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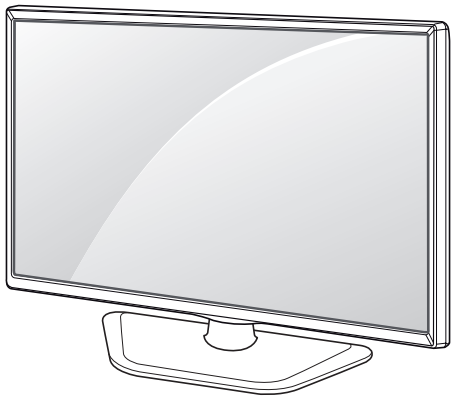
LED TV
SERVICE MANUAL

CHASSIS : LJ36B

MODEL : 32LN5400 32LN5400-SA/SB
32LN540B 32LN540B-SA/SH

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



P/NO : MFL67711903 (1302-REV00)

Printed in Korea

CONTENTS

SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

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

General Guidance

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

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

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

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

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

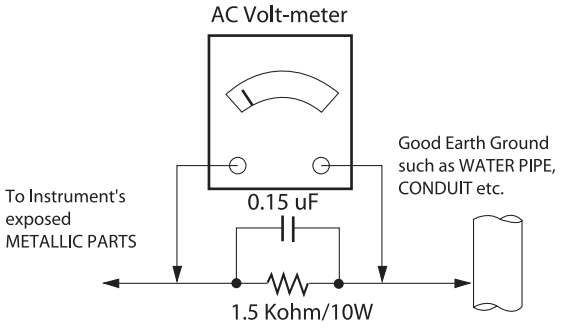
always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

Leakage Current Cold Check(Antenna Cold Check)
With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.
If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1 MΩ and 5.2 MΩ.
When the exposed metal has no return path to the chassis the reading must be infinite.
An other abnormality exists that must be corrected before the receiver is returned to the customer.

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

Do not use a line Isolation Transformer during this check.
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.
Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.
Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which is corresponds to 0.5 mA.
In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

Leakage Current Hot Check circuit



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

SERVICING PRECAUTIONS

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

General Servicing Precautions

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

Electrostatically Sensitive (ES) Devices

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

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

General Soldering Guidelines

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

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

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

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

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

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

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

Fuse and Conventional Resistor
Removal/Replacement
1. Clip each fuse or resistor lead at top of the circuit board hollow stake.
2. Securely crimp the leads of replacement component around notch at stake top.
3. Solder the connections.
   CAUTION: Maintain original spacing between the replaced component and adjacent components and the circuit board to prevent excessive component temperatures.

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

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

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

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

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

SPECIFICATION

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

1. Application range

This spec sheet is applied all of the 32”, 42”, 47”, 50” LED TV with LJ31B/LJ36B chassis.

2. Test condition

Each part is tested as below without special notice.

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

3. Test method

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

4. General Specification

No	Item	Specification	Measurement	Result	Remark
1.	Receiving System	1) SBTVD / NTSC / PAL-M / PAL-N			
2.	Available Channel	1) VHF : 02~13 2) UHF : 14~69 3) CATV : 01~135			
3.	Input Voltage	1) AC 100 ~ 240V 50/60Hz			
4.	Market	Central and South AMERICA			
5.	Screen Size	32 inch Wide (1366 × 768)			32LN540B-SB/SA 32LA615B-SC
		32 inch Wide (1920 × 1080)			32LN5400-SH/SA
		39 inch Wide (1920 × 1080)			39LN5400-SB/SA
		42 inch Wide (1920 × 1080)			42LN5400-SB/SA 42LA6150-SC
		47 inch Wide (1920 × 1080)			47LN5400-SB/SA 47LA6150-SC
		50 inch Wide (1920 × 1080)			50LN5400-SB/SA
		50 inch Wide (1920 × 1080)			55LN5400-SB/SA
6.	Aspect Ratio	16:9			
7.	Tuning System	FS			

No	Item	Specification	Measurement	Result	Remark
8.	Module	LC320DXE-SFR1	HD, 60Hz	LGD	32LN540B-SB/SA
		LC320DUE-SFR1	FHD, 60Hz	LGD	32LN5400-SH/SA
		V390BJ1-PE1	FHD, 60Hz	CMI	39LN5400-SB/SA
		LC420DUE-SFR1	FHD, 60Hz	LGD	42LN5400-SB/SA
		LC470DUE-SFR1	FHD, 60Hz	LGD	47LN5400-SB/SA
		LC500DUE-SFR1	FHD, 60Hz	LGD	50LN5400-SB/SA
		LC550DUK-SEE1	FHD, 60Hz	LGD	55LN5400-SB/SA
		LC320DXE-SFR1	HD, 60Hz	LGD	32LA615B-SC
		LC320DUE-SFR1	FHD, 60Hz	LGD	42LA6150-SC
		V390BJ1-PE1	FHD, 60Hz	LGD	47LA6150-SC
9.	Operating Environment	1) Temp : 0 ~ 40 deg 2) Humidity : ~ 80 %			
10.	Storage Environment	1) Temp : -20 ~ 60 deg 2) Humidity : ~ 85 %			

5. External Input Support Format

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

No	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock	Proposed
1.	720*576	15.625	50.000	13.5	SDTV 576I
2.	720*480	15.73	60	13.5135	SDTV ,DVD 480I
3.	720*480	15.73	59.94	13.5	SDTV ,DVD 480I
4.	720*480	31.50	60	27.027	SDTV 480P
5.	720*480	31.47	59.94	27.0	SDTV 480P
6.	720*576	31.250	50.000	27.000	SDTV 576P
7.	1280*720	37.500	50.000	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	74.250	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	56.250	50.00	148.50	HDTV 1080P
14.	1920*1080	67.500	60.00	148.50	HDTV 1080P
15.	1920*1080	67.432	59.939	148.352	HDTV 1080P
16.	1920*1080	27.000	24.000	74.25	HDTV 1080P
17.	1920*1080	26.97	23.976	74.176	HDTV 1080P
18.	1920*1080	33.75	30.000	74.25	HDTV 1080P
19.	1920*1080	33.71	29.97	74.176	HDTV 1080P

5.2. HDMI Input (PC/DTV)

***HDMI PC support only Rear HDMI Input**
***If use DVI to HDMI cable for PC, you have to use external SPK for PC audio sound.**

No	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	
	PC					DDC
1.	640*350	31.468	70.09	25.17	EGA	X
2.	720*400	31.469	70.08	28.32	DOS	O
3.	640*480	31.469	59.94	25.17	VESA(VGA)	O
4.	800*600	37.879	60.31	40.00	VESA(SVGA)	O
5.	1024*768	48.363	60.00	65.00	VESA(XGA)	O
6.	1152*864	54.348	60.053	80.00	VESA	O
7.	1360*768	47.712	60.015	85.50	VESA (WXGA)	O
8.	1280*1024(FHD Only)	63.981	60.02	108.00	VESA (SXGA)	O
9.	1920*1080(FHD Only)	67.5	60	148.5	HDTV 1080P	O
	DTV					
1.	720*480	31.469	59.940	27.000	SDTV 480P	
2.	720*480	31.500	60.000	27.027	SDTV 480P	
3.	720*576	31.250	50.000	27.000	SDTV 576P	
4.	1280*720	37.500	50.000	74.25	HDTV 720P	
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	28.125	50.000	74.25	HDTV 1080I	
8.	1920*1080	33.75	60.00	74.25	HDTV 1080I	
9.	1920*1080	33.72	59.94	74.176	HDTV 1080I	
10.	1920*1080	56.250	50.000	148.50	HDTV 1080P	
11.	1920*1080	67.500	60.00	148.50	HDTV 1080P	
12.	1920*1080	67.432	59.94	148.352	HDTV 1080P	
13.	1920*1080	27.000	24.000	74.25	HDTV 1080P	
14.	1920*1080	26.97	23.976	74.176	HDTV 1080P	
15.	1920*1080	33.75	30.00	74.25	HDTV 1080P	
16.	1920*1080	33.71	29.97	74.176	HDTV 1080P	

※ HDMI Monitor Range Limits
Min Vertical Freq - 58 Hz
Max Vertical Freq - 62 Hz
Min Horiz. Freq - 30 kHz
Max Horiz. Freq - 83 kHz
Pixel Clock - 160 MHz

ADJUSTMENT INSTRUCTION

1. Application

This spec sheet is applied all of the LED TV with LJ36B chassis

2. Designation

(1) The adjustment is according to the order which is designated and which must be followed, according to the plan whic al Unit: Product Specification Standard.
(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 ºC±5 ºC
Relative humidity : 65 ± 10%
Input voltage : 100~220V, 50/60Hz
(6) Adjustment equipments : Color Analyzer (CA-210 or CA-110), SVC remote controller
(7) Push The “IN STOP KEY” – For memory initialization.

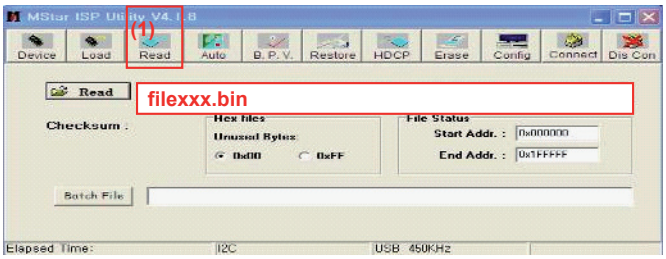
Case1 : Software version up
1) After downloading S/W by USB , TV set will reboot automatically
2) Push “In-stop” key
3) Push “Power on” key
4) Function inspection
5) After function inspection, Push “In-stop” key.

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.

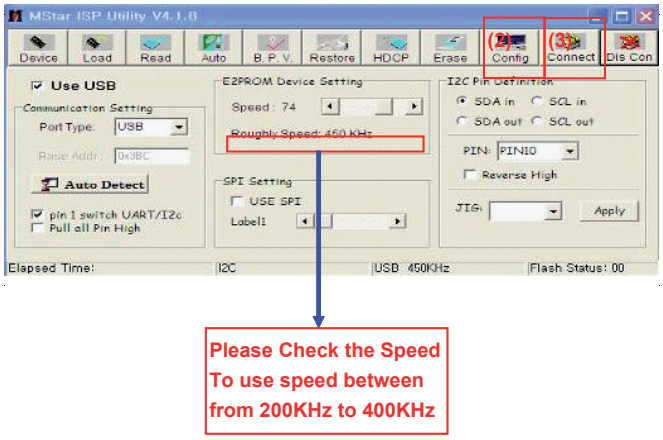
3. Main PCB check process

* APC – After Manual-Insert, executing APC
* Boot file Download

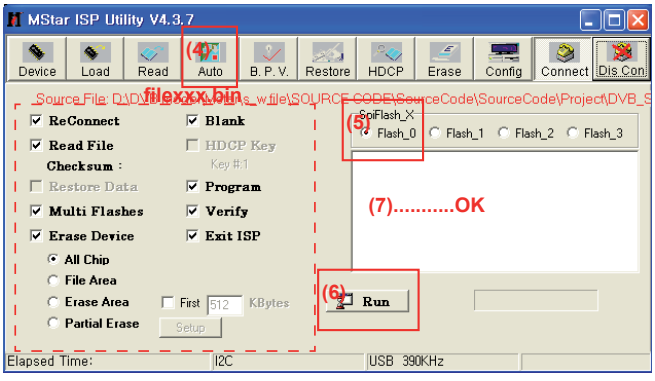
(1) Execute ISP program “Mstar ISP Utility” and then click “Config” tab.
(2) Set as below, and then click “Auto Detect” and check “OK” message.
If “Error” is displayed, Check connection between computer, jig, and set.
(3) Click “Read” tab, and then load download file (XXXX.bin) by clicking “Read”



(4) Click “Connect” tab. If “Can’t ” is displayed, Check connection between computer, jig, and set.



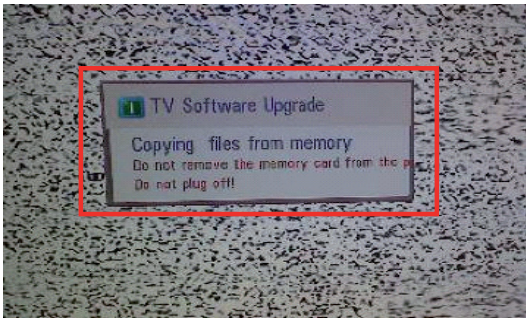
(5) Click “Auto” tab and set as below.
(6) Click “Run”.
(7) After downloading, check “OK” message.



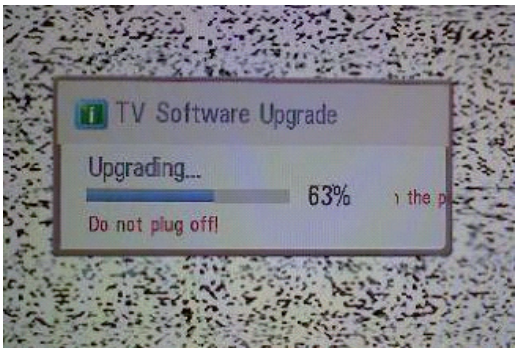
* USB DOWNLOAD(*.epk file download)

(1) Put the USB Stick to the USB socket.
(2) Automatically detecting update file in USB Stick.
- If your downloaded program version in USB Stick is Low, it didn't work. But your downloaded version is High, USB data is automatically detecting

(3) Show the message "Copying files from memory"



(4) Updating is staring.



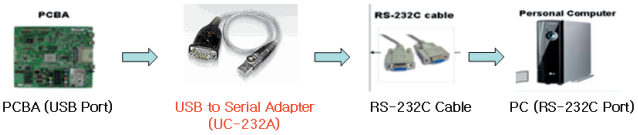
(5) After updating is complete, The TV will restart automatically.
(6) If TV turns on, check your updated version and Tool option. (refer to the next page about tool option)
* If downloading version is higher than your TV have, TV can lost all channel data. In this case, you have to channel recover. 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 controller.
(2) Select "Tool Option 1" and Push "OK" button.
(3) Punch in the number. (Each model has their number.)
(4) Completed selecting Tool option.

Model	Module	Tool option1	Tool option2	Tool option3	Tool option4	Tool option5	Tool option6
32LA615B-SC	LGD	52	2440	32669	13576	43012	97
42LA6150-SC	LGD	55	2440	32669	13576	43012	97
47LA6150-SC	LGD	56	2440	32669	13576	43012	97
32LN540B-SB/SA	LGD	20	2440	16281	13576	43012	17
32LN5400-SH/SA	LGD	20	2440	16281	13576	43012	17
39LN5400-SB/SA	CMI	2070	2440	16281	13576	43012	17
39LN5400-SB/SA	AUO	4118	2440	16281	13576	43012	17
42LN5400-SB/SA	LGD	23	2440	16281	13576	43012	17
42LN5400-SB/SA	AUO	4119	2440	16281	13576	43012	17
47LN5400-SB/SA	LGD	24	2440	16281	13576	43012	17
50LN5400-SB/SA	LGD	25	2440	16281	13576	43012	17
55LN5400-SB/SA	POLA	26	2440	16281	13576	43012	17

* 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.
※ Caution: LJ31* chassis support only UC-232A driver. (only use this one.)



4. Total Assembly line process

4.1. Adjustment Preparation

■ W/B Equipment condition

CA210 : CH14, Test signal : Inner pattern (80IRE) – in case of LED back light

■ Above 5 minutes H/run in the inner pattern. (“power on” key of adjust remote control)

► The spec of color temperature and coordinate

Model	Mode	Color Temp	Color coordinate	Remark
All	Cool (C50)	13,000k	x = 0.271 (±0.002) y = 0.270 (±0.002)	※ Test signal - Inner pattern for W/B adjust - External white pattern (80IRE, 204gray)
	Medium (0)	9,300k	x = 0.286 (±0.002) y = 0.289 (±0.002)	
	Warm (W50)	6,500k	x = 0.313 (±0.002) y = 0.329 (±0.002)	

► CA210 : CH 14, Test signal : Inner pattern (80IRE)

- Standard color coordinate and temperature using CA-1000 (by H/R time)

▪ Normal line

model: (normal line)LN5xxx, LA6xxx, LA7xxx, LA8xxx

H/R Time(Min)		Cool		Medium		Warm	
		x	y	x	x	y	x
		271	270	286	289	313	329
1	0-2	283	287	298	306	322	342
2	3-5	282	285	297	304	321	340
3	6-9	281	284	296	303	320	339
4	10-19	279	281	294	300	318	336
5	20-35	277	277	292	296	316	332
6	36-49	275	274	290	293	314	329
7	50-79	273	272	288	291	312	327
8	80-119	272	271	287	290	311	326
9	Over 120	271	270	286	289	310	325

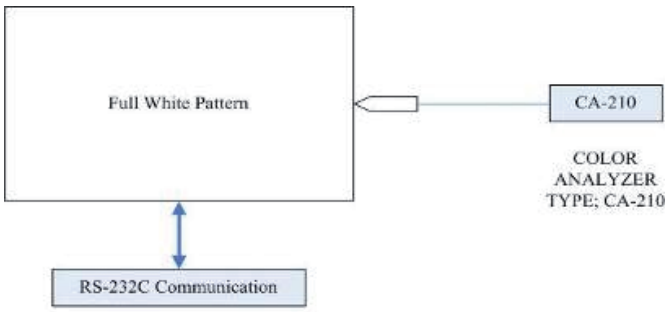
▪ Aging chamber line

model: (aging chamber)LN5xxx, LA6xxx, LA7xxx, LA8xxx

H/R Time(Min)		Cool		Medium		Warm	
		x	y	x	x	y	x
		271	270	286	289	313	329
1	0-5	282	285	297	304	321	340
2	6-10	278	280	293	299	317	335
3	11-20	275	275	290	294	314	330
4	21-30	272	272	287	291	311	327
5	31-40	269	269	284	288	308	324
6	41-50	268	267	283	286	307	322
7	51-80	267	266	282	285	306	321
8	81-119	266	264	281	283	305	319
9	Over 120	265	263	280	282	304	318

※ 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 R/C POWER-ON -> Enter the mode of White-Balance, the pattern will come out.



[Fig.5] **connecting picture (On Automatic Control)**

● Auto-control interface and directions

(1) Adjust in the place where the influx of light like floodlight around is blocked. (Illumination is less than 10ux).

(2) Adhere closely the Color Analyzer (CA210) to the module less than 10cm distance, keep it with the surface of the Module and Color Analyzer’s Prove 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

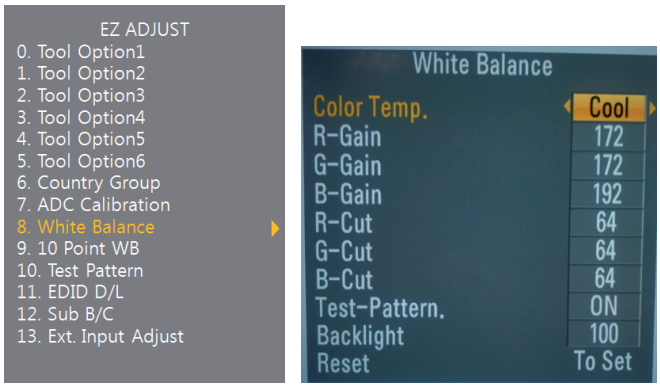
*Manual W/B process using adjusts Remote control.(TBD)

■ 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 “8. White Balance”.



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

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

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

(3) Press ADJ key -> EZ adjust using adj. R/C -> 8. White-Balance then press the cursor to the right (KEY►). When KEY(►) is pressed 206 Gray internal pattern will be displayed.

(4) Adjust Cool modes

(i). Fix the one of R/G/B gain to 192 (default data) and decrease the others

(If G gain is adjusted over 172 and R and B gain less than 192, increase G gain to 192 and increase R gain and B gain same amount of increasing G gain.)

(ii). If G gain is less than 172,

Increase G gain by up to 172, and then increase R gain and G gain same amount of increasing G gain.

(iii). If R gain or B gain is over 255,

Readjust G gain less than 172, Conform to R gain is 255 or B gain is 255

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

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

▪ If internal pattern is not available, use RF input. In EZ Adj. menu 8. 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 206 Gray pattern.

※ 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

How to adjust

(1) If G gain is adjusted over 172 and R gain 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 B 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

※ CASE Medium / Warm

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. DPM operation confirmation (Only Apply for MNT Model)

Check if Power LED Color and Power Consumption operate as standard.

- ■ Set Input to RGB and connect D-sub cable to set
- ■ Measurement Condition: (100~240V@ 50/60Hz)
- ■ Confirm DPM operation at the state of screen without Signal

4.3. 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 Ass'y, EDID have to be downloaded.

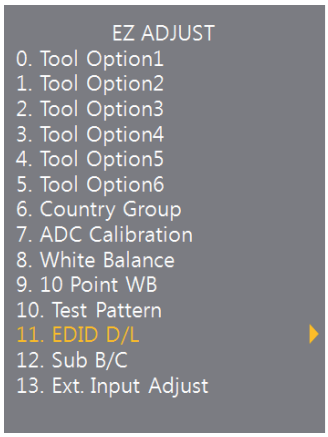
4.4. EDID DATA

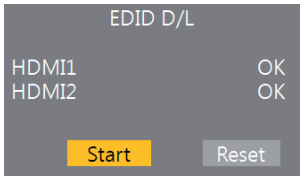
1) All Data : HEXA Value

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.





※ Edid data and Model option download (RS232C)

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 download (The use of a internal Data)

※ Caution

* Use the proper signal cable for EDID Download
- Analog EDID : Pin3 exists
- Digital EDID : Pin3 exists

=> Caution

- Never connect HDMI & D-sub Cable at the same time.
- Use the proper cables below for EDID Writing.
- Download HDMI1, HDMI2 separately because HDMI1 is different from HDMI2.

For Analog EDID	For HDMI EDID	
D-sub to D-sub	DVI-D to HDMI or HDMI to HDMI	
		

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

● **EDID DATA**

(1) HD 2D EDID Data

	CheckSum	Physical Address (0x9E)
HDMI 1	A3/5B	10
HDMI 2	A3/4B	20

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	17	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	01	01
30	01	01	01	01	01	01	66	21	50	B0	51	00	1B	30	40	70
40	36	00	40	84	63	00	00	1E	64	19	00	40	41	00	26	30
50	18	88	03	06	40	84	63	00	00	18	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	A3

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	22	F1	4E	10	1F	04	93	05	14	03	02	12	20	21
10	22	15	01	26	15	07	50	09	57	07	67	03	0C	00	10	00
20	80	1E	01	1D	80	18	71	1C	16	20	58	2C	25	00	A0	5A
30	00	00	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00
40	20	C2	31	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E
50	96	00	A0	5A	00	00	00	18	02	3A	80	18	71	38	2D	40
60	58	2C	45	00	A0	5A	00	00	00	1E	00	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	5B

(2) FHD 2D EDID Data (Support Deep Color – 10bit)

	CheckSum	Physical Address (0x9E)
HDMI 1	42/DE	10
HDMI 2	42/CE	20

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	17	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	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	42

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	22	F1	4E	10	9F	04	13	05	14	03	02	12	20	21
10	22	15	01	26	15	07	50	09	57	07	67	03	0C	00	10	00
20	B8	2D	01	1D	80	18	71	1C	16	20	58	2C	25	00	20	C2
30	31	00	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00
40	20	C2	31	00	00	1E	02	3A	80	18	71	38	2D	40	58	2C
50	45	00	A0	5A	00	00	00	1E	01	1D	00	BC	52	D0	1E	20
60	B8	28	55	40	C4	8E	21	00	00	1E	00	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	DE

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	22	F1	4E	10	9F	04	13	05	14	03	02	12	20	21
10	22	15	01	26	15	07	50	09	57	07	67	03	0C	00	10	00
20	B8	2D	01	1D	80	18	71	1C	16	20	58	2C	25	00	20	C2
30	31	00	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00
40	20	C2	31	00	00	1E	02	3A	80	18	71	38	2D	40	58	2C
50	45	00	A0	5A	00	00	00	1E	01	1D	00	BC	52	D0	1E	20
60	B8	28	55	40	C4	8E	21	00	00	1E	00	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	DE

(3) FHD 2D EDID Data (Not Support Deep Color – 8bit)

	CheckSum	Physical Address (0x9E)
HDMI 1	42/25	10
HDMI 2	42/15	20

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	17	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	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	42

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	22	F1	4E	10	9F	04	13	05	14	03	02	12	20	21
10	22	15	01	26	15	07	50	09	57	07	67	03	0C	00	10	00
20	80	1E	01	1D	80	18	71	1C	16	20	58	2C	25	00	20	C2
30	31	00	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00
40	20	C2	31	00	00	1E	02	3A	80	18	71	38	2D	40	58	2C
50	45	00	A0	5A	00	00	00	1E	01	1D	00	BC	52	D0	1E	20
60	B8	28	55	40	C4	8E	21	00	00	1E	00	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	25

(4) HD 3D EDID Data

	CheckSum	Physical Address (0x9E)
HDMI 1	A3/59	10
HDMI 2	A3/49	20

- HDMI

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	17	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	01	01
30	01	01	01	01	01	01	66	21	50	B0	51	00	1B	30	40	70
40	36	00	40	84	63	00	00	1E	64	19	00	40	41	00	26	30
50	18	88	03	06	40	84	63	00	00	18	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	A3

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	33	F1	4E	10	1F	04	93	05	14	03	02	12	20	21
10	22	15	01	26	15	07	50	09	57	07	78	03	0C	00	10	00
20	80	1E	20	C0	0E	01	40	0A	0F	08	10	18	10	98	10	58
30	10	38	10	01	1D	80	18	71	1C	16	20	58	2C	25	00	A0
40	5A	00	00	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55
50	00	20	C2	31	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10
60	3E	96	00	A0	5A	00	00	00	18	02	3A	80	18	71	38	2D
70	40	58	2C	45	00	A0	5A	00	00	00	1E	00	00	00	00	59

(5) FHD 3D EDID Data (Not Support Deep Color – 8bit)

	CheckSum	Physical Address (0x9E)
HDMI 1	42/23	10
HDMI 2	42/13	20

- HDMI

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	17	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	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	42

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	33	F1	4E	10	9F	04	13	05	14	03	02	12	20	21
10	22	15	01	26	15	07	50	09	57	07	78	03	0C	00	10	00
20	80	1E	20	C0	0E	01	40	0A	0F	08	10	18	10	98	10	58
30	10	38	10	01	1D	80	18	71	1C	16	20	58	2C	25	00	20
40	C2	31	00	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55
50	00	20	C2	31	00	00	1E	02	3A	80	18	71	38	2D	40	58
60	2C	45	00	A0	5A	00	00	00	1E	01	1D	00	BC	52	D0	1E
70	20	B8	28	55	40	C4	8E	21	00	00	1E	00	00	00	00	23

(6) FHD 3D EDID Data (Support Deep Color – 10bit)

	CheckSum	Physical Address (0x9E)
HDMI 1	42/DC	10
HDMI 2	42/CC	20

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	17	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	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	42

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	33	F1	4E	10	9F	04	13	05	14	03	02	12	20	21
10	22	15	01	26	15	07	50	09	57	07	78	03	0C	00	10	00
20	B8	2D	20	C0	0E	01	40	0A	0F	08	10	18	10	98	10	58
30	10	38	10	01	1D	80	18	71	1C	16	20	58	2C	25	00	20
40	C2	31	00	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55
50	00	20	C2	31	00	00	1E	02	3A	80	18	71	38	2D	40	58
60	2C	45	00	A0	5A	00	00	00	1E	01	1D	00	BC	52	D0	1E
70	20	B8	28	55	40	C4	8E	21	00	00	1E	00	00	00	00	DC

(7) HD 3D DTS EDID Data

	CheckSum	Physical Address (0x9E)
HDMI 1	A3/C0	10
HDMI 2	A3/B0	20

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	17	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	01	01
30	01	01	01	01	01	01	66	21	50	B0	51	00	1B	30	40	70
40	36	00	40	84	63	00	00	1E	64	19	00	40	41	00	26	30
50	18	88	03	06	40	84	63	00	00	18	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	A3

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	36	F1	4E	10	1F	04	93	05	14	03	02	12	20	21
10	22	15	01	29	15	07	50	09	57	07	3D	06	50	78	03	0C
20	00	10	00	80	1E	20	C0	0E	01	40	0A	0F	08	10	18	10
30	98	10	58	10	38	10	01	1D	80	18	71	1C	16	20	58	2C
40	25	00	A0	5A	00	00	00	9E	01	1D	00	72	51	D0	1E	20
50	6E	28	55	00	20	C2	31	00	00	1E	8C	0A	D0	8A	20	E0
60	2D	10	10	3E	96	00	A0	5A	00	00	00	18	02	3A	80	18
70	71	38	2D	40	58	2C	45	00	A0	5A	00	00	00	1E	00	C0

(8) FHD 3D DTS EDID Data (Not Support Deep Color – 8bit)

	CheckSum	Physical Address (0x9E)
HDMI 1	42/8A	10
HDMI 2	42/7A	20

- HDMI

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	17	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	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	42

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	36	F1	4E	10	9F	04	13	05	14	03	02	12	20	21
10	22	15	01	29	15	07	50	09	57	07	3D	06	50	78	03	0C
20	00	10	00	80	1E	20	C0	0E	01	40	0A	0F	08	10	18	10
30	98	10	58	10	38	10	01	1D	80	18	71	1C	16	20	58	2C
40	25	00	20	C2	31	00	00	9E	01	1D	00	72	51	D0	1E	20
50	6E	28	55	00	20	C2	31	00	00	1E	02	3A	80	18	71	38
60	2D	40	58	2C	45	00	A0	5A	00	00	00	1E	01	1D	00	BC
70	52	D0	1E	20	B8	28	55	40	C4	8E	21	00	00	1E	00	8A

(9) HD 2D DTS EDID Data

	CheckSum	Physical Address (0x9E)
HDMI 1	A3/C2	10
HDMI 2	A3/B2	20

- HDMI

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	17	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	01	01
30	01	01	01	01	01	01	66	21	50	B0	51	00	1B	30	40	70
40	36	00	40	84	63	00	00	1E	64	19	00	40	41	00	26	30
50	18	88	03	06	40	84	63	00	00	18	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	A3

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	25	F1	4E	10	1F	04	93	05	14	03	02	12	20	21
10	22	15	01	29	15	07	50	09	57	07	3D	06	50	67	03	0C
20	00	10	00	80	1E	01	1D	80	18	71	1C	16	20	58	2C	25
30	00	A0	5A	00	00	00	9E	01	1D	00	72	51	D0	1E	20	6E
40	28	55	00	20	C2	31	00	00	1E	8C	0A	D0	8A	20	E0	2D
50	10	10	3E	96	00	A0	5A	00	00	00	18	02	3A	80	18	71
60	38	2D	40	58	2C	45	00	A0	5A	00	00	00	1E	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	C2

(10) FHD 2D DTS EDID Data (Not Support Deep Color – 8bit)

	CheckSum	Physical Address (0x9E)
HDMI 1	42/8C	10
HDMI 2	42/7C	20

- HDMI

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	17	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	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	42

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	25	F1	4E	10	9F	04	13	05	14	03	02	12	20	21
10	22	15	01	29	15	07	50	09	57	07	3D	06	50	67	03	0C
20	00	10	00	80	1E	01	1D	80	18	71	1C	16	20	58	2C	25
30	00	20	C2	31	00	00	9E	01	1D	00	72	51	D0	1E	20	6E
40	28	55	00	20	C2	31	00	00	1E	02	3A	80	18	71	38	2D
50	40	58	2C	45	00	A0	5A	00	00	00	1E	01	1D	00	BC	52
60	D0	1E	20	B8	28	55	40	C4	8E	21	00	00	1E	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	8C

4.5. Outgoing condition Configuration

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

4.6. GND & Hi-pot test

4.6.1. GND & HI-POT auto-check preparation

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

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: 1.5KV/min at 100mA
- SIGNAL: 3KV/min at 100mA

② 2 Poles
- SIGNAL: 3KV/min at 100mA

(2) TEST time: 1 second
(3) TEST POINT
① 3 Poles
- GND Test = POWER CORD GND and SIGNAL CABLE GND.
- Hi-pot Test = POWER CORD GND and LIVE & NEUTRAL.

② 2 Poles
- Hi-pot Test = Accessible Metal and LIVE & NEUTRAL.

(4) LEAKAGE CURRENT: At 0.5mArms

5. Local Dimming Function Check

Step1) Turn on TV.
Step2) Press “P-only” key, enter to power only mode and escape the “P-only” Mode by pressing “Exit” key
Step3) Press “Tilt” key, entrance to Local Dimming mode.
Step4) At the Local Dimming mode, module Edge Backlight moving Top to bottom Back light of module moving
Step5) confirm the Local Dimming mode
Step6) Press “Exit” key

6. 3D Function Test (Only 3D Model)

(Pattern Generator MSHG-600, MSPG-6100 [SUPPORT HDMI1.4])

* HDMI mode NO. 872 , pattern No.83

1) Please input 3D test pattern like below (HDMI mode NO. 872 , pattern No.83)

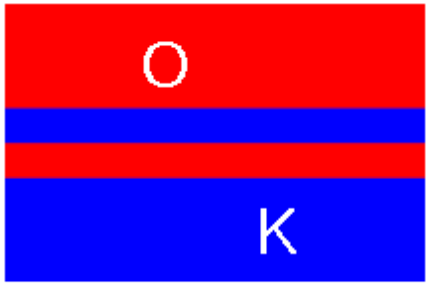


Fig.1
<HDMI Mode 872번, Pattern No. 83>

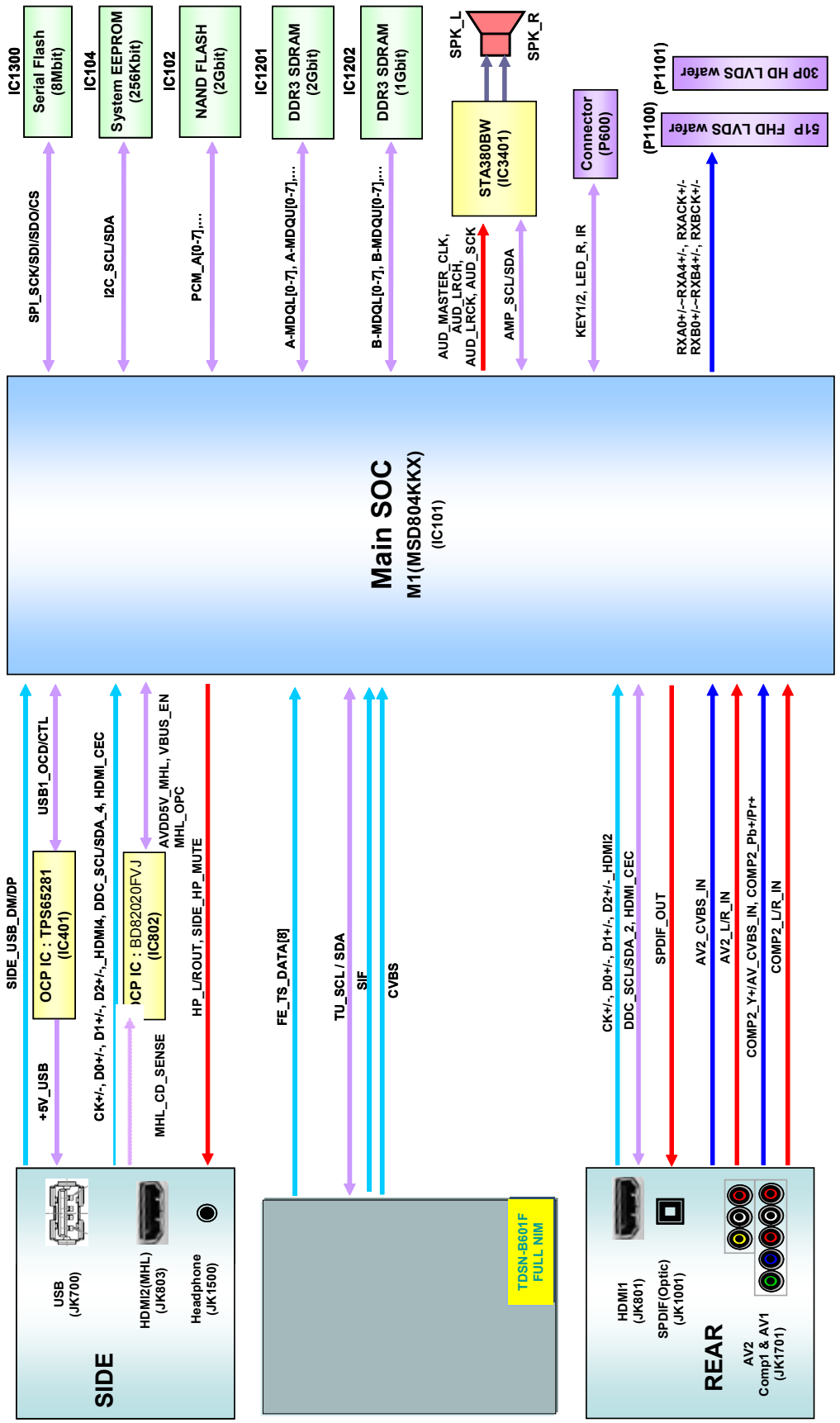
2) When 3D OSD appear automatically , then select OK button.

Fig.3
<OK Key>

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

Fig.2
<3D Mode 진입 후 화면>
* 안경을 착용하지 않은 상태임.

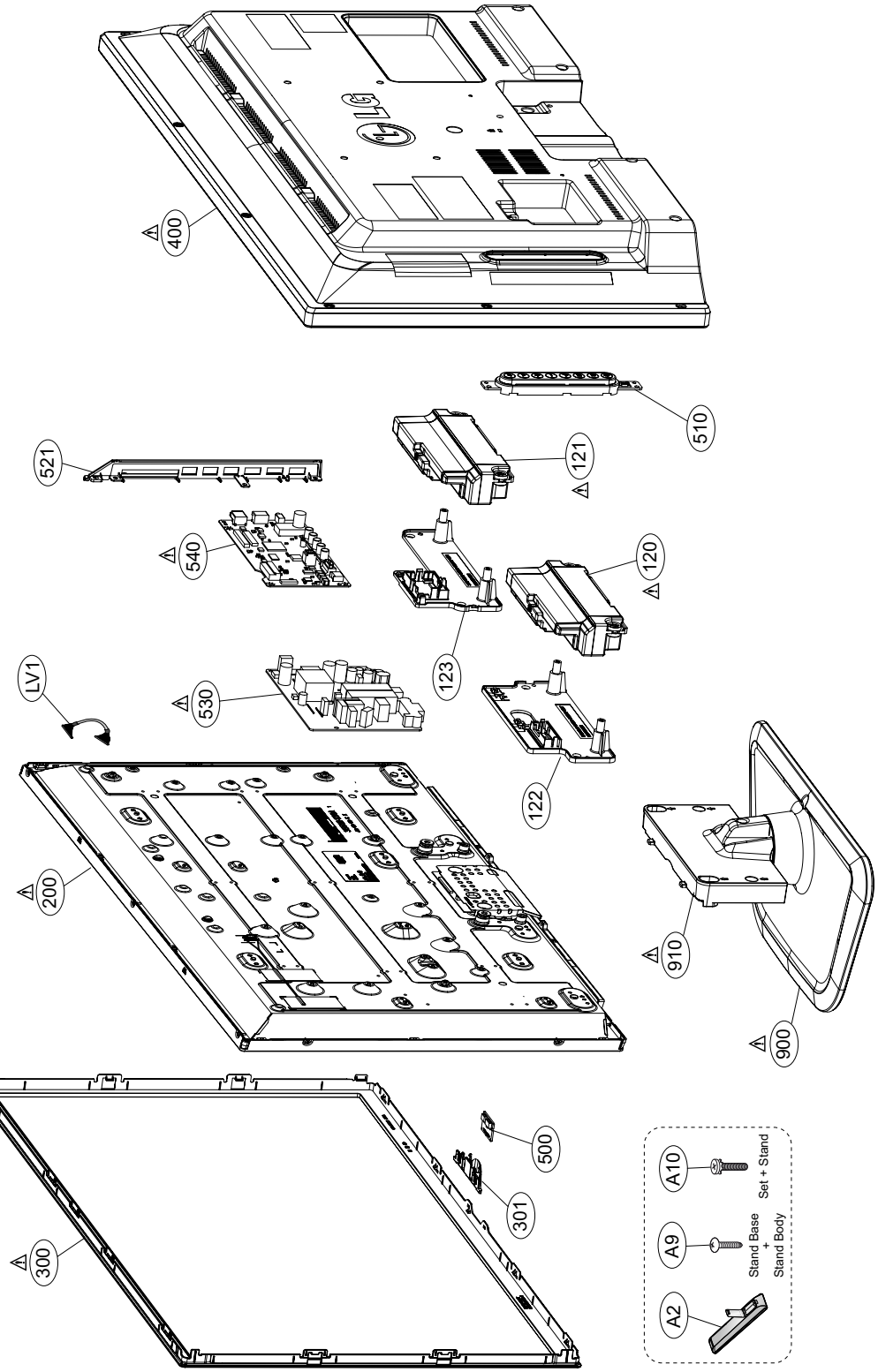
BLOCK DIAGRAM



EXPLODED VIEW

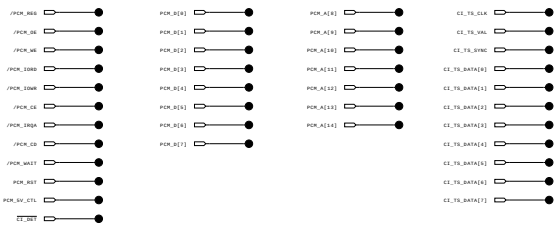
IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ 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 X-RADIATION, Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.

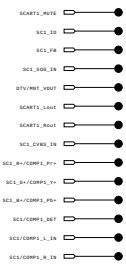


TP for NON-EU models(except EU and China)

TP for CI slot



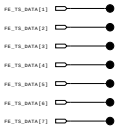
TP for SCART



TP for Headphone

TP for S2

TP for FE_TS_DATA



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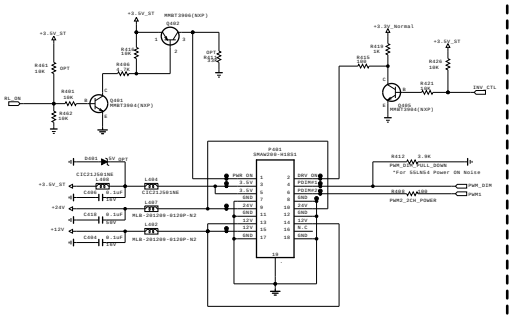
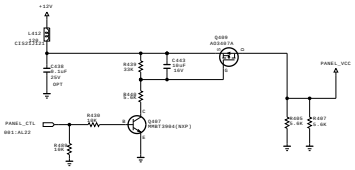
MODEL	NC4_S7LRM	DATE	2012.07.02
BLOCK	TP_NON_EN	SHEET	3

L13 POWER BLOCK (POWER DETECT 2)

FROM LIPS & POWER B/D

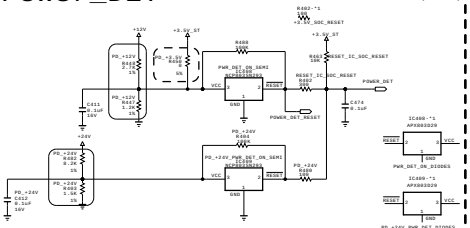


PANEL_POWER

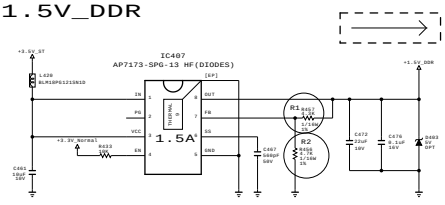


Power_DET

+3.5V_ST --> 3.375V --> 3.46V
+24V --> 3.78V --> 3.92V (3.79V)
+12V --> 3.58V --> 3.82V (3.68V)

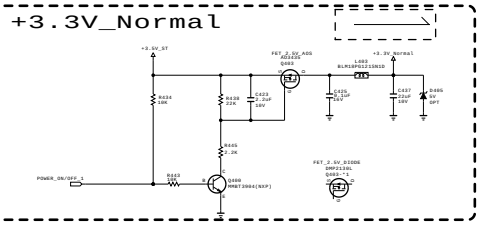


+1.5V_DDR

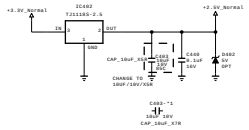


Vout=0.8*(1+R1/R2)=1.5319

+3.3V_Normal

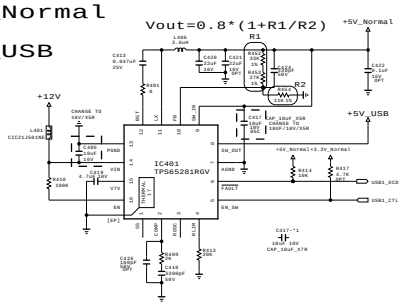


+2.5V_Normal

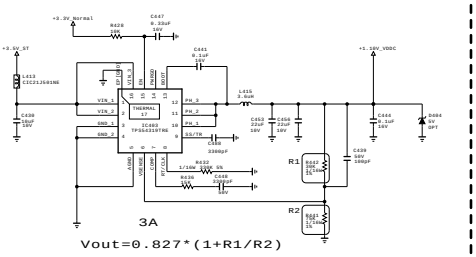


+5V_Normal & +5V_USB

Vout=0.8*(1+R1/R2)



S7LR core 1.15V volt



3A

Vout=0.827*(1+R1/R2)

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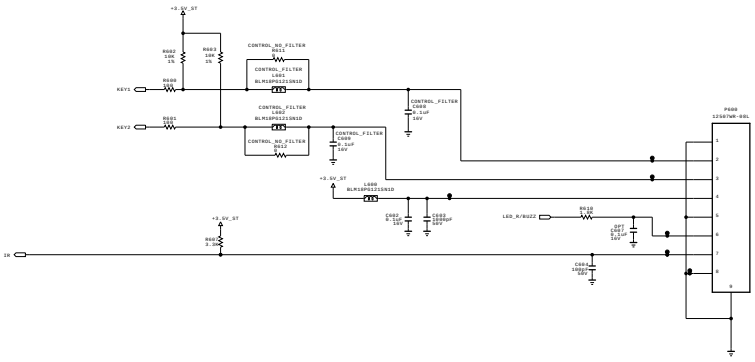
MODEL	NC4_S7LRM	DATE	2012/09/19
BLOCK	Power_PD2	SHEET	4

IR/LED and Control



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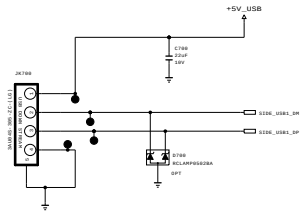
MODEL	NC4_S7LRM	DATE	2012/07/18
BLOCK	IR/CONTROL	SHEET	6

USB (SIDE)



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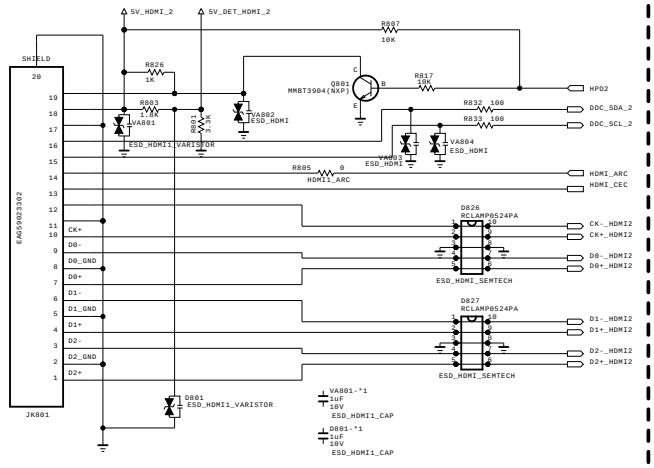
LG ELECTRONICS

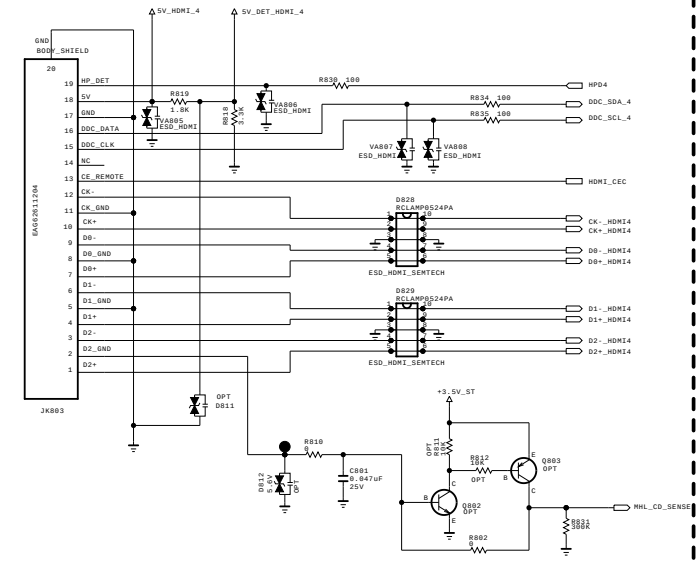
MODEL	NC4_S7LRM	DATE	12/06/20
BLOCK	USB	SHEET	7

HDMI (REAR 1 / SIDE 1 MHL)

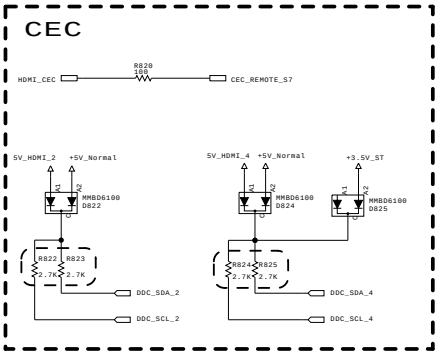
HDMI_1

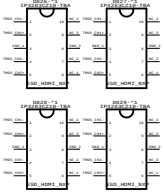


SIDE_HDMI (MHL)

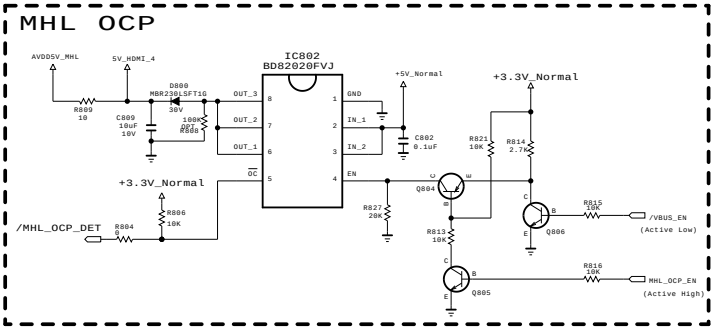


CEC





MHL OCP



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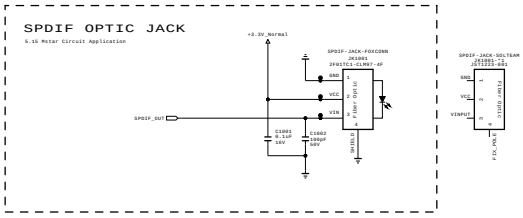
MODEL	NC4_S7LRM	DATE	2012/11/07
BLOCK	HDMI_R1_S1	SHEET	8

SPDIF



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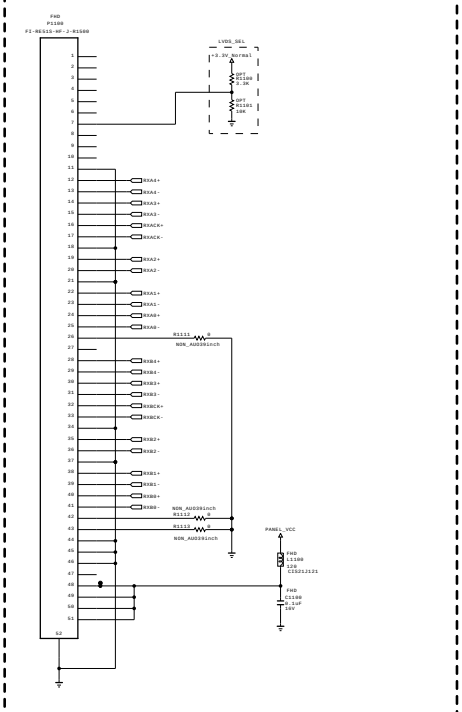
LG ELECTRONICS

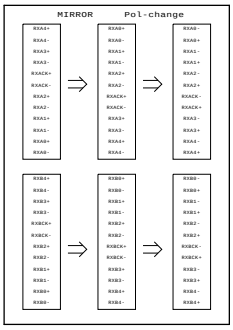
MODEL	NC4_S7LRM	DATE	12/06/12
BLOCK	SPDIF	SHEET	10

LVDS (NON EU)

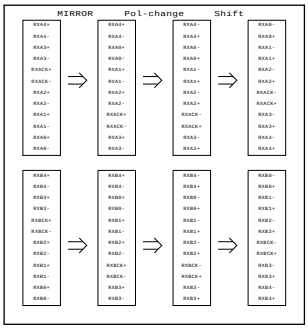
[51Pin LVDS Connector]
(For FHD 60Hz)



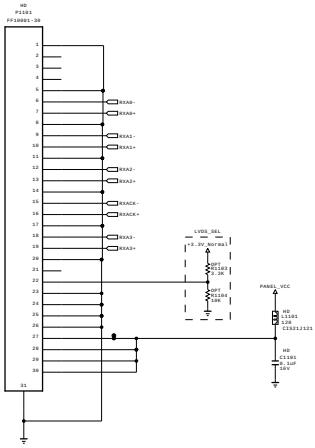
FOR FHD REVERSE(10bit)
Change in S7LR



FOR FHD REVERSE(8bit)
Change in S7LR



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



EU pin assign is different from NON EU.
Because of position of HD wafer.

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

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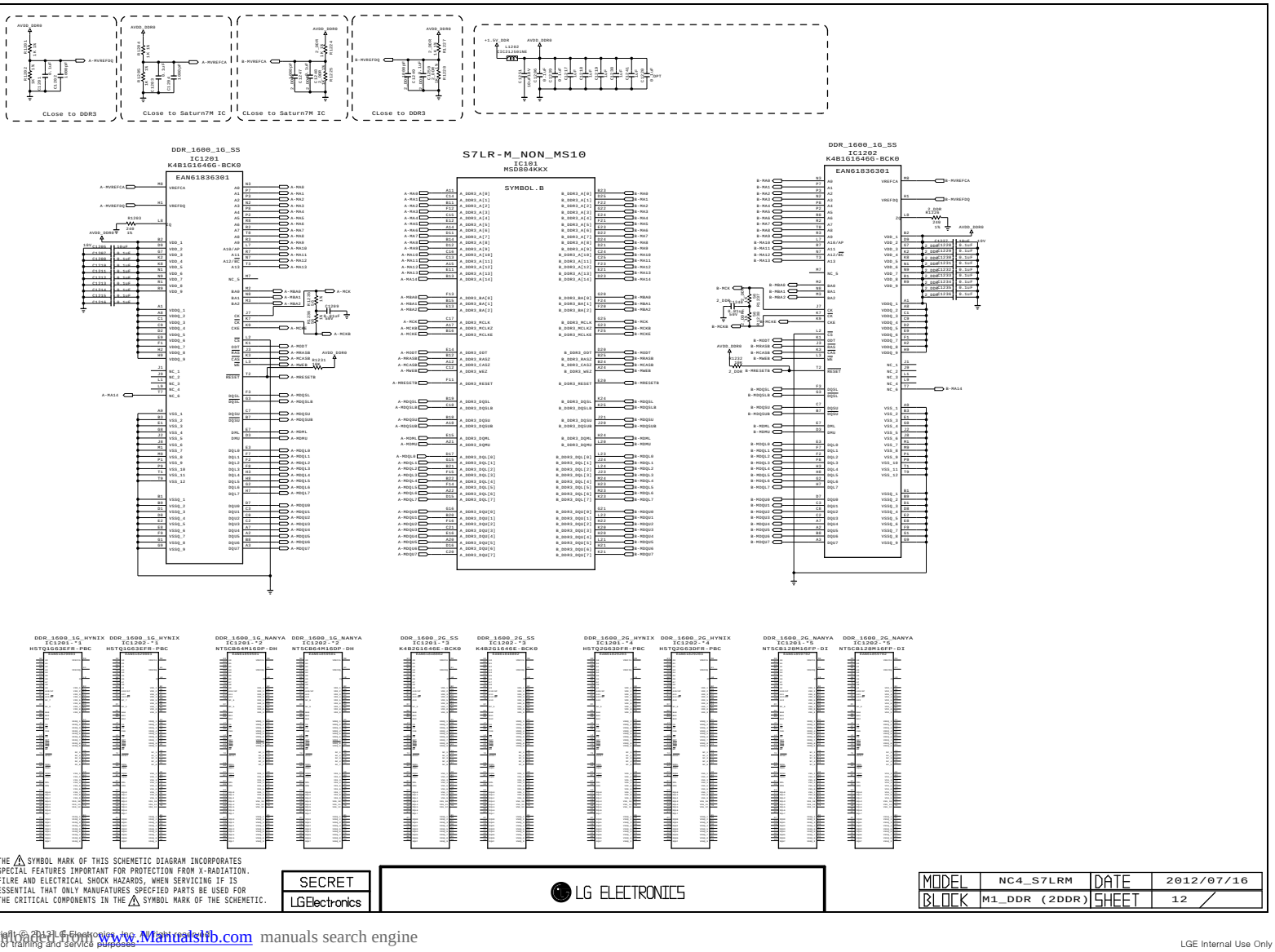
MODEL	NC4_S7LRM	DATE	2012/09/19
BLOCK	LVDS_NON_EU	SHEET	11



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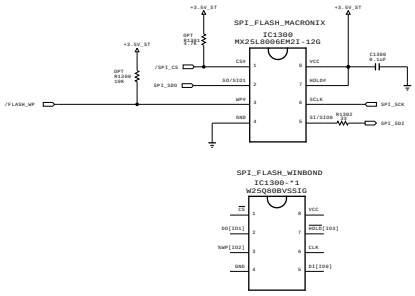
LG ELECTRONICS

MODEL	NC4_S7LRM	DATE	2012/07/16
BLOCK	M1_DDR (2DDR)	SHEET	12

Serial Flash for SPI boot(OS)



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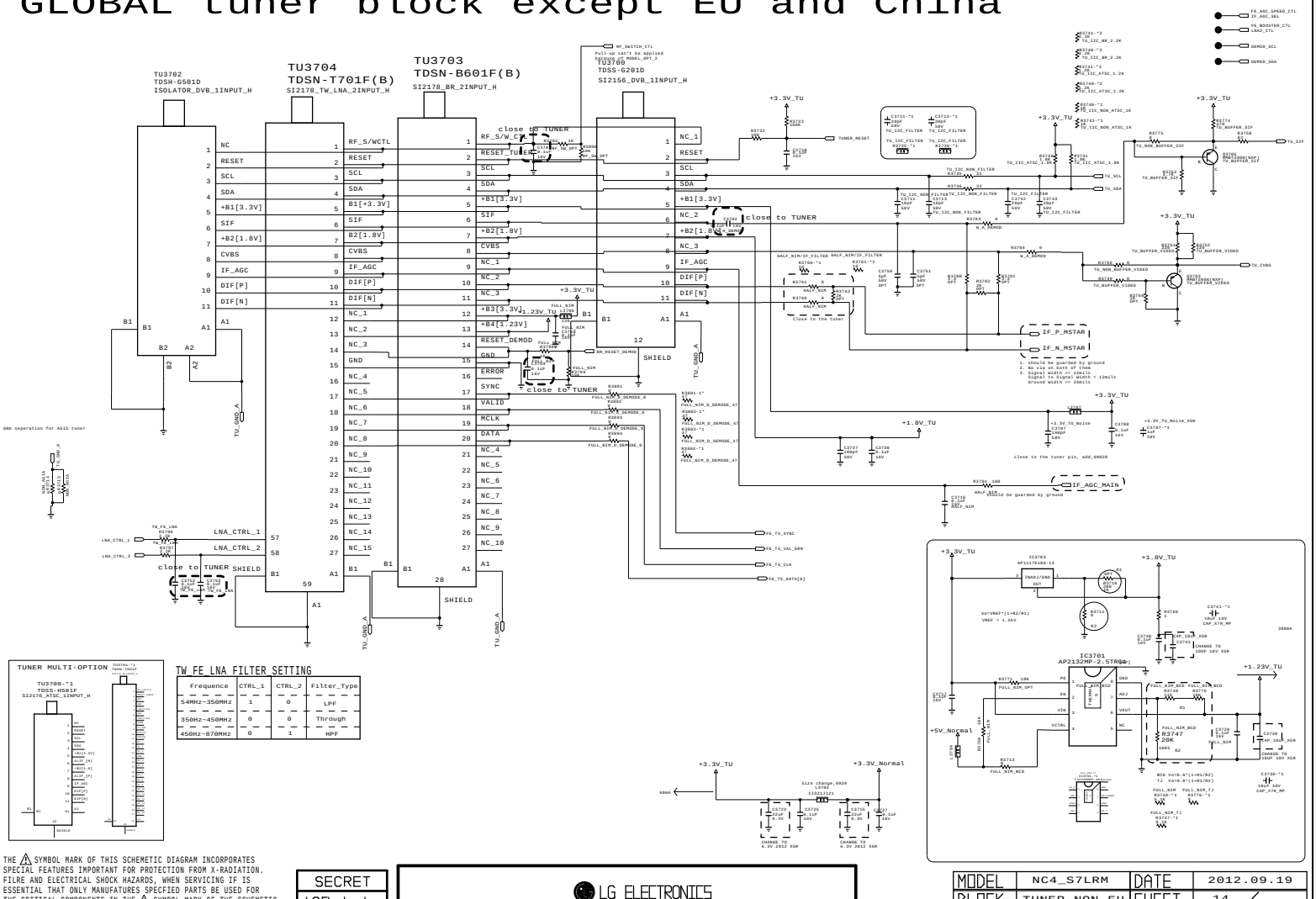
LG ELECTRONICS

MODEL	NC4_S7LRM	DATE	2012/06/20
BLOCK	S_FLASH_OS	SHEET	13

GLOBAL tuner block except EU and China



TW_FE_LNA FILTER SETTING

Frequence	CTRL_1	CTRL_2	Filter_Type
54MHz~350MHz	1	0	LPF
350Hz~450MHz	0	0	Through
450Hz~870MHz	0	1	HPF

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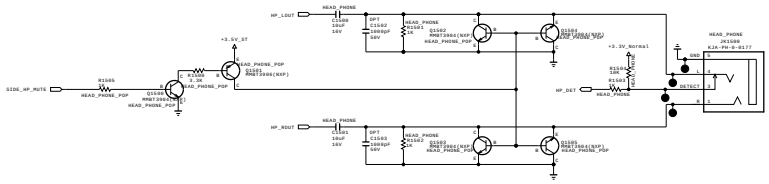
MODEL	NC4_S7LRM	DATE	2012.09.19
BLOCK	TUNER_NON_EU	SHEET	14

Headphone
*Option : HEAD_PHONE



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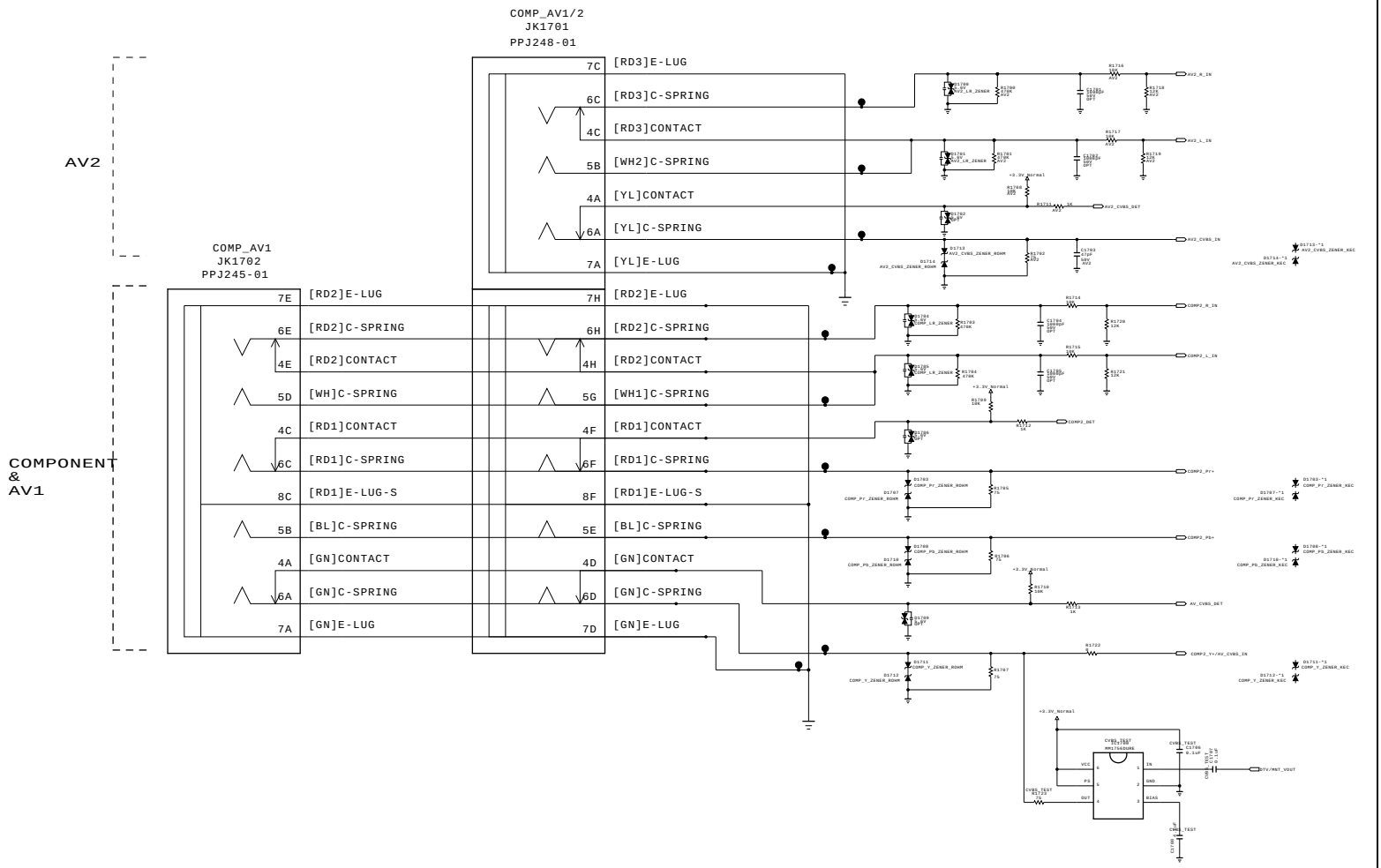
MODEL	NC4_S7LRM	DATE	2012/06/20
BLOCK	HEADPHONE	SHEET	15

COMPONENT1 & AV(COMMON), AV2



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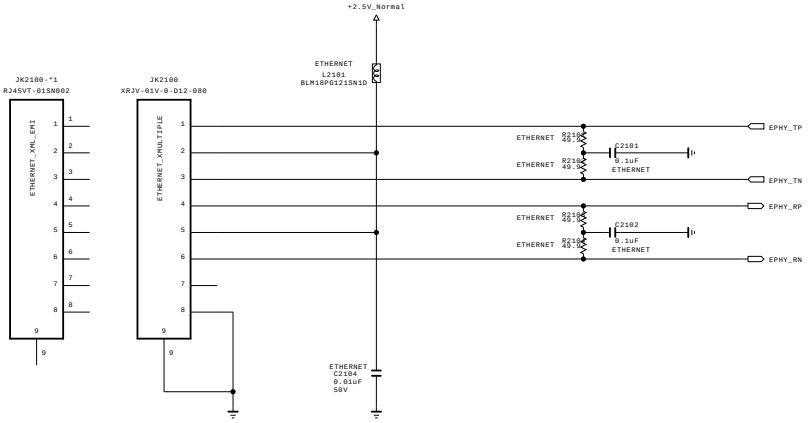
MODEL	NC4_S7LRM	DATE	2012.08.14
BLOCK	REAR_NON_EU_L	SHEET	17

ETHERNET

* H/W option : ETHERNET



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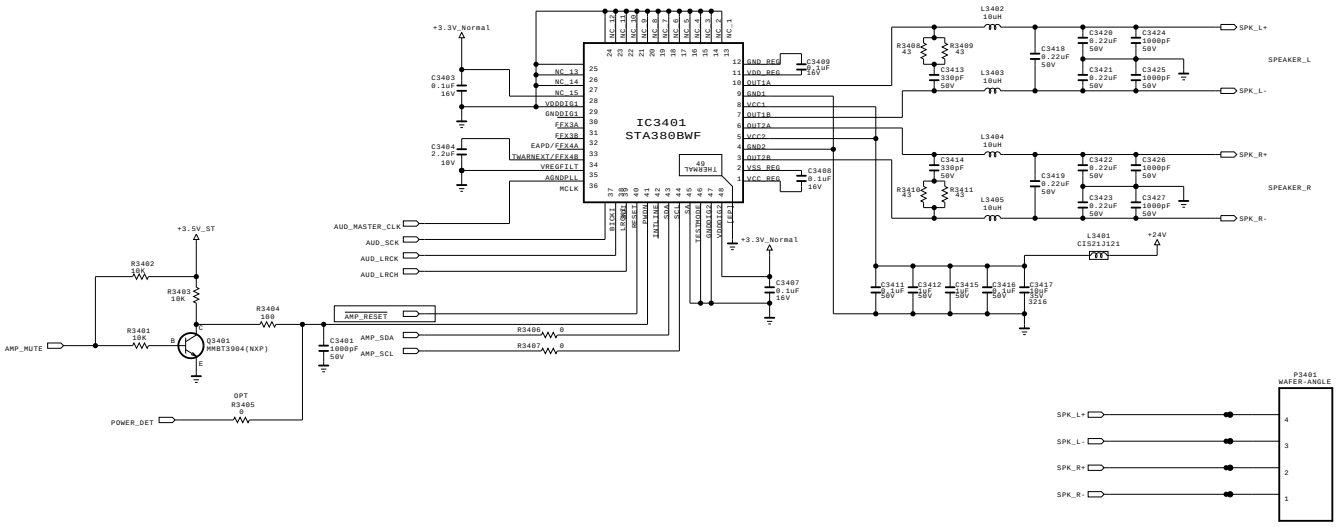
LGElectronics	LG ELECTRONICS

MODEL	NC4_S7LRM	DATE	2012/06/21
BLOCK	LAN	SHEET	21

AUDIO AMP(STA380BWEF)



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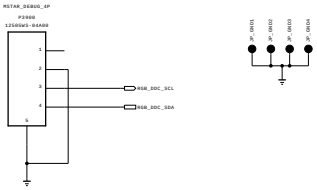
LG ELECTRONICS

MODEL	NC4_S7LRM	DATE	2012/08/29
BLOCK	AMP_STA380BWEF	SHEET	34

MSTART DEBUG_4PIN



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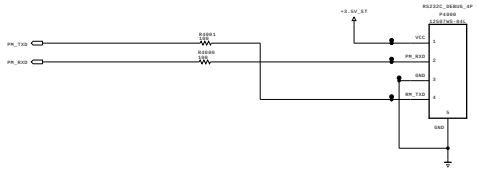
LG ELECTRONICS

MODEL	NC4_S7LRM	DATE	2012/06/20
BLOCK	MSTAR DEBUG_4PIN	SHEET	39

RS-232C



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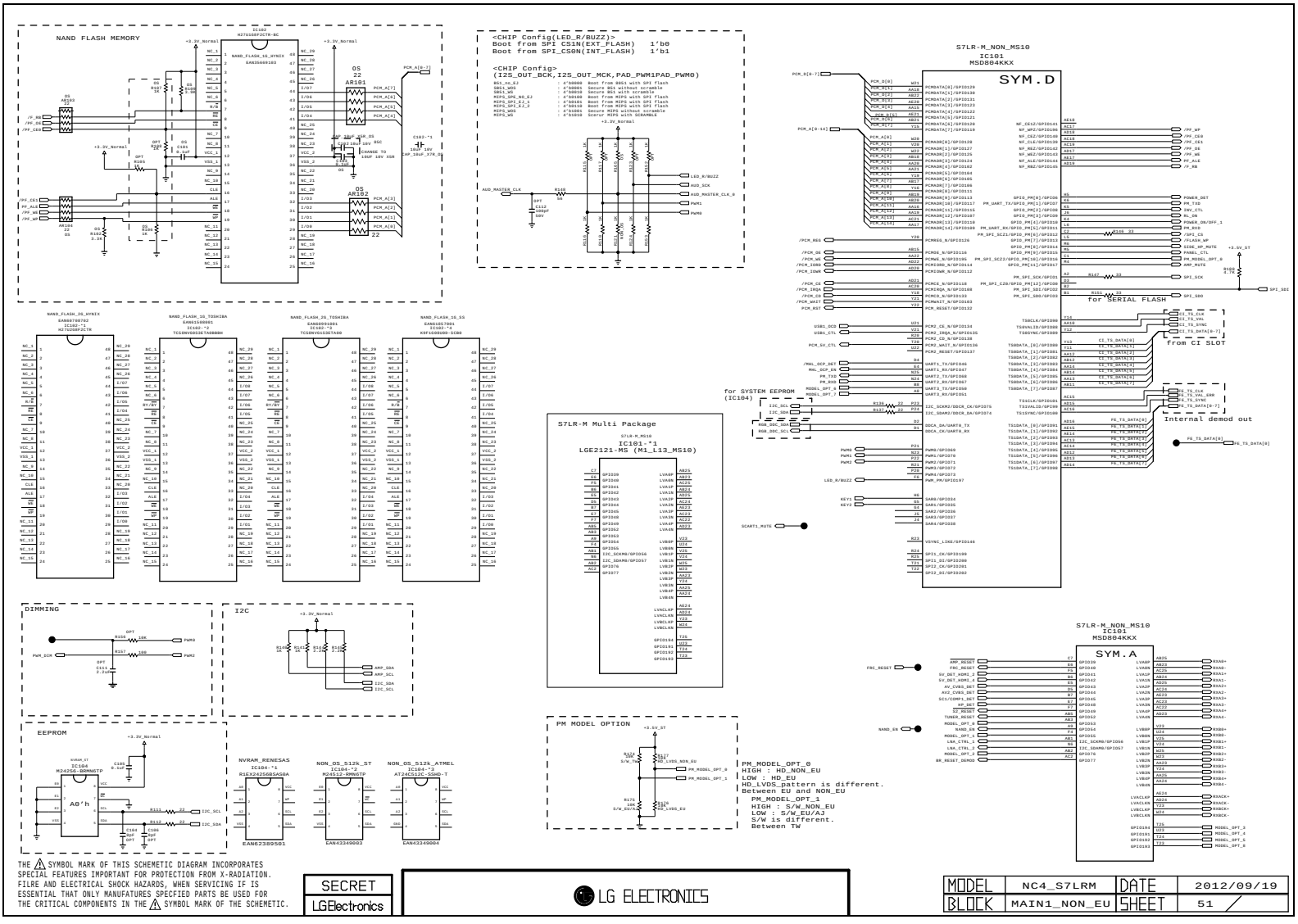
MODEL	NC4_S7LRM	DATE	2012/06/20
BLOCK	RS232C_4P_OS	SHEET	40



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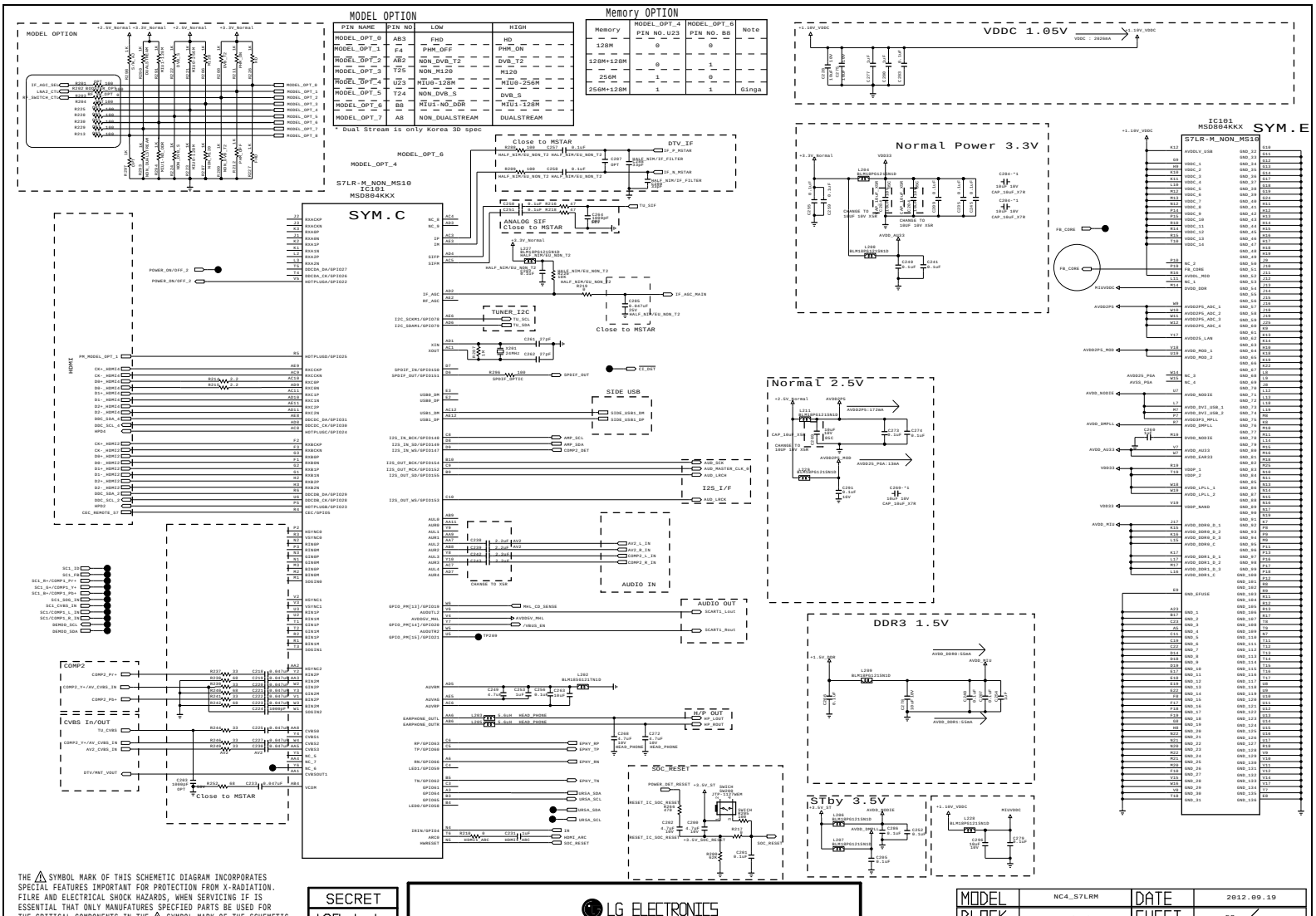
LG ELECTRONICS

MODEL	NC4_S7LRM	DATE	2012/09/19
BLOCK	MAIN1_NON_EU	SHEET	51



Contents of LCD TV Standard Repair Process

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

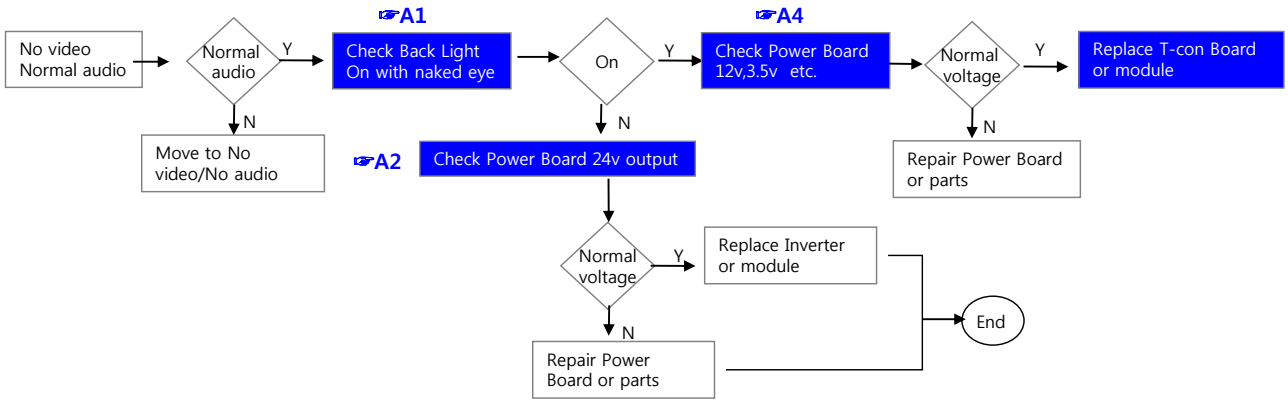
Contents of LCD TV Standard Repair Process Detail Technical Manual

Continue to the next page

Standard Repair Process

LCD TV	Error symptom	A. Video error	Established date	2012. 01 .14	
		No video/ Normal audio	Revised date		1/14

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



※Precaution ☞A6 & A3

Always check & record S/W Version and White Balance value before replacing the Main Board → Replace Main Board → Re-enter White Balance value

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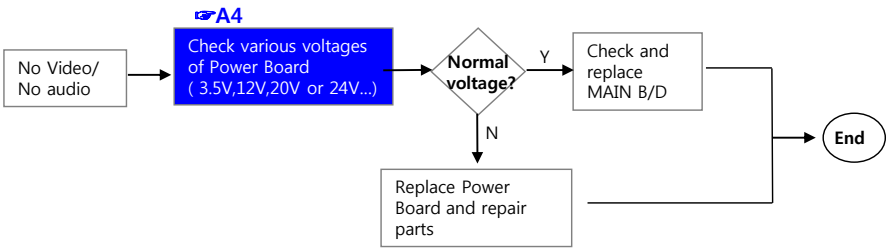
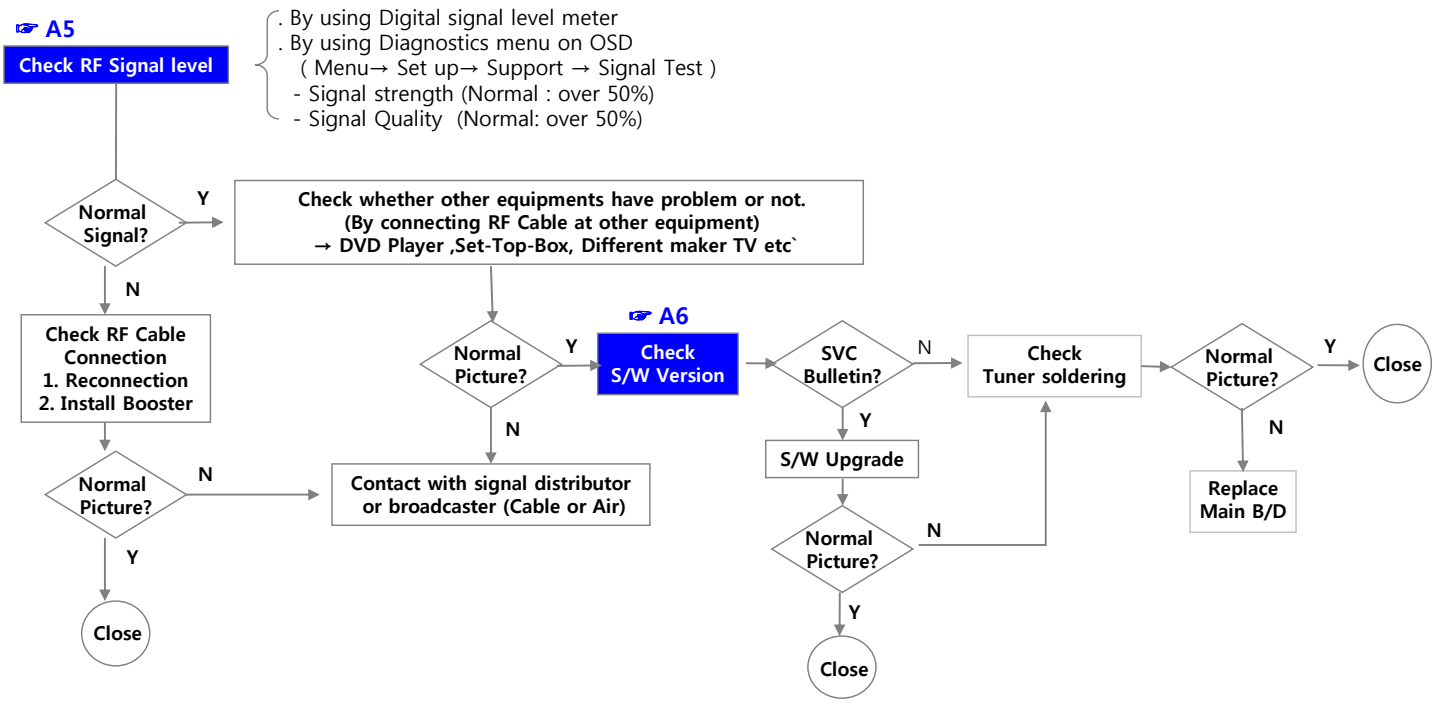
LCD TV	Error symptom	A. Video error	Established date	2012 . 01 .14	
		No video/ No audio	Revised date		2/14



Standard Repair Process

LCD TV	Error symptom	A. Video error	Established date	2012. 01 .14	
		Picture broken/ Freezing	Revised date		3/14



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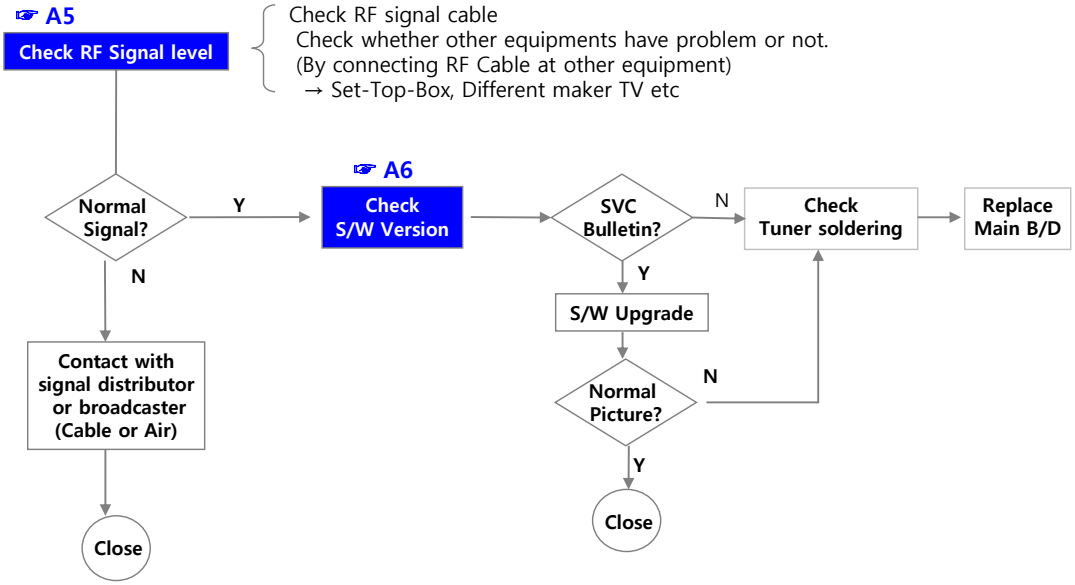
Standard Repair Process

LCD TV	Error symptom	A. Video error	Established date	2012. 01 .14	
		Tuning fail, Picture broken/ Freezing	Revised date		4/14



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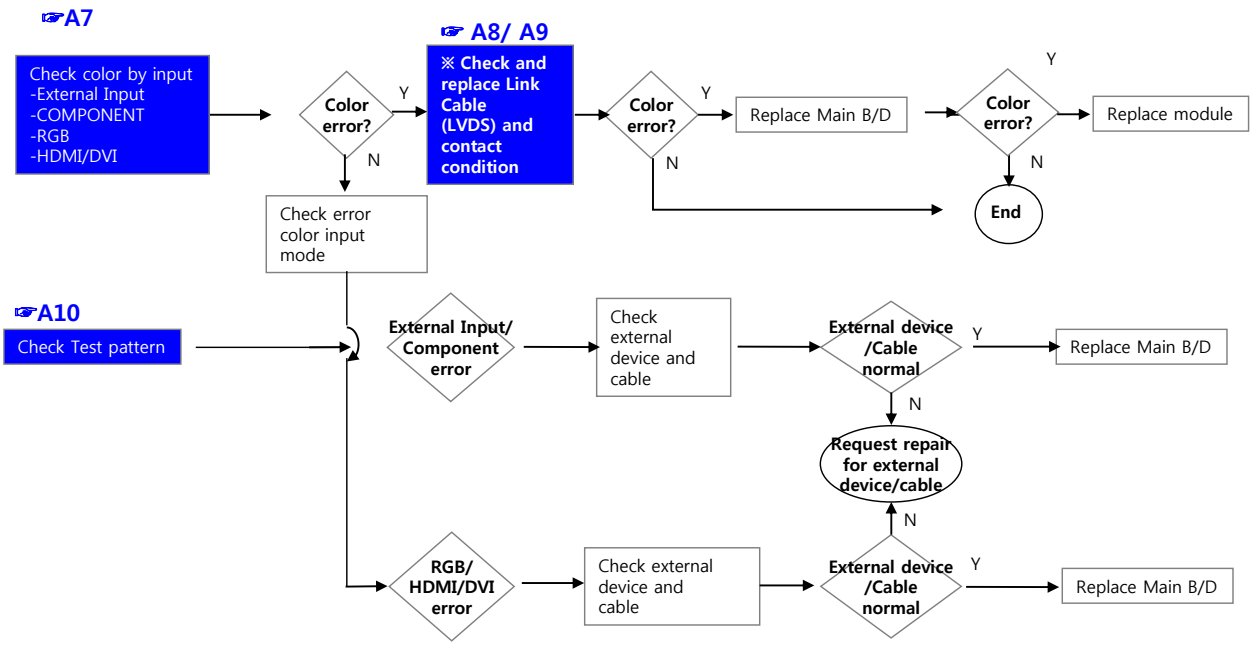
Standard Repair Process

LCD TV	Error symptom	A. Video error	Established date	2012. 01 .14	
		Color error	Revised date		5/14



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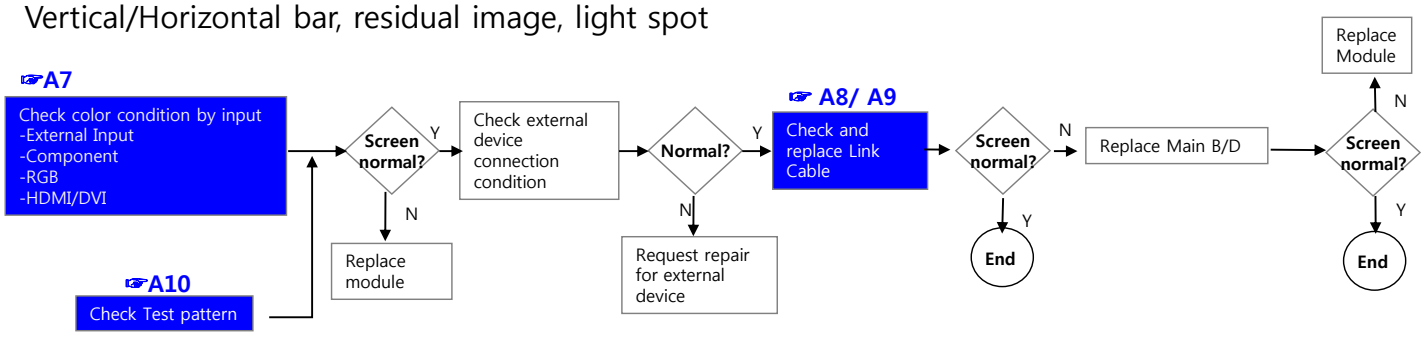
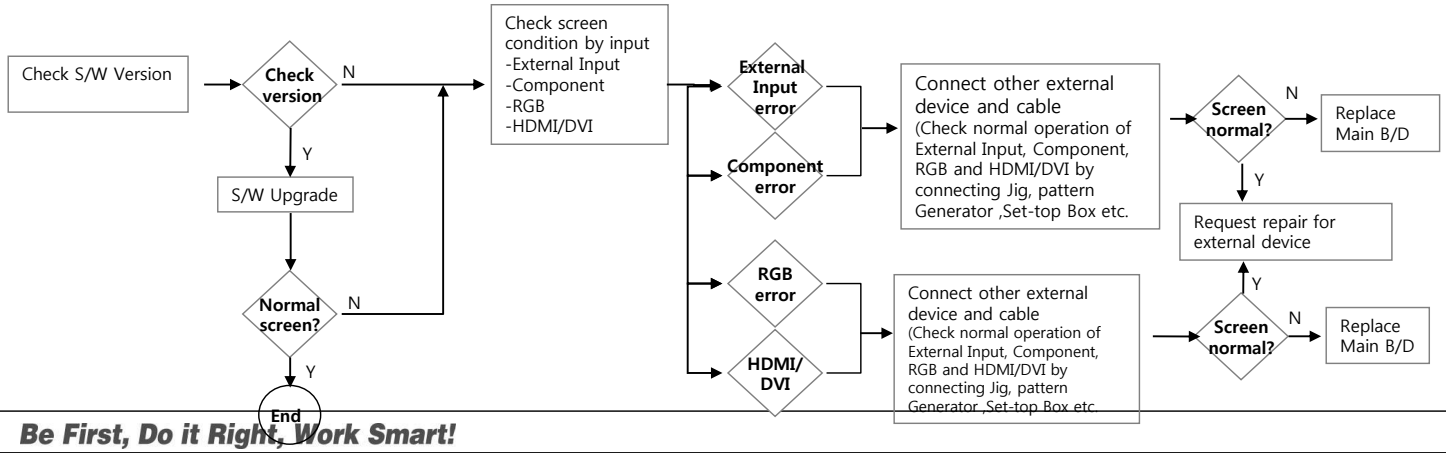
Standard Repair Process

LCD TV	Error symptom	A. Video error	Established date	2012. 01 .14	
		Vertical / Horizontal bar, residual image, light spot, external device color error	Revised date		6/14

Vertical/Horizontal bar, residual image, light spot

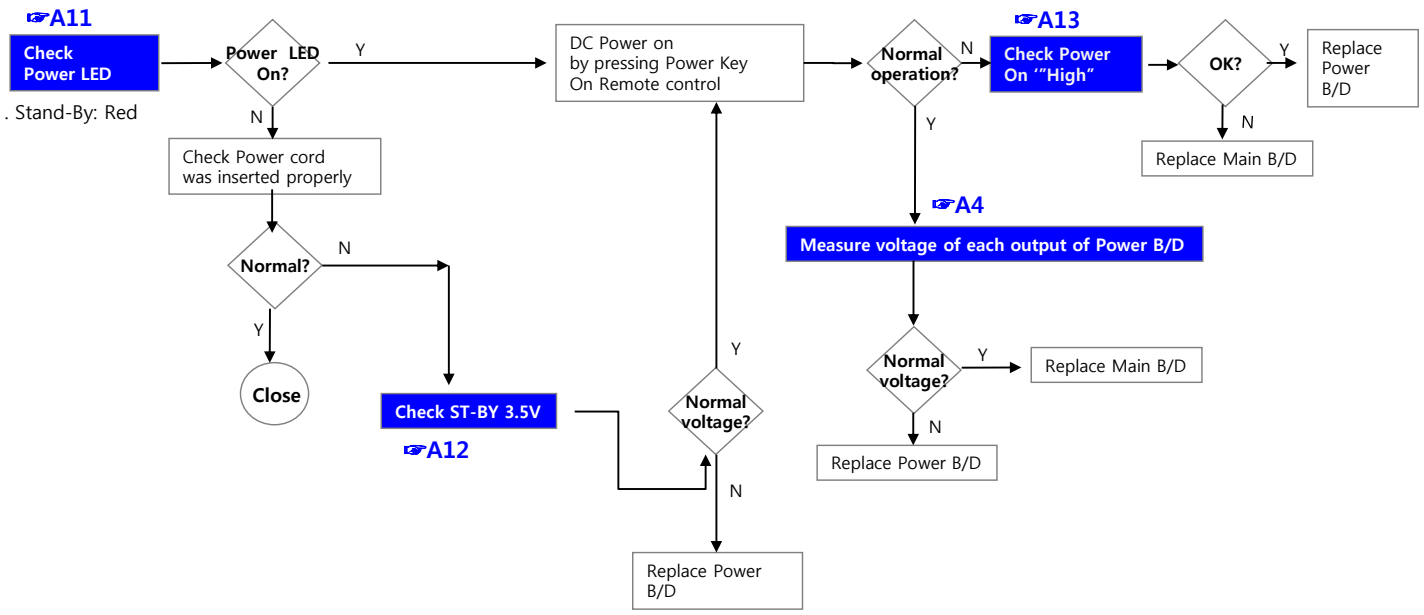


External device screen error-Color error



Standard Repair Process

LCD TV	Error symptom	B. Power error	Established date	2012. 01 .14	
		No power	Revised date		7/14



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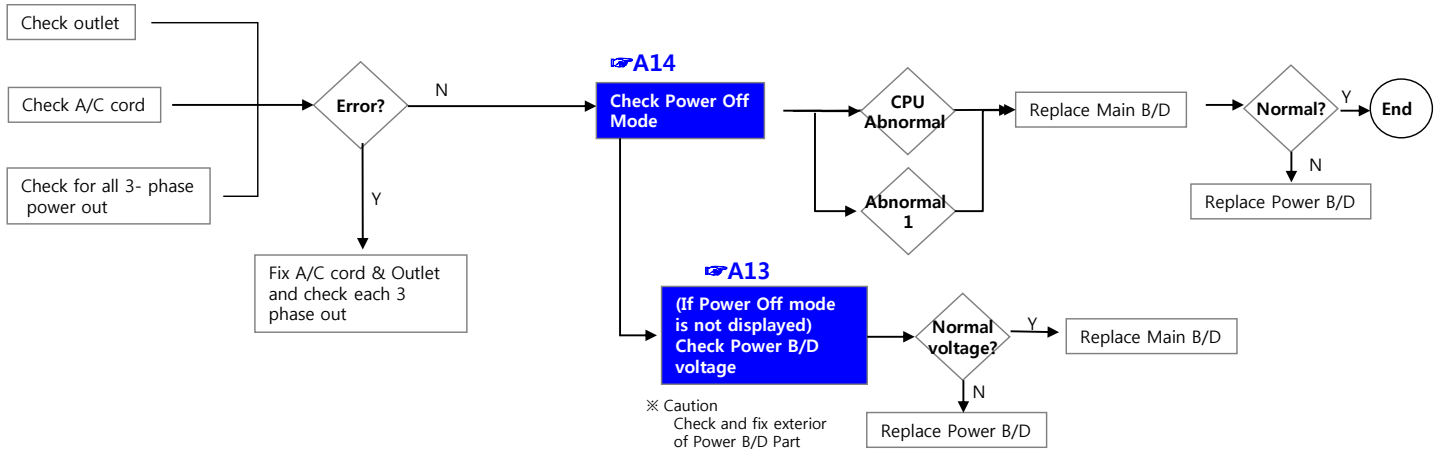
Standard Repair Process

LCD TV	Error symptom	B. Power error	Established date	2012. 01 .14	
		Off when on, off while viewing, power auto on/off	Revised date		8/14



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

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

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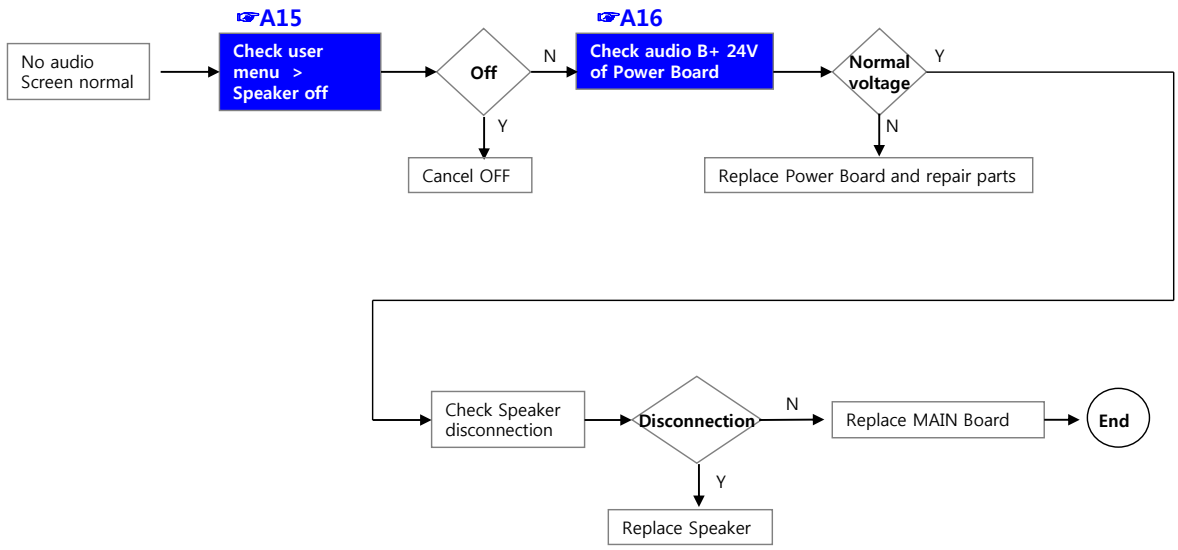
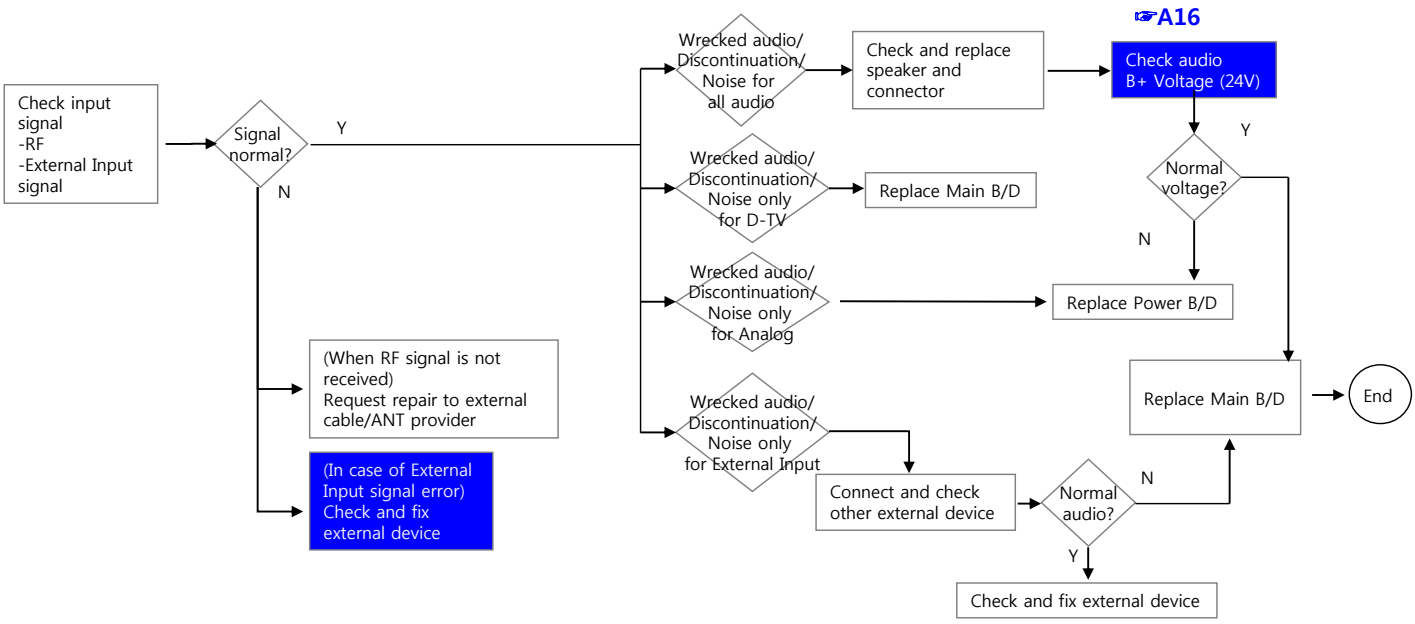
LCD TV	Error symptom	C. Audio error	Established date	2012. 01 .14	
		No audio/ Normal video	Revised date		9/14



Standard Repair Process

LCD TV	Error symptom	C. Audio error	Established date	2012. 01 .14	
		Wrecked audio/ discontinuation/noise	Revised date		10/14

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



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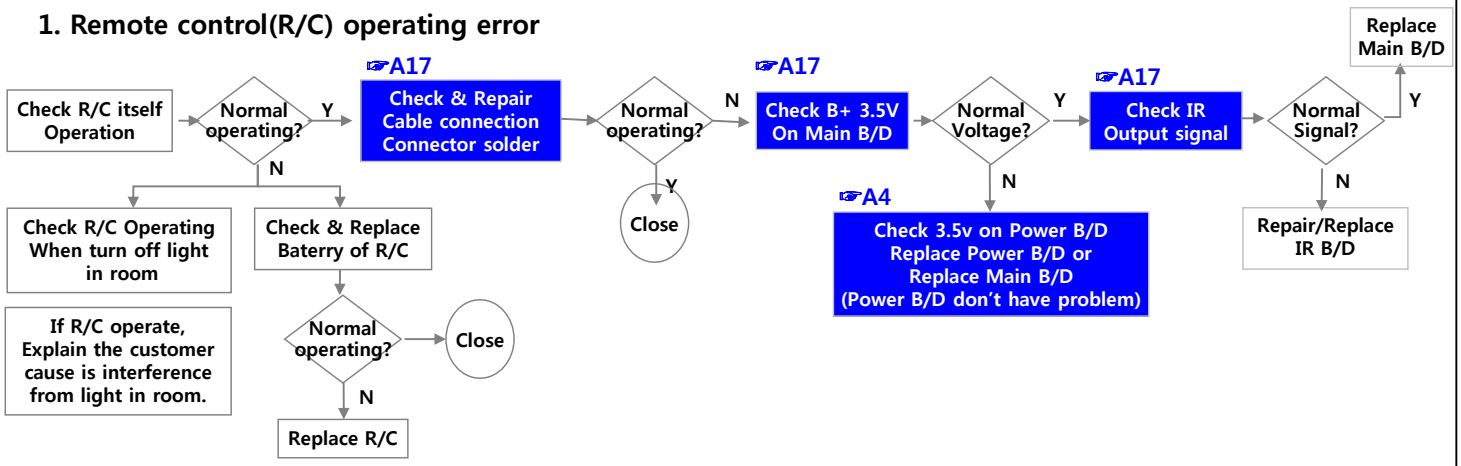
Standard Repair Process

LCD TV	Error symptom	D. Function error	Established date	2012. 01 .14	
		Remote control & Local switch checking	Revised date		11/14

1. Remote control(R/C) operating error



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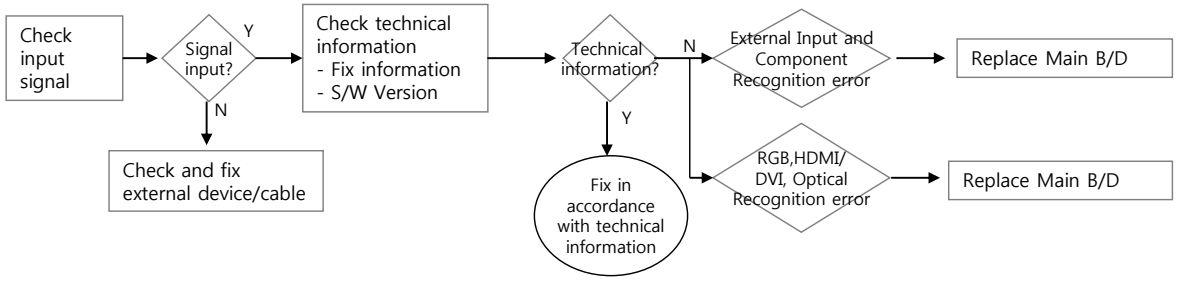
Standard Repair Process

LCD TV	Error symptom	D. Function error	Established date	2012. 01 .14	
		External device recognition error	Revised date		12/14



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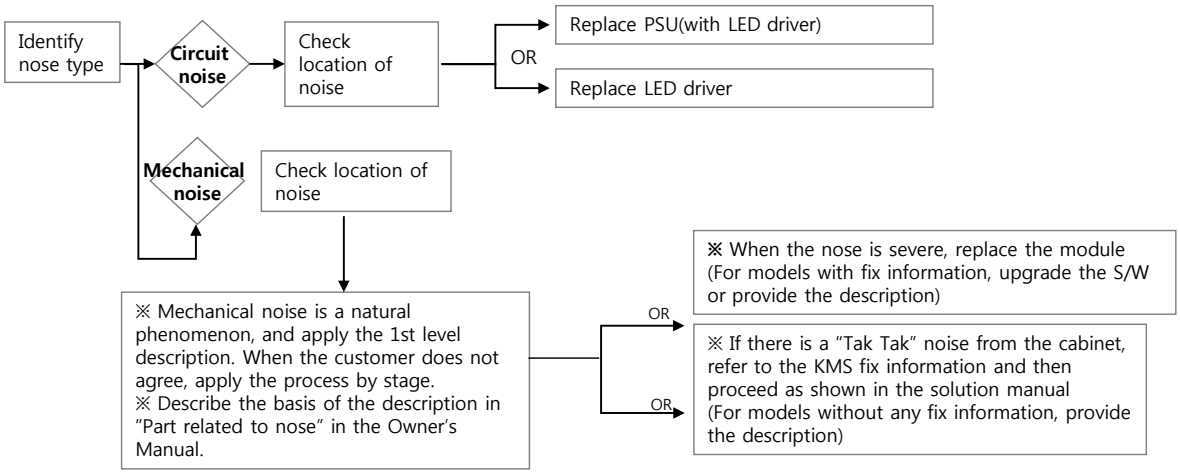
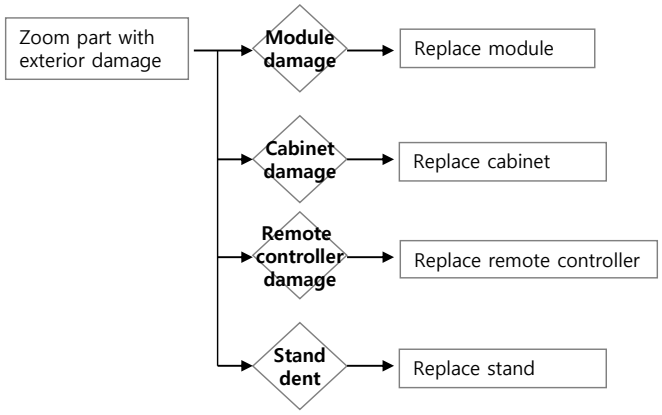
LCD TV	Error symptom	E. Noise	Established date	2012. 01 .14	
		Circuit noise, mechanical noise	Revised date		13/14



Standard Repair Process

LCD TV	Error symptom	F. Exterior defect	Established date	2012. 01 .14	
		Exterior defect	Revised date		14/14



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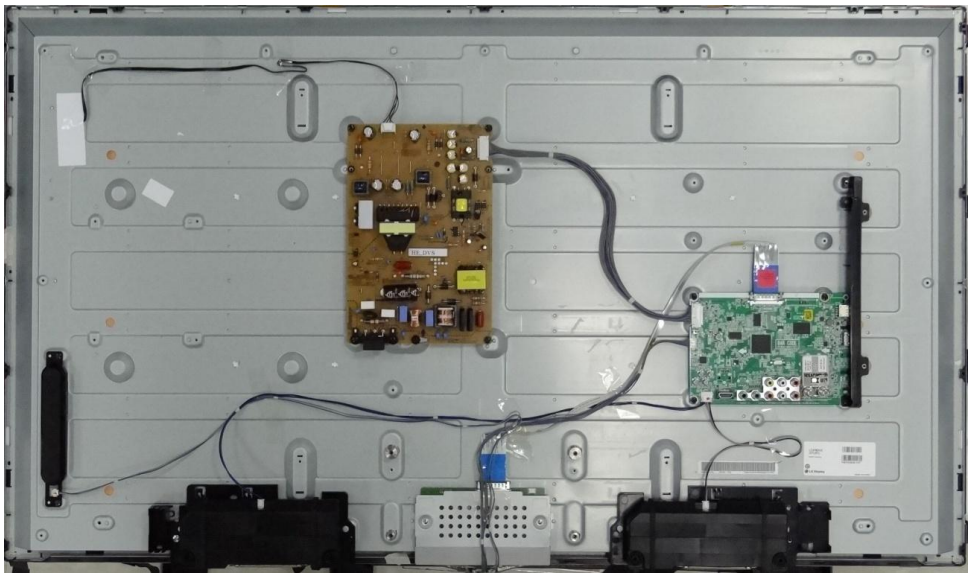
Contents of LCD TV Standard Repair Process Detail Technical Manual

Continued from previous page

Standard Repair Process Detail Technical Manual

LCD TV	Error symptom	A. Video error_No video/Normal audio	Established date	2012. 01.14	
	Content	Check Back Light On with naked eye	Revised date		A1

<ALL MODELS>



Power On -> disjoint back case -> check lighting at any point

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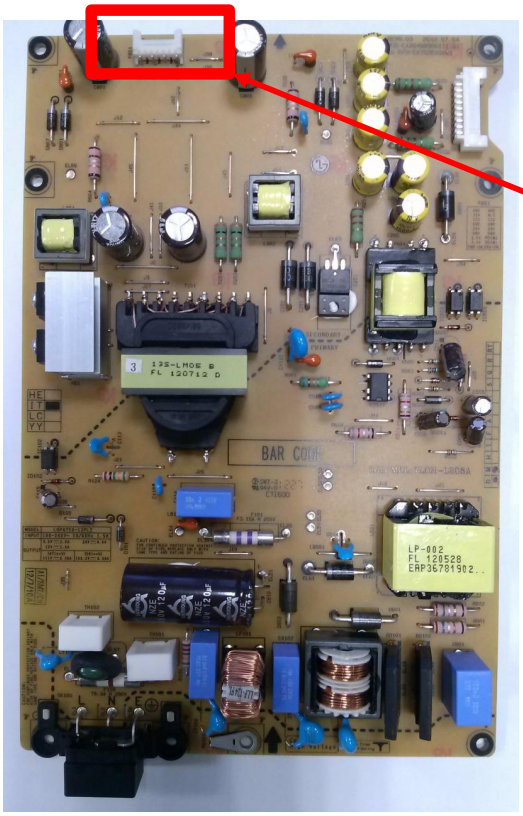
Standard Repair Process Detail Technical Manual

LCD TV	Error symptom	A. Video error_No video/Normal audio	Established date	2012. 11 .17	
	Content	Inverter B+ 24V measuring method	Revised date		A2

<LPB MODELS>



Measure LED+ applying to LED Back Light from Power Board.

Output LED+ from Power Board -> supply to LED B/L.
Check Pin contacting statement and connection statement.

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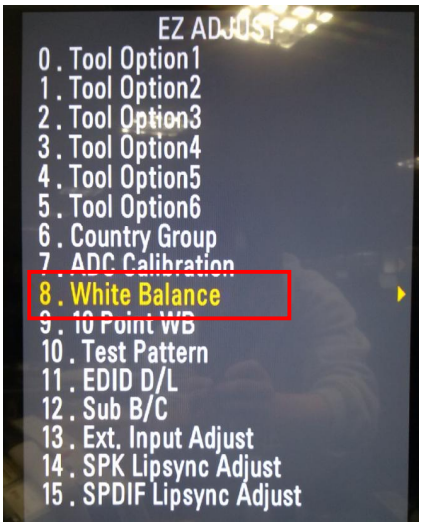
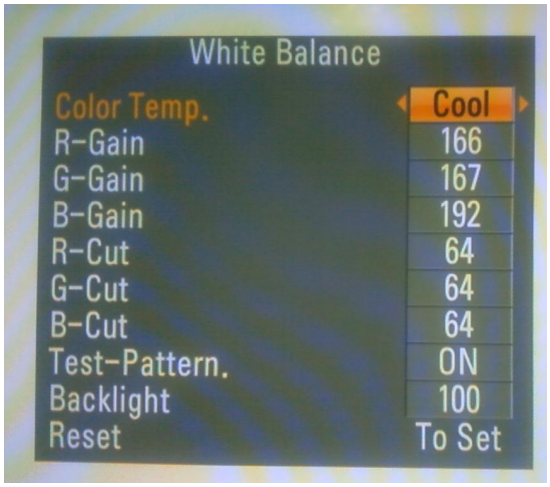
LCD TV	Error symptom	A. Video error_No video/Normal audio	Established date	2012. 11 .17	
	Content	Check White Balance value	Revised date		A3

<ALL MODELS>



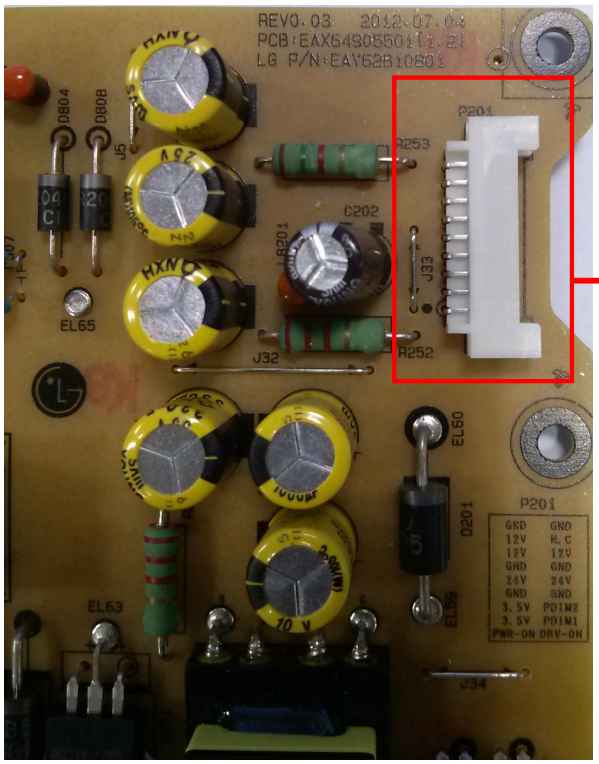


Entry method

1. Press the ADJ button on the remote controller for adjustment.
2. Enter into White Balance of item 8.
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

LCD TV	Error symptom	A. Video error_No video/ Audio	Established date	2012. 11 .17	
	Content	Power Board voltage measuring method	Revised date		A4



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

18 Pin (Power Board ↔ Main Board) - 공통 ? (YEONHO)			
1	PWR-ON	2	DRV-ON
3	3.5V	4	PDIM1
5	3.5V	6	PDIM2
7	GND	8	GND
9	24V	10	24V
11	GND	12	GND
13	12V	14	12V
15	12V	16	24V
17	GND	18	GND

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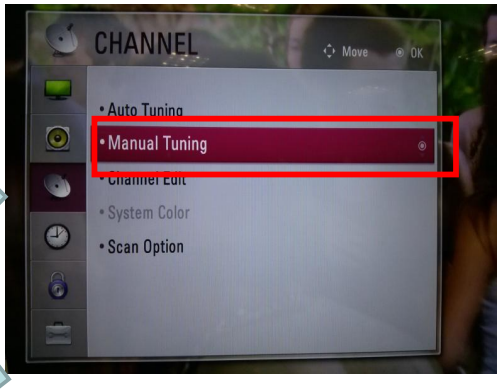
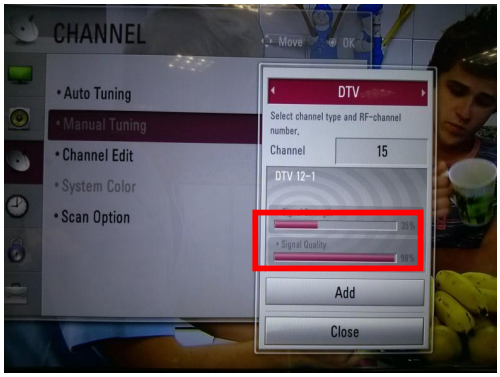
Standard Repair Process Detail Technical Manual

LCD TV	Error symptom	A. Video error_Video error, video lag/stop	Established date	2012. 01 .14	
	Content	TUNER input signal strength checking method	Revised date		A5

<ALL MODELS>





MENU => CHANNEL => Manual Tuning
=> Check Signal Strength & Signal Quality

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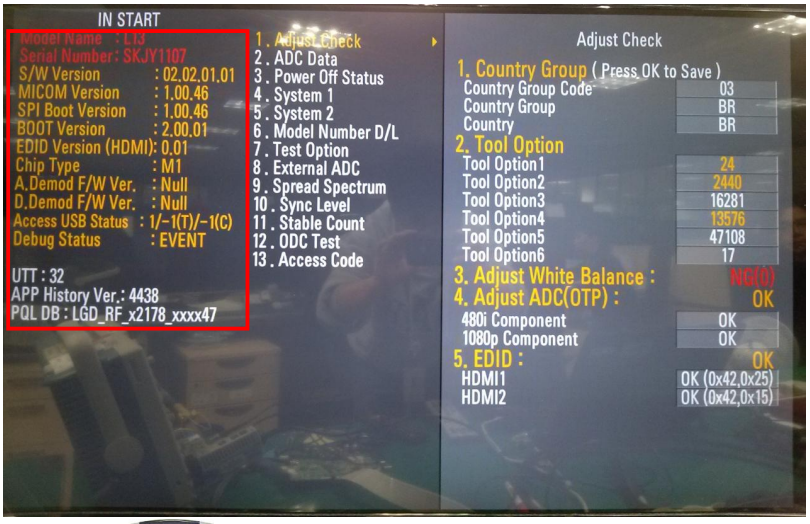
Standard Repair Process Detail Technical Manual

LCD TV	Error symptom	A. Video error_Video error, video lag/stop	Established date	2012. 11 .17	
	Content	LCD-TV Version checking method	Revised date		A6

<ALL MODELS>

1. Checking method for remote controller for adjustment

Version



Press the IN-START with the remote controller for adjustment

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Standard Repair Process Detail Technical Manual

LCD TV	Error symptom	A. Video error _Vertical/Horizontal bar, residual image, light spot	Established date	2012. 11 .17	
	Content	LCD TV connection diagram (1)	Revised date		A7

<ALL MODELS>

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

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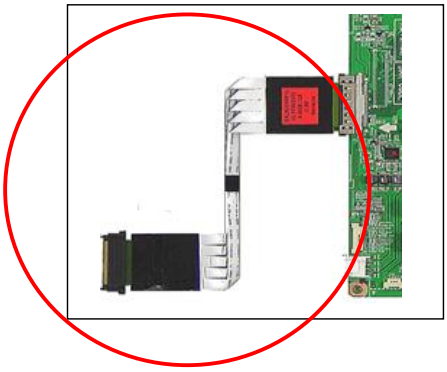
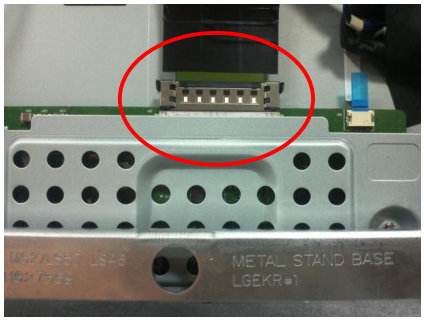
Standard Repair Process Detail Technical Manual

LCD TV	Error symptom	A. Video error_Color error	Established date	2012. 01 .14	
	Content	Check and replace Link Cable(LVDS) and contact condition	Revised date		A8/A9

<ALL MODELS>





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

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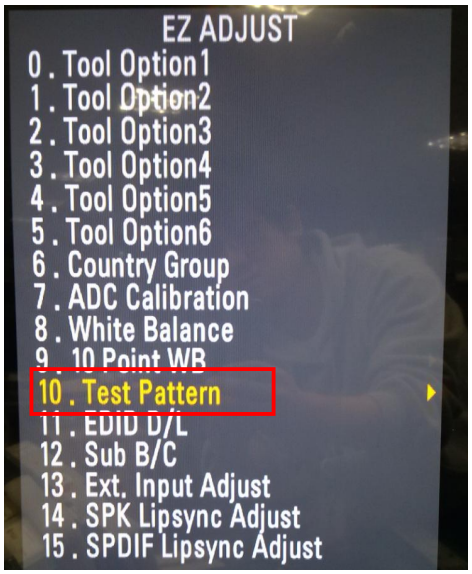
Standard Repair Process Detail Technical Manual

LCD TV	Error symptom	A. Video error_Color error	Established date	2012. 11 .17	
	Content	Adjustment Test pattern - ADJ Key	Revised date		A10



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!)

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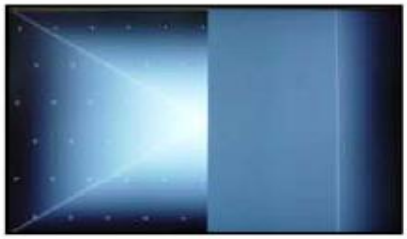
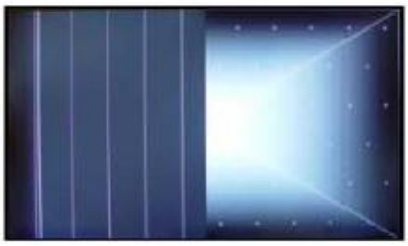
Appendix : Exchange T-Con Board (1)

Solder defect, CNT Broken

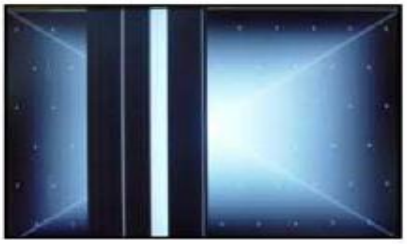


Solder defect, CNT Broken



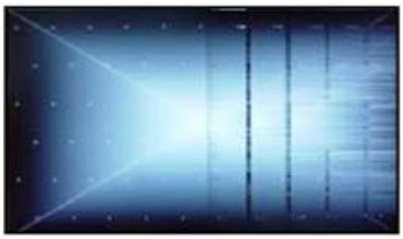
Solder defect, CNT Broken

Solder defect, CNT Broken



Solder defect, CNT Broken

Abnormal Power Section



Solder defect, Short/Crack

Abnormal Power Section

Solder defect, Short/Crack

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Appendix : Exchange T-Con Board (2)

Abnormal Power Section

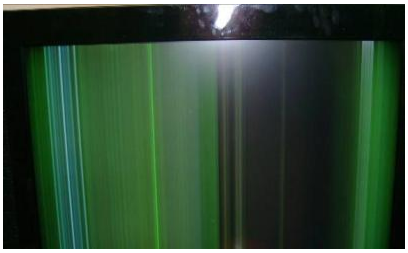
Abnormal Power Section

Solder defect, Short/Crack

Solder defect, Short/Crack

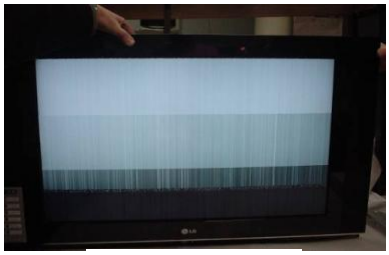
Fuse Open, Abnormal power section

Abnormal Display



GRADATION

Noise



GRADATION

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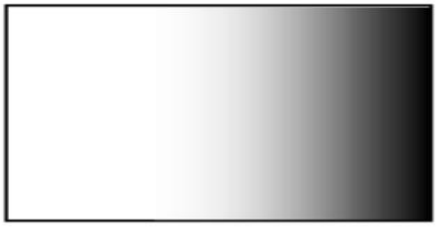
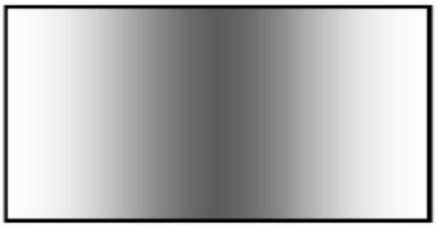
Appendix : Exchange PSU(LED driver)

No Light



Dim Light

Dim Light



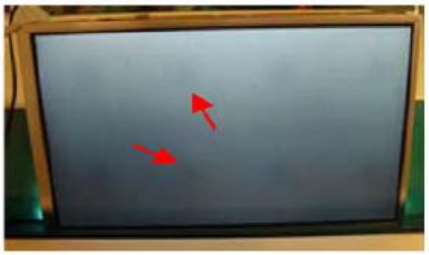
Dim Light

No picture/Sound Ok

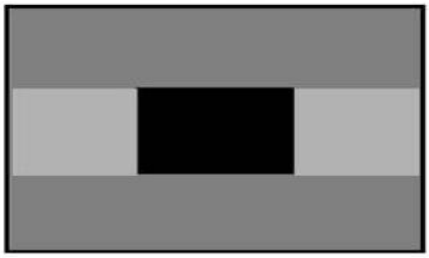
Appendix : Exchange the Module (1)

Panel Mura, Light leakage

Panel Mura, Light leakage



Press damage



Crosstalk

Press damage

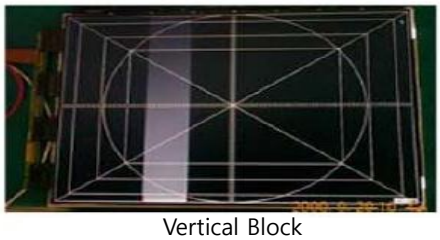
Crosstalk

Press damage

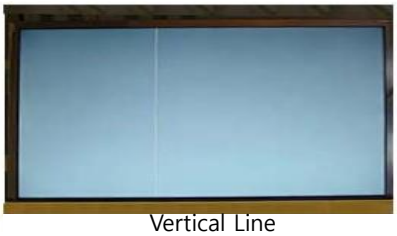
Un-repairable Cases

In this case please exchange the module.

Appendix : Exchange the Module (2)



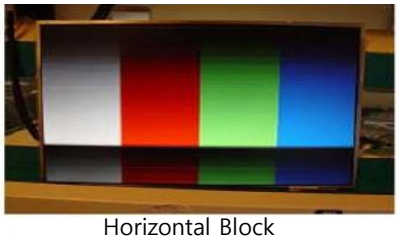
Vertical Block
Source TAB IC Defect



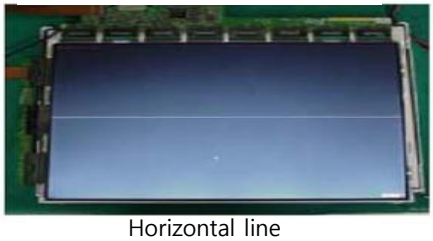
Vertical Line
Source TAB IC Defect

Vertical Block
Source TAB IC Defect

Horizontal Block
Gate TAB IC Defect



Horizontal Block
Gate TAB IC Defect



Horizontal line
Gate TAB IC Defect

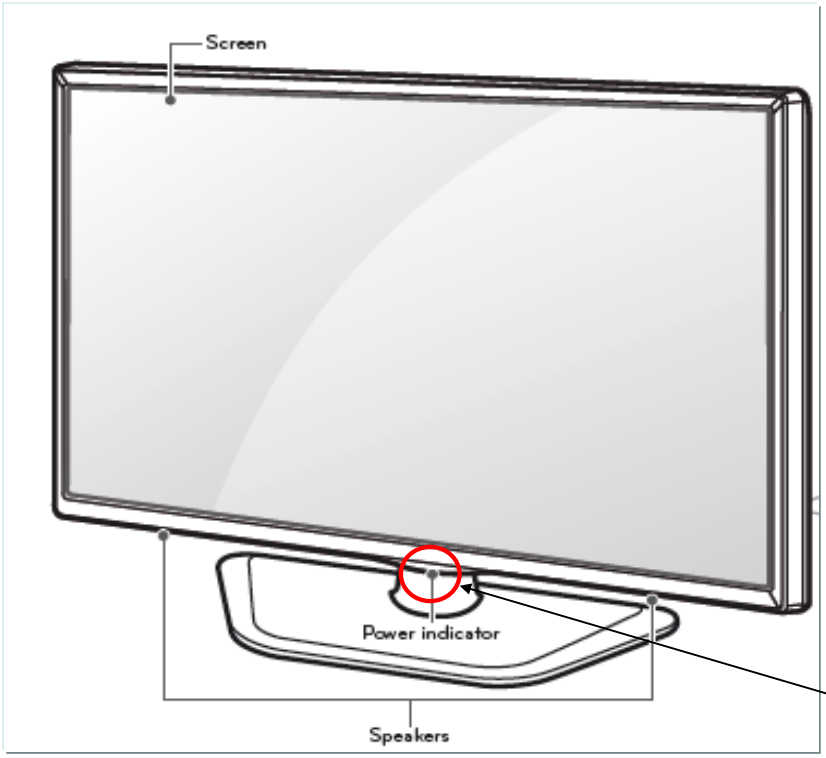
Horizontal Block
Gate TAB IC Defect

Un-repairable Cases

In this case please exchange the module.

Standard Repair Process Detail Technical Manual

LCD TV	Error symptom	B. Power error _No power	Established date	2012. 11.17	
	Content	Check front display LED	Revised date		A11



Front LED control :
Menu → Option → Power Indicator
→ Standby light ON

ST-BY condition: Red

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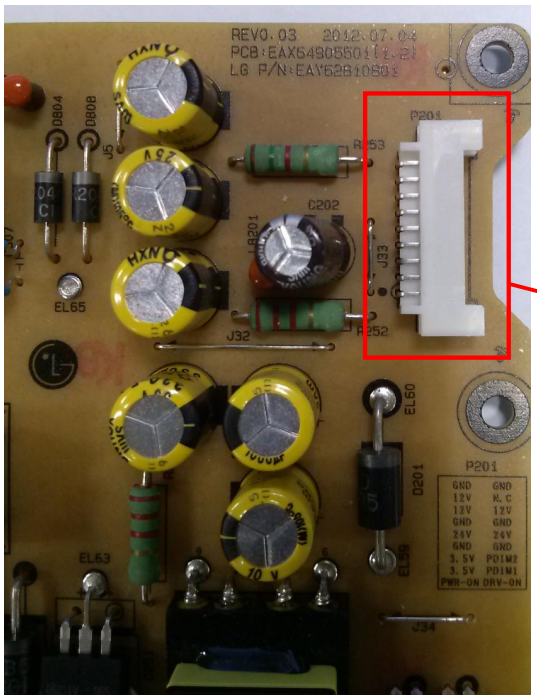
Standard Repair Process Detail Technical Manual

LCD TV	Error symptom	B. Power error _No power	Established date	2012. 11 .17	
	Content	Check power input voltage and ST-BY 3.5V	Revised date		A12



Check the DC 20V/24V, 12V, 3.5V.

18 Pin (Power Board ↔ Main Board) - 공통 ? (YEONHO)			
1	PWR-ON	2	DRV-ON
3	3.5V	4	PDIM1
5	3.5V	6	PDIM2
7	GND	8	GND
9	24V	10	24V
11	GND	12	GND
13	12V	14	12V
15	12V	16	24V
17	GND	18	GND

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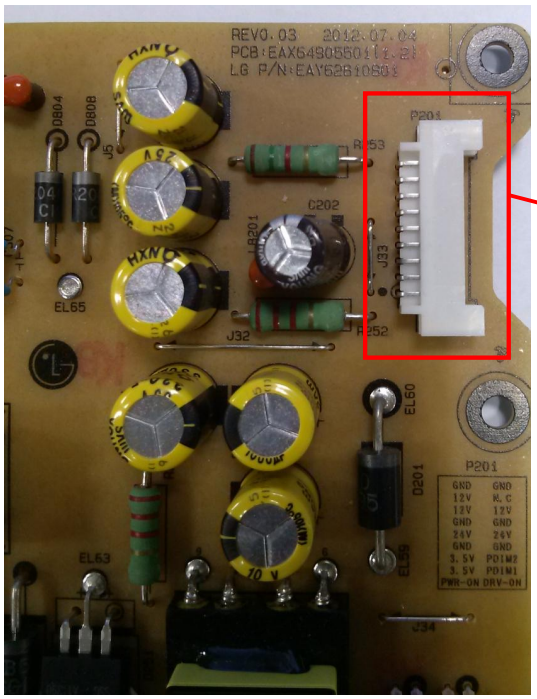
Standard Repair Process Detail Technical Manual

LCD TV	Error symptom	B. Power error _No power	Established date	2012. 11 .17	
	Content	Checking method when power is ON	Revised date		A13



Check "power on(Pin 1)" pin is high(about 3.3V)

18 Pin (Power Board ↔ Main Board) - 공통 ? (YEONHO)			
1	PWR-ON	2	DRV-ON
3	3.5V	4	PDIM1
5	3.5V	6	PDIM2
7	GND	8	GND
9	24V	10	24V
11	GND	12	GND
13	12V	14	12V
15	12V	16	24V
17	GND	18	GND

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Standard Repair Process Detail Technical Manual

LCD TV	Error symptom	B. Power error _Off when on, off whiling viewing	Established date	2012. 11 .17	
	Content	POWER OFF MODE checking method	Revised date		A14

<ALL MODELS>

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

LCD TV	Error symptom	C. Audio error_No audio/Normal video	Established date	2012. 01 .14	
	Content	Checking method in menu when there is no audio	Revised date		A15

<LA58xx>

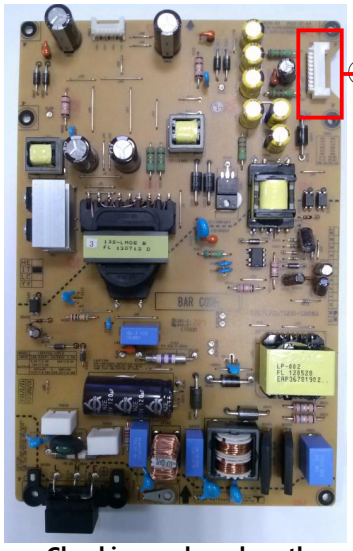
Checking method

1. Press the MENU button on the remote controller
2. Select the AUDIO function of the Menu
3. Select TV Speaker from Off to On

Standard Repair Process Detail Technical Manual

LCD TV	Error symptom	C. Audio error_No audio/Normal video	Established date	2012. 11 .17	
	Content	Voltage and speaker checking method when there is no audio	Revised date		A16

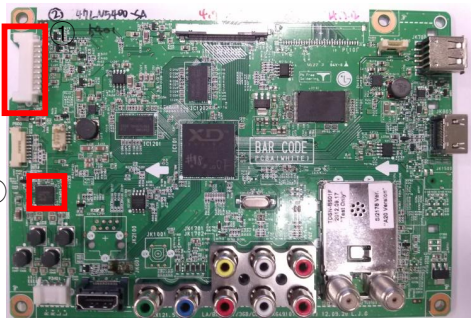
<ALL MODELS>



18 Pin (Power Board ↔ Main Board) - 공통

? (YEONHO)

1	PWR-ON	2	DRV-ON
3	3.5V	4	PDIM1
5	3.5V	6	PDIM2
7	GND	8	GND
9	24V	10	24V
11	GND	12	GND
13	12V	14	12V
15	12V	16	24V
17	GND	18	GND



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.

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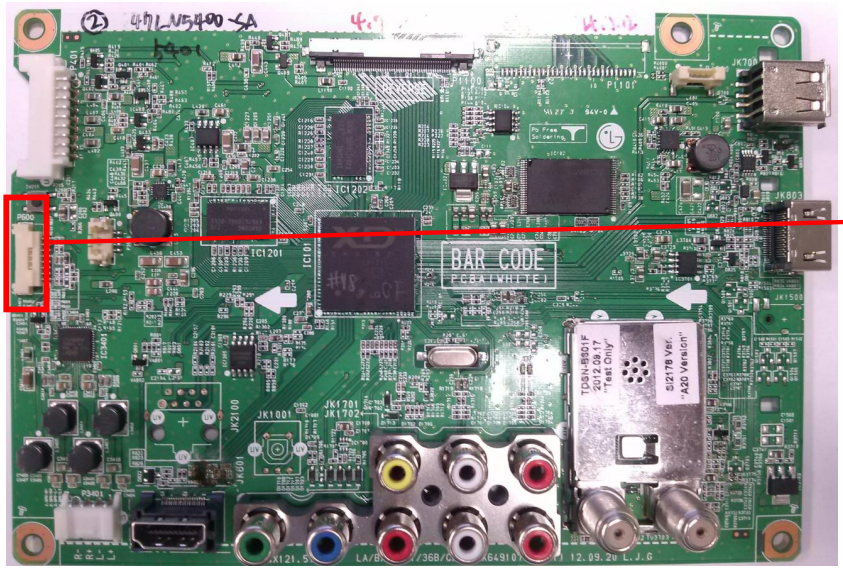
Standard Repair Process Detail Technical Manual

LCD TV	Error symptom	D. Function error_ No response in remote controller, key error	Established date	2012. 01 .14	
	Content	Remote controller operation checking method	Revised date		A17

<ALL MODELS>

②



③

④

P600	
1	GND
2	KEY1
3	KEY2
4	St 3.5V
5	GND
6	RED_LED
7	IR
8	GND

Checking order

1, 2. Check IR cable condition between IR & Main board.
3. Check the st-by 3.3V on the terminal 6.
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.