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LED LCD TV

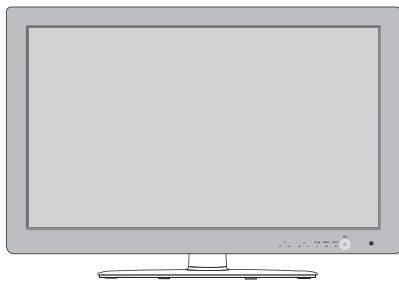
SERVICE MANUAL

CHASSIS : LD03E

MODEL : 42LV5300/5380/530N/530U
42LV5300/5380/530N/530U-ZA

CAUTION

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



P/NO : MFL63263133 (1102-REV00)

Printed in Korea

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SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

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

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

Do not modify the original design without permission of manufacturer.

General Guidance

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

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

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

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 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 Ω and 5.2 M Ω .

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

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

Leakage Current Hot Check (See below Figure)

Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.

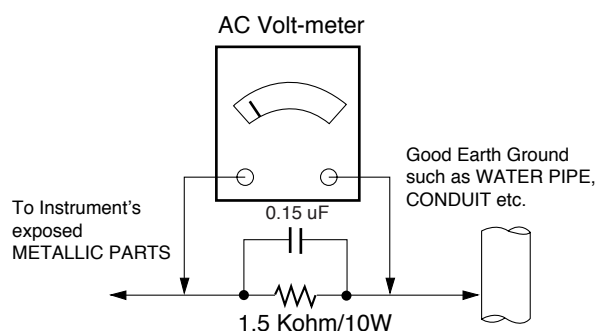
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

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

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

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

Leakage Current Hot Check circuit



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

*Base on Adjustment standard

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 LD03E 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 5 minutes prior to the adjustment.

3. Test method

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

4. Model General Specification

No.	Item	Specification	Remarks
1	Market	EU(PAL Market-36Countries)	<p>DTV & Analog (Total 36 countries)</p> <p>DTV (MPEG2/4, DVB-T) : 29 countries (England/Italy/Germany/France/Spain/Sweden/Finland/Netherlands/ Belgium/ Luxemburg/ Greece/Denmark/Czech/Austria /Hungary/Swiss/Croatia/Turkey/Norway/Slovenia/Poland/ Ukraine/Portugal/Ireland/Moroco/Latvia/Estonia/Lithania/Rumania)</p> <p>DTV (MPEG2/4, DVB-T2): 1 country (England)</p> <p>DTV (MPEG2/4, DVB-C): 2 countries (Sweden/Finland)</p> <p>Analog Only - 7 countries (Russia/Slovakia/Bosnia/Serbia/Bulgaria/Albania/Kazakhstan)</p>
2	Broadcasting system	1) PAL-BG 2) PAL-DK 3) PAL-I/I' 4) SECAM L/L', DK, BG, I 5) DVB-T 6) DVB-C 7) DVB-T2	
3	Receiving system	Analog : Upper Heterodyne Digital : COFDM, QAM	<p>DBV-T</p> <p>- Guard Interval(Bitrate_Mbit/s) 1/4, 1/8, 1/16, 1/32</p> <p>- Modulation : Code Rate QPSK : 1/2, 2/3, 3/4, 5/6, 7/8 16-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 64-QAM : 1/2, 2/3, 3/4, 5/6, 7/8</p> <p>DVB-T2</p> <p>- Guard Interval(Bitrate_Mbit/s) 1/4, 1/8, 1/16, 1/32, 1/128, 19/128, 19/256,</p> <p>- Modulation : Code Rate QPSK : 1/2, 2/5, 2/3, 3/4, 5/6 16-QAM : 1/2, 2/5, 2/3, 3/4, 5/6 64-QAM : 1/2, 2/5, 2/3, 3/4, 5/6 256-QAM : 1/2, 2/5, 2/3, 3/4, 5/6</p> <p>DVB-C</p> <p>- Symbolrate : 4.0Msymbols/s to 7.2Msymbols/s</p> <p>- Modulation : 16QAM, 64-QAM, 128-QAM and 256-QAM</p>
4	Scart Jack (1EA)	PAL, SECAM	Scart jack is Full scart and support MNT/DTV-OUT,DTV Recording.(not support DTV Auto AV)
5	Video Input RCA(2EA)	PAL, SECAM, NTSC	4 System : PAL, SECAM, NTSC, PAL60
6	Component Input (2EA)	Y/Cb/Cr Y/Pb/Pr	
7	RGB Input	RGB-PC	Analog(D-SUB 15PIN)
8	HDMI Input (4EA)	HDMI1-DTV/DVI HDMI2-DTV HDMI3-DTV HDMI4-DTV	PC(HDMI version 1.3) Support HDCP
9	Audio Input (4EA)	RGB/DVI Audio, Component, AV Side gender(Component2+AV3)	L/R Input
10	SDPIF out (1EA)	SPDIF out	
11	Earphone out (1EA)	Antenna, AV1, AV2, AV3, Component, RGB, HDMI1, HDMI2, HDMI3, HDMI4, USB	
12	USB (2EA)	EMF, DivX HD, For SVC (download)	JPEG, MP3, Divx HD

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

No.	Specification				Remark
	Resolution	H-freq(kHz)	V-freq(Hz)		
1.	720x480	15.73	60.00	SDTV,DVD 480i	
2.	720x480	15.63	59.94	SDTV,DVD 480i	
3.	720x480	31.47	59.94	480p	
4.	720x480	31.50	60.00	480p	
5.	720x576	15.625	50.00	SDTV,DVD 625 Line	
6.	720x576	31.25	50.00	HDTV 576p	
7.	1280x720	45.00	50.00	HDTV 720p	
8.	1280x720	44.96	59.94	HDTV 720p	
9.	1280x720	45.00	60.00	HDTV 720p	
10.	1920x1080	31.25	50.00	HDTV 1080i	
11.	1920x1080	33.75	60.00	HDTV 1080i	
12.	1920x1080	33.72	59.94	HDTV 1080i	
13.	1920x1080	56.250	50	HDTV 1080p	
14.	1920x1080	67.5	60	HDTV 1080p	

6. RGB (PC)

No.	Specification				Proposed	Remarks
	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel Clock(MHz)		
1.	720*400	31.468	70.08	28.321		For only DOS mode
2.	640*480	31.469	59.94	25.17	VESA	Input 848*480 60Hz, 852*480 60 Hz -> 640*480 60 Hz Display
3.	800*600	37.879	60.31	40.00	VESA	
4.	1024*768	48.363	60.00	65.00	VESA(XGA)	
5.	1280*768	47.78	59.87	79.5	WXGA	
6.	1360*768	47.72	59.8	84.75	WXGA	
7.	1280*1024	63.595	60.0	108.875	SXGA	FHD model
8.	1920*1080	66.587	59.93	138.625	WUXGA	FHD model

7. HDMI Input

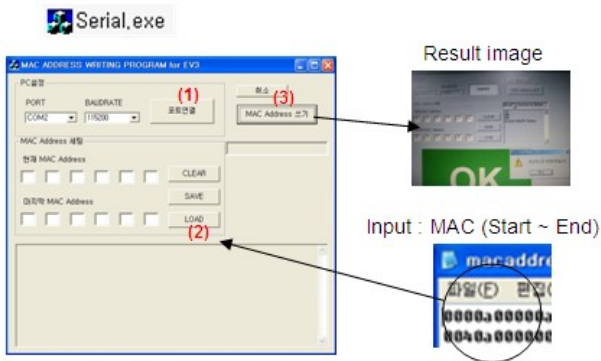
(1) DTV Mode

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remark
1.	720*480	31.469 /31.5	59.94 /60	27.00/27.03	SDTV 480P	
2.	720*576	31.25	50	54	SDTV 576P	
3.	1280*720	37.500	50	74.25	HDTV 720P	
4.	1280*720	44.96 /45	59.94 /60	74.17/74.25	HDTV 720P	
5.	1920*1080	33.72 /33.75	59.94 /60	74.17/74.25	HDTV 1080I	
6.	1920*1080	28.125	50.00	74.25	HDTV 1080I	
7.	1920*1080	26.97 /27	23.97 /24	74.17/74.25	HDTV 1080P	
8.	1920*1080	33.716 /33.75	29.976 /30.00	74.25	HDTV 1080P	
9.	1920*1080	56.250	50	148.5	HDTV 1080P	
10.	1920*1080	67.43 /67.5	59.94 /60	148.35/148.50	HDTV 1080P	

(2) PC Mode

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remark
1.	720*400	31.468	70.08	28.321		HDCP
2.	640*480	31.469	59.94	25.17	VESA	HDCP
3.	800*600	37.879	60.31	40.00	VESA	HDCP
4.	1024*768	48.363	60.00	65.00	VESA(XGA)	HDCP
5.	1280*768	47.78	59.87	79.5	WXGA	HDCP
6.	1360*768	47.72	59.8	84.75	WXGA	HDCP
7.	1280*1024	63.595	60.0	108.875	SXGA	HDCP/FHD model
8.	1920*1080	67.5	60.00	138.625	WUXGA	HDCP/FHD model

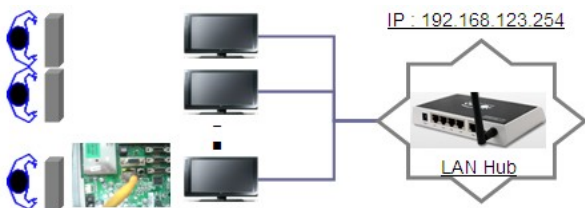
- 2) MAC Address Download
 - Com 1,2,3,4 and 115200(Baud rate)
 - Port connection button click(1)



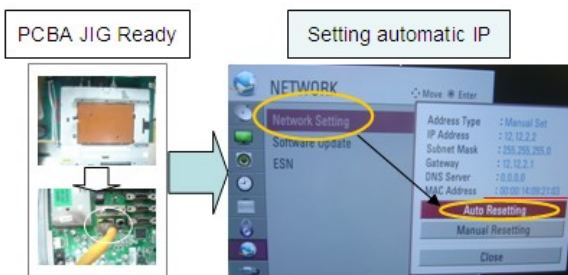
- Load button click(2) for MAC Address write.
- Start MAC Address write button(3)
- Check the OK Or NG

3.3. LAN

- (1) Equipment & Condition
 - Each other connection to LAN Port of IP Hub and Jig

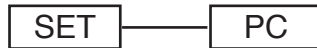


- (2) LAN inspection solution
 - LAN Port connection with PCB
 - Network setting at MENU Mode of TV
 - setting automatic IP
 - Setting state confirmation
 - > If automatic setting is finished, you confirm IP and MAC Address.



3.4. LAN PORT INSPECTION(PING TEST)

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

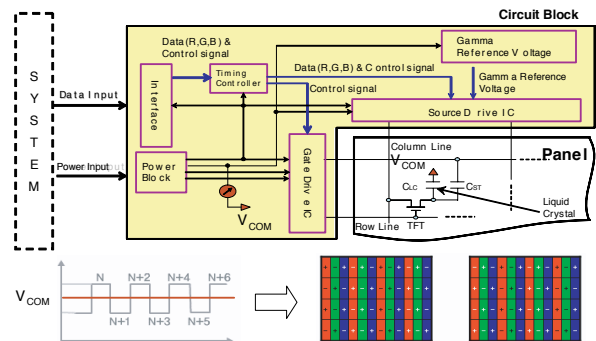


- (1) Equipment setting
 - 1) Play the LAN Port Test PROGRAM.
 - 2) Input IP set up for an inspection to Test Program.
 - *IP Number : 12.12.2.2
- (2) LAN PORT inspection (PING TEST)
 - 1) Play the LAN Port Test Program.
 - 2) Connect each other LAN Port Jack.
 - 3) Play Test (F9) button and confirm OK Message.
 - 4) Remove LAN CABLE



3.5. V-COM Adjust(Only LGD(M+S) Module)

- Why need Vcom adjustment?
- The Vcom (Common Voltage) is a Reference Voltage of Liquid Crystal Driving.
- > Liquid Crystal need for Polarity Change with every frame.



- Adjust sequence

- Press the PIP key of the ADJ remote controller. (This PIP key is hot key to enter the VCOM adjusting mode)
(Or After enter Service Mode by pushing “ADJ” key, then Enter V-Com Adjust mode by pushing “▶” key at “10. V-Com”)
- As pushing the right or the left button on the remote controller, And find the V-COM value Which is no or minimized the Flicker.
(If there is no flicker at default value, Press the exit key and finish the VCOM adjustment.)
- Push the OK key to store value. Then the message “Saving OK” is pop.
- Press the exit key to finish VCOM adjustment.



[Visual Adjust and control the Voltage level]

3.6. Model name & serial number download

(1) Model name & Serial number D/L

- Press “Power on” key of service remocon.(Baud rate : 115200 bps)
- Connect RS232 Signal Cable to RS-232 Jack.
- Write Serial number by use RS-232.
- Must check the serial number at Instart menu.

(2) Method & notice

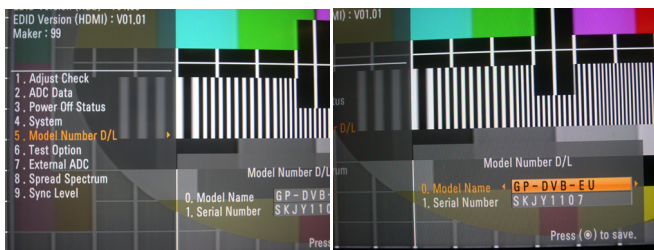
- A. Serial number D/L is using of scan equipment.
- B. Setting of scan equipment operated by Manufacturing Technology Group.
- C. Serial number D/L must be conformed when it is produced in production line, because serial number D/L is mandatory by D-book 4.0

* Manual Download (Model Name and Serial Number)

If the TV set is downloaded by OTA or service man, sometimes model name or serial number is initialized.(Not always)

There is impossible to download by bar code scan, so It need Manual download.

- a. Press the 'instart' key of ADJ remote control.
- b. Go to the menu '5.Model Number D/L' like below photo.
- c. Input the Factory model name(ex 42LD450-ZA) or Serial number like photo.



- d. Check the model name Instart menu ‡ Factory name displayed (ex 42LE7500-ZA)
- e. Check the Diagnostics (DTV country only) ‡ Buyer model displayed (ex 42LE7500-ZA)

3.7. CI+ Key Download method

(1) Download Procedure

- 1) Press "Power on" button of a service R/C.(Baud rate : 115200 bps)
- 2) Connect RS232-C Signal Cable.
- 3) Write CI+ Key through RS-232-C.
- 4) Check whether the key was downloaded or not at 'In Start' menu. (Refer to below).



=> Check the Download to CI+ Key value in LGset.

1. check the method of CI+ Key value
 - a. check the method on Instart menu
 - b. check the method of RS232C Command
 - 1) into the main ass'y mode (RS232 : aa 00 00)

CMD 1	CMD 2	Data 0	
A	A	0	0

- 2) check the key download for transmitted command (RS232 : ci 00 10)

CMD 1	CMD 2	Data 0	
C	I	1	0

- 3) result value
 - normally status for download : OKx
 - abnormally status for download : NGx

2. Check the method of CI+ Key value (RS232)
 - 1) into the main ass'y mode (RS232 : aa 00 00)

CMD 1	CMD 2	Data 0	
A	A	0	0

- 2) Check the method of CI+ key by command (RS232 : ci 00 20)

CMD 1	CMD 2	Data 0	
C	I	2	0

- 3) Result value

i 01 OK 1d1852d21c1ed5dcx

→ CI+ key Value

4. Manual Adjustment

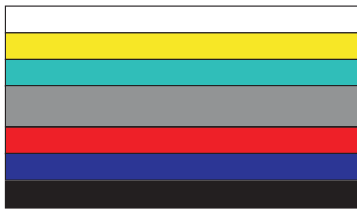
4.1. ADC(GP2) Adjustment

4.1.1. Overview

ADC adjustment is needed to find the optimum black level and gain in Analog-to-Digital device and to compensate RGB deviation.

4.1.2. Equipment & Condition

- (1) Adjust Remocon
- (2) 801GF(802B, 802F, 802R) or MSPG925FA Pattern Generator
 - Resolution :
 - 480i, 720*480 (MSPG-925FA -> Model: 209, Pattern: 65)
 - 480i
 - 1080p, 1920*1080 (MSPG-925FA -> Model: 225, Pattern: 65) - 1080p
 - Pattern : Horizontal 100% Color Bar Pattern
 - Pattern level: 0.7 ± 0.1 Vp-p
 - Image



(3) Must use standard cable

4.1.3. Adjust method

- (1) ADC 480i, 1080p Comp1
 - 1) Check connected condition of Comp1 cable to the equipment
 - 2) Give a 480i, 1080p Mode, Horizontal 100% Color Bar Pattern to Comp1.
 - (MSPG-925FA -> Model: 209, Pattern: 65) - 480i
 - (MSPG-925FA -> Model: 225, Pattern: 65) - 1080p
 - 3) Change input mode as Component1 and picture mode as "Standard"
 - 4) Press the In-start Key on the ADJ remote after at least 1 min of signal reception. Then, select 7. External ADC -> 1. COMP 1080p on the menu. Press enter key. The adjustment will start automatically.
 - 5) If ADC calibration is successful, "ADC RGB Success" is displayed.
 - If ADC calibration is failure, "ADC RGB Fail" is displayed.
 - 6) If ADC calibration is failure, after recheck ADC pattern or condition retry calibration Error message refer to 5).
- (2) ADC 1920*1080 RGB
 - 1) Check connected condition of Component & RGB cable to the equipment
 - 2) Give a 1920*1080 Mode, 100 % Horizontal Color Bar Pattern to RGB port.
 - (MSPG-925 Series -> model:126 , pattern:65)
 - 3) Change input mode as RGB and picture mode as "Standard".
 - 4) Press the In-start Key on the ADJ remote after at least 1 min of signal reception. Then, select 7. External ADC -> 1. COMP 1080p on the menu. Press enter key. The adjustment will start automatically.
 - 5) If ADC calibration is successful, "ADC RGB Success" is displayed.
 - If ADC calibration is failure, "ADC RGB Fail" is displayed.
 - 6) If ADC calibration is failure, after recheck ADC pattern or condition retry calibration Error message refer to 5).

4.2. EDID(The Extended Display Identification Data)/DDC(Display Data Channel) download

(1) Overview

It is a VESA regulation. A PC or a MNT will display an optimal resolution through information sharing without any necessity of user input. It is a realization of "Plug and Play".

(2) Equipment

- Adjust remote control
- Since embedded EDID data is used, EDID download JIG, HDMI cable and D-sub cable are not need.

(3)Download method

- 1) Press Adj. key on the Adj. R/C, then select "10.EDID D/L", By pressing Enter key, enter EDID D/L menu.
- 2) Select [Start] button by pressing Enter key, HDMI1 / HDMI2 / HDMI3 / HDMI4 / RGB are Writing and display OK or NG.

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

(4) EDID DATA

■ HDMI

	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x0A	0x0B	0x0C	0x0D	0x0E	0x0F
0x00	00	FF	FF	FF	FF	FF	FF	00	1E	6D						
0x01			01	03	80	10	09	78	0A	EE	91	A3	54	4C	99	26
0x02	0F	50	54	A1	08	00	71	4F	81	80	01	01	01	01	01	01
0x03	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
0x04	45	00	A0	5A	00	00	00	1E	01	1D	00	72	51	D0	1E	20
0x05	6E	28	55	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
0x06	3E	1E	53	10	00	0A	20	20	20	20	20	20				
0x07															01	
0x00	02	03	26	F1	4E	10	1F	84	13	05	14	03	02	12	20	21
0x01	22	15	01	26	15	07	50	09	57	07	67					
0x02			E3	05	03	01	01	1D	80	18	71	1C	16	20	58	2C
0x03	25	00	A0	5A	00	00	00	9E	01	1D	00	80	51	D0	0C	20
0x04	40	80	35	00	A0	5A	00	00	00	1E	02	3A	80	18	71	38
0x05	2D	40	58	2C	45	00	A0	5A	00	00	00	1E	66	21	50	B0
0x06	51	00	1B	30	40	70	36	00	A0	5A	00	00	00	1E	00	00
0x07	00	00	00	00	00	00	00	00	00	00	00	00	00	00	01	

■ RGB

	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x0A	0x0B	0x0C	0x0D	0x0E	0x0F
0x00	00	FF	FF	FF	FF	FF	FF	00	1E	6D						
0x01			01	03	68	10	09	78	0A	EE	91	A3	54	4C	99	26
0x02	0F	50	54	A1	08	00	81	80	61	40	45	40	31	40	01	01
0x03	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
0x04	45	00	A0	5A	00	00	00	1E	01	1D	00	72	51	D0	1E	20
0x05	6E	28	55	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
0x06	3E	1E	53	10	00	0A	20	20	20	20	20	20				
0x07															00	

■ Reference

- HDMI1 ~ HDMI4 / RGB
- In the data of EDID, bellows may be different by S/W or Input mode.

Product ID

Model Name	HEX	EDID Table	DDC Function
All Model	0001	01 00	Analog
	0001	01 00	Digital

Serial No. : Controlled on product line

Month, Year: Controlled on production line:

ex) Monthly : '01' -> '01'

Year : '2010' -> '14'

Model Name(Hex):

MODEL	MODEL NAME(HEX)
all	00 00 00 FC 00 4C 47 20 54 56 0A 20 20 20 20 20 20

Checksum: Changeable by total EDID data.

Vendor Specific(HDMI)

INPUT	MODEL NAME(HEX)
HDMI1	67 03 0C 00 10 00 B8 2D
HDMI2	67 03 0C 00 20 00 B8 2D
HDMI3	67 03 0C 00 30 00 B8 2D
HDMI4	67 03 0C 00 40 00 B8 2D
HDMI5	67 03 0C 00 50 00 B8 2D

4.3. White Balance Adjustment

4.3.1 Overview

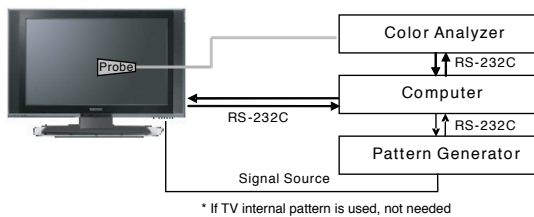
- (1) W/B adj. Objective & How-it-works
- (2) Objective: To reduce each Panel's W/B deviation
- (3) How-it-works : When R/G/B gain in the OSD is at 192, it means the panel is at its Full Dynamic Range. In order to prevent saturation of Full Dynamic range and data, one of R/G/B is fixed at 192, and the other two is lowered to find the desired value.
- (4) Adj. condition : normal temperature
 - 1) Surrounding Temperature : 25 °C ± 5 °C
 - 2) Warm-up time: About 5 Min
 - 3) Surrounding Humidity : 20 % ~ 80 %

4.3.2 Equipment

- 1) Color Analyzer: CA-210 (LED Module : CH 14)
- 2) Adj. Computer(During auto adj., RS-232C protocol is needed)
- 3) Adjust Remocon
- 4) Video Signal Generator MSPG-925F 720p/216-Gray (Model:217, Pattern:78)
-> Only when internal pattern is not available

■ Color Analyzer Matrix should be calibrated using CS-1000

4.3.3. Equipment connection MAP



4.3.4. Adj. Command (Protocol)

<Command Format>

START 6E A 50 A LEN A 03 A CMD A 00 A VAL A CS A STOP

- LEN: Number of Data Byte to be sent
 - CMD: Command
 - VAL: FOS Data value
 - CS: Checksum of sent data
 - A: Acknowledge
- Ex) [Send: JA_00_DD] / [Ack: A_00_okDDX]

■ RS-232C Command used during auto-adj.

RS-232C COMMAND			Explanation
[CMD]	ID	DATA]	
wb	00	00	Begin White Balance adj.
wb	00	10	Gain adj.(internal white pattern)
wb	00	1f	Gain adj. completed
wb	00	20	Offset adj.(internal white pattern)
wb	00	2f	Offset adj. completed
wb	00	ff	End White Balance adj.(Internal pattern disappears)

- Ex) wb 00 00 -> Begin white balance auto-adj.
 wb 00 10 -> Gain adj.
 ja 00 ff -> Adj. data
 jb 00 c0
 ...
 ...
 wb 00 1f -> Gain adj. completed
 *(wb 00 20(Start), wb 00 2f(completed)) -> Off-set adj.
 wb 00 ff -> End white balance auto-adj.

■ Adj. Map

	ITEM	Command		Data Range (Hex.)		Default (Decimal)
		Cmd 1	Cmd 2	Min	Max	
Cool	R-Gain	j	g	00	C0	
	G-Gain	j	h	00	C0	
	B-Gain	j	i	00	C0	
	R-Cut					
	G-Cut					
Medium	R-Gain	j	a	00	C0	
	G-Gain	j	b	00	C0	
	B-Gain	j	c	00	C0	
	R-Cut					
	G-Cut					
Warm	R-Gain	j	d	00	C0	
	G-Gain	j	e	00	C0	
	B-Gain	j	f	00	C0	
	R-Cut					
	G-Cut					

4.3.5. Adj. method

(1) Auto adj. method

- 1) Set TV in adj. mode using POWER ON key.
- 2) Zero calibrate probe then place it on the center of the Display.
- 3) Connect Cable (RS-232C)
- 4) Select mode in adj. Program and begin adjustment.
- 5) When adj. is complete (OK Sing), check adj. status pre mode. (Warm, Medium, Cool)
- 6) Remove probe and RS-232C cable to complete adj.

■ W/B Adj. must begin as start command “wb 00 00”, and finish as end command “wb 00 ff”, and Adj. offset if need.

(2) Manual adj. method

- 1) Set TV in Adj. mode using POWER ON
- 2) Zero Calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10cm of the surface.
- 3) Press ADJ key -> EZ adjust using adj. R/C -> 7. White-Balance then press the cursor to the right (KEY ►).
(When KEY(►) is pressed 216 Gray internal pattern will be displayed)
- 4) One of R Gain / G Gain / B Gain should be fixed at 192, and the rest will be lowered to meet the desired value.
- 5) Adj. is performed in COOL, MEDIUM, WARM 3 modes of color temperature.

■ If internal pattern is not available, use RF input. In EZ Adj. menu 7.White Balance, you can select one of 2 Test-pattern: ON, OFF. Default is inner(ON). By selecting OFF, you can adjust using RF signal in 216 Gray pattern.

■ Adj. condition and cautionary items

- 1) Lighting condition in surrounding area
Surrounding lighting should be lower 10 lux. Try to isolate adj. area into dark surrounding.
- 2) Probe location
: Color Analyzer (CA-210) probe should be within 10cm and perpendicular of the module surface (80°~100°)
- 3) Aging time
- After Aging Start, Keep the Power ON status during 5 Minutes.
- In case of LCD, Back-light on should be checked using no signal or Full-white pattern.

4.3.6. Reference (White Balance Adj. coordinate and temperature)

- Luminance : 216 Gray
- Standard color coordinate and temperature using CS-1000 (over 26 inch)

Mode	Color Coordination		Temp	ΔUV
	x	y		
COOL	0.269	0.273	13000K	0.0000
MEDIUM	0.285	0.293	9300K	0.0000
WARM	0.313	0.329	6500K	0.0000

- Standard color coordinate and temperature using CA-210(CH 9)

Mode	Color Coordination		Temp	ΔUV
	x	y		
COOL	0.269 ± 0.002	0.273 ± 0.002	13000K	0.0000
MEDIUM	0.285 ± 0.002	0.293 ± 0.002	9300K	0.0000
WARM	0.313 ± 0.002	0.329 ± 0.002	6500K	0.0000

4.4. EYE-Q function check

- Step 1) Turn on TV
- Step 2) Press EYE key of Adj. R/C
- Step 3) Cover the Eye Q II sensor on the front of the using your hand and wait for 6 seconds
- Step 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.
- Step 5) Remove your hand from the Eye Q II sensor and wait for 6 seconds.
- Step 6) Confirm that “ok” pop up. If change is not seen, replace Eye Q II sensor.



4.5. Local Dimming Function Check

- Step 1) Turn on TV.
- Step 2) Press Tilt key of Adj. R/C.
- Step 3) Confirm under the screen.



4.6. Option selection per country

(1) Overview

- Option selection is only done for models in Non-EU
- Applied model: LD03D/03E Chassis applied EU model

(2) Method

- 1) Press ADJ key on the Adj. R/C, then select Country Group Menu
- 2) Depending on destination, select Country Group Code 04 or Country Group EU then on the lower Country option, select US, CA, MX. Selection is done using +, - or ►◀ KEY.

4.7. Tool Option selection

- Method : Press Adj. key on the Adj. R/C, then select Tool option.

4.8. Ship-out mode check(In-stop)

- After final inspection, press IN-STOP key of the Adj. R/C and check that the unit goes to Stand-by mode.
After final inspection, Always turn on the Mechanical S/W.

5. GND and Internal Pressure check

5.1. Method

- 1) GND & Internal Pressure auto-check preparation
 - Check that Power Cord is fully inserted to the SET.
(If loose, re-insert)
- 2) Perform GND & Internal Pressure auto-check
 - Unit fully inserted Power cord, Antenna cable and A/V arrive to the auto-check process.
 - Connect D-terminal to AV JACK TESTER
 - Auto CONTROLLER(GWS103-4) ON
 - Perform GND TEST
 - If NG, Buzzer will sound to inform the operator.
 - If OK, changeover to I/P check automatically.
(Remove CORD, A/V form AV JACK BOX)
 - Perform I/P test
 - If NG, Buzzer will sound to inform the operator.
 - If OK, Good lamp will lit up and the stopper will allow the pallet to move on to next process.

5.2. Checkpoint

- TEST voltage
 - GND: 1.5KV/min at 100mA
 - SIGNAL: 3KV/min at 100mA
- TEST time: 1 second
- TEST POINT
 - GND TEST = POWER CORD GND & SIGNAL CABLE METAL GND
 - Internal Pressure TEST = POWER CORD GND & LIVE & NEUTRAL
- LEAKAGE CURRENT: At 0.5mArms

6. Audio

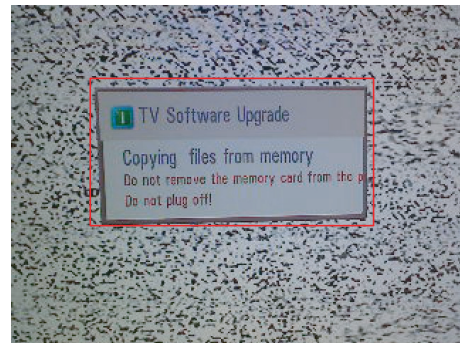
No.	Item	Min.	Typ.	Max.	Unit	
1.	Audio practical max Output, L/R (Distortion=10% max Output)	9.0	10.0	12.0	W	EQ Off AVL Off
		8.5	8.9	9.8	Vrms	Clear Voice Off
2.	Speaker (8Ω Impedance)		10.0	15.0	W	EQ On AVL On Clear Voice On

Measurement condition:

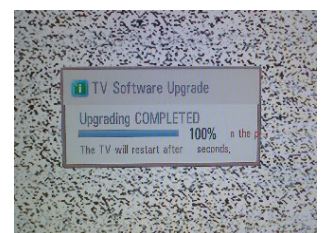
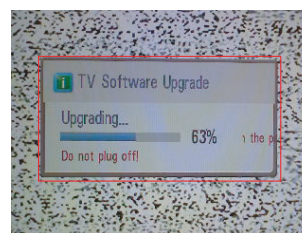
1. RF input: Mono, 1KHz sine wave signal, 100% Modulation
2. CVBS, Component: 1KHz sine wave signal 0.4Vrms
3. RGB PC: 1KHz sine wave signal 0.7Vrms

7. USB S/W Download (option, Service only)

- 1) Put the USB Stick to the USB socket
- 2) Automatically detecting update file in USB Stick
 - If your downloaded program version in USB Stick is Low, it didn't work. But your downloaded version is High, USB data is automatically detecting
- 3) Show the message "Copying files from memory"



- 4) Updating is starting.

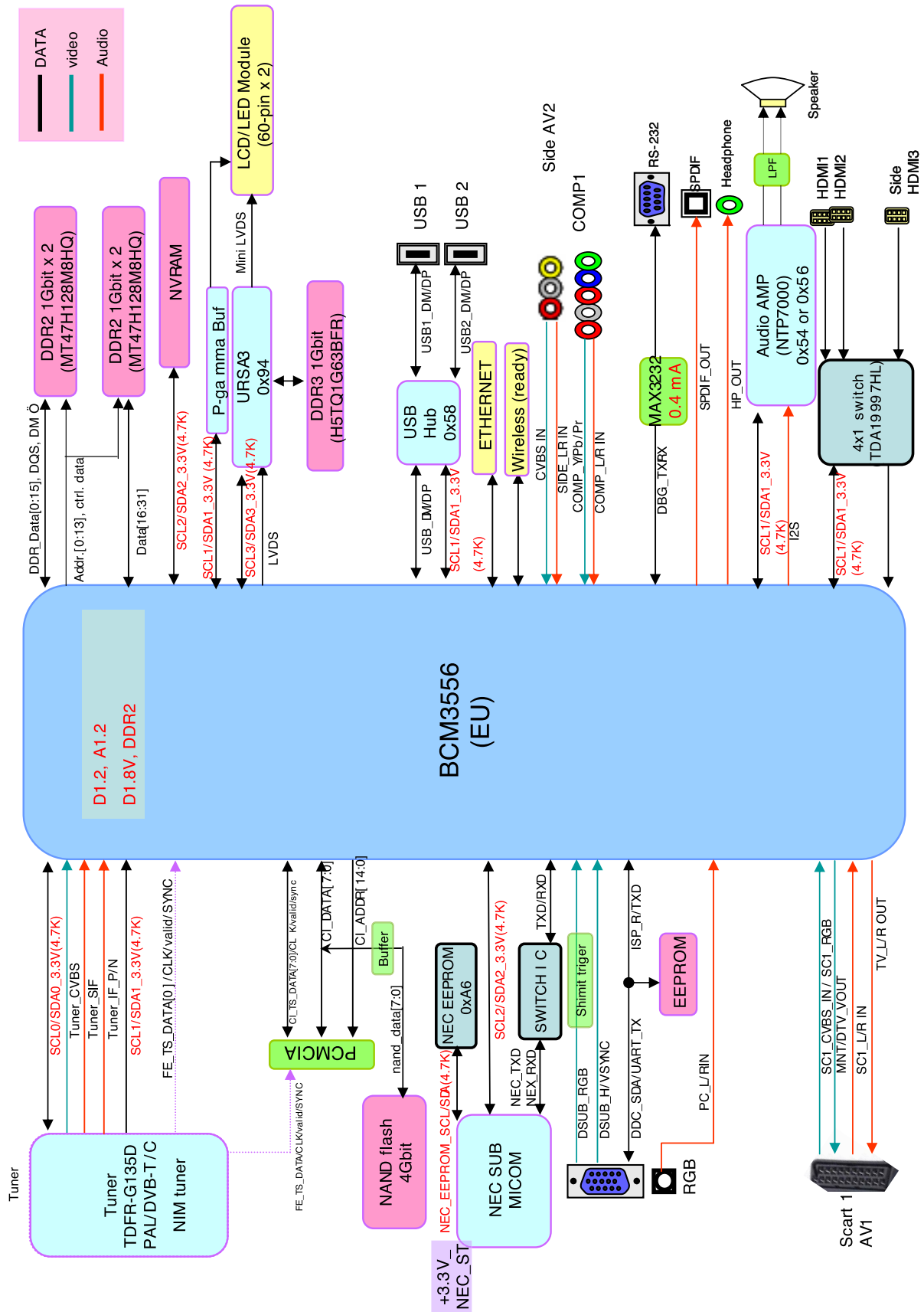


- 5) Updating Completed, The TV will restart automatically
- 6) If your TV is turned on, check your updated version and Tool option. (explain the Tool option, next stage)
 - * If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel recover. if all channel data is cleared, you didn't have a DTV/ATV test on production line.

* After downloading, have to adjust TOOL OPTION again.

1. Push "IN-START" key in service remote control.
2. Select "Tool Option 1" and Push "OK" button.
3. Punch in the number. (Each model has their number.)

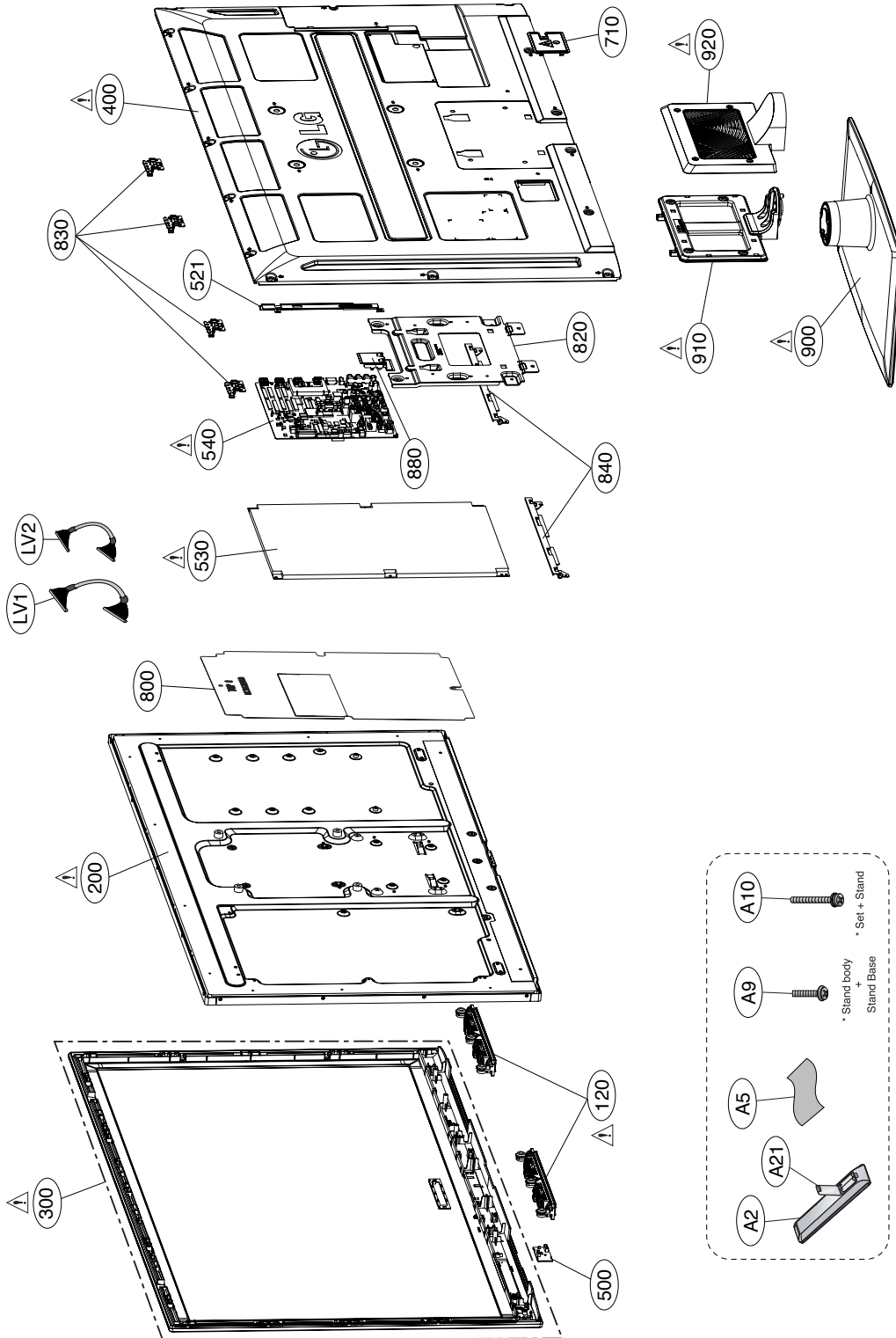
BLOCK DIAGRAM



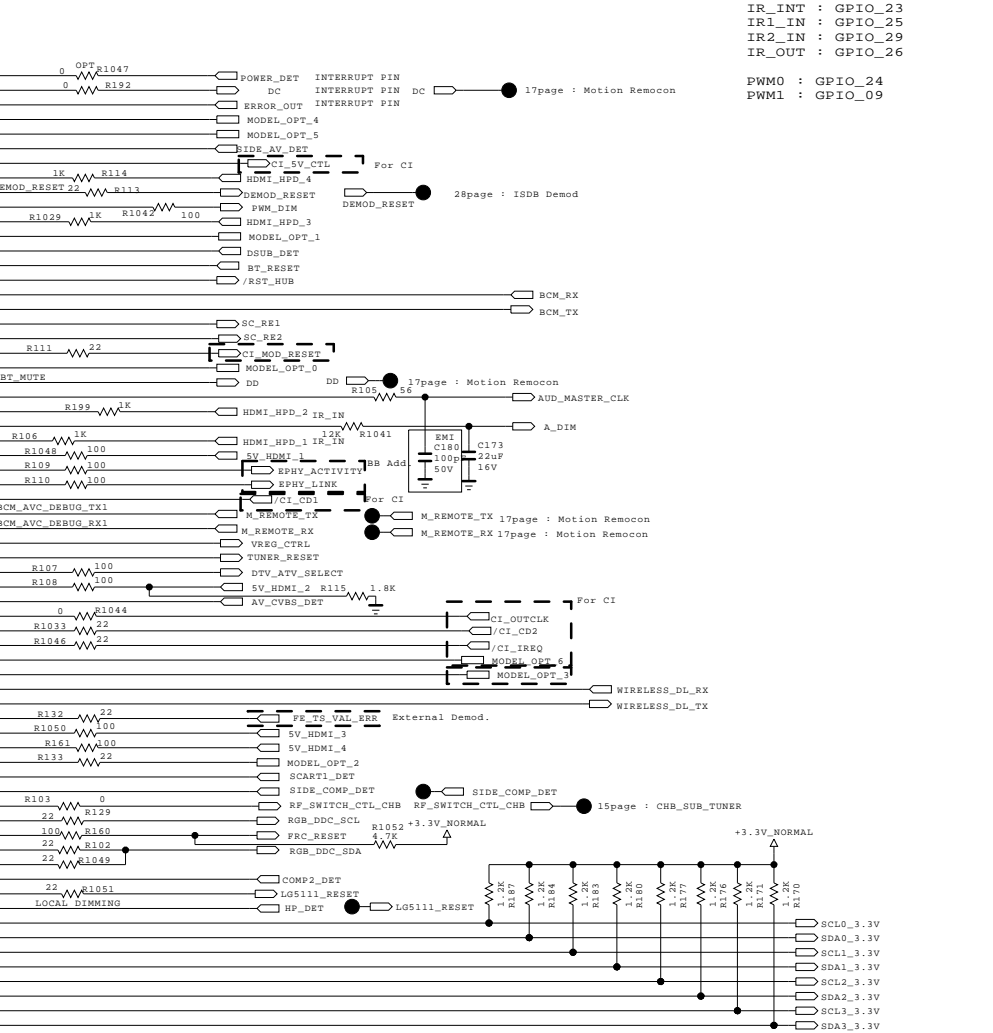
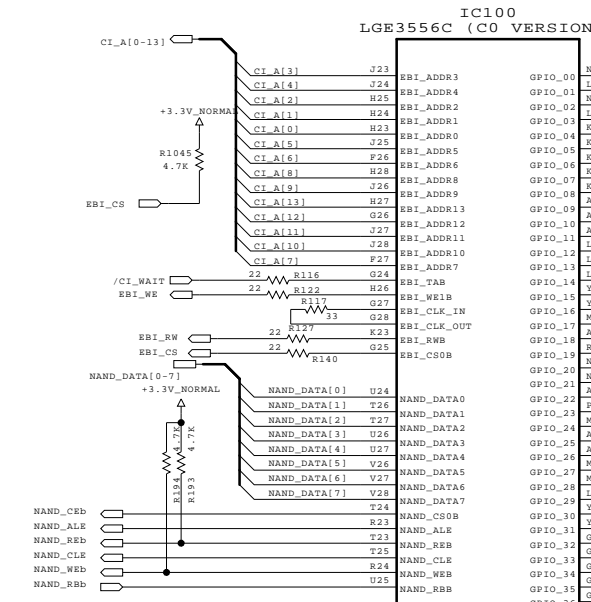
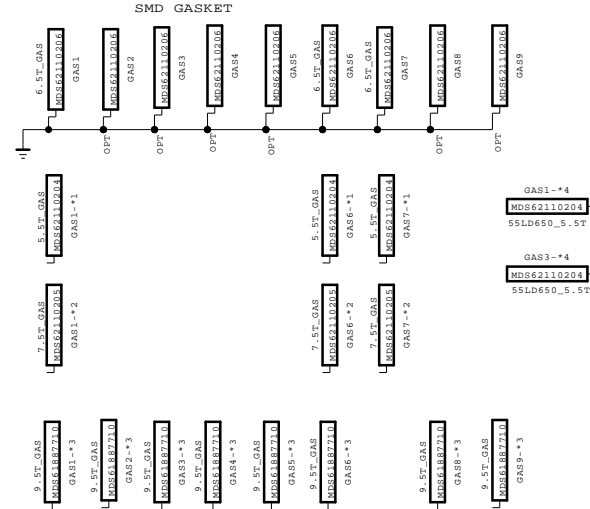
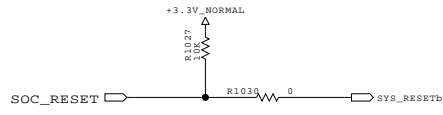
EXPLODED VIEW

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by \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.

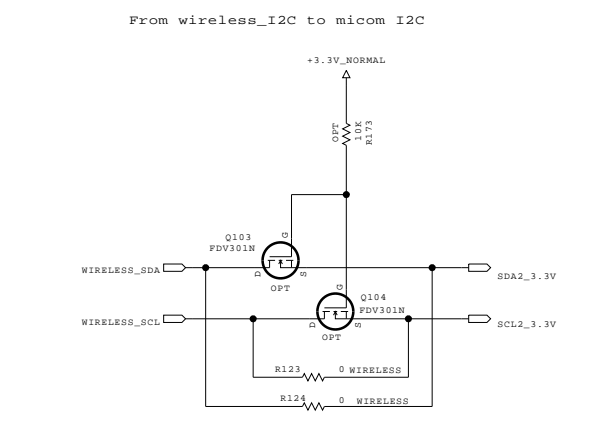
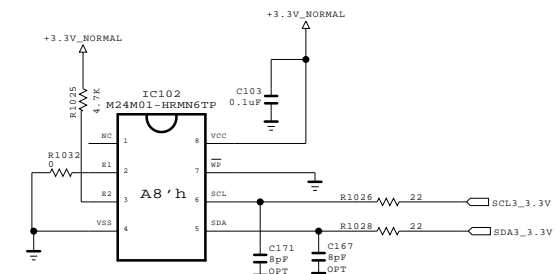


RESET



EXT_IRQ : GPIO_00, GPIO_01, GPIO_02, GPIO_11, GPIO_11, GPIO_39
 IR_INT : GPIO_23
 IRI_IN : GPIO_25
 IR2_IN : GPIO_29
 IR_OUT : GPIO_26
 PWM0 : GPIO_24
 PWM1 : GPIO_09

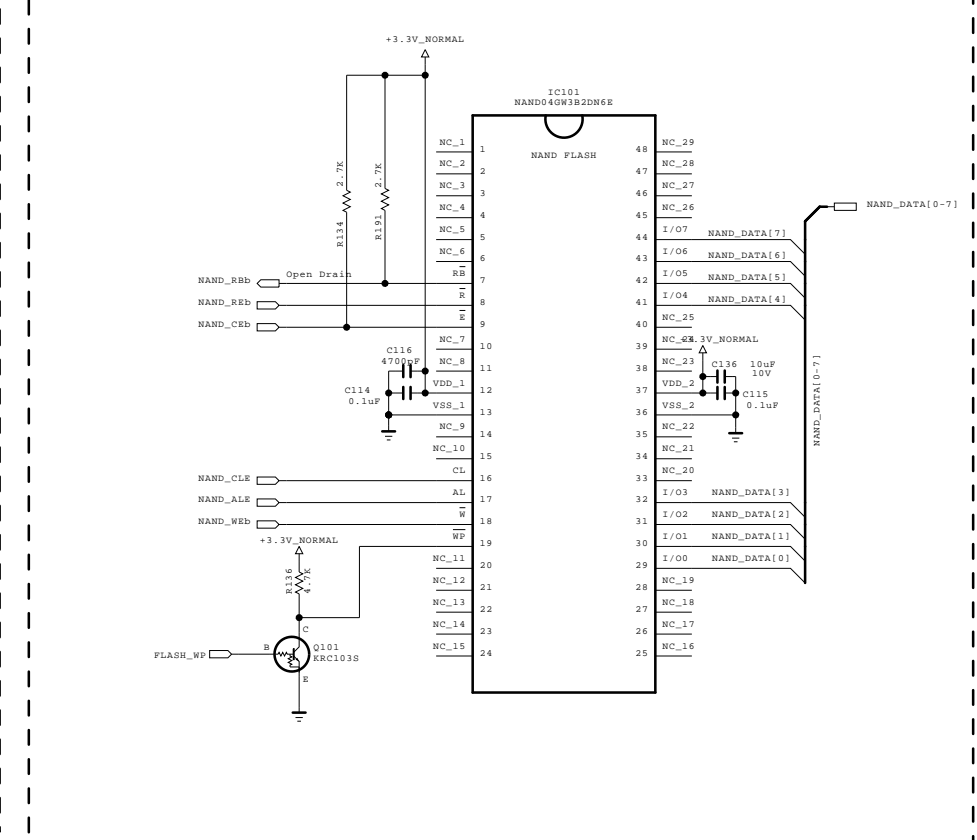
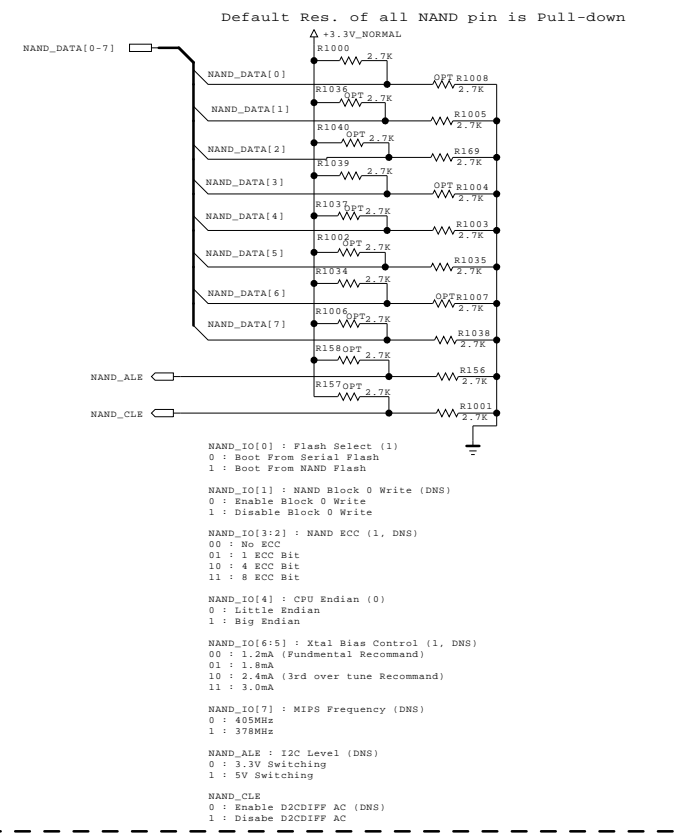
NVRAM



* I2C MAP
 * I2C_0 :
 * I2C_1 :
 * I2C_2 :
 * I2C_3 :

Boot Strap

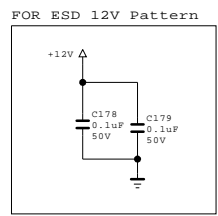
* NAND FLASH MEMORY 4Gbit (512M for BB)



Default Res. of all NAND pin is Pull-down
 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 (1, DNS)
 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 (Fundamental Recommend)
 01 : 1.8mA
 10 : 2.4mA (3rd over tune Recommend)
 11 : 3.0mA
 NAND_IO[7] : MIPS Frequency (DNS)
 0 : 405MHz
 1 : 378MHz
 NAND_ALE : I2C Level (DNS)
 0 : 3.3V Switching
 1 : 5V Switching
 NAND_CLE :
 0 : Enable D2CDIFF AC (DNS)
 1 : Disable D2CDIFF AC

MODEL OPTION			
PIN NAME	PIN NO.	HIGH	LOW
MODEL_OPT_0	N28	URSA3	NON_URSA3
MODEL_OPT_1	AA26	MAIN_MINI_LVDS	MAIN_LVDS
MODEL_OPT_2	R26	DDR-256M	DDR-512M
MODEL_OPT_3	K1	FRD	HD
MODEL_OPT_4	L25	FRC	NON_FRC
MODEL_OPT_5	K27	GIP	NON_GIP
MODEL_OPT_6	K4	OLED	NOR_OLED

*MODEL_OPT_0 & MODEL_OPT_4 REFER TO THIS OPTION
 MODEL_OPT_0 MODEL_OPT_4
 LOW LOW NO FRC
 HIGH LOW URSA3 Internal
 HIGH HIGH URSA3 External
 LOW HIGH PWIZ Panel 7-con With LG FRC

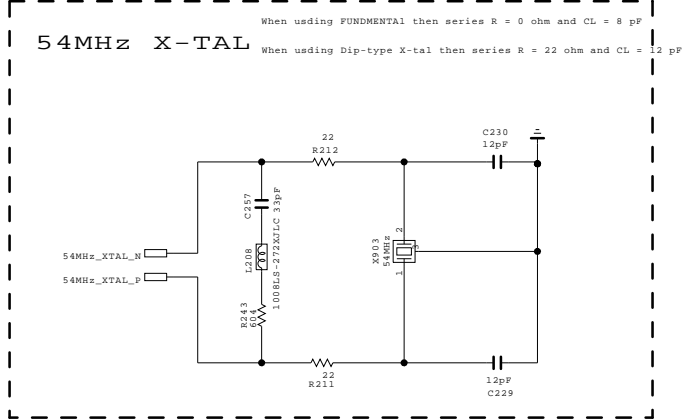
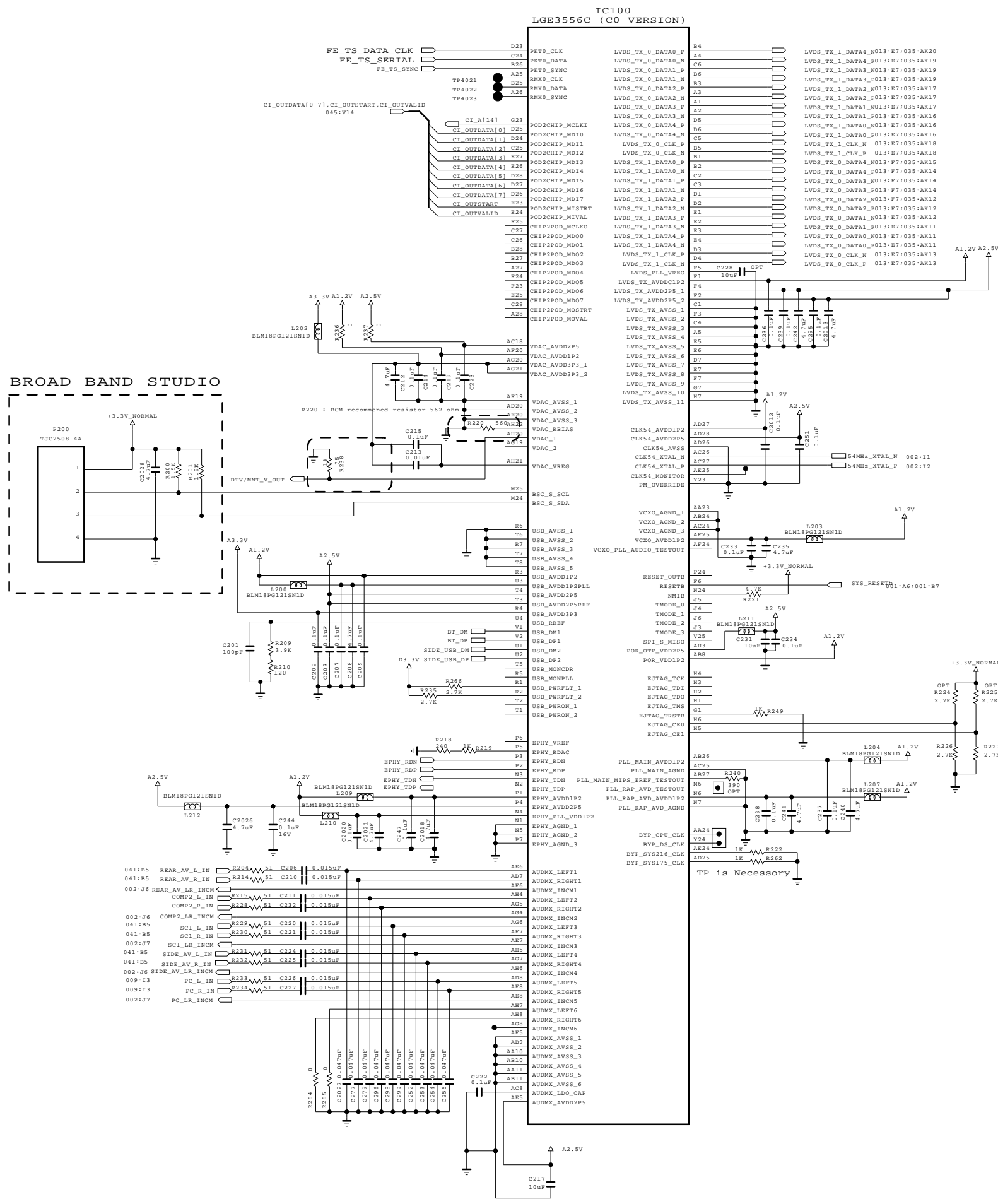


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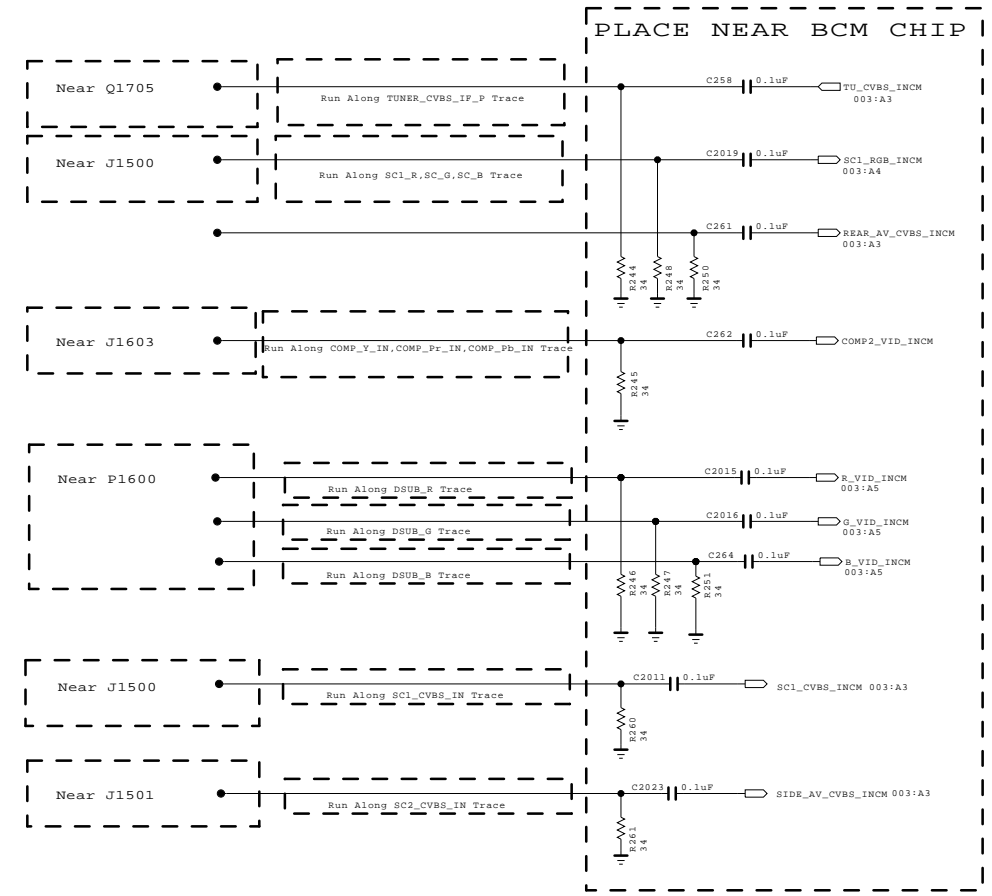
SECRET
 LGElectronics



MODEL BLOCK	BCM (EUROBBTV)	DATE SHEET	2009.06.18
	BCM3556 & NAND FLASH		1

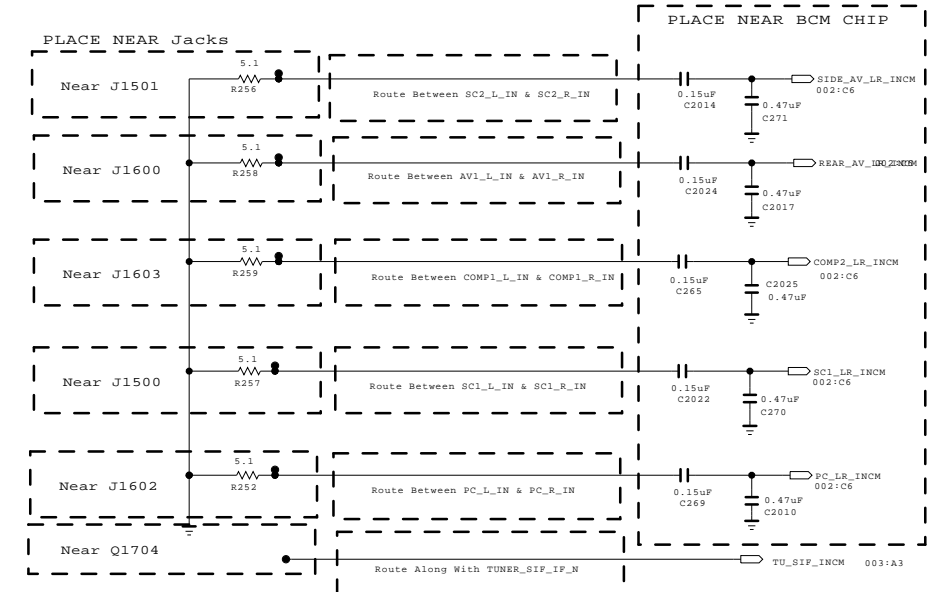


VIDEO INCM



Route INCM between associated left and right signals of same channel. The INCM trace ends at the same point where the connector ground connects to the board ground (thru-hole connector pin). Place test points, resistors near audio connector. Connect the other side of the resistor to GND as close as possible to the ground connection of the associated audio connector.

AUDIO INCM

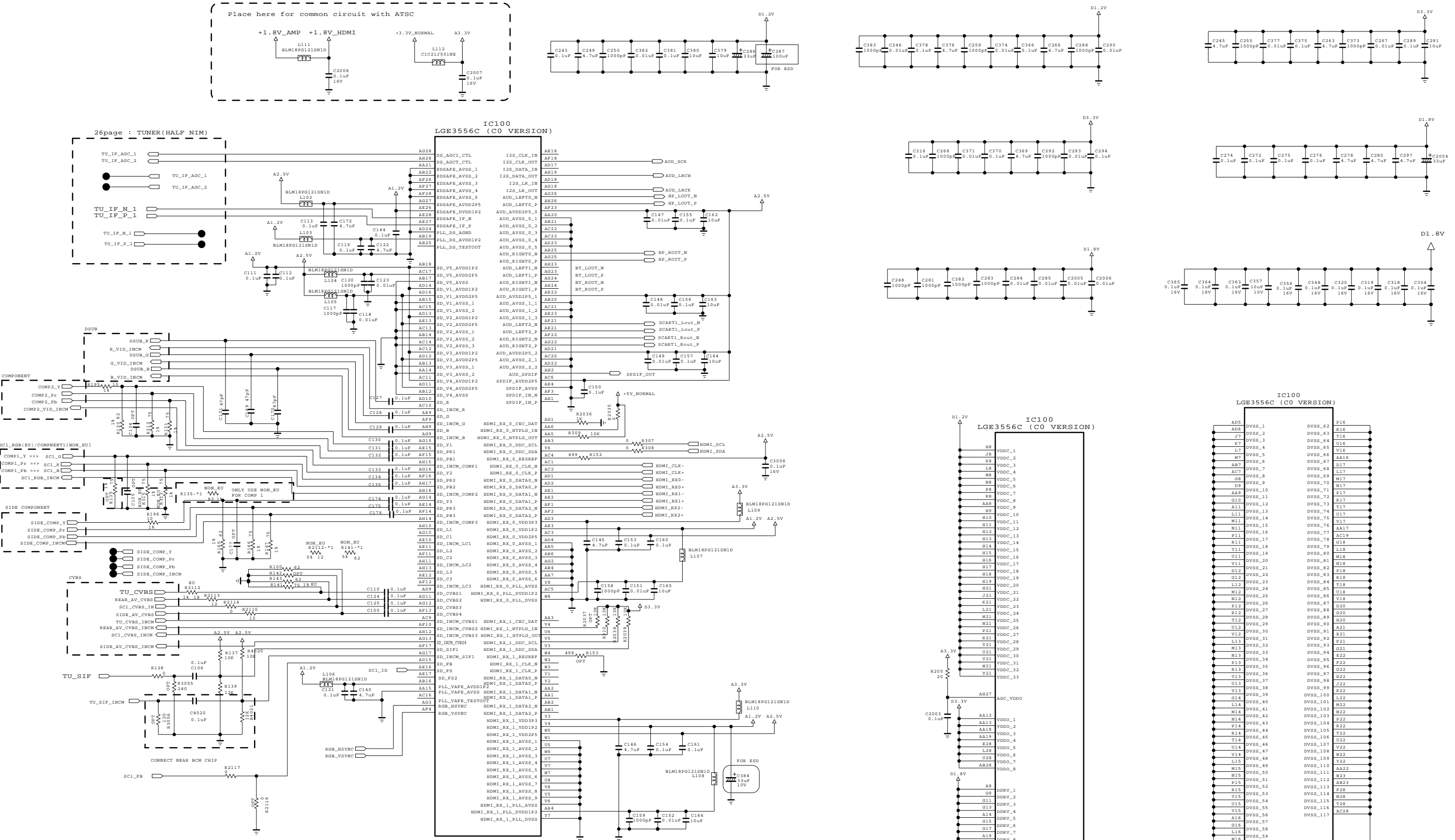


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MODEL	BCM (EUROBBTV)	DATE	2009.06.18
BLOCK	BCM3556 AUD_IN/LVDS	SHEET	2

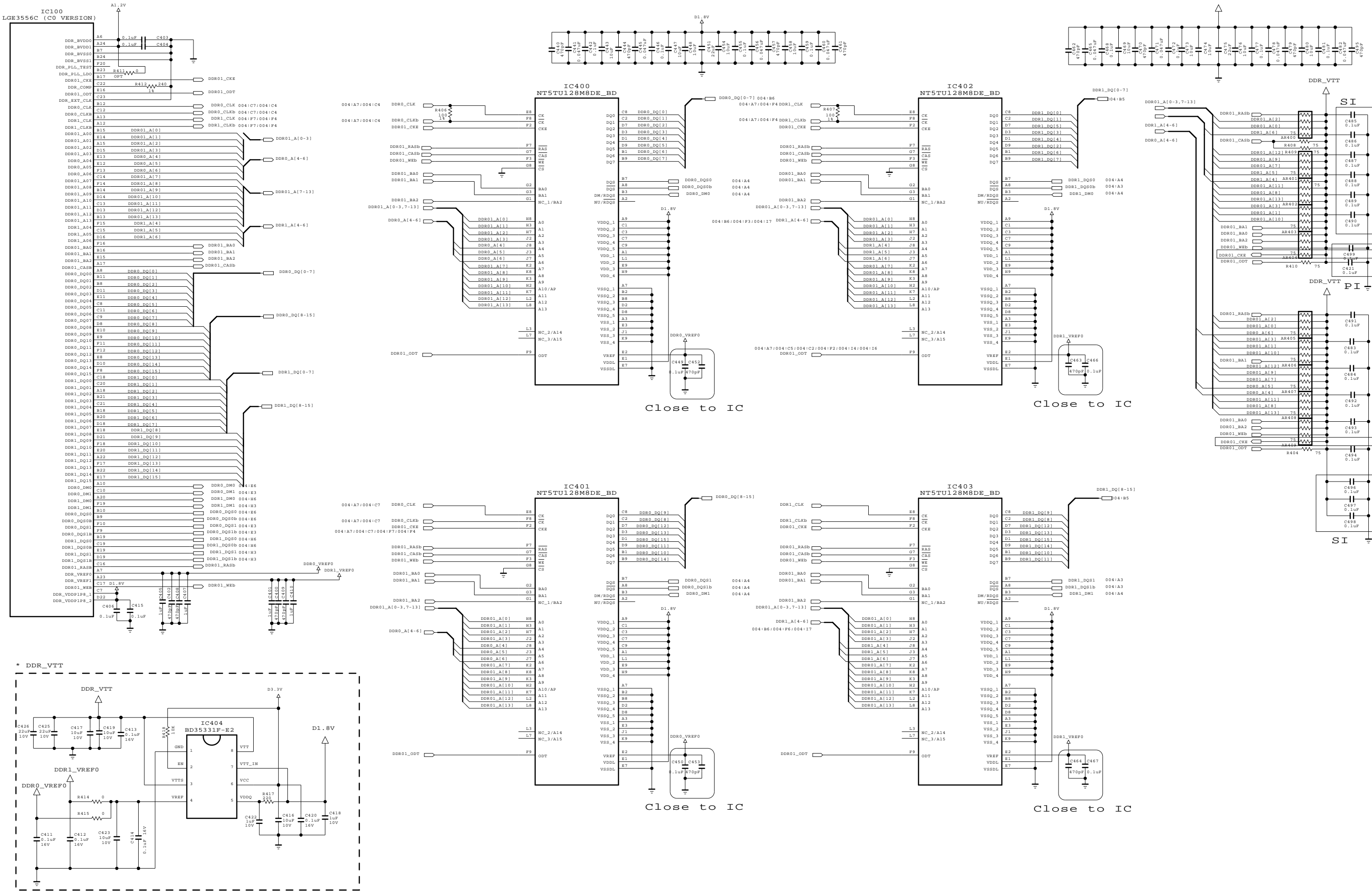


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MODEL	EUROBTV	DATE	2009.06.18
BLOCK	BCM3556 VIDEO IN	SHEET	3



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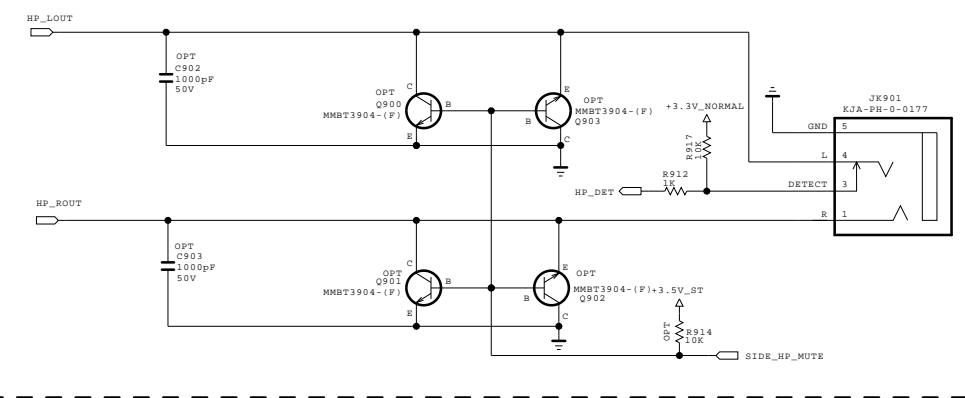
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HONG YEON HYUK

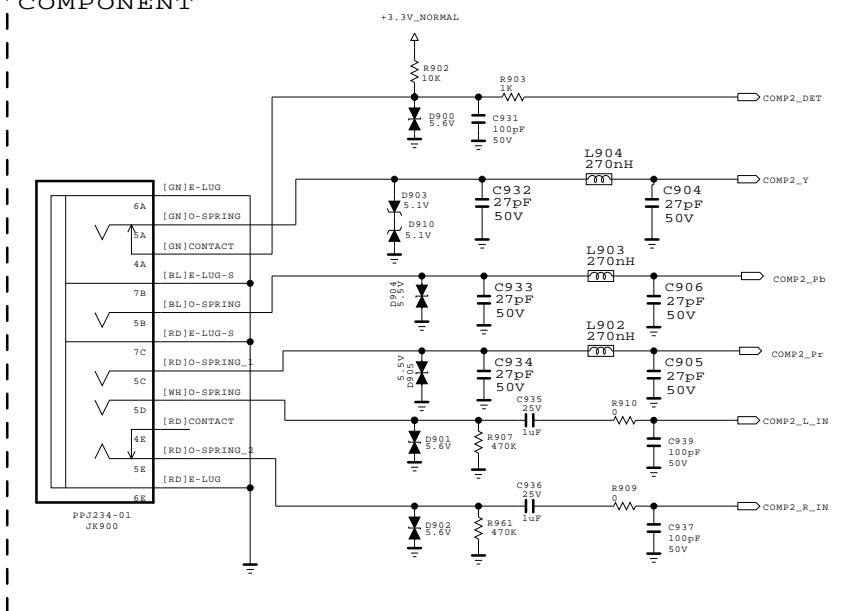


MODEL	BCM (EUROBBTV)	DATE	2009.06.18
BLOCK	DDR Memory	SHEET	4

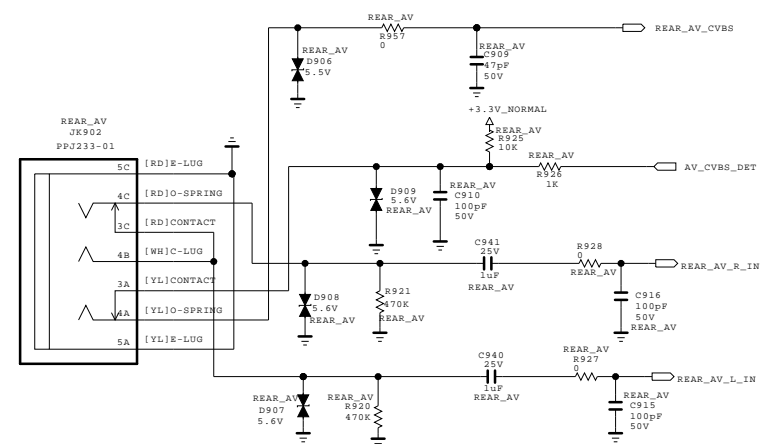
New Item Development
EARPHONE BLOCK



COMPONENT



Rear CVBS



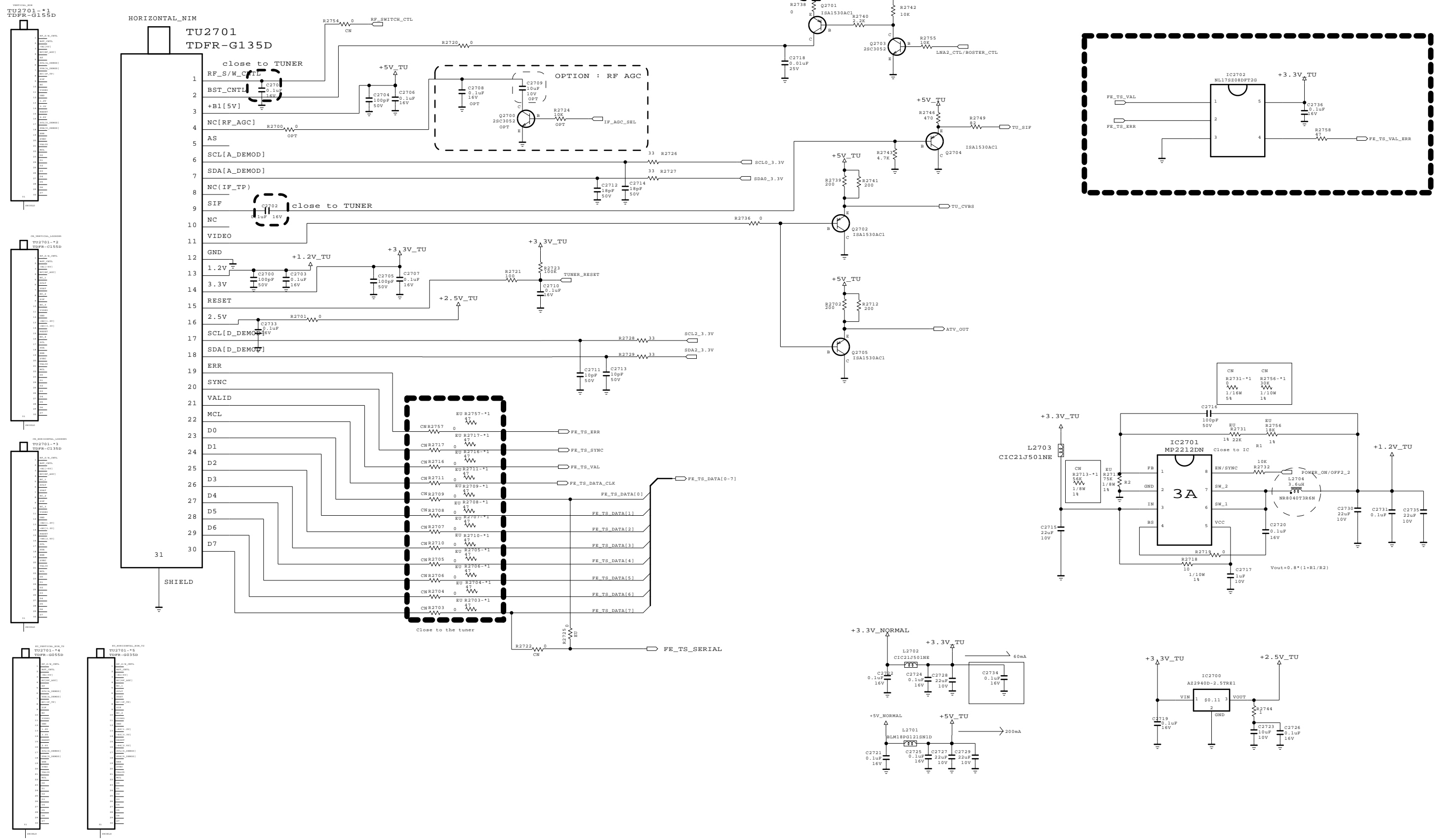
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MODEL	EUROBBTV	DATE	2009.06.18
BLOCK	ETC SUB BOARD I/F	SHEET	9

CAN H-NIM/NIM TUNER for EU



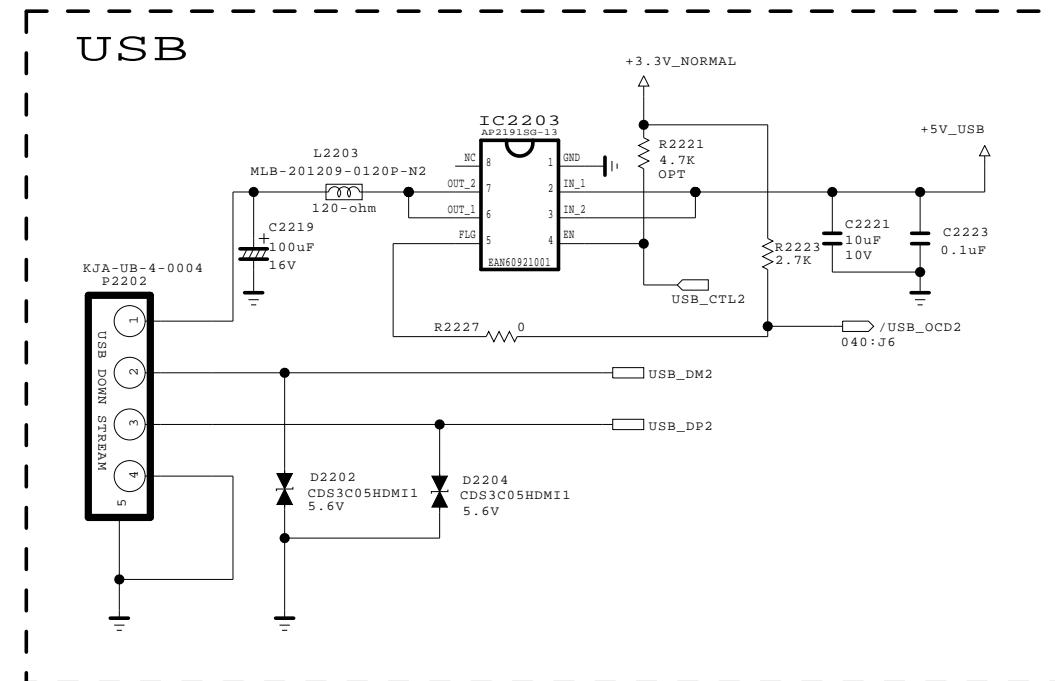
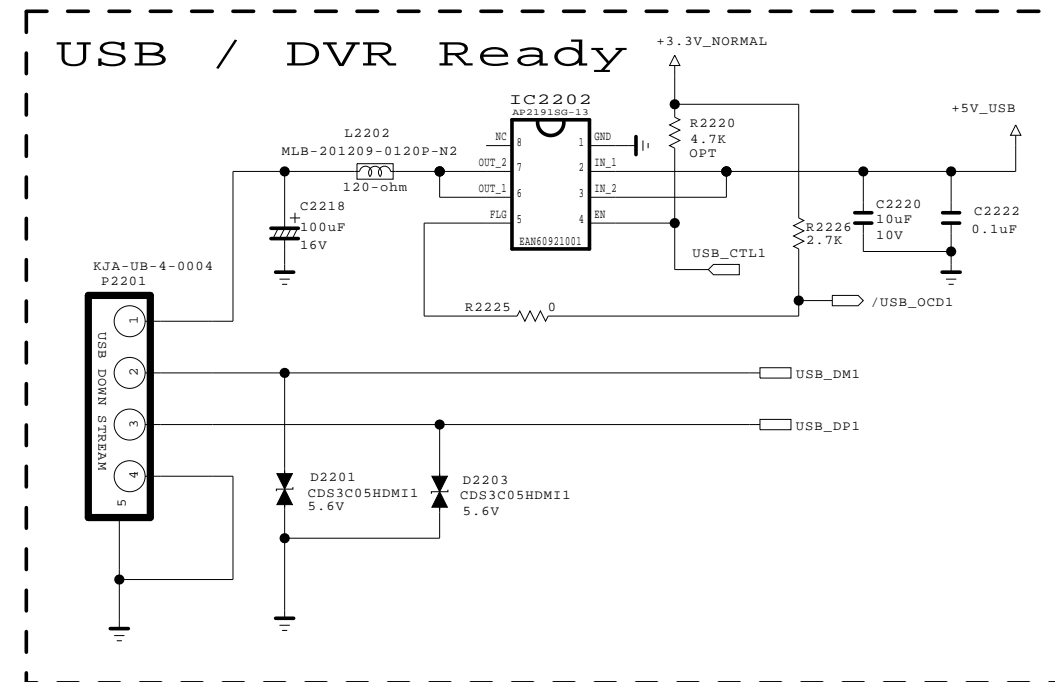
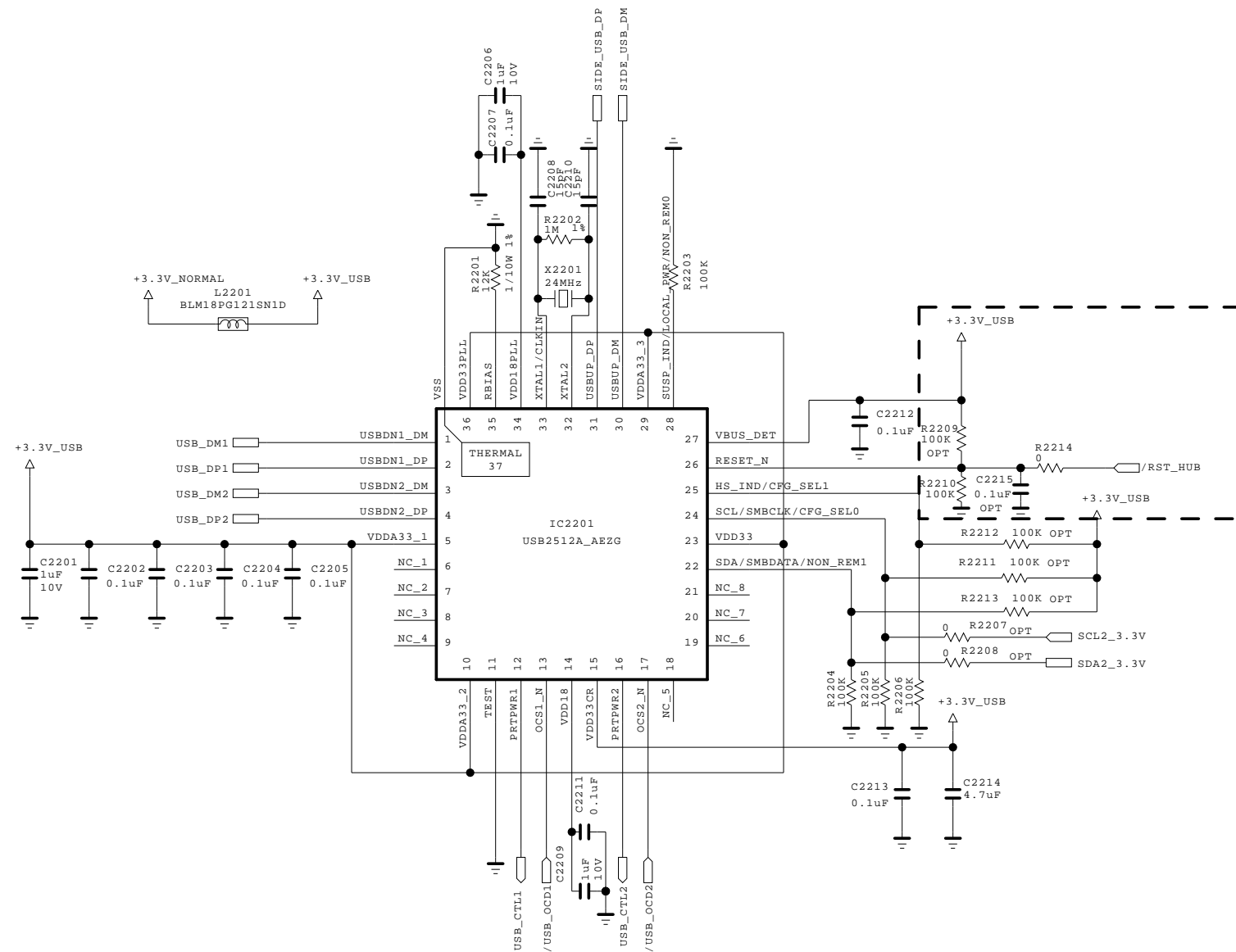
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MODEL		DATE	
BLOCK		SHEET	27

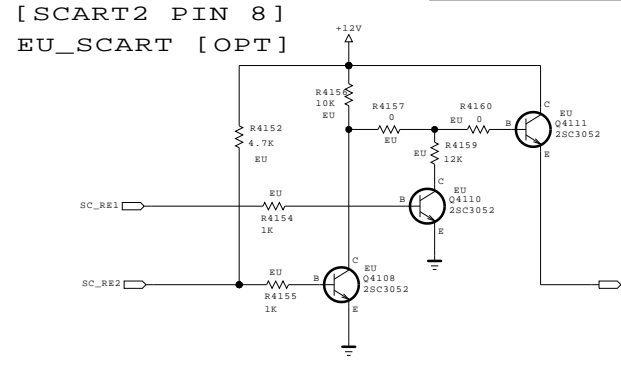
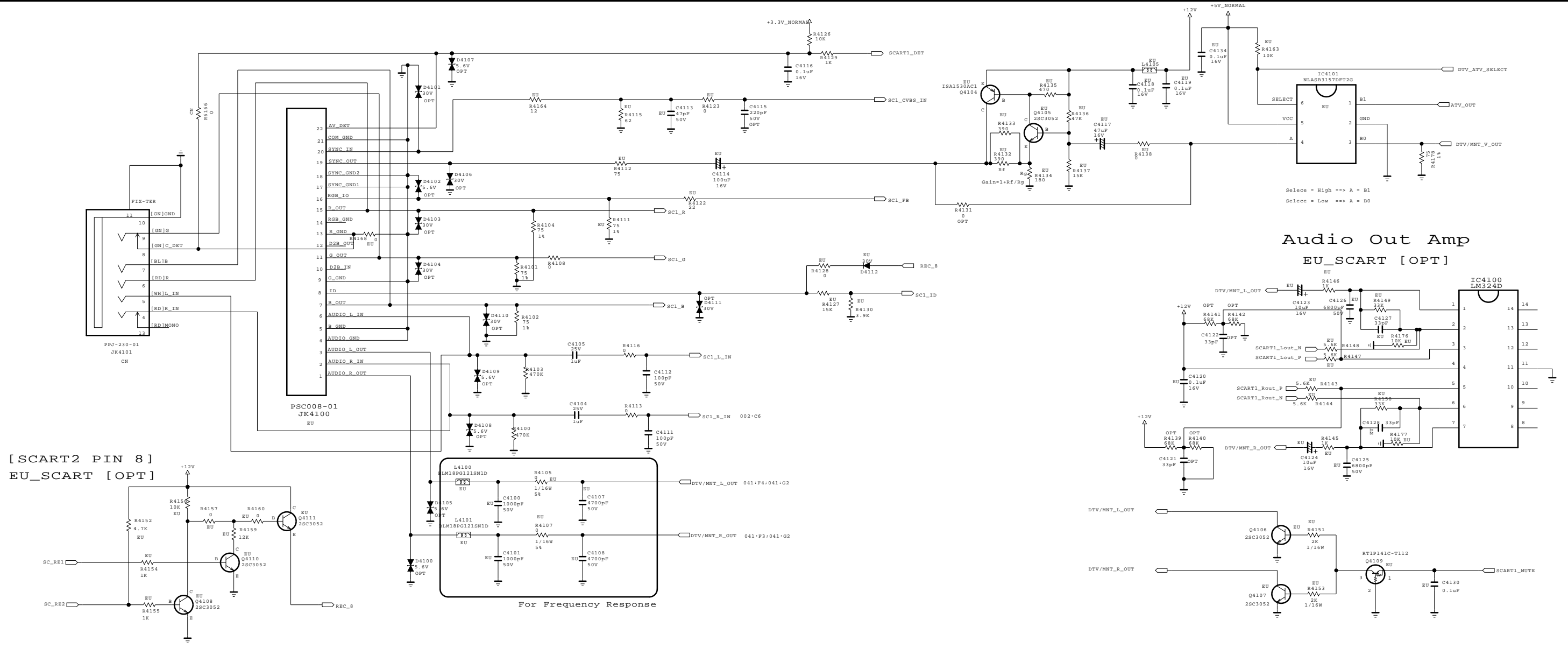
USB2 OPTION



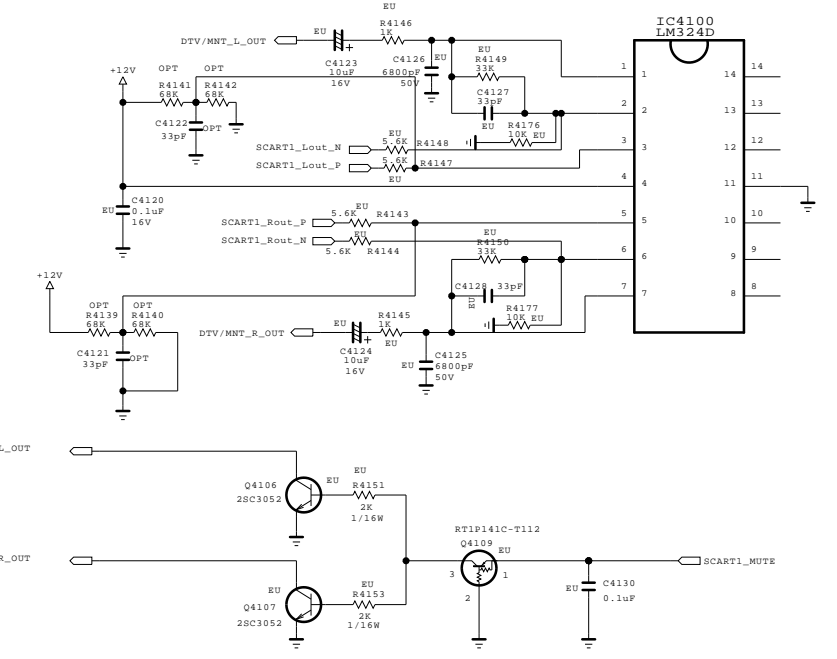
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LGElectronics	

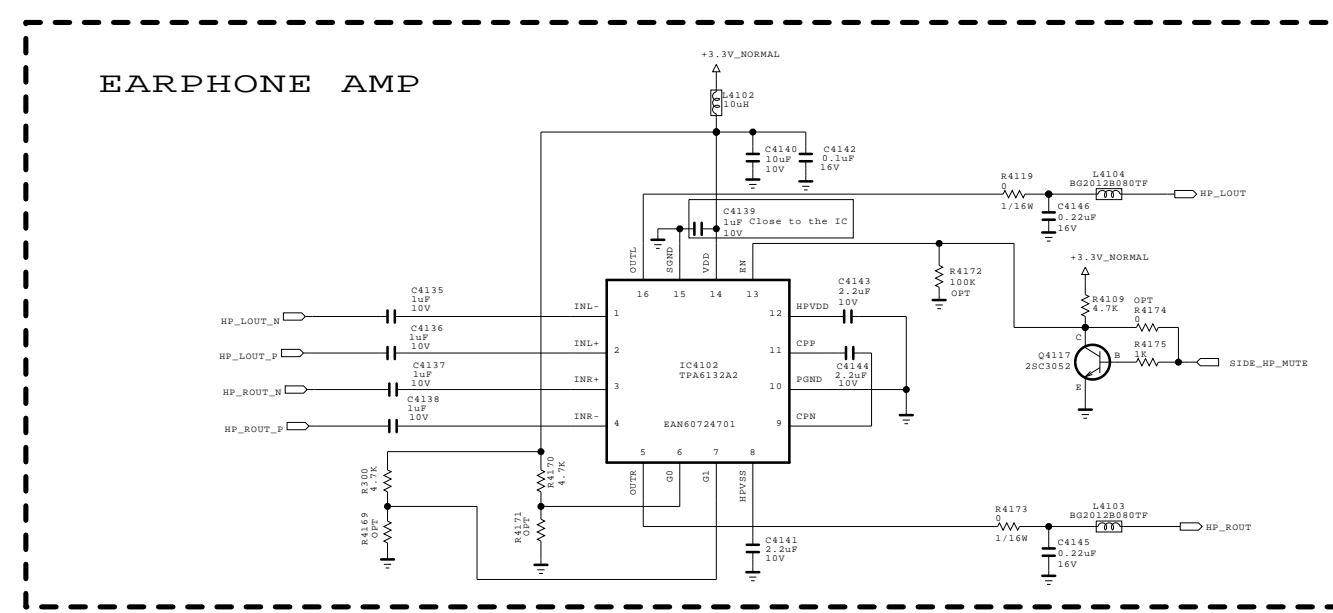
MODEL		DATE	
BLOCK		SHEET	40 /



Audio Out Amp EU_SCART [OPT]



EARPHONE BLOCK



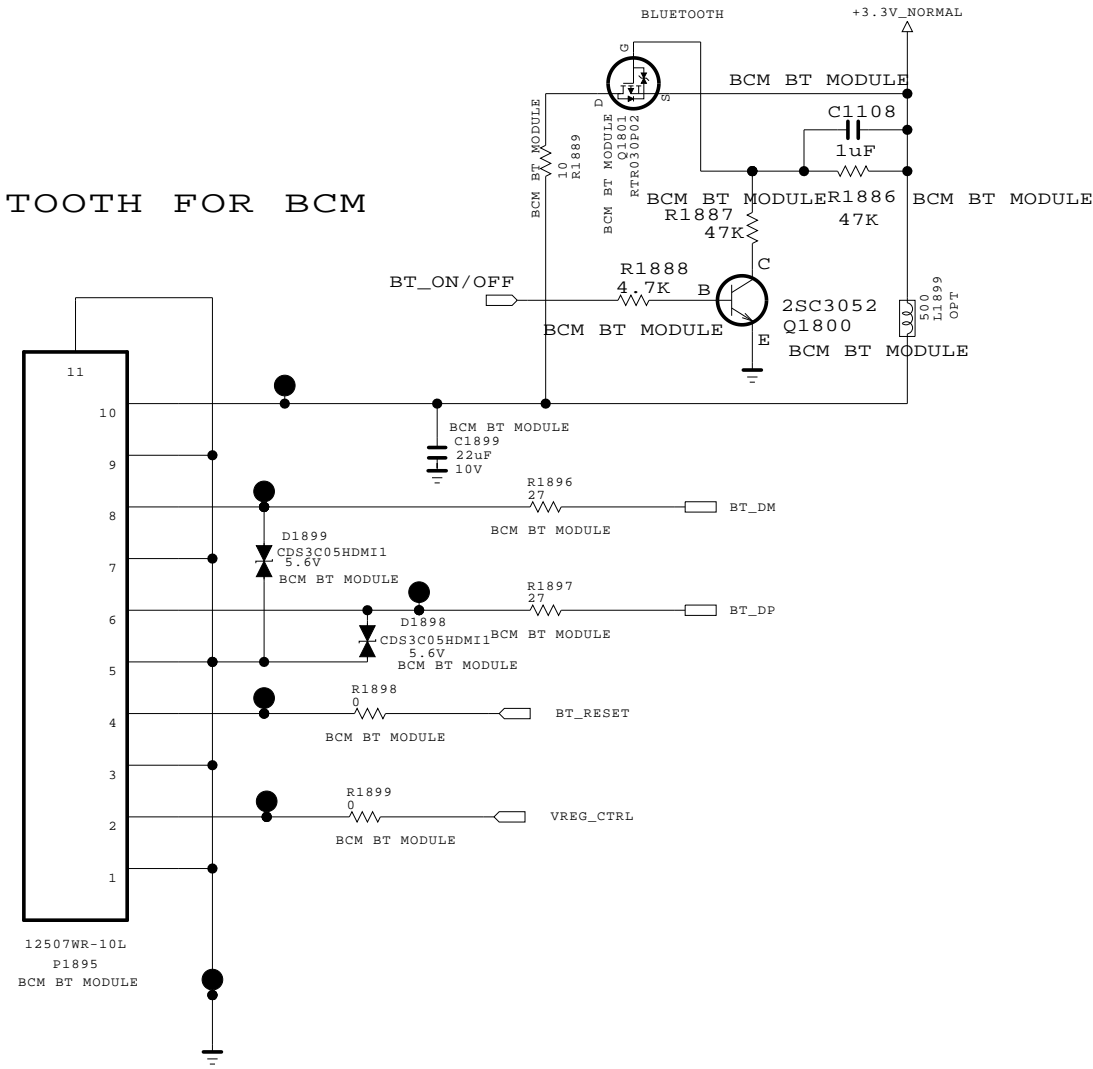
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MODEL	EUROBTV	DATE	2009.06.18
BLOCK	ETC SUB BOARD I/F	SHEET	41

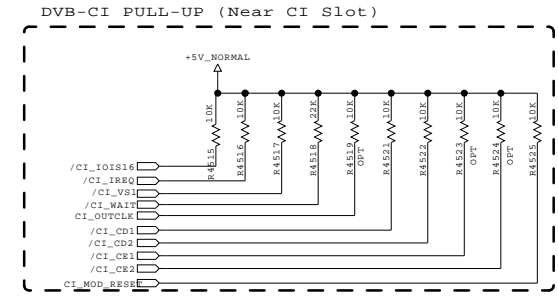
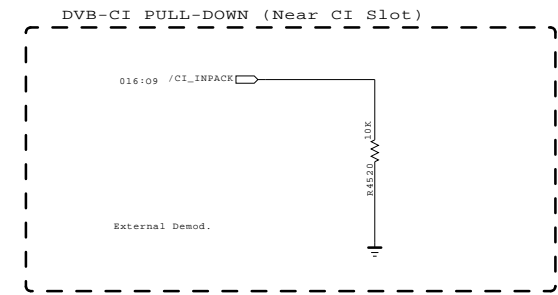
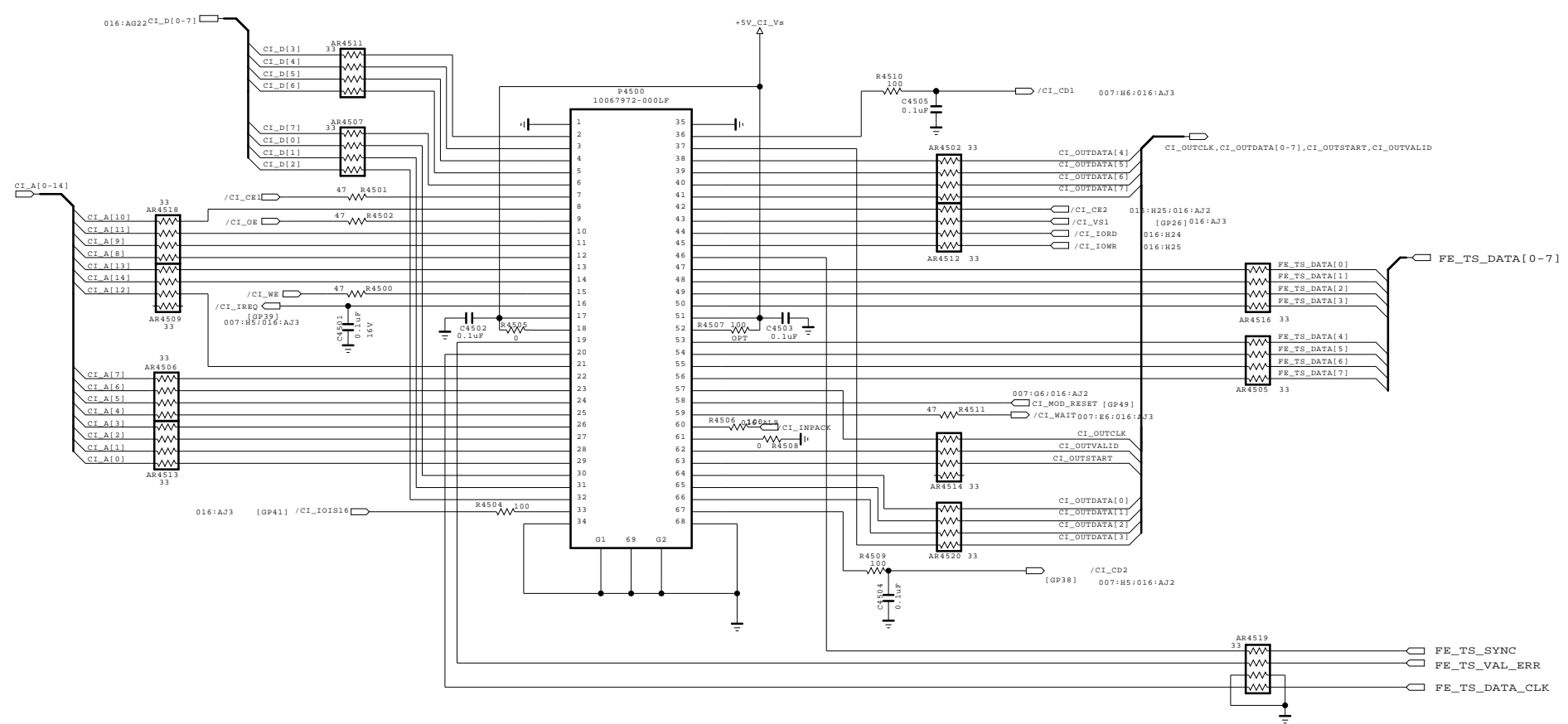
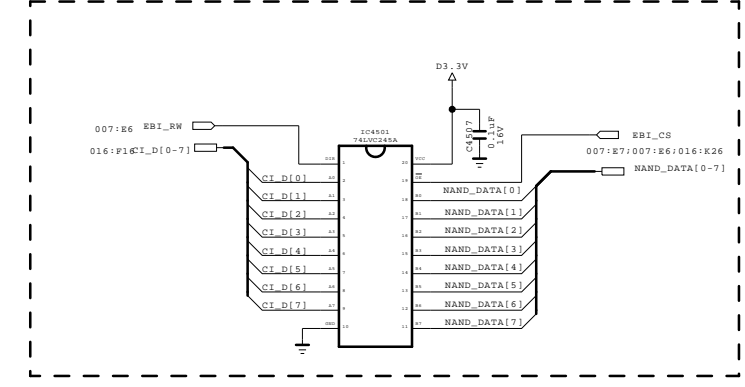
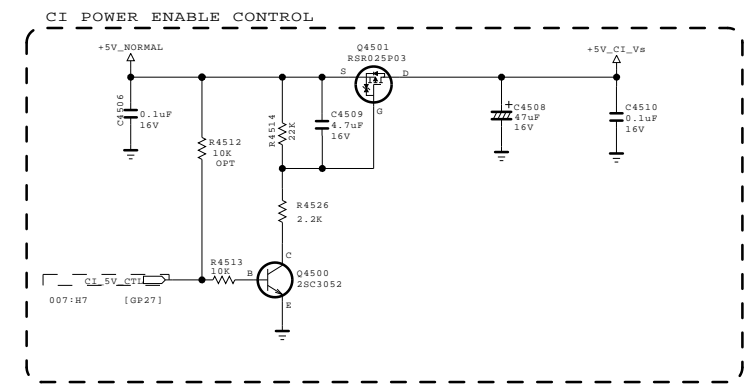
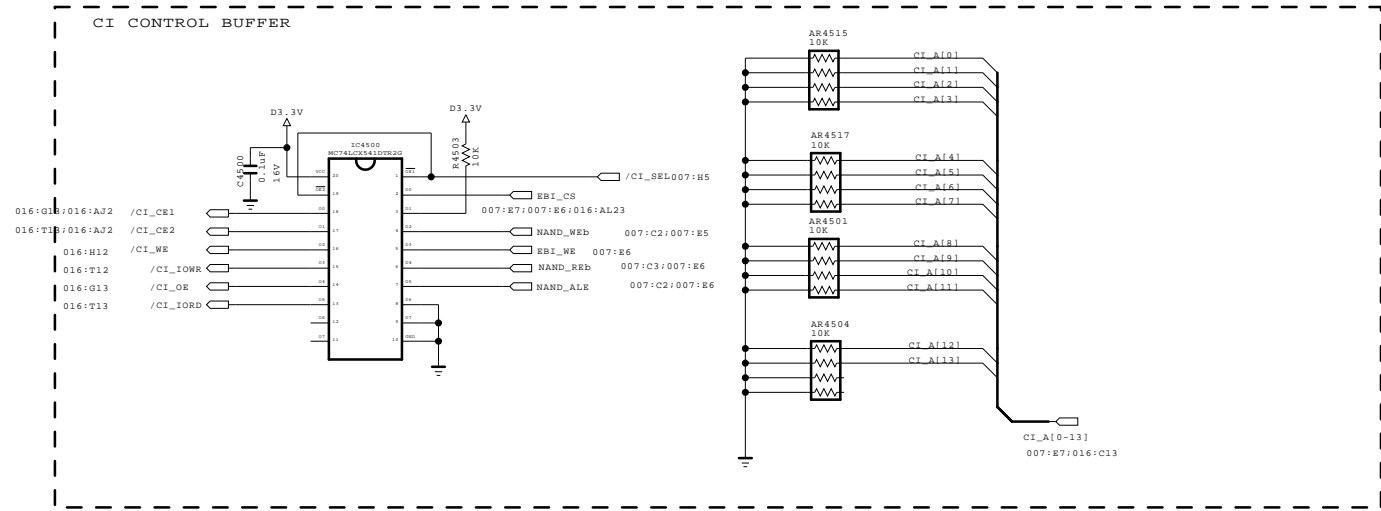
BLUETOOTH FOR BCM



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SECRET	LG ELECTRONICS
LG Electronics	

MODEL		DATE	
BLOCK		SHEET	43 /



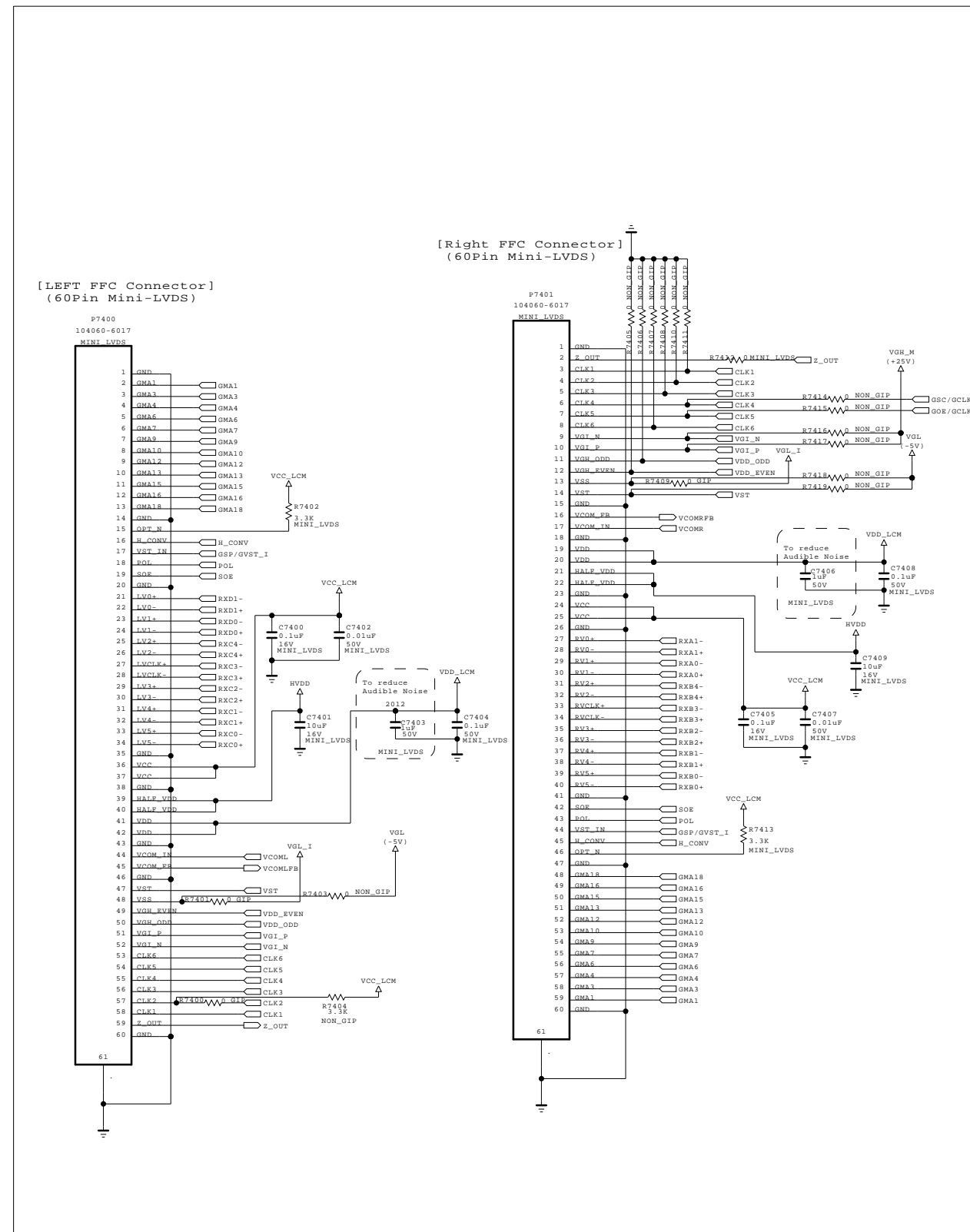
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

SECRET
LGElectronics



MODEL	EUROBBTV	DATE	2009.06.18
BLOCK	CI	SHEET	45

Mini LVDS



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.

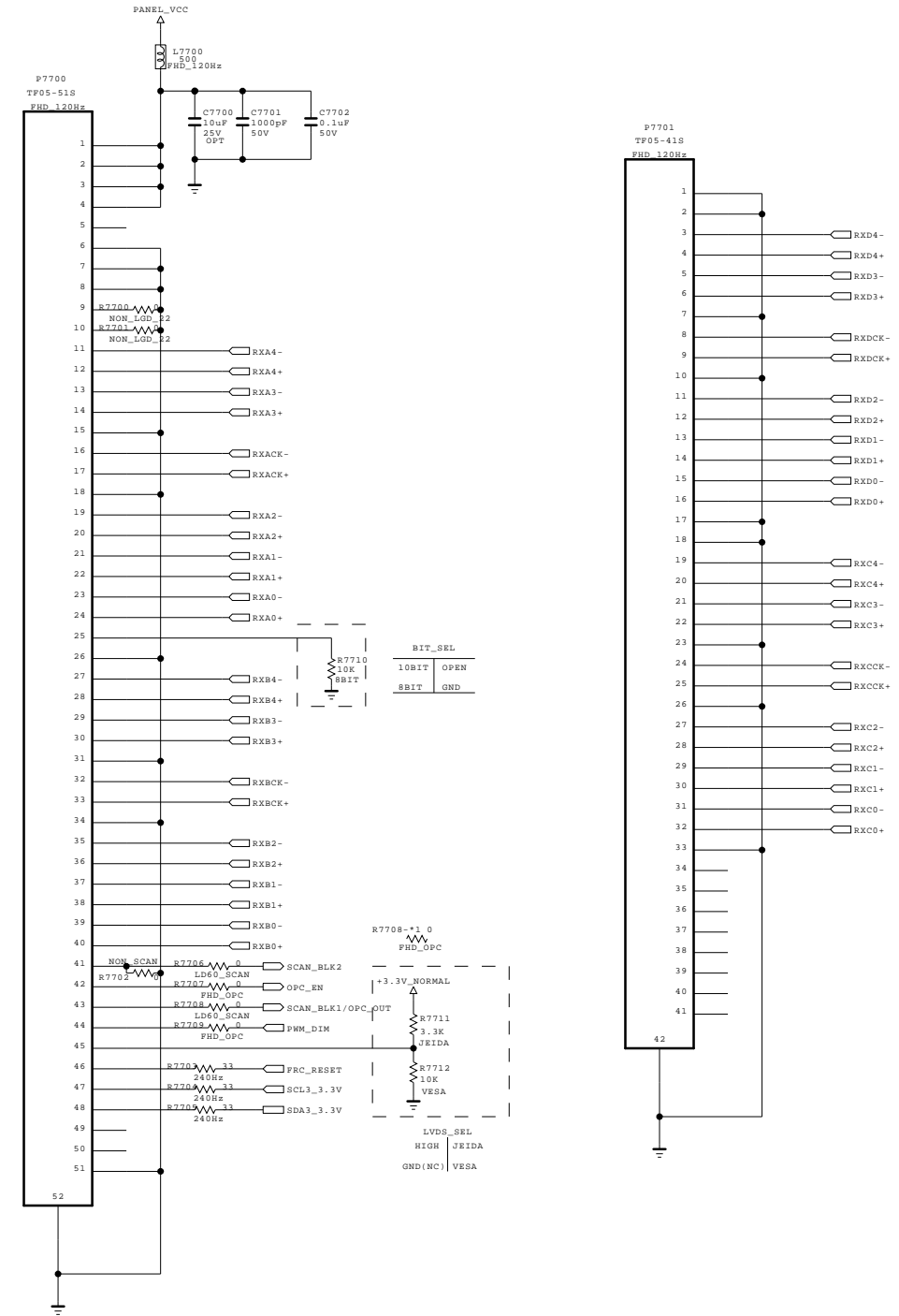
SECRET	LG ELECTRONICS
LGElectronics	

MODEL	COMMON	DATE	09/10/xx
BLOCK	URSA3 120Hz MINI_LVDS	SHEET	74

LVDS

[51Pin LVDS Connector]
(For FHD 60/120Hz)

[41Pin LVDS Connector]
(For FHD 120Hz)



TP7700 ● ———— OPC_OUT

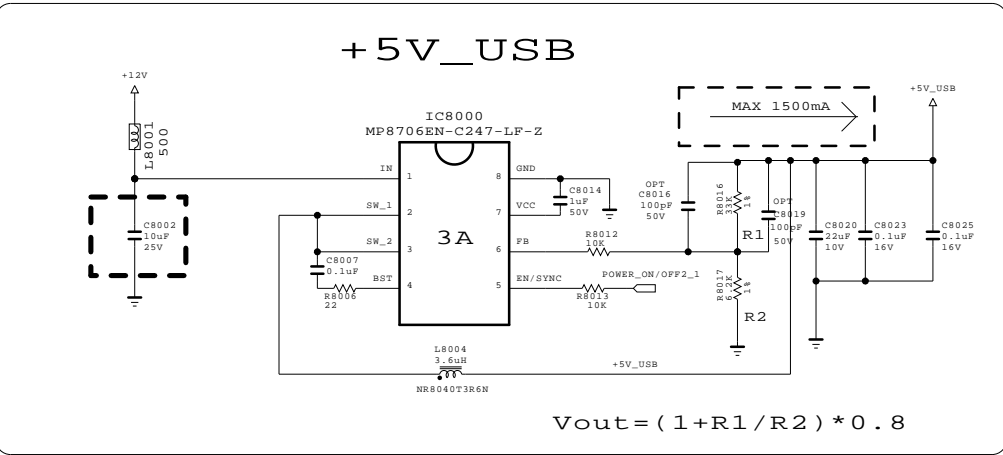
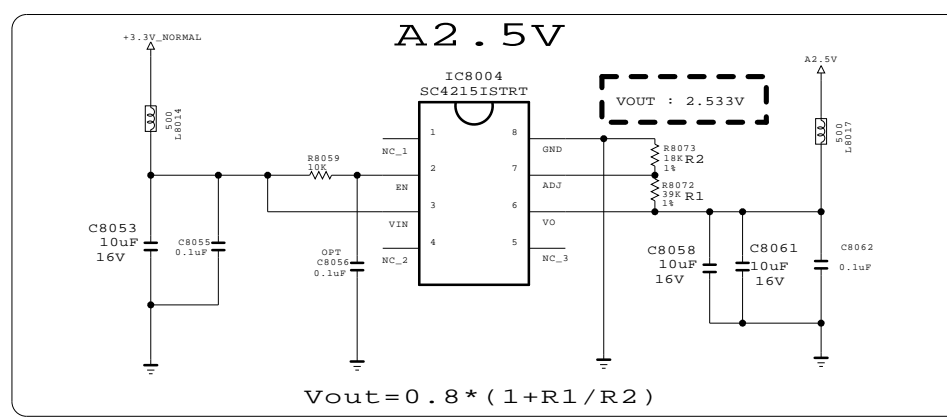
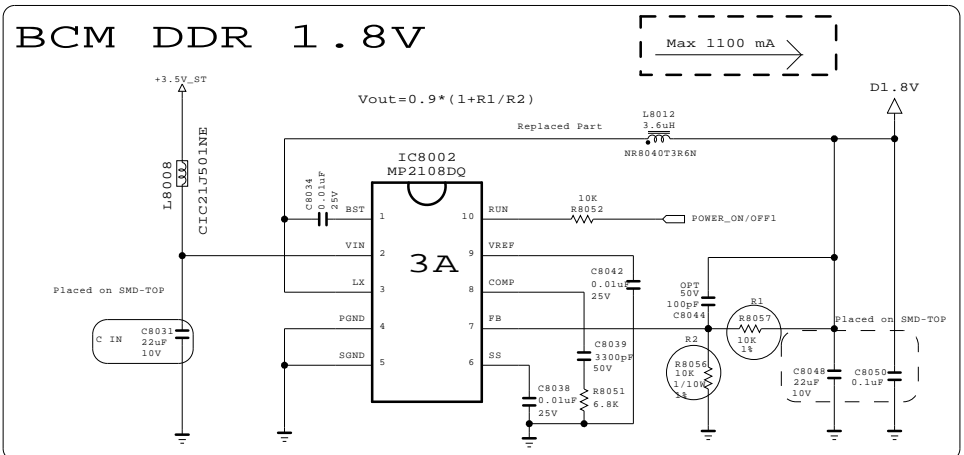
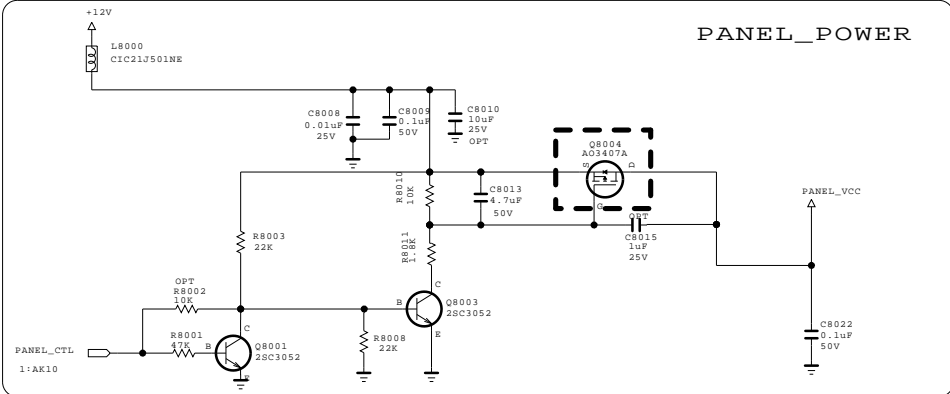
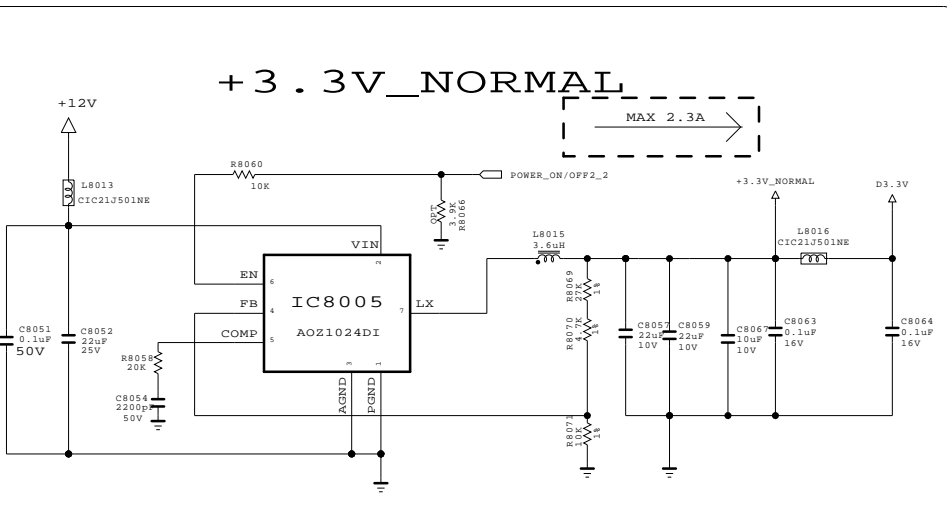
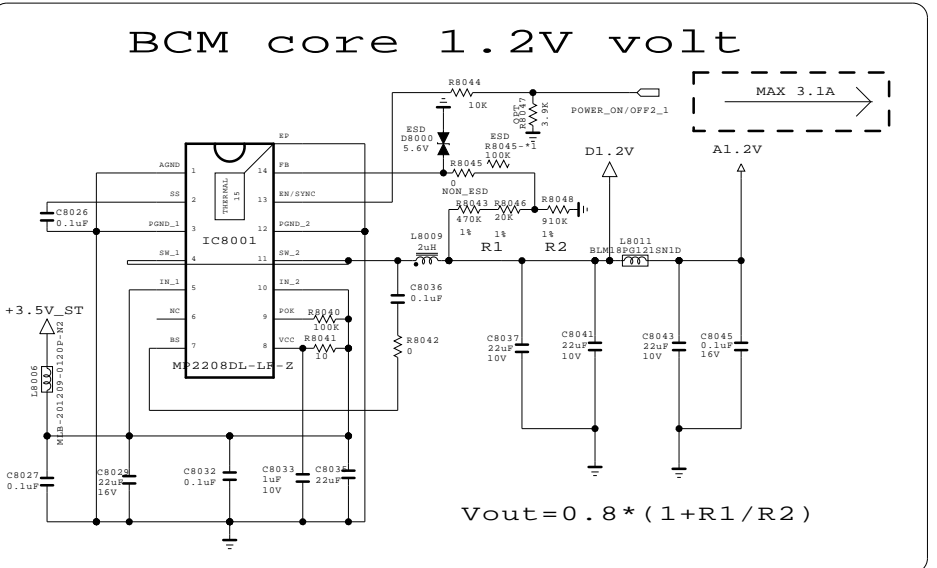
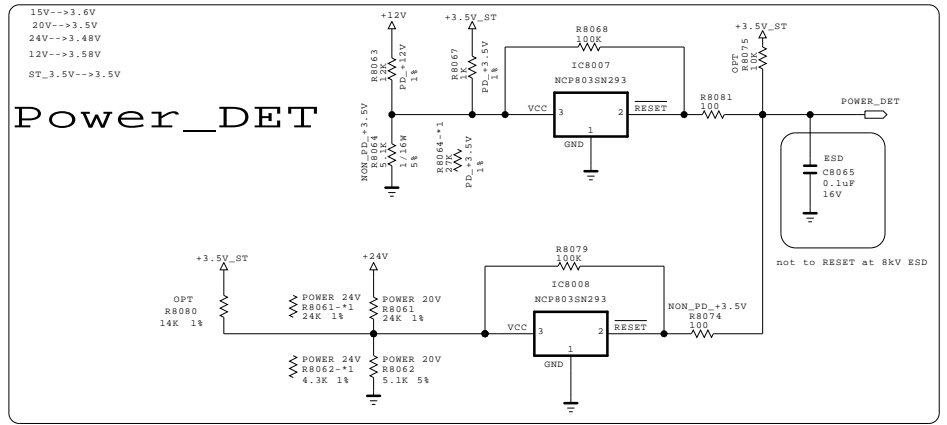
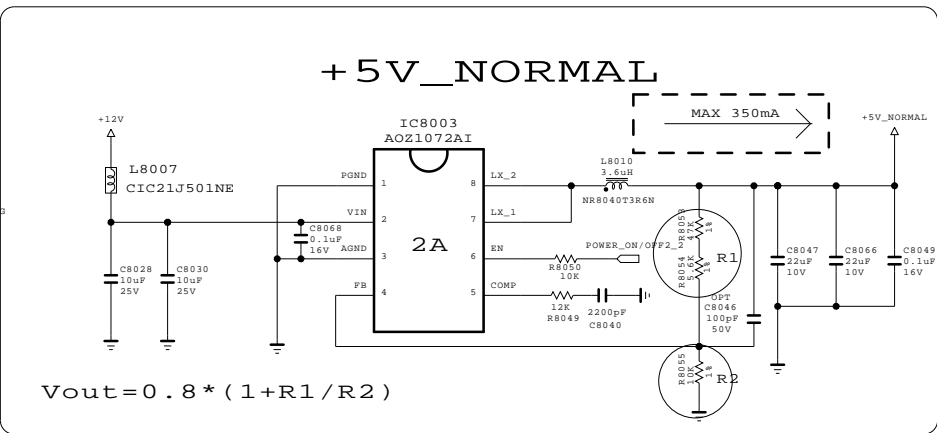
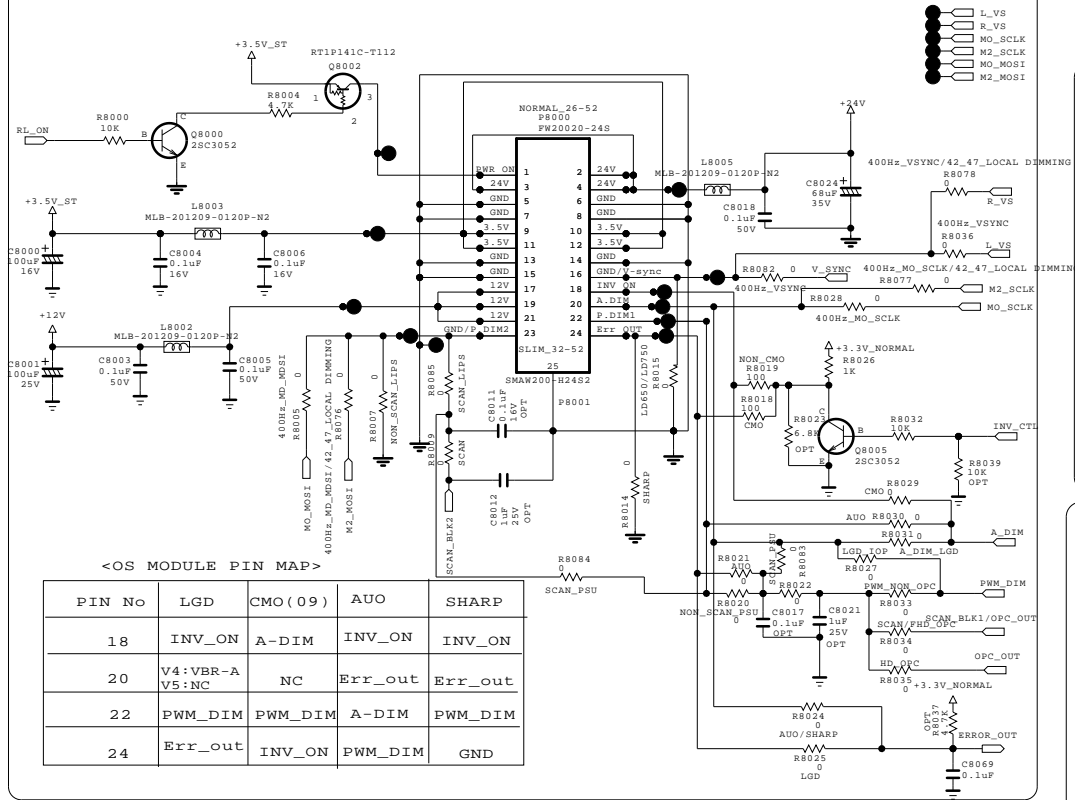
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

SECRET
LGElectronics



MODEL		DATE	
BLOCK		SHEET	35

FROM LIPS & POWER B/D

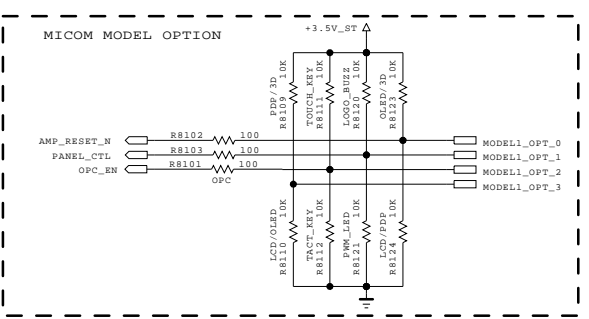
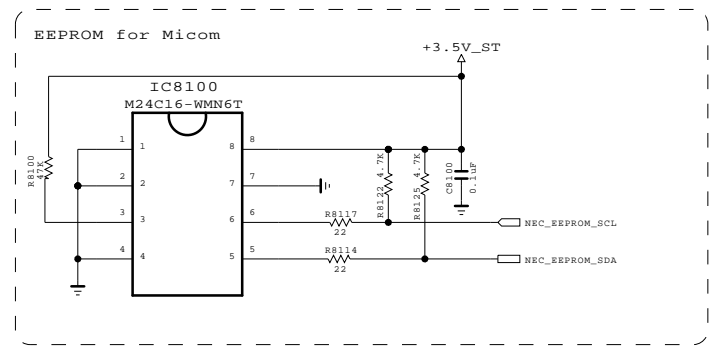
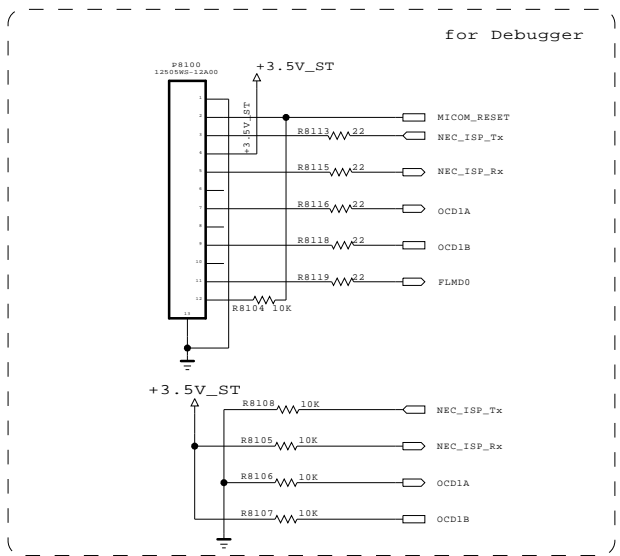


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SECRET
LGElectronics



MODEL	BCM (EUROBBTV)	DATE	
BLOCK	POWER	SHEET	15

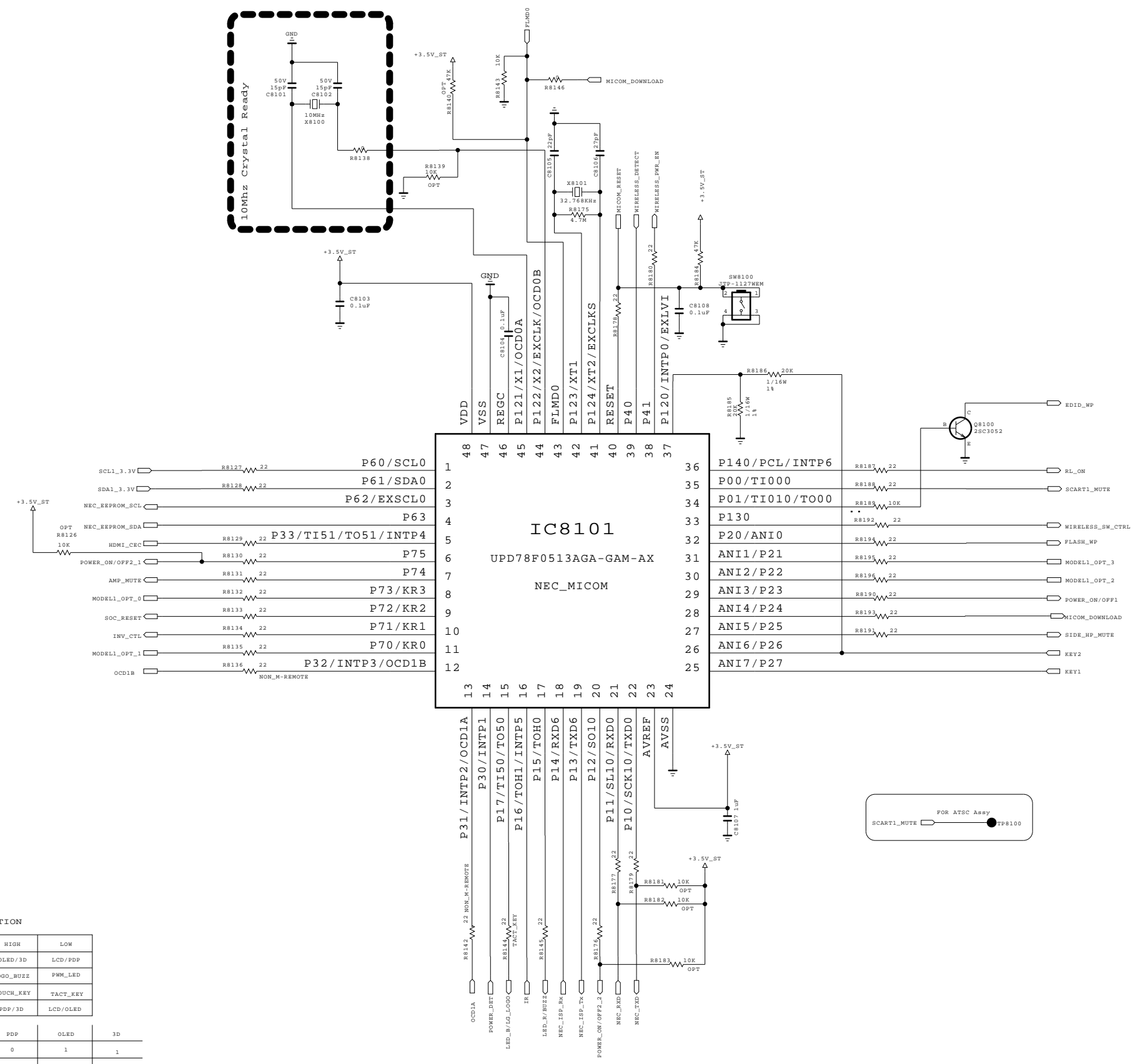


MODEL OPTION

PIN NAME	PIN NO.	HIGH	LOW
MODEL_OPT_0	8	OLED/3D	LCD/PDP
MODEL_OPT_1	11	LOGO_BUZZ	PMW_LED
MODEL_OPT_2	30	TOUCH_KEY	TACT_KEY
MODEL_OPT_3	31	PDP/3D	LCD/OLED

	LCD	PDP	OLED	3D
MODEL_OPT_0	0	0	1	1
MODEL_OPT_3	0	1	0	1

	LOW	LOW_SMALL	TBD	HIGH
MODEL_OPT_1	0	0	1	1
MODEL_OPT_2	0	1	0	1



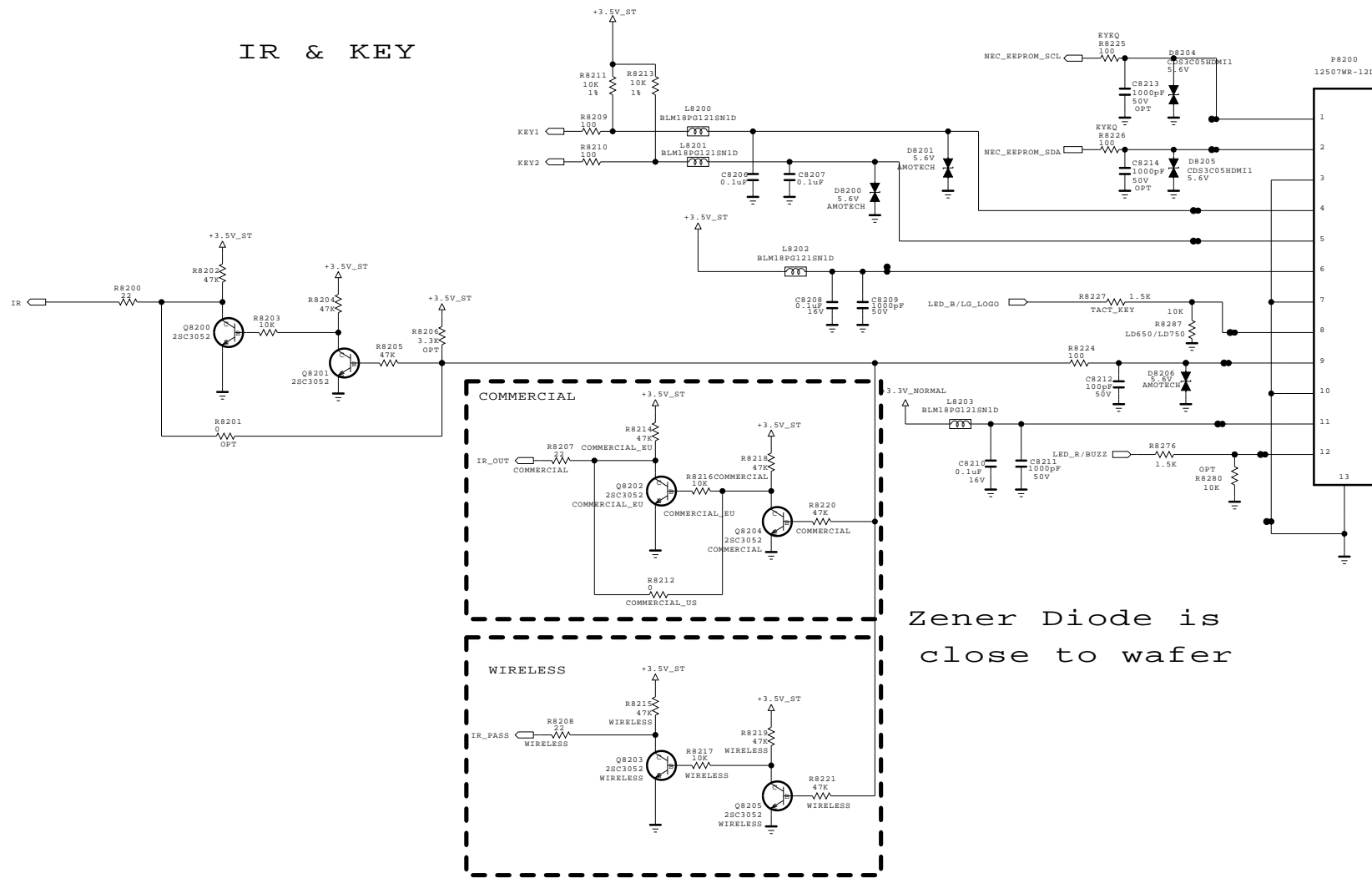
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

SECRET
LGElectronics

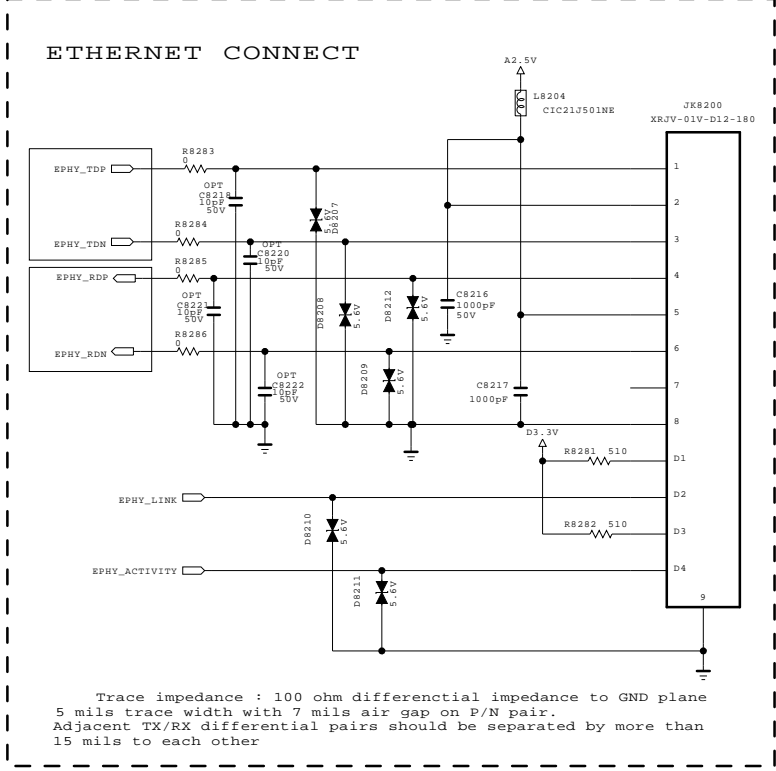


MODEL	GP2_Saturn7M	DATE	Ver. 1.4
BLOCK	MICOM	SHEET	5

IR & KEY

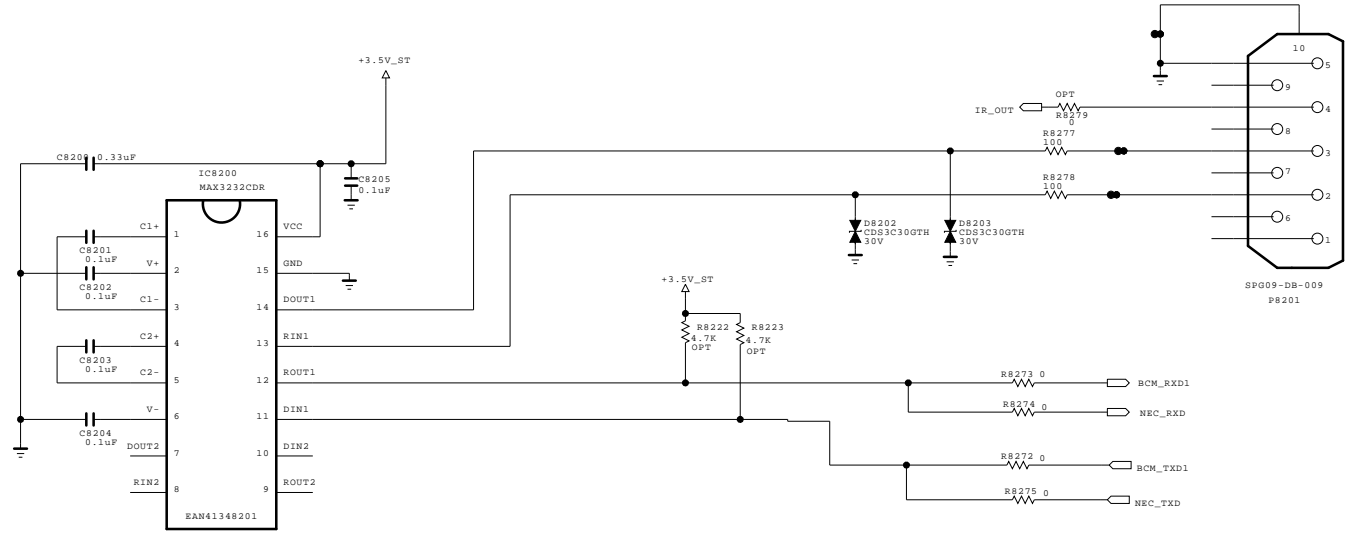


Zener Diode is close to wafer



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

RS232C

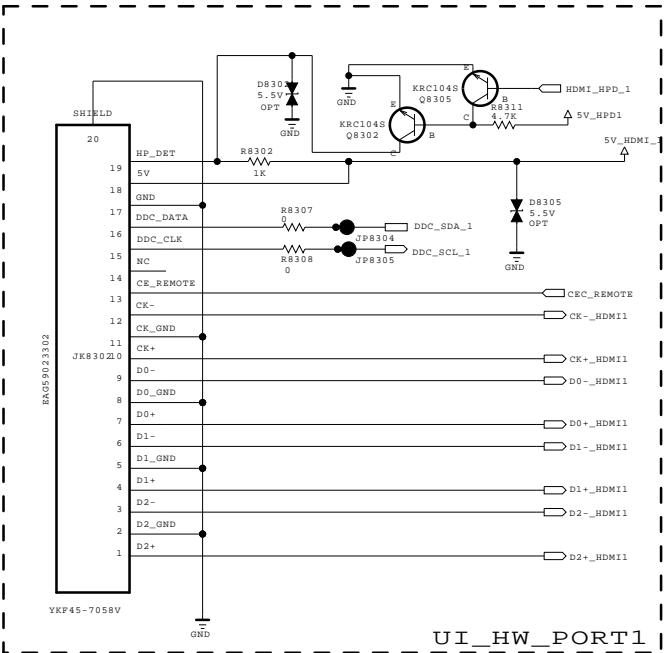


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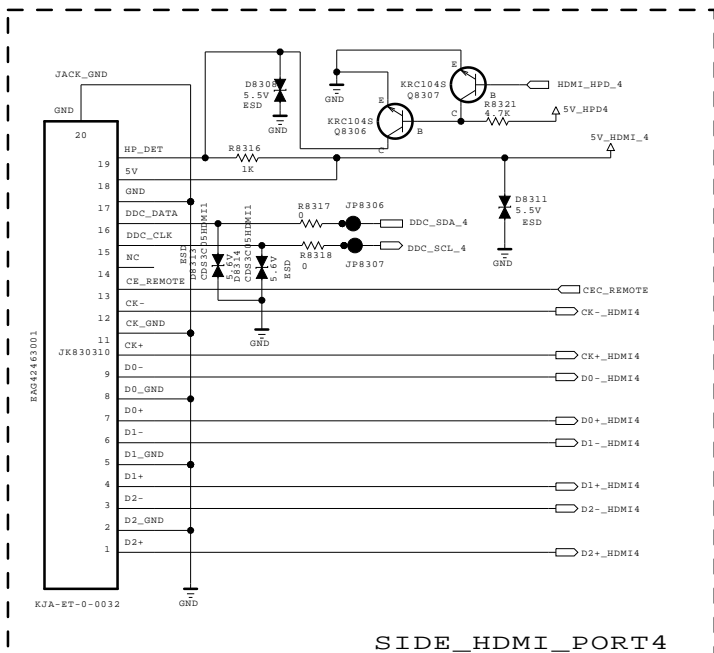
SECRET
LGElectronics



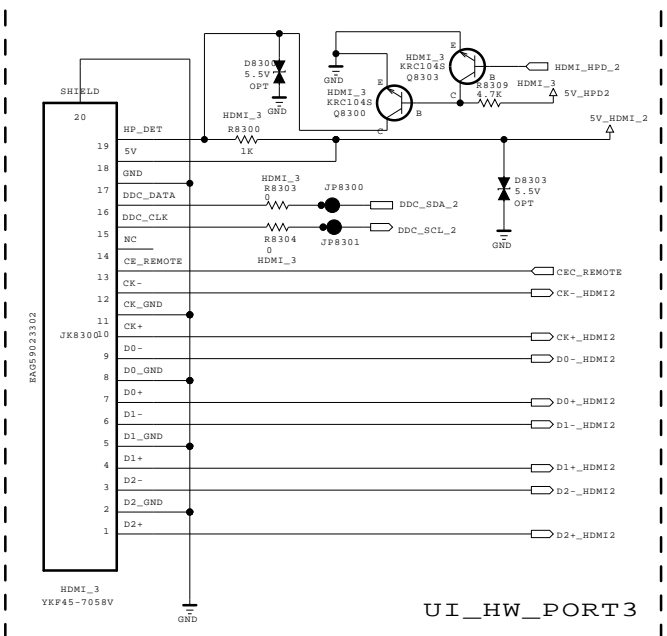
MODEL		DATE	
BLOCK		SHEET	



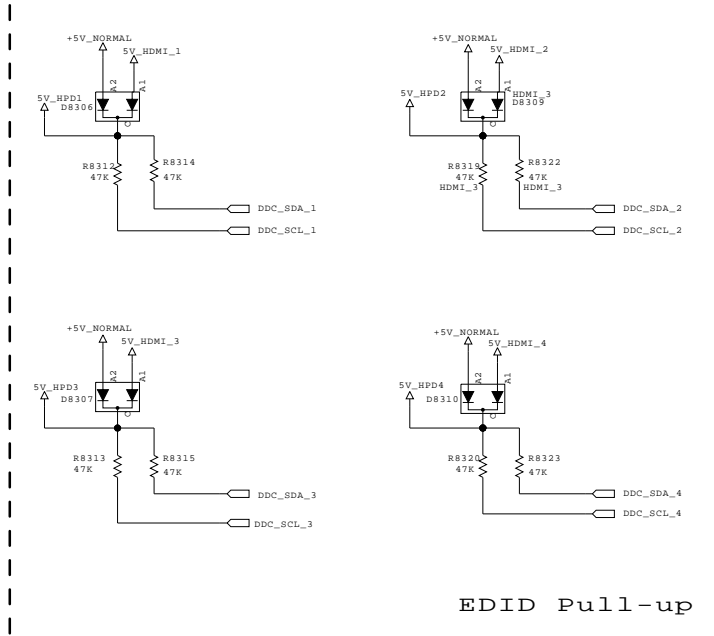
UI_HW_PORT1



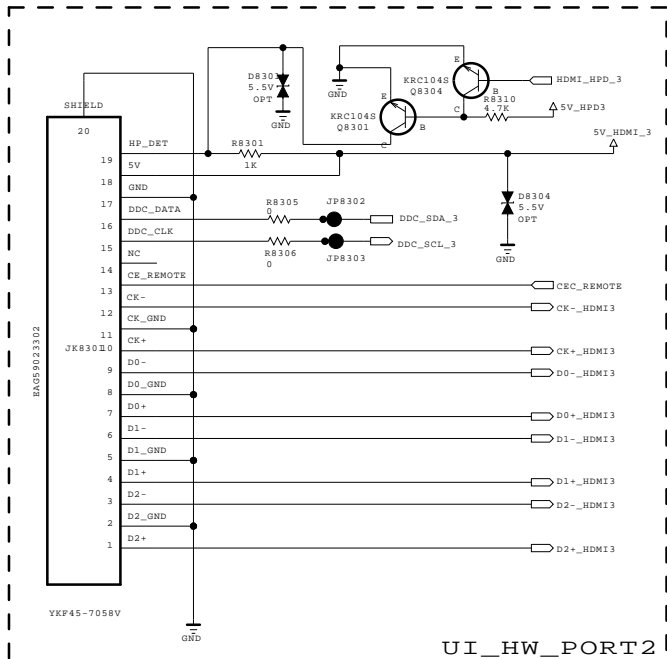
SIDE_HDMI_PORT4



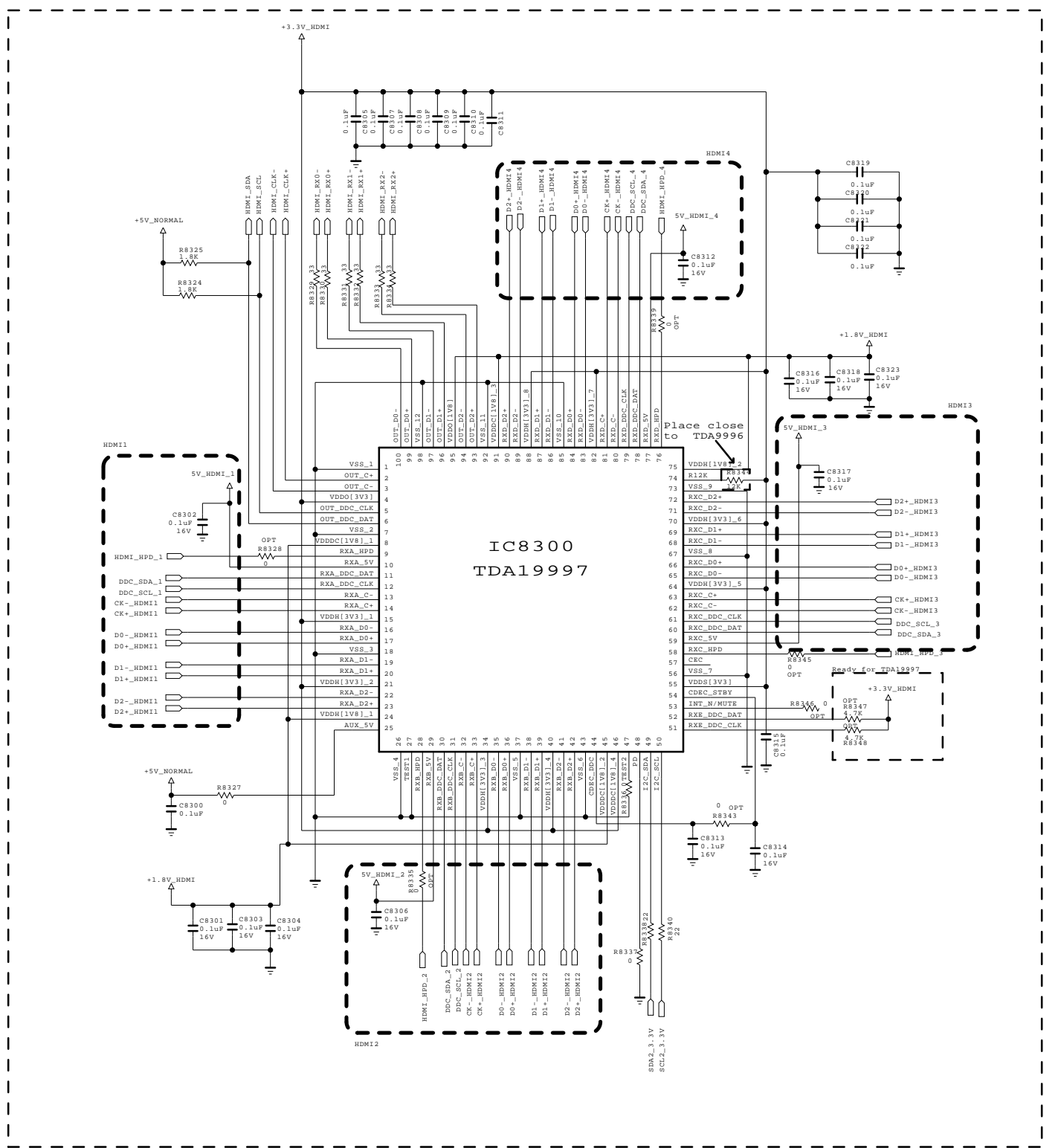
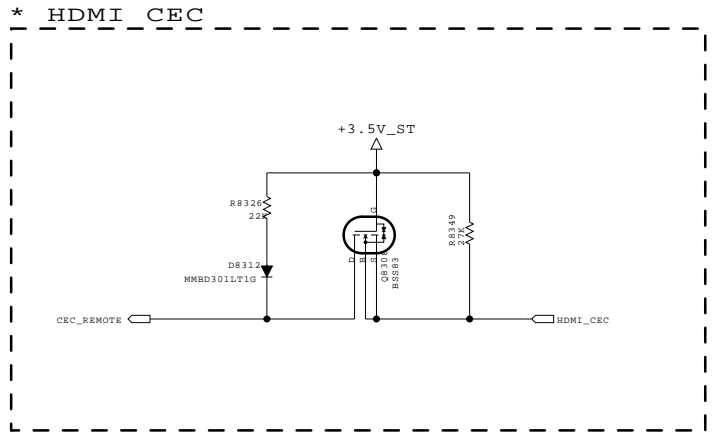
UI_HW_PORT3



EDID Pull-up



UI_HW_PORT2



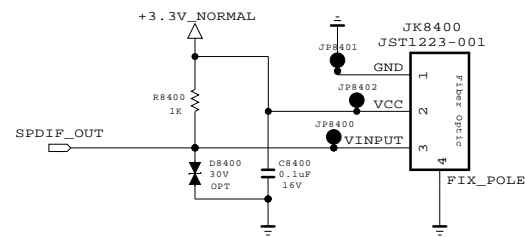
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SECRET
LGElectronics

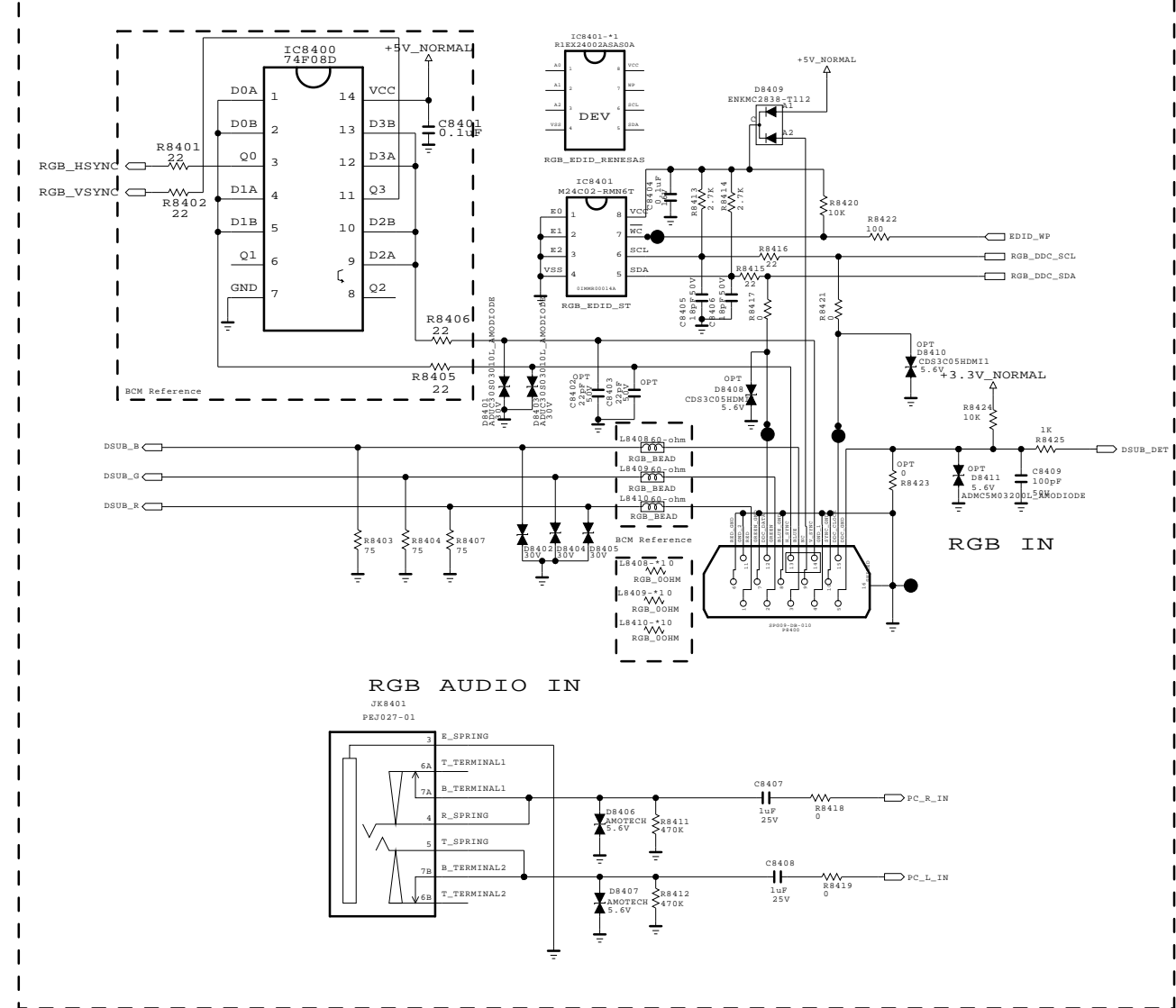
LEE GI YOUNG



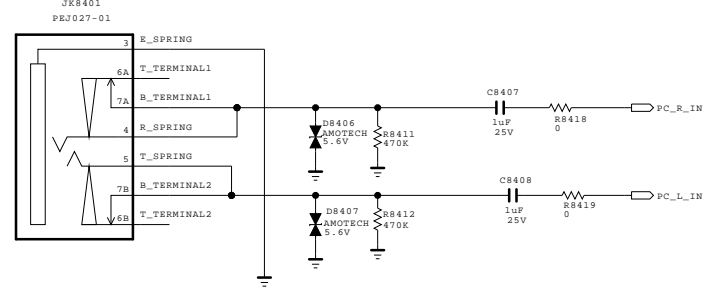
MODEL	BCM (EUROBBTV)	DATE	2009.06.18
BLOCK	HDMI	SHEET	8



RGB_PC



RGB AUDIO IN



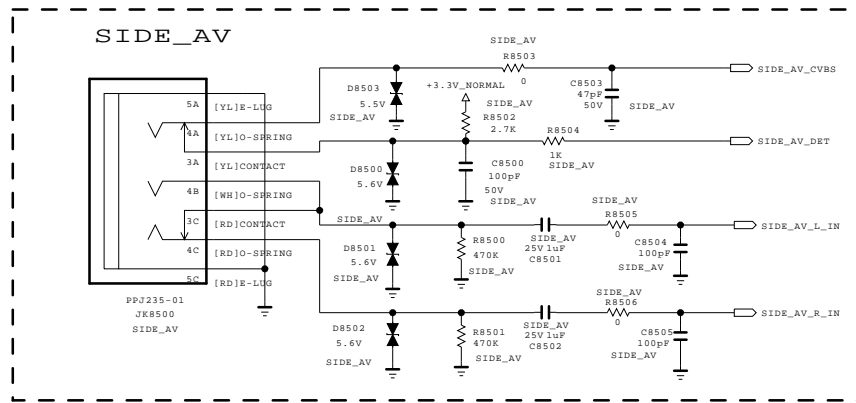
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LGElectronics



MODEL	EUROBBTV	DATE	2009.06.18
BLOCK	ETC SUB BOARD I/F	SHEET	9 /

(New Item Development H:9.2mm)



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

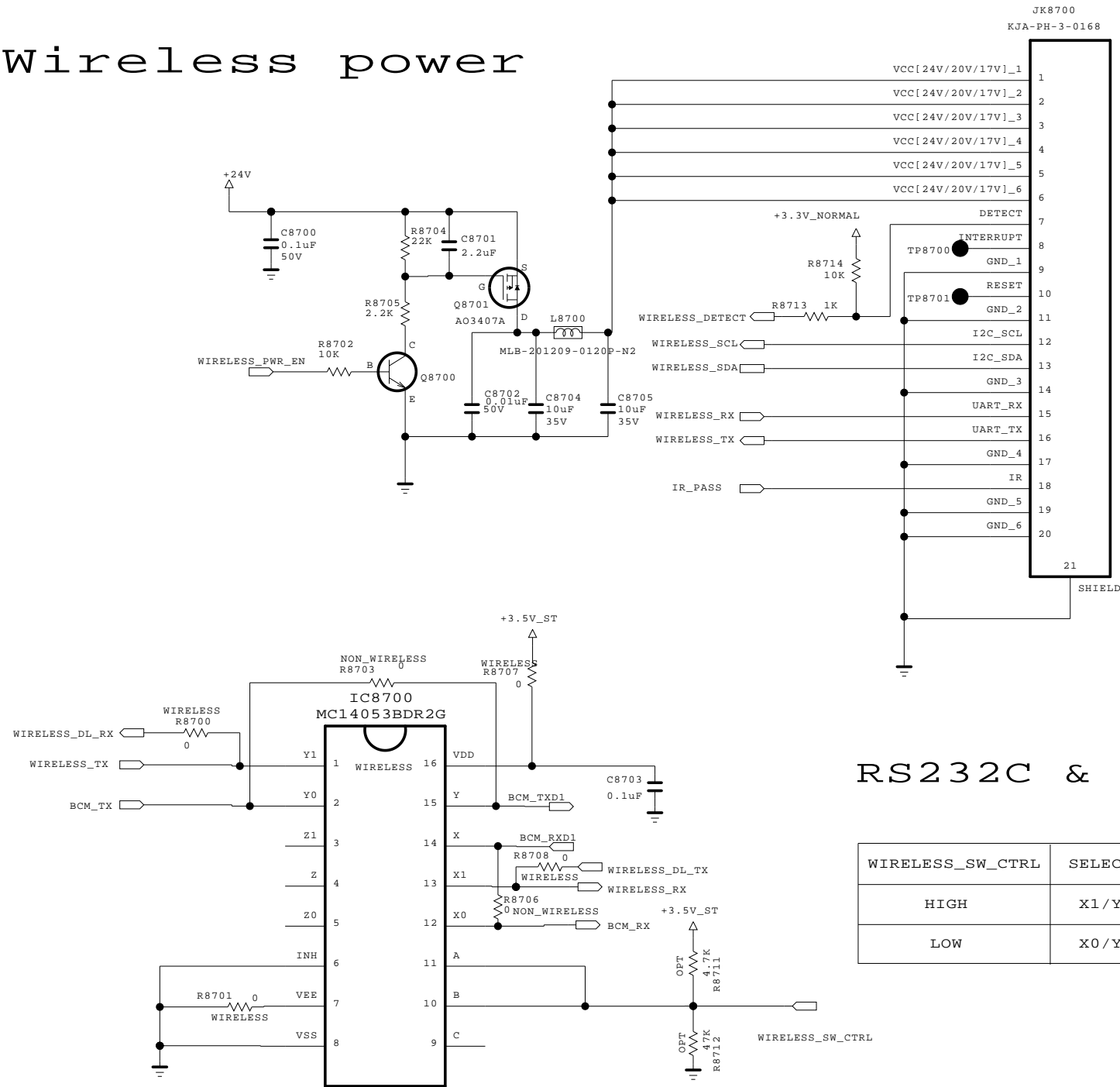
SECRET
LGElectronics



MODEL		DATE	
BLOCK		SHEET	/

WIRELESS READY MODEL

Wireless power



RS232C & Wireless

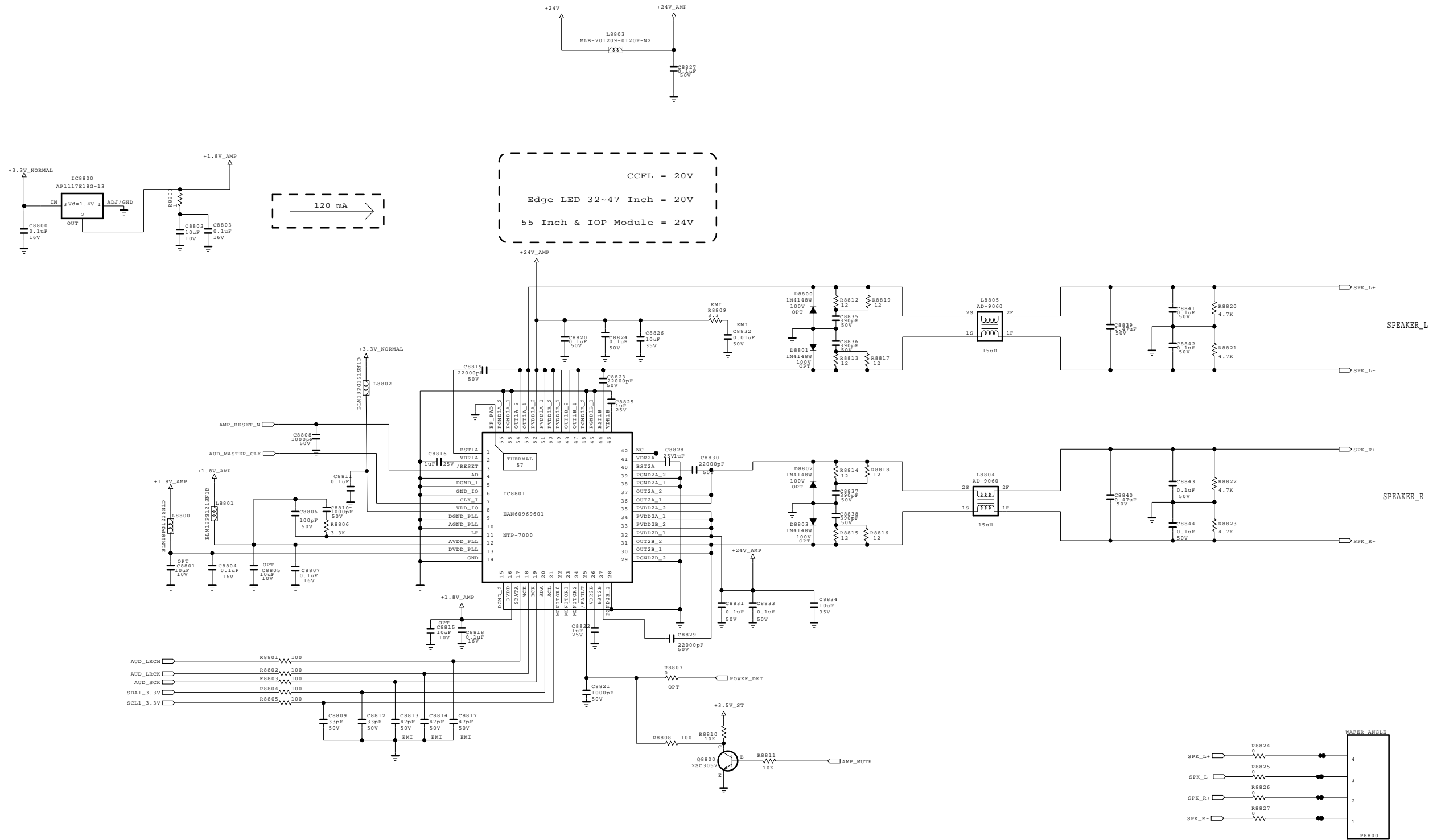
WIRELESS_SW_CTRL	SELECT PIN	STATUS
HIGH	X1/Y1/Z1	WIRELESS Dongle connect --> WIRELESS RS232
LOW	X0/Y0/Z0	WIRELESS Dongle Dis_con --> S7 RS232

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

LG ELECTRONICS

MODEL		DATE	
BLOCK		SHEET	12 /

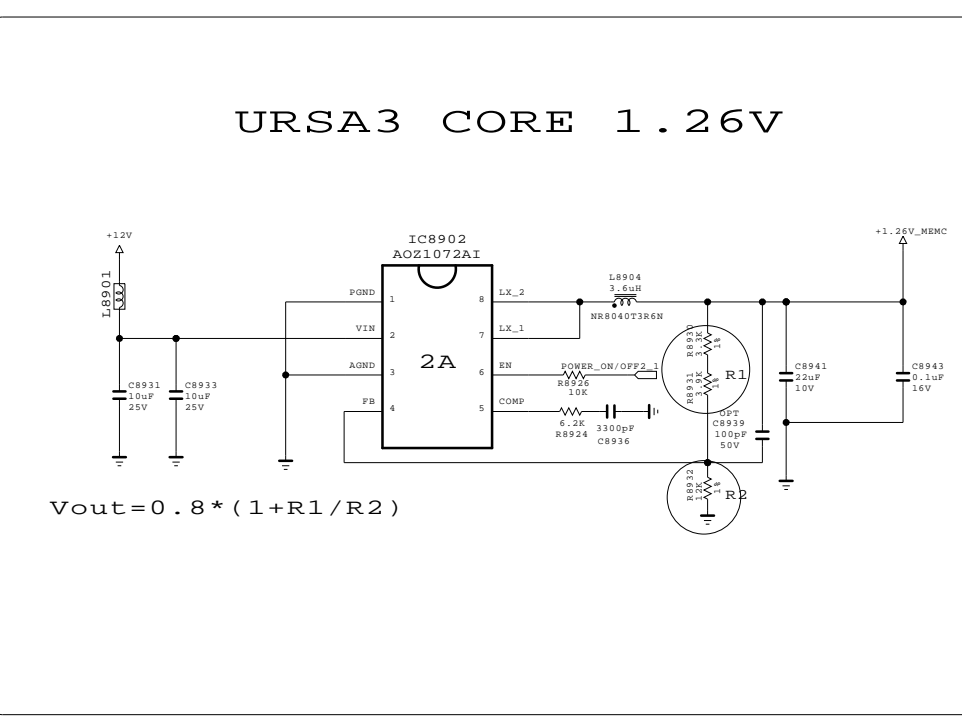
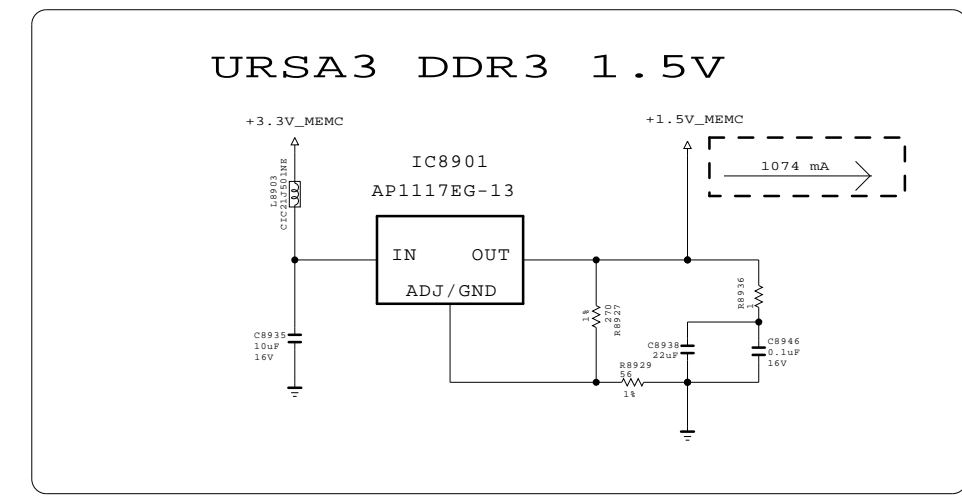
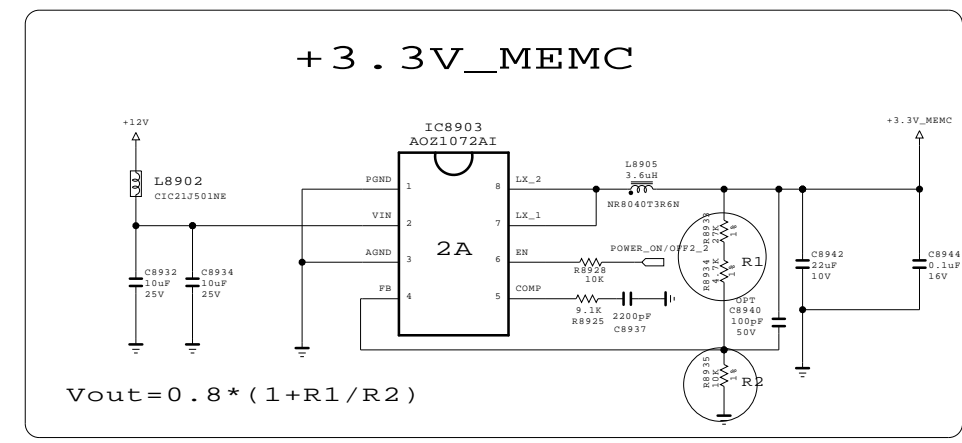
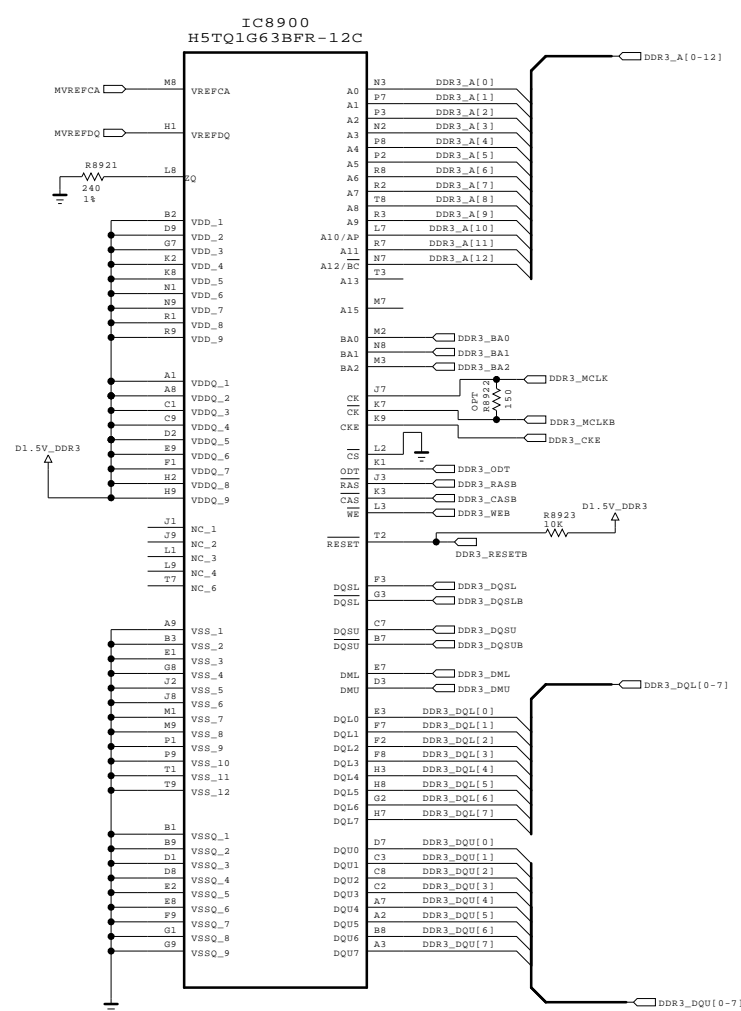
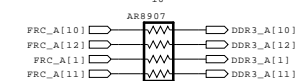
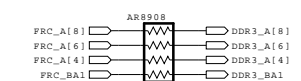
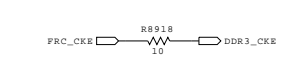
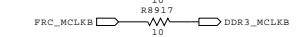
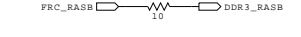
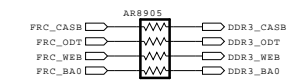
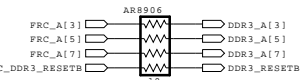
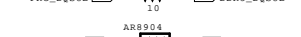
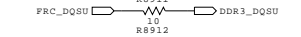
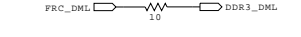
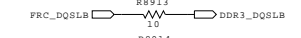
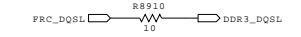
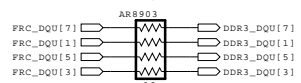
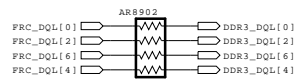
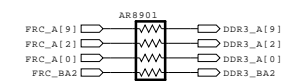
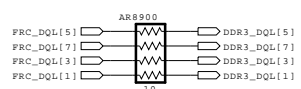
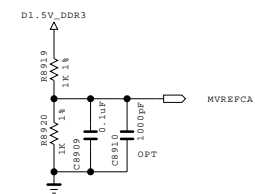
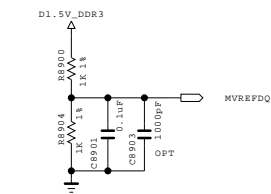
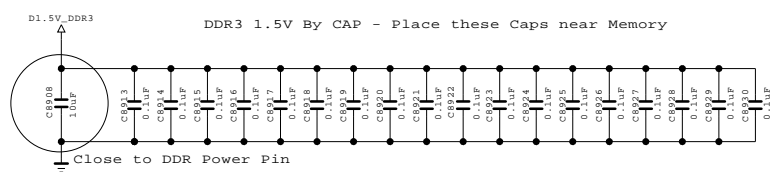
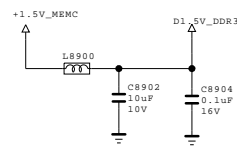


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SECRET
LGElectronics

KIM JONG HYUN LG ELECTRONICS

MODEL	BCM (EUROBBTV)	DATE	2009.06.18
BLOCK	NTP7000	SHEET	38 /



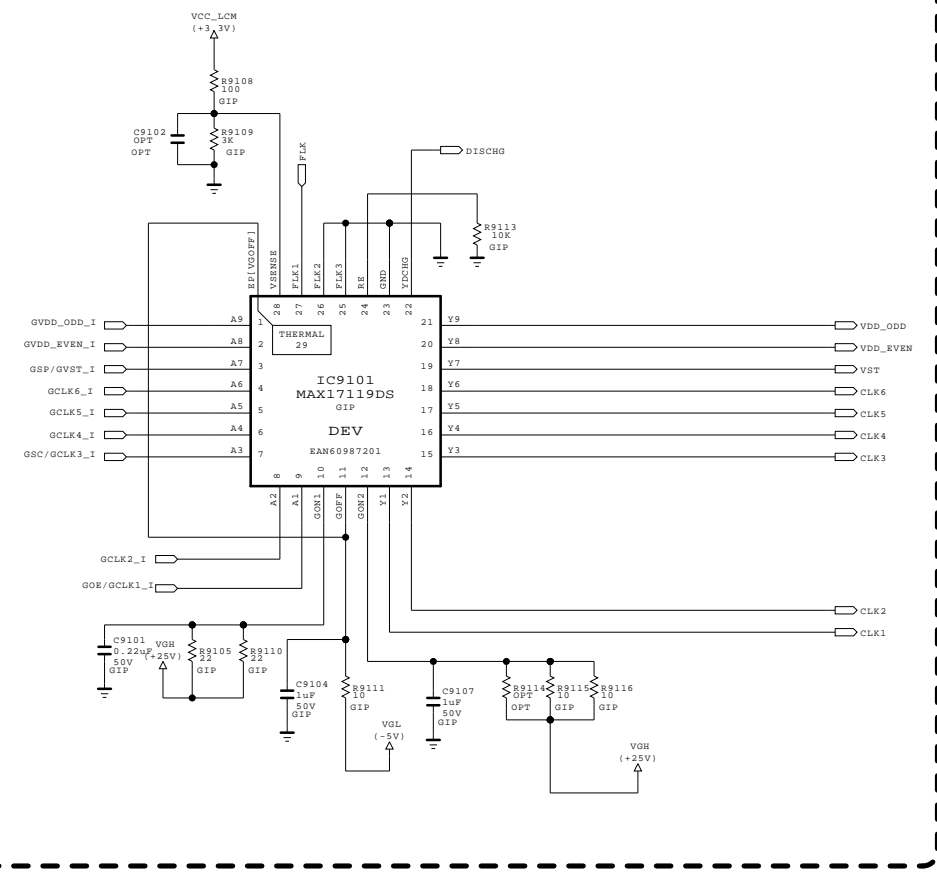
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SECRET
LGElectronics



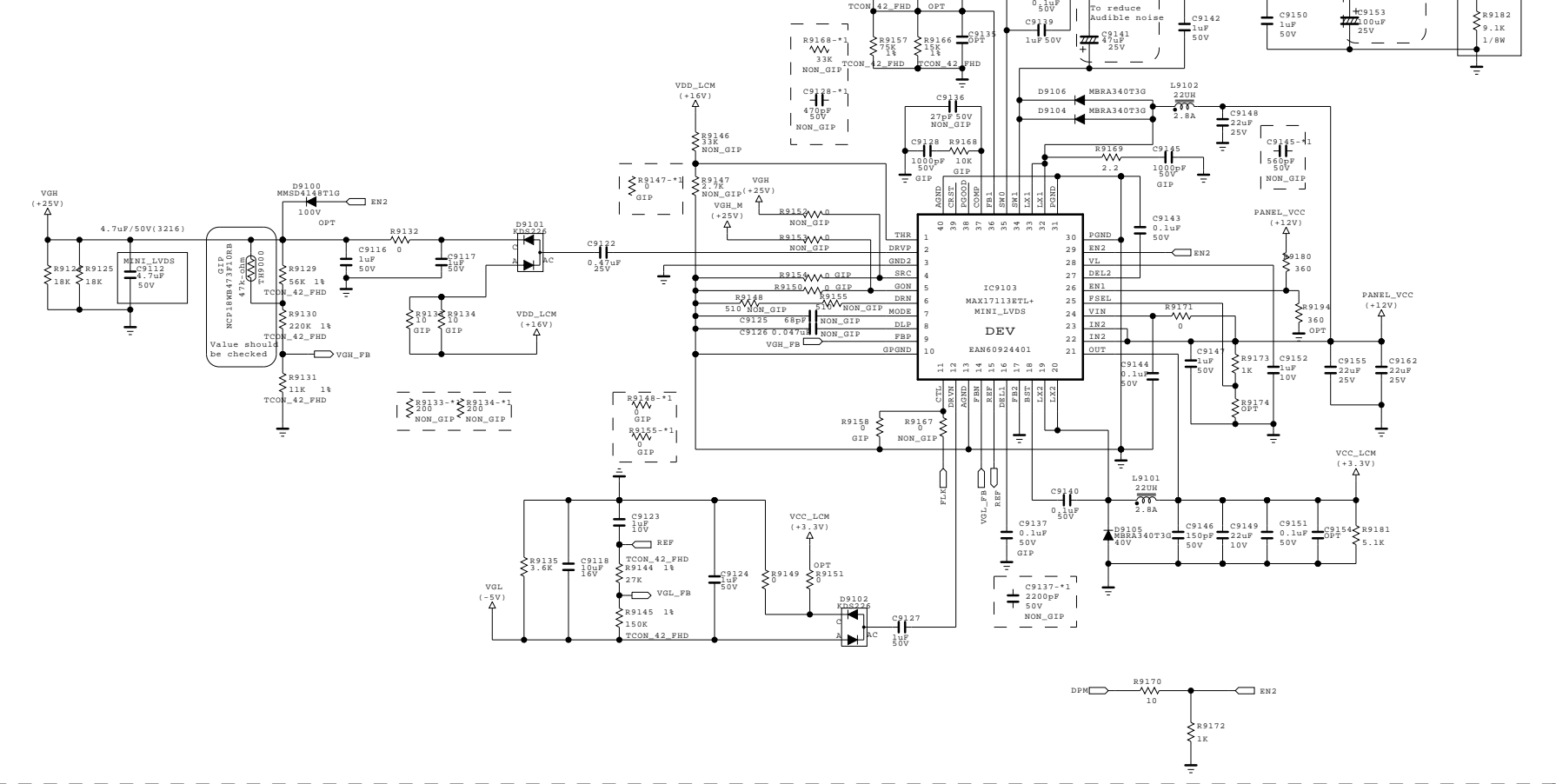
MODEL	COMMON	DATE	2009.09.11
BLOCK	URSA3 DDR & Power	SHEET	89

[LEVEL Shift Block]



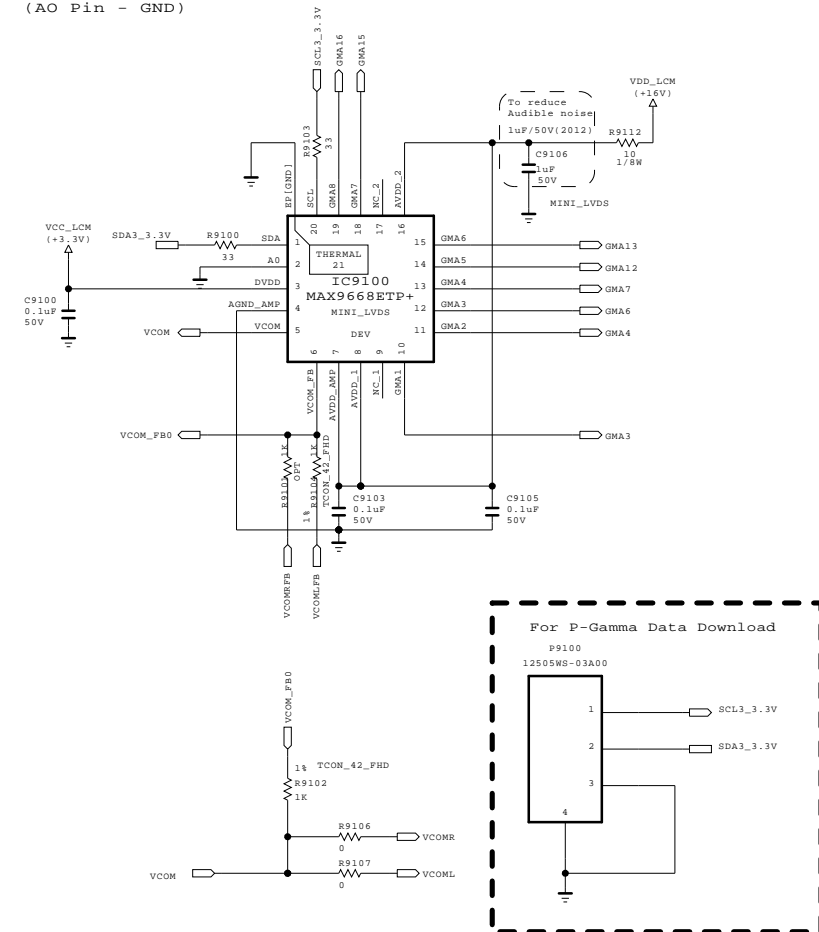
[POWER Block]

* Voltage Target
 VDD_LCM = 16.25V
 VGH = 28.50V
 VGL = -5.35V

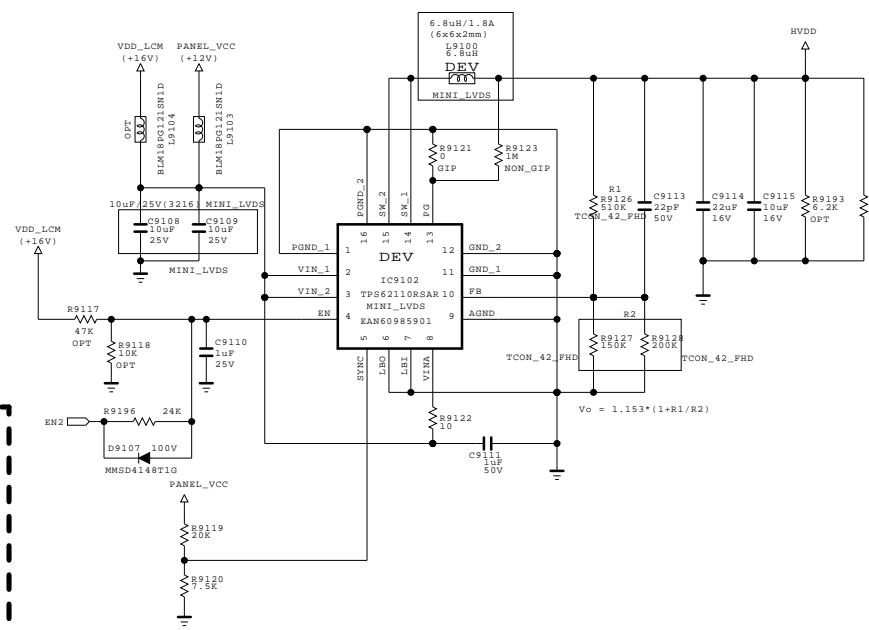


[P-GAMMA Block]

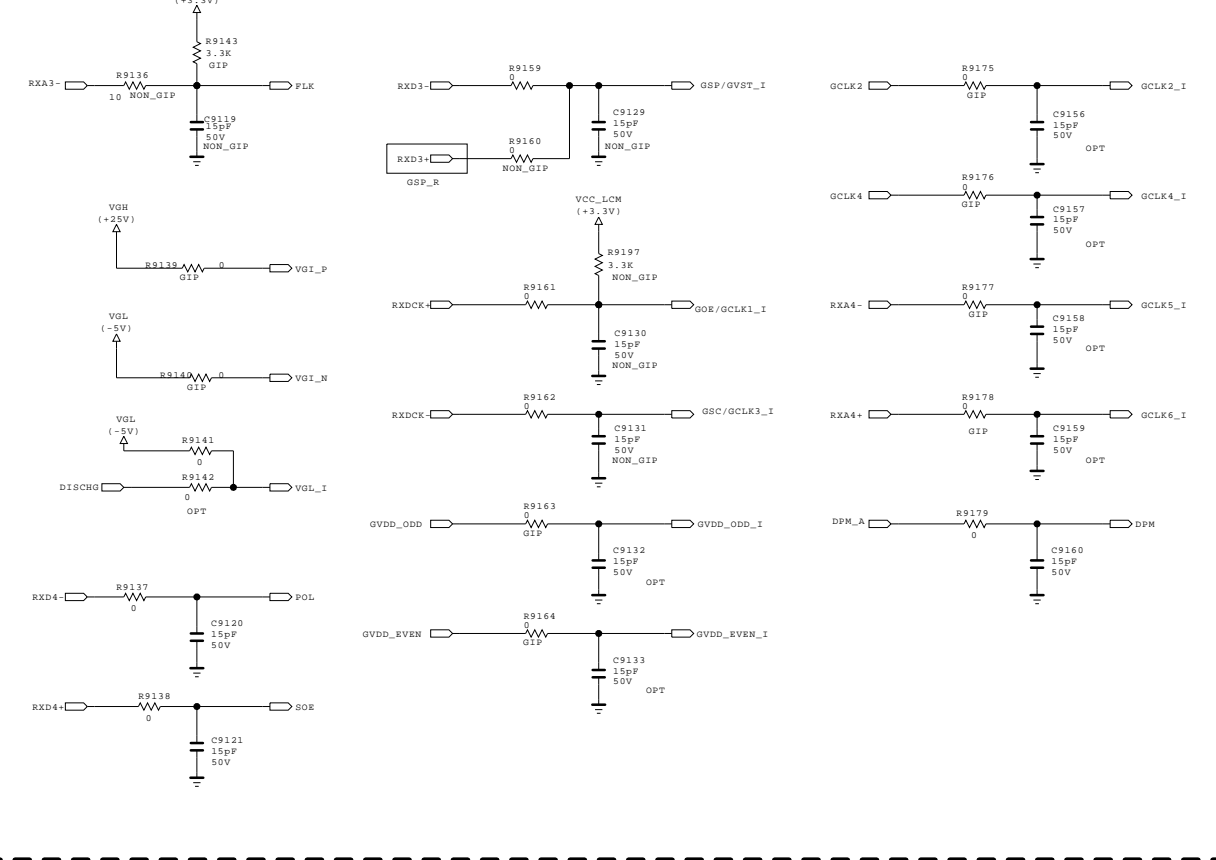
Slave Address : 0xE8h
 (AO Pin - GND)



[HVDD Block]



(Signal Name Change)

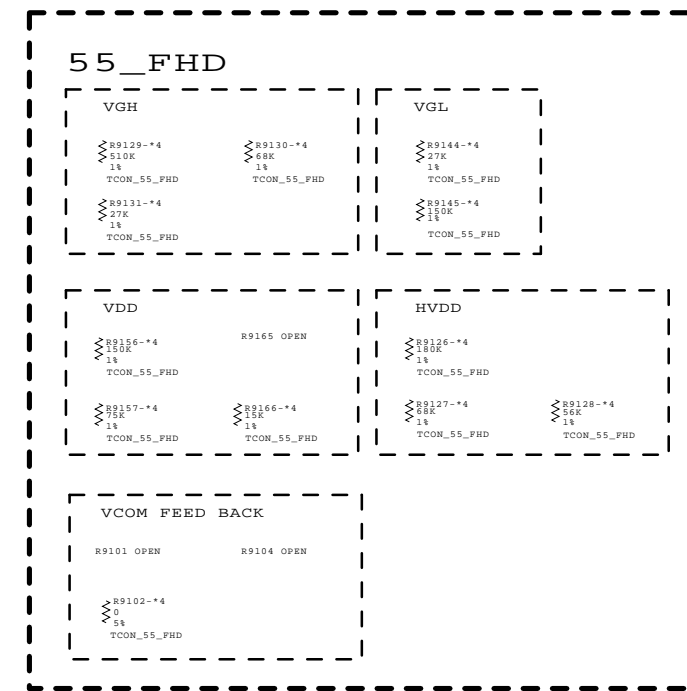
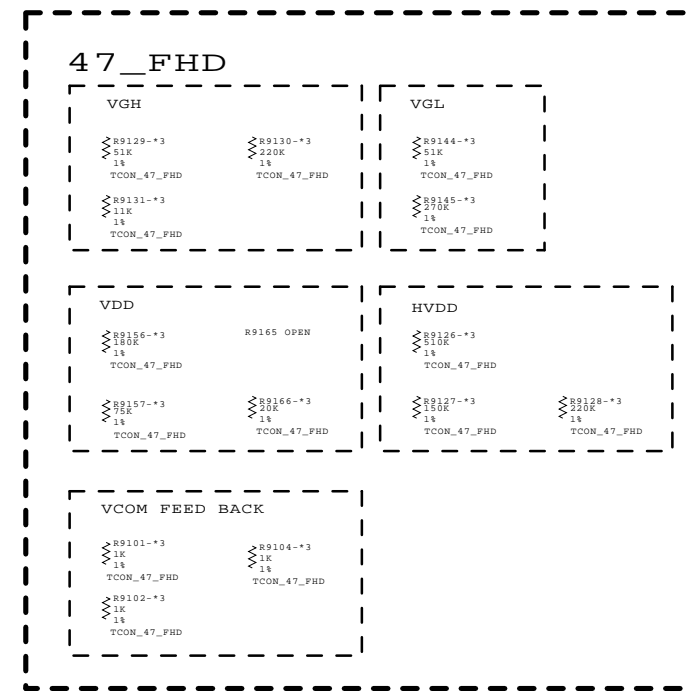
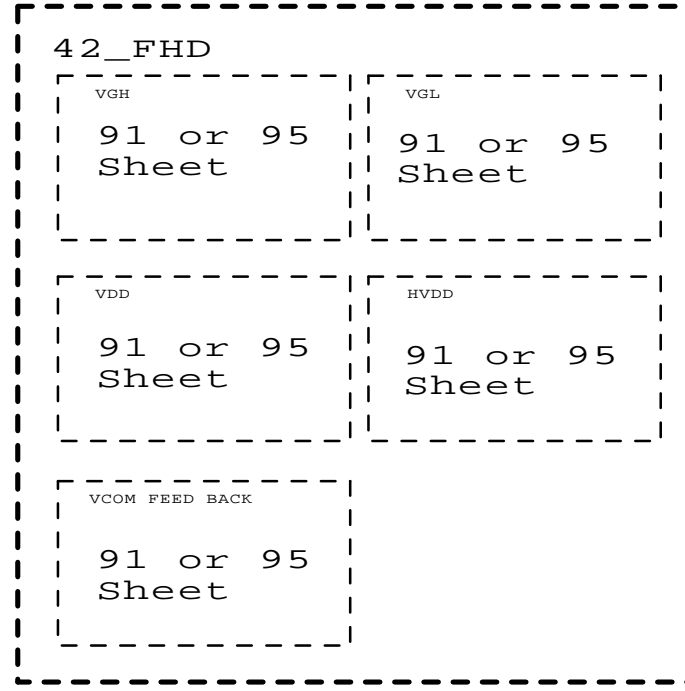
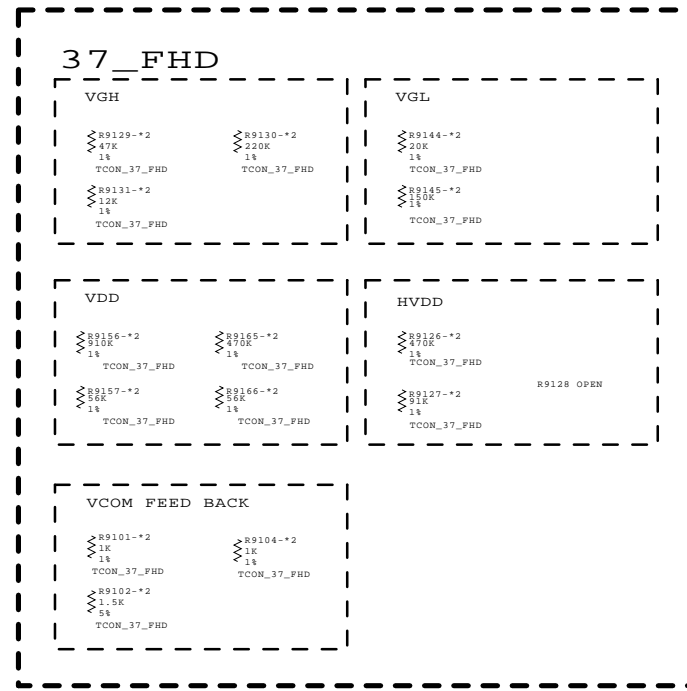
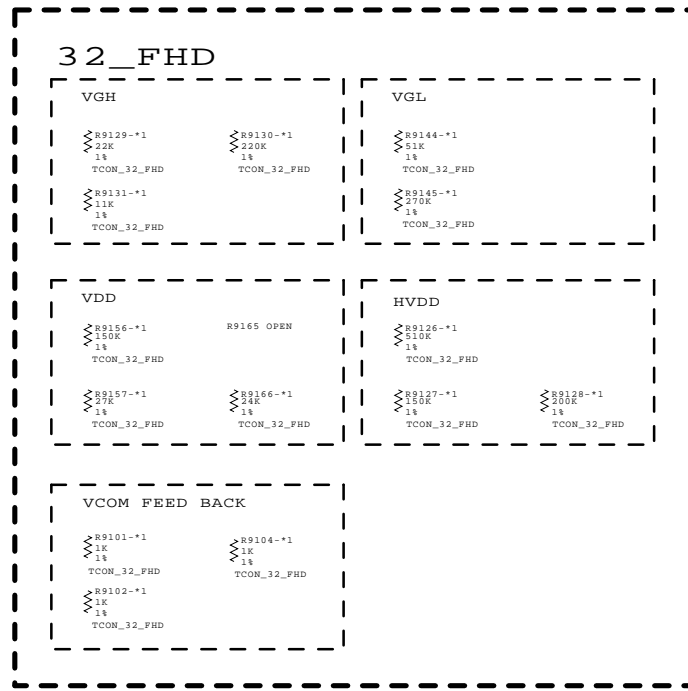


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SECRET
 LGElectronics



MODEL	COMMON	DATE	09/09/10
BLOCK	T-Con (NO L.D.)	SHEET	91



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

SECRET
LGElectronics



MODEL	Common	DATE	09/12/15
BLOCK	T-Con Power Option	SHEET	98 /

