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LED TV

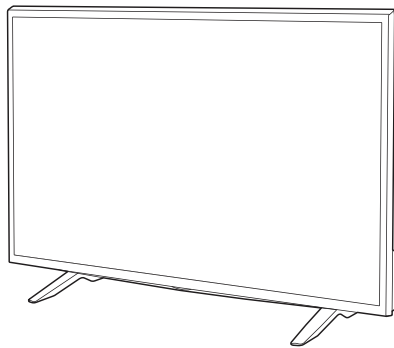
SERVICE MANUAL

CHASSIS : LB55A / LB55B

MODEL : 43/49LF5100/510T/510Y
43/49LF5100/510T/510Y-TA

CAUTION

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



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SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

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

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

Do not modify the original design without permission of manufacturer.

General Guidance

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

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

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

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

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

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

Leakage Current Cold Check(Antenna Cold Check)

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

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

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

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

Leakage Current Hot Check (See below Figure)

Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.

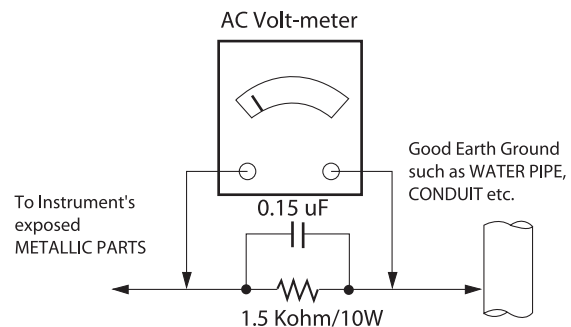
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 μ F capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

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

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

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

Leakage Current Hot Check circuit



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

*Base on Adjustment standard

SERVICING PRECAUTIONS

CAUTION: Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the **SAFETY PRECAUTIONS** on page 3 of this publication.

NOTE: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions. Remember: Safety First.

General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;

- Removing or reinstalling any component, circuit board module or any other receiver assembly.
- Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
- 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.

- 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".
- Do not spray chemicals on or near this receiver or any of its assemblies.
- 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.
- Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
- 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.
- 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.
- 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.

- 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.

- 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.
- Use only a grounded-tip soldering iron to solder or unsolder ES devices.
- 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.
- Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
- 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).
- 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.
- 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

- 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.
- Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
- Keep the soldering iron tip clean and well tinned.
- 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.
- Use the following unsoldering technique
 - Allow the soldering iron tip to reach normal temperature. (500 °F to 600 °F)
 - Heat the component lead until the solder melts.
 - 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.
- Use the following soldering technique.
 - Allow the soldering iron tip to reach a normal temperature (500 °F to 600 °F)
 - First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
 - 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.
 - 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 LB55A/B 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 5 minutes prior to the adjustment.

3. Test method

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

4. Model General Specification

No.	Item	Specification	Remarks
1	Market	Asia, Oceania, Africa, Middle East (PAL/DVB Market)	
2	Broadcasting system	1) PAL B/G/D/K/I, SECAM B/G/D/K 2) NTSC-M 3) DVB-T 4) DVB-T//T2 5) DVB-T/T2/S2	1) Support all model 2) Support all model 3) depend on model 4) depend on model 5) depend on model
3	Channel Storage	1) DVB-T & Analog TV : 1500EA 2) DVB-T/T2 & Analog TV : 1500EA 3) DVB-T/T2/S2 & Analog TV : 6000EA	Satellite Digital TV : VHF, UHF, C-Band, Ku-Band Digital TV : VHF, UHF Analogue TV : VHF, UHF, CATV
4	Receiving system	Analog : VHF,UHF,CATV Digital : DVB	▶ 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-S - symbol rate DVB-S2 (8PSK / QPSK) : 2 ~ 45Msymbol/s DVB-S (QPSK) : 2 ~ 45Msymbol/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	Video(Composite) Input	PAL, SECAM, NTSC	4 System : PAL, SECAM, NTSC, PAL60
6	Component Input	Y/Cb/Cr, Y/Pb/Pr	
7	HDMI Input	HDMI1-DTV/PC	Support HDCP 1.4(can't support MHL)
8	USB Input	For My Media(Movie/Photo/Music List) and SVC	
9	Headphone		

5. Component Video Input (Y, C_B/P_B, C_R/P_R)

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	Remark
1	720*576	15.625	50.00	13.5	SDTV ,DVD 576I	
2	720*480	15.73	60.00	13.5135	SDTV ,DVD 480I	
3	720*480	15.73	59.94	13.50	SDTV ,DVD 480I	
4	720*576	31.25	50.00	27.00	SDTV 576P	
5	720*480	31.50	60.00	27.027	SDTV 480P	
6	720*480	31.47	59.94	27.00	SDTV 480P	
7	1280*720	37.50	50.00	74.25	HDTV 720P	
8	1280*720	45.00	60.00	74.25	HDTV 720P	
9	1280*720	44.96	59.94	74.176	HDTV 720P	
10	1920*1080	28.125	50.00	74.25	HDTV 1080I	
11	1920*1080	33.75	60.00	74.25	HDTV 1080I	
12	1920*1080	33.72	59.94	74.176	HDTV 1080I	
13	1920*1080	56.25	50.00	148.50	HDTV 1080P	
14	1920*1080	67.50	60.00	148.50	HDTV 1080P	
15	1920*1080	67.432	59.94	148.352	HDTV 1080P	
16	1920*1080	27.00	24.00	74.25	HDTV 1080P	
17	1920*1080	26.97	23.94	74.176	HDTV 1080P	
18	1920*1080	33.75	30.00	74.25	HDTV 1080P	
19	1920*1080	33.71	29.97	74.176	HDTV 1080P	

6. HDMI Input(PC/DTV)

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed		Remark
PC(DVI)					DDC		
1	640*350	31.46	70.09	25.17	EGA	X	
2	720*400	31.46	70.08	28.32	DOS	O	
3	640*480	31.46	59.94	25.17	VESA(VGA)	O	
4	800*600	37.87	60.31	40.00	VESA(SVGA)	O	
5	1024*768	48.36	60.00	65.00	VESA(XGA)	O	
6	1152*864	54.34	60.05	80.00	VESA	O	
7	1360*768	47.71	60.01	85.50	VESA (WXGA)	O	
8	1280*1024	63.98	60.02	108.0	VESA (SXGA)	O	Except HD Model
9	1920*1080	67.50	60.00	148.5	HDTV 1080P	O	Except HD Model
DTV							
1	640*480	31.46	59.94	25.125			
2	640*480	31.50	60.00	25.125			
3	720*480	15.73	59.94	13.500			Don't insert in manual spec. out
4	720*480	15.75	60.00	13.514			
5	720*576	15.62	50.00	13.500			
6	720*480	31.47	59.94	27.00			
7	720*480	31.50	60.00	27.027			
8	720*576	31.25	50.00	27.00			
9	1280*720	37.50	50.00	74.25			
10	1280*720	45.00	60.00	74.25			
11	1280*720	44.96	59.94	74.176			
12	1920*1080	28.12	50.00	74.25			
13	1920*1080	33.75	60.00	74.25			
14	1920*1080	33.72	59.94	74.176			
15	1920*1080	56.25	50.00	148.50			
16	1920*1080	67.50	60.00	148.50			
17	1920*1080	67.43	59.94	148.35			
18	1920*1080	27.00	24.00	74.25			
19	1920*1080	26.97	23.97	74.175			
20	1920*1080	33.75	30.00	74.25			
21	1920*1080	33.71	29.97	74.175			

ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied to all of the LED TV with LB55A/B chassis.

2. Designation

- (1) The adjustment is according to the order which is designated and which must be followed, according to the plan which can be changed only on agreeing.
- (2) Power adjustment : Free Voltage.
- (3) Magnetic Field Condition: Nil.
- (4) Input signal Unit: Product Specification Standard.
- (5) Reserve after operation: Above 5 Minutes (Heat Run)
Temperature : at 25 °C ± 5 °C
Relative humidity : 65 ± 10 %
Input voltage : 100-220 V~, 50/60 Hz
- (6) Adjustment equipments
: Color Analyzer(CA-210 or CA-110), Service remote control.
- (7) Push the "IN STOP" key - For memory initialization.

Case1 : Software version up

1. After downloading S/W by USB , TV set will reboot automatically.
2. Push "In-stop" key.
3. Push "Power on" key.
4. Function inspection
5. After function inspection, Push "In-stop" key.

Case2 : Function check at the assembly line

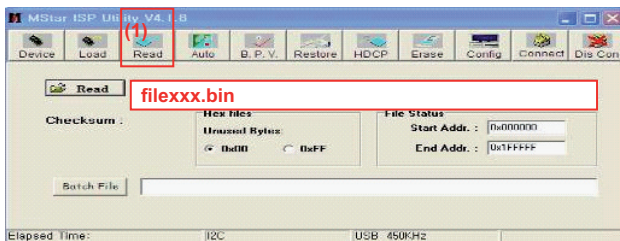
1. When TV set is entering on the assembly line, Push "In-stop" key at first.
2. Push "Power on" key for turning it on.
→ If you push "Power on" key, TV set will recover channel information by itself.
3. After function inspection, Push "In-stop" key.

3. Main PCB check process

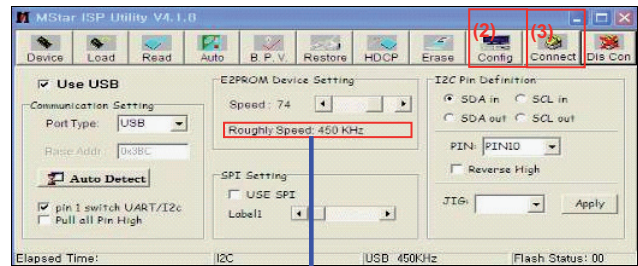
- APC - After Manual-Insert, executing APC

* Boot file Download

- (1) Execute ISP program "Mstar ISP Utility" and then click "Config" tab.
- (2) Set as below, and then click "Auto Detect" and check "OK" message.
If "Error" is displayed, check connection between computer, jig, and set.
- (3) Click "Read" tab, and then load download file(XXXX.bin) by clicking "Read"

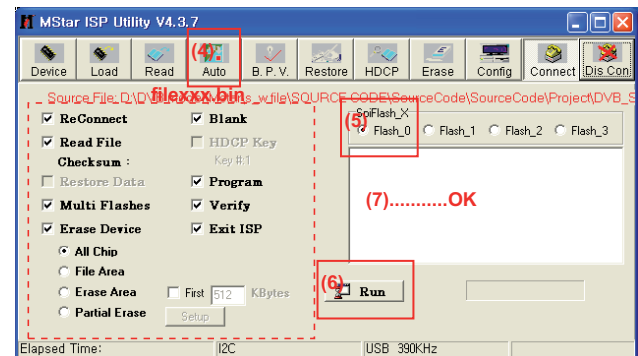


- (4) Click "Connect" tab. If "Can't" is displayed, check connection between computer, jig and set.



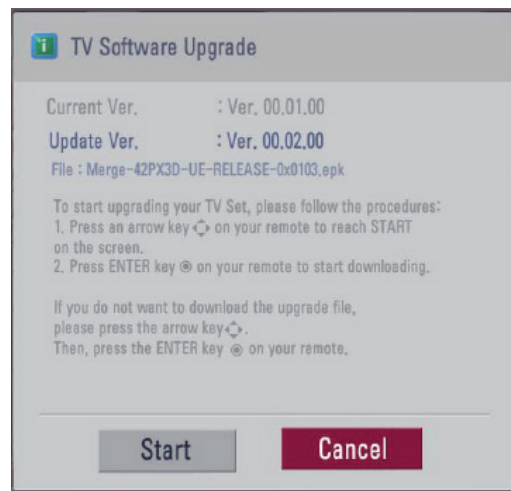
Please Check the Speed :
To use speed between
from 200KHz to 400KHz

- (5) Click "Auto" tab and set as below.
- (6) Click "Run".
- (7) After downloading, check "OK" message.



* USB DOWNLOAD(*.epk file download)

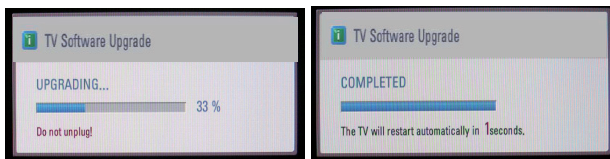
- (1) Put the USB Stick to the USB socket.
- (2) Automatically detecting update file in USB Stick.
- If version of update file in USB Stick is older, it will not work. But version of update file is newer, USB data will be detected automatically.



(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 updated version is newer than what TV has, the 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.

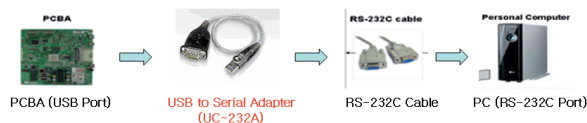
* After downloading, have to adjust Tool Option again.

- (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)
- (4) Completed selecting Tool option.

* RS-232C Connection Method.

Connection : PCBA (USB Port) → USB to Serial Adapter (UC-232A) → RS-232C cable → PC(RS-232C port)

- Product name of USB to Serial Adapter is UC-232A.



4. Total Assembly line process

4.1. Adjustment Preparation

- W/B Equipment condition
CA210: CH14, Test signal: Inner pattern(80IRE)-LED Module
- Above 5 minutes H/run in the inner pattern. ("power on" key of Adjustment remote control)

* The spec of color temperature and coordinate.

Mode	Color Temp.	Color coordinate	Remark
Cool (C50)	13,000 K	X = 0.271 (± 0.002) Y = 0.270 (± 0.002)	* Test Signal - Inner pattern for W/B adjust - External white pattern (80IRE, 204gray) * W/B luminance Spec Min. 60
Medium (0)	9,300 K	X = 0.286 (± 0.002) Y = 0.289 (± 0.002)	
Warm (W50)	6,500 K	X = 0.313 (± 0.002) Y = 0.329 (± 0.002)	

* W/B Table in process of aging time
- LGD Module

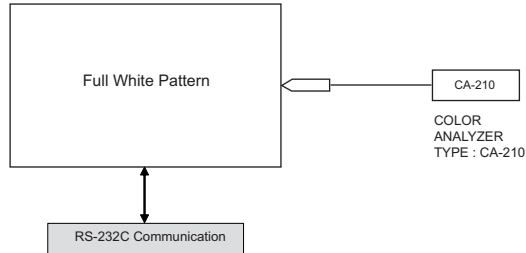
(normal line) March ~ December						
Aging time(Min)		Cool		Medium		Warm
color coordinate		x	y	x	y	x y
Target		271	270	286	289	313 329
1	0-2	282	289	297	308	324 348
2	3-5	281	287	296	306	323 346
3	6-9	279	284	294	303	321 343
4	10-19	277	280	292	299	319 339
5	20-35	275	277	290	296	317 336
6	36-49	274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

(normal line) January ~ February						
Aging time		Cool		Medium		Warm
color coordinate		x	y	x	y	x y
Target		271	270	286	289	313 329
1	0-2	286	295	301	314	328 354
2	3-5	284	290	299	309	326 349
3	6-9	282	287	297	306	324 346
4	10-19	279	283	294	302	321 342
5	20-35	276	278	291	297	318 337
6	36-49	274	275	289	294	316 334
7	50-79	273	272	288	291	315 331
8	80-119	272	271	287	290	314 330
9	Over 120	271	270	286	289	313 329

- AUO/INX/COST/SHARP/BOE Module which cool spec is 13000 K

	Cool		Medium		Warm	
	x	y	x	y	x	y
spec	271	270	286	289	313	329
target	278	280	293	299	320	339

- * Connecting picture of the measuring instrument
(On Automatic control)
Inside Pattern is used when W/B is controlled. Connect to auto controller or push Adjustment Remote control POWER ON → Enter the mode of White-Balance, the pattern will come out.



* Auto-control interface and directions

- (1) Adjust in the place where the influx of light like floodlight around is blocked. (Illumination is less than 10 lux).
- (2) Adhere closely the Color analyzer(CA210) to the module less than 10 cm distance, keep it with the surface of the Module and Color analyzer's probe vertically.(80° ~ 100°).
- (3) Aging time
 - After aging start, keep the power on (no suspension of power supply) and heat-run over 5 minutes.
 - Using 'no signal' or 'full white pattern' or the others, check the back light on.

■ Auto adjustment Map(RS-232C)

RS-232C COMMAND

[CMD ID DATA]

Wb 00 00 White Balance Start
Wb 00 ff White Balance End

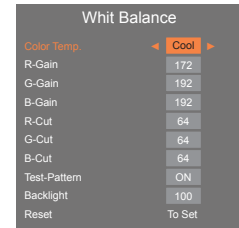
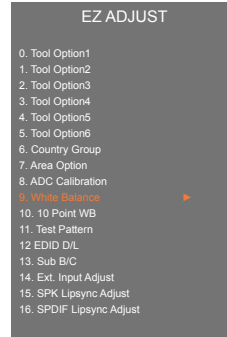
	RS-232C COMMAND [CMD ID DATA]			MIN	CENTER (DEFAULT)			MAX
	Cool	Mid	Warm		Cool	Mid	Warm	
R Gain	jg	Ja	jd	00	172	192	192	192
G Gain	jh	Jb	je	00	172	192	192	192
B Gain	ji	Jc	jf	00	192	192	172	192
R Cut					64	64	64	128
G Cut					64	64	64	128
B Cut					64	64	64	128

<Caution>

Color Temperature : COOL, Medium, Warm.
One of R Gain/G Gain/ B Gain should be kept on 0xC0, and adjust other two lower than C0.(When R/G/B Gain are all C0, it is the FULL Dynamic Range of Module)

* Manual W/B process using adjust Remote control.

- Color analyzer(CA100+, CA210) should be used in the calibrated ch by CS-1000.
- Operate the zero-calibration of the CA100+ or CA-210, then stick sensor to the module when adjusting.
- After enter Service Mode by pushing "ADJ" key,
- Enter White Balance by pushing "►" key at "9. White Balance".



- For manual adjustment, it is also possible by the following sequence.

- (1) Set TV in Adj. mode using "P-ONLY" key on remote controller and then operate heat run longer than 15 minutes.(If not executed this step, the condition for W/B may be different.)
- (2) Push "Exit" key.
- (3) Enter White Balance mode by pushing the ADJ key and select "9. White Balance". When KEY (►) is pressed, 206 Gray internal pattern will be displayed.
- (4) Zero Calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10 cm of the surface
- (5) Select each items (Red/Green/Blue Gain) using ▲/▼ (CH +/-) key on Remote control.
- (6) Adjust R/ G/ B Gain using ◀/▶ (VOL +/-) key on R/C.
- (7) Adjust three modes all (Cool / Medium / Warm)
 - For All model w/o LS345
Fix the one of R/G/B gain and change the others
 - For G-FIX model
Cool Mode
 - 1) Fix the one of R/G/B gain to 192 (default data) and decrease the others. (If G gain is adjusted over 172 and R and B gain less than 192 , Adjust is O.K.)
 - 2) If G gain is less than 172, Increase G gain by up to 172, and then increase R gain and G gain same amount of increasing G gain.
 - 3) If R gain or B gain is over 255, readjust G gain less than 172, Conform to R gain is 255 or B gain is 255
Medium / Warm Mode - Fix the one of R/G/B gain to 192 (default data) and decrease the others.
- (8) When adjustment is completed, exit adjustment mode using EXIT key on Remote control.

* CASE Cool

First adjust the coordinate far away from the target value(x, y).

1) x, y > target

i) Decrease the R, G.

2) x, y < target

i) First decrease the B gain,

ii) Decrease the one of the others.

3) x > target, y < target

i) First decrease B, so make y a little more than the target.

ii) Adjust x value by decreasing the R.

4) x < target, y > target

i) First decrease B, so make x a little more than the target.

ii) Adjust x value by decreasing the G.

* After You finish all adjustments, Press "In-start" button and compare Tool option and Area option value with its BOM, if it is correctly same then unplug the AC cable.

If it is not same, then correct it same with BOM and unplug AC cable.

For correct it to the model's module from factory JIG model.

* Push the "IN STOP" key after completing the function inspection.

4.2. DDC EDID Write (HDMI 256Byte)

- Connect HDMI Signal Cable to HDMI Jack.
 - Write EDID DATA to EEPROM(24C02) by using DDC2B protocol.
 - Check whether written EDID data is correct or not.
- * For SVC main Assembly, EDID have to be downloaded.

4.3. EDID DATA

1) All Data : HEXA Value

2) Changeable Data :

*: Serial No : Controlled / Data:01

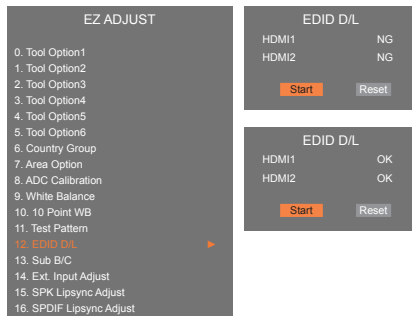
**: Month : Controlled / Data:00

***: Year : Controlled

****: Check sum

- Auto Download

- After enter Service Mode by pushing "ADJ" key,
- Enter EDID D/L mode.
- Enter "START" by pushing "OK" key.



[Caution]

* Use the proper signal cable for EDID Download

- Analog EDID : Pin3 exists

- Digital EDID : Pin3 exists

* Edid data and Model option download (RS232)

NO	Item	CMD 1	CMD 2	Data 0	
Enter download Mode	Download 'Mode In'	A	A	0 0	When transfer the 'Mode In', Carry the command.
EDID data and Model option download	Download	A	E	00 10	Automatically adjustment (The use of a internal pattern)

No.	Item	Condition	Hex Data
1	Manufacturer ID	GSM	1E6D
2	Version	Digital : 1	01
3	Revision	Digital : 3	03

(1) FHD 8BIT 2D HDMI EDID DATA

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	1E	6D	A				B	
10	C	01	03	80	A0	5a	78	0A	EE	91	A3	54	4C	99	26	
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	A0	5A	00	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	D			
70	D															E
80	02	03	22	F1	4E	10	9F	04	13	05	14	03	02	12	20	21
90	22	15	01	26	15	07	50	09	57	07	f					
A0	f	01	1d	80	18	71	1c	16	20	58	2c	25	00	20	C2	
B0	31	00	00	9e	01	1d	00	72	51	d0	1e	20	6e	28	55	00
C0	20	C2	31	00	00	1e	02	3a	80	18	71	38	2d	40	58	2c
D0	45	00	A0	5a	00	00	00	1e	01	1d	00	Bc	52	d0	1e	20
E0	B8	28	55	40	C4	8e	21	00	00	1e	00	00	00	00	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	E

(2) Detail EDID Options are below

a. Product ID

Model Name	HEX	EDID Table	DDC Function
HD/FHD Model	0001	01 00	Analog/Digital

b. Serial No: Controlled on production line.

c. Month, Year: Controlled on production line:

ex) Week : '01' -> '01'

Year : '2014' -> '18' fix

d. Model Name(Hex): Refer to the ASCII Code Table.

Cf) model name in EDID data is below.

MODEL NAME	MODEL NAME(HEX)
LG TV	00 00 00 FC 00 4C 47 20 54 56 0A 20 20 20 20 20 20 (LG TV)

e. Checksum: Changeable by total EDID data.

EDID C/S data		2D FHD 8BIT
		HDMI
Check Sum (Hex)	Block 0	40
	Block 1	25 (HDMI1)

f. Vendor Specific

INPUT	MODEL NAME(HEX)
HDMI1	67 03 0C 00 10 00 80 1E

4.4. Function Check

- Check display and sound

- (1) TV
- (2) AV (CVBS)
- (3) COMPONENT (480i)
- (4) HDMI

* Display and Sound check is executed by Remote controller.

- ▶ Caution : Not to push the INSTOP KEY after completion if the function inspection.

4.5. Outgoing condition Configuration

- When pressing IN-STOP key by Service remote control, Red LED are blinked alternatively. And then automatically turn off. (Must not AC power OFF during blinking)

4.6. GND and HI-POT Test

4.6.1. GND & HI-POT auto-check preparation

- (1) Check the POWER CABLE and SIGNAL CABLE insertion condition.
- (2) You can't use Tuner Ground & Tuner signal line at all models. (applied Isolator inner tuner)

4.6.2. GND & HI-POT auto-check

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

4.6.3. Checkpoint

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

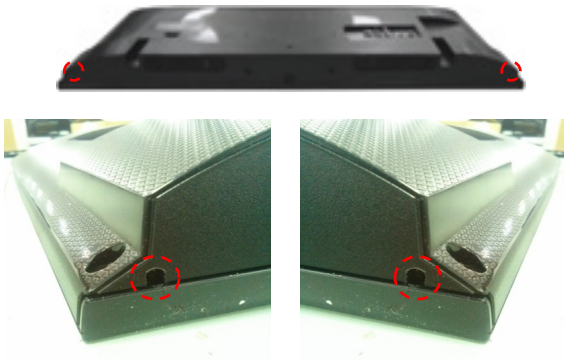
DISASSEMBLY

1. Disassembly of Back cover

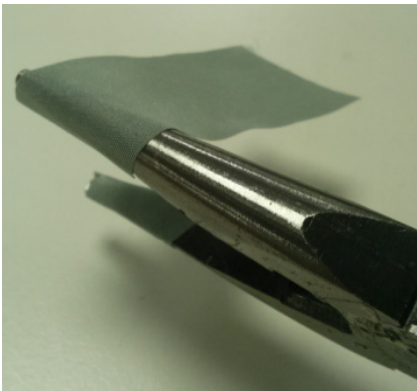
(1) Unscrew bolts in the set.



(2) Check both right and left hole.



(3) Attach tape to 'Long nose pliers'.



* Scratch can be caused without tape.

(4) Put 'long nose' into the hole.



(5) Open B/C with push/pulling long nose to upper and lower sides.

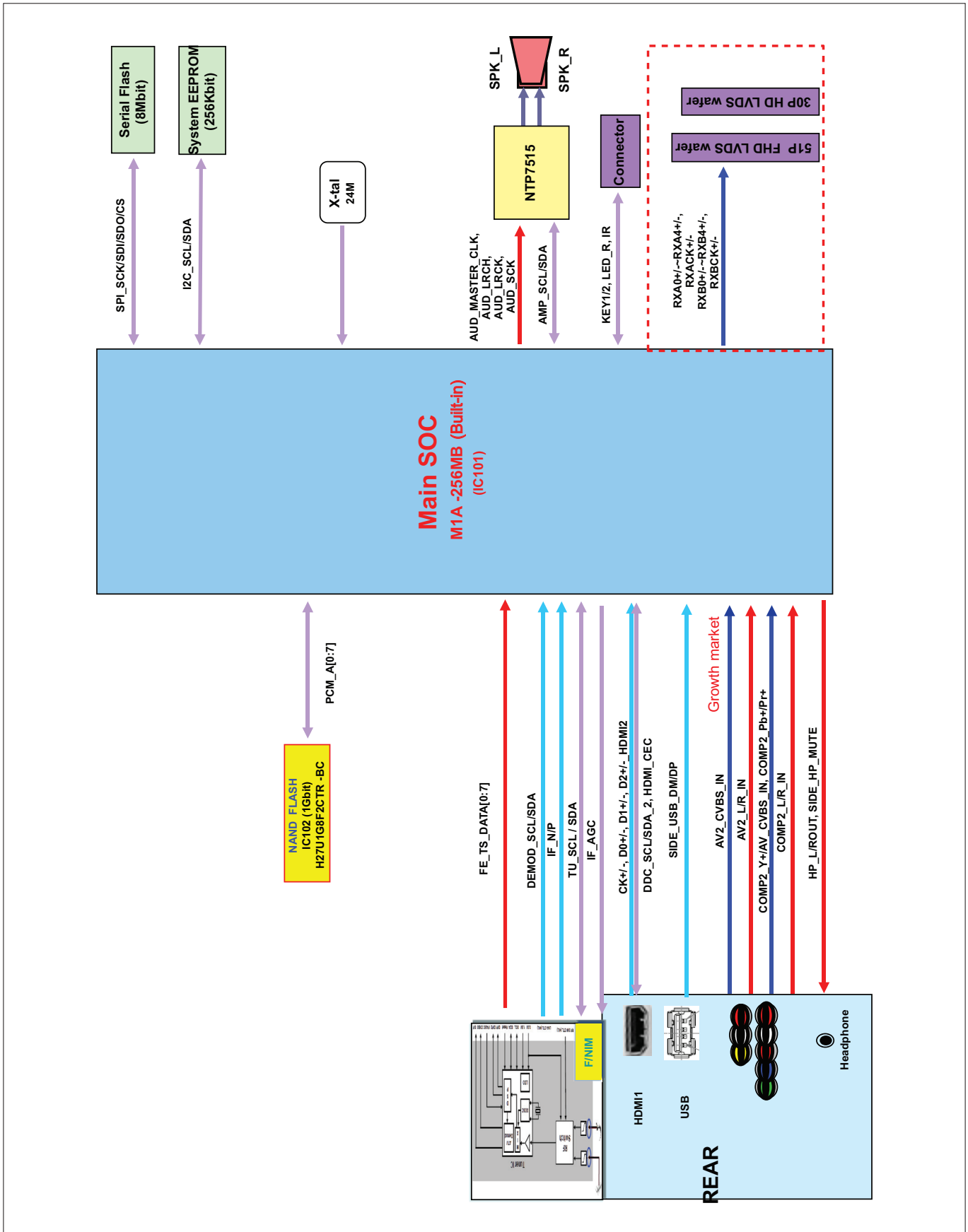


(6) Disassemble Back cover.



* Disassemble it from left to right for top side hook on Back cover

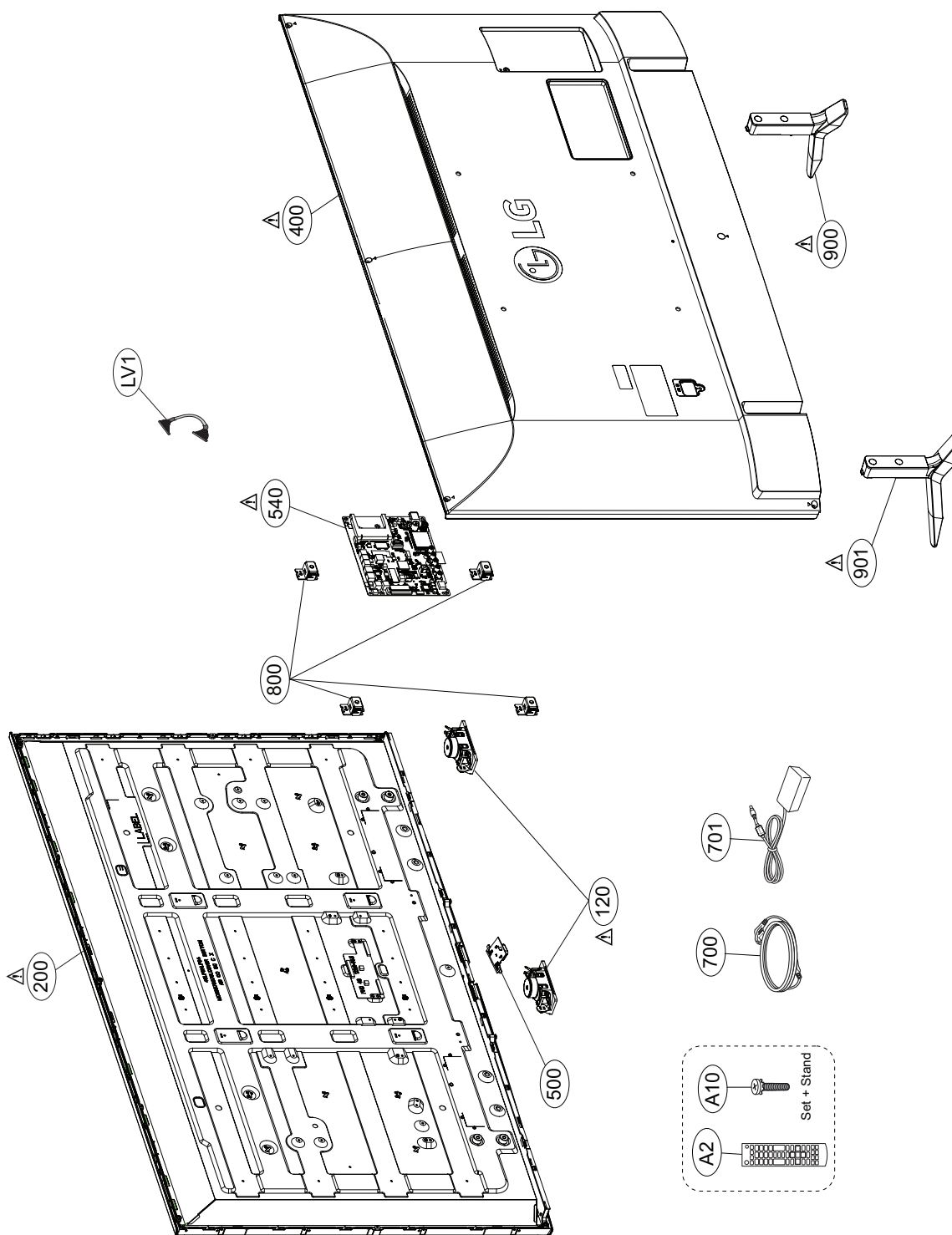
BLOCK DIAGRAM



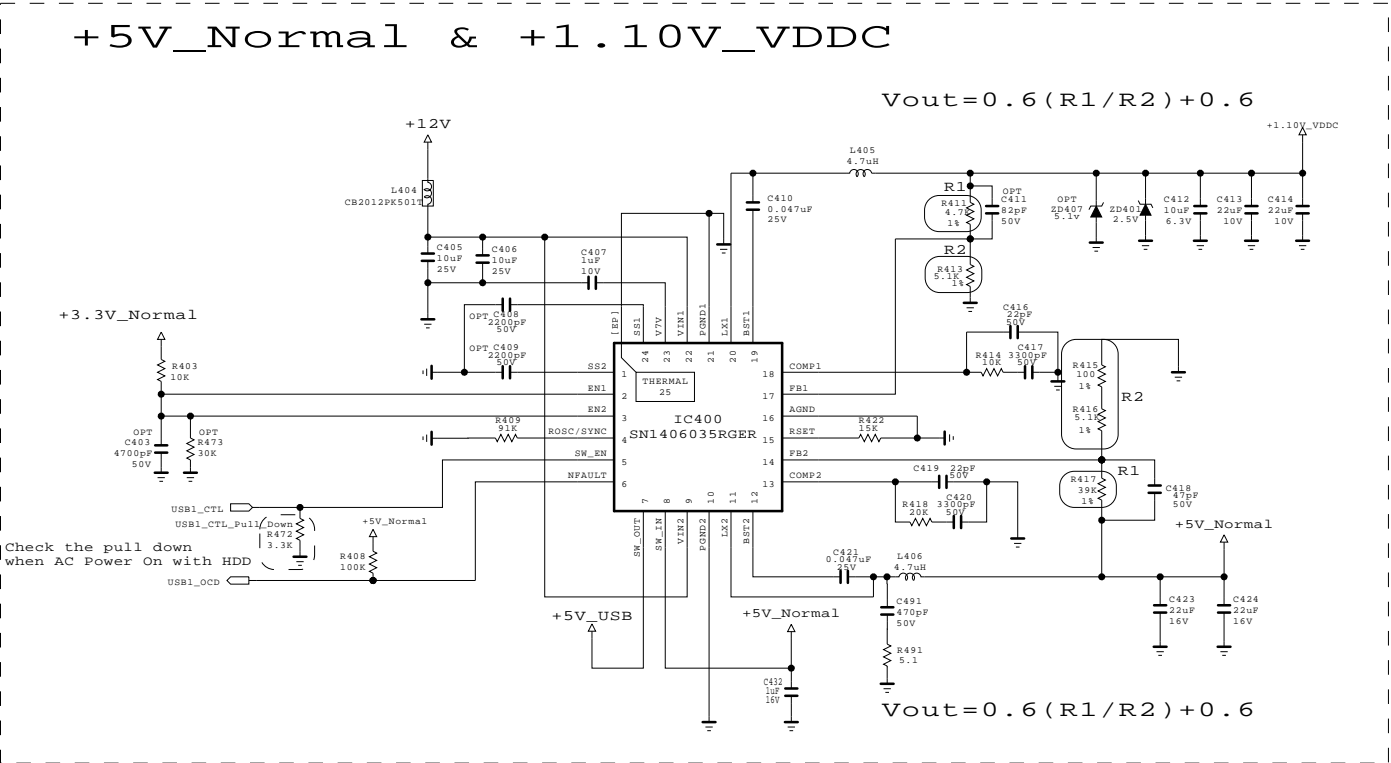
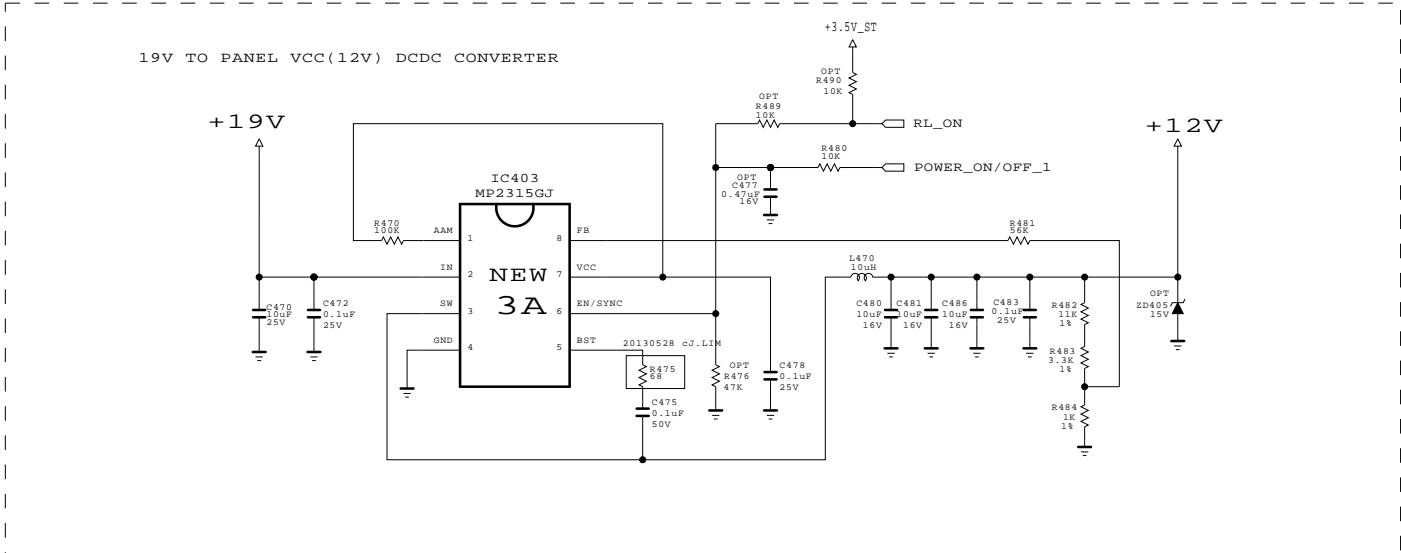
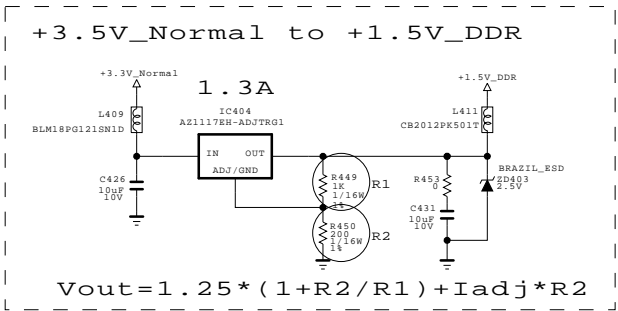
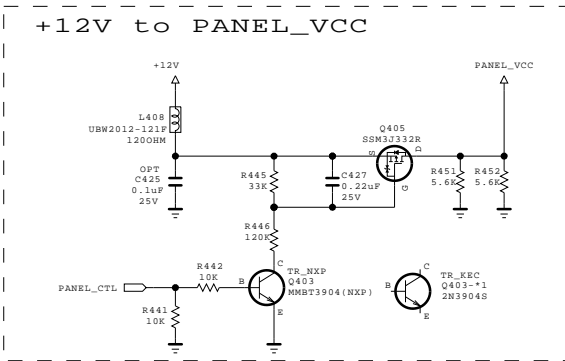
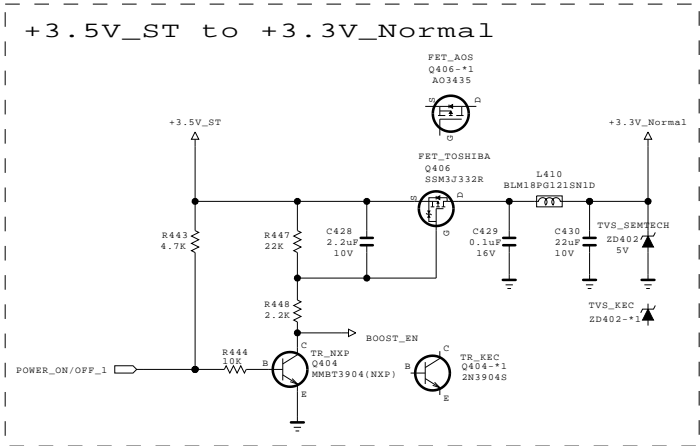
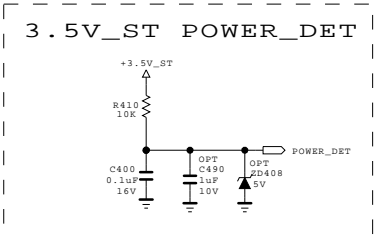
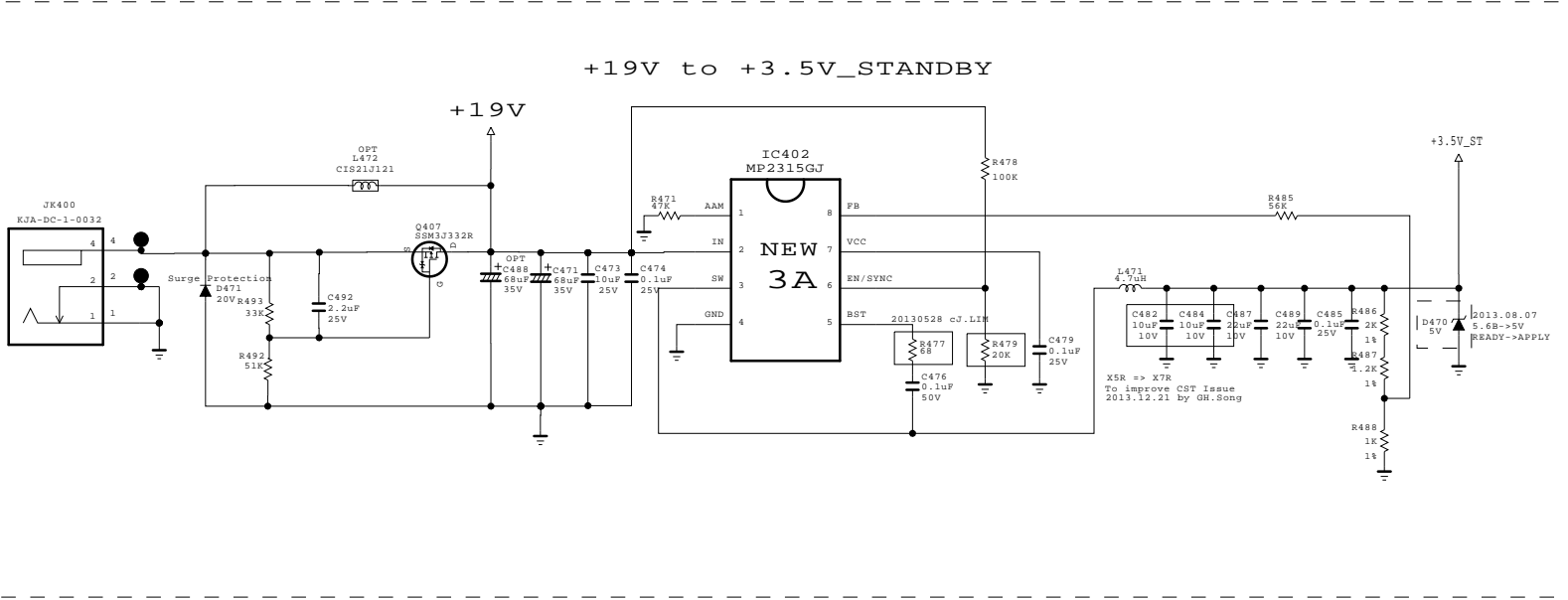
EXPLODED VIEW



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.



POWER
FROM ADAPTOR 19V



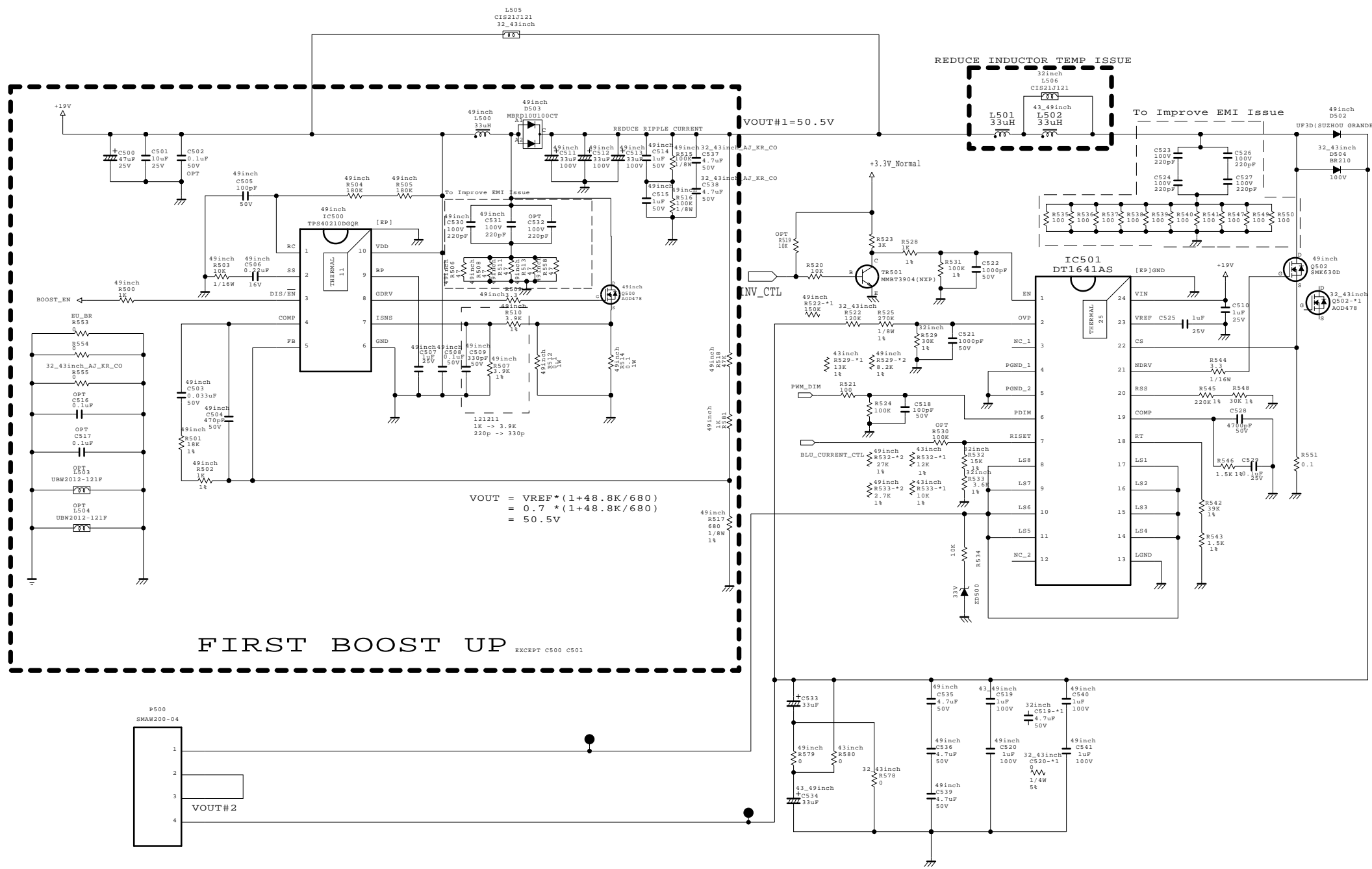
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.



SECRET
LGElectronics

 LG ELECTRONICS

MODEL	L15.5_ECI_M1A	DATE	150112
BLOCK	POWER	SHEET	4

TOTAL LED DRIVER BLOCK



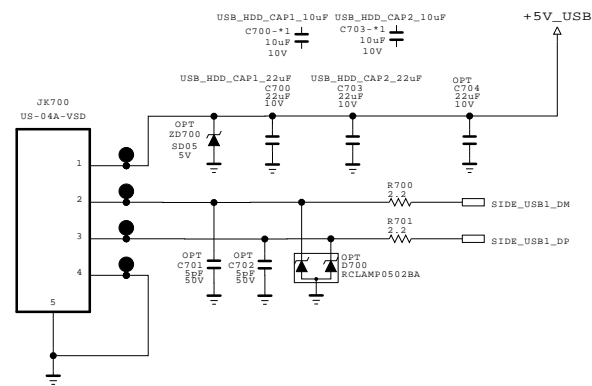
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

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LGElectronics



MODEL	L15.5_ECI_M1A	DATE	150112
BLOCK	LED_DRIVER	SHEET	5

USB



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

SECRET

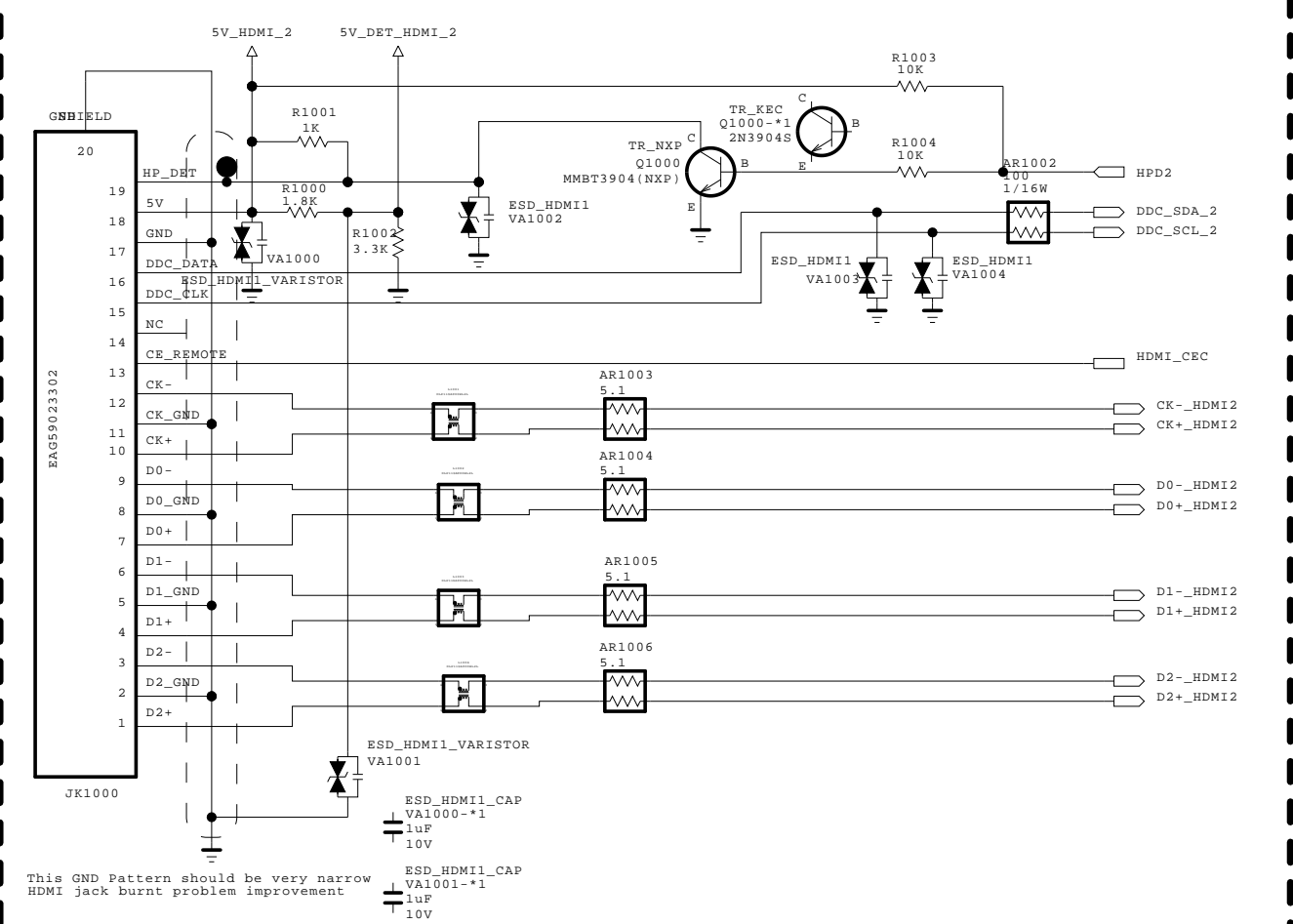
LG Electronics



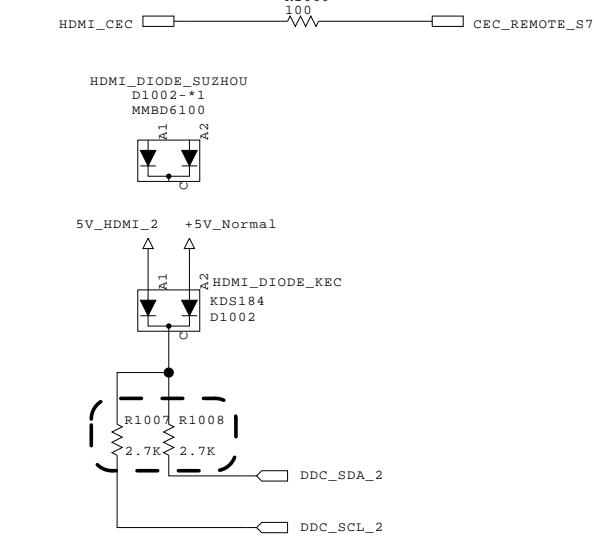
MODEL	L15.5_ECI_M1A	DATE	150112
BLOCK	USB_S1	SHEET	7 /



HDMI (REAR)


HDMI_1





CEC



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.

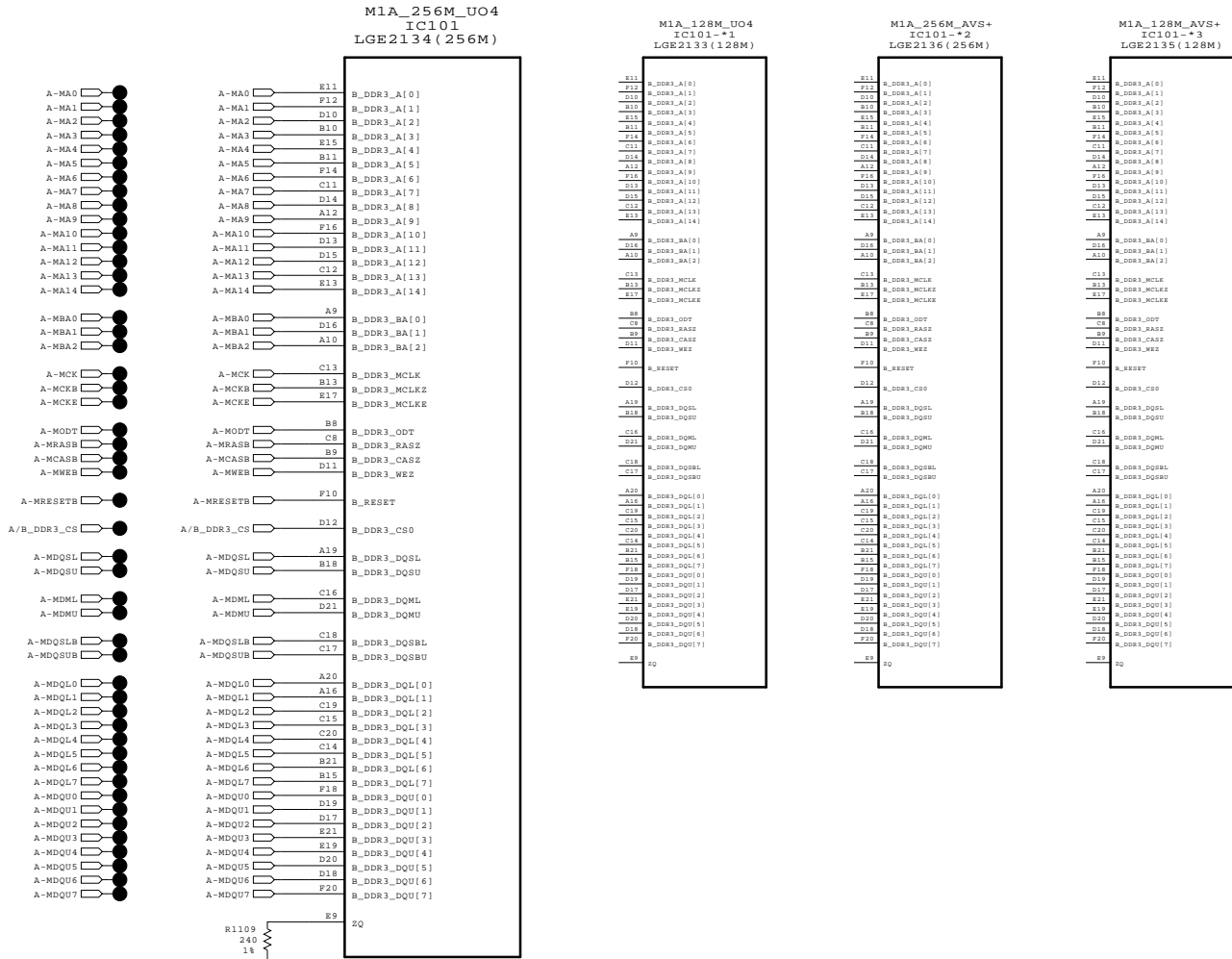
SECRET LGElectronics	 LG ELECTRONICS	MODEL	L15.5	DATE	2015/01/21
		BLOCK	HDMI_R1S1	SHEET	8 /

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.

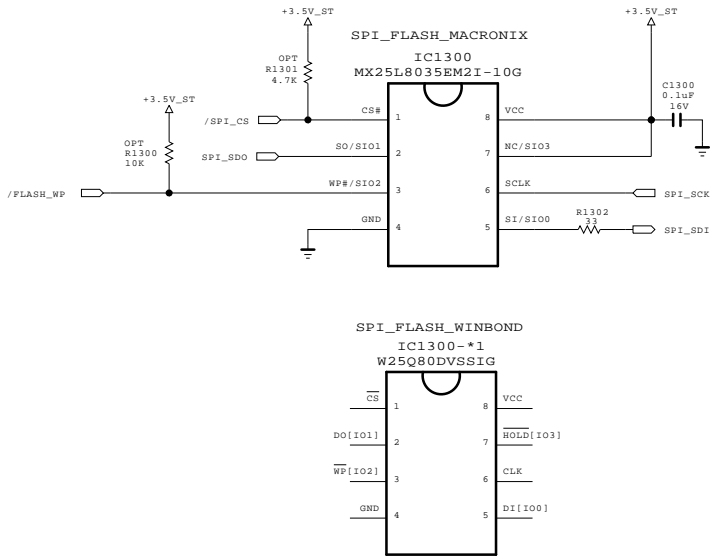
SECRET
LGElectronics





MODEL	L14_CA_M1A	DATE	2014/06/13
BLOCK	MAIN3_DDR	SHEET	12 /



Serial Flash for SPI boot



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.

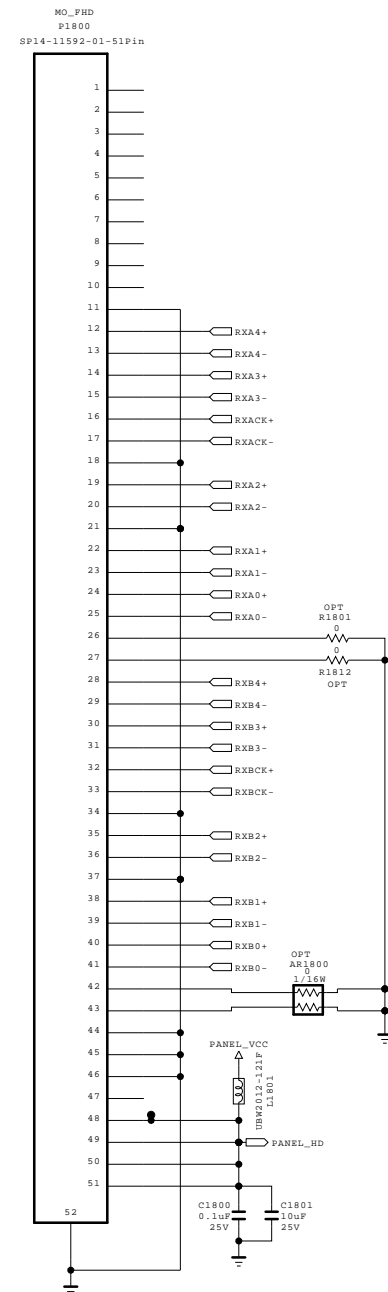
SECRET
LGElectronics



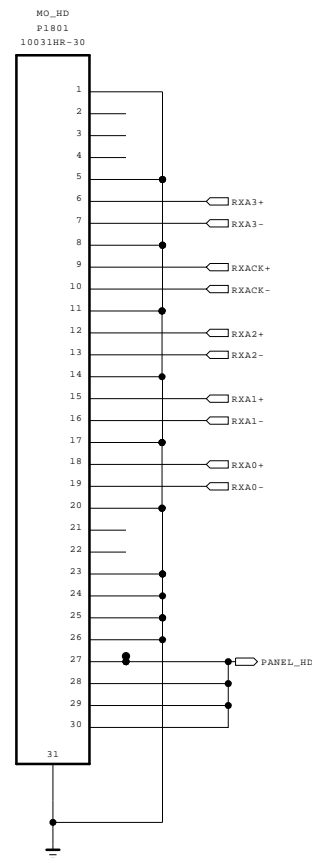
MODEL	L15.5_ECI_M1A	DATE	140721
BLOCK	S_FLASH	SHEET	13 /



LVDS

[51Pin LVDS Connector]
(For FHD 60Hz)



```
[30Pin LVDS Connector]
(For HD 60Hz_Normal)
```



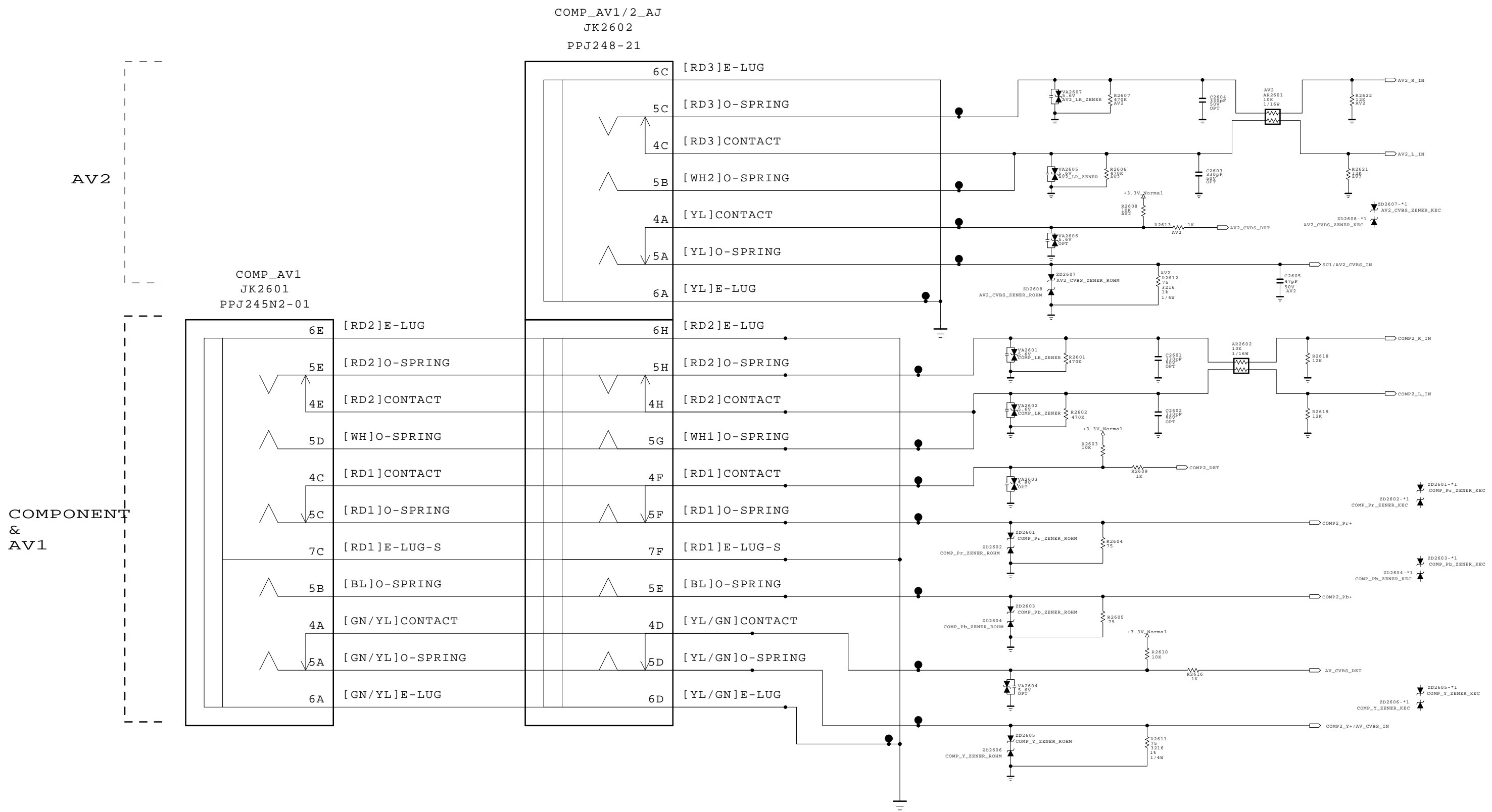
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.



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LG Electronics



MODEL	L14_CA_M1A	DATE	140613
BLOCK	LVDS	SHEET	18 /

COMPONENT & AV1 (COMMON) , AV2



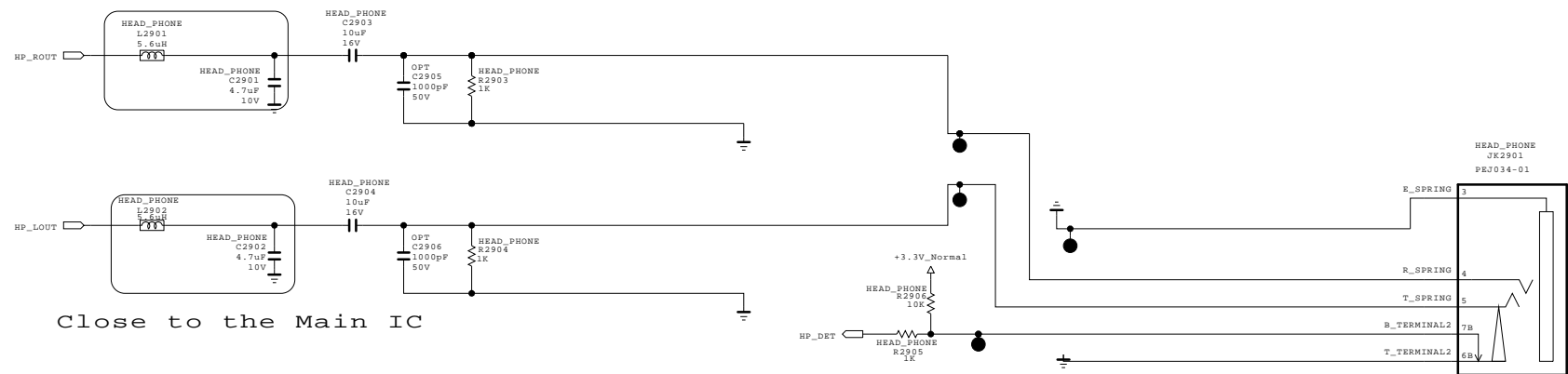
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

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MODEL	L15.5_CA_M1A	DATE	2014/07/02
BLOCK	COMPONENT	SHEET	26 /

HEAD PHONE



Close to the Main IC

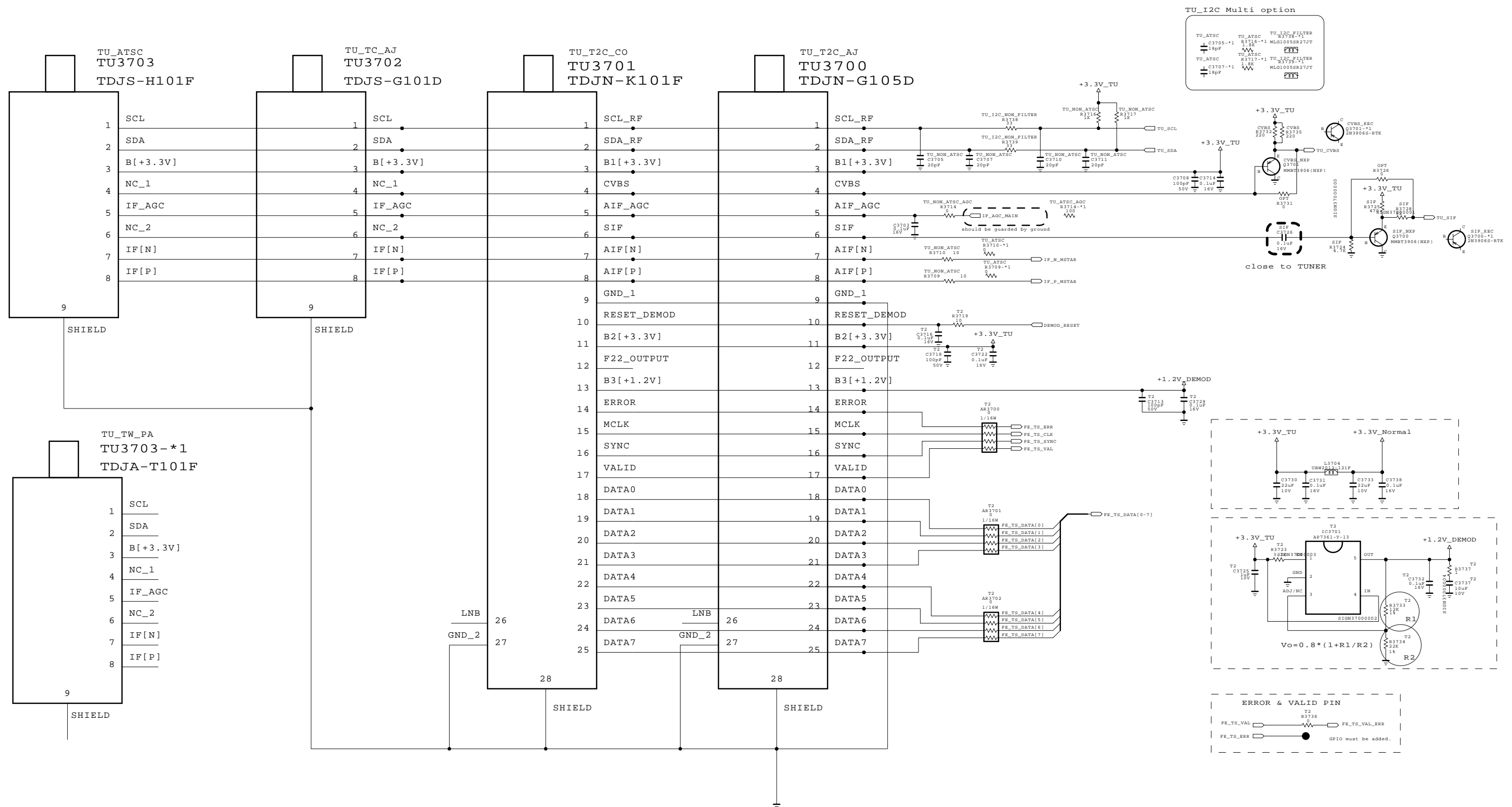
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MODEL	L15.5_CA_M1A	DATE	15/01/26
BLOCK	HEAD_PHONE	SHEET	29 /

TUNER T/C_T2/C



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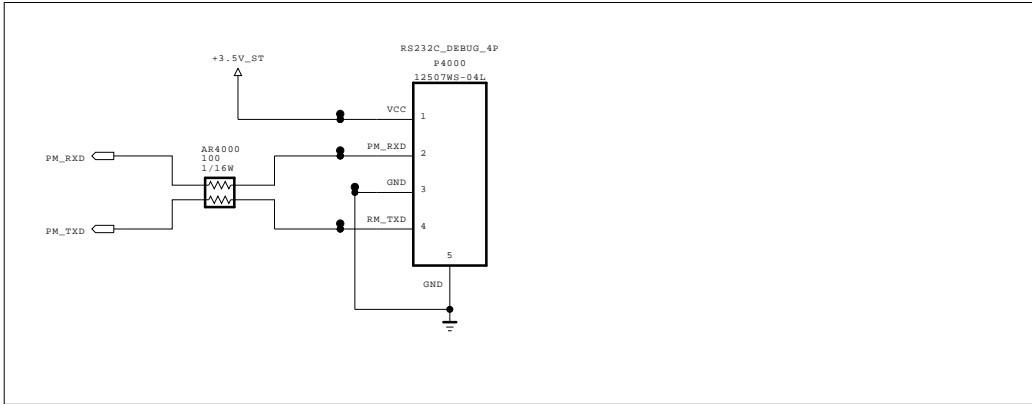
SECRET
_____G Electronics



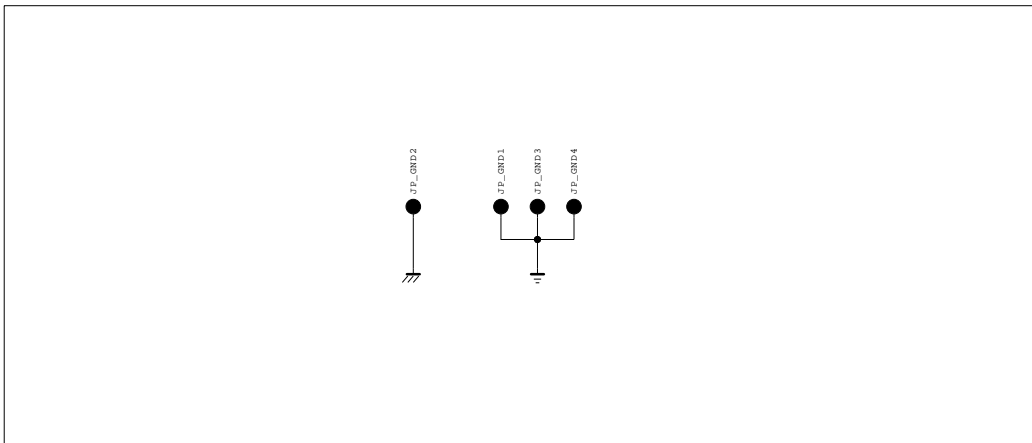
MODEL	L14_CA_M1A	DATE	2015/04/06
BLOCK	TUNER	SHEET	37 /



RS-232C 4PIN

RS-232C 4PIN



MSTAR DEBUG 4PIN



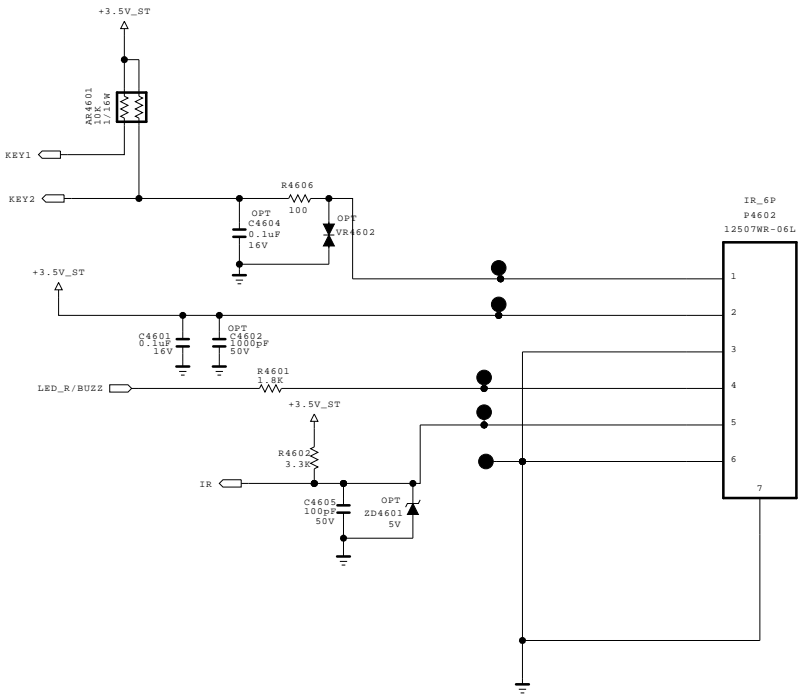
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.



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LGElectronics



MODEL	L14_CA_M1A	DATE	2014/05/22
BLOCK	RS232C_MSTAR_DEBUG_4P	SHEET	40 /

IR

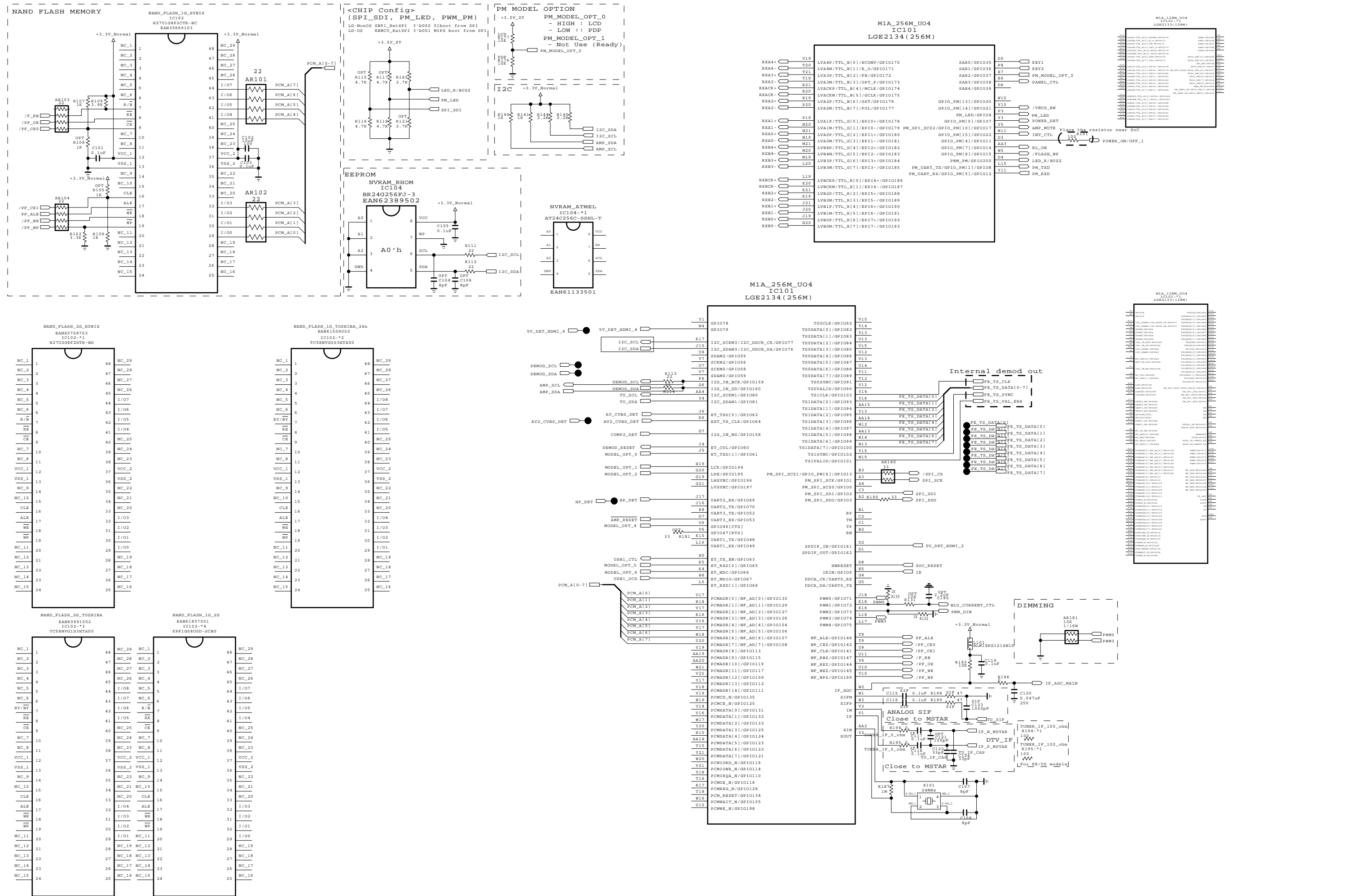


THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

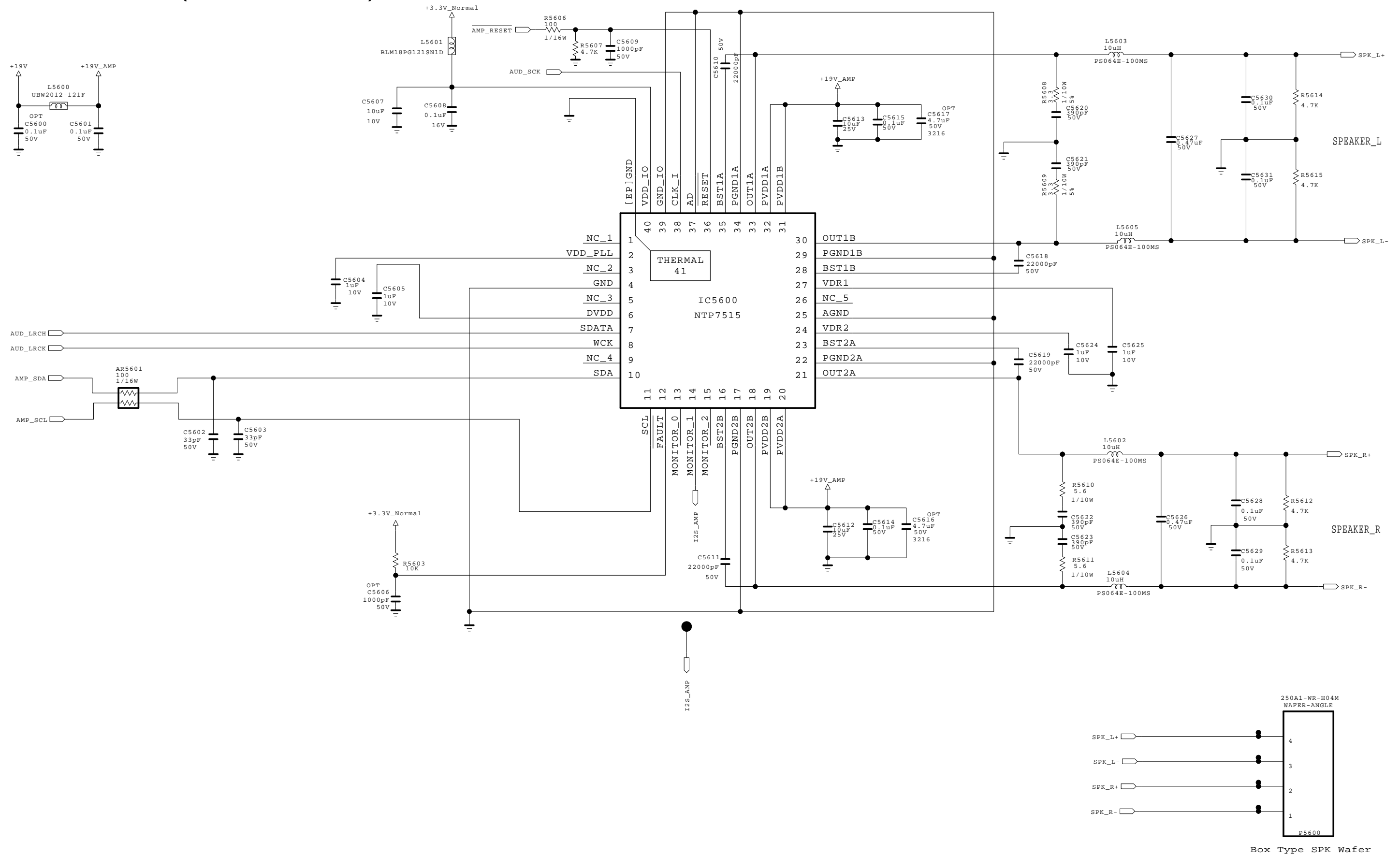
SECRET
LGElectronics





MODEL	L15.5_CI_M1A	DATE	2015/01/12
BLOCK	IR	SHEET	47 /



AUDIO AMP (NTP7515)



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
LG Electronics



MODEL	L15.5_ECI_M1A	DATE	150112
BLOCK	AMP_NTP	SHEET	56 /



Trouble shooting guide

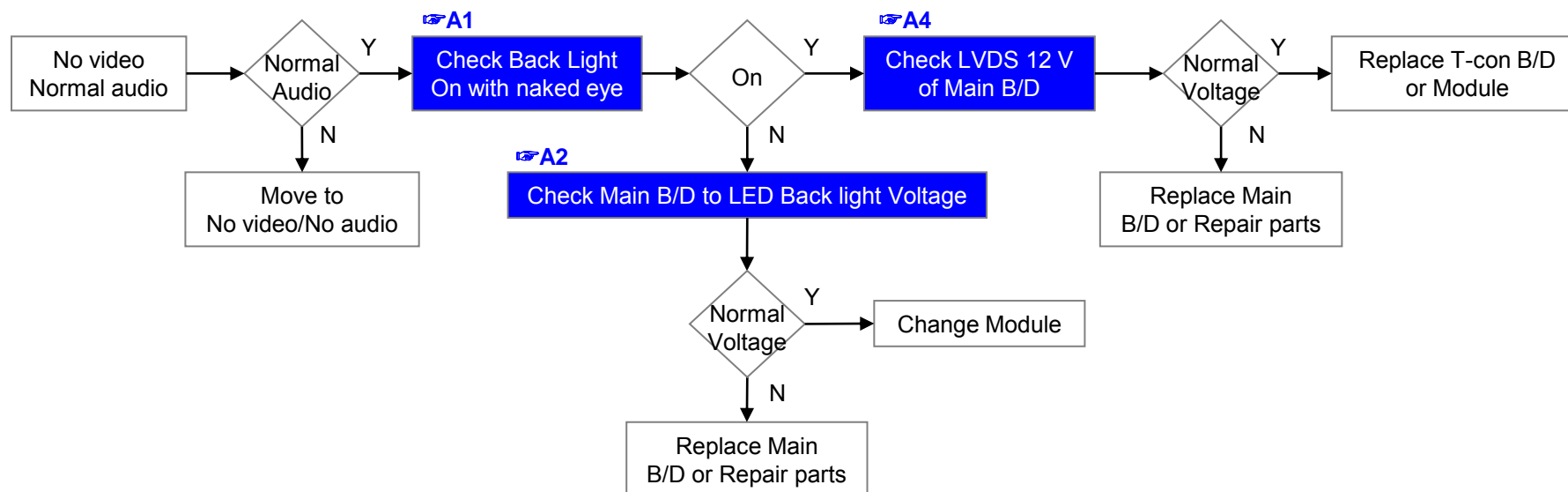
Contents of Standard Repair Process

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

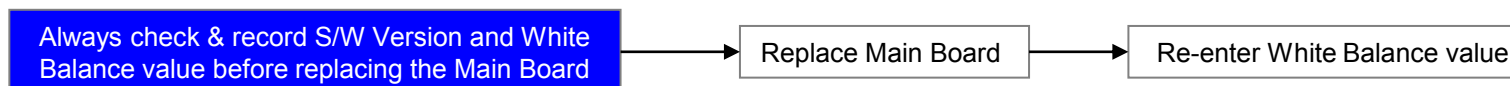
No.	Error symptom (High category)	Error symptom (Mid category)	Page	Remarks
1	A. Video error	No video/Normal audio	1	
2		No video/No audio	2	
3		Tuning fail, Picture broken/ Freezing	3, 4	
4		Color error	5	
5		Vertical/Horizontal bar, residual image, light spot, external device color error	6	
6	B. Power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

	Error Symptom	A. Video Error	Established date	2015.04.17	1/14
	Content	No video / Normal audio	Revised date		

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

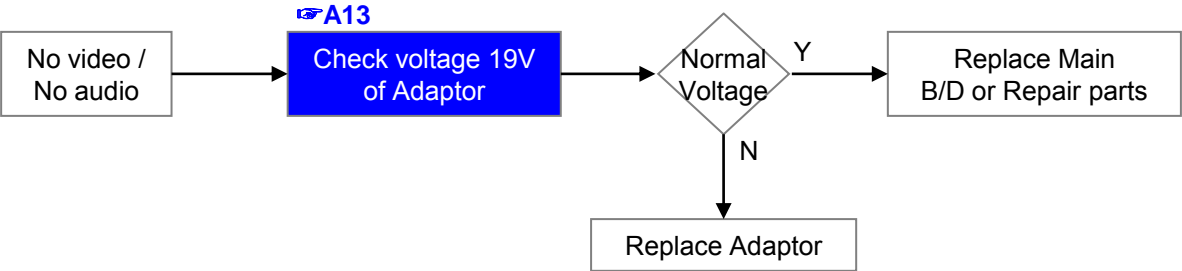


※Precaution A3 & A6

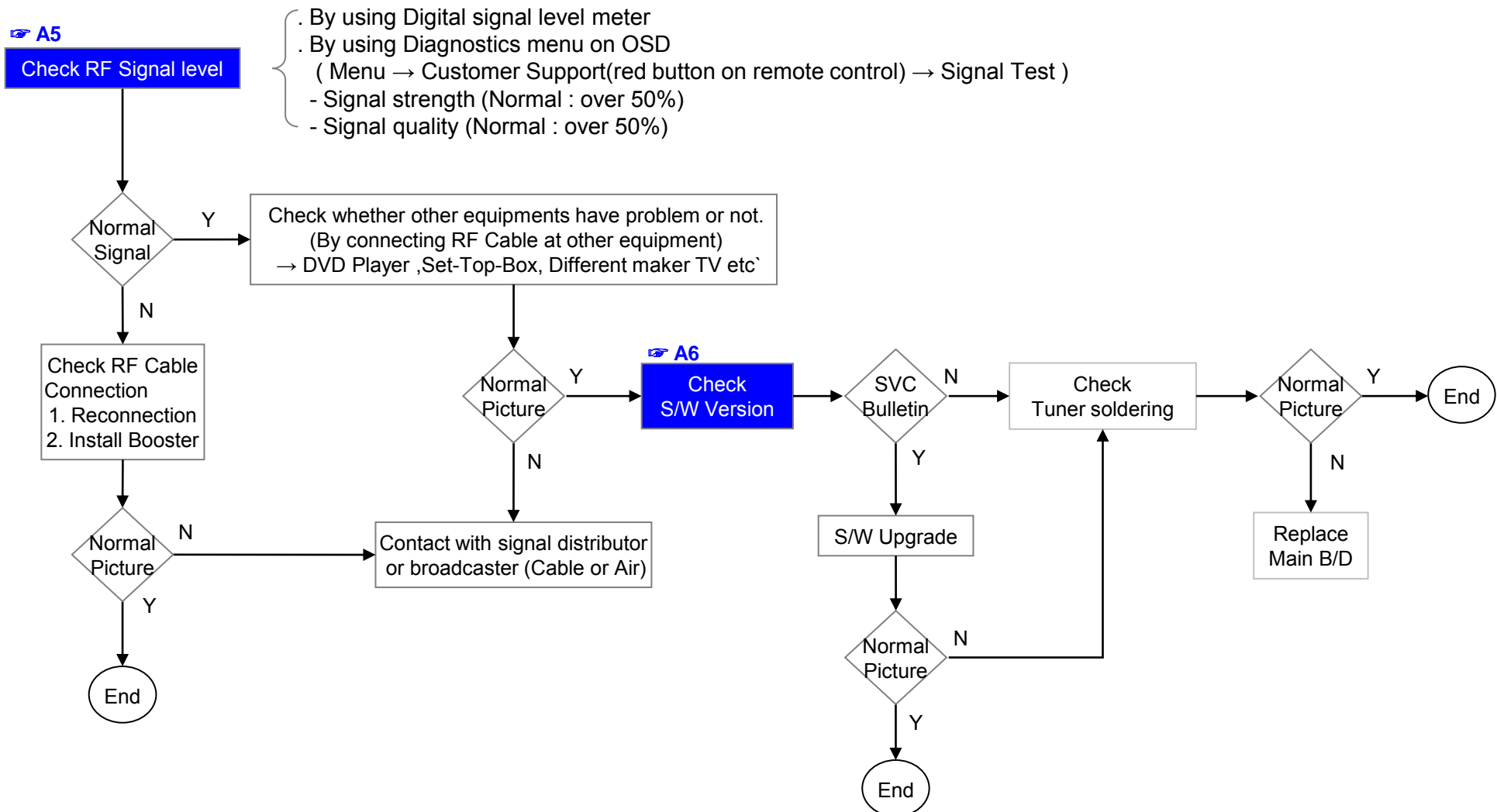


Standard Repair Process

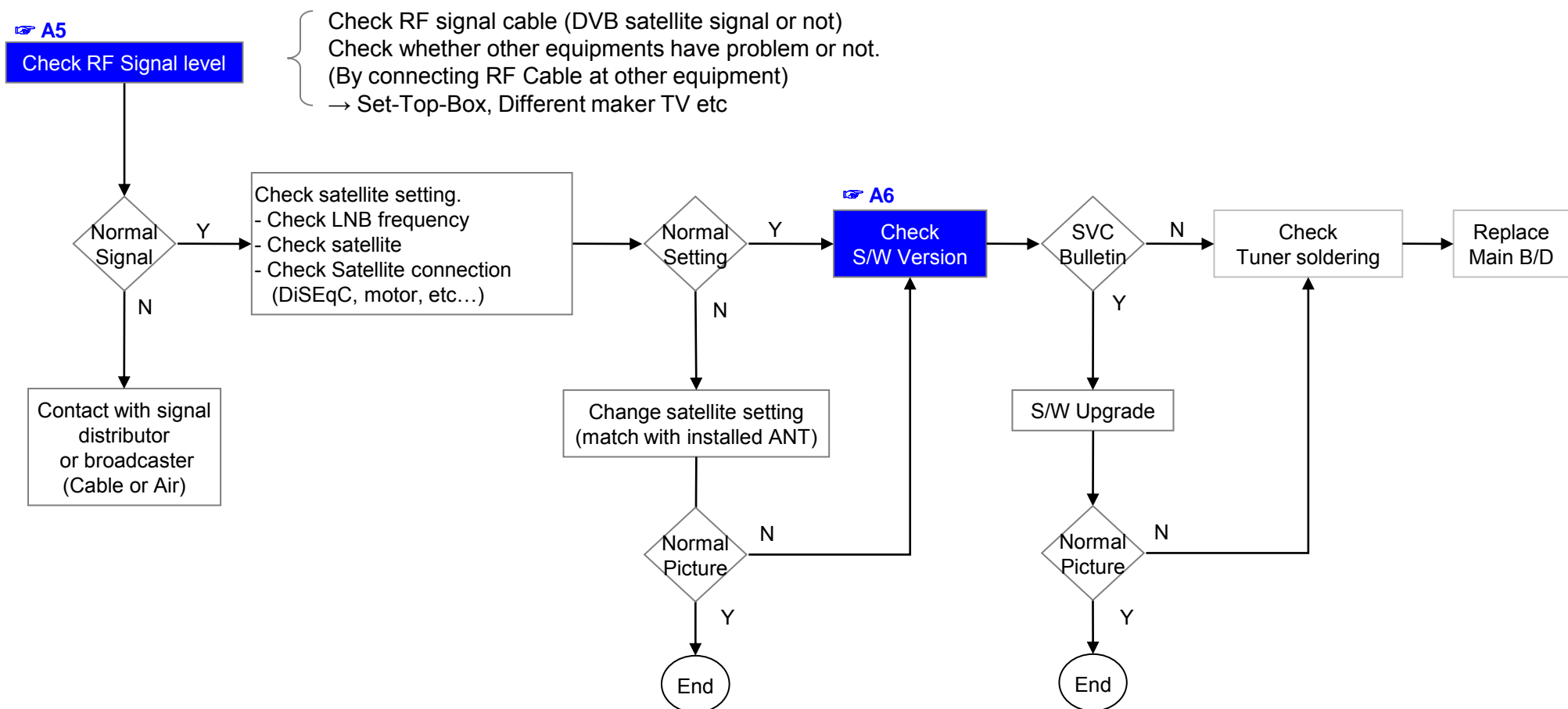
	Error Symptom	A. Video Error	Established date	2015.04.17	2/14
	Content	No video / No audio	Revised date		



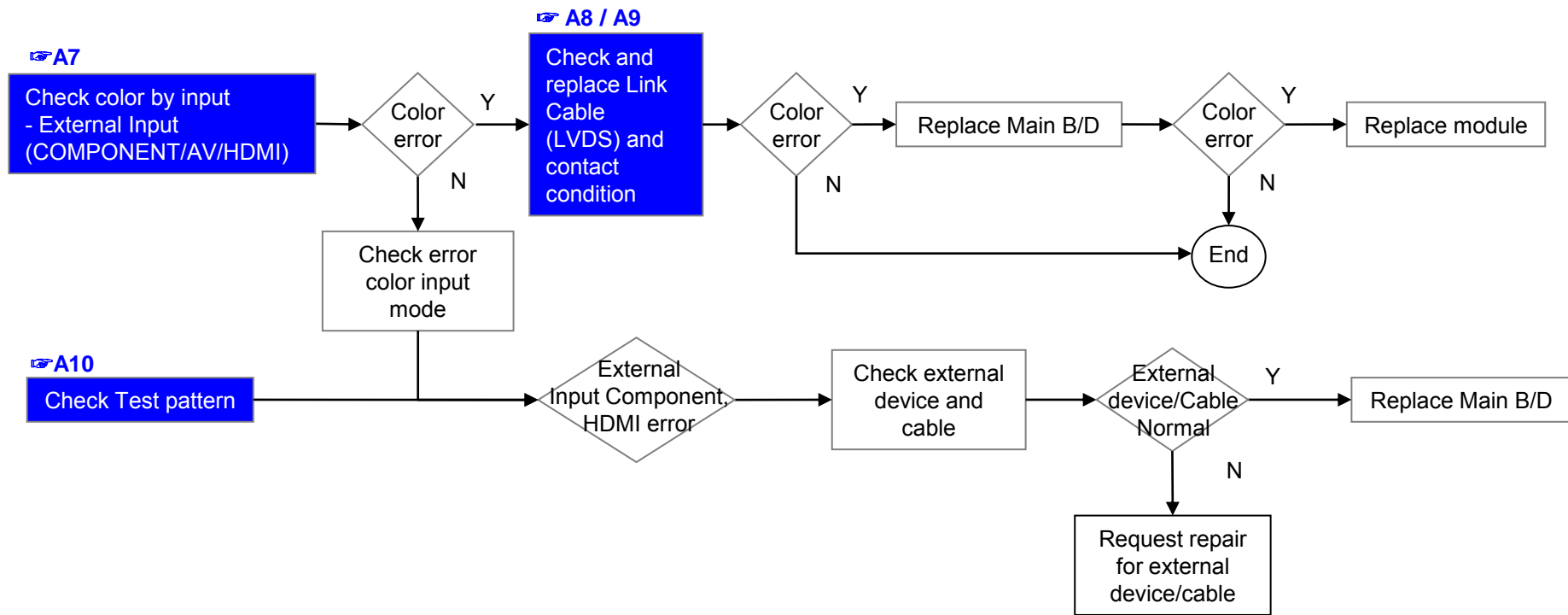
	Error Symptom	A. Video Error	Established date	2015.04.17	3/14
	Content	Tuning fail, Picture broken/freezing	Revised date		



	Error Symptom	A. Video Error	Established date	2015.04.17	4/14
	Content	Tuning fail, Picture broken/freezing	Revised date		

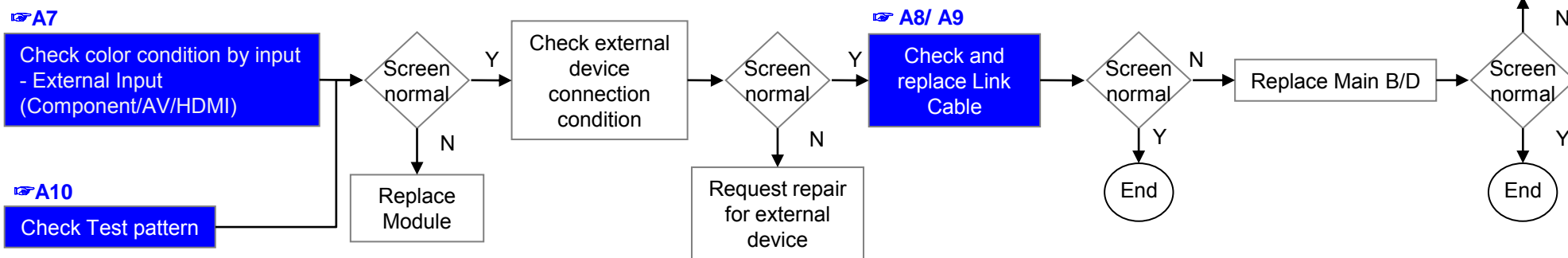


	Error Symptom	A. Video Error	Established date	2015.04.17	5/14
	Content	Color error	Revised date		

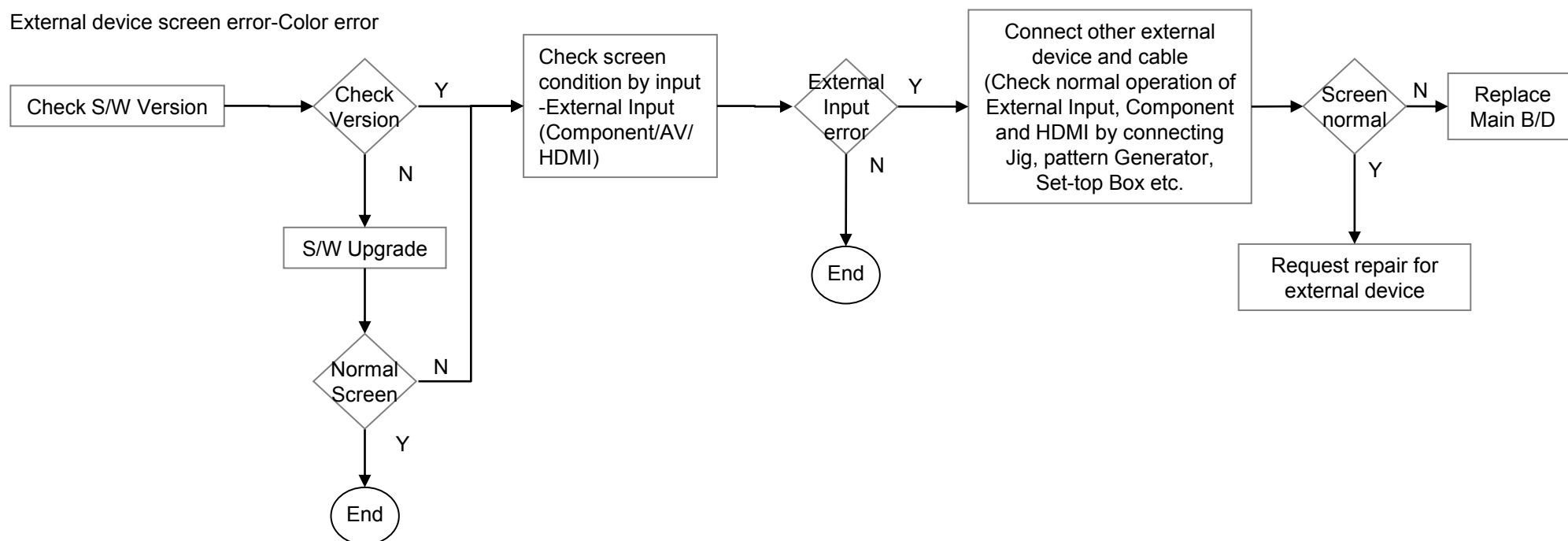


	Error Symptom	A. Video Error	Established date	2015.04.17	6/14
	Content	Vertical/Horizontal bar, Residual Image, Light spot, External device Color error	Revised date		

Vertical/Horizontal bar, residual image, light spot



External device screen error-Color error

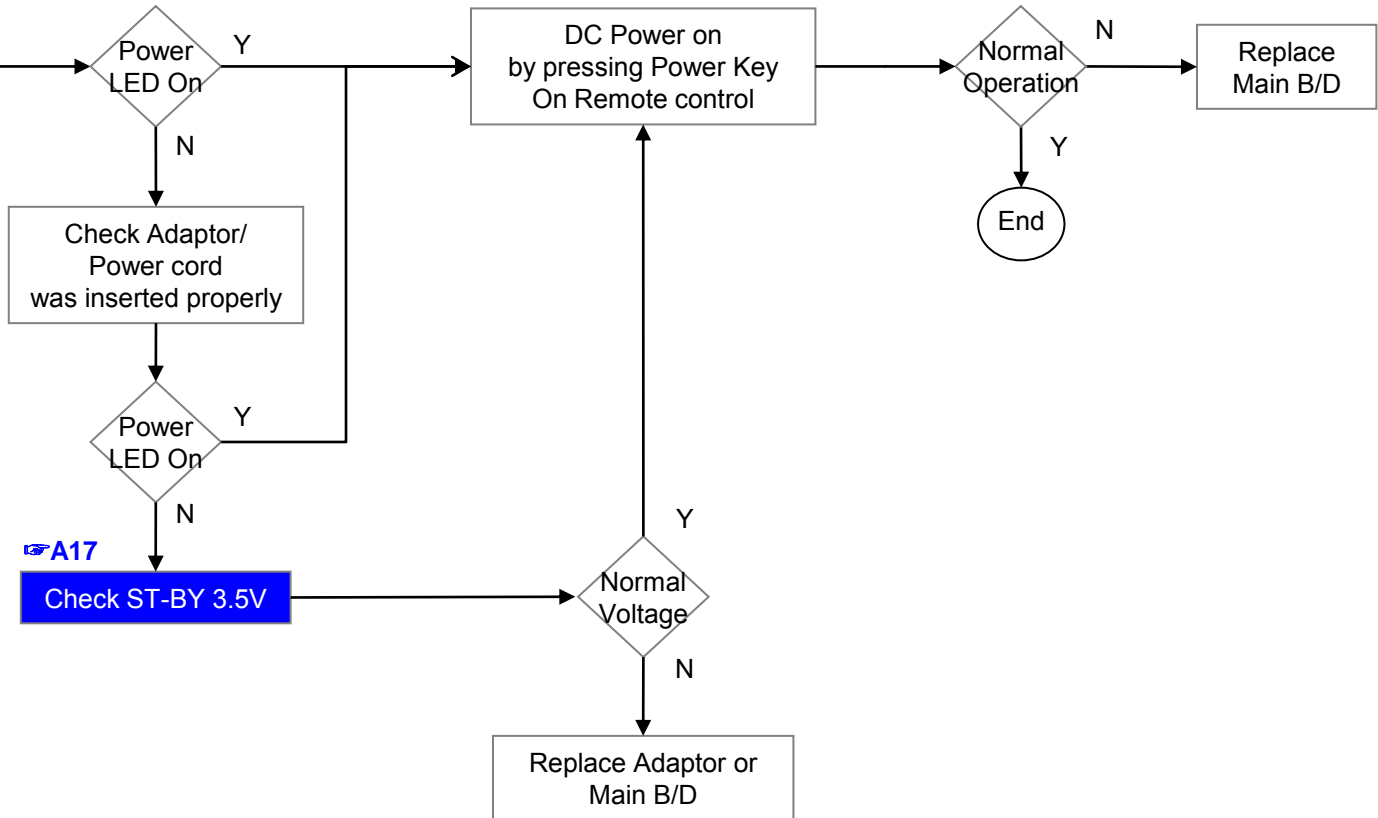


	Error Symptom	B. Power Error	Established date	2015.04.17	7/14
	Content	No power	Revised date		

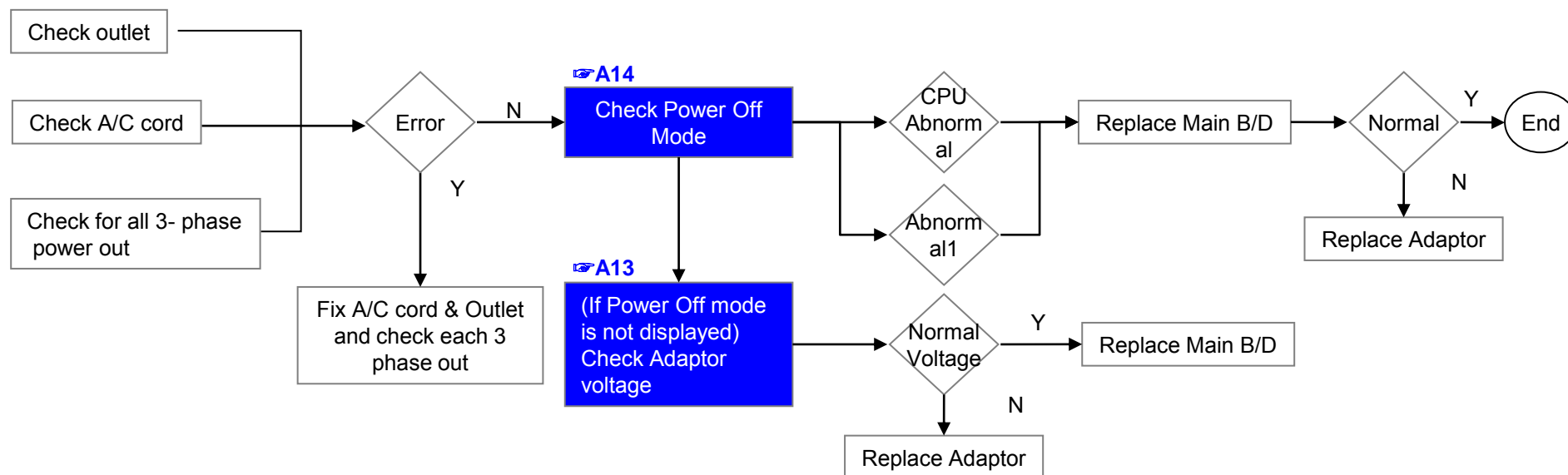
A11

Check
Power LED

Stand-By : Red



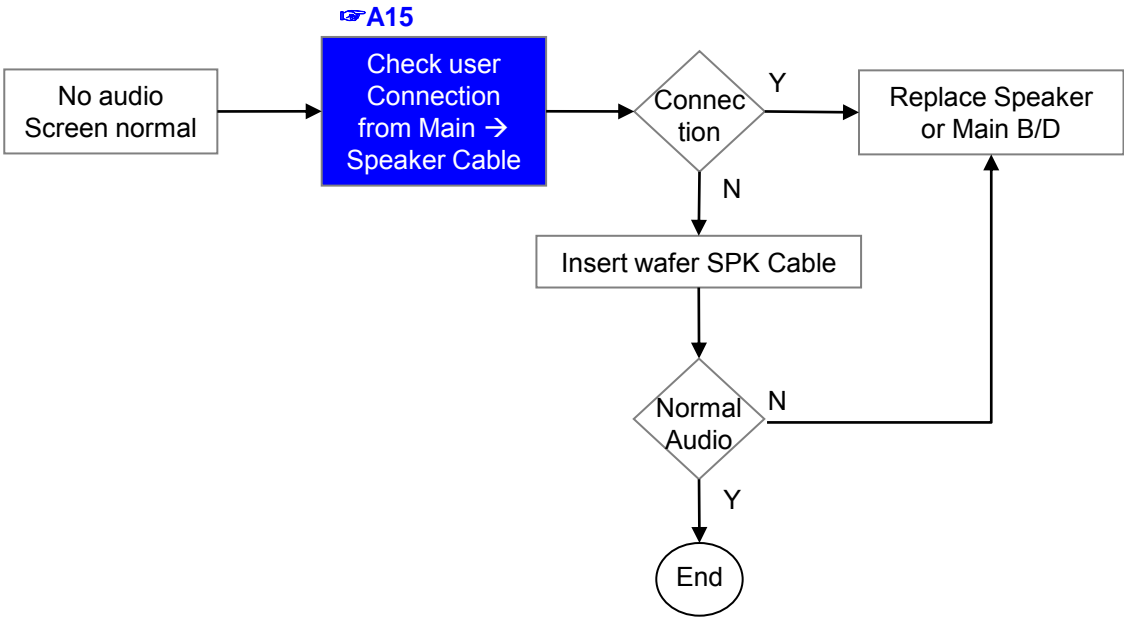
	Error Symptom	B. Power Error	Established date	2015.04.17	8/14
	Content	Off when on/off while viewing, power auto on/off	Revised date		



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

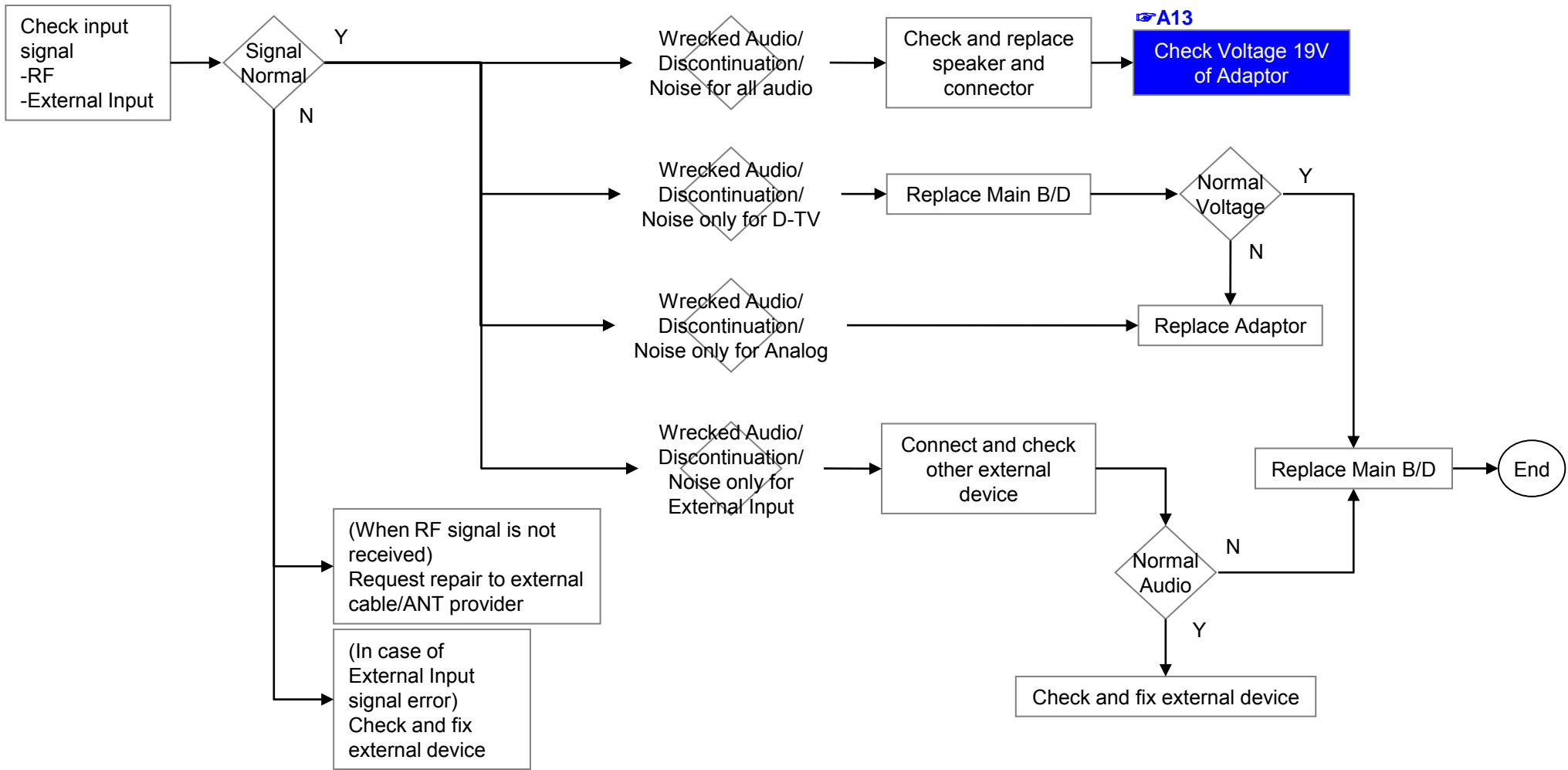
Status	Power off List	Explanation
Normal	"POWEROFF_REMOTEKEY"	Power off by REMOTE CONTROL
	"POWEROFF_OFFTIMER"	Power off by OFF TIMER
	"POWEROFF_SLEEPTIMER"	Power off by SLEEP TIMER
	"POWEROFF_INSTOP"	Power off by INSTOP KEY
	"POWEROFF_AUTOOFF"	Power off by AUTO OFF
	"POWEROFF_ONTIMER"	Power off by ON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

	Error Symptom	C. Audio Error	Established date	2015.04.17	9/14
	Content	No audio / Normal video	Revised date		

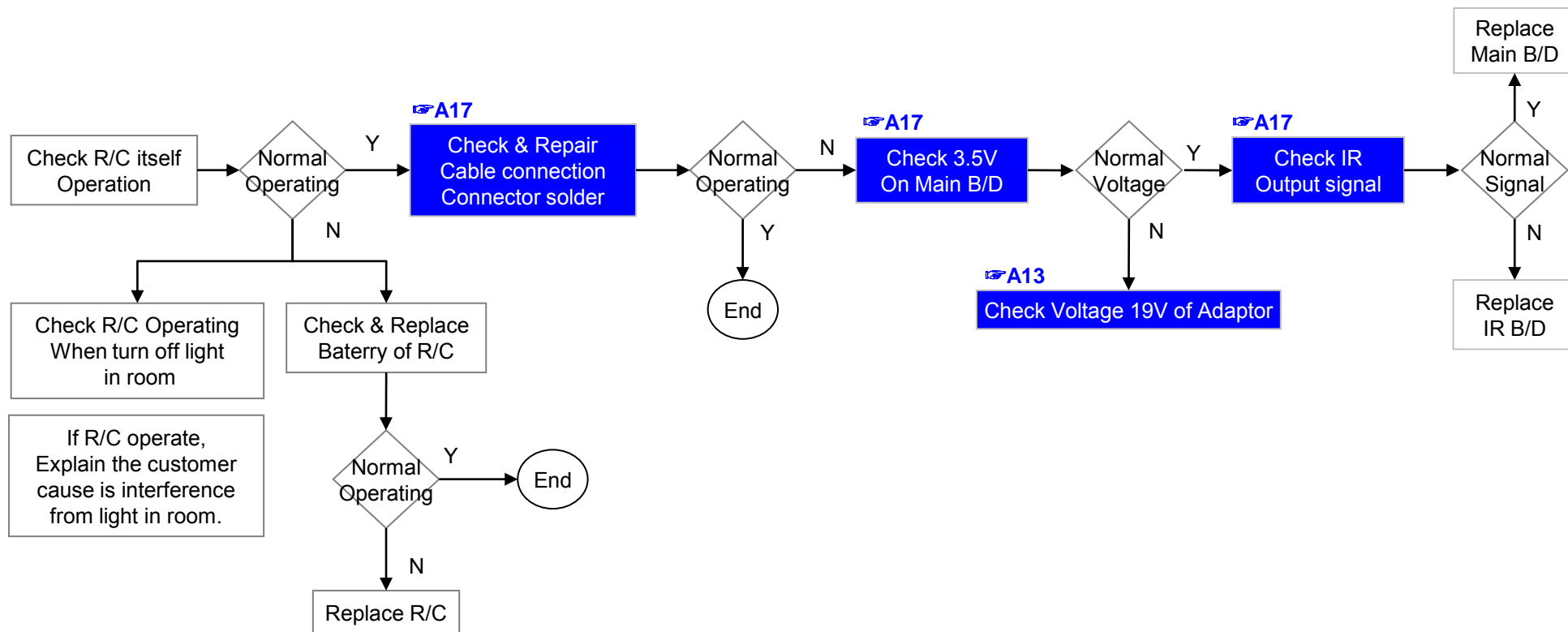


Standard Repair Process

	Error Symptom	C. Audio Error	Established date	2015.04.17	10/14
	Content	Wrecked audio / Discontinuation / Noise	Revised date		

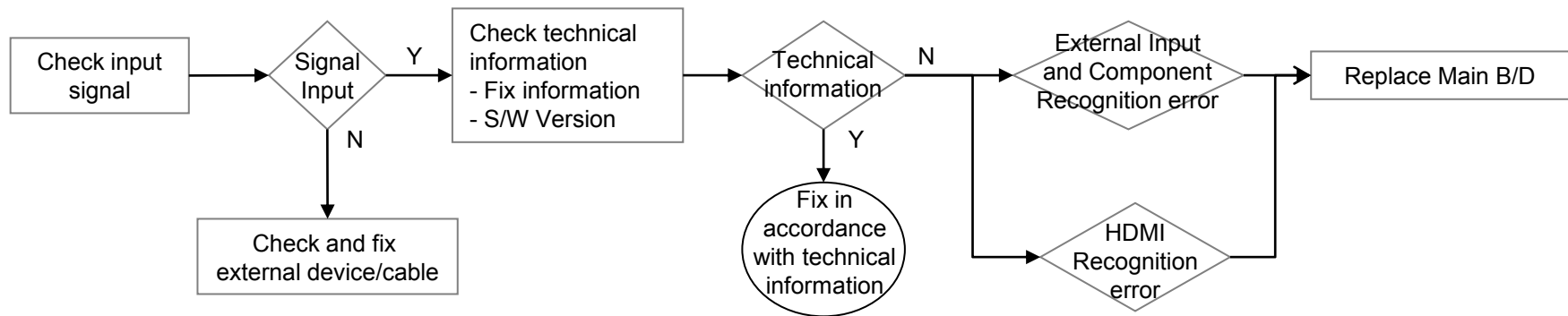


	Error Symptom	D. Function Error	Established date	2015.04.17	11/14
	Content	Remote control & Local switch checking	Revised date		



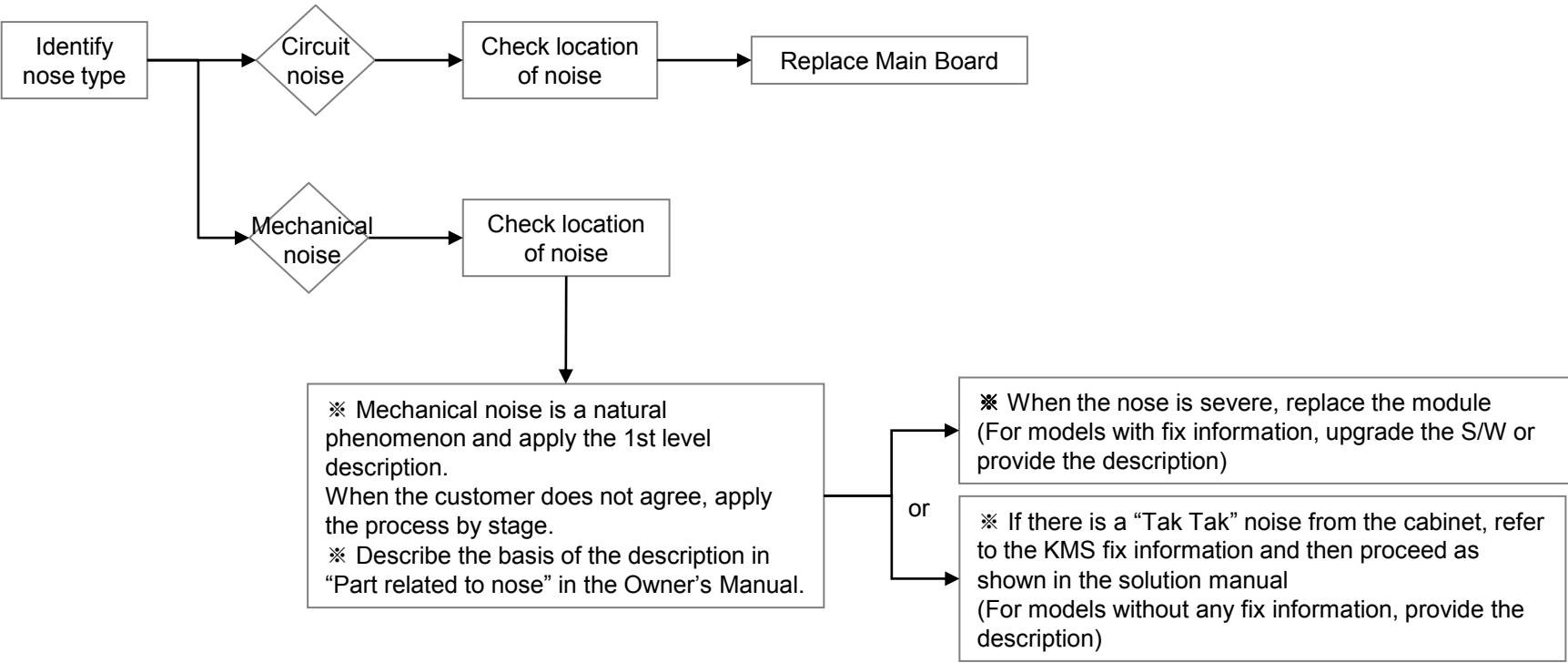
Standard Repair Process

	Error Symptom	D. Function Error	Established date	2015.04.17	12/14
	Content	External device recognition error	Revised date		



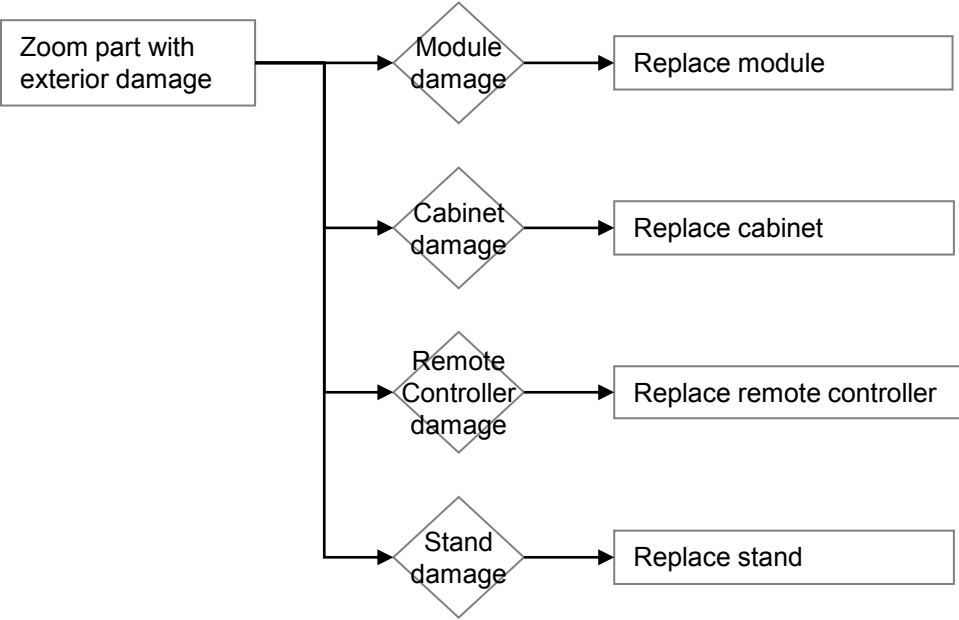
Standard Repair Process

	Error Symptom	E. Noise	Established date	2015.04.17	13/14
	Content	Circuit noise, Mechanical noise	Revised date		



Standard Repair Process

	Error Symptom	F. Exterior Defect	Established date	2015.04.17	14/14
	Content	Exterior defect	Revised date		



Contents of Standard Repair Process Detail Technical Manual

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

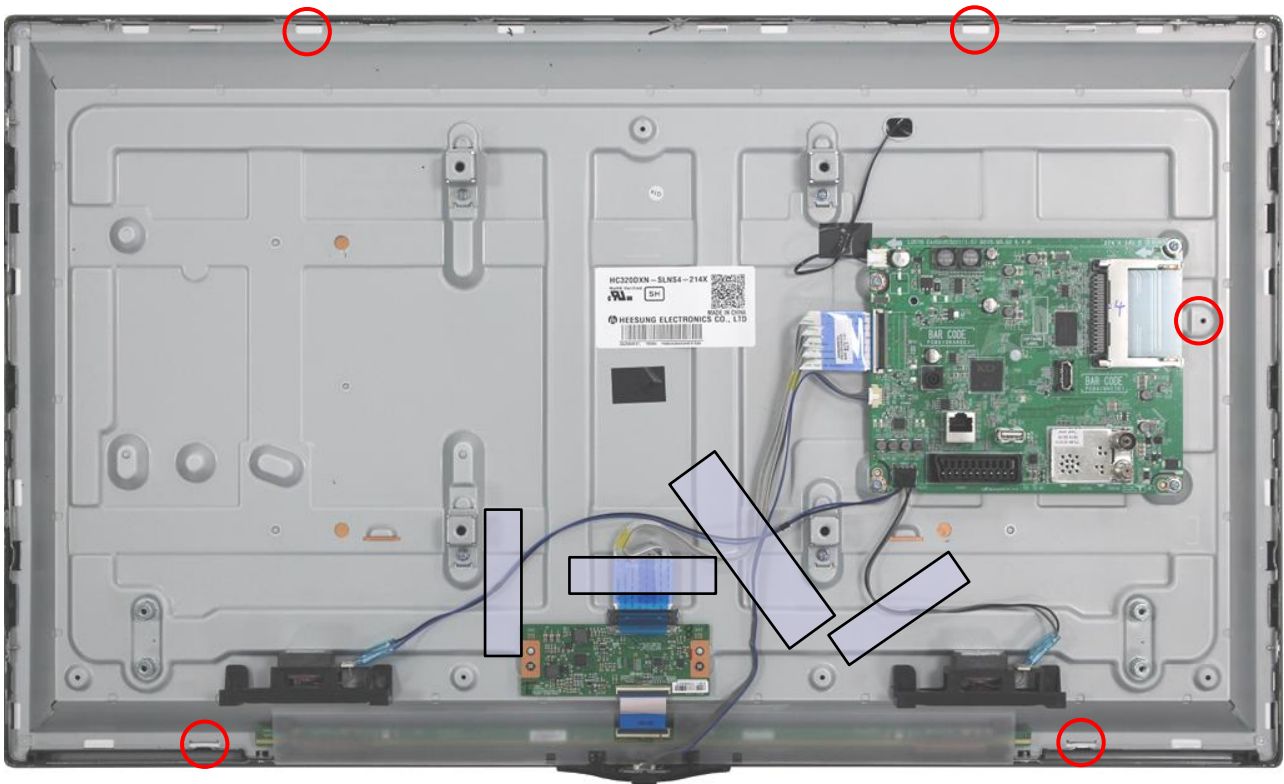
No.	Error symptom	Content	Page	Remarks
1	A. Video error_ No video/Normal audio	Check LCD back light with naked eye	A1	
2		LED driver B+ 24V measuring method	A2	
3		Check White Balance value	A3	
4		Power Board voltage measuring method	A4	
6	A. Video error_ No video/Video lag/stop	TUNER input signal strength checking method	A5	
7		TV Version checking method	A6	
9	A. Video error_Color error	Connection diagram	A7	
10		Check Link Cable (LVDS) reconnection condition	A8	
11			A9	
12		Adjustment Test pattern - ADJ Key	A10	
13	A. Video error_Vertical/Horizontal bar, residual image, light spot	Connection diagram	A8	
14		Check Link Cable (LVDS) reconnection condition	A8	
15			A9	
16	<Appendix> Defected Type caused by T-Con/ Inverter/ Module	Adjustment Test pattern - ADJ Key	A10	
17		Exchange T-Con Board (1)	A-1/5	
18		Exchange T-Con Board (2)	A-2/5	
19		Exchange LED driver Board (PSU)	A-3/5	
20		Exchange Module itself (1)	A-4/5	
		Exchange Module itself (2)	A-5/5	

Contents of Standard Repair Process Detail Technical Manual

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

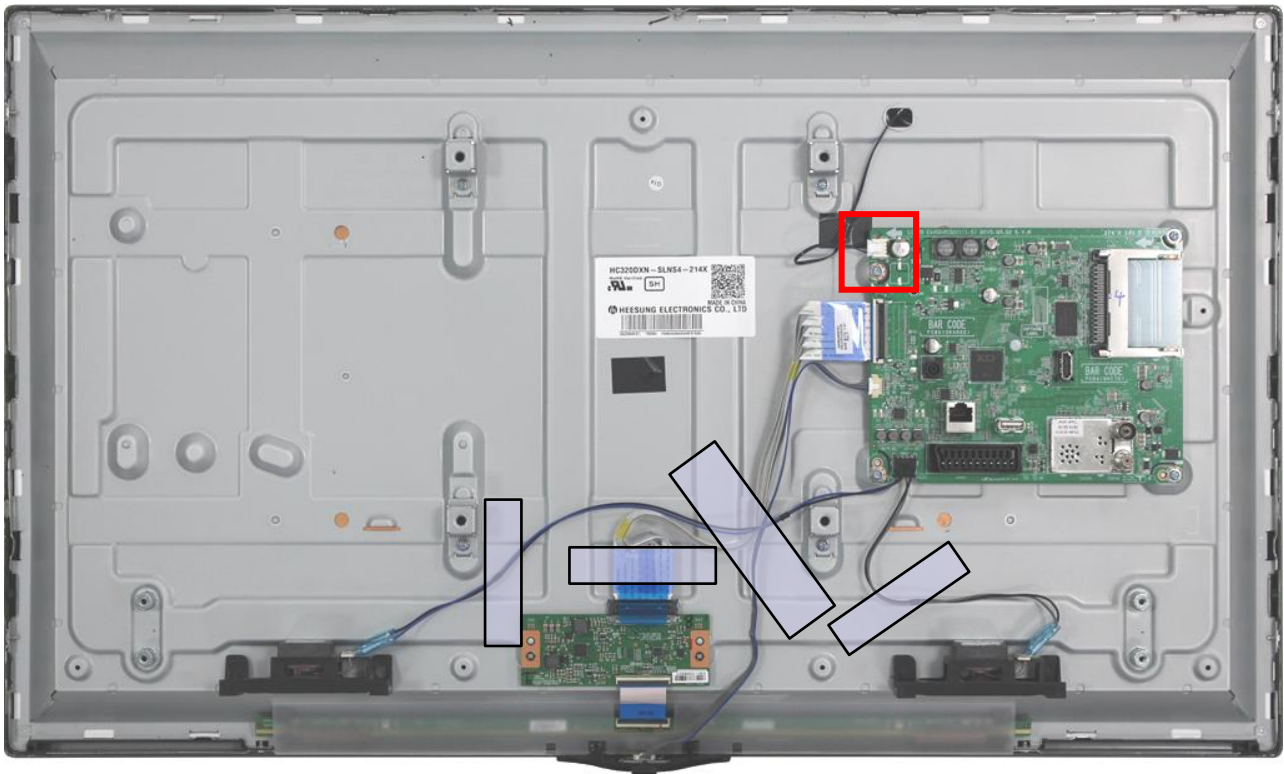
No.	Error symptom	Content	Page	Remarks
21	B. Power error_No power	Check front display LED	A11	
22		Check power input Voltage & ST-BY 3.5V	A12	
23		Checking method when power is ON	A13	
24		POWER BOARD voltage measuring method	A4	
26	B. Power error_Off when on, off while viewing	POWER OFF MODE checking method	A14	
28	C. Audio error_No audio/Normal video	Checking method in menu when there is no audio	A15	
29	D. Function error_ No response in remote controller, key error	Remote controller operation checking method	A17	

	Error Symptom	A. Video Error, No Video/Normal Audio	Established date	2015.04.17	A1
	Content	Check Back Light On with Naked eye	Revised date		



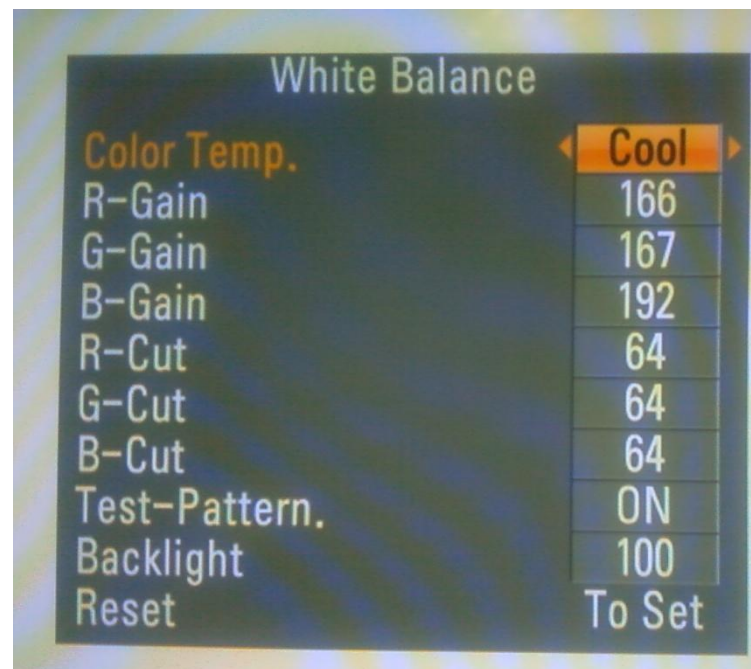
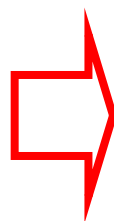
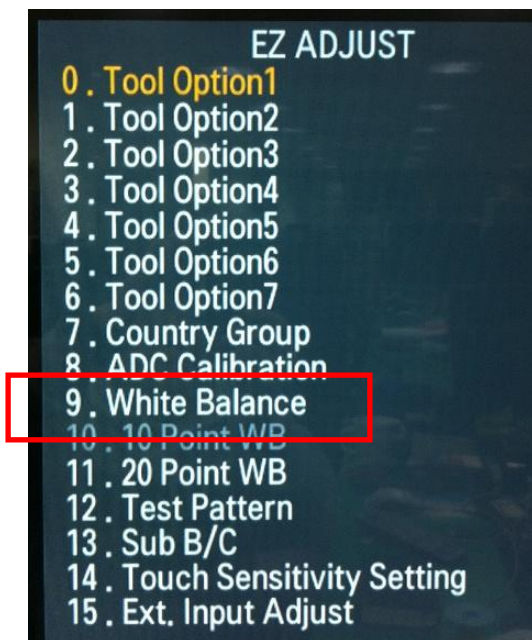
Power On -> disjoint back case -> check lighting

	Error Symptom	A. Video Error, No Video/Normal Audio	Established date	2015.04.17	A2
	Content	Power Board to LED back light Voltage	Revised date		



Measure DC Voltage applying to LED backlight from Main B/D

	Error Symptom	A. Video Error, No Video/Normal Audio	Established date	2015.04.17	A3
	Content	Check White Balance value	Revised date		

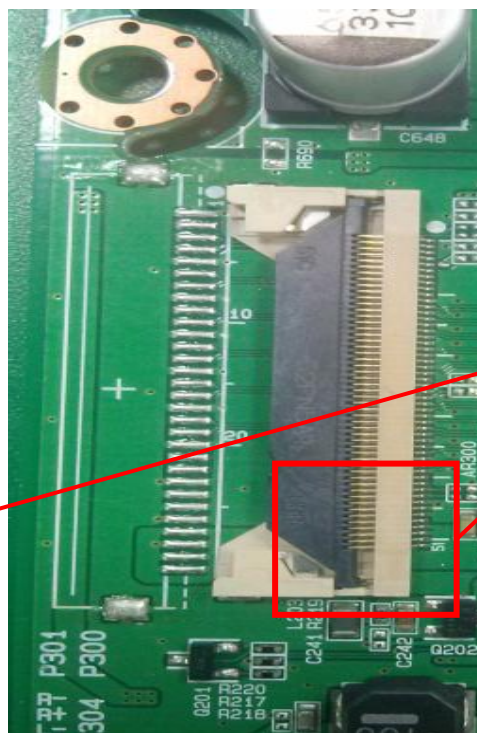
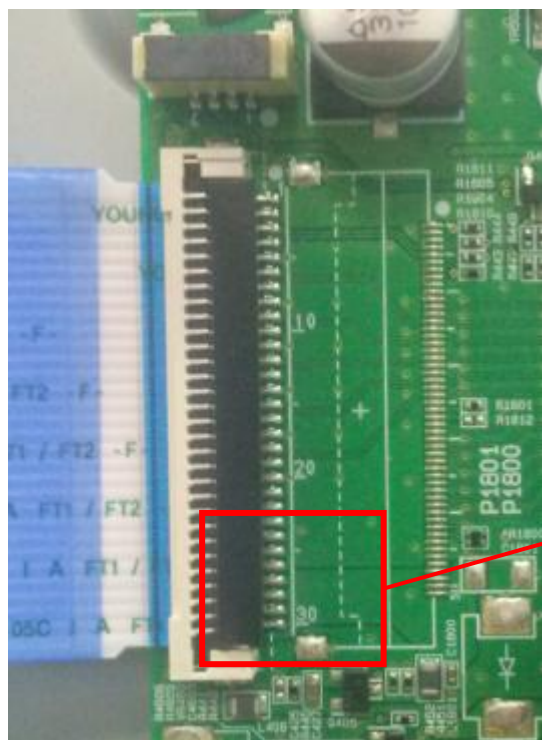


1. Press the ADJ button on the remote controller for adjustment
2. Enter into White Balance of item 9
3. After recording the R, G, B (GAIN, Cut) value of Color Temp (Cool/Medium/Warm), re-enter the value after replacing the MAIN BOARD

	Error Symptom	A. Video Error, No Video/Normal Audio	Established date	2015.04.17	A4
	Content	Power Board Voltage Measuring Method	Revised date		

HD Model : 27 ~ 30 pin

FHD Model : 48 ~ 51 pin



Check LVDS 12V

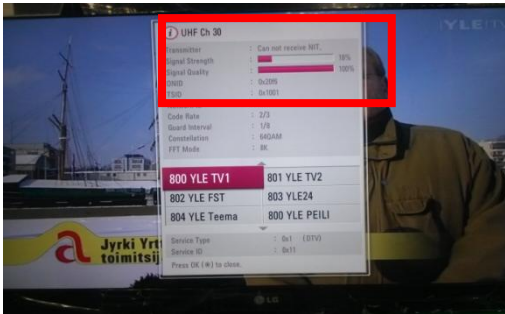
	Error Symptom	A. Video Error, Video lag/stop	Established date	2015.04.17	A5
	Content	Tuner Input Signal Strength Checking Method	Revised date		



MENU → Press red key Remote controller → signal test
→ Select channel

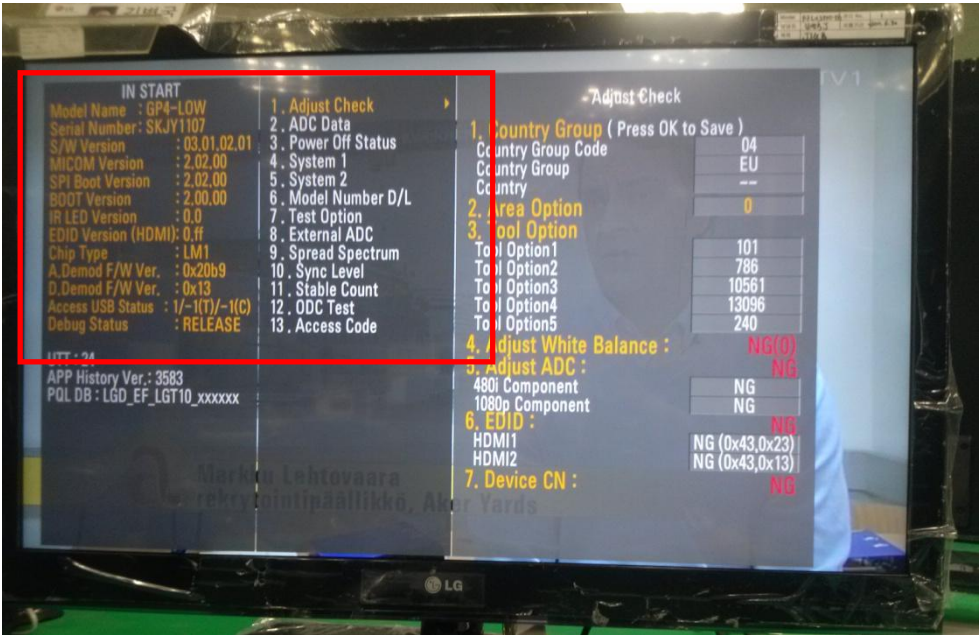


When the signal is strong, use the attenuator (-10dB, -15dB, -20dB etc.)



	Error Symptom	A. Video Error, No Video/Normal Audio	Established date	2015.04.17	A6
	Content	TV Version Checking Method	Revised date		

Checking SW version method for remote controller for adjustment



Press the IN-START with the remote control for adjustment

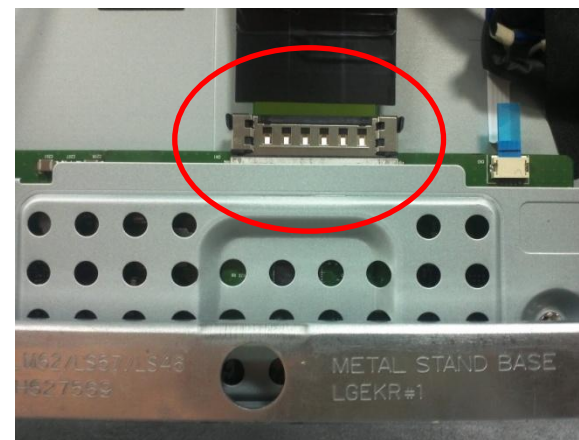
	Error Symptom	A. Video Error, Vertical/Horizontal bar, Residual Image, Light spot	Established date	2015.04.17	A7
	Content	Connection diagram	Revised date		



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

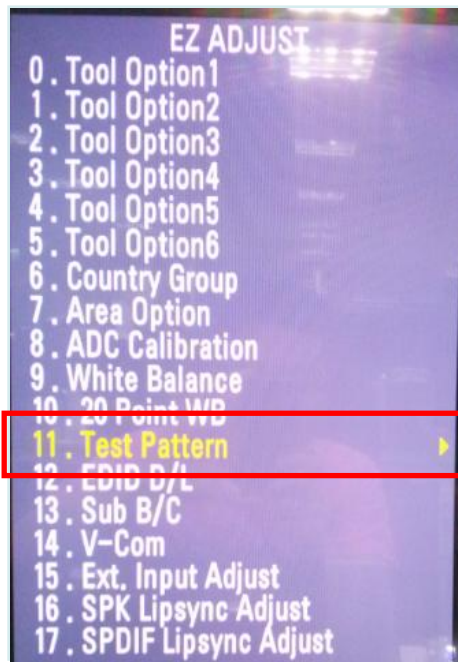
* Jack spec. : depending on Model

	Error Symptom	A. Video Error, Color Error	Established date	2015.04.17	A8/ A9
	Content	Check and replace Link Cable(LVDS) and contact condition	Revised date		



1. Check and replace LVDS Cable
2. Check LVDS connection condition

	Error Symptom	A. Video Error, Color Error	Established date	2015.04.17	A10
	Content	Adjustment Test Pattern – ADJ Key	Revised date		



You can view 6 types of patterns using the ADJ Key

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

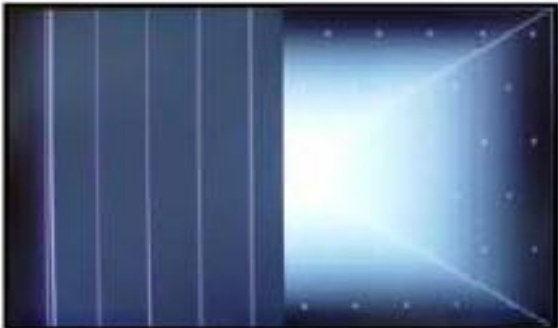
Appendix : Exchange T-Con Board (1)



Solder defect, CNT Broken



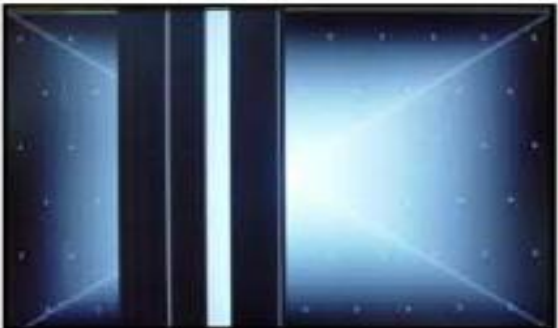
Solder defect, CNT Broken



Solder defect, CNT Broken



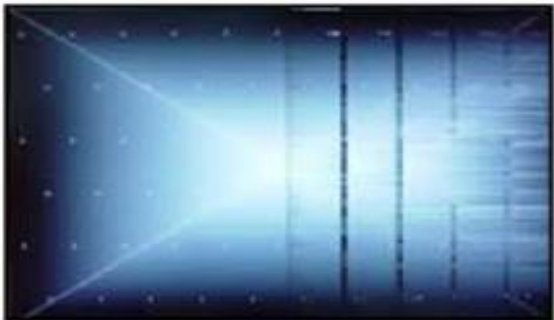
Solder defect, CNT Broken



Solder defect, CNT Broken



Abnormal Power Section



Solder defect, Short/Crack



Abnormal Power Section



Solder defect, Short/Crack

Appendix : Exchange T-Con Board (2)



Abnormal Power Section



Abnormal Power Section



Solder defect, Short/Crack



Solder defect, Short/Crack



Fuse Open, Abnormal power section



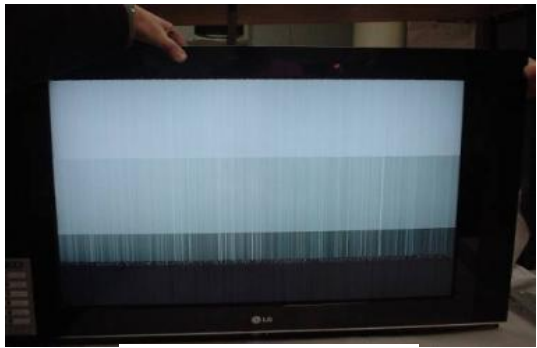
Abnormal Display



GRADATION



Noise



GRADATION

Appendix : Exchange the Module (1)



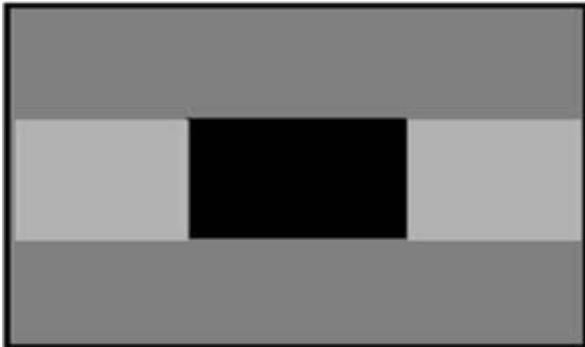
Press damage



Press damage



Press damage



Crosstalk

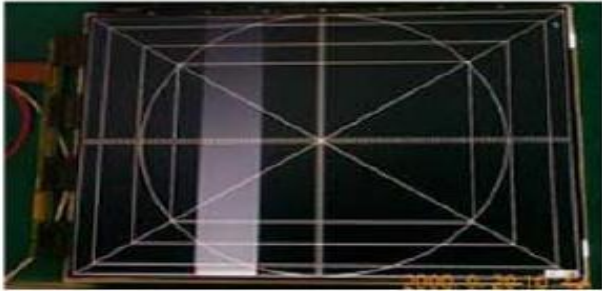


Crosstalk

Un-repairable Cases

In this case please exchange the module.

Appendix : Exchange the Module (2)



Vertical Block
Source TAB IC Defect



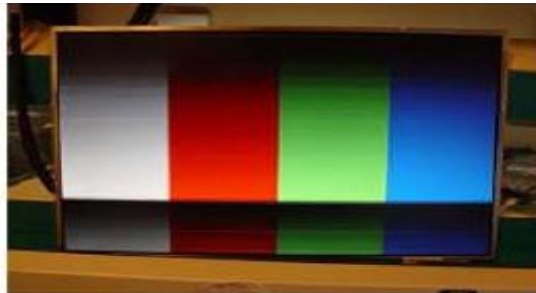
Vertical Line
Source TAB IC Defect



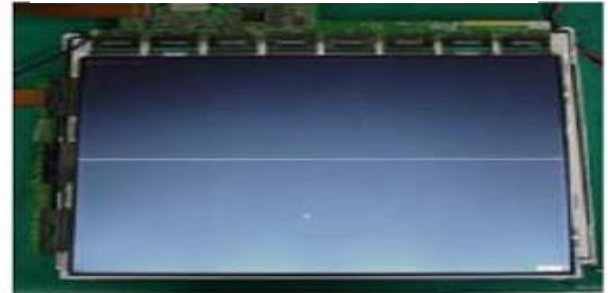
Vertical Block
Source TAB IC Defect



Horizontal Block
Gate TAB IC Defect



Horizontal Block
Gate TAB IC Defect



Horizontal line
Gate TAB IC Defect

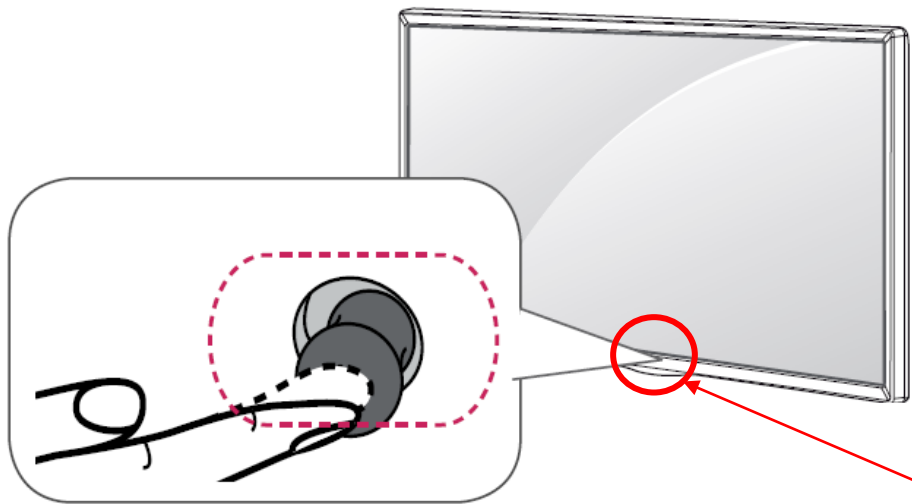


Horizontal Block
Gate TAB IC Defect

Un-repairable Cases

In this case please exchange the module.

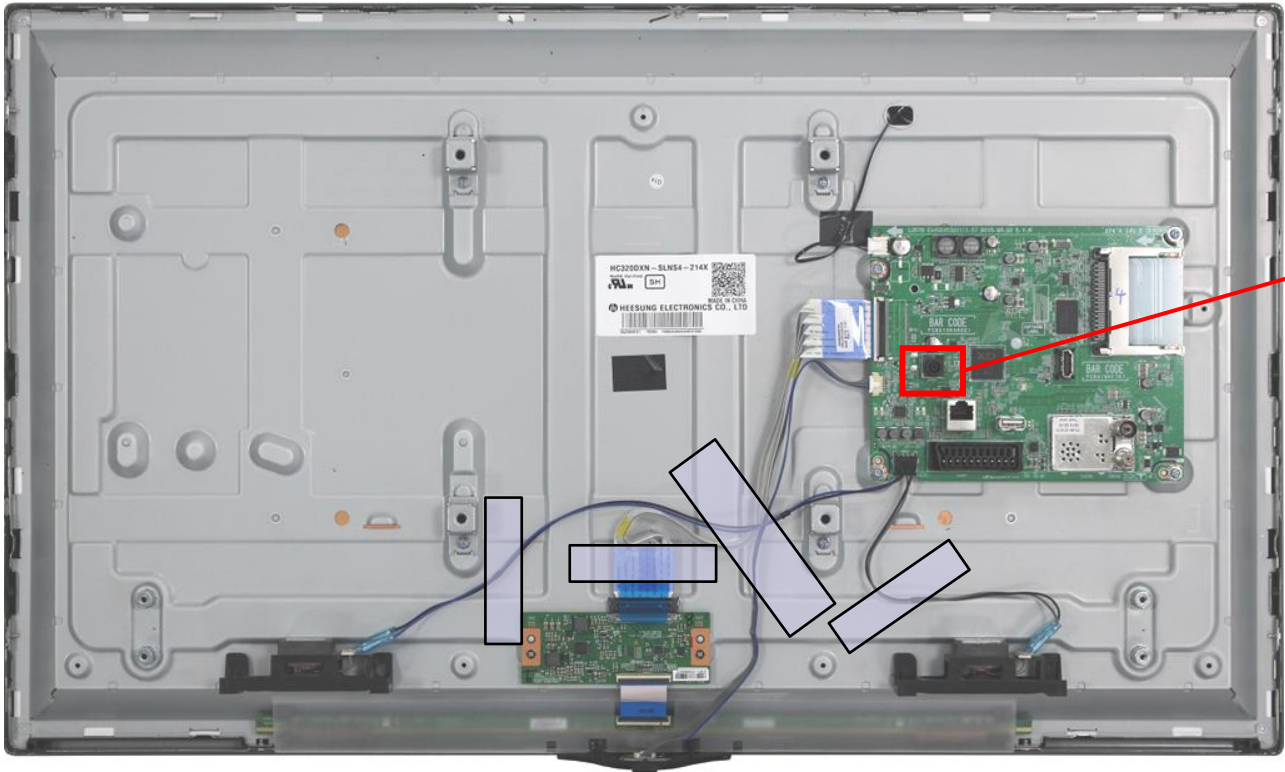
	Error Symptom	B. Power Error, No Power	Established date	2015.04.17	A11
	Content	Check front Display LED	Revised date		



ST-BY condition: Red

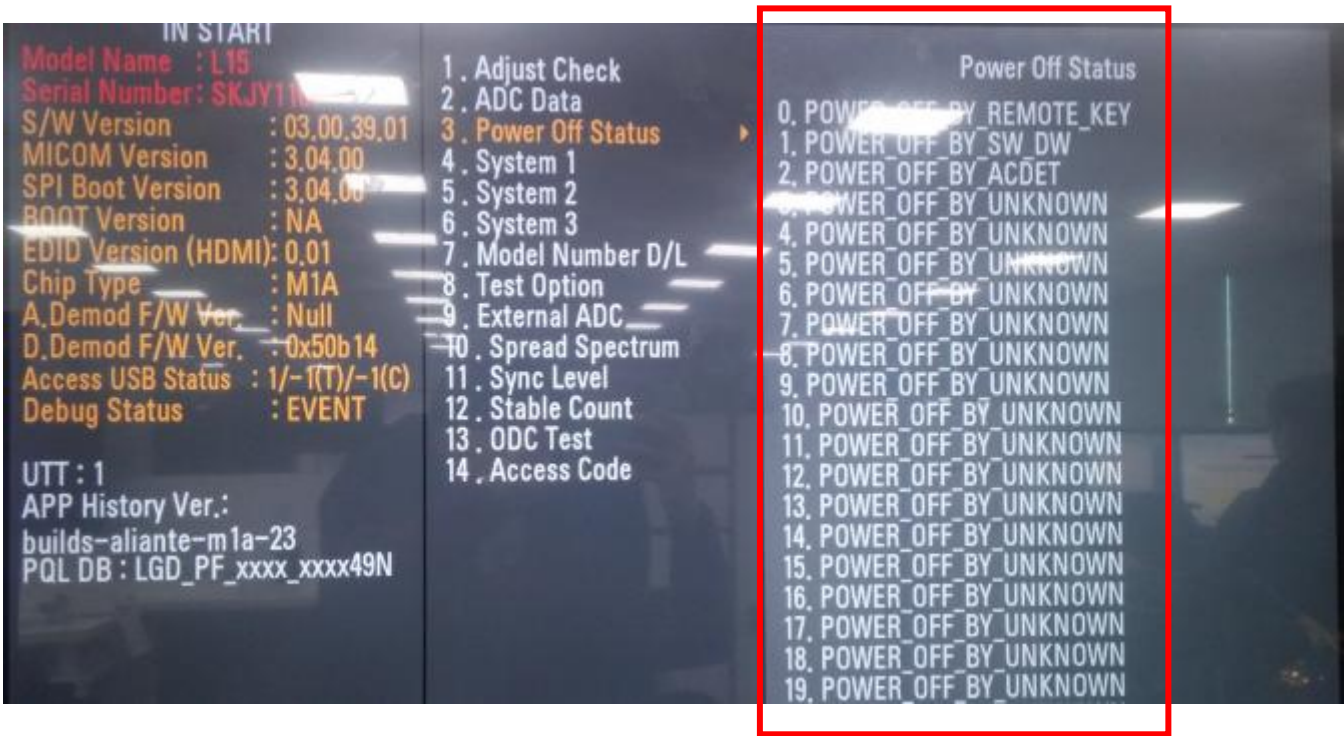
Front LED control :
Menu → Option → Standby Light → On/Off

	Error Symptom	B. Power Error, No Power	Established date	2015.04.17	A12/ A13
	Content	Checking Method When Power is ON	Revised date		



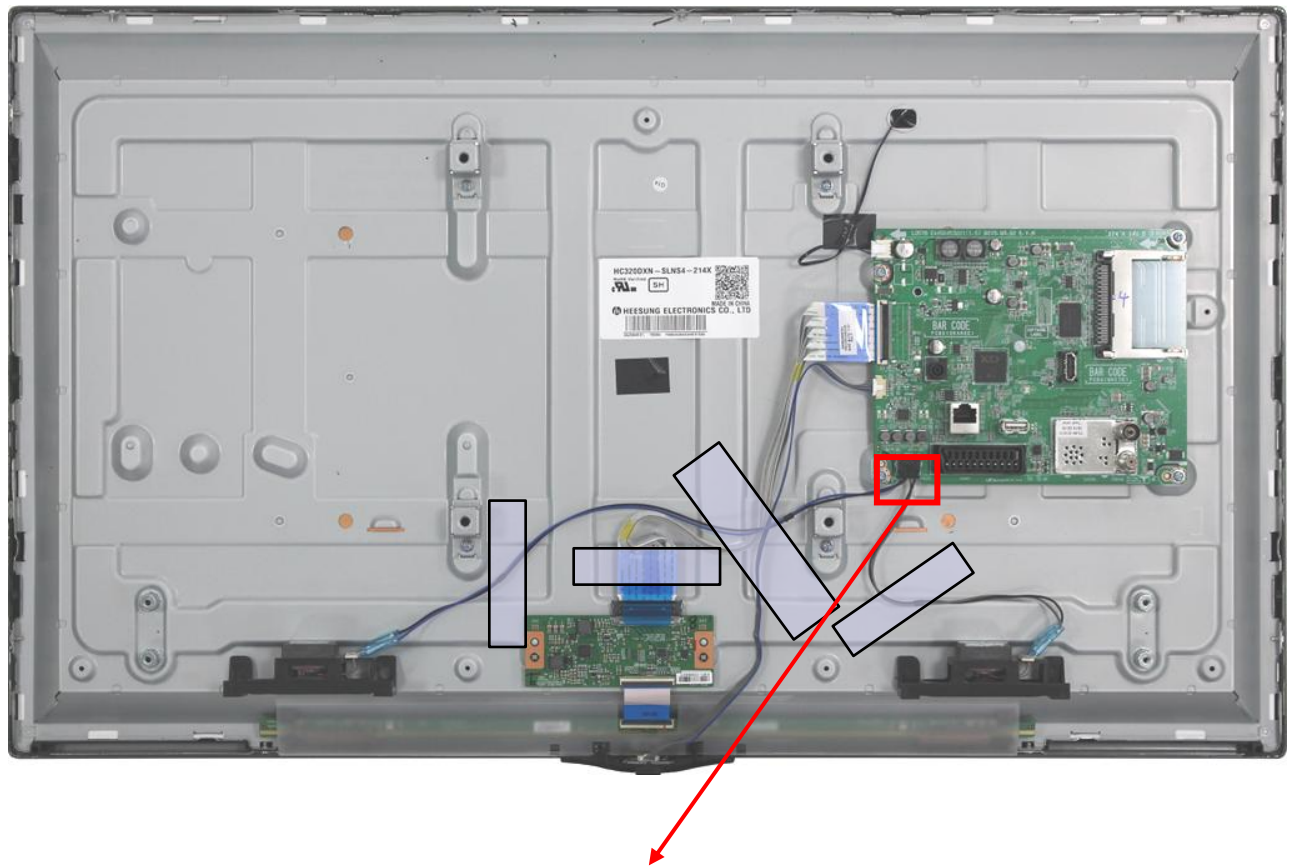
Check Voltage 19V of Adaptor Power

	Error Symptom	B. Power Error, Off when on, off whiling viewing	Established date	2015.04.17	A14
	Content	Power off Mode checking method	Revised date		



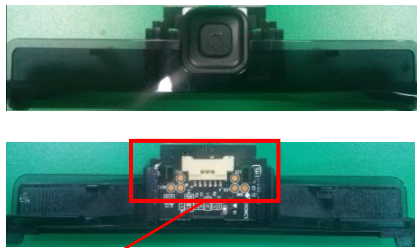
1. Press the IN-START button of the remote controller for adjustment
2. Check the entry into adjustment item 3

	Error Symptom	C. Audio Error, No Audio/Normal Video	Established date	2015.04.17	A15
	Content	Checking method in menu when there is no audio	Revised date		

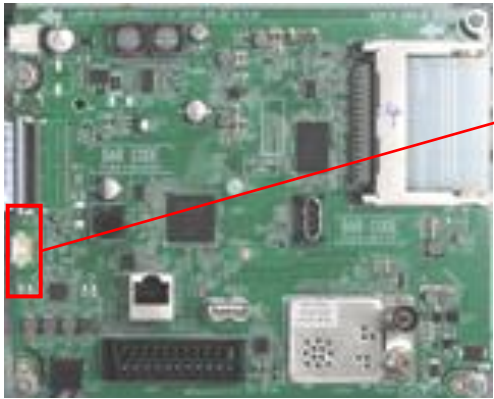


Check Connection from Main B/D to Speaker

	Error Symptom	D. Function Error, No Response in remote controller, Key error	Established date	2015.04.17	A17
	Content	Remote controller operation checking method	Revised date		



① < Sub Ass'y >



②

< Main Ass'y >

P4600

1	KEY2
③ 2	3.5V_ST
3	GND
4	LED R/BUZZ
④ 5	IR
6	GND

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