



LG

Life's Good

LCD TV **SERVICE MANUAL**

CHASSIS : LP24B

**MODEL : 32CS410/410Y/411/411Y/412
32CS410/410Y-TB 32CS411/411Y-TA
32CS412-TD**

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 Δ in the Schematic Diagram and Exploded View.

It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.

Do not modify the original design without permission of manufacturer.

General Guidance

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

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

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

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1 W), keep the resistor 10 mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

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

Leakage Current Cold Check(Antenna Cold Check)

With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.

If the exposed metallic part has a return path to the chassis, the measured resistance should be between $1\text{ M}\Omega$ and $5.2\text{ M}\Omega$.

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

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

Leakage Current Hot Check (See below Figure)

Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.

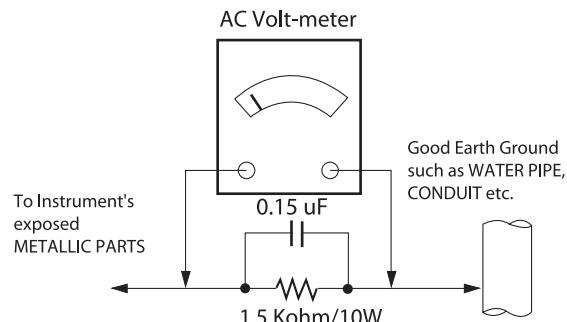
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

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

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

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

Leakage Current Hot Check circuit



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

*Base on Adjustment standard

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 is 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 of 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 small wire-bristle (0.5 inch, or 1.25 cm) 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 the LP24B chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

1) Temperature: $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ($77^{\circ}\text{F} \pm 9^{\circ}\text{F}$), CST: $40^{\circ}\text{C} \pm 5^{\circ}\text{C}$

2) Relative Humidity: $65\% \pm 10\%$

3) Power Voltage

: Standard input voltage (AC 100-240 V~, 50/60 Hz)

* Standard Voltage of each products is marked by models.

4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.

5) The receiver must be operated for about 5 minutes prior to the adjustment.

3. Test method

1) Performance: LGE TV test method followed

2) Demanded other specification

- Safety : CE, IEC specification

- EMC : CE, IEC

4. Model General Specification

No.	Item	Specification			Remarks
1.	Market	NON EU			
2.	Broadcasting system	1) PAL/SECAM B/G/D/K 2) PAL-I/II 3) NTSC-M			
3.	Channel Storage	PAL	NTSC	China(DK)	
		E2-C69 S21~S47	2~78 1~71	C1~C62 S1~S41	
4.	Receiving system	Upper Heterodyne			
5.	Video Input	PAL, SECAM, NTSC			Rear (1EA)
6.	Component Input	Y/Cb/Cr, Y/Pb/Pr			Rear (1EA)
7.	USB Input	MP3, JPEG			Side(1EA)
8.	AV Audio Output	RF/AV/HDMI Audio Output			Rear (1EA)
9.	D-SUB INPUT	S/W Upgrade Only			Rear (1EA)
10.	HDMI Input	HDMI-DTV, Only PCM MODE			Rear (1EA)
11.	Audio Input (1EA)	AV&Component			L/R Input(1EA)

5. Component Video Input (Y, Pb, Pr)

No.	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel clock(MHz)	Proposed
1.	720*480	15.73	59.94	13.500	SDTV, DVD 480I(525I)
2.	720*480	15.75	60.00	13.514	SDTV, DVD 480I(525I)
3.	720*576	15.625	50.00	13.500	SDTV, DVD 576I(625I) 50Hz
4.	720*480	31.47	59.94	27.000	SDTV 480P
5.	720*480	31.50	60.00	27.027	SDTV 480P
6.	720*576	31.25	50.00	27.000	SDTV 576P 50Hz
7.	1280*720	44.96	59.94	74.176	HDTV 720P
8.	1280*720	45.00	60.00	74.250	HDTV 720P
9.	1280*720	37.50	50.00	74.25	HDTV 720P 50Hz
10.	1920*1080	28.125	50.00	74.250	HDTV 1080I 50Hz,
11.	1920*1080	33.72	59.94	74.176	HDTV 1080I
12.	1920*1080	33.75	60.00	74.25	HDTV 1080I
13.	1920*1080	56.25	50	148.5	HDTV 1080P
14.	1920*1080	67.432	59.94	148.350	HDTV 1080P
15.	1920*1080	67.5	60.00	148.5	HDTV 1080P

6. HDMI Input

6.1. PC Mode

* Spec. out but it can be shown the picture at only HDMI/DVI IN 1 via DVI to HDMI Cable

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remarks
1.	640×480	31.469	59.94	25.17	VESA(VGA)	
2.	800×600	37.879	60.317	40.00	VESA(SVGA)	
3.	1024×768	48.363	60.004	65.00	VESA(XGA)	
4.	1280×768	47.776	59.87	79.5	VESA(WXGA)	
5.	1360×768	47.72	59.799	84.62	VESA(WXGA)	
6.	1366×768	47.7	60.00	84.62	WXGA	
7.	1280×1024	63.595	60.00	108.875	SXGA	
8.	1920×1080	66.647	59.988	138.625	WUXGA	

* Monitor Range Limits

Min Vertical Freq - 58 Hz / Max Vertical Freq - 63 Hz

Min Horiz. Freq - 28 kHz / Max Horiz. Freq - 68 kHz

Pixel Clock - 150 MHz

6.2. DTV Mode

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	Remarks
1.	720*480	15.73	59.94	13.500	SDTV, DVD 480I(525I)	Spec. out but display.
2.	720*480	15.75	60.00	13.514	SDTV, DVD 480I(525I)	
3.	720*576	15.625	50.00	13.500	SDTV, DVD 576I(625I) 50Hz	
4.	720*480	31.47	59.94	27	SDTV 480P	
5.	720*480	31.5	60.00	27.027	SDTV 480P	
6.	720*576	31.25	50.00	27	SDTV 576P	
7.	1280*720	44.96	59.94	74.176	HDTV 720P	
8.	1280*720	45	60.00	74.25	HDTV 720P	
9.	1280*720	37.5	50.00	74.25	HDTV 720P	
10.	1920*1080	28.125	50.00	74.25	HDTV 1080I	
11	1920*1080	33.72	59.94	74.176	HDTV 1080I	
12	1920*1080	33.75	60.00	74.25	HDTV 1080I	
13	1920*1080	56.25	50.00	148.5	HDTV 1080P	
14	1920*1080	67.432	59.94	148.350	HDTV 1080P	
15	1920*1080	67.5	60.00	148.5	HDTV 1080P	
16	1920*1080	27	24.00	74.25	HDTV 1080P	
17	1920*1080	33.75	30.00	74.25	HDTV 1080P	
18	1920*1080	26.97	23.97	74.25	HDTV 1080P	
19	1920*1080	33.716	29.976	74.25	HDTV 1080P	

ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied to all of the LCD TV with LP24B chassis.

2. Designation

- (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 $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ of temperature and $65\% \pm 10\%$ of relative humidity if there is no specific designation.
- (4) The input voltage of the receiver must keep 100-220 V, 50/60Hz.
- (5) The standard signal level is approved in $65\text{ dB}_{\mu}\text{V} \pm 1\text{ dB}_{\mu}\text{V}$.
- (6) The receiver must be operated for over 5 minutes prior to the adjustment when module is in the circumstance of above 15°C .
 - 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.

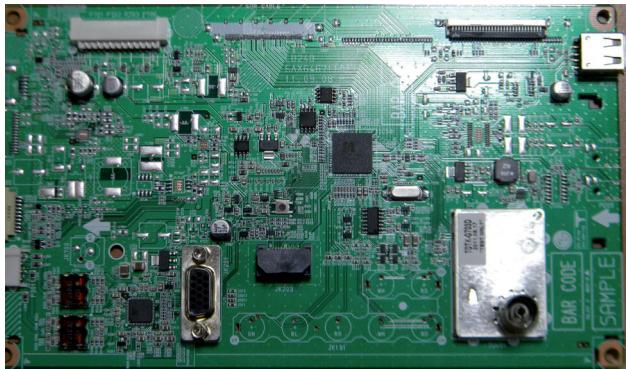
3. PCB assembly adjustment method

3.1. Mstar Main S/W program download

3.1.1. Using D/L Jig

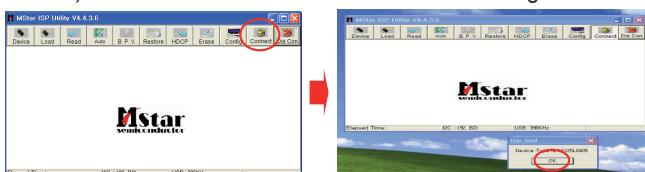
- (1) Preliminary steps

- 1) Connect the download jig to D-sub(JK201) Jack.



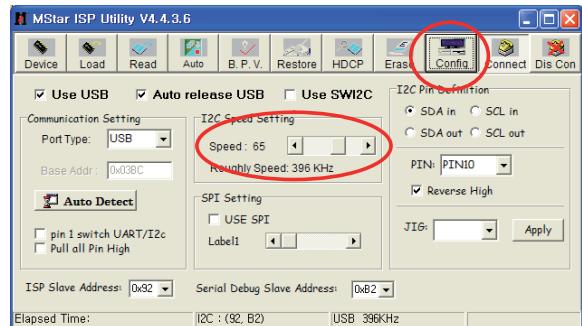
- (2) Download steps

- 1) Execute 'ISP Tool' program, the main window(Mstar ISP utility Vx.x.x) will be opened.
- 2) Click the "Connect" button and confirm "Dialog Box".



- 3) Click the "Config." button and Change speed

I2C Speed setting : 350Khz~400Khz



- 4) Read and write bin file

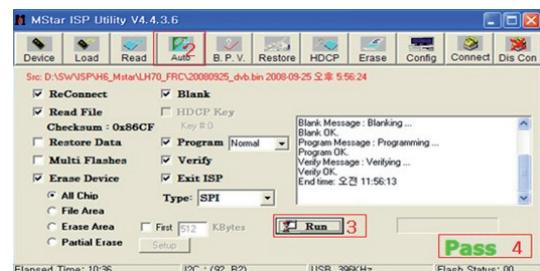
Click "(1)Read" tab, and then load download file(XXXX.bin) by clicking "Read".



- 5) Click "(2)Auto" tab and set as below

- 6) Click "(3)Run".

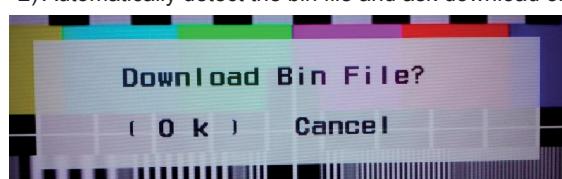
7) After downloading, you can see the "(4)Pass" message.



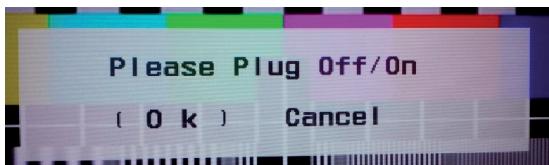
3.1.2. Using the Memory Stick

** USB DOWNLOAD : Service Mode

- 1) Insert the USB memory Stick to the USB port. (The file name of bin file should start as "M8R...". and Bin file should not be encrypted)
- 2) Automatically detect the bin file and ask download or not.



3) Press OK key then Message will be changed as below.



4) Plug off and on TV set, then you can see downloading process.



5) Then, Plug off and on TV set again, and Download is finished

3.2. Input tool option.

- Adjust tool option refer to the BOM.
- Tool Option Input : PCBA Check Process
- Area Option Input : Set Assembly Process

- After Input Tool Option and AC off

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

(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 Remote control.)
- (If not changed the option, the input menu can differ the model spec.)

Refer to Job Expression of each main chassis ass'y (EBTxxxxxxxx) for Option value.

*Caution: Don't Press "IN-STOP" key after completing the function inspection.

* Caution: Don't connect HDMI cable when downloading the EDID. If the cables are connected, Downloading of edid could be failed.

3.3. EDID data

- EDID D/L method: The EDID data is automatically saved.

■ HD MODEL

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01	
10	01	16	01	03	80	A0	5A	78	0A	F3	30	A4	54	46	96	
20	0F	49	4B	21	08	00	45	40	01	01	61	40	01	01	01	
30	01	01	01	01	01	01	01	1D	00	72	51	D0	1E	20	6E	
40	55	00	C4	8E	21	00	00	1E	1B	21	50	A0	51	00	1E	
50	48	88	35	00	BC	77	21	00	00	1C	00	00	00	FC	00	
60	47	20	54	56	0A	20	20	20	20	20	20	20	20	00	00	
70	00	3A	3F	1C	44	0F	00	0A	20	20	20	20	20	20	01	
80	02	03	25	F1	4F	84	07	01	16	02	03	11	12	13	14	
90	20	22	1F	10	23	09	07	07	83	01	00	00	68	03	0C	
A0	10	00	80	1E	00	01	1D	00	80	51	D0	1C	20	40	80	
B0	00	BC	88	21	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	
C0	3E	96	00	13	8E	21	00	00	18	8C	0A	A0	14	51	F0	
D0	00	26	7C	43	00	C4	8E	21	00	00	98	01	1D	80	18	
E0	1C	16	20	58	2C	25	00	C4	8E	21	00	00	9E	00	00	
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	2A	

3.4. ADC Calibration

3.4.1. ADC Calibration-Component

(Using External pattern)

* Required Equipments

■ Remote controller for adjustment

■ MSPG-925F/MSPG-1025/MSPG-3233 Pattern Generator

3.4.2. Process

(1) Change the Input to Component mode.

(2) Input the Component 480P@60 Hz 100% color Bar Y Pb Pr signal into Component. (MSPG-925F Model: 212/ Pattern: 65)



(3) Press ADJ key on R/C for adjustment.

(4) Enter Password number. Password is "0413".

(5) Select "Auto-RGB" and press OK(■) key.

(6) ADC adjustment is executed automatically.

(7) When ADC adjustment is finished, this OSD appear "COMPONENT - OK".

3.4.3. Confirmation

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

(2) We confirm whether "0x77 (offset), 0x78 (gain)" address of EEPROM "0xBE" is "0xAA" or not.

(3) If "0x77", "0x78" address of EEPROM "0xBE" isn't "0xAA", we adjust once more

(4) We can confirm the ADC values from "0x56~0x5B" addresses in a page "0xBE"

3.4.4. EEPROM Address

EEPROM	Address
EEPROM Sub Address	0XBE
Red Gain	0X59
Green Gain	0X5A
Blue Gain	0X5B
Red Offset	0x56
Green Offset	0X57
Blue Offset	0X58

3.5 Check SW Version

3.5.1 Method

- (1) Push In-star key on Adjust remote-controller.
- (2) SW Version check

Check "Main : Vx.xx" :



4. SET assembly adjustment method

4.1. Input Area-Option

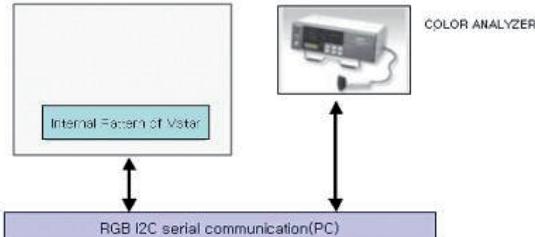
- (1) Profile : Must be changed the Area option value because being different of each Country's
- (2) Equipment : adjustment remote control.
- (3) Adjustment method
 - The input methods are same as other chassis.(Use IN-START key on the Adjust Remote control.)
 - Refer to Job Expression of each main chassis ass'y (EBTxxxxxxxx) for Option value.

	Tool Option	Area Option	
Module Maker	0 : CMI 1 : THTF 2 : LPL	Lang Group	0 : NONEU A 1 : NONEU H 2 : NONEU ALL
Inch	0 : 22" (Default) 1 : 23" 2 : 32"	Def. Lang	0 : ENGLISH 1 : CHINESE 2 : ESPANOL 3 : PORTUGUES
Frame	0 : LK230 (Default)	TTX Group	0 : OFF 1 : ON
Module Rev.	0 : Rev.0 (Default) 1 : Rev.1	I II SAVE	0 : OFF 1 : ON
		HDEV	
		MONO	
		BlueBack	
		Country	

4.2. Adjustment of White Balance.

- 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.
- Adjustment mode : Three modes - Cool / Medium / Warm (Medium data is automatically calibrated by the Cool data)
- Adj. condition: normal temperature
 - 1) Surrounding Temperature: $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$
 - 2) Warm-up time: About 5 Min
 - 3) Surrounding Humidity: 20 % ~ 80 %
- Required Equipment
- Remote controller for adjustment
- Color Analyzer : CA100+ or CA-210 or same product - LCD TV(CH: 9), (should be used in the calibrated ch by CS-1000)
- Auto W/B adjustment instrument (only for Auto adjustment)

4.2.1. Connecting diagram of equipment for measuring (For Automatic Adjustment)



(1) Enter the adjustment mode of DDC

- 22Set 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(WB 00 FF) 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, 00).

(4) Release the adjust mode of white balance

- Enter the white balance adjustment mode with aging command(F3, 00, FF)

* Luminance min value is 150cd in the Cool/Medium/Warm mode(For LCD)

4.3. Adjustment of White Balance

(for Manual adjustment)

- Color analyzer(CA100+, CA210) should be used in the calibrated ch by CS-1000
- Operate the zero-calibration of the CA100+ or CA-210, then stick sensor to the module when adjusting.
- 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 5 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.
 - 4) Input external pattern (85% white pattern)
 - 5) Push the ADJ key two times (entering White Balance mode) → Enter "0413" (Password)
 - 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 three modes all (Cool / Medium / Warm) : Fix the one of R/G/B gain 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).

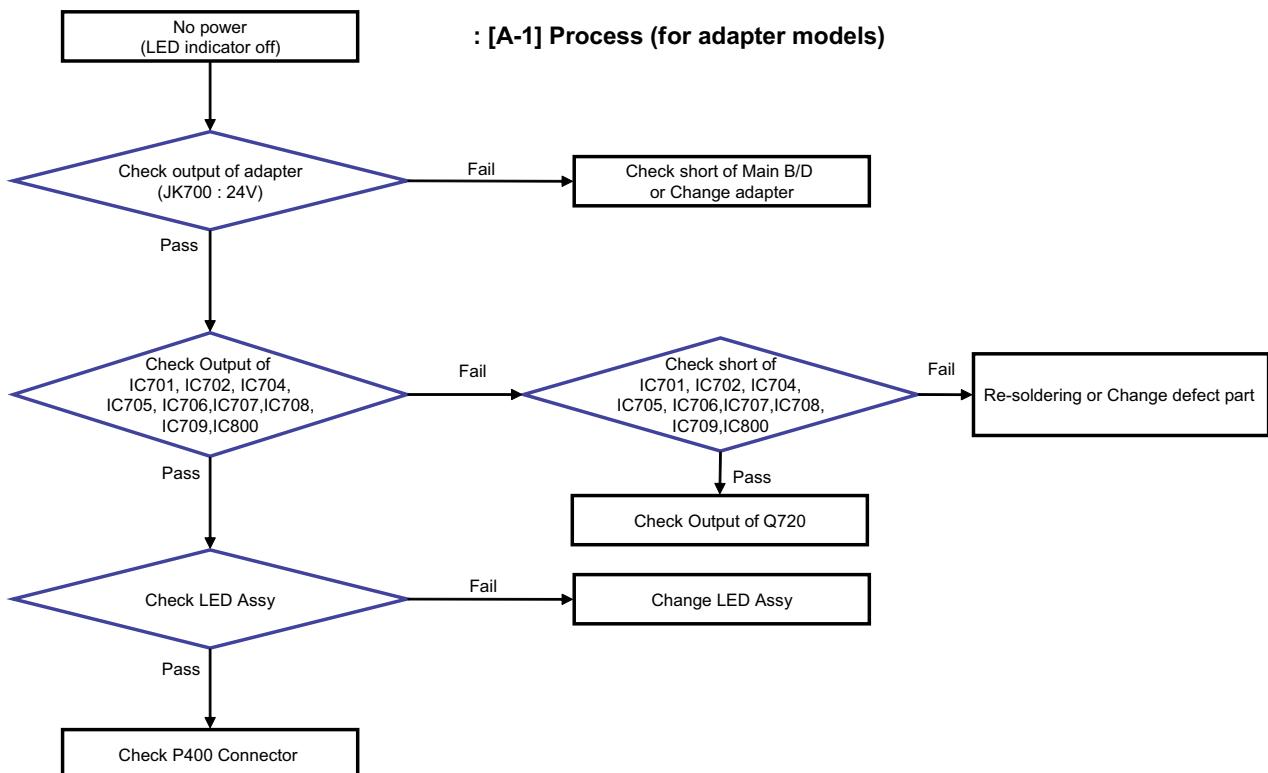
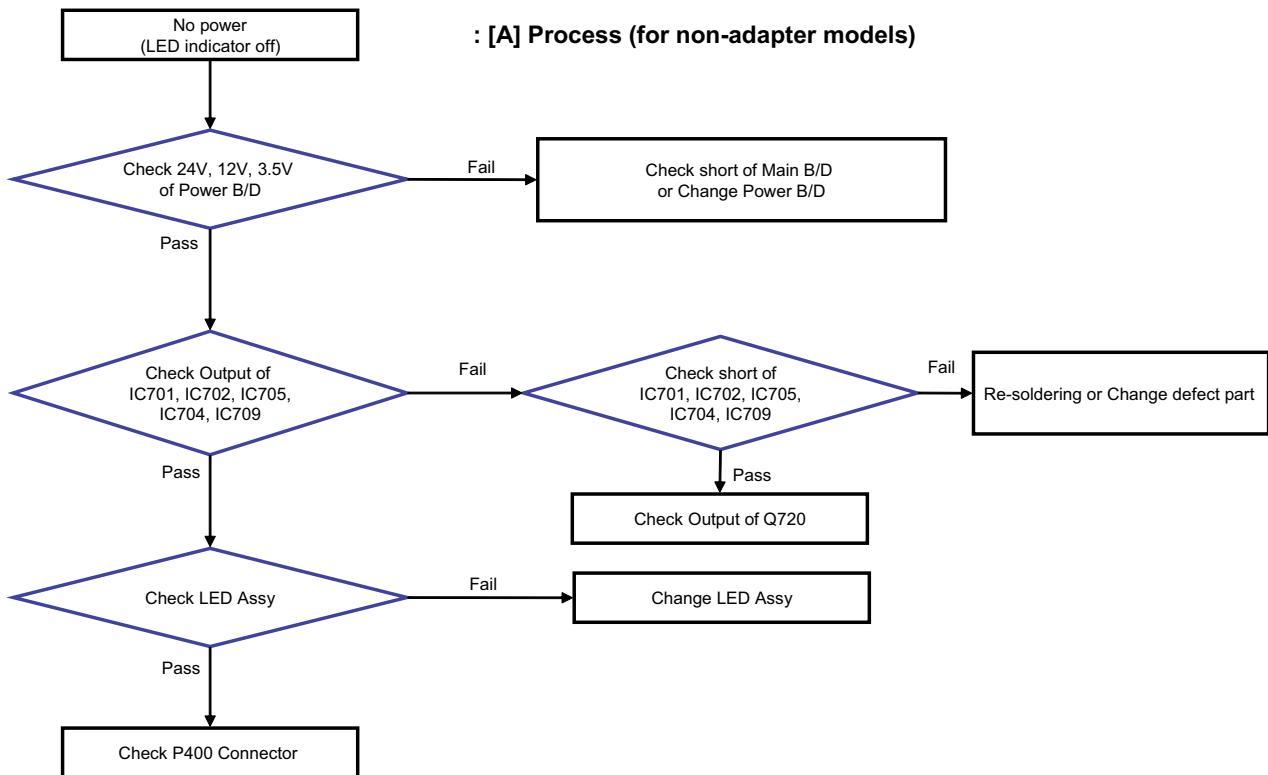
- 1) x, y > target
 - i) Decrease the R, G.
- 2) x, y < target
 - i) First decrease the B gain,
 - ii) Decrease the one of the others.
- 3) x > target , y < target
 - i) First decrease B, so make y a little more than the target.
 - ii) Adjust x value by decreasing the R
- 4) x < target , y > target
 - i) First decrease B, so make x a little more than the target.
 - ii) Adjust x value by decreasing the G

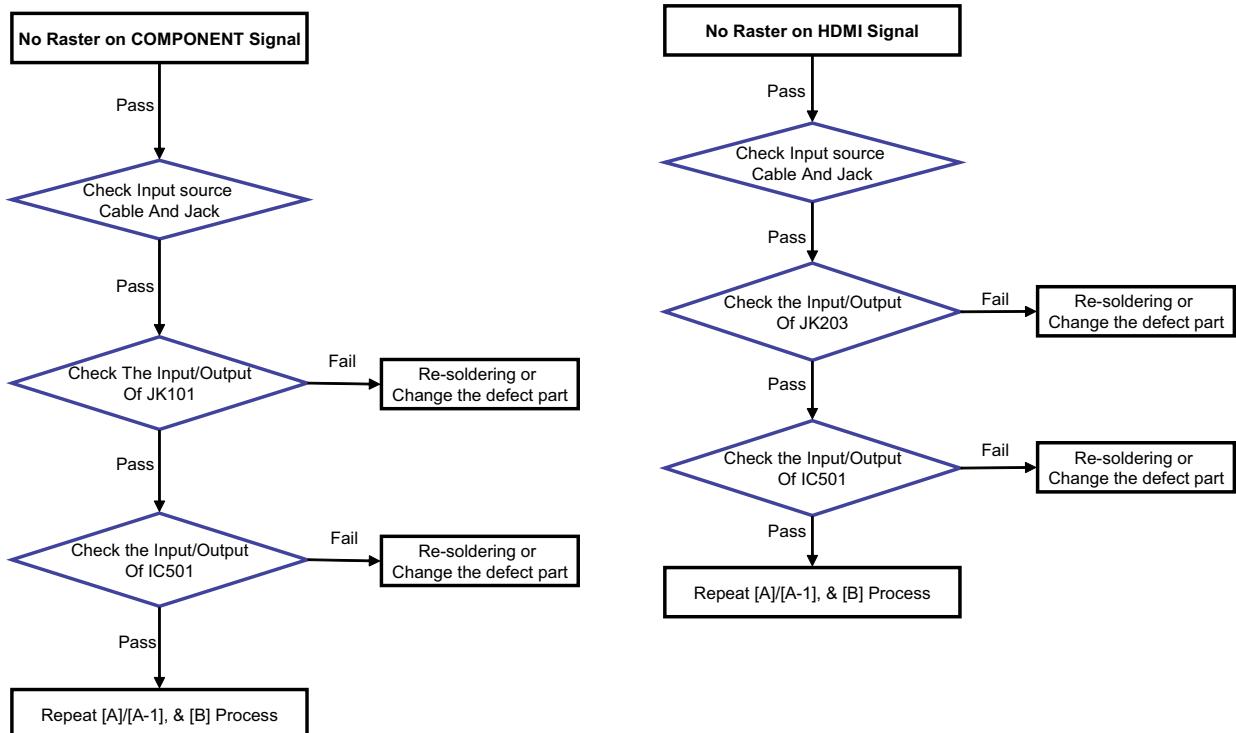
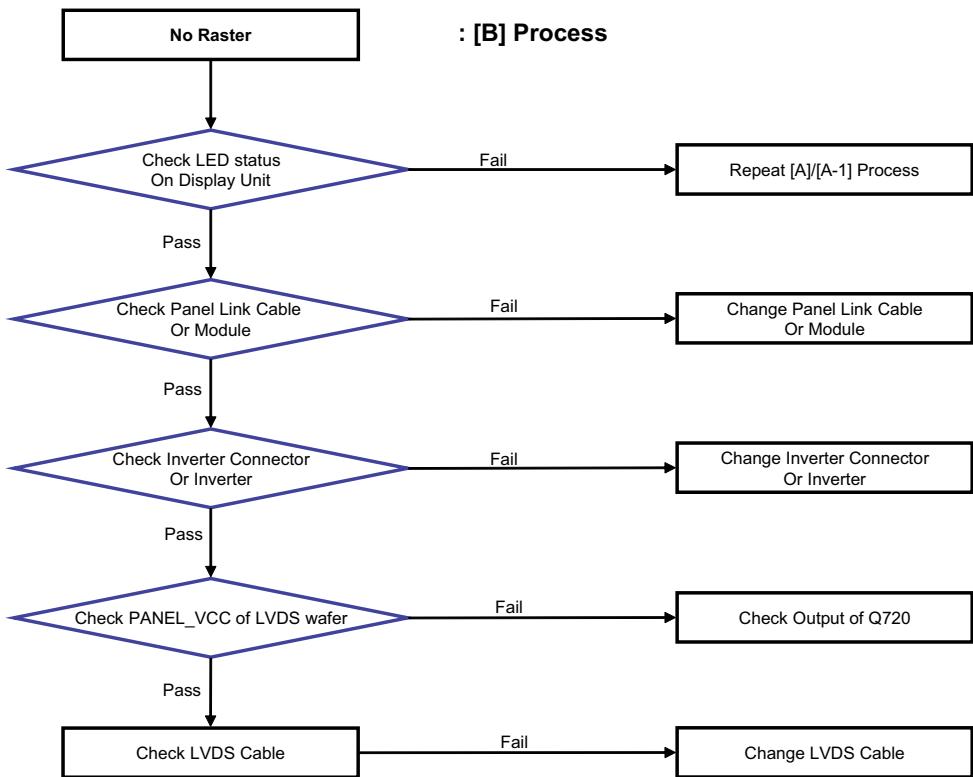
■ Standard color coordinate and temperature when using the CA100+ or CA210 equipment (Small size inch's color coordinate is different from others, So use below table)

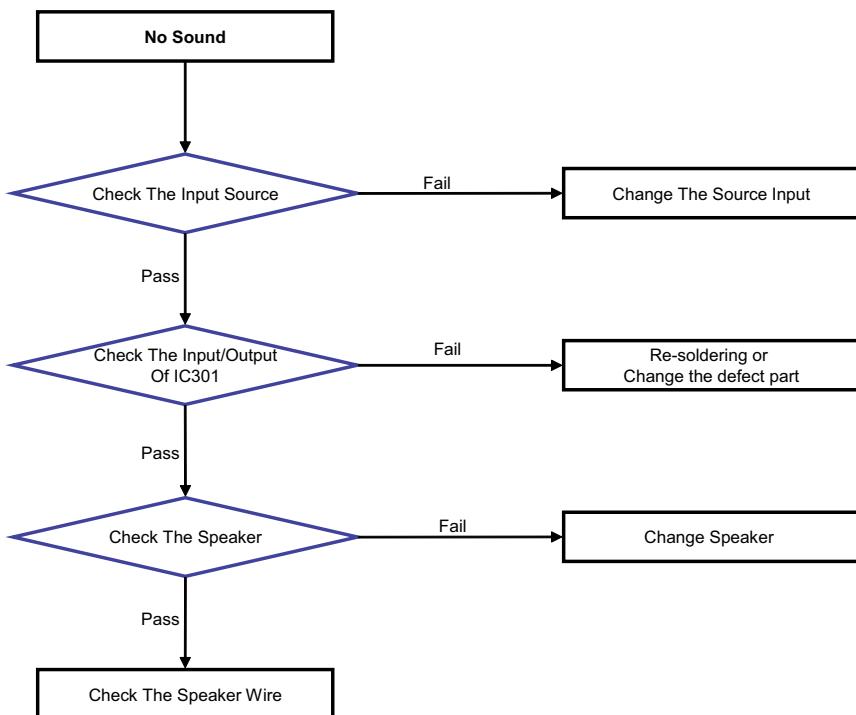
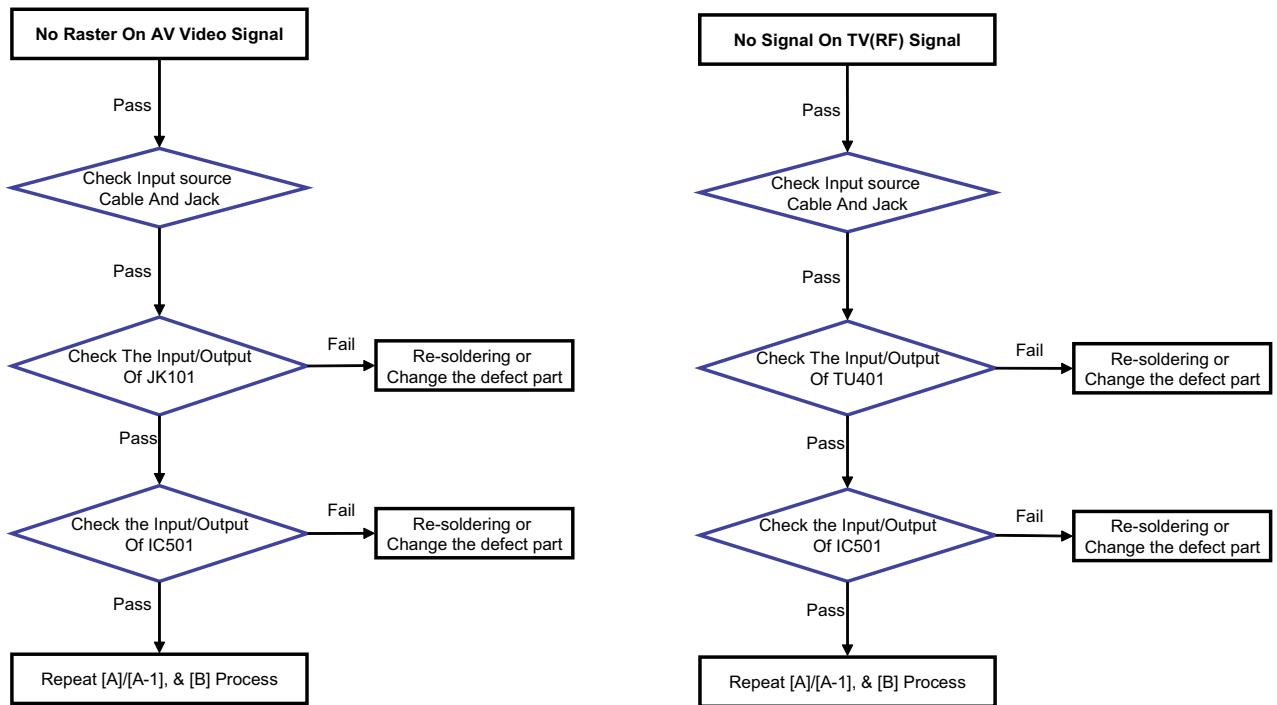
- 1) All Edge LED(except LGD), lamp over 26 and None Edge LED(LGD Direct LED 42inch) and LGD Edge LED 26inch Over

Mode	Color coordinate		Temp	Δuv
	x	y		
Cool	0.271 ± 0.002	0.276 ± 0.002	13,000 K	0.000
Medium	0.287 ± 0.002	0.296 ± 0.002	9,300 K	0.000
Warm	0.315 ± 0.002	0.332 ± 0.002	6,500 K	0.003

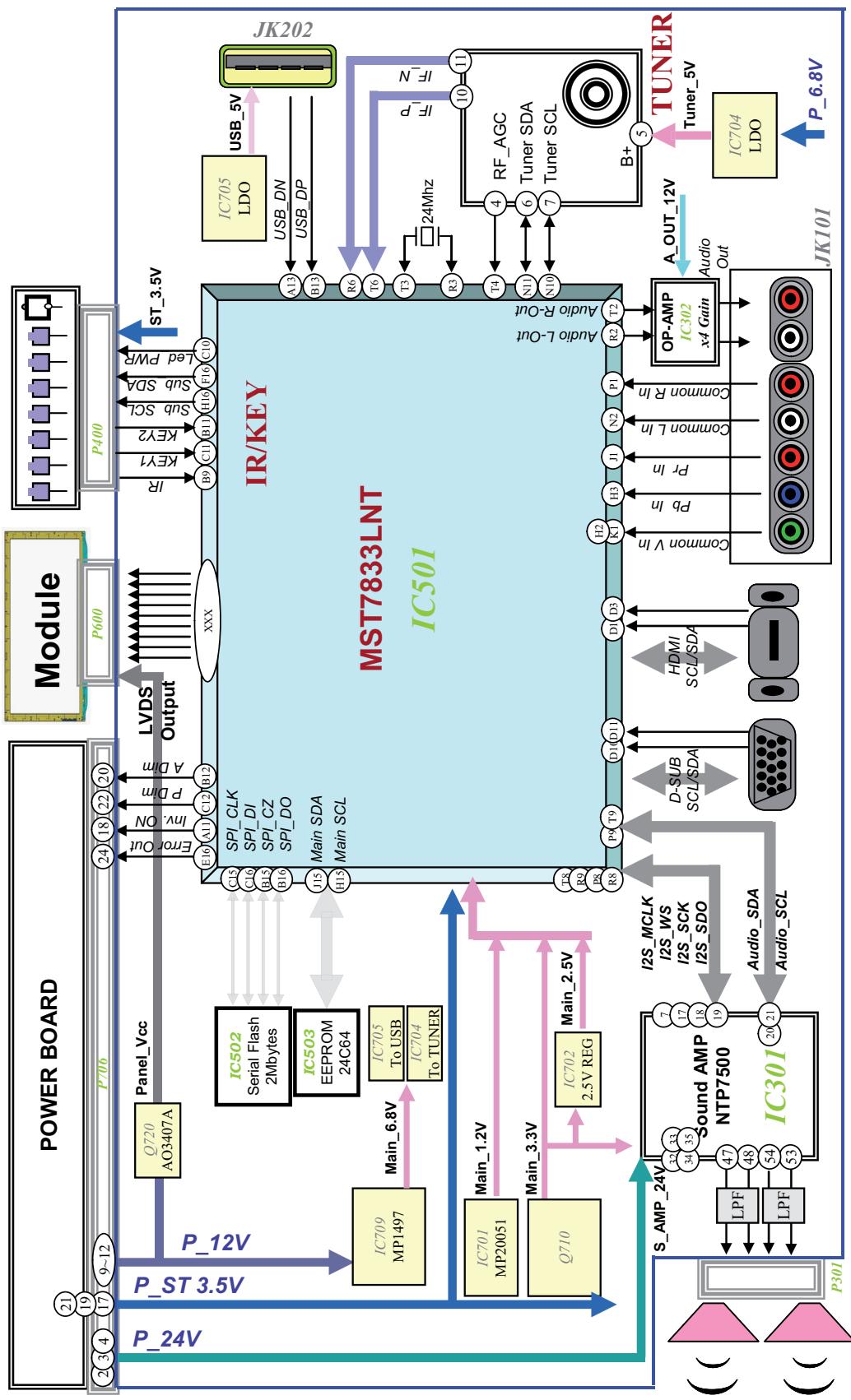
TROUBLE SHOOTING







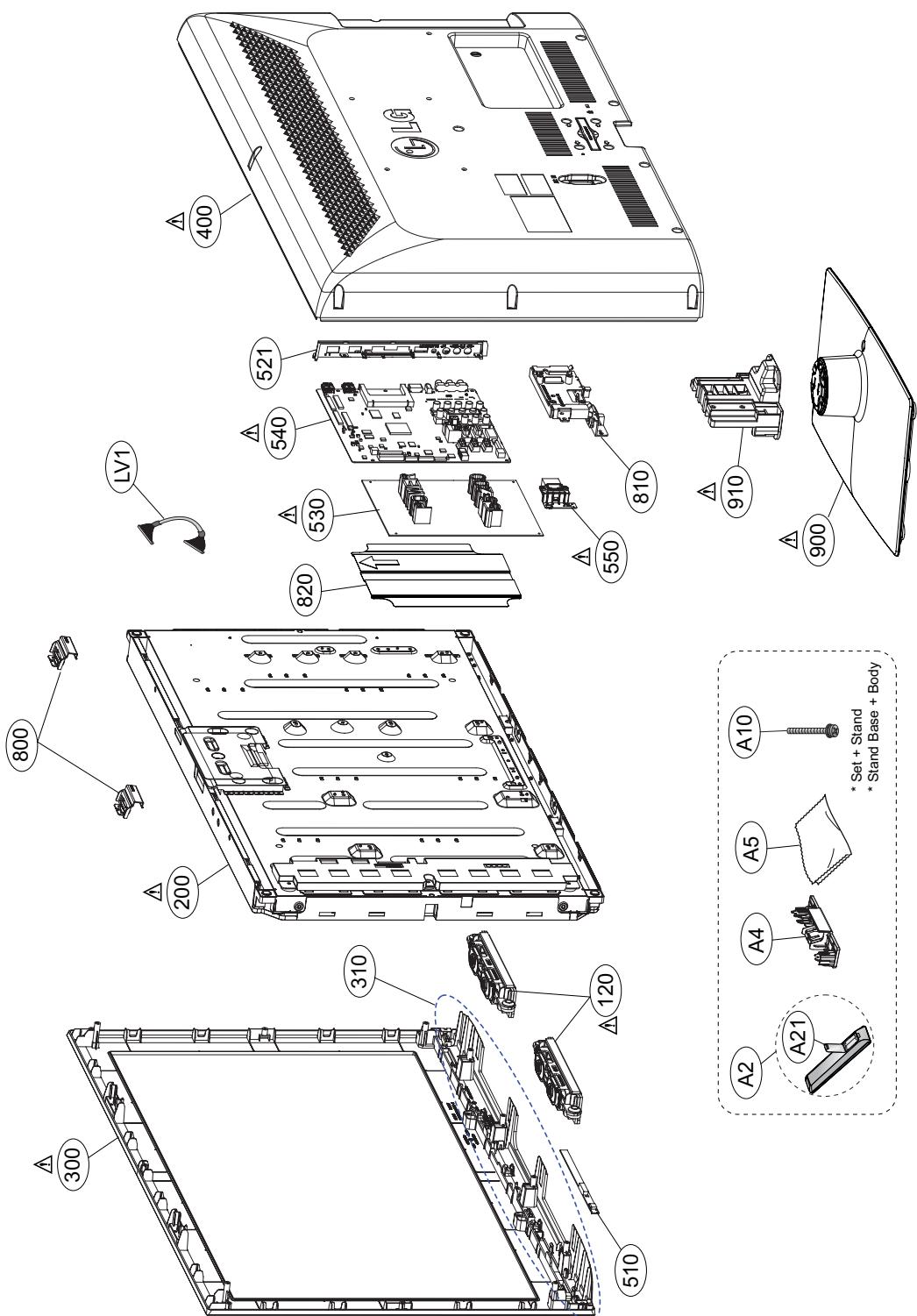
BLOCK DIAGRAM



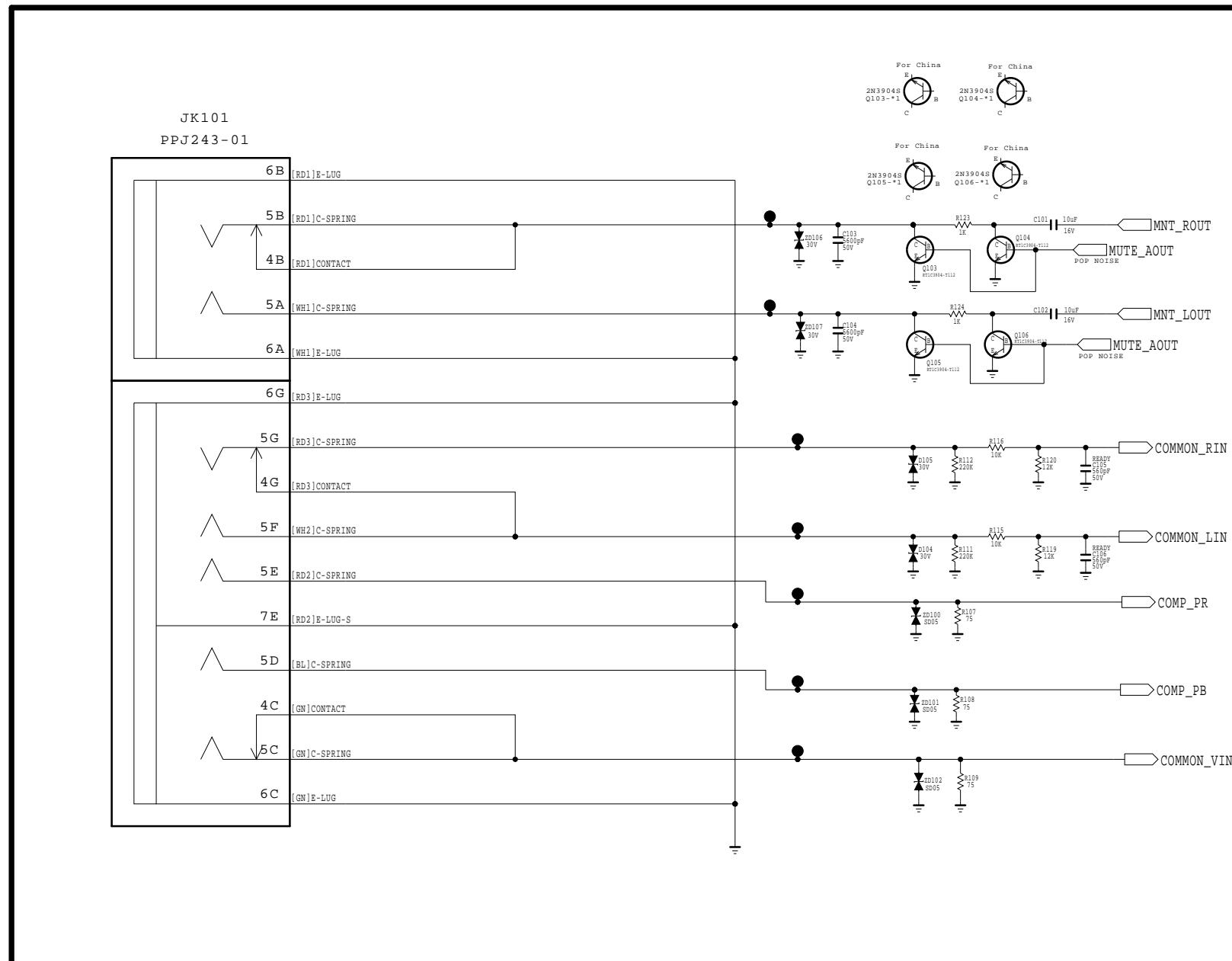
EXPLODED VIEW

IMPORTANT SAFETY NOTICE

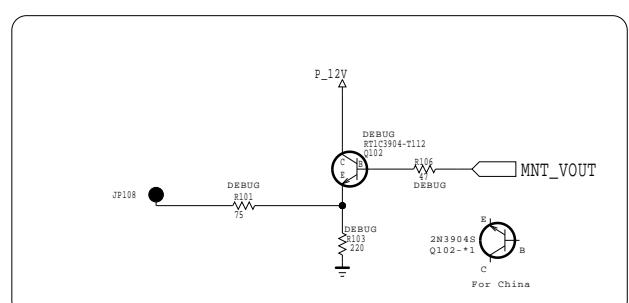
Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by \triangle in the Schematic Diagram and EXPLODED VIEW.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual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



COMPONENT / AV IN / AV AUDIO OUT



V-OUT Buffer(DEBUG)

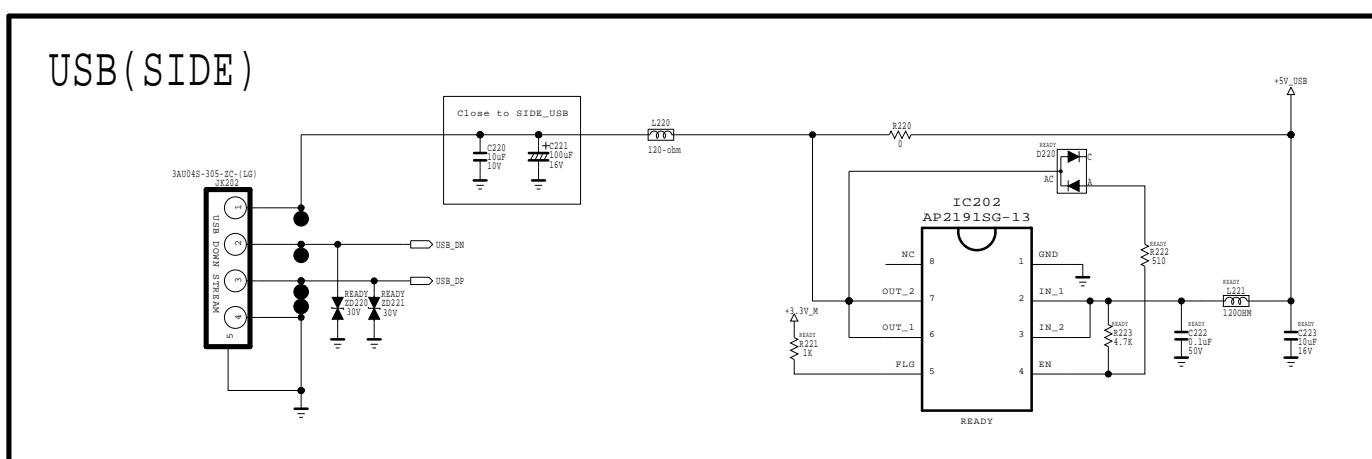
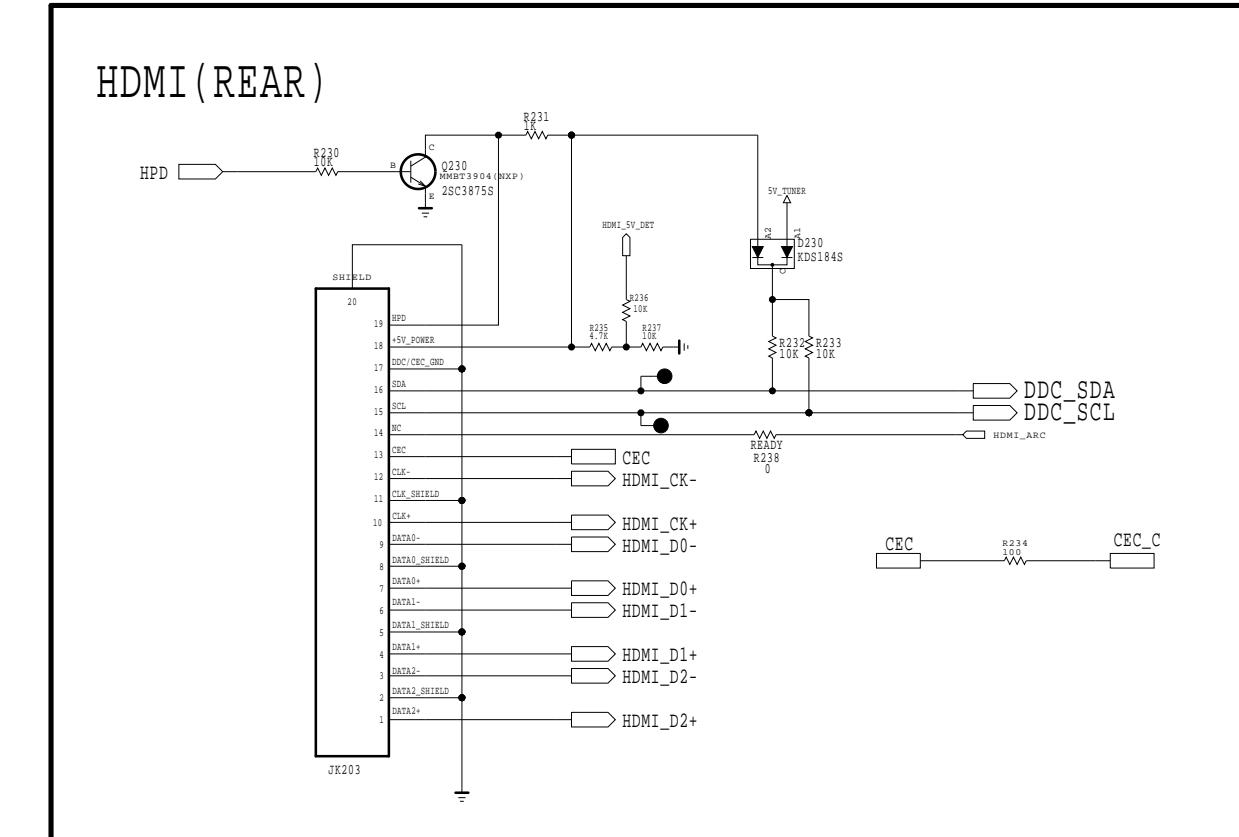
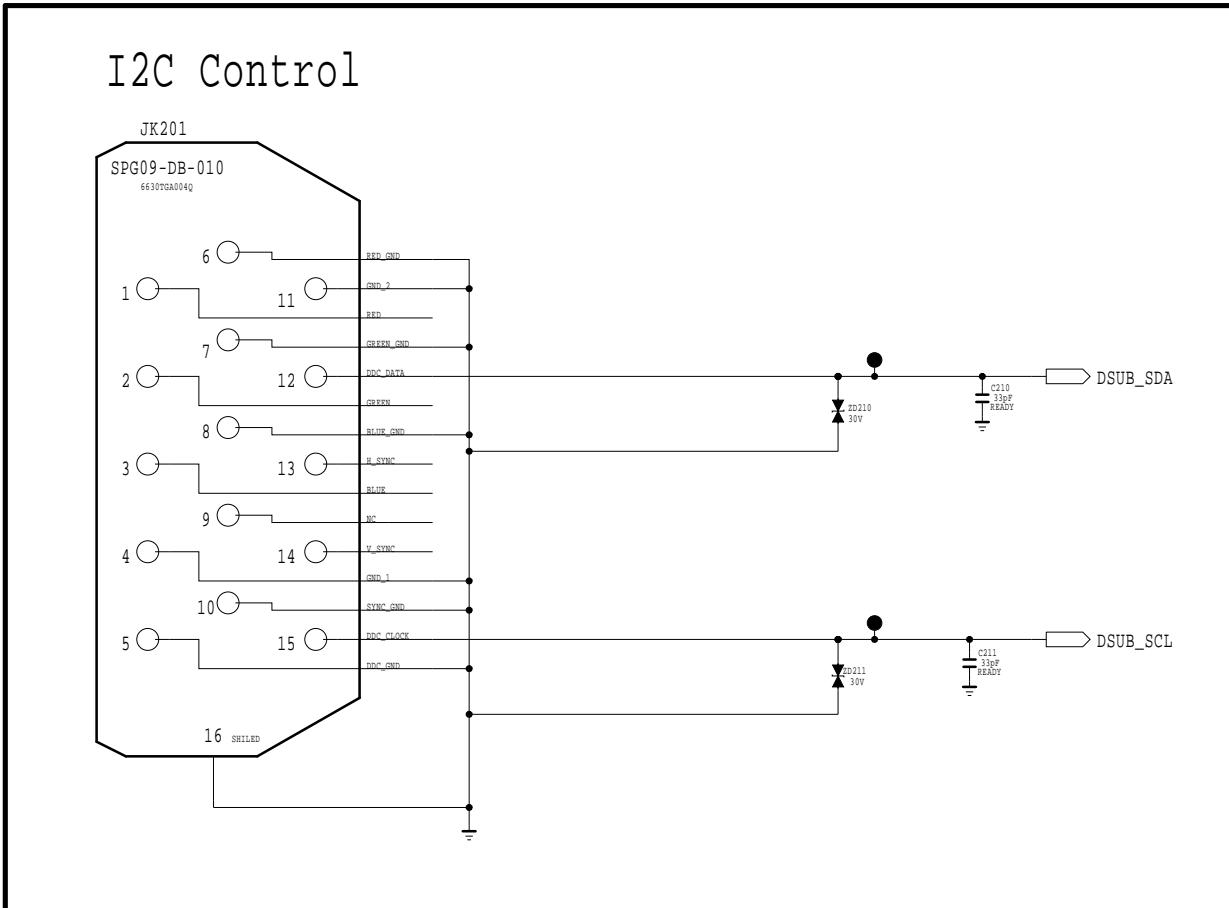


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LG Electronics

LG ELECTRONICS

MODEL	32CS410	DATE	2012/03/02
BLOCK	INPUT1	SHEET	1 / 8

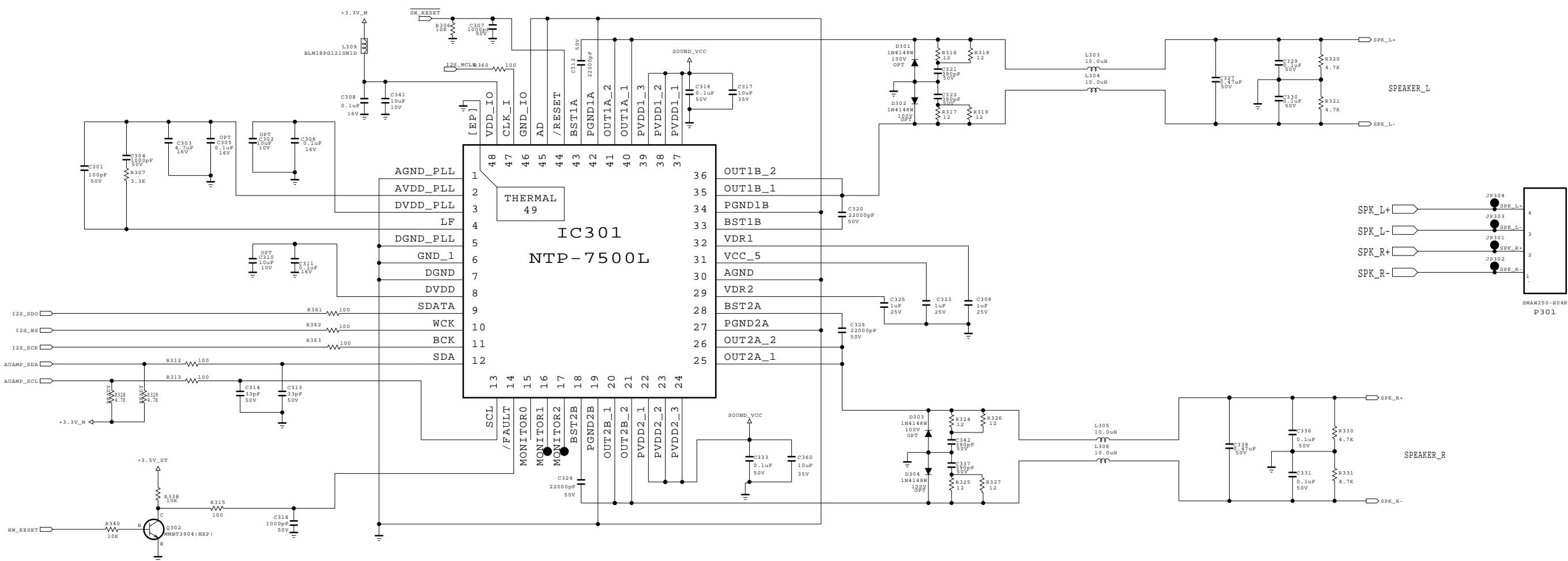


THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC

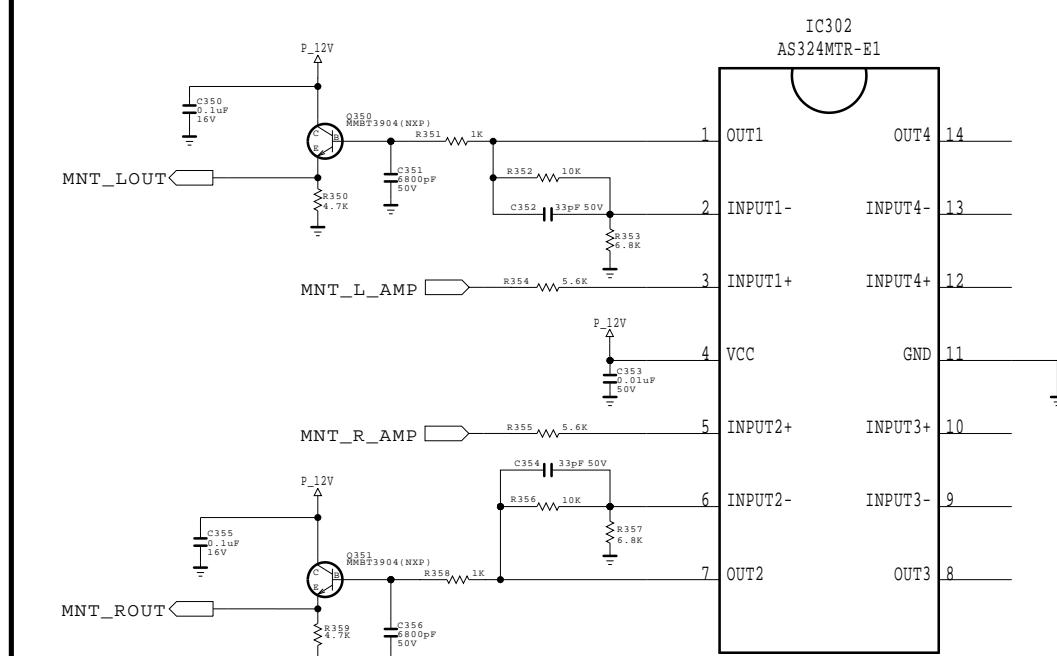
SECRET
LG Electronic

LG ELECTRONICS

MODEL	32CS410	DATE	2012/03/02
BLOCK	INPUT2	SHEET	2 / 8



AUDIO_OUT AMP : GAIN X 4



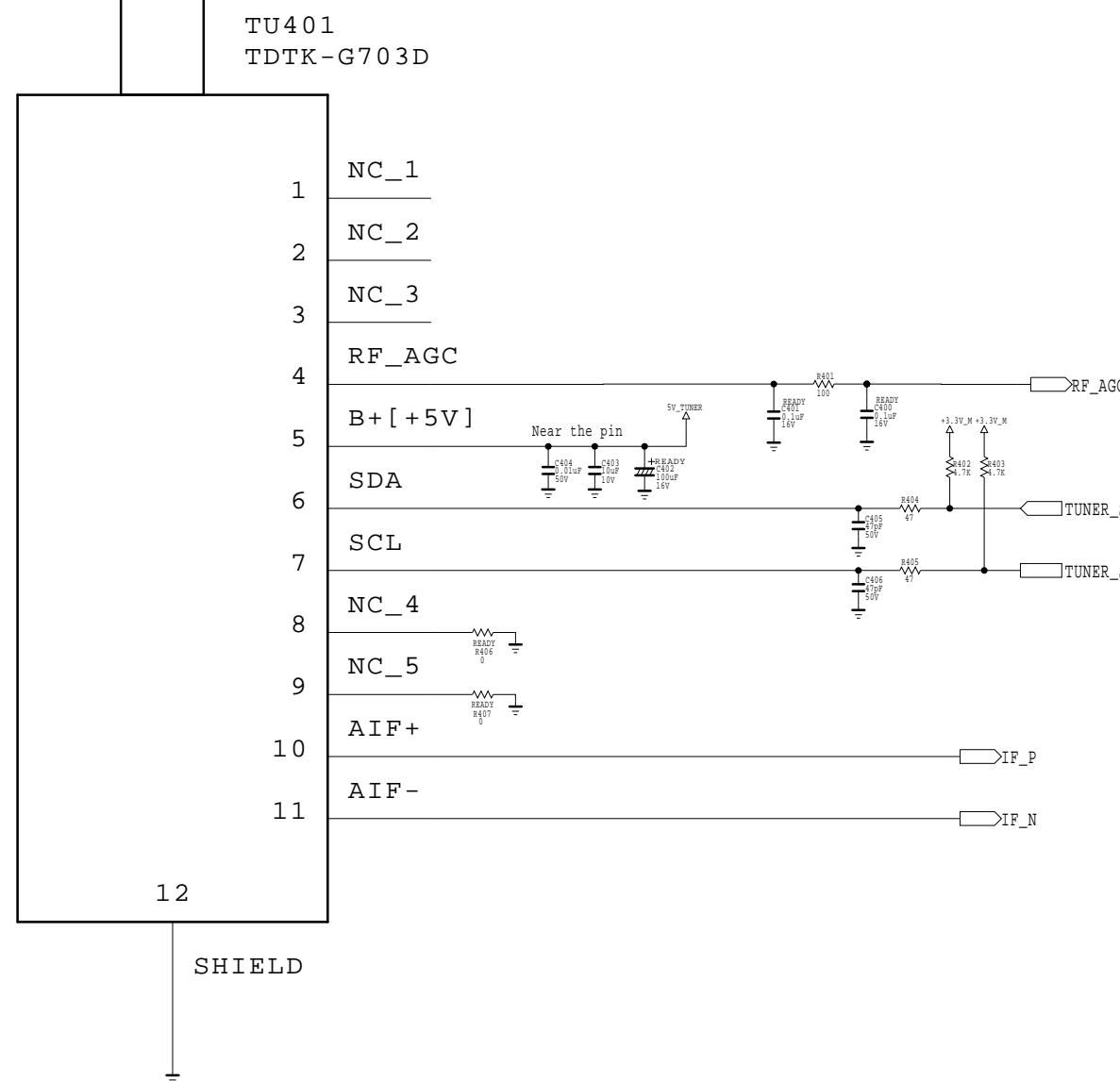
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

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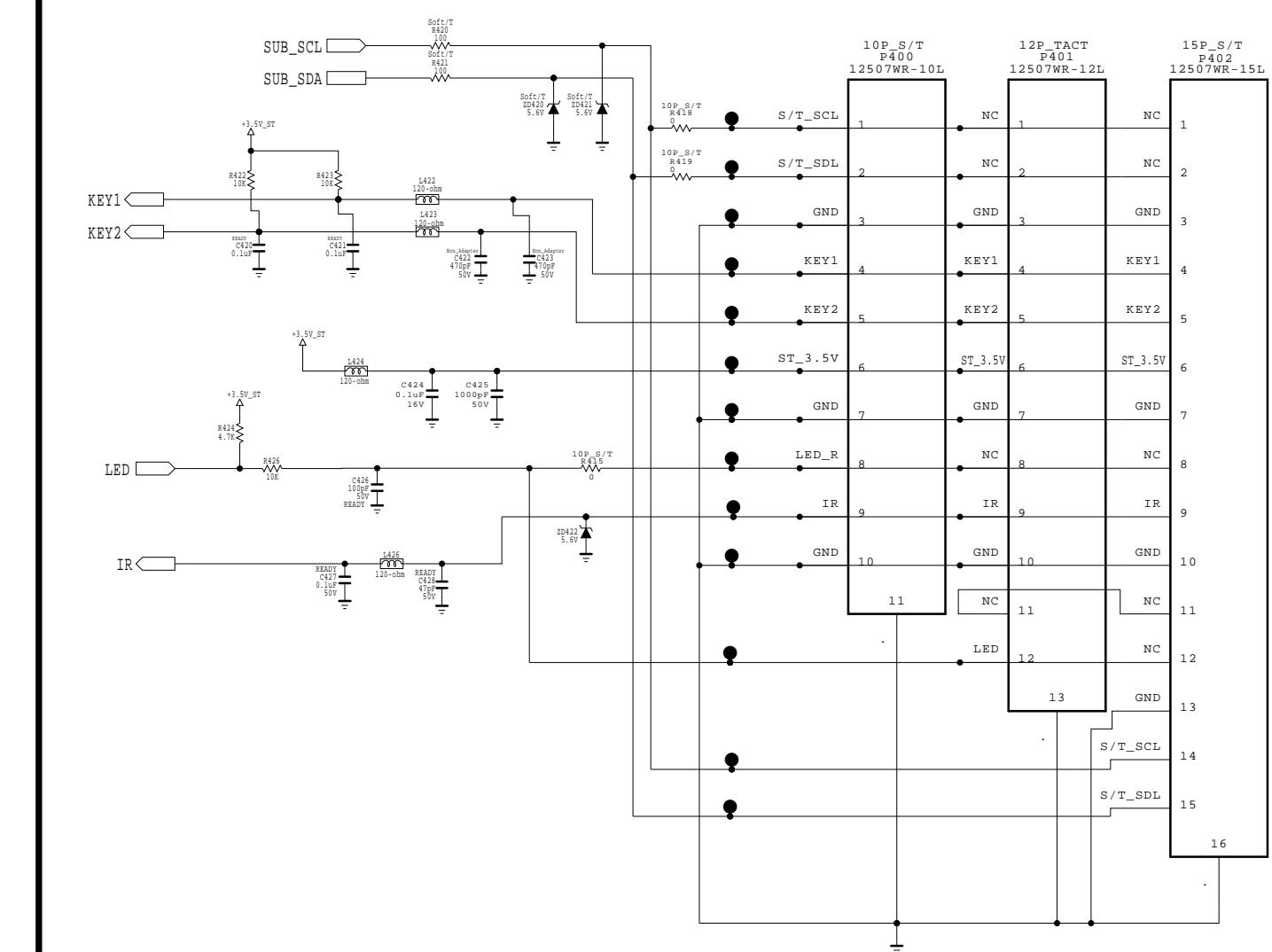
LG ELECTRONICS

MODEL	32CS410	DATE	2012/03/02
BLOCK	AUDIO	SHEET	3 / 8

IE



IR

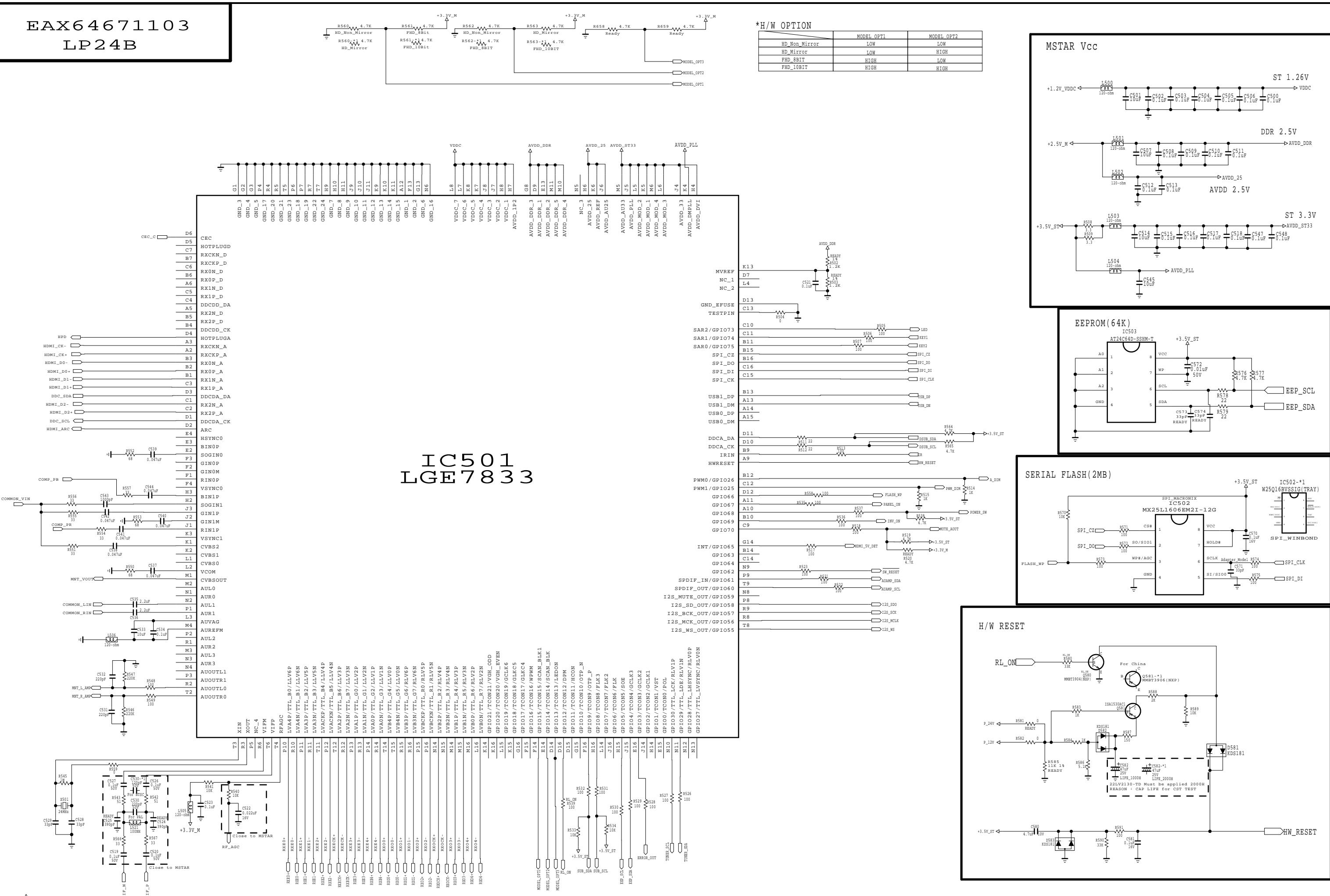


THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

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LG ELECTRONICS

MODEL	32CS410	DATE	2012/03/02
BLOCK	TUNER & IR	SHEET	4 / 8



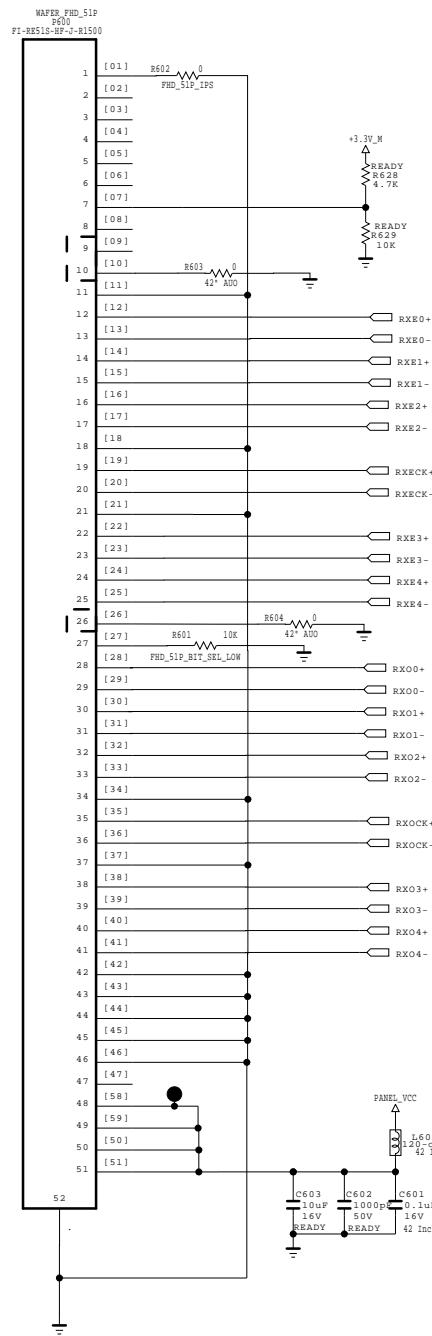
The SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

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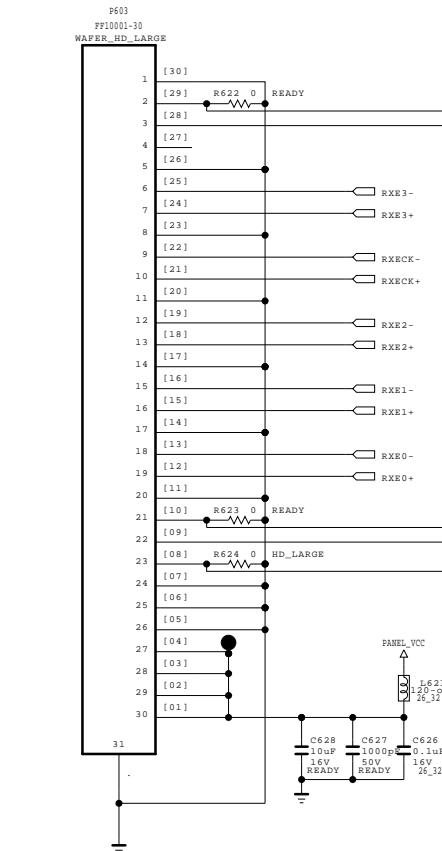
LG ELECTRONICS

MODEL	32CS410	DATE	2012/03/02
BLOCK	MAIN SOC	SHEET	5 / 8

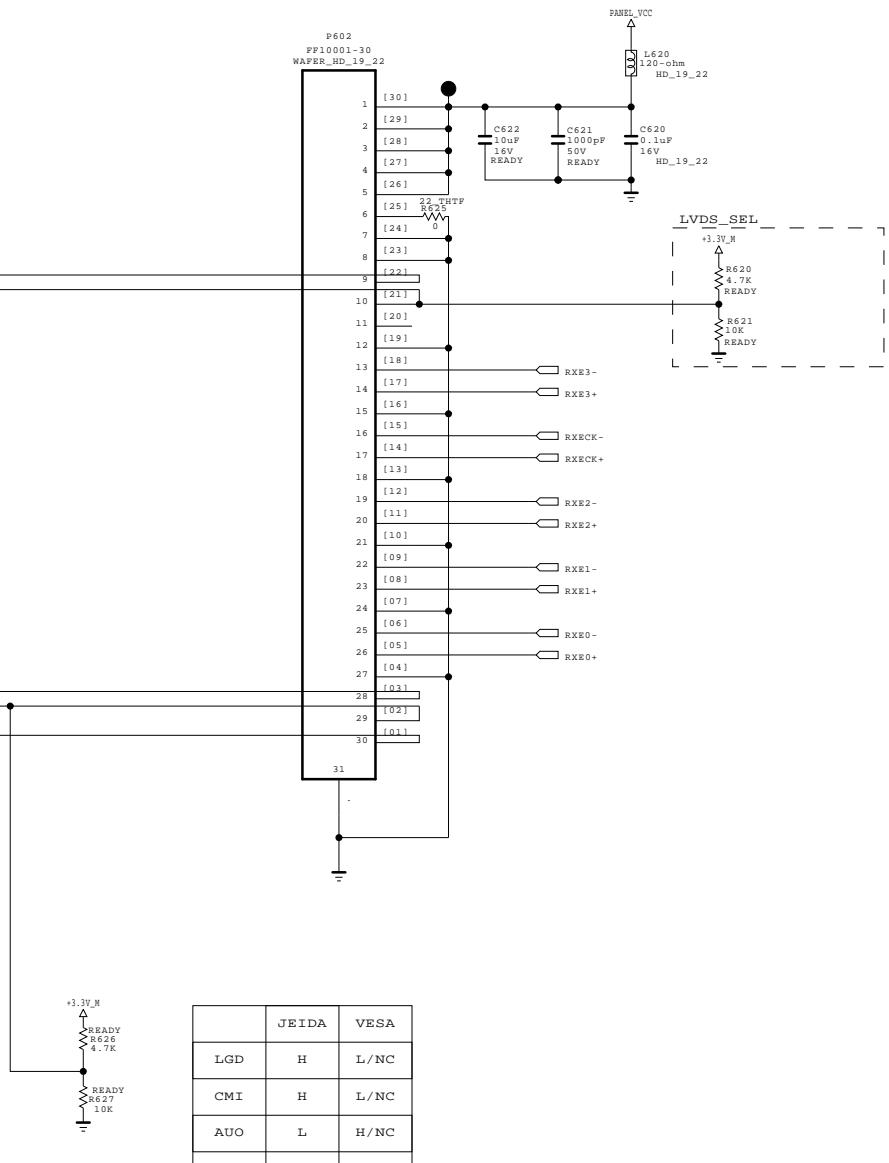
[51Pin LVDS Connector]
(For FHD 60Hz_Large)



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



[30Pin LVDS Connector]
(For HD 60Hz_19" / 22")



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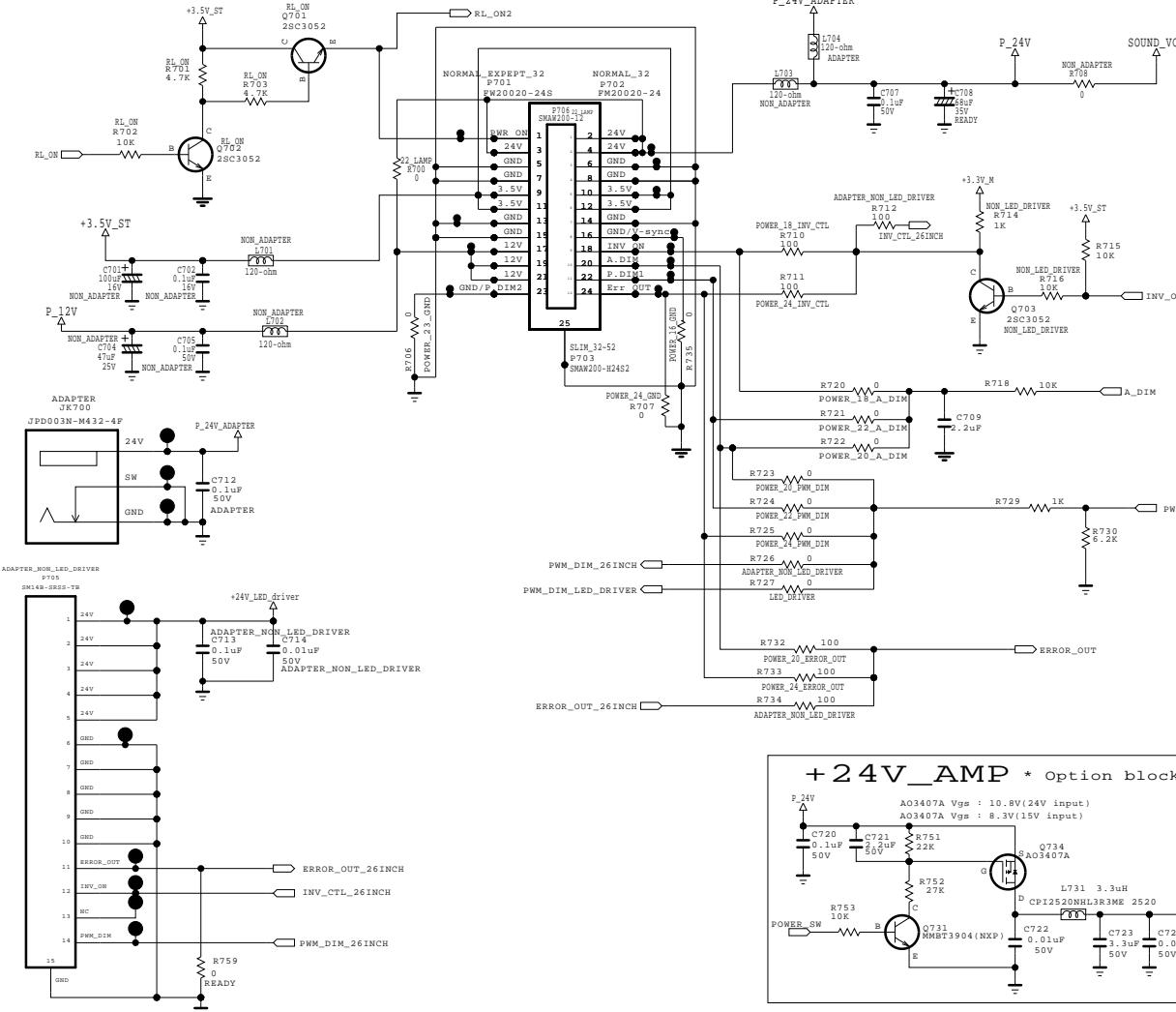
LG ELECTRONICS

MODEL	32CS410	DATE	2012/03/02
BLOCK	LVDS	SHEET	6 / 8

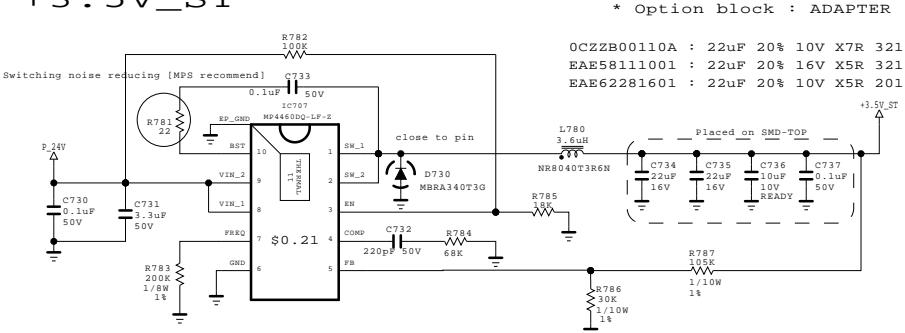
EAX64671103

LP24B

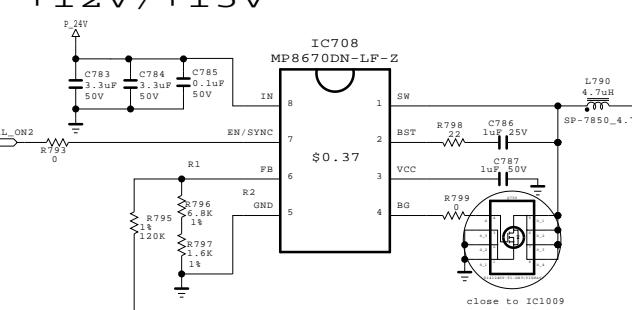
FROM LIPS & POWER B/D



+3.5V_ST



+12V/+15V



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Pinmap for EEFL

PIN	LIPS	CMI (PSU)	AUO (PSU)	IPS (PSU)	LGD (PSU)
16	GND	GND	GND	GND	GND
18 (12)	INV_ON	INV_ON	INV_ON	INV_ON	INV_ON
20 (13)	VBR_A	NC	NC	NC	VBR_A
22 (14)	PWM_DIM	PWM_DIM	PWM_DIM	PWM_DIM	PWM_DIM
24 (11)	ERR_OUT	ERR_OUT	ERR_OUT	ERR_OUT	ERR_OUT
23	GND	NC	NC	NC	NC

Pinmap for Edge LED

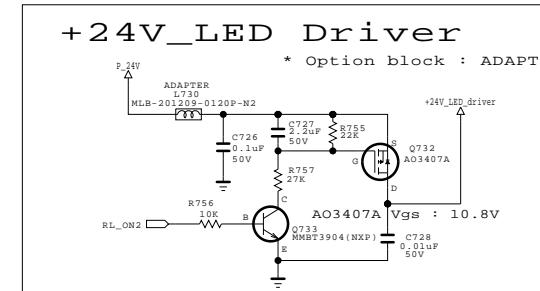
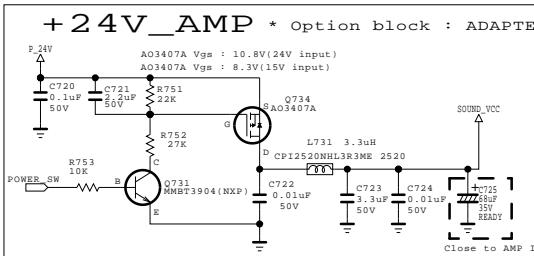
PIN	LPB	CMI (PSU)	AUO (PSU)	IPS (PSU)	LGD (PSU)
16	NC	GND	GND	GND	GND
18 (12)	INV_ON	INV_ON	INV_ON	INV_ON	INV_ON
20 (13)	NC	NC	NC	NC	NC
22 (14)	PWM_DIM	PWM_DIM	PWM_DIM	PWM_DIM	PWM_DIM
24 (11)	ERR_OUT	ERR_OUT	ERR_OUT	ERR_OUT	ERR_OUT
23	NC	NC	NC	NC	NC

Power for EEFL

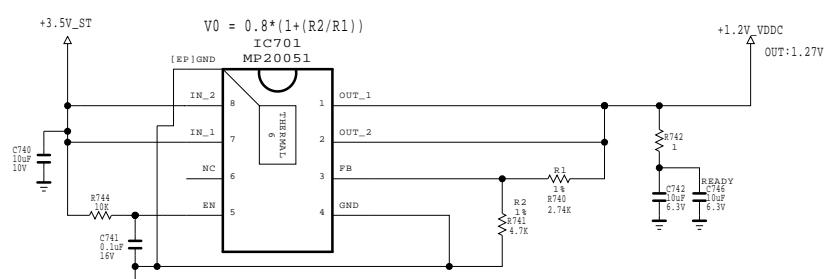
	LGD	OS
32"	'11 PSU	
37"	'10 LIPS	'11 PSU
42"	'10 LIPS	'11 PSU
47"	'10 LIPS	X

Power for LED

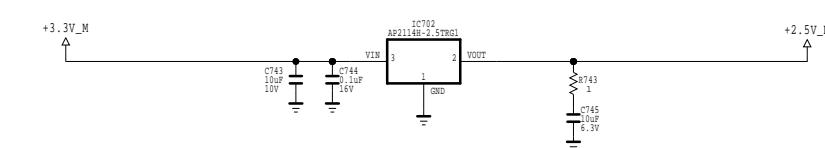
	LGD	OS
32"	'11 PSU	
37"	'11 LPB	'11 PSU
42"	'11 LPB	'11 PSU
47"	'11 LPB	'11 PSU



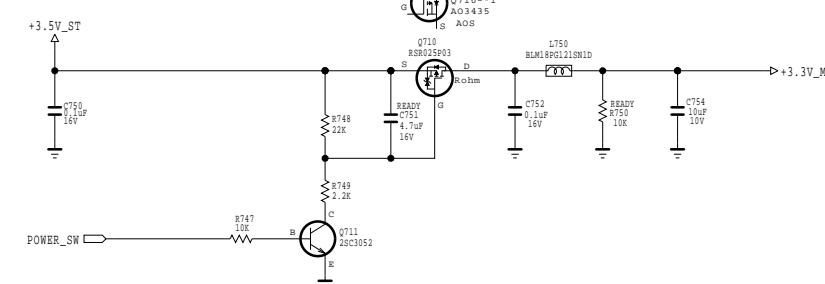
** 3.5V_ST → 1.26V VDDC



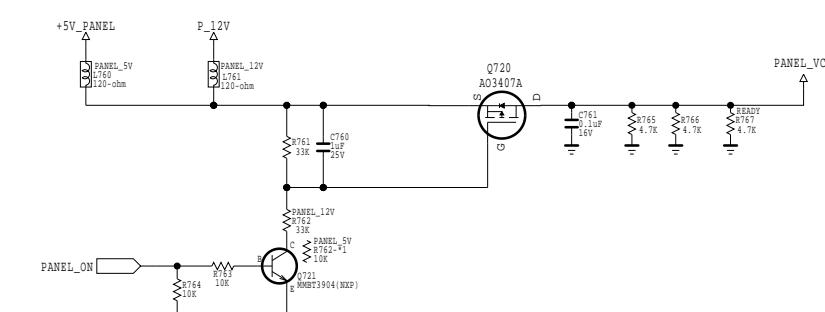
** 3.3V_M → 2.5V_M



** +3.5V_ST → 3.3V_M



** Switch Panel-Vcc



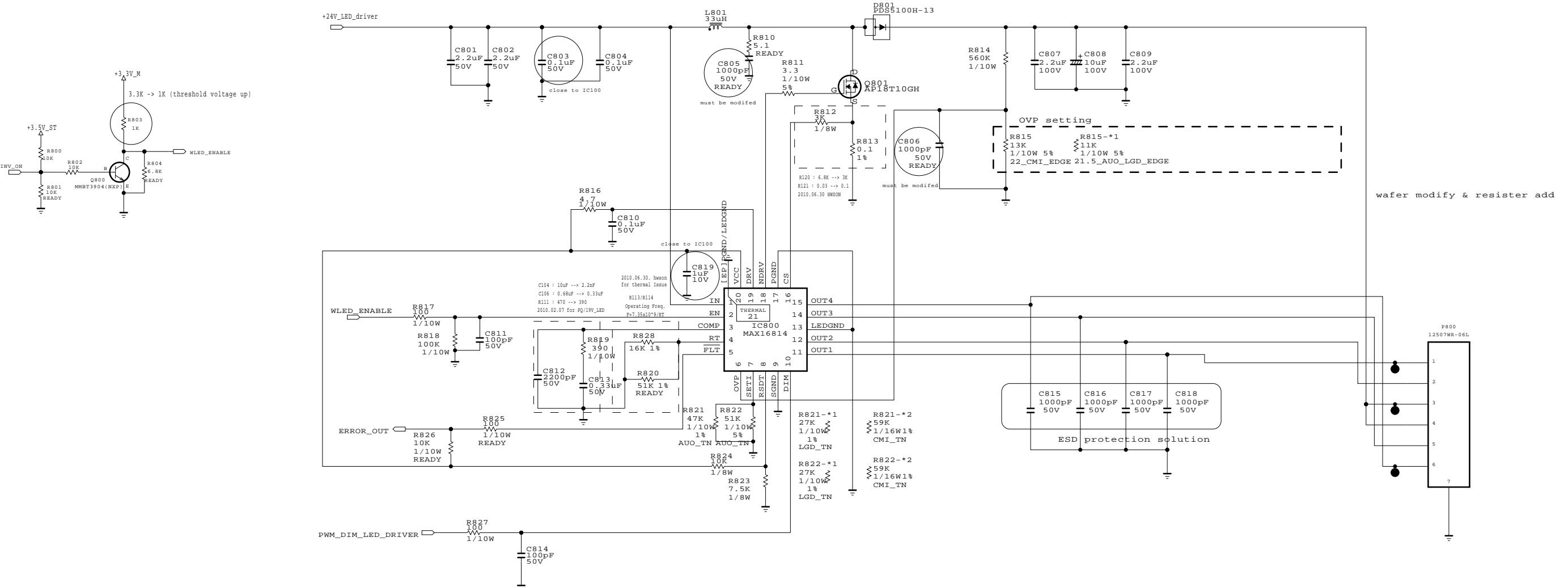
PANEL_VCC

PANEL_12V

PANEL_5V

PANEL_12

TN_module_LED_DRIVER_CIRCUIT



IILED=1500/RSETI

Module	IILED spec	R10011	R10013	Remark
AUO_18.5_HD	60mA_Typ 63mA_Max	47Kohm	51Kohm	61.35mA
AUO_21.5_FHD				
LGD_21.5_FHD	110mA_Typ 120mA_Max	27Kohm	27Kohm	111.11mA
CMI_18.5_HD	50mA_Typ 56mA_Max	59Kohm	59Kohm	50.85mA
CMI_21.5_FHD				

OVP setting OVP=1.23x(1+R1/R2)

Module	Vs spec	R10018	R10019	Remark
AUO_18.5	34V_Typ 36V_Max	560Kohm	16Kohm	44.28V
AUO_21.5	52.8V_Typ 57.6V_Max	560Kohm	11Kohm	63.85V
LGD_21.5	51.2V_Typ 56V_Max	560Kohm	11Kohm	63.85V
CMI_18.5	33V_Typ 34V_Max	560Kohm	18Kohm	39.5V
CMI_21.5	44.8V_Typ 47.6V_Max	560Kohm	13Kohm	54.26V

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MODEL	32CS410	DATE	2012/03/02
BLOCK	LED DRIVER	SHEET	8 / 8

