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# LED LCD TV

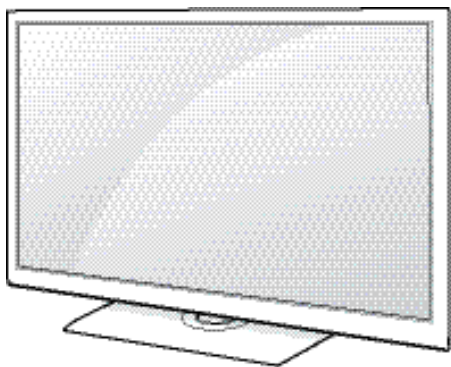
# SERVICE MANUAL

CHASSIS : LJ21C

**MODEL : 32LS3400    32LS3400-SA**

## CAUTION

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



P/NO : MFL67405914 (1203-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 $\Omega$  and 5.2 M $\Omega$ .

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

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

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

Plug the AC cord directly into the AC outlet.

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

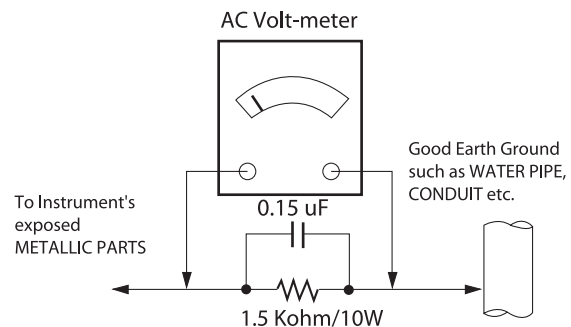
Connect 1.5 K / 10 watt resistor in parallel with a 0.15  $\mu$ F capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

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

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

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

### Leakage Current Hot Check circuit



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

\*Base on Adjustment standard

# SPECIFICATION

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

## 1. Application range

This spec sheet is applied all of the 22", 32", 37", 42", 47", 50", 55" LCD TV with LJ21A/B/C chassis

## 3. Test method

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

## 2. Test condition

Each part is tested as below without special notice.

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

## 4. General Specification

No	Item	Specification	Measurement	Result	Remark
1.	Receiving System	1) SBTVD / NTSC / PAL-M / PAL-N			
2.	Available Channel	1) VHF : 02~13 2) UHF : 14~69 3) CATV : 01~135			
3.	Input Voltage	1) AC 100 ~ 240V 50/60Hz			
4.	Market	Central and South AMERICA			
5.	Screen Size	22 inch Wide (1366 × 768)			22LS3500-SA
		32 inch Wide (1366 × 768)			32CS460-SA/SZ 32LS3400-SA 32LM3400-SB 32LS3500-SA
		32 inch Wide (1920 × 1080)			32CS560-SA 32LS4600-SA
		37 inch Wide (1366 × 768)			37LS3400-SA 37LM3400-SB
		42 inch Wide (1920 × 1080)			42CS460-SA 42CS560-SA 42LS3400-SA 42LS4600-SA 42LM3400-SB 42LS4600-SA 42LM5800-SB
		47 inch Wide (1920 × 1080)			47LS4600-SA 47LM4600-SB 47LM5800-SB
		50 inch Wide (1920 × 1080)			50LS4000-SA
		55 inch Wide (1920 × 1080)			55LM4600-SB
6.	Aspect Ratio	16:9			
7.	Tuning System	FS			

No	Item	Specification	Measurement	Result	Remark
8.	Module	V216BG1-LE1	HD, 60Hz	CMI	22LS3500-SA
		LC320WXN-SCA2	HD, 60Hz	LGD	32CS460-SA
		LC320WXE-SCA1	HD, 60Hz	LGD	32CS460-SZ
		LC320WUN-SCA2	FHD, 60Hz	LGD	32CS560-SA
		T320HVN01.4	FHD, 60Hz	AUO	32CS560-SA
		LC320DXN-SER2	HD, 60Hz	LGD	32LS3400-SA
		LC320DXN-SEU2	HD, 60Hz	LGD	32LM3400-SB
		LC320EXN-SEA2	HD, 60Hz	LGD	32LS3500-SA
		T320XVN01.1	HD, 60Hz	AUO	32LS3500-SA
		LC320EUN-SEM2	FHD, 60Hz	LGD	32LS4600-SA
		LC370DXN-SER2	FHD, 60Hz	LGD	37LS3400-SA
		LC370DXN-SEU2			37LM3400-SB
		LC420WUE-SCA2	FHD, 60Hz	LGD	42CS460-SA 42CS560-SA
		T420HVN02.1	FHD, 60Hz	AUO	42CS460-SA 42CS560-SA
		LC420DUN-SER2	HD, 60Hz	LGD	42LS3400-SA
		LC420DUN-SEU2	FHD, 60Hz	LGD	42LM3400-SB
		LC420EUE-SEM1	FHD, 60Hz	LGD	42LS4600-SA
		LC420EUE-SEF1	FHD, 120Hz	LGD	42LM5800-SB
		LC470EUE-SEM1	FHD, 60Hz	LGD	47LS4600-SA
		LC470EUE-SEF1	FHD, 120Hz	LGD	47LM5800-SB 47LM4600-SB
		LC550EUE-SEF1	FHD, 120Hz	LGD	55LM4600-SB
9.	Operating Environment	1) Temp : 0 ~ 40 deg 2) Humidity : ~ 80 %			
10.	Storage Environment	1) Temp : -20 ~ 60 deg 2) Humidity : ~ 85 %			

## 5. External Input Support Format

### 5.1. Component input(Y, CB/PB, CR/PR)

No	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock	Proposed
1.	720*576	15.625	50.000	13.5	SDTV 576I
2.	720*480	15.73	60	13.5135	SDTV ,DVD 480I
3.	720*480	15.73	59.94	13.5	SDTV ,DVD 480I
4.	720*480	31.50	60	27.027	SDTV 480P
5.	720*480	31.47	59.94	27.0	SDTV 480P
6.	720*576	31.250	50.000	27.000	SDTV 576P
7.	1280*720	37.500	50.000	74.25	HDTV 720P
8.	1280*720	45.00	60.00	74.25	HDTV 720P
9.	1280*720	44.96	59.94	74.176	HDTV 720P
10.	1920*1080	28.125	50.00	74.250	HDTV 1080I
11.	1920*1080	33.75	60.00	74.25	HDTV 1080I
12.	1920*1080	33.72	59.94	74.176	HDTV 1080I
13.	1920*1080	56.250	50.00	148.50	HDTV 1080P
14.	1920*1080	67.500	60.00	148.50	HDTV 1080P
15.	1920*1080	67.432	59.939	148.352	HDTV 1080P
16.	1920*1080	27.000	24.000	74.25	HDTV 1080P
17.	1920*1080	26.97	23.976	74.176	HDTV 1080P
18.	1920*1080	33.75	30.000	74.25	HDTV 1080P
19.	1920*1080	33.71	29.97	74.176	HDTV 1080P

### 5.2. RGB input(PC)

No	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	
	PC					DDC
1.	640*350	31.468	70.09	25.17	EGA	X
2.	720*400	31.469	70.08	28.32	DOS	O
3.	640*480	31.469	59.94	25.17	VESA(VGA)	O
4.	800*600	37.879	60.31	40.00	VESA(SVGA)	O
5.	1024*768	48.363	60.00	65.00	VESA(XGA)	O
6.	1152*864	54.348	60.053	80.00	VESA	O
7.	1360*768	47.712	60.015	85.50	VESA (WXGA)	O
8.	1920*1080	67.5	60	148.5	HDTV 1080P	O

※ RGB PC Monitor Range Limits

Min Vertical Freq - 58 Hz  
 Max Vertical Freq - 62 Hz  
 Min Horiz. Freq - 30 kHz  
 Max Horiz. Freq - 83 kHz  
 Pixel Clock - 160 MHz

### 5.3. HDMI Input (PC/DTV)

No	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	
	PC					DDC
1.	640*350	31.468	70.09	25.17	EGA	X
2.	720*400	31.469	70.08	28.32	DOS	O
3.	640*480	31.469	59.94	25.17	VESA(VGA)	O
4.	800*600	37.879	60.31	40.00	VESA(SVGA)	O
5.	1024*768	48.363	60.00	65.00	VESA(XGA)	O
6.	1152*864	54.348	60.053	80.00	VESA	O
7.	1360*768	47.712	60.015	85.50	VESA (WXGA)	O
8.	1280*1024(FHD Only)	63.981	60.02	108.00	VESA (SXGA)	O
9.	1920*1080(FHD Only)	67.5	60	148.5	HDTV 1080P	O
	DTV					
1.	720*480	31.469	59.940	27.000	SDTV 480P	
2.	720*480	31.500	60.000	27.027	SDTV 480P	
3.	720*576	31.250	50.000	27.000	SDTV 576P	
4.	1280*720	37.500	50.000	74.25	HDTV 720P	
5.	1280*720	45.00	60.00	74.25	HDTV 720P	
6.	1280*720	44.96	59.94	74.176	HDTV 720P	
7.	1920*1080	28.125	50.000	74.25	HDTV 1080I	
8.	1920*1080	33.75	60.00	74.25	HDTV 1080I	
9.	1920*1080	33.72	59.94	74.176	HDTV 1080I	
10.	1920*1080	56.250	50.000	148.50	HDTV 1080P	
11.	1920*1080	67.500	60.00	148.50	HDTV 1080P	
12.	1920*1080	67.432	59.94	148.352	HDTV 1080P	
13.	1920*1080	27.000	24.000	74.25	HDTV 1080P	
14.	1920*1080	26.97	23.976	74.176	HDTV 1080P	
15.	1920*1080	33.75	30.00	74.25	HDTV 1080P	
16.	1920*1080	33.71	29.97	74.176	HDTV 1080P	

※ HDMI Monitor Range Limits

Min Vertical Freq - 58 Hz  
 Max Vertical Freq - 62 Hz  
 Min Horiz. Freq - 30 kHz  
 Max Horiz. Freq - 83 kHz  
 Pixel Clock - 160 MHz

# ADJUSTMENT INSTRUCTION

## 1. Application

This spec sheet is applied all of the LCD TV with LJ21A/B/C chassis

## 2. Designation

- (1) The adjustment is according to the order which is designated and which must be followed, according to the plan which Unit: Product Specification Standard.
- (2) Power adjustment : Free Voltage.
- (3) Magnetic Field Condition: Nil.
- (4) Input signal Unit: Product Specification Standard.
- (5) Reserve after operation: Above 5 Minutes (Heat Run).  
Temperature : at 25 °C±5 °C  
Relative humidity : 65 ± 10%  
Input voltage : 100~220V, 50/60Hz
- (6) Adjustment equipments : Color Analyzer (CA-210 or CA-110), SVC remote controller
- (7) Push The "IN STOP KEY" – For memory initialization.

Case1 : Software version up

- 1) After downloading S/W by USB , TV set will reboot automatically
- 2) Push "In-stop" key
- 3) Push "Power on" key
- 4) Function inspection
- 5) After function inspection, Push "In-stop" key.

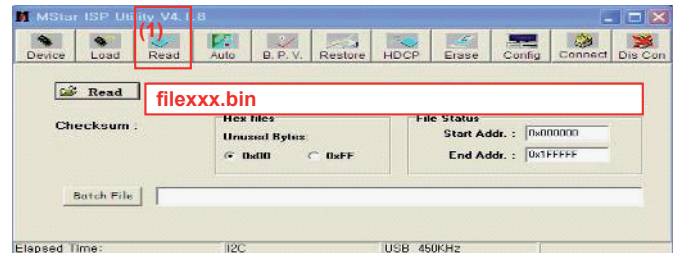
Case2 : Function check at the assembly line

- 1) When TV set is entering on the assembly line, Push "In-stop" key at first.
- 2) Push "Power on" key for turning it on.  
=> If you push "Power on" key, TV set will recover channel information by itself.
- 3) After function inspection, Push "In-stop" key.

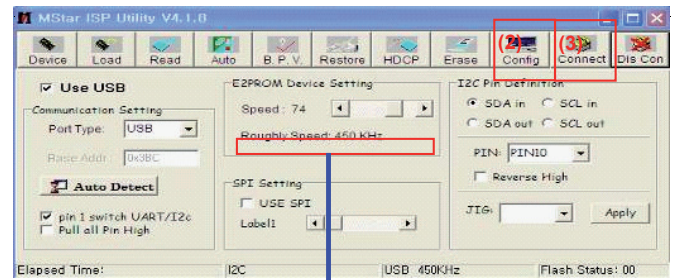
## 3. Main PCB check process

- \* APC – After Manual-Insert, executing APC
- \* Boot file Download

- (1) Execute ISP program "Mstar ISP Utility" and then click "Config" tab.
- (2) Set as below, and then click "Auto Detect" and check "OK" message.  
If "Error" is displayed, Check connection between computer, jig, and set.
- (3) Click "Read" tab, and then load download file (XXXX.bin) by clicking "Read"

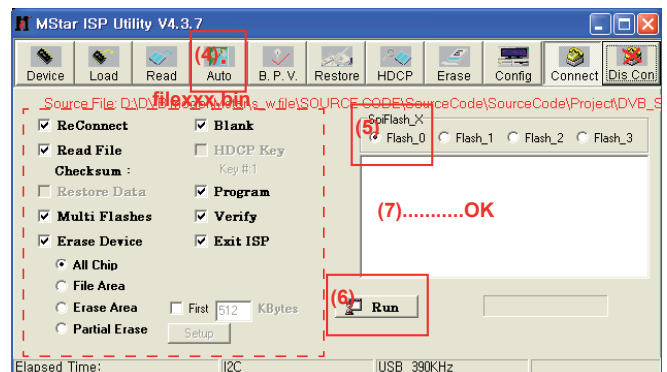


- (4) Click "Connect" tab. If "Can't" is displayed, Check connection between computer, jig, and set.



Please Check the Speed  
To use speed between  
from 200KHz to 400KHz

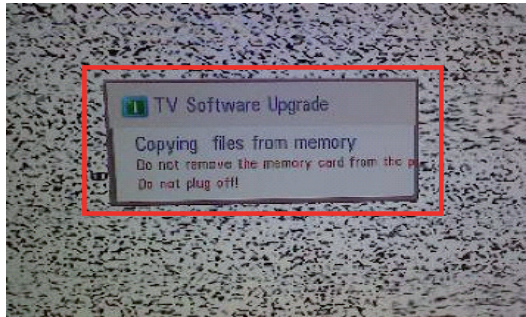
- (5) Click "Auto" tab and set as below.
- (6) Click "Run".
- (7) After downloading, check "OK" message.



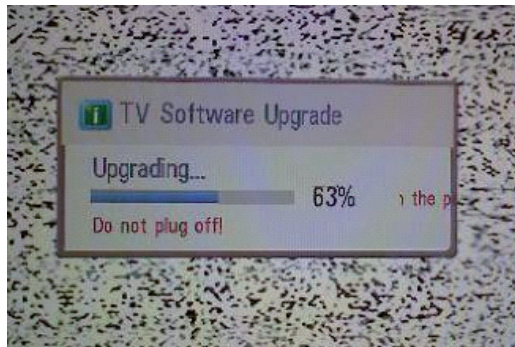


### \* USB DOWNLOAD(\*.epk file download)

- (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) After updating is complete, The TV will restart automatically.
- (6) If TV turns on, check your updated version and Tool option.  
(refer to the next page about tool option)

\* If downloading version is higher 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 controller.
- (2) Select "Tool Option 1" and Push "OK" button.
- (3) Punch in the number. (Each model has their number.)
- (4) Completed selecting Tool option.

Model	Module	Tool option1	Tool option2	Tool option3	Tool option4	Tool option5
32CS460-SA	LGD	32788	358	9243	13200	2592
32CS460-SZ	LGD	32788	870	9243	13200	2560
42CS460-SA	LGD	32790	870	9243	13200	2561
42CS460-SA	AUO					
32CS560-SA	LGD					
32CS560-SA	AUO	36900	358	9243	13200	2592
42CS560-SA	LGD	32806	870	9243	13200	2561
42CS560-SA	AUO					
32LS3400-SA	LGD					
37LS3400-SA	LGD					
42LS3400-SA	LGD	33190	358	9371	13200	2080
32LM3400-SB	LGD					
37LM3400-SB	LGD					
42LM3400-SB	LGD					
22LS3500-SA	CMI	35105	358	9499	13200	2080
32LS3500-SA	LGD					
32LS3500-SA	AUO	37156	358	9499	13200	2096
32LS4600-SA	LGD	33092	35191	9499	13200	7202
42LS4600-SA	LGD	33094	2423	9499	13200	7170
47LS4600-SA	LGD	33095	2423	9499	13200	7170
50LS4000-SA	AUO					
47LM4600-SB	LGD					
55LM4600-SB	LGD					
42LM5800-SB	LGD	32870	2423	9499	13200	7170
47LM5800-SB	LGD					

### \* RS-232C Connection Method

Connection : PCBA (USB Port) -> USB to Serial Adapter (UC-232A) -> RS-232C cable -> PC(RS-232C port)

▪ Product name of USB to Serial Adapter is UC-232A.

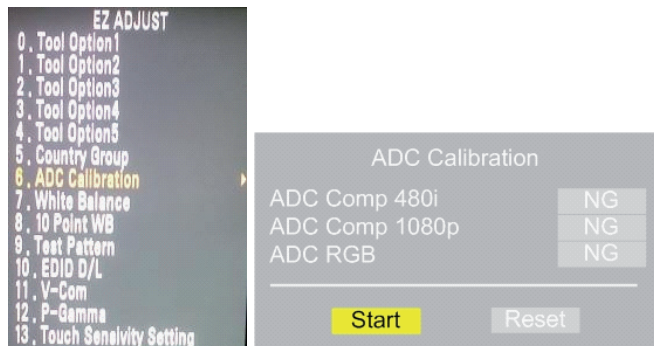
※ Caution: LJ21\* chassis support only UC-232A driver. ( only use this one. )



### 3.1. ADC Process(TBD)

#### 3.1.1. ADC

- Enter Service Mode by pushing "ADJ" key,
- Enter Internal ADC mode by pushing "▶" key at "6. ADC Calibration"



=> Caution : Using 'power on' button of the Adjustment R/C, power on TV.

#### ※ ADC Calibration Protocol (RS232C/USB)

NO	Item	CMD 1	CMD 2	Data 0	
Enter Adjust MODE	Adjust 'Mode In'	A	A	0 0	When transfer the 'Mode In', Carry the command.
ADC adjust	ADC Adjust	A	D	1 0	Automatically adjustment (The use of a internal pattern)

#### ※ Adjust Sequence

- aa 00 00 [Enter Adjust Mode]
  - xb 00 40 [Component1 Input (480i)]
  - ad 00 10 [Adjust 480i Comp1]
  - xb 00 60 [RGB Input (1024\*768)]
  - ad 00 10 [Adjust 1024\*768 RGB]
  - aa 00 90 End Adjust mode
- \* Required equipment : Adjustment R/C.

### 3.2. Function Check

#### 3.2.1. Check display and sound

- Check Input and Signal items. (cf. work instructions)
- (1) TV
- (2) AV (CVBS)
- (3) COMPONENT (480i)
- (4) RGB (PC : 1024 x 768 @ 60hz)
- (5) HDMI
- (6) PC Audio In

\* Display and Sound check is executed by Remote controller.

※ Caution : Not to push the INSTOP KEY after completion if the function inspection

### 4. Total Assembly line process

#### 4.1. Adjustment Preparation

- W/B Equipment condition
- CA210 : CH 9, Test signal : Inner pattern (80IRE) – in case of CCFL back light
- CA210 : CH14, Test signal : Inner pattern (80IRE) – in case of LED back light
- Above 5 minutes H/run in the inner pattern. ("power on" key of adjust remote control)

Color Temperature	Cool	13,000k	K	X=0.269 (±0.002) Y=0.273 (±0.002)	26/32LS3500-SA 32/42CS460-SA 32/37/42CS560-SA 32/42/47/55LS4600-SA 32/42/47LM5800-SA 47CM565-SA	<Test signal> Inner pattern (204 Gray 80IRE)
	Medium	9,300k	K	X=0.285 (±0.002) Y=0.293 (±0.002)		
	Warm	6,500k	K	X=0.313 (±0.002) Y=0.329 (±0.002)		

Color Temperature	Cool	13,000k	K	X=0.271 (±0.002) Y=0.276 (±0.002)	32/37/42LS3400-SA 32/37/42LM3400-SA	<Test signal> Inner pattern (204 Gray 80IRE)
	Medium	9,300k	K	X=0.287 (±0.002) Y=0.296 (±0.002)		
	Warm	6,500k	K	X=0.315 (±0.002) Y=0.332 (±0.002)		

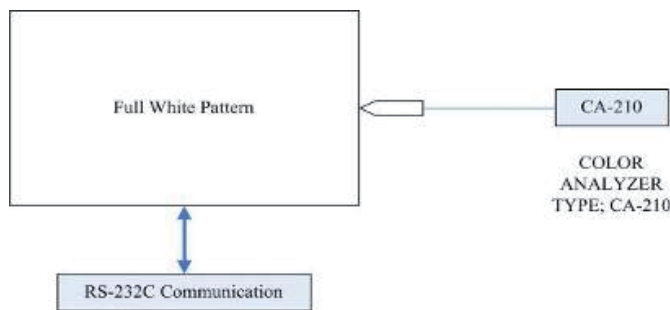
Color Temperature	Cool	13,000k	K	X=0.285 (±0.002) Y=0.293 (±0.002)	22LS3500-SA	<Test signal> Inner pattern (204 Gray 80IRE)
	Medium	9,300k	K	X=0.295 (±0.002) Y=0.305 (±0.002)		
	Warm	6,500k	K	X=0.313 (±0.002) Y=0.329 (±0.002)		

- Edge LED W/B Table in process of time (Only LGD except AUO/ CMI)  
LS35/46, LM58 Tool ( LED LCD TV Model )  
CA210 : CH 14, Test signal : Inner pattern (80IRE)
- Standard color coordinate and temperature using CA-1000 (by H/R time)

H/R Time(Min)		Cool		Medium		Warm	
		x	y	x	x	y	x
		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	80-119	270	274	286	294	310	324
9	Over 120	269	273	285	293	309	323

※ **Connecting picture of the measuring instrument  
(On Automatic control)**

Inside PATTERN is used when W/B is controlled. Connect to auto controller or push Adjustment R/C POWER-ON -> Enter the mode of White-Balance, the pattern will come out.



[Fig.5] connecting picture (On Automatic Control)

● **Auto-control interface and directions**

- (1) Adjust in the place where the influx of light like floodlight around is blocked. (Illumination is less than 10ux).
- (2) Adhere closely the Color Analyzer ( CA210 ) to the module less than 10cm distance, keep it with the surface of the Module and Color Analyzer's Probe vertically.(80~100°).
- (3) Aging time
  - After aging start, keep the power on (no suspension of power supply) and heat-run over 5 minutes.
  - Using 'no signal' or 'full white pattern' or the others, check the back light on.

● **Auto adjustment Map(RS-232C)**

**RS-232C COMMAND**

[ CMD ID DATA ]

Wb 00 00 White Balance Start  
Wb 00 ff White Balance End

	RS-232C COMMAND [CMD ID DATA]			MIN	CENTER (DEFAULT)			MAX
	Cool	Mid	Warm		Cool	Mid	Warm	
R Gain	jg	Ja	jd	00	172	192	192	192
G Gain	jh	Jb	je	00	172	192	192	192
B Gain	ji	Jc	jf	00	192	192	172	192
R Cut					64	64	64	128
G Cut					64	64	64	128
B Cut					64	64	64	128

**\*\* Caution \*\***

Color Temperature : COOL, Medium, Warm.

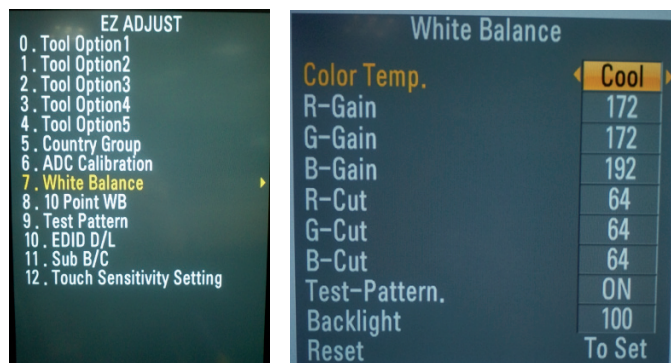
One of R Gain/G Gain/ B Gain should be kept on 0xC0, and adjust other two lower than C0.

(when R/G/B Gain are all C0, it is the FULL Dynamic Range of Module)

\*Manual W/B process using adjusts Remote control.

■ After enter Service Mode by pushing "ADJ" key,

■ Enter White Balance by pushing "►" key at "7. White Balance".



※ After You finish all adjustments, Press "In-start" button and compare Tool option and Area option value with its BOM, if it is correctly same then unplug the AC cable.

If it is not same, then correct it same with BOM and unplug AC cable. For correct it to the model's module from factory JIG model.

※ Push The "IN STOP KEY" after completing the function inspection. And Mechanical Power Switch must be set "ON".

## 4.2. DDC EDID Write (RGB 128Byte)

- Connect D-sub Signal Cable to D-Sub Jack.
  - Write EDID DATA to EEPROM (24C02) by using DDC2B protocol.
  - Check whether written EDID data is correct or not.
- \* For SVC main Ass'y, EDID have to be downloaded to Insert Process in advance.

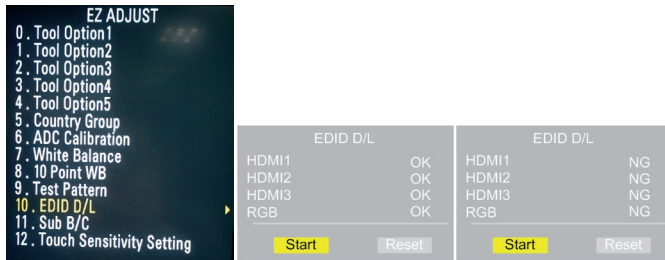
## 4.3. DDC EDID Write (HDMI 256Byte)

- Connect HDMI Signal Cable to HDMI Jack.
  - Write EDID DATA to EEPROM(24C02) by using DDC2B protocol.
  - Check whether written EDID data is correct or not.
- \* For SVC main Ass'y, EDID have to be downloaded to Insert Process in advance.

## 4.4. EDID DATA

- 1) All Data : HEXA Value
- 2) Changeable Data :
  - \*: Serial No : Controlled / Data:01
  - \*\* : Month : Controlled / Data:00
  - \*\*\*:Year : Controlled
  - \*\*\*\*:Check sum

- Auto Download
- After enter Service Mode by pushing "ADJ" key,
- Enter EDID D/L mode.
- Enter "START" by pushing "OK" key.



※ Edid data and Model option download (RS232C)

NO	Item	CMD 1	CMD 2	Data 0	
Enter download MODE	Download 'Mode In'	A	A	0	0
Edid data and Model option download	Download	A	E	00	10

When transfer the 'Mode In', Carry the command

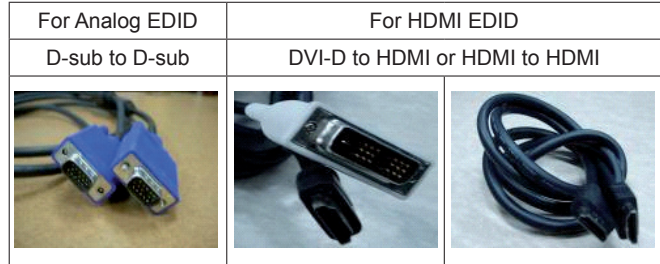
Automatically download (The use of a internal Data)

※ Caution

- \* Use the proper signal cable for EDID Download
- Analog EDID : Pin3 exists
- Digital EDID : Pin3 exists

⇒ Caution

- Never connect HDMI & D-sub Cable at the same time.
- Use the proper cables below for EDID Writing.
- Download HDMI1, HDMI2 separately because HDMI1 is different from HDMI2.



No.	Item	Condition	Hex Data
1	Manufacturer ID	GSM	1E6D
2	Version	Digital : 1	01
3	Revision	Digital : 3	03

### ● EDID DATA

(1) HD EDID Data

	Checksum	Physical Address (0x9E)
HDMI 1	A4/5B	10
HDMI 2	A4/4B	20

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	16	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	01	01
30	01	01	01	01	01	01	66	21	50	B0	51	00	1B	30	40	70
40	36	00	40	84	63	00	00	1E	64	19	00	40	41	00	26	30
50	18	88	03	06	40	84	63	00	00	18	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	A4

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	22	F1	4E	10	1F	84	13	05	14	03	02	12	20	21
10	22	15	01	26	15	07	50	09	57	07	67	03	0C	00	10	00
20	80	1E	01	1D	80	18	71	1C	16	20	58	2C	25	00	A0	5A
30	00	00	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00
40	20	C2	31	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E
50	96	00	A0	5A	00	00	00	18	02	3A	80	18	71	38	2D	40
60	58	2C	45	00	A0	5A	00	00	00	1E	00	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	5B



## (2) FHD EDID Data(Deep Color support)

	Checksum	Physical Address (0x9E)
HDMI 1	43/DE	10
HDMI 2	43/CE	20
HDMI 3	43/BE	30

## - HDMI

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	16	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	A0	5A	00	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	00	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	01	43	

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	22	F1	4E	10	9F	04	13	05	14	03	02	12	20	21
10	22	15	01	26	15	07	50	09	57	07	67	03	0C	00	10	00
20	B8	2D	01	1D	80	18	71	1C	16	20	58	2C	25	00	20	C2
30	31	00	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00
40	20	C2	31	00	00	1E	02	3A	80	18	71	38	2D	40	58	2C
50	45	00	A0	5A	00	00	00	1E	01	1D	00	BC	52	D0	1E	20
60	B8	28	55	40	C4	8E	21	00	00	1E	00	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	DE

## - RGB

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	16	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	A0	5A	00	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	00	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	00	5C	

## (3) FHD EDID Data(Deep Color not support)

	Checksum	Physical Address (0x9E)
HDMI 1	43/25	10
HDMI 2	43/15	20
HDMI 3	43/05	30

## - HDMI

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	16	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	A0	5A	00	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	00	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	01	43	

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	22	F1	4E	10	9F	04	13	05	14	03	02	12	20	21
10	22	15	01	26	15	07	50	09	57	07	67	03	0C	00	10	00
20	80	1E	01	1D	80	18	71	1C	16	20	58	2C	25	00	20	C2
30	31	00	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00
40	20	C2	31	00	00	1E	02	3A	80	18	71	38	2D	40	58	2C
50	45	00	A0	5A	00	00	00	1E	01	1D	00	BC	52	D0	1E	20
60	B8	28	55	40	C4	8E	21	00	00	1E	00	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	25

## - RGB

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	16	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	A0	5A	00	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	00	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	00	5C	

#### (4) 3D EDID Data(Deep Color not support)

	Checksum	Physical Address (0x9E)
HDMI 1	43/23	10
HDMI 2	43/13	20
HDMI 3	43/03	30

#### - HDMI

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	16	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	A0	5A	00	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	20	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	43

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	33	F1	4E	10	9F	04	13	05	14	03	02	12	20	21
10	22	15	01	26	15	07	50	09	57	07	78	03	0C	00	10	00
20	80	1E	20	C0	0E	01	40	0A	0F	08	10	18	10	98	70	58
30	10	38	10	01	1D	80	18	71	1C	16	20	58	2C	25	00	20
40	C2	31	00	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55
50	00	20	C2	31	00	00	1E	02	3A	80	18	71	38	2D	40	58
60	2C	45	00	A0	5A	00	00	00	1E	01	1D	00	BC	52	D0	1E
70	20	B8	28	55	40	C4	8E	21	00	00	1E	00	00	00	00	23

#### - RGB

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	16	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	A0	5A	00	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	20	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	00	5C

#### - Model List

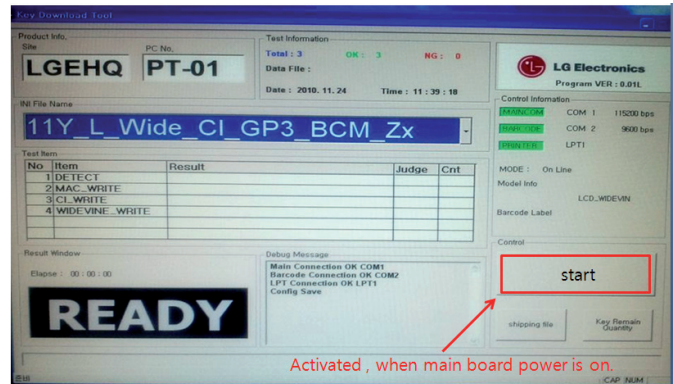
HD(LAMP)	FHD(LAMP)	HD(LED)	FHD(LED)	FHD 3D(LED)
32CS460-SA	32CS560-SA	22LS3500-SA	42LS3400-SA	42LM3400-SB
32CS460-SZ	42CS560-SA	32LS3500-SA		
			32LS4600-SA	47LM4600-SB
	42CS460-SA	32LS3400-SA	42LS4600-SA	55LM4600-SB
		37LS3400-SA	47LS4600-SA	
		32LM3400-SB		42LM5800-SB
		37LM3400-SB	50LS4000-SA	47LM5800-SB

## 4.5. MAC address D/L

Connect: USB port

Communication Prot connection

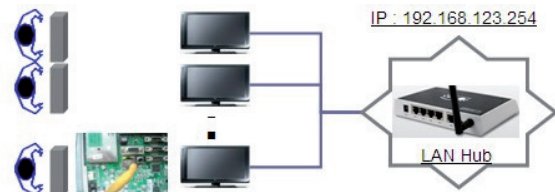
- Com 1,2,3,4 and 115200(Baudrate)
- Mode check: Online Only
- Check the test process: DETECT -> MAC -> CI -> Widevine
- Play: START
- Result: Ready, Test, OK or NG
- Printer Out (MAC Address Label)



## 4.6. LAN Inspection

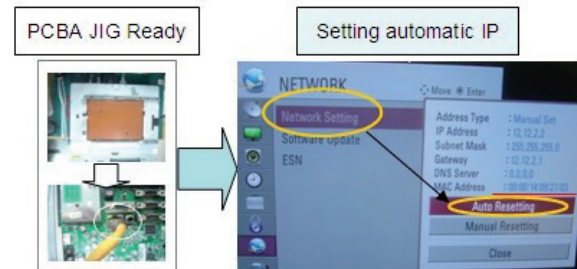
### 4.6.1. Equipment & Condition

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



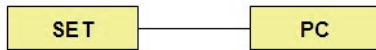
### 4.6.2. LAN inspection solution

- 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.



## 4.7. LAN PORT INSPECTION(PING TEST)

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

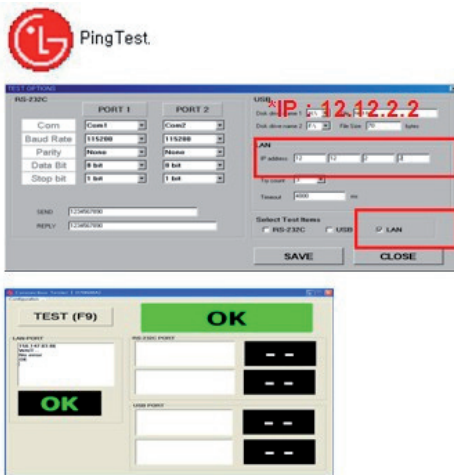


### 4.7.1. Equipment setting

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

### 4.7.2. 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



## 4.8. Outgoing condition Configuration

- When pressing IN-STOP key by SVC remocon, Red LED are blinked alternatively. And then automatically turn off. (Must not AC power OFF during blinking)

## 4.9 GND & Hi-pot test

Confirm whether is normal or not when between power board's ac block and GND is impacted on 1.5kV(dc) or 2.2kV(dc) for one second.

- GND TEST = POWER CORD GND and SIGNAL CABLE GND
  - Hi-pot TEST = POWER CORD GND and LIVE&NUETRAL
  - Test Process
- (1) Check the POWER CABLE and SIGNAL CABLE insertion condition.
  - (2) Connect the AV JACK Tester
  - (3) Controller(GWS103-4) on
  - (4) GND TEST(Auto)
    - If Test is failed, Buzzer operate
    - If Test is passed, execute next process(HI-pot test)
    - Remove A/V CORD from A/V JACK BOX
  - (5) HI-POT test(Auto)
    - If Test is failed, Buzzer operate
    - If Test is passed, GOOD Lamp on and move to next process automatically.

## 5. EYE-Q function check

- Step1) Turn on TV.
- Step2) Press "P-only" key, enter to power only mode and escape the "P-only" Mode by pressing "Exit" key
- Step3) Press "Tilt" key, entrance to Local Dimming mode.
- Step4) At the Local Dimming mode, module Edge Backlight moving Top to bottom Back light of module moving
- Step5) confirm the Local Dimming mode
- Step6) Press "Exit" key

## 6. 3D Function Test

(Pattern Generator MSHG-600, MSPG-6100 [SUPPORT HDMI1.4])

\* HDMI mode NO. 872 , pattern No.83

- 1) Please input 3D test pattern like below (HDMI mode NO. 872 , pattern No.83)

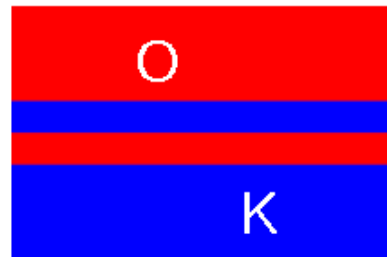


Fig.1

<HDMI Mode 872번, Pattern No. 83>

- 2) When 3D OSD appear automatically , then select OK button.



Fig.3  
<OK Key>

- 3) Don't wear a 3D Glasses, Check the picture like below



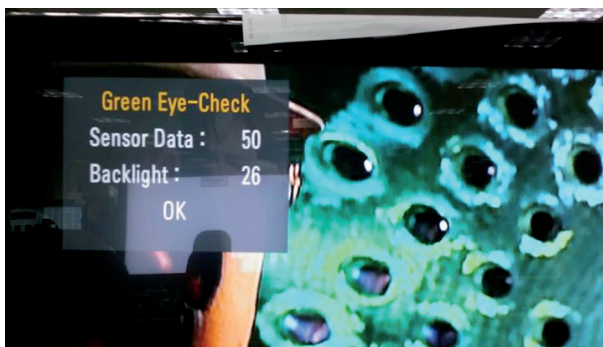
Fig.2

<3D Mode 진입 후 화면>

\* 안경을 착용하지 않은 상태임.

## 7. EYE-Q function check

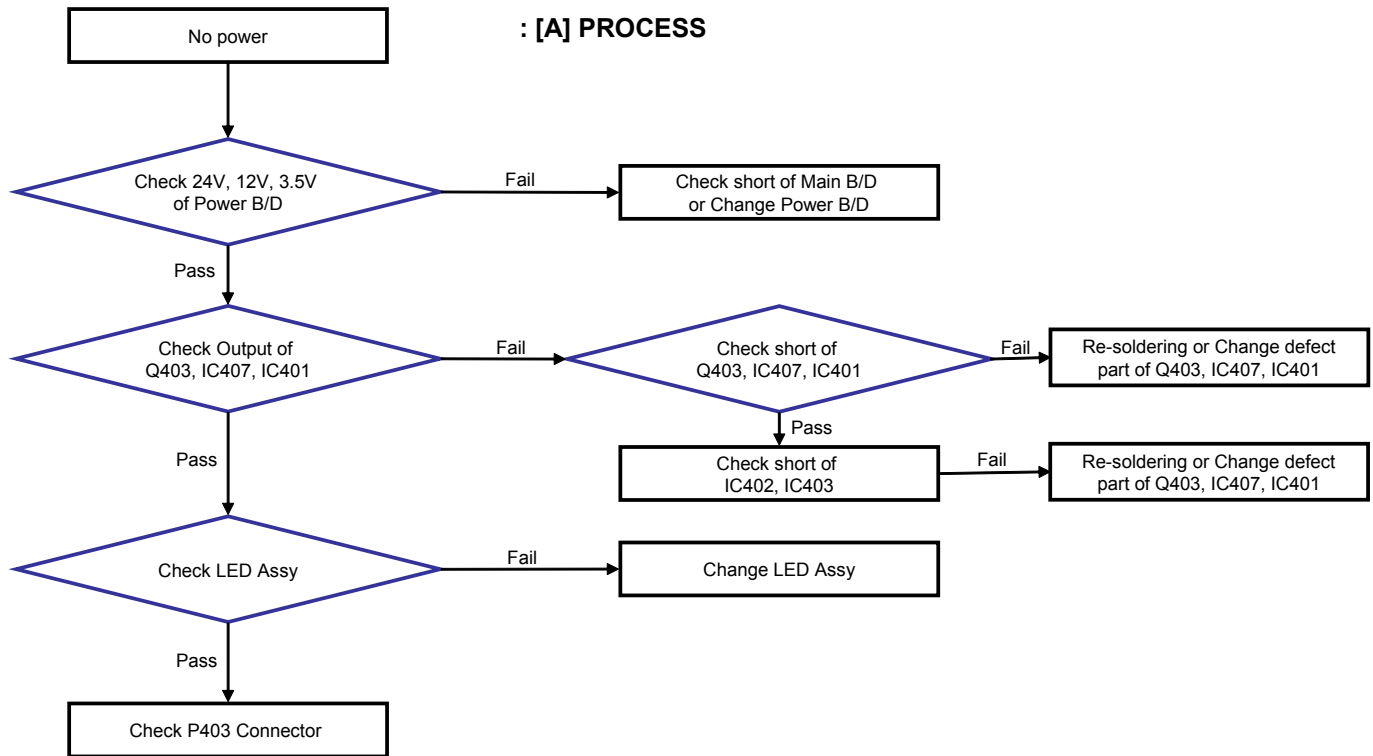
- Step 1) Turn on TV
- Step 2) Press EYE key of Adj. R/C
- Step 3) Cover the Eye Q II sensor on the front of the using your hand and wait for 6 seconds
- Step 4) Confirm that R/G/B value is lower than 10 of the "Raw Data (Sensor data, Back light )". If after 6 seconds, R/G/B value is not lower than 10,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

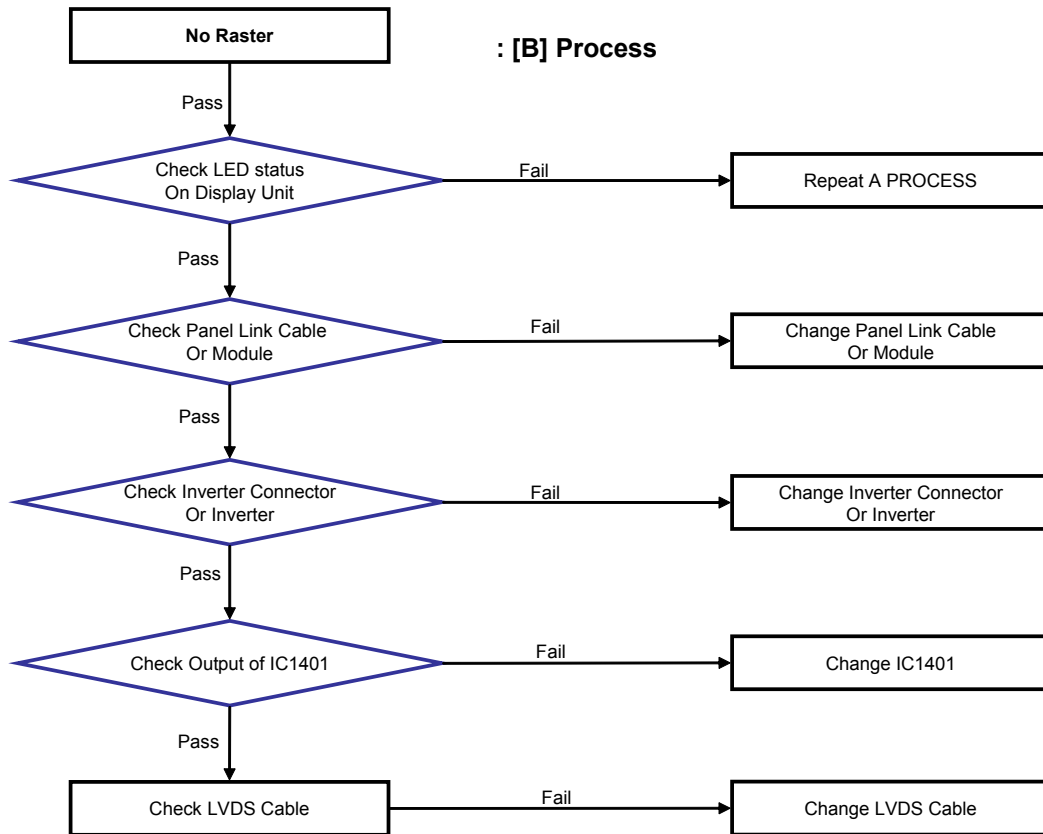


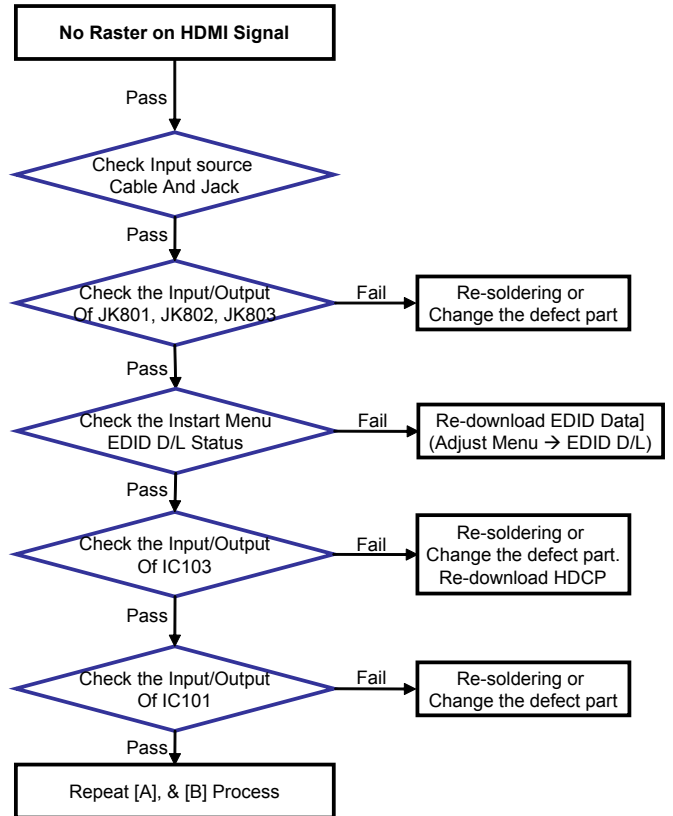
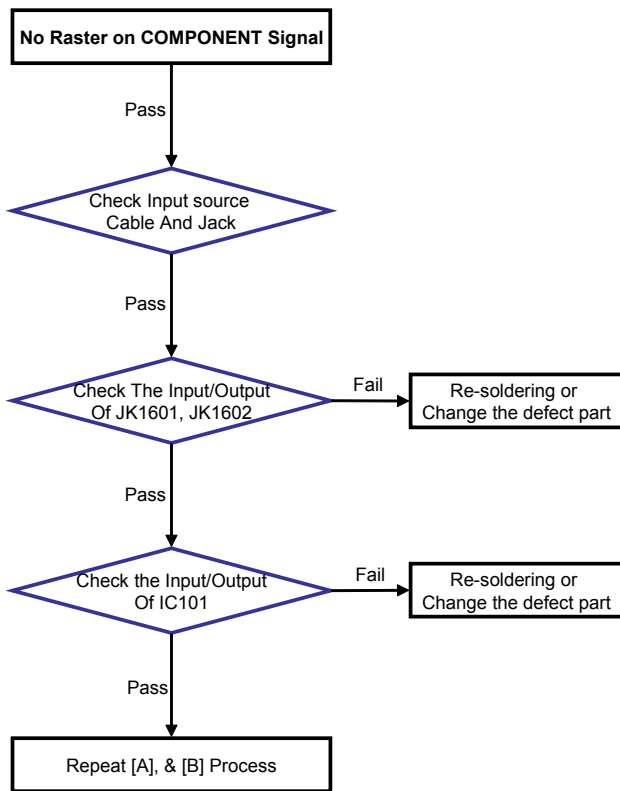


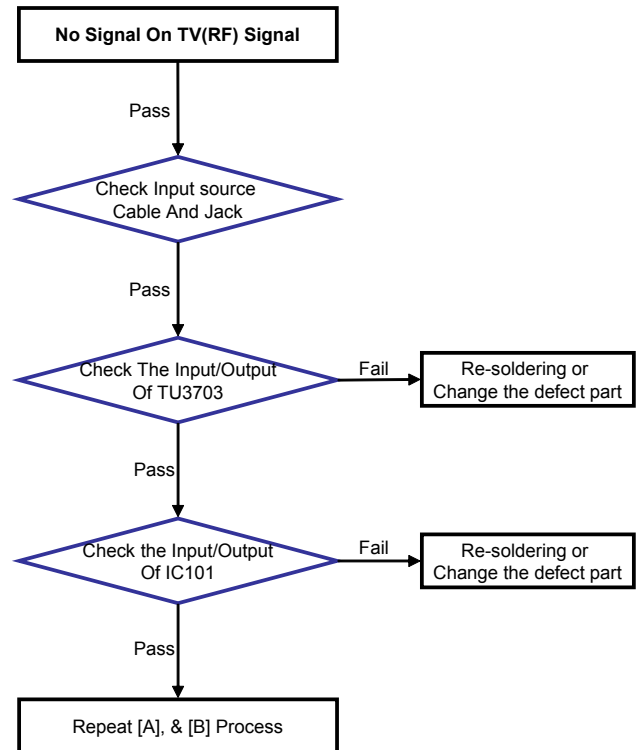
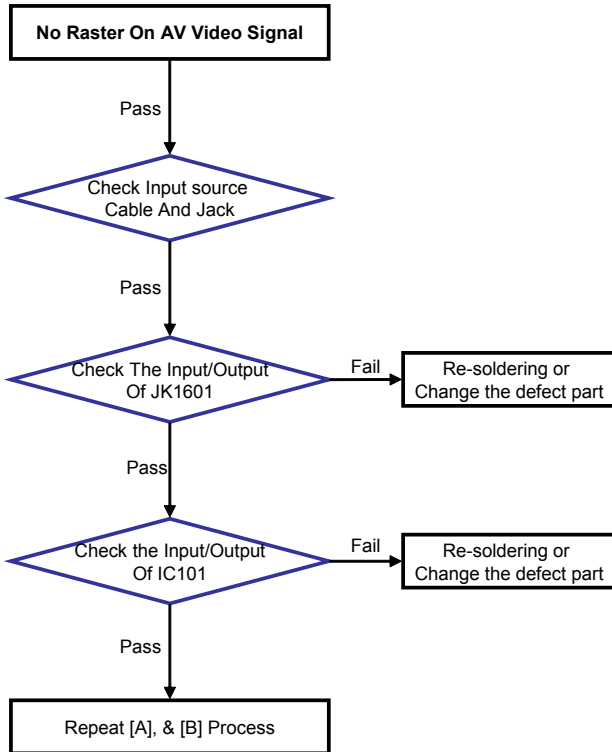
# TROUBLE SHOOTING

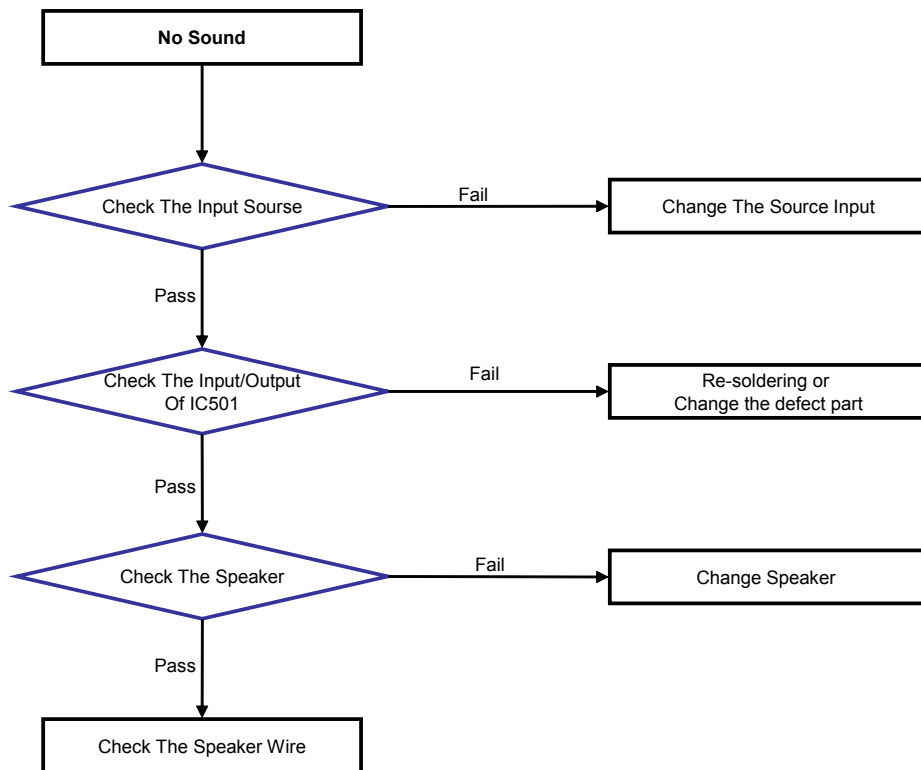
: [A] PROCESS



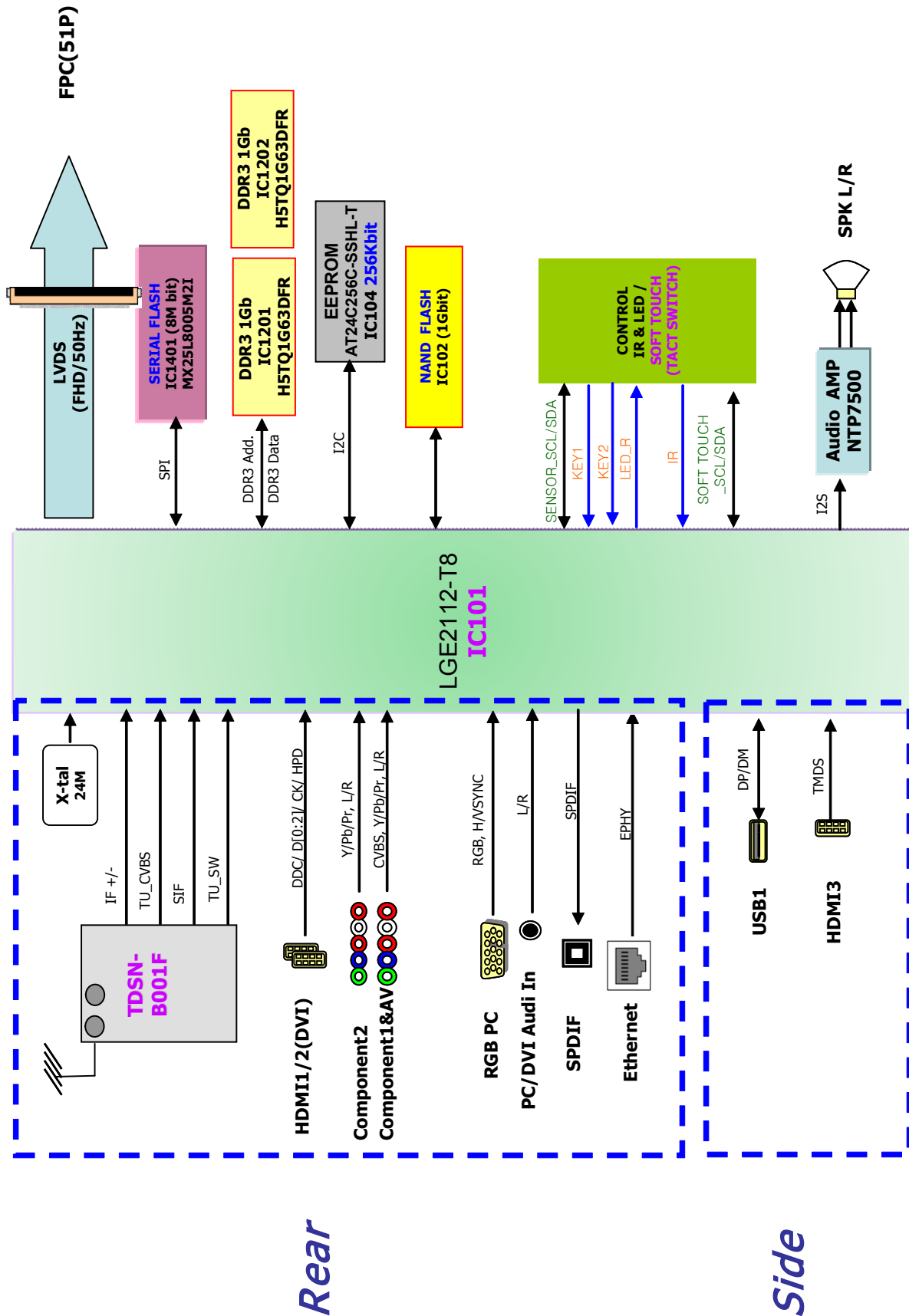








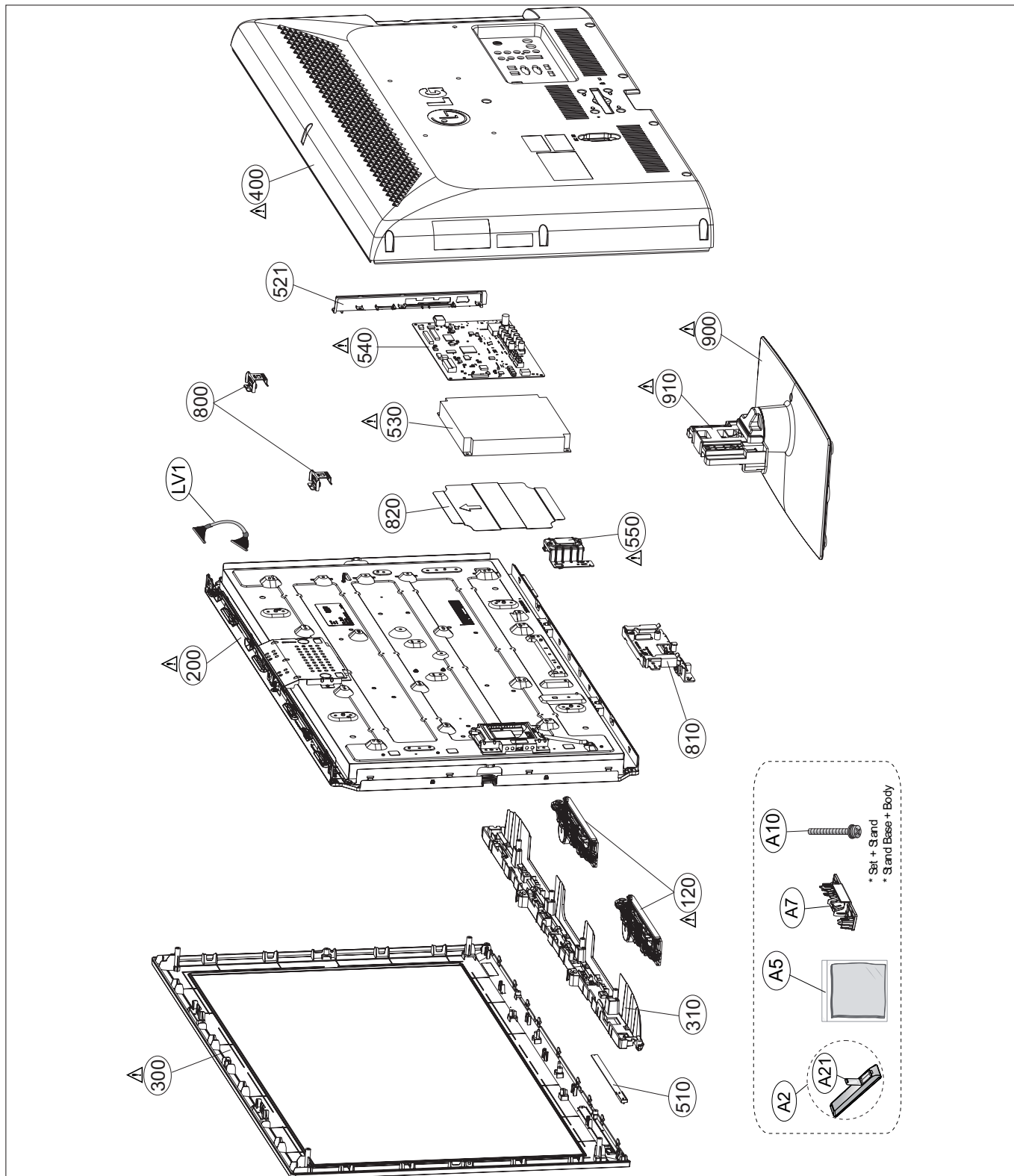
# BLOCK DIAGRAM

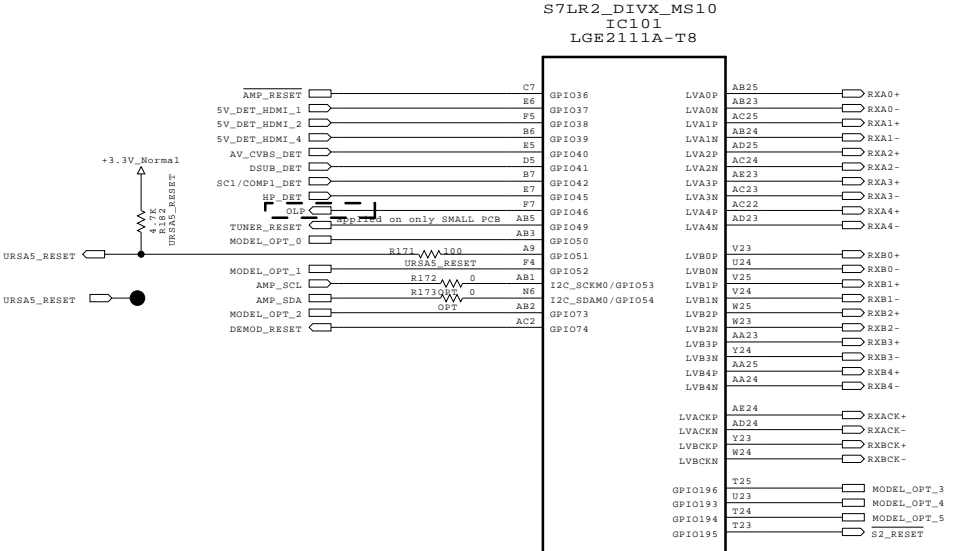
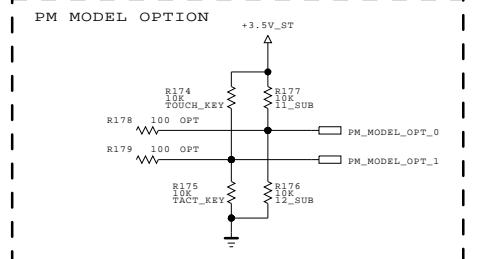
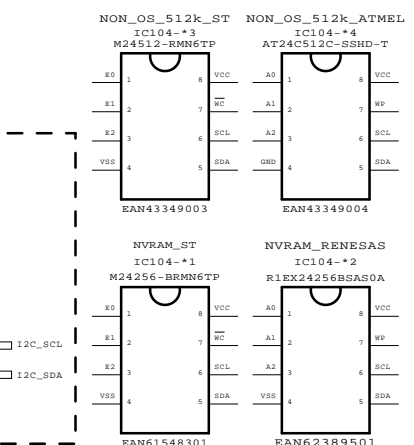
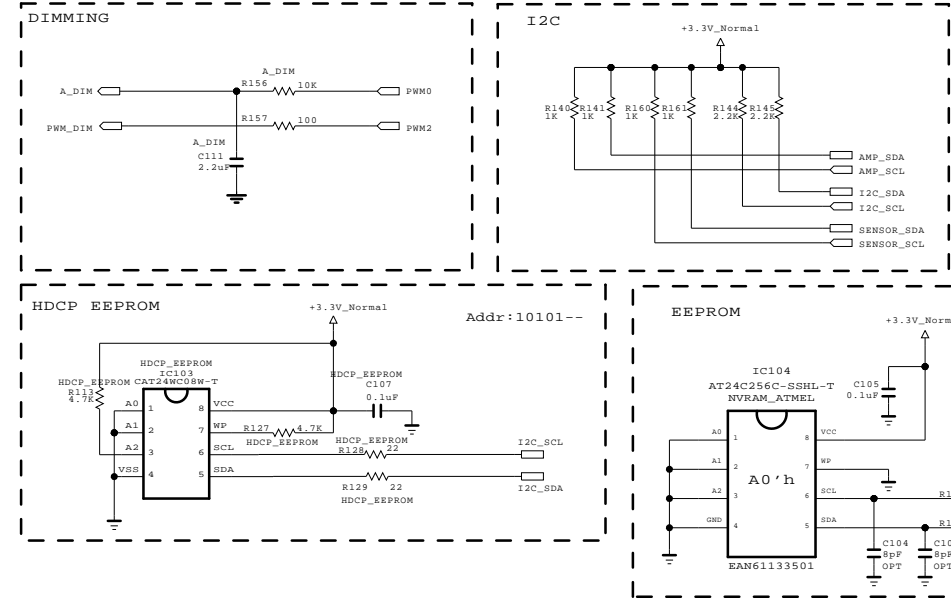
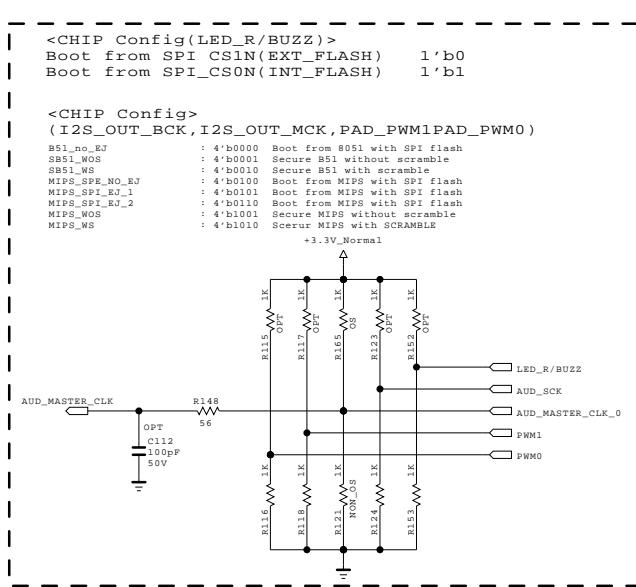




# EXPLODED VIEW

## IMPORTANT SAFETY NOTICE

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





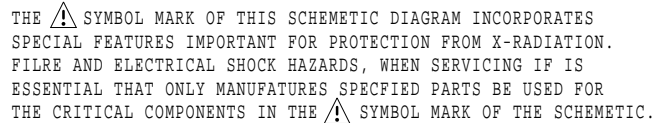
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LGElectronics



MODEL	GP4L_S7LR2	DATE	2011.12.01
BLOCK	FLASH/EEPROM/GPIO	SHEET	1 /

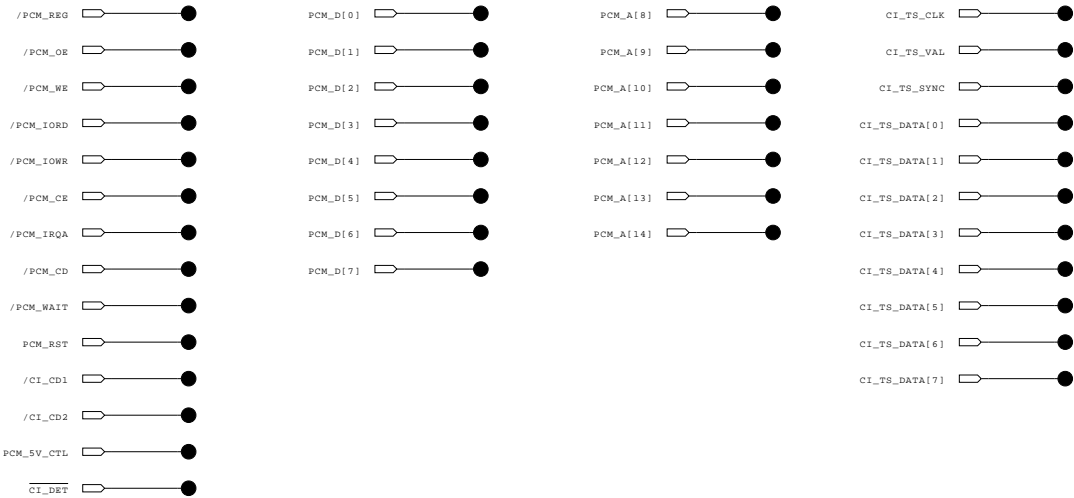




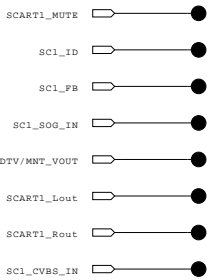
MODEL	GP4L_S7LR2	DATE	2011.07.12
BLOCK	POWER, IN/OUT, H/W OPT	SHEET	2 /

# TP for NON-EU models(except EU and China)

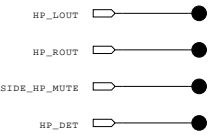
## TP for CI slot



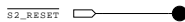
## TP for SCART





## TP for Headphone



## TP for S2



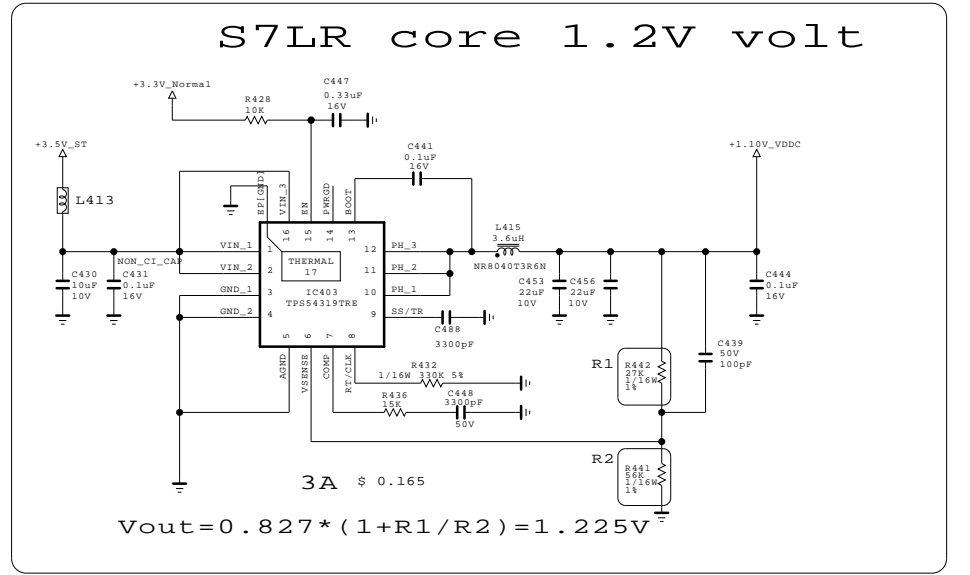
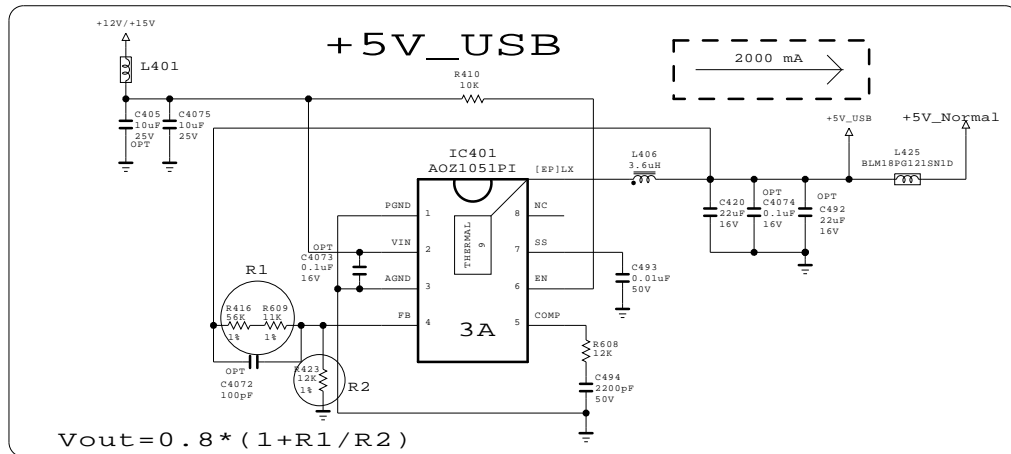
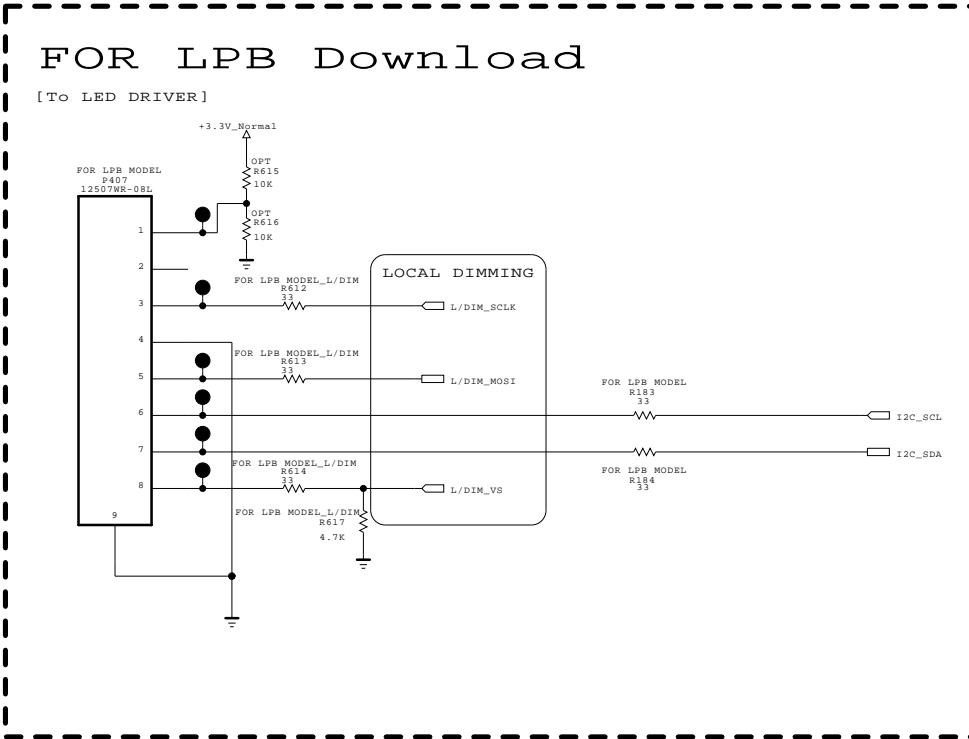
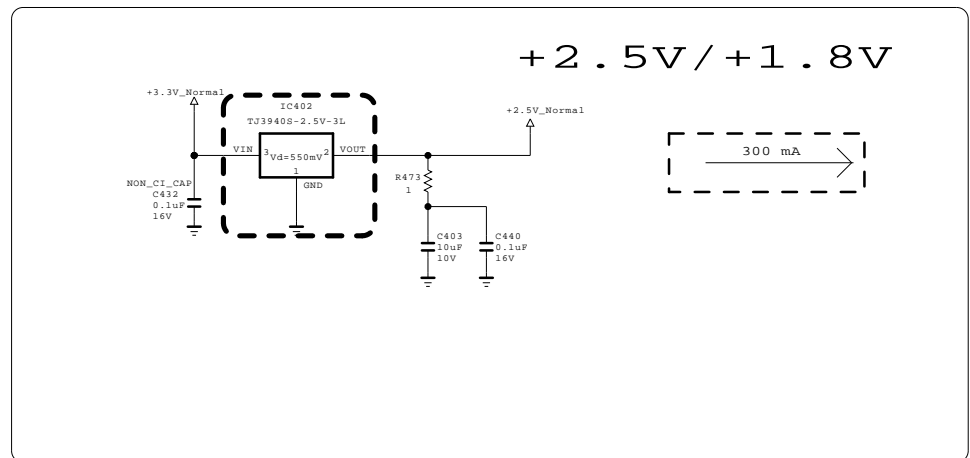
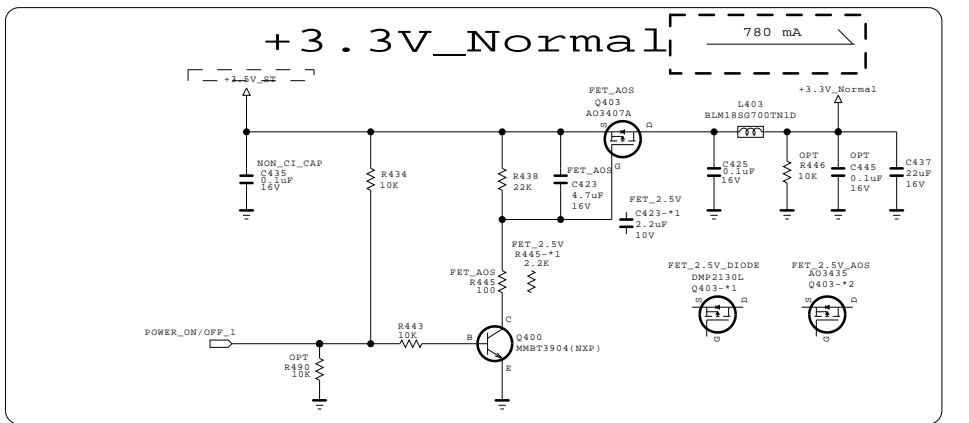
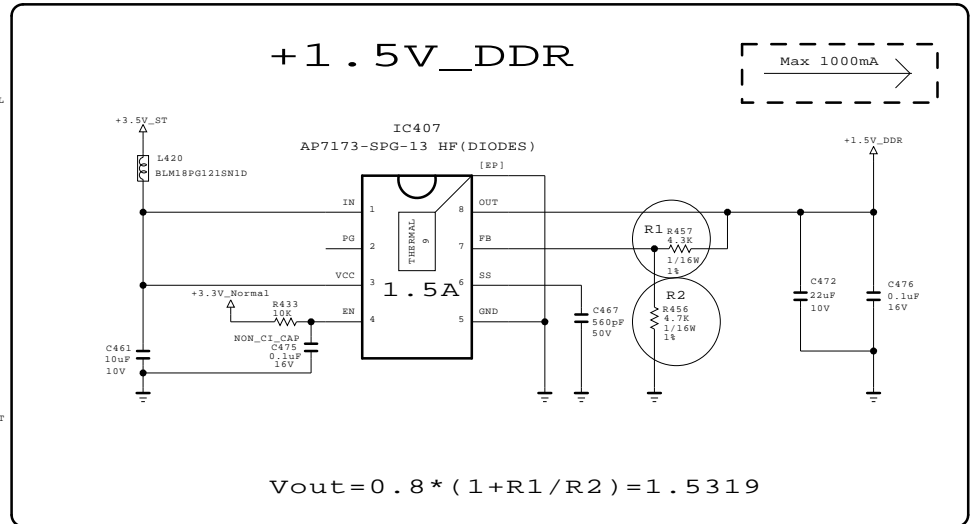
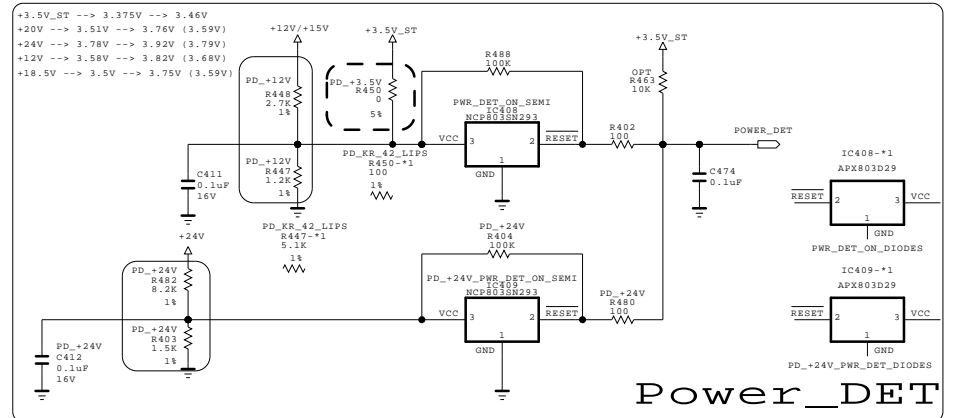
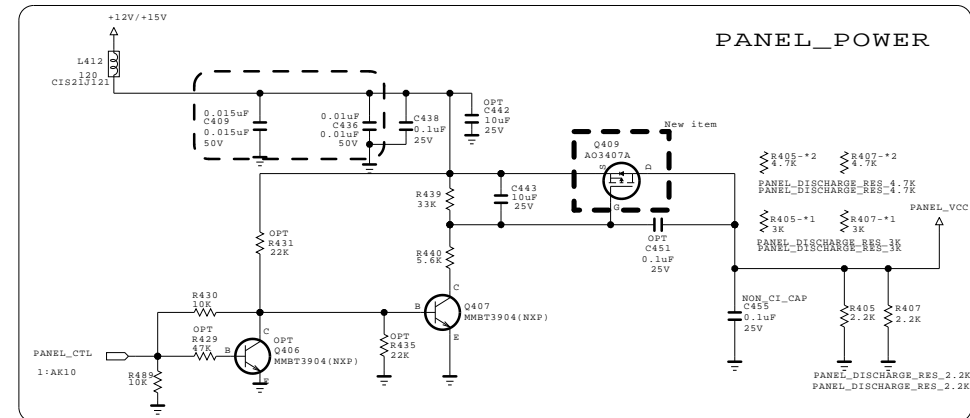
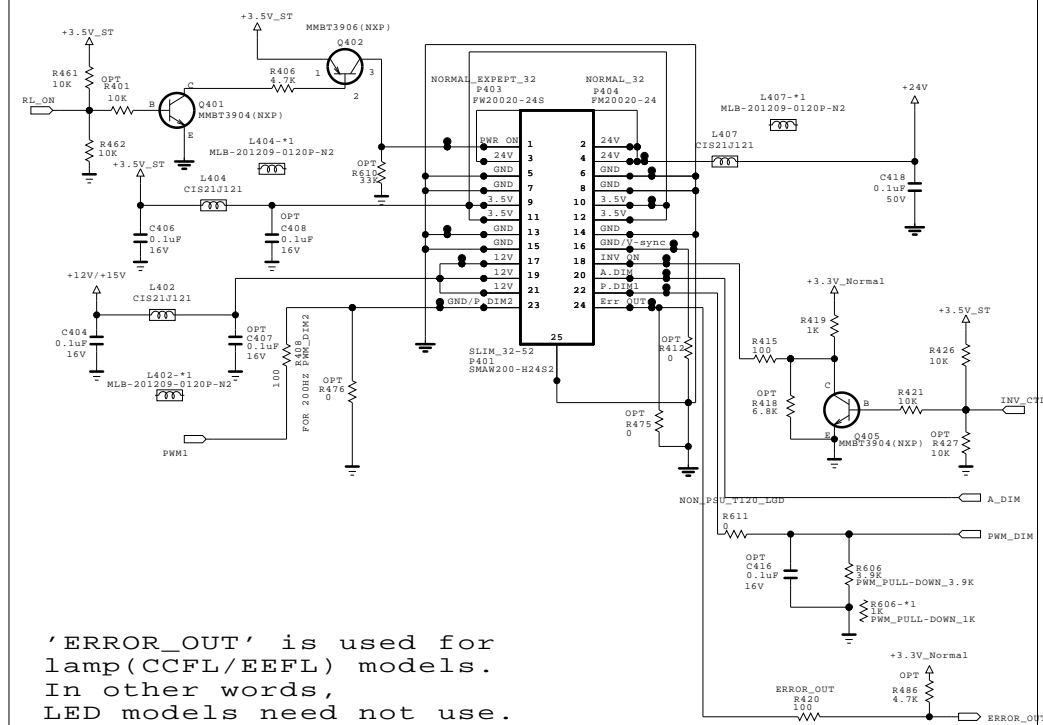
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LGElectronics



MODEL	GP4_S7LR2	DATE	2011.07.07
BLOCK	TP_NON_EN	SHEET	3 /

FROM LIPS & POWER B/D



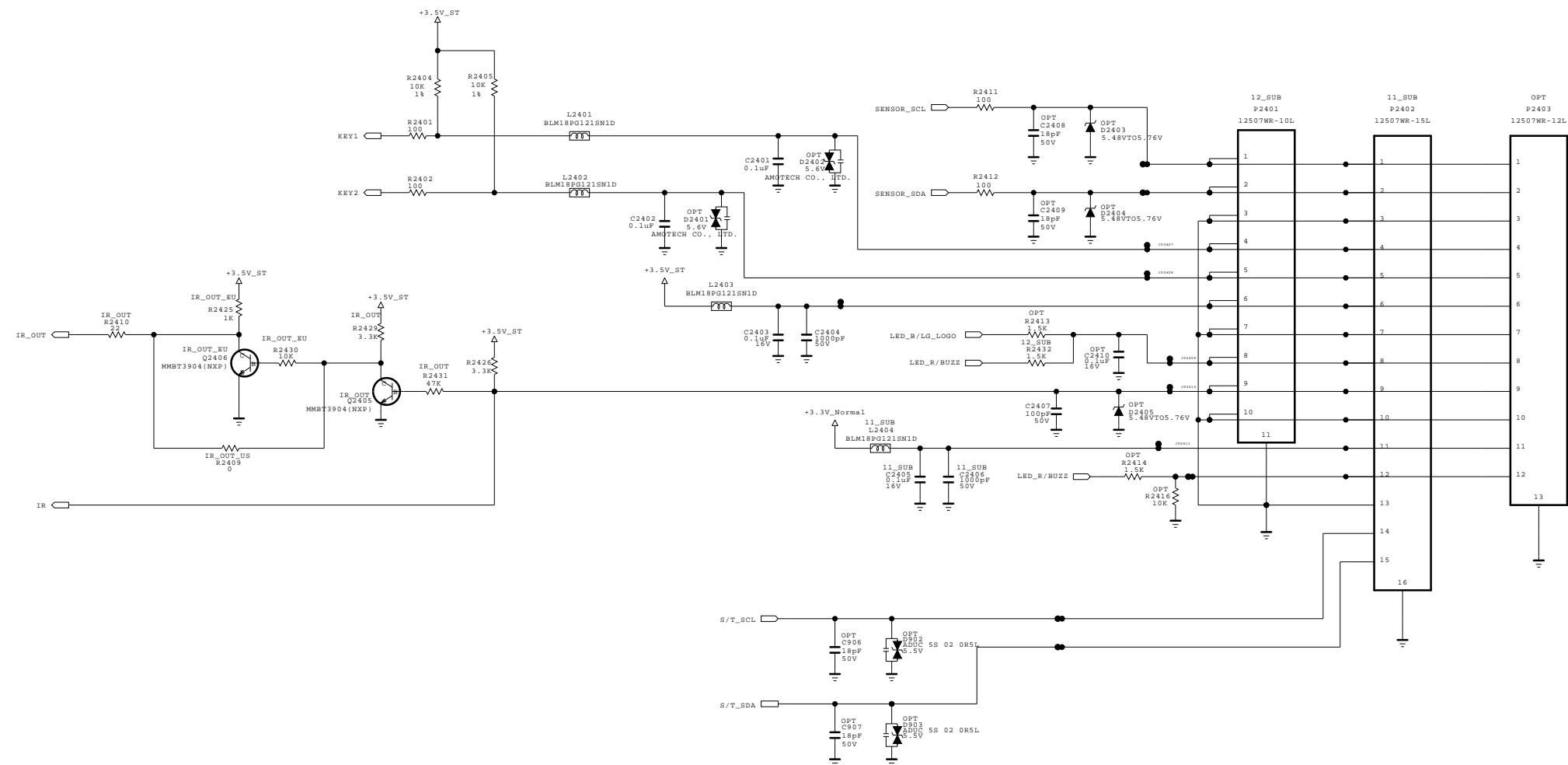
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LGElectronics



MODEL	GP4L_S7LR2	DATE	2011/11/26
BLOCK	POWER_LARGE	SHEET	4

IR/LED and control for normal models.



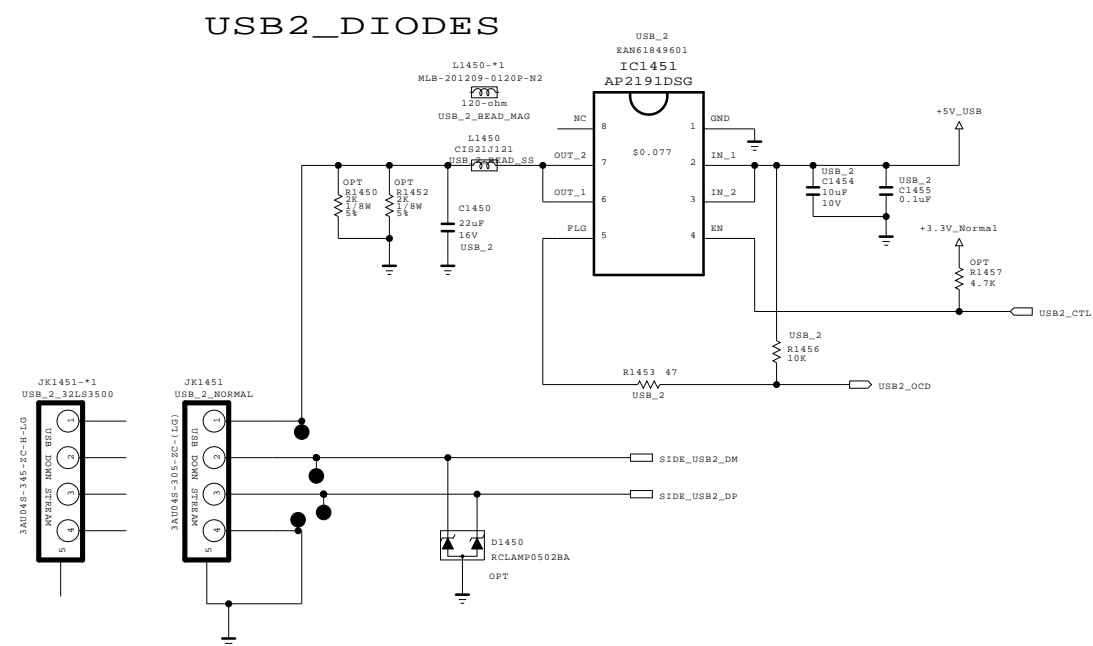
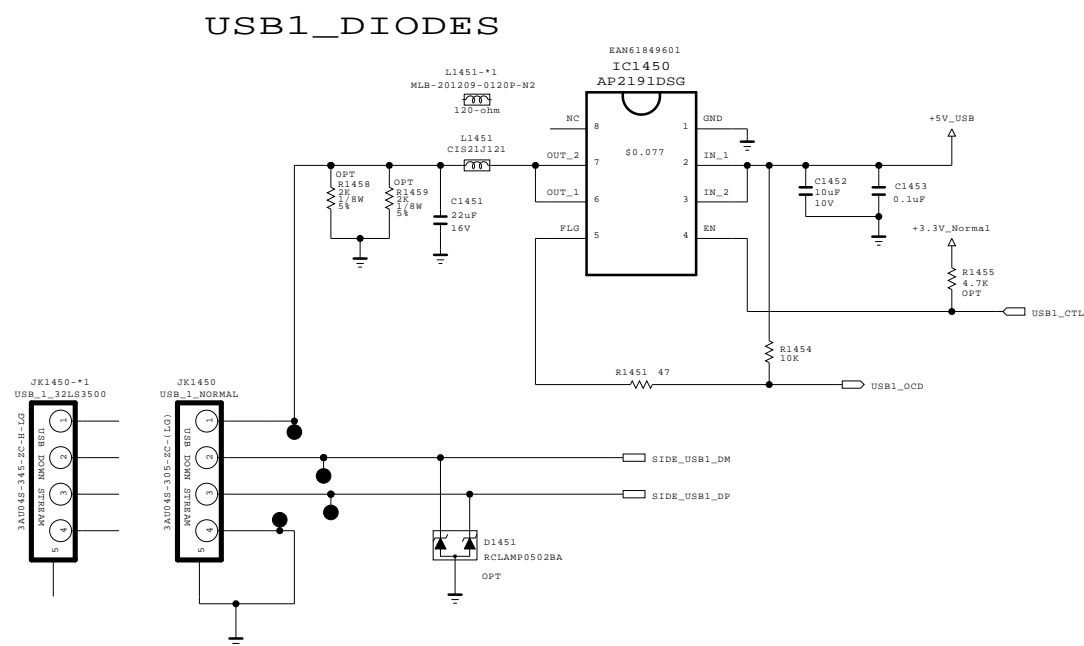
THE ⚠ SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMATIC.



SECRET  
LGElectronics



MODEL	GP4L_S7LR2	DATE	2011/11/16
PACK	IR/CONTROL	SHEET	6 /

USB (SIDE)



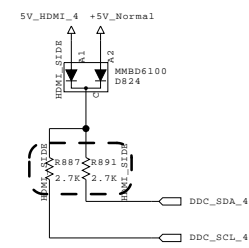
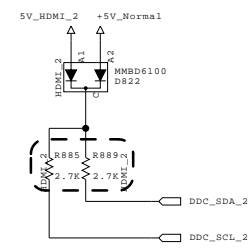
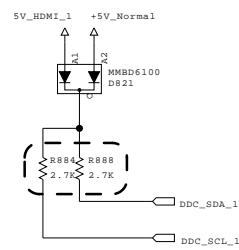
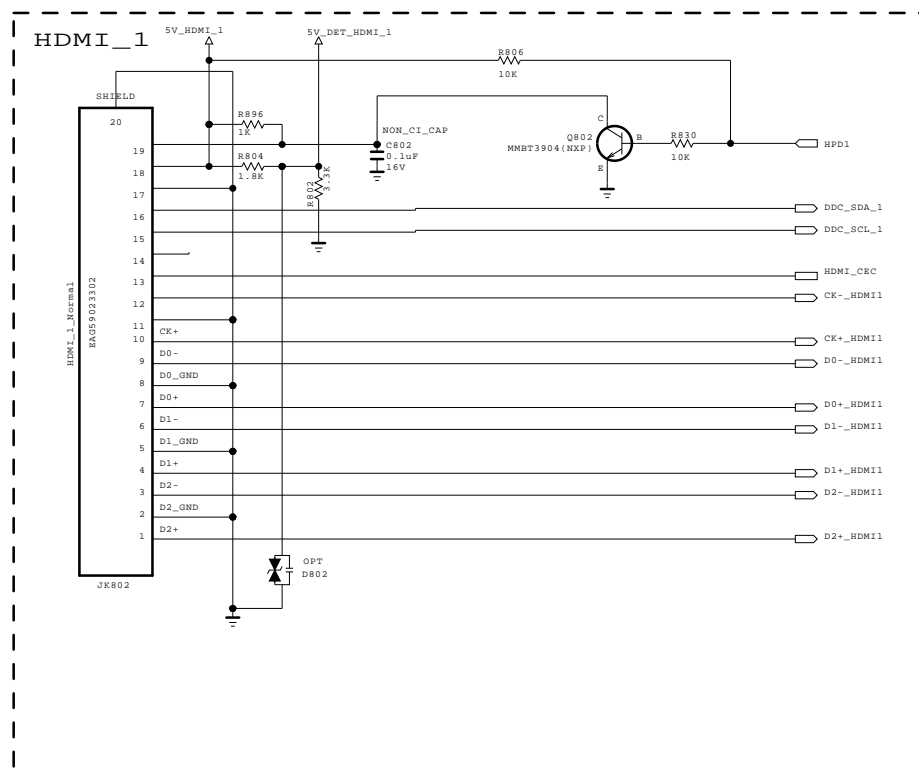
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SECRET  
LGElectronics

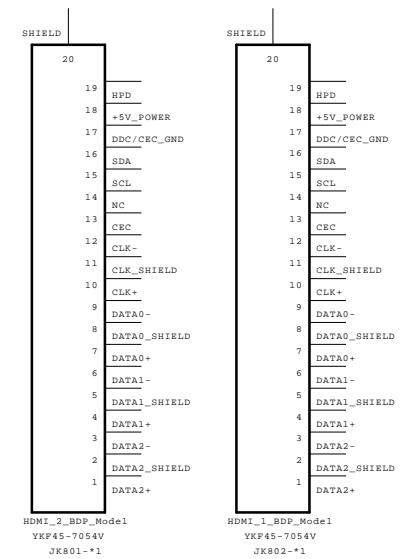
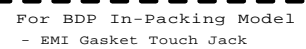
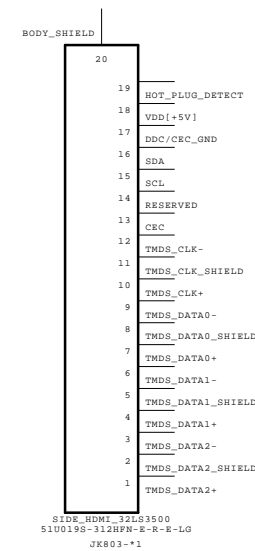
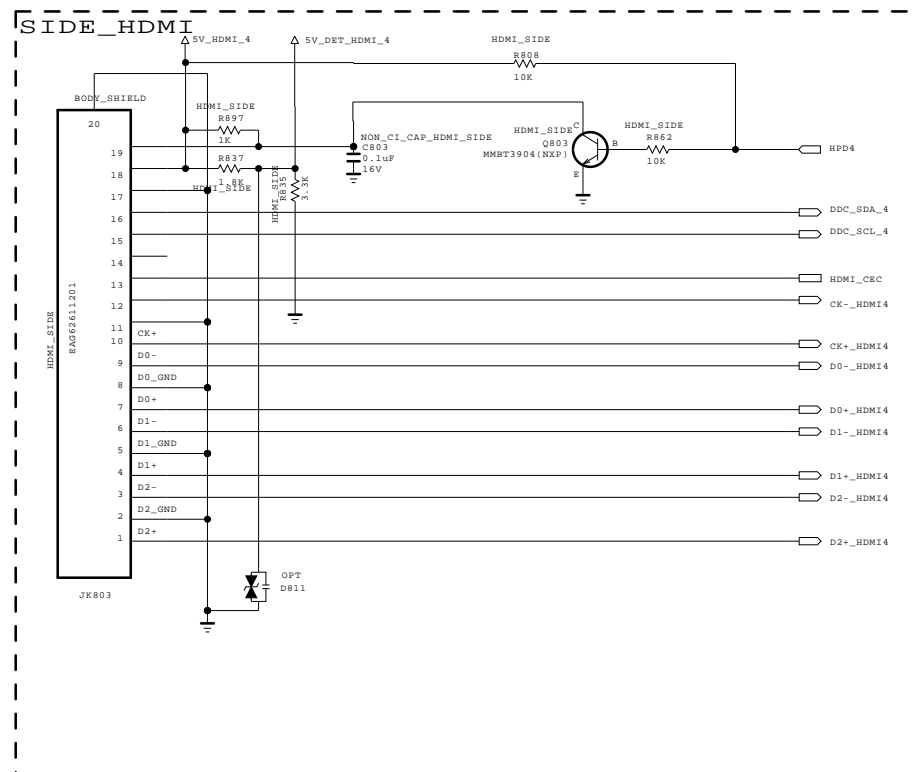
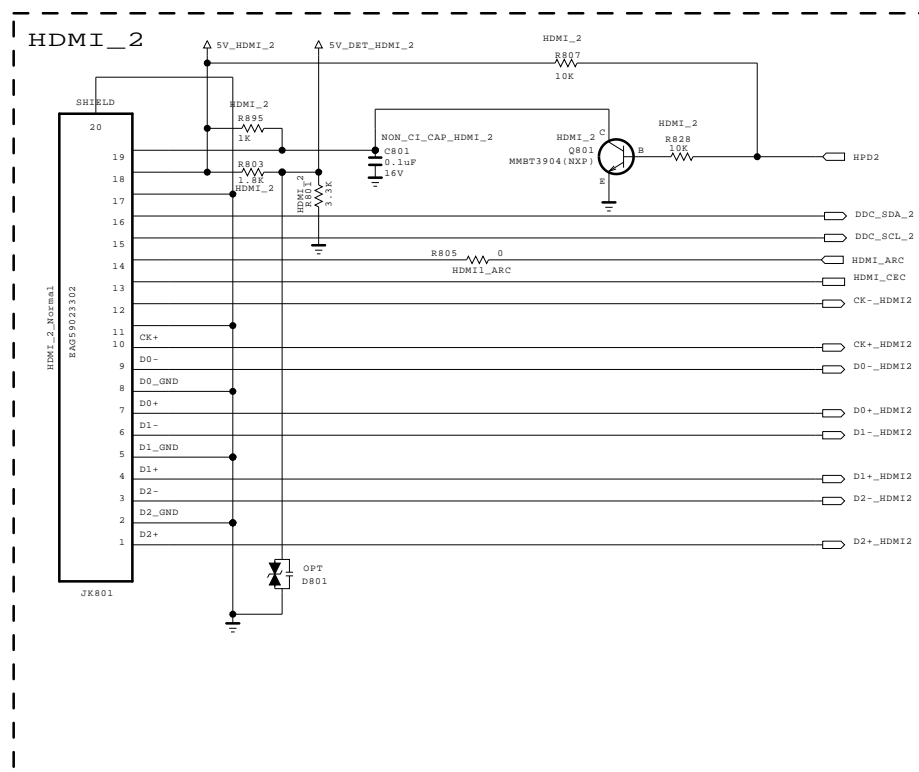


MODEL	GP4_S7LR2	DATE	10/08/13
BLOCK	USB_OCP_DIODE	SHEET	7 /

## HDMI



For CEC



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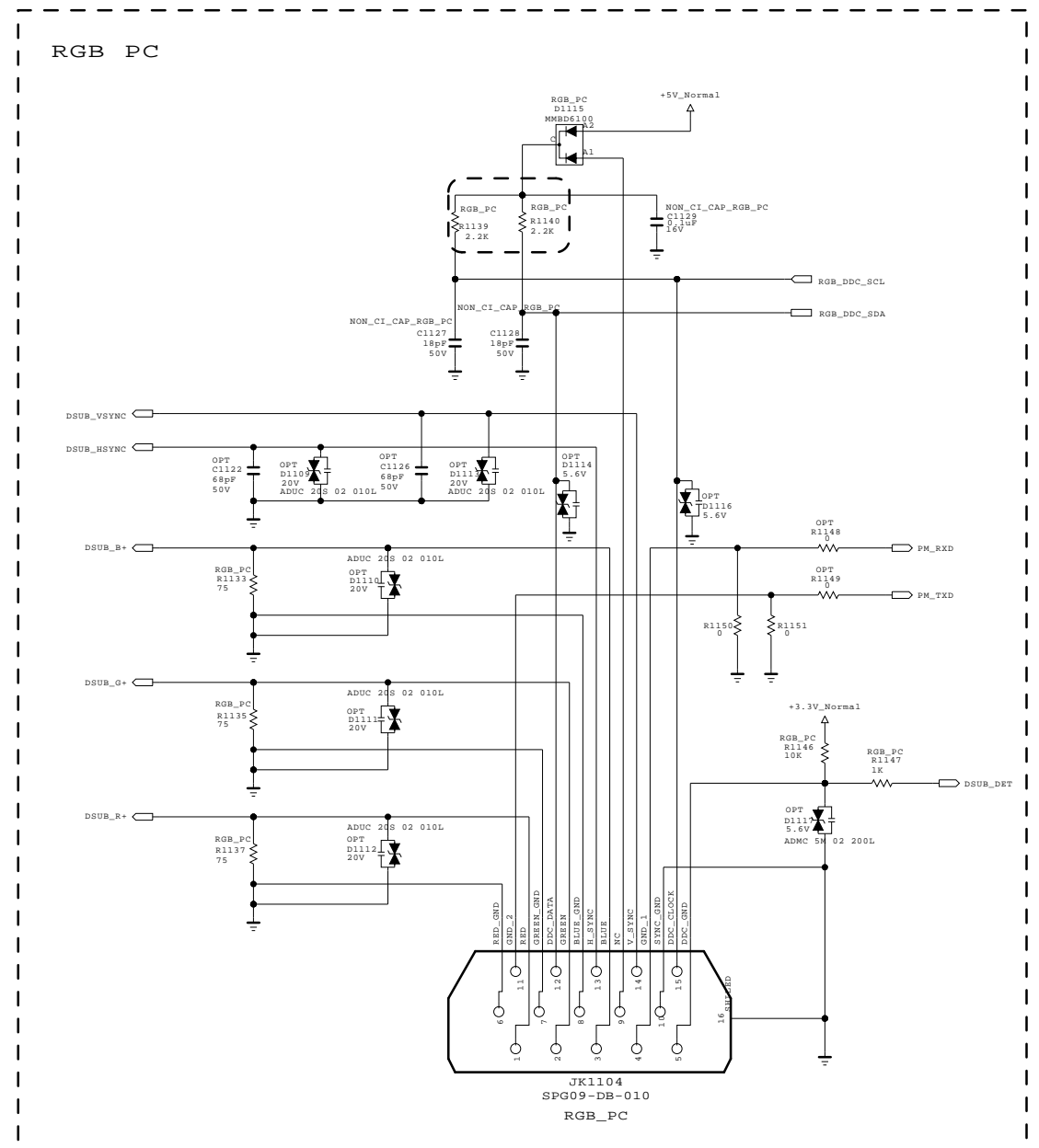
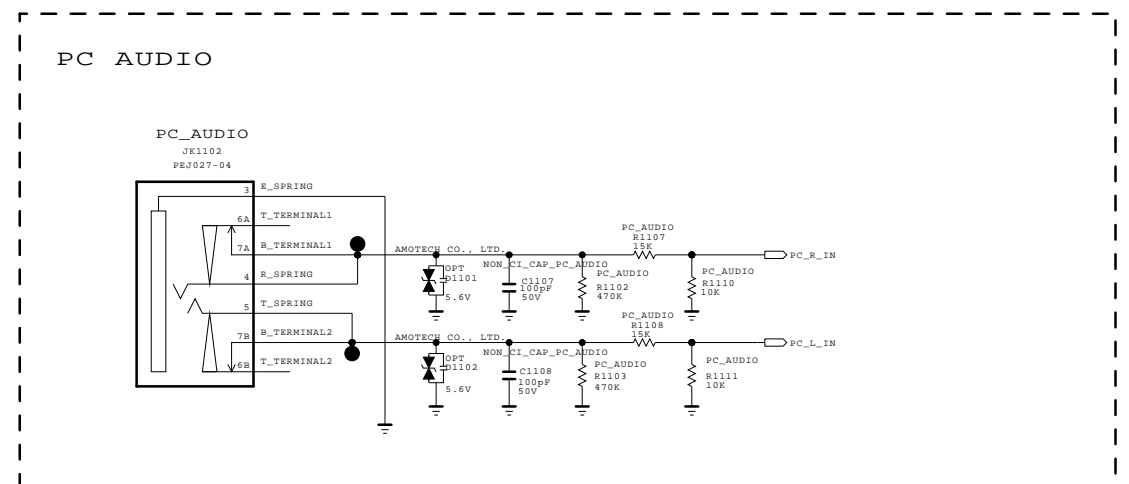
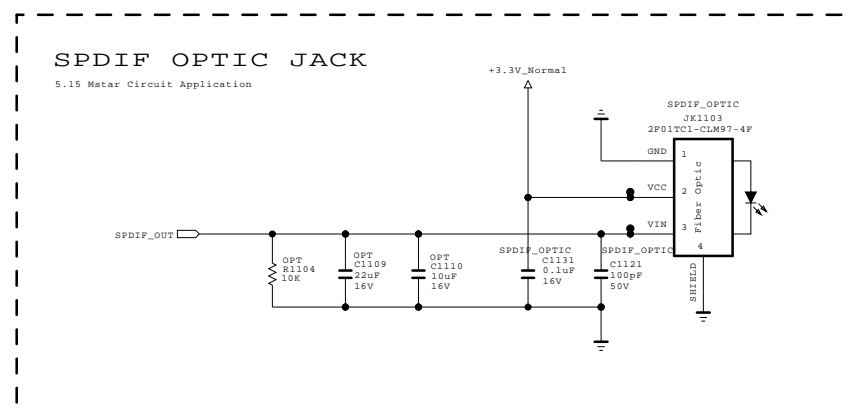
SECRET



LG Electronics



MODEL	GP4L_S7LR2	DATE	2011.10.04
BLOCK	HDMI	SHEET	8 /

## RGB-PC / SPDIF



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

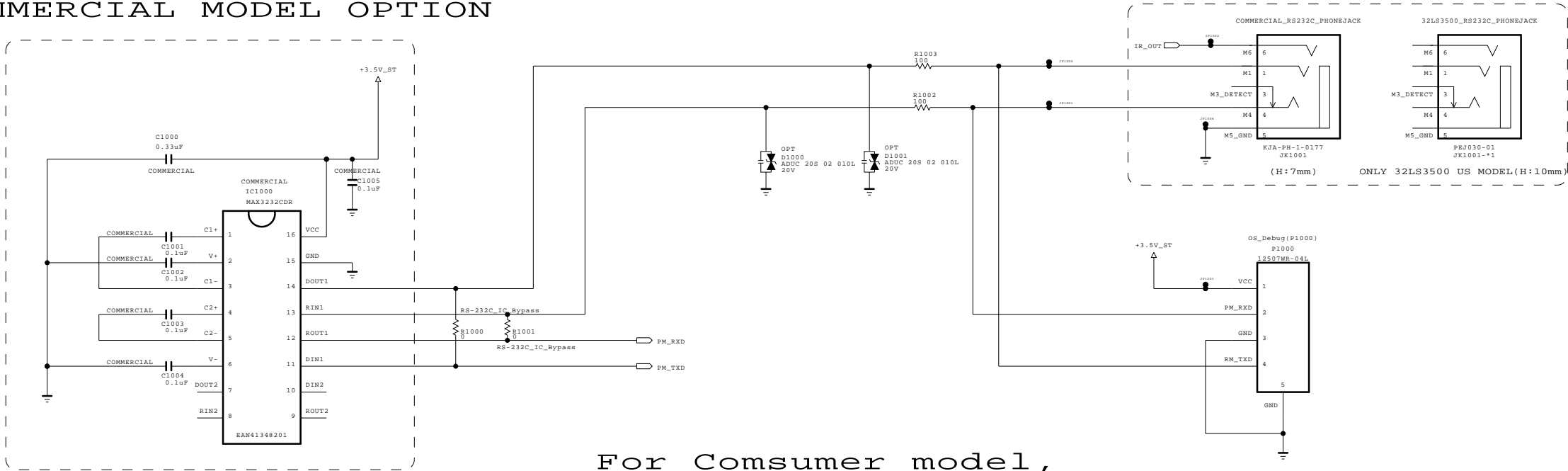


MODEL	GP4L_S7LR2	DATE	2011/09/27
PORT	RGB-PC/SPDIF	SHEET	9 /



RS-232C

COMMERCIAL/NonOS MODEL OPTION

COMMERCIAL MODEL OPTION



For Comsumer model ,  
use 4PIN Wafer .

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SECRET  
LGElectronics

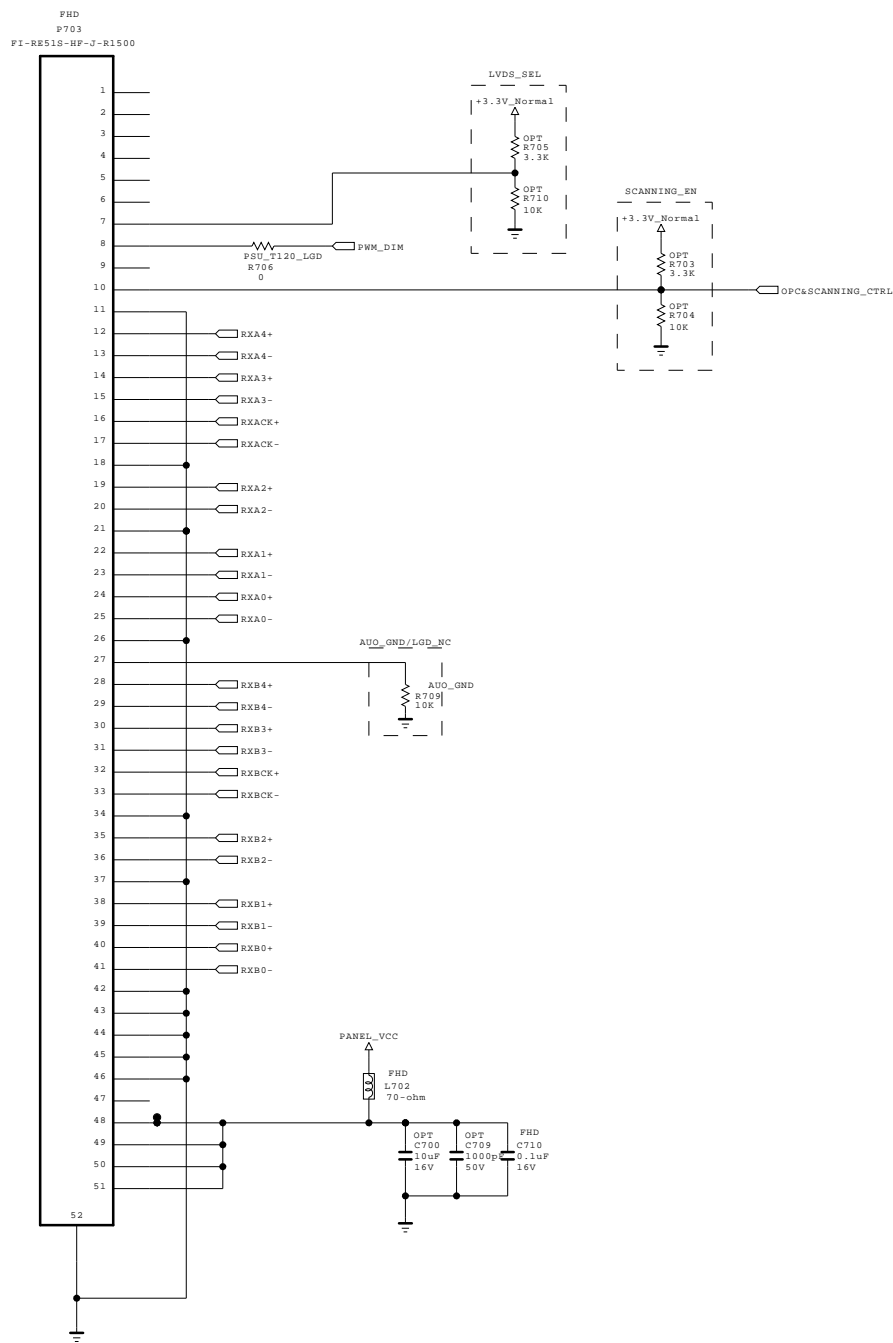


MODEL	GP4L_S7LR2	DATE	2011/08/13
BLOCK	RS232C_PHONE	SHEET	10 /

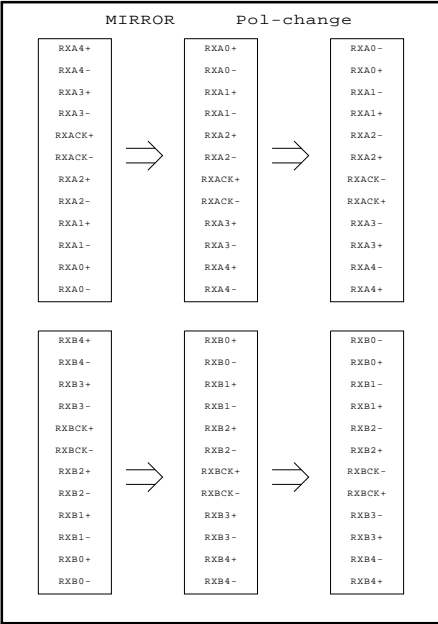


LVDS for large inch

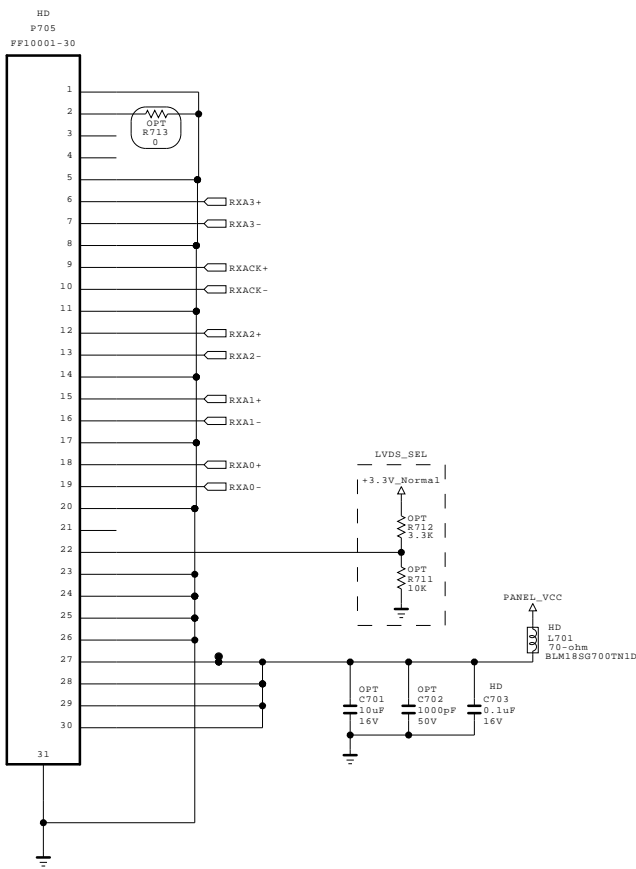
[51Pin LVDS Connector]  
(For FHD 60Hz)



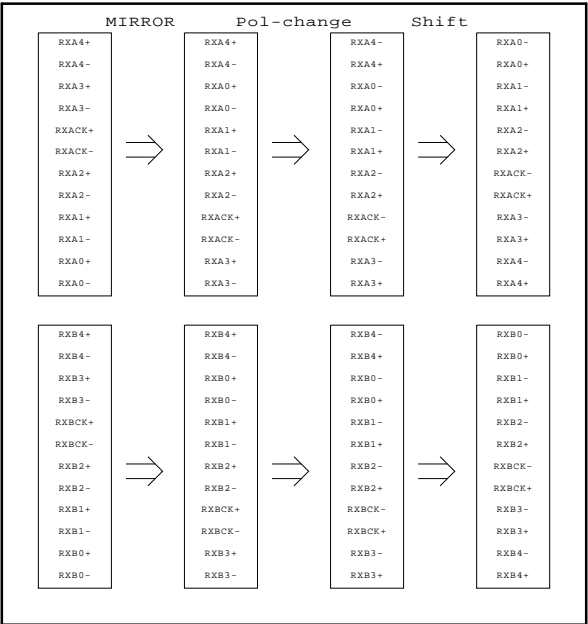
FOR FHD REVERSE(10bit)  
Change in S7LR





[30Pin LVDS Connector]  
(For HD 60Hz\_Normal)



FOR FHD REVERSE(8bit)  
Change in S7LR

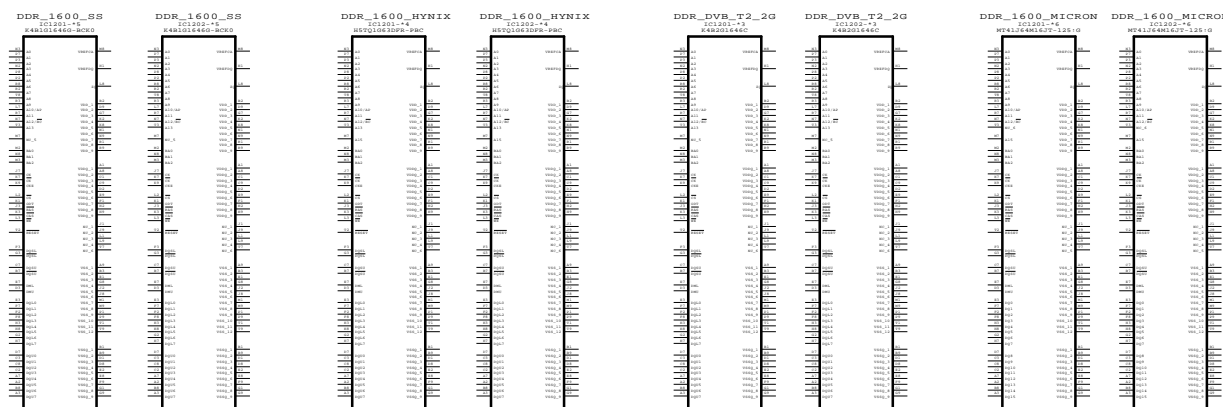
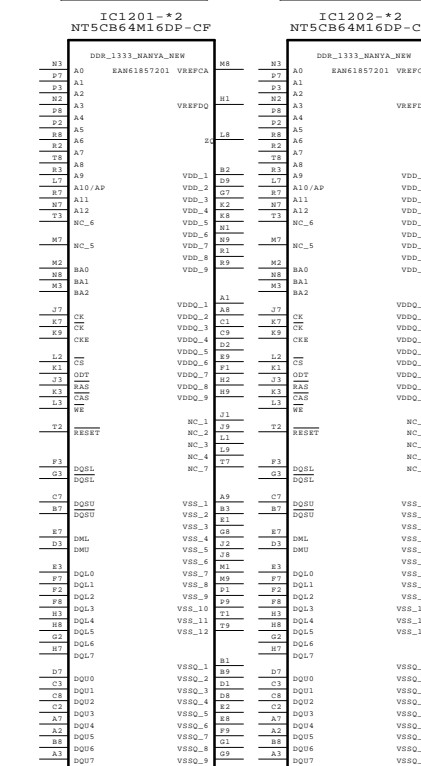
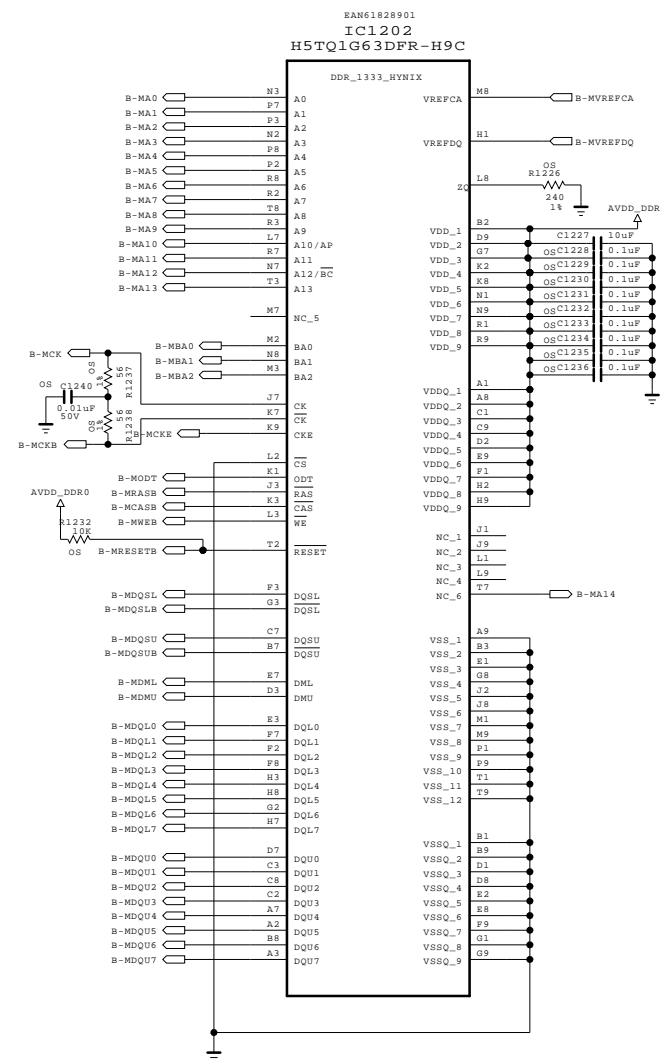
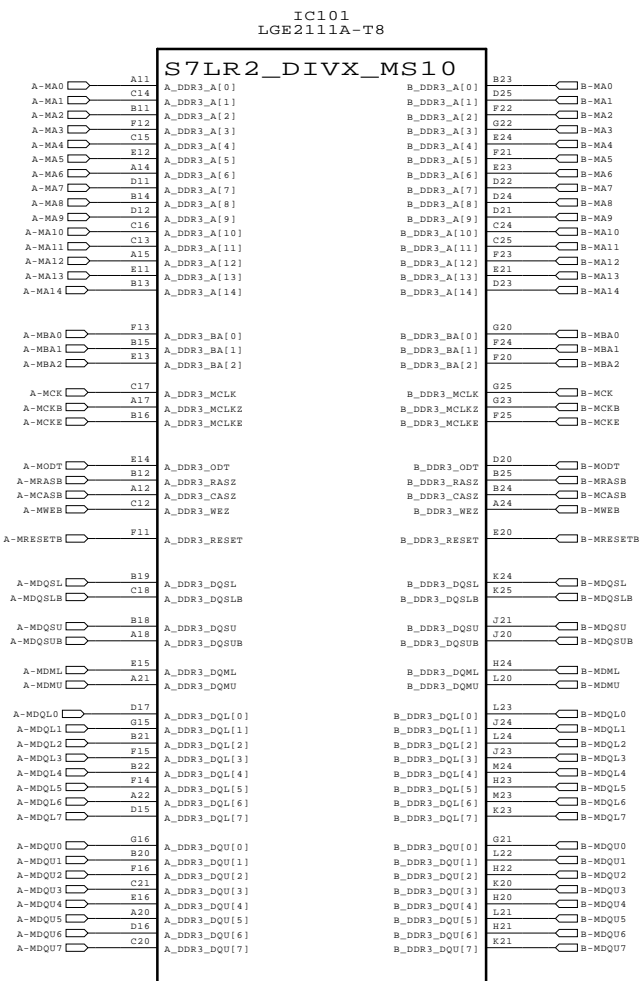
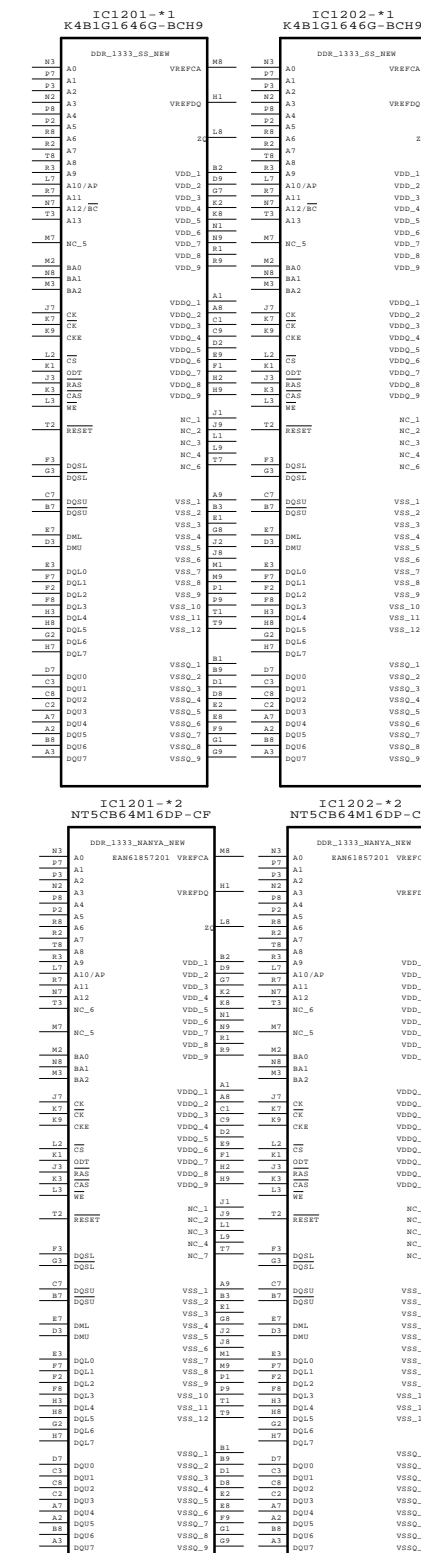


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SECRET  
LGElectronics



MODEL	GP4L_S7LR2	DATE	2011/11/14
BLOCK	LVDS_LARGE	SHEET	11 /



SECRET  
LG Electronics



MODEL	GP4L_S7LR2	DATE	2011/06/03
BLOCK	DDR_256	SHEET	12 /

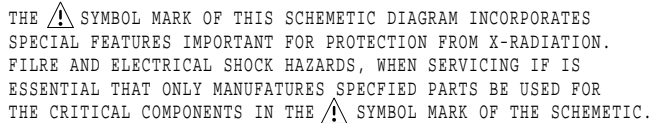
FE\_AGC\_SPEED\_CTL  
IF\_AGC\_SEL

DEMOD\_RESET

FE\_BOOSTER\_CTL  
LNA2\_CTL

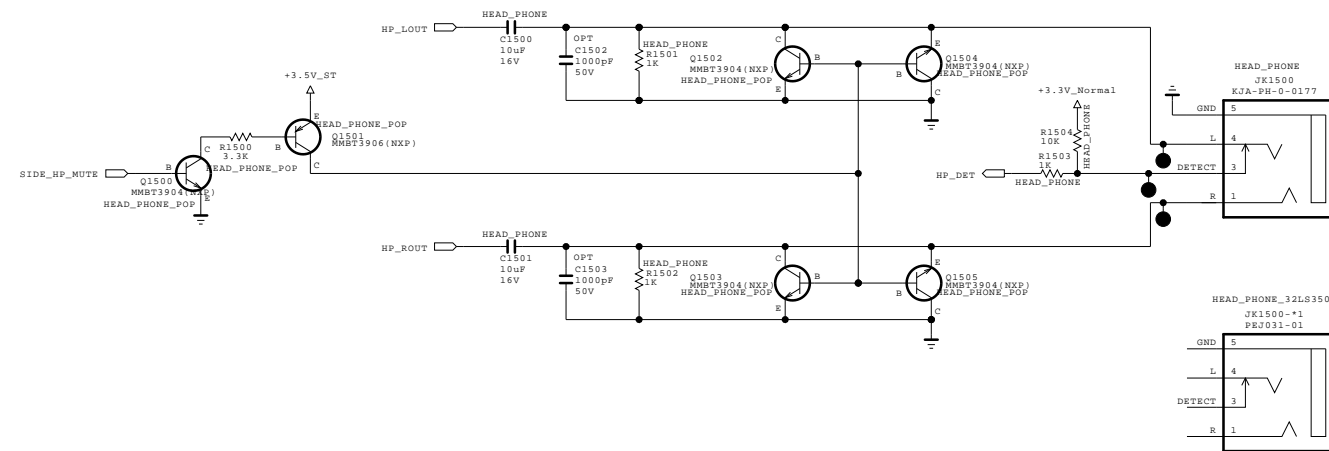
DEMOD\_SCL



DEMOD\_SDA



MODEL	GP4L_S7LR2	DATE	2011.10.11
BLOCK	TUNER_NON_EU	SHEET	14 /

```
Headphone    *Option   : HEAD_PHONE
```



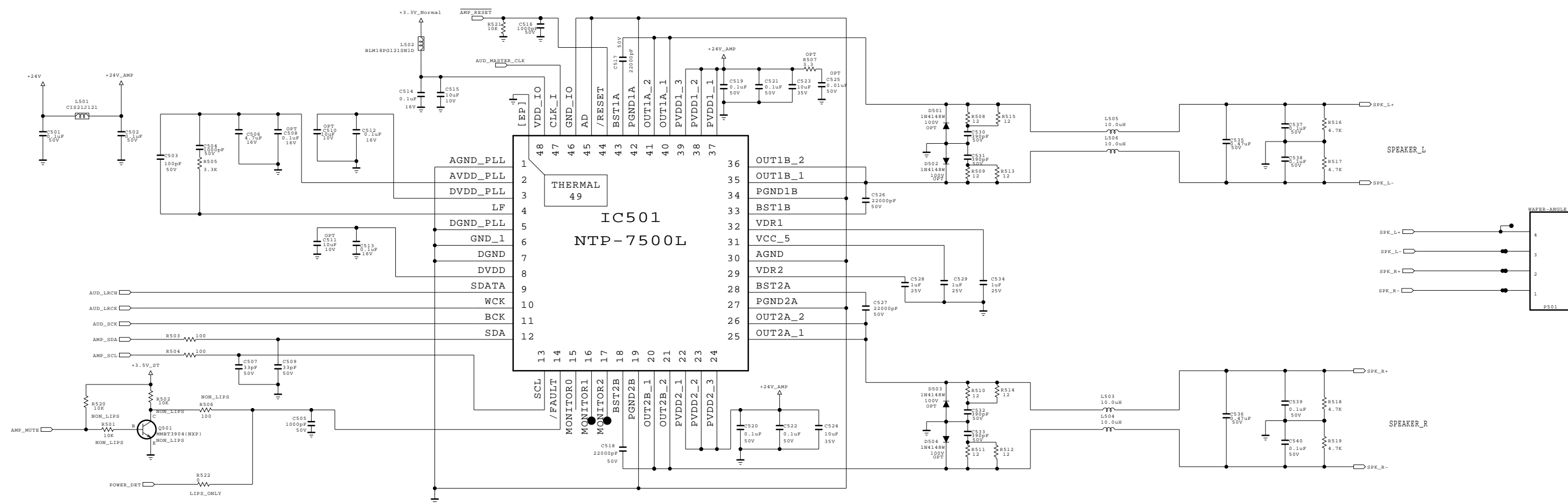
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SECRET  
LGElectronics



MODEL	GP4L_S7LR2	DATE	2011/10/04
BIJCK	HEADPHONE	SHEET	15 /

Audio amp (NTP-7500)



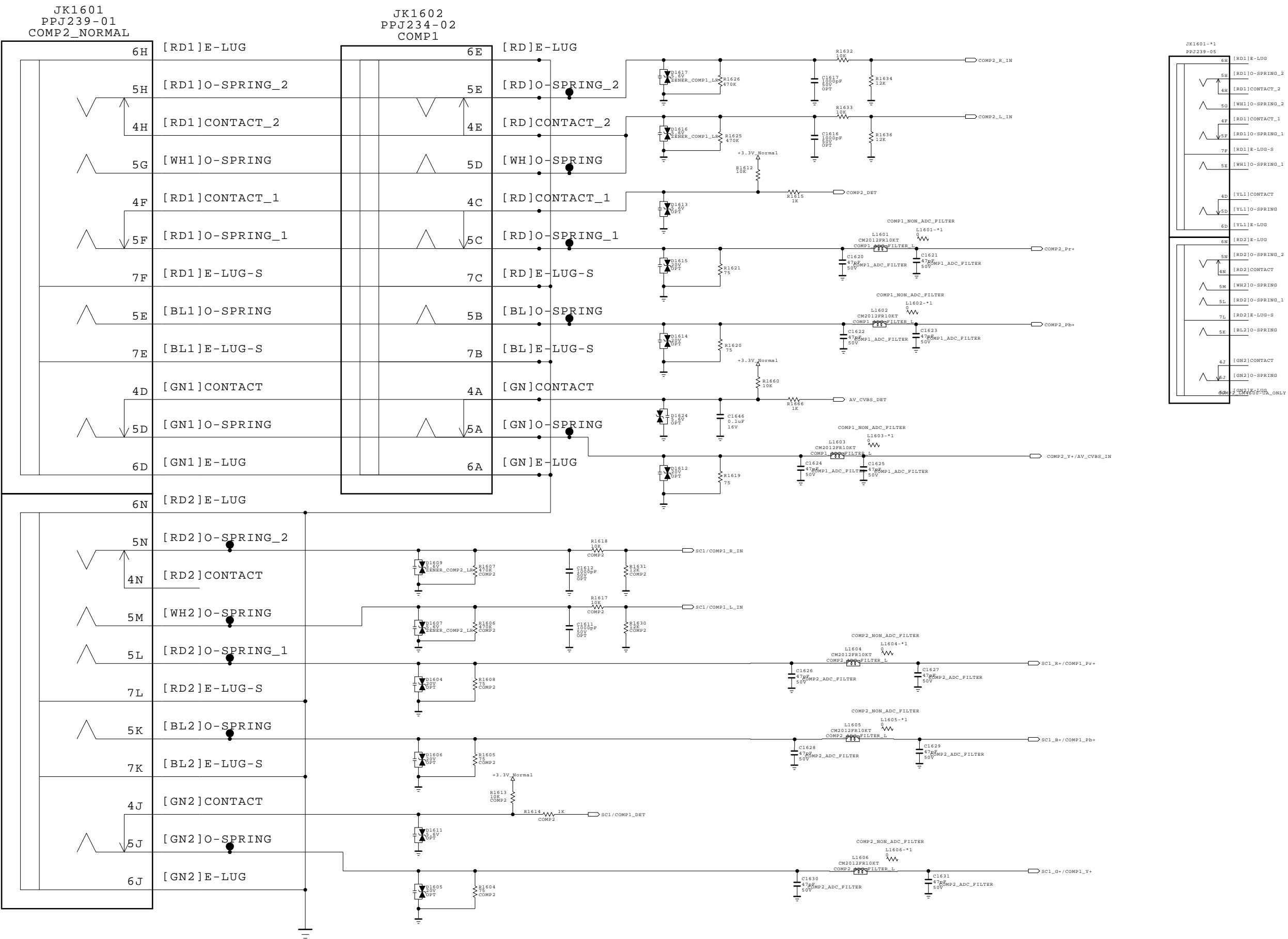
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SECRET  
LGElectronics





MODEL	GP4L_S7LR2	DATE	2011.10.04
BLOCK	NTP-7500	SHEET	16 /

COMPONENT1 & AV (COMMON), COMPONENT2



COMPONENT1  
&  
AV

COMPONENT2

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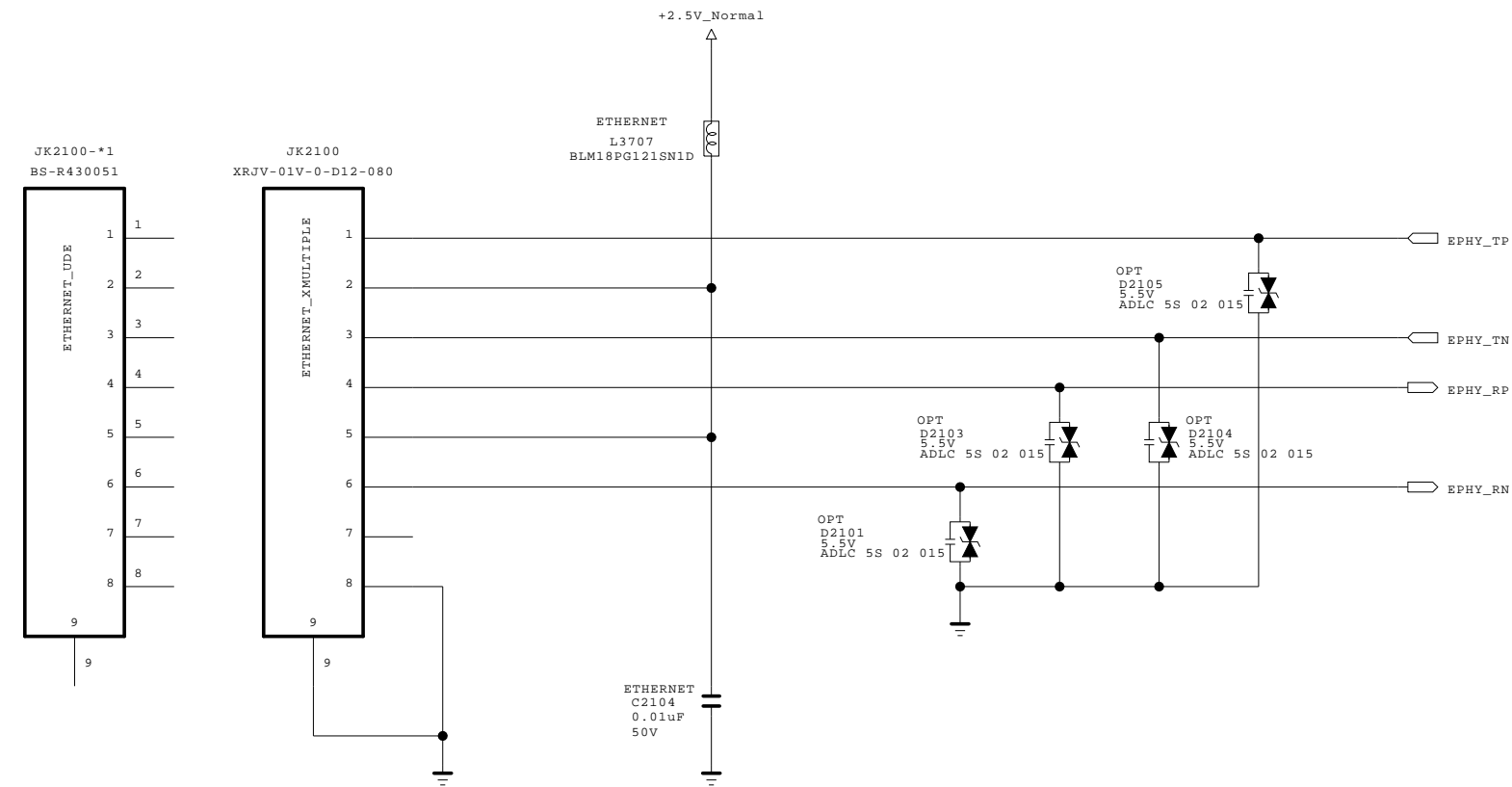
SECRET  
LGElectronics






MODEL	GP4L_S7LR2	DATE	2011.11.28
BLOCK	REAR_NON_EU_L	SHEET	17

# ETHERNET

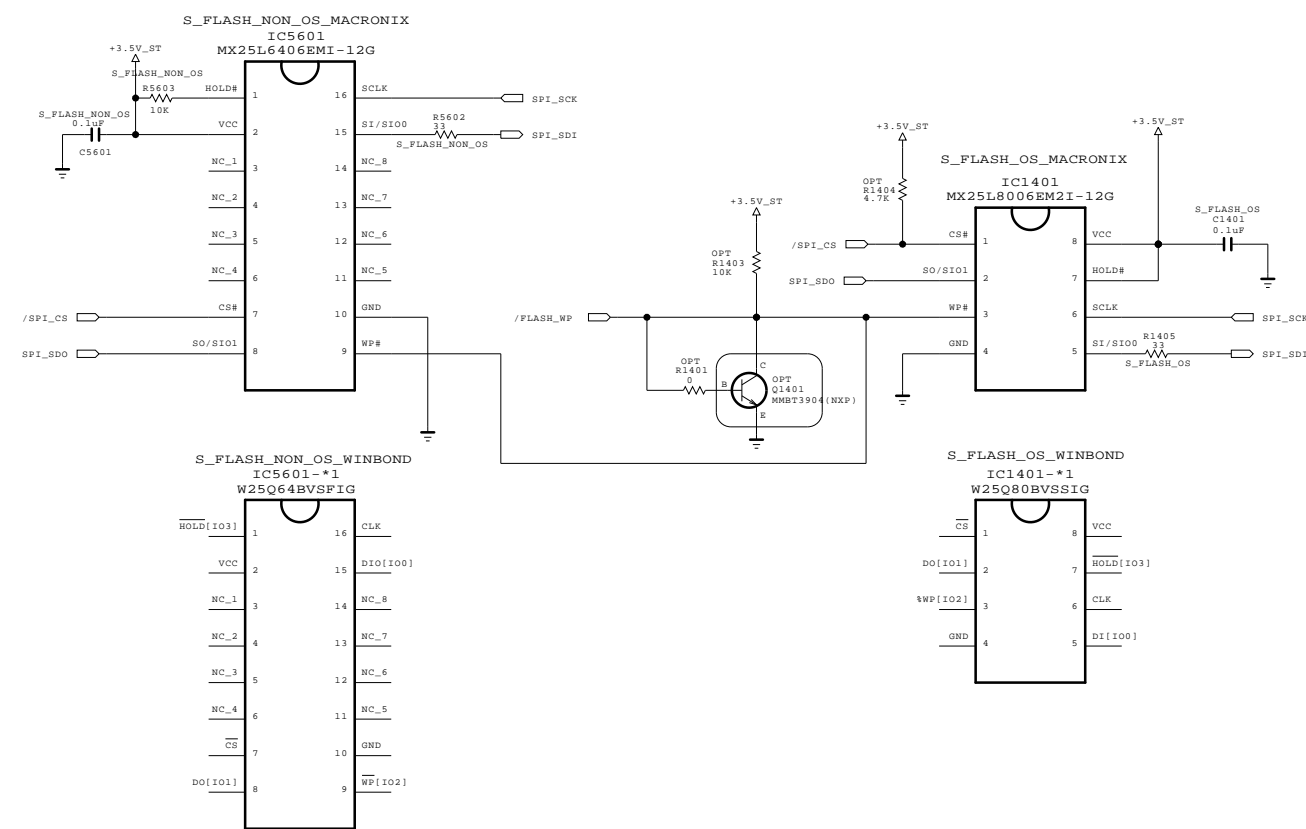
\* H/W option : ETHERNET





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SECRET	 LG ELECTRONICS	MODEL	GP4L_S7LR2	DATE	2011/06/14
		BLOCK	ETHERNET	SHEET	21 /

# Serial Flash for SPI boot\_NON\_OS and OS



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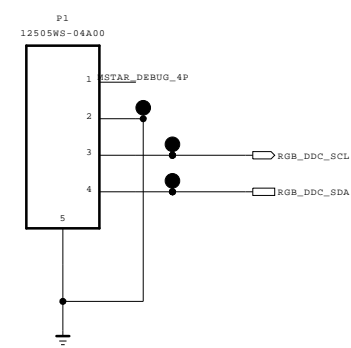
SECRET  
LGElectronics





MODEL	GP4L_S7LR	DATE	2011.08.29
BLOCK	Serial FLASH	SHEET	56 /



MSTAR\_DEBUG\_4PIN



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SECRET  
LGElectronics



MODEL	GP4L_S7LR2	DATE	2011/09/05
BLOCK	MSTAR_DEBUG_4PIN	SHEET	58 /

