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LED TV

SERVICE MANUAL

CHASSIS : 6M68N

MODEL: 43LH5000

CAUTION

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



Printed in Korea

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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 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.

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 10 M Ω and 200 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.

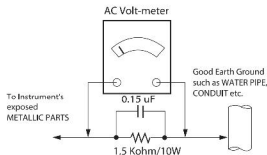
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 μ F capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

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

- 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 or 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 perpendicularly 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 then 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 6M62N 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 120V~, 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 5minutes prior to the adjustment.

3. Test method

- 1) Performance: LGE TV test method followed
- 2) Demanded other specification
 - Safety : UL specification
 - EMC : FCC

4. Model General Specification

No.	Item	Specification	Remarks
1.	Market	US/Canada/Mexico	
2.	Broadcasting system	1) NTSC 2) AIR-ATSC 3) CABLE: 64QAM/256QAM	
3.	Channel Storage	1) VHF : 02-13 2) UHF : 14-69 3) DTV : 02-69 4) CATV : 01-135 (N.America) 5) CADTV : 01-135 (N.America)	
4.	Receiving system	Analog : Upper Heterodyne Digital : 8VSB/64&256QAM	
5.	Video/Composite Input)	PAL, NTSC	4 System : PAL M, PAL N, NTSC, PAL60
6.	Component Input	Y/Cb/Cr, Y/Pb/Pr	
7.	HDMI Input	HDMI: DTV/DVI	Support HDCP
8.	Screen Size	32" Inch wide (1366×768)	

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

No.	Resolution	H-freq(kHz)	V-freq(Hz)	Proposed
1	720×480	15.73	60.00	SDTV, DVD 480i
2	720×480	15.63	59.94	SDTV, DVD 480i
3	720×480	31.47	59.94	480p
4	720×480	31.50	60.00	480p
5	1280×720	44.96	59.94	HDTV 720p
6	1280×720	45.00	60.00	HDTV 720p
7	1920×1080	26.97	23.976	HDTV 1080p
8	1920×1080	27	24	HDTV 1080p
9	1920×1080	33.72	29.97	HDTV 1080p
10	1920×1080	33.75	30	HDTV 1080p
11	1920×1080	33.75	60.00	HDTV 1080i
12	1920×1080	33.72	59.94	HDTV 1080i
13	1920×1080	67.432	59.94	HDTV 1080p
14	1920×1080	67.5	60	HDTV 1080p

6. HDMI Input : Refer to adjust specification about EDID data.

6.1. DTV mode

No.	Resolution	H-freq(kHz)	V-freq. (kHz)	Pixel clock(MHz)	Proposed
1.	640*480	31.469 / 31.5	59.94 / 60	25.175/25.200	SDTV 480P
2.	720*480	31.469 / 31.5	59.94 / 60	27.00/27.03	SDTV 480P
3.	720(1440)*480	15.73 / 15.75	59.94 / 60	27.00/27.028	SDTV 480i
4.	1280*720	44.96 / 45	59.94 / 60	74.17/74.25	HDTV 720P
5.	1920*1080	33.72 / 33.75	59.94 / 60	74.17/74.25	HDTV 1080i
6.	1920*1080	26.97 / 27	23.97 / 24	74.17/74.25	HDTV 1080P
7.	1920*1080	33.716/33.75	29.976/30.00	74.25	HDTV 1080P
8.	1920*1080	67.43 / 67.5	59.94 / 60	148.35/148.50	HDTV 1080P

6.2. PC mode

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remark
1.	720*400 @70Hz	31.469	70.08	28.321	DOS	
2.	640*480 @60Hz	31.469	59.940	25.175	VESA(VGA)	
3.	800*600 @60Hz	37.879	60.31	40.000	VESA(SVGA)	
4.	1024*768 @60Hz	48.363	60.00	65.000	VESA(XGA)	
5.	1280*1024 @60Hz	63.981	60.020	108	VESA(SXGA)	FHD only(Support to HDMI-PC)
6.	1360*768 @60Hz	47.712	60.015	85.5	VESA(WXGA)	
7.	1920*1080 @60Hz	67.5	60.0	148.5	WUXGA (Reduced blanking)	FHD only(Support to HDMI-PC)

ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied to all of the LED TV with MSD3393LU 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 : 120V~, 50/60 Hz
- (6) Adjustment equipments
: Color Analyzer(CA-210 or CA-310), Service remote control.
- (7) Push the "RESTORE" key - For memory initialization.

Case1 : Software version up

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

Case2 : Function check at the assembly line

1. When TV set is entering on the assembly line, Push "RESTORE" 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 "RESTORE" key.

3. Main PCB check process

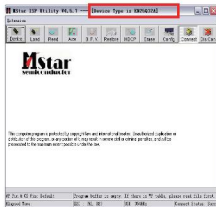
- APC - After Manual-Insert, executing APC

* Burning HDCP EY

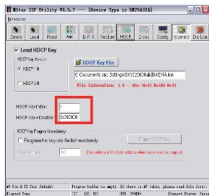
1. Connect your PC to TV set with USB debug cable.
2. Turn on the TV set, then open the HDCP operating tool "MStar IS P Utility V4.5.7 Alpha".



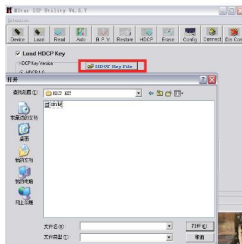
3. Click "Connect" to get communication from the TV set, and read out the device type.



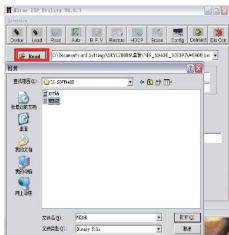
4. Click "HDCP" to enter HDCP management interface. Change the Value "HDCP Key Index" to "1", "HDCP Key Allocation" to "0X390000" for 32LF500.



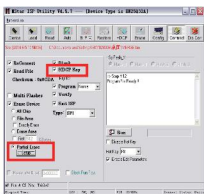
5. Click "HDCP Key File" to load the HDCP Key file provided.



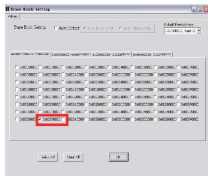
6. Click "Read" to load the main software for this TV set.



7. Click "Auto" to ready for HDCP Key updating. Settings as below:



8. Click to select "PartialErase", then click Setup. An erase block setting window will pop up. Choose the bank according to "0X390000" for 32LF500B. Click "OK" to confirm.



9. Click "Run" to update the HDCP Key.



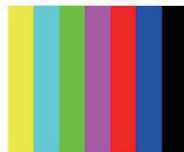
Warm Tips:

The HDCP Key index value will be increased automatically. That means after you update the first TV set, you only need to connect another TV set to your PC, click "Connect", then "Run" to update.

4. ADC Process

4.1. ADC

- Set TV to YUV source by pushing "YUV" key
- Input full color bar signal using HD signal generator
- Begin adjust by pushing "ADC ADJ" key
- * Required equipment : Factory remote control, HD signal generator.



100% color bar

- Note:
1. The YPBPR Auto White Balance adjust. (AUTO ADC) must be done on the product line.
 2. In YPBPR channel ,must adjust the SD and HD two modes.

4.2. Function Check

4.2.1. Check display and sound

- Check Input and Signal items.

- (1) TV
- (2) AV (CVBS)
- (3) COMPONENT (1080i/480i)
- (4) HDMI

* Display and Sound check is executed by Remote control.

<Caution> Not to push the "RESTORE" key after completion if the function inspection.

5. Total Assembly line process

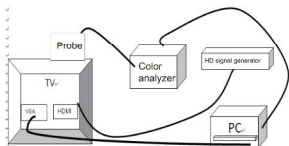
5.1. Adjustment Preparation

- W/B Equipment condition
CA310: CH01, 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.

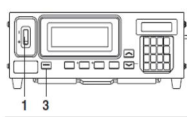
Mode	Color Temp	Color coordinate	Remark
Cool (C50)	13,000 K	X=0.271 (± 0.002) Y=0.270 (± 0.002)	<Test Signal> - Inner pattern for W/B adjust
Medium(0)	9,300 K	X=0.286 (± 0.002) Y=0.289 (± 0.002)	- External white pattern (80IRE, 204gray)
Warm(W50)	6,500 K	X=0.313 (± 0.002) Y=0.329 (± 0.002)	

* Auto Adjust -W/B

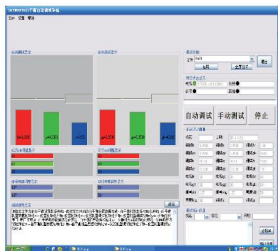


*STEPS:

1. Connect Debug line.
2. Connect HDMI port and input 80% full white signal.
3. Calibrate the color analyzer (CA310).



4. Open W/R auto adjust system and load saved parameters



5. Click the "application" button and begin to adjust automatically when finished ,it will display PASS.



■ **Manual W/B process using adjust Remote control.**

- Color analyzer(CA310,CA210)should be used in the calibrated ch.
- Operate the zero-calibration of the CA310 or CA210, then stick sensor to the module when adjusting.
- Enter factory mode by pushing customer remote controller: input 3195.□□
- Select W/B ADJUST item , push "ok" then enter into adjust page.



- For manual adjustment, it is also possible by the following sequence.
 - (1) Set TV in aging mode by play a picture or music by USB for more than 30 minutes. (if not executed this step the condition for w/B will be different). (| | | |)
 - (2) Push "Exit" key.
 - (3) Enter factory mode by pushing customer remote controller: input 3195 | | . Select W/B ADJUST item , push "ok" then enter into adjust page.
 - (4) Zero Calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10cm 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 thrcce modca all (Cool / Medium / Warm)
 - For All model
 - 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) $x, y > \text{target}$
 - i) Decrease the R, G.
- 2) $x, y < \text{target}$
 - i) First decrease the B gain,
 - ii) Decrease the one of the others.
- 3) $x > \text{target}, y < \text{target}$
 - i) First decrease B, so make y a little more than the target.
 - ii) Adjust x value by decreasing the R.
- 4) $x < \text{target}, y > \text{target}$
 - 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 and function inspections, Press "SETTING" button, choose Initial Setting" option, and choose "Yes". It will show choose language picture, then turn off TV and unplug the AC cable.

5.4. Outgoing condition Configuration

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

5.5. GND and HI-POT Test

5.5.1. 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)

5.5.2. 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 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.

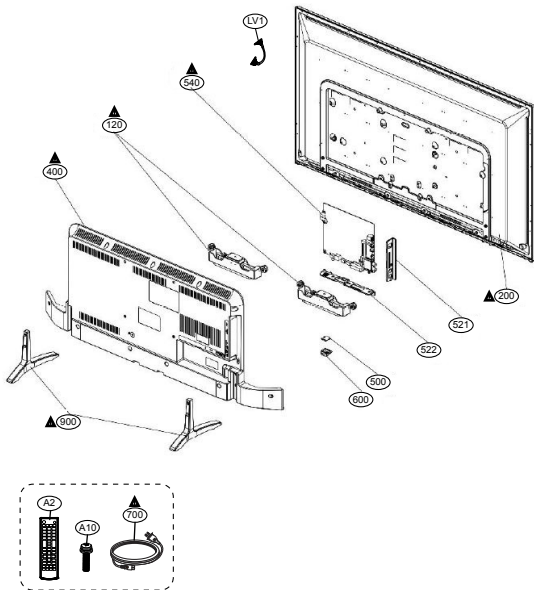
5.5.3. Checkpoint

- (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 mA rms

EXPLODED VIEW (43LH5000)

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 X-RADIATION, Shock, Fire, or other Hazards. Do not modify the original design without permission of manufacturer.

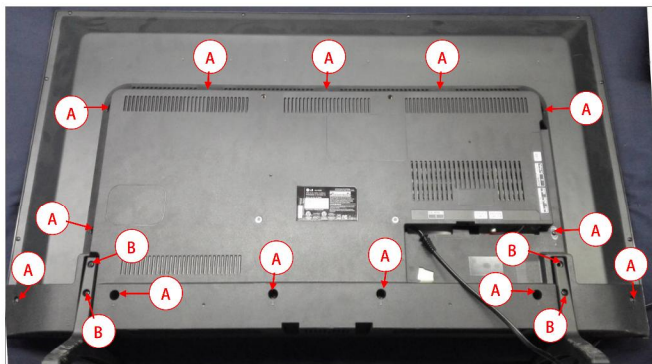


Product Disassembly Process

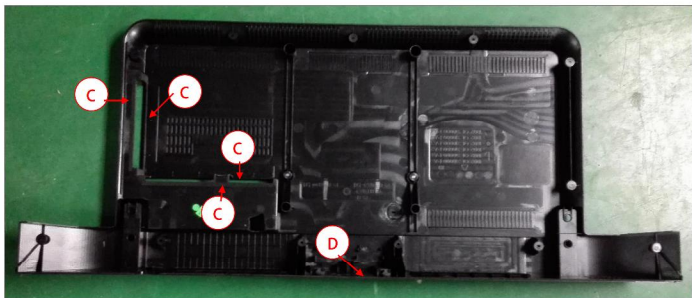
List the basic steps that should typically be followed to remove components and materials requiring selective treatment:

1	Unlock screw ("A-13EA") to separate back cover assembly. Unlock screw ("B-4EA") to separate the base.	[Fig.1]
2	Separate the cushion (C,D) from backcover.	[Fig.2]
3	Unlock screw ("E-4EA") to separate main board and AV bracket (F,G). Unlock Ferrite Ring ("H") to separate Main Board from Panel.	[Fig.3]
4	Separate the receive assembly from front cover; Separate the receive board from IR LENS; Separate the PC sheet (I) from IR LENS.	[Fig.4]

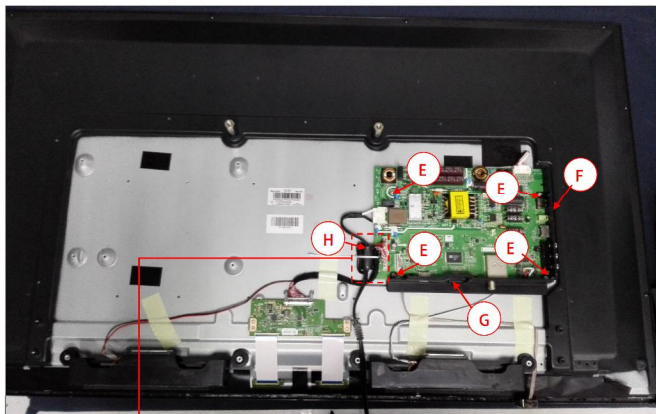
1.OPTIONAL: Depending upon the complexity of the disassembly process, a graphic depicting the locations of items contained within the product which require selective treatment (with descriptions and arrows identifying locations) can be inserted below:



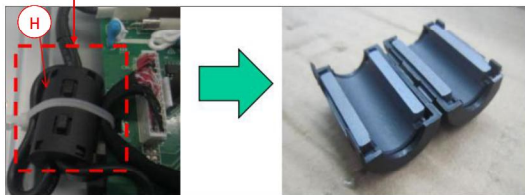
[Fig.1]

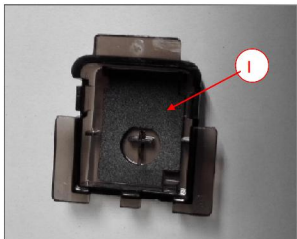


[Fig.2]



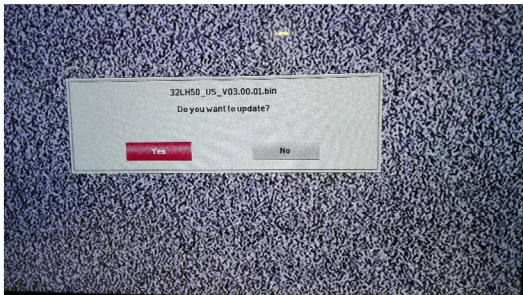
[Fig.3]





[Fig.4]

SOFTWARE UPGRADING PROCESS



Note:

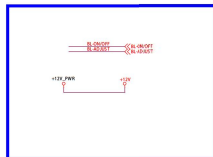
1. In the above picture, "32LH50_US_V03.00.01.bin" is the software upgrading file name, in which "32LH50" means TV model, "US" means country, and "V03.00.01" means software version.
2. Currently have US(usa), CA(canada) and KR(korean) three country choices.

Steps:

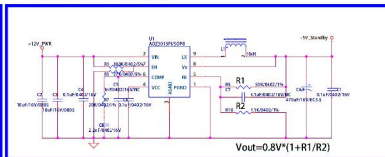
1. Copy the software upgrade image file to a USB device;
2. Insert the USB device to the USB port after turning on the TV;
3. TV will display the software upgrading menu;
4. Select "Yes" and press OK button to start the upgrading process.

SCHEMATIC CIRCUIT DIAGRAM

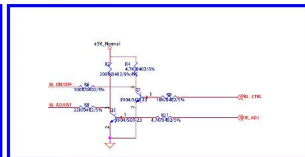
Conneter



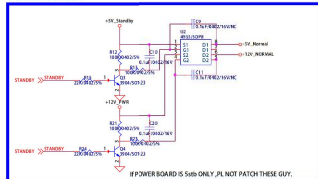
5V Standby Power(option) 3A



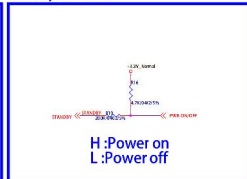
Inverter controller



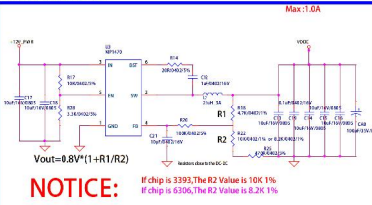
Power Switch



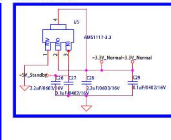
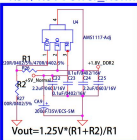
Standby controller



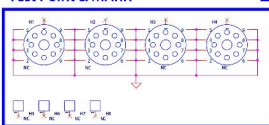
1.15V Core Power



1.5V/1.8V Power_Normal 3.3V Power



Test Point & MARK



NOTICE:

If chip is 3393, The R1 Value is 220R 5% Vout=1.8V
If chip is 6306, The R1 Value is 470R 5% Vout=1.5V

MSD3393	
Rev	1.0
Doc No	System power
Date	2014.08.20
Drawn	
Checked	
Approved	

HDMI Interface

HDMI_HDQP	>	HDMI_HDQP
HDMI_HDQF	>	HDMI_HDQF
HDMI_HD1P	>	HDMI_HD1P
HDMI_HD1F	>	HDMI_HD1F
HDMI_HD2P	>	HDMI_HD2P
HDMI_HD2F	>	HDMI_HD2F
HDMI_HD3P	>	HDMI_HD3P
HDMI_HD3F	>	HDMI_HD3F
HDMI_HD4P	>	HDMI_HD4P
HDMI_HD4F	>	HDMI_HD4F
HDMI_HD5P	>	HDMI_HD5P
HDMI_HD5F	>	HDMI_HD5F
HDMI_HD6P	>	HDMI_HD6P
HDMI_HD6F	>	HDMI_HD6F
HDMI_HD7P	>	HDMI_HD7P
HDMI_HD7F	>	HDMI_HD7F
HDMI_HD8P	>	HDMI_HD8P
HDMI_HD8F	>	HDMI_HD8F
HDMI_HD9P	>	HDMI_HD9P
HDMI_HD9F	>	HDMI_HD9F
HDMI_HD10P	>	HDMI_HD10P
HDMI_HD10F	>	HDMI_HD10F
HDMI_HD11P	>	HDMI_HD11P
HDMI_HD11F	>	HDMI_HD11F
HDMI_HD12P	>	HDMI_HD12P
HDMI_HD12F	>	HDMI_HD12F
HDMI_HD13P	>	HDMI_HD13P
HDMI_HD13F	>	HDMI_HD13F
HDMI_HD14P	>	HDMI_HD14P
HDMI_HD14F	>	HDMI_HD14F
HDMI_HD15P	>	HDMI_HD15P
HDMI_HD15F	>	HDMI_HD15F

YPBPR Interface

YPb_Pr	<	YPb_Pr	<	YPb_Pr
YPr_B	<	YPr_B	<	YPr_B
YPr_G	<	YPr_G	<	YPr_G
YPr_R	<	YPr_R	<	YPr_R
YCbCr	<	YCbCr	<	YCbCr

CVBS IN & OUT

AV1_IN	<	AV1_IN	<	AV1_IN
AV2_IN	<	AV2_IN	<	AV2_IN
AV3_IN	<	AV3_IN	<	AV3_IN
CVBS_OUT	<	CVBS_OUT	<	CVBS_OUT

AUDIO IN

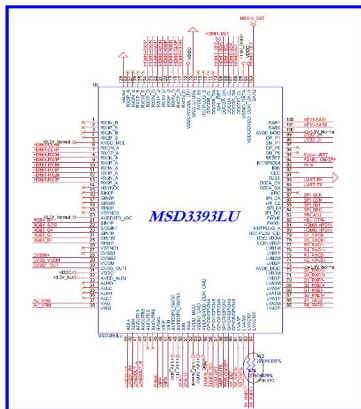
AI1_IN	<	AI1_IN	<	AI1_IN
AI2_IN	<	AI2_IN	<	AI2_IN

DIF IN

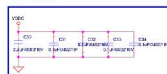
DIF_IN	>	DIF_IN	>	DIF_IN
DIF_OUT	>	DIF_OUT	>	DIF_OUT

USB & SPDIF_OUT

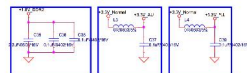
USB_D-	<	USB_D-	<	USB_D-
USB_D+	<	USB_D+	<	USB_D+



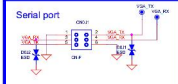
VDC 1.15V



DDR2 1.8V 3.3V audio 3.3V MPLL



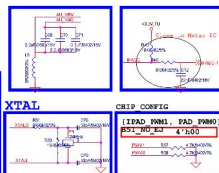
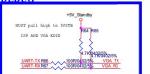
Audio Line Out



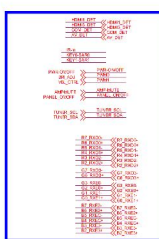
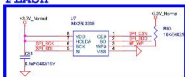
RESET



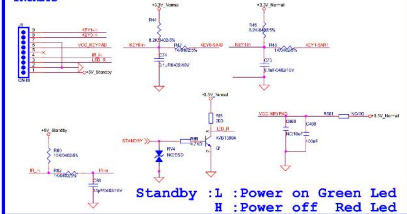
DEBUG



FLASH

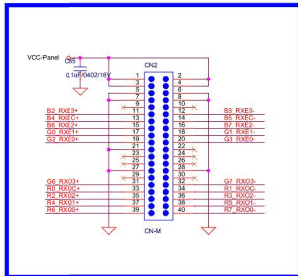


IR6KEYS

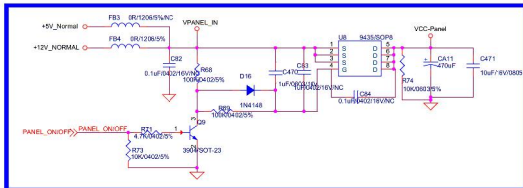


LVDS CONNECTOR (1 DIP + 2 SMT OPTIONAL)

HI CONNECTOR



Power for panel

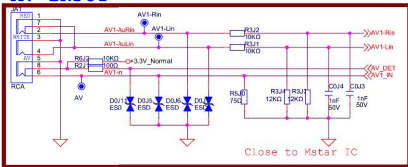


Net to other page

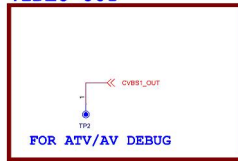


Rev	MSD3393		Rev
Doc	Document Number	LVDS Interface	1.0
Date	Tuesday, December 29, 2015	Sheet 3 of 9	

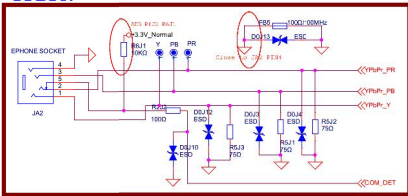
AV INPUT



VIDEO OUT

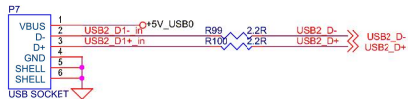


YPBPR

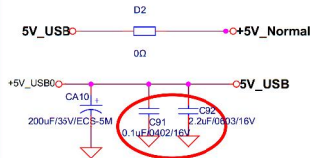


Title			MSD3393		
Rev	Document Number	Video Interface		Rev	1.0
Date	Thursday, January 07, 2016	Sheet	4	of	9

USB INTERFACE



USB POWER



Title

MSD3393

Size

Document Number

USB Interface

Rev

1.0

Date:

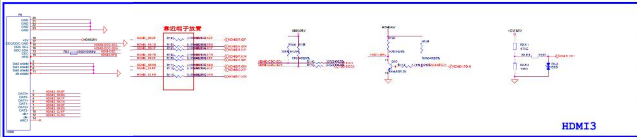
Thursday, January 07, 2016

Sheet

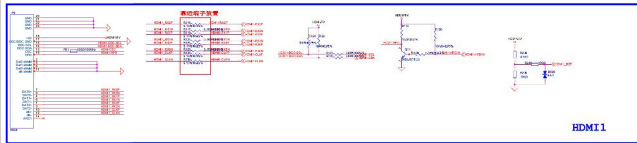
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of

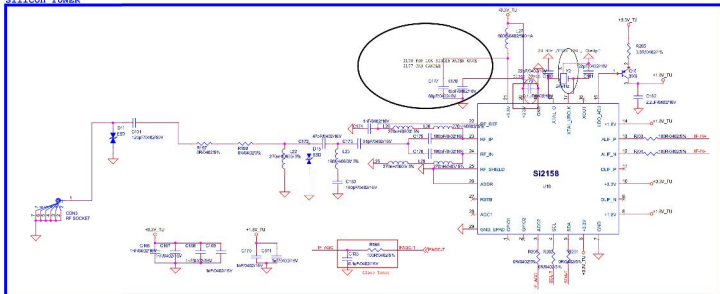
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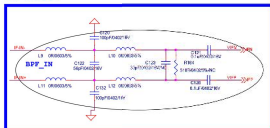
HDMI3



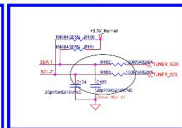
HDMI1



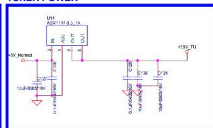
DIF IN&OUT

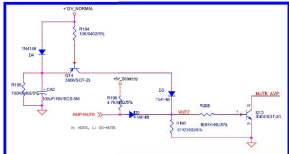
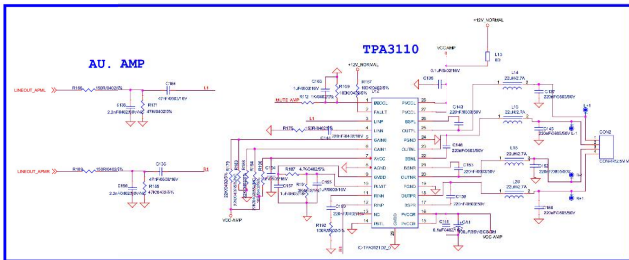


AGC RC Filter & I2C

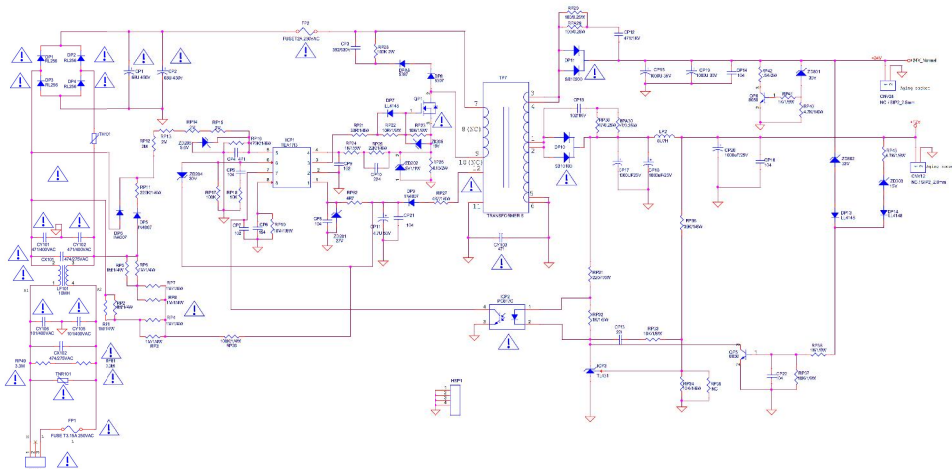


TUNER POWER

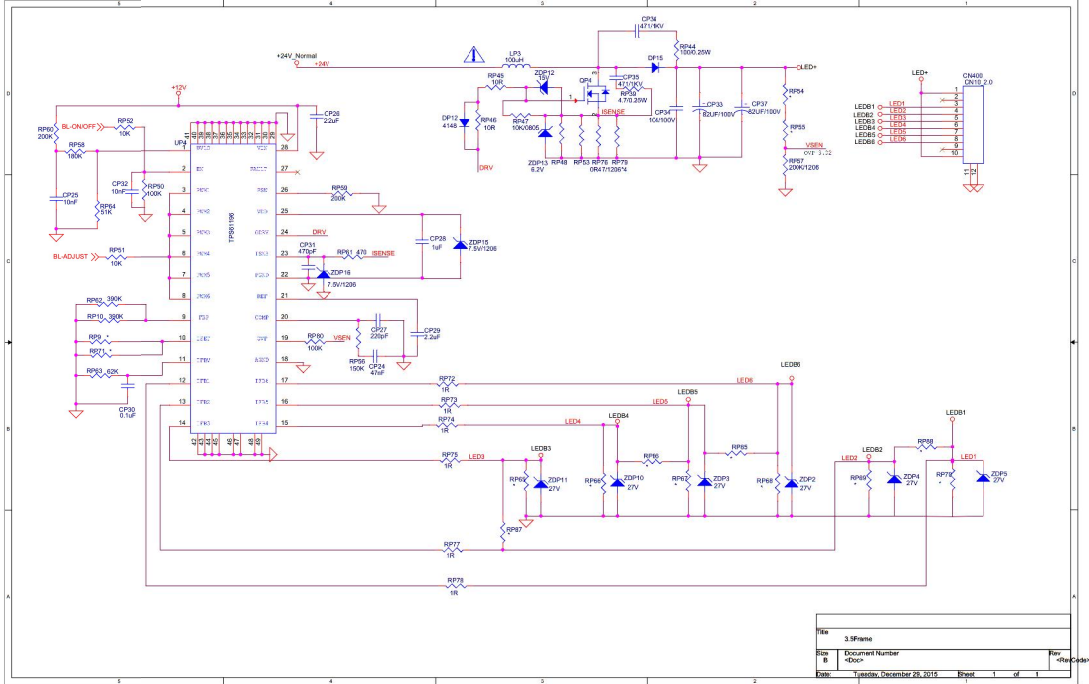




Rev	MSD3393		Rev
Rev	Revised/Revised	Amplifier	Rev
Rev	Revised/Revised	Amplifier	Rev
Rev	Revised/Revised	Amplifier	Rev



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Sheet	1	Sheet	1
Doc	3.0PName	Doc	



File	3.5Frame	
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Date	Tuesday, December 28, 2015	Sheet 1 of 1



L14 Repair Process

Contents of LCD TV Standard Repair Process

No.	Error symptom (High category)	Error symptom (Mid category)	Page	Remarks
1	A. Video error	No video/Normal audio	1	
2		No video/No audio	2	
3		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	Extericr defect	14	

*** 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

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

Continue to the next page

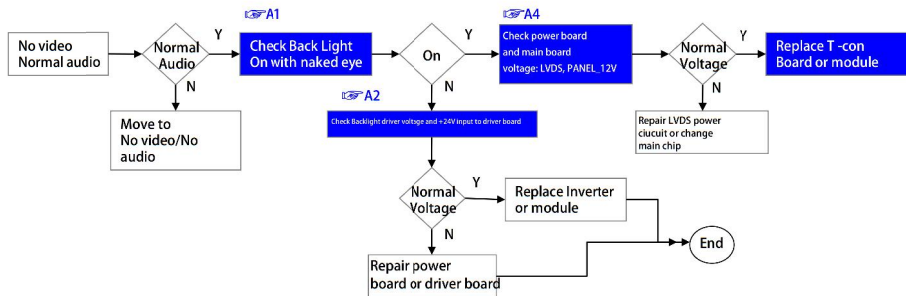
Contents of LCD TV Standard Repair Process Detail Technical Manual

Continued from previous page

No.	Error symptom	Content	Page	Remarks
21	B. Power error_No power	Check front display LED	A11	
22		Check +12V from power board and ST-BY 5V from main board	A12	
23		Checking method when power is ON	A13	
24		Power board and main board voltage measuring method	A4	
25				
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		Voltage and speaker checking method when there is no audio	A16	
30	C. Audio error_Wrecked audio/discontinuation	Voltage and speaker checking method in case of audio error	A16	
31	D. Function error_ No response in remote controller, key error	Remote controller operation checking method	A17	

LE D TV	Error symptom	A. Video error	Established date	2016.02.03	
		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,,)



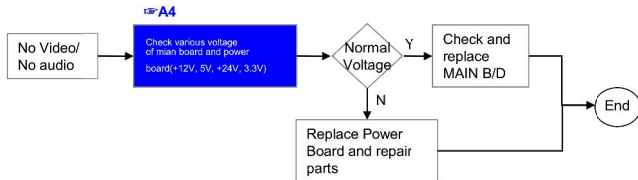
※Precaution A6 & A3

Always check & record S/W Version and White Balance value before replacing the Main Board

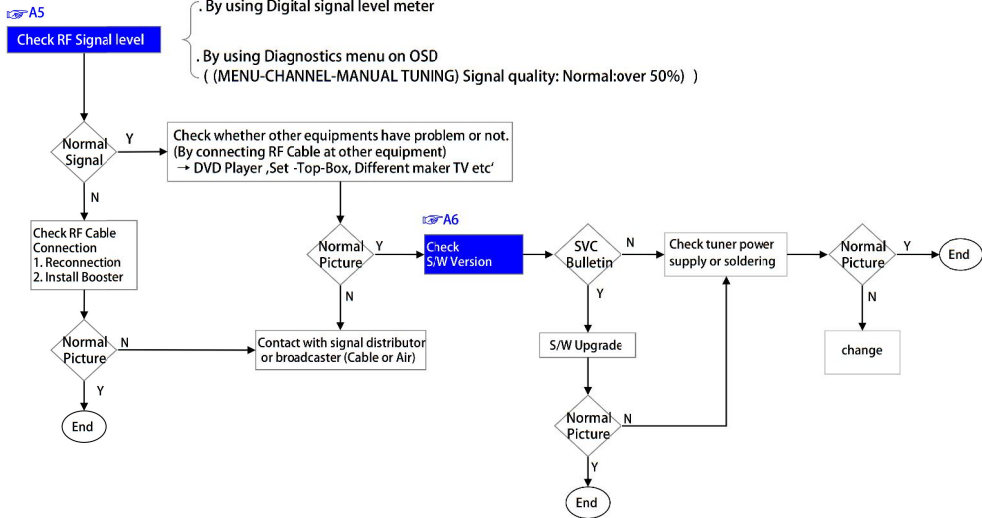
Replace Main Board

Re-enter White Balance value

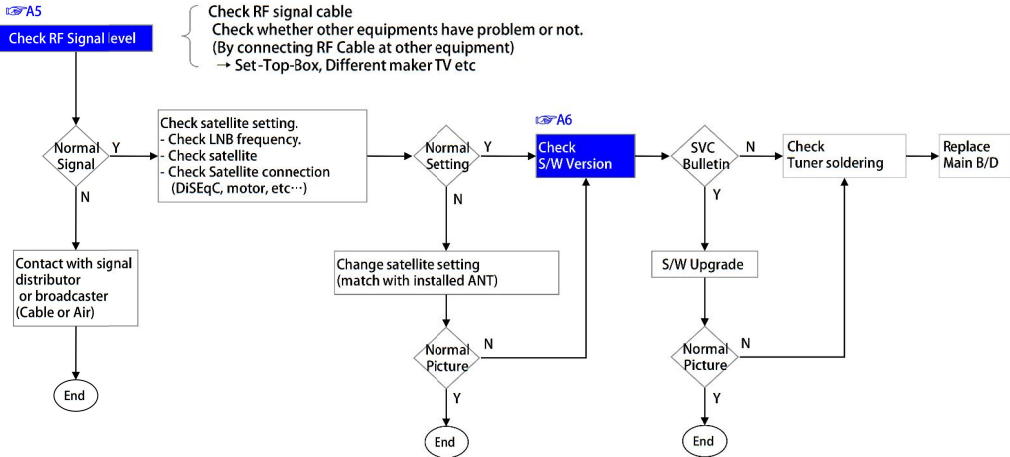
LED TV	Error symptom	A. Video error	Established date	2016.02.03	
		No video/ No audio	Revised date		2/14



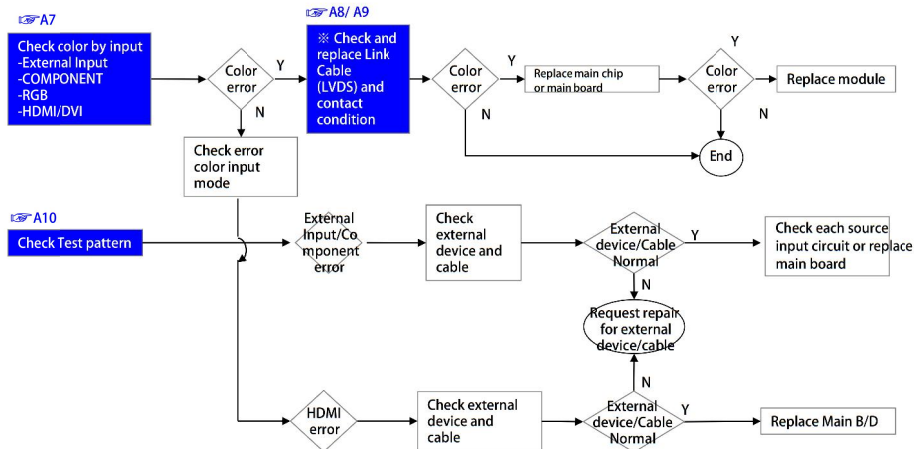
LED TV	Error symptom	A. Video error	Established date	2016.02.03	
		Picture brcken/ Freezing	Revised date		3/14



LED TV	Error symptom	A. Video error	Established date	2016. 02.03
		Tuning fail, Picture broken/ Freezing	Revised date	4/14

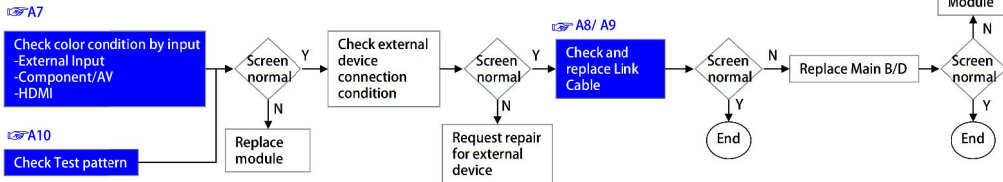


LED TV	Error symptom	A. Video error	Established date	2016.02.03
		Color error	Revised date	

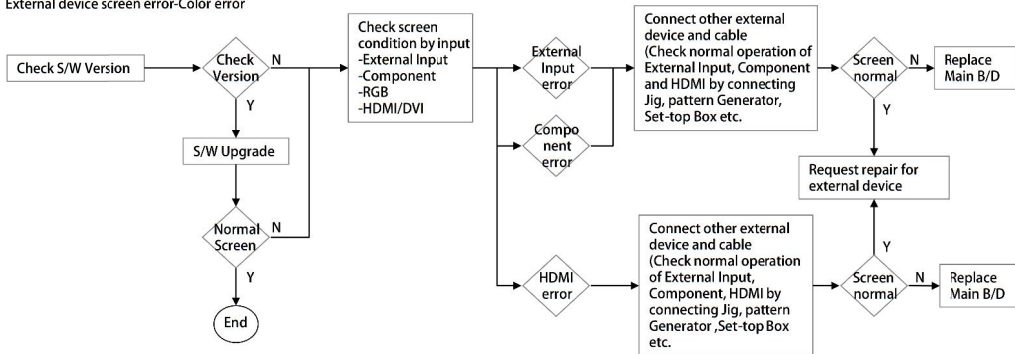


LED TV	Error symptom	A. Video error	Established date	2016.02.03	
		Vertical / Horizontal bar, residual image, light spot, external device color error	Revised date		6/14

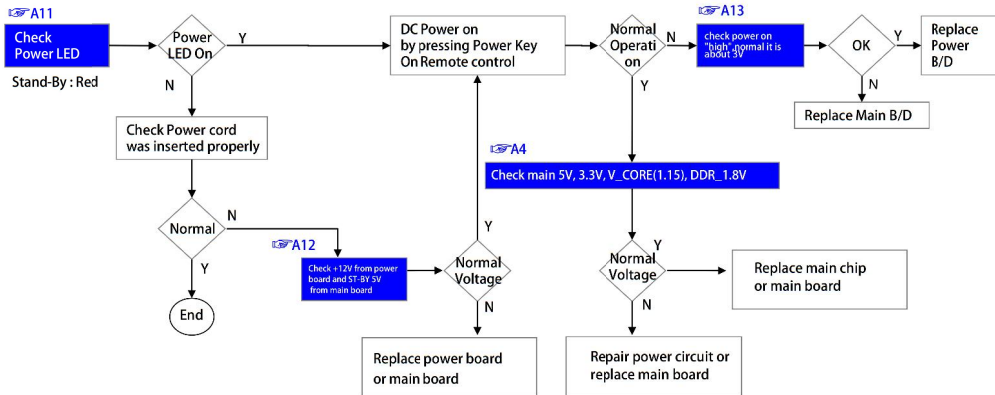
Vertical/Horizontal bar, residual image, light spot



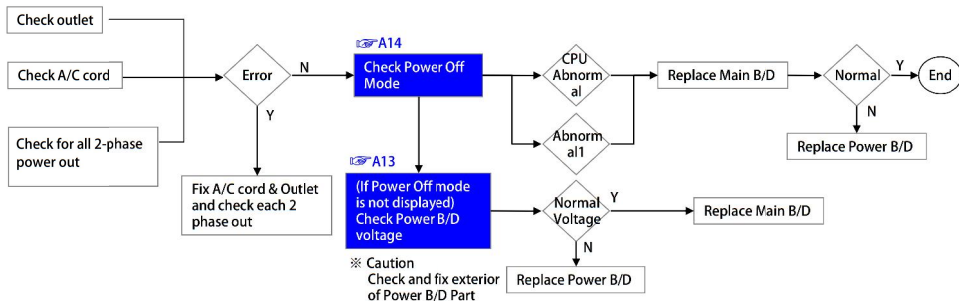
External device screen error-Color error



LED TV	Error symptom	B. Power error	Established date	2016.02.03	
		No power	Revised date		7/14



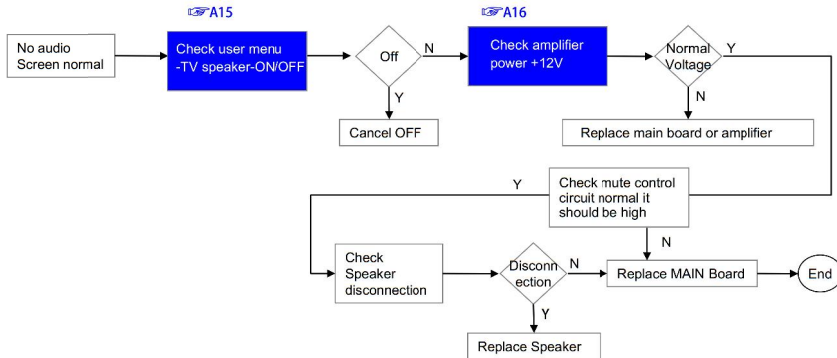
LED TV	Error symptom	B. Power error	Established date	2016.02.03	
		Off when on, off while viewing, power auto on/off	Revised date		8/14



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

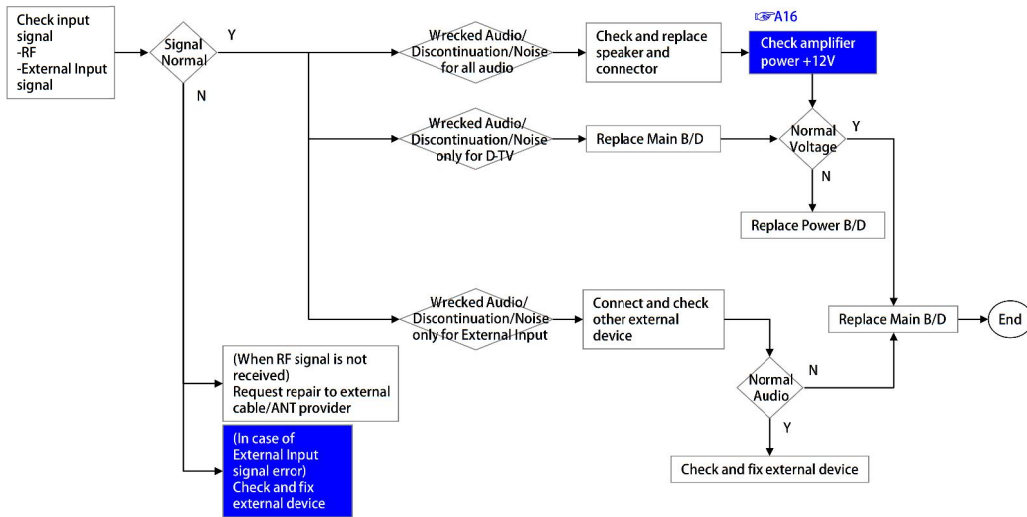
Status	Power off List	Explanation
Normal	"POWEROFF_REMOTEKEY"	Power off by REMOTE CONTROL
	"POWEROFF_OFFTIMER"	Power off by OFF TIMER
	"POWEROFF_SLEEPTIMER"	Power off by SLEEP TIMER
	"POWEROFF_INSTOP"	Power off by RESTORE KEY
	"POWEROFF_AUTOOFF"	Power off by AUTO OFF
	"POWEROFF_ONTIMER"	Power off by ON TIMER
	"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

LED TV	Error symptom	C. Audio error	Established date	2016.02.03	
		No audio/ Normal video	Revised date		9/14



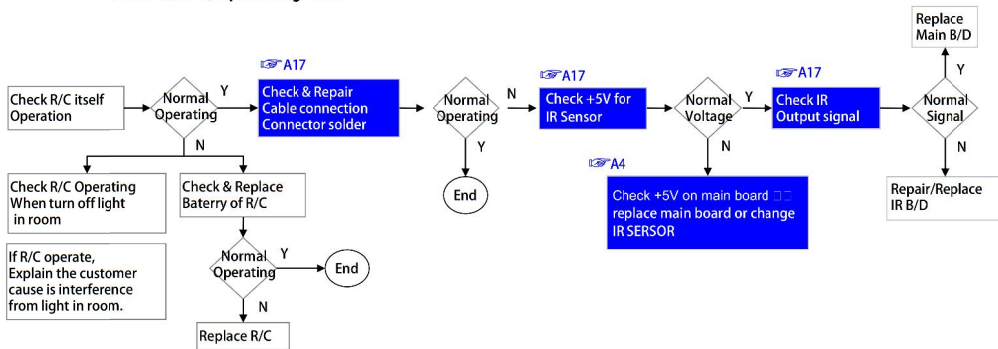
LED TV	Error symptom	C. Audio error	Established date	2016.02.03	
		Wrecked audio/ discontinuation/noise	Revised date		10/14

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



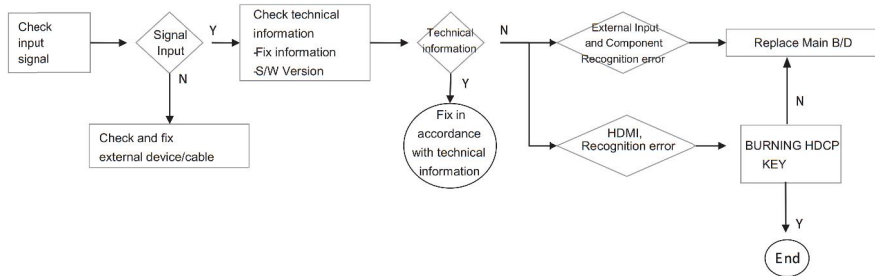
LED TV	Error symptom	D. Function error	Established date	2016.02.03	
		Remote control & Local switch checking	Revised date		11/14

1. Remote control(R/C) operating error



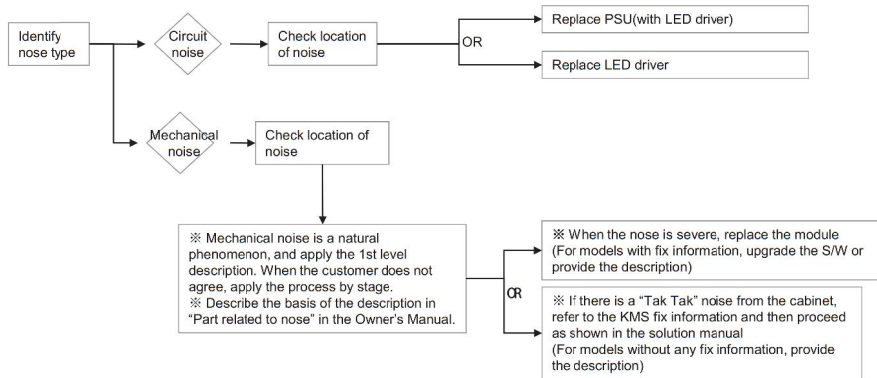
Standard Repair Process

LED TV	Error symptom	D. Function error	Established date	2016.02.03	
		External device recognition error	Revised date		12/14

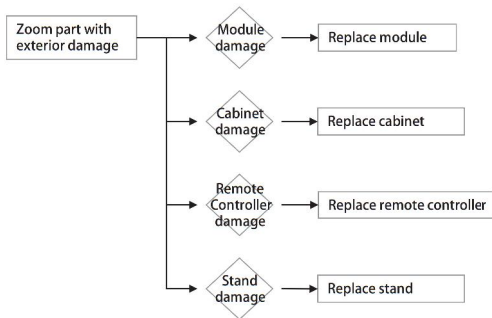


Standard Repair Process

LED TV	Error symptom	E. Noise	Established date	2016.02.03	
		Circuit noise, mechanical noise	Revised date		13/14



LED TV	Error symptom	F. Exterior defect	Established date	2016.02.03	
		Exterior defect	Revised date		14/14



Standard Repair Process Detail Technical Manual

LED TV	Error symptom	A. Video error_No video/Normal audio	Established date	2016. 02.03	
	Content	Inverter B+ 24V measuring method	Revised date		A2



1. Measure DC 24V applying to inverter PCB from Power Board.
2. Output 24V from Power Board supply to inverter PCB.
Check Pin contacting statement and connection statement.

Standard Repair Process Detail Technical Manual

LED TV	Error symptom	A. Video error_No video/ Audio	Established date	2016. 02.03	
	Content	Main Board voltage measuring method	Revised date		A4



Check main 5V,3.3V , V_CORE(1.15),DDR_1.8V

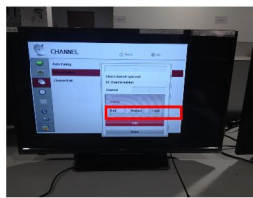
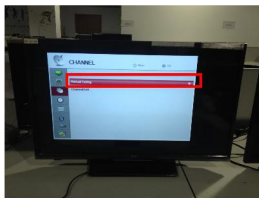
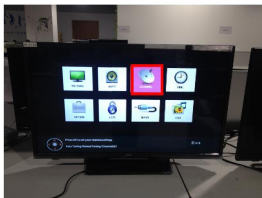
U5	3.3V
U4	DDR 1.8V
CA8	V CORE(1.15V)
CA3	MAIN 5V

Standard Repair Process Detail Technical Manual

LED TV	Error symptom	A. Video error_Video error, video lag/stop	Established date	2016. 02.03	
	Content	TUNER input signal strength checking method	Revised date		A5

(MENU-CHANNEL-MANUAL TUNING)

Signal quality: Normal:over 50%)

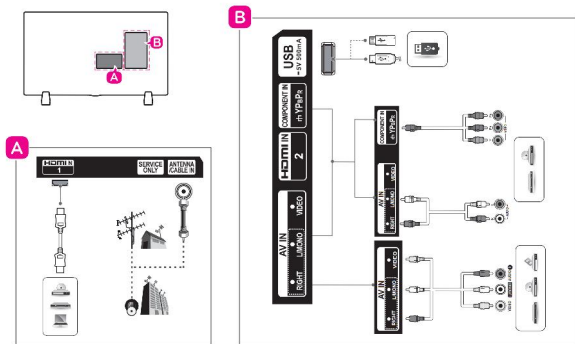


When the signal is strong, use the attenuator (-10dB, -15dB, -20dB etc.)



Standard Repair Process Detail Technical Manual

LED TV	Error symptom	A. Video error _ Vertical/Horizontal bar, residual image, light spot	Established date	2016. 02.03	
		Content	LCD TV connection diagram (1)	Revised date	



SERVICE ONLY

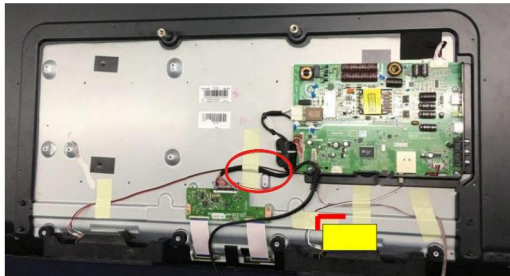
Note: Only for professional technicians, not for users.

Remarque : Uniquement pour les techniciens professionnels, pas pour les utilisateurs.

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

Standard Repair Process Detail Technical Manual

LED TV	Error symptom	B. Video error_Color error	Established date	2016.02.03	
	Content	Check and replace Link Cable (LVDS) and contact condition	Revised date		A8/A9

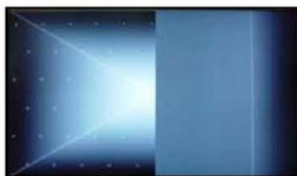


1. Check and replace LVDS Cable.
2. Check LVDS connection condition.

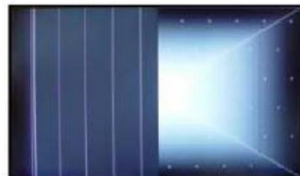
Appendix : Exchange T-Con Board (1)



Solder defect, CNT Broken



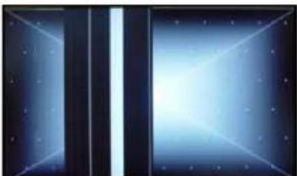
Solder defect, CNT Broken



Solder defect, CNT Broken



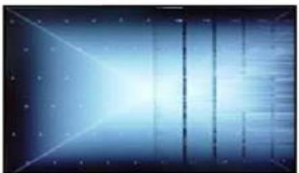
Solder defect, CNT Broken



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



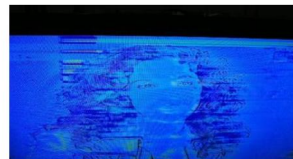
Solder defect, Short/Crack



Solder defect, Short/Crack



Fuse Open, Abnormal power section



Abnormal Display



GRADATION



Noise



GRADATION

Appendix : Exchange the Module (1)



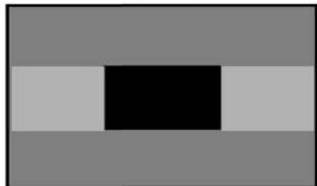
Panel Mura, Light leakage



Panel Mura, Light leakage



Press damage



Crosstalk



Press damage



Crosstalk

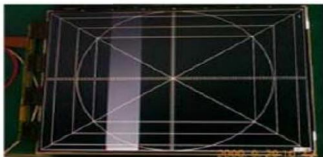


Press damage

Un-repairable Cases

In this case please exchange the module.

Appendix : Exchange the Module (2)



Vertical Block
Source TAB IC Defect



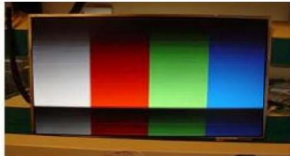
Vertical Line
Source TAB IC Defect



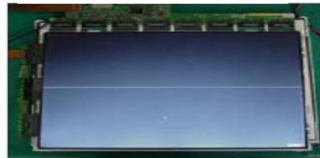
Vertical Block
Source TAB IC Defect



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

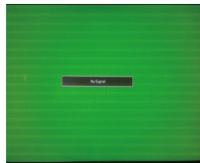
In this case please exchange the module.

Standard Repair Process Detail Technical Manual

LED TV	Error symptom	B. Video error_Color error	Established date	2016.02.03	
	Content	Check test pattern	Revised date		A10



Red pattern



Green pattern

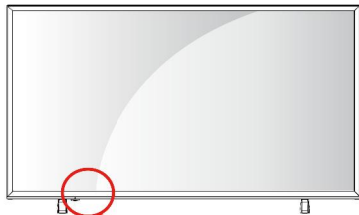


Blue pattern

Press "Input + 3195", then enter into factory mode, select "System Setting" item, enter into next page, select "Test Pattern" to switch different color pattern.

Standard Repair Process Detail Technical Manual

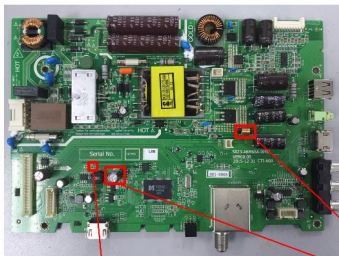
LED TV	Error symptom	B. Power error_No power	Established date	2016.02.03	
	Content	Check front display LED	Revised date		A11



ST-BY Condition: Red

Standard Repair Process Detail Technical Manual

LED TV	Error symptom	B. Power error_No Power	Established date	2016.02.03	
	Content	Check power input voltage and ST-BY 5V	Revised date		A12

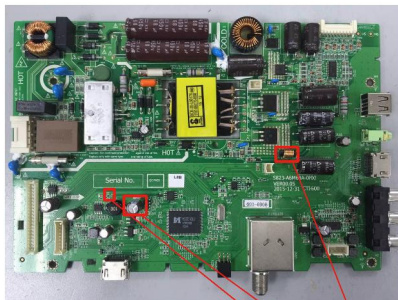


Check "5VS (CA3)" pin is high (about 5.0V)

LP2	12V
R19	ST
CA3	5VS

Standard Repair Process Detail Technical Manual

LED TV	Error symptom	B. Power error_No Power	Established date	2016.02.03	
	Content	Check method when power is ON	Revised date		A13

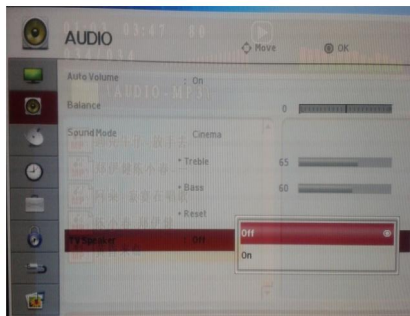


Check "STB (R19)" pin is high (about 3.0V)

LP2	12V
R19	ST
CA3	5VS

Standard Repair Process Detail Technical Manual

LED TV	Error symptom	C. Audio error_No audio /Normal video	Established date	2016.02.03	
	Content	Check method in menu when there is no audio	Revised date		A15

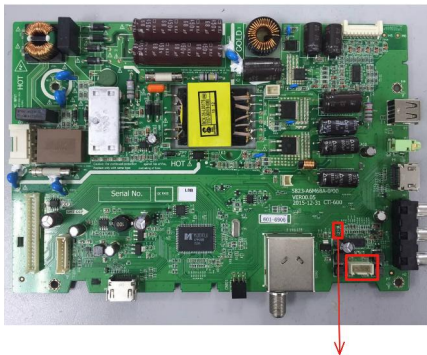


Checking order

1. Press the MENU button on the remote controller.
2. Select the AUDIO function of the MENU.
3. Select TV speaker and check its state.

Standard Repair Process Detail Technical Manual

LED TV	Error symptom	C. Audio error_No audio /Normal video	Established date	2016.02.03	
	Content	Voltage and speaker checking method when there is no audio	Revised date		A16



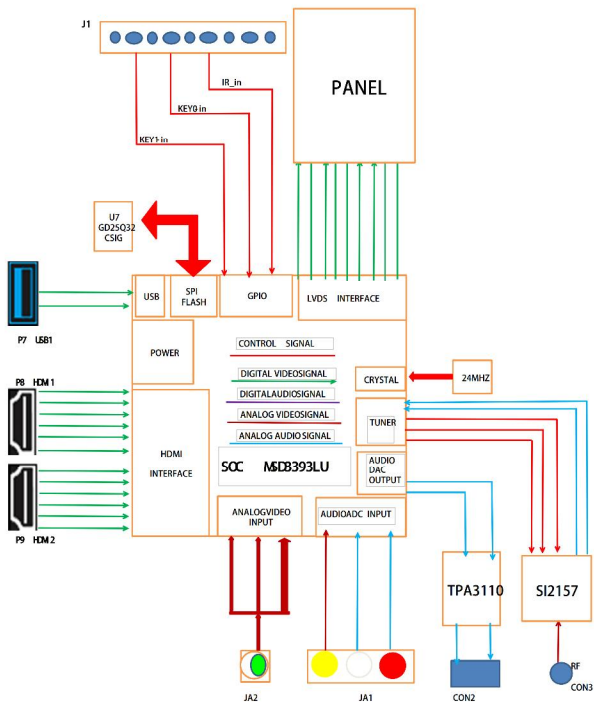
12V for amplifier

Checking order

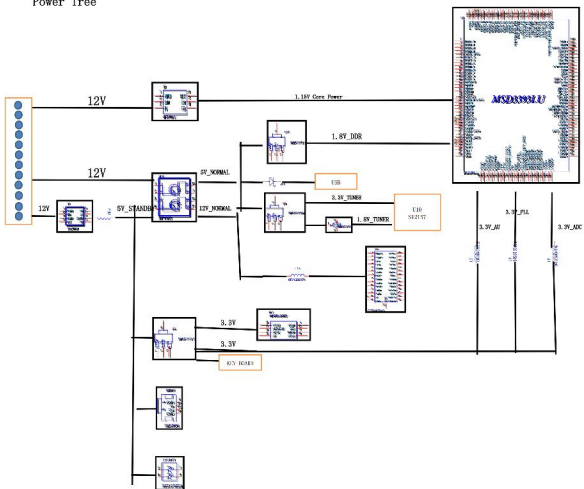
1. Check the 12V for amplifier from L13.
2. Connect the tester RX1 to the speaker terminal and if you hear the Chik Chik sound when you touch the GND and output terminal, the speaker is normal.

Block Diagram

System Block Diagram



Power Tree



Wire Block

