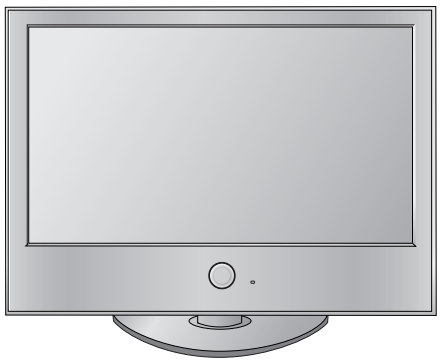
Internal Use Only
website:http://biz.LGservice.com

LCD TV
SERVICE MANUAL

CHASSIS : LD89A

MODEL : 32LG6000 32LG6000-ZA

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



CONTENTS

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 Replacement Parts List.
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,

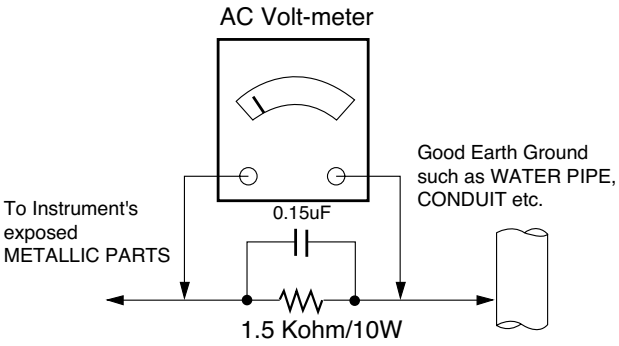
always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

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



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.

IC Remove/Replacement

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

Removal

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

Replacement

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

"Small-Signal" Discrete Transistor Removal/Replacement

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

Power Output, Transistor Device Removal/Replacement

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

Diode Removal/Replacement

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

Fuse and Conventional Resistor Removal/Replacement

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

Circuit Board Foil Repair

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

At IC Connections

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

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

At Other Connections

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

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

SPECIFICATION

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

1. General Specification(TV)

No.	Item	Specification	Remark
1.	Video input applicable system	PAL-D/K, B/G, I, SECAM	
2.	Receivable Broadcasting System	1) PAL/SECAM B/G 2) PAL/SECAM D/K 3) PAL I/II 4) SECAM L/L' 5) DVB-T	EU(PAL Market)
3.	RF Input Channel	VHF : E2 ~ E12 UHF : E21 ~ E69 CATV : S1 ~ S20 HYPER : S21~ S47	PAL
4.	Input Voltage	100-240V~ /50Hz, 60Hz	
5.	Market	English/ Germany/ Denmark/ Spain/ France/ Italy/ Greece/ Netherlands/ Norway/ Sweden/ Finland/ Portugal/ Hungary/ Poland/ Rumania/ Croatia/ Slovenia/ Czech/ Serbia/ Bulgaria/ Russia/ Luxemburg/Belgium/ Swiss/Austria	25 Country
6.	Picture Size	32 inch	32LG6000
7.	Tuning System	FVS 100 program	PAL, 200 PR.(Option)
8.	Operating Environment	1) Temp : 0 ~ 40 deg 2) Humidity : 10 ~ 90 %	LGE SPEC
9.	Storage Environment	3) Temp : -20 ~ 50 deg 4) Humidity : 10 ~ 90 %	LGE SPEC
10.	Display	LCD Module	LPL

2. General Specification(LCD Module)

No.	Item	Specification		Unit	Remark
1.	Panel	32" TFT WXGA LCD			32LG6000
2.	Frequency range	H : 45 ~ 50Khz, V : 47 ~ 63Hz			32 inch
3.	Power consumption	≤ 4.2 + 92.4		W	LCD + Backlight
4.	LCD Module-LPL (42inch)	Type Size	760.0 x 450.0 x 48.0	mm	(H) x (V) x (D)
		Pixel Pitch	170.25 μm x 510.75 μm	mm	
		Pixel Format	1366 horiz. By 768 vert. Pixels RGB stripe arrangement		
		Coating	Hard coating(3H), Anti-glare treatment of the front polarizer (Haze 13%)		
		Back Light	12 Lamp(EEFL)		

3. Component Video Input (Y, P_B, P_R)

No.	Specification			Remark
	Resolution	H-freq(kHz)	V-freq(Hz)	
1.	720X480	15.73	60.00	SDTV, DVD 480i
2.	720X480	15.63	59.94	SDTV, DVD 480i
3.	720X480	31.47	59.94	SDTV, 480p
4.	720X480	31.50	60.00	SDTV, 480p
5.	720X576	15.625	50.00	SDTV, DVD 625 Line
6.	720X576	31.25	50.00	HDTV 576p
7.	1280X720	45.00	60.00	HDTV 720p
8.	1280X720	44.96	59.94	HDTV 720p
9.	1280X720	37.50	50	HDTV 720p 50Hz
10.	1920X1080	31.25	50.00	HDTV 1080i
11.	1920X1080	33.75	60.00	HDTV 1080i
12.	1920X1080	33.72	59.94	HDTV 1080i
13.	1920X1080	56.25	50.00	HDTV 1080P
14.	1920X1080	67.433	59.94	HDTV 1080P
15.	1920X1080	67.50	60	HDTV 1080P

4. RGB input (PC)

No.	Specification				Remark
	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel clock(MHz)	
1.	720X400	31.468	70.08	28.32	
2.	640X480	31.469	59.94	25.17	VESA
3.	800X600	37.879	60.31	40.00	VESA
4.	1024X768	48.363	60.00	65.00	VESA(XGA)
5.	1280X768	47.78	59.87	79.5	VESA(WXGA)
6.	1360X768	47.72	59.8	84.625	VESA(WXGA)
7.	1920X1080	66.647	59.988	138.625	WUXGA
8.	1280X1024	63.981	60.02	108	SXGA(Only FHD)
9.	1400X1050	65.317	59.978	121.75	SXGA(Only FHD)

8. HDMI DTV

No.	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel clock(MHz)	Remark	Proposed
1.	640X480	31.469	59.94	25.175	SDTV 480p 60Hz	
2.	640X480	31.469	60	25.20	SDTV 480p 60Hz	
3.	720X480	31.47	59.94	27.00	SDTV 480p 60Hz	
4.	720X480	31.50	60	27.027	SDTV 480p 60Hz	
5.	720X576	31.25	50.00	27.000	SDTV 576p 50Hz	
6.	1280X720	37.50	50.00	74.176	HDTV 720p 50Hz	HDCP
7.	1280X720	44.96	59.94	74.176	HDTV 720p 60Hz	HDCP
8.	1280X720	45.00	60	74.250	HDTV 720p 60Hz	HDCP
9.	1920X1080	28.125	50.00	74.250	HDTV 1080i 50Hz	HDCP
10.	1920X1080	33.72	59.94	74.176	HDTV 1080i 60Hz	HDCP
11.	1920X1080	33.75	60	74.250	HDTV 1080i 60Hz	HDCP
12.	1920X1080	27.000	24.00	74.250	HDTV 1080P 24Hz	HDCP
13.	1920X1080	33.750	30	74.25	HDTV 1080P 30Hz	HDCP
14.	1920X1080	56.25	50.00	148.500	HDTV 1080P 50Hz	HDCP
15.	1920X1080	67.433	59.94	148.352	HDTV 1080P 60Hz	HDCP
16.	1920X1080	67.50	60	148.500	HDTV 1080P 60Hz	HDCP

9. HDMI PC

No.	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel clock(MHz)	Remark
1.	720X400	31.468	70.08	28.32	
2.	640X480	31.469	59.94	25.17	VESA
3.	800X600	37.879	60.31	40.00	VESA
4.	1024X768	48.363	60.00	65.00	VESA(XGA)
5.	1280X768	47.78	59.87	80.125	VESA(WXGA)
6.	1360X768	47.72	59.8	84.625	VESA(WXGA)
7.	1280X1024	63.981	60.02	108	SXGA(Only FHD)
8.	1400X1050	65.317	59.978	121.75	SXGA(Only FHD)
9.	1920*1080	66.647	59.988	138.625	WUXGA

ADJUSTMENT INSTRUCTION

1. Application Range

This spec. sheet is applied to all of the LD89A chassis manufactured at LG TV Plant all over the world.

2. Specification.

(1) Because this is not a hot chassis, it is not necessary to use an isolation transformer. However, the use of isolation transformer will help protect test instrument.
(2) Adjustment must be done in the correct order.
(3) The adjustment must be performed in the circumstance of 25±5°C of temperature and 65±10% of relative humidity if there is no specific designation.
(4) The input voltage of the receiver must keep 100-240V, 50/60Hz.
(5) The receiver must be operated for about 15 minutes prior to the adjustment.
- 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 Adjustment R/C.
  2) Press the "ADJ KEY" on Adjustment R/C.
  3) Select "3. Test Pattern" by using ▲/▼(CH +/-) and press ENTER(■)
  4) Select "White" by using ◄/►(VOL +/-) and press ENTER(■)

* Set is activated HEAT run without signal generator in this mode.
* Single color pattern (RED / BLUE / GREEN) of HEAT RUN MODE uses to check panel.
* Caution : If you turn on a still pattern more than 20 minutes (Especially digital pattern, cross hatch pattern), an after image may be occur in the black level part of the screen.

3. PCB assembly adjustment method

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

* ADC Calibration Protocol (RS232)

	Item	CMD1	CMD2	Data0		
Enter Adjust Mode	Adjust 'Mode In'	A	D	0	0	When transfer the 'Mode In', Carry the command.
ADC adjust	ADC Adjust	A	D	1	0	Automatically adjustment (The use of a internal pattern)
	Adjust 'Mode Out'	A	D	9	0	
	Adjustment Confirmation	A	D	9	9	To check ADC Adjustment on Assembly line.

- Baud rate : 115200 bps
- RS232 Host : PC
- echo : none

3.1 ADC adjustment

RF input	AV / Component / RGB input
NO SIGNAL or White noise	NO SIGNAL

* Adjustment can be done using only internal ADC, so input signal is not necessary.
* Required equipment : Adjustment R/C.

1) Press ADJ key on adjustment R/C.
2) Select "1. ADC calibration" by using ▲/▼(CH +/-) and press ENTER(■)
3) Select "Start" by using ◄/►(VOL +/-) and press ENTER(■)
4) ADC adjustment is executed automatically.

3.2 PCMCIA CARD Checking Method

You must adjust DTV 29 Channel and insert PCMCIA CARD to socket.
1) If PCMCIA CARD works normally, normal signals display on screen. But it works abnormally, "No CA module" words display on screen.

* Caution: Set up "RF mode" before launching products.

4. Set Assembly adjustment method

4.1 EDID (The Extended Display Identification DATA)

* When company internal production(total assembly), EDID data must scan in DDC line.

4.1.1 EDID Download

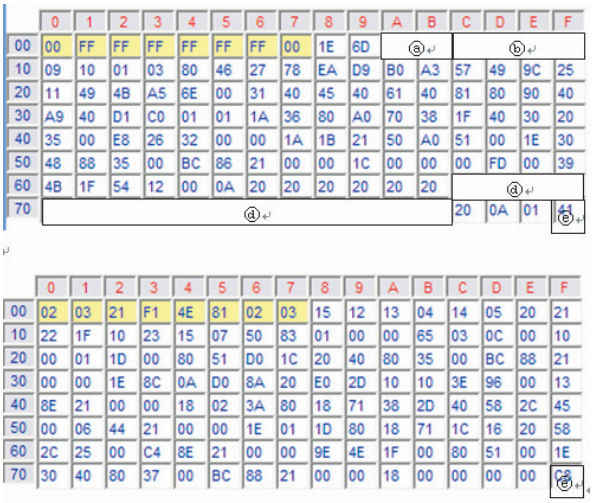
Before downloading EDID Data, check the RGB/HDMI cable is disconnected.

1) Press ADJ key on Adjustment R/C.
2) Select "5.EDID D/L" by using ▲/▼(CH +/-) and press ENTER(■)
3) Select "Start" by using ◄/►(VOL +/-) and press ENTER(■)
4) EDID DownLoad is executed if word "NG" is changed to "OK" about all HDMI ports.

4.1.2 EDID Data

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

1) HDMI1



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30	A9	40	D1	C0	01	01	1A	36	80	A0	70	38	1F	40	30	20
40	35	00	E8	26	32	00	00	1A	1B	21	50	A0	51	00	1E	30
50	48	88	35	00	BC	86	21	00	00	1C	00	00	00	FD	00	39
60	4B	1F	54	12	00	0A	20	20	20	20	20	20	ⓓ			
70	ⓓ												20	0A	01	ⓔ

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10	22	1F	10	23	15	07	50	83	01	00	00	65	03	0C	00	10
20	00	01	1D	00	80	51	D0	1C	20	40	80	35	00	BC	88	21
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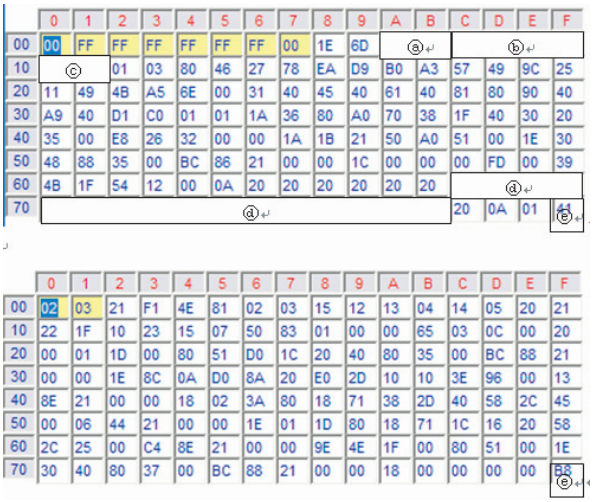
40	8E	21	00	00	18	02	3A	80	18	71	38	2D	40	58	2C	45
50	00	06	44	21	00	00	1E	01	1D	80	18	71	1C	16	20	58
60	2C	25	00	C4	8E	21	00	00	9E	4E	1F	00	80	51	00	1E
70	30	40	80	37	00	BC	88	21	00	00	18	00	00	00	00	C8

2) HDMI2



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50	48	88	35	00	BC	86	21	00	00	1C	00	00	00	FD	00	39
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70	ⓓ												20	0A	01	ⓔ

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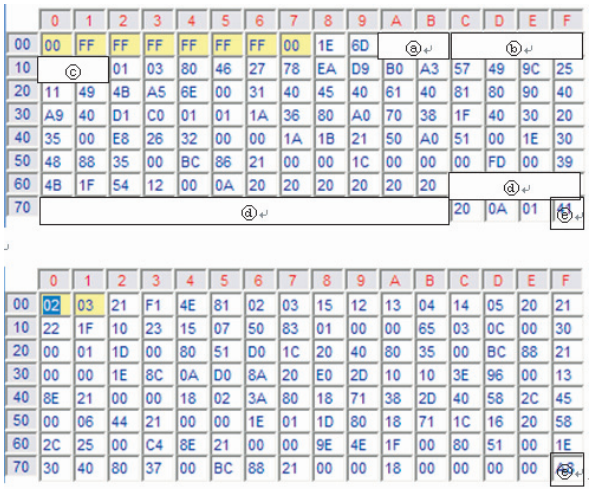
20	00	01	1D	00	80	51	D0	1C	20	40	80	35	00	BC	88	21
30	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E	96	00	13
40	8E	21	00	00	18	02	3A	80	18	71	38	2D	40	58	2C	45
50	00	06	44	21	00	00	1E	01	1D	80	18	71	1C	16	20	58
60	2C	25	00	C4	8E	21	00	00	9E	4E	1F	00	80	51	00	1E
70	30	40	80	37	00	BC	88	21	00	00	18	00	00	00	00	E8

3) HDMI3



	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	ⓐ		ⓑ			
10	ⓒ		01	03	80	46	27	78	EA	D9	B0	A3	57	49	9C	25
20	11	49	4B	A5	6E	00	31	40	45	40	61	40	81	80	90	40
30	A9	40	D1	C0	01	01	1A	36	80	A0	70	38	1F	40	30	20
40	35	00	E8	26	32	00	00	1A	1B	21	50	A0	51	00	1E	30
50	48	88	35	00	BC	86	21	00	00	1C	00	00	00	FD	00	39
60	4B	1F	54	12	00	0A	20	20	20	20	20	20	ⓓ			
70	ⓓ												20	0A	01	ⓔ

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	21	F1	4E	81	02	03	15	12	13	04	14	05	20	21
10	22	1F	10	23	15	07	50	83	01	00	00	65	03	0C	00	30
20	00	01	1D	00	80	51	D0	1C	20	40	80	35	00	BC	88	21
30	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E	96	00	13
40	8E	21	00	00	18	02	3A	80	18	71	38	2D	40	58	2C	45
50	00	06	44	21	00	00	1E	01	1D	80	18	71	1C	16	20	58
60	2C	25	00	C4	8E	21	00	00	9E	4E	1F	00	80	51	00	1E
70	30	40	80	37	00	BC	88	21	00	00	18	00	00	00	00	E8

4) HDMI4

	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	ⓐ		ⓑ			
10	ⓒ		01	03	80	46	27	78	EA	D9	B0	A3	57	49	9C	25
20	11	49	4B	A5	6E	00	31	40	45	40	61	40	81	80	90	40
30	A9	40	D1	C0	01	01	1A	36	80	A0	70	38	1F	40	30	20
40	35	00	E8	26	32	00	00	1A	1B	21	50	A0	51	00	1E	30
50	48	88	35	00	BC	86	21	00	00	1C	00	00	00	FD	00	39
60	4B	1F	54	12	00	0A	20	20	20	20	20	20	ⓓ			
70	ⓓ												20	0A	01	ⓔ

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	21	F1	4E	81	02	03	15	12	13	04	14	05	20	21
10	22	1F	10	23	15	07	50	83	01	00	00	65	03	0C	00	40
20	00	01	1D	00	80	51	D0	1C	20	40	80	35	00	BC	88	21
30	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E	96	00	13
40	8E	21	00	00	18	02	3A	80	18	71	38	2D	40	58	2C	45
50	00	06	44	21	00	00	1E	01	1D	80	18	71	1C	16	20	58
60	2C	25	00	C4	8E	21	00	00	9E	4E	1F	00	80	51	00	1E
70	30	40	80	37	00	BC	88	21	00	00	18	00	00	00	00	E8

- Detail EDID Options are below (ⓐ, ⓑ, ⓒ, ⓓ, ⓔ,)
  ⓐ Product ID
  ⓑ Serial No: Controlled on production line.
  ⓒ Month, Year: Controlled on production line
  : ex) Monthly : '09' -> '09'
  Year: '2006' Ë '10'
  ⓓ Model Name(Hex):
  ⓔ Checksum: Changeable by total EDID data.

4.2. Adjustment of White Balance

(1) Test Equipment
- Color Analyzer (CS-1000, CA-100+(CH.9), CA-210(CH.9))
- Please adjust CA-100+ / CA-210 by CS-1000 before measuring
-> You should use Channel 9 which is Matrix compensated (White, Red, Green, Blue revised) by CS-1000 and adjust in accordance with White balance adjustment coordinate.

* Color temperature standards according to CSM and Module

CSM	LCD
Cool	11000K
Medium	9300K
Warm	6500K

* Change target luminance and range of the Auto adjustment W/B equipment.

Target luminance	65
Gamma	20

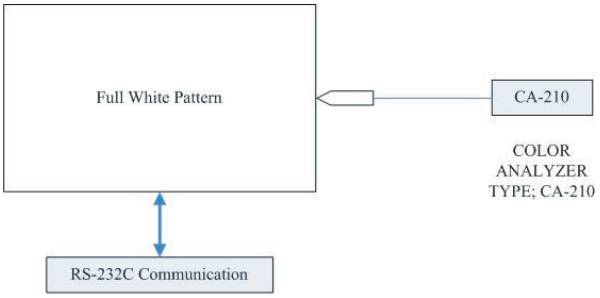
* White balance adjustment coordinate and color temperature

Cool	CS-1000	CA-100+(CH.9)	CA-210(CH.9)
X	0.276	0.276±0.002	0.276±0.002
Y	0.283	0.283±0.002	0.283±0.002
Δuv	0.000	0.000	0.000
Medium	**CS-1000**	**CA-100+(CH.9)**	**CA-210(CH 9)**
X	0.285	0.285±0.002	0.285±0.002
Y	0.293	0.293±0.002	0.293±0.002
Δuv	0.000	0.000	0.000
Warm	**CS-1000**	**CA-100+(CH.9)**	**CA-210(CH 9)**
X	0.313	0.313±0.002	0.313±0.002
Y	0.329	0.329±0.002	0.329±0.002
Δuv	0.000	0.000	0.000

- PC (for communication through RS-232C) -> UART Baud rate : 115200 bps

(2) 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 IN-START -> Enter the mode of White-Balance, the pattern will come out.



(3) Auto-control interface and directions

1) Adjust in the place where the influx of light like floodlight around is blocked. (illumination is less than 10ux).
2) Adhere closely the Color Analyzer (CA210) to the module less than 10cm distance, keep it with the surface of the Module and Color Analyzer's Prove vertically.(80~100°).
3) Aging time
   - After aging start, keep the power on (no suspension of power supply) and heat-run over 15 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]			MIN	CENTER (DEFAULT)			Max
	Cool	Medium	Warm		Cool	Medium	Warm	
R Gain	jg	Ja	jd	00	192	192	192	255
G Gain	jh	Jb	je	00	192	192	192	255
B Gain	ji	Jc	jf	00	192	192	192	255
R Cut					64	64	64	128
G Cut					64	64	64	128
B Cut					64	64	64	128

(4) Manual white Balance

1) Press the ADJ KEY on Adjustment R/C.
   Select "3. Test Pattern" by using ▲/▼(CH +/-) and press ENTER(■)
   Select "White" by using ◄/►(VOL +/-) and press ENTER(■) and heat run over 15 minutes.
2) Zero Calibrate CA-100+ / CA-210, and when controlling, stick the sensor to the center of LCD module surface.
3) Press the ADJ KEY on Adjustment R/C
4) Select "2. White Balance" and press ►(VOL +)
   Set test-pattern on and display inside pattern.
5) Control is carried out on three color temperatures, COOL, MEDIUM, WARM.
   (Control is carried out three times)
   < Temperature: COOL >
   - R-Cut / G-Cut / B-Cut is set to 64.
   - Control R-Gain and G-Gain.
   - Each gain is limited to 192.
   < Temperature: MEDIUM >
   - R-Cut / G-Cut / B-Cut is set to 64.
   - Control R-Gain and B-Gain.
   - Each gain is limited to 192.
   < Temperature: WARM >
   - R-Cut / G-Cut / B-Cut is set to 64.
   - Control G-Gain and B-Gain.
   - Each gain is limited to 192.

   * One of R Gain / G Gain / B Gain should be kept on 192, and adjust other two lower than 192.
   (When R/G/B GAIN are all 192, it is the FULL DYNAMIC Range of Module)

(5) Input the Shipping Option Data

1) Push the ADJ key in a Adjustment R/C.
2) Input the Option Number that was specified in the BOM, into the Shipping area.
3) The work is finished, Push ■ Key.

5. Set Information (Serial No & Model name)

5.1 Check the serial number & Model Name

1) Push the menu button in DTV mode.
2) Select the SETUP _ Select the Diagnostics.
3) Check the Serial Number.

TROUBLE SHOOTING

1. Power Board

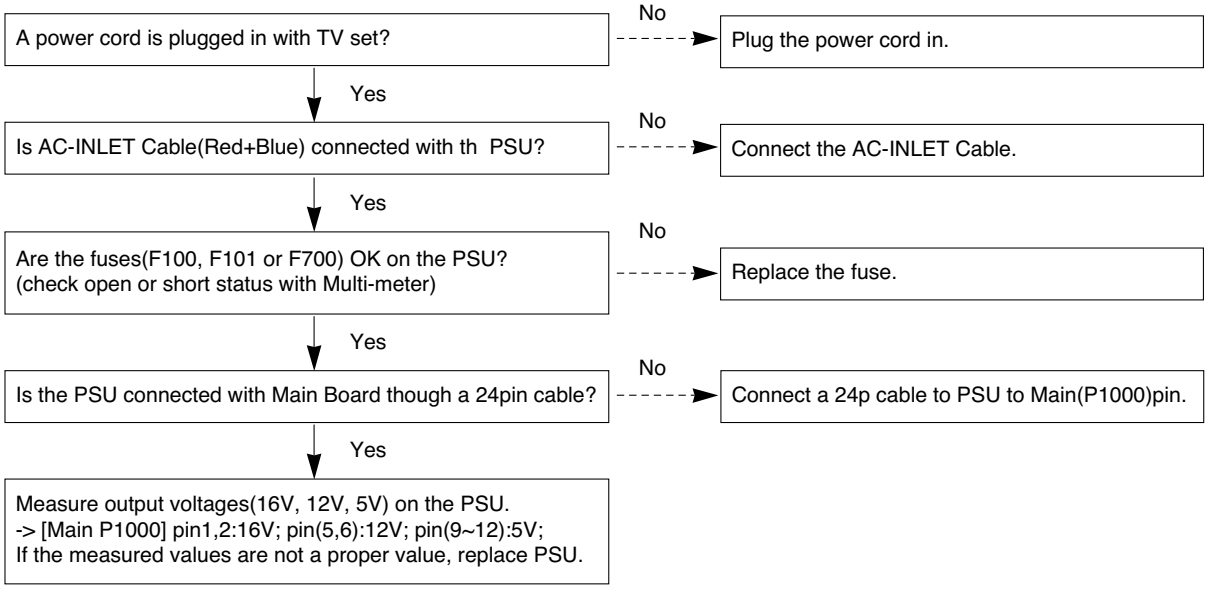
1-1. The whole flow chart which it follows in voltage output state

1-2. In case of No Power

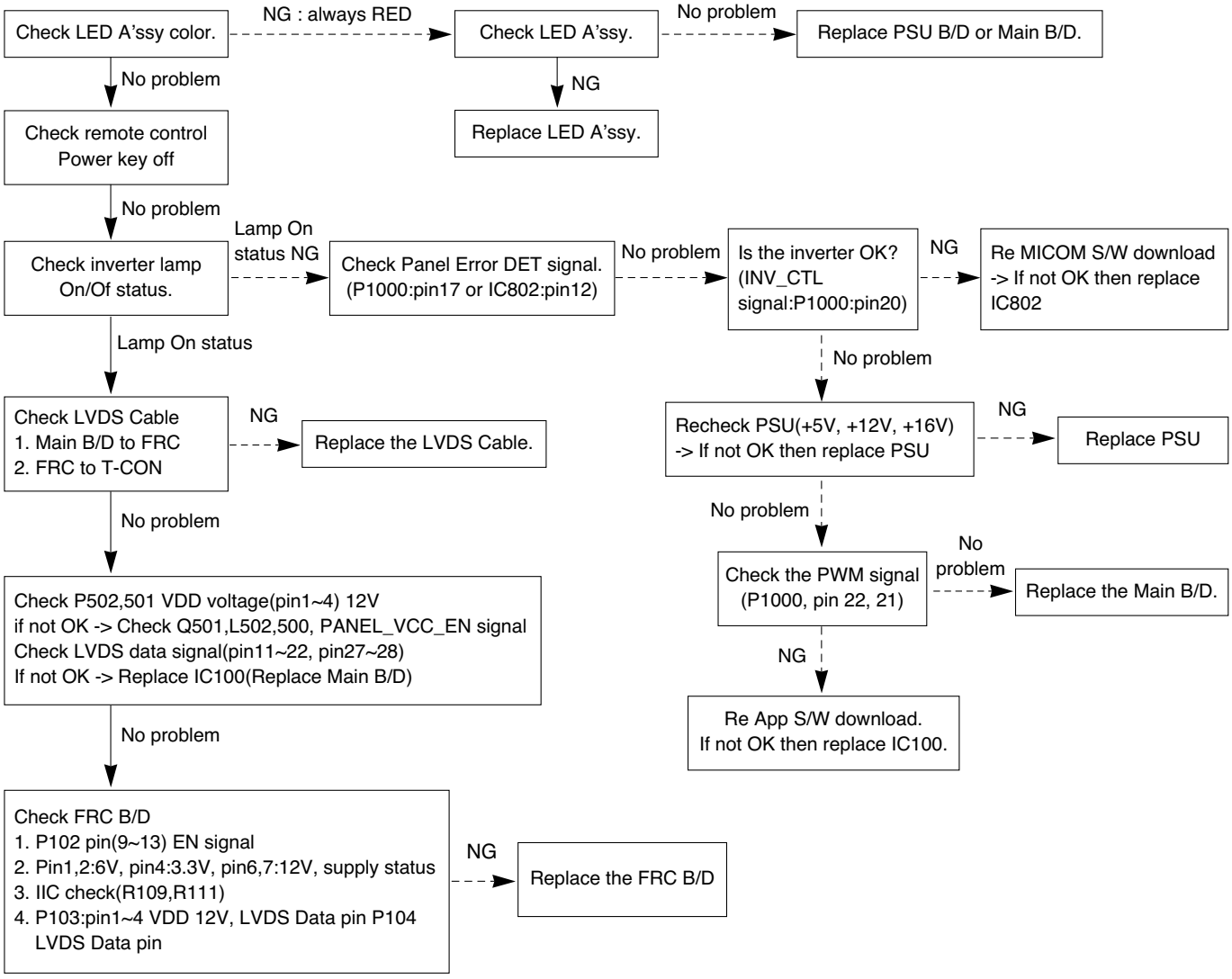
(1) Symptom

1) It does not charge at module.
2) Front LED does not work.

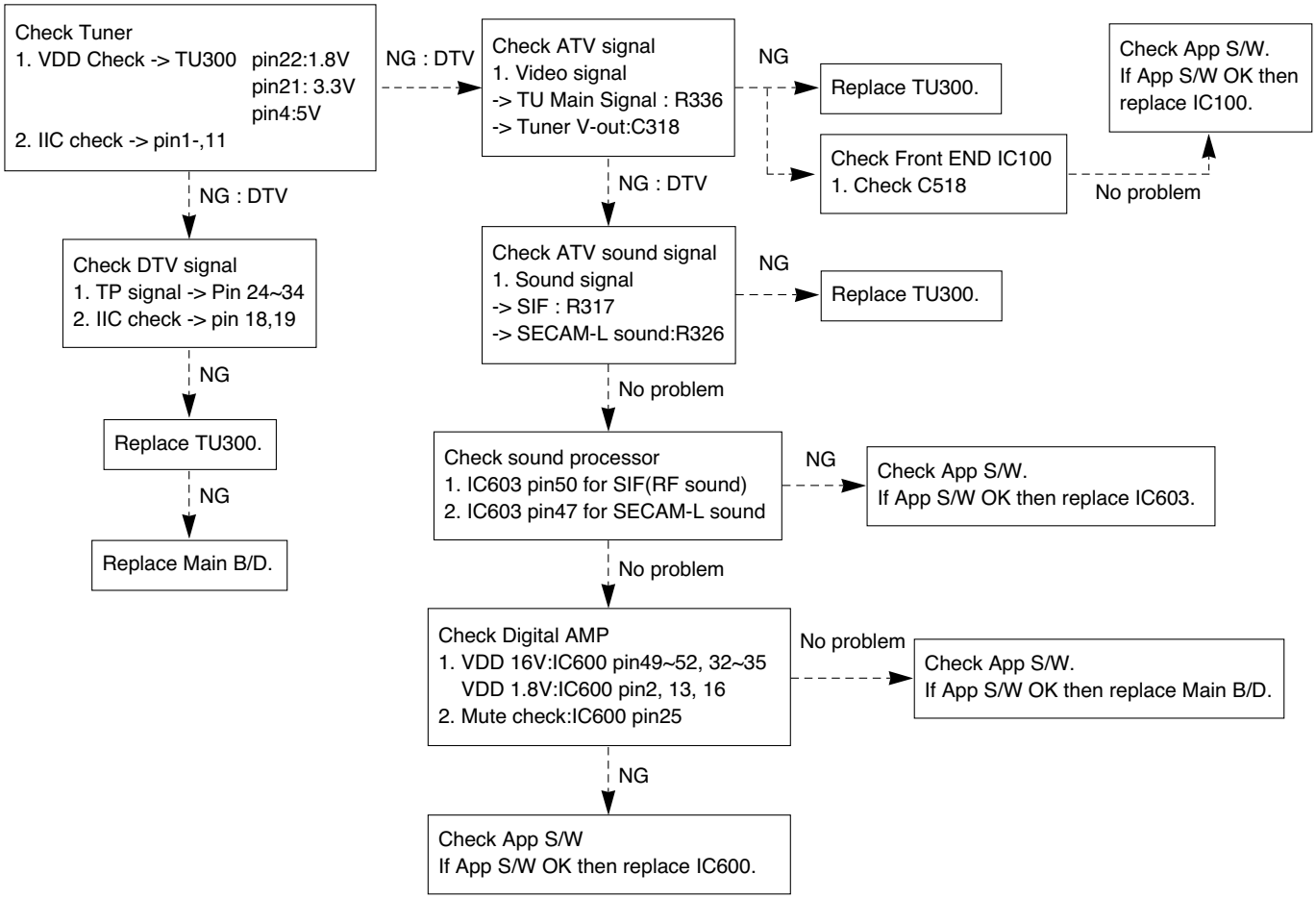
(2) Check the followings



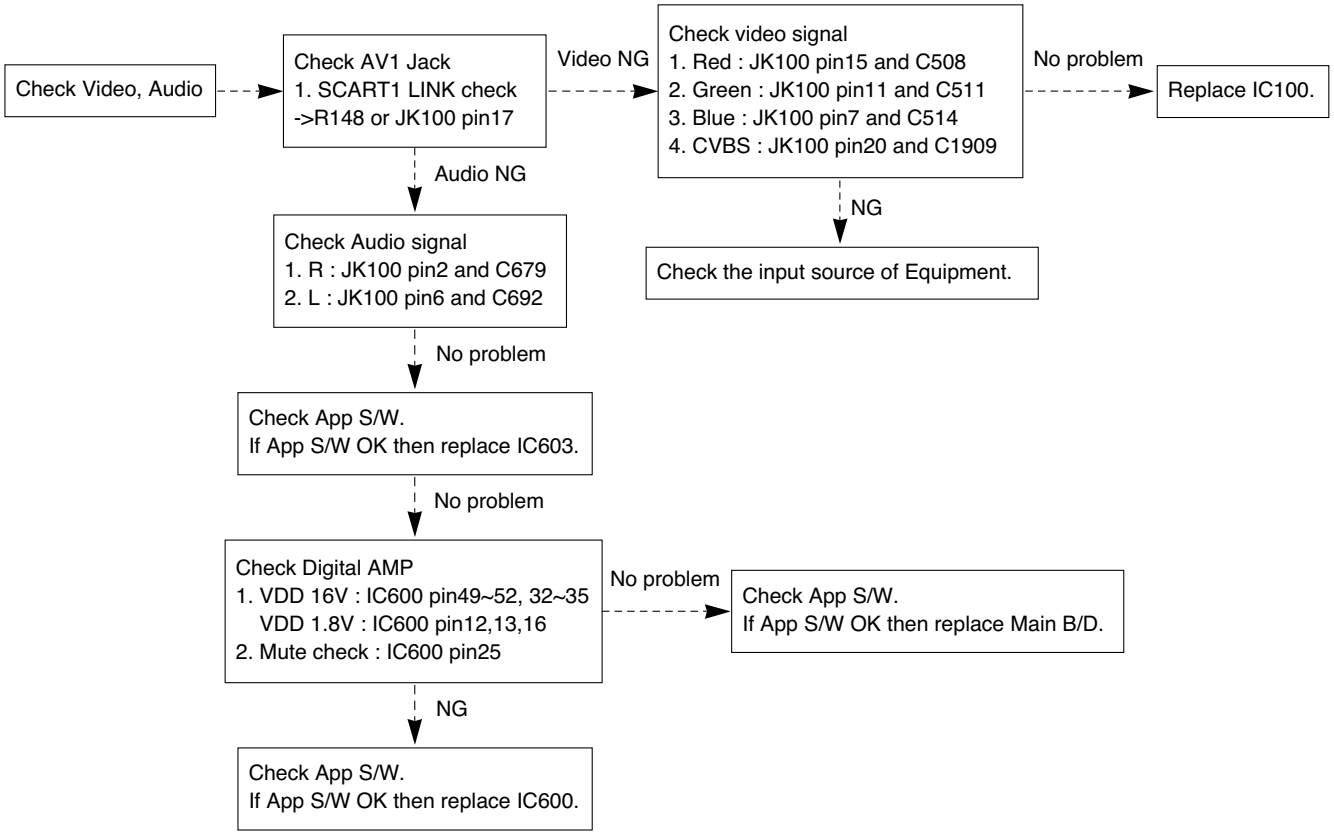
2. Main Board
2-1. In case of No Raster



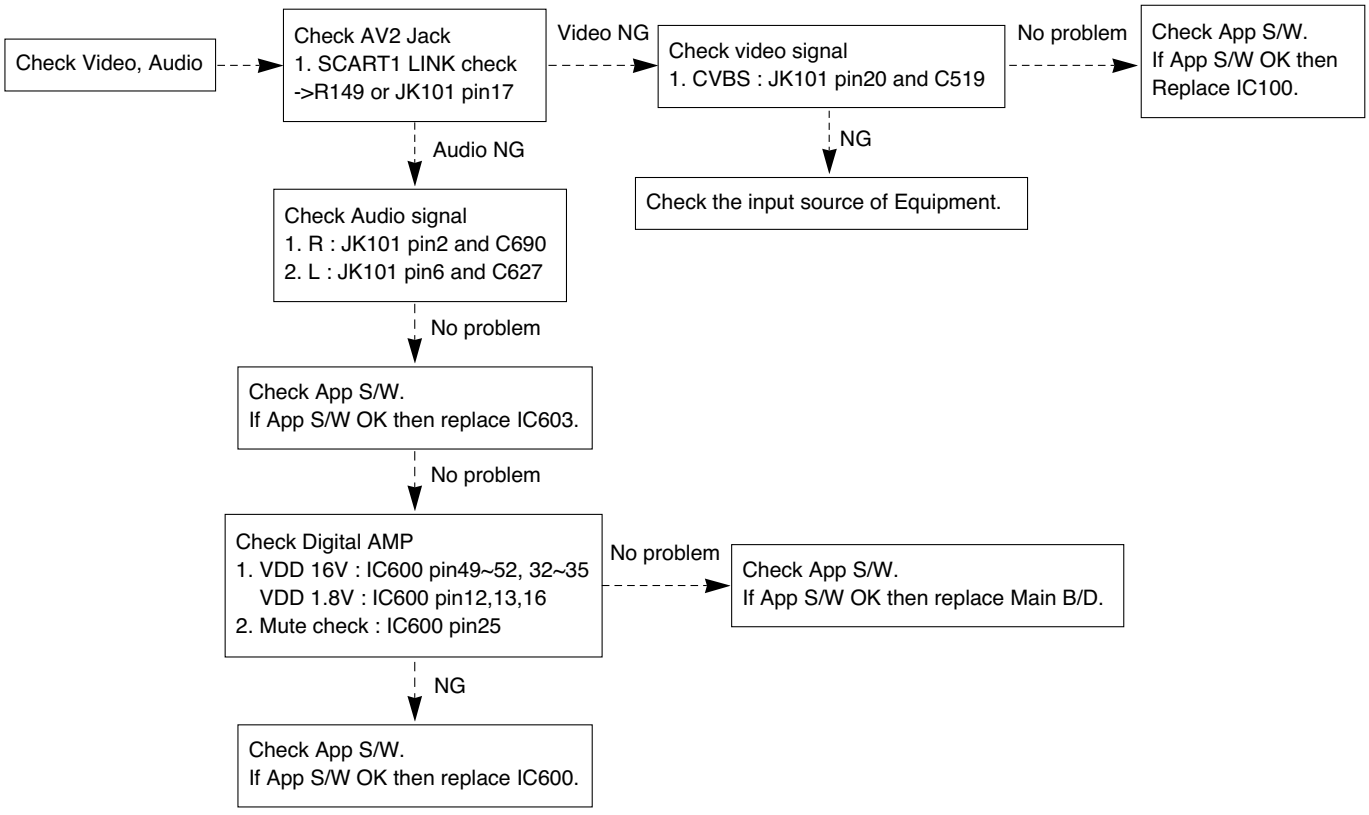
2-2. In case of abnormal display or sound when RF mode



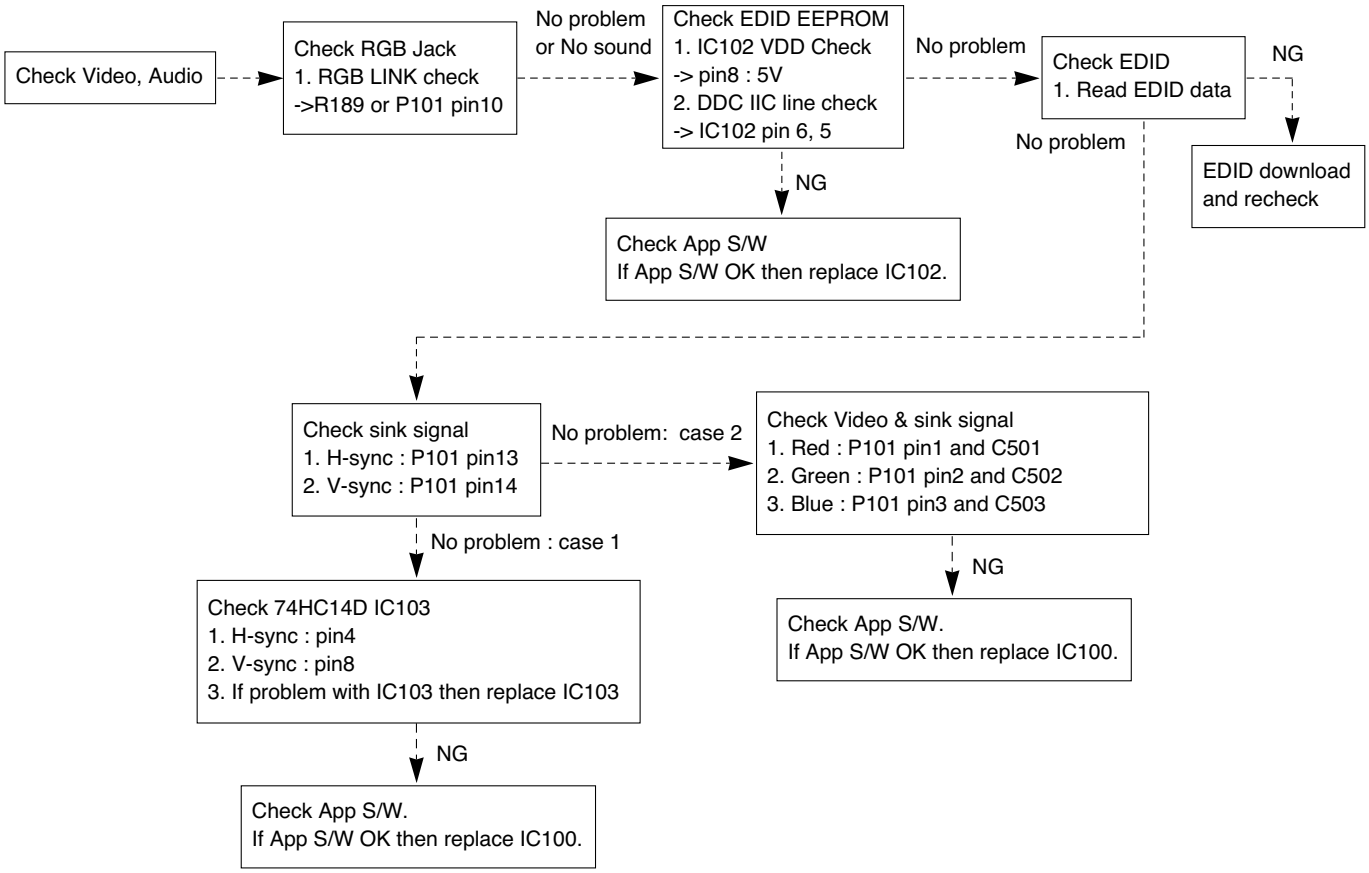
2-3. In case of abnormal display or sound when side AV1(SCART1) mode



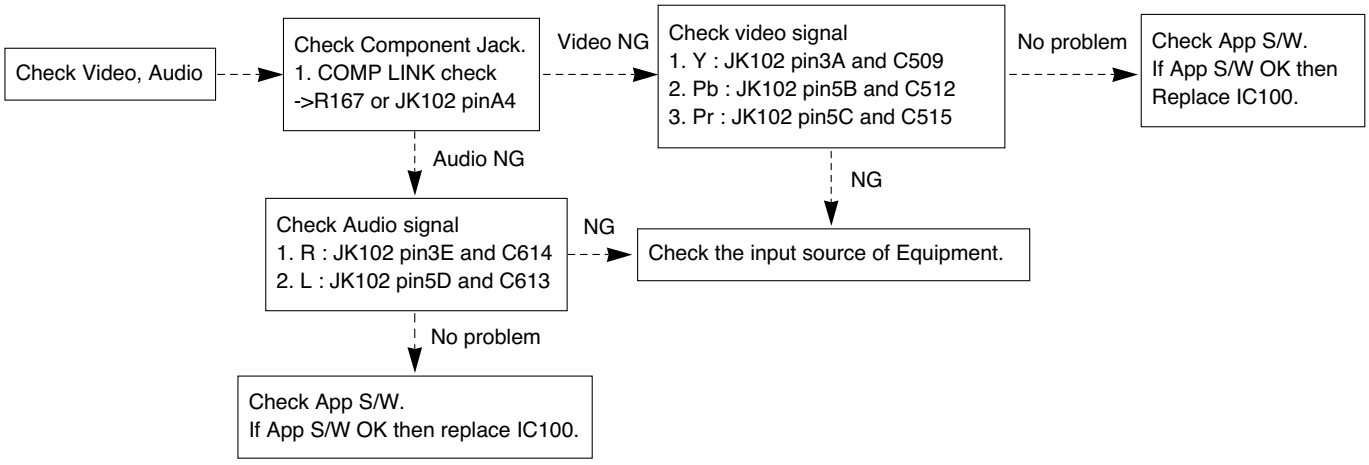
2-4. In case of abnormal display or sound when side AV2(SCART2) mode



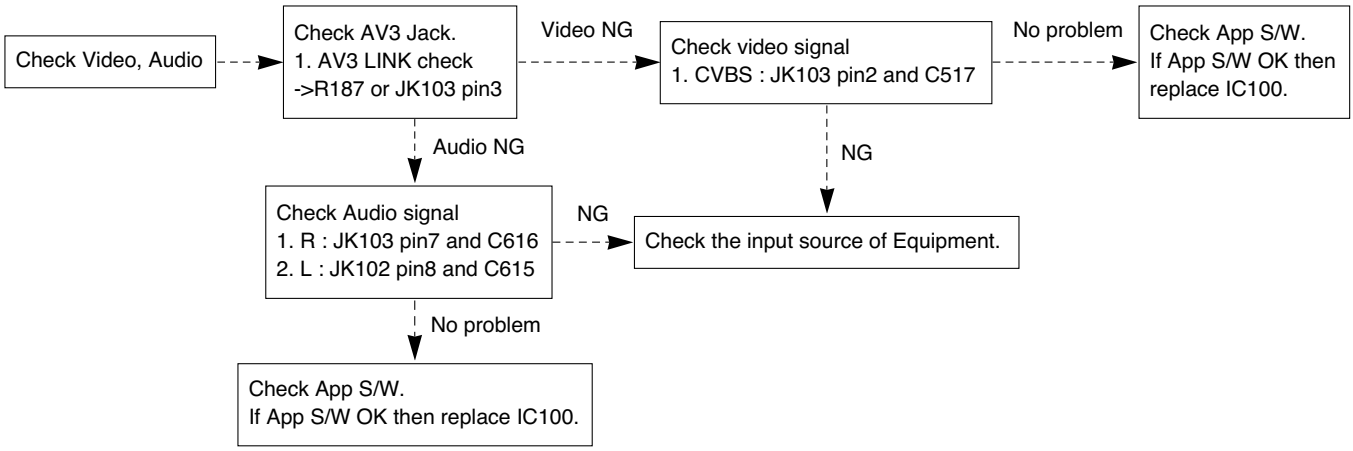
2-5. In case of abnormal display or sound when VGA Input mode



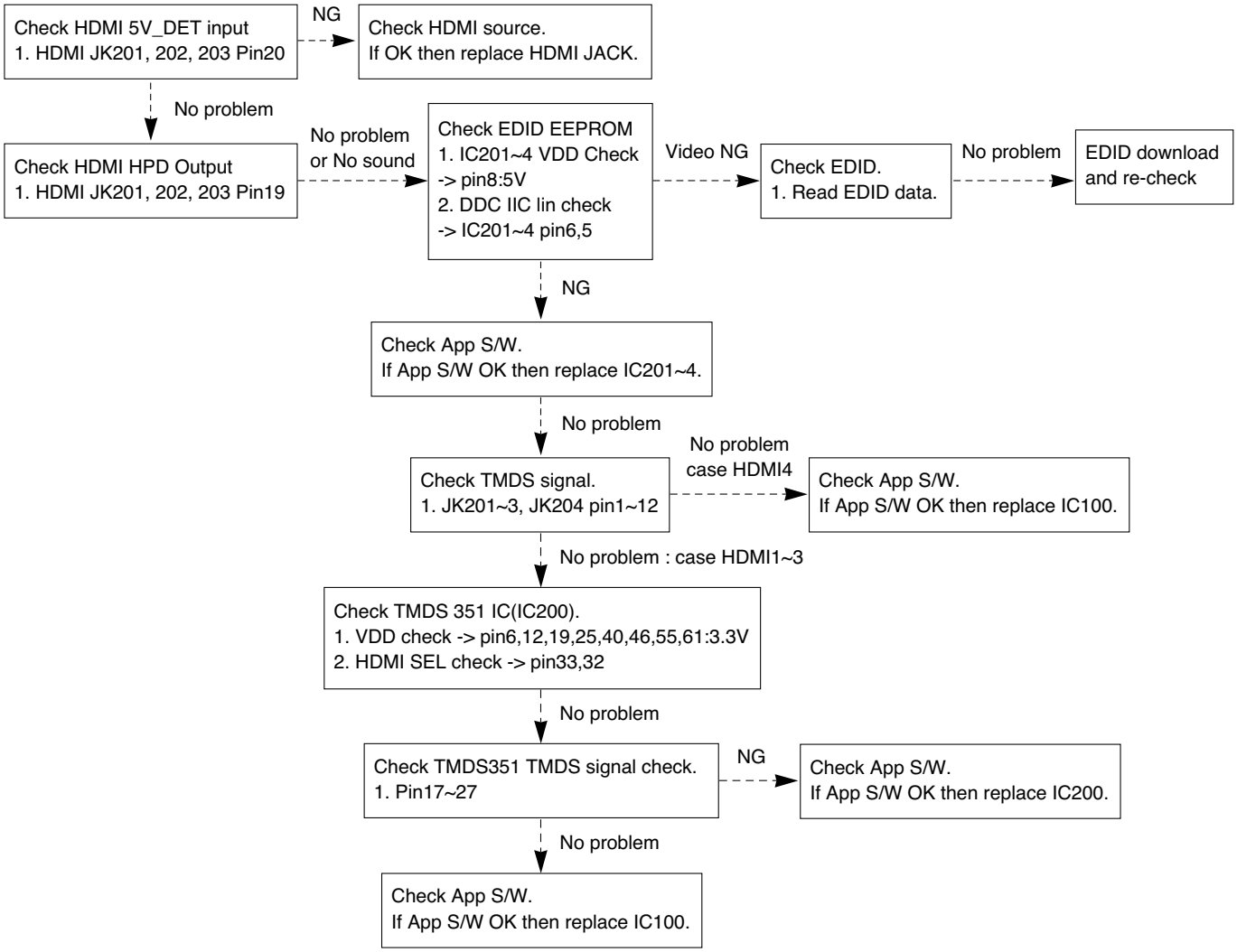
2-6. In case of abnormal display or sound when Component Input mode



2-7. In case of abnormal display or sound when side AV3 mode



2-8. In case of abnormal display or sound when HDMI1,2,3,4 mode

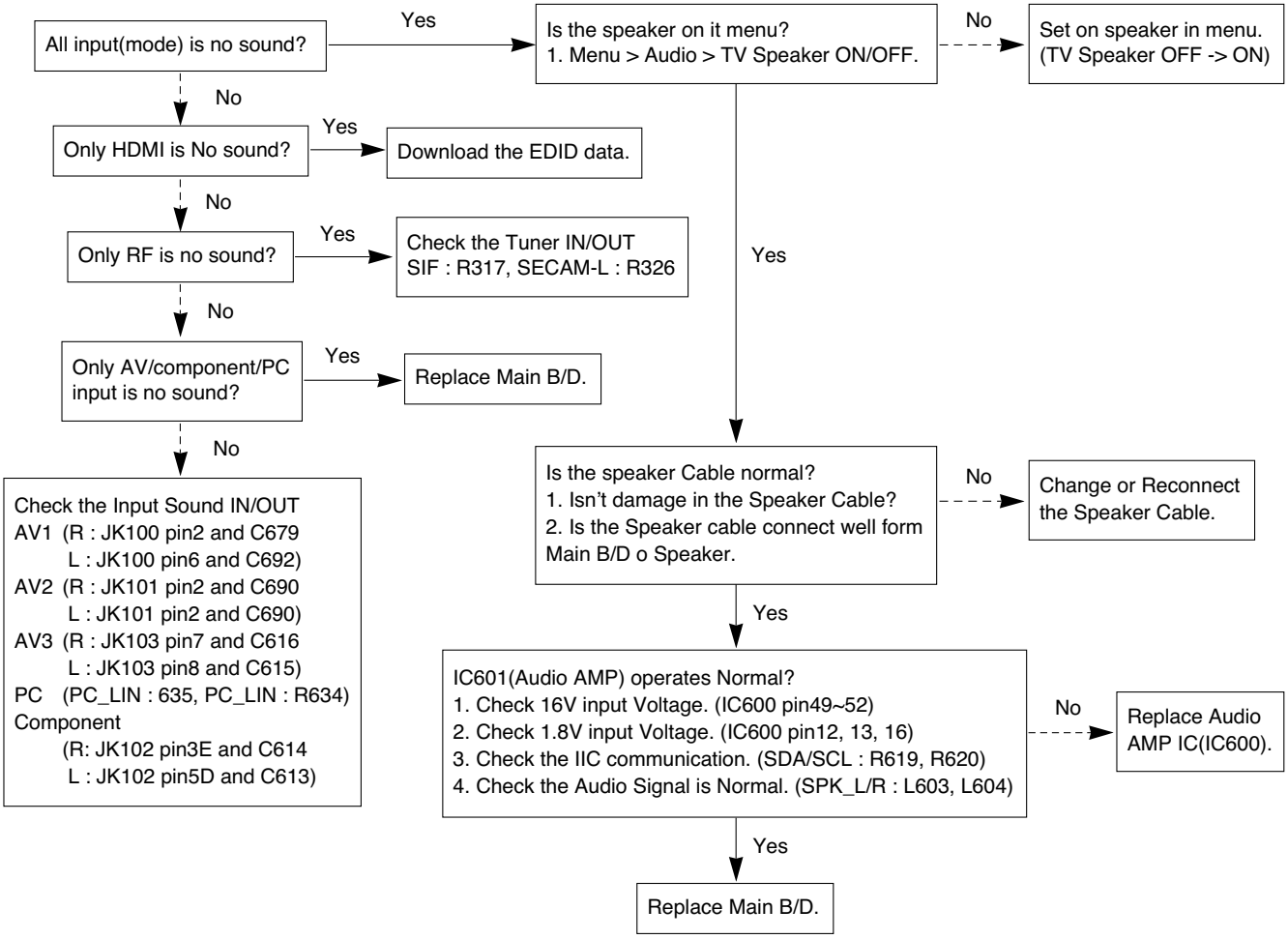


2-9. In case of No sound

(1) Symptom

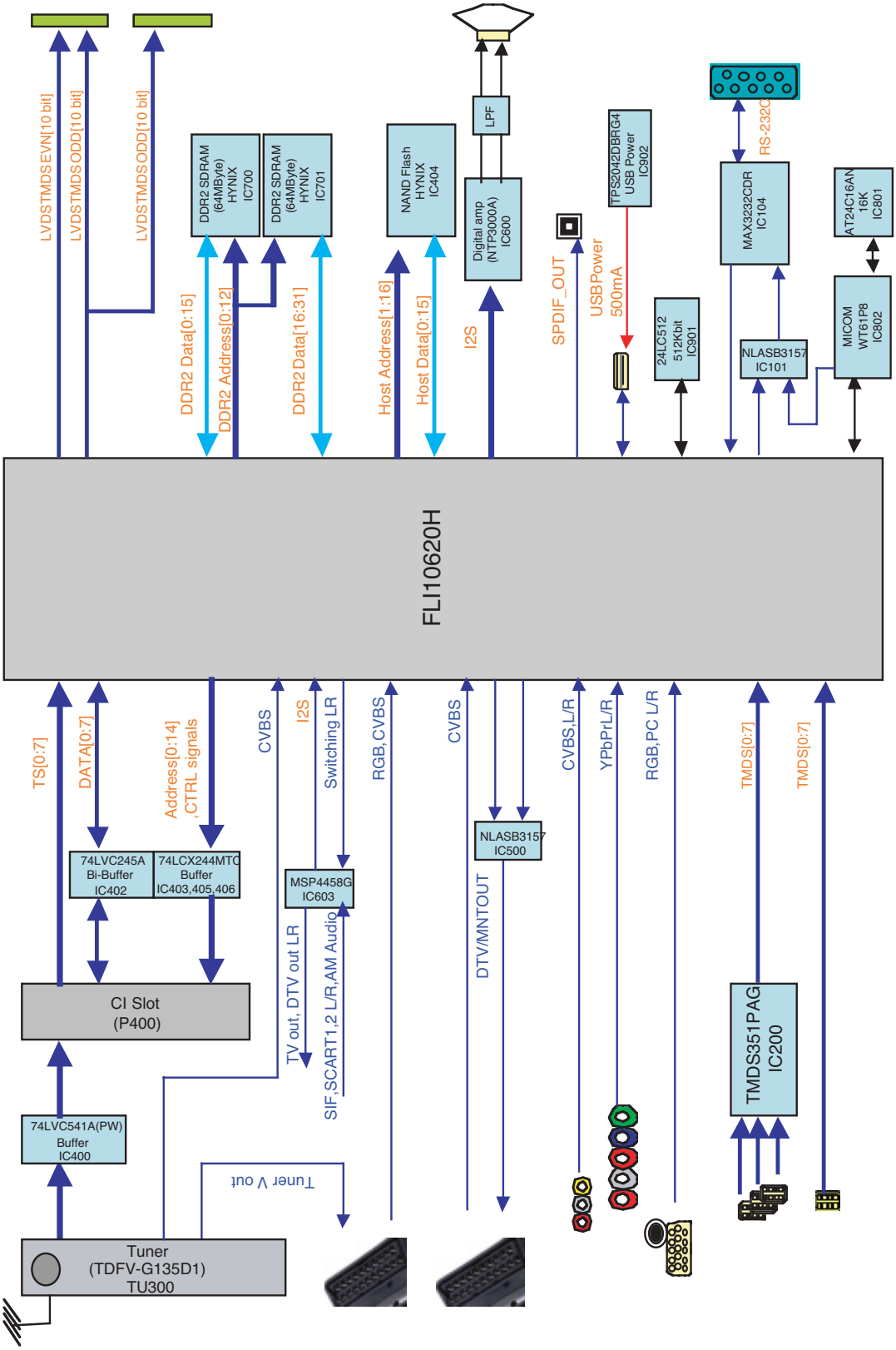
1) LED is green.
2) Screen display but sound is not output.

(2) Check the followings

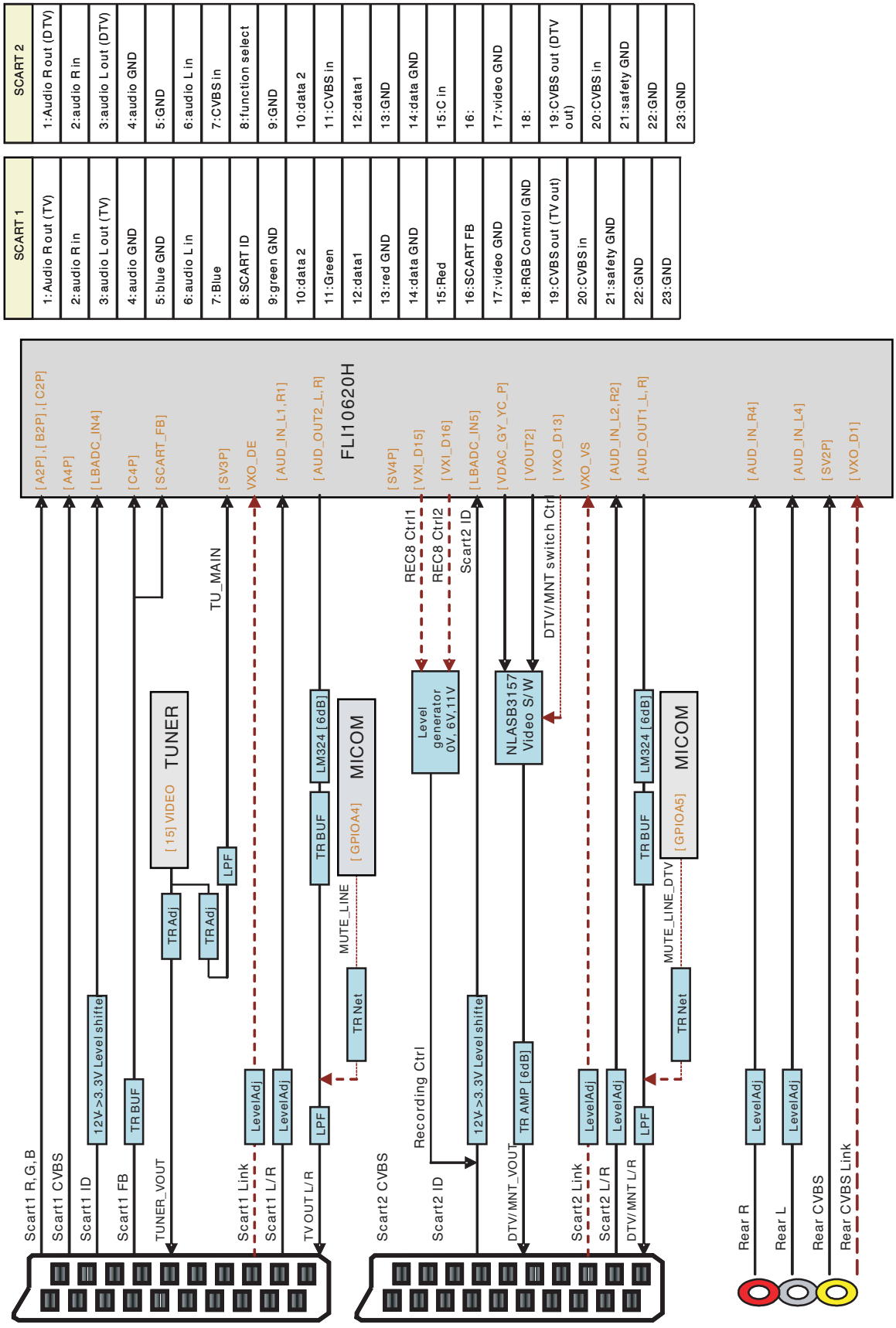


BLOCK DIAGRAM

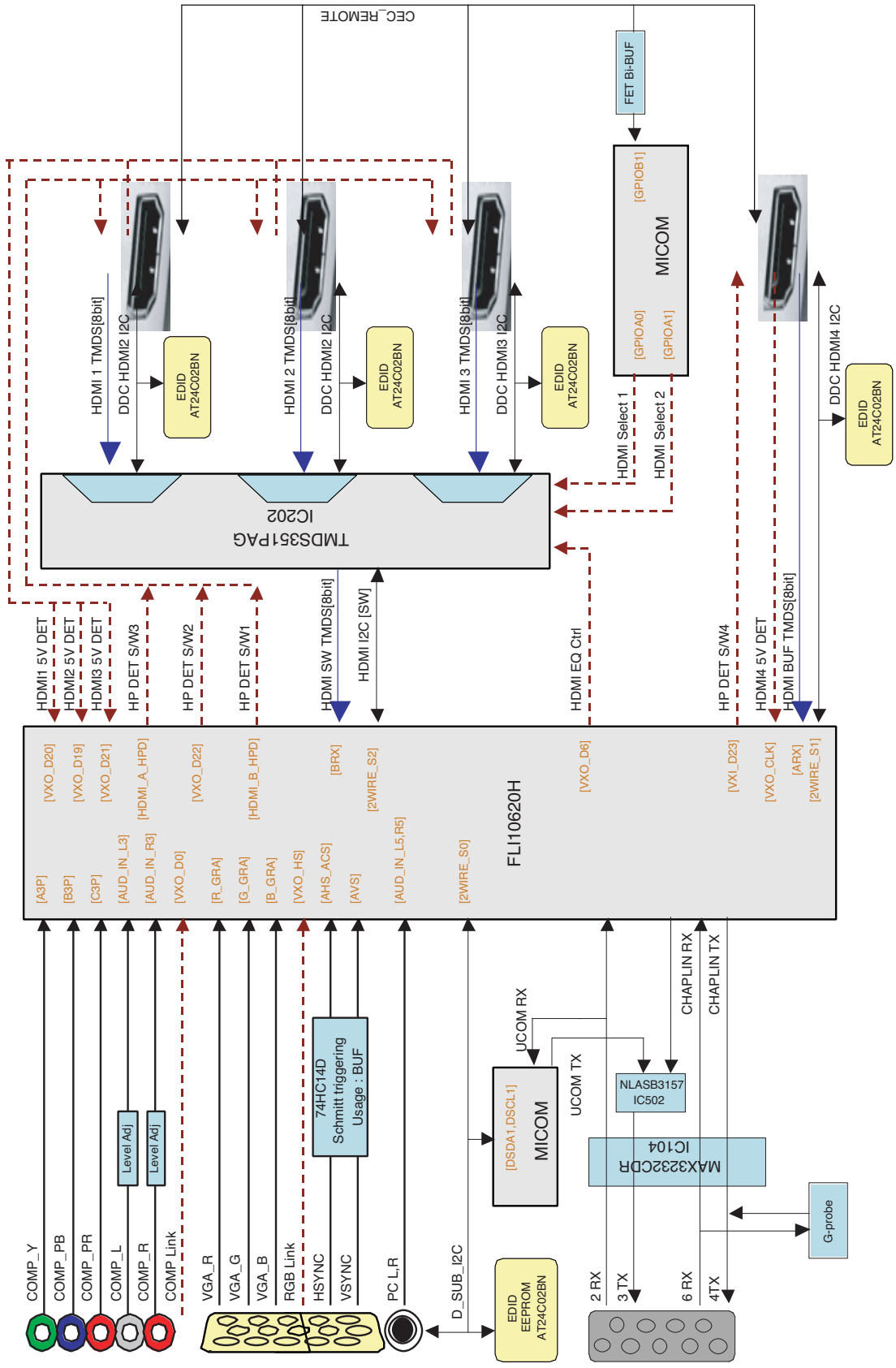
1. A TN Main Overall



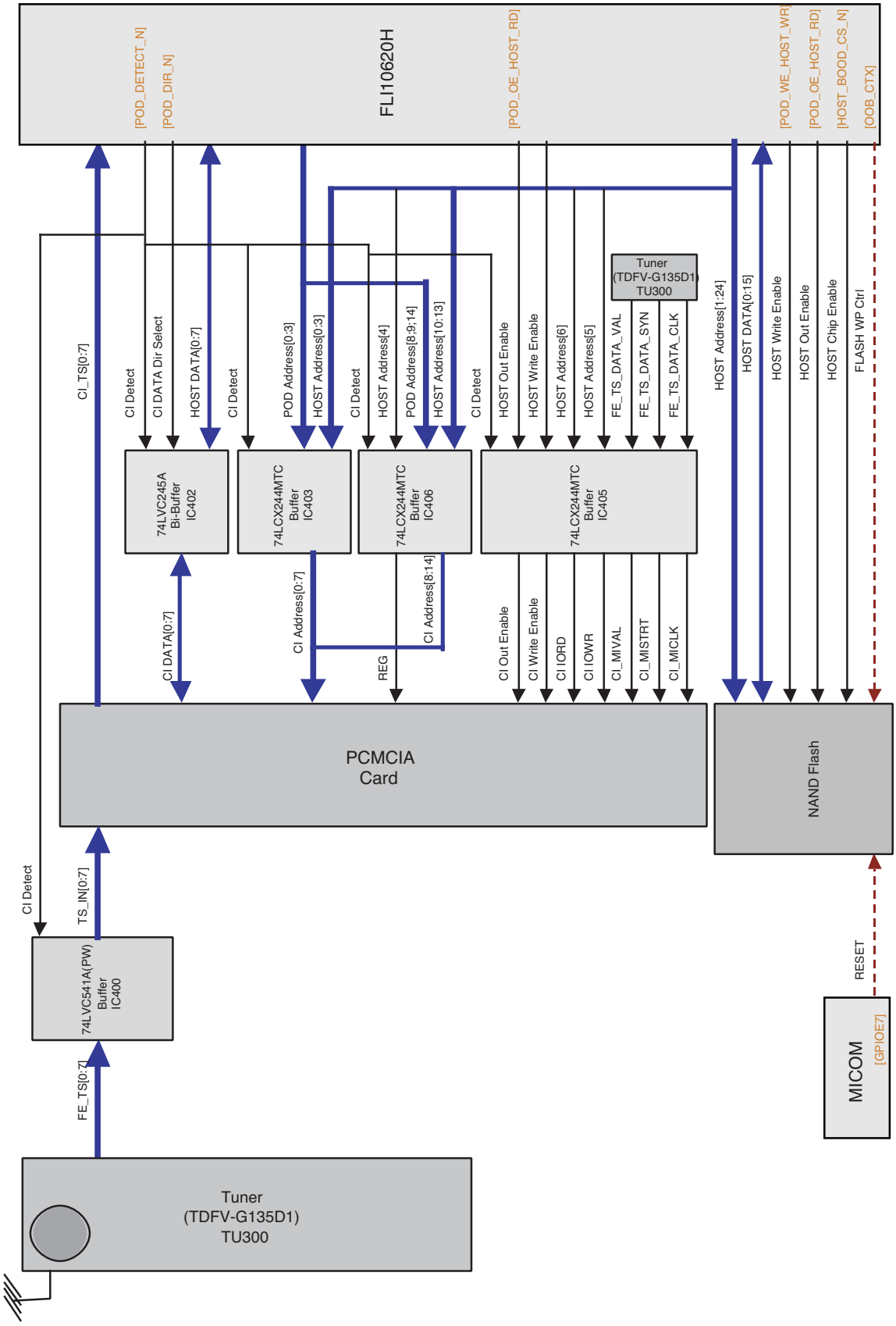
2. SCART 1,2, AV3



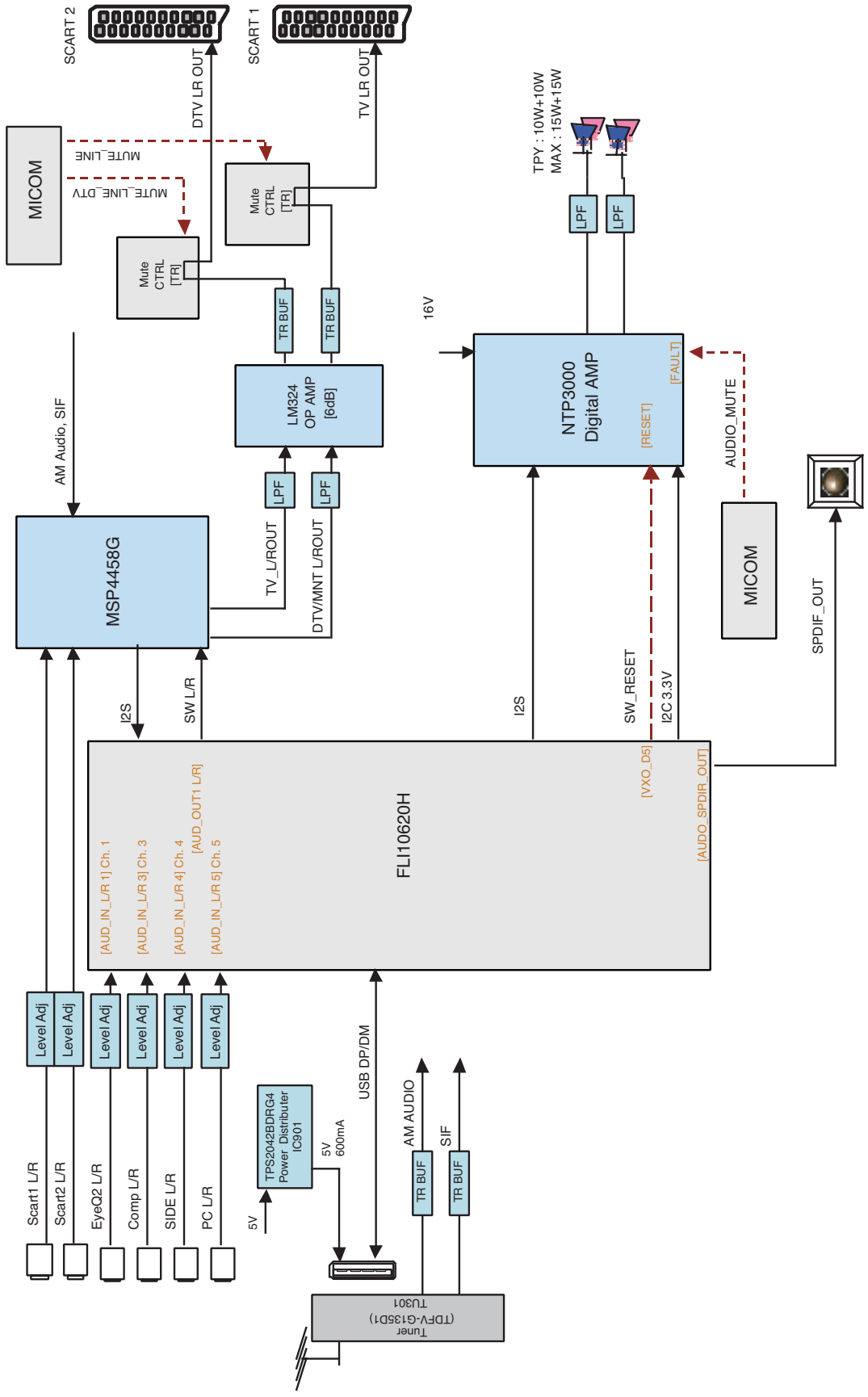
3. Component, RGB, HDMI, RS232



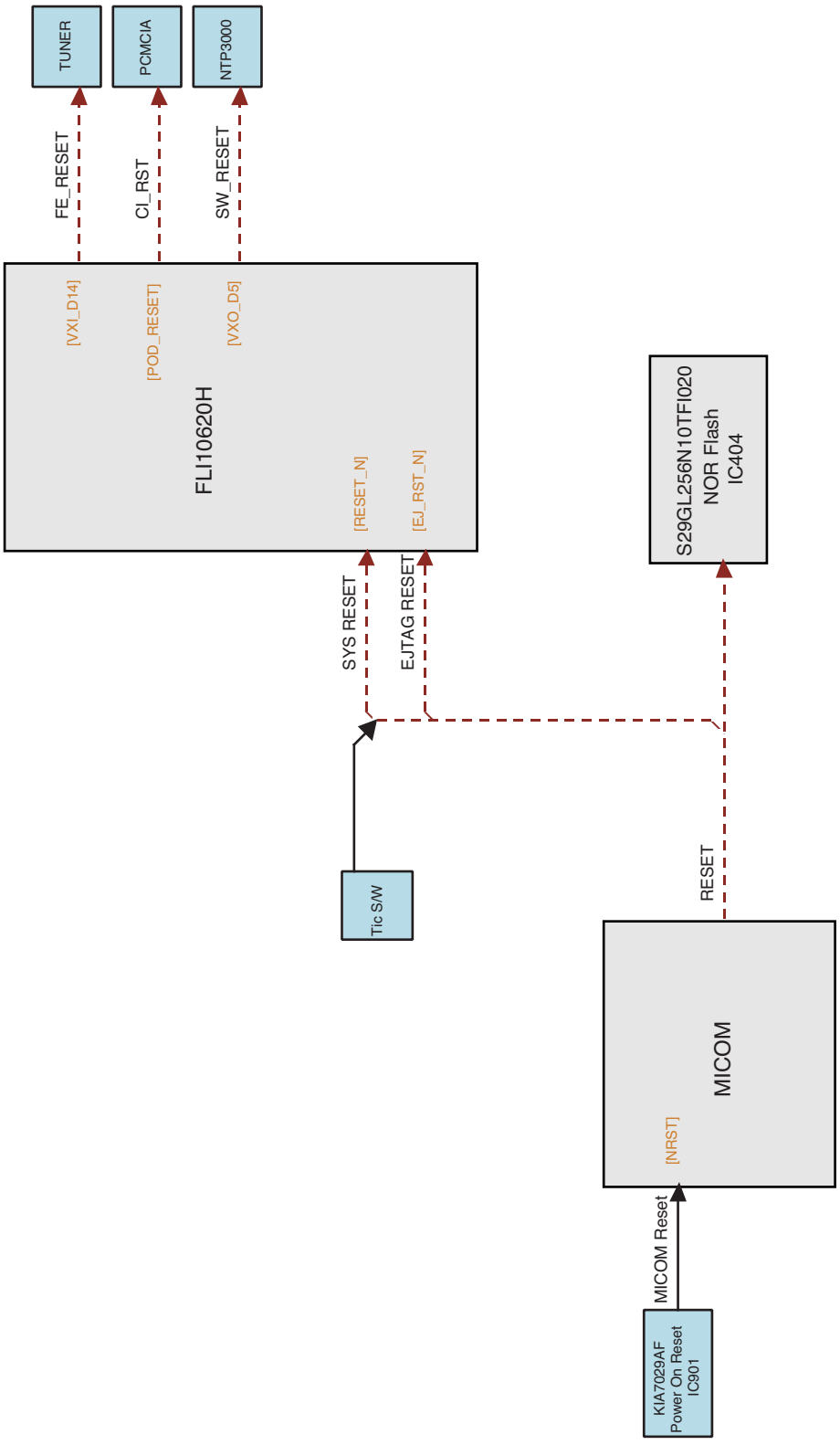
4. Tuner, CI



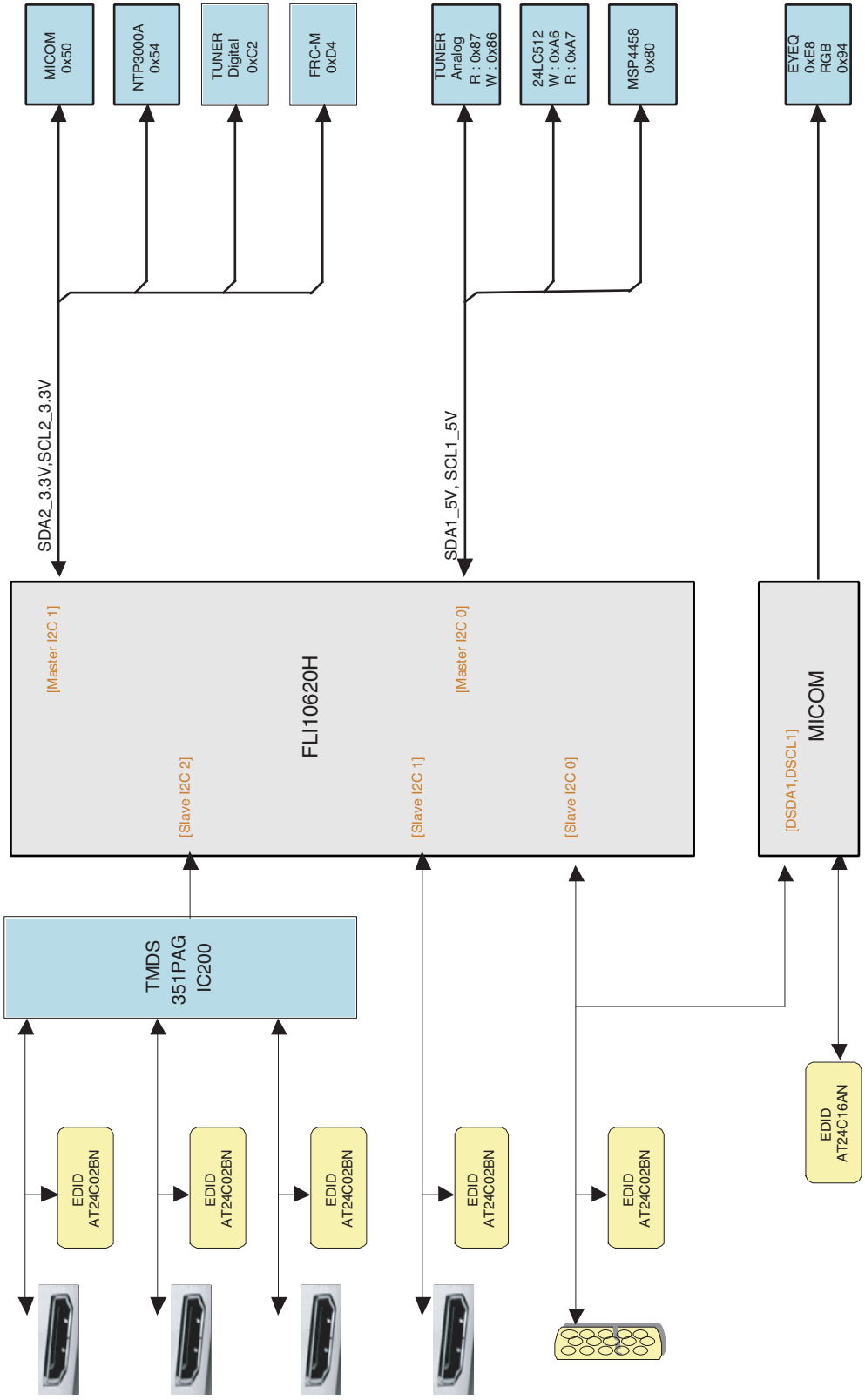
5. Audio(MSP4458, N TP3000A)



6. Reset system



7. I²C Control system



8. Weltrend uCOM GPIO

GPIO	Type	Assignment	Discription	Comment
A0/PWM4/P00	I/O	HDMI_SEL1	HDMI Switch IC Ch. Selection	
A1/PWM5/P01	I/O	HDMI_SEL2	HDMI Switch IC Ch. Selection	
A2/PWM6/P02	I/O	1.8V_DOUGLAS_EN	Active High	
A3/PWM7/P03	I/O	1.2V_DOUGLAS_EN	Active High	
A4/DSCL2	I/O	MUTE_LINE	H : Mute	
A5/DSDA2	I/O	MUTE_LINE_DTV	H : Mute	
DSCL1	I2C	D_SUB_SCL	For EEPROM Programming	
DSDA1	I2C	D_SUB_SDA	For EEPROM Programming	
B0/IRQ2	I/O	-	-	
B1/IRQ3/CEC	I/O	CEC_0	HDMI CEC	
B2/IR	I/O	IR	IR Signal Input	
B3/P04	I2C	EEPROM SCL	MICOM EX EEPROM I2C	
B4/P05	I2C	EEPROM SDA	MICOM EX EEPROM I2C	
B5/SSCL	I2C	SCL2_3.3V	I2C with FLI10620	
B6/SSDA	I2C	SDA2_3.3V	I2C with FLI10620	
C0/AD0	ADC	KEY1	KEY ADC Input1	
C1/AD1	ADC	KEY2	KEY ADC Input2	
C2/AD2	I/O	-	-	
C3/AD3	I/O	-	-	
C4/P14/RXD1	I/O	UART_SEL	L : Micom TX, H : ChaplinDegugTx	
C5/P15/TXD1	I/O	UCOM_SDA_3.3V	uCOMI2C for EyeQ2 Control	

9. Weltrend uCOM GPIO map

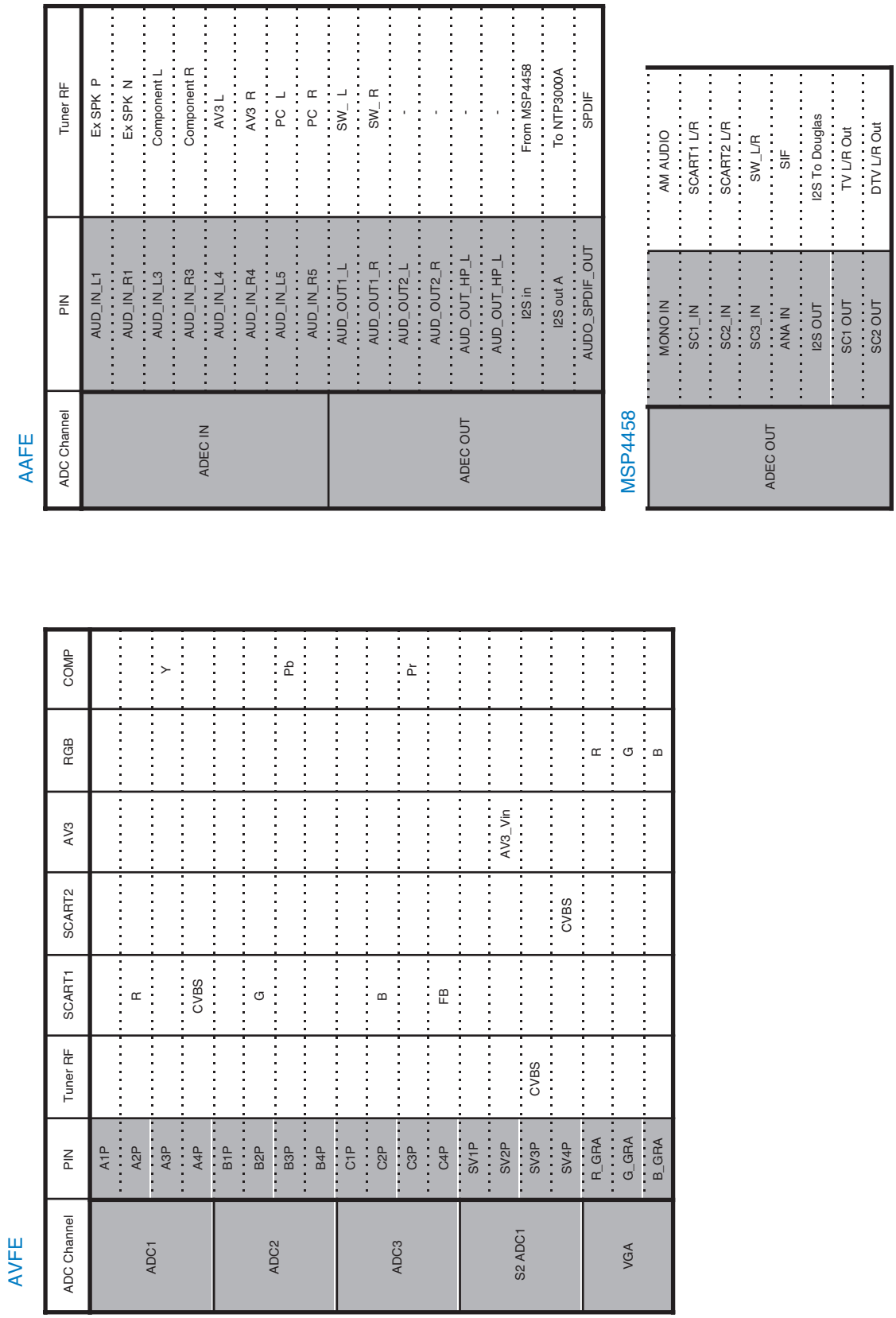
GPIO	Type	Assignment	Discription	Comment
C6/P16/IRQ0	I/O	AC_DET	H : AC Power ON, L:AC Power OFF detection	
C7/P17/IRQ1	I/O	PANEL_ERROR_DET	.	
D0/HIN1	I/O	AUDIO_MUTE	Active Low	
D1/HIN2	I/O	-	-	
D2/P10/AD4	I/O	LCD/PDP SEL	H : PDP L : LCD	
D3/P11/AD5	I/O	Model SEL	H : Aus model L : EP4 H	
D4/P12/AD6	I/O	3.3V_EN	Active High	
D5/P13/AD7	I/O	RL_ON/PWR_ON/OFF	H : PSU Relay On	
D6/TXD2	TX	UCOM_TX	For MICOM Programming Debugging	
D7/RXD2	RX	UCOM_RX	For MICOM Programming Debugging	
E0/PWM0	PWM	-		
E1/PWM1	I/O	-	LG7000 ready	
E2/PWM2	I/O	-		
E3/PWM3	I/O	LED_IR_3.3V_ST_On/Off_CTRL	LED SubA°Øssy Standby 3.3V on/off CTRL	
E4/LPWM/P06	I/O	INV_CTRL	H : Inverter On to PSU	
E5/P07	I/O	UCOM_SCL_3.3V	uCOMI2C for EyeQ2 Control	
E6/VIN2	I/O	PANEL_VCC_EN	T-con B/D 12V power supply CTRL	
E7/VIN1	I/O	RESET	Active Low Reset signal OUT	

10. Douglas GPIO map

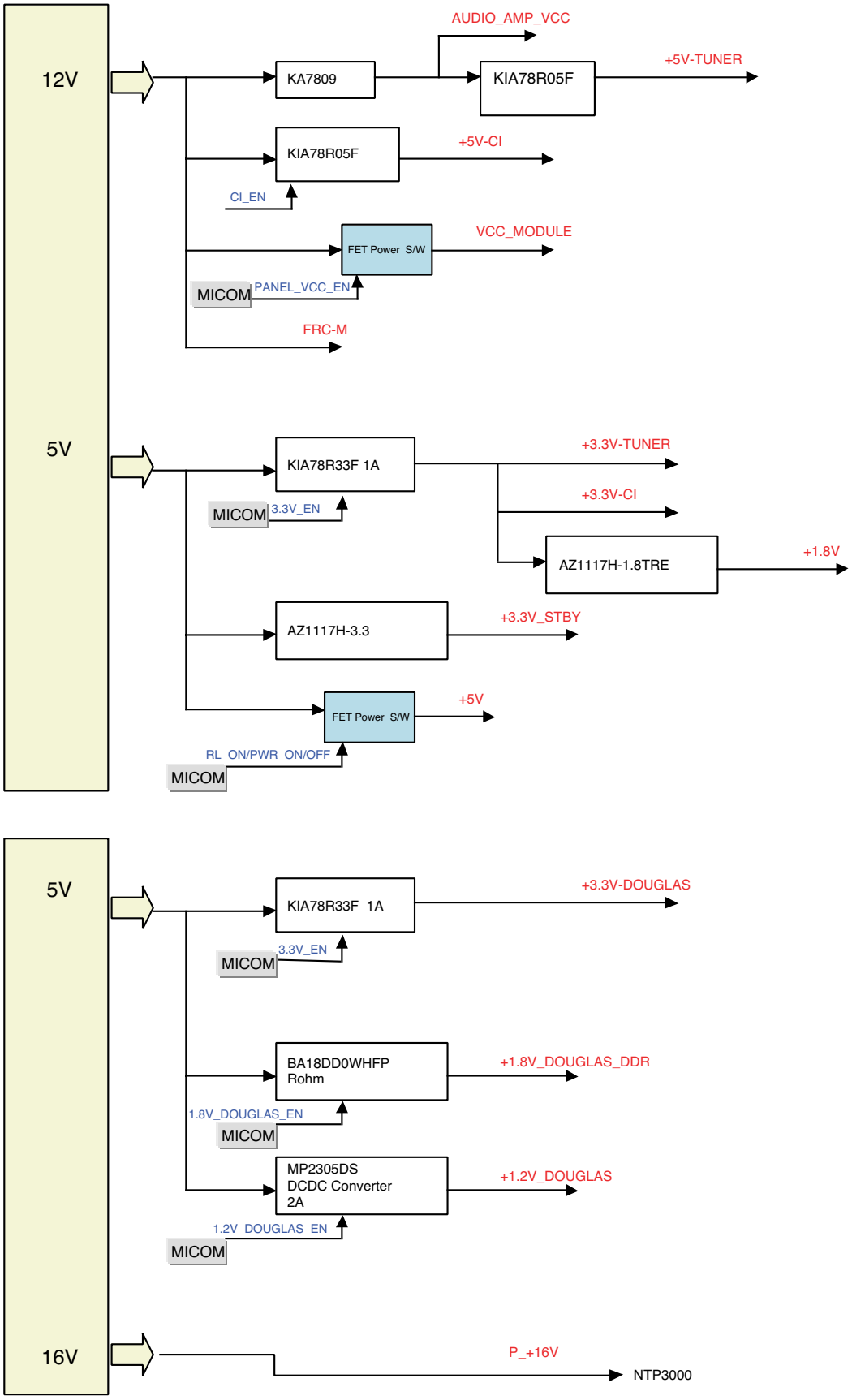
GPIO	Type	Assignment	Discription	Comment
VXI D14		FE_RESET	Tuner Reset Active Low	
VXI D15		REC_8_CTRL1	[00] PeriTV [01] Normal [10] 16:9	
VXI D16		REC_8_CTRL2		
VXI D19		HDMI2_5V_DET		
VXI D20		HDMI1_5V_DET		
VXI D21		HDMI3_5V_DET		
VXI D22		HP_DET_S/W_2		
VXI D23		HP_DET_S/W_4		
PWM0		CI_EN		
VXO CLK		HDMI4_5V_DET		
VXO DE		SCART1_LINK		
VXO VS		SCART2_LINK		
VXO HS		RGB_LINK		
VXO D0		COMP_LINK		
VXO D1		AV3_LINK		
VXO D4		EN_1.3PLL		
VXO D5		SW_RESET	Active Low [digital AMP reset]	
VXO D6		HDMI_SW_EQ		
VXO D7		AGC_SPEED_CTL		
VXO D8		BOOSTER		
VXO D10		EN_1.8VF		
VXO D12		EN_3.3VF		
VXO D13		DTV/MNT_SWITCH		
VXO D14		EN_1.3VF		
VXO D15		EN_2.5VF		

GPIO	Type	Assignment	Discription	Comment
PWM2		VBR_A	[LPL] A-Dimming (0V~1.65Vdc)	R(6.8K), C(32uF)
PWM3		VBR_B	[LPL] Burst Dimming (0V~3.3Vdc)	R(0), C(Ready)
LBADC_IN4		SCART1_ID	Level 0 " 0V to +2V (television broadcast reproduction) Level 1A : +4.5V to +7V (reproduction of an external source with ARC 16:9) Level 1B : +9.5V to +12V (peritelevision reproduction)	
LBADC_IN5		SCART2_ID		
OOB_CTX		FLASH_WP		
HDMI_A_HPD		HP_DET_S/W_3		
AUDO_I2SB_DAT1		5V_ANN_CTL	Not used	
AUDO_I2SB_DAT2		5V_ANN_MNT	Not used	

11. Analog video & audio Front End

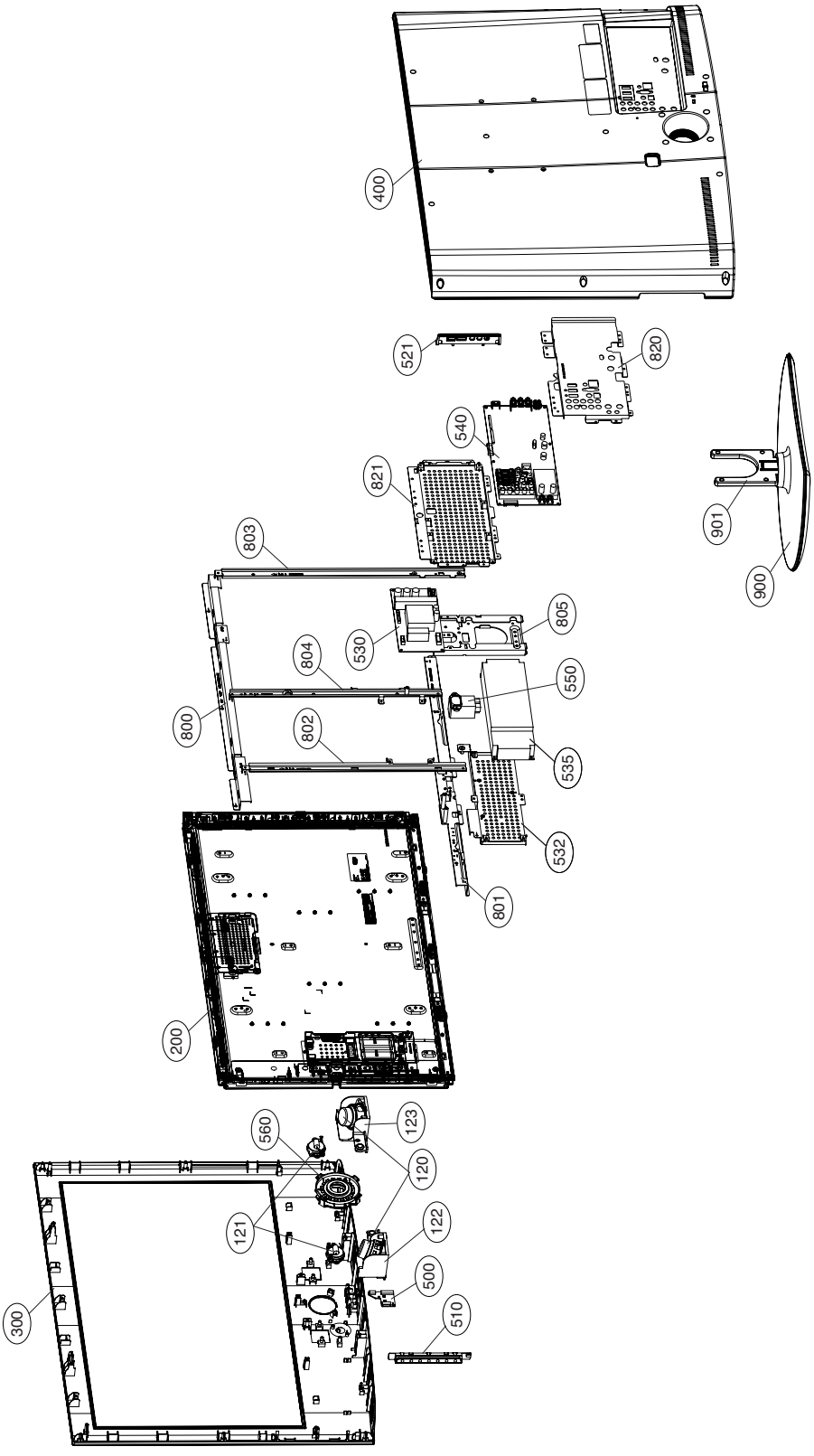


12. Power supply tree

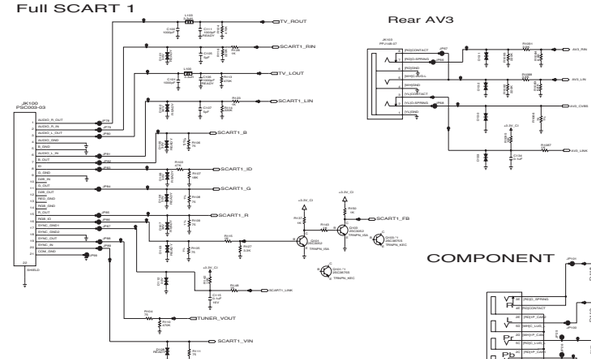


MEMO

EXPLODED VIEW

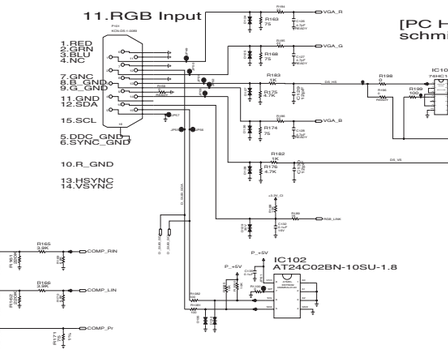


Full SCART 1



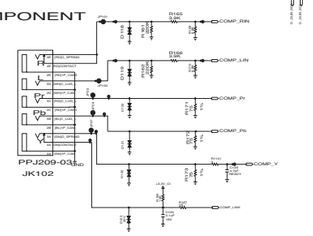
Rear AV3

11.RGB Input

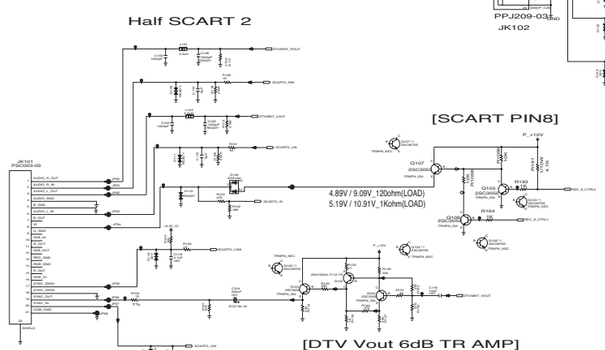


[PC H,V SYNC] schmitt trigger

COMPONENT



Half SCART 2

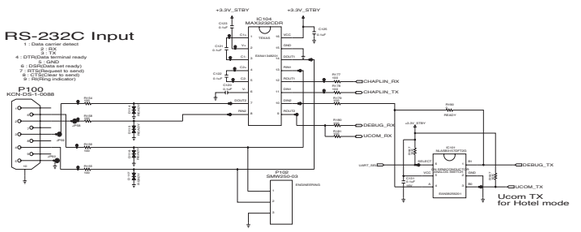


[SCART PIN8]

4.89V / 9.09V_120ohm(LOAD)
5.19V / 10.91V_1Kohm(LOAD)

[DTV Vout 6dB TR AMP]

RS-232C Input



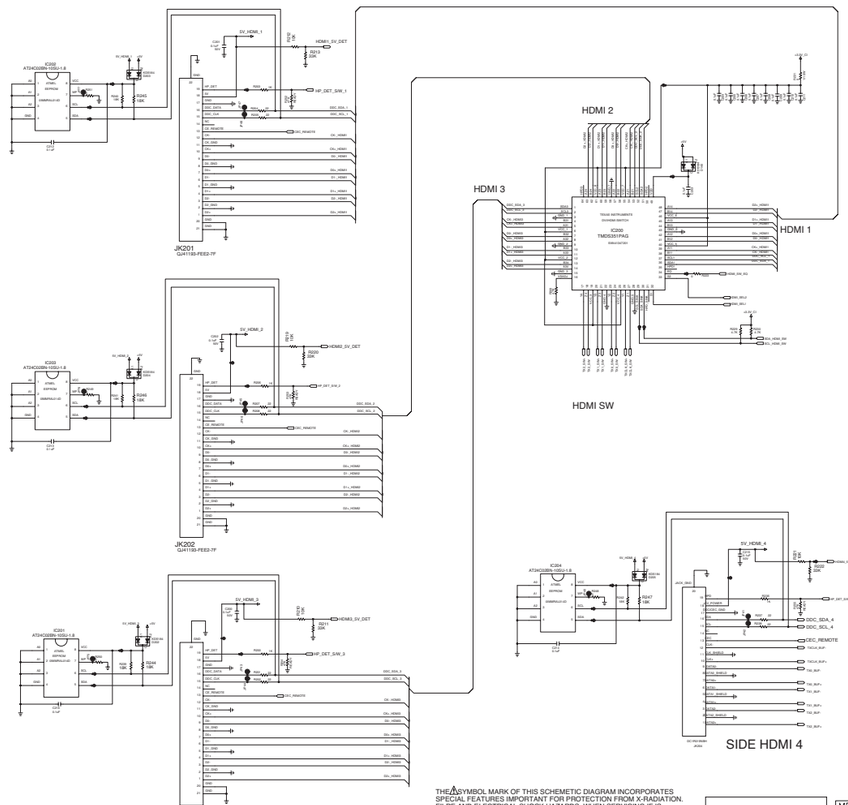
PCB No : EAX39192001(14)
ECO No : EAX39192001(19)
For MP

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 SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

LG ELECTRONICS

MODEL	LG6000 ATN	DATE	08.1.9
BLOCK	External Jack	SHEET	1 / 10

HDMI SW



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LG ELECTRONICS

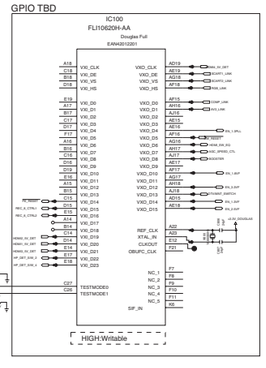
MODEL	Douglas	DATE	
BLOCK	HDMI	SHEET	2 / 10

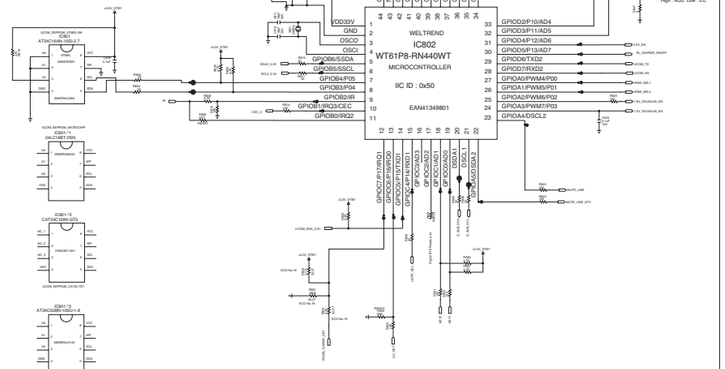
IR/KEY/EYE Q2/LED

EyeQ2 Sensor IIC ID : 0xE8
RGB Sensor IIC ID : 0x94(TBD)

FRCM CONTROL

GPIO TBD





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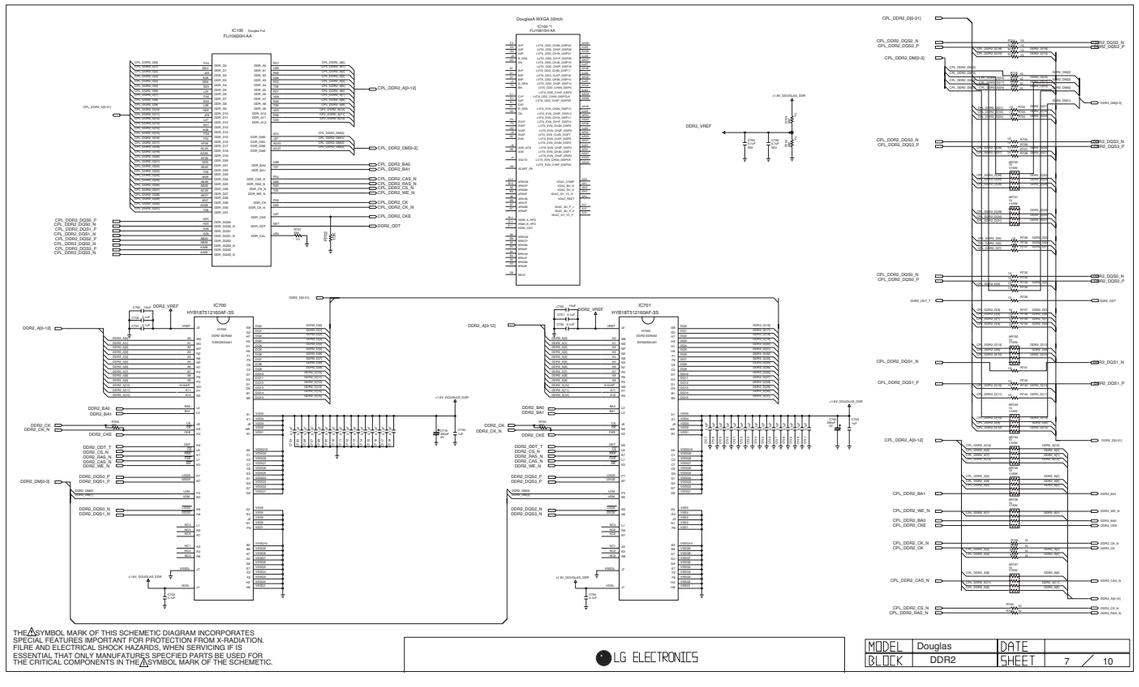
LG ELECTRONICS

MODEL	Douglas	DATE	
BLOCK	GPIO, Sub-Micom	SHEET	8 / 10

DDR2



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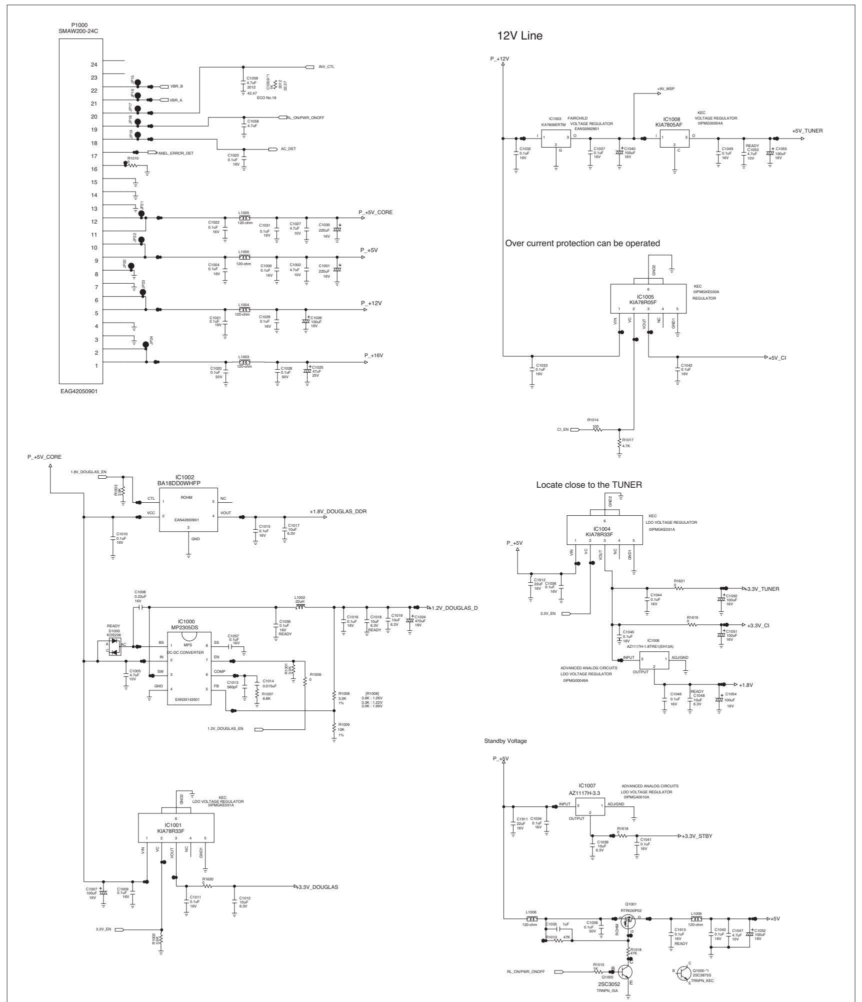
LG ELECTRONICS

MODEL	Douglas	DATE	
BLOCK	DDR2	SHEET	7 / 10



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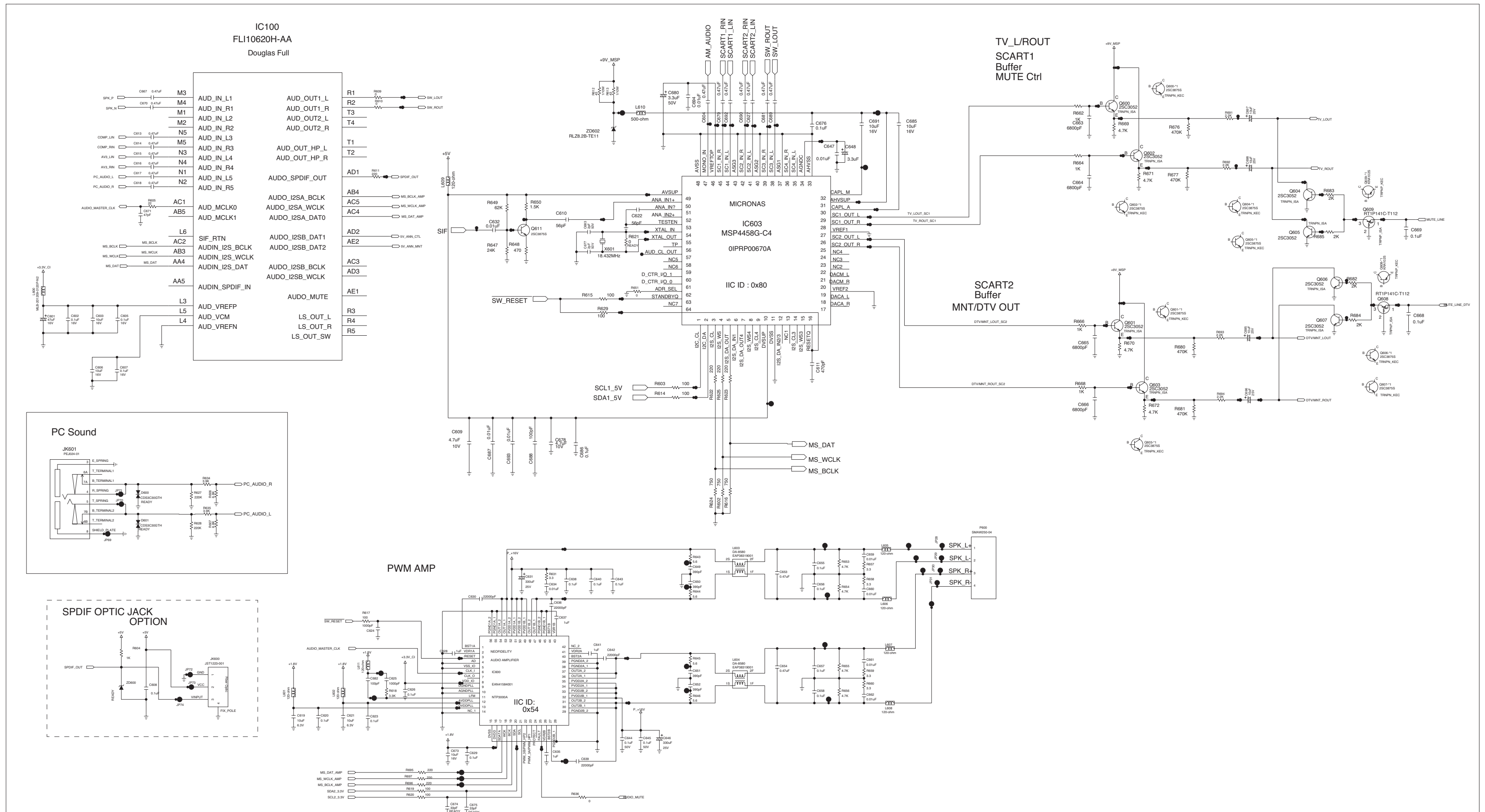
LG ELECTRONICS

MODEL	Douglas	DATE	
BLOCK	POWER	SHEET	10 / 10



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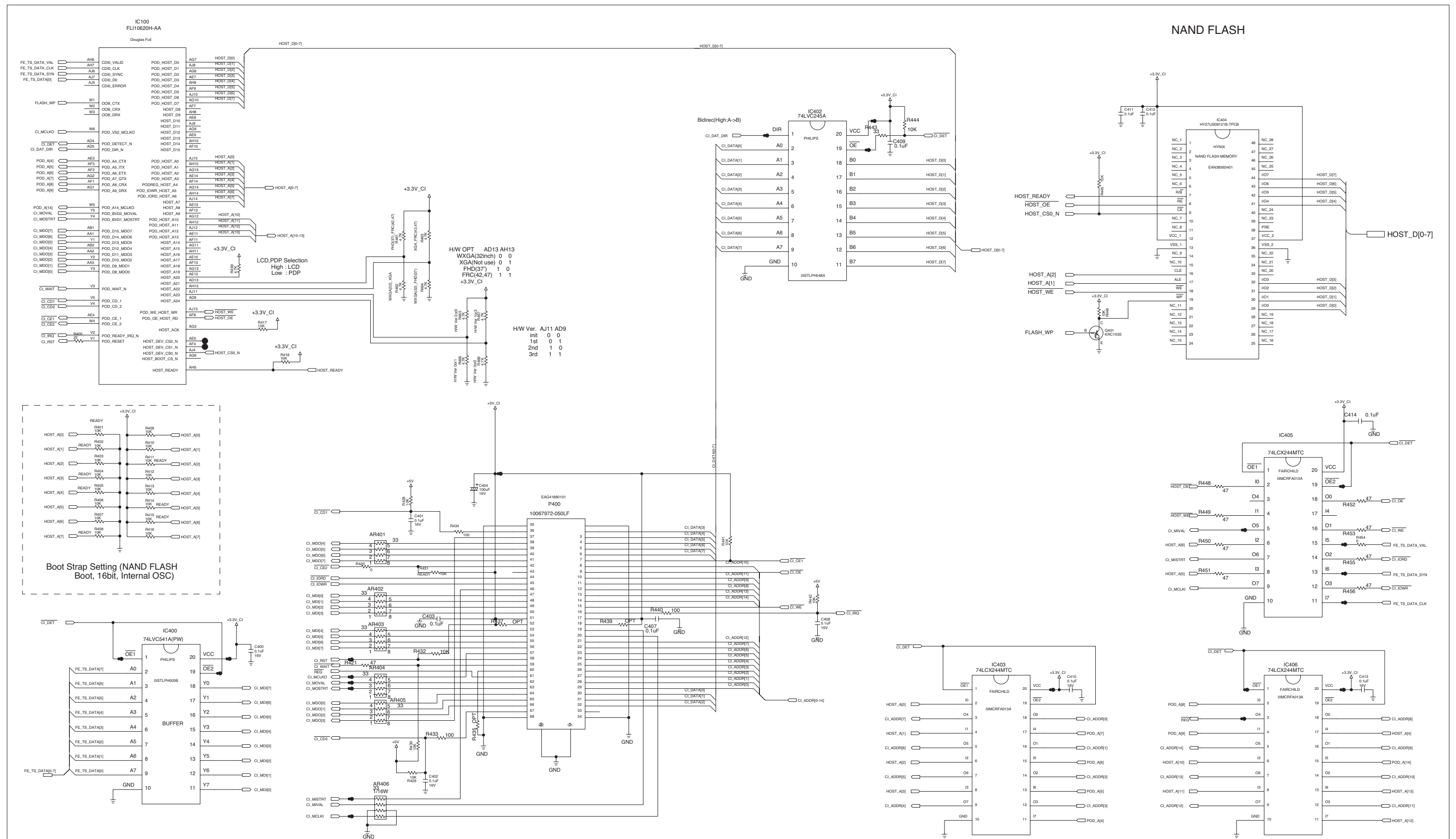
LG ELECTRONICS

MODEL	Douglas	DATE	
BLOCK	AUDIO	SHEET	6 / 10



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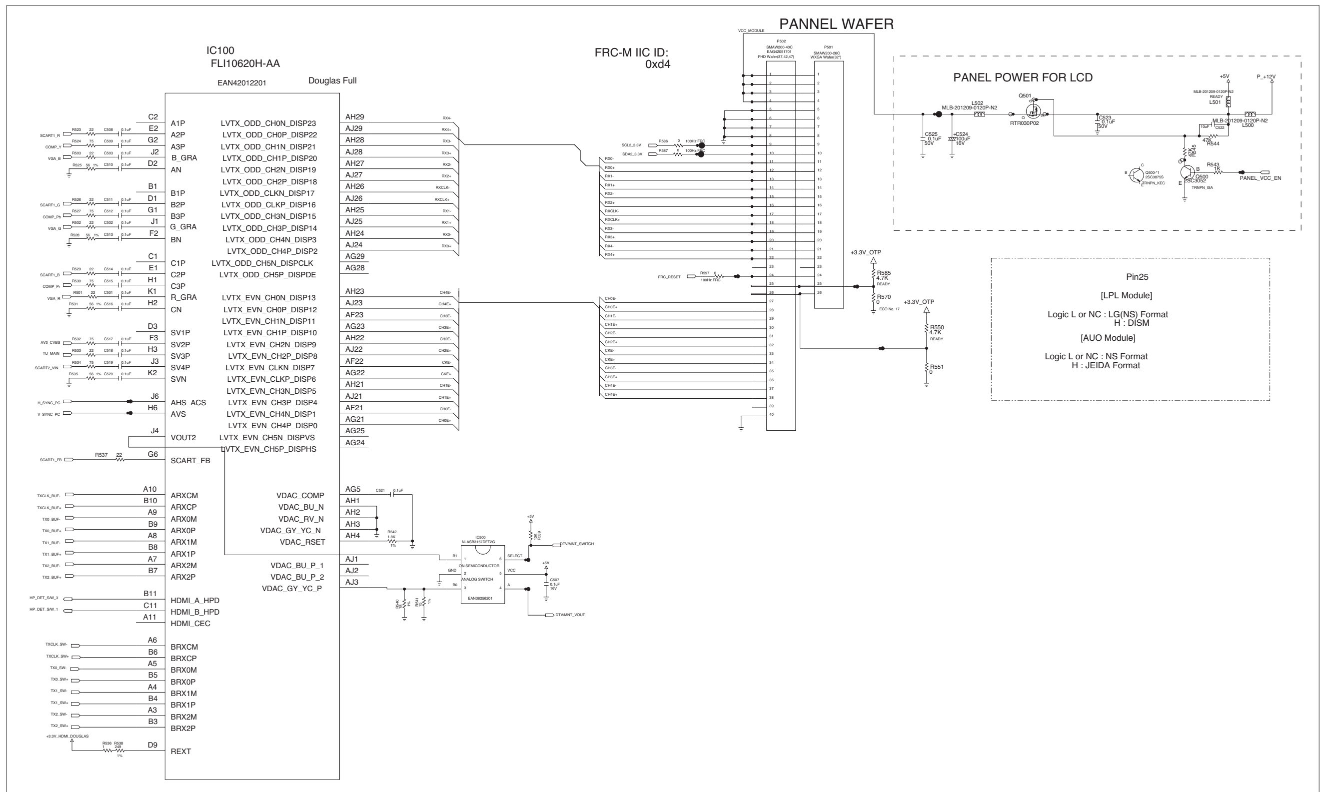
LG ELECTRONICS

MODEL	Douglas	DATE	
BLOCK	Flash & CI	SHEET	4 / 10



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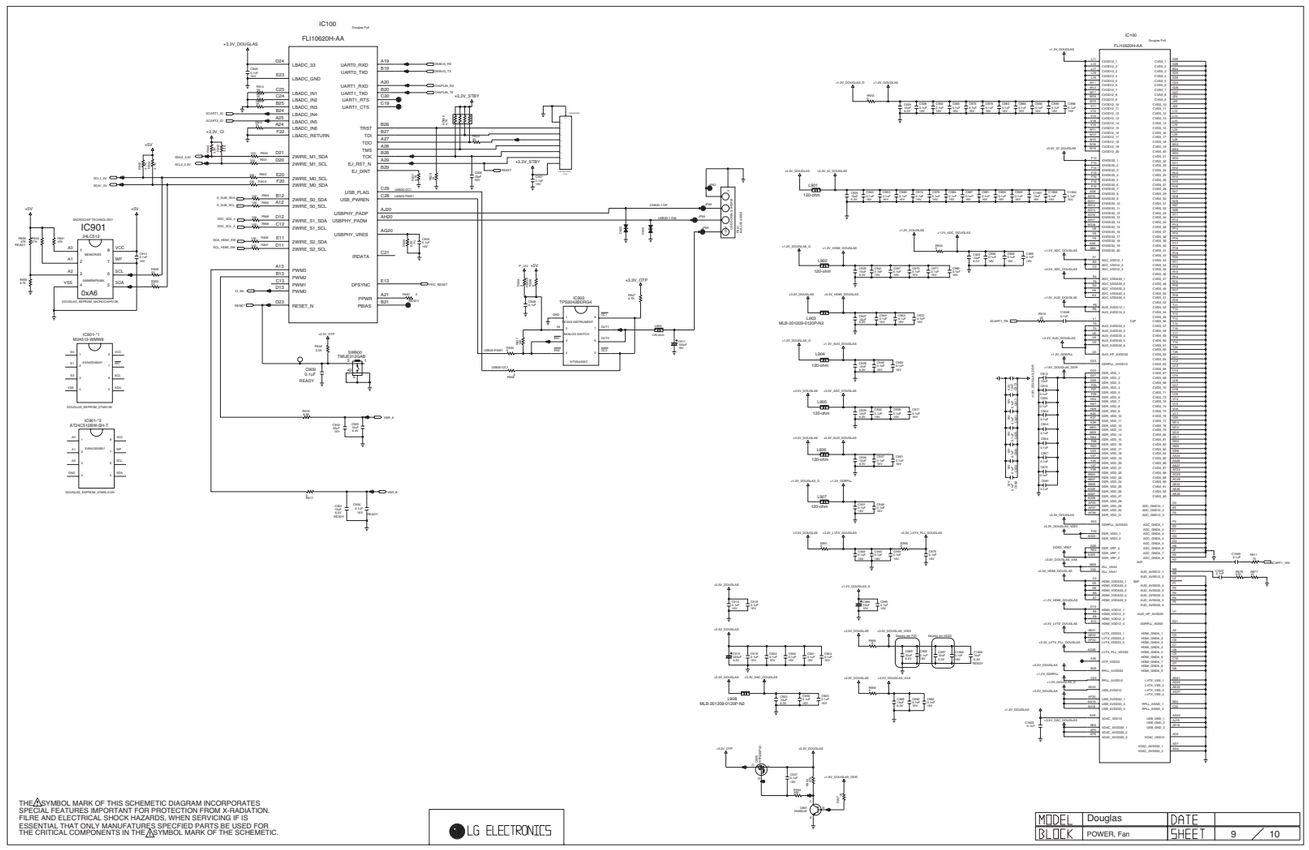
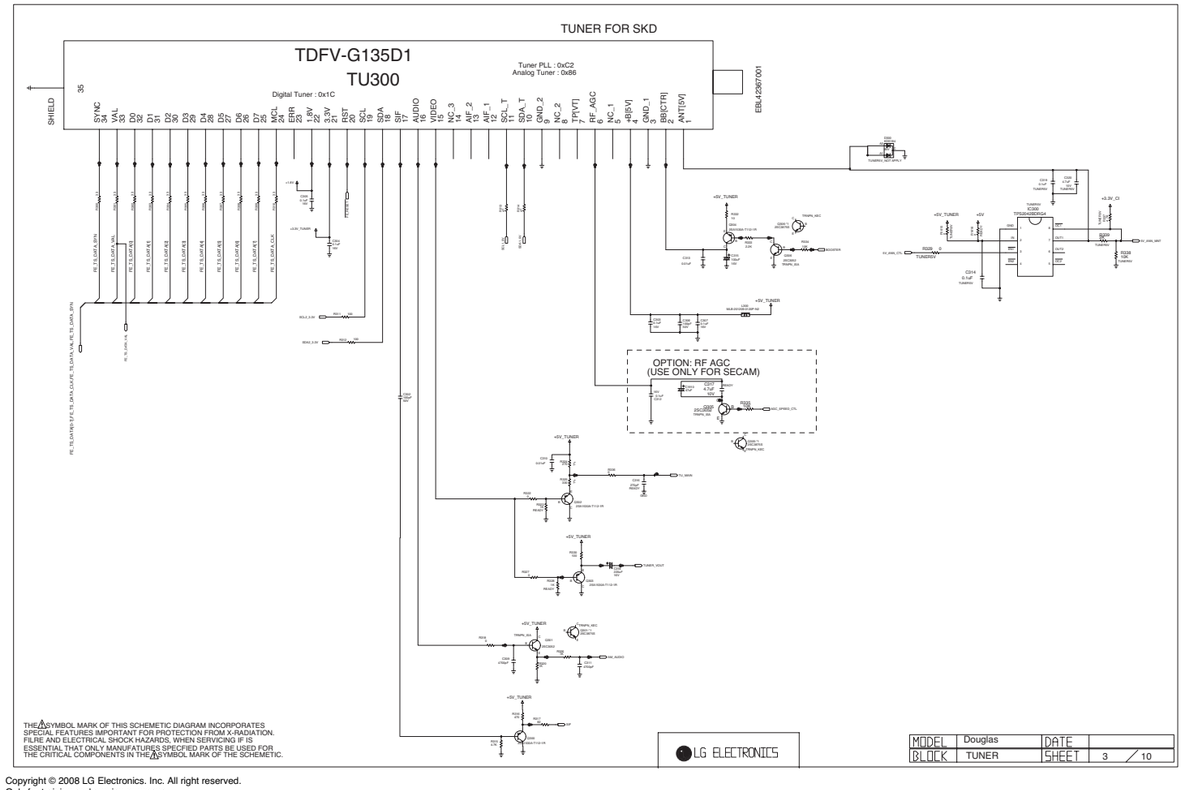
LG ELECTRONICS

MODEL	Douglas	DATE	
BLOCK	LVDS, AFE	SHEET	5 / 10





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Jan., 2008
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