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# LED LCD TV

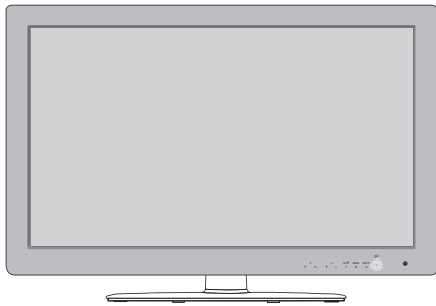
# SERVICE MANUAL

CHASSIS : LJ03D

MODEL : 32LE5500 32LE5500-SA

## CAUTION

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



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# SAFETY PRECAUTIONS

## IMPORTANT SAFETY NOTICE

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

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

Do not modify the original design without permission of manufacturer.

### General Guidance

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

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

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

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

Keep wires away from high voltage or high temperature parts.

### Before returning the receiver to the customer,

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

### Leakage Current Cold Check(Antenna Cold Check)

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

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

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

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

### Leakage Current Hot Check (See below Figure)

Plug the AC cord directly into the AC outlet.

### Do not use a line Isolation Transformer during this check.

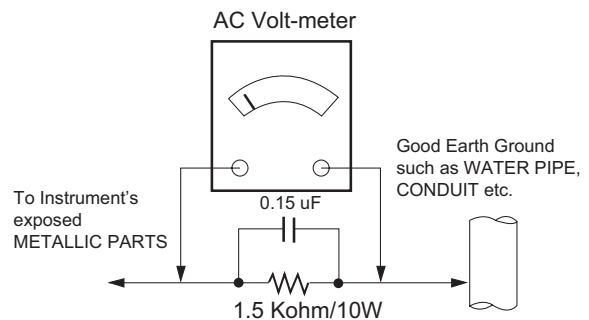
Connect 1.5 K / 10 watt resistor in parallel with a 0.15  $\mu$ F capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

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

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

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

### Leakage Current Hot Check circuit



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

\*Base on Adjustment standard

# SERVICING PRECAUTIONS

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

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

## General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;
  - a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
  - b. Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
  - c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.

**CAUTION:** A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.

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

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

## Electrostatically Sensitive (ES) Devices

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

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

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

## General Soldering Guidelines

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

### IC Remove/Replacement

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

#### Removal

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

#### Replacement

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

### "Small-Signal" Discrete Transistor

#### Removal/Replacement

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

### Power Output, Transistor Device

#### Removal/Replacement

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

### Diode Removal/Replacement

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

### Fuse and Conventional Resistor

#### Removal/Replacement

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

### Circuit Board Foil Repair

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

#### At IC Connections

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

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

#### At Other Connections

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

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

# SPECIFICATION

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

## 1. Application range

This specification is applied to the LCD TV used LJ03B/D/E/F chassis.

## 2. Requirement for Test

Each part is tested as below without special appointment.

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

## 3. Test method

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

## 4. General Specification(TV)

No	Item	Specification	Remark
1	Receivable System	1) SBTVD / NTSC / PAL-M / PAL-N	
2	Available Channel	VHF : 02 ~ 13 UHF : 14 ~ 69 DTV : 07 ~ 69 CATV : 01 ~ 135	
3	Input Voltage	1) AC 100 ~ 240V 50/60Hz	
4	Market	Central and South AMERICA	
5	Screen Size	32 inch Wide (1920 x 1080) 42 inch Wide (1920 x 1080) 47 inch Wide (1920 x 1080) 55 inch Wide (1920 x 1080) 60 inch Wide (1920 x 1080)	32LE7500,32LD650,32LE5500 42LE7500,42LD650,42LE5500,42LE8500 47LE7500,47LD650,47LE5500, 55LE7500,55LD650 60LE5500
6	Aspect Ratio	16:9	
7	Tuning System	FS	
8	LCD Module	LC320EUH-SCA4 (Vitiaz 5) LC420EUH-SCA2 (Vitiaz 5) LC470EUH-SCA2 (Vitiaz 5) LC550EUB-SCA2 (Vitiaz 5) LC320WUH-SCA1(Vitiaz 5) LC420WUH-SCA1(Vitiaz 5) LC470WUH-SCA1(Vitiaz 5) LC550WUB-SCA1(Vitiaz 5) LC320EUH-SCA1(Vitiaz 5) LC420EUH-SCA1(Vitiaz 5) LC470EUH-SCA1(Vitiaz 5) Sharp 60 FHD T240 IOP LED LC420MUK-SCA1 (Vitiaz 5)	32LE7500-SA 42LE7500-SA 47LE7500-SA 55LE7500-SA 32LD650-SA 42LD650-SA 47LD650-SA 55LD650-SA 32LE5500-SA 42LE5500-SA 47LE5500-SA 60LE5500-SA 42LE8500-SA
9	Operating Environment	Temp : 0 ~ 40 deg Humidity : ~ 80 %	
10	Storage Environment	Temp : -20 ~ 60 deg Humidity : -85 %	

## 5. Chrominance & Luminance Specification

### 1) LJ03D/E (LE5500,LE7500,42LE8500)

No	Item			Min	Typ	Max	Unit	Remark	
1.	Max Luminance (Center 1-point / Full White Pattern)	Module		360	450		cd/m <sup>2</sup>	32/42/47/55LE7(5)500 42LE8500	
				450	500				
		Set		300	450		cd/m <sup>2</sup>	32/42/47/55LE7(5)500 42LE8500	
				400	500				
2.	Luminance uniformity			77			%	Full white	
3.	Color coordinate	RED	X	Typ. -0.03	0.651	Typ. +0.03			32LE7(5)500 42/55LE7(5)500 47LE7(5)500 (42LE8500)
					0.647				
			0.645						
			(TBD)						
		Y	0.332						
			0.332						
		GREEN	X		0.308				
					0.309				
			0.310						
			(TBD)						
		Y	0.597						
			0.601						
BLUE	X	0.149							
		0.149							
	0.152								
	(TBD)								
Y	0.059								
	0.059								
WHITE	X	0.057							
		(TBD)							
	0.279								
	(0.280)								
Y	0.292								
	(0.290)								
4.	Color coordinate uniformity							N/A	
5.	Contrast ratio			900:1	1300:1			32LE7(5)500 42/47/55, 42LE85	
				1000:1	1400:1				
				3,000,000:1	5,000,000:1			LE7(5)500 42LE8500	
				5,000,000:1	7,000,000:1				
6.	Color Temperature	Cool		0.267	0.269	0.271		<Test Condition> 85% Full white pattern ** The W/B Tolerance is ±0.015 Adjustment	
				0.271	0.273	0.275			
		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			
7.	Color Distortion, DG					10.0	%		
8.	Color Distortion, DP					10.0	deg		
9.	Color S/N, AM/FM			43.0			dB		
10.	Color Killer Sensitivity			-80			dBm		



## 2) LJ03B (32/42/47/55LD650-SA)

No	Item			Min	Typ	Max	Unit	Remark	
1.	Max Luminance (Center 1-point / Full White Pattern)	Module		400	500		cd/m <sup>2</sup>	32/42/47/55LD650	
		Set		400	500		cd/m <sup>2</sup>	32/42/47/55LD650	
2.	Luminance uniformity			77			%	Full white	
3.	Color coordinate	RED	X	Typ. -0.03	0.642	Typ. +0.03			32LD650 42LD650 47LD650 55LD650
			Y		0.636				
		GREEN	X		0.639				
					(TBD)				
			Y		0.334				
					(TBD)				
		BLUE	X		0.335				
					(TBD)				
			Y		0.334				
					(TBD)				
		WHITE	X		0.292				
					(TBD)				
Y	0.291								
	(TBD)								
WHITE	X	0.290							
		(TBD)							
	Y	0.607							
		(TBD)							
WHITE	X	0.603							
		(TBD)							
	Y	0.606							
		(TBD)							
WHITE	X	0.146							
		(TBD)							
	Y	0.146							
		(TBD)							
WHITE	X	0.146							
		(TBD)							
	Y	0.056							
		(TBD)							
WHITE	X	0.061							
		(TBD)							
	Y	0.058							
		(TBD)							
WHITE	X	0.279							
		(TBD)							
	Y	0.292							
		(TBD)							
4.	Color coordinate uniformity							N/A	
5.	Contrast ratio			1000:1	1400:1			32LD650	NORMAL
				1100:1	1500:1			42/55LD650	DCR
5.	Contrast ratio			1200:1	1500:1			47LD650	DCR
				50,000:1	70,000:1				
6.	Color Temperature	Cool		0.267	0.269	0.271			<Test Condition> 85% Full white pattern ** The W/B Tolerance is ±0.015 Adjustment
				0.271	0.273	0.275			
		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			
7.	Color Distortion, DG					10.0	%		
8.	Color Distortion, DP					10.0	deg		
9.	Color S/N, AM/FM			43.0			dB		
10.	Color Killer Sensitivity			-80			dBm		

## 6. Component Video Input (Y, Cb/Pb, Cr/Pr)

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	31.50	60	27.027	SDTV 480P
4.	720*480	31.47	59.94	27.00	SDTV 480P
5.	720*576	15.625	50*	13.5	SDTV 576I
6.	720*576	31.25	50*	13.5	SDTV 576P
7.	1280*720	37.5	50*	74.25	HDTV 720P
8.	1280*720	45.00	60.00	74.25	HDTV 720P
9.	1280*720	44.96	59.94	74.176	HDTV 720P
10.	1929*1080	28.125	50*	74.25	HDTV 1080I
11.	1920*1080	33.75	60.00	74.25	HDTV 1080I
12.	1920*1080	33.72	59.94	74.176	HDTV 1080I
13.	1920*1080	56.25	50*	148.5	HDTV 1080P
14.	1920*1080	67.50	60	148.50	HDTV 1080P
15.	1920*1080	67.432	59.94	148.352	HDTV 1080P
16.	1920*1080	27.00	24.00	74.25	HDTV 1080P
17.	1920*1080	26.97	23.976	74.176	HDTV 1080P
18.	1920*1080	33.75	30.00	74.25	HDTV 1080P
19.	1920*1080	33.71	29.97	74.176	HDTV 1080P

## 8. RGB Input (PC)

No	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock	Proposed	
	PC					DDC
1.	640*350	31.468	70.09	25.17	EGA	X
2.	720*400	31.469	70.08	28.32	DOS	O
3.	640*480	31.469	59.94	25.17	VESA(VGA)	O
4.	800*600	37.879	60.31	40.00	VESA(SVGA)	O
5.	1024*768	48.363	60.00	65.00	VESA(XGA)	O
6.	1280*768	47.776	59.87	79.50	CVT(WXGA)	O
7.	1360*768	47.712	60.015	85.50	VESA(WXGA)	O
8.	1280*1024	63.981	60.020	108.00	VESA(SXGA)	O
9.	1600*1200	75.00	60.00	162	VESA(UXGA)	O
10.	1920*1080	67.50	60	148.5	HDTV 1080P	O

- RGB PC Monitor Range Limits

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

## 9. HDMI input (PC/DTV)

No	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock	Proposed	
						DDC
	PC					
1.	640*350	31.468	70.09	25.17	EGA	X
2.	720*400	31.469	70.08	28.32	DOS	O
3.	640*480	31.469	59.94	25.17	VESA(VGA)	O
4 .	800*600	37.879	60.31	40.00	VESA(SVGA)	O
5.	1024*768	48.363	60.00	65.00	VESA(XGA)	O
6.	1280*768	47.776	59.870	79.50	CVT(WXGA)	X
7.	1360*768	47.712	60.015	85.50	VESA(WXGA)	X
8.	1280*1024	63.981	60.020	108.00	VESA(SXGA)	O
9.	1600*1200	75.00	60.00	162	VESA(UXGA)	O
10.	1920*1080	67.5	60	148.5	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.	720*576	31.25	50*	13.5	SDTV 576P	
4.	1280*720	37.5	50*	74.25	HDTV 720P	
5.	1280*720	45.00	60.00	74.25	HDTV 720P	
6.	1280*720	44.96	59.94	74.176	HDTV 720P	
7.	1929*1080	28.125	50*	74.25	HDTV 1080I	
8.	1920*1080	33.75	60.00	74.25	HDTV 1080I	
9.	1920*1080	33.72	59.94	74.176	HDTV 1080I	
10.	1920*1080	56.25	50*	148.5	HDTV 1080P	
11.	1920*1080	67.50	60	148.50	HDTV 1080P	
12.	1920*1080	67.432	59.94	148.352	HDTV 1080P	
13.	1920*1080	27.00	24.00	74.25	HDTV 1080P	
14.	1920*1080	26.97	23.976	74.176	HDTV 1080P	
15.	1920*1080	33.75	30.00	74.25	HDTV 1080P	
16.	1920*1080	33.71	29.97	74.176	HDTV 1080P	

- HDMI Monitor Range Limits

Min Vertical Freq - 56 Hz

Min Horiz. Freq - 30 kHz

Pixel Clock - 170 MHz

Max Vertical Freq - 62 Hz

Max Horiz. Freq - 80 kHz

# ADJUSTMENT INSTRUCTION

## 1. Application Range

This specification sheet is applied all of the LJ03D/E 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.
- (3) The adjustment must be performed in the circumstance of 25 °C ± 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 AC 100-220 V~ 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

- △ MAC Address 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"
  - △ EDID (The Extended Display Identification Data)/DDC (Display Data Channel) download

### 3.2. Set Assembly Adjustment

- △ Color Temperature (White Balance) Adjustment
- △ Using RS-232C
- △ PING Test
- △ Selection Factory output option

## 4. PCB Assembly Adjustment

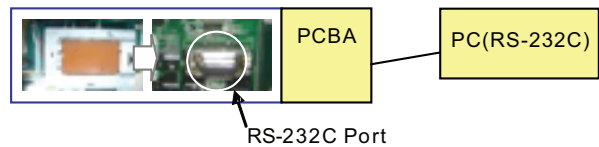
### 4.1. MAC Address

#### 4.1.1. Equipment & Condition

- Play file: Serial.exe
- MAC Address edit
- Input Start / End MAC address

#### 4.1.2 Download method

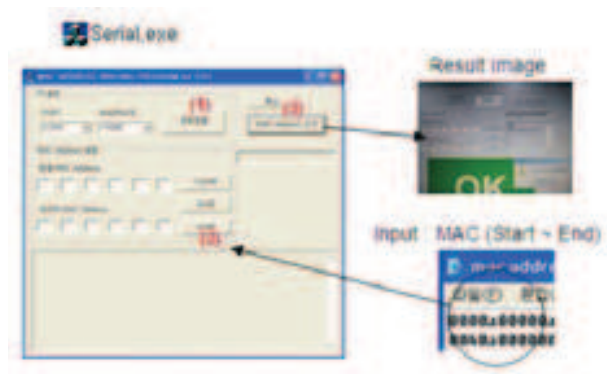
##### 4.1.2.1 Communication Prot connection



Connect: PCBA Jig-> RS-232C Port== PC-> RS-232C Port

##### 4.1.2.2 MAC Address Download

- Com 1,2,3,4 and 115200(Baudrate)
- Port connection button click(1)



- Load button click(2) for MAC Address write.
- Start MAC Address write button(3)
- Check the OK Or NG

#### 4.1.3 Equipment & Condition

- Each other connection to LAN Port of IP Hub and Jig



#### 4.1.4 LAN inspection solution

- LAN Port connection with PCB
- Network setting at MENU Mode of TV
- Setting automatic IP
- Setting state confirmation
  - If automatic setting is finished, you confirm IP and MAC Address.



#### 4.1.5 LAN Port Inspection (PING Test)

Connect SET-> LAN Port == PC-> LAN Port



##### 4.1.5.1 Equipment setting

- 1) Play the LAN Port Test PROGRAM.
- 2) Input IP set up for an inspection to Test Program.  
\*IP Number : 12.12.2.2

#### 4.1.6 LAN Port Inspection (PING Test)

- 1) Play the LAN Port Test Program.
- 2) connect each other LAN Port Jack.
- 3) Play Test (F9) button and confirm OK Message.
- 4) remove LAN CABLE



#### 4.2. Using RS-232C

Adjust 3 items at 3.1 PCB assembly adjustments “adjustment sequence” one after the order.

##### A Adjustment protocol

Order	Command	Self response
1. Enter the Adjustment mode	aa 00 00	0x00 00 00
2. Change the source	xb 00 40 xb 00 60	0x00 00 00 (Adjust 480i Comp1) 0x00 00 00 (Adjust 1080p Comp1) 0x00 00 00 (Adjust 1080p-PC)
3. Start Adjustment	ad 00 10	
4. Return the response		0x00 00 00 (Success condition) 0x00 00 00 (Failed condition)
5. Read Adjustment data	[ mode ] ad 00 10 [ mode ] ad 00 10	0x00 00 00 (component) 480i RGB (1080p) 0x00 00 00 (component) 1080p 0x00 00 00 (component) 1080p-PC
6. Confirm Adjustment	ad 00 90	0x00 00 00 (Success condition) 0x00 00 00 (Failed condition) 0x00 00 00 (Failed condition) 0x00 00 00 (Success condition)
7. End of Adjustment	ad 00 90	0x00 00 00

See ADC Adjustment RS232C Protocol\_Ver1.0

##### A Necessary items before Adjustment items

- Pattern 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)

##### A Adjustment sequence

- aa 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
- xb 00 90: Endo of Adjustment

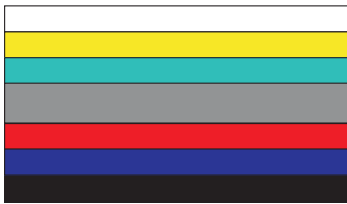
## 5 Factory Adjustment

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

A Summary : Adjustment component 480i/1080i and RGB 1080p is Gain and Black level setting at Analog to Digital converter, and compensate the RGB deviation

A 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 >

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

A Adjustment method 480i Comp1, Adjust 1080p Comp1/RGB (Factory adjustment)

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

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

A 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.

A 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.



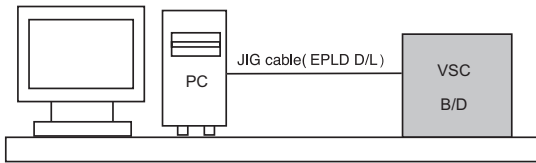
§ Edid data and Model option download (RS232)

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

### 5.2.1 Manual Download

A Write HDMI EDID data

- Using instruments
  - Jig. (PC Serial to D-Sub connection) for PC, DDC adjustment.
  - S/W for DDC recording (EDID data write and read)
  - D-sub jack
  - Additional HDMI cable connection Jig.
- Preparing and setting.
  - Set instruments and Jig. Like pic.5), then turn on PC and Jig.
  - Operate DDC write S/W (EDID write & read)
  - It will operate in the DOS mode.



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

- EDID data for LJ03B/D/E/R Chassis (Model name = LG TV)

- HDMI-1 EDID table (0x04, 0x5A)

```

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 FF 00 1E 6D 01 00 01 01 01 01
0010 01 14 01 03 80 10 09 78 0A EE 91 A3 54 4C 99 26
0020 0F 50 54 A1 00 00 01 00 61 40 45 40 31 40 01 01
0030 01 01 01 01 01 01 01 02 3A 80 10 71 38 2D 40 50 2C
0040 45 00 A0 5A 00 00 00 1E 01 1D 00 72 51 D0 1E 20
0050 6E 28 55 00 A0 5A 00 00 00 1E 00 00 00 FD 00 39
0060 3F 1F 52 10 00 0A 20 20 20 20 20 20 20 20 01 04
0070 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20 01 04
0080 02 03 1F F1 47 10 22 20 05 04 03 02 26 15 07 50
0090 09 07 07 67 03 0C 00 10 00 B0 2D E3 05 03 01 02
00A0 3A 80 18 71 38 2D 40 58 2C 04 05 A0 5A 00 00 00
00B0 1E 01 1D 80 18 71 1C 16 20 58 2C 25 00 A0 5A 00
00C0 00 00 9E 01 1D 00 72 51 D0 1E 20 6E 28 55 00 A0
00D0 5A 00 00 00 1E 0C 0A D0 8A 20 E0 2D 10 10 3E 96
00E0 00 A0 5A 80 00 00 18 26 36 80 A0 70 38 1F 40 30
00F0 20 25 00 A0 5A 00 00 00 1A 00 00 00 00 00 00 2A
    
```

- HDMI-2 EDID table (0x04, 0x4A)

```

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 FF 00 1E 6D 01 00 01 01 01 01
0010 01 14 01 03 80 10 09 78 0A EE 91 A3 54 4C 99 26
0020 0F 50 54 A1 00 00 01 00 61 40 45 40 31 40 01 01
0030 01 01 01 01 01 01 01 02 3A 80 10 71 38 2D 40 50 2C
0040 45 00 A0 5A 00 00 00 1E 01 1D 00 72 51 D0 1E 20
0050 6E 28 55 00 A0 5A 00 00 00 1E 00 00 00 FD 00 39
0060 3F 1F 52 10 00 0A 20 20 20 20 20 20 20 20 01 04
0070 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20 01 04
0080 02 03 1F F1 47 10 22 20 05 04 03 02 26 15 07 50
0090 09 07 07 67 03 0C 00 10 00 B0 2D E3 05 03 01 02
00A0 3A 80 18 71 38 2D 40 58 2C 04 05 A0 5A 00 00 00
00B0 1E 01 1D 80 18 71 1C 16 20 58 2C 25 00 A0 5A 00
00C0 00 00 9E 01 1D 00 72 51 D0 1E 20 6E 28 55 00 A0
00D0 5A 00 00 00 1E 0C 0A D0 8A 20 E0 2D 10 10 3E 96
00E0 00 A0 5A 80 00 00 18 26 36 80 A0 70 38 1F 40 30
00F0 20 25 00 A0 5A 00 00 00 1A 00 00 00 00 00 00 2A
    
```

- HDMI-3 EDID table (0x04, 0x3A)

```

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 FF 00 1E 6D 01 00 01 01 01 01
0010 01 14 01 03 80 10 09 78 0A EE 91 A3 54 4C 99 26
0020 0F 50 54 A1 00 00 01 00 61 40 45 40 31 40 01 01
0030 01 01 01 01 01 01 01 02 3A 80 10 71 38 2D 40 50 2C
0040 45 00 A0 5A 00 00 00 1E 01 1D 00 72 51 D0 1E 20
0050 6E 28 55 00 A0 5A 00 00 00 1E 00 00 00 FD 00 39
0060 3F 1F 52 10 00 0A 20 20 20 20 20 20 20 20 01 04
0070 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20 01 04
0080 02 03 1F F1 47 10 22 20 05 04 03 02 26 15 07 50
0090 09 07 07 67 03 0C 00 10 00 B0 2D E3 05 03 01 02
00A0 3A 80 18 71 38 2D 40 58 2C 04 05 A0 5A 00 00 00
00B0 1E 01 1D 80 18 71 1C 16 20 58 2C 25 00 A0 5A 00
00C0 00 00 9E 01 1D 00 72 51 D0 1E 20 6E 28 55 00 A0
00D0 5A 00 00 00 1E 0C 0A D0 8A 20 E0 2D 10 10 3E 96
00E0 00 A0 5A 80 00 00 18 26 36 80 A0 70 38 1F 40 30
00F0 20 25 00 A0 5A 00 00 00 1A 00 00 00 00 00 00 2A
    
```

- HDMI-4 EDID table (0x04, 0x2A)

```

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 FF 00 1E 6D 01 00 01 01 01 01
0010 01 14 01 03 80 10 09 78 0A EE 91 A3 54 4C 99 26
0020 0F 50 54 A1 00 00 01 00 61 40 45 40 31 40 01 01
0030 01 01 01 01 01 01 01 02 3A 80 10 71 38 2D 40 50 2C
0040 45 00 A0 5A 00 00 00 1E 01 1D 00 72 51 D0 1E 20
0050 6E 28 55 00 A0 5A 00 00 00 1E 00 00 00 FD 00 39
0060 3F 1F 52 10 00 0A 20 20 20 20 20 20 20 20 01 04
0070 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20 01 04
0080 02 03 1F F1 47 10 22 20 05 04 03 02 26 15 07 50
0090 09 07 07 67 03 0C 00 10 00 B0 2D E3 05 03 01 02
00A0 3A 80 18 71 38 2D 40 58 2C 04 05 A0 5A 00 00 00
00B0 1E 01 1D 80 18 71 1C 16 20 58 2C 25 00 A0 5A 00
00C0 00 00 9E 01 1D 00 72 51 D0 1E 20 6E 28 55 00 A0
00D0 5A 00 00 00 1E 0C 0A D0 8A 20 E0 2D 10 10 3E 96
00E0 00 A0 5A 80 00 00 18 26 36 80 A0 70 38 1F 40 30
00F0 20 25 00 A0 5A 00 00 00 1A 00 00 00 00 00 00 2A
    
```

- Analog (RGB) EDID table (0x1D)

```

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 FF 00 1E 6D 01 00 01 01 01 01
0010 01 14 01 03 80 10 09 78 0A EE 91 A3 54 4C 99 26
0020 0F 50 54 A1 00 00 01 00 61 40 45 40 31 40 01 01
0030 01 01 01 01 01 01 01 02 3A 80 10 71 38 2D 40 50 2C
0040 45 00 A0 5A 00 00 00 1E 01 1D 00 72 51 D0 1E 20
0050 6E 28 55 00 A0 5A 00 00 00 1E 00 00 00 FD 00 3A
0060 3E 1E 53 10 00 0A 20 20 20 20 20 20 20 20 01 0D
0070 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20 01 0D
0080 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0090 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00A0 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00B0 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00C0 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00D0 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00E0 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00F0 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
    
```

See Working Guide if you want more information about EDID communication.

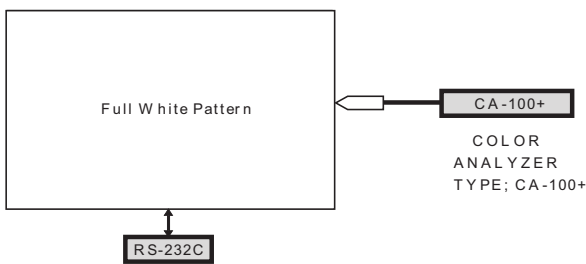
### 5.3 Adjustment Color Temperature (White balance)

A Using Instruments

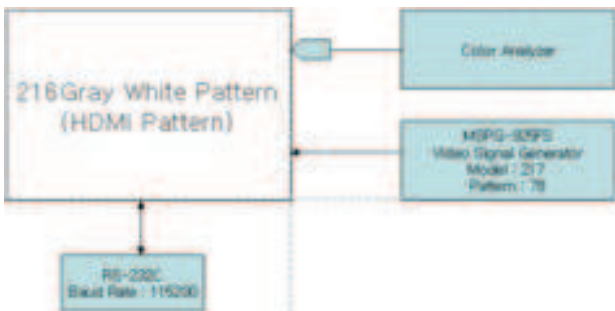
- Color Analyzer: CA-210 (CH 9)  
- Using LCD color temperature, Color Analyzer (CA-210) must use CH 9, which Matrix compensated (White, Red, Green, Blue compensation) with CS-2100. See the Coordination bellowed one.
- Auto-adjustment Equipment (It needs when Auto-adjustment – It is availed communicate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

A Connection Diagram (Auto Adjustment)

- Using Inner Pattern



- Using HDMI input



<Pic.5 Connection Diagram for Adjustment White balance>

A 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 "Test-Pattern. On" will be selected in The "Test-Pattern. On/Off".

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



A RS-232C Command (Commonly apply)

RS-232C COMMAND	Meaning		
CHND	ID	D	
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)



**○ Notice) Adjustment Mapping information**

	RS-232C COMMAND [CMD ID DATA]			MIN	CENTER (DEFAULT)			Max
	Cool	Mid	Warm		Cool	Mid	Warm	
R Gain	32	38	3d	00	192	192	192	192
G Gain	3h	3h	3e	00	189	175	157	192
B Gain	3j	3c	3f	00	153	127	57	192
R Cut					64	64	64	127
G Cut					64	64	64	127

- When Color temperature (White balance) Adjustment (Automatically)
  - Press "Power only key" of service remocon and operate automatically adjustment.
  - Set BaudRate to 115200.
- If it needs, then adjustment "Offset".

**A 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 "G" button of navigation key.  
(When press "G" 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 (A 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,  $\Delta uv=0.000$ ,  $x=0.276$   $y=0.283$
  - MEDIUM : T=9300K,  $\Delta uv=0.000$ ,  $x=0.285$   $y=0.293$
  - WARM : T=6500K,  $\Delta uv=0.000$ ,  $x=0.313$   $y=0.329$

- Using CA-210 Equipment. (9 CH)
  - Contrast value: 216 Gray

Color temperature	Test Equipment	Color Coordination	
		x	y
COOL	CA-210	0.269±0.002	0.273±0.002
MEDIUM	CA-210	0.285±0.002	0.293±0.002
WARM	CA-210	0.313±0.002	0.329±0.002

- White Balance adjustment coordination and color temperature for Edge(IOP) LED (LJ03D/E)

Color Temperature		Cool	11,000K	%	X=0.285 (+0.002) Y=0.293 (+0.002)	3210(H)770(E)7500-SA 3210(H)750(E)5500-SA 43.0500-SA	<Test signal> 3sec pattern (216gray)25RE			
								Medium	9,300K	X=0.285 (+0.002) Y=0.293 (+0.002)
								Warm	6,500K	X=0.313 (+0.002) Y=0.329 (+0.002)

- White Balance adjustment table for Edge (IOP) LED (LJ03D/E)

	H/R Time(Min)	Cool		Medium		Warm	
		x	y	x	y	x	y
		269	273	285	293	313	329
1	0-2 Min	280	291	296	311	319	340
2	3-5 Min	278	288	294	308	317	338
3	6-9 Min	276	285	292	305	315	335
4	10-19 Min	274	292	290	302	313	332
5	20-35 Min	273	279	289	299	312	329
6	36-49 Min	270	276	287	296	310	326
7	50-79 Min	269	273	286	293	308	323
8	Above of 80 Min	269	273	285	293	308	323

## 5.4 EYE-Q function check

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



## 5.5 HDCP (High-Bandwidth Digital Contents Protection) Setting

- No Need.

## 5.6 Test of RS-232C control.

Press In-Start button of Service Remocon then set the "4.Baud Rate" to 115200. Then check RS-232C control and

## 5.7 Selection of Country option.

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

- Models: All models which use LJ03X Chassis (See the first page.)
- Press "In-Start" button of Service Remocon, then enter the "Option" Menu with "PIP CH-" Button
- Select one of these three (USA, CANADA, MEXICO) depends on its market using "Vol. +/-" button.

**\* Caution : Don't push The INSTOP KEY after completing the function inspection.**

## 6. GND and ESD Testing

### 6.1 Prepare GND and ESD Testing.

- A Check the connection between set and power cord

### 6.2 Operate GND and ESD auto-test.

- A Fully connected (Between set and power cord) set enter the Auto-test sequence.
- A Connect D-Jack AV jack test equipment.
- A Turn on Auto-controller(GWS103-4)
- A Start Auto GND test.
- A If its result is NG, then notice with buzzer.
- A If its result is OK, then automatically it turns to ESD Test.
- A Operate ESD test
- A If its result is NG, then notice with buzzer.
- A If its result is OK, then process next steps. Notice it with Good lamp and STOPER Down.Check Items.
- A Test Voltage
  - GND: 1.5KV/min at 100mA
  - Signal: 3KV/min at 100mA
- A Test time: just 1 second.
- A Test point
  - GND test: Test between Power cord GND and Signal cable metal GND.
  - ESD test: Test between Power cord GND and Live and neutral.
- A Leakage current: Set to 0.5mA(rms)

## 7. Preset Ch information.

Country	SYSTEM	CH	FREQ	RF FREQ	VIDEO	AUDIO	REMARK
KOREA	NTSC	101.0	68.25	68.75	SHITE	STEREO	
	PAL-M	88.4	67.25	71.75	DIGITAL	STEREO	
	NTSC	101.0	68.25	68.75	PRODUCTION SYSTEM	STEREO	
	NTSC	101.0	100.25	100.75	WIDE PICTURE	STEREO	
	NTSC	101.0	100.25	100.75	OCUS HATCH	STEREO	
	PAL-M	88.4	100.25	100.75	DIGITAL	STEREO	
	NTSC	101.0	214.25	215.75	DIGITAL	STEREO	
	NTSC	101.0	217.25	218.75	SECURITY	STEREO	
	NTSC	88.4	100.25	100.75	Real DTV System	STEREO	Use DTV Support Channel, To Support User Interface, etc.
	NTSC	88.4	100.25	100.75	Real DTV System	STEREO	
	NTSC	101.0	100.25	100.75	OCUS HATCH	STEREO	CUSTOM CHANNEL
	NTSC	101.0	100.25	100.75	OCUS HATCH	STEREO	Discontinued
PAL-M	88.4	100.25	100.75	OCUS HATCH	STEREO	Discontinued	
NTSC	101.0	100.25	100.75	OCUS HATCH	STEREO	Discontinued	

In case of POWER ONLY, System color is operated multi system

In case of IN STOP, System color is operated default system (PAN-M)

## 8. Default Service option.



### 8.1 ADC-Set.

- A R-Gain adjustment Value (default 128)
- A G-Gain adjustment Value (default 128)
- A B-Gain adjustment Value (default 128)
- A R-Offset adjustment Value (default 128)
- A G-Offset adjustment Value (default 128)
- A B-Offset adjustment Value (default 128)

### 8.2 White balance. Value.

	CENTER (DEFAULT)			MAX
	Cool	Mid	Warm	
R. Gain	192	192	192	
G Gain	192	192	192	
B Gain	192	192	192	
R. Cut	64	64	64	
G Cut	64	64	64	
B Cut	64	64	64	

## 9. USB DOWNLOAD (\*.epk file download)

9.1 Put the USB Stick to the USB socket

9.2 Press Menu key, and move OPTION



9.3 Press "FAV" Press 7 times.



9.4 Select download file (epk file)



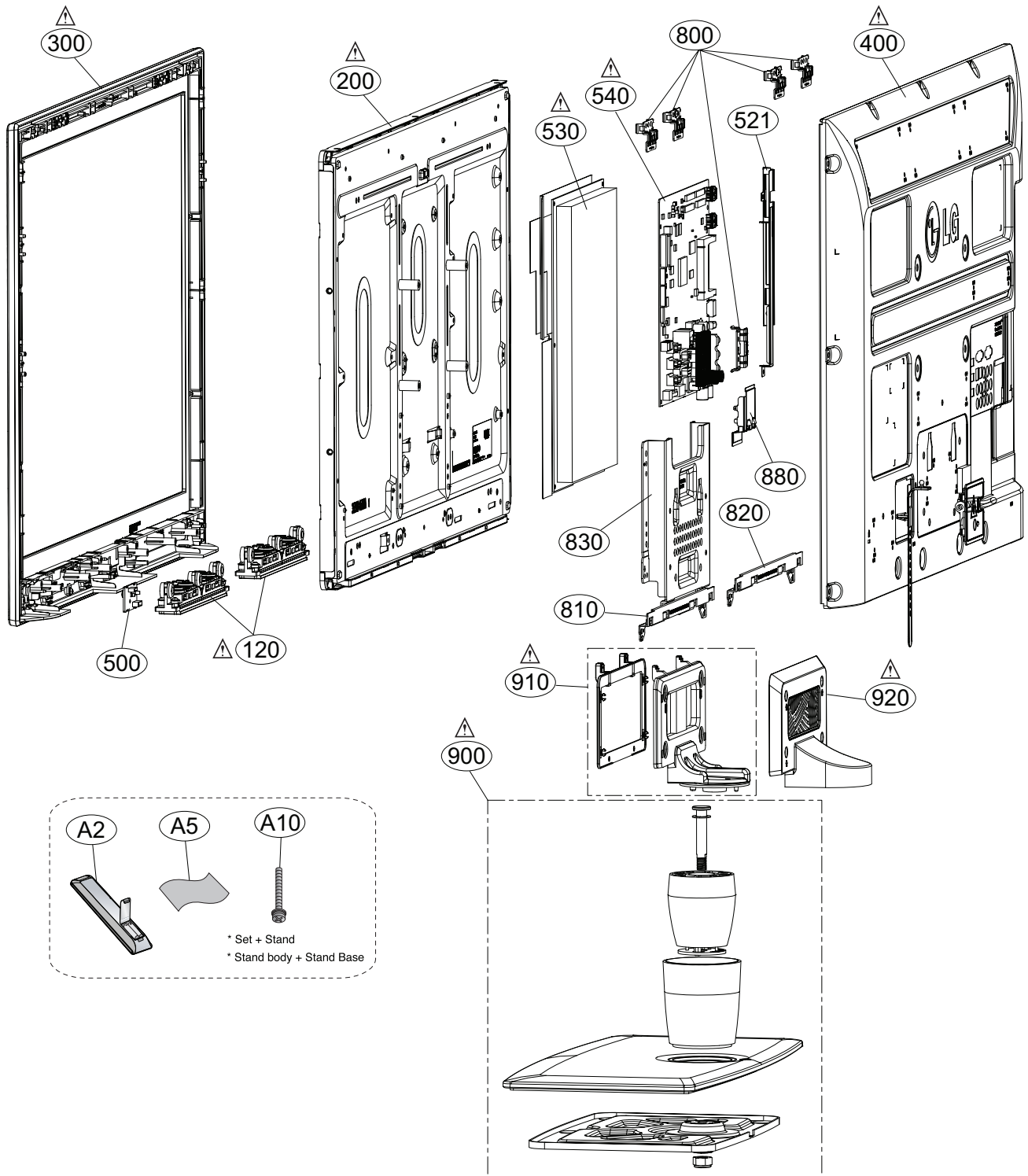
9.5 After download is finished, remove the USB stick.

9.6 Press "IN-START" key of ADJ remote control, check the S/W version.

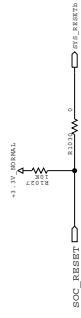
# EXPLODED VIEW

## IMPORTANT SAFETY NOTICE

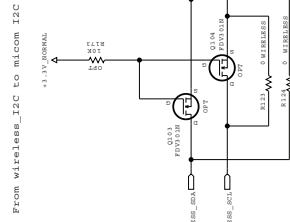
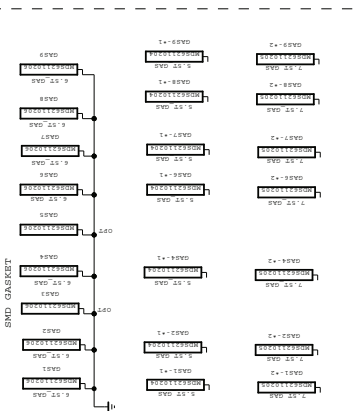
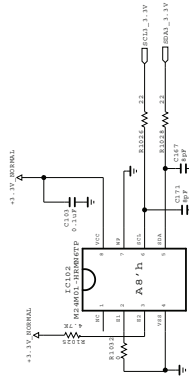
Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by  $\triangle$  in the Schematic Diagram and EXPLODED VIEW. It is essential that these special safety parts should be replaced with the same components as recommended in this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



**RESET**



**NVRAM**

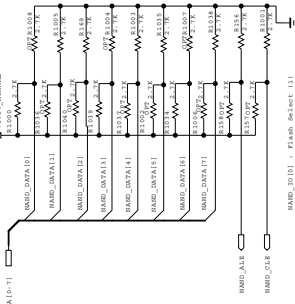


From wireless\_I2C to micron I2C

- \* I2C MAP
- \* I2C\_0
- \* I2C\_1
- \* I2C\_2
- \* I2C\_3

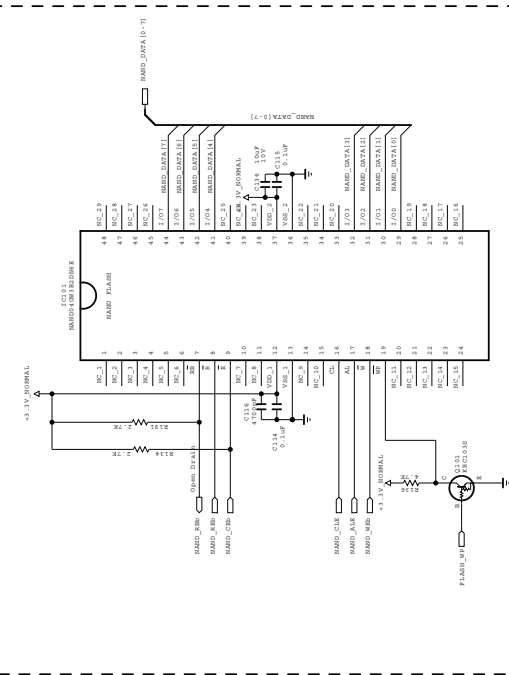
**Boot Strap**

Default Res. of all NAND pin is Pull-down



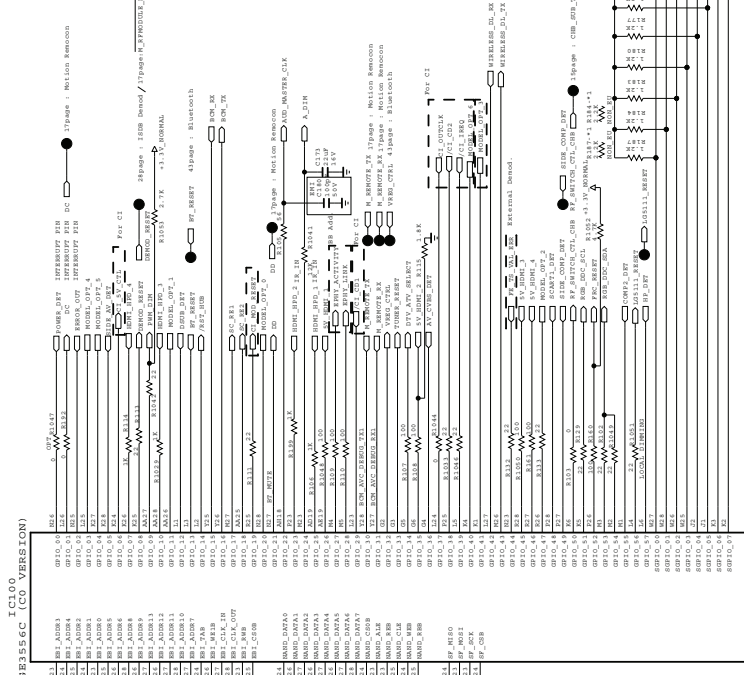
- NAND\_D0[1] = PEAR Select (1)
- NAND\_D0[2] = NAND Select (1)
- NAND\_D0[3] = NAND Select (1)
- NAND\_D0[4] = NAND Select (1)
- NAND\_D0[5] = NAND Select (1)
- NAND\_D0[6] = NAND Select (1)
- NAND\_D0[7] = NAND Select (1)
- NAND\_D0[8] = NAND Select (1)
- NAND\_D0[9] = NAND Select (1)
- NAND\_D0[10] = NAND Select (1)
- NAND\_D0[11] = NAND Select (1)
- NAND\_D0[12] = NAND Select (1)
- NAND\_D0[13] = NAND Select (1)
- NAND\_D0[14] = NAND Select (1)
- NAND\_D0[15] = NAND Select (1)

**NAND FLASH MEMORY 4Gbit (512M for BB)**



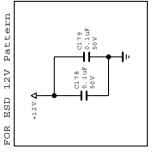
**EXT. I/O**

- GPIO\_00, GPIO\_01, GPIO\_02, GPIO\_11, GPIO\_11, GPIO\_39
- IR\_INT : GPIO\_23
- IR\_IN : GPIO\_25
- IR\_OUT : GPIO\_26
- PWM0 : GPIO\_24
- PWM1 : GPIO\_09

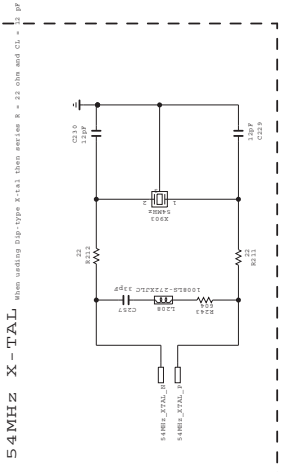


**MODEL OPTION**

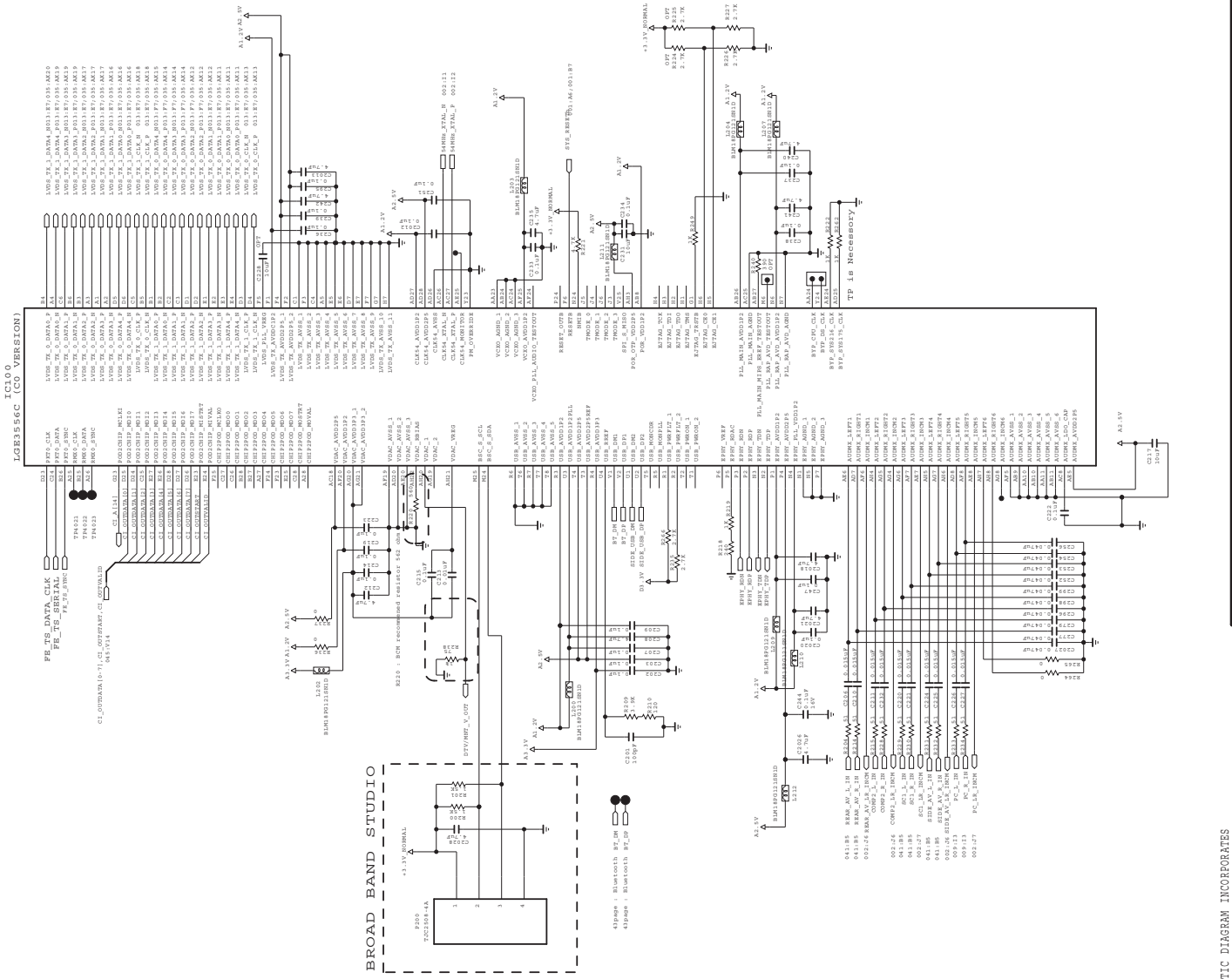
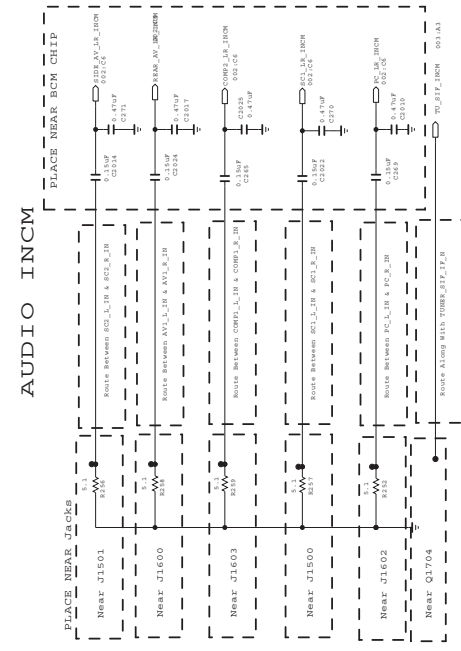
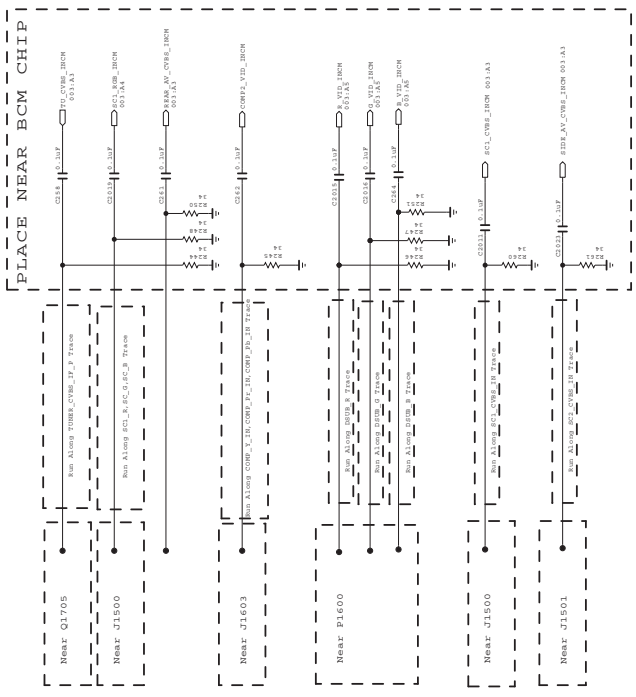
EXT BANK	EXT IO	HIGH	LOW
MODEL_OPT_0	RES	URBAN	LOW
MODEL_OPT_1	ANK	MAIN/HTL_200	MAIN_100
MODEL_OPT_2	R54	DDR-150M	DDR-150M
MODEL_OPT_3	R53	RES	RES
MODEL_OPT_4	L28	PC	RAM_FPC
MODEL_OPT_5	R57	OSP	RAM_OSP
MODEL_OPT_6	R4	OSD	RAM_OSD



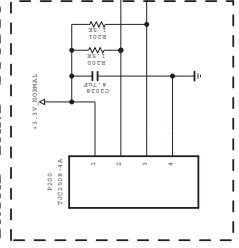
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. PLEASE READ ELECTRICAL SHOCK PRECAUTIONS, WHEN SERVING. IF IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.



VIDEO INCM



BROAD BAND STUDIO



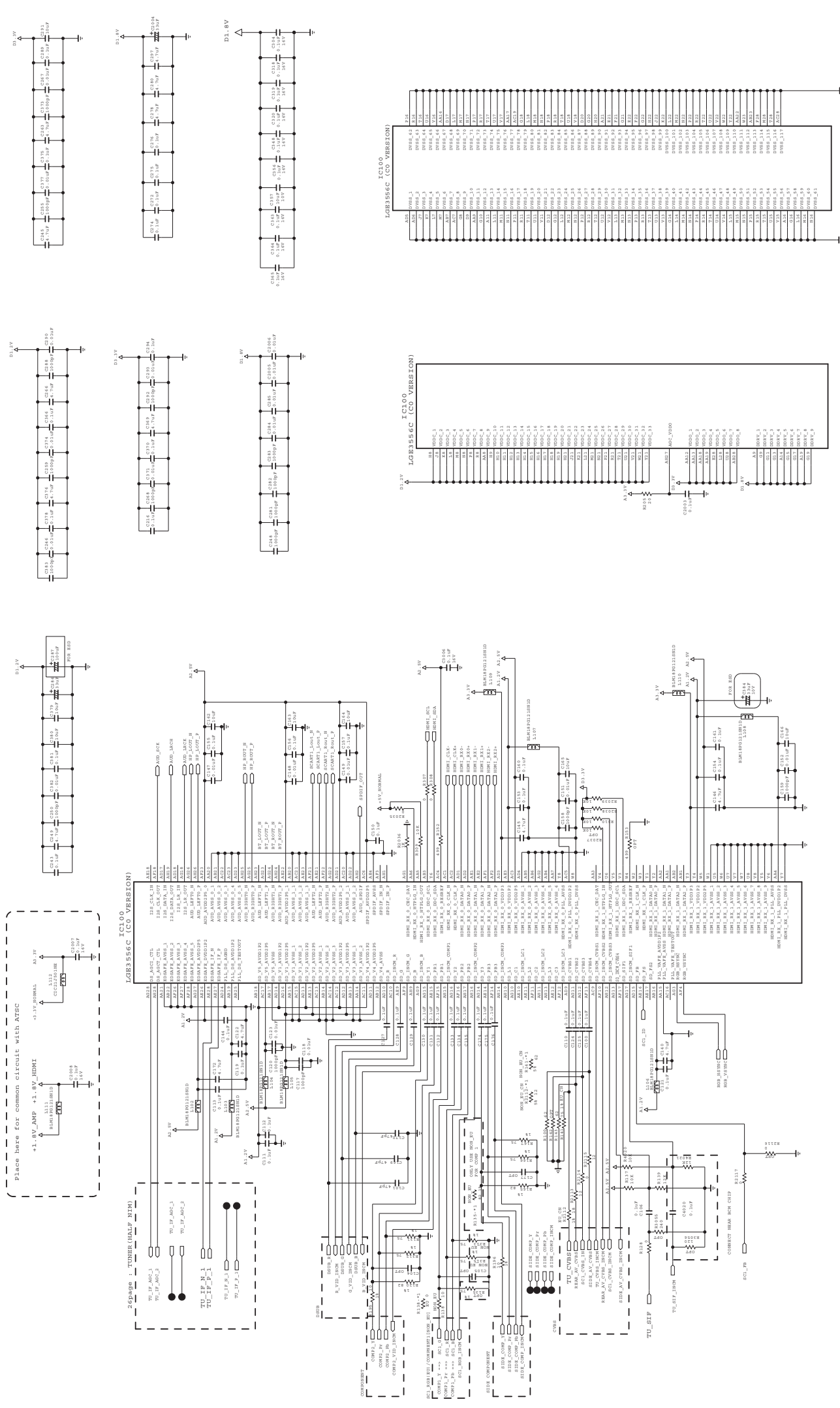
NOTE: INCM between associated pins and right signals of same channel.  
If possible, use the connector through-hole connector. However, ground plane that points, resistors connect the other side of the ground plane to the ground plane. Associated with connector associated

MODEL	BCM (EUROBEVY)	DATE	2009.06.18
BLOCK	ICG3556C AUDIO_IN/VIDEO	SHEET	2



SECRET  
LGElectronics

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



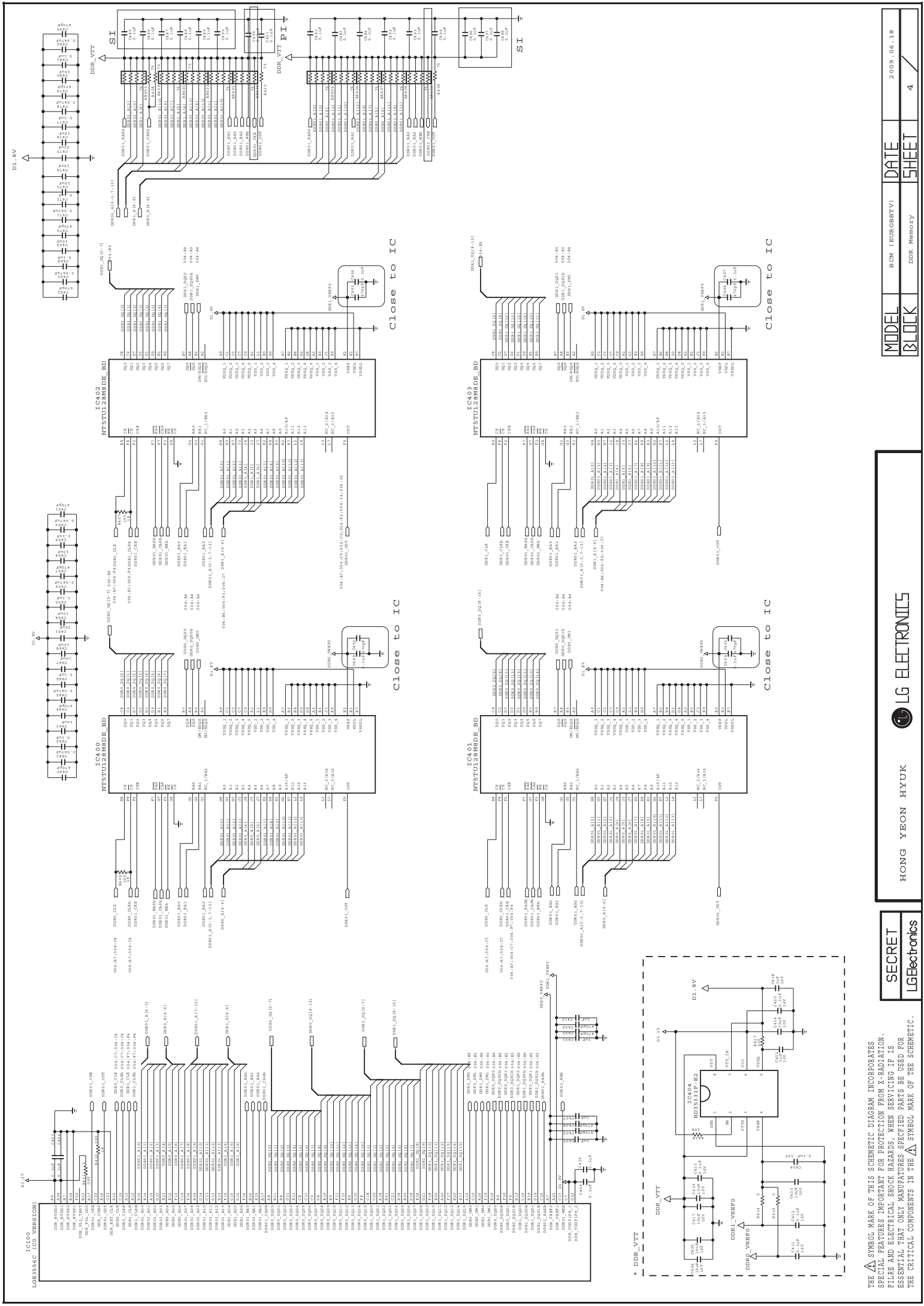
Place here for common circuit with ATSC

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

SECRET  
LGElectronics

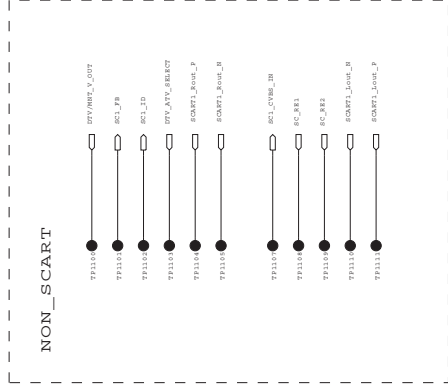
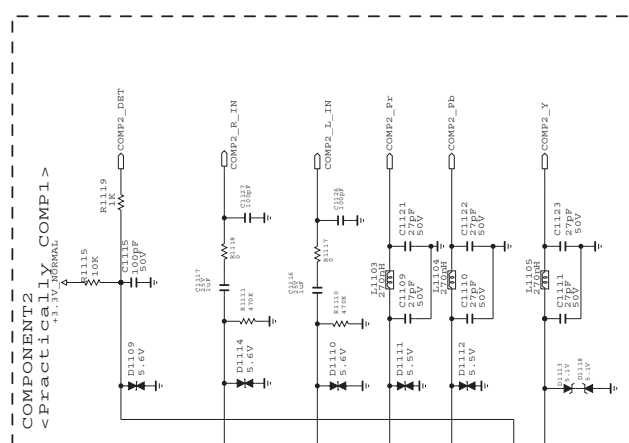
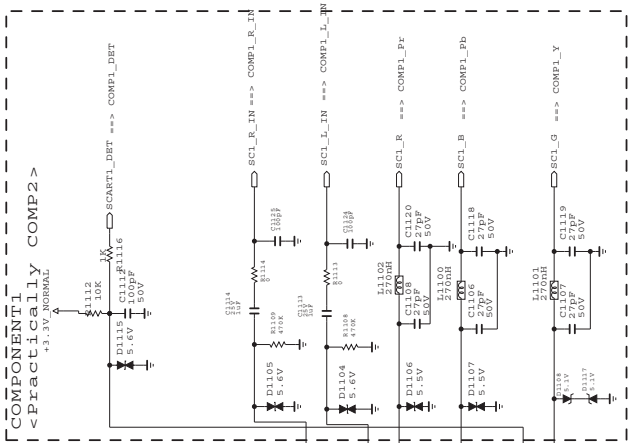
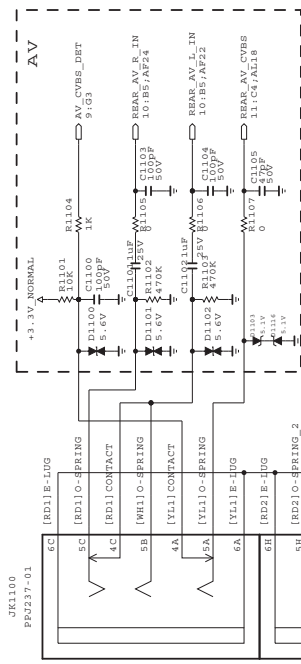
LG ELECTRONICS

MODEL BLOCK EUROBERTY DATE SHEET  
BOM5566 YEDROG IN 2009.06.18 3

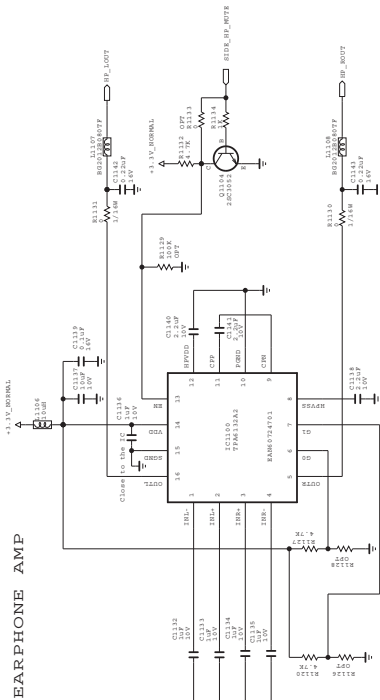
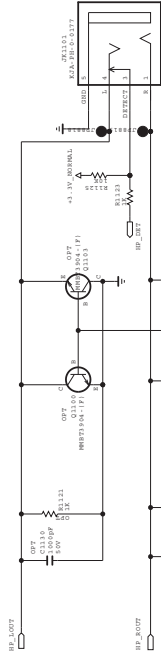


THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIGURE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE ELECTRICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

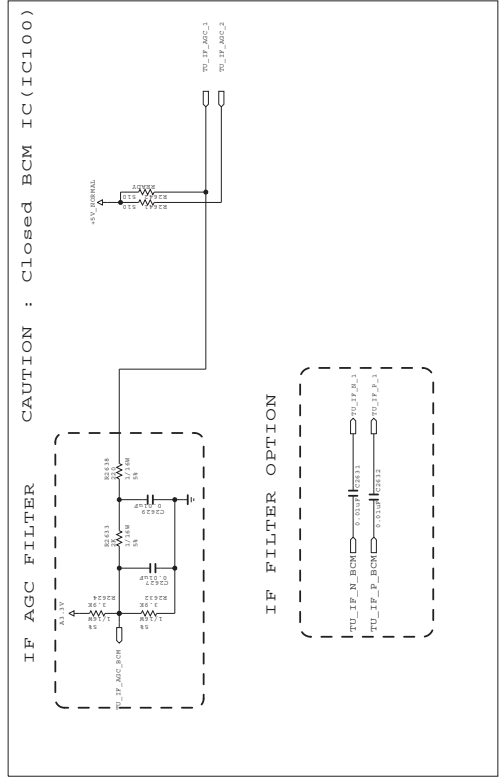
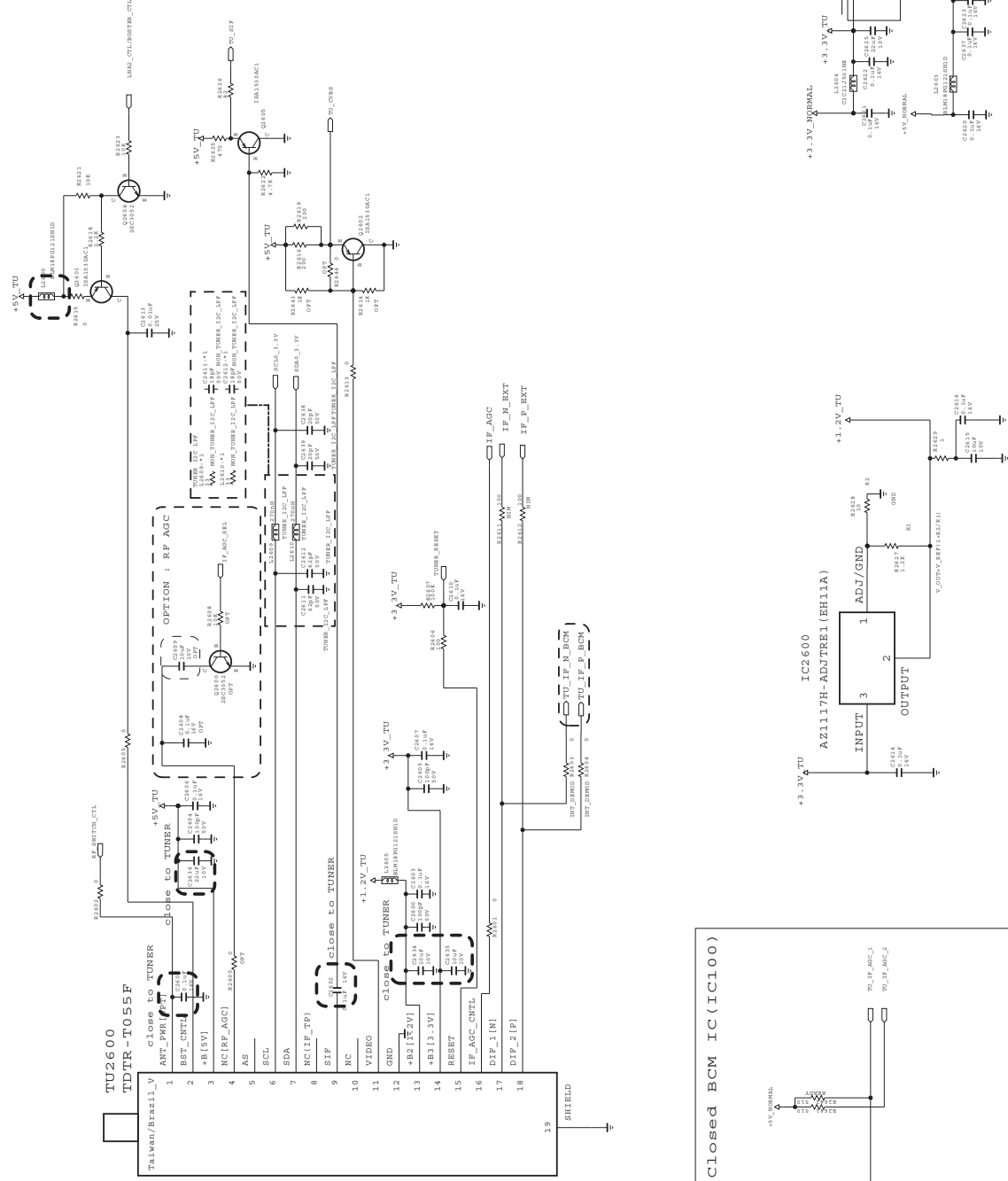
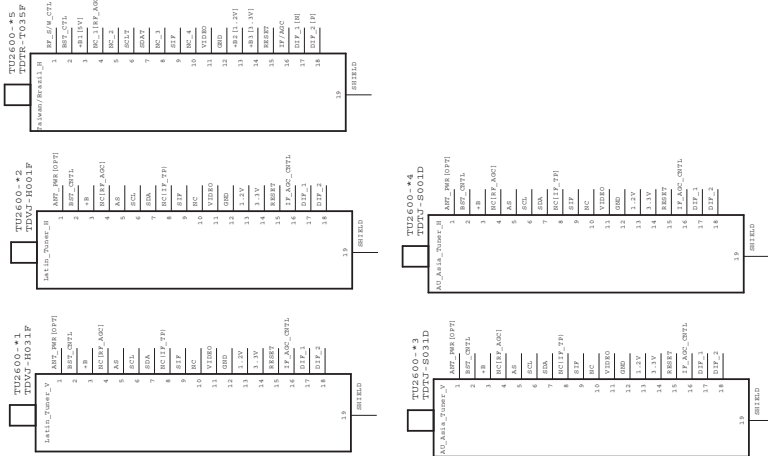




New Item Development  
EARPHONE BLOCK



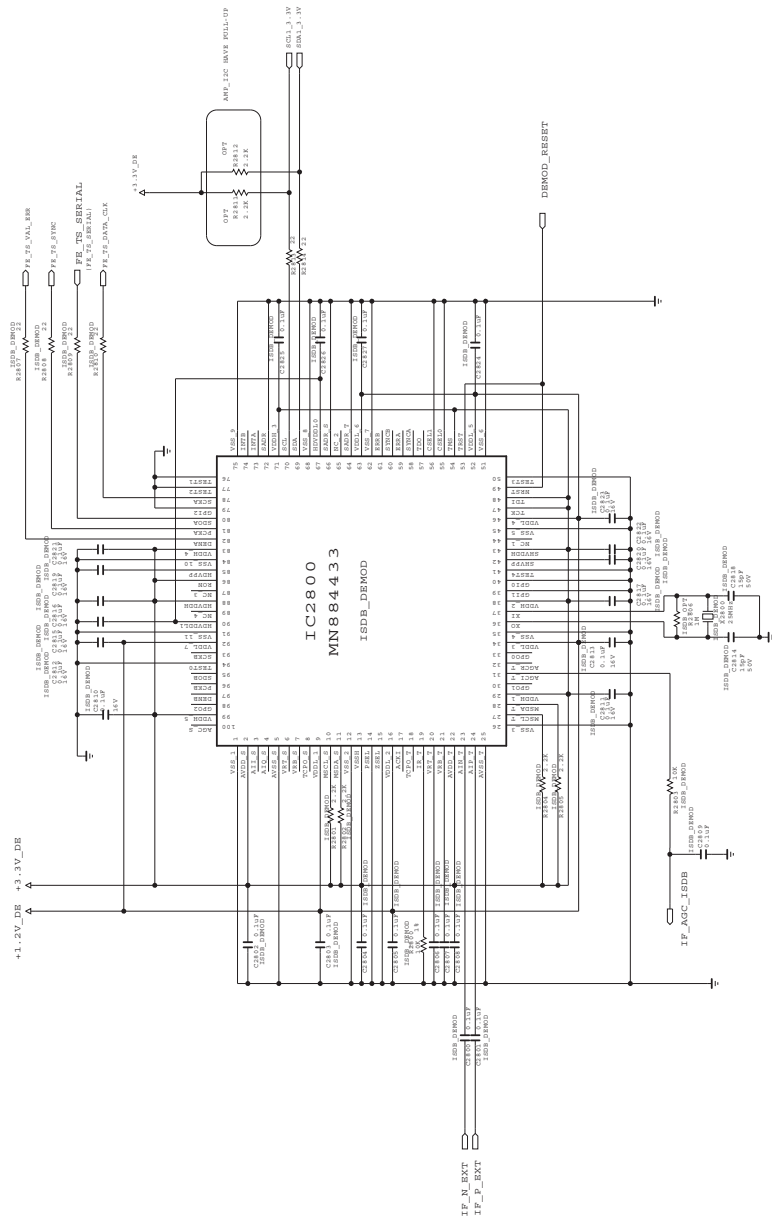
# CAN H-NIM/NIM TUNER for TAIWAN



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

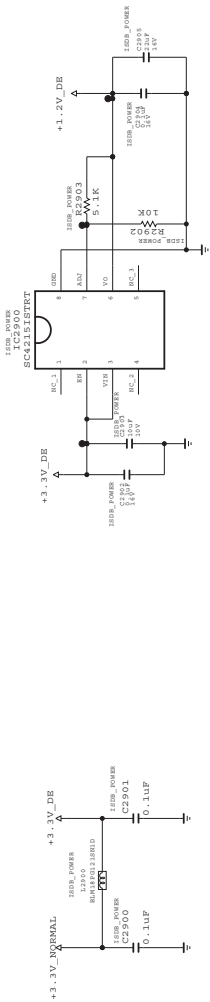
# PANASONIC (ISDB-T)

## MN884433

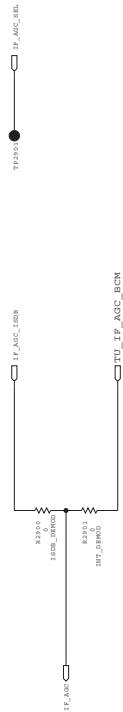




THE  $\Delta$  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  $\Delta$  SYMBOL MARK OF THE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

# Panasonic Demodulator Power (3.3V, 1.2V)



## IF AGC SELECTION



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

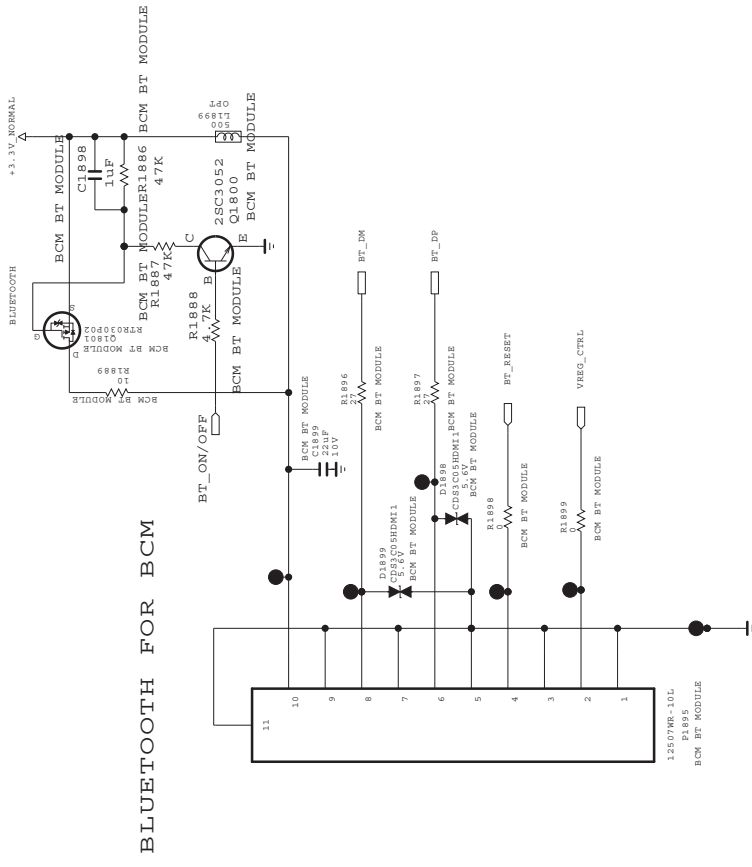
SECRET  
LGElectronics



MODEL GP2\_Saturn7M DATE  
BLOCK Demodulator SHEET

Ver. 1.0  
2/9





BLUETOOTH FOR BCM

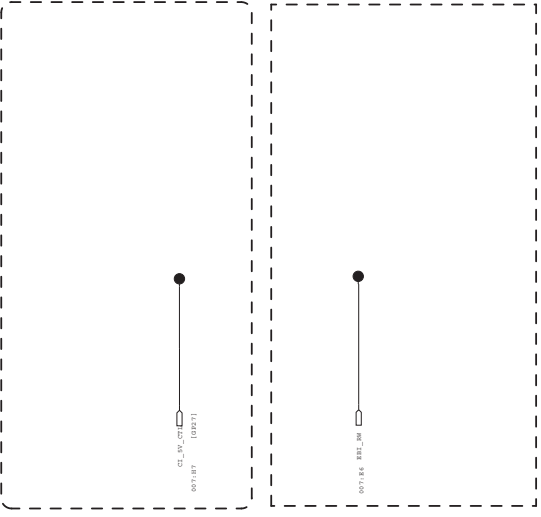
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

SECRET  
 LGElectronics

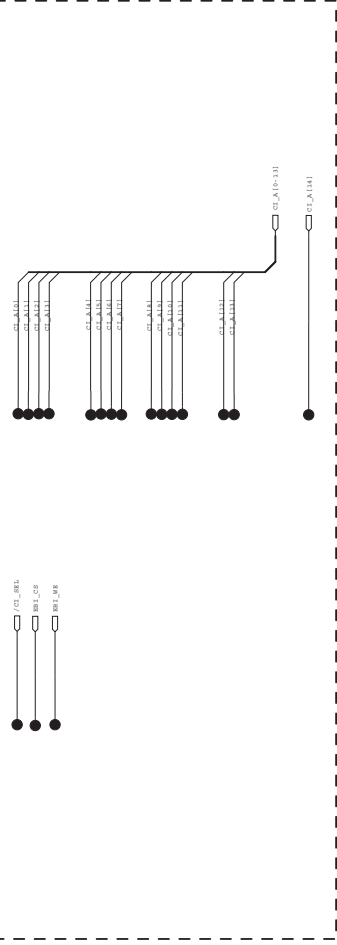


MODEL	DATE
BLOCK	SHEET
	43

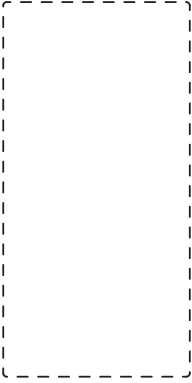
CI POWER\_ENABLE\_CONTROL



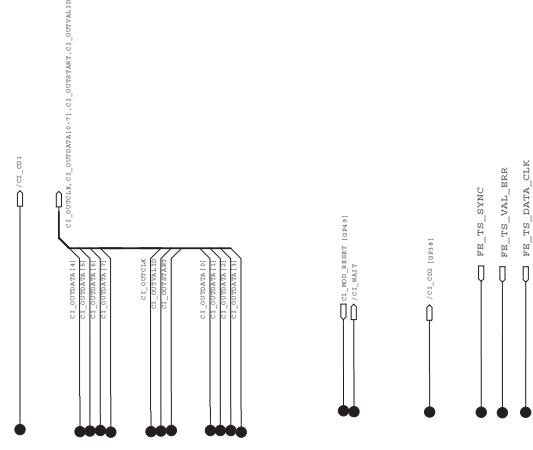
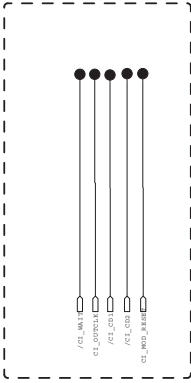
CI CONTROL\_BUFFER



DVB\_CI\_PULL\_DOWN (Near CI Slot)



DVB-CI PULL-UP (Near CI Slot)



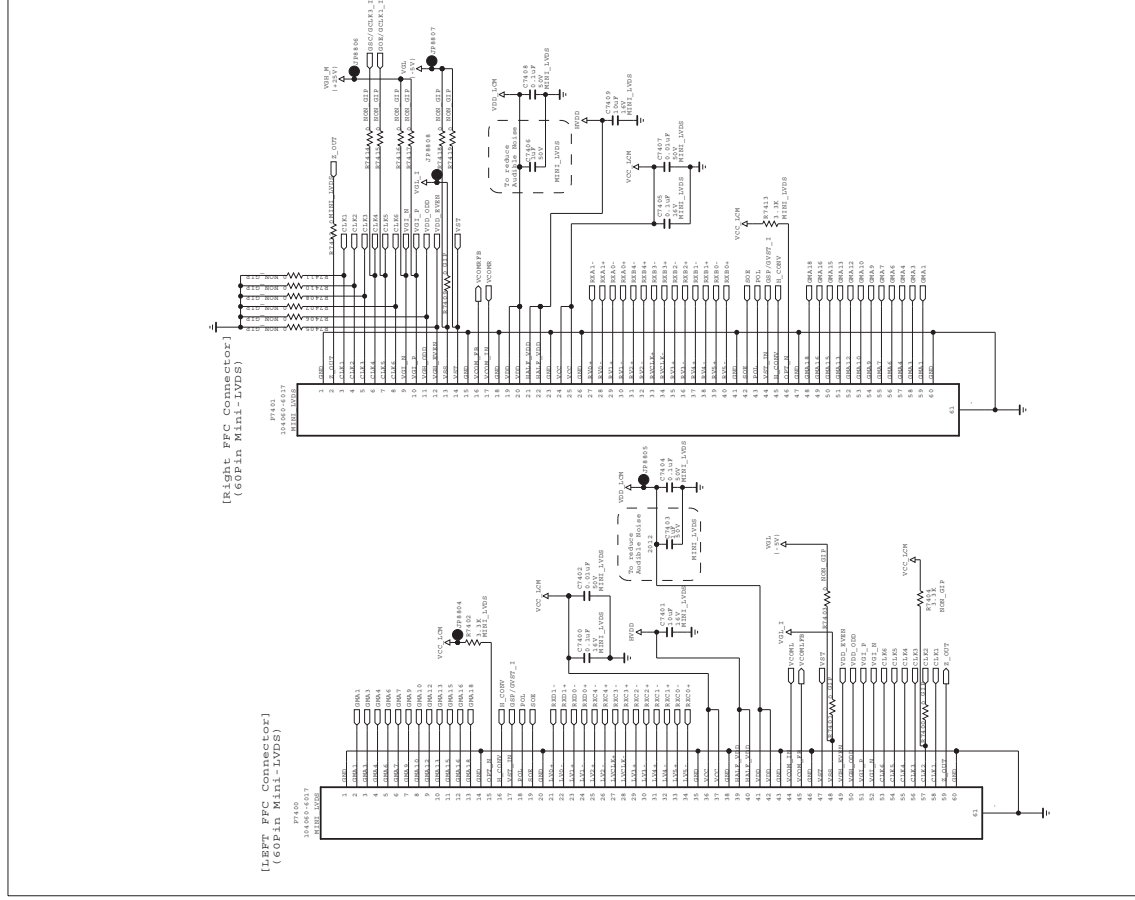
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. PLEASE READ ELECTRICAL SHOCK WARNINGS, WHEN SERVING IF IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

SECRET  
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MODEL	High_Common(BCK93556)	DATE	2009.10.19
BLOCK	Non_CI	SHEET	46

Mini LVDS



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

SECRET  
LGElectronics

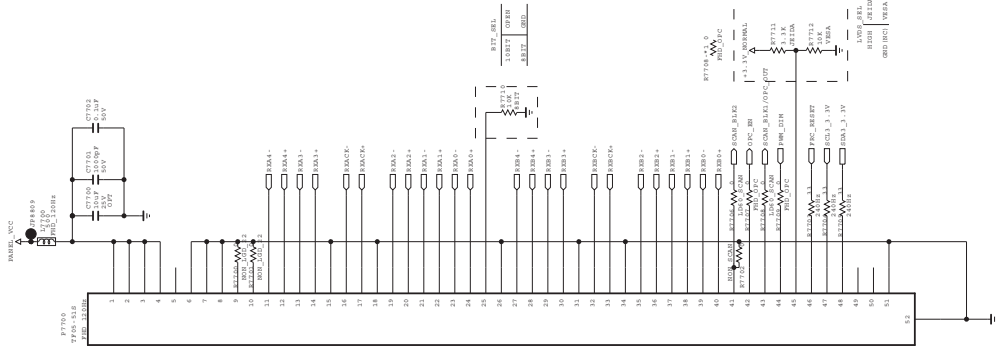


MODEL COMMON  
BLOCK UBSA3 1.20GHZ MERE\_LVDS  
DATE SHEET

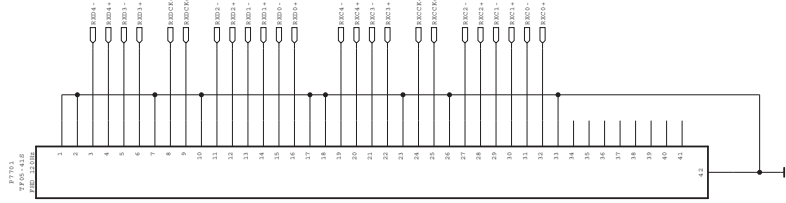


LVDS

[51Pin LVDS Connector]  
(For FHD 60/140Hz)



[41Pin LVDS Connector]  
(For FHD 140Hz)



R77100 10PC\_01P

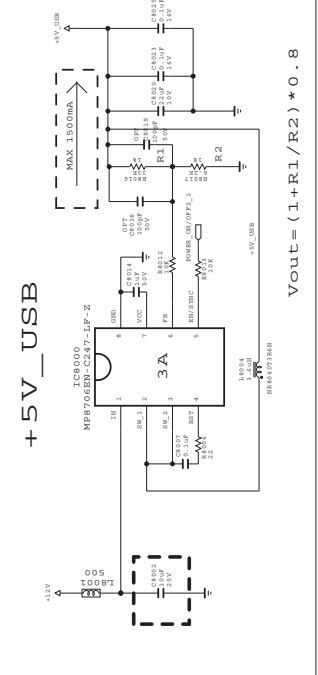
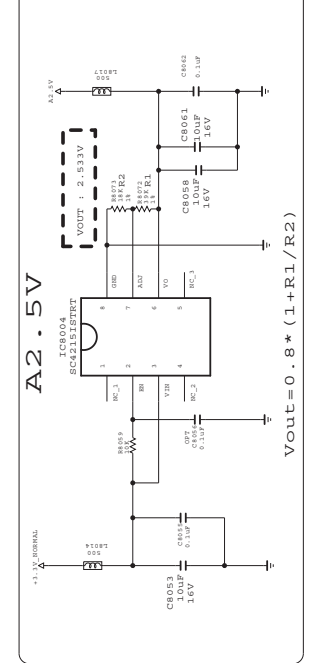
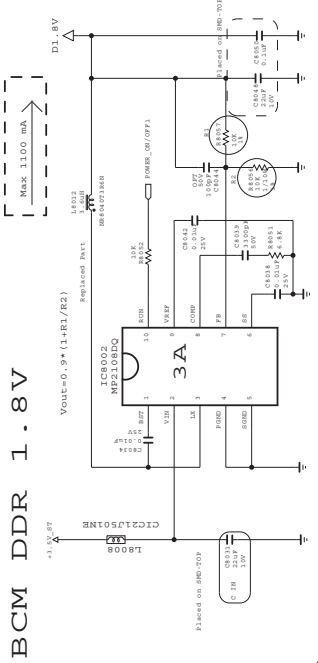
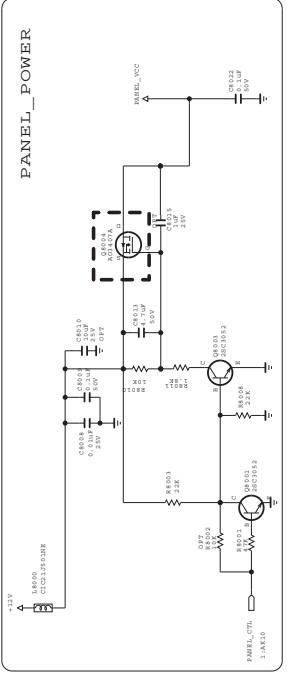
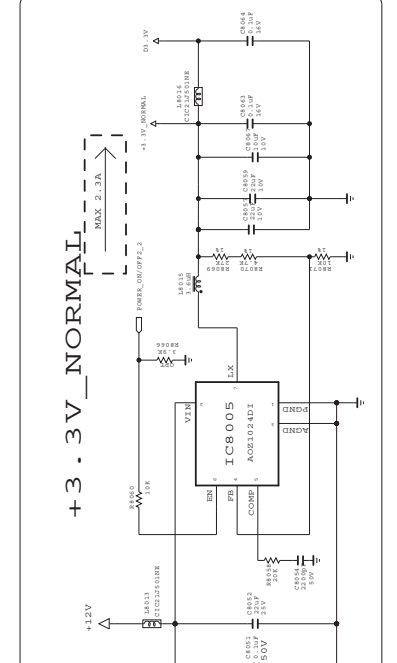
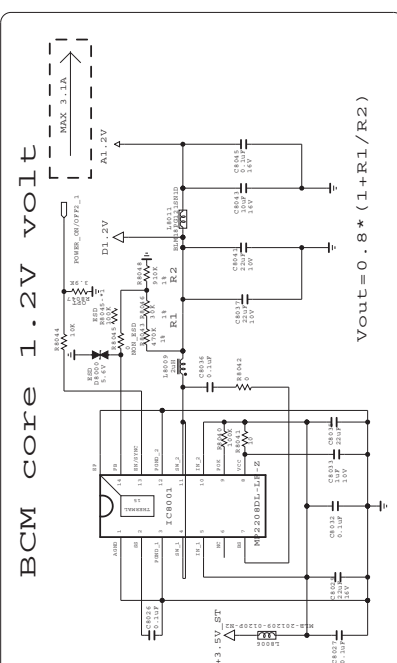
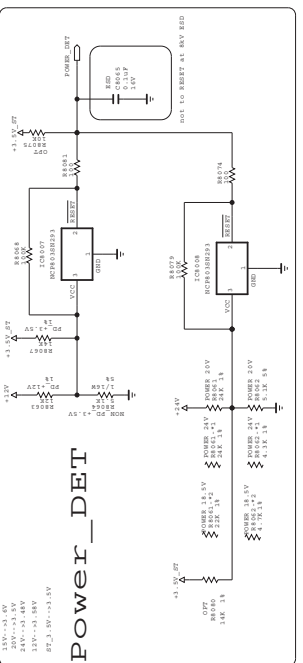
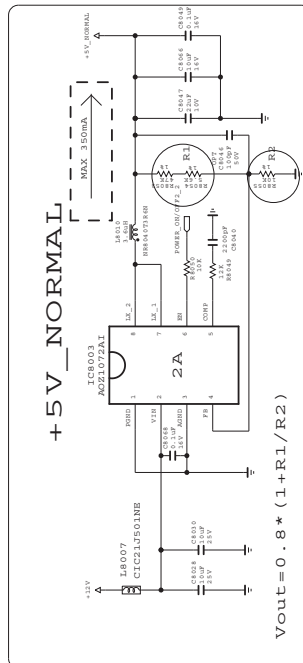
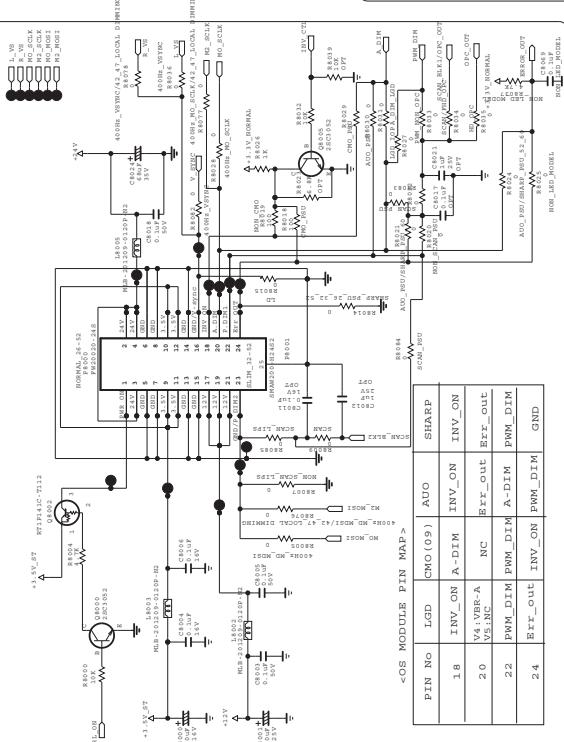
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LGElectronics

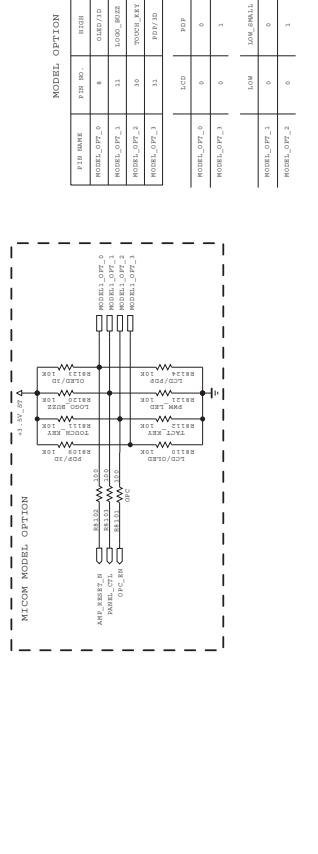
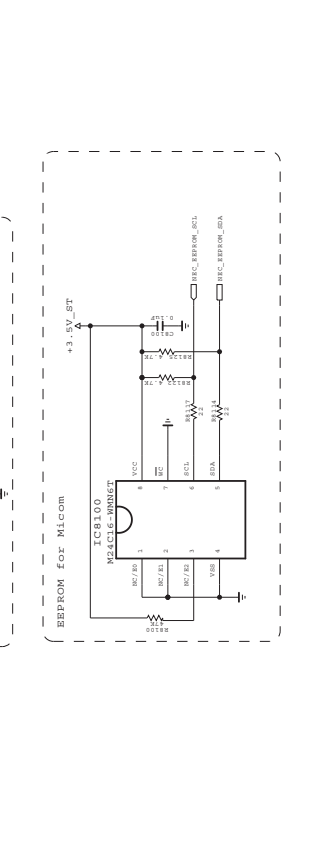
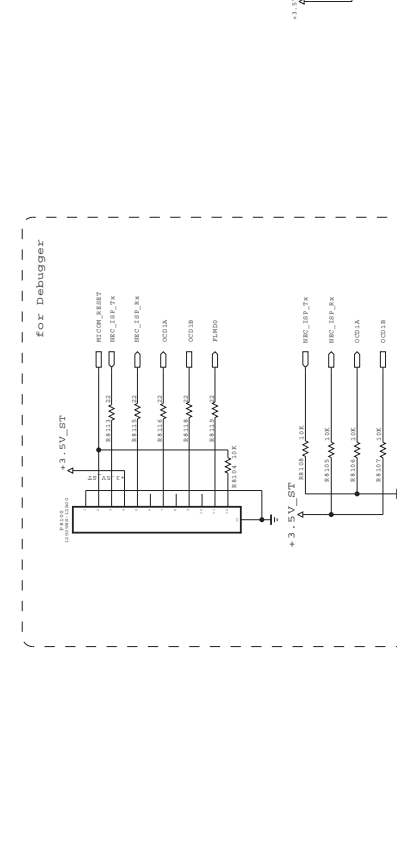
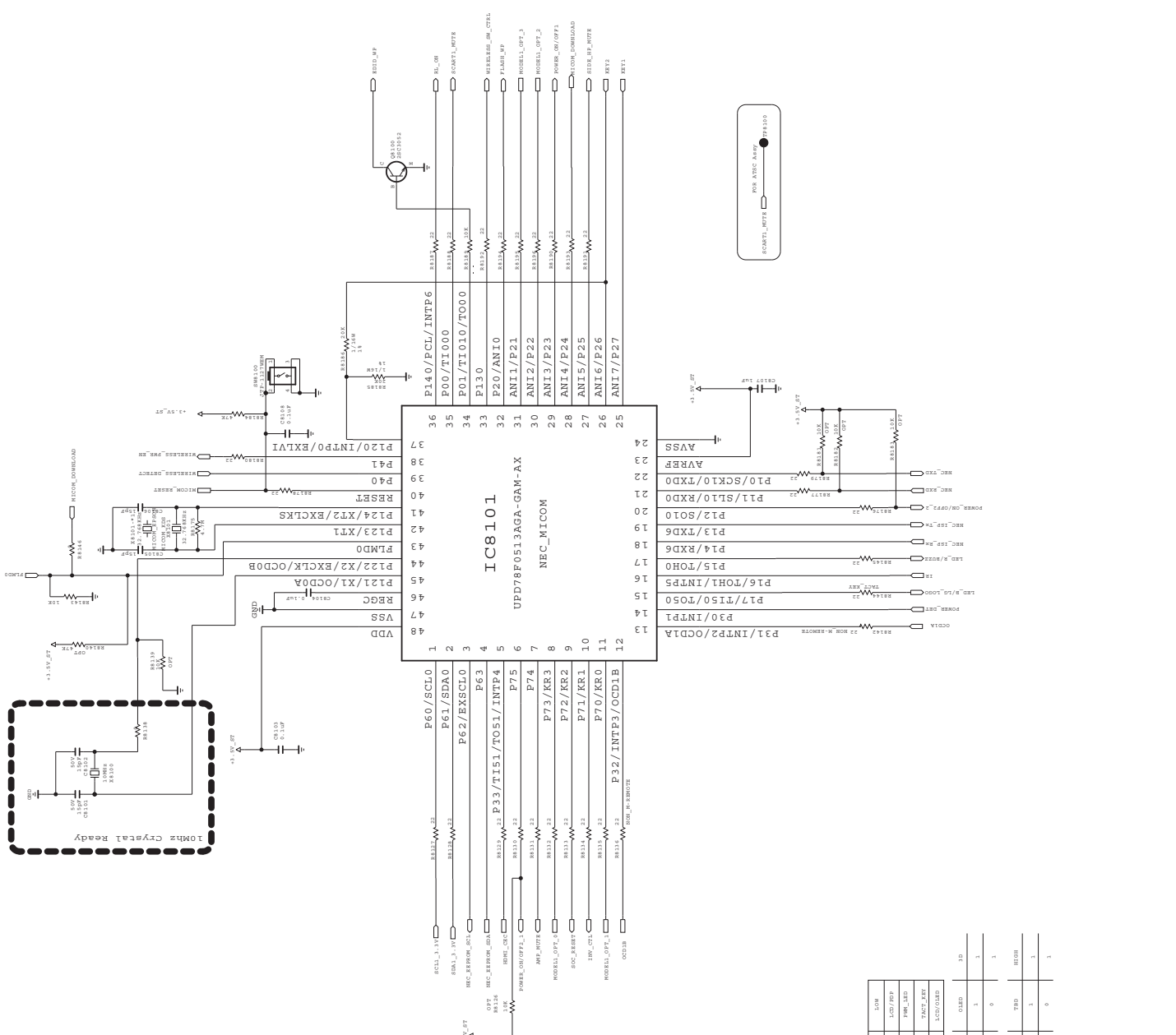
LG ELECTRONICS

MODEL	DATE
BLOCK	SHEET
	35

# FROM LIPS & POWER B/D



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

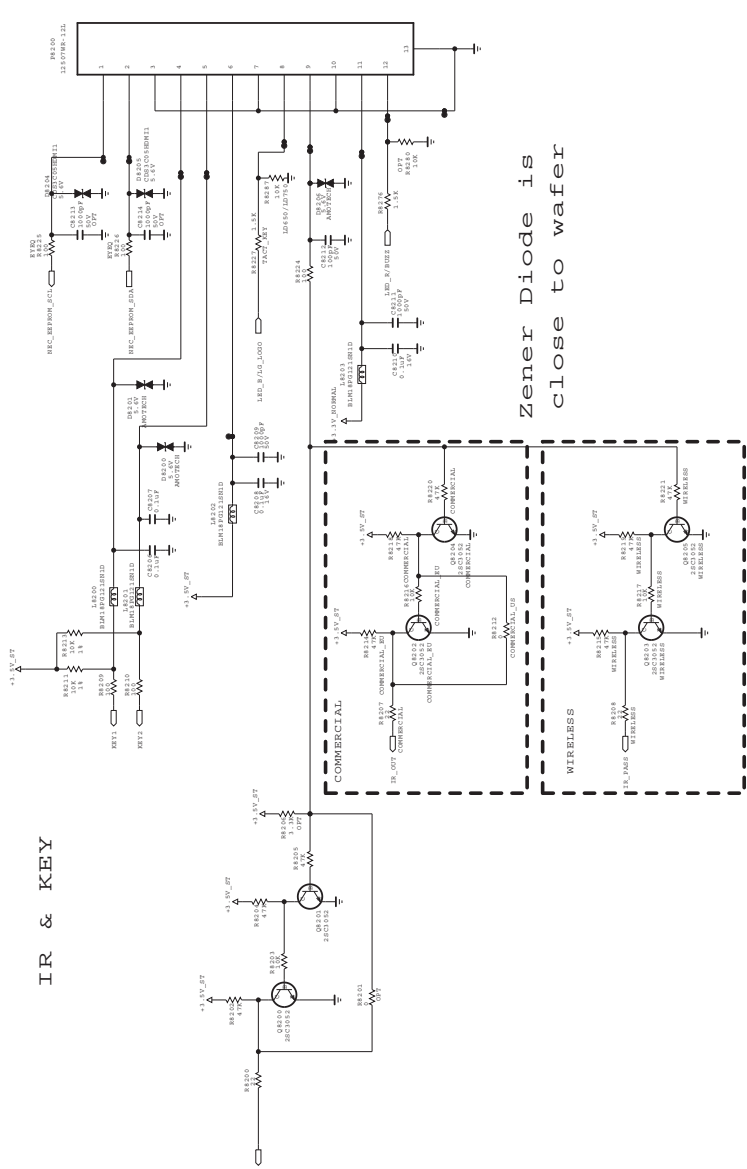


MODEL OPTION	P78 WR0	TR00	TR01	TR02
MODEL_OPT_0	4	0	0	0
MODEL_OPT_1	11	1	1	1
MODEL_OPT_2	30	1	1	1
MODEL_OPT_3	31	1	1	1

MODEL OPTION	TR00	TR01	TR02	TR03
MODEL_OPT_0	0	0	0	0
MODEL_OPT_1	1	1	1	1
MODEL_OPT_2	1	1	1	1
MODEL_OPT_3	1	1	1	1

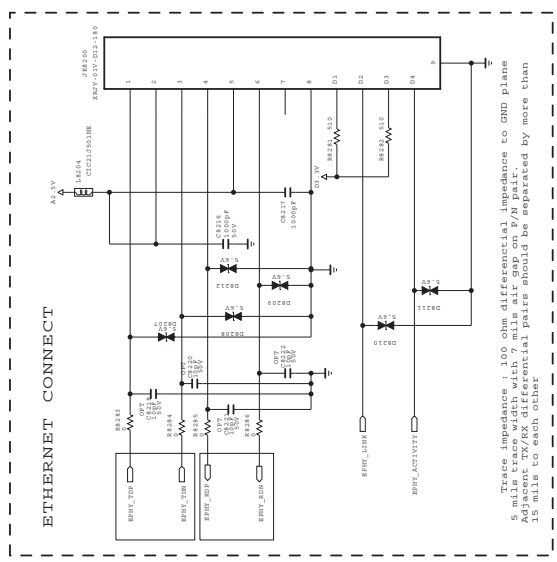
THE  $\Delta$  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIGURE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVING IF IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  $\Delta$  SYMBOL MARK OF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

IR & KEY



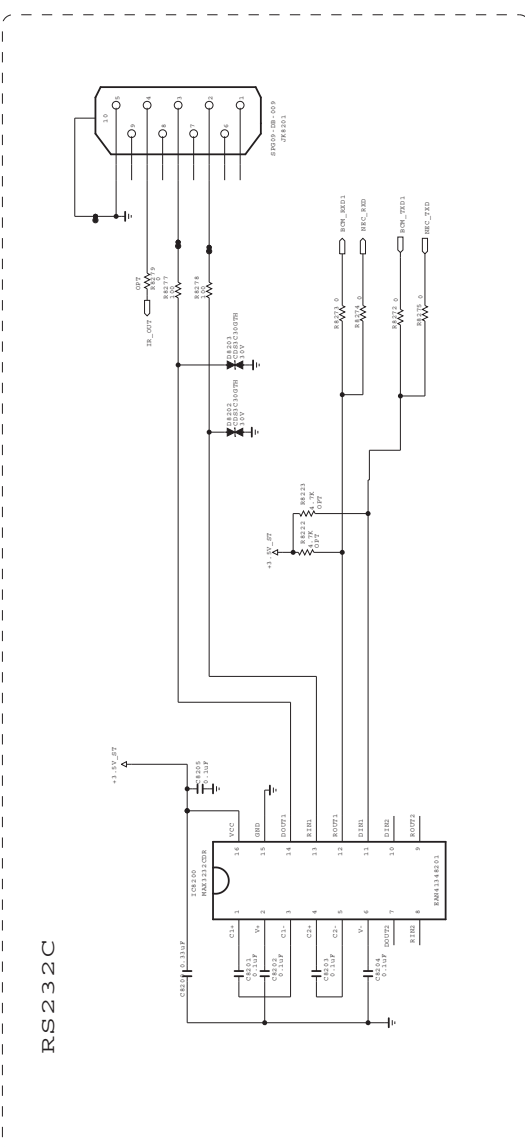
Zener Diode is close to wafer

ETHERNET CONNECT



Trace impedance : 100 ohm differential impedance to GND plane  
5 mils traces with 7 mils air gap on P/N pair.  
100 ohm differential pairs should be separated by more than 15 mils to each other

RS232C



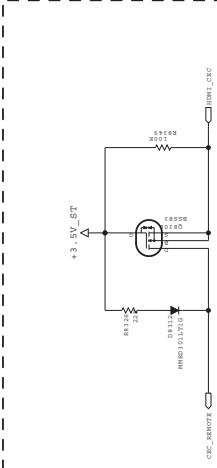
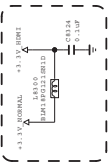
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SECRET  
LGElectronics

LG ELECTRONICS

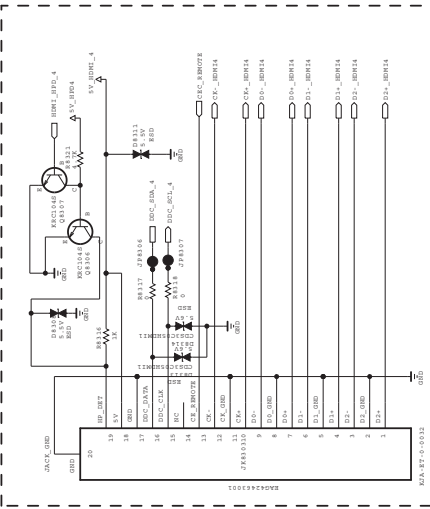
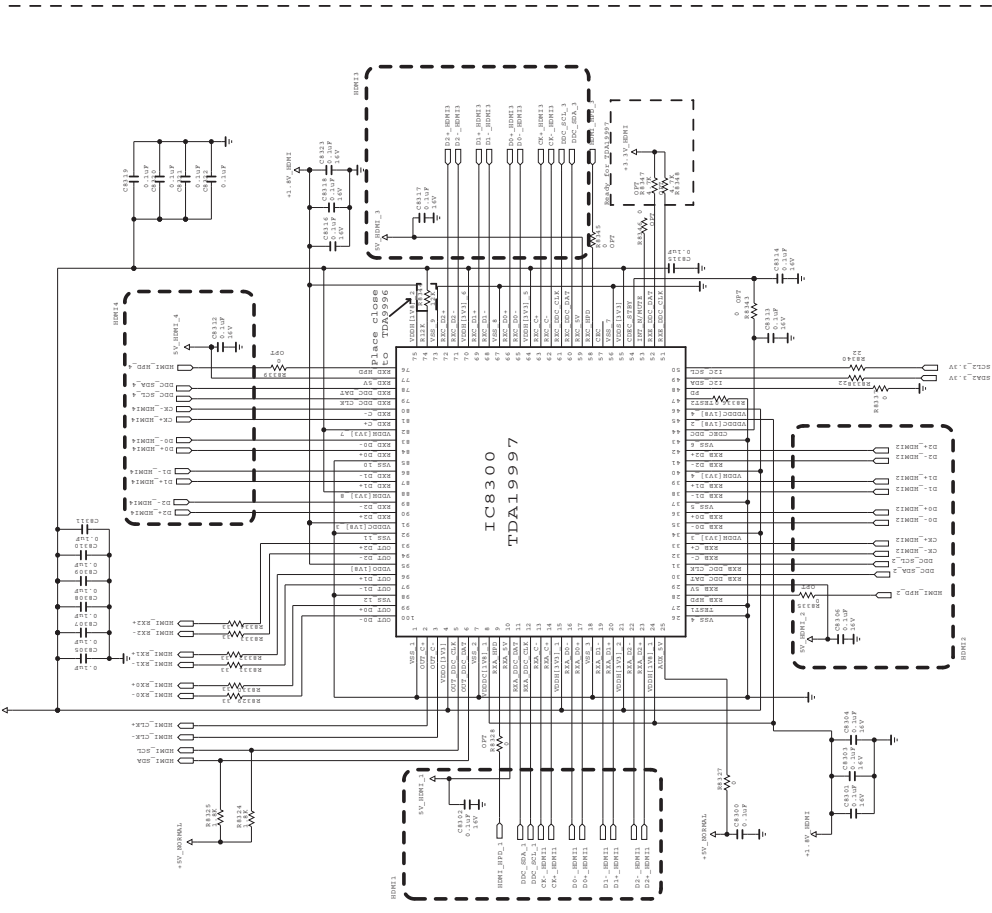
MODEL DATE  
BLOCK SHEET

\* HDMI\_CEC

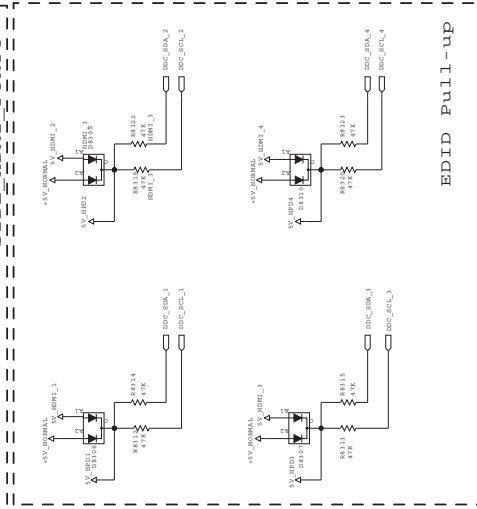


CEC\_BROTE CEC\_HDMI\_CEC

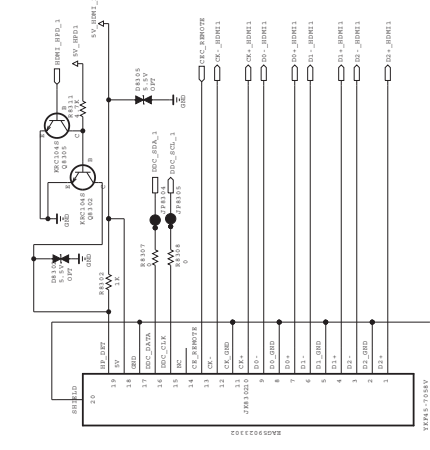
\*1.5V\_HDMI



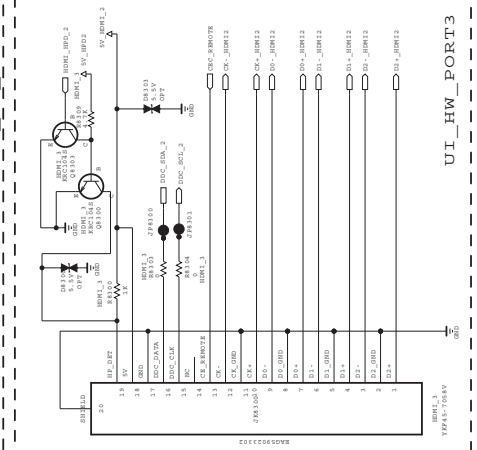
SIDE\_HDMI\_PORT4



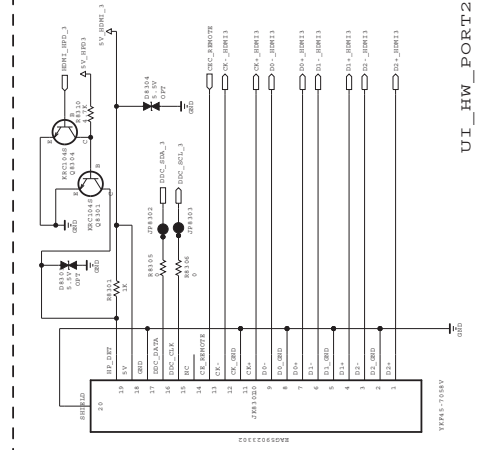
EDID Pull-up



UI\_HW\_PORT1



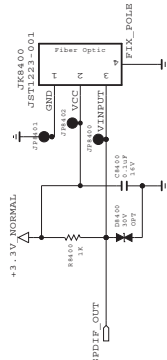
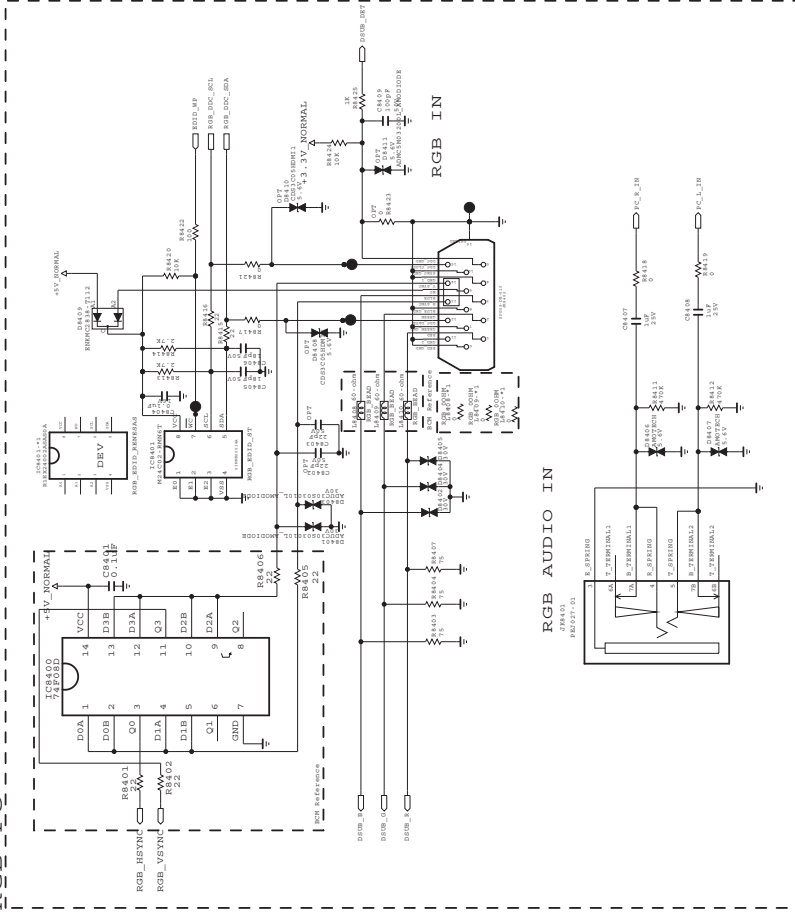
UI\_HW\_PORT2



UI\_HW\_PORT3

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

RGB\_PC



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

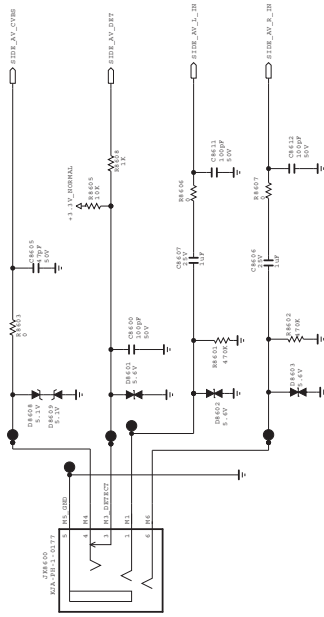
SECRET  
LGElectronics

LG ELECTRONICS

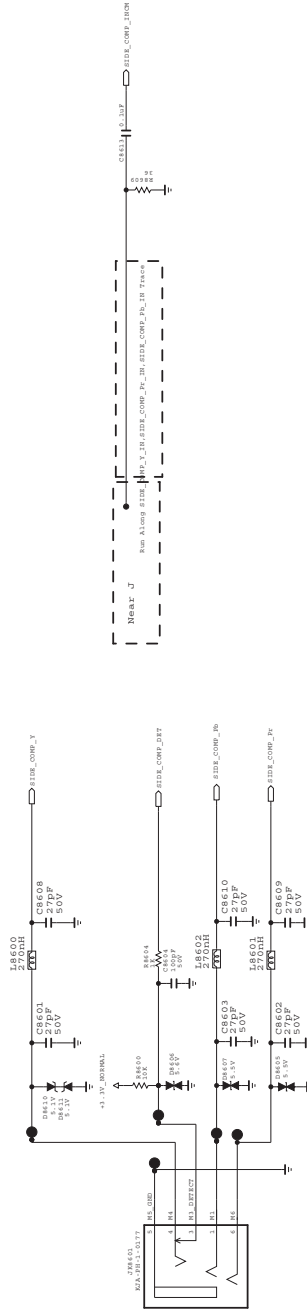
MODEL	EUROBETV	DATE	2009.06.18
BLOCK	ETC SOB BOARD I/F	SHEET	9

# ALL for SIDE\_GENDER option

## SIDE CVBS PHONE JACK (New Item Development)



## SIDE COMPONENT PHONE JACK (New Item Development)



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

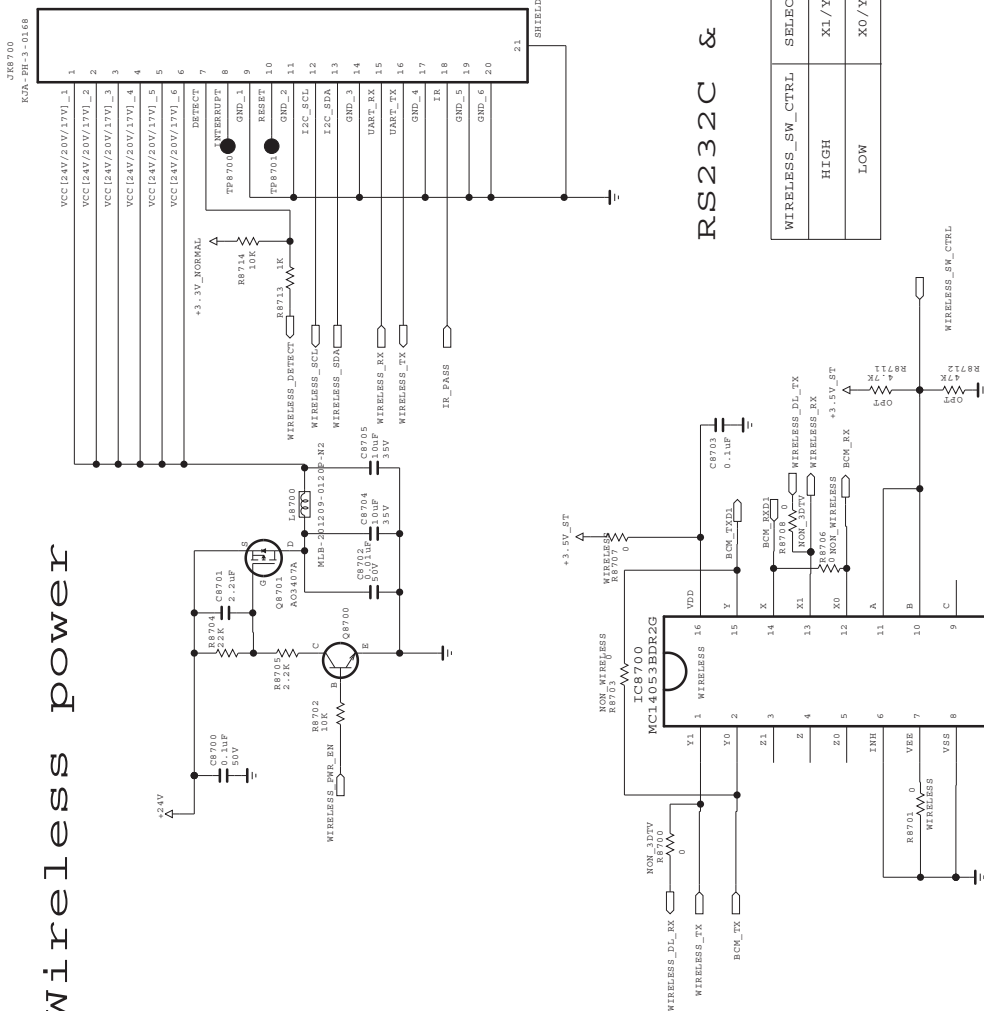
SECRET  
LGElectronics

LG ELECTRONICS

MODEL	DATE
BLOCK	SHEET
	1.1

# WIRELESS READY MODEL

## Wireless power



## RS232C & Wireless

WIRELESS_SW_CTRL	SELECT PIN	STATUS
HIGH	X1/Y1/Z1	WIRELESS Dongle connect --> WIRELESS RS232
LOW	X0/Y0/Z0	WIRELESS Dongle Dis_con --> S7 RS232

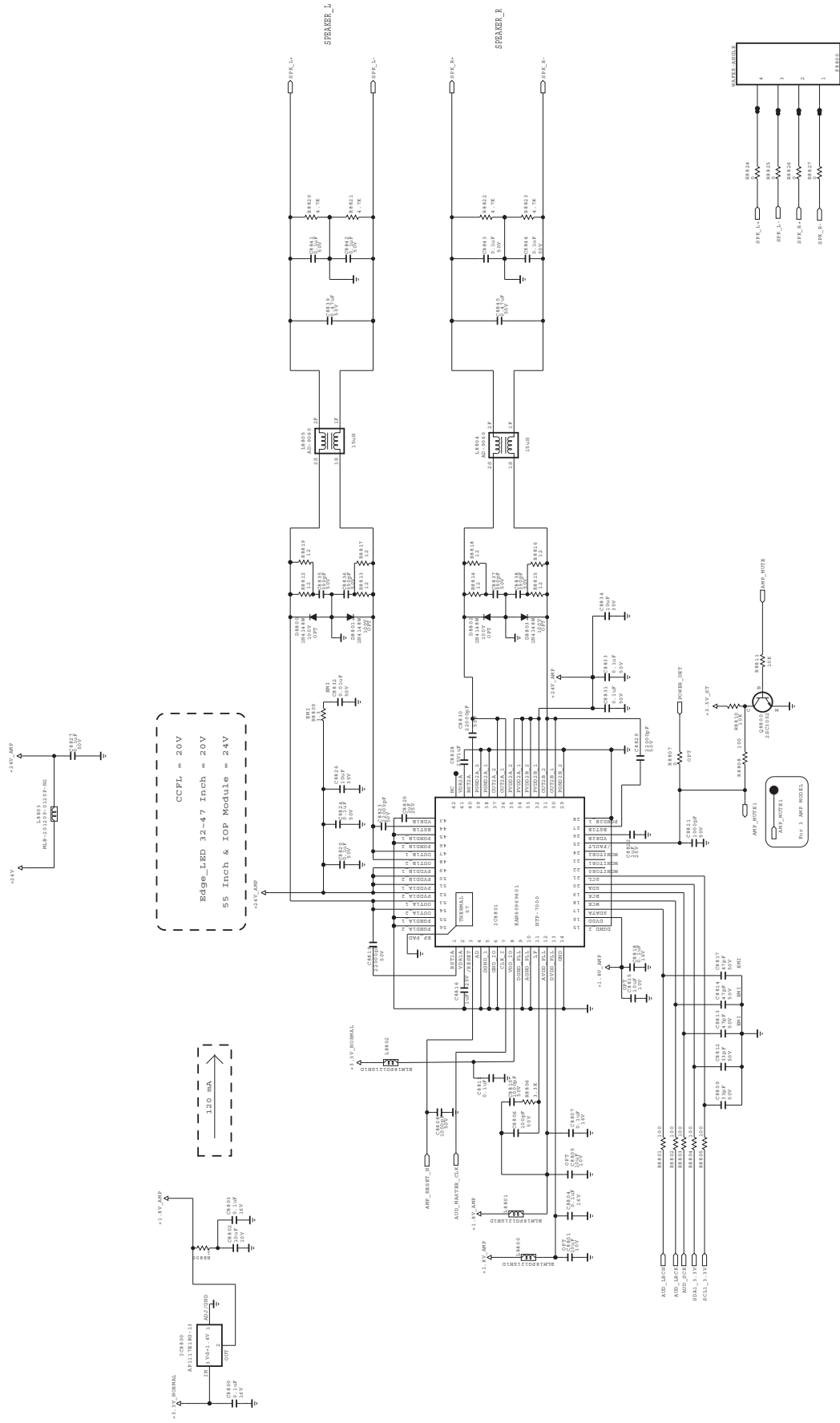
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

**SECRET**  
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MODEL	DATE
BLOCK	SHEET
	1/2





CCFL = 20V  
 Edge\_LED 32-47 Inch = 20V  
 55 Inch & TOP Module = 24V

120 mA

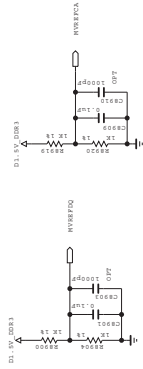
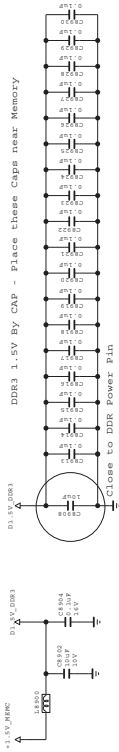
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FUSE AND ELECTRICAL SHOCK HEADINGS, WHEN SERVING IF IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

SECRET  
 LGElectronics

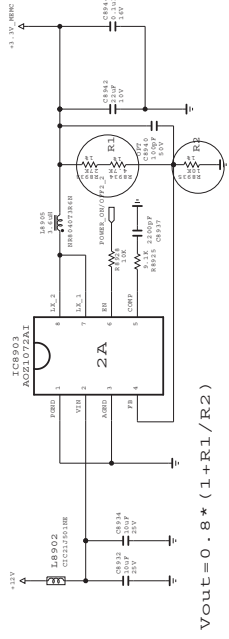
KIM JONG HYUN

LG ELECTRONICS

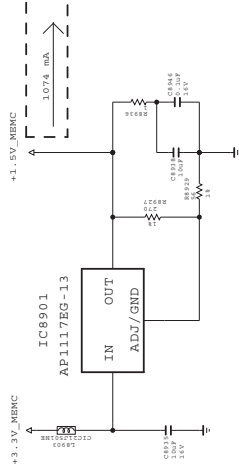
MODEL	BCM (EUKOBBTV)	DATE	2009.06.18
BLOCK	INTP7000	SHEET	38



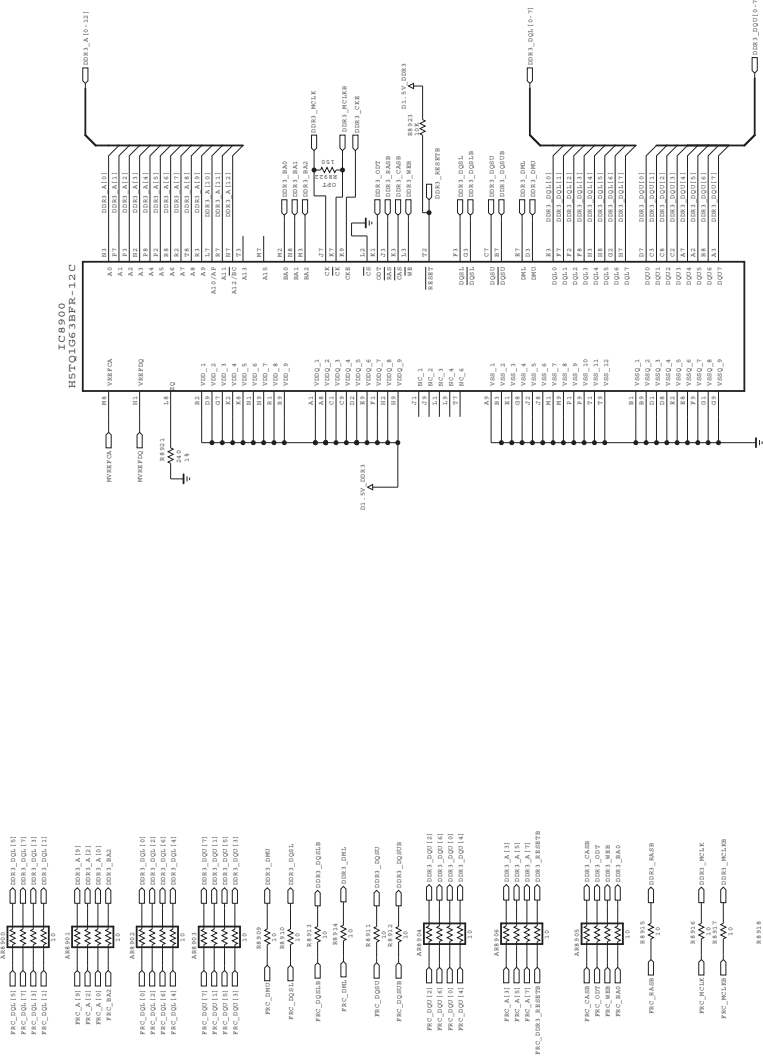
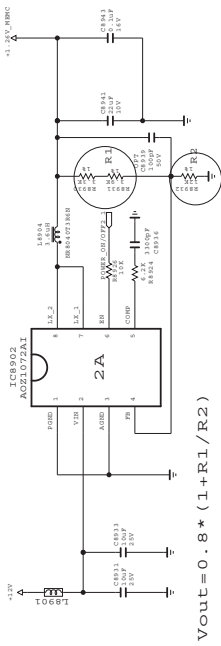
### + 3 . 3 V \_ M E M C



### URSA3 DDR3 1.5V

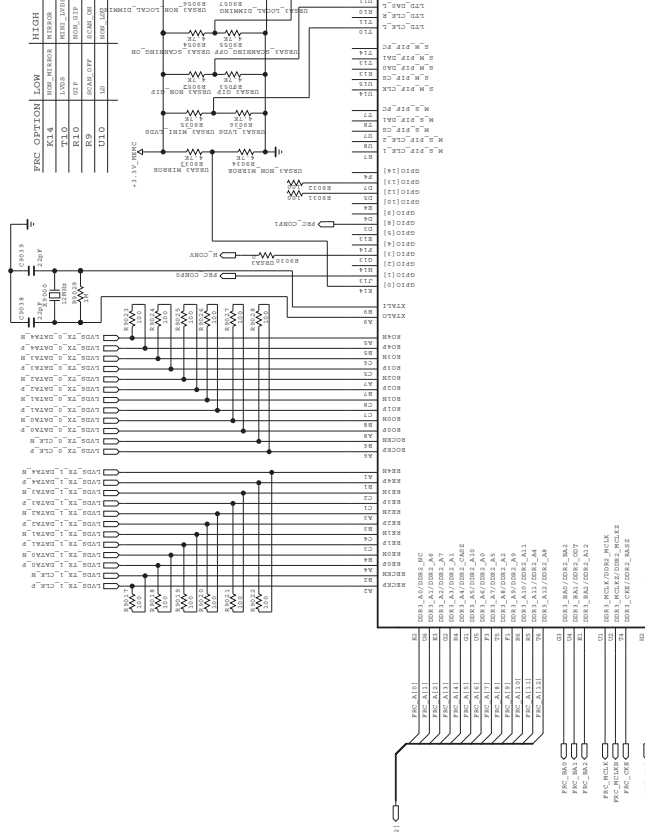
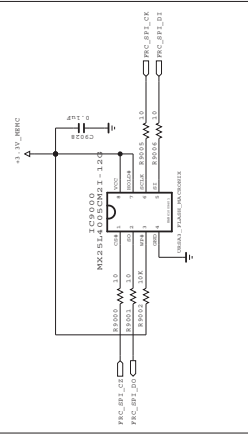


### URSA3 CORE 1.26V

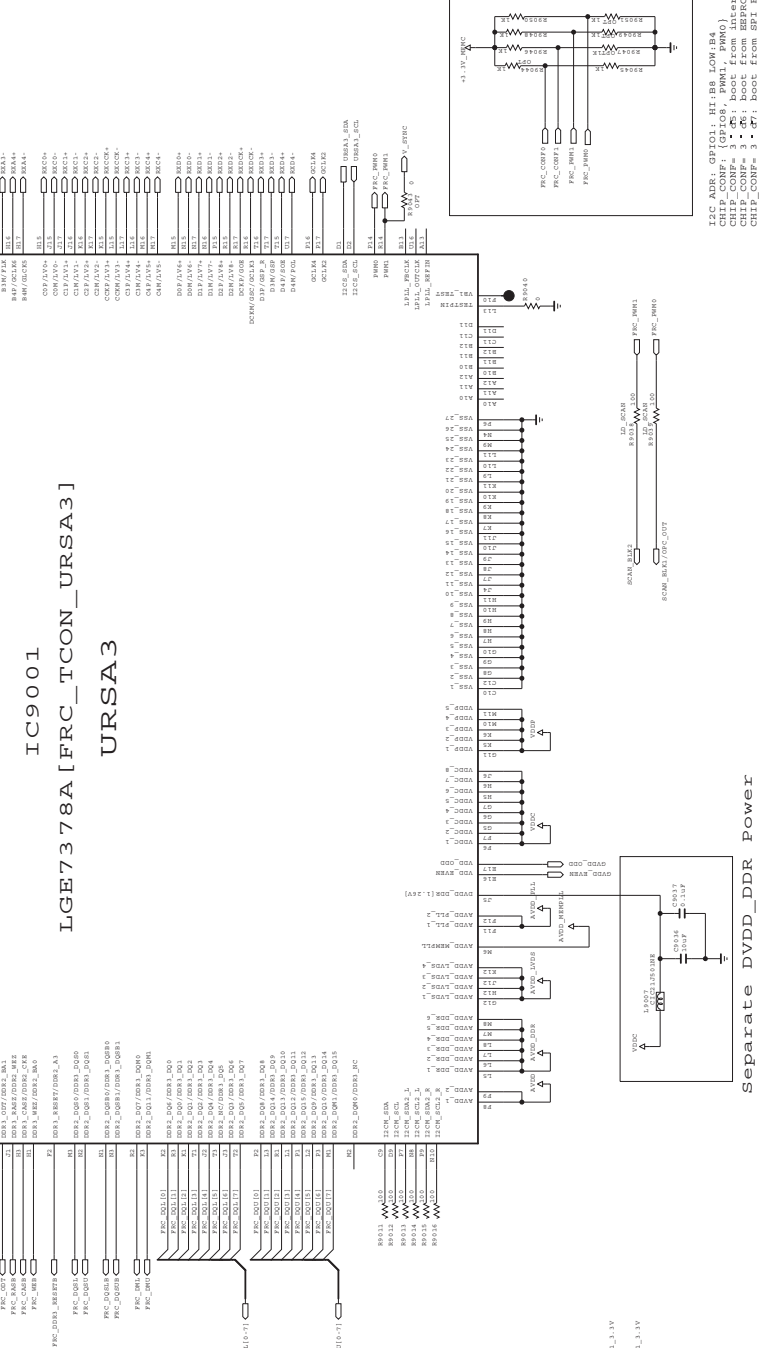


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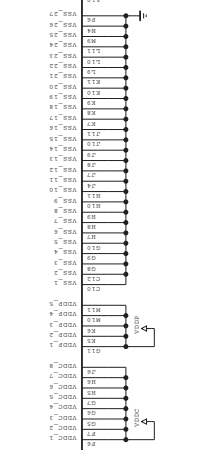
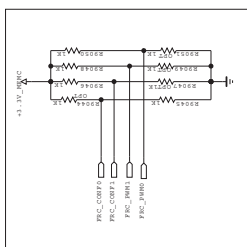
# Serial Flash



## IC9001 LGE7378A [FRC\_TCON\_URSA3] URSA3



IC2 ADDR: OPT01: HI\_BB\_LOM8A  
 CHIP\_CONF: {GP109, PM11, PM00}  
 CHIP\_CONF\_2: {GP109, PM11, PM00}  
 CHIP\_CONF\_3: {GP109, PM11, PM00}  
 CHIP\_CONF\_4: {GP109, PM11, PM00}



Separate VDDDD Power

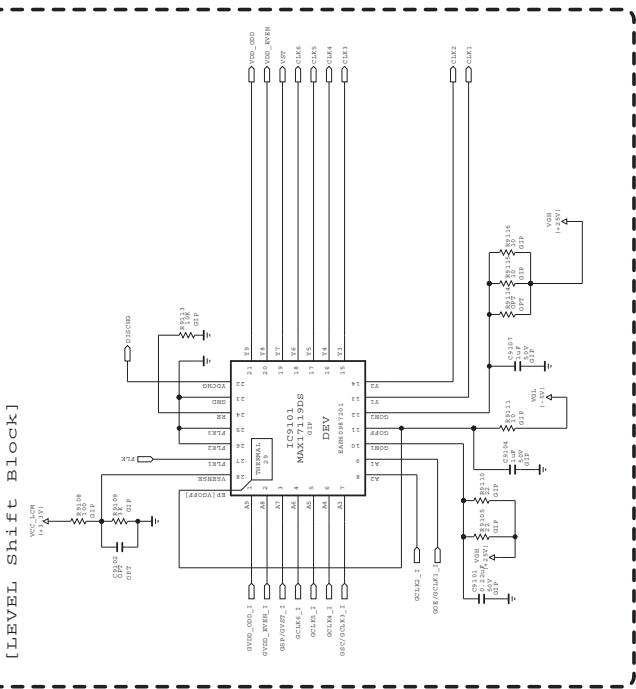
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MODEL	COMMON	DATE	2009.09.11
BLOCK	URSA3 (NO. L.D.)	SHEET	90



SECRET  
 LGElectronics

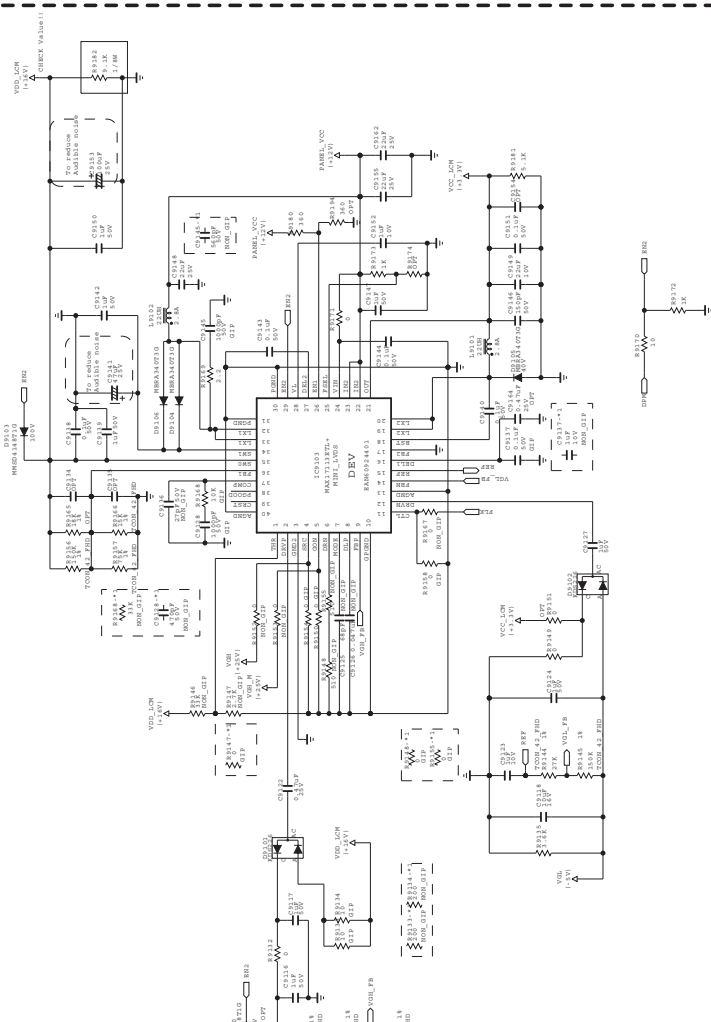
[LEVEL Shift Block]



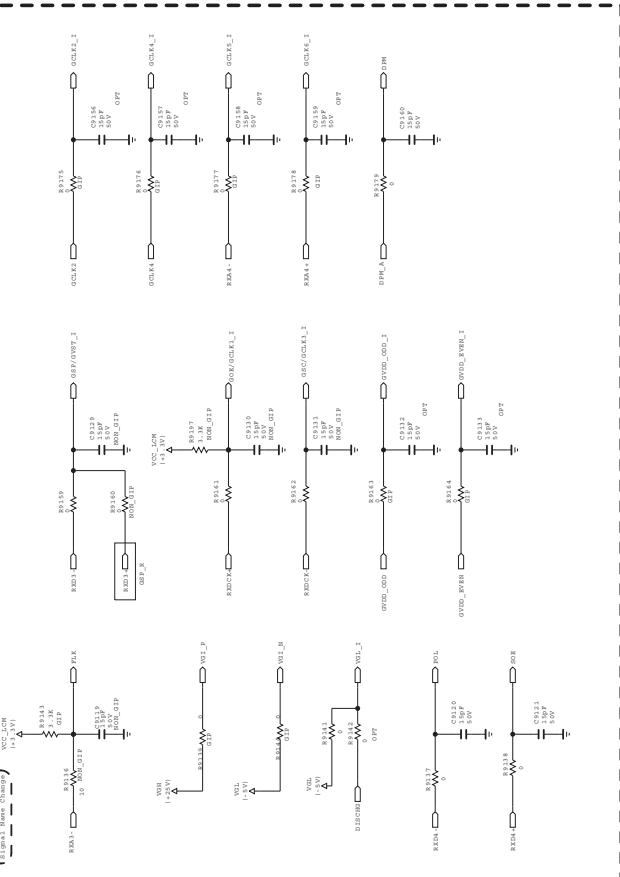
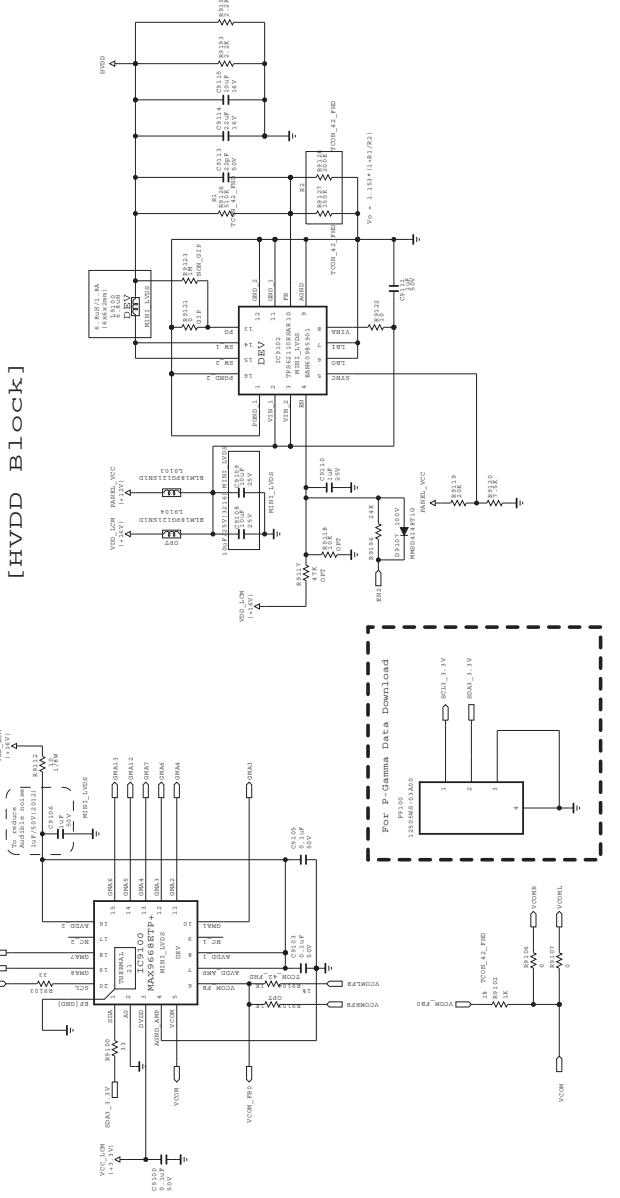
[P-GAMMA Block]  
Slave Address : 0xE8h  
(AO Pin - GND)

[POWER Block]

Voltage Targets:  
VDD\_LCN = 2.8-5.0V  
VGH = 5.5-5.8V  
VGL = -5.5-5.5V



[HVDD Block]



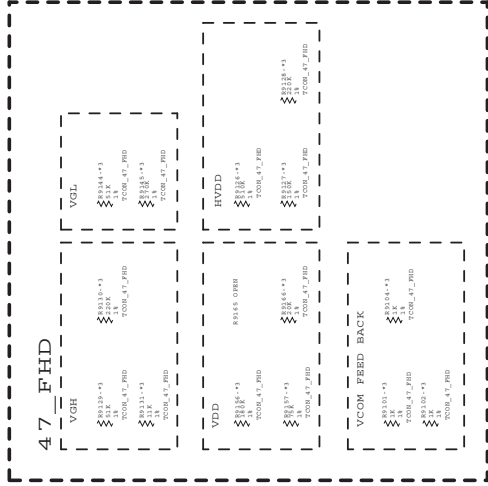
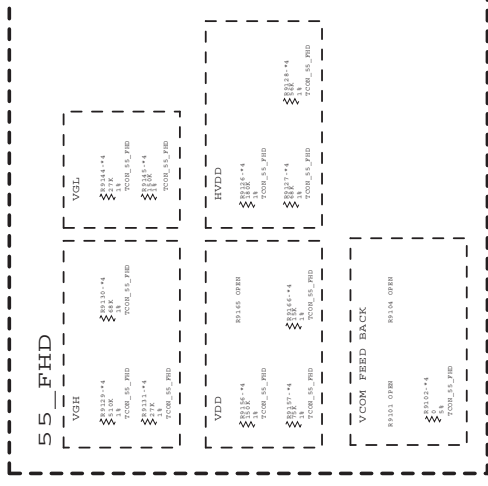
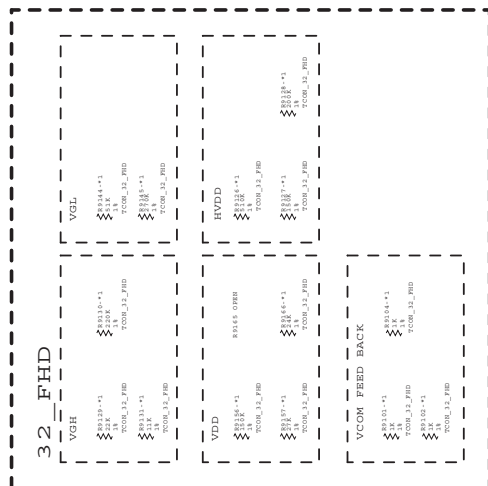
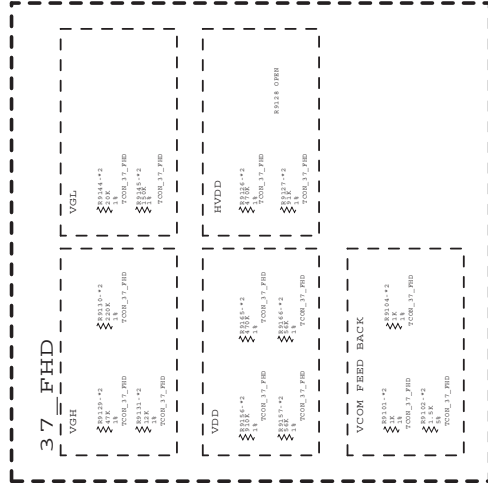
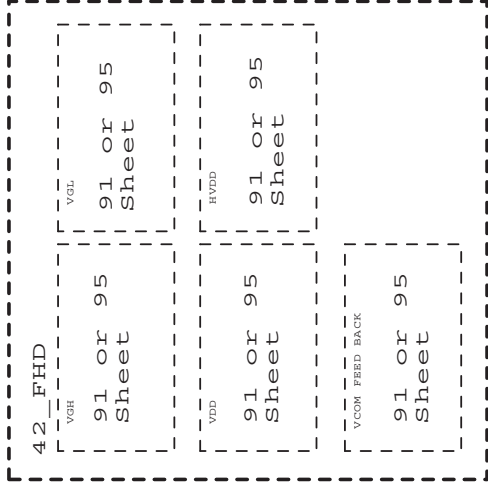
THE  $\Delta$  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIGURE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVING IF IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  $\Delta$  SYMBOL MARK OF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

SECRET  
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LG ELECTRONICS

MODEL BLOCK  
COMMON  
DATE SHEET  
T-Corr (NO L-D.)

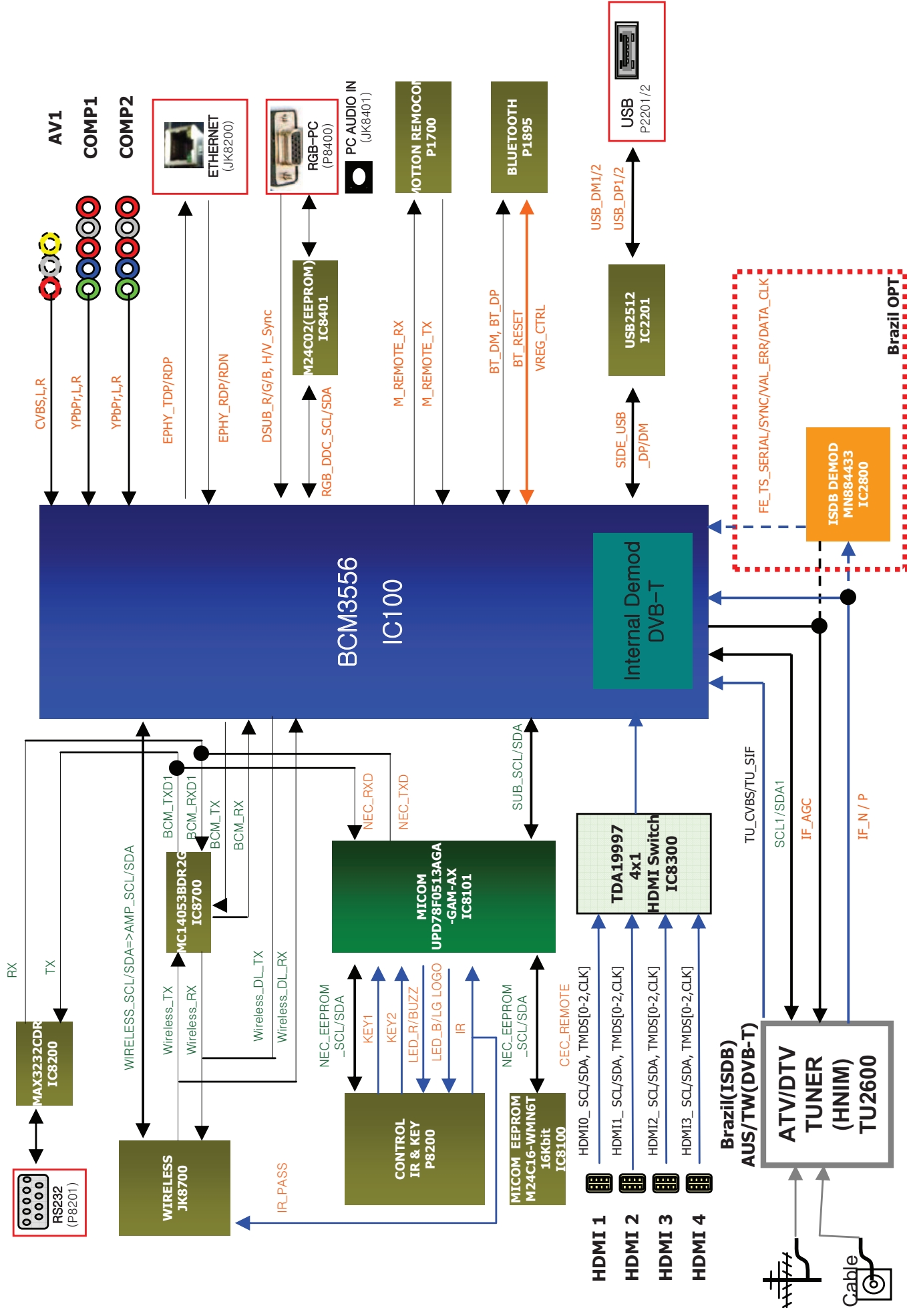
09/09/1.0  
91



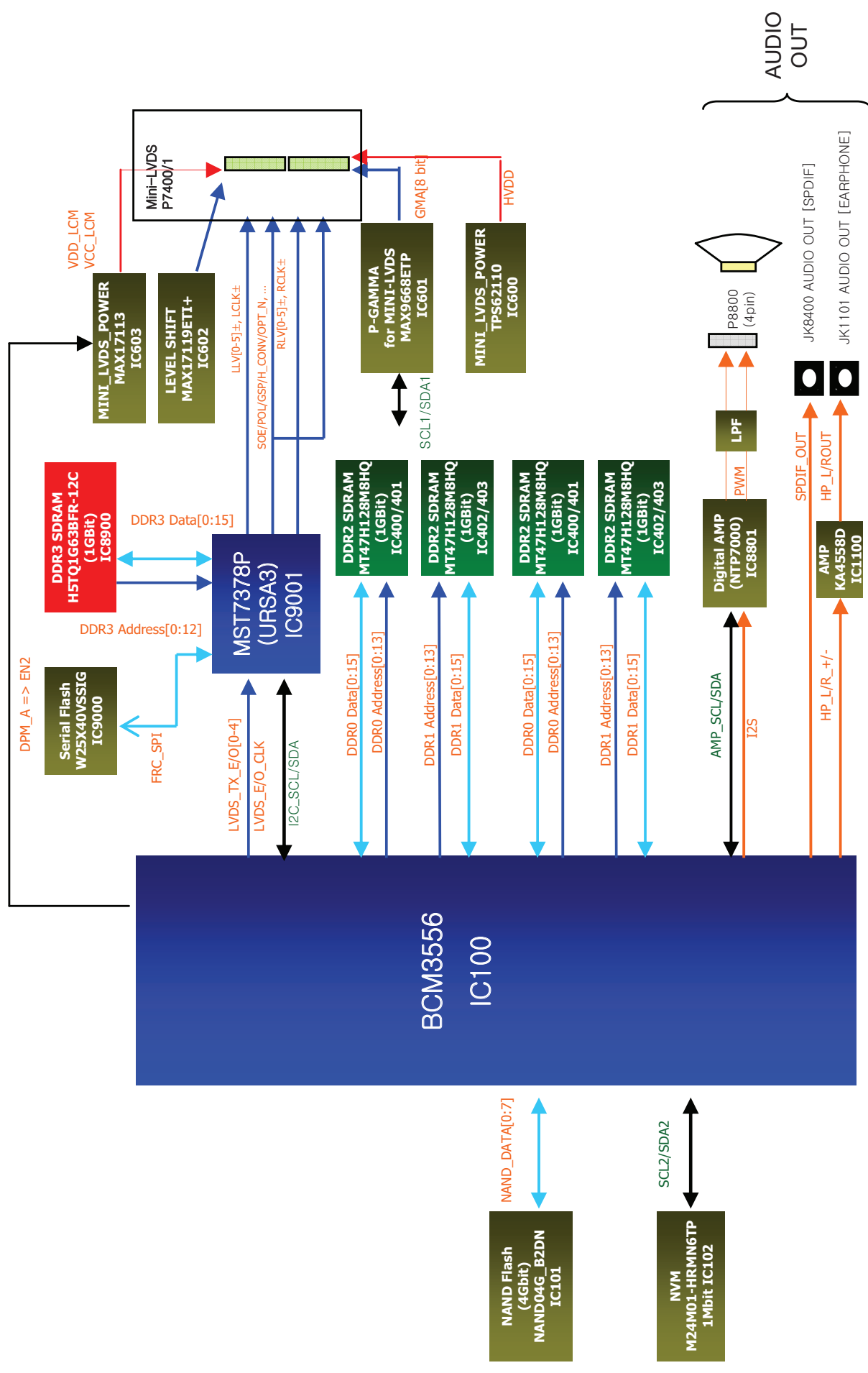
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# BCM High Block Diagram (Input/Interface)

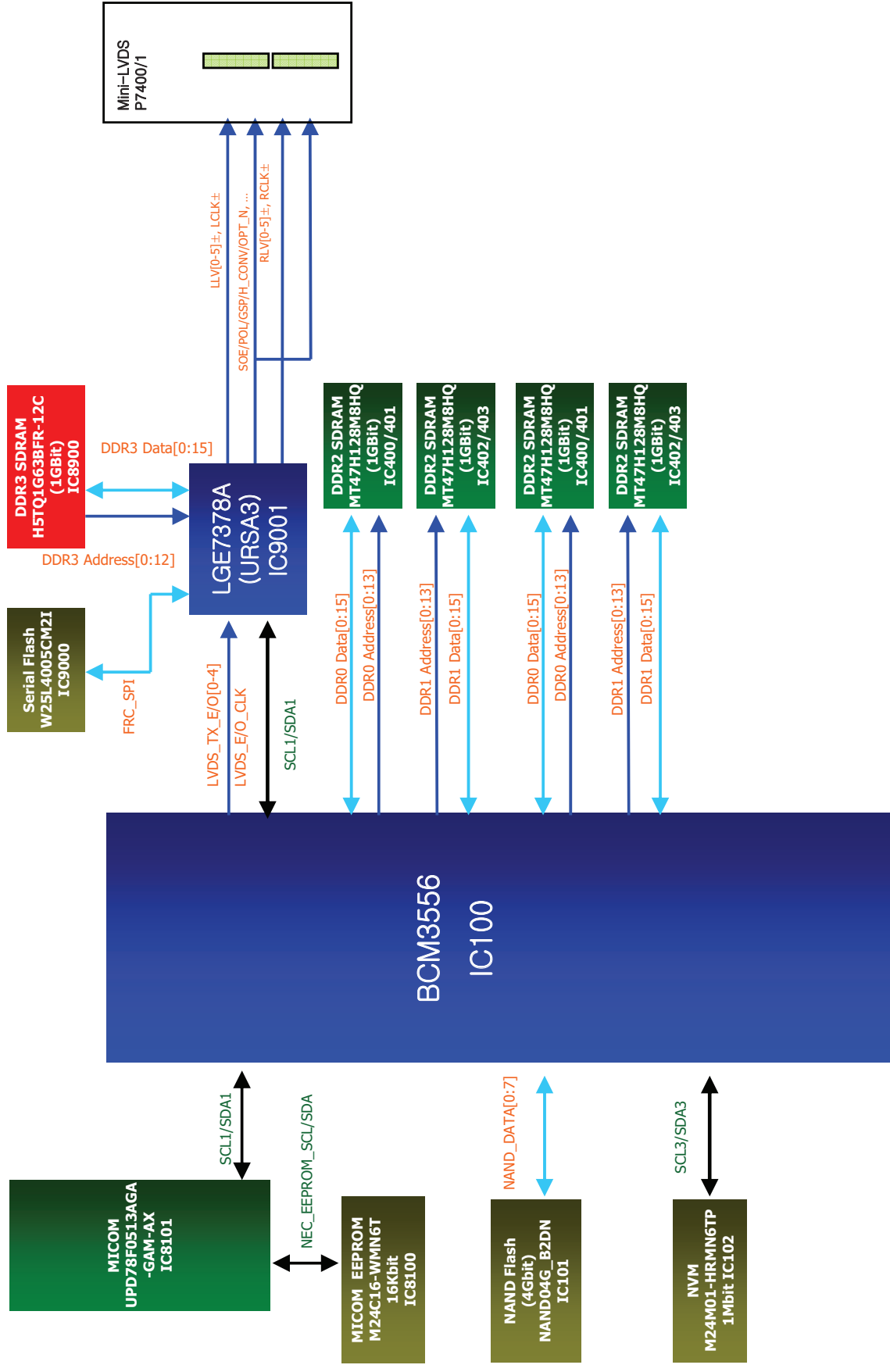


# BCM High Block Diagram (Output/Audio)

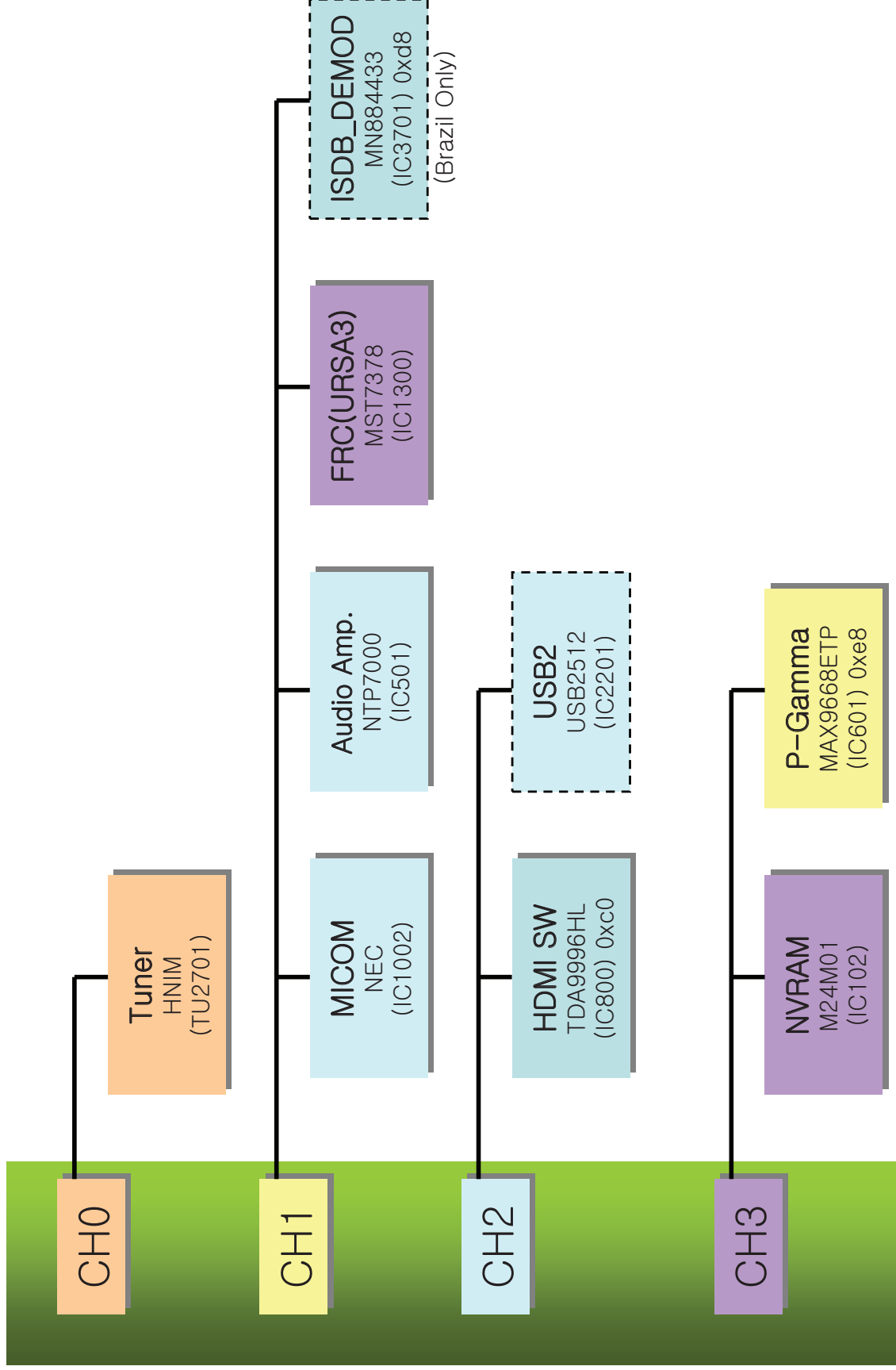




# BCM High Block Diagram (Memory)



# I2C Map\_DV2



# I2C Map\_DV1

