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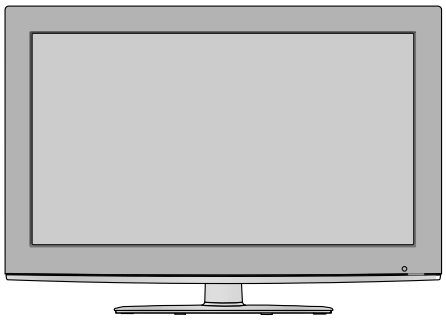
LCD TV
SERVICE MANUAL

CHASSIS : LA04A

MODEL : 32LD350 32LD350-UA

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



P/NO : MFL62863204 (1003-REV00)

Printed in Korea

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SVC. SHEET .....

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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 1W), keep the resistor 10mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

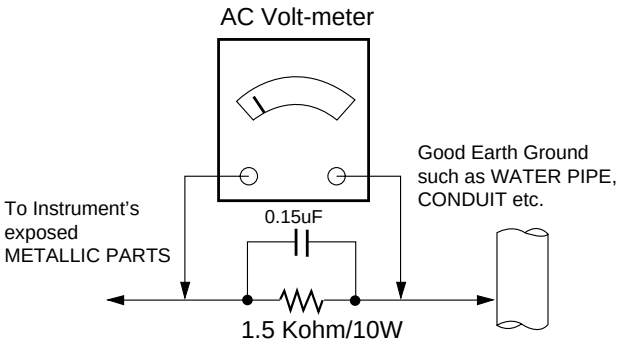
always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

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 1MΩ and 5.2MΩ.
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 1.5K/10watt resistor in parallel with a 0.15uF 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 0.5mA.
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



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SERVICING PRECAUTIONS

CAUTION: Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the *SAFETY PRECAUTIONS* on page 3 of this publication.
NOTE: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions. Remember: Safety First.

General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;
   a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
   b. Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
   c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.
   CAUTION: A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.

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

Electrostatically Sensitive (ES) Devices

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

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

General Soldering Guidelines

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

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IC Remove/Replacement

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

Removal

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

Replacement

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

"Small-Signal" Discrete Transistor Removal/Replacement

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

Power Output, Transistor Device Removal/Replacement

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

Diode Removal/Replacement

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

Fuse and Conventional Resistor Removal/Replacement

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

Circuit Board Foil Repair

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

At IC Connections

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

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

At Other Connections

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

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

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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 19”, 22”, 26”, 32” LCD TV with LA04A chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

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

3. Test method

1) Performance: LGE TV test method followed
2) Demanded other specification
   - Safety : UL, CSA, IEC specification
   - EMC: FCC, ICES, IEC specification

Model	Market	Appliance
19LD350-UB 22LD350-UB 26LD350-UB 32LD350-UB	North America	Safety : UL1492, CSA C22.2.No.1, EMC : FCC Class B, IEC Class B

4. General Specification(TV)

No	Item	Specification		Remark
1	Receivable System	1) ATSC / NTSC-M		
2	Available Channel	VHF : 02 ~ 13 UHF : 14 ~ 69 DTV : 02 ~ 69 CATV : 01 ~ 135 CADTV : 01 ~ 135		
3	Input Voltage	1) AC 100 ~ 240V 50/60Hz		
4	Market	North America		
5	Screen Size	19 inch Wide(1366x 768) 22 inch Wide(1366x 768) 26 inch Wide(1366x 768) 32 inch Wide(1366x 768)	HD HD HD HD	19LD350-UB 22LD350-UB 26LD350-UB 32LD350-UB
6	Aspect Ratio	16:9		
7	Tuning System	FS		
8	LCD Module	CMO 18.5 HD 60 CCFL LC190WH1-TLC1	CMO LGD(V4)	
		CMO 21.6 HD 60 CCFL LC220WXE-TBA1	CMO LGD(V4)	
		Sharp 26 HD 60 CCFL T260XW04-V3	Sharp AUO	
		T315XW03-V1	AUO	
9	Operating Environment	Temp : 0 ~ 40 deg Humidity : ~ 80 %		
10	Storage Environment	Temp : -20 ~ 60 deg Humidity : -85 %		

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5. Chrominance & Luminance

5.1. 32LD350-UB (AUO)

No.	Item			Min	Typ	Max	Unit	Remarks
1	Max Luminance		Module	245	294		cd/m^2	
	(Center 1-point / Full White Pattern)		Set	300	380			
2	Luminance uniformity							
3	Color coordinate	RED	X	Typ.	0.64	Typ.		
	(Default)		Y	-0.03	0.33	+0.03		
		GREEN	X		0.29			
			Y		0.60			
		BLUE	X		0.15			
			Y		0.05			
		WHITE	X		0.28			
			Y		0.29			
4	Contrast ratio			1680:1	2100:1			
				10000:1	15000:1			
6	Color Temperature	Cool		x:0.267	x:0.269	x:0.271	oK	The W/B Tolerance is
				y:0.271	y:0.273	y:0.275		±0.015 for Adjustment
		Medium		x:0.283	x:0.285	x:0.287		
				y:0.291	y:0.293	y:0.295		
		Warm		x:0.311	x:0.313	x:0.315		
				y:0.327	y:0.329	y:0.331		

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6. Component Video Input (Y, C_B/P_B, C_R/P_R)

No	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock	Proposed
1.	720*480	15.73	60	13.5135	SDTV ,DVD 480I
2.	720*480	15.73	59.94	13.5	SDTV ,DVD 480I
3.	720*480	31.50	60	27.027	SDTV
4.	720*480	31.47	59.94	27.0	SDTV
5.	1280*720	45.00	60.00	74.25	HDTV
6.	1280*720	44.96	59.94	74.176	HDTV
7.	1920*1080	33.75	60.00	74.25	HDTV
8.	1920*1080	33.72	59.94	74.176	HDTV
9.	1920*1080	67.500	60	148.50	HDTV
10.	1920*1080	67.432	59.94	148.352	HDTV
11.	1920*1080	27.000	24.000	74.25	HDTV
12.	1920*1080	26.97	23.976	74.176	HDTV
13.	1920*1080	33.75	30.000	74.25	HDTV
14.	1920*1080	33.716	29.97	74.176	HDTV

7. RGB Input (PC)

No	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock	Proposed	
	PC					DDC
1	640*350	31.469	70.08	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
7	1280*768	47.776	59.87	79.50	CVT(WXGA)	X
8	1360*768	47.720	59.799	84.75	CVT(WXGA)	O

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8. HDMI input (PC/DTV)

No	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock	Proposed	
	PC					DDC
1	640*350	31.469	70.08	25.17	EGA	X
2	720*400	31.469	70.08	28.32	DOS	O
3	640*480	31.469	59.94	25.17	VESA(VGA)	O
4	800*600	37.879	60.31	40.00	VESA(SVGA)	O
5	1024*768	48.363	60.00	65.00	VESA(XGA)	O
6	1280*768	47.776	59.87	79.50	CVT(WXGA)	X
7	1360*768	47.720	59.799	84.75	CVT(WXGA)	O
	DTV					
1	720*480	31.5	60	27.027	SDTV 480P	
2	720*480	31.47	59.94	27.00	SDTV 480P	
3	1280*720	45.00	60.00	74.25	HDTV 720P	
4	1280*720	44.96	59.94	74.176	HDTV 720P	
5	1920*1080	33.75	60.00	74.25	HDTV 1080I	
6	1920*1080	33.72	59.94	74.176	HDTV 1080I	
7	1920*1080	67.500	60	148.50	HDTV 1080P	
8	1920*1080	67.432	59.939	148.352	HDTV 1080P	
9	1920*1080	27.000	24.000	74.25	HDTV 1080P	
10	1920*1080	26.97	23.976	74.176	HDTV 1080P	
11	1920*1080	33.75	30.000	74.25	HDTV 1080P	
12	1920*1080	33.716	29.97	74.176	HDTV 1080P	

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ADJUSTMENT INSTRUCTION

1. Application range

This spec. sheet applies to LA04A Chassis applied LCD TV all models manufactured in TV factory

2. Specification

2.1 Because this is not a hot chassis, it is not necessary to use an isolation transformer. However, the use of isolation transformer will help protect test instrument.

2.2 AdjThe adjustment must be performed in the circumstance of 25 ±5 C of temperature and 65±10% of relative humidity if there is no specific designation.

2.4 The input voltage of the receiver must keep 100~240V, 50/60Hz.

2.5 The receiver must be operated for about 5 minutes prior to the adjustment when module is in the circumstance of over 15

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

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

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

3. Adjustment items

3.1 Board Level Adjustment

•Adjust 480i Comp1(ADC)
•EDID/DDC download

Above adjustment items can be also performed in Final Assembly if needed. Both Board-level and Final assembly adjustment items can be check using In-Star Menu 1.ADJUST CHECK. Component 1080p and RGB-PC Adjust will be calculated by 480i adjust value.

3.2 Final assembly adjustment

•White Balance adjustment
•RS-232C functionality check
•Factory Option setting per destination
•Ship-out mode setting (In-Stop)

3.3 Etc

•Ship-out mode
•Service Option Default
•USB Download(S/W Update, Option, Service only)
•ISP Download (Optional)

4. Automatic Adjustment

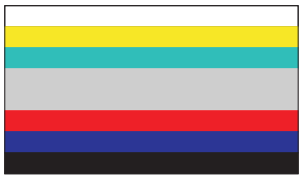
4.1. ADC Adjustment

(1) Overview

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

(2) Equipment & Condition

1) Jig (RS-232C protocol)
2) MSPG-925 Series Pattern Generator(MSPG-925FA)
- Resolution : 480i Comp1 (MSPG-925FA: model-209, pattern-65)
- Resolution : 1024*768 RGB (Inner Pattern)
- Pattern : Horizontal 100% Color Bar Pattern
- Pattern level : 0.7±0.1 Vp-p
- Image



(3) Adjustment

1) Adjustment method
- Using RS-232, adjust items listed in 3.1 in the other shown in “4.1.3.3”

2) Adj. protocol

Protocol	Command	Set ACK
Enter adj. mode	aa 00 00	a 00 OK00x
Source change	xb 00 40	b 00 OK40x (Adjust 480i Comp1)
	xb 00 60	b 00 OK60x (Adjust 1024*768 RGB)
Begin adj.	ad 00 10	
Return adj. result		OKx (Case of Success)
		NGx (Case of Fail)
Read adj. data	(main)	(main)
	ad 00 20	00000000000000000000000007c007b006dx
	(sub)	(Sub)
	ad 00 21	00000007000000000000000007c00830077x
Confirm adj.	ad 00 99	NG 03 00x (Fail)
		NG 03 01x (Fail)
		NG 03 02x (Fail)
		OK 03 03x (Success)
End adj.	aa 00 90	a 00 OK90x

Ref.) ADC Adj. RS232C Protocol_Ver1.0

3) Adj. order
- aa 00 00 [Enter ADC adj. mode]
- xb 00 40 [Change input source to Component1(480i)]
- ad 00 10 [Adjust 480i Comp1]
- xb 00 60 [Change input source to RGB(1024*768)]
- ad 00 10 [Adjust 1024*768 RGB]
- ad 00 90 End adj.

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5. Manual Adjustment

5.1. ADC(Saturn5) Adjustment

(1) Overview

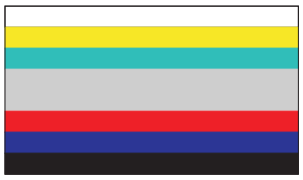
ADC adjustment is needed to find the optimum black level and gain in Analog-to-Digital device and to compensate RGB deviation.

(2) Equipment & Condition

1) Adjust Remocon

2) 801GF(802B, 802F, 802R) or MSPG925FA Pattern Generator

- Resolution: 480i, 1024*768
- Pattern : Horizontal 100% Color Bar Pattern
- Pattern level: 0.7±0.1 Vp-p
- Image



3) Must use standard cable

(3) Adjust method

• ADC 480i/1080p Comp1, RGB

1) Check connected condition of Comp1 cable to the equipment
2) Give a 480i Mode, Horizontal 100% Color Bar Pattern to Comp1.
(MSPG-925FA -> Model: 209, Pattern: 65)
3) Change input mode as Component1 and picture mode as “Standard”
4) Press the In-start Key on the ADJ remote after at least 1 min of signal reception. Then, select 5.ADC Calibration. And Press OK Button on the menu “Start”. The adjustment will start automatically.
5) If ADC Comp 480i is successful, “ADC Component Success” is displayed and Comp480i/1080p is completed.
If ADC calibration is failure, “ADC Component Fail” is displayed.
6) If ADC calibration is failure, after rechecking ADC pattern or condition, retry calibration
7) After completing ADC Component, input mode will be changed to RGB automatically.
8) If ADC calibration is successful, “ADC RGB Success” is displayed. If ADC calibration is failure, “ADC RGB Fail” is displayed.
9) If ADC calibration is failure, after recheck ADC pattern or condition, retry calibration

5.2 EDID/DDC Download

(1) Overview

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

(2) Equipment

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

(3) Download method

1) Press Adj. key on the Adj. R/C,
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.

•Caution) When EDID Download, must remove RGB/HDMI Cable.

(4) EDID DATA

1)LD350 Tool(HD)

• HDMI I [C/S: XXBA]

EDID Block 0 table =

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	13	01	03	80	73	41	78	0A	CF	74	A3	57	4C	B0	23
20	09	48	4C	A1	08	00	B1	C0	01	01	01	01	01	01	01	01
30	01	01	01	01	01	01	66	21	50	B0	51	00	1B	30	40	70
40	36	00	7E	BA	42	00	00	1E	01	1D	00	72	51	D0	1E	20
50	6E	28	55	00	7E	BA	42	00	00	1E	00	00	00	FD	00	39
60	3F	1F	3C	09	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	1D

EDID Block 1 table =

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	02	03	1B	F1	47	10	22	20	05	84	03	02	23	09	07	07
10	67	03	0C	00	10	00	B8	2D	02	3A	80	18	71	38	2D	40
20	58	2C	04	05	7E	BA	42	00	00	1E	01	1D	80	18	71	1C
30	16	20	58	2C	25	00	7E	BA	42	00	00	9E	01	1D	00	72
40	51	D0	1E	20	6E	28	55	00	7E	BA	42	00	00	1E	8C	0A
50	D0	8A	20	E0	2D	10	10	3E	96	00	7E	BA	42	00	00	18
60	25	96	B0	A0	70	38	1F	40	30	20	25	00	7E	BA	42	00
70	00	1A	00	00	00	00	00	00	00	00	00	00	00	00	00	2C

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• HDMI II [C/S: XXAA]
EDID Block 0 table =

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	13	01	03	80	73	41	78	0A	CF	74	A3	57	4C	B0	23
20	09	48	4C	A1	08	00	B1	C0	01	01	01	01	01	01	01	01
30	01	01	01	01	01	01	66	21	50	B0	51	00	1B	30	40	70
40	36	00	7E	BA	42	00	00	1E	01	1D	00	72	51	D0	1E	20
50	6E	28	55	00	7E	BA	42	00	00	1E	00	00	00	FD	00	39
60	3F	1F	3C	09	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	10

EDID Block 1 table =

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	02	03	1B	F1	47	10	22	20	05	B4	03	02	23	09	07	07
10	67	03	0C	00	20	00	B8	2D	02	3A	80	18	71	38	2D	40
20	58	2C	04	05	7E	BA	42	00	00	1E	01	1D	80	18	71	1C
30	16	20	58	2C	25	00	7E	BA	42	00	00	9E	01	1D	00	72
40	51	D0	1E	20	6E	28	55	00	7E	BA	42	00	00	1E	8C	0A
50	D0	8A	20	E0	2D	10	10	3E	96	00	7E	BA	42	00	00	18
60	28	36	80	A0	70	38	1F	40	30	20	25	00	7E	BA	42	00
70	00	1A	00	00	00	00	00	00	00	00	00	00	00	00	00	1C

• RGB [C/S: XX]
EDID Block 0 table =

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	13	01	03	68	73	41	78	0A	CF	30	A3	57	4C	B0	23
20	09	50	4E	A1	08	00	B1	C0	01	01	01	01	01	00	01	01
30	01	01	01	01	01	01	66	21	50	B0	51	00	1B	30	40	70
40	36	00	7E	BA	42	00	00	1E	01	1D	00	72	51	D0	1E	20
50	6E	28	55	00	7E	BA	42	00	00	1E	00	00	00	FD	00	39
60	3F	1F	3C	09	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	00	71

5.3. White Balance Adjustment

(1) Overview

• W/B adj. Objective & How-it-works

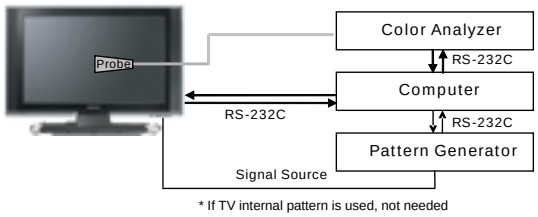
- Objective: To reduce each Panel's W/B deviation
- How-it-works: When R/G/B gain in the OSD is at 192, it means the panel is at its Full Dynamic Range. In order to prevent saturation of Full Dynamic range and data, one of R/G/B is fixed at 192, and the other two is lowered to find the desired value.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

(2) Equipment

1) Color Analyzer: CA-210 (NCG: CH 9 / WCG: CH12)
2) Adj. Computer(During auto adj., RS-232C protocol is needed)
3) Adjust Remocon
4) Video Signal Generator MSPG-925F 720p/216-Gray (Model:217, Pattern:78)
   -> Only when internal pattern is not available

• Color Analyzer Matrix should be calibrated using CS-1000

(3) Equipment connection MAP



Connection Diagram of Automatic Adjustment

(4) Adj. Command (Protocol)

1) RS-232C Command used during auto-adj.

RS-232C COMMAND [CMD	ID	DATA]	Meaning
wb	00	00	Begin White Balance adj.
wb	00	ff	End White Balance adj.(Internal pattern disappeared)

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

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2) Adjustment Map

Applied Model : 19LD350-UB, 22LD350-UB, 26LD350-UB, 32LD350-UB

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

(5) Adj. method

• Auto adj. method

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

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

• Manual adj. method

1) Set TV in Adj. mode using POWER ON
2) Zero Calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10cm of the surface..
3) Press ADJ key -> EZ adjust using adj. R/C > 6. White-Balance then press the cursor to the right (KEY G).
(When KEY(G) is pressed 216 Gray internal pattern will be displayed)
4) One of R Gain / G Gain / B Gain should be fixed at 192, and the rest will be lowered to meet the desired value.
5) Adj. is performed in COOL, MEDIUM, WARM 3 modes of color temperature.

- If internal pattern is not available, use RF input. In EZ Adj. menu 6.White Balance, you can select one of 2 Test-pattern: ON, OFF. Default is inner(ON). By selecting OFF, you can adjust using RF signal in 216 Gray pattern.

* Adj. condition and cautionary items

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

(6) Reference (White Balance Adj. coordinate and color temperature)

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

• 26/32LD350-UB

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

• 19/22LD350-UB (Small size panel have different color coordinate)

Mode	Color Coordination		Temp	ΔUV
	x	y		
COOL	0.285	0.293	9300K	0.0000
MEDIUM	0.295	0.305	8000K	0.0000
WARM	0.313	0.329	6500K	0.0000

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

• 26/32LD350-UB

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

• 19/22LD350-UB (Small size panel have different color coordinate)

Mode	Color Coordination		Temp	ΔUV
	x	y		
COOL	0.285±0.002	0.293±0.002	9300K	0.0000
MEDIUM	0.295±0.002	0.305±0.002	8000K	0.0000
WARM	0.313+0.002	0.329±0.002	6500K	0.0000

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5.4. HDCP SETTING

- HDCP setting is not necessary in Saturn5 model.

5.5 Option selection per country

(1) Overview

- Option selection is only done for models in Non-USA North America due to rating
- Applied model: LA92A Chassis applied None USA model(CANADA, MEXICO)

(2) Method

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

5.6. Tool Option selection

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

Model	Tool 1	Tool 2	Tool 3	Tool 4	Menu
19LD350(CMO)					1 HDMI
19LD350(LGD)	2689	548	1442	1824	1 HDMI
22LD350(CMO)					1HDMI
22LD350(LGD)	6785	548	1442	1824	1 HDMI
26LD350(Sharp)					2HDMI
26LD350(AUO)	10897	1576	1442	1824	2 HDMI
32LD350(AUO)	19089	1576	34210	1824	2 HDMI

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

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

6. GND and Internal Pressure check

6.1. Method

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

6.2. Checkpoint

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

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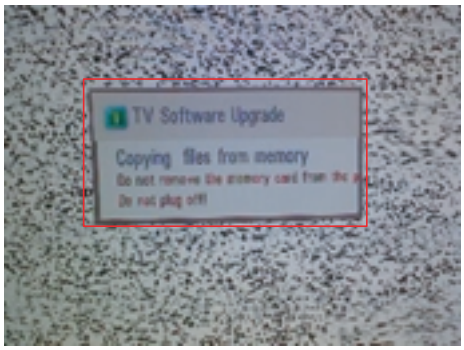
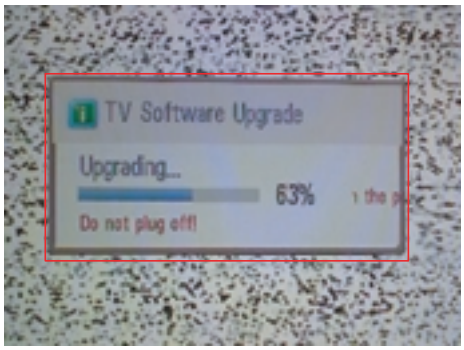
7. USB S/W Download (option)

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

* After downloading, have to adjust TOOL OPTION again.
1) Push "IN-START" key in service remote controller.
2) Select "Tool Option 1" and Push "OK" button.
3) Punch in the number. (Each model has their number.)

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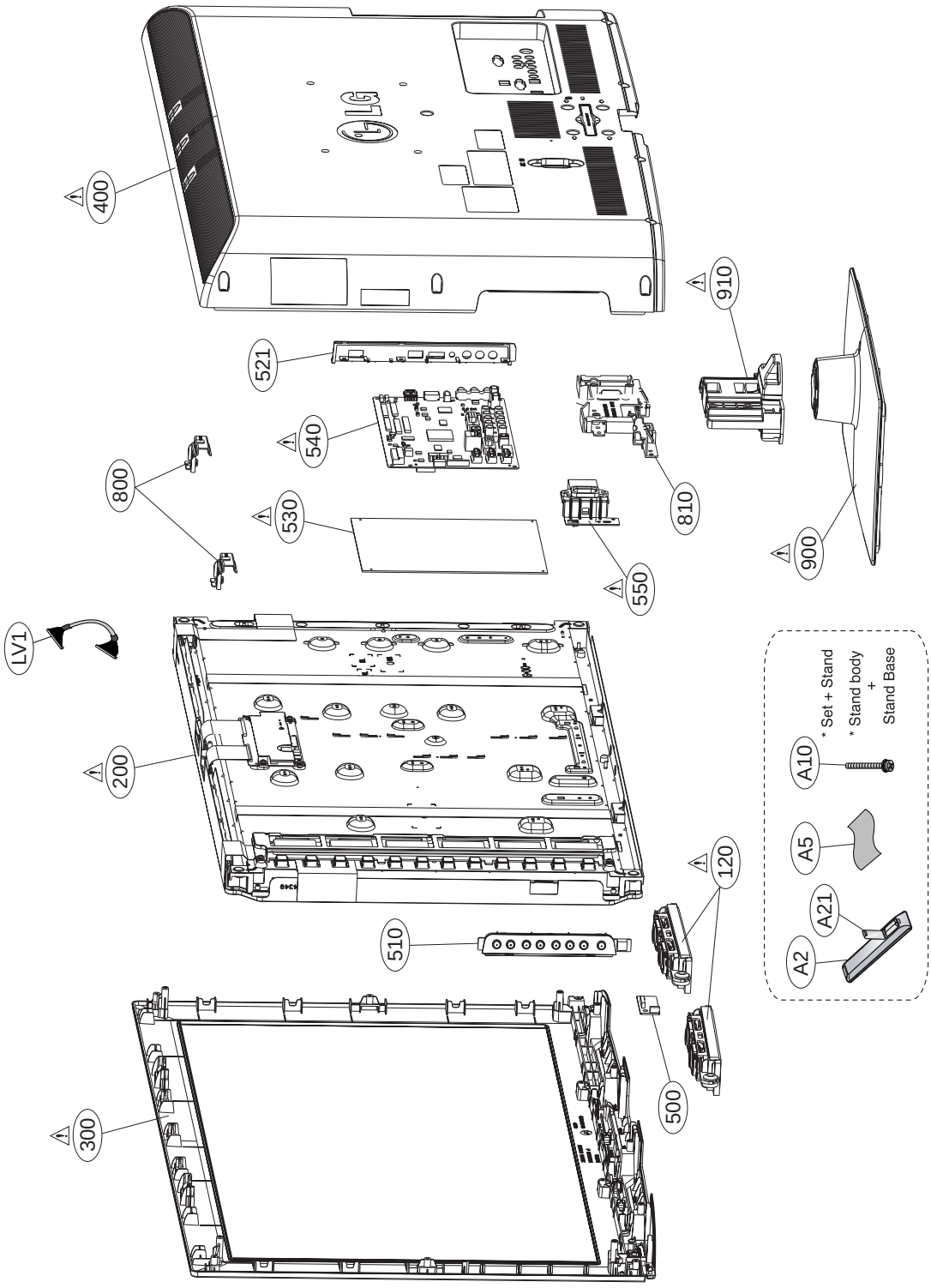
EXPLODED VIEW

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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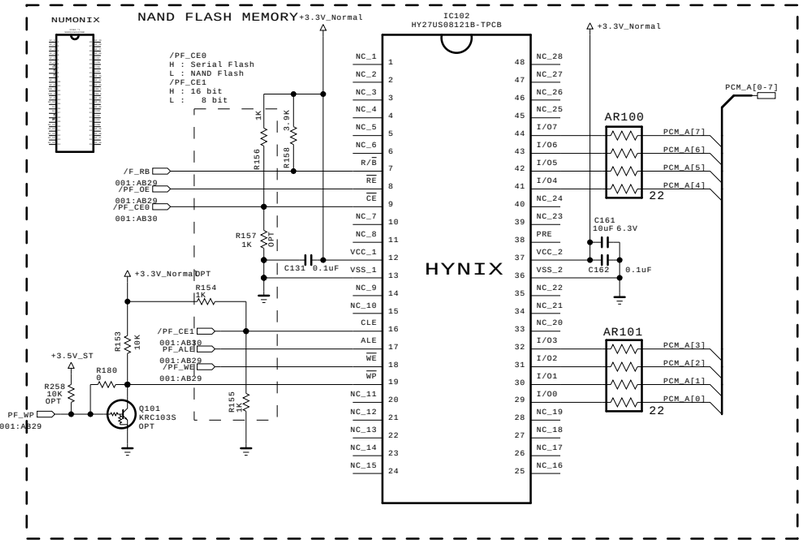

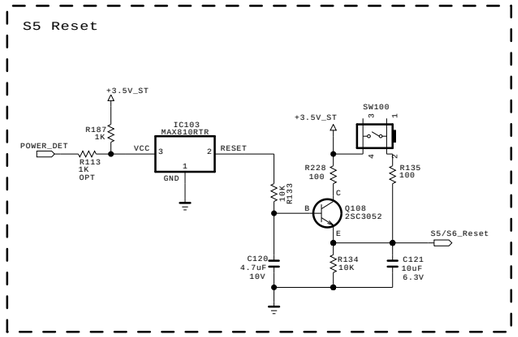

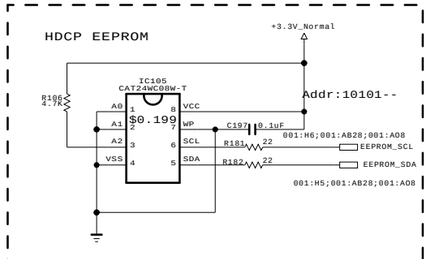

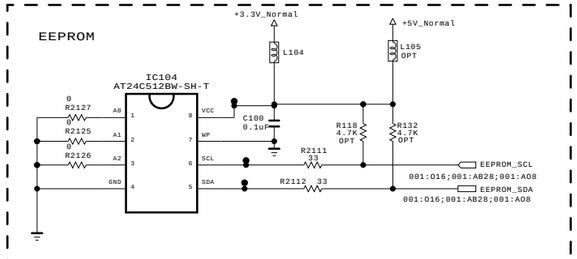

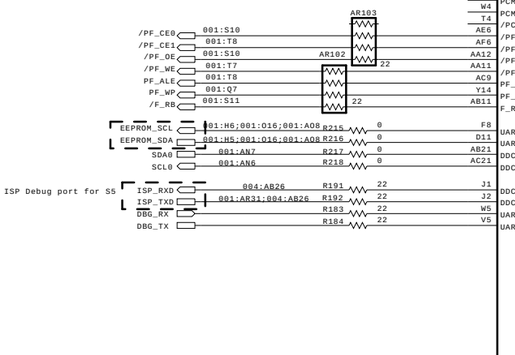

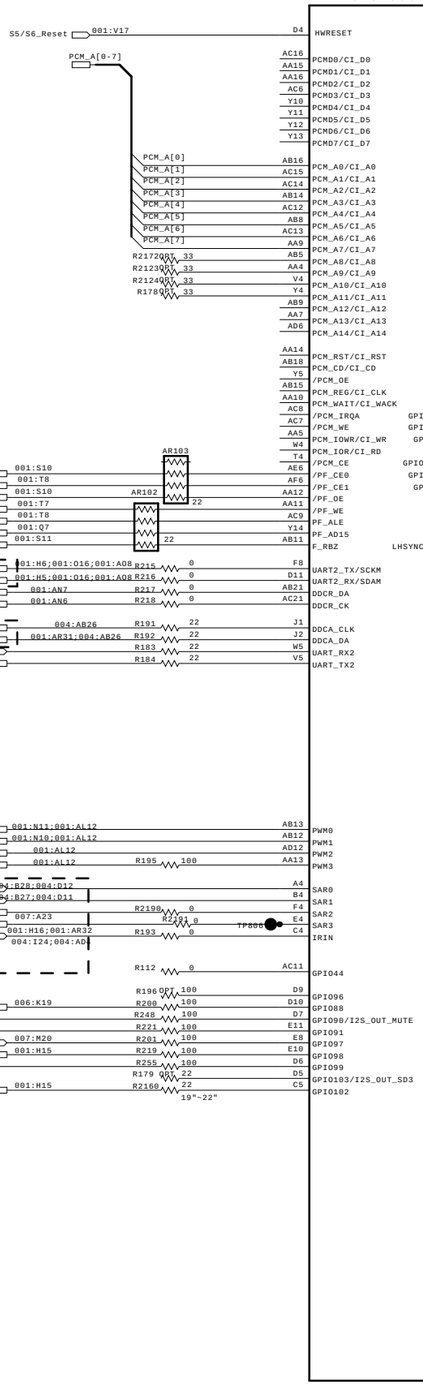

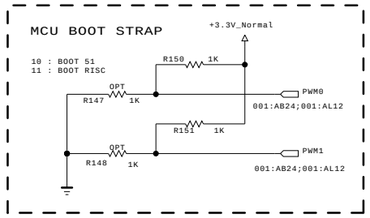

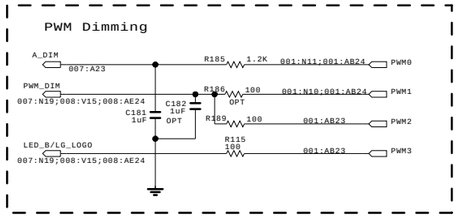

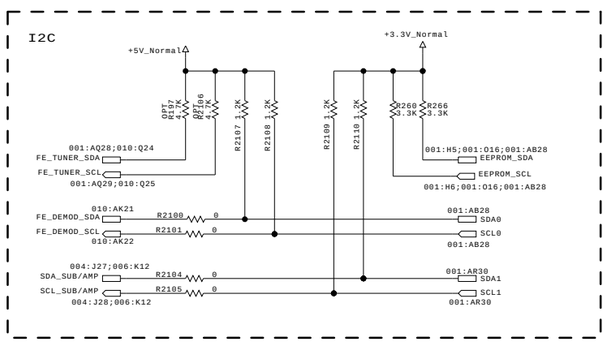

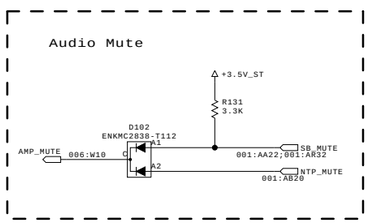

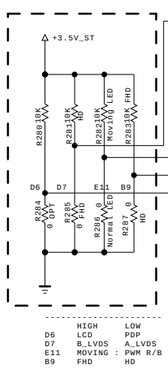

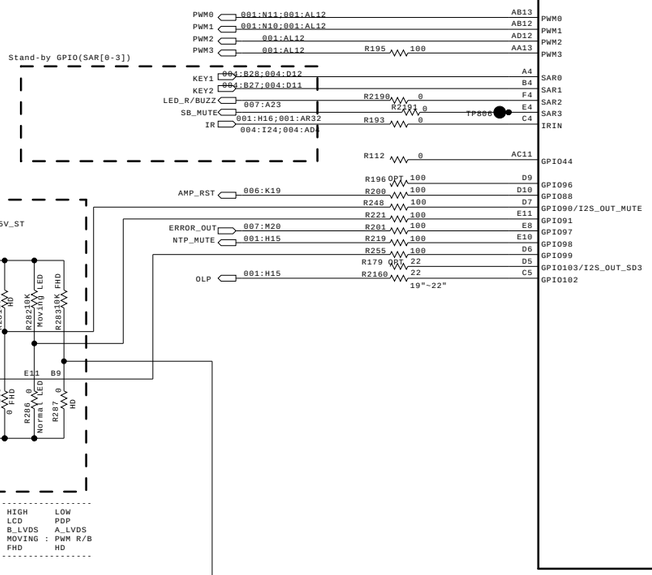

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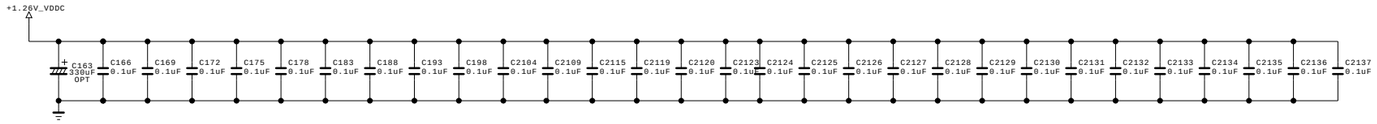
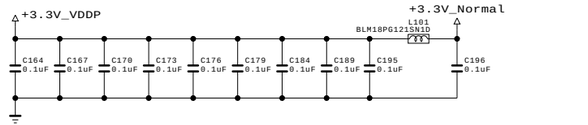
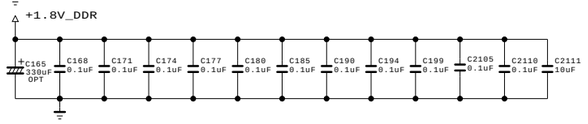
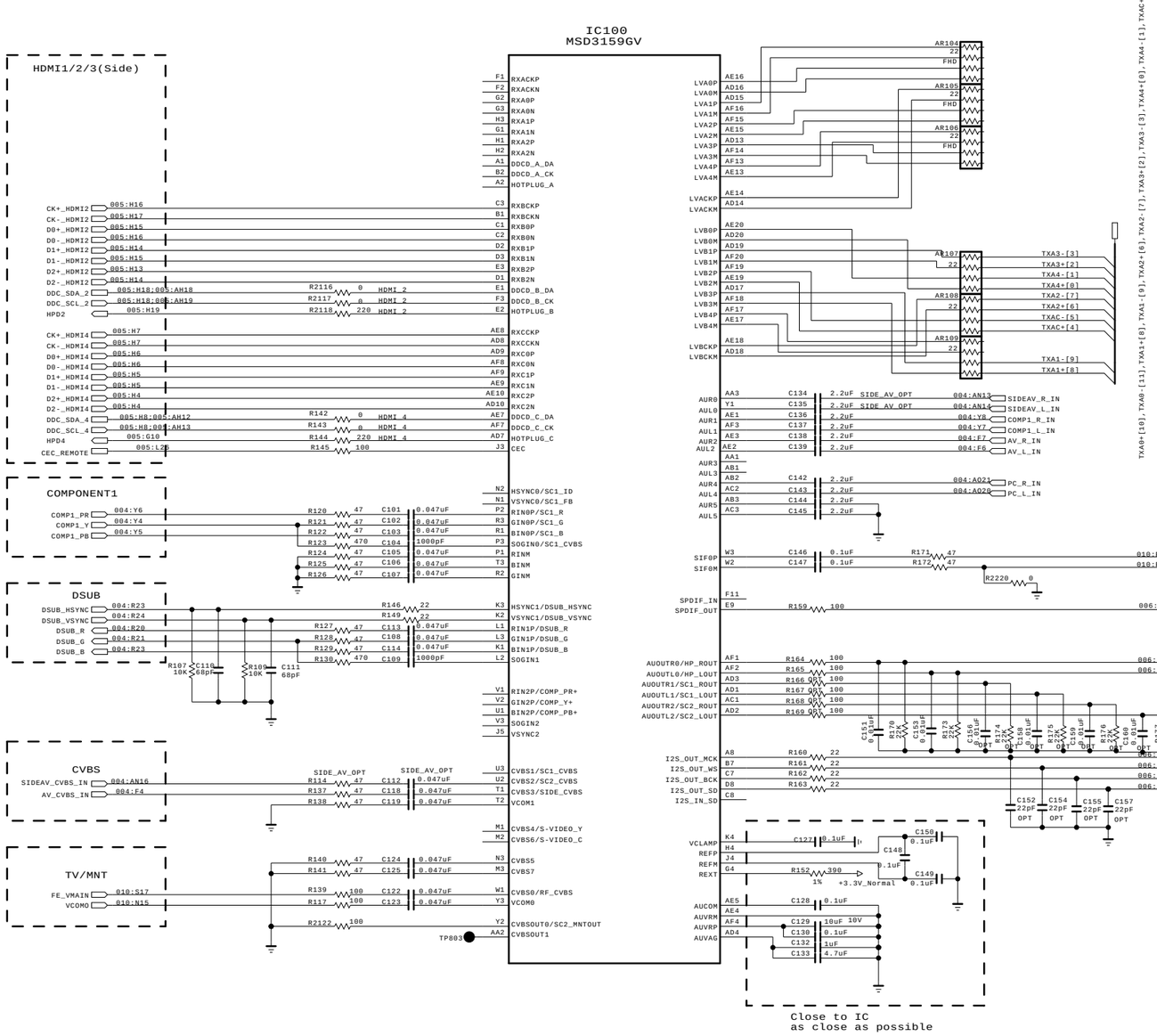
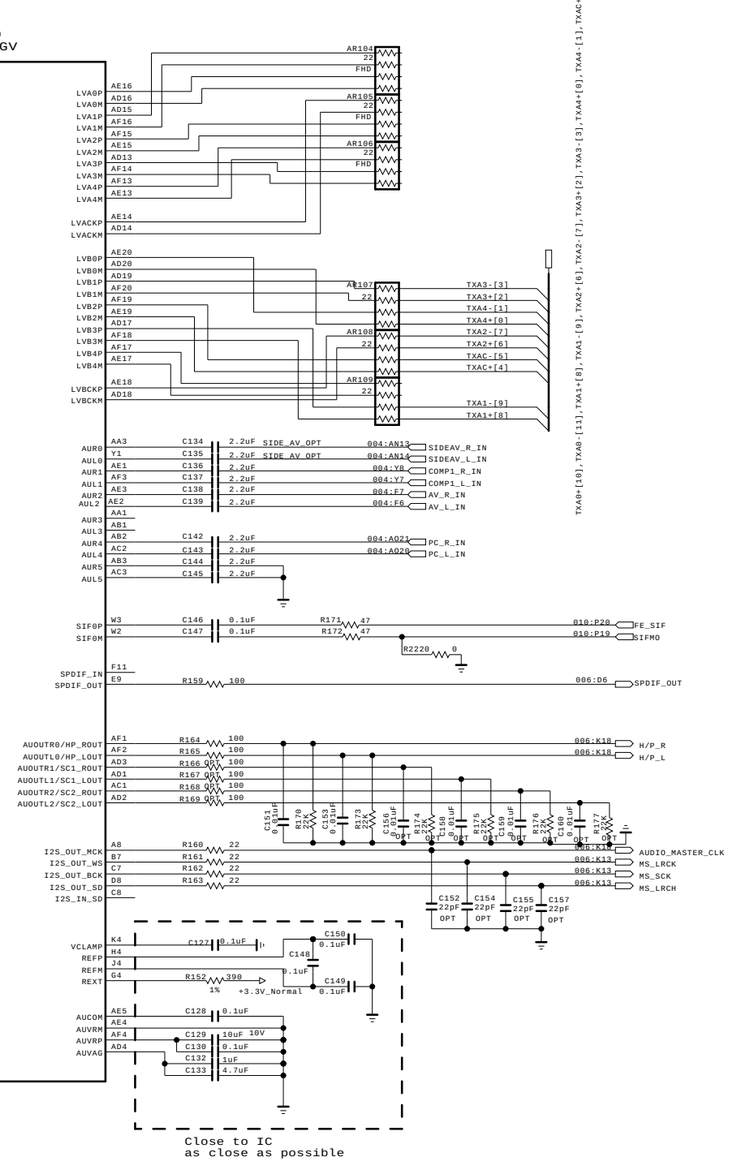
MMAIN_SOC_1

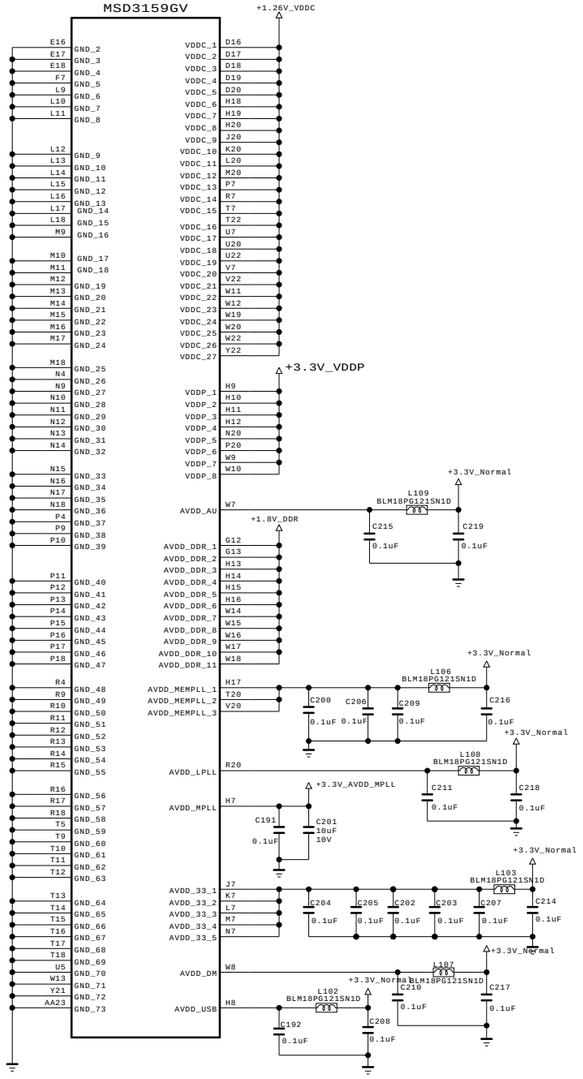












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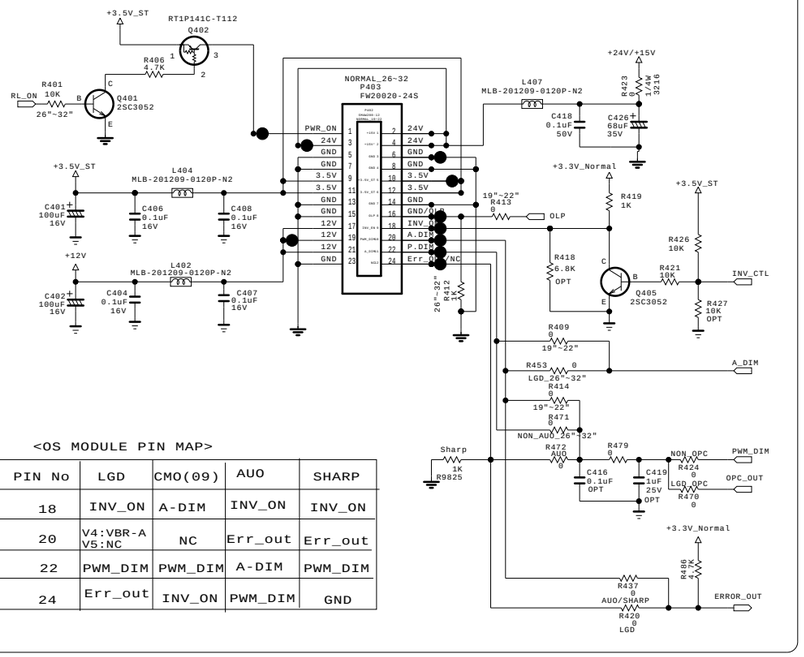
MODEL	LD350	DATE	09.09.03
BLOCK	MAIN_SOC_2	SHEET	2 /

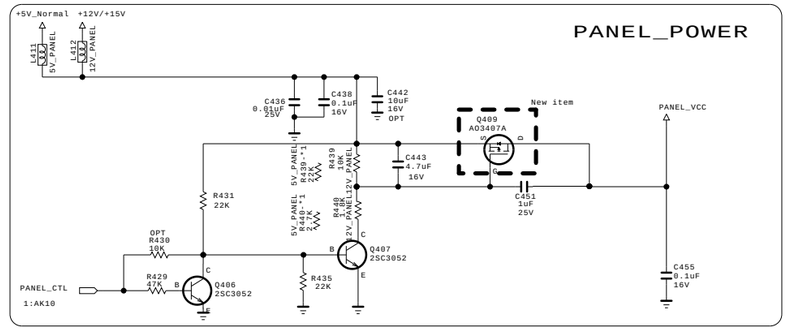
FROM LIPS & POWER B/D



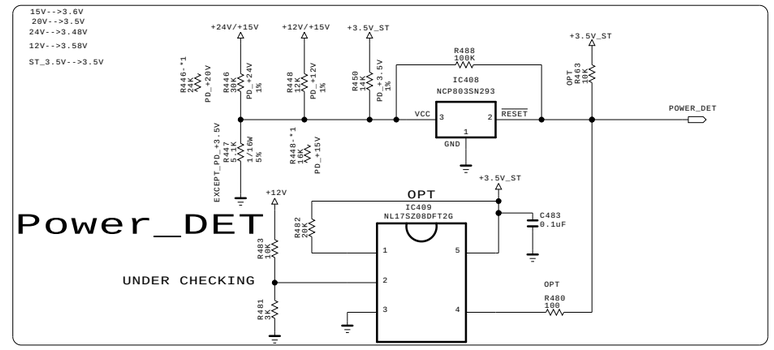
<OS MODULE PIN MAP>

PIN No	LGD	CMO(09)	AUO	SHARP
18	INV_ON	A-DIM	INV_ON	INV_ON
20	V4:VBR-A V5:NC	NC	Err_out	Err_out
22	PWM_DIM	PWM_DIM	A-DIM	PWM_DIM
24	Err_out	INV_ON	PWM_DIM	GND

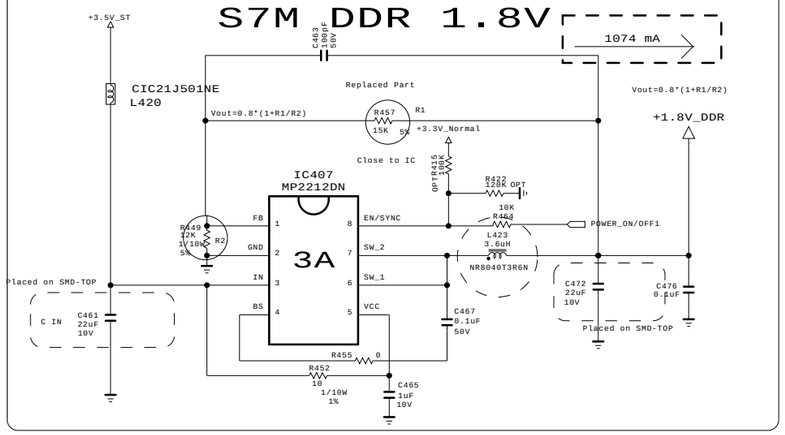
PANEL_POWER



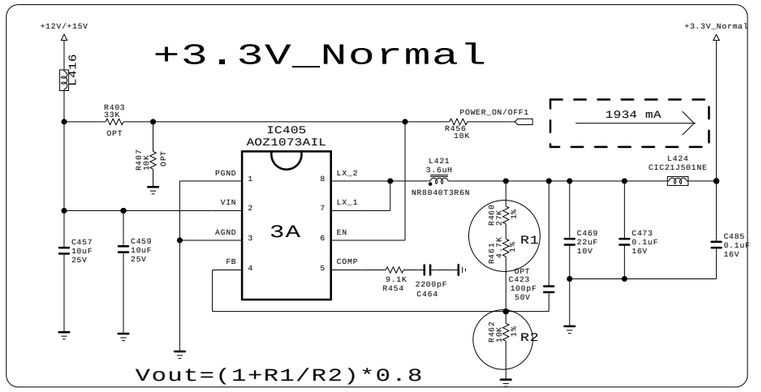
Power_DET



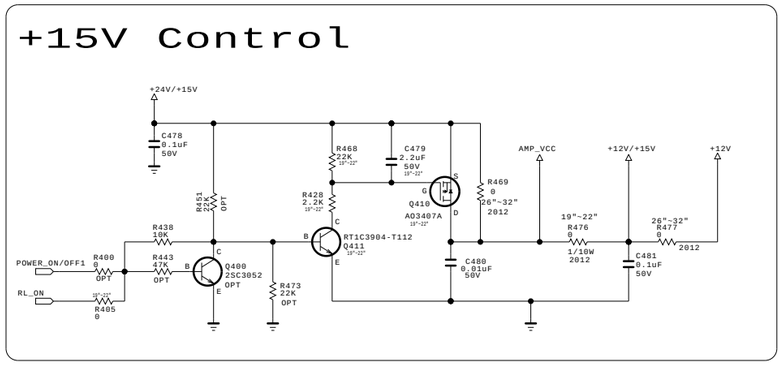
S7M DDR 1.8V



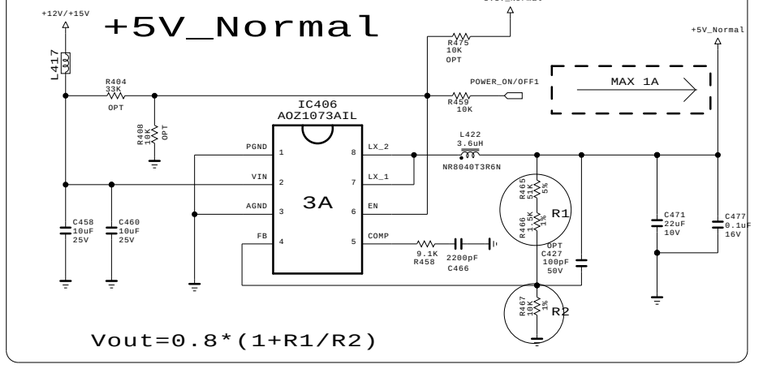
+3.3V_Normal



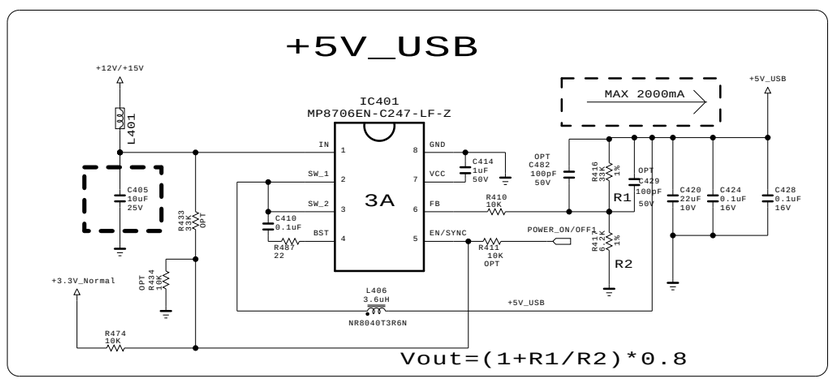
+15V Control



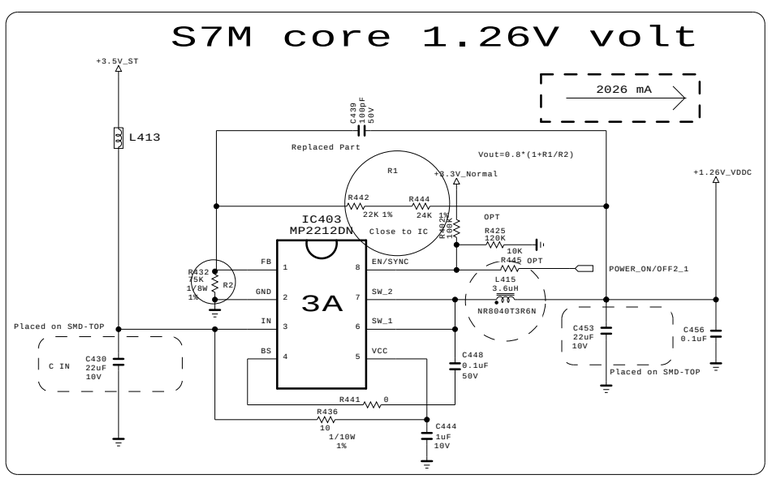
+5V_Normal



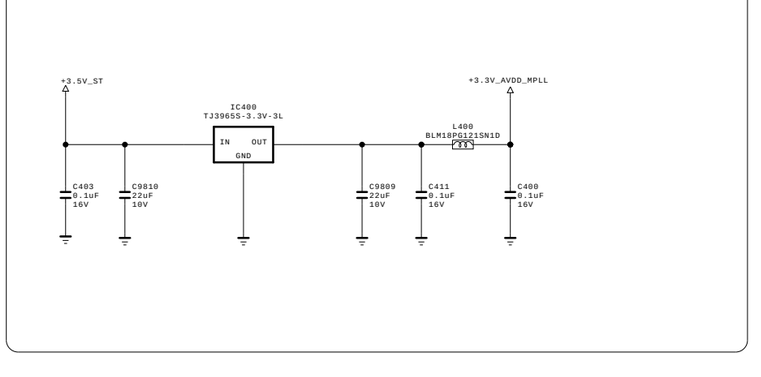
+5V_USB



S7M core 1.26V volt



+3.3V_AVDD_MPLL



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SECRET

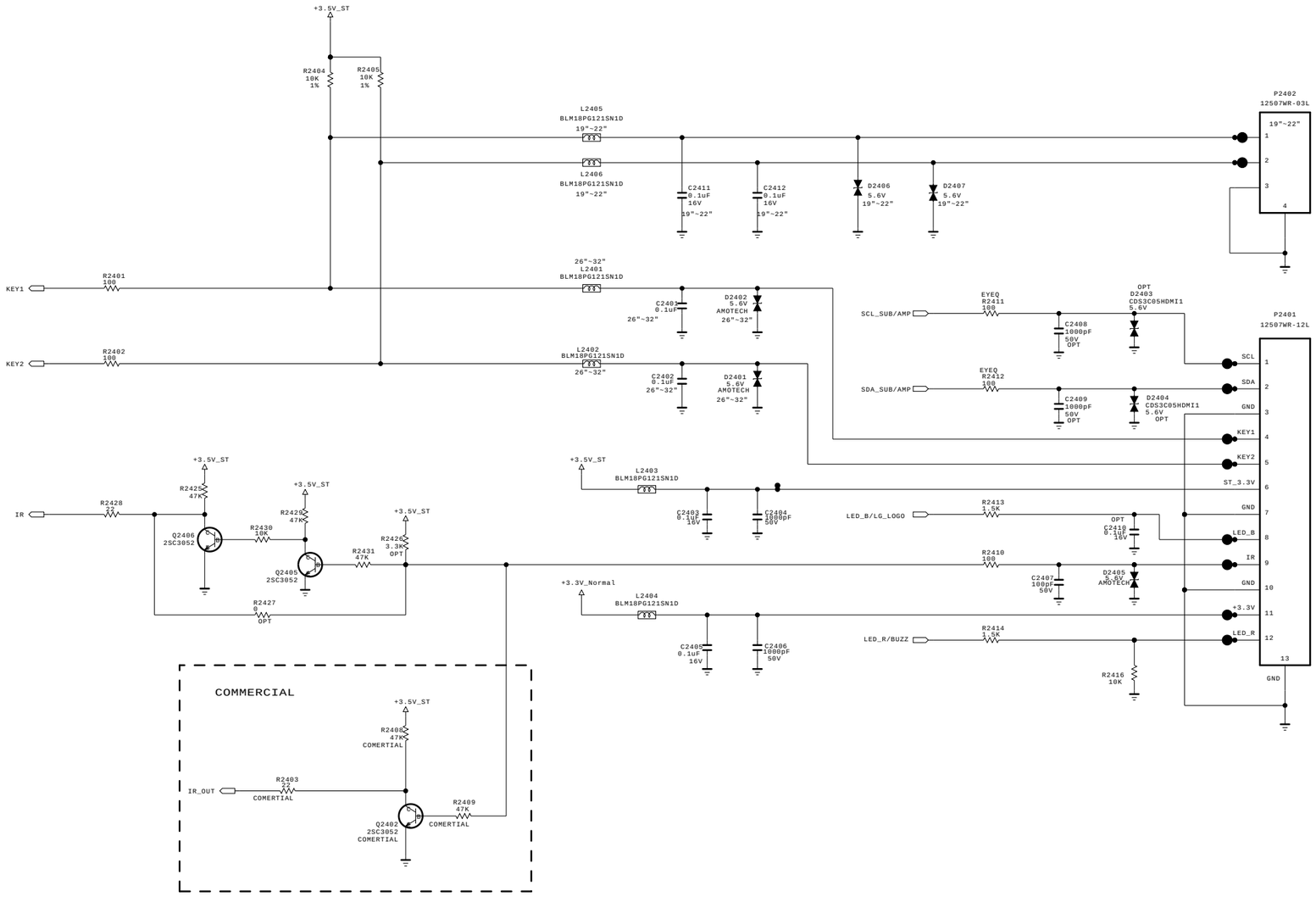
LGElectronics

LG ELECTRONICS

MODEL	LD350	DATE	09.09.03
BLOCK	Power Block	SHEET	2 /

CONTROL

IR & LED



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SECRET

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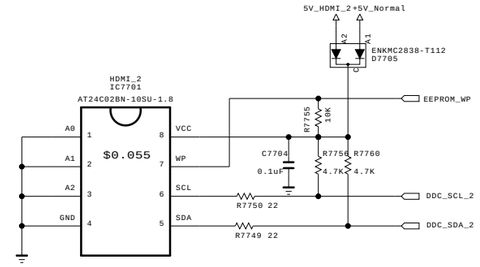
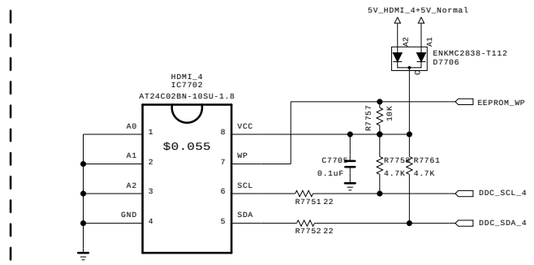
LG ELECTRONICS

MODEL	LD350	DATE	09.09.03
BLOCK	IR & LED	SHEET	6

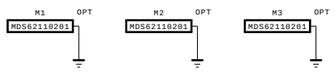
HDMI EEPROM



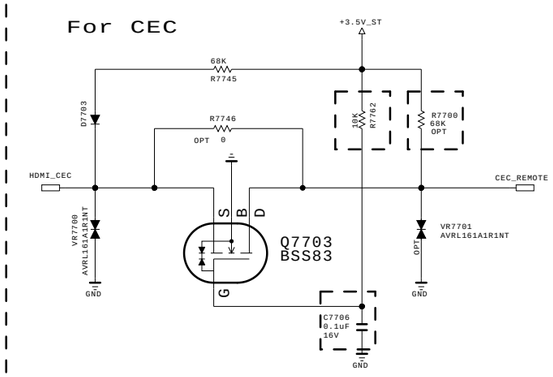


HDMI_2

HDMI_4



For CEC



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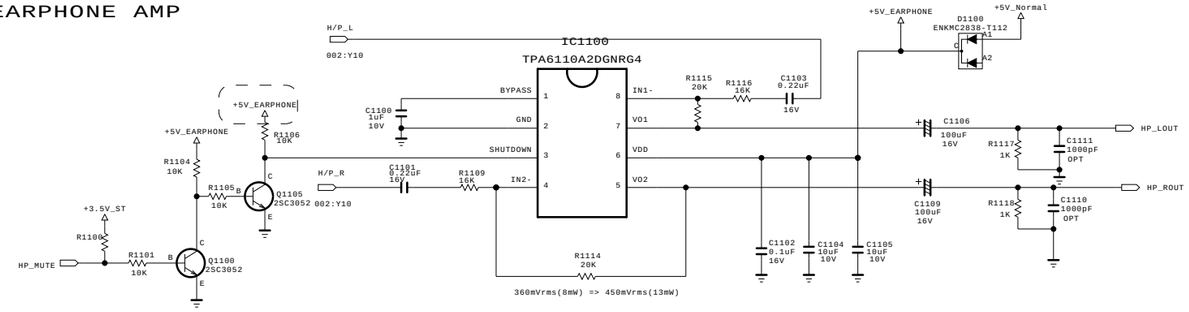
SECRET
LGElectronics

LG ELECTRONICS

MODEL	LD350	DATE	09.09.03
BLOCK	HDMI	SHEET	8

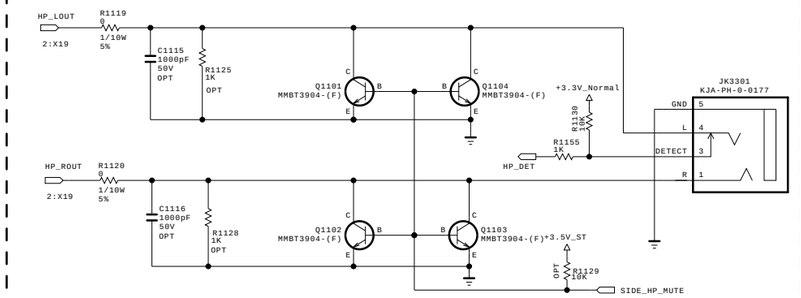
COMMON AREA

EARPHONE AMP

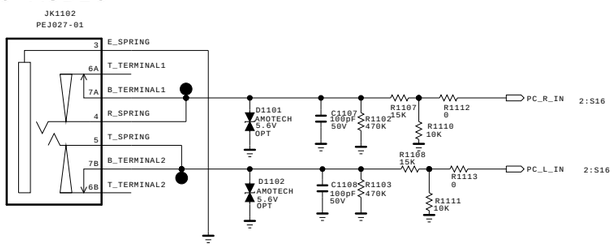


New Item Development

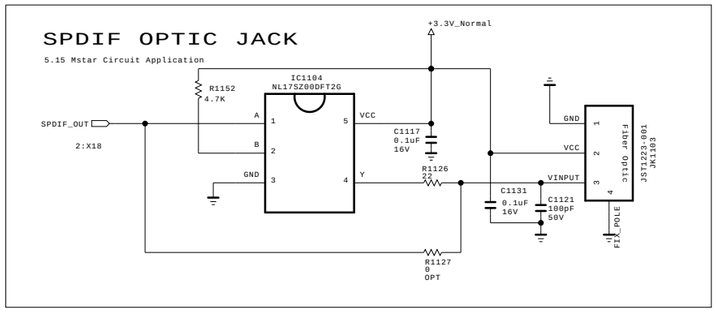
EARPHONE BLOCK



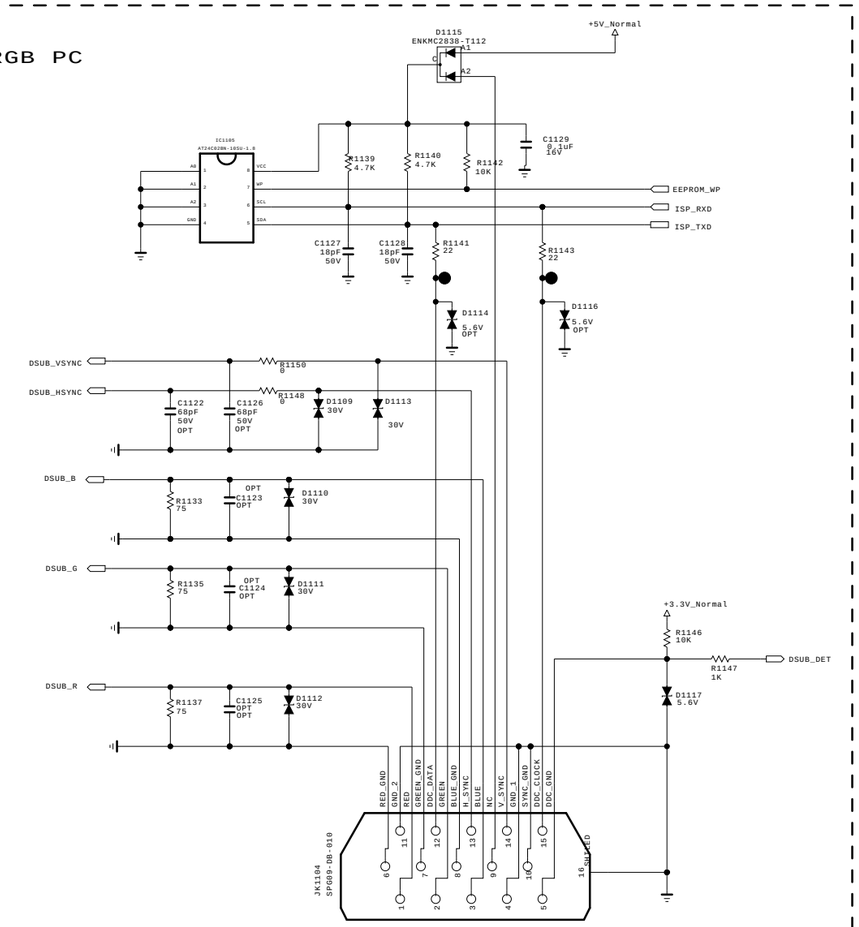
PC AUDIO



SPDIF OPTIC JACK



RGB PC



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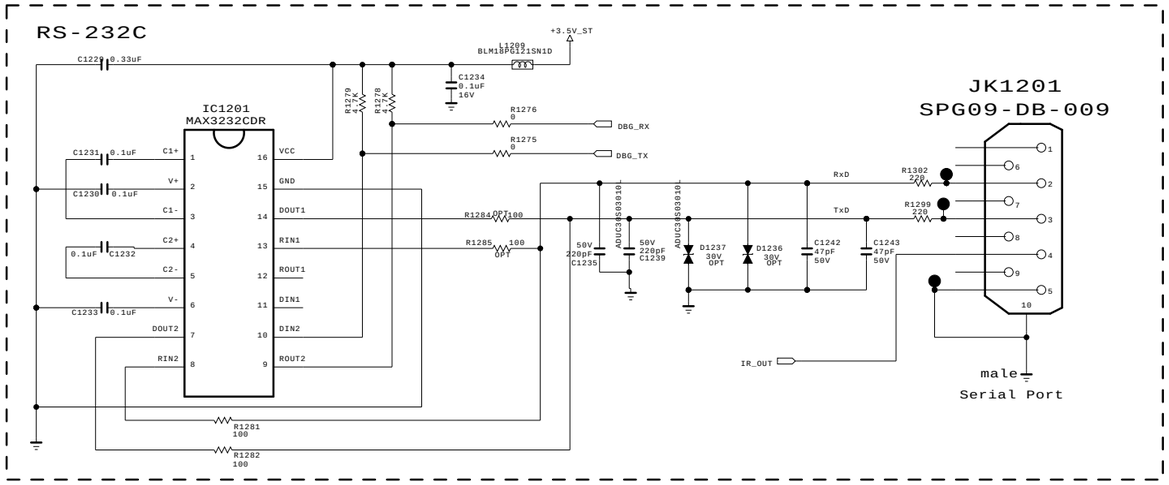
SECRET

LGElectronics

LG ELECTRONICS

MODEL	LD350	DATE	09.09.03
BLOCK	COMMON AREA	SHEET	9



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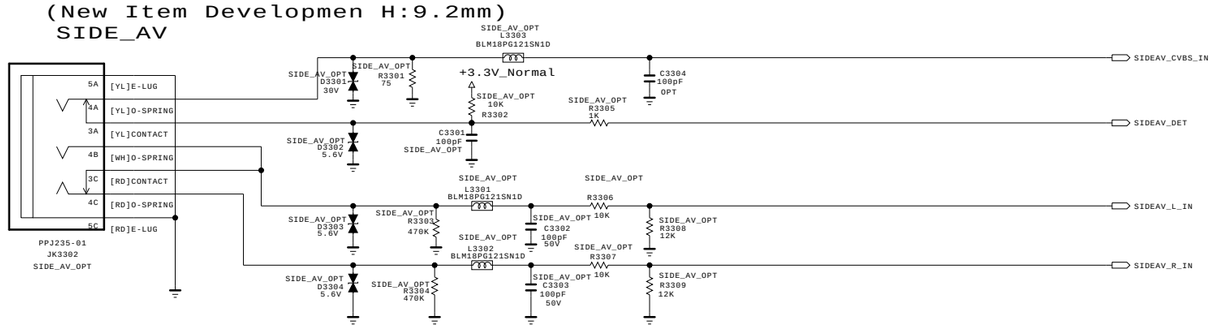
SECRET
LGElectronics

LG ELECTRONICS

MODEL	LD350	DATE	09.09.03
BLOCK	RS-232C	SHEET	10/

(New Item Developmen H:9.2mm)
SIDE_AV



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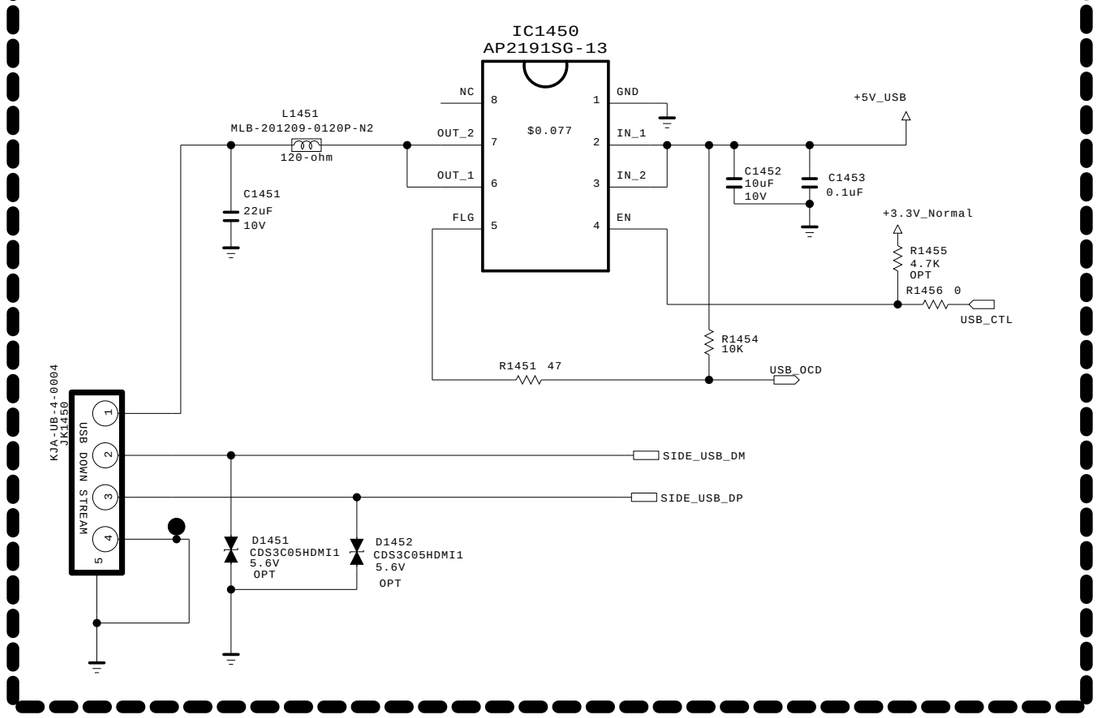
SECRET
LGElectronics

LG ELECTRONICS

MODEL	LD350	DATE	09.09.03
BLOCK	SIDE AV	SHEET	11

USB_DIODES



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SECRET

LGElectronics

LG ELECTRONICS

MODEL	LD350	DATE	09.09.03
BLOCK	USB	SHEET	14

DDR2 1.8V By CAP - Place these Caps near Memory

+1.8V_DDR

L1 BLM18PG121SN1D

C1 0.1uF

C3 10uF

C2 0.1uF

C4 0.1uF

C5 0.1uF

C6 0.1uF

C7 0.1uF

C8 0.1uF

C9 0.1uF

C10 0.1uF

C11 0.1uF

C12 0.1uF

C13 10uF

C14 0.1uF

C15 0.1uF

C16 0.1uF

C17 0.1uF

C18 0.1uF

C19 0.1uF

C20 0.1uF

C21 0.1uF

+1.8V_S_DDR

C22 0.1uF

C23 10uF

C24 0.1uF

C25 0.1uF

C26 0.1uF

C27 0.1uF

C29 0.1uF

C30 10uF

C31 0.1uF

C32 0.1uF

C33 0.1uF

C34 0.1uF

C35 0.1uF

C36 0.1uF

C37 10uF

C38 0.1uF

C39 0.1uF

C41 0.1uF

C42 0.1uF

IC1-*1

A3R12E4JBF-GBE

ZENTEL

IC1

H5PS5162FFR-S6C

HYNIX

+1.8V_S_DDR

R4 1K 1%

R5 1K 1%

C2 1000pF

C4 0.1uF

R23 1K 1%

R24 1K 1%

C16 0.1uF

C18 1000pF

IC100

MSD3159GV

+1.8V_S_DDR

R47 1K 1%

R44 1K 1%

C40 0.1uF

C42 1000pF

IC2

H5PS5162FFR-S6C

HYNIX

IC2-*1

A3R12E4JFF-GBE

ZENTEL

+1.8V_S_DDR

SDDR_D[0-15]

ADDR2_A[0-12]

ADDR2_D[0-15]

BDDR2_A[0-12]

BDDR2_D[0-15]

TDDR_A[0-12]

TDDR_D[0-15]

R48 0 OPT

R51 0 OPT

R45 0 OPT

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SECRET

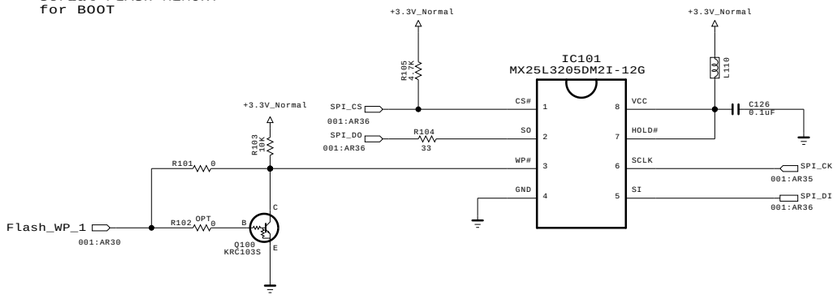
LGElectronics

HONG YEON HYUK

LG ELECTRONICS

MODEL	LD350	DATE	09.09.03
BLOCK	DDR2	SHEET	21

Serial FLASH MEMORY for BOOT



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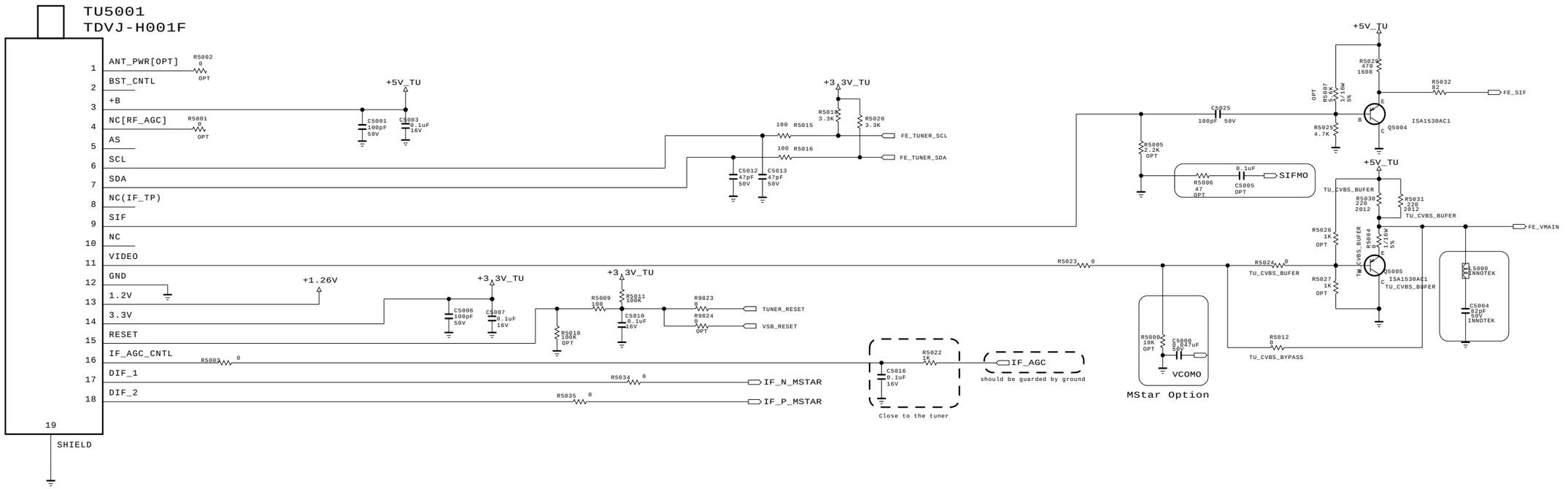
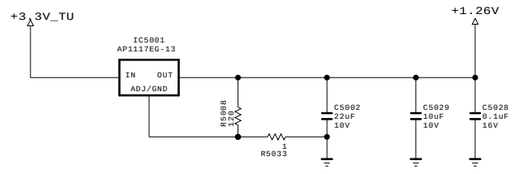
LG ELECTRONICS

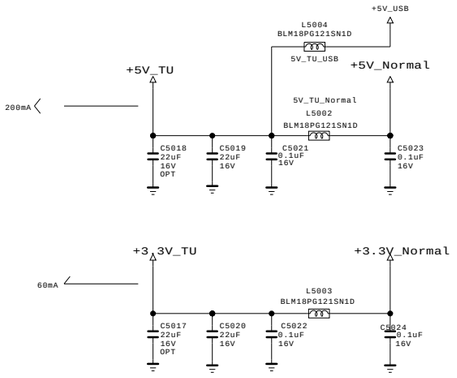
MODEL	LD350	DATE	09.09.03
BLOCK	SERIAL FLASH	SHEET	21

SERIAL_FLASH

LGIT CAN H/N TUNER for US







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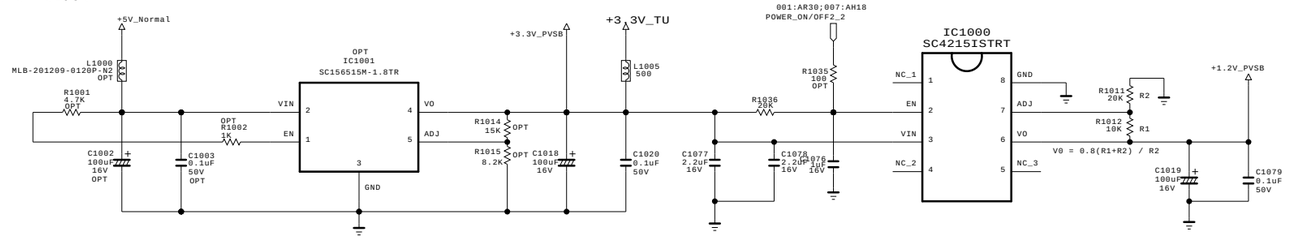
LGElectronics

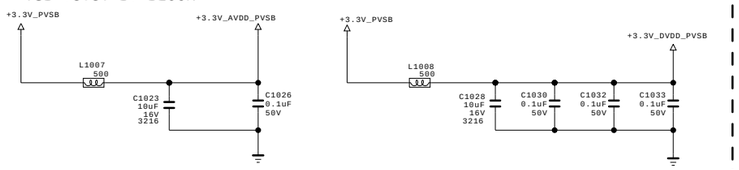
LG ELECTRONICS

MODEL	LD350	DATE	09.09.03
BLOCK	ATSC_CAN_TUNER	SHEET	26

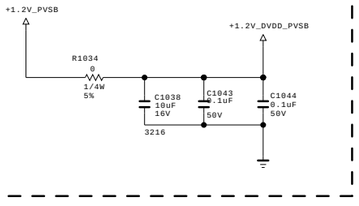
VSB B+ BLOCK

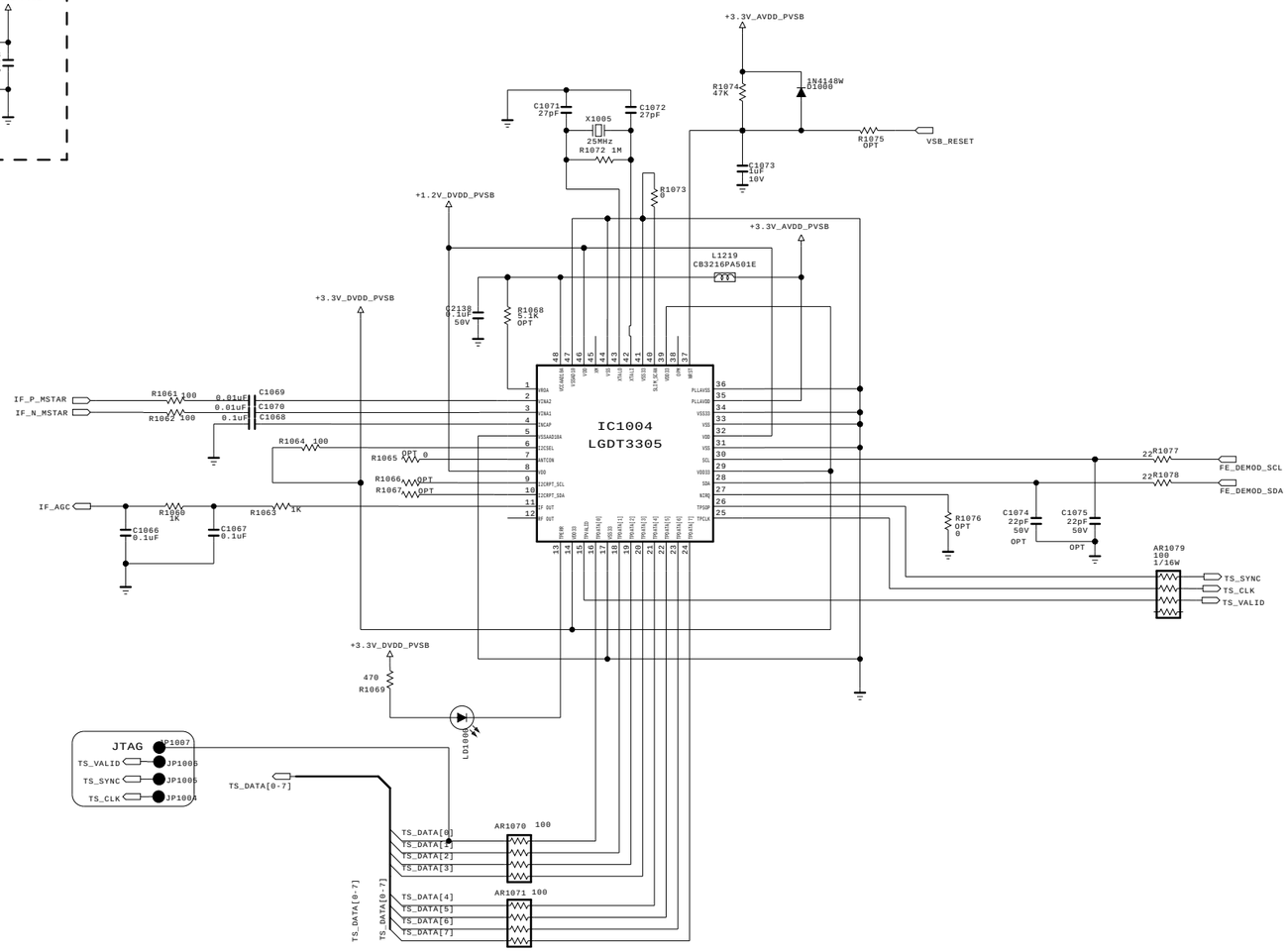


VSB +3.3V B+ BLOCK



VSB +1.0V B+ BLOCK





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SECRET

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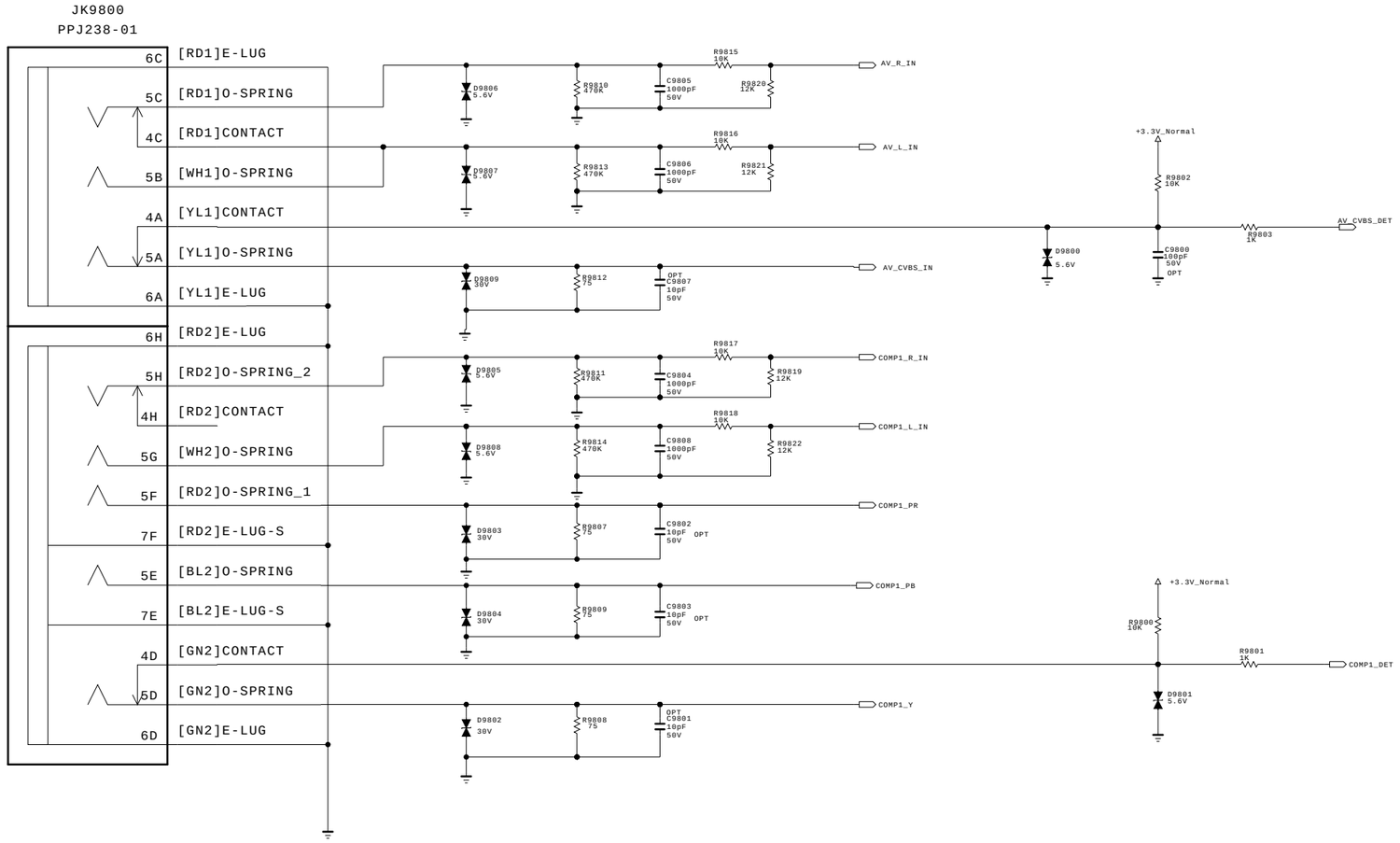
LG ELECTRONICS

MODEL	LD350	DATE	09.09.03
BLOCK	VSB_DEMOD	SHEET	28



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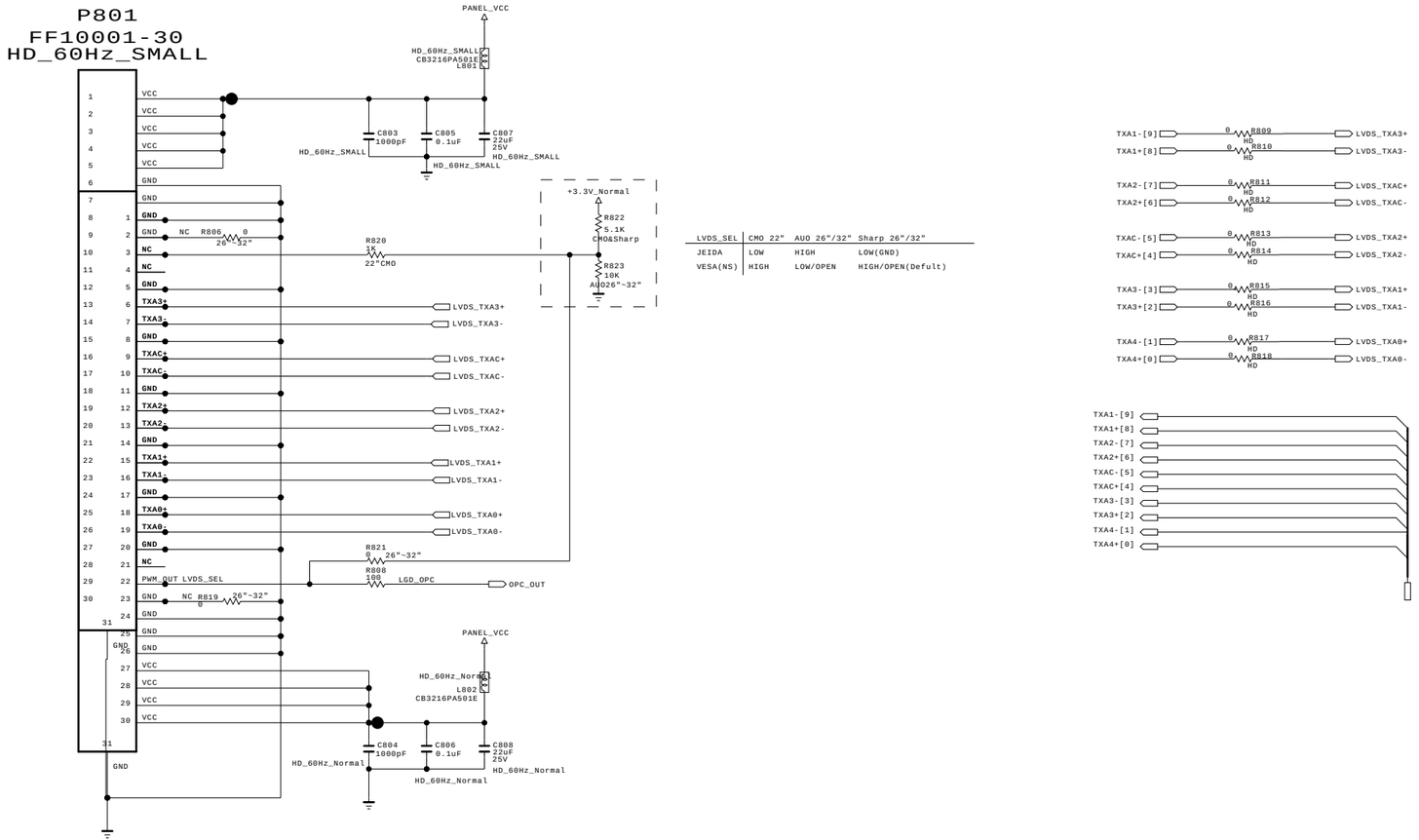
SECRET
LGElectronics

LG ELECTRONICS

MODEL	LD350	DATE	09.09.03
BLOCK	COMPONENT&AV	SHEET	31



P802
FF10001-30
HD_60Hz_Normal

[30Pin LVDS Connector]
(For HD 60Hz_Normal)

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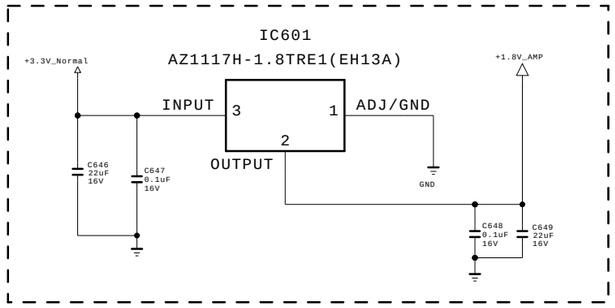
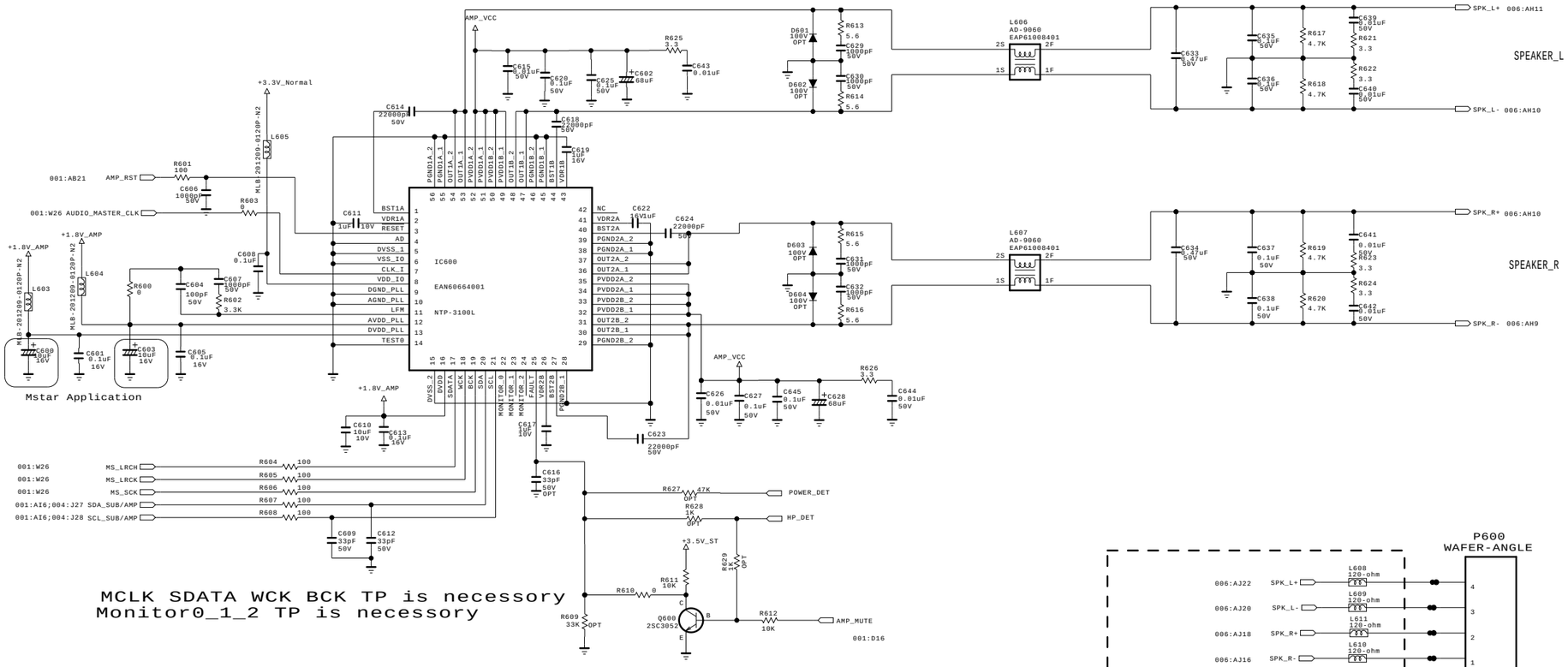
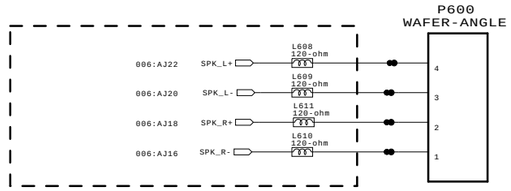
SECRET
LGElectronics

LG ELECTRONICS

MODEL	LD350	DATE	09.09.03
BLOCK	LVDS	SHEET	32







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

SECRET
LGElectronics

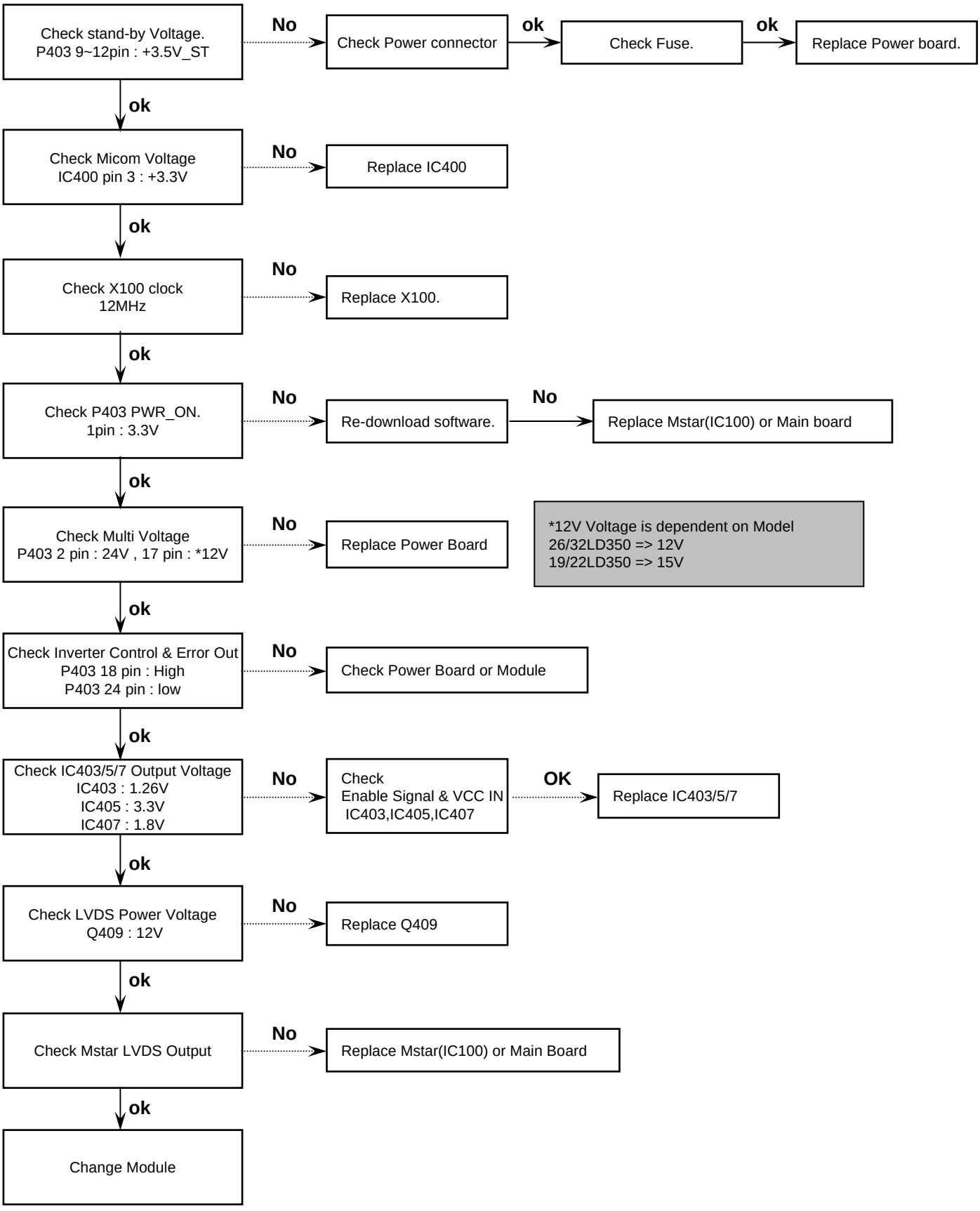
KIM JONG HYUN

LG ELECTRONICS

MODEL	Mstar(MERCURY)	DATE	09.02.19
BLOCK	Audio Amp	SHEET	3/14

LG Electronics Inc.

1. Power-up boot check



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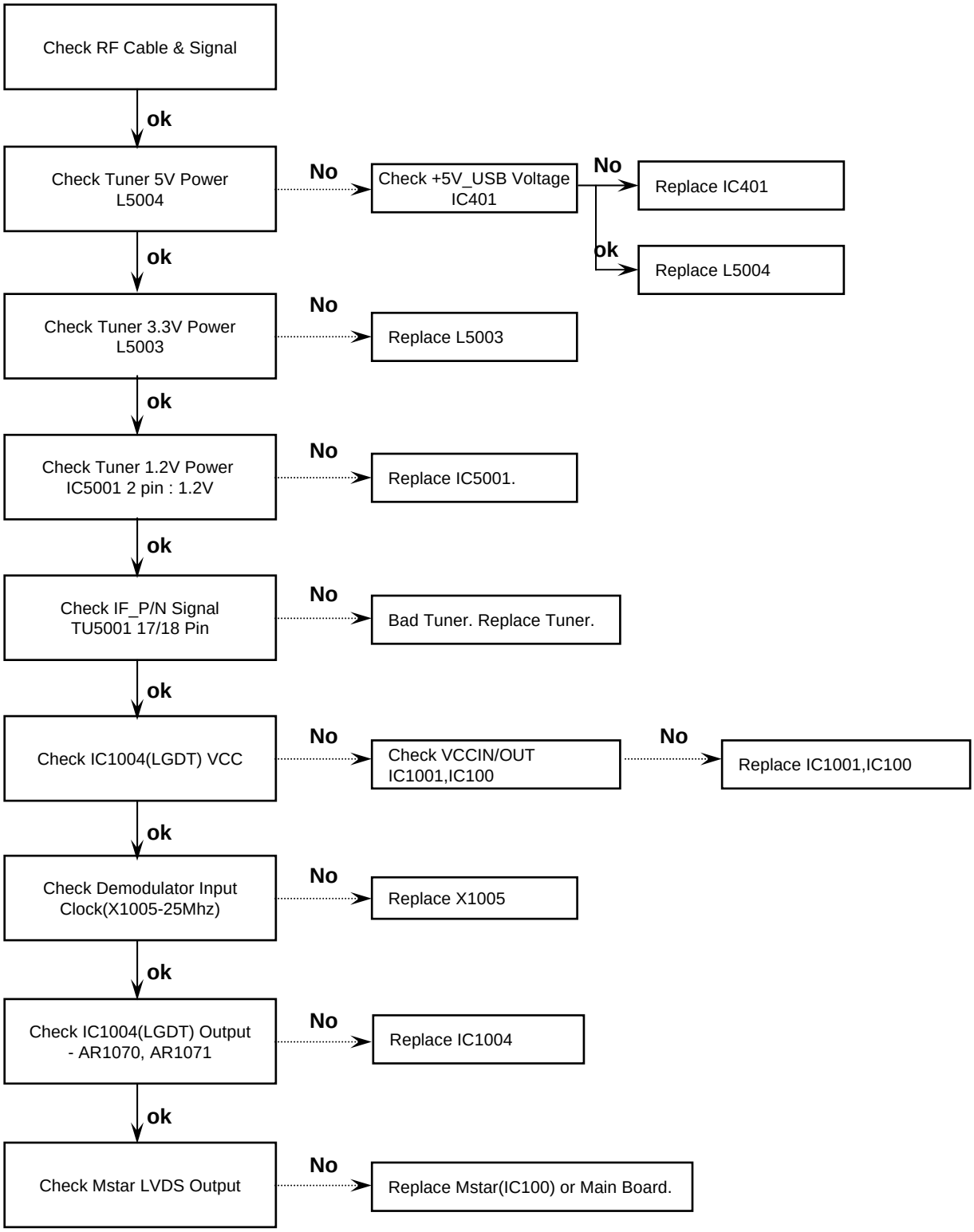
2. Digital TV Video



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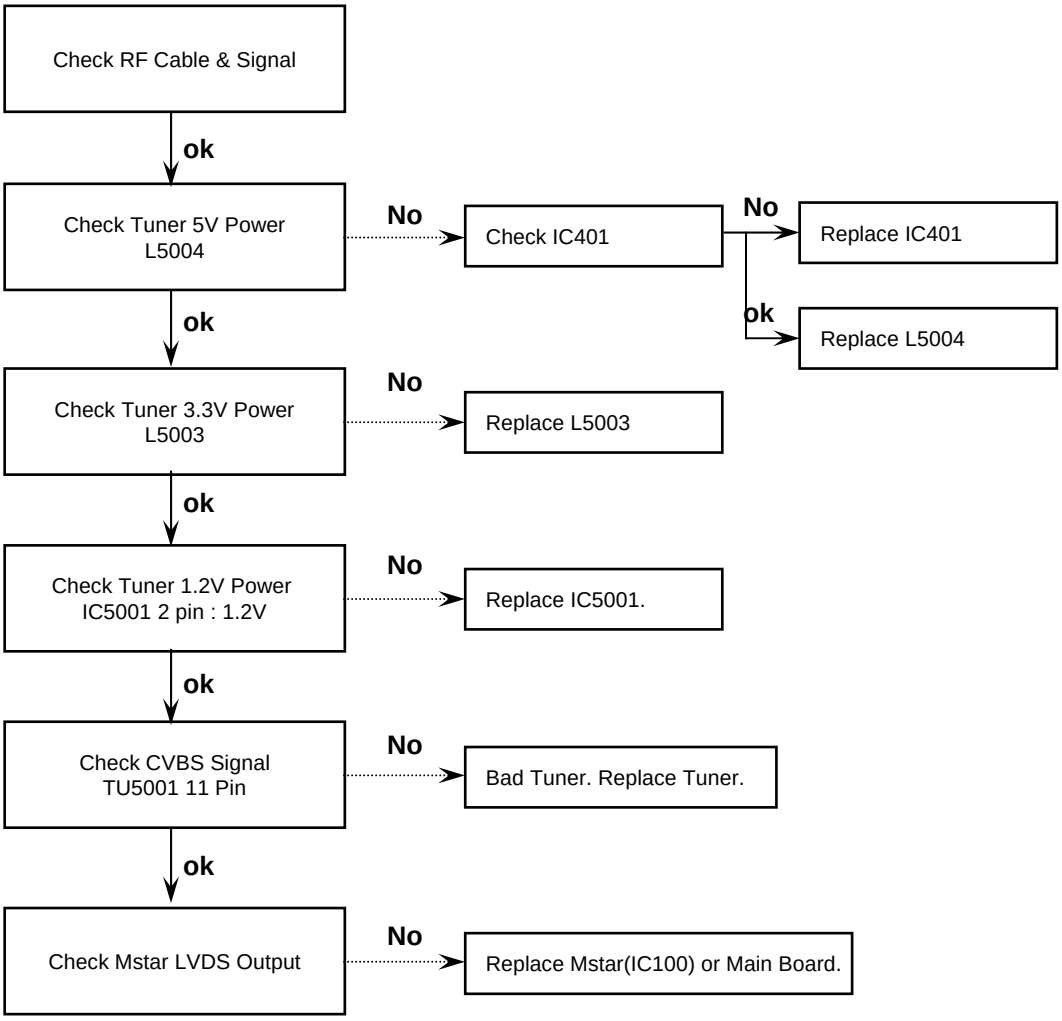
3. Analog TV Video



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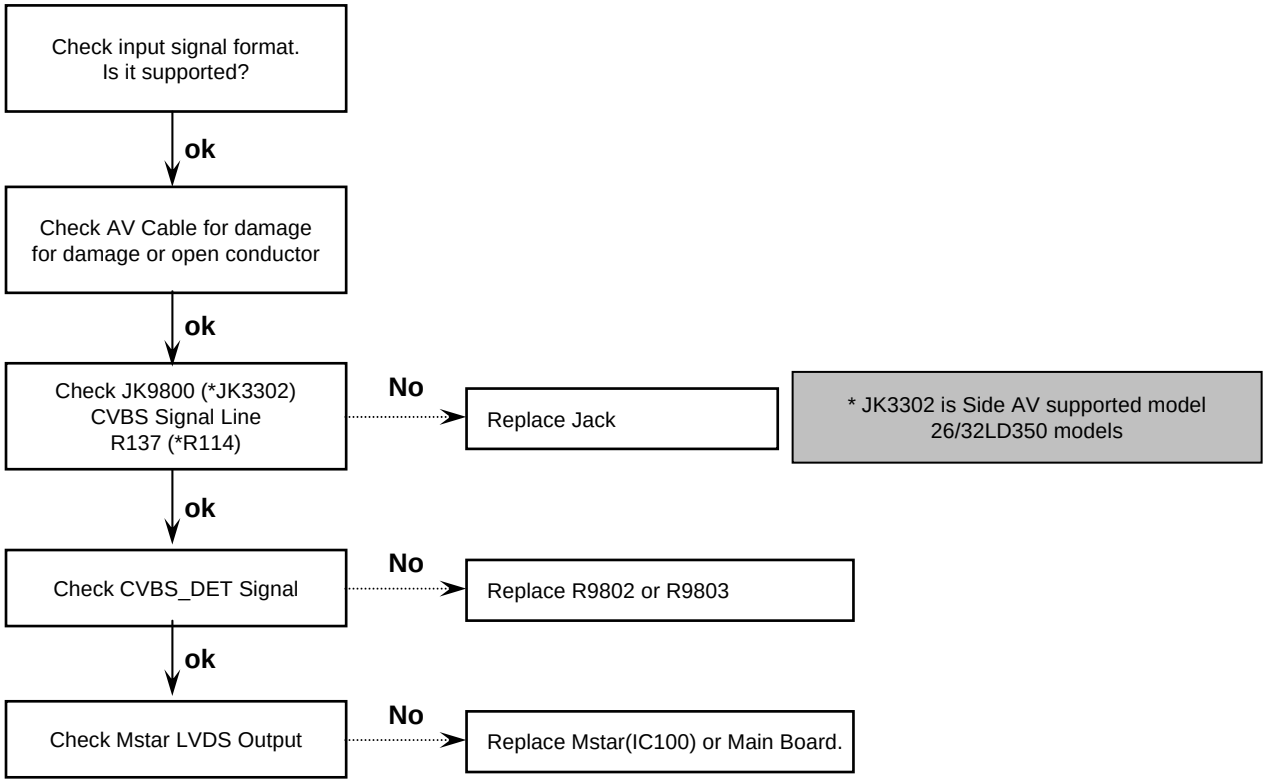
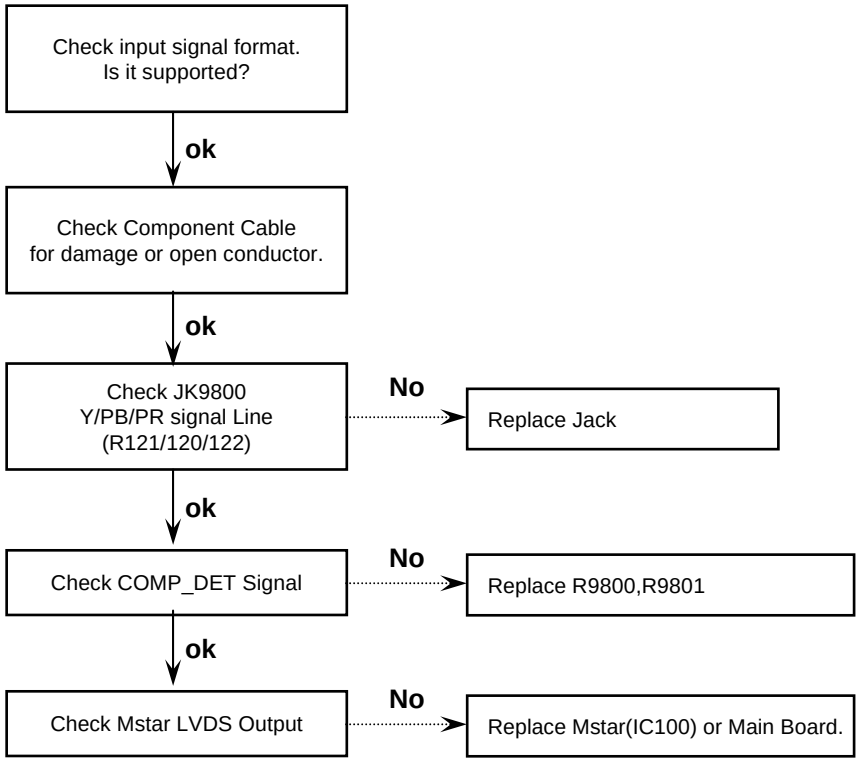
4. AV Video



5. Component Video



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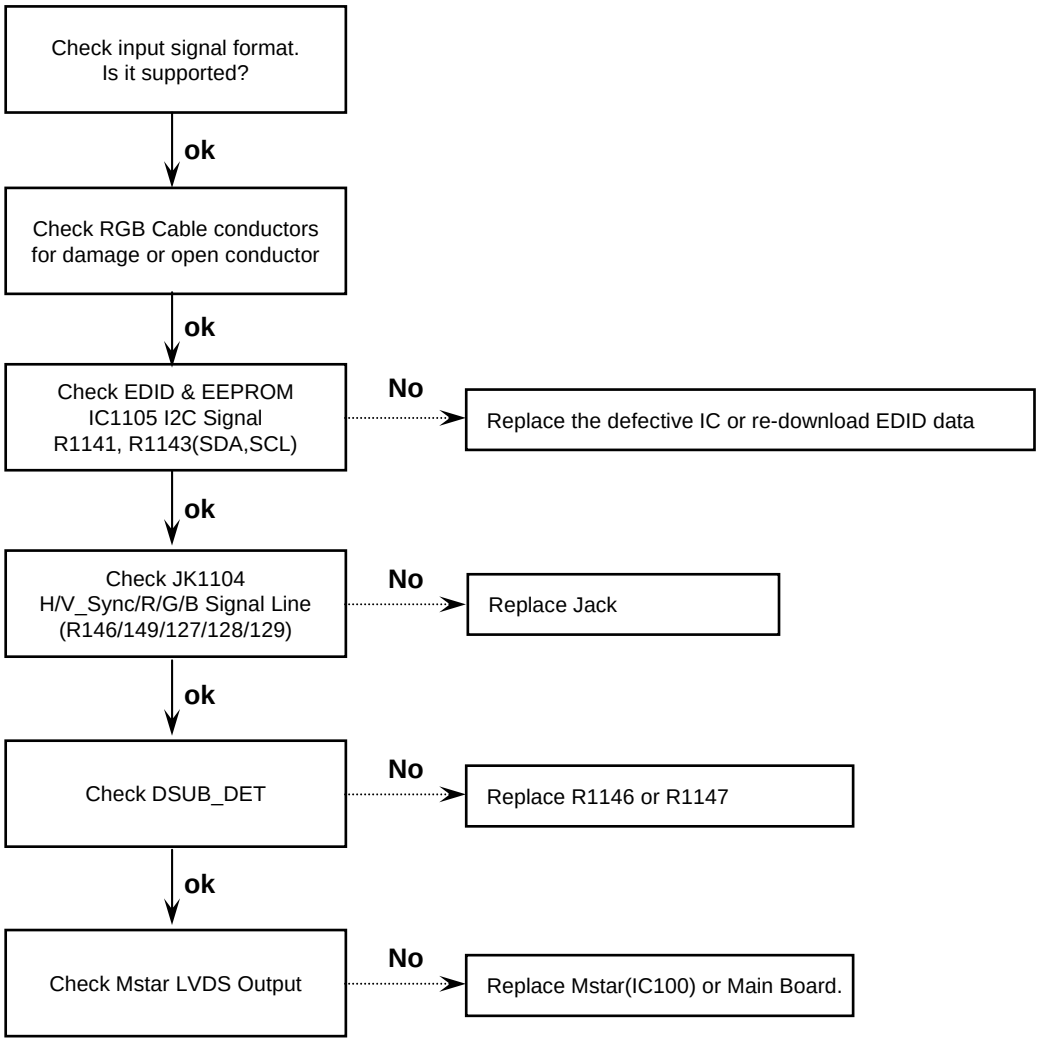
6. RGB Video



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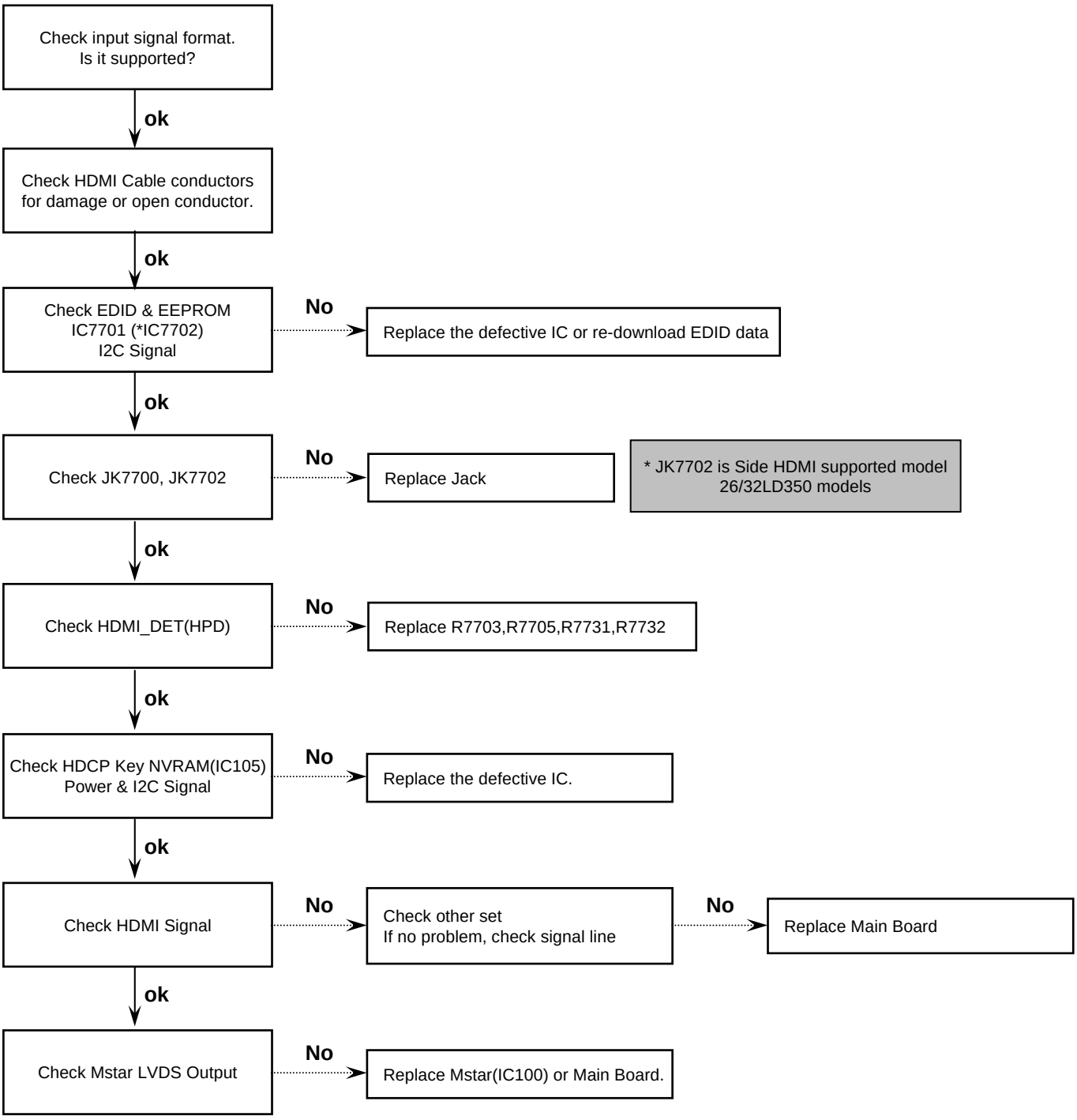
7. HDMI Video



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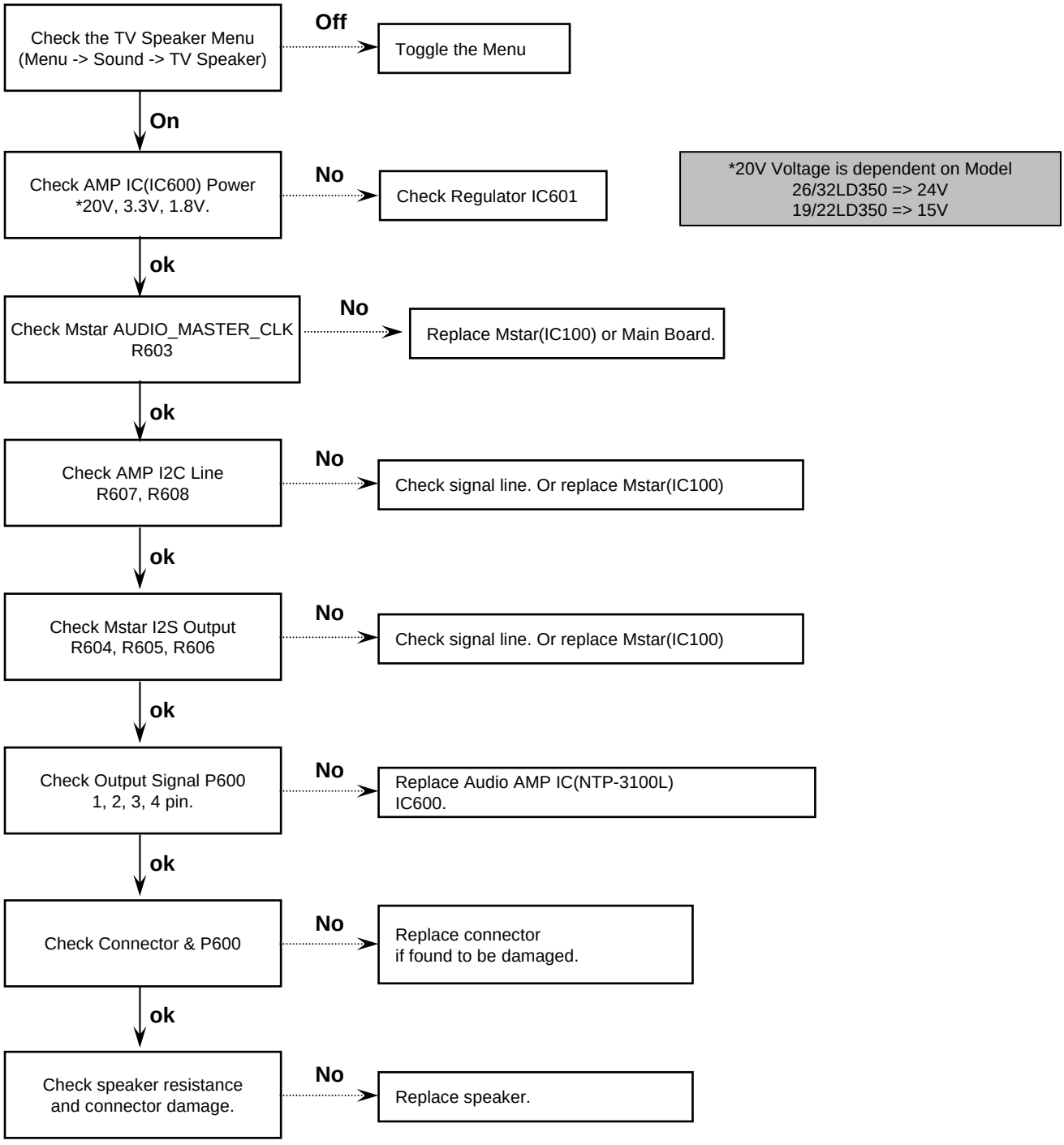
8. All Source Audio



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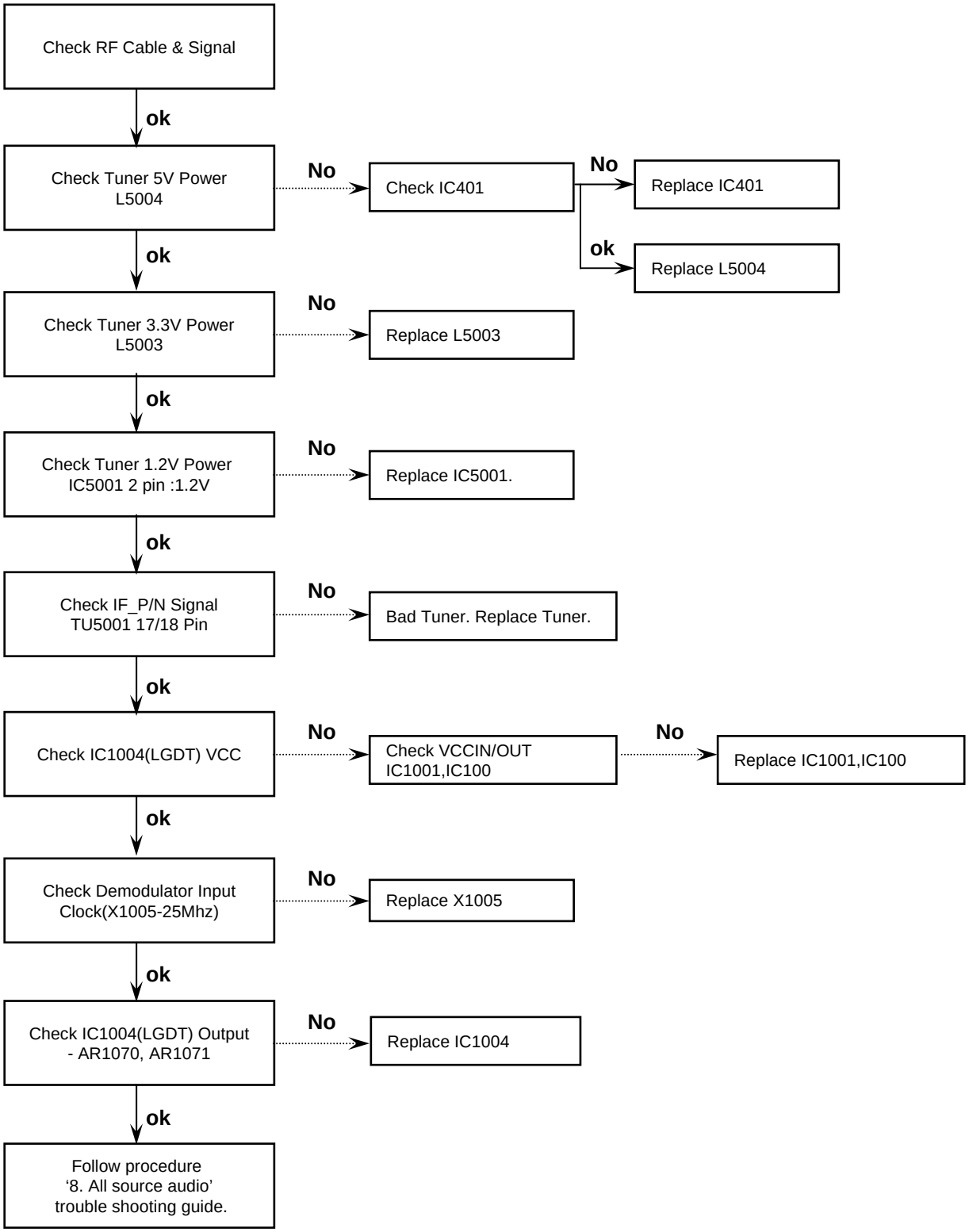
9. Digital TV Audio



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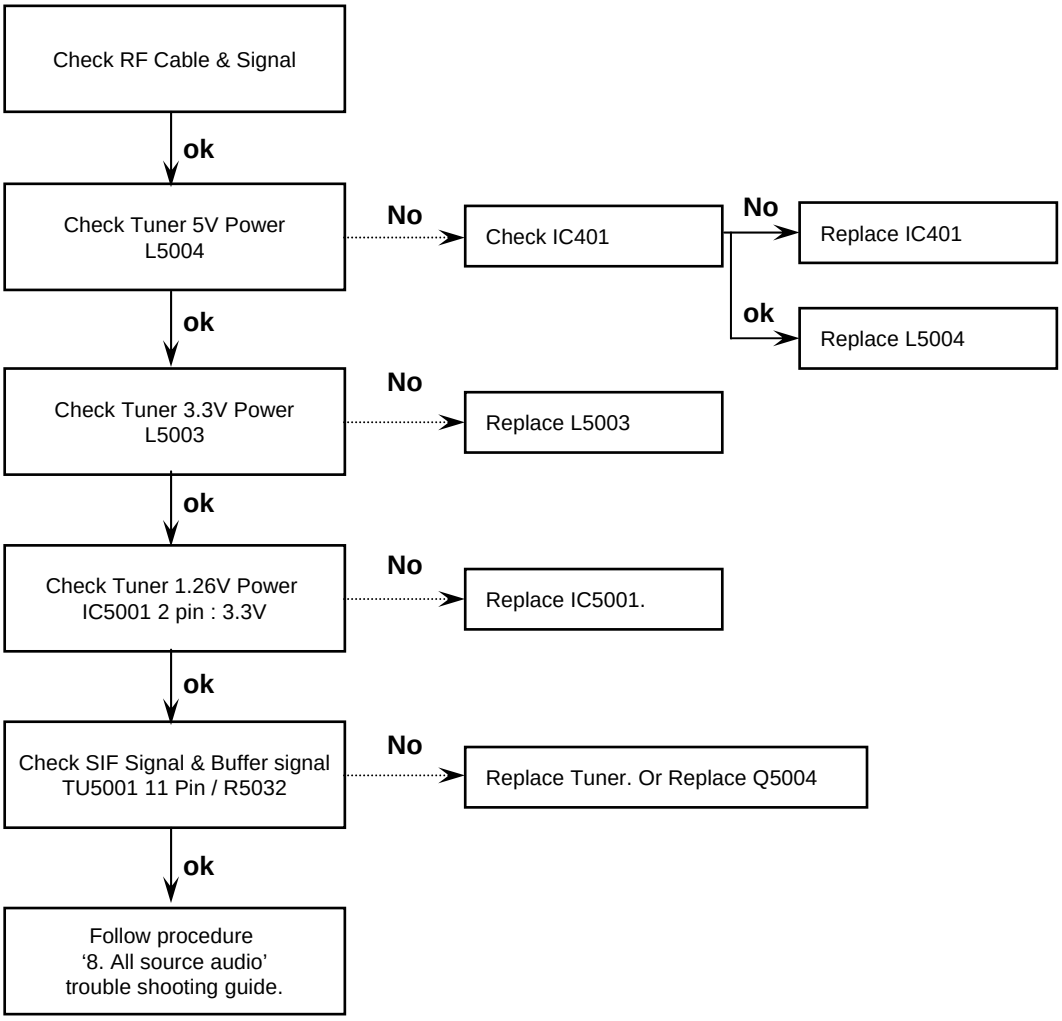
10. Analog TV Audio



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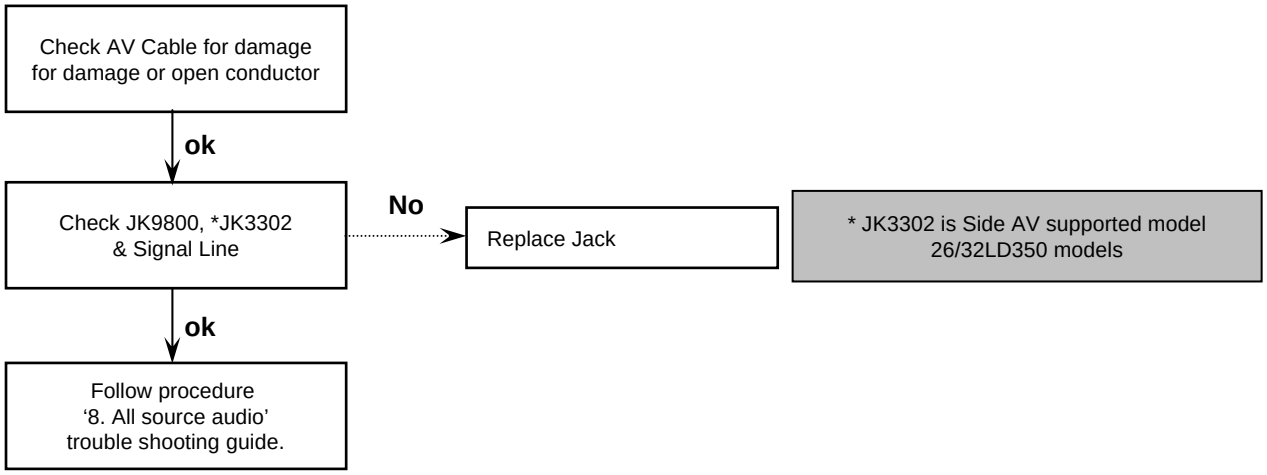
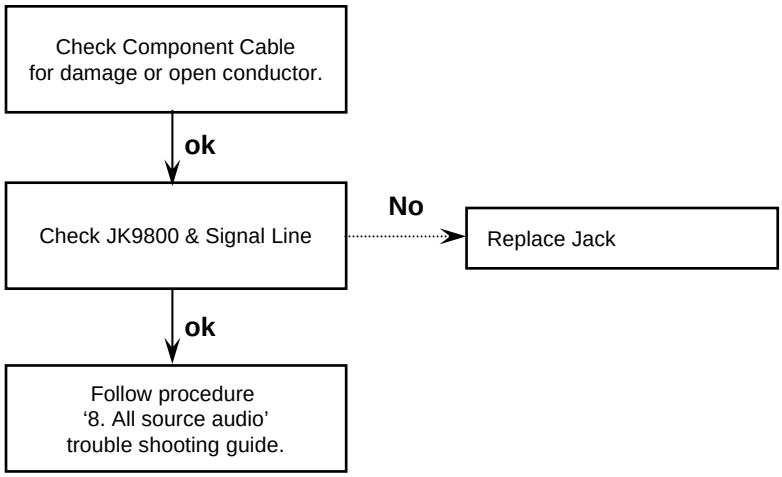
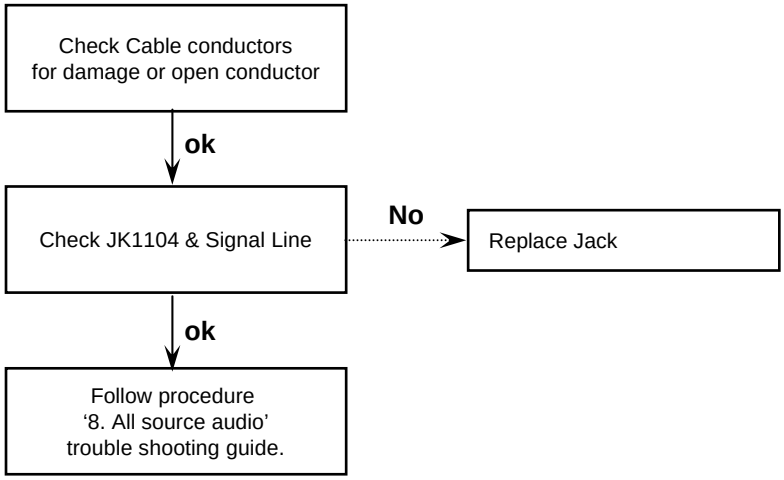
11. AV Audio



12. Component Audio



13. RGB Audio



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LD350 Block Diagram

< Contents >

- Overall Block Diagram
- Video Signal Block
- Audio Signal Block
- Flash Block & Reset
- MSD3368 I2C Block
- MSD3368 GPIO Block
- LVDS 출력 Block
- POWER Block

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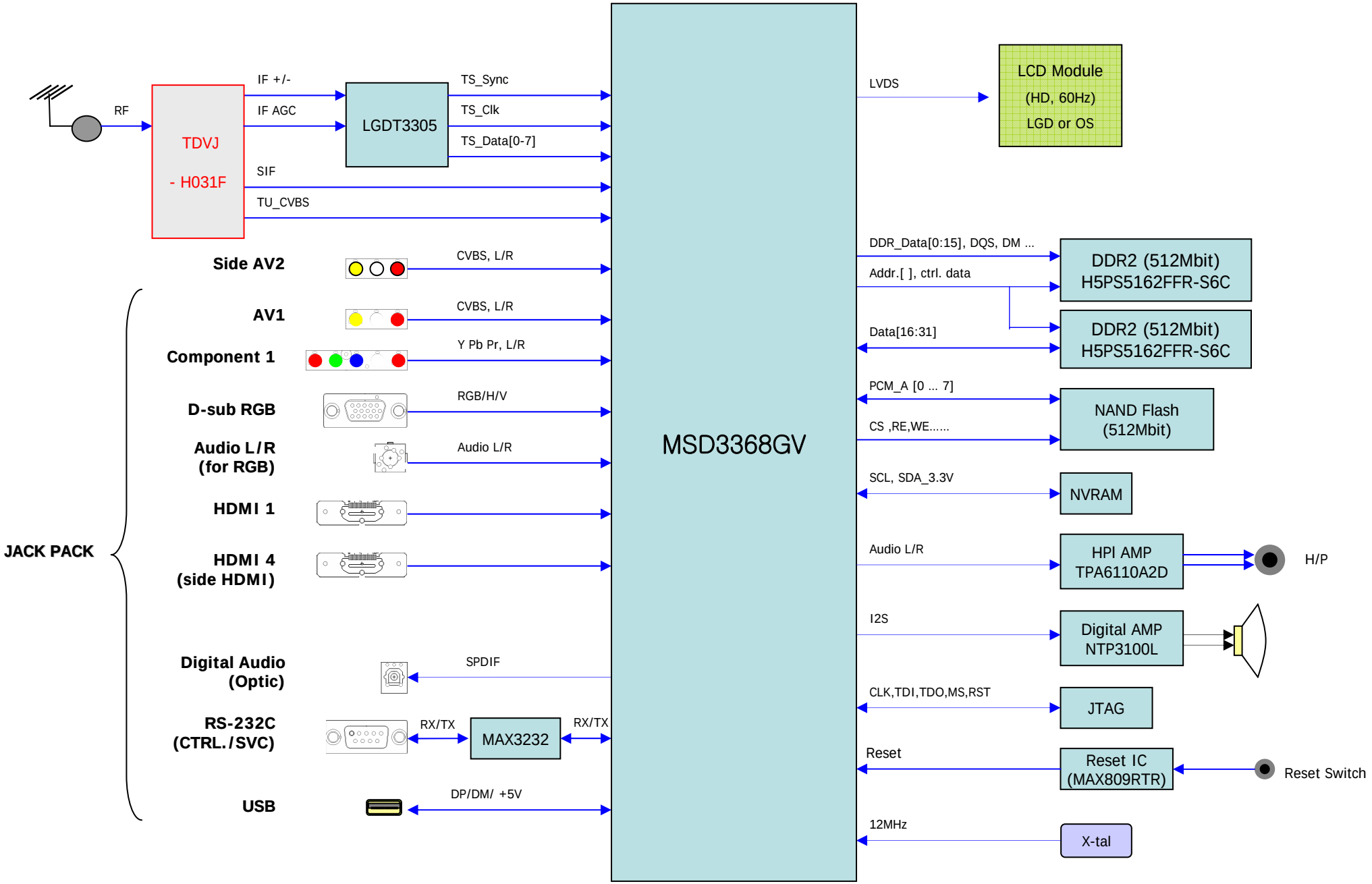

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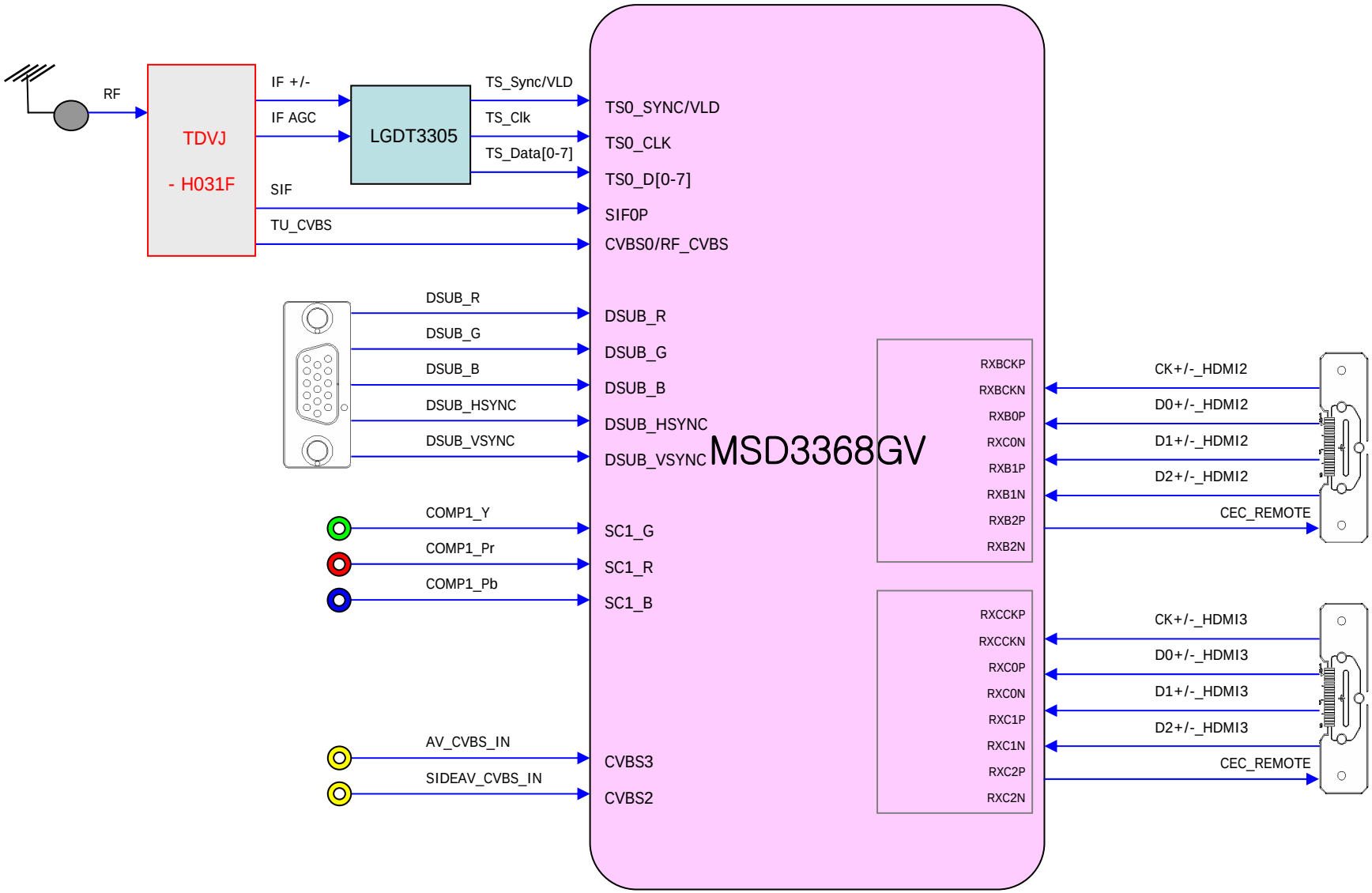
Video Signal Block



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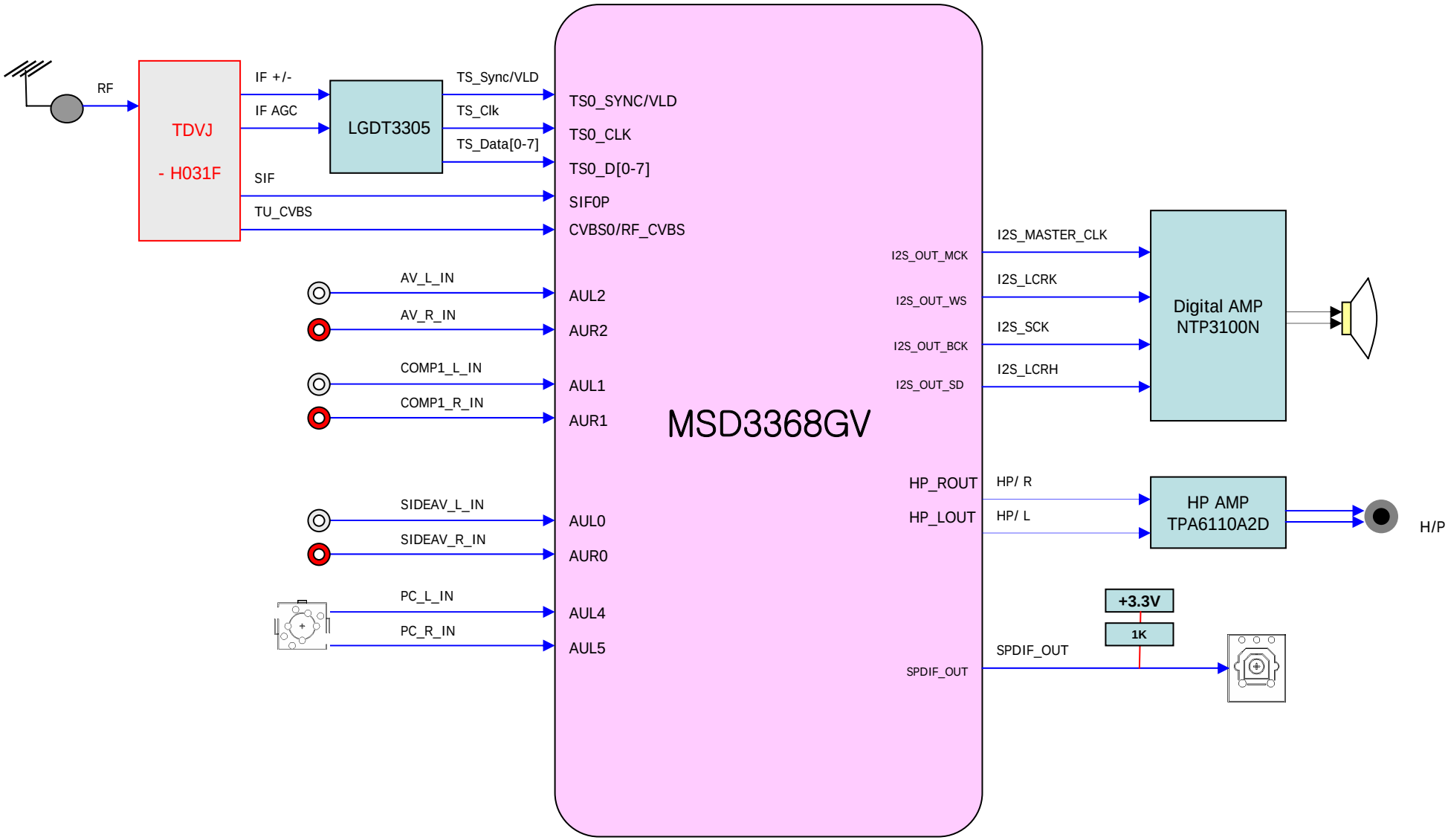
Audio Signal Block



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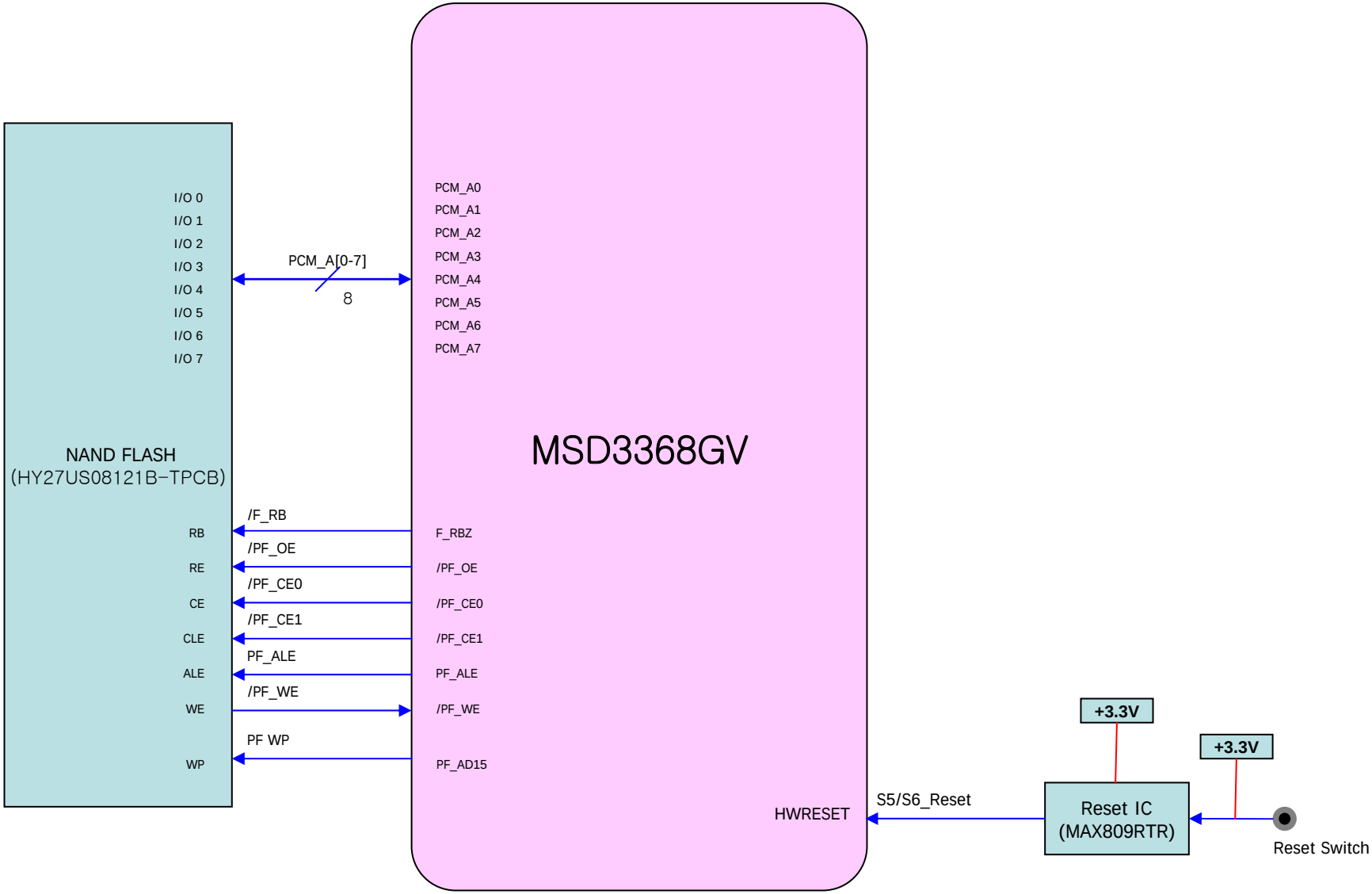
Flash Block & Reset



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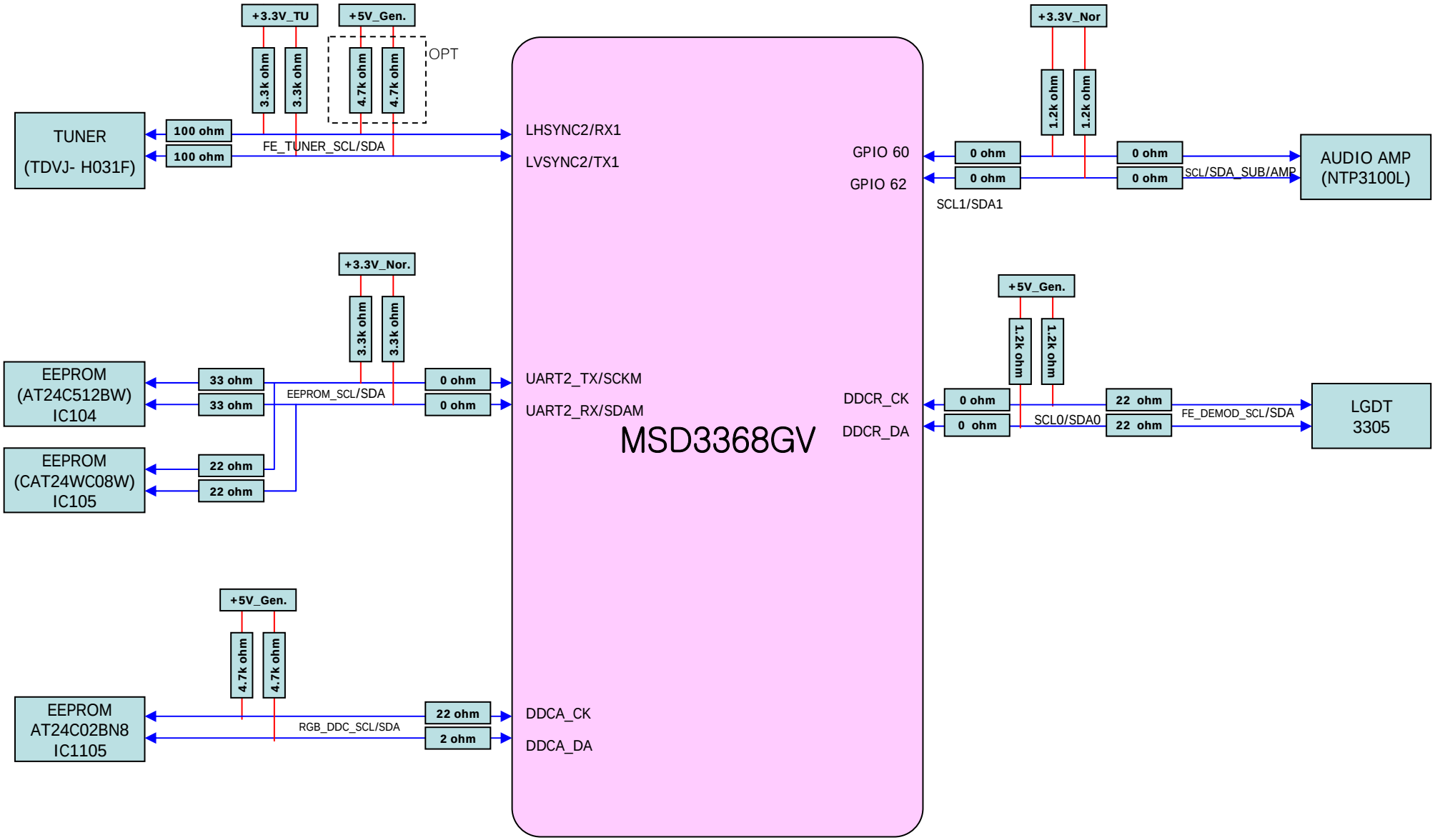
I2C Block



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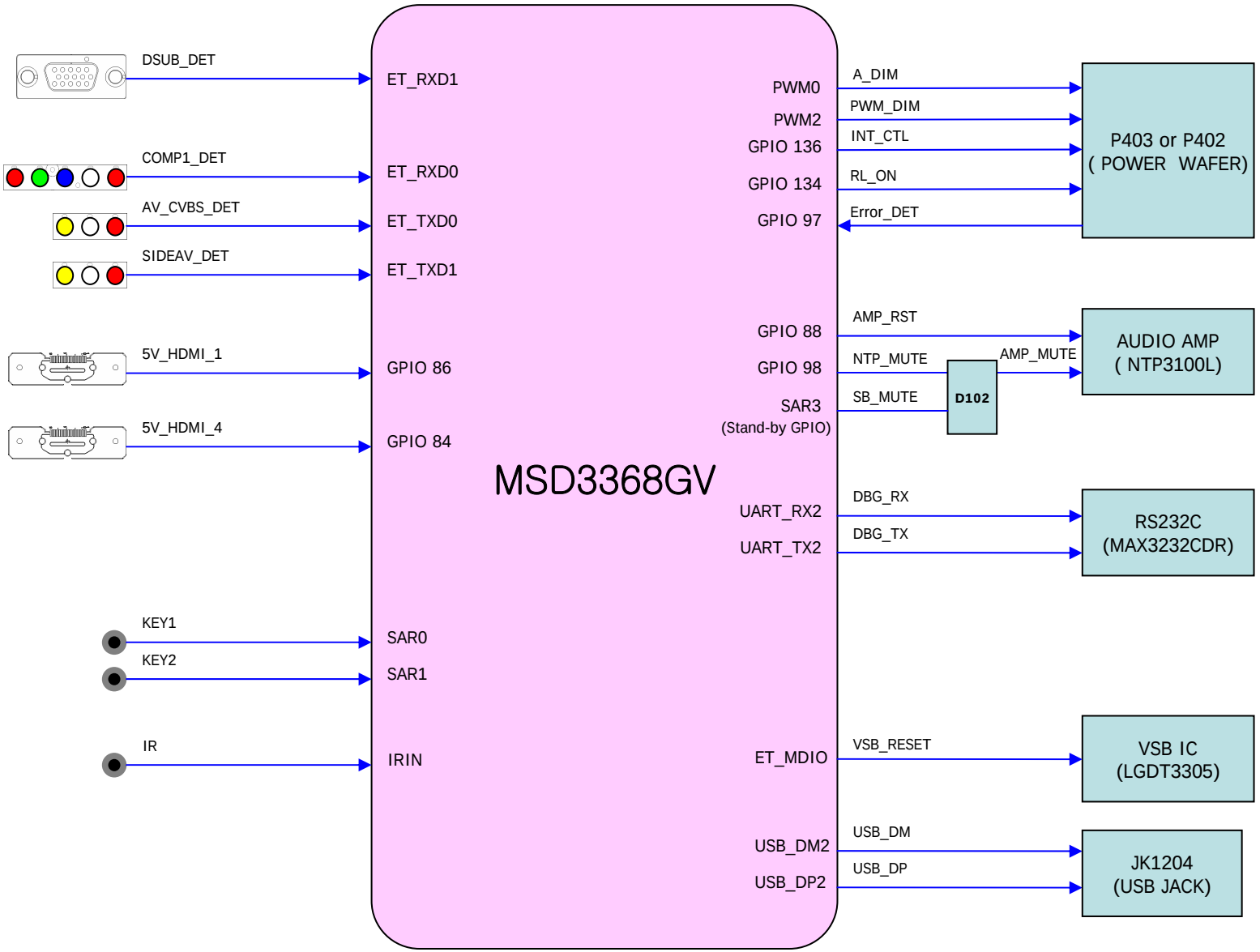
GPIO Block



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MSD3368 GPIO Block

	Pin Number	Pin Name	GP1.5 Signal Name(Ver3)
1	HWRESET	D4	S5/S6_Reset
34	UART2_TX_SCKM	F8	EEPROM_SCL
35	UART2_RX/SDAM	D11	EEPROM_SDA
36	DDCR_DA	AB21	SDA0
37	DDCR_CK	AC21	SCL0
38	DDCA_CLK	J1	ISP_RXD
39	DDCA_DA	J2	ISP_TXD
40	UART_RX2	W5	DBG_RX
41	UART_TX2	V5	DBG_TX
42	PWM0	AB13	PWM0
43	PWM1	AB12	PWM1
44	PWM2	AD12	PWM2
45	PWM3	AA13	PWM3
46	SAR0	A4	KEY1
47	SAR1	B4	KEY2
48	SAR2	F4	LED_R/Buzz
49	SAR3	E4	SB_MUTE
50	IRIN	C4	IR
51	GPIO44	AC11	OPT
52	GPIO96	D9	OPT
53	GPIO88	D10	AMP_RST
54	GPIO90/I2S_OUT_MUTE	D7	HD&19/22LH&19LU,(FHD)
55	GPIO91	E11	Moving LED,(Normal LED)
56	GPIO97	E8	ERROR_OUT
57	GPIO98	E10	NTP_MUTE
58	GPIO99	D6	+3.3V_ST,(OPT)
59	GPIO103/I2S_OUT_SD3	D5	BIT_SEL
60	GPIO102	C5	OLP
61	GPIO68	B8	HP_MUTE
62	GPIO67	A7	USB_CTL
63	ET_COL	A11	SIDE_HP_MUTE
64	ET_MDIO	B9	VSB_RESET,
65	ET_MDC	A10	
66	ET_TX_EN	B10	EEPROM_WP
67	ET_RXD1	C9	DSUB_DET
68	ET_RXD0	C11	COMP1_DET
69	ET_TX_CLK	A9	HP_DET
70	ET_TXD1	B11	SIDEAV_DET
71	ET_TXD0	C10	AV_CVBS_DET

	Pin Number	Pin Name	GP1.5 Signal Name(Ver3)
72	TS1_CLK	AA19	OPT
73	TS1_VLD	AC19	OPT
74	TS1_SYNC	AA20	OPT
75	TS1_D0	AB19	OPT
76	TS0_CLK	AB4	TS_CLK
77	TS0_VLD	AD5	TS_VALID
78	TS0_SYNC	AC4	TS_SYNC
79	GPIO43/PCM2_IRQA_N	AF10	OPT
80	GPIO42/PCM2_CE_N	AF5	TUNER RESET
81	UART1_TX/GPIO87	B6	5V_HDMI_DET_2
82	UART1_RX/GPIO86	A6	5V_HDMI_DET_1
83	UART2_TX/GPIO85	F10	USB_OCD
84	UART2_RX/GPIO84	F9	5V_HDMI_DET_4
85	GPIO79/LVSYNC2/TX1	C6	FE_TUNER_SDA
86	LVSYNC/GPIO133	AC18	OPC_EN
87	LHSYNC2/I2S_OUT_MUTE/RX1	E7	FE_TUNER_SCL
88	GPIO62/PCM2_CD_N/TX1	AA17	SCL1
89	GPIO60/PCM2_RESET/RX1	AA18	SDA1
90	GPIO132/LHSYNC/SPI_WPn	AF11	Flash_WP_1
91	GPIO130/LCK	AB17	Power on/off2-2
92	GPIO131/LDE/SPI_WPn1	AC17	Power on/off2-1
93	GPIO_PM6/INT2/GPIO140	H6	POWER_DET
94	GPIO_PM5/INT1/GPIO139	G6	DBG_RX
95	GPIO_PM4/GPIO138	F6	POWER_ON/OFF1
96	GPIO_PM3/GPIO137	H5	PANEL_CTL
97	GPIO_PM2/GPIO136	G5	INV_CTL
98	GPIO_PM1/GPIO135	F5	DBG_TX
99	GPIO_PM0/GPIO134	E5	RL_ON
100	USB_DP_2	AB10	.
101	USB_DM_2	AC10	.
102	USB_DM_1	A5	SIDE_USB_DM
103	USB_DP_1	B5	SIDE_USB_DP
104	SPI_CK	AD11	SPI_CK
105	/SPI_CS	AE12	SPI_CS
106	SPI_DO	AF12	SPI_DO
107	SPI_DI	AE11	SPI_DI
108	TESTPIN/GND	E6	.
109	XOUT	A3	.
110	XIN	B3	.

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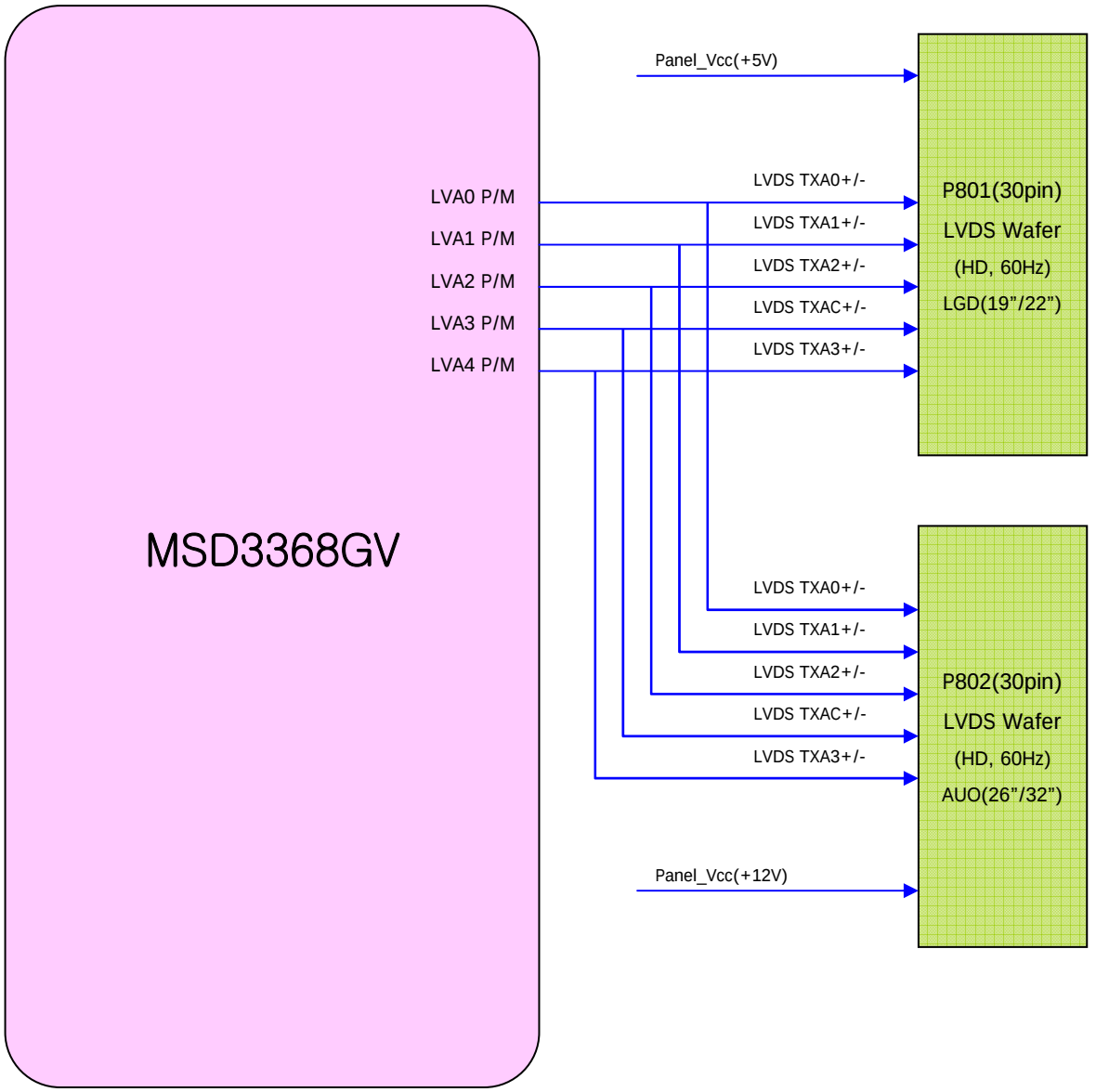
LVDS 출력 Block



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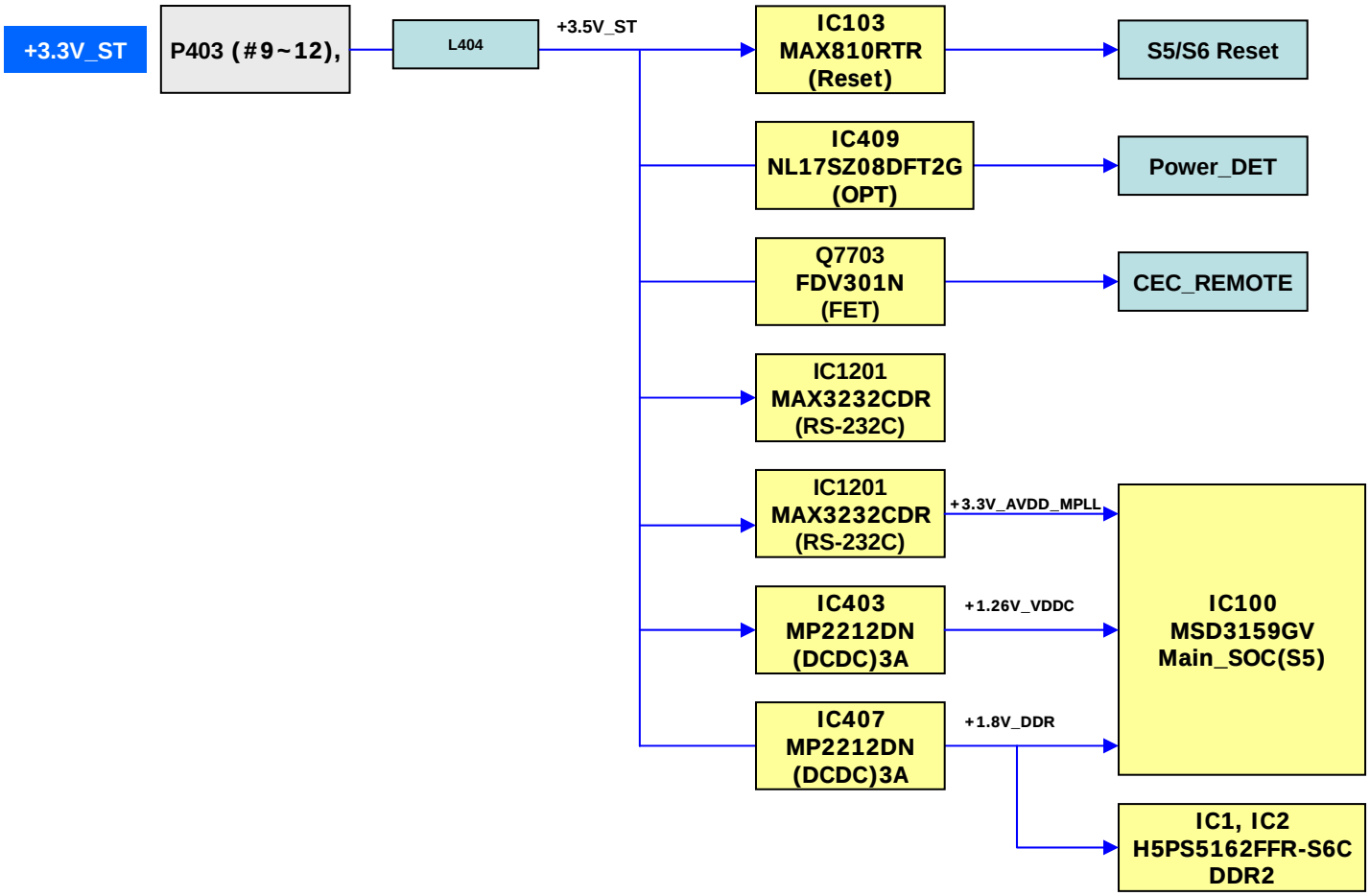
POWER Block (+3.5V_ST)_For 26”/32”



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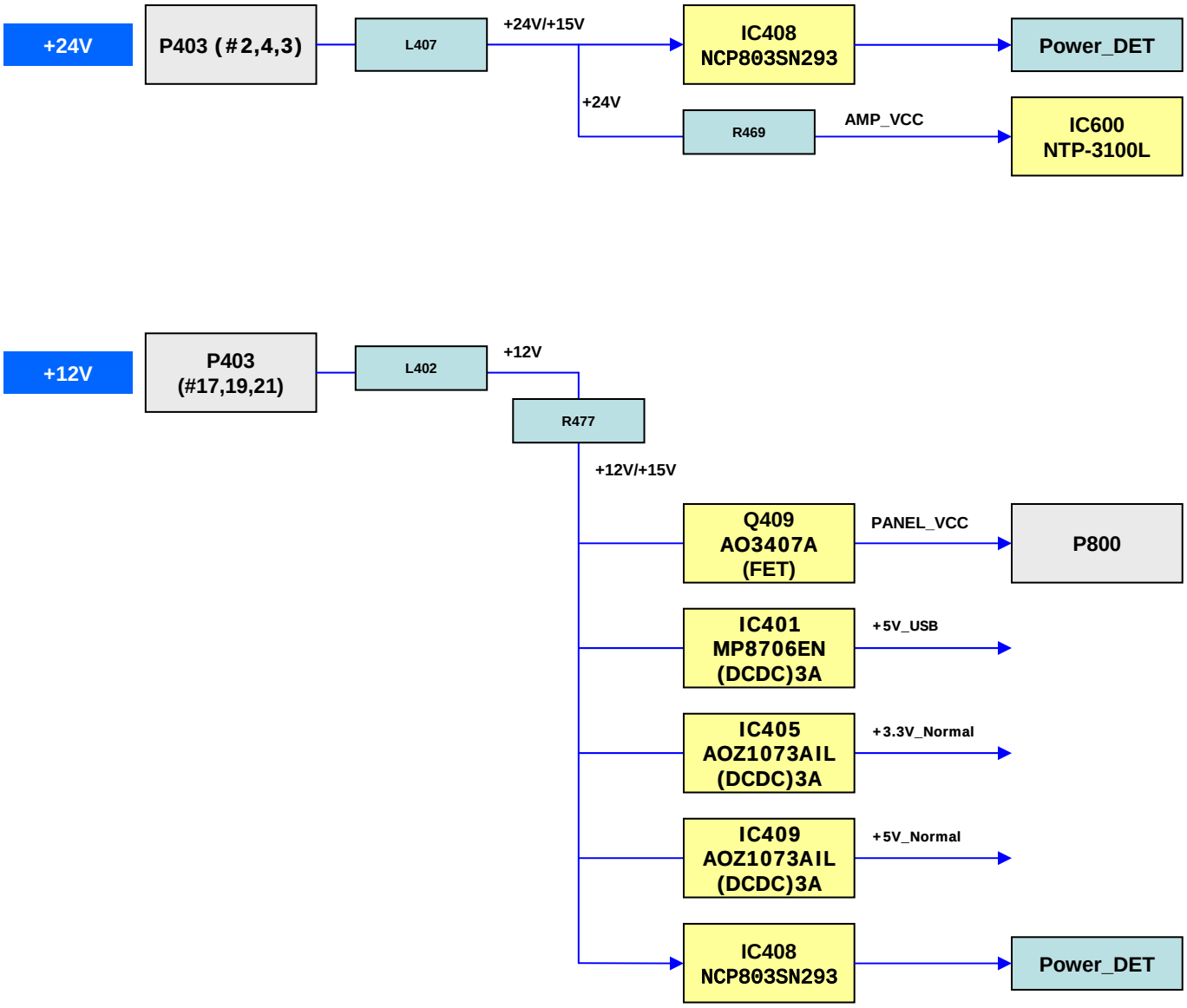
POWER Block (+24V & 12V &+12V/+15V)_For 26”/32”



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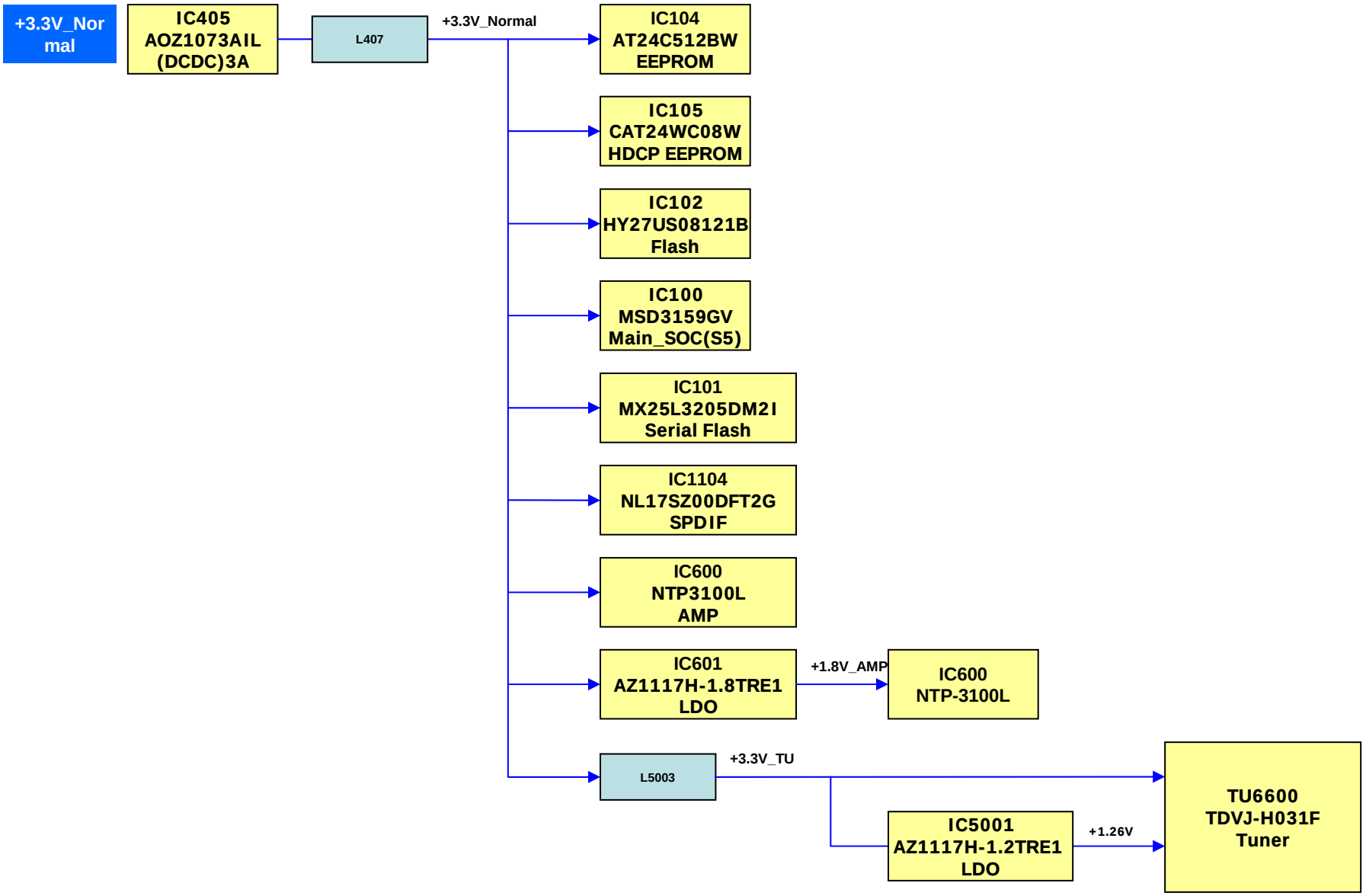
POWER Block (+3.3V_Noraml)_For 26”/32”



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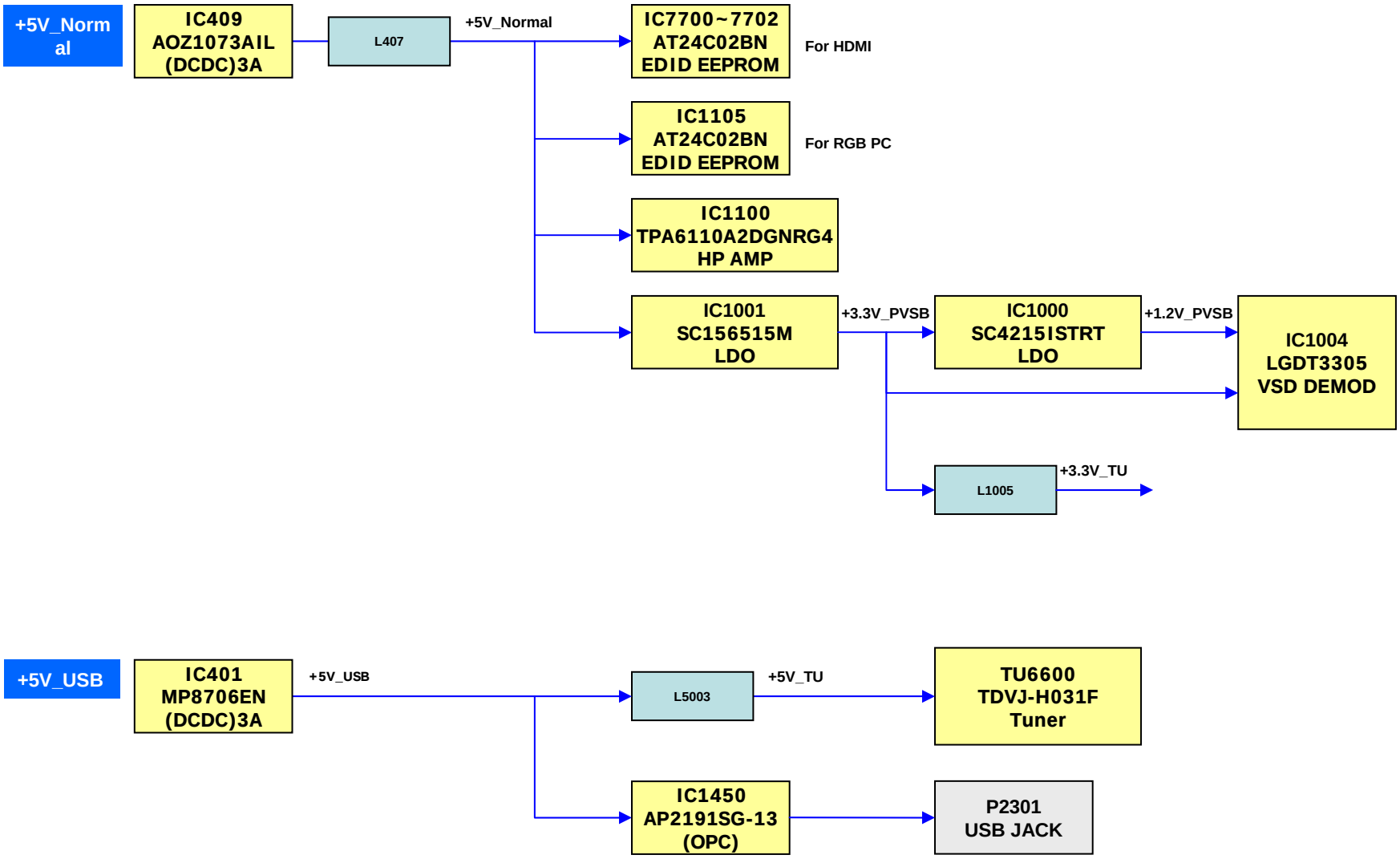
POWER Block (+5V_Noraml)_For 26”/32”



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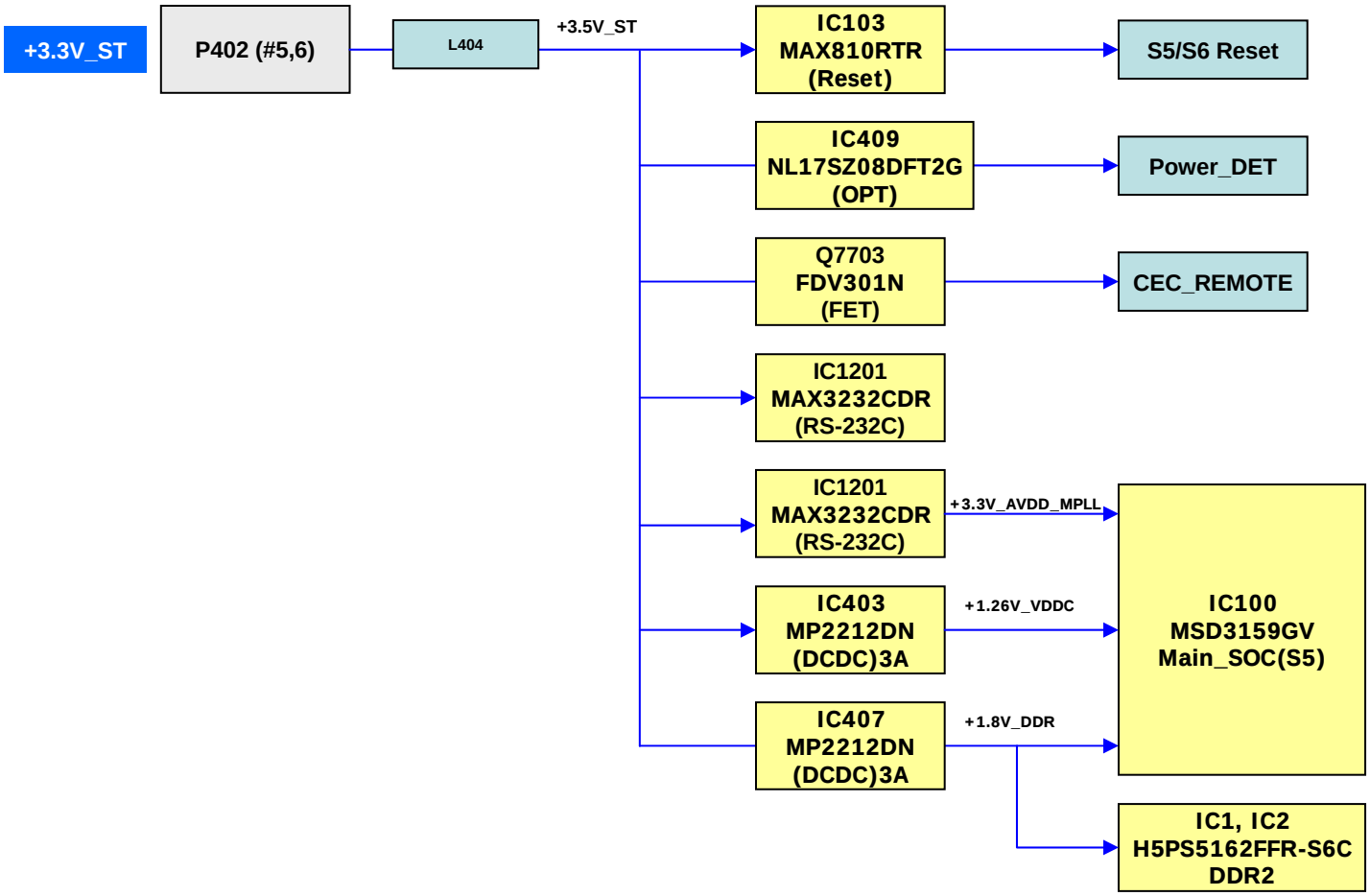
POWER Block (+3.5V_ST)_For 19”/22”



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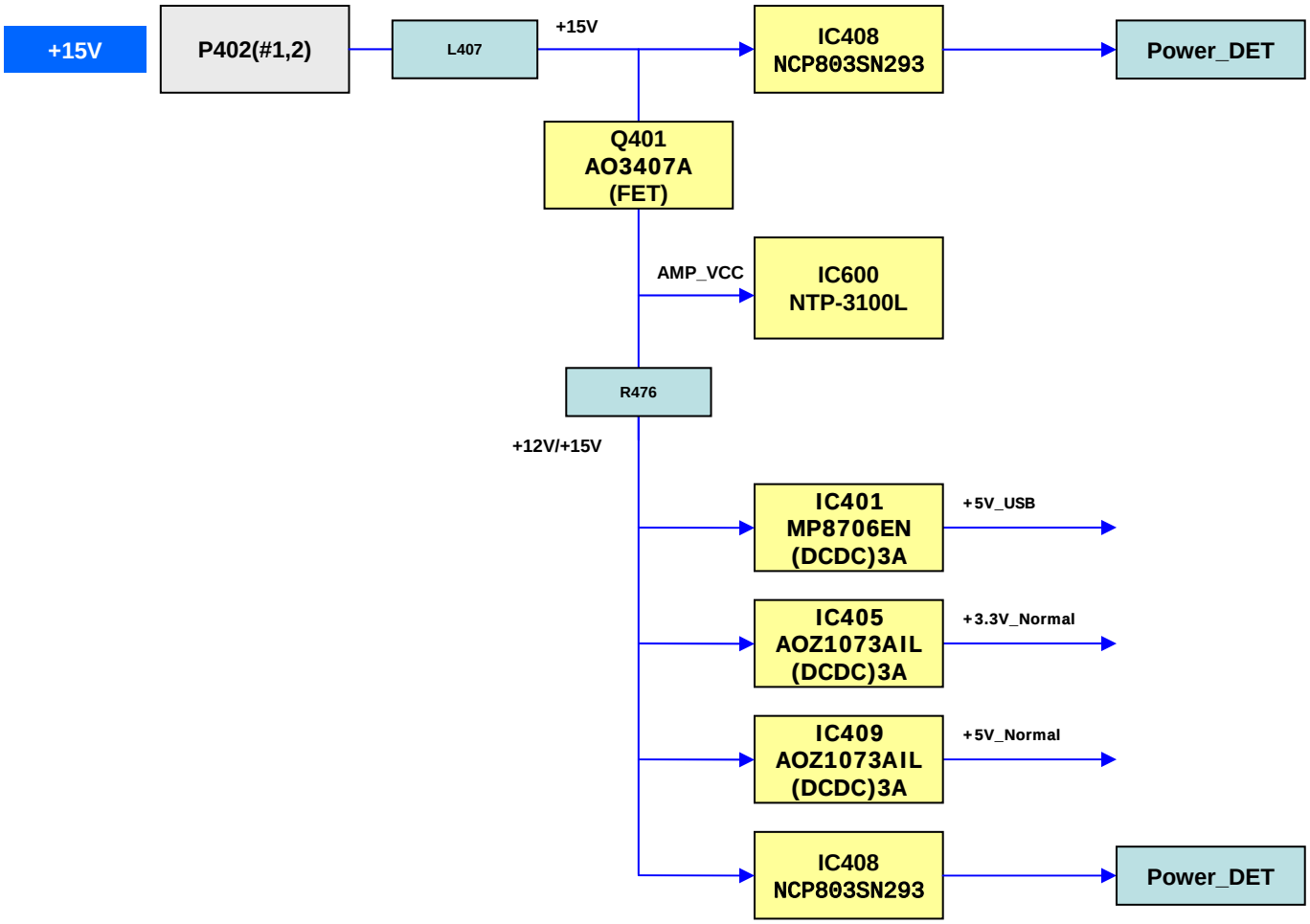
POWER Block (+15V & +12V/+15V)_For 19”/22”



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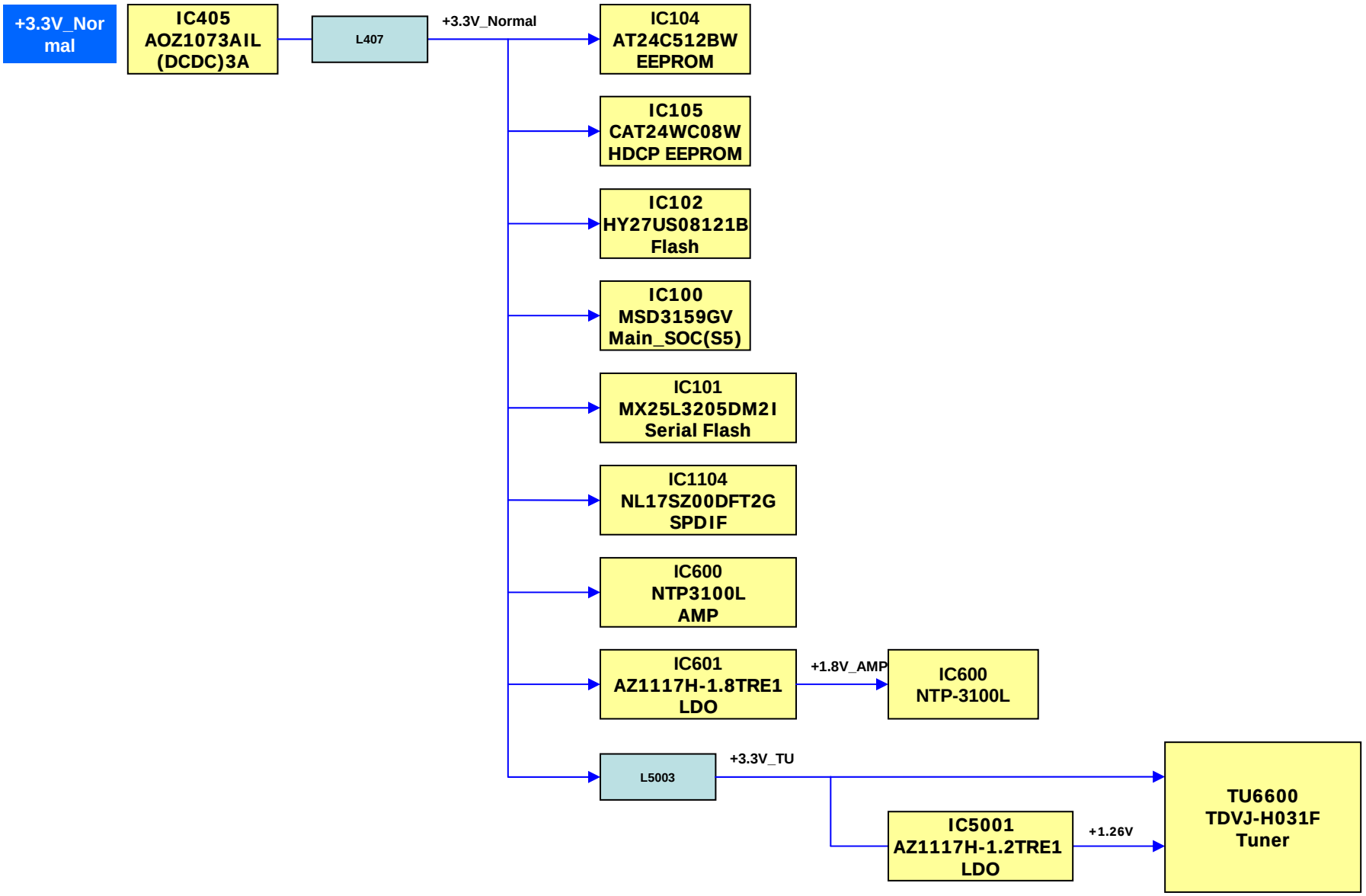
POWER Block (+3.3V_Noraml)_For 19”/22”



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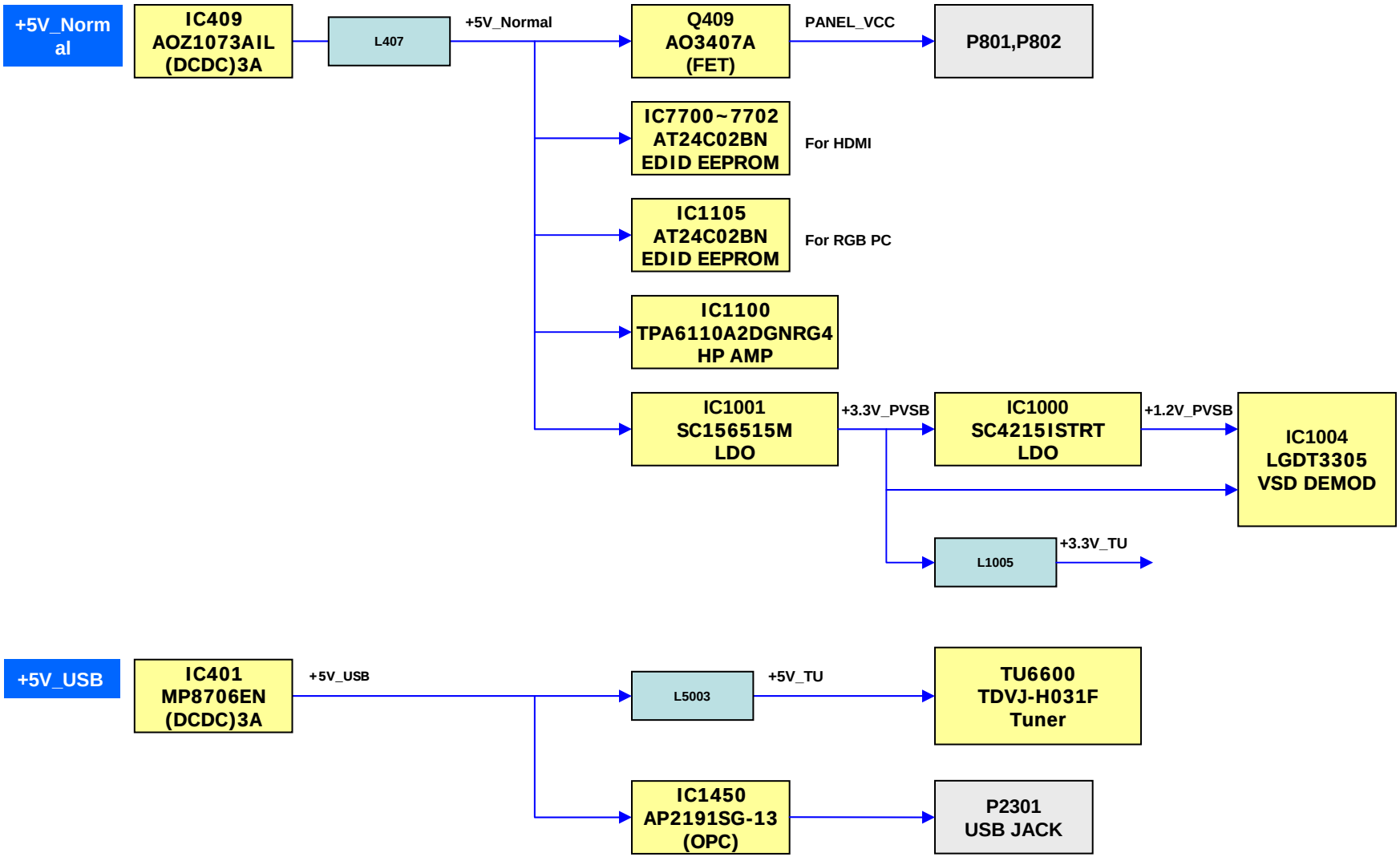
POWER Block (+3.3V_Noraml)_For 19”/22”



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