LG

LCD TV
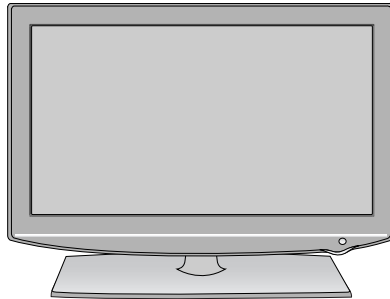# SERVICE MANUAL

CHASSIS : LJ91A

MODEL : 42LH35FD 42LH35FD-SF

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

CONTENTS

SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

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

General Guidance

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

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

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

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 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 1MΩ and 5.2MΩ.
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 is 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

AC Volt-meter

To Instrument's exposed METALLIC PARTS

0.15uF

1.5 Kohm/10W

Good Earth Ground such as WATER PIPE, CONDUIT etc.
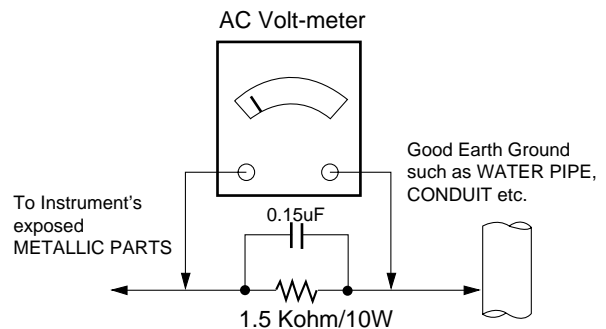
When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1 Ω
*Base on Adjustment standard

SERVICING PRECAUTIONS

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

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

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

Electrostatically Sensitive (ES) Devices
Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called *Electrostatically Sensitive (ES) Devices.* Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static by static electricity.
1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.

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

General Soldering Guidelines
1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range or 500°F to 600°F.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25cm) 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 LJ91A chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

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

3. Test method

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

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	32 inch Wide (1920 X 1080) 37 inch Wide (1920 X 1080) 42 inch Wide (1920 X 1080)	32LH35FD-SF 37LH35FD-SF 42LH35FD-SF
6.	Aspect Ratio	16:9	
7.	Tuning System	FS	
8.	Module	LC320WUN-SAB2 (VITIAZ 3) LC370WUE-SBB2 (VITIAZ 4) LC420WUE-SBC1 (VITIAZ 4)	32LH35FD-SF 37LH35FD-SF 42LH35FD-SF
9.	Operating Environment	1) Temp : 0 ~ 40 deg 2) Humidity : ~ 80 %	
10.	Storage Environment	1) Temp : -20 ~ 60 deg 2) Humidity : ~ 85 %	

5. Chromiance & Luminance spec.

No	Item			Min	Typ	Max	Unit	Remark
1.	Max Luminance (Center 1-point / Full White Pattern)	Module		400	500		cd/m	LC420WUE-SBC1(V4)
		Set		400	500		cd/m	
2.	Luminance uniformity			77			%	Full white
3.	Color coordinate	RED	X	Typ. -0.03	0.638	Typ. +0.03		
4.			Y		0.334			
5.		GREEN	X		0.290			
6.			Y		0.606			
7.		BLUE	X		0.144			
8.			Y		0.064			
9.		WHITE	X		0.279			
10.			Y		0.292			
11.	Color coordinate uniformity							N/A
	Contrast ratio			1000:1	1400:1			NORMAL
				50000:1	80000:1			DCR
12.	Color Temperature	Cool		0.274	0.276	0.278		<Test Condition> 85% Full white pattern ** The W/B Tolerance is –0.015 for Adjustment Dynamic contrast : off Dynamic color : off OPC : off
				0.281	0.283	0.285		
		Standard		0.283	0.285	0.287		
				0.291	0.293	0.295		
		Warm		0.311	0.313	0.315		
				0.327	0.329	0.331		
13.	Color Distortion, DG					10.0	%	
14.	Color Distortion, DP					10.0	deg	
15.	Color S/N, AM/FM			43.0			dB	
16.	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	23.976	74.176	HDTV 1080P
13.	1920*1080	33.75	30.000	74.25	HDTV 1080P
14.	1920*1080	33.71	29.97	74.176	HDTV 1080P
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	138.5	HDTV 1080P reduced timing	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	31.50	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	23.976	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 Sleep Timer / Auto Sleep	Off
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

10. Mechanical Specification

No.	Item		Content			Unit	Remark
			Width (W)	Length (D)	Height (H)	mm	
1.	Product Dimension	Before Packing	1028	297	715.4	mm	With Stand
			1028	88.7	658.6	mm	Without Stand
		After Packing	1330	228	770	mm	With Stand
			1314	212	748	mm	Without Stand
2.	Product Weight	Only SET	18.0			Kg	With Stand
			16.2			Kg	Without Stand
		With BOX	21.8			Kg	With Stand
			20.0			Kg	Without Stand
3.	Container Loading Quantity	Individual or Palletizing	40ft		40ft(H-CUBIC)		
			Indi.	Woo den	Indi.	Wooden	
			270	-	360	-	
4.	Stand Assy	Swivel Degree Swivel Force	+/- 20 degree 0.8Kg f ~ 2.5Kgf				

ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied all of the LJ91A 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 ±5°C of temperature and 65±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
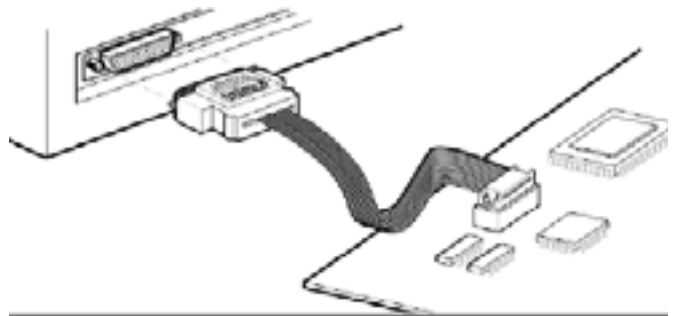
4.2. << PRINT PORT >> PIN MAP

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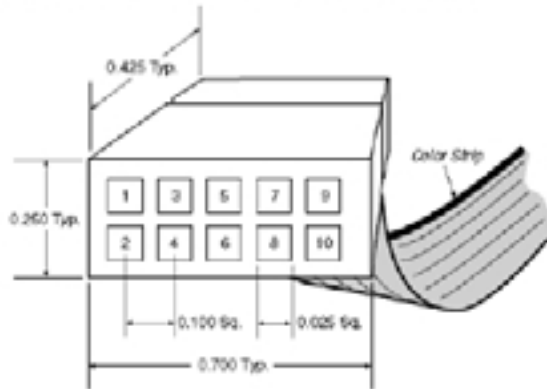
Table 2 identifies the 10-pin female plug's pin names for the corresponding download mode.

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

Pin	PS Mode		JTAG Mode	
	Signal Name	Description	Signal Name	Description
1	DCLK	Clock signal	TCK	Clock signal
2	GND	Signal ground	GND	Signal ground
3	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.
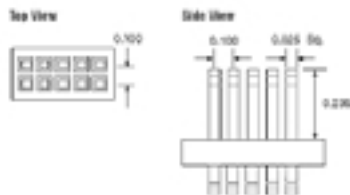
Operating Conditions

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 Jam File (.jam) and Jam Byte-Code File (.jbc) 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 (for MAX II devices)** 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
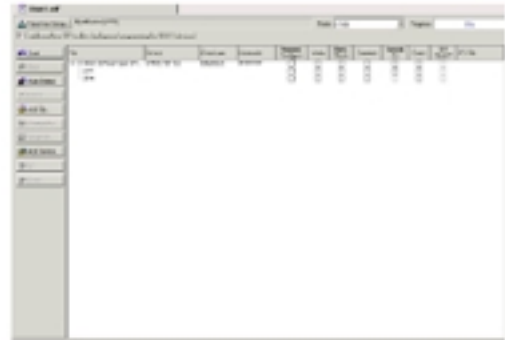
You can also enable the real-time ISP feature in the Quartus II software through the following steps:

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 .snf file to configure APEX II, APEX 20K, Mercury, and Excalibur 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 10-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.

○ Adjustment protocol

Order	Command	Set response
1. Inter the Adjustment mode	ad 00 00	d 00 OK00x
2. Change the Source	kb 00 40	b 00 OK40x (Adjust 480i Comp1/1080p Comp1)
	kb 00 60	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 : component1 480i, RGB 1080p) 00000000000000000000000007c007b006dx
	(main) ad 00 30	(main : component1 1080p) 00000007000000000000000007c00830077x
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

○ Necessary items befire Adjustment items
- Patterb Generator : MSPG-925FA
- Adjust 480i Comp1(MSPG-925FA:model:209, pattern:65) - Comp1 Mode
- Adjust 1080p Comp1(MSPG-925FA:model:225, pattern:65)-Comp1 Mode
- Adjust RGB(MSPG-925FA:model:225, pattern:65) - RGB-PC Mode

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

○ 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

○ 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±0.1V p-p correctly)

<Pic.4 Adjustment pattern : 480i / 1080p 60Hz Pattern >
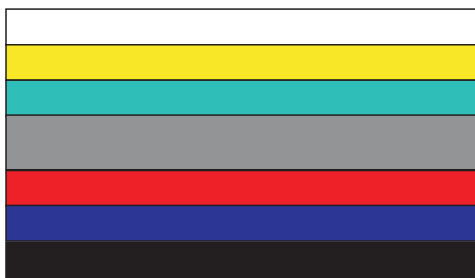
* You must make it sure its resolution and pattern cause every instrument can have different setting

○ Adjustment method 480i Comp1, Adjust 1080p Comp1/RGB (Factory adjustment)
• ADC 480i Component1 adjustment
- Check connection of Component1
- MSPG-925FA Ё 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"
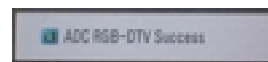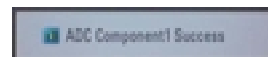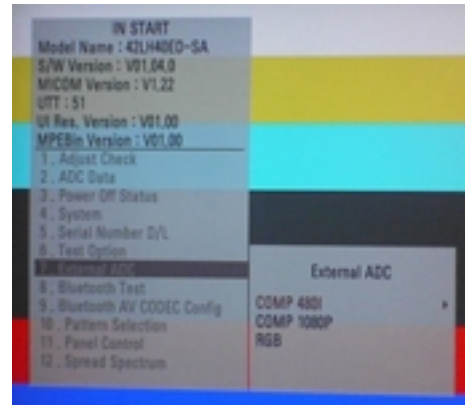
5.2 EDID (The Extended Display Identification Data) / DDC (Display Data Channel) Download.

○ 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.
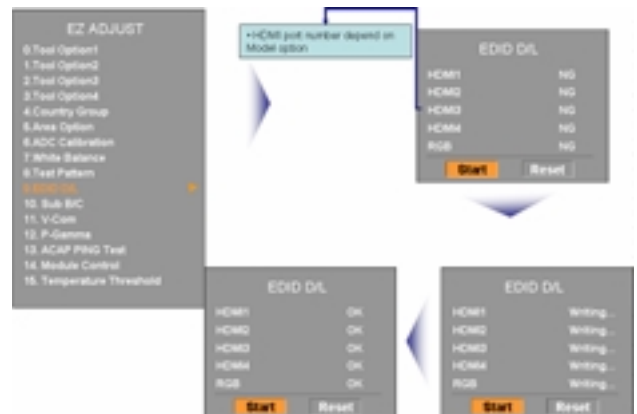
Edid data and Model option download (RS232)

NO	Item	CMD 1	CMD 2	Data 0	
Enter download MODE	Download ModeIn	A	E	0	0	When transfer the 'Mode In', Carry the command.
Edid data and Model option download	Download	A	E	*Note1	*Note2	Automatically downbad (The use of a internal Data)
	Adjust Mode Out	A	E	9	0	
	Adjustment Confirmation	A	E	9	9	To check Download on Assembly line.

○ 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.

Download jig

PC

Main B/D

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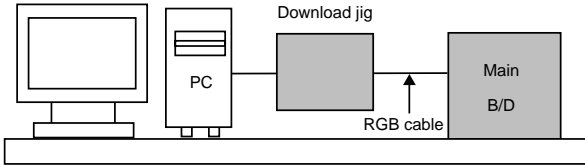
Pic.3) For write EDID data, setting Jig and another instruments.

- • 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 1A 36 80 A0 70 38 1F 40 30 20
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 00 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 1A 36 80 A0 70 38 1F 40 30 20
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 00 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 20 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 1A 36 80 A0 70 38 1F 40 30 20
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 00 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 30 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 (0xA5, 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 18 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 1A 36 80 A0 70 38 1F 40 30 20
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 00 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
```

5.3 Adjustment Color Temperature(White balance)

○ 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)

○ Connection Diagram (Auto Adjustment)
   • Using Inner Pattern

```
┌─────────────────────────┐
│                         │         ┌─────────────┐
│   Full White Pattern    │◁────────│   CA-100+   │
│                         │         └─────────────┘
│                         │          COLOR
│                         │          ANALYZER
└─────────────────────────┘          TYPE; CA-100+
         ↑
   ┌───────────┐
   │ RS-232C   │
   └───────────┘
```

   • Using HDMI input

```
┌──────────────────────┐         ┌─────────────────┐
│                      │────────▷│  Color Analyzer │
│ 216Gray White Pattern│         └─────────────────┘
│   (HDMI Pattern)     │         ┌─────────────────┐
│                      │◁────────│   MSPG-925FS    │
└──────────────────────┘         │ Video Signal    │
         ↑                       │ Generator       │
   ┌──────────────┐              │ Model : 217     │
   │ RS-232C      │              │ Pattern : 78    │
   │ Baud Rate:   │              └─────────────────┘
   │ 115200       │
   └──────────────┘
```

<Pic.5 Connection Diagram for Adjustment White balance> .
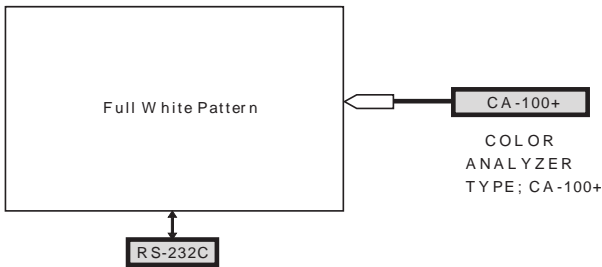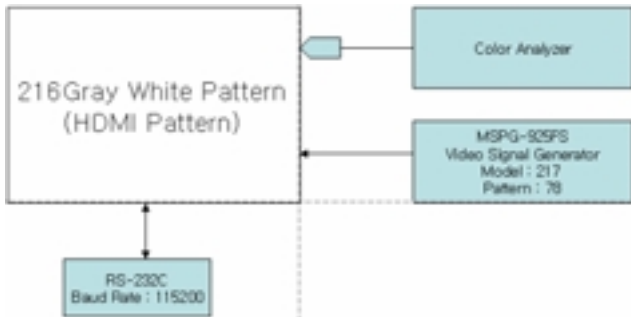
○ White Balance Adjustment
   If you can't adjust with inner pattern, then you can adjust it using HDMI pattern. You can select option at "Ez-Adjust Menu – 7. White Balance" there items "NONE, INNER, HDMI". It is normally setting at inner basically. If you can't adjust using inner pattern you can select 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 orignally.
   • Connect RS-232C cable to set
   • Connect HDMI cable to set
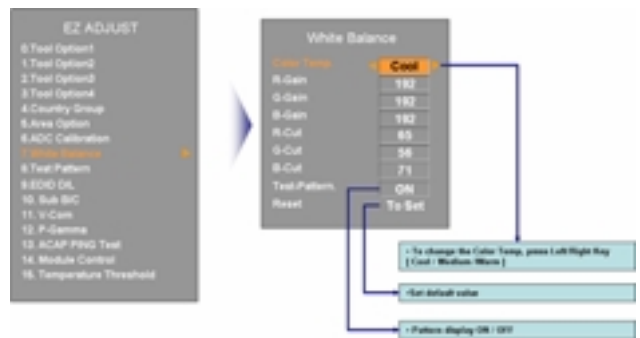
¢ RS-232C Command (Commonly apply)

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)

○ 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.

○ Using CS-1000 Equipment.
    - COOL : T=11000K,   uv=0.000, x=0.276 y=0.283
    - MEDIUM : T=9300K,   uv=0.000, x=0.285 y=0.293
    - WARM : T=6500K,   uv=0.000, x=0.313 y=0.329

EXPLODED VIEW

* SET + STAND

Block Diagram

(Front-end)

Cable

ISDB-T/
PAL/NTS
C
TU101/2

Serial
TP1

CVBS1/
SIF1

(System + Scalar)

NANDFlash
IC101
128MB

DDR2
256MB

DDR2
256MB

CVBS_LIVE

2069_L/R_OUT1

TP1

TP2

MPEG_TS

HDMI0_BCM

SIF_LIVE

LVDS

SPDIF

USB2.0

1080P

USB

BCM3556
IC100
(400M MIPS)

CVBS1
CVBS2
AV1 LR
AV2 LR
COMP1_LR
COMP2_LR
RGB_LR

(Comp1/2, RGB)

X-TAL
54MHz

(Etc)

I2S_BCM

NTP3100L
IC500

I2C

SIDE HDMI_PORT4   HDMI4

UI_HW_PORT1   HDMI2

UI_HW_PORT2   HDMI1

TDA9996
IC601

HDMI0_BCM

MICOM
IC407

X-TAL
24MHz

> ## BCM3556 (Main Chip)
> - There are no power sequence requirements. Any sequence will be acceptable
> - All supplies have a minimum ramp up time of 100us. There is no maximum ramp up time restriction
> - RESET should be held active during ramp up and at least 10ms after all voltages are above 95% of their specified nominal levels

Min 100us

either 1.2V, 1.8V, 2.5V, 3.3V

All power rails above minimum operating voltage

1.2V rail at 1.14V
1.8V rail at 1.71V
2.5V rail at 2.375V
3.3V rail at 3.135V

95%

either 1.2V, 1.8V, 2.5V, 3.3V

Min 10ms

Reset Input
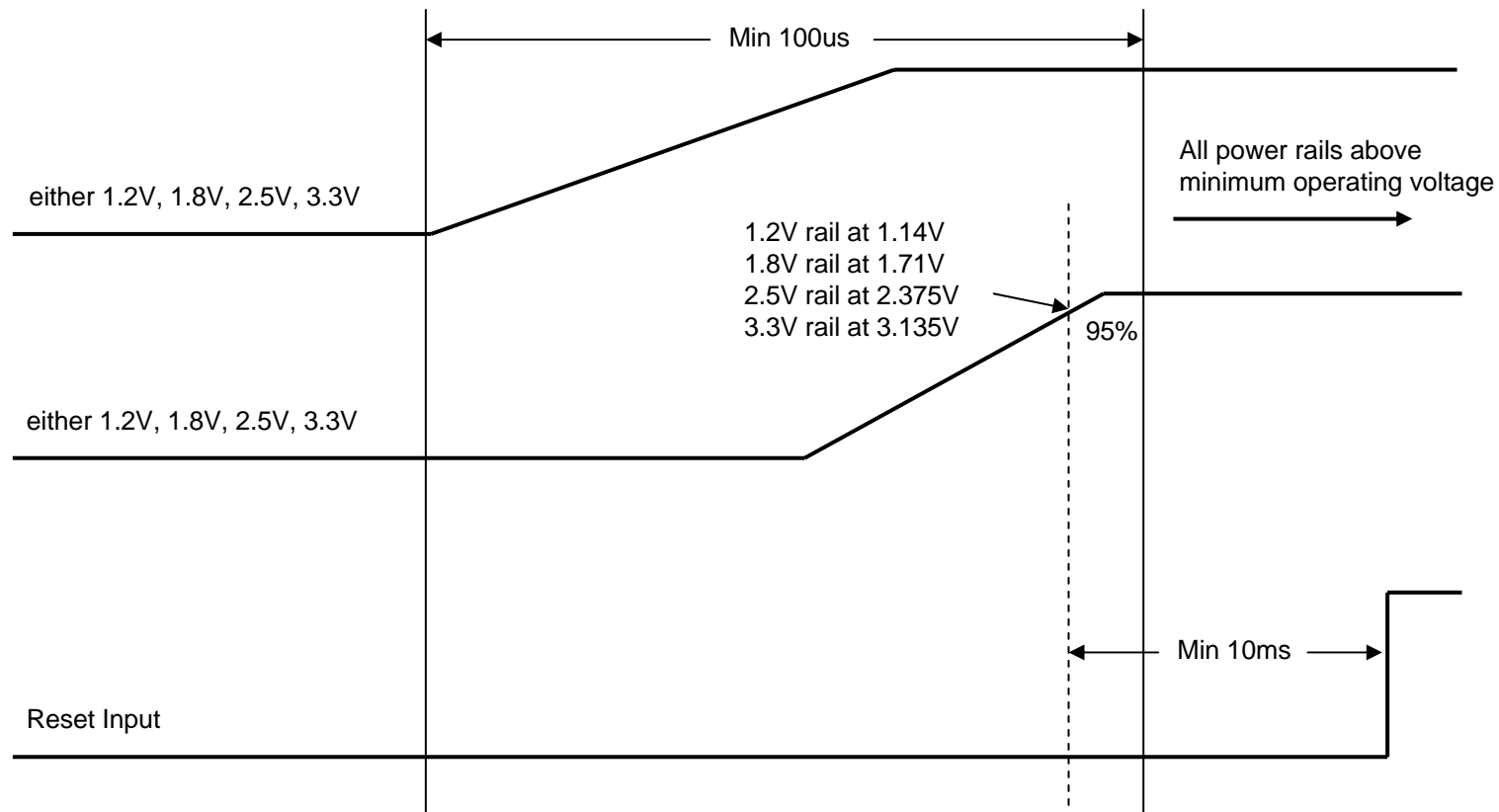
➢ **SAA7164 (MPEG Encoder)**
- Applications must guarantee **all 4 conditions** mentioned below during power-on of SAA7164

- Condition 1:
  - RESET has to be LOW, when the 1.2 V digital and the 3.3 V digital supplies become available
  - RESET has to remain LOW for at least 5 ms after all supplies became available.
- Condition 2:
  - Either power-on the 1.2 V analog and 3.3 V analog supplies simultaneously
  - Or power-on the 1.2 V analog supplies after the 3.3 V analog supplies
- Condition 3:
  - Either power-on the 1.2 V analog, the 1.2 V digital and 3.3 V digital supplies simultaneously
  - Or power-on the 1.2 V digital supplies after the 1.2 V analog and 3.3 V digital supplies.
- Condition 4:
  - Either power-on the 2.6 V digital supplies after the 3.3 V digital supplies
  - Or power-on the 1.2 V digital supplies simultaneously or after the 2.6 V digital supplies.

➢ **Measured Waveform**
- All power have enough ramp up time (4 ms > minimum 100us)
- RESET is negated after last power is ramped up (115 ms > minimum 10ms)
- 3.3V, 2.6V, 1.2V power sequence requirement of MPEG encoder is satisfied.

3.3V, 2.5V, 1.8V, 1.2V
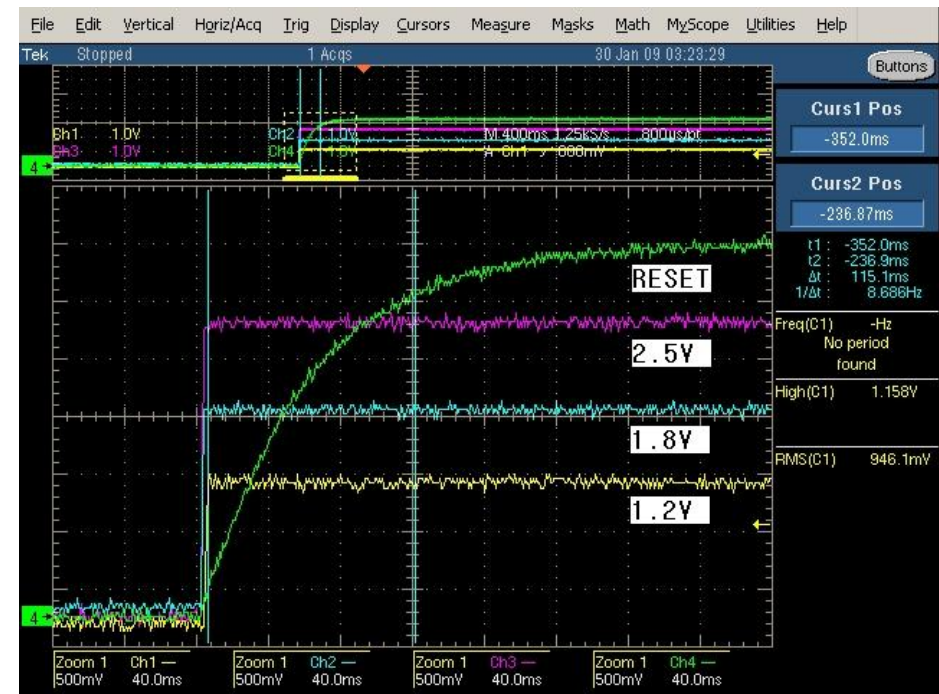
2.5V, 1.8V, 1.2V, RESET

1. Power-Up Boot Fail Trouble Shooting

```
┌─────────────────────────┐   N   ┌─────────────────────────┐   Y   ┌─────────────────────────┐
│  Check P800 All Voltage │ ────> │  Check Power connector  │ ────> │  Replace Power board    │
│  Level (20V, 12V, 5V_ST)│       └─────────────────────────┘       └─────────────────────────┘
└─────────────────────────┘
           │ Y
           ▼
┌─────────────────────────┐   N   ┌─────────────────────────┐
│  Check All Voltage Level│ ────> │  Replace one of         │
│  at L804/L807/L808      │       │  L804/L807/L808         │
└─────────────────────────┘       │  & Recheck              │
           │ Y                     └─────────────────────────┘
           ▼
┌─────────────────────────┐   N   ┌─────────────────────────┐   N   ┌─────────────────────────┐
│  Check Voltage Level    │ ────> │  Replace one of         │ ────> │                         │
│  3.3V at L815           │       │  IC807/IC802/L815/L823/ │       │                         │
└─────────────────────────┘       │  L810/L826 & Recheck    │       │                         │
           │ Y                     └─────────────────────────┘       │                         │
           ▼                                                         │                         │
┌─────────────────────────┐   N   ┌─────────────────────────┐   N   │                         │
│  Check Voltage Level    │ ────> │  Replace one of         │ ────> │                         │
│  2.5V at L827           │       │  IC803/L824/L827        │       │                         │
└─────────────────────────┘       │  & Recheck              │       │  Check Micom IC407      │
           │ Y                     └─────────────────────────┘       │  Redownload or replace  │
           ▼                                                         │                         │
┌─────────────────────────┐   N   ┌─────────────────────────┐   N   │                         │
│  Check Voltage Level    │ ────> │  Replace one of         │ ────> │                         │
│  1.8V at IC804 #6 pin    │       │  IC804/L825             │       │                         │
└─────────────────────────┘       │  & Recheck              │       │                         │
           │ Y                     └─────────────────────────┘       │                         │
           ▼                                                         │                         │
┌─────────────────────────┐   N   ┌─────────────────────────┐   N   │                         │
│  Check Voltage Level    │ ────> │  Replace one of         │ ────> │                         │
│  1.2V at L803           │       │  IC809/IC800/L803/L816/ │       └─────────────────────────┘
└─────────────────────────┘       │  L819/L801 & Recheck    │
           │ Y                     └─────────────────────────┘
           ▼
┌─────────────────────────┐   N   ┌─────────────────────────┐
│  Check X201 Clock 54MHz │ ────> │  Replace X201           │
└─────────────────────────┘       └─────────────────────────┘
           │ Y
           ▼
┌─────────────────────────┐   N   ┌─────────────────────────┐
│  Check signal transition│ ────> │  Maybe BCM3556 has      │
│  at IC101 #9 pin         │       │  troubles               │
└─────────────────────────┘       └─────────────────────────┘
           │ Y
           ▼
┌─────────────────────────┐
│  Replace IC101 Flash    │
│  Memory                 │
└─────────────────────────┘
```

2. No OSD Trouble Shooting

```
┌─────────────────────┐   N   ┌─────────────────────┐   Y   ┌─────────────────────┐
│  Check 12V Voltage  │──────▶│ Check Power connector│──────▶│ Replace Power board │
│  Level at P800 #13  │       │                     │       │                     │
│        Pin          │       └─────────────────────┘       └─────────────────────┘
└─────────────────────┘
         │ Y
         ▼
┌─────────────────────┐   N   ┌─────────────────────┐
│  Check 12V Voltage  │──────▶│ Replace one of      │
│   Level at L902     │       │  L804/L902          │
│                     │       │  & Recheck          │
└─────────────────────┘       └─────────────────────┘
         │ Y
         ▼
┌─────────────────────┐   N   ┌─────────────────────┐
│ Check 12V Voltage   │──────▶│ Replace one of      │
│ Level at L903       │       │ Q900/Q901/Q902/L903 │
│                     │       │ & Recheck           │
└─────────────────────┘       └─────────────────────┘
         │ Y
         ▼
┌─────────────────────┐   N   ┌─────────────────────┐
│    Check P903       │──────▶│ Maybe BCM3556(IC100)│
│ #16(TXAC-), #17(TXAC+),     │  has troubles       │
│ #32(TXBC-), #33(TXBC+)      │                     │
└─────────────────────┘       └─────────────────────┘
         │ Y
         ▼
┌─────────────────────┐   N   ┌─────────────────────┐
│  Check LVDS Cable   │──────▶│   Replace Cable     │
│                     │       │                     │
└─────────────────────┘       └─────────────────────┘
         │ Y
         ▼
┌─────────────────────┐
│ Check Voltage LCD   │
│      Module         │
└─────────────────────┘
```

3. Digital TV Video Trouble Shooting

```
┌──────────────────────────┐
│      Check RF Cable       │
└──────────────────────────┘
            │ Y
            ▼
┌──────────────────────────┐    N    ┌──────────────────────────┐
│  Check Tuner(TU1101) Power│────────▶│      Replace one of       │
│   (5.0V, 2.5V, 3.3V, 1.2V)│         │ L1108/L1105/L1100/L1107/L1109 │
└──────────────────────────┘         │         & Recheck          │
            │ Y                       └──────────────────────────┘
            ▼
┌──────────────────────────┐    N    ┌──────────────────────────┐
│  Check TP Clock, Data, Sync│───────▶│    Maybe Tuner(TU1101) has │
│   R1114, R1103, R1102     │         │         problems          │
└──────────────────────────┘         └──────────────────────────┘
            │ Y
            ▼
┌──────────────────────────┐
│    Maybe BCM3556(IC100)   │
│      has problems         │
└──────────────────────────┘
```

4. Analog TV Video Trouble Shooting

```
┌─────────────────────────┐
│      Check RF Cable      │
└─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐   N    ┌──────────────────────────────┐
│    Check Tuner Power     │ ─────▶ │      Replace one of          │
│  (5.0V, 2.5V, 3.3V, 1.2V)│        │ L1108/L1105/L1100/L1107/L1109│
└─────────────────────────┘        │         & Recheck            │
            │ Y                     └──────────────────────────────┘
            ▼
┌─────────────────────────┐   N    ┌──────────────────────────────┐
│    Check CVBS Signal     │ ─────▶ │     Maybe Tuner(TU1100) has  │
│     TU1101 #9 Pin        │        │          problems            │
└─────────────────────────┘        └──────────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐   N    ┌──────────────────────────────┐
│    Check CVBS Signal     │ ─────▶ │   Replace one of C1122/R1122 │
│          C102            │        │          & Recheck           │
└─────────────────────────┘        └──────────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐
│    Maybe BCM3556(IC100)  │
│      has problems        │
└─────────────────────────┘
```

5. Component Video Trouble Shooting

```
┌─────────────────────────┐
│   Check Signal Format   │
│   Is it supported signal?│
└─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐
│   Check Component Cable  │
└─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐    N    ┌─────────────────────────┐
│ Check Component Jack JK700│──────▶│     Replace Jack        │
└─────────────────────────┘         └─────────────────────────┘
            │ Y
            ▼                                 Replace one of
┌─────────────────────────┐    N    ┌─────────────────────────┐
│  Check Component Signal  │──────▶│   R754, R755, R756      │
│    R754, R755, R756      │         │     /L705/L706/L707     │
│    R741, R744, R745      │         │   R741, R744, R745      │
└─────────────────────────┘         │     /L702/L703/L704     │
            │ Y                       │       & Recheck         │
            ▼                         └─────────────────────────┘
┌─────────────────────────┐    N    ┌─────────────────────────┐
│  Check Component Signal  │──────▶│       Replace it        │
│    C127, C128, C129      │         └─────────────────────────┘
│    C130, C131. C132      │
└─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐
│   Maybe BCM3556(IC100)   │
│      has problems        │
└─────────────────────────┘
```

6. RGB Video Trouble Shooting

```
┌─────────────────────────┐
│   Check Signal Format    │
│   Is it supported signal?│
└─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐
│     Check RGB Cable      │
└─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐   N    ┌─────────────────────────┐
│   Check RGB Jack JK701   │───────▶│      Replace Jack        │
└─────────────────────────┘        └─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐   N    ┌─────────────────────────┐
│     Check RGB Signal     │───────▶│    Replace It & Recheck  │
│     L708, L709, L710     │        └─────────────────────────┘
└─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐   N    ┌─────────────────────────┐
│     Check Sync Signal    │───────▶│ Replace one of R759/R761/IC702│
│     IC702 #11, #3        │        │        & Recheck         │
└─────────────────────────┘        └─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐   N    ┌─────────────────────────┐
│    Check EEPROM (IC703)  │───────▶│   Replace it or re-burn  │
│                          │        │        & Recheck         │
└─────────────────────────┘        └─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐
│   Maybe BCM3556(IC100)   │
│     has problems         │
└─────────────────────────┘
```

7. AV Video Trouble Shooting

```
┌─────────────────────────┐
│   Check Signal Format    │
│   Is it supported signal?│
└─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐
│     Check AV Cable       │
└─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐      N    ┌─────────────────────────┐
│            Y            │──────────▶│      Replace Jack        │
│  Check Jack JK700/JK704  │           └─────────────────────────┘
└─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐      N    ┌─────────────────────────┐
│    Check CVBS Signal     │──────────▶│     Replace one of       │
│          C103            │           │  R729/R706/C711/D703     │
└─────────────────────────┘           │       & Recheck          │
            │ Y                        └─────────────────────────┘
            ▼
┌─────────────────────────┐
│   Maybe BCM3556(IC100)   │
│      has problems        │
└─────────────────────────┘
```

8. HDMI Video Trouble Shooting

```
┌─────────────────────────┐
│   Check Signal Format    │
│   Is it supported signal?│
└─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐
│     Check HDMI Cable     │
└─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐    N    ┌─────────────────────────┐
│     Check HDMI Jack      │ ──────▶ │      Replace Jack        │
│   JK500, JK501, JK503    │         │                          │
└─────────────────────────┘         └─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐    N    ┌─────────────────────────┐
│  Check IC601 Voltage Level│ ─────▶ │     Replace one of       │
│  +1.8V_HDMI, +3.3V_HDMI  │         │   L601/L602/R665/R663    │
└─────────────────────────┘         └─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────────────┐    N    ┌─────────────────────────┐
│       Check I2C Signal          │ ──────▶ │   Replace It & Recheck   │
│        R670/R671                │         │                          │
│ /R605/R606/R616/R617/R639/R642  │         └─────────────────────────┘
└─────────────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐
│   Maybe BCM3556(IC100)   │
│     has problems         │
└─────────────────────────┘
```

9. All Source Audio Trouble Shooting

```
┌─────────────────────────┐
│ Make sure you can't hear any │
│          audio          │
└─────────────────────────┘
             │ Y
             ▼
┌─────────────────────────┐      N      ┌─────────────────────────┐
│      Check Speaker      │ ──────────▶ │      Replace Speaker     │
└─────────────────────────┘             └─────────────────────────┘
             │ Y
             ▼
┌─────────────────────────┐      N      ┌─────────────────────────┐
│   Check Connector P500  │ ──────────▶ │    Replace Connector    │
└─────────────────────────┘             └─────────────────────────┘
             │ Y
             ▼
┌─────────────────────────┐      N   ┌──────────────────────────────┐   N   ┌──────────────────────────┐
│      Check Signal       │ ───────▶ │       Replace one of         │ ────▶ │ Maybe NTP3100 has problems. │
│       L504, L506        │          │ L508/L509/L510/L511/L504/L506 │       │        Replace It         │
└─────────────────────────┘          │         & Recheck            │       └──────────────────────────┘
             │ Y                     └──────────────────────────────┘
             ▼
┌─────────────────────────┐      N      ┌─────────────────────────┐
│     Check IC500 Power   │ ──────────▶ │   Replace It & Recheck  │
│     20V, 3.3V, 1.8V     │             └─────────────────────────┘
│ L500,L501,L502,L503,IC504 │
└─────────────────────────┘
             │ Y
             ▼
┌─────────────────────────┐      N      ┌─────────────────────────┐
│ Check BCM3556 I2S Output │ ──────────▶ │   Replace It & Recheck  │
│    R148, R149, R150     │             └─────────────────────────┘
└─────────────────────────┘
             │ Y
             ▼
┌─────────────────────────┐
│   Maybe BCM3556(IC100)  │
│      has problems       │
└─────────────────────────┘
```

10. Digital TV Audio Trouble Shooting

```
┌─────────────────────────┐    N    ┌─────────────────────────┐
│                         │ ──────► │  Follow procedure digital TV │
│   Check video output    │         │   video trouble shooting │
│                         │         │                         │
└─────────────────────────┘         └─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐    N    ┌─────────────────────────┐
│ Follow procedure All source │ ──────► │ Maybe BCM3556 internal audio │
│  audio trouble shooting │         │ DSP has problems. Replace It │
│                         │         │                         │
└─────────────────────────┘         └─────────────────────────┘
```

11. Analog TV Audio Trouble Shooting

Check video output	**N** →	**Follow procedure analog TV video trouble shooting**

Y ↓

Check Tuner Power (5.0V, 2.5V, 3.3V, 1.2V)	**N** →	**Replace one of L1108/L1105/L1100/L1107/L1109 & Recheck**

Y ↓

Check SIF Signal TU1101 #8 Pin	**N** →	**Maybe Tuner(TU1101) has problems**

Y ↓

Check SIF Signal C1139	**N** →	**Replace one of R1124,R1125,C1137,Q1101,R1129 Recheck**

Y ↓

Check SIF Signal C141	**N** →	**Replace one of R113/R128 & Recheck**

Y ↓

Follow procedure All source audio trouble shooting	**N** →	**Maybe BCM3556 audio block has problems. Replace It**

12. Component / RGB / AV Audio Trouble Shooting

```
┌─────────────────────────┐      N    ┌─────────────────────────┐
│                         │ ────────> │  Follow procedure       │
│    Check Video Output   │           │  external input video   │
│                         │           │  trouble shooting       │
└─────────────────────────┘           └─────────────────────────┘
           │ Y
           ▼
┌─────────────────────────┐      N    ┌─────────────────────────┐
│                         │ ────────> │                         │
│ Check Jack JK700/JK703/ │           │      Replace Jack       │
│         JK704           │           │                         │
└─────────────────────────┘           └─────────────────────────┘
           │ Y
           ▼
┌─────────────────────────┐      N    ┌─────────────────────────┐
│      Check Signal       │ ────────> │                         │
│      C204, C205         │           │      Replace IT         │
│      C206, C222         │           │                         │
│      C210, C211         │           └─────────────────────────┘
│      C217, C218         │
│      C220, C221         │
└─────────────────────────┘
           │ Y
           ▼
┌─────────────────────────┐      N    ┌─────────────────────────┐
│  Follow procedure All   │ ────────> │ Maybe BCM3556 audio     │
│  source audio trouble   │           │ block has problems.     │
│       shooting          │           │      Replace It         │
└─────────────────────────┘           └─────────────────────────┘
```

13. HDMI Audio Trouble Shooting

```
┌─────────────────────┐      N    ┌─────────────────────┐
│                     │──────────▶│ Follow procedure    │
│  Check video output │           │ HDMI video          │
│                     │           │ trouble shooting    │
└─────────────────────┘           └─────────────────────┘
          │ Y
          ▼
┌─────────────────────┐      N    ┌─────────────────────┐
│                     │──────────▶│                     │
│ Re-download EDID    │           │   Replace IC601     │
│ data                │           │                     │
└─────────────────────┘           └─────────────────────┘
          │ Y
          ▼
┌─────────────────────┐      N    ┌─────────────────────┐
│ Follow procedure    │──────────▶│ Maybe BCM3556 audio │
│ All source          │           │ block has           │
│ audio trouble       │           │ problems. Replace it│
│ shooting            │           │                     │
└─────────────────────┘           └─────────────────────┘
```

14. USB Trouble Shooting

```
┌─────────────────────────┐
│   Check USB 2.0 Cable    │
└─────────────────────────┘
           │ Y
           ▼
┌─────────────────────────┐
│     Check USB device     │
│  If devuce is 2.5 inch HDD, │
│   Check power adaptor    │
└─────────────────────────┘
           │ Y
           ▼
┌─────────────────────────┐    N    ┌─────────────────────────┐
│       Check JK1403       │ ──────▶ │      Replace Jack        │
└─────────────────────────┘         └─────────────────────────┘
           │ Y
           ▼
┌─────────────────────────┐    N    ┌─────────────────────────┐
│ Check 5V voltage level at L1407 │ ──────▶ │     Replace one of       │
│                         │         │  L1407/IC1402 & Recheck  │
└─────────────────────────┘         └─────────────────────────┘
           │ Y
           ▼
┌─────────────────────────┐
│   Maybe BCM3556(IC100)   │
│  has problems. Replace It. │
└─────────────────────────┘
```

• 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)

15. Digital TV Recording Fail Trouble Shooting (USING USB HDD)

```
┌─────────────────────────┐    N    ┌─────────────────────────┐
│                         │ ──────> │  Follow procedure digital TV│
│  Check video/audio output│         │  video/audio trouble shooting│
└─────────────────────────┘         └─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐    N    ┌─────────────────────────┐
│                         │ ──────> │                         │
│  Check USB HDD  more 40Gbyte│      │       Replace HDD       │
└─────────────────────────┘         └─────────────────────────┘
            │ Y
            ▼
┌─────────────────────────┐    N    ┌─────────────────────────┐
│  Maybe IC1402 has problems│ ──────>│  Maybe BCM3556(IC100) USB│
│      Replace It.        │         │  block has problems. Replace It.│
└─────────────────────────┘         └─────────────────────────┘
```

COMPONENT1/2,AV1

AV

COMPONENT1

COMPONENT2

R,G,B PC INPUT

IC703
M24C02-RMN6T

SIDE_AV

JK704
PPJ218-01
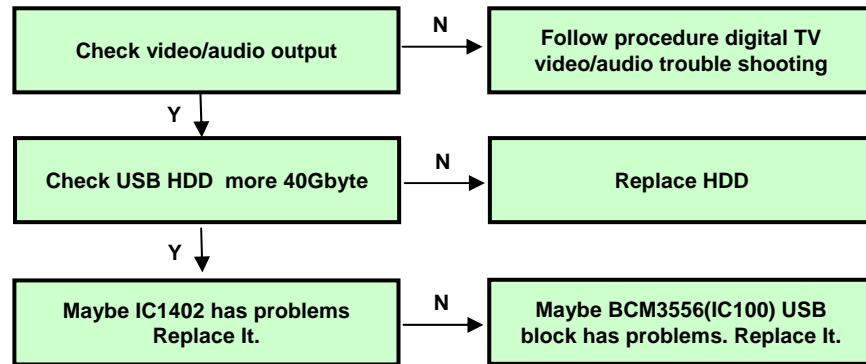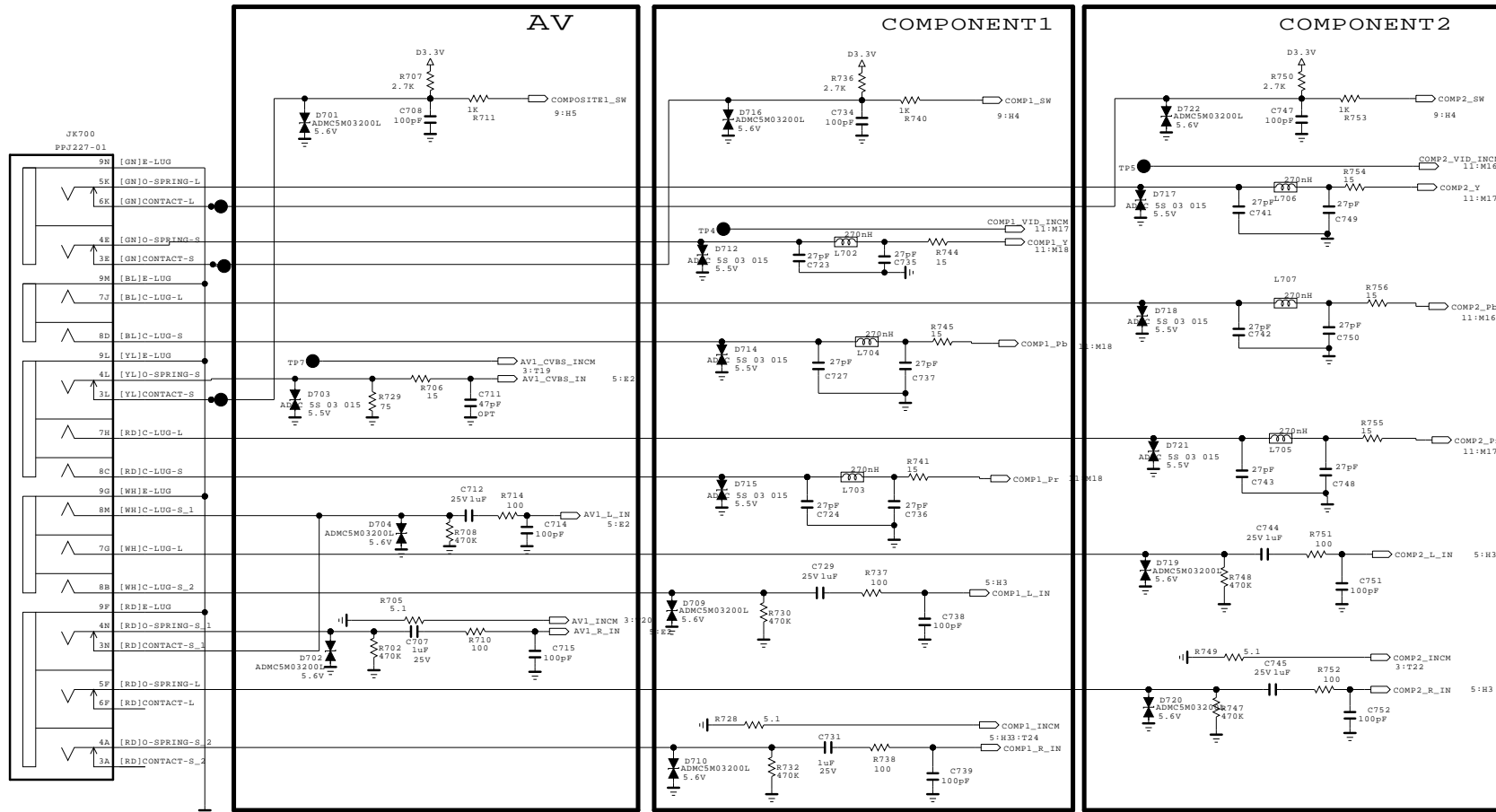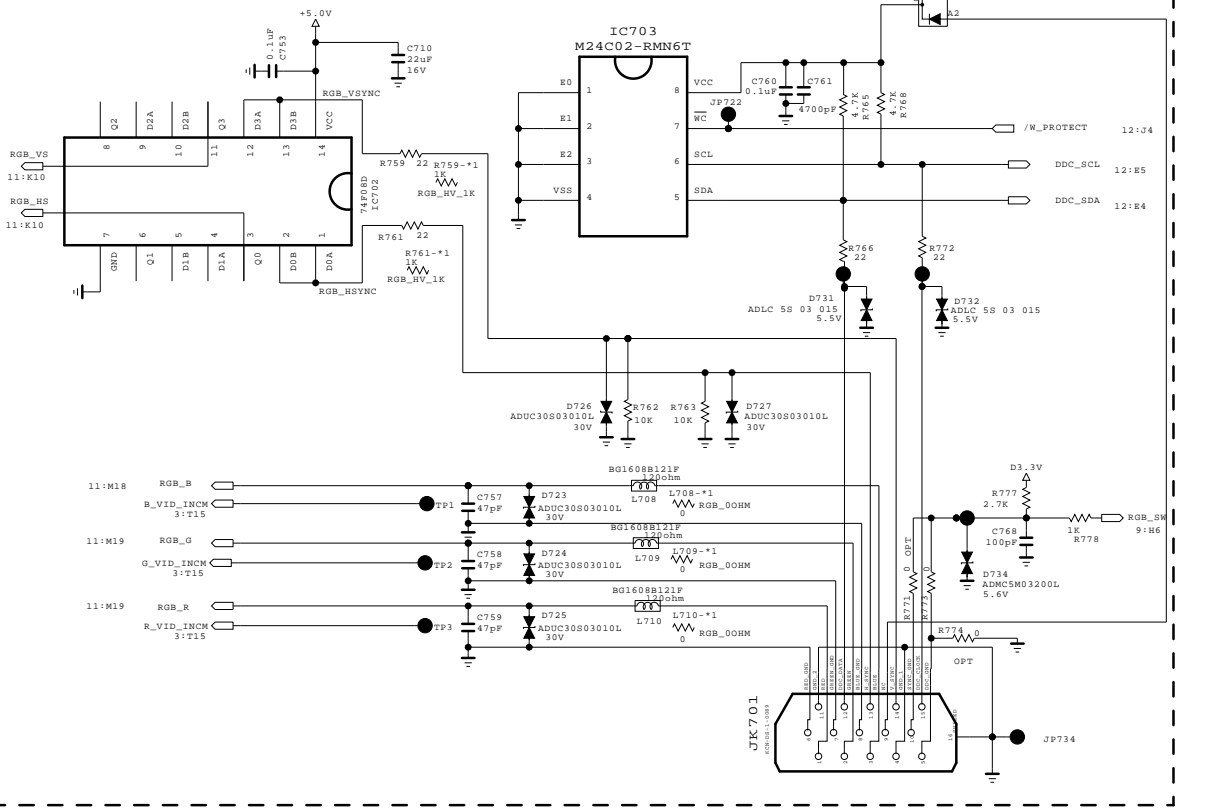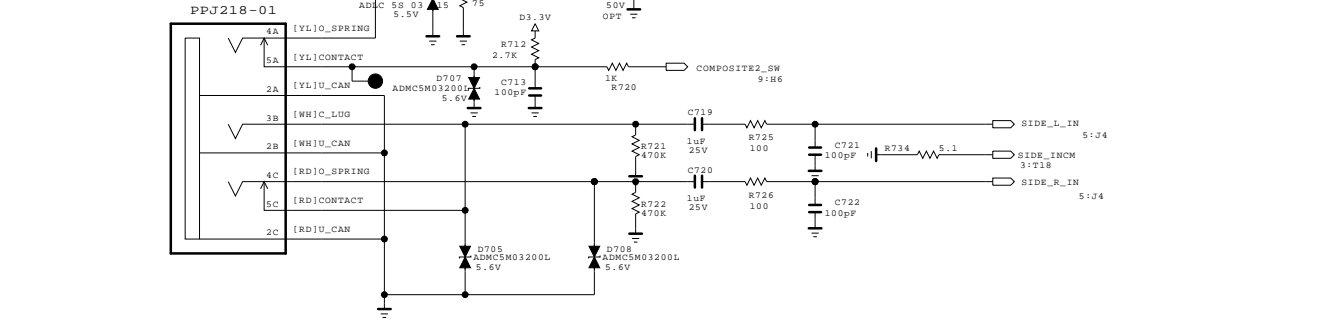
SMD Gasket Option
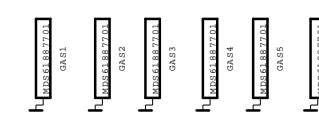
PC AUDIO
JK703
PEJ024-01
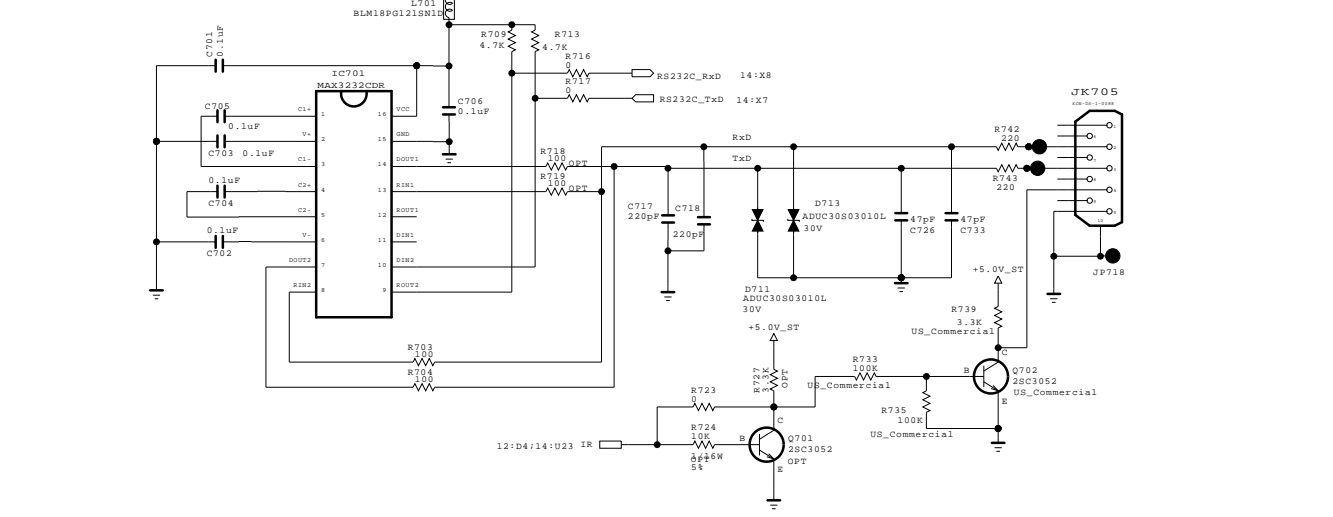
INCM

Place this INCM
near connector

Run along G, B, R traces
Run along Y, Pb, Pr traces
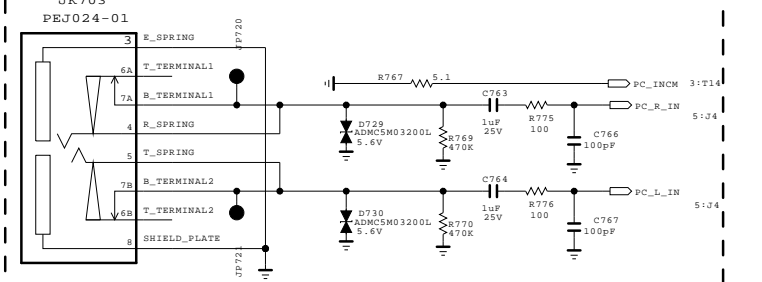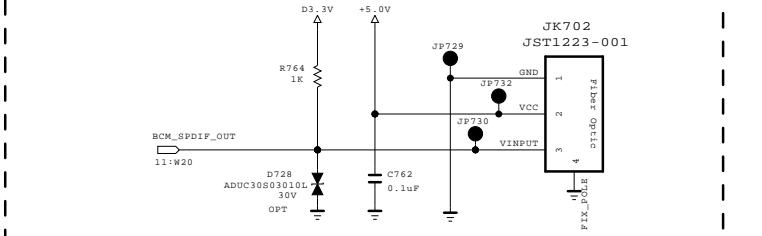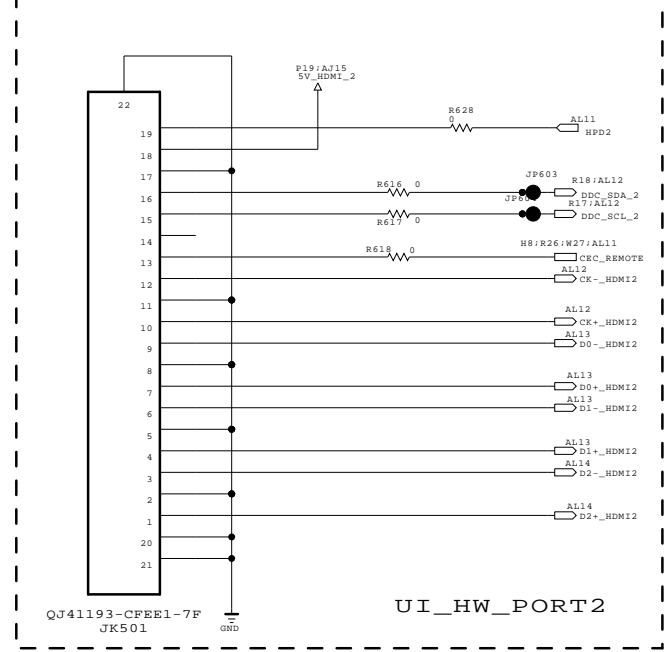
RS-232C
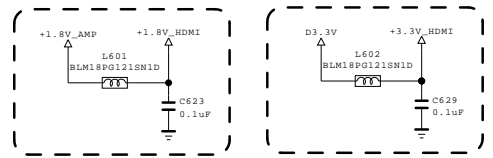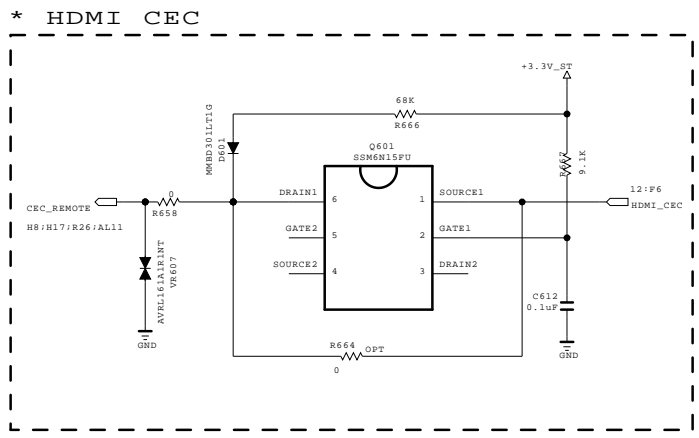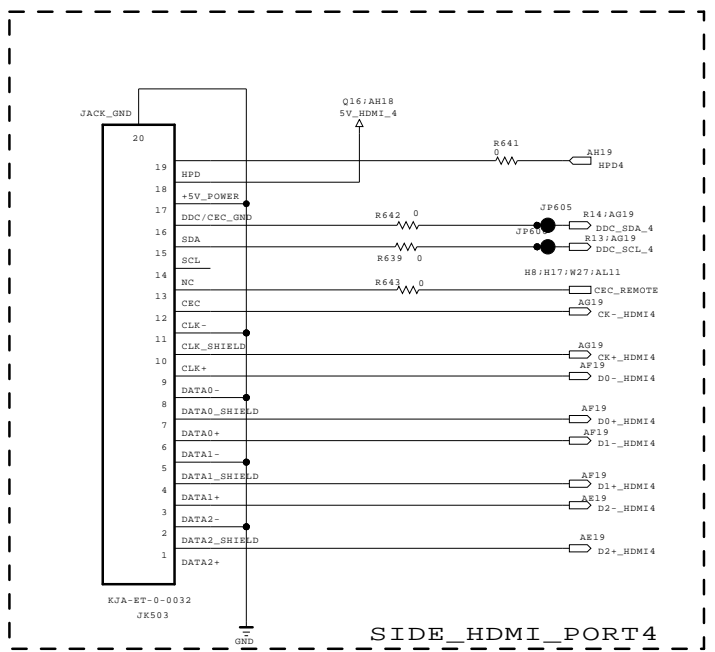
IC701
MAX3232CDW

JK705

SPDIF OPTIC JACK

JK702
JST1223-001

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 MANUFATURES SPECFIED PARTS BE USED FOR
THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMATIC.

SECRET

LGElectronics

🄛 LG ELECTRONICS

MODEL	BRAZIL DVR DV	DATE	2009.01.20
BLOCK	VIDEO EXT.INPUT	SHEET	1 / 17

* HDMI CEC

SIDE_HDMI_PORT4

JACK_GND
KJA-ET-0-0032
JK503

Q16:AH18
5V_HDMI_4

IC601
TDA9996HL

UI_HW_PORT2

QJ41193-CFEE1-7F
JK501

EDID Pull-up

UI_HW_PORT1

QJ41193-CFEE1-7F
JK500

Q601
SSM6N15FU

HDMI S/W For MSTAR Platform

Net Labels changed for HDMI2
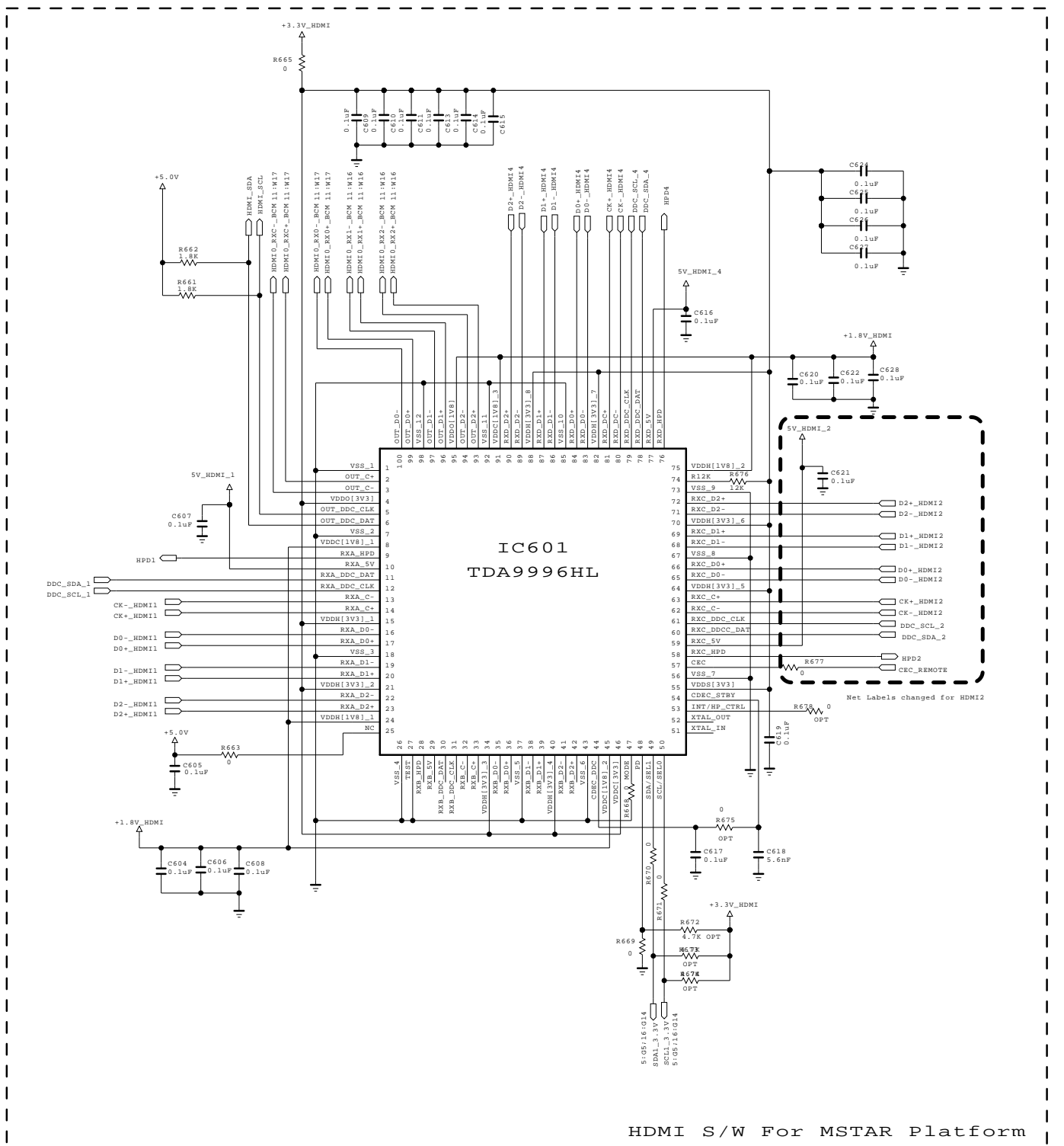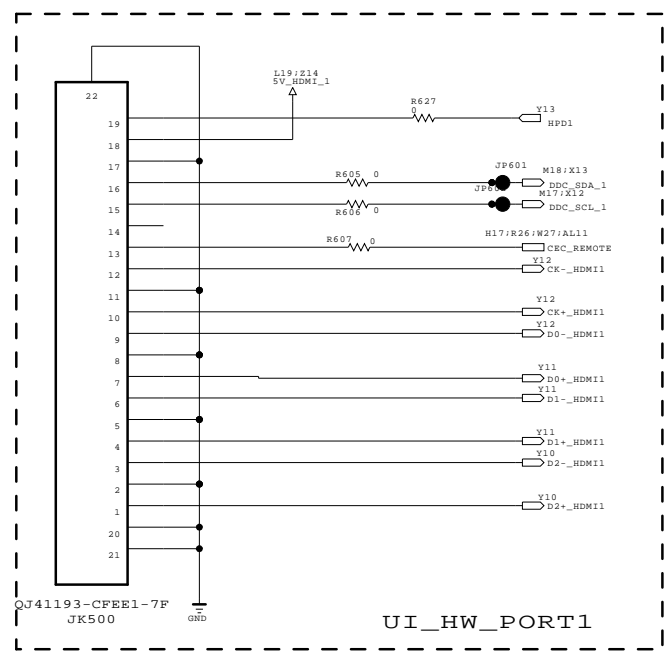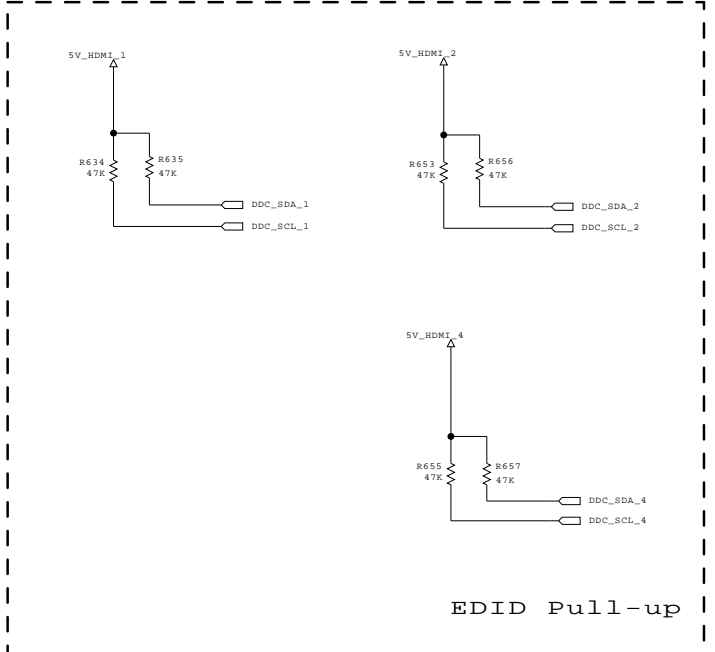
VARISTORS(VR500/501/502/503/504/505/506/507) on lines-HPD1/2/3/4 are all options
in case HDMI Switch doesn't support 'ESD protection'

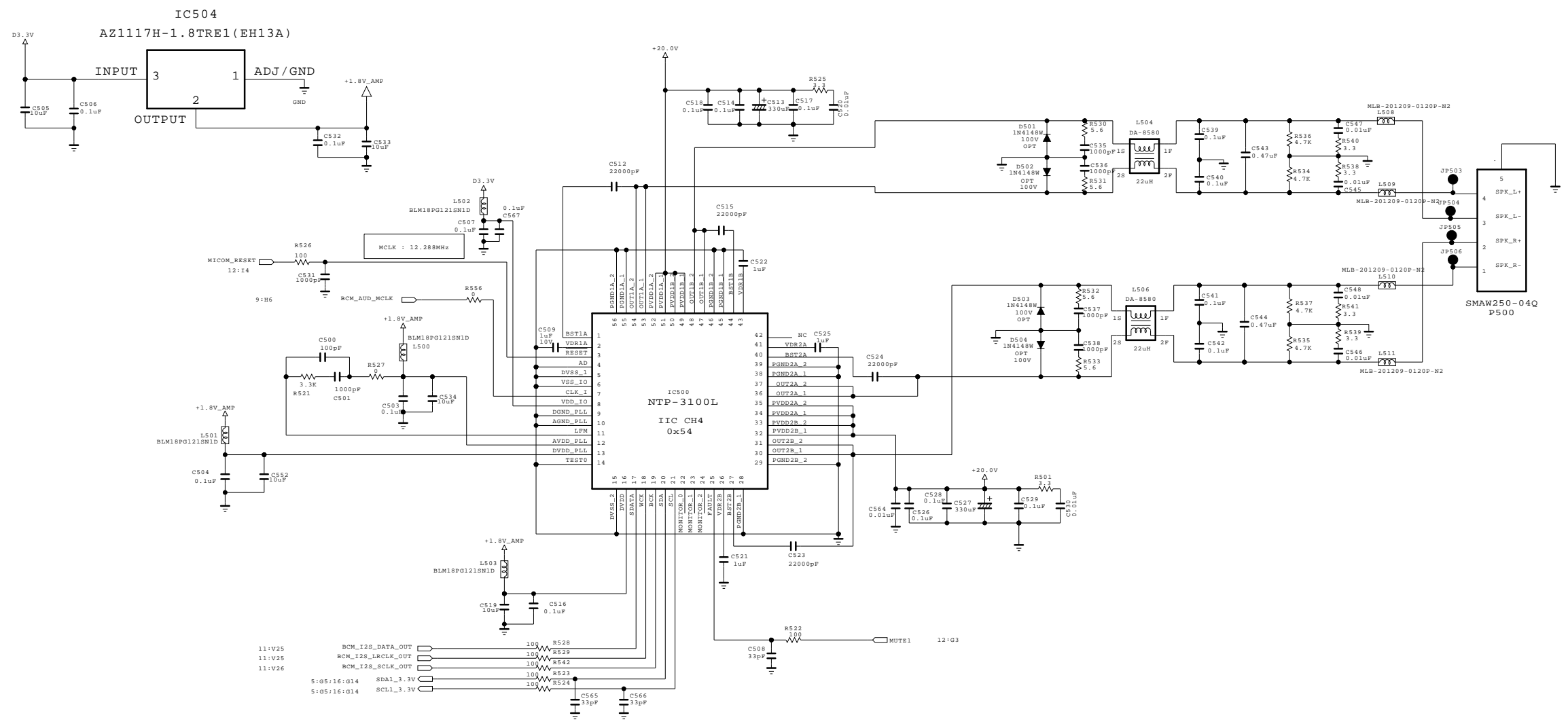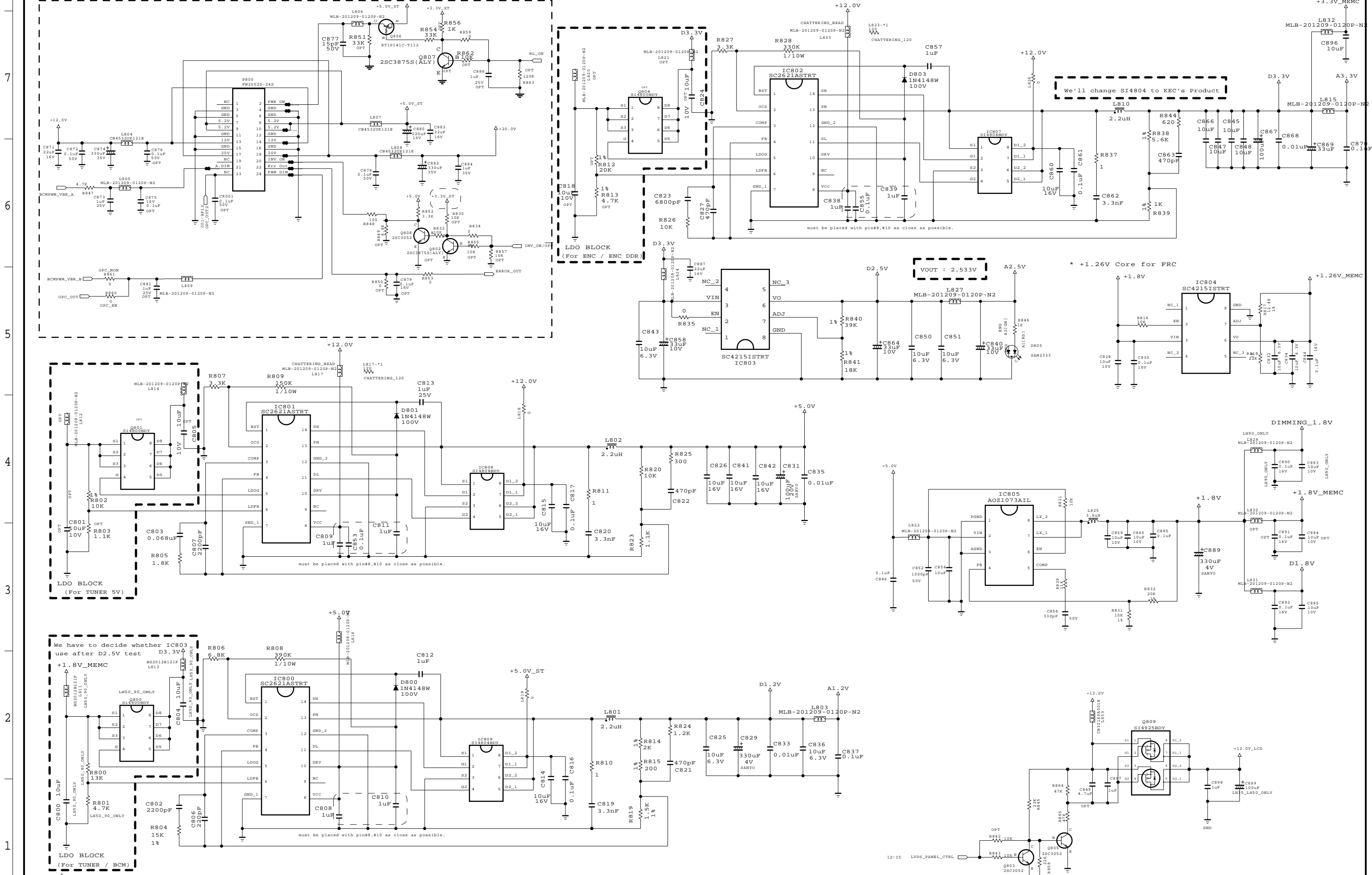THE ⚠ SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES
SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION.
FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS
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THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LGElectronics

LG ELECTRONICS

IC504
AZ1117H-1.8TRE1(EH13A)

D3.3V

INPUT 3   1 ADJ/GND
       2
OUTPUT   GND

+1.8V_AMP

C505 10uF
C506 0.1uF
C532 0.1uF
C533 10uF

+20.0V

C516 0.1uF
C514 0.1uF
C513 330uF
C517 0.1uF
R525

D501 1N4148W 100V OPT
D502 1N4148W OPT 100V
R530 5.6
R531 5.6
C535 1000pF 1B
C536 1000pF 1B
L504 DA-8580
22uH
1F
2F
C539 0.1uF
C543 0.47uF
R536 4.7K
R534 4.7K
R540 3.3
R538 3.3
C540 0.1uF
C545
C547 0.01uF
C546 0.01uF
MLB-201209-0120P-N2 L508
MLB-201209-0120P-N2

D503 100V OPT
D504 1N4148W OPT 100V
R532 5.6
R533 5.6
C537 1000pF 1B
C538 1000pF 2B
L506 DA-8580
22uH
1F
2F
C541 0.1uF
C544 0.47uF
R537 4.7K
R535 4.7K
R541 3.3
R539 3.3
C542 0.1uF
C548 0.01uF
C546 0.01uF
MLB-201209-0120P-N2 L510
MLB-201209-0120P-N2

L502 BLM18PG121SN1D
C507 0.1uF
C567 0.1uF
D3.3V

MCLK : 12.288MHz

R526 100
C531 1000pF
MICOM_RESET 12:I4
BCM_AUD_MCLK
R556
9:H6

+1.8V_AMP
L500 BLM18PG121SN1D
C500 100pF
R527
C501 1000pF
R521 3.3K
C503 0.1uF
C514 10uF

+1.8V_AMP
L501 BLM18PG121SN1D
C504 0.1uF
C552 10uF

C512 22000pF
C515 22000pF
C522 1uF
C509 1uF 10V

IC500
NTP-3100L
IIC CH4
0x54

BST1A
VDR1A
RESET
AD
DVSS_1
CLK_1
VDD_IO
DGND_PLL
AGND_PLL
LPM
AVDD_PLL
DVDD_PLL
TEST0

POND1A_2
PGND1A_1
OUT1A_2
OUT1A_1
PVDD1A_2
PVDD1A_1
PVDD1B_2
OUT1B_2
OUT1B_1
PGND1B_2
PGND1B_1
VDR1B
BST1B

NC
VDR2A
BST2A
PGND2A_2
PGND2A_1
OUT2A_2
OUT2A_1
PVDD2A_2
PVDD2A_1
PVDD2B_2
PVDD2B_1
OUT2B_2
OUT2B_1
PGND2B_2

DVFS_2
SDATA
WCK
BCK
SDA
SCL
MONITOR_0
MONITOR_1
MONITOR_2
FAULT
VDR2B
BST2B
PGND2B

C525
C524 22000pF
C521 1uF
C523 22000pF

+20.0V
R501 2.1
C528 0.1uF
C527 330uF
C529 0.1uF
C526 0.1uF
C564 0.01uF

+1.8V_AMP
L503 BLM18PG121SN1D
C518 10uF
C516 0.1uF

R522 100
C508 33pF
MUTE1
12:G3

11:V25 BCM_I2S_DATA_OUT
11:V25 BCM_I2S_LRCLK_OUT
11:V26 BCM_I2S_SCLE_OUT
5:G5/16:G14 SDA1_3.3V
5:G5/16:G14 SCL1_3.3V

R528
R529
R542
R523
R524

C565 33pF
C566 33pF

JP503
JP504
JP505
JP506

SMAW250-04Q
P500

5 SPK_L+
4 SPK_L-
3 SPK_R+
1 SPK_R-

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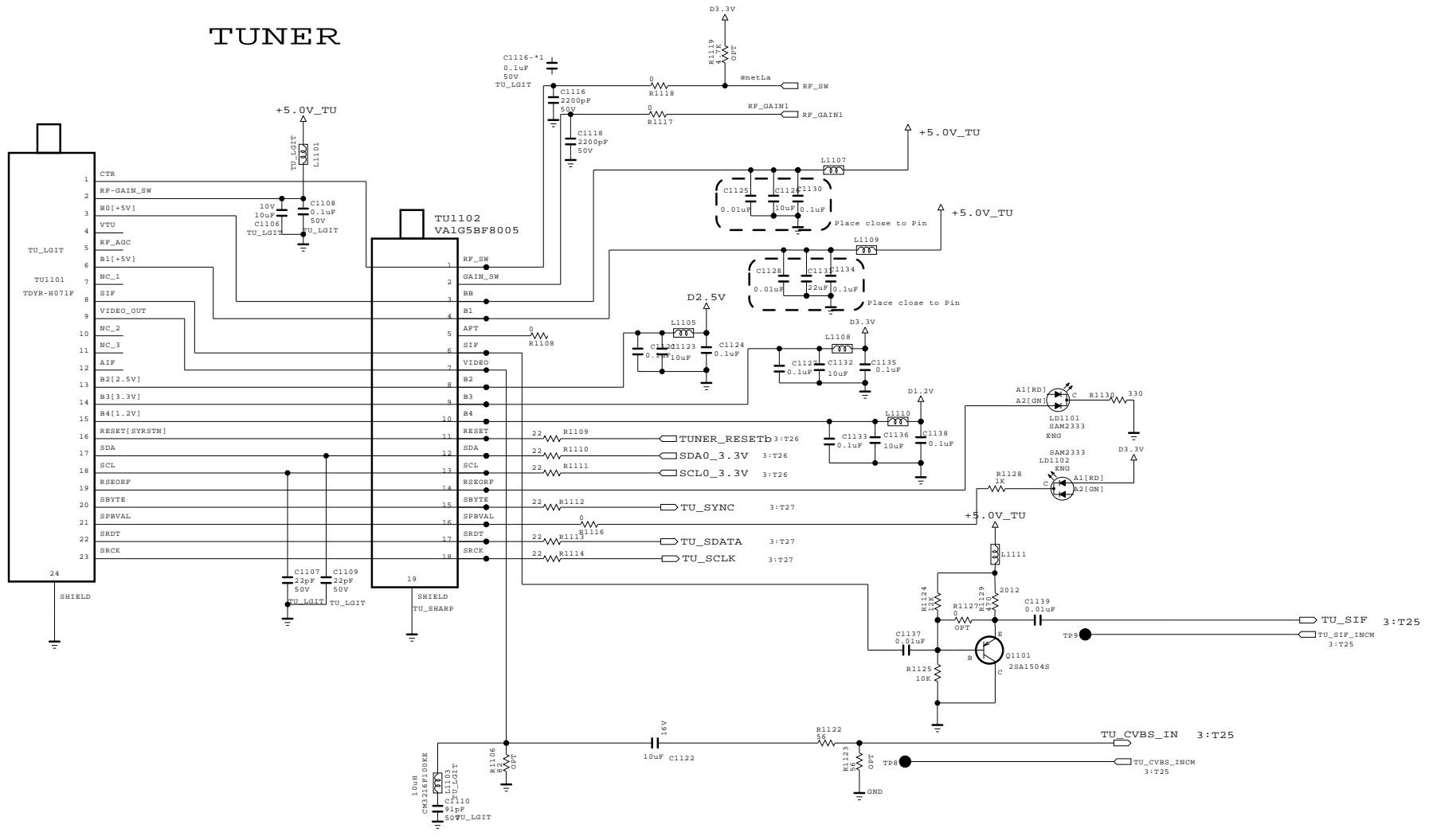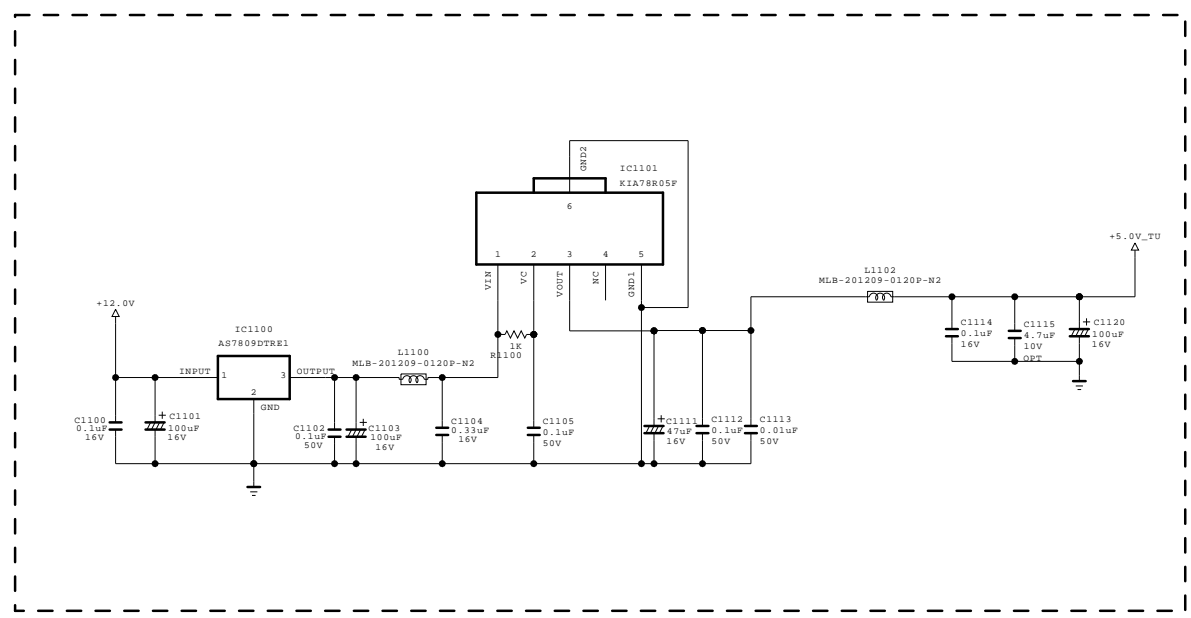THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

LG ELECTRONICS

MODEL BRAZIL DVR DV
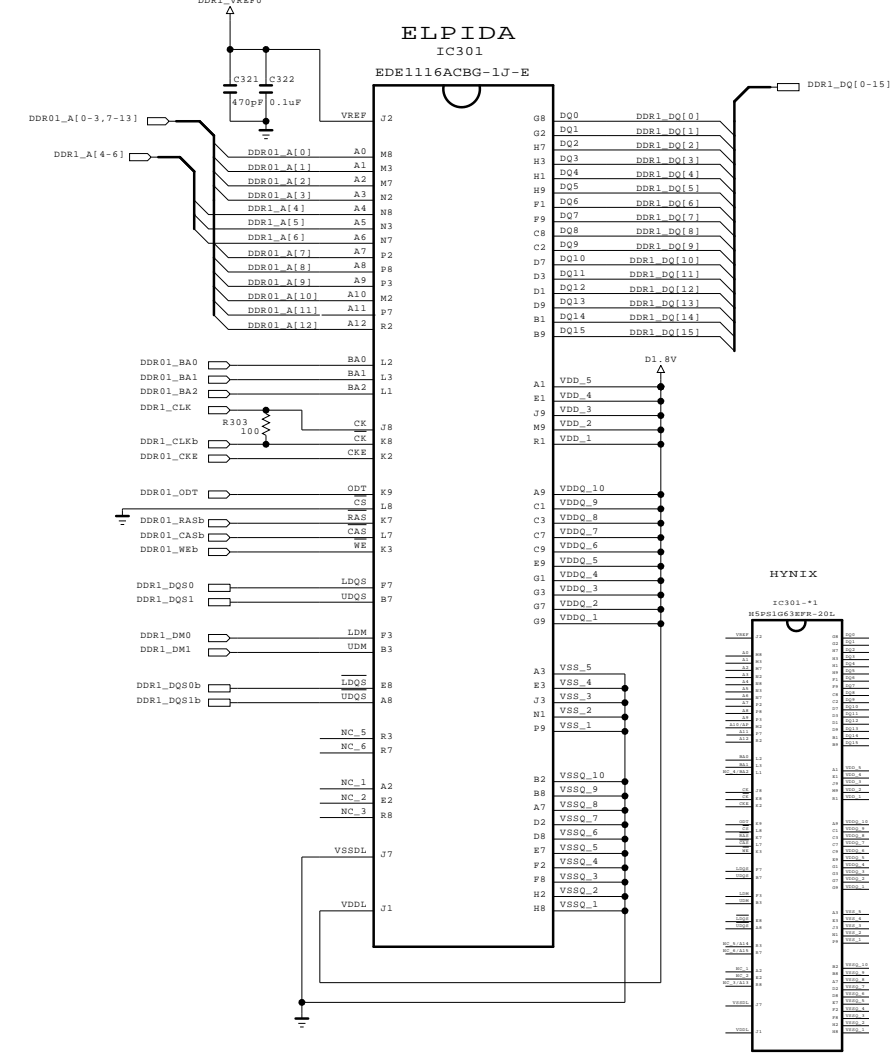BLOCK AUDIO
DATE 2009.01.20
SHEET 3 / 17

SECRET

LGElectronics

LG ELECTRONICS

| MODEL | BRAZIL DVR DV | DATE | 2009.01.20 |
| BLOCK | POWER | SHEET | 4 / 17 |

* FROM LIPS & POWER B/D -->Apply changed Pin Map

TUNER

+5.0V_TU

D3.3V

C1116-*1
0.1uF
50V
TU_LGIT

R1119
OPT

C1116
2200pF
50V
R1118
0
#netLa
RF_SW

R1117
RF_GAIN1

C1118
2200pF
50V

+5.0V_TU

L1107

C1125 C1129 C1130
0.01uF 10uF 0.1uF
Place close to Pin

+5.0V_TU

L1109

C1128 C1111 C1134
0.01uF 22uF 0.1uF
Place close to Pin

+5.0V_TU

C1108
0.1uF
50V
TU_LGIT

C1106
10uF
10V

TU1102
VA1G5BF8005

Pin	Signal
1	CTR
2	RF-GAIN_SW
3	B0[+5V]
4	VTU
5	RF_AGC
6	B1[+5V]
7	NC_1
8	SIF
9	VIDEO_OUT
10	NC_2
11	NC_3
12	AIF
13	B2[2.5V]
14	B3[3.3V]
15	B4[1.2V]
16	RESET[SYRSTN]
17	SDA
18	SCL
19	RSEORF
20	SBYTE
21	SPBVAL
22	SRDT
23	SRCK
24	SHIELD

TU_LGIT
TU1101
TDYR-H071F

RF_SW
GAIN_SW
BB
B1
AFT
SIF
VIDEO
B2
B3
B4
RESET
SDA
SCL
RSEORF
SBYTE
SPBVAL
SRDT
SRCK

D2.5V

L1105
R1108 0

C1123
0.1uF 10uF

C1124
0.1uF

D3.3V
L1108

C1122 C1132 C1135
0.1uF 10uF 0.1uF

D1.2V
L1110

C1133 C1136 C1138
0.1uF 10uF 0.1uF

R1109 22 TUNER_RESETb 3:T26
R1110 22 SDA0_3.3V 3:T26
R1111 22 SCL0_3.3V 3:T26
R1112 22 TU_SYNC 3:T27
R1116 0 TU_SDATA 3:T27
R1113
R1114 22 TU_SCLK 3:T27

A1[RD]
A2[GN]
LD1101
SAM2333
ENG
R1136 330

SAM2333
LD1102
ENG
A1[RD]
A2[GN]
R1128 1K

+5.0V_TU

L1111
2012
C1139
0.01uF

R1134
R1127 0
OPT
C1137
0.01uF
R1125 10K
Q1101
2SA1504S

TP3
TU_SIF 3:T25
TU_SIF_INCM 3:T25

C1107 C1109
22pF 22pF
50V 50V
TU_LGIT TU_LGIT

19
SHIELD
TU_SHARP

R1106
OPT

1.5V

10uF C1122

R1122
56

R1123 TP8
TU_CVBS_IN 3:T25
TU_CVBS_INCM 3:T25
GND

L1103
CM3214F100KH
C1110
91pF
50V TU_LGIT

MAIN & SUB TUNER +5V

GND2
IC1101
KIA78R05F
6
1 2 3 4 5
VIN VC VOUT NC GND1

+5.0V_TU

L1102
MLB-201209-0120P-N2

C1114 C1115 C1120
0.1uF 4.7uF 100uF
16V 10V 16V
OPT

+12.0V

IC1100
AS7809DTRE1
1 INPUT OUTPUT 3
2 GND

L1100
MLB-201209-0120P-N2

R1100
1K

C1100
0.1uF
16V

C1101
100uF
16V

C1102 C1103
0.1uF 100uF
50V 16V

C1104
0.33uF
16V

C1105
0.1uF
50V

C1111 C1112 C1113
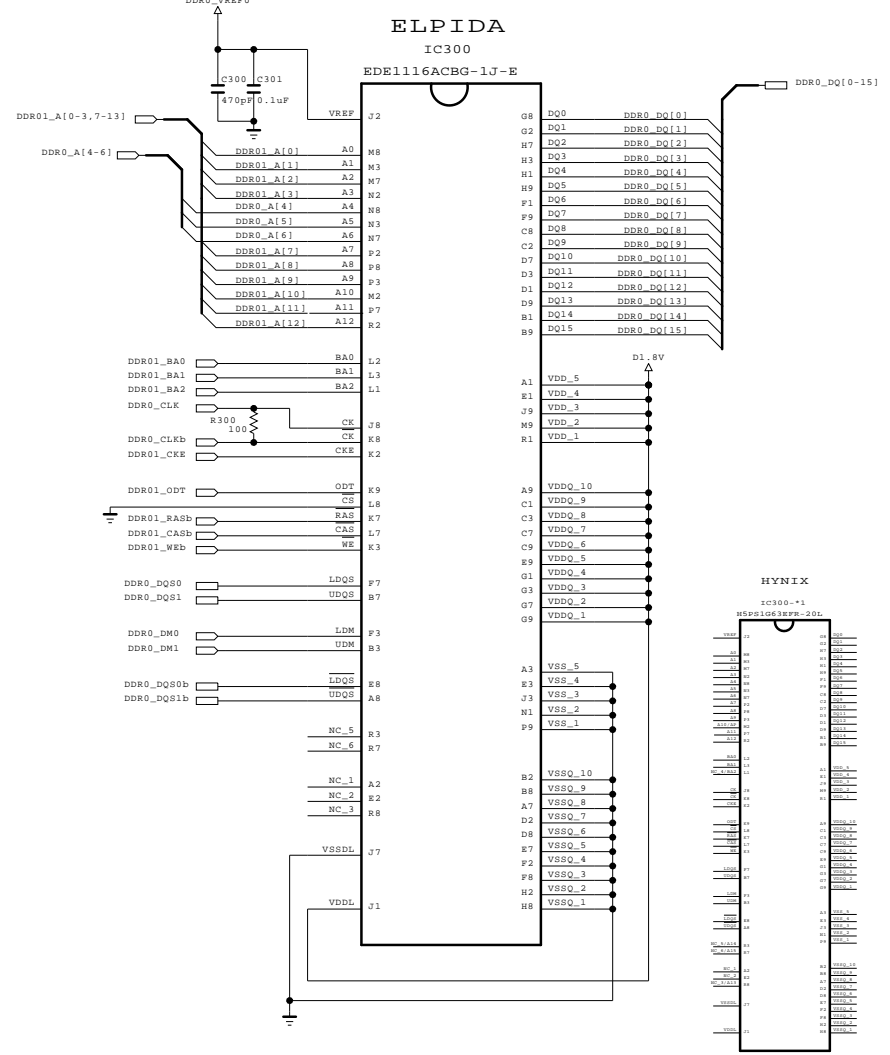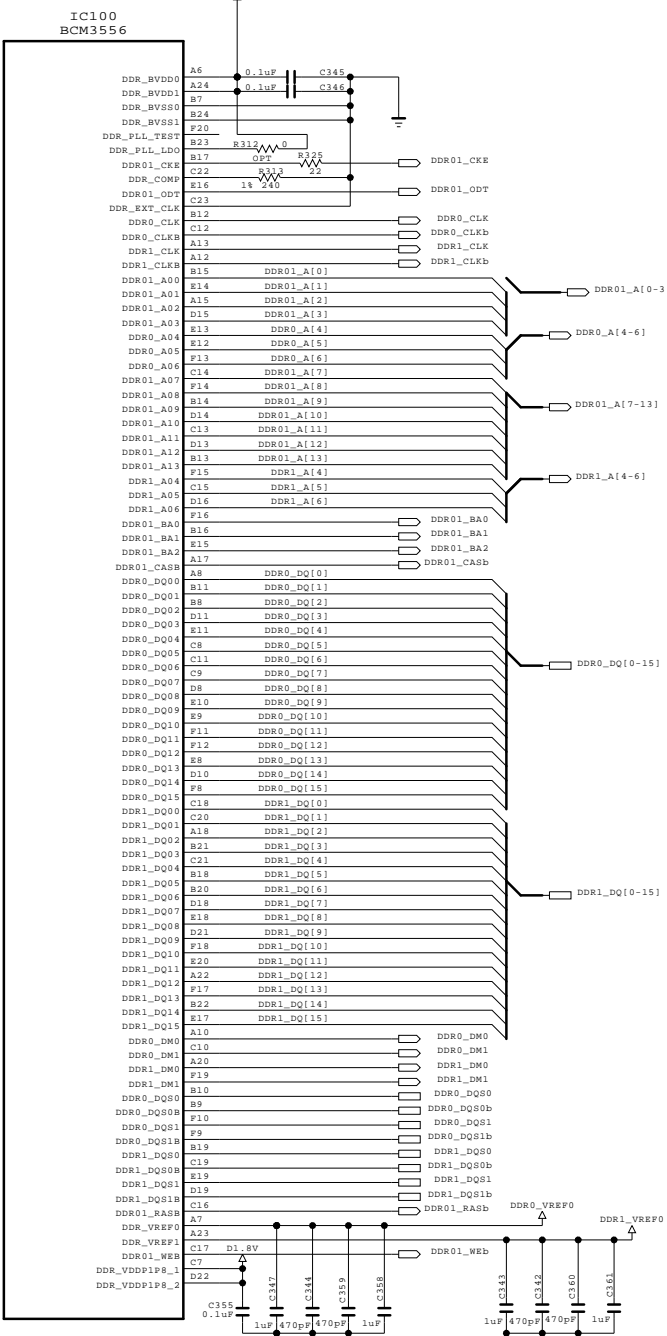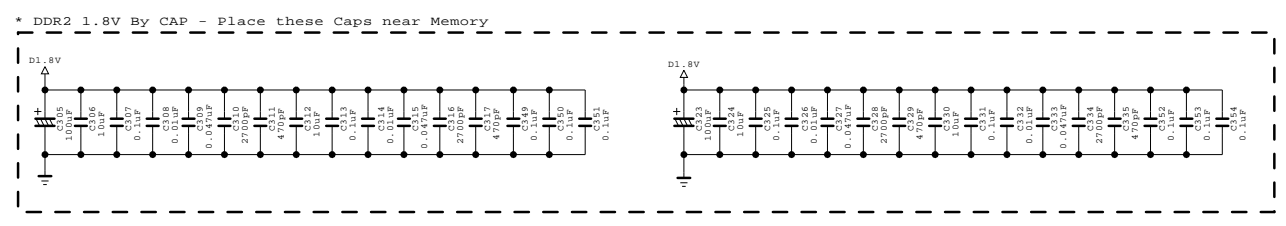47uF 0.1uF 0.01uF
16V 50V 50V
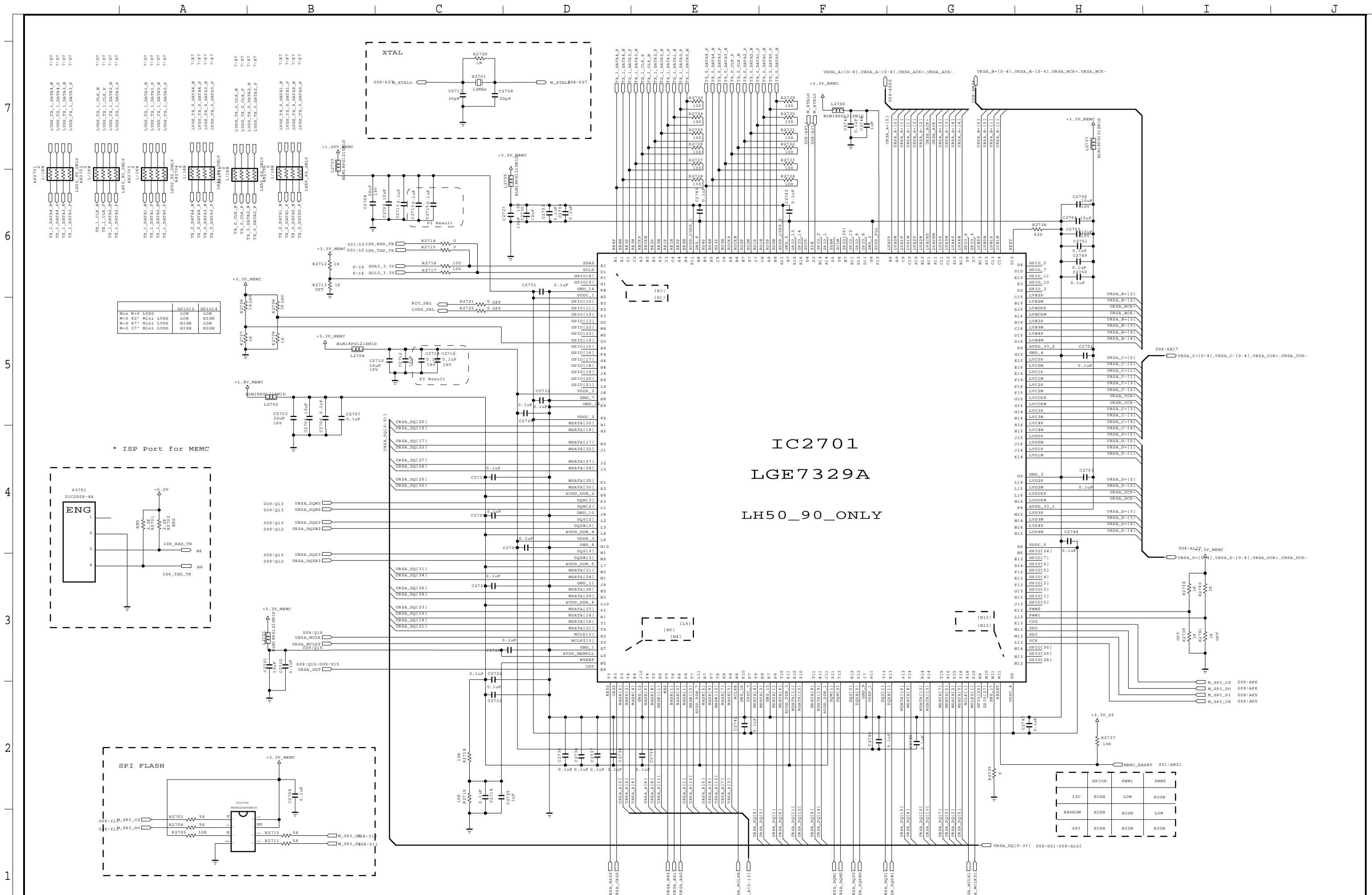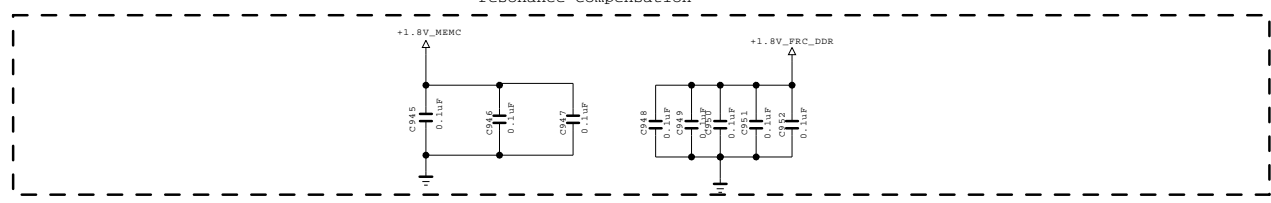
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SECRET
LGElectronics

LG ELECTRONICS

MODEL	BRAZIL DVR DV	DATE	2009.01.20
BLOCK	TUNER	SHEET	5 / 17
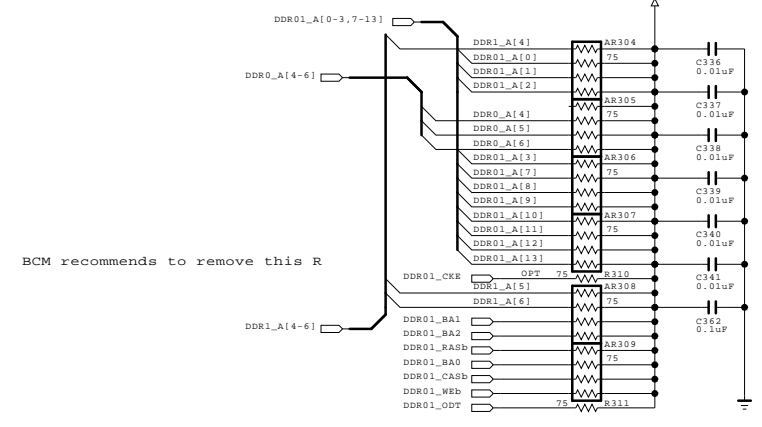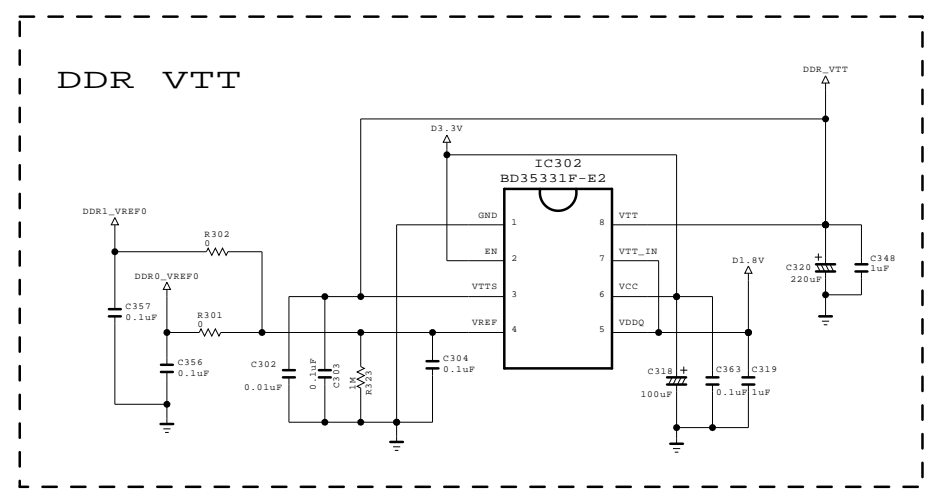
* DDR2 1.8V By CAP - Place these Caps near Memory

IC100
BCM3556

ELPIDA
IC300
EDE1116ACBG-1J-E

ELPIDA
IC301
EDE1116ACBG-1J-E

HYNIX
IC300.*1
H5PS1G63EFR-20L

HYNIX
IC301.*1
H5PS1G63EFR-20L

DDR VTT
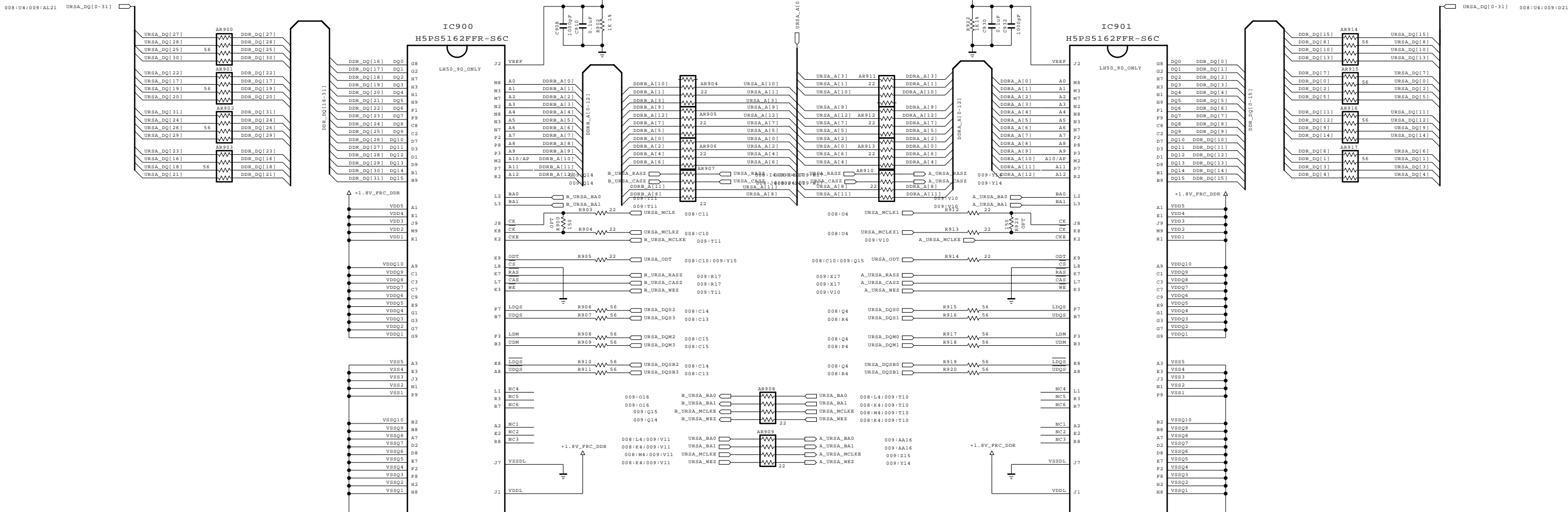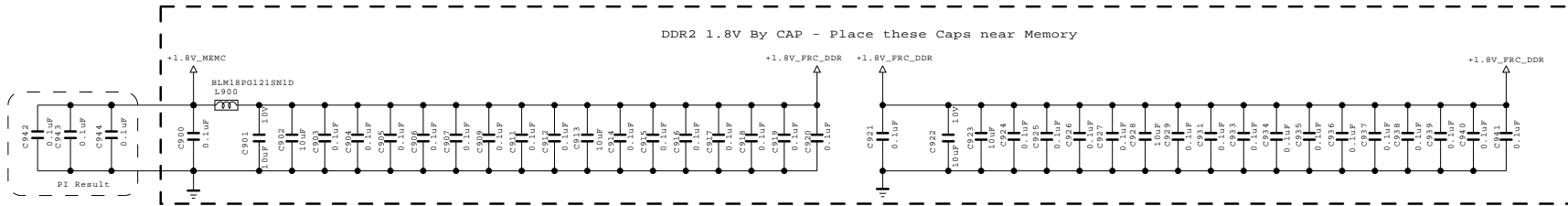
IC302
BD35331F-E2

BCM recommends to remove this R

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SECRET
LGElectronics

LG ELECTRONICS

MODEL / BLOCK   BRAZIL DVR DV   DDR
DATE   2009.01.20
SHEET   6 / 17

IC2701
LGE7329A
LH50_90_ONLY

XTAL

* ISP Port for MEMC

SPI FLASH

ENG

Non M+S LVDS / M+S 42" Mini LVDS / M+S 47" Mini LVDS / M+S 37" Mini LVDS

	GPIO12	GPIO14
Non M+S LVDS	LOW	LOW
M+S 42" Mini LVDS	LOW	HIGH
M+S 47" Mini LVDS	HIGH	LOW
M+S 37" Mini LVDS	HIGH	HIGH

	GPIO8	PWM1	PWM0
I2C	HIGH	LOW	HIGH
EEPROM	HIGH	HIGH	LOW
SPI	HIGH	HIGH	HIGH

URSA_A+[0-4],URSA_A-[0-4],URSA_ACK+,URSA_ACK-
URSA_B+[0-4],URSA_B-[0-4],URSA_BCK+,URSA_BCK-
URSA_C+[0-4],URSA_C-[0-4],URSA_CCK+,URSA_CCK-
URSA_D+[0-4],URSA_D-[0-4],URSA_DCK+,URSA_DCK-

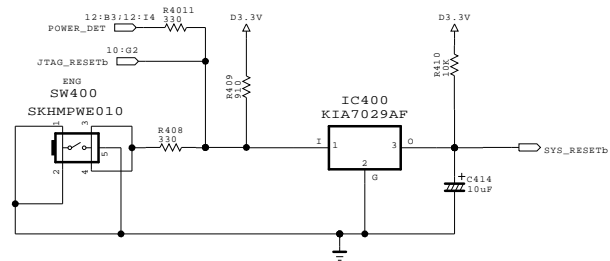URSA_DQ[0-31] 009:D21,009:AL21

This page is all LH50/90_ONLY option

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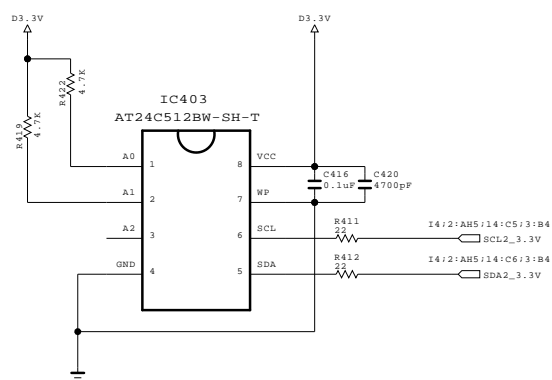THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMATIC.

SECRET

LG Electronics

⊕ LG ELECTRONICS

MODEL BLOCK	BCM (BRAZIL VENUS)	DATE	2008.10.15
	Mstar FRC	SHEET	7 / 15

DDR2 1.8V By CAP - Place these Caps near Memory

+1.8V_MEMC
+1.8V_FRC_DDR +1.8V_FRC_DDR
+1.8V_FRC_DDR

BLM18PG121SN1D
L900

PI Result

URSA_DQ[0-31]
URSA_DQ[0-31]

AR900
URSA_DQ[27]   DDR_DQ[27]
URSA_DQ[28]   DDR_DQ[28]
URSA_DQ[25] 56 DDR_DQ[25]
URSA_DQ[30]   DDR_DQ[30]

IC900
H5PS5162FFR-S6C

IC901
H5PS5162FFR-S6C

AR914
DDR_DQ[15]   URSA_DQ[15]
DDR_DQ[8]   URSA_DQ[8]
DDR_DQ[10] 56 URSA_DQ[10]
DDR_DQ[13]   URSA_DQ[13]

LH50_90_ONLY

resonance Compensation

+1.8V_MEMC   +1.8V_FRC_DDR

This page is all LH50/90_ONLY option

LG ELECTRONICS

| MODEL | BCM (BRAZIL VENUS) | DATE | 08.10.15 |
| BLOCK | M-STAR FRC DDR | SHEET | 8 / 15 |

RESET

POWER_DET   12:B3/12:14   R4011 330
JTAG_RESETb   10:02
ENG
SW400
SKHMPWE010
R408 135
IC400
KIA7029AF
D3.3V
R409
R410
C414 10uF
SYS_RESETb

NVRAM

D3.3V
R420 4.7K
R419 4.7K
IC403
AT24C512BW-SH-T
A0 VCC
A1 WP
A2 SCL
GND SDA
C416 0.1uF   C420 4700pF
R411   SCL2_3.3V   I4:2/AH5/14:C5/3:B4
R412   SDA2_3.3V   I4:2/AH5/14:C6/3:B4

Boot Strap
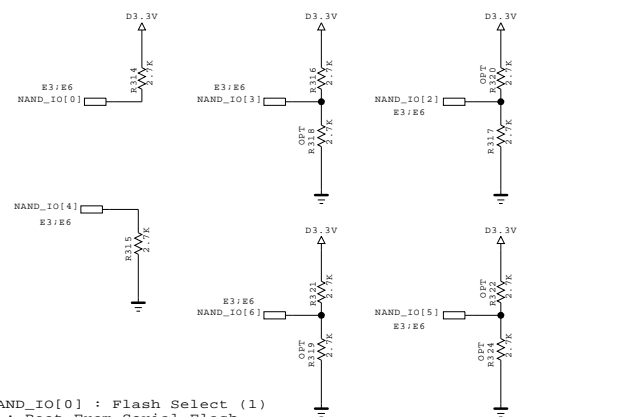
D3.3V
NAND_IO[0]   E3:E6
NAND_IO[2]   E3:E6
NAND_IO[3]   E3:E6
NAND_IO[4]   E3:E6
NAND_IO[6]   E3:E6
NAND_IO[5]
NAND_IO[0] : Flash Select (1)
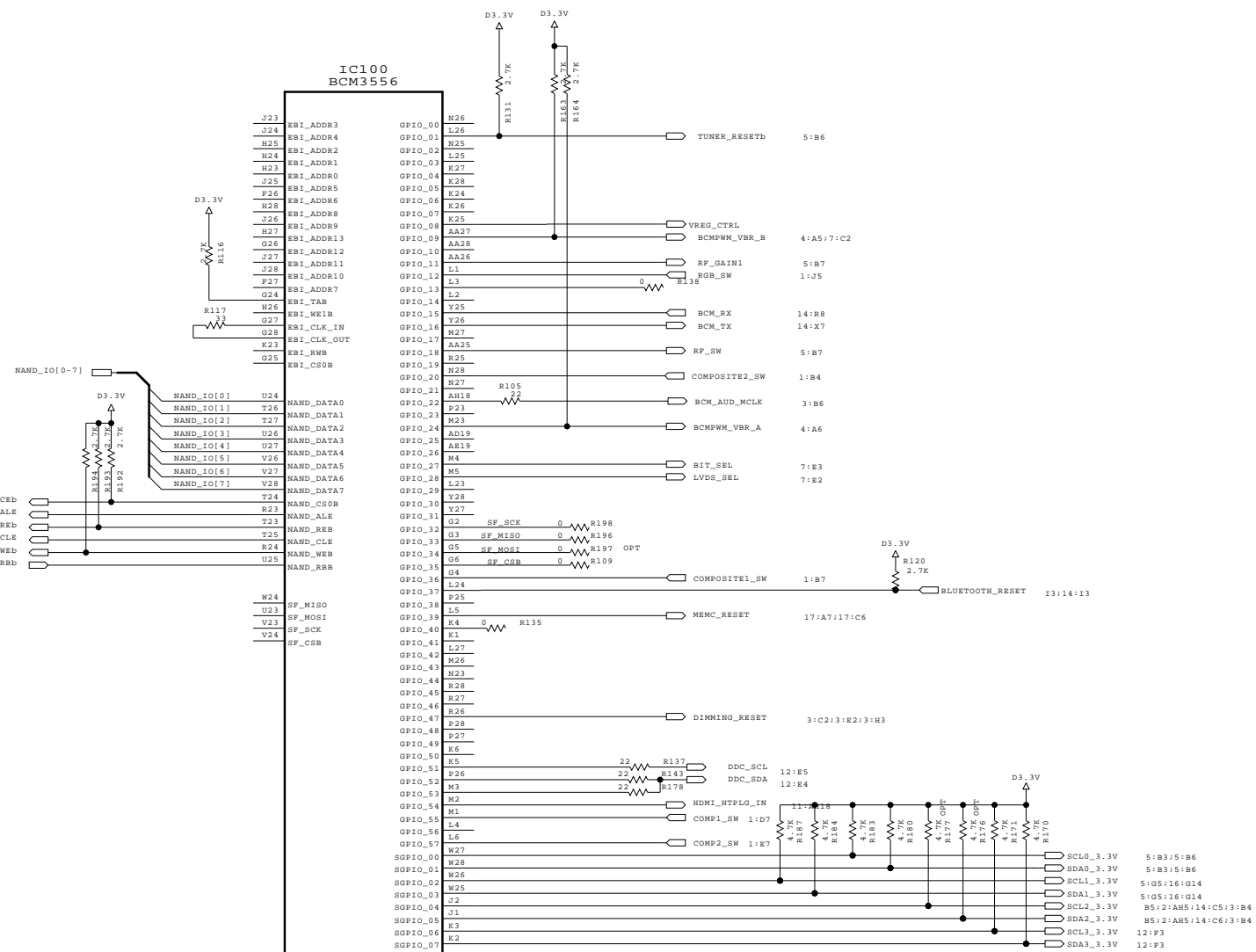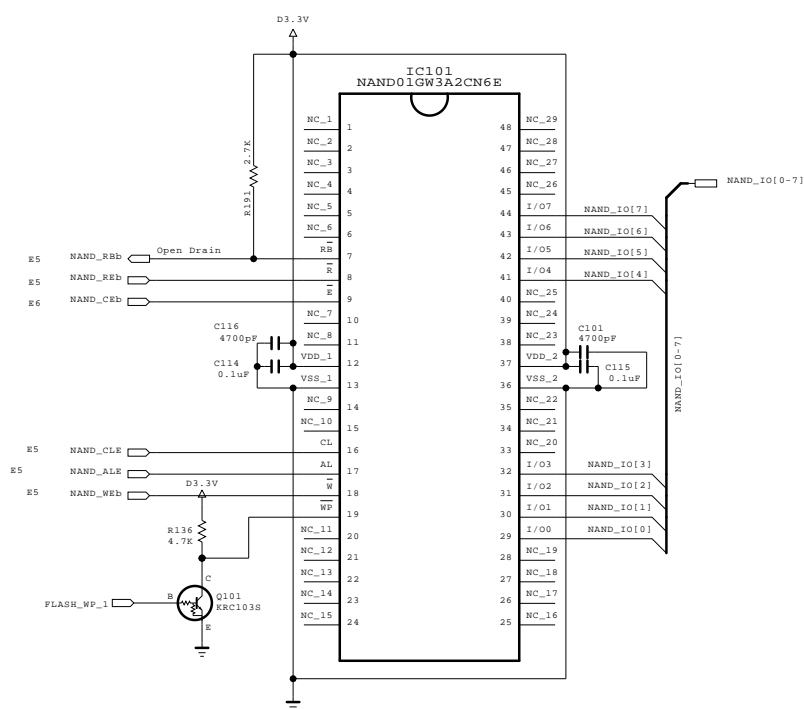0 : Boot From Serial Flash
1 : Boot From NAND Flash

NAND_IO[1] : NAND Block 0 Write (DNS)
0 : Enable Block 0 Write
1 : Disable Block 0 Write

NAND_IO[3:2] : NAND ECC (01)
00 : No ECC
01 : 1 ECC Bit
10 : 4 ECC Bit
11 : 8 ECC Bit

NAND_IO[4] : CPU Endian (0)
0 : Little Endian
1 : Big Endian

NAND_IO[6:5] : Xtal Bias Control (1, DNS)
00 : 1.2mA
01 : 1.8mA
10 : 2.4mA (Recommand)
11 : 3.0mA

* NAND FLASH MEMORY 1G bit

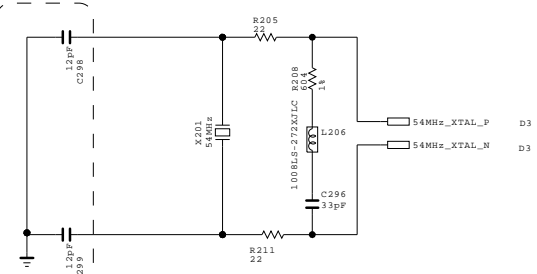D3.3V
R191 2.7K
IC101
NAND01GW3A2CN6E

NC_1   1   48 NC_29
NC_2   2   47 NC_28
NC_3   3   46 NC_27
NC_4   4   45 NC_26
NC_5   5   44 I/O7   NAND_IO[7]
NC_6   6   43 I/O6   NAND_IO[6]
RB   7   42 I/O5   NAND_IO[5]
RE   8   41 I/O4   NAND_IO[4]
CE   9   40 NC_25
NC_7   10   39 NC_24
NC_8   11   38 NC_23
VDD_1   12   37 VDD_2
VSS_1   13   36 VSS_2
NC_9   14   35 NC_22
NC_10   15   34 NC_21
CL   16   33 NC_20
AL   17   32 I/O3   NAND_IO[3]
W   18   31 I/O2   NAND_IO[2]
WP   19   30 I/O1   NAND_IO[1]
NC_11   20   29 I/O0   NAND_IO[0]
NC_12   21   28 NC_19
NC_13   22   27 NC_18
NC_14   23   26 NC_17
NC_15   24   25 NC_16

NAND_RRb Open Drain
NAND_REb
NAND_CEb
NAND_CLE
NAND_ALE
NAND_WEb
C116 4700pF   C114 0.1uF
C101 4700pF   C115 0.1uF
R136 4.7K
FLASH_WP_1
Q101 KRC103S

NAND_IO[0-7]

IC100 BCM3556

J23 EBI_ADDR3
J24 EBI_ADDR4
H25 EBI_ADDR2
H24 EBI_ADDR1
H23 EBI_ADDR0
J25 EBI_ADDR5
P26 EBI_ADDR8
H28 EBI_ADDR6
H27 EBI_ADDR9
J26 EBI_ADDR13
J27 EBI_ADDR12
J28 EBI_ADDR11
P27 EBI_ADDR10
G24 EBI_ADDR7
G26 EBI_TAB
G27 EBI_WE1R
K32 EBI_CLK_IN
K33 EBI_CLK_OUT
G25 EBI_RWB
H26 EBI_CS0B

GPIO_00 M26
GPIO_01 L26
GPIO_02 M25
GPIO_03 K27
GPIO_04 K28
GPIO_05 K24
GPIO_06 K26
GPIO_07 K25
GPIO_08 AA27
GPIO_09 AA28
GPIO_10 AA26
GPIO_11 L1
GPIO_12 L3
GPIO_13 L2
GPIO_14 Y25
GPIO_15 Y26
GPIO_16 M27
GPIO_17 AA25
GPIO_18 N28
GPIO_19 N27
GPIO_20 N26
GPIO_21 AB18
GPIO_22 AD23
GPIO_23 AD19
GPIO_24 AE19
GPIO_25 M4
GPIO_26 M5
GPIO_27 L23
GPIO_28 Y28
GPIO_29 Y27
GPIO_30 G2
GPIO_31 D3
GPIO_32 G5
GPIO_33 G6
GPIO_34 G4
GPIO_35 Y3
GPIO_36 P25
GPIO_37 L24
GPIO_38 L5
GPIO_39 K4
GPIO_40 K1
GPIO_41 L27
GPIO_42 M26
GPIO_43 N28
GPIO_44 K26
GPIO_45 R26
GPIO_46 N28
GPIO_47 R27
GPIO_48 X6
GPIO_49 E5
GPIO_50 R26
GPIO_51 M3
GPIO_52 M2
GPIO_53 M1
GPIO_54 L4
GPIO_55 L6
GPIO_56 W27

SGPIO_00 W28
SGPIO_01 W26
SGPIO_02 W25
SGPIO_03 J2
SGPIO_04 J1
SGPIO_05 K3
SGPIO_06 K2
SGPIO_07

TUNER_RESETb   5:B6
VREG_CTRL
BCMPWM_VBR_R   4:A5/7:C2
RF_GAIN1   5:B7
RGR_SW   1:J5
BCM_RX   14:X8
BCM_TX   14:X7
RF_SW   5:B7
COMPOSITE2_SW   1:B4
BCM_AUD_MCLK   3:B6
BCMPWM_VBR_A   4:A6
BIT_SEL   7:E3
LVDS_SEL   7:E2
COMPOSITE1_SW   1:B7
BLUETOOTH_RESET   13/14:I3
MEMC_RESET   17:A7/17:C6
DIMMING_RESET   3:C2/3:E2/3:H3
DDC_SCL   12:E5
DDC_SDA   12:E4
HDMI_HTPLG_IN
COMP1_SW 1:D7
COMP2_SW 1:E7

SCL0_3.3V   5:B3/5:B6
SDA0_3.3V   5:B3/5:B6
SCL1_3.3V   5:G5/16:G14
SDA1_3.3V   5:G5/16:G14
SCL2_3.3V   B5:2/AH5/14:C5/3:B4
SDA2_3.3V   B5:2/AH5/14:C6/3:B4
SCL3_3.3V   12:F3
SDA3_3.3V   12:F3

NAND_DATA0 U24
NAND_DATA1 T26
NAND_DATA2 T27
NAND_DATA3 U26
NAND_DATA4 U27
NAND_DATA5 V26
NAND_DATA6 V27
NAND_DATA7 V28
NAND_CSB   T24
NAND_ALE   R23
NAND_REB   T23
NAND_CLE   T25
NAND_WEB   R24
NAND_RBB   U25

SF_MISO W24
SF_MOSI U23
SF_SCK   V23
SF_CSB   V24

NAND_IO[0-7]
D3.3V
NAND_IO[0]
NAND_IO[1]
NAND_IO[2]
NAND_IO[3]
NAND_IO[4]
NAND_IO[5]
NAND_IO[6]
NAND_IO[7]

NAND_CEb
NAND_ALE
NAND_REb
NAND_CLE
NAND_WEb
NAND_RRb

SF_SCK   R198
SF_MISO   R196
SF_MOSI   R197 OPT
SF_CSB   R109

R105 22
R137 22   DDC_SCL
R143 22   DDC_SDA
R178 22

I2C 0 : TUNER
I2C 1 : TDA9996,NTP3100
I2C 2 : NVRAM, MICOM
I2C 3 : FRC, DIMMING IC

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 MANUFATURES SPECFIED PARTS BE USED FOR
THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMATIC.

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MODEL   BRAZIL DVR DV
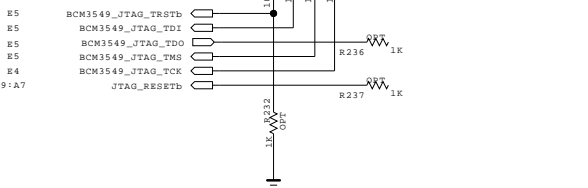BLOCK   BCM3556 & NAND
DATE   2009.01.20
SHEET   9 / 17

54MHz X-TAL

There are Lots of problem using fundamental crystal
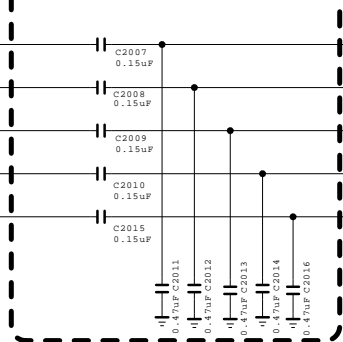
MOVE BOTTOM SIDE TO TOP SIDE OF PCB

JTAG

INCM

Route INCM between associated Left and Right signals of same channel.

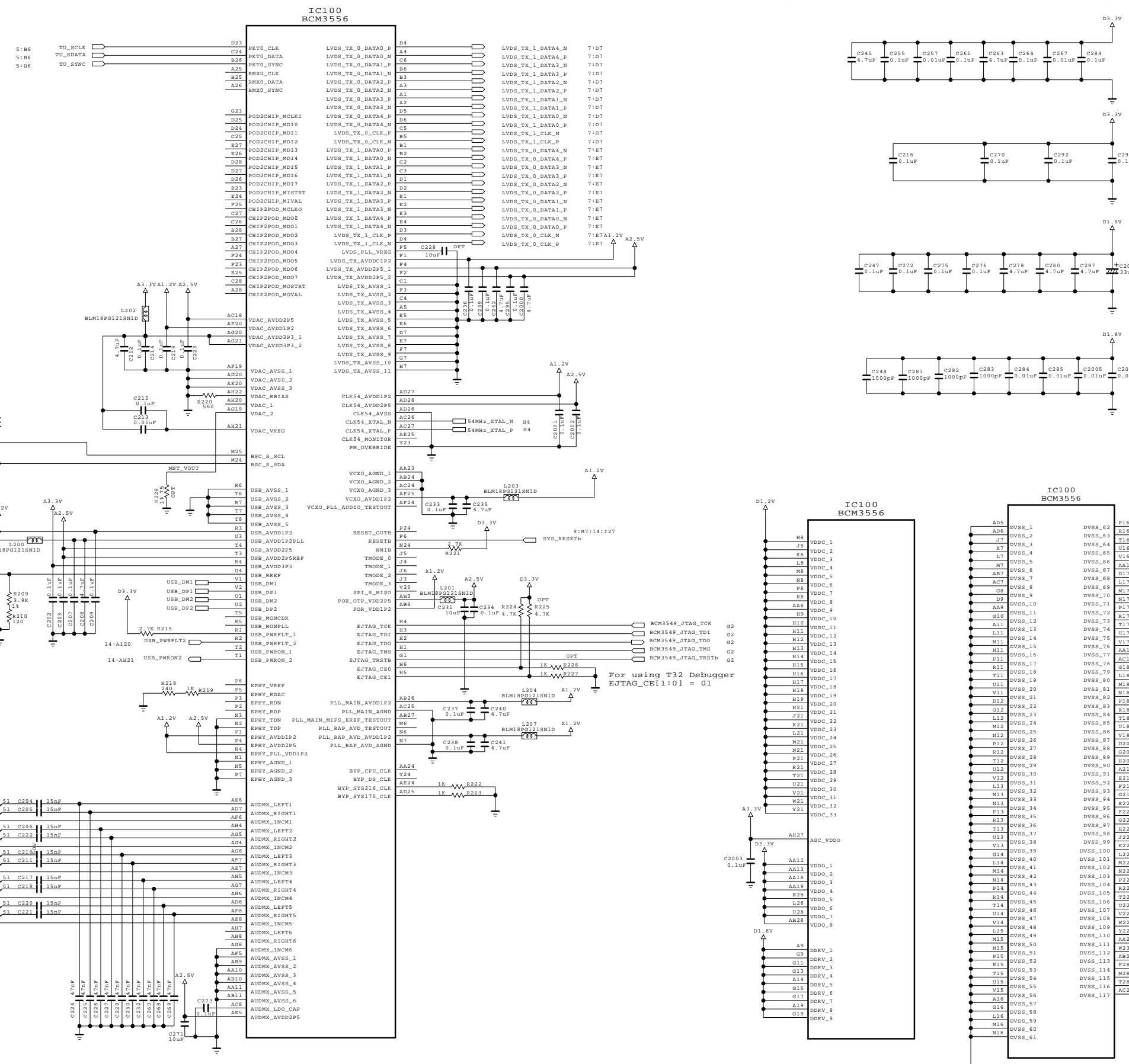Route all 3 traces as matched lines. Shield all lines!!!
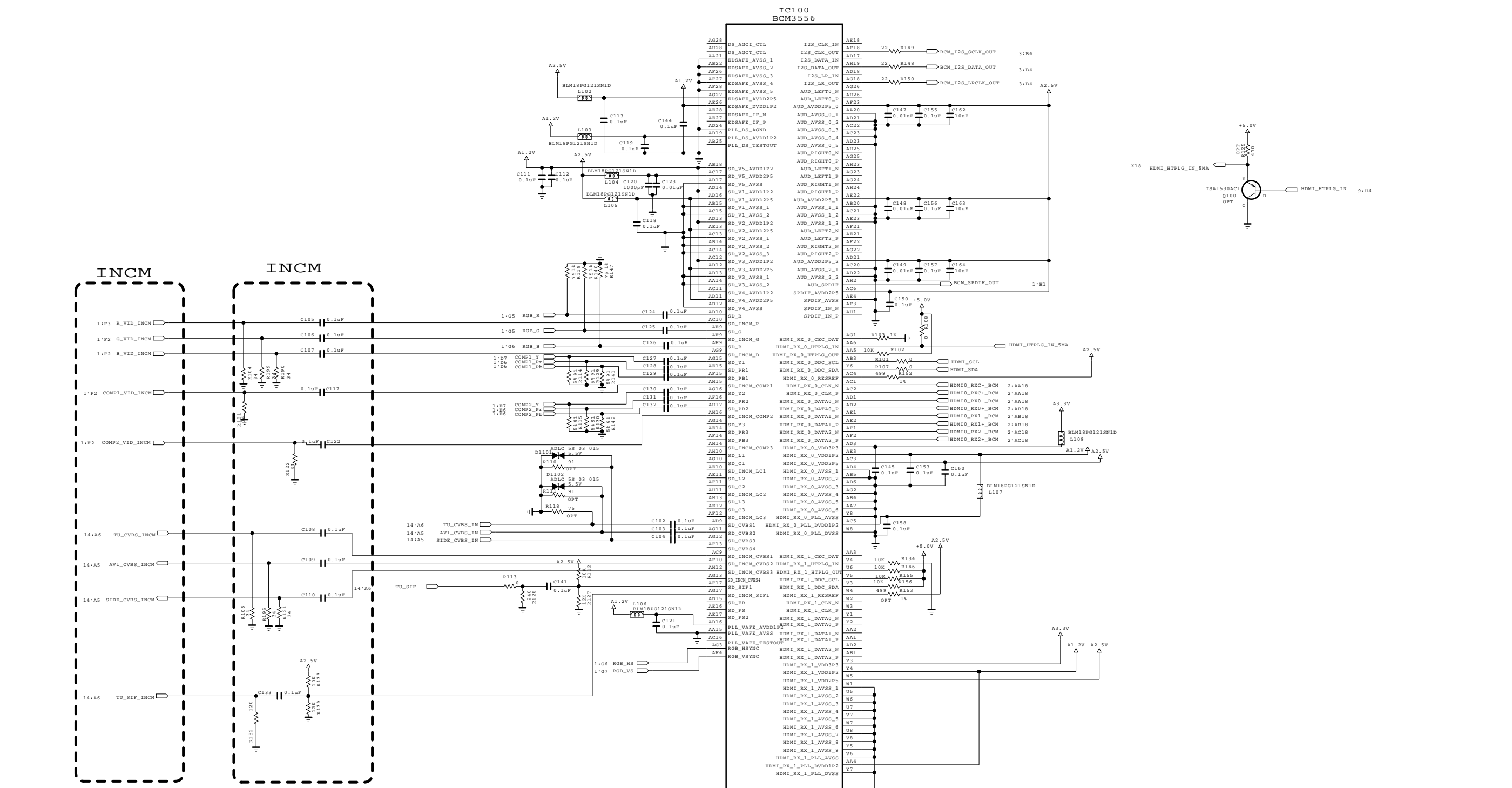
INCM

Example)

<<----- Left signal ----<<
<<----- INCM -----------<<
<<----- Right signal ---<<

Place this TP,Resistors <<---
near Audio connector.

---> Place capacitors very close to BCM3556

IC100
BCM3556

For using T32 Debugger
EJTAG_CE[1:0] = 0l

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MODEL BRAZIL DVR DV
BLOCK BCM3556_AUDIO_XTAL
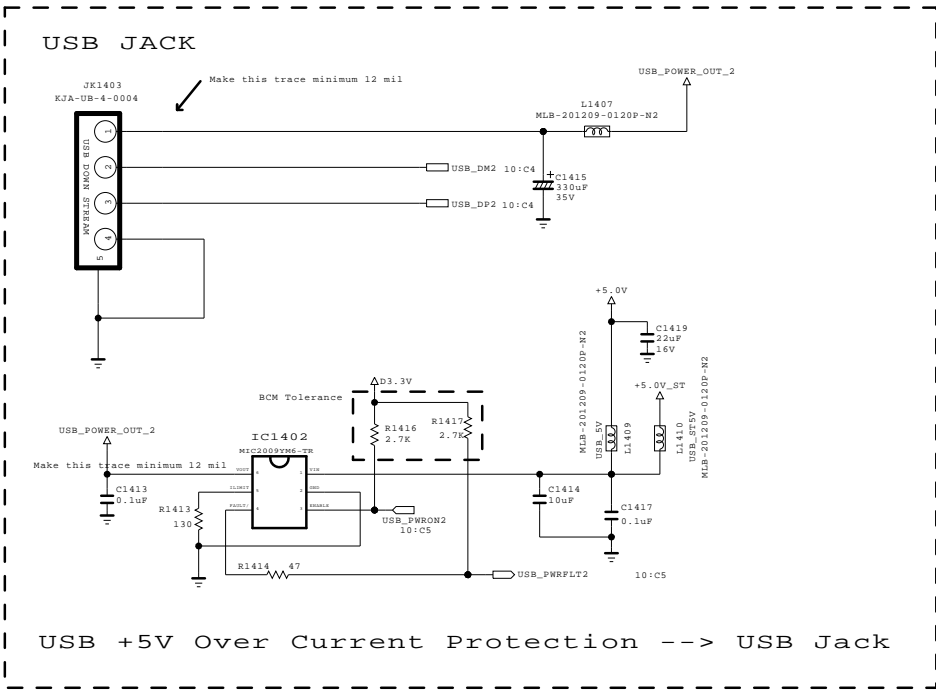
DATE 2009.01.20
SHEET 10 / 17

LG ELECTRONICS
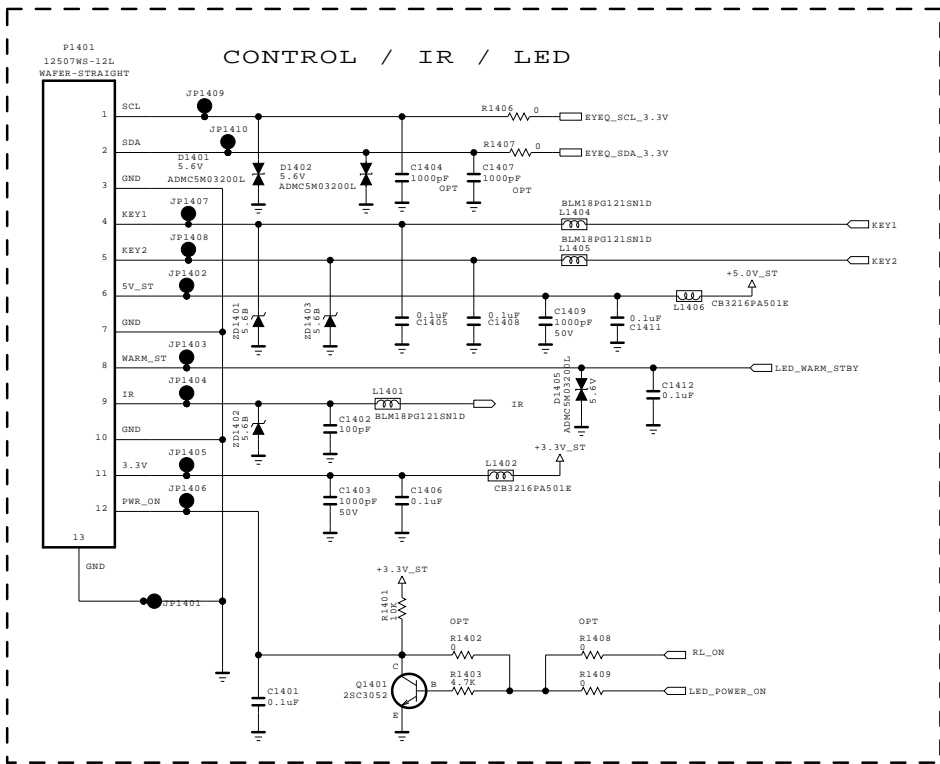
THE ⚠ SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES
SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION.
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IC100
BCM3556

INCM

INCM

Place this TP near JACK <<--   -->> Place these components near BCM3556

3.3V_VDDP_ST , MICOM

IC404
AZ1117H-3.3
+5.0V_ST
INPUT
OUTPUT
ADJ/GND
+3.3V_ST
C415 0.1uF
C404 10uF
C405 22uF
C417 0.1uF

POWER DETECT

+12.0V
+5.0V
+3.3V_ST
+20.0V
+5.0V_ST
R480 15K
R468 OPT
R472 10K
R475 30K 1/10W
R477 OPT
POWER_DET
R467 OPT
Q460 2SC3052 OPT
R469 OPT
Q461 2SC3052 OPT
R471 OPT
R470 OPT
R474 OPT
R476 5.1K 1/10W 5%
R481 7.5K
IC460 NCP803SN293
RESET
VCC
GND
R473 OPT
R4009 OPT
R4010 0
R473

IC405
KIA7029AF
+3.3V_ST
R427
R423
Q400 2SC3052
R436 33K
2:AD27 HDMI_CEC
C423 0.1uF
C424 0.1uF
R411 1K
R433 4.7K
GND

PDP
LCD
AI_ON/OFF
POD
R413 0
R414 OPT 0

IC407
MTV416GMF

P1.4/DA3 44
P1.3/DA2 43
P1.2/DA1 42
P1.1/DA0 41
P1.0/ET2 40
P4.2/AD2 39
VDD 38
P5.0 37
P5.1 36
P5.2 35
P5.3 34

HSYNC/P1.5 1
VSYNC/P1.6 2
P1.7/SOGI 3
RST 4
HSCL1/P3.0/RXD 5
P4.3/AD3 6
HSDA1/P3.1/TXD 7
P3.2/INT0 8
P3.3/INT1 9
ISDA/P3.4/T0 10
ISCL/P7.5 11

P5.4 33
P5.5 32
P5.6 31
P5.7/CLKO2 30
P7.0/HBLANK 29
P4.1/AD1 28
P7.1/VBLANK 27
P7.2/HCLAMP 26
P6.7 25
P6.6 24
P6.5 23

HSDA2/P7.4 12
HSCL2/P7.3 13
X2 14
X1 15
VSS 16
P4.0/AD0 17
P6.0/CLKO1 18
P6.1 19
P6.2 20
P6.3 21
P6.4 22

ERROR_OUT 4:C5
HTV2_SCL_3.3V
HTV2_SDA_3.3V
LED_WARM_STBY
LED_POWER_ON
D3.3V
R441 100
R442 4.7K
R443
GND
+3.3V_ST
R461 100
R462 100
R464 2K
R463 2K
R439 100
R440 100

+3.3V_ST
R415 100
R417 100
C422 0.1uF
C418 0.1uF
GND
GND
+3.3V_ST
0.1uF C431
R453 68K
R459 OPT 22 LVDS_PANEL_CTRL 4:G1
R455 1K FLASH_WP_1 9:C1
R454 1K INV_ON/OFF 4:C6
RL_ON 4:D7,14:X19
33K R456
R4005 1K POWER_DET 9:A7/B3
MICOM_RESET 3:A6
+5.0V
R460 4.7K
Q401 RT1N141C-T112-1 /W_PROTECT 1:I7

+5.0V_ST
DDC_SCL 1:J7
R429 22
R418 4.7K
DDC_SDA 1:J7
R430 22
R431 4.7K
1:C1,14:U23 IR
14:R8 UCOM_RX
R424 220
14:X6 UCOM_TX
R432 220

+3.3V_ST
R434 15K
R425 4.7K
R426 4.7K
C425 0.1uF
R428 4.7K
GND

+3.3V_ST
IC406
M24C16-WMN6T
C426 0.1uF
R420 22
R421 22
R435 4.7K
GND

+3.3V_ST
R4006 4.7K
R4007 4.7K
R437 22
R438 22
SDA1_3.3V
SCL1_3.3V
GND

X400 24MHz
C427 22pF
C428 22pF
GND

MUTE1
OPC_EN

R401 100
R404 100
R403 100

R448 1K
R449 OPT 4.7K
R452 4.7K
+3.3V_ST
R450 33K
R451 33K
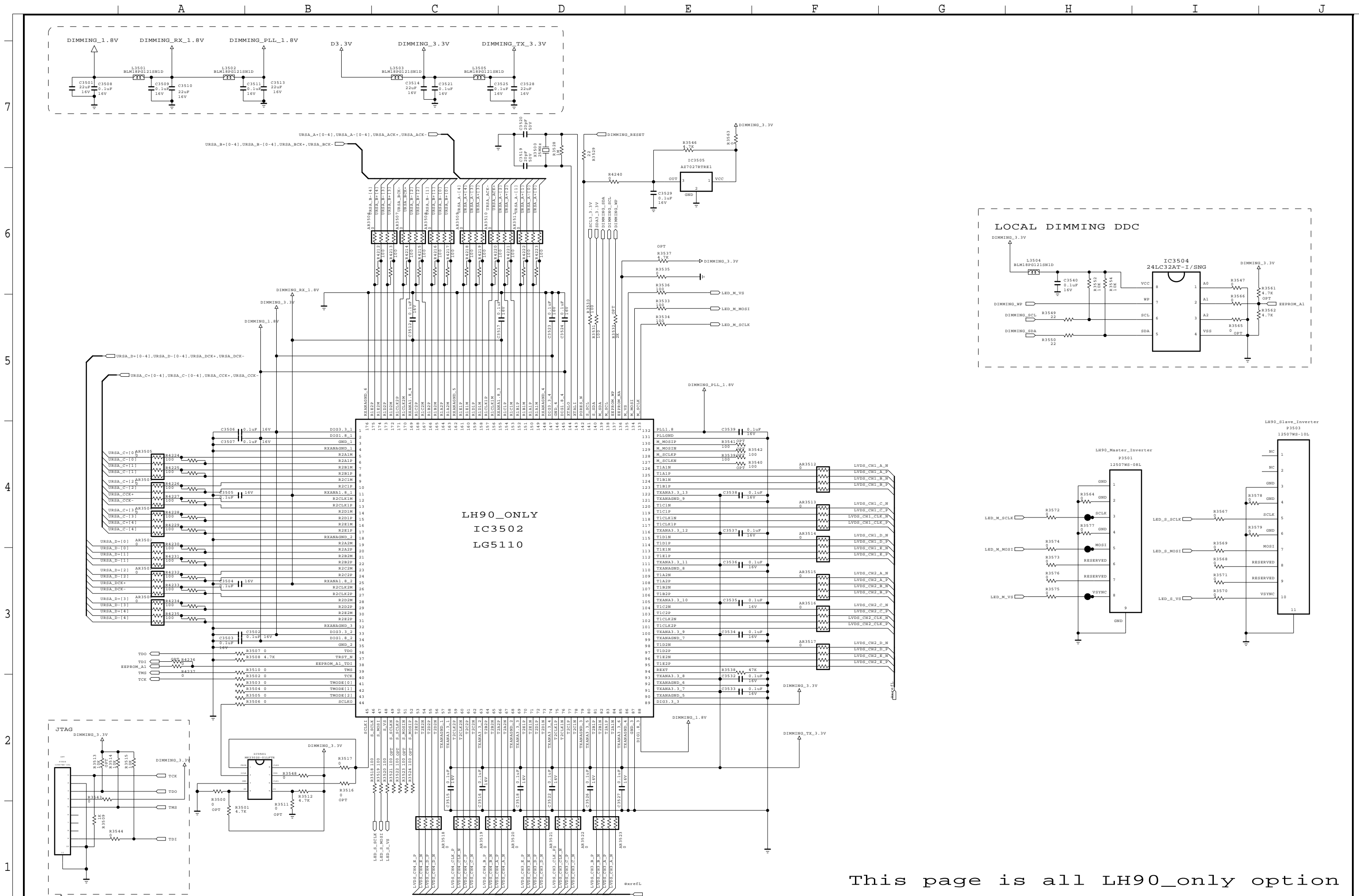R402 100
GND
C429 0.1uF
C430 0.1uF
GND
14:AA25 KEY2
14:AA25 KEY1
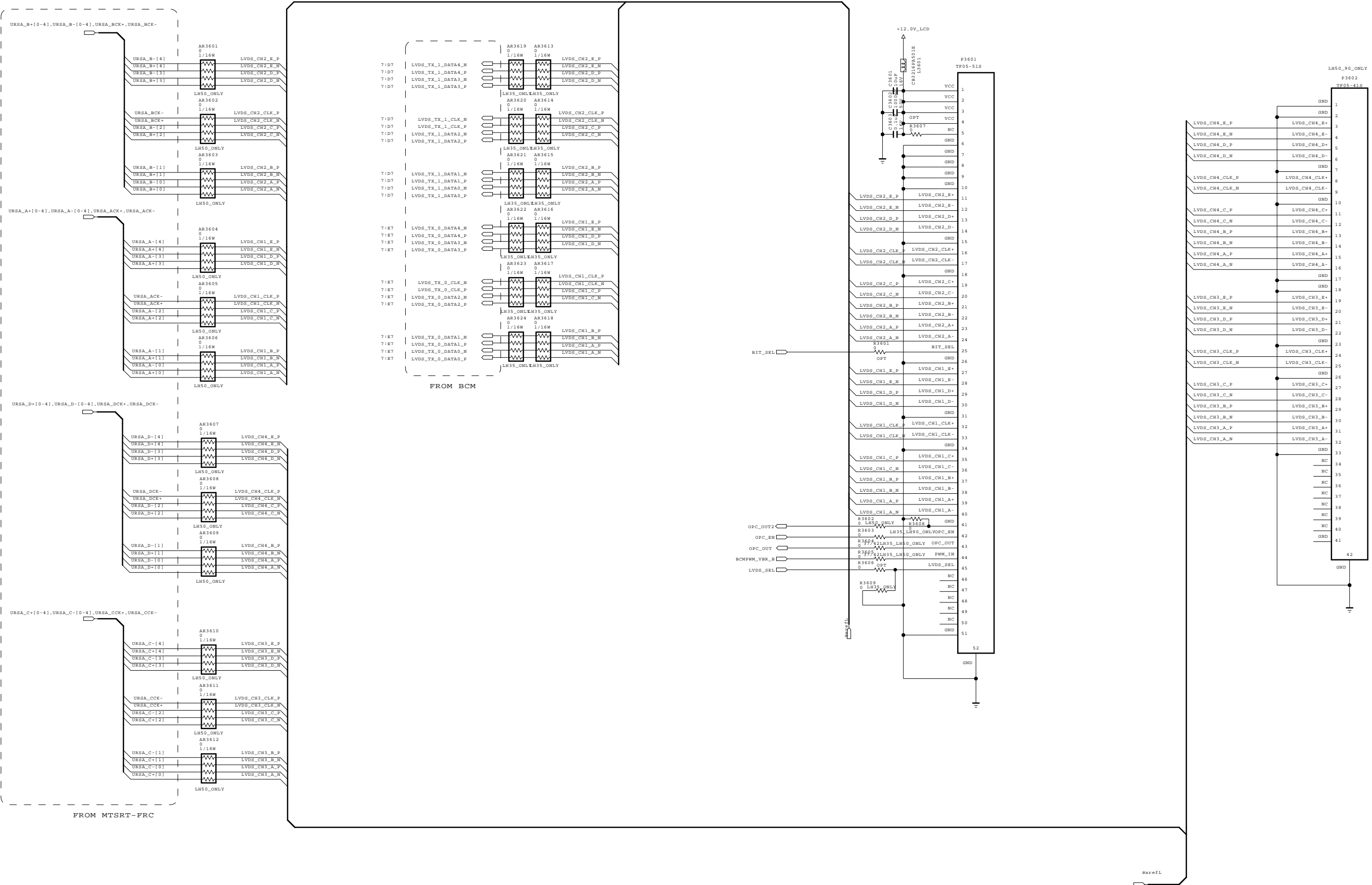
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES
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MODEL BRAZIL DVR DV
BLOCK MICOM, POWER_DE
DATE 2009.01.20
SHEET 12 / 17

SECRET

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| MODEL | BRAZIL DVR DV | DATE | 2009.01.20 |
| BLOCK | BCM3556_POWER | SHEET | 13 / 17 |

BCM3556_POWER_GND

CONTROL / IR / LED

USB JACK

USB +5V Over Current Protection --> USB Jack
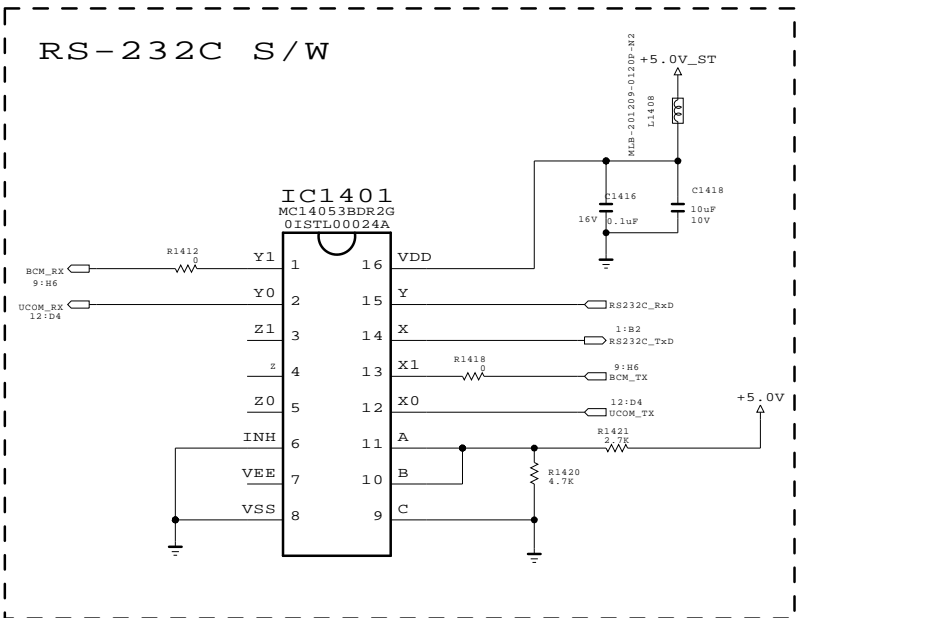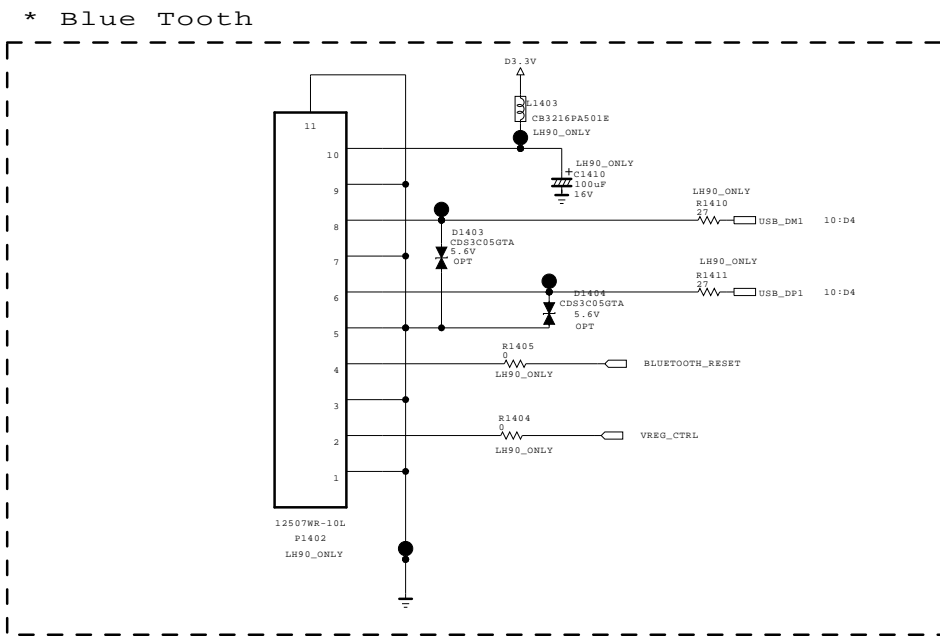
* Blue Tooth

RS-232C S/W

LG ELECTRONICS

| MODEL | BRAZIL DVR DV | DATE | 2009.01.20 |
| BLOCK | USB/USB2SATA/Eth | SHEET | 14 / 17 |

LOCAL DIMMING DDC

LH90_ONLY
IC3502
LG5110

LH90_Master_Inverter
P3501
12507WS-08L

LH90_Slave_Inverter
P3503
12507WS-10L

JTAG

IC3505
AS7027RTRE1

IC3504
24LC32AT-I/SNG

This page is all LH90_only option

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| MODEL | BRAZIL DVR DV | DATE | 2009.01.20 |
| BLOCK | LOCAL DIMMING IC | SHEET | 15 / 16 |

This is a full-page electronic schematic diagram for LG ELECTRONICS, BRAZIL DVR DV, LVDS block, SHEET 16/17, dated 2009.01.20.

LG Electronics Inc.