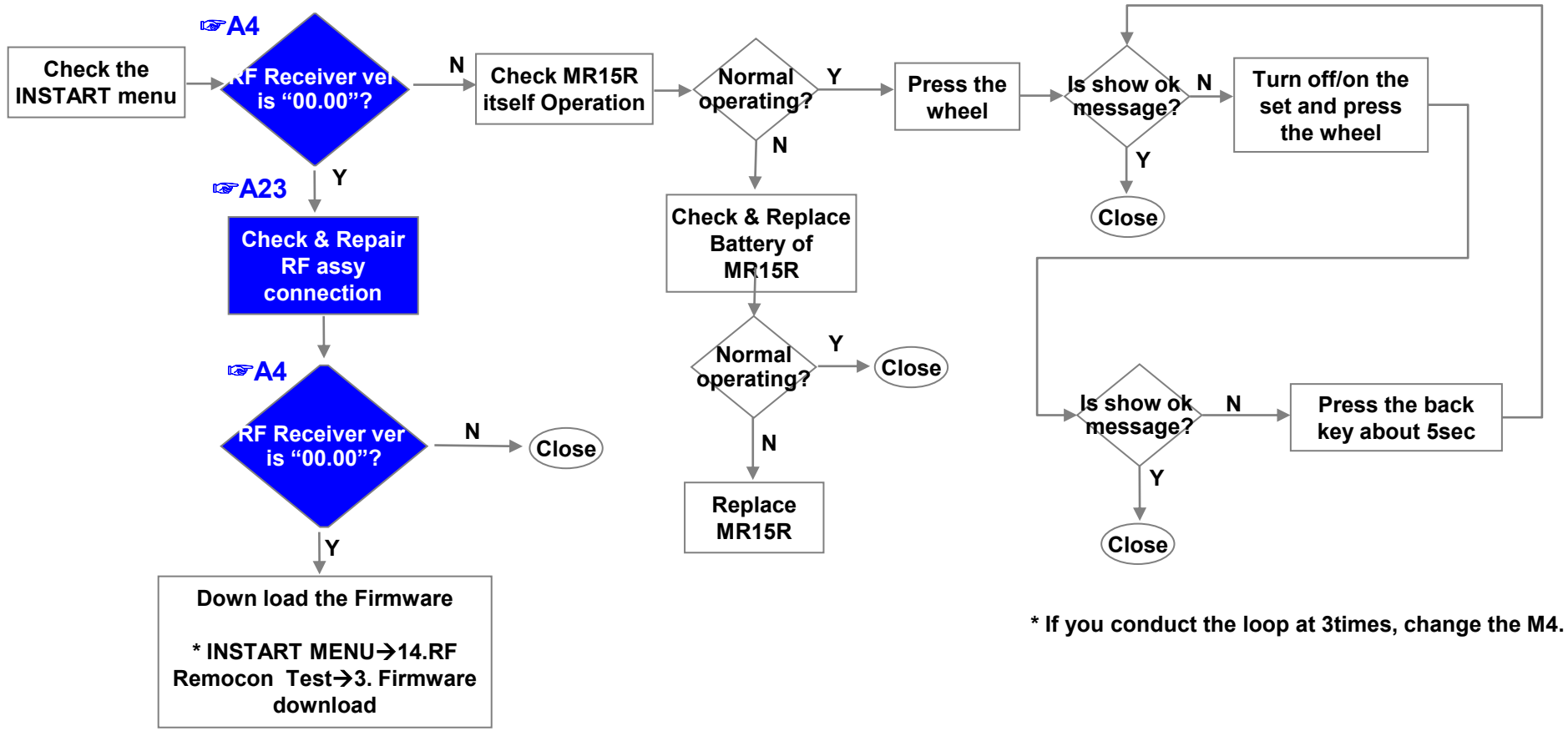
	Error symptom	D. Function error	Established date		
		Remote control & Local switch checking	Revised date		10/16

1. Remote control(R/C) operating error



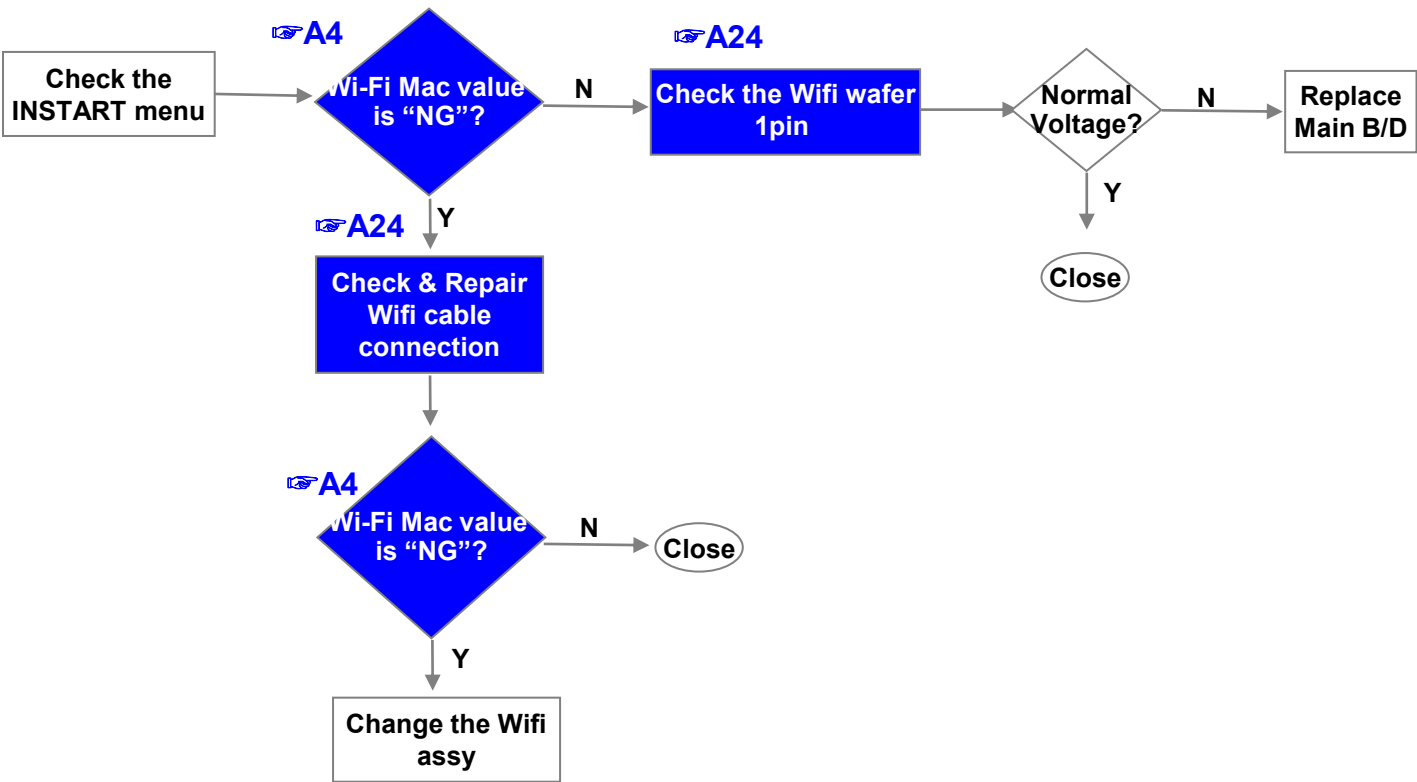
	Error symptom	D. Function error	Established date		
		MR13 operating checking	Revised date		11/16

2. MR15R(Magic Remocon) operating error



	Error symptom	D. Function error	Established date		
		Wifi operating checking	Revised date		12/16

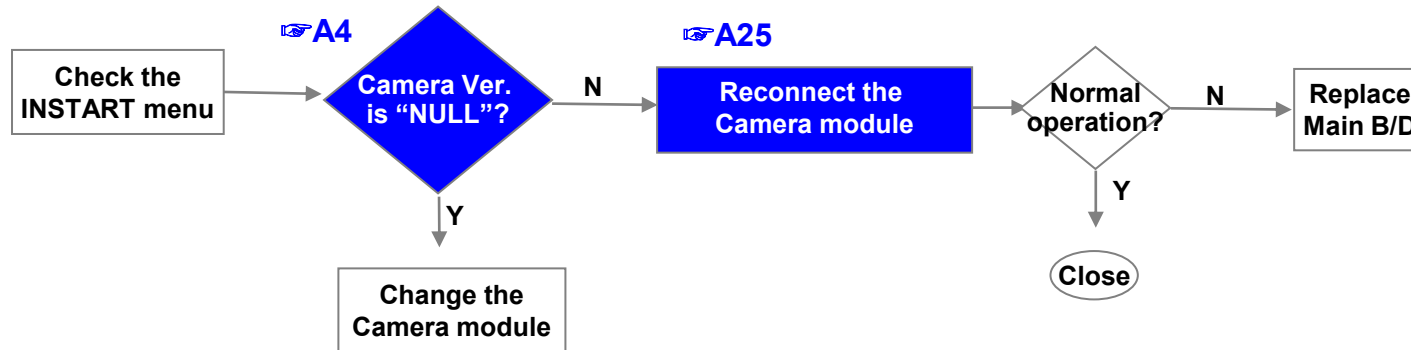
3.Wifi operating error



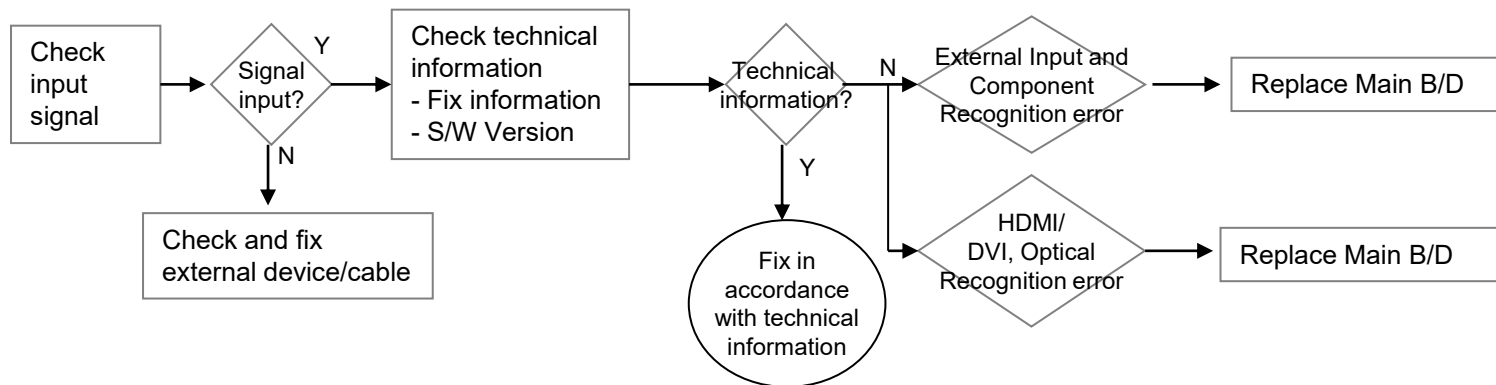
	Error symptom	D. Function error	Established date		
		Camera operating checking	Revised date		13/16

4.Camera operating error (Camera operation is not support)

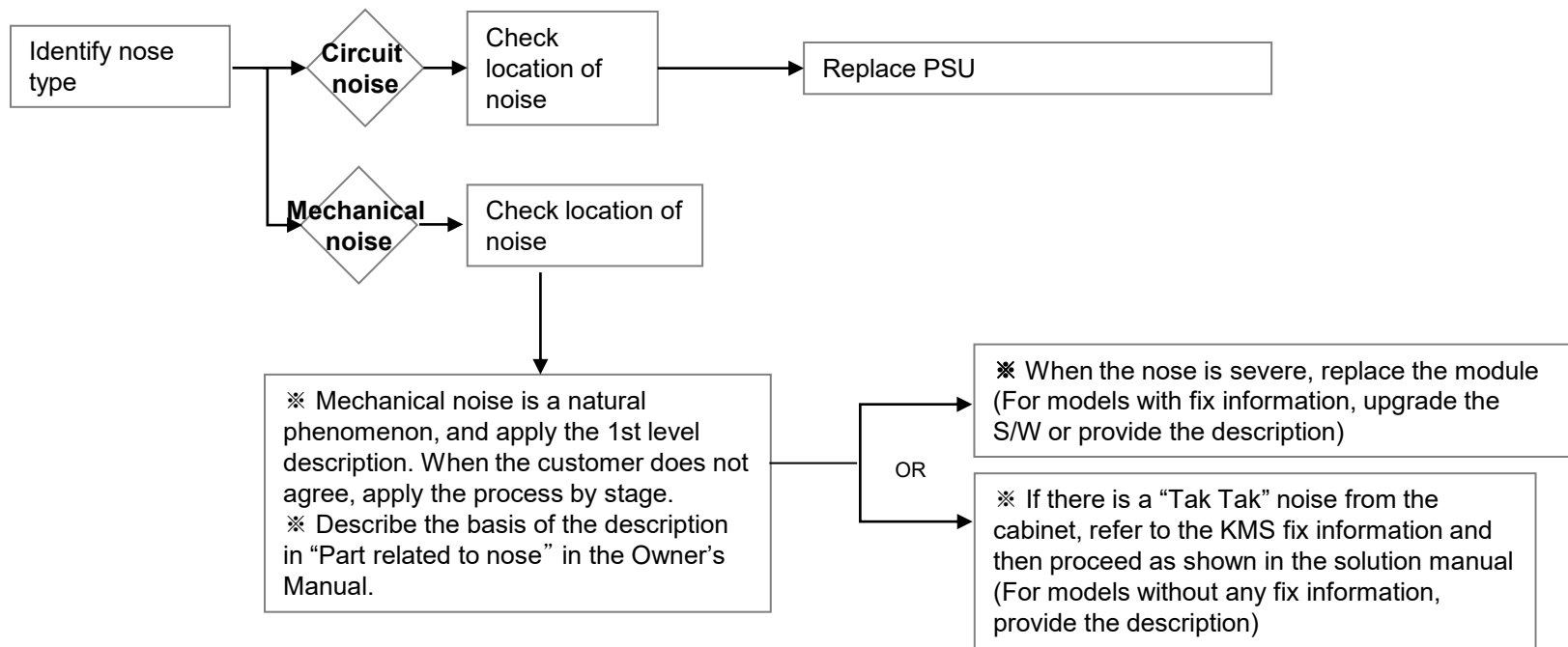
* UH61 series isn't support the camera.



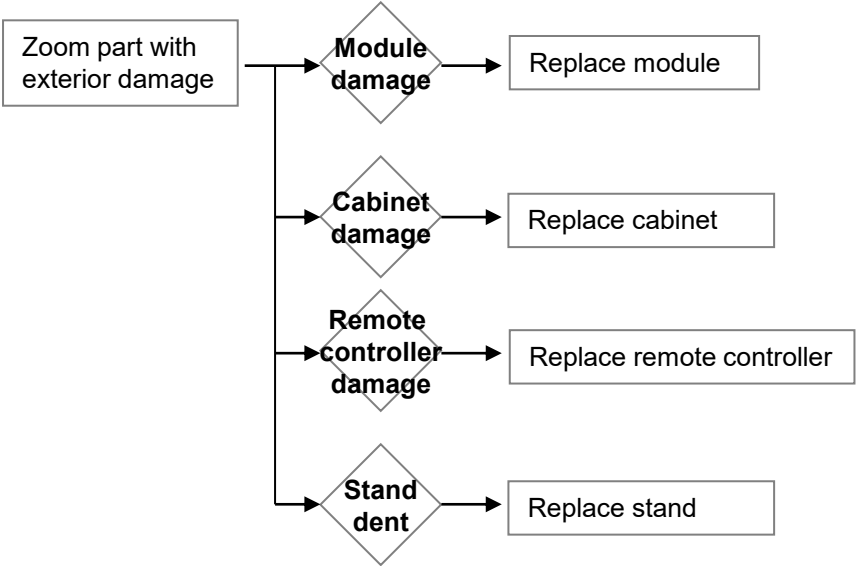
	Error symptom	D. Function error	Established date		
		External device recognition error	Revised date		14/16



	Error symptom	E. Noise	Established date		
		Circuit noise, mechanical noise	Revised date		15/16



	Error symptom	F. Exterior defect	Established date		
		Exterior defect	Revised date		16/16



Contents of Standard Repair Process Detail Technical Manual

No.	Error symptom	Content	Page	Remarks
1	A. Video error_ No video/Normal audio	Check LCD back light with naked eye	A1	
2		Check White Balance value	A2	
3	A. Video error_ video error /Video lag/stop	TUNER input signal strength checking method	A3	
4		Version checking method	A4	
5		Tuner Checking Part	A5	
6	A. Video error _Vertical/Horizontal bar, residual image, light spot	Connection diagram	A6	
7	A. Video error_ Color error	Check Link Cable reconnection condition	A7	
8		Adjustment Test pattern – ADJ Key	A8	
9	<Appendix> Defected Type caused by T-Con/ Inverter/ Module	Exchange Main Board (1)	A-1/5	
10		Exchange Main Board (2)	A-2/5	
11		Exchange Power Board (PSU)	A-3/5	
12		Exchange Module (1)	A-4/5	
13		Exchange Module (2)	A-5/5	

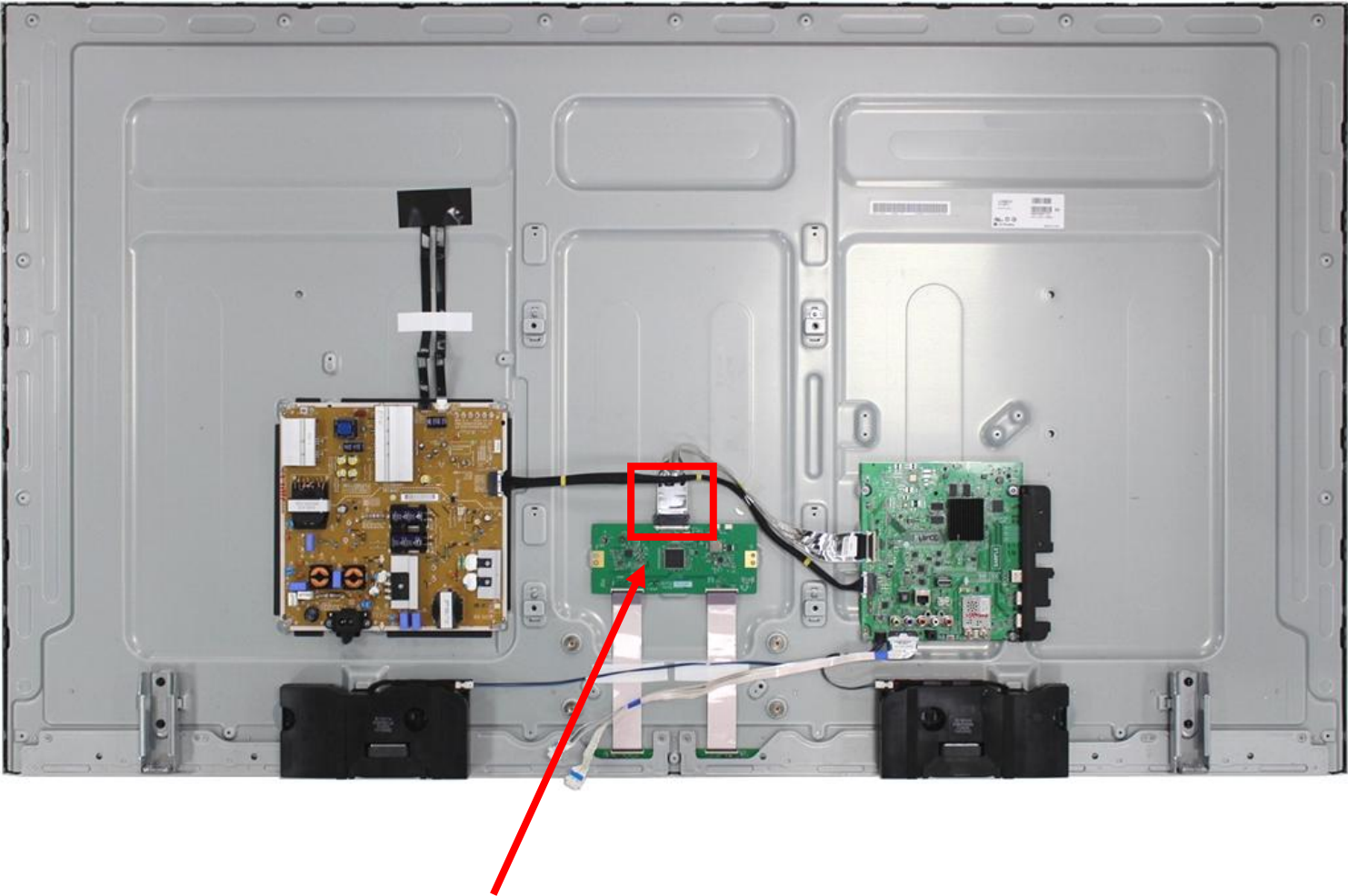
Contents of Standard Repair Process Detail Technical Manual

No.	Error symptom	Content	Page	Remarks
14	B. Power error_ No power	Check front display LED	A17	
15		Check power input Voltage & ST-BY 3.5V	A18	
16	B. Power error_Off when on, off while viewing	POWER OFF MODE checking method	A19	
17	C. Audio error_ No audio/Normal video	Checking method in menu when there is no audio	A20	
18		Voltage and speaker checking method when there is no audio	A21	
19	D. Function error	Remote controller operation checking method	A22	
20		Motion Remote operation checking method	A23	
21		Wifi operation checking method	A24	
22		Camera operation checking method	A25	Not Used
23	E. Etc	Tool option changing method	A26	

Standard Repair Process Detail Technical Manual

	Error symptom	A. Video error_No video/Normal audio	Established date		
	Content	Check LCD back light with naked eye	Revised date		A1

<UH61 series>



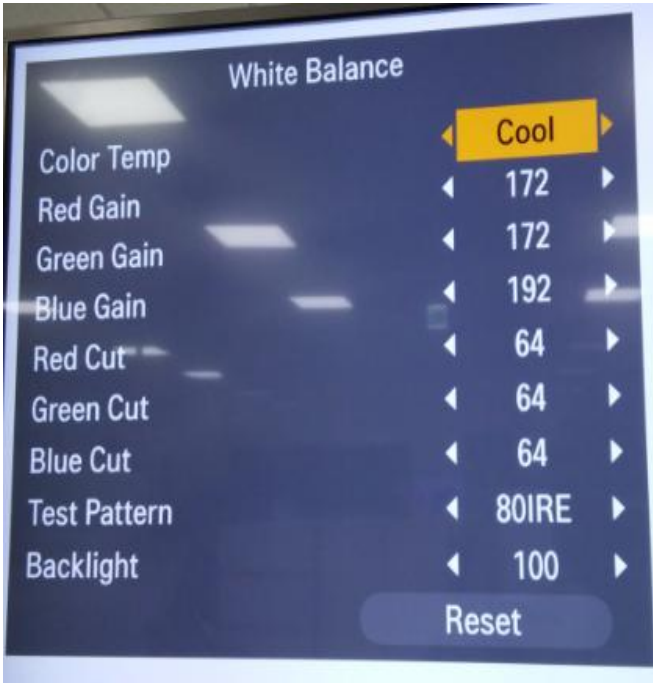
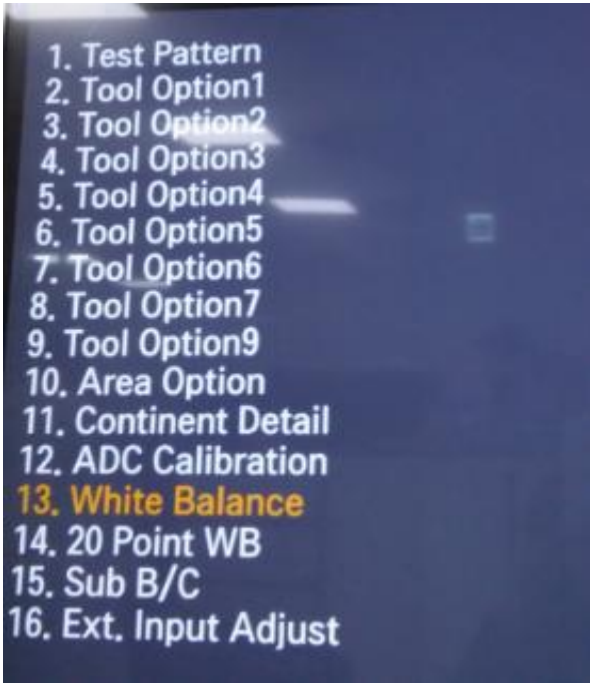
After turning on the power and disassembling the case, check with the naked eye, whether you can see light from locations.

* Pictures may be slightly different by model.

Standard Repair Process Detail Technical Manual

	Error symptom	A. Video error_No video/Normal audio	Established date		
	Content	Check White Balance value	Revised date		A2

<ALL MODELS>



Entry method

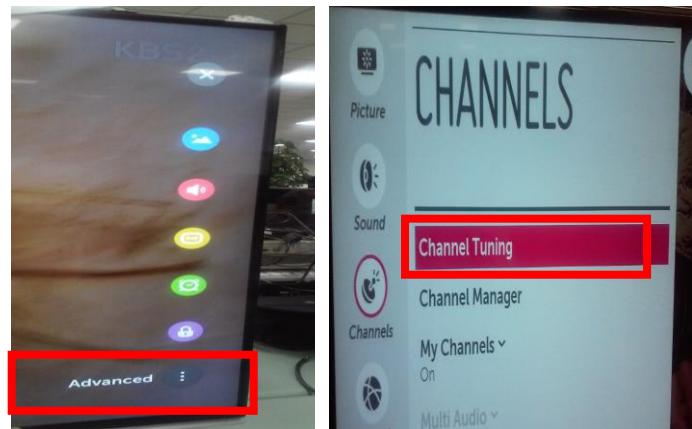
1. Press the ADJ button on the remote controller for adjustment.
2. Enter into White Balance of item 6.
3. After recording the R, G, B (GAIN, Cut) value of Color Temp (Cool/Medium/Warm), re-enter the value after replacing the MAIN BOARD.

* Pictures may be slightly different by model.

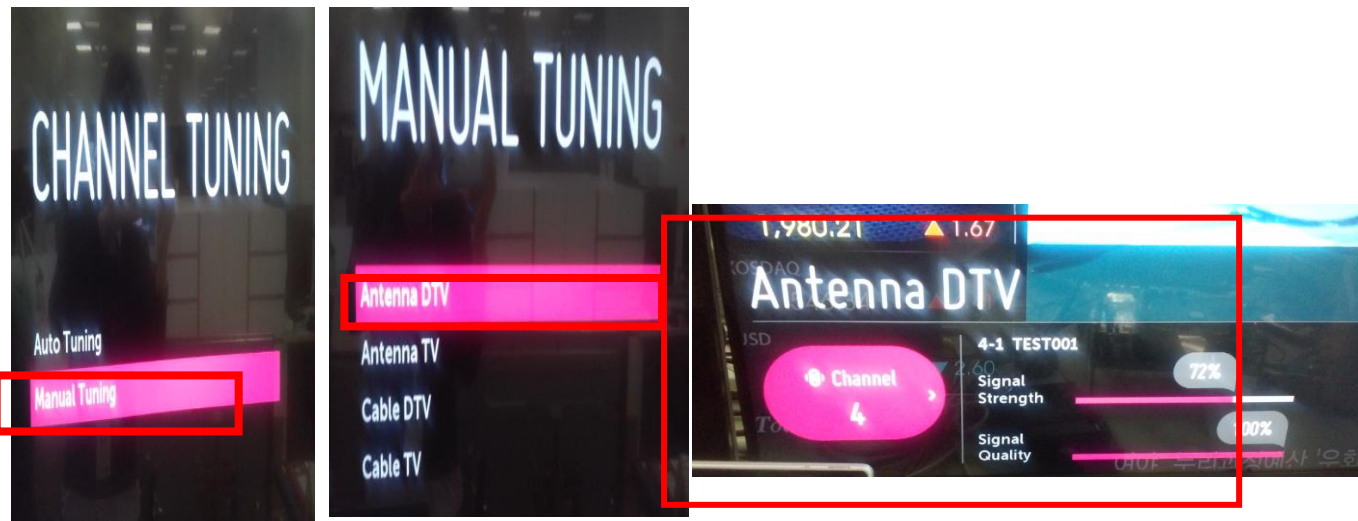
Standard Repair Process Detail Technical Manual

	Error symptom	A. Video error_Video error, video lag/stop	Established date		
	Content	TUNER input signal strength checking method	Revised date		A3

<ALL MODELS>



Advanced → Channels → Channel Tuning → Manual Tuning



When the signal is strong, use the attenuator (-10dB, -15dB, -20dB etc.)



* Pictures may be slightly different by model.

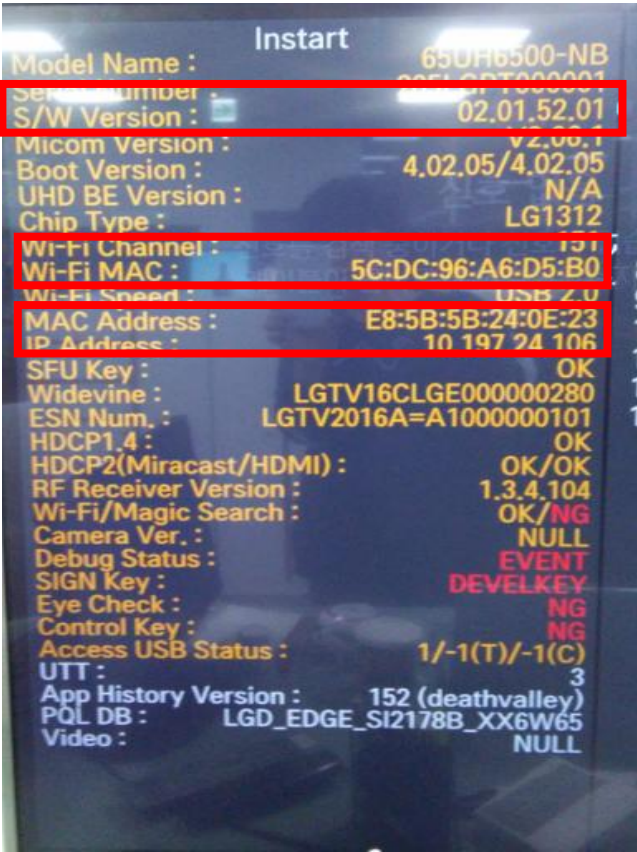
Standard Repair Process Detail Technical Manual

	Error symptom	A. Video error_Video error, video lag/stop	Established date		
	Content	Version checking method	Revised date		A4

<ALL MODELS>

1. Checking method for remote controller for adjustment

Version

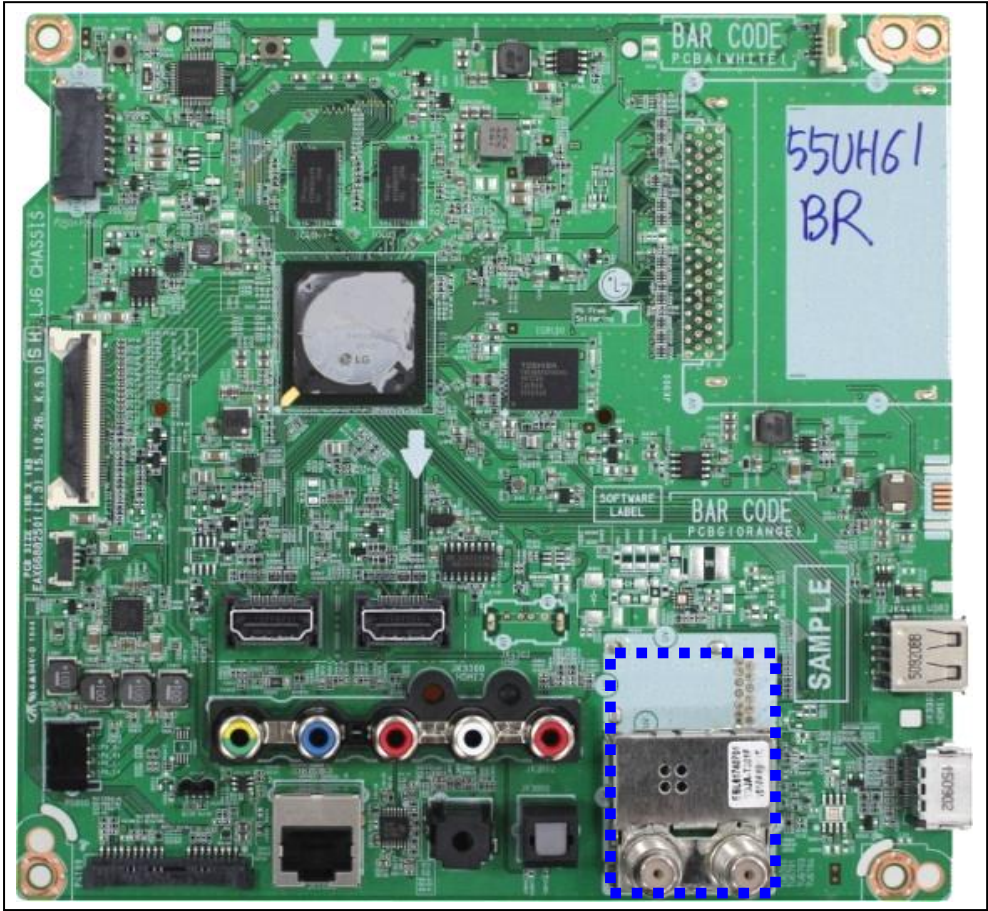


Press the IN-START with the remote controller for adjustment

Standard Repair Process Detail Technical Manual

	Error symptom	A. Video error_Video error, video lag/stop	Established date		
	Content	TUNER checking part	Revised date		A5

<ALL MODELS>

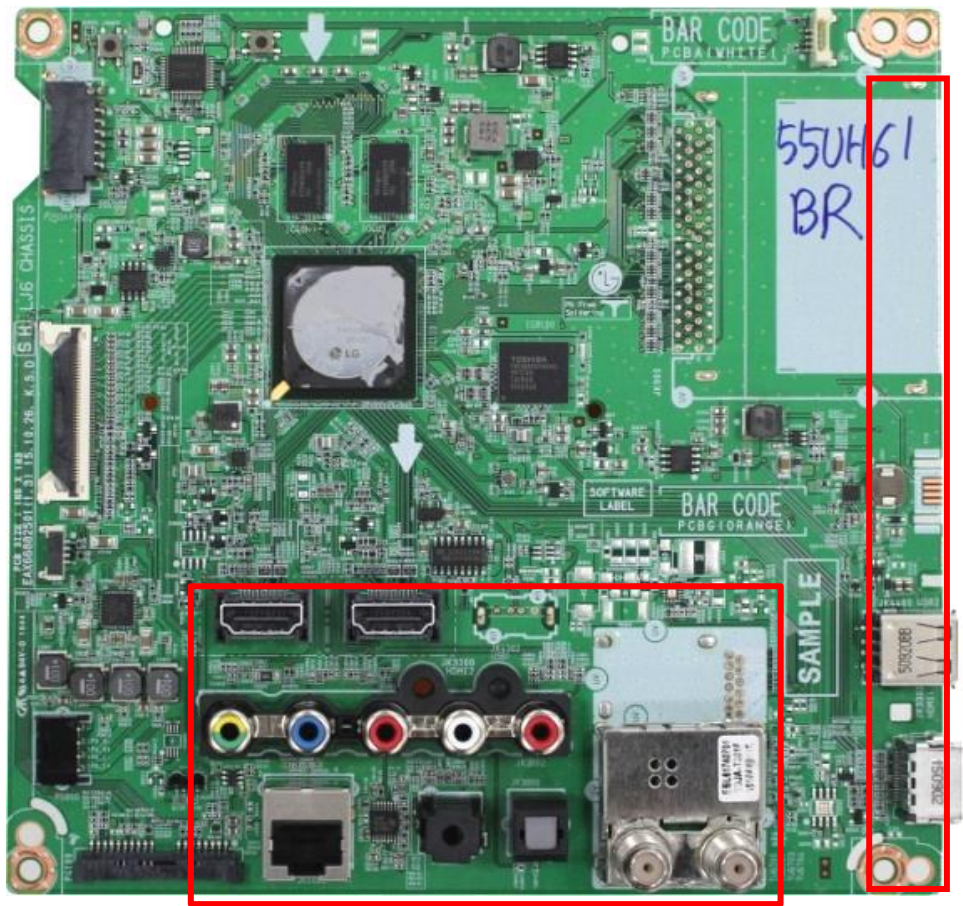


- Checking method:
1. Check the signal strength or check whether the screen is normal when the external device is connected.
 2. After measuring each voltage from power supply, finally replace the MAIN BOARD.
 3. If you can't see the UHD live TV, please connect signal at left side of jack. (Korea model only)

Standard Repair Process Detail Technical Manual

	Error symptom	A. Video error _Vertical/Horizontal bar, residual image, light spot	Established date		
	Content	Connection diagram (1)	Revised date		A6

<ALL MODELS>

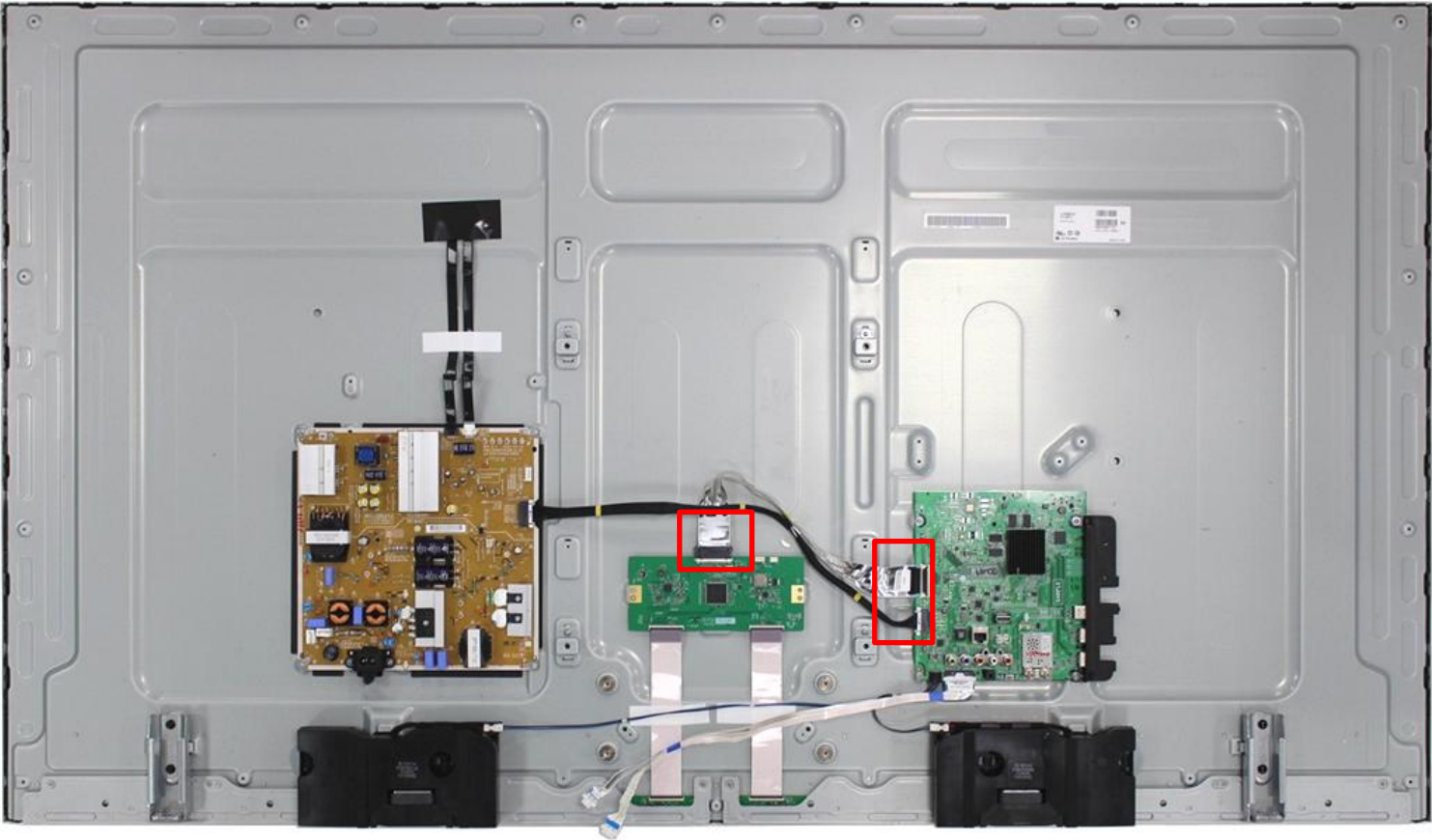


As the part connecting to the external input, check the screen condition by signal

Standard Repair Process Detail Technical Manual

	Error symptom	A. Video error_Color error	Established date		
	Content	Check Link Cable(VX1) reconnection condition	Revised date		A7

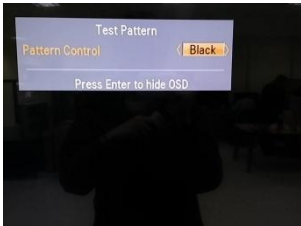
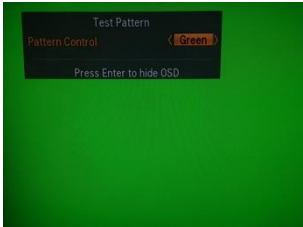
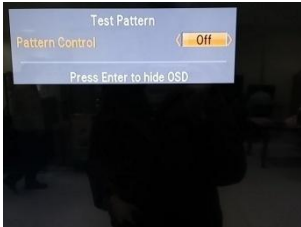
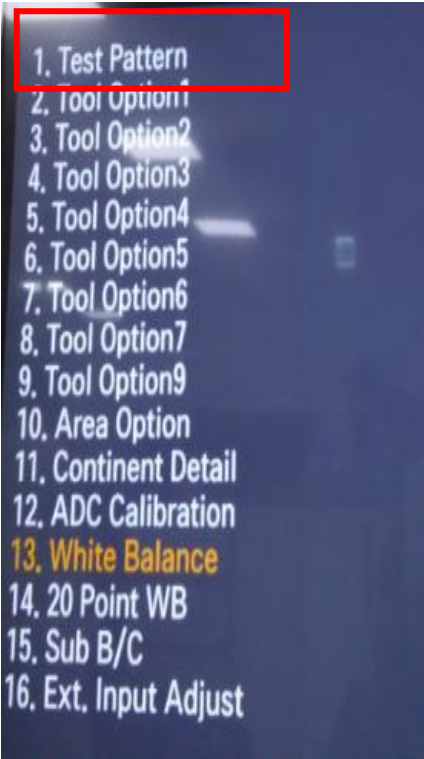
<ALL MODELS>



Check the contact condition of the Link Cable, especially dust or mis insertion.

Standard Repair Process Detail Technical Manual

	Error symptom	A. Video error_Color error	Established date		
	Content	Adjustment Test pattern - ADJ Key	Revised date		A8



You can view 6 types of patterns using the ADJ Key

Checking item : 1. Defective pixel 2. Residual image 3. MODULE error (ADD-BAR,SCAN BAR..)
4.Video error (Classification of MODULE or Main-B/D!)

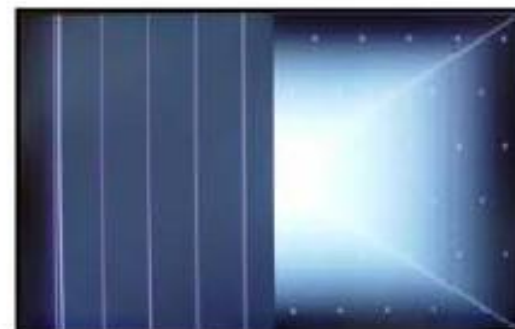
Appendix : Exchange Main Board (1)



Solder defect, CNT Broken



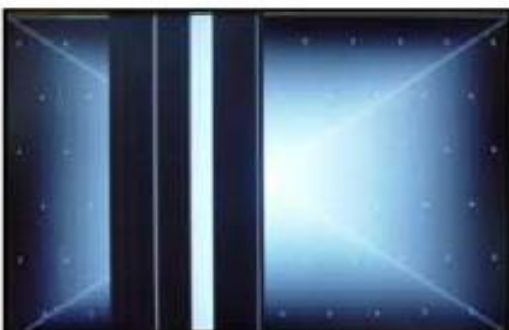
Solder defect, CNT Broken



Solder defect, CNT Broken



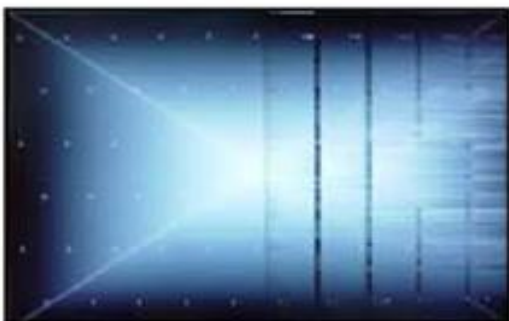
Solder defect, CNT Broken



Solder defect, CNT Broken



Abnormal Power Section



Solder defect, Short/Crack

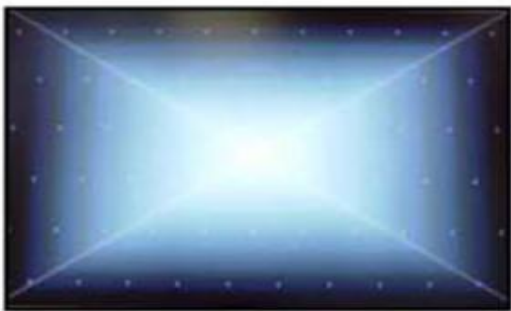


Abnormal Power Section



Solder defect, Short/Crack

Appendix : Exchange Main Board (2)



Abnormal Power Section



Abnormal Power Section



Solder defect, Short/Crack



Solder defect, Short/Crack



Fuse Open, Abnormal power section



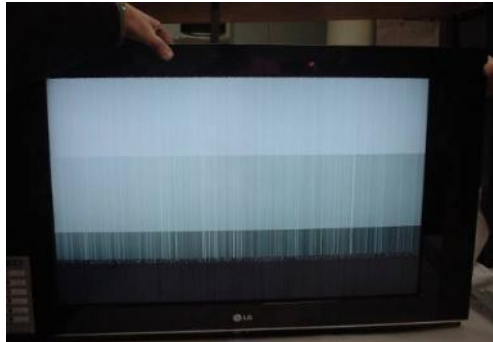
Abnormal Display



GRADATION



Noise



GRADATION

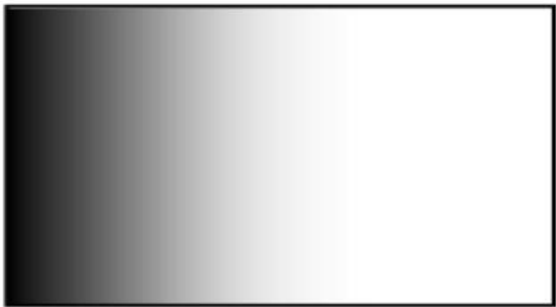
Appendix : Exchange Power Board (PSU)



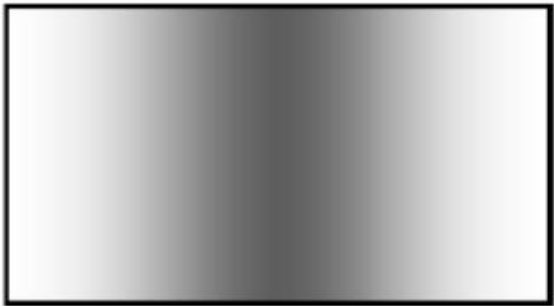
No Light



Dim Light



Dim Light



Dim Light



No picture/Sound Ok

Appendix : Exchange the Module (1)



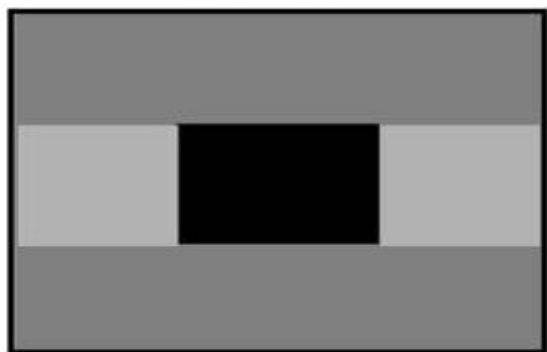
Panel Mura, Light leakage



Panel Mura, Light leakage



Press damage



Crosstalk



Press damage



Crosstalk

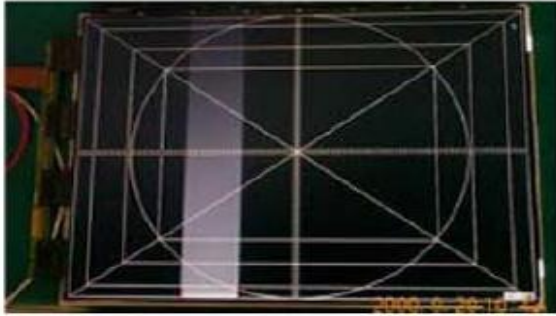


Press damage

Un-repairable Cases

In this case please exchange the module.

Appendix : Exchange the Module (2)



Vertical Block
Source TAB IC Defect



Vertical Line
Source TAB IC Defect



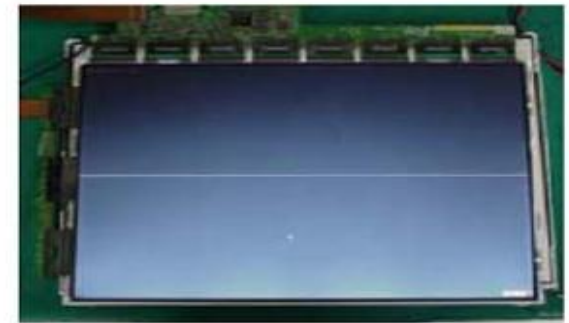
Vertical Block
Source TAB IC Defect



Horizontal Block
Gate TAB IC Defect



Horizontal Block
Gate TAB IC Defect



Horizontal line
Gate TAB IC Defect

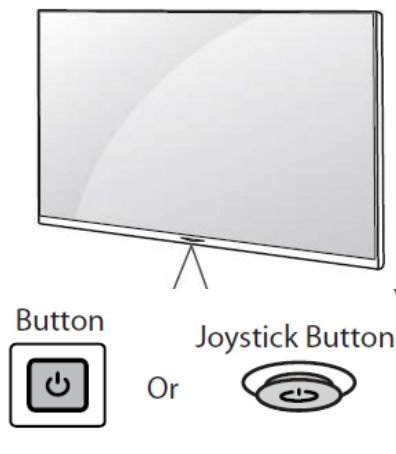


Horizontal Block
Gate TAB IC Defect

Un-repairable Cases
In this case please exchange the module.

Standard Repair Process Detail Technical Manual

	Error symptom	B. Power error _No power	Established date		
	Content	Check front Power Indicator	Revised date		A17



* 43/49UH61: Only power on/off button

ST-BY condition: On or Off
Power ON condition: Turn Off

Adjusting the Menu

When the TV is turned on, press ⏻ button one time. You can adjust the Menu items pressing or moving the buttons.

⏻	Turns the power off.
⚙️	Accesses the setting menu.
✕	Clears on-screen displays and returns to TV viewing.
📺	Changes the input source.

* Pictures may be slightly different by model.

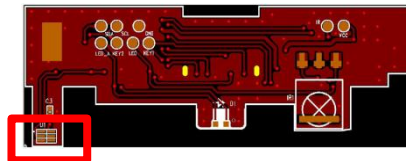
	Power On (Press) Power Off (Press and Hold) ¹
	Volume Control
	Channels Control

2. Luminance sensor

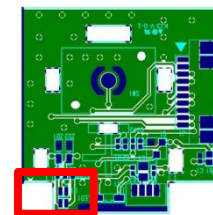
TV sensor detects the ambient lighting and automatically adjusts the screen brightness.

55/60/65UH61 model : luminance sensor

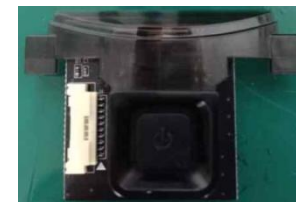
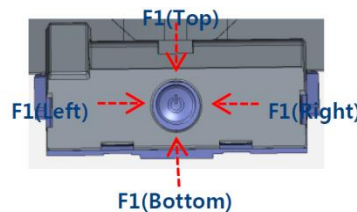
43/49UH61 : RGB sensor



55/60/65UH61



43/49UH61



Standard Repair Process Detail Technical Manual

	Error symptom	B. Power error _No power	Established date		
	Content	Check power input voltage and ST-BY 3.5V	Revised date		A18

Check the DC 13.2V



P201			
Type : SMAW200-H18S5K			
Maker : YEONHO			
Pin No.	Signal	Pin No.	Signal
1	GND	2	GND
3	PWR_ON	4	P-DIM2
5	GND	6	13.2V
7	13.2V	8	13.2V
9	13.2V	10	13.2V
11	GND	12	GND

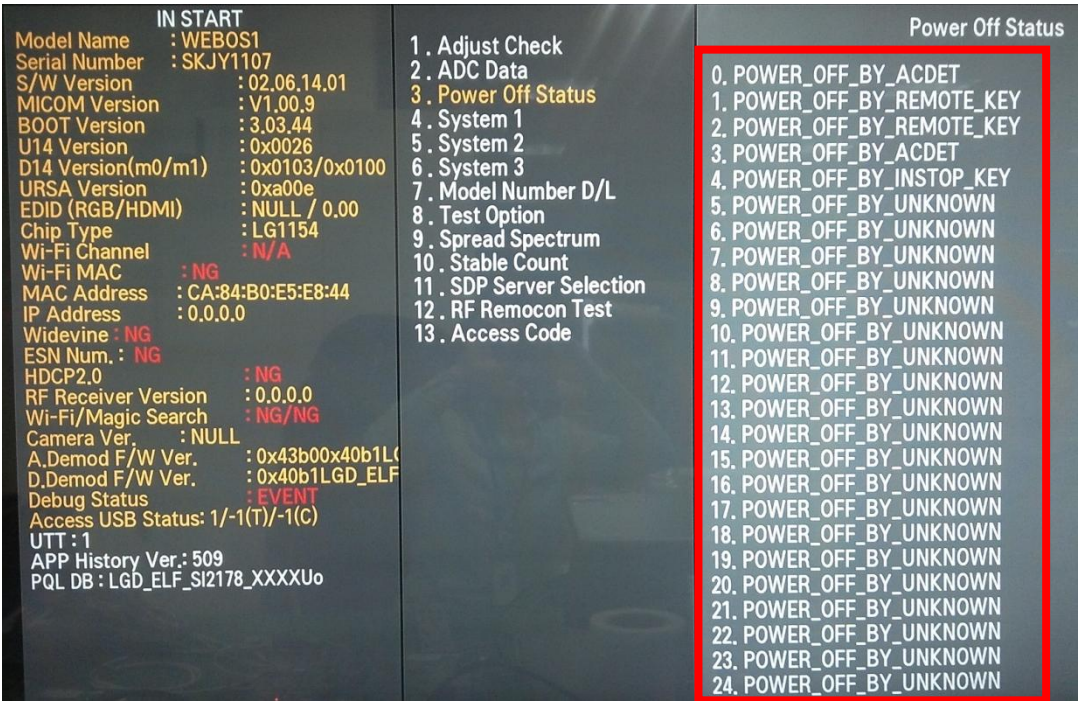
* Pictures may be slightly different by model.

A18

Standard Repair Process Detail Technical Manual

	Error symptom	B. Power error _Off when on, off whiling viewing	Established date		
	Content	POWER OFF MODE checking method	Revised date		A19

<ALL MODELS>



Entry method

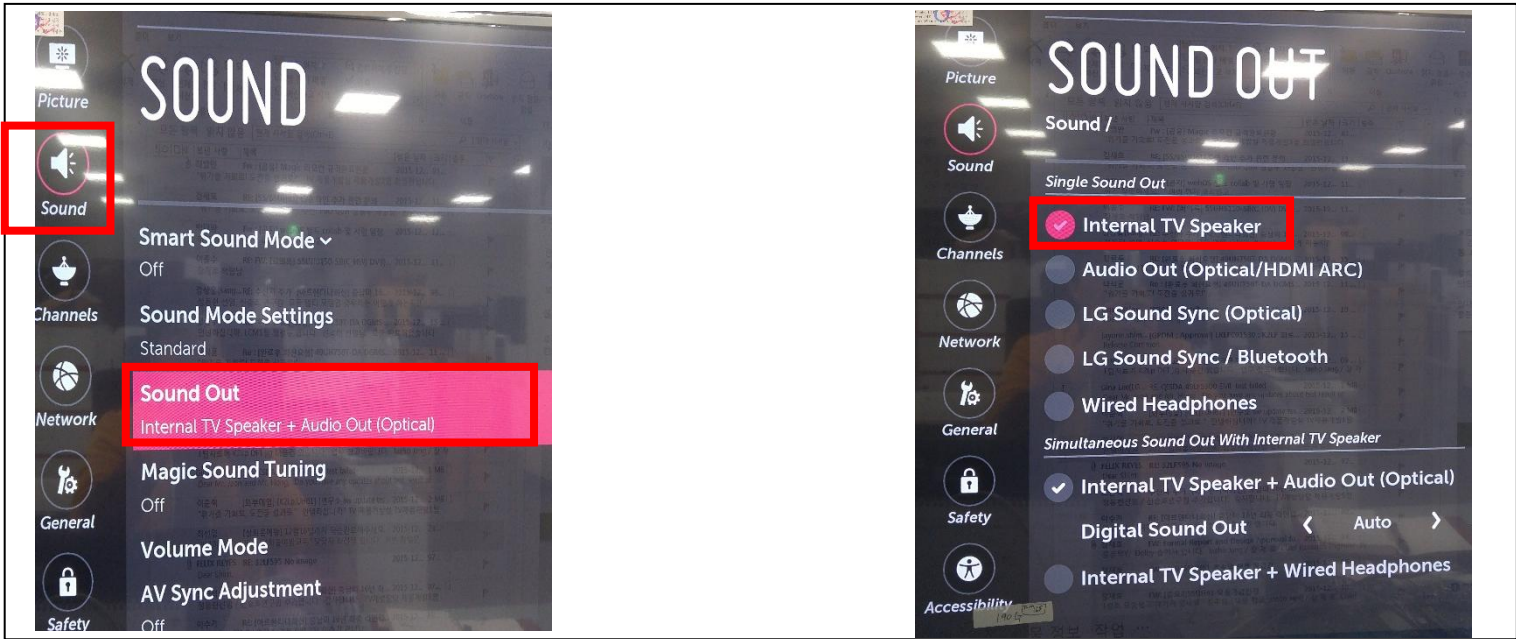
1. Press the IN-START button of the remote controller for adjustment
2. Check the entry into adjustment item 3

* Pictures may be slightly different by model.

Standard Repair Process Detail Technical Manual

	Error symptom	C. Audio error_No audio/Normal video	Established date		
	Content	Checking method in menu when there is no audio	Revised date		A20

<ALL MODELS>



Checking method

1. Press the Setting button on the remote controller
2. Select the Sound function of the Menu
3. Select the Sound Out
4. Select Internal TV Speaker

* Pictures may be slightly different by model.

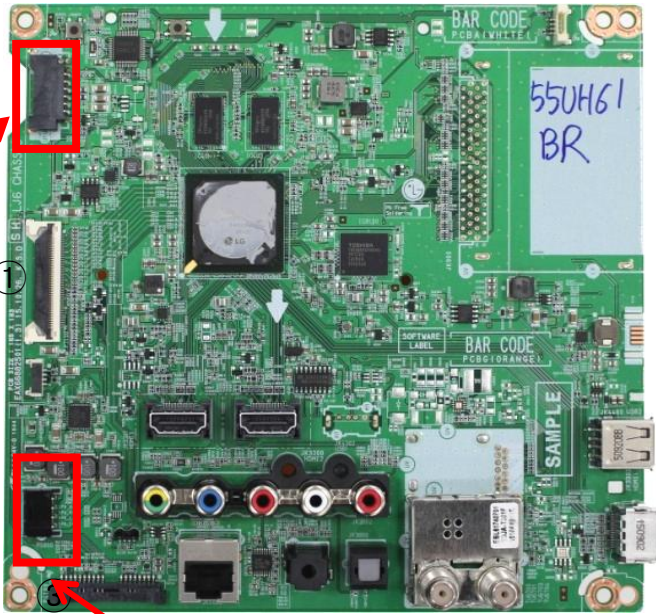
Standard Repair Process Detail Technical Manual

	Error symptom	C. Audio error_No audio/Normal video	Established date		
	Content	Voltage and speaker checking method when there is no audio	Revised date		A21

<UH61 series>



Pin No.	Signal	Pin No.	Signal
1	GND	2	GND
3	PWR_ON	4	P-DIM2
5	GND	6	13.2V
7	13.2V	8	13.2V
9	13.2V	10	13.2V
11	GND	12	GND



Checking order when there is no audio

1.Check the contact condition of or 13V connector of Main Board

2. Measure the 13V input voltage supplied from Power Board
(If there is no input voltage, remove and check the connector)

3.Connect the tester RX1 to the speaker terminal and if you hear the Chik Chik sound when you touch the GND and output terminal, the speaker is normal.

1	SPK_R-
2	SPK_R+
3	SPK_L-
4	SPK_L+

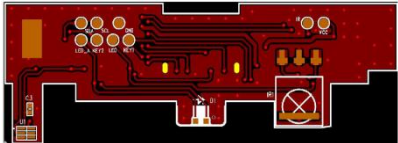
* Pictures may be slightly different by model.

Standard Repair Process Detail Technical Manual

	Error symptom	D. Function error	Established date		
	Content	Remote controller operation checking method	Revised date		A22

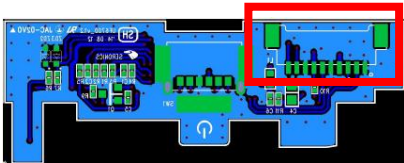
<UH61 series>

① IR & Control Key front

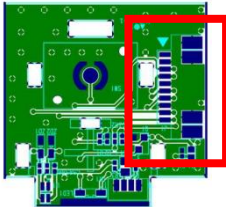


55/60/65UH61

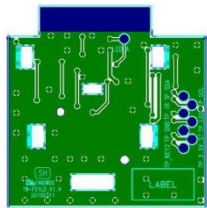
IR & Control Key Rear



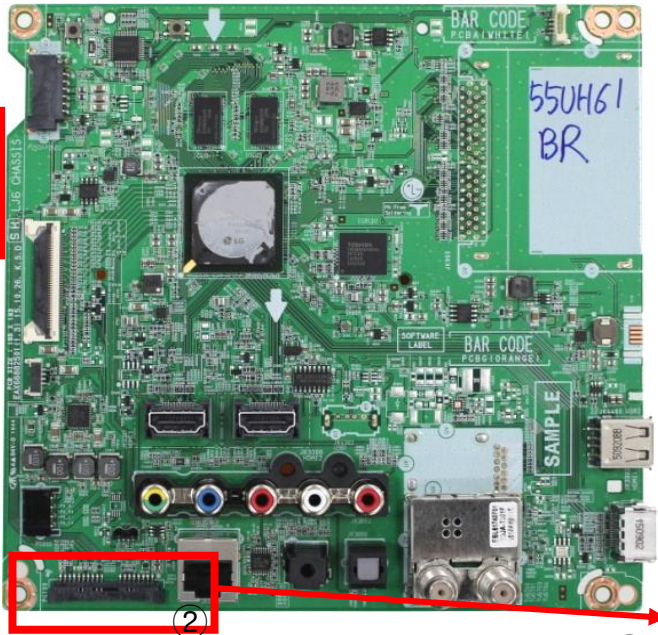
55/60/65UH61



43/49UH61



43/49UH61



1	+3.5V_WIFI
2	WIFI_DM_JACK
3	WIFI_DP_JACK
4	GND
5	WOL/WIFI_POWER_ON_JACK
6	3D_SYNC_RF_JACK
7	BT_RESET_JACK
8	GND
12	EYE_SDA_JACK
13	EYE_SCL_JACK
14	GND
15	IR
16	LED_R_JACK
17	GND
18	+3.5V_ST
19	KEY2_JACK
20	KEY1_JACK
21	GND

Checking order to check remote controller

Checking order

1. Check IR cable condition between IR & Main board.(Check picture number① and ②)
2. Check the standby 3.5V on the terminal 18 pin (③)
3. AS checking the Pre-Amp(IR LED light) , the power is in ON condition, an Analog Tester needle should move slowly, otherwise, it's defective.

* Pictures may be slightly different by model.

Standard Repair Process Detail Technical Manual

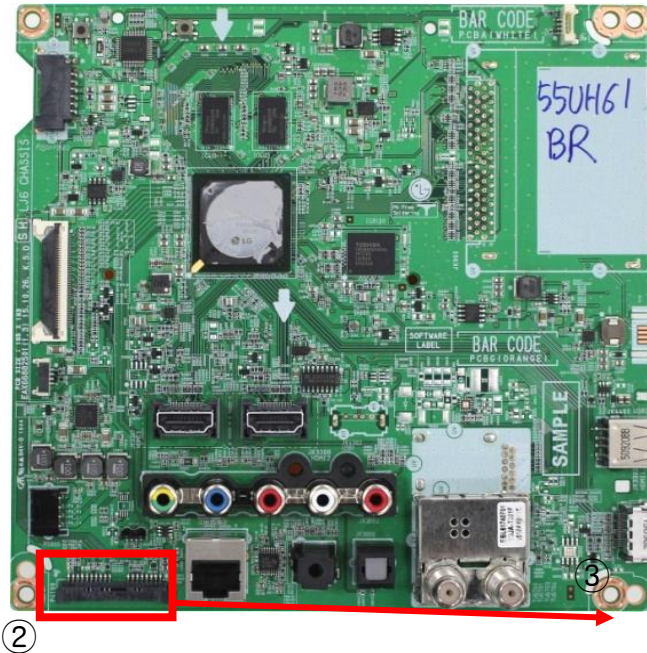
	Error symptom	D. Function error	Established date		
	Content	Remote controller operation checking method	Revised date		A23/24

< UH61 series >

① Wifi & BT Front



Wifi & BT Rear



1	+3.5V_WIFI
2	WIFI_DM_JACK
3	WIFI_DP_JACK
4	GND
5	WOL/WIFI_POWER_ON_JACK
6	3D_SYNC_RF_JACK
7	BT_RESET_JACK
8	GND
12	EYE_SDA_JACK
13	EYE_SCL_JACK
14	GND
15	IR
16	LED_R_JACK
17	GND
18	+3.5V_ST
19	KEY2_JACK
20	KEY1_JACK
21	GND

Checking order to check motion remote/wifi

Checking order

1. Check BT/Wifi cable condition between BT/Wifi assy & Main board.
2. Check the 3.5V on the terminal 1 (+3.5V_WIFI)

* Pictures may be slightly different by model.