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LED TV

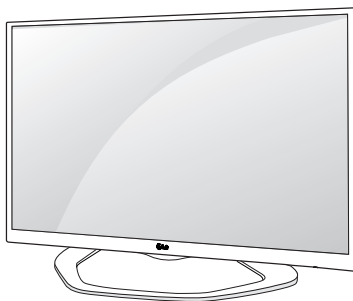
SERVICE MANUAL

CHASSIS : LD33B

MODEL : 47LP860H 47LN860H-ZA

CAUTION

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



P/NO : MFL67867102 (1307-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 μ F capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

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

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

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

Leakage Current Hot Check circuit



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

*Base on Adjustment standard

SERVICING PRECAUTIONS

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

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

General Servicing Precautions

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 of 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 LED TV used LD3BF chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

- 1) Temperature: 25 °C ± 5 °C (77 °F ± 9 °F), CST: 40 °C ± 5 °C
- 2) Relative Humidity: 65 % ± 10 %
- 3) Power Voltage
 - : Standard input voltage (AC 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. Model General Specification

No.	Item	Specification	Remarks
1	Market	EU(PAL Market-37Countries)	DTV (MPEG2/4, DVB-T) : 37 countries (Albania/Austria/Belarus/Belgium/Bosnia/Bulgaria/Croatia/Czech/Denmark/Estonia/Finland/France/Germany/Greece/Hungary/Ireland/Italy/Kazakhstan/Latvia/Lithuania/Luxembourg/Morocco/Netherlands/Norway/Poland/Portugal/Romania/Russia/Serbia/Slovakia/Slovenia/Spain/Sweden/Switzerland/Turkey/UK/Ukraine) DTV (MPEG2/4, DVB-C): 37 countries (Albania/Austria/Belarus/Belgium/Bosnia/Bulgaria/Croatia/Czech/Denmark/Estonia/Finland/France/Germany/Greece/Hungary/Ireland/Italy/Kazakhstan/Latvia/Lithuania/Luxembourg/Morocco/Netherlands/Norway/Poland/Portugal/Romania/Russia/Serbia/Slovakia/Slovenia/Spain/Sweden/Switzerland/Turkey/UK/Ukraine)
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	Analogue VHF : E2 to E12, UHF : E21 to E69, CATV : S1 to S20, HYPER : S21 to S47 Digital VHF UHF
3	Receiving system	Analog : Upper Heterodyne Digital : COFDM, QAM	► DVB-T - Guard Interval(Bitrate_Mbit/s) 1/4, 1/8, 1/16, 1/32 - 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 ► DVB-C - Symbolrate : 4.0Msymbols/s to 7.2Msymbols/s - Modulation : 16QAM, 64-QAM, 128-QAM and 256-QAM

No.	Item	Specification	Remarks
4	Scart (1EA)	PAL, SECAM	Scart 1 Jack is Full scart and support ATV/DTV-OUT (not support DTV Auto AV)
5	Head phone out	Antenna, AV1, AV2, Component, HDMI1, HDMI2, HDMI3, USB1, USB2, USB3	
6	CLOCK	CLOCK	Interface : (D-SUB 15PIN)
7	HDMI Input (3EA)	HDMI1-DTV HDMI2-DTV HDMI3-DTV	HDMI version 1.4 Support HDCP
8	SDPIF out (1EA)	SPDIF out	
9	USB (2EA)	EMF, DivX HD, For SVC (download)	JPEG, MP3, DivX HD
10	Ethernet Connect(2EA)	Ethernet Connect	WOL/WOWLAN Support
11	Ext. Speaker out (1EA)	Ext. Speaker out	Stereo 1 W / 8 Ω, Fix, Variable, Line Out
12	Ext. Volume control(1EA)	Ext. volume control	
13	RS-232C	SVC, Control, Power outlet (Selectable 12V/1A or 5V/2A)	
14	Audio Input (1EA)	AV	L/R Input

5. HDMI input (DTV mode)

No.	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel clock	Remarks
1.	720*480	31.469 / 31.5	59.94 / 60	SDTV 480P	LP860H-ZA not support HDMI PC mode but can display PC input
2.	720*576	31.25	50	SDTV 576P	
3.	1280*720	37.500	50	HDTV 720P	
4.	1280*720	44.96 / 45	59.94 / 60	HDTV 720P	
5.	1920*1080	33.72 / 33.75	59.94 / 60	HDTV 1080I	
6.	1920*1080	28.125	50.00	HDTV 1080I	
7.	1920*1080	26.97 / 27	23.97 / 24	HDTV 1080P	
8.	1920*1080	33.716 / 33.75	29.976 / 30.00	HDTV 1080P	
9.	1920*1080	56.250	50	HDTV 1080P	
10.	1920*1080	67.43 / 67.5	59.94 / 60	HDTV 1080P	

ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied to all of the LED TV with LD3BF chassis.

2. Designation

- (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 $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ of temperature and $65\% \pm 10\%$ of relative humidity if there is no specific designation.
- (4) The input voltage of the receiver must keep AC 100-240 V~, 50/60 Hz.
- (5) The receiver must be operated for about 5 minutes prior to the adjustment when module is in the circumstance of over 15.

In case of keeping module is in the circumstance of 0°C , it should be placed in the circumstance of above 15°C for 2 hours.

In case of keeping module is in the circumstance of below -20°C , it should be placed in the circumstance of above 15°C for 3 hours.

[Caution]

When still image is displayed for a period of 20 minutes or longer (Especially where W/B scale is strong. Digital pattern 13ch and/or Cross hatch pattern 09ch), there can some afterimage in the black level area.

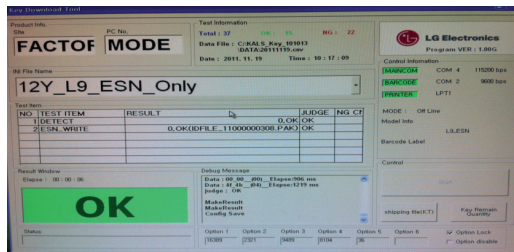
3. Automatic Adjustment

3.1. MAC address D/L, CI+ key D/L, Widevine key D/L, ESN D/L

Connect: USB port

Communication Prot connection

- Com 1,2,3,4 and 115200(Baudrate)
- Mode check: Online Only
- Check the test process: DETECT -> MAC -> CI -> Widevine -> ESN
- Play: Press Enter key
- Result: Ready, Test, OK or NG
- Printer Out (MAC Address Label)



3.2. LAN Inspection

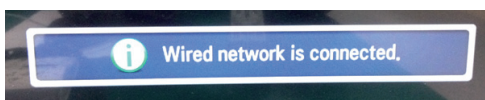
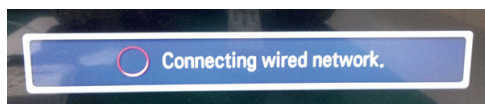
3.2.1. Equipment & Condition

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



3.2.2. LAN inspection solution

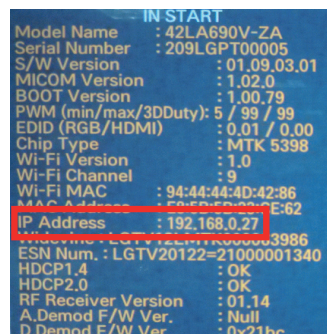
- LAN Port connection with PCB
- Setting automatic IP



- If you want manual connection, Instart->menu->Network Setup->Network Setting->Press OK
Press Wired or Wireless connection key, then Network will be connected.



- Setting state confirmation
- If automatic setting is finished, you confirm IP and MAC Address at 'in start' menu mode.



3.2.3. WIDEVINE key Inspection

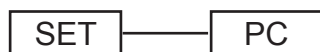
- Confirm key input data at the "IN START" MENU Mode.

```

IN START
Model Name : 42LA690V-ZA
Serial Number : 209LGPT00005
S/W Version : 01.09.03.01
MICOM Version : 1.02.0
BOOT Version : 1.00.79
PWM (min/max/3DDuty): 5 / 99 / 99
EDID (RGB/HDMI) : 0.01 / 0.00
Chip Type : MTK 5398
Wi-Fi Version : 1.0
Wi-Fi Channel : 9
Wi-Fi MAC : 94:44:44:42:86
MAC Address : E8:5B:5B:23:CE:62
Widevine : LGTV12LMTK000063986
HDCP1.4 : OK
HDCP2.0 : OK
RF Receiver Version : 01.14
A.Demod F/W Ver. : Null
D.Demod F/W Ver. : 0x21bc
  
```

3.3. LAN PORT INSPECTION(PING TEST)

Connect SET → LAN port == PC → LAN Port



3.3.1. 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

3.3.2. 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.



3.4. Model name & Serial number Download

3.4.1. Model name & Serial number D/L

- Press "Power on" key of service remote control.
(Baud rate : 115200 bps)
- Connect RS-232C Signal to USB Cable to USB.
- Write Serial number by use USB port.
- Must check the serial number at Instart menu.

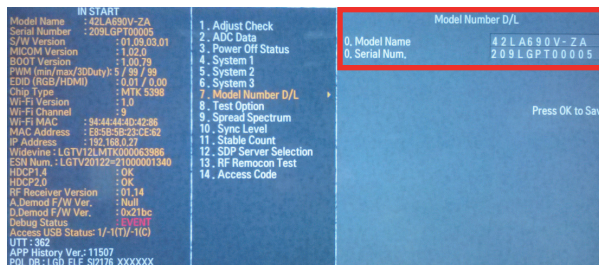
3.4.2. Method & notice

- (1) Serial number D/L is using of scan equipment.
- (2) Setting of scan equipment operated by Manufacturing Technology Group.
- (3) 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)
It is impossible to download by bar code scan, so It need Manual download.

- 1) Press the "Instart" key of Adjustment remote control.
- 2) Go to the menu "7.Model Number D/L" like below photo.
- 3) Input the Factory model name(ex 42LA690V-ZA) or Serial number like photo.



- 4) Check the model name Instart menu. → Factory name displayed. (ex 42LA690V-ZA)
- 5) Check the Diagnostics.(DTV country only) → Buyer model displayed. (ex 42LA690V-ZA)

3.5. CI+ Key checking method

Check whether the key was downloaded or not at 'In Start' menu. (Refer to below).



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

3.5.1. Check the method of CI+ Key value

- (1) Check the method on Instart menu
- (2) 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

3.5.2. 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

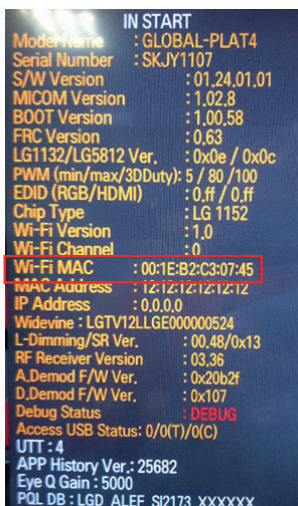
- 3) Result value
 - i 01 OK 1d1852d21c1ed5dcx
 - CI+ Key Value

3.6. WIFI MAC ADDRESS CHECK

- (1) Using RS232 Command

	H-freq(kHz)	V-freq.(Hz)
Transmission	[A][I][Set ID][20][Cr]	[O][K][X] or [NG]

- (2) Check the menu on in-start



4. Manual Adjustment

* ADC adjustment is not needed because of OTP(Auto ADC adjustment)

4.1. EDID DATA

4.1.1. 2D EDID

HDMI EDID DATA _2D	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	00	00	00	00	00	00
0x01	00	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26	00
0x02	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
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	66	21	50	B0	51	00	1B	30
0x05	40	70	36	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	20	20	20	20
0x07	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0x08	02	03	26	F1	4E	10	9F	04	13	05	14	03	02	12	20	21
0x09	22	15	01	26	15	07	50	09	57	07	00	00	00	00	00	00
0x0A	00	E3	05	00	00	01	1D	80	18	71	1C	16	20	58	2C	00
0x0B	25	00	A0	5A	00	00	00	9E	01	1D	00	80	51	D0	1A	20
0x0C	6E	88	55	00	A0	5A	00	00	00	1A	02	3A	80	18	71	38
0x0D	2D	40	58	2C	45	00	A0	5A	00	00	00	1E	66	21	50	80
0x0E	51	00	1B	30	40	70	36	00	A0	5A	00	00	00	1E	00	00
0x0F	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

• Reference

- HDMI1 ~ HDMI3

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

① Product ID

HEX	EDID Table	DDC Function
0001	0100	Analog
0001	0100	Digital

② Serial No: Controlled on production line.

③ Month, Year: Controlled on production line:

ex) Monthly : '01' → '01'

Year : '2013' → '17'

④ Model Name(Hex): LGTV

Chassis	MODEL NAME(HEX)
LD3BF	00 00 00 FC 00 4C 47 20 54 56 0A 20 20 20 20 20 20

⑤ Checksum(LG TV): Changeable by total EDID data.

	①	②	③
HDMI1	E8	85	X
HDMI2	E8	75	X
HDMI3	E8	65	X

⑥ Vendor Specific(HDMI)

INPUT	MODEL NAME(HEX)
HDMI1	67 03 0C 00 10 00 80 2D
HDMI2	67 03 0C 00 20 00 80 2D
HDMI3	67 03 0C 00 30 00 80 2D

4.2. White Balance Adjustment

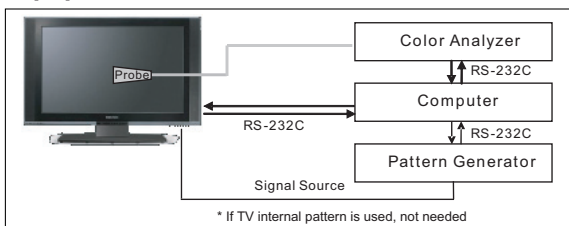
4.2.1. Overview

- W/B adj. Objective & How-it-works
 - (1) Objective: To reduce each Panel's W/B deviation
 - (2) 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.
 - (3) Adjustment condition : normal temperature
 - 1) Surrounding Temperature : 25 °C ± 5 °C
 - 2) Surrounding Humidity : 20 % ~ 80 %

4.2.2. Equipment

- (1) Color Analyzer: CA-210 (LED Module : CH 14)
 - (2) Adjustment Computer(During auto adj., RS-232C protocol is needed)
 - (3) Adjustment Remote control
 - (4) Video Signal Generator MSPG-925F 720p/216-Gray (Model: 217, Pattern: 49)
 - Only when internal pattern is not available
- Color Analyzer Matrix should be calibrated using CS-100.

4.2.3. Equipment connection MAP



4.2.4. Adj. Command (Protocol)

<Command Format>

START	6E	A	50	A	LEN	A	03	A	CMD	A	00	A	VAL	A	CS	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-adjustment.

RS-232C COMMAND [CMD ID DATA]			Explanation
wb	00	00	Begin White Balance adjustment
wb	00	10	Gain adjustment(internal white pattern)
wb	00	1f	Gain adjustment completed
wb	00	20	Offset adjustment(internal white pattern)
wb	00	2f	Offset adjustment completed
wb	00	ff	End White Balance adjustment (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(end)) → Off-set adj.
 wb 00 ff → End white balance auto-adj.

- Adj. Map

	Adj. item	Command (lower caseASCII)		Data Range (Hex.)		Default (Decimal)
		CMD1	CMD2	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					
	B Cut					
Medium	R Gain	j	a	00	C0	
	G Gain	j	b	00	C0	
	B Gain	j	c	00	C0	
	R Cut					
	G Cut					
	B Cut					
Warm	R Gain	j	d	00	C0	
	G Gain	j	e	00	C0	
	B Gain	j	f	00	C0	
	R Cut					
	G Cut					
	B Cut					

4.2.5. Adj. method

- (1) Auto adj. method
 - 1) Set TV in adj. mode using P-ONLY key(or POWER ON key).
 - 2) Zero calibrate probe then place it on the center of the Display.
 - 3) Connect Cable.(RS-232C to USB)
 - 4) Select mode in adj. Program and begin adj.
 - 5) When adj. is complete (OK Sign), 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 adjustment. method
 - 1) Set TV in Adj. mode using P-Only key.
 - 2) Zero Calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10 cm 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 right key(►) is pressed 204 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) Adjustment 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 204 Gray pattern.

- Adjustment 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 10 cm and perpendicular of the module surface (80° ~ 100°)

4.2.6. Reference (White balance Adj. coordinate and color temperature)

- Luminance : 204 Gray
- Standard color coordinate and temperature using CS-1000 (over 26 inch)

Mode	Coordinate		Temp	Δuv
	x	y		
Cool	0.269	0.273	13,000 K	0.0000
Medium	0.285	0.293	9,300 K	0.0000
Warm	0.313	0.329	6,500 K	0.0000

- Standard color coordinate and temperature using CA-210(CH 14) (1) LGD

Mode	Coordinate		Temp	Δuv
	x	y		
Cool	0.269 ± 0.002	0.273 ± 0.002	13,000 K	0.0000
Medium	0.285 ± 0.002	0.293 ± 0.002	9,300 K	0.0000
Warm	0.313 ± 0.002	0.329 ± 0.002	6,500 K	0.0000

(2) O/S Module(AUO, CMI, Sharp, IPS...)

Mode	Coordinate		Temp	Δuv
	x	y		
Cool	0.271 ± 0.002	0.276 ± 0.002	13,000 K	0.0000
Medium	0.287 ± 0.002	0.296 ± 0.002	9,300 K	0.0000
Warm	0.315 ± 0.002	0.332 ± 0.002	6,500 K	0.0000

4.2.7. LED White balance table

- * Normal Line

GP4	Aging time (Min)	Cool		Medium		Warm	
		X	y	x	y	x	y
		269	273	285	293	313	329
1	0-2	280	287	296	307	320	337
2	3-5	279	285	295	305	319	335
3	6-9	277	284	293	304	317	334
4	10-19	276	283	292	303	316	333
5	20-35	274	280	290	300	314	330
6	36-49	272	277	288	297	312	327
7	50-79	271	275	287	295	311	325
8	80-149	270	274	286	294	310	324
9	Over 150	269	273	285	293	309	323

- * Aging Chamber

GP2	Aging time (Min)	Cool		Medium		Warm	
		X	y	x	y	x	y
		269	273	285	293	313	329
1	0-2	280	287	296	307	320	337
2	3-5	277	284	293	304	317	334
3	6-9	274	280	290	300	314	330
4	10-19	269	275	285	295	309	325
5	20-35	268	272	284	292	308	322
6	36-49	267	269	283	289	307	319
7	50-79	265	268	281	288	305	318
8	80-149	264	267	280	287	304	317
9	Over 150	263	266	279	286	303	316

4.3. Tool Option selection

- Method : Press "ADJ" key on the Adjustment remote control, then select Tool option.

	42LP860H-ZA	47LP860H-ZA	55LP860H-ZA
Tool Option 1	38	39	41
Tool Option 2	41350	41350	41350
Tool Option 3	565	565	565
Tool Option 4	12909	12909	12909
Tool Option 5	4315	4315	4315
Tool Option 6	1305	1305	1305
Tool Option 7	5807	5807	5807
Commercial Tool Option	60950	60950	60950
Country Group	04	04	04

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

	EU,EK	EN	RU	UAE
Area Code	32898	33155	33154	12418
Nordic UI	0	1	0	0
Use HW Option	1	1	1	1
T2	0	0	0	0
C2	0	0	0	0
Satellite	0	0	0	0
MHP	0	0	0	0
HBBTV	2	2	2	2
Isolator	0	1	1	0
EU_Country	Non-Nordic	Non-Nordic	Non-Nordic	Non-Nordic
Arabic	0	0	0	0
Wi-Fi Frequency	8	8	8	3

4.4. Wi-Fi Test

Step 1) Turn on TV

Step 2) Select Network Connection option in Network Menu.

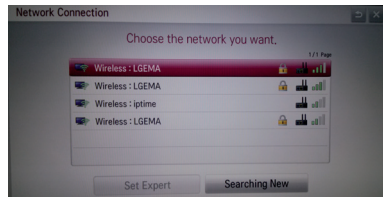
Instat menu -> Menu -> Network Setup (Network Setting>Press OK)



Step 3) Select Start Connection button in Network Connection.



Step 4) If the system finds any AP like blow PIC, it is working well.



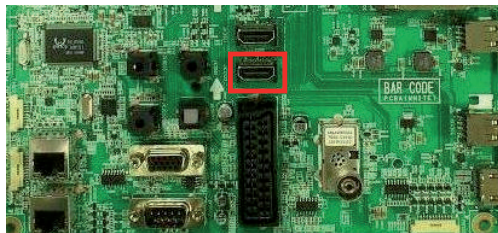
4.5. HDMI ARC Function Inspection

4.5.1. Test equipment

- Optic Receiver Speaker
- MSHG-600 (SW: 1220 ↑)
- HDMI Cable (for 1.4 version)

4.5.2. Test method

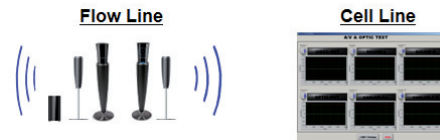
- (1) Insert the HDMI Cable to the HDMI ARC port from the master equipment (HDMI1)



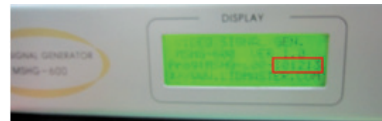
- (2) Check the sound from the TV Set



- (3) Check the Sound from the Speaker or using AV & Optic TEST program (It's connected to MSHG-600)



* Remark: Inspect in Power Only Mode and check SW version in a master equipment



4.6. Local Dimming Function Check

Step 1) Turn on TV.

Step 2) Press "TILT" key on the Adj. R/C.

Step 3) At the Local Dimming mode, module Edge Backlight moving right to left Back light of IOP module moving.

Step 4) Confirm the Local Dimming mode.

Step 5) Press "exit" key.



Local Dimming Demo
(Edge LED Model)

4.7. Magic Motion Remote control test

- (1) Equipment : RF Remote control for test, IR-KEY-Code Remote control for test

- (2) You must confirm the battery power of RF-Remote control before test.(recommend that change the battery per every lot)

- (3) Sequence (test)

1) if you select the "Start(Wheel)" key on the Adjustment remote control, you can pairing with the TV SET.

2) You can check the cursor on the TV Screen, when select the "Wheel" key on the Adjustment remote control.

3) You must remove the pairing with the TV Set by select "Mute" key on the Adjustment remote control.

5. Check Commercial features

Mode info.		Commercial Feature				
Name	inch	IR Out	DC Power Out (5V/ 12V)	Ext SPK Out	CLOCK	Pro:Idiom
LP860H-ZA	42/47/55	O	O	O	X	O

5.1. External SPK Out

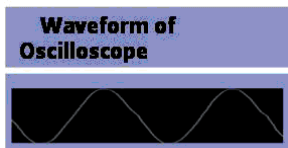


5.1.1. Equipment & Condition

- Jig (Speaker out JIG) or Oscilloscope

5.1.2. Check the speaker out

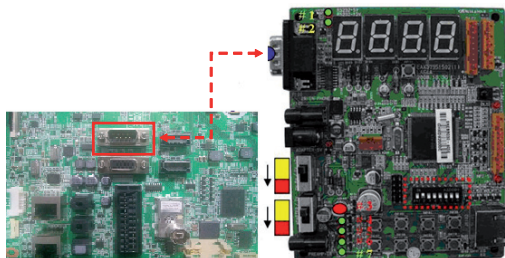
- 1) Connect the External Speaker : check the sound
Connect oscilloscope, you can see this waveform.



Recommended Input signal
RF, 1KHz, Sing wave

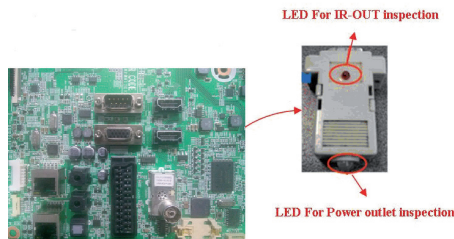
5.2. IR Out and DC Power Outlet (5V/12V)

- (1) Equipment & Condition
 - Jig (commercial check JIG)
 - Special 232C Cable for commercial check Jig
 - Power only mode
 - PCB mode (instart menu -> menu -> Configuration Setup -> RS232 DC Power Outlet)
- (2) Check the power out & IR out - commercial check jig
 - 1) Connect each other RS232c port on the Commercial Check JIG
 - 2) Press RED Color Button on SVC Remote-control in power only mode (or PCB mode)
 - 3) Check the LED of jig board
 - +5 V / +12 V LED (OK condition: Turn On)
 - IR LED (OK condition: blinking)



- (3) Check the power out & IR out - mini jig

- 1) Connect mini jig on RS232c port
- 2) Press RED Color Button on SVC Remote control in power only mode (or PCB mode)
- 3) Check the LED of mini jig



- (4) Pro:Idiom Check

- 1) Connect the RF Cable
- 2) Turn to the Pro:Idiom channel (No. 333)
- 3) Check the video & sound

** Only displayed at "POWER ONLY" mode



6. Audio

No.	Item	Min	Typ	Max	Unit	Remark
1.	Audio practical max Output, L/R (Distortion=10% max Output)	9	10	12	W	EQ Off AVL Off Clear Voice Off
2.	Speaker (8 Ω Impedance)	9	10	12	W	

Measurement condition:

- (1) RF input: Mono, 1 KHz sine wave signal, 100 % Modulation
- (2) CVBS, Component: 1 KHz sine wave signal 0.5 Vrms

7. GND and HI-POT Test

7.1. Tool Option selection

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

7.1. 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.

7.2 GND and Hi-pot auto-check

7.2.1 Method

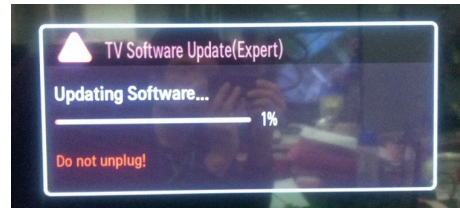
- (1) GND & Hi-pot auto-check preparation
 - Check that Power Cord is fully inserted to the SET. (If loose, re-insert)
- (2) Perform GND & Hi-pot auto-check
 - Unit fully inserted Power cord, Antenna cable and A/V arrive to the auto-check process.
 - Connect D-terminal to AV JACK TESTER
 - Auto CONTROLLER(GWS103-4) 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 from 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.

7.2.2. Checkpoint

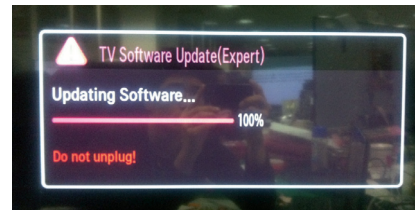
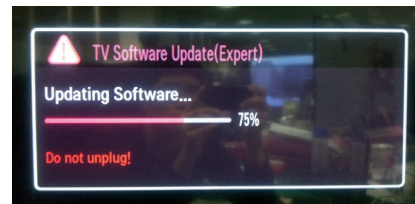
- TEST voltage
 - GND: 1.5 KV / min at 100 mA
 - SIGNAL: 3 KV / min at 100 mA
- TEST time: 1 second
- TEST POINT
 - GND TEST = POWER CORD GND & SIGNAL CABLE METAL GND
 - Hi-pot TEST = POWER CORD GND & LIVE & NEUTRAL
- LEAKAGE CURRENT: At 0.5 mArms

8. USB S/W Download(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 Lower, it didn't work.
 - But your downloaded version is Higher, USB data is automatically detecting (Download Version High & Power only mode, Set is automatically Download)
- (3) Show the message "Copying files from memory"



- (4) Updating is starting.



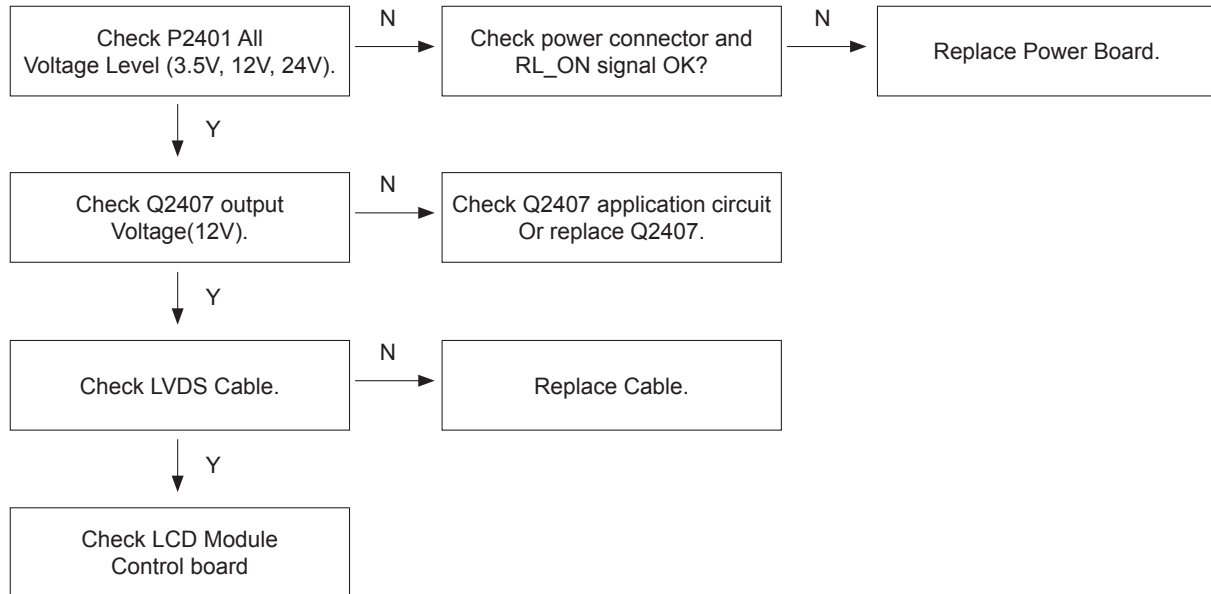
- (5) Updating Completed, The TV will restart automatically.
- (6) If your TV is turned on, check your updated version and Tool option. (explain the Tool option, next stage)
 - * If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel recover. 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.

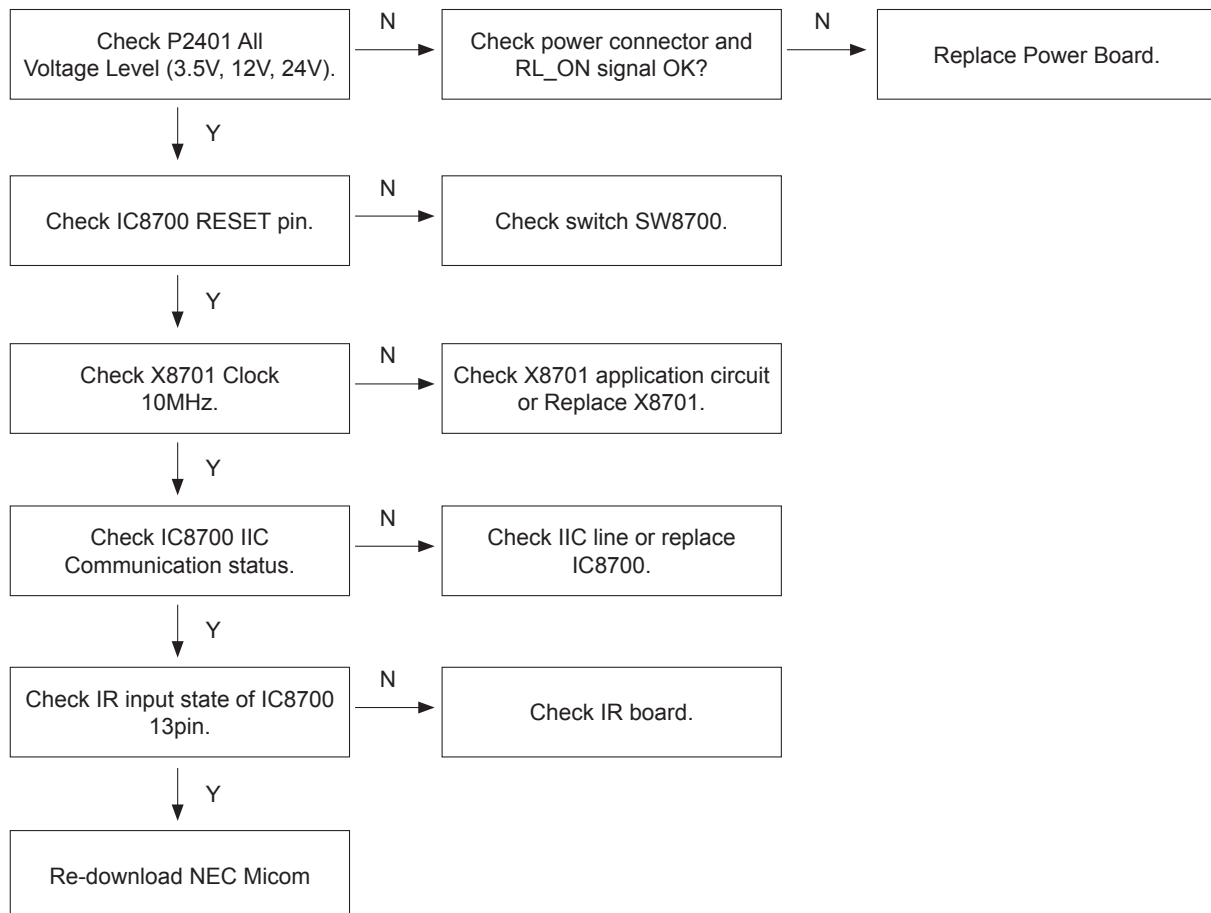
- (1) Push "IN-START" key in service remote control.
- (2) Select "Tool Option 1" and push "OK" key.
- (3) Punch in the number. (Each model has their number)

TROUBLESHOOTING GUIDE

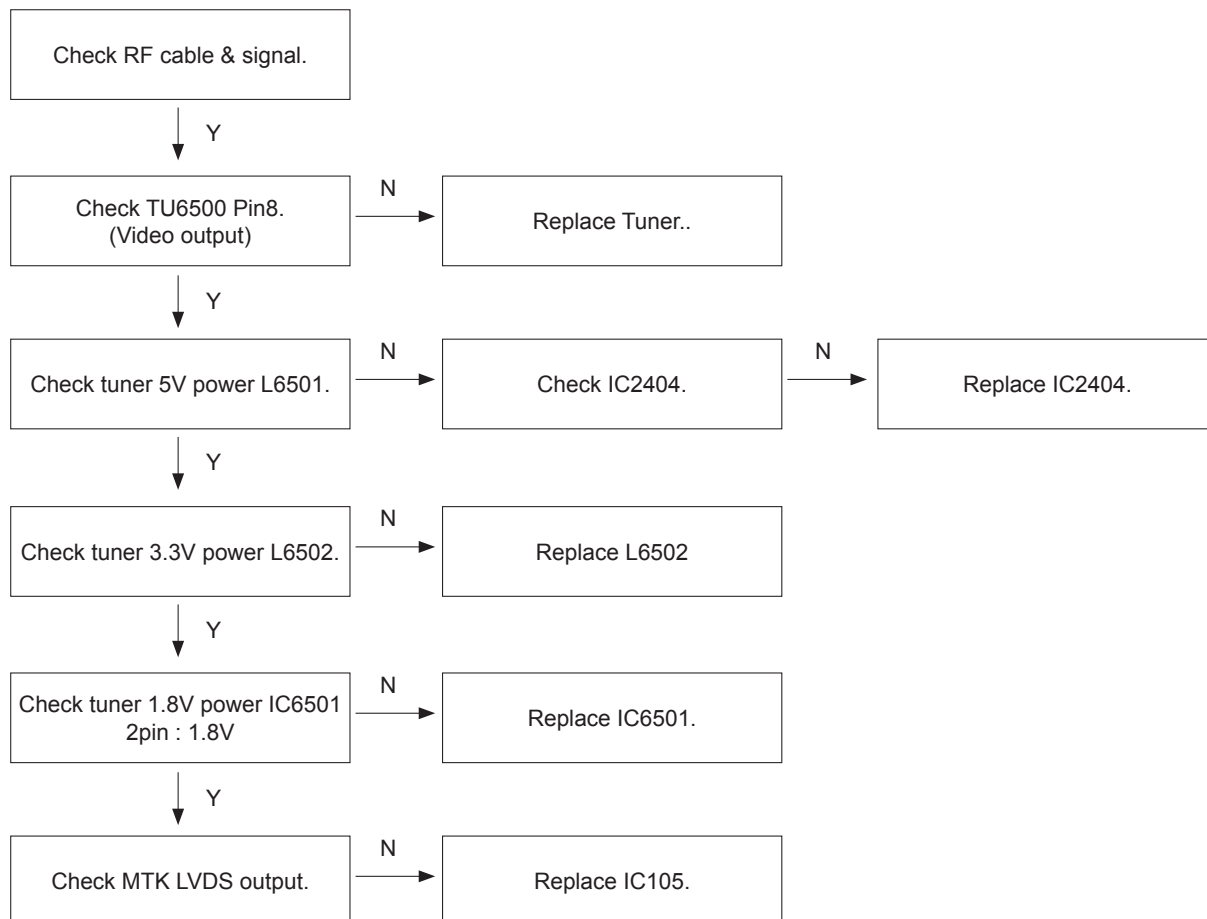
1. Power-Up Boot Fail Trouble Shooting guide



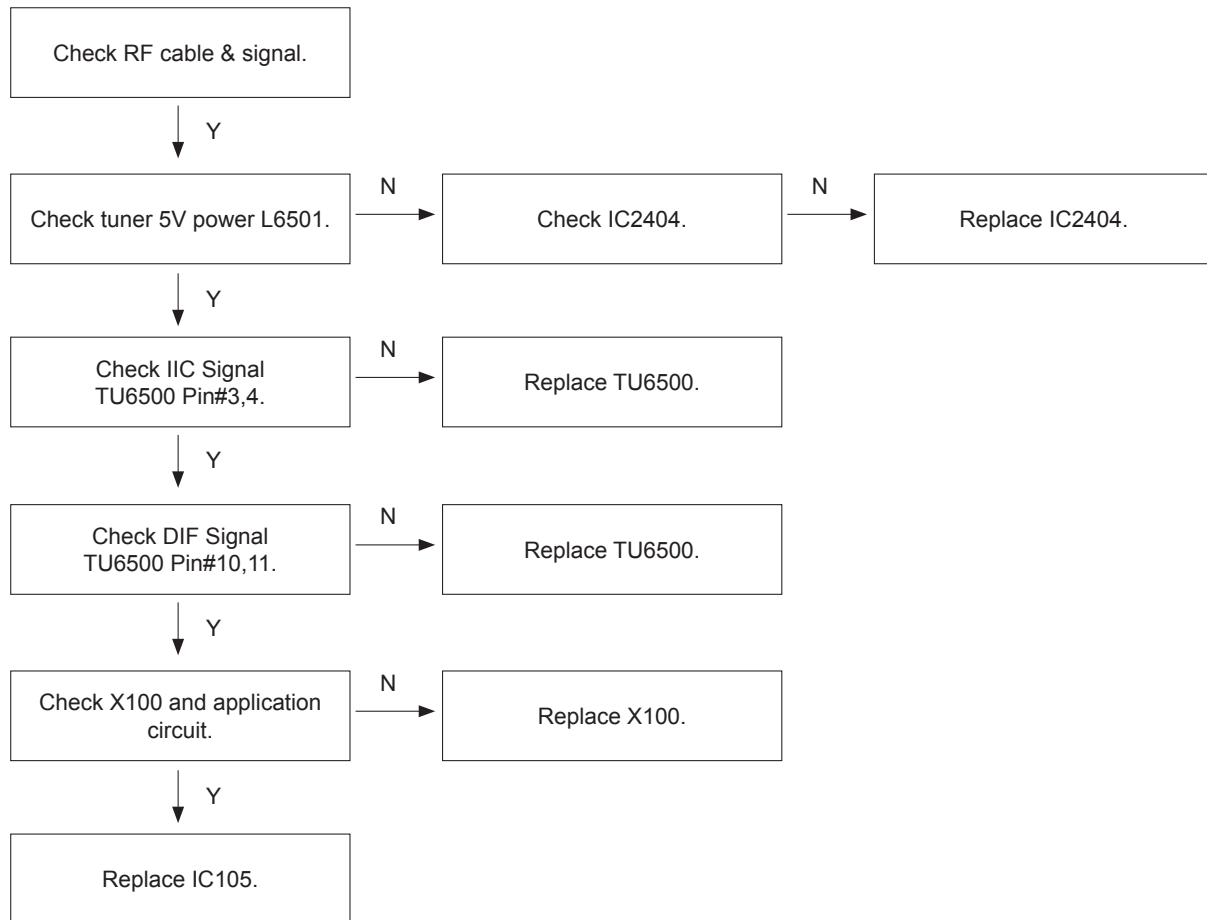
2. No OSD Trouble Shooting guide



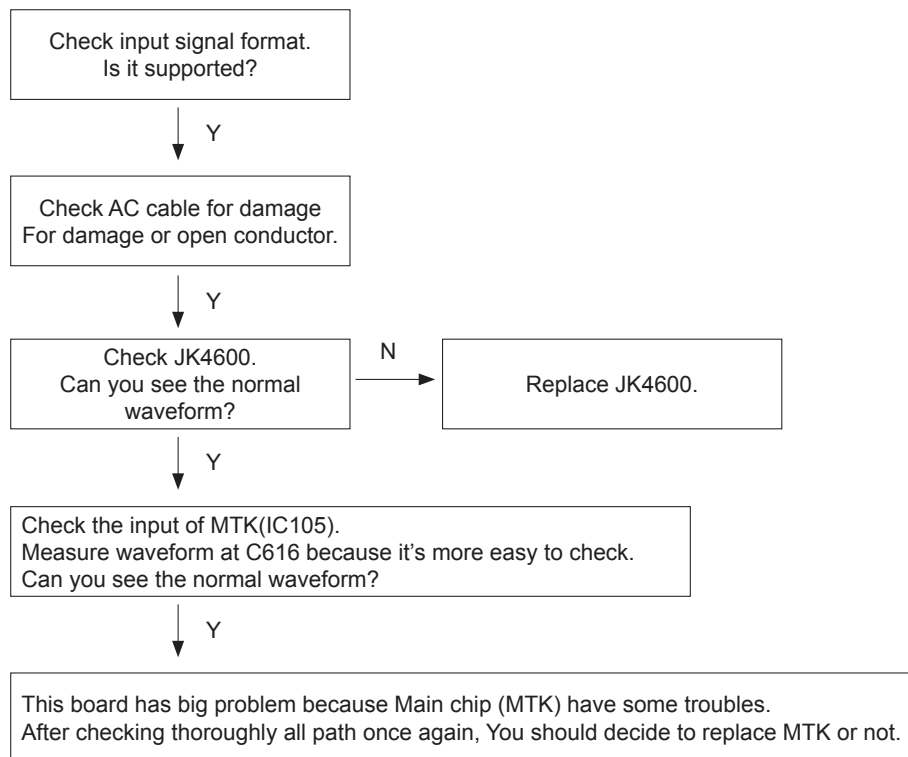
3. Analog RF Video Trouble Shooting guide



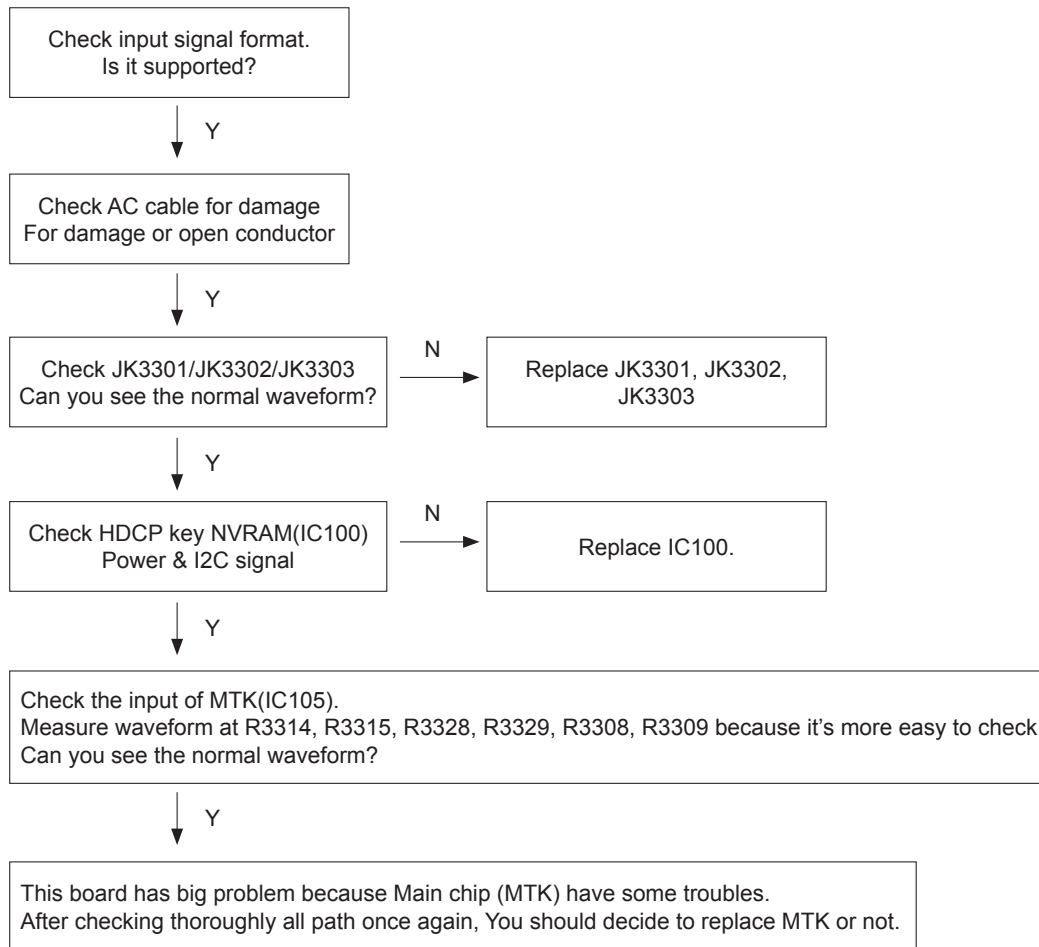
4. Digital RF Trouble Shooting guide



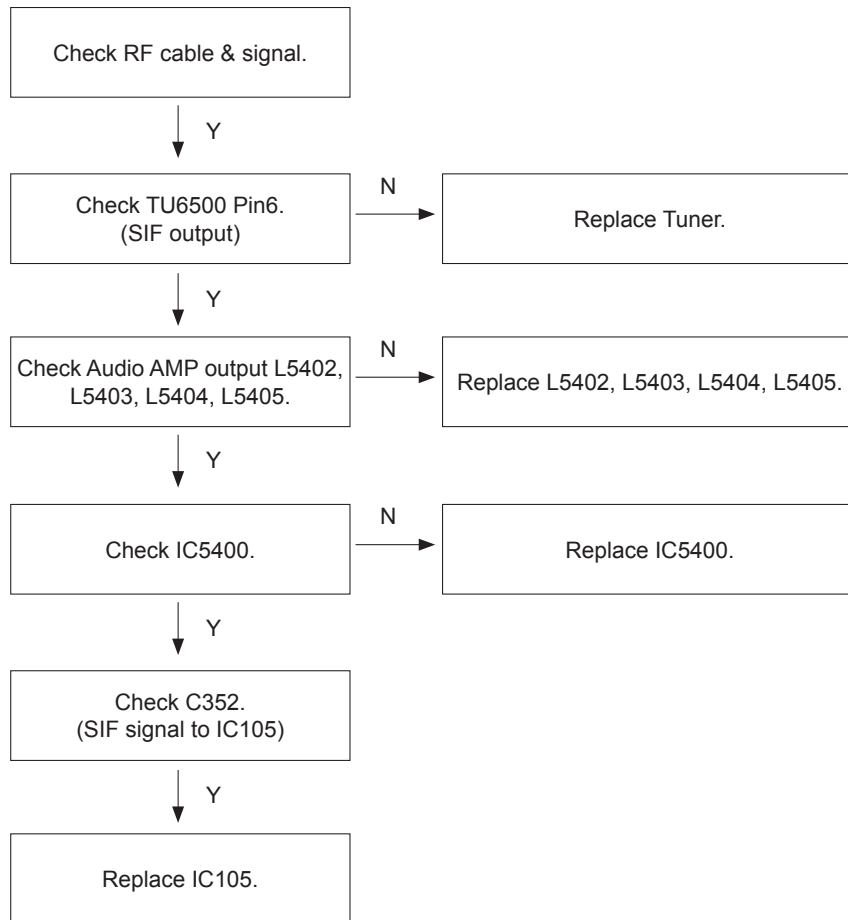
5. AV Video Trouble Shooting guide



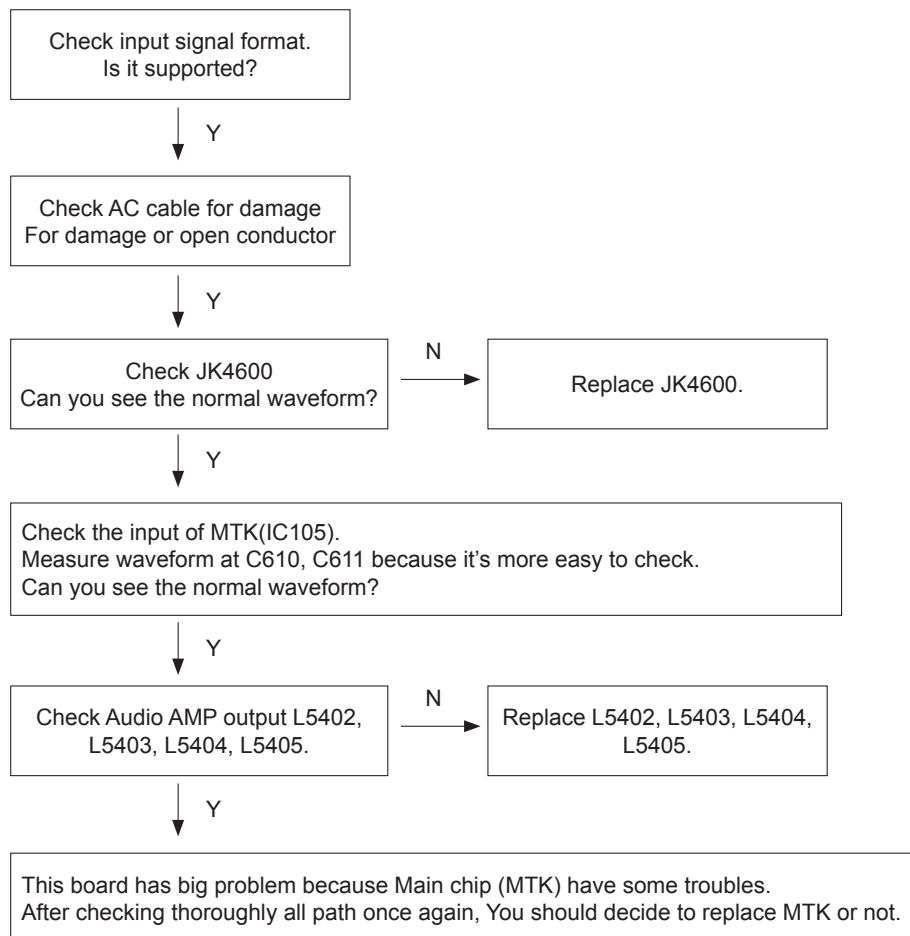
6. HDMI Video Trouble Shooting guide



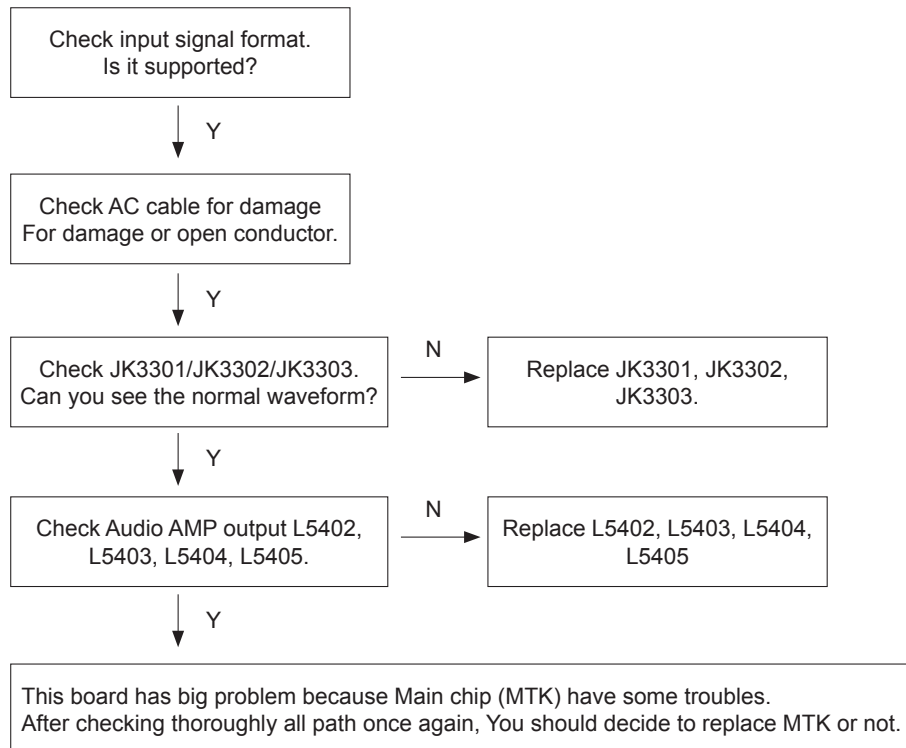
7. Analog RF Audio Trouble Shooting guide



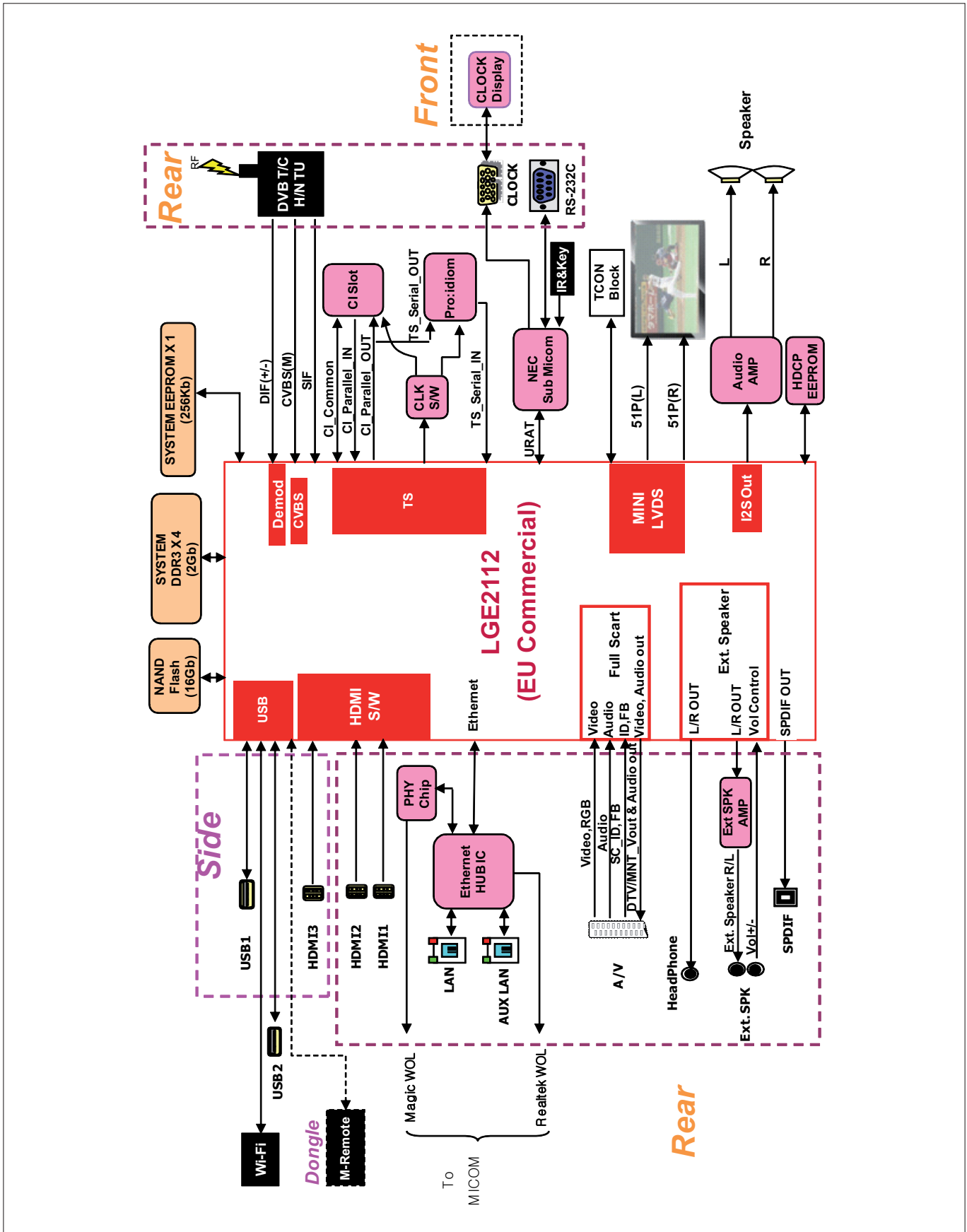
8. AV / RGB-PC Audio in Trouble Shooting guide



9. HDMI Audio in Trouble Shooting guide



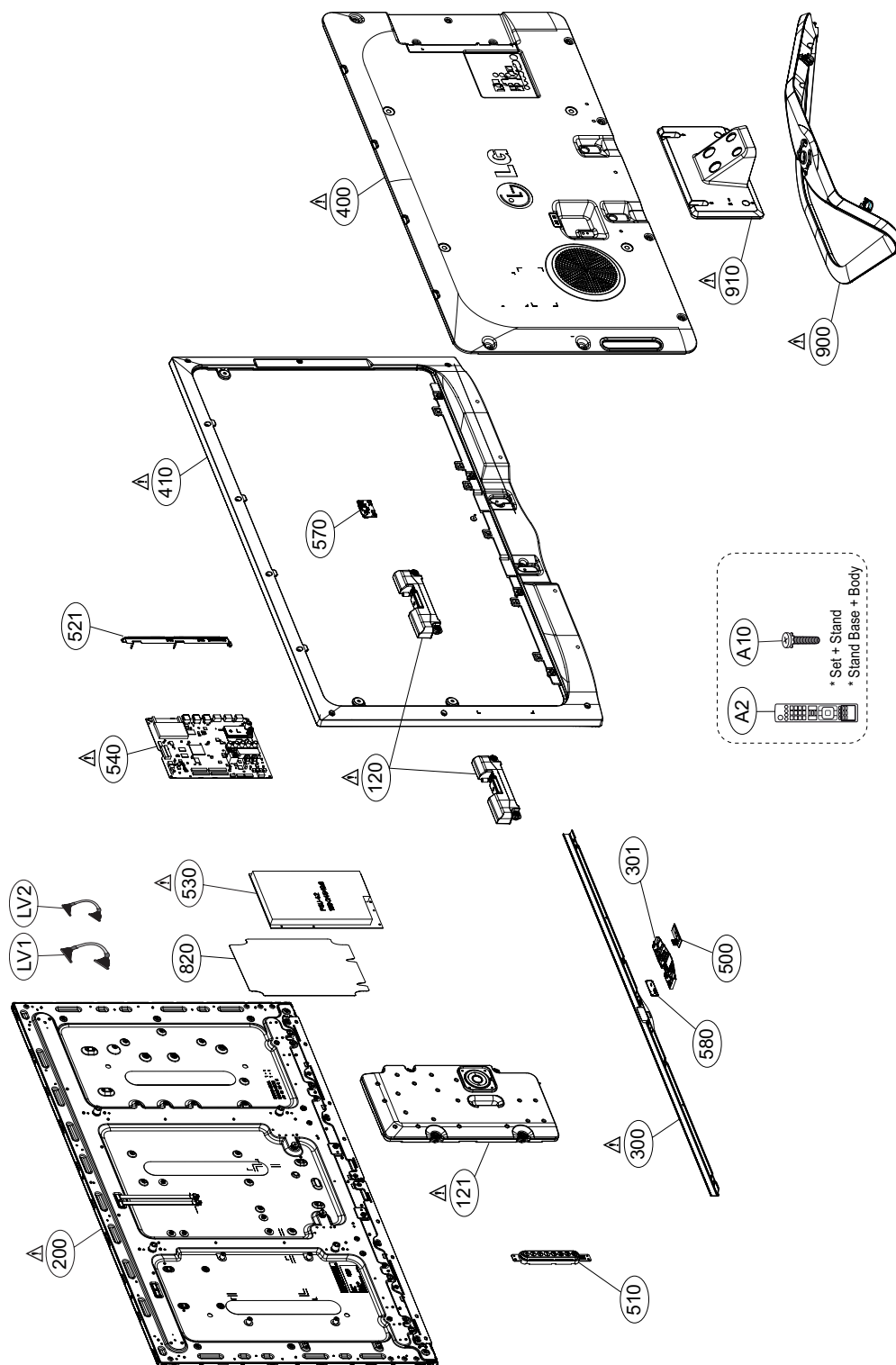
BLOCK DIAGRAM



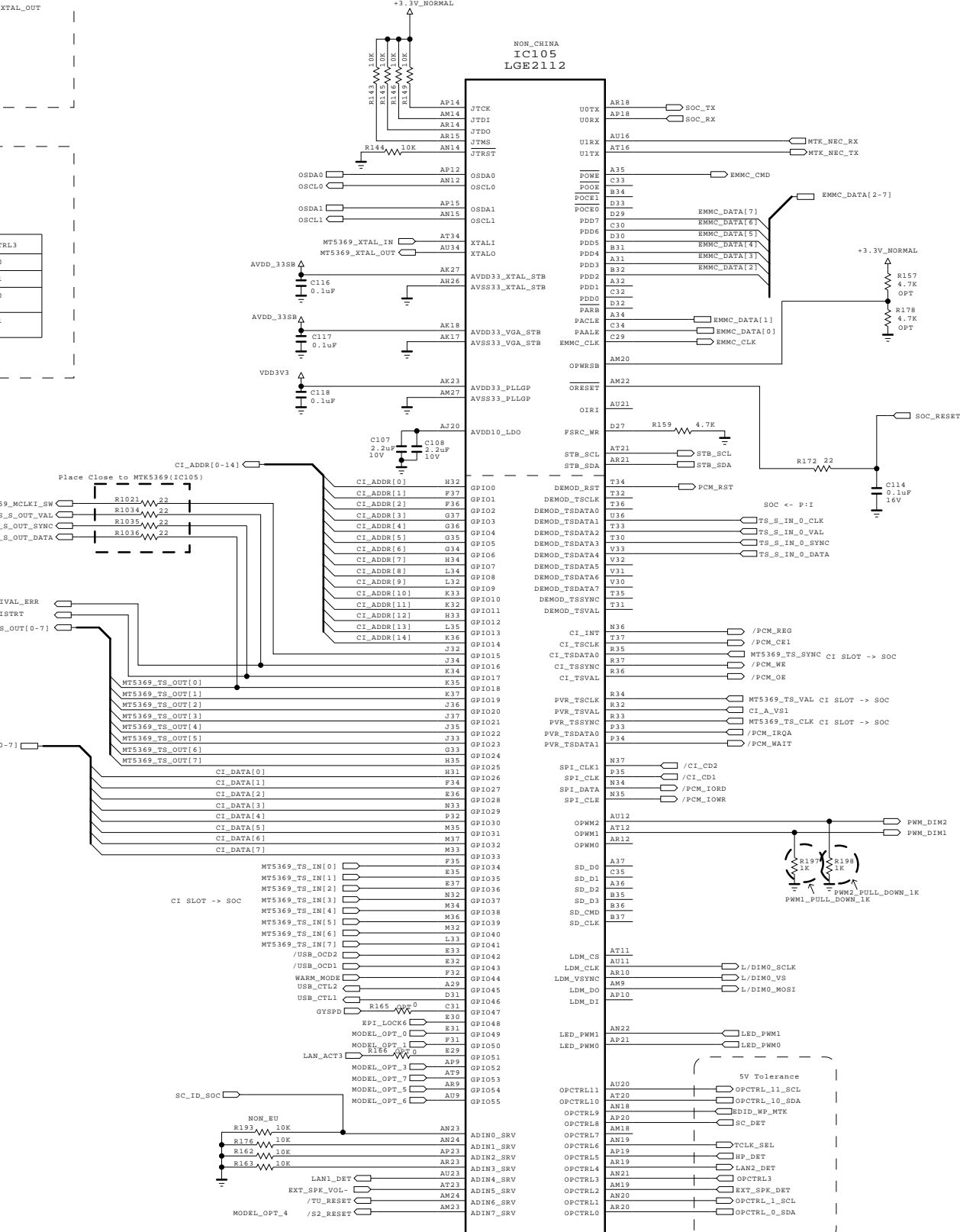
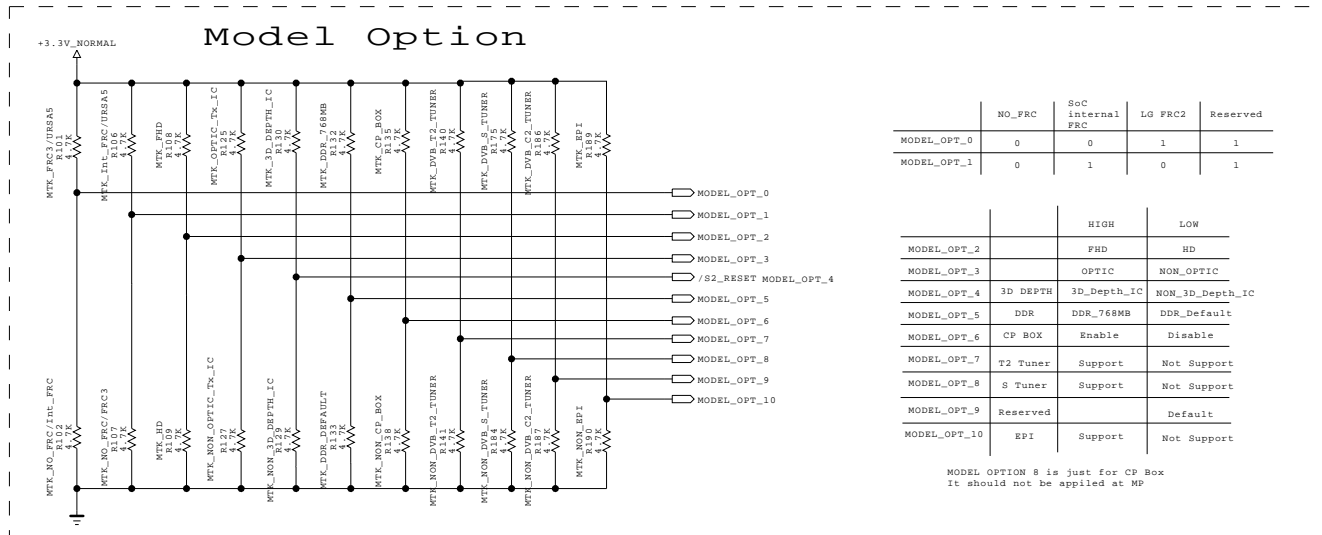
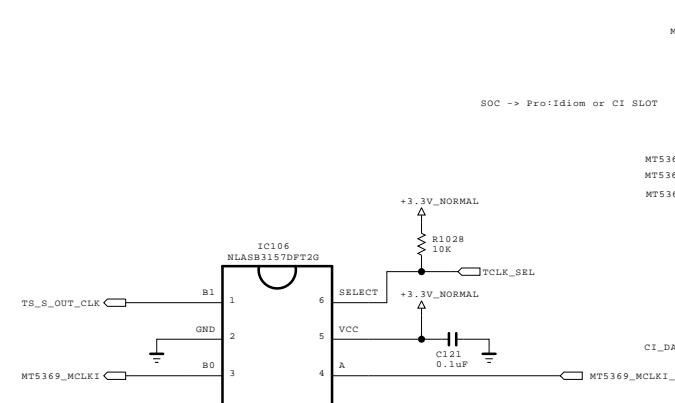
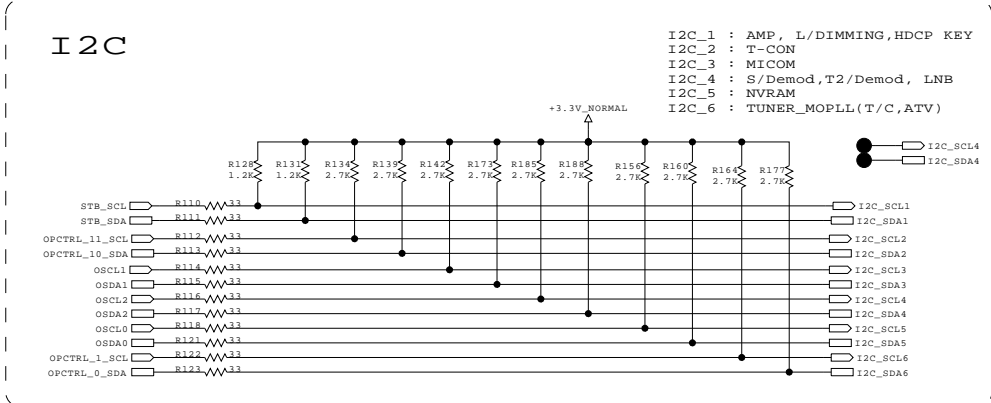
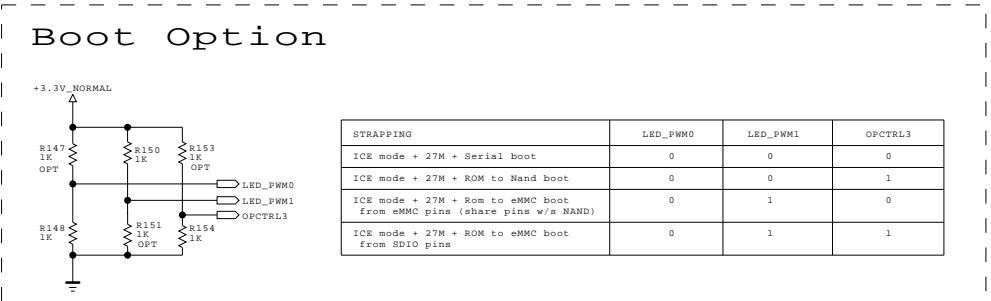
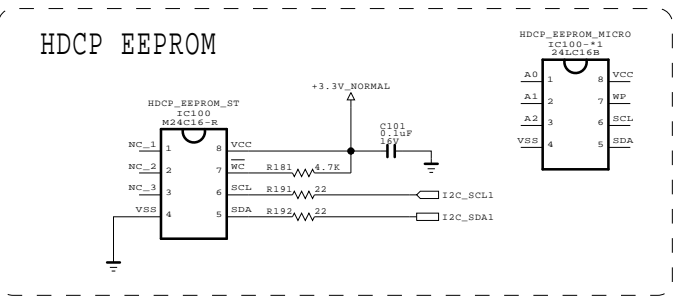
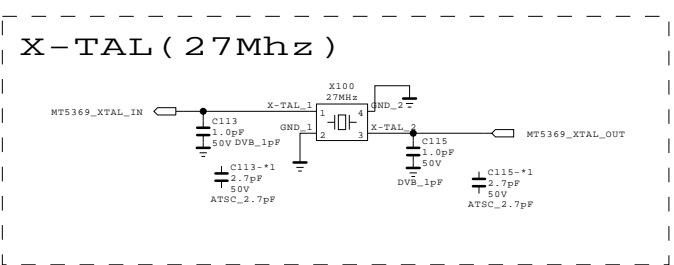
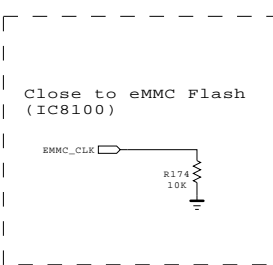
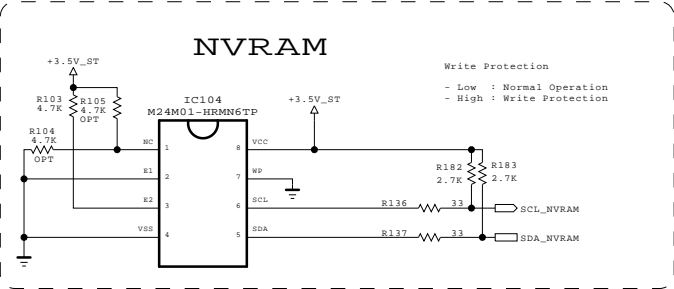
EXPLODED VIEW

IMPORTANT SAFETY NOTICE

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



EAX6430790* : LD22* / LC22*
EAX6443420* : LT22* / LJ22* / LA22* / LB22*



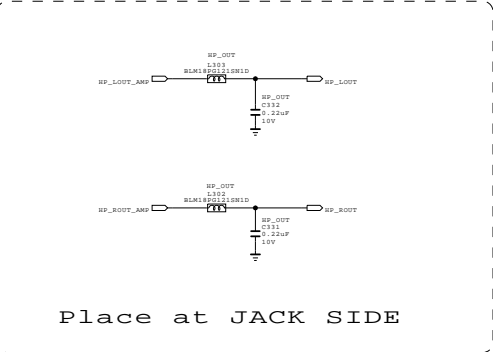
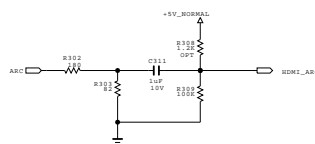
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILTRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

SECRET
LGElectronics

LG ELECTRONICS

MODEL	xxLP860H-ZA	DATE	2012.12.10
BLOCK	MID_MAIN_1	SHEET	8

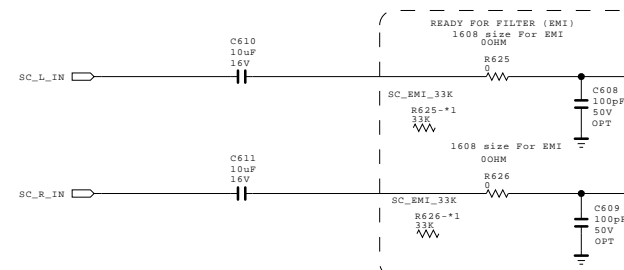
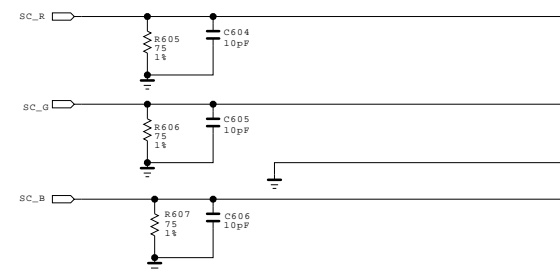
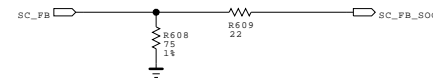
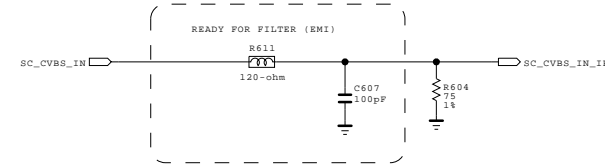
PLACE AT JACK SIDE



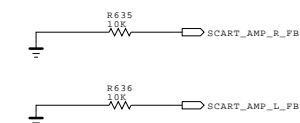
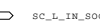
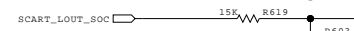
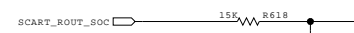
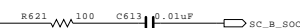
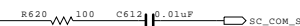
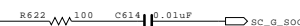
SECRET
LGElectronics



Schematic diagram of the SC_ID_80 signal path. The signal line from SC_ID to SC_ID_80 includes a series resistor R610 (51K, 1/16W, 1%) and a parallel resistor R613 (10K) connected to ground at the SC_ID_80 input.



R623 100 C615 0.01uF SC_R_S01

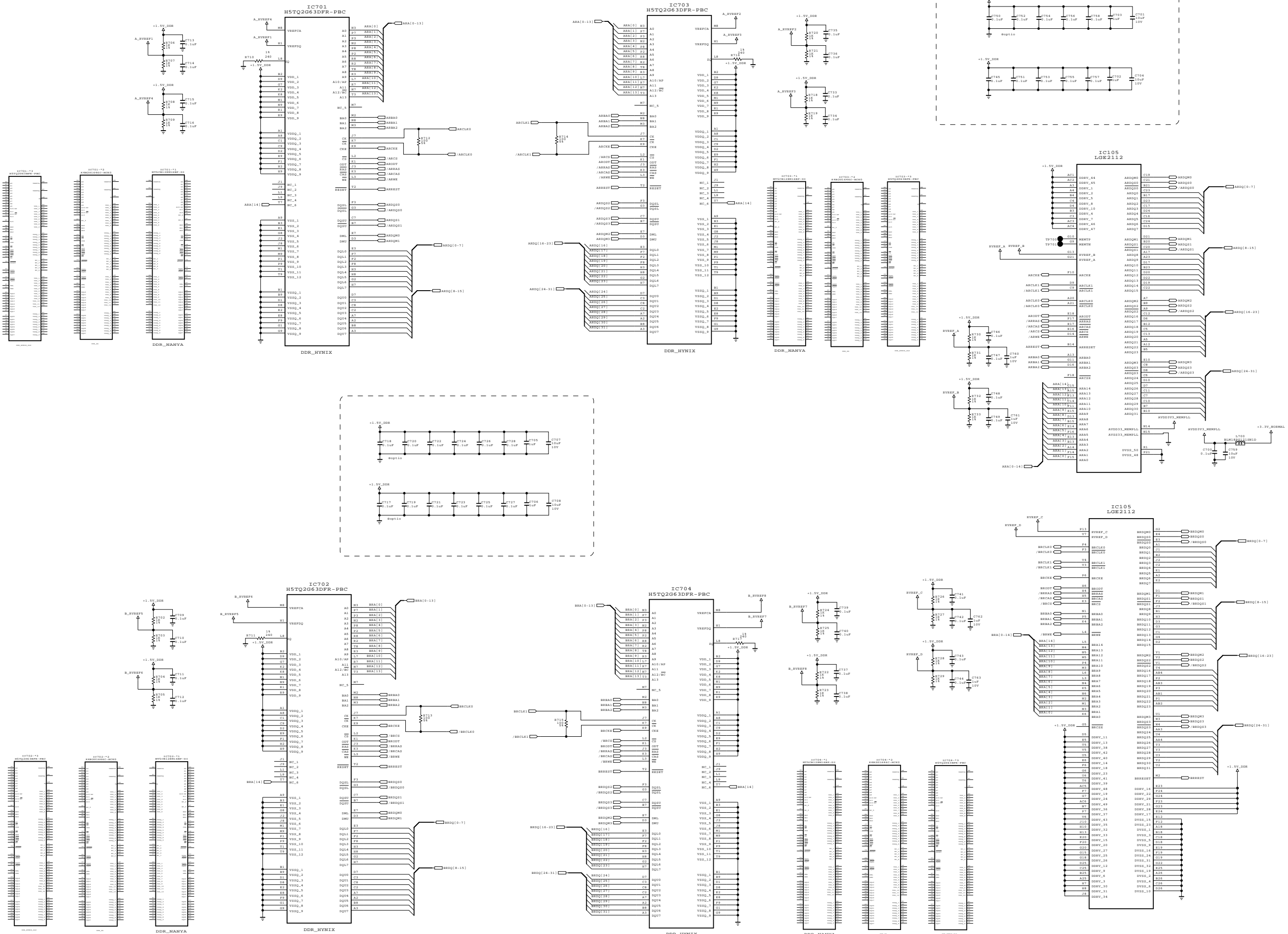




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MODEL	xxLP860H-ZA	DATE	2012.12.10
FIG. NO.	MID_MAIN_SCART	SHEET	11 /

DDR3 SDRAM

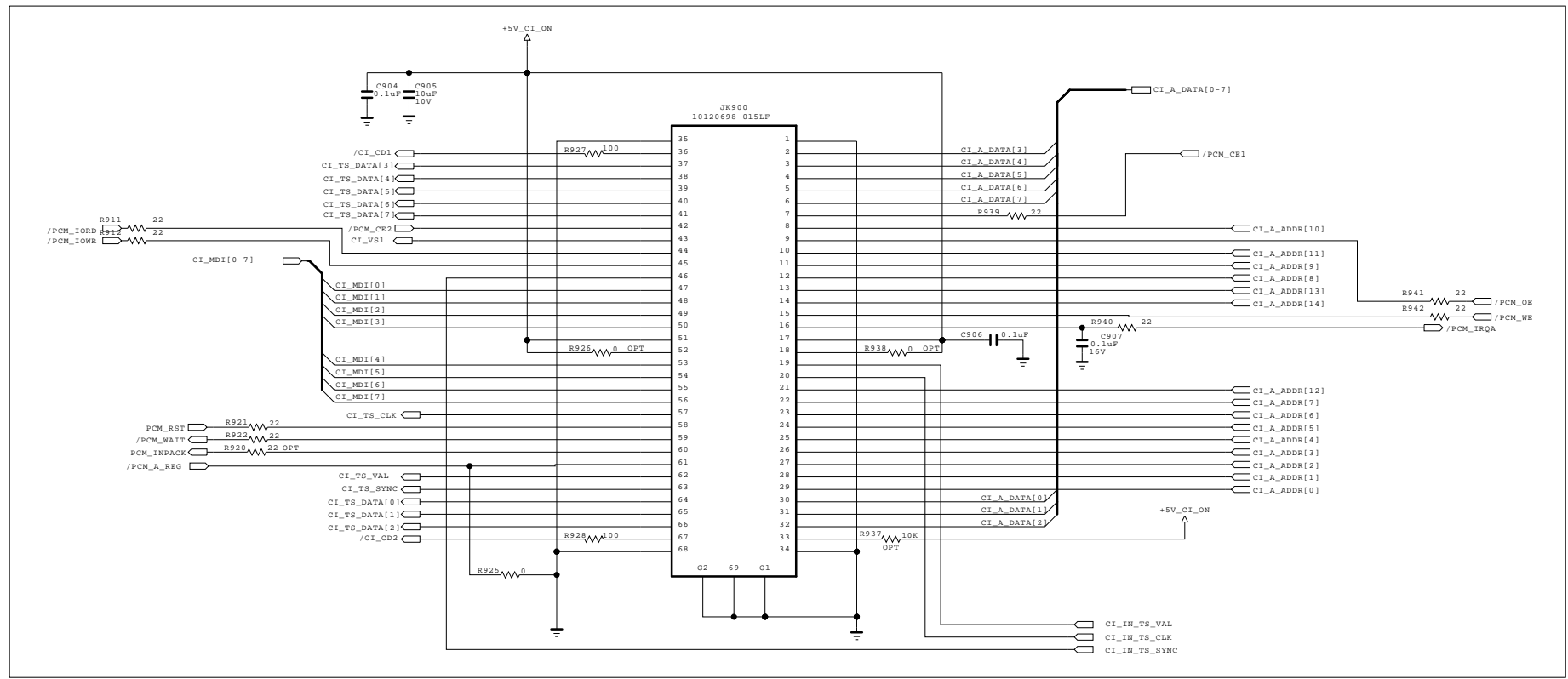
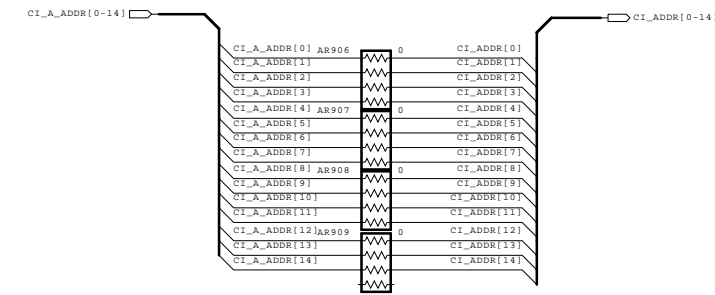


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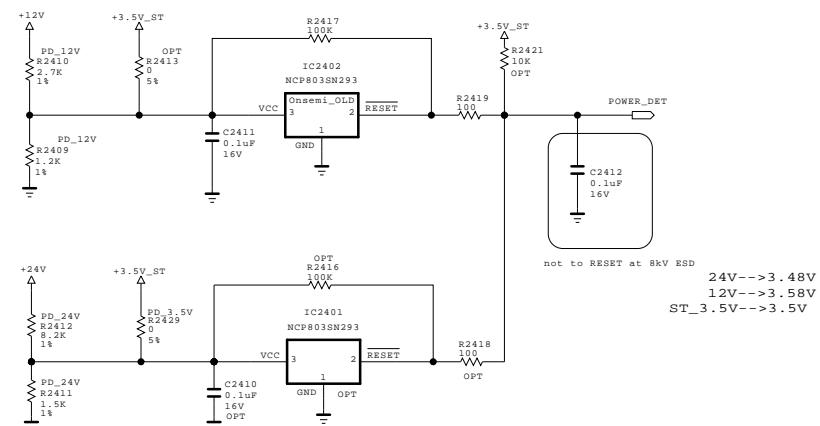
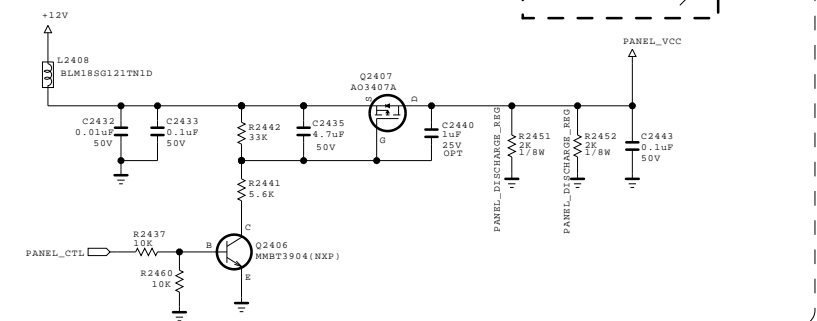
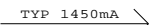
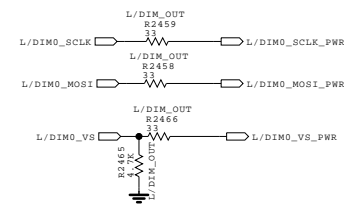
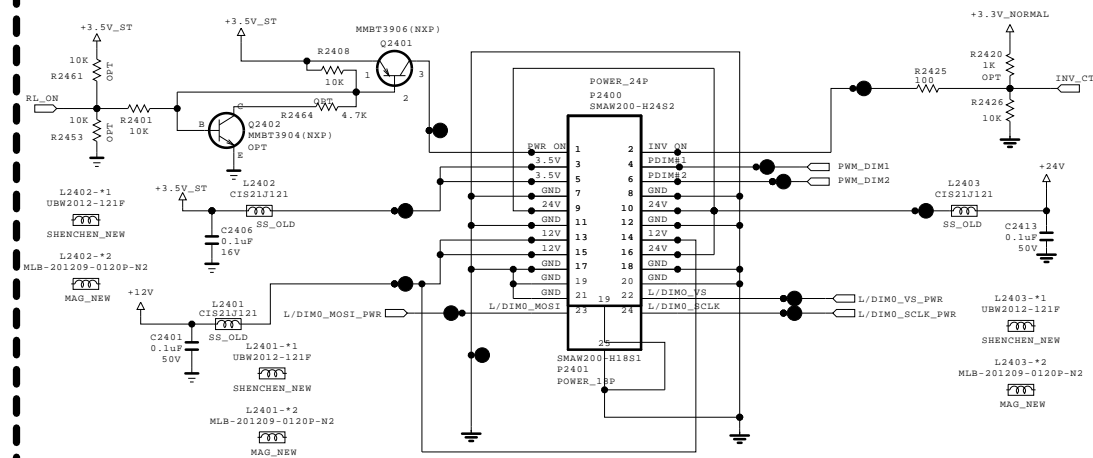


MODEL	xxLP860H-ZA	DATE	2012.12.10
BLOCK	DDR ONE SIDE	SHEET	12 /

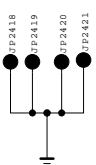


MODEL	xxLP860H-ZA	DATE	2012.12.10
BLOCK	MID_MAIN_CI	SHEET	13 /

LOCAL DIMMING



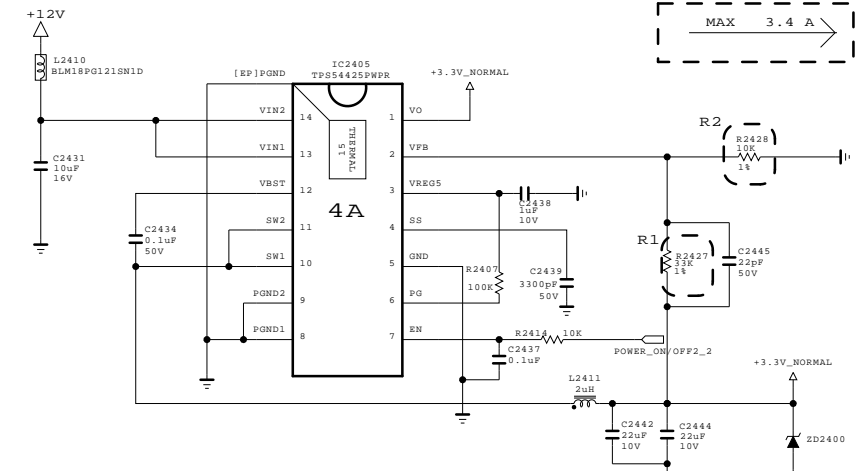
● POWER_ON/OFF1
● POWER_ON/OFF2_1
● POWER_ON/OFF2_2
● POWER_ON/OFF2_3
● POWER_ON/OFF2_4





$$V_{out} = 0.8 * (1 + R1 / R2)$$

$$V_{out} = 0.827 * (1 + R1/R2) = 1.521V$$

MAX 3.4 A



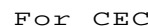
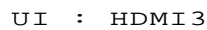
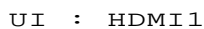
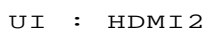
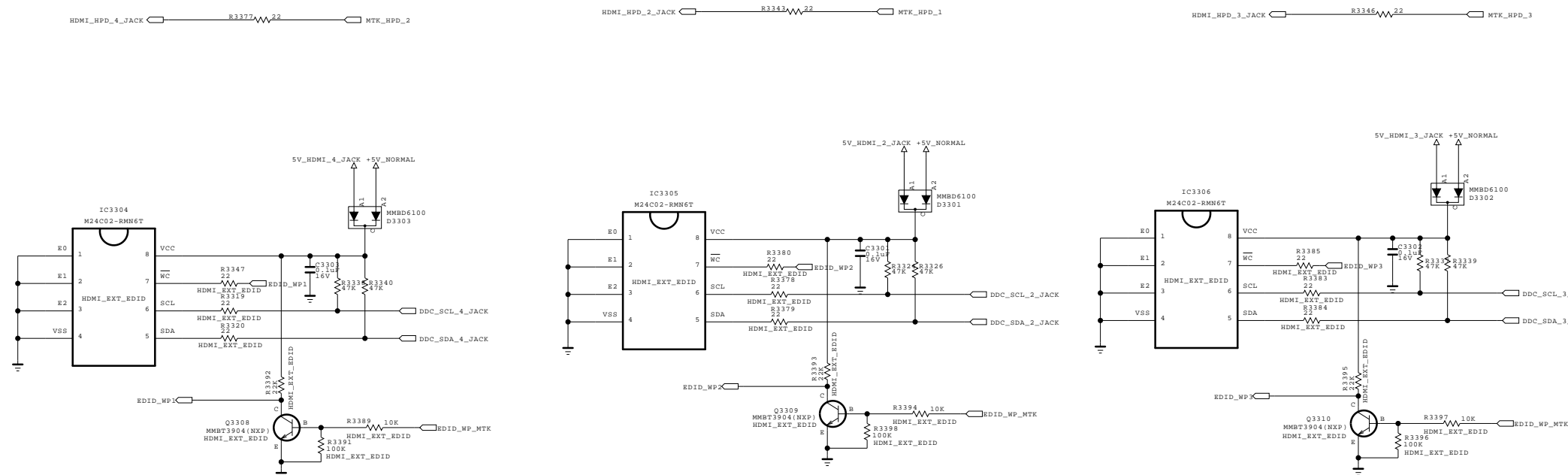
$$V_{out} = (0.763 + 0.0017 * V_{out.set}) * (1 + R1/R2)$$

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MODEL	xxLP860H-ZA	DATE	2012.12.10
BLOCK	MID_POWER	SHEET	24 /

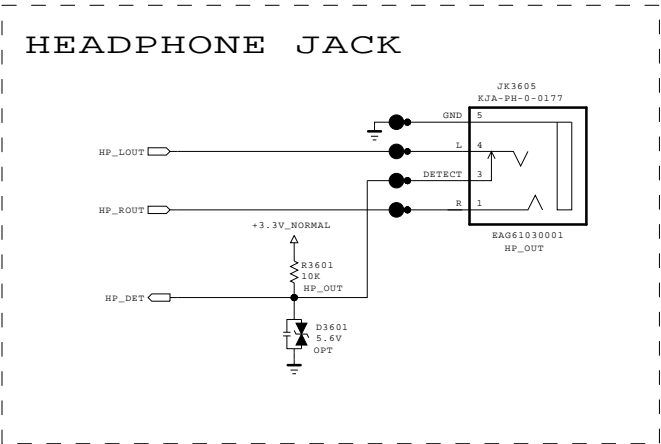
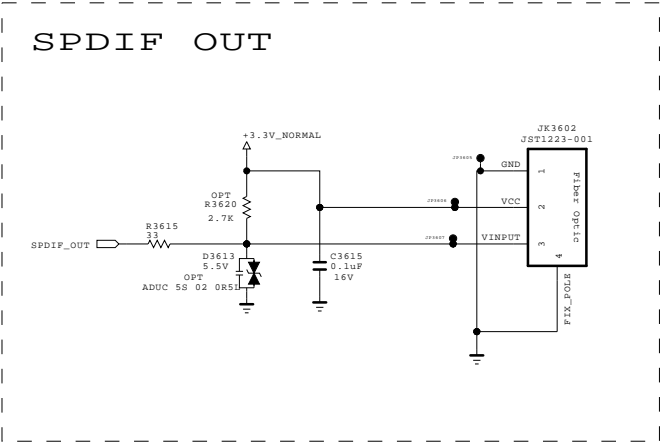
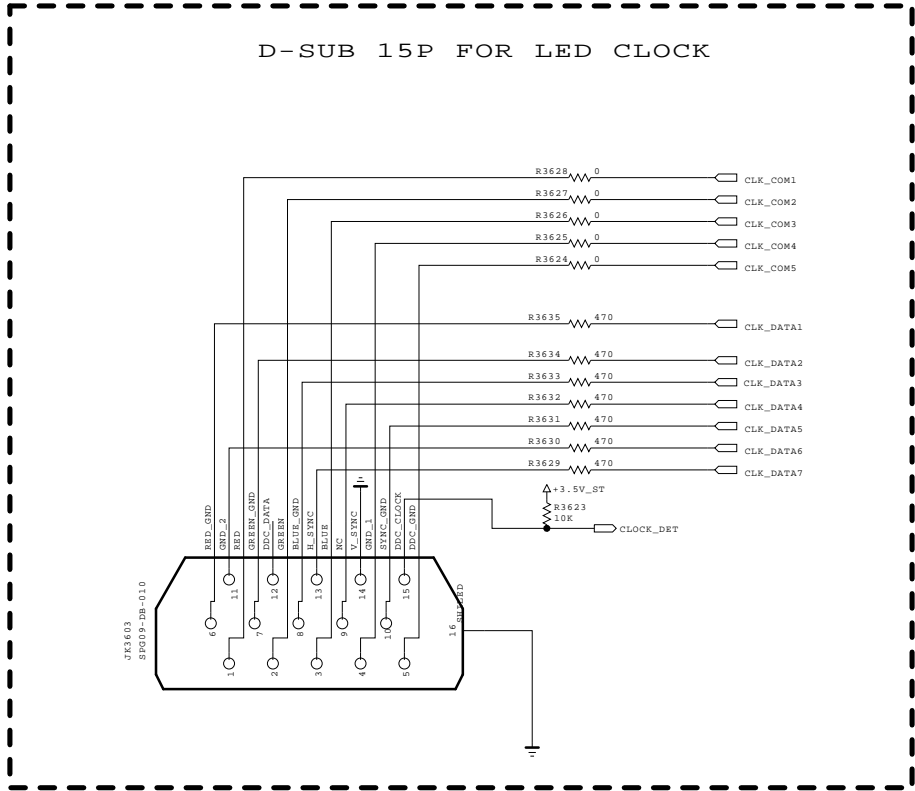


SECRET
G Electronics



MODEL	xxLP860H-ZA	DATE	2012.12.10
BLOCK	HDMI	SHEET	33 /

LED CLOCK / SPDIF / HP



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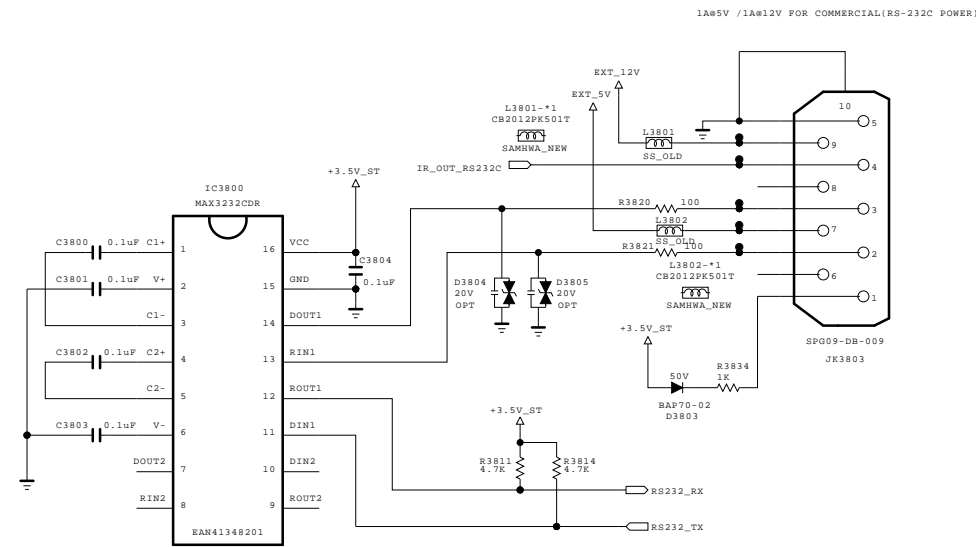
SECRET
GElectronics



MODEL	xxLP860H-ZA	DATE	2012.12.10
BLOCK	CLOCK/SPDIF/HP	SHEET	36 /

RS 232C

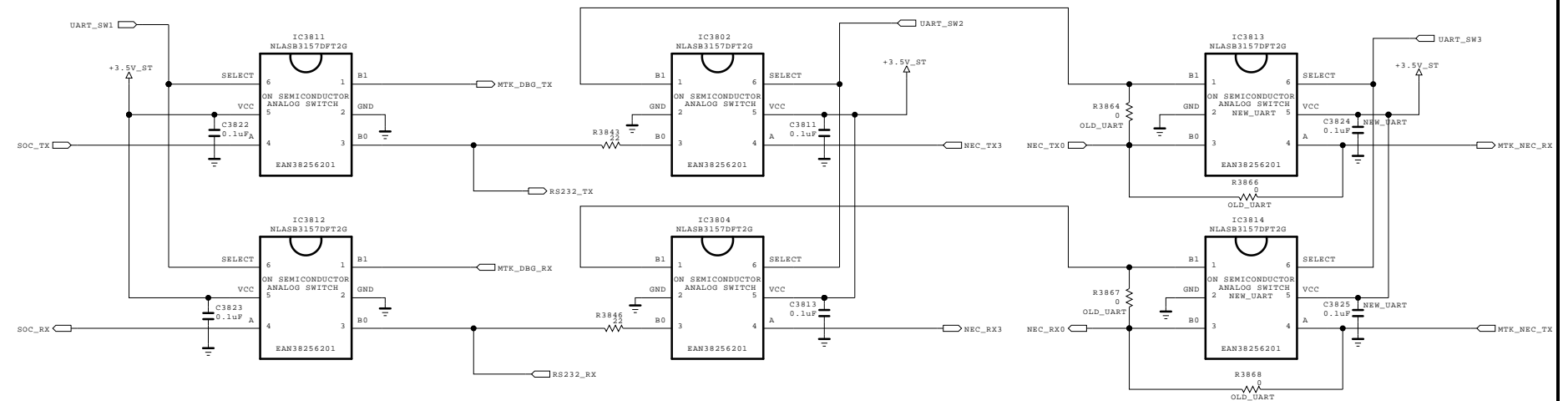
EXT UART SWITCH



DBG_SW	CONNECTION	
L	B0 - A	MTK - RS232C ADJ.
H	B1 - A	MTK - PHONE JK. DEBUG

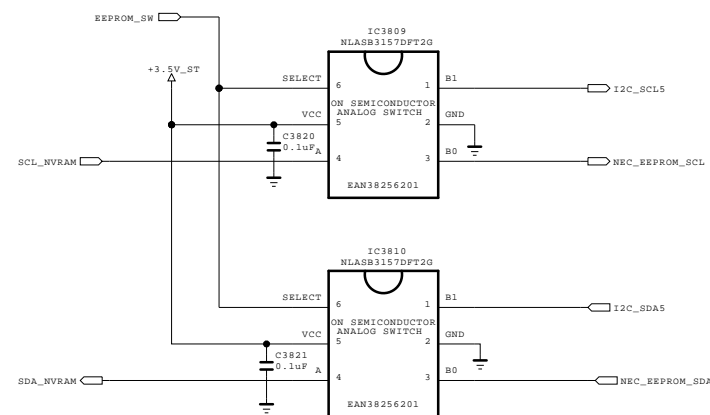
UART_SW2	CONNECTION	
L	B0 - A	RS232C - NEC_UART3, INTERACTIVE
H	B1 - A	MTK - NEC_UART3, NEC USB D/L

UART_SW3	CONNECTION	
L	B0 - A	MTK - NEC_URAT0,NORMAL COMM.
H	B1 - A	MTK - NEC_UART3,NEC USB D/L



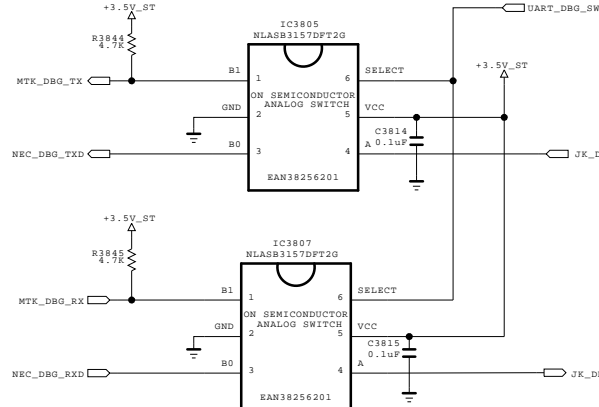
NVRAM I2C SWITCH

UART_SW2	CONNECTION	
L	B0 - A	NVRAM - NEC
H	B1 - A	NVRAM - MTK



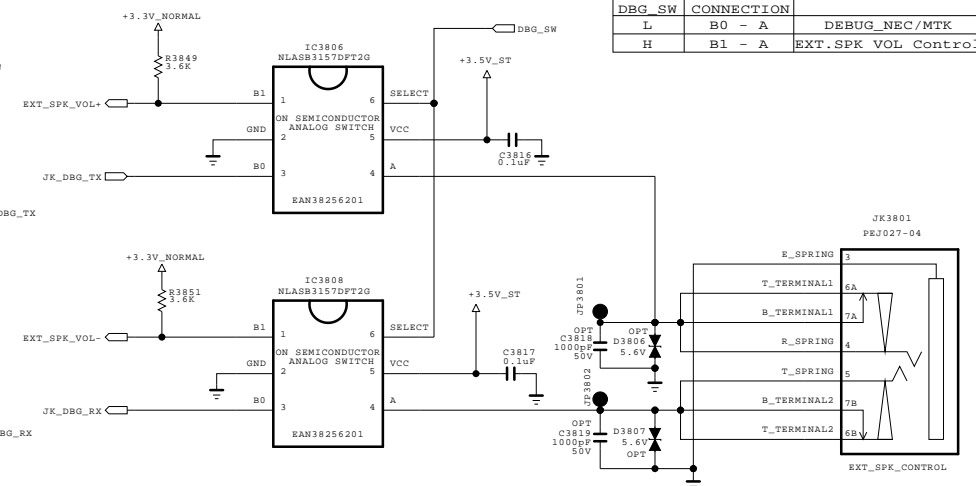
UART DBG SWITCH



UART_DBG_SW	CONNECTION	
L	B0 - A	Debug NEC
H	B1 - A	Debug MTK



EXT SPK CONTROL & DBG OUT

DBG_SW	CONNECTION	
L	B0 - A	DEBUG_NEC/MTK
H	B1 - A	EXT.SPK VOL Control



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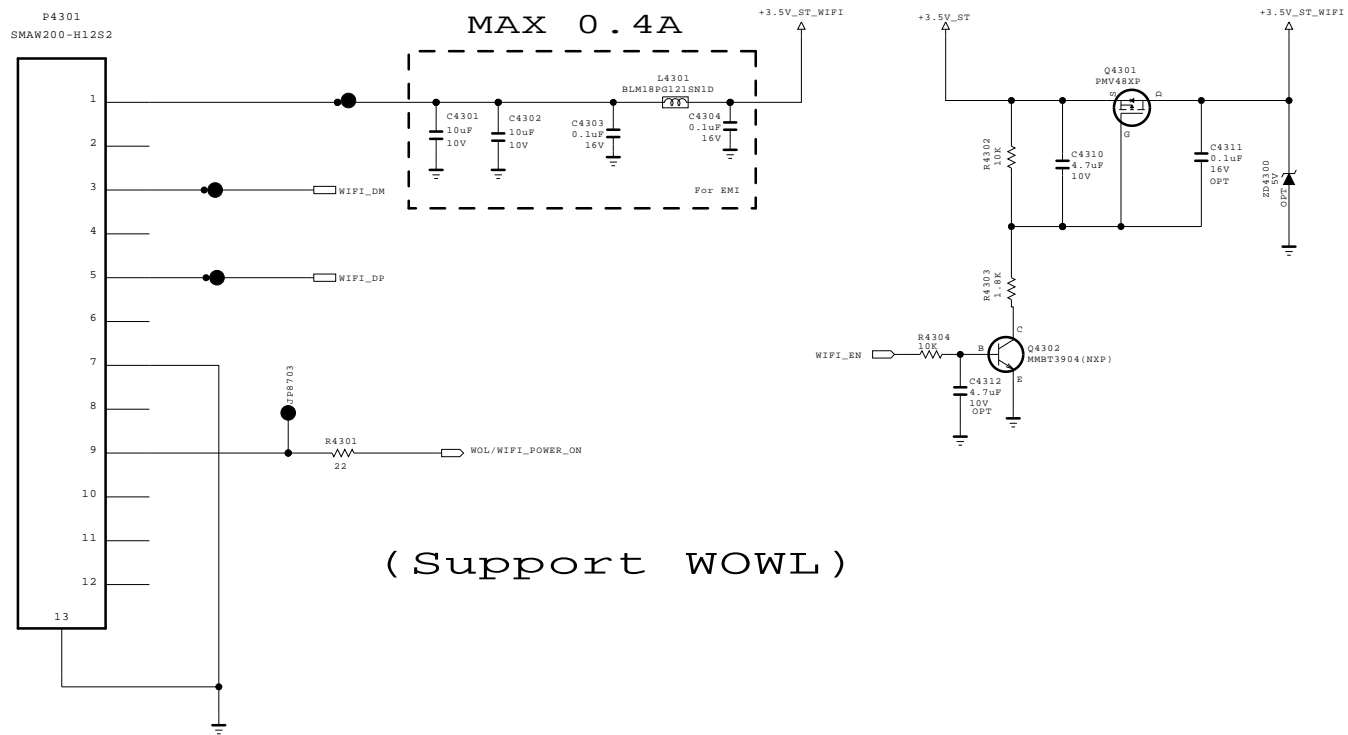
MODEL	xxLP860H-ZA	DATE	2012.12.10
BLOCK	RS232/UART	SHEET	38 /

The schematic diagram illustrates the internal circuitry of the IR & KEY section of the P4101 12507WR-08L module. The circuit is powered by a +3.5V_ST supply. Two key inputs, KEY1 and KEY2, are connected to the supply through resistors R4113 and R4114 (10K) and capacitors C4100 and C4102 (0.1uF). The IR LED is driven by a +3.5V_ST supply through a resistor R4125 (10K) and a diode D4100 (5.6V OPT). The module also includes a LOGO_LIGHT input and a +5V_ST supply. The P4101 module is shown as a multi-pin connector with pins for GND, KEY1, KEY2, +3.5V_ST, GND, LOGO/LED_R, IR, and GND.

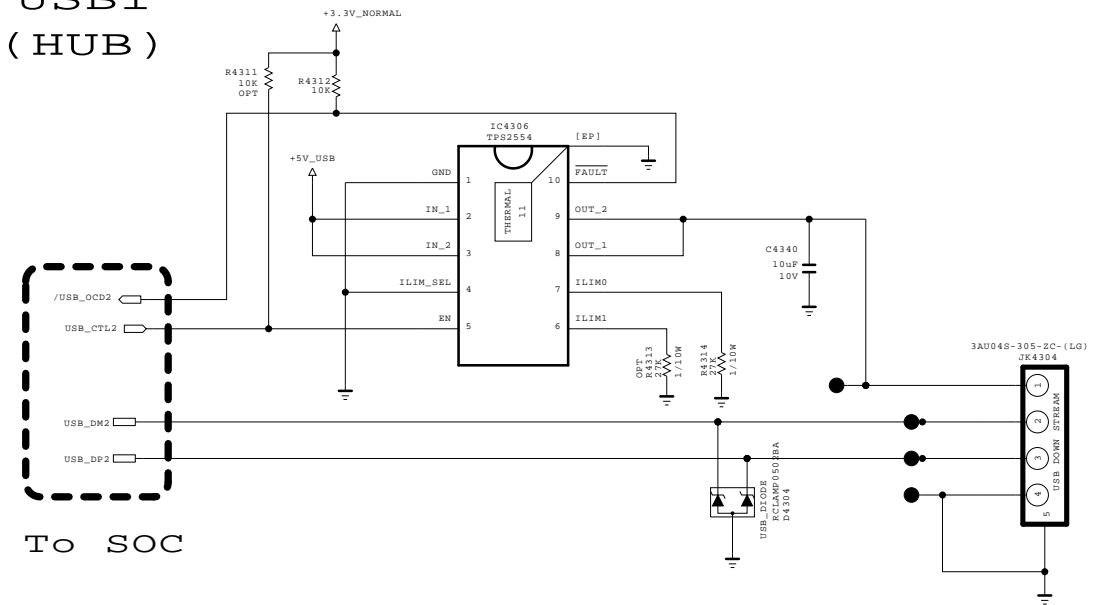
SECRET
LGElectronics



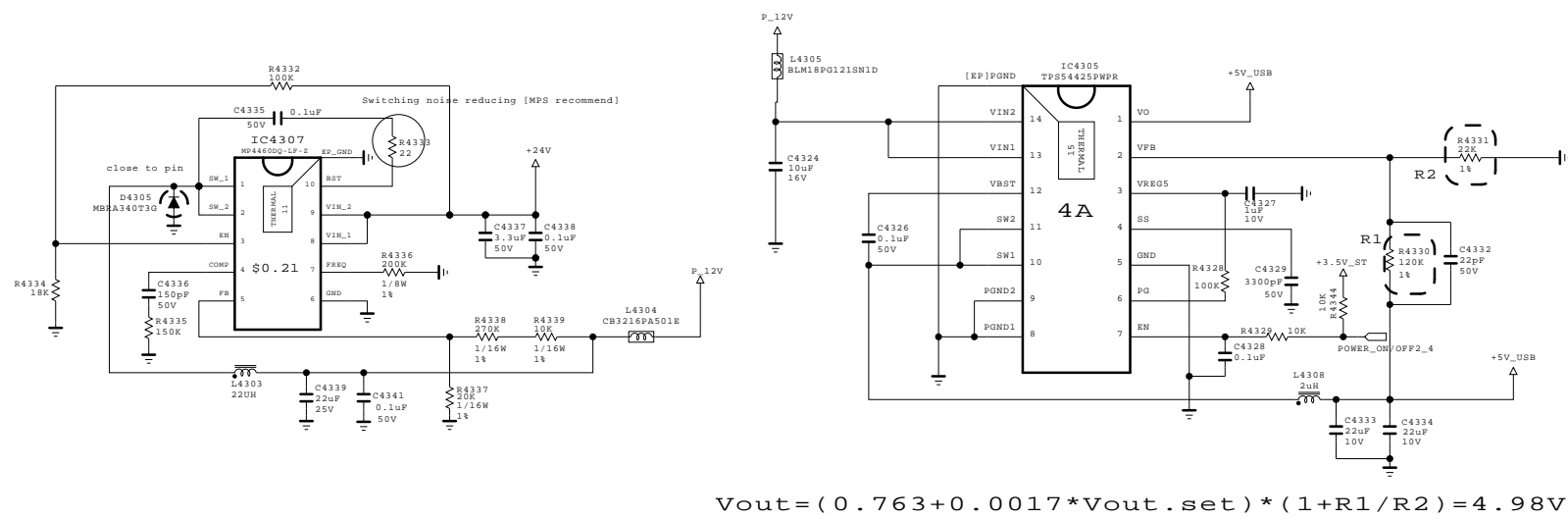
WIFI (Netcast 4.0 WIFI Module)



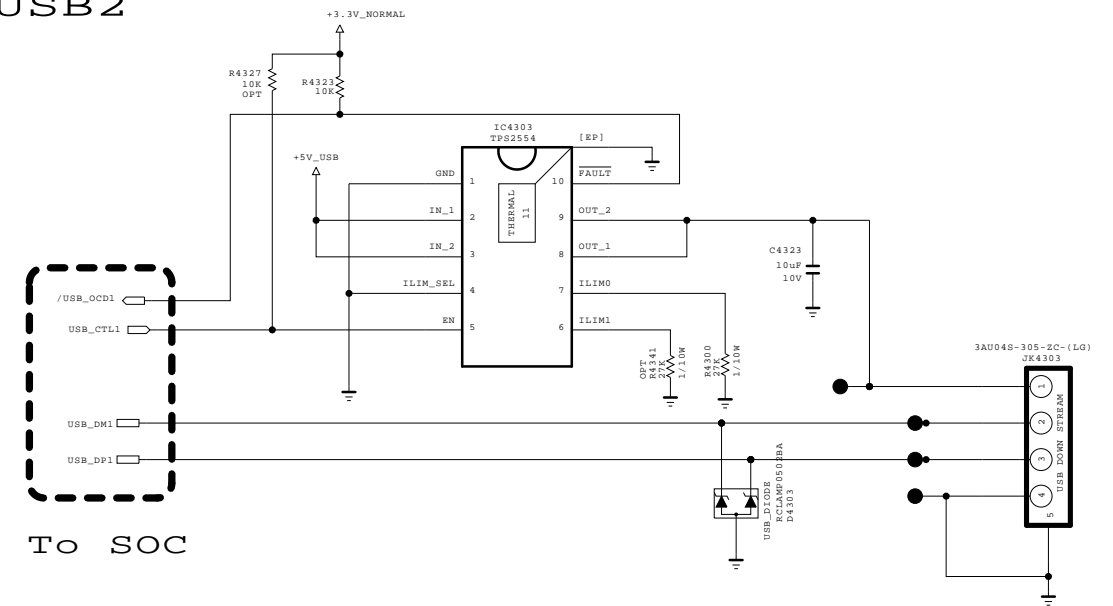
USB1
(HUB)





USB POWER (+24V->P_12V->+5V_USB)



USB 2



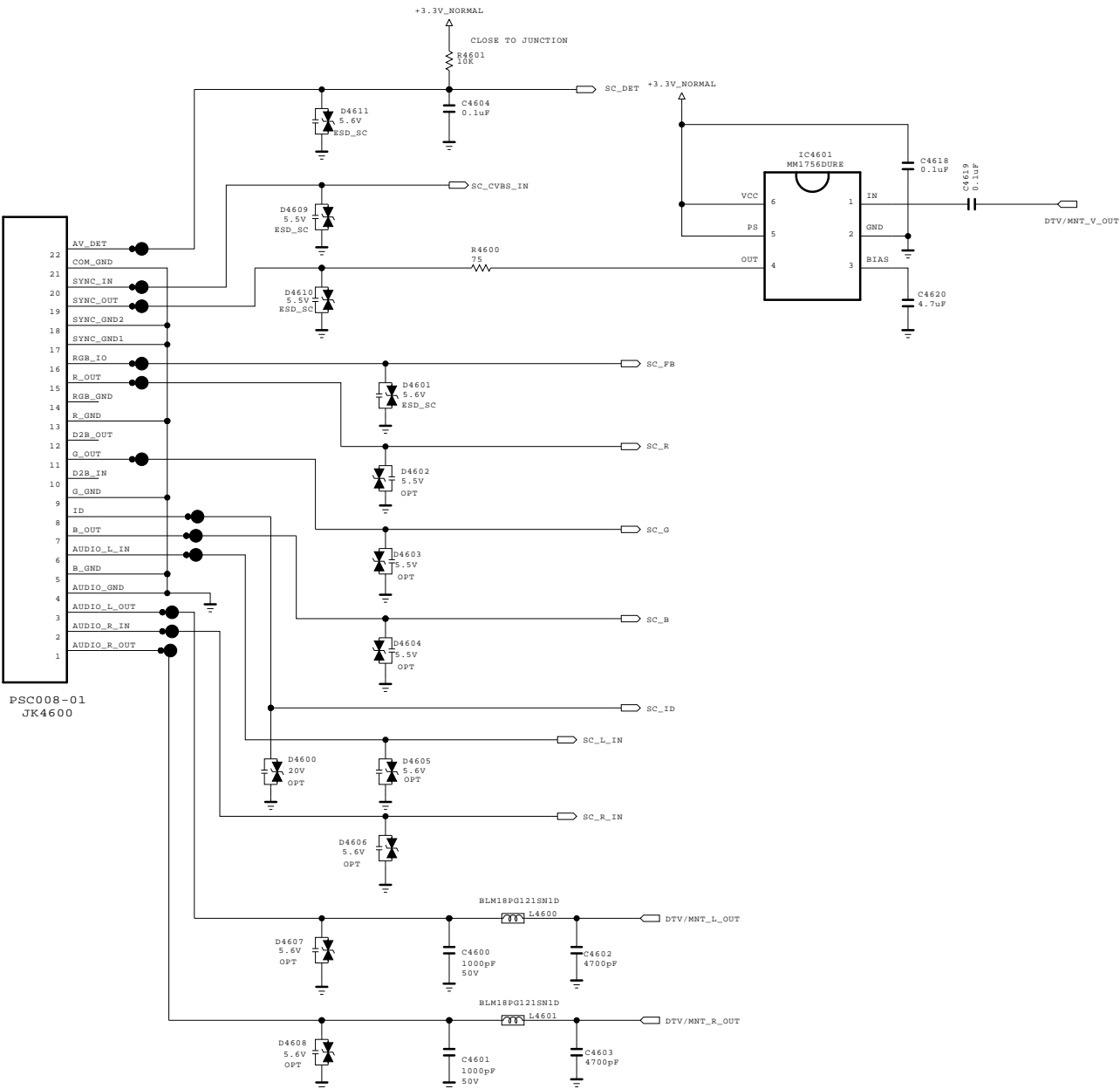
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SECRET
G Electronics



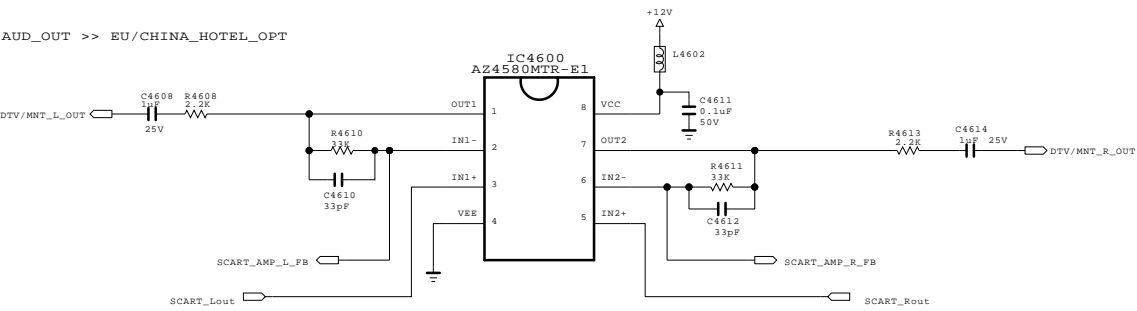
MODEL	xxLP860H-ZA	DATE	2012.12.10
BLOCK	USB/WIFI	SHEET	43 /

Full Scart

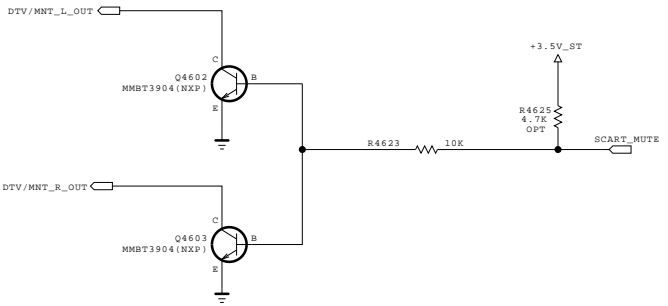




SCART AMP

AUD_OUT >> EU/CHINA_HOTEL_OPT



[SCART AUDIO MUTE]



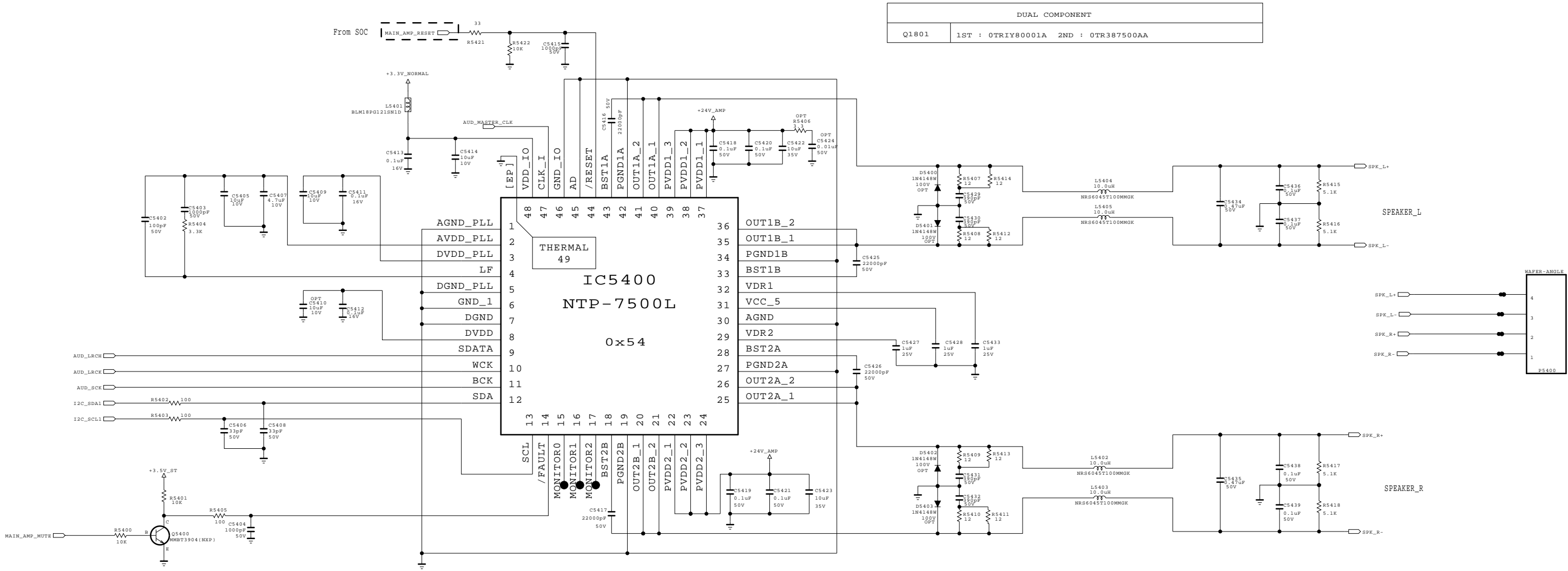
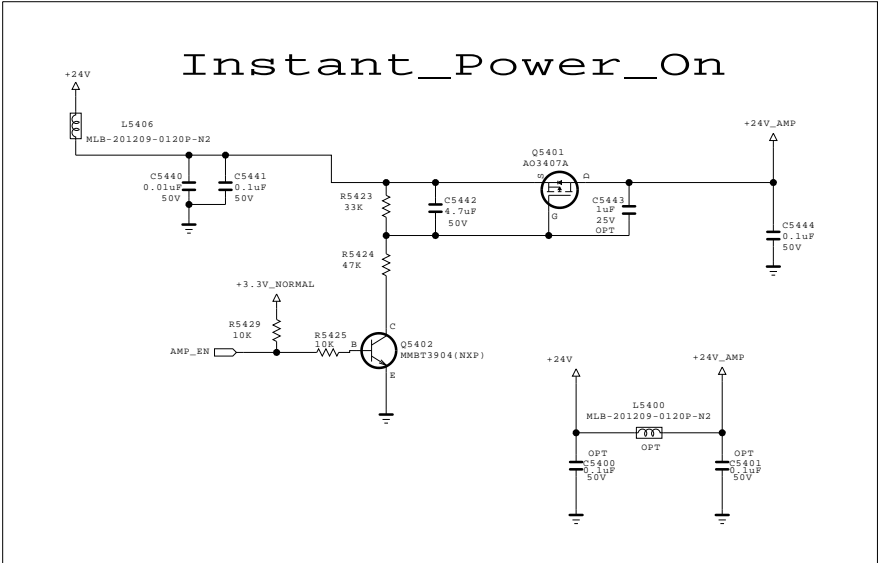
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MODEL	xxLP860H-ZA	DATE	2012.12.10
BLOCK	SCART GENDER	SHEET	46 /

AUDIO AMP (NTP-7500L)



DUAL COMPONENT	
Q1801	1ST : 0TRIY80001A 2ND : 0TR387500AA

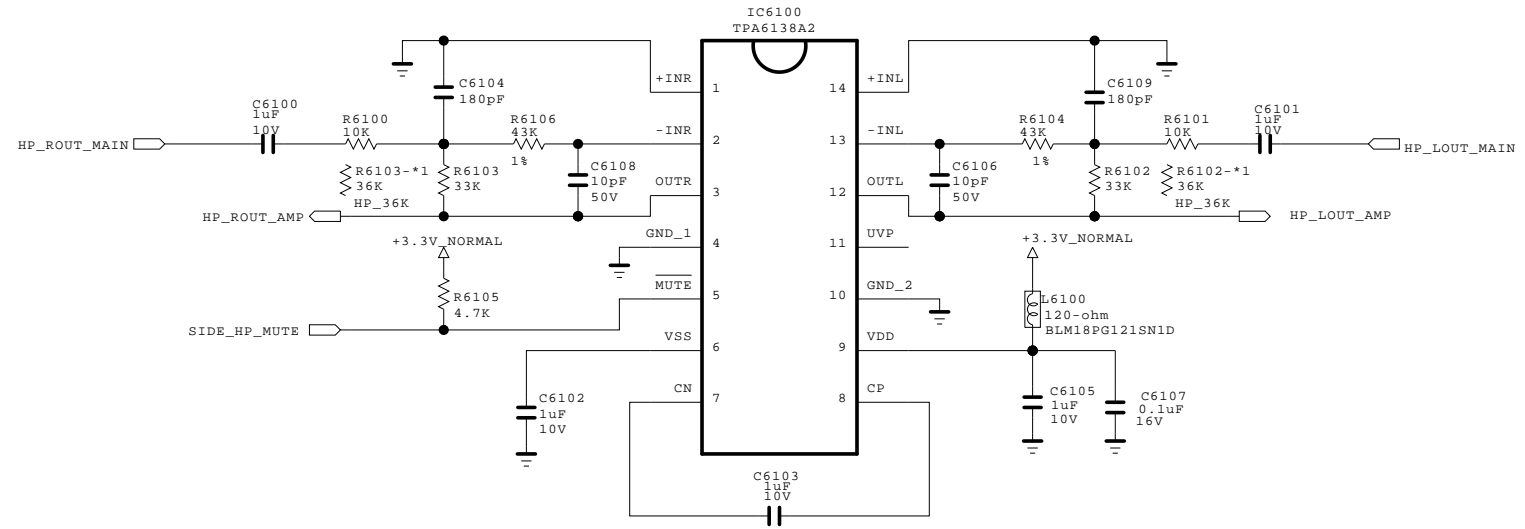
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SECRET
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MODEL	xxLP860H-ZA	DATE	2012.12.10
BLOCK	AMP_NTP7500L	SHEET	54 /

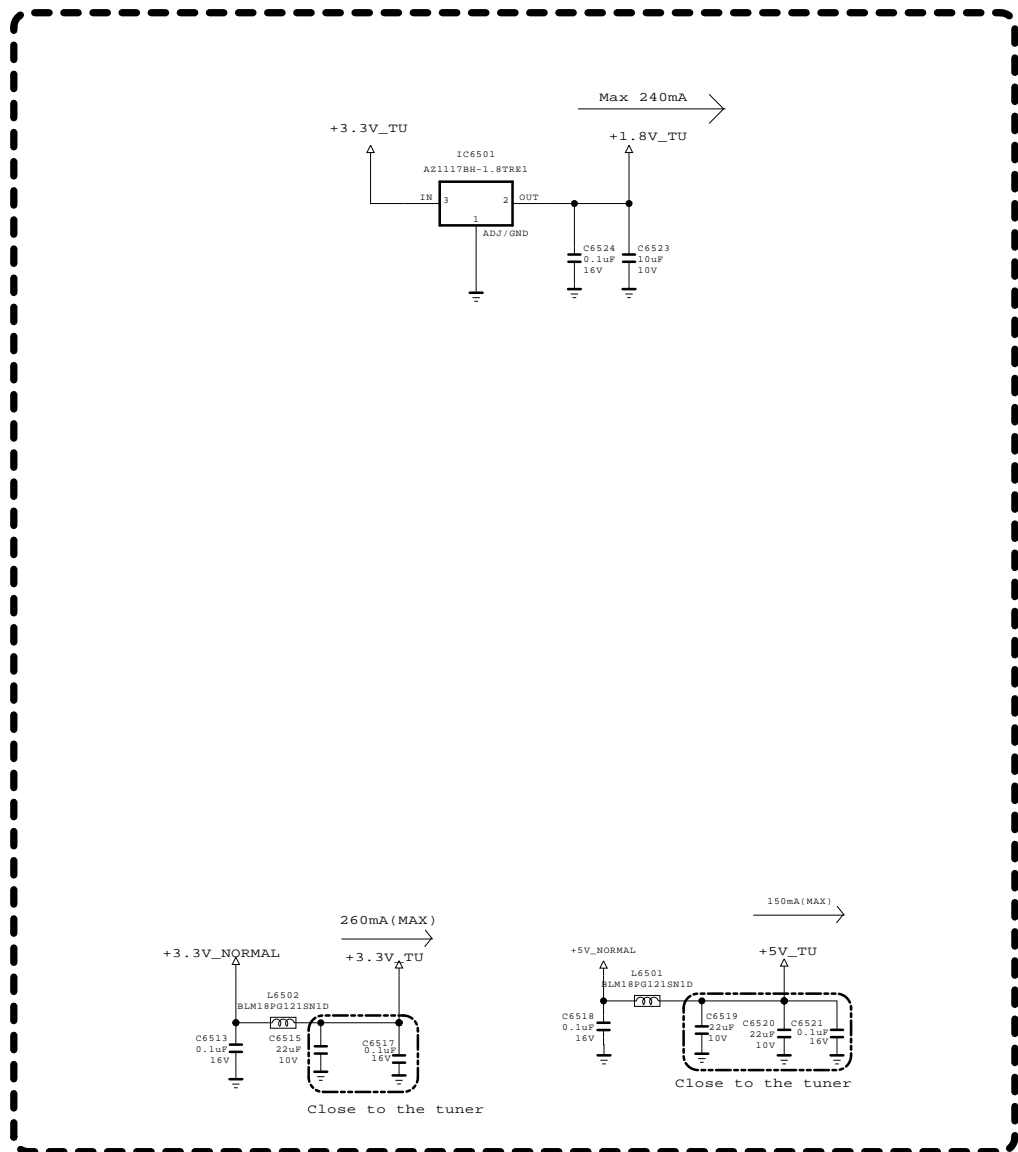
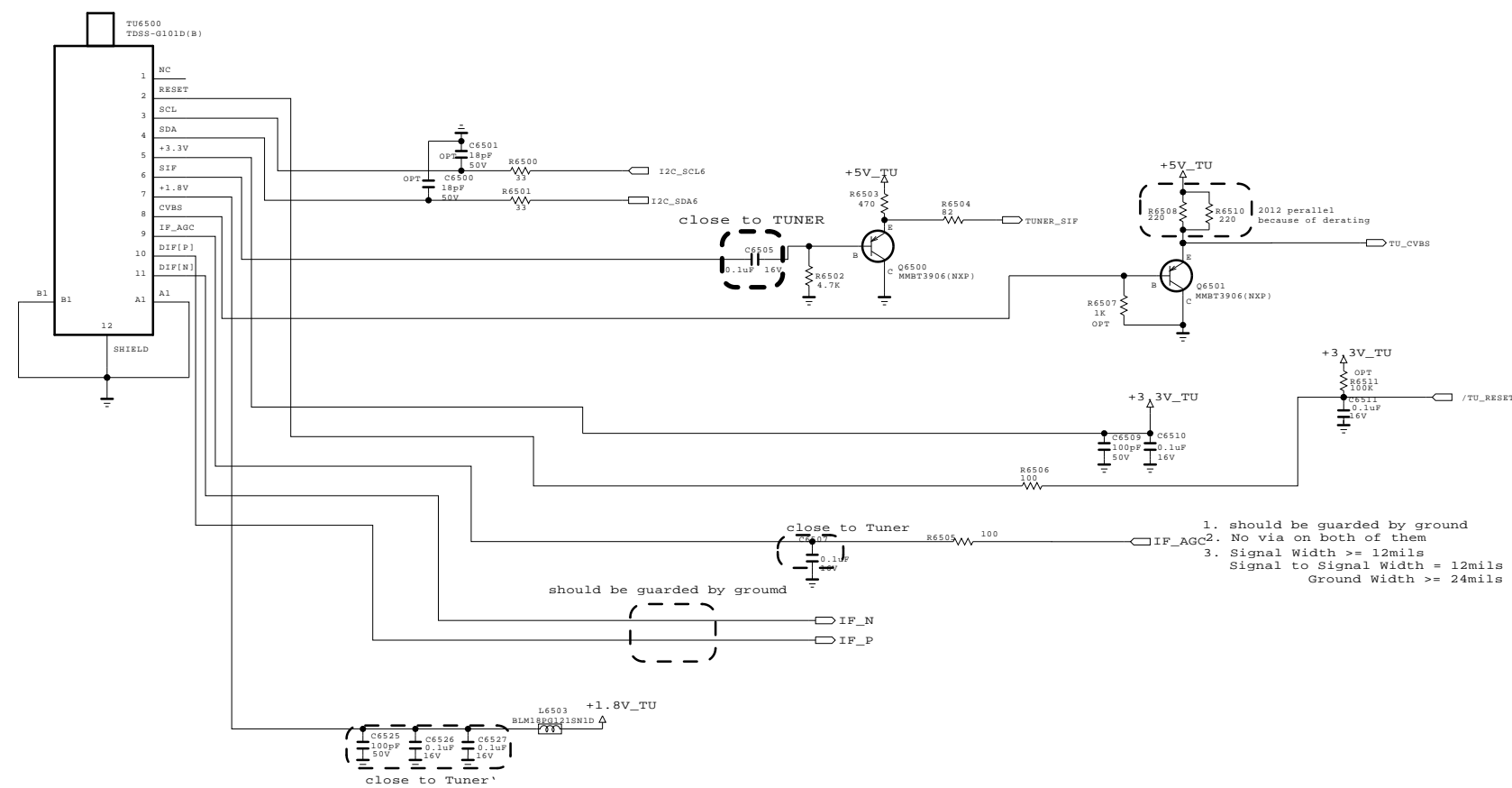
HEADPHONE AMP





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SECRET	 LG ELECTRONICS	MODEL	XXLP860H-ZA	DATE	2012.12.10
		BLOCK	HEADPHONE AMP	SHEET	61 /

H/NIM for Commercial (EU)

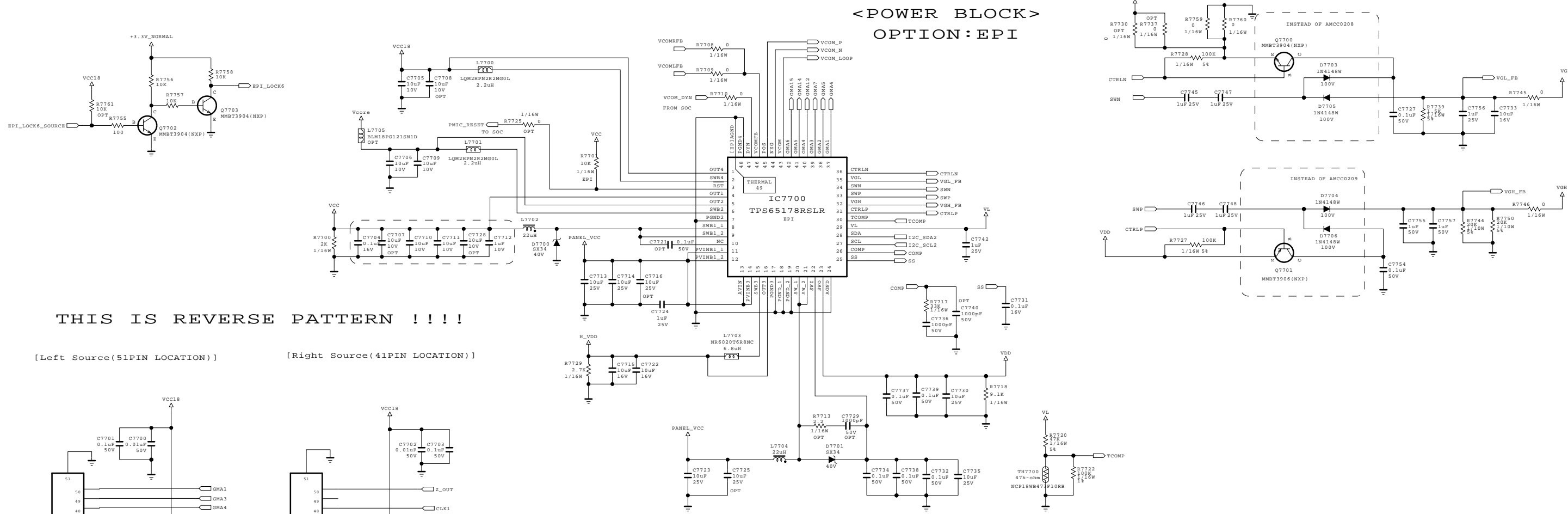


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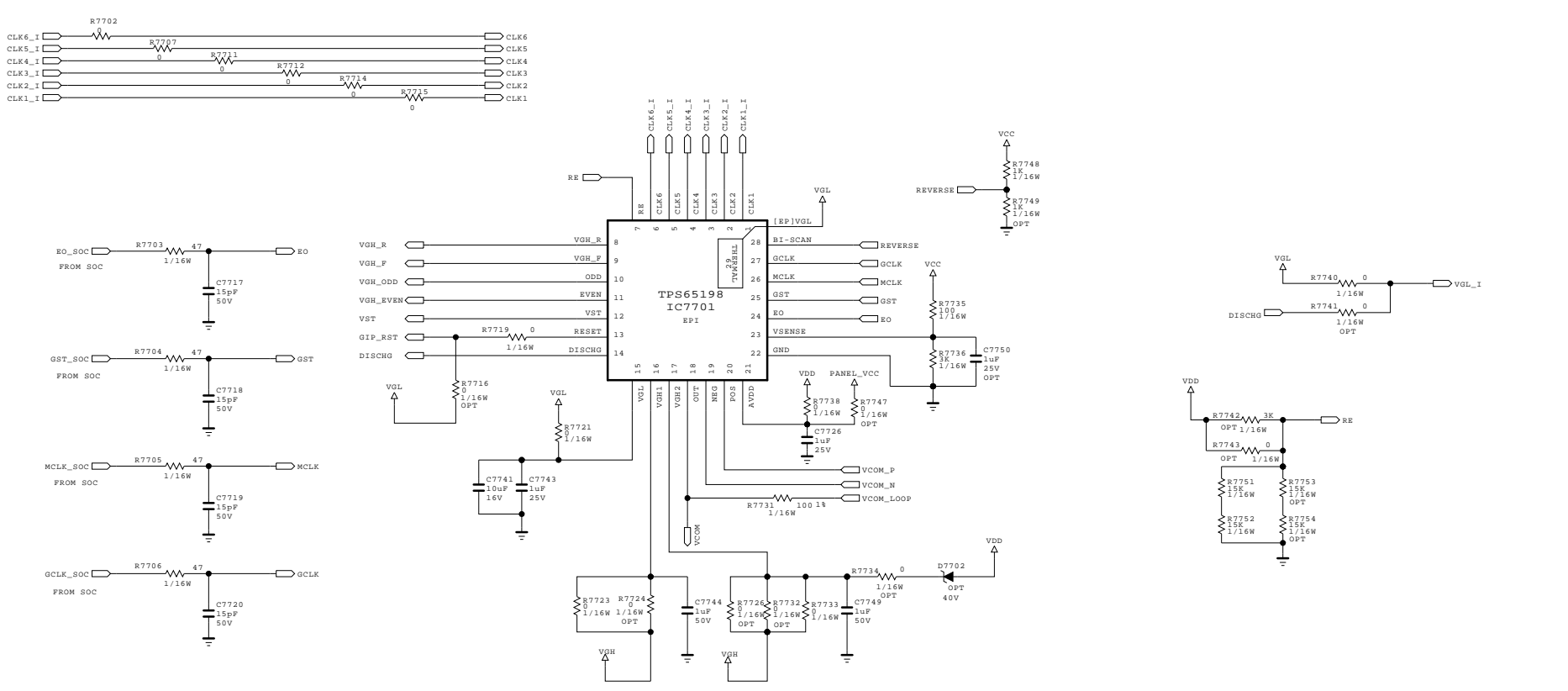
SECRET
LGElectronics





MODEL	xxLP860H-ZA	DATE	2012.12.10
BLOCK	TUNER	SHEET	65



<LEVEL SHIFTER BLOCK>



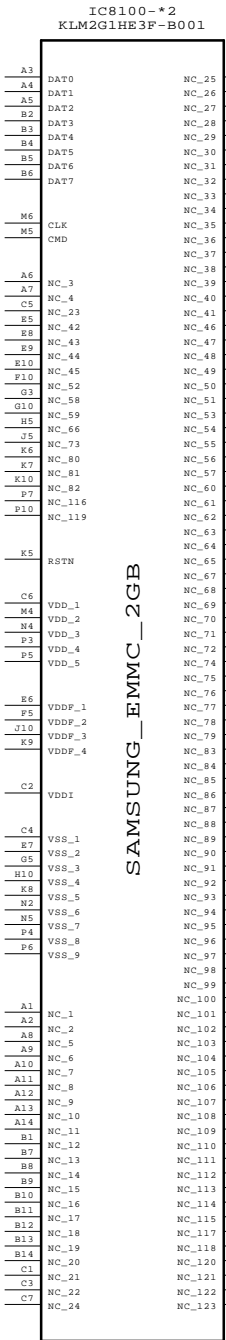
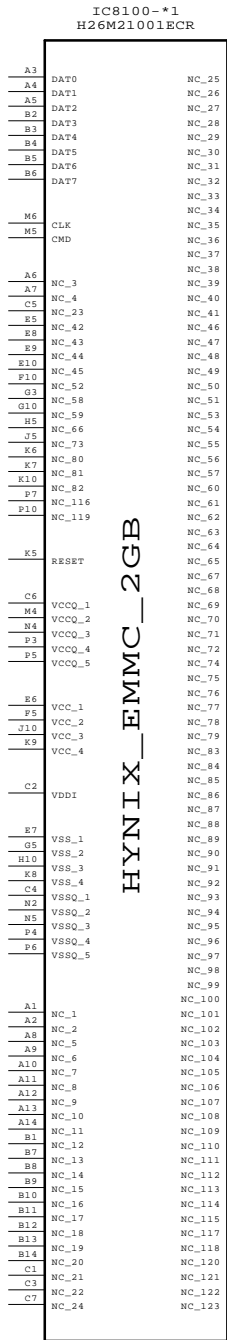
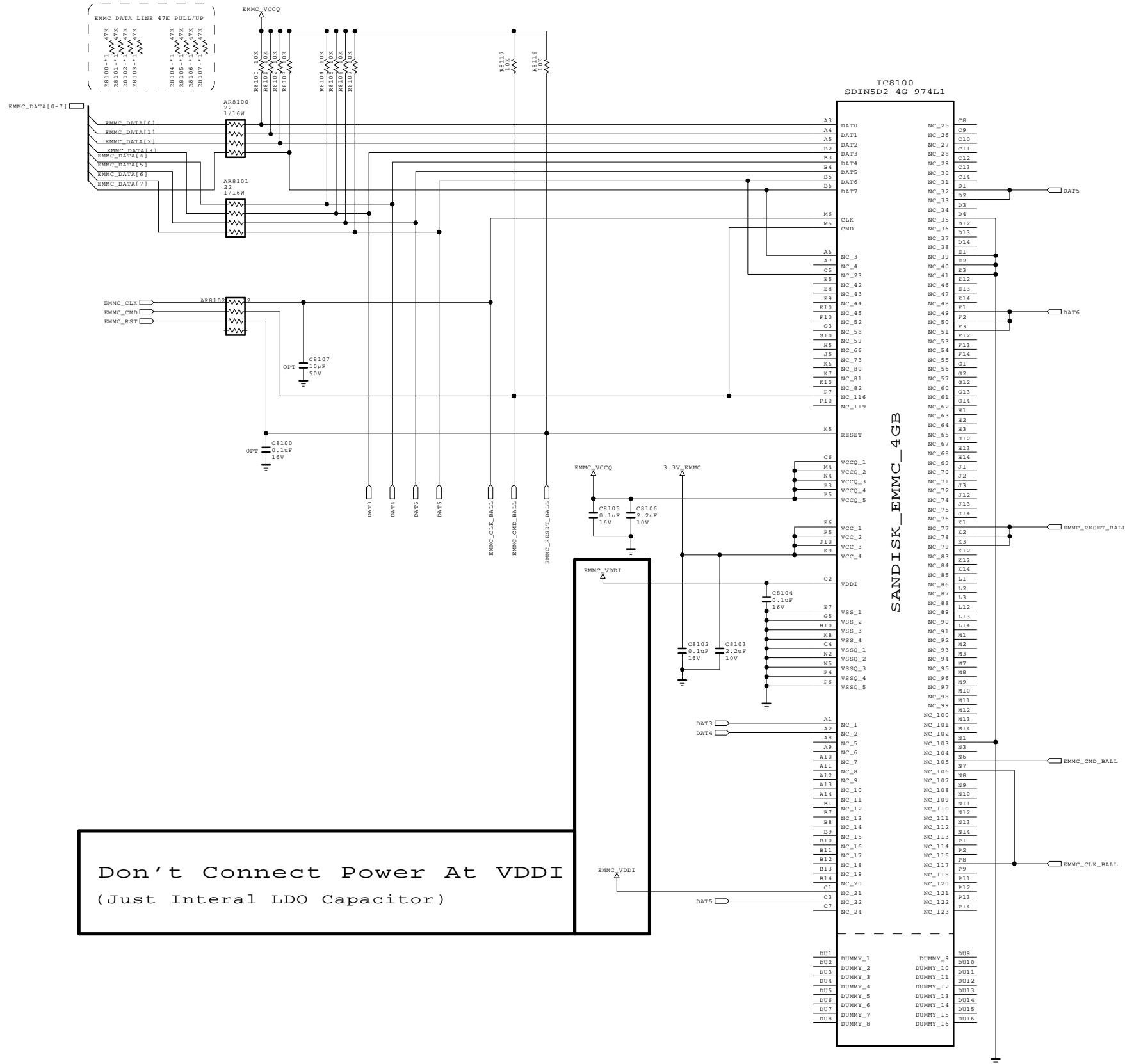
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SECRET
LG Electronics



MODEL	xxLP860H-ZA	DATE	2012.12.10
BLOCK	T-Con/MINI LVDS	SHEET	77

eMMC I/F



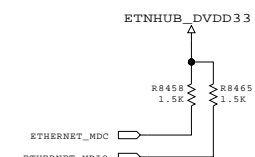
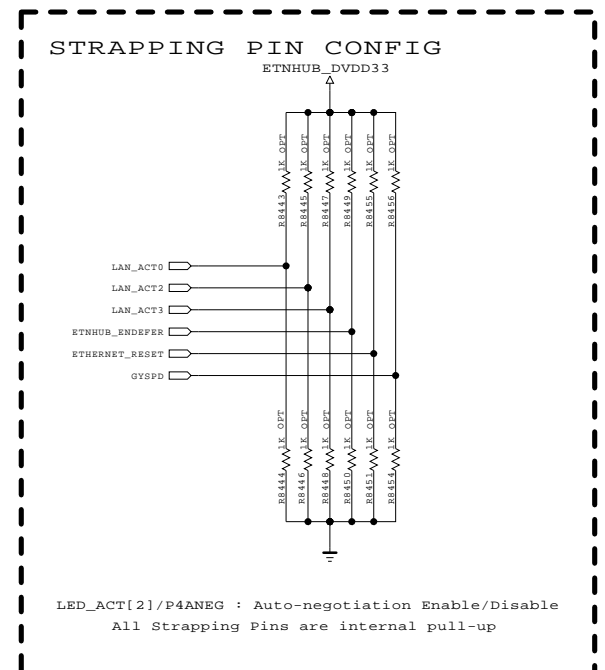
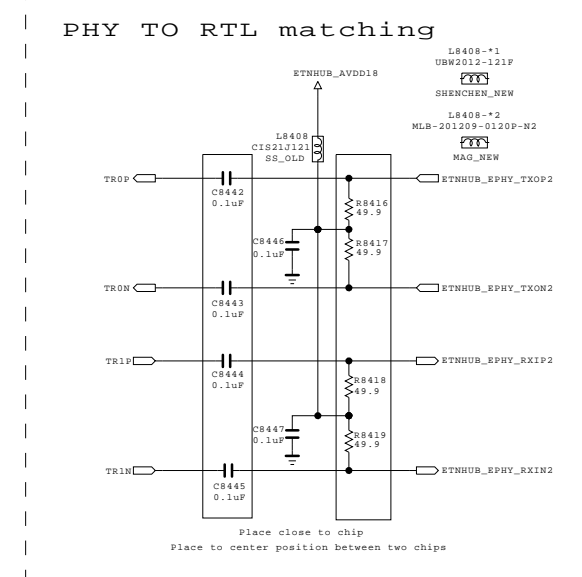
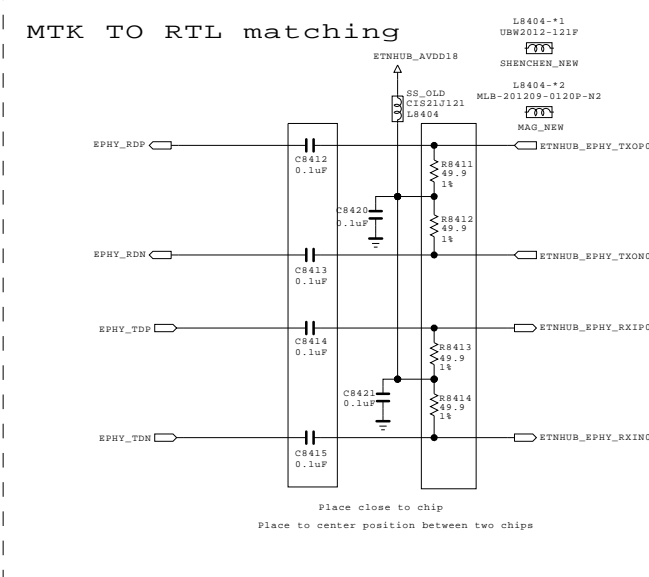
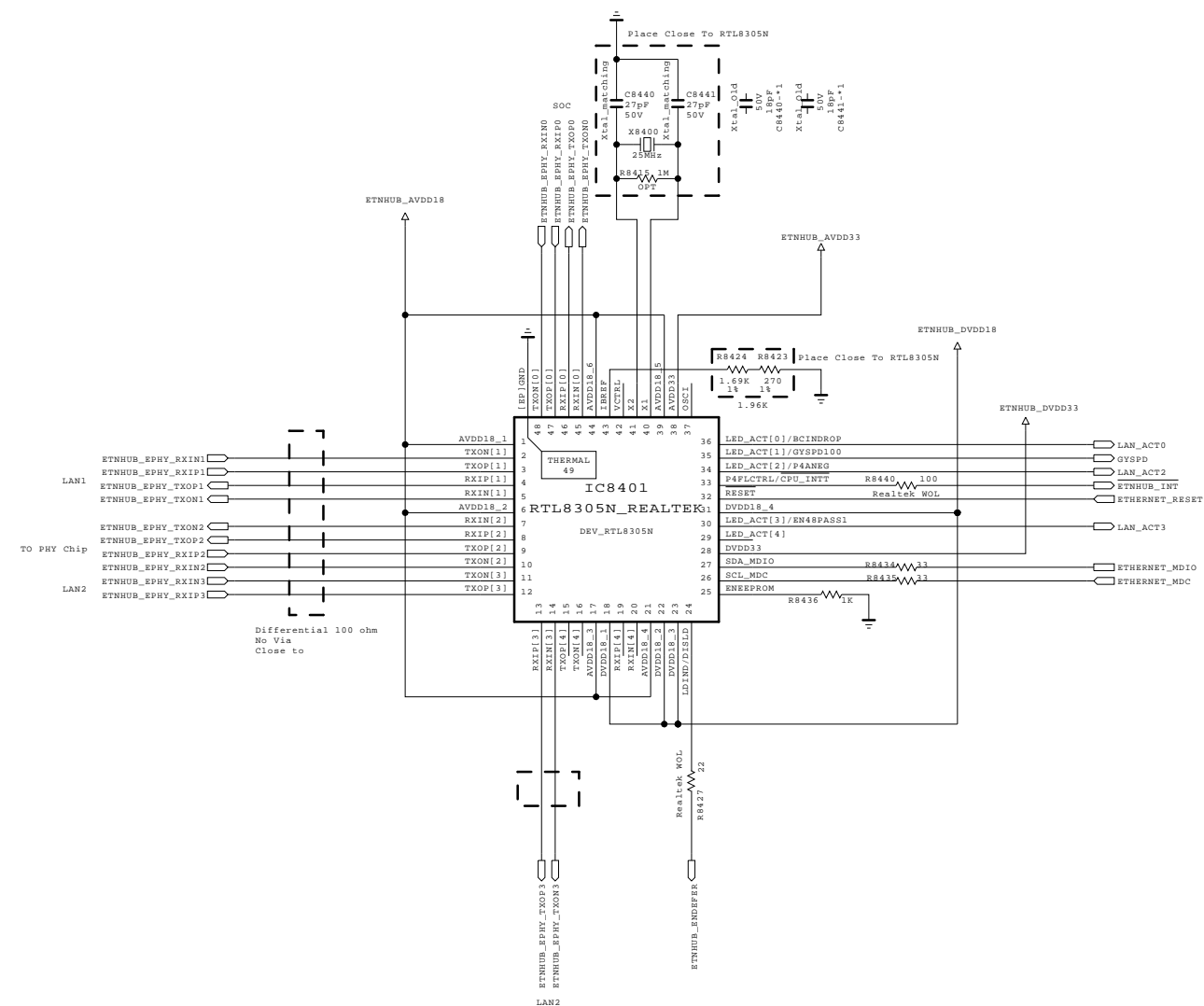
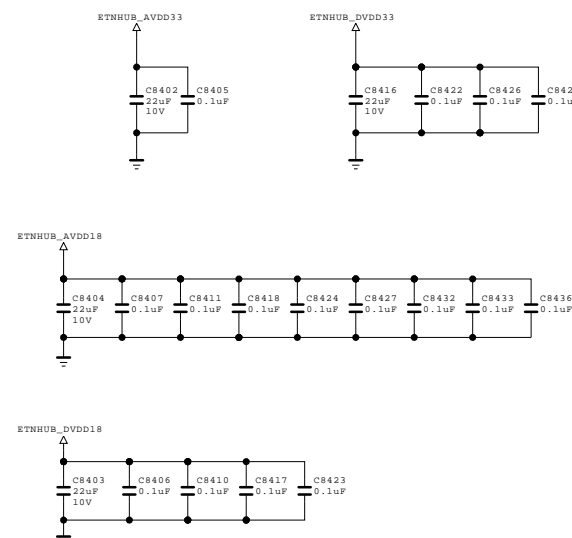
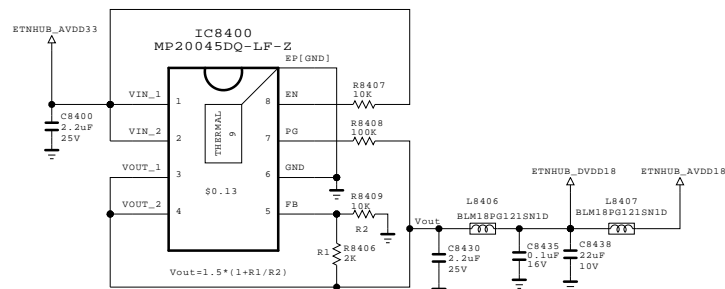
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MODEL	xxLP860H-ZA	DATE	12.12.10
BLOCK	eMMC Flash	SHEET	81 /

Ethernet Power

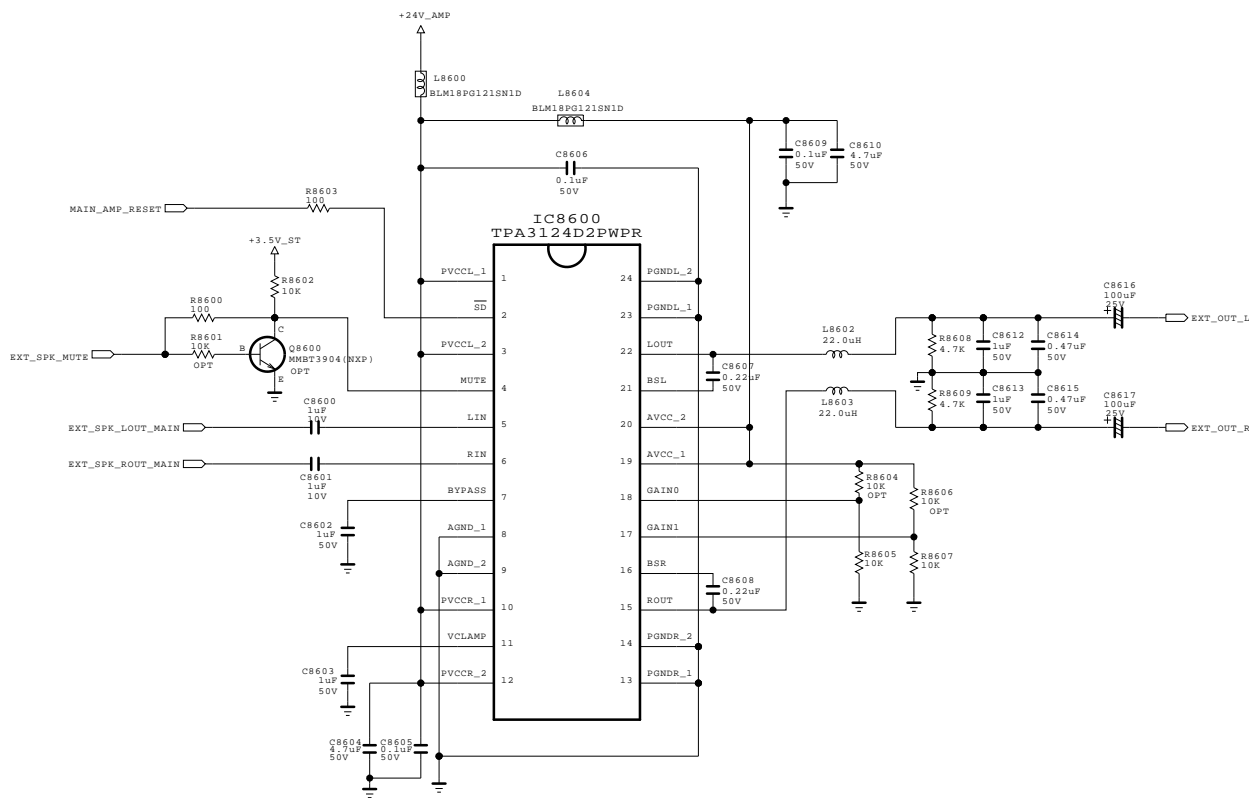


SECRET
LGElectronics

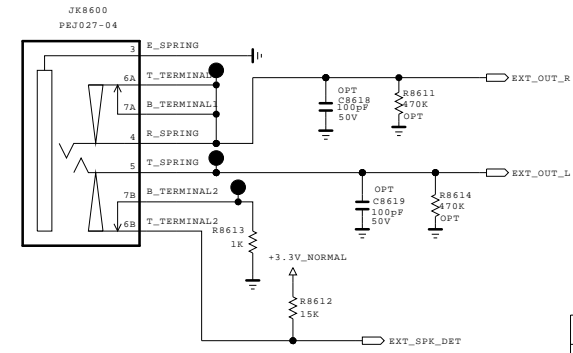


MODEL	xxLP860H-ZA	DATE	2012.12.10
BLK CK	Ethernet Hub	SHEET	84 /



EXT_SPEAKER_AMP



EXT_SPK OUT(Single End)



EXT_SPK_DET	
Connected	Disconnected
High	Low

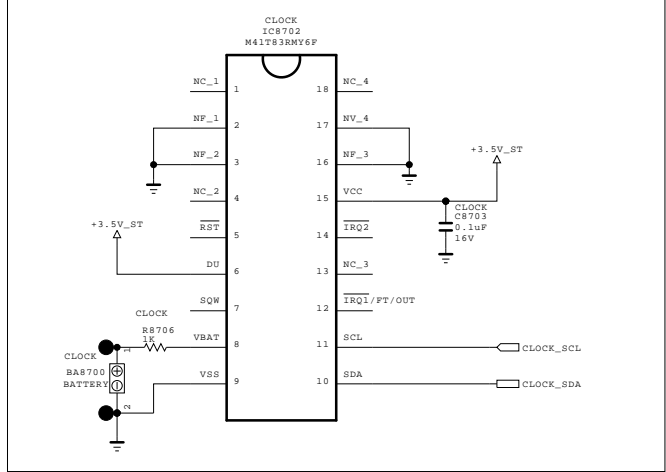
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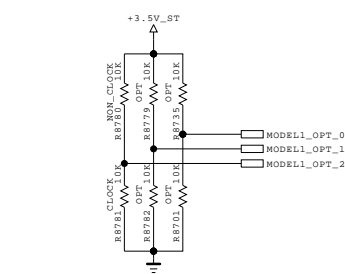


MODEL	xxLP860H-ZA	DATE	2012.12.10
BLOCK	EXT_SPK	SHEET	86 /

REAL TIME CLOCK (RTC)

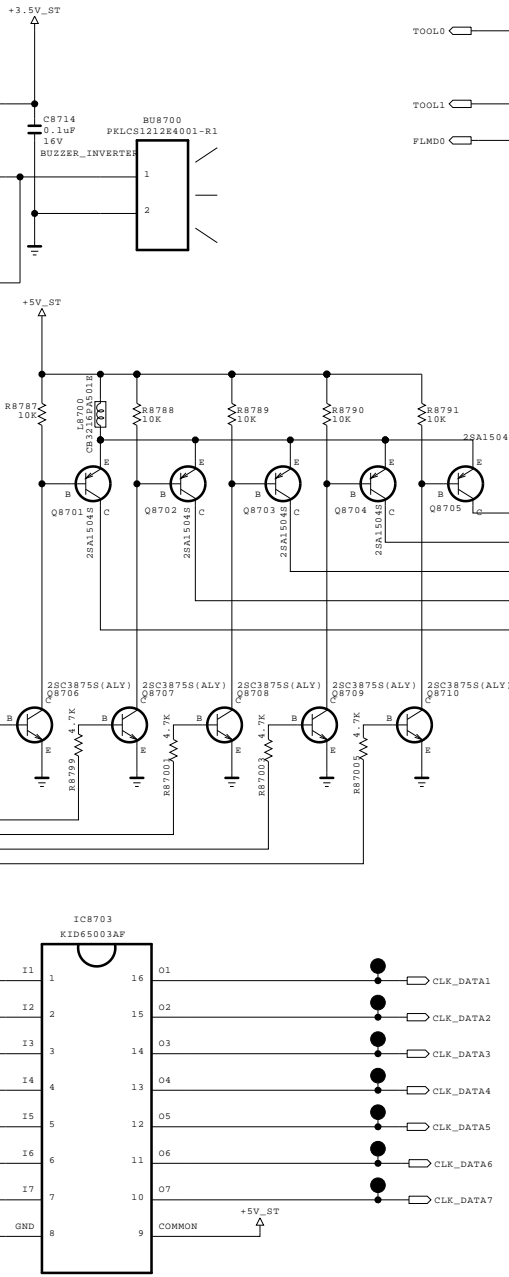
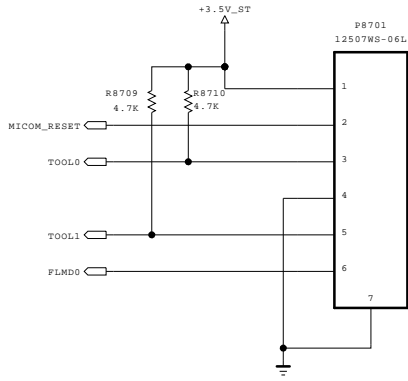
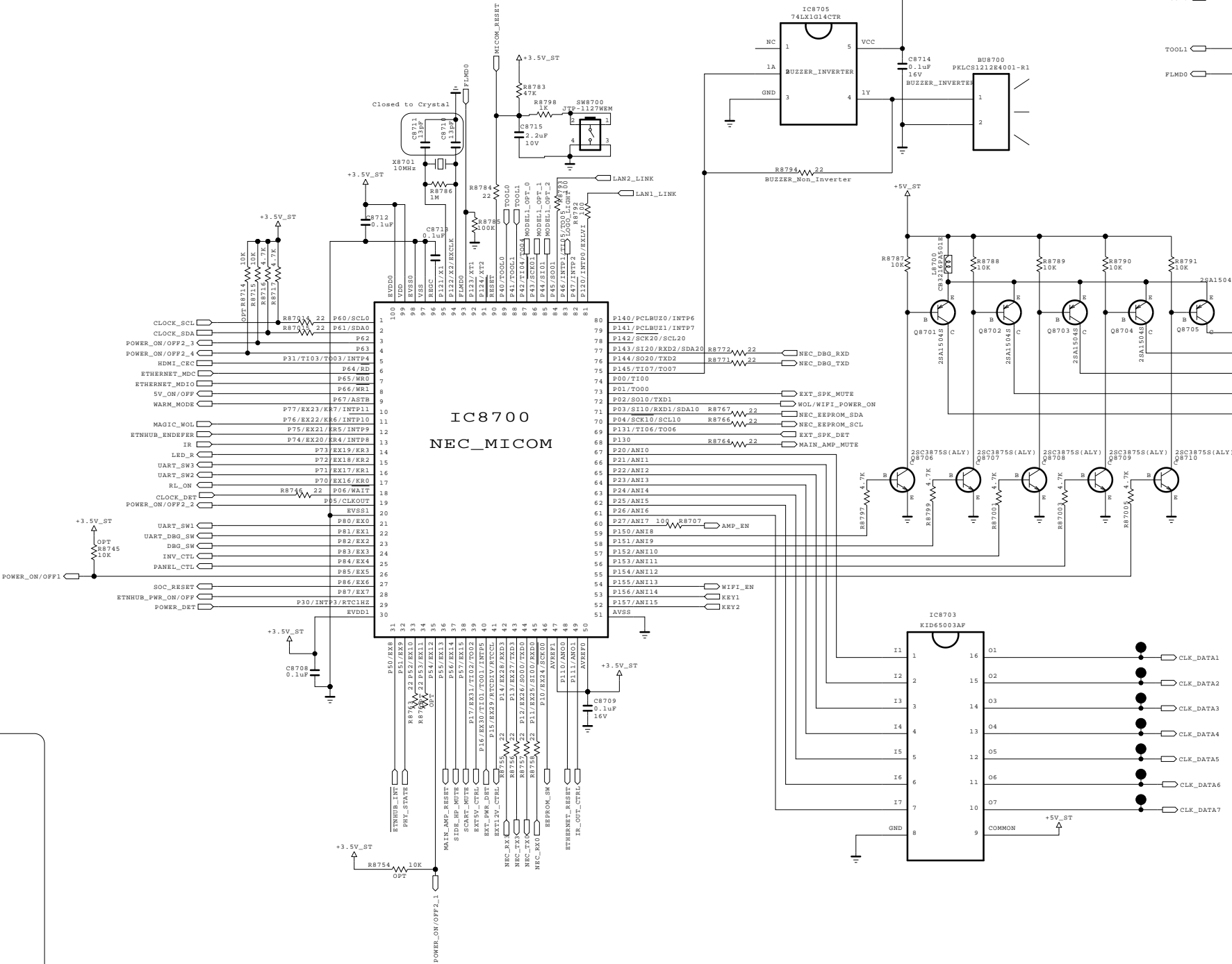
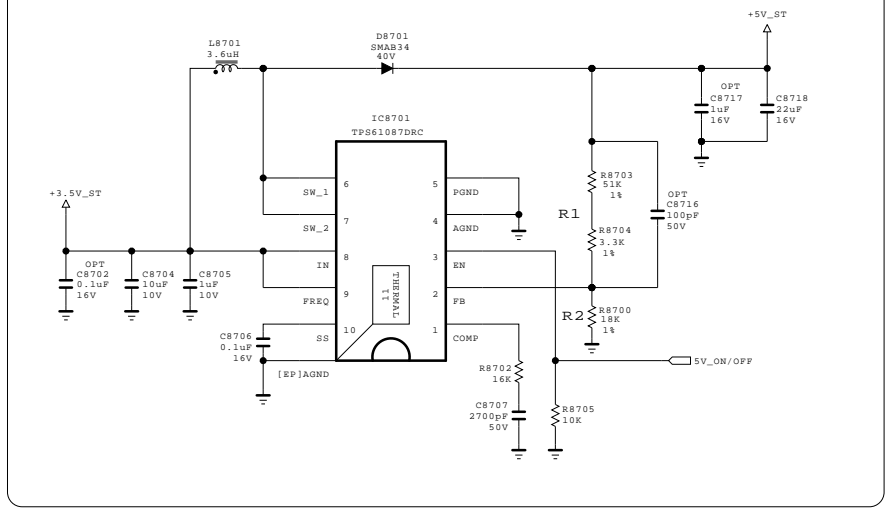




MICOM MODEL OPTION



PIN NAME	PIN NO.	HIGH	LOW
MODEL_OPT_0	80	OPT	OPT
MODEL_OPT_1	79	OPT	OPT
MODEL_OPT_2	78	NON_CLOCK	CLOCK

Step Up regulator from 3.5V to 5V



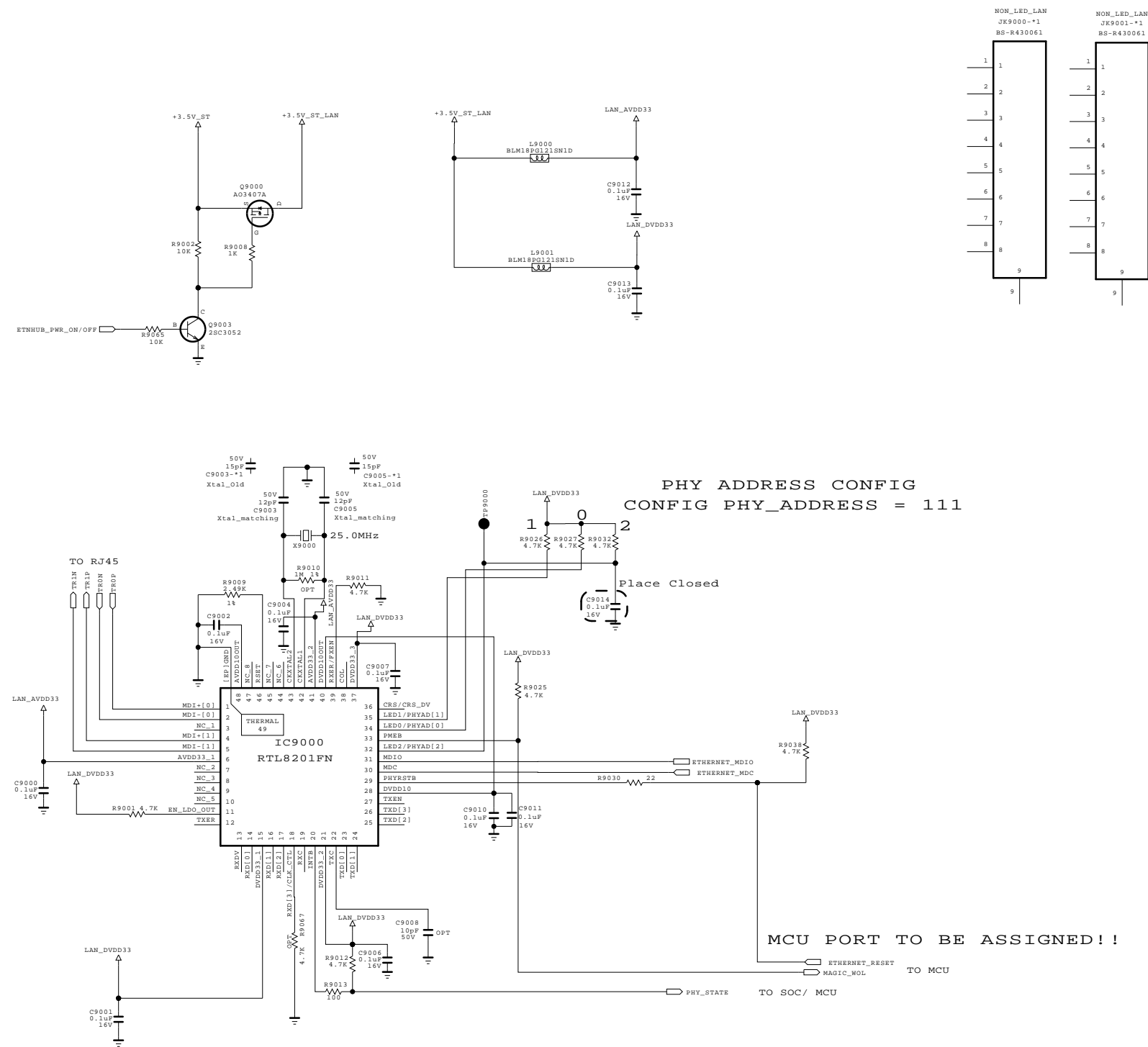
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET
LGElectronics

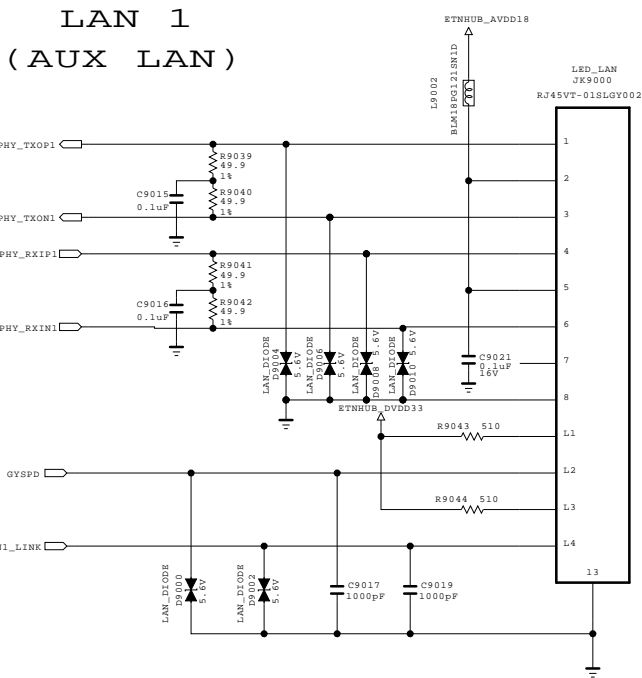
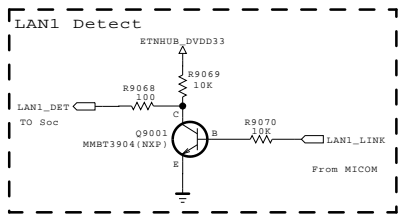
LG ELECTRONICS

MODEL	xxLP860H-ZA	DATE	2012.12.10
BLOCK	NEC Micom	SHEET	87

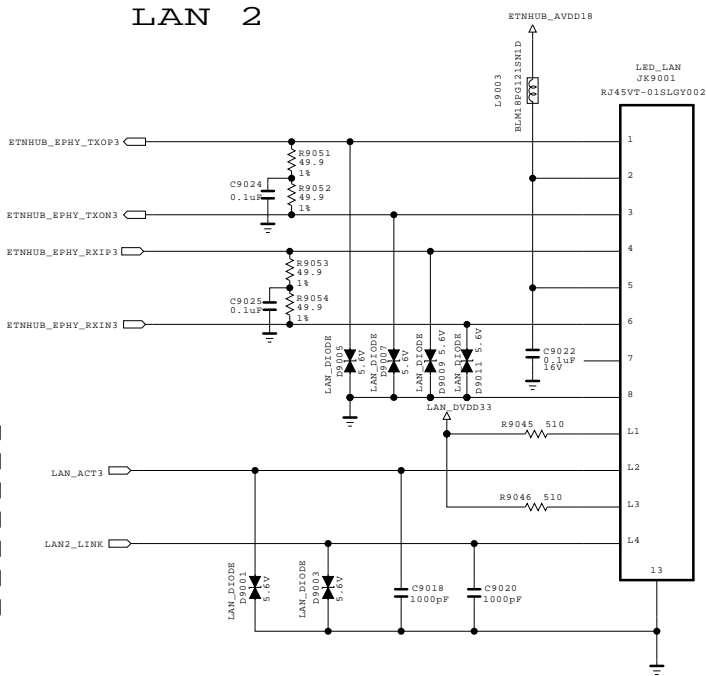
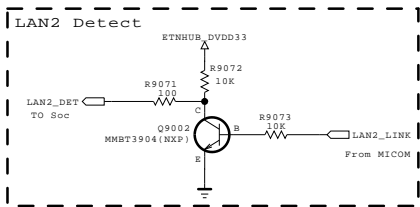
Ethernet PHY(RTL8201FN) /RJ45





LAN1_DET	MTK pin no	Status
	G37	Input
Connected	LAN1_DET	LAN1_LINK
	High	Low
Disconnected	Low	High



LAN2_DET	MTK pin no	Status
	G36	Input
Connected	LAN2_DET	LAN2_LINK
	High	Low
Disconnected	Low	High



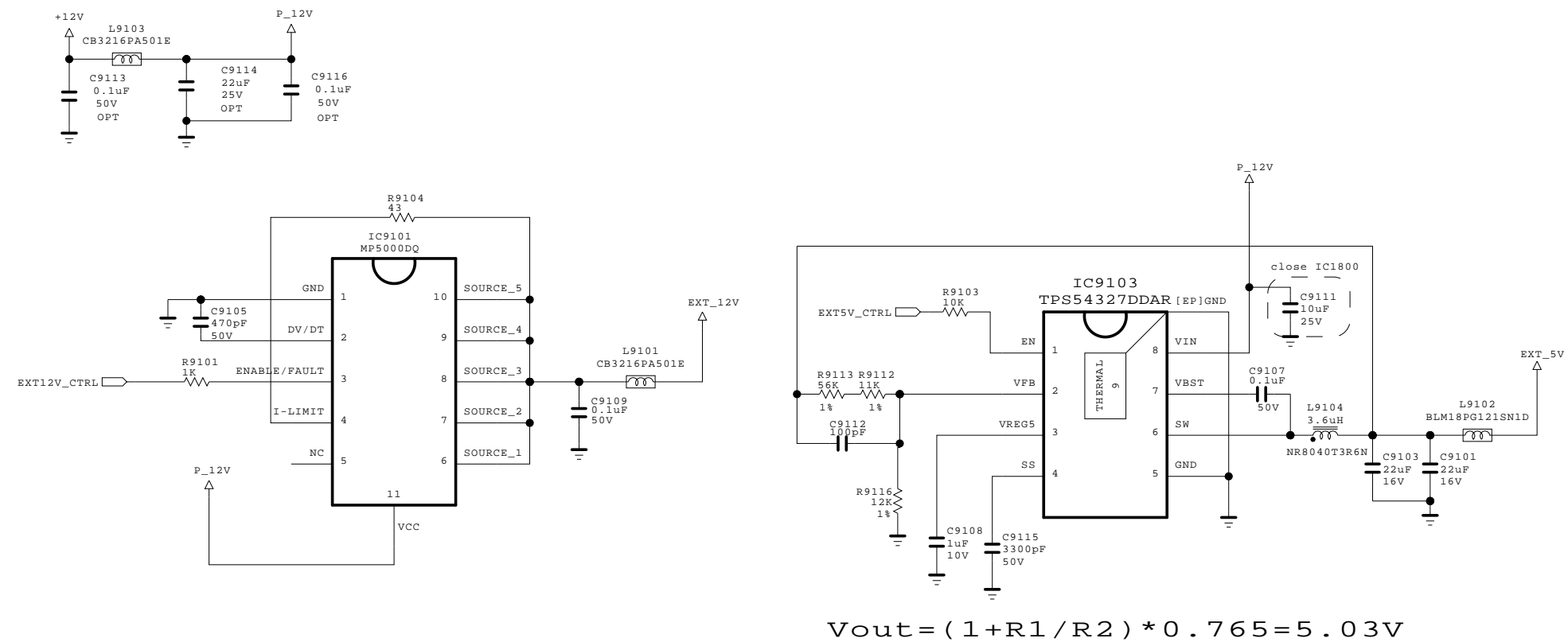
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SECRET
LGElectronics

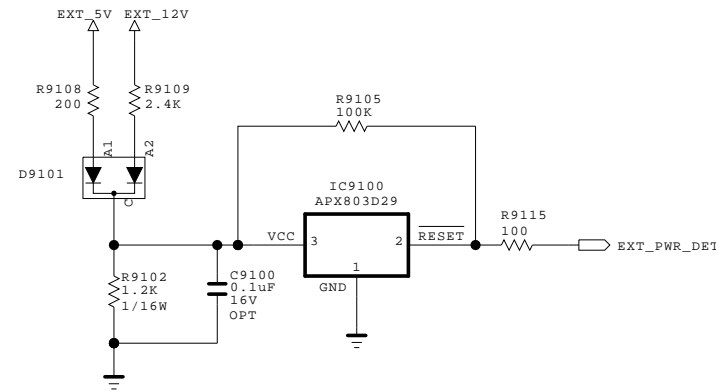




MODEL	xxLP860H-ZA	DATE	2012.12.10
BLOCK	Ethernet PHY/RJ45	SHEET	90 /

EXTERNAL_POWER OUT 5V/12V



EXTERNAL_POWER DETECTION



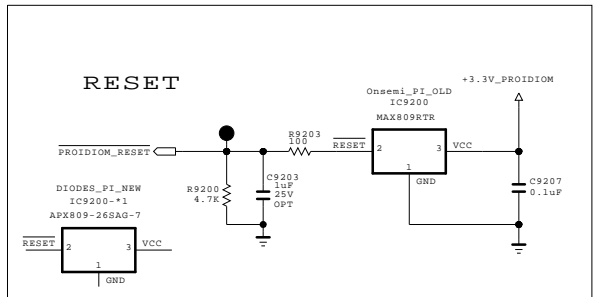
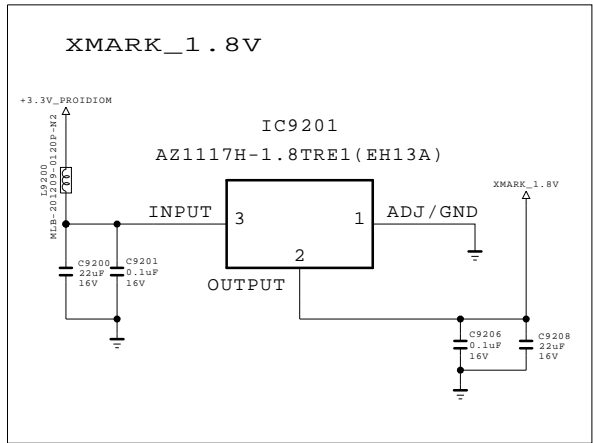
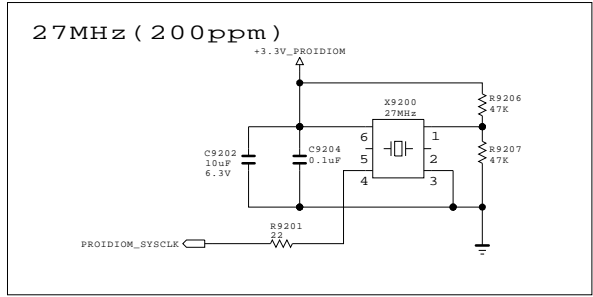
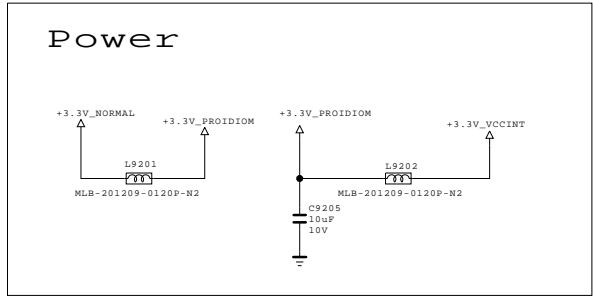
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SECRET

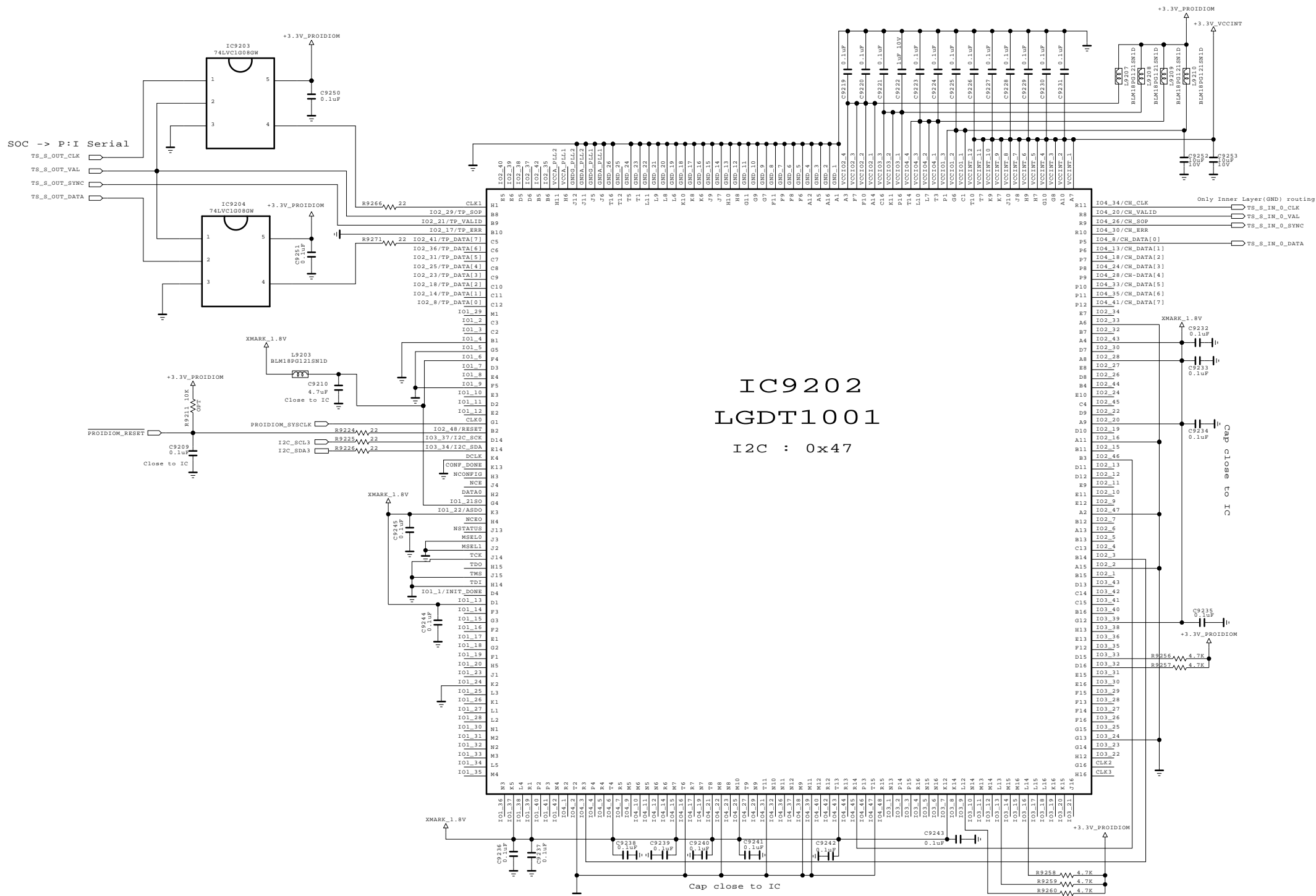
LGElectronics

 LG ELECTRONICS

MODEL	xxLP860H-ZA	DATE	2012.12.10
BLOCK	5V/12V EXT.Power Out	SHEET	91 /



Pro:Idiom (XMARK)



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

LG ELECTRONICS

MODEL	xxLP860H-ZA	DATE	2012.12.10
BLOCK	Pro:Idiom	SHEET	92

