



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

LCD TV SERVICE MANUAL

CHASSIS : LP81A

MODEL : 32LG30R 32LG30R-MA

CAUTION

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



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SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by $\triangle$ in the Schematic Diagram and 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 its components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

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

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 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 $1M\Omega$ and $5.2M\Omega$.

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

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

Leakage Current Hot Check (See below Figure)

Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.

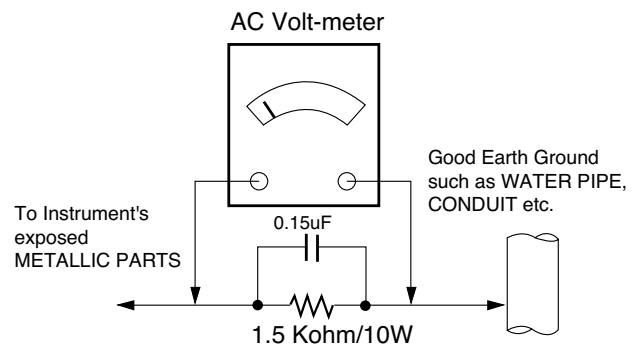
Connect 1.5K/10watt resistor in parallel with a 0.15uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

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 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)
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. Application range

This specification is applied to LP81A chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

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

3. Test method

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

4. General Specification(LCD Module)

Item	Specification			Measurement	Result	Remark
Display Screen Device	26" wide Color Display Module					Resolution:1366X768(HD)
	32" wide Color Display Module					Resolution:1366X768(HD)
Aspect Ratio	16:9					
LCD Module	26" TFT WXGA LCD					26" HD MAKER :CMO
	32" TFT WXGA LCD					32" HD MAKER :LPL CPT, CMO, AUO, SHARP
Operating Environment	1) Temp. : 0 ~ 40 deg 2) Humidity : 0 ~ 85%					LGE SPEC
Storage Environment	1) Temp. : -20 ~ 60 deg 2) Humidity : 0 ~ 85 %					
Input Voltage	100-240V~, 50/60Hz					
Power Consumption	Power on (Blue) : LG30/LG50					Volume: 1/8 volume of sound distortion point
	Power on (White) : LG60					
	≤ TBD	26" HD				
	≤ TBD	32" HD				
	St-By (Red) ≤ 1.0 W (All)					LG60:St-by Light condition
LCD Module (Maker : AUO, CMO, CPT, LPL, SHARP)	Maker		Inch	(H) x (V) x (D)	unit	Remark
	CMO(HD)	Outline Dimension	26"	626 x 373 x 43.7	mm	[with inverter]
		Pixel Pitch	26"	0.1405 x 0.4215	mm	
		Back Light	26"	12 CCFL	mm	
		Outline Dimension	32"	760 x 450 x 47.4	mm	[with inverter]
		Pixel Pitch	32"	0.17025 x 0.51075	mm	
		Back Light	32"	16 CCFL	mm	
	LPL(HD)	Outline Dimension	32"	760 x 450 x 48	mm	[with inverter]
		Pixel Pitch	32"	0.17025 x 0.51075	mm	
		Back Light	32"	12 EEFL	mm	
	Display Colors			-		
	Coating			3H, AG/ 2H, AG		LPL, CMO, AUO / Sharp

5. Model Specification

Item		Specification		Remark
Market		Central and South America		
Broadcasting system		PAL SECAM B/G/D/K, PAL I/II, NTSC-M		
Available Channel		BAND	NTSC	
		VHF	2~13	
		UHF	14~69	
		CATV	1~125	
Receiving system		Upper Heterodyne		
Video Input (2EA)		NTSC, PAL-M/N		Rear 1EA, Side 1EA
AV Output (1EA)		NTSC, PAL-M/N		Rear
S-Video Input (1EA)		NTSC, PAL-M/N		Side (S-Video Priority)
Component Input (2EA)		Y/Cb/Cr, Y/ Pb/Pr		Rear
RGB Input (1EA)		RGB-PC, S/W Upgrade		Rear
HDMI Input	2EA	HDMI-DTV, Only PCM MODE		LG30 Tool, 32LG60
	3EA			LG50, LG70 Tool
Audio Input (5EA)		PC Audio, Component (2EA), AV (2EA)		L/R Input
RS-232C		Remote control, Commercial		Side(1EA)-LG30 Tool only (LG50, LG60, LG70 not Support)
USB Input		Divx, MP3, JPEG		Side(1EA) - LG60, LG70 Tool Only (LG30, LG50 Not Support)

6. Component Video Input (Y, PB, PR)

Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed
720*480	15.73	59.94	13.500	SDTV, DVD 480I(525I)
720*480	15.75	60.00	13.514	SDTV, DVD 480I(525I)
720*576	15.625	50.00	13.500	SDTV, DVD 576I(625I) 50Hz
720*480	31.47	59.94	27.000	SDTV 480P
720*480	31.50	60.00	27.027	SDTV 480P
720*576	31.25	50.00	27.000	SDTV 576P 50Hz
1280*720	44.96	59.94	74.176	HDTV 720P
1280*720	45.00	60.00	74.250	HDTV 720P
1280*720	37.50	50.00	74.25	HDTV 720P 50Hz
1920*1080	28.125	50.00	74.250	HDTV 1080I 50Hz,
1920*1080	33.72	59.94	74.176	HDTV 1080I
1920*1080	33.75	60.00	74.25	HDTV 1080I
1920*1080	56.25	50	148.5	HDTV 1080P
1920*1080	67.432	59.94	148.350	HDTV 1080P
1920*1080	67.5	60.00	148.5	HDTV 1080P

7. RGB Input (Analog PC)

Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	Remark
640*350	31.468	70.80	25.17	EGA	
720*400	31.469	70.08	28.32	DOS	
640*480	31.469	59.94	25.17	VESA(VGA)	
800*600	37.879	60.31	40	VESA(SVGA)	
1024*768	48.363	60	65	VESA(XGA)	
1280*768	47.776	59.87	79.5	VESA(WXGA)	
1360*768	47.72	59.799	84.75	VESA(WXGA)	
1366*768	47.7	60	84.62	VESA(WXGA)	
1280*1024	63.668	59.895	109.00	SXGA	Only FHD
1400*1050	65.317	59.978	121.75	SXGA	Only FHD
1600*1200	74.537	59.869	161.00	UXGA	Only FHD
1920*1080	66.587	59.934	138.50	WUXGA(Reduced Blanking)	Only FHD

8. HDMI input (PC)

- Spec. out but display correctly at only HDMI/DVI IN 1 via DVI to HDMI Cable

Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	Remark
720_400	31.468	70.08	28.32		
640_480	31.469	59.94	25.17	VESA(VGA)	
800_600	37.879	60.31	40.00	VESA(SVGA)	
1024_768	48.363	60.00	65.00	VESA(XGA)	
1280_768	47.776	59.87	79.5	VESA(WXGA)	
1360_768	47.72	59.799	84.62	VESA(WXGA)	
1366_768	47.7	60	84.62	VESA(WXGA)	
1280_1024	63.595	60.0	108.875	SXGA	Only FHD
1400_1050	65.160	60.0	122.50	SXGA	Only FHD
1600_1200	74.077	60.0	130.375	UXGA	Only FHD
1920_1080	66.647	59.988	138.625	WUXGA	Only FHD

9. HDMI input (DTV)

Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	Remark
720*480	31.47	59.94	27	SDTV 480P	Support(not spec)
720*480	31.5	60	27.027	SDTV 480P	support(not spec)
720*576	31.25	50	27	SDTV 576P	support(not spec)
1280*720	44.96	59.94	74.176	HDTV 720P	
1280*720	45	60	74.25	HDTV 720P	
1280*720	37.5	50	74.25	HDTV 720P	
1920*1080	28.125	50	74.25	HDTV 1080I	
1920*1080	33.72	59.94	74.176	HDTV 1080I	
1920*1080	33.75	60	74.25	HDTV 1080I	
1920*1080	56.25	50	148.5	HDTV 1080P	
1920*1080	67.432	59.94	148.350	HDTV 1080P	
1920*1080	67.5	60.00	148.5	HDTV 1080P	
1920*1080	27	24	74.25	HDTV 1080P	
1920*1080	33.75	30	74.25	HDTV 1080P	

ADJUSTMENT INSTRUCTION

1. Application Range

This spec. sheet is applied all of the 32/37/42/47/52" LCD TV, LP81A chassis (HURRICANE 5) by manufacturing 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 $25\pm 5^{\circ}\text{C}$ of temperature and $65\pm 10\%$ of relative humidity if there is no specific designation.
- 4) The input voltage of the receiver must keep 100-220V, 50/60Hz.
- 5) Before adjustment, execute Heat-Run for 15 minutes at RF no signal.

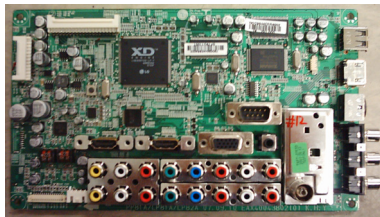
3. S/W program download

3-1. Preliminary steps

- (1) Download method 1 (PCB Assy)
 - HD



- FHD



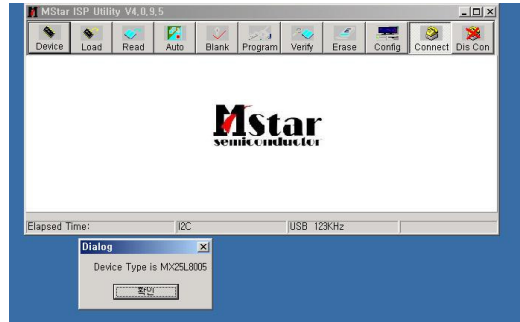
- (2) Connect the download jig to D-sub jack

3-2. Download steps

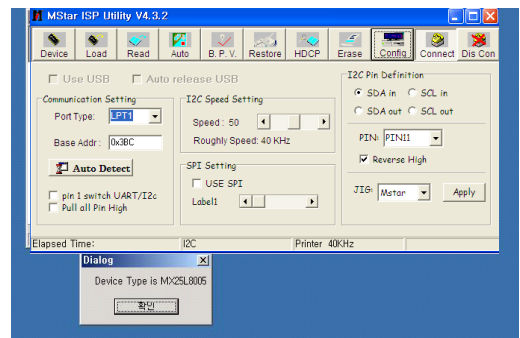
- (1) Execute 'ISP Tool' program in PC, then a main window will be opened



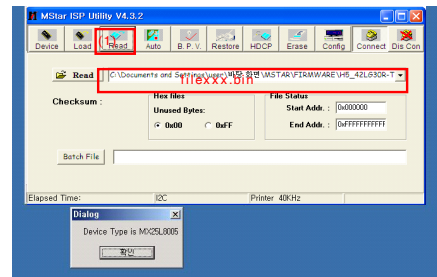
- (2) Click the connect button and confirm "Dialog Box".



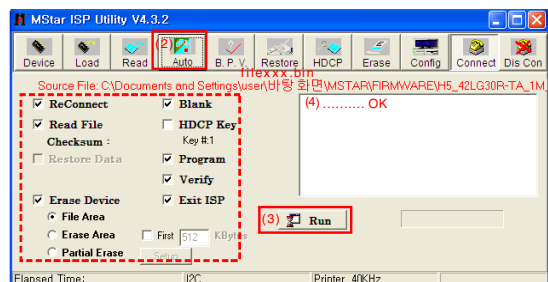
- (3) Click the Config button and Change speed E2PROM Device setting : over the 350KHz



- (4) Read and write bin file
Click "(1)Read" tab, and then load download file(XXXX.bin) by clicking "Read".

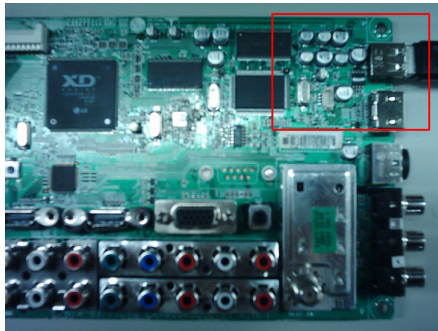


- (5).Click "Auto(2)" tab and set as below
- (6).click "Run(3)".
- (7).After downloading, check "OK(4)" message.

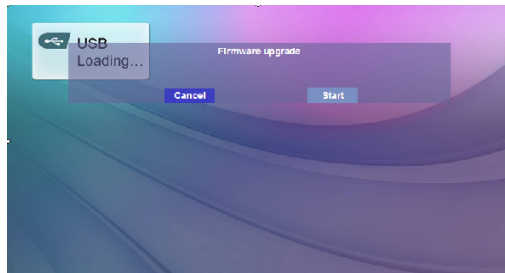


USB DOWNLOAD

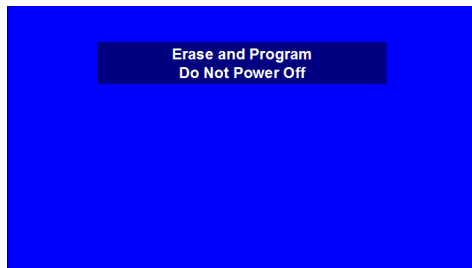
- 1) Put the USB Stick to the USB socket



- 2) Automatically detecting update file in USB Stick



- 3) Select "Start" Button and press "ok" button
Updating is starting.



- 4) Finishing the version updating, you have to put out USB stick and "AC Power" off.
- 5) After putting "AC Power" on and check updated version on your TV.

4. ADC Process

- * Required Equipments
 - Remote controller for adjustment
 - MSPG-925F Pattern Generator

4-1. Method of Auto RGB Color Balance

- Convert to RGB PC in Input-source
- Input the PC 1024x768 @ 60Hz 1/2 Black & White Pattern(MSPG-925F model:60, pattern:54) into RGB.
- Adjust by commanding AUTO_COLOR_ADJUST(0xF1) 0x00 0x02 instruction.



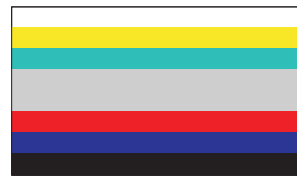
- (1) Confirmation

- We confirm whether "0xF1 (offset), 0xF2 (gain)" address of EEPROM "0xBC" is "0xAA" or not.
- If "0xF1", "0xF2" address of EEPROM "0xBC" isn't "0xAA", we adjust once more
- We can confirm the ADC values from "0x00~0x05" addresses in a page "0xBC"
- * Manual ADC process using Service Remocon. After enter Service Mode by pushing "ADJ" key, execute "Auto-RGB" by pushing "_" key at "Auto-RGB".

4-2. Component input ADC

- (1) Component Gain/Offset Adjustment7

- Convert to Component in Input-source
- Input the Component (Which has 720p@60Hz YPbPr signal : 100% Color Bar (MSPG-925F Model: 217/ Pattern: 65) into Component.



- Adjust by commanding AUTO_COLOR_ADJUST (0xF1) 0x00 0x02 instruction

- (2) Confirmation

- We confirm whether "0xF3 (offset), 0xF4 (gain)" address of EEPROM "0xBC" is "0xAA" or not.
- If "0xF3", "0xF4" address of EEPROM "0xBC" isn't "0xAA", we adjust once more.
- We can confirm the ADC values from "0x06~0x0B" addresses in a page "0xBC".
- * Manual ADC process using Service Remocon. After enter Service Mode by pushing "ADJ" key, execute "Auto-RGB" by pushing "_" key at "Auto-RGB".

** TOOL Option, Area Option change and AC off

Before PCBA check, you have to change the Tool option, Area option and have to AC off/on (Plug out and in)
(If missing this process, set can operate abnormally)

5. TOOL Option, Area Option change

- (1) Profile : Must be changed the option value because being different with some setting value depend on module maker, inch and market.
- (2) Equipment : adjustment remote control.
- (3) Adjustment method
The input methods are same as other chassis.(Use IN-START Key on the Adjust Remocon.)
(If not changed the option, the input menu can differ the model spec.)
* Refer to Job Expression of each main chassis ass'y (EBTxxxxxxx) for Option value

* Never push the IN-STOP KEY after completing the function inspection.

6. EDID (The Extended Display Identification Data) /DDC (Display Data Channel) download

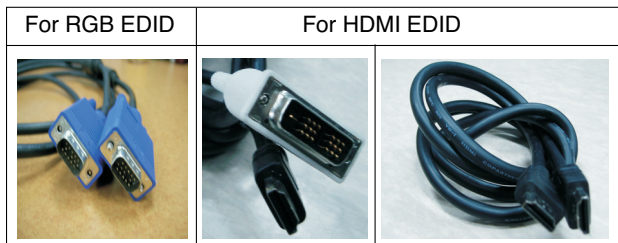
* Caution

Use the proper signal cable for EDID Download

6-1. EDID DOWNLOAD

* Caution:

- Never connect HDMI & D-SUB Cable at the same time.
- Use the proper cables below for EDID Writing



* EDID Data

Item	Condition	Data
Manufacturer ID	GSM	1E6D
Version	Digital : 1	01
Revision	Digital :3	03

* LP81A HD Model EDID

<Analog : 128bytes>

Addr	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
0000	00	FF	FF	FF	FF	FF	FF	00	1E	6D	A					
0010																
0020	11	49	4B	A1	08	00	01	01	45	40	61	40	01	01	01	01
0030	01	01	01	01	01	01	1B	21	50	A0	51	00	1E	30	48	88
0040	35	00	BC	88	21	00	00	1C	0E	1F	00	80	51	00	1E	30
0050	40	80	37	00	BC	88	21	00	00	18						
0060																
0070	00	32	4B	1C	43	0F	00	0A	20	20	20	20	20	20	01	E
0080	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
0090	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
00A0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
00B0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
00C0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
00D0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
00E0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
00F0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF

<HDMI 1 : 256bytes> / <HDMI 2 : 256bytes>
The data is same without Physical address

Addr	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
0000	00	FF	FF	FF	FF	FF	FF	00	1E	6D	A					
0010																
0020	11	49	4B	A1	08	00	01	01	45	40	61	40	01	01	01	01
0030	01	01	01	01	01	01	1B	21	50	A0	51	00	1E	30	48	88
0040	35	00	BC	88	21	00	00	1C	0E	1F	00	80	51	00	1E	30
0050	40	80	37	00	BC	88	21	00	00	18						
0060																
0070	00	32	4B	1C	43	0F	00	0A	20	20	20	20	20	20	01	E
0080	02	03	26	F1	50	02	03	04	05	07	10	11	12	13	14	16
0090	1F	20	21	22	81	23	09	07	07	83	01	00	00	68	03	0C
00A0	00															
00B0	35	00	BC	88	21	00	00	1E	8C	0A	D0	8A	20	E0	2D	10
00C0	10	3E	96	00	13	8E	21	00	00	18	8C	0A	A0	14	51	F0
00D0	16	00	26	7C	43	00	C4	8E	21	00	00	98	01	1D	80	18
00E0	71	1C	16	20	58	2C	25	00	C4	8E	21	00	00	9E	00	00
00F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

-> Physical address(F) : HDMI 1 -> 10, HDMI 2 -> 20

- Detail EDID Options are below (A, B, C, D, E, F)

A. Product ID

B. Serial No: Controlled on production line

C. Month, Year: Controlled on production line:

ex) Monthly: '09 '09

Year: '2007 '11'

D. Model Name(Hex):

Model name	Model Name(HEX)															
LG TV	00	00	00	FC	00	4C	47	20	54	56	0A	20	20	20	20	20

E Checksum: Changeable by total EDID data

6-2. HDCP SETTING

(High-Bandwidth Digital Contents Protection)

- Connect D-sub Signal Cable to D-Sub Jack
- Input HDCP key with HDCP-key- in-program
- HDCP Key value is stored on EEPROM(AT24C64) which is From "0x80" addresses of 0xA0 page
- AC off/ on and on HDCP button of MSPG925 and confirm whether picture is displayed or not of using MSPG925
- HDCP Key value is different among the sets.,

7. Adjustment of White Balance

7-1. Purpose and Principle for adjustment of the color temperature

- Purpose : Adjust the color temperature to reduce the deviation of the module color temperature.
- Principle : To adjust the white balance without the saturation, Fix the one of R/G/B gain to C0 and decrease the others.

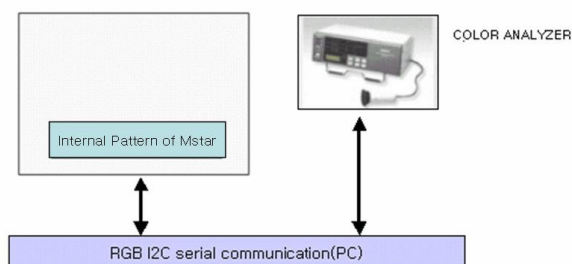
7-2. Adjustment mode : Two modes of Cool and Warm

(Medium data is automatically calibrated by the Cool data)

* Required Equipment

- Remote controller for adjustment
- Color Analyzer : CA100+ or CA-210 or same product (ch:9)
- Auto W/B adjustment instrument(only for Auto adjustment)

7-3. Connecting diagram of equipment for measuring (For Automatic Adjustment)



- (1) Enter the adjustment mode of DDC
 - Set command delay time : 50ms
 - Enter the DDC adjustment mode at the same time heat-run mode when pushing the power on by power only key
 - Maintain the DDC adjustment mode with same condition of Heat-run (Maintain after AC off/on in status of Heat-run pattern display)
- (2) Release the DDC adjustment mode
 - Release the adjust mode after AC off/on or std-by off/on in status of finishing the Hear-run mode
 - Release the Adjust mode when receiving the aging off command(F3 00 00) from adjustment equipment
 - Need to transmit the aging off command to TV set after finishing the adjustment.
 - Check DDC adjust mode release by exit key and release DDC adjust mode
- (3) Enter the adjust mode of white balance
 - Enter the white balance adjustment mode with aging command(F3, 00, FF)

* Luminance min value is 200cd/m²≥ in the cool mode (For LCD)

7-4. Adjustment of White Balance (for Manual adjustment)

- (1) Adjustment mode : Two modes (Cool and Warm)
(Medium data is automatically calibrated by the Cool data)
- (2) Color analyzer(CA100+, CA210) should be used in the calibrated ch by CS-1000(LCD : CH9, PDP : CH10)
- (3) Operate the zero-calibration of the CA100+ or CA-210, then stick sensor to the module when adjusting.
- (4) For manual adjustment, it is also possible by the following sequence.
 - 1) Select white pattern of heat-run by pressing "POWER ON" key on remote control for adjustment then operate heat run longer than 15 minutes. (If not executed this step, the condition for W/B may be different.)
 - 2) Push "Exit" key.
 - 3) Change to the AV mode by remote control.(Push front-AV or Input key)
 - 4) Input external pattern(85% white pattern)
 - 5) Push the ADJ key two times (entering White Balance mode)
 - 6) Stick the sensor to the center of the screen and select each items (Red/Green/Blue Gain and Offset) using ▲/▼(CH +/-) key on R/C.
 - 7) Adjust R/ G/ B Gain using ◀/▶(VOL +/-) key on R/C.
 - 8) Adjust two modes (Cool and Warm)
(Fix the one of R/G/B and change the others)
 - 9) When adjustment is completed, Exit adjustment mode using EXIT key on R/C.

* CASE

First adjust the coordinate far away from the target value(x, y).

- (1) x, y > target
 - 1) Decrease the R, G.
- (2) x, y < target
 - 1) First decrease the B gain,
 - 2) Decrease the one of the others.
 - In case of decreasing the x, decreasing the R : fix G
 - In case of decreasing the y, decreasing the G : fix R

- (3) x > target , y < target
 - 1) First decrease B, so make y a little more than the target.
 - 2) Adjust x value by decreasing the R
- (4) x < target , y > target
 - 1) First decrease B, so make x a little more than the target.
 - 2) Adjust x value by decreasing the G

- Standard color coordinate and temperature when using the CA100+ or CA210 equipment

Mode	Color coordinate		Temp	Δuv
	X	Y		
Cool	0.276±0.002	0.283±0.002	11,000K	0.000
Warm	0.313±0.002	0.329±0.002	6,500K	0.003

** DDC Command set **

Adjustment	CMD(HEX)	ADR	VALUE	detail
Aging On/Off	F3	00	FF/00	FF : ON / 00 : OFF
Input select	F4	00		0x10 : TV 0x20 : AV1 0x21 : AV2 0x40 : Component1 0x41 : Component2 0x60 : RGB 0x90 : HDMI1 0x91 : HDMI2
R GAIN	16	00	00 - C0	GAIN adjustment CSM COOL
G GAIN	18		00 - C0	
B GAIN	1A		00 - C0	
R GAIN	16	01	00 - C0	GAIN adjustment CSM NORMAL
G GAIN	18		00 - C0	
B GAIN	1A		00 - C0	
R GAIN	16	02	00 - C0	GAIN adjustment CSM WARM
G GAIN	18		00 - C0	
B GAIN	1A		00 - C0	
CSM mode	F2	00	00	COOL
			01	NORMAL
			02	WARM
AUTO ADC	F1	00	0, 1, 2	0: Offset adjustment 1: Gain adjustment 2: Offset and Gain adjustment
EEPROM Read	E7	00	00	EEPROM read
EEPROMWrite	E8	00	data	EEPROM write

8. DDC command protocol

8-1. Signal TABLE

START [6E] [A] [50] [A] [84] [A] [03] [A] [CMD] [A] [ADR] [A] [VAL] [A] [CS] [A] [STOP]

8-2. E2PROM Data Write

(1) Signal TABLE

START [6E] [A] [50] [A] [84+n] [A] [03] [A] [CMD] [A] [ADH] [A] [ADL] [A]
[Data_1] [A] [. . .] [Data_n] [A] [CS] [A] [STOP] Delay 20m

LEN : 84h+Bytes

CMD : E8h

ADH : E2PROM Slave Address (A0,A2,A4,A6), Not 00h
(Reserved by BufferToEEPROM)

ADL : E2PROM Sub Address(00~FF)

Data : Write data

Delay : 20ms

(2) Command Set

Adjustment contents	CMD(hex)	LEN	Details
EEPROM WRITE	E8h	94	16-Byte Write
		(84+n)h	n-byte Write

* Purpose

- 1) EDID write : 16-byte by 16-byte, 8 order (128-byte)
write(TO "00 – 7F" of "EEPROM Page A4").
- 2) FOS Default write : 14-mode data write
(SyncFlags, HPeriodH, HPeriodL, VtotalH, VtotalL,
SrcHTotalH, SrcHTotalL, SrcHStartH, SrcHStartL,
SrcVStartH, SrcVStartL, HsyncPhase).
- 3) Random Data write : write the appointment Address of
E2PROM.

(3) E2PROM Data Read

1) Signal TABLE

START [6E] [A] [50] [A] [84] [A] [03] [A] [CMD] [A] [ADH] [A] [ADL] [A] [CS] [A] [STOP]
Delay 150ms
START [6F] [A] [D1] [A] - [Dn] [A] [STOP]
128 Bytes

2) COMMAND SET

Adjustment contents	CMD(hex)	ADH(hex)	ADL(hex)	Details
EEPROM READ	E7	A0	0	0-Page 0~7F Read
			80	0-Page 80~FF Read
		A2	0	1-Page 0~7F Read
			80	1-Page 80~FF Read
		A4	0	2-Page 0~7F Read
			80	2-Page 80~FF Read
		A6	0	3-Page 0~7F Read
			80	3-Page 80~FF Read

* Purpose : To read(84h) the appointment Address of E2PROM
by 128(80h)-byte

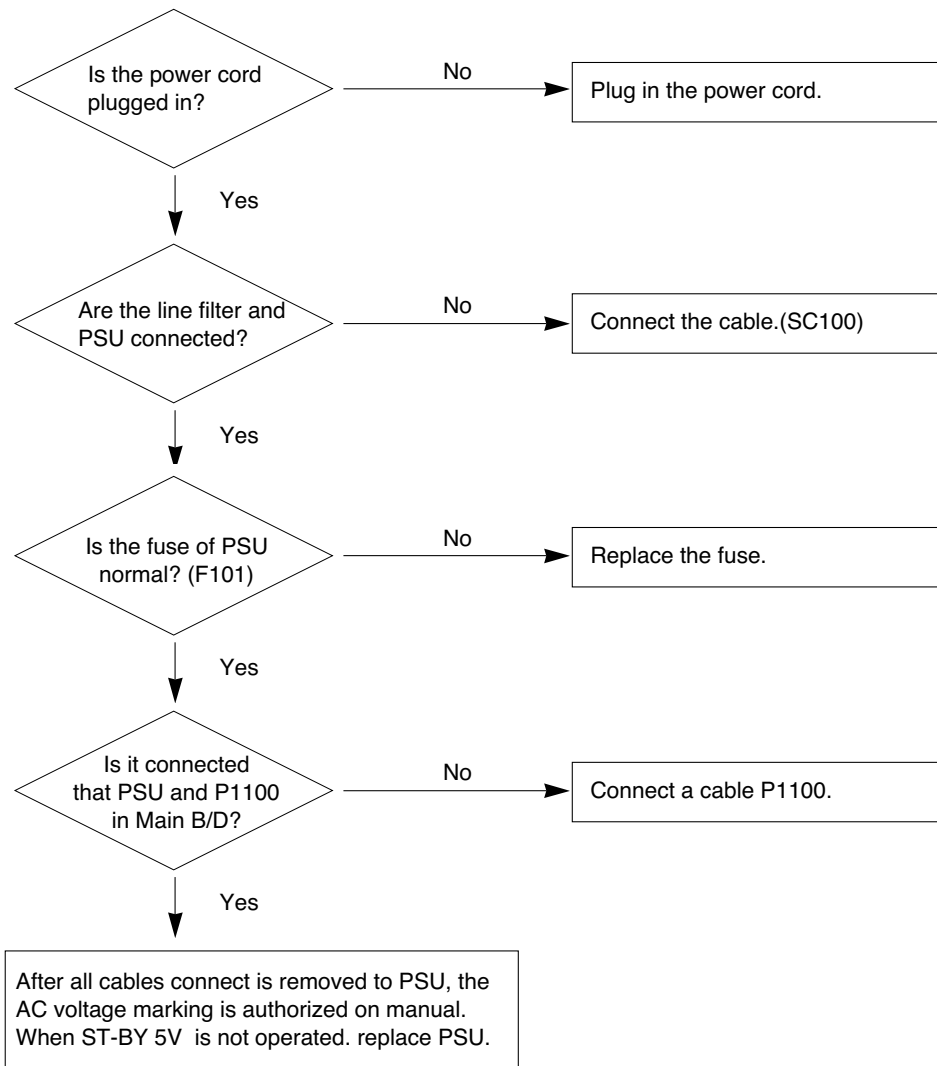
TROUBLESHOOTING

1. No power

(1) Symptom

- 1) It is not discharged minutely from module.
- 2) Light does not come into the front LED.

(2) Check process

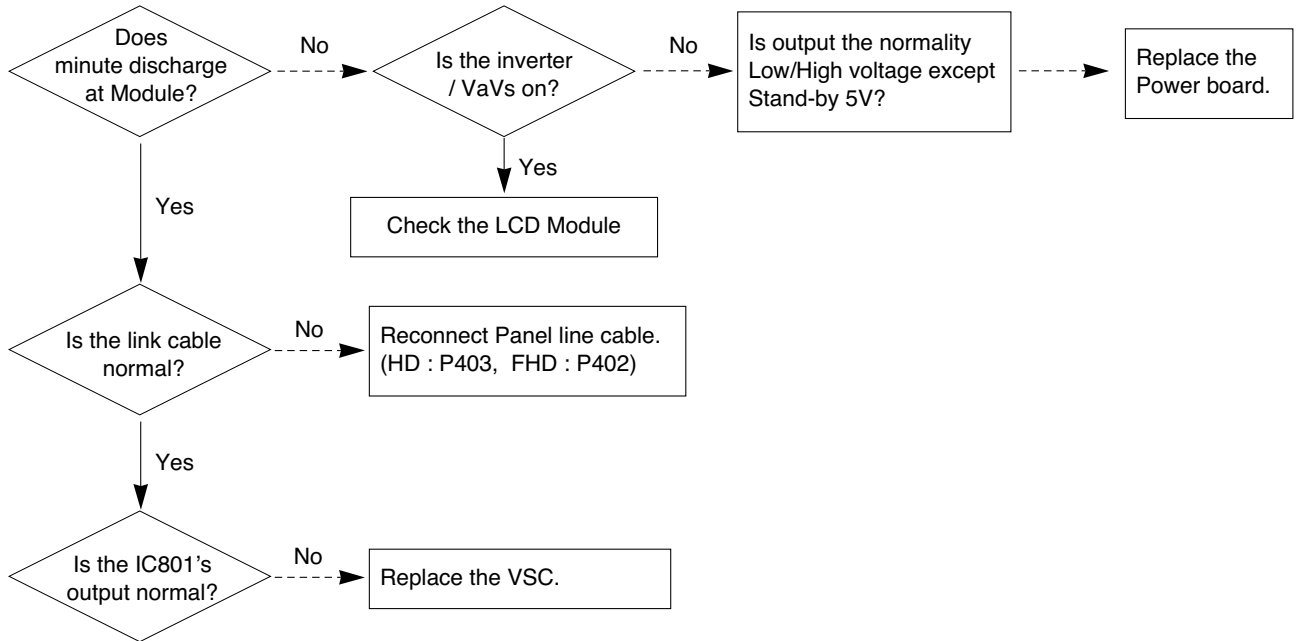


2. No Raster

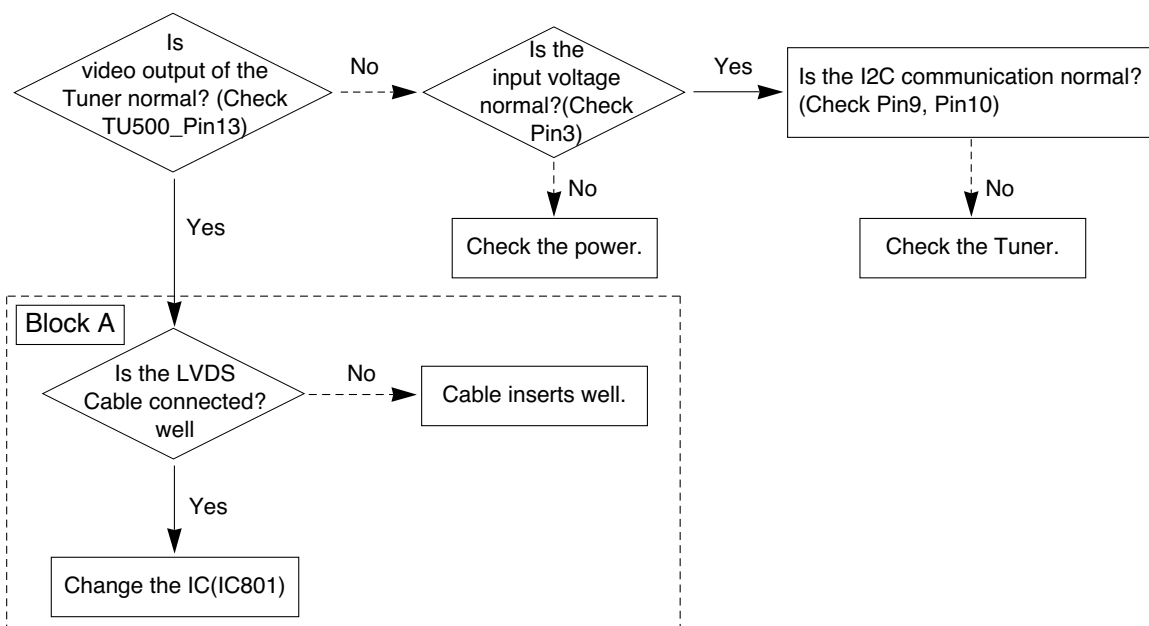
(1) Symptom

- 1) No OSD and image occur at screen.
- 2) It maintains the condition where the front LED is green.

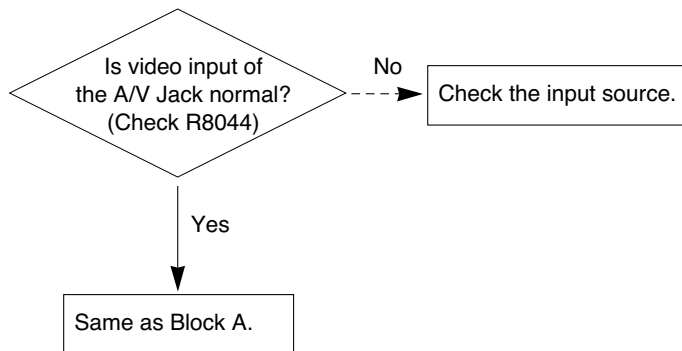
(2) Check process



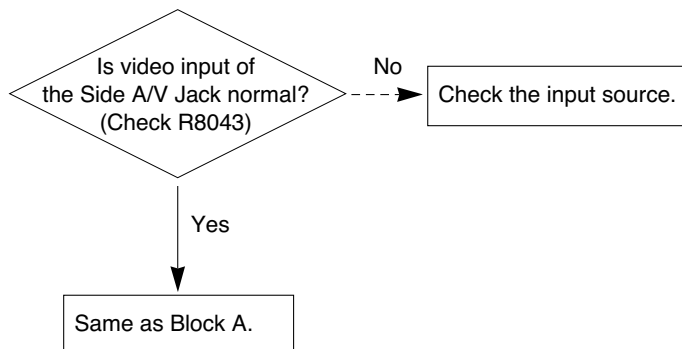
3. Unusual display from RF mode



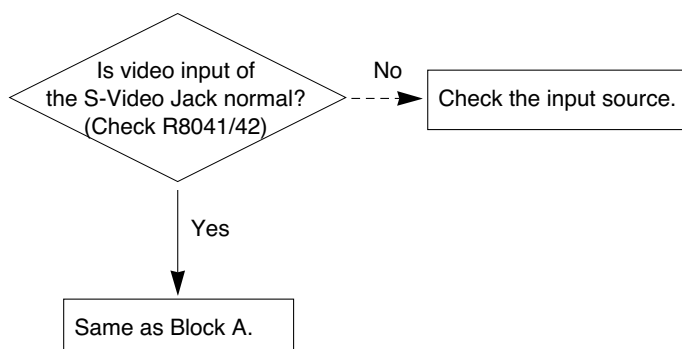
4. Unusual display from rear AV mode.



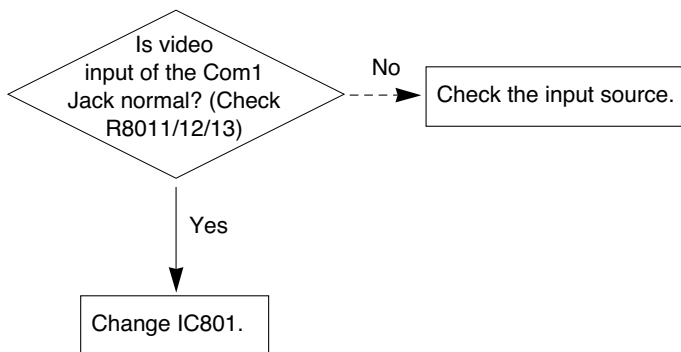
5. Unusual display from Side AV model.



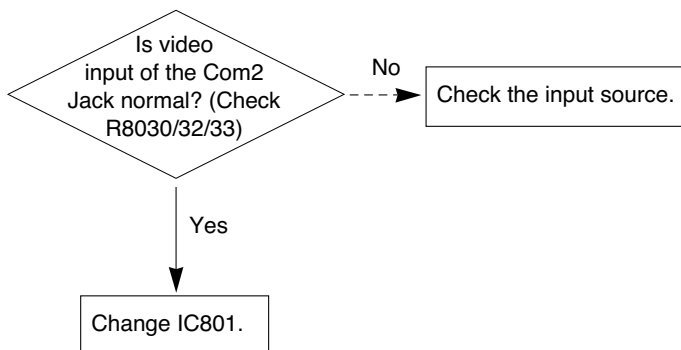
6. Unusual display from Side S-Video mode.



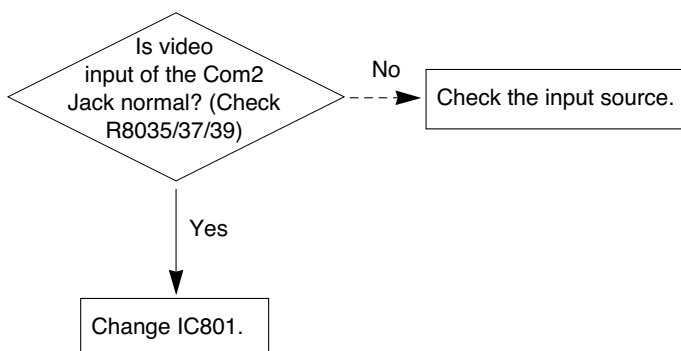
7. Unusual display from component 1 mode



8. Unusual display from component 2 model



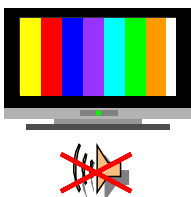
9. Unusual display from RGB model



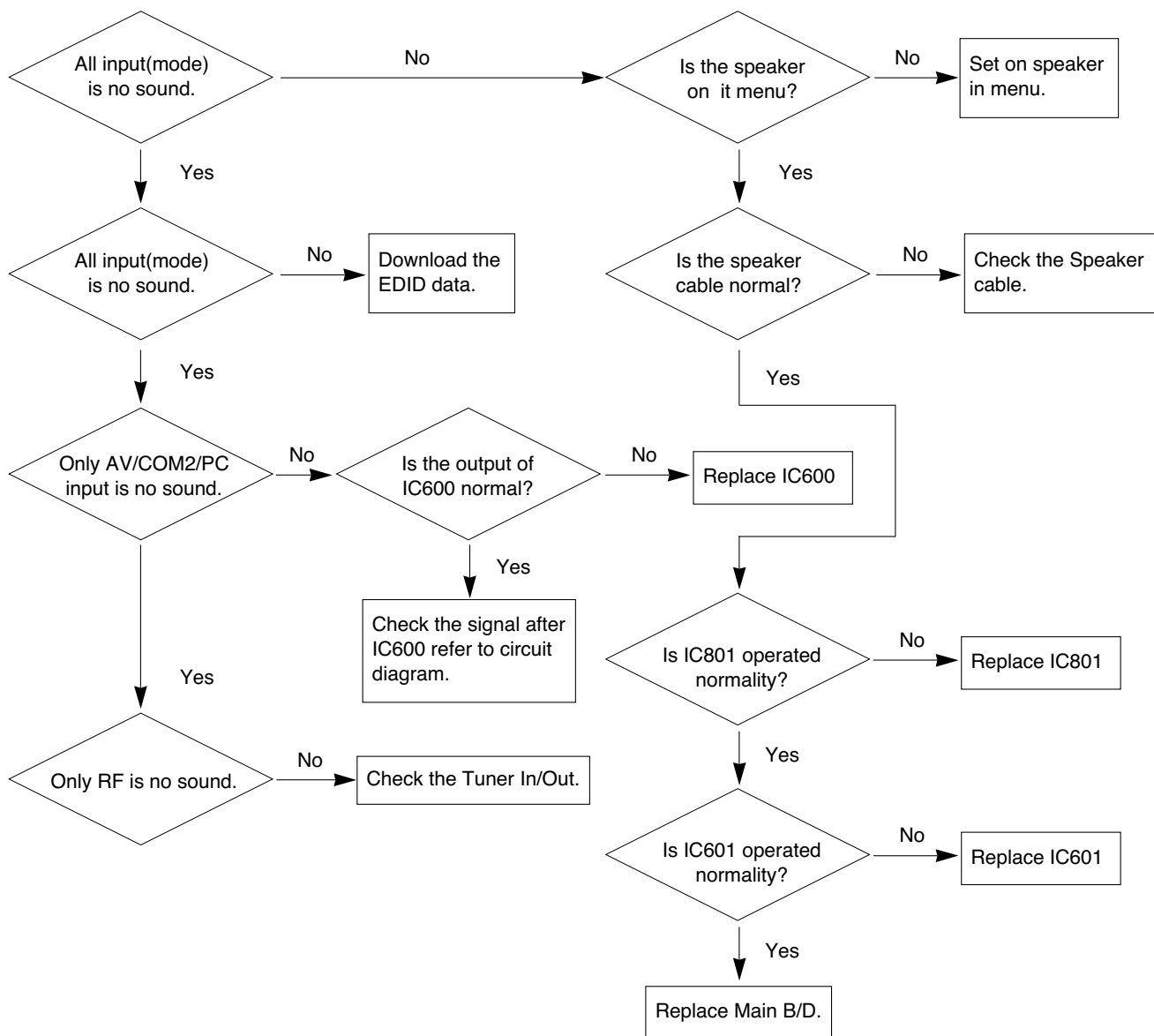
10. No Sound

(1) Symptom

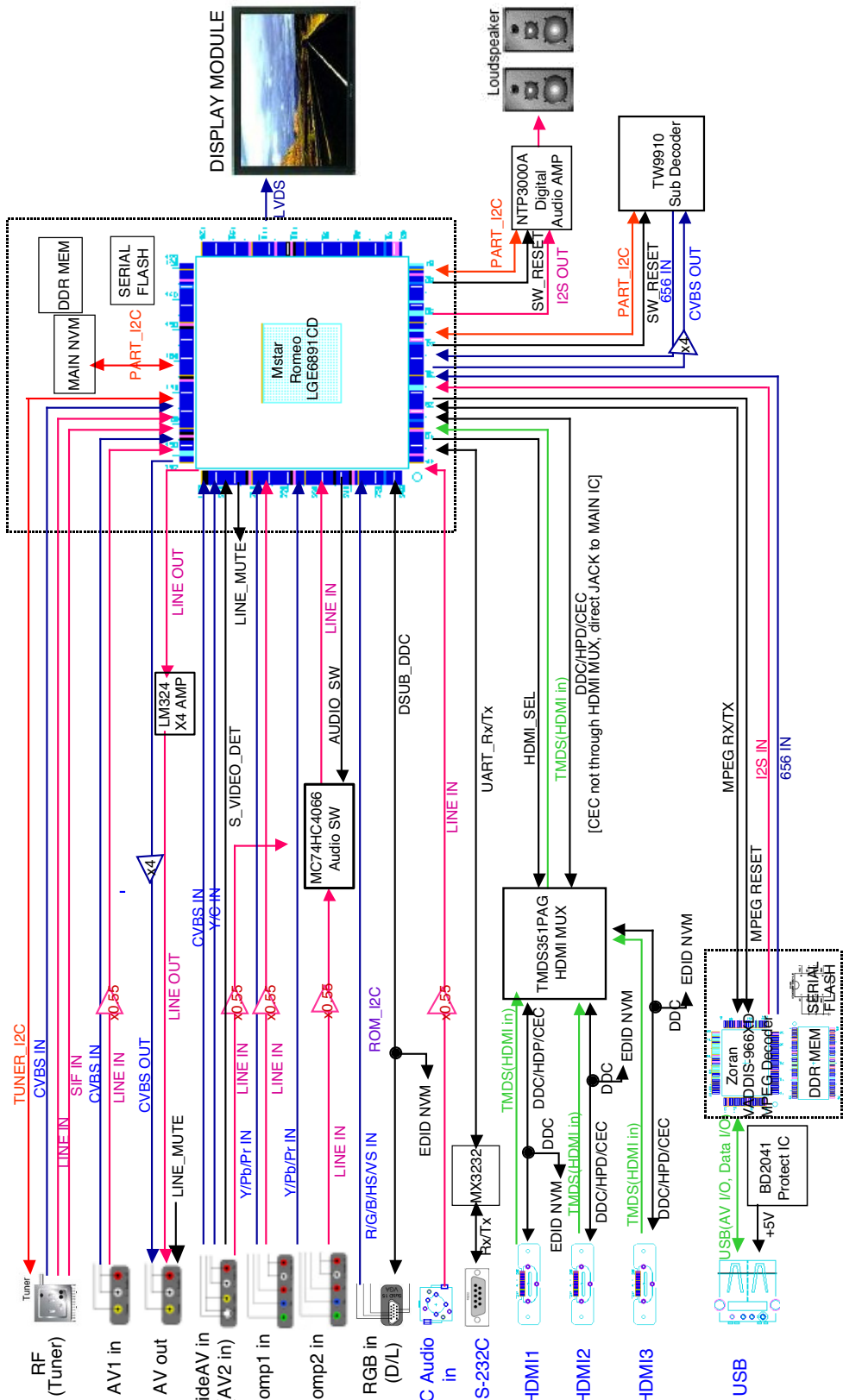
- 1) LED is green
- 2) Screen display but sound is not output.



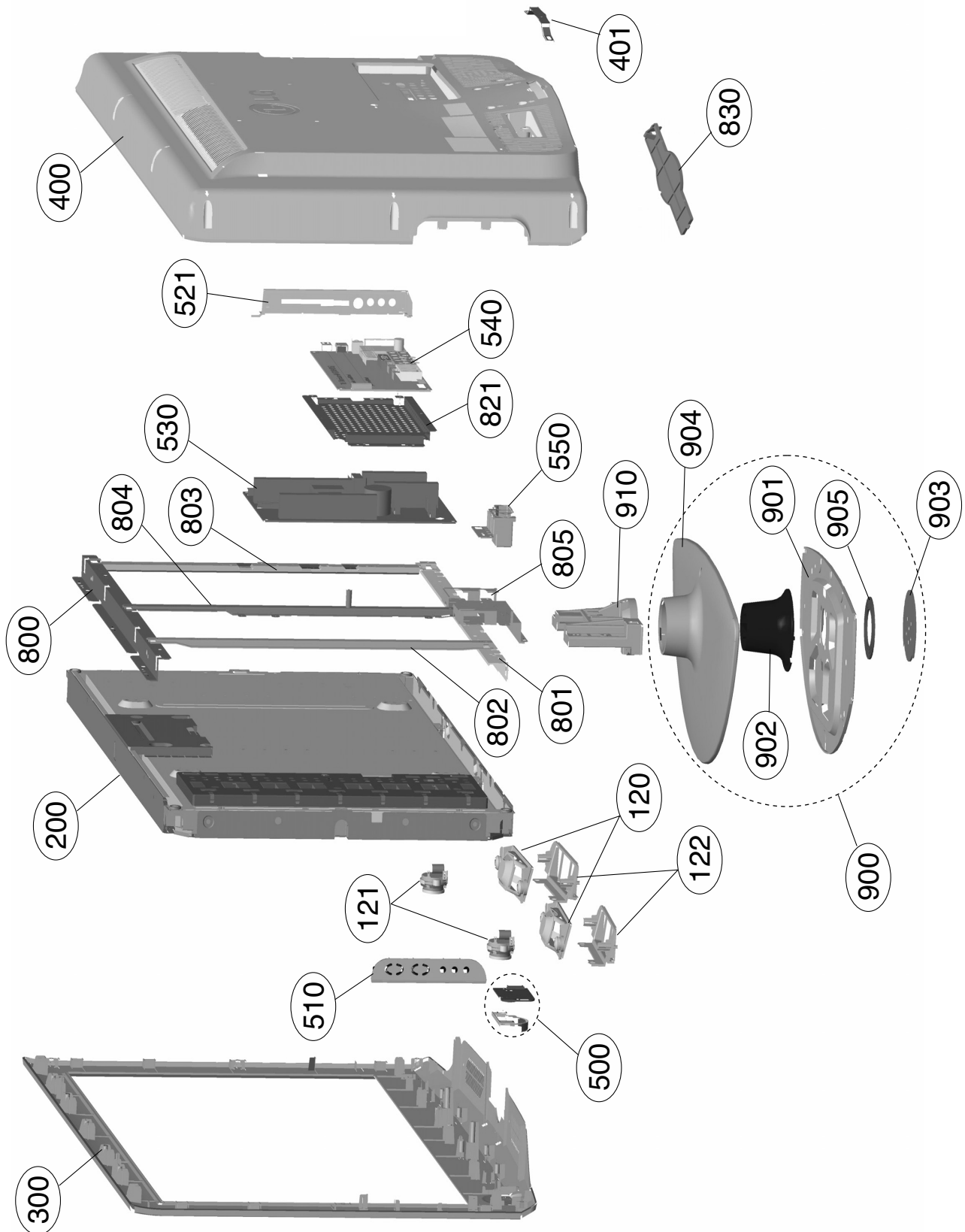
(2) Check process

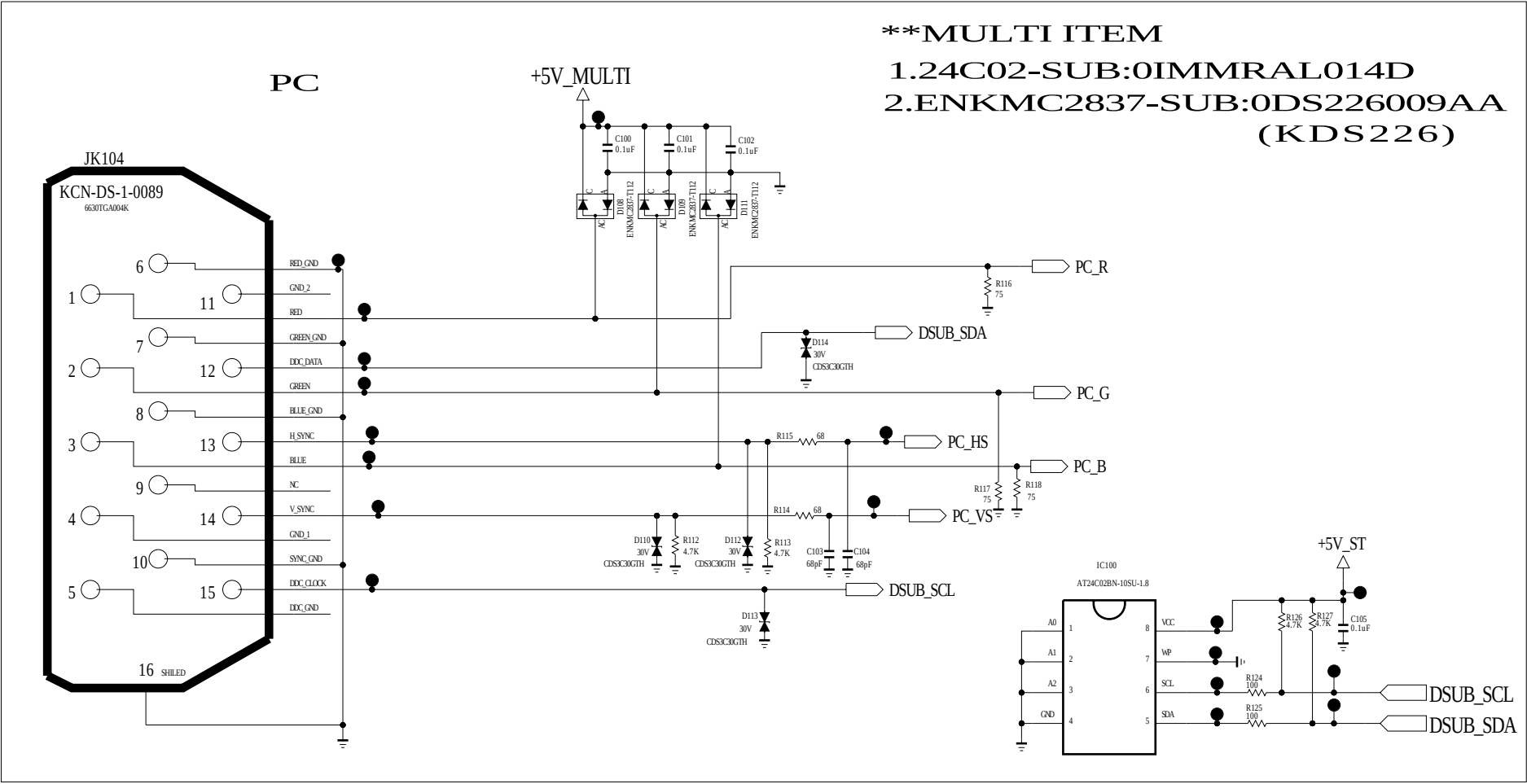
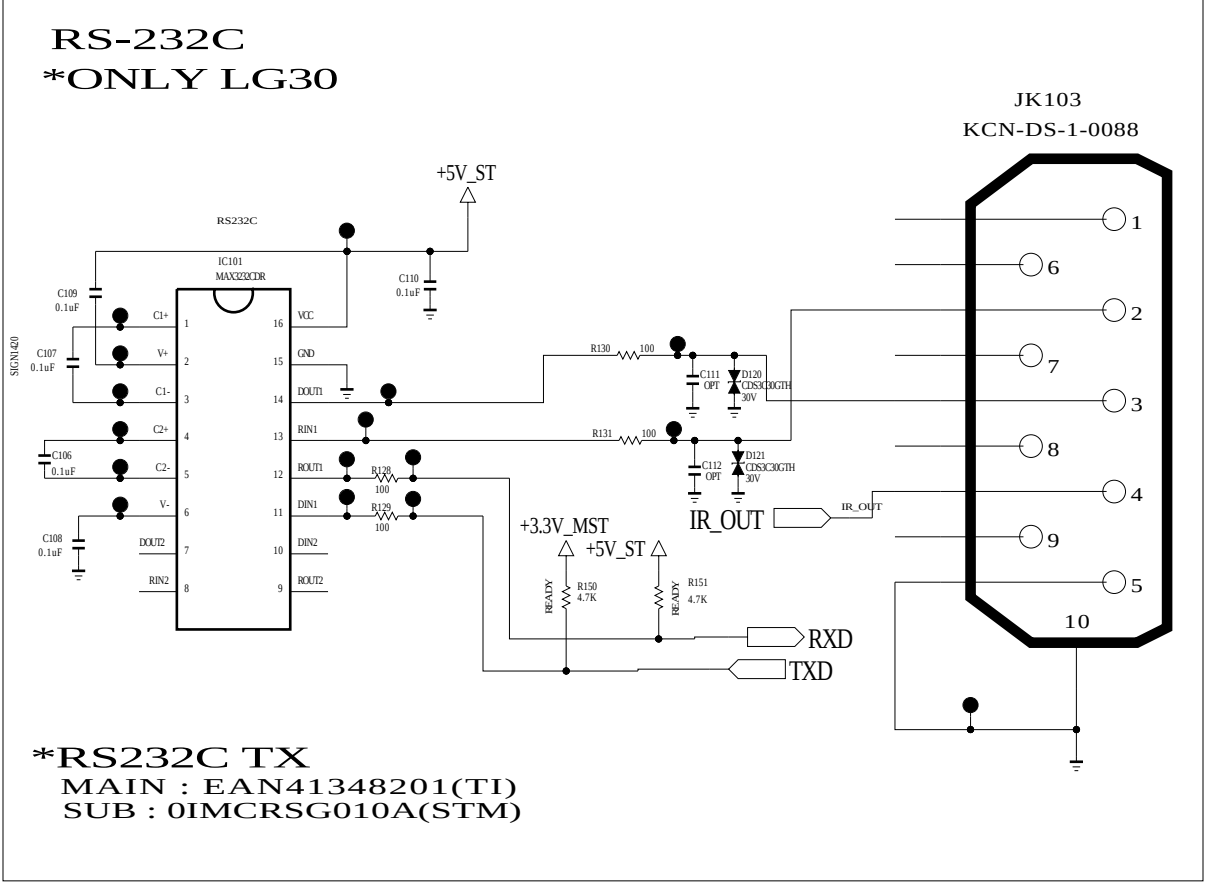
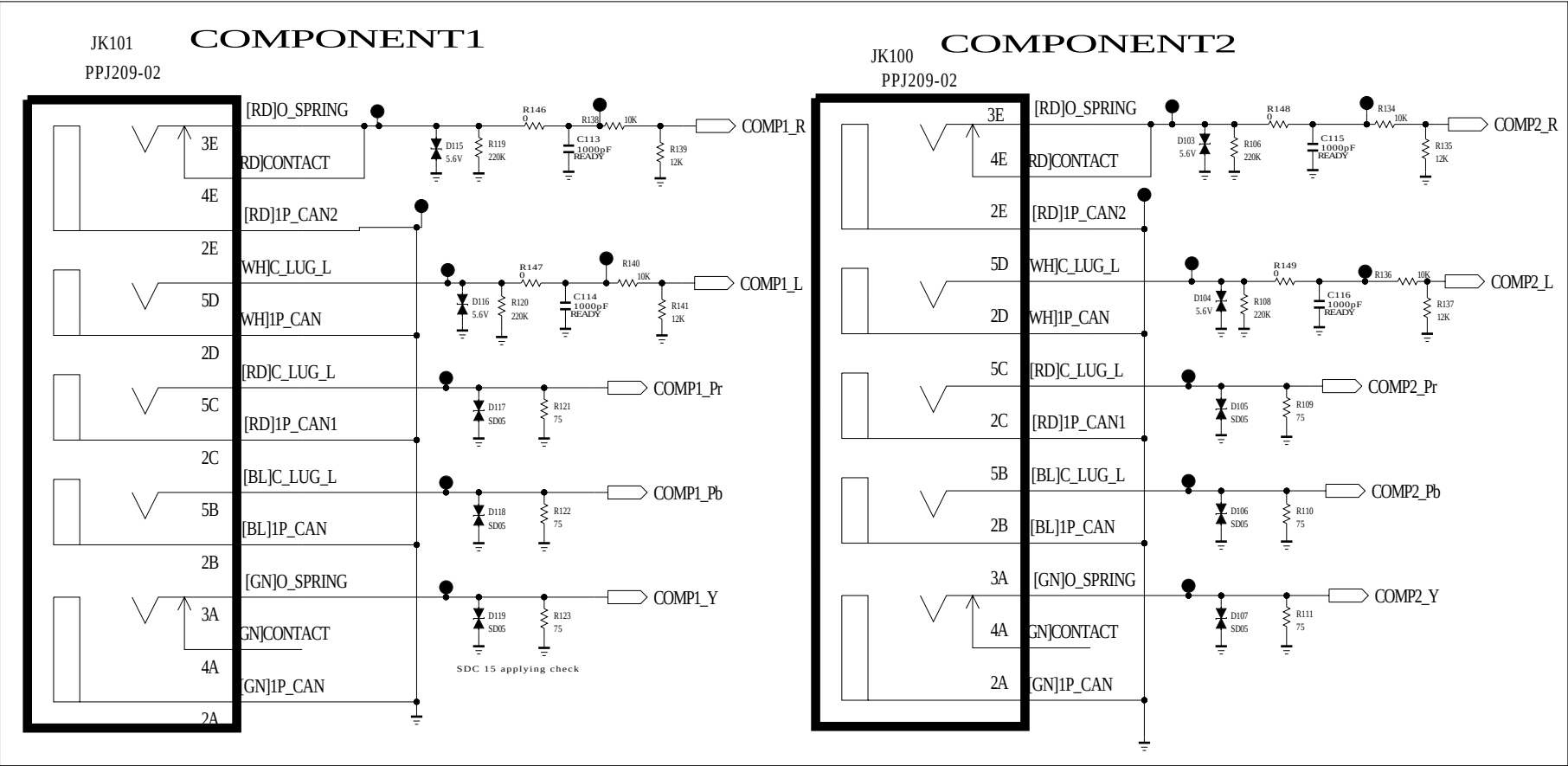


BLOCK DIAGRAM



EXPLODED VIEW

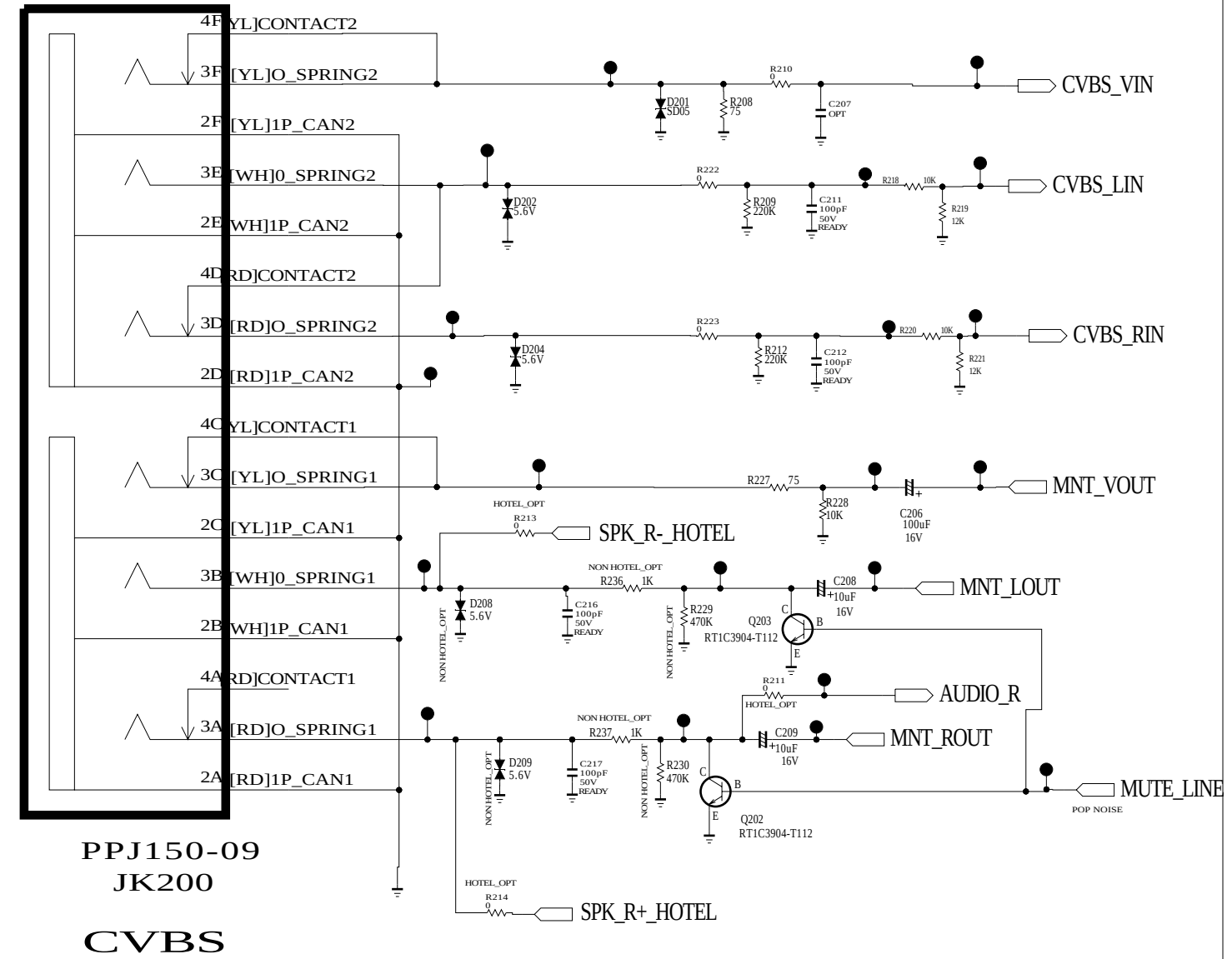
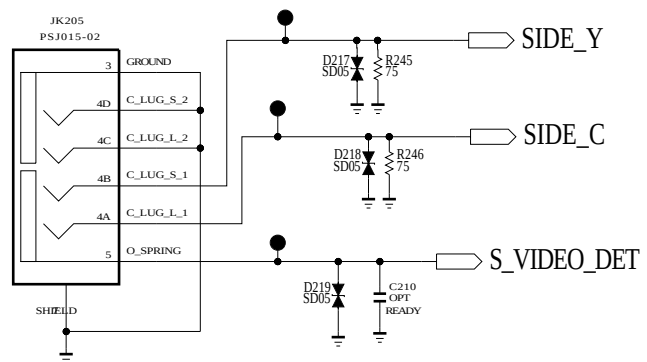
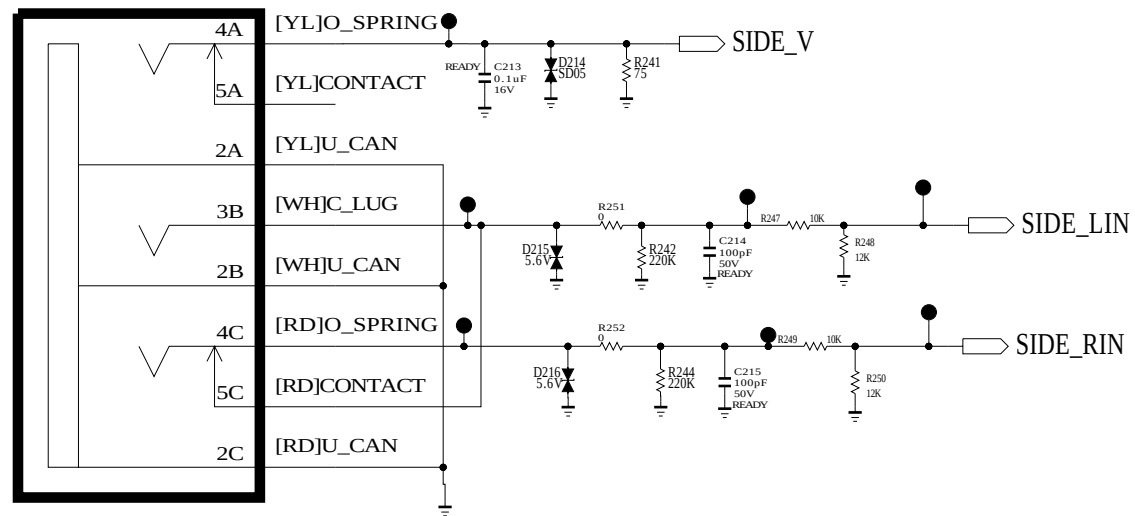






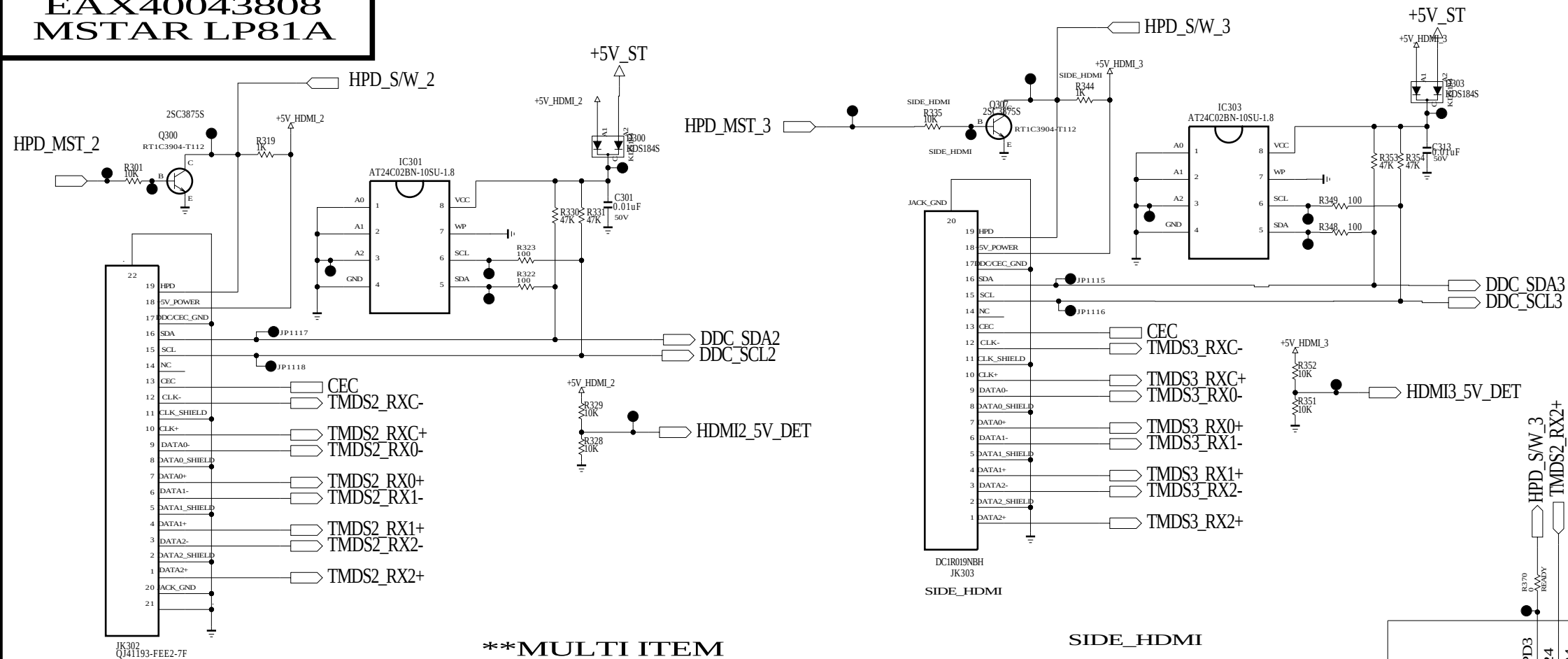
JK204

PPJ218-01



INPUT2 : CVBS, SIDE AV

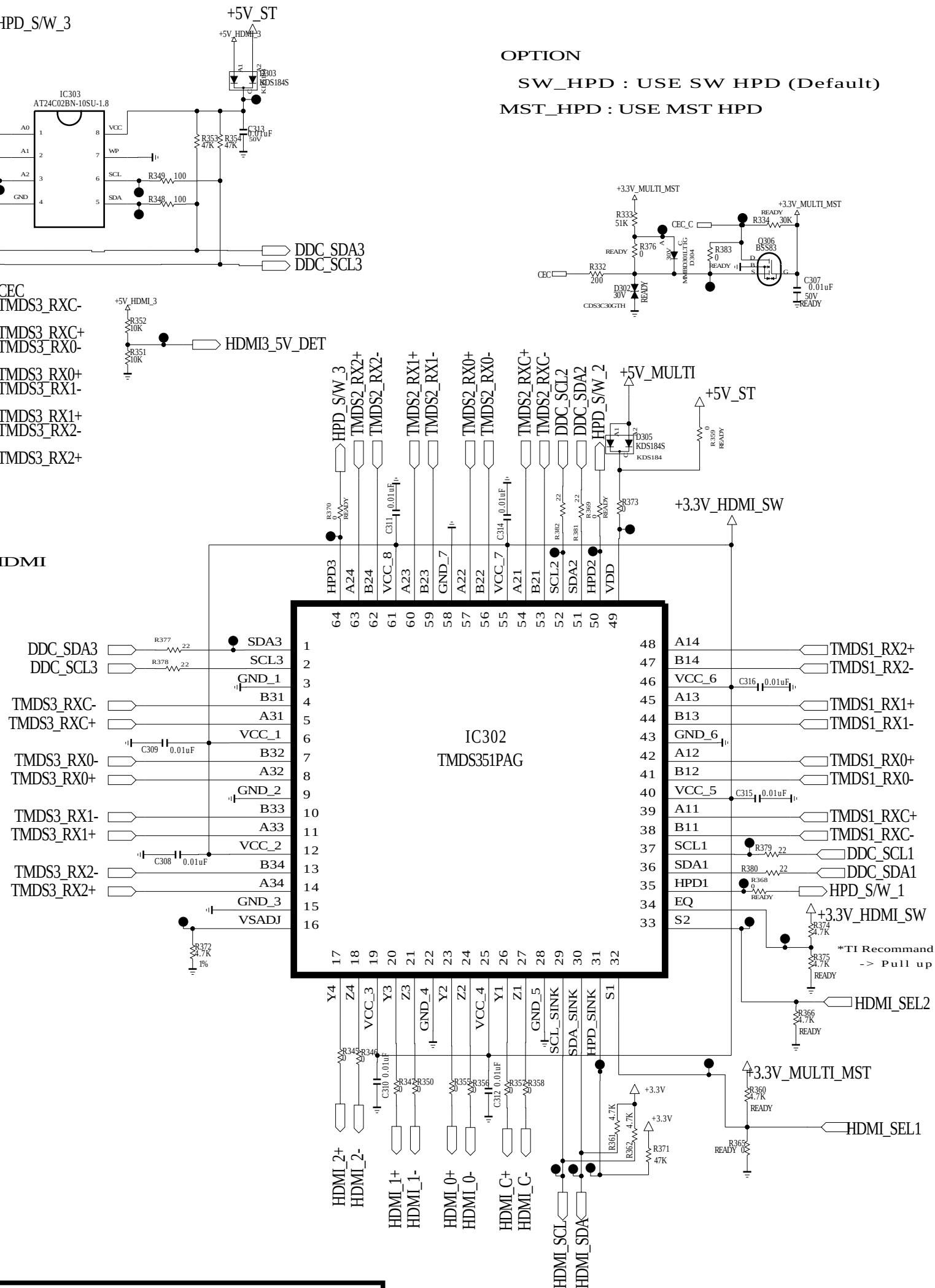
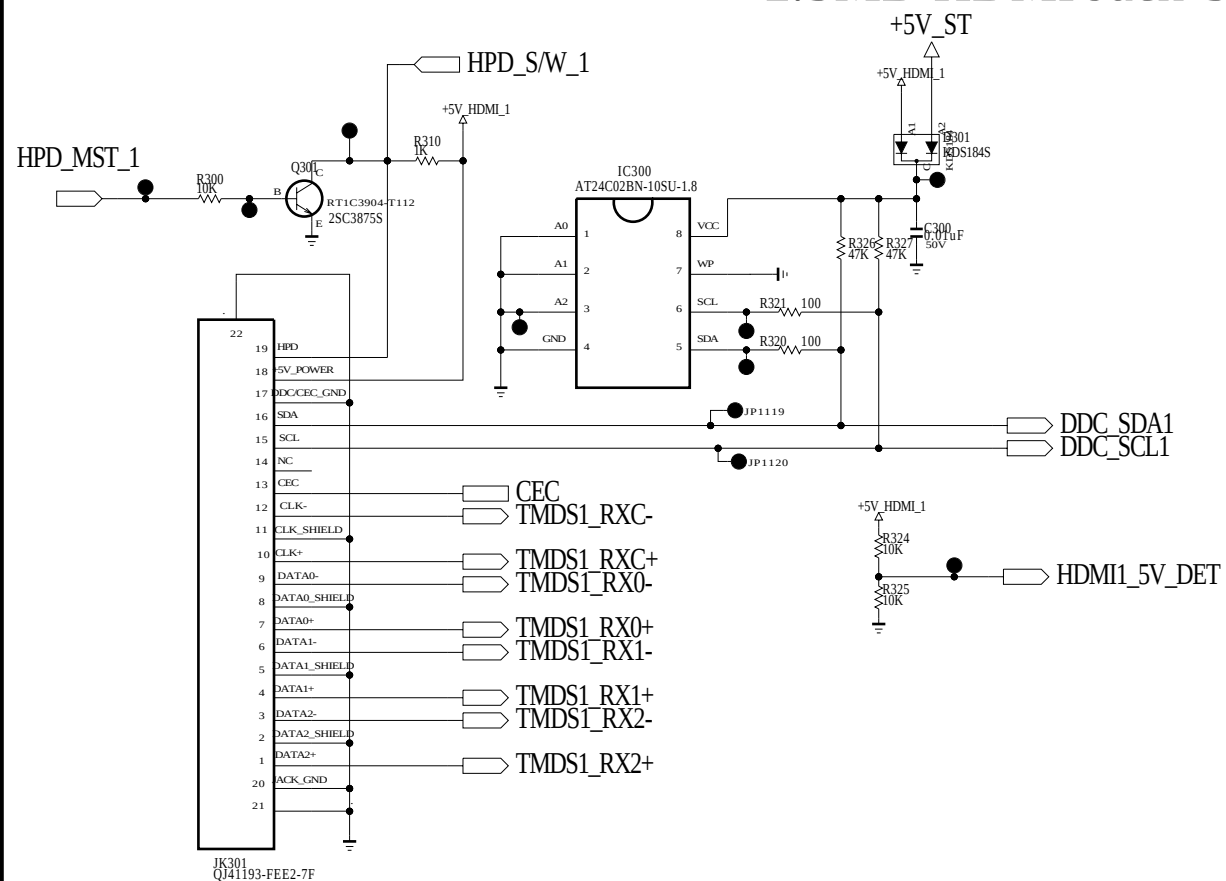
MODEL	MSTAR N-EU	DATE	2007/12/20
BLOCK	INPUT2	SHEET	2 / 11

EAX40043808
MSTAR LP81A

****MULTI ITEM**

1.24C02-SUB:0IMMRAL014D

2.SMD HDMI Jack-SUB:6612B00015B



OPTION

SW_HPD : USE SW HPD (Default)

MST_HPD : USE MST HPD

[illegible]

IC302
TMDS351PAG

*TI Recommand
-> Pull up

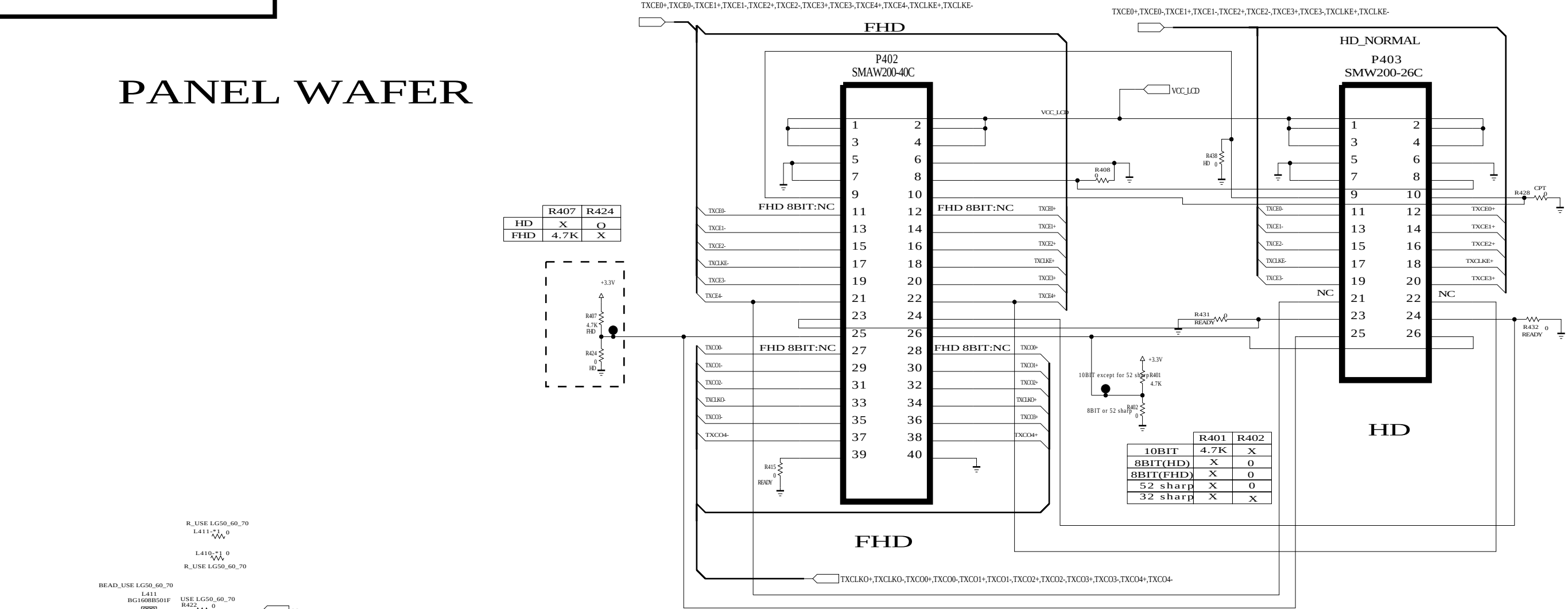
☐ HDMI_SEL2

 $\Delta_{3.3V_MULTI_MST}$

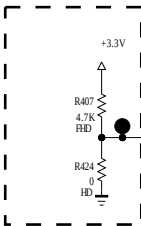
HDMI SEL1

MODEL	MSTAR N-EU	DATE	2007/12/20
BLOCK	HDMI	SHEET	3 / 11

PANEL WAFER



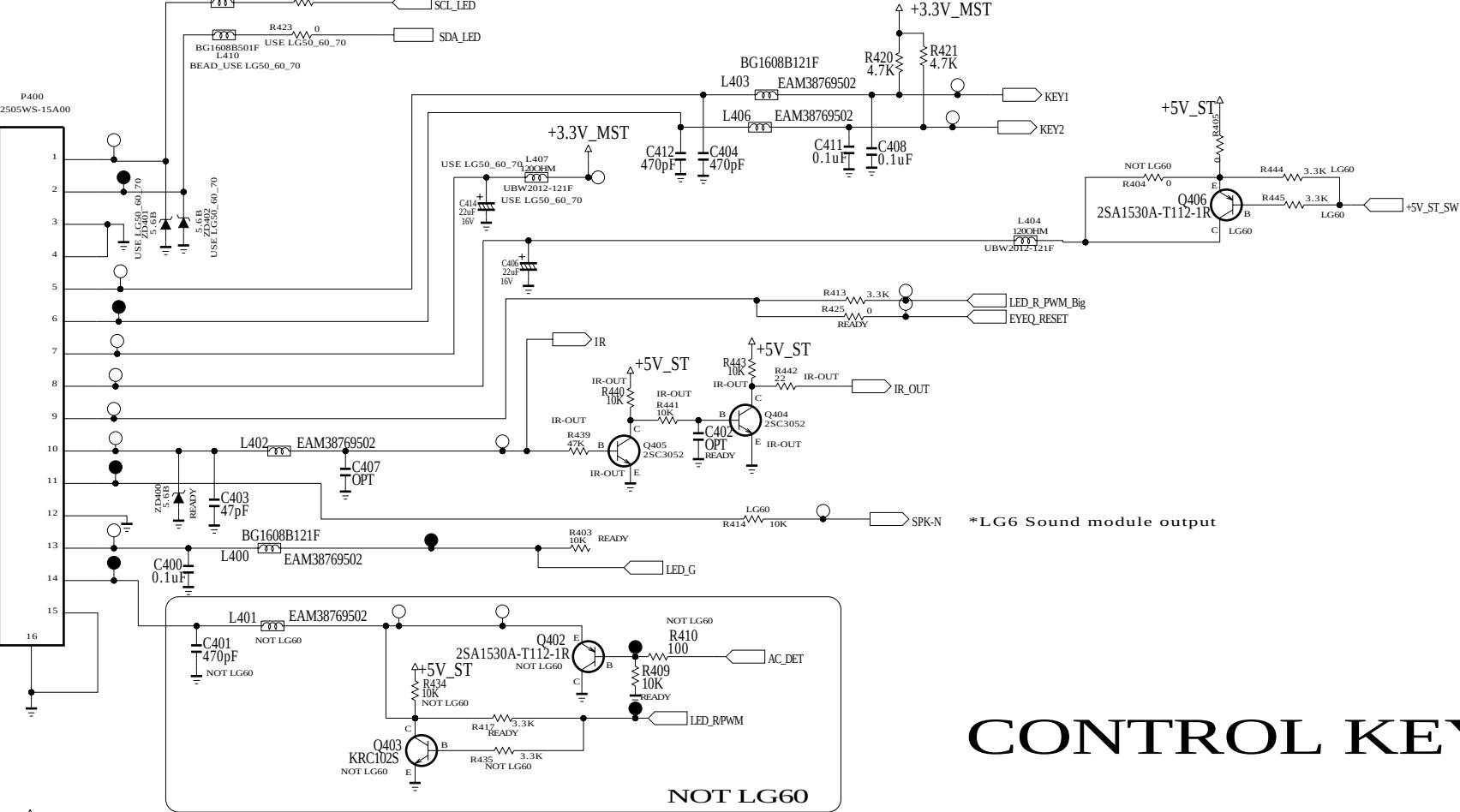
	R407	R424
HD	X	O
FHD	4.7K	X



	R401	R402
10BIT	4.7K	X
8BIT(HD)	X	0
8BIT(FHD)	X	0
52 sharp	X	0
32 sharp	X	X

HD_ATN	
P403-11 SMAW200-24C	
1	2
3	4
5	6
7	8
9	10
11	12
13	14
15	16
17	18
19	20
21	22
23	24

	R428
CPT	O
LPL	X
32 sharp	X



	R404	R444	R445	Q406	L410	L411	L407	C414	R414
LG30	O	X	X	X	X	X	X	X	X
LG50	O	X	X	X	BEAD	BEAD	BEAD	22uF	X
LG60	X	3.3K	3.3K	O	BEAD	BEAD	BEAD	22uF	10K
LG70	O	X	X	X	BEAD	BEAD	BEAD	22uF	X

****MULTI ITEM**
2SC3052(P/N:0TRIY80001A) RA:2SC3875(P/N:0TR387500AA)

CONTROL KEY

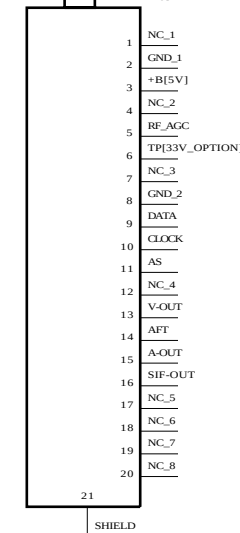
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.



NON EU TUNER

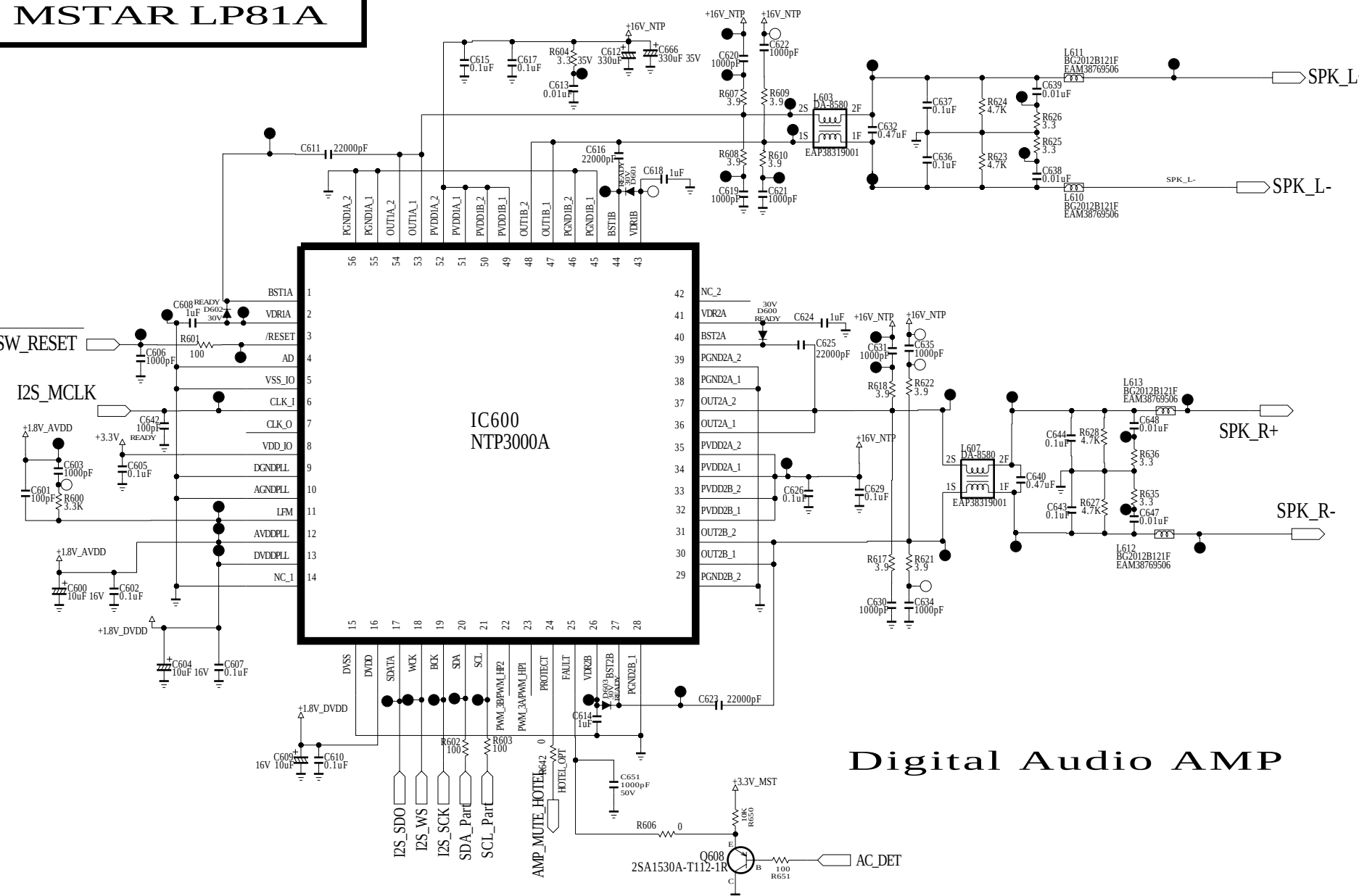
Near the pin

TU500-*1 NTSC TUNER
TAFT-H703F

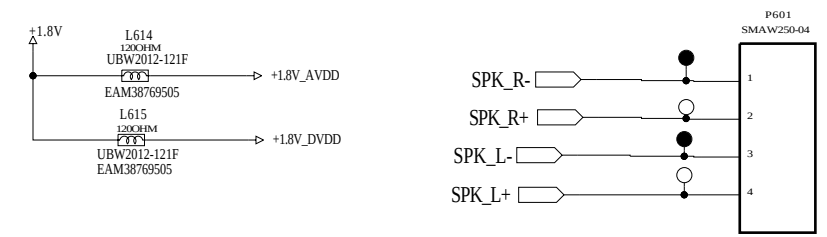


MODEL	MSTAR	DATE	2007/12/20
BLOCK	TUNER	SHEET	5 / 11

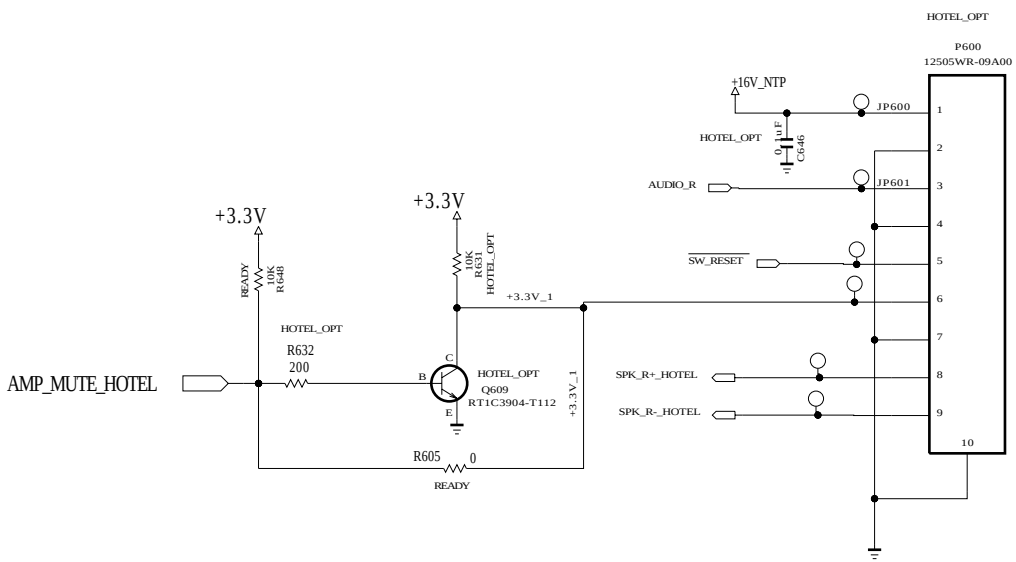
EAX40043808
MSTAR LP81A



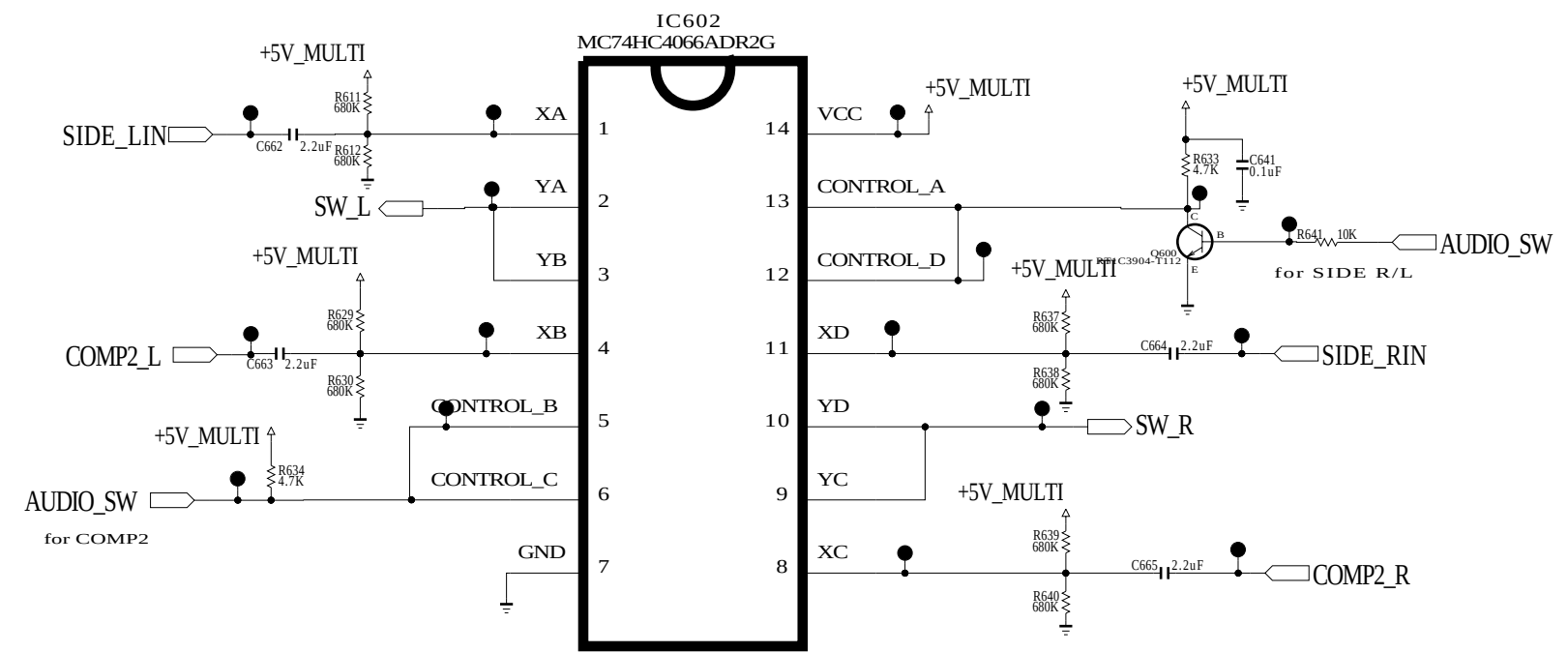
Digital Audio AMP



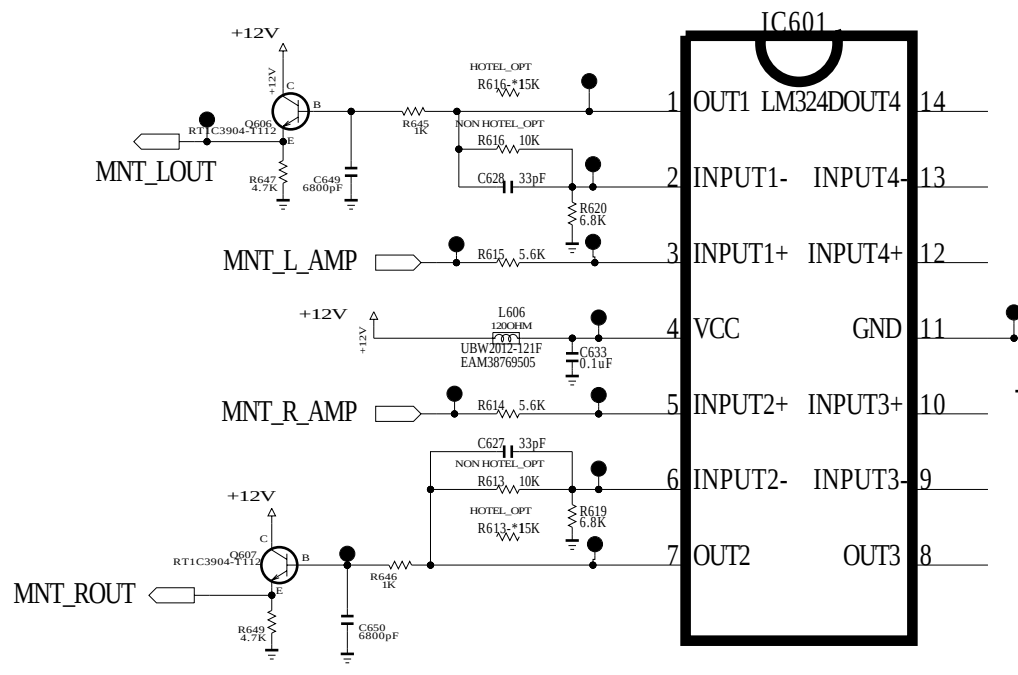
Chinese Hotel Option



AMP :GAIN X 4



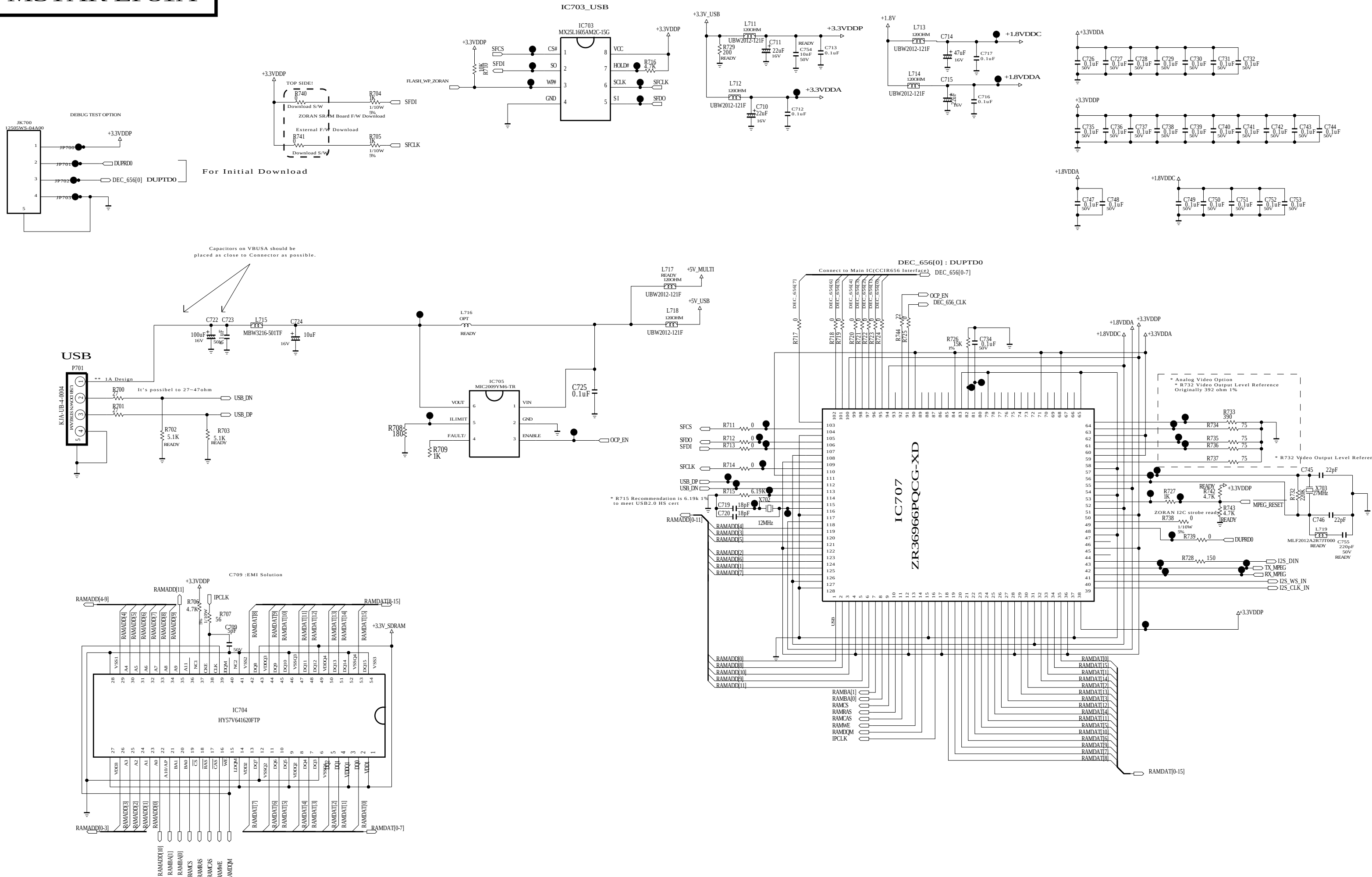
Audio S/W : COMP2 or SIDE L/R



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

MODEL	MSTAR N-EU	DATE	2007/12/20
BLOCK	AUDIO	SHEET	6 / 11

EAX40043808
MSTAR LP81A



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

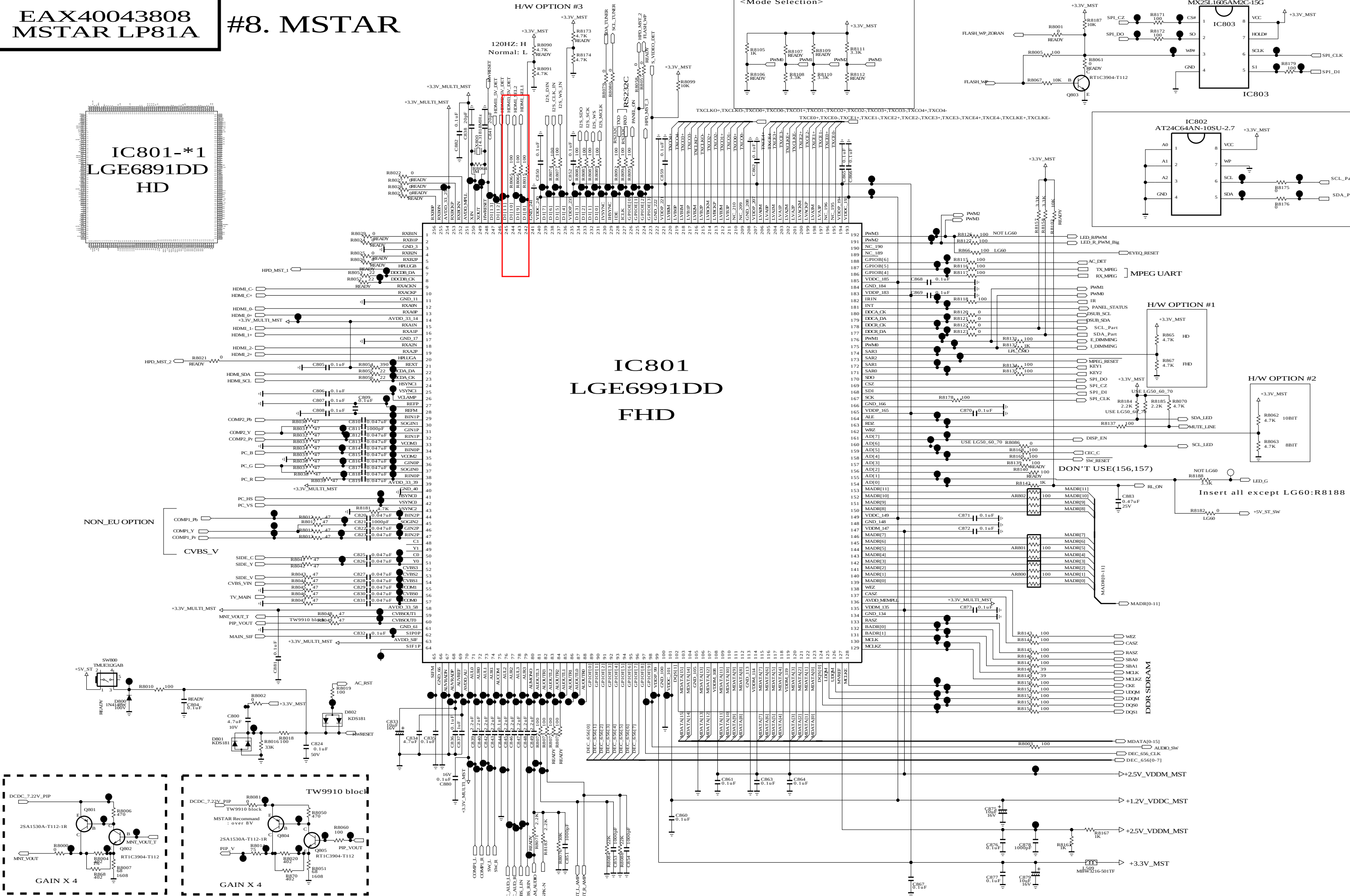
MODEL	MSTAR N-EU	DATE	2007/12/20
BLOCK	USB/MPEG DEC	SHEET	7 / 11

EAX40043808
MSTAR LP81A

#8. MSTAR



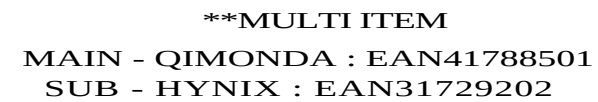
IC801
LGE6991DD
FHD

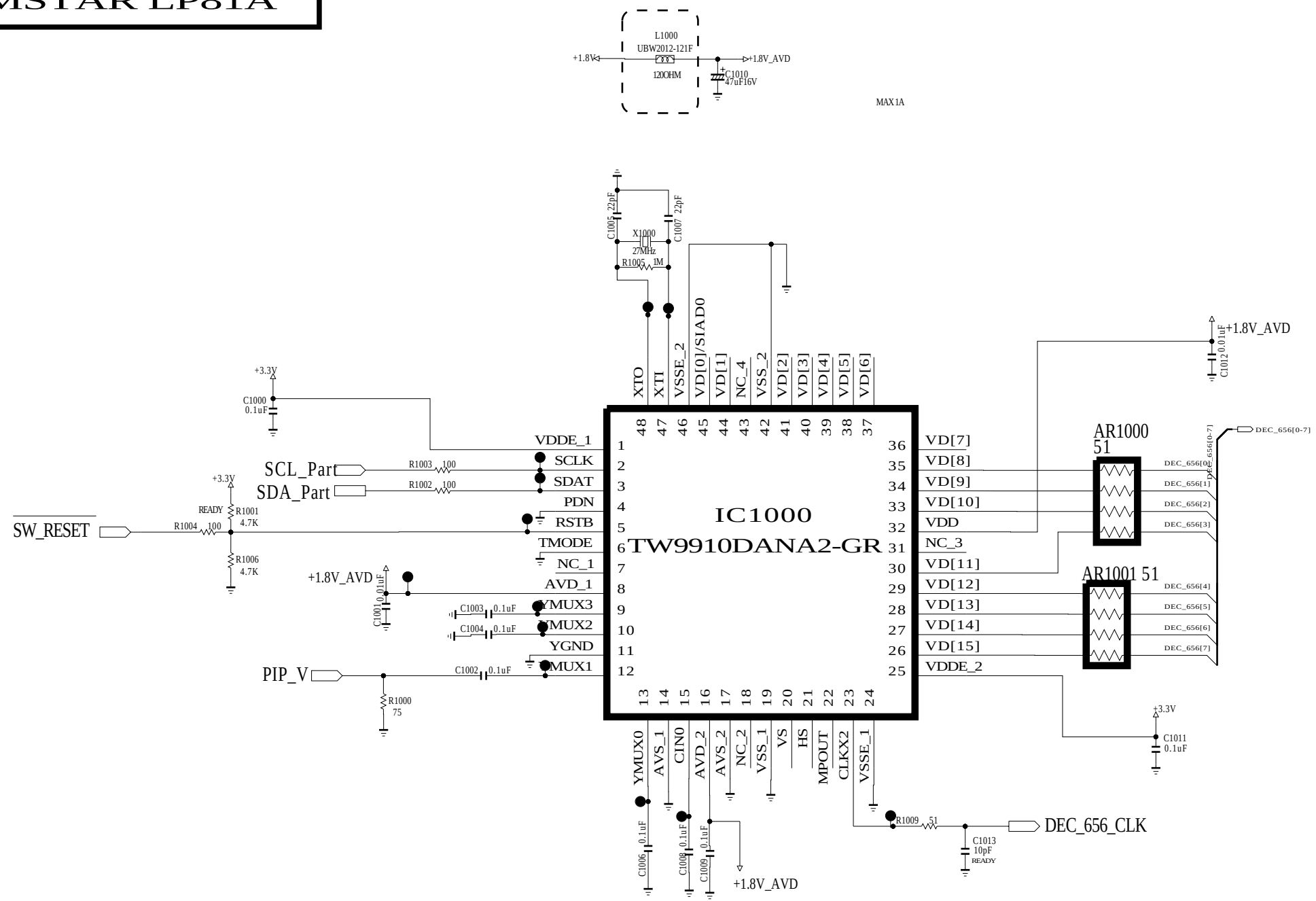


THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.



MODEL	MSTAR N-EU	DATE	2007/12/20
BLOCK	MSTAR	SHEET	8 / 11





TW9910

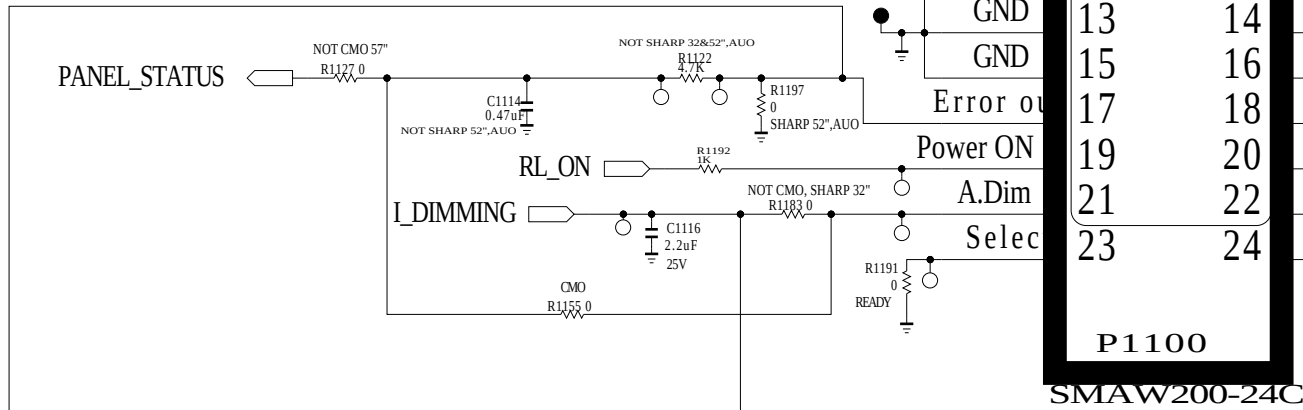
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMETIC.

MODEL	MSTAR	DATE	2007/12/20
BLOCK	TW9909	SHEET	19 / 11

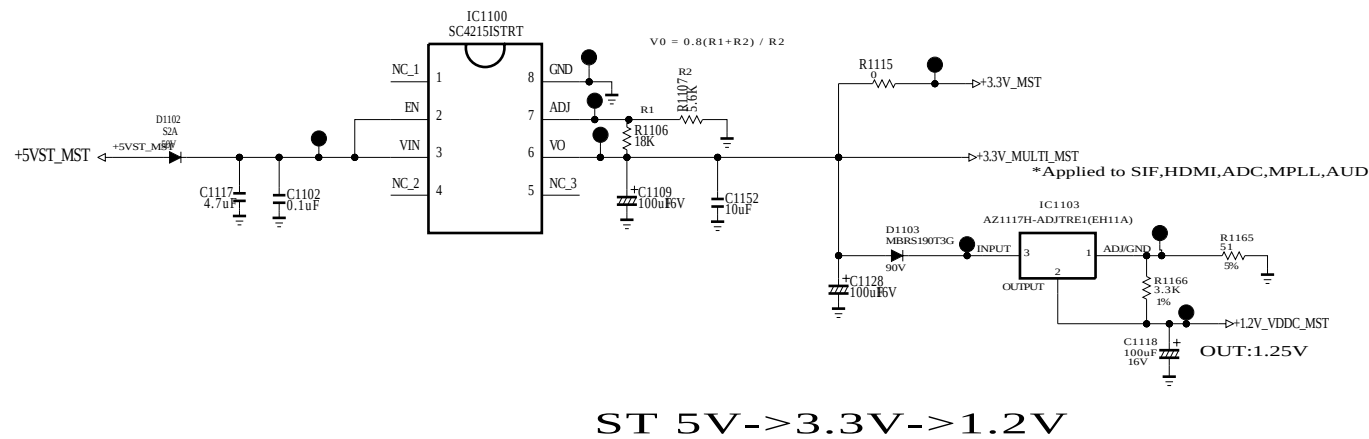
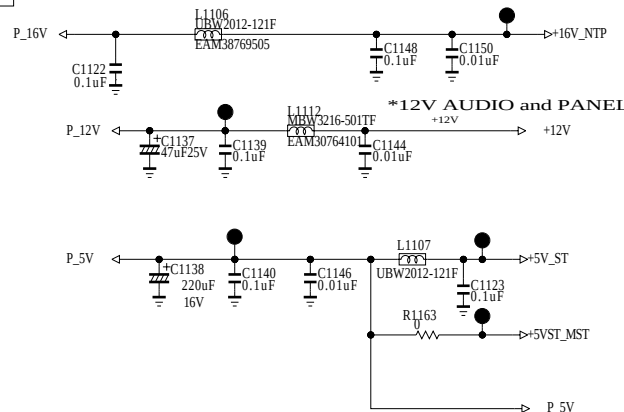
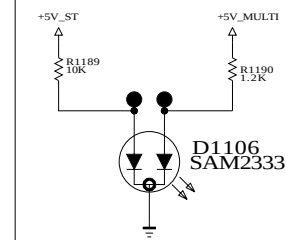
EAX40043807 MSTAR LP81A

*PANEL OPTION

	R1197	R1122	C1114	R1127	R1183	R1155	R1103	R1185	R1186	R1187	R1104
Sharp 52"	O	X	X	O	O	X	X	X	X	X	O
AUO	O	X	X	O	O	X	X	X	X	X	X
CMO 32/42/47"	X	4.7K	0.47uF	O	X	O	O	O	X	X	X
CMO 57"	X	4.7K	0.47uF	X	X	O	O	X	O	O	X
Sharp 32"	X	X	X	X	X	X	X	X	X	X	O
the rest	X	4.7K	0.47uF	O	O	X	X	X	X	X	O

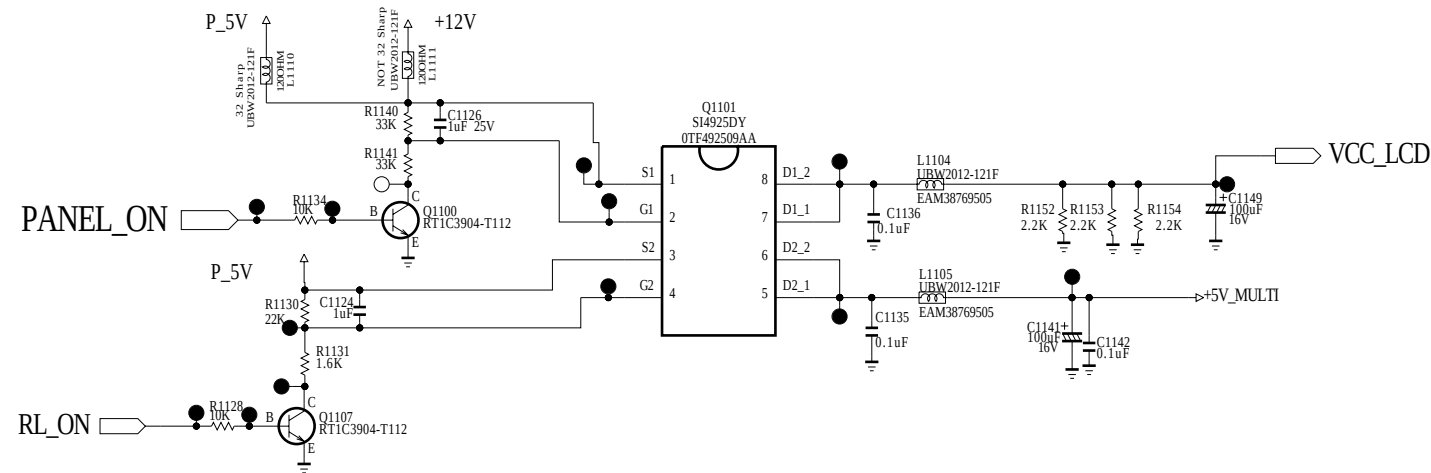


LED Block



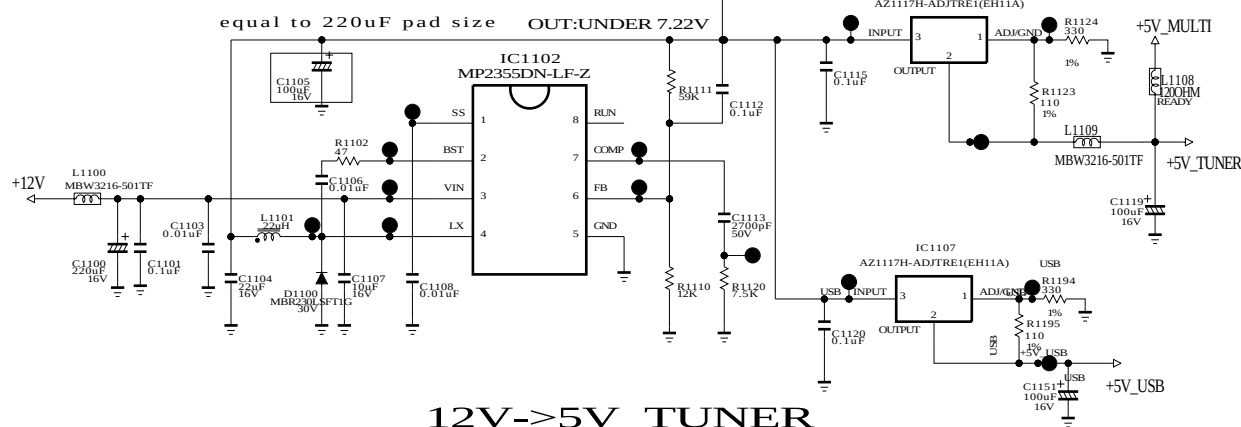
ST 5V->3.3V->1.2V

SWITCH VCC_LCD:12V or 5V 5V:5V_PULLUP,5V_MULTI



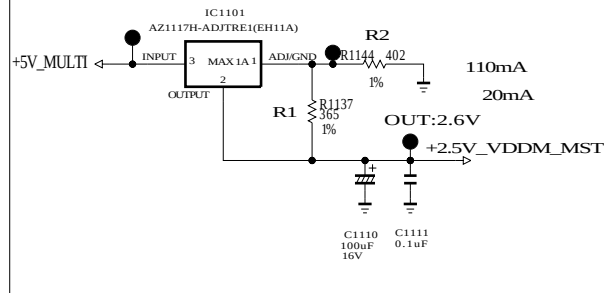
DC-DC CONVERTER

DCDC_7.22V_PIP (8)

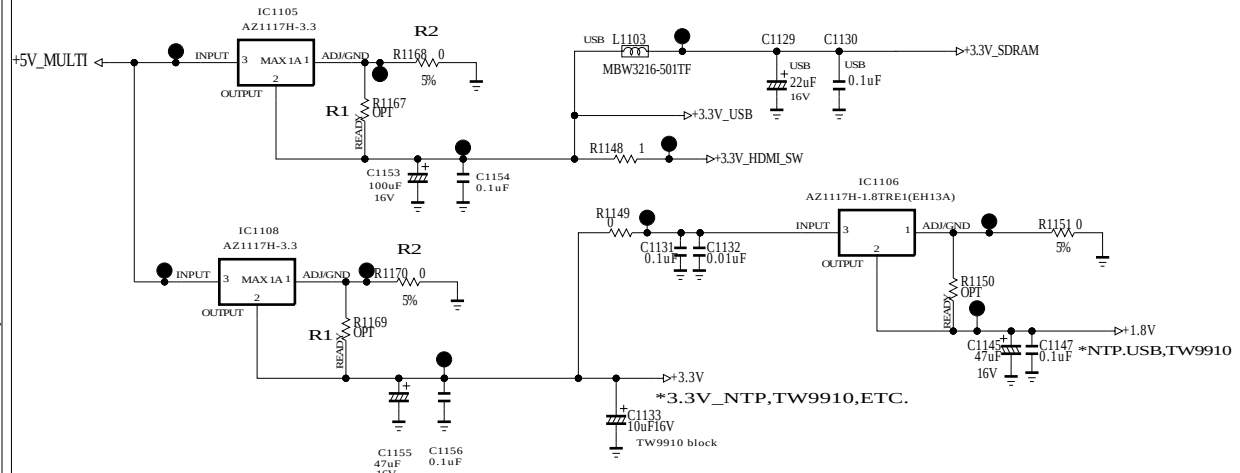


12V->5V_TUNER

SWITCH 5V->DDR 2.5V



SWITCH 5V->3.3V->1.8V



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