



LG
Life's Good

Internal Use Only

LED TV

SERVICE MANUAL

CHASSIS : LA66H

MODEL : 49LH6000 49LH6000-UB

CAUTION

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



P/NO : MFL69375706 (1601-REV00)

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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.

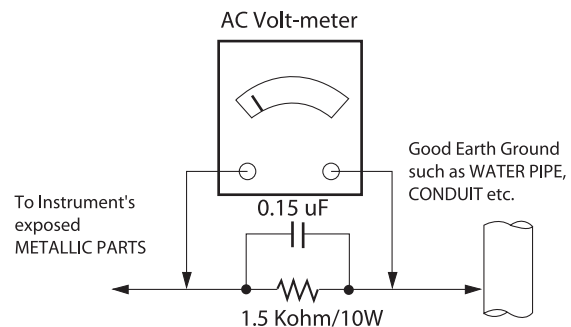
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 μ F capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

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 LA66H chassis

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.

3. Test method

- (1) Performance: LGE TV test method followed
- (2) Demanded other specification
 - Safety : UL, CSA, CE, IEC specification
 - EMC : FCC, ICES, CE, IEC specification
 - Wireless : Wireless HD Specification (Option)

4. General Specification

4.1. Model Specification

No	Item	Specification		Remark
1	Receiving system	ATSC / NTSC-M / 64 QAM / 256 QAM		
2	Available Channel	VHF : 2~13		
		UHF : 14~69		
		DTV : 2-69		
		CATV : 1 ~ 135		
		CADTV : 1 ~ 135		
3	Video Input	AC 100 ~ 240V@ 50/60Hz		
4	Market	North America		
5	Screen Size	32", 40", 43", 49", 55"		
6	Aspect Ratio	16:9		
7	Tuning System	FS		
8	LCD Module	LC320DXE-FJM1	LGD	32LH600B-UB
		HC320DXN-ABRR1	HEESUNG (BOE)	32LH600B-UB
		LC430DUE-FJM1	LGD	43LH6000-UB
		NC430DUE-VBDN1	newoptics (BOE)	43LH6000-UB
		LC490DUE-FJM1	LGD	49LH6000-UB
		HC490DUN-ABRR1	HEESUNG (BOE)	49LH6000-UB
		LC550EUE-FJM1	LGD	55LH6000-UB
		HC550EUN-VSQR1	HEESUNG(CSOT)	55LH6000-UB
9	Operating Environment	Temp : 0 ~ 40 deg Humidity : ~ 80 %		
10	Storage Environment	Temp. : -20 ~ 60 deg Humidity : ~ 85%		

5. External input format

5.1. 2D Mode

5.1.1. 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

5.1.2. HDMI Input (PC/DTV)

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed		Remark
	HDMI-PC				DDC		
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 (43/49/55LH6000) FHD only (43/49/55LH66xx)
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(43/49/55LH6000) FHD only (43/49/55LH66xx)

	HDMI-DTV				
No	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed
1	640*480	31.46	59.94	25.125	SDTV 480P
2	640*480	31.50	60.00	25.125	SDTV 480P
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	23.97	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	67.43	59.94	148.352	HDTV 1080P
14	1920*1080	67.50	60.00	148.50	HDTV 1080P
15	3840*2160	67.5	30.00	297.00	UDTV 2160P
16	3840*2160	61.43	29.97	296.703	UDTV 2160P

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

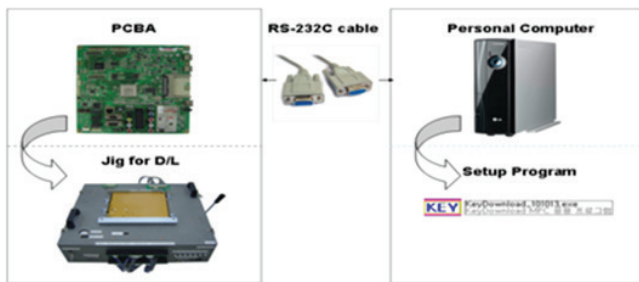
- (1) Key Write: Com 1,2,3,4 and 115200 (Baudrate)
- (2) Barcode: Com 1,2,3,4 and 9600 (Baudrate)

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

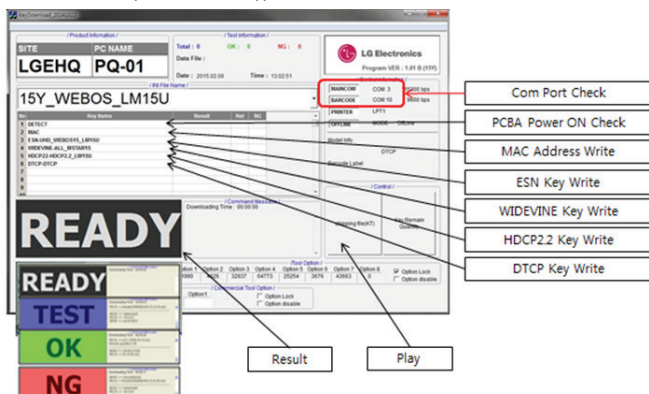


4.2.5. Download

(Caution)

You need to Access USB certification to key download

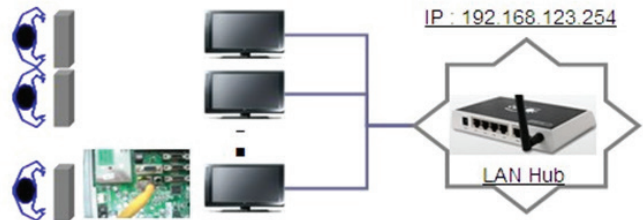
- (1) Models (MAC + Widevine + ESN + HDCP2.0 + DTCP(US,Canada)) : North America model



4.3. LAN Inspection

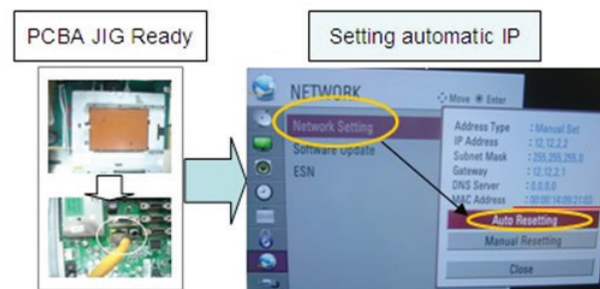
4.3.1. Equipment & Condition

- 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)

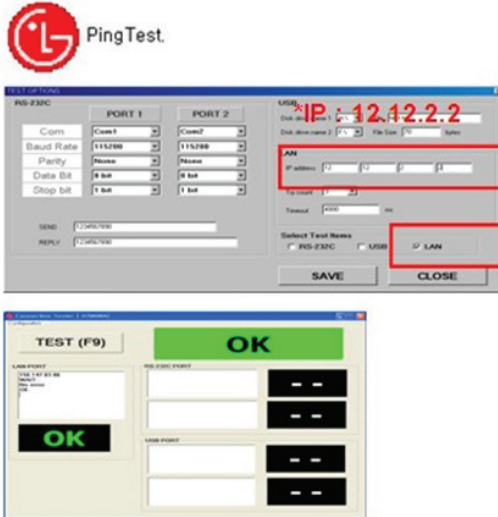
Connect SET → LAN port == PC → LAN Port



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

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 remote.(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

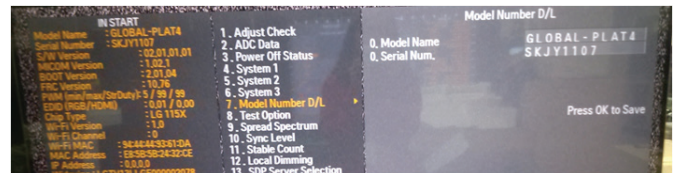
- A. Serial number D/L is using of scan equipment.
- B. Setting of scan equipment operated by Manufacturing Technology Group.
- C. Serial number D/L must be conformed when it is produced in production line, because serial number D/L is mandatory by D-book 4.0

* 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 controller.
- 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.



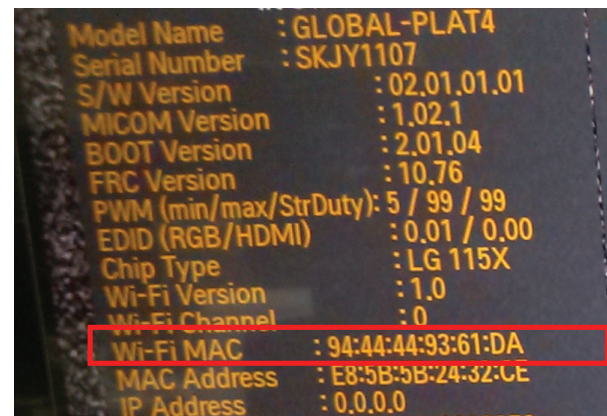
- d. Check the model name INSTART menu -> Factory name displayed
- e. Check the Diagnostics (DTV country only) -> Buyer model displayed

4.5. WIFI MAC ADDRESS CHECK

4.5.1. Using RS232 Command

	Command	Set ACK
Transmission	[A][0][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

(EDID Download is not needed)

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
0	00	FF	FF	FF	FF	FF	FF	00	1E	6D	a				b	
10	c	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26	
20	0F	50	54	A1	8	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	40	84	63	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	40	84	63	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20			d		
70															01	e1
0	02	03	3A	F1	4E	10	9F	04	13	05	14	03	02	12	20	21
10	22	15	01	29	3D	06	C0	15	07	50				f		
20																
30		f			10	28	10	E3	05	03	01	02	3A	80	18	71
40	2D	40	58	2C	45	00	40	84	63	00	00	1E	01	1D	80	18
50	71	1C	16	20	58	2C	25	00	40	84	63	00	00	9E	01	1D
60	00	72	51	D0	1E	20	6E	28	55	00	40	84	63	00	00	1E
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	e2

- Ⓐ 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

- DTS - FHD /2D/8bit (40/43/49/55LH600x-xx - Default)

EDID Block 0, Bytes 0-127 [00H-7FH]

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
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	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	40	84	63	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	40	84	63	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	20	20	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	E5

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

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	02	03	23	F1	48	90	22	20	05	04	03	02	01	29	3D	06
10	C0	15	07	50	09	57	07	67	03	0C	00	20	00	80	1E	E3
20	05	00	00	02	3A	80	18	71	38	2D	40	58	2C	45	00	40
30	84	63	00	00	1E	01	1D	80	18	71	1C	16	20	58	2C	25
40	00	40	84	63	00	00	9E	01	1D	00	72	51	D0	1E	20	6E
50	28	55	00	40	84	63	00	00	1E	8C	0A	D0	8A	20	E0	2D
60	10	10	3E	96	00	40	84	63	00	00	18	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	65

EDID Block 1, Bytes 128-255 [80H-FFH] -HDMI 2

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	02	03	23	F1	48	90	22	20	05	04	03	02	01	29	3D	06
10	C0	15	07	50	09	57	07	67	03	0C	00	20	00	80	1E	E3
20	05	00	00	02	3A	80	18	71	38	2D	40	58	2C	45	00	40
30	84	63	00	00	1E	01	1D	80	18	71	1C	16	20	58	2C	25
40	00	40	84	63	00	00	9E	01	1D	00	72	51	D0	1E	20	6E
50	28	55	00	40	84	63	00	00	1E	8C	0A	D0	8A	20	E0	2D
60	10	10	3E	96	00	40	84	63	00	00	18	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	55

EDID Block 1, Bytes 128-255 [80H-FFH] -HDMI 3

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	02	03	23	F1	48	90	22	20	05	04	03	02	01	29	3D	06
10	C0	15	07	50	09	57	07	67	03	0C	00	30	00	80	1E	E3
20	05	00	00	02	3A	80	18	71	38	2D	40	58	2C	45	00	40
30	84	63	00	00	1E	01	1D	80	18	71	1C	16	20	58	2C	25
40	00	40	84	63	00	00	9E	01	1D	00	72	51	D0	1E	20	6E
50	28	55	00	40	84	63	00	00	1E	8C	0A	D0	8A	20	E0	2D
60	10	10	3E	96	00	40	84	63	00	00	18	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	45

- PCM - FHD /2D/8bit (40/43/49/55LH600x-xx)

EDID Block 0, Bytes 0-127 [00H-7FH]

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
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	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	40	84	63	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	40	84	63	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	20	20	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	E5

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

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	02	03	1D	F1	48	90	22	20	05	04	03	02	01	23	09	57
10	07	67	03	0C	00	10	00	80	1E	E3	05	00	00	02	3A	80
20	18	71	38	2D	40	58	2C	45	00	40	84	63	00	00	1E	01
30	1D	80	18	71	1C	16	20	58	2C	25	00	40	84	63	00	00
40	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00	40	84	63
50	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E	96	00	40
60	84	63	00	00	18	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	E0

EDID Block 1, Bytes 128-255 [80H-FFH]-HDMI 2

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	02	03	1D	F1	48	90	22	20	05	04	03	02	01	23	09	57
10	07	67	03	0C	00	20	00	80	1E	E3	05	00	00	02	3A	80
20	18	71	38	2D	40	58	2C	45	00	40	84	63	00	00	1E	01
30	1D	80	18	71	1C	16	20	58	2C	25	00	40	84	63	00	00
40	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00	40	84	63
50	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E	96	00	40
60	84	63	00	00	18	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	00

EDID Block 1, Bytes 128-255 [80H-FFH]-HDMI 3

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	02	03	1D	F1	48	90	22	20	05	04	03	02	01	23	09	57
10	07	67	03	0C	00	30	00	80	1E	E3	05	00	00	02	3A	80
20	18	71	38	2D	40	58	2C	45	00	40	84	63	00	00	1E	01
30	1D	80	18	71	1C	16	20	58	2C	25	00	40	84	63	00	00
40	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00	40	84	63
50	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E	96	00	40
60	84	63	00	00	18	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	00

• AC3 - FHD /2D/8bit (40/43/49/55LH600x-xx)

EDID Block 0, Bytes 0-127 [00H-7FH]

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
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	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	40	84	63	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	40	84	63	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	E5

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

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	02	03	20	F1	48	90	22	20	05	04	03	02	01	26	15	07
10	50	09	57	07	67	03	0C	00	10	00	80	1E	E3	05	00	00
20	02	3A	80	18	71	38	2D	40	58	2C	45	00	40	84	63	00
30	00	1E	01	1D	80	18	71	1C	16	20	58	2C	25	00	40	84
40	63	00	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00
50	40	84	63	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E
60	96	00	40	84	63	00	00	18	00	00	00	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

EDID Block 1, Bytes 128-255 [80H-FFH]-HDMI 2

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	02	03	20	F1	48	90	22	20	05	04	03	02	01	26	15	07
10	50	09	57	07	67	03	0C	00	20	00	80	1E	E3	05	00	00
20	02	3A	80	18	71	38	2D	40	58	2C	45	00	40	84	63	00
30	00	1E	01	1D	80	18	71	1C	16	20	58	2C	25	00	40	84
40	63	00	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00
50	40	84	63	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E
60	96	00	40	84	63	00	00	18	00	00	00	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

EDID Block 1, Bytes 128-255 [80H-FFH]-HDMI 3

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	02	03	20	F1	48	90	22	20	05	04	03	02	01	26	15	07
10	50	09	57	07	67	03	0C	00	30	00	80	1E	E3	05	00	00
20	02	3A	80	18	71	38	2D	40	58	2C	45	00	40	84	63	00
30	00	1E	01	1D	80	18	71	1C	16	20	58	2C	25	00	40	84
40	63	00	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00
50	40	84	63	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E
60	96	00	40	84	63	00	00	18	00	00	00	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

5.5. White Balance Adjustment

5.5.1. Overview

5.5.1.1. W/B adj. Objective & How-it-works

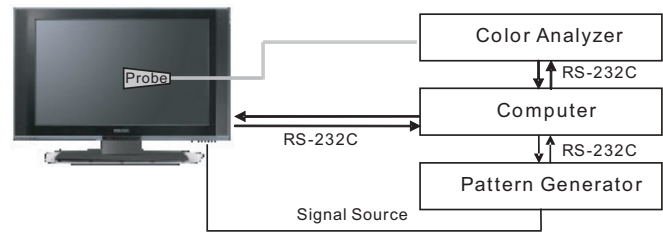
- (1) Objective: To reduce each Panel's W/B deviation
- (2) How-it-works: When R/G/B gain in the OSD is at 192, it means the panel is at its Full Dynamic Range. In order to prevent saturation of Full Dynamic range and data, one of R/G/B is fixed at 192, and the other two is lowered to find the desired value.
- (3) Adj. condition: normal temperature
 - Surrounding Temperature: 25 °C ± 5 °C
 - Warm-up time: About 5 Min
 - Surrounding Humidity: 20% ~ 80%

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/216-Gray(Model:217, Pattern:78)
 - Only when internal pattern is not available

※ Color Analyzer Matrix should be calibrated using CS-1000

5.5.3. Equipment connection MAP



* If TV internal pattern is used, not needed

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
	B Cut					TBD
Medium	R Gain	j	a	00	C0	TBD
	G Gain	j	b	00	C0	TBD
	B Gain	j	c	00	C0	TBD
	R Cut					TBD
	G Cut					TBD
	B Cut					TBD
Warm	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
	B 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.

** R-fix adjustment

Adjust modes (Cool), Fix the R gain to 210 (default data) and change the others (G/B Gain).

- Adjust the R gain more than 210 (If G gain or B gain is less than 0 , R gain can adjust more than 210) 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 (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.

5.5.6. 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	13,000K	0.0000
Medium	0.283	0.289	9,300K	0.0000
Warm	0.313	0.329	6,500K	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

- Edge & ALEF LED module change color coordinate because of aging time
- apply under the color coordinate table, for compensated aging time
- Luminance: 204 Gray, 80IRE
- ** Except Gumi winter season(Jan~Feb) and except for winter season (Mar ~ Dec) & Global are same as the table below
- Standard color coordinate and temperature using CA-210(CH-14) – by aging time

	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

* Use only AUO, INX, Sharp, CSOT, BOE
(Cool temp Spec is 13000K)

	cool		med		warm	
	x	y	x	y	x	y
spec	271	270	286	289	313	329
target	278	280	293	299	320	339

5.6. HDMI ARC Function Inspection

5.6.1. Test equipment

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

5.6.2. Test method

- (1) Insert the HDMI Cable to the HDMI ARC port from the master equipment (HDMI2)
- (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)

6. 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 0.5mAmps

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 (6Ω 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, Component: 1KHz sine wave signal (0.4Vrms)
- (3) RGB PC: 1KHz sine wave signal 0.7Vrms

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

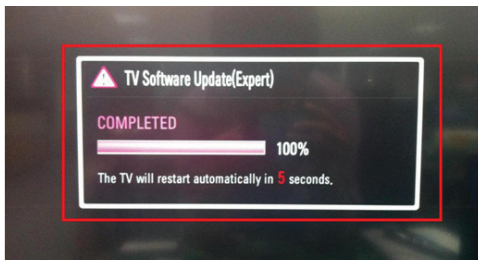
- (1) Put the USB Stick to the USB socket
- (2) Automatically detecting update file in USB Stick
 - If your downloaded program version in USB Stick is lower than that of TV set, it didn't work. Otherwise USB data is automatically detected.
- (3) Show the message "Copying files from memory"



- (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.

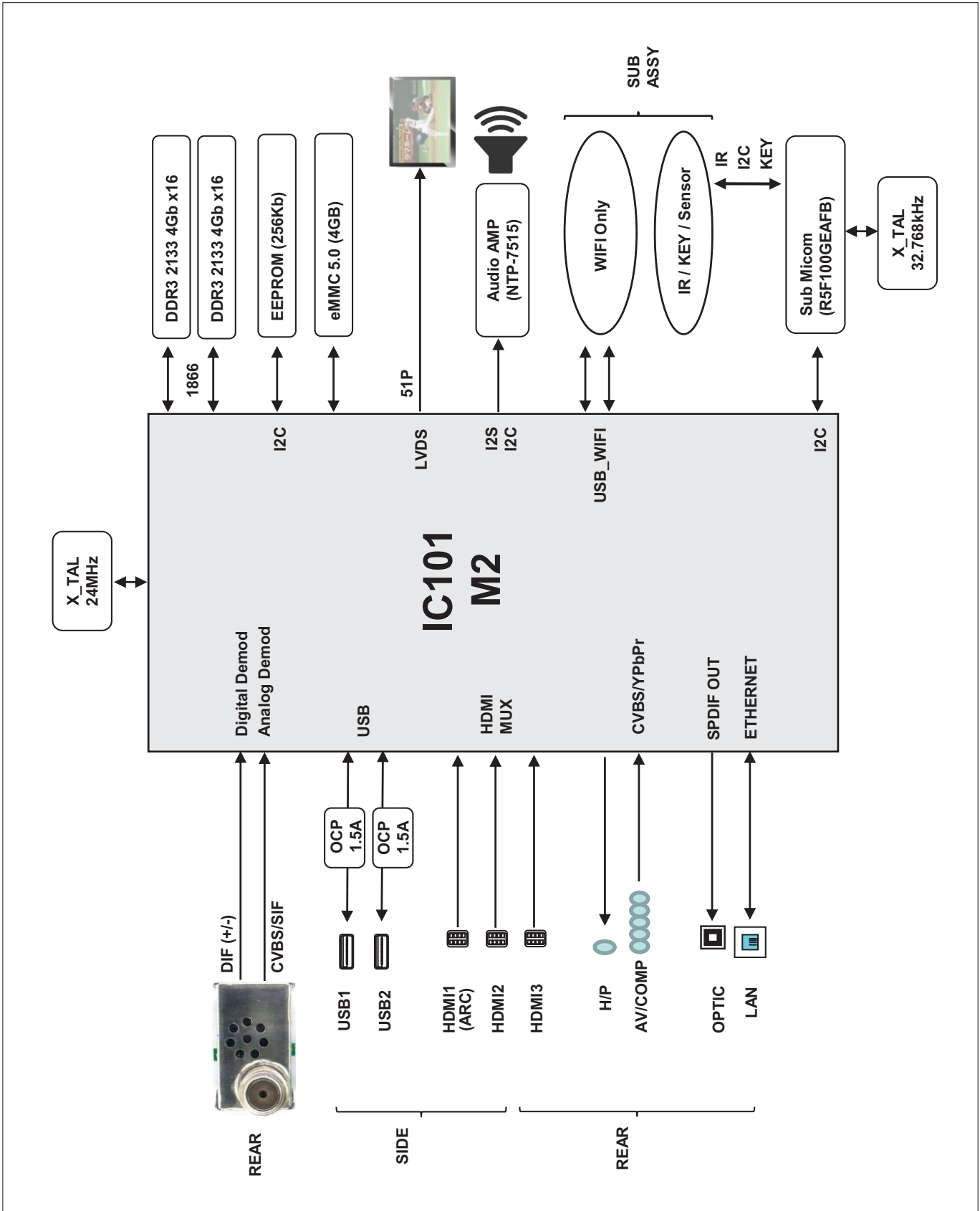
* If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel recover. If all channel data is cleared, you didn't have a DTV/ATV test on production line.

* After downloading, TOOL OPTION setting is needed again.

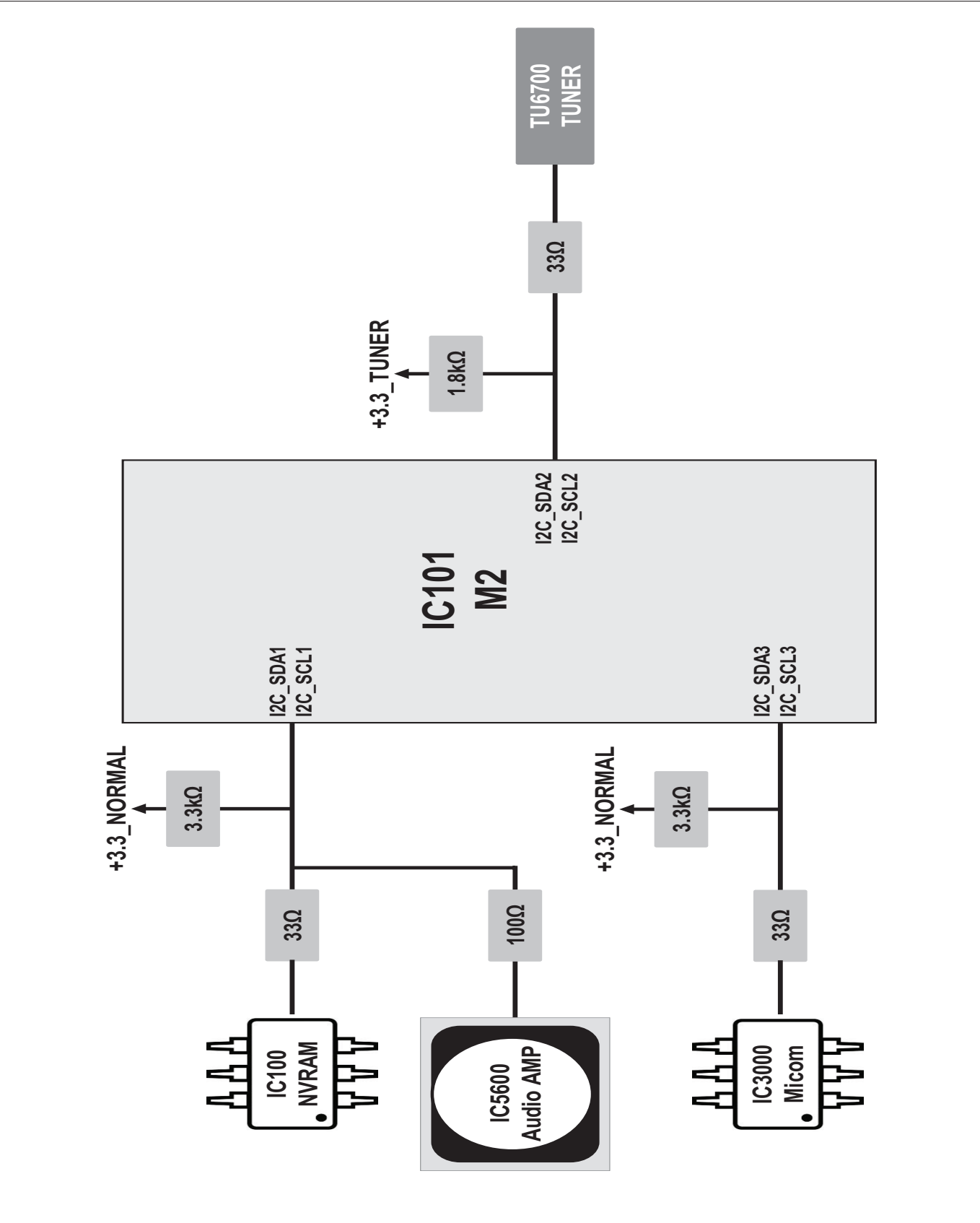
- (1) Push "IN-START" key in service remote controller.
- (2) Select "Tool Option 1" and Push "OK" button.
- (3) Punch in the number. (Each model has their number.)

Block Diagram

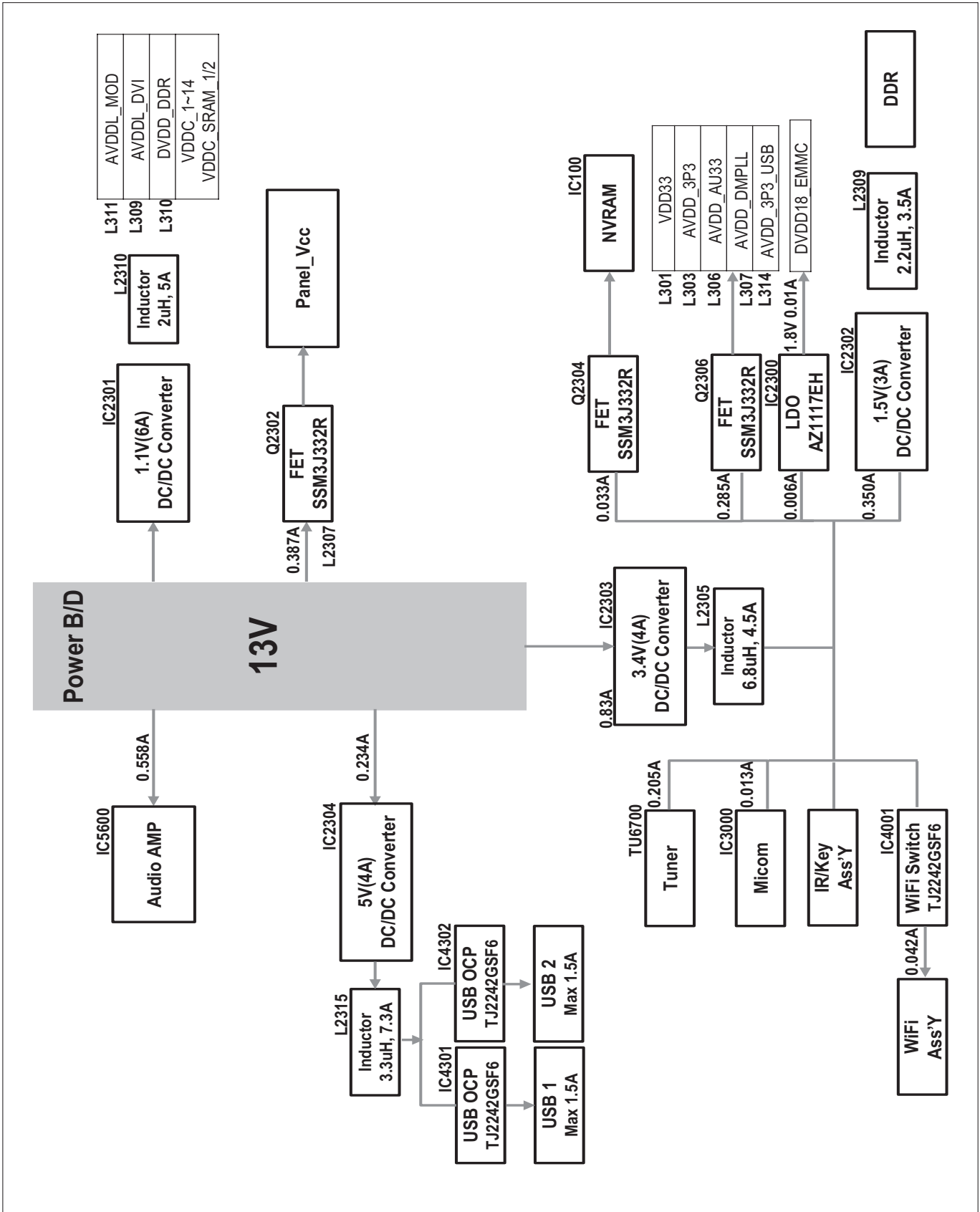
1. M2 Circuit Block Diagram



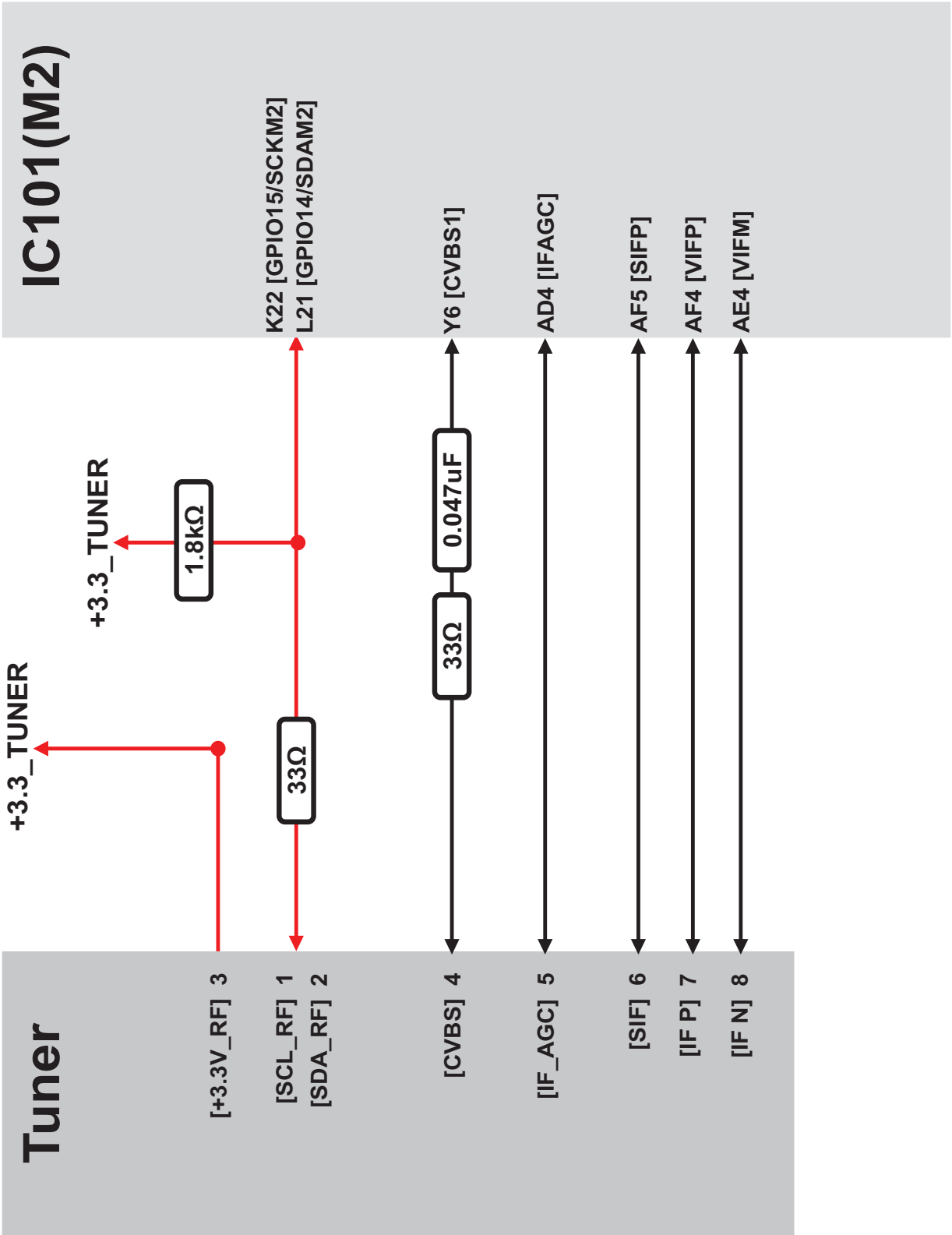
2. I2C Block Diagram



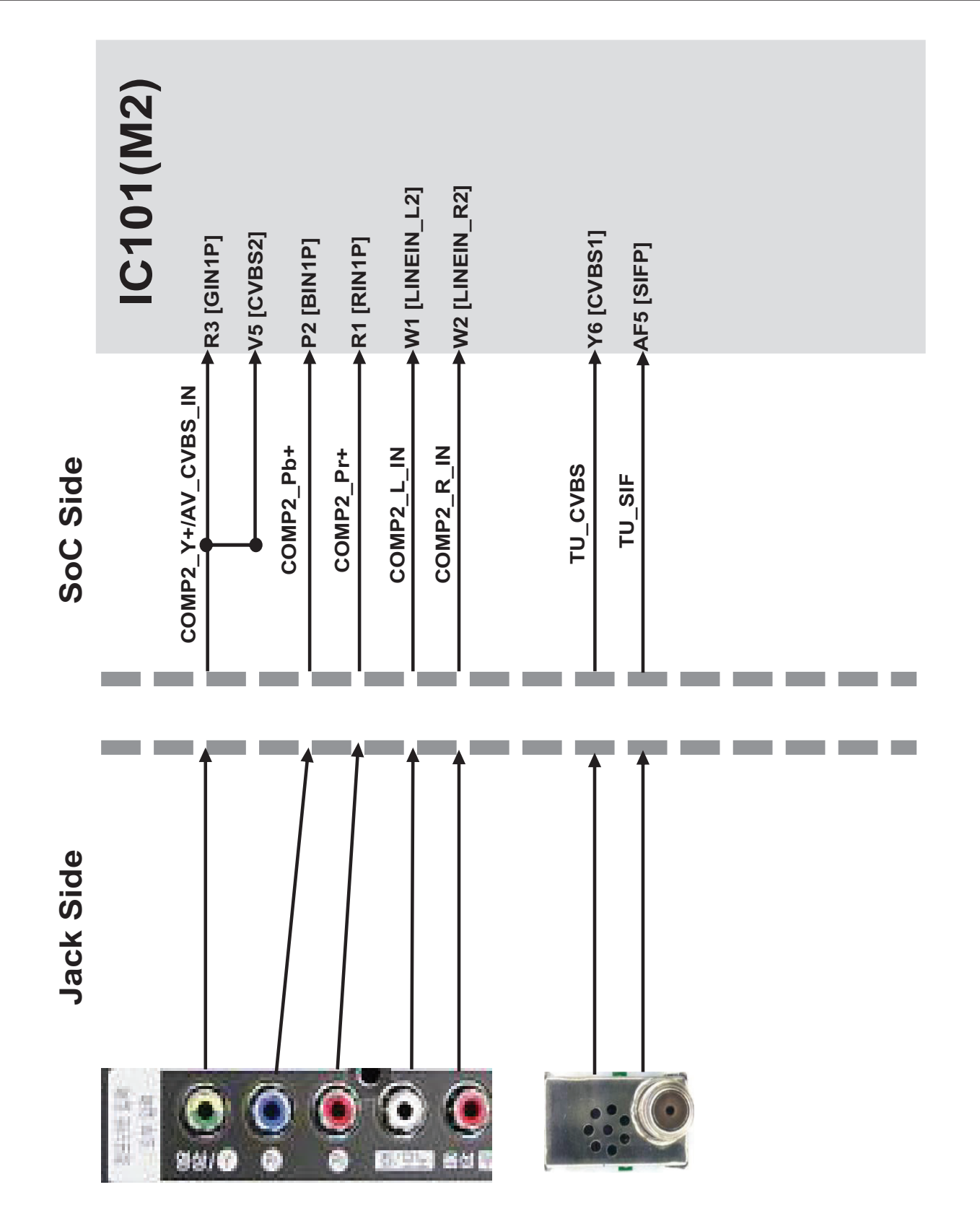
3. Power Block



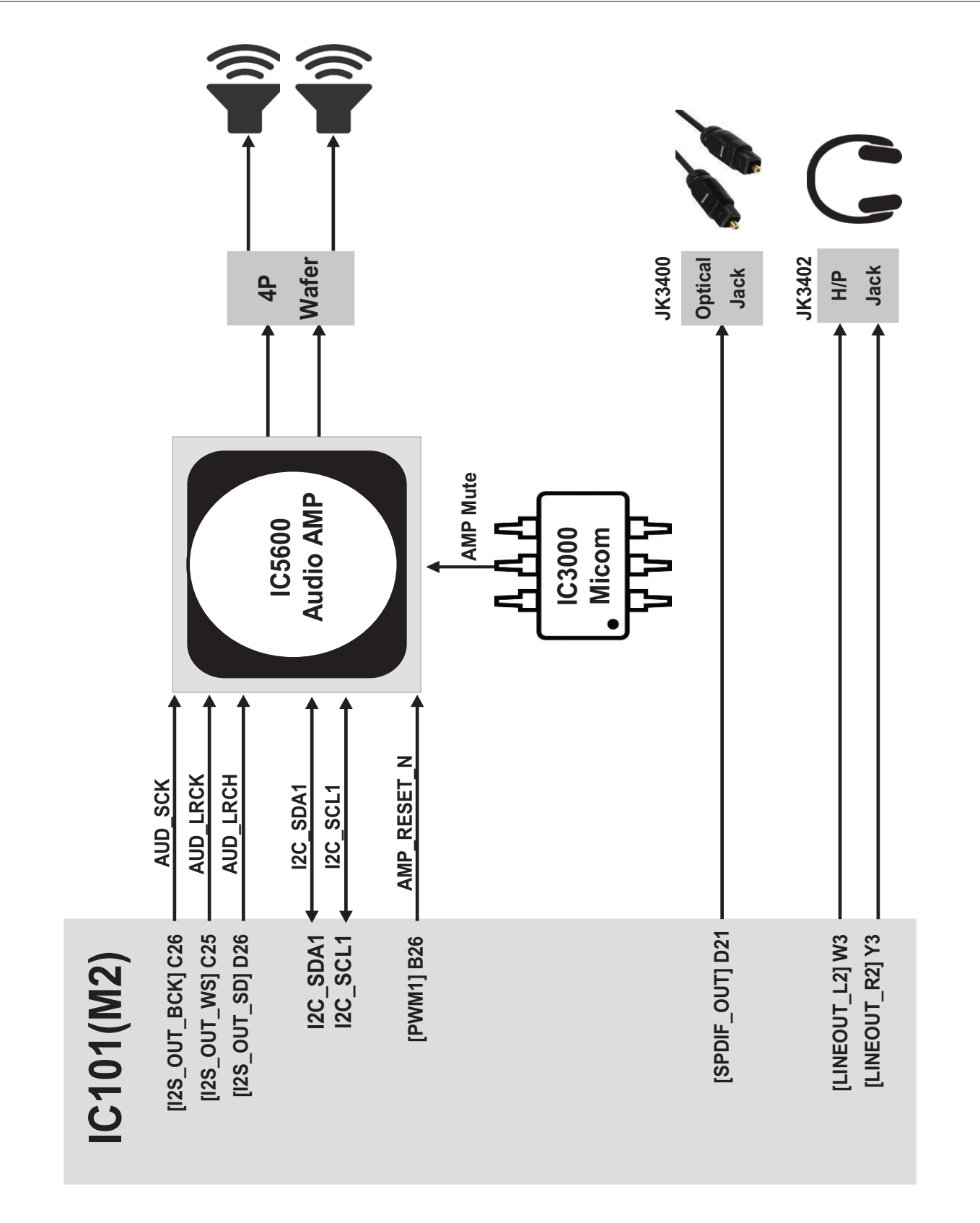
4. Tuner Block Diagram



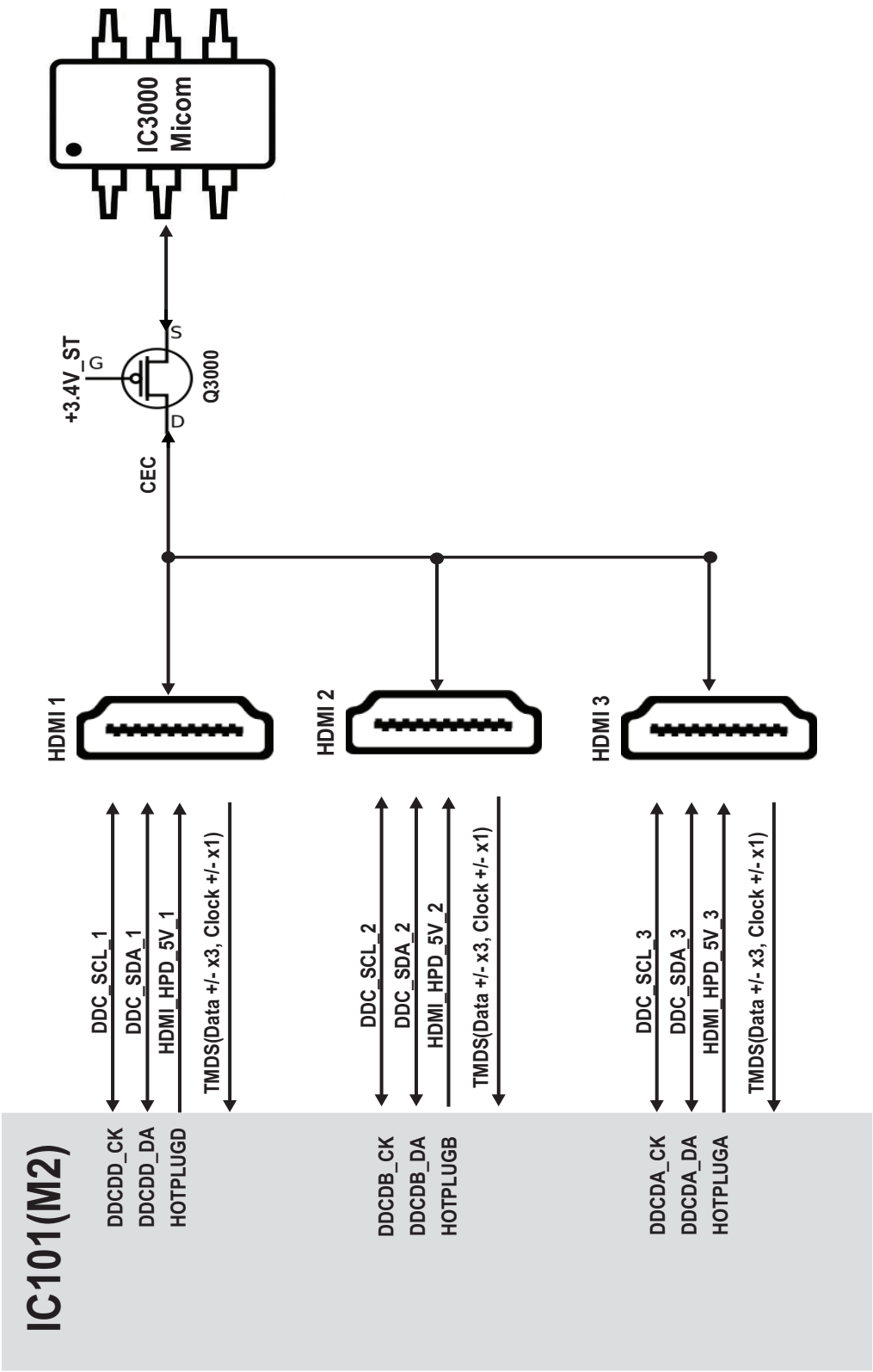
5. Video/Audio In Block Diagram



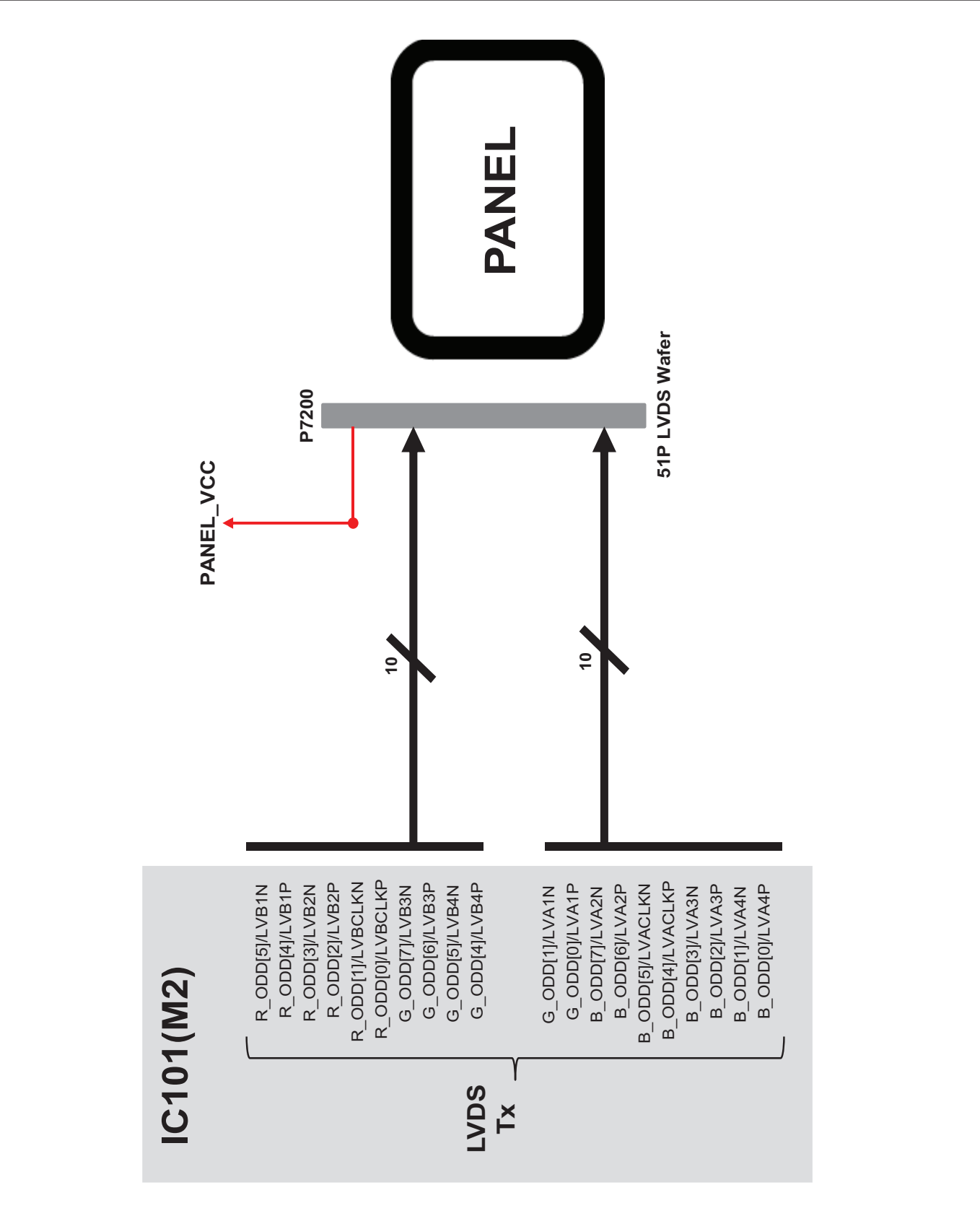
6. Audio Out Block Diagram



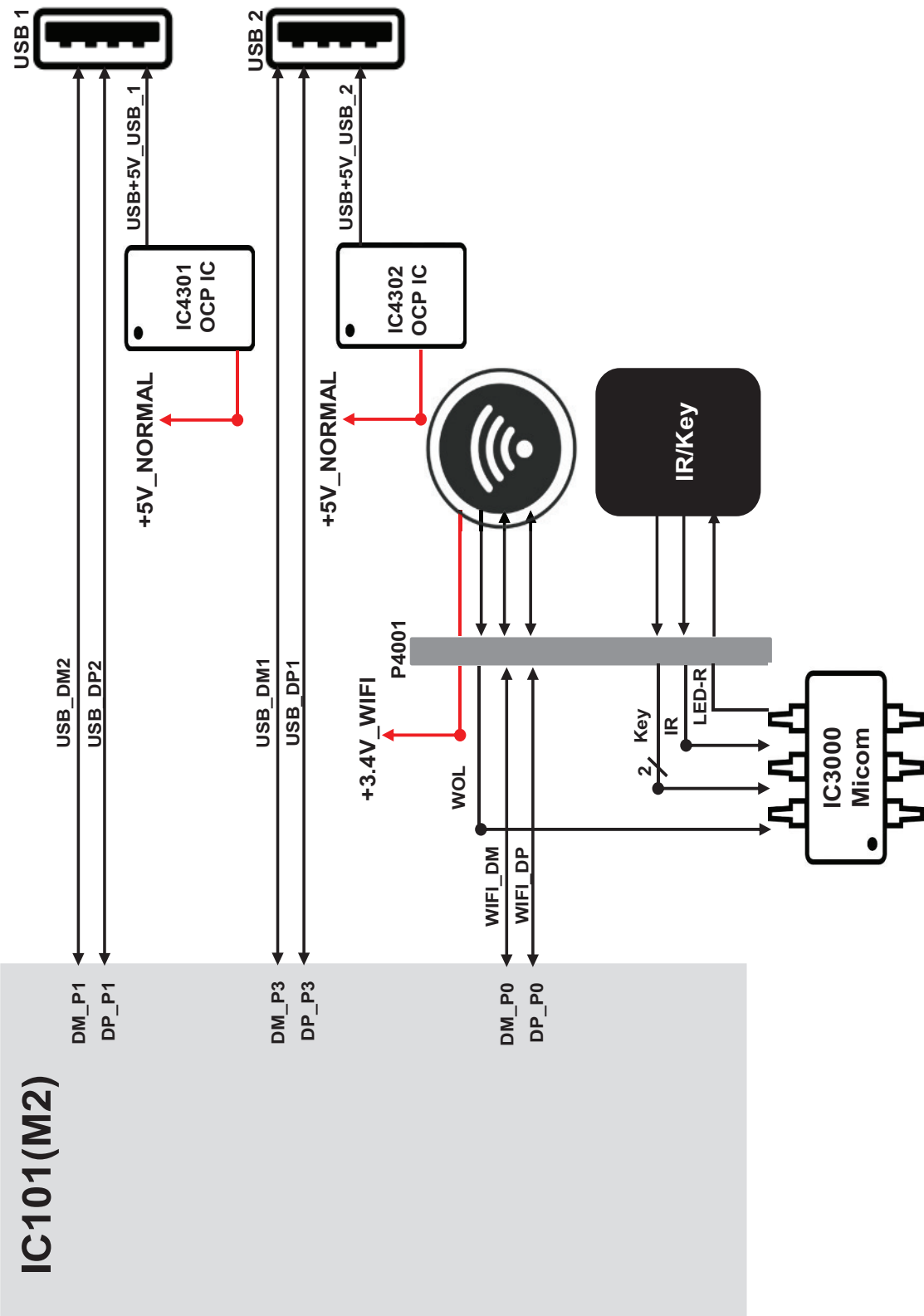
7. HDMI



8. Panel Interface



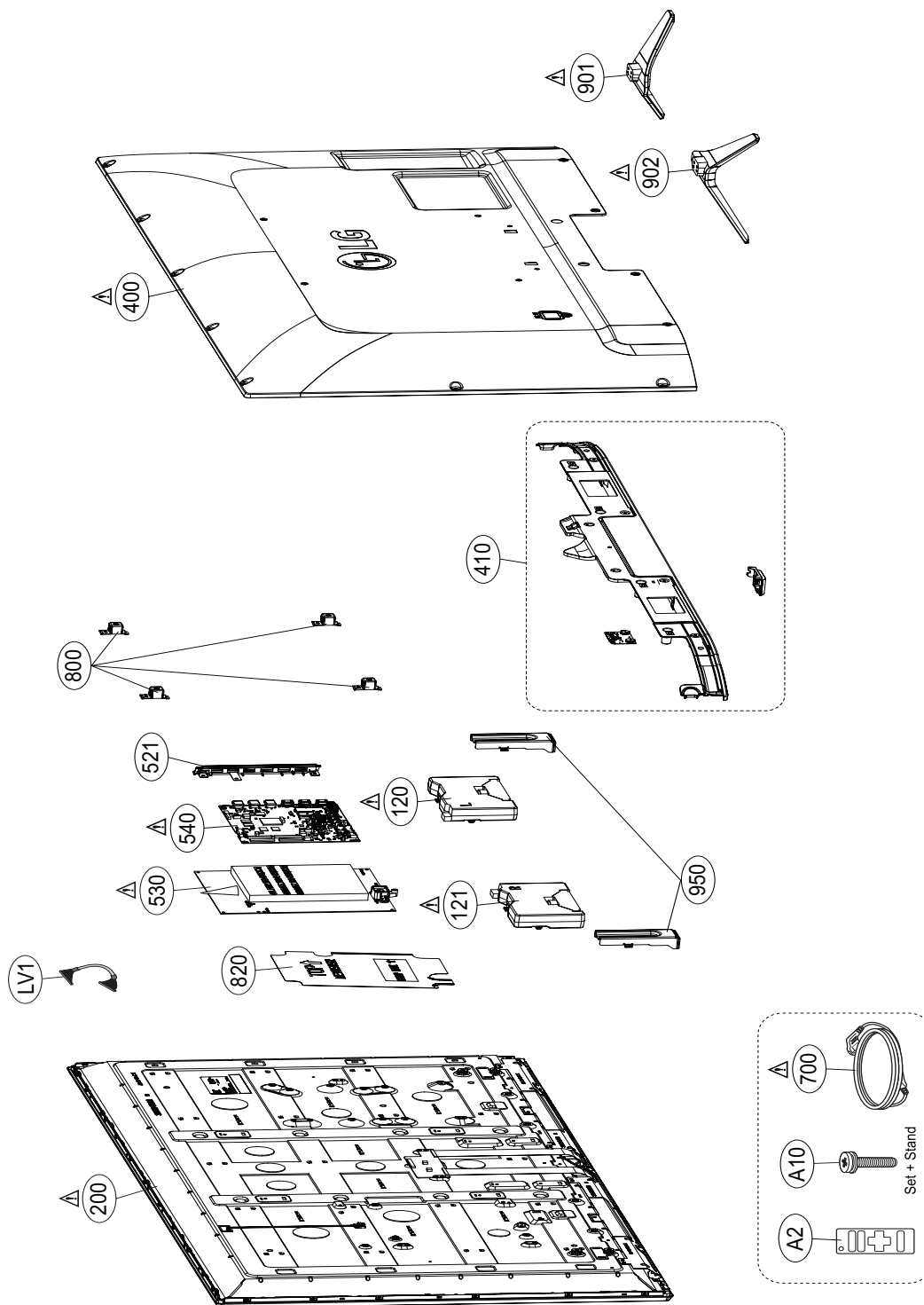
9. USB 2.0 / WiFi / IR-Key



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.



DISASSEMBLY

1. Disassemble parts Back Cover

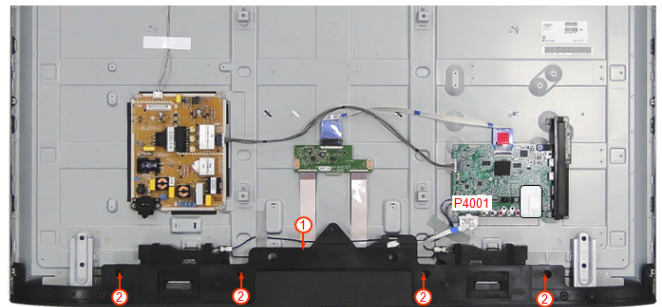


<Disassemble screws>

Pull the upward.

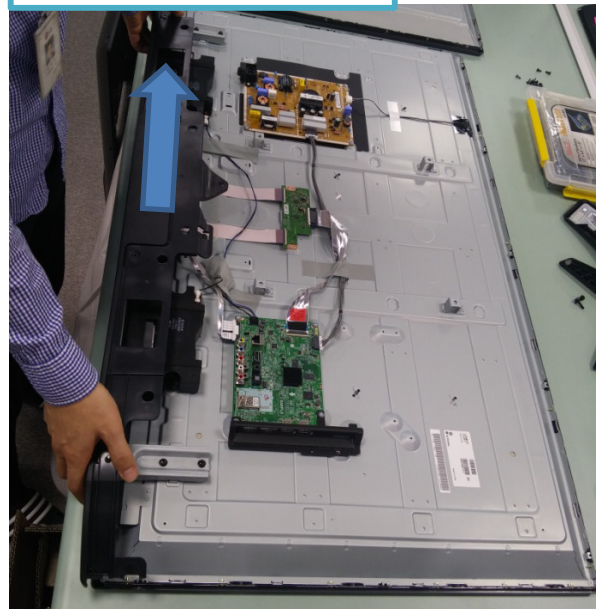


2. Disassemble parts Back Cover Bottom



<Disassemble screws>

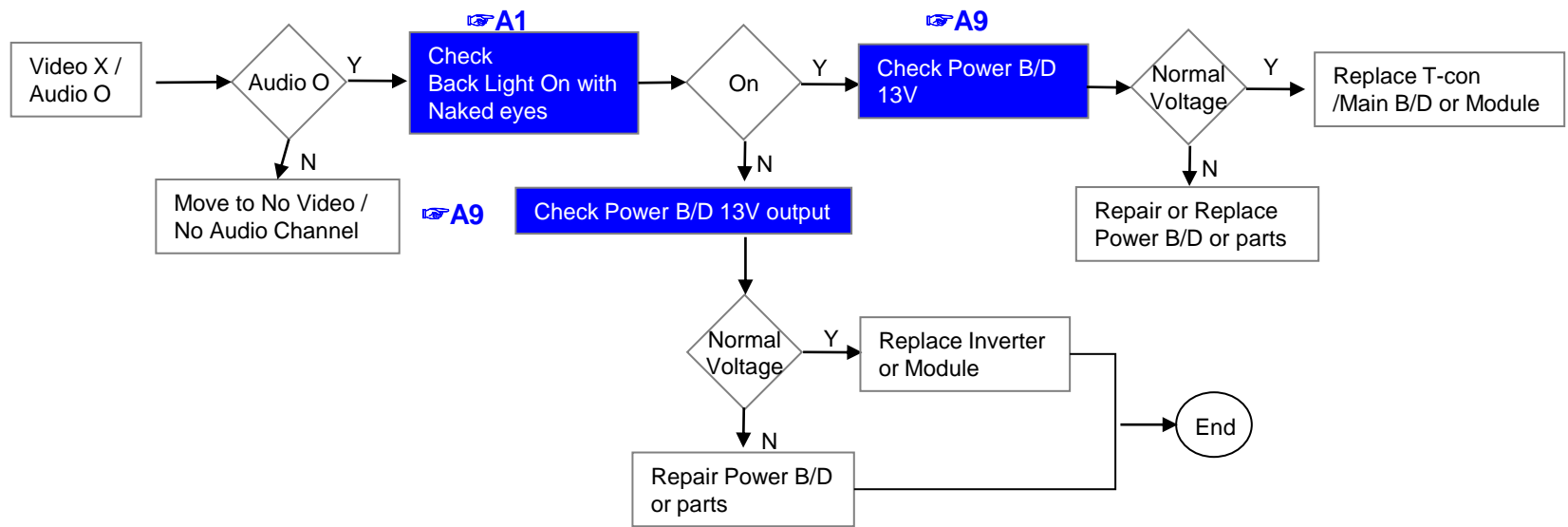
Pull the upward.



TROUBLE SHOOTING GUIDE

	Error symptom	A. Video error	Established date		
		Video X / Audio O	Revised date		1/14

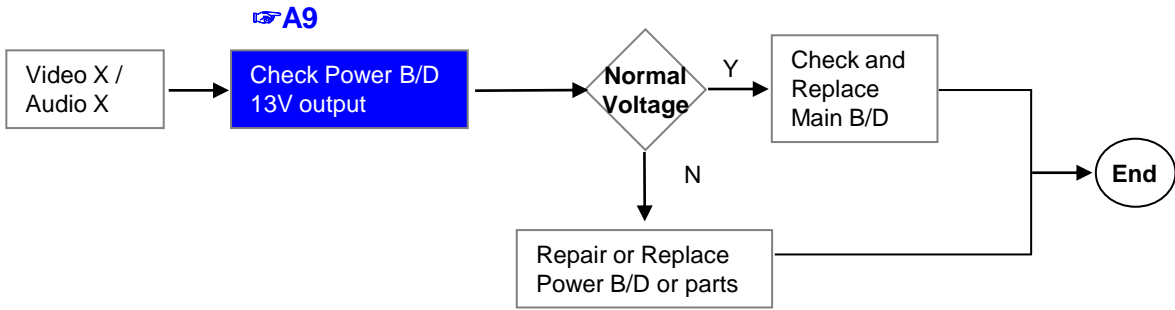
**First of all, Check whether all of cables between board is inserted properly or not.
(Main B/D↔ Power B/D, LVDS Cable, Speaker Cable, IR B/D Cable...)**



※Precaution A4 & A2



Standard Repair Process					
	Error symptom	A. Video error	Established date		
		Video X / Audio O	Revised date		2/14

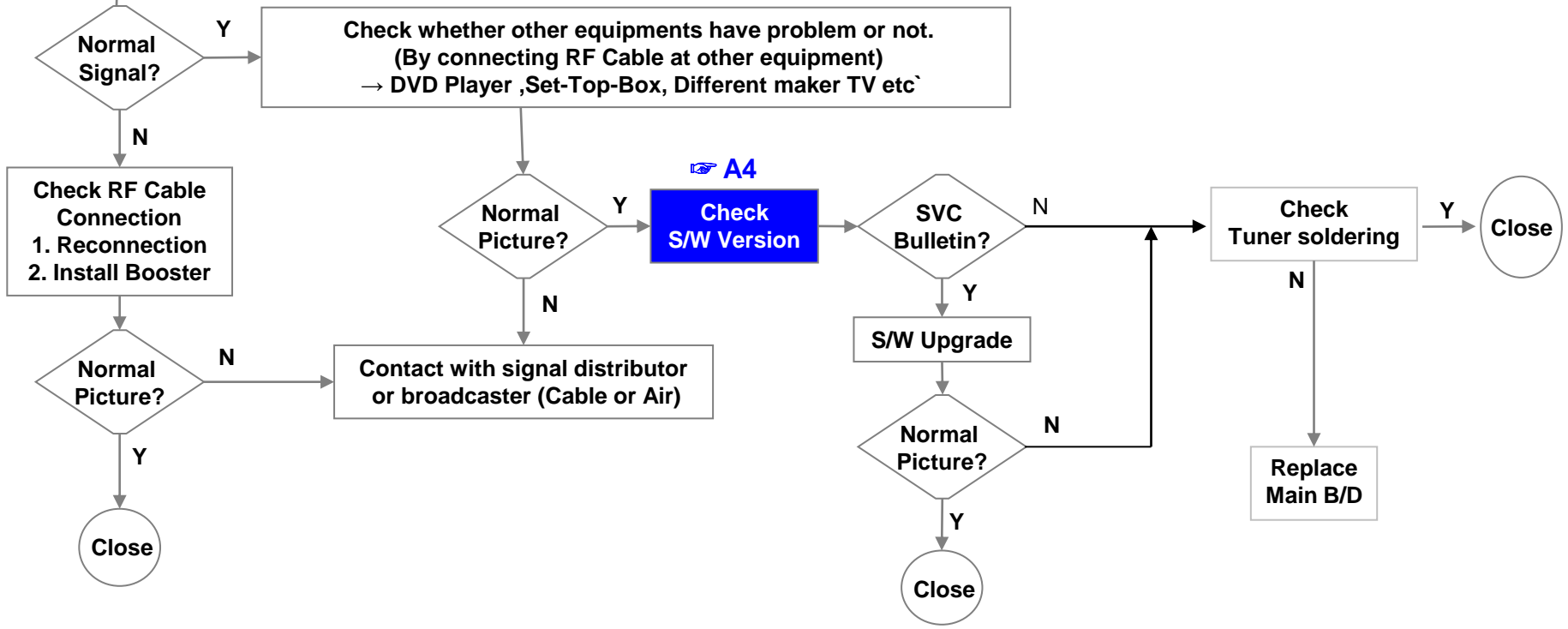


	Error symptom	A. Video error	Established date		
		Picture broken / Freezing	Revised date		3/14

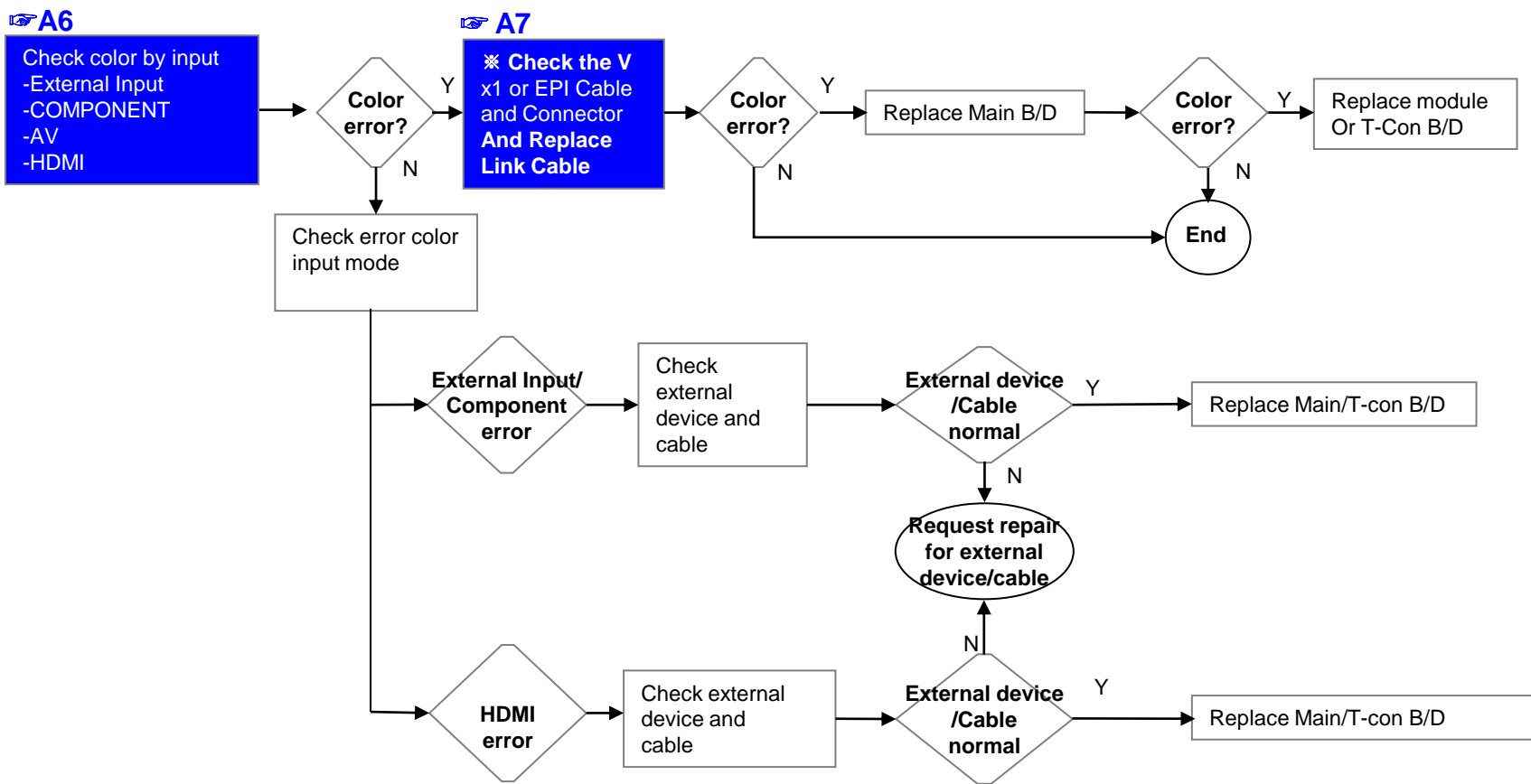
👉 A3

Check RF Signal level

- . By using Digital signal level meter
- . By using Diagnostics menu on OSD
(All Settings → Programmes → Programmes Tuning & Settings → Manual Tuning → Check the Signal)
- Signal strength (Normal : over 50%)
- Signal Quality (Normal: over 50%)

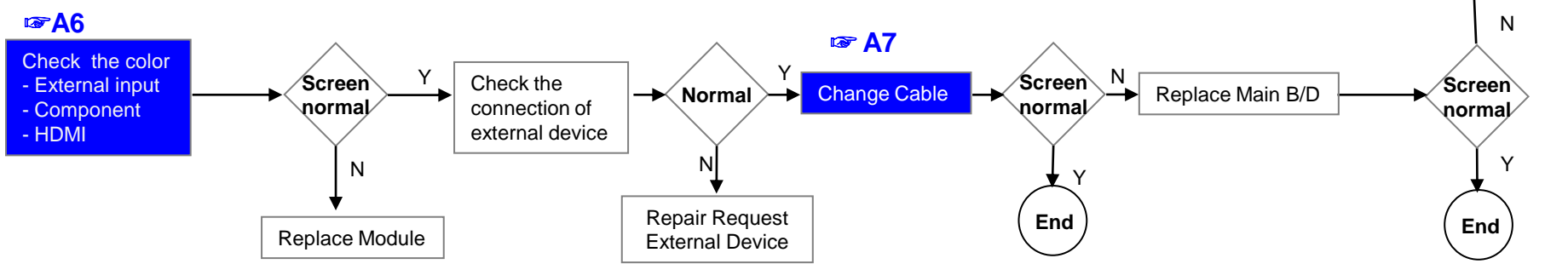


	Error symptom	A. Video error	Established date		
		Color error	Revised date		4/14

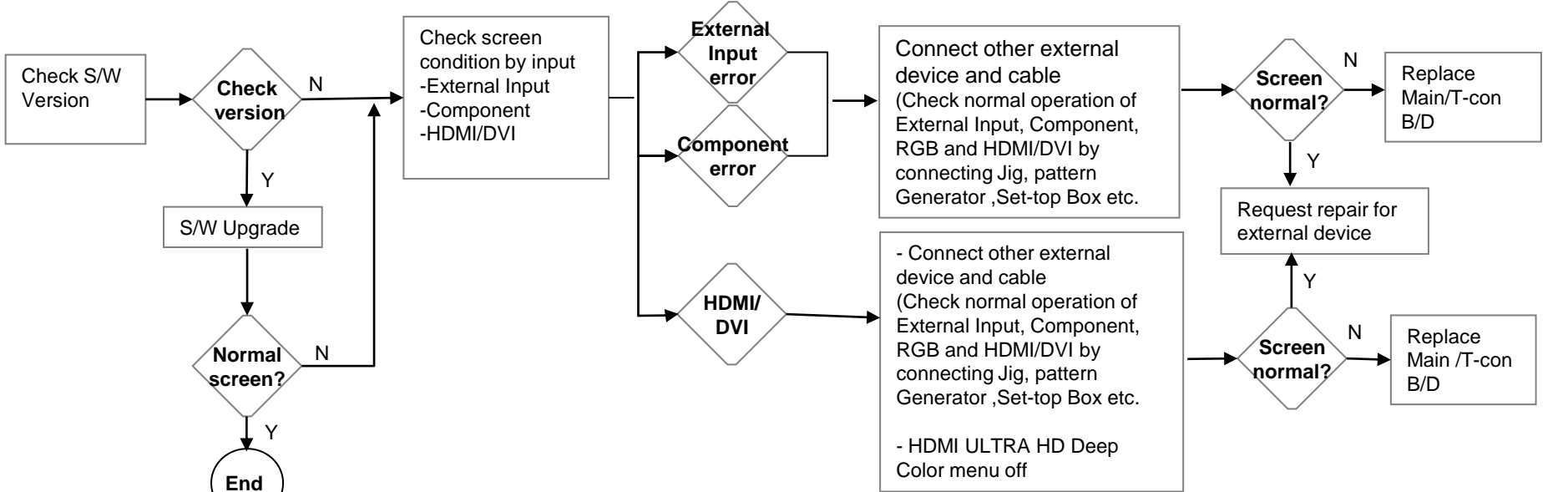


	Error symptom	A. Video error	Established date		
		Vertical / Horizontal bar, residual image, light spot, external device color error	Revised date		5/14

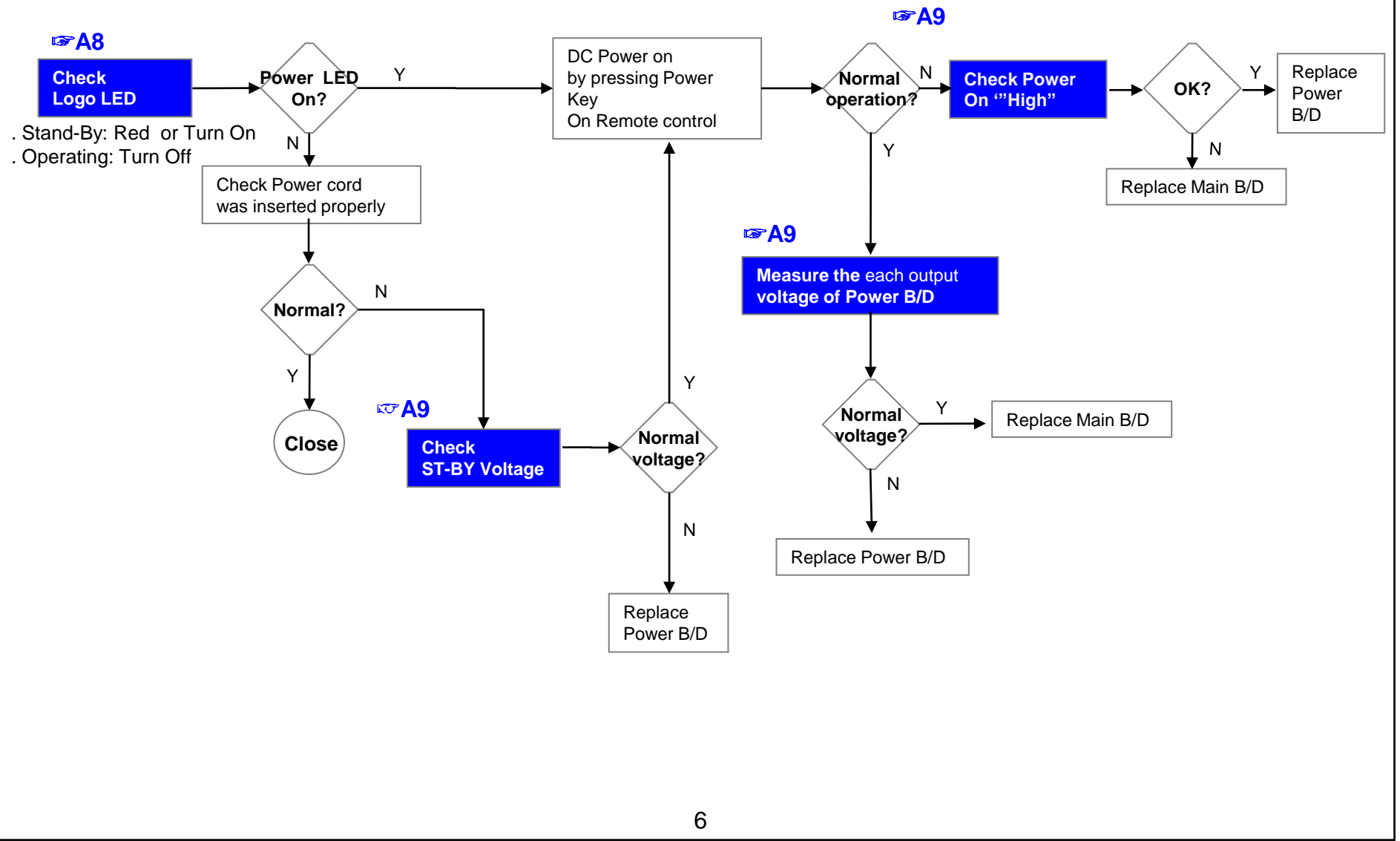
Vertical/Horizontal bar, residual image, light spot



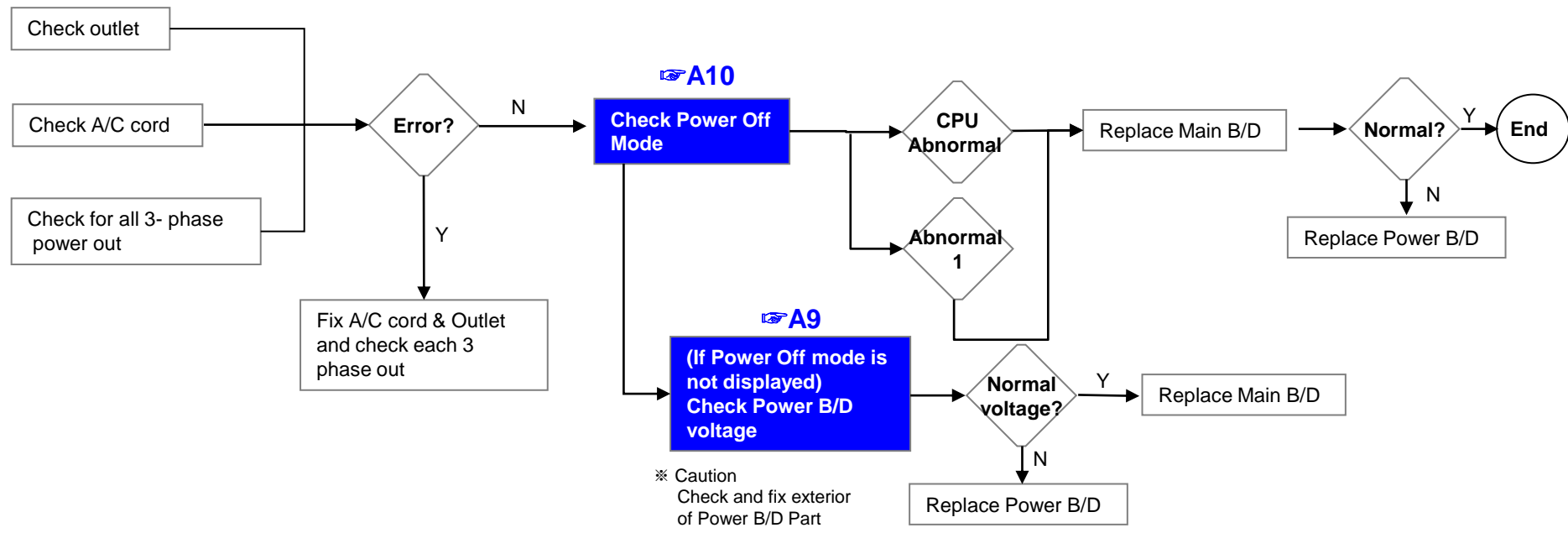
External device screen error-Color error



Standard Repair Process					
	Error symptom	B. Power error	Established date		
		No power	Revised date		6/14



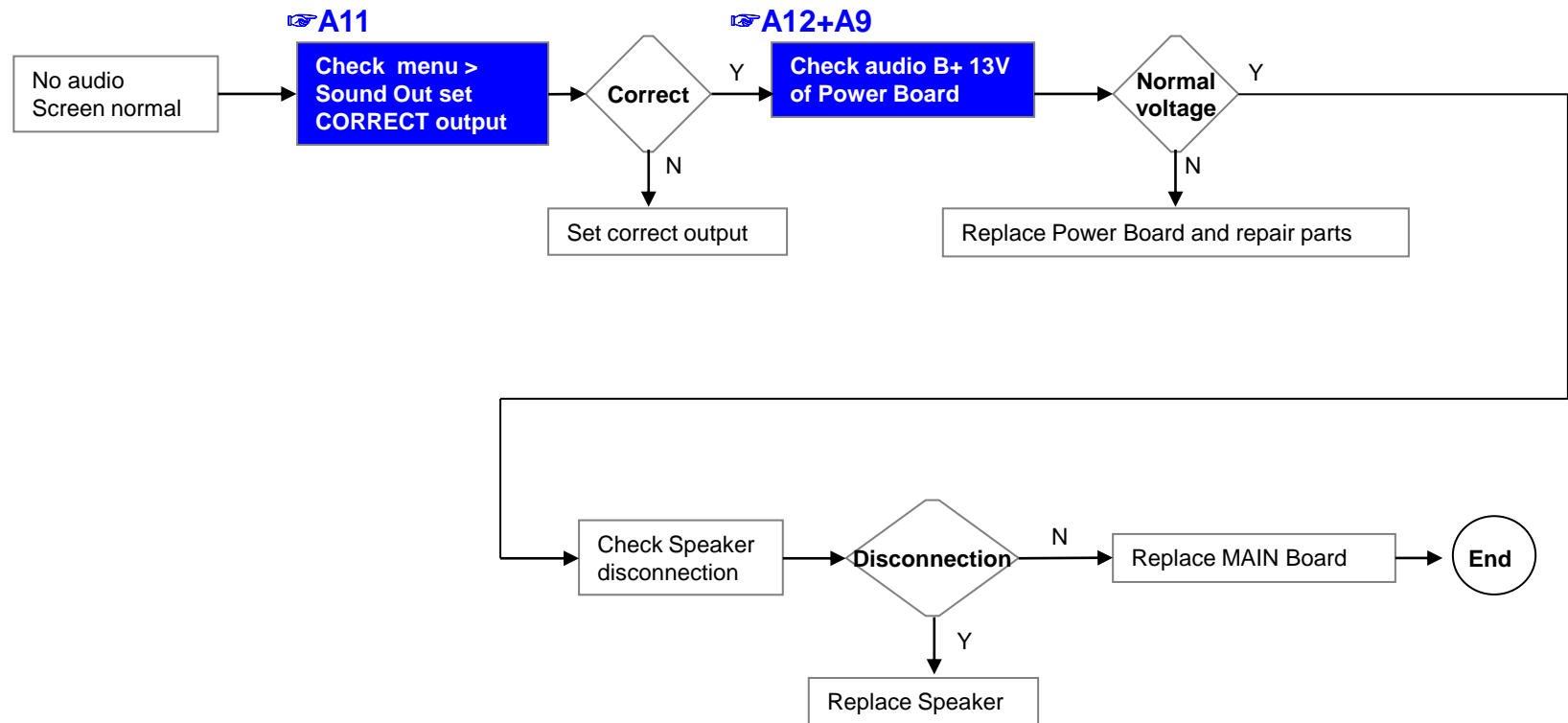
	Error symptom	B. Power error	Established date		
		Off when on, off while viewing, power auto on/off	Revised date		7/14



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

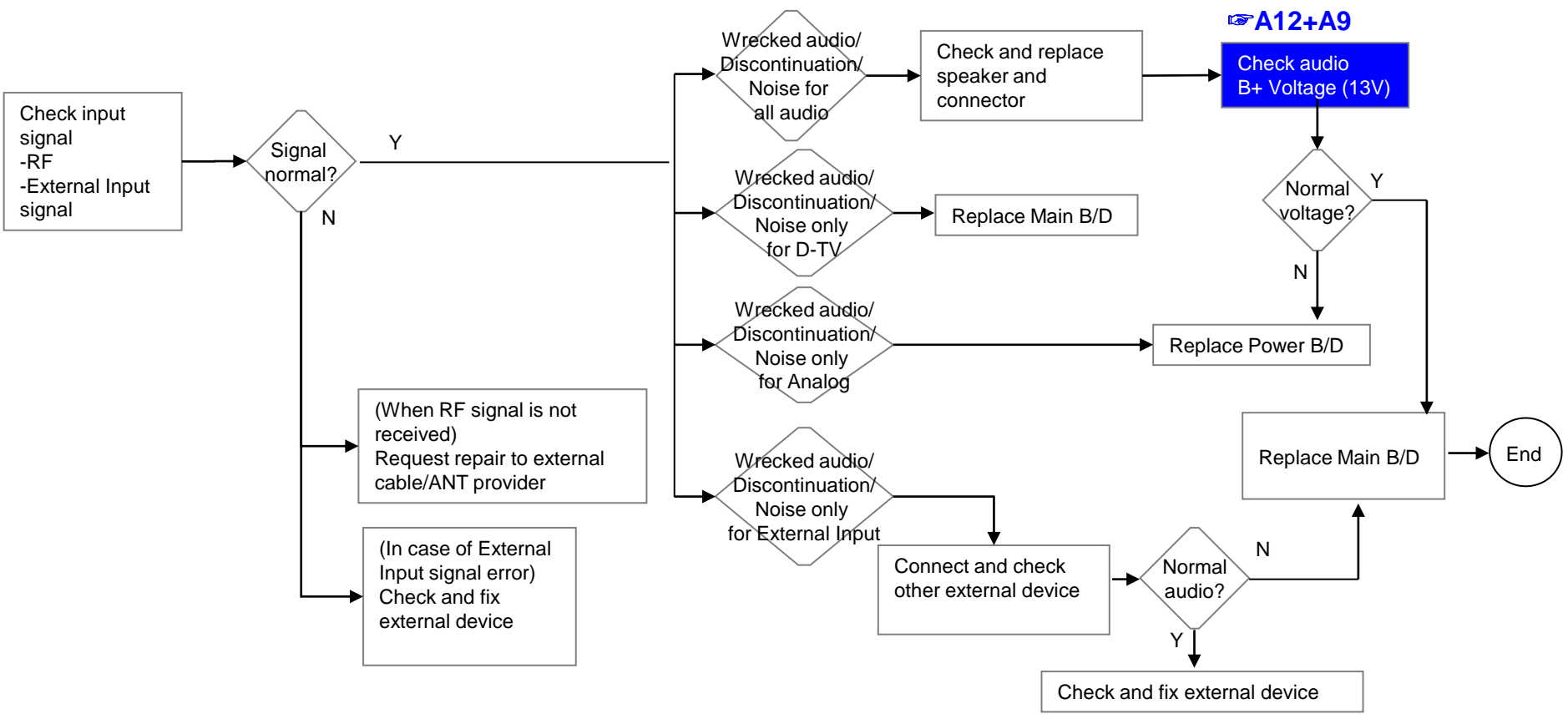
Status	Power off List	Explanation
Normal	"POWEROFF_REMOTEKEY"	Power off by REMOTE CONTROL
	"POWEROFF_OFFTIMER"	Power off by OFF TIMER
	"POWEROFF_SLEEPTIMER"	Power off by SLEEP TIMER
	"POWEROFF_INSTOP"	Power off by INSTOP KEY
	"POWEROFF_AUTOOFF"	Power off by AUTO OFF
	"POWEROFF_ONTIMER"	Power off by ON TIMER
	"POWEROFF_20V_DET"	Power off by AC OFF
	"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		
		Audio X / Video O	Revised date		8/14



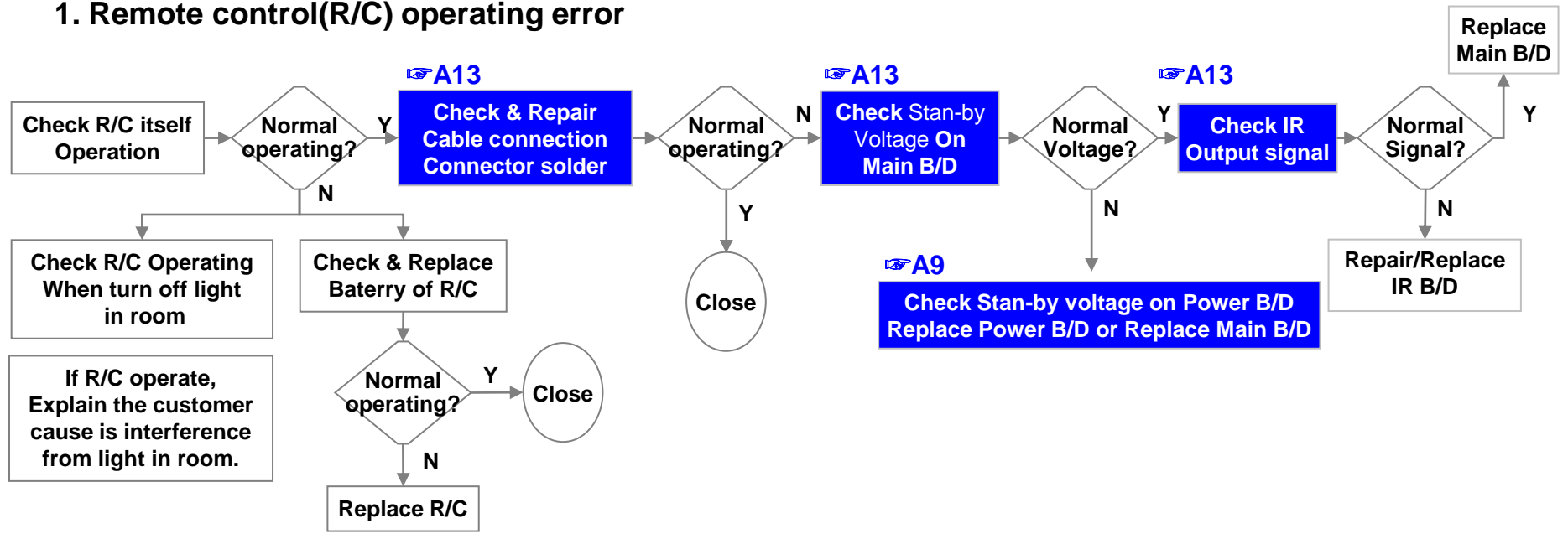
	Error symptom	C. Audio Error	Established date		
		Wrecked audio/ discontinuation/noise	Revised date		9/14

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



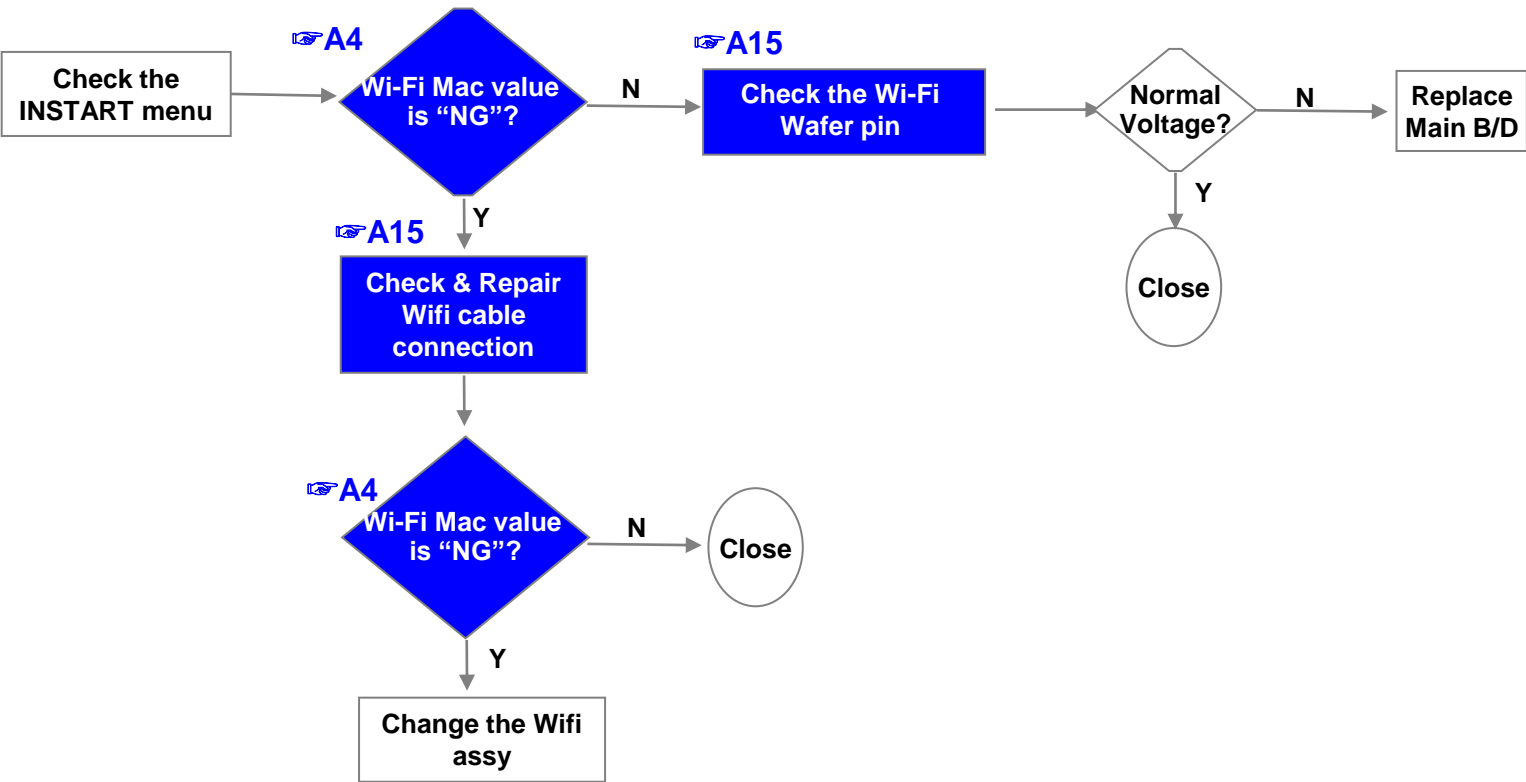
	Error symptom	D. Function Error	Established date		
		Remote control & Local switch checking	Revised date		10/14

1. Remote control(R/C) operating error

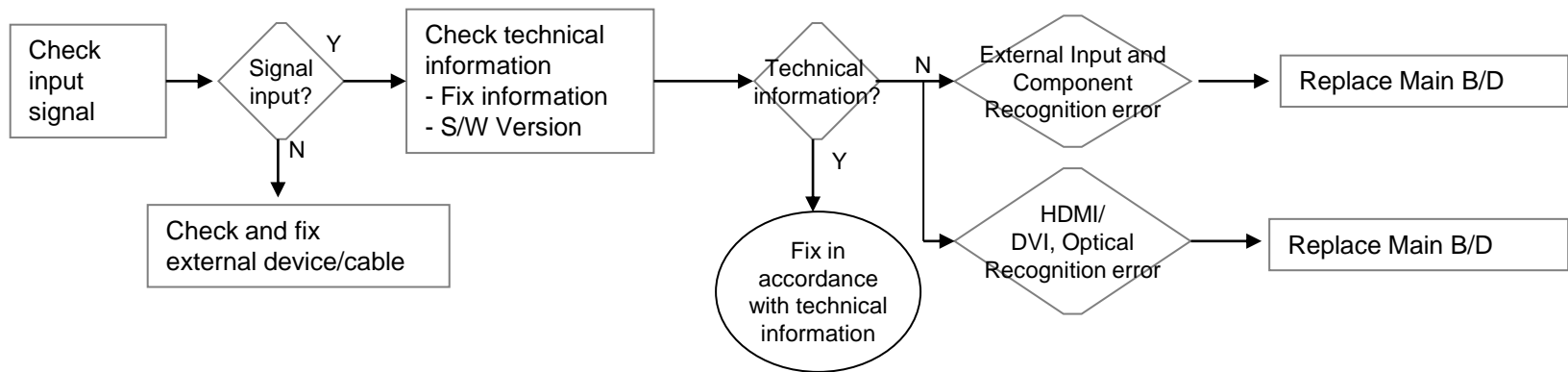


	Error symptom	D. Function Error	Established date		
		Wi-Fi operating checking	Revised date		11/14

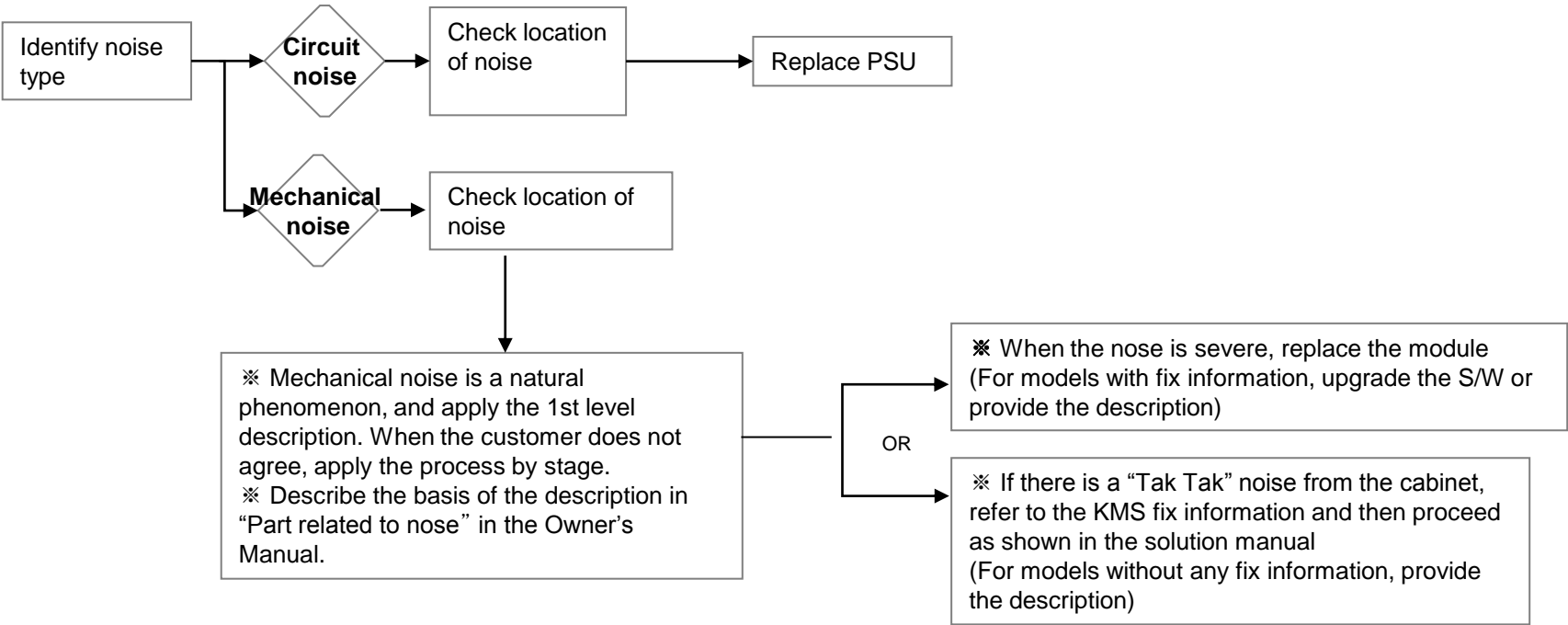
2.Wifi operating error



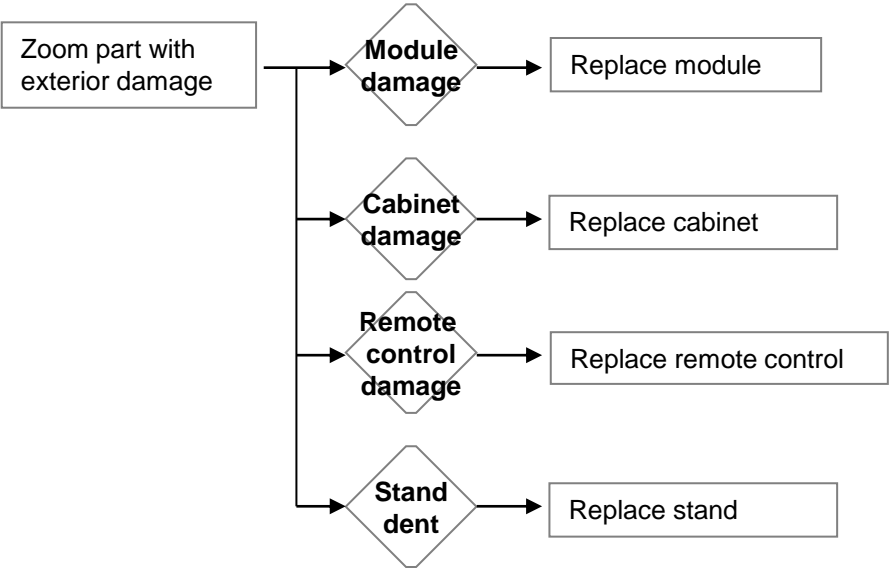
	Error symptom	D. Function Error	Established date		
		External device recognition error	Revised date		12/15



	Error symptom	E. Noise	Established date		
		Circuit noise, mechanical noise	Revised date		13/14



Standard Repair Process					
	Error symptom	F. Exterior defect	Established date		
		Exterior defect	Revised date		14/14



Contents of Standard Repair Process Detail Technical Manual

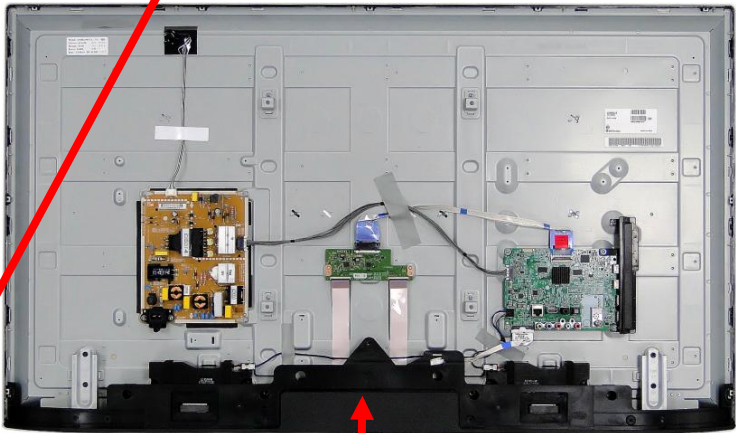
No.	Error symptom	Content	Page	Remarks
1	A. Video error_ No video/Normal audio	Check LCD back light with naked eye	A1	
2		Check White Balance value	A2	
3	A. Video error_ video error /Video lag/stop	TUNER input signal strength checking method	A3	
4		Version checking method	A4	
5		Tuner Checking Part	A5	
6	A. Video error _Vertical/Horizontal bar, residual image, light spot	Connection diagram	A6	
7	A. Video error_ Color error	Check Link Cable (EPI) reconnection condition	A7	
8	<Appendix>	Exchange Module (1)	A-1/2	
		Exchange Module (2)	A-2/2	

Contents of Standard Repair Process Detail Technical Manual

No.	Error symptom	Content	Page	Remarks
9	B. Power error_ No power	Check front display LED	A8	
10		Check power input Voltage & ST-BY	A9	
11	B. Power error_Off when on, off while viewing	POWER OFF MODE checking method	A10	
12	C. Audio error_ No audio/Normal video	Checking method in menu when there is no audio	A11	
13		Voltage and speaker checking method when there is no audio	A12	
14	D. Function error	Remote control operation checking method	A13	
15		Wi-Fi operation checking method	A14	

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

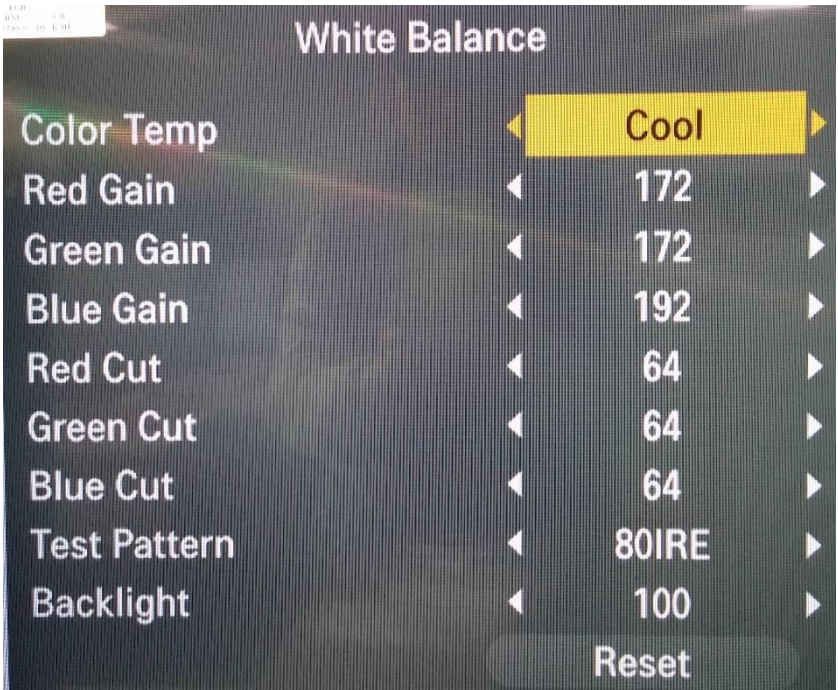
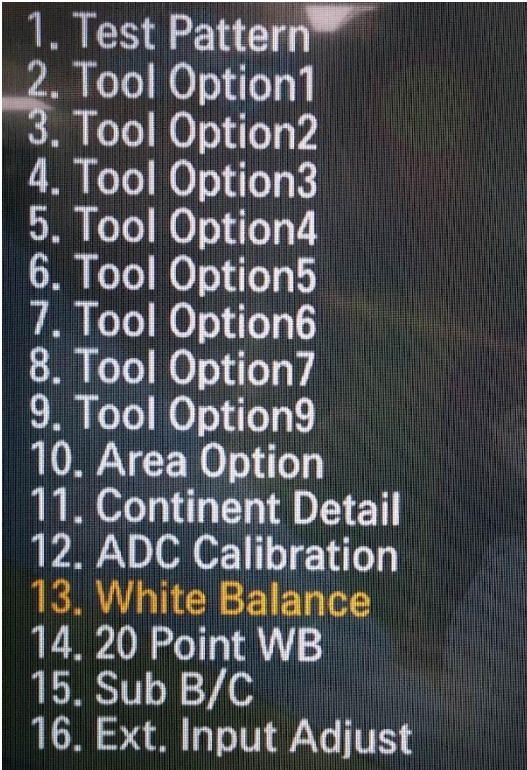


After turning on the power and disassembling the case, check with the naked eye, whether you can see light from locations.

A1

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



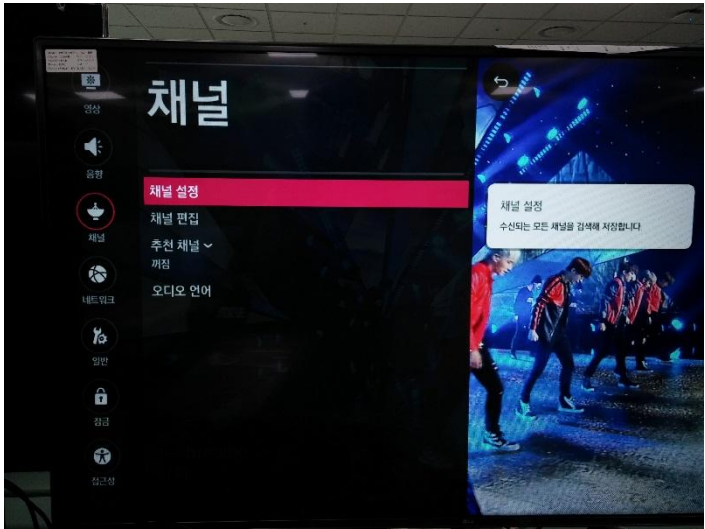
Entry method

1. Press the ADJ button on the remote control for adjustment.
2. Enter into White Balance of item 13.
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.

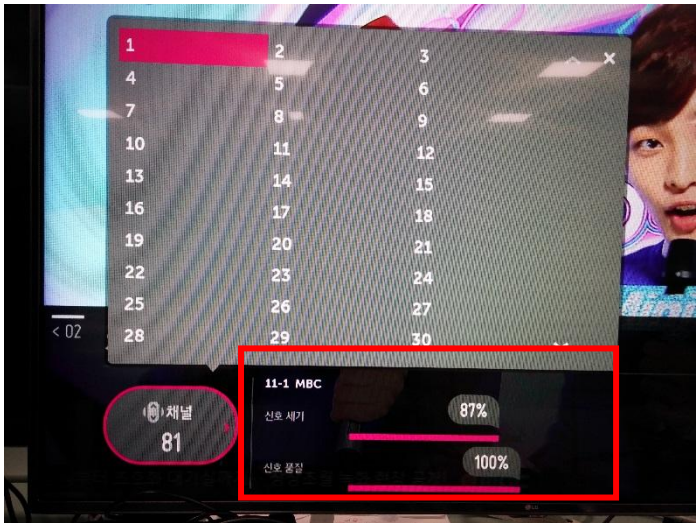
Standard Repair Process Detail Technical Manual

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

<ALL MODELS>



All Settings→ Channels → Channel Tuning → Manual Tuning
→Select Channel



Signal Strength is too strong : Use attenuator
(-10dB, -15dB, -20dB etc.)
Signal Strength is too weak : Use Signal Booster

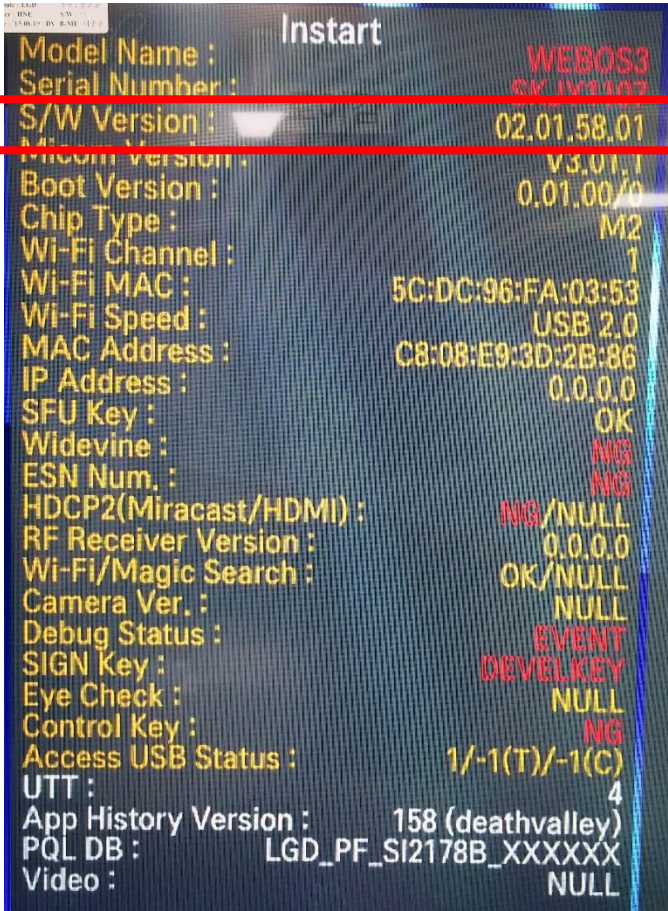


Standard Repair Process Detail Technical Manual

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

<ALL MODELS>

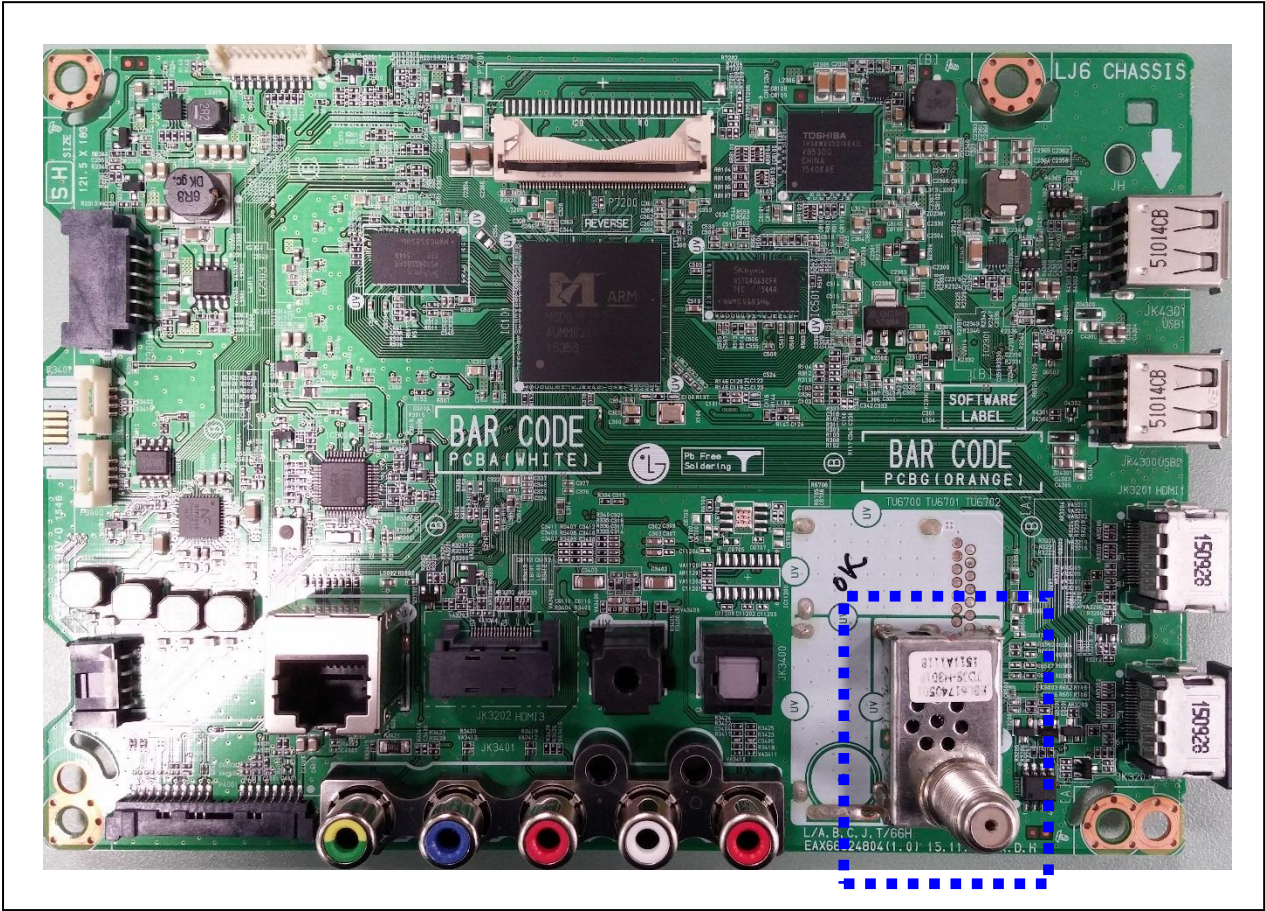
Version



Press the IN-START with the remote control for adjustment

Standard Repair Process Detail Technical Manual

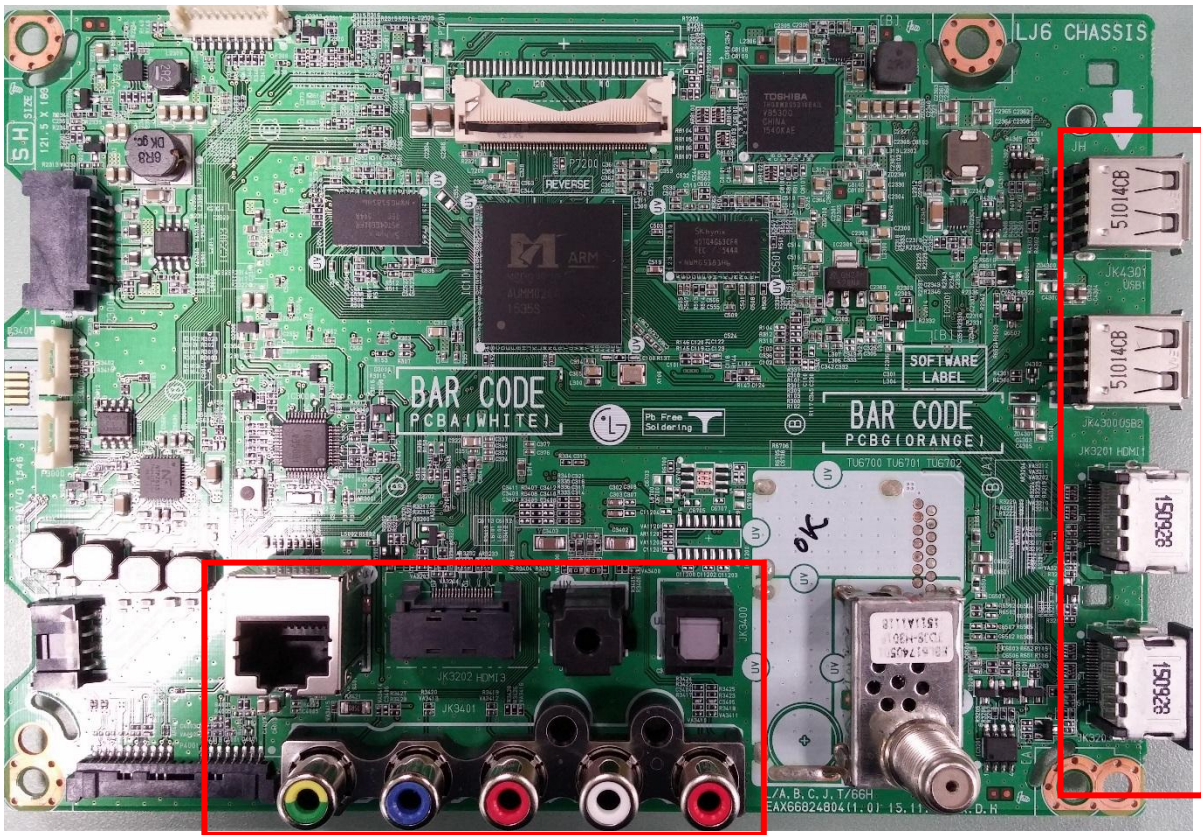
Error Symptom	A. Video error_Video error, video lag/stop	Established date		
Content	TUNER checking part	Revised date		A5



- 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.

Standard Repair Process Detail Technical Manual

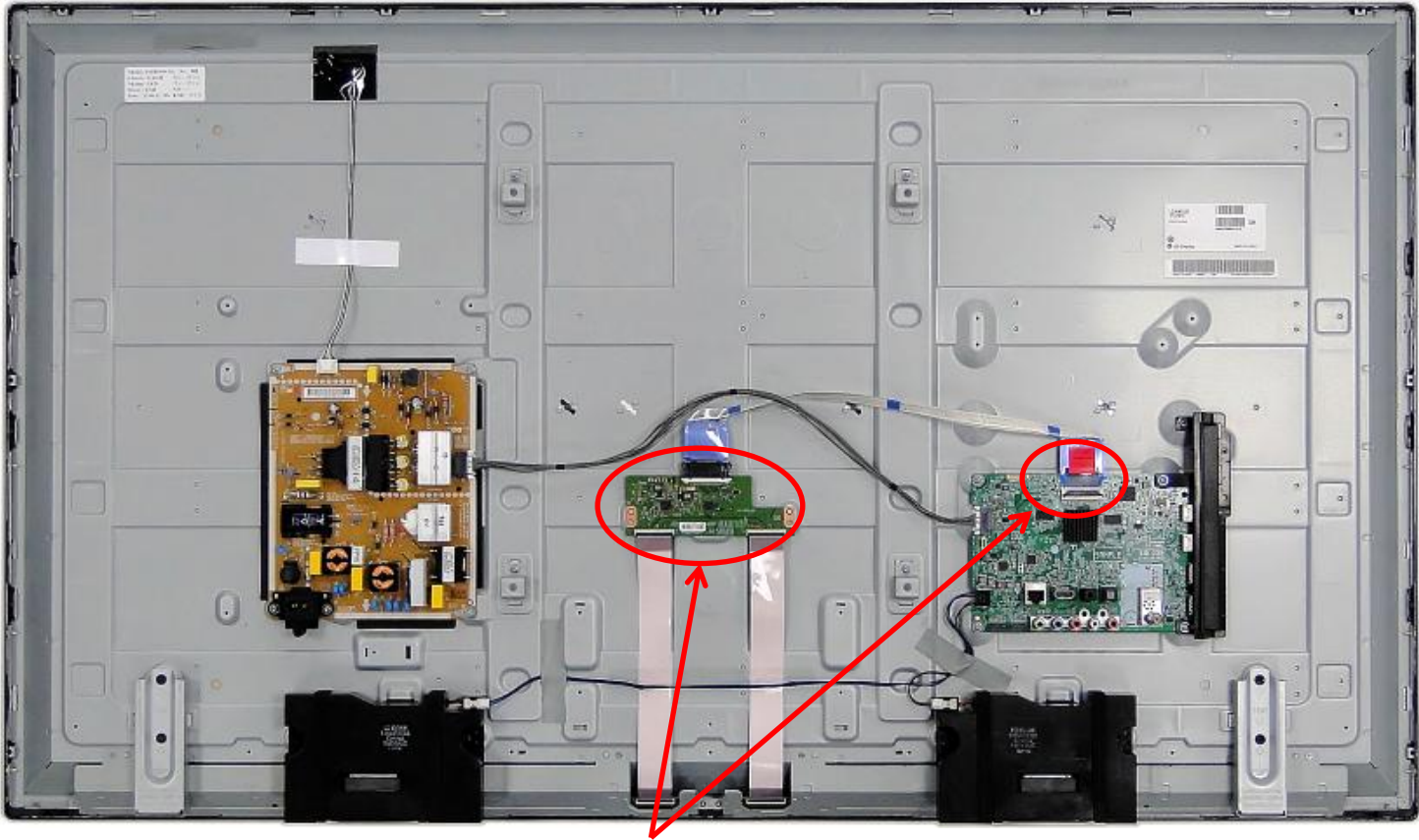
Error Symptom	A. Video error _Vertical/Horizontal bar, residual image, light spot	Established date	
Content	connection diagram (1)	Revised date	A6



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

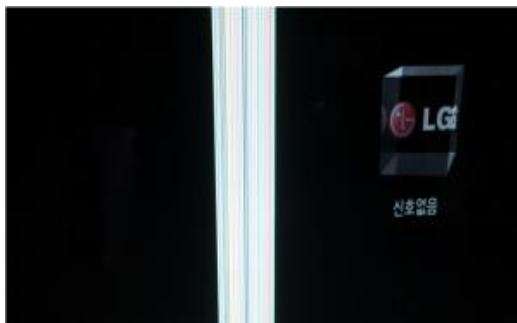
Standard Repair Process Detail Technical Manual

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



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

Appendix : Exchange the Module (1)



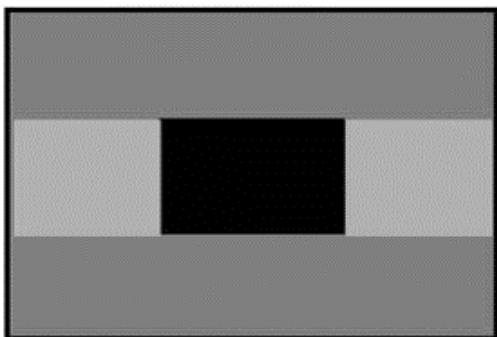
Vertical abnormal display



Brightness difference



Line Dim



Crosstalk



Press damage



Crosstalk



Burnt

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

Appendix : Exchange the Module (2)



Angle view Color difference



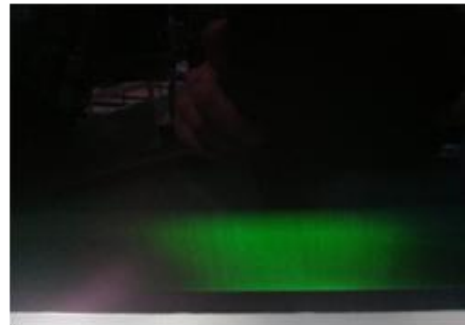
Brightness dot noise



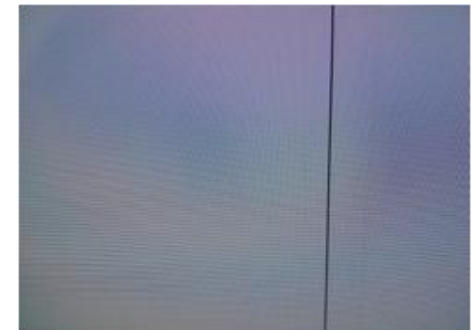
Half dead



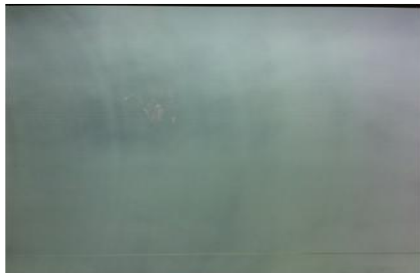
Brightness difference



Green Noise on power on/off time



Line Defect

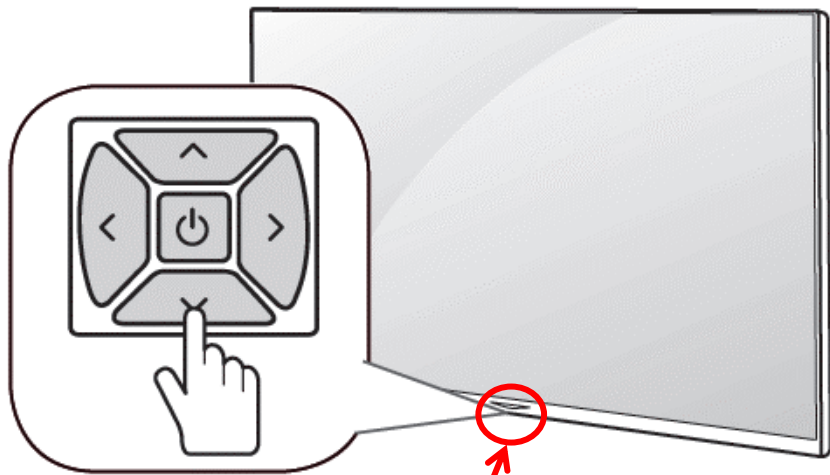


Mura

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		A8



Basic functions

		Power On (Press) Power Off (Press and hold)
		Volume Control
		Programmes Control

! NOTE

- When the TV is turned on, place your finger on the button and press it once for a few seconds and release it. All running apps will close, and any recording in progress will stop.

Adjusting the menu

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

	Turns the power off.
	Clears on-screen displays and returns to TV viewing.
	Changes the input source.
	Accesses the settings menu.

! NOTE

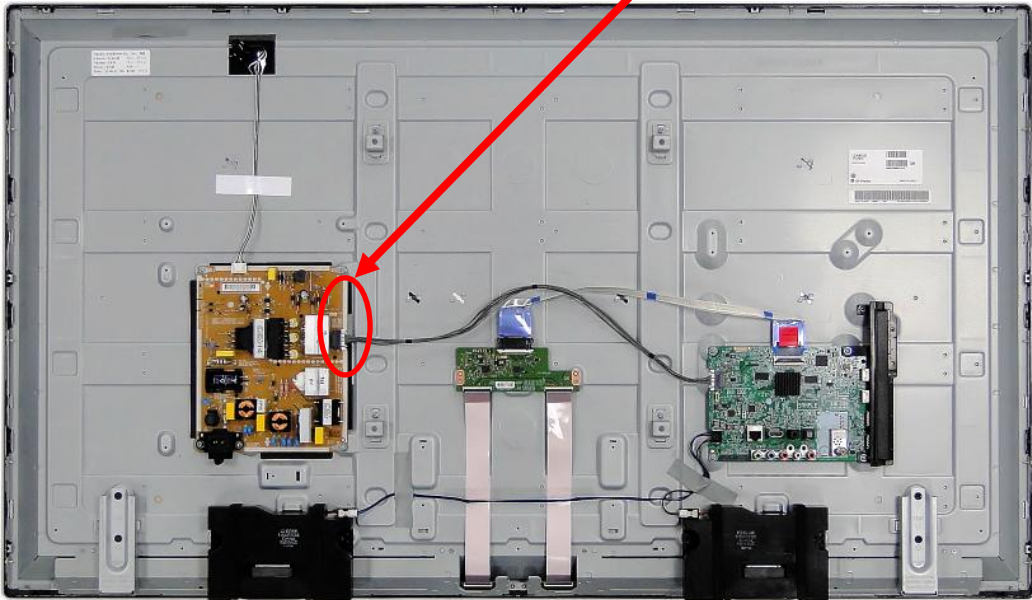
- When your finger over the joystick button and push it to the up, down, left or right, be careful not to press the joystick button. If you press the joystick button first, you may not be able to adjust the volume level and saved programmes.

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

Standard Repair Process Detail Technical Manual

Error Symptom	B. Power error _No power	Established date		
Content	Check the Power output voltage and St-by voltage	Revised date		A9

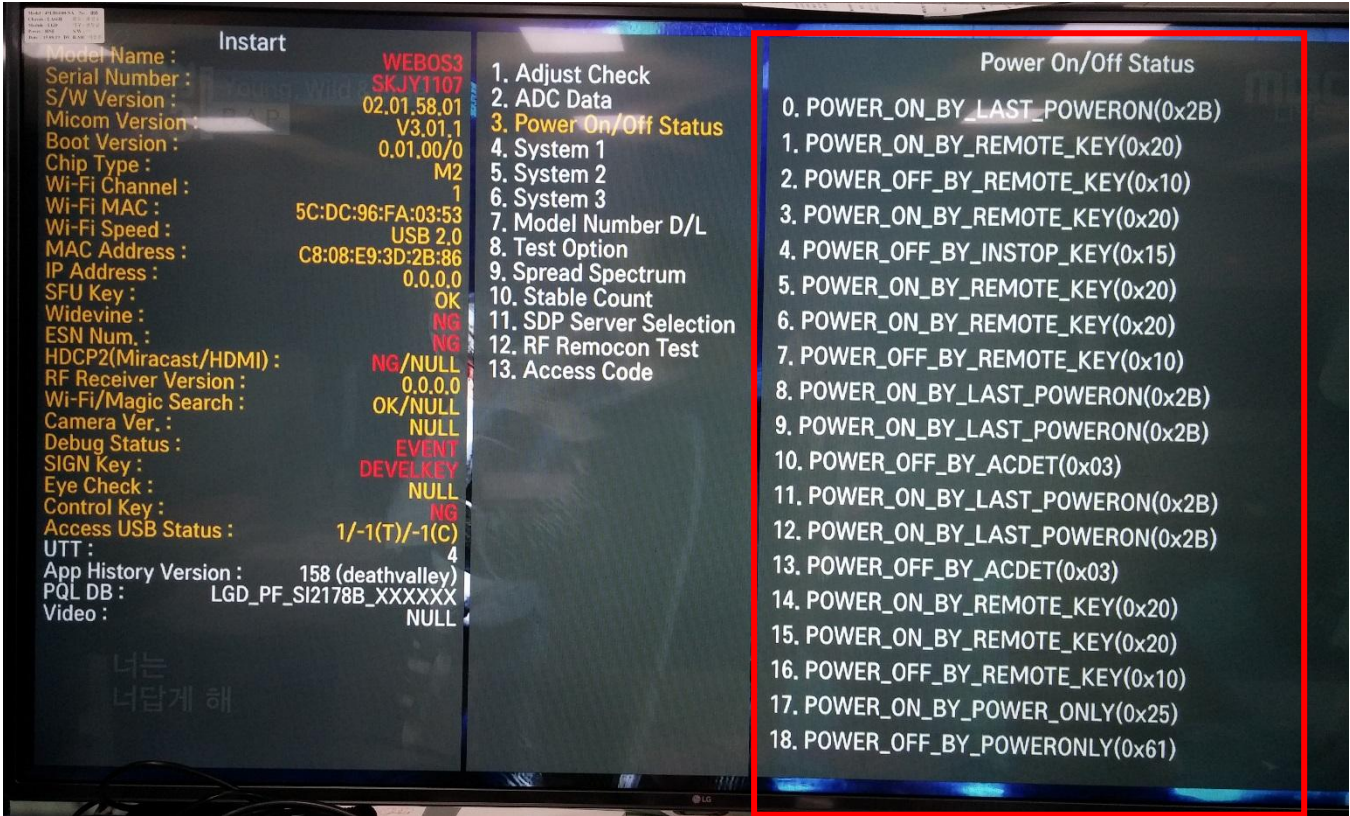
Check the DC 13V.



1	Power ON/OFF	2	PDIM #2
3	GND	4	D13.2V
5	D13.2V	6	D13.2V
7	A13.2V	8	A13.2V
9	GND	10	GND
11	MS	12	PDIM #1

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		A10



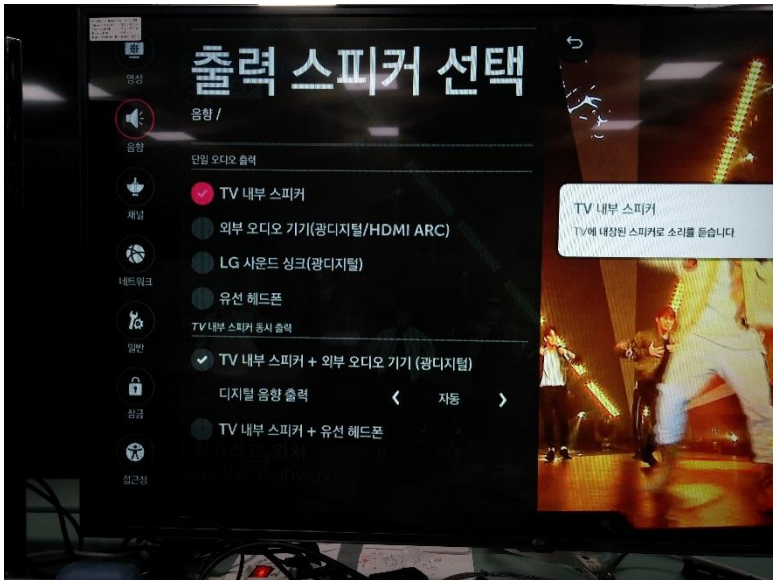
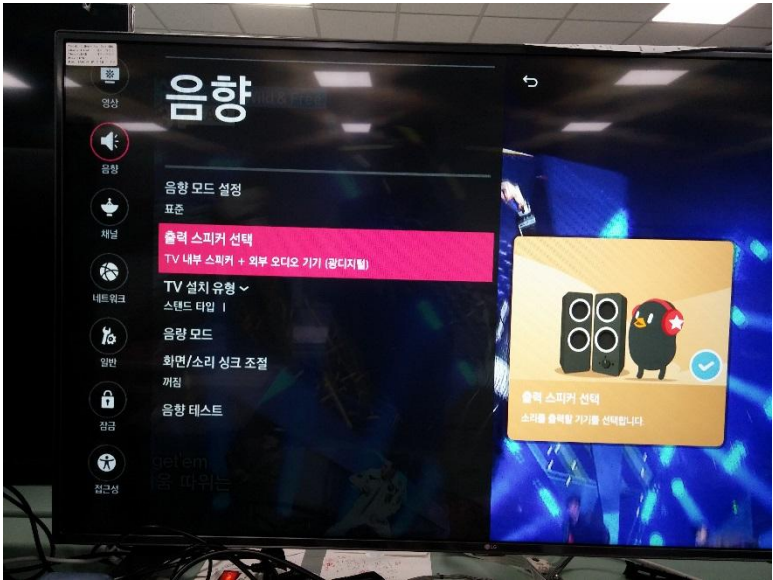
Entry method

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

A10

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		A11

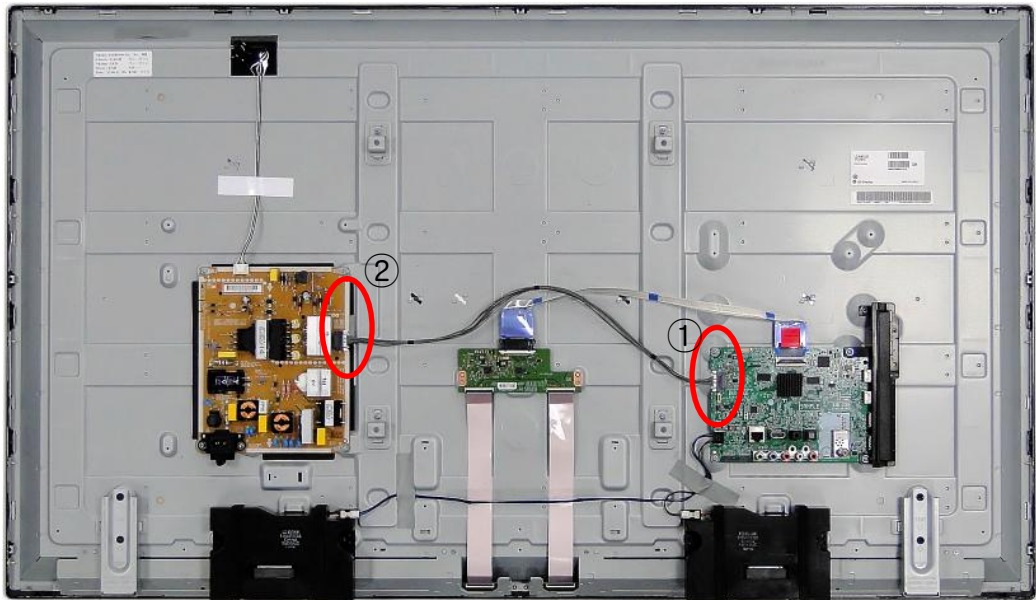


Checking method

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

Standard Repair Process Detail Technical Manual

Error Symptom	C. Audio error_No audio/Normal video	Established date		
Content	Checking Voltage and speaker	Revised date		A12



1	Power ON/OFF	2	PDIM #2
3	GND	4	D13.2V
5	D13.2V	6	D13.2V
7	A13.2V	8	A13.2V
9	GND	10	GND
11	MS	12	PDIM #1

Checking methond when no audio

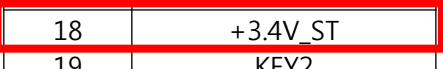
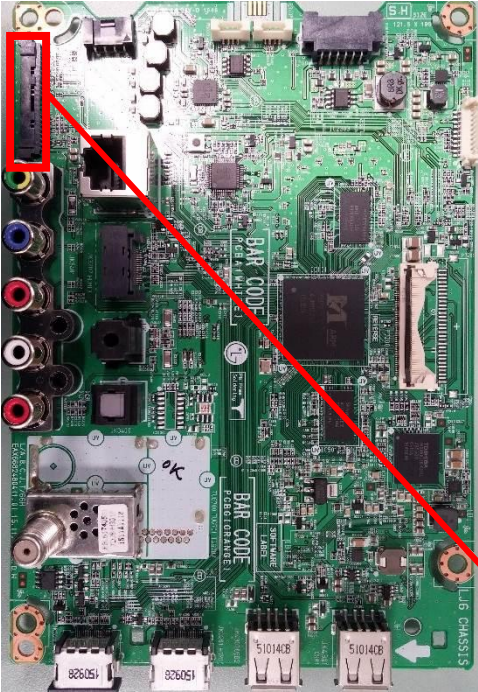
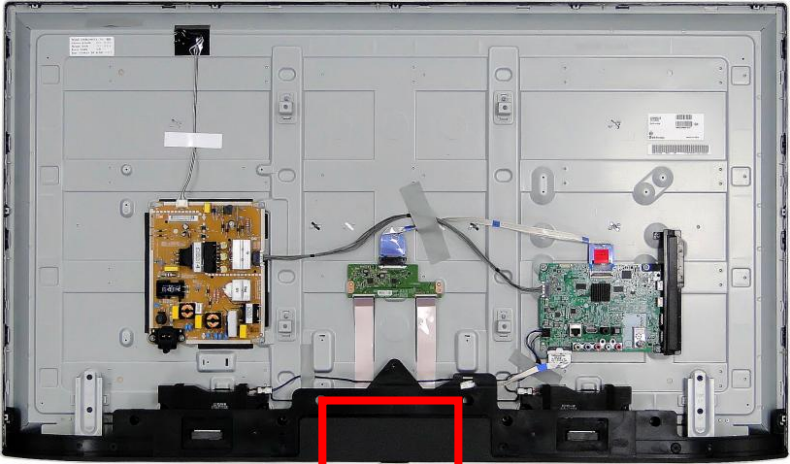
① Check Main B/D 13V

② Check Power B/D 13V

After connect speaker and contact the output terminal of the speaker with GND, if there is sound ouput noise, we conclude the speaker works well.

Standard Repair Process Detail Technical Manual

Error Symptom	D. Function error	Established date		
Content	Remote control operation checking method	Revised date		A13

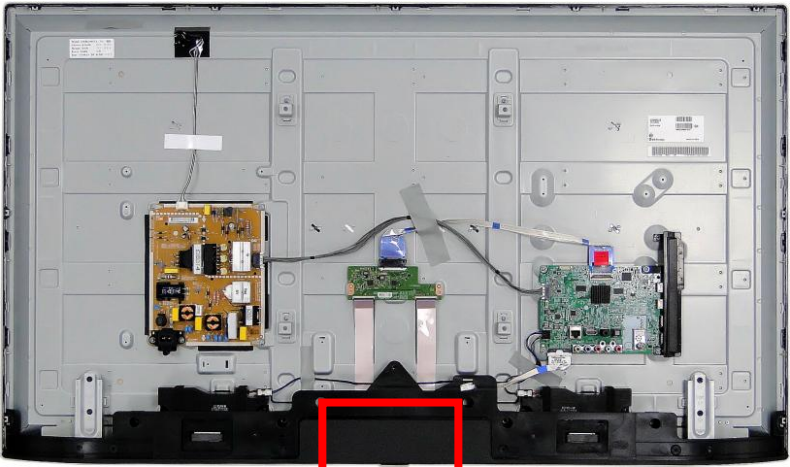


P4001	
1	+3.4V_WIFI
2	WIFI_DM
3	WIFI_DP
4	GND
5	WOL/WIFI_POWER_ON
6	GND
7	NC
8	GND
9	
12	EYE_SDA
13	EYE_SCL
14	GND
15	IR
16	LED_R
17	GND
18	+3.4V_ST
19	KEY2
20	KEY1
21	GND

Checking order
1. Check IR cable condition between IR & Main board.
2. Check the st-by 3.5V on the pin 18

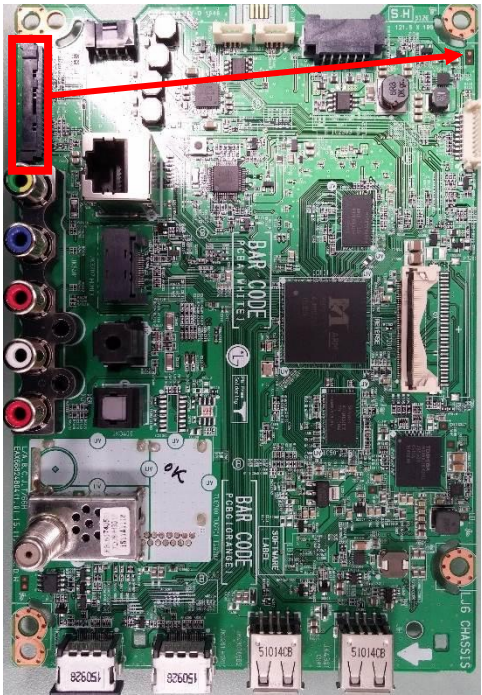
Standard Repair Process Detail Technical Manual

Error Symptom	D. Function error	Established date		
Content	Wi-Fi operation checking method	Revised date		A14



1

2



3

P4001	
1	+3.4V_WIFI
2	WIFI_DM
3	WIFI_DP
4	GND
5	WOL/WIFI_POWER_ON
6	GND
7	NC
8	GND
9	
12	EYE_SDA
13	EYE_SCL
14	GND
15	IR
16	LED_R
17	GND
18	+3.4V_ST
19	KEY2
20	KEY1
21	GND

Checking order

- 1. Check the IR cable condition
- 2. Check the Wifi Cable condition
- 3. Check the voltage 3.4V_WIFI on P4101