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LCD TV

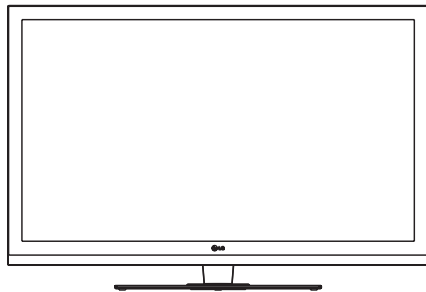
SERVICE MANUAL

CHASSIS : LJ91L

MODEL : 47SL90QD 47SL90QD-SA

CAUTION

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



P/NO : MFL61862417 (0911-REV01)

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 $\triangle$ in the Schematic Diagram and Exploded View.

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

Do not modify the original design without permission of manufacturer.

General Guidance

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

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

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

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1W), keep the resistor 10mm 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 $1M\Omega$ and $5.2M\Omega$.

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.

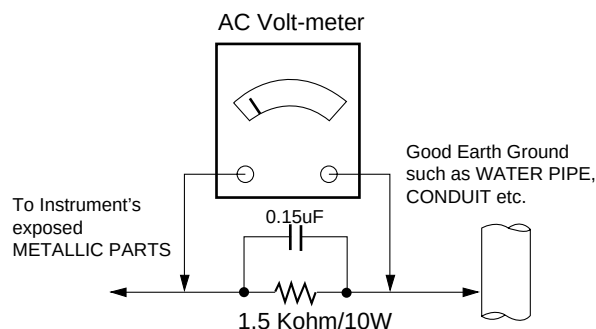
Connect 1.5K/10watt resistor in parallel with a 0.15uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

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 0.5mA.

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 0.1Ω

*Base on Adjustment standard

SERVICING PRECAUTIONS

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

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

General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;
 - a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
 - b. Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
 - c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.**CAUTION:** A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.

2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe. Do not test high voltage by "drawing an arc".
3. Do not spray chemicals on or near this receiver or any of its assemblies.
4. Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10% (by volume) Acetone and 90% (by volume) isopropyl alcohol (90%-99% strength)
CAUTION: This is a flammable mixture.
Unless specified otherwise in this service manual, lubrication of contacts is not required.
5. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
6. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
7. Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.
Always remove the test receiver ground lead last.
8. Use with this receiver only the test fixtures specified in this service manual.

CAUTION: Do not connect the test fixture ground strap to any heat sink in this receiver.

Electrostatically Sensitive (ES) Devices

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

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

unit under test.

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

General Soldering Guidelines

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

IC Remove/Replacement

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

Removal

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

Replacement

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

"Small-Signal" Discrete Transistor

Removal/Replacement

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

Power Output, Transistor Device

Removal/Replacement

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

Diode Removal/Replacement

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

Fuse and Conventional Resistor

Removal/Replacement

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

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

Circuit Board Foil Repair

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

At IC Connections

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

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

At Other Connections

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

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

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

SPECIFICATION

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

1. Application range

This specification is applied to the LCD TV used LJ91L chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

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

3. Test method

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

4. Electrical specification

4.1 General Specification

No	Item	Specification	Remark
1.	Receiving System	1) SBTVD / NTSC / PAL-M / PAL-N	
2.	Available Channel	1) VHF : 02~13 2) UHF : 14~69 3) DTV : 02-69 4) CATV : 01~135	
3.	Input Voltage	1) AC 100 ~ 240V 50/60Hz	Mark : 110V, 60Hz
4.	Market	Central and South AMERICA	
5.	Screen Size	42 inch Wide(1920x1080) 47 inch Wide(1920x1080)	42SL90QD-SA 47SL90QD-SA
6.	Aspect Ratio	16:9	
7.	Tuning System	FS	
8.	Module	LC420WUL-SBT1 LC470WUL-SBT1	42SL90QD-SA 47SL90QD-SA
9.	Operating Environment	1) Temp : 0 ~ 40 deg 2) Humidity : ~ 80 %	
10.	Storage Environment	1) Temp : -20 ~ 60 deg 2) Humidity : ~ 85 %	

5. Chrominance & Luminance spec.

No	Item			Min	Typ	Max	Unit	Remark
1.	White brightness		Module	294	368		cd/m ²	
2.	Luminance uniformity			77			%	Full white
3.	Color coordinate	RED	X	Typ. -0.03	0.640	Typ. +0.03		
4.			Y		0.331			
5.		GREEN	X		0.282			
6.			Y		0.634			
7.		BLUE	X		0.151			
8.			Y					
9.		WHITE	X		0.279			
10.			Y		0.292			
11.	Color coordinate uniformity							N/A
12.	Contrast ratio			900	1300			
13.	Color Temperature	Cool		Typ. -0.015	0.269 0.273	Typ. +0.015		<Test Condition> 85% Full white pattern ** The W/B Tolerance is -0.015 for Adjustment Dynamic contrast : off Dynamic color : off OPC : off
		Standard		Typ. -0.015	0.285 0.293	Typ. +0.015		
		Warm		Typ. -0.015	0.313 0.329	Typ. +0.015		
14.	Color Distortion, DG					10.0	%	
15.	Color Distortion, DP					10.0	deg	
16.	Color S/N, AM/FM			43.0			dB	
17.	Color Killer Sensitivity			-80			dBm	

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

No	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock	Proposed
1.	720*480	15.73	60	13.5135	SDTV ,DVD 480I
2.	720*480	15.73	59.94	13.5	SDTV ,DVD 480I
3.	720*480	31.47	60	27.027	SDTV 480P
4.	720*480	31.47	59.94	27.0	SDTV 480P
5.	1280*720	45.00	60.00	74.25	HDTV 720P
6.	1280*720	44.96	59.94	74.176	HDTV 720P
7.	1920*1080	33.75	60.00	74.25	HDTV 1080I
8.	1920*1080	33.72	59.94	74.176	HDTV 1080I
9.	1920*1080	67.500	60	148.50	HDTV 1080P
10.	1920*1080	67.432	59.939	148.352	HDTV 1080P
11.	1920*1080	27.000	24.000	74.25	HDTV 1080P
12.	1920*1080	26.97	23.94	74.176	HDTV 1080P
13.	1920*1080	33.75	30.000	74.25	HDTV 1080P
14.	1920*1080	33.71	29.97	74.176	HDTV 1080P
15.	1920*1080	56.25	50.000	148.5	HDTV 1080P
16.	1920*1080	28.125	25.000	74.25	HDTV 1080P

7. RGB Input (PC)

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	35.156	56.25	36.00	VESA(SVGA)	O
5.	800*600	37.879	60.31	40.00	VESA(SVGA)	O
6.	1024*768	48.363	60.00	65.00	VESA(XGA)	O
7.	1280*768	47.776	59.870	79.5	CVT(WXGA)	O
8.	1360*768	47.712	60.015	85.50	VESA (WXGA)	O
9.	1280*1024	63.981	60.020	108.00	VESA	O
10.	1600*1200	75.00	60.00	162	VESA (UXGA)	O
11.	1920*1080	67.5	60	148.5	HDTV 1080P	O

** RGB PC Monitor Range Limits

- Min Vertical Freq - 56 Hz
- Max Vertical Freq - 62 Hz
- Min Horiz. Freq - 30 kHz
- Max Horiz. Freq - 80 kHz
- Pixel Clock - 170 MHz

8. HDMI Input (PC/DTV)

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	35.156	56.25	36.00	VESA(SVGA)	O
5	800*600	37.879	60.31	40.00	VESA(SVGA)	O
6	1024*768	48.363	60.00	65.00	VESA(XGA)	O
7	1280*768	47.776	59.870	79.5	CVT(WXGA)	O
8	1360*768	47.712	60.015	85.50	VESA (WXGA)	O
9	1280*1024	63.981	60.020	108.00	VESA (SXGA)	O
10	1600*1200	75.00	60.00	162	VESA (UXGA)	O
11	1920*1080	66.587	59.934	138.5	HDTV 1080P	O
	DTV					
1	720*480	31.47	60	27.027	SDTV 480P	
2	720*480	31.47	59.94	27.00	SDTV 480P	
3	1280*720	45.00	60.00	74.25	HDTV 720P	
4	1280*720	44.96	59.94	74.176	HDTV 720P	
5	1920*1080	33.75	60.00	74.25	HDTV 1080I	
6	1920*1080	33.72	59.94	74.176	HDTV 1080I	
7	1920*1080	67.500	60	148.50	HDTV 1080P	
8	1920*1080	67.432	59.939	148.352	HDTV 1080P	
9	1920*1080	27.000	24.000	74.25	HDTV 1080P	
10	1920*1080	26.97	23.94	74.176	HDTV 1080P	
11	1920*1080	33.75	30.000	74.25	HDTV 1080P	
12	1920*1080	33.71	29.97	74.176	HDTV 1080P	
17.	1920*1080	56.25	50.000	148.5	HDTV 1080P	
18.	1920*1080	28.125	25.000	74.25	HDTV 1080P	

** HDMI Monitor Range Limits

- Min Vertical Freq - 56 Hz
- Max Vertical Freq - 62 Hz
- Min Horiz. Freq - 30 kHz
- Max Horiz. Freq - 80 kHz
- Pixel Clock - 170 MHz

9. Consignment Setting (OUTGOING CONDITION)

No	Item		Condition
1.	Input Mode		TV02CH
2.	Volume Level		10
3.	Mute		Off
4.	Aspect Ratio		16:9
5.	System Color		PAL-M
6.	Booster		On
7.	Picture	Picture Mode	Vivid
		Backlight	100
		Contrast	100
		Brightness	50
		Sharpness	70
		Color	70
		Tint	0
		Color Temperature	Cool
		Picture Reset	
8.	Audio	Sound Mode	Standard
		Auto Volume	Off
		Clear Voice	Off
		SRS TruSurround XT	Off
		Balance	0
		TV Speaker	On
9.	Time	Clock	Auto
		Off Timer / On Timer	Off
		Sleep Timer / Auto Sleep	
10.	Option	Language (Menu/Audio)	Portugues
		SimpLink	On
		Key Lock	Off
		Caption	Off
		Set ID	1
11.	Channel Memory		RF : 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 30, 51, 63 CATV : 15, 16, 17

ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied all of the LJ91T LCD TV models, which produced in manufacture department or similar LG TV factory.

2. Notice

- 1) Because this is not a hot chassis, it is not necessary to use an isolation transformer. However, the use of isolation transformer will help protect test instrument.
 - 2) Adjustment must be done in the correct order. But it is flexible when its factory local problem occurs. .
 - 3) The adjustment must be performed in the circumstance of $25 \pm 5^{\circ}\text{C}$ of temperature and $65 \pm 10\%$ of relative humidity if there is no specific designation.
 - 4) The input voltage of the receiver must keep 100~220V, 50/60Hz.
 - 5) Before adjustment, execute Heat-Run for 5 minutes.
- After Receive 100% Full white pattern (06CH) then process Heat-run (or "8. Test pattern" condition of Ez-Adjust status)
 - How to make set white pattern
 - 1) Press Power ON button of Service Remocon
 - 2) Press ADJ button of Service remocon. Select "8. Test pattern" and, after select "White" using navigation button, and then you can see 100% Full White pattern.

* In this status you can maintain Heat-Run useless any pattern generator

* Notice: if you maintain one picture over 20 minutes (Especially sharp distinction black with white pattern – 13Ch, or Cross hatch pattern – 09Ch) then it can appear image stick near black level.

3. Adjustment Items

3.1 PCB Assembly adjustment

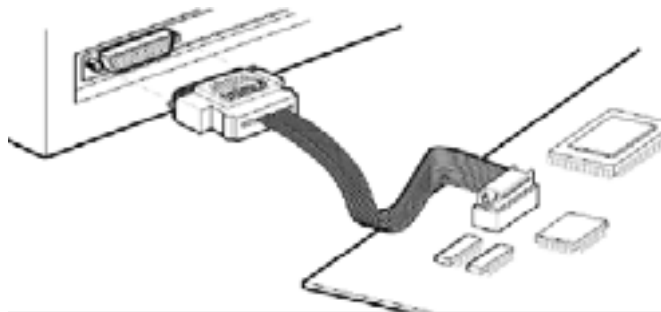
- CPLD DOWNLOAD
- Adjust 480i Comp1
- Adjust 1080p Comp1/RGB
 - If it is necessary, it can adjustment at Manufacture Line
 - You can see set adjustment status at "1. ADJUST CHECK" of the "In-start menu"

3.2 Set Assembly Adjustment

- EDID (The Extended Display Identification Data) / DDC (Display Data Channel) download
- Color Temperature (White Balance) Adjustment
- Make sure RS-232C control
- Selection Factory output option

4. PCB Assembly Adjustment

4.1. CPLD DOWNLOAD : JTAG MODE



4.2. << PRINT PORT >> PIN MAP

Pin	JTAG Mode Signal Name
2	TCK
3	TMS
8	TDI
11	TDO
13	-
15	VCC
18 TO 25	GND

4.3. << 10P WAFER >> PIN MAP

Dimensions are shown in inches. The spacing between pin centers is 0.1 inch.

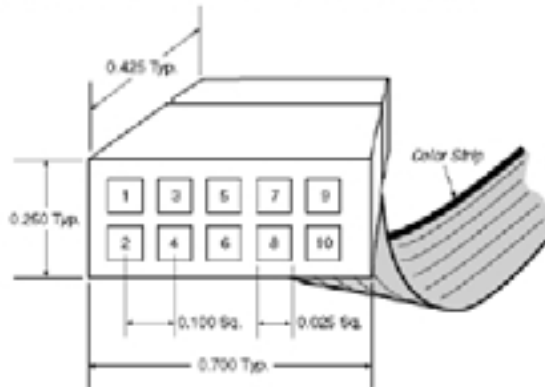


Table 2 identifies the 10-pin female plug's pin names for the corresponding download mode.

Table 2. ByteBlasterMV Female Plug's Pin Names & Download Modes

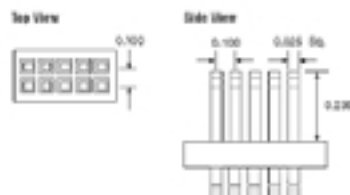
Pin	PS Mode		JTAG Mode	
	Signal Name	Description	Signal Name	Description
1	CLK	Clock signal	CLK	Clock signal
2	GND	Signal ground	GND	Signal ground
9	CONF_DONE	Configuration control	TDO	Data from device
4	VCC	Power supply	VCC	Power supply
5	nCONFIG	Configuration control	TMS	JTAG state machine control
6	—	No connect	—	No connect
7	nSTATUS	Configuration status	—	No connect
8	—	No connect	—	No connect
9	DATA0	Data to device	TDI	Data to device
10	GND	Signal ground	GND	Signal ground

Circuit Board Header Connection

The ByteBlasterMV 10-pin female plug connects to a 10-pin male header on the circuit board. The 10-pin male header has two rows of five pins, which are connected to the device's programming or configuration pins. The ByteBlasterMV cable receives power and downloads data via the male header. Figure 4 shows the dimensions of a typical 10-pin male header.

Figure 4. 10-Pin Male Header Dimensions

Dimensions are shown in inches.



Operating Conditions

Tables 3 through 5 summarize the absolute maximum ratings, recommended operating conditions, and DC operating conditions for the ByteBlasterMV cable.

Table 3. ByteBlasterMV Cable Absolute Maximum Ratings

Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	Supply voltage	With respect to ground	-0.5	7.0	V
V _I	DC input voltage	With respect to ground	-0.5	7.0	V

Table 4. ByteBlasterMV Cable Recommended Operating Conditions

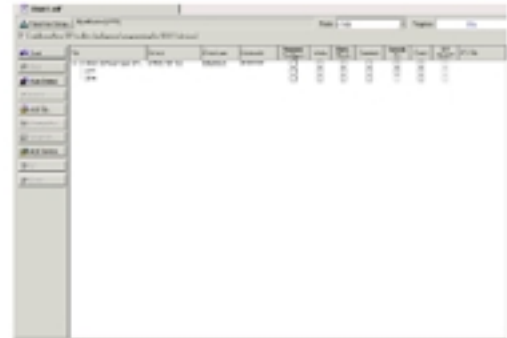
Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	Supply voltage, 5.0-V operation		4.5	5.5	V
	Supply voltage, 3.3-V operation		3.0	3.6	V

Real-Time ISP with the Quartus II Software

The programming file formats generated by the Quartus II software that support these two features are the Programmer Object File (.pof) that is used with the Quartus II programmer, and the .lpm file (.lpm) and .lpm Byte-Code File (.lbc) that are used with either the Quartus II programmer or other programming tools.

Ensure that you enable this feature before programming a MAX II device through the Quartus II programmer. You can enable the real-time ISP feature by selecting the Enable real-time ISP to allow background programming the MAX II device option from the Quartus II programmer window. Refer to Figure 12-3.

Figure 12-3. Real-Time ISP Option in the Quartus II Programmer Window



You can also enable the real-time ISP feature in the Quartus II software through the following steps:

1. Choose Options (Tools menu).
2. Choose Programmer under the Category section.

Software Instructions

Altera's Quartus II and the MAX+PLUS II design software packages provide the programmer function required to configure or program devices using the BytEBlasterMV download cable.

Quartus II Instructions

To configure or program one or more devices with the BytEBlasterMV cable and the Quartus II programmer

1. Compile a project. The Quartus II compiler generates a .sof file to configure APEX II, APEX 20K, Mercury, and Escalibur devices. To program an EPC configuration device, a .pof or JAM STAPL format file should be used.
2. Attach the BytEBlasterMV cable to a parallel port on a PC and insert the 18-pin female plug into the prototype system containing the target device. The board must supply power to the BytEBlasterMV cable.

 For the Windows NT operating system, a driver must be installed before using the BytEBlasterMV cable. For instructions on installing BytEBlasterMV drivers, go to the "BytEBlaster MV and MasterBlaster Installation" section in the Quartus II Installation and Licensing for PCs Manual. If you do not see a selection for the BytEBlasterMV cable in the hardware setup windows, the BytEBlasterMV driver is not installed.

3. Open the Quartus II programmer by selecting **Open Programmer** from the (Processing menu). Choose **Setup...** in the Programming Hardware section. Specify the BytEBlasterMV cable and the appropriate LPT port. Please see "Changing Setup" under the BytEBlasterMV cable in the Quartus II software Help menu for more information.
4. Select either passive serial or JTAG programming mode and then add the files and/or devices you want to program or configure using the **add file...** or **add device...** buttons to create a chain description file (.cdf).

 The programmer has two programming modes: passive serial and JTAG. In passive serial mode, you select which SOFs to include in the device chain. In JTAG mode, you add specific devices and configuration devices to the device chain, in addition to POFs and SOFs, and you have several programming options for each configuration device in the chain. In JTAG mode, you can verify an EPC configuration device's contents against its programming file data, check that a device is blank, examine a programmed device and save its data to file, or use its data to program or verify another configuration device.

5. Choose the **start** button in the Quartus II software to program or configure the device(s). The BytEBlasterMV cable downloads the data from the SOF and/or POF file(s) into the device(s).

4.4. Using RS-232C

Adjust 3 items at 3.1 PCB assembly adjustments "4.1.3 sequence" one after the order.

O Adjustment protocol

Order	Command	Set response
1. Inter the Adjustment mode	ad 00 00	d 00 OK00x
2. Change the Source	kb 00 40 kb 00 60	b 00 OK40x (Adjust 480i Comp1/1080p Comp1) b 00 OK60x (Adjust 1080p RGB)
3. Start Adjustment	ad 00 10	
4. Return the Response		OKx (Success condition) NGx (Failed condition)
5. Read Adjustment data	(main) ad 00 20 (main) ad 00 30	(main : component1 480i, RGB 1080p) 0000000000000000000000007c007b006dx (main : component1 1080p) 0000000700000000000000007c00830077x
6. Confirm Adjustment	ad 00 99	NG 03 00x (Failed condition) NG 03 01x (Failed condition) NG 03 02x (Failed condition) OK 03 03x (Success condition)
7. End of Adjustment	ad 00 90	d 00 OK90x

See ADC Adjustment RS232C Protocol_Ver1.0

O Adjustment protocol

- Pattern Generator : (MSPG-925FA)
- Adjust 480i Comp1 (MSPG-925FA : model :209 , pattern : 65)
- Adjust 1080p Comp1/RGB(MSPG-925FA:model : 225 , pattern : 65)
- Adjust RGB (MSPG-925FA:model :225 , Pattern :65) – RGB-PC Mode

* If you want more information then see the below Adjustment method (Factory Adjustment)

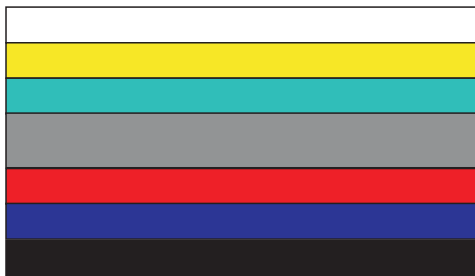
O Adjustment sequence

- ad 00 00 : Enter the ADC Adjustment mode.
- xb 00 40: Change the mode to Component1 (No actions)
- ad 00 10: Adjust 480i Comp
- ad 00 10: Adjust 1080p Comp
- xb 00 60: Change to RGB-PC mode(No action)
- ad 00 10: Adjust 1080p RGB
- ad 00 90: End of the adjustment

5. Factory Adjustment

5.1 Manual Adjust Component 480i/1080p RGB 1080p

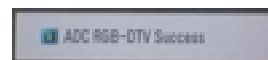
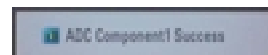
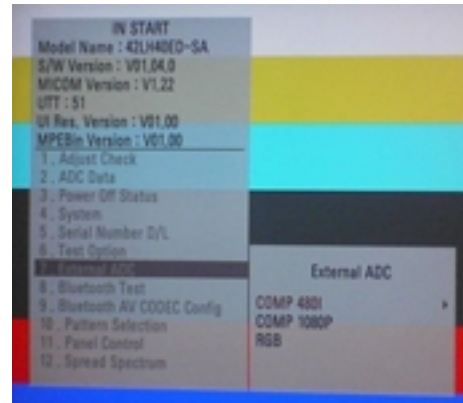
- Summary : Adjustment component 480i/1080i and RGB 1080p is Gain and Black levelsetting at Analog to Digital converter, and compensate the RGB deviation
- Using instrument
 - Adjustment remocon, 801GF(802B, 802F, 802R) or MSPG925FA pattern generator (It can output 480i/1080i horizontal 100% color bar pattern signal, and its output level must setting $0.7V \pm 0.1V$ p-p correctly)



<Pic.4 Adjustment pattern : 480i / 1080p 60Hz Pattern >

* You must make it sure its resolution and pattern cause every instrument can have different setting

- Adjustment method 480i Comp1, Adjust 1080p Comp1/RGB (Factory adjustment)
 - ADC 480i Component1 adjustment
 - Check connection of Component1
 - MSPG-925FA Model: 209, Pattern 65
 - Set Component 480i mode and 100% Horizontal Color Bar Pattern(HozTV31Bar), then set TV set to Component1 mode and its screen to "NORMAL"
 - ADC 1080p Component1 / RGB adjustment
 - Check connection both of Component1 and RGB
 - MSPG-925FA Model: 225, Pattern 65
 - Set Component 1080p mode and 100% Horizontal Color Bar Pattern(HozTV31Bar), then set TV set to Component1 mode and its screen to "NORMAL"
 - After get each the signal, wait more a second and enter the "IN-START" with press IN-START key of Service remocon. After then select "7. External ADC" with navigator button and press "Enter".
 - After Then Press key of Service remocon "Right Arrow(VOL+)"
 - You can see "ADC Component1 Success"
 - Component1 1080p, RGB 1080p Adjust is same method.
 - Component 1080p Adjustment in Component1 input mode
 - RGB 1080p adjustment in RGB input mode
 - If you success RGB 1080p Adjust. You can see "ADC RGB-DTV Success"



5.2 EDID (The Extended Display Identification Data) / DDC (Display Data Channel) Download.

- Summary
 - It is established in VESA, for communication between PC and Monitor without order from user for building user condition. It helps to make easily use realize "Plug and Play" function.
 - For EDID data write, we use DDC2B protocol.
- Auto Download
 - After enter Service Mode by pushing "ADJ" key,
 - Enter EDID D/L mode.
 - Enter "START" by pushing "OK" key.

Caution: - Never connect HDMI & D-sub Cable when the user downloading .
- Use the proper cables below for EDID Writing.



Edid data and Model option download (RS232)

NO	Item	CMD 1	CMD 2	Data 0	
Enter download MODE	Download ModelIn	A	E	0	0
Edid data and Model option download	Download	A	E	*Note1	*Note2
	Adjust Mode Out	A	E	9	0
	Adjustment Confirmation	A	E	9	9

Manual Download

Write HDMI EDID data

Using instruments

=> Jig. (PC Serial to D-Sub connection) for PC, DDC adjustment.

=> S/W for DDC recording (EDID data write and read)

=> D-sub jack

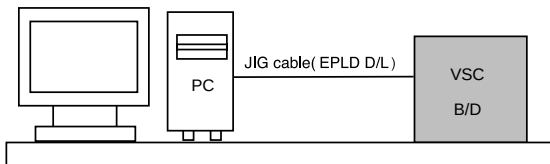
=> Additional HDMI cable connection Jig.

Preparing and setting.

=> Set instruments and Jig. Like pic.5), then turn on PC and Jig.

=> Operate DDC write S/W (EDID write & read)

=> It will operate in the DOS mode.



Pic.3) For write EDID data, setting Jig and another instruments.

EDID data for LJ91D Chassis (Model name = LG TV)

HDMI-1 EDID table (0x3D, 0x2C)

Addr	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
0000	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
0010	00	13	01	03	80	73	41	96	0A	CF	74	A3	57	4C	B0	23
0020	09	48	4C	A3	08	00	31	40	45	40	61	40	81	80	A9	40
0030	01	01	01	01	01	01	01	1A	36	80	A0	70	38	1F	40	30
0040	35	00	C4	8E	21	00	00	1A	66	21	50	B0	51	00	1B	30
0050	40	70	36	00	C4	8E	21	00	00	1E	00	00	00	FD	00	38
0060	3E	1E	50	11	00	0A	20	20	20	20	20	20	20	00	00	FC
0070	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	3D
0080	02	03	20	F1	48	84	05	03	02	20	22	10	1F	26	15	07
0090	50	09	07	07	67	03	0C	00	10	00	38	2D	E3	05	03	01
00A0	01	1D	00	72	51	D0	1E	20	6E	28	55	00	C4	8E	21	00
00B0	00	1E	01	1D	80	18	71	1C	16	20	58	2C	25	00	C4	8E
00C0	21	00	00	9E	8C	0A	D0	8A	20	E0	2D	10	10	3E	96	00
00D0	C4	8E	21	00	00	18	8C	0A	D0	8A	20	E0	2D	10	10	3E
00E0	96	00	13	8E	21	00	00	18	0E	1F	00	80	51	00	1E	30
00F0	40	80	37	00	C4	8E	21	00	00	1C	00	00	00	00	00	2C

HDM2 EDID table (0x3D, 0x1C)

Addr	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
0000	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
0010	00	13	01	03	80	73	41	96	0A	CF	74	A3	57	4C	B0	23
0020	09	48	4C	A3	08	00	31	40	45	40	61	40	81	80	A9	40
0030	01	01	01	01	01	01	01	1A	36	80	A0	70	38	1F	40	30
0040	35	00	C4	8E	21	00	00	1A	66	21	50	B0	51	00	1B	30
0050	40	70	36	00	C4	8E	21	00	00	1E	00	00	00	FD	00	38
0060	3E	1E	50	11	00	0A	20	20	20	20	20	20	20	00	00	FC
0070	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	3D
0080	02	03	20	F1	48	84	05	03	02	20	22	10	1F	26	15	07
0090	50	09	07	07	67	03	0C	00	10	00	38	2D	E3	05	03	01
00A0	01	1D	00	72	51	D0	1E	20	6E	28	55	00	C4	8E	21	00
00B0	00	1E	01	1D	80	18	71	1C	16	20	58	2C	25	00	C4	8E
00C0	21	00	00	9E	8C	0A	D0	8A	20	E0	2D	10	10	3E	96	00
00D0	C4	8E	21	00	00	18	8C	0A	D0	8A	20	E0	2D	10	10	3E
00E0	96	00	13	8E	21	00	00	18	0E	1F	00	80	51	00	1E	30
00F0	40	80	37	00	C4	8E	21	00	00	1C	00	00	00	00	00	1C

HDMI-3 EDID table (0x3D, 0x0C)

Addr	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
0000	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
0010	00	13	01	03	80	73	41	96	0A	CF	74	A3	57	4C	B0	23
0020	09	48	4C	A3	08	00	31	40	45	40	61	40	81	80	A9	40
0030	01	01	01	01	01	01	01	1A	36	80	A0	70	38	1F	40	30
0040	35	00	C4	8E	21	00	00	1A	66	21	50	B0	51	00	1B	30
0050	40	70	36	00	C4	8E	21	00	00	1E	00	00	00	FD	00	38
0060	3E	1E	50	11	00	0A	20	20	20	20	20	20	20	00	00	FC
0070	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	3D
0080	02	03	20	F1	48	84	05	03	02	20	22	10	1F	26	15	07
0090	50	09	07	07	67	03	0C	00	10	00	38	2D	E3	05	03	01
00A0	01	1D	00	72	51	D0	1E	20	6E	28	55	00	C4	8E	21	00
00B0	00	1E	01	1D	80	18	71	1C	16	20	58	2C	25	00	C4	8E
00C0	21	00	00	9E	8C	0A	D0	8A	20	E0	2D	10	10	3E	96	00
00D0	C4	8E	21	00	00	18	8C	0A	D0	8A	20	E0	2D	10	10	3E
00E0	96	00	13	8E	21	00	00	18	0E	1F	00	80	51	00	1E	30
00F0	40	80	37	00	C4	8E	21	00	00	1C	00	00	00	00	00	0C

Analog (RGB) EDID table (0x9B, 0x25)

Addr	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
0000	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
0010	00	13	01	03	80	73	41	96	0A	CF	74	A3	57	4C	B0	23
0020	09	48	4C	A3	08	00	31	40	45	40	61	40	81	80	A9	40
0030	01	01	01	01	01	01	01	1A	36	80	A0	70	38	1F	40	30
0040	35	00	C4	8E	21	00	00	1A	66	21	50	B0	51	00	1B	30
0050	40	70	36	00	C4	8E	21	00	00	1E	00	00	00	FD	00	38
0060	3E	1E	50	11	00	0A	20	20	20	20	20	20	20	00	00	FC
0070	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	A5
0080	02	03	04	00	0E	1F	00	80	51	00	1E	30	40	80	37	00
0090	C4	8E	21	00	00	1C	00	00	00	00	00	00	00	00	00	00
00A0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00B0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00C0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00D0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00E0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	25

See Workig Guide of you want more information about EDID communication.

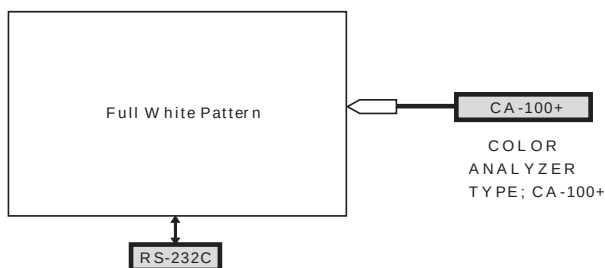
5.3 Adjustment Color Temperature (White balance)

O Using Instruments

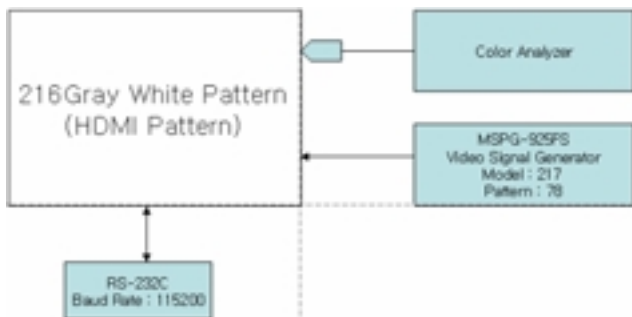
- Color Analyzer: CA-210 (CH 9)
 - Using LCD color temperature, Color Analyzer (CA-210) must use CH 9, which Matrix compensated (White, Red, Green, Blue compensation) with CS-2100. See the Coordination bellowed one.
- Auto-adjustment Equipment (It needs when Auto-adjustment – It is availed communicate with RS-232C : Baud rate: 115200)
- Video Signal Generator MSPG-925F 720p, 216Gray (Model: 217, Pattern 78)

O Connection Diagram (Auto Adjustment)

- Using Inner Pattern



- Using HDMI input



<Pic.5 Connection Diagram for Adjustment White balance> .

O White Balance Adjustment

If you can't adjust with inner pattern, then you can adjust it using HDMI pattern. You can select option at "Ez-Adjust Menu – 7. White Balance" there items "NONE, INNER, HDMI". It is normally setting at inner basically. If you can't adjust using inner pattern you can select HDMI item, and you can adjust.

In manual Adjust case, if you press ADJ button of service remocon, and enter "Ez-Adjust Menu – 7. White Balance", then automatically inner pattern operates. (In case of "Inner" originally "Inner" will be selected.

- Connect all cables and equipments like Pic.5)
- Set Baud Rate of RS-232C to 115200. It may set 115200 originally.
- Connect RS-232C cable to set
- Connect HDMI cable to set



¢ RS-232C Command (Commonly apply)

wb	00	00	White Balance adjustment start.
wb	00	10	Start of adjust gain (Inner white pattern)
wb	00	1f	End of gain adjust
wb	00	20	Start of offset adjust (Inner white pattern)
wb	00	2f	End of offset adjust
wb	00	ff	End of White Balance adjust (Inner pattern disappeared)

- "wb 00 00": Start Auto-adjustment of white balance.
- "wb 00 10": Start Gain Adjustment (Inner pattern)
- "jb 00 c0" :
- ...
- "wb 00 1f": End of Adjustment
 - * If it needs, offset adjustment (wb 00 20-start, wb 00 2f-end)
- "wb 00 ff": End of white balance adjustment (inner pattern disappear)

O White Balance Adjustment (Manual adjustment)

- Test Equipment: CA-210
 - Using LCD color temperature, Color Analyzer (CA-210) must use CH 9, which Matrix compensated (White, Red, Green, Blue compensation) with CS-2100. See the Coordination bellowed one.
- Manual adjustment sequence is like bellowed one.
 - Turn to "Ez-Adjust" mode with press ADJ button of service remocon.
 - Select "10.Test Pattern" with CH+/- button and press enter. Then set will go on Heat-run mode. Over 30 minutes set let on Heat-run mode.
 - Let CA-210 to zero calibration and must has gap more 10cm from center of LCD module when adjustment.
 - Press "ADJ" button of service remocon and select "7.White-Balance" in "Ez-Adjust" then press "▶" button of navigation key.
(When press "▶" button then set will go to full white mode)
 - Adjust at three mode (Cool, Medium, Warm)
 - If "cool" mode
 - Let B-Gain to 192 and R, G, B-Cut to 64 and then control R, G gain adjustment High Light adjustment.
 - If "Medium" and "Warm" mode
 - Let R-Gain to 192 and R, G, B-Cut to 64 and then control G, B gain adjustment High Light adjustment.
 - All of the three mode
 - Let R-Gain to 192 and R, G, B-Cut to 64 and then control G, B gain adjustment High Light adjustment.
 - With volume button (+/-) you can adjust.
 - After all adjustment finished, with Enter (■) key turn to Ez-Adjust mode. Then with ADJ button, exit from adjustment mode

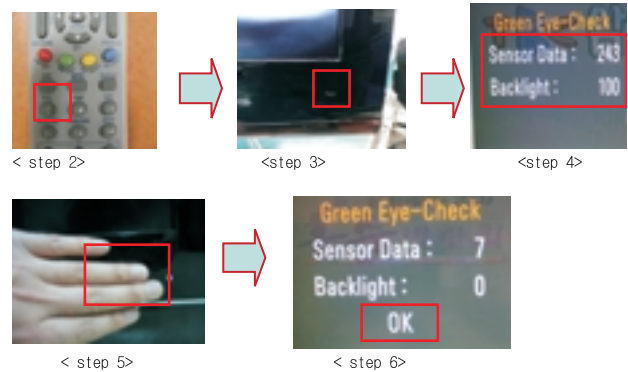
Attachment: White Balance adjustment coordination and color temperature.

O Using CS-1000 Equipment.

- COOL : $T=11000K$, $\Delta uv=0.000$, $x=0.276$ $y=0.283$
- MEDIUM : $T=9300K$, $\Delta uv=0.000$, $x=0.285$ $y=0.293$
- WARM : $T=6500K$, $\Delta uv=0.000$, $x=0.313$ $y=0.329$

5.4 EYE-Q Function check.

- 1) Turn on TV
- 2) Press EYE Key of Adj R/C
- 3) Cover the Eye Q II sensor on the front of the using your hand and wait for 6 seconds
- 4) Confirm that R/G/B value os ;pwer tjam 10 of the 'Raw Data (Sensor data, Back light)". If after 6 seconds, R/G/B value is not lower than 10, re[;ace EYE Q II sensor.
- 5) Remove your hand from the EYE Q II sensor and wait for 6 sencond
- 6) Confirm that "OK" pop up.
If change is not seen, replace EYE Q II sensor



5.5 Test of RS-232C control

Press IN-Start button of service remocon then set the "4.Baud rate" to 15200, Then check RS-232C control and

5.6 Selection of Country option.

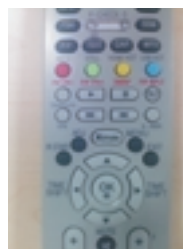
Selection of country option is allowed only North American model (Not allowed Korean model). It is selection of Country about Rating and Time Zone.

- Models: All models which use LA75A Chassis (See the first page.)
- Press "In-Start" button of Service Remocon, then enter the "Option" Menu with "PIP CH-" Button
- Select one of these three (USA, CANADA, MEXICO) depends on its market using "Vol. +/-" button.

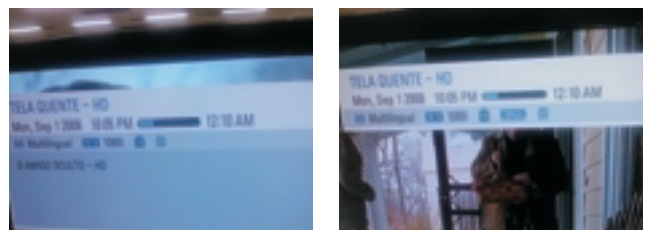
*** Caution : Don't push The Instop Key ater completing the function inspection.**

5.7 Check the Ginga(Data Broadcasting)

- 1) Turn on TV
- 2) Press the OK Button on the ADJ R/C



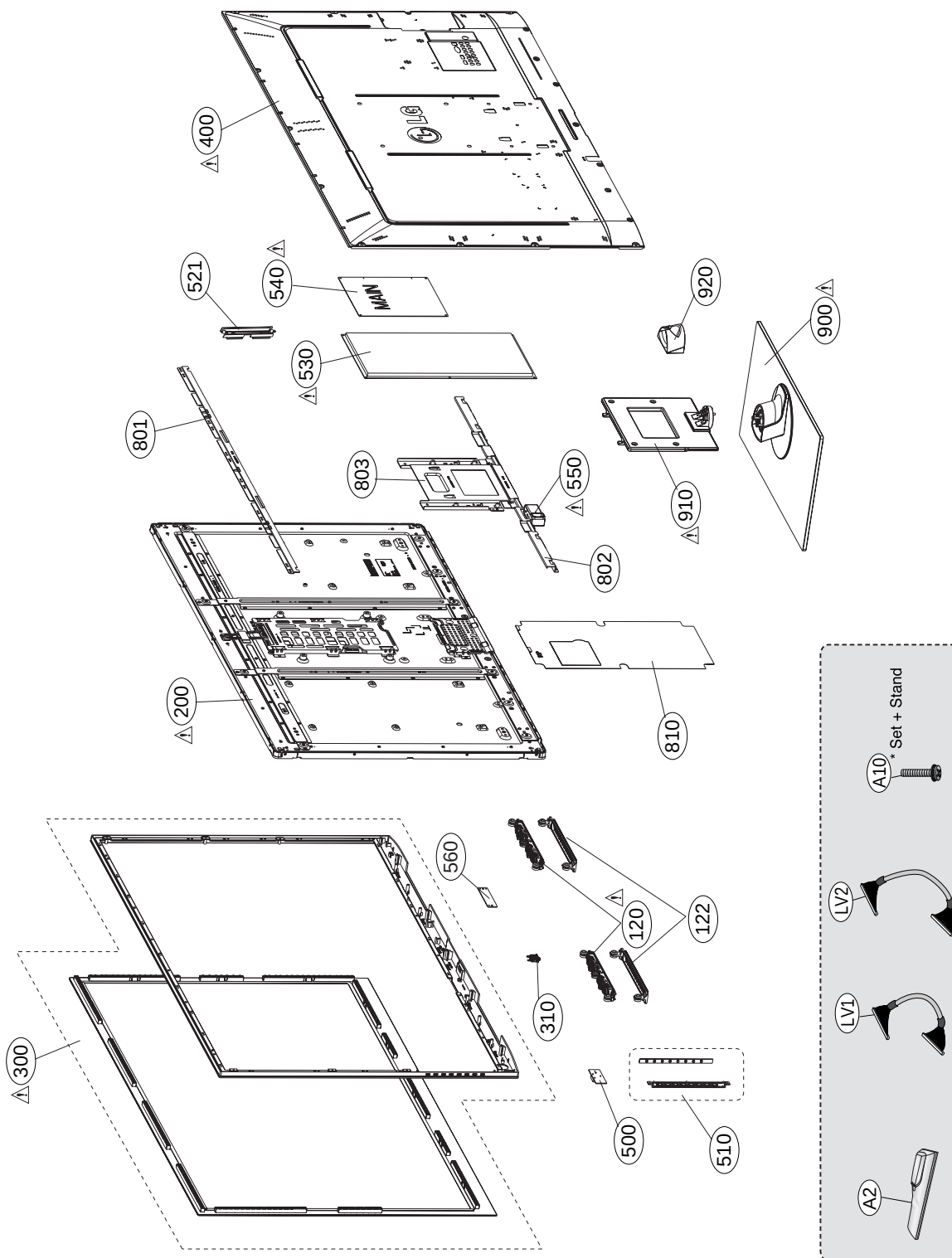
- 3) Check the Ginga icon

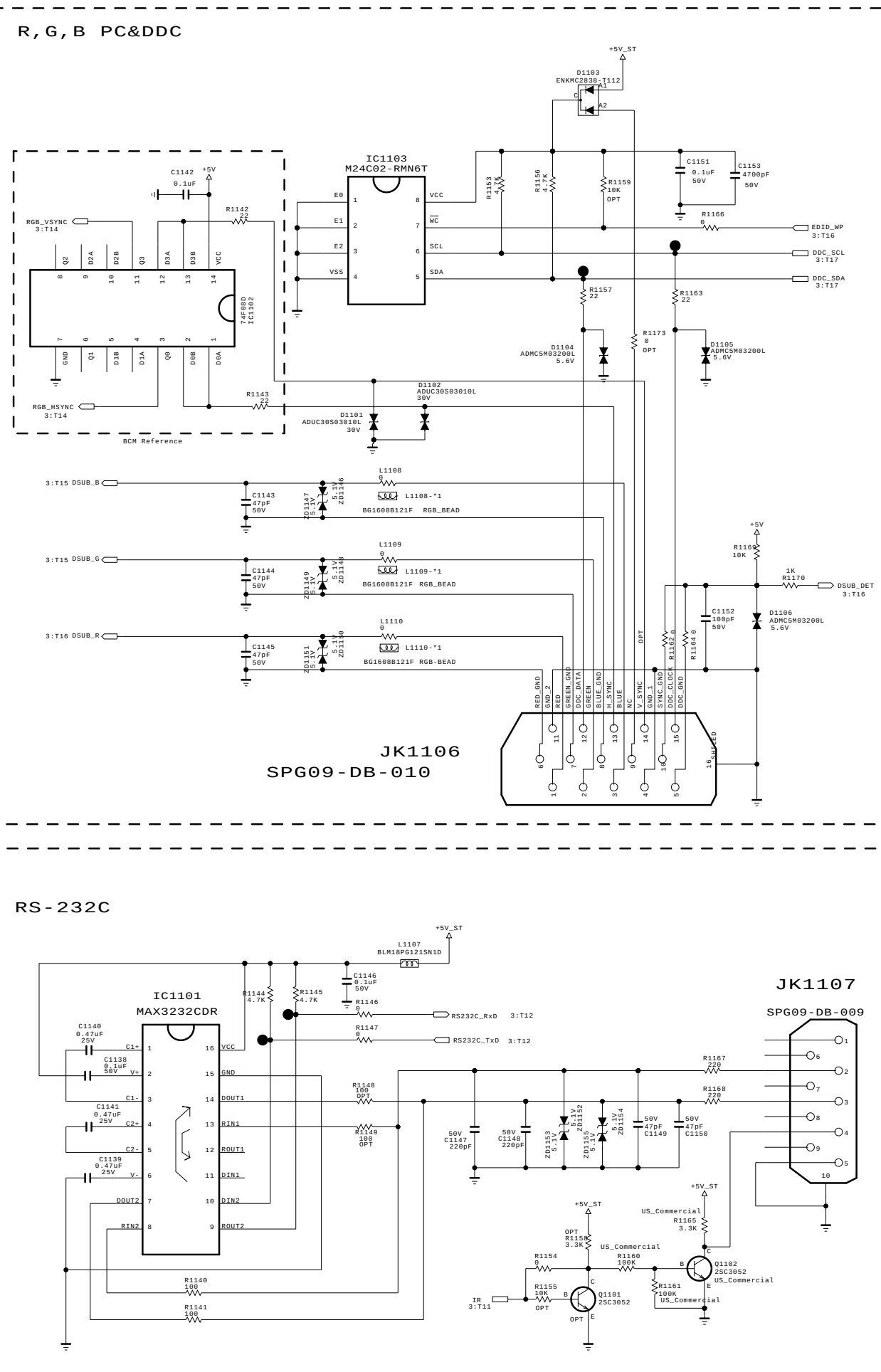
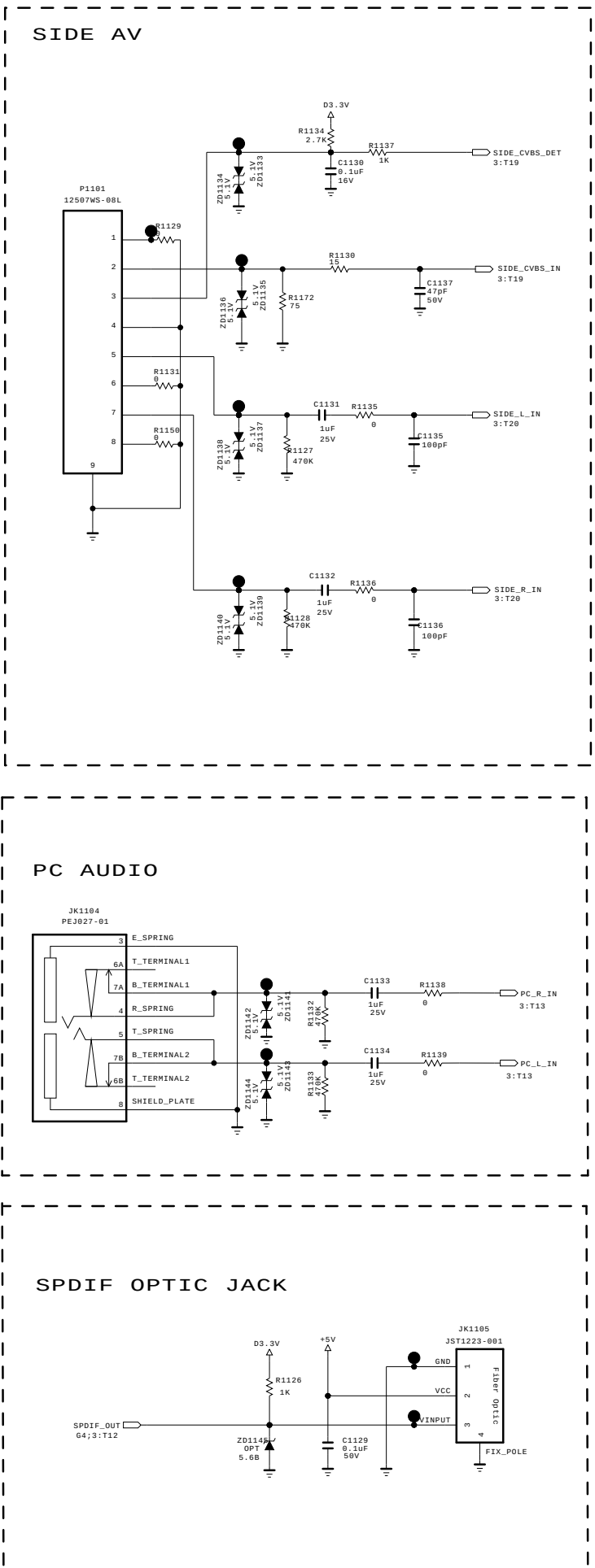


EXPLODED VIEW

IMPORTANT SAFETY NOTICE

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

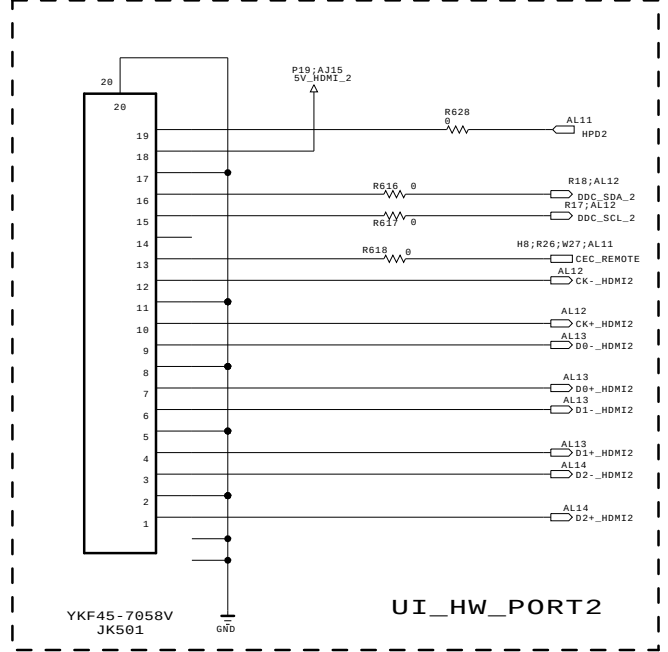




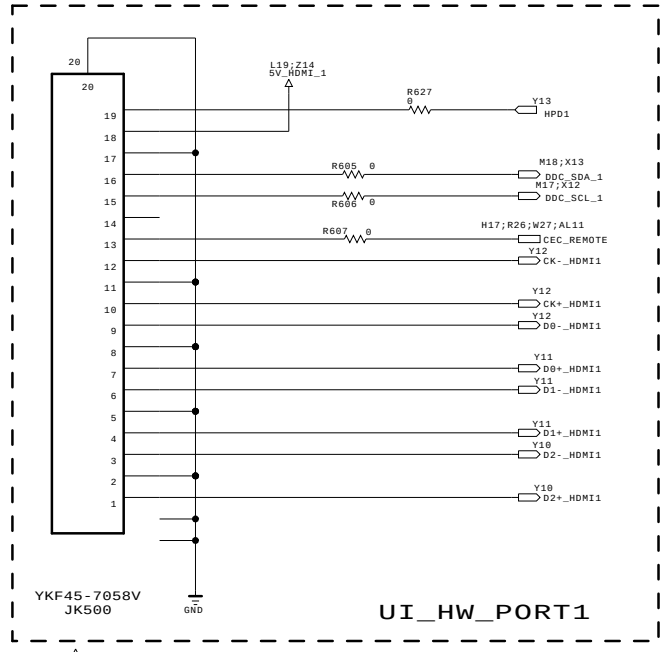
SECRET	LEE GI YOUNG  LG ELECTRONICS	MODEL	BCM (BRAZIL VENUS)	DATE	2009. 03. 23
LG Electronics		BLOCK	IN - OUT	SHEET	1 / 15

29
28
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1

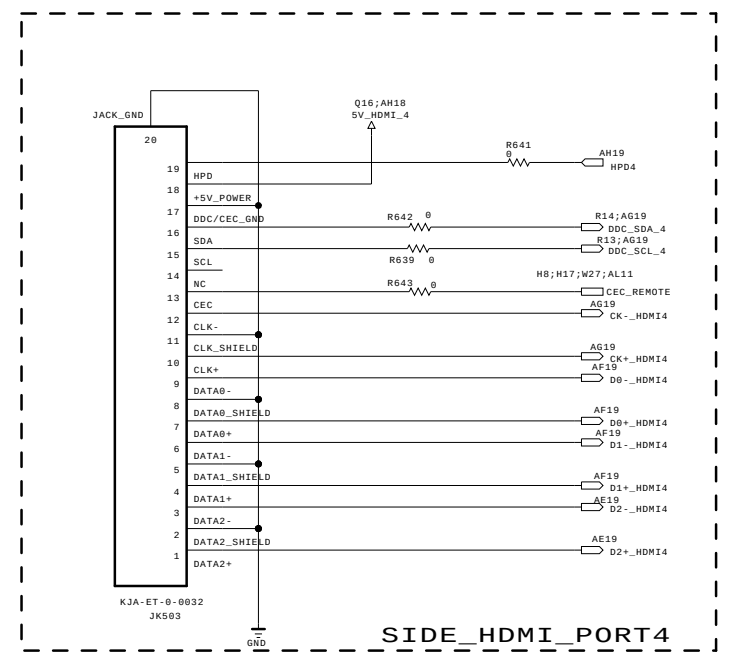
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z AA AB AC AD AE AF AG AH AI AJ AK AL AM AN AO AP



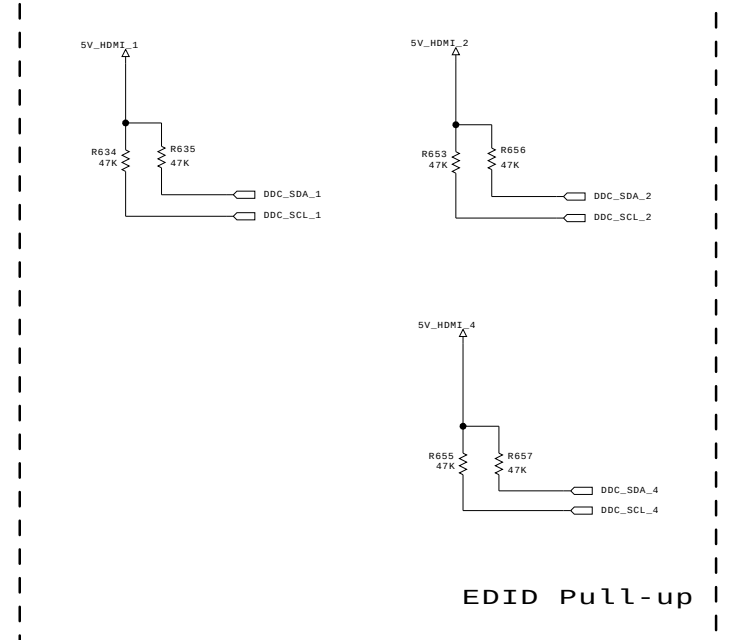
UI_HW_PORT2



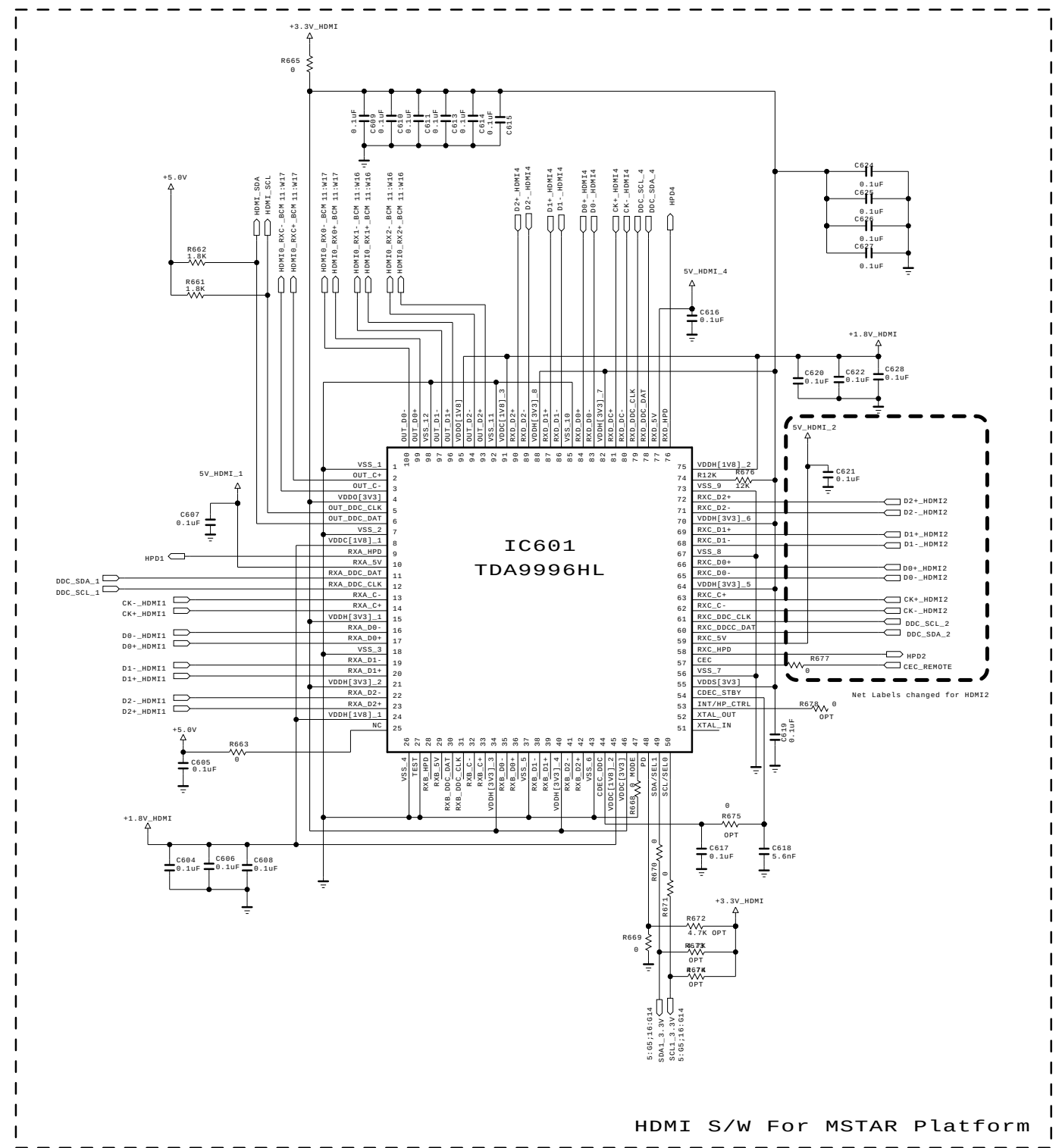
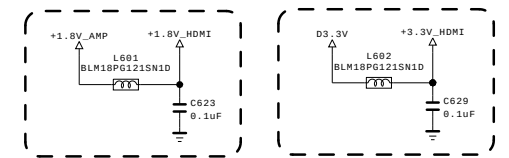
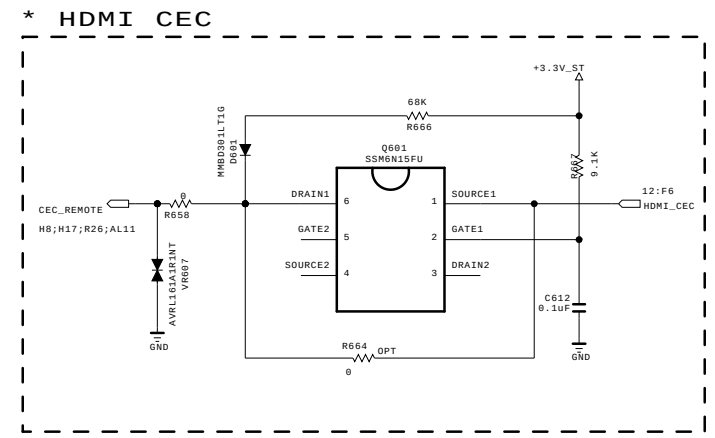
UI_HW_PORT1



SIDE_HDMI_PORT4



EDID Pull-up



HDMI S/W For MSTAR Platform

VARISTORS(VR500/501/502/503/504/505/506/507) on lines-HPD1/2/3/4 are all options in case HDMI Switch doesn't support 'ESD protection'

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

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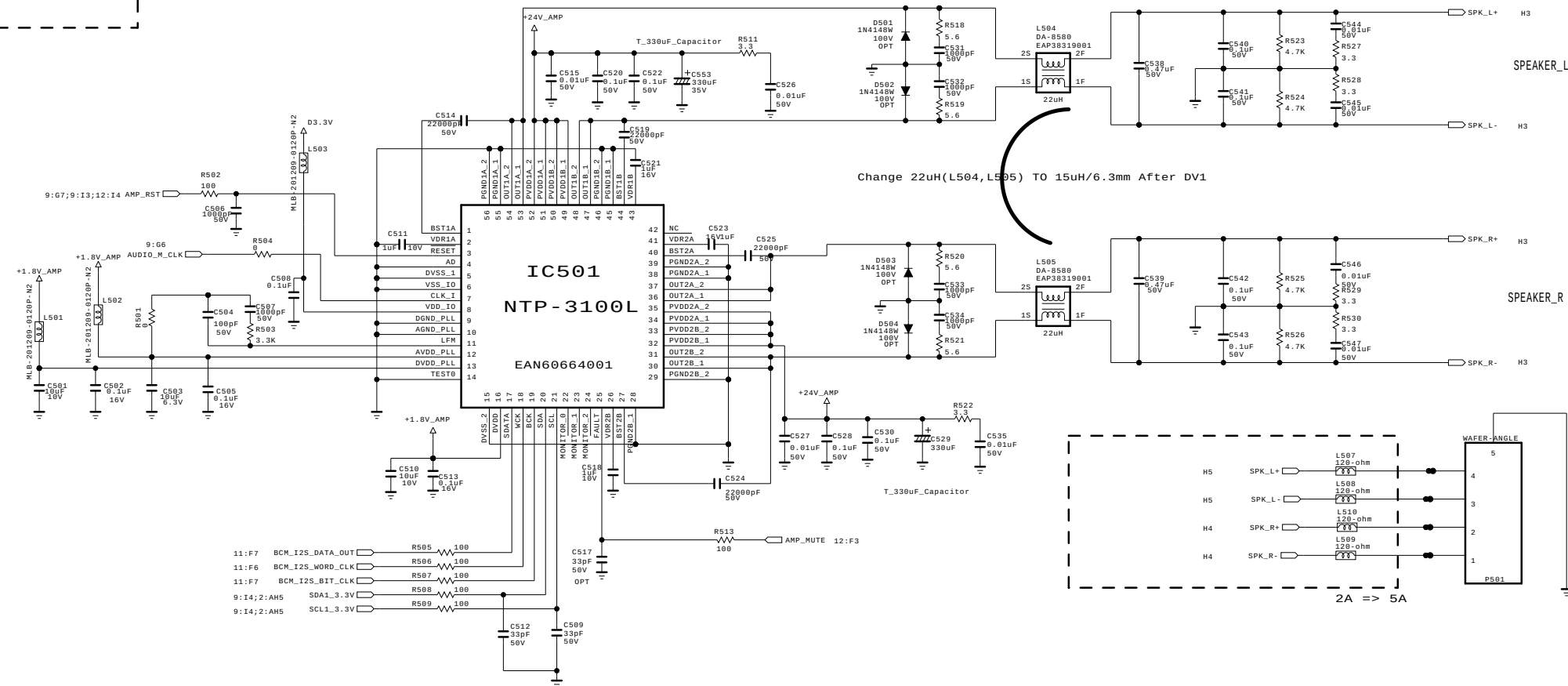
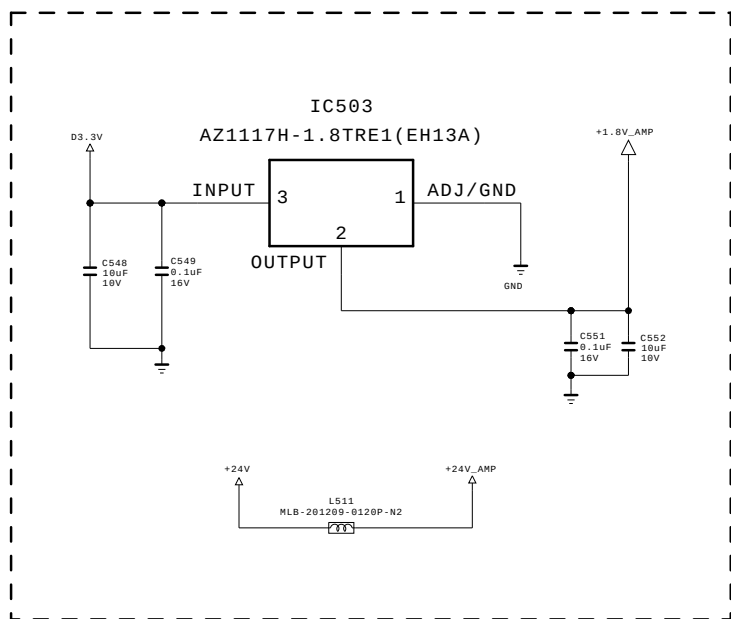
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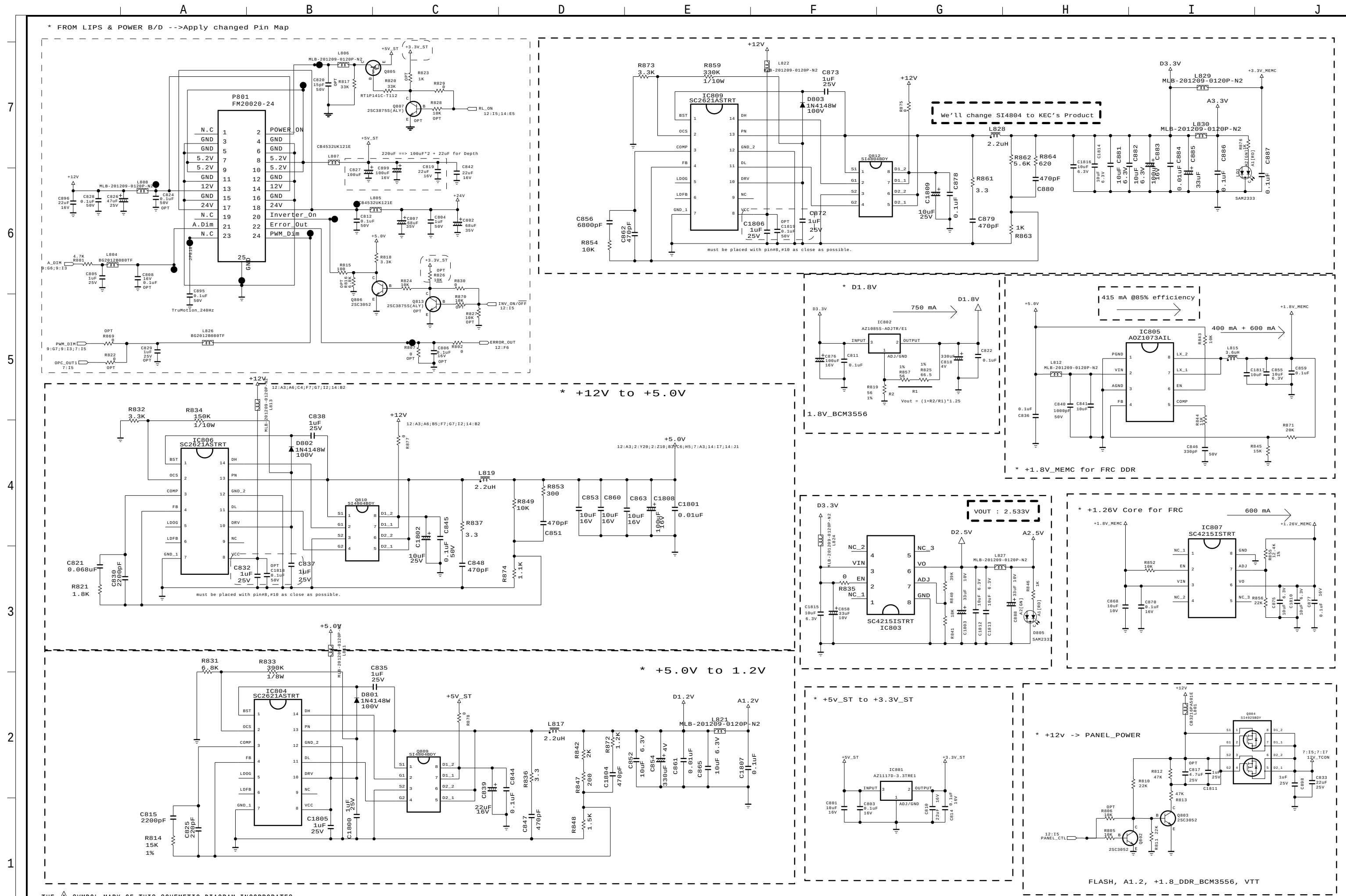
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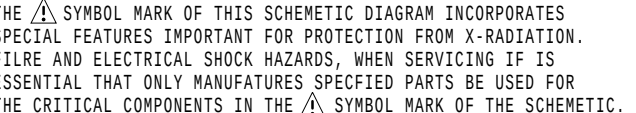
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MCLK SDATA WCK BCK TP is necessary
Monitor0_1_2 TP is necessary

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





PARK . S . W



MODEL	BCM (BRAZIL VENUS)	DATE	2009.03.23
BLOCK	LVDS / Mstar FRC	SHEET	7 / 15

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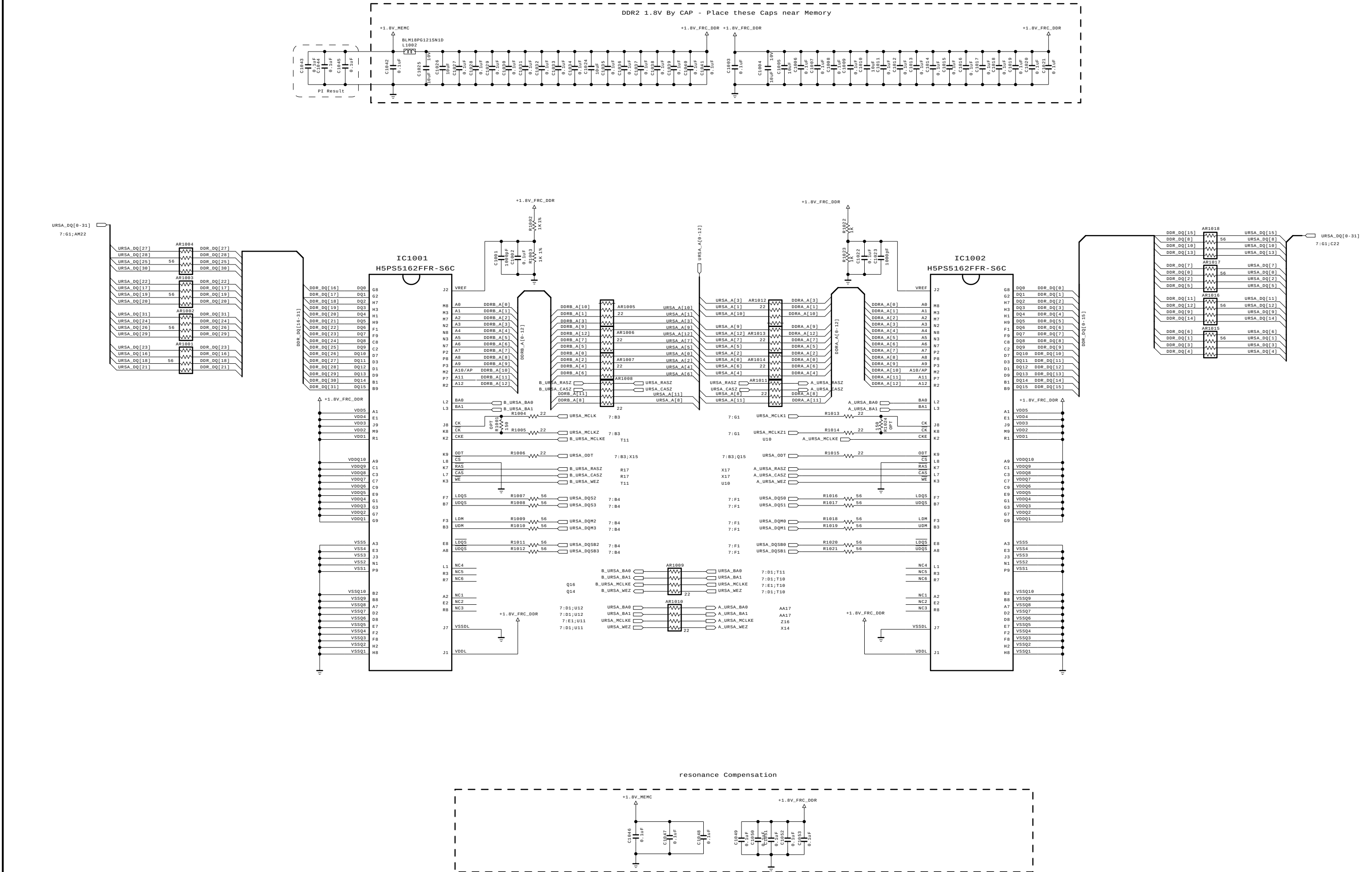
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THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS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

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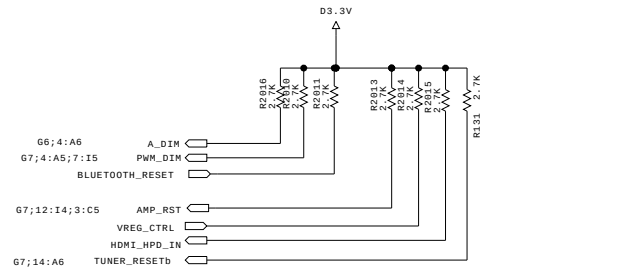
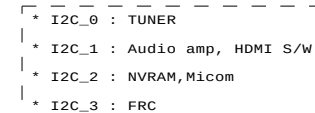


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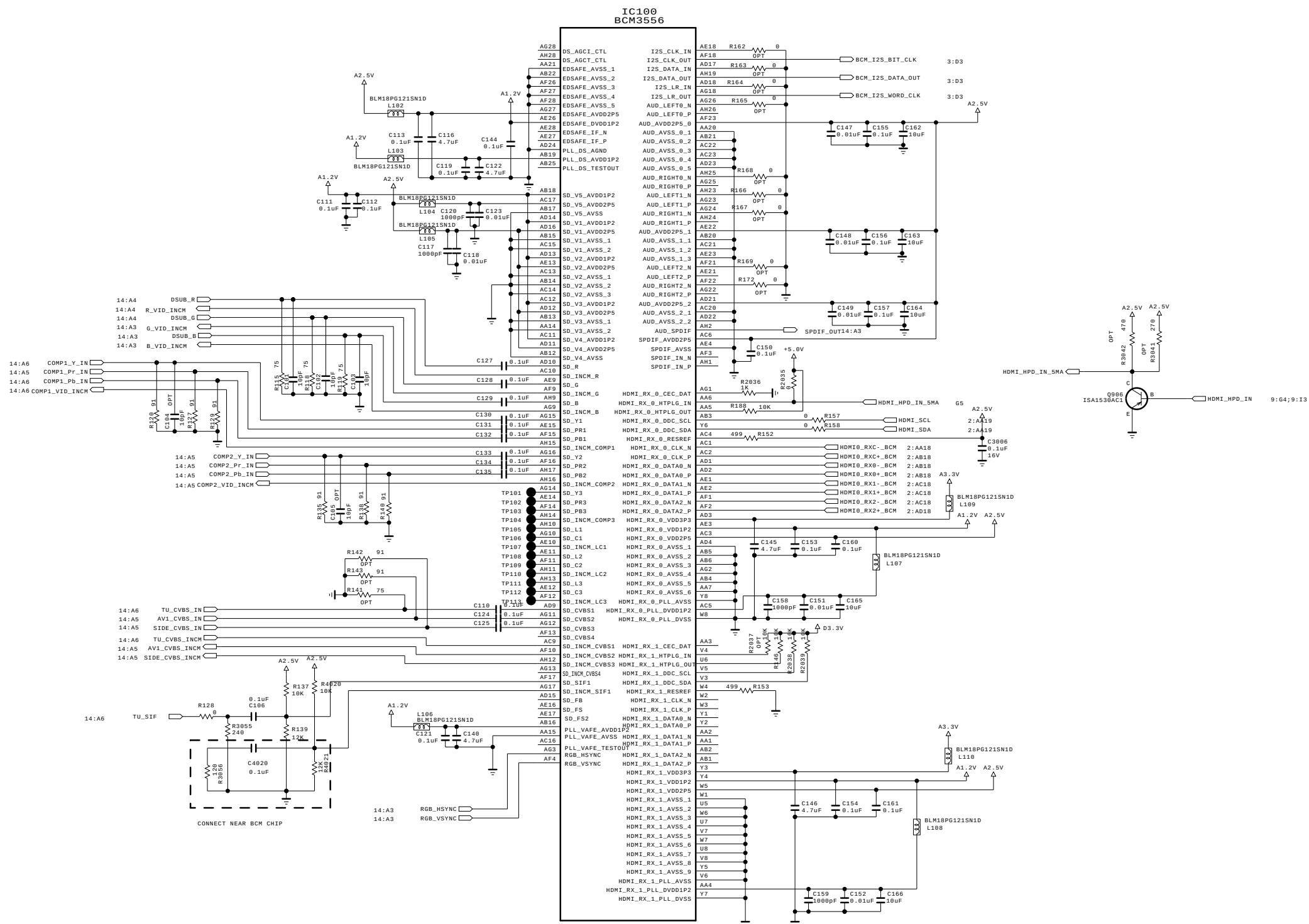
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.



MODEL	BCM (BRAZIL VENUS)	DATE	2009.03.23
BLOCK	BCM3556 & NAND FLASH	SHEET	9 / 15



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

P701
12507WS-12L

The schematic diagram illustrates the internal circuitry of the P701 12507WS-12L module, which is connected to a 12-pin connector. The module's internal components include:

- Power Management:** A +5V_ST regulator (L705, CB3212BPA501E) and a +3.3V_ST regulator (L702, CB3212BPA501E) are shown. The +3.3V_ST regulator is connected to the 3.3V_ST pin (pin 11) and provides power to the IR pin (pin 9) and the LED_WARM_STBY pin (pin 8).
- Signal Processing:** The SCL (pin 1) and SDA (pin 2) pins are connected to the UCOM_SCL_3.3V and UCOM_SDA_3.3V pins (pins 12:F6). The KEY1 (pin 4) and KEY2 (pin 5) pins are connected to the KEY1 and KEY2 pins (pins 12:H3).
- Temperature Sensing:** The WARM_ST pin (pin 8) is connected to the LED_WARM_STBY pin (pin 8) via a 2SC3052 transistor (Q702) and a 10k resistor (R711).
- Relay Control:** The RL_ON (pin 13) and LED_POWER_ON (pin 12) pins are connected to the RL_ON and LED_POWER_ON pins (pins 12:H3) via 2SC3052 transistors (Q701, Q702) and resistors (R708, R709, R713, R714).
- Other Components:** The diagram also shows various passive components like capacitors (C701, C703, C704, C706, C708, C709, C710, C718, C719, C720, C721, C722, C723, C724, C725, C726, C727, C728, C729, C730, C731, C732, C733, C734, C735, C736, C737, C738, C739, C740, C741, C742, C743, C744, C745, C746, C747, C748, C749, C750, C751, C752, C753, C754, C755, C756, C757, C758, C759, C760, C761, C762, C763, C764, C765, C766, C767, C768, C769, C770, C771, C772, C773, C774, C775, C776, C777, C778, C779, C780, C781, C782, C783, C784, C785, C786, C787, C788, C789, C790, C791, C792, C793, C794, C795, C796, C797, C798, C799, C800, C801, C802, C803, C804, C805, C806, C807, C808, C809, C810, C811, C812, C813, C814, C815, C816, C817, C818, C819, C820, C821, C822, C823, C824, C825, C826, C827, C828, C829, C830, C831, C832, C833, C834, C835, C836, C837, C838, C839, C840, C841, C842, C843, C844, C845, C846, C847, C848, C849, C850, C851, C852, C853, C854, C855, C856, C857, C858, C859, C860, C861, C862, C863, C864, C865, C866, C867, C868, C869, C870, C871, C872, C873, C874, C875, C876, C877, C878, C879, C880, C881, C882, C883, C884, C885, C886, C887, C888, C889, C890, C891, C892, C893, C894, C895, C896, C897, C898, C899, C900, C901, C902, C903, C904, C905, C906, C907, C908, C909, C910, C911, C912, C913, C914, C915, C916, C917, C918, C919, C920, C921, C922, C923, C924, C925, C926, C927, C928, C929, C930, C931, C932, C933, C934, C935, C936, C937, C938, C939, C940, C941, C942, C943, C944, C945, C946, C947, C948, C949, C950, C951, C952, C953, C954, C955, C956, C957, C958, C959, C960, C961, C962, C963, C964, C965, C966, C967, C968, C969, C970, C971, C972, C973, C974, C975, C976, C977, C978, C979, C980, C981, C982, C983, C984, C985, C986, C987, C988, C989, C990, C991, C992, C993, C994, C995, C996, C997, C998, C999, C1000, C1001, C1002, C1003, C1004, C1005, C1006, C1007, C1008, C1009, C1010, C1011, C1012, C1013, C1014, C1015, C1016, C1017, C1018, C1019, C1020, C1021, C1022, C1023, C1024, C1025, C1026, C1027, C1028, C1029, C1030, C1031, C1032, C1033, C1034, C1035, C1036, C1037, C1038, C1039, C1040, C1041, C1042, C1043, C1044, C1045, C1046, C1047, C1048, C1049, C1050, C1051, C1052, C1053, C1054, C1055, C1056, C1057, C1058, C1059, C1060, C1061, C1062, C1063, C1064, C1065, C1066, C1067, C1068, C1069, C1070, C1071, C1072, C1073, C1074, C1075, C1076, C1077, C1078, C1079, C1080, C1081, C1082, C1083, C1084, C1085, C1086, C1087, C1088, C1089, C1090, C1091, C1092, C1093, C1094, C1095, C1096, C1097, C1098, C1099, C1100, C1101, C1102, C1103, C1104, C1105, C1106, C1107, C1108, C1109, C1110, C1111, C1112, C1113, C1114, C1115, C1116, C1117, C1118, C1119, C1120, C1121, C1122, C1123, C1124, C1125, C1126, C1127, C1128, C1129, C1130, C1131, C1132, C1133, C1134, C1135, C1136, C1137, C1138, C1139, C1140, C1141, C1142, C1143, C1144, C1145, C1146, C1147, C1148, C1149, C1150, C1151, C1152, C1153, C1154, C1155, C1156, C1157, C1158, C1159, C1160, C1161, C1162, C1163, C1164, C1165, C1166, C1167, C1168, C1169, C1170, C1171, C1172, C1173, C1174, C1175, C1176, C1177, C1178, C1179, C1180, C1181, C1182, C1183, C1184, C1185, C1186, C1187, C1188, C1189, C1190, C1191, C1192, C1193, C1194, C1195, C1196, C1197, C1198, C1199, C1200, C1201, C1202, C1203, C1204, C1205, C1206, C1207, C1208, C1209, C1210, C1211, C1212, C1213, C1214, C1215, C1216, C1217, C1218, C1219, C1220, C1221, C1222, C1223, C1224, C1225, C1226, C1227, C1228, C1229, C1230, C1231, C1232, C1233, C1234, C1235, C1236, C1237, C1238, C1239, C1240, C1241, C1242, C1243, C1244, C1245, C1246, C1247, C1248, C1249, C1250, C1251, C1252, C1253, C1254, C1255, C1256, C1257, C1258, C1259, C1260, C1261, C1262, C1263, C1264, C1265, C1266, C1267, C1268, C1269, C1270, C1271, C1272, C1273, C1274, C1275, C1276, C1277, C1278, C1279, C1280, C1281, C1282, C1283, C1284, C1285, C1286, C1287, C1288, C1289, C1290, C1291, C1292, C1293, C1294, C1295, C1296, C1297, C1298, C1299, C1300, C1301, C1302, C1303, C1304, C1305, C1306, C1307, C1308, C1309, C1310, C1311, C1312, C1313, C1314, C1315, C1316, C1317, C1318, C1319, C1320, C1321, C1322, C1323, C1324, C1325, C1326, C1327, C1328, C1329, C1330, C1331, C1332, C1333, C1334, C1335, C1336, C1337, C1338, C1339, C1340, C1341, C1342, C1343, C1344, C1345, C1346, C1347, C1348, C1349, C1350, C1351, C1352, C1353, C1354, C1355, C1356, C1357, C

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12507WR-10L
P702

D3.3V

L707

CB2216PA501E

JP712

C713
100F
1.6V

JP711

D705
CDS3C05GTA
5.6V
OPT

R722
27

USB_DM1

10:D4

JP713

D706
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5.6V
OPT

R723
27

USB_DP1

10:D4

R720
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BLUETOOTH_RESET

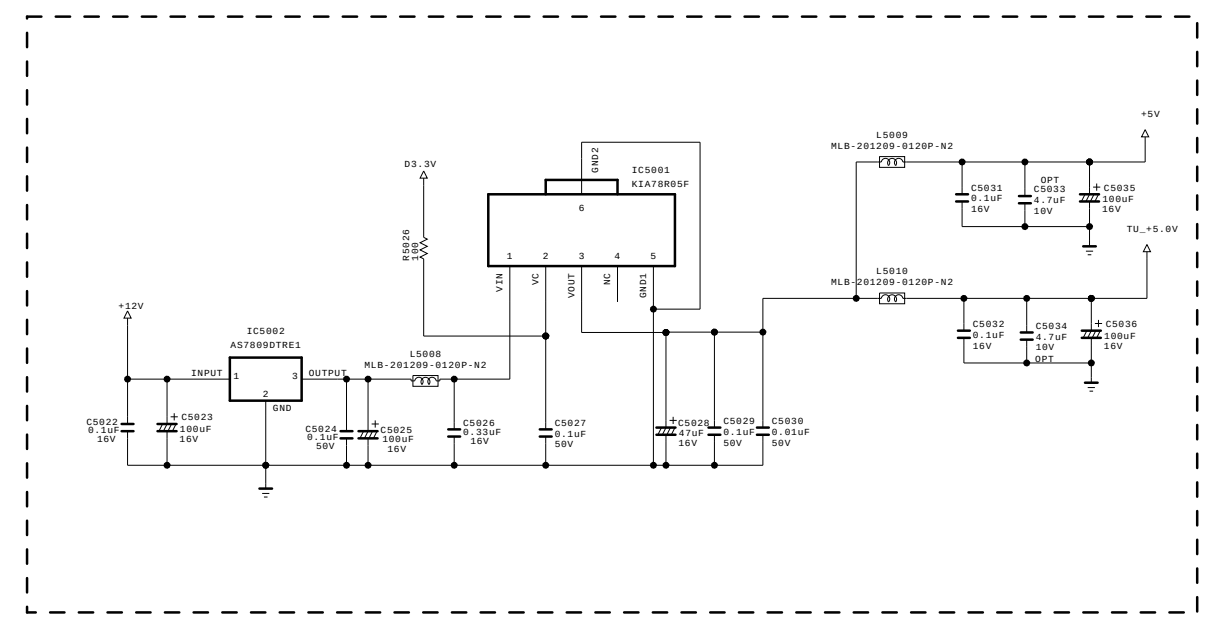
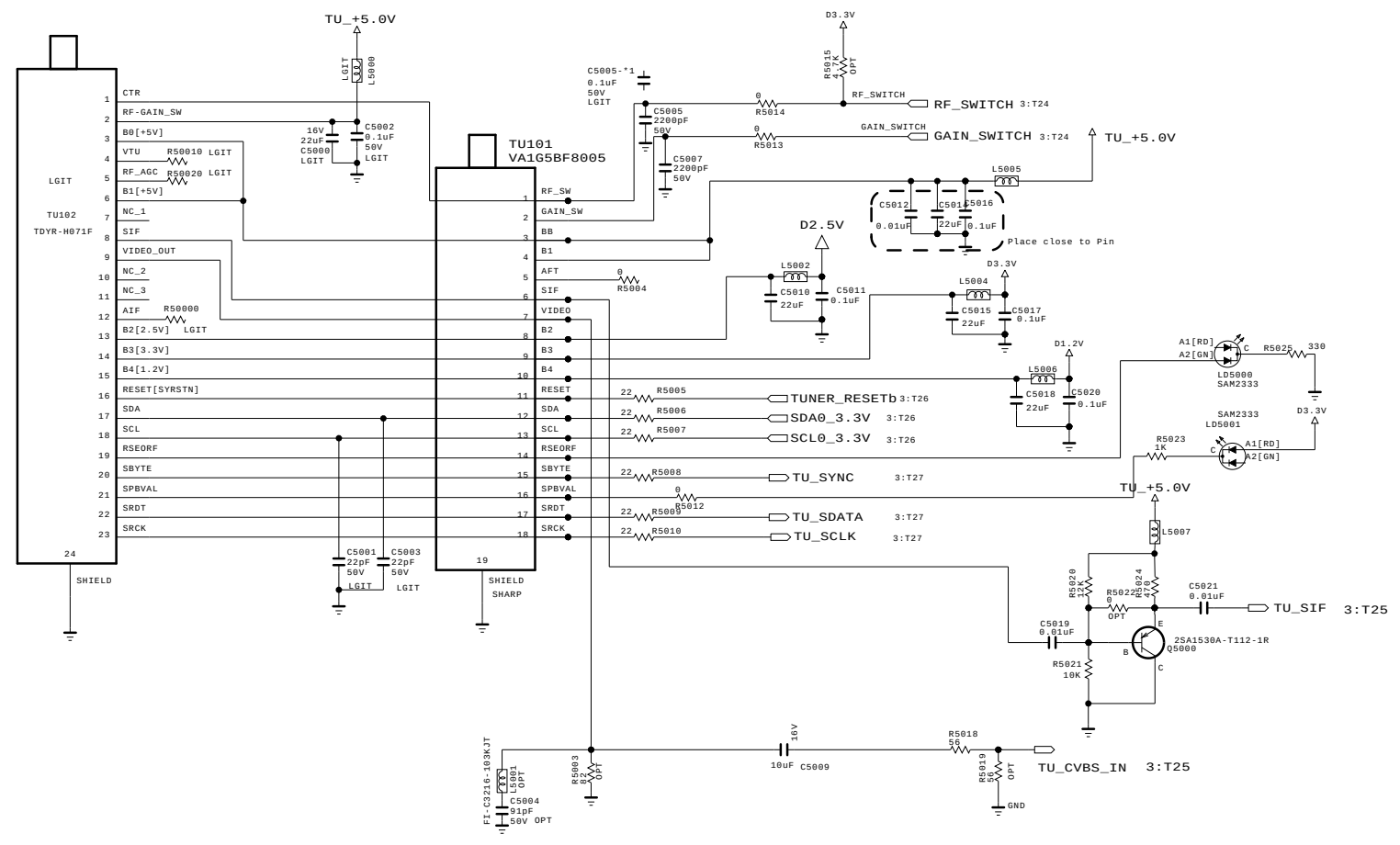
R719
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VREG_CTRL

MODEL	BRAZIL VENUS	DATE	2009.03.23
BLOCK	CONTROL IR/BT/USB	SHEET	14 / 15

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A B C D E F G H I J



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

SECRET
LGElectronics

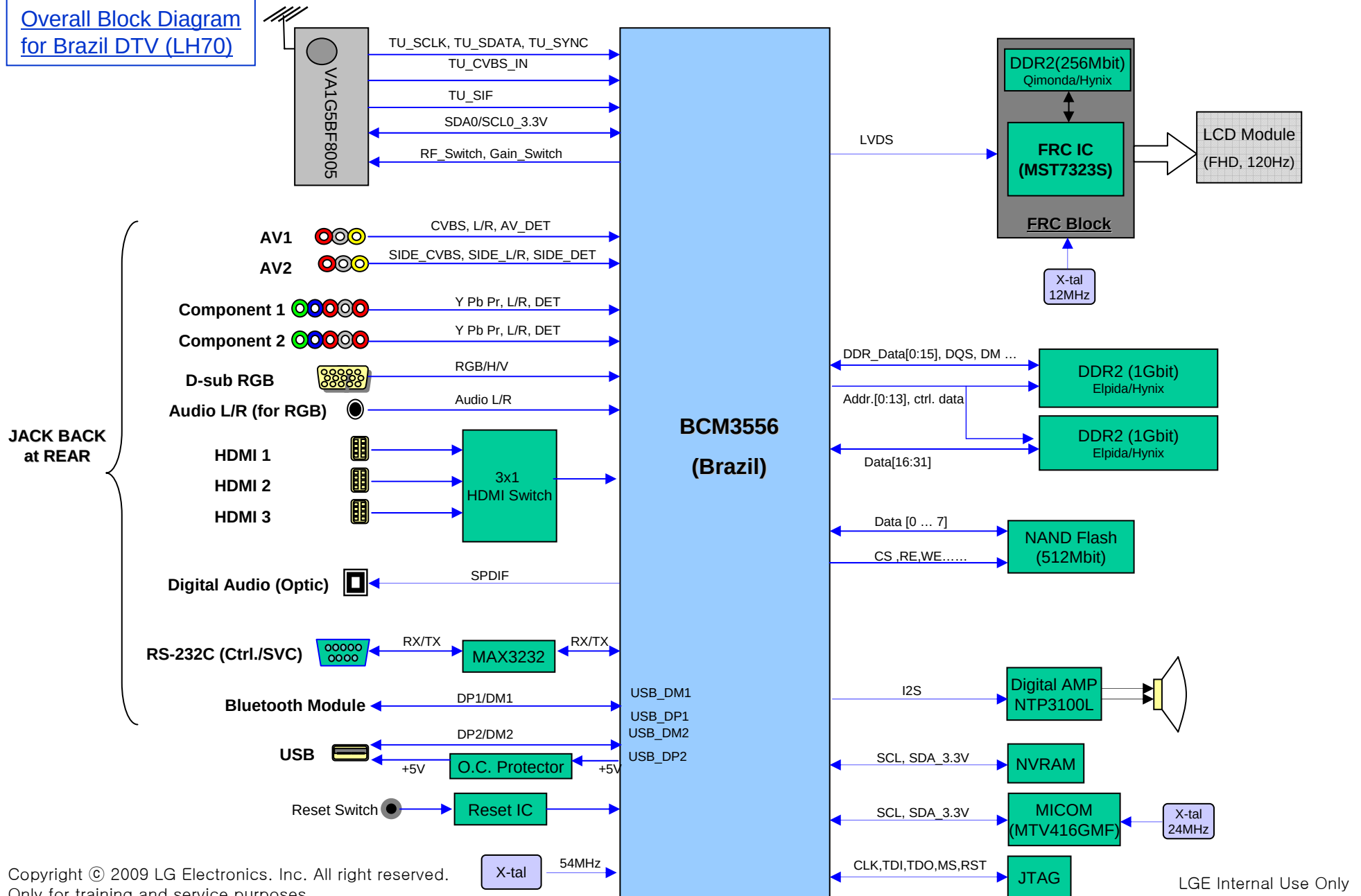
DO . J . G
 LG ELECTRONICS

MODEL	BRAZIL VENUS	DATE	2009.03.23
BLOCK	TUNER	SHEET	15 / 15



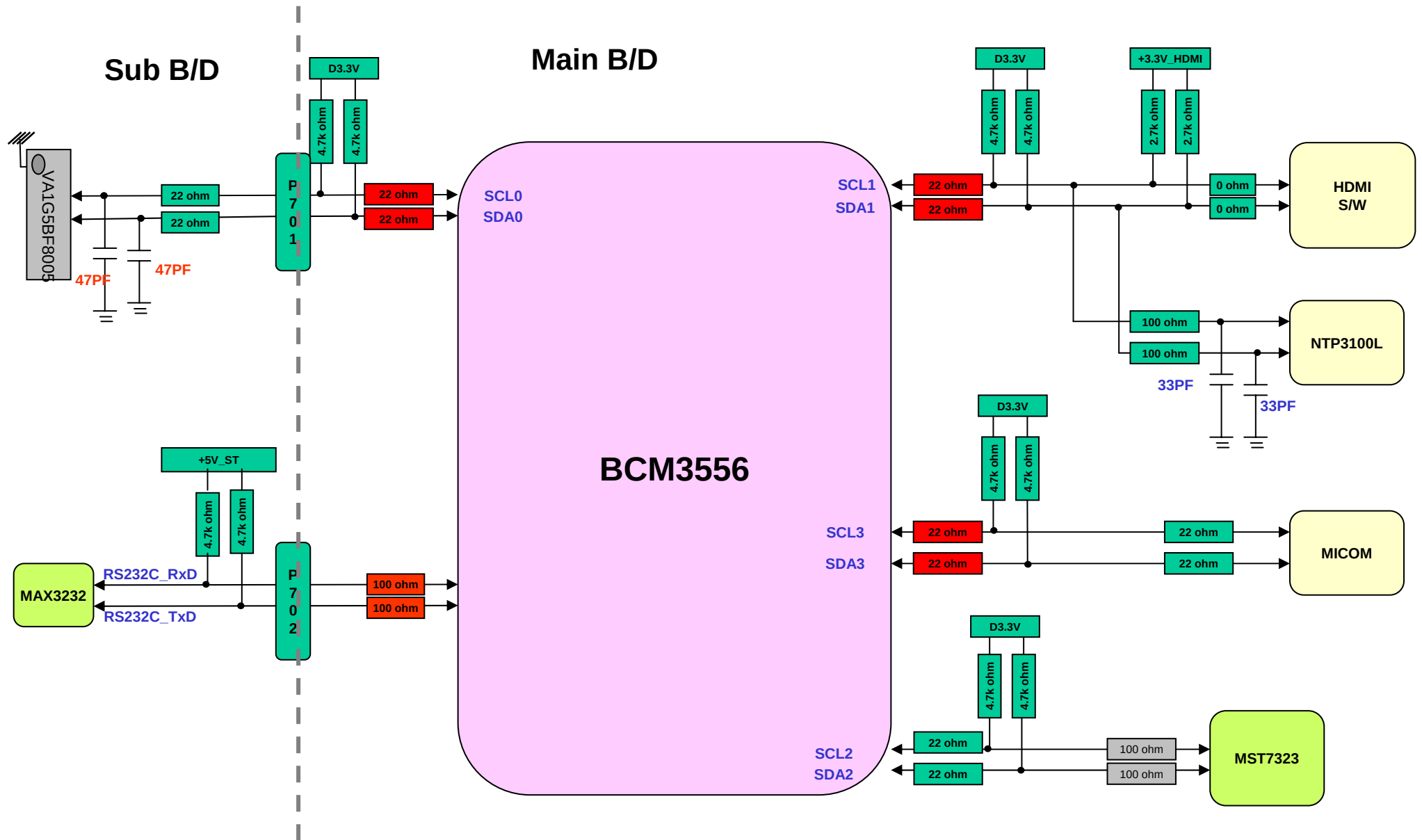
Block Diagram

Overall Block Diagram for Brazil DTV (LH70)



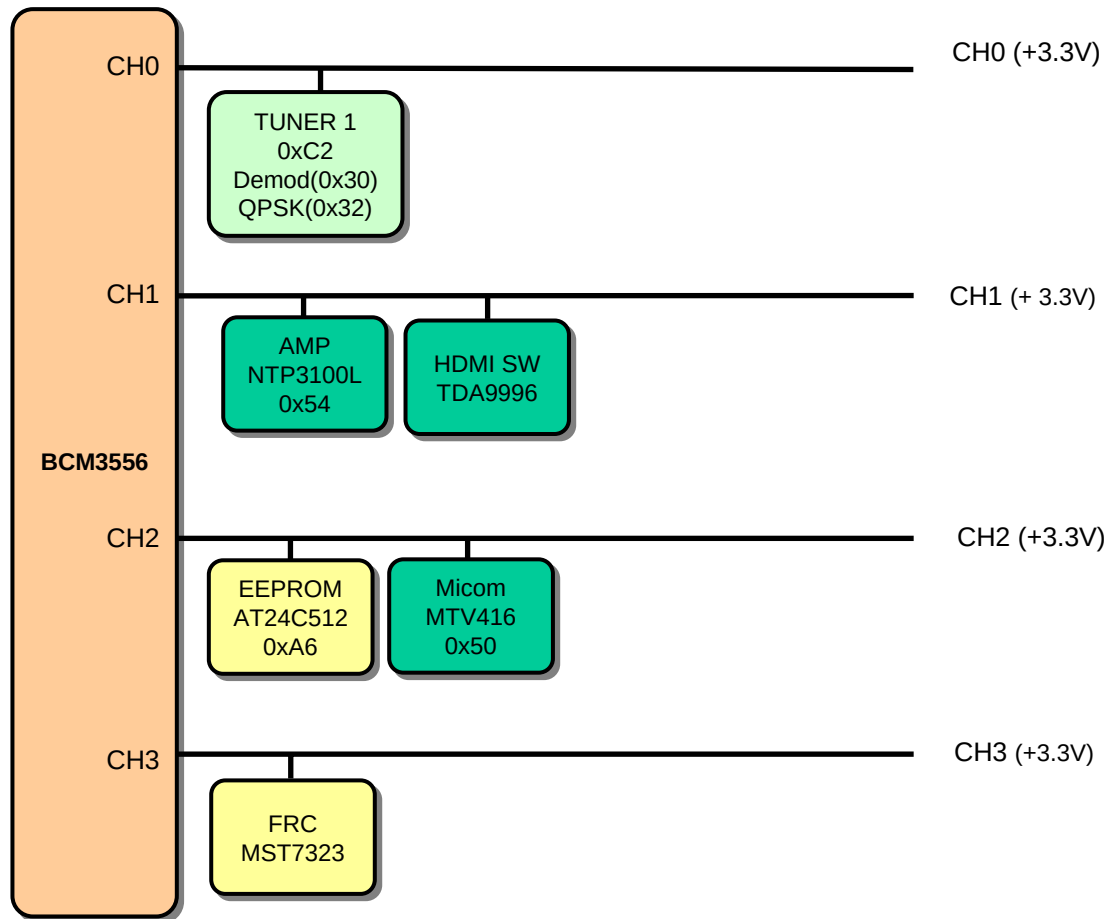
Block Diagram

I2C & RS232 Communication

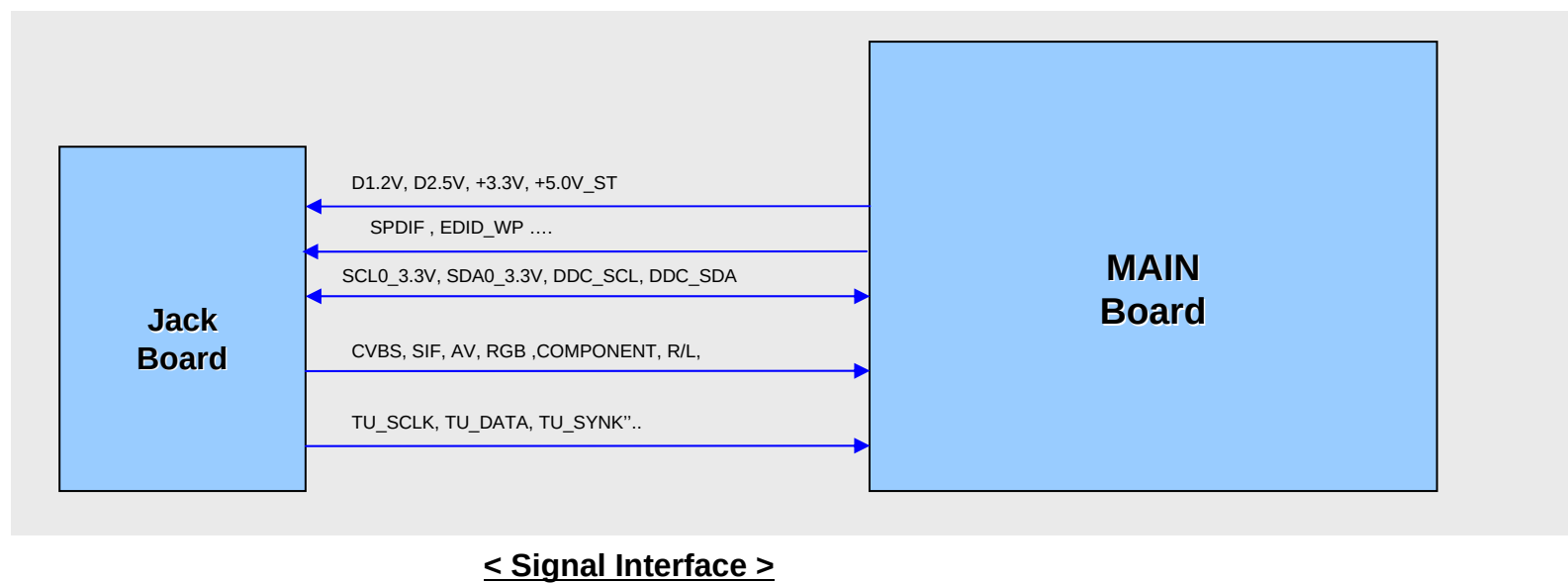


Block Diagram

• I2C channel [LH70]

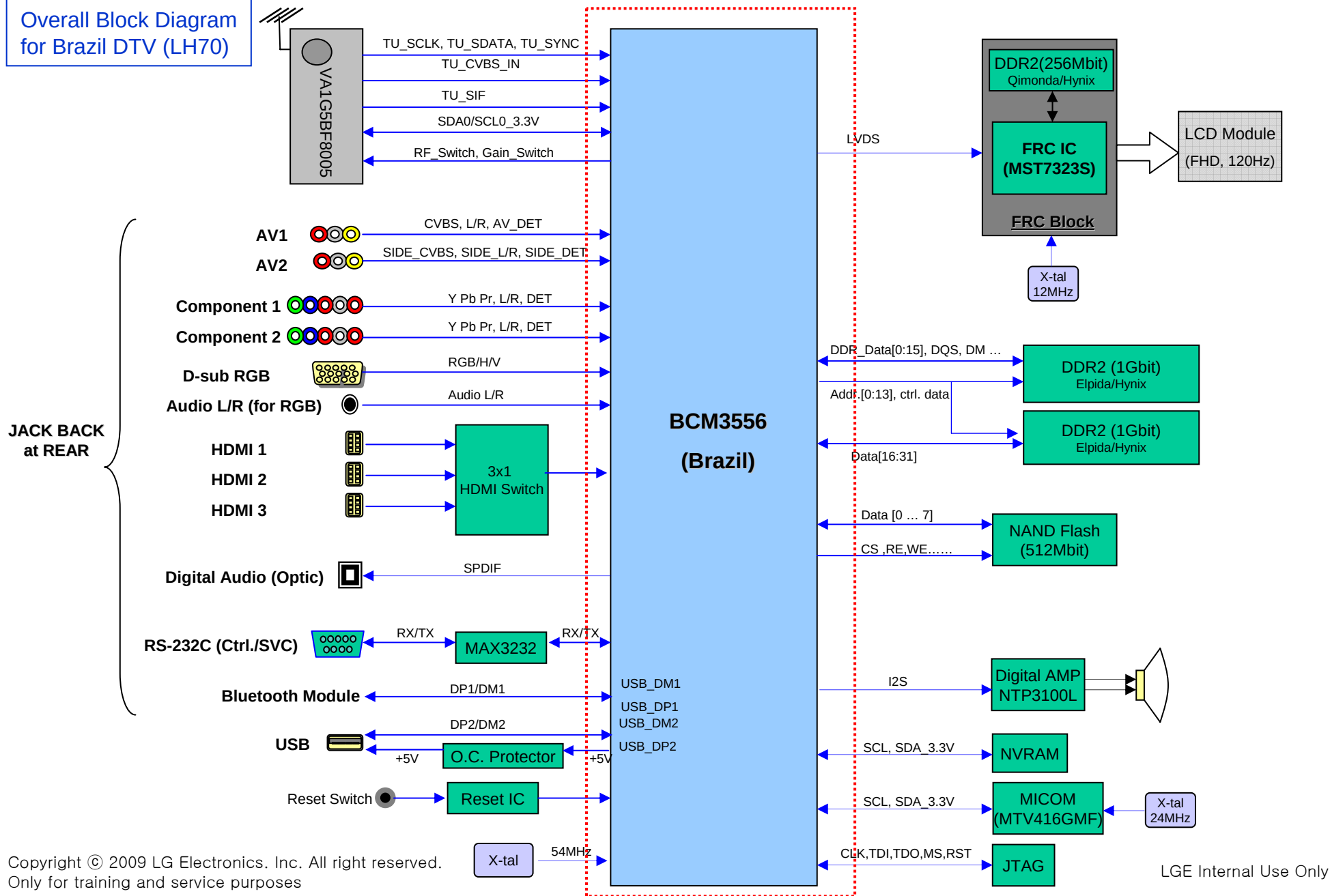


Block Diagram

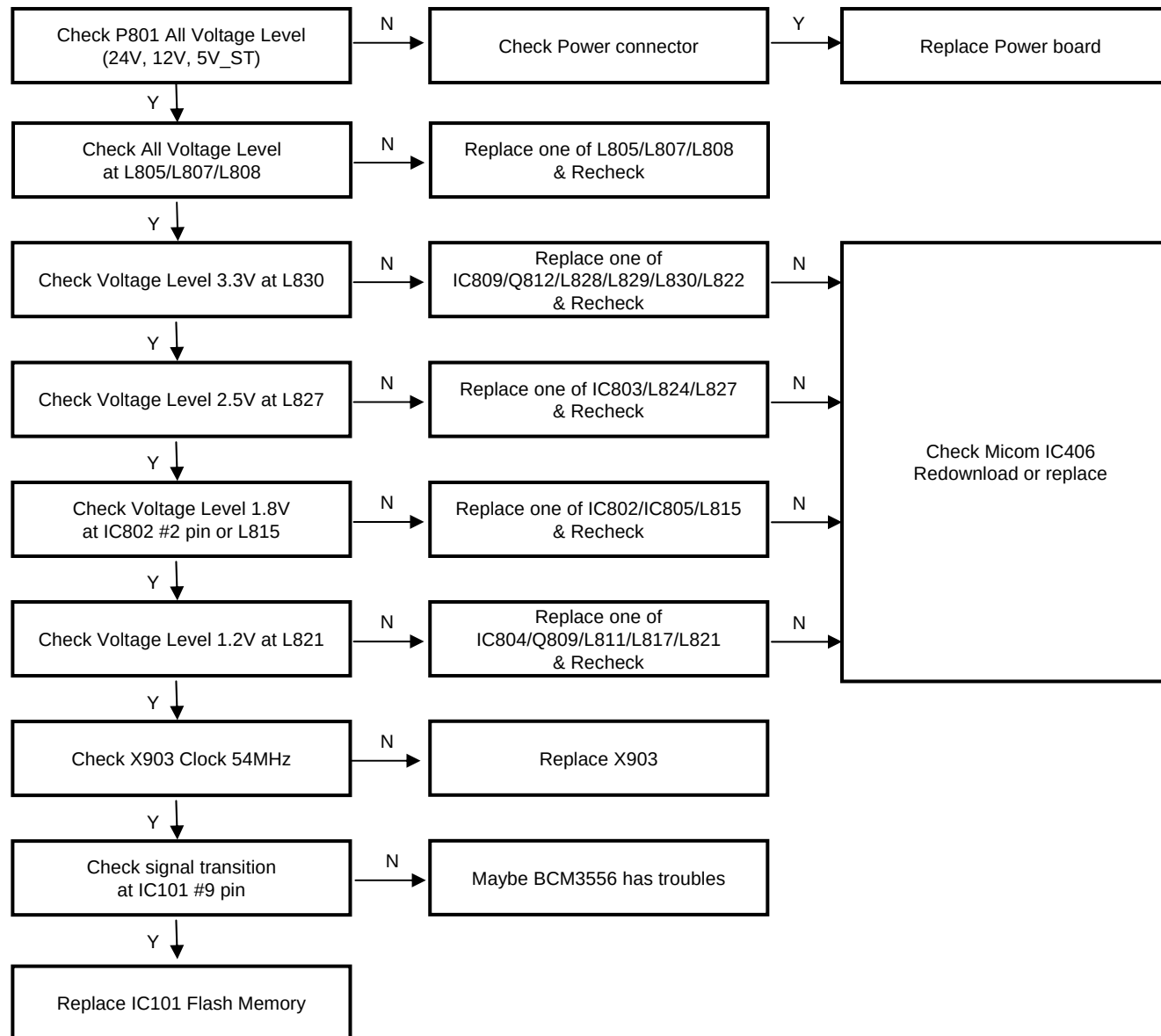


1. Power-Up Boot Fail Trouble Shooting

Overall Block Diagram
for Brazil DTV (LH70)

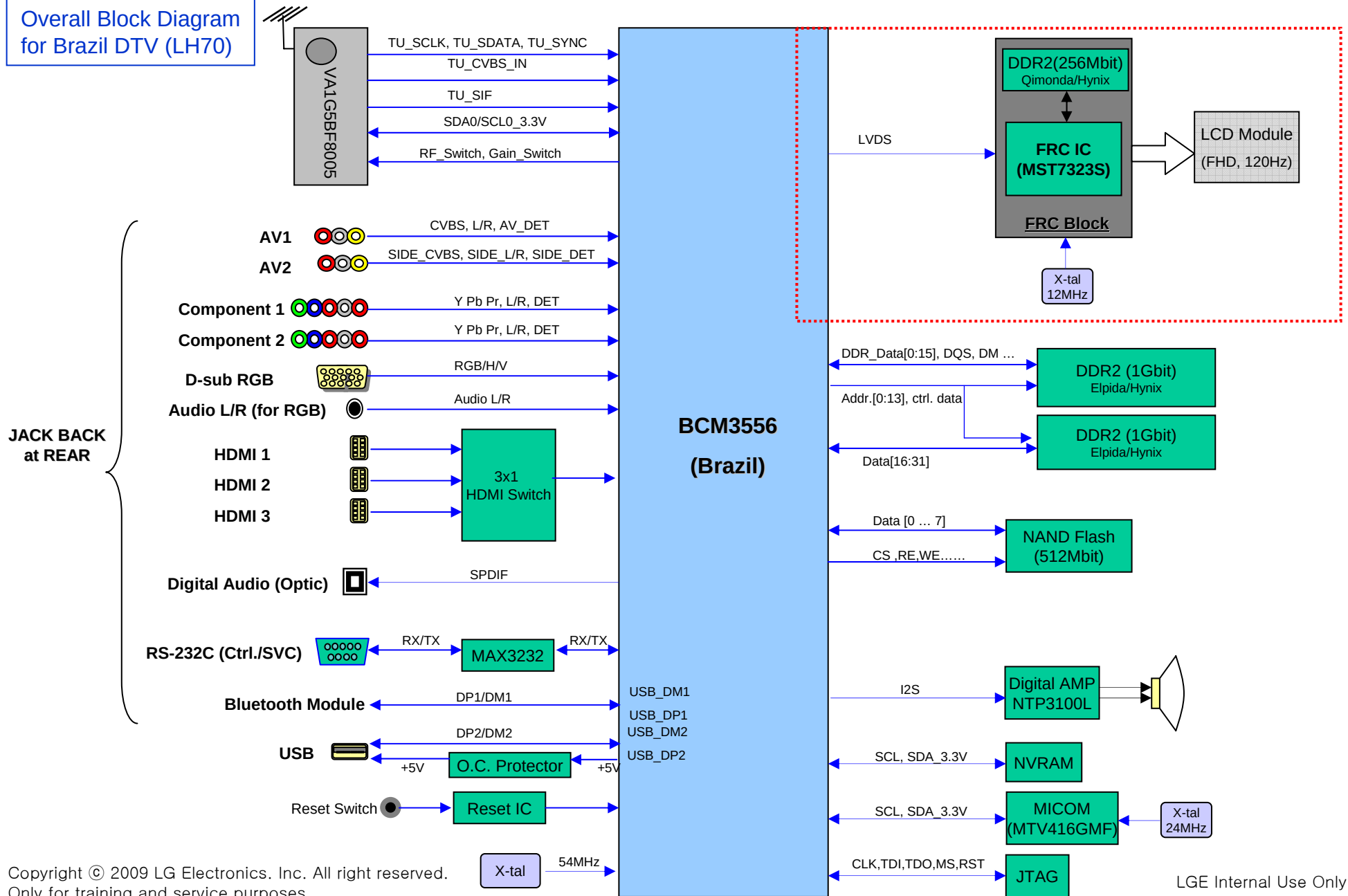


1. Power-Up Boot Fail Trouble Shooting

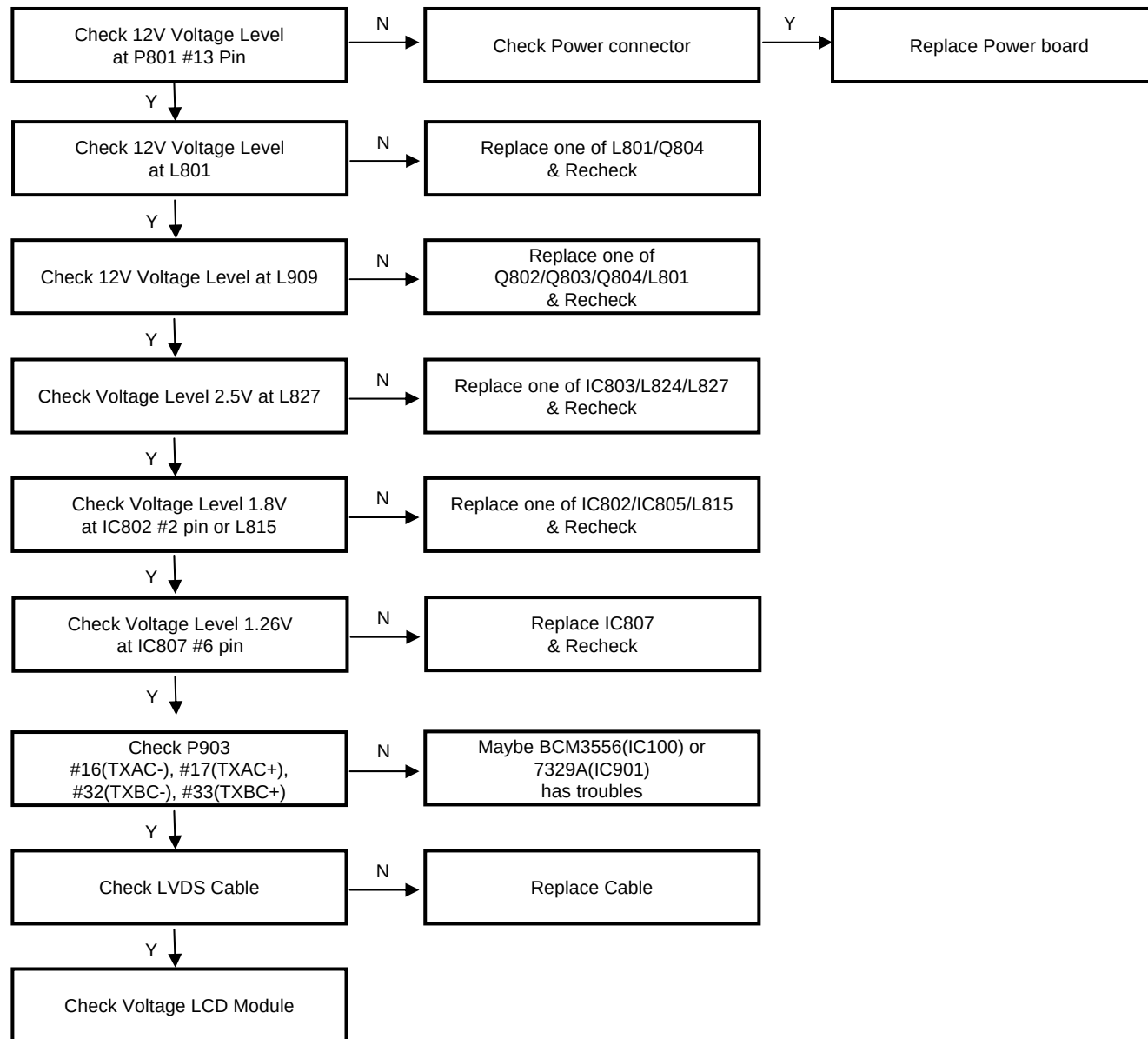


2. No OSD Trouble Shooting

Overall Block Diagram
for Brazil DTV (LH70)

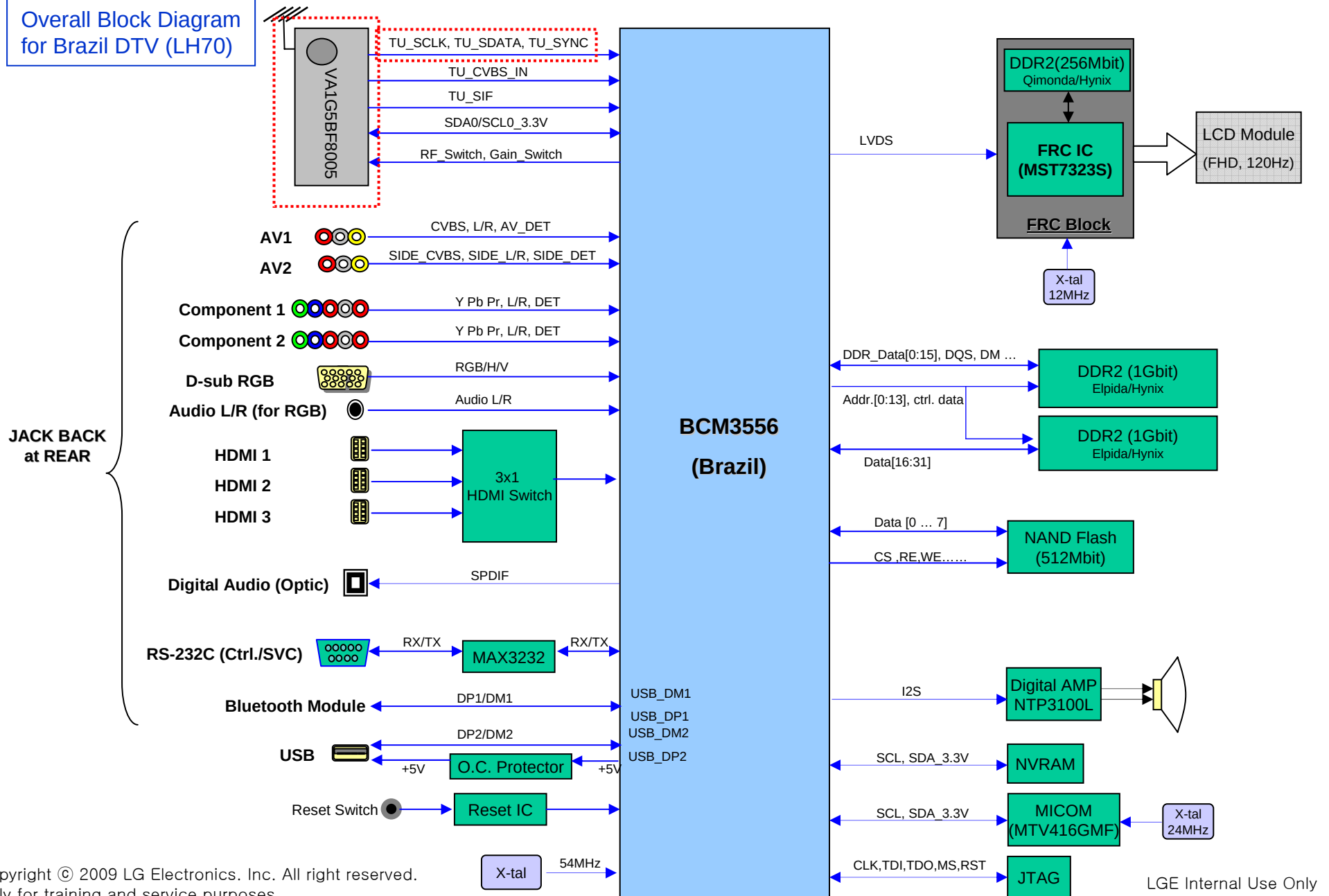


2. No OSD Troubleshooting

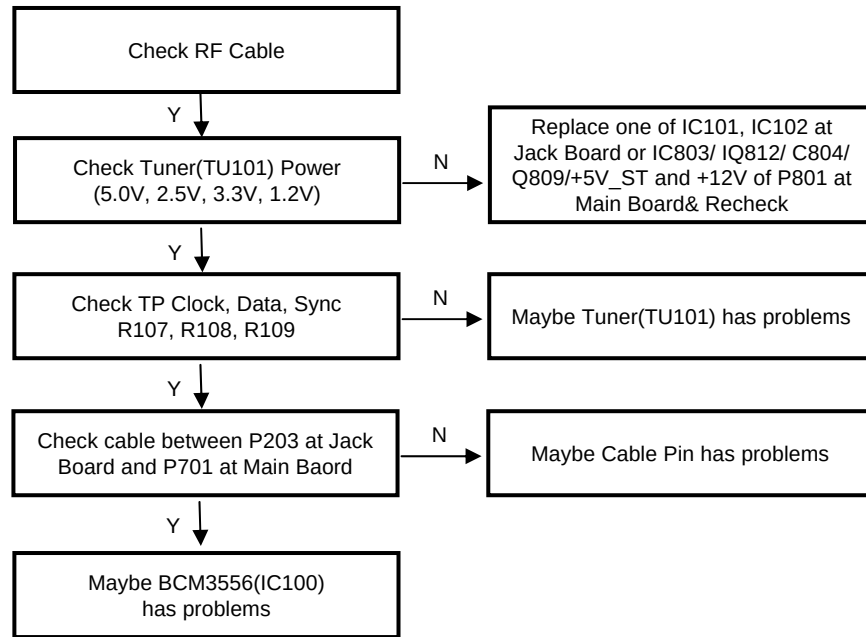


3. Digital TV Video Trouble Shooting

Overall Block Diagram
for Brazil DTV (LH70)

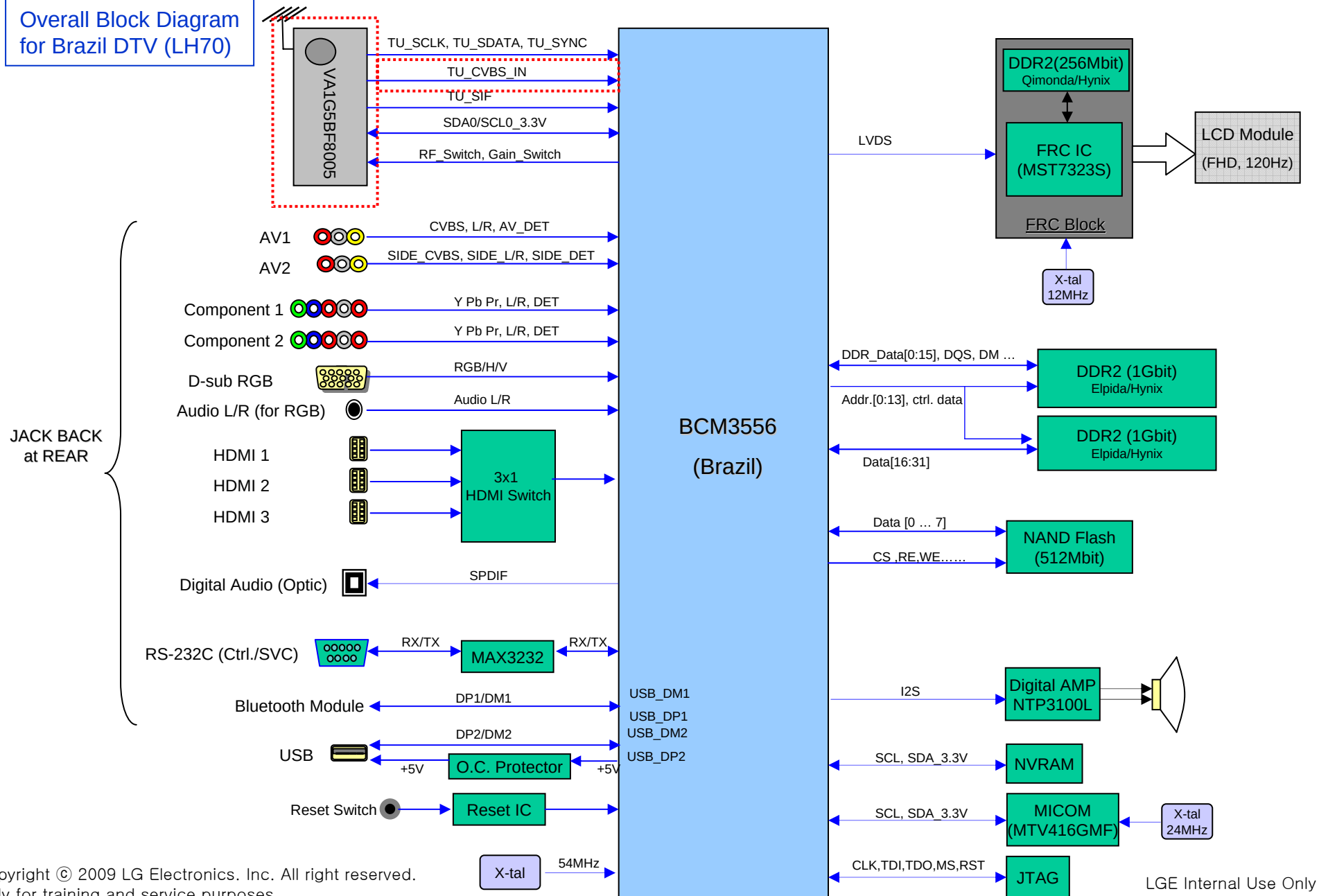


3. Digital TV Video Trouble Shooting

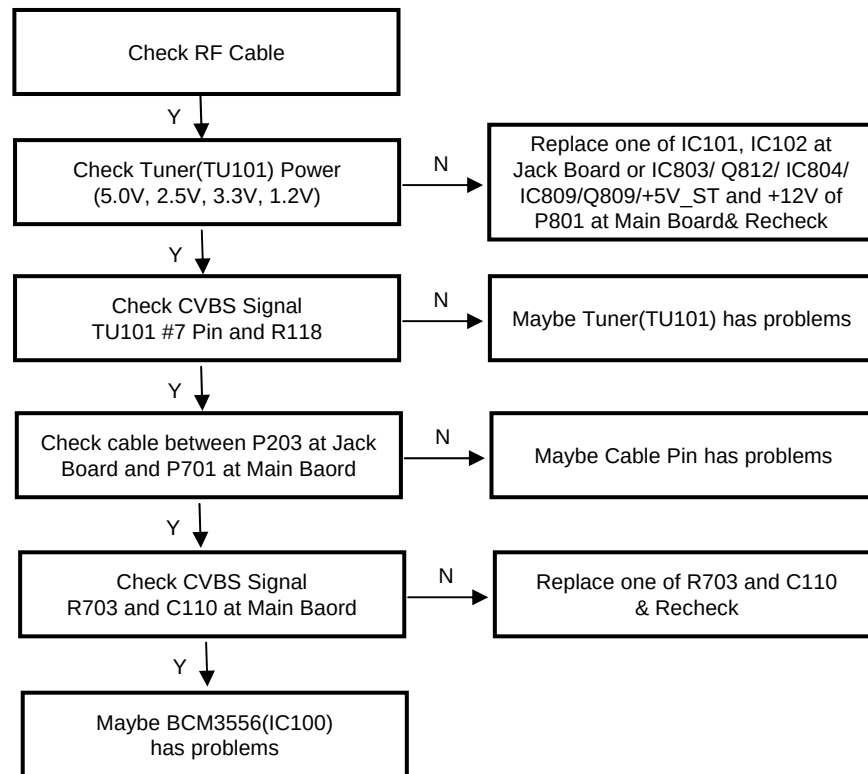


4. Analog TV Video Trouble Shooting

Overall Block Diagram
for Brazil DTV (LH70)

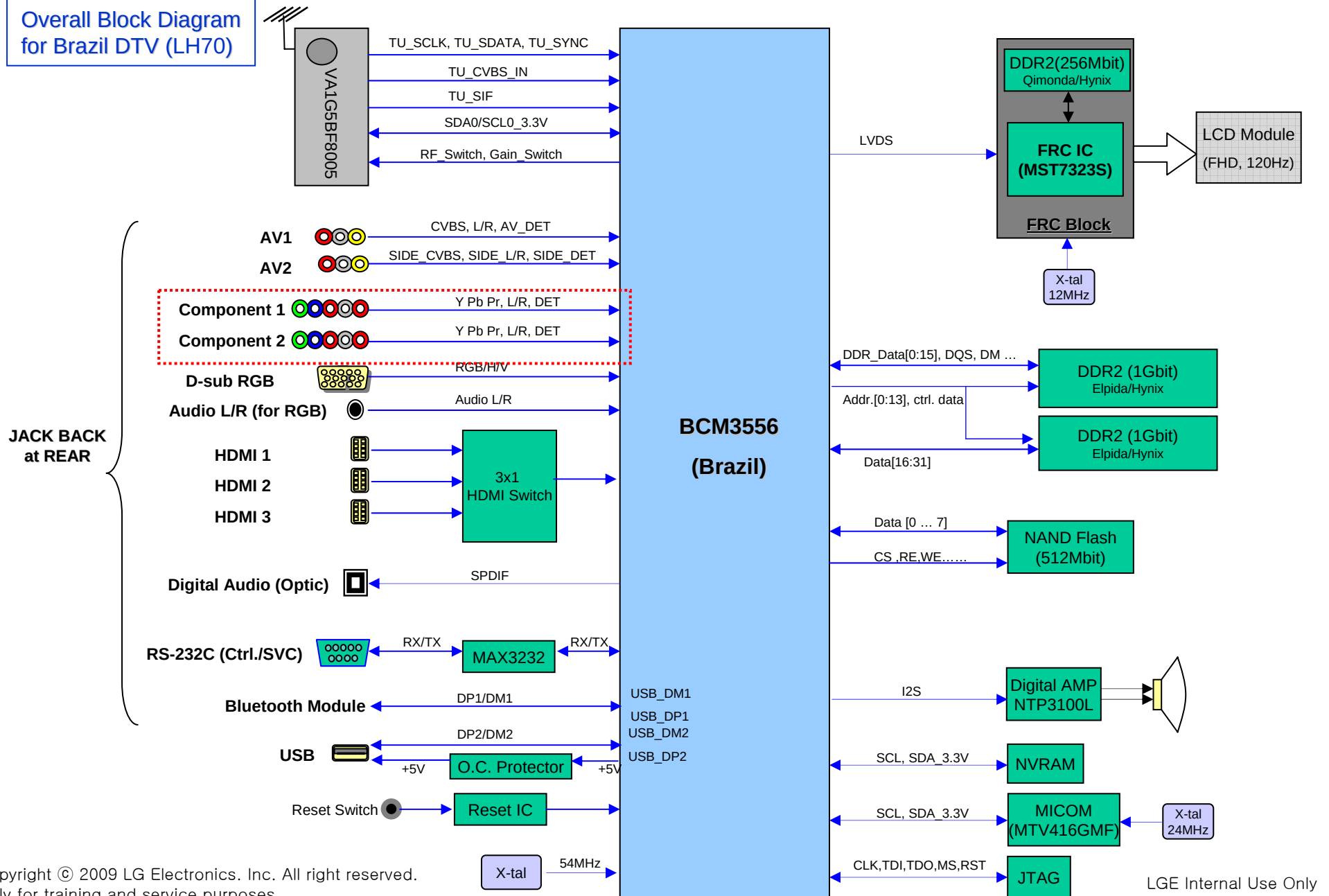


4. Analog TV Video Trouble Shooting

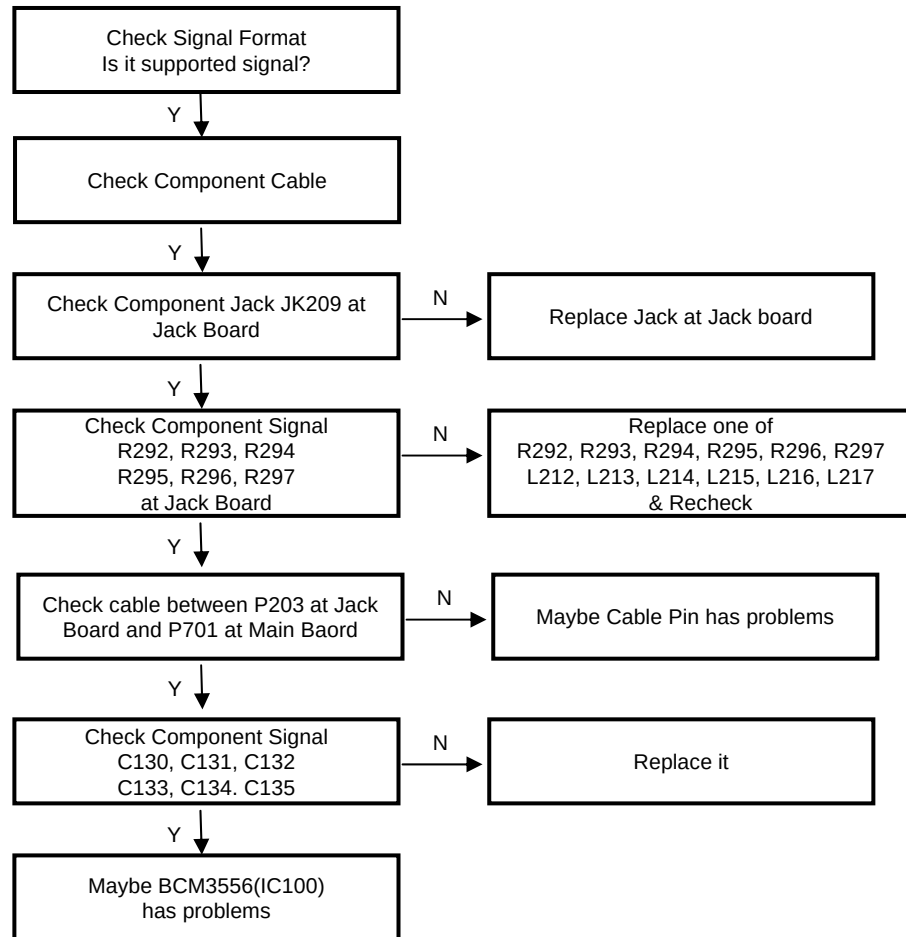


5. Component Video Trouble Shooting

Overall Block Diagram
for Brazil DTV (LH70)

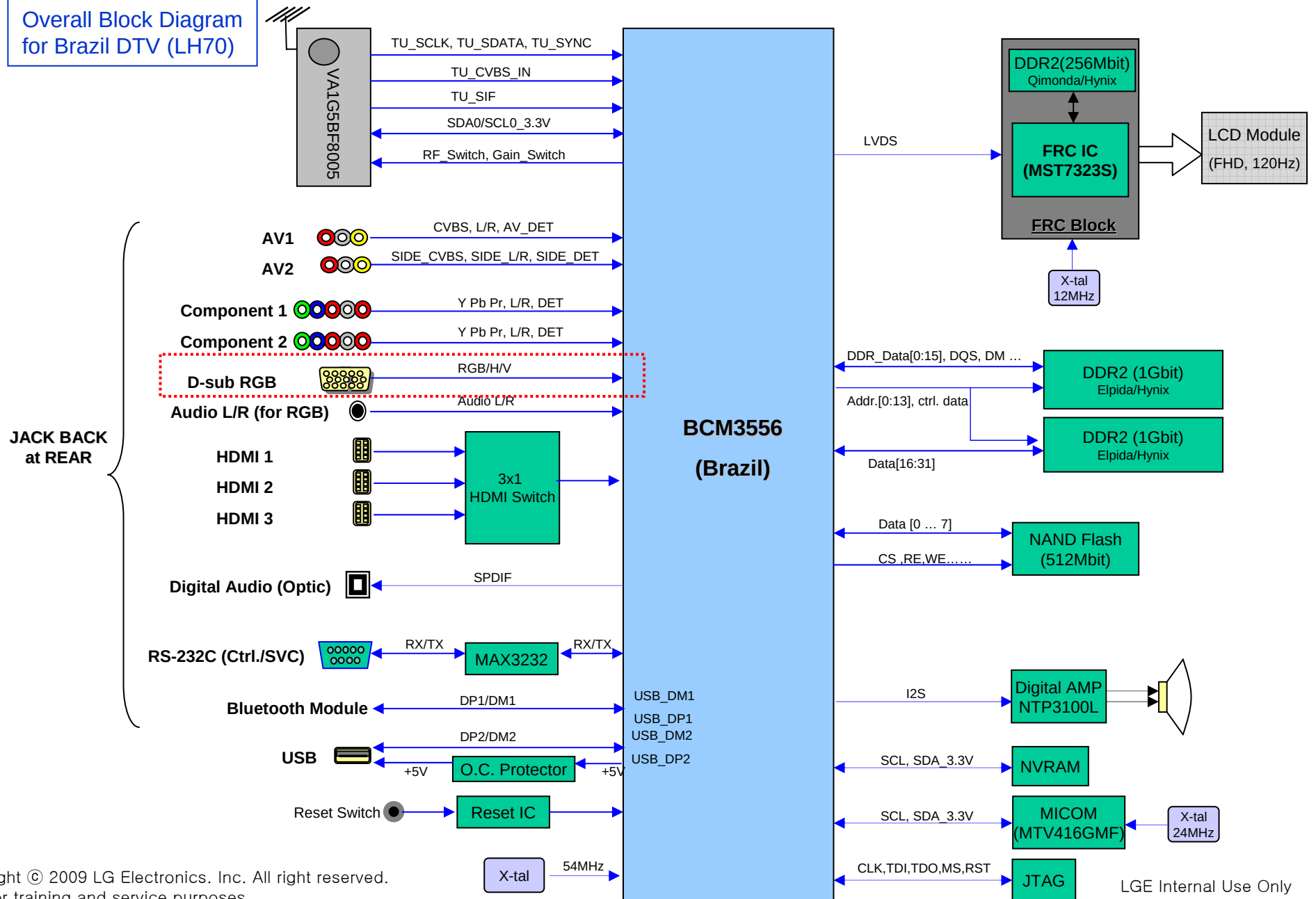


5. Component Video Trouble Shooting

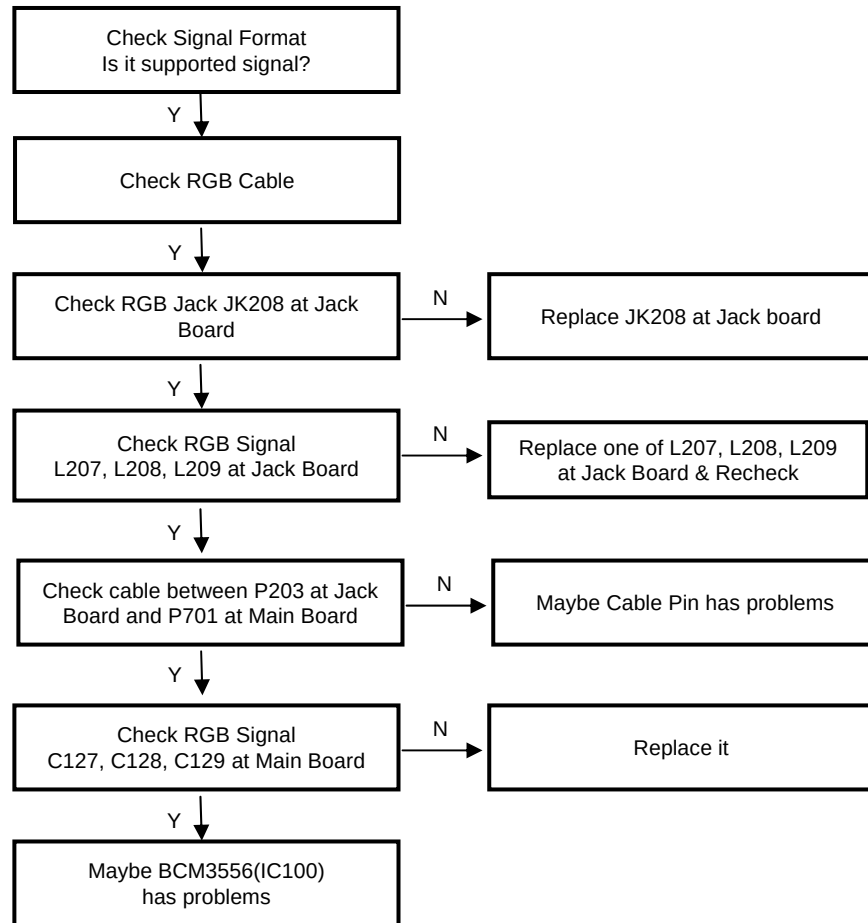


6. RGB Video Trouble Shooting

Overall Block Diagram
for Brazil DTV (LH70)

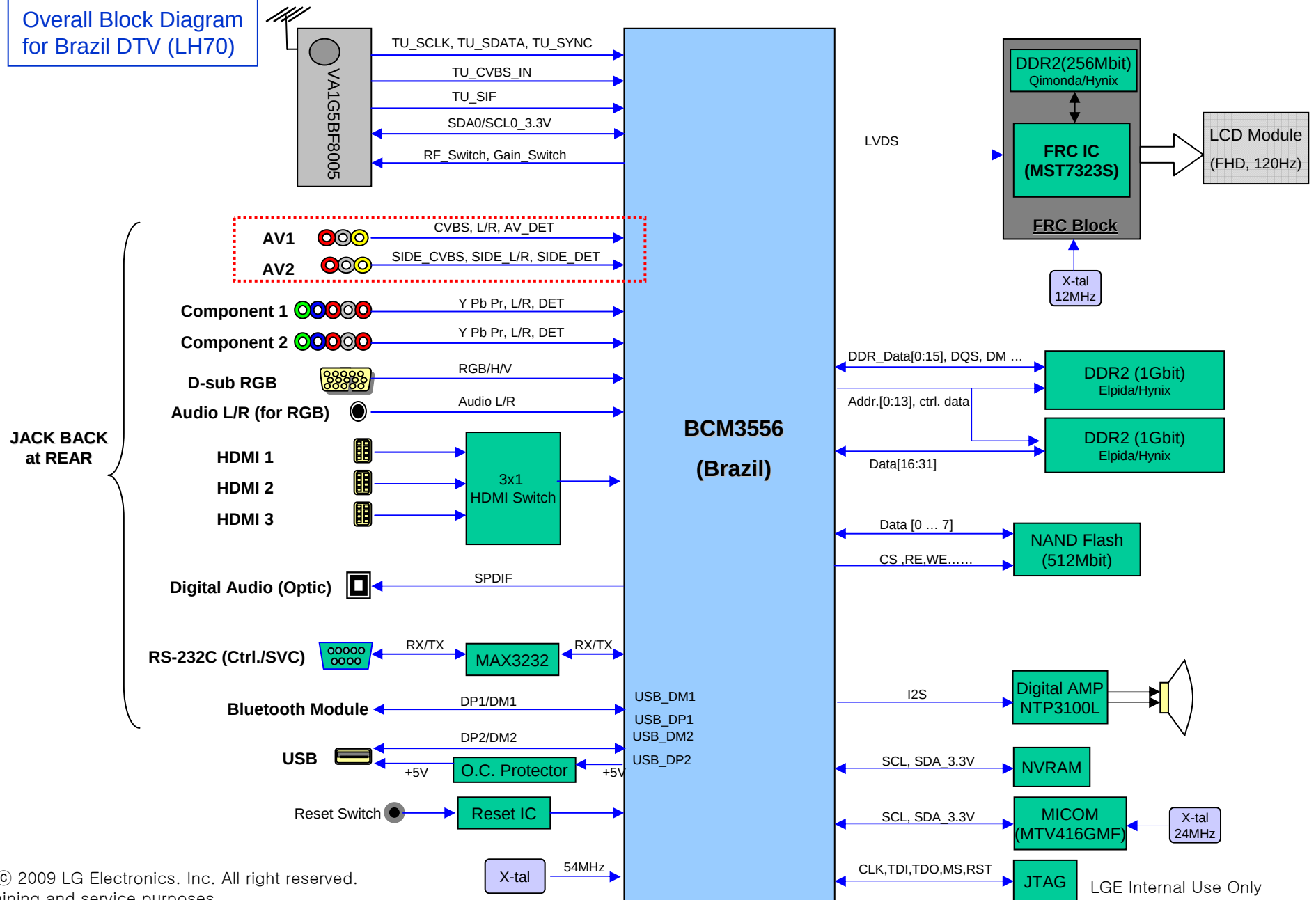


6. RGB Video Trouble Shooting

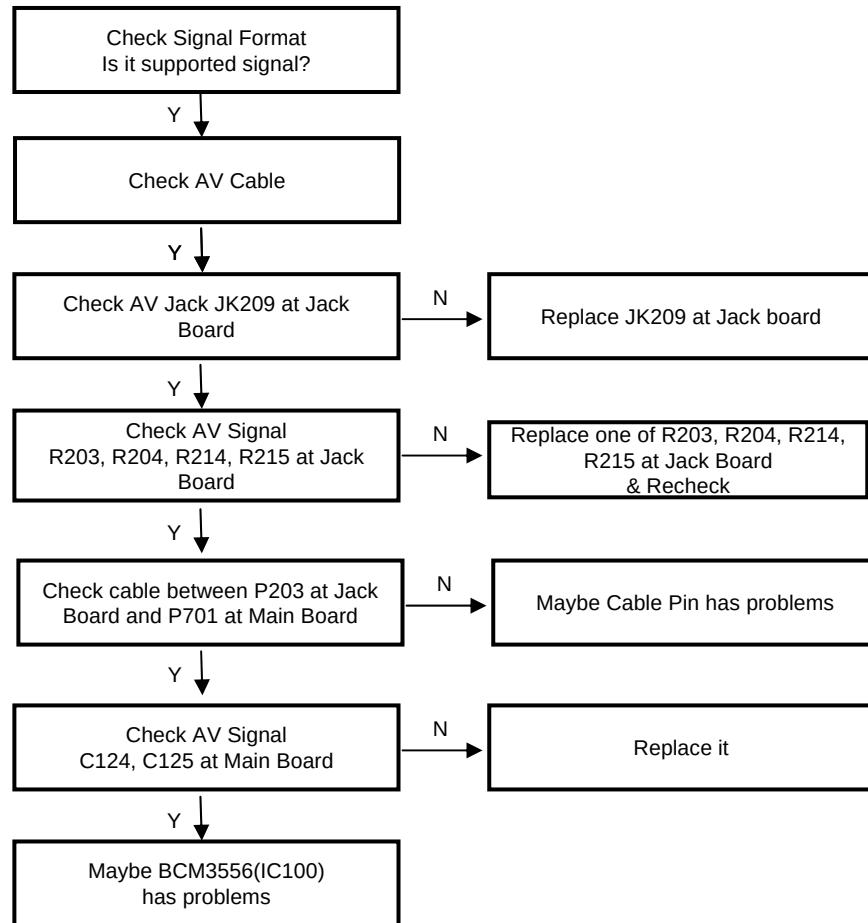


7. AV Video Trouble Shooting

Overall Block Diagram
for Brazil DTV (LH70)

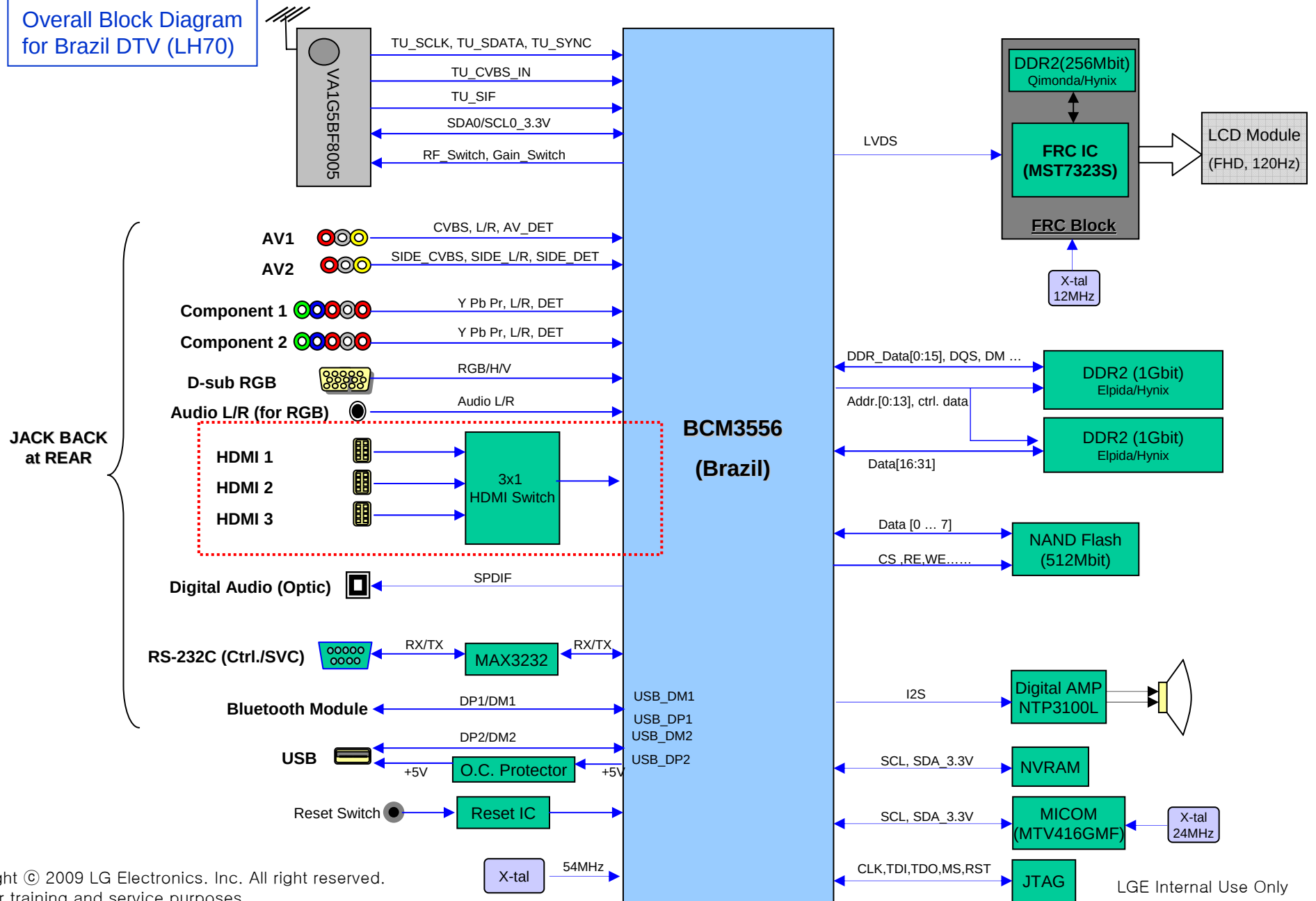


7. AV Video Trouble Shooting

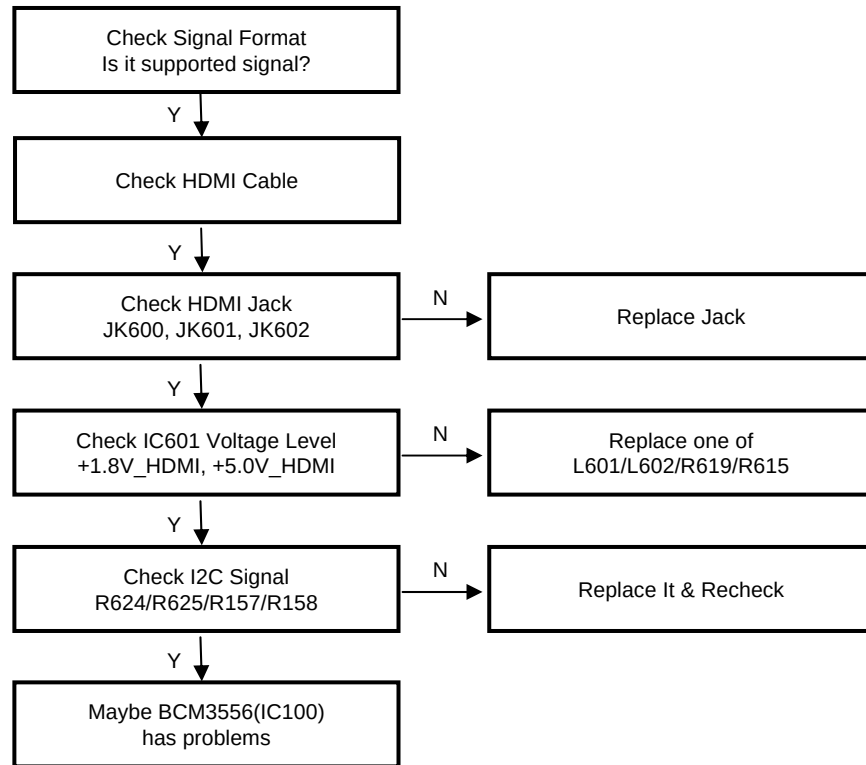


8. HDMI Video Trouble Shooting

Overall Block Diagram
for Brazil DTV (LH70)

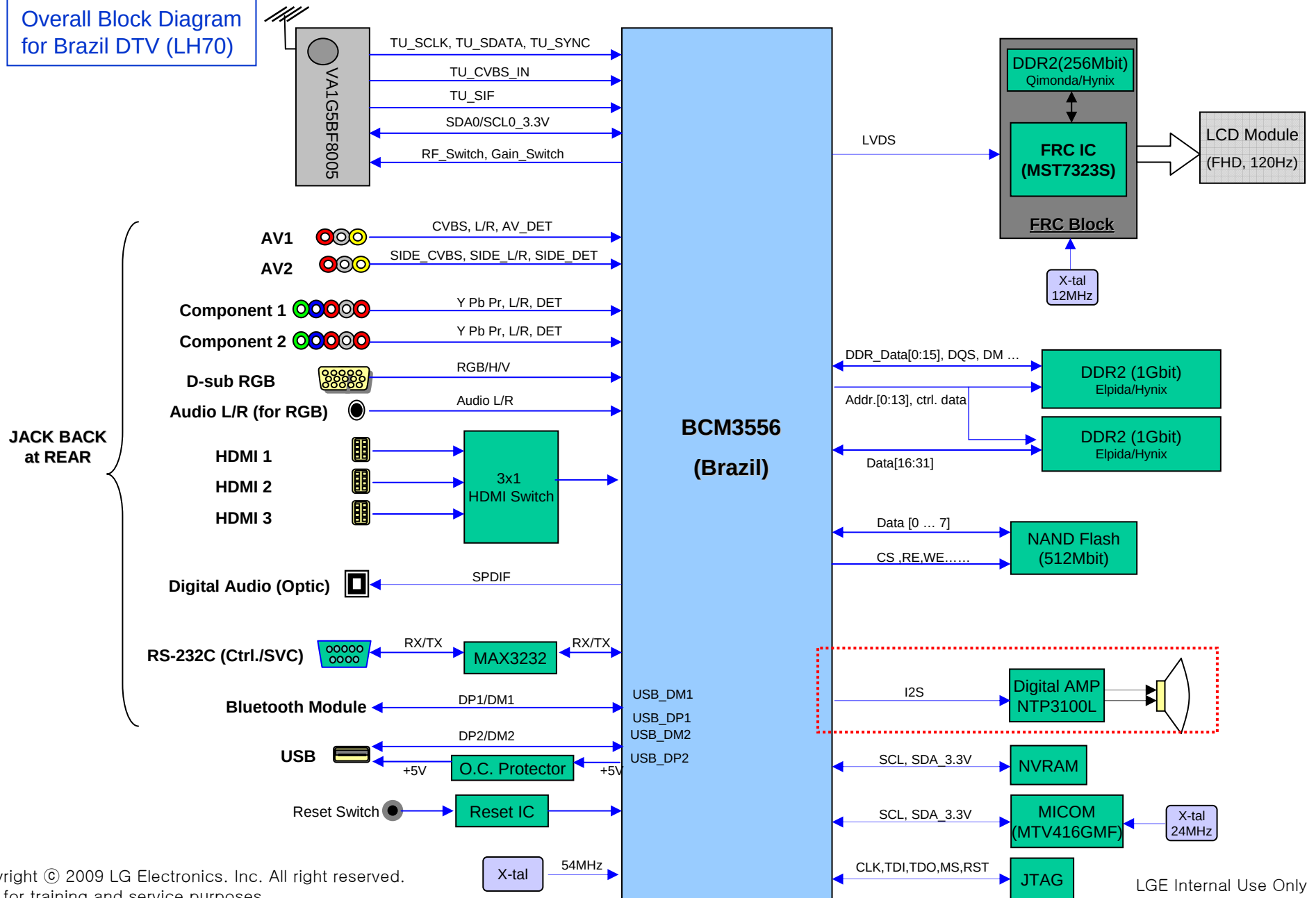


8. HDMI Video Trouble Shooting

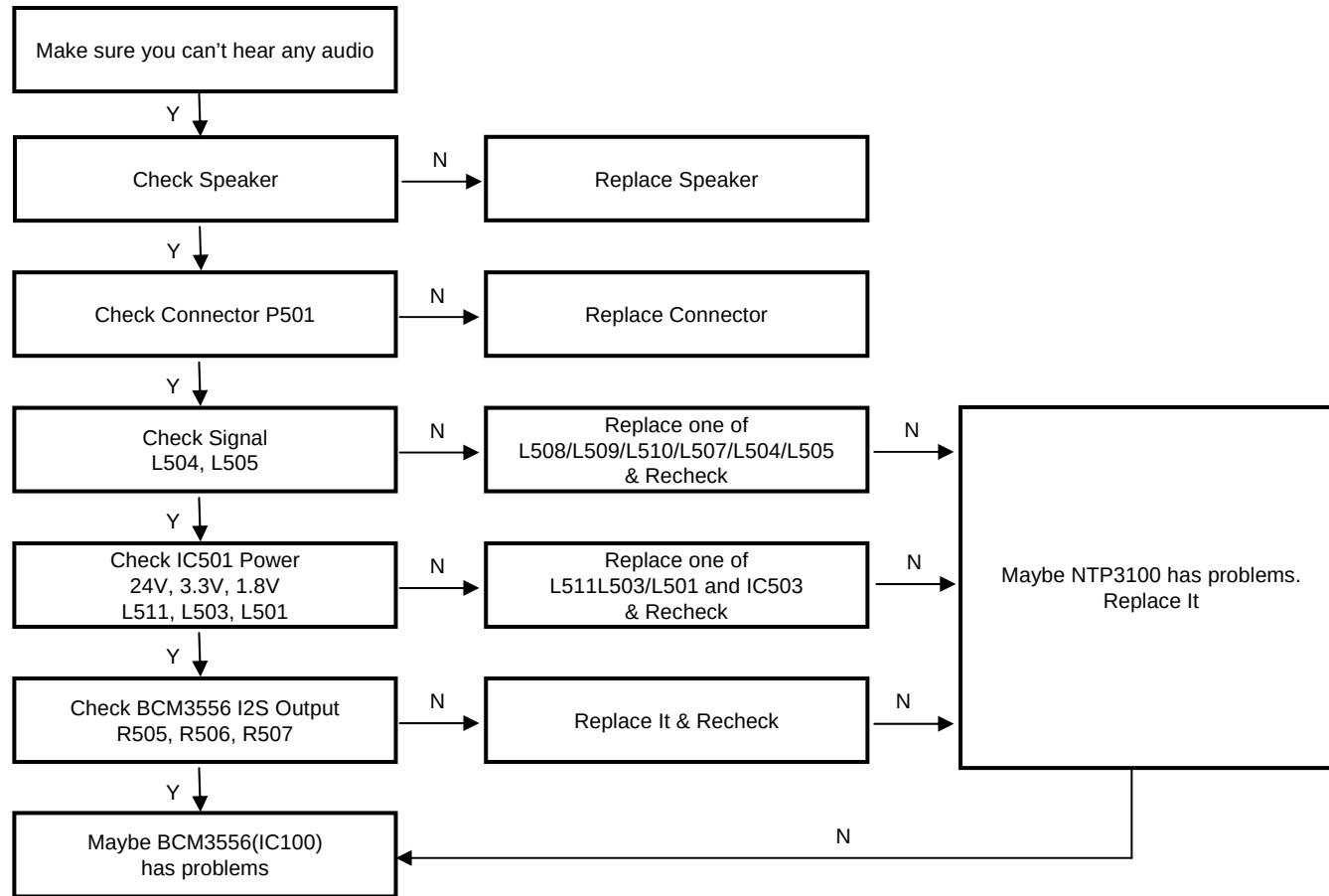


9. All Source Audio Trouble Shooting

Overall Block Diagram
for Brazil DTV (LH70)

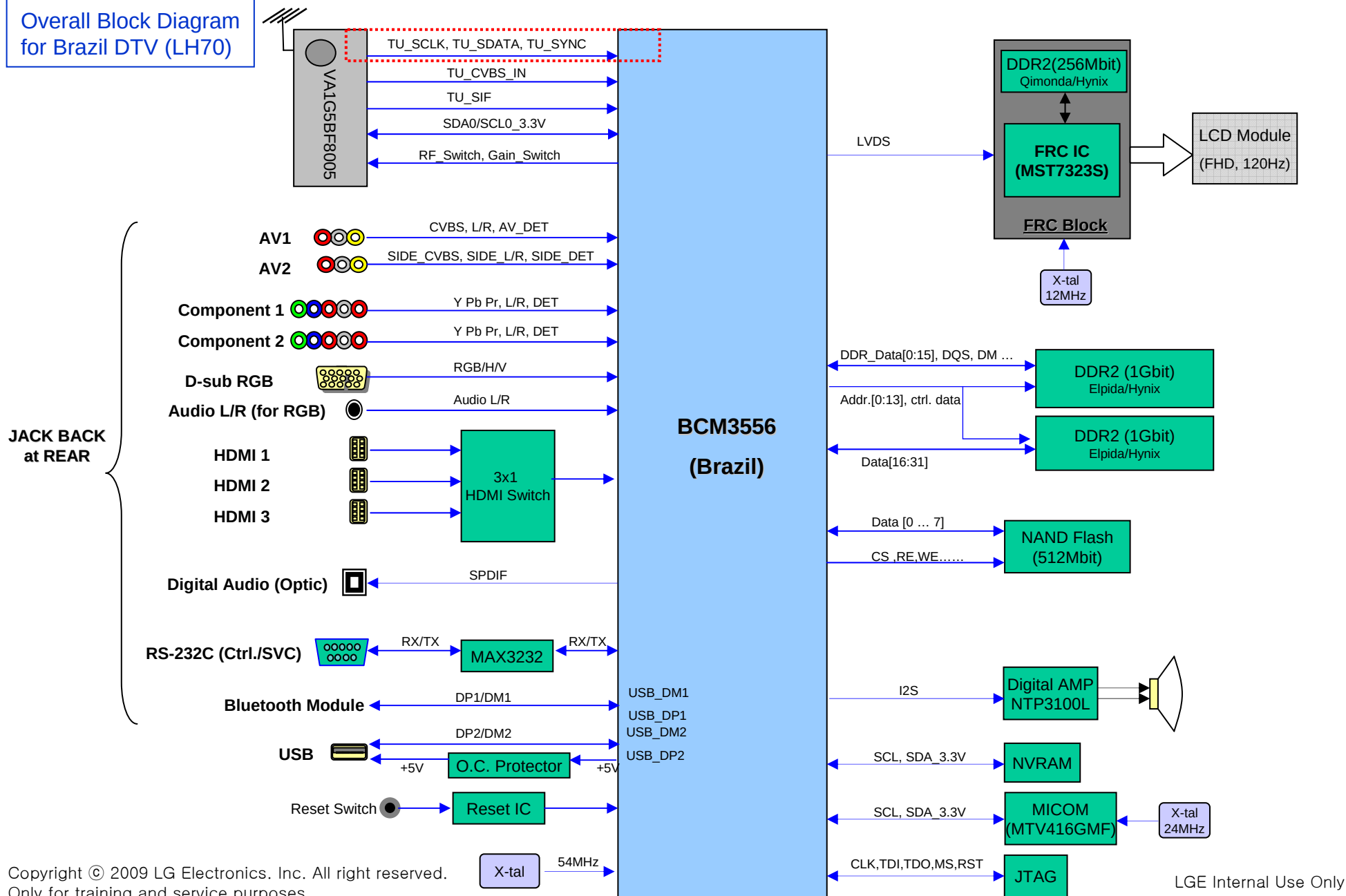


9. All Source Audio Trouble Shooting

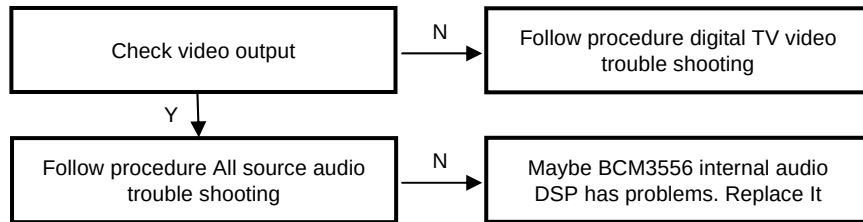


10. Digital TV Audio Trouble Shooting

Overall Block Diagram
for Brazil DTV (LH70)

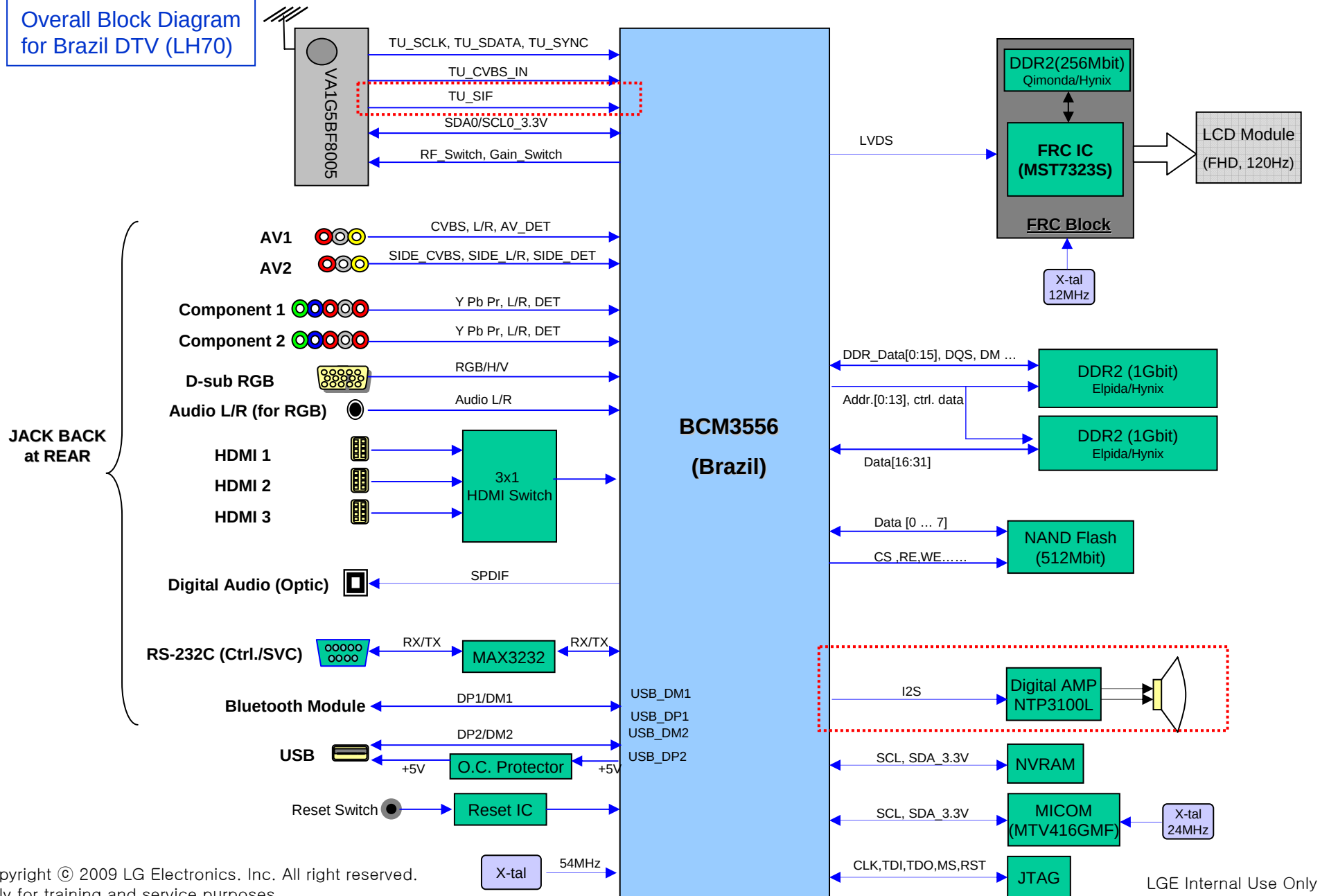


10. Digital TV Audio Trouble Shooting

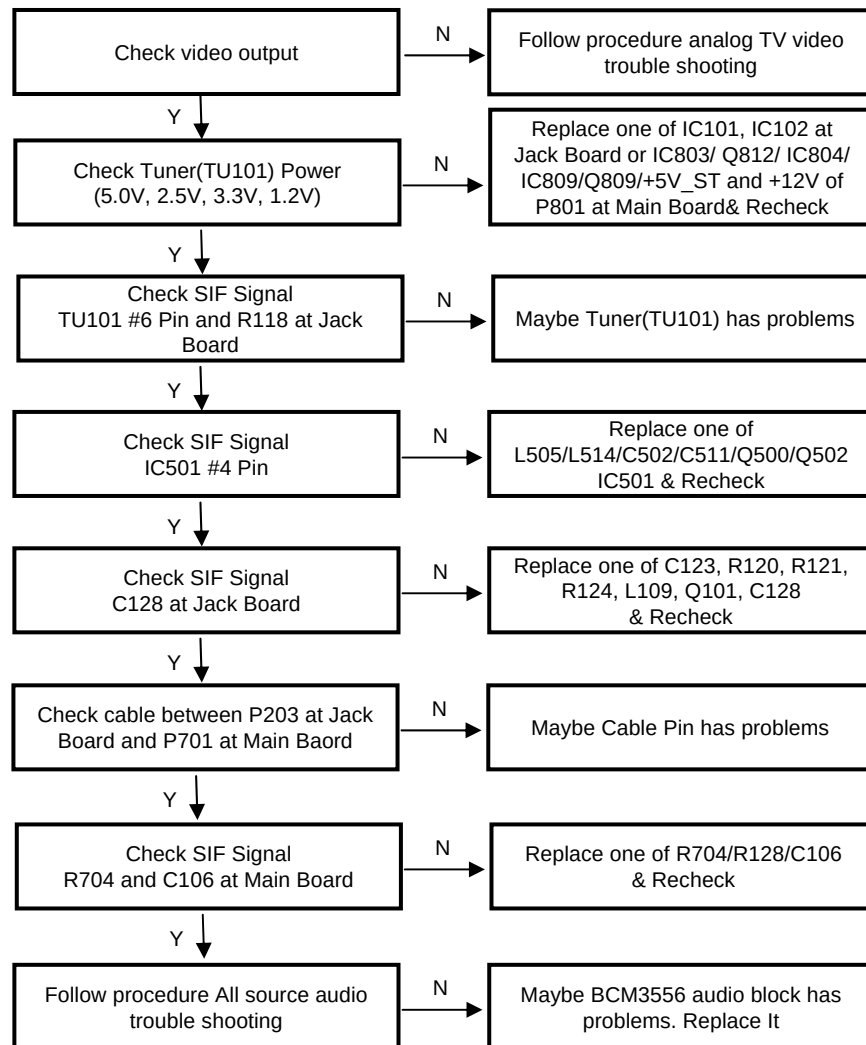


11. Analog TV Audio Trouble Shooting

Overall Block Diagram
for Brazil DTV (LH70)

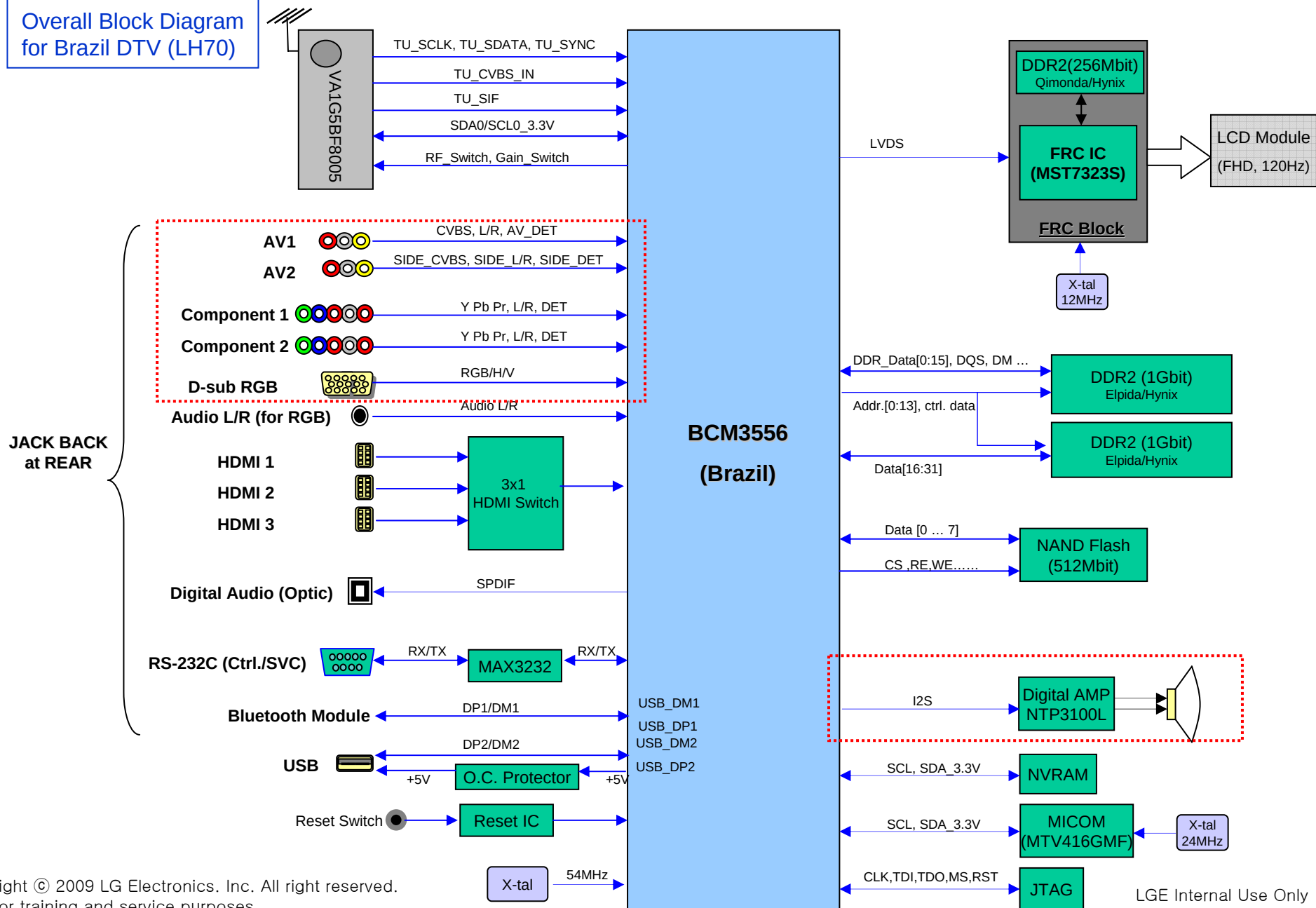


11. Analog TV Audio Trouble Shooting

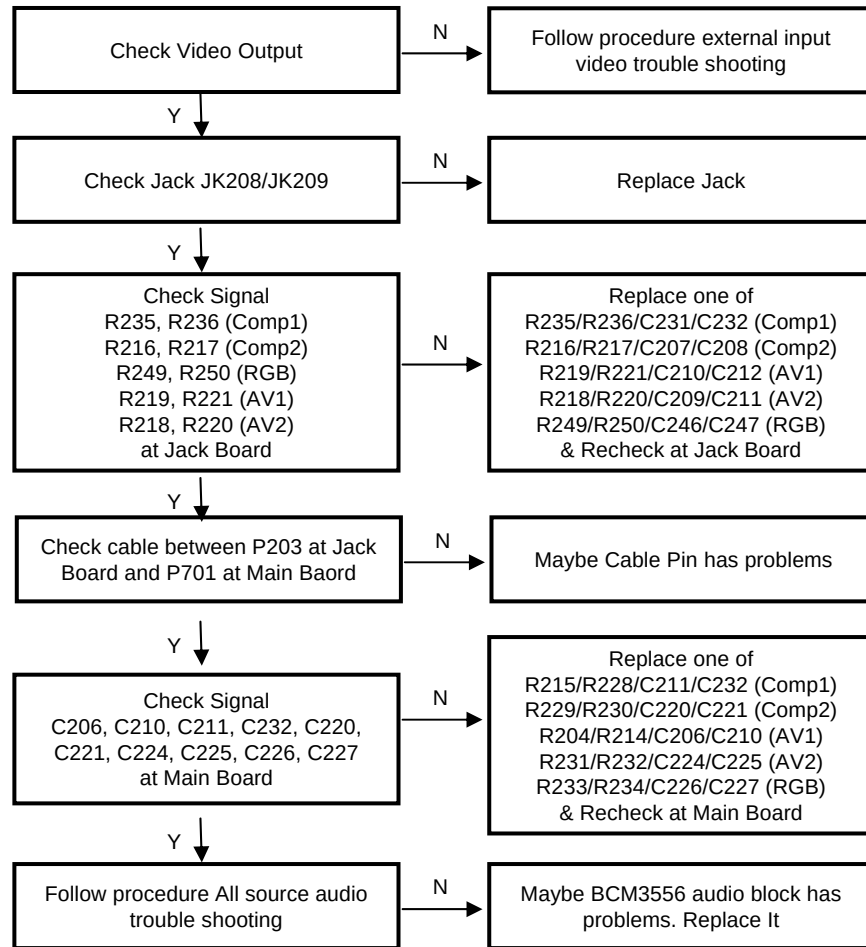


12. Component / RGB / AV Audio Trouble Shooting

Overall Block Diagram
for Brazil DTV (LH70)

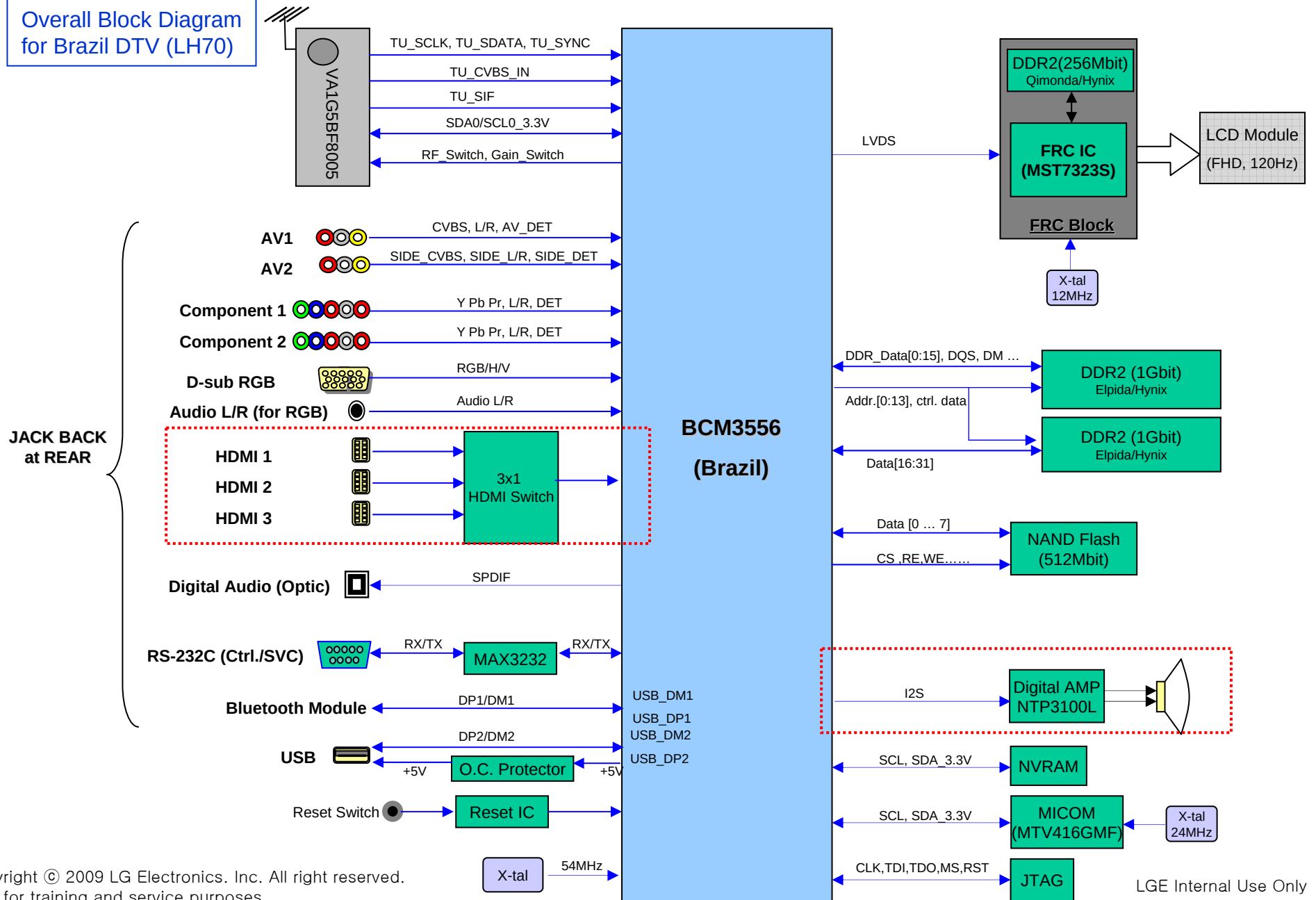


12. Component / RGB / AV Audio Trouble Shooting

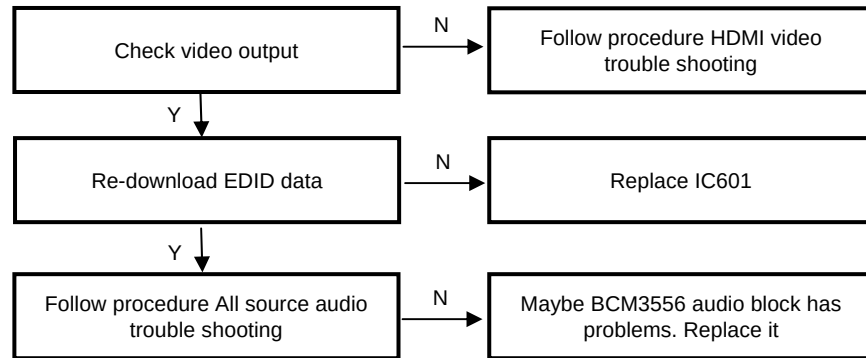


13. HDMI Audio Trouble Shooting

Overall Block Diagram
for Brazil DTV (LH70)

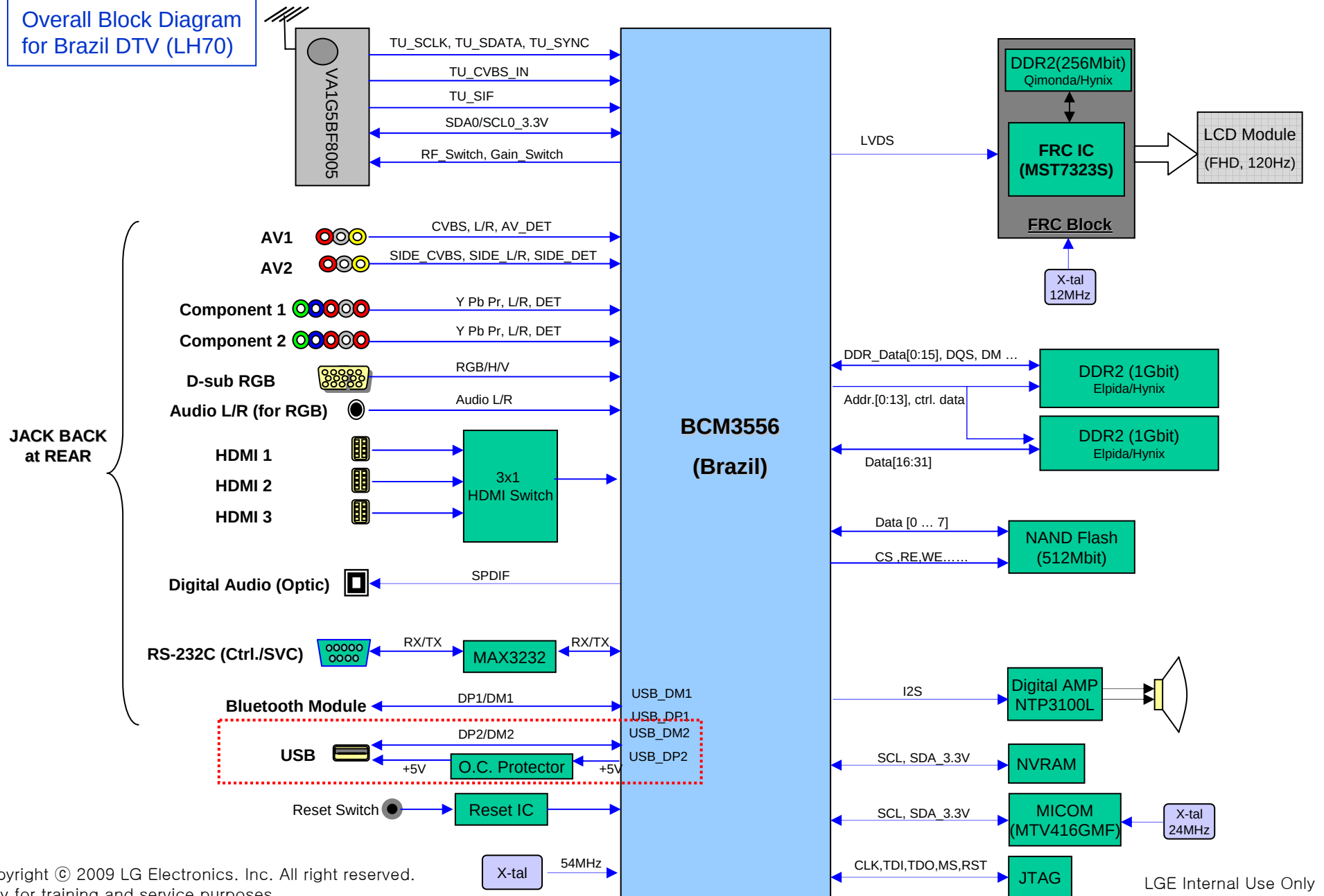


13. HDMI Audio Trouble Shooting

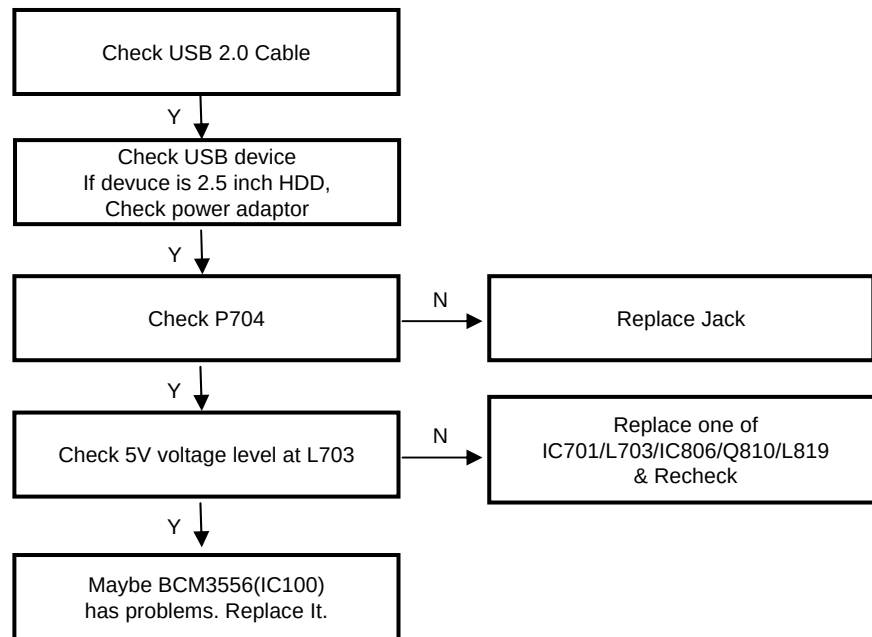


14. USB Trouble Shooting

Overall Block Diagram
for Brazil DTV (LH70)



14. USB Trouble Shooting

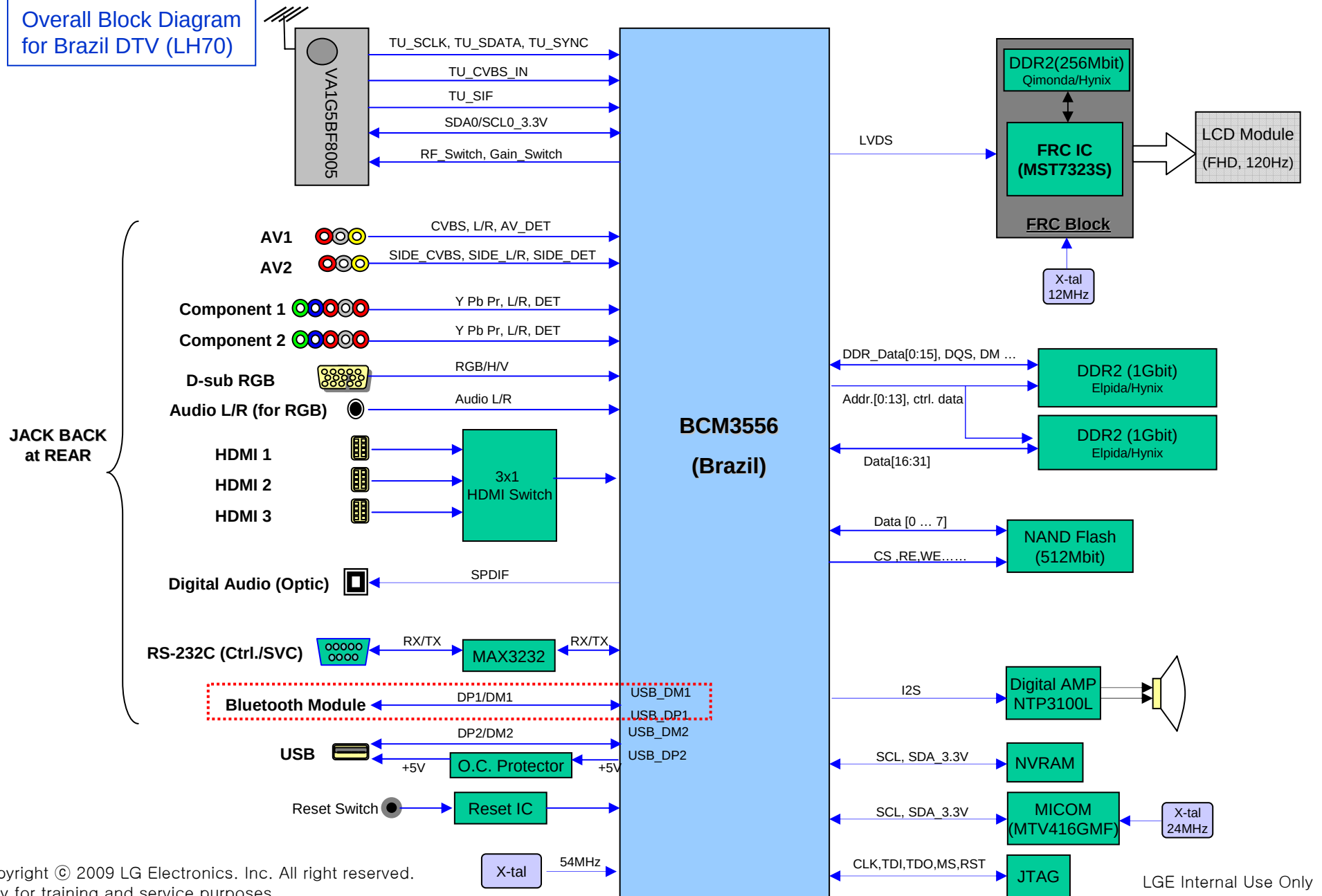


- **Exception**

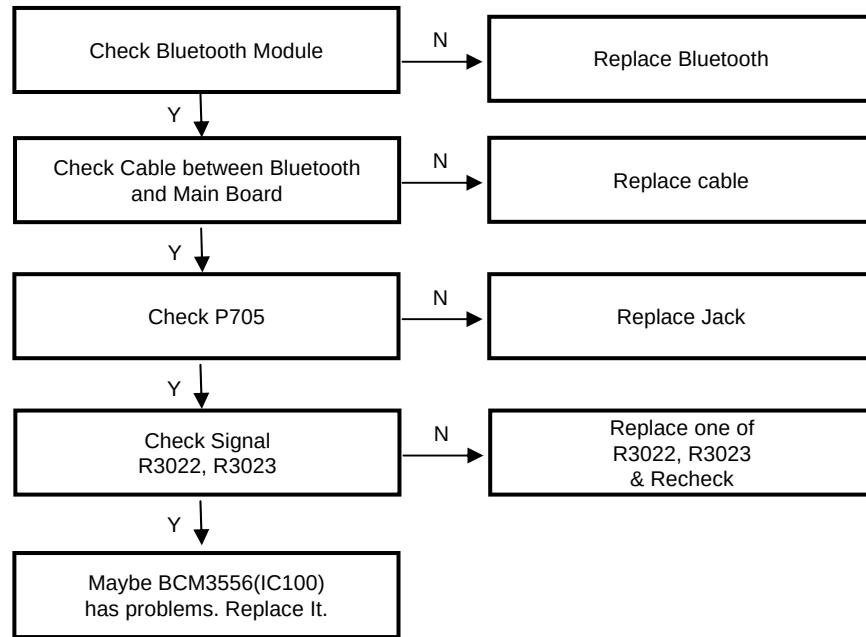
- USB power could be disabled by inrushing current
- In this case, remove the device and try to reboot the TV (AC power off/on)

14. Bluetooth Trouble Shooting

Overall Block Diagram
for Brazil DTV (LH70)

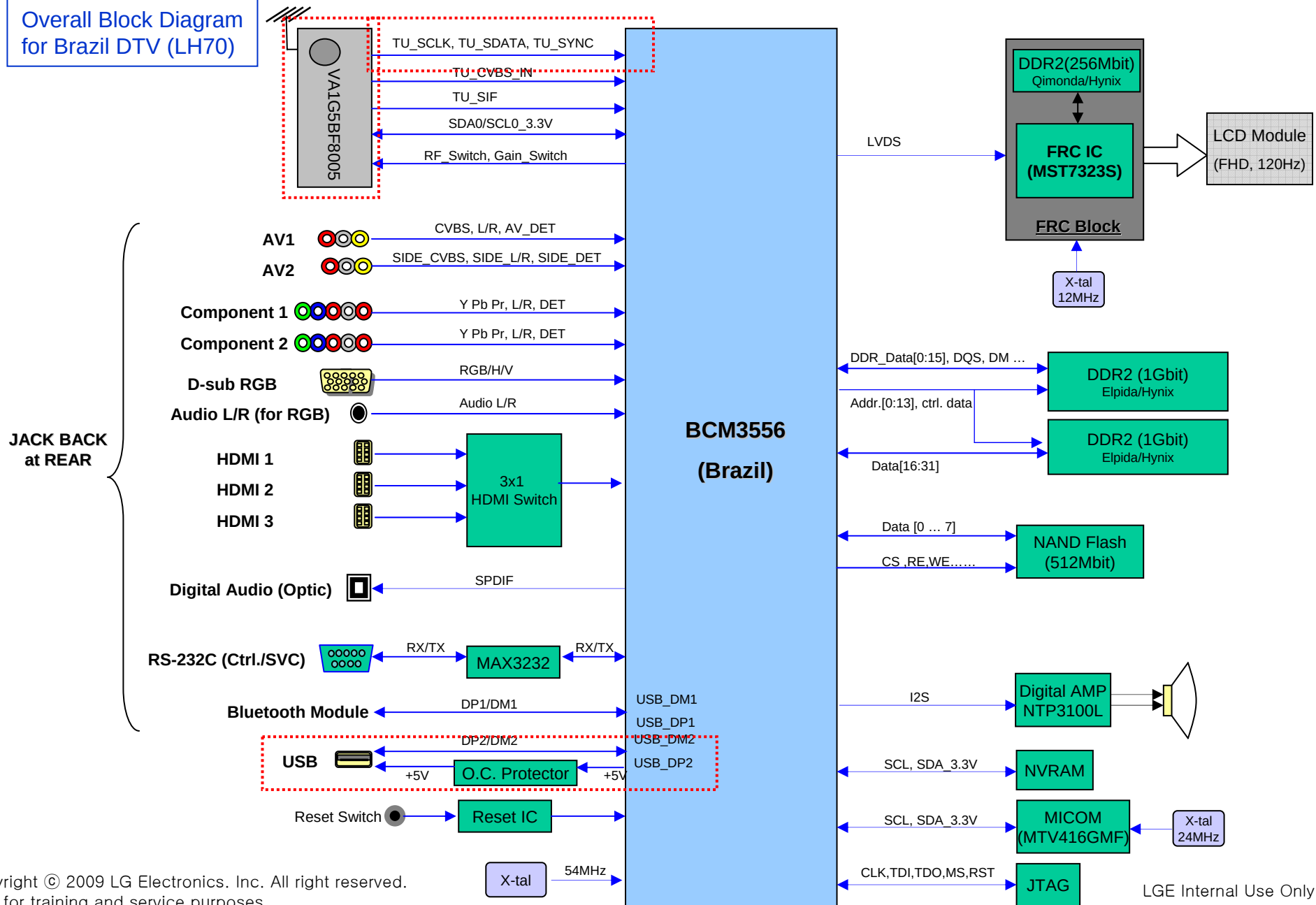


14. USB Trouble Shooting

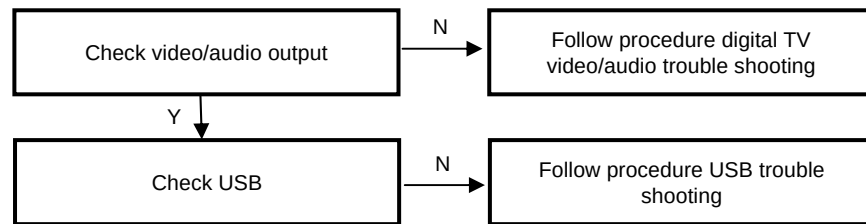


15. Digital TV Recording Fail Trouble Shooting

Overall Block Diagram
for Brazil DTV (LH70)

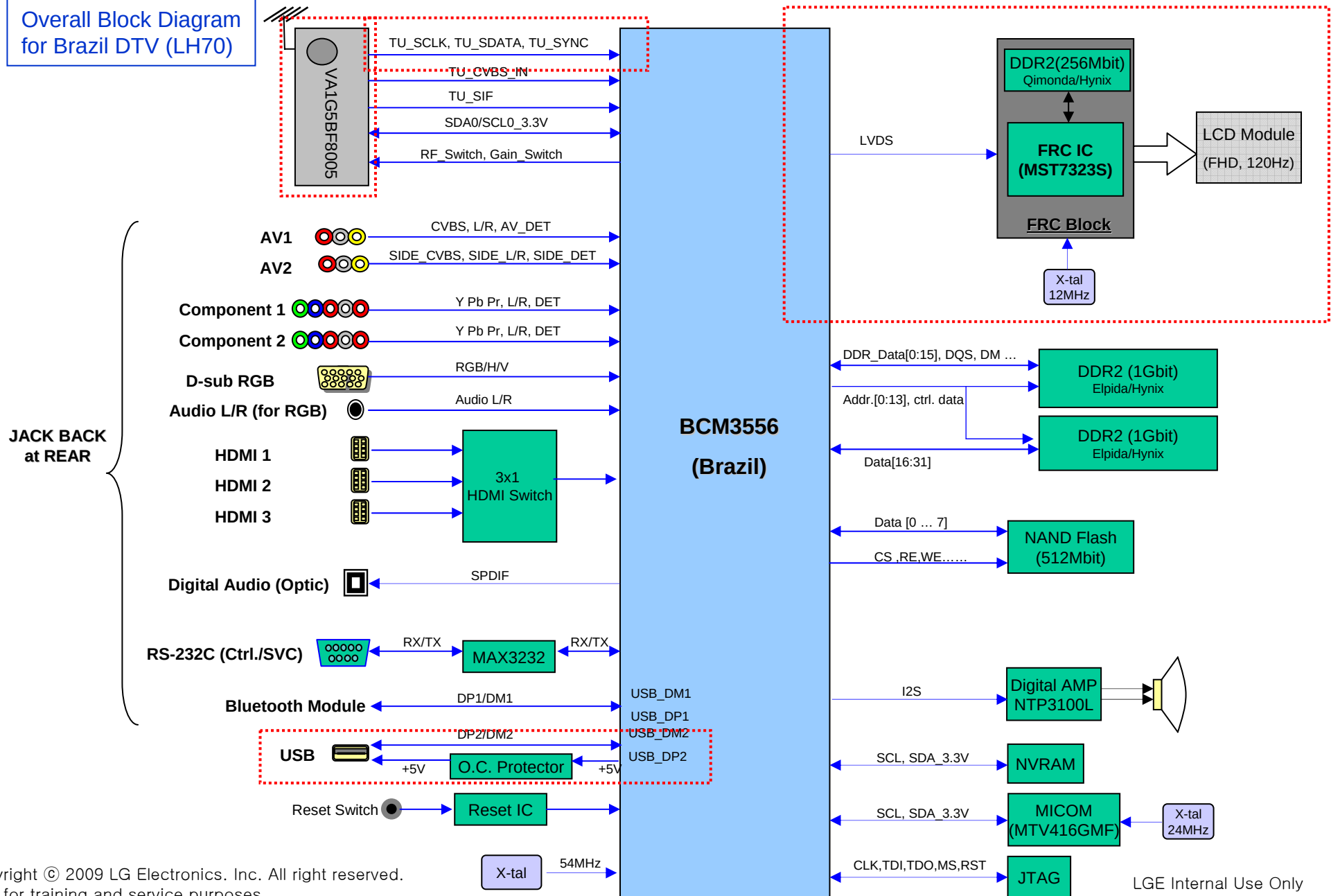


15. Digital TV Recording Fail Trouble Shooting

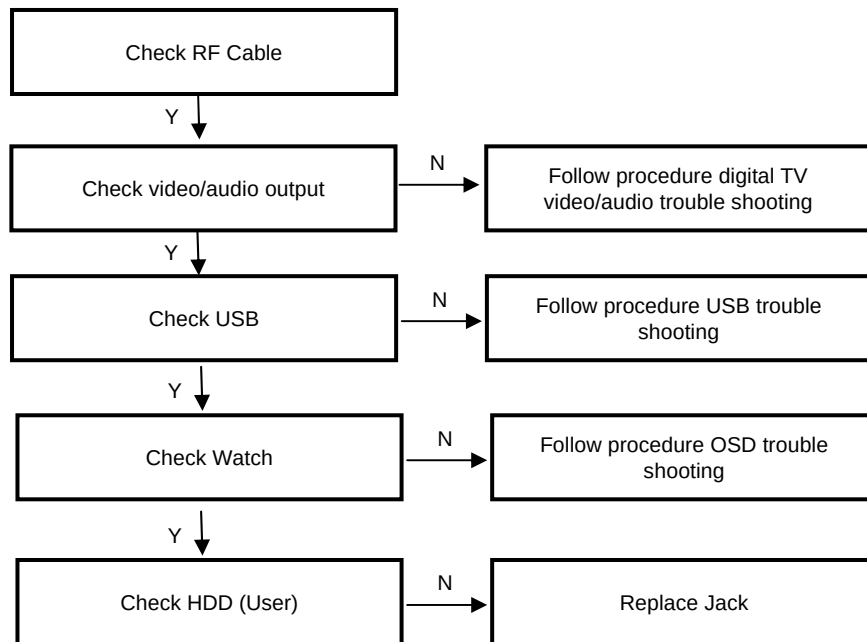


18. Digital TV Video Trouble Shooting while recording (Watch & Record)

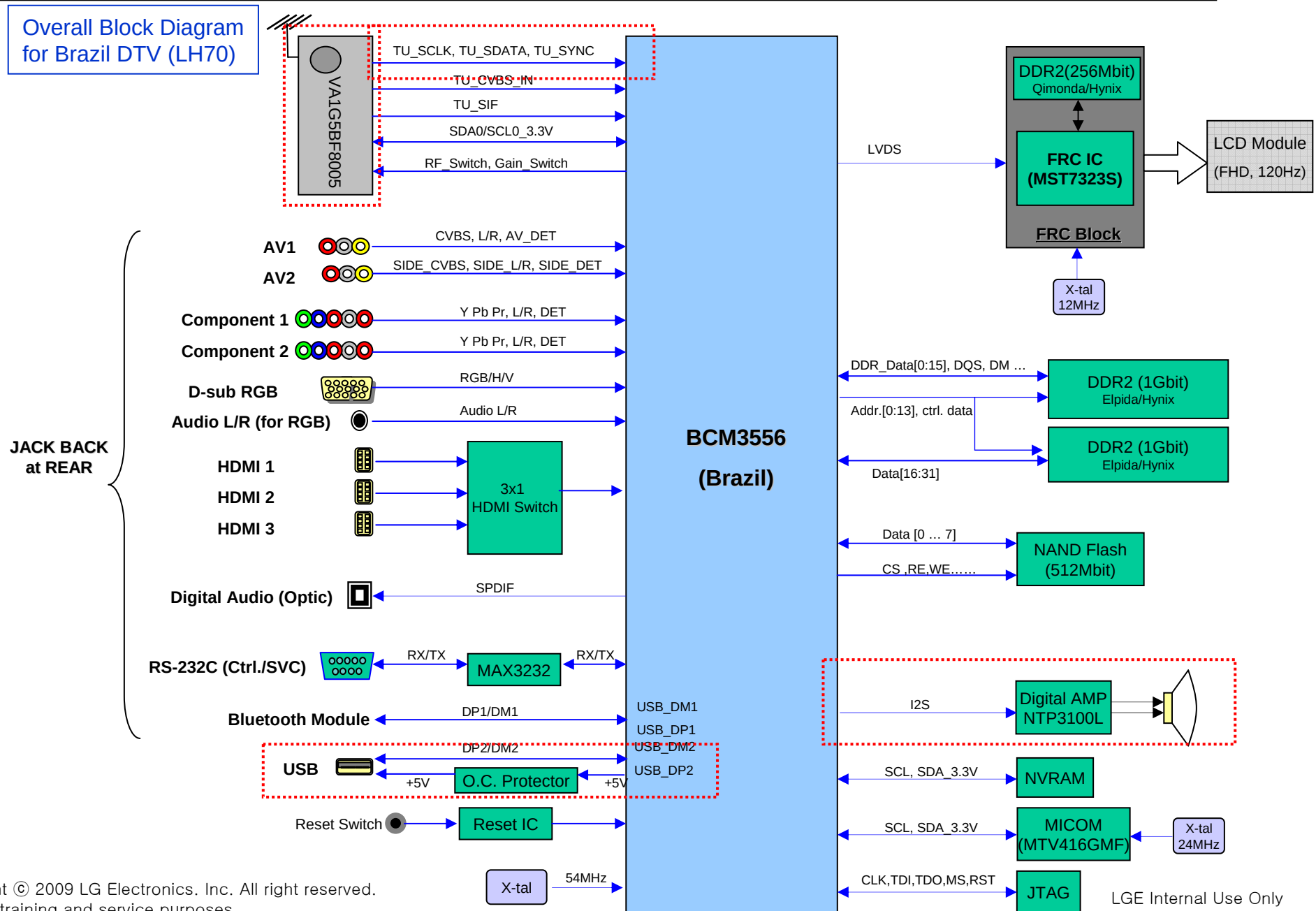
Overall Block Diagram for Brazil DTV (LH70)



18. Digital TV Video Trouble Shooting while recording (Watch & Record)



19. Digital TV Audio Trouble Shooting while recording (Watch & Record)



19. Digital TV Audio Trouble Shooting while recording (Watch & Record)

