Internal Use Only

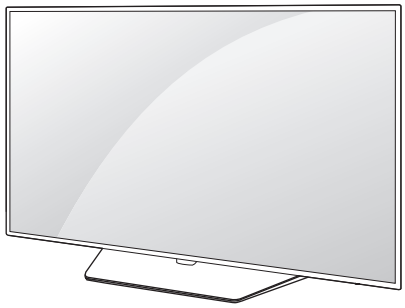
# LED TV
# SERVICE MANUAL

**CHASSIS : LA51H**

## MODEL : 65LF6300/6350/6390

**65LF6300/6350/6390-UA**

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



P/NO : MFL68660904 (1605-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 ⚠ 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 it's 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,**

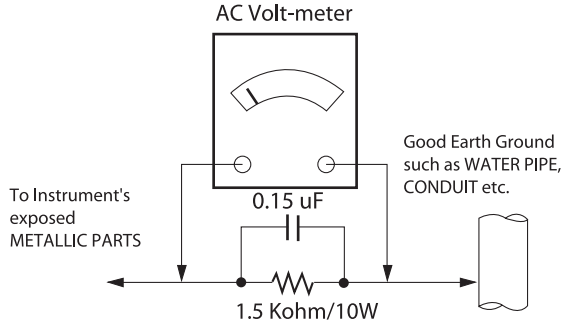
always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

**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 MΩ and 5.2 MΩ.
When the exposed metal has no return path to the chassis the reading must be infinite.
An other abnormality exists that must be corrected before the receiver is returned to the customer.

**Leakage Current Hot Check** (See below Figure)
Plug the AC cord directly into the AC outlet.

**Do not use a line Isolation Transformer during this check.**
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.
Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.
Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which is 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 in not required.
5. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
6. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
7. Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.
   Always remove the test receiver ground lead last.
8. Use with this receiver only the test fixtures specified in this service manual.
   **CAUTION**: Do not connect the test fixture ground strap to any heat sink in this receiver.

**Electrostatically Sensitive (ES) Devices**

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

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static type solder removal device. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
   **CAUTION**: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

General Soldering Guidelines

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range or 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 LA51H chassis

## 2. Test condition

Each part is tested as below without special notice.

1) Temperature : 20 ºC ± 5 ºC
2) Relative Humidity: 65 % ± 10 %
3) Power Voltage
   Standard input voltage (100~240V@ 50/60Hz)
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 : CE, IEC specification
   - EMC: CE, IEC

# 4. General Specification

| No | Item | Specification | Result | Module Name | Remark |
|---|---|---|---|---|---|
| 1. | Receiving System | ATSC / NTSC-M / 64 & 256 QAM | | | |
| 2. | Available Channel | 1) VHF : 02~13<br>2) UHF : 14~69<br>3) DTV : 02-69<br>4) CATV : 01~135<br>5) CADTV : 01~135 | | | |
| 3. | Input Voltage | AC 100 ~ 240V 50/60Hz | | | Mark : 110V, 60Hz |
| 4. | Market | NORTH AMERICA | | | |
| 5. | Screen Size | 43”, 49", 55”, 65" | | | |
| 6. | Aspect Ratio | 16:9 | | | |
| 7. | Tuning System | FS | | | |
| 8. | Module | LC430EUE-FHM1 FHD 43INCH 1920X1080 300CD COLOR 68% 16/9 1200:1 60Hz Inverter N LED 2D TBD LG Display Co., Ltd. | LGD | LC430EUE-FHM1<br>P/N: EAJ63109701 | 43LF6300-UA |
| | | LC490EUE-FHM1 FHD 49INCH 1920X1080 300CD COLOR 68% 16/9 1200:1 60Hz Inverter N LED 2D With T-con, 51.1W/47W/4.1W, 8Bit, 10000K, 178/178, GTGBW 9ms, LVDS 2ch, Carbon Titan LG Display Co., Ltd. | LGD | LC490EUE-FHM1<br>P/N: EAJ63110601 | 49LF6300-UA |
| | | LC550EUE-FHM1 FHD 55.0INCH 1920X1080 330CD COLOR 68% 16/9 1200:1 60Hz Inverter N LED 2D With T-con, 62.0W/58.4W/3.6W, 8Bit, 10000K, 178/178, GTGBW 9ms, LVDS 2ch, Carbon Titan LG Display Co., Ltd. | LGD | LC550EUE-FHM1<br>P/N: EAJ63110501 | 55LF6300-UA |
| | | LC650EUF-FHM1 FHD 65INCH 1920X1080 350CD COLOR 68% 16/9 1400:1 120Hz Inverter N LED 2D With T-con, 83.3W/80.1W/3.2W, 10Bit(Dithering), 10000K, 178/178, GTGBW 9ms, LVDS 4ch, Carbon Titan LG Display Co., Ltd. | LGD | LC650EUF-FHM1<br>P/N: EAJ63110401 | 65LF6300-UA |
| 9. | Operating Environment | 1) Temp : 0 ~ 40 deg<br>2) Humidity : ~ 80 % | | | |
| 10. | Storage Environment | 1) Temp : -20 ~ 60 deg<br>2) Humidity : ~ 85 % | | | |

# 5. Supported video resolutions

## 5.1. Component 2D input(Y, CB/PB, CR/PR)

| No | Resolution | H-freq(kHz) | V-freq.(Hz) | Pixel clock(MHz) | Proposed |
|---|---|---|---|---|---|
| 1. | 720*480 | 15.73 | 60 | 13.5135 | SDTV ,DVD 480I |
| 2. | 720*480 | 15.73 | 59.94 | 13.5 | SDTV ,DVD 480I |
| 3. | 720*480 | 31.50 | 60 | 27.027 | SDTV 480P |
| 4. | 720*480 | 31.47 | 59.94 | 27.0 | SDTV 480P |
| 5. | 1280*720 | 45.00 | 60.00 | 74.25 | HDTV 720P |
| 6. | 1280*720 | 44.96 | 59.94 | 74.176 | HDTV 720P |
| 7. | 1920*1080 | 33.75 | 60.00 | 74.25 | HDTV 1080I |
| 8. | 1920*1080 | 33.72 | 59.94 | 74.176 | HDTV 1080I |
| 9. | 1920*1080 | 67.50 | 60 | 148.50 | HDTV 1080P |
| 10. | 1920*1080 | 67.432 | 59.94 | 148.352 | HDTV 1080P |

## 5.2. Component 3D input(Y, CB/PB, CR/PR)

| No. | Resolution | H-freq(kHz) | V-freq.(kHz) | Pixel clock | 3D input proposed mode | Proposed |
|---|---|---|---|---|---|---|
| 1. | 1280*720 | 45.00 | 60.00 | 74.25 | 2D to 3D,Side by Side, Top and Bottom | HDTV 720P |
| 2. | 1280*720 | 44.96 | 59.94 | 74.176 | 2D to 3D,Side by Side, Top and Bottom | HDTV 720P |
| 3. | 1920*1080 | 33.75 | 60.00 | 74.25 | 2D to 3D,Side by Side, Top and Bottom | HDTV 1080I |
| 4. | 1920*1080 | 33.72 | 59.94 | 74.176 | 2D to 3D,Side by Side, Top and Bottom | HDTV 1080I |

## 5.3. HDMI Input (PC/DTV)

| No | Resolution | H-freq(kHz) | V-freq.(Hz) | Pixel clock(MHz) | Proposed | |
|---|---|---|---|---|---|---|
| | PC | | | | | |
| 1 | 640*350 | 31.468 | 70.09 | 25.17 | EGA | X |
| 2. | 720*400 | 31.469 | 70.08 | 28.32 | DOS | O |
| 3. | 640*480 | 31.469 | 59.94 | 25.17 | VESA(VGA) | O |
| 4 | 800*600 | 37.879 | 60.31 | 40.00 | VESA(SVGA) | O |
| 5 | 1024*768 | 48.363 | 60.00 | 65.00 | VESA(XGA) | O |
| 6 | 1152*864 | 54.348 | 60.053 | 80.002 | VESA | O |
| 7 | 1360*768 | 47.712 | 60.015 | 85.50 | VESA (WXGA) | X |
| 8 | 1280*1024 | 63.981 | 60.020 | 108.00 | VESA (SXGA) | O |
| 9 | 1920*1080 | 67.5 | 60 | 148.5 | HDTV 1080P | O |
| | DTV | | | | | |
| 1 | 640*480 | 31.469 | 59.94 | 25.175 | SDTV 480P | |
| 2 | 640*480 | 31.5 | 60 | 25.200 | SDTV 480P | |
| 3 | 720*480 | 31.50 | 60 | 27.027 | SDTV 480P | |
| 4 | 720*480 | 31.469 | 59.94 | 27.00 | SDTV 480P | |
| 5 | 1280*720 | 45.00 | 60.00 | 74.25 | HDTV 720P | |
| 6 | 1280*720 | 44.96 | 59.94 | 74.176 | HDTV 720P | |
| 7 | 1920*1080 | 33.75 | 60.00 | 74.25 | HDTV 1080I | |
| 8 | 1920*1080 | 33.72 | 59.94 | 74.176 | HDTV 1080I | |
| 9 | 1920*1080 | 67.500 | 60 | 148.50 | HDTV 1080P | |
| 10 | 1920*1080 | 67.43 | 59.94 | 148.352 | HDTV 1080P | |
| 11 | 1920*1080 | 27.000 | 24.000 | 74.25 | HDTV 1080P | |
| 12 | 1920*1080 | 26.97 | 23.97 | 74.176 | HDTV 1080P | |
| 13 | 1920*1080 | 33.75 | 30.000 | 74.25 | HDTV 1080P | |
| 14 | 1920*1080 | 33.716 | 29.976 | 74.176 | HDTV 1080P | |

## 5.4. 3D HDMI Input(1.4b)

| No | Resolution | H-freq(kHz) | V-freq.(Hz) | Pixel clock(MHz) | 3D input proposed mode |
|---|---|---|---|---|---|
| 1. | 720*480p | 63 | 59.94 / 60 | 54.00 | F/P,L/A |
| | | 31.5 | | 27.00 | T/B,S/S,S/S Full |
| 2. | 1280*720p | 90.00 | 59.94 / 60 | 148.5 | F/P, L/A |
| | | 44.96 / 45 | | 74.17/74.25 | S/S, T&B, S/S Full |
| 3. | 1920*1080i | 67.432 / 67.5 | 59.94 / 60 | 148.35/148.5 | F/P, F/A |
| | | 33.75 | | 74.25 | S/S, T&B, S/S Full |
| 4. | 1920*1080p | 54 | 23.976 / 24 | 148.5 | F/P, L/A |
| | | 26.973 / 27 | 23.976 / 24 | 74.175/74.25 | S/S, T&B, S/S Full |
| 5. | 1920*1080p | 33.716 / 33.75 | 29.97 / 30.00 | 74.175/74.25 | S/S, T&B, S/S Full |
| | | 67.50 | 30.00 | 148.5 | F/P, L/A |
| | | | 60.00 | | S/S, T&B |

## 5.5. 3D HDMI-PC Input

| No. | Resolution | H-freq(kHz) | V-freq.(Hz) | Pixel clock(MHz) | 3D input proposed mode |
|---|---|---|---|---|---|
| 1. | 1024*768 | 48.363 | 60.004 | 65.000 | 2D to 3D, S/S, T&B |
| 2. | 1360*768 | 47.712 | 60.015 | 85.500 | |
| 3. | 1920*1080 | 67.50 | 60.00 | 148.50 | 2D to 3D, S/S, T&B, C/B, R/I, C/I |

## 5.6. HDMI Input(1.3)

| No | Resolution | H-freq(kHz) | V-freq.(Hz) | Pixel clock(MHz) | 3D input proposed mode |
|---|---|---|---|---|---|
| 1. | 720*480p | 63 | 59.94 / 60 | 54.00 | 2D to 3D, S/S, T&B, C/B, R/I, C/I |
| | | 31.5 | | 27.00 | |
| 2. | 1280*720p | 90.00 | 59.94 / 60 | 148.5 | |
| | | 44.96 / 45 | | 74.17/74.25 | |
| 3. | 1920*1080i | 67.432 / 67.5 | 59.94 / 60 | 148.35/148.5 | 2D to 3D, S/S, T&B |
| | | 33.75 | | 74.25 | |
| 4. | 1920*1080p | 54 | 23.976 / 24 | 148.5 | 2D to 3D, S/S, T&B, C/B, R/I, C/I |
| | | 26.973 / 27 | 23.976 / 24 | 74.175/74.25 | |
| 5. | 1920*1080p | 33.716 / 33.75 | 29.97 / 30.00 | 74.175/74.25 | |

## 5.7. USB/DLNA Input

### 5.7.1. 3D Auto detection

| No. | Resolution | H-freq(kHz) | V-freq.(kHz) | Pixel clock(MHz) | 3D input proposed mode | Proposed |
|---|---|---|---|---|---|---|
| 1 | 1920*1080 | 33.75 | 30.000 | 74.25 | Side-by-side, Top-and-Bottom Checkerboard, Row Interleaving, Column Interleaving, Frame Sequentia (Photo : Side-by-side, Top-and-Bottom) | HDTV 1080P |

### 5.7.2. 3D Manual(Movie)

| No. | Resolution | H-freq(kHz) | V-freq.(kHz) | 3D input proposed mode |
|---|---|---|---|---|
| 1 | Under 704*480 | - | - | 2D to 3D |
| 2 | Over 704*480i | | | 2D to 3D,Side-by-side , Top-and-Bottom |
| 3 | Over 704*480p | | 50/60 | 2D to 3D,Side-by-side , Top-and-Bottom Checkerboard, Row Interleaving, Column Interleaving, Frame Sequential |
| 4 | Over 704*480p | | Others | 2D to 3D,Side-by-side , Top-and-Bottom Checkerboard, Row Interleaving, Column Interleaving |

### 5.7.3. 3D Manual(Photo)

| No. | Resolution | H-freq(kHz) | V-freq.(kHz) | 3D input proposed mode |
|---|---|---|---|---|
| 1 | Under 320*240 | - | - | 2D to 3D |
| 2 | Over 320*240 | | | 2D to 3D,Side-by-side , Top-and-Bottom |

## 5.8. Miracast/Widi Input

### 5.8.1. 3D Manual

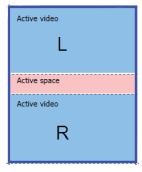
| No. | Resolution | H-freq(kHz) | V-freq.(kHz) | 3D input proposed mode |
|---|---|---|---|---|
| 1 | 1024*768p | - | 30/60 | 2D to 3D,Side-by-side , Top-and-Bottom |
| 2 | 1280*720p | | | |
| 3 | 1920*1080p | | | |
| 4 | Others | | - | 2D to 3D |

### 5.8.2. RF 3D Input(DTV)

| No. | Resolution | H-freq(kHz) | V-freq.(Hz) | Pixel clock(MHz) | Proposed | 3D input proposed mode |
|---|---|---|---|---|---|---|
| 1 | 1280*720 | 45.000 | 60 | 74.25 | HDTV 720P | 2D to 3D, Side by Side, Top & Bottom |
| 2 | 1920*1080 | 33.75 | 60 | 74.25 | HDTV 1080I | 2D to 3D, Side by Side, Top & Bottom |

## 5.9. 2D to 3D Conversion(RF 3D Input(DTV))

| No | INPUT | Freq | Resolution |
|---|---|---|---|
| 1 | Digital TV / Analog TV | 2D Support freq | 2D Support resolution |
| 2 | HDMI | 2D Support freq | 2D Support resolution |
| 3 | Component | 2D Support freq | 2D Support resolution |
| 4 | Composite | 2D Support freq | 2D Support resolution |
| 5 | USB | 2D Support freq | 2D Support resolution |

| No | Side by Side | Top & Bottom | Checkerboard | Single Frame Sequential | Frame Packing | 2D to 3D |
|---|---|---|---|---|---|---|
| 1 |  |  |  |  |  |  |

# ADJUSTMENT INSTRUCTION

## 1. Application

This spec. sheet applies to LA51H Chassis applied LED TV all models manufactured in TV factory

## 2. Specification

(1) Because this is not a hot chassis, it is not necessary to use an isolation transformer. However, the use of isolation transformer will help protect test instrument.
(2) Adjustment must be done in the correct order.
(3) The adjustment must be performed in the circumstance of 25 ±5 ºC of temperature and 65±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 ºC
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 PCBA Adjustments

(1) ADC adjustment(OTP) : Component
(2) EDID downloads for HDMI

### 3.2. Final assembly adjustment

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

### 3.3. Appendix

(1)Tool option menu, USB Download (S/W Update, Option and Service only)
(2) Manual adjustment for ADC calibration and White balance.
(3) Shipment conditions, Channel pre-set

## 4. MAIN PCBA Adjustments

### 4.1. ADC Calibration

- An ADC calibration is not necessary because MAIN SoC (LGExxxx) is already calibrated from IC Maker
- If it needs to adjust manually, refer to appendix.

### 4.2. MAC Address, ESN Key and Widevine Key download

#### 4.2.1. Equipment & Condition

1) Play file: keydownload.exe

#### 4.2.2. Communication Port connection

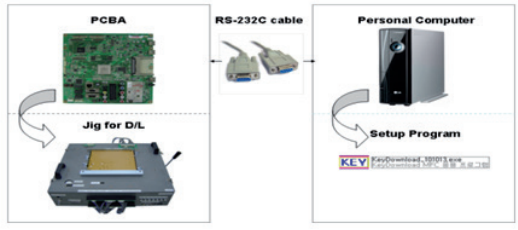
1) Key Write: Com 1,2,3,4 and 115200 (Baudrate)
2) Barcode: Com 1,2,3,4 and 9600 (Baudrate)

#### 4.2.3. Download process

1) Select the download items.
2) Mode check: Online Only
3) Check the test process
- US, Canada models: DETECT -> MAC_WRITE -> WIDEVINE_WRITE
- Korea, Mexico models: DETECT -> MAC_WRITE -> WIDEVINE_WRITE
4) Play : START
5) Check of result: Ready, Test, OK or NG

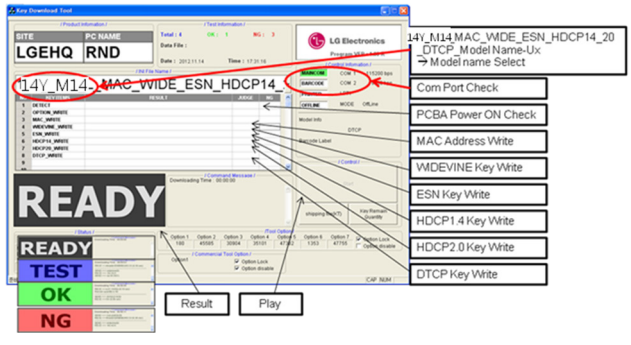
#### 4.2.4. Communication Port connection

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




#### 4.2.5. Download

1) US, Canada models (14Y LCD TV + MAC + Widevine + ESN Key + DTCP Key + HDCP1.4 and HDCP2.0)



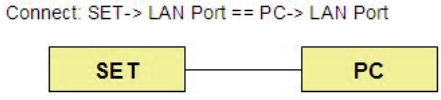

#### 4.2.6. Inspection

- In INSTART menu, check these keys.

## 4.3. LAN port Inspection (Ping Test)

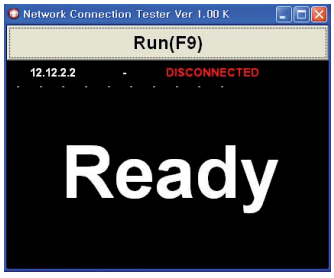
### 4.3.1. Equipment setting

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

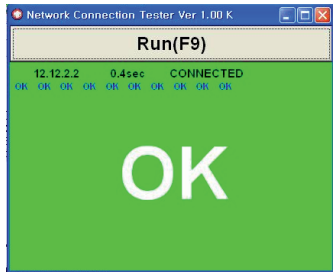



### 4.3.2. LAN PORT inspection (PING TEST)

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




Step 1)




Step 3) Check 'OK' Signal

## 4.4. EDID Download

### 4.4.1 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".

### 4.4.2 Equipment

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

### 4.4.3. EDID DATA

4.4.3.1. 2D_8bit_PCM(US) _ xvYCC : off

HDMI EDID 2D_8bit_PCM(US)_xvYCC : off

| | 0x00 | 0x01 | 0x02 | 0x03 | 0x04 | 0x05 | 0x06 | 0x07 | 0x08 | 0x09 | 0x0A | 0x0B | 0x0C | 0x0D | 0x0E | 0x0F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0x00 | 00 | FF | FF | FF | FF | FF | FF | 00 | 1E | 6D | ⓐ | | ⓑ | | | |
| 0x01 | ⓒ | | 01 | 03 | 80 | A0 | 5A | 78 | 0A | EE | 91 | A3 | 54 | 4C | 99 | 26 |
| 0x02 | 0F | 50 | 54 | A1 | 08 | 00 | 31 | 40 | 45 | 40 | 61 | 40 | 71 | 40 | 81 | 80 |
| 0x03 | 01 | 01 | 01 | 01 | 01 | 01 | 02 | 3A | 80 | 18 | 71 | 38 | 2D | 40 | 58 | 2C |
| 0x04 | 45 | 00 | 40 | 84 | 63 | 00 | 00 | 1E | 66 | 21 | 50 | B0 | 51 | 00 | 1B | 30 |
| 0x05 | 40 | 70 | 36 | 00 | 40 | 84 | 63 | 00 | 00 | 1E | 00 | 00 | 00 | FD | 00 | 3A |
| 0x06 | 3E | 1E | 53 | 10 | 00 | 0A | 20 | 20 | 20 | 20 | 20 | 20 | ⓓ | | | |
| 0x07 | ⓓ | | | | | | | | | | | | | | 01 | ⓔ1 |
| 0x00 | 02 | 03 | 1D | F1 | 48 | 90 | 22 | 20 | 05 | 04 | 03 | 02 | 01 | 23 | 09 | 57 |
| 0x01 | 07 | ⓕ | | | | | | | | E3 | 05 | 00 | 00 | 02 | 3A | 80 |
| 0x02 | 18 | 71 | 38 | 2D | 40 | 58 | 2C | 04 | 05 | A0 | 5A | 00 | 00 | 00 | 1E | 01 |
| 0x03 | 1D | 80 | 18 | 71 | 1C | 16 | 20 | 58 | 2C | 25 | 00 | 40 | 84 | 63 | 00 | 00 |
| 0x04 | 9E | 01 | 1D | 00 | 72 | 51 | D0 | 1E | 20 | 6E | 28 | 55 | 00 | 40 | 84 | 63 |
| 0x05 | 00 | 00 | 1E | 8C | 0A | D0 | 8A | 20 | E0 | 2D | 10 | 10 | 3E | 96 | 00 | 40 |
| 0x06 | 84 | 63 | 00 | 00 | 18 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 0x07 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ⓔ2 |

▪Reference
- HDMI1 ~ HDMI3
- In the data of EDID, bellows may be different by S/W or Input mode.

ⓐ Product ID

| HEX | EDID Table | DDC Function |
|---|---|---|
| 0001 | 0100 | Analog |
| 0001 | 0100 | Digital |

ⓑ Serial No: Controlled on production line.
ⓒ Month, Year: Controlled on production line:
ex) Monthly : '01' -> '01'
Year : '2015' -> '19'
ⓓ Model Name(Hex): LGTV

| Chassis | MODEL NAME(HEX) |
|---|---|
| LA51H | 00 00 00 FC 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20 |

ⓔ Checksum(LG TV): Changeable by total EDID data.

| | ⓔ1 | ⓔ2 | ⓔ3 |
|---|---|---|---|
| HDMI1 | E6 | E0 | X |
| HDMI2 | E6 | D0 | X |
| HDMI3 | E6 | C0 | X |

ⓕ Vendor Specific(HDMI)

| INPUT | MODEL NAME(HEX) |
|---|---|
| HDMI1 | 67 03 0C 00 10 00 80 1E |
| HDMI2 | 67 03 0C 00 20 00 80 1E |
| HDMI3 | 67 03 0C 00 30 00 80 1E |

4.4.3.2. 2D_10bit_PCM(US) _ xvYCC : off

HDMI EDID 2D_10bit_PCM(US)_xvYCC : off

| | 0x00 | 0x01 | 0x02 | 0x03 | 0x04 | 0x05 | 0x06 | 0x07 | 0x08 | 0x09 | 0x0A | 0x0B | 0x0C | 0x0D | 0x0E | 0x0F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0x00 | 00 | FF | FF | FF | FF | FF | FF | 00 | 1E | 6D | ⓐ | | ⓑ | | | |
| 0x01 | ⓒ | | | 01 | 03 | 80 | A0 | 5A | 78 | 0A | EE | 91 | A3 | 54 | 4C | 99 | 26 |
| 0x02 | 0F | 50 | 54 | A1 | 08 | 00 | 31 | 40 | 45 | 40 | 61 | 40 | 71 | 40 | 81 | 80 |
| 0x03 | 01 | 01 | 01 | 01 | 01 | 01 | 02 | 3A | 80 | 18 | 71 | 38 | 2D | 40 | 58 | 2C |
| 0x04 | 45 | 00 | A0 | 5A | 00 | 00 | 00 | 1E | 66 | 21 | 50 | B0 | 51 | 00 | 1B | 30 |
| 0x05 | 40 | 70 | 36 | 00 | A0 | 5A | 00 | 00 | 00 | 1E | 00 | 00 | 00 | FD | 00 | 3A |
| 0x06 | 3E | 1E | 53 | 10 | 00 | 0A | 20 | 20 | 20 | 20 | 20 | 20 | ⓓ | | | |
| 0x07 | ⓓ | | | | | | | | | | | | | | 01 | ⓔ1 |
| 0x00 | 02 | 03 | 1D | F1 | 48 | 90 | 22 | 20 | 05 | 04 | 03 | 02 | 01 | 23 | 09 | 57 |
| 0x01 | 07 | ⓕ | | | | | | | | E3 | 05 | 00 | 00 | 02 | 3A | 80 |
| 0x02 | 18 | 71 | 38 | 2D | 40 | 58 | 2C | 04 | 05 | A0 | 5A | 00 | 00 | 00 | 1E | 01 |
| 0x03 | 1D | 80 | 18 | 71 | 1C | 16 | 20 | 58 | 2C | 25 | 00 | A0 | 5A | 00 | 00 | 00 |
| 0x04 | 9E | 01 | 1D | 00 | 72 | 51 | D0 | 1E | 20 | 6E | 28 | 55 | 00 | A0 | 5A | 00 |
| 0x05 | 00 | 00 | 1E | 8C | 0A | D0 | 8A | 20 | E0 | 2D | 10 | 10 | 3E | 96 | 00 | A0 |
| 0x06 | 5A | 00 | 00 | 00 | 18 | 26 | 36 | 80 | A0 | 70 | 38 | 1B | 40 | 30 | 20 | 25 |
| 0x07 | 00 | A0 | 5A | 00 | 00 | 00 | 1A | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ⓔ2 |

▪Reference
- HDMI1 ~ HDMI3
- In the data of EDID, bellows may be different by S/W or Input mode.

ⓐ Product ID

| HEX | EDID Table | DDC Function |
|---|---|---|
| 0001 | 0100 | Analog |
| 0001 | 0100 | Digital |

ⓑ Serial No: Controlled on production line.
ⓒ Month, Year: Controlled on production line:
ex) Monthly : '01' -> '01'
Year : '2015' -> '19'
ⓓ Model Name(Hex): LGTV

| Chassis | MODEL NAME(HEX) |
|---|---|
| LA51H | 00 00 00 FC 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20 |

ⓔ Checksum(LG TV): Changeable by total EDID data.

| | ⓔ1 | ⓔ2 | ⓔ3 |
|---|---|---|---|
| HDMI1 | E6 | 99 | X |
| HDMI2 | E6 | 89 | X |
| HDMI3 | E6 | 79 | X |

ⓕ Vendor Specific(HDMI)

| INPUT | MODEL NAME(HEX) |
|---|---|
| HDMI1 | 67 03 0C 00 10 00 B8 2D |
| HDMI2 | 67 03 0C 00 20 00 B8 2D |
| HDMI3 | 67 03 0C 00 30 00 B8 2D |

4.4.3.3. 3D_8bit_PCM(US) _ xvYCC : off

HDMI EDID 3D_8bit_PCM(US)_xvYCC : off

| | 0x00 | 0x01 | 0x02 | 0x03 | 0x04 | 0x05 | 0x06 | 0x07 | 0x08 | 0x09 | 0x0A | 0x0B | 0x0C | 0x0D | 0x0E | 0x0F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0x00 | 00 | FF | FF | FF | FF | FF | FF | 00 | 1E | 6D | ⓐ | | ⓑ | | | |
| 0x01 | ⓒ | | | 01 | 03 | 80 | A0 | 5A | 78 | 0A | EE | 91 | A3 | 54 | 4C | 99 | 26 |
| 0x02 | 0F | 50 | 54 | A1 | 08 | 00 | 31 | 40 | 45 | 40 | 61 | 40 | 71 | 40 | 81 | 80 |
| 0x03 | 01 | 01 | 01 | 01 | 01 | 01 | 02 | 3A | 80 | 18 | 71 | 38 | 2D | 40 | 58 | 2C |
| 0x04 | 45 | 00 | 40 | 84 | 63 | 00 | 00 | 1E | 66 | 21 | 50 | B0 | 51 | 00 | 1B | 30 |
| 0x05 | 40 | 70 | 36 | 00 | 40 | 84 | 63 | 00 | 00 | 1E | 00 | 00 | 00 | FD | 00 | 3A |
| 0x06 | 3E | 1E | 53 | 10 | 00 | 0A | 20 | 20 | 20 | 20 | 20 | 20 | ⓓ | | | |
| 0x07 | ⓓ | | | | | | | | | | | | | | 01 | ⓔ1 |
| 0x00 | 02 | 03 | 2E | F1 | 48 | 90 | 22 | 20 | 05 | 04 | 03 | 02 | 01 | 23 | 09 | 57 |
| 0x01 | 07 | ⓕ | | | | | | | | | | | | | | |
| 0x02 | ⓕ | | | | | | | | | E3 | 05 | 00 | 00 | 02 | 3A | |
| 0x03 | 80 | 18 | 71 | 38 | 2D | 40 | 58 | 2C | 45 | 00 | 40 | 84 | 63 | 00 | 00 | 1E |
| 0x04 | 01 | 1D | 80 | 18 | 71 | 1C | 16 | 20 | 58 | 2C | 25 | 00 | 40 | 84 | 63 | 00 |
| 0x05 | 00 | 9E | 01 | 1D | 00 | 72 | 51 | D0 | 1E | 20 | 6E | 28 | 55 | 00 | 40 | 84 |
| 0x06 | 63 | 00 | 00 | 1E | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 0x07 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ⓔ2 |

▪Reference
- HDMI1 ~ HDMI4
- In the data of EDID, bellows may be different by S/W or Input mode.

ⓐ Product ID

| HEX | EDID Table | DDC Function |
|---|---|---|
| 0001 | 0100 | Analog |
| 0001 | 0100 | Digital |

ⓑ Serial No: Controlled on production line.
ⓒ Month, Year: Controlled on production line:
ex) Monthly : '01' -> '01'
Year : '2015' -> '19
ⓓ Model Name(Hex): LGTV

| Chassis | MODEL NAME(HEX) |
|---|---|
| LA51H | 00 00 00 FC 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20 |

ⓔ Checksum(LG TV): Changeable by total EDID data.

| | ⓔ1 | ⓔ2 | ⓔ3 |
|---|---|---|---|
| HDMI1 | E6 | FC | X |
| HDMI2 | E6 | EC | X |
| HDMI3 | E6 | DC | X |
| HDMI4 (LB87 only) | E6 | CC | X |

ⓕ Vendor Specific(HDMI)

| INPUT | MODEL NAME(HEX) |
|---|---|
| HDMI1 | 78 03 0C 00 10 00 80 1E 20 CO 0E 01 4F 00 FE 08 10 06 10 18 10 28 10 38 10 |
| HDMI2 | 78 03 0C 00 20 00 80 1E 20 CO 0E 01 4F 00 FE 08 10 06 10 18 10 28 10 38 10 |
| HDMI3 | 78 03 0C 00 30 00 80 1E 20 CO 0E 01 4F 00 FE 08 10 06 10 18 10 28 10 38 10 |
| HDMI4 (LB87 Only) | 78 03 0C 00 30 00 80 1E 20 CO 0E 01 4F 00 FE 08 10 06 10 18 10 28 10 38 10 |

4.4.3.4. 3D_10bit_PCM(US) _ xvYCC : off

HDMI EDID 3D_10bit_PCM(US)_xvYCC : off

| | 0x00 | 0x01 | 0x02 | 0x03 | 0x04 | 0x05 | 0x06 | 0x07 | 0x08 | 0x09 | 0x0A | 0x0B | 0x0C | 0x0D | 0x0E | 0x0F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0x00 | 00 | FF | FF | FF | FF | FF | FF | 00 | 1E | 6D | ⑧ | | ⑨ | | | |
| 0x01 | ⑥ | | | 01 | 03 | 80 | A0 | 5A | 78 | 0A | EE | 91 | A3 | 54 | 4C | 99 | 26 |
| 0x02 | 0F | 50 | 54 | A1 | 08 | 00 | 31 | 40 | 45 | 40 | 61 | 40 | 71 | 40 | 81 | 80 |
| 0x03 | 01 | 01 | 01 | 01 | 01 | 01 | 02 | 3A | 80 | 18 | 71 | 38 | 2D | 40 | 58 | 2C |
| 0x04 | 45 | 00 | 40 | 84 | 63 | 00 | 00 | 1E | 66 | 21 | 50 | B0 | 51 | 00 | 1B | 30 |
| 0x05 | 40 | 70 | 36 | 00 | 40 | 84 | 63 | 00 | 00 | 1E | 00 | 00 | 00 | FD | 00 | 3A |
| 0x06 | 3E | 1E | 53 | 10 | 00 | 0A | 20 | 20 | 20 | 20 | 20 | 20 | ④ | | | |
| 0x07 | ④ | | | | | | | | | | | | | | 01 | ⑥1 |
| 0x00 | 02 | 03 | 2E | F1 | 48 | 90 | 22 | 20 | 05 | 04 | 03 | 02 | 01 | 23 | 09 | 57 |
| 0x01 | 07 | ⑦ | | | | | | | | | | | | | | |
| 0x02 | ⑦ | | | | | | | | | | E3 | 05 | 00 | 00 | 02 | 3A |
| 0x03 | 80 | 18 | 71 | 38 | 2D | 40 | 58 | 2C | 45 | 00 | 40 | 84 | 63 | 00 | 00 | 1E |
| 0x04 | 01 | 1D | 80 | 18 | 71 | 1C | 16 | 20 | 58 | 2C | 25 | 00 | 40 | 84 | 63 | 00 |
| 0x05 | 00 | 9E | 01 | 1D | 00 | 72 | 51 | D0 | 1E | 20 | 6E | 28 | 55 | 00 | 40 | 84 |
| 0x06 | 63 | 00 | 00 | 1E | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 0x07 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | ⑥2 |

▪Reference
- HDMI1 ~ HDMI3
- In the data of EDID, bellows may be different by S/W or Input mode.

ⓐ Product ID

| HEX | EDID Table | DDC Function |
|---|---|---|
| 0001 | 0100 | Analog |
| 0001 | 0100 | Digital |

ⓑ Serial No: Controlled on production line.
ⓒ Month, Year: Controlled on production line:
ex) Monthly : '01' -> '01'
Year : '2015' -> '19
ⓓ Model Name(Hex): LGTV

| Chassis | MODEL NAME(HEX) |
|---|---|
| LA51H | 00 00 00 FC 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20 |

ⓔ Checksum(LG TV): Changeable by total EDID data.

| | ⓔ1 | ⓔ2 | ⓔ3 |
|---|---|---|---|
| HDMI1 | E6 | B5 | X |
| HDMI2 | E6 | A5 | X |
| HDMI3 | E6 | 95 | X |

ⓕ Vendor Specific(HDMI)

| INPUT | MODEL NAME(HEX) |
|---|---|
| HDMI1 | 78 03 0C 00 10 00 B8 2D 20 C0 0E 01 4F 00 FE 08 10 06 10 18 10 28 10 38 10 |
| HDMI2 | 78 03 0C 00 20 00 B8 2D 20 C0 0E 01 4F 00 FE 08 10 06 10 18 10 28 10 38 10 |
| HDMI3 | 78 03 0C 00 30 00 B8 2D 20 C0 0E 01 4F 00 FE 08 10 06 10 18 10 28 10 38 10 |

# 5. Final Assembly Adjustment

## 5.1. White Balance Adjustment

### 5.1.1. Overview

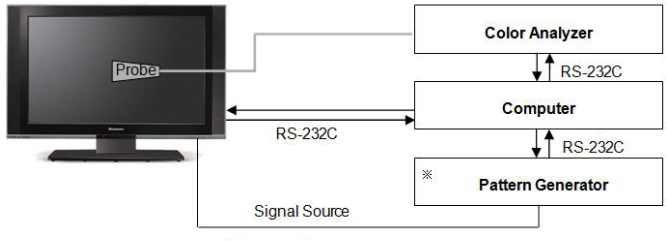
5.1.1.1. W/B adj. Objective & How-it-works
(1) Objective: To reduce each Panel's W/B deviation
(2) How-it-works: When R/G/B gain in the OSD is at 192, it means the panel is at its Full Dynamic Range. In order to prevent saturation of Full Dynamic range and data, one of R/G/B is fixed at 192, and the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

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

### 5.1.2. Equipment

(1) Color Analyzer: CA-210 (NCG: CH 9 / WCG: CH12 / LED: CH14)
(2) Adj. Computer (During auto adj., RS-232C protocol is needed)
(3) Adjust Remocon
(4) Video Signal Generator MSPG-925F 720p/204-Gray (Model: 217, Pattern: 49)
※ Color Analyzer Matrix should be calibrated using CS-1000

### 5.1.3. Equipment connection




※ If TV internal pattern is used, not needed

### 5.1.4. Adjustment Command (Protocol)

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

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

(2) Adjustment Map

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

### 5.1.5. Adjustment method

5.1.5.1. Auto WB calibration

(1) Set TV in ADJ mode using P-ONLY key (or POWER ON key)

(2) Place optical probe on the center of the display

- It need to check probe condition of zero calibration before adjustment.

(3) Connect RS-232C Cable

(4) Select mode in ADJ Program and begin a adjustment.

(5) When WB adjustment is completed with OK message, check adjustment status of pre-set mode (Cool, Medium, Warm)

(6) Remove probe and RS-232C cable.

▪ W/B Adj. must begin as start command “wb 00 00” , and finish as end command “wb 00 ff”, and Adj. offset if need

5.1.5.2. Manual adjustment

(1) Set TV in Adj. mode using POWER ON

(2) Zero Calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10cm of the surface..

(3) Press ADJ key -> EZ adjust using adj. R/C à 9. White-Balance then press the cursor to the right (KEY►). When KEY(►) is pressed 206 Gray internal pattern will be displayed.

(4) Adjust Cool modes

(i) Fix the one of R/G/B gain to 192 (default data) and decrease the others.
(If G gain is adjusted over 172 and R and B gain less than 192 , Adjust is O.K.)

(ii) If G gain is less than 172,
Increase G gain by up to 172, and then increase R gain and G gain same amount of increasing G gain.

(iii) If R gain or B gain is over 255,
Readjust G gain less than 172, Conform to R gain is 255 or B gain is 255

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

(6) Adj. is completed, Exit adjust mode using “EXIT” key on Remote controller.

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

(1) Luminance: 204 Gray, 80IRE

(2) Standard color coordinate and temperature using CS-1000 (over 26 inch)

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

▪ Luminance: 204 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 | 0.286 | 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) – by aging time

(1) Normal line in Korea (From January to February) : LGD (LB5xxx, LB6xxx, LB7xxx, LB8xxx Series models)

| | Aging time (Min) | Cool | | Medium | | Warm | |
|---|---|---|---|---|---|---|---|
| | | X | Y | X | Y | X | Y |
| | | 271 | 270 | 286 | 289 | 313 | 329 |
| 1 | 0-2 | 286 | 295 | 301 | 314 | 328 | 354 |
| 2 | 3-5 | 284 | 290 | 299 | 309 | 326 | 349 |
| 3 | 6-9 | 282 | 287 | 297 | 306 | 324 | 346 |
| 4 | 10-19 | 279 | 283 | 294 | 302 | 321 | 342 |
| 5 | 20-35 | 276 | 278 | 291 | 297 | 318 | 337 |
| 6 | 36-49 | 274 | 275 | 289 | 294 | 316 | 334 |
| 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 |

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

(2) Normal line in Korea (From March to December) : LGD (LB5xxx, LB6xxx, LB7xxx, LB8xxx Series models)
Normal line in Mexico : LGD (LB5xxx, LB6xxx, LB7xxx, LB8xxx Series models)

| | 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 |

(3) O/S Module(AUO, INX, Sharp, CSOT, BOE)

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

## 5.2. Option selection per country

### 5.2.1. Overview

(1) Tool option selection is only done for models in Non-USA North America due to rating

(2) Applied model: LA42B Chassis applied to CANADA and MEXICO

### 5.2.2. Country Group selection

(1) Press ADJ key on the Adj. R/C, and then select Country Group Menu

(2) Depending on destination, select US, then on the lower Country option, select US, CA, MX.
Selection is done using +, - KEY

### 5.2.3. Tool Option inspection

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

* Tool option can be reconstructed by Software

## 5.3. Magic Motion remote controller Check

### 5.3.1. Test equipment

▪ RF-remote controller for check, IR-KEY-CODE remote controller.

▪ Check AA battery before test. A recommendation is that a tester change battery every lots.

### 5.3.2. Test

(1) Make pairing with TV set by pressing “Start key(Wheel key)” on RCU.

(2) Check a cursor on screen by pressing ‘Wheel key” of RCU

(3) Stop paring with TV set by pressing “Back+ Home” key of RCU

### 5.3.3. Applied models

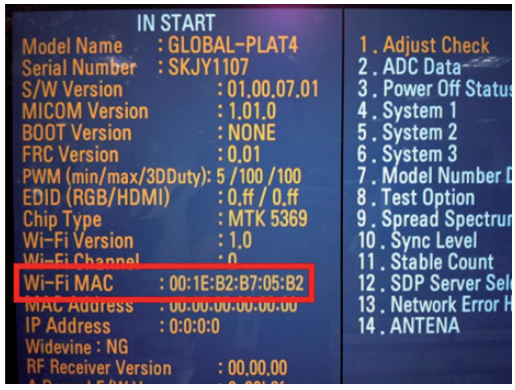
| Chassis | Model Name | Magic RF receiver |
|---|---|---|
| LA51H | LF6300-UA | Built-in |

## 5.4. Wi-Fi MAC Address Check

### 5.4.1. Using RS232 Command

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

### 5.4.2. Check the menu on in-start




## 5.5. 3D pattern test (Only for 3D models)

### 5.5.1. Test equipment

(1) Pattern Generator MSHG-600 or MSPG-6100 (HDMI 1.4 support)
(2) Pattern: HDMI mode (model No. 872, pattern No. 83)

### 5.5.2. Test method

(1) Input 3D test signal as Fig.1.


Fig.1
<HDMI Mode 872번, Pattern No. 83>

(2) Press 'OK" key as a 3D input OSD is shown.
(3) Check pattern as Fig2 without 3D glasses. (3D mode without 3D glasses)


Fig.2
〈OK in 3D mode without 3D glasses〉


Fig.3
〈NG in 3D mode without 3D glasses〉

### 5.5.3. 3D Inner pattern

(1). Using RS232 Command

| | Command | Set ACK |
|---|---|---|
| Transmission | [A][I][ ][Set ID][ ][72][Cr] | [O][K][x] or [N][G][x] |

(2) It support internal 3D pattern without 'MASTER' equipment. Except that one, other method is same when use the 'MASTER' equipment

## 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 (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)

**Flow Line**

**Cell Line**

* Remark: Inspect in Power Only Mode and check SW version in a master equipment

## 5.7. EYE-Q Green Function Inspection

Step 1) Turn on the TV..
Step 2) Press 'EYE button' on the adjustment remote-controller.
Step 3) Cover 'Eye Q sensor' on the front of set with your hands, hold it for 6 seconds.
Step 4) Check "the Sensor Data" on the screen, make certain that Data is below 10. If Data isn't below 10 in 6 seconds, Eye Q sensor would be bad. You should change Eye Q sensor.
Step 5) Uncover your hands from Eye Q sensor, hold it for 6 seconds.
Step 6) Check "Back Light(xxx)" on the screen, check data increase . You should change Eye Q sensor.


## 5.8. 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. AUDIO output check

## 6.1. Audio input condition

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

## 6.2. Specification

| No | Item | Min | Typ | Max | Unit | Remark |
|---|---|---|---|---|---|---|
| 1 | Audio practical max Output, L/R (Distor-tion=10% max Output) | 9.0<br>8.5 | 10.0<br>8.9 | 12.0<br>9.9 | W<br>Vrms | (1) Measurement condition<br>- EQ/AVL/Clear Voice: Off<br>(2) Speaker (8Ω Impedance)<br>ALL MODEL |

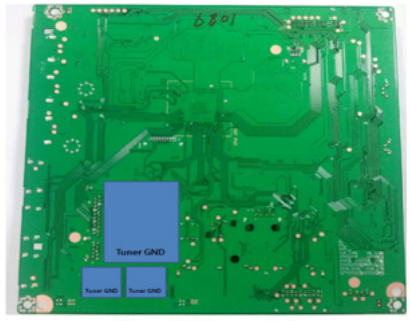
# 7. GND and HI-POT Test

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

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

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

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



<Tuner GND is separated>

## 8.3. Checkpoint

(1) Test voltage

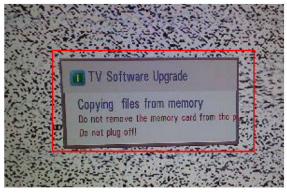
| Products/Model | | TV | MNT, Projec-tor |
|---|---|---|---|
| 2Poles | Japan | 1500V(AC)/ 2121v(DC) | 3000V(AC)/ 4242V(DC) |
| | Other | 3000V(AC)/ 4242V(DC) | |
| 3Poles | Japan | 800V(AC)/ 1131(DC) | 1500V(AC)/ 2121(DC) |
| | Other | 1500V(AC)/ 2121V(DC) | |
| Cut off current | | 100mA(AC)/100mA(DC) | |
| Earth Continutiy test | | | |

(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 0.5mArms

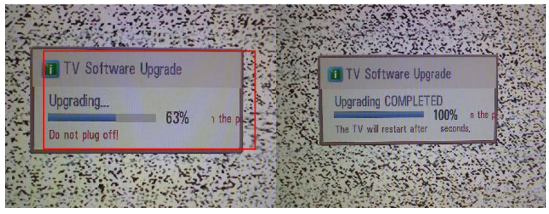
# 9. USB S/W Download (optional, Service only)

(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 staring.




(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.)

# 10. Optional adjustments

## 10.1. Manual White balance Adjustment

### 10.1.1. Adj. condition and cautionary items

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

### 10.1.2. Equipment

(1) Color Analyzer: CA-210 (NCG: CH 9 / WCG: CH12 / LED: CH14)
(2) Adj. Computer (During auto adj., RS-232C protocol is needed)
(3) Adjust Remocon
(4) Video Signal Generator MSPG-925F 720p/216-Gray (Model: 217, Pattern: 78)

### 10.1.3. Adjustment

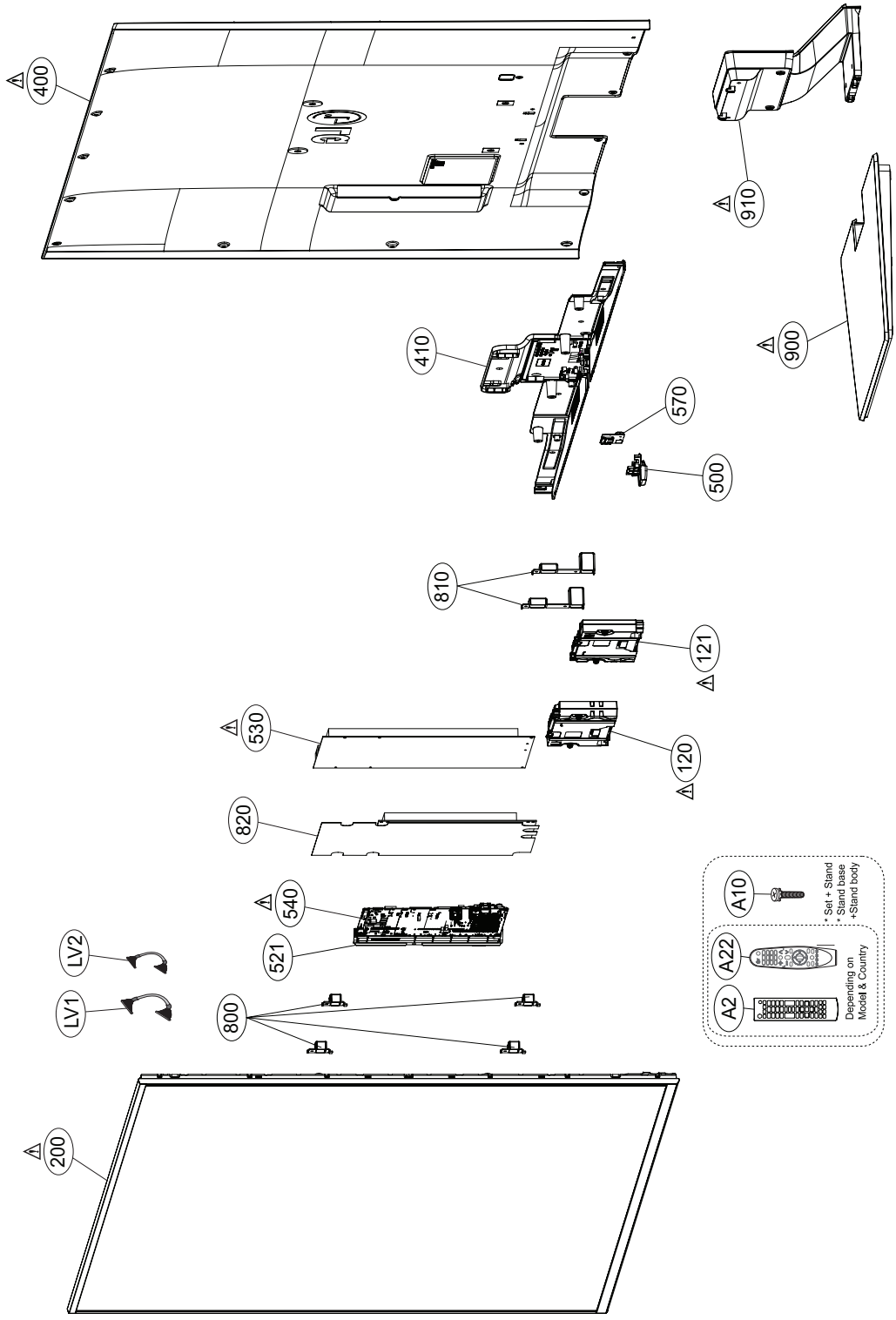
(1) Set TV in Adj. mode using POWER ON
(2) Zero Calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10cm of the surface.
(3) Press ADJ key -> EZ adjust using adj. R/C -> 6. White-Balance then press the cursor to the right (KEY►). When KEY(►) is pressed 216 Gray internal 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.

▪ If internal pattern is not available, use RF input. In EZ Adj. menu 6.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.

# EXPLODED VIEW

**IMPORTANT SAFETY NOTICE**

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

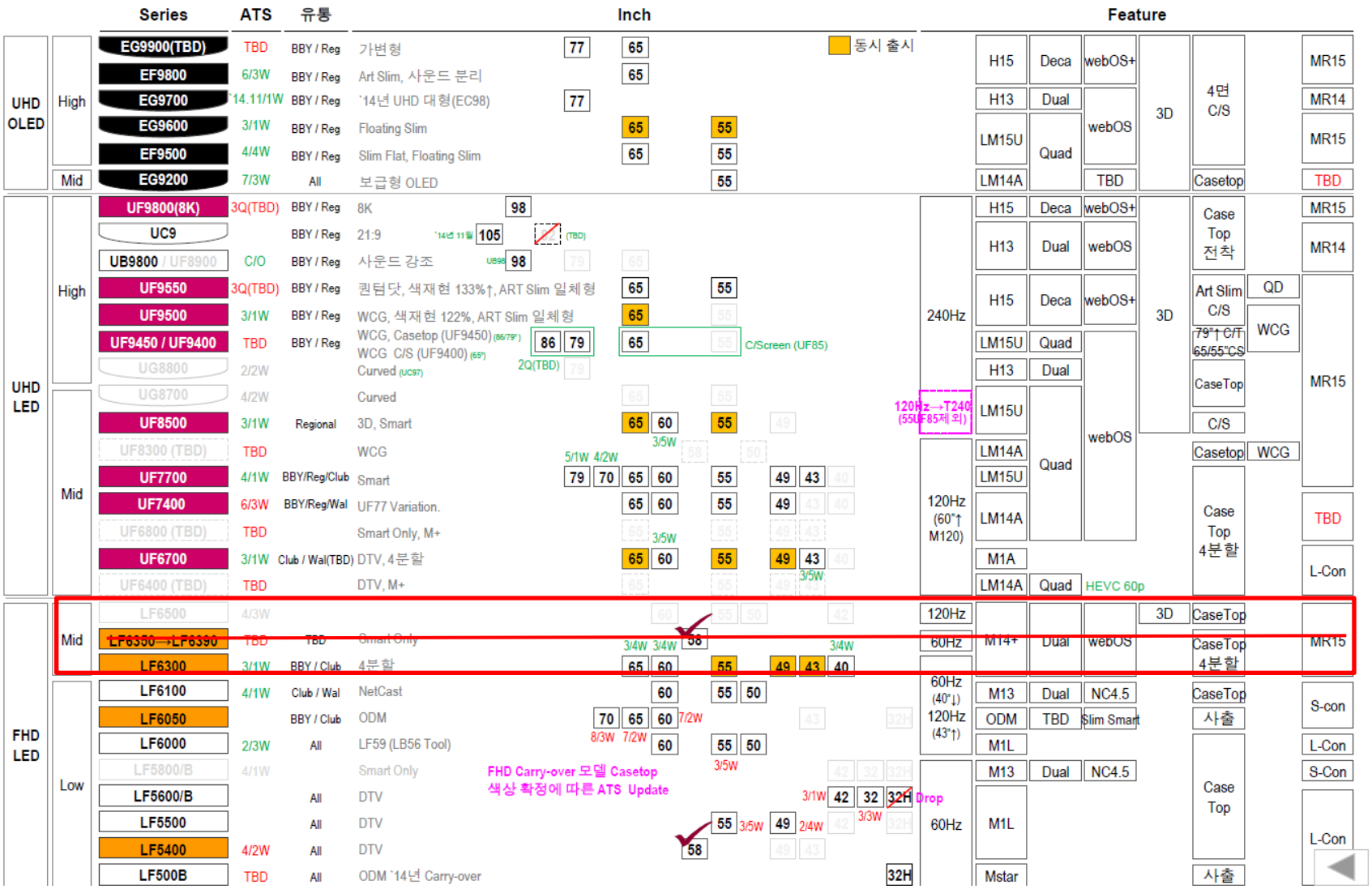


# 2015
# Engineering guide

**< Applicable Model – Mid end >**
**40/43/49/55/60/65LF6300**
**42/47/50/55/60LF6500**

# ◈ CONTENT ◈

# ◈ CONTENT ◈



# ◈ CONTENT ◈

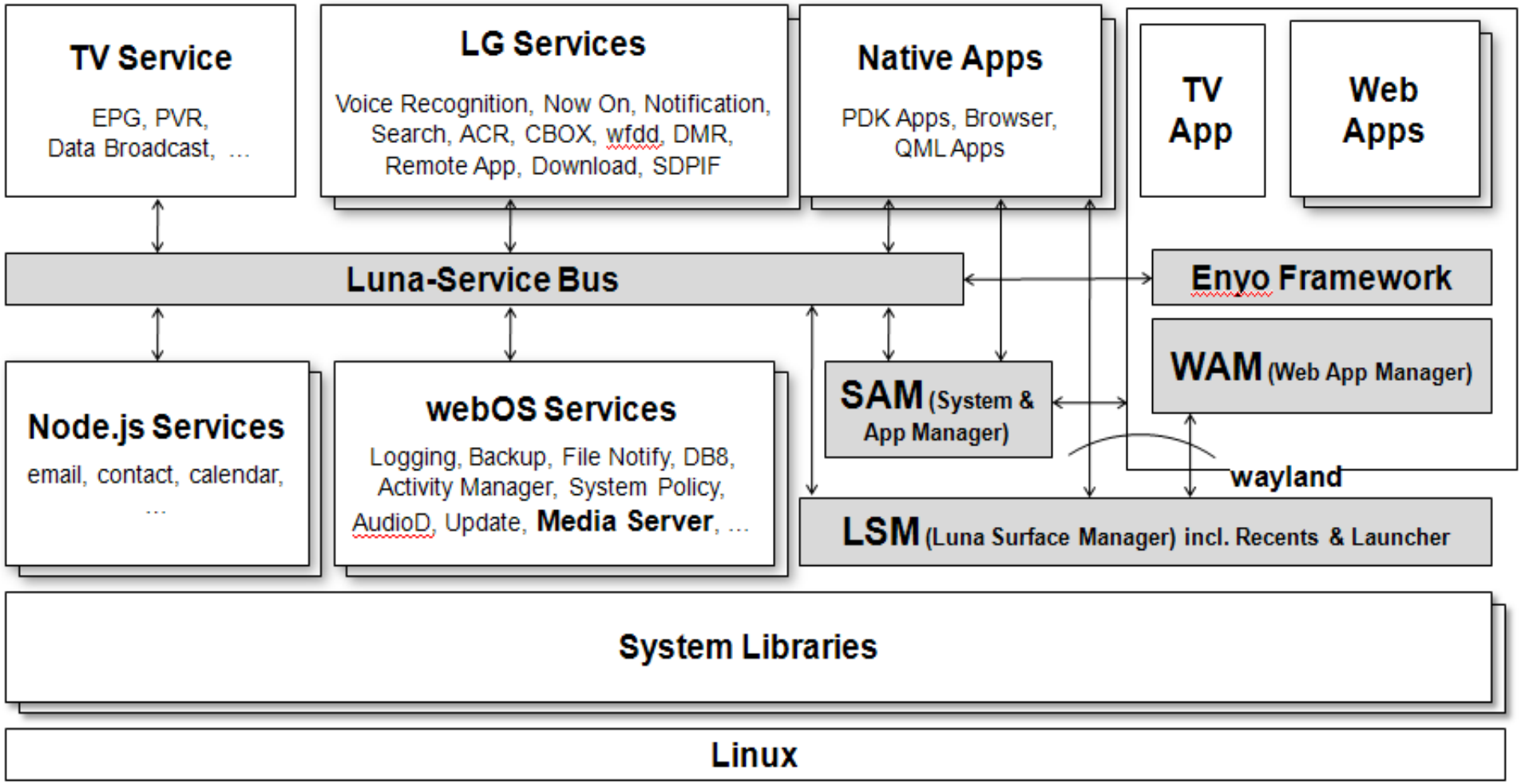
# Model naming and Tool option

| | |
|---|---|
| Standard of 2015 Model Name | Model Name |
| Description of Tool Options | Tool option info |

# ◈ CONTENT ◈

# webOS Architecture

- **Luna Bus**에 기반하여 서비스 및 응용을 통합함으로써, 개발 독립성과 기능 확장성을 제고한다.
- **Web** 응용 프레임워크에 기반하여 응용 개발 생산성을 높인다.
- **webOS** 프로세스 및 자원 관리를 통해 시스템 자원을 효율적 활용할 수 있도록 한다 (멀티 **Tasking**)

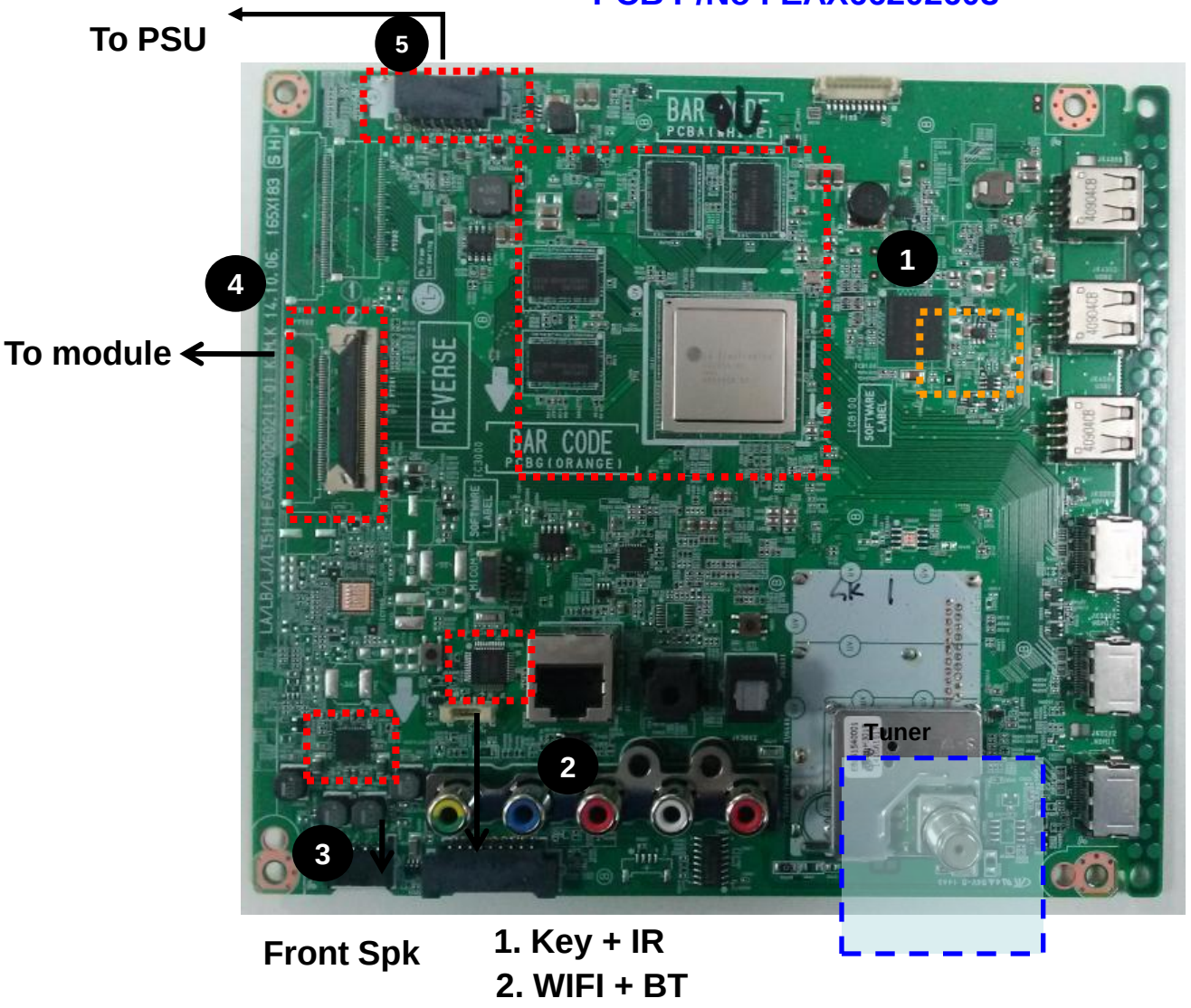


# ◈ CONTENT ◈

# Main PCB for Broadband

## 40/43/49/55LF6300

Chassis : LA51H
PCB P/No : EAX66202603

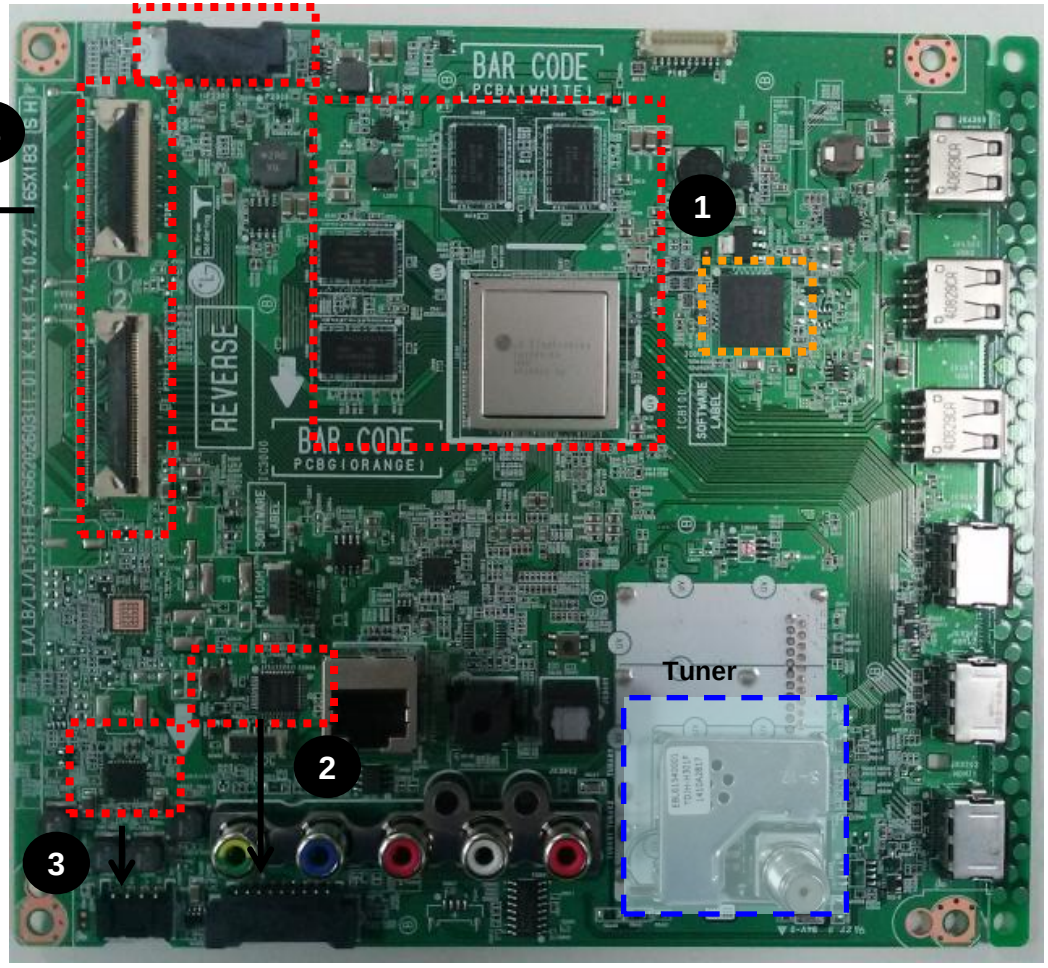



1. Main processor, DDR Memory
   eMMC Memory
2. Micom for Key/IR sensing
   WiFi + BT(Magic Remocon receiver)
3. Audio AMP (10W+10W)
4. LVDS or EPI Wafer
5. PSU

# Main PCB for Broadband

**60/65LF6300**
**60LF6500**

**Chassis : LA51H**
**PCB P/No : EAX66202603**

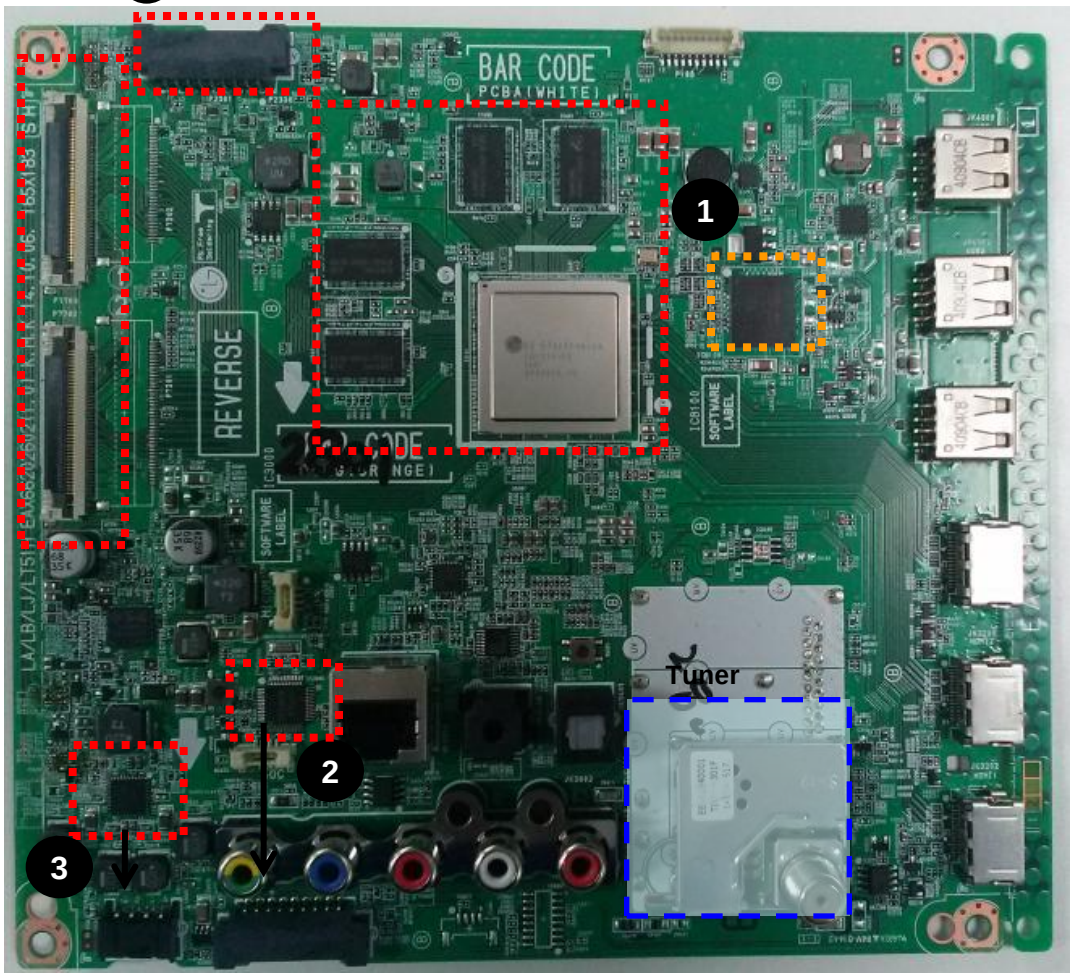



1. Main processor, DDR Memory
   eMMC Memory
2. Micom for Key/IR sensing
   WiFi + BT(Magic Remocon receiver)
3. Audio AMP (12W+12W)
4. LVDS or EPI Wafer
5. PSU

# Main PCB for Broadband

## 42/47/50/55LF6500

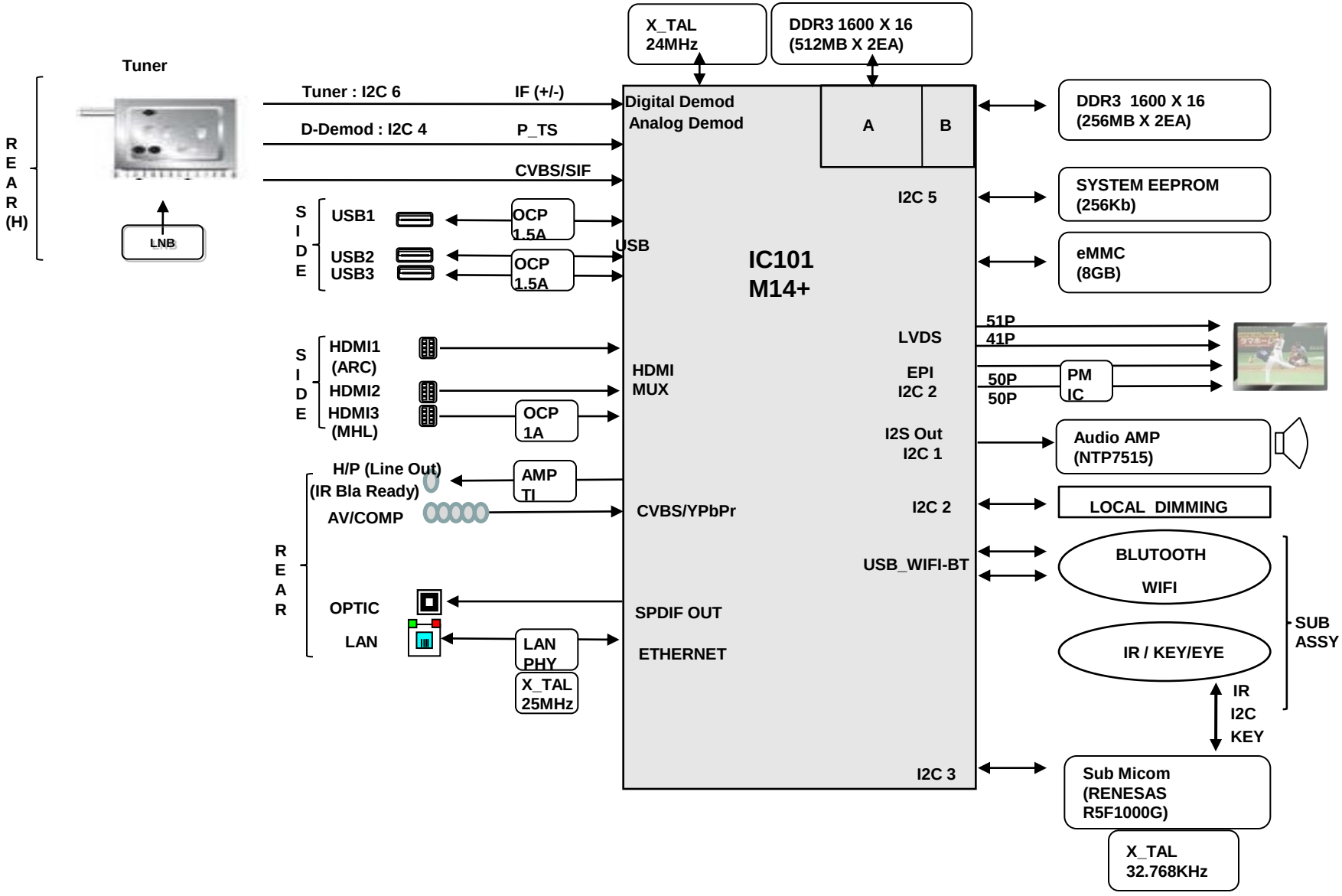
Chassis : LA51H
PCB P/No : EAX66202603



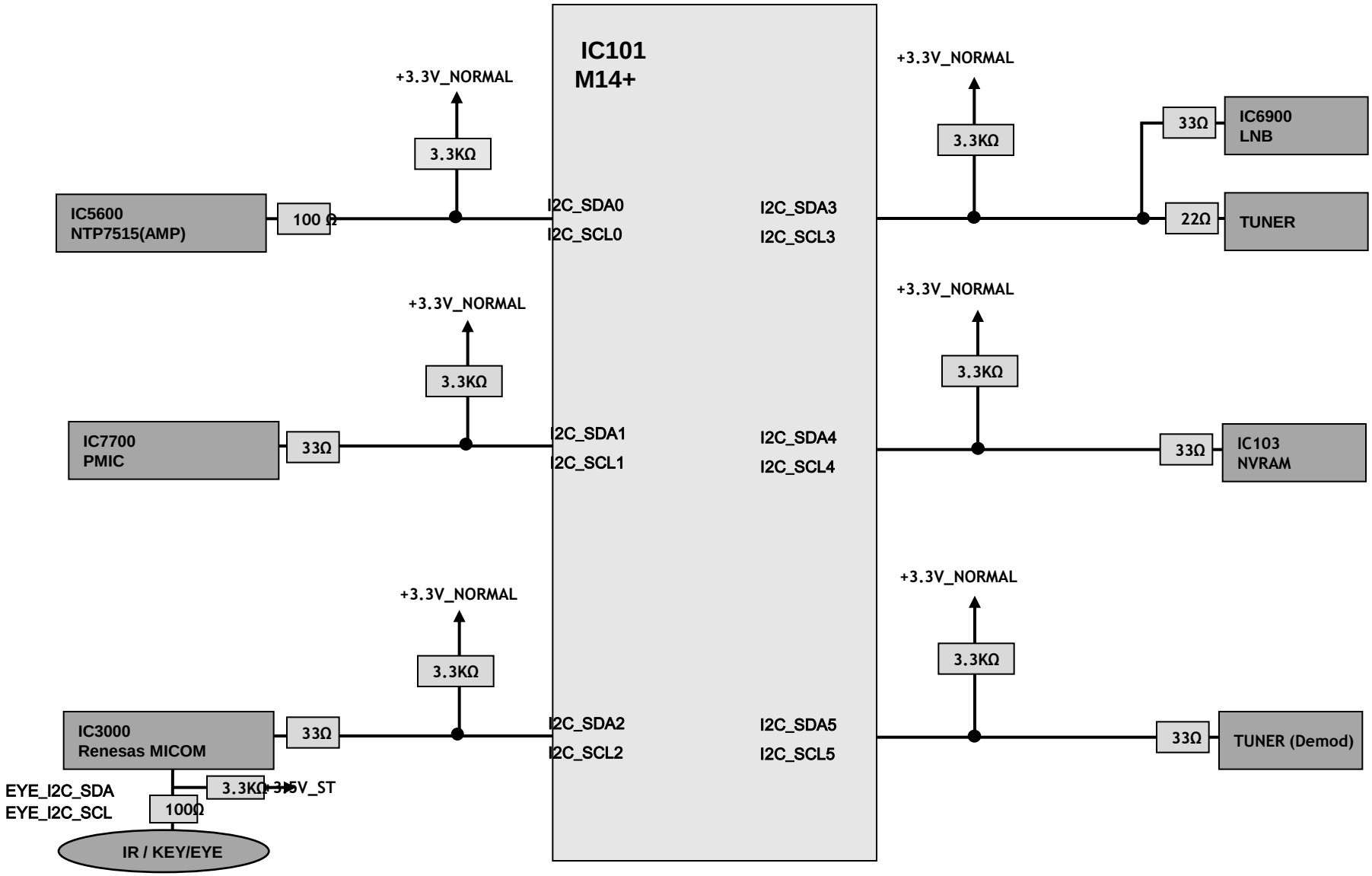

1. Main processor, DDR Memory
   eMMC Memory
2. Micom for Key/IR sensing
   WiFi + BT(Magic Remocon receiver)
3. Audio AMP (12W+12W)
4. LVDS or EPI Wafer
5. PSU

# ◈ CONTENT ◈

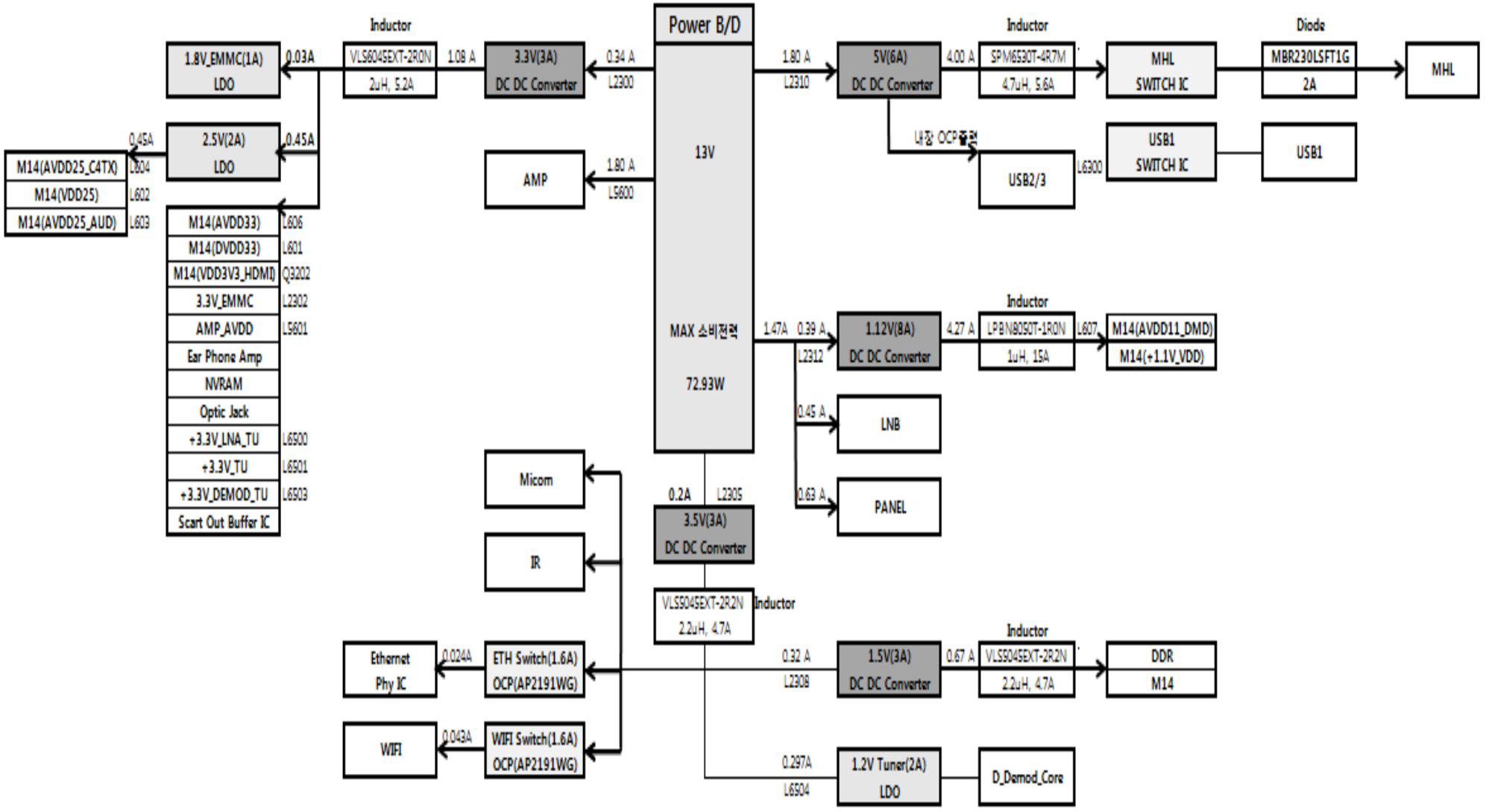
# 1. M14+ Block Diagram



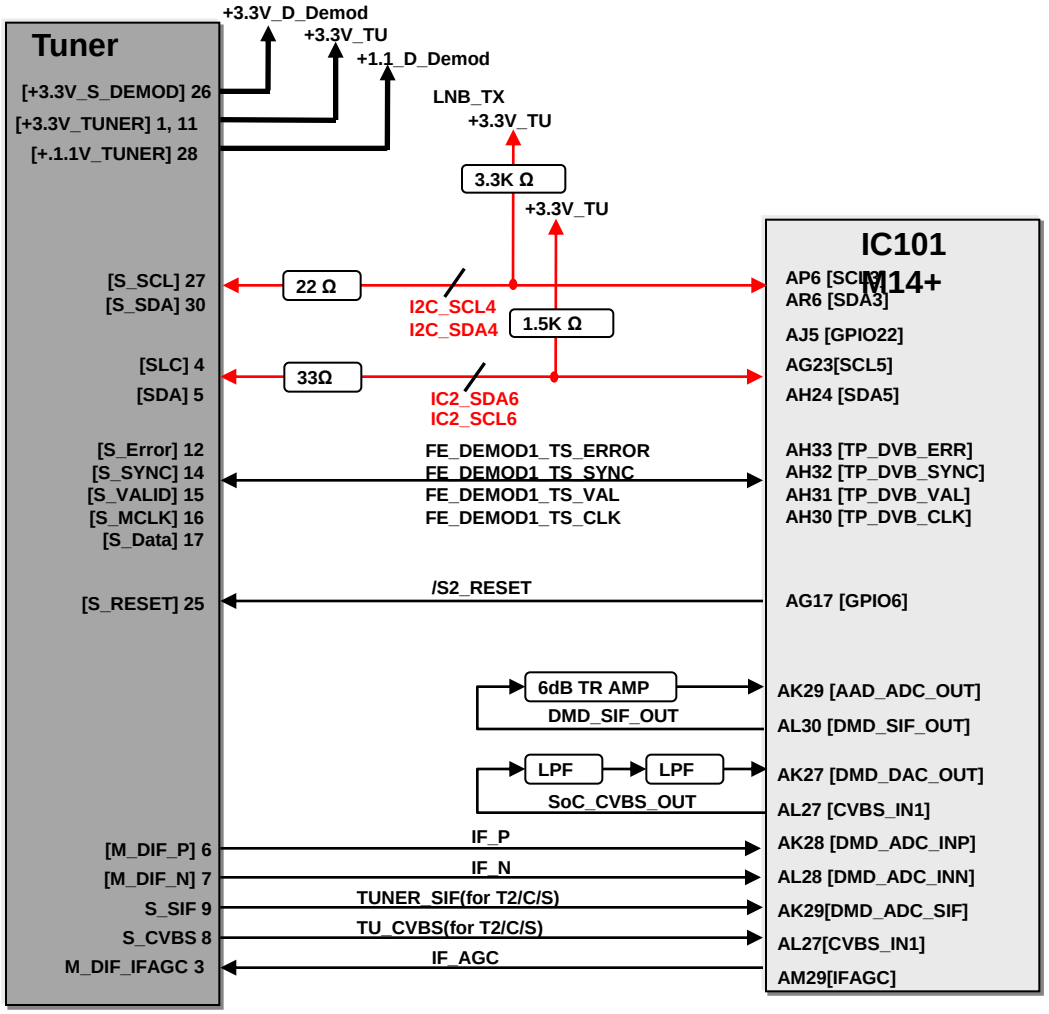
# 2. M14+ I2C Block Diagram



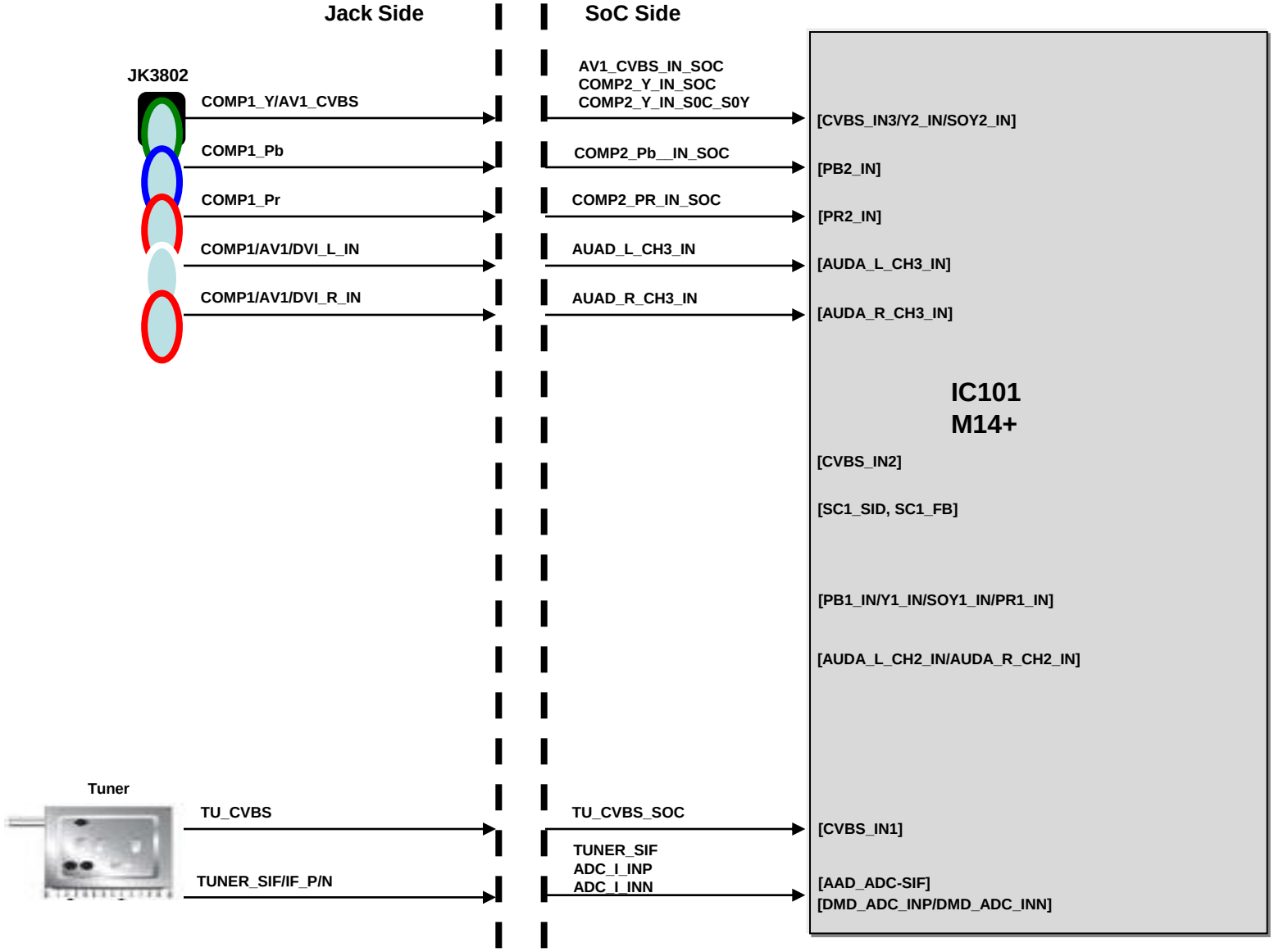
# 3. Power Block Diagram



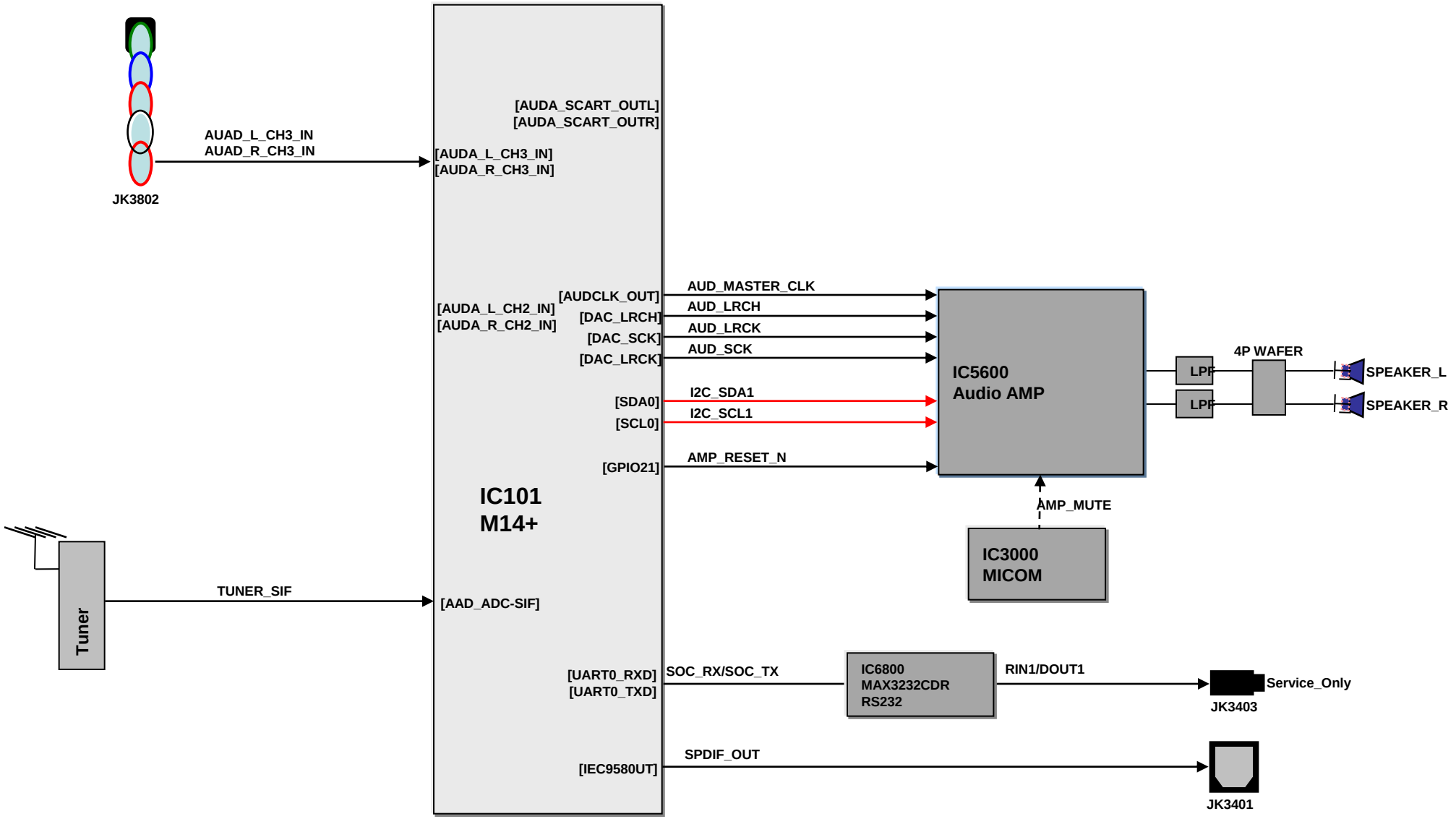
# 4. Tuner Block Diagram



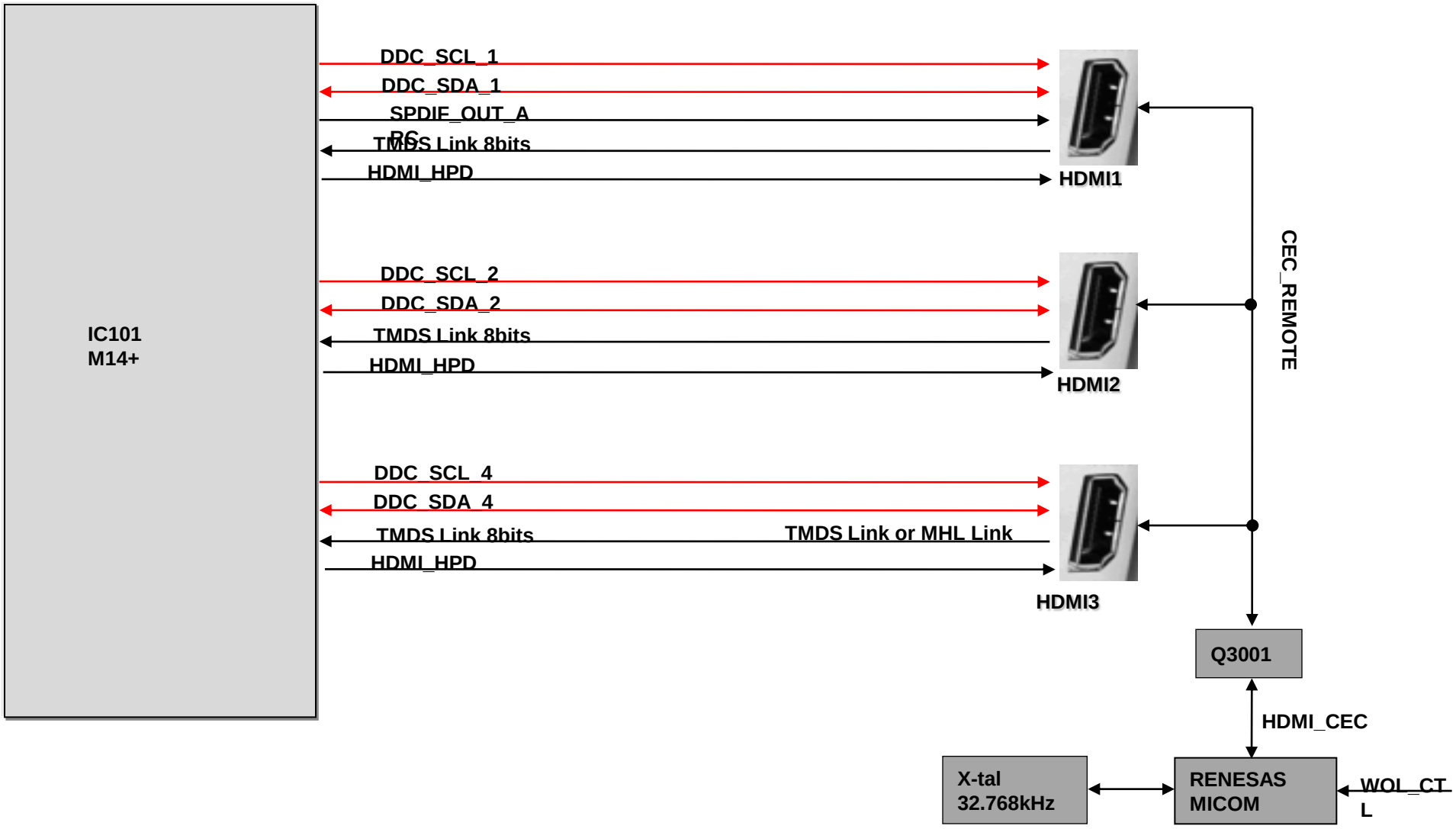
# 5. Video/Audio In Block Diagram



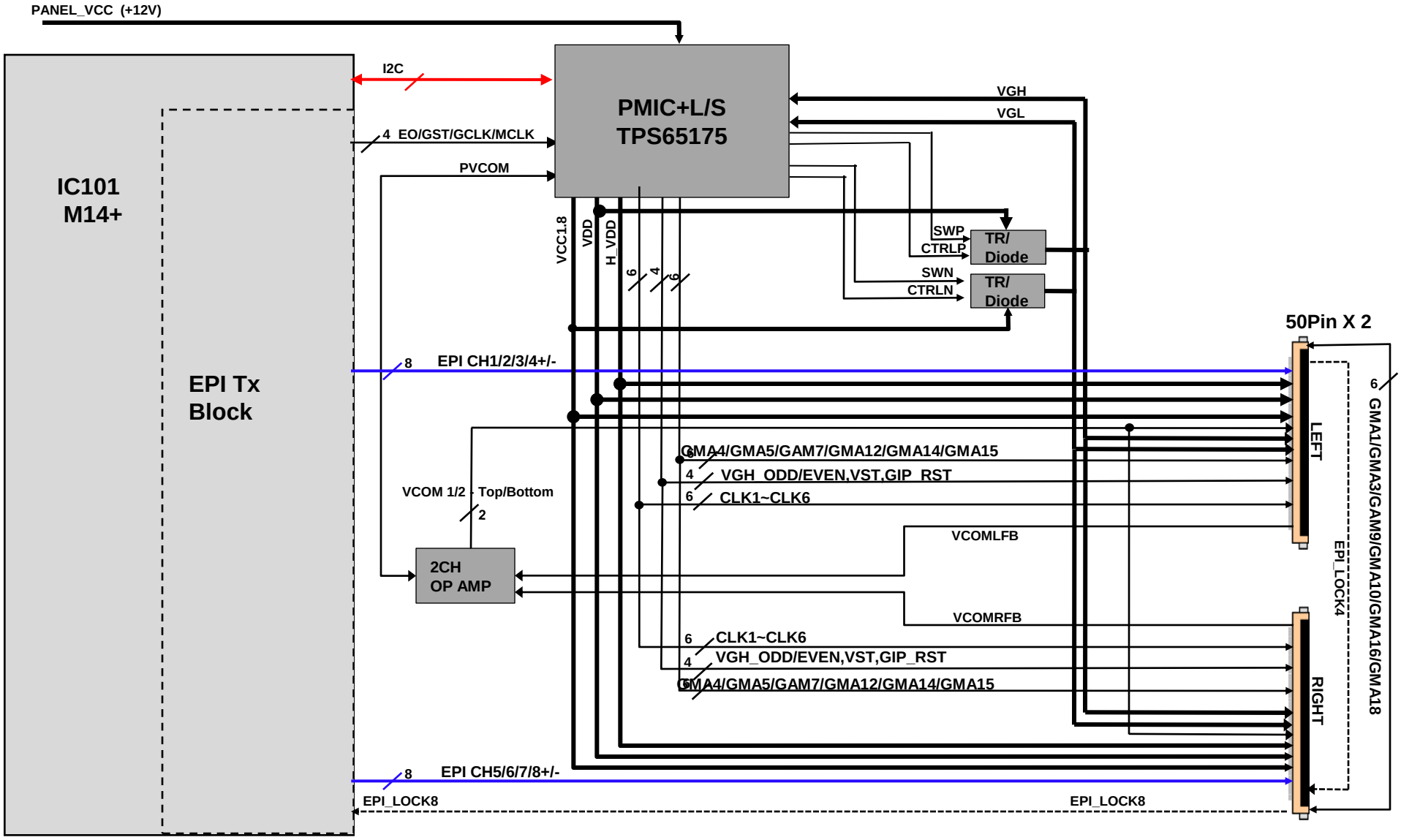
# 6. Audio Out Block Diagram



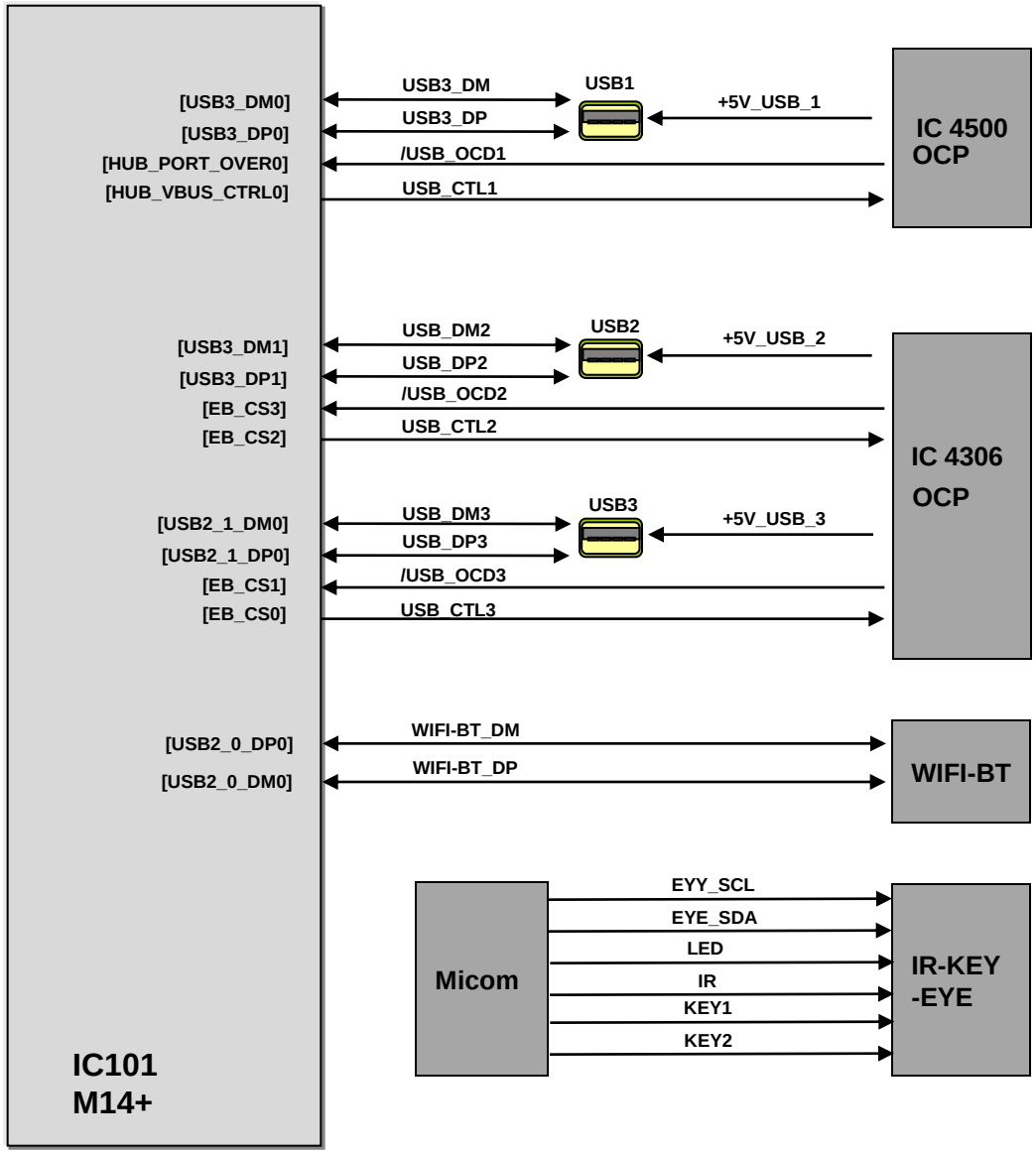
# 7. HDMI



# 8. Panel Interface Block Diagram



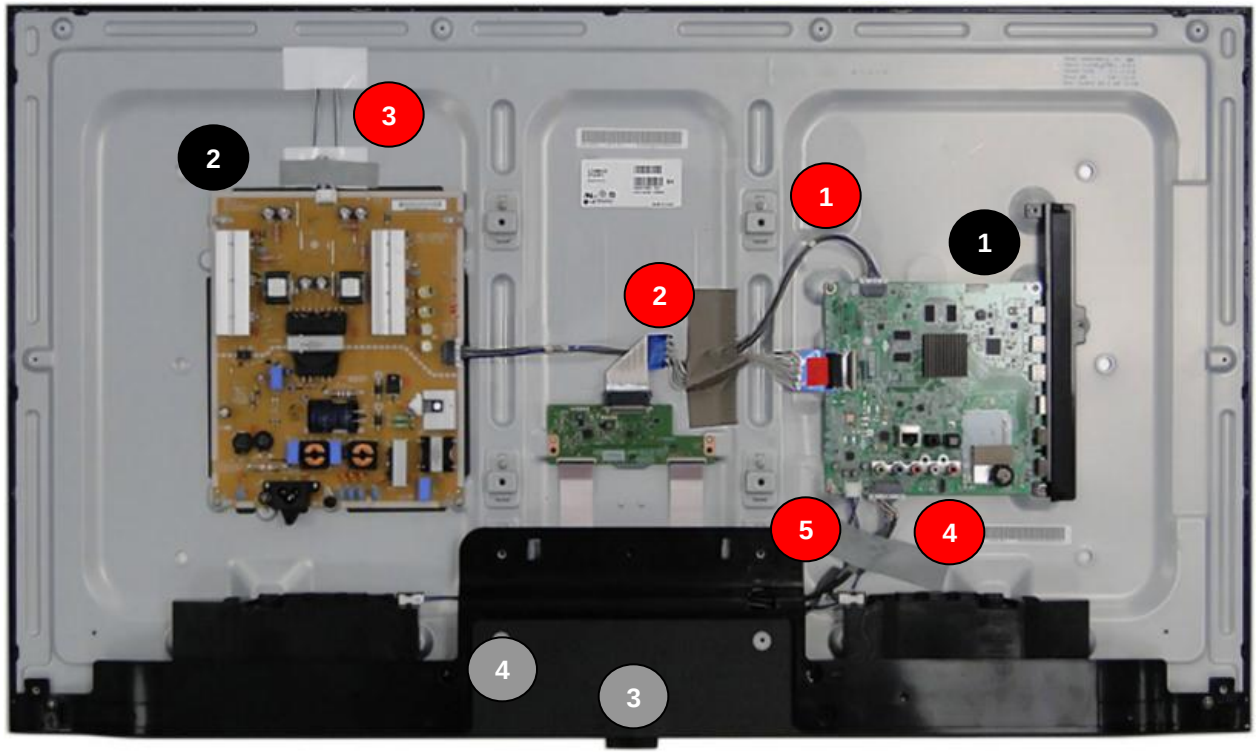
# 9. USB 2.0 / WIFI-BT / IR-KEY-EYE



# ◈ CONTENT ◈

# Interconnection

## 43LF6300




### [PCBs]

1. Main PCB
2. Power Board
3. IR / Key Assy
4. WIFI/BT Assy

### [Cables]

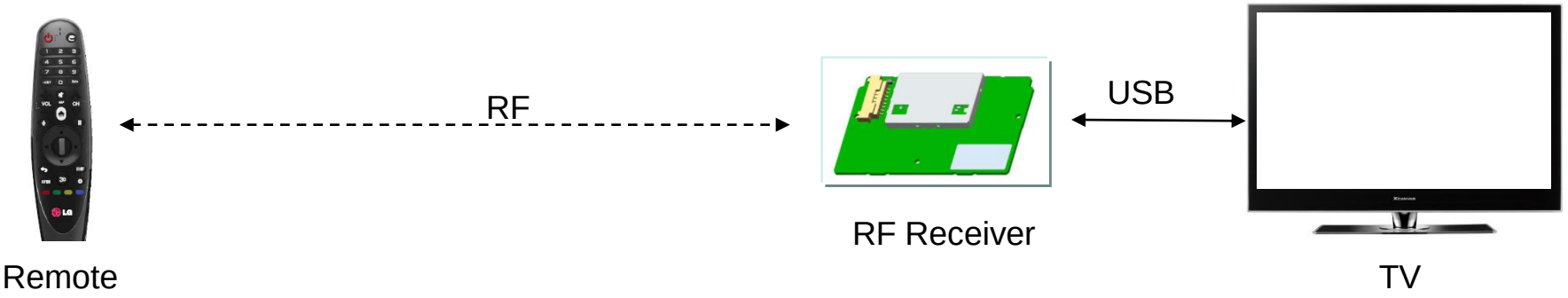
1. Main / LPB 12Pin cable
2. Main / Module LVDS Cable
3. Module B/light Cable
4. 18Pin IR+key / WIFI/BT Cable
5. SPK Cable

# ◈ CONTENT ◈

# Introductions of 15Y WIFI / BT built in assy + Magic Remote control

## Table of Contents

# 1. System




❖ *Pairing Information Transmission (Send to TV after Paired)*
- Static Calibration Data (Bypass only)
- Remote FW ver. (Save also in Receiver)
- BD_ADDR (Save also in Receiver)

• *Pairing Information Transmission Sequence*
- When it is paired, the remote sends packets(pairing success, F/W version, BD_ADDR) to the receiver.
- The receiver sends the pairing success packet to TV directly.
- F/W version and BD_ADDR packets are just saved on the receiver.
- The receiver sends F/W version or BD_ADDR packet to TV when it is required.

❖ *Motion Data Transmission*
- Period : 7.5msec
- Motion Data : gyro, accelerometer

❖ *Voice Data Transmission*
- Period : 10msec
- Voice sampling : 16khz 16bit

# 2. RF Pairing / Un-pairing Method

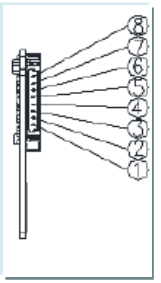
| | Method | Description |
|---|---|---|
| RF Pairing | ❖ Method1<br>– If unpaired, just press Wheel key.<br>– If paired, press Wheel key after unpairing.<br>❖ Method 2 (Repairing)<br>– Press “BACK" button for 5 sec. | • When do pairing, the remote should make pairing request IR signal(0x29) to TV.<br>• When TV receive the IR signal, it should send "pairing request packet" to the RF receiver.<br>• After pairing success, the remote should blink LED for some time and TV send "pairing success packet" back to TV.<br>• When remote try to unpairing, it doesn’t care about state of receiver(stand alone). |
| RF Unpairing | Press “HOME" button and “BACK" button at the same time for 5 sec. | • When remote try to unpairing, it doesn’t care about state of receiver(stand alone).<br>• After unpairing, all pairing information should be erased.<br>• After unpairing, LED should be blinked for 3sec.<br>• The remote just becomes to IR mode. |

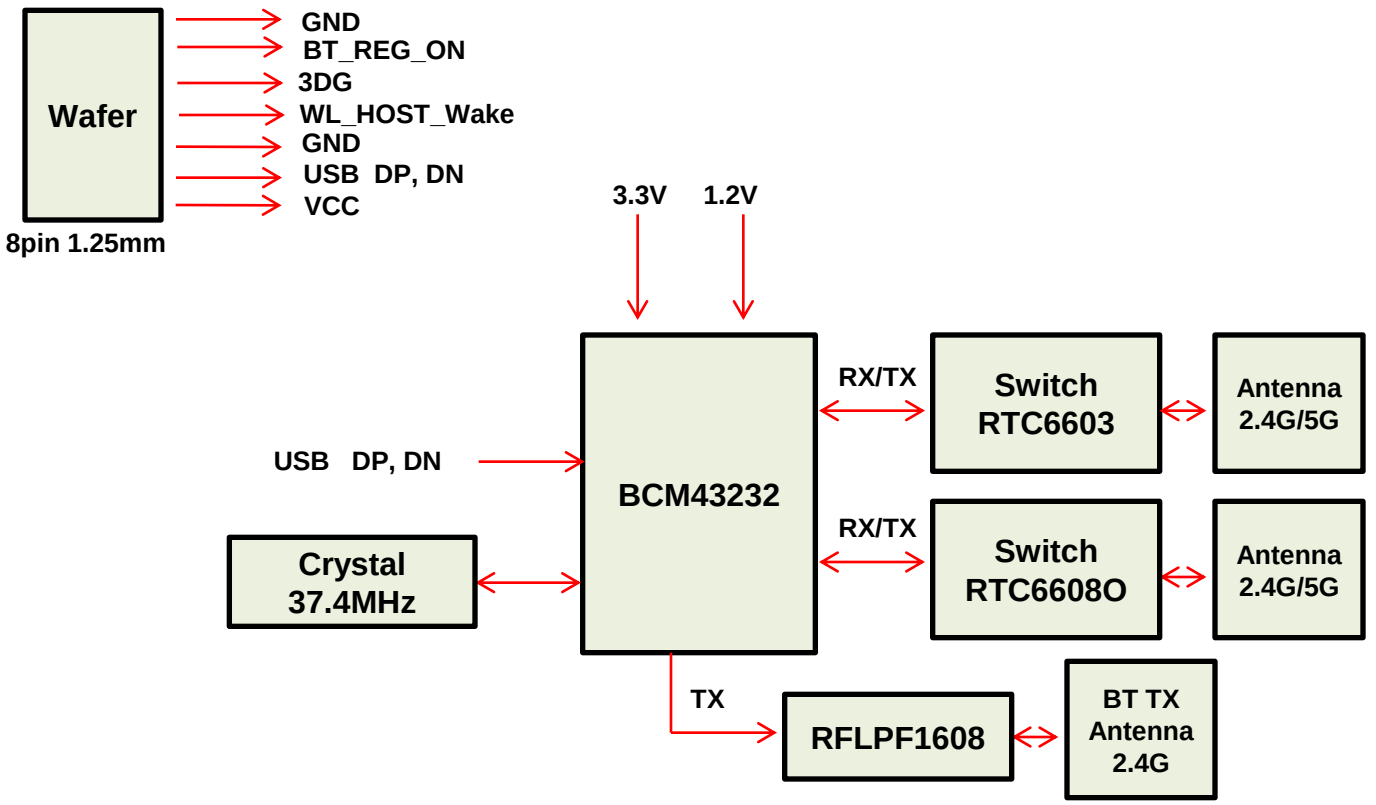
# 3. WIFI Built in assy feature

## Block diagram

34

54



# 4. WIFI Built in ass'y Specification

- Frequency Band:
  - Draft 802.11n Radio: 2.4 GHz
  - 802.11g Radio: 2.4 GHz
  - 802.11b Radio: 2.4 GHz

| | |
|---|---|
| USA – FCC | 2412~2462MHz (Ch1~Ch11) |
| Canada – IC | 2412~2462MHz (Ch1~Ch11) |
| Europe – ETSI | 2412~2472MHz (Ch1~Ch13) |
| Japan – STD-T66/STD-33 | 2412~2484MHz (Ch1~Ch14) |

802.11a Radio : 5 GHz

5.150~5.250GHz

5.725~5.850GHz

- Operating Channels:

IEEE 802.11b/g/n compliant:

11 channels (US, Canada)

13 channels (ETSI)

14 channels (Japan)

- Transmit Power and Sensitivity:

TX Output Power:(Typical) (Meet emission standard)

| | | |
|---|---|---|
| 11b | 17 | +/- 2 dBm |
| 11g | 14 | +/- 2 dBm@54Mbps (Each chain) |
| 11n | 13 | +/- 2 dBm (Each chain) |

Rx Sensitivity:(Typical)

-69dBm at HT20 m7 2.4GHz

-87dBm at HT20 m0 2.4GHz

-69dBm at HT20 m7 5.0GHz

-87dBm at HT20 m0 5.0GHz

- Modulation

DBPSK @1Mbps

DQPSK@2Mbp

CCK@5.5/11Mbps

BPSK@6/9 Mbps

QPSK@12/18Mbps

16-QAM@24Mbps

64-QAM@48/54Mpb and above

- Current consumption(5V DC):

Full load: 430mA

- Operating Temperature: 0 ~ 60 ℃ ambient
- Storage Temperature: -20 ~ 60 ℃ ambient
- Humidity: under 85% and must be non-condensing

- Regulation and certification compliance available:
  - CE
  - FCC
  - WiFi


  - WPS

# ◈ CONTENT ◈

# Contents of Standard Repair Process



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

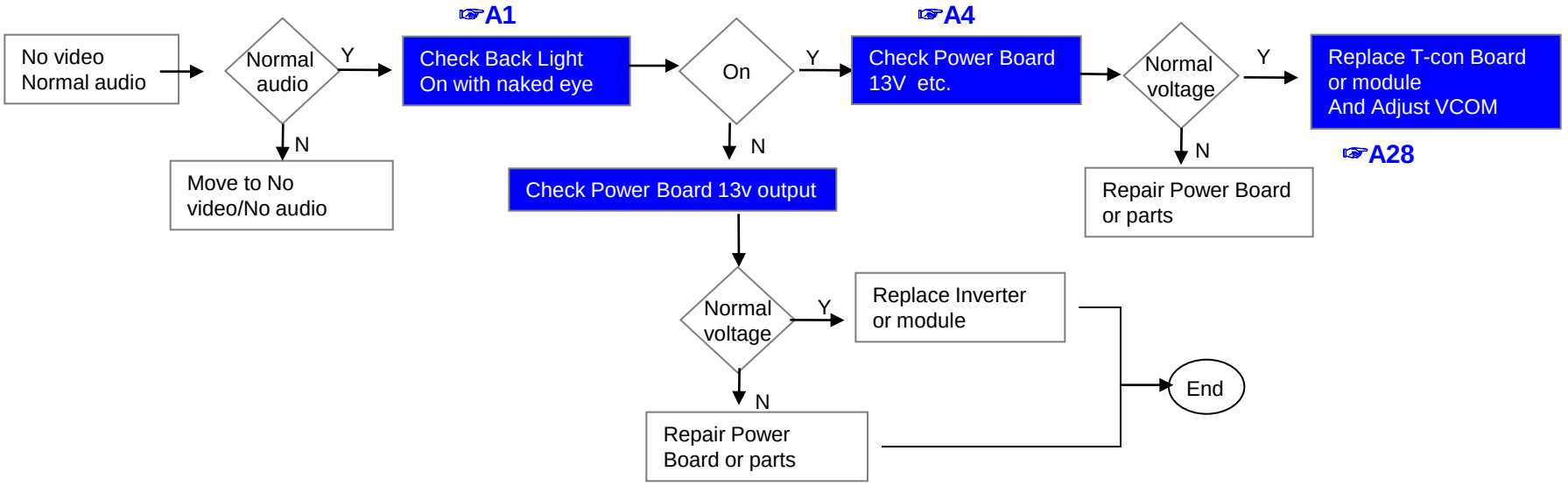
# Contents of Standard Repair Process Detail Technical Manual



**Continue to the next page**

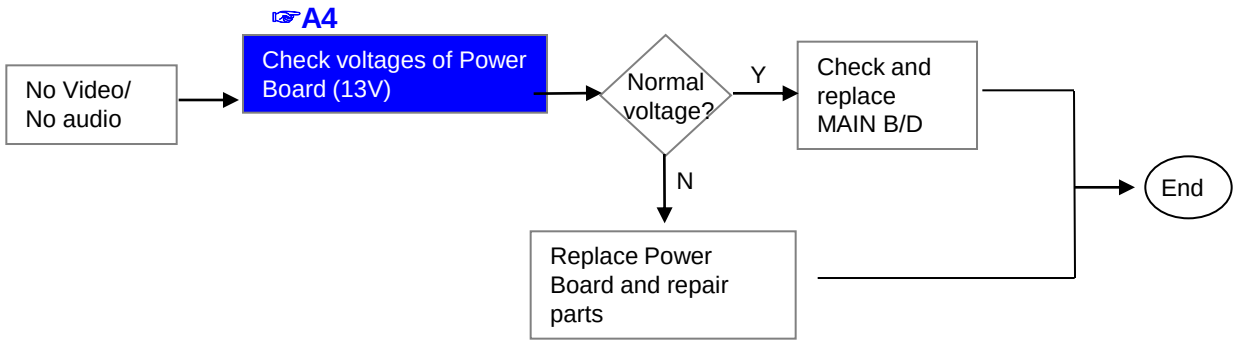
| Error symptom | A. Video error | Established date | | |
|---|---|---|---|---|
| | No video/ Normal audio | Revised date | | 1/13 |

## 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,,,)

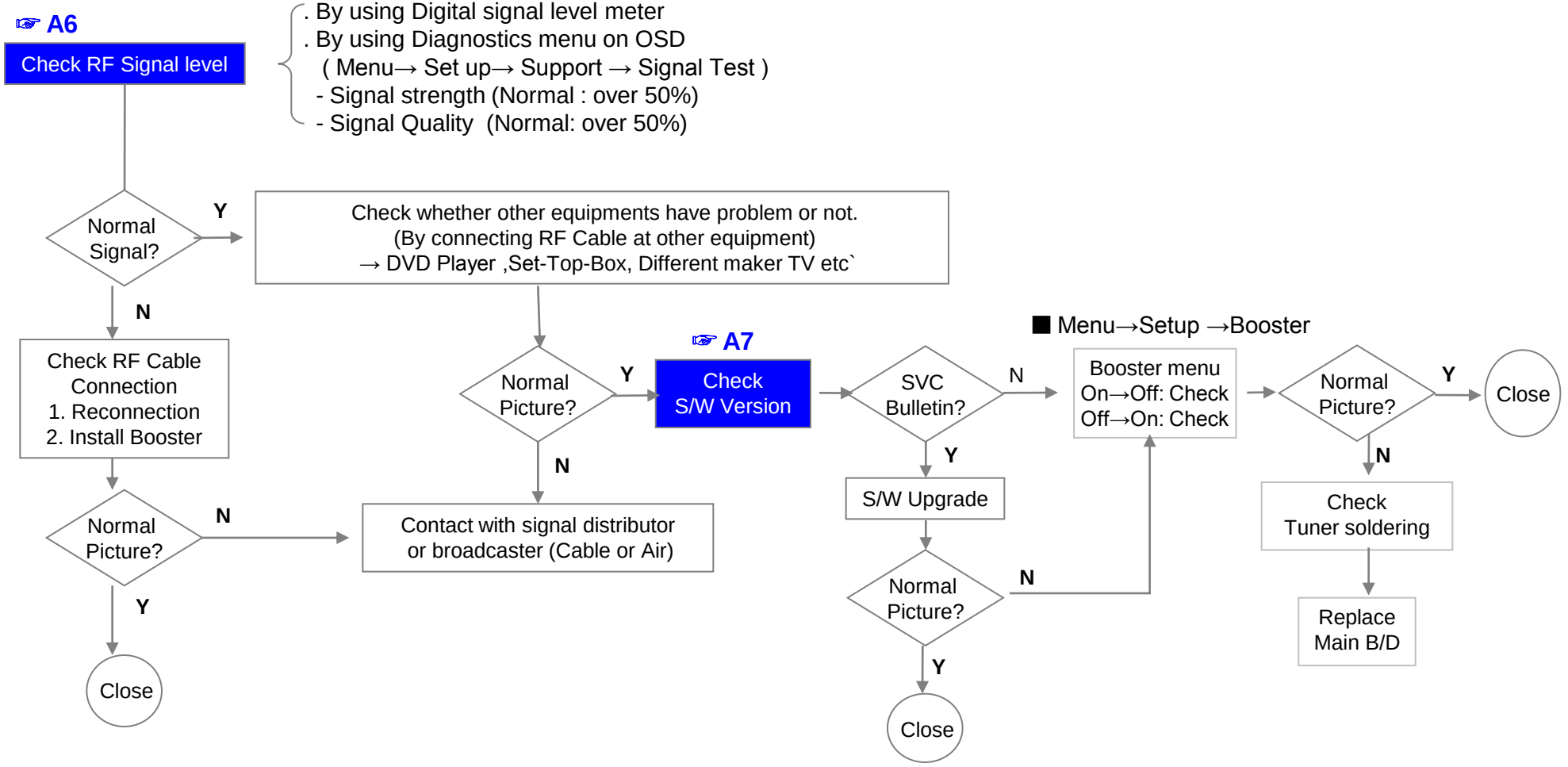



※Precaution ☞A7

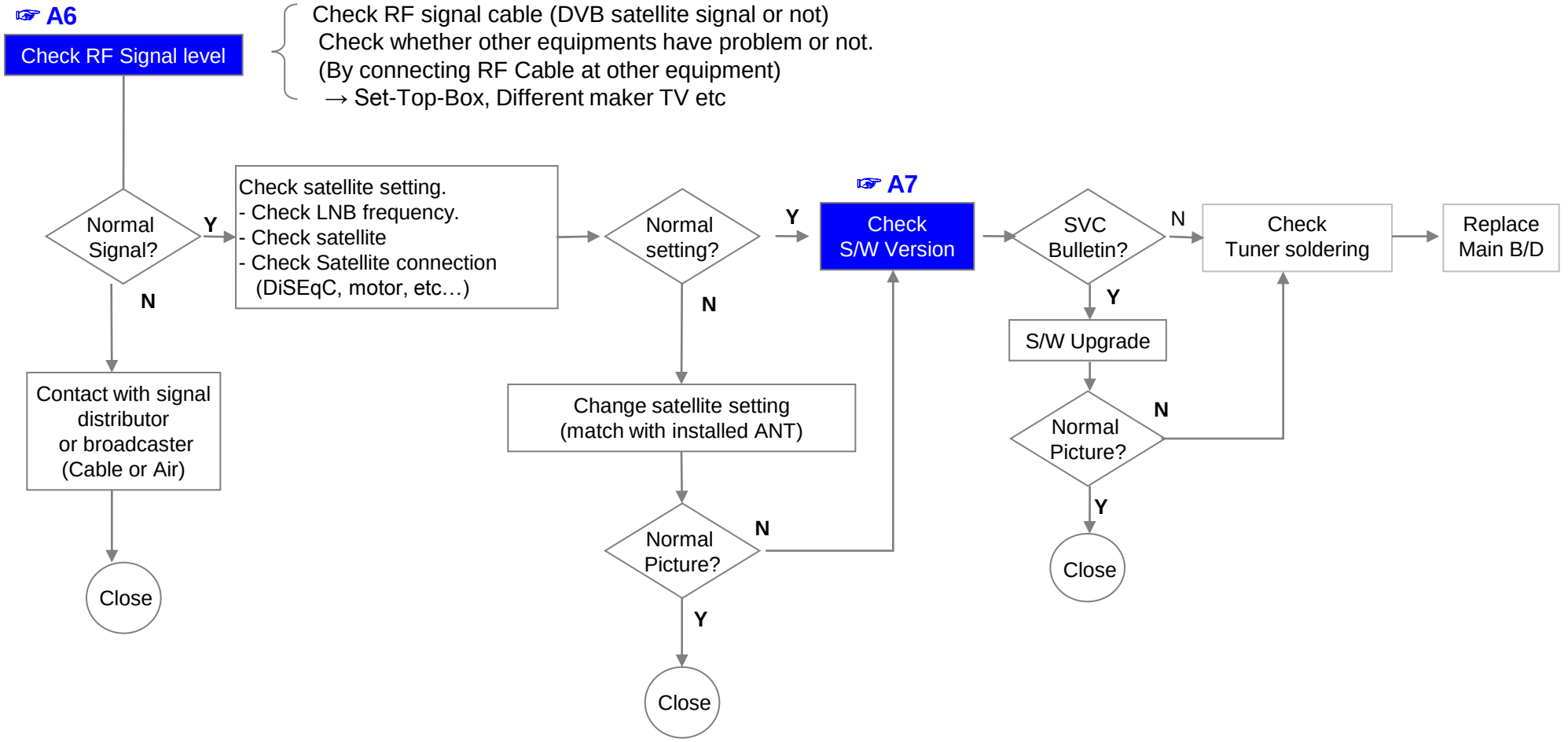
| Error symptom | A. Video error | Established date | | |
|---|---|---|---|---|
| | No video/ No audio | Revised date | | 2/13 |



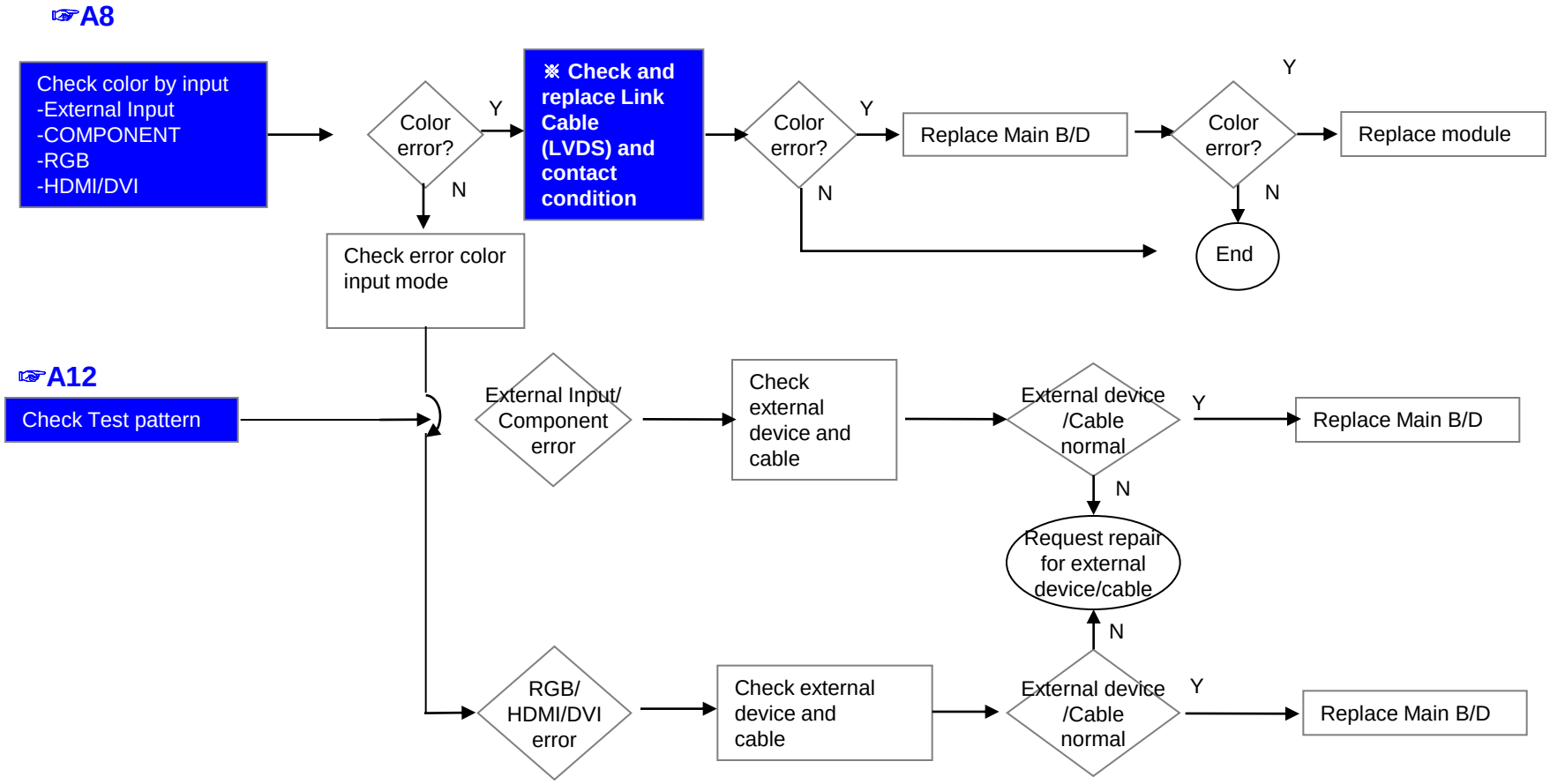
| Error symptom | A. Picture Problem | Established date | | |
|---|---|---|---|---|
| | Picture broken/ Freezing | Revised date | | 3/13 |



| Error symptom | A. Picture Problem (DVB-S/S2) | Established date | | |
|---|---|---|---|---|
| | Tuning fail, Picture broken/ Freezing | Revised date | | 3/13 |

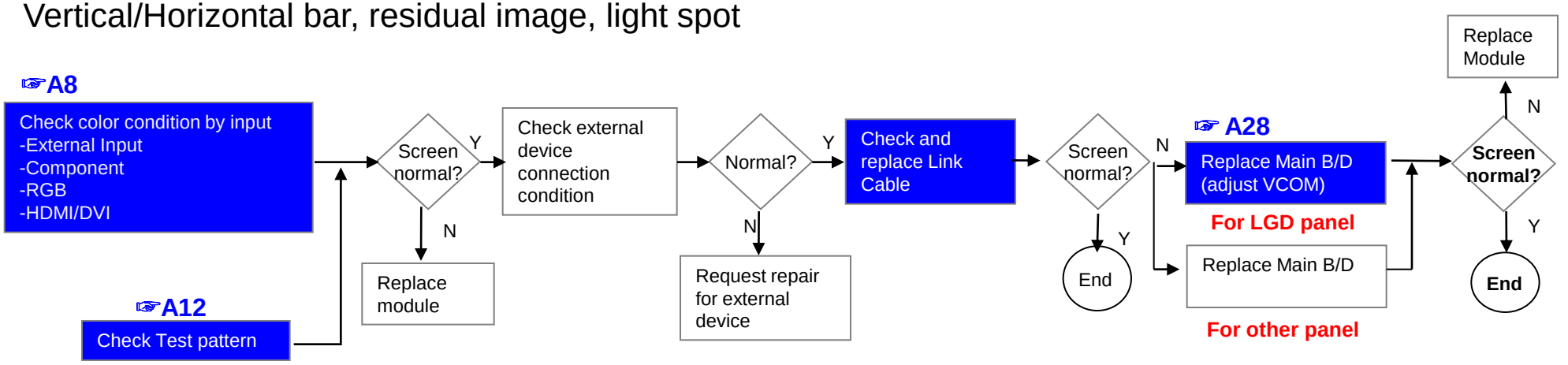


| Error symptom | A. Video error | Established date | | |
|---|---|---|---|---|
| | Color error | Revised date | | 4/13 |

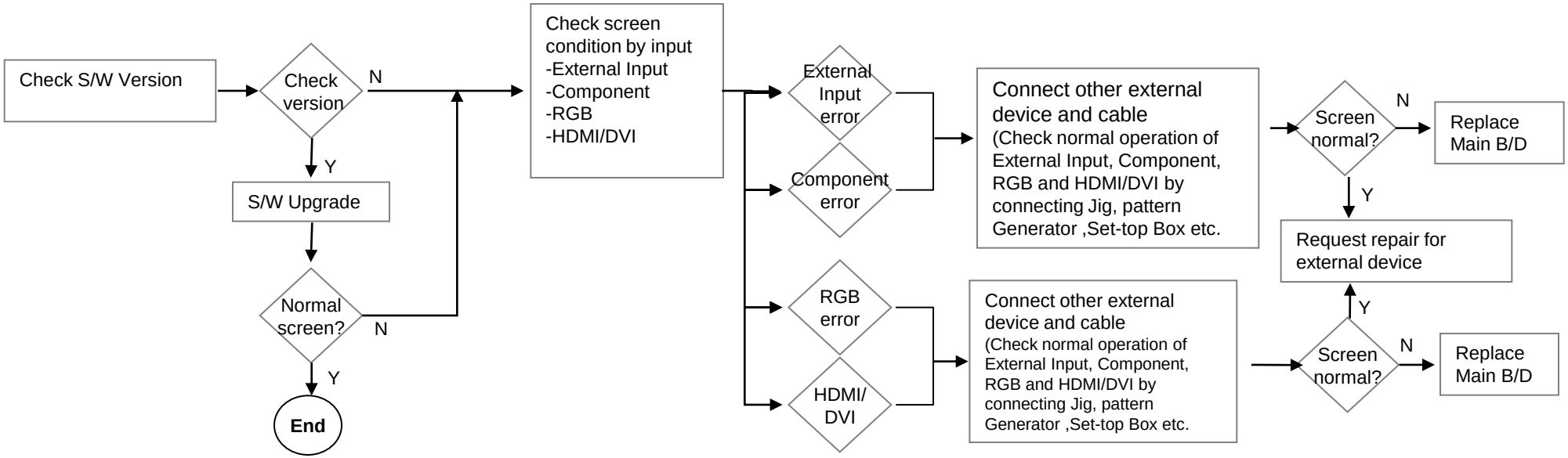


| Error symptom | A. Video error | Established date | | |
|---|---|---|---|---|
| | Vertical / Horizontal bar, residual image, light spot, external device color error | Revised date | | 5/13 |

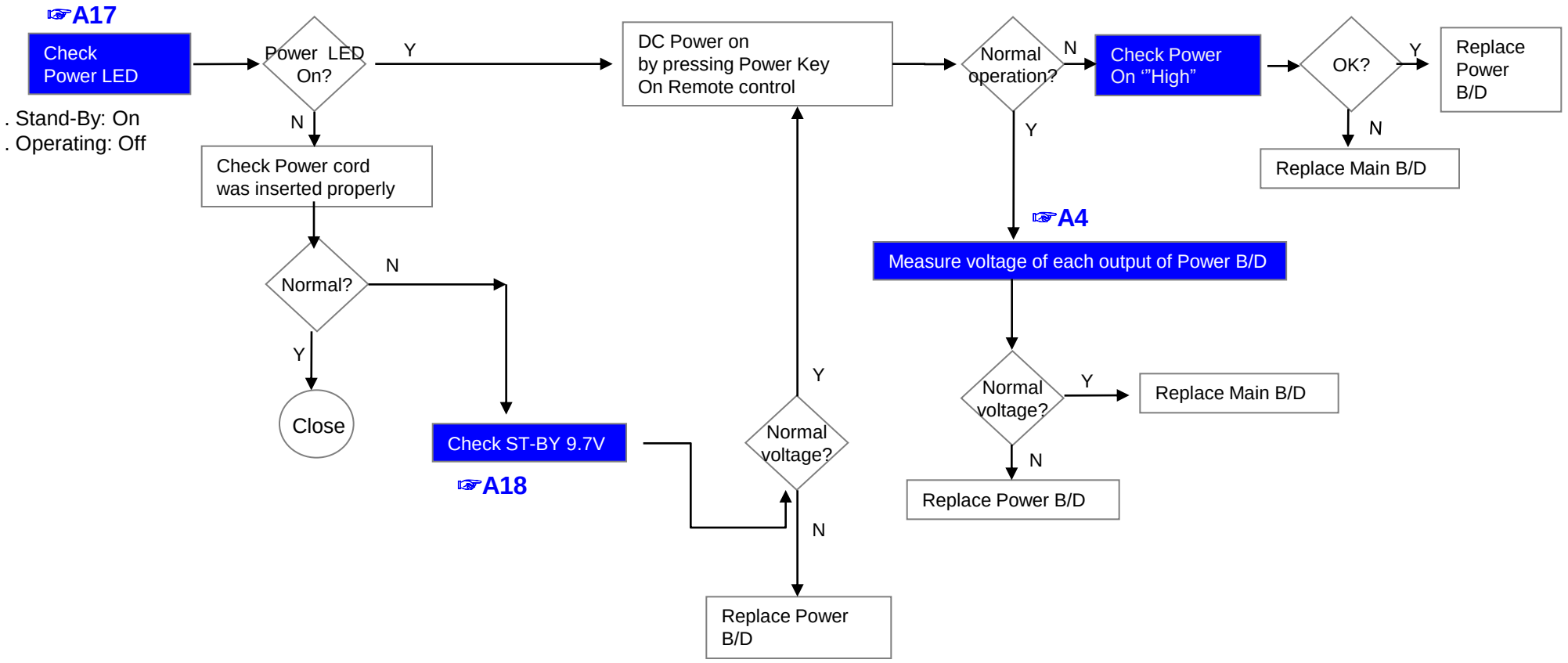
## Vertical/Horizontal bar, residual image, light spot



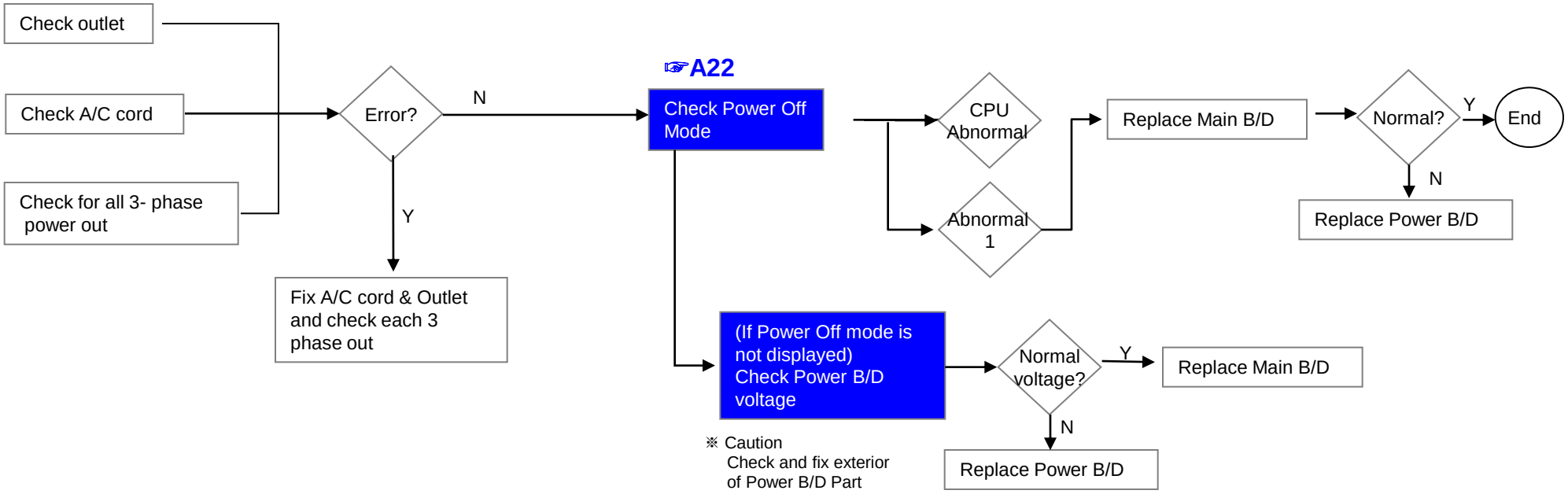

## External device screen error-Color error



| Error symptom | B. Power error | Established date | | |
|---|---|---|---|---|
| | No power | Revised date | | 6/13 |



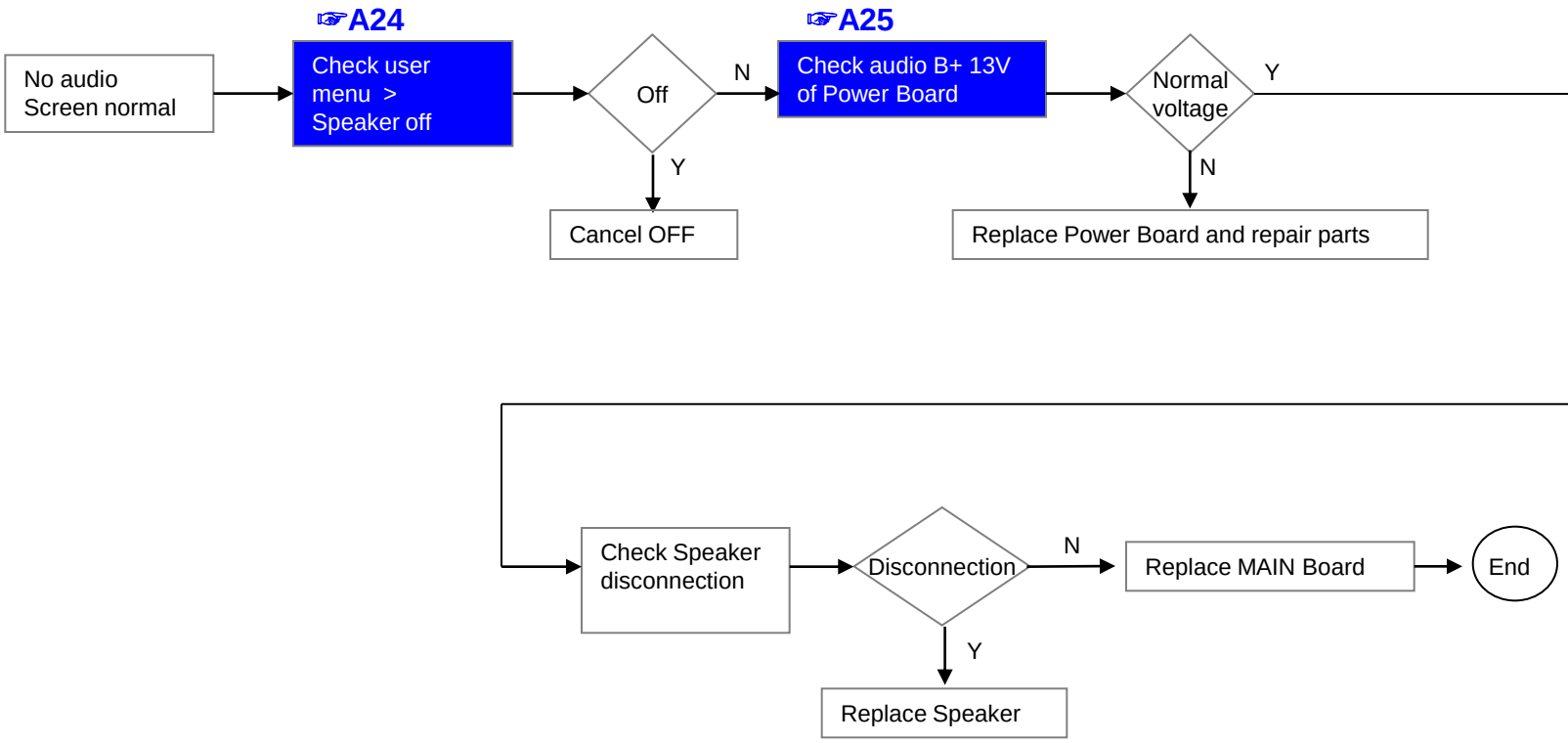
| Error symptom | B. Power error | Established date | | |
|---|---|---|---|---|
| | Off when on, off while viewing, power auto on/off | Revised date | | 7/13 |




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

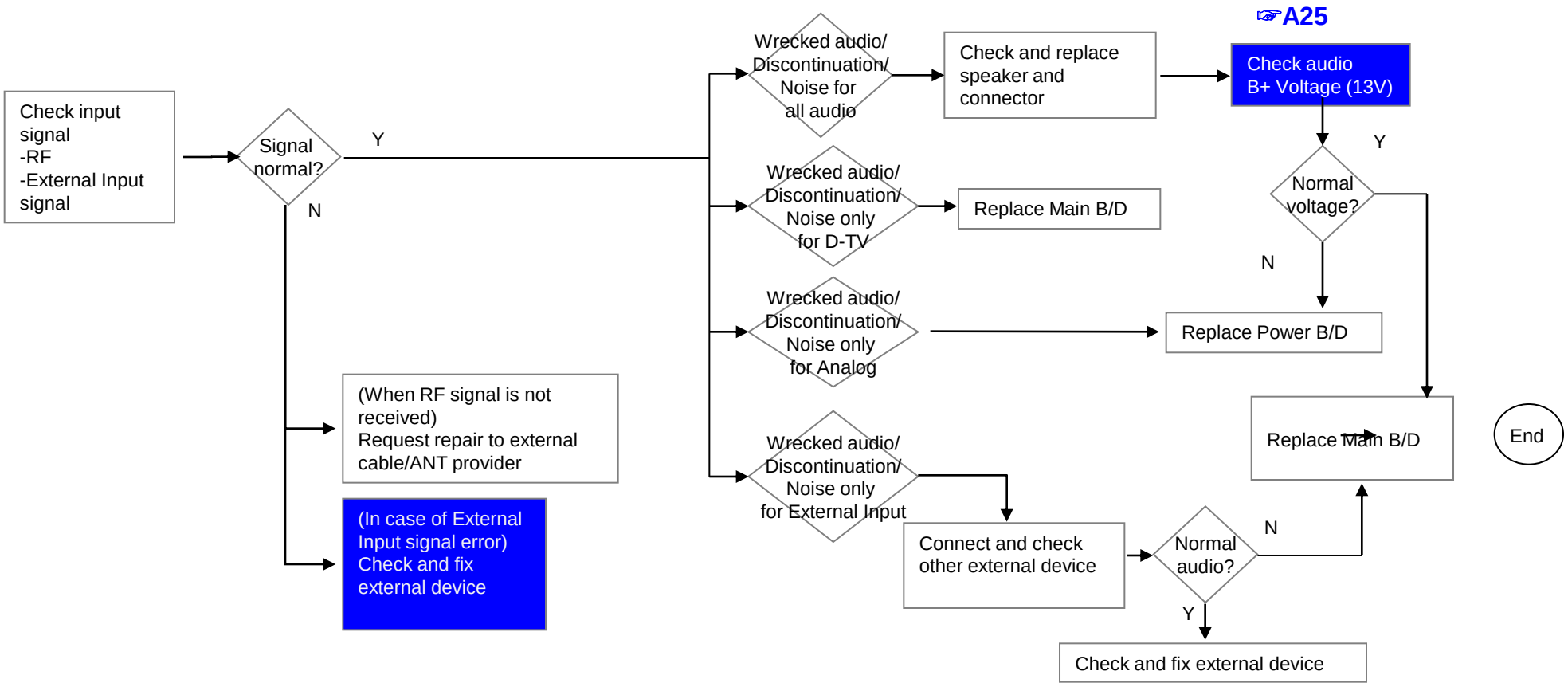
| Status | Power off List | Explanation |
|---|---|---|
| Normal | "POWEROFF_REMOTEKEY" | Power off by REMOTE CONTROL |
| | "POWEROFF_OFFTIMER" | Power off by OFF TIMER |
| | "POWEROFF_SLEEPTIMER" | Power off by SLEEP TIMER |
| | "POWEROFF_INSTOP" | Power off by INSTOP KEY |
| | "POWEROFF_AUTOOFF" | Power off by AUTO OFF |
| | "POWEROFF_ONTIMER" | Power off by ON TIMER |
| | "POWEROFF_RS232C" | Power off by RS232C |
| | "POWEROFF_RESREC" | Power off by Reservated 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 | | 8/13 |



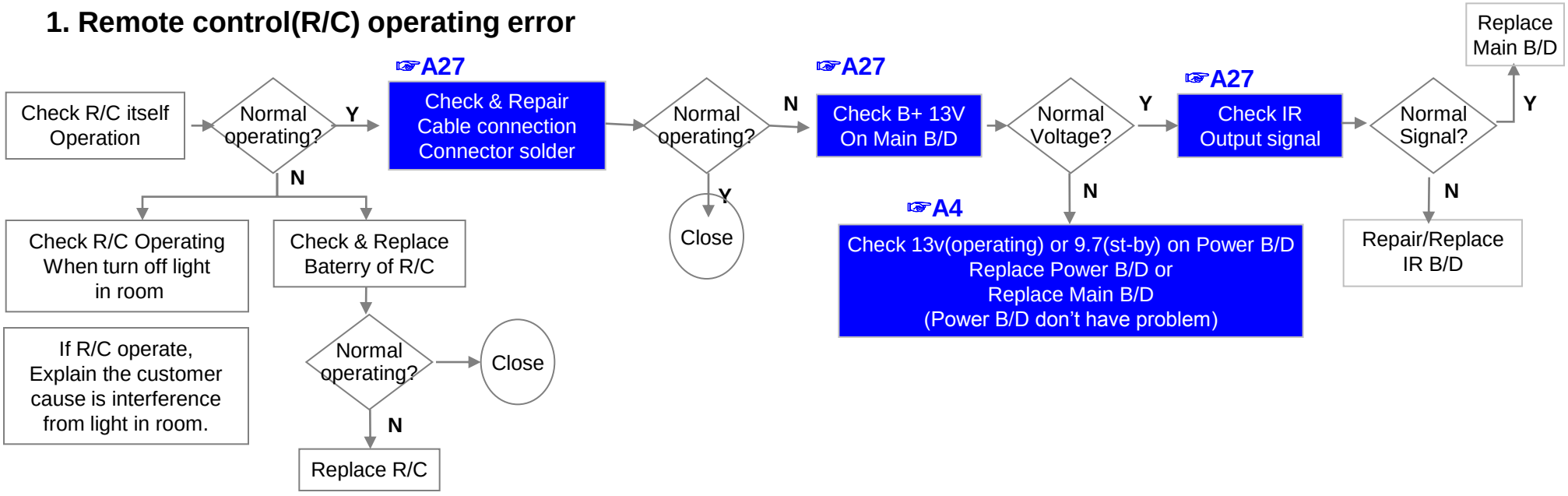
| Error symptom | C. Audio error | Established date | | |
|---|---|---|---|---|
| | Wrecked audio/ discontinuation/noise | Revised date | | 9/13 |

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

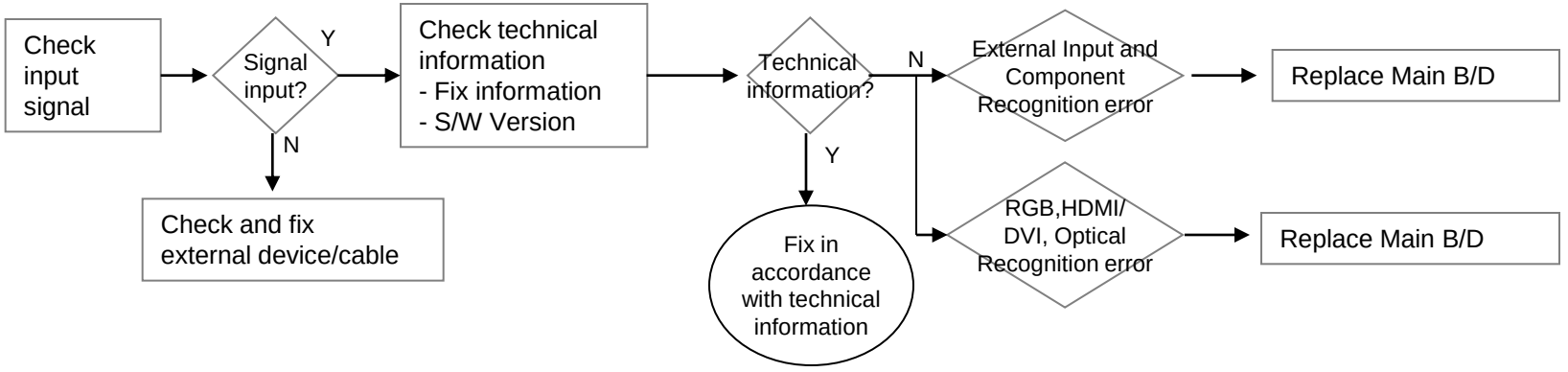


| Error symptom | D. General Function Problem | Established date | | |
|---|---|---|---|---|
| | Remote control & Local switch checking | Revised date | | 10/13 |

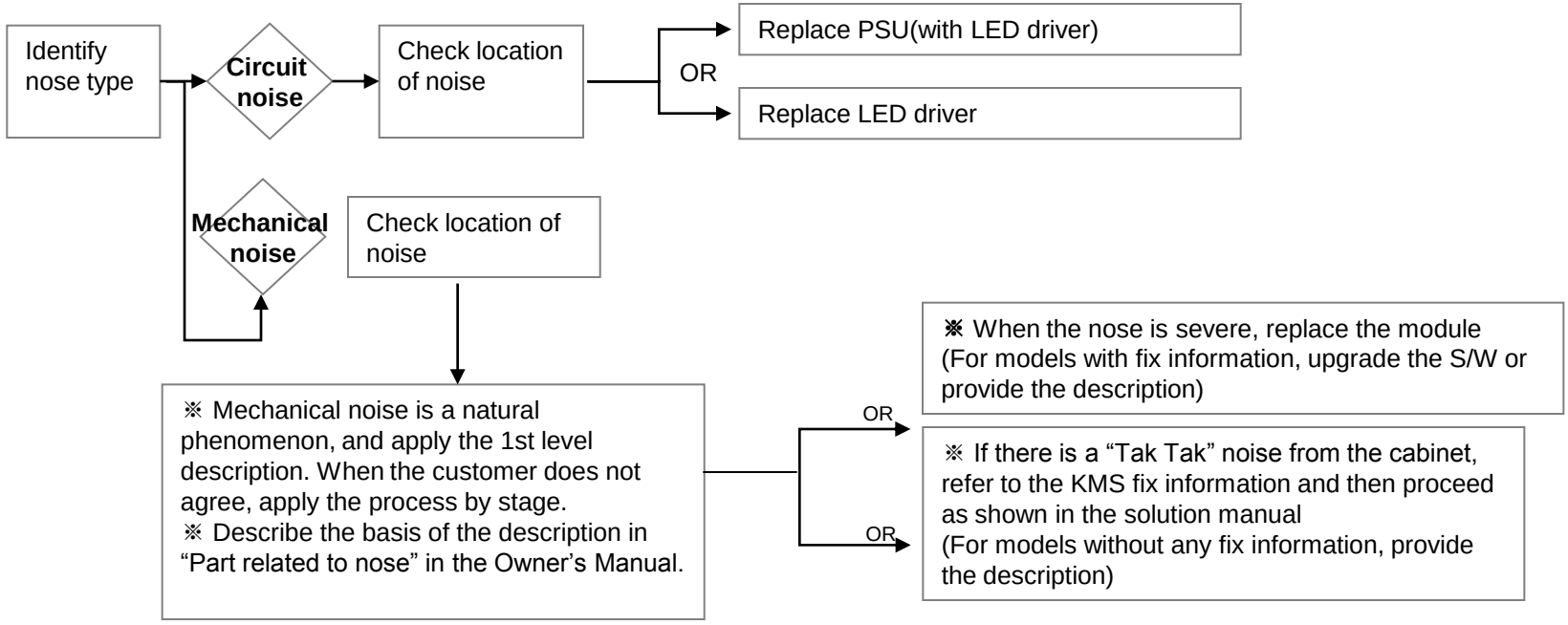
## 1. Remote control(R/C) operating error



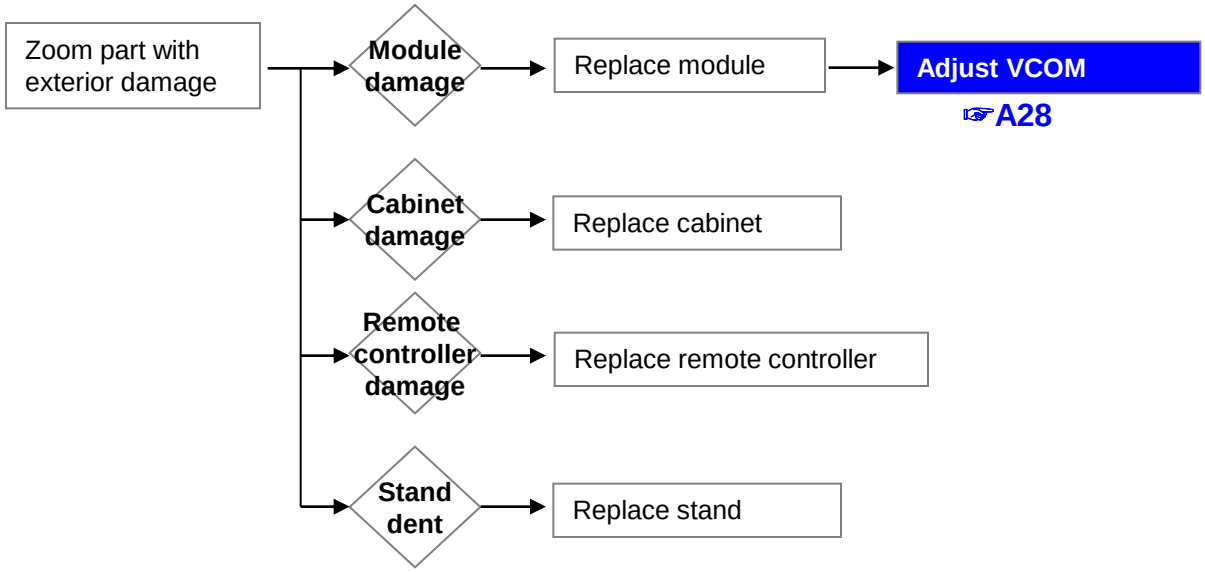
| Error symptom | D. Function error | Established date | | |
|---|---|---|---|---|
| | External device recognition error | Revised date | | 11/13 |



| Error symptom | E. Noise | Established date | | |
|---|---|---|---|---|
| | Circuit noise, mechanical noise | Revised date | | 12/13 |



| Error symptom | F. Exterior defect | Established date | | |
|---|---|---|---|---|
| | Exterior defect | Revised date | | 13/13 |

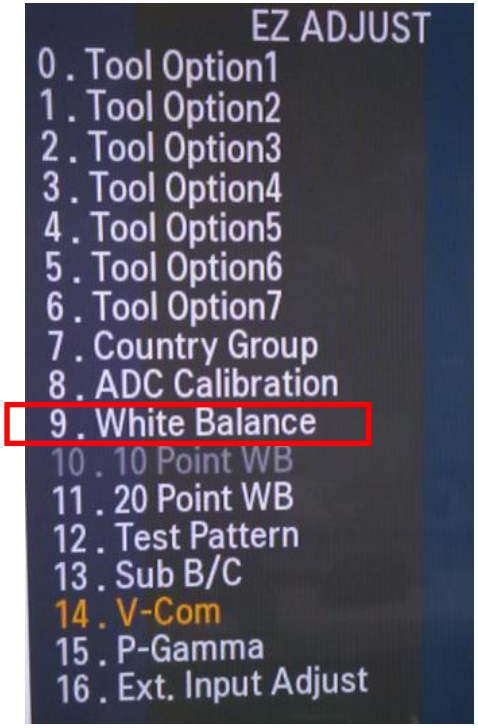


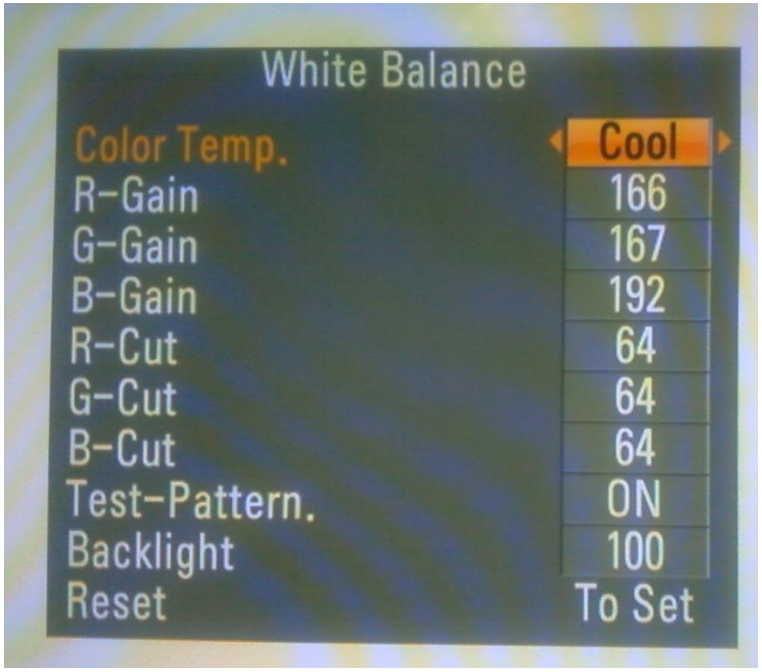
# Contents of Standard Repair Process Detail Technical Manual

**Continued from previous page**

| Error symptom | A. Video error_No video/Normal audio | Established date | | |
|---|---|---|---|---|
| Content | Check White Balance value | Revised date | | A4 |

<ALL MODELS>



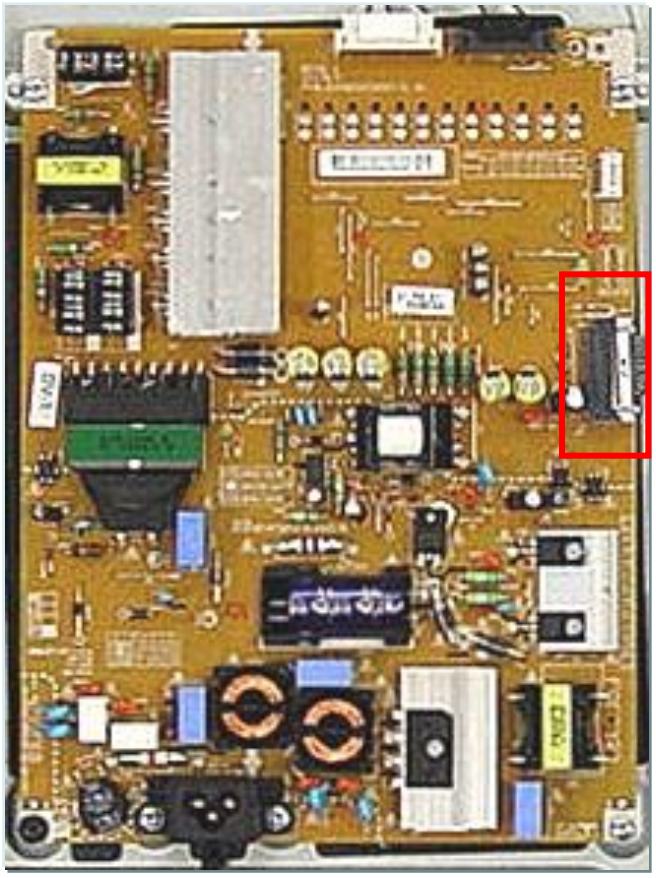

**Entry method**

1. Press the ADJ button on the remote controller for adjustment.

2. Enter into White Balance of item 9.

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.

| Error symptom | A. Video error_No video/ Audio | Established date | | |
|---|---|---|---|---|
| Content | Power Board voltage measuring method | Revised date | | A5 |



## 2015, 12Pin map

| | | | |
|---|---|---|---|
| 1 | PWR 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 | DRV ON/OFF | 12 | PDIM #1 |

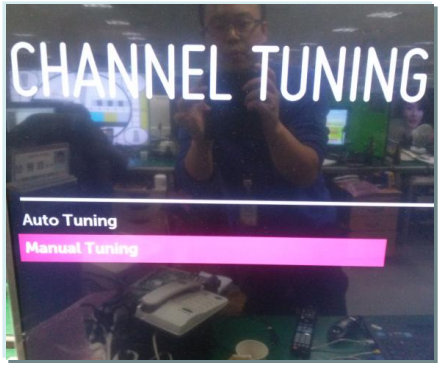
## 2015, 18Pin map (local dimming Model)

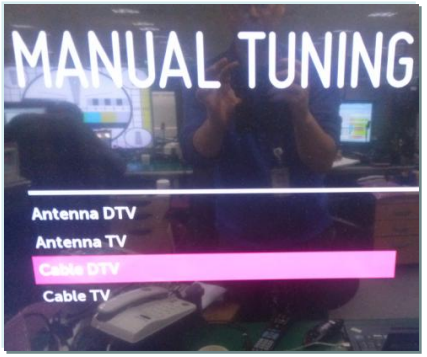
| | | | |
|---|---|---|---|
| 1 | PWR ON/OFF | 2 | PDIM #2 |
| 3 | GND | 4 | D13.2V |
| 5 | D13.2V | 6 | D13.2V |
| 7 | A13.2V | 8 | A13.2V |
| 9 | GND | 10 | GND |
| 11 | DRV ON/OFF | 12 | PDIM #1 |
| 13 | GND | 14 | GND |
| 15 | GND | 16 | V-SYNC |
| 17 | SPI-SIN | 18 | SPI-SCLK |

# 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 | | A6 |

<ALL MODELS>


MENU → Channel → Manual → select channel

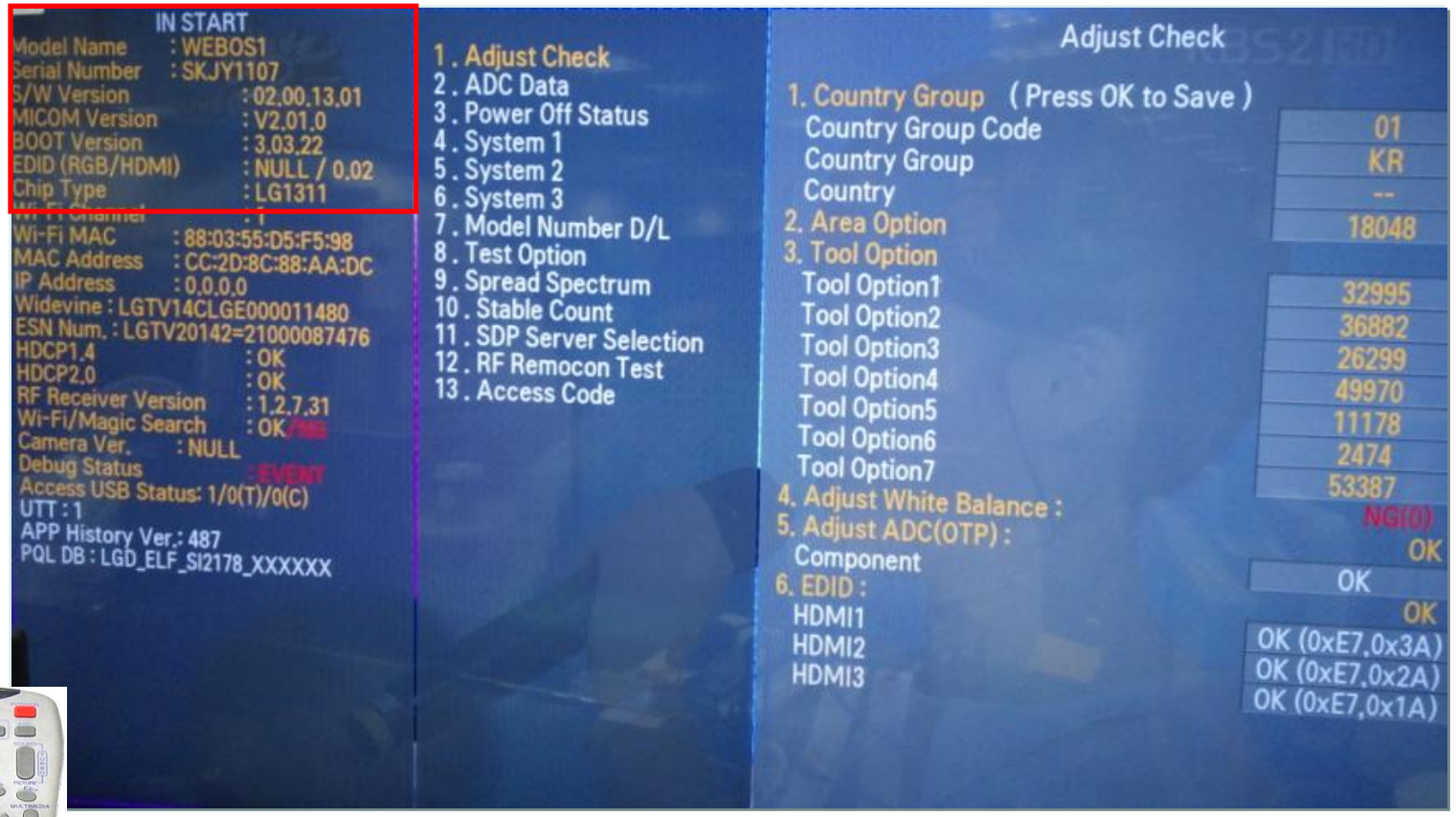

When the signal is strong, use the attenuator (-10dB, -15dB, -20dB etc.)

| Error symptom | A. Video error_Video error, video lag/stop | Established date | | |
|---|---|---|---|---|
| Content | Version checking method | Revised date | | A7 |

<ALL MODELS>

## 1. Checking method for remote controller for adjustment

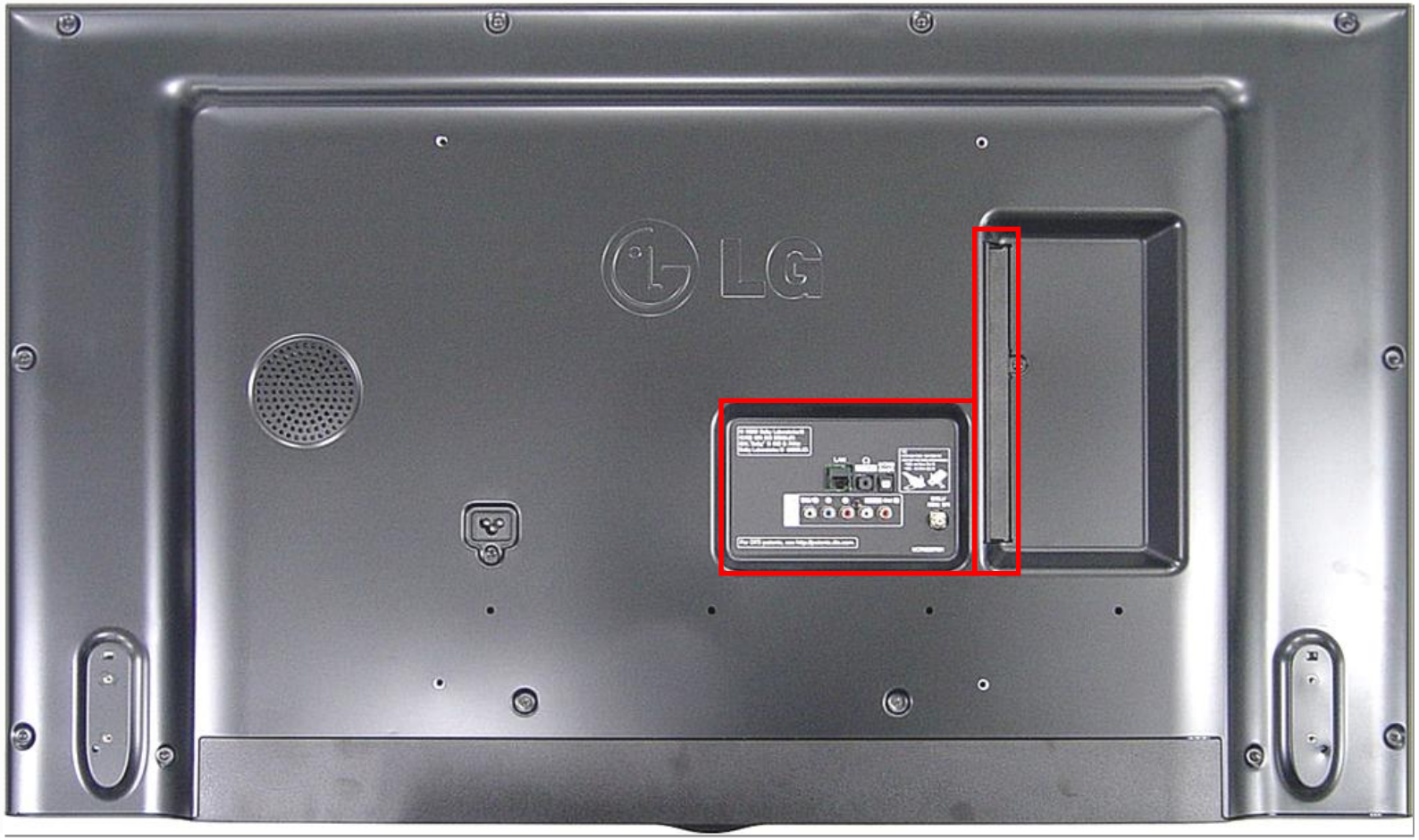
**Version**




Press the IN-START with the remote controller for adjustment

| Error symptom | A. Video error _Vertical/Horizontal bar, residual image, light spot | Established date | | |
|---|---|---|---|---|
| Content | connection diagram (1) | Revised date | | A8 |

<ALL MODELS>

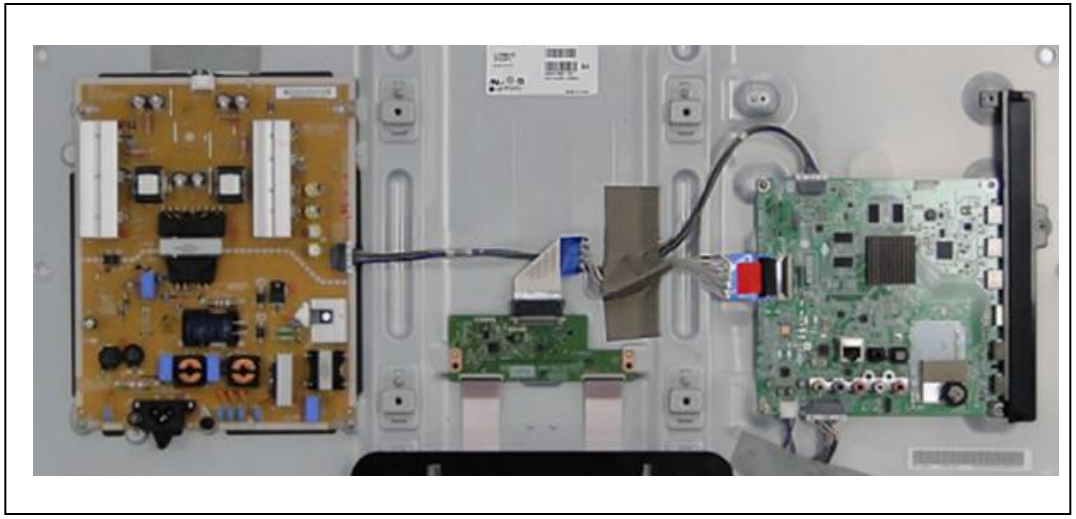


**As the part connecting to the external input, check the screen condition by signal**

# Standard Repair Process Detail Technical Manual

| Error symptom | A. Video error_Video error, video lag/stop | Established date | | |
|---|---|---|---|---|
| Content | TUNER checking part | Revised date | | A9 |

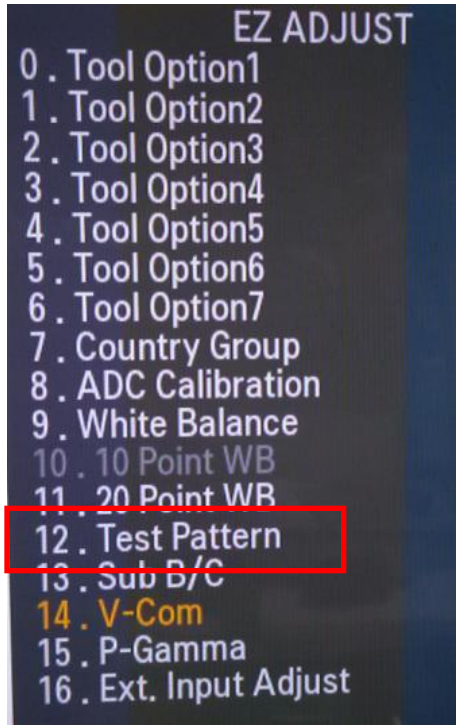
<ALL MODELS>



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.

# Standard Repair Process Detail Technical Manual

| Error symptom | A. Video error_Color error | Established date | | |
|---|---|---|---|---|
| Content | Adjustment Test pattern - ADJ Key | Revised date | | A12 |







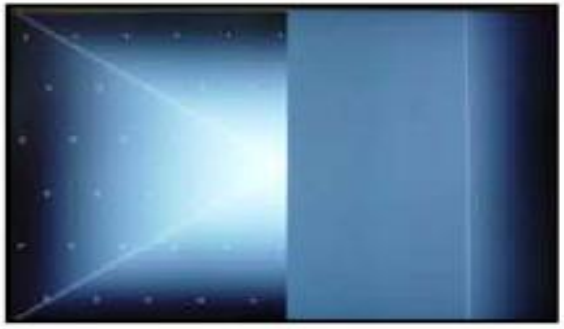

You can view 6 types of patterns using the ADJ Key

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!)

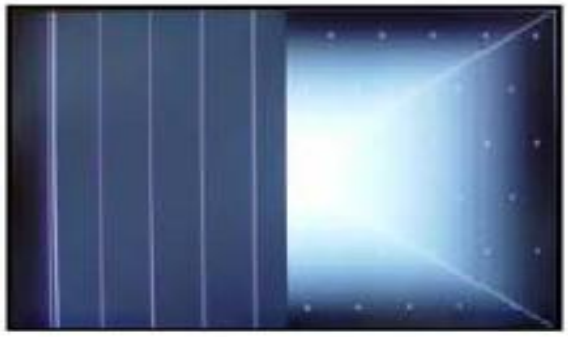
# Appendix : Exchange T-Con Board (1)



Solder defect, CNT Broken

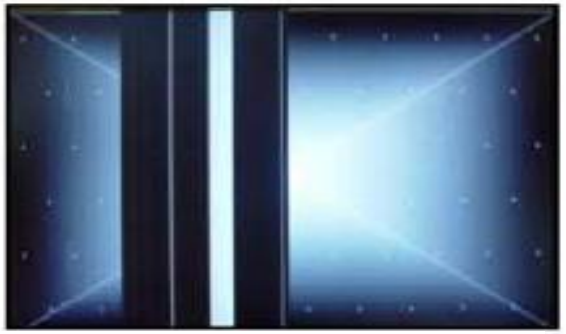


Solder defect, CNT Broken



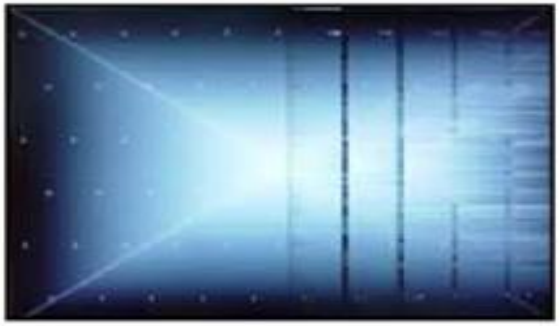
Solder defect, CNT Broken

Solder defect, CNT Broken



Solder defect, CNT Broken

Abnormal Power Section



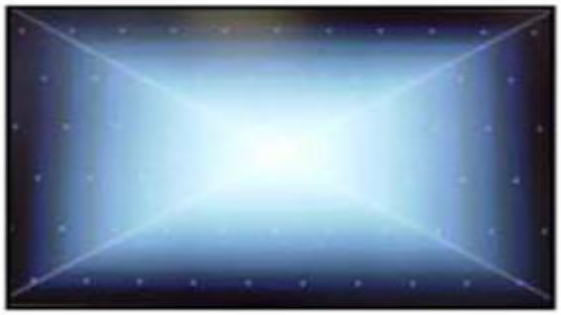
Solder defect, Short/Crack

Abnormal Power Section

Solder defect, Short/Crack

# Appendix : Exchange T-Con Board (2)





Abnormal Power Section

Abnormal Power Section

Solder defect, Short/Crack

Solder defect, Short/Crack

Fuse Open, Abnormal power section

Abnormal Display

GRADATION

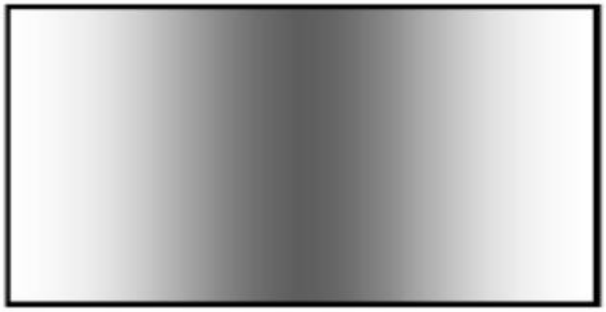
Noise

GRADATION

No Light

Dim Light

Dim Light



Dim Light


No picture/Sound Ok

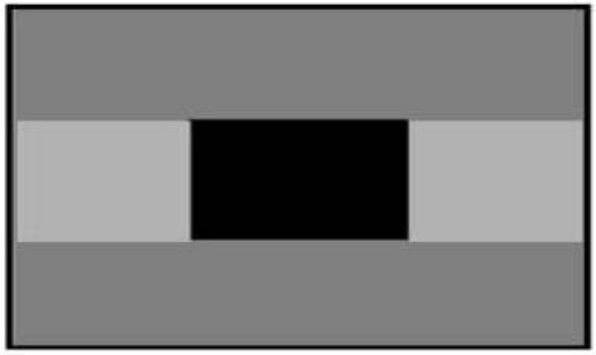
# Appendix : Exchange the Module (1)



Panel Mura, Light leakage

Panel Mura, Light leakage

Press damage



Crosstalk

Press damage

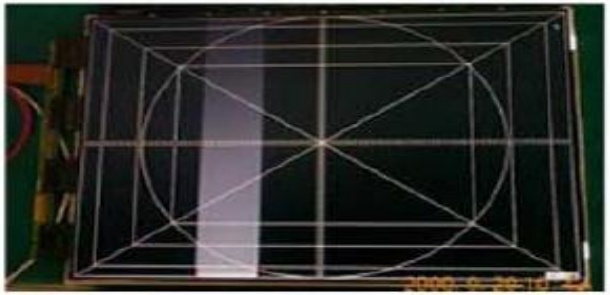
Crosstalk

Press damage

**Un-repairable Cases**

**In this case please exchange the module.**

# Appendix : Exchange the Module (2)

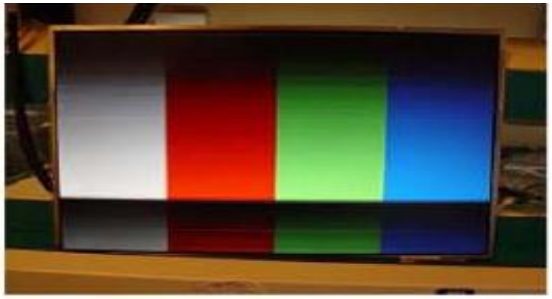


Vertical Block
Source TAB IC Defect

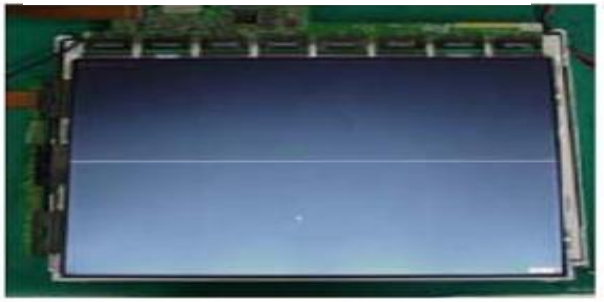
Vertical Line
Source TAB IC Defect

Vertical Block
Source TAB IC Defect

Horizontal Block
Gate TAB IC Defect



Horizontal Block
Gate TAB IC Defect



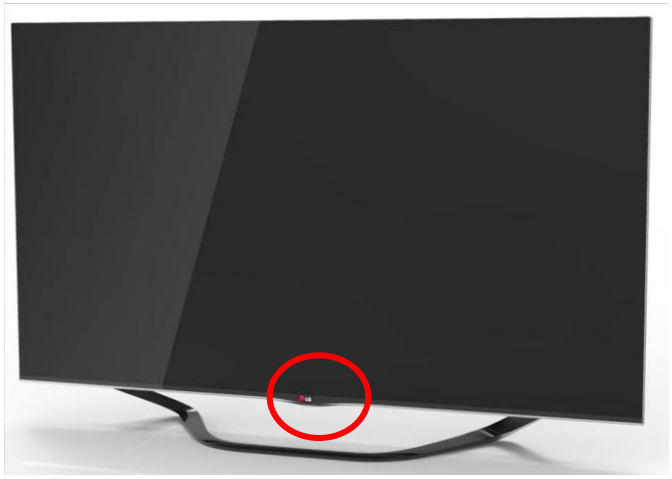
Horizontal line
Gate TAB IC Defect

Horizontal Block
Gate TAB IC Defect

**Un-repairable Cases**

**In this case please exchange the module.**

| Error symptom | B. Power error _No power | Established date | | |
|---|---|---|---|---|
| Content | Check front display LED | Revised date | | A17 |



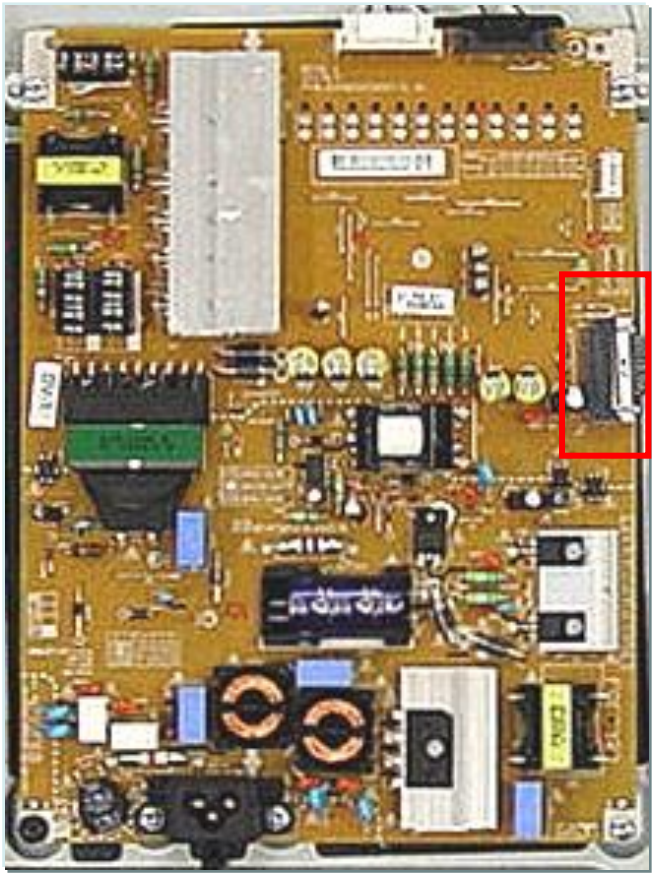

ST-BY condition: On
Power ON condition: Off

# Standard Repair Process Detail Technical Manual

| Error symptom | B. Power error _No power | Established date | | |
|---|---|---|---|---|
| Content | Check power input voltage and ST-BY 9.7V | Revised date | | A18 |

**Checking method when power is ON**

When st-by, only 9.7V is normally on.



## 2015, 12Pin map

| | | | |
|---|---|---|---|
| 1 | PWR 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 | DRV ON/OFF | 12 | PDIM #1 |

## 2015, 18Pin map (local dimming Model)

| | | | |
|---|---|---|---|
| 1 | PWR 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 | DRV ON/OFF | 12 | PDIM #1 |
| 13 | GND | 14 | GND |
| 15 | GND | 16 | V-SYNC |
| 17 | SPI-SIN | 18 | SPI-SCLK |

# 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 | | A22 |

<ALL MODELS>

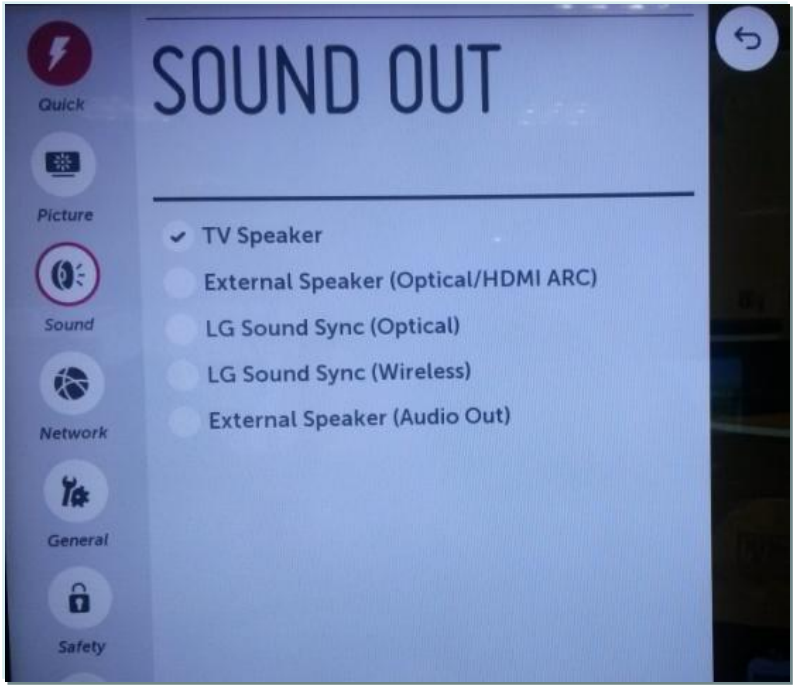

Entry method

1. Press the IN-START button of the remote controller for adjustment

2. Check the entry into adjustment item 3

| Error symptom | C. Audio error_No audio/Normal video | Established date | | |
|---|---|---|---|---|
| Content | Checking method in menu when there is no audio | Revised date | | A24 |

<ALL MODELS>




## Checking method

1. Press the MENU button on the remote controller
2. Select the AUDIO function of the Menu
3. Select TV Speaker Or Other

# Standard Repair Process Detail Technical Manual

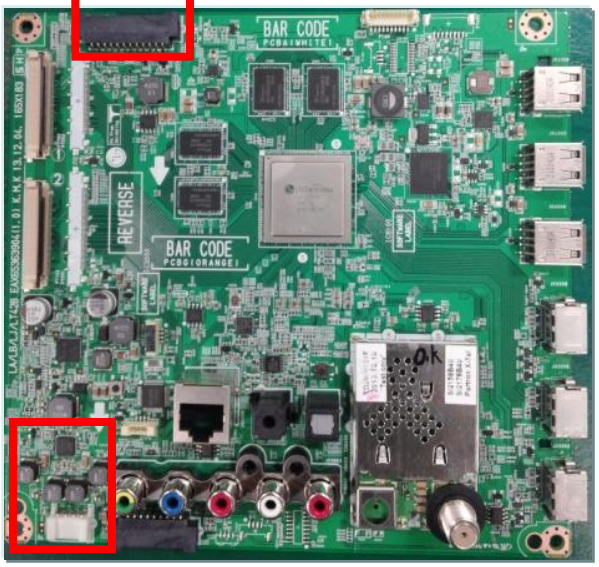
| Error symptom | C. Audio error_No audio/Normal video | Established date | | |
|---|---|---|---|---|
| Content | Voltage and speaker checking method when there is no audio | Revised date | | A25 |

<ALL MODELS>

②

| | | | |
|---|---|---|---|
| 1 | PWR 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 | DRV ON/OFF | 12 | PDIM #1 |
| 13 | GND | 14 | GND |
| 15 | GND | 16 | V-SYNC |
| 17 | SPI-SIN | 18 | SPI-SCLK |

①




③

**Checking order when there is no audio**

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

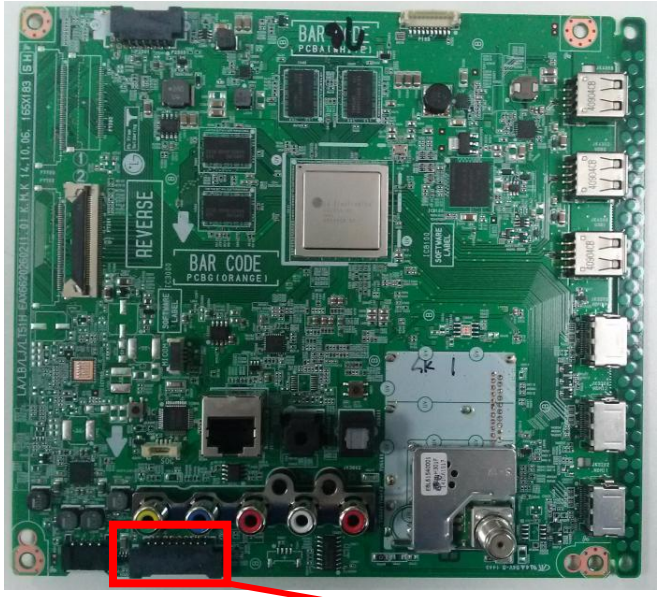
② Measure the 13 input voltage supplied from Power Board
(If there is no input voltage, remove and check the connector)

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.

| Error symptom | D. Function error_ No response in remote controller, key error | Established date | | |
|---|---|---|---|---|
| Content | Remote controller operation checking method | Revised date | | A27 |

<ALL MODELS>

①




②

④

③

| P4000 | |
|---|---|
| 1 | GND |
| 2 | 3.5V_WOL |
| 3 | BT_RESET |
| 4 | USB_DM |
| 5 | NC |
| 6 | USB_DP |
| 7 | WOL |
| 8 | GND |
| 9 | EYE_SDA |
| 10 | GND |
| 11 | EYE_SCL |
| 12 | KEY1 |
| 13 | GND |
| 14 | KEY2 |
| 15 | IR |
| 16 | 3.5V_ST |
| 17 | LED_R |
| 18 | GND |

Checking order

1, 2. Check IR cable condition between IR & Main board.
3. Check the st-by 3.5V on the terminal 16.
4. When checking the Pre-Amp when the power is in ON condition, it is normal when the Analog Tester needle moves slowly, and defective when it does not move at all.