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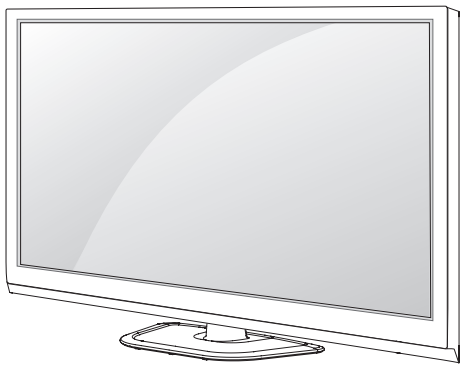
PLASMA TV
SERVICE MANUAL

CHASSIS : PD31B

MODEL : 50PN450D 50PN450D-ZA

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



P/NO : MFL67682004 (1301-REV00)

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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 ⚠ in the Schematic Diagram and Exploded View.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.

General Guidance

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

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

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

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 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,

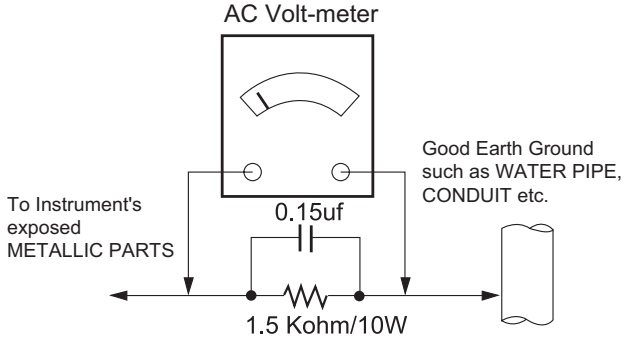
always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

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 MΩ and 5.2 MΩ.
When the exposed metal has no return path to the chassis the reading must be infinite.
An other abnormality exists that must be corrected before the receiver is returned to the customer.

Leakage Current Hot Check (See below Figure)
Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.
Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.
Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which is 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
*Base on Adjustment standard

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SPECIFICATION

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

1. Application range

This spec sheet is applied all of the PDP TV with PD31B 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 5 minutes prior to the adjustment.

3. Test method

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

4. Module General Specification

- 50" 2D HD

No	Item	Specification	Remark
1	Display Screen Device	127 cm (50 inch) wide Color Display Module	PDP
2	Aspect Ratio	16:9	
3	PDP Module	PDP50T4####, RGB Closed (Well) Type, Glass Filter (38%) Pixel Format: 1024 horiz. By 768 ver.	
4	Operating Environment	1) Temp. : 0 ~ 40 deg 2) Humidity : 20 ~ 80%	LGE SPEC
5	Storage Environment	1) Temp. : -20 ~ 60 deg 2) Humidity : 10 ~ 90 %	
6	Input Voltage	AC100 ~ 240V, 50/60Hz	Maker LG

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5. Model General Specification

No	Item	Specification	Remark
1	Market	Albania, Austria, Belgium, Bosnia, Bulgaria, Coratia, Czech, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Kazakhstan, Latvia, Lithuania, Luxembourg, Morocco, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovenia, Spain, Sweden, Slovakia, Switzerland, Turkey, Ukraine, UK	36 Country
		Australia, New Zealand, Malaysia, Indonesia, Singapore, South Africa, Israel, Iran, Vietnam, Kenya, Asia,Non-EU analog, CHINA(cormmercial)	Non-EU
2	Broadcasting system	1) PAL/SECAM BG 2) PAL/SECAM DK 3) PAL I / II 4) SECAM L/L' 5) DVB T 6) DVB C 7) DVB T2 8) DVB S2	Programme Coverage (EU) Digital TV - PD31B/C are not support SECAM L/L` - Only PD31B support DVB-T2 - Only PD31C support DVB-S2 Analogue TV VHF: E2 to E12, UHF: E21 to E69, CATV: S1 to S20, HYPER: S21 to S47
		1) PAL/SECAM BG 2) PAL/SECAM DK 3) PAL I 4) NTSC M 5) DVB T	Programme Coverage (NON-EU) Digital TV VHF 04 to 13, UHF 27 to 69 Analogue TV VHF/UHF 1 to 78, CATV 01 to 71
3	Receiving system	Analog : Upper Heterodyne Digital : COFDM	
4	Scart Jack (1EA)	PAL, SECAM	EU ONLY
5	Component Input (1EA)	Y/Cb/Cr, Y/ Pb/Pr	
6	RGB Input (1EA)	RGB-PC	Commercial Model ONLY
7	RS232C (1EA)	SVC	Commercial Model ONLY
8	AV (2EA)	CVBS (Hybrid :1)	EU model have 1 AV (Hybrid)
9	HDMI Input (2 or 3EA)	HDMI-PC HDMI-DTV	HDMI/PC 1, HDMI2
10	Audio Input (1EA)	DVI Audio, Component	L/R Input
11	SPDIF Out (1 EA)	SPDIF Out	
12	USB (1EA)	for SVC, S/W Download, DivX	
13	LAN	only DVB-T2 (UK, Irend) Model	
14	PCMCI (1EA)	DVB-T/C Decryption Interface, CI+	EU ONLY

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ADJUSTMENT INSTRUCTION

1. Application Range

This spec. sheet applies to PD31B chassis applied PDP TV all models manufactured in TV factory.

2. Designation

(1) The adjustment is according to the order which is designated and which must be followed, according to the plan which can be changed only on agreeing.
(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 : 220V, 60Hz
(6) Adjustment equipments : Color Analyzer (CA-210 or CA-110), DDC Adjustment Jig equipment, SVC remote controller.
(7) 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.

■ After RGB Full White in HEAT-RUN Mode, the receiver must be operated prior to the adjustment.
■ Enter into HEAT-RUN MODE
1) Press the POWER ON KEY on R/C for adjustment.
2) OSD display and screen display PATTERN MODE.
● Set is activated HEAT run without signal generator in this mode.
● Single color pattern (WHITE) of HEAT RUN MODE uses to check panel.
● Caution : If you turn on a still screen more than 20 minutes (Especially digital pattern, cross hatch pattern), an after image may be occur in the black level part of the screen.
(8) Push The “IN STOP KEY” – For memory initialization.

Case1 : Software version up
1) After downloading S/W by USB , Multi-vision 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.

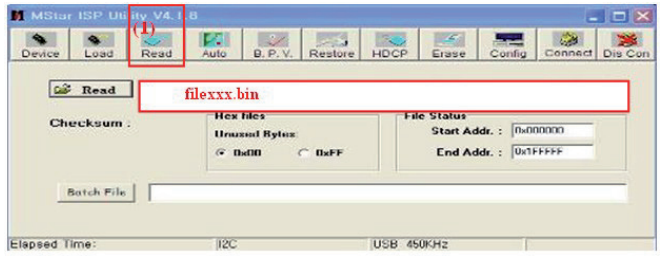
Case2 : Function check at the assembly line
1) When TV set is entering on the assembly line, Push “In-stop” key at first.
2) Push “Power on” key for turning it on.
-> If you push “Power on” key, TV set will recover channel information by itself.
3) After function inspection, Push “In-stop” key.

3. Main PCB check process

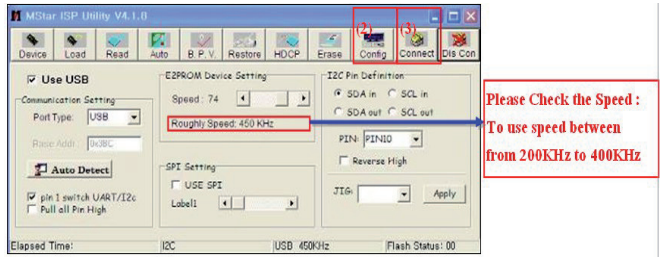
* APC - After Manual-Insult, executing APC

* Boot file Download

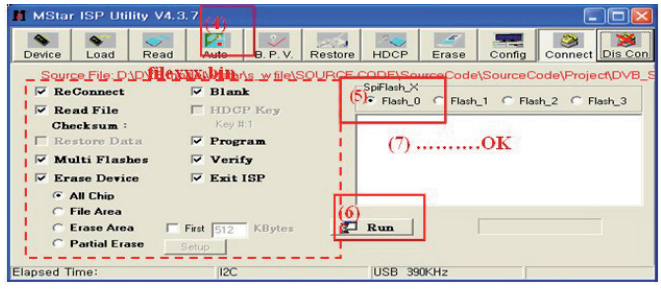
(1) Execute ISP program “Mstar ISP Utility” and then click “Config” tab.
(2) Set as below, and then click “Auto Detect” and check “OK” message
If “Error” is displayed, Check connection between computer, jig, and set.
(3) Click “Read” tab, and then load download file (XXXX.bin) by clicking “Read”



(4) Click “Connect” tab. If “Can’t ” is displayed, Check connection between computer, jig, and set.



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



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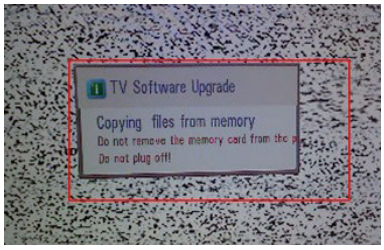
* USB DOWNLOAD(*.epk file download)

(1) Put the USB Stick to the USB socket

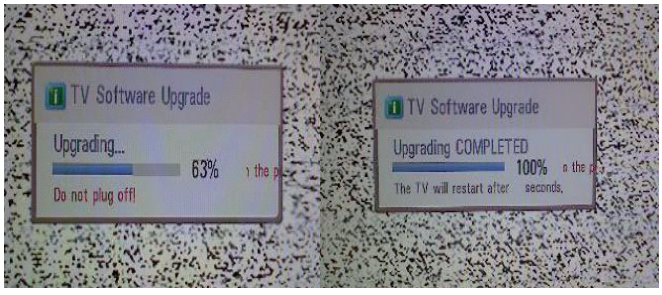
(2) Automatically detecting update file in USB Stick

- 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 staring.



(5) Updating Completed, The Multi-vision will restart automatically.

(6) If your Multi-vision is turned on, check your updated version and Tool option. (explain the Tool option, next stage)

* 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 of models has their number.)
4) Completed selecting Tool option.

	50PN450D-Z*
HD/FHD	HD
Tool option 1	36864
Tool option 2	21800
Tool option 3	3313
Tool option 4	51846
Tool option 5	42(170) * UK Model

3.1. ADC Process

3.1.1. ADC

■ Enter Service Mode by pushing "ADJ" key,

■ Enter Internal ADC mode by pushing "►" key at "5. ADC Calibration"

* Caution : Using 'power on' button of the Adjustment R/C , power on Multi-vision.

* ADC Calibration Protocol (RS232)

NO	Enter Adjust MODE	ADC adjust
Item	Adjust 'Mode In'	ADC Adjust
CMD 1	A	A
CMD 2	A	D
Data 0	0	1
	0	0
	When transfer the 'Mode In', Carry the command.	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]
  - ▪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 (SCART/ CVBS)
3) COMPONENT (480i)
4) HDMI
5) 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.

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4. Total Assembly line process

4.1. POWER PCB Assy voltage adjustment

(Vs voltage adjustment)

4.1.1.Test equipment : D.M.M 1EA

4.1.2. Condition for adjustment

- No signal with the snow noise in RF mode

4.1.3. Connection Diagram for Measuring : refer to fig.7

4.1.4. Adjustment method

4.1.4.1 Vs adjustment

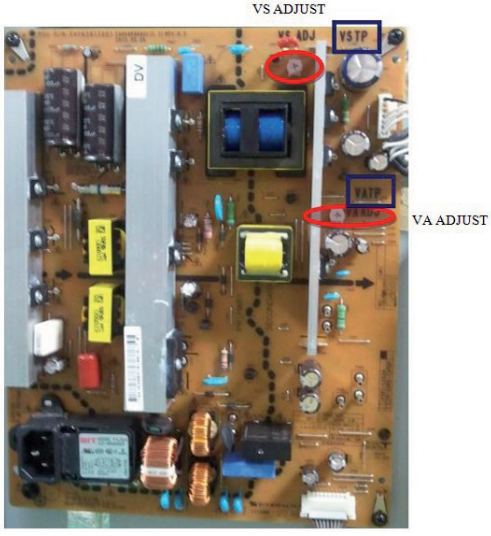
(1) Connect + terminal of D. M..M. to Vs TP, connect -terminal to GND.

(2) After turning VR901, voltage of D.M.M adjustment as same as Vs voltage which on label of panel right/top (deviation ; ±0.5V)

4.1.4.2 Va adjustment

(1) Connect + terminal of D. M..M. to Va TP, connect -terminal to GND.

(2) After turning VR502, voltage of D.M.M adjustment as same as Va voltage which on label of panel right/top (deviation ; ±0.5V)



4.2. Adjustment Preparation

● Required Equipment

- Remote controller for adjustment
- Color Analyzer (CS-1000, CA-100,100+,CA-210 or same product : CH 11 (PDP)

* Please adjust CA-210, CA-100+ by CS-1000 before measuring

- Auto W/B adjustment instrument(only for Auto adjustment)
- 9 Pin D-Sub Jack(RS232C) is connected to the AUTO W/B EQUIPMENT.

Before Adjust of White Balance, Please press POWER ONLY key

- Adjust Process will start by execute RS232C Command.

● Color temperature standards according to CSM and Module

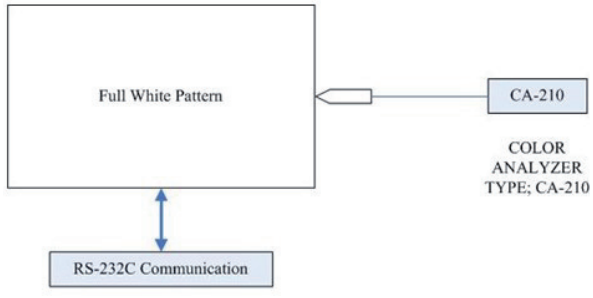
CSM	PLASMA
Cool	11000K
Medium	9300K
Warm	6500K

● CS-1000/CA-100+/CA-210(CH 10) White balance adjustment coordinates and color temperature.

CSM	Color Coordination		Temp	± Color Coordination
	x	y		
COOL	0.276	0.283	11000K	0.002
MEDIUM	0.285	0.293	9300K	0.002
WARM	0.313	0.329	6500K	0.002

* 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.



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* Auto-control interface and directions
  1) Adjust in the place where the influx of light like floodlight around is blocked. (Illumination is less than 100Lux).
  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 Prove 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 "6. White Balance".
  ■ Stick the sensor to the center of the screen and select each items(Red/Green/Blue Gain) using ▲/▼(CH +/-) key on R/C.
  ■ Adjust R/G/B Gain using◄/►(VOL +/-) key on R/C.
  ■ Adjust three modes all(Cool/Medium/Warm) : Fix the one of R/G/B Gain and Change the others.
  ■ When the adjustment is completed, Enter "COPY ALL".
  ■ Exit adjustment mode using EXIT key on R/C.

* 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"
* To check the coordinates of White Balance, you have to measure at the below conditions.
- Picture mode : Vivid, Energy Saving : Off, Below the Advanced control, Dynamic Contrast : Off, Dynamic Colour : Off
Colour Temp.

Cool	30
Medium	0
Warm	30

-> Picture Mode change : Vivid -> Vivid(User)

4.3. DDC EDID Write (HDMI 256Byte) -> Not used any more, Use Auto D/L

■ 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

4.5. EDID DATA Auto Download

(1) Press Adj. key on the Adj. R/C,
(2) Select EDID D/L menu.
(3) By pressing Enter key, EDID download will begin
(4) If Download is successful, OK is display, but If Download is failure, NG is displayed.
(5) If Download is failure, Re-try downloads.

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4.6 LNB voltage and 22KHz tone check

(1) Test method

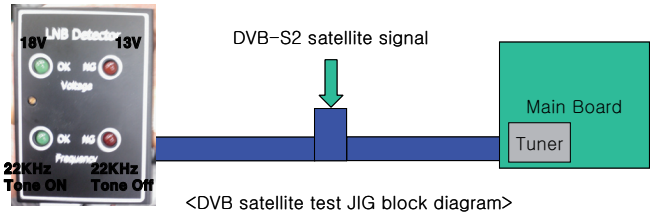
1) Press "Power on" button of a service R/C.(Baud rate : 115200 bps)
2) Connect cable between satellite ANT and test JIG.
3) Connect RS232-C Signal Cable.
4) Write LNB ON control command through RS-232-C.
5) check LED light 'ON' at 18V menu.
6) check LED light 'ON' at 22KHz tone menu.
7) Write LNB OFF control command through RS-232-C.
8) check LED light 'OFF' at 18V menu.
9) check LED light 'OFF' at 22KHz tone menu.

(2) RS-232 command for test LNB

	Command	Set ACK
LNB On	[A][I][ ][Set ID][ ][30][Cr]	[O][K][x] or NG : [N][G][x]
LNB Off	[A][I][ ][Set ID][ ][40][Cr]	[O][K][x] or NG : [N][G][x]

(3) Test result

- After send LNB On command, '18V LED' and '22KHz tone LED' should be ON.
- After send LNB Off command, '18V LED' and '22KHz tone LED' should be OFF.



<DVB satellite test JIG block diagram>

<Remark>
After the measurement conditions witnessed in the last state.

* Caution : Never connect HDMI & D-sub Cable when EDID downloaded.

■ Edid data and Model option download (RS232 Zender)

NO	Enter download MODE	EDID data and Model option download
Item	download 'Mode In'	download
CMD 1	A	A
CMD 2	A	E
Data 0	0	00
	0	10
	When transfer the 'Mode In', Carry the command.	Automatically download (The use of a internal Data)

- Manual Download

* Caution

● Use the proper signal cable for EDID Download
- 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.

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

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

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* 2D HD EDID data

- 2D HD HDMI1 EDID data

	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	17	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	01	01	01	01
30	01	01	01	01	01	01	64	19	00	40	41	00	26	30	18	88
40	36	00	B0	84	43	00	00	18	A0	0F	20	00	31	58	1C	20
50	28	80	14	00	B0	84	43	00	00	1E	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	3E

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	21	F1	4D	10	1F	04	93	05	14	03	02	12	20	22
10	15	01	26	15	07	50	09	57	07	67	03	0C	00	10	00	80
20	2D	01	1D	00	72	51	D0	1E	20	6E	28	55	00	40	84	63
30	00	00	1E	02	3A	80	18	71	38	2D	40	58	2C	45	00	40
40	84	63	00	00	1E	01	1D	80	18	71	1C	16	20	58	2C	25
50	00	40	84	63	00	00	9E	00	00	00	00	00	00	00	00	00
60	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	24

- 2D HD HDMI2 EDID data

	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	17	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	01	01	01	01
30	01	01	01	01	01	01	64	19	00	40	41	00	26	30	18	88
40	36	00	B0	84	43	00	00	18	A0	0F	20	00	31	58	1C	20
50	28	80	14	00	B0	84	43	00	00	1E	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	3E

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	21	F1	4D	10	1F	04	93	05	14	03	02	12	20	22
10	15	01	26	15	07	50	09	57	07	67	03	0C	00	20	00	80
20	2D	01	1D	00	72	51	D0	1E	20	6E	28	55	00	40	84	63
30	00	00	1E	02	3A	80	18	71	38	2D	40	58	2C	45	00	40
40	84	63	00	00	1E	01	1D	80	18	71	1C	16	20	58	2C	25
50	00	40	84	63	00	00	9E	00	00	00	00	00	00	00	00	00
60	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	14

* Vender ID

Input	HEX
HDMI1	10
HDMI2	20
HDMI3	30

* Checksum: Changeable by total EDID data.

EDID C/S data		2D-HD
		HDMI
check sum (Hex)	Block 0	0x3E
	Block 1	0x24(HDMI1)
		0x14(HDMI2)

4.7. GND & Hi-pot test

■ 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.

■ Checkpoint

(1) Test voltage

1) 3 Poles
   - GND: 1.5KV/min at 100mA
   - SIGNAL: 3KV/min at 100mA

2) 2 Poles
   - SIGNAL: 3KV/min at 100mA

(2) TEST time: 1 second

(3) TEST POINT

1) 3 Poles
   - GND Test = POWER CORD GND and SIGNAL CABLE GND.
   - Hi-pot Test = POWER CORD GND and LIVE & NEUTRAL.

2) 2 Poles
   - Hi-pot Test = Accessible Metal and LIVE & NEUTRAL.

(4) LEAKAGE CURRENT: At 0.5mArms

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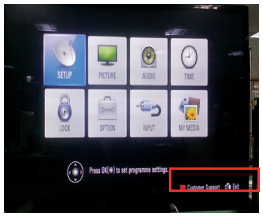
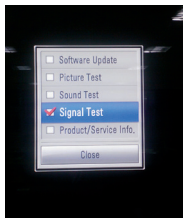
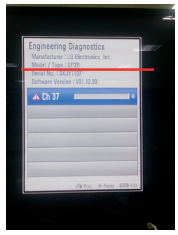
5. Model name & Serial number Download

5.1. Model name & Serial number D/L

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



5.2. Signal TABLE

CMD	LENGTH	ADH	ADL	DATA_1	...	Data_n	CS	DELAY

CMD: A0h
LENGTH : 85~94h (1~16 bytes)
ADH : EEPROM Sub Address high (00~1F)
ADL : EEPROM Sub Address low (00~FF)
Data : Write data
CS : CMD + LENGTH + ADH + ADL + Data_1 + … + Data_n
Delay : 20ms

5.3. Command Set

* Description

No.	1
Adjust mode	EEPROM WRITE
CMD(hex)	A0h
LENGTH(hex)	84h+n
Description	n-bytes Write (n = 1~16)

FOS Default write : <7mode data> write
Vtotal, V_Frequency, Sync_Polarity, Htotal, Hstart, Vstart, 0, Phase
Data write : Model Name and Serial Number write in EEPROM,.

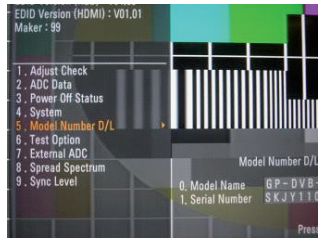
5.4. Method & Notice

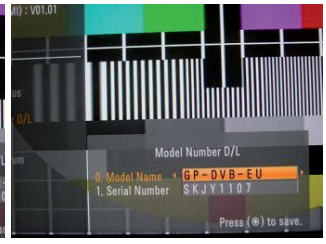
(1) Serial number D/L is using of scan equipment.
(2) Setting of scan equipment operated by Manufacturing Technology Group.
(3) Serial number D/L must be conformed when it is produced in production line, because serial number D/L is mandatory by D-book 4.0

* 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)

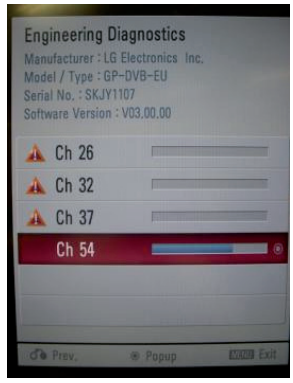
There is impossible to download by bar code scan, so It need Manual download.

1) Press the ‘instart’ key of ADJ remote controller.
2) Go to the menu ‘5.Model Number D/L’ like below photo.
3) Input the Factory model name or Serial number like photo.



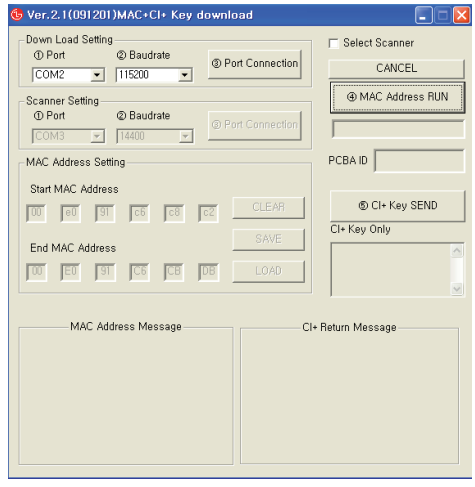


4) Check the model name Instart menu -> Factory name displayed.
5) Check the Diagnostics (DTV country only) -> Buyer model displayed



6. Download CI+ Key (EU model only)

* Connect TV SET and PC which download keys Writing program by RS232C-Cable
(1) Start “CIKeyI.exe”Program and Click (3) Button to connect TV and PC.
(2) Click (5) to download CI+ Key.
(3) When download succeed, you can see “OK” on (6)



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■ Check the method of RS232C Command
(1) into the main ass'y mode (RS232 : aa 00 00)

CMD1	CMD2	Data 0	
A	A	0	0

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

CMD1	CMD2	Data 0	
C	1	1	0

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

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

CMD1	CMD2	Data 0	
A	A	0	0

(2) check the mothed of CI+ key by command (RS232 : ci 00 20)

CMD1	CMD2	Data 0	
C	1	1	0

(3) result value
i 01 OK 1d1852d21c1ed5dcx
└──> CI+ Key Value

7. Download MAC Address, CI+ Key and widevine Key.

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

-> MAC Address need only DVB-T2 Model (ex.50PA650T-ZA).

* Connect TV SET and PC which download keys Writing program by RS232C-Cable
1) Start "MAC+CIKeyl.exe"Program and Click (3) Button to connect TV and PC.
2) Click (4) to download MAC Address.
3) Click (5) to download CI+ Key.
4) When download succeed, you can see "OK" on (6)

* Each Chassis has it's own MAC Address. Please be careful of download.

■ Check the method of RS232C Command
(1) into the main ass'y mode (RS232 : aa 00 00)

CMD1	CMD2	Data 0	
A	A	0	0

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

CMD1	CMD2	Data 0	
C	1	1	0

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

8. SW Download Guide.

* Put a *.bin to USB Stick and Turn on TV

(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 staring.
(5) Updating Completed, The TV will restart automatically.
After turn on TV, Please press 'IN-STOP' button on ADJ Remote-control.
* IF you don't have ADJ R/C, enter 'Factory Reset' in OPTION MENU.
(6) When TV turn on, check the Updated version on Diagnostics MENU.

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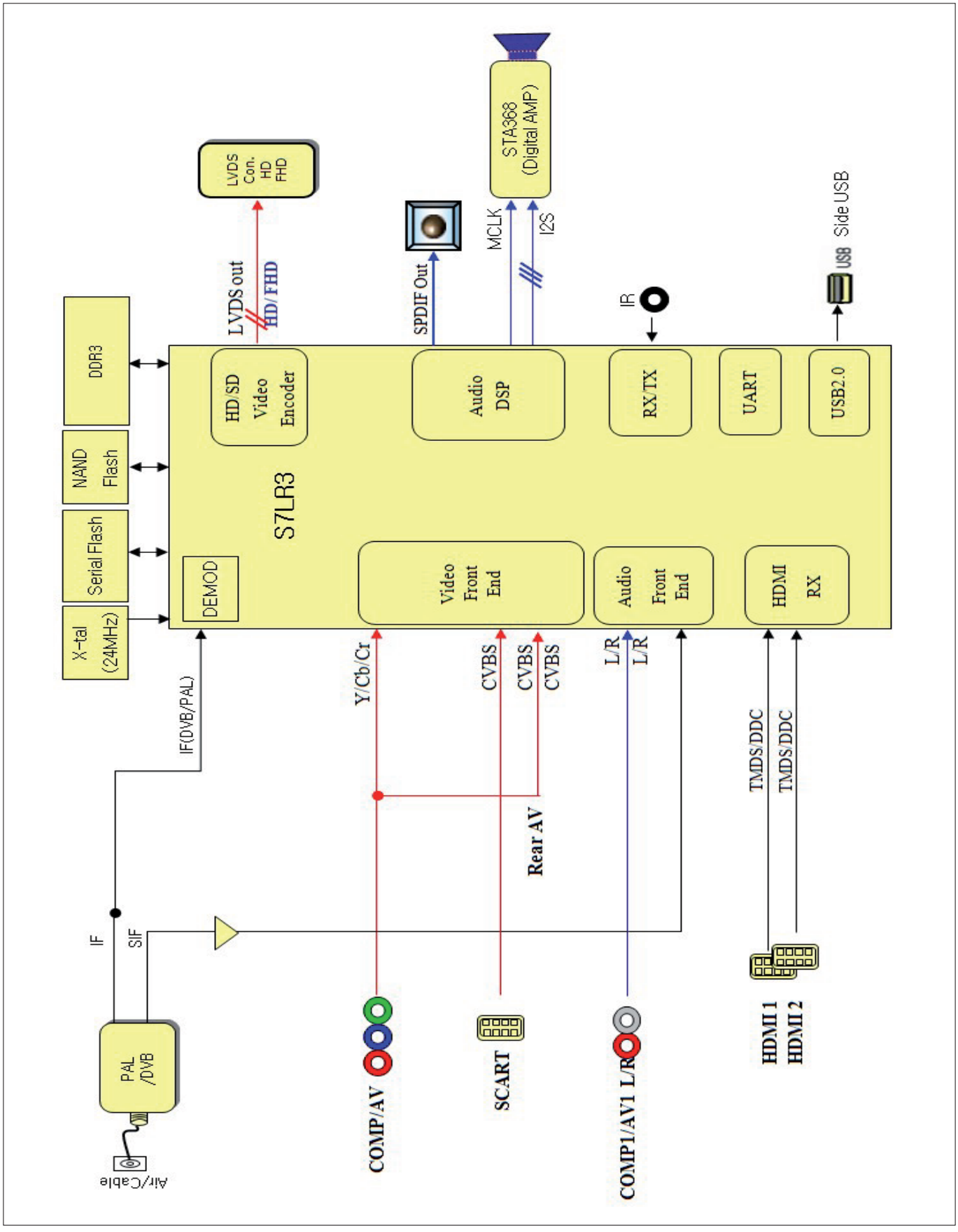
BLOCK DIAGRAM



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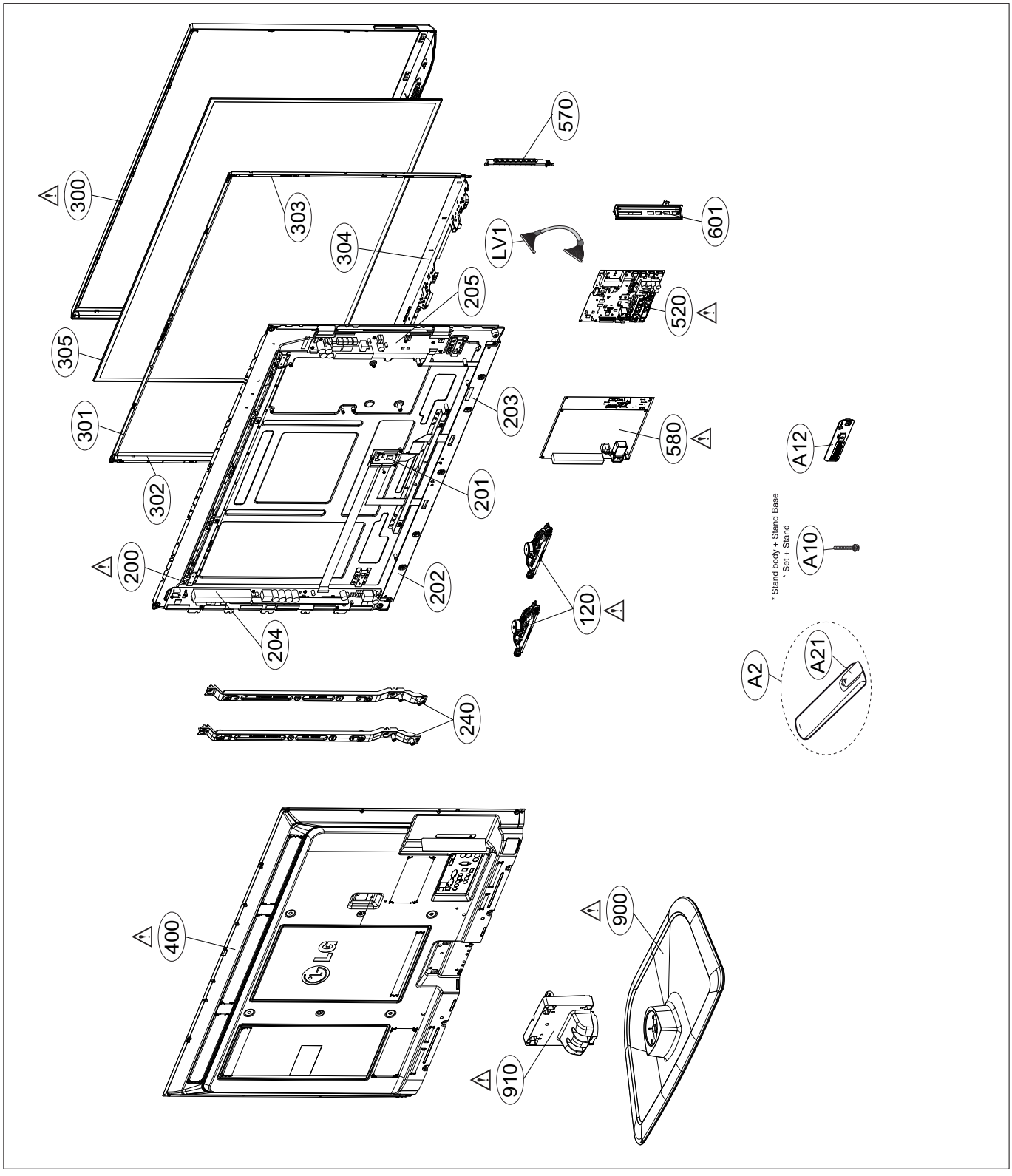
EXPLODED VIEW

IMPORTANT SAFETY NOTICE

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



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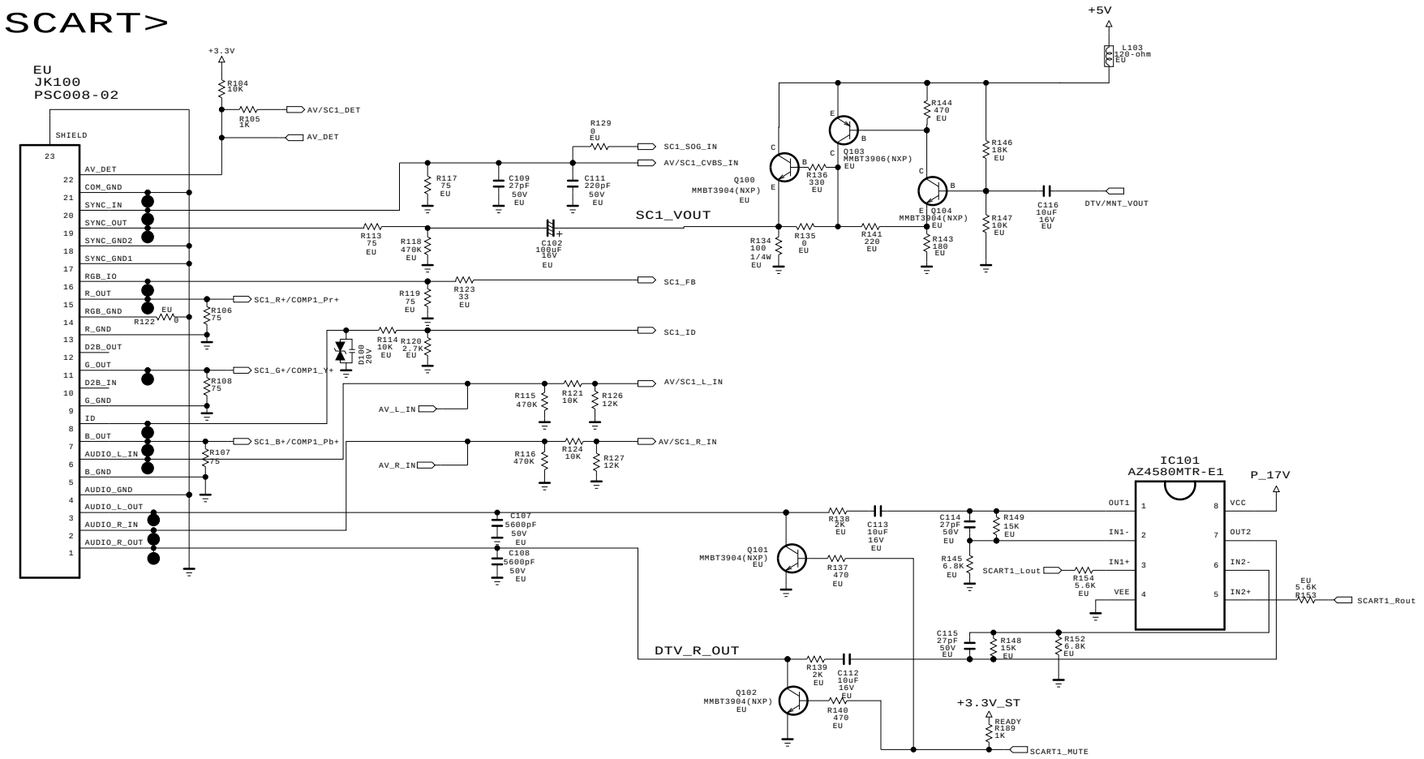
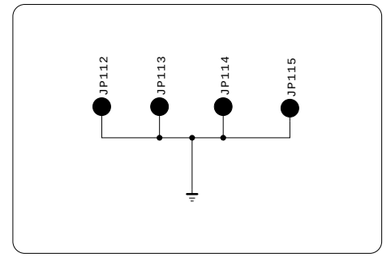
PDP L13
EAX65071305

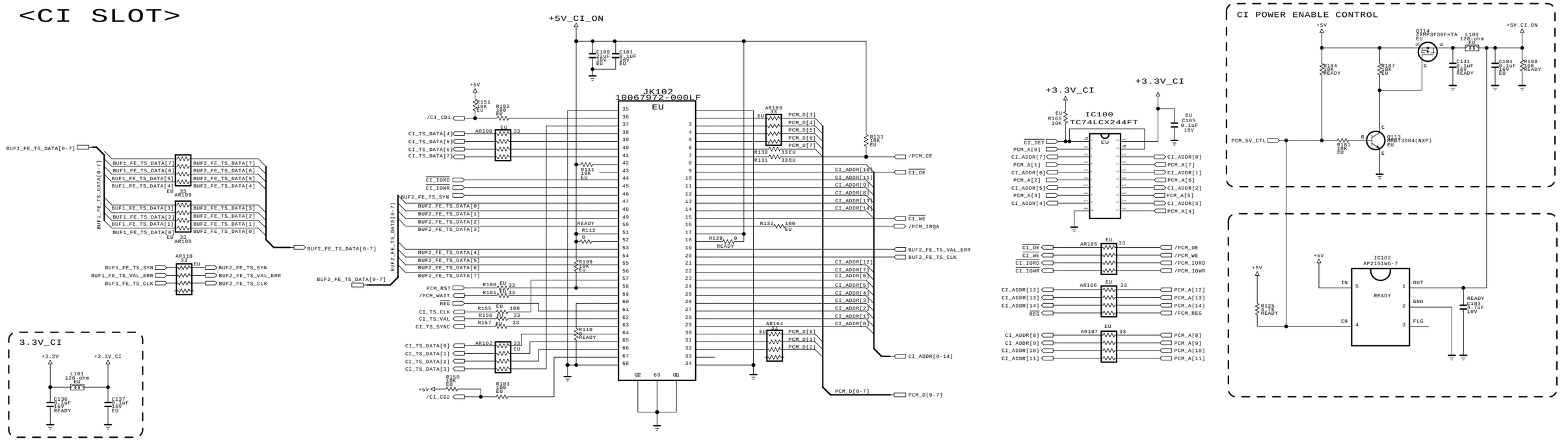
<Full SCART>





JIG_GND

<CI SLOT>



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MODEL	L13	DATE	2012-09-20
BLOCK	SCART,CI Slot	SHEET	1 / 7

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<HDMI>

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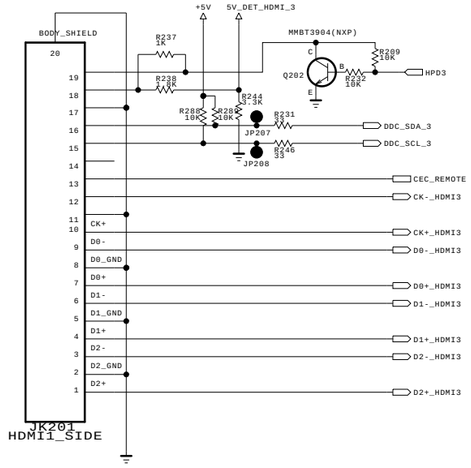

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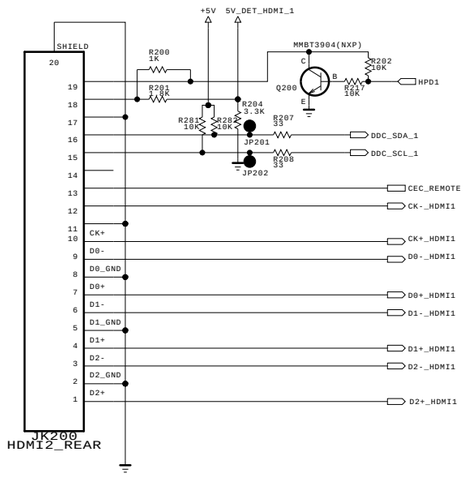

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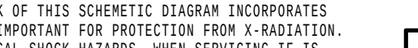
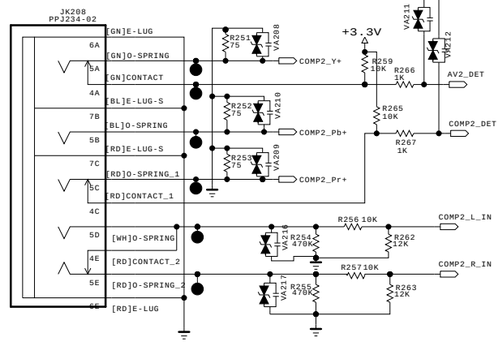


<IN/OUT>

<COMPONENT>



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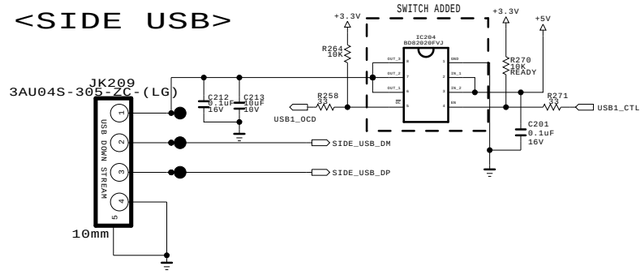
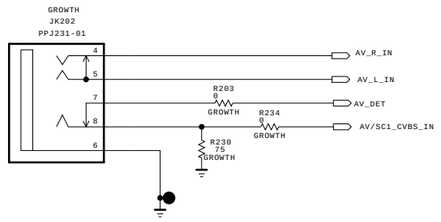


<AV (Growth & SCA)>



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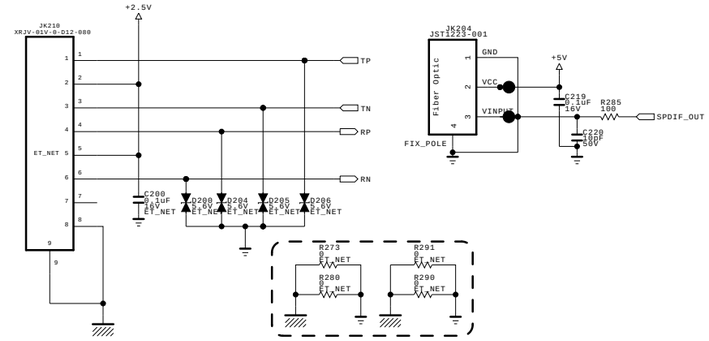

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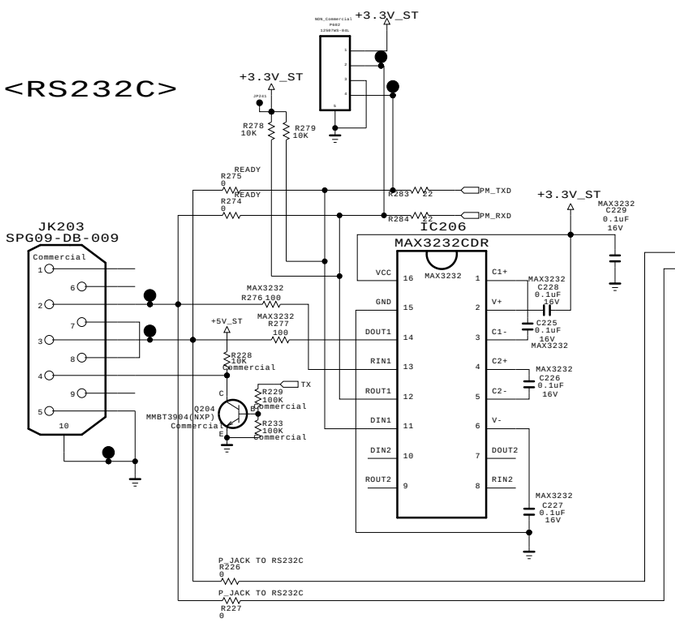
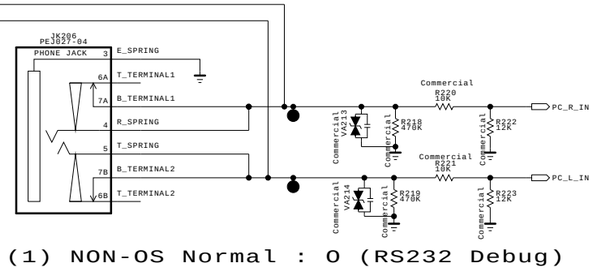
<RS232C>

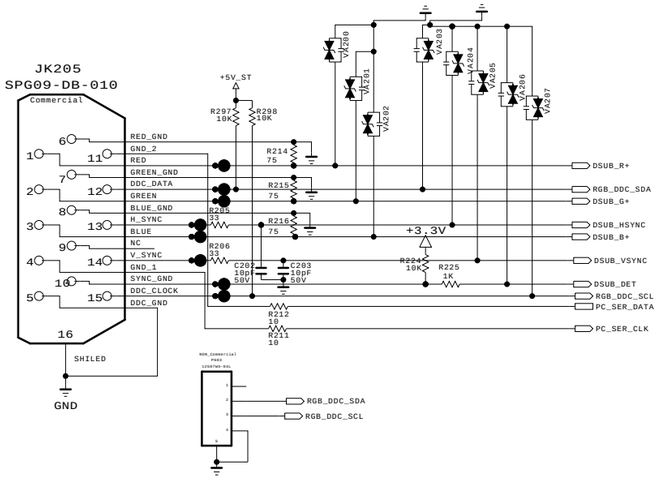


<PHONE JACK>



(1) NON-OS Normal : O (RS232 Debug)
(2) NON-OS Commercial : O (PC Audio)
(3) OS Normal : X
(4) OS Commercial : O (PC Audio)

<RGB PC>



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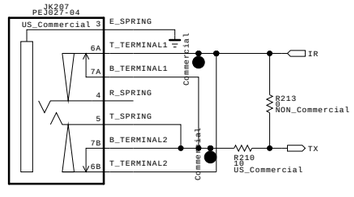

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MODEL	L13	DATE	2012-06-01
BLOCK	JACK INTERFACE	SHEET	2 / 7

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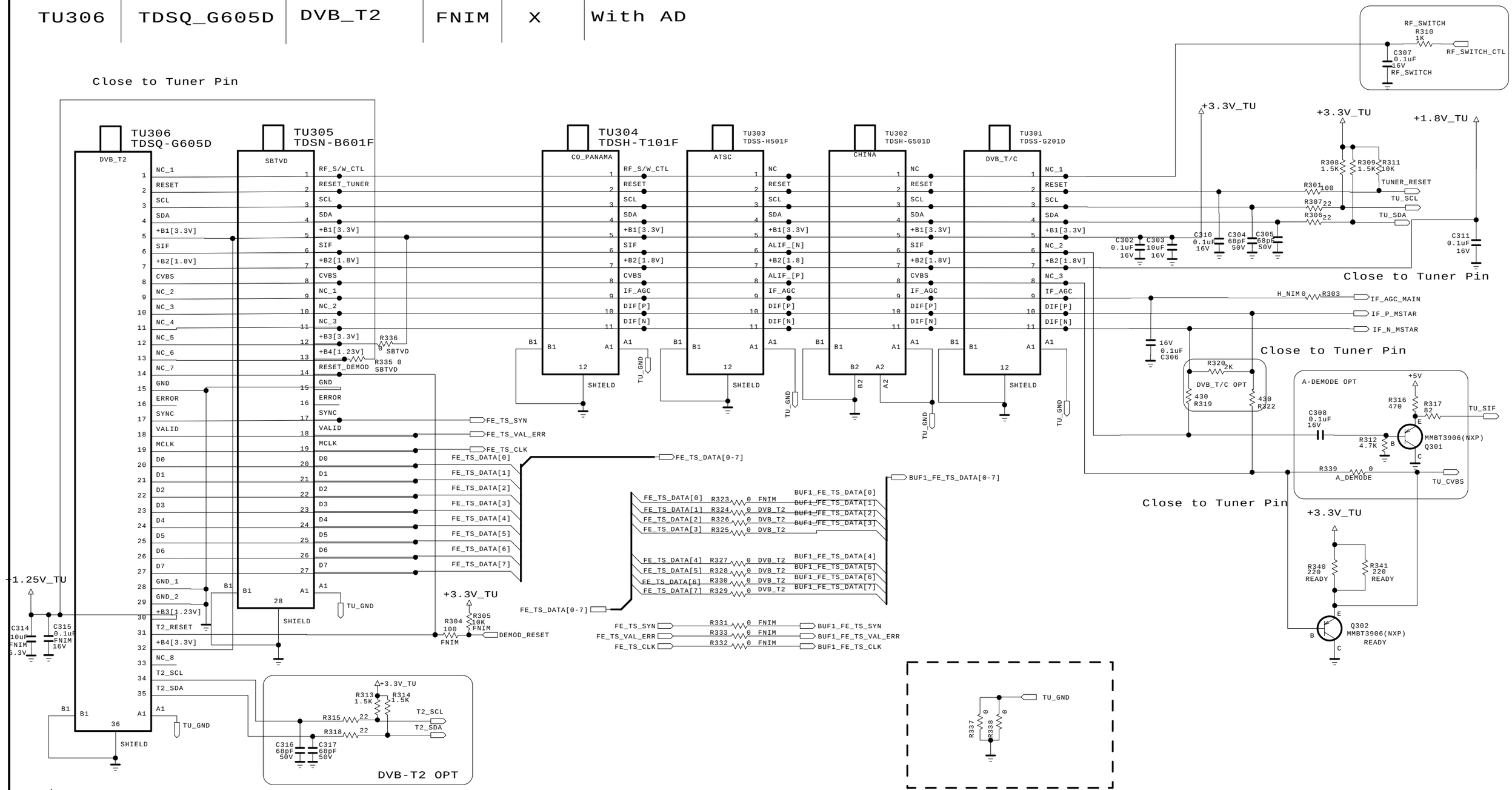
	TUNER	OPT1	OPT2	OPT3	OPT4
TU301	TDSS-G501D	DVB-T/C	HNIM	X	W/O AD
TU302	TDSH-G501D	China	HNIM	X	W/O AD
TU303	TDSS-H501F	ATSC	HNIM	X	W/O AD
TU304	TDSN-T501F	DVB-T_SCA	HNIM	RF_SW	W/O AD
TU305	TDSN_B601F	SBTVD	FNIM	RF_SW	With AD
TU306	TDSQ_G605D	DVB_T2	FNIM	X	With AD



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MODEL	L13	DATE	2012-06-01
BLOCK	Tuner block	SHEET	3 / 7

TUNER

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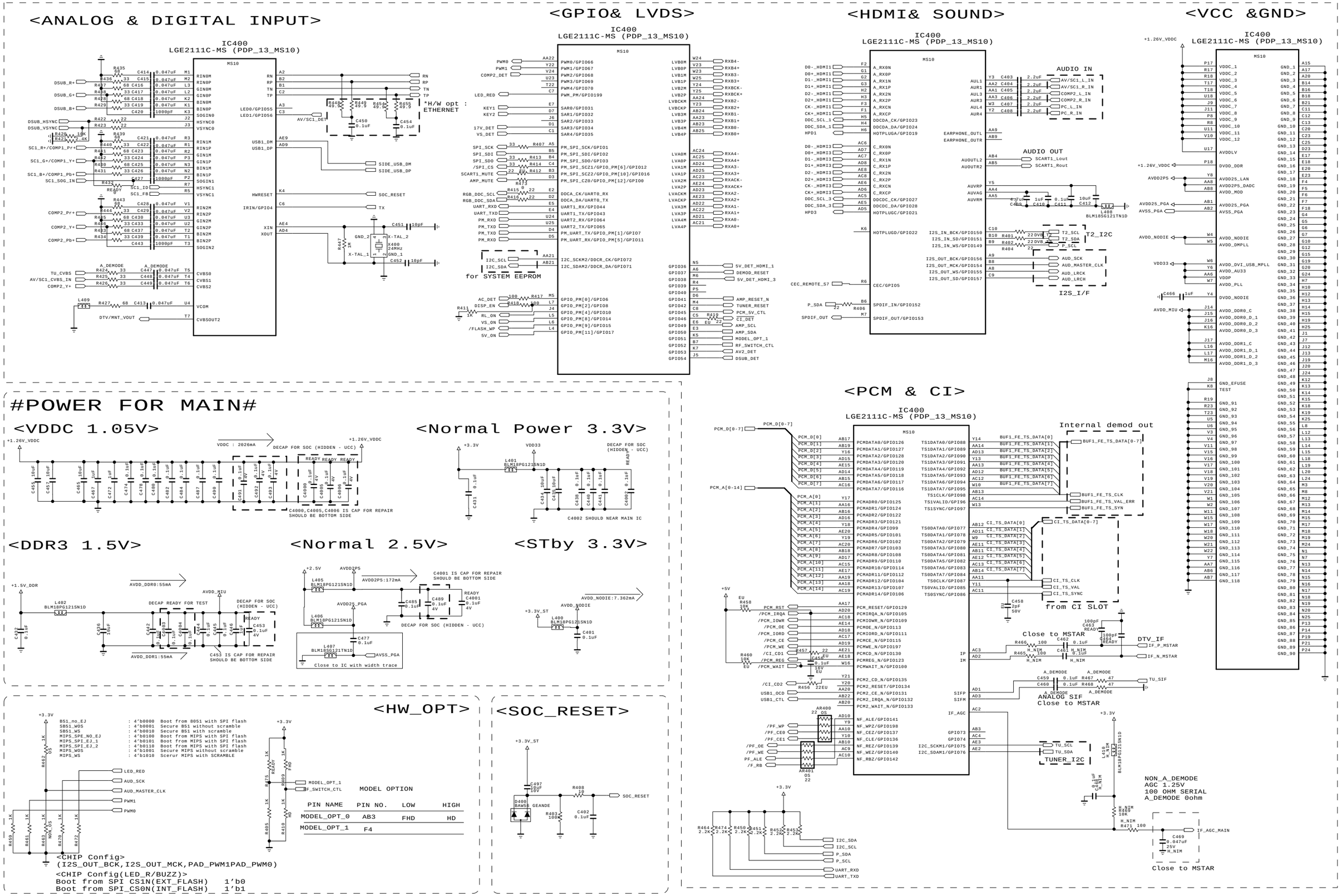

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MODEL	L13	DATE	2012-06-201
BLOCK	MAIN	SHEET	4 / 7

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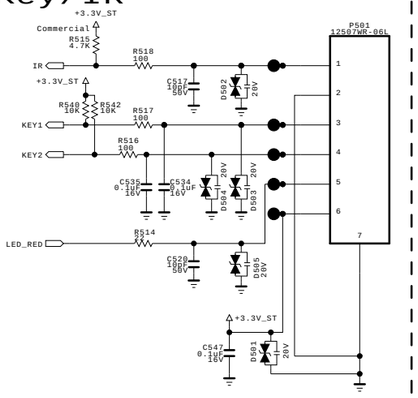
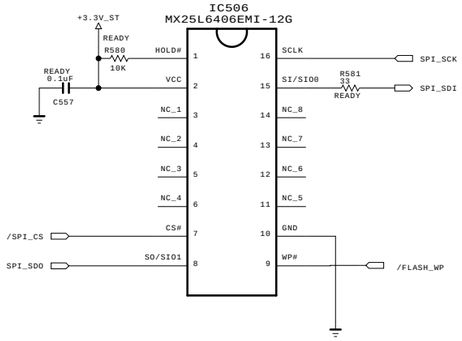
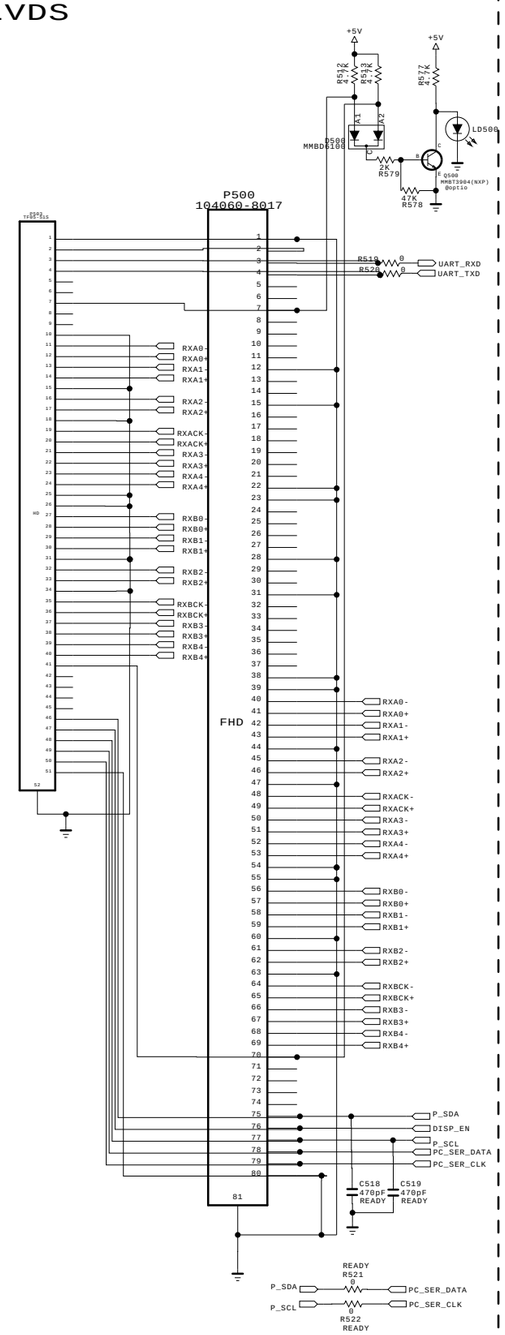
Key/IR



NON OS

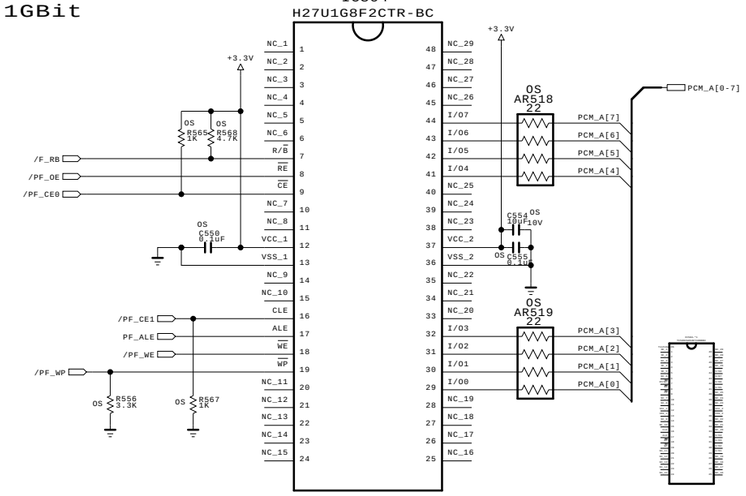


LVDS

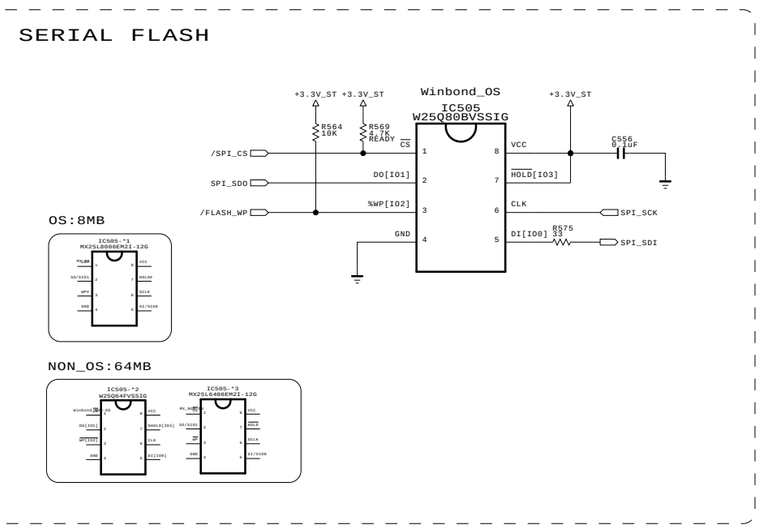


* LCI: LVDS Connection Indicator

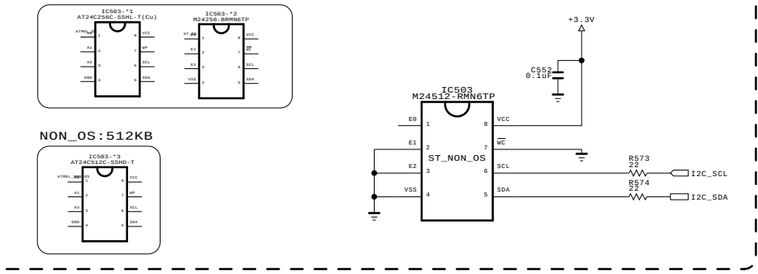
NAND Flash 1GBit



SERIAL FLASH



NVRAM



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SECRET
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MODEL	L13	DATE	2012-06-01
BLOCK	Memory.LVDS,IR	SHEET	5 / 7

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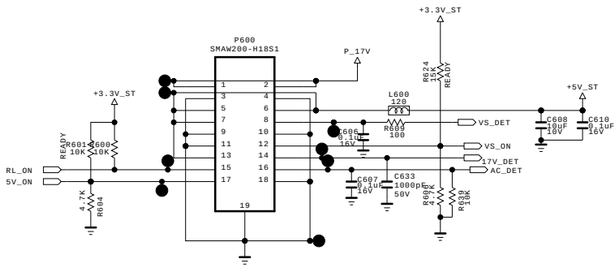
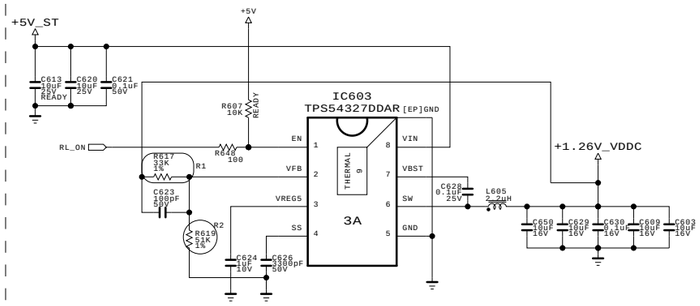
POWER & AMP

<ST-BY>

<Power Wafer>

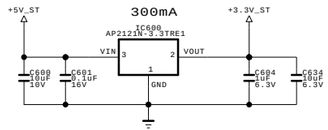


1.26V Core

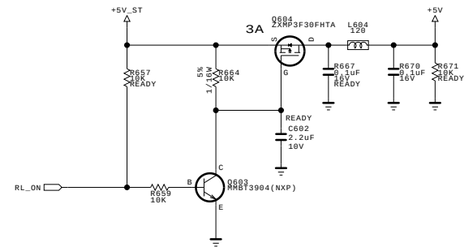


Vout=0.765*(1+R1/R2)

+5V_ST --> 3.3Vst



5V_STBY --> MULTI 5V



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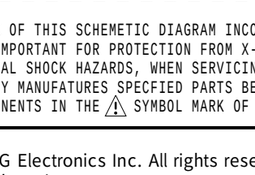
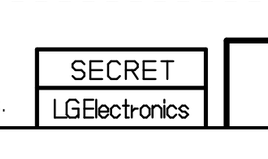
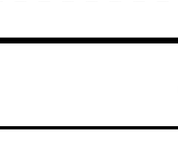
+5V->+3.3V_DDR



--> +1.5V_DDR

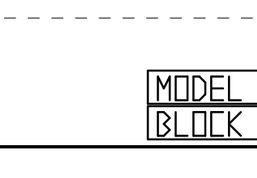


+5V->+2.5V



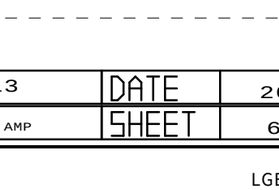
+5V->+3.3V ->+3.3V_TU

+5V->+1.8V_TU



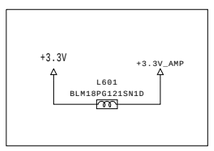
Vout=1.25*(1+R2/R1)

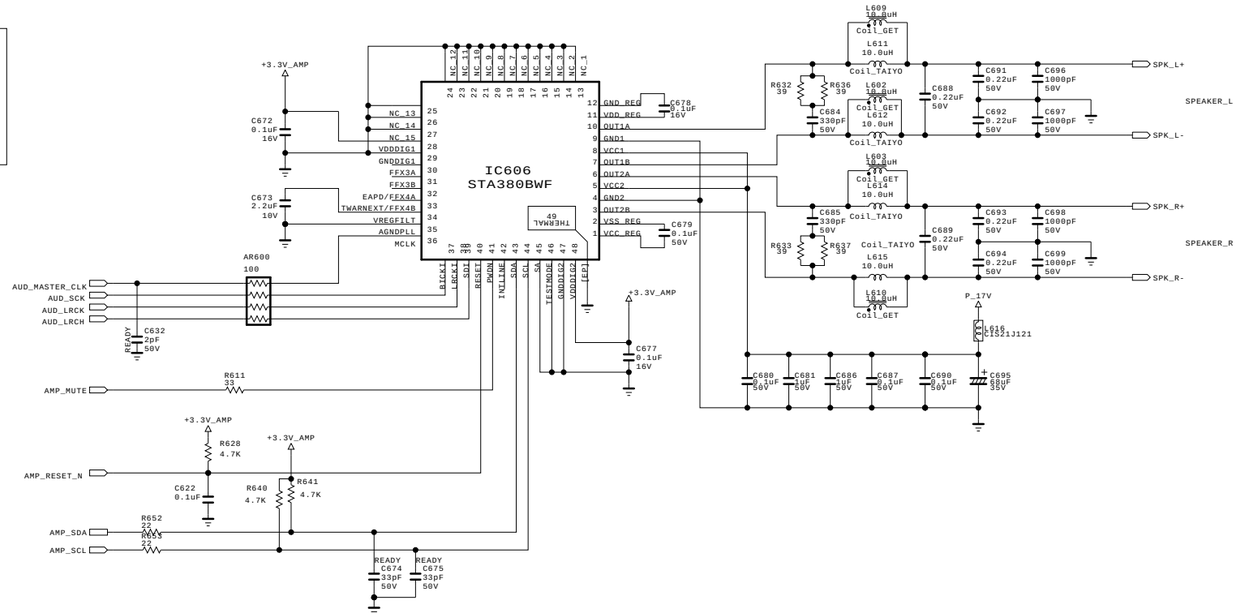
+5V->+1.25V_TU

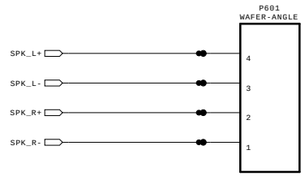


Vout=1.25*(1+R2/R1)

<AUDIO AMP>







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LG ELECTRONICS

MODEL	L13	DATE	2012-06-01
BLOCK	Power, AMP	SHEET	6 / 7

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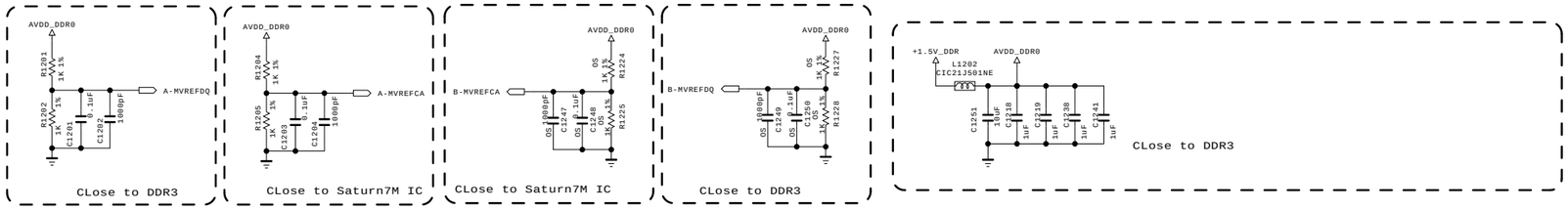

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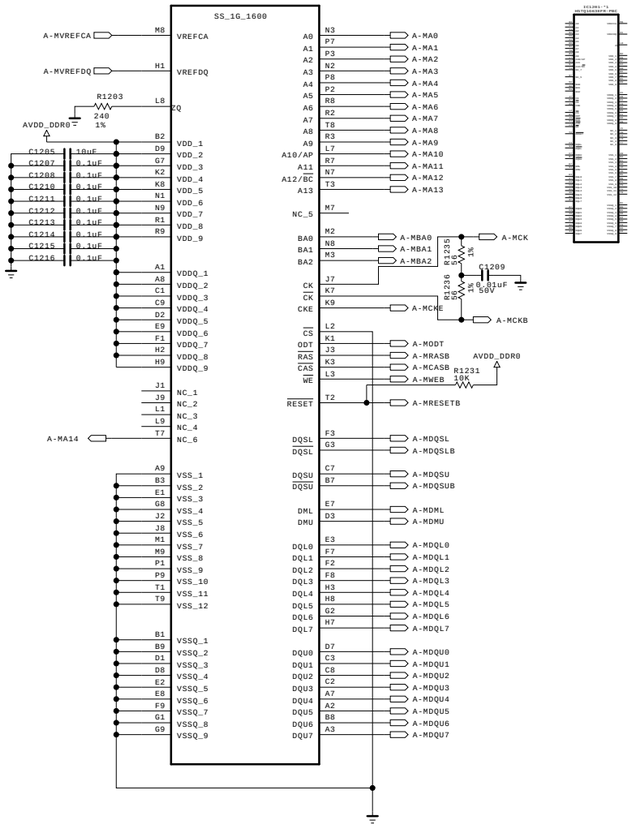
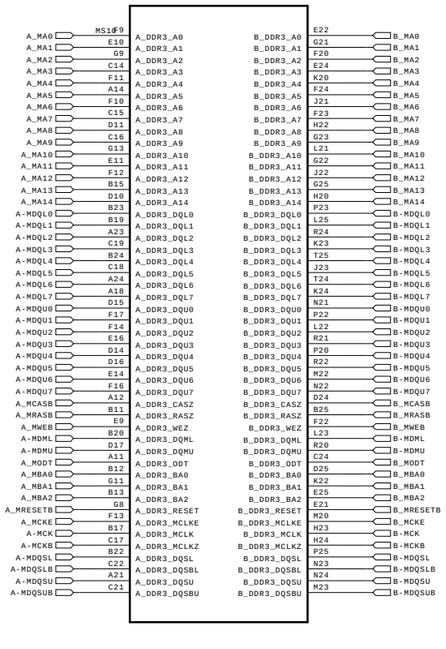
IC1201
K4B1G1646G-BCK0

SS_1G_1600



IC400
LGE2111C-MS (PDP_13_MS10)



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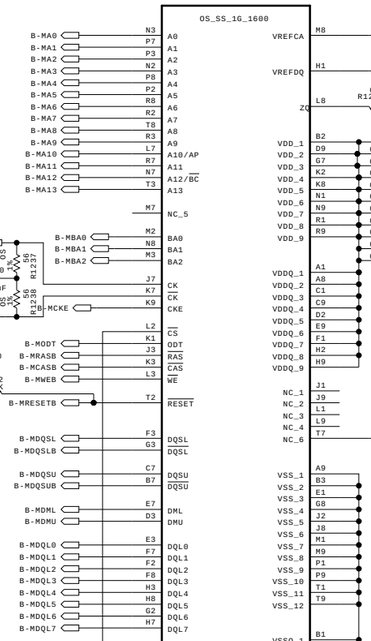
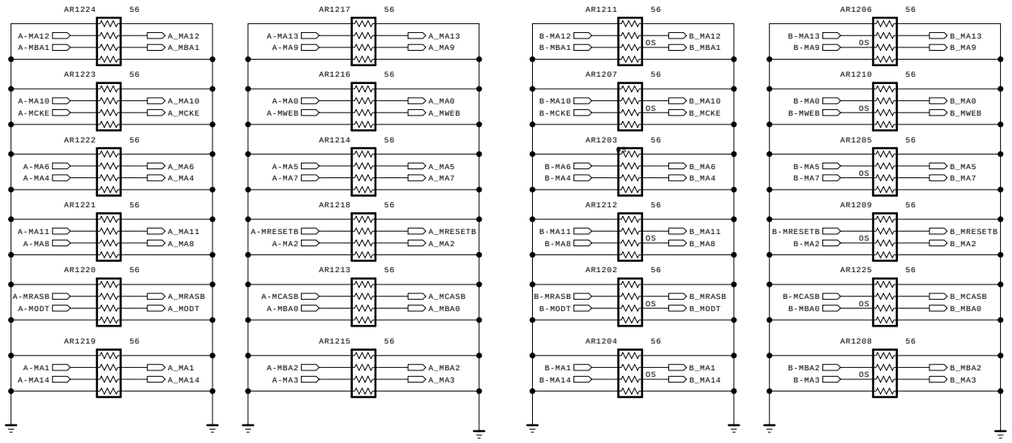
OS_SS_1G_1600





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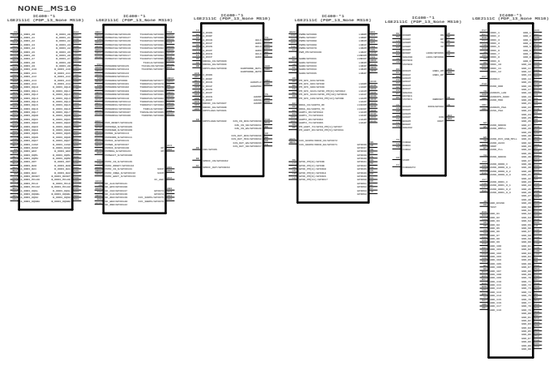

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LG ELECTRONICS

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

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L13 Training Manual

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2. L13 Power On/Off sequence
3. L13 Power Block
4. L13 I2C MAP
5. L13 Front End

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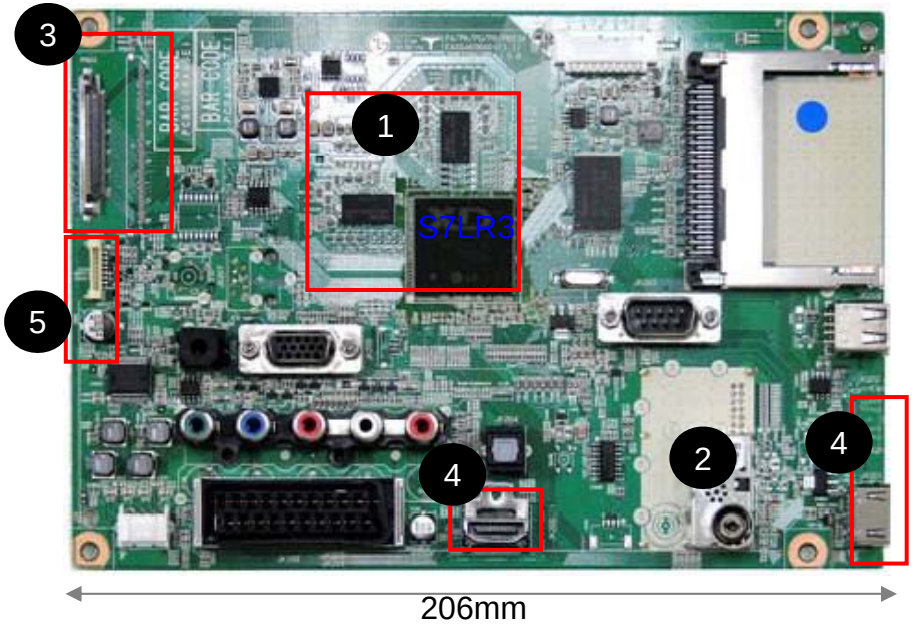
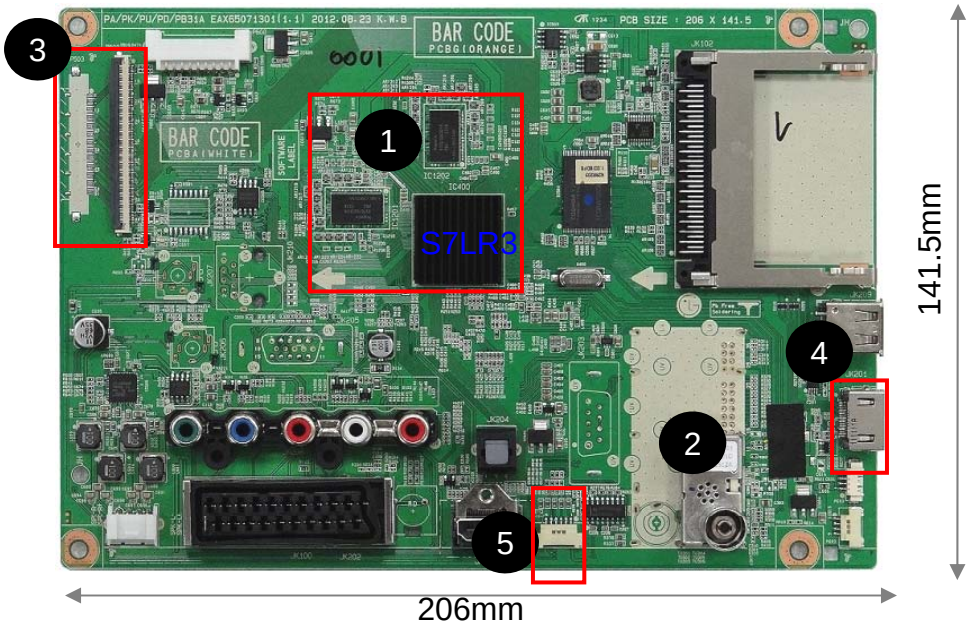
1. L13 Concept(’12 Vs. ’13)

42PA4500/50PA4500
50PA6500/60PA6500



1 Main processor, DDR, NAND
2 Tuner
3 LVDS Wafer
4 HDMI Block
5 Tact Key+LED+EYE+IR

42PN4500/50PN4500
50PN6500/60PN6500



Jack ERRC
1) RGB ,RS-232C and PC-Audio is removed
2) Comp./Comp. Hybrid → Comp. Hybrid (EU: 1ea)
3) HDMI 1 Jack is removed
4) Non-EU use Video(AV Jack) intead of SCART Jack

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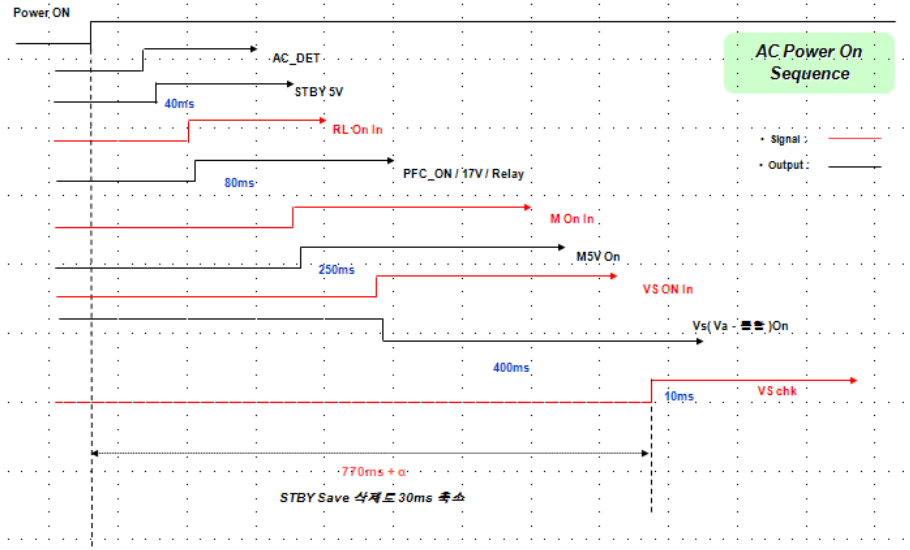
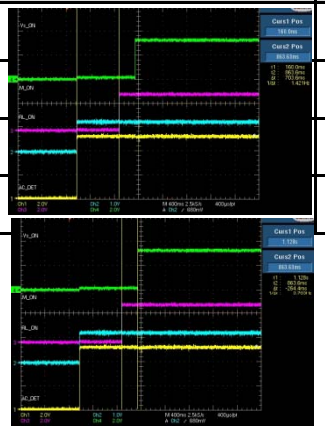
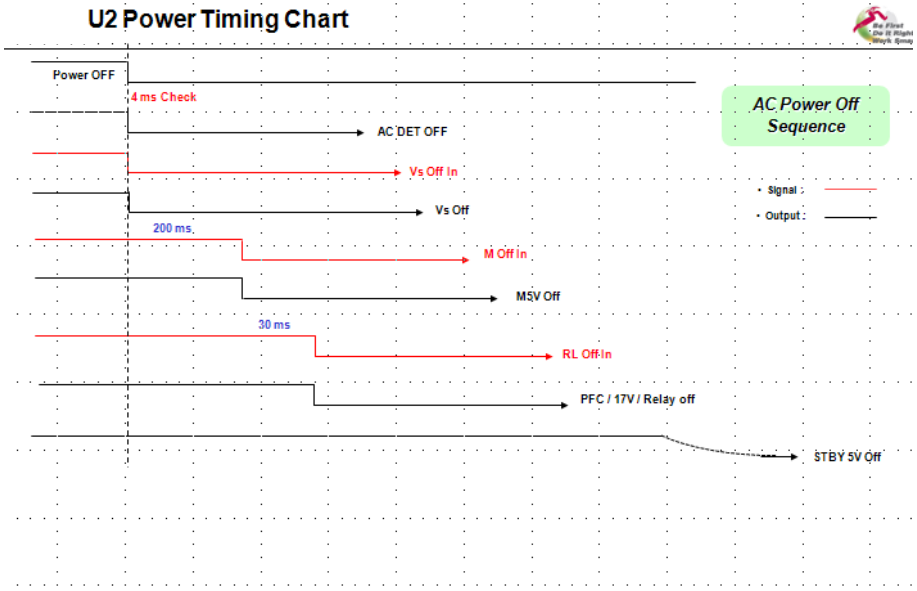
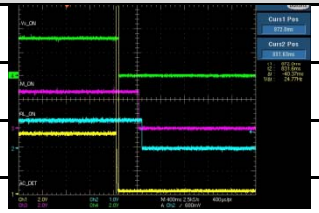
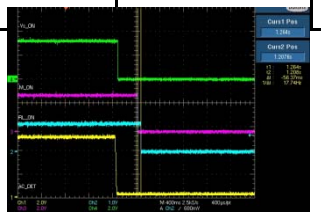
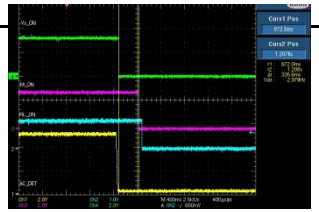
2. Power On/Off sequence (AC)



Signal	Spec.(min)	Measure	Graph	Remark
RL_On	40ms	0		
M_On	80ms	700ms		
VS_On	250ms	260ms		
VS_DET		-		



Signal	Spec.(min)	Measure	Graph	Remark
VS_On	0	40ms		
RL_On	200ms	335ms		
M_On	30ms	56ms		
			 	

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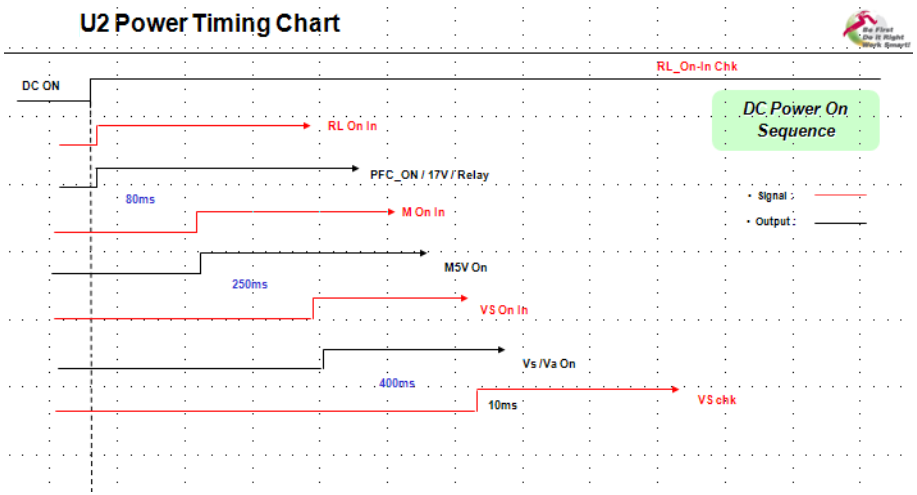
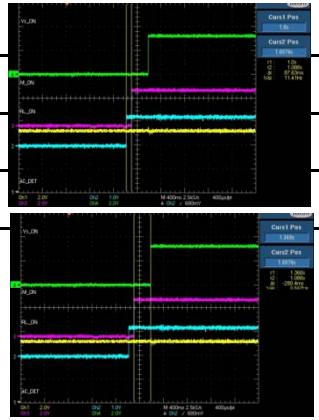
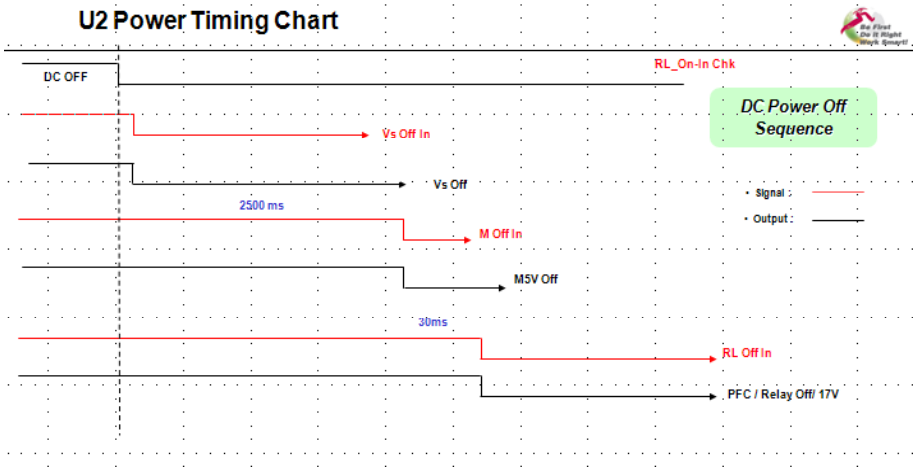
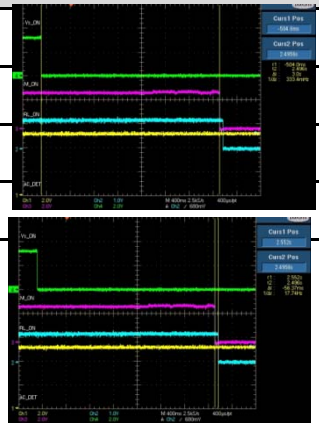
2. Power On/Off sequence (DC)



Signal	Spec.(min)	Measure	Graph	Remark
RL_On				
M_On	80ms	87ms		
VS_On	250ms	280ms		
VS_DET				



Signal	Spec.(min)	Measure	Graph	Remark
M_On	2500ms	3000ms		
RL_On	30ms	56ms		

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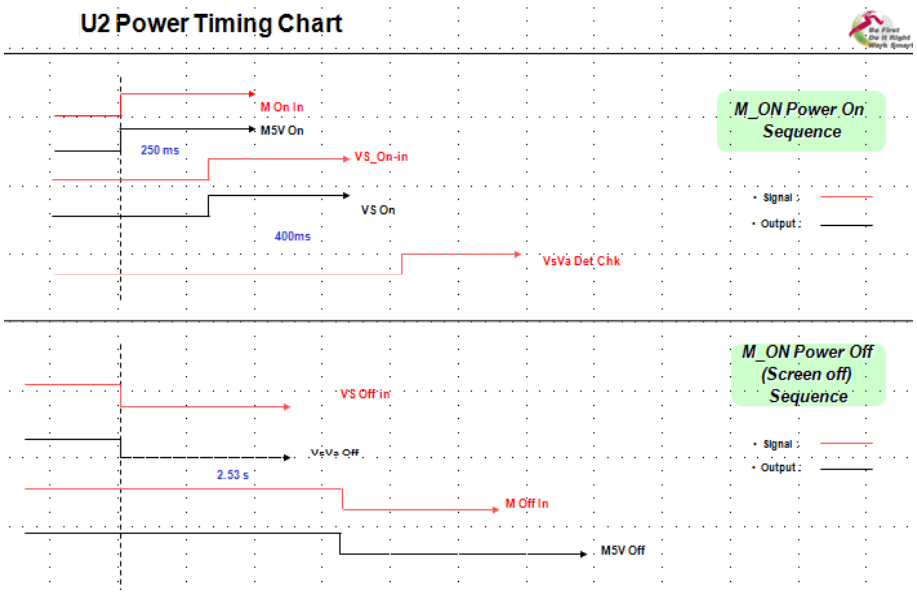
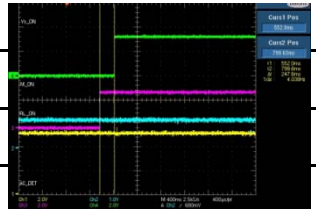
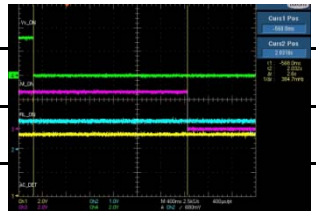
2. Screen On/Off sequence



Signal	Spec.(min)	Measure	Graph	Remark
VS_On	250ms	247ms		
VS_DET	400ms	-		

Signal	Spec.(min)	Measure	Graph	Remark
M_On	2530ms	2600ms		

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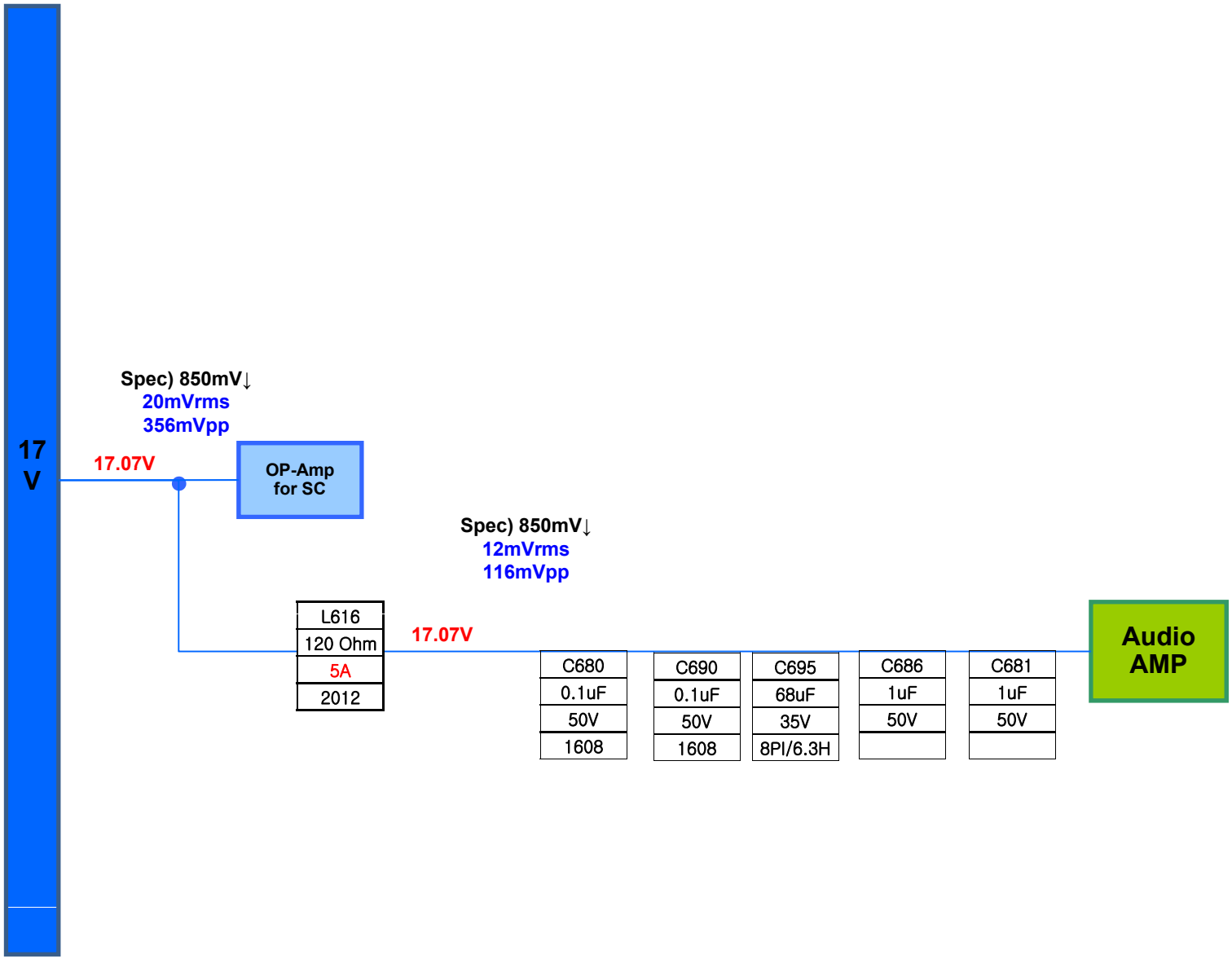
3. Power Block.



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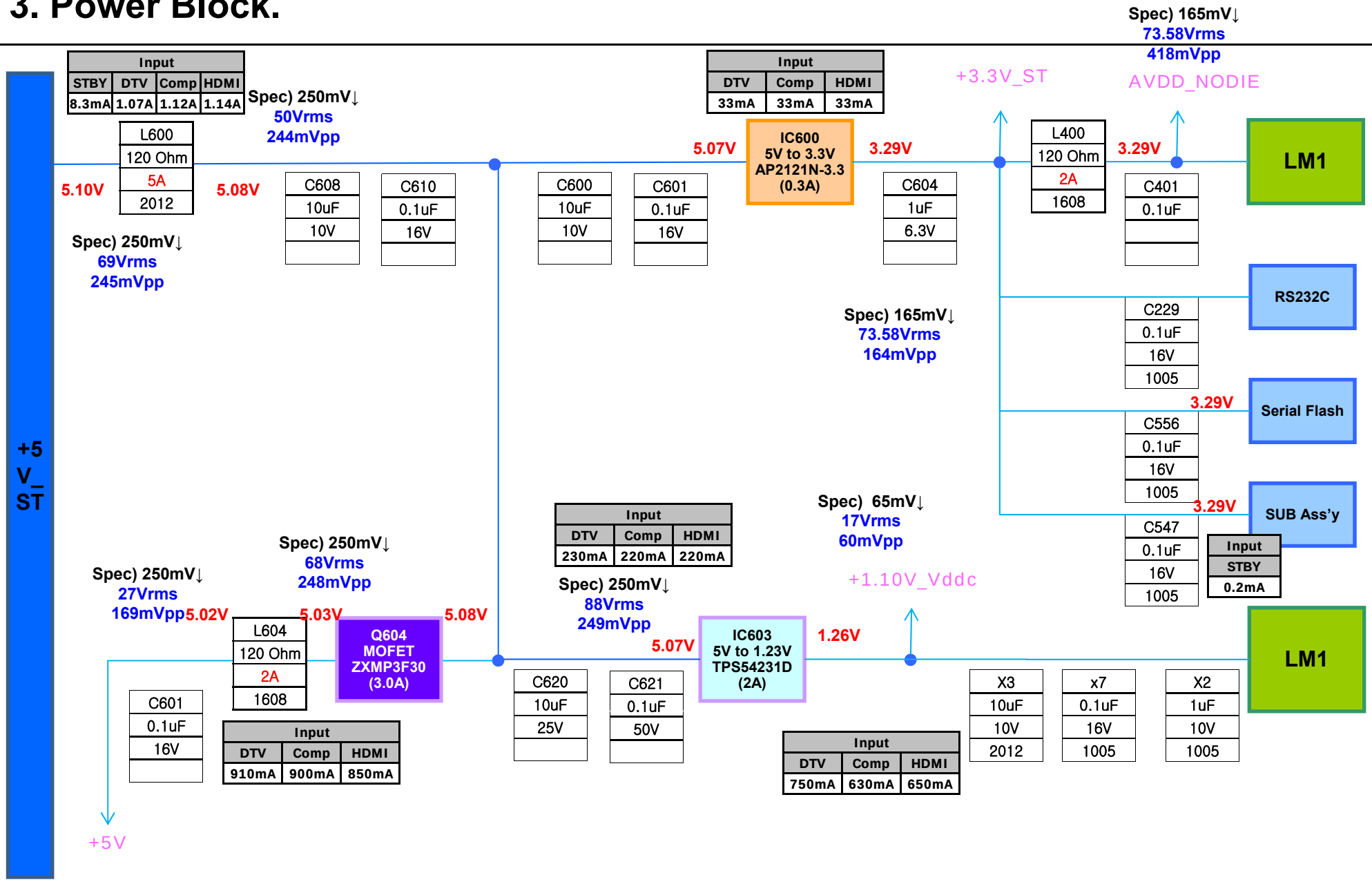
3. Power Block.



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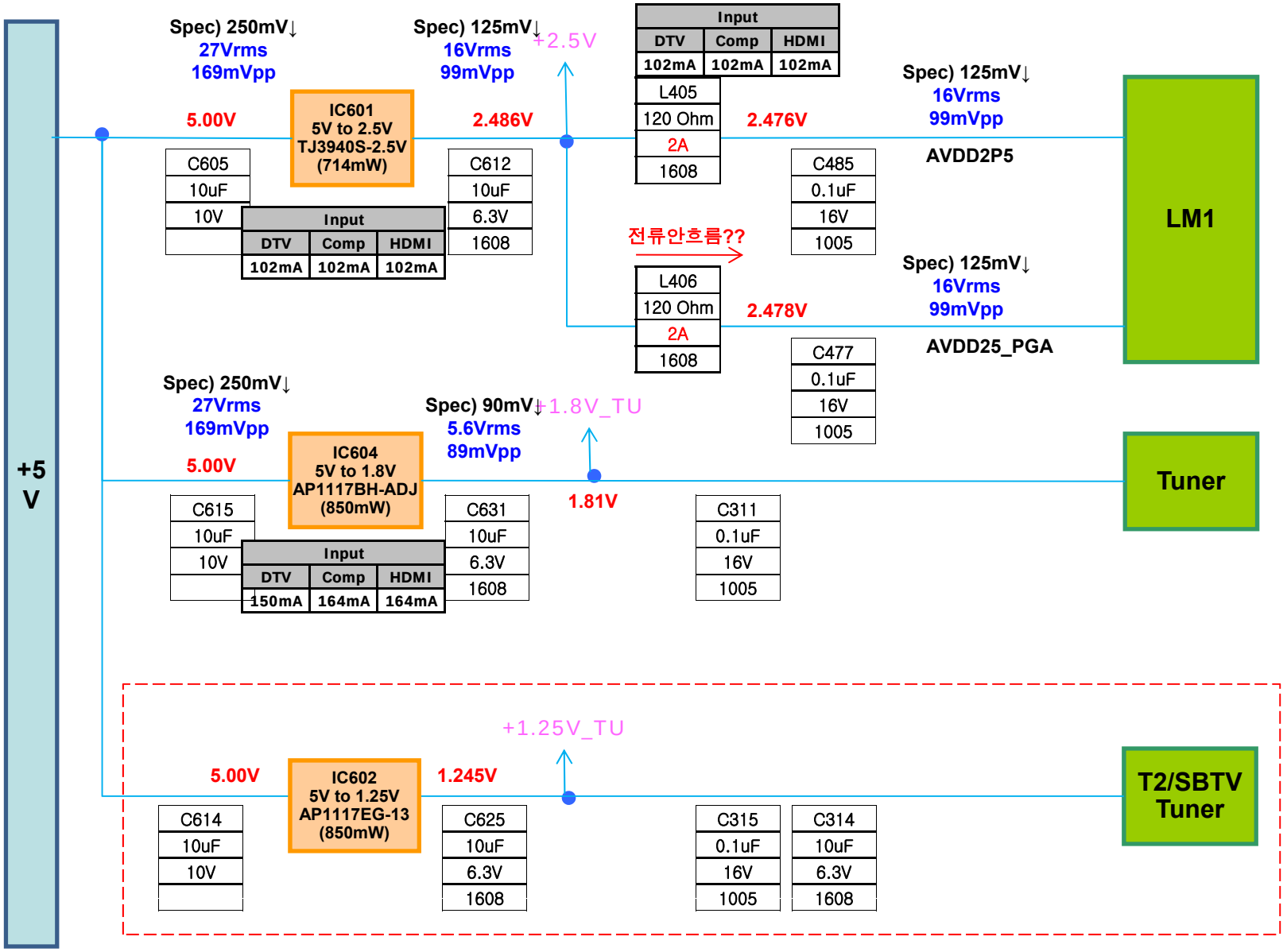
3. Power Block.



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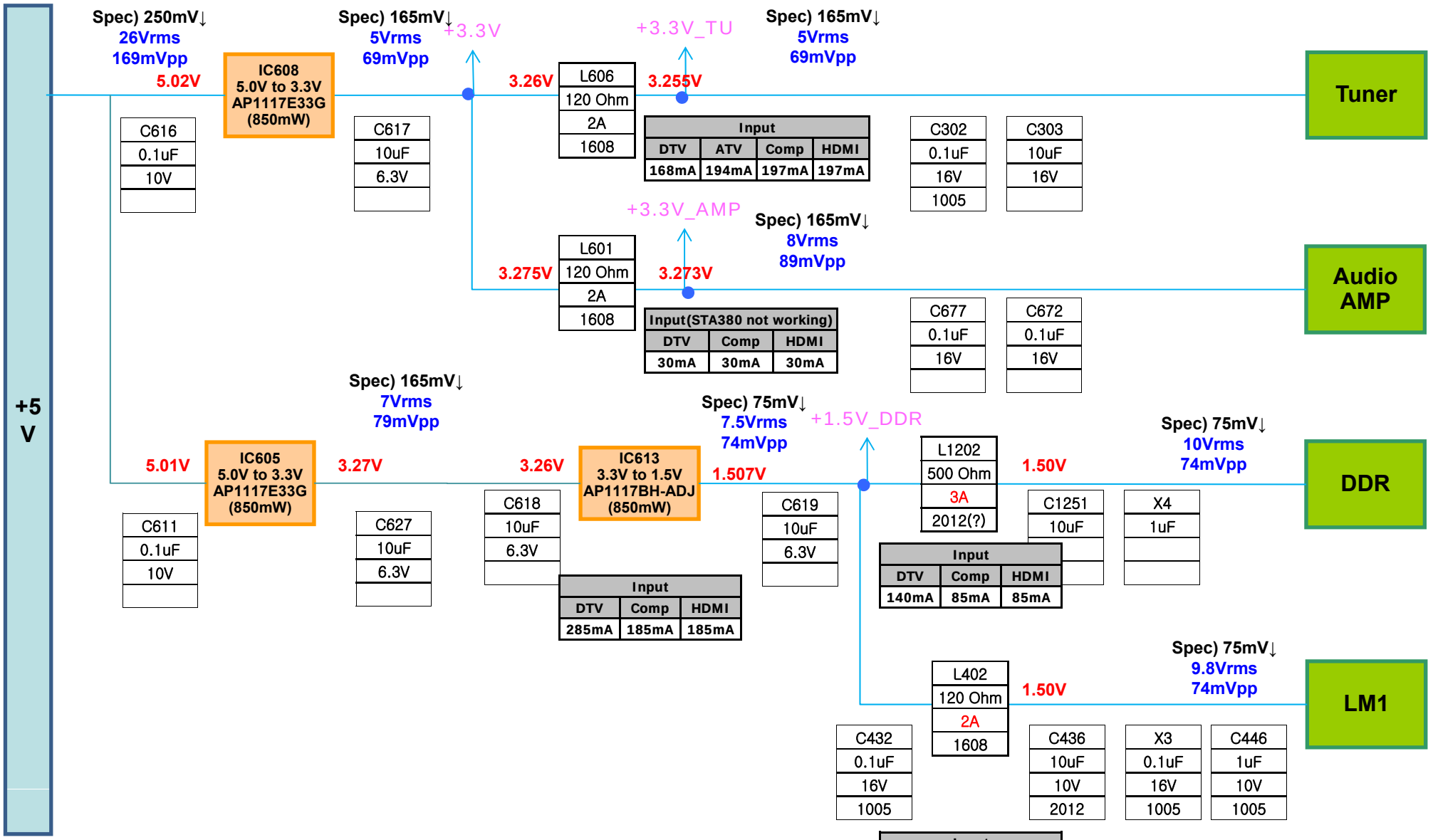
3. Power Block.



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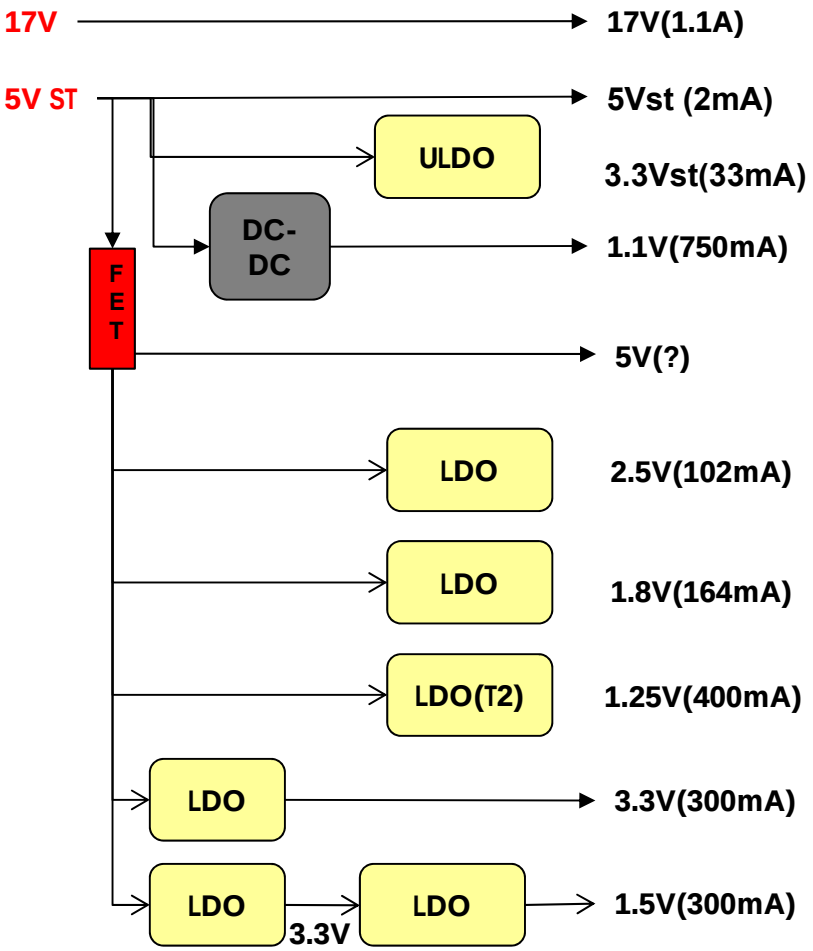
3. Power Block.



In	Out	Current	type	
5Vst	5Vst	2mA	STBY	
5Vst	3.3Vst	35mA	ULDO 0.3A	60mW
17V	17V	1.1A	Multi	
5Vst	5V	910mA + 1A	FET 3A	
5V	5V	1A	Multi	USB 1A
5Vst	1.1V	(Input 220mA) 750mA	DCDC 3A	1/4
5V	2.5V	102mA	LDO 714mW	255mW
5V	1.8V	164mA	LDO 850mW	525mW
5V	1.25V	400mA(?)	LDO 850mW	1500mW
5V	3.3V	300mA	LDO 850mW	510mW
5V	3.3V	300mA	LDO 850mW	510mW
3.3V	1.5V	300mA	LDO 850mW	480mW

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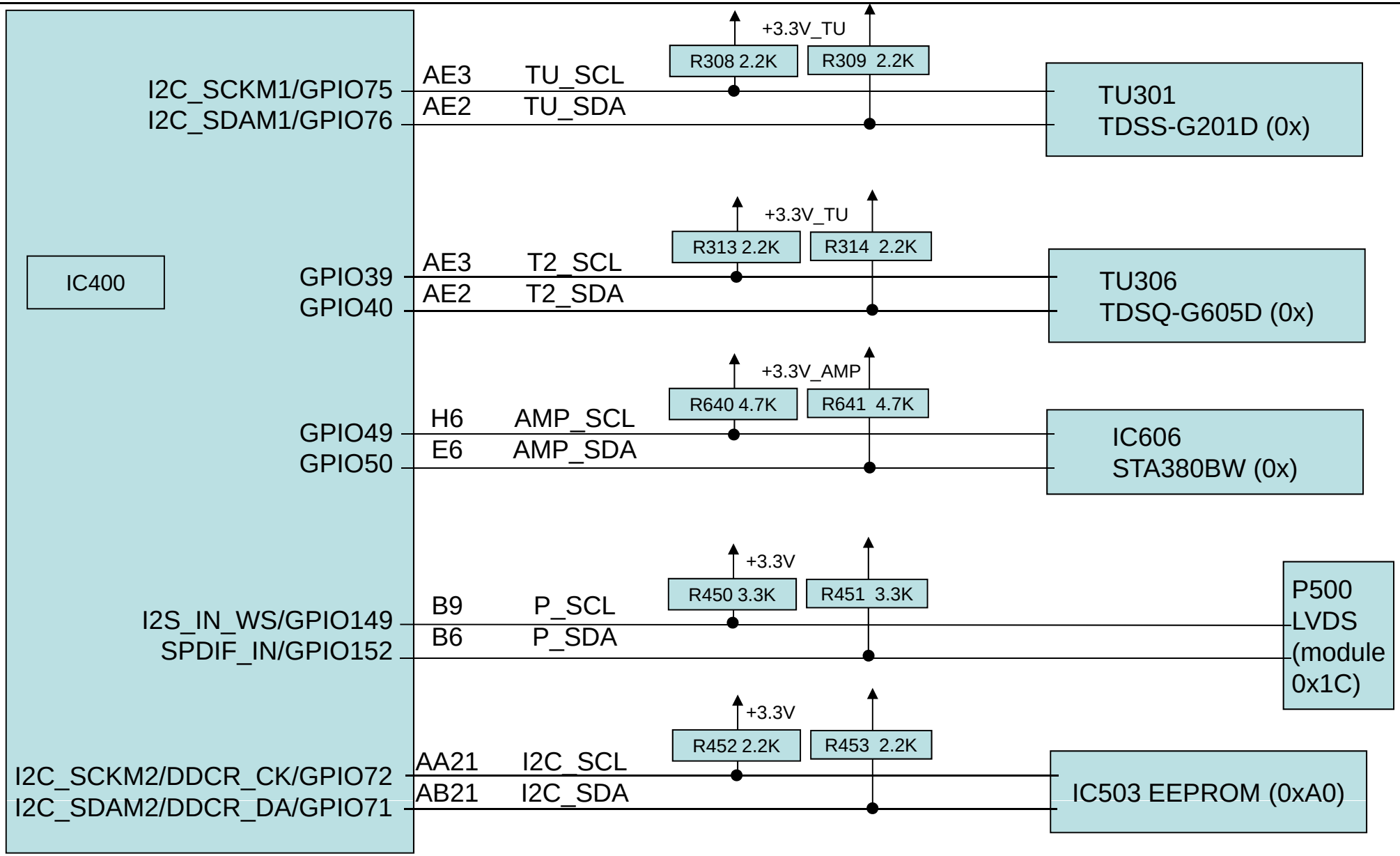
4. L13 I2C MAP



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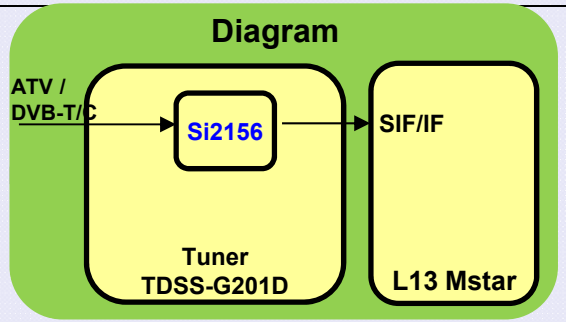
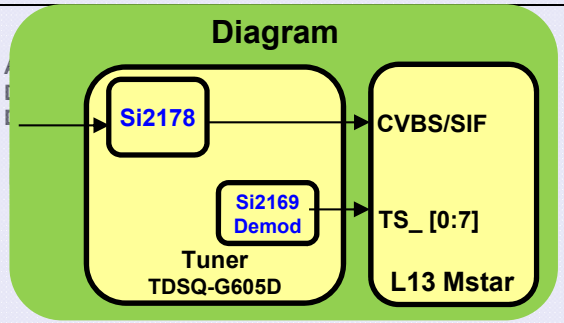
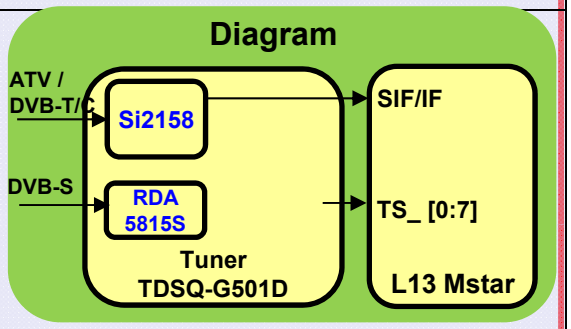
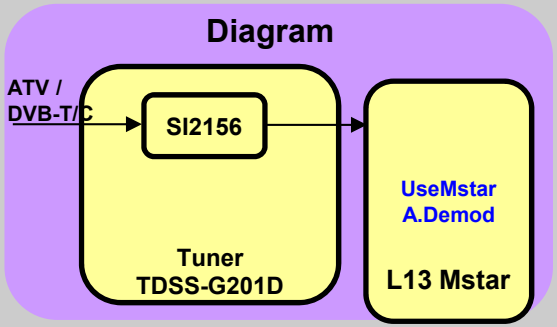
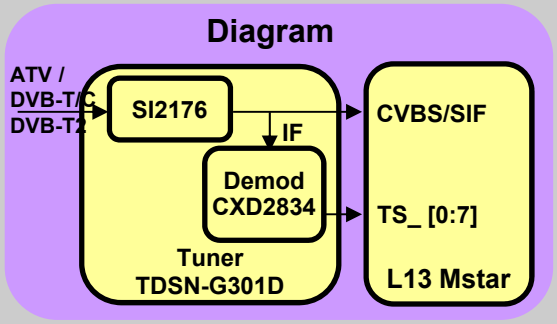
5. L13 Front End

NetCast 4.0 Low model (Mstar) use three kind of tuner as below
But we apply 2ea PCB(T/C_T2/C,S2), for each tuner and distinguish by circuit option and tool option

	T/C	T2/C	T/C/S2
2013 Tuner Figure			
2013 Tuner Block Diagram	 SI2156 : PLL + With out Analog Demod L13 : DVB-T/C Demod , A.Demod	 SI2178 : PLL + With Analog Demod SI2169 : DVB-T2/C/S/S2 Demod	 Si2166B : DVB-S/S2 Demod RDA5815S : DVB-S/S2 PLL L13 : DVB-T/C Demod, A.Demod
2012 Tuner Compare	 SI2156 : PLL + ATV Demod L13 : DVB-T/C Demod	 CXD2834 : DVB-T/C/T2 Demod	

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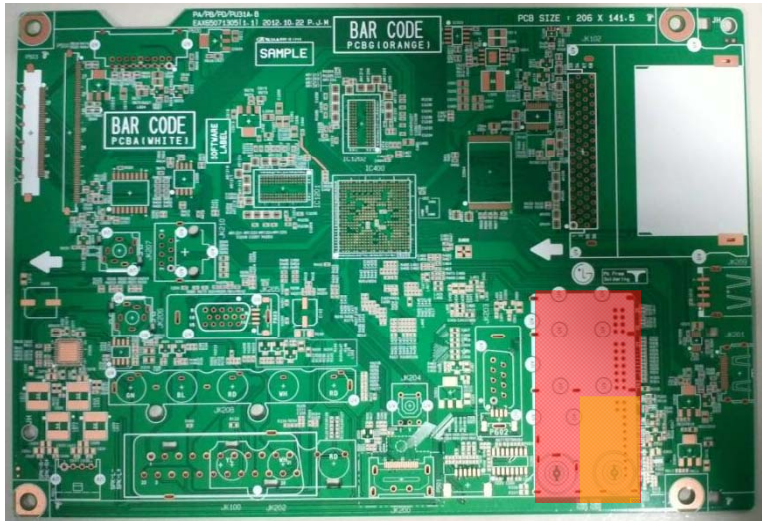
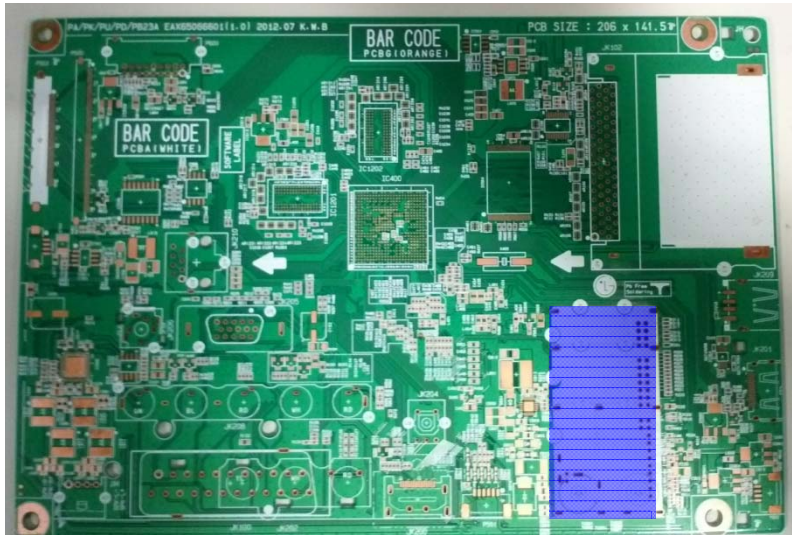
5. L13 Front End

Use 2ea PCB for each tuner and apply different circuit option and tool option



EU/AU/JA



Only Setellite

Tool option4

-T/C
Digital Demod-S : DVB_S7
Digital Demod-T/C : DEFAULT
Analog Demod : MSTAR_56

-T2/C
Digital Demod-S : NO_DEMOD
Digital Demod-T/C : DVBS_SI2169
Analog Demod : SI2176

-T/C/S2
Digital Demod-S : DVB_S7
Digital Demod-T/C : DVBS_SI2166B
Analog Demod : MSTAR_58

T/C/S Tuner Area
T2/C Tuner Area
T/C Tuner Area

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