



LG

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Internal Use Only

OLED TV

SERVICE MANUAL

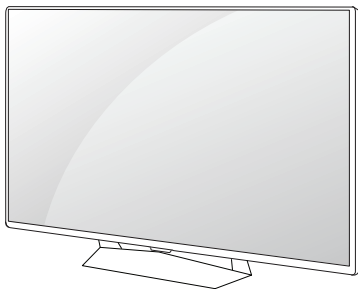
CHASSIS : EA64B

MODEL : OLED55B6P OLED55B6P-U

OLED65B6P OLED65B6P-U

CAUTION

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



P/NO : MFL69589301 (1604-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.

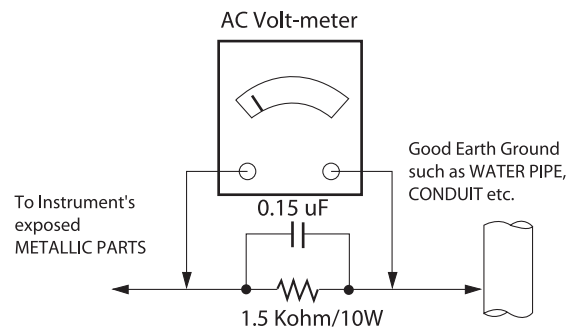
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

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

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

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

Leakage Current Hot Check circuit



When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1 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 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 small 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 EA64B chassis

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

2. Test condition

Each part is tested as below without special notice.

- (1) Temperature : 25 °C ± 5 °C(77±9°F), CST : 40 °C±5 °C
- (2) Relative Humidity: 65 % ± 10 %
- (3) Power Voltage
 - Standard input voltage (100~240V@ 50/60Hz)
 - * Standard Voltage of each products is marked by models.
- (4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.
- (5) The receiver must be operated for about 20 minutes prior to the adjustment.

4. General Specification

4.1. Model Specification

No	Item	Specification	Remark	
1	Market	North America		
2	Broadcasting system	Digital : DVB-T2, ATSC /64 & 256 QAM, ATSC Analog : NTSC-M / NTSC-M		
3	Available Channel	VHF : 2 ~ 13		
		UHF : 14 ~ 69		
		DTV : 2 ~ 69		
		CATV : 1 ~ 135		
		CADTV : 1 ~ 135		
		DTV(UHD) : 2 ~ 69		
4	Receiving system	Digital : ATSC Analog : NTSC-M		
5	Video Input	NTSC-M	Rear RCA	
6	Component Input	Y/Cb/Cr, Y/ Pb/Pr	Rear RCA	
7	HDMI Input	HDMI 1	PC / DTV format, Support HDCP2.2	Rear, Support 6Gbps
		HDMI 2	PC / DTV format, Support HDCP2.2	Rear, Support 6Gbps, Support ARC
		HDMI 3	PC / DTV format, Support HDCP2.2	Rear, , Support MHL 3.0 (external IC)
		HDMI 4	PC / DTV format, Support HDCP2.2	Rear, Support 6Gbps(Only E6 / B6 model)
8	Audio Input	Component / AV Audio / DVI audio	L/R Input ; Rear Component and av and DVI use same jack ; Rear (Gender)	
9	SPDIF out(1EA)	Optical Audio out	Rear (1EA),	
10	USB Input(3EA)	EMF, DivX HD, For SVC (download)	JPEG, MP3, DivX HD	

5. External input format

5.1. 2D Mode

5.1.1. Component input(Y, PB, PR)

No	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed
1	720*480i	15.73	59.94	13.50	SDTV, DVD 480i(525I)
2	720*480i	15.75	60.00	13.51	SDTV, DVD 480i(525I)
3	720*576i	15.62	50.00	13.50	SDTV, DVD 576i(625I) 50Hz
4	720*480p	31.47	59.94	27.00	SDTV 480P
5	720*480p	31.50	60.00	27.02	SDTV 480P
6	720*576p	31.25	50.00	27.00	SDTV 576P 50Hz
7	1280*720	44.96	59.94	74.17	HDTV 720P
8	1280*720	45.00	60.00	74.25	HDTV 720P
9	1280*720	37.50	50.00	74.25	HDTV 720P 50Hz
10	1920*1080	28.12	50.00	74.25	HDTV 1080I 50Hz,
11	1920*1080	33.72	59.94	74.17	HDTV 1080I
12	1920*1080	33.75	60.00	74.25	HDTV 1080I
13	1920*1080	56.25	50	148.5	HDTV 1080P
14	1920*1080	67.43	59.94	148.5	HDTV 1080P
15	1920*1080	67.50	60.00	148.5	HDTV 1080P

5.1.2. HDMI Input (PC/DTV)

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	Remarks
	HDMI-PC					
1	640*350	31.46	70.09	25.17	EGA	
2	720*400	31.46	70.08	28.32	DOS	
3	640*480	31.46	59.94	25.17	VESA(VGA)	
4	800*600	37.87	60.31	40	VESA(SVGA)	
5	1024*768	48.36	60.00	65	VESA(XGA)	
6	1360*768	47.71	60.01	84.75	VESA(WXGA)	
7	1152*864	54.34	60.05	80	VESA	
8	1280*1024	63.98	60.02	109.00	SXGA	Support to HDMI-PC
9	1920*1080	67.5	60	158.40	WUXGA(Reduced Blanking)	
10	3840*2160	54	24.00	297.00	UDTV 2160P	
11	3840*2160	56.25	25.00	297.00	UDTV 2160P	
12	3840*2160	67.5	30.00	297.00	UDTV 2160P	
13	4096*2160	53.95	23.97	296.70	UDTV 2160P	
14	4096*2160	54	24	297	UDTV 2160P	

No	Resolution	H-freq.(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remarks
	DTV mode					
1	640*480	31.46	59.94	25.12	SDTV 480P	
2	640*480	31.5	60.00	25.12	SDTV 480P	
3	720*480	15.73	59.94	13.50	SDTV, DVD 480I(525I)	Spec. out but display
4	720*480	15.75	60.00	13.51	SDTV, DVD 480I(525I)	
5	720*576	15.62	50.00	13.50	SDTV, DVD 576I(625I) 50Hz	
6	720*480	31.47	59.94	27	SDTV 480P	
7	720*480	31.5	60.00	27.02	SDTV 480P	
8	720*576	31.25	50.00	27	SDTV 576P	
9	1280*720	44.96	59.94	74.17	HDTV 720P	
10	1280*720	45	60.00	74.25	HDTV 720P	
11	1280*720	37.5	50.00	74.25	HDTV 720P	
12	1920*1080	28.12	50.00	74.25	HDTV 1080I	
13	1920*1080	33.72	59.94	74.17	HDTV 1080I	
14	1920*1080	33.75	60.00	74.25	HDTV 1080I	
15	1920*1080	26.97	23.97	63.29	HDTV 1080P	
16	1920*1080	27.00	24.00	63.36	HDTV 1080P	
17	1920*1080	33.71	29.97	79.120	HDTV 1080P	
18	1920*1080	33.75	30.00	79.20	HDTV 1080P	
19	1920*1080	56.25	50.00	148.5	HDTV 1080P	
20	1920*1080	67.43	59.94	148.35	HDTV 1080P	
21	1920*1080	67.5	60.00	148.50	HDTV 1080P	
22	3840*2160	53.95	23.98	296.70	UDTV 2160P	
23	3840*2160	54	24.00	297.00	UDTV 2160P	
24	3840*2160	56.25	25.00	297.00	UDTV 2160P	
25	3840*2160	61.43	29.97	296.70	UDTV 2160P	
26	3840*2160	67.5	30.00	297.00	UDTV 2160P	
27	3840*2160	112.5	50.00	594	UDTV 2160P	When HDMI1,2,3 UHD DEEP COLOUR ON
28	3840*2160	134.86	59.94	593.40	UDTV 2160P	When HDMI1,2,3 UHD DEEP COLOUR ON
29	3840*2160	135	60.00	594	UDTV 2160P	When HDMI1,2,3 UHD DEEP COLOUR ON
30	4096*2160	53.95	23.98	296.70	UDTV 2160P	
31	4096*2160	54	24.00	297	UDTV 2160P	
32	4096*2160	56.25	25.00	297	UDTV 2160P	
33	4096*2160	61.43	29.97	296.70	UDTV 2160P	
34	4096*2160	67.5	30.00	297	UDTV 2160P	
35	4096*2160	112.5	50.00	594	UDTV 2160P	When HDMI1,2,3 UHD DEEP COLOUR ON
36	4096*2160	134.86	59.94	593.40	UDTV 2160P	When HDMI1,2,3 UHD DEEP COLOUR ON
37	4096*2160	135	60.00	594	UDTV 2160P	When HDMI1,2,3 UHD DEEP COLOUR ON

ADJUSTMENT INSTRUCTION

1. Application Range

This spec. sheet applies to EA64B 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 °C ±5 °C of temperature and 65 % ± 10 % of relative humidity if there is no specific designation
- (4) The input voltage of the receiver must keep 100 V~240 V, 50/60Hz
- (5) The receiver must be operated for about 5 minutes prior to the adjustment when module is in the circumstance of over 15°C

- In case of keeping module is in the circumstance of 0°C, it should be placed in the circumstance of above 15°C for 2 hours
- In case of keeping module is in the circumstance of below -20°C, it should be placed in the circumstance of above 15°C for 3 hours

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

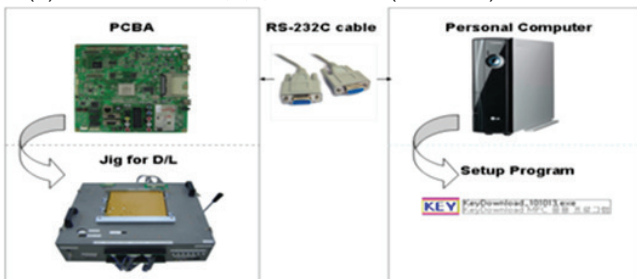
3. PCB assembly adjustment method

3.1. MAC Address, ESN Key, Wide-vine Key, HDCP 2.2 Download

- D/L Program : keydownload.exe

3.1.1. Equipment & Condition

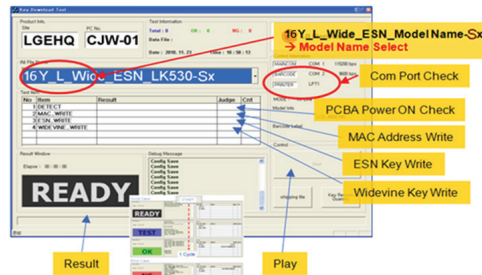
- (1) Play file: keydownload.exe
- (2) Key Write: Com 1,2,3,4 and 115200 (Baudrate)
- (3) Barcode: Com 1,2,3,4 and 9600 (Baudrate)



3.1.2. Download Process

(MAC + WIDEVINE + ESN+HDCP2.2)

- (1) Execute "keydownload.exe" on PC
- (2) Select the download items.
- (3) Mode check : Online only
- (4) Check the test process
 - DETECT -> MAC_WRITE -> ESN_WRITE (only Colombia/Panama) -> WIDEVINE_WRITE
- (5) Play: START
- (6) Check of result: Ready, Test, OK or NG



3.1.3. Inspection : ININSTART menu, check these keys.

3.2. LAN Test(Ping-test)

3.2.1. PING Test(LAN Operating Test)

3.2.1.1. Check PCBA

- (1) Connect LAN to PCBA& Power On.(Default IP can be set to automatic setting. When power ON, IP can be Automatically be achieved from the router)
- (2) Push ADJ key on Adjust remote-controller.
- (3) Enter "13. ACAP PING TEST" & check Network.

3.2.1.2. Check Set(Manufacturer)

- (1) Connect TV-Set & PC with Cross LAN cable.(PC IP : 12.12.2.3)
- (2) Execute "PINT Test program", Check setting data of program. (TV-Set IP : 12.12.2.2)



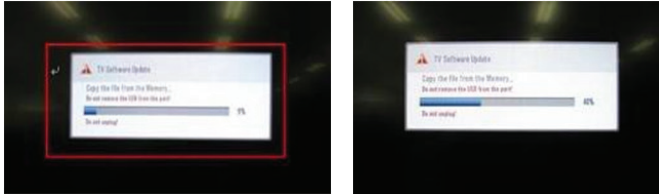
- (3) Push Power Only key on Adjust remote-controller.
- (4) Click "RUN", Check "OK" or "NG"



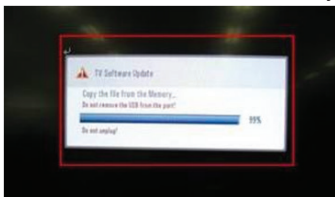
3.3. Main S/W program download

3.3.1. Using the Memory Stick

- ** USB DOWNLOAD : Service Mode
- (1) Insert the USB memory Stick to the USB port
 - (2) Automatically detect the SW Version.
-> S/W download process is executed automatically.
 - (3) Show the message "Copy the file from the Memory"



- (4) After Finished the Download, Automatically DC Off -> On



- (5) If the TV IS Turn On, Check the updated SW Version and Tool Option.

3.4. Input tool option

Adjust tool option refer to the BOM.

- Tool Option Input : PCBA Check Process
- Area Option Input : Set Assembly Process

After Input Tool Option and AC off
Before PCBA check, you have to change the Tool option and have to AC off/on (Plug out and in)
(If missing this process, set can operate abnormally)

3.4.1. Profile

Must be changed the option value because being different with some setting value depend on module maker, inch and market

3.4.2. Equipment

adjustment remote control.

3.4.3. Adjustment method

- The input methods are same as other chassis.(Use ADJ Key on the Adjust Remocon.)
(If not changed the option, the input menu can differ the model spec.)
Refer to Job Expression of each main chassis ass'y (EBTxxxxxxx) for Option value

(Caution)
Don't Press "IN-STOP" key after completing the function inspection.

3.5. EDID D/L method

Recommend that don't connect HDMI and RGB(D-SUB) cable when downloading the EDID.
If not possible, recommend that connect the MSPG equipment.
There are two methods of downloading the edid data

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"

3.5.1. 1st Method

EDID data's are automatically downloaded when adjusting the Tool Options.
Automatically downloaded when pushing the enter key in the EDID D/L menu.
It takes about 2seconds.

3.5.2. 2nd Method

(Caution)
Must be checked that the tool option is right or not.
If tool option is wrong, HDMI edid data could not be downloaded well.

- (1) Press the ADJ key
- (2) Move to the 13. EDID D/L and Press the right direction key(▶)
- (3) Press the right direction key(▶) at Start.
- (4) After about a few seconds, appear "Waiting.." => "OK", then complete.

3.5.3. RS-232C command Method

(1) Command : AE 00 10
(Caution)
Don't connect HDMI and RGB(D-SUB) cable when downloading the EDID.
If the cables are connected, Downloading of edid could be failed.

3.5.4. EDID data

3.5.4.1. DTS

Input	2D				3G : HDMI Deep Color Off 6G : HDMI Deep Color On
	6G		3G		
HDMI 1	9F	B6	9F	DC	For EA62E, EA64B
HDMI 2	9F	A6	9F	CC	
HDMI 3	9F	96	9F	BC	
HDMI 4	9F	86	9F	AC	

- * DTS Checksum (HDMI 1/2/3/4)
- B6 Only @Power Only Mode
- Due to External EEPROM for HDMI3&4, EDID C/S is shown below @ power only mode

Input	HDMI Deep Color On FFh (Checksum)		HDMI Deep Color Off FFh (Checksum)	
HDMI1	9F	B6	9F	DC
HDMI2	9F	A6	9F	CC
HDMI3	9F	BC	9F	BC
HDMI4	9F	AC	9F	AC

(1) 2D_6G

- HDMI1 6G_UHD Deep Color ON

	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	01	00	01	01	01	01
10	01	1A	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	08	E8	00	30	F2	70	5A	80	B0	58
40	8A	00	40	84	63	00	00	1E	02	3A	80	18	71	38	2D	40
50	58	2C	45	00	40	84	63	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	88	3C	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	9F
80	02	03	42	F1	50	61	10	22	20	05	04	03	02	01	5D	5E
90	5F	66	62	63	64	29	3D	06	C0	15	07	50	09	57	07	6E
A0	03	0C	00	10	00	B8	3C	20	00	80	01	02	03	04	67	D8
B0	5D	C4	01	78	80	03	E3	05	C0	00	E3	0F	01	10	E3	06
C0	07	01	01	1D	80	18	71	1C	16	20	58	2C	25	00	40	84
D0	63	00	00	9E	66	21	50	B0	51	00	1B	30	40	70	36	00
E0	40	84	63	00	00	1E	00	00	00	00	00	00	00	00	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	B6

- HDMI2 6G_UHD Deep Color ON

	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	01	00	01	01	01	01
10	01	1A	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	08	E8	00	30	F2	70	5A	80	B0	58
40	8A	00	40	84	63	00	00	1E	02	3A	80	18	71	38	2D	40
50	58	2C	45	00	40	84	63	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	88	3C	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	9F
80	02	03	42	F1	50	61	10	22	20	05	04	03	02	01	5D	5E
90	5F	66	62	63	64	29	3D	06	C0	15	07	50	09	57	07	6E
A0	03	0C	00	10	00	B8	3C	20	00	80	01	02	03	04	67	D8
B0	5D	C4	01	78	80	03	E3	05	C0	00	E3	0F	01	10	E3	06
C0	07	01	01	1D	80	18	71	1C	16	20	58	2C	25	00	40	84
D0	63	00	00	9E	66	21	50	B0	51	00	1B	30	40	70	36	00
E0	40	84	63	00	00	1E	00	00	00	00	00	00	00	00	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	A6

- HDMI3 6G_UHD Deep Color ON

	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	01	00	01	01	01	01
10	01	1A	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	08	E8	00	30	F2	70	5A	80	B0	58
40	8A	00	40	84	63	00	00	1E	02	3A	80	18	71	38	2D	40
50	58	2C	45	00	40	84	63	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	88	3C	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	9F
80	02	03	42	F1	50	61	10	22	20	05	04	03	02	01	5D	5E
90	5F	66	62	63	64	29	3D	06	C0	15	07	50	09	57	07	6E
A0	03	0C	00	10	00	B8	3C	20	00	80	01	02	03	04	67	D8
B0	5D	C4	01	78	80	03	E3	05	C0	00	E3	0F	01	10	E3	06
C0	07	01	01	1D	80	18	71	1C	16	20	58	2C	25	00	40	84
D0	63	00	00	9E	66	21	50	B0	51	00	1B	30	40	70	36	00
E0	40	84	63	00	00	1E	00	00	00	00	00	00	00	00	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	96

- HDMI4 6G_UHD Deep Color ON

	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	01	00	01	01	01	01
10	01	1A	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	08	E8	00	30	F2	70	5A	80	B0	58
40	8A	00	40	84	63	00	00	1E	02	3A	80	18	71	38	2D	40
50	58	2C	45	00	40	84	63	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	88	3C	00	0A	20	20	20	20	20	20	20	20	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	9F
80	02	03	42	F1	50	61	10	22	20	05	04	03	02	01	5D	5E
90	5F	66	62	63	64	29	3D	06	C0	15	07	50	09	57	07	6E
A0	03	0C	00	10	00	B8	3C	20	00	80	01	02	03	04	67	D8
B0	5D	C4	01	78	80	03	E3	05	C0	00	E3	0F	01	10	E3	06
C0	07	01	01	1D	80	18	71	1C	16	20	58	2C	25	00	40	84
D0	63	00	00	9E	66	21	50	B0	51	00	1B	30	40	70	36	00
E0	40	84	63	00	00	1E	00	00	00	00	00	00	00	00	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	86

(2) 2D_3G

- HDMI1 3G_UHD Deep Color ON

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	1A	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26	01
10	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80	26
20	01	01	01	01	01	08	E8	00	30	F2	70	5A	80	B0	58	80
30	00	40	84	63	00	00	1E	02	3A	80	18	71	38	2D	40	58
40	2C	45	00	40	84	63	00	00	1E	00	00	00	00	FD	00	3A
50	1E	88	3C	00	0A	20	20	20	20	20	20	20	20	00	00	FC
60	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	9F	FC
70	03	34	F1	4E	5D	10	22	20	05	04	03	02	01	5E	5F	9F
80	63	64	29	3D	06	C0	15	07	50	09	57	07	07	6E	03	5F
90	10	00	B8	3C	20	00	80	01	02	03	04	E3	0E	61	66	0C
A0	06	07	01	01	1D	80	18	71	1C	16	20	58	2C	25	00	FC
B0	84	63	00	00	9E	66	21	50	B0	51	00	1B	30	40	70	71
C0	00	40	84	63	00	00	1E	00	00	00	00	00	00	00	00	50
D0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
E0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	8B

- HDMI2 3G_UHD Deep Color ON

	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	01	00	01	01	01	01
10	01	1A	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	08	E8	00	30	F2	70	5A	80	B0	58
40	8A	00	40	84	63	00	00	1E	02	3A	80	18	71	38	2D	40
50	58	2C	45	00	40	84	63	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	88	3C	00	0A	20	20	20	20	20	20	20	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	9F
80	02	03	42	F1	50	61	10	22	20	05	04	03	02	01	5E	5F
90	62	63	64	29	3D	06	C0	15	07	50	09	57	07	6E	03	0C
A0	00	20	00	B8	3C	20	00	80	01	02	03	04	E3	0E	61	66
B0	E3	06	07	01	01	1D	80</									

- HDMI3 3G_UHD Deep Color ON

0	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	01	00	01	01	01	01
10	01	1A	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	08	E8	00	30	F2	70	5A	80	B0	58
40	8A	00	40	84	63	00	00	1E	02	3A	80	18	71	38	2D	40
50	58	2C	45	00	40	84	63	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	88	3C	00	0A	20	20	20	20	20	20	20	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	9F
80	02	03	34	F1	4E	5D	10	22	20	05	04	03	02	01	5E	5F
90	62	63	64	29	3D	06	C0	15	07	50	09	57	07	6E	03	0C
A0	00	30	00	B8	3C	20	00	80	01	02	03	04	E3	0E	61	66
B0	E3	06	07	01	01	1D	80	18	71	1C	16	20	58	2C	25	00
C0	40	84	63	00	00	9E	66	21	50	B0	51	00	1B	30	40	70
D0	36	00	40	84	63	00	00	1E	00	00	00	00	00	00	00	00
E0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	BC

- HDMI4 3G_UHD Deep Color OFF

0	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	01	00	01	01	01	01
10	01	1A	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	08	E8	00	30	F2	70	5A	80	B0	58
40	8A	00	40	84	63	00	00	1E	02	3A	80	18	71	38	2D	40
50	58	2C	45	00	40	84	63	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	88	3C	00	0A	20	20	20	20	20	20	20	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	9F
80	02	03	34	F1	4E	5D	10	22	20	05	04	03	02	01	5E	5F
90	62	63	64	29	3D	06	C0	15	07	50	09	57	07	6E	03	0C
A0	00	40	00	B8	3C	20	00	80	01	02	03	04	E3	0E	61	66
B0	E3	06	07	01	01	1D	80	18	71	1C	16	20	58	2C	25	00
C0	40	84	63	00	00	9E	66	21	50	B0	51	00	1B	30	40	70
D0	36	00	40	84	63	00	00	1E	00	00	00	00	00	00	00	00
E0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	AC

3.6. ADC Calibration

Comp 480i/Comp 1080p/RGB

3.6.1. ADC Calibration : Internal Auto ADC

ADC calibration is not necessary because MAIN SoC (LGExxxx) is already calibrated from IC Maker

3.6.2. Manual ADC Calibration

3.6.2.1. Equipment & Condition

- (1) Adjustment Remocon
- (2) 801GF (802B, 802F, 802R) or MSPG925FA Pattern Generator
 - Resolution : 480i Comp1 (MSPG-925FA: model-209, pattern-65)
 - Resolution : 1080p Comp1 (MSPG-925FA: model-225, pattern-65)
 - Resolution : 1080p RGB (MSPG-925FA: model-225, pattern-65)
 - Pattern : Horizontal 100% Color Bar Pattern
 - Pattern level: 0.7±0.1 Vp-p

3.6.2.2. Adjust method

3.6.2.2.1. ADC 480i/1080p Comp

- (1) Check connected condition of Comp cable to the equipment
- (2) Give a 480i Mode, Horizontal 100% Color Bar Pattern to Comp1. (MSPG-925FA -> Model: 209, Pattern: 65)
- (3) Change input mode as Component1 and picture mode as "Standard"
- (4) Press the In-start Key on the ADJ remote after at least 1 min of signal reception. Then, select
- (5) External ADC. And Press OK or Right Button for going to sub menu.
- (6) Press OK in Comp 480i menu
- (7) Give a 1080p Mode, Horizontal 100% Color Bar Pattern to Comp1. (MSPG-925FA -> Model: 225, Pattern: 65)
- (8) Press OK in Comp 1080p menu
- (9) If ADC Comp is successful, "ADC Component Success" is displayed.
- (10) If ADC calibration is failure, "ADC Component Fail" is displayed.
- (11) If ADC calibration is failure, after rechecking ADC pattern or condition, retry calibration
- (12) If ADC calibration is failure, after recheck ADC pattern or condition, retry calibration

3.7. Check SW Version

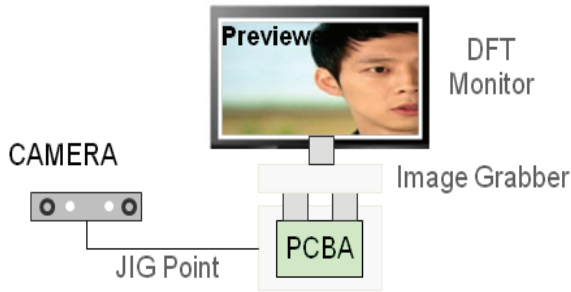
3.7.1. Method

- (1) Push In-star key on Adjust remote-controller.
- (2) SW Version check

IN START		Adjust Check	
Model Name :	49UH9300-NA	1.Adjust Check	
Serial Number :	012PTED6N500	2.ADC Data	Country Group
S/W Version :	3.02.06.01	3.Power Off Status	Country Group Code
MICOM Version :	3.05.3	4.System1	Country Group
BOOT Version :	1.02.22	5.System2	Country
UHD BE Version :	OK(40.00.1b.00)	6.System3	Area Option
Chip Type :	LG1312	7.Model Number D/L	Tool Option
Wi-Fi Channel :	1	8.Test Option	Tool Option1
Wi-Fi MAC :	E8:F2:E2:69:06:CA	9.Spread Spectrum	Tool Option2
Wi-Fi Speed :	USB 2.0	10.Stable Count	Tool Option3
MAC Address :	3C:CD:93:4F:CB:5D	11.SDP Server Selection	Tool Option4
IP Address :	0.0.0.0	12.RF Remocon Test	Tool Option5
SFU Key :	OK	13.Access Code	Tool Option6
Widevine :	LGTV10L000011618	14.Twin TV	Tool Option7
ESN Num. :	LGTV20162*21001000272		Tool Option9
HDCP1.4 :	OK		Tool CRC
HDCP2(Miracast/HDMI) :	OK/OK		Adjust White Balance :
DTCP :	OK		Adjust ADC(OTP) :
RF Receiver Version :	1.3.4.18		Component :
Wi-Fi/Magic Search :	OK/OK		EDID :
Camera Ver. :	NULL		HDMI1
Debug Status :	Release		HDMI2
SIGN Key :	DEVELKEY		HDMI3
Eye Check :	OK		OK(0x7F,0xCB)
Control Key :	OK		OK(0x7F,0xBB)
Access USB Status :	1 / -(T) / -(C)		OK(0x7F,0xAB)
UTT : 40	75		
APP History Version	146(deathvalley)		
PQL DB :	LGD_EGDE_S12178B_XXXX55		
Video :	NULL		

3.8. Camera Port Inspection

- (1) Objective : To check PCBA's CAMERA Port.
- (2) How-it-works
 - 1) Connect the PCBA like below Picture.
 - 2) Send specific RS-232C Command for displaying Camera Preview.
- * CAMERA need to be status of Slide up



3) RS-232C Command

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

4. SET assembly adjustment method

4.1. Input Area-Option

4.1.1. Profile

Must be changed the Area option value because being different of each Country's Language and signal Condition.

4.1.2. Equipment

adjustment remote control.

4.1.3. Adjustment method

- The input methods are same as other chassis.(Use IN-START Key on the Adjust Remocon.)
- Refer to Job Expression of each main chassis ass'y (EBTxxxxxxx) for Option value.

4.2. Adjustment of White Balance

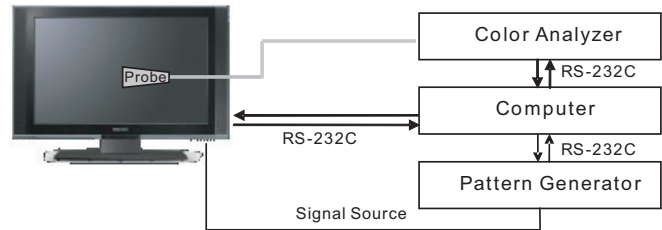
- * In case of keeping module is in the circumstance of 0°C, it should be placed in the circumstance of above 15°C for 2 hours
- * In case of keeping module is in the circumstance of below -20°C, it should be placed in the circumstance of above 15°C for 3 hours.
- Purpose : Adjust the color temperature to reduce the deviation of the module color temperature.
- Principle : To adjust the white balance without the saturation, Fix the one of R/G/B gain to 192 (default data) and decrease the others.
- Adjustment mode : Three modes – Cool / Medium / Warm

* Required Equipment

- Remote controller for adjustment
- Color Analyzer : CA100+ or CA-210 or same product (should be used in the calibrated ch by CS-1000)
 - LCD TV : CH-9
 - PDP TV : CH-10
 - White LED TV : CH-14
 - ALEF : CH-18
 - RGB LED(MNT) : CH-16
 - Auto W/B adjustment instrument(only for Auto adjustment)

4.2.1. Adjustment of White Balance (For Automatic Adjustment)

Connecting diagram of equipment for measuring (For Automatic Adjustment)



* If TV internal pattern is used, not needed

- (1) Set TV in ADJ mode using P-ONLY key (or POWER ON key)
- (2) Place optical probe on the center of the display
- (3) It need to check probe condition of zero calibration before adjustment.
- (4) Connect RS-232C Cable
- (5) Select mode in ADJ Program and begin a adjustment.
- (6) When WB adjustment is completed with OK message, check adjustment status of pre-set mode (Cool, Medium, Warm)
- (7) 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

4.2.2. Adjustment of White Balance (for Manual adjustment)

4.2.2.1. 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
 - 1) After Aging Start, Keep the Power ON status during 5 Minutes.
 - 2) In case of LCD, Back-light on should be checked using no signal or Full-white pattern.

4.2.2.2. 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)

4.2.2.3. 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.

4.2.3. OLED White balance table

4.2.3.1. Cool Mode

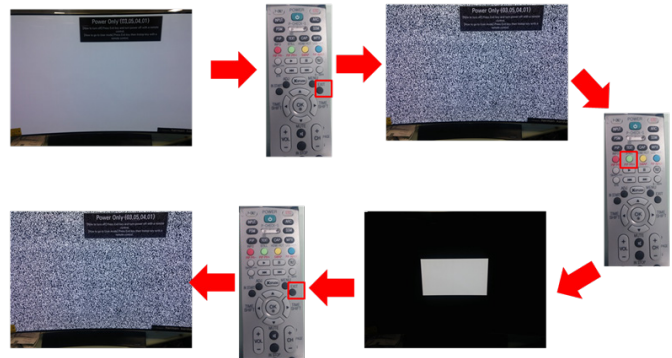
- (1) Purpose : To reduce each Panel's W/B deviation
- (2) Principle : When R/G/B gain in the OSD is at 192, it means the panel is at its Full Dynamic Range. In order to prevent saturation of Full Dynamic range and data, one of R/G/B is fixed at 192, and the other two is lowered to find the desired value.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

▪ Standard color coordinate and temperature when using the CA210 equipment(CH 14)

Mode	Coordinate		Temp	△uv
	X	Y		
Cool	0.277±0.002	0.278±0.002	11000K	-0.0030
Medium	0.286±0.002	0.289±0.002	9,300 K	0.000
Warm	0.313±0.002	0.329±0.002	6,500K	+0.0030

4.2.3.2. Auto WB calibration & 10% window pattern brightness check(HDR)

- (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, 10% window pattern brightness check)
 - (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



4.2.4. LED White balance table

4.2.4.1. Cool Mode

- (1) Purpose : Especially G-gain fix adjust leads to the luminance enhancement. Adjust the color temperature to reduce the deviation of the module color temperature.
- (2) Principle : To adjust the white balance without the saturation, Adjust the G gain more than 172 (If R gain or G gain is more than 255 , G gain can adjust less than 172) and change the others (R/B Gain).
- (3) Adjustment mode : mode – Cool

4.2.4.2. Medium / Warm Mode

- (1) Purpose : Adjust the color temperature to reduce the deviation of the module color temperature.
- (2) Principle : To adjust the white balance without the saturation,Fix the one of R/G/B gain to 192 (default data) and decrease the others.
- (3) Adjustment mode : Two modes – Medium / Warm

▪ Standard color coordinate and temperature when using the CA210 equipment(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	9,300 K	0.000
Warm	0.313±0.002	0.329±0.002	6,500K	0.003

- The Time Table of color coordinates by SET Aging Time
(1) Edge LED Models(UH8/UH9)_nomarl line

	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

- In the SET applied LED module (LM9600), cause of the physical characteristics of LED Module, sets are taken a 120 minutes by aging time to stabilize a color coordinates. So White Balance Control equipments have to get the SET Aging Time from the SET and then going to control the W/B by revise color coordinates at each time

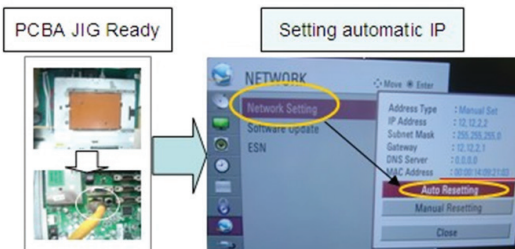
- To check the Coordinates of White Balance, you have to measure at the below conditions.

- Picture Mode : select Vivid and change
 Dynamic Contrast : Off ,
 Dynamic Colour : Off,
 Clear White : Off
 -> Picture Mode change : Vivid -> Vivid(User)

(If you miss the upper condition, the coordinates of W/B can be lower than the spec.)

4.3. LAN Inspection

- (1) LAN Port connection with PCB
- (2) Network setting at MENU Mode of TV
- (3) Setting automatic IP
- (4) Setting state confirmation
- (5) If automatic setting is finished, you confirm IP and MAC Address



4.4. WIDEVINE Key Inspection

- (1) Confirm Key input Data at the "IN START" MENU Mode



4.5. Model name & Serial number D/L

4.5.1. Notice

- (1) Serial number D/L is using of scan equipment.
- (2) Setting of scan equipment operated by Manufacturing Technology Group.
- (3) 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
- (4) Check the model name In-start menu -> Factory name displayed
- (5) Check the Diagnostics (DTV country only) -> Buyer model displayed

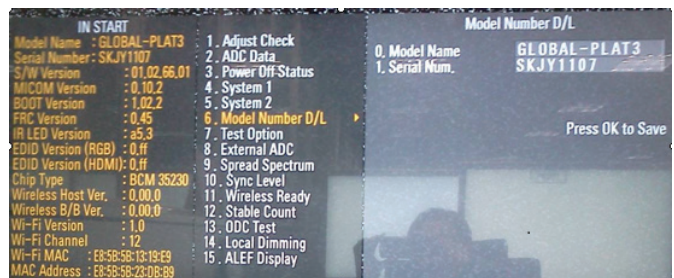
4.5.2. Method : Auto

- (1) Press "Power on" key of service remocon.(Baud rate : 115200 bps)
- (2) Connect RS232 Signal Cable to RS-232 Jack
- (3) Write Serial number by use RS-232.
- (4) Must check the serial number at Instart menu.

4.5.3. Method : Manual

* 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.

- (1) Press the 'instart' key of ADJ remote controller.
- (2) Go to the menu '6.Model Number D/L' like below photo.
- (3) Input the Factory model name or Serial number like photo.



4.6. Wi-Fi MAC Address Check

4.6.1. Using RS232 Command

	Command	Set ACK
Transmission	[A][0][Set ID][20][Cr]	[O][K][x] or [N][G]

4.6.2. Check the menu on in-start

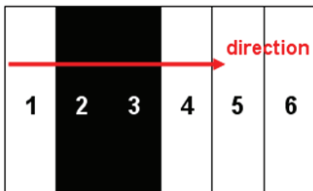


4.7. Local Dimming Inspection (Optional)

4.7.1. ALEF models with local dimming

- (1) Press 'TILT' key of the Adj. R/C and check moving patterns. The black bar patterns moves from top left to bottom right.

If local dimming function does not work, a whole screen shows full white.



4.8. GND and Hi-Pot test

4.8.1. GND & HI-POT auto-check preparation

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

4.8.2. 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).
- (5) HI-POT test (Auto)
 - If Test is failed, Buzzer operates.
 - If Test is passed, GOOD Lamp on and move to next process automatically.

4.8.3. Check point

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

4.9. Motion Remote controller Inspection

- (1) Equipment : Motion remote controller for test, IR-KEY-CODE remote controller for test
 - 1) Check battery before test. (Recommend : Change battery for every Lot.)
- (2) Process
 - 1) If you select the 'start key(wheel)' on the controller, you can pairing with the TV SET.
 - 2) You can check the cursor on the TV Screen, when select the 'Wheel Key' on the controller
 - 3) You must remove the pairing with the TV Set by select 'Back + Home Key' on the controller

4.10. AUDIO output check

No	Item	Min	Typ	Max	Unit	Remark
1	Audio practical max Output, L/R (Distortion=10% max Output)	9.0 8.5	10.0 8.10	12.0 9.88	W Vrms	Measurement condition
2	Speaker (8Ω Impedance)		10.0	15.0	W	Measurement condition

*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)

4.11. HDMI ARC Function Inspection

4.11.1. Test equipment

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

4.11.2. 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

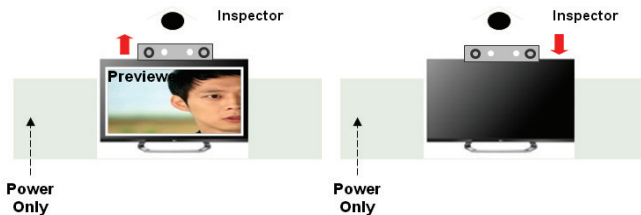


- * Remark: Inspect in Power Only Mode and check SW version in a master equipment

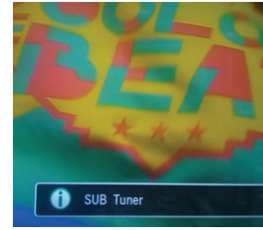


4.12. Camera Port Inspection

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



4.13. PIP/W&R Function Inspection



- (1) Objective : To check the connection between sub tuner and PCBA, and their Function
- (2) Test Method : This Inspection is available only Power-Only Status.
 - 1) Press exit key of the Adj. R/C and Press PIP key.
 - 2) Check that the SUB TUNER pop up window on the TV Set.
- (3) Check that the normal operation (picture, sound) of DTV on the TV Set.

** Appendix **

A. DDC Adjustment Command set

	Adjustment content	CMD (HEX)	ADR	VALUE	detail
1	Aging On/Off	F3	00	FF/00	FF : ON / 00 : OFF
2	Input select	F4	00		0x10 : TV 0x20 : AV1 0x21 : AV2 0x40 : Component1 0x41 : Component2 0x60 : RGB 0x90 : HDMI1 0x91 : HDMI2
3	R GAIN	16	00	00 - C0	Gain Value Adjustment CSM COOL
4	G GAIN	18		00 - C0	
5	B GAIN	1A		00 - C0	
6	R GAIN	16	01	00 - C0	Gain Value Adjustment CSM NORMAL
7	G GAIN	18		00 - C0	
8	B GAIN	1A		00 - C0	
9	R GAIN	16	02	00 - C0	Gain Value Adjustment CSM WARM
10	G GAIN	18		00 - C0	
11	B GAIN	1A		00 - C0	
12	CSM mode	F2	00	00	COOL
				01	NORMAL
				02	WARM
13	AUTO ADC	F1	00	0, 1, 2	0: Offset Value Adjustment 1: Gain Value Adjustment 2: Offset and Gain Value Adjustment
14	EEPROM Read	E7	00	00	EEPROM read
15	EEPROM Write	E8	00	data	EEPROM write

B. DDC command protocol

1. Signal TABLE

START 6E A 50 A 84 A 03 A CMD A ADR A VAL A CS A STOP

2. E²PROM Data Write

(1) Signal TABLE

START 6E A 50 A 84+n A 03 A CMD A ADH A ADL A
Data_1 A ... Data_n A CS A STOP Delay 20

LEN : 84h+Bytes
CMD : E8h
ADH : E2PROM Slave Address(A0,A2,A4,A6),
Not 00h(Reserved by BufferToEEPROM)
ADL : E2PROM Sub Address(00~FF)
Data : Write data
Delay : 20ms

(2) Command Set

	Adjustment content	CMD(hex)	LEN	Detail
1	EEPROM READ	E8h	94h	16-Byte Write
2			(84+n)h	n-byte Write

3. E²PROM Data Read

(1) Command Sequential TABLE

START 6E A 50 A 84 A 03 A CMD A ADH A ADL A CS A STOP

Delay 150ms

START 6E A D1 A 128 Bytes Dn A STOP

(2) COMMAND SET

No.	Adjustment content	CMD (hex)	ADH (hex)	ADL (hex)	Detail
1	EEPROM READ	E7	A0	0	0-Page 0~7F Read
2				80	0-Page 80~FF Read
3			A2	0	1-Page 0~7F Read
4				80	1-Page 80~FF Read
5			A4	0	2-Page 0~7F Read
6				80	2-Page 80~FF Read
7			A6	0	3-Page 0~7F Read
8				80	3-Page 80~FF Read

C. RS-232C Command Protocol

RS-232C COMMAND			Explanation
CMD	ID	DATA	
wb	00	00	White Balance Adjust Start.
wb	00	10	Gain Adjust Start (Internal white pattern)
wb	00	1f	Gain Adjust Stop.
wb	00	20	Offset Adjust Start. (Internal white pattern)
wb	00	2f	Offset Adjust Stop.
wb	00	ff	White Balance Adjust Stop (Internal pattern Exit)
xb	00		10 : Analog, 20 : Video 1, 21 : Video 2, 40 : Component 1, 41 : Component 2, 50 : RGB_DTV, 60 : RGB_PC 90 : HDMI 1, 91 : HDMI 2, 92 : HDMI
ad	00	10	ADC Start

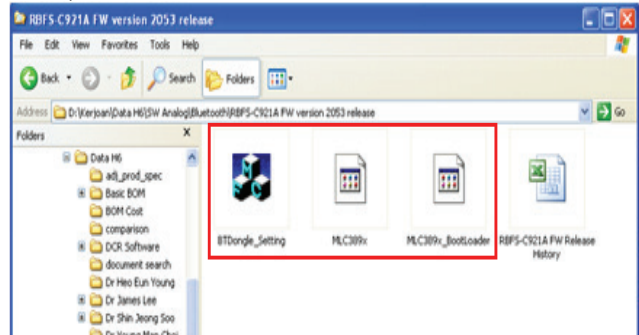
D. Bluetooth S/W Upgrade by using USB drive Input

(1) Preparation Equipment

1) USB Memory Stick



2) New Bluetooth Software



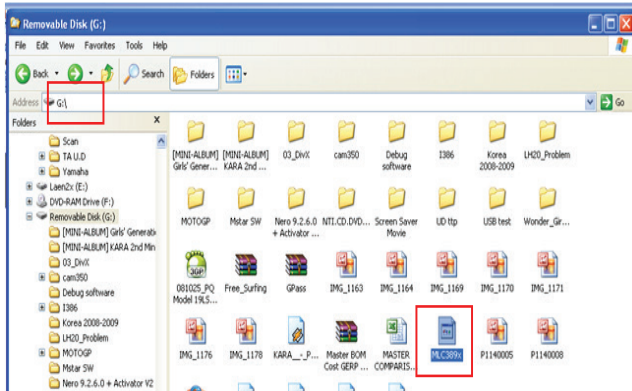
3) Copy New File

Copy Bluetooth software MCL389x.bin file to memory stick with out folder.

(Caution) Do not copy the file to the inside folder

3) Copy New File

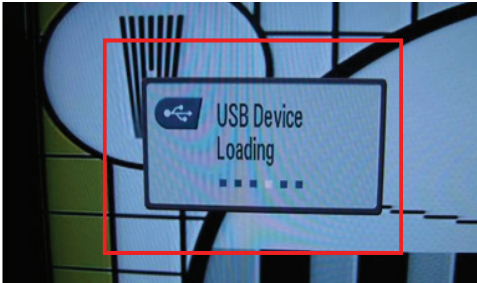
Copy Bluetooth software MCL389x.bin file to memory stick with out folder.
(Caution) Do not copy the file to the inside folder



(2) Connection

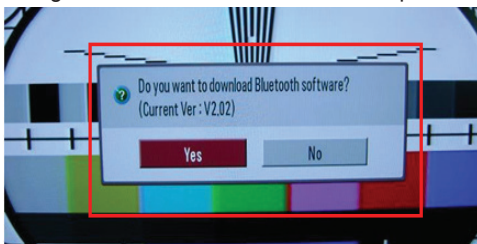
- Plug-in USB Memory stick to the USB input of the set.

(3) USB input -> Automatically loading menu



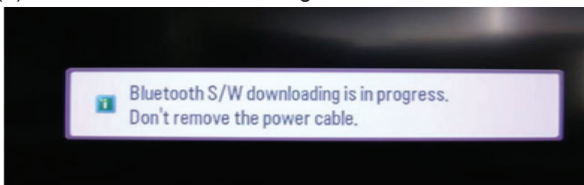
* The OSD "USB Device loading" is appeared by automatically...

(4) Selecting Window for Bluetooth Software update



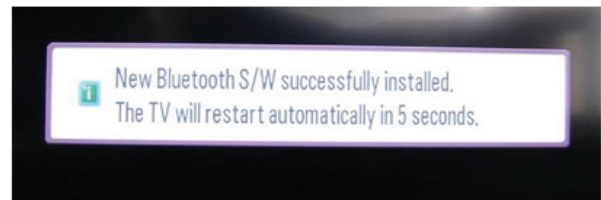
- The Pop-up window appears for selecting to update Bluetooth software and information about current Bluetooth software. (Ex : V2.02)
- Select "Yes"

(5) Bluetooth S/W Downloading Process



- Time Process Downloading new Bluetooth software about 10seconds
- Please Wait until finish and do not un-plug power cable

(6) OSD – Bluetooth software updated successfully



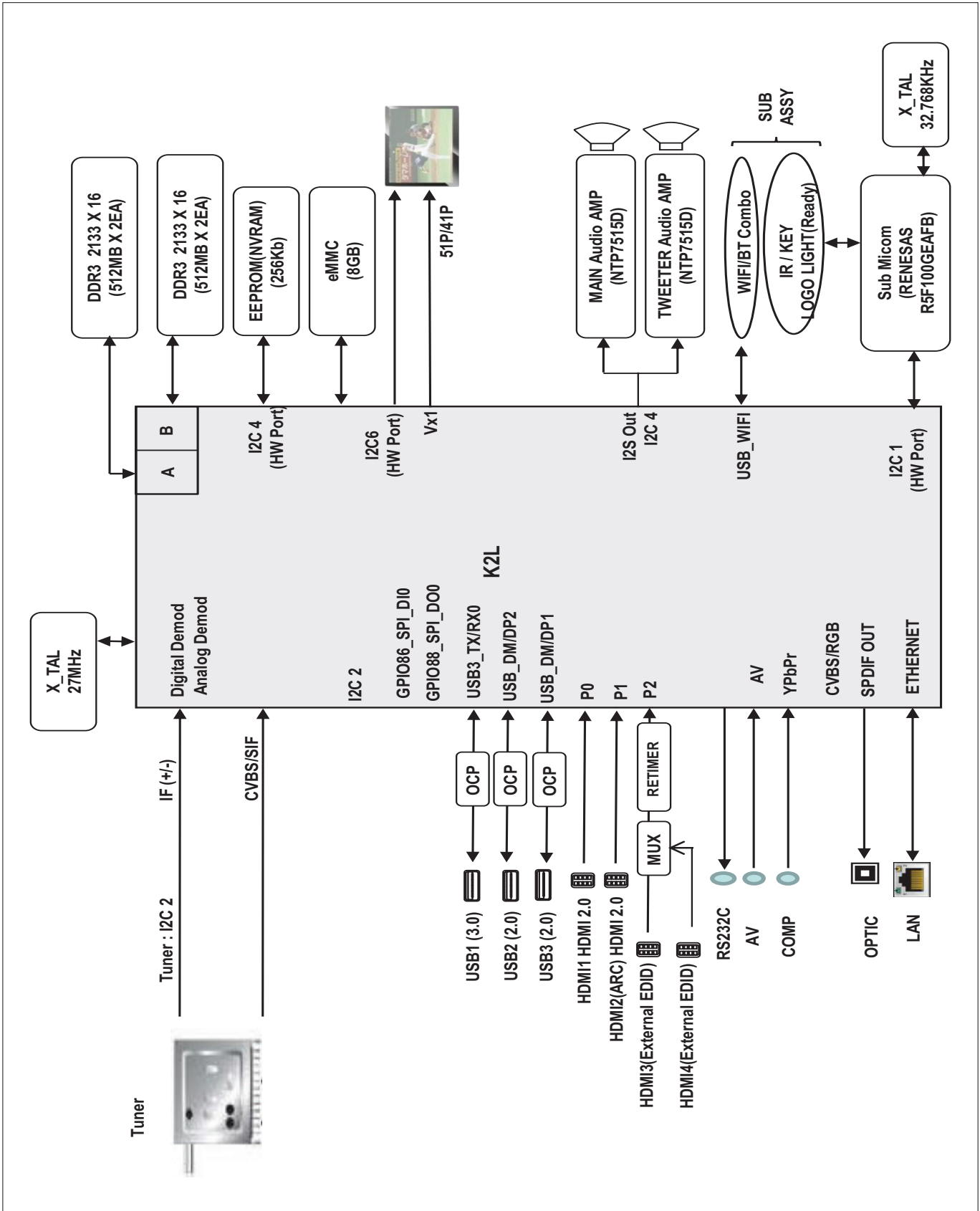
- OSD Information Bluetooth software update success
- LCDTV Set will restart by automatically...
- Time Process to restart about 5seconds

(7) Check S/W Version

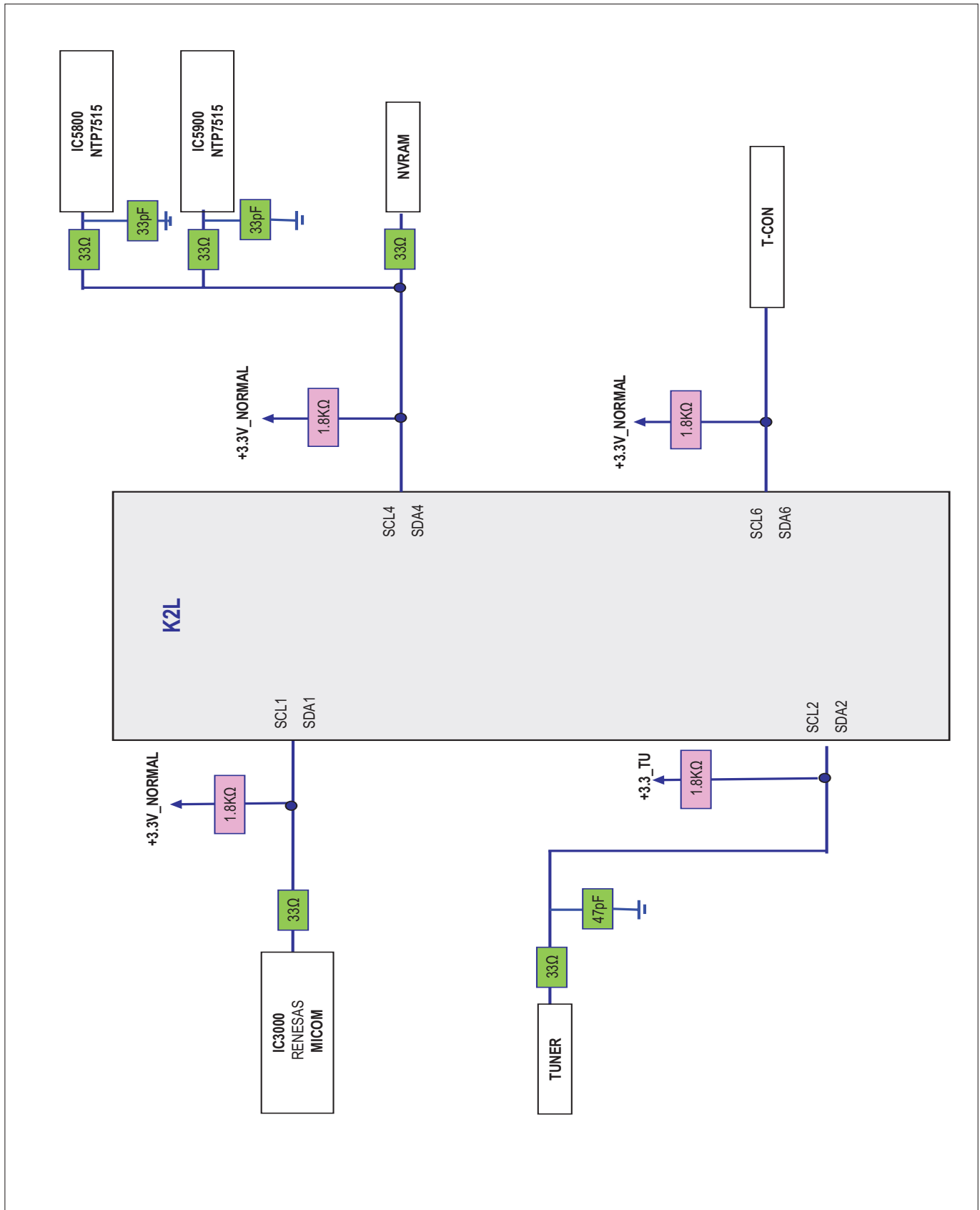
- Push "IN-START" button on service remote Controller
- Check Information Bluetooth S/W version will appear on OSD Service Menu.
Example : Bluetooth SW version 2.05

Block Diagram

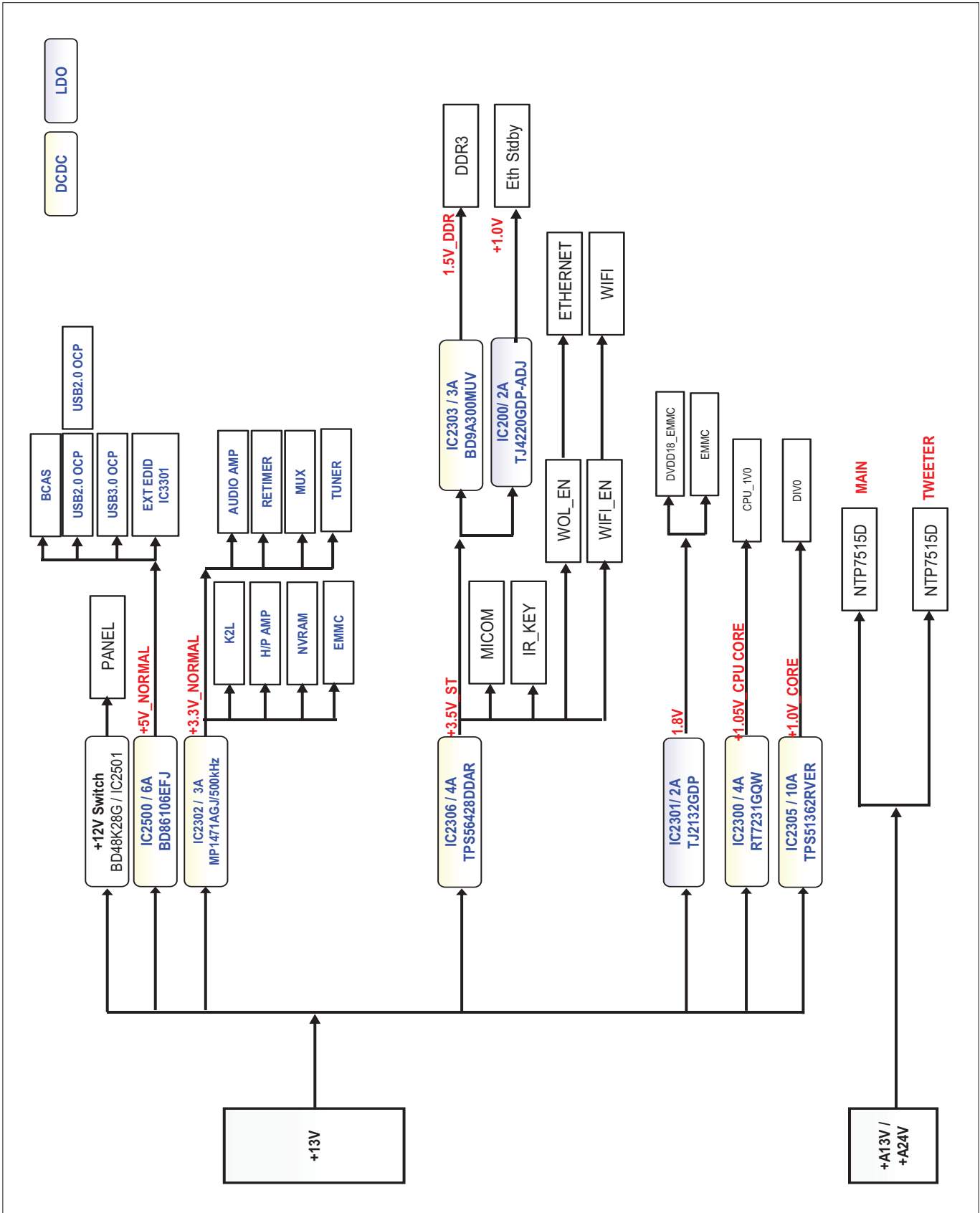
1.K2L Circuit Block Diagram



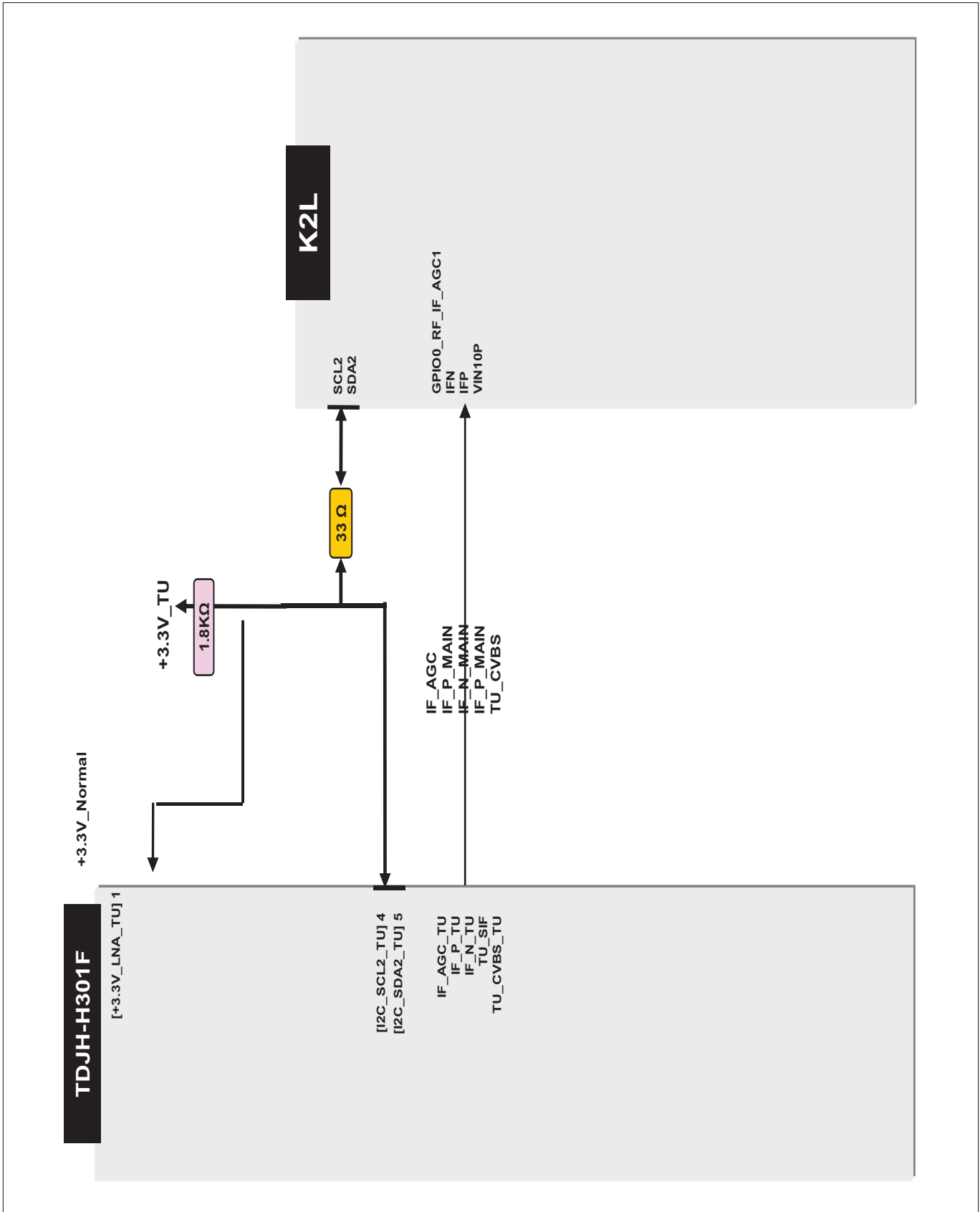
2. K2L I2C Block Diagram



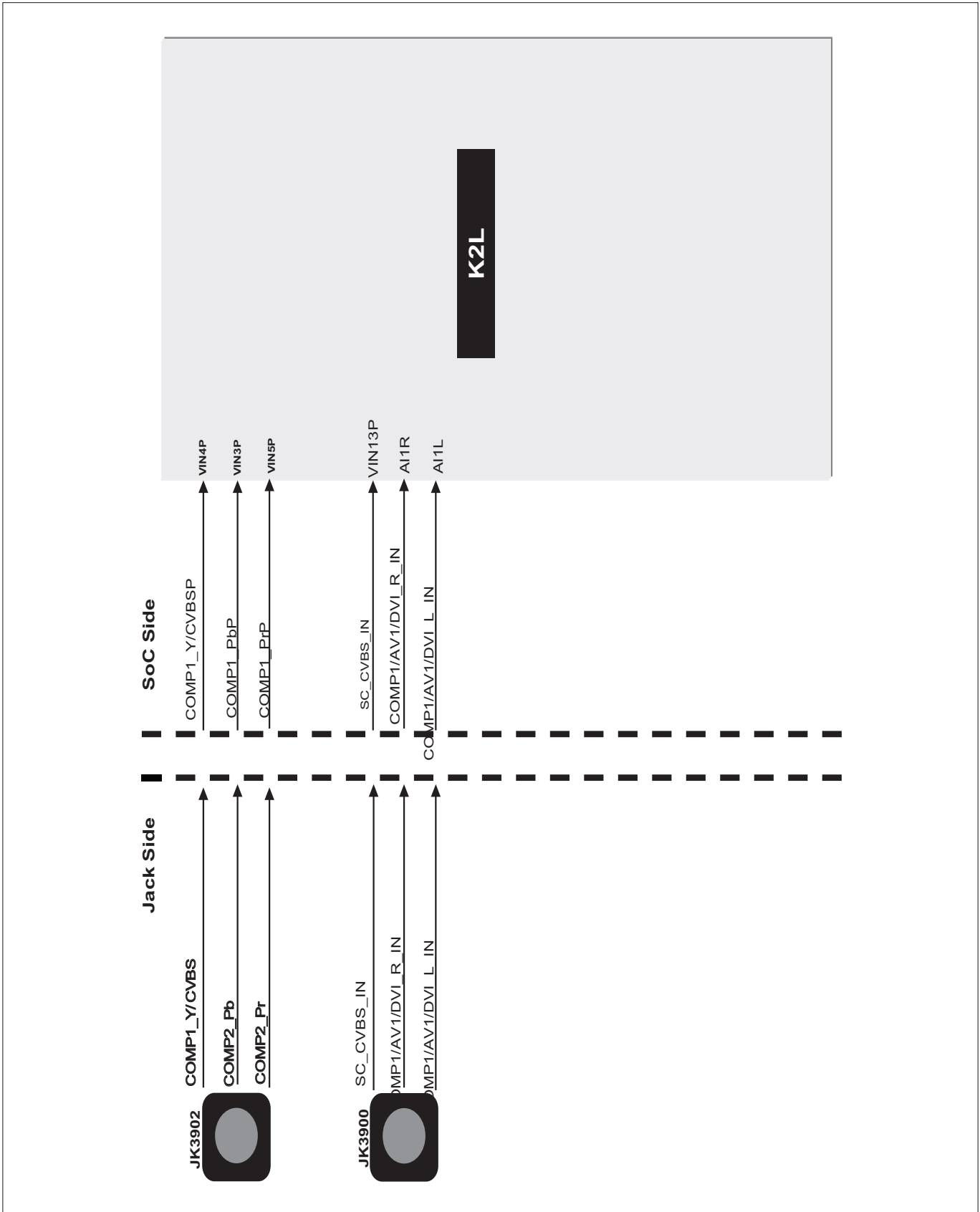
3. K2L Power Block



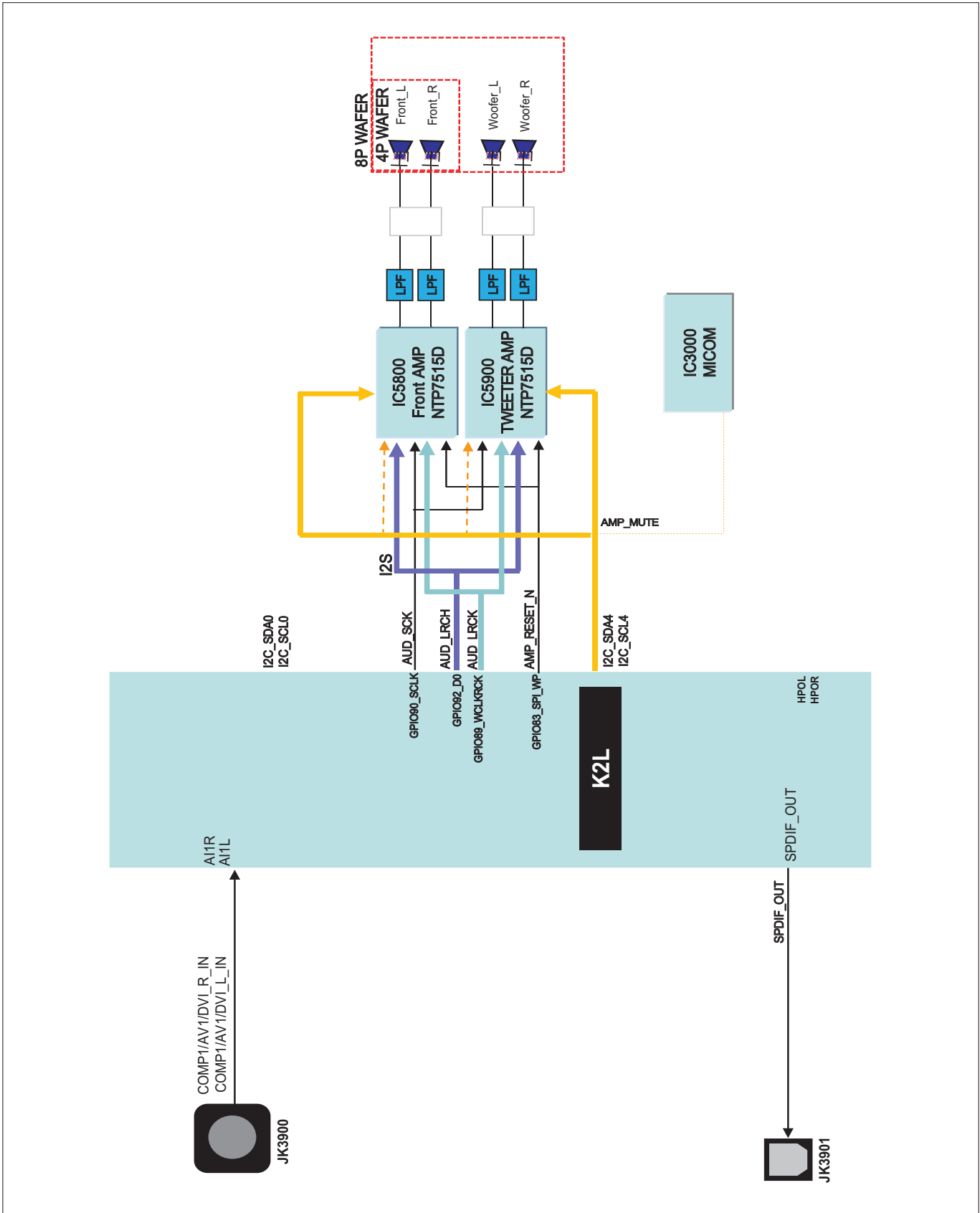
4. Tuner/CI Block Diagram



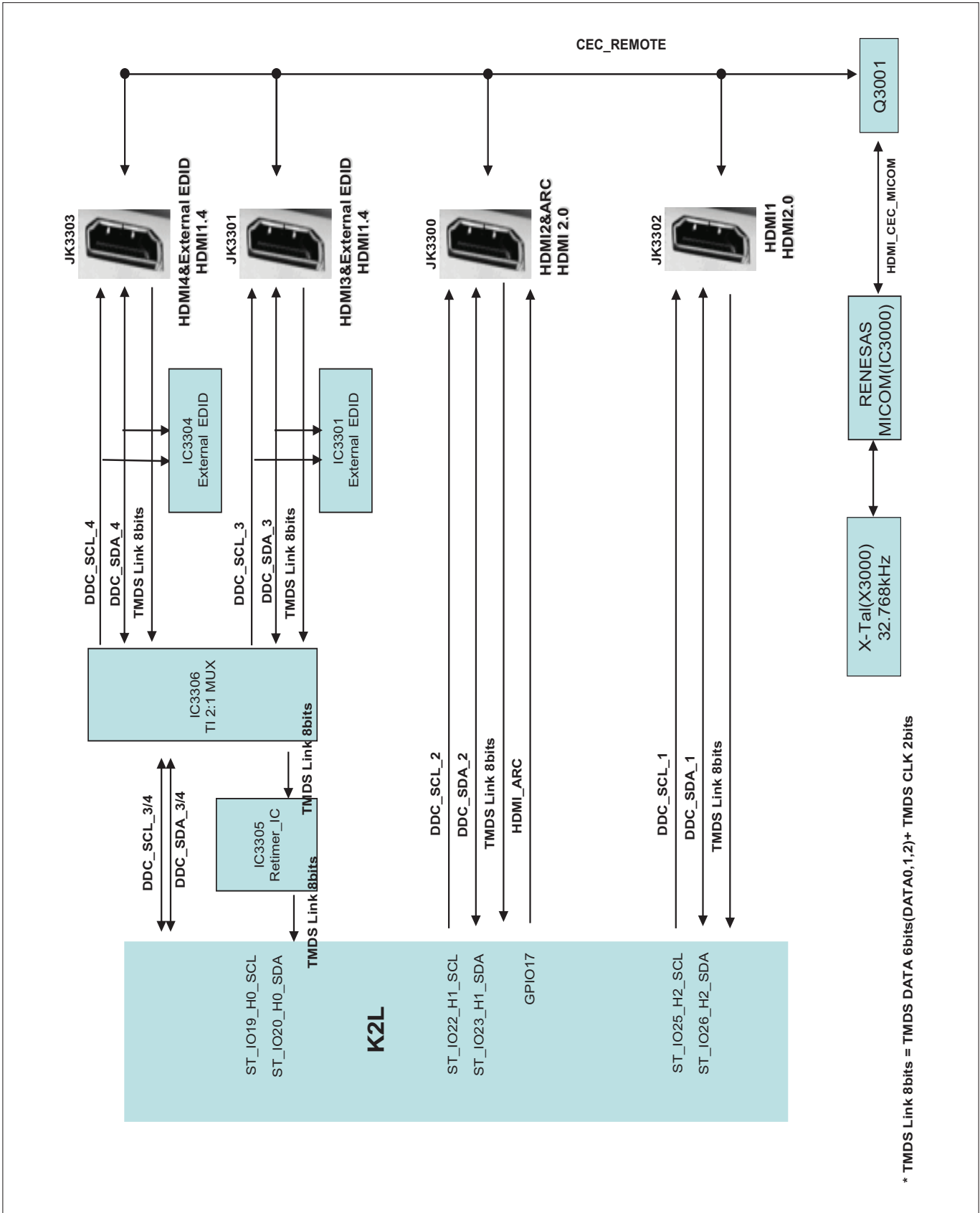
5. Video/Audio In Block Diagram



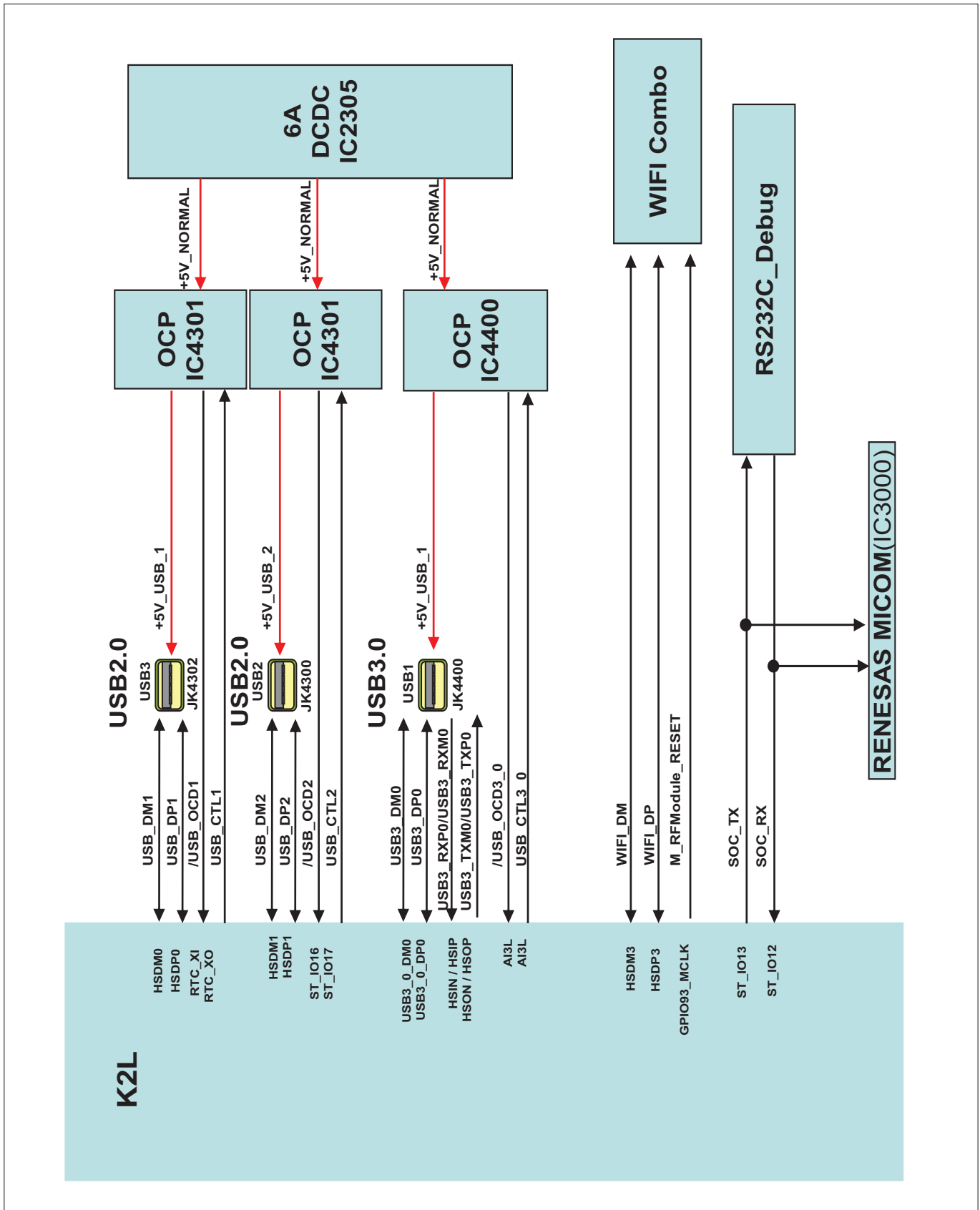
6. Audio Out Block Diagram



7. HDMI



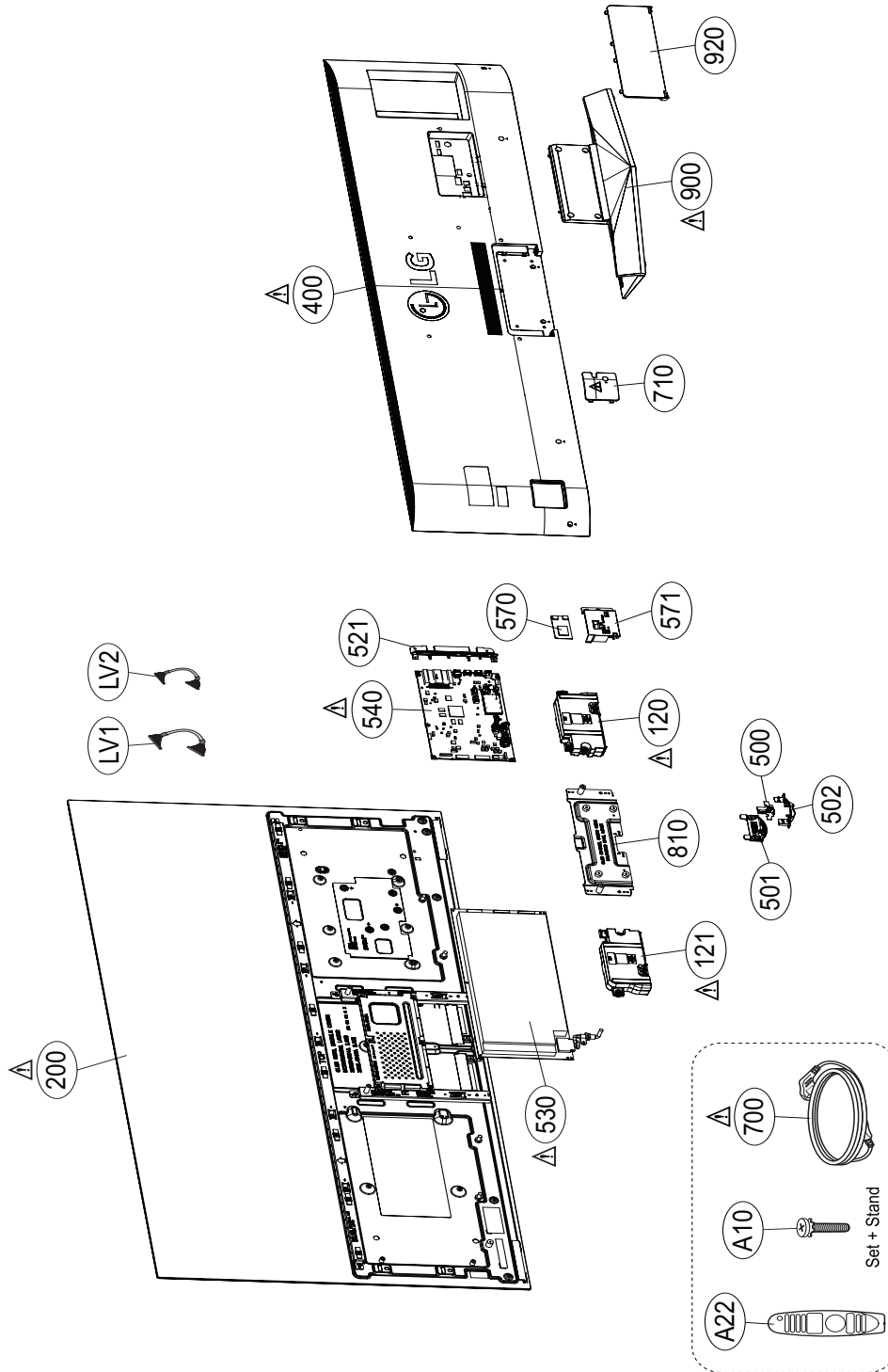
8. USB / WIFI / M-REMOTE / UART



EXPLODED VIEW

IMPORTANT SAFETY NOTICE

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



DISASSEMBLY

(1) Put the set on the flat pad.



(3) Remove Stand Screw and Stand



(2) Remove Rear Small Cover



○ FAB30016103 (M4*12mm), 4EA
- Remove Screw 4EA first, next remove Stand

(4) Remove Back Cover Screw



- Pull up bottom of Rear Small Cover to remove.



○ FAB31843216 (M3*5.5mm, Gray) 9EA
-> Common use 55"/65"

○ FAB31843216 (M3*5.5mm, Gray) 1EA
-> Add only 55"

(5) Remove PowerCord Bracket

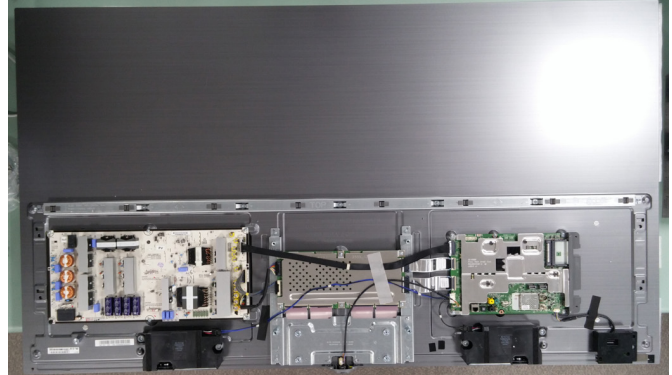


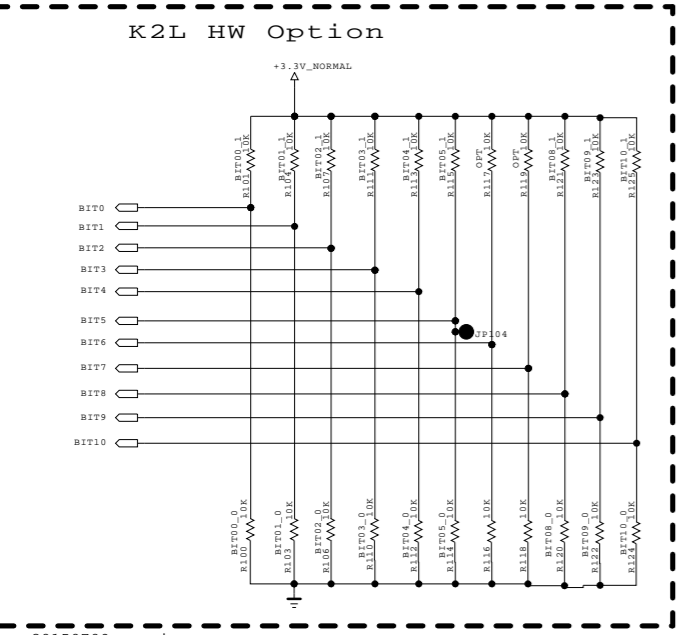
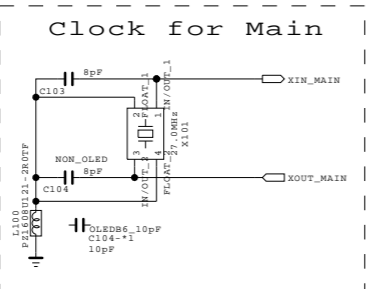
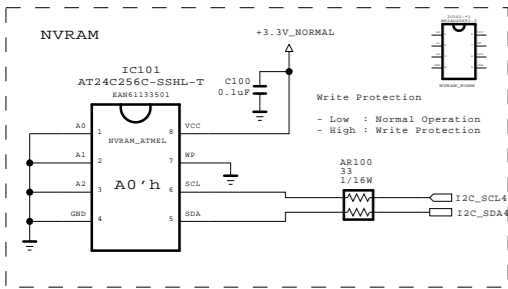
- Pull up Power Cord, than remove Bracket, next remove cord from PSU.

(6) Remove Back Cover



- Pull up bottom of Back Cover to remove.





20150709 version

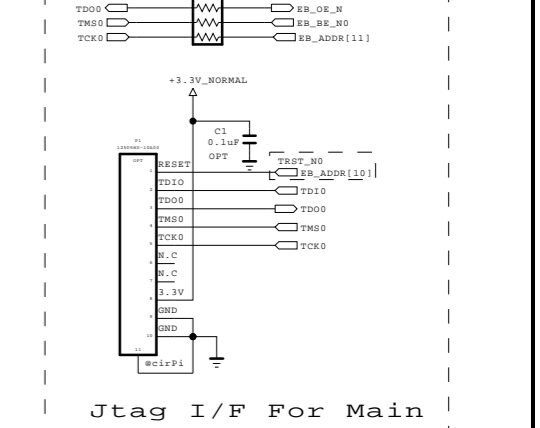
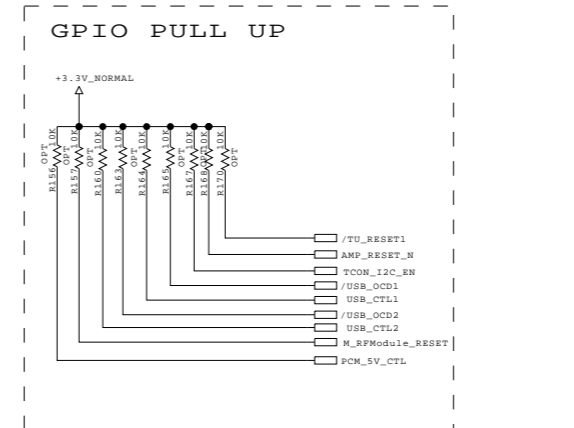
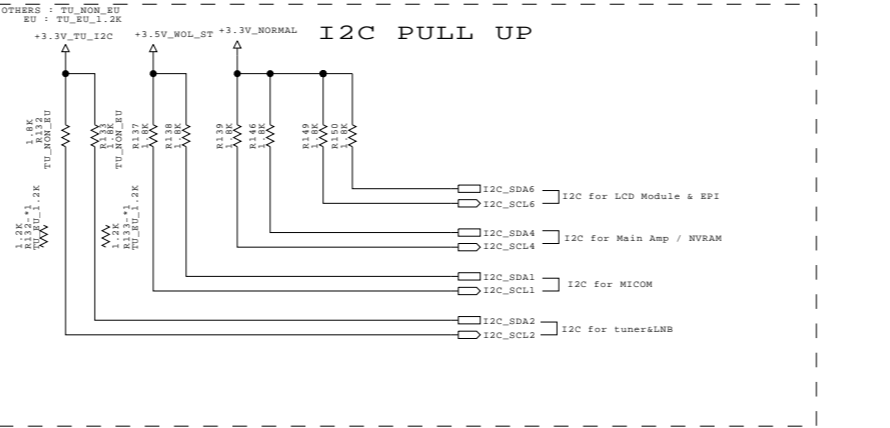
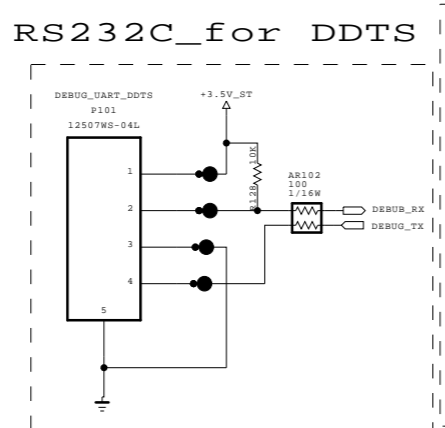
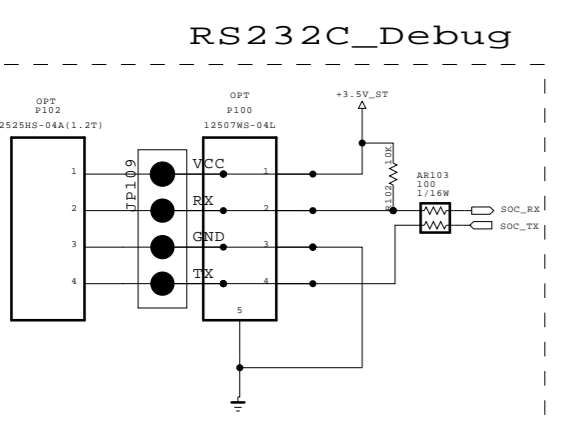
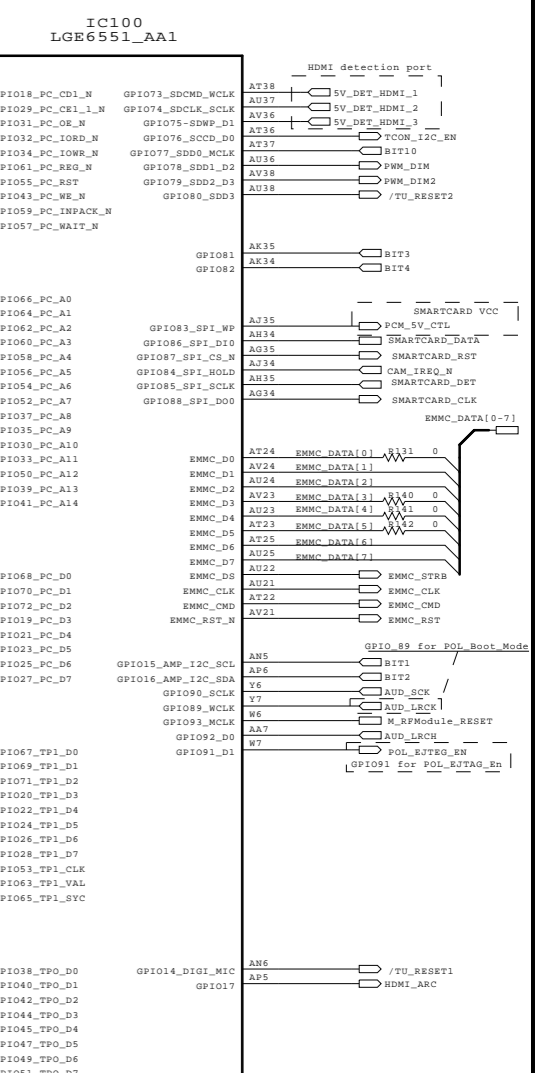
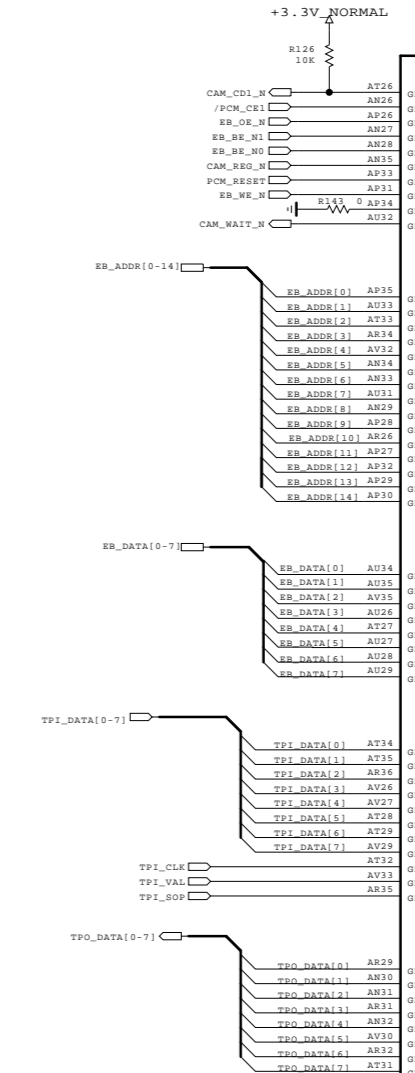
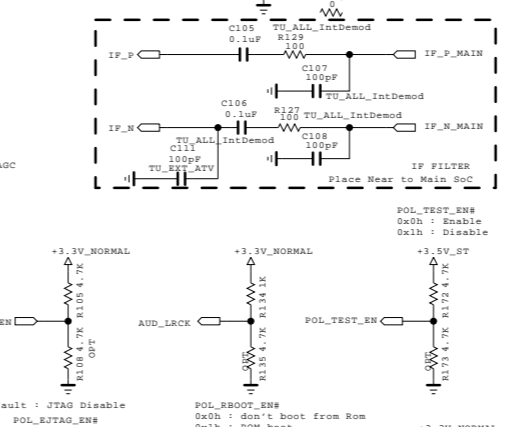
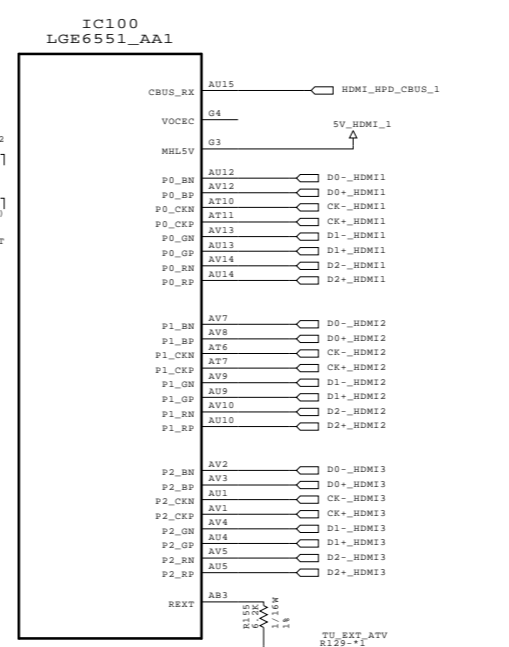
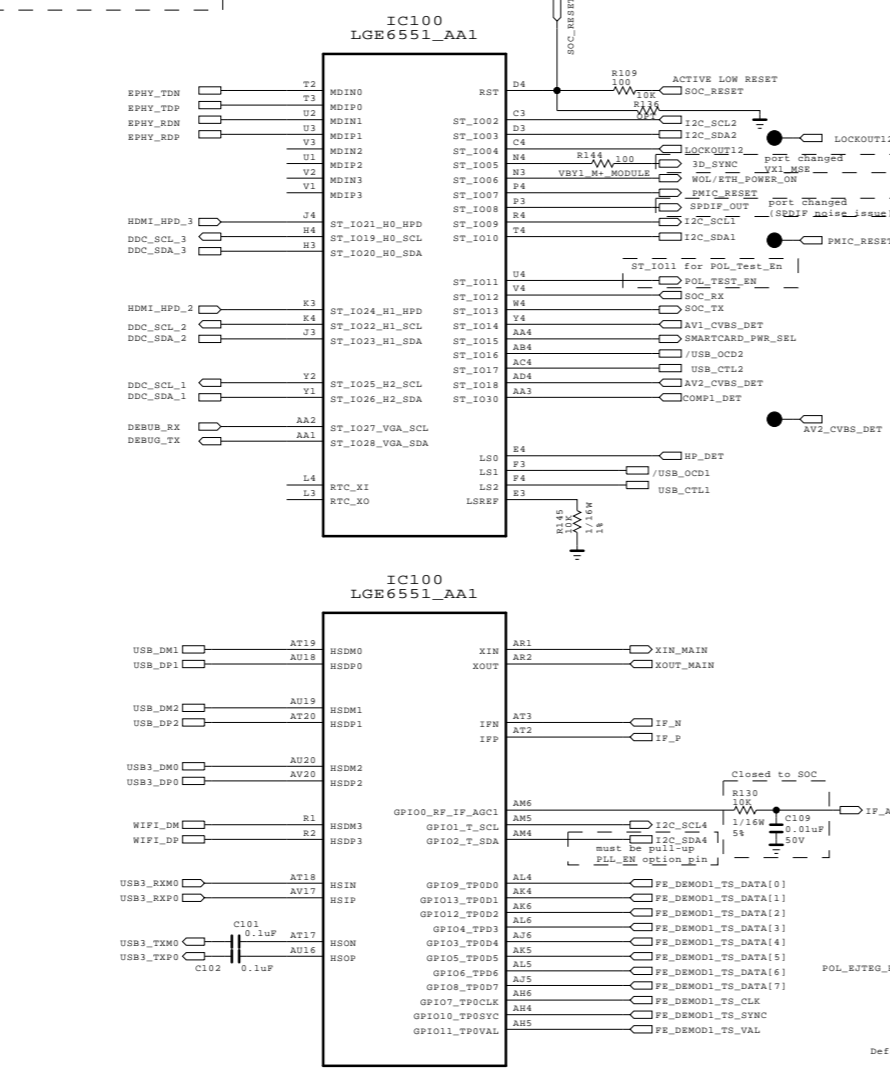
BIT(0/1)	DVB	ATSC	JP
00	TW/COL	US	
01	CN/HK	KR	JP
10	EU	BR	
11	AJJA	CI	

BIT4	Display	LCD	OLED
BIT5	15/16 Tuner	15_Tuner	16_Tuner

BIT6	Reserved	default	High
BIT7	Reserved	default	

BIT(8)	B/R(FRC)
0	Vx1_60Hz
1	Vx1_120Hz

BIT(2/3)	EU/CIS	AJJA	TW/COL	CN/HK	KR	North_AM	BR	JP
00	T2/C/S2_PIP_EX_ATV	T_IN_ATV		EXT_ATV		IN_ATV		Default
01	T2/C/S2_IN_ATV	T2/C/S2_IN_ATV	T2_IN_ATV	IN_ATV	ATSC-T2_IN_ATV			
10	T2/C/S2_EX_ATV	T2/C/S2_EX_ATV						
11		T2_EX_ATV						

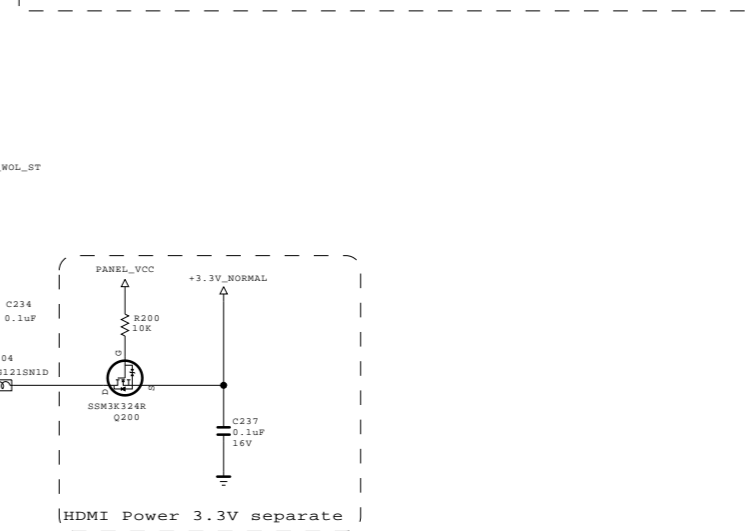
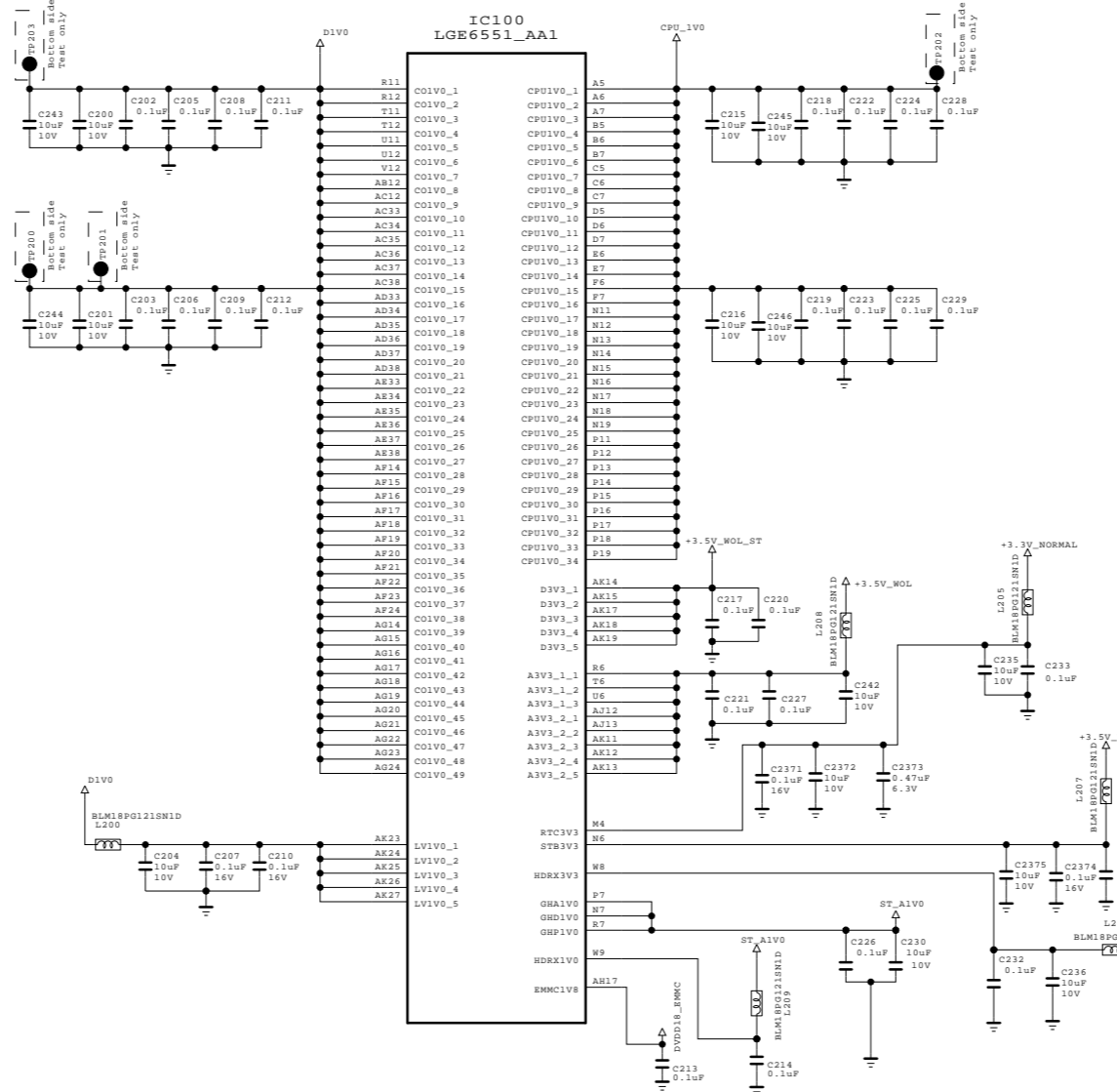
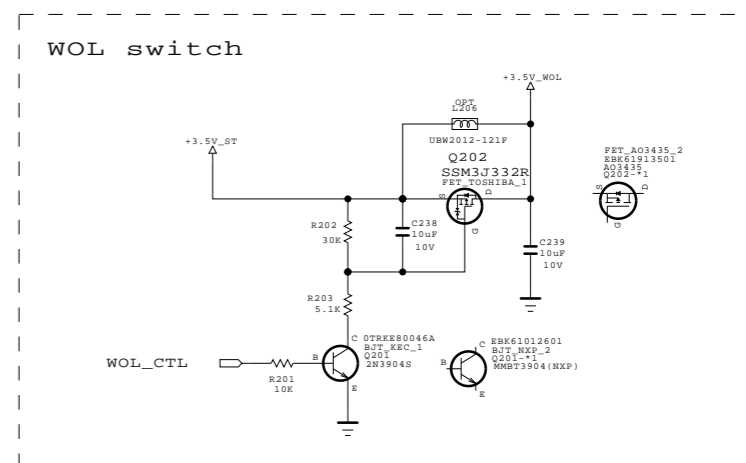
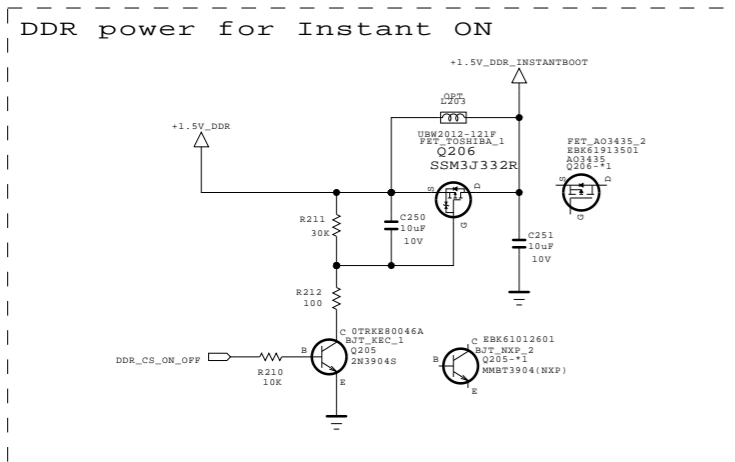
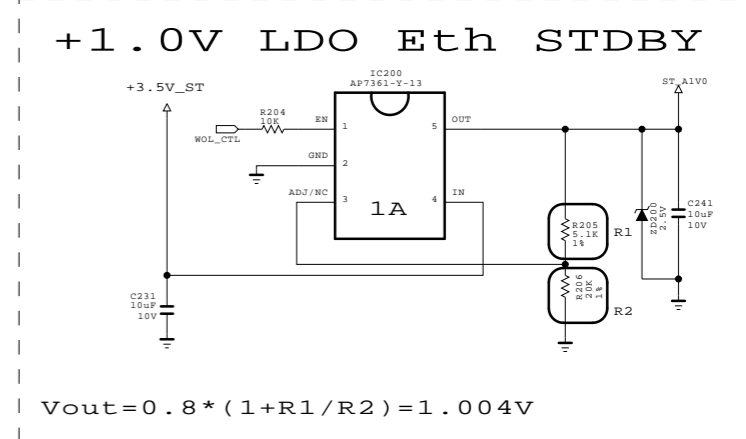
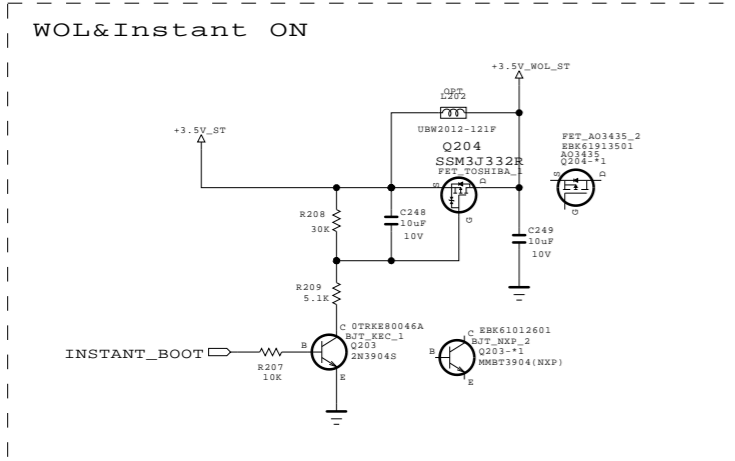


THE Δ SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE Δ SYMBOL MARK OF THE SCHEMATIC.

SECRET
LGElectronics



MODEL	K2L	DATE	2015-06-13
BLOCK	MAIN1_SYSTEM	SHEET	01

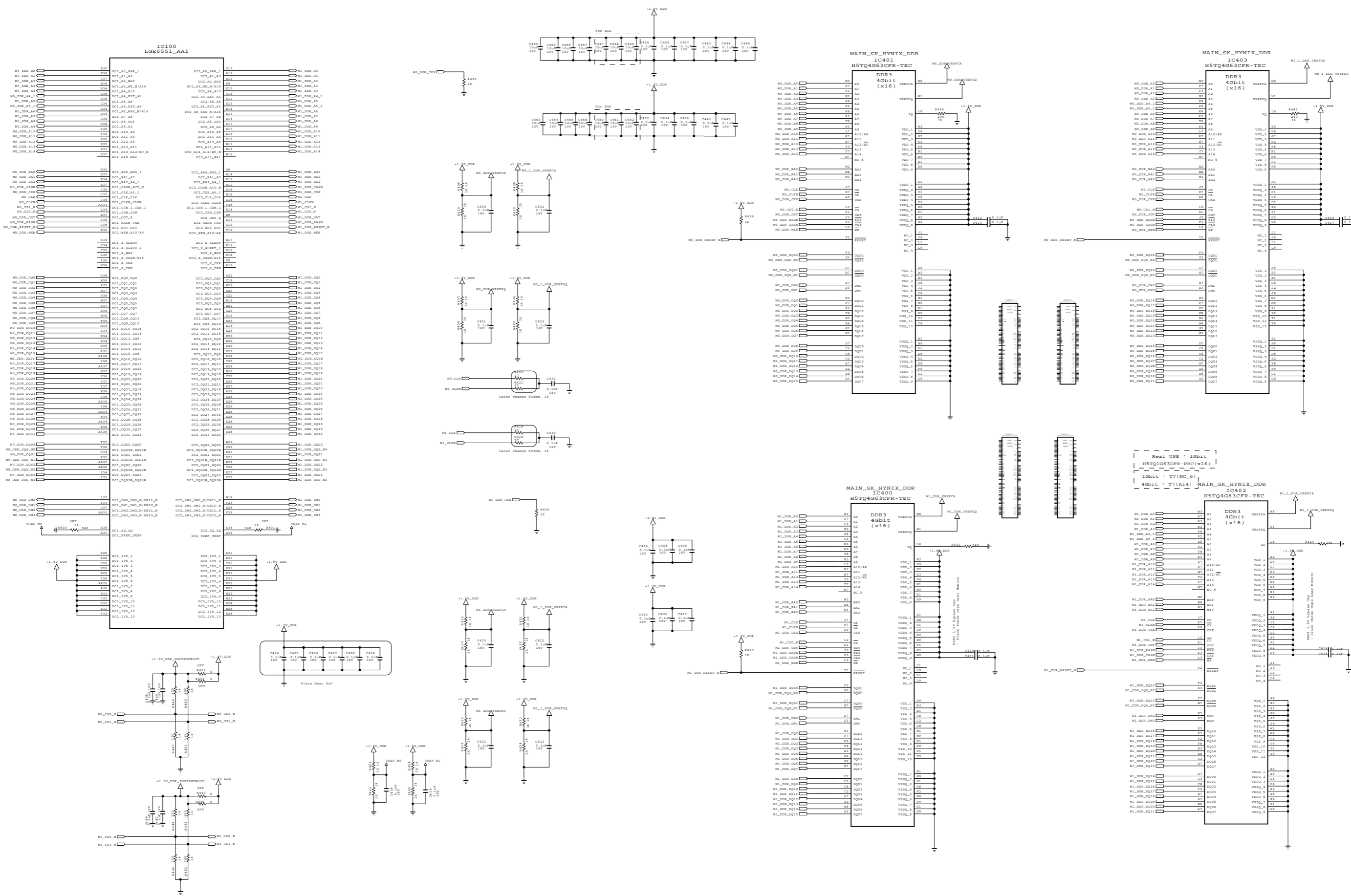


THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

SECRET
LGElectronics



MODEL	K2L	DATE	2015-06-13
BLOCK	K2L POWER	SHEET	02



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

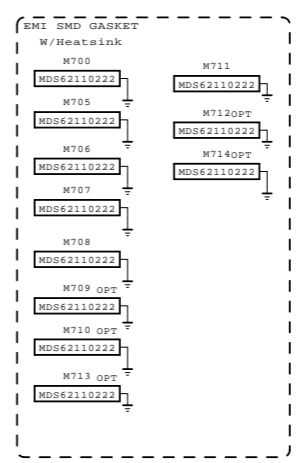
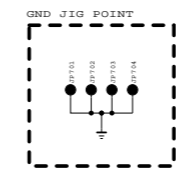
SECRET
LGElectronics

LG ELECTRONICS

MODEL	K2L	DATE	2015-06-13
BLOCK	K2L_DDR	SHEET	03

IC100
LGR6551_AA1

A0	D000_1	D000_149	AB11
A01	D000_2	D000_150	AB12
A02	D000_3	D000_151	AB13
A03	D000_4	D000_152	AB14
A04	D000_5	D000_153	AB15
A05	D000_6	D000_154	AB16
A06	D000_7	D000_155	AB17
A07	D000_8	D000_156	AB18
A08	D000_9	D000_157	AB19
A09	D000_10	D000_158	AB20
A10	D000_11	D000_159	AB21
A11	D000_12	D000_160	AB22
A12	D000_13	D000_161	AB23
A13	D000_14	D000_162	AB24
A14	D000_15	D000_163	AB25
A15	D000_16	D000_164	AB26
A16	D000_17	D000_165	AB27
A17	D000_18	D000_166	AB28
A18	D000_19	D000_167	AB29
A19	D000_20	D000_168	AB30
A20	D000_21	D000_169	AB31
A21	D000_22	D000_170	AB32
A22	D000_23	D000_171	AB33
A23	D000_24	D000_172	AB34
A24	D000_25	D000_173	AB35
A25	D000_26	D000_174	AB36
A26	D000_27	D000_175	AB37
A27	D000_28	D000_176	AB38
A28	D000_29	D000_177	AB39
A29	D000_30	D000_178	AB40
A30	D000_31	D000_179	AB41
A31	D000_32	D000_180	AB42
A32	D000_33	D000_181	AB43
A33	D000_34	D000_182	AB44
A34	D000_35	D000_183	AB45
A35	D000_36	D000_184	AB46
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A40	D000_41	D000_189	AB51
A41	D000_42	D000_190	AB52
A42	D000_43	D000_191	AB53
A43	D000_44	D000_192	AB54
A44	D000_45	D000_193	AB55
A45	D000_46	D000_194	AB56
A46	D000_47	D000_195	AB57
A47	D000_48	D000_196	AB58
A48	D000_49	D000_197	AB59
A49	D000_50	D000_198	AB60
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A56	D000_57	D000_205	AB67
A57	D000_58	D000_206	AB68
A58	D000_59	D000_207	AB69
A59	D000_60	D000_208	AB70
A60	D000_61	D000_209	AB71
A61	D000_62	D000_210	AB72
A62	D000_63	D000_211	AB73
A63	D000_64	D000_212	AB74
A64	D000_65	D000_213	AB75
A65	D000_66	D000_214	AB76
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A67	D000_68	D000_216	AB78
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B00	D000_101	D000_249	AB111
B01	D000_102	D000_250	AB112
B02	D000_103	D000_251	AB113
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B05	D000_106	D000_254	AB116
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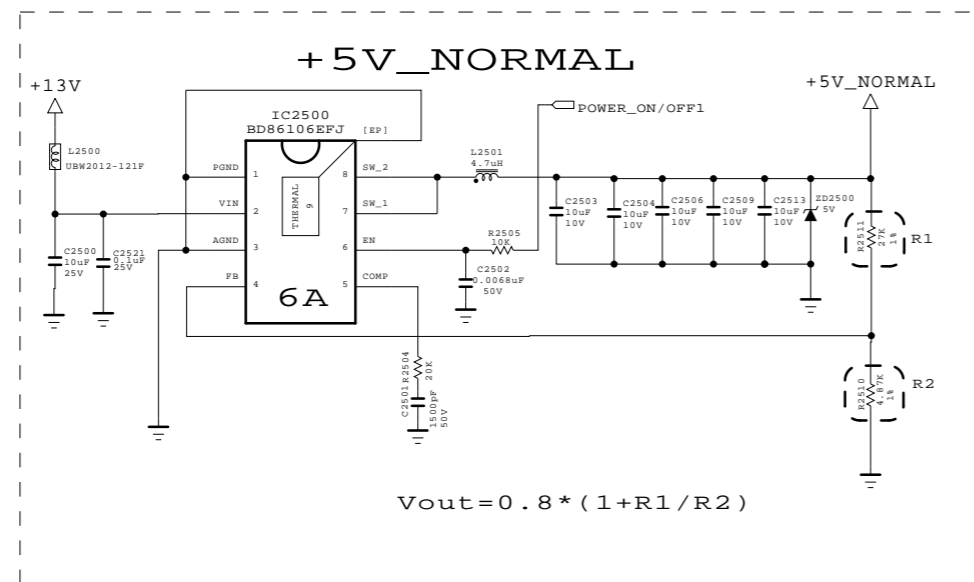
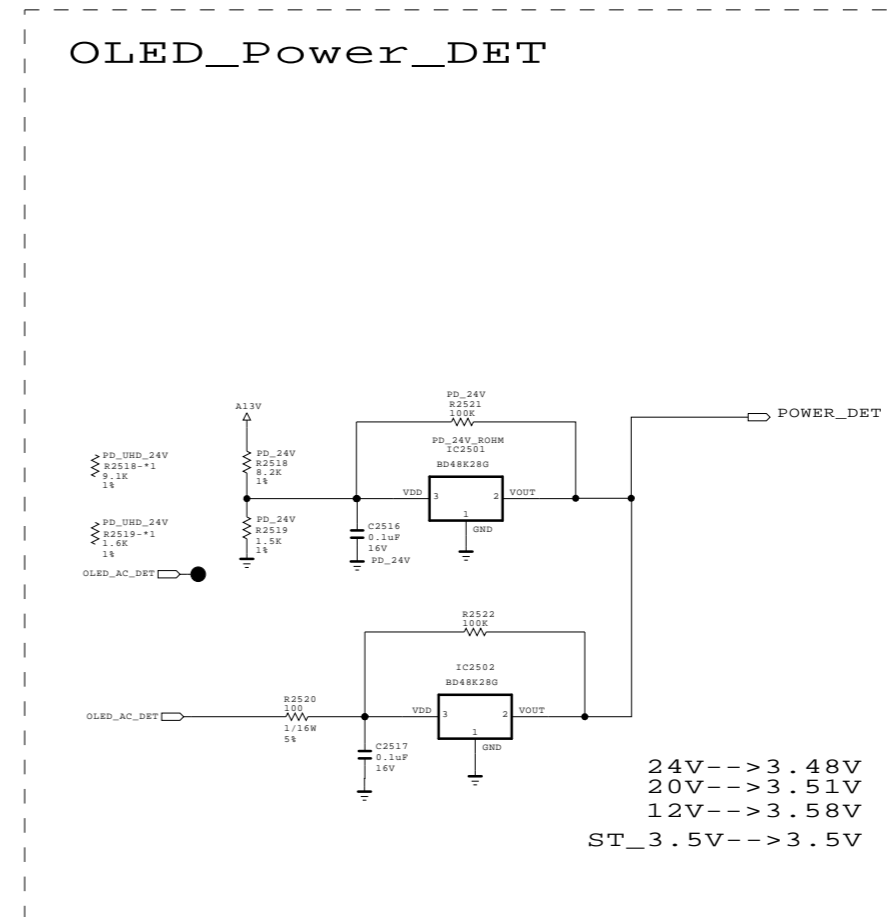
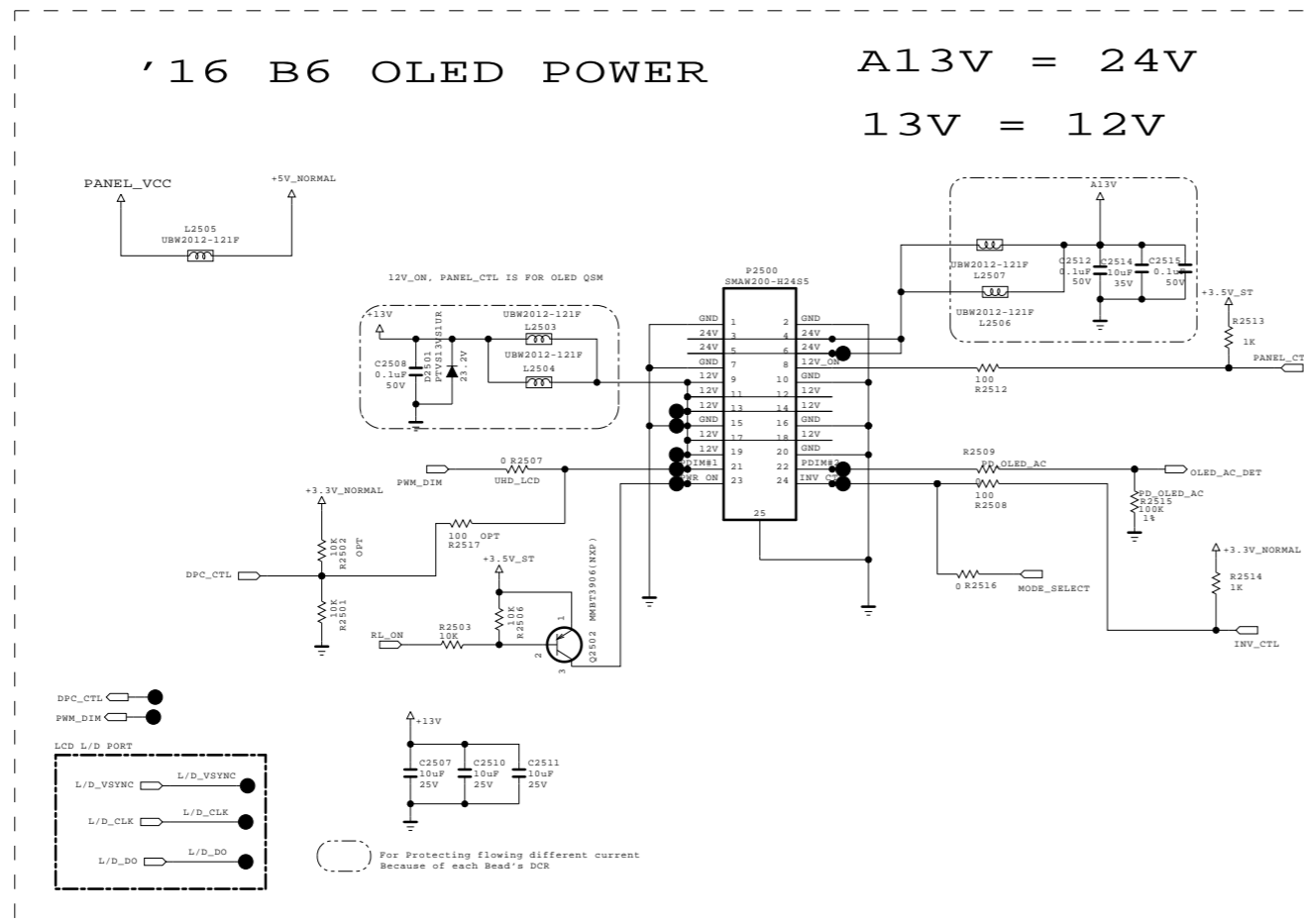


THE Δ SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE Δ SYMBOL MARK OF THE SCHEMATIC.

SECRET
LGElectronics



MODEL	K2L	DATE	2015-06-13
BLOCK	K2L_GND	SHEET	07 /



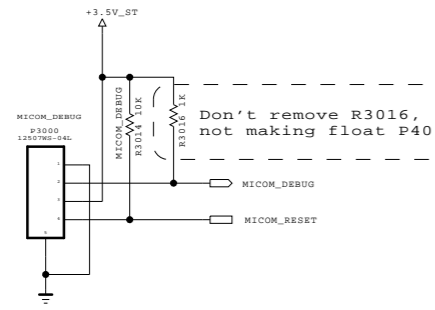
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

SECRET
LGElectronics

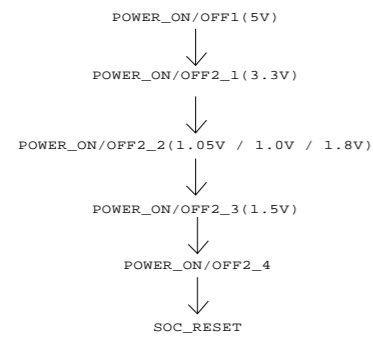


MODEL	K2L	DATE	2015-06-13
BLOCK	PWR_2	SHEET	25 /

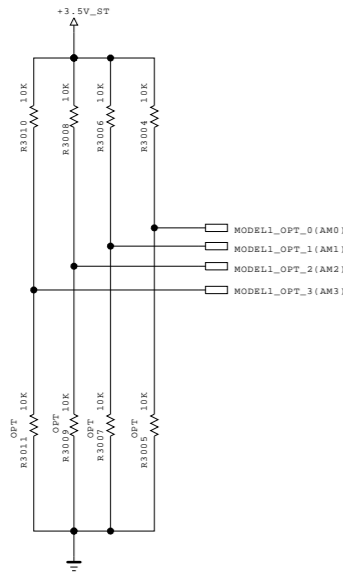
For Debug



K2L Power SEQUENCE

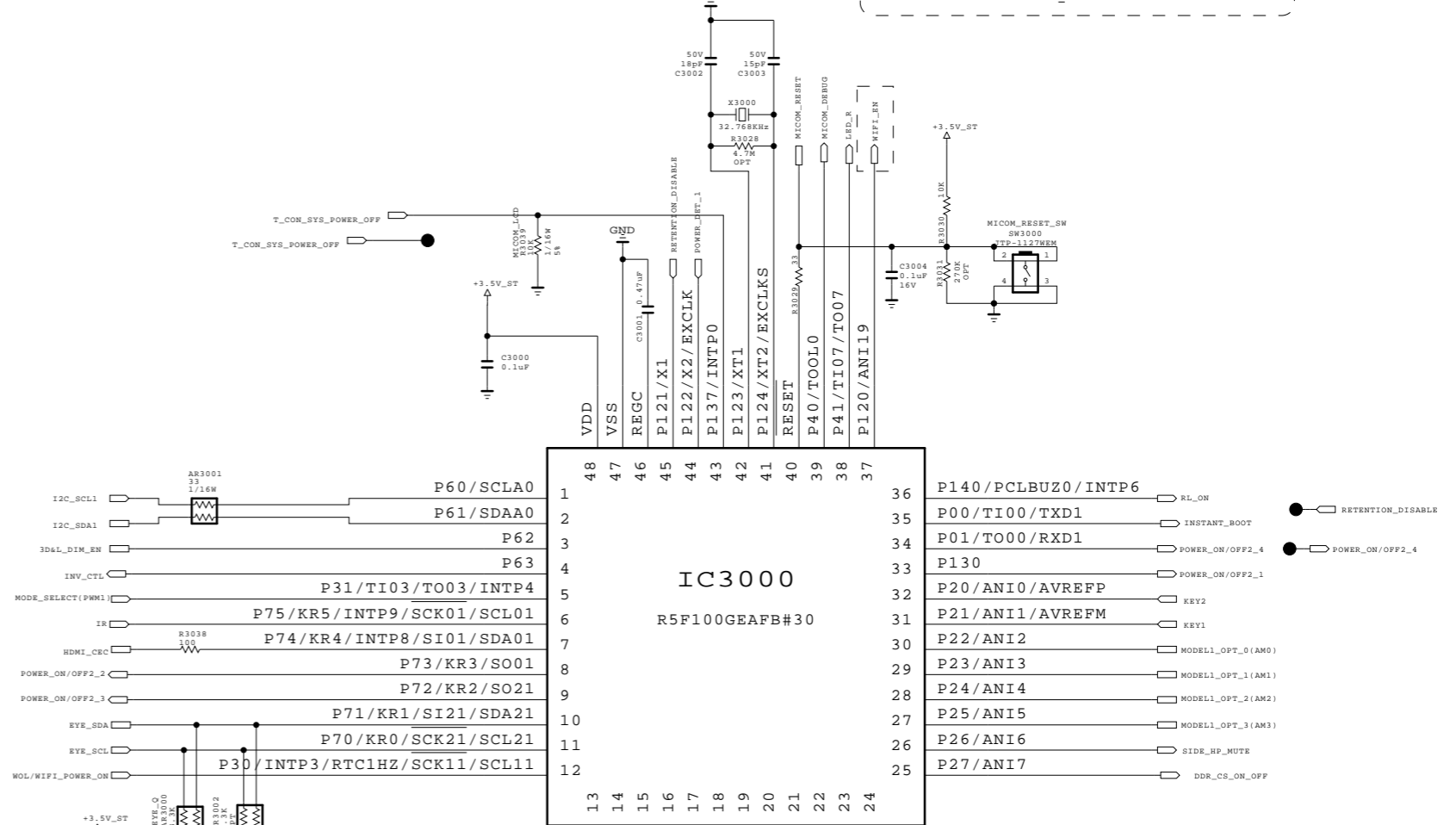
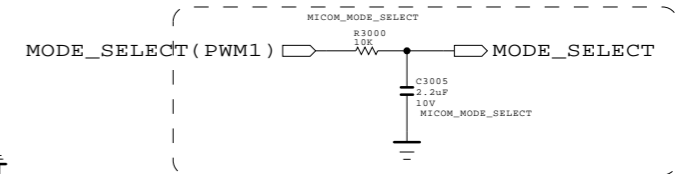


MICOM MODEL OPTION

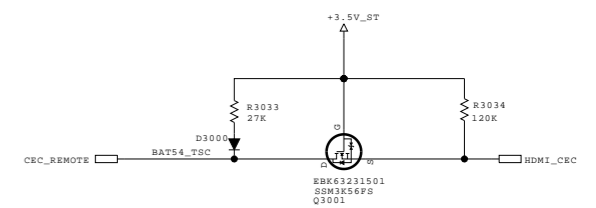


MICOM MODEL OPTION

	0.72V	1.53V	2.27V	3.0V
MODEL1_OPT_0	NON LOGO / LCD	LOGO / LCD	NON LOGO / OLED	LOGO / OLED
MODEL1_OPT_1	TV	BOX	TV	BOX
MODEL1_OPT_2	FHD		UHD	8K
MODEL1_OPT_3 (FHD)	M16		A5LR	M2
MODEL1_OPT_3 (UHD)	M16	RTK	H15	



For CEC



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SECRET
LGElectronics





MODEL	K2L / K2Lp	DATE	2015-06-13
BLOCK	MICOM	SHEET	30 /

MICOM MODEL OPTION

	0.72V (2.7K)	1.53V (8.2K)	2.27V (20K)	3.0V (75K)
MODEL_OPT_0(AM0)	NON LOGO / LCD	LOGO / LCD	NON LOGO / OLED	LOGO / OLED
MODEL_OPT_1(AM1)	TV_NON_EPI	BOX_NON_EPI	TV_EPI	BOX_NON_EPI
MODEL_OPT_2(AM2)	FHD		UHD	8K
MODEL_OPT_3(AM3) (FHD)	M16		A5LR	M2
MODEL_OPT_3(AM3) (UHD)	M16	RTK	H15	

	0.72V (2.7K)	1.53V (8.2K)	2.27V (20K)	3.0V (75K)
MODEL_OPT_0(AM0)	MICOM_NON_LOGO/LCD R3005-*1 2.7K ⚡	MICOM_LOGO/LCD R3005-*2 8.2K ⚡	MICOM_NON_LOGO/OLED R3005-*3 20K ⚡	MICOM_LOGO/OLED R3005-*4 75K ⚡
MODEL_OPT_1(AM1)	MICOM_TV_NON_EPI R3007-*1 2.7K ⚡		MICOM_TV_EPI R3007-*3 20K ⚡	
MODEL_OPT_2(AM2)	MICOM_FHD R3009-*1 2.7K ⚡		MICOM_UHD R3009-*3 20K ⚡	MICOM_8K R3009-*4 75K ⚡
MODEL_OPT_3(AM3) (FHD)	MICOM_M16 R3011-*1 2.7K ⚡	MICOM_RTK R3011-*2 8.2K ⚡	MICOM_H15/A5LR R3011-*3 20K ⚡	MICOM_M2 R3011-*4 75K ⚡
MODEL_OPT_3(AM3) (UHD)				

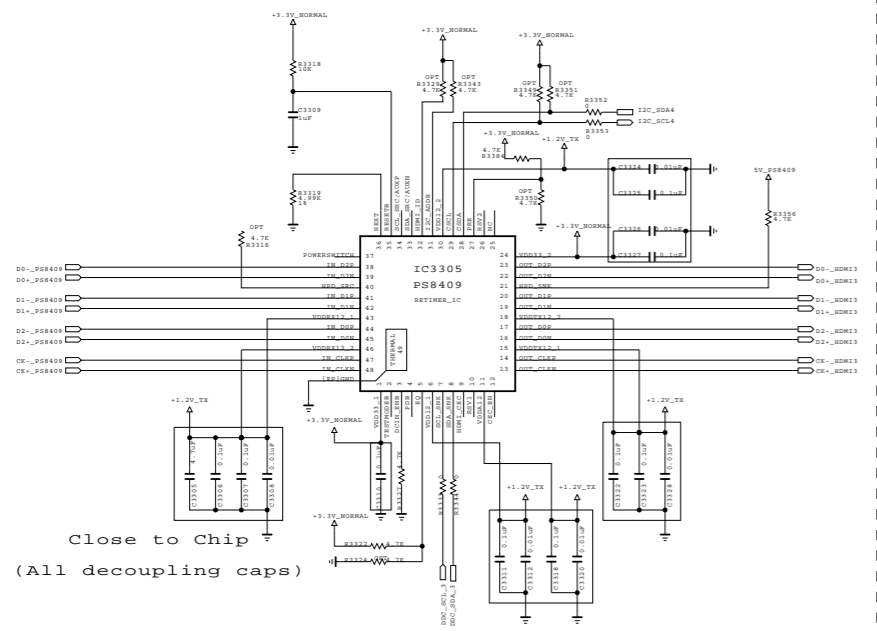
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET
LGElectronics

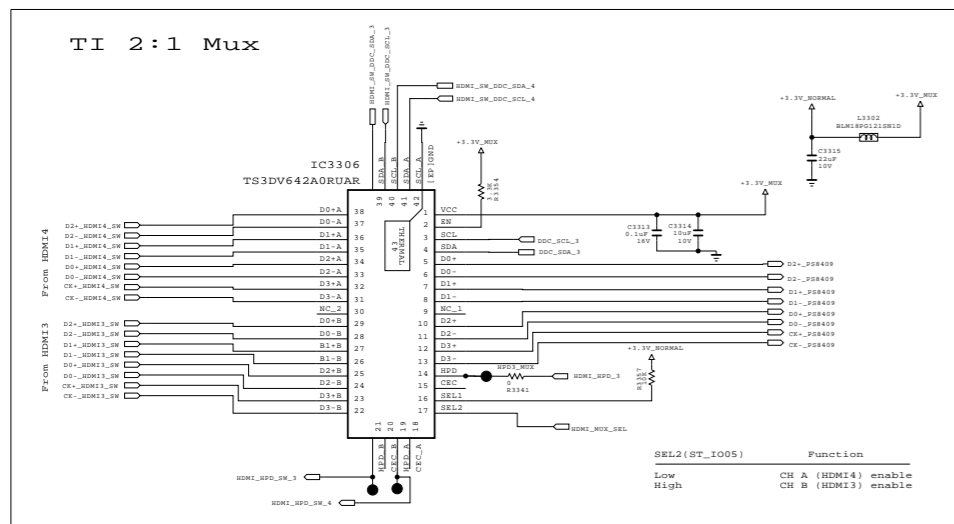


MODEL	K2H	DATE	2015-01-10
BLOCK	MODEL OPTION	SHEET	30 /

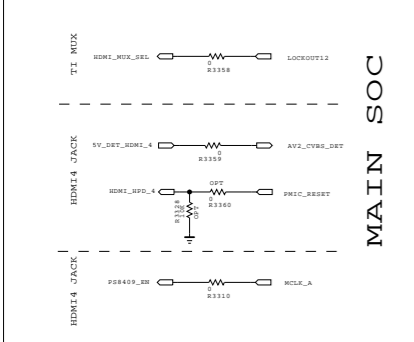
HDMI3/4_Retimer



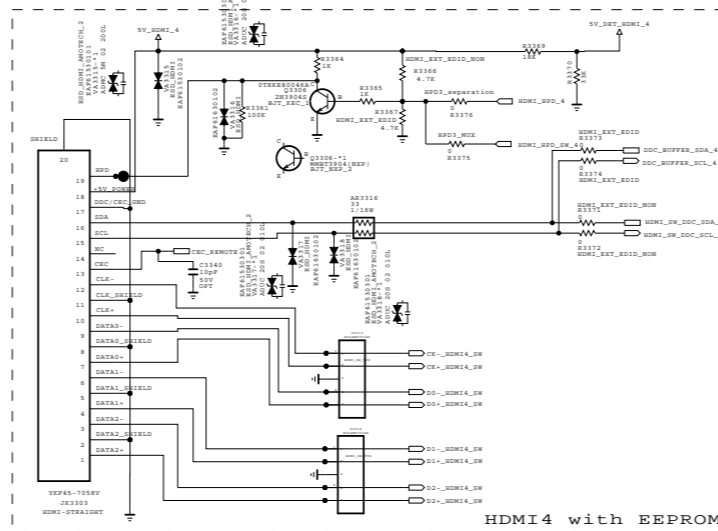
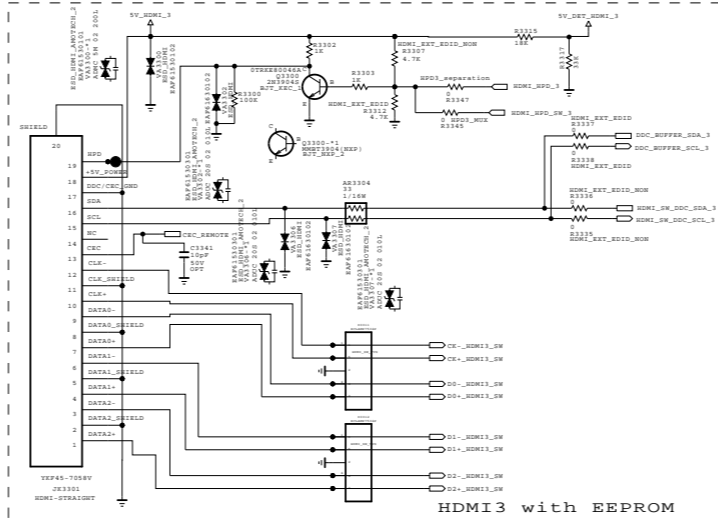
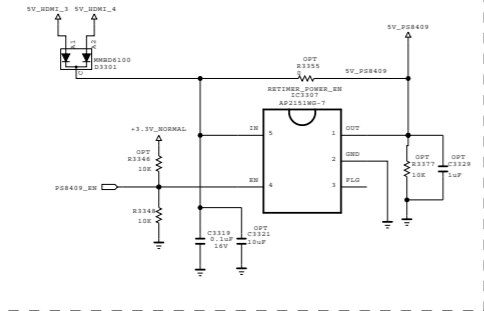
TI 2:1 Mux



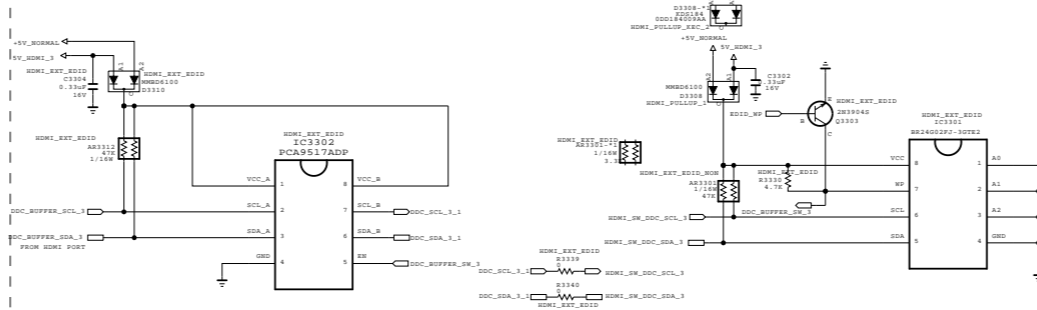
HDMI4 DET GPIO



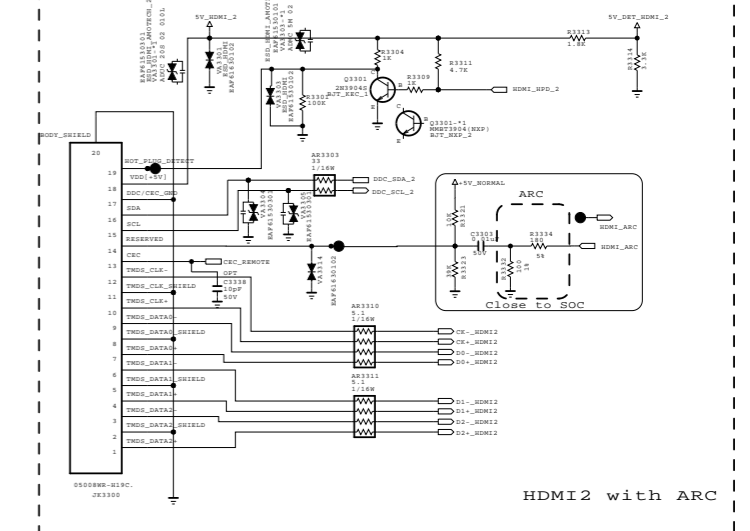
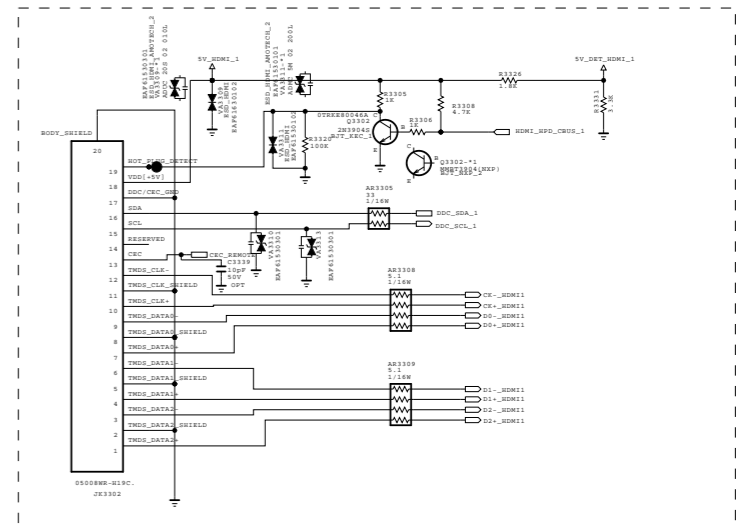
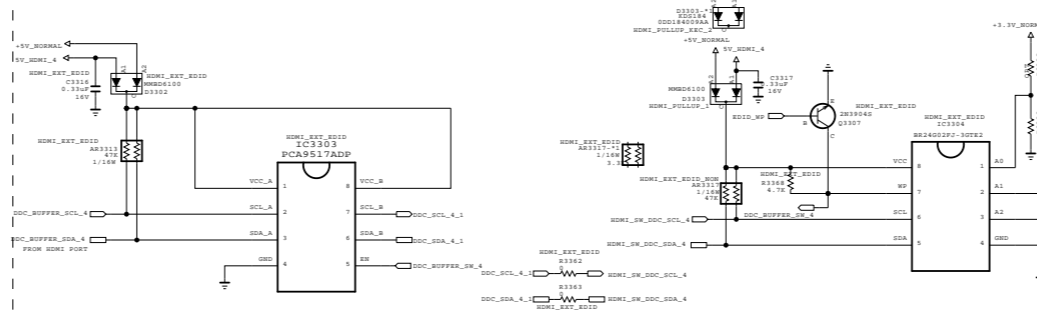
Retimer Power Control



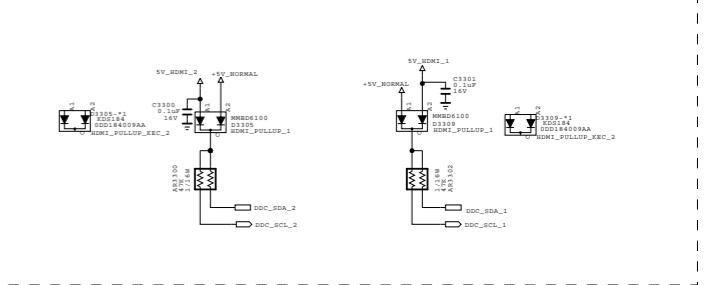
EDID external EEPROM & DDC BUFFER for HDMI3



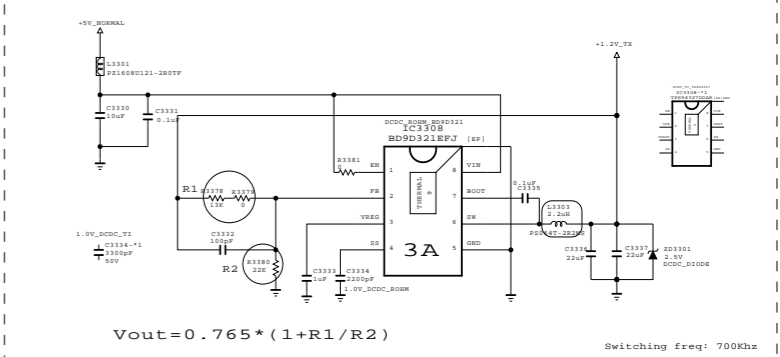
EDID external EEPROM & DDC BUFFER for HDMI4



DDC pull-up



+5V_NORMAL to +1.2V_TX



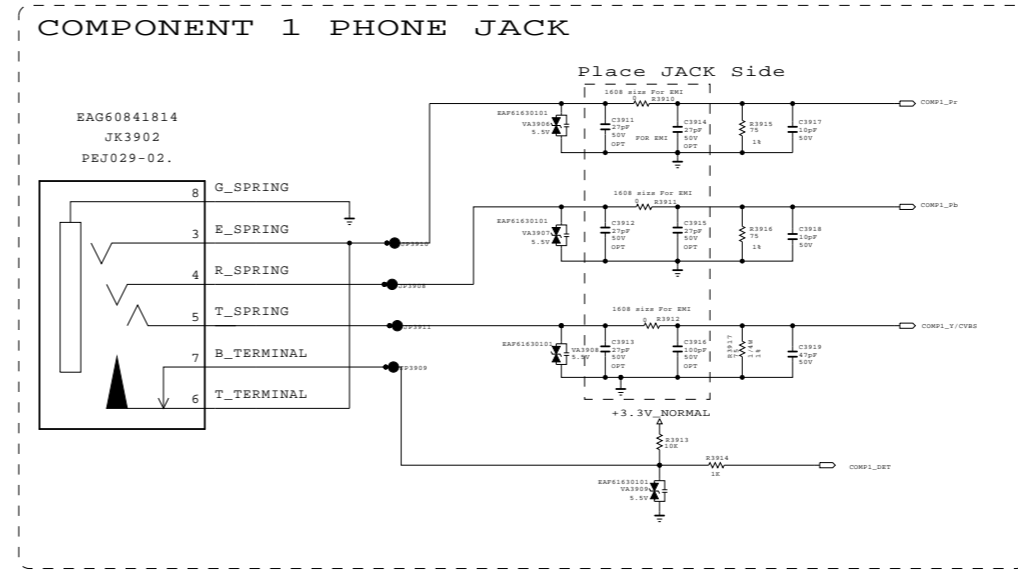
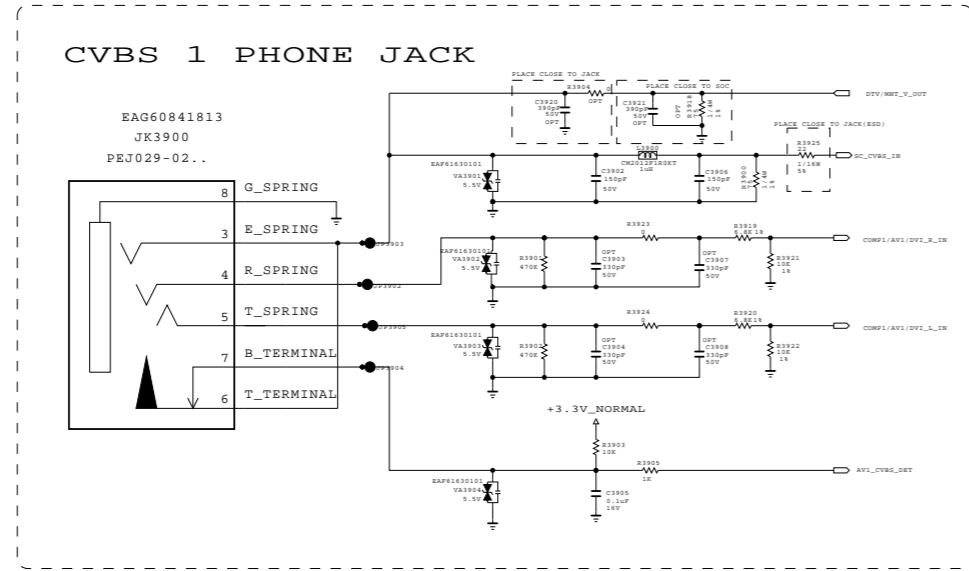
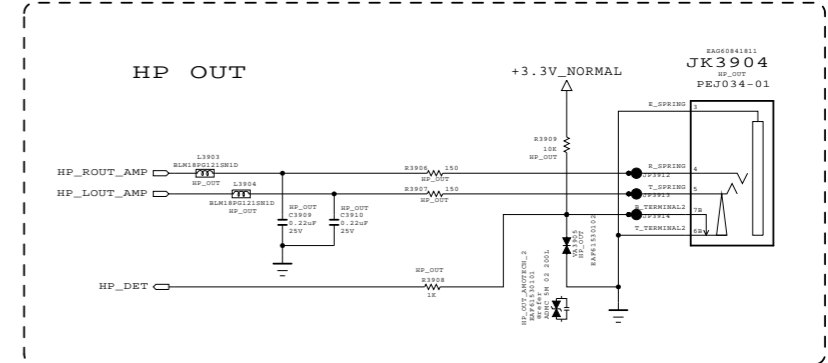
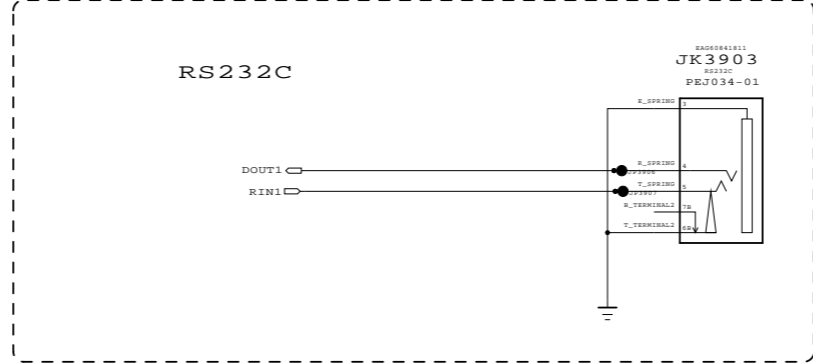
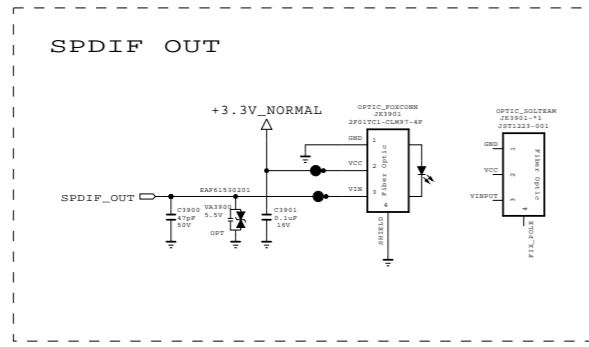
THE Δ SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE Δ SYMBOL MARK OF THE SCHEMATIC.

SECRET
LGElectronics

LG ELECTRONICS

HDMI K2L 2015-01-10 33

MODEL	DATE
BLOCK	SHEET



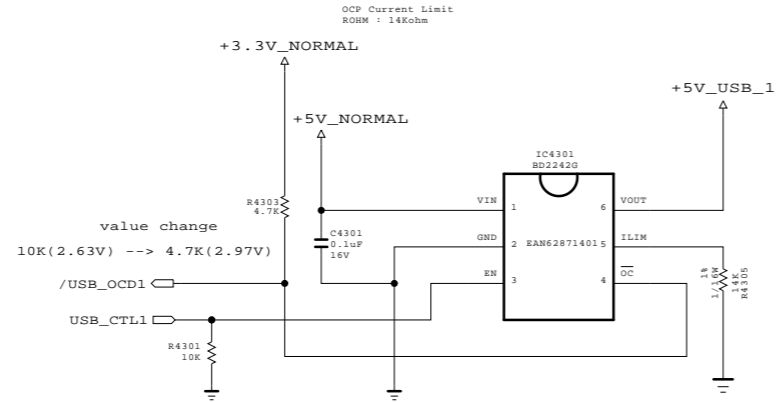
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SECRET
LGElectronics

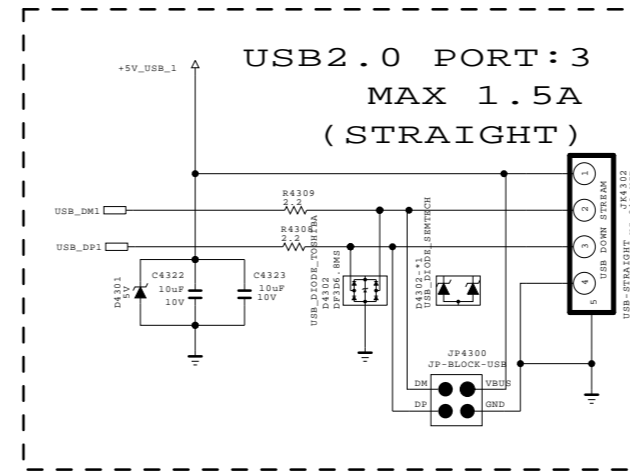
LG ELECTRONICS

MODEL	UF71/7500	DATE	2014-07-24
BLOCK	COMMON_PHONE	SHEET	38 /

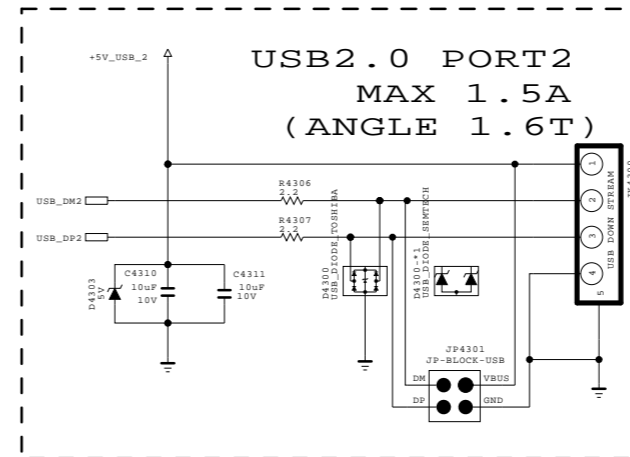
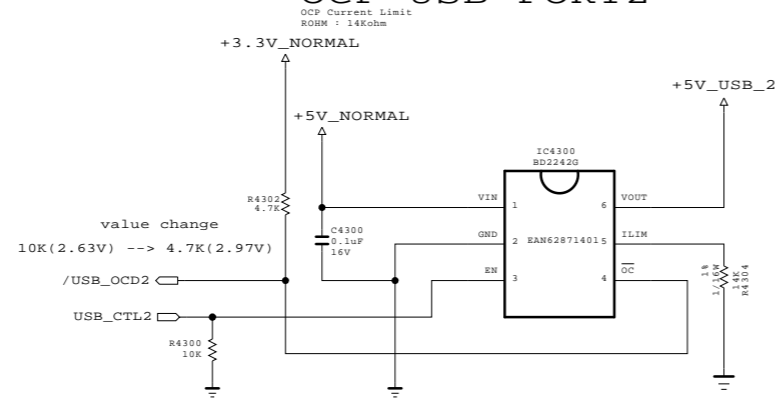
OCB USB2.0 PORT3



USB2.0 2Port



OCB USB PORT2



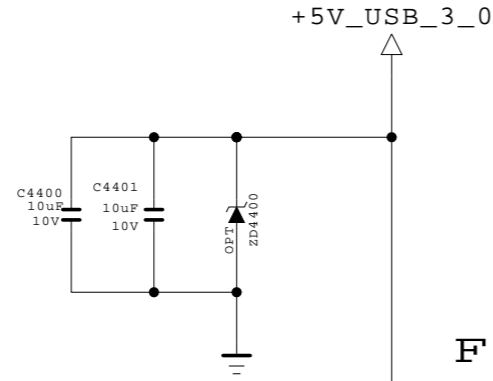
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SECRET
LGElectronics



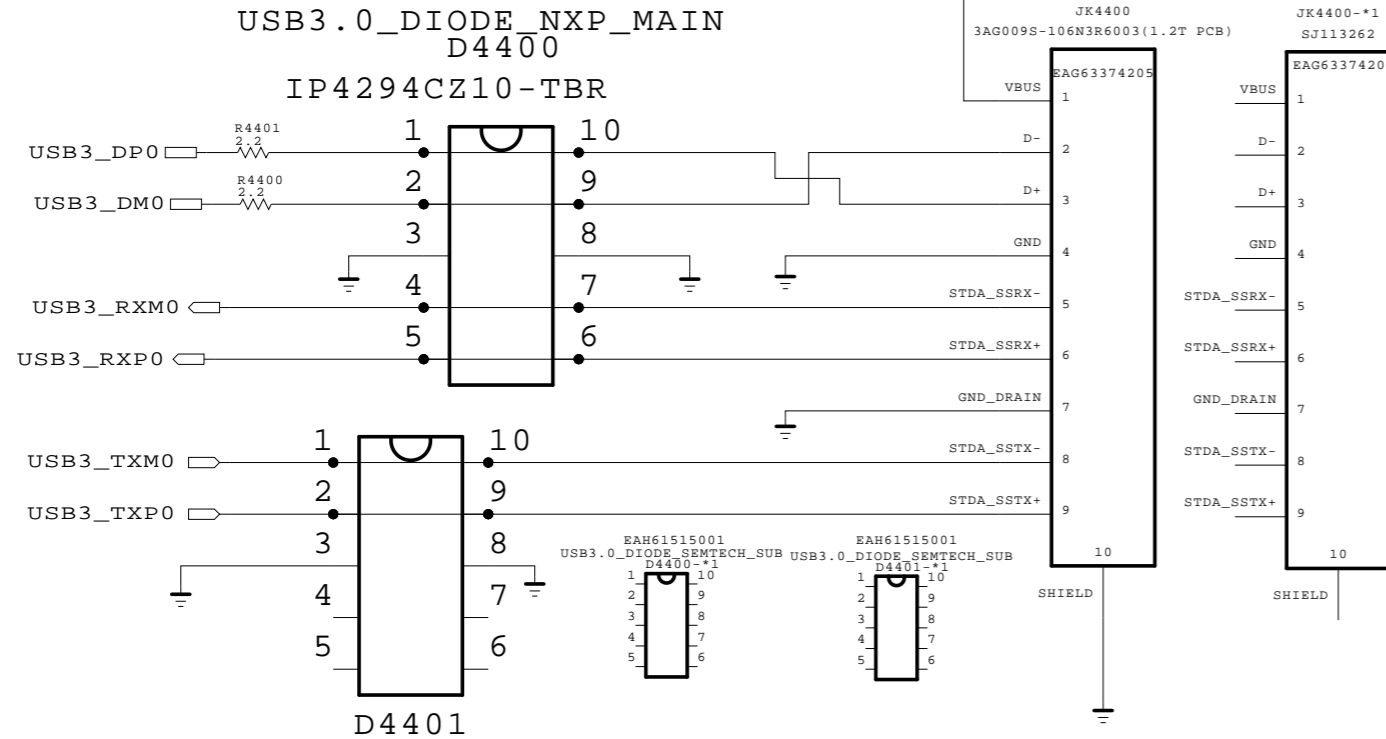
MODEL	K2L	DATE	2015-04-27
BLOCK	USB2.0 jack	SHEET	13 /

USB3.0
MAX 1.5A



FOR 1.2T PCB

USB3.0_FREEPORT_1.2T JK4400 3AG009S-106N3R6003(1.2T PCB)
USB3.0_CNPLUS_1.2T JK4400-*1 SJ113262

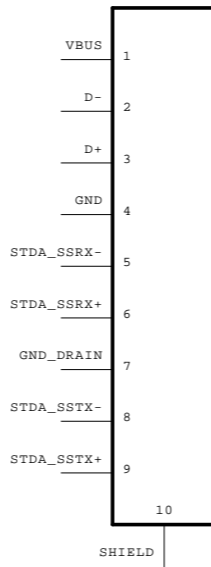


USB3.0_DIODE_NXP_MAIN
D4400
IP4294CZ10-TBR

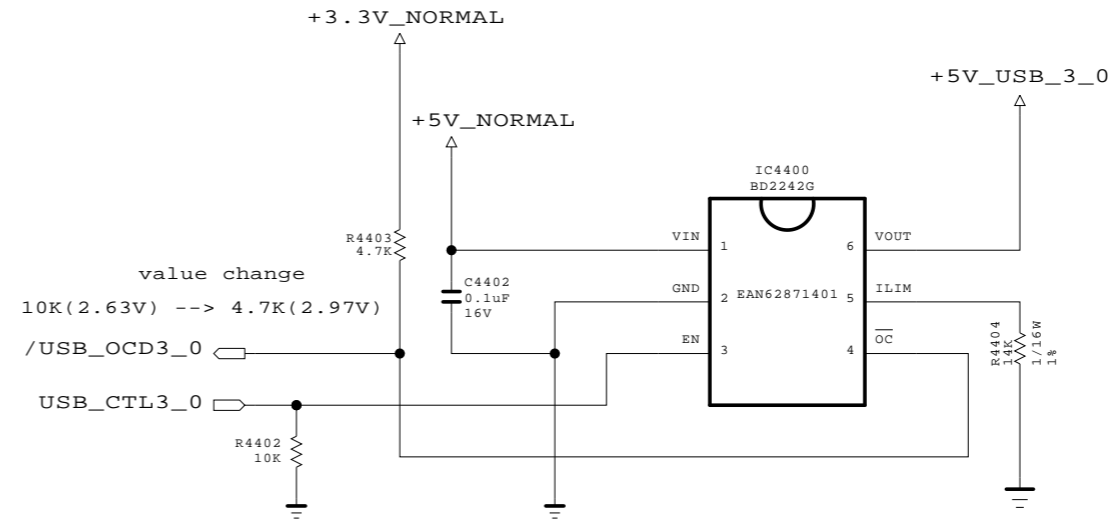
D4401
IP4294CZ10-TBR
USB3.0_DIODE_NXP_MAIN

FOR 1.6T PCB

USB3.0_CNPLUS_1.6T JK4400-*2 5205-56209



OCP USB3.0
OCP Current Limit 1.5A
ROHM : 14K



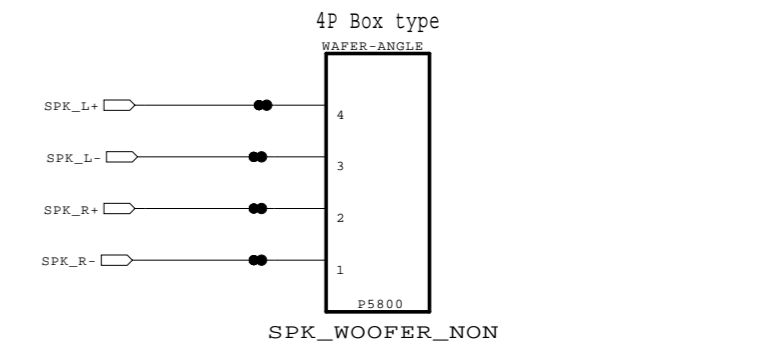
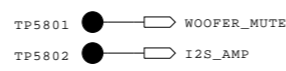
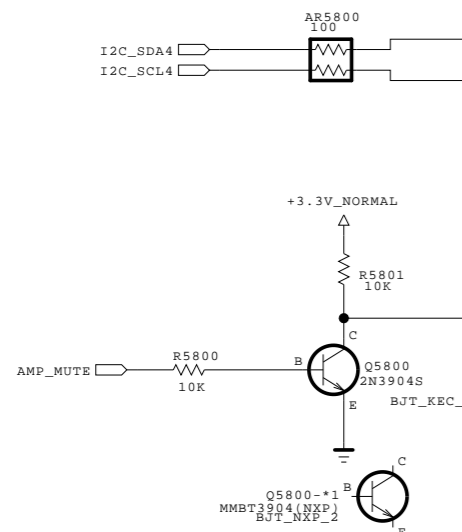
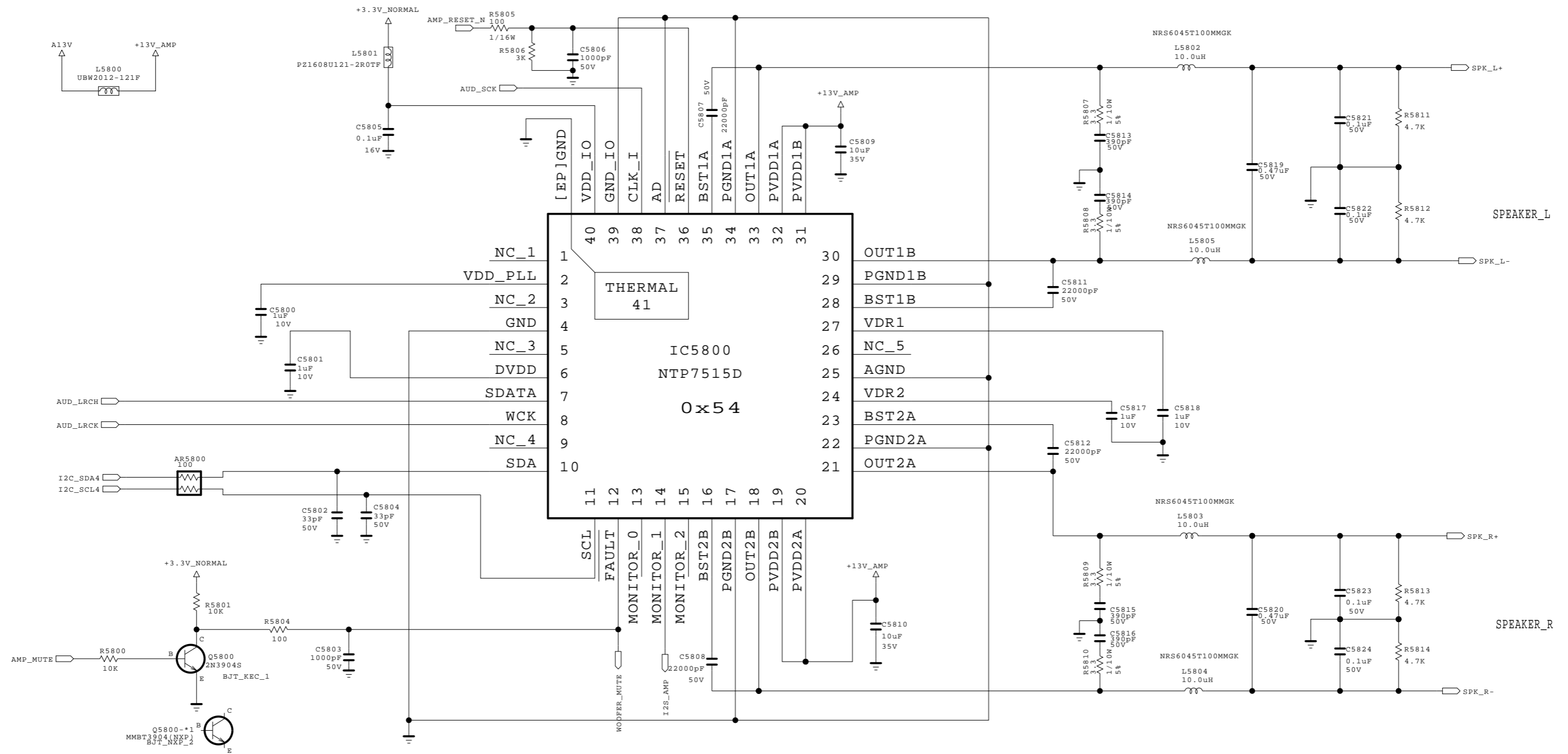
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SECRET	LG ELECTRONICS
LGElectronics	

MODEL	K2H	DATE	2015.02.11
BLOCK	USB 2 & 3	SHEET	15 / 26

043.sht

AUDIO AMP (NTP7515)



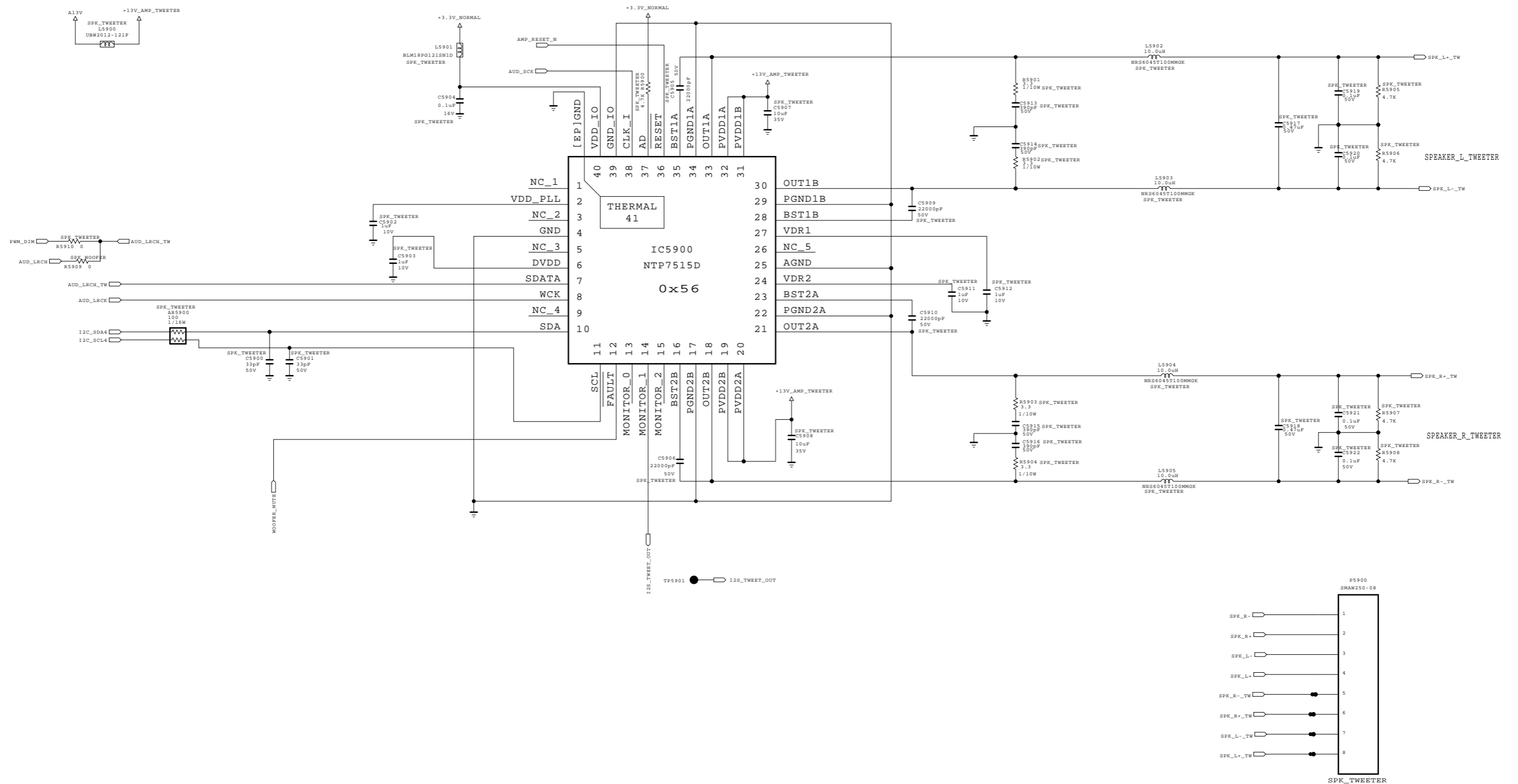
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SECRET	LG ELECTRONICS
LGElectronics	

MODEL		DATE	2014-10-17
BLOCK	MAIN_AMP	SHEET	58 /

AMP - tweeter

Option name : SPK_tweeter



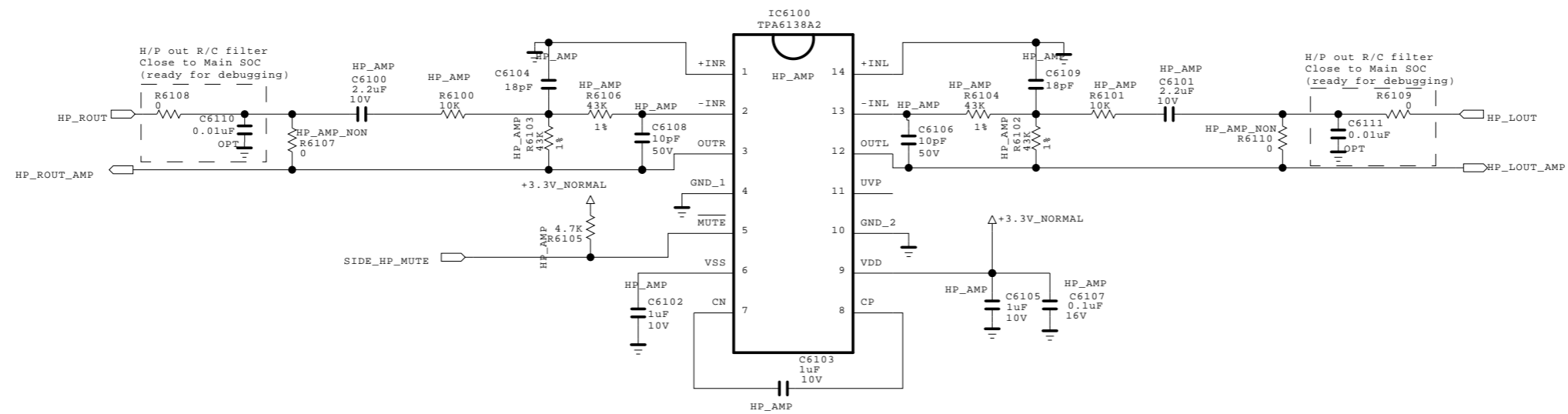
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.



SECRET
LGElectronics



MODEL	K2L	DATE	2015.03.16
BLOCK	WOOPER AMP	SHEET	59 /

EARPHONE AMP



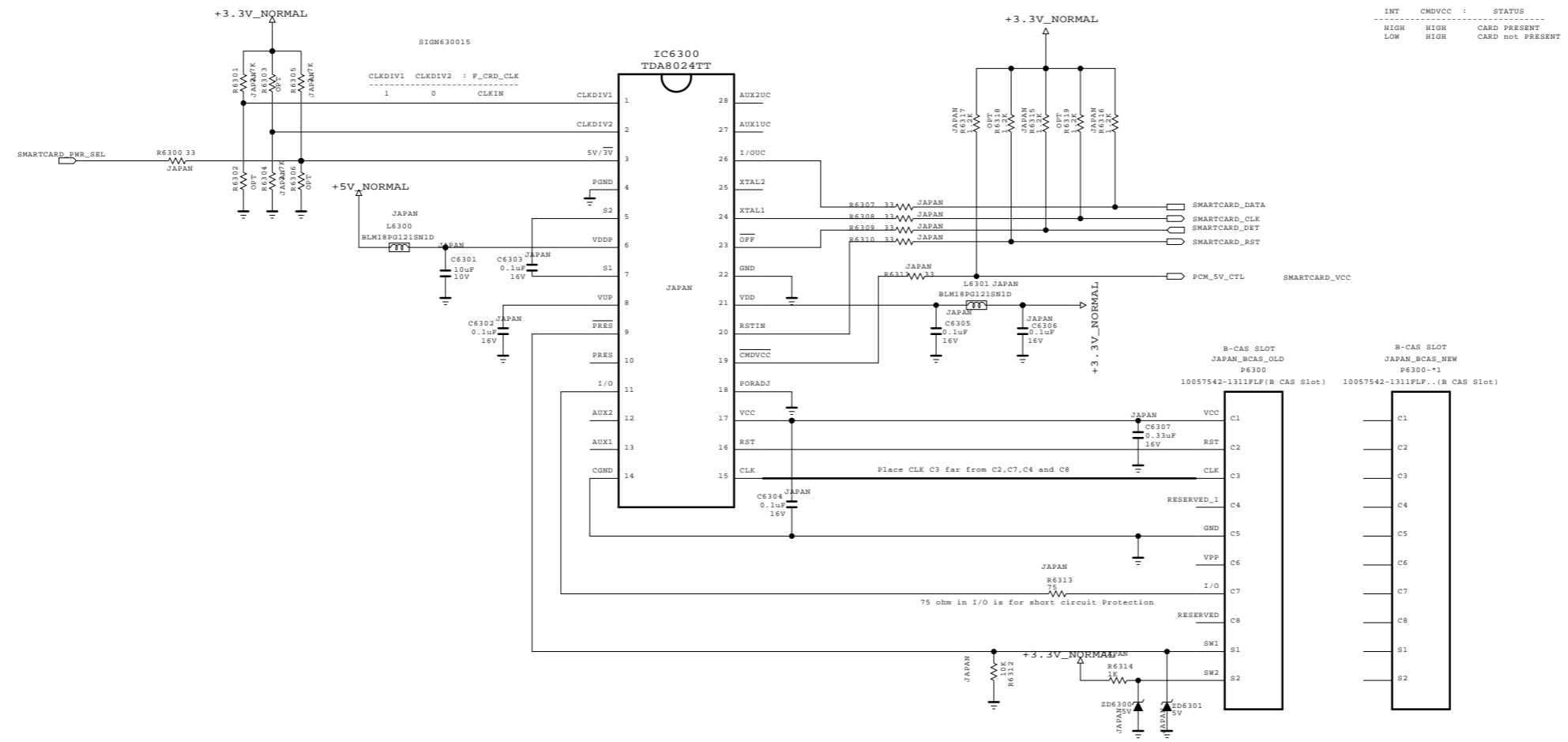
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SECRET
LGElectronics



MODEL	K2H	DATE	2014-11-22
BLOCK	HP_AMP	SHEET	61 /

B-CAS (SMART CARD) INTERFACE

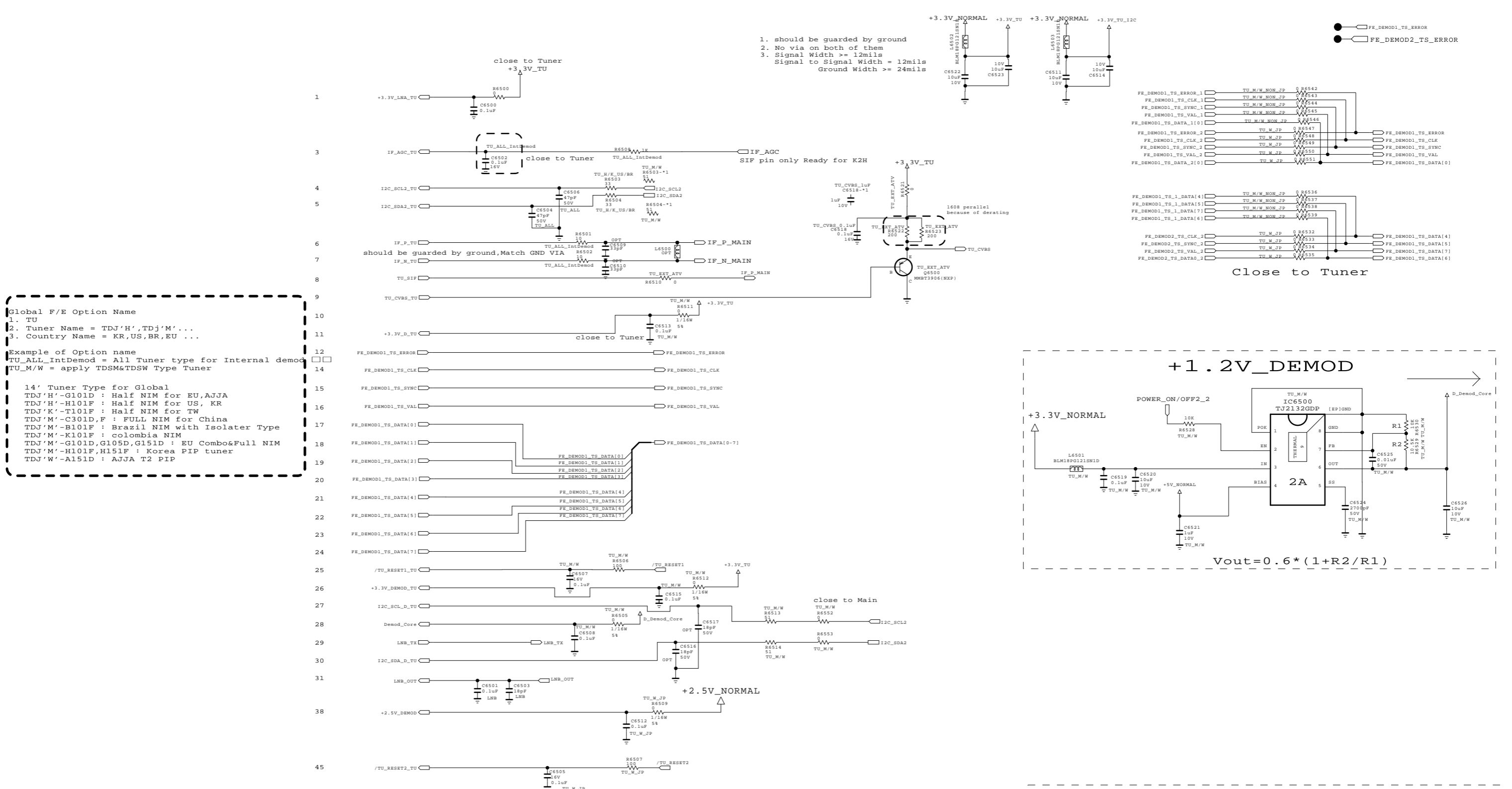


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SECRET
LGElectronics



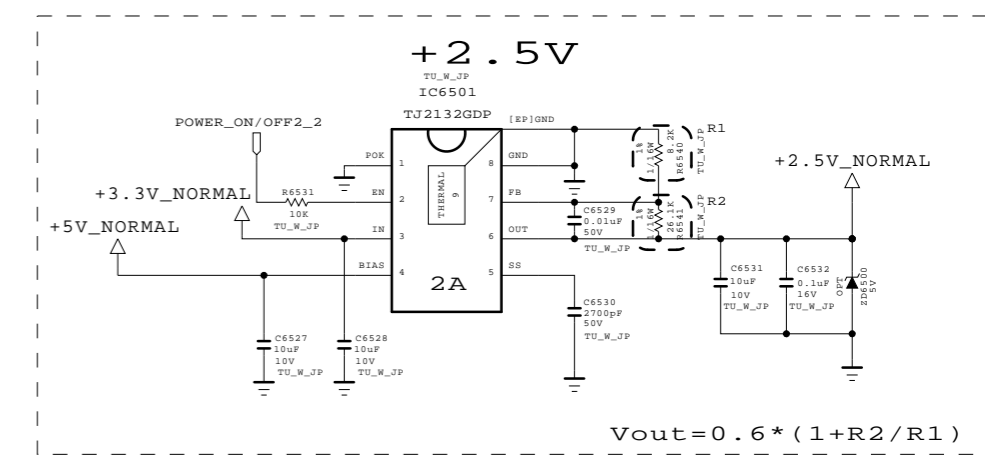
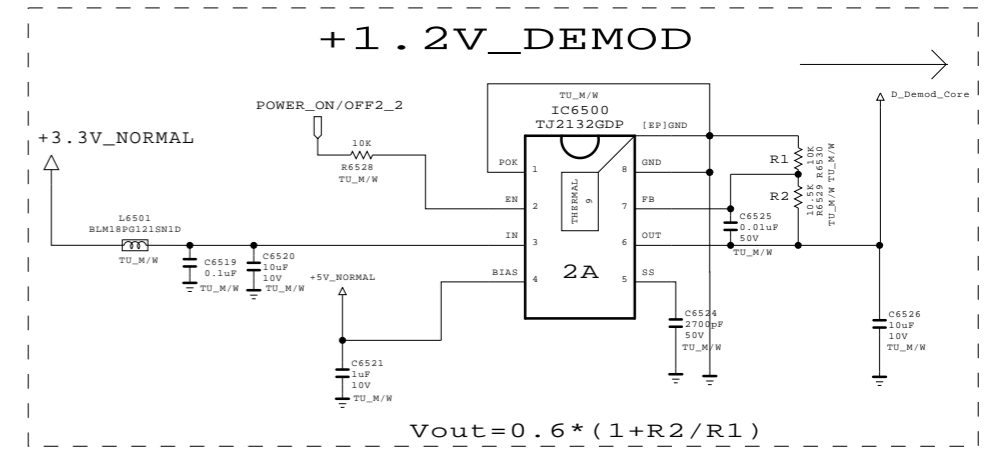
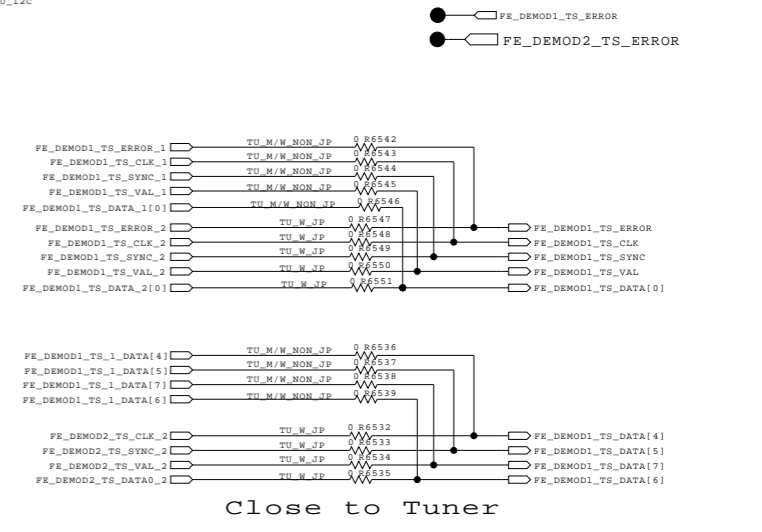
MODEL	JAPAN B-CAS	DATE	2011.04.17
BLOCK		SHEET	63 /



Global F/E Option Name
 1. TU
 2. Tuner Name = TDJ'H',TDJ'M'...
 3. Country Name = KR,US,BR,EU ...

Example of Option name
 TU_ALL_IntDemod = All Tuner type for Internal demod
 TU_M/W = apply TDSM&TDSW Type Tuner

14' Tuner Type for Global
 TDJ'H'-G101D : Half NIM for EU,AJJA
 TDJ'H'-H101F : Half NIM for US, KR
 TDJ'K'-T101F : Half NIM for TW
 TDJ'M'-C301D,F : FULL NIM for China
 TDJ'M'-B101F : Brazil NIM with Isolater Type
 TDJ'M'-K101F : Colombia NIM
 TDJ'M'-G101D,G105D,G151D : EU Combo&Full NIM
 TDJ'M'-H101F,H151F : Korea PIP tuner
 TDJ'W'-A151D : AJJA T2 PIP

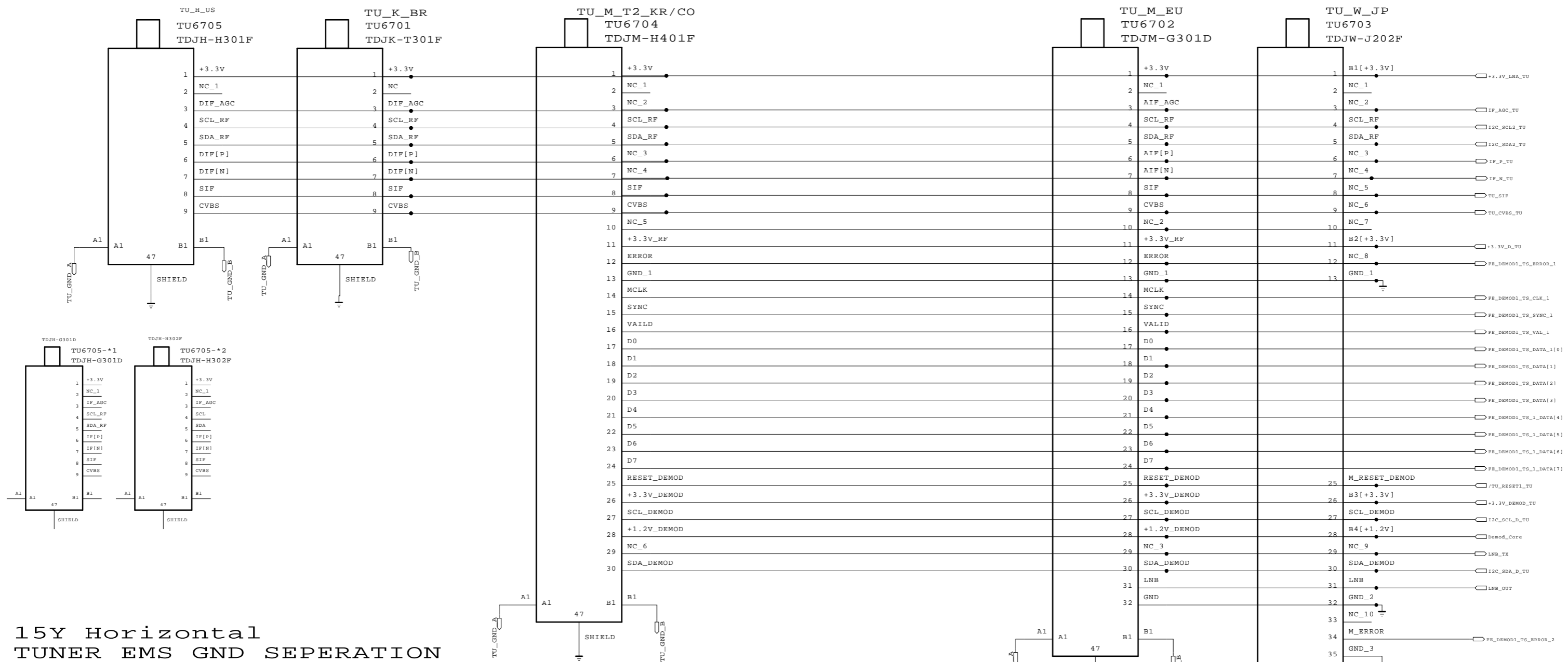


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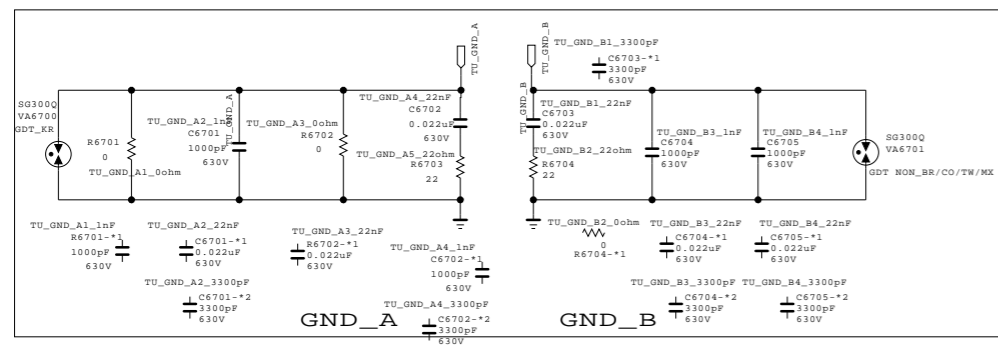
SECRET
 LG Electronics



MODEL	K2H	DATE	2014-10-17
BLOCK	TU_CIRCUIT	SHEET	18

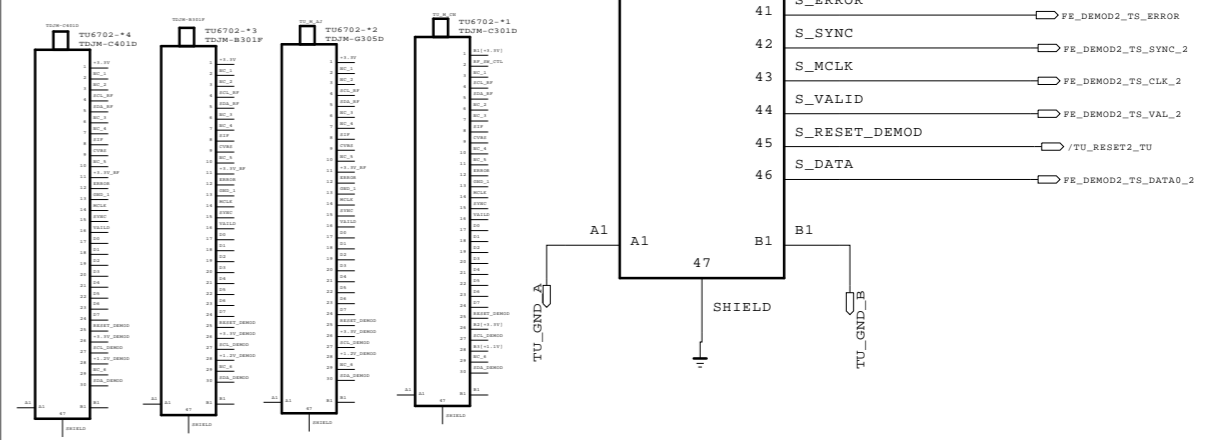
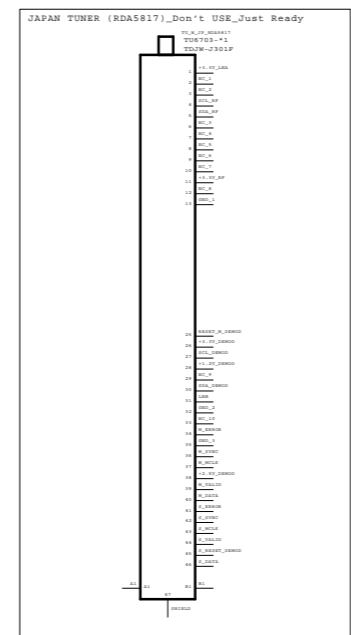


15Y Horizontal TUNER EMS GND SEPERATION



TU_GND_A	EU/CIS	AJJA	TW/COL	CN/RK	KR	US/CA	MX	BR	JP
GND_A_1	0 ohm	0 ohm			X	0 ohm	0 ohm	X	0 ohm
GND_A_2	X	X			22 nF	X	X	22 nF	1 nF
GND_A_3	X	0 ohm			X	0 ohm	X	22 nF	0 ohm
GND_A_4	X	X			22 nF	X	X	22 nF	1 nF
GND_A_5	X	X			22 ohm	X	X	22 ohm	22 ohm

TU_GND_B	EU/CIS	AJJA	TW/COL	CN/RK	KR	US/CA	MX	BR	JP
GND_B_1	X	X			22 nF	22 nF	X	22 nF	X
GND_B_2	X	X			22 ohm	22 ohm	X	22 ohm	X
GND_B_3	1 nF	1 nF			22 nF	1 nF	X	22 nF	1 nF
GND_B_4	1 nF	1 nF			22 nF	1 nF	X	22 nF	1 nF



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SECRET
LGElectronics

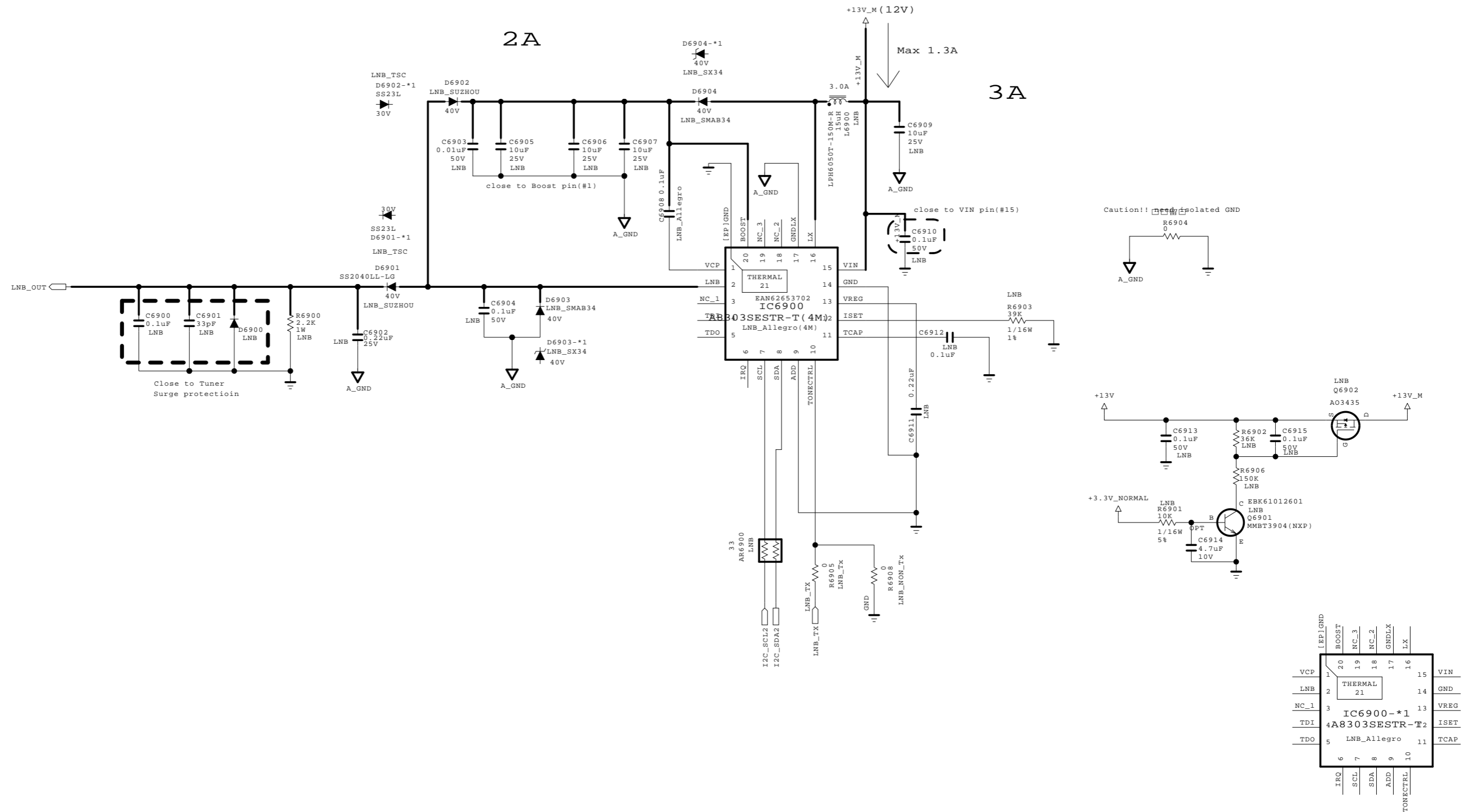


MODEL	K2H	DATE	2014-09-11
BLOCK	TU_SYMBOL_H	SHEET	19

DVB-S2 LNB Part Allegro/DMBT

(Option:LNB)

Input trace widths should be sized to conduct at least 3A
 Output trace widths should be sized to conduct at least 2A



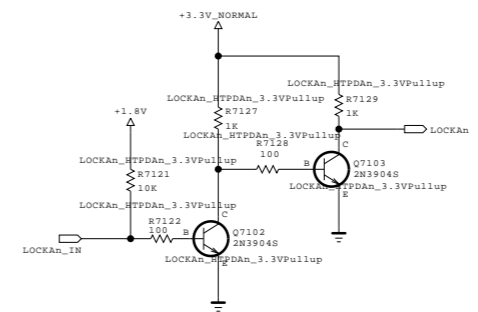
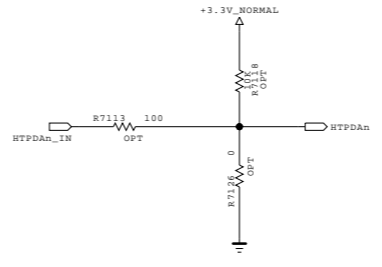
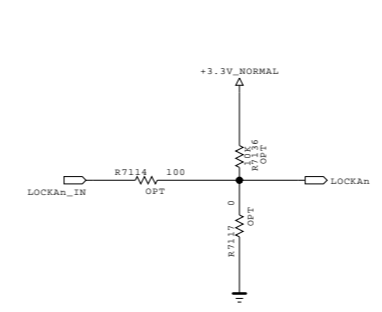
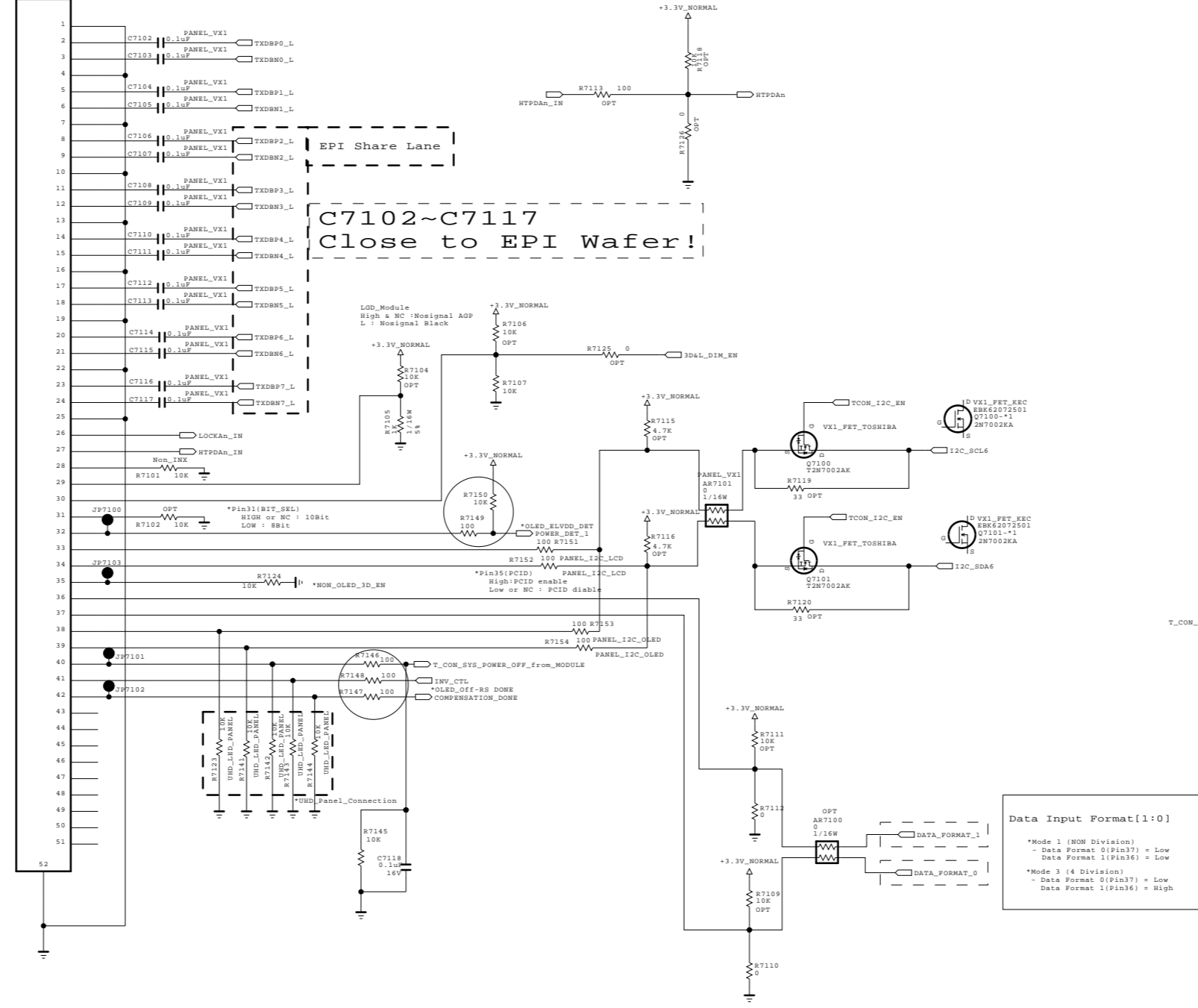
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SECRET	
LGElectronics	

MODEL	K2L	DATE	2012.03.08
BLOCK	LNB	SHEET	69 /

[51P Vx1 output wafer]

PANEL_VX1
S7100
SP14-11592-01-51Ppin



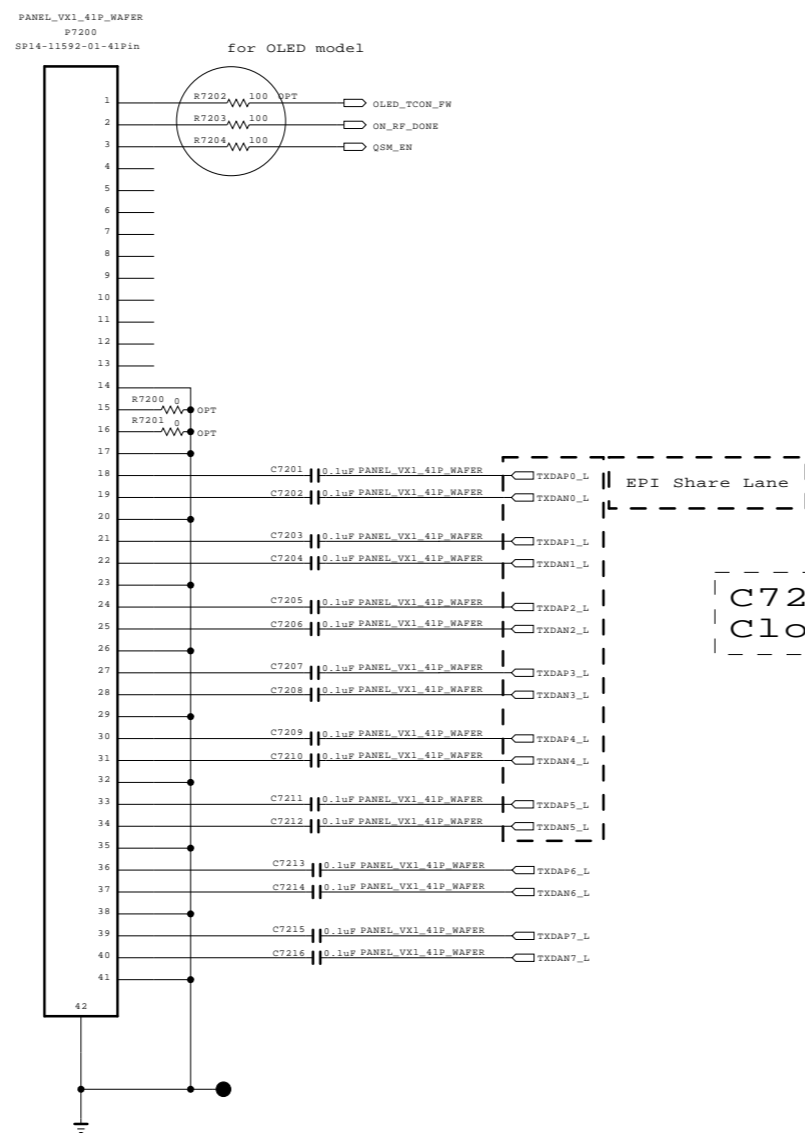
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SECRET
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MODEL	K2H	DATE	2014-08-27
BLOCK	Vx1 51P	SHEET	21 /

[41P Vx1
output wafer]



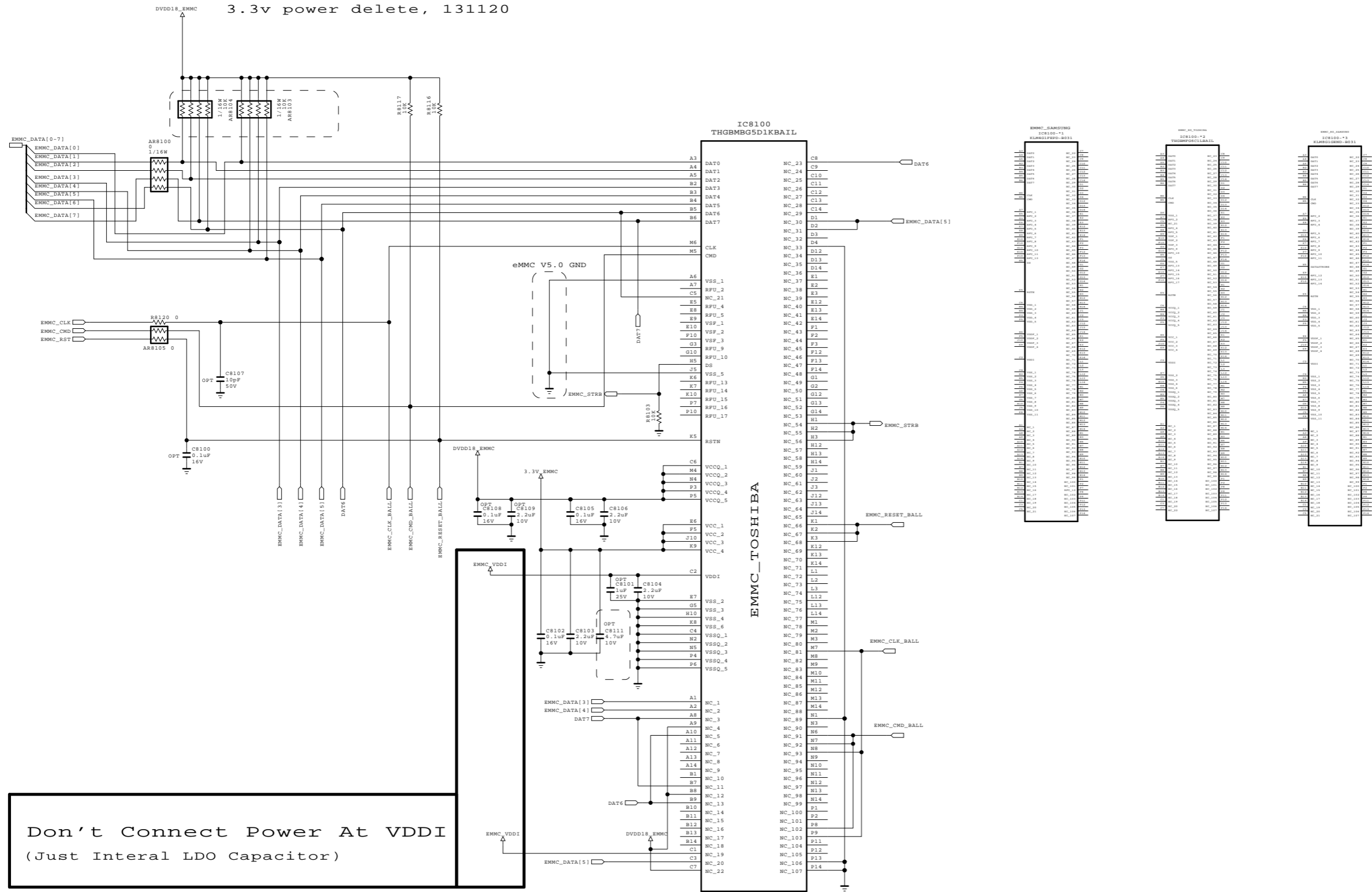
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SECRET
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MODEL	UF71/7500	DATE	14/07/19
BLOCK	Vx1 41P	SHEET	22 /

eMMC I/F



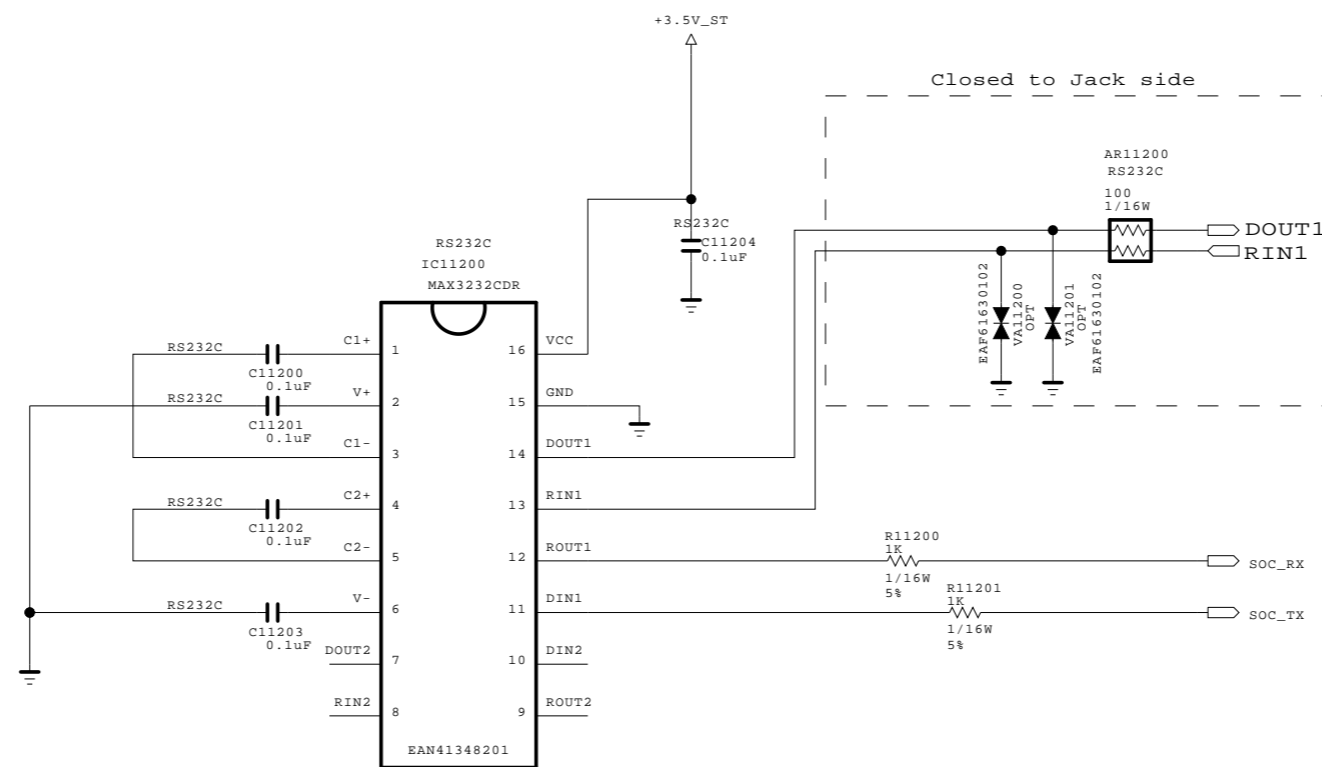
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MODEL	K2H	DATE	2014-11-17
BLOCK	eMMC	SHEET	81 /

RS-232C Control INTERFACE



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SECRET
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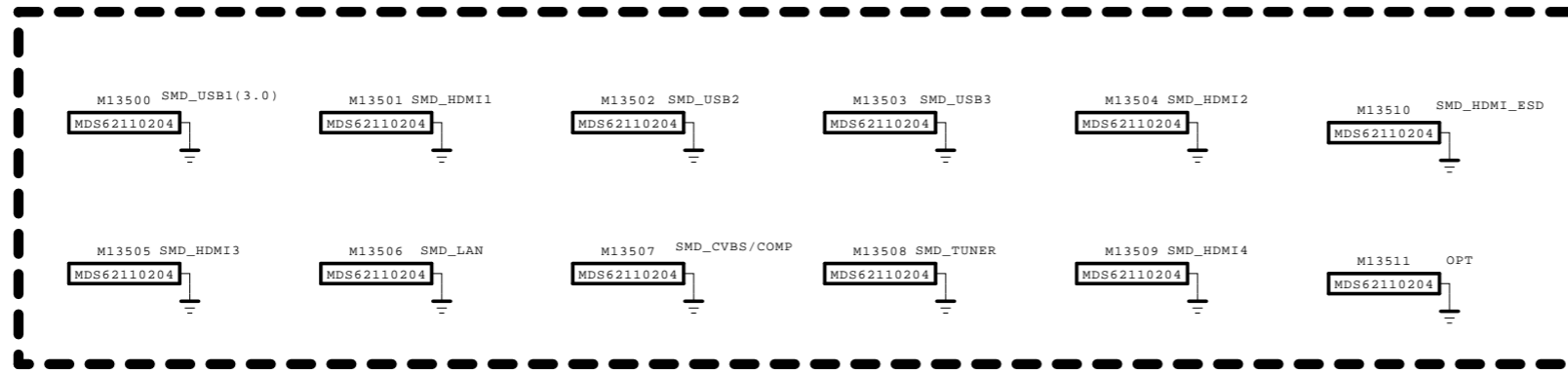


MODEL	UF71/7500	DATE	2014-05-19
BLOCK	RS232C	SHEET	22 /

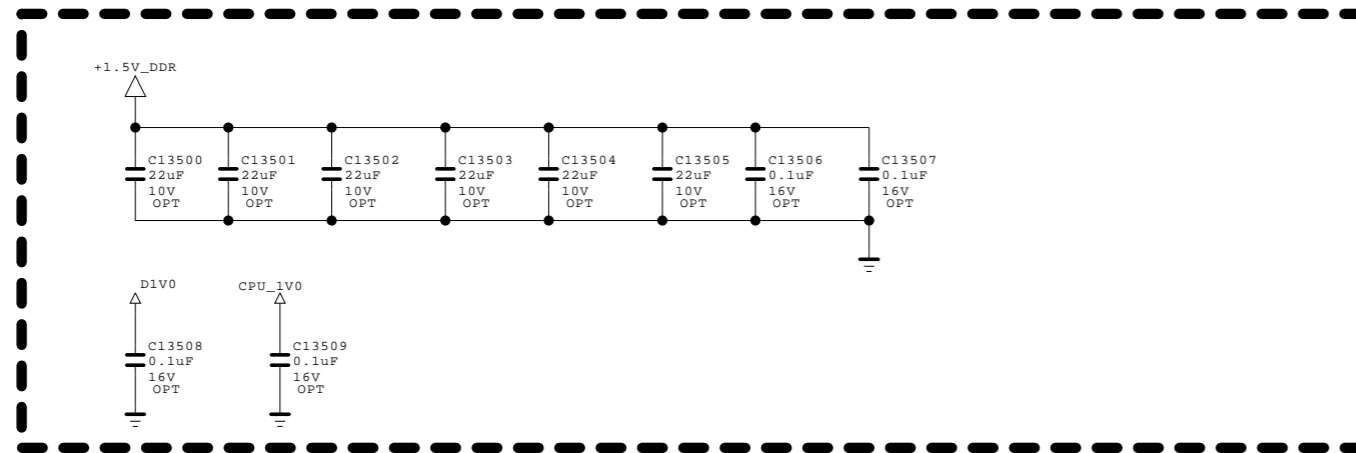
K2L B6



SMD Bottom

5.5T



4th Layer



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SECRET
LGElectronics



MODEL		DATE	15.10.01
BLOCK	SMD GASKET	SHEET	/



TROUBLE SHOOTING GUIDE

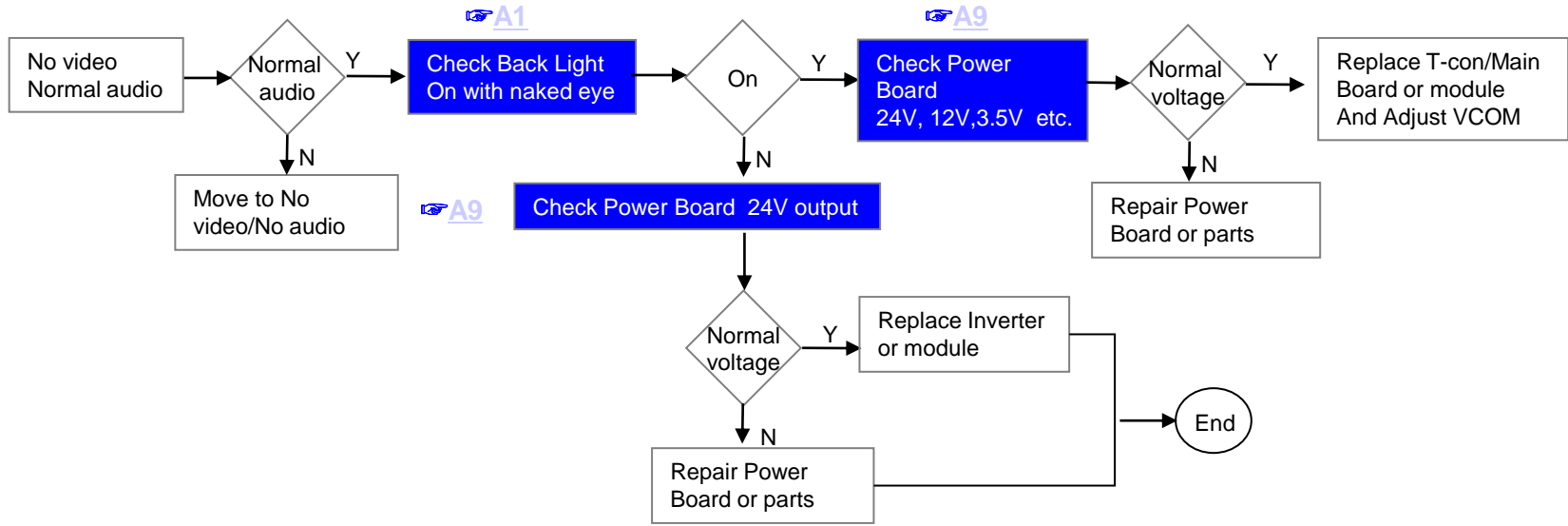
Contents of Standard Repair Process

No.	Error symptom (High category)	Error symptom (Mid category)	Page	Remarks
1	A. Video error	No video/Normal audio	1	
2		No video/No audio	2	
3		Picture broken/ Freezing	3	
4		Color error	4	
5		Vertical/Horizontal bar, residual image, light spot, external device color error	5	
6	B. Power error	No power	6	
7		Off when on, off while viewing, power auto on/off	7	
8	C. Audio error	No audio/Normal video	8	
9		Wrecked audio/discontinuation/noise	9	
10	D. Function error	Remote control & Local switch checking	10	
11		MR15R operating checking	11	
12		Wifi operating checking	12	
13		External device recognition error	13	
14	E. Noise	Circuit noise, mechanical noise	14	
15	F. Exterior error	Exterior defect	15	

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

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

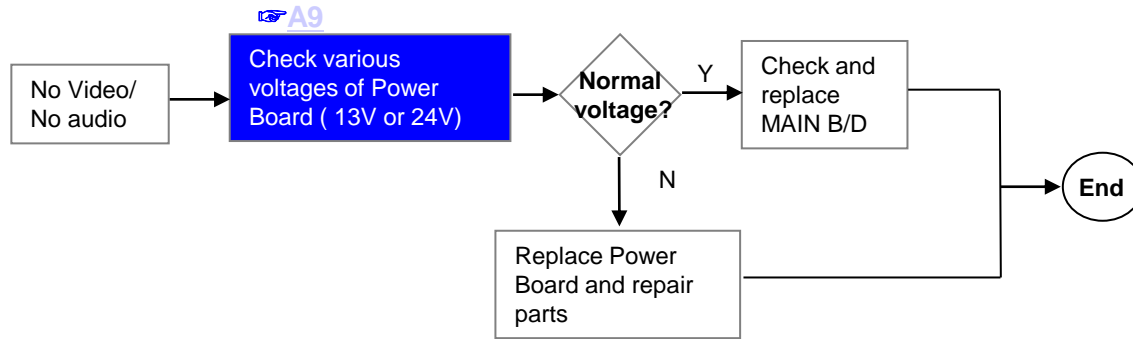
**First of all, Check whether all of cables between board is inserted properly or not.
(Main B/D↔ Power B/D, LVDS Cable, Speaker Cable, IR B/D Cable,,)**



※Precaution A4 & A2



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

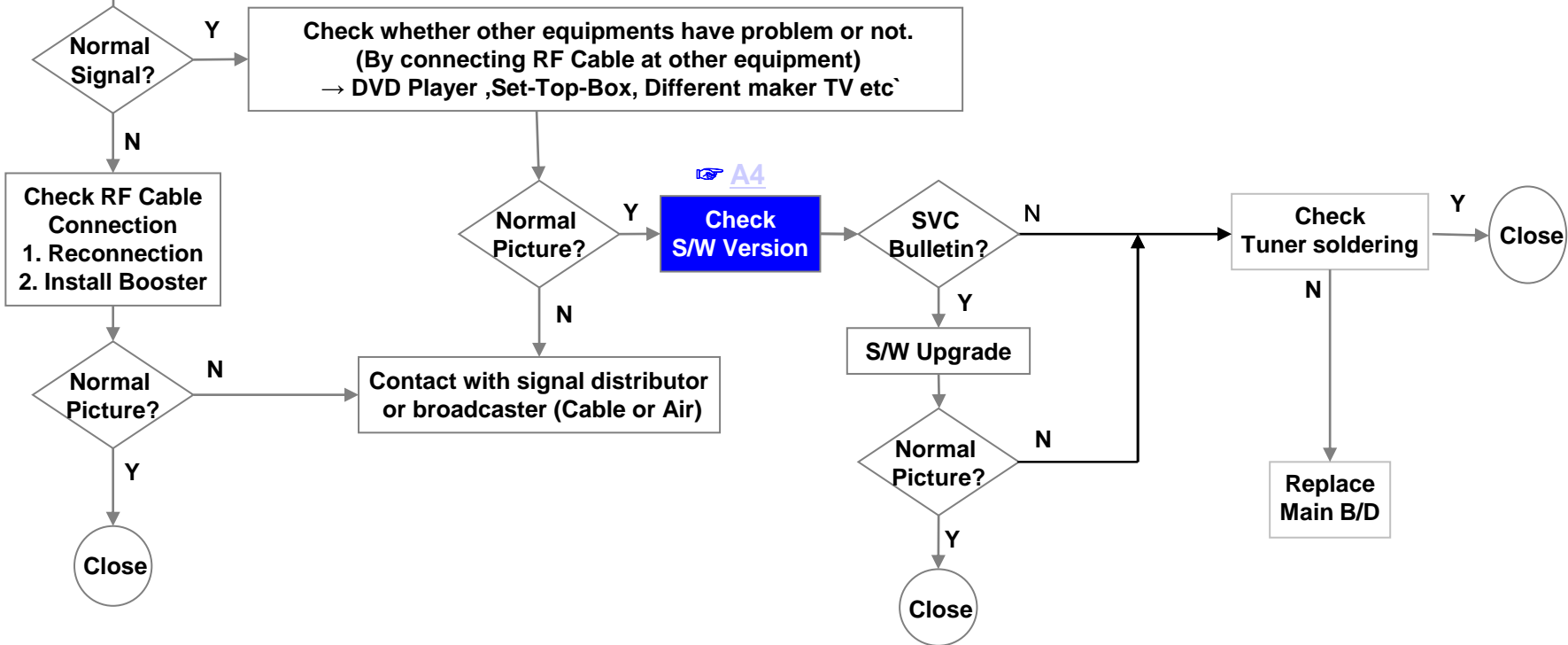


OLED TV	Error symptom	A. Video error	Established date	
		Picture broken/ Freezing	Revised date	3/16

A3

Check RF Signal level

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



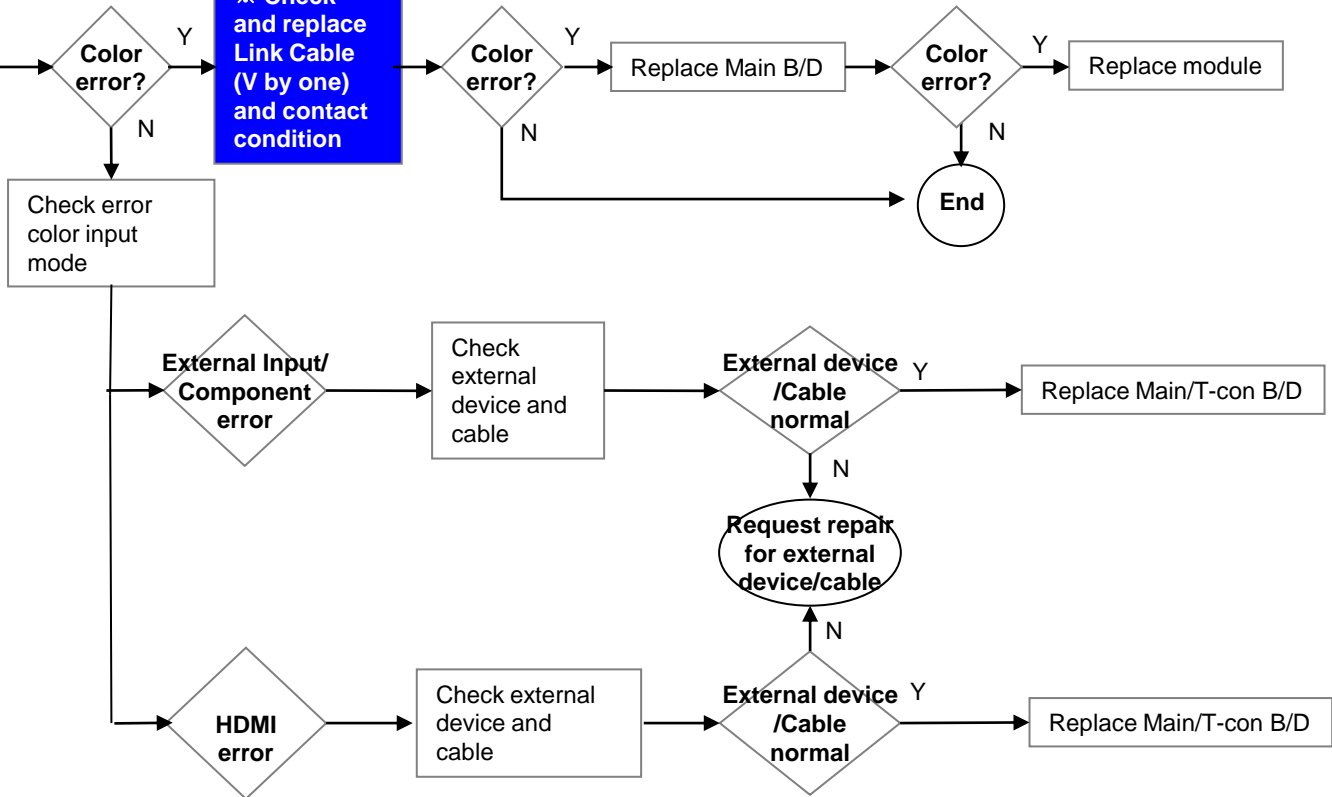
OLED TV	Error symptom	A. Video error	Established date	
		Color error	Revised date	4/16

A6

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

A7

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

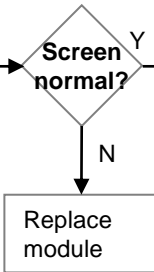


OLED TV	Error symptom	A. Video error	Established date	
		Vertical / Horizontal bar, residual image, light spot, external device color error	Revised date	5/16

Vertical/Horizontal bar, residual image, light spot

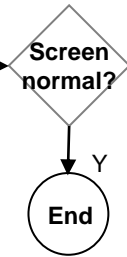
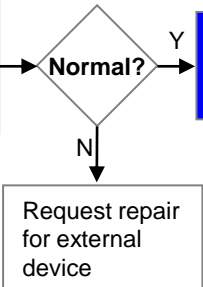
A6

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

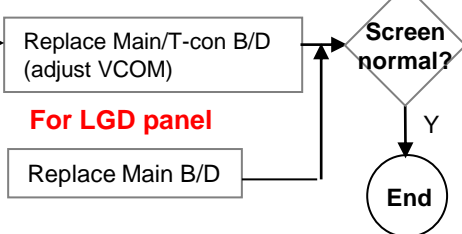


A7

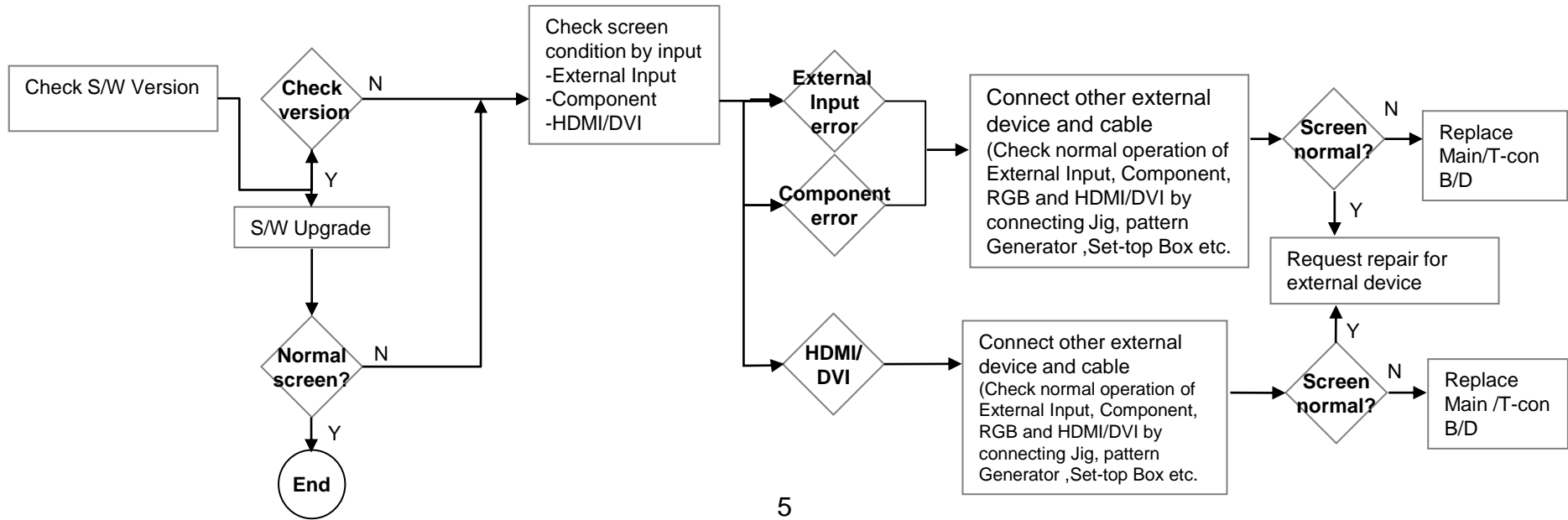
Check and replace Link Cable



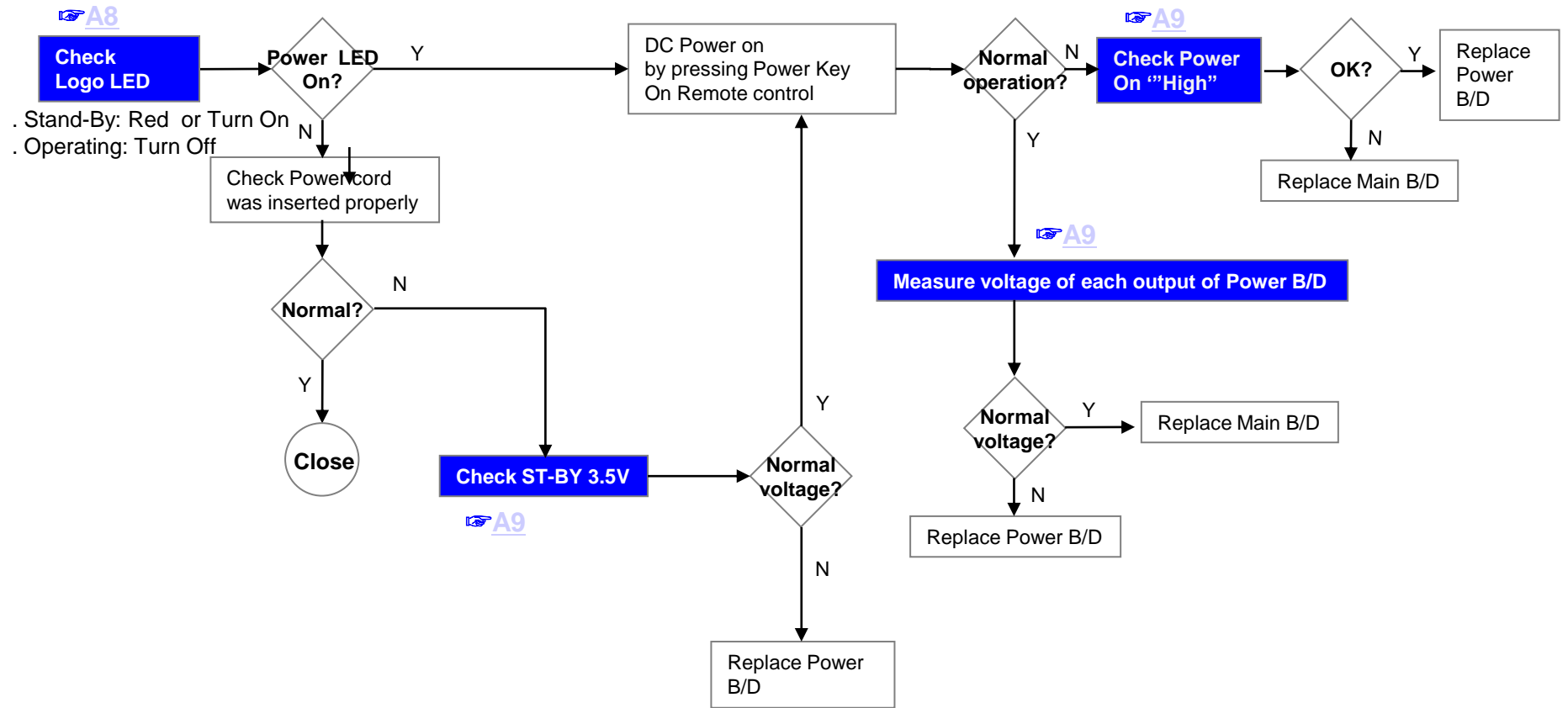
For LGD panel
For other panel



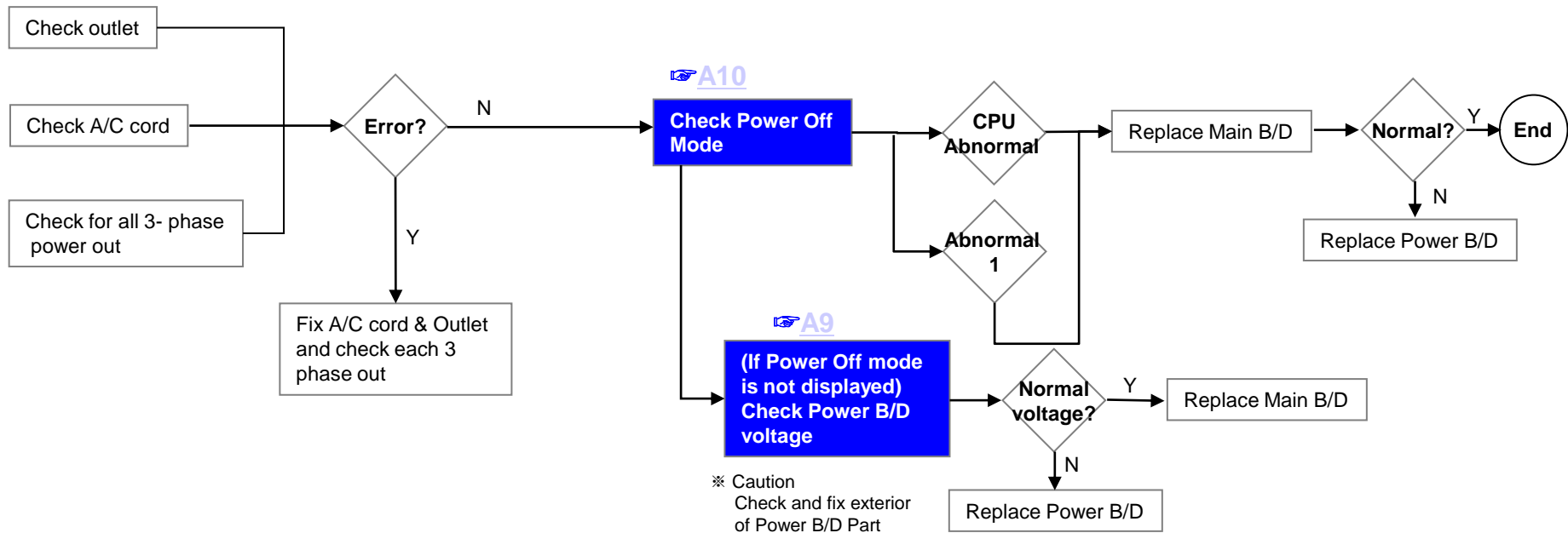
External device screen error-Color error



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



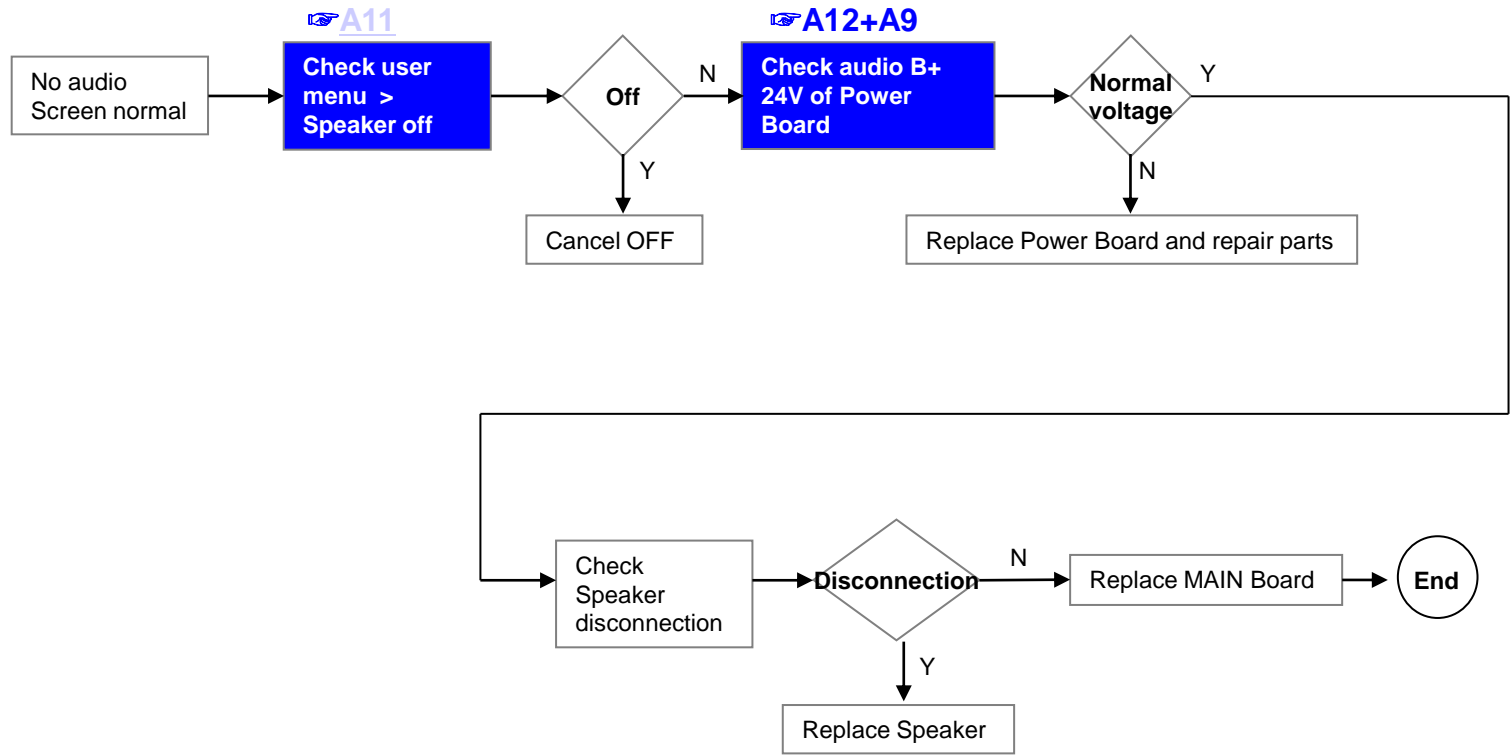
OLED TV	Error symptom	B. Power error	Established date	
		Off when on, off while viewing, power auto on/off	Revised date	7/16



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

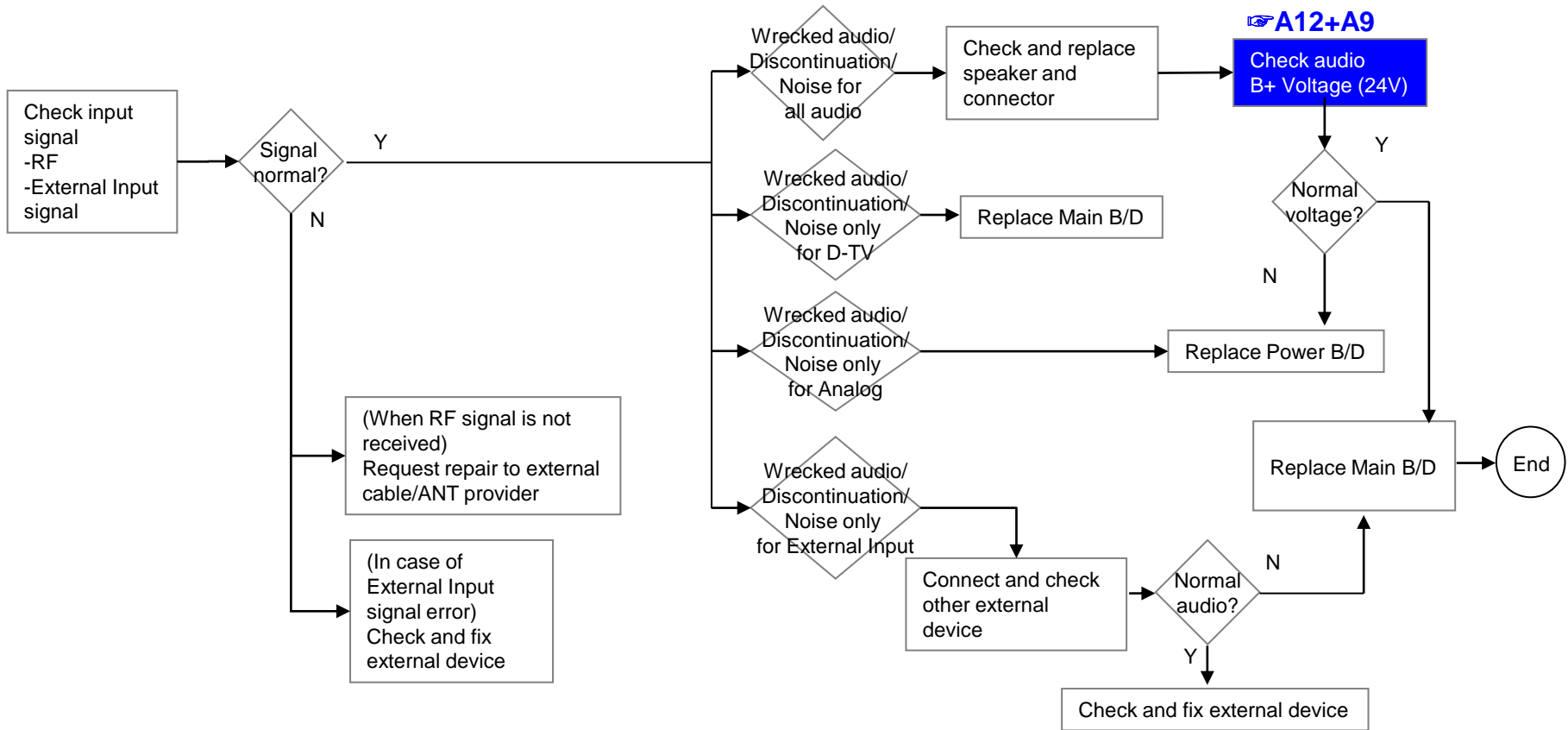
Status	Power off List	Explanation
Normal	"POWER_OFF_BY_REMOTE_KEY"	Power off by REMOTE CONTROL
	"POWER_OFF_BY_OFF_TIMER"	Power off by OFF TIMER
	"POWER_OFF_BY_SLEEP_TIMER"	Power off by SLEEP TIMER
	"POWER_OFF_BY_INSTOP"	Power off by INSTOP KEY
	"POWER_OFF_BY_AUTO_OFF"	Power off by AUTO OFF
	"POWER_OFF_BY_ON_TIMER"	Power off by ON TIMER
	"POWER_OFF_BY_RS232C"	Power off by RS232C
	"POWER_OFF_BY_RESREC"	Power off by Reserved Record
	"POWER_OFF_BY_RECEND"	Power off by End of Recording
	"POWER_OFF_BY_SW_DW"	Power off by S/W Download
	"POWER_OFF_BY_UNKNOWNN"	Power off by unknown status except listed case
Abnormal	"POWER_OFF_BY_CPU_ABN"	Power off by CPU Abnormal

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



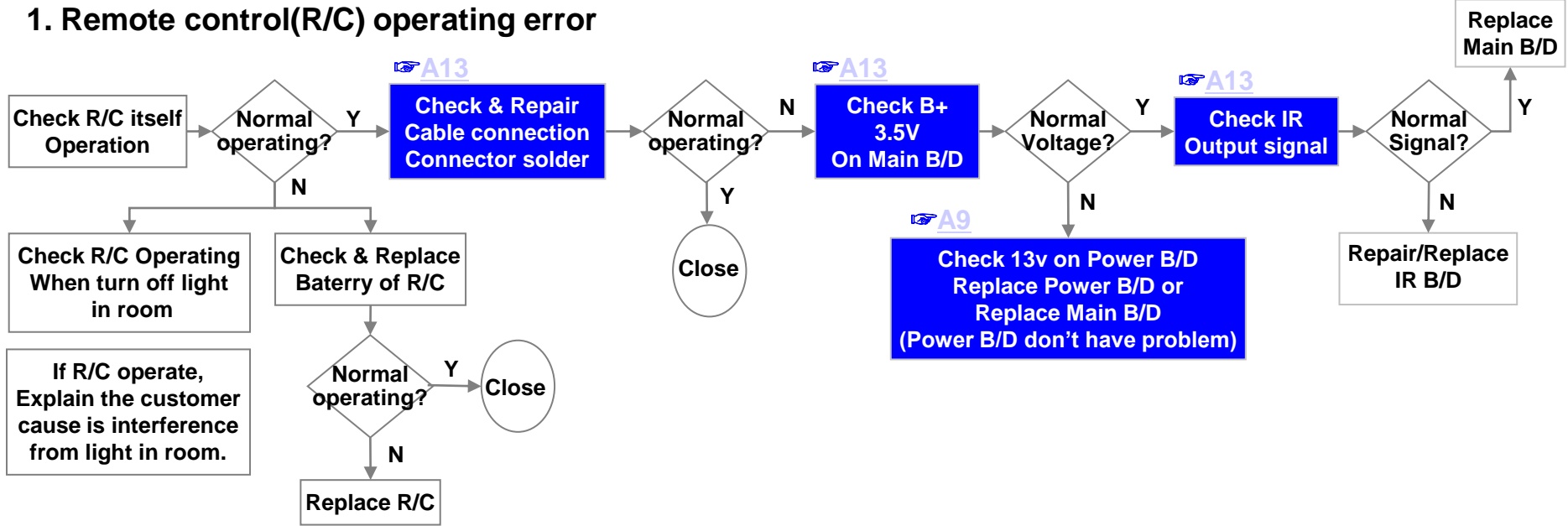
OLED TV	Error symptom	C. Audio error	Established date	
		Wrecked audio/ discontinuation/noise	Revised date	9/16

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



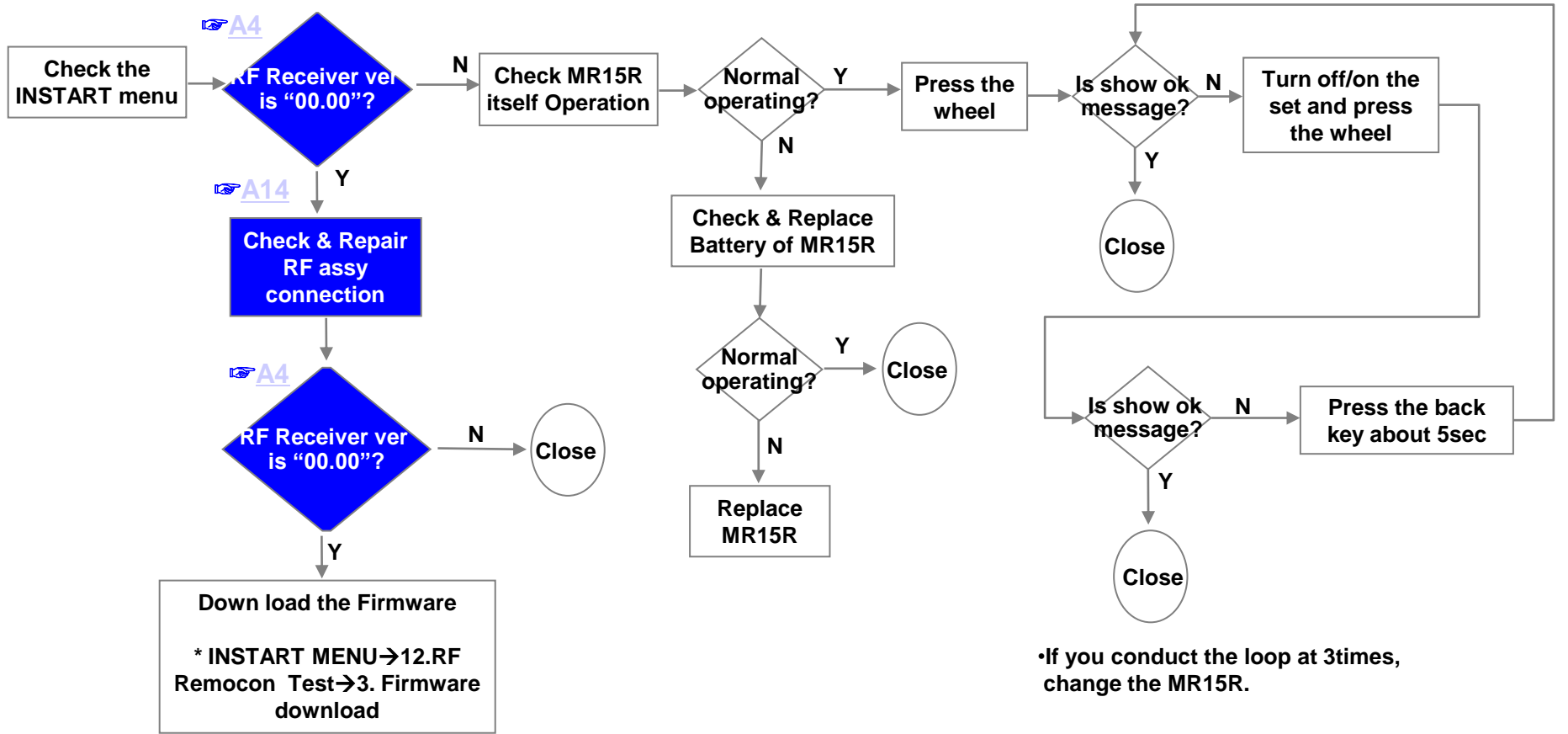
OLED TV	Error symptom	D. Function error	Established date	
		Remote control & Local switch checking	Revised date	10/16

1. Remote control(R/C) operating error



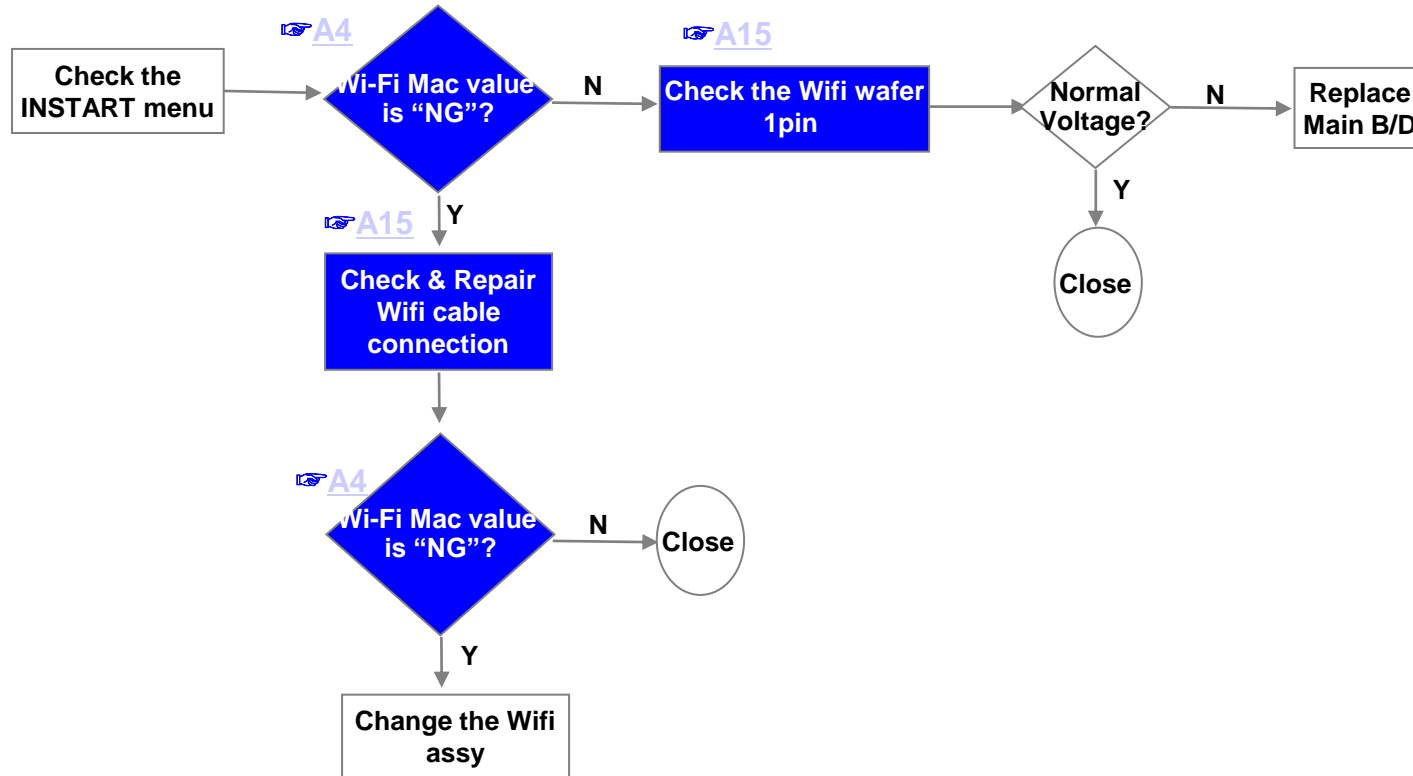
OLED TV	Error symptom	D. Function error	Established date	
		MR15R operating checking	Revised date	11/15

2. MR15R (Magic Remocon) operating error

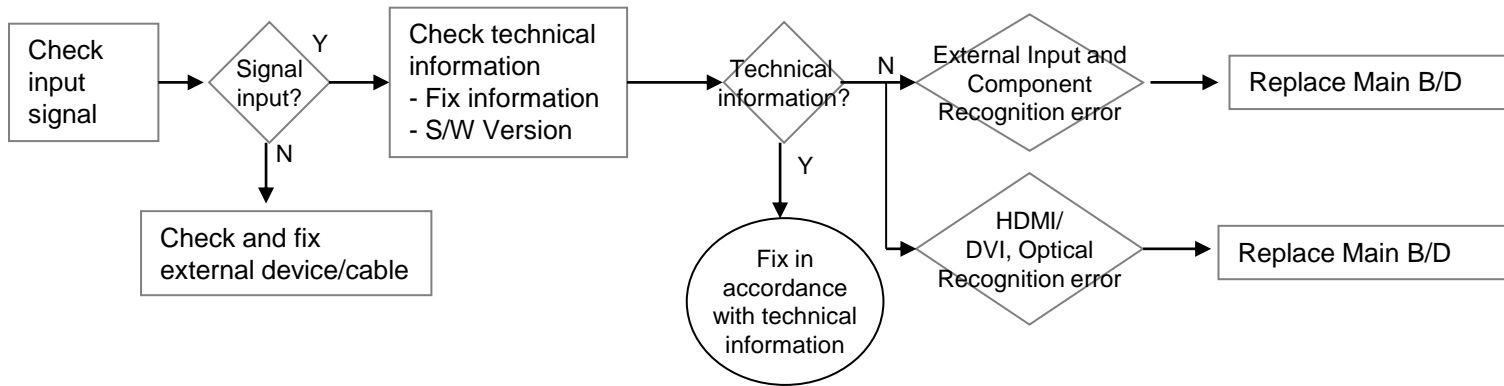


OLED TV	Error symptom	D. Function error	Established date	
		Wifi operating checking	Revised date	12/16

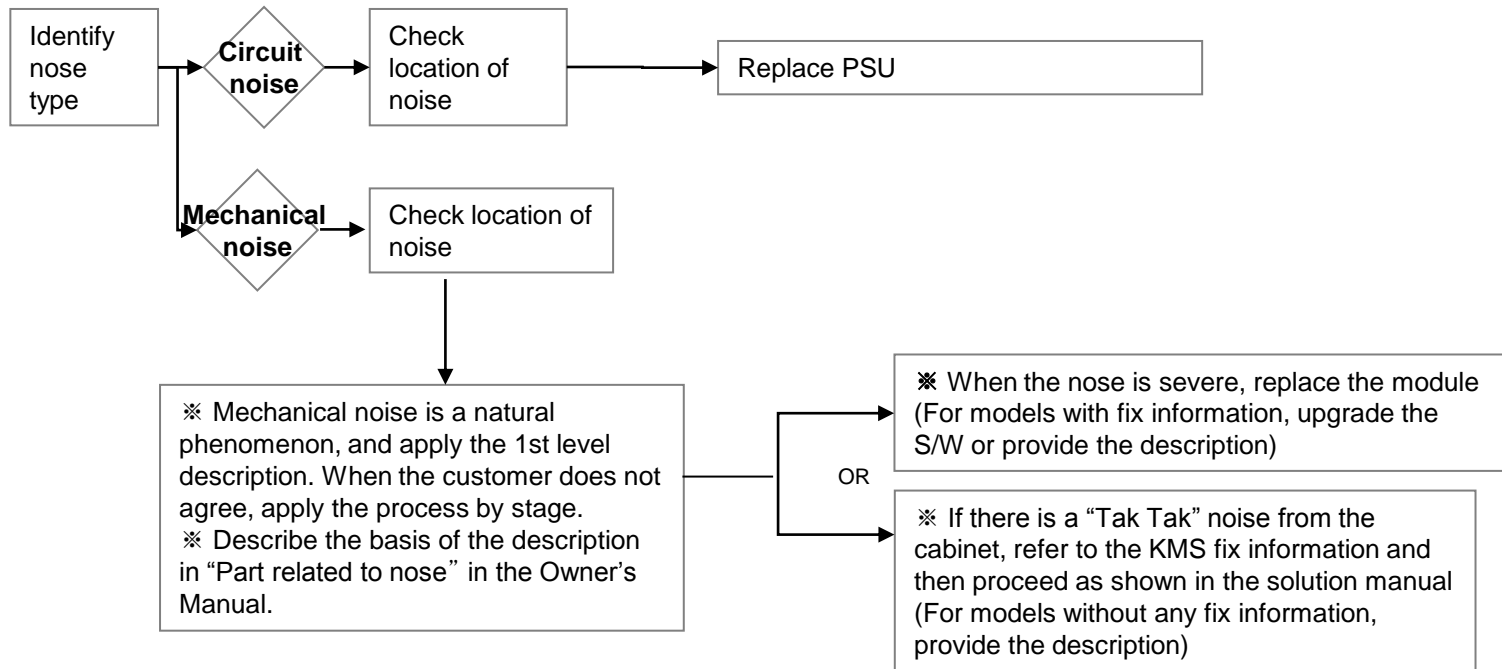
3.Wifi operating error



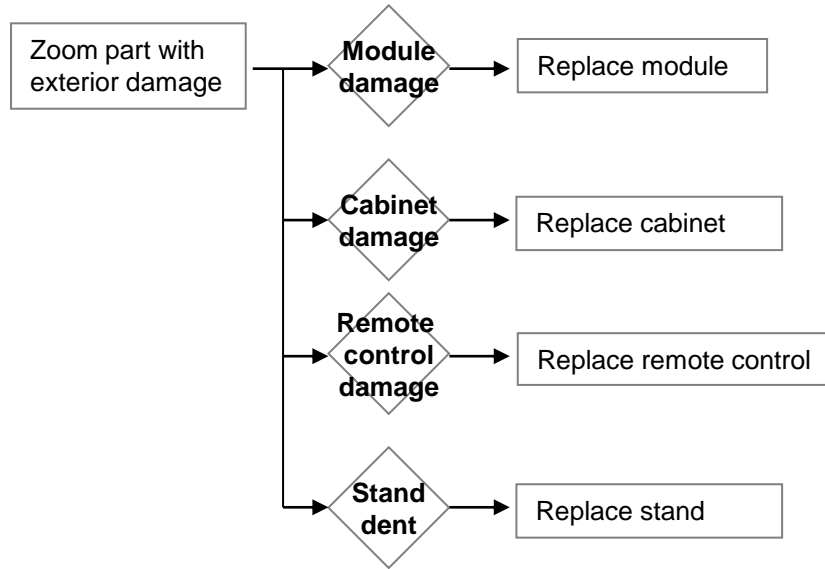
OLED TV	Error symptom	D. Function error	Established date		
		External device recognition error	Revised date		14/16



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



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



Contents of Standard Repair Process Detail Technical Manual

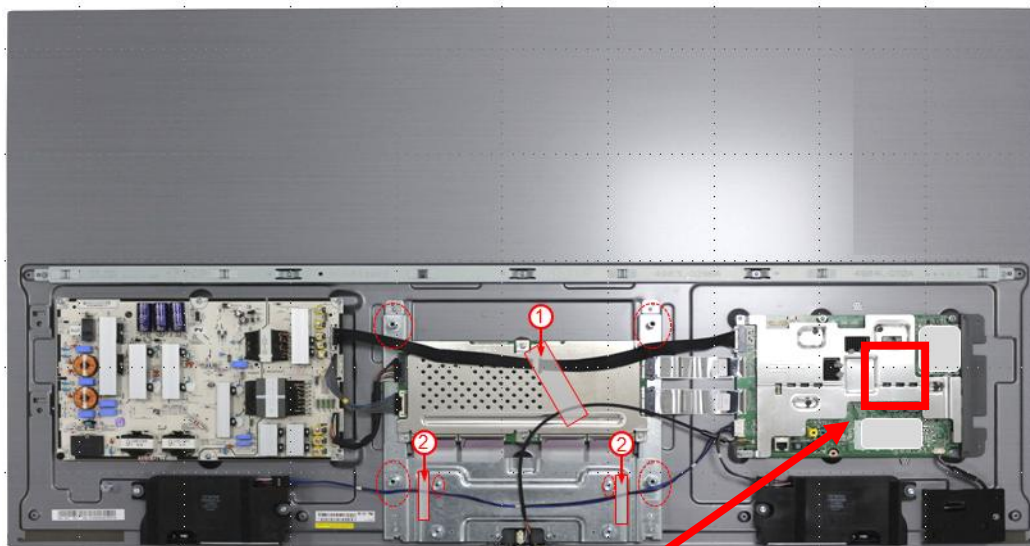
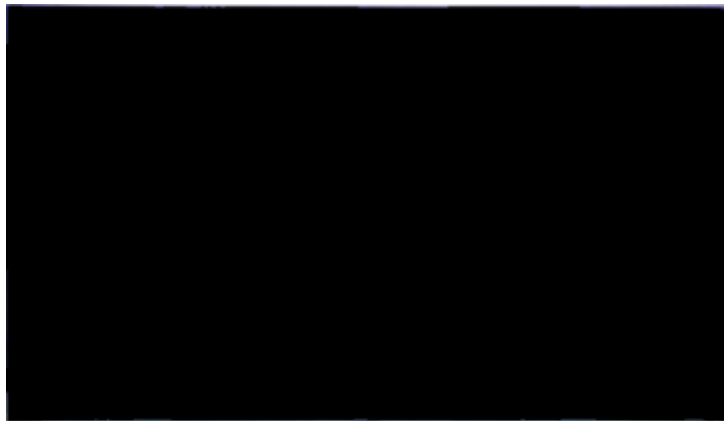
No.	Error symptom	Content	Page	Remarks
1	A. Video error_ No video/Normal audio	Check Vx1 lock LED light with naked eye	A1	
2		Check White Balance value	A2	
3	A. Video error_ video error /Video lag/stop	TUNER input signal strength checking method	A3	
4		Version checking method	A4	
5		Tuner Checking Part	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> Defected Type caused by T-Con/ Inverter/ Module	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 Logo	A8	
10		Check power input Voltage & ST-BY 3.5V	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		Motion Remote operation checking method	A14	
16		Wifi operation checking method	A15	
17	E. Etc	Tool option changing method	A16	

Standard Repair Process Detail Technical Manual

OLED TV	Error symptom	A. Video error_No video/Normal audio	Established date		
	Content	Check Vx1 lock LED light with naked eye	Revised date		A1

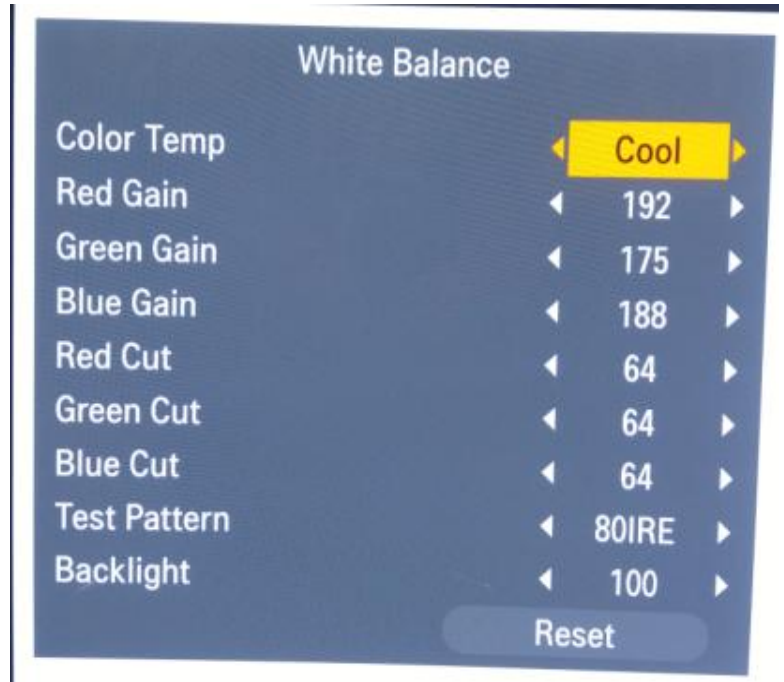
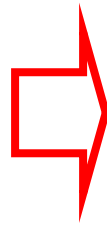
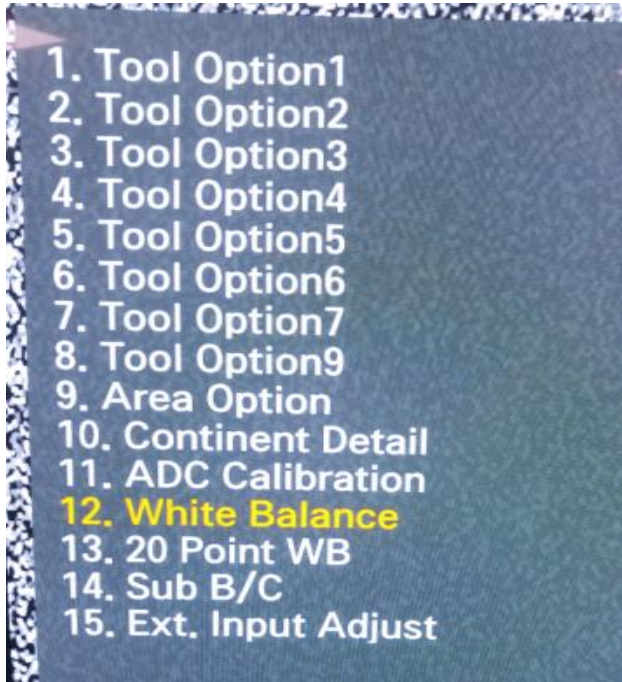


After Remove the Rear Cover, turning on the power and check with the naked eye, Whetehr you can see light from locations.

A1

Standard Repair Process Detail Technical Manual

OLED TV	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 12.
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.

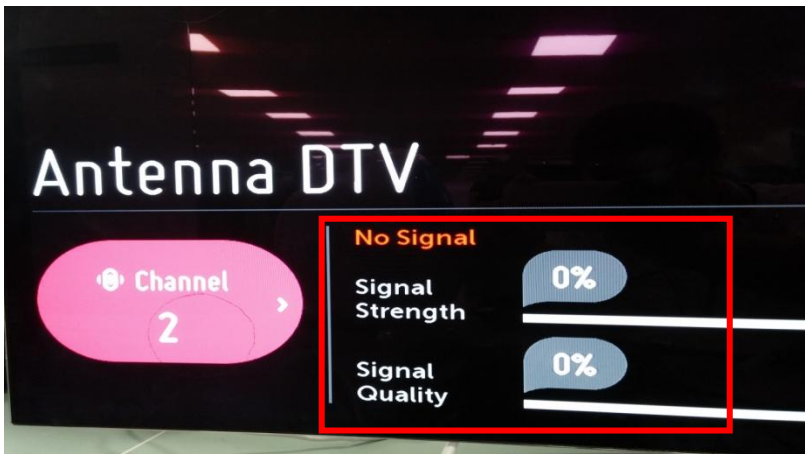
A2

Standard Repair Process Detail Technical Manual

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



All Settings → Channels → Channel Tuning



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



Standard Repair Process Detail Technical Manual

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

1. Checking method for remote control for adjustment

Version



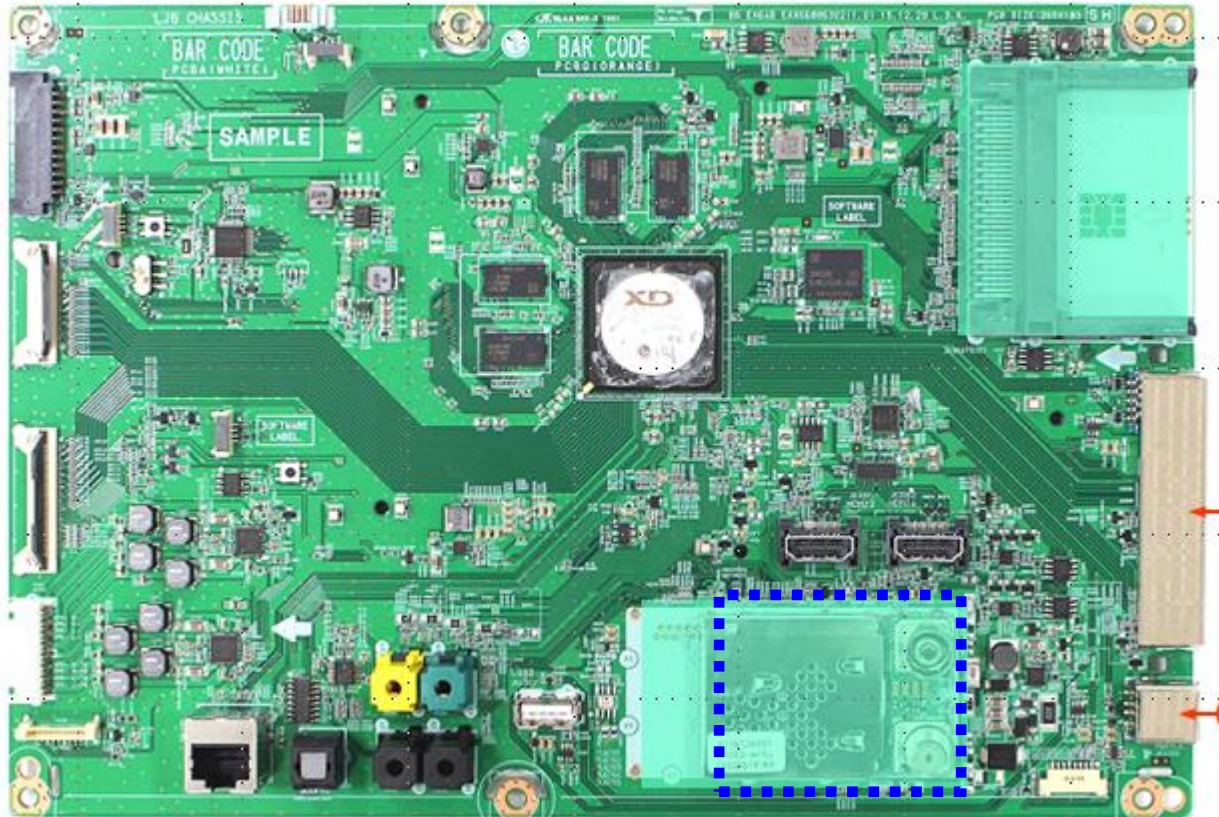
```

Instart
Model Name : OLED55C6P-U
Serial Number : 512KCCV64619
S/W Version : 02.01.71.01
Micom Version : V3.02.1
Boot Version : 4.02.11/4.02.11
UHD BE Version : OK(40.03.01.00)
Chip Type : LG1312
Wi-Fi Channel : 1
Wi-Fi MAC : E8:F2:E2:73:15:DA
Wi-Fi Speed : USB 2.0
MAC Address : C8:08:E9:6A:FD:15
IP Address : 0.0.0.0
SFU Key : OK
Widevine : LGTV16CLGE000006708
ESN Num. : LGTV20162=21001004419
HDCP1.4 : OK
HDCP2(Miracast/HDMI) : OK/OK
BTCP : 00000000000000000000000000000000
RF Receiver Version : 1.3.4.110
Wi-Fi/Magic Search : OK/OK
Camera Ver. : NULL
Debug Status : RELEASE
SIGN Key : DEVELKEY
Eye Check : OK
Control Key : OK
Access USB Status : 1/-1(T)/-1(C)
UTT : 3
OLED Comp. Count(OffRS/JB) : 0/0
App History Version : 171 (deathvalley)
PQL DB : LGD_OLED_SI2178B_XXXX55
Video : NULL
    
```

Press the IN-START with the remote control for adjustment

Standard Repair Process Detail Technical Manual

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

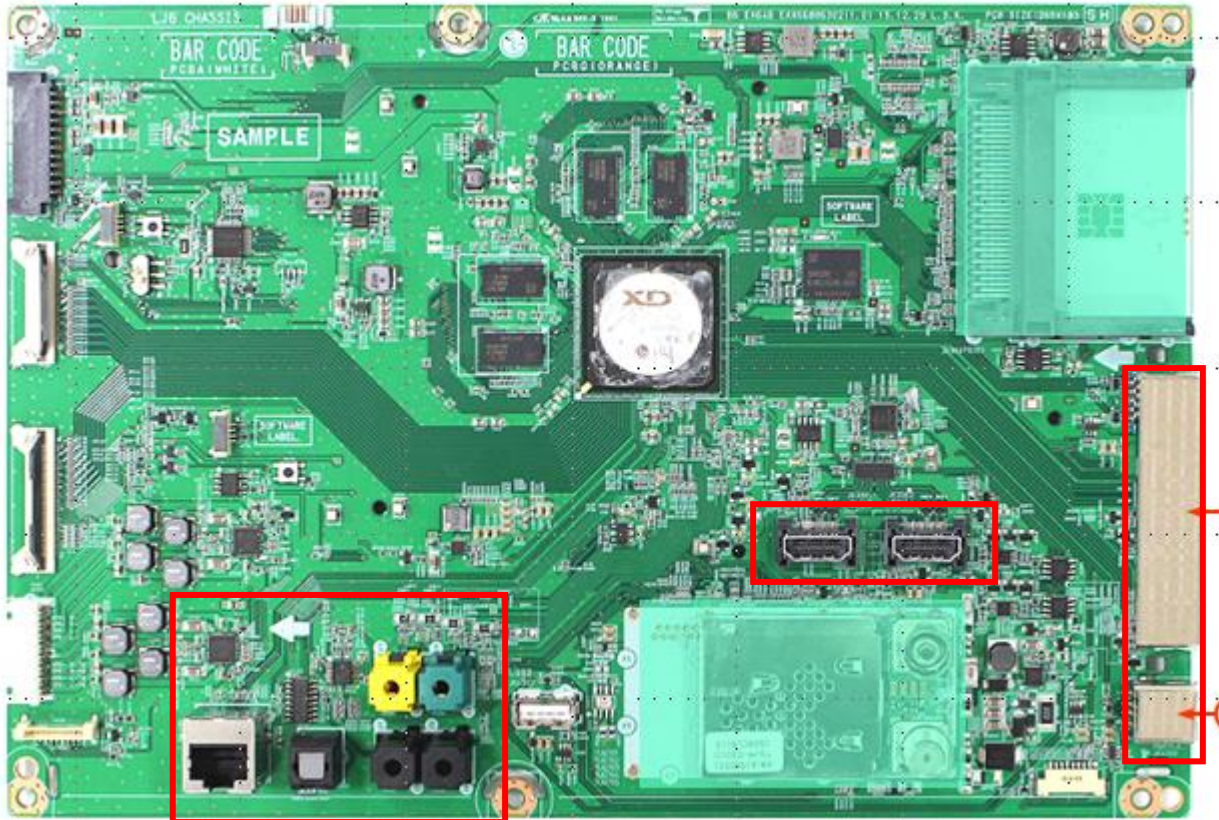


Checking method:

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

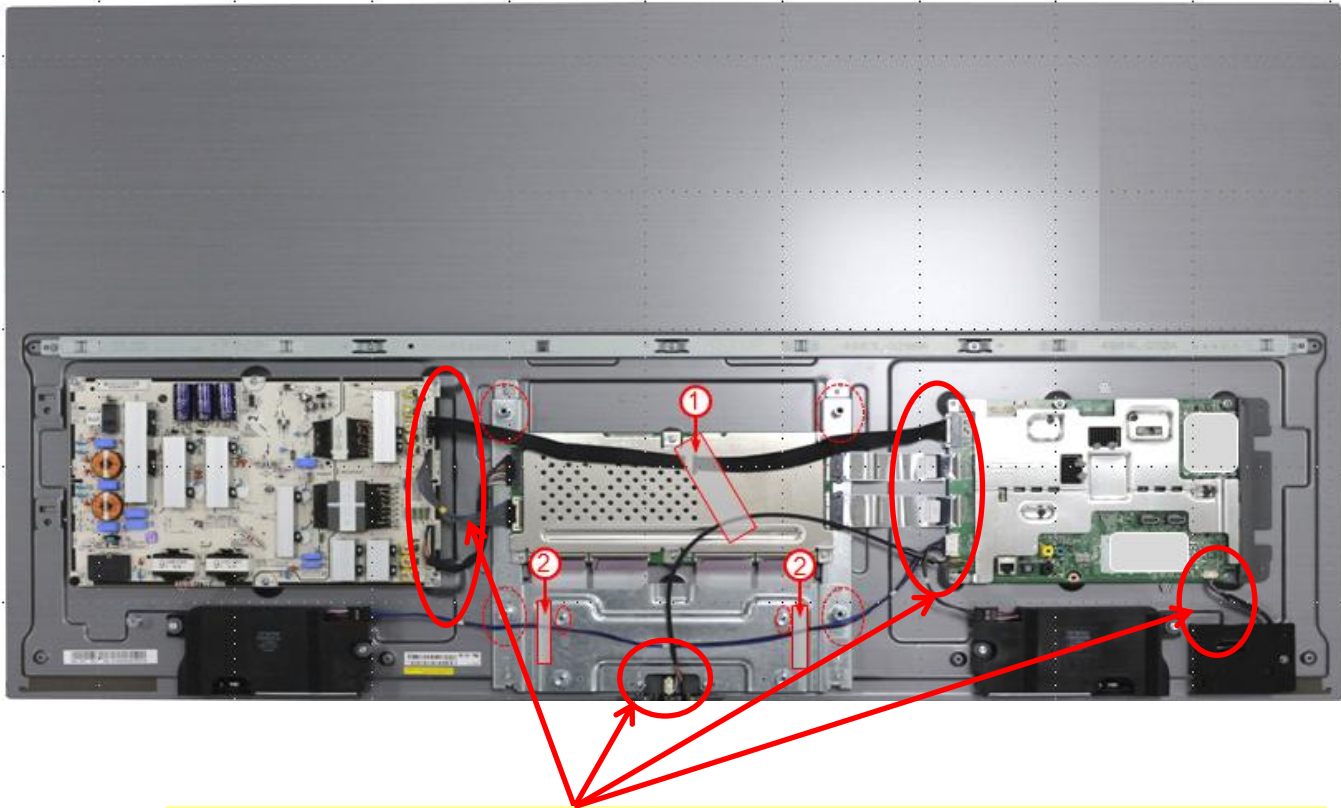
OLED TV	Error symptom	A. Video error _ Vertical/Horizontal bar, residual image, light spot	Established date		
	Content	Connection diagram	Revised date		A6



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

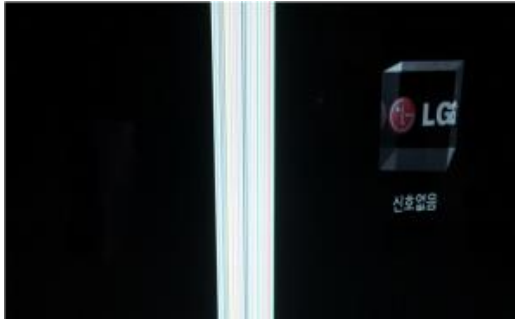
Standard Repair Process Detail Technical Manual

OLED TV	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)



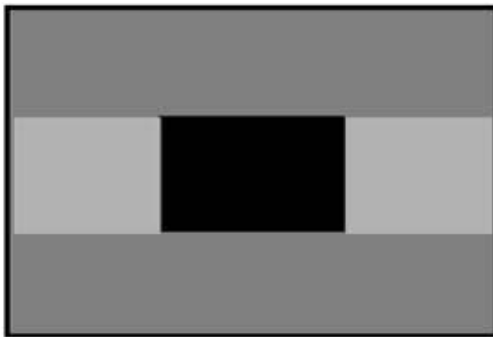
Vertical abnormal display



Brightness difference



Line Dim



Crosstalk



Press damage



Crosstalk



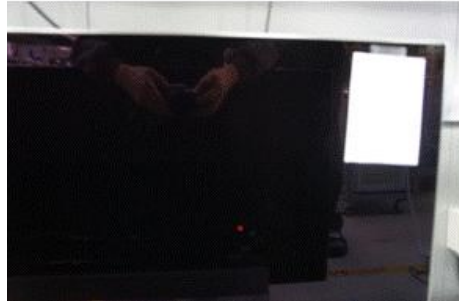
Burnt

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

Appendix : Exchange the Module (2)



Angle view Color difference



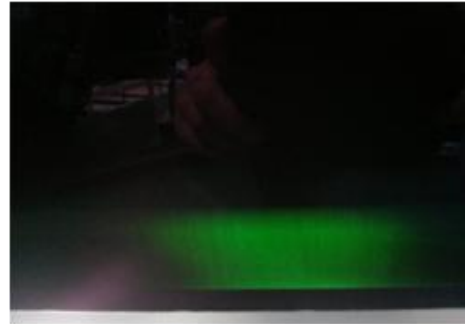
Brightness dot noise



Half dead



Brightness difference



Green Noise on power on/off time



Line Defect

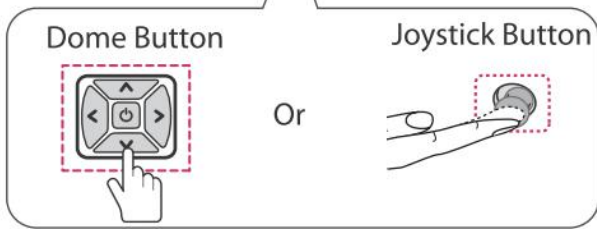
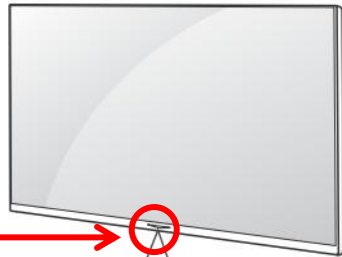


Mura

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

Standard Repair Process Detail Technical Manual

OLED TV	Error symptom	B. Power error _No power	Established date		
	Content	Check front display Logo	Revised date		A8



NOTE

- You can set the LG Logo Light or power indicator light to on or off by selecting **GENERAL** in the main menus.

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

Basic Functions

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

NOTE

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

Adjusting the Menu

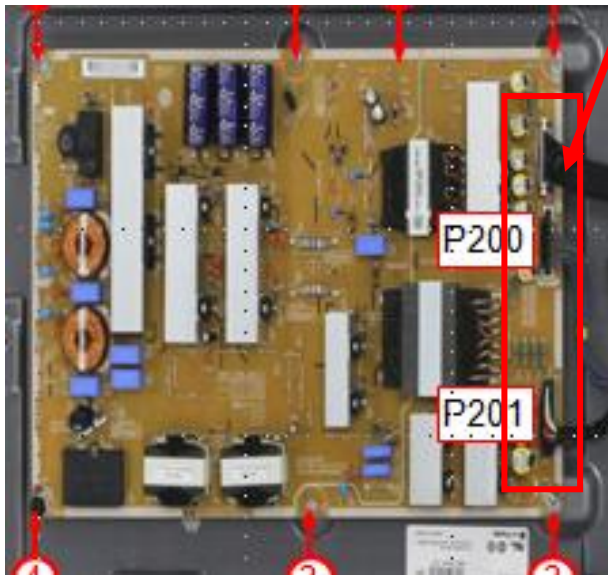
When the TV is turned on, press button one time. You can adjust the Menu items pressing or moving the buttons.

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

Standard Repair Process Detail Technical Manual

OLED TV	Error symptom	B. Power error _No power	Established date		
	Content	Check power input voltage	Revised date		A9

Check the DC 24V, 13V



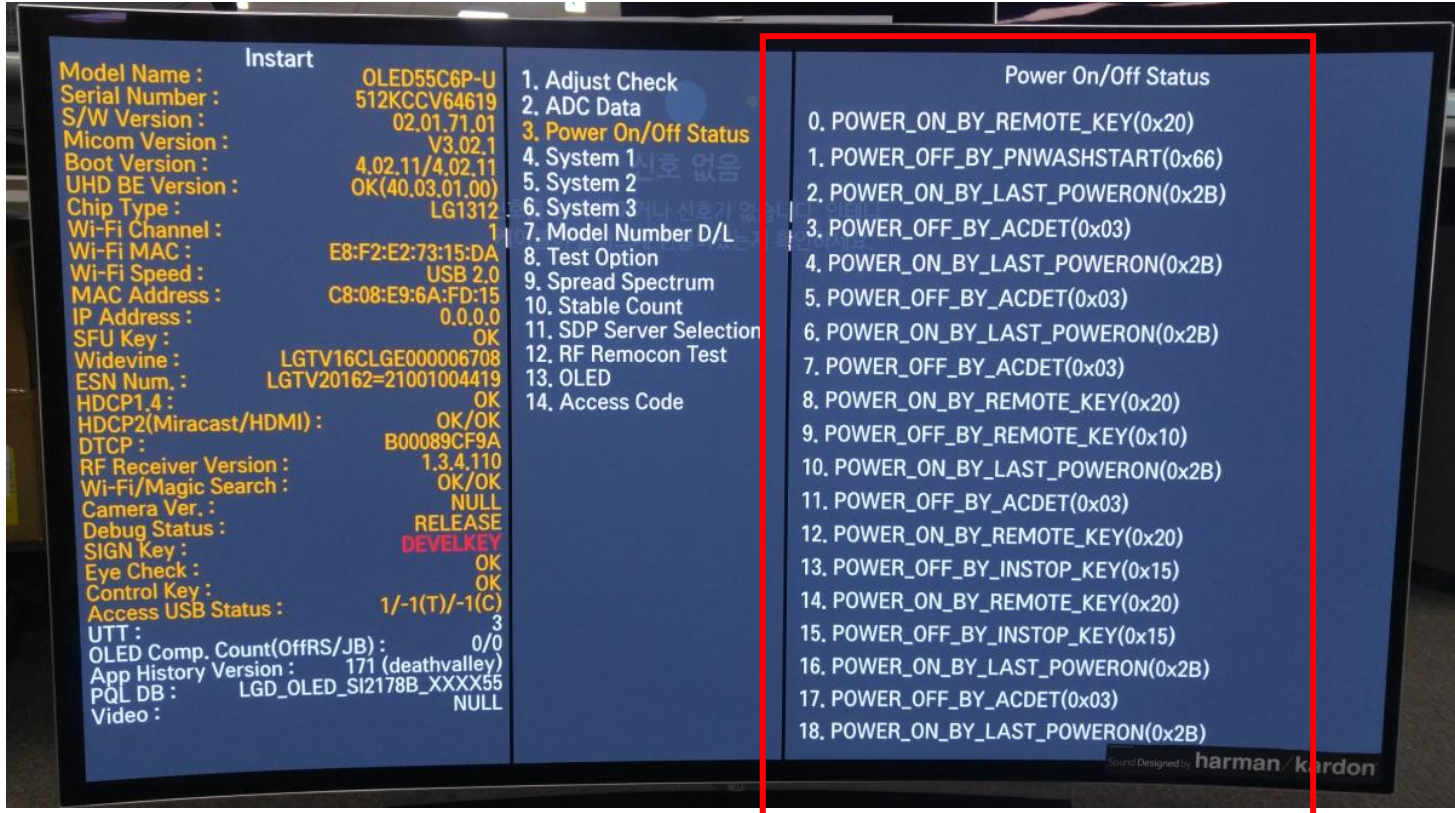
P201			
Type : SMW200-H24S5K Maker : YEON-HO			
Pin No.	Signal	Pin No.	Signal
1	POWER_ON	2	DRV_ON
3	N.C	4	ACD
5	12VM	6	GND
7	12VM	8	12VM
9	GND	10	GND
11	12VM	12	12VM
13	12VM	14	12VM
15	12VM	16	GND
17	GND	18	12VT_ON
19	24VS	20	24VS
21	24VS	22	24VS
23	GND	24	GND

P202	
Type : 20022WS-H15JB Maker : YEON-HO	
Pin No.	Signal
1~7	GND
8 ~ 15	24VD

P203	
Type : 20022WS-H14JB Maker : YEON-HO	
Pin No.	Signal
1~6	GND
7 ~ 12	12VT
13	N.C
14	GND

Standard Repair Process Detail Technical Manual

OLED TV	Error symptom	B. Power error _Off when on, off whiling viewing	Established date		
	Content	POWER OFF MODE checking method	Revised date		A10

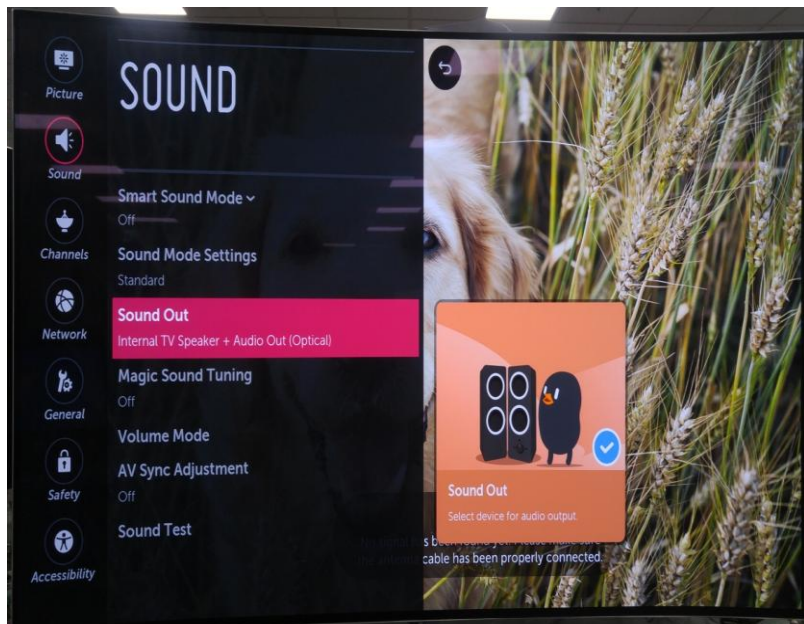


Entry method

1. Press the IN-START button of the remote control for adjustment
2. Check the entry into adjustment item 3(power On/Off Status)

Standard Repair Process Detail Technical Manual

OLED TV	Error symptom	C. Audio error_No audio/Normal video	Established date		
	Content	Checking method in menu when there is no audio	Revised date		A11

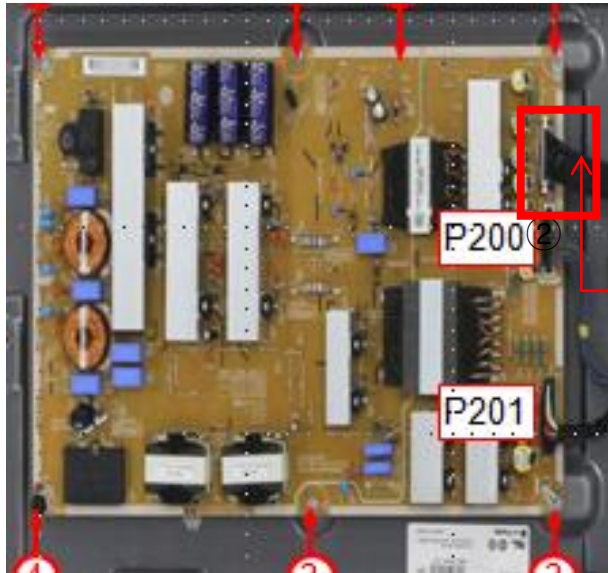


Checking method

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

OLED TV	Error symptom	C. Audio error_No audio/Normal video	Established date	
	Content	Voltage and speaker checking method when there is no audio	Revised date	A12



P201			
Type : SMW200-H24S5K			
Maker : YEON-HO			
Pin No.	Signal	Pin No.	Signal
1	POWER_ON	2	DRV_ON
3	N.C	4	ACD
5	12VM	6	GND
7	12VM	8	12VM
9	GND	10	GND
11	12VM	12	12VM
13	12VM	14	12VM
15	12VM	16	GND
17	GND	18	12VT_ON
19	24VS	20	24VS
21	24VS	22	24VS
23	GND	24	GND



1	SPK_R-_FT	2	SPK_R+_FT
3	SPK_L-_FT	4	SPK_L+_FT
5	SPK_R-_TW	6	SPK_R+_TW
7	SPK_L-_TW	8	SPK_L+_TW

Checking order when there is no audio

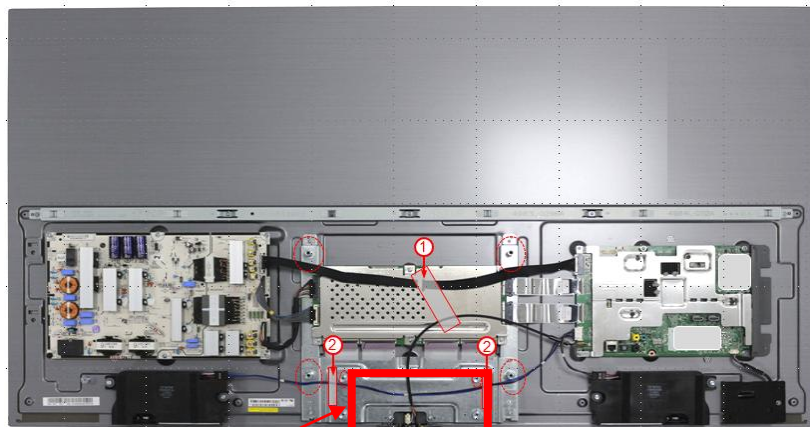
① Check the contact condition of or 24V connector of Main Board

② Measure the 24V input voltage supplied from Power Board
(If there is no input voltage, remove and check the connector)

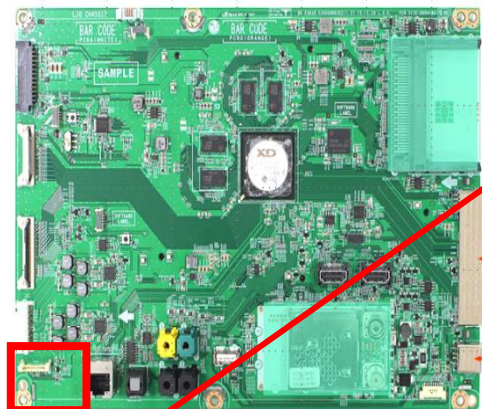
③ Connect the tester RX1 to the speaker terminal and if you hear the Chik Chik sound when you touch the GND and output terminal, the speaker is normal.

Standard Repair Process Detail Technical Manual

OLED TV	Error symptom	D. Function error	Established date		
	Content	Remote control operation checking method	Revised date		A13



①



②

③

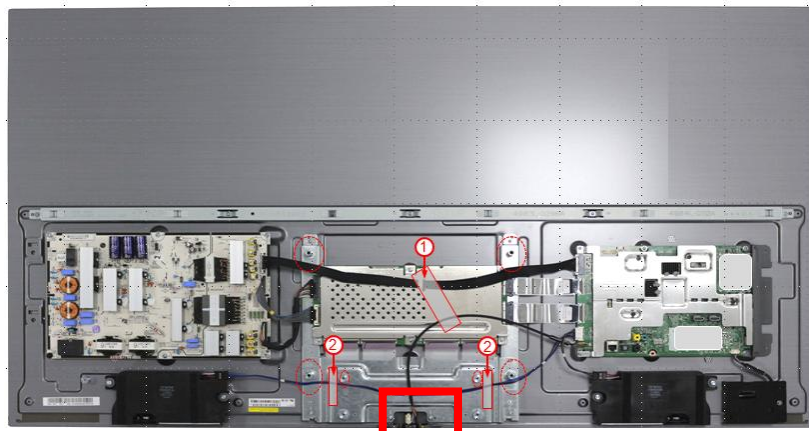
P4001	
1	GND
2	KEY1
3	KEY2
4	3.5V_ST
5	GND
6	LOGO_LIGHT
7	IR
8	GND
9	EYE_SCL
10	EYE_SDA

Checking order

- 1, 2. Check IR cable condition between IR & Main board.
3. Check the st-by 3.5V on the terminal 4

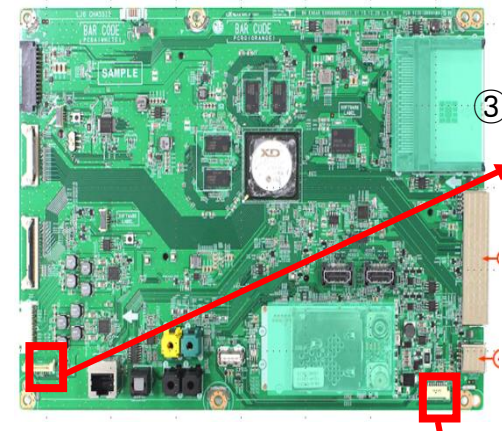
Standard Repair Process Detail Technical Manual

OLED TV	Error symptom	D. Function error	Established date		
	Content	Motion Remote operation checking method	Revised date		A14



①

②



③

③

P4102	
1	GND
2	KEY1
3	KEY2
4	3.5V_ST
5	GND
6	LED_R
7	IR
8	GND
9	EYE_SCL
10	EYE_SDA

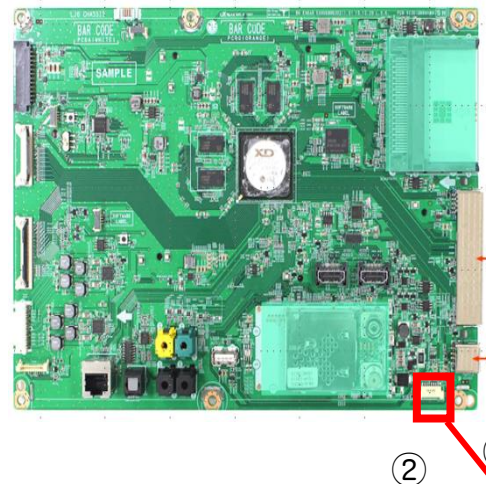
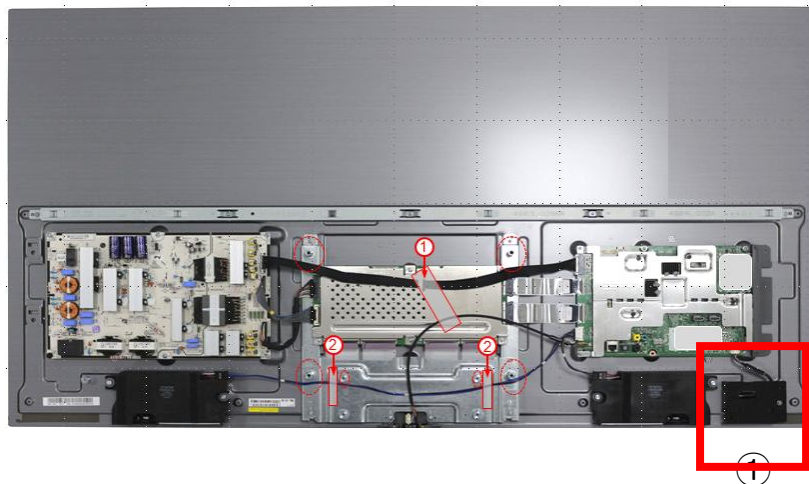
P4101	
1	GND
2	BT_RESET
3	3D_SYNC_RF
4	WOL/WIFI_POWER_ON
5	GND
6	WIFI_DP
7	WIFI_DM
8	3.5V_WIFI

Checking order

1. Check IR cable condition between IR & Main board.
2. Check WIFI Combo cable condition between WIFI Combo Assy & Main board.
3. Check the st-by 3.5V P4102 on the terminal 4
4. Check the 3.5V_WIFI P4101 on the terminal 8

Standard Repair Process Detail Technical Manual

OLED TV	Error symptom	D. Function error	Established date		
	Content	Wifi operation checking method	Revised date		A15



P4000	
1	GND
2	M_RFModule_RESET
3	NOT USE
4	WOL/WIFI_POWER_ON
5	GND
6	WIFI_DP
7	WIFI_DM
8	3.5V_WIFI

Checking order

- 1, 2. Check Wifi cable condition between Wifi assy & Main board.
3. Check the 3.3V on the terminal 8.