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LED TV

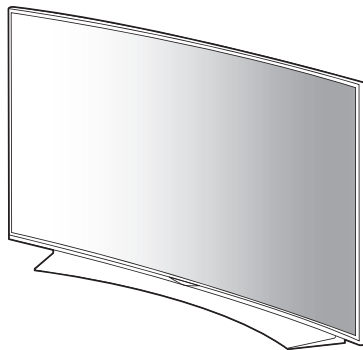
SERVICE MANUAL

CHASSIS : LD53V

MODEL : 65UG870V 65UG870V-ZA
65UG8709 65UG8709-ZA

CAUTION

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



CONTENTS

CONTENTS	2
SAFETY PRECAUTIONS	3
SERVICING PRECAUTIONS.....	4
SPECIFICATION	6
ADJUSTMENT INSTRUCTION	15
BLOCK DIAGRAM.....	25
EXPLODED VIEW	35
SCHEMATIC CIRCUIT DIAGRAM	APPENDIX
TROUBLE SHOOTING GUIDE	APPENDIX

SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by $\triangle$ in the Schematic Diagram and Exploded View.

It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.

Do not modify the original design without permission of manufacturer.

General Guidance

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

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

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

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

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

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

Leakage Current Cold Check(Antenna Cold Check)

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

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

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

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

Leakage Current Hot Check (See below Figure)

Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.

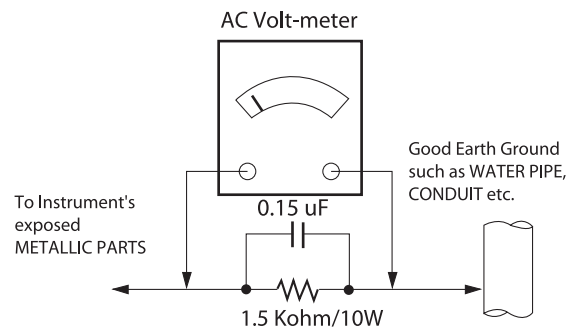
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 μ F capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

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

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

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

Leakage Current Hot Check circuit



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

*Base on Adjustment standard

SERVICING PRECAUTIONS

CAUTION: Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the **SAFETY PRECAUTIONS** on page 3 of this publication.
NOTE: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions. Remember: Safety First.

General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;
 - a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
 - b. Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
 - c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.**CAUTION:** A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.
2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe. Do not test high voltage by "drawing an arc".
3. Do not spray chemicals on or near this receiver or any of its assemblies.
4. Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10 % (by volume) Acetone and 90 % (by volume) isopropyl alcohol (90 % - 99 % strength)
CAUTION: This is a flammable mixture.
Unless specified otherwise in this service manual, lubrication of contacts is not required.
5. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
6. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
7. Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.
Always remove the test receiver ground lead last.
8. Use with this receiver only the test fixtures specified in this service manual.
CAUTION: Do not connect the test fixture ground strap to any heat sink in this receiver.

Electrostatically Sensitive (ES) Devices

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

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.

2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static type solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

General Soldering Guidelines

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range of 500 °F to 600 °F.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25 cm) brush with a metal handle. Do not use freon-propelled spray-on cleaners.
5. Use the following unsoldering technique
 - a. Allow the soldering iron tip to reach normal temperature. (500 °F to 600 °F)
 - b. Heat the component lead until the solder melts.
 - c. Quickly draw the melted solder with an anti-static, suction-type solder removal device or with solder braid.
CAUTION: Work quickly to avoid overheating the circuit board printed foil.
6. Use the following soldering technique.
 - a. Allow the soldering iron tip to reach a normal temperature (500 °F to 600 °F)
 - b. First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
 - c. Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.
CAUTION: Work quickly to avoid overheating the circuit board printed foil.
 - d. Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.

IC Remove/Replacement

Some chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

Removal

1. Desolder and straighten each IC lead in one operation by gently prying up on the lead with the soldering iron tip as the solder melts.
2. Draw away the melted solder with an anti-static suction-type solder removal device (or with solder braid) before removing the IC.

Replacement

1. Carefully insert the replacement IC in the circuit board.
2. Carefully bend each IC lead against the circuit foil pad and solder it.
3. Clean the soldered areas with a small wire-bristle brush. (It is not necessary to reapply acrylic coating to the areas).

"Small-Signal" Discrete Transistor

Removal/Replacement

1. Remove the defective transistor by clipping its leads as close as possible to the component body.
2. Bend into a "U" shape the end of each of three leads remaining on the circuit board.
3. Bend into a "U" shape the replacement transistor leads.
4. Connect the replacement transistor leads to the corresponding leads extending from the circuit board and crimp the "U" with long nose pliers to insure metal to metal contact then solder each connection.

Power Output, Transistor Device

Removal/Replacement

1. Heat and remove all solder from around the transistor leads.
2. Remove the heat sink mounting screw (if so equipped).
3. Carefully remove the transistor from the heat sink of the circuit board.
4. Insert new transistor in the circuit board.
5. Solder each transistor lead, and clip off excess lead.
6. Replace heat sink.

Diode Removal/Replacement

1. Remove defective diode by clipping its leads as close as possible to diode body.
2. Bend the two remaining leads perpendicular y to the circuit board.
3. Observing diode polarity, wrap each lead of the new diode around the corresponding lead on the circuit board.
4. Securely crimp each connection and solder it.
5. Inspect (on the circuit board copper side) the solder joints of the two "original" leads. If they are not shiny, reheat them and if necessary, apply additional solder.

Fuse and Conventional Resistor

Removal/Replacement

1. Clip each fuse or resistor lead at top of the circuit board hollow stake.
2. Securely crimp the leads of replacement component around notch at stake top.

3. Solder the connections.

CAUTION: Maintain original spacing between the replaced component and adjacent components and the circuit board to prevent excessive component temperatures.

Circuit Board Foil Repair

Excessive heat applied to the copper foil of any printed circuit board will weaken the adhesive that bonds the foil to the circuit board causing the foil to separate from or "lift-off" the board. The following guidelines and procedures should be followed whenever this condition is encountered.

At IC Connections

To repair a defective copper pattern at IC connections use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections).

1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. Carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the out-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area and clip off any excess jumper wire.

At Other Connections

Use the following technique to repair the defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.

1. Remove the defective copper pattern with a sharp knife. Remove at least 1/4 inch of copper, to ensure that a hazardous condition will not exist if the jumper wire opens.
2. Trace along the copper pattern from both sides of the pattern break and locate the nearest component that is directly connected to the affected copper pattern.
3. Connect insulated 20-gauge jumper wire from the lead of the nearest component on one side of the pattern break to the lead of the nearest component on the other side. Carefully crimp and solder the connections.

CAUTION: Be sure the insulated jumper wire is dressed so the it does not touch components or sharp edges.

SPECIFICATION

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

1. Application range

This specification is applied to the LED TV used LD53V chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

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

3. Test method

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

4. Model General Specification

No.	Item	Specification	Remarks
1	Market	EU/CIS(PAL Market-37Countries)	DTV & Analog (Total 37 countries) DTV (MPEG2/4, DVB-T) : 26 countrie Germany, Netherland, Switzerland, Hungary, Austria, Slovenia, Bulgaria, France, Spain, Belgium, Luxemburg, Greece, Czech, Turkey, Morocco, Ireland, Latvia, Estonia, Lithuania, Poland, Portugal, Romania, Albania, Bosnia, Slovakia, Belarus DTV (MPEG2/4, DVB-T2) :11 countries UK(Ireland), Sweden, Denmark, Finland, Norway, Ukraine, Kazakhstan, Russia, Italy, Croatia, Serbia DTV (MPEG2/4, DVB-C) : 37 countries Germany, Netherland, Switzerland, Hungary, Austria, Slovenia, Bulgaria, France, Spain, Italy, Belgium, Russia, Luxemburg, Greece, Czech, Croatia, Turkey, Morocco, Ireland, Latvia, Estonia, Lithuania, Poland, Portugal, Romania, Albania, Bosnia, Serbia, Slovakia, Belarus, UK, Sweden, Denmark, Finland, Norway, Ukraine, Kazakhstan DTV (MPEG2/4,DVB-S) : 37 countries Germany, Netherland, Switzerland, Hungary, Austria, Slovenia, Bulgaria, France, Spain,Belgium, Luxemburg, Greece, Czech, Turkey, Morocco, Ireland, Latvia, Estonia, Lithuania, Poland, Portugal, Romania, Albania, Bosnia, Slovakia, Belarus, UK(Ireland), Sweden, Denmark, Finland, Norway, Ukraine, Kazakhstan,Russia, Italy, Croatia, Serbia Supported satellite : 35 satellites ABS1 75.0E, AMOS 4.0W, ASIASEAT3S 105.5E, ASTRA 19.2E, ASTRA 23.5E, ASTRA 28.2E, ASTRA 4.8E, ATLANTIC BIRD2 8.0W, ATLANTIC BIRD3 5.0W, BADR 26.0E, DIRECTV-1R 56.0E, EUROBIRO 9A 9.0E, EUROBIRO3 33.0E, EUTELSAT 36 A/B 36.0E,EUTELSAT W2A 10.0E, EUTELSAT W3A 7.0E, EUTELSAT7WA 7.3WEUTELSAT 16.0E, EXPRESS AM1 40.0E, EXPRESS AM3 140.0E, EXPRESS AM33 96.5E, HELLASAT 39.0E, HISPASAT 1CDE 30.0WHOTBIRD 13.0E, INTEL-SAT10&7 68.5E, INTELAT15 85.2E, INTELAT1R 50.0W, INTEL-SAT903 33.5W, INTELAT904 60.0E, NILESAT 7.0W, NSS12 57.0E, THOR 0.8W, TURKSAT 42.0E,YAMAL201 90.0E, OTHER

No.	Item	Specification	Remarks
2	Broadcasting system	(1) PAL/SECAM B/G/I/D/K, SECAM L/L' (2) DVB-T/T2, C, S/S2	
3	Program coverage	(1) Digital TV - VHF, UHF - C-Band, Ku-Band (2) Analogue TV -VHF : E2 to E12 -UHF : E21 to E69 -CATV : S1 to S20 -HYPER : S21 to S47	
4	Receiving system	Analog : Upper Heterodyne Digital : COFDM, QAM	► DVB-T - Guard Interval(Bitrate_Mbit/s) 1/4, 1/8, 1/16, 1/32 - Modulation : Code Rate QPSK : 1/2, 2/3, 3/4, 5/6, 7/8 16-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 64-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 ► DVB-T2 - Guard Interval(Bitrate_Mbit/s) 1/4, 1/8, 1/16, 1/32, 1/128, 19/128, 19/256, - Modulation : Code Rate QPSK : 1/2, 2/5, 2/3, 3/4, 5/6 16-QAM : 1/2, 2/5, 2/3, 3/4, 5/6 64-QAM : 1/2, 2/5, 2/3, 3/4, 5/6 256-QAM : 1/2, 2/5, 2/3, 3/4, 5/6 ► DVB-C - Symbolrate : 4.0 Msymbols/s to 7.2 Msymbols/s - Modulation : 16QAM, 64-QAM, 128-QAM and 256-QAM ► DVB-S/S2 - symbolrate : DVB-S2 (8PSK / QPSK) : 2 ~ 45 Msymbol/s DVB-S (QPSK) : 2 ~ 45 Msymbol/s - viterbi DVB-S mode : 1/2, 2/3, 3/4, 5/6, 7/8 DVB-S2 mode : 1/2, 2/3, 3/4, 3/5, 4/5, 5/6, 8/9, 9/10
5	Input Voltage	AC 100 ~ 240V 50/60Hz	

5. External Input Format

5.1. 2D Mode

(1) Component (Y, Cb/Pb, Cr/Pr)

No.	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel clock(MHz)	Proposed
1	720*480	15.73	60	13.5135	SDTV ,DVD 480I
2	720*480	15.73	59.94	13.5	SDTV ,DVD 480I
3	720*480	31.50	60	27.027	SDTV 480P
4	720*480	31.47	59.94	27.0	SDTV 480P
5	1280*720	45.00	60.00	74.25	HDTV 720P
6	1280*720	44.96	59.94	74.176	HDTV 720P
7	1920*1080	33.75	60.00	74.25	HDTV 1080I
8	1920*1080	33.72	59.94	74.176	HDTV 1080I
9	1920*1080	67.500	60	148.50	HDTV 1080P
10	1920*1080	67.432	59.94	148.352	HDTV 1080P
11	1920*1080	27.000	24.000	74.25	HDTV 1080P
12	1920*1080	26.97	23.976	74.176	HDTV 1080P
13	1920*1080	33.75	30.000	74.25	HDTV 1080P
14	1920*1080	33.71	29.97	74.176	HDTV 1080P

(2) HDMI(PC/DTV)

1) DTV mode

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	Remarks
1	640*480	31.46	59.94	25.13	SDTV 480P	
2	640*480	31.50	60.00	25.13	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	27.00	SDTV 480P	
7	720*480	31.50	60.00	27.03	SDTV 480P	
8	720*576	31.25	50.00	27.00	SDTV 576P	
9	1280*720	44.96	59.94	74.18	HDTV 720P	
10	1280*720	45.00	60.00	74.25	HDTV 720P	
11	1280*720	37.50	50.00	74.25	HDTV 720P	
12	1920*1080	28.12	50.00	74.25	HDTV 1080I	
13	1920*1080	33.72	59.94	74.18	HDTV 1080I	
14	1920*1080	33.75	60.00	74.25	HDTV 1080I	
15	1920*1080	26.97	23.97	63.30	HDTV 1080P	
16	1920*1080	27.00	24.00	63.36	HDTV 1080P	
17	1920*1080	33.71	29.97	79.12	HDTV 1080P	
18	1920*1080	33.75	30.00	79.20	HDTV 1080P	
19	1920*1080	56.25	50.00	148.50	HDTV 1080P	
20	1920*1080	67.43	59.94	148.35	HDTV 1080P	
21	1920*1080	67.50	60.00	148.50	HDTV 1080P	
22	3840*2160	53.95	23.98	297.00	UDTV 2160P	UHD only
23	3840*2160	54.00	24.00	297.00	UDTV 2160P	UHD only
24	3840*2160	56.25	25.00	297.00	UDTV 2160P	UHD only
25	3840*2160	61.43	29.97	297.00	UDTV 2160P	UHD only
26	3840*2160	67.50	30.00	297.00	UDTV 2160P	UHD only
27	3840*2160	112.50	50.00	594.00	UDTV 2160P(DVB)	UHD only(Port1,2)-LM15U Only
28	3840*2160	135.00	59.94	593.41	UDTV 2160P	UHD only(Port1,2)-LM15U Only
29	3840*2160	135.00	60.00	594.00	UDTV 2160P	UHD only(Port1,2)-LM15U Only
30	4096*2160	53.95	23.98	297.00	UDTV 2160P	UHD only
31	4096*2160	54.00	24.00	297.00	UDTV 2160P	UHD only
32	4096*2160	56.25	25.00	297.00	UDTV 2160P	UHD only
33	4096*2160	61.43	29.97	297.00	UDTV 2160P	UHD only
34	4096*2160	67.50	30.00	297.00	UDTV 2160P	UHD only
35	4096*2160	112.50	50.00	594.00	UDTV 2160P(DVB)	UHD only(Port1,2)-LM15U Only
36	4096*2160	135.00	59.94	593.41	UDTV 2160P	UHD only(Port1,2)-LM15U Only
37	4096*2160	135.00	60.00	594.00	UDTV 2160P	UHD only(Port1,2)-LM15U Only

2) PC mode

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	Remarks
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	40.00	VESA(SVGA)	
5	1024*768	48.36	60.00	65.00	VESA(XGA)	
6	1152*864	54.34	60.05	80.00	VESA	
7	1280*1024	63.98	60.02	109.00	VESA(SXGA)	FHD only
8	1360*768	47.71	60.01	85.00	VESA(WXGA)	
9	1920*1080	67.50	60.00	158.40	WUXGA(CEA 861D)	FHD only
10	3840*2160	67.50	30.00	297.00	UDTV 2160P	UHD only
11	3840*2160	56.25	25.00	297.00	UDTV 2160P	UHD only
12	3840*2160	54.00	24.00	297.00	UDTV 2160P	UHD only
13	4096*2160	53.95	23.97	296.703	UDTV 2160P	UHD only
14	4096*2160	54.00	24.00	297.00	UDTV 2160P	UHD only

6.1. 3D Mode

(1) RF Input

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	Remarks
1	1280*720	37.500	50	74.25	HDTV 720P	2D to 3D, Side by Side, Top & Bottom
2	1920*1080	28.125	50	74.25	HDTV 1080I	2D to 3D, Side by Side, Top & Bottom

(2) HDMI Input (3D Supported mode manually)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	VIC	3D input proposed mode	Proposed
1	640*480	31.469 / 31.5	59.94/ 60	25.125/25.2	1	Top-and-Bottom Side-by-side(half)	Secondary(SDTV 480P) Secondary(SDTV 480P)
		31.469 / 31.5	59.94/ 60	50.35/50.4	1	Side-by-side(Full)	(SDTV 480P)
		62.938/63	59.94/ 60	50.35/50.4	1	Frame packing Line alternative	Secondary(SDTV 480P) (SDTV 480P)
2	720*480	31.469 / 31.5	59.94 / 60	27.00/27.03	2,3	Top-and-Bottom Side-by-side(half)	Secondary(SDTV 480P) Secondary(SDTV 480P)
		31.469 / 31.5	59.94 / 60	54/54.06	2,3	Side-by-side(Full)	(SDTV 480P)
		62.938/63	59.94 / 60	54/54.06	2,3	Frame packing Line alternative	Secondary(SDTV 480P) (SDTV 480P)
3	720*576	31.25	50	27	17,18	Top-and-Bottom Side-by-side(half)	Secondary(SDTV 576P) Secondary(SDTV 576P)
		31.25	50	54	17,18	Side-by-side(Full)	(SDTV 576P)
		62.5	50	54	17,18	Frame packing Line alternative	Secondary(SDTV 576P) (SDTV 576P)
4	1280*720	37.50	50	74.25	19	Top-and-Bottom Side-by-side(half)	Primary(HDTV 720P) Primary(HDTV 720P)
		37.50	50	148.5	19	Side-by-side(Full)	(HDTV 720P)
		44.96 / 45	59.94 / 60	74.17/74.25	4	Frame packing Line alternative	Primary(HDTV 720P) (HDTV 720P)
		44.96 / 45	59.94 / 60	148.35/148.5	4	Side-by-side(Full)	(HDTV 720P)
		75.00	50.00	148.50	19	Top-and-Bottom Side-by-side(half)	Primary(HDTV 720P) Primary(HDTV 720P)
		89.91/90	59.94 / 60	148.35/148.5	4	Frame packing Line alternative	Primary(HDTV 720P) (HDTV 720P)
5	1920*1080	28.12	50.00	74.25	20	Frame packing Line alternative	Secondary(HDTV 1080I) Primary(HDTV 1080I)
		28.12	50.00	148.50	20	Side-by-side(Full)	(HDTV 1080I)
		33.72 / 33.75	59.94 / 60.00	74.17/74.25	5	Top-and-Bottom Side-by-side(half)	Secondary(HDTV 1080I) Primary(HDTV 1080I)
		33.72 / 33.75	59.94 / 60.00	148.35/148.50	5	Side-by-side(Full)	(HDTV 1080I)
		56.25	50.00	148.50	20	Frame packing Field alternative	Primary(HDTV 1080I) (HDTV 1080I)
		67.43/67.50	59.94 / 60.00	148.35/148.50	5	Frame packing Field alternative	Primary(HDTV 1080I) (HDTV 1080I)
		26.97 / 27.00	23.97 / 24.00	74.17 / 74.25	32	Top-and-Bottom Side-by-side(half)	Primary(HDTV 1080P) Primary(HDTV 1080P)
		26.97 / 27.00	23.97 / 24.00	148.35 / 148.50	32	Side-by-side(Full)	(HDTV 1080P)
		28.12	25.00	74.25	33	Top-and-Bottom Side-by-side(half)	Secondary(HDTV 1080P) Secondary(HDTV 1080P)
		28.12	25.00	148.50	33	Side-by-side(Full)	(HDTV 1080P)
		33.71 / 33.75	29.97 / 30.00	74.18/74.25	34	Side-by-side(Full)	(HDTV 1080P)
		33.71 / 33.75	29.97 / 30.00	148.35/148.50	34	Frame packing Line alternative	Primary(HDTV 1080P) (HDTV 1080P)
		43.94/54.00	23.97 / 24.00	148.35/148.50	32	Frame packing Line alternative	Secondary(HDTV 1080P) (HDTV 1080P)
		56.25	25.00	148.50	33	Frame packing Line alternative	Primary(HDTV 1080P) (HDTV 1080P)
		67.43 / 67.5	29.97 / 30.00	148.35/148.50	34	Frame packing Line alternative	Primary(HDTV 1080P) (HDTV 1080P)
		56.25	50.00	148.50	31	Top-and-Bottom Side-by-side(half)	Primary(HDTV 1080P) Secondary(HDTV 1080P)
		67.43 / 67.50	59.94 / 60.00	148.35/148.50	16	Top-and-Bottom Side-by-side(half)	Primary(HDTV 1080P) Secondary(HDTV 1080P)

(3) DTV(3D) (3D supported mode automatically)

No.	Signal	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	3D input proposed mode
1	Frame compatible	-	-	-	-	Side by Side(half), Top & Bottom

(4) DTV/ATV(CVBS/SCART) Input(3D) (3D supported mode manually)

No.	Signal	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	3D input proposed mode
1	HD/SD	-	-	-	-	2D to 3D, Side by Side(half) Top & Bottom
2	SD	-	-	-	-	

(5) Component Input (3D) (3D Supported mode manually)

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	3D input proposed mode
1	1280*720	37.50	50.00	74.25	HDTV 720P	2D to 3D, Side by Side(half), Top & Bottom
2	1280*720	45.00	60.00	74.25	HDTV 720P	2D to 3D, Side by Side(half), Top & Bottom
3	1280*720	44.96	59.94	74.18	HDTV 720P	2D to 3D, Side by Side(half), Top & Bottom
4	1920*1080	33.75	60.00	74.25	HDTV 1080I	2D to 3D, Side by Side(half), Top & Bottom
5	1920*1080	33.72	59.94	74.18	HDTV 1080I	2D to 3D, Side by Side(half), Top & Bottom
6	1920*1080	28.12	50.00	74.25	HDTV 1080I	2D to 3D, Side by Side(half), Top & Bottom
7	1920*1080	67.50	60.00	148.50	HDTV 1080P	2D to 3D, Side by Side(half), Top & Bottom
8	1920*1080	67.43	59.94	148.35	HDTV 1080P	2D to 3D, Side by Side(half), Top & Bottom
9	1920*1080	27.00	24.00	74.25	HDTV 1080P	2D to 3D, Side by Side(half), Top & Bottom
10	1920*1080	28.12	25.00	74.25	HDTV 1080P	2D to 3D, Side by Side(half), Top & Bottom
11	1920*1080	56.25	50.00	74.25	HDTV 1080P	2D to 3D, Side by Side(half), Top & Bottom
12	1920*1080	26.97	23.97	74.18	HDTV 1080P	2D to 3D, Side by Side(half), Top & Bottom
13	1920*1080	33.75	30.00	74.25	HDTV 1080P	2D to 3D, Side by Side(half), Top & Bottom
14	1920*1080	33.71	29.97	74.18	HDTV 1080P	2D to 3D, Side by Side(half), Top & Bottom

(6) HDMI-PC Input (3D) (3D supported mode manually)

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	3D input proposed mode
1	1024*768	48.36	60.00	65.00	HDTV 768P	2D to 3D, Side by Side(half), Top & Bottom
2	1360*768	47.71	60.00		HDTV 768P	
3	1920*1080	67.50	60.00	148.50	HDTV 1080P	2D to 3D, Side by Side(half), Top & Bottom, Checker Board, Frame Sequential, Row Interleaving, Column Interleaving
4	3840*2160 (Ultra HD model only)	54.00	24.00	296.70	HDTV 2160P	2D to 3D, Top & Bottom(half) Side by Side(half)
		56.25	25.00	297.00		
		67.50	30.00	296.70		
5	4096*2160 (Ultra HD model only)	54	24.00	297.00	HDTV 2160P	
6	Others	-	-	-	640*350 720*400 640*480 800*600 1152*864	2D to 3D, Side by Side(half), Top & Bottom

(7) HDMI-DTV (3D supported mode manually)

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	3D input proposed mode
1	720*480	31.50	60.00	27.03	SDTV 480P	2D to 3D, Side by Side(Half), Top & Bottom, Checker Board, Frame Sequential, Row Interleaving, Column Interleaving
2	720*576	31.25	50.00	27.00	SDTV 576P	
3	1280*720	45.00	60.00	74.25	HDTV 720P	
		37.50	50.00	74.25	HDTV 720P	
4	1920*1080	33.75	60.00	74.25	HDTV 1080I	2D to 3D, Side by Side(Half), Top & Bottom
		28.12	50.00	74.25	HDTV 1080I	
5	1920*1080	27.00	24.00	74.25	HDTV 1080P	2D to 3D, Side by Side(Half), Top & Bottom, Checker Board, Row Interleaving, Column Interleaving
		28.12	25.00	74.25	HDTV 1080P	
		33.75	30.00	74.25	HDTV 1080P	
		67.50	60.00	148.50	HDTV 1080P	2D to 3D, Side by Side(Half), Top & Bottom, Checker Board, Single Frame Sequential, Row Interleaving, Column Interleaving
		56.25	50.00	148.50	HDTV 1080P	
6	3840*2160 4096*2160 (Ultra HD model only)	53.95	23.97	297.00	HDTV 2160P	2D to 3D, Top & Bottom(half), Side by Side(half)
		54.00	24.00	296.70		
		56.25	25.00	297.00		
		61.43	29.97	297.00		
		67.50	30.00	296.70		
		112.50	50.00(HDMI1, HDMI2 Only)	594.00	HDTV 2160P	2D to 3D, Side by Side(half), Top & Bottom
		135.00	60.00(HDMI1, HDMI2 Only)	594.00		

(8) USB - Movie (3D) (3D supported mode manually)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	3D input proposed mode
1	Under 704x480	-	-	-	2D to 3D
2	Over 704x480 Under 1080P interlaced	-	-	-	2D to 3D, Side by Side(Half), Top & Bottom
3	Over 704x480 Under 1080P progressive	-	50 / 60	-	2D to 3D, Side by Side(Half), Top & Bottom, Checker Board, Row Interleaving, Column Interleaving
		-	others	-	2D to 3D, Side by Side(Half), Top & Bottom, Checker Board, Row Interleaving, Column Interleaving
4	Over 2160P (Ultra HD model only)	-	24/25/30/50/60	-	2D to 3D, Side by Side(Half), Top & Bottom

(9) USB, DLNA -Photo (3D) (3D supported mode manually)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	3D input proposed mode
1	USB(photo)	-	-	-	2D to 3D, Side by Side(Half), Top & Bottom

(10) Miracast Intel WIDI (3D supported mode manually)

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

(11) USB, DLNA (3D) (3D supported mode automatically)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	3D input proposed mode
1	1080p	33.75	30	74.25	Side by Side(Half), Top & Bottom, Checker Board MPO(Photo), JPS(Photo)
2	2160p	67.5	30	297	

■ Remark: 3D Input mode

No.	Side by Side	Top & Bottom	Checker board	Single Frame Sequential	Frame Packing	Row Interleaving	Column Interleaving	2D to 3D
1								

ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied to all of the LED TV with LD53V chassis.

2. Designation

- (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 $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ of temperature and $65\% \pm 10\%$ of relative humidity if there is no specific designation.
- (4) The input voltage of the receiver must keep AC 100-240 V~, 50/60 Hz.
- (5) The receiver must be operated for about 5 minutes prior to the adjustment when module is in the circumstance of over 15.

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.

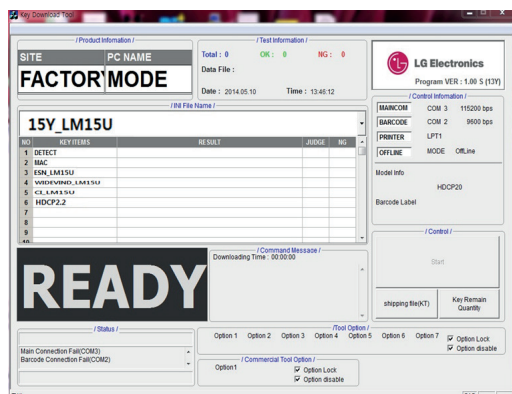
3. Automatic Adjustment

3.1. MAC address D/L, CI+ key D/L, Widevine key D/L, ESN D/L, HDCP20 D/L

Connect: USB port

Communication Prot connection

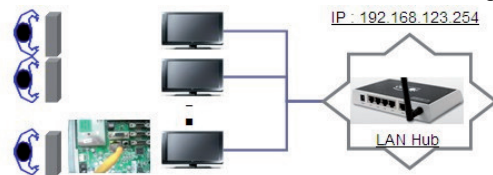
- Com 1,2,3,4 and 115200(Baudrate)
- Mode check: Online Only
- Check the test process
- DETECT → MAC → ESN → Widevine → CI → HDCP20
- Result: Ready, Test, OK or NG
- Printer Out (MAC Address Label)



3.2. LAN Inspection

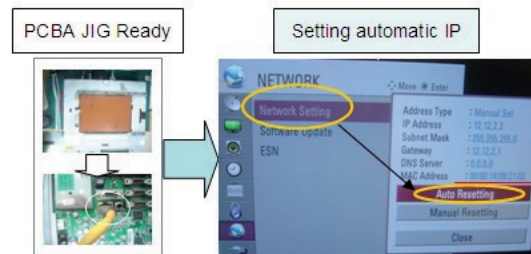
3.2.1. Equipment & Condition

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



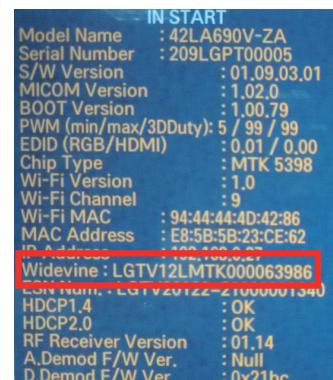
3.2.2. LAN inspection solution

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



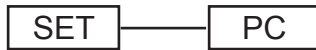
3.2.3. WIDEVINE key Inspection

- Confirm key input data at the "IN START" MENU Mode.



3.3. LAN PORT INSPECTION(PING TEST)

Connect SET → LAN port == PC → LAN Port

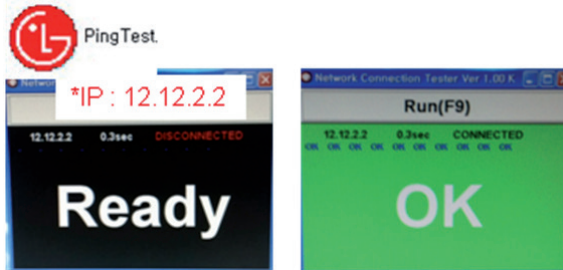


3.3.1. Equipment setting

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

3.3.2. LAN PORT inspection(PING TEST)

- (1) Play the LAN Port Test Program.
- (2) Connect each other LAN Port Jack.
- (3) Play Test (F9) button and confirm OK Message.
- (4) Remove LAN cable.



3.4. Model name & Serial number Download

3.4.1. Model name & Serial number D/L

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

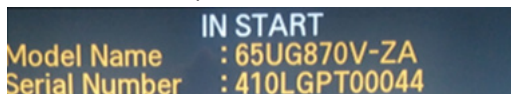
3.4.2. Method & notice

- (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.

* Manual Download (Model Name and Serial Number)

If the TV set is downloaded by OTA or service man, sometimes model name or serial number is initialized.(Not always)
It is impossible to download by bar code scan, so It need Manual download.

- 1) Press the "Instart" key of Adjustment remote control.
- 2) Go to the menu "7.Model Number D/L" like below photo.
- 3) Input the Factory model name(ex 65UG870V-ZA) or Serial number like photo.

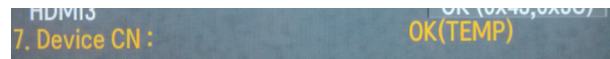


- 4) Check the model name Instart menu. → Factory name displayed. (ex 65UG870V-ZA)
- 5) Check the Diagnostics.(DTV country only) → Buyer model displayed. (ex 65UG870V-ZA)

3.5. CI+ Key checking method

- Check the Section 3.1

Check whether the key was downloaded or not at 'In Start' menu. (Refer to below).



=> Check the Download to CI+ Key value in LGset.

3.5.1. Check the method of CI+ Key value

- (1) Check the method on Instart menu
- (2) Check the method of RS232C Command

1) Into the main ass'y mode(RS232: aa 00 00)

CMD 1	CMD 2	Data 0
A	A	0 0

2) Check the key download for transmitted command (RS232: ci 00 10)

CMD 1	CMD 2	Data 0
C	I	1 0

3) Result value

- Normally status for download : OKx
- Abnormally status for download : NGx

3.5.2. Check the method of CI+ key value(RS232)

1) Into the main ass'y mode(RS232: aa 00 00)

CMD 1	CMD 2	Data 0
A	A	0 0

2) Check the mothed of CI+ key by command (RS232: ci 00 20)

CMD 1	CMD 2	Data 0
C	I	2 0

3) Result value

i 01 OK 1d1852d21c1ed5dcx

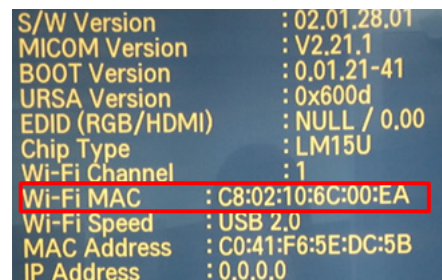
→ CI+ Key Value

3.6. WIFI MAC ADDRESS CHECK

(1) Using RS232 Command

	H-freq(kHz)	V-freq.(Hz)
Transmission	[A][I][Set ID][20][Cr]	[O][K][X] or [NG]

(2) Check the menu on in-start



HDMI 2(C/S : E6 5F) - HDMI UHD Deep off case
EDID Block 0, Bytes 0-127 [00H-7FH]

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01	01
01	19	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26	26
0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80	80
01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C	58
45	00	40	84	63	00	00	1E	66	21	50	B0	51	00	1B	30	40
40	70	36	00	40	84	63	00	00	1E	00	00	00	FD	00	3A	3A
3E	1E	53	10	00	0A	20	20	20	20	20	20	00	00	00	FC	FC
00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	E6	A0

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

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
80	02	03	40	F1	54	10	9F	04	13	05	14	03	02	12	20	21
90	22	15	01	5D	5E	5F	62	63	64	23	09	57	07	7C	03	0C
A0	00	20	00	B8	3C	20	C0	8E	01	02	03	04	01	4F	3F	FC
B0	08	10	18	10	06	10	16	10	28	10	E5	0E	60	61	65	66
C0	01	1D	80	18	71	1C	16	20	58	2C	25	00	40	84	63	00
D0	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00	40	84
E0	63	00	00	1E	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	5F

HDMI 3(C/S : E6 4F) - HDMI UHD Deep off case
EDID Block 0, Bytes 0-127 [00H-7FH]

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01	01
01	01	19	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
0F	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C	58
45	45	00	40	84	63	00	00	1E	66	21	50	B0	51	00	1B	30
40	40	70	36	00	40	84	63	00	00	1E	00	00	00	FD	00	3A
3E	3E	1E	53	10	00	0A	20	20	20	20	20	20	00	00	00	FC
00	00	4C	47	20	54	56	0A	20	20	20	20	20	20	01	E6	A0

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

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
80	02	03	40	F1	54	10	9F	04	13	05	14	03	02	12	20	21
90	22	15	01	5D	5E	5F	62	63	64	23	09	57	07	7C	03	0C
A0	00	30	00	B8	3C	20	C0	8E	01	02	03	04	01	4F	3F	FC
B0	08	10	18	10	06	10	16	10	28	10	E5	0E	60	61	65	66
C0	01	1D	80	18	71	1C	16	20	58	2C	25	00	40	84	63	00
D0	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00	40	84
E0	63	00	00	1E	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	4F

* Checksum(HDMI 1/2/3)

Input	HDMI Deep Color On FFh (Checksum)		HDMI Deep Color Off FFh (Checksum)	
HDMI1	A0	19	E6	6F
HDMI2	A0	09	E6	5F
HDMI3	E6	4F	E6	4F

4.1.5. Green Eye Inspection Guide

(Only use Germany and CIS, Spec out other EU country)

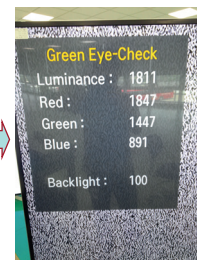
Step 1) Turn on the TV set.

Step 2). Press "EYE" button on the Adjustment remote control.



Step 3) Block the Intelligent Sensor module on the front C/A about 6 seconds. When the "Sensor Data" is lower than 20, you can see the "OK" message
→ If it doesn't show "OK" message, the Sensor Module is defected one.

You have to replace that with a good one.



Step 4) After check the "OK" message come out, take out your hand from the Sensor module.

→ Check "Backlight" value change from "0" to "100" or not. If it doesn't change the value, the sensor is also defected one.

You have to replace it.

4.2. White Balance Adjustment

4.2.1. Overview

• W/B adj. Objective & How-it-works

(1) Objective: To reduce each Panel's W/B deviation

(2) How-it-works : When R/G/B gain in the OSD is at 192, it means the panel is at its Full Dynamic Range. In order to prevent saturation of Full Dynamic range and data, one of R/G/B is fixed at 192, and the other two is lowered to find the desired value.

(3) Adjustment condition : normal temperature

1) Surrounding Temperature : 25 °C ± 5 °C

2) Warm-up time: About 5 Min

3) Surrounding Humidity : 20 % ~ 80 %

4.2.2. Equipment

(1) Color Analyzer: CA-210 (LED Module : CH 14)

(2) Adjustment Computer(During auto adj., RS-232C protocol is needed)

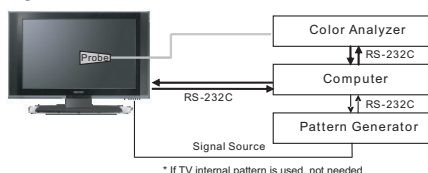
(3) Adjustment Remote control

(4) Video Signal Generator MSPG-925F 720p/216-Gray (Model: 204, Pattern: 49)

→ Only when internal pattern is not available

• Color Analyzer Matrix should be calibrated using CS-100.

4.2.3. Equipment connection MAP



4.2.4. Adj. Command (Protocol)

<Command Format>

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

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

- RS-232C Command used during auto-adjustment.

RS-232C COMMAND [CMD ID DATA]			Explanation
wb	00	00	Begin White Balance adjustment
wb	00	10	Gain adjustment(internal white pattern)
wb	00	1f	Gain adjustment completed
wb	00	20	Offset adjustment(internal white pattern)
wb	00	2f	Offset adjustment completed
wb	00	ff	End White Balance adjustment (internal pattern disappears)

- Ex) wb 00 00 → Begin white balance auto-adj.
wb 00 10 → Gain adj.
ja 00 ff → Adj. data
jb 00 c0
...
...
wb 00 1f → Gain adj. completed
*(wb 00 20(Start), wb 00 2f(end)) → Off-set adj.
wb 00 ff → End white balance auto-adj.

- Adj. Map

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

4.2.5. Adj. method

- (1) Auto adj. method

- 1) Set TV in adj. mode using POWER ON key.
- 2) Zero calibrate probe then place it on the center of the Display.
- 3) Connect Cable.(RS-232C to USB)
- 4) Select mode in adj. Program and begin adj.
- 5) When adj. is complete (OK Sign), check adj. status pre mode. (Warm, Medium, Cool)
- 6) Remove probe and RS-232C cable to complete adj.

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

- (2) Manual adjustment. method

- 1) Set TV in Adj. mode using POWER ON.
- 2) Zero Calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10 cm of the surface.
- 3) Press ADJ key → EZ adjust using adj. R/C → 7. White-Balance then press the cursor to the right(key ►).
(When right 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) Adjustment is performed in COOL, MEDIUM, WARM 3 modes of color temperature.

** G-fix adjustment

Adjust modes (Cool), Fix the G gain to 172 (default data) and change the others (G/B Gain).
Adjust two modes(Medium / Warm), Fix the one of R/G/B gain to 192 (default data) and decrease the others.
If internal pattern is not available, use RF input. In EZ Adj. menu 7.White Balance, you can select one of 2 Test-pattern: ON, OFF. Default is inner(ON). By selecting OFF, you can adjust using RF signal in 216 Gray pattern.

- Adjustment 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 10 cm and perpendicular of the module surface (80° ~ 100°)
- 3) Aging time
- After Aging Start, Keep the Power ON status during 5 Minutes.
- In case of LCD, Back-light on should be checked using no signal or Full-white pattern.

4.2.6. Reference (White balance adjustment coordinate and color temperature)

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

Mode	Coordinate		Temp	Δuv
	x	y		
Cool	0.271	0.270	13000 K	0.0000
Medium	0.286	0.289	9300 K	0.0000
Warm	0.313	0.329	6500 K	0.0000

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

Mode	Coordinate		Temp	Δuv
	x	y		
Cool	0.271 $\pm$ 0.002	0.270 $\pm$ 0.002	13000 K	0.0000
Medium	0.286 $\pm$ 0.003	0.289 $\pm$ 0.003	9300 K	0.0000
Warm	0.313 $\pm$ 0.002	0.329 $\pm$ 0.002	6500 K	0.0000

4.2.7. EDGE & IOL LED White balance table

- Edge & ALEF LED module change color coordinate because of aging time.
- Apply under the color coordinate table, for compensated aging time.
- (Normal line) Edge & ALEF LED White balance table
- gumi(Mar.~Dec.) & Global
Model : (normal line)LGD, CMI

	Aging time (Min)	Cool		Medium		Warm	
		x	y	x	y	x	y
		271	270	286	289	313	329
1	0-2	277	282	292	301	319	340
2	3-5	276	280	291	299	318	339
3	6-9	275	277	290	296	317	336
4	10-19	274	275	289	294	316	334
5	20-35	273	274	288	293	315	333
6	36-49	273	272	288	291	315	331
7	50-79	272	271	287	290	314	330
8	80-119	272	271	287	290	314	330
9	Over 120	271	270	286	289	313	329

- gumi(Jan~Feb) & Global
Model : (normal line)LGD
Same as non-winter table

	Aging time (Min)	Cool		Medium		Warm	
		x	y	x	y	x	y
		271	270	286	289	313	329
1	0-2	277	282	292	301	319	340
2	3-5	276	280	291	299	318	339
3	6-9	275	277	290	296	317	336
4	10-19	274	275	289	294	316	334
5	20-35	273	274	288	293	315	333
6	36-49	273	272	288	291	315	331
7	50-79	272	271	287	290	314	330
8	80-119	272	271	287	290	314	330
9	Over 120	271	270	286	289	313	329

4.2.8. OLED White balance table

(1) Cool Mode

- 1) Purpose : Especially B-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 B gain more than 192 (If R gain or G gain is more than 255, G gain can adjust less than 192) and change the others (R/G Gain).
- 3) Adjustment mode : mode - Cool

(2) Medium

- 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 B gain to 192 (default data) and decrease the others.
- 3) Adjustment mode : mode - Medium

(3) Warm

- 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 W gain to 192 (default data) and decrease the others.
- 3) Adjustment mode : mode - Warm

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

- Luminance: 204 Gray, 80IRE
- Standard color coordinate and temperature using CS-1000 (over 26 inch)

Mode	Coordinate		Temp	Δuv
	x	y		
Cool	0.277	0.278	11,000 K	- 0.0030
Medium	0.286	0.289	9,300 K	0.0000
Warm	0.313	0.329	6,500 K	+ 0.0030

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

Mode	Coordinate		Temp	Δuv
	x	y		
Cool	0.277 $\pm$ 0.002	0.278 $\pm$ 0.002	11000 K	- 0.0030
Medium	0.286 $\pm$ 0.003	0.289 $\pm$ 0.003	9300 K	0.0000
Warm	0.313 $\pm$ 0.002	0.329 $\pm$ 0.002	6500 K	+ 0.0030

4.3. Local Dimming Function Check

- (1) Turn on TV.
- (2) At the Local Dimming mode, module Edge Backlight moving right to left Back light of IOP module moving.
- (3) Confirm the Local Dimming mode.
- (4) Press "exit" Key.



4.4. Magic Motion Remote control test

- Equipment : RF Remote control for test, IR-KEY-Code Remote control for test
- You must confirm the battery power of RF-Remote control before test(recommend that change the battery per every lot)
- Sequence (test)
 - 1) If you select the 'start key(OK)' on the Adjustment remote control, you can pairing with the TV SET.
 - 2) You can check the cursor on the TV Screen, when select the "OK" key on the Adjustment remote control.
 - 3) You must remove the pairing with the TV Set by select 'Mute + OK Key' on the Adjustment remote control.

4.5. 3D function test

(Pattern Generator MSHG-600, MSPG-6100[Support HDMI1.4])
 * HDMI mode NO. 872 , pattern No.83

- (1) Please input 3D test pattern like below.



- (2) When 3D OSD appear automatically, then select green key.



- (3) Don't wear a 3D Glasses, Check the picture like below.



4.6. Option selection per country

4.6.1. Overview

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

4.6.2. Method

- (1) Press "ADJ" key on the Adjustment remote control, then select Country Group Menu.
- (2) Depending on destination, select Country Group Code or Country Group then on the lower Country option, select US, CA, MX. Selection is done using +, - or ►◀ KEY.

4.7. HDMI ARC Function Inspection

- (1) Test equipment
 - Optic Receiver Speaker
 - MSHG-600 (SW: 1220 ↑)
 - HDMI Cable (for 1.4 version)
- (2) Test method
 - 1) Insert the HDMI Cable to the HDMI ARC port from the master equipment. (HDMI2)



- 2) Check the sound from the TV Set.



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

4.8. Tool Option selection

- Method : Press "ADJ" key on the Adjustment remote control, then select Tool option.

Model	EU/CIS	Tool 1	Tool 2	Tool 3	Tool 4	Tool 5	Tool 6	Tool 7	Tool 9
65UG87_V-Z	EU	34537	4628	58041	64601	59558	2379	37007	3
65UG87_9-Z	EU	34537	4628	58041	64601	59558	2379	37519	3
65UG87_V-Z	CIS	34537	4632	58009	64601	59558	2379	37519	3

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

- After final inspection, press In-Stop key of the Adjustment remote control and check that the unit goes to Stand-by mode.

5. GND and Internal Pressure check

5.1. Method

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

5.2. Checkpoint

- TEST voltage
 - GND: 1.5 KV / min at 100 mA
 - SIGNAL: 3 KV / min at 100 mA
- TEST time: 1 second
- TEST POINT
 - GND TEST = POWER CORD GND & SIGNAL CABLE METAL GND
 - Internal Pressure TEST = POWER CORD GND & LIVE & NEUTRAL
- LEAKAGE CURRENT: At 0.5 mArms

6. Audio

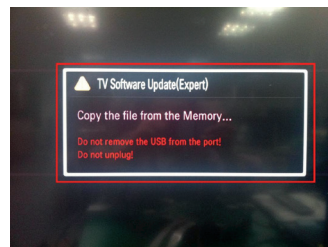
No.	Item	Min	Typ	Max	Unit	
1	Audio practical max Output, L/R (Distortion=10% max Output)		10	12	W	EQ Off AVL Off Clear Voice Off
			8.10	10.8	Vrms	
2	Speaker (8 Ω Impedance)		10	12	W	EQ On AVL On Clear Voice On

Measurement condition:

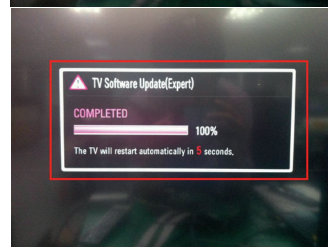
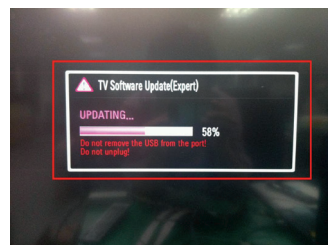
- (1) RF input: Mono, 1 KHz sine wave signal, 100 % Modulation
- (2) CVBS, Component: 1 KHz sine wave signal 0.5 Vrms

7. USB S/W Download(Service only)

- (1) Put the USB Stick to the USB socket.
- (2) Go to General menu then enter to About This TV.
 - If your downloaded program version in USB Stick is older, it didn't work.
 - But your downloaded version is newer, USB data is automatically detecting. (Download Version High & Power only mode, Set is automatically Download)
- (3) Show the message "Copying files from memory".



- (4) Updating is starting.
- (5) Updating completed, the TV will restart automatically



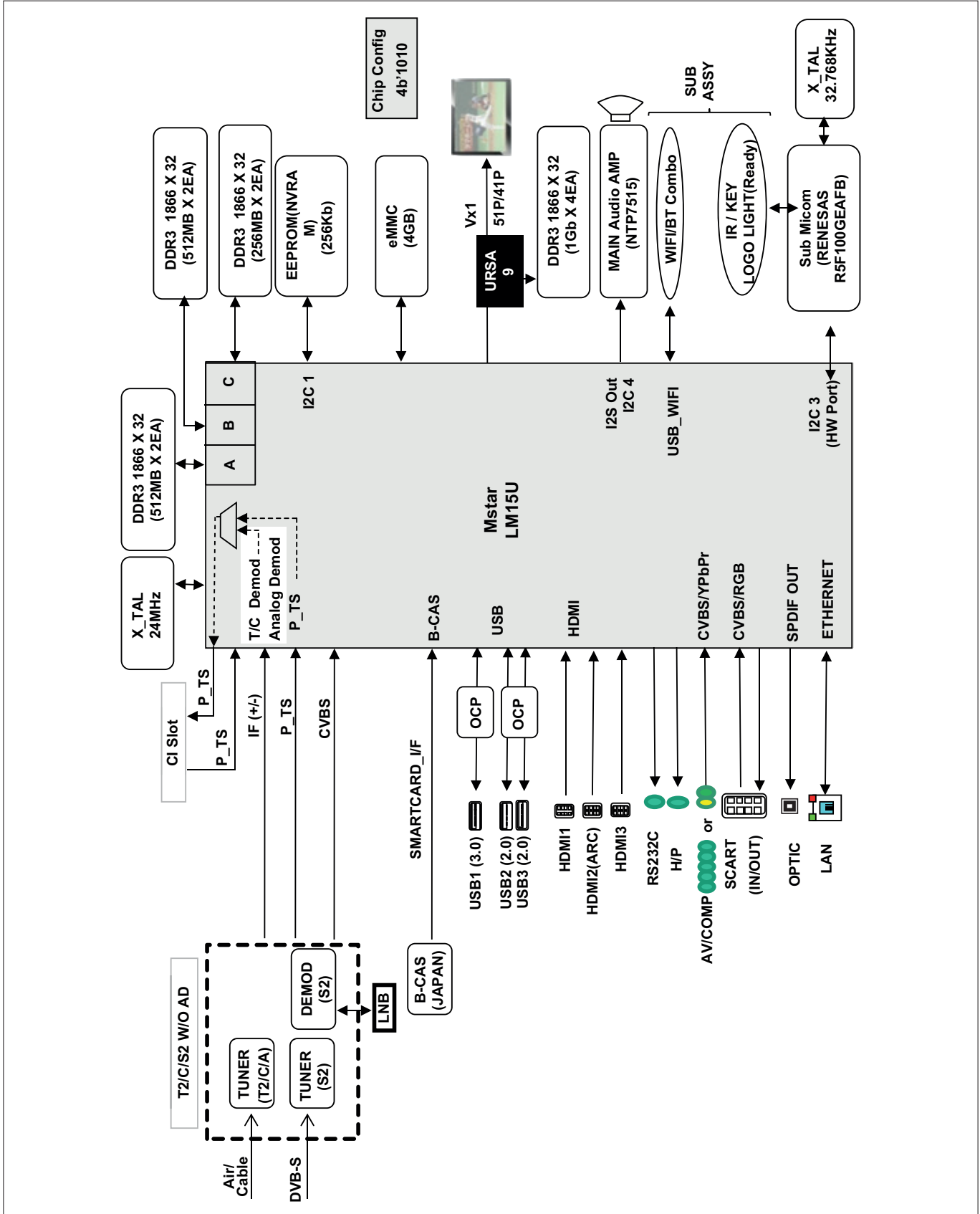
- (6) If your TV is turned on, check your updated version and Tool option. (explain the Tool option, next stage)
 - * If downloading version is more new than your TV have, TV can lost all channel data. In this case, you have to channel recover. if all channel data is cleared, you didn't have a DTV/ATV test on production line.

* After downloading, have to adjust Tool Option again.

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

BLOCK DIAGRAM

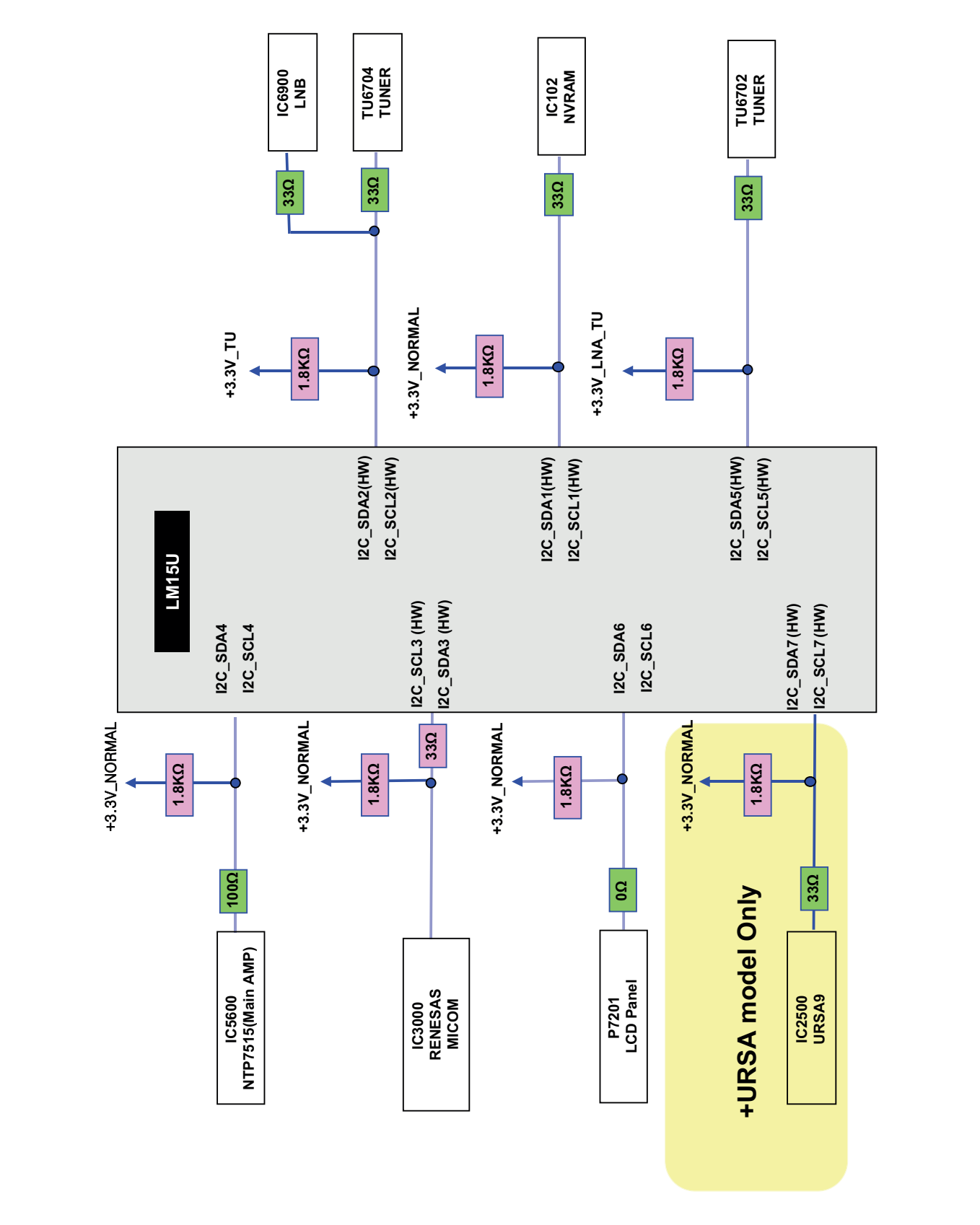
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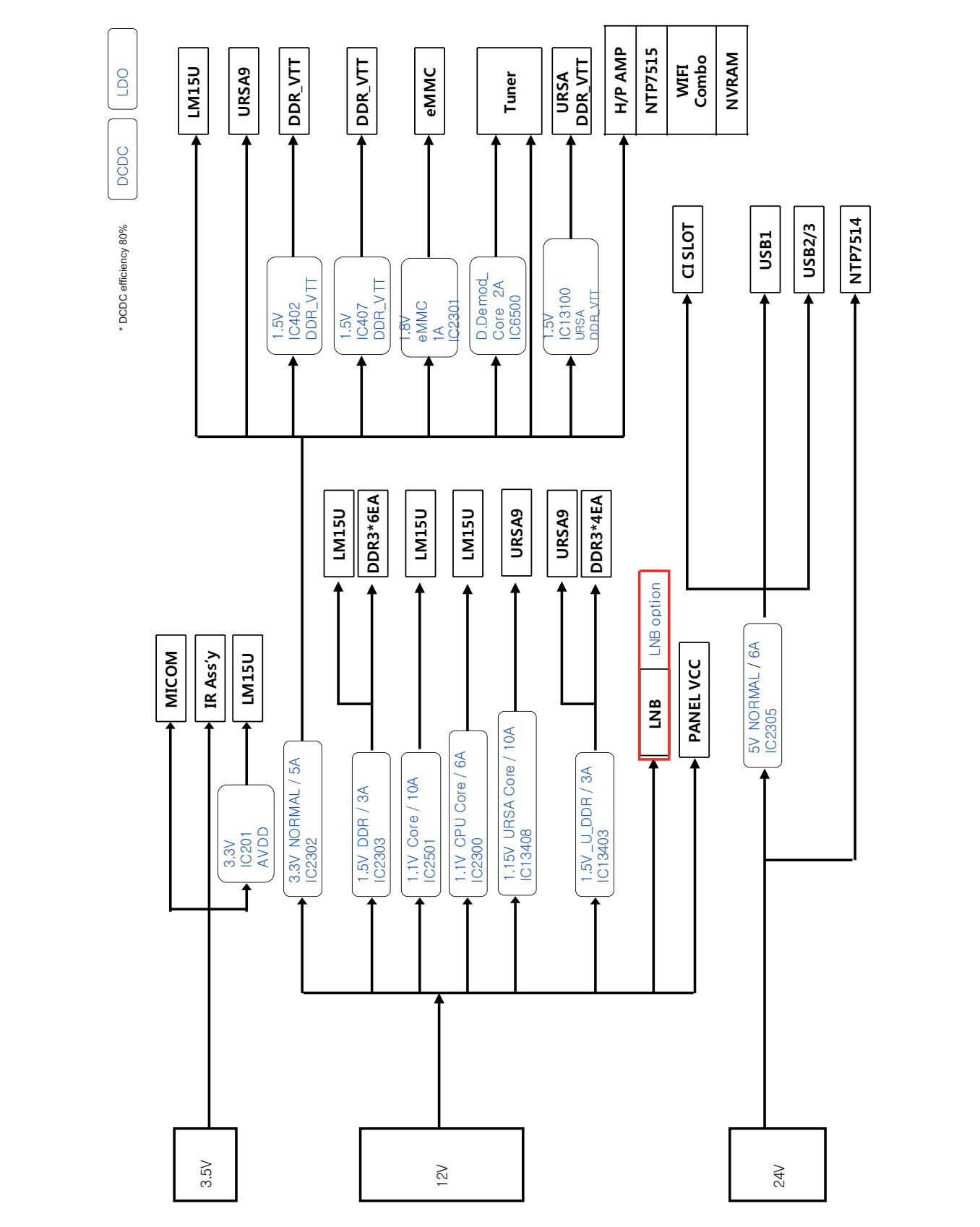
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Only for training and service purposes



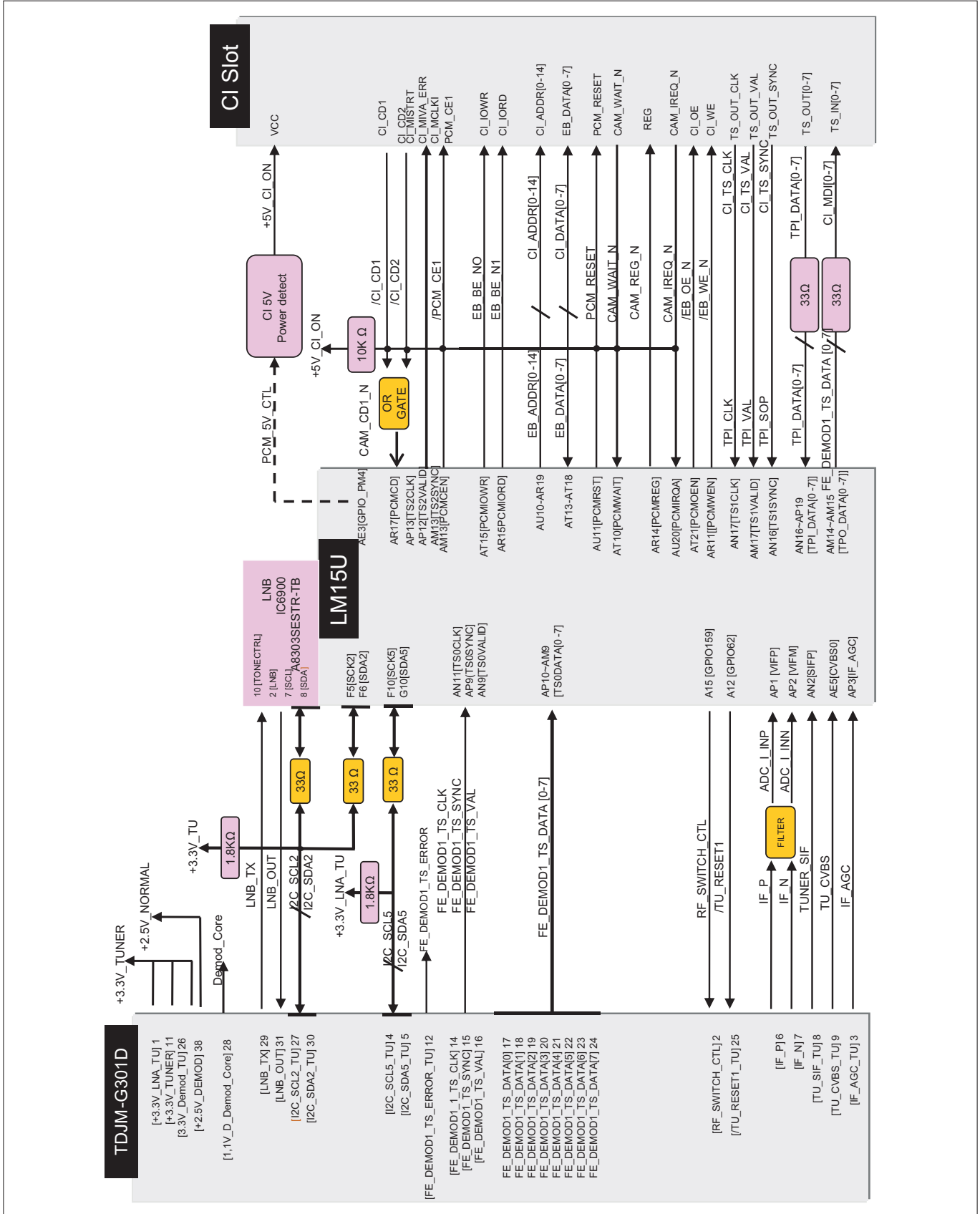
3. I2C



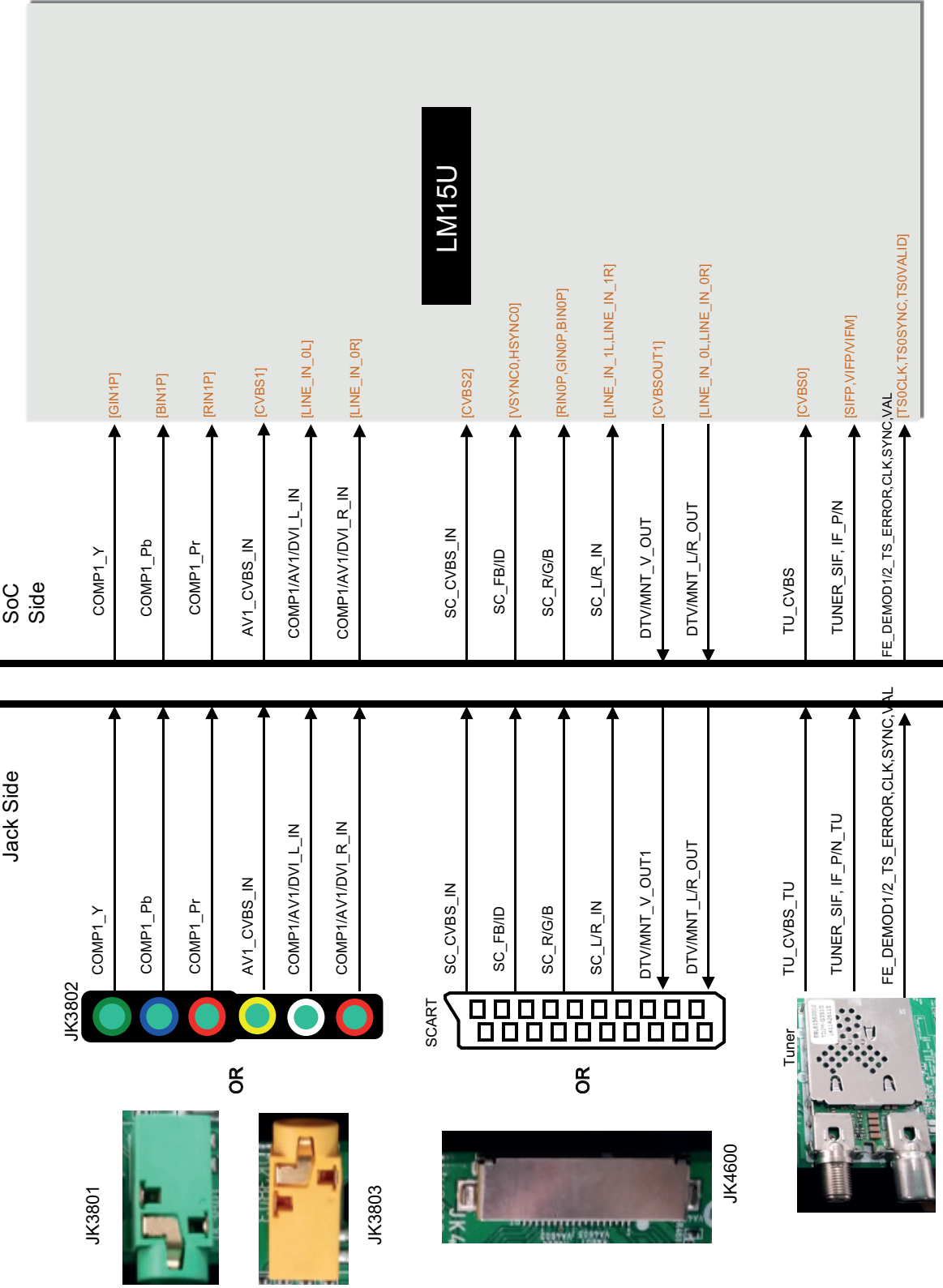
5. Power



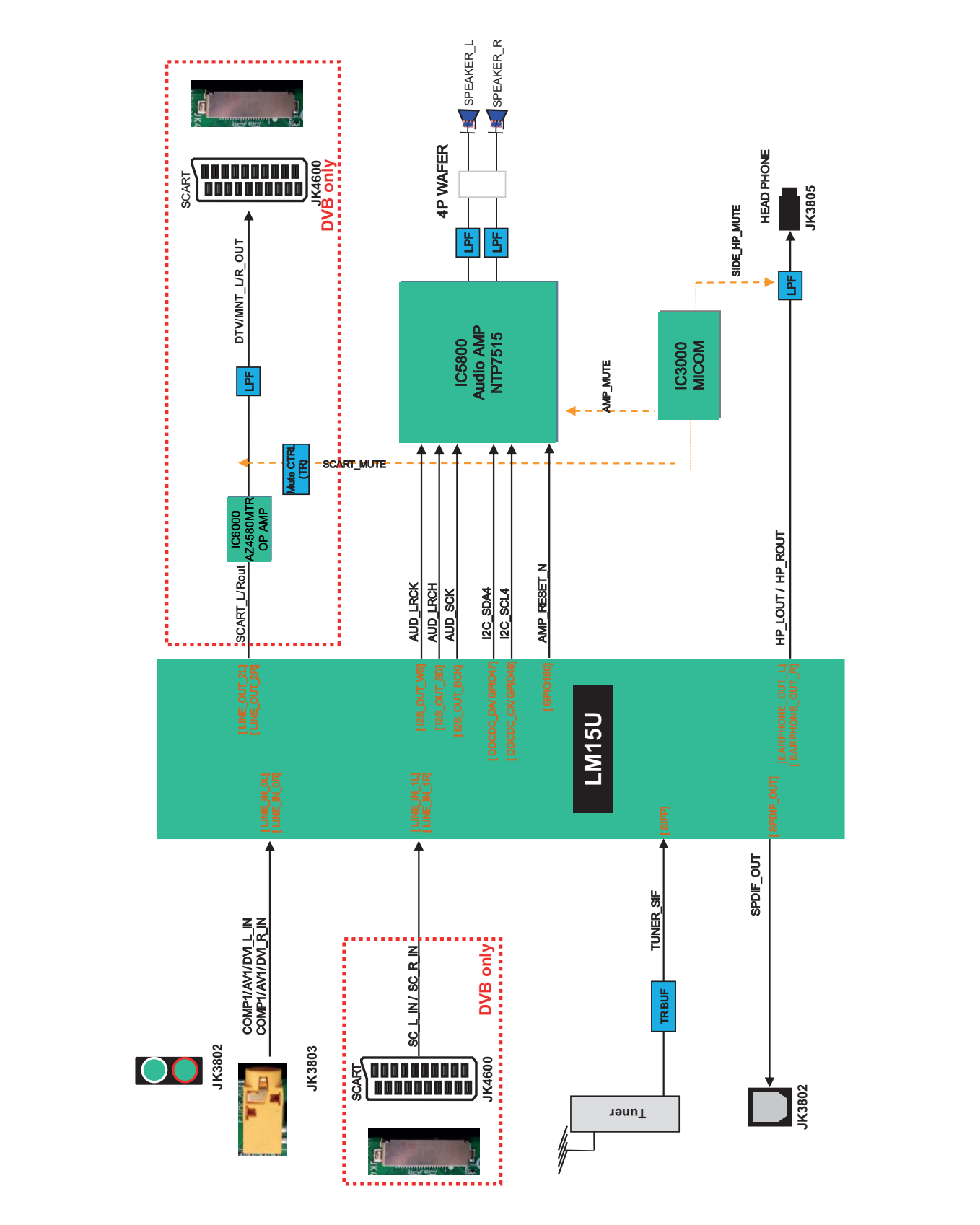
6. Tuner/CI



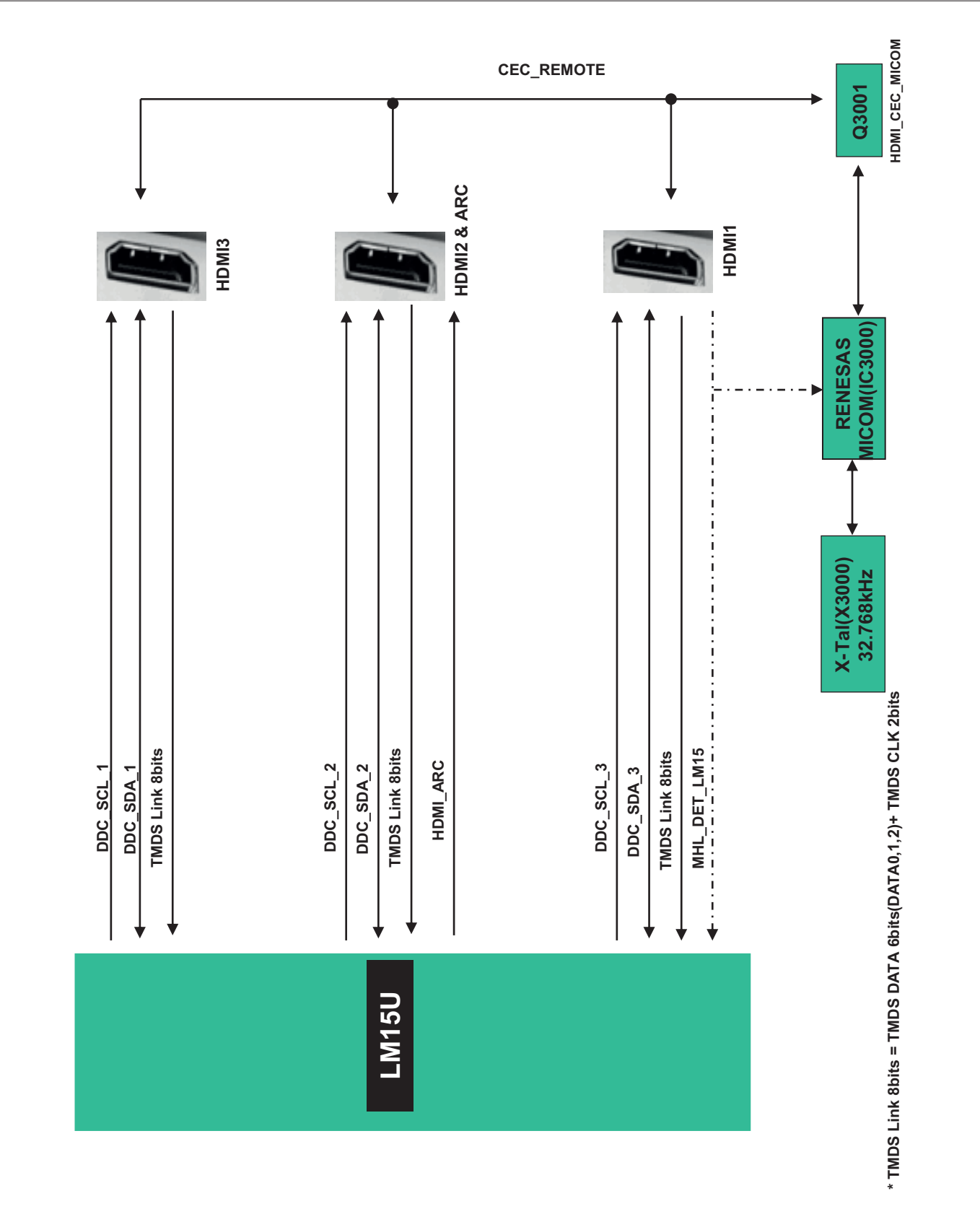
7. Video/Audio In



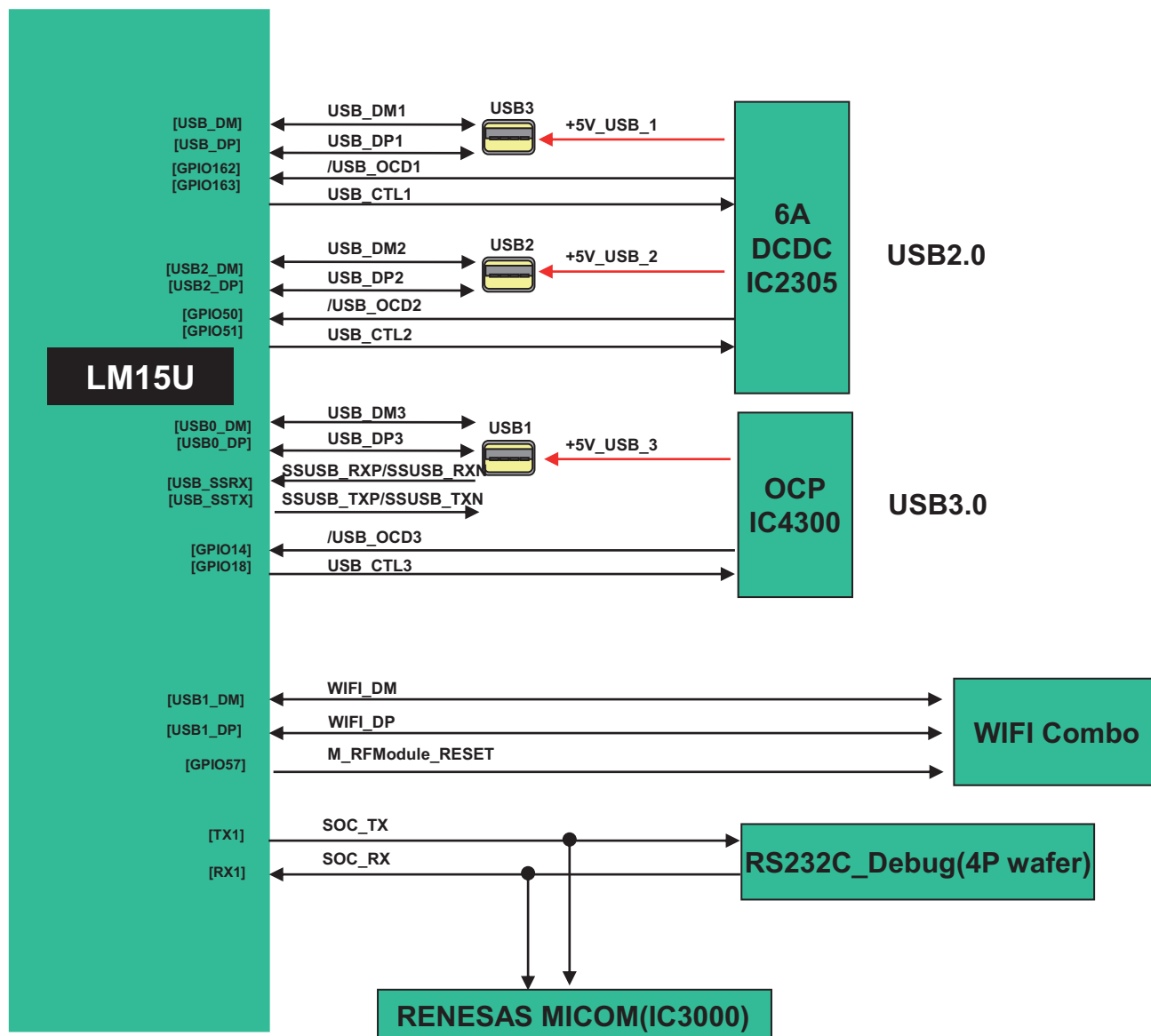
8. Audio Out



9. HDMI



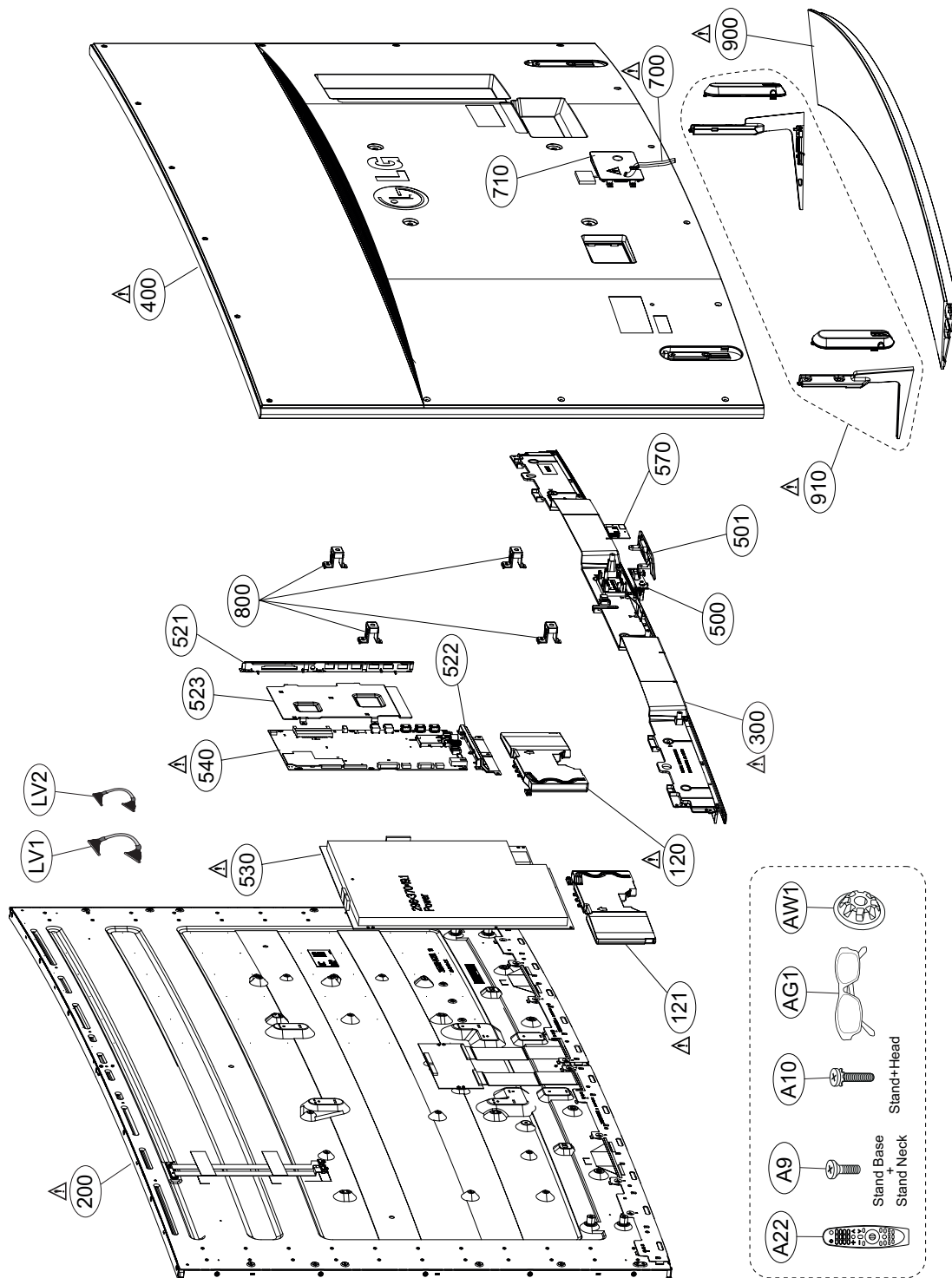
10. USB / WIFI / M-REMOTE / UART

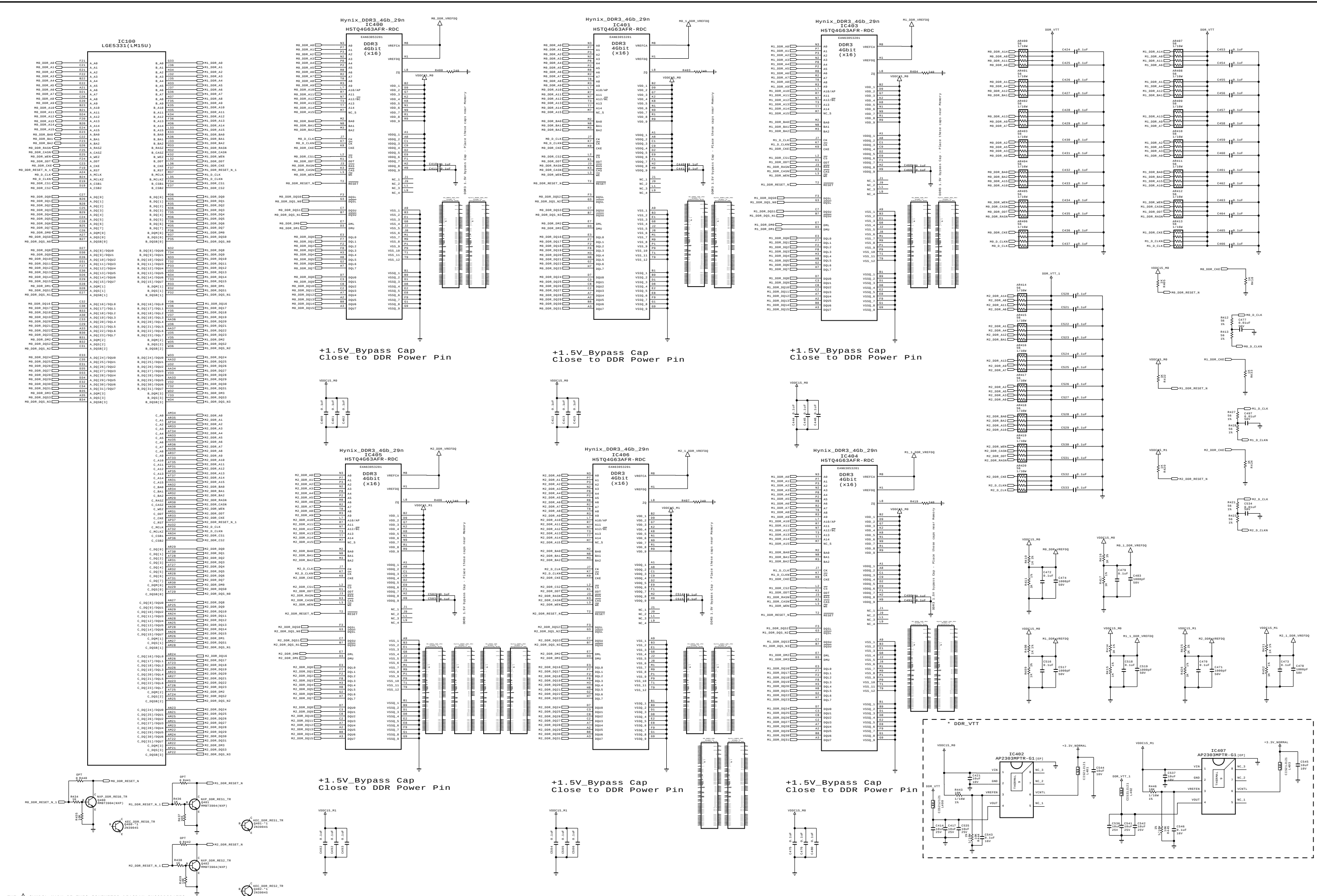


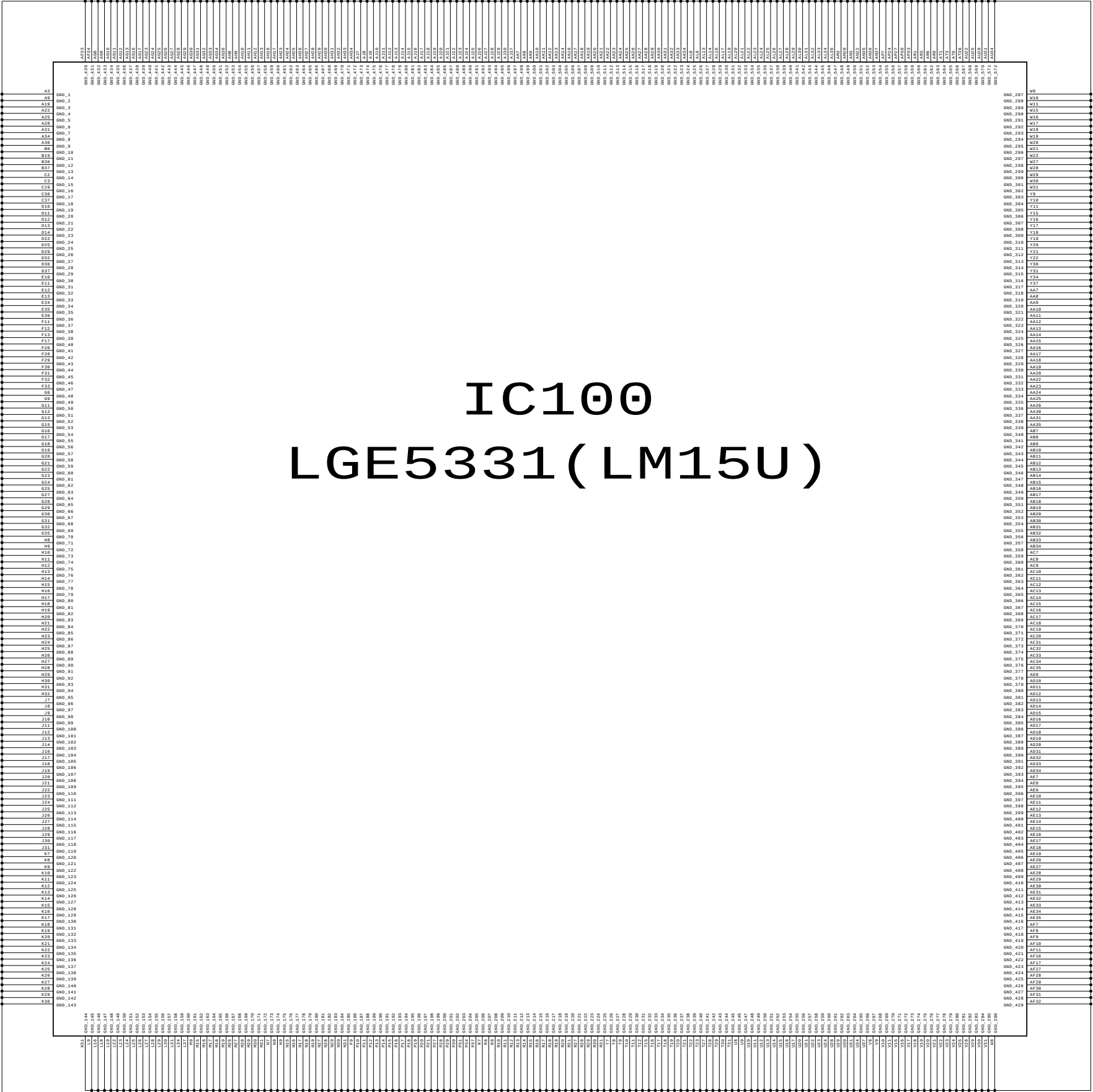
EXPLODED VIEW

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.







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

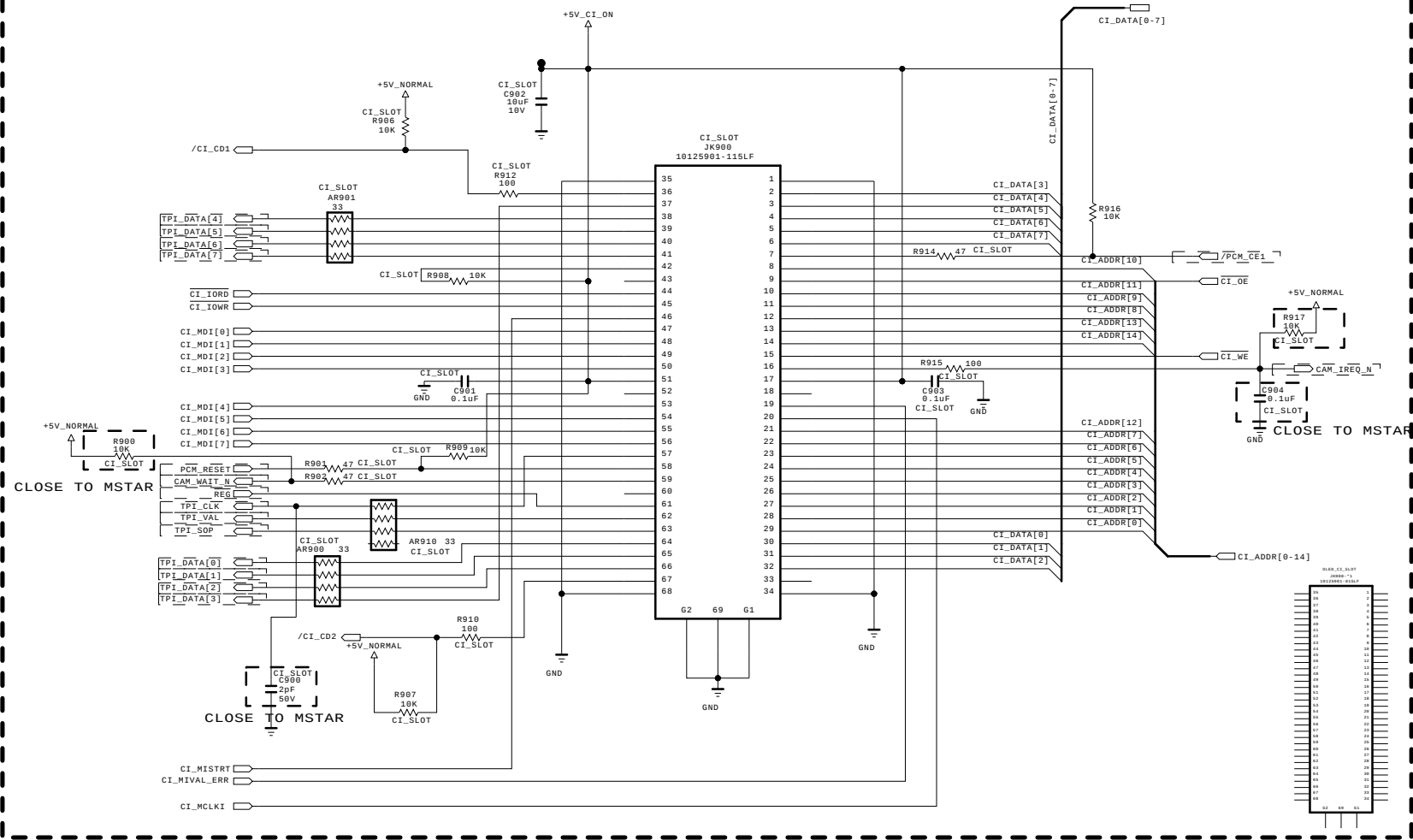
SECRET
LGElectronics



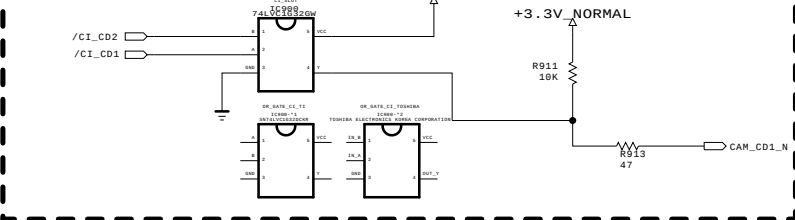
MODEL	LM15U	DATE	2014-1-21
BLOCK	LM15U_GND	SHEET	05 /

CI Region

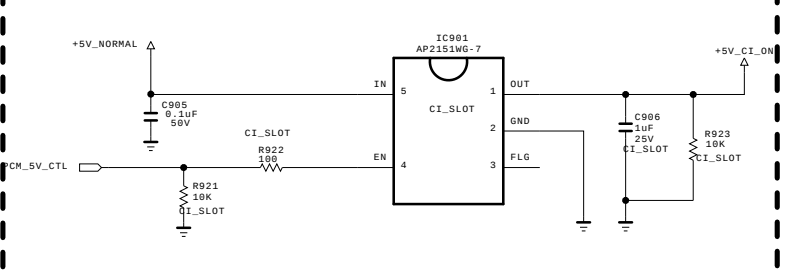
CI SLOT



CI DETECT

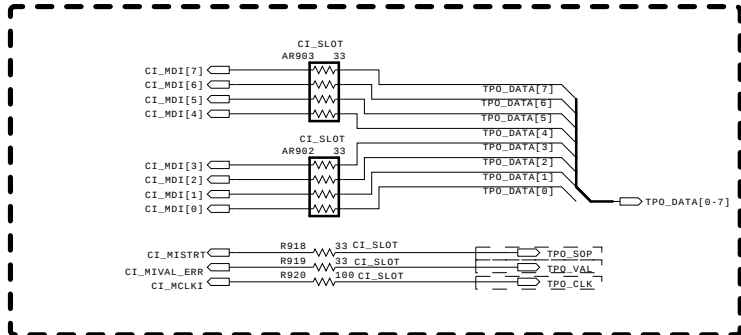


CI POWER ENABLE CONTROL

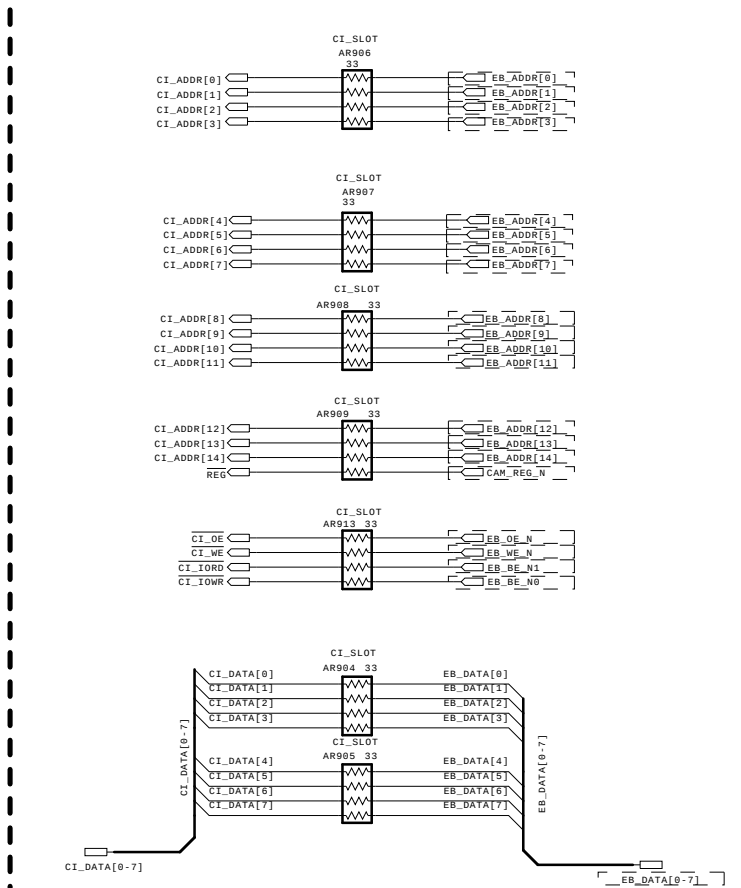


* Option name of this page : CI_SLOT (because of Hong Kong)

CI TS INPUT



CI HOST I/F

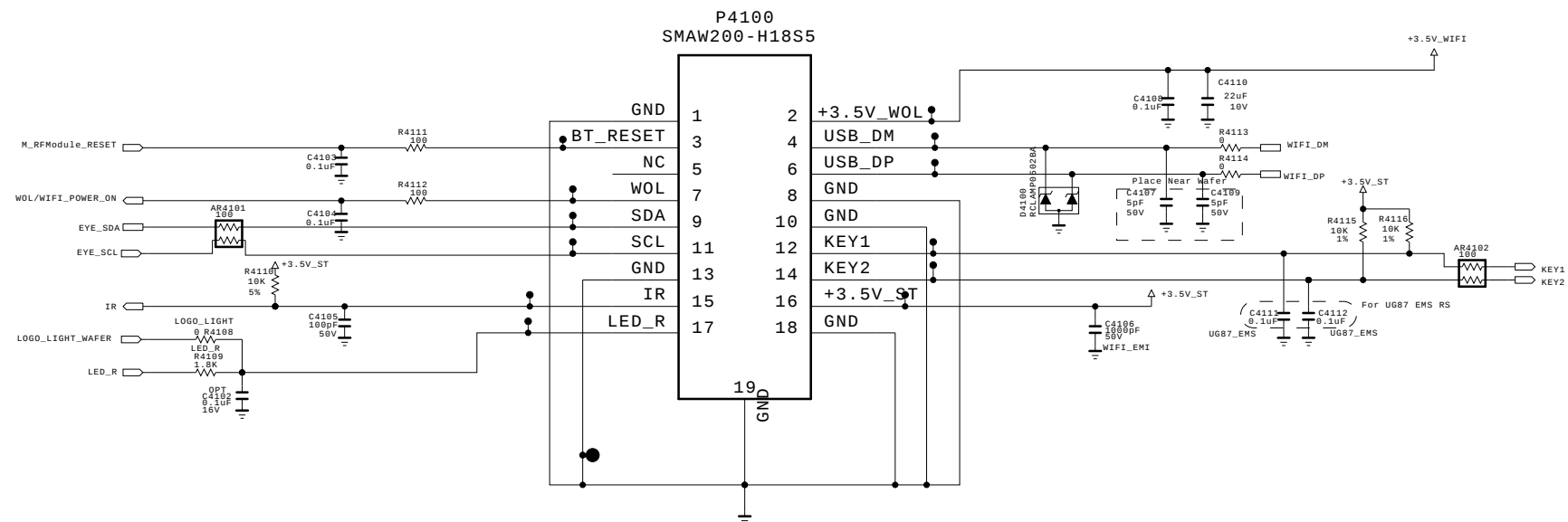
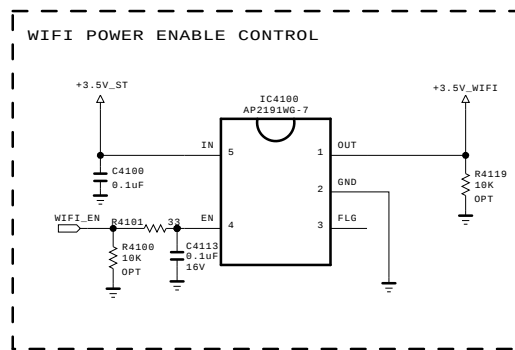


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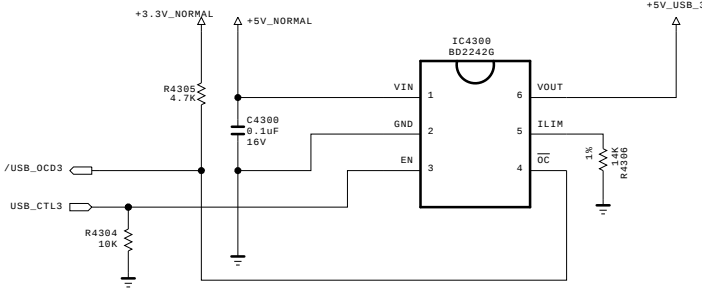


MODEL	LM15U	DATE	2014-10-17
BLOCK	PCMCi	SHEET	9

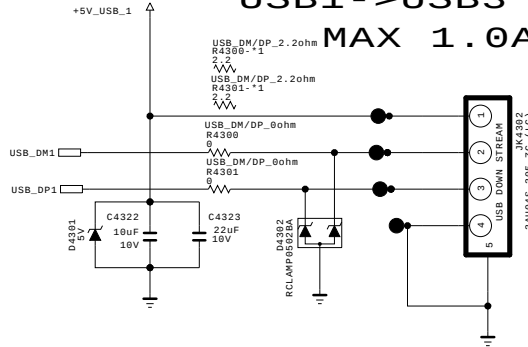


+5V_USB FOR USB3 ->USB1

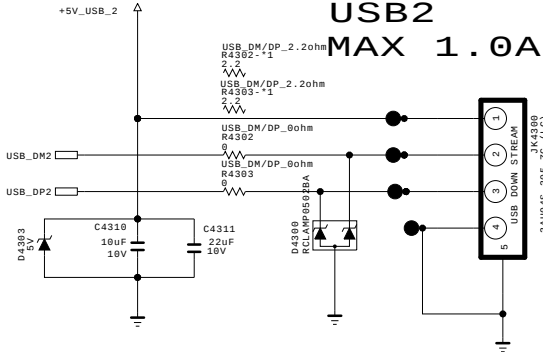
OCP USB3 ->USB1



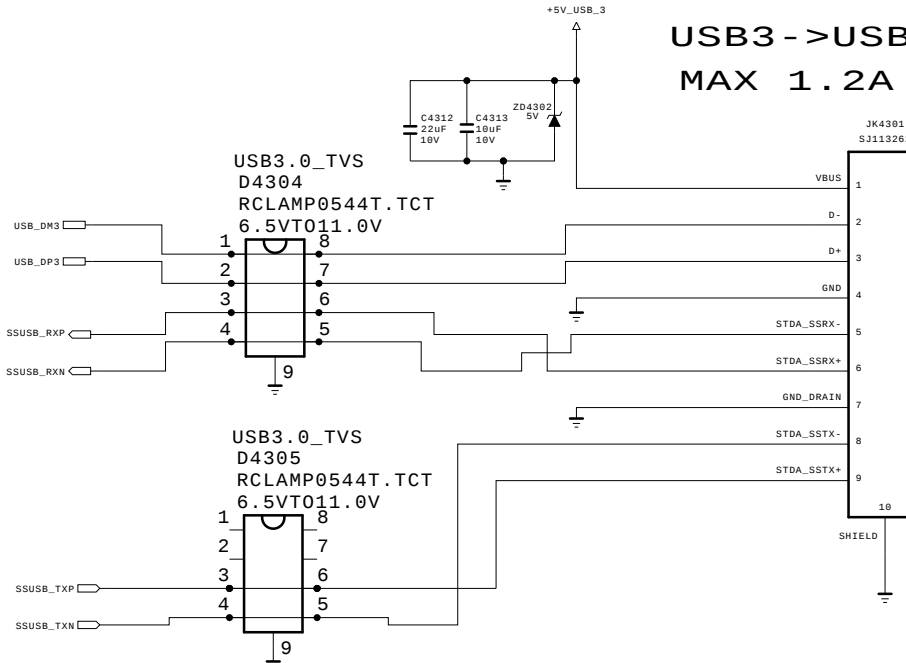
USB1 ->USB3
MAX 1.0A



USB2
MAX 1.0A



USB3->USB1 (3.0)
MAX 1.2A



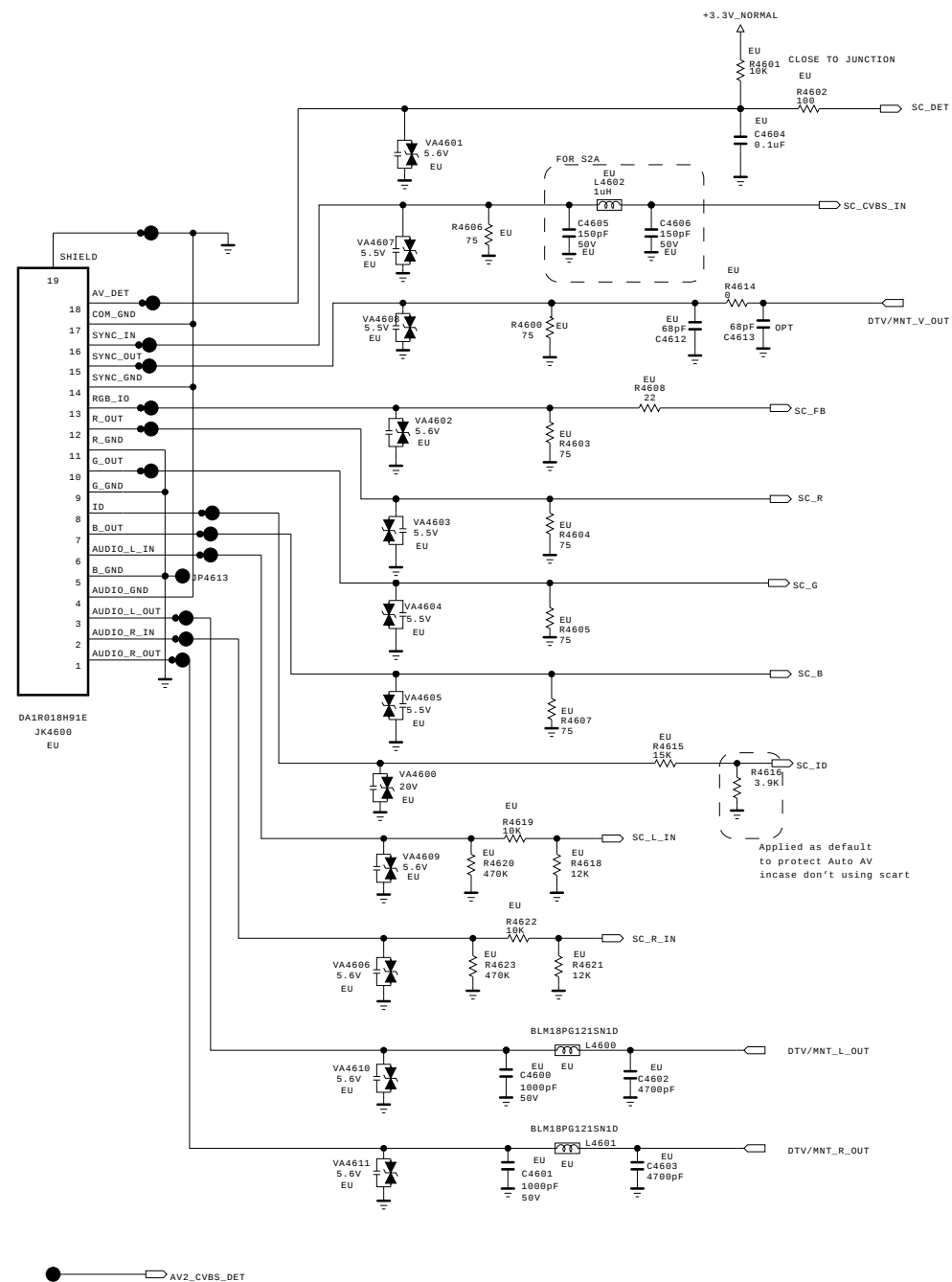
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G Electronics



MODEL	LM15U	DATE	2014-12-10
BLOCK	USB3_HUB	SHEET	43 /

Full Scart(18 Pin Gender)



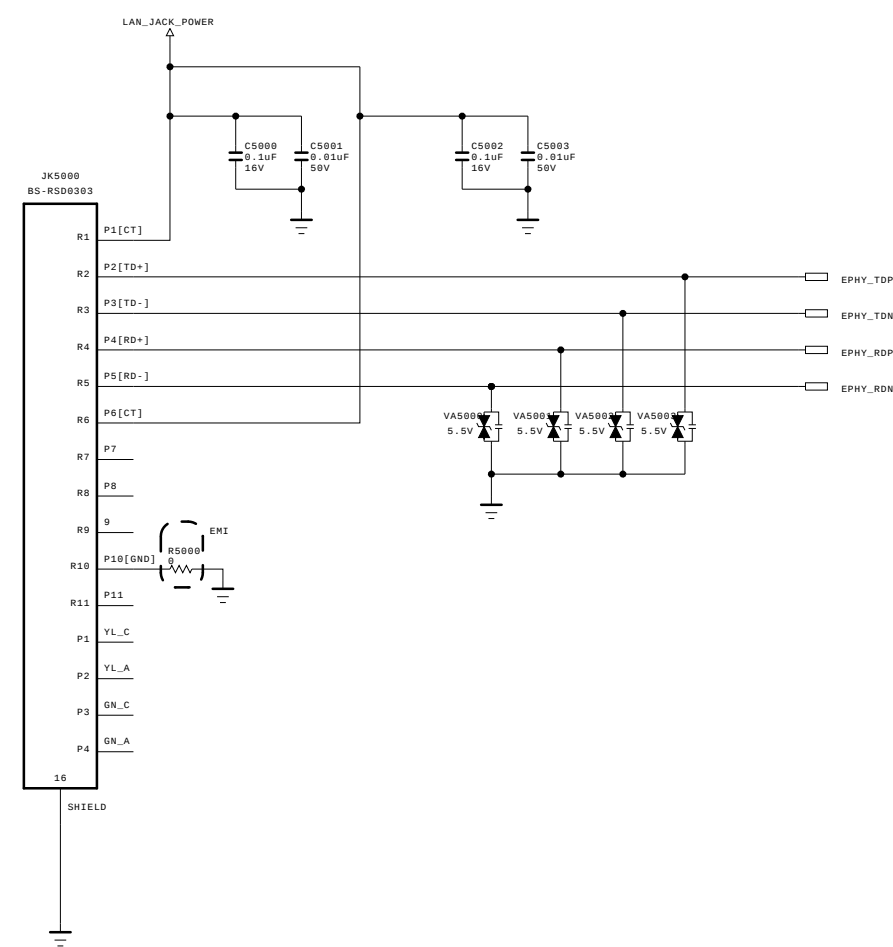
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MODEL	LM15U	DATE	2014-09-18
BLOCK	SCART_JACK_V	SHEET	46 / 01

Ethernet Block



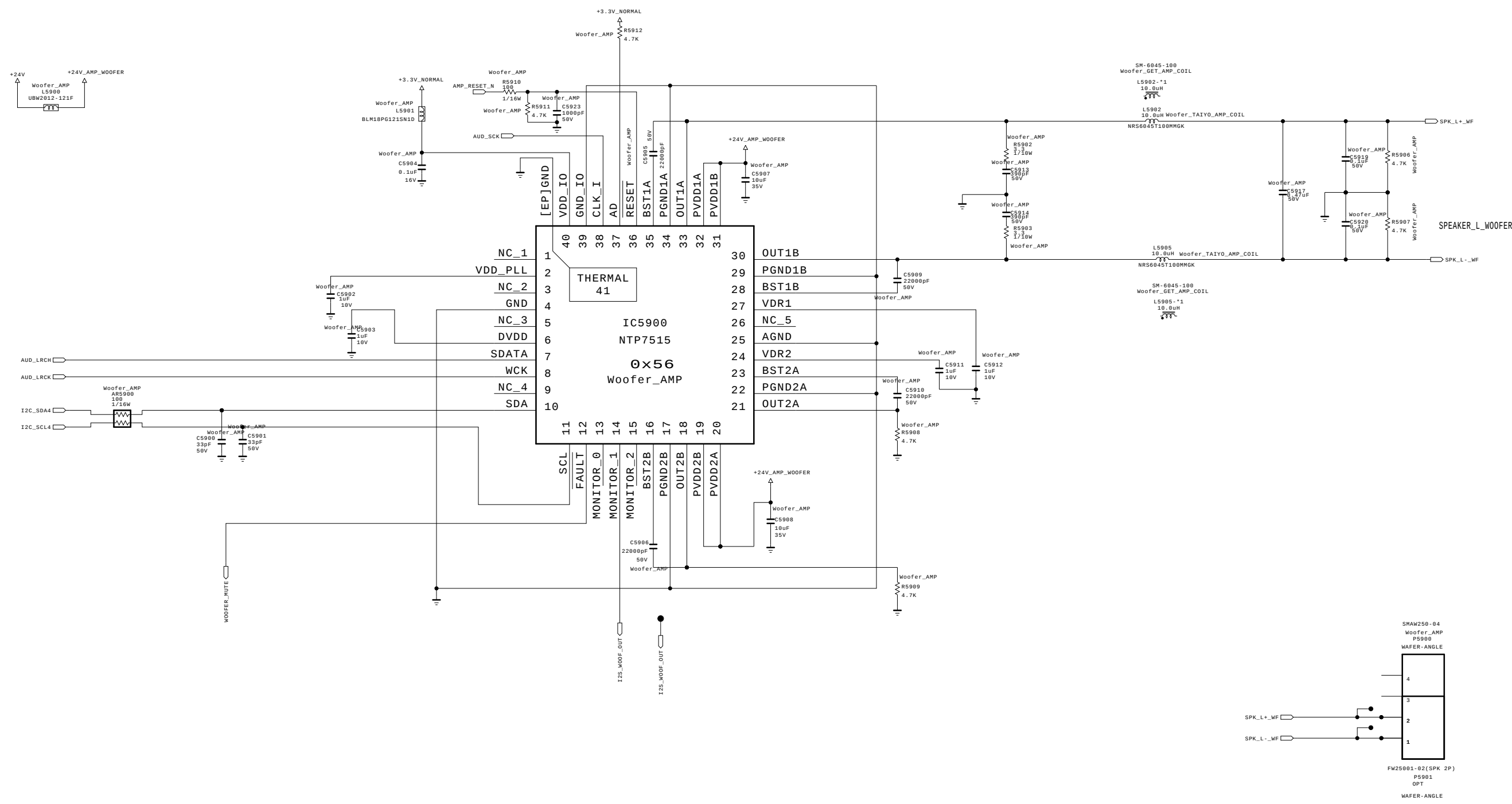
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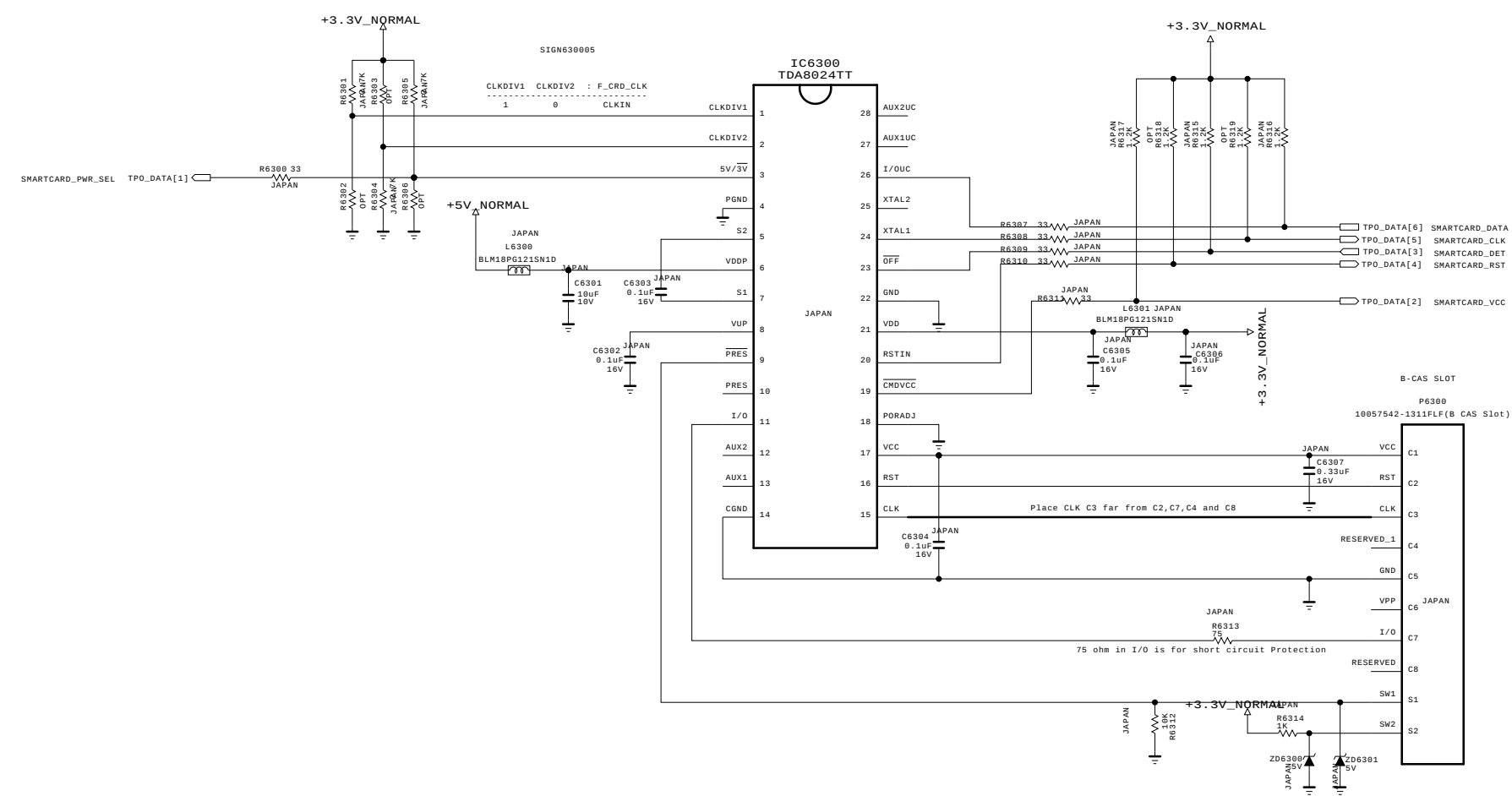


MODEL	LM15U	DATE	2014-09-10
BLOCK	LAN_V	SHEET	50 / 01

AMP - Woofer



B-CAS (SMART CARD) INTERFACE



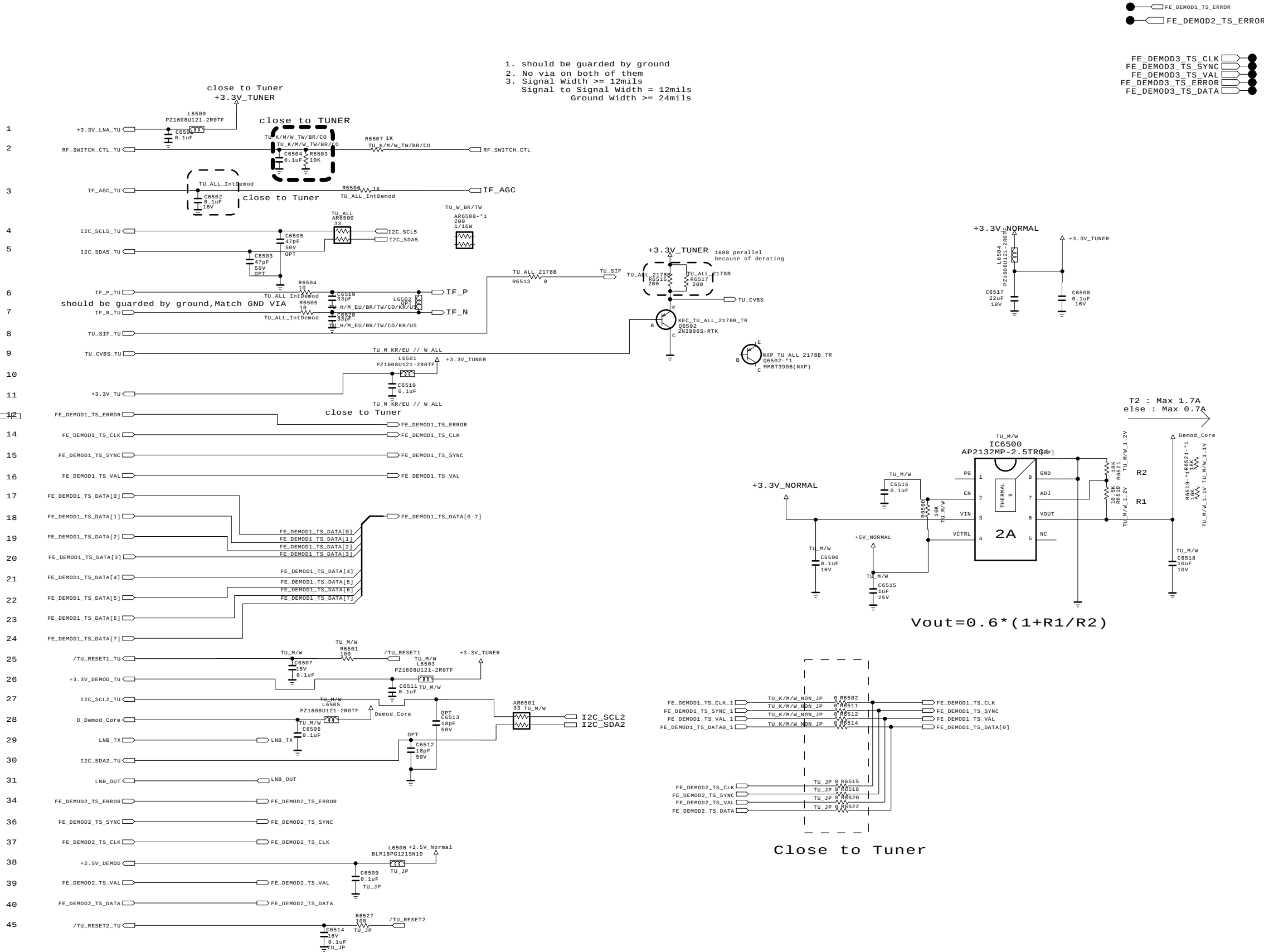
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

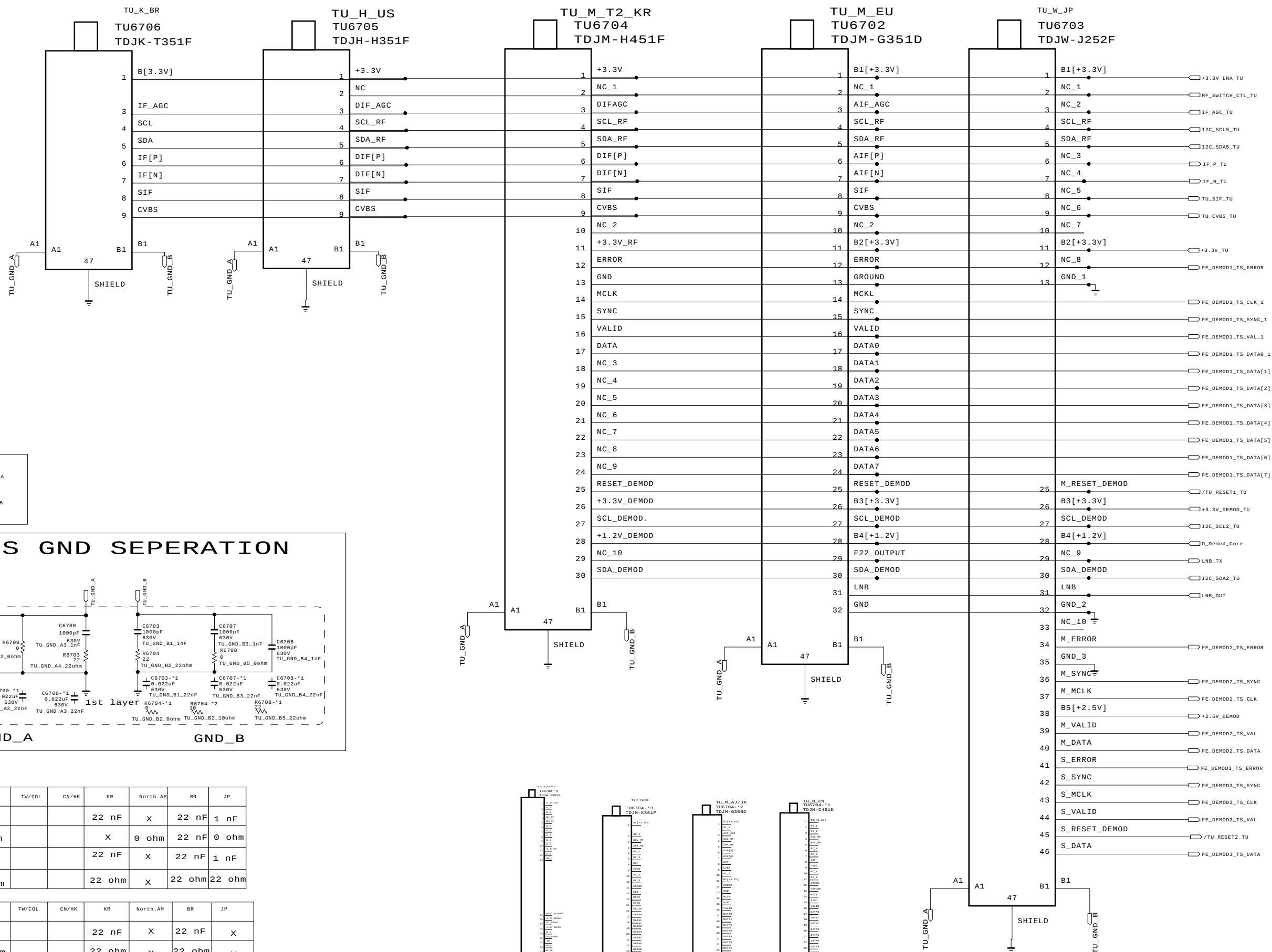
SECRET
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MODEL	JAPAN B-CAS	DATE	2011.04.17
BLOCK		SHEET	63 /

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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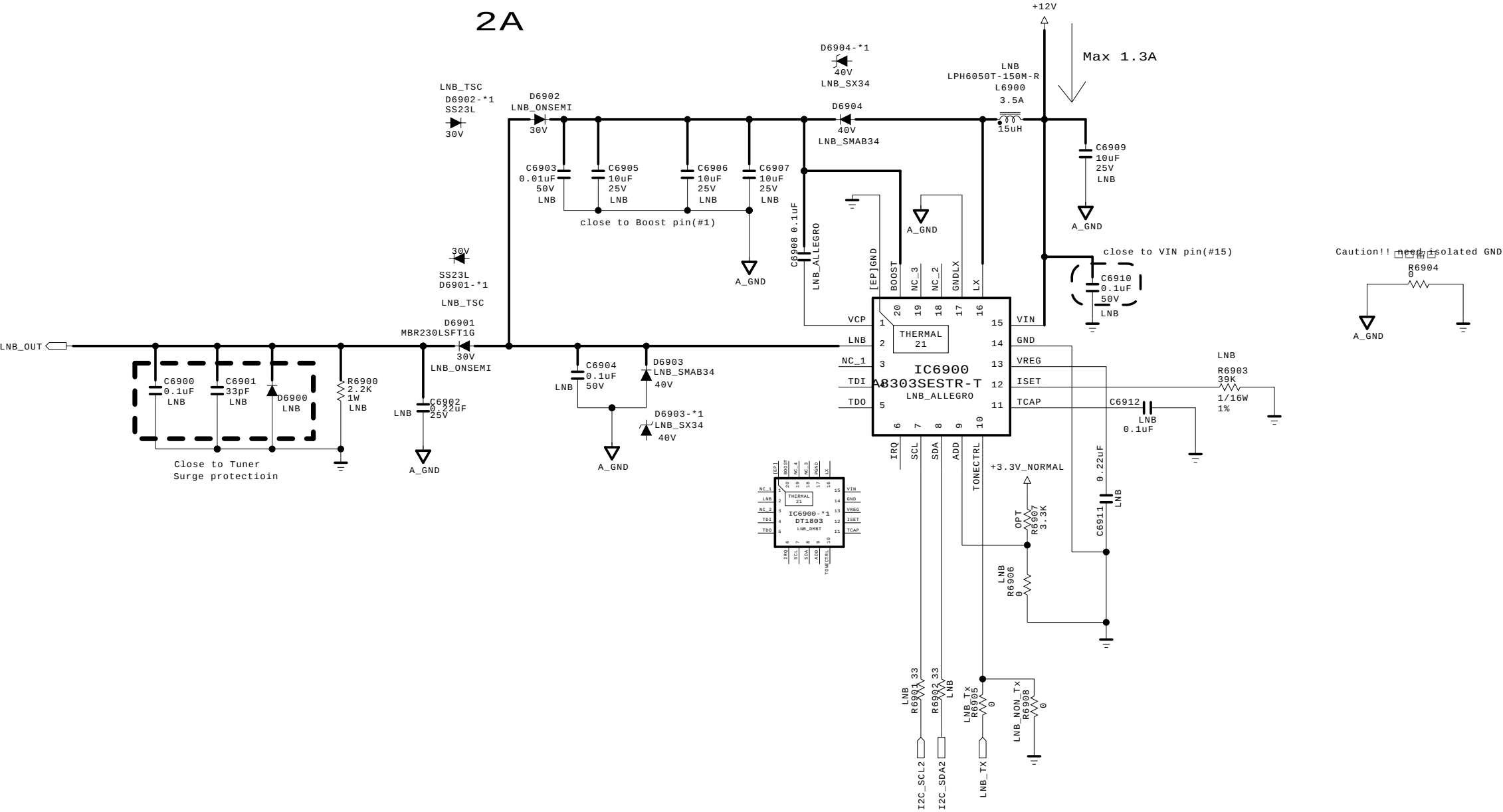
MODEL		DATE	2014-08-11
BLOCK	TU_SYMBOL_V_DVB	SHEET	67_01

DVB-S2 LNB Part Allegro

(Option:LNB)

3A

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



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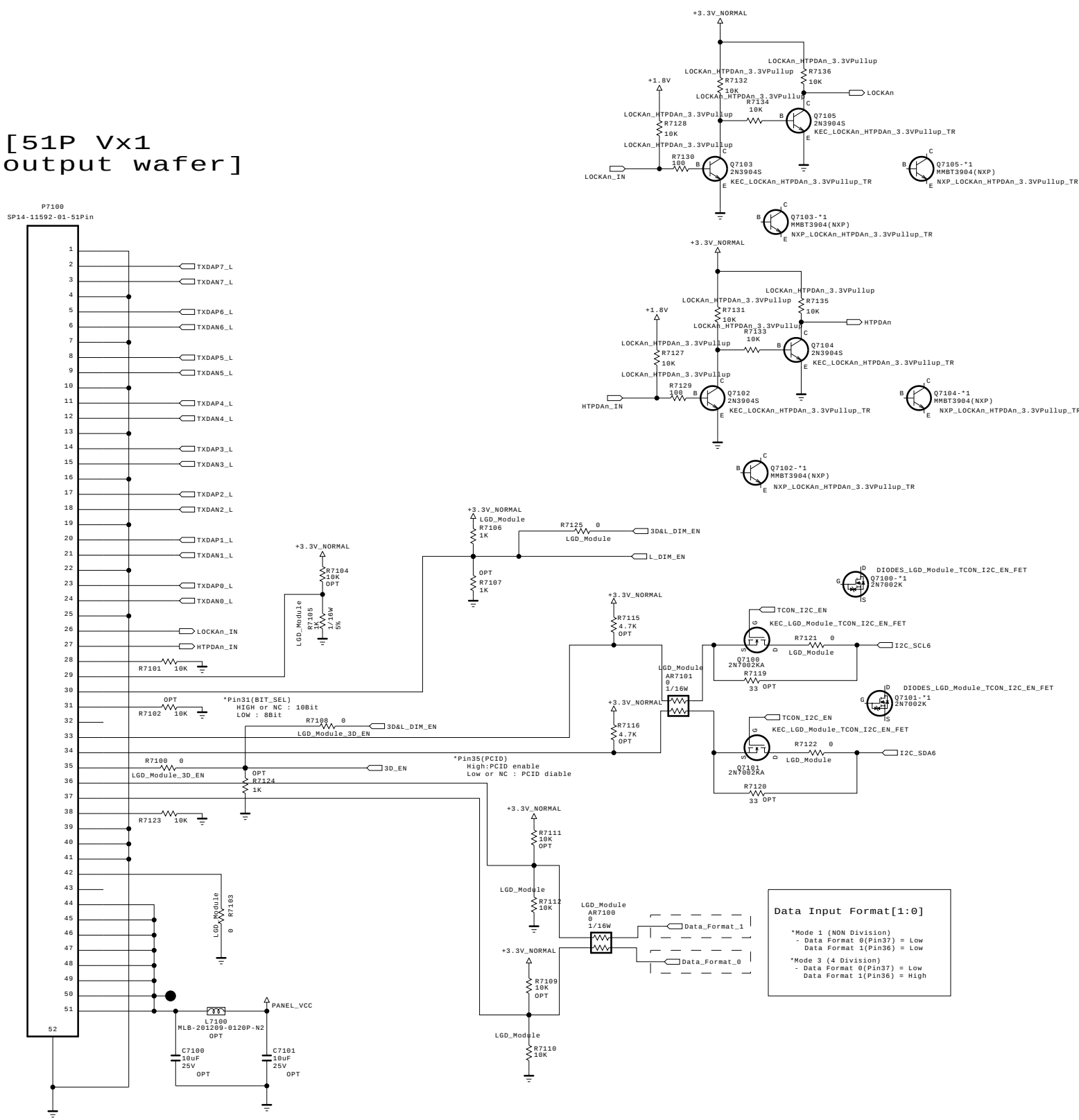
SECRET

LGElectronics

 LG ELECTRONICS

MODEL	LM15U	DATE	2014-08-25
BLOCK	LNB	SHEET	20 /

[51P Vx1 output wafer]



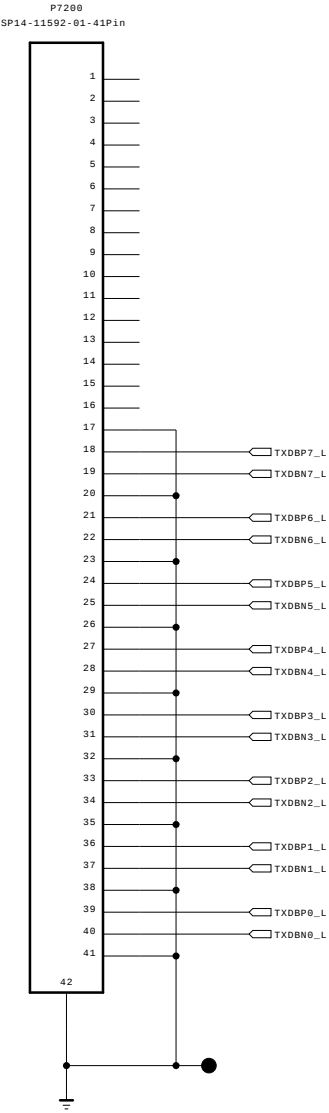
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET
LGElectronics



MODEL	LM15U	DATE	2014-08-27
BLOCK	Vx1 51P	SHEET	21 /

[41P Vx1
output wafer]



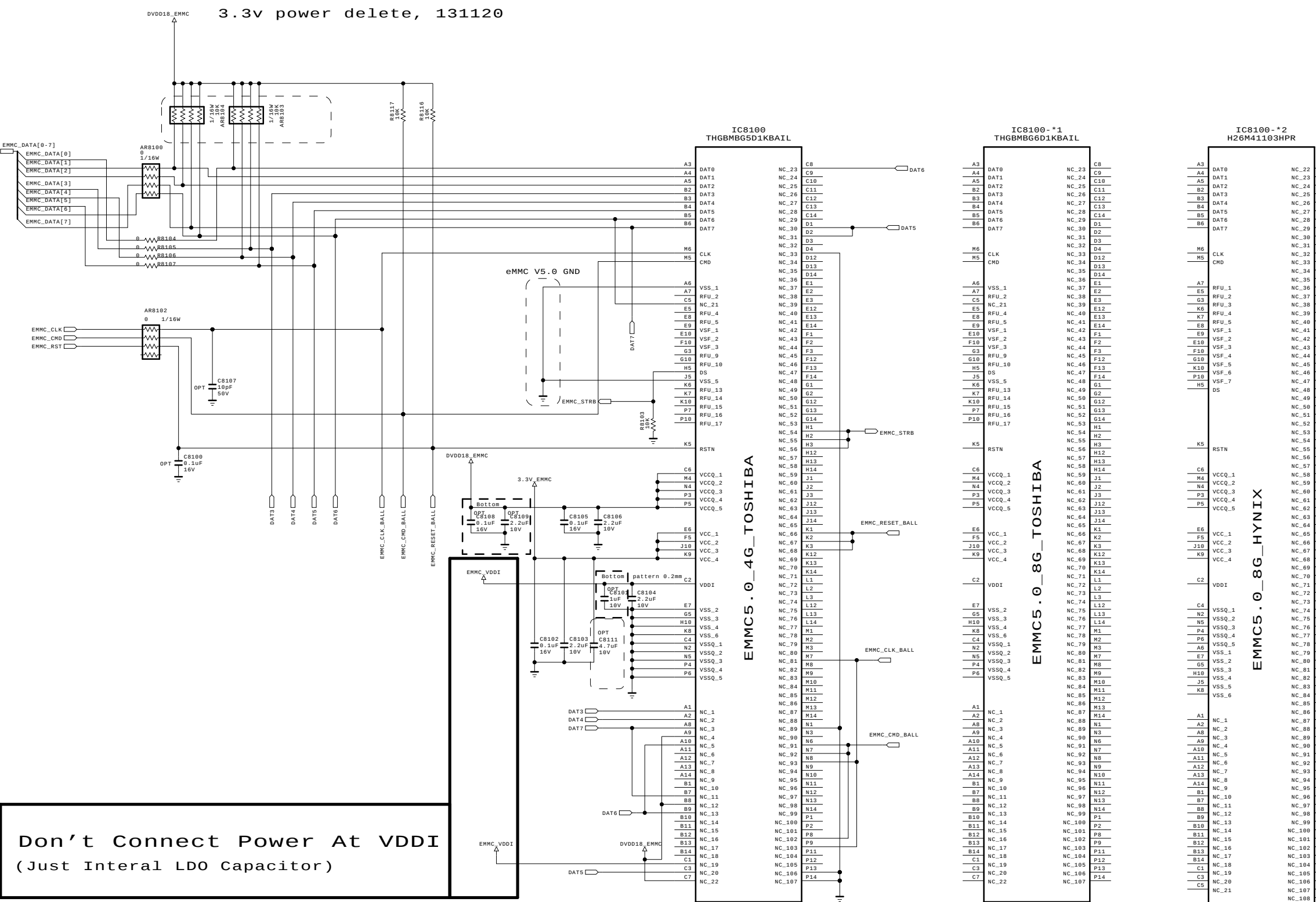
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET
LGElectronics



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

eMMC I/F



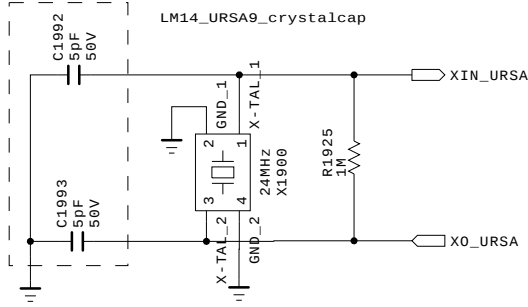
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

SECRET
LGElectronics

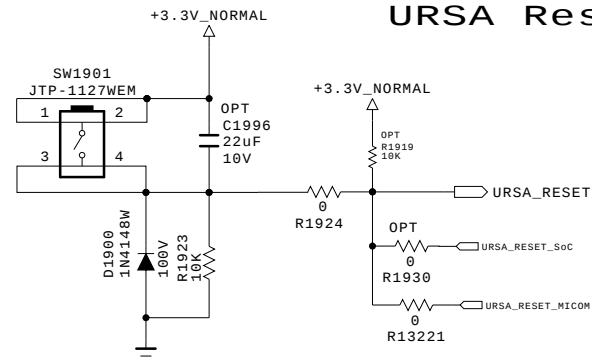


MODEL	LM15U	DATE	2014-11-17
BLOCK	eMMC	SHEET	81 /

Clock for URSA9

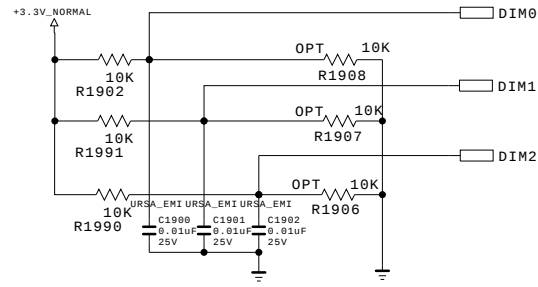


URSA Reset



Chip Config

Debug/ISP ADDR
Slave (Debug Port:0XB4,ISP:0X98)
CHIP_CONF:{DIM2,DIM1,DIM0}
CHIP_CONF=3'd7:111:boot from SPI Flash

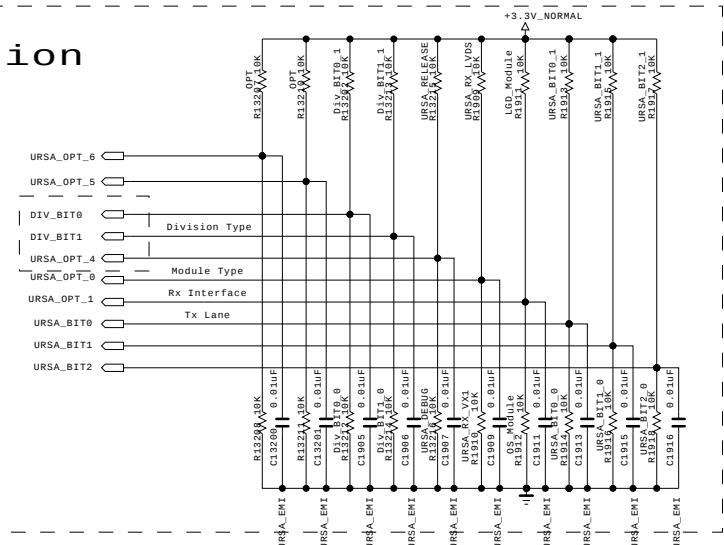


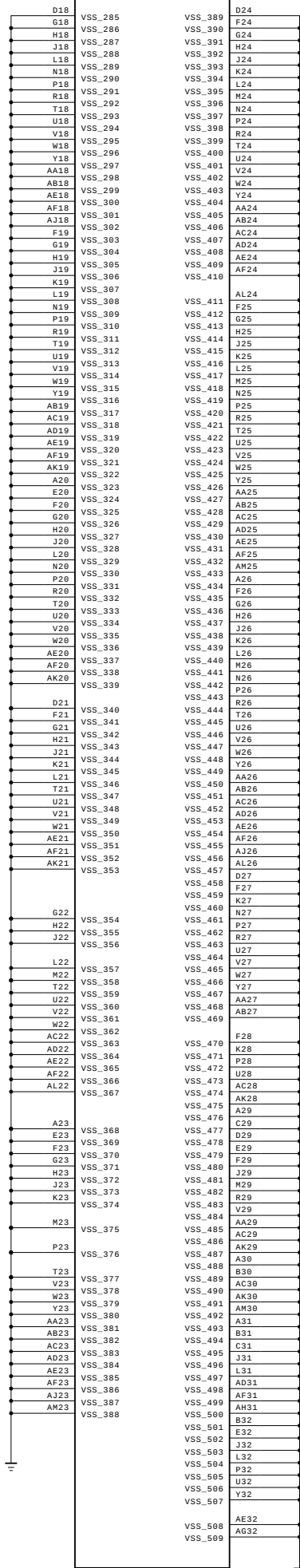
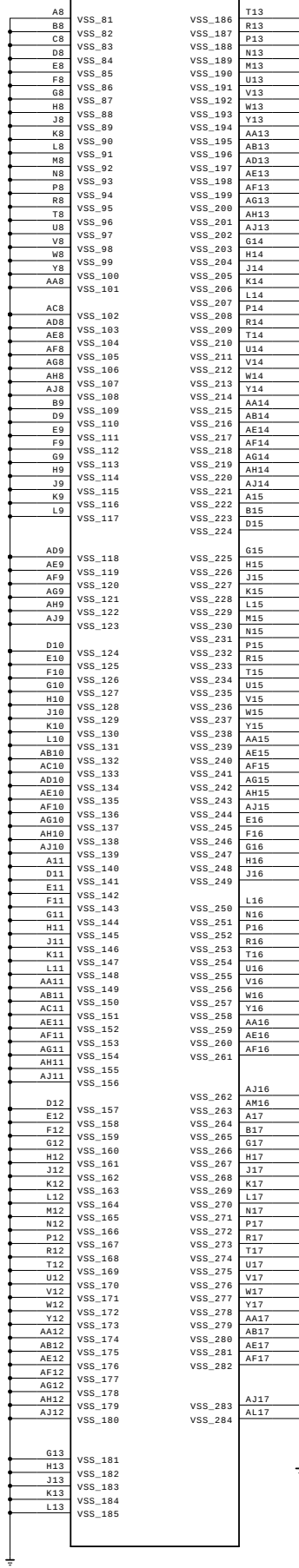
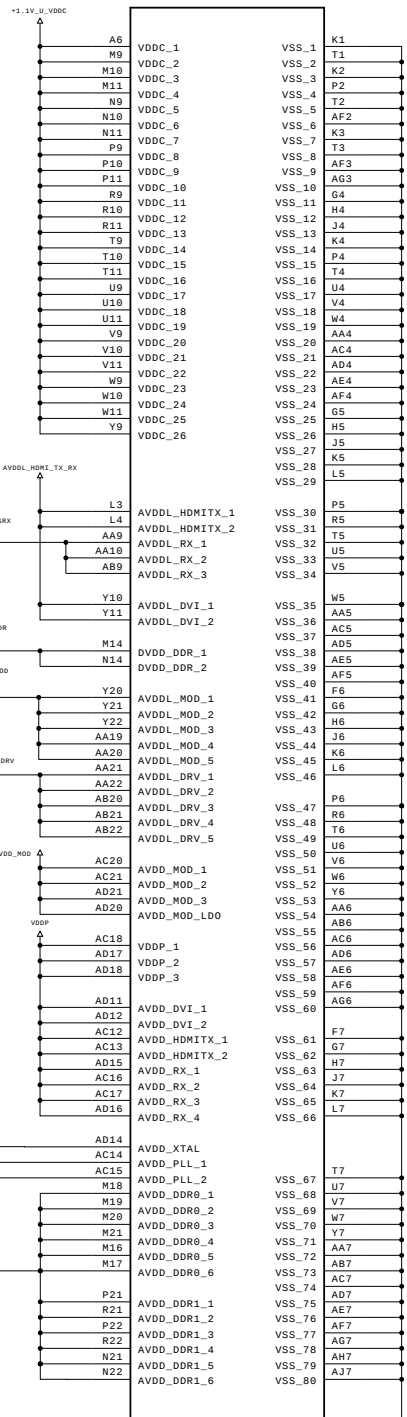
URSA9 Option

DIV_BIT [1/0]	MODULE DIVISION
0/0	NON DIVISION
0/1	2 DIVISION
1/0	4 DIVISION
1/1	8 DIVISION

URSA_OPT_4	HIGH:URSA_PRINT_OFF LOW:URSA_PRINT_ON
------------	--

BIT [2/1/0]	Tx Lane
0/0/0	4K@120 (16lane)
0/0/1	4k@60 (8lane)
0/1/0	5k@120 (20lane)
0/1/1	OLED ULTRA HD
1/0/0	FHD@120 (4lane)
1/0/1	FHD@60 (2lane)
1/1/0	Reserved
1/1/1	Reserved







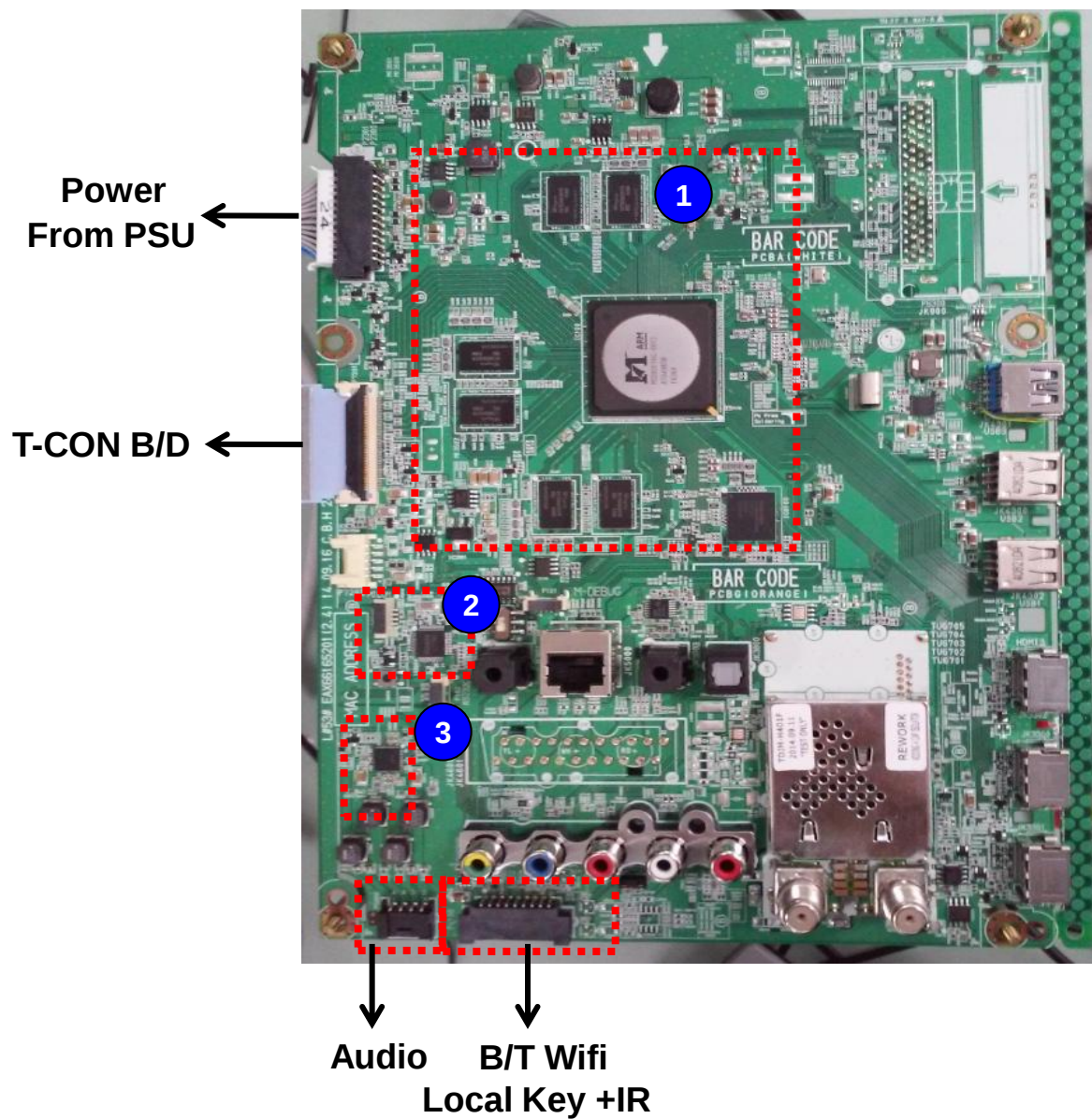
Repair Guide

`15 years New Models

< Applicable Model >
49/55/60/65 UF85
55/65 UG87

Main PCB

49/55UF85 (CIS)



- 1 Main processor_(LM15U),
DDR Memory
eMMC Memory
- 2 Micom for Key/IR sensing
- 3 Audio AMP

<SIZE: 254X183>

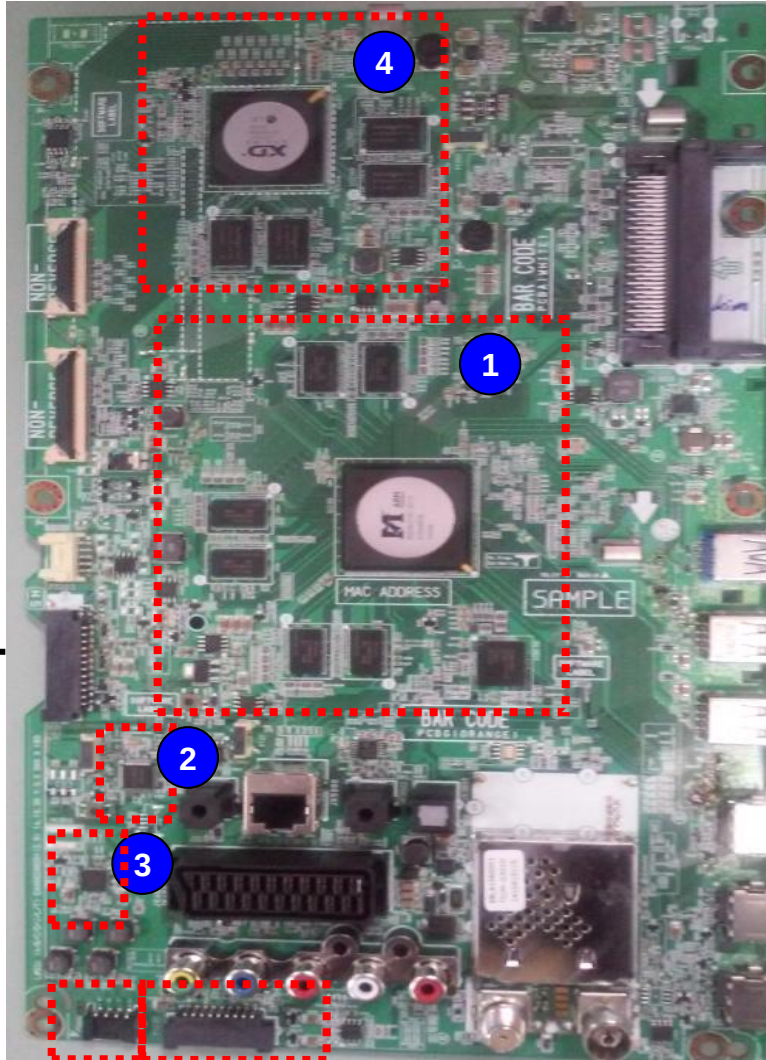
Main PCB

49/55UF85(EU)

60/65UF85(EU/CIS)

T-CON B/D

Power
From PSU



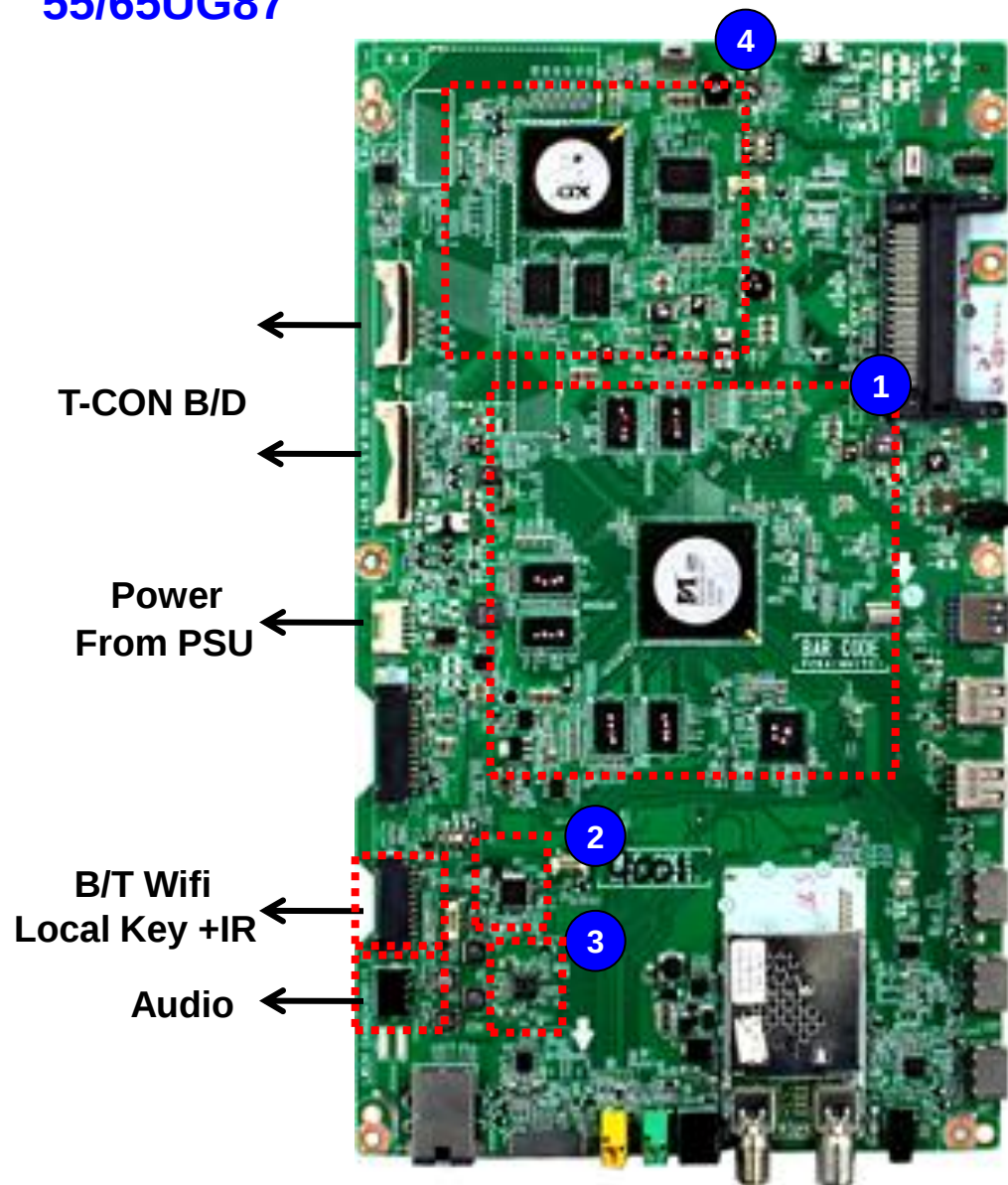
Audio B/T Wifi
Local Key +IR

- 1 Main processor_(LM15U),
DDR Memory
eMMC Memory
- 2 Micom for Key/IR sensing
- 3 Audio AMP
- 4 FRC IC_(URSA9)
DDR memory

<SIZE: 300X183>

Main PCB

55/65UG87

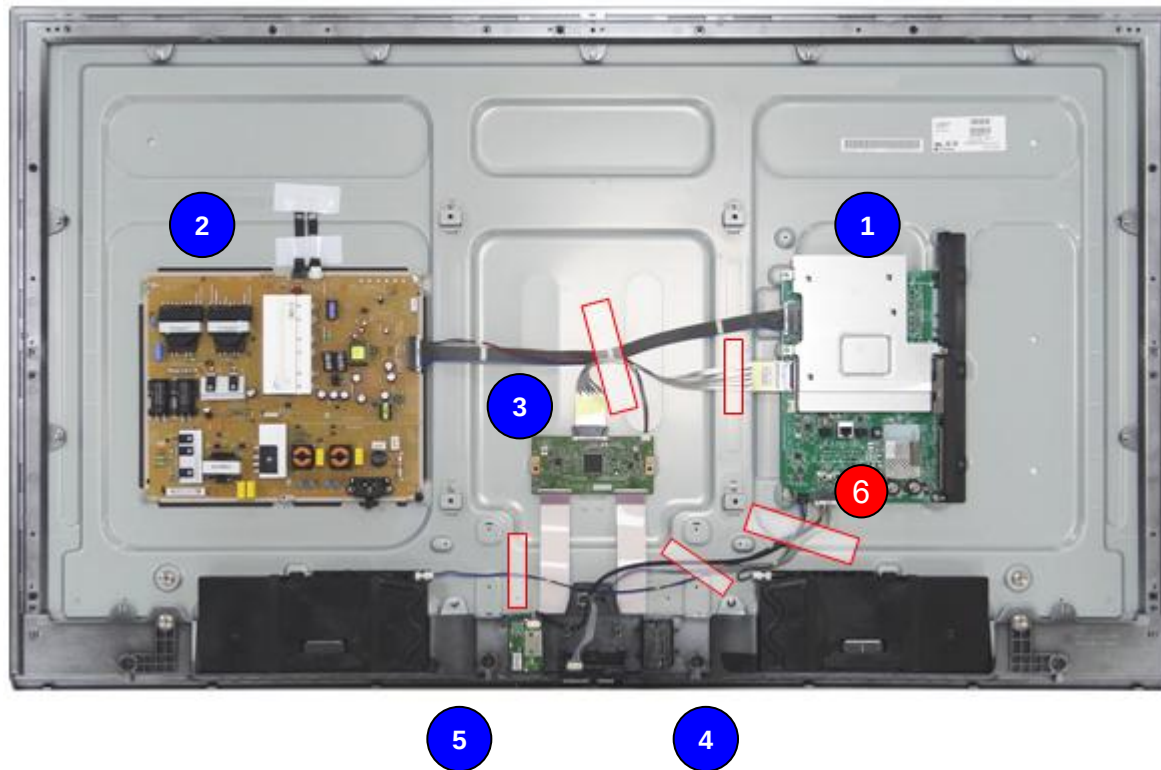


- 1 Main processor_(LM15U),
DDR Memory
eMMC Memory
- 2 Micom for Key/IR sensing
- 3 Audio AMP
- 4 FRC IC_(URSA9)
DDR memory

<SIZE: 300X183>

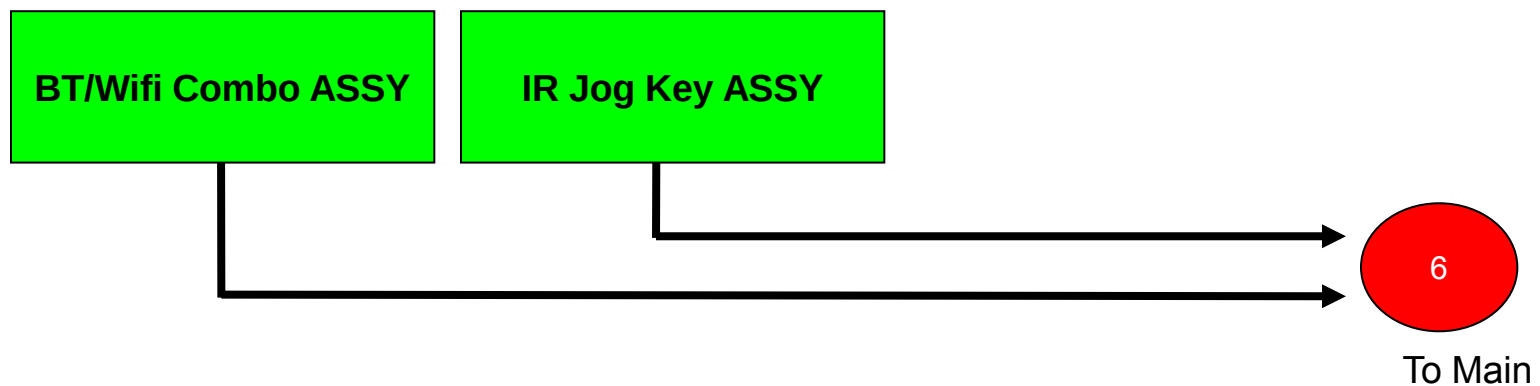
Interconnection – sub PCB UF85 series

49/55UF85



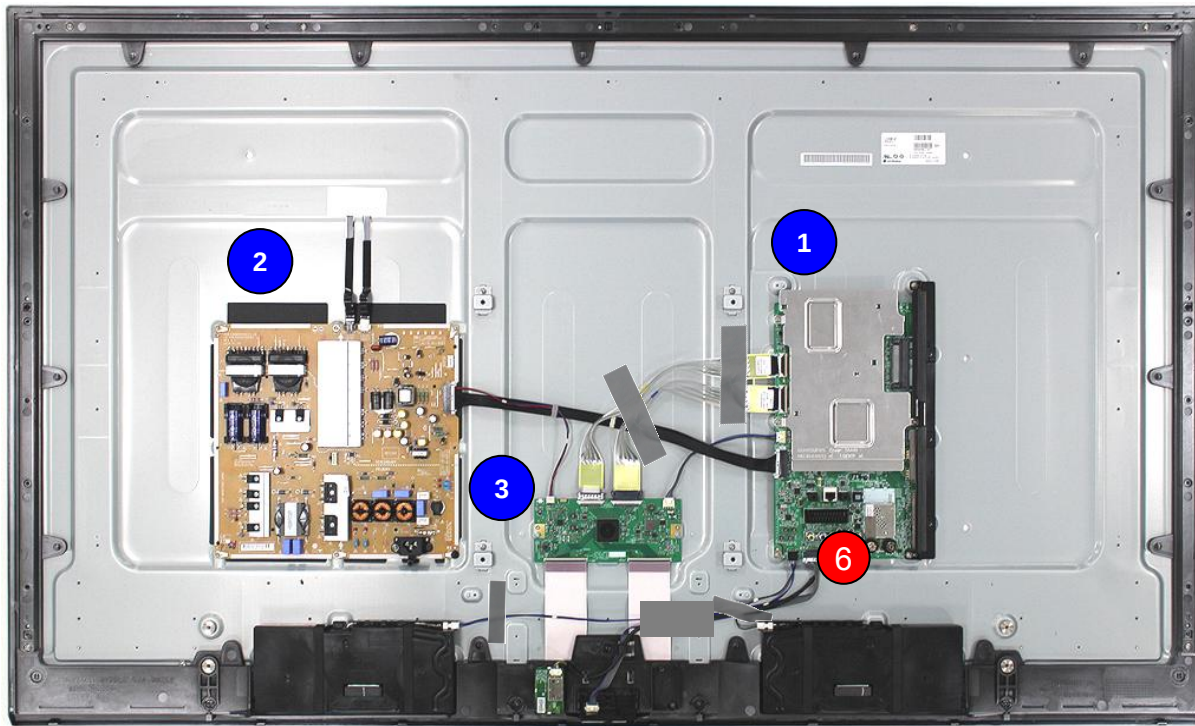
[PCBs]

- 1 Main PCB
- 2 PSU
- 3 T - CON
- 4 IR Jog Key ASSY
- 5 BT/Wifi Combo ASSY



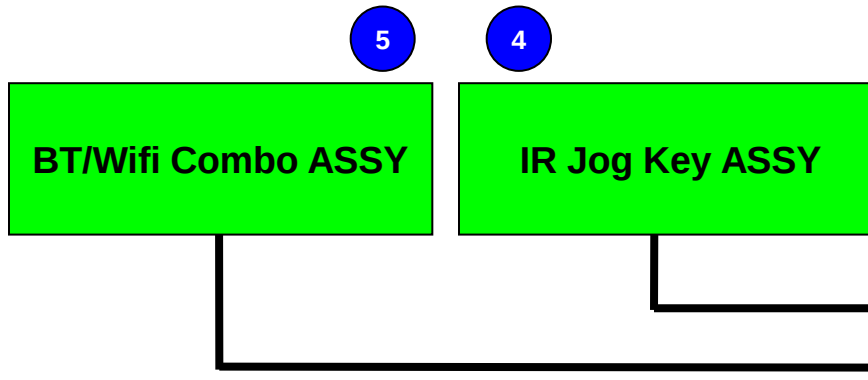
Interconnection – sub PCB UF85 series

65UF85



[PCBs]

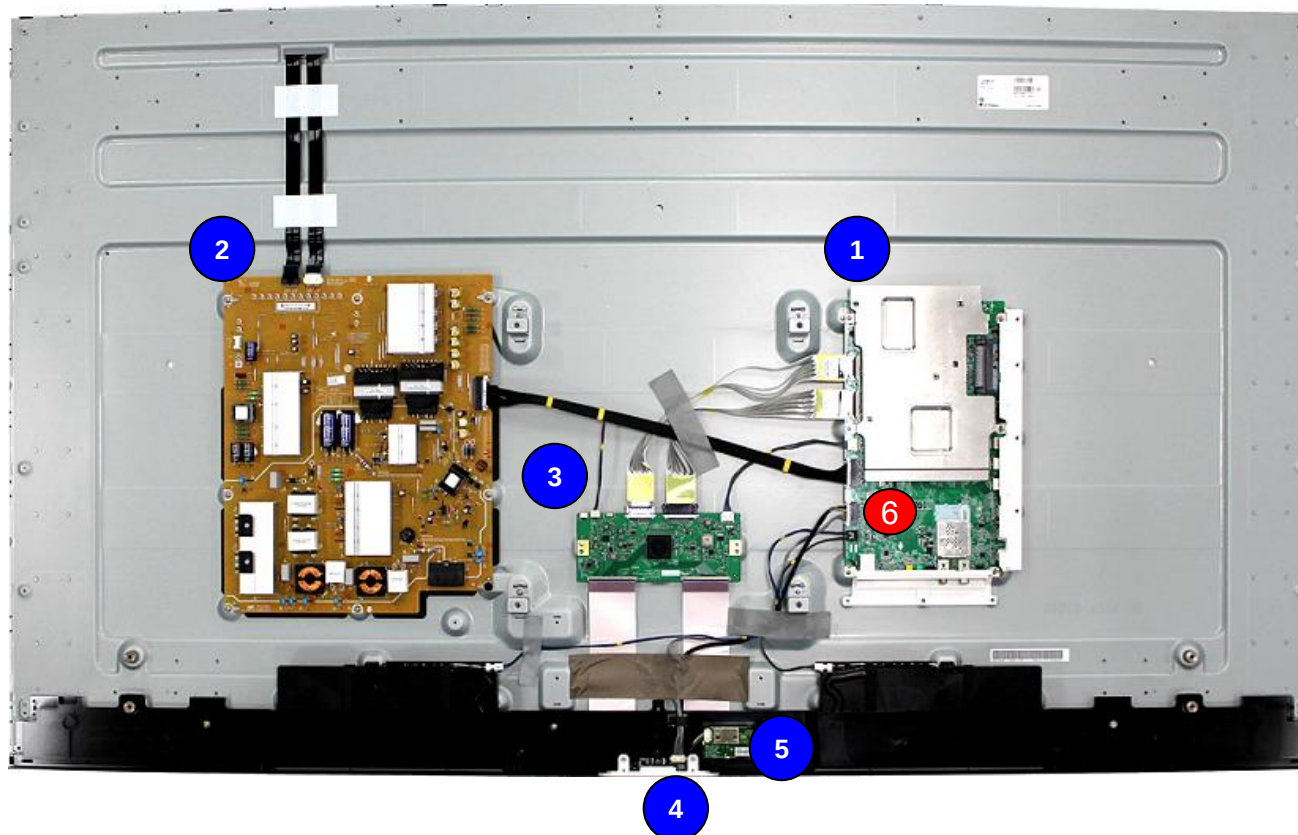
- 1 Main PCB
- 2 PSU
- 3 T - CON
- 4 IR Jog Key ASSY
- 5 BT/Wifi Combo ASSY



To Main

Interconnection – sub PCB UG87 series

55/65UG87



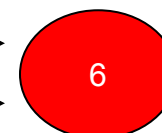
[PCBs]

- 1 Main PCB
- 2 PSU
- 3 T - CON
- 4 IR Jog Key ASSY
- 5 BT/Wifi Combo ASSY

BT/Wifi Combo ASSY

IR Jog Key ASSY

To Main



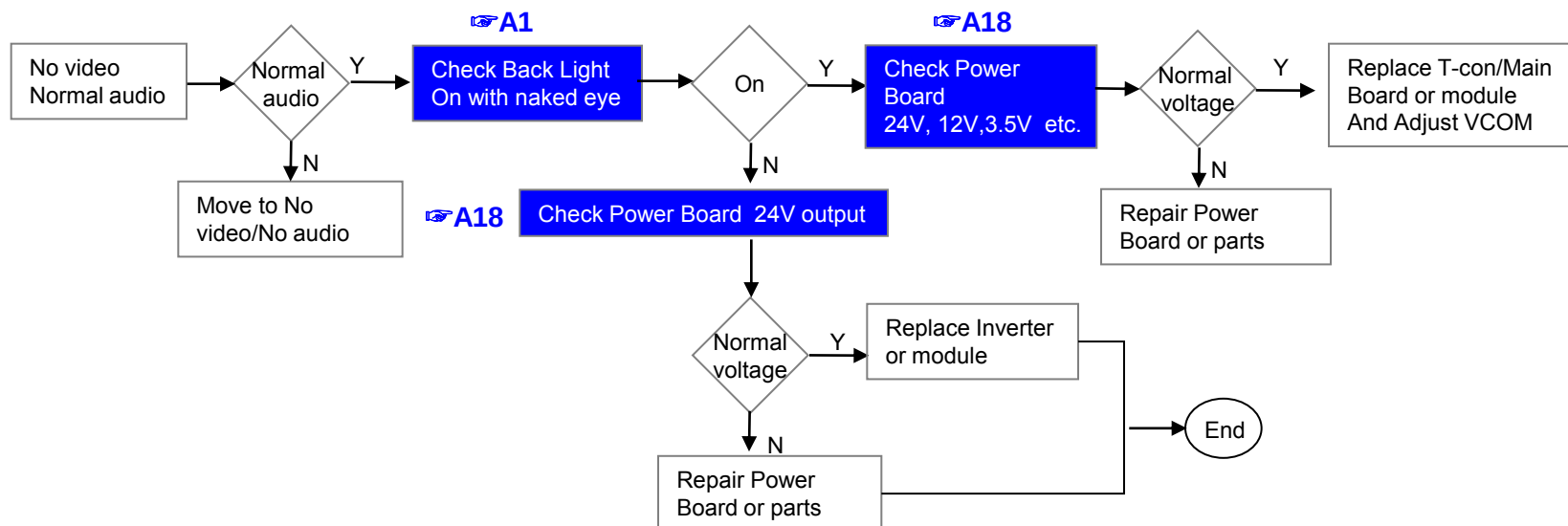
Contents of Standard Repair Process

No.	Error symptom (High category)	Error symptom (Mid category)	Page	Remarks
1	A. Video error	No video/Normal audio	1	
2		No video/No audio	2	
3		Picture broken/ Freezing	3	
4		Color error	4	
5		Vertical/Horizontal bar, residual image, light spot, external device color error	5	
6	B. Power error	No power	6	
7		Off when on, off while viewing, power auto on/off	7	
8	C. Audio error	No audio/Normal video	8	
9		Wrecked audio/discontinuation/noise	9	
10	D. Function error	Remote control & Local switch checking	10	
11		MR15 operating checking	11	
12		Wifi operating checking	12	
13		Camera operating checking	13	
14		External device recognition error	14	
15	E. Noise	Circuit noise, mechanical noise	15	
16	F. Exterior error	Exterior defect	16	

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

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

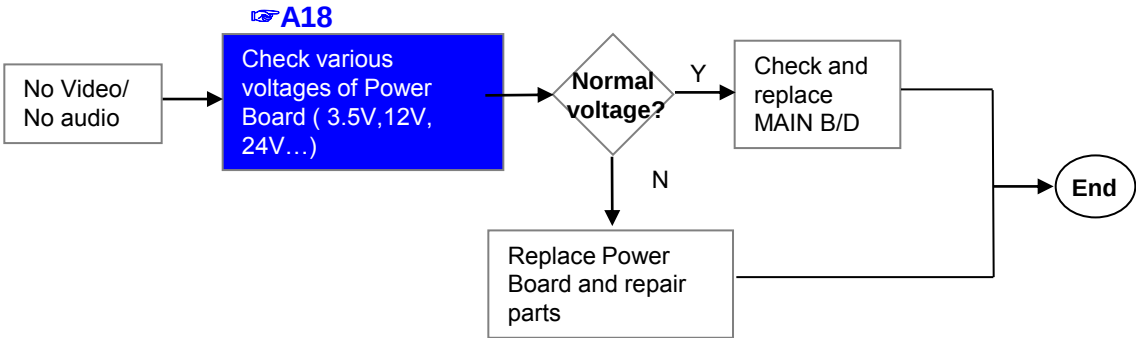
**First of all, Check whether all of cables between board is inserted properly or not.
(Main B/D↔ Power B/D, LVDS Cable, Speaker Cable, IR B/D Cable,,)**



※Precaution A4 & A2



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

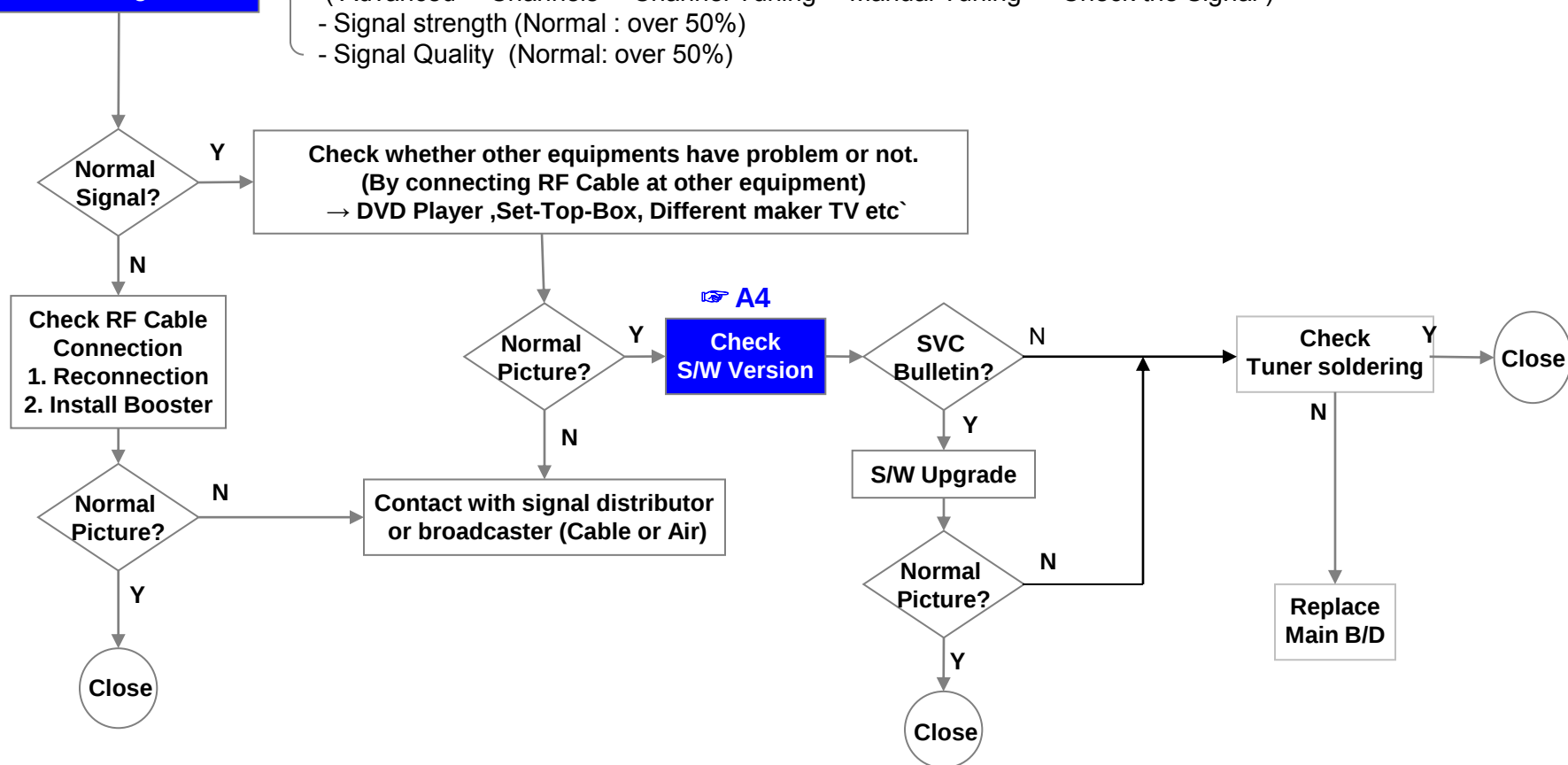


Error symptom	A. Video error	Established date		
	Picture broken/ Freezing	Revised date		3/16

A3

Check RF Signal level

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



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

A6

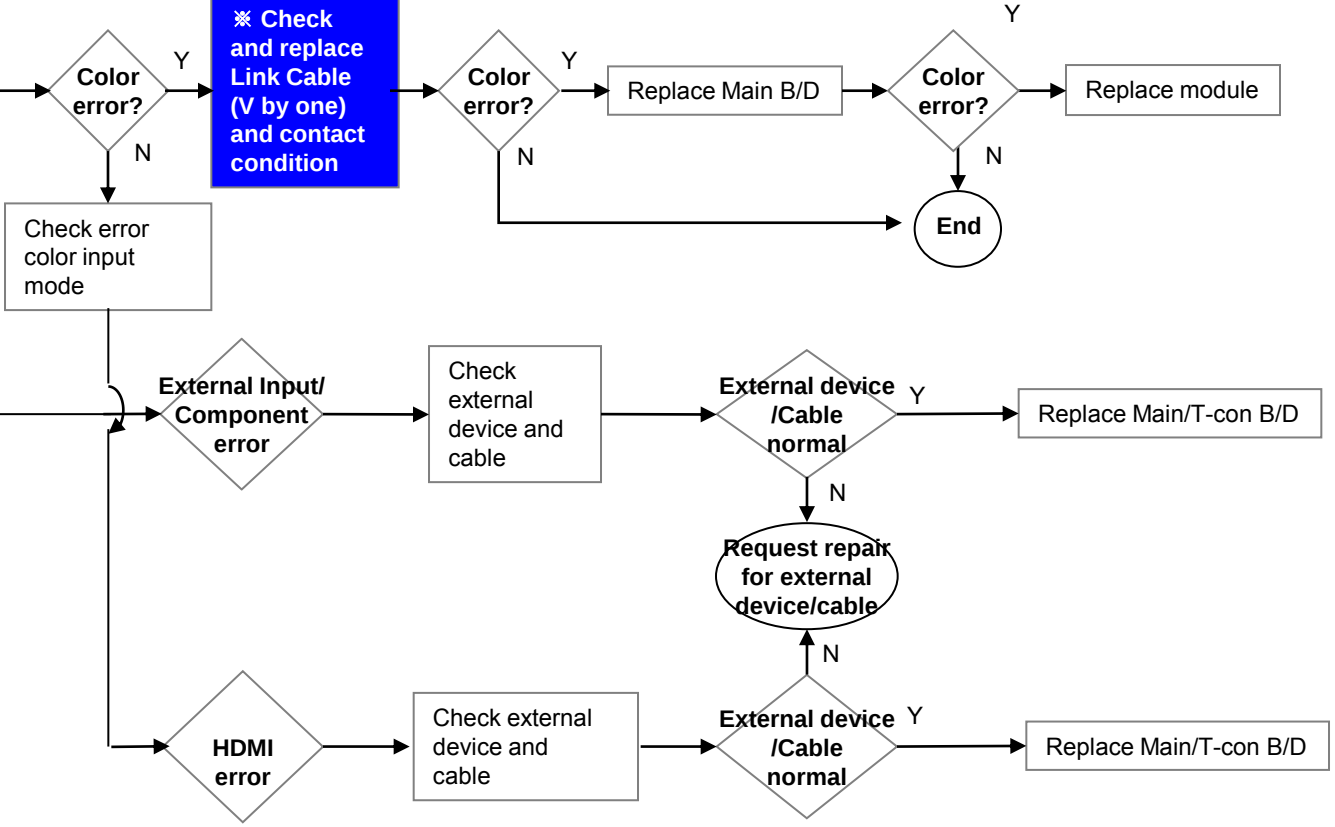
Check color by input
-External Input
-COMPONENT
-AV
-HDMI

A7

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

A8

Check Test pattern



A. Video error

Established
date

Revised date

5/16

Error symptom

Vertical / Horizontal bar, residual image,
light spot, external device color error

Vertical/Horizontal bar, residual image, light spot

A6

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

Screen
normal?Replace
moduleCheck external
device
connection
condition

Normal?

Request repair
for external
device

A7

Check and
replace Link
CableScreen
normal?

End

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

For LGD panel

Replace Main B/D

For other panel

Screen
normal?

End

Replace
Module

A8

Check Test pattern

External device screen error-Color error

Check S/W Version

Check
version

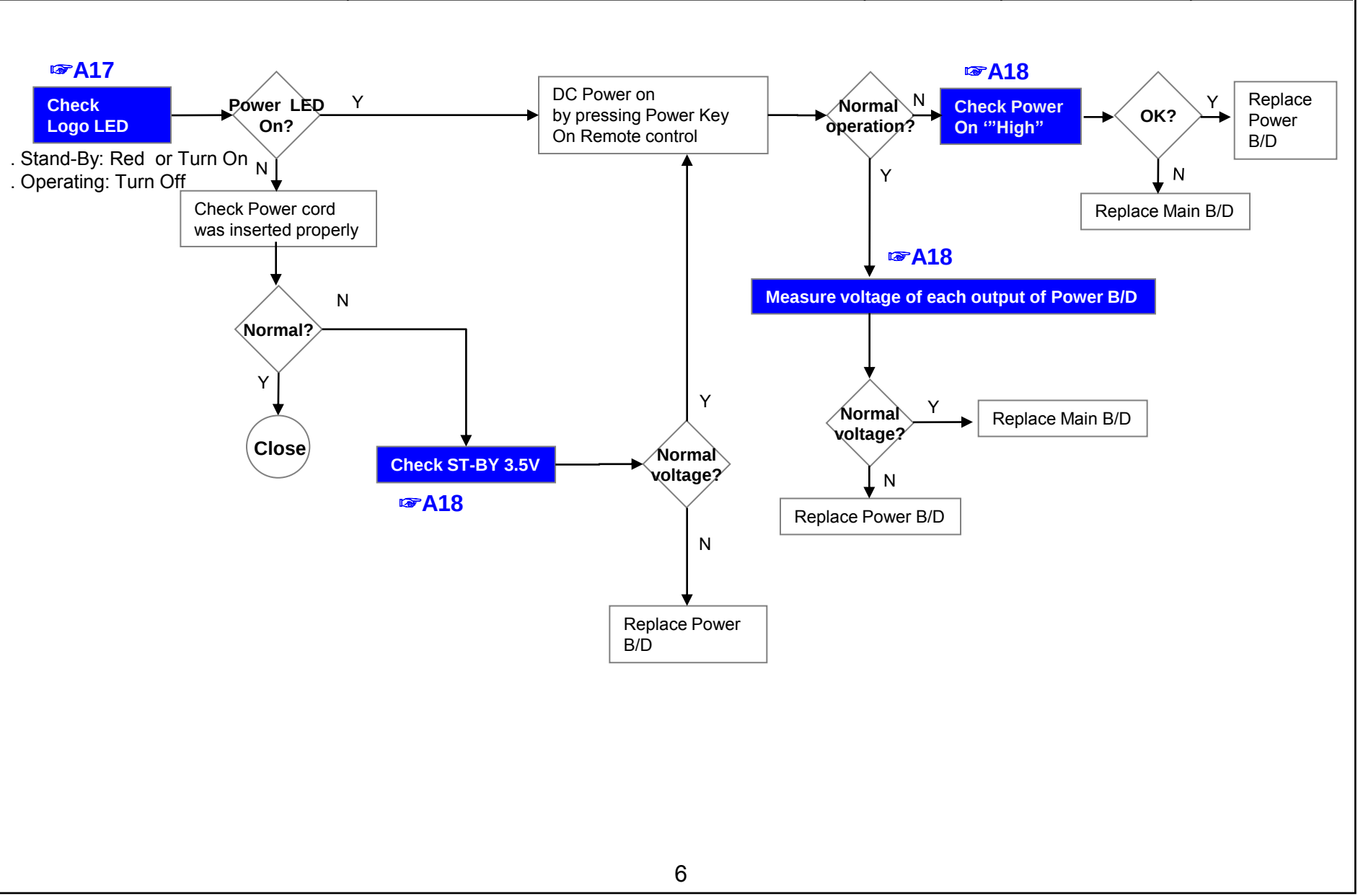
S/W Upgrade

Normal
screen?

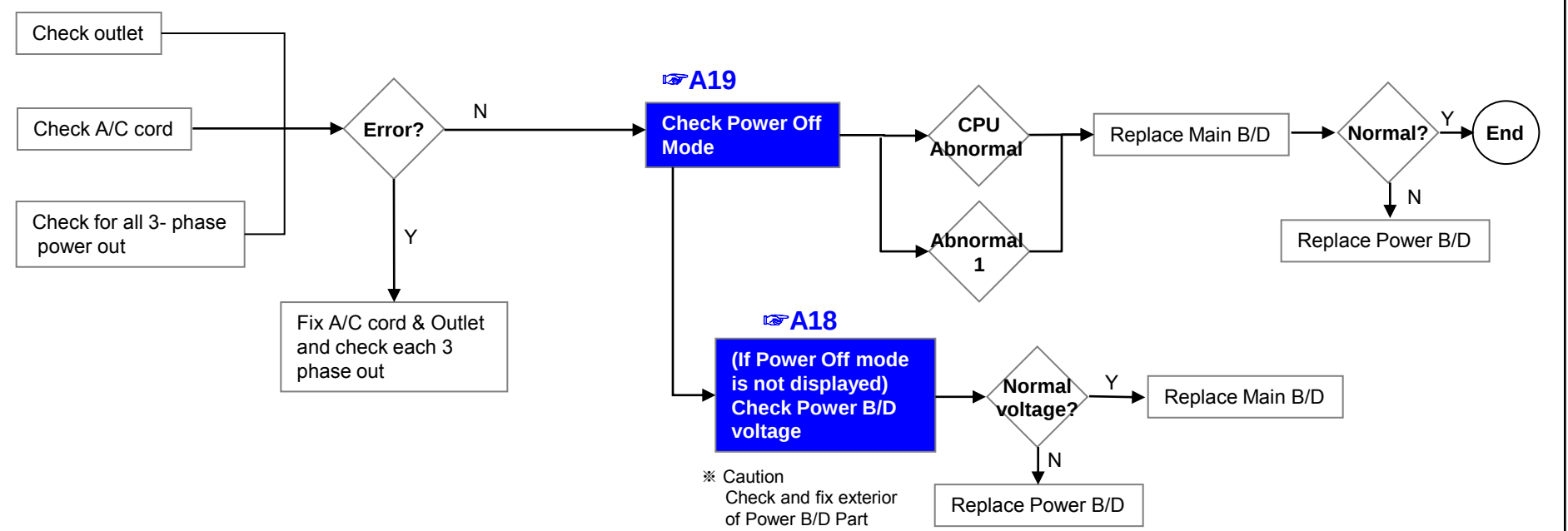
End

Check screen
condition by input
-External Input
-Component
-HDMI/DVIExternal
Input
errorComponent
errorHDMI/
DVIConnect other external
device and cable
(Check normal operation of
External Input, Component,
RGB and HDMI/DVI by
connecting Jig, pattern
Generator ,Set-top Box etc.Connect other external
device and cable
(Check normal operation of
External Input, Component,
RGB and HDMI/DVI by
connecting Jig, pattern
Generator ,Set-top Box etc.Screen
normal?Replace
Main/T-con
B/DRequest repair for
external deviceScreen
normal?Replace
Main /T-con
B/D

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



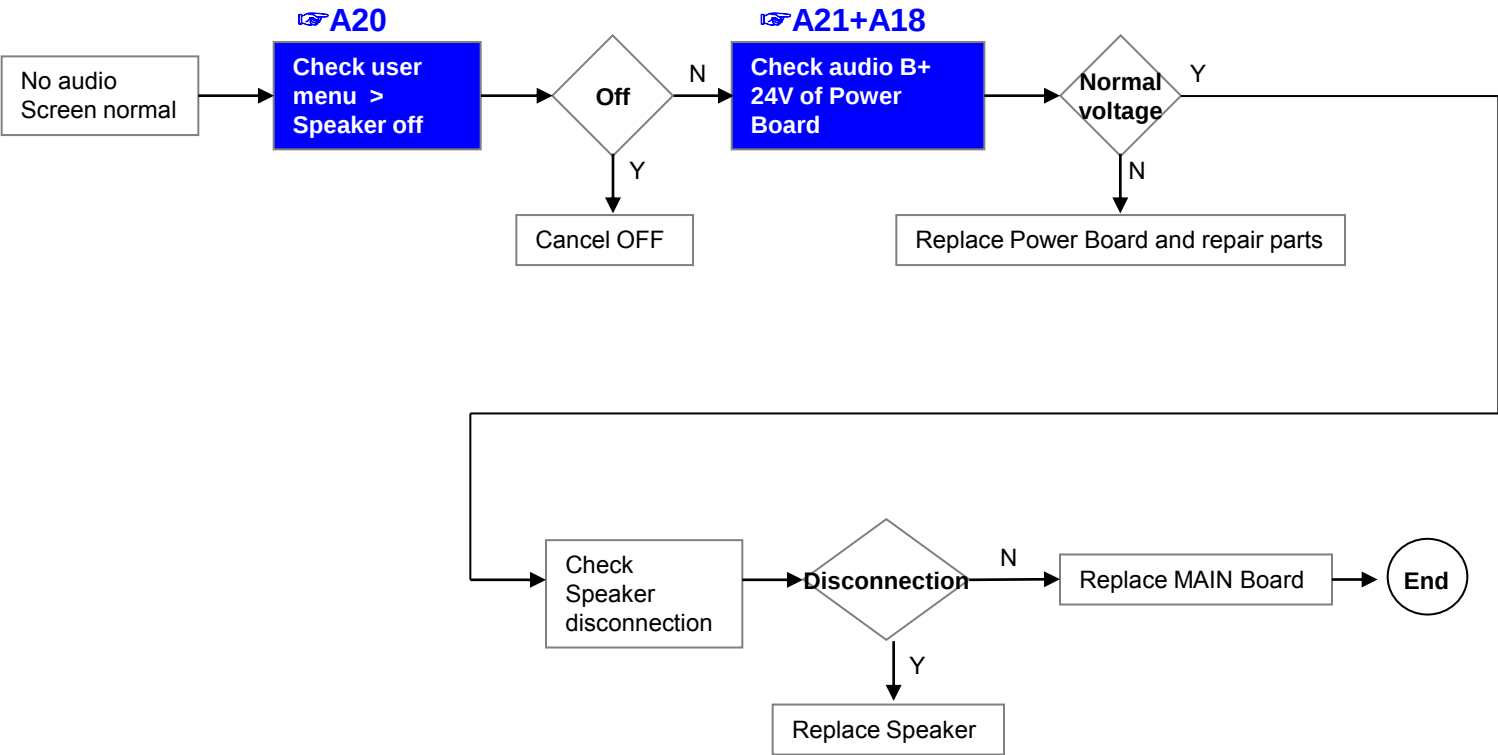
Error symptom	B. Power error	Established date		
	Off when on, off while viewing, power auto on/off	Revised date		7/16



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

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

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



C. Audio error

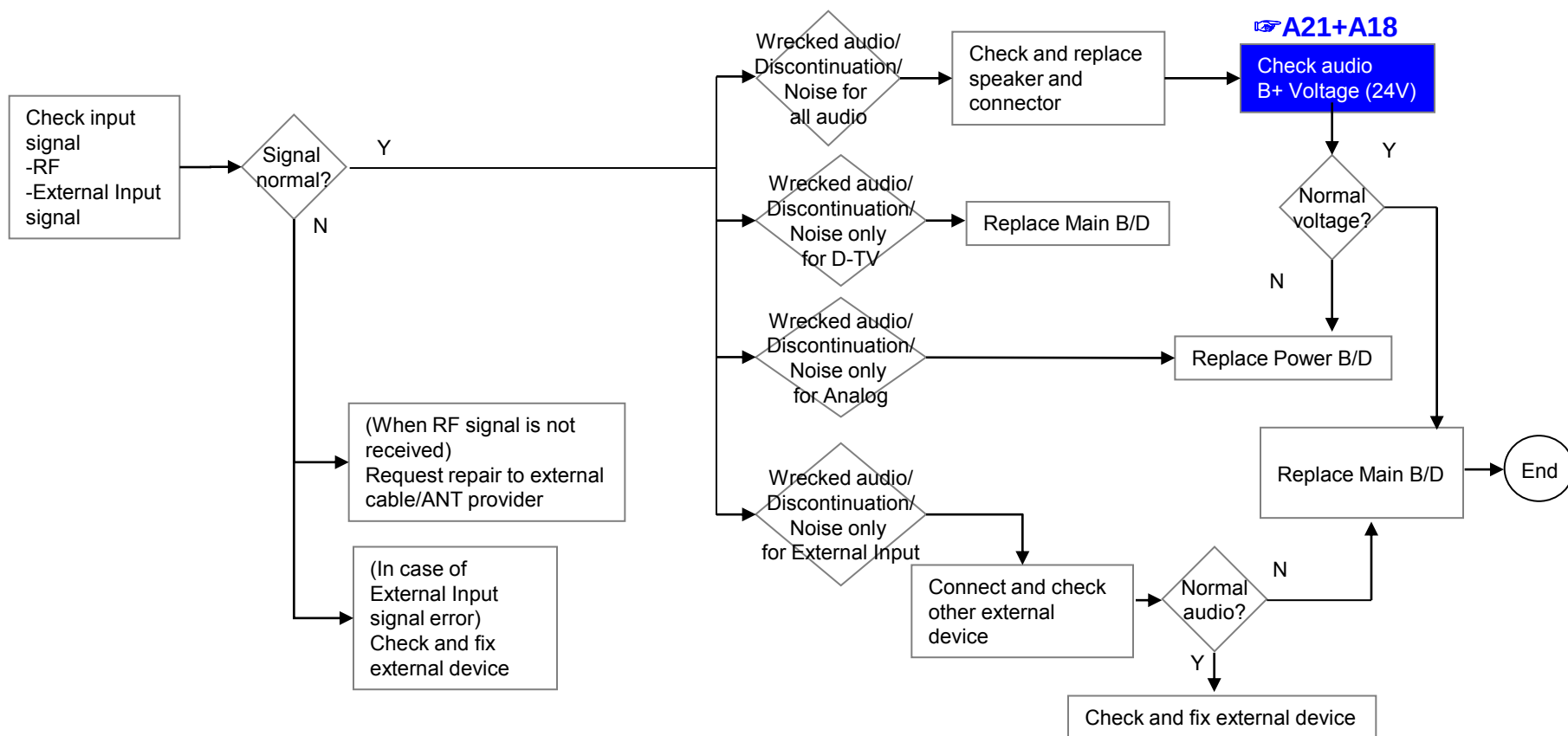
Established
date

Wrecked audio/ discontinuation/noise

Revised date

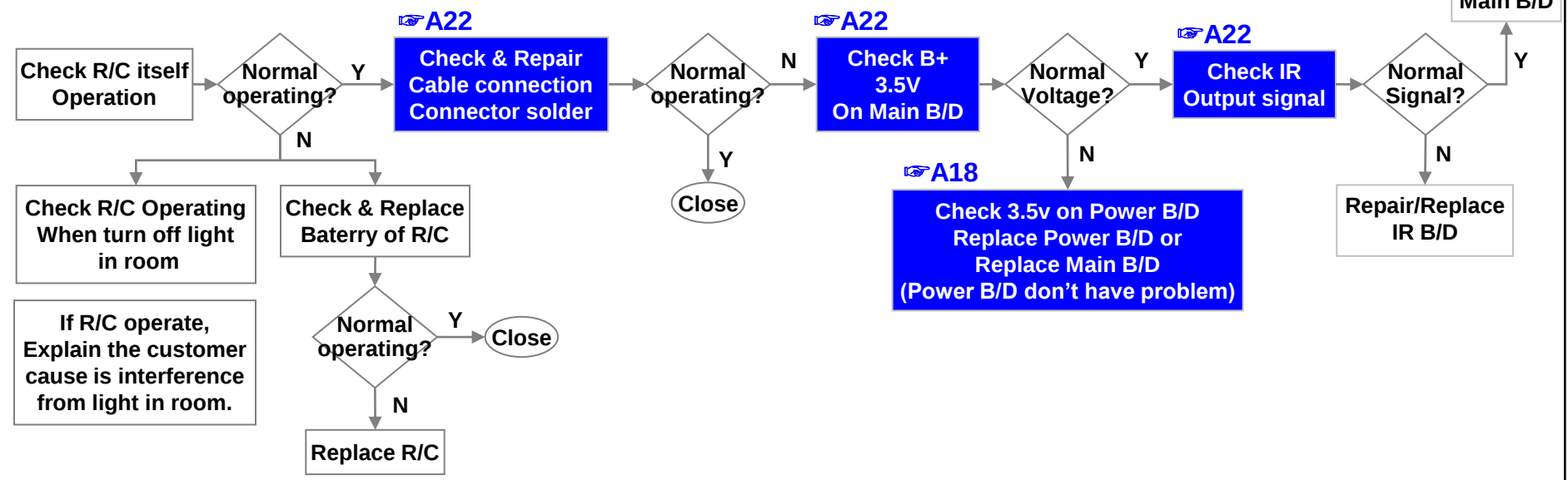
9/16

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



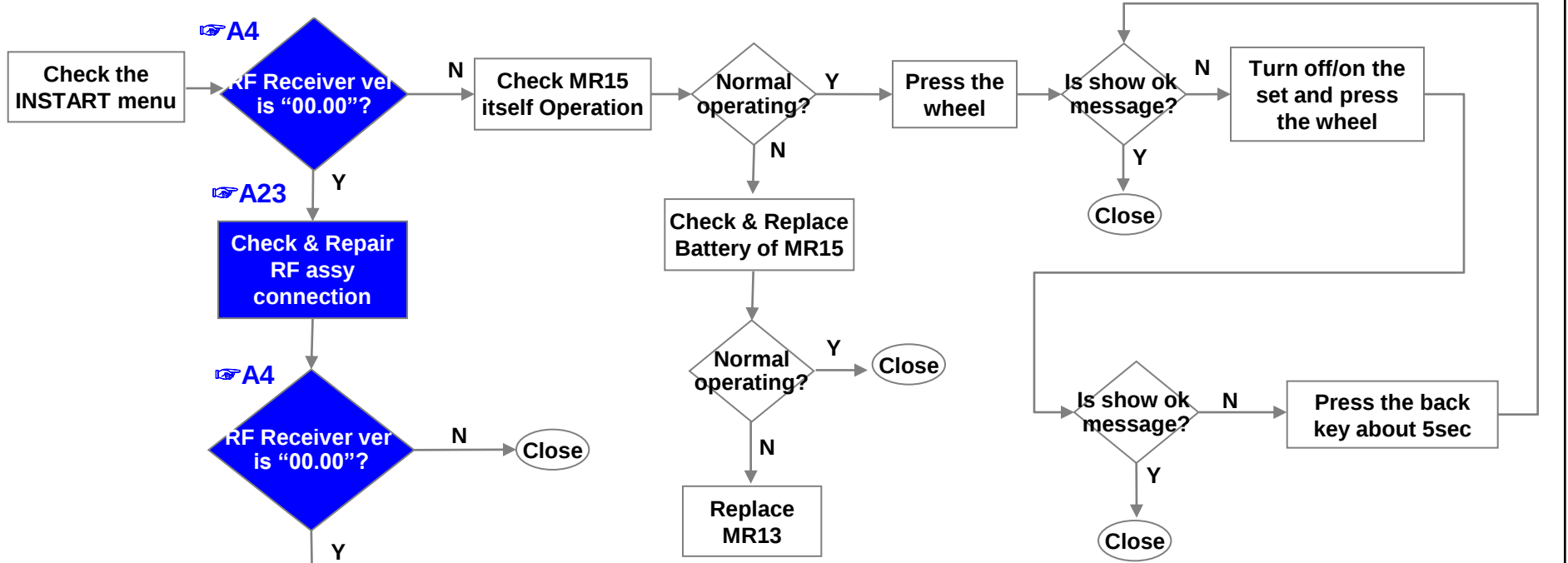
Error symptom	D. Function error	Established date		
	Remote control & Local switch checking	Revised date		10/16

1. Remote control(R/C) operating error



Error symptom	D. Function error	Established date		
	MR15 operating checking	Revised date		11/16

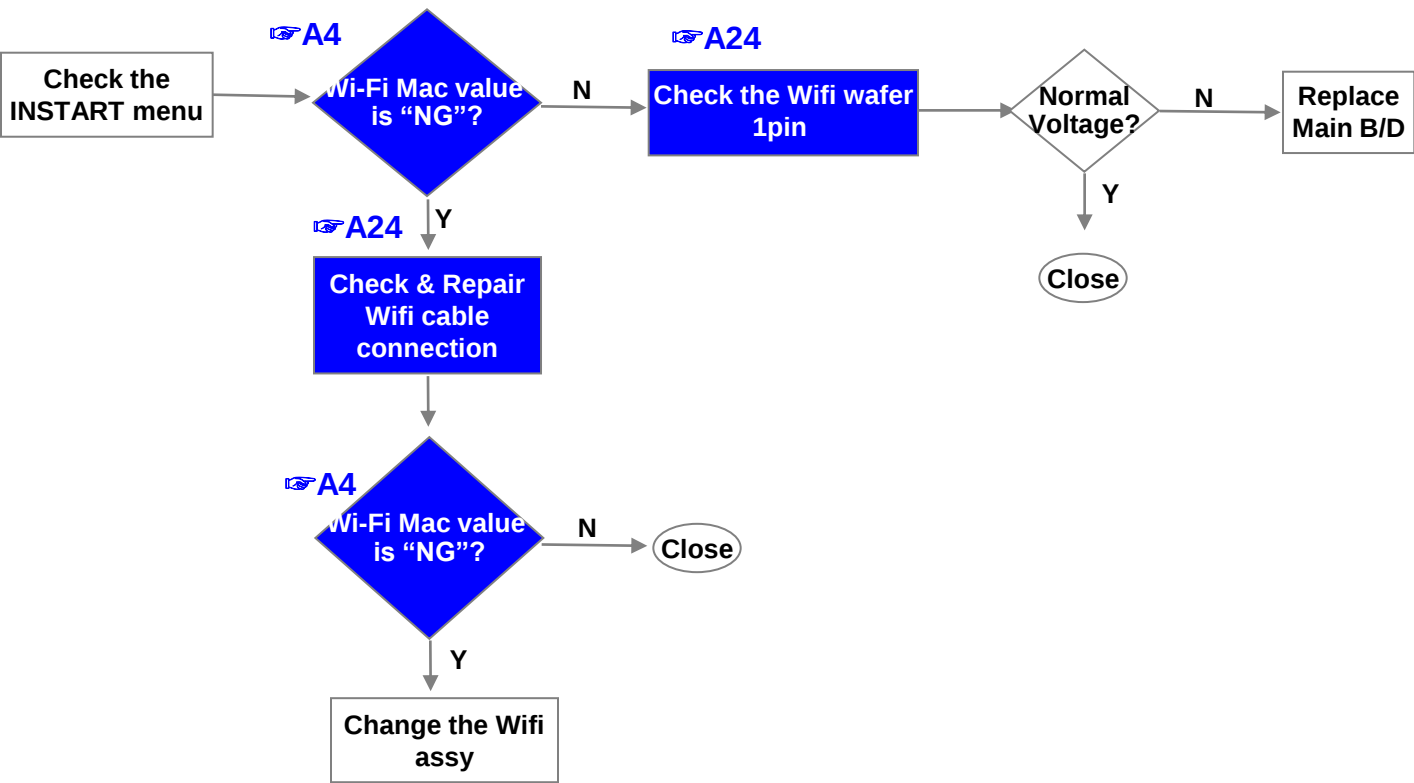
2. MR15(Magic Remocon) operating error



* If you conduct the loop at 3times, change the M4.

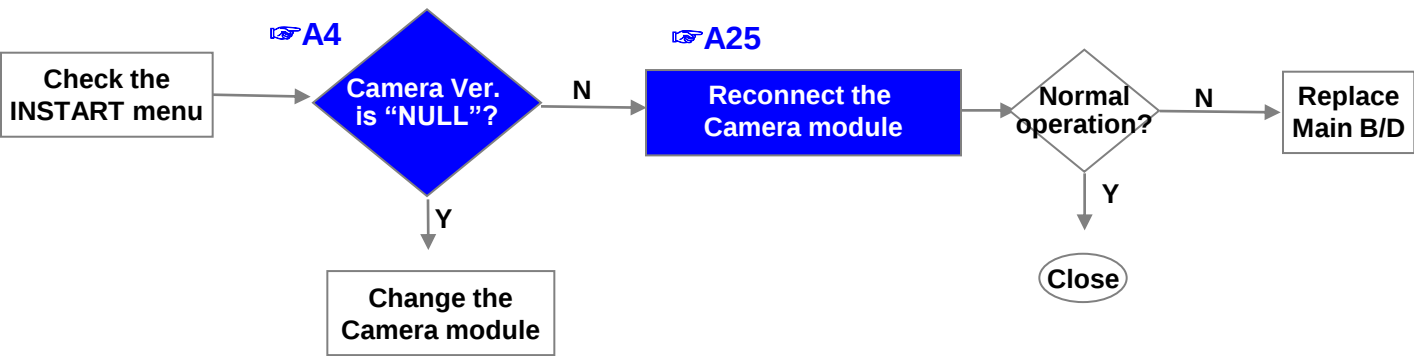
Error symptom	D. Function error	Established date		
	Wifi operating checking	Revised date		12/16

3.Wifi operating error

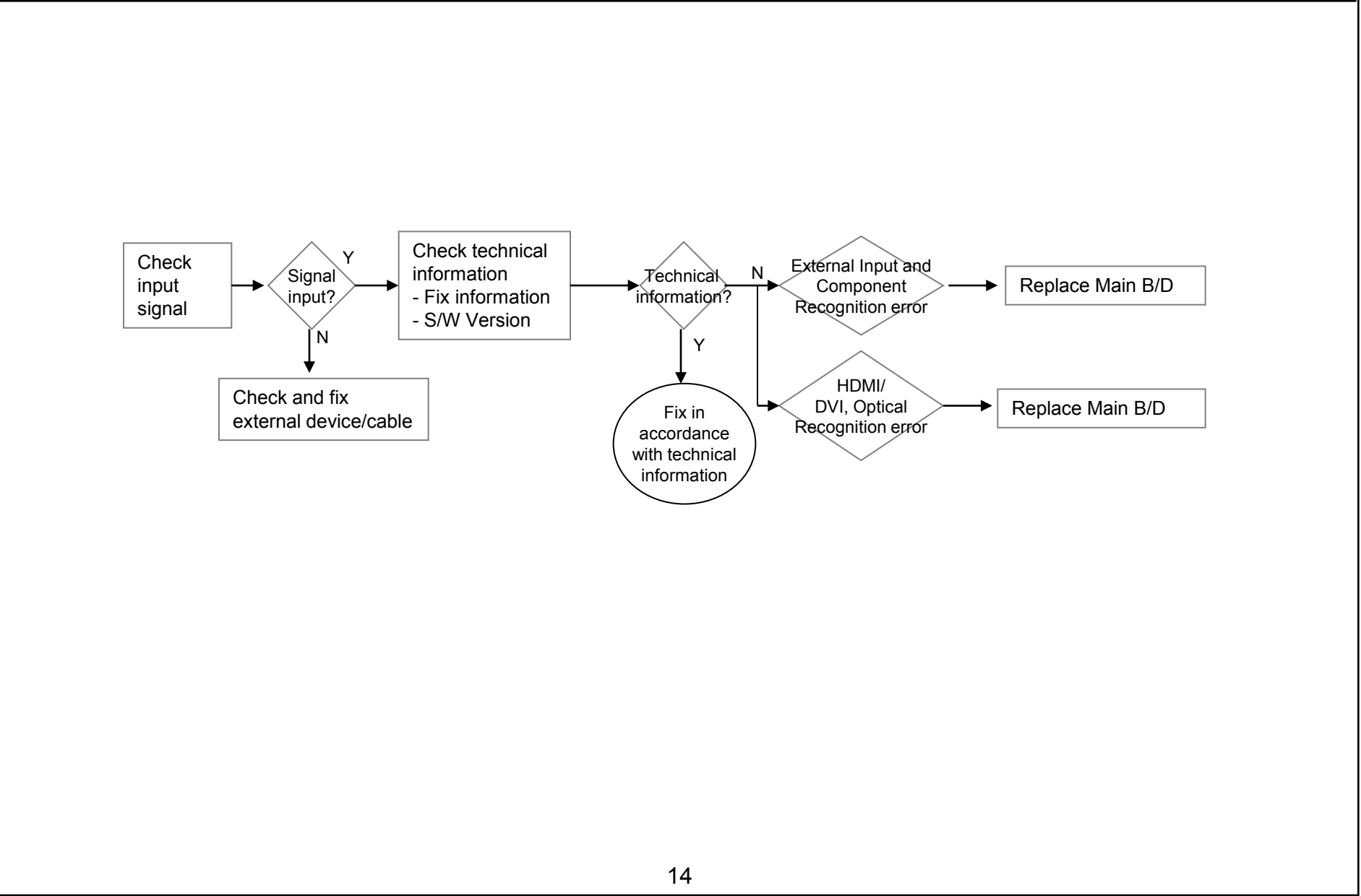


Error symptom	D. Function error	Established date		
	Camera operating checking	Revised date		13/16

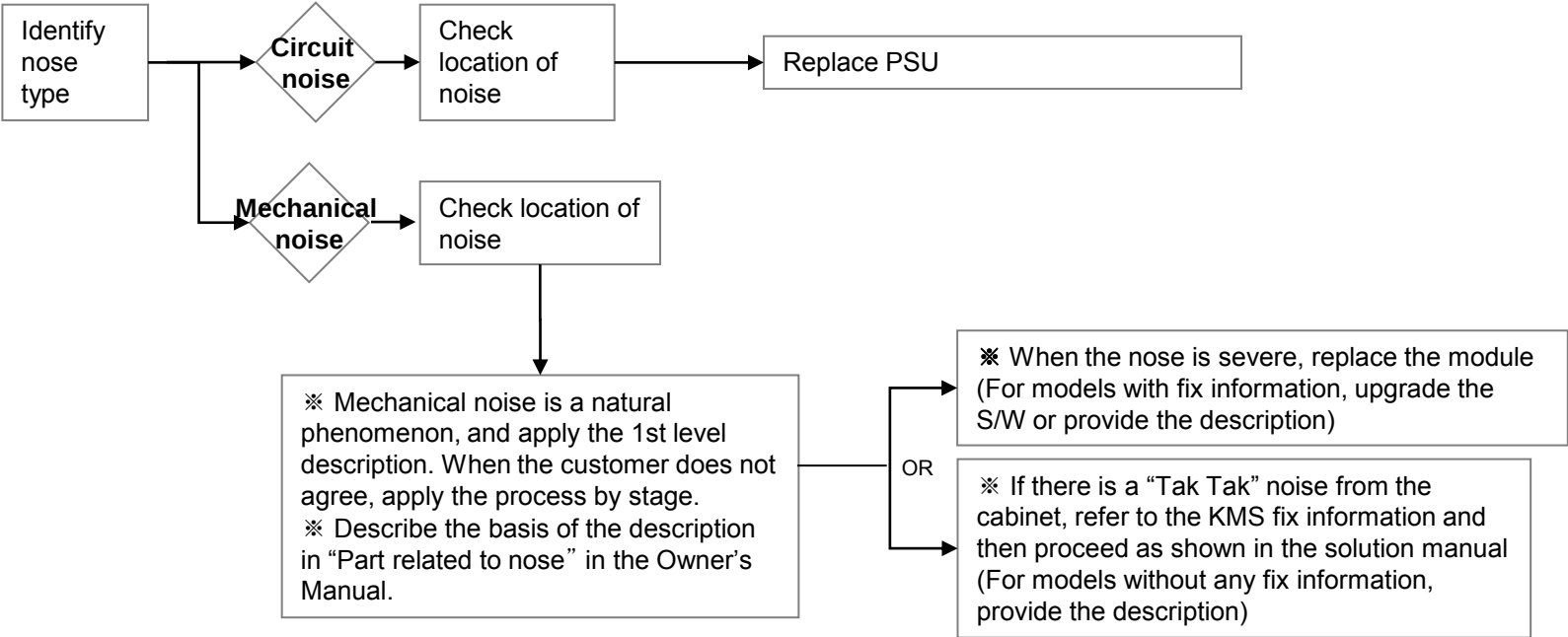
4.Camera operating error



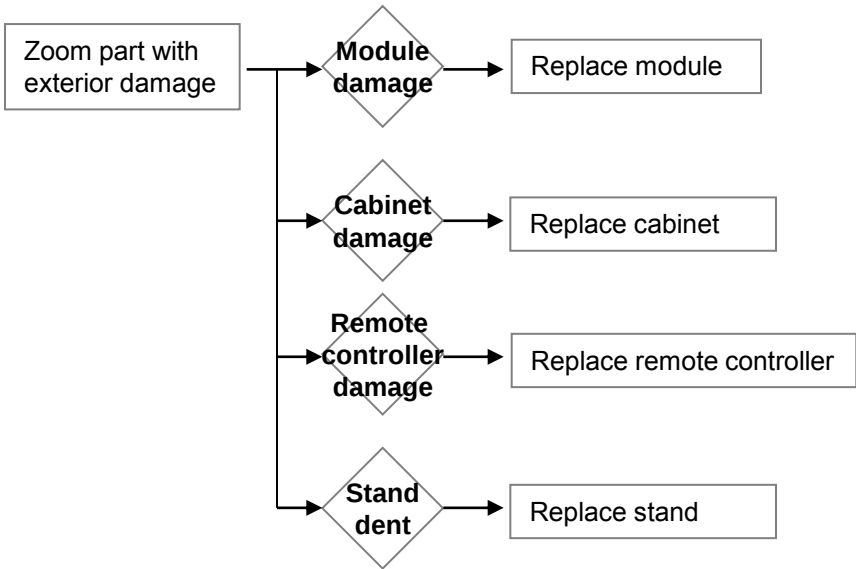
Error symptom	D. Function error	Established date		
	External device recognition error	Revised date		14/16



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



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



Contents of Standard Repair Process Detail Technical Manual

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

Continue to the next page

Contents of Standard Repair Process Detail Technical Manual

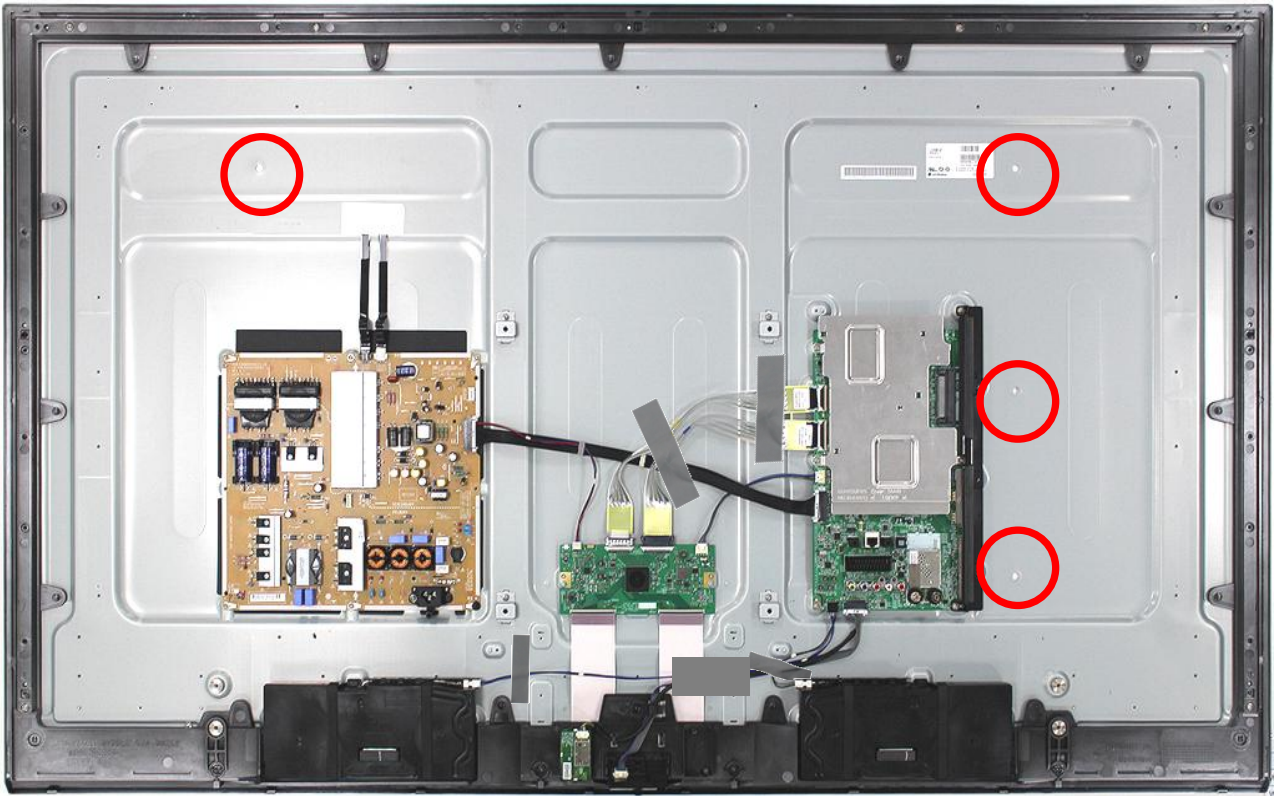
Continued from previous page

No.	Error symptom	Content	Page	Remarks
16	B. Power error_ No power	Check front display LED	A17	
17		Check power input Voltage & ST-BY 3.5V	A18	
18	B. Power error_Off when on, off while viewing	POWER OFF MODE checking method	A19	
19	C. Audio error_ No audio/Normal video	Checking method in menu when there is no audio	A20	
20		Voltage and speaker checking method when there is no audio	A21	
21	D. Function error	Remote controller operation checking method	A22	
22		Motion Remote operation checking method	A23	
23		Wifi operation checking method	A23	

Standard Repair Process Detail Technical Manual

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

<65UF850V-ZB>



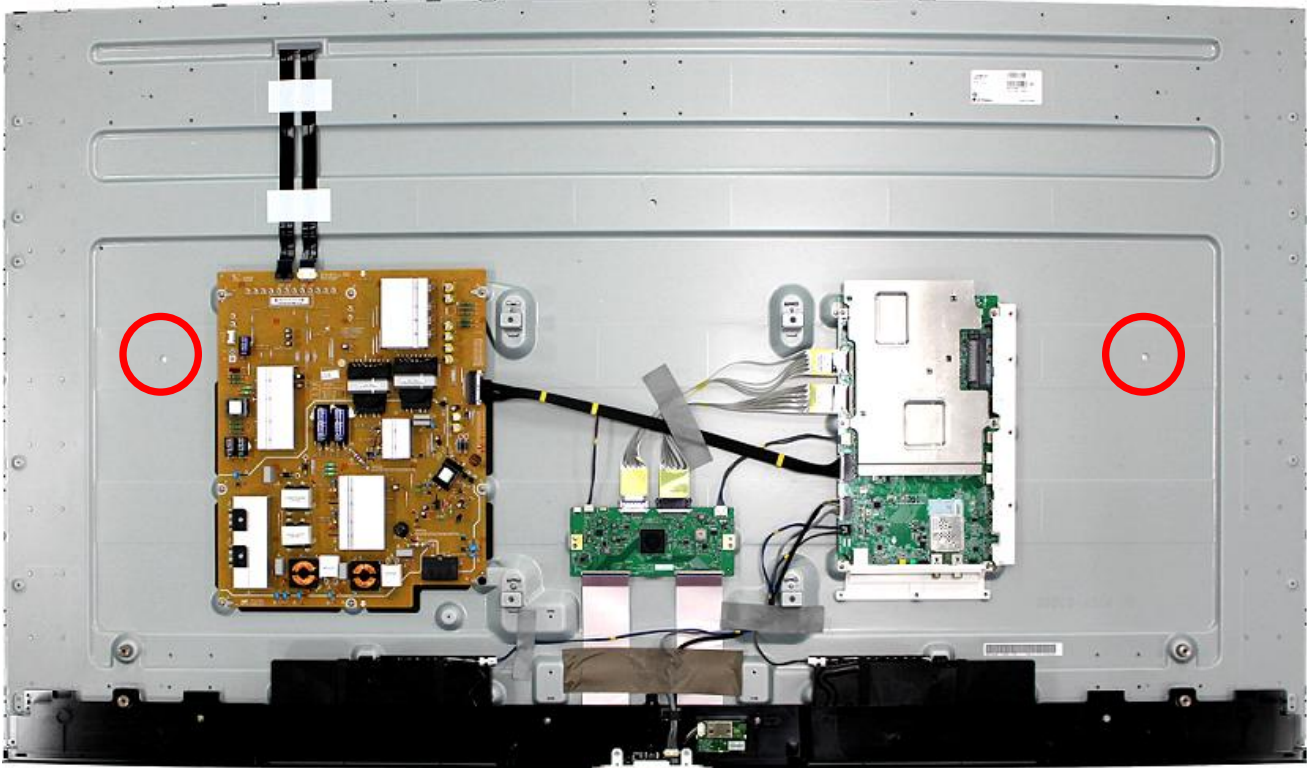
After turning on the power and disassembling the case, check with the naked eye, whether you can see light from locations.

A1

Standard Repair Process Detail Technical Manual

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

<55/65UG87>

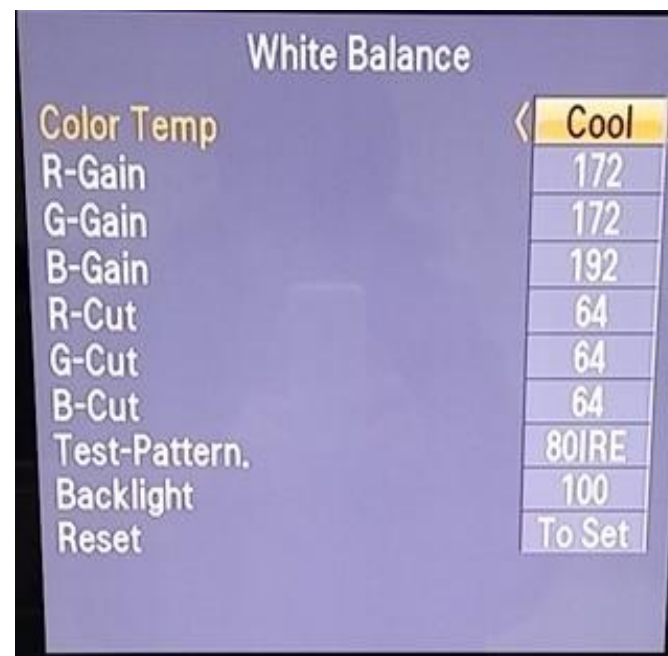
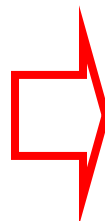
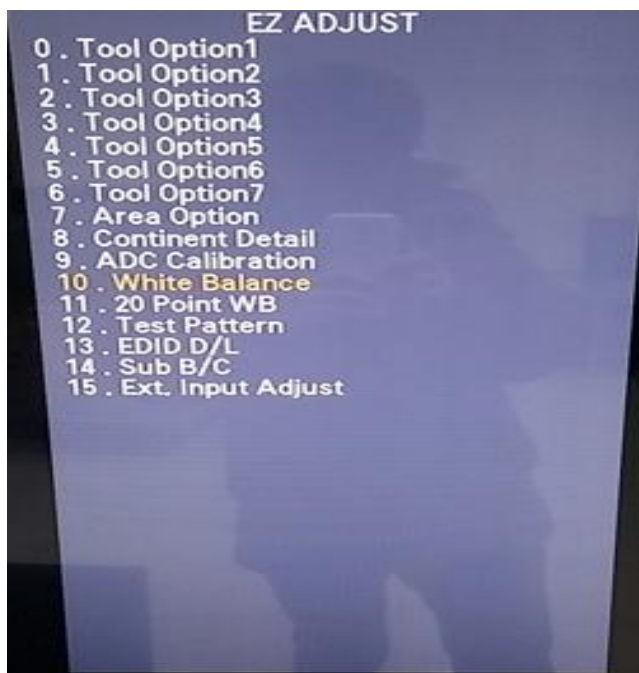


After turning on the power and disassembling the case, check with the naked eye, whether you can see light from locations.

Standard Repair Process Detail Technical Manual

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

<ALL MODELS>



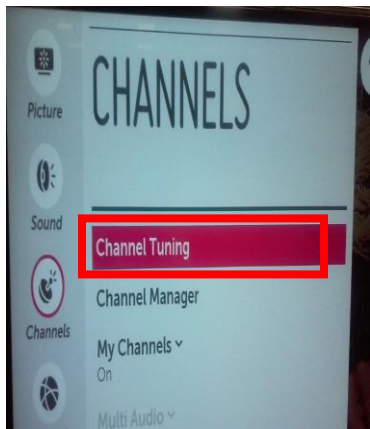
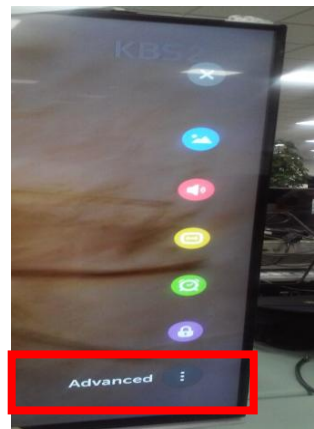
Entry method

1. Press the ADJ button on the remote controller for adjustment.
2. Enter into White Balance of item 10.
3. After recording the R, G, B (GAIN, Cut) value of Color Temp (Cool/Medium/Warm), re-enter the value after replacing the MAIN BOARD.

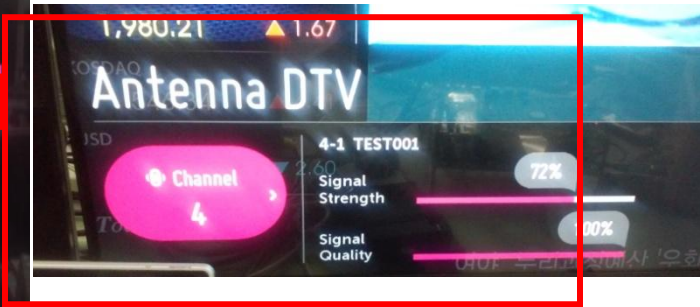
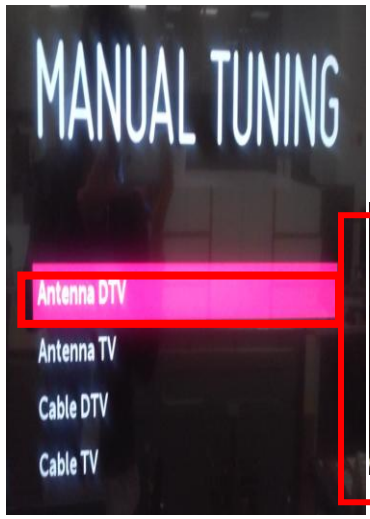
Standard Repair Process Detail Technical Manual

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

<ALL MODELS>



Advanced → Channels → Channel Tuning → Manual Tuning



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



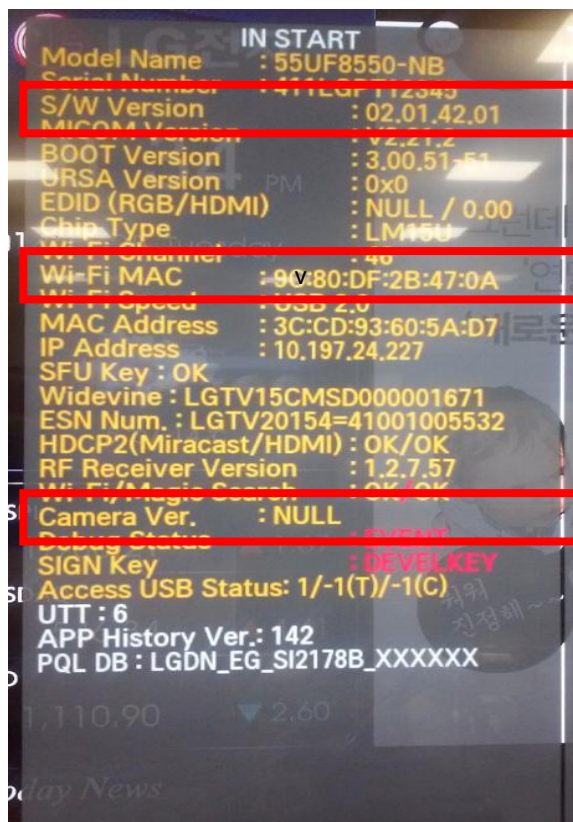
Standard Repair Process Detail Technical Manual

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

<ALL MODELS>

1. Checking method for remote controller for adjustment

Version



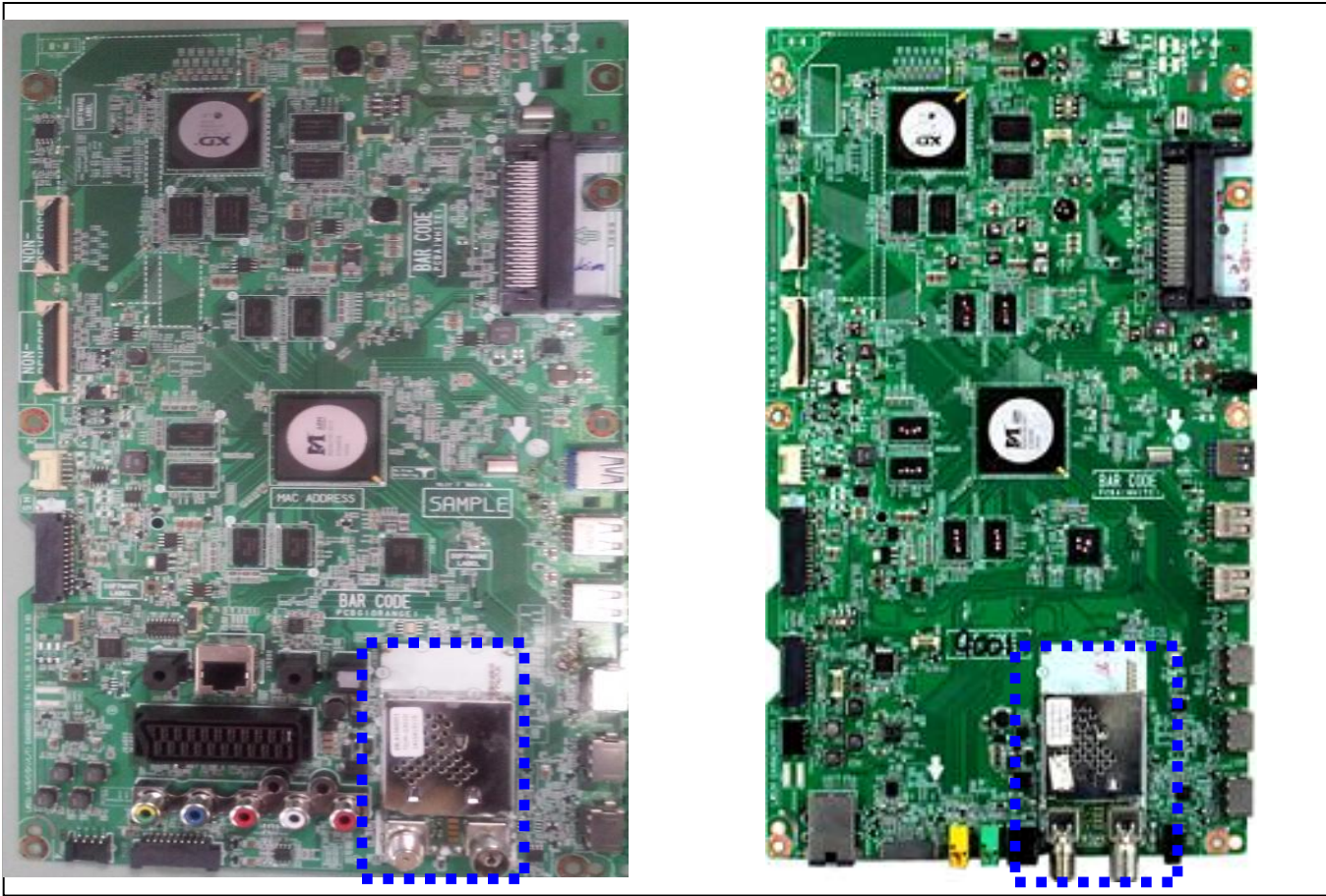
Press the IN-START with the remote controller for adjustment

A4

Standard Repair Process Detail Technical Manual

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

<ALL MODELS>

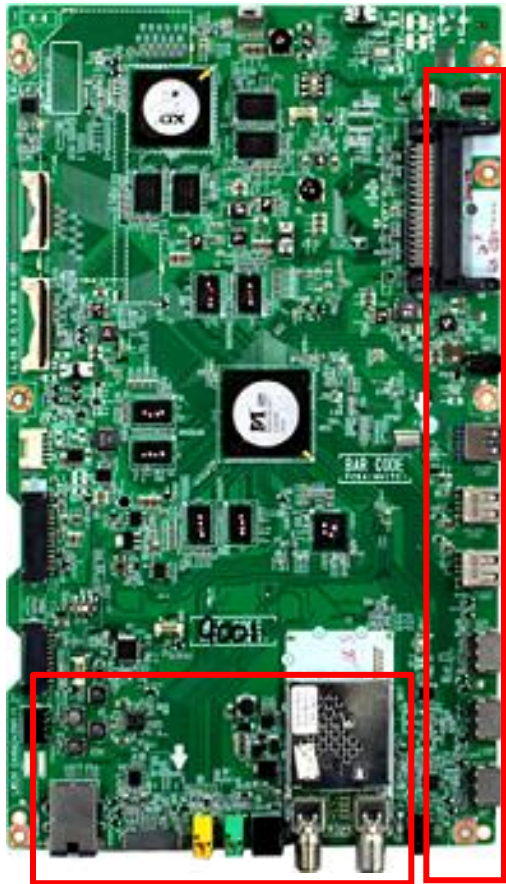
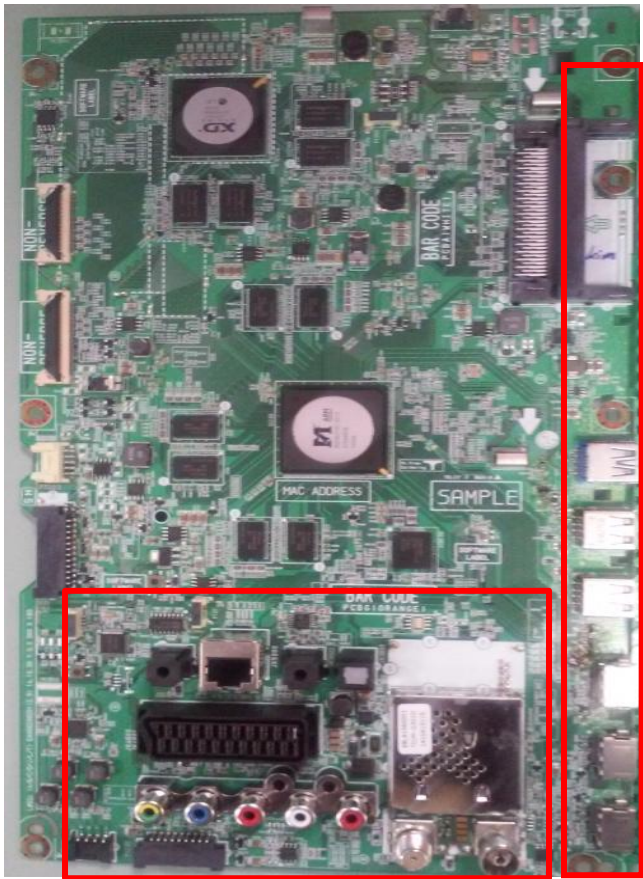


- Checking method:
- 1. Check the signal strength or check whether the screen is normal when the external device is connected.
 - 2. After measuring each voltage from power supply, finally replace the MAIN BOARD.
 - 3. If you can't see the UHD live TV, please connect signal at left side of jack. (Korea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

Standard Repair Process Detail Technical Manual

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

<ALL MODELS>

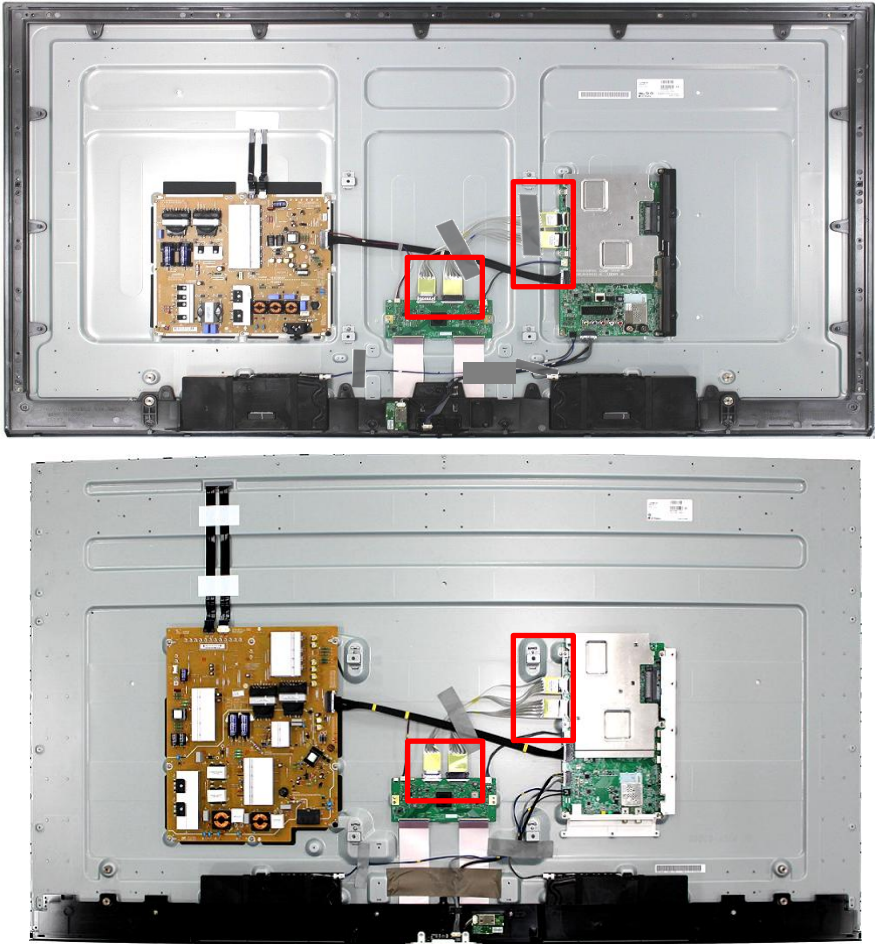


As the part connecting to the external input, check the screen condition by signal

Standard Repair Process Detail Technical Manual

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

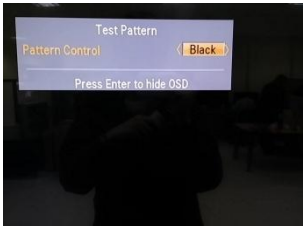
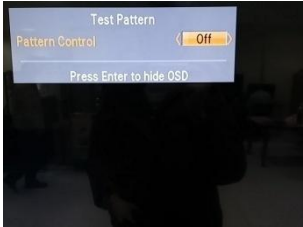
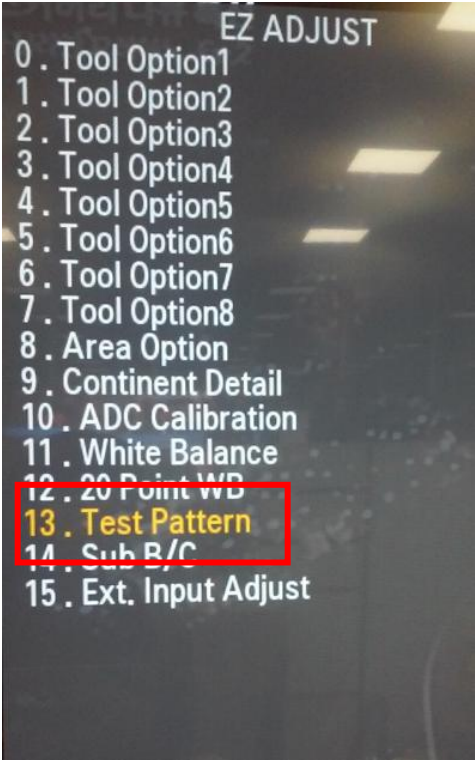
<ALL MODELS>



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

Standard Repair Process Detail Technical Manual

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



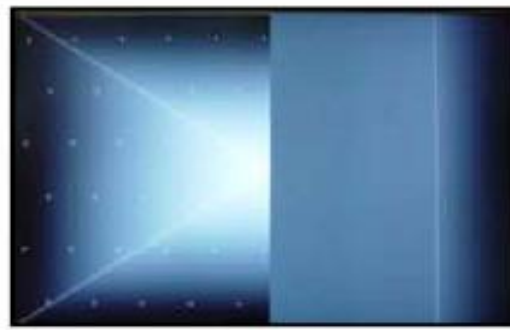
You can view 6 types of patterns using the ADJ Key

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

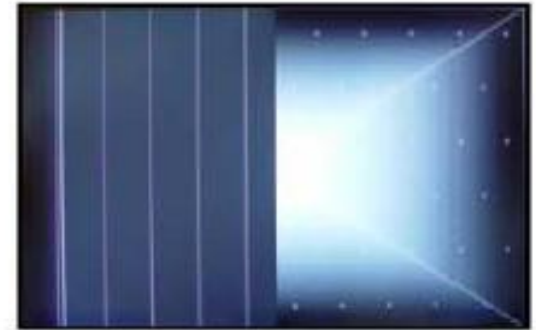
Appendix : Exchange Main Board (1)



Solder defect, CNT Broken



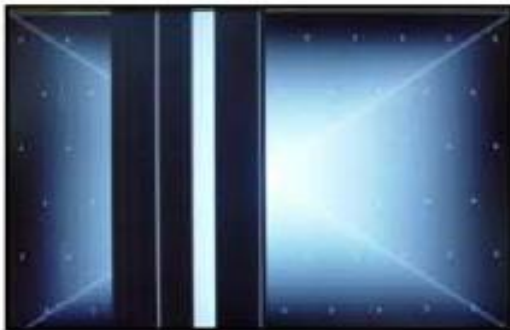
Solder defect, CNT Broken



Solder defect, CNT Broken



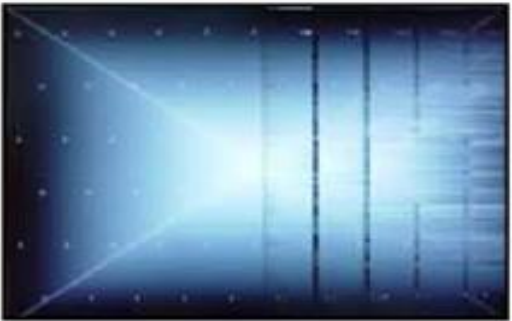
Solder defect, CNT Broken



Solder defect, CNT Broken



Abnormal Power Section



Solder defect, Short/Crack

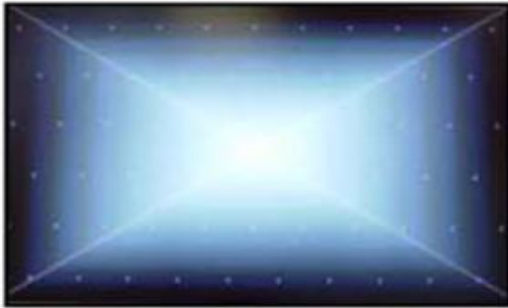


Abnormal Power Section



Solder defect, Short/Crack

Appendix : Exchange Main Board (2)



Abnormal Power Section



Abnormal Power Section



Solder defect, Short/Crack



Solder defect, Short/Crack



Fuse Open, Abnormal power section



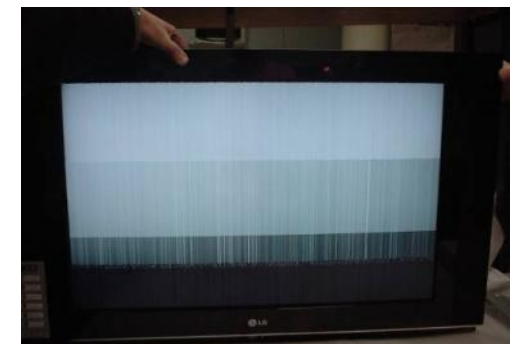
Abnormal Display



GRADATION



Noise



GRADATION

Appendix : Exchange Power Board (PSU)



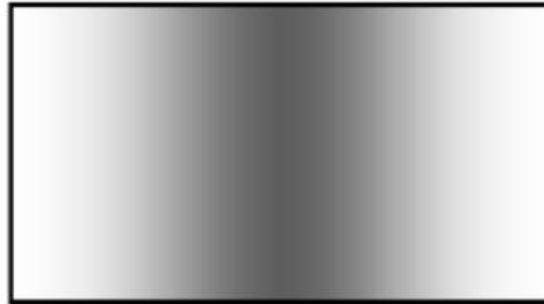
No Light



Dim Light



Dim Light



Dim Light



No picture/Sound Ok

Appendix : Exchange the Module (1)



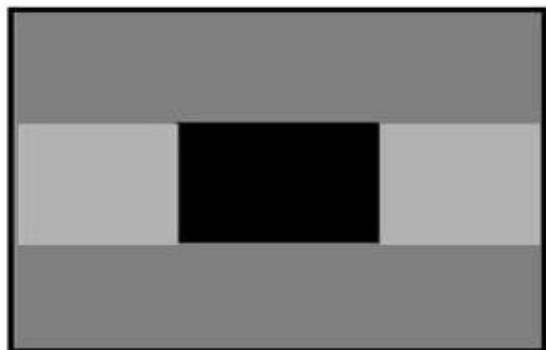
Panel Mura, Light leakage



Panel Mura, Light leakage



Press damage



Crosstalk



Press damage



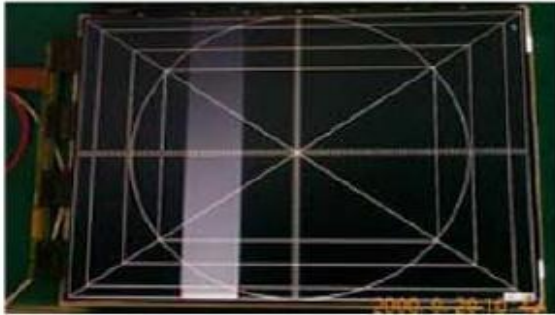
Crosstalk



Press damage

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

Appendix : Exchange the Module (2)



Vertical Block
Source TAB IC Defect



Vertical Line
Source TAB IC Defect



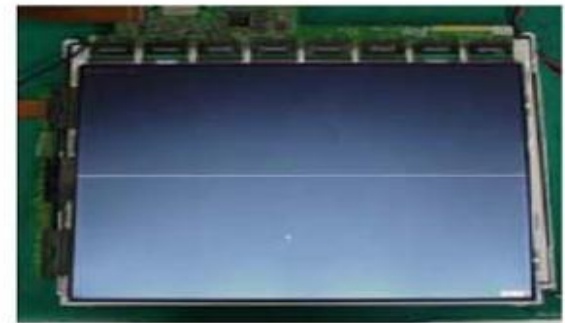
Vertical Block
Source TAB IC Defect



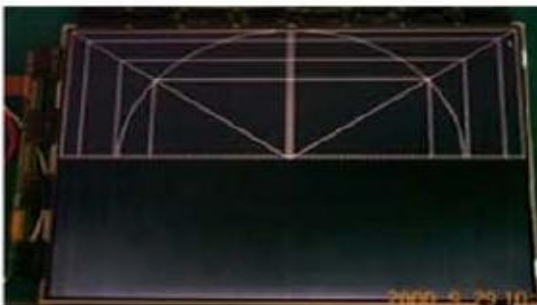
Horizontal Block
Gate TAB IC Defect



Horizontal Block
Gate TAB IC Defect



Horizontal line
Gate TAB IC Defect



Horizontal Block
Gate TAB IC Defect

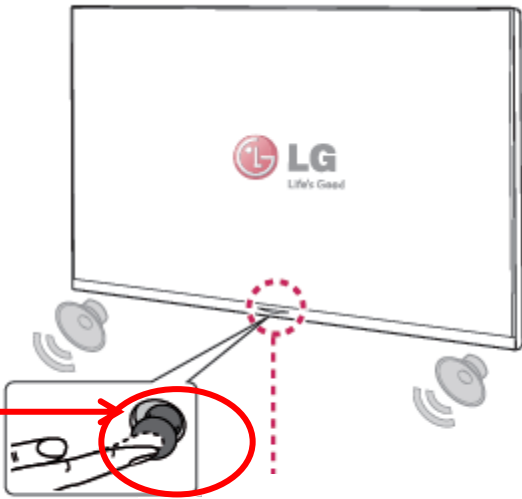
Un-repairable Cases
In this case please exchange the module.

Standard Repair Process Detail Technical Manual

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

<ALL MODELS>

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



Basic Functions

	Power On	When the TV is turned off, place your finger on the joystick button and press it once and release it.
	Power Off	When the TV is turned on, place your finger on the joystick button and press it once for a few seconds and release it.
	Volume Control	If you place your finger over the joystick button and move it left or right, you can adjust the volume level you want.
	Programmes Control	If you place your finger over the joystick button and move it up or down, you can scrolls through the saved programmes you want.

Adjusting the Menu

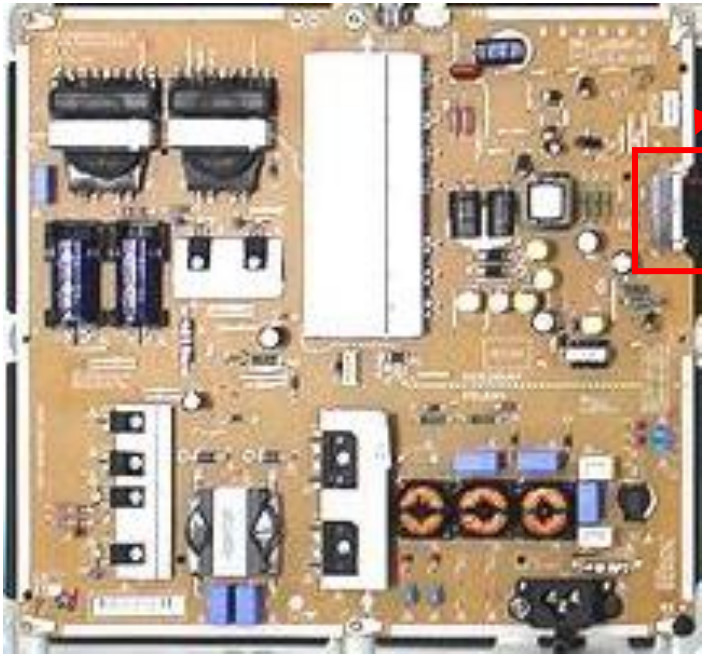
When the TV is turned on, press the joystick button one time. You can adjust the Menu items moving the joystick button up, down, left or right.

	Turns the power off.
	Clears on-screen displays and returns to TV viewing.
	Changes the input source.
	Accesses the main menu. (Depending on model)

Standard Repair Process Detail Technical Manual

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

Check the DC 24V, 12V, 3.5V.



<55/65UG87>

Pin No.	Signal	Pin No.	Signal
1	PWR_ON	2	DRV_ON
3	P-DIM	4	P-DIM2
5	3.5V	6	GND
7	3.5V	8	3.5V
9	GND	10	GND
11	12V	12	12V
13	12V	14	12V
15	12V	16	GND
17	GND	18	24V
19	24V	20	24V
21	24V	22	24V
23	GND	24	GND

<49/55/60/65UF85>

Pin No.	Signal	Pin No.	Signal
1	PWR_ON	2	DRV_ON
3	P-DIM	4	P-DIM2
5	3.5V	6	GND
7	3.5V	8	3.5V
9	GND	10	GND
11	12V	12	12V
13	12V	14	12V
15	12V	16	GND
17	GND	18	24V
19	24V	20	24V
21	24V	22	GND
23	GND	24	N.C

Standard Repair Process Detail Technical Manual

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

<ALL MODELS>

IN START		Power Off Status
Model Name : WEBOS1	1. Adjust Check	0. POWER_OFF_BY_ACDET
Serial Number : SKJY1107	2. ADC Data	1. POWER_OFF_BY_REMOTE_KEY
S/W Version : 02.06.14.01	3. Power Off Status	2. POWER_OFF_BY_REMOTE_KEY
MICOM Version : V1.00.9	4. System 1	3. POWER_OFF_BY_ACDET
BOOT Version : 3.03.44	5. System 2	4. POWER_OFF_BY_INSTOP_KEY
U14 Version : 0x0026	6. System 3	5. POWER_OFF_BY_UNKNOWN
D14 Version(m0/m1) : 0x0103/0x0100	7. Model Number D/L	6. POWER_OFF_BY_UNKNOWN
URSA Version : 0xa00e	8. Test Option	7. POWER_OFF_BY_UNKNOWN
EDID (RGB/HDMI) : NULL / 0.00	9. Spread Spectrum	8. POWER_OFF_BY_UNKNOWN
Chip Type : LG1154	10. Stable Count	9. POWER_OFF_BY_UNKNOWN
Wi-Fi Channel : N/A	11. SDP Server Selection	10. POWER_OFF_BY_UNKNOWN
Wi-Fi MAC : NG	12. RF Remocon Test	11. POWER_OFF_BY_UNKNOWN
MAC Address : CA:84:B0:E5:E8:44	13. Access Code	12. POWER_OFF_BY_UNKNOWN
IP Address : 0.0.0.0		13. POWER_OFF_BY_UNKNOWN
Widevine : NG		14. POWER_OFF_BY_UNKNOWN
ESN Num. : NG		15. POWER_OFF_BY_UNKNOWN
HDCP2.0 : NG		16. POWER_OFF_BY_UNKNOWN
RF Receiver Version : 0.0.0.0		17. POWER_OFF_BY_UNKNOWN
Wi-Fi/Magic Search : NG/NG		18. POWER_OFF_BY_UNKNOWN
Camera Ver. : NULL		19. POWER_OFF_BY_UNKNOWN
A.Demod F/W Ver. : 0x43b00x40b1L		20. POWER_OFF_BY_UNKNOWN
D.Demod F/W Ver. : 0x40b1LGD_ELF		21. POWER_OFF_BY_UNKNOWN
Debug Status : EVENT		22. POWER_OFF_BY_UNKNOWN
Access USB Status: 1/-1(T)/-1(C)		23. POWER_OFF_BY_UNKNOWN
UTT : 1		24. POWER_OFF_BY_UNKNOWN
APP History Ver.: 509		
PQL DB : LGD_ELF_SI2178_XXXXUo		

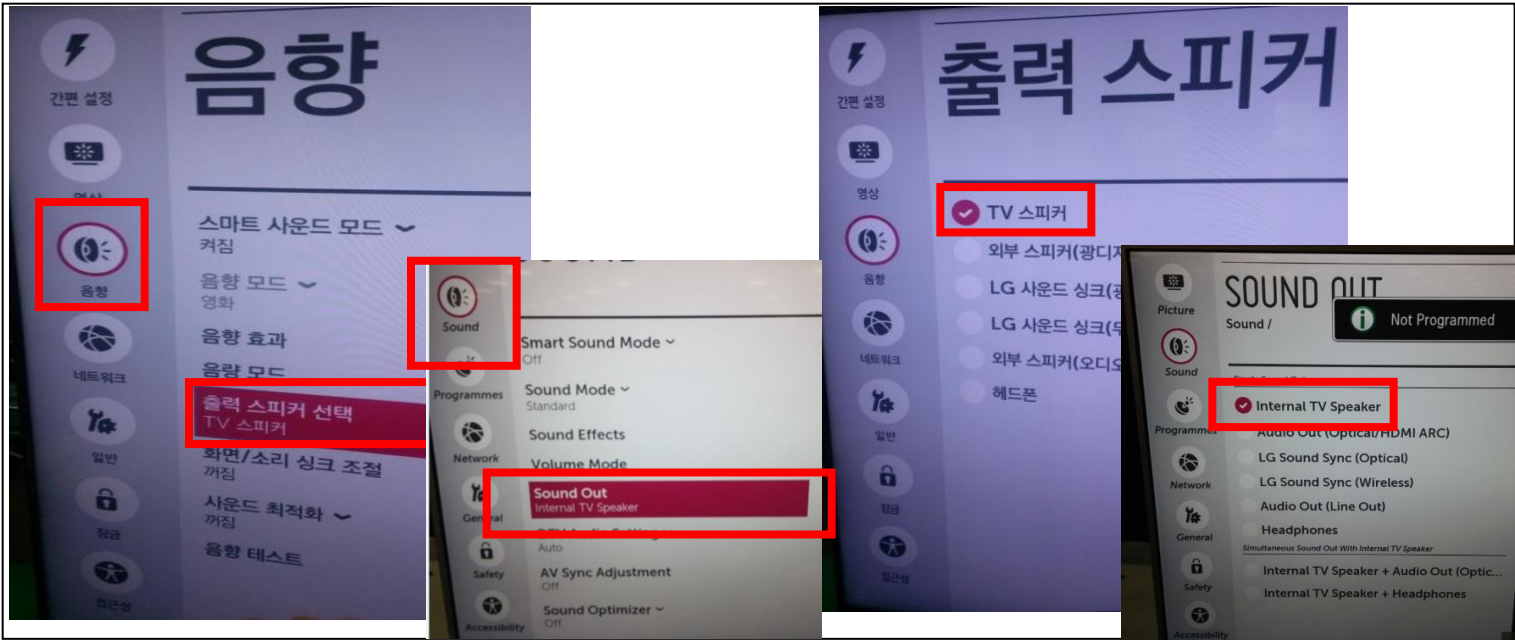
Entry method

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

Standard Repair Process Detail Technical Manual

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

<ALL MODELS>



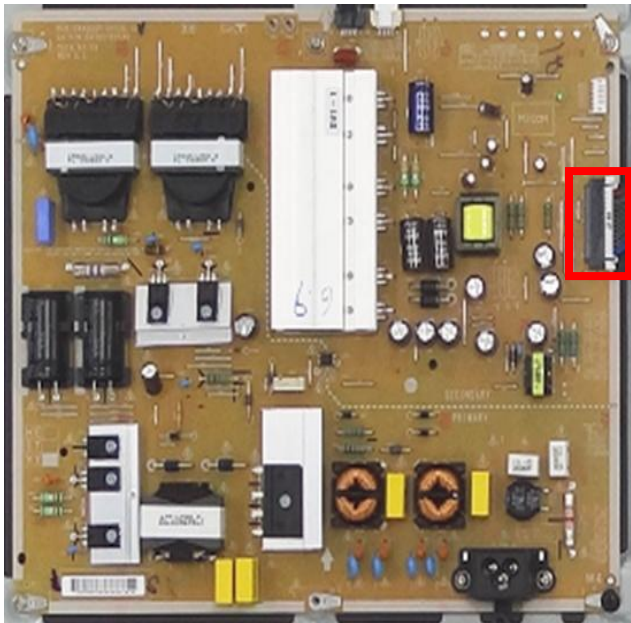
Checking method

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

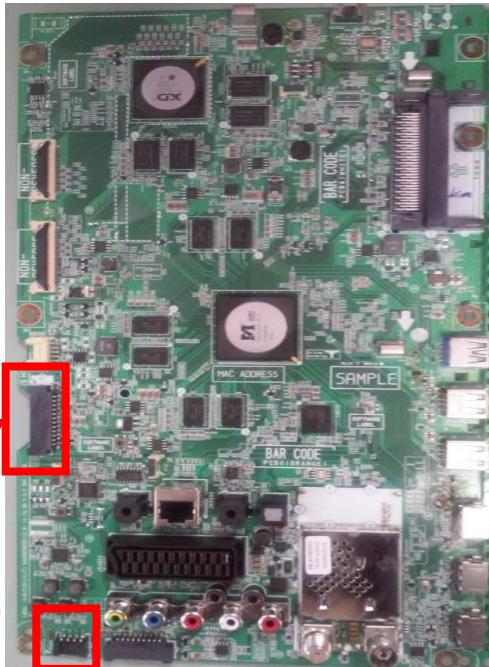
Standard Repair Process Detail Technical Manual

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

<65UF850V-ZB>



1	PWR ON	2	DVR_ON
3	P_DIM #1	4	PDIM #2
5	3.5V	6	GND
7	3.5V	8	3.5V
9	GND	10	GND
11	12V	12	12V
13	12V	14	12V
15	12V	16	GND
17	GND	18	24V
19	24V	20	24V
21	24V	22	GND
23	GND	24	NC



Checking order when there is no audio

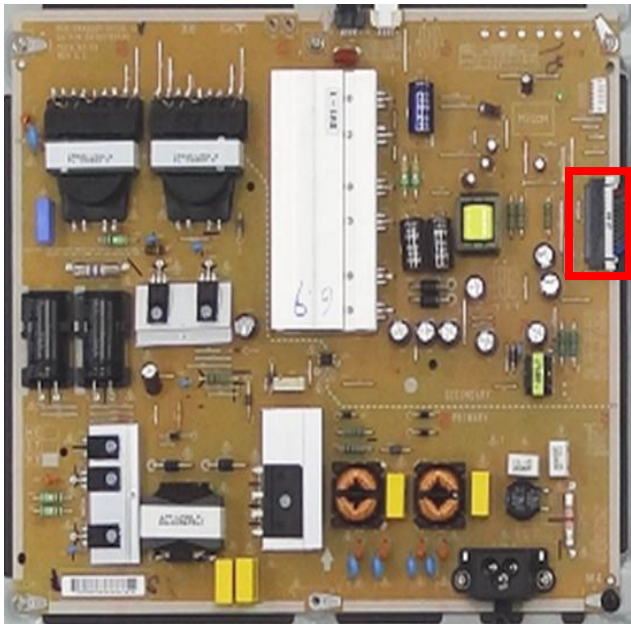
1. Check the contact condition of or 24V connector of Main Board
2. Measure the 24V input voltage supplied from Power Board
(If there is no input voltage, remove and check the connector)
3. Connect the tester RX1 to the speaker terminal and if you hear the Chik Chik sound when you touch the GND and output terminal, the speaker is normal.

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

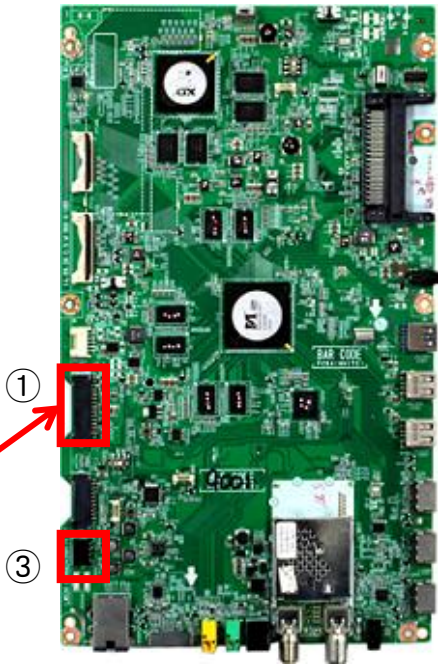
Standard Repair Process Detail Technical Manual

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

<55/65UG870V-ZA>



Pin No.	Signal	Pin No.	Signal
1	PWR_ON	2	DRV_ON
3	P-DIM	4	P-DIM2
5	3.5V	6	GND
7	3.5V	8	3.5V
9	GND	10	GND
11	12V	12	12V
13	12V	14	12V
15	12V	16	GND
17	GND	18	24V
19	24V	20	24V
21	24V	22	24V
23	GND	24	GND



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

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

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

<55UF8550-NB>

①
IR & LOGO light front



IR & LOGO light Rear



Eye

IR



②

③

1	GND
2	+3.5V WOL
3	BT_RESET
4	USB_DM
5	NC
6	USB_DP
7	WOL
8	GND
9	SDA
10	GND
11	SCL
12	KEY1
13	GND
14	KEY2
15	IR
16	+3.5V_ST
17	LED_R
18	GND

Checking order to check remote controller

Checking order

1. Check IR cable condition between IR & Main board. (Check picture number ① and ②)
2. Check the standby 3.5V on the terminal 16 pin (③)
3. AS checking the Pre-Amp(IR LED light) , the power is in ON condition, an Analog Tester needle should move slowly, otherwise, it's defective.

Standard Repair Process Detail Technical Manual

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

< 55/65UG87>

①

IR & LOGO light front



IR & LOGO light Rear



IR Eye

②



③

1	GND
2	+3.5V WOL
3	BT_RESET
4	USB_DM
5	NC
6	USB_DP
7	WOL
8	GND
9	SDA
10	GND
11	SCL
12	KEY1
13	GND
14	KEY2
15	IR
16	+3.5V_ST
17	LED_R
18	GND

Checking order to check remote controller

Checking order

1. Check IR cable condition between IR & Main board. (Check picture number ① and ②)
2. Check the standby 3.5V on the terminal 16 pin (③)
3. AS checking the Pre-Amp(IR LED light) , the power is in ON condition, an Analog Tester needle should move slowly, otherwise, it's defective.

Standard Repair Process Detail Technical Manual

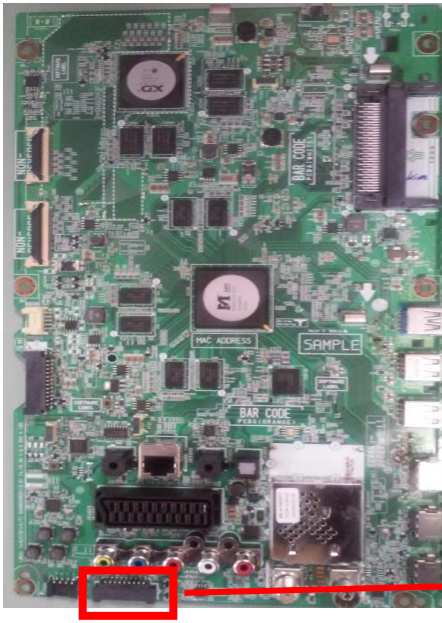
Error symptom	D. Function error	Established date		
Content	Remote controller operation checking method	Revised date		A23

<55/65UG87>

① Wifi & BT Front



Wifi & BT Rear



1	GND
2	+3.5V WOL
3	BT_RESET
4	USB_DM
5	NC
6	USB_DP
7	WOL
8	GND
9	SDA
10	GND
11	SCL
12	KEY1
13	GND
14	KEY2
15	IR
16	+3.5V_ST
17	LED_R
18	GND

Checking order to check motion remote/wifi

- Checking order
- 1.Check BT/Wifi cable condition between BT/Wifi assy & Main board.
 - 2.Check the 3.5V on the terminal 16