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# LCD TV

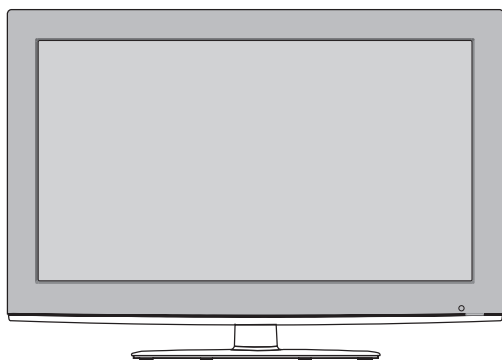
# SERVICE MANUAL

CHASSIS : LB01U

MODEL : 37LV3500    37LV3500-TA

## CAUTION

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



P/NO : MFL67002704 (1101-REV00)

Printed in Korea

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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 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 M $\Omega$  and 5.2 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.

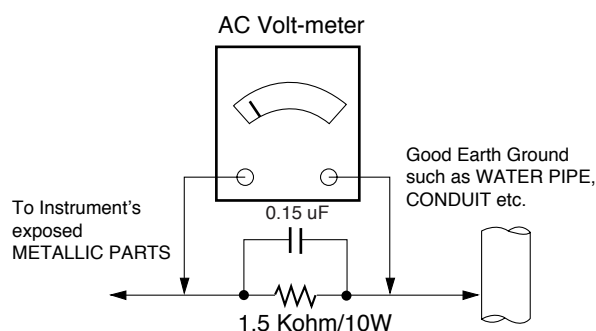
Connect 1.5 K / 10 watt resistor in parallel with a 0.15  $\mu$ F capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

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 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 1.25 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 LCD TV used LB01U chassis.

## 2. Requirement for Test

Each part is tested as below without special appointment.

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

## 3. Test method

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

## 4. Model General Specification

| No. | Item                | Specification                                                                                 | Remarks                                                                                                                                                                                                   |
|-----|---------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.  | Market              | Australia, New Zealand, Singapore, Malaysia, Vietnam, Indonesia, South Africa, Israel, A-ASIA | only Analog for A-ASIA                                                                                                                                                                                    |
| 2.  | Broadcasting system | 1) PAL/SECAM-B/G/D/K<br>2) PAL-I/II<br>3) NTSC-M<br>4) DVB-T                                  | PAL for NZ/SG                                                                                                                                                                                             |
| 3.  | Receiving system    | Analog : Upper Heterodyne<br>Digital : COFDM(DVB-T)                                           | ► DVB-T<br>- Guard Interval(Bitrate_Mbit/s)<br>1/4, 1/8, 1/16, 1/32<br>- Modulation : Code Rate<br>QPSK : 1/2, 2/3, 3/4, 5/6, 7/8<br>16-QAM : 1/2, 2/3, 3/4, 5/6, 7/8<br>64-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 |
| 4.  | Video Input RCA     | PAL, SECAM, NTSC                                                                              | 4 System : PAL, SECAM, NTSC, PAL60                                                                                                                                                                        |
| 5.  | Component Input     | Y/Cb/Cr, Y/Pb/Pr                                                                              |                                                                                                                                                                                                           |
| 6.  | RGB Input (1EA)     | RGB-PC                                                                                        | Analog(D-SUB 15PIN)                                                                                                                                                                                       |
| 7.  | HDMI Input          | HDMI1-DTV/DVI<br>HDMI2-DTV/DVI<br>HDMI3-DTV/DVI                                               | PC<br>-. HD Model : HDMI version 1.3<br>-. FHD Model : HDMI version 1.4<br>Support HDCP                                                                                                                   |
| 8.  | Audio Input         | RGB/DVI Audio<br>Component<br>AV                                                              |                                                                                                                                                                                                           |
| 9.  | SDPIF out           | SPDIF out                                                                                     |                                                                                                                                                                                                           |
| 10. | USB                 | For My Media(Movie/Photo/Music List) or For SVC                                               |                                                                                                                                                                                                           |

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

| 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      | 480p              |        |
| 4.  | 720x480       | 31.50       | 60.00      | 480p              |        |
| 5.  | 720x576       | 15.625      | 50.00      | SDTV,DVD 625 Line |        |
| 6.  | 720x576       | 31.25       | 50.00      | HDTV 576p         |        |
| 7.  | 1280x720      | 45.00       | 50.00      | HDTV 720p         |        |
| 8.  | 1280x720      | 44.96       | 59.94      | HDTV 720p         |        |
| 9.  | 1280x720      | 45.00       | 60.00      | HDTV 720p         |        |
| 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     | 56.250      | 50         | HDTV 1080p        |        |
| 14. | 1920x1080     | 67.5        | 60         | HDTV 1080p        |        |

## 6. RGB Input (PC)

| No. | Specification |             |            |                  | Proposed  | Remark                                                         |
|-----|---------------|-------------|------------|------------------|-----------|----------------------------------------------------------------|
|     | Resolution    | H-freq(kHz) | V-freq(Hz) | Pixel Clock(MHz) |           |                                                                |
| 1.  | 720*400       | 31.468      | 70.08      | 28.321           |           | For only DOS mode                                              |
| 2.  | 640*480       | 31.469      | 59.94      | 25.17            | VESA      | Input 848*480 60 Hz, 852*480 60 Hz<br>-> 640*480 60 Hz Display |
| 3.  | 800*600       | 37.879      | 60.31      | 40.00            | VESA      |                                                                |
| 4.  | 1024*768      | 48.363      | 60.00      | 65.00            | VESA(XGA) |                                                                |
| 5.  | 1280*768      | 47.78       | 59.87      | 79.5             | WXGA      |                                                                |
| 6.  | 1360*768      | 47.72       | 59.8       | 84.75            | WXGA      |                                                                |
| 7.  | 1280*1024     | 63.981      | 60.02      | 108.875          | SXGA      | FHD Model                                                      |
| 8.  | 1920*1080     | 66.587      | 59.93      | 138.625          | WUXGA     | FHD model                                                      |

## 7. HDMI Input

### (1) DTV Mode

| No. | Resolution | H-freq(kHz)   | V-freq.(Hz)   | Pixel clock(MHz) | Proposed   | Remark |
|-----|------------|---------------|---------------|------------------|------------|--------|
| 1.  | 720*480    | 31.469 /31.5  | 59.94 /60     | 27.00/27.03      | SDTV 480P  |        |
| 2.  | 720*576    | 31.25         | 50            | 54               | SDTV 576P  |        |
| 3.  | 1280*720   | 37.500        | 50            | 74.25            | HDTV 720P  |        |
| 4.  | 1280*720   | 44.96 /45     | 59.94 /60     | 74.17/74.25      | HDTV 720P  |        |
| 5.  | 1920*1080  | 33.72 /33.75  | 59.94 /60     | 74.17/74.25      | HDTV 1080I |        |
| 6.  | 1920*1080  | 28.125        | 50.00         | 74.25            | HDTV 1080I |        |
| 7.  | 1920*1080  | 26.97 /27     | 23.97 /24     | 74.17/74.25      | HDTV 1080P |        |
| 8.  | 1920*1080  | 33.716 /33.75 | 29.976 /30.00 | 74.25            | HDTV 1080P |        |
| 9.  | 1920*1080  | 56.250        | 50            | 148.5            | HDTV 1080P |        |
| 10. | 1920*1080  | 67.43 /67.5   | 59.94 /60     | 148.35/148.50    | HDTV 1080P |        |

### (2) PC Mode

| No. | Resolution | H-freq(kHz) | V-freq.(Hz) | Pixel clock(MHz) | Proposed  | Remark         |
|-----|------------|-------------|-------------|------------------|-----------|----------------|
| 1.  | 720*400    | 31.468      | 70.08       | 28.321           |           | HDCP           |
| 2.  | 640*480    | 31.469      | 59.94       | 25.17            | VESA      | HDCP           |
| 3.  | 800*600    | 37.879      | 60.31       | 40.00            | VESA      | HDCP           |
| 4.  | 1024*768   | 48.363      | 60.00       | 65.00            | VESA(XGA) | HDCP           |
| 5.  | 1360*768   | 47.72       | 59.8        | 84.75            | WXGA      | HDCP           |
| 6.  | 1280*1024  | 63.981      | 60.02       | 108.875          | SXGA      | HDCP/FHD model |
| 7.  | 1920*1080  | 67.5        | 60.00       | 138.625          | WUXGA     | HDCP/FHD model |

# ADJUSTMENT INSTRUCTION

## 1. Application Range

This specification sheet is applied to all of the LCD TV with LB01U chassis.

## 2. Designation

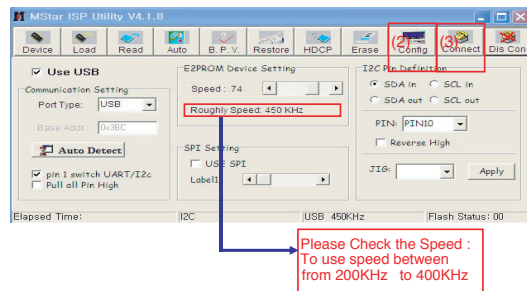
- 1) The adjustment is according to the order which is designated and which must be followed, according to the plan which can be changed only on agreeing.
- 2) Power Adjustment: Free Voltage
- 3) Magnetic Field Condition: Nil.
- 4) Input signal Unit: Product Specification Standard
- 5) Reserve after operation: Above 5 Minutes (Heat Run)  
Temperature : at 25 °C ± 5 °C  
Relative humidity : 65 % ± 10 %  
Input voltage : 220 V, 60 Hz
- 6) Adjustment equipments: Color Analyzer(CA-210 or CA-110), DDC Adjustment Jig equipment, Service remote control.
- 7) Push the "IN STOP" key - For memory initialization.

### Case1 : Software version up

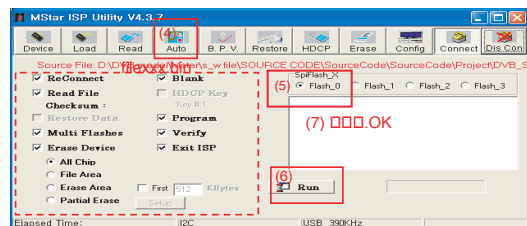
1. After downloading S/W by USB, TV set will reboot automatically
2. Push "In-stop" key
3. Push "Power on" key
4. Function inspection
5. After function inspection, Push "In-stop" key.

### Case2 : Function check at the assembly line

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

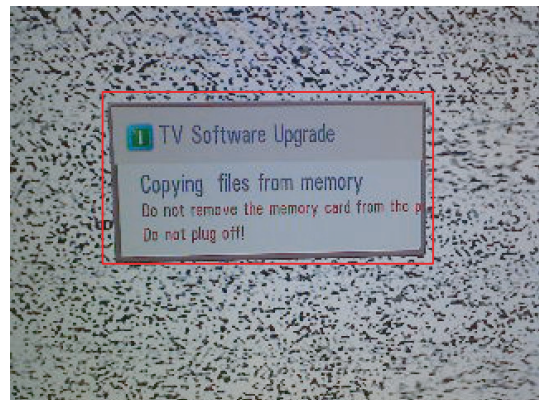


- 5) Click "Auto" tab and set as below
- 6) Click "Run".
- 7) After downloading, check "OK" message.



### \* USB DOWNLOAD

- 1) Put the USB Stick to the USB socket
- 2) Automatically detecting update file in USB Stick  
- If your downloaded program version in USB Stick is Low, it didn't work. But your downloaded version is High, USB data is automatically detecting
- 3) Show the message "Copying files from memory"

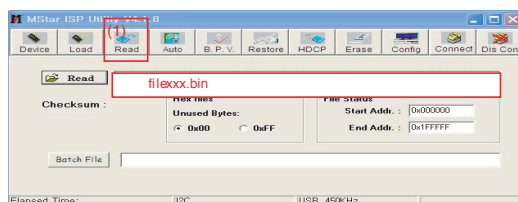


## 3. Main PCB check process

\* APC - After Manual-Insert, executing APC

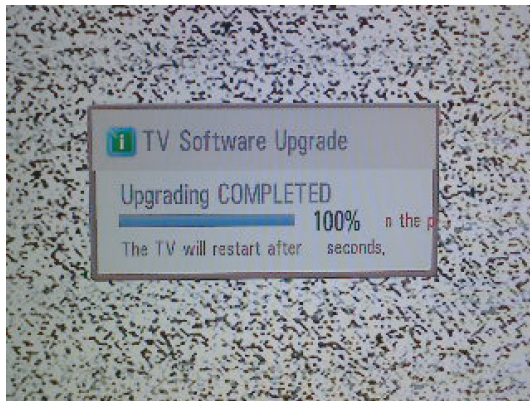
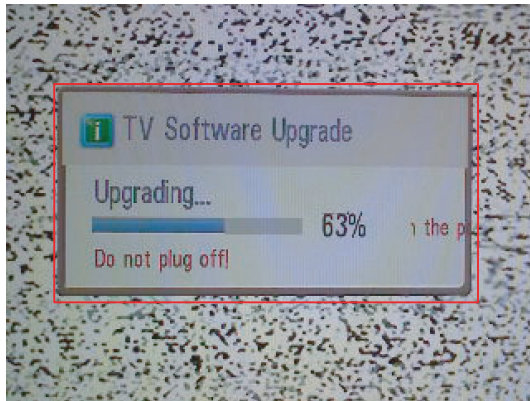
### \* Boot file Download

- 1) Execute ISP program "Mstar ISP Utility" and then click "Config" tab.



- 2) Set as below, and then click "Auto Detect" and check "OK" message  
If "Error" is displayed, Check connection between computer, jig, and set.
- 3) Click "Read" tab, and then load download file (XXXX.bin) by clicking "Read"
- 4) Click "Connect" tab. If "Can't" is displayed, check connection between computer, jig, and set.

4) Updating is starting.



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

**\* After downloading, have to adjust Tool Option again.**

- 1) Push "IN-START" key in service remote control.
- 2) Select "Tool Option 1" and Push "OK" button.
- 3) Punch in the number. (Each model has their number)

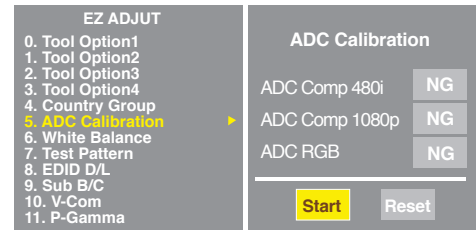
| Module | Tool option1 | Tool option2 | Tool option3(AU,TS) | Tool option4 | Tool option5 |
|--------|--------------|--------------|---------------------|--------------|--------------|
| AUO    | 22376        | 19478        | 55337(55337)        | 26904        | 352          |
| LGD    | 22368        | 19478        | 55337               | 26904        | 288          |

4) Completed selecting Tool option.

### 3.1. ADC Process

(1) ADC

- Enter Service Mode by pushing "ADJ" key,
- Enter Internal ADC mode by pushing "▶" key at "5. ADC Calibration"



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

\* ADC Calibration Protocol (RS232)

| No                | Item             | CMD1 | CMD2 | Data0 |                                                          |
|-------------------|------------------|------|------|-------|----------------------------------------------------------|
| Enter Adjust Mode | Adjust 'Mode In' | A    | A    | 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 Sequence

- aa 00 00 [Enter Adjust Mode]
  - xb 00 40 [Component1 Input (480i)]
  - ad 00 10 [Adjust 480i Comp1]
  - xb 00 60 [RGB Input (1024\*768)]
  - ad 00 10 [Adjust 1024\*768 RGB]
  - aa 00 90 End Adjust mode
- \* Required equipment : Adjustment R/C.

### 3.2. Function Check

\* Check display and sound

- Check Input and Signal items. (cf. work instructions)

- 1) TV
- 2) AV (SCART1/SCART2/ CVBS)
- 3) COMPONENT (480i)
- 4) RGB (PC : 1024 x 768 @ 60hz)
- 5) HDMI
- 6) PC Audio In

\* Display and Sound check is executed by Remote control.



## 4. Total Assembly line process

### 4.1. Adjustment Preparation

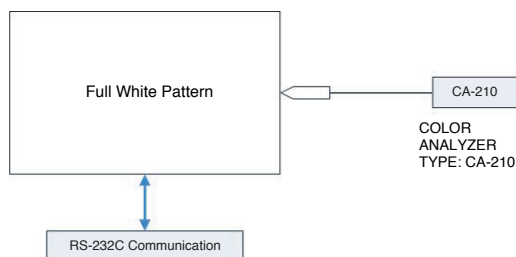
- W/B Equipment condition  
CA210
- : CCFL/EEFL -> CH9, Test signal: Inner pattern(80IRE)  
LED -> CH14, Test signal: Inner pattern(80IRE)
- Above 5 minutes H/run in the inner pattern. ("power on" key of adjust remote control)

|        |        |   |                                    |                                                   |
|--------|--------|---|------------------------------------|---------------------------------------------------|
| Cool   | 13,000 | K | X=0.269(±0.002)<br>Y=0.273(±0.002) | <Test Signal><br>Inner pattern<br>(204gray,80IRE) |
| Medium | 9,300  | K | X=0.285(±0.002)<br>Y=0.293(±0.002) |                                                   |
| Warm   | 6,500  | K | X=0.313(±0.002)<br>Y=0.329(±0.002) |                                                   |
|        |        |   |                                    |                                                   |

- Edge LED W/B Table is process of aging time (Only LGD Edge LED Module except AUO, CMI, IPS Module)

| GP2R | Aging Time<br>(Min.) | Cool |     | Medium |     | Warm |     |
|------|----------------------|------|-----|--------|-----|------|-----|
|      |                      | X    | Y   | X      | Y   | X    | Y   |
|      |                      | 269  | 273 | 285    | 293 | 313  | 329 |
| 1    | 0-2                  | 279  | 288 | 295    | 308 | 319  | 338 |
| 2    | 3-5                  | 278  | 286 | 294    | 306 | 318  | 336 |
| 3    | 6-9                  | 277  | 285 | 293    | 305 | 317  | 335 |
| 4    | 10-19                | 276  | 283 | 292    | 303 | 316  | 333 |
| 5    | 20-35                | 274  | 280 | 290    | 300 | 314  | 330 |
| 6    | 36-49                | 272  | 277 | 288    | 297 | 312  | 327 |
| 7    | 50-79                | 271  | 275 | 287    | 295 | 311  | 325 |
| 8    | 80-149               | 270  | 274 | 286    | 294 | 310  | 324 |
| 9    | Over 150             | 269  | 273 | 285    | 293 | 309  | 323 |

- Connecting picture of the measuring instrument  
(On Automatic control)  
Inside PATTERN is used when W/B is controlled. Connect to auto controller or push Adjustment R/C POWER ON -> Enter the mode of White-Balance, the pattern will come out.



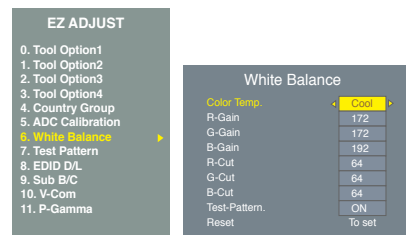
- Auto-control interface and directions
  - Adjust in the place where the influx of light like floodlight around is blocked. (illumination is less than 10 lux).
  - Adhere closely the Color Analyzer (CA210) to the module less than 10 cm distance, keep it with the surface of the Module and Color Analyzer's probe vertically.(80° ~ 100°).
  - Aging time
    - After aging start, keep the power on (no suspension of power supply) and heat-run over 5 minutes.
    - Using 'no signal' or 'full white pattern' or the others, check the back light on.

- Auto adjustment Map(RS-232C)  
RS-232C COMMAND  
[CMD ID DATA]  
Wb 00 00 White Balance Start  
Wb 00 ff White Balance End

|        | RS-232C COMMAND<br>[CMD ID DATA] |     |      | MIN | CENTER<br>(DEFAULT) |     |      | MAX |
|--------|----------------------------------|-----|------|-----|---------------------|-----|------|-----|
|        | Cool                             | Mid | Warm |     | Cool                | Mid | Warm |     |
| R Gain | jg                               | Ja  | jd   | 00  | 172                 | 192 | 192  | 192 |
| G Gain | jh                               | Jb  | je   | 00  | 172                 | 192 | 192  | 192 |
| B Gain | ji                               | Jc  | jf   | 00  | 192                 | 192 | 172  | 192 |
| R Cut  |                                  |     |      |     | 64                  | 64  | 64   | 128 |
| G Cut  |                                  |     |      |     | 64                  | 64  | 64   | 128 |
| B Cut  |                                  |     |      |     | 64                  | 64  | 64   | 128 |

- <Caution>  
Color Temperature : COOL, Medium, Warm.  
One of R Gain/G Gain/ B Gain should be kept on 0xC0, and adjust other two lower than C0.  
(when R/G/B Gain are all C0, it is the FULL Dynamic Range of Module)

- Manual W/B process using adjusts Remote control.
  - After enter Service Mode by pushing "ADJ" key,
  - Enter White Balance by pushing "►" key at "6. White Balance".



- After you finished all adjustments, Press "In-start" key and compare Tool option and Area option value with its BOM, if it is correctly same then unplug the AC cable. If it is not same, then correct it same with BOM and unplug AC cable. For correct it to the model's module from factory Jig model.
- Push the "IN STOP" key after completing the function inspection. And Mechanical Power Switch must be set "ON".

## 4.2. DDC EDID Write (RGB 128Byte )

- Connect D-sub Signal Cable to D-sub Jack.
- Write EDID Data to EEPROM(24C02) by using DDC2B protocol.
- Check whether written EDID data is correct or not.
- \* For SVC main Assembly, EDID have to be downloaded to Insert Process in advance.

## 4.3. DDC EDID Write (HDMI 256Byte)

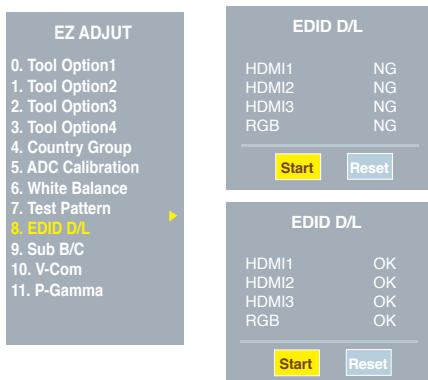
- Connect HDMI Signal Cable to HDMI Jack.
- Write EDID Data to EEPROM(24C02) by using DDC2B protocol.
- Check whether written EDID data is correct or not.
- \* For SVC main Assembly, EDID have to be downloaded to Insert Process in advance.

## 4.4. EDID DATA

- 1) All Data : HEXA Value
  - 2) Changeable Data :
- \*: Serial No : Controlled / Data:01  
 \*\*: Month : Controlled / Data:00  
 \*\*\*:Year : Controlled  
 \*\*\*\*:Check sum

## 4.5. Auto Download

- 1) After enter Service Mode by pushing "ADJ" key.
- 2) Enter EDID D/L menu.
- 3) Enter "START" by pushing "OK" key.



<Caution> Nerver connect HDMI && D-sub cable when EDID downloaded

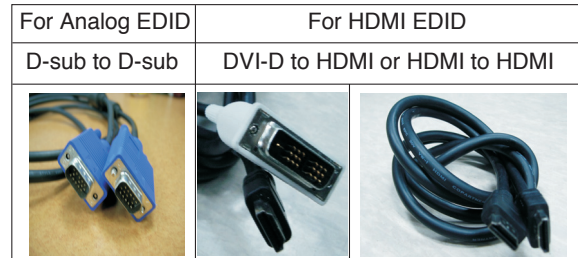
\* Edid data and Model option download (RS232)

| NO                                  | Item               | CMD1 | CMD2 | Data0 |                                                        |
|-------------------------------------|--------------------|------|------|-------|--------------------------------------------------------|
| Enter download Mode                 | Download 'Mode In' | A    | A    | 0 0   | When transfer the 'Mode In', Carry the command.        |
| EDID data and Model option download | Download           | A    | E    | 00 10 | Automatically Download (The use of a internal pattern) |

## - Manual Download

\* Caution

- 1) Use the proper signal cable for EDID Download
  - Analog EDID : Pin3 exists
  - Digital EDID : Pin3 exists
- 2) Never connect HDMI & D-sub Cable at the same time.
- 3) Use the proper cables below for EDID Writing
- 4) Download HDMI1, HDMI2, separately because HDMI1 is different from HDMI2



| Item            | Condition   | Data(Hex) |
|-----------------|-------------|-----------|
| Manufacturer ID | GSM         | 1E6D      |
| Version         | Digital : 1 | 01        |
| Revision        | Digital : 3 | 03        |

### 1) FHD RGB EDID data

|    | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | A  | B  | C  | D  | E  | F  |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 0  | 0  | ff | ff | ff | ff | ff | ff | 0  | 1e | 6d | a  |    |    |    | b  |    |
| 10 | c  | 1  | 3  | 68 | 10 | 9  | 78 | 0a | ee | 91 | a3 | 54 | 4c | 99 | 26 |    |
| 20 | 0f | 50 | 54 | a1 | 8  | 0  | 81 | 80 | 61 | 40 | 45 | 40 | 31 | 40 | 1  | 1  |
| 30 | 1  | 1  | 1  | 1  | 1  | 1  | 2  | 3a | 80 | 18 | 71 | 38 | 2d | 40 | 58 | 2c |
| 40 | 45 | 0  | a0 | 5a | 0  | 0  | 0  | 1e | 1  | 1d | 0  | 72 | 51 | d0 | 1e | 20 |
| 50 | 6e | 28 | 55 | 0  | a0 | 5a | 0  | 0  | 0  | 1e | 0  | 0  | 0  | fd | 0  | 3a |
| 60 | 3e | 1e | 53 | 10 | 0  | 0a | 20 | 20 | 20 | 20 | 20 | 20 |    | d  |    |    |
| 70 |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 0  | e  |

### 2) FHD HDMI EDID data

|    | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | A  | B  | C  | D  | E  | F  |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 0  | 0  | ff | ff | ff | ff | ff | ff | 0  | 1e | 6d | a  |    |    |    | b  |    |
| 10 | c  | 1  | 3  | 80 | 10 | 9  | 78 | 0a | ee | 91 | a3 | 54 | 4c | 99 | 26 |    |
| 20 | 0f | 50 | 54 | a1 | 8  | 0  | 71 | 4f | 81 | 80 | 1  | 1  | 1  | 1  | 1  | 1  |
| 30 | 1  | 1  | 1  | 1  | 1  | 1  | 2  | 3a | 80 | 18 | 71 | 38 | 2d | 40 | 58 | 2c |
| 40 | 45 | 0  | a0 | 5a | 0  | 0  | 0  | 1e | 1b | 21 | 50 | a0 | 51 | 0  | 1e | 30 |
| 50 | 48 | 88 | 35 | 0  | a0 | 5a | 0  | 0  | 0  | 1c | 0  | 0  | 0  | fd | 0  | 3a |
| 60 | 3e | 1e | 53 | 10 | 0  | 0a | 20 | 20 | 20 | 20 | 20 | 20 |    | d  |    |    |
| 70 |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 1  | e  |
| 80 | 2  | 3  | 26 | f1 | 4e | 10 | 1f | 84 | 13 | 5  | 14 | 3  | 2  | 12 | 20 | 21 |
| 90 | 22 | 15 | 1  | 26 | 15 | 7  | 50 | 9  | 57 | 7  |    |    |    |    | f  |    |
| A0 | f  | e3 | 5  | 3  | 1  | 1  | 1d | 80 | 18 | 71 | 1c | 16 | 20 | 58 | 2c |    |
| B0 | 25 | 0  | a0 | 5a | 0  | 0  | 0  | 9e | 1  | 1d | 0  | 72 | 51 | d0 | 1e | 20 |
| C0 | 6e | 28 | 55 | 0  | a0 | 5a | 0  | 0  | 0  | 1e | 2  | 3a | 80 | 18 | 71 | 38 |
| D0 | 2d | 40 | 58 | 2c | 45 | 0  | a0 | 5a | 0  | 0  | 0  | 1e | 1  | 1d | 0  | bc |
| E0 | 52 | d0 | 1e | 20 | b8 | 28 | 55 | 40 | a0 | 5a | 0  | 0  | 0  | 1e | 0  | 0  |
| F0 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | e  |



\* Detail EDID Options are below

① Product ID

| Model Name   | HEX  | EDID Table | DDC Function   |
|--------------|------|------------|----------------|
| HD/FHD Model | 0001 | 01 00      | Analog/Digital |

- ② Serial No: Controlled on production line.  
 ③ Month, Year: Controlled on production line:  
 ex) Week : '01' -> '01'  
 Year : '2011' -> '15' fix  
 ④ Model Name(Hex):

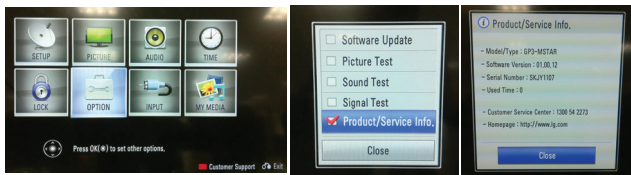
| MODEL | MODEL NAME(HEX)                                    |
|-------|----------------------------------------------------|
| all   | 00 00 00 FC 00 4C 47 20 54 56 0A 20 20 20 20 20 20 |

- ⑤ Checksum: Changeable by total EDID data.  
 ⑥ Vendor Specific(HDMI)

| INPUT | MODEL NAME(HEX)  |
|-------|------------------|
| HDMI1 | 67030C001000B82D |
| HDMI2 | 67030C002000B82D |
| HDMI3 | 67030C003000B82D |

## 5. Model name & Serial number D/L

- Press "Power on" key of service remocon.  
(Baud rate : 115200 bps)
- Connect RS232 Signal Cable to RS-232 Jack.
- Write Serial number by use RS-232.
- Must check the serial number at the Product/Service info.(menu key -> red key -> select product/Service info)



### 5.1. Signal TABLE

| CMD | LENGTH | ADH | ADL | DATA_1 | ... | Data_n | CS | DELAY |
|-----|--------|-----|-----|--------|-----|--------|----|-------|
|-----|--------|-----|-----|--------|-----|--------|----|-------|

CMD : A0h  
 LENGTH : 85~94h (1~16 bytes)  
 ADH : EEPROM Sub Address high (00~1F)  
 ADL : EEPROM Sub Address low (00~FF)  
 Data : Write data  
 CS : CMD + LENGTH + ADH + ADL + Data\_1 +...+ Data\_n  
 Delay : 20ms

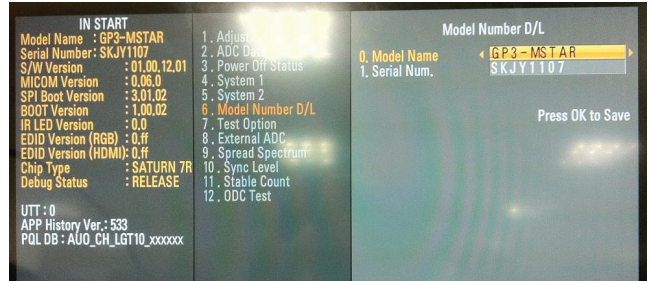
### 5.2. Command Set

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

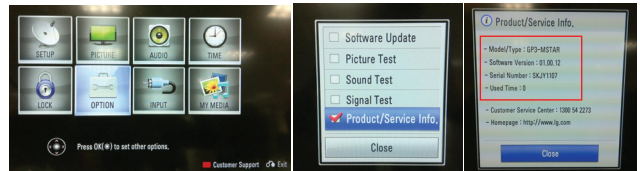
\* Description  
 FOS Default write : <7mode data> write  
 Vtotal, V\_Frequency, Sync\_Polarity, Htotal, Hstart, Vstart, 0, Phase  
 Data write : Model Name and Serial Number write in EEPROM,.

### 5.3. Method & notice

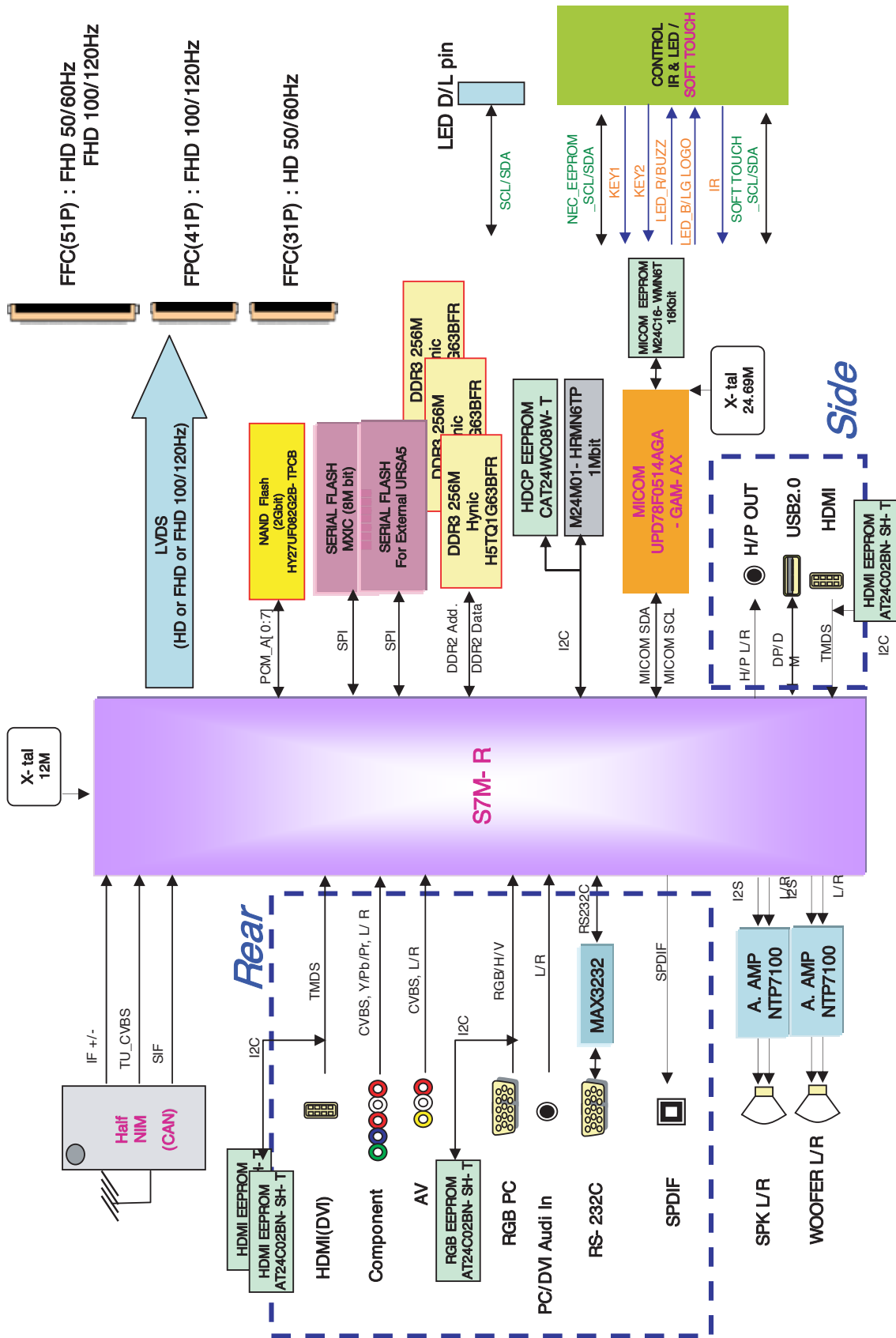
- Serial number D/L is using of scan equipment.
- Setting of scan equipment operated by Manufacturing Technology Group.
- Serial number D/L must be conformed when it is produced in production line, because serial number D/L is mandatory by D-book 4.0.



- \* Manual Download (Model Name and Serial Number)  
 If the TV set is downloaded by OTA or Service man, Sometimes model name or serial number is initialized.(Not always)  
 There is impossible to download by bar code scan, so It need Manual download.  
 1) Press the 'instart' key of ADJ remote control.  
 2) Go to the menu '6.Model Number D/L' like below photo.  
 3) Input the Factory model name(ex 32LV2510-TB) or Serial number like photo.  
 4) Check the model name Instart menu -> Factory name displayed (ex 32LV2510-TB)  
 5) Check the Product/Service info.(Menu key -> Red key -> Select product/Service info)  
 -> Buyer model displayed (ex 32LV2510-TB)



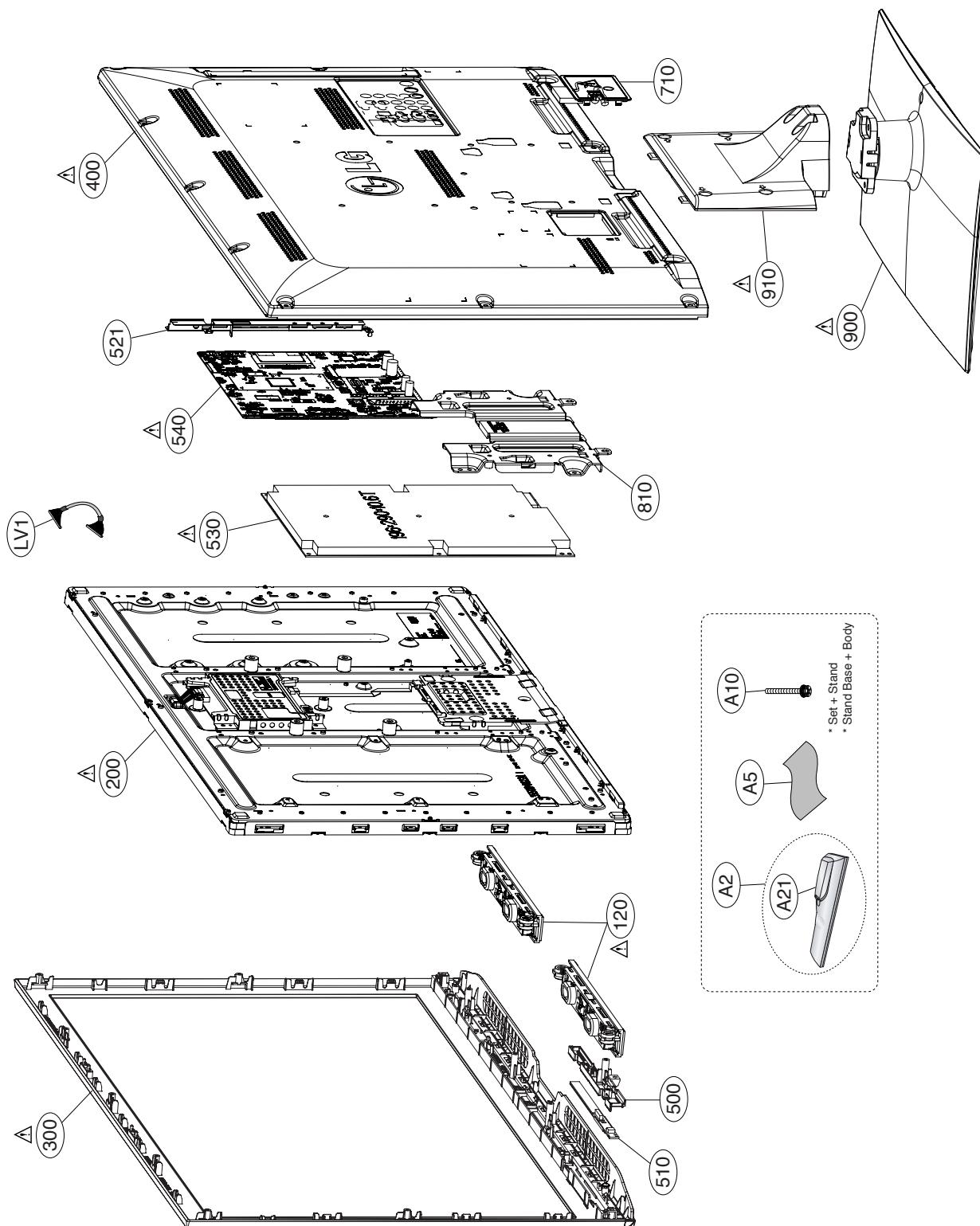
## BLOCK DIAGRAM

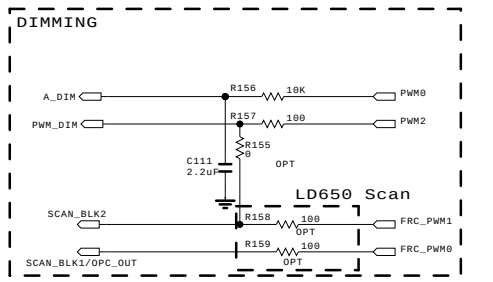
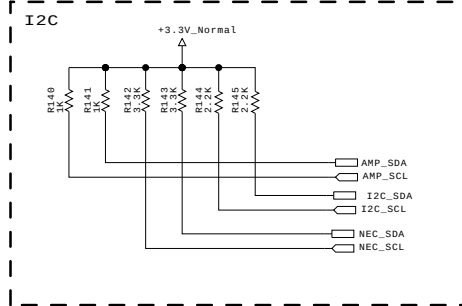
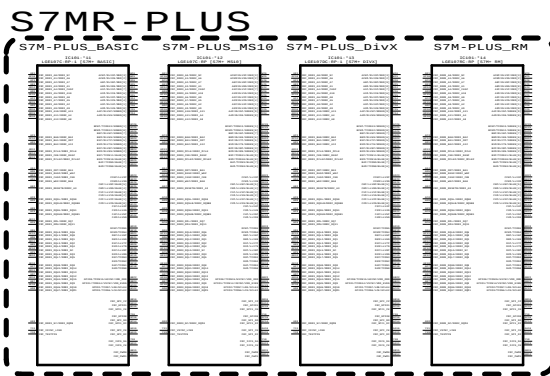
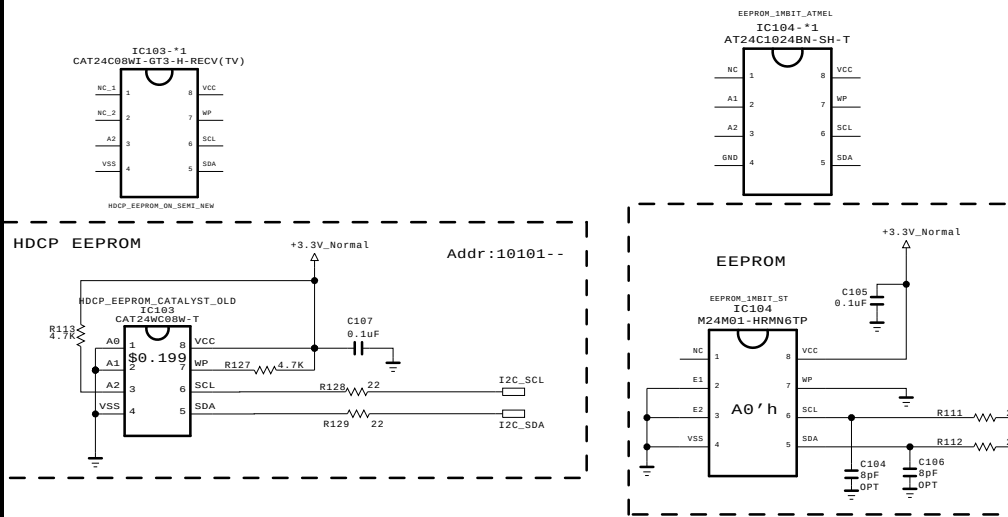
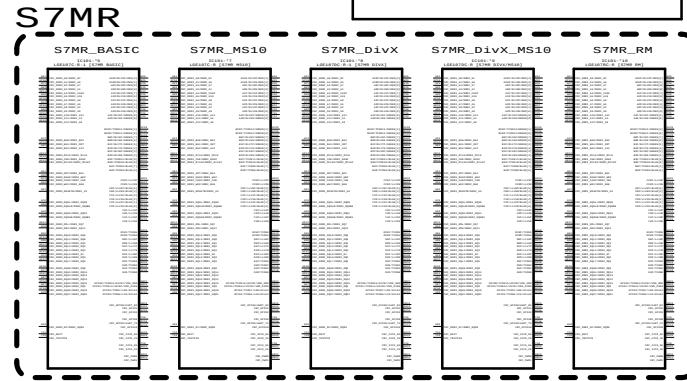
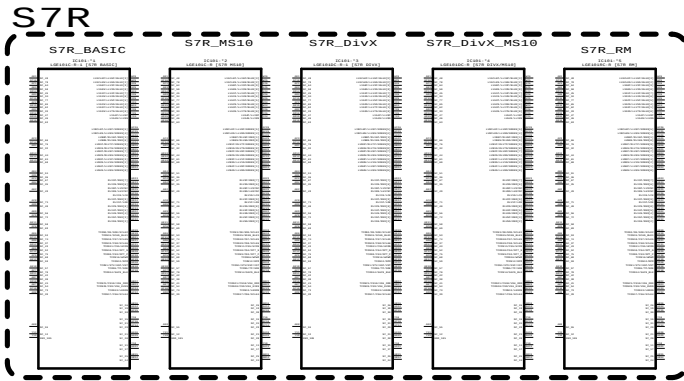
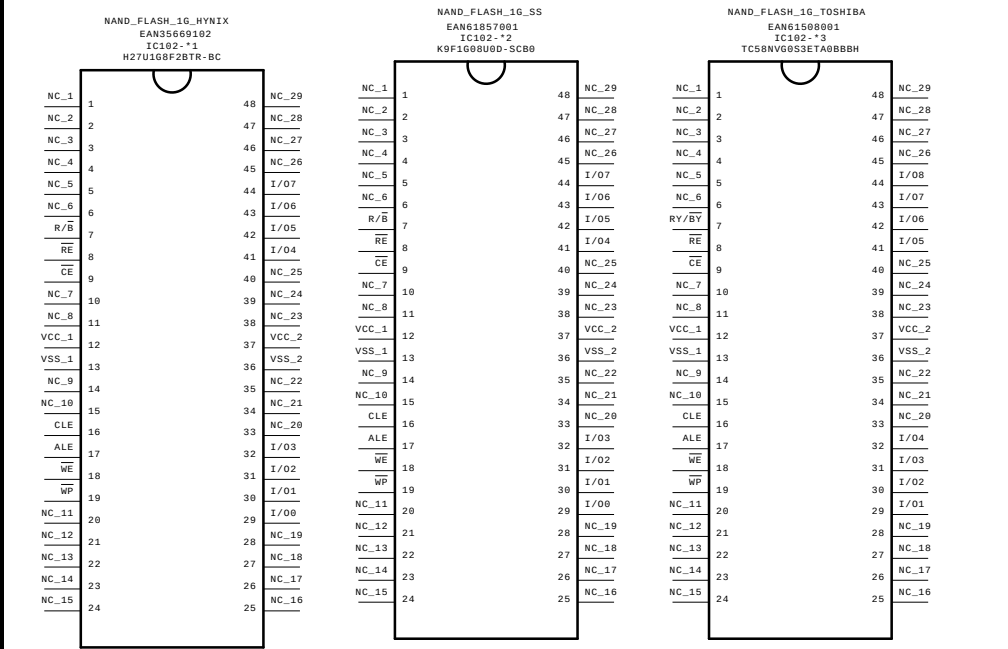
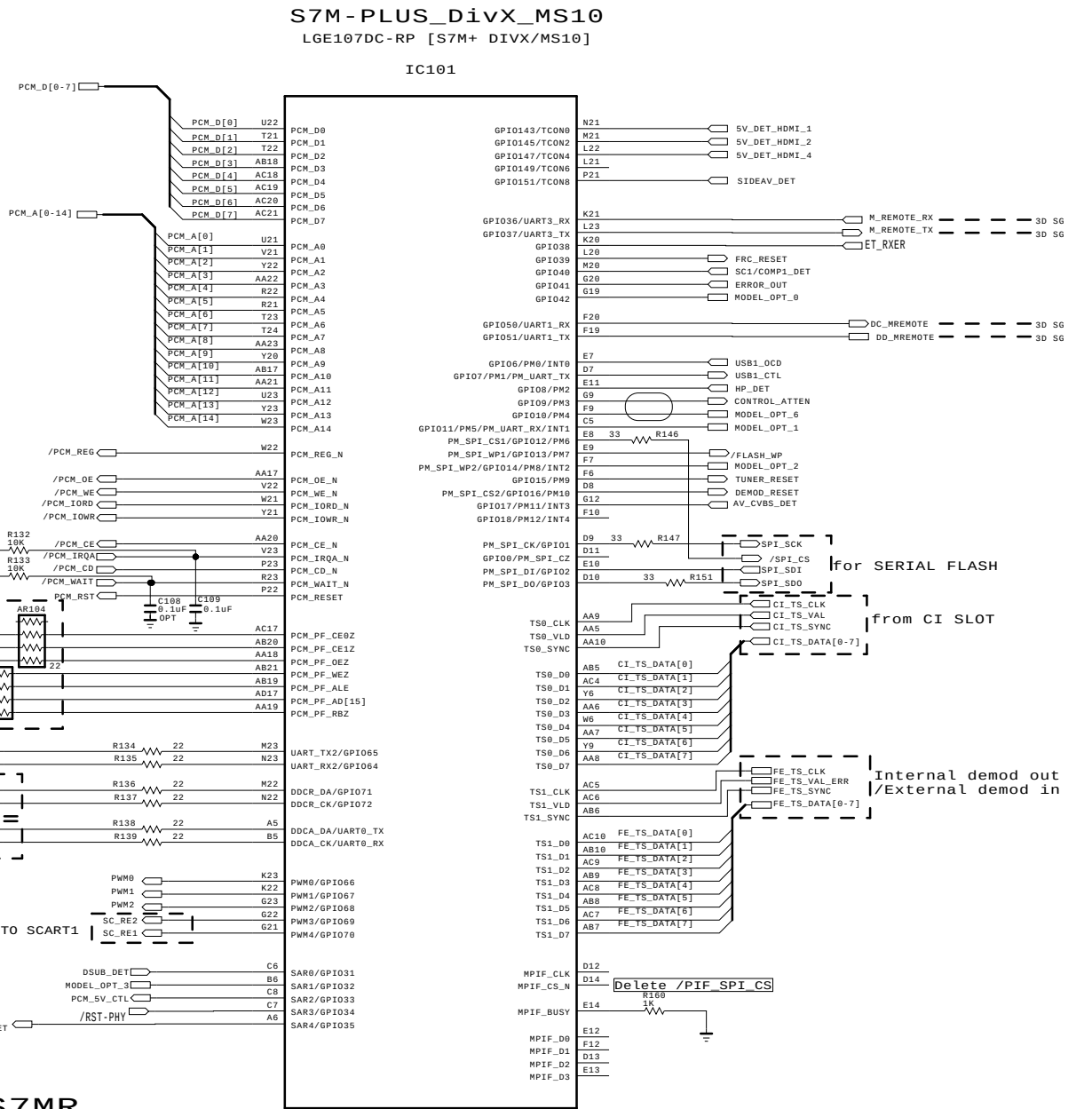
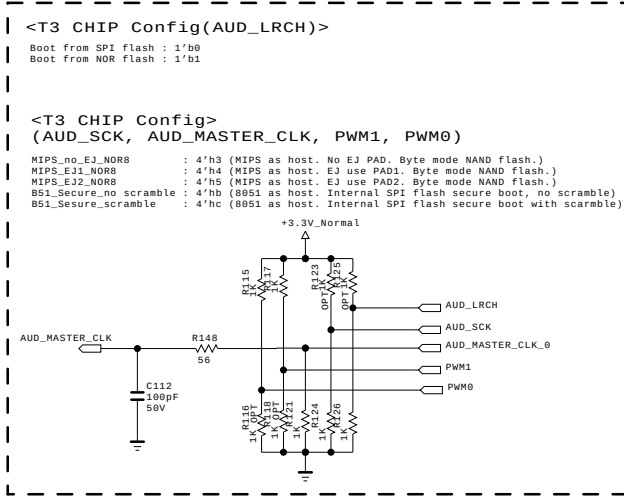
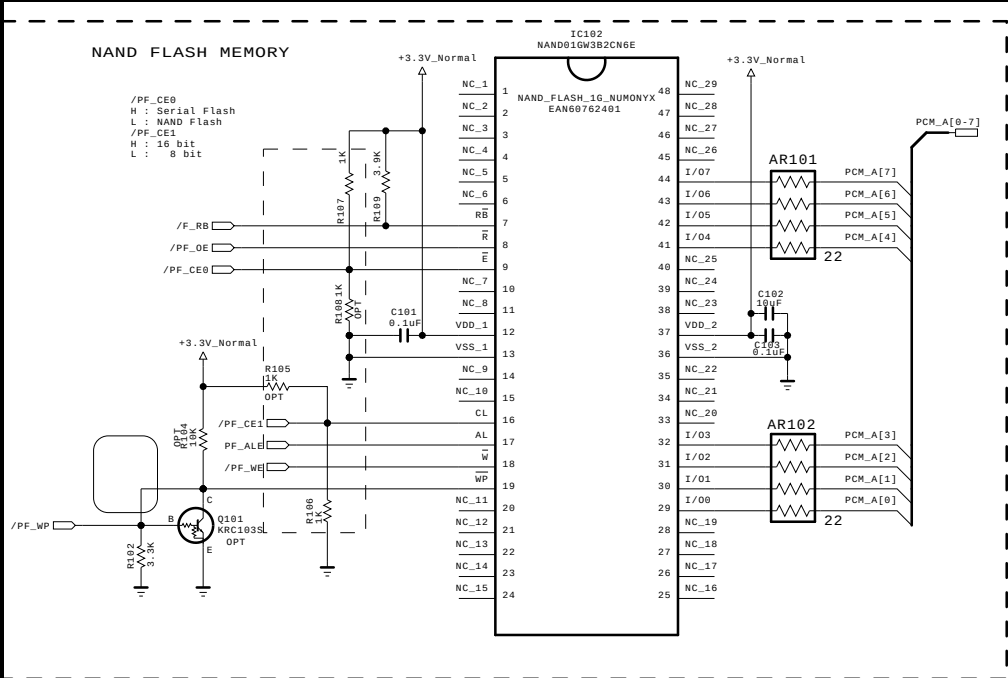


# EXPLODED VIEW

## IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by  $\Delta$  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.



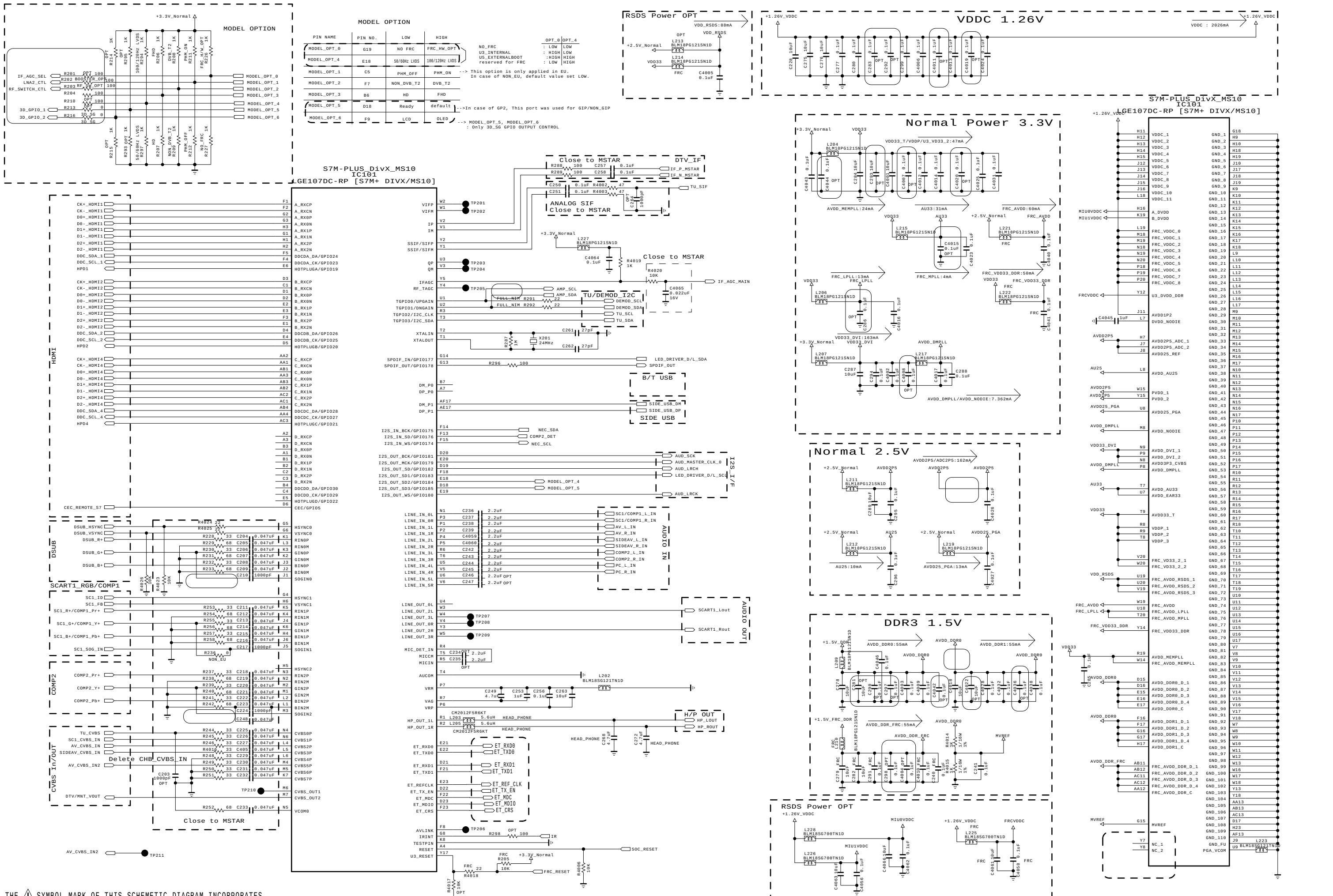


THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILTRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

SECRET  
LGElectronics

LG ELECTRONICS

|       |                   |       |          |
|-------|-------------------|-------|----------|
| MODEL | GP3_Saturn7M      | DATE  | Ver. 0.1 |
| BLOCK | FLASH/EEPROM/GPIO | SHEET | 1        |

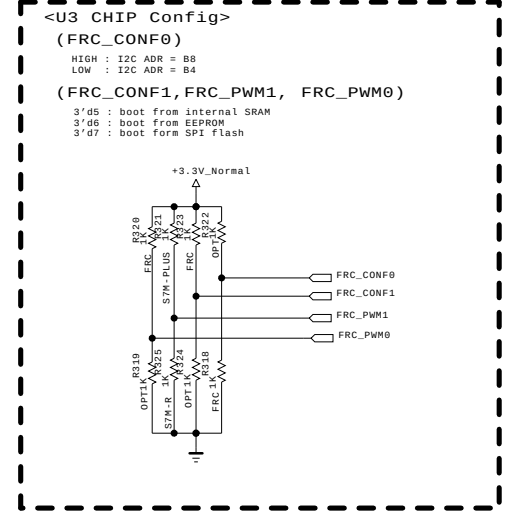
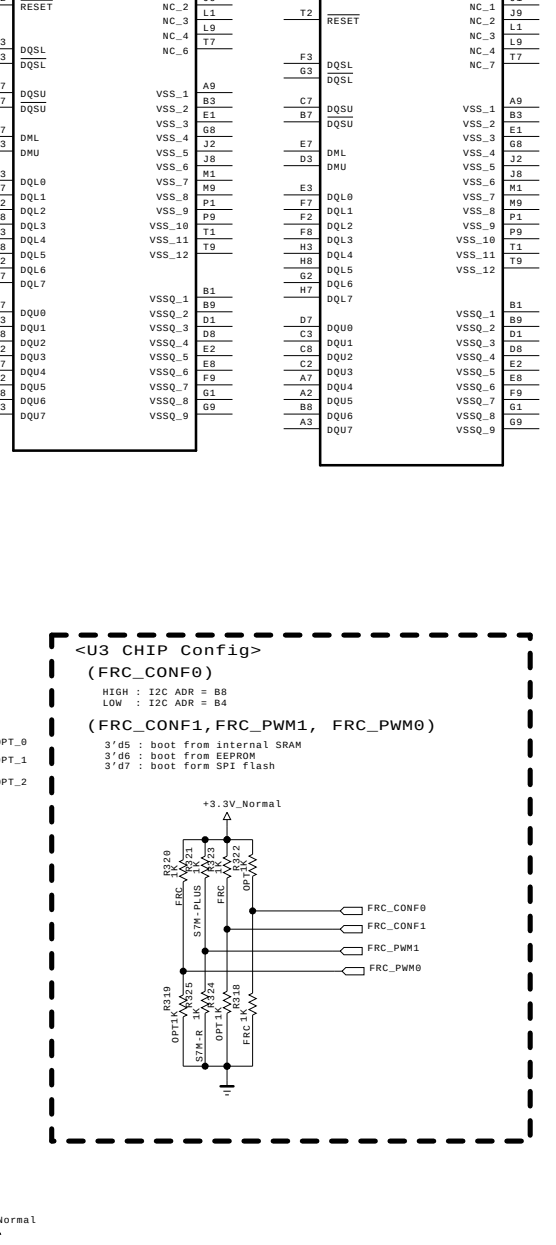
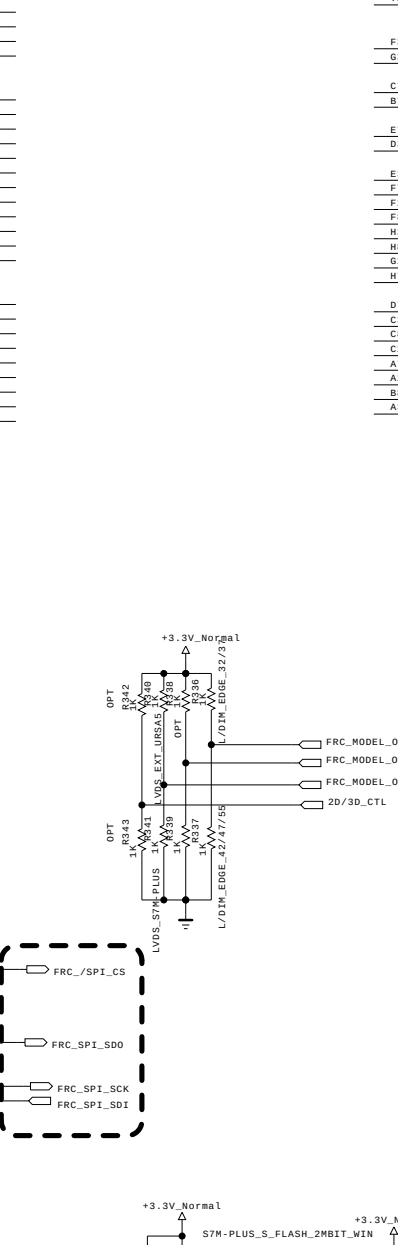
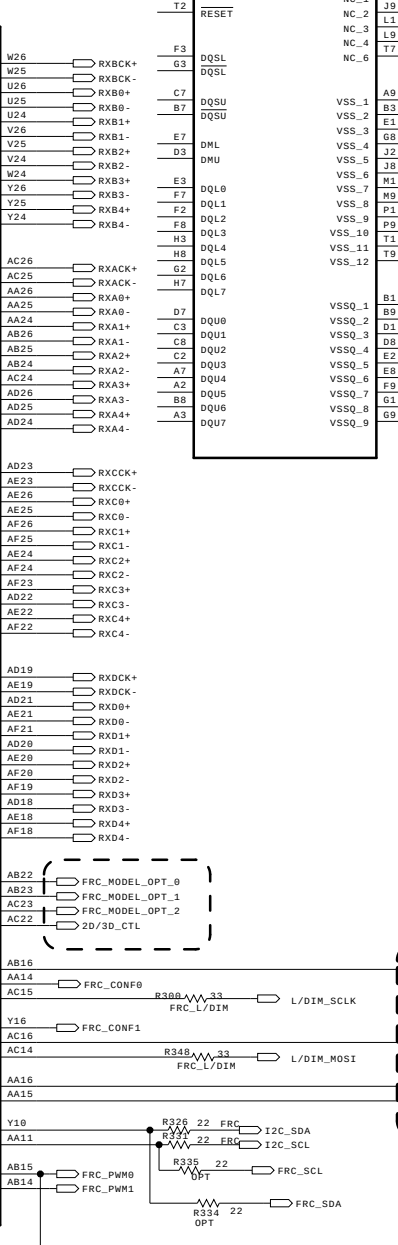
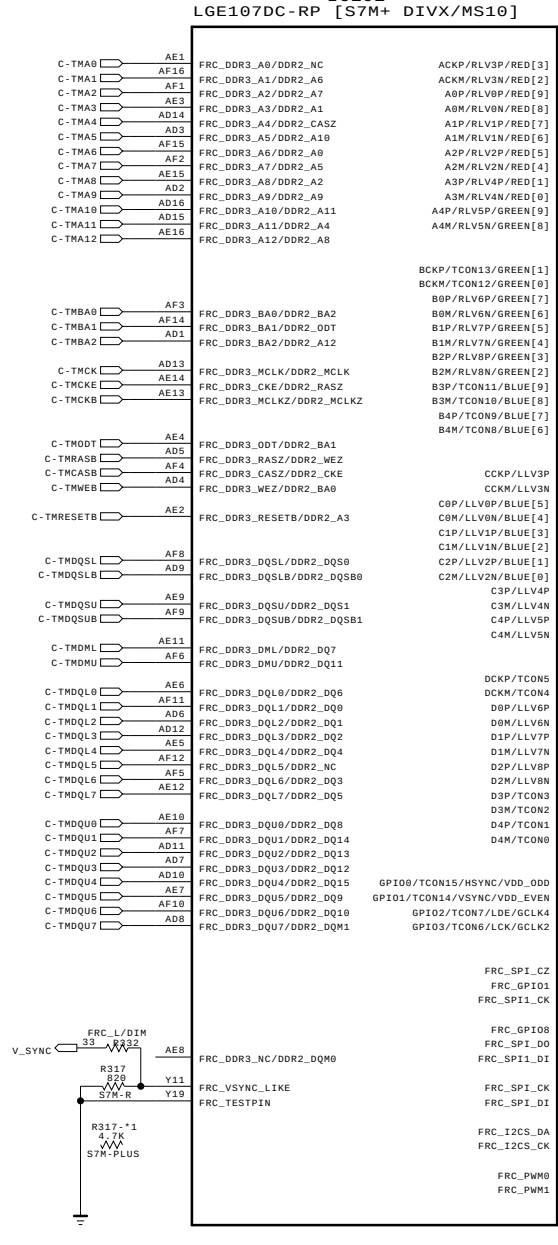
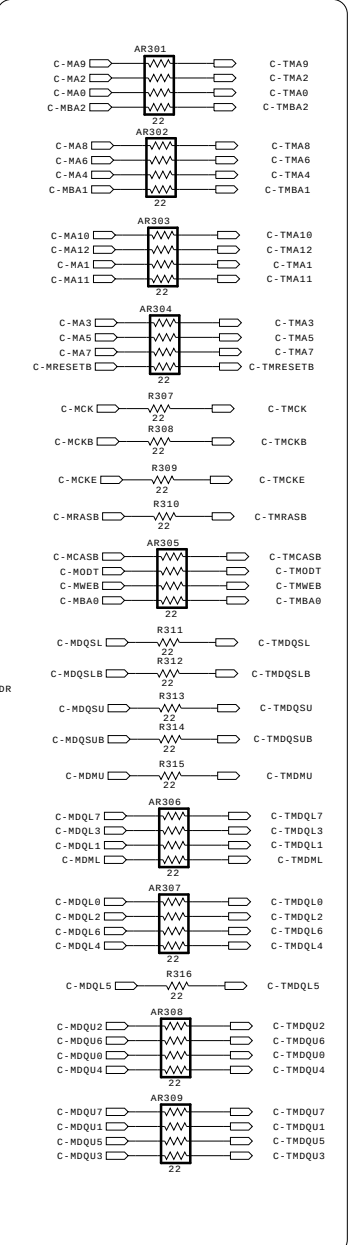
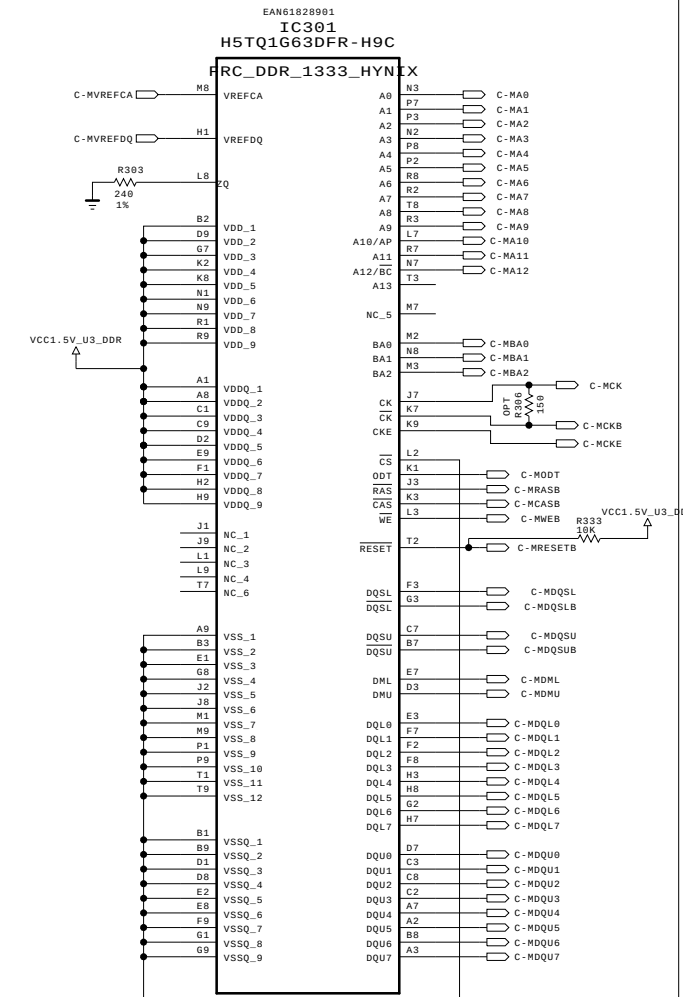
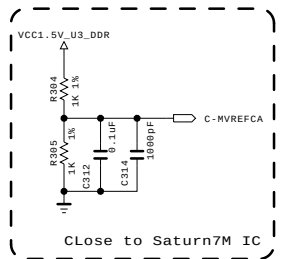
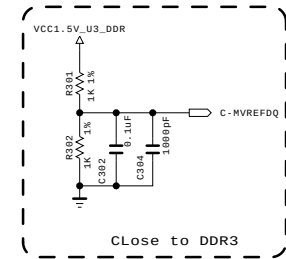
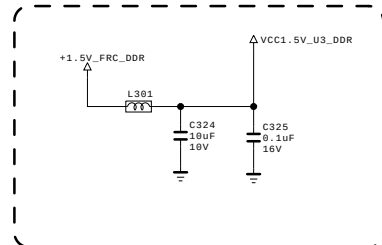
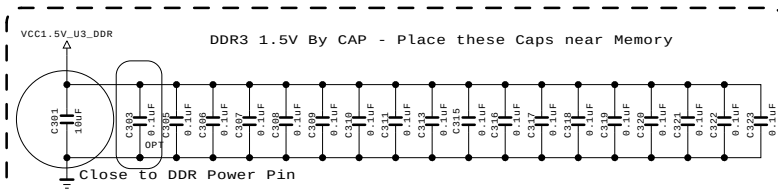


THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILTRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE MARK OF THE SCHEMATIC.

**SECRET**  
LGElectronics



|       |               |       |          |
|-------|---------------|-------|----------|
| MODEL | GP2R          | DATE  | 20101023 |
| BLOCK | MAIN2, HW OPT | SHEET | 2        |



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 SPECIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

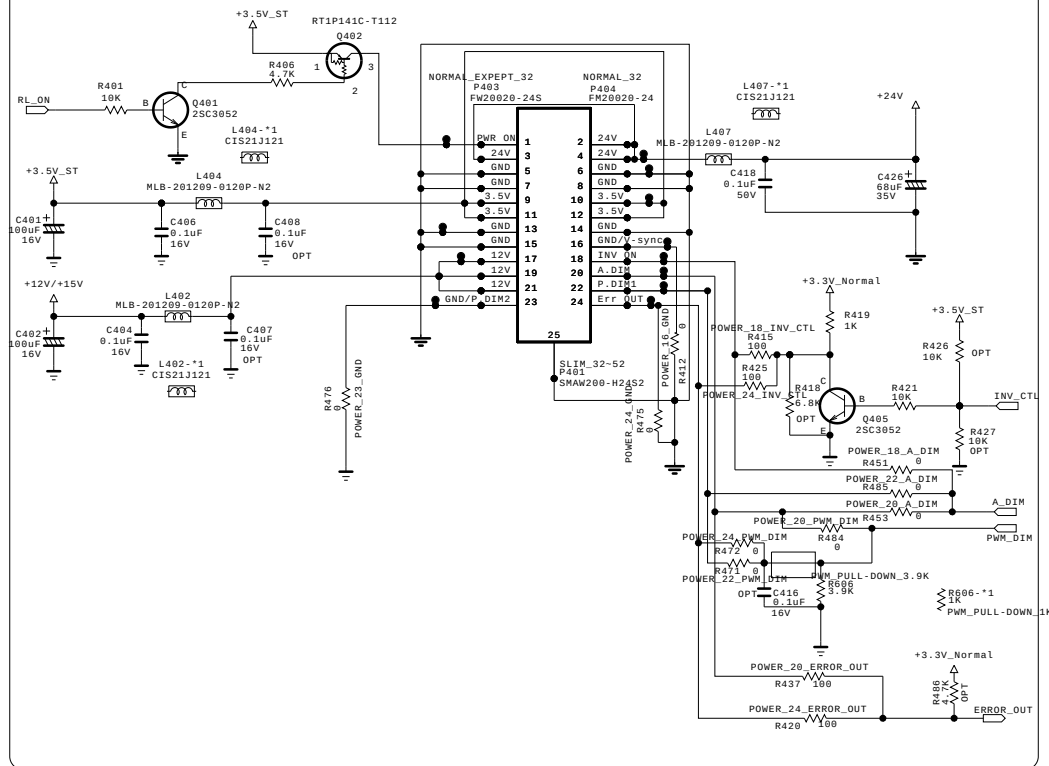
SECRET  
LGElectronics

LG ELECTRONICS

|       |         |       |          |
|-------|---------|-------|----------|
| MODEL | GP2R    | DATE  | 20101023 |
| BLOCK | FRC_DDR | SHEET | 3        |

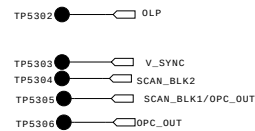


# FROM LIPS & POWER B/D



<MODULE PIN MAP>

| PIN No | LGD (PSU) or LIPS | CM010*Lamp (PSU) | AUD 10*Lamp (PSU) | SHARP (PSU)               | IPS-@ (PSU) |
|--------|-------------------|------------------|-------------------|---------------------------|-------------|
| 16     | GND               | GND              | GND               | GND                       | GND         |
| 18     | INV_ON            | A-DIM            | INV_ON            | INV_ON                    | INV_ON      |
| 20     | VBR-A             | NC               | Err_out           | 52/60:ERROR<br>26/32HD:NC | Err_out     |
| 22     | PWM_DIM           | PWM_DIM          | NC                | 26/32/52:PWM<br>60:NC     | NC          |
| 24     | Err_out           | INV_ON           | PWM_DIM           | 26/32/52:GND<br>60:PWM    | PWM_DIM     |
| 23     | GND               | GND              | GND               | GND                       | GND         |



<LED MODULE PIN MAP -> latest update 20100618>

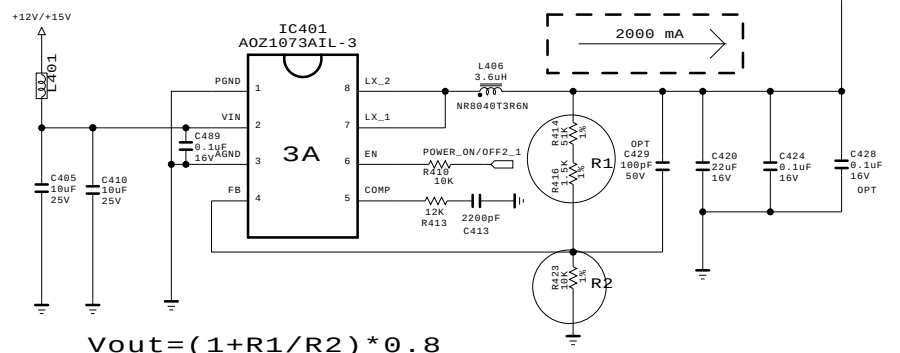
| PIN No | LGD LPB OS LPB | 32LE5300-TA CM010*LED (PSU) | 32LE5300-TA AUD 10*LED (PSU) | 32LE5300-TA LGD 10*LED (PSU) |  |
|--------|----------------|-----------------------------|------------------------------|------------------------------|--|
| 16     | NC             | NC                          | NC                           | NC                           |  |
| 18     | INV_ON         | INV_ON                      | INV_ON                       | INV_ON                       |  |
| 20     | NC             | err_out --> NC              | err_out --> NC               | NC                           |  |
| 22     | PWM_DIM        | NC                          | NC                           | PWM_DIM                      |  |
| 24     | err_out --> NC | PWM_DIM                     | PWM_DIM                      | err_out --> NC               |  |
| 23     | NC             | NC                          | NC                           | NC                           |  |

LGD edge led error-out use or not? checking is necessary...

<Module Inv to Main Pin Connection>

|     |      |      |
|-----|------|------|
| INV | <--> | MAIN |
| #11 | <--> | #24  |
| #12 | <--> | #18  |
| #13 | <--> | #20  |
| #14 | <--> | #22  |

## +5V\_USB



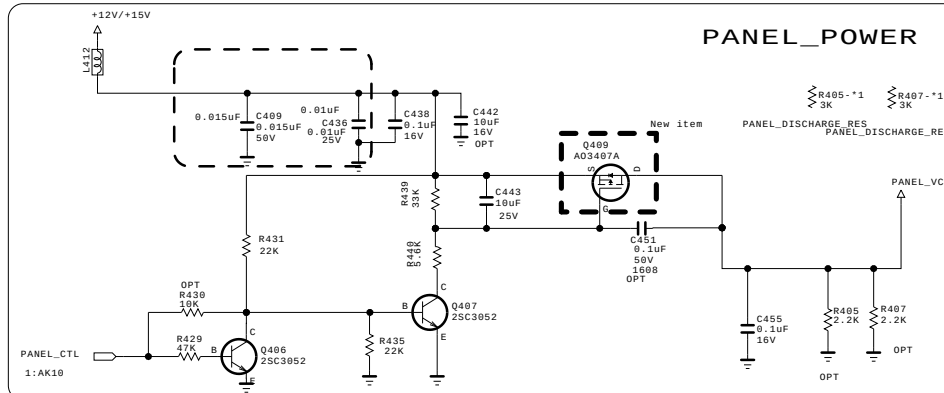
$$V_{out} = (1 + R1/R2) * 0.8$$

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 SPECIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMATIC.

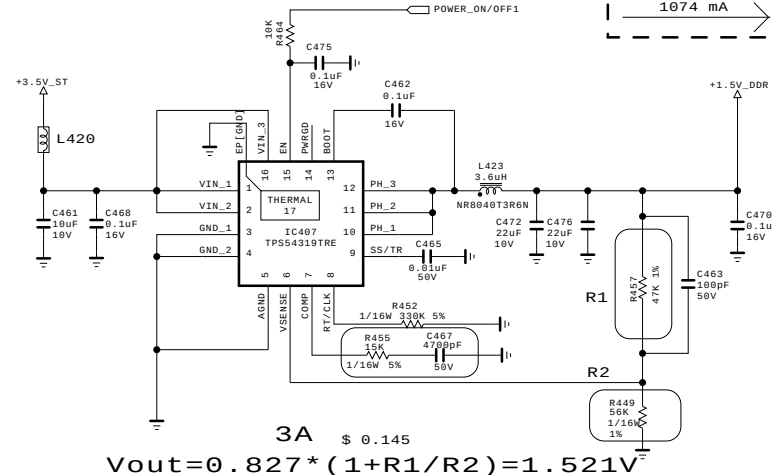
SECRET  
LGElectronics

LG ELECTRONICS

## PANEL\_POWER

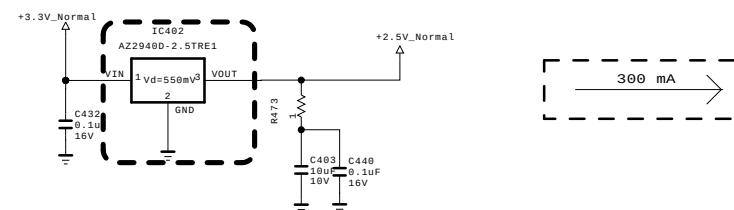


## S7M DDR 1.5V

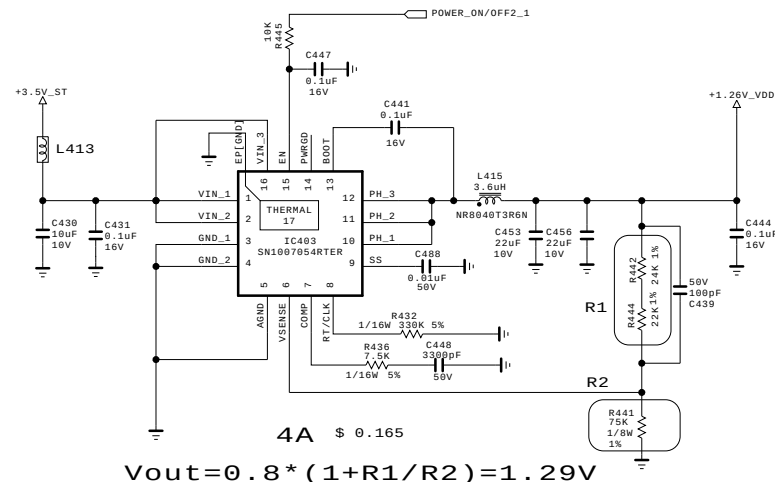


$$V_{out} = 0.827 * (1 + R1/R2) = 1.521V$$

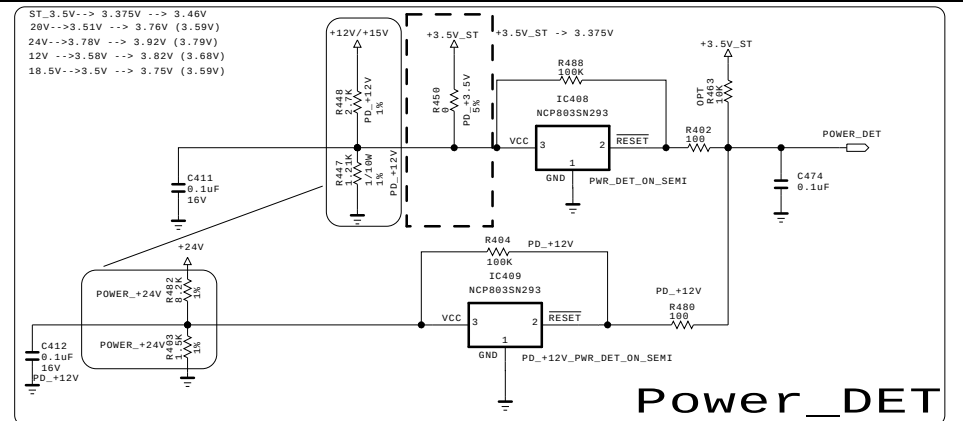
## +2.5V/+1.8V



## S7M core 1.26V volt

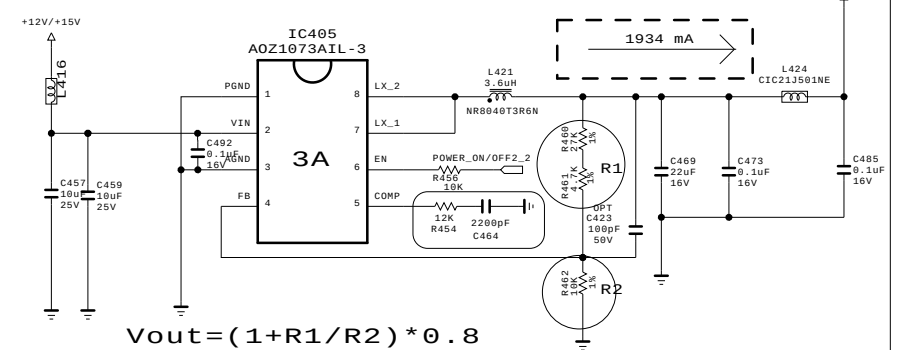


$$V_{out} = 0.8 * (1 + R1/R2) = 1.29V$$



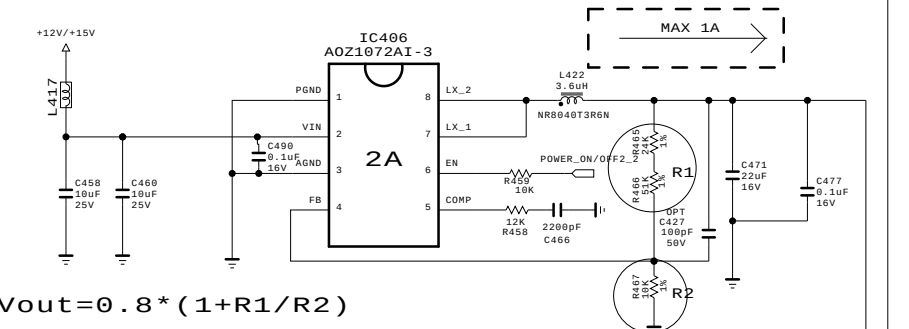
## Power\_DET

## +3.3V\_Normal

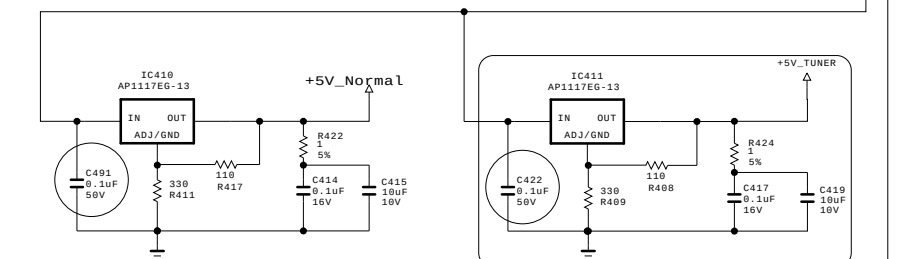


$$V_{out} = (1 + R1/R2) * 0.8$$

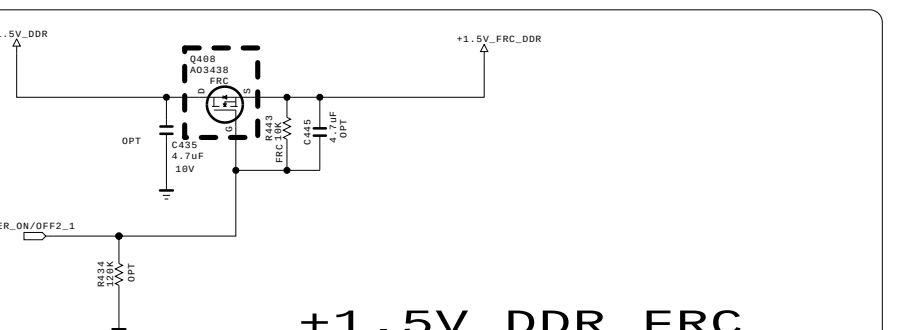
## +5V\_Normal



$$V_{out} = 0.8 * (1 + R1/R2)$$



C421, C422 Close to LD0

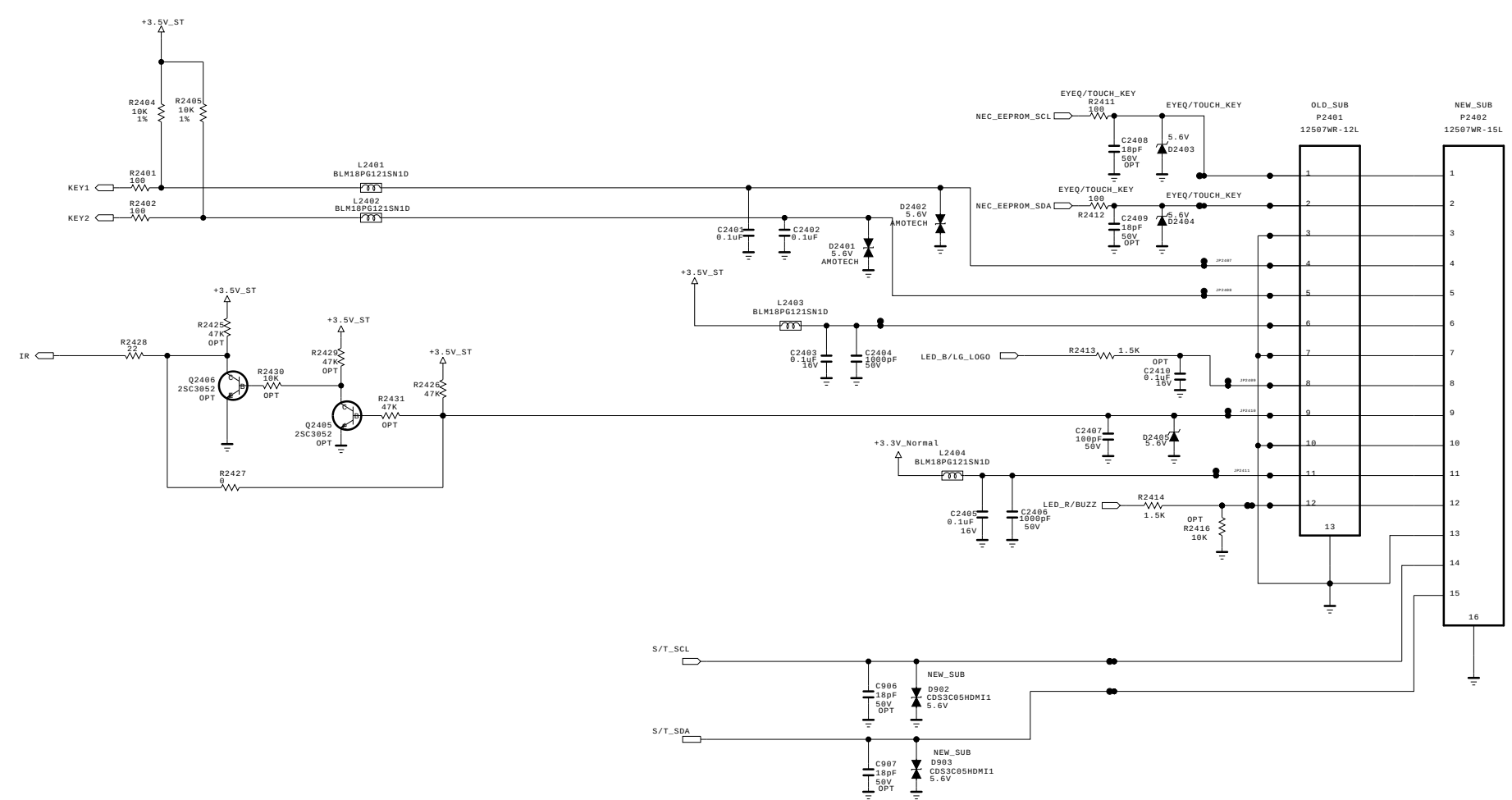


## +1.5V\_DDR\_FRC

|       |             |       |          |
|-------|-------------|-------|----------|
| MODEL | GP2R        | DATE  | 20101023 |
| BLOCK | POWER_LARGE | SHEET | 4        |



CONTROL  
IR & LED

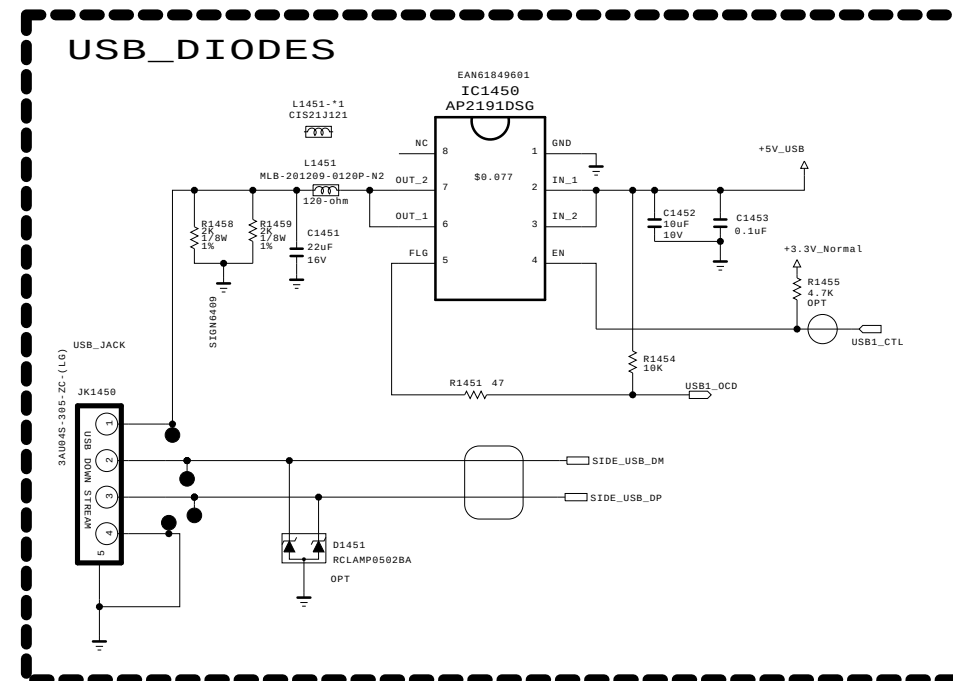


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|       |                |       |          |
|-------|----------------|-------|----------|
| MODEL | GP2R           | DATE  | 20101023 |
| BLOCK | IR/CONTROL - L | SHEET | 6 /      |

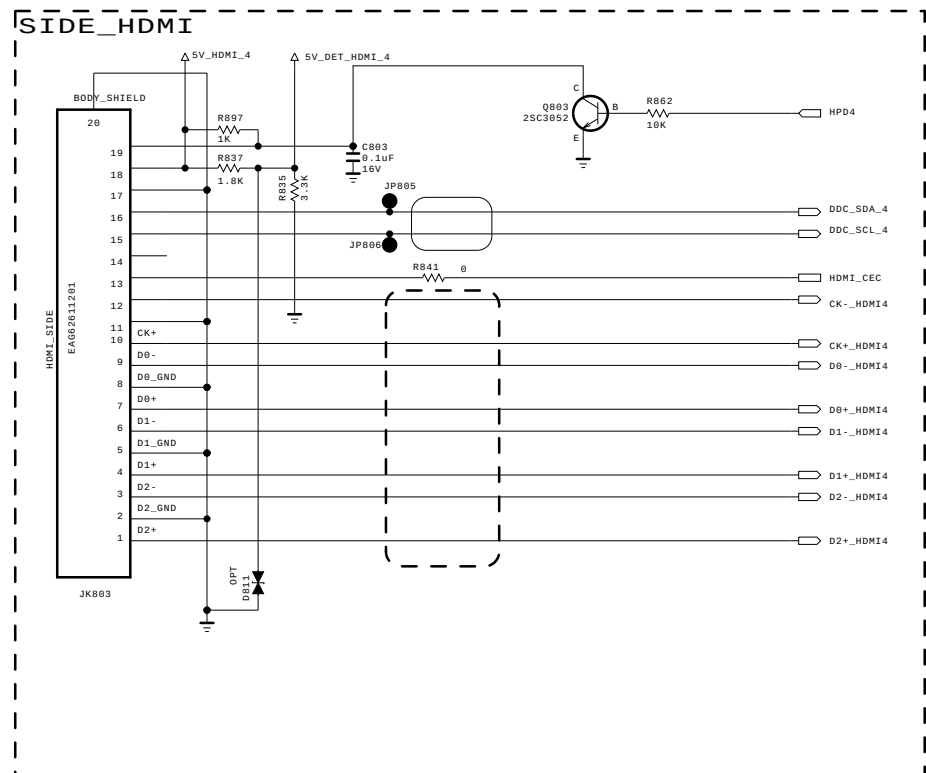
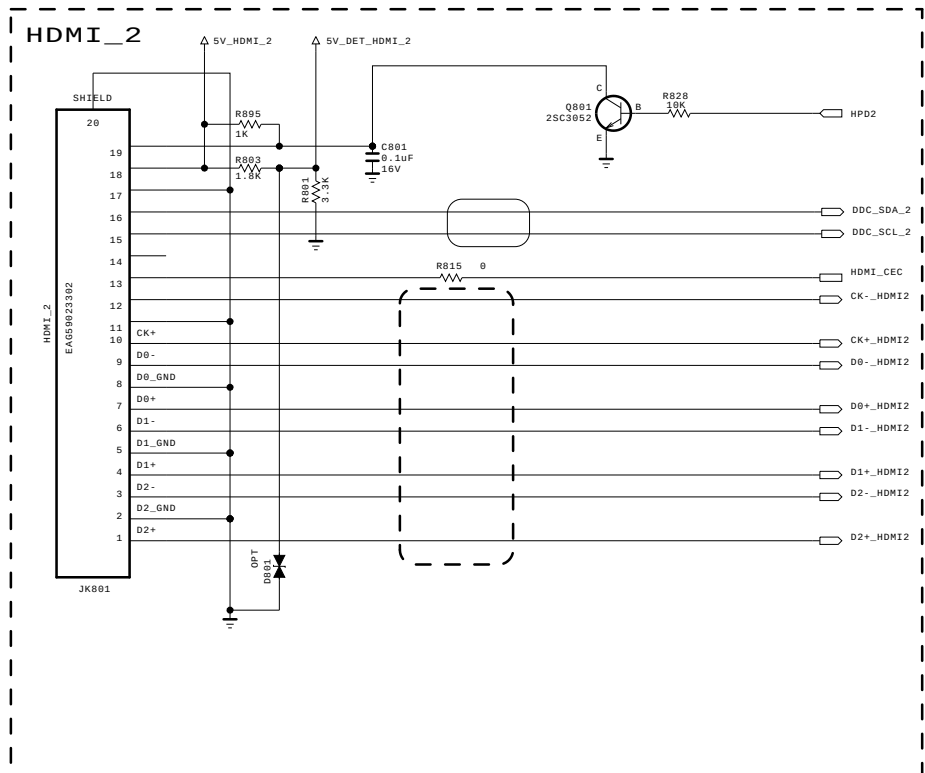
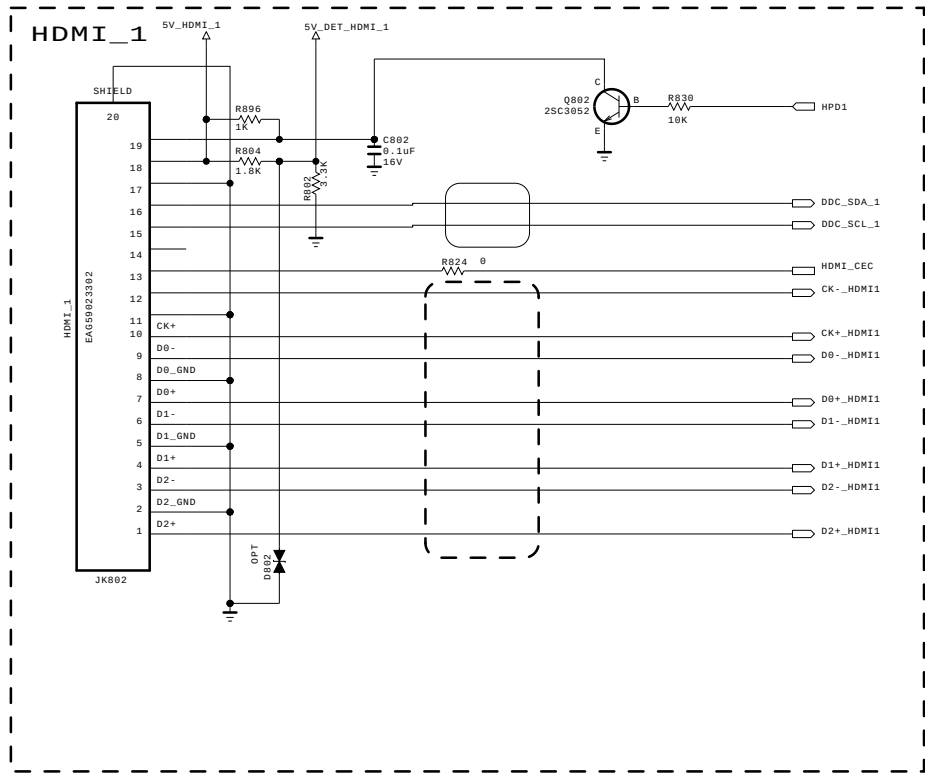


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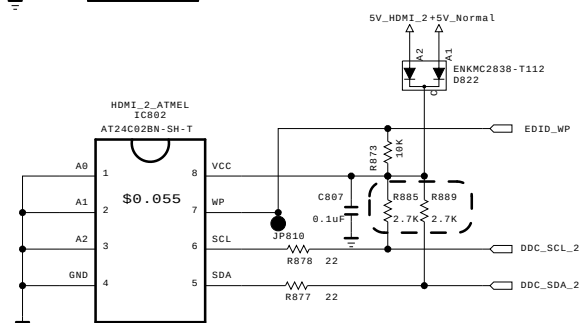
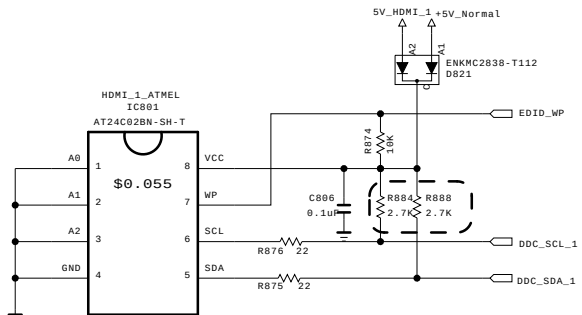
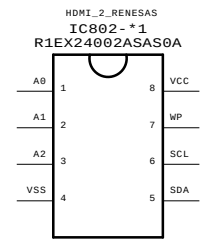
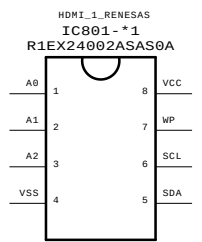
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|       |               |       |          |
|-------|---------------|-------|----------|
| MODEL | GP2R          | DATE  | 20101023 |
| BLOCK | USB_OCP_DIODE | SHEET | 7 /      |



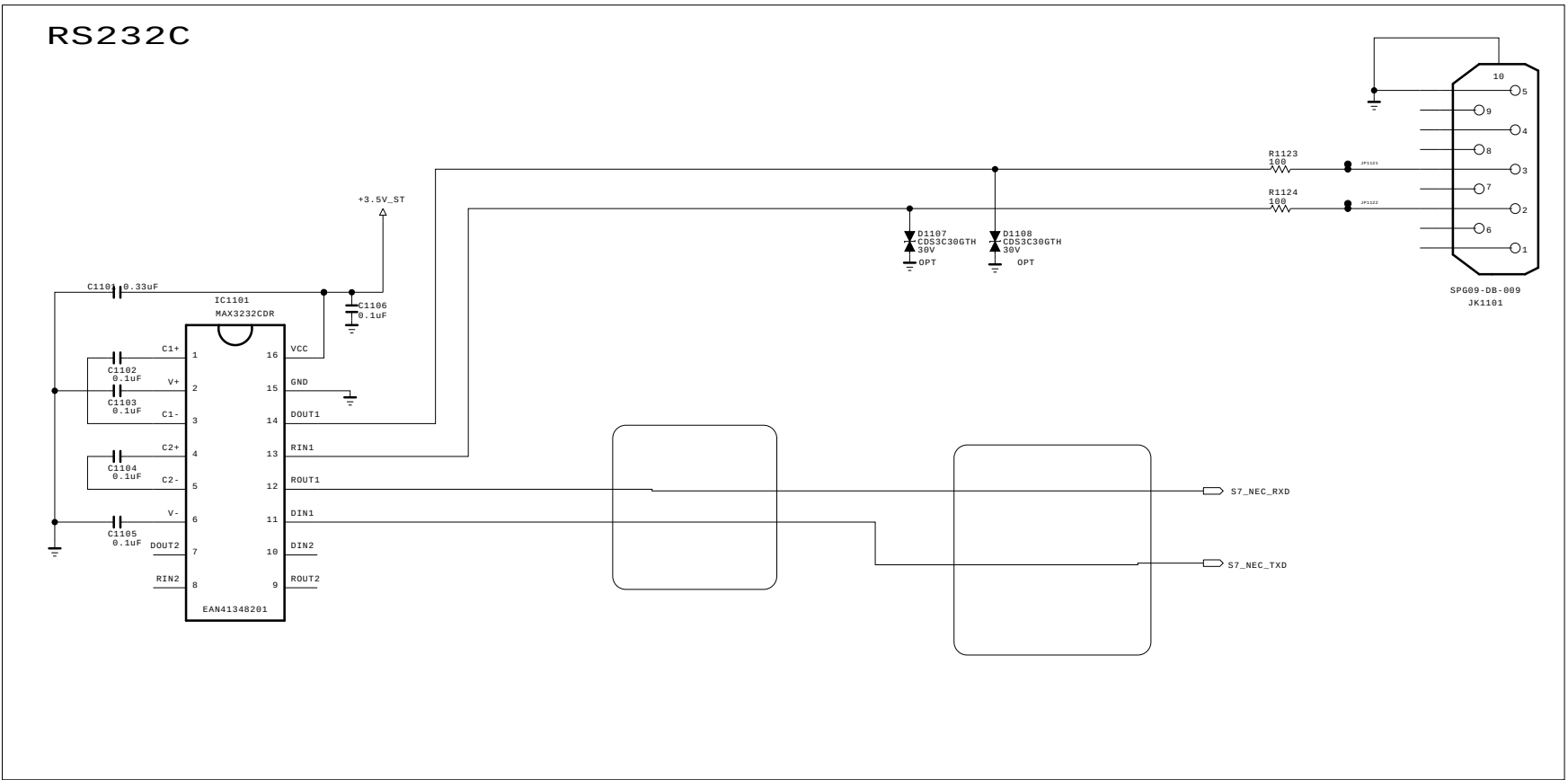
## HDMI EEPROM







RS232C

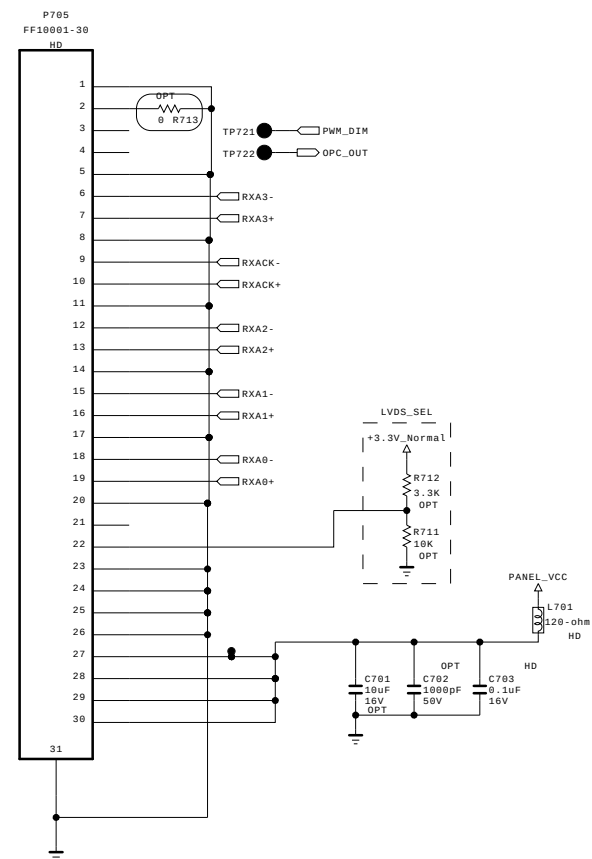
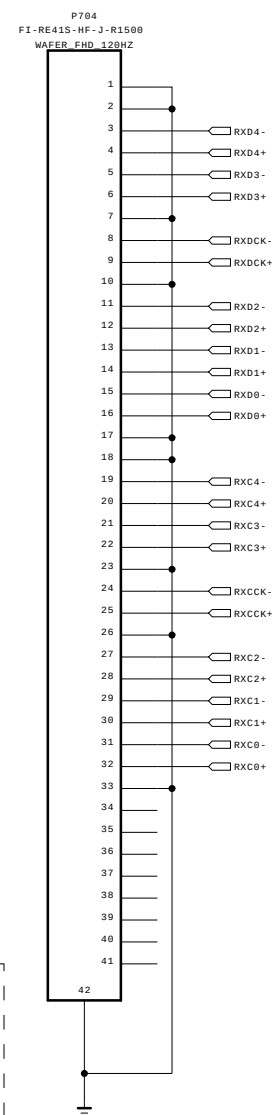
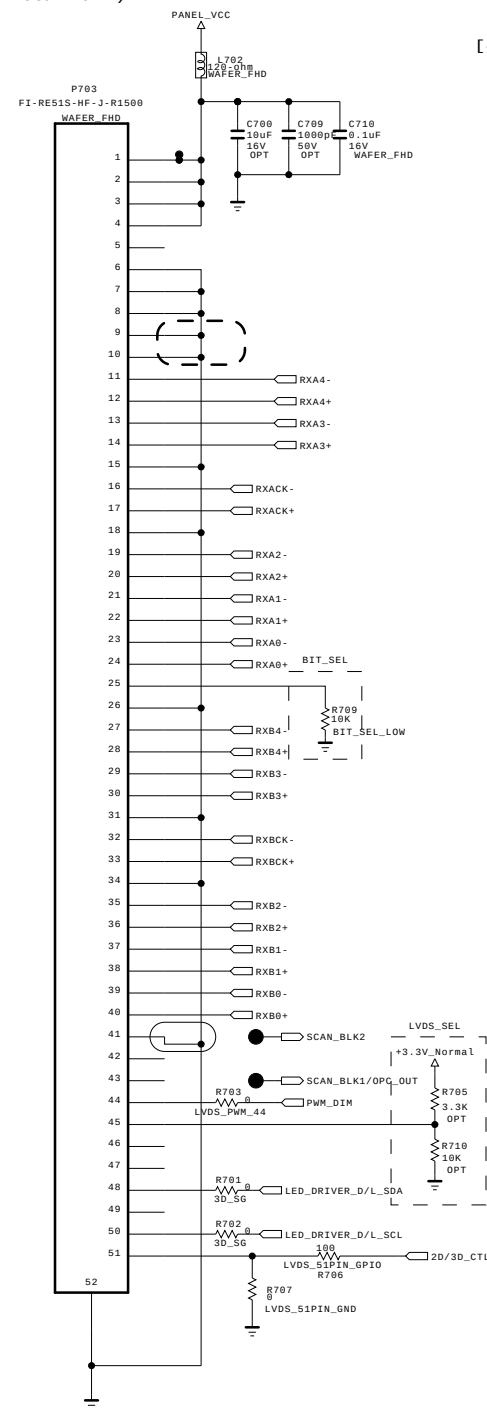


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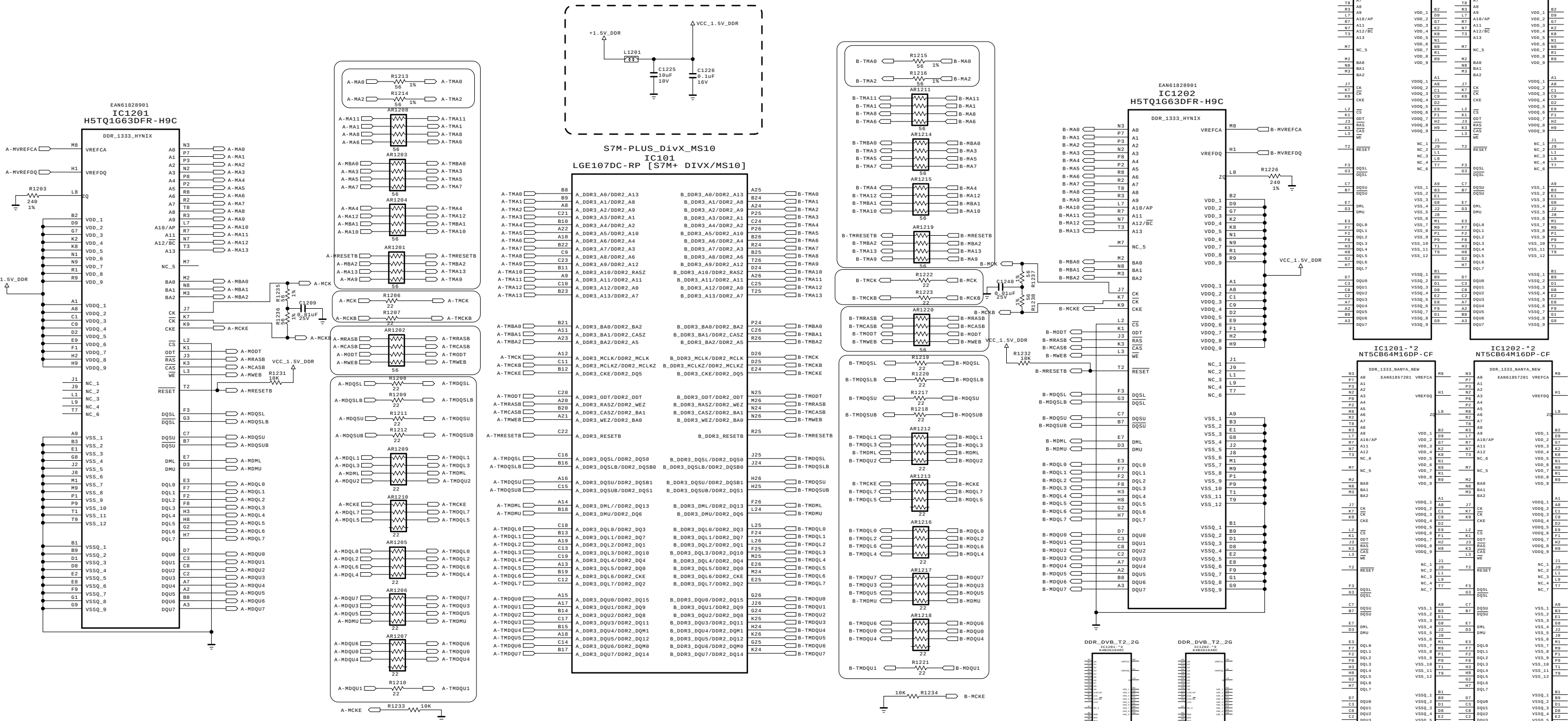
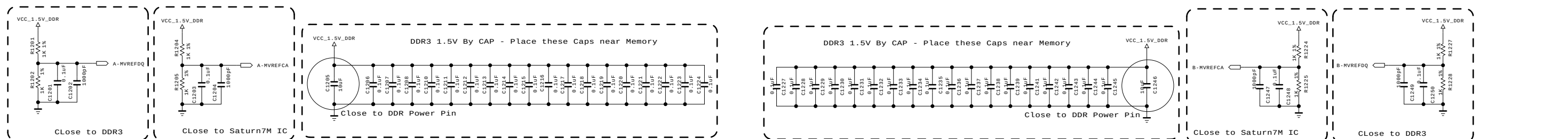
|       |             |       |          |
|-------|-------------|-------|----------|
| MODEL | GP2R        | DATE  | 20101023 |
| BLOCK | RS232C_9PIN | SHEET | 10 /     |



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|       |            |       |          |
|-------|------------|-------|----------|
| MODEL | GP2R       | DATE  | 20101023 |
| BLOCK | LVDS_LARGE | SHEET | 11 /     |

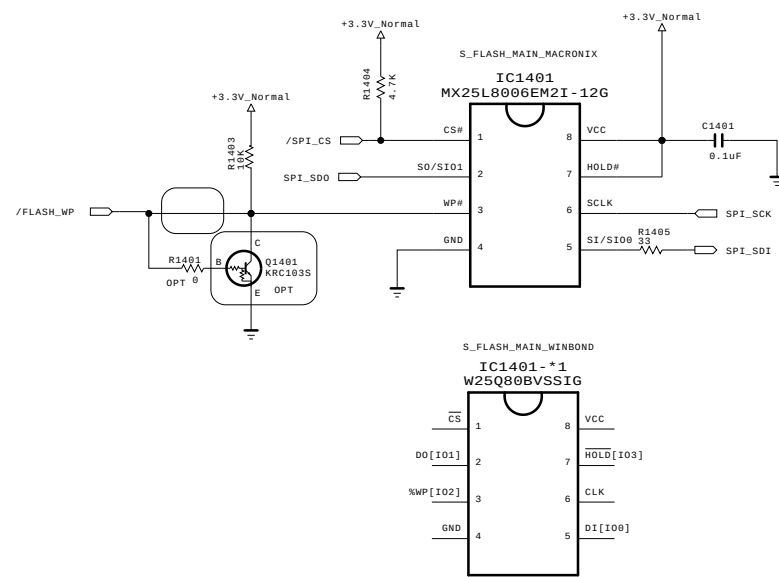


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|       |         |       |          |
|-------|---------|-------|----------|
| MODEL | GP2R    | DATE  | 20101023 |
| BLOCK | DDR_256 | SHEET | 12 /     |



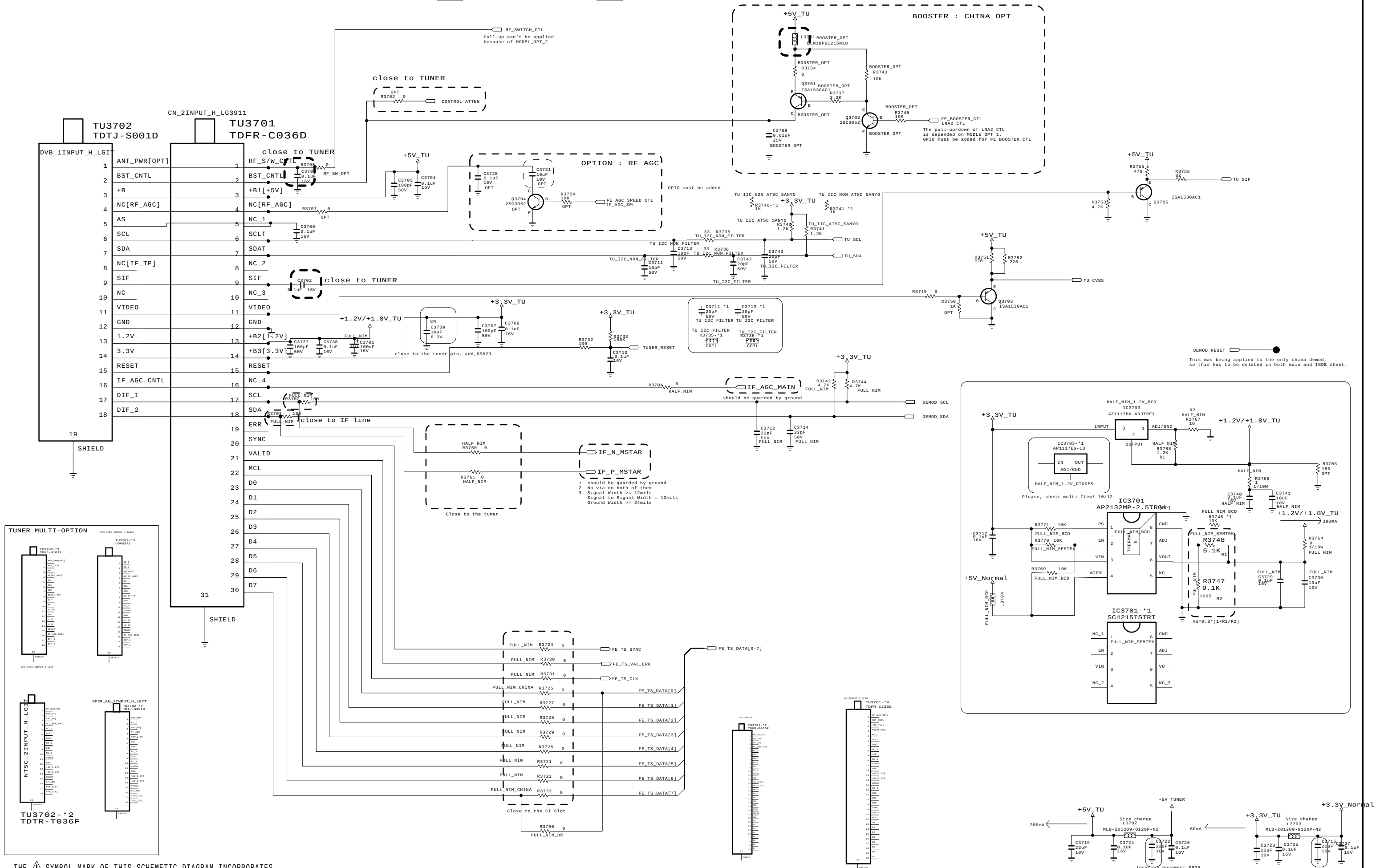
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

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|       |            |       |          |
|-------|------------|-------|----------|
| MODEL | GP2R       | DATE  | 20101023 |
| BLOCK | SFLASH_1MB | SHEET | 13 /     |

# GP2R\_LARGE\_TUNER

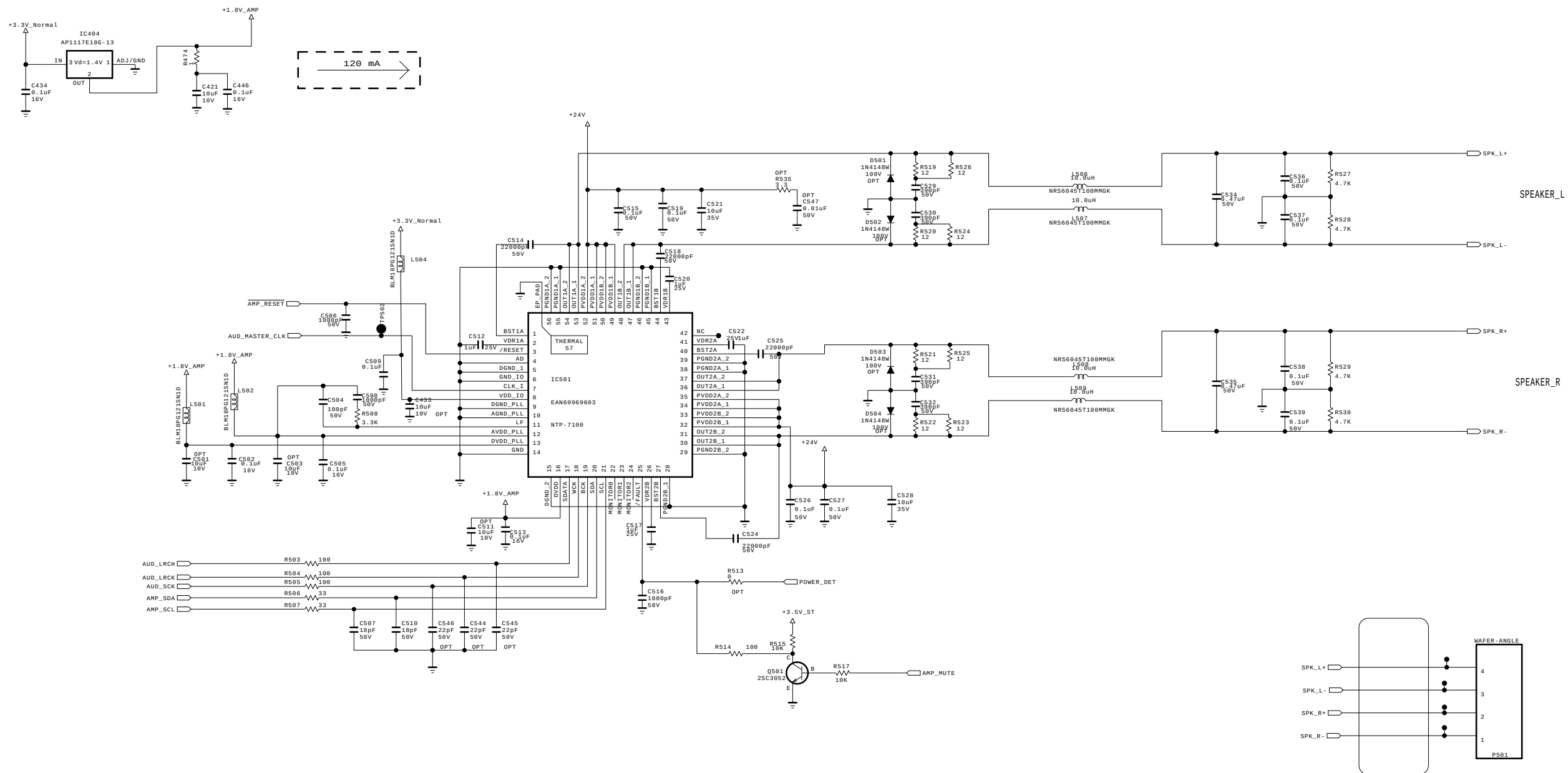


THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

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|       |         |       |          |
|-------|---------|-------|----------|
| MODEL | GP2R    | DATE  | 20101023 |
| BLOCK | TUNER_L | SHEET | 14 /     |



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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|       |         |       |          |
|-------|---------|-------|----------|
| MODEL | GP2R    | DATE  | 20101023 |
| BLOCK | AMP_NTP | SHEET | 16 /     |



The schematic diagram illustrates the internal circuitry of the rear AV input section. It features a 5-pin DIN connector with the following connections:

- 5C: [RD]E-LUG
- 4C: [RD]D-SPRING
- 3C: [RD]CONTACT
- 4B: [WH]C-LUG
- 3A: [YL]CONTACT
- 4A: [YL]D-SPRING
- 5A: [YL]E-LUG

The circuit includes a +3.3V\_Norm1 supply and various passive components:

- Resistors:** R1654 (30V), R1643 (47pF), R1648 (50V OPT), R1660 (10K), R1656 (1K), R1685 (10K), R1684 (10K), R1688 (12K), R3672 (470K), R3671 (470K).
- Capacitors:** C1643 (47pF), C1648 (220pF), C1646 (0.1uF), C1663 (330pF), C1662 (330pF).
- Diodes:** D1619 (30V), D1624 (5.6V OPT), D1625 (5.6V), D1626 (5.6V).
- Inductors:** L1609 (120-ohm), L1610 (120-ohm).

The outputs are labeled AV\_CVBS\_IN, AV\_CVBS\_DET, REAR\_AV, REAR\_AV, REAR\_AV, and REAR\_AV.

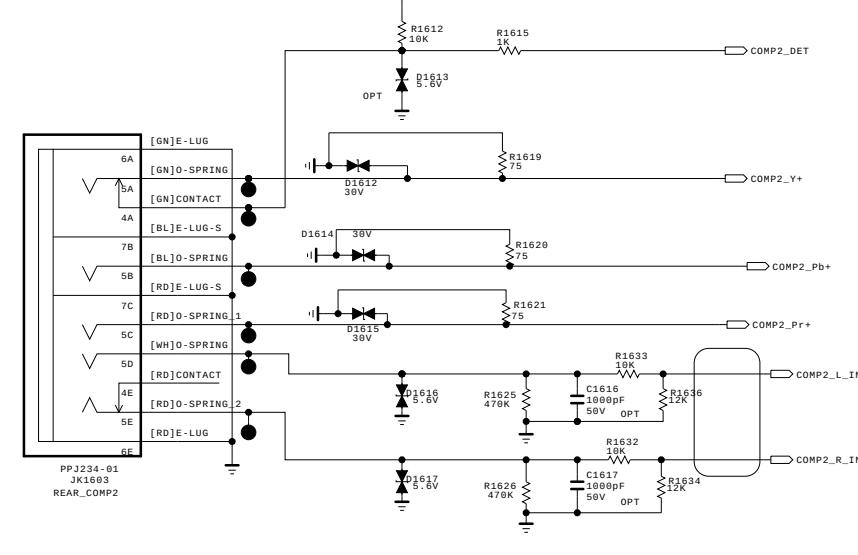
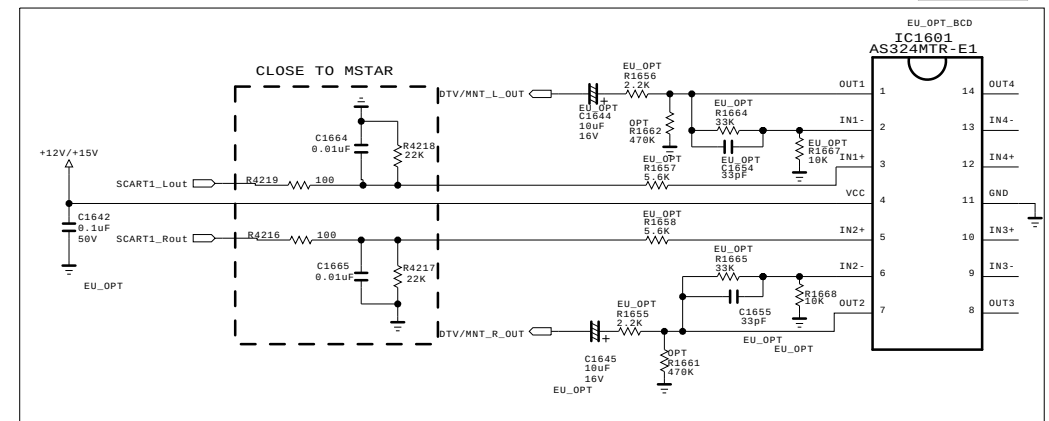


Diagram showing the connections for IC1601-1 SW324:

- OUT1 (Pin 1) to TP1610 (ET\_RXD0)
- INV\_INV1 (Pin 2) to TP1611 (ET\_TXD0)
- NON\_INV\_INV1 (Pin 3) to TP1612 (ET\_RXD1)
- VCC (Pin 4) to TP1613 (ET\_TXD1)
- NON\_INV\_INV2 (Pin 5) to TP1614 (ET\_REF\_CLK)
- INV\_INV2 (Pin 6) to TP1615 (ET\_TX\_EN)
- OUT2 (Pin 7) to TP1616 (ET\_MDC)
- INV\_INV3 (Pin 9) to TP1617 (ET\_MDIO)
- OUT3 (Pin 14) to TP1618 (ET\_CRS)
- OUT4 (Pin 14) to TP1619 (ET\_RXER)
- OUT5 (Pin 14) to TP1620 (/RST-PHY)



DTV/MNT\_L\_OUT

EU\_OPT Q1607 25C3052

EU\_OPT R1648 2K

DTV/MNT\_R\_OUT

EU\_OPT Q1608 25C3052

EU\_OPT R1650 2K

EU\_OPT RT1P41C-T112 Q1610

EU\_OPT R1652 10K

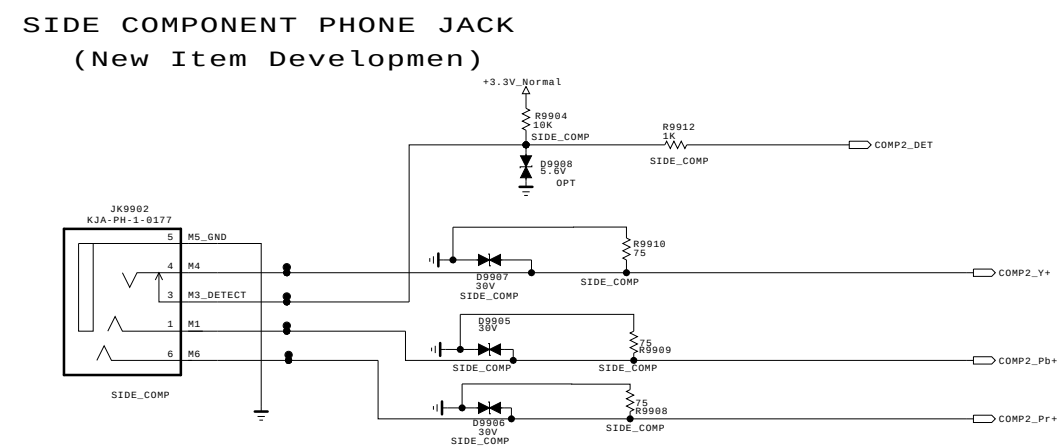
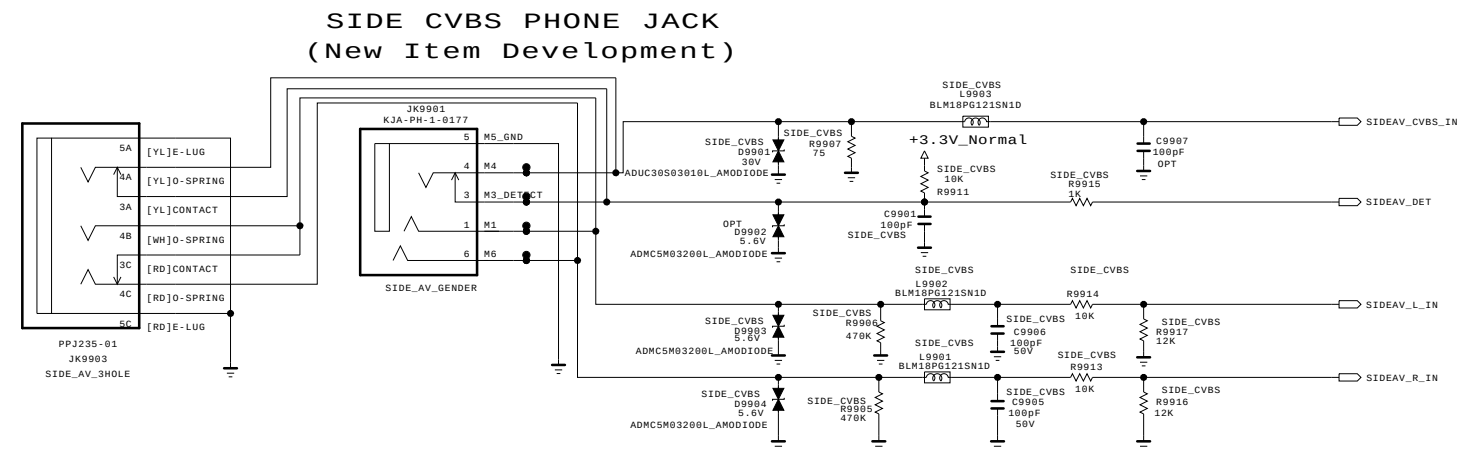
+3.5V\_ST

SCART1\_MUTE

EU\_OPT C1636 0.1uF

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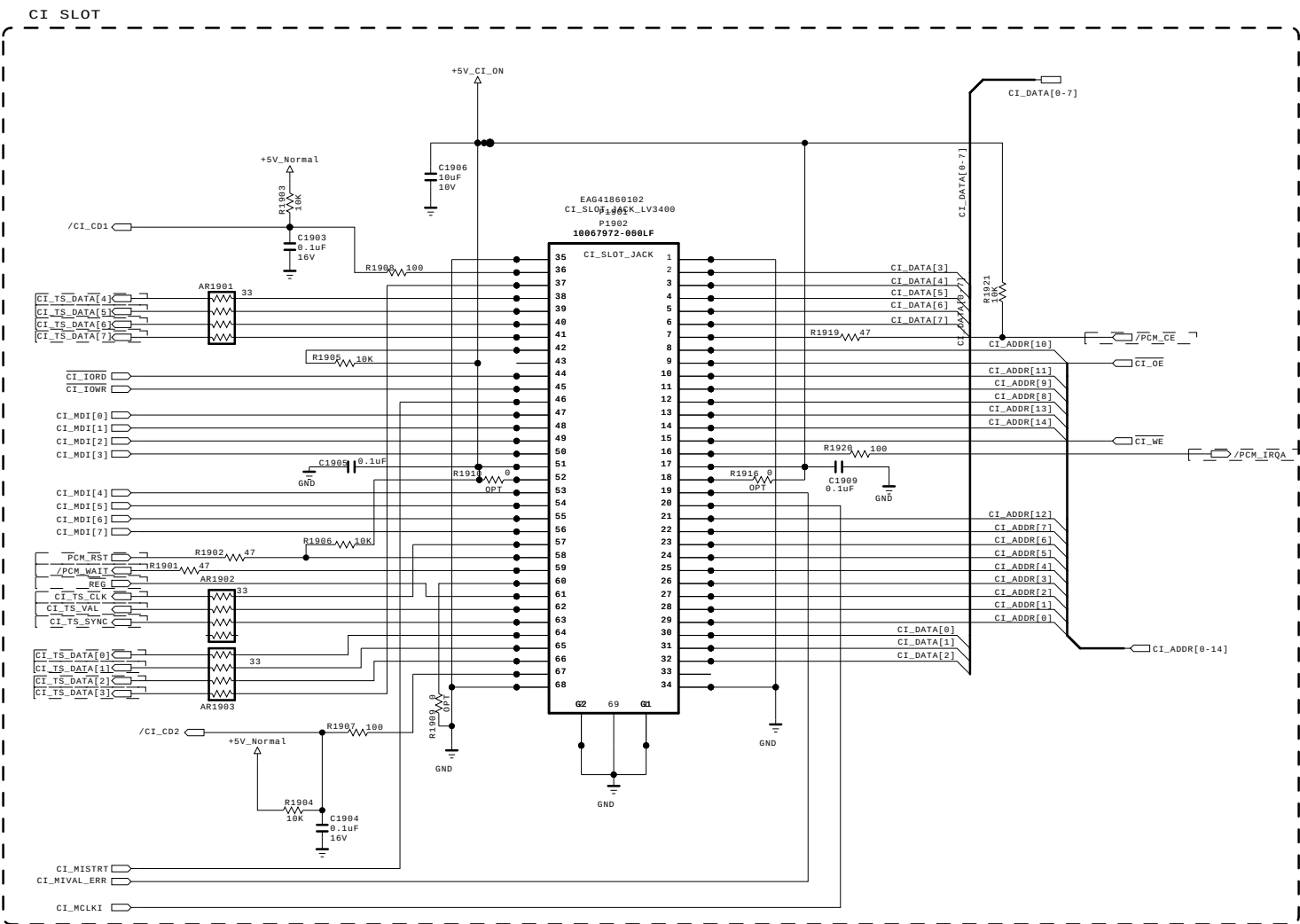


|       |           |       |          |
|-------|-----------|-------|----------|
| MODEL | GP2R      | DATE  | 20101023 |
| BLOCK | SIDE_JACK | SHEET | 18 /     |

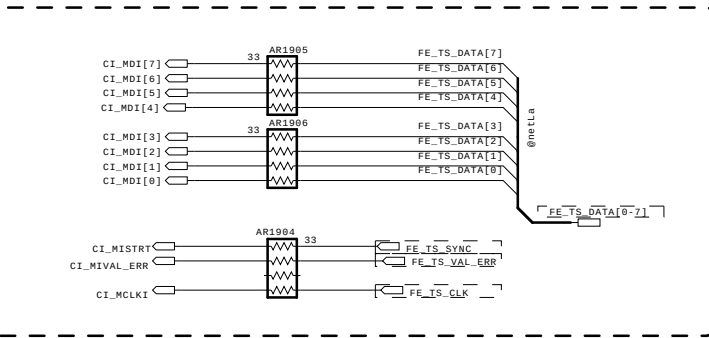


\* Option name of this page : CI\_SLOT  
(because of Hong Kong)

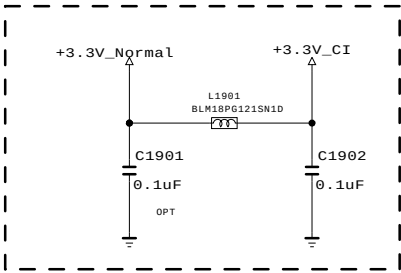
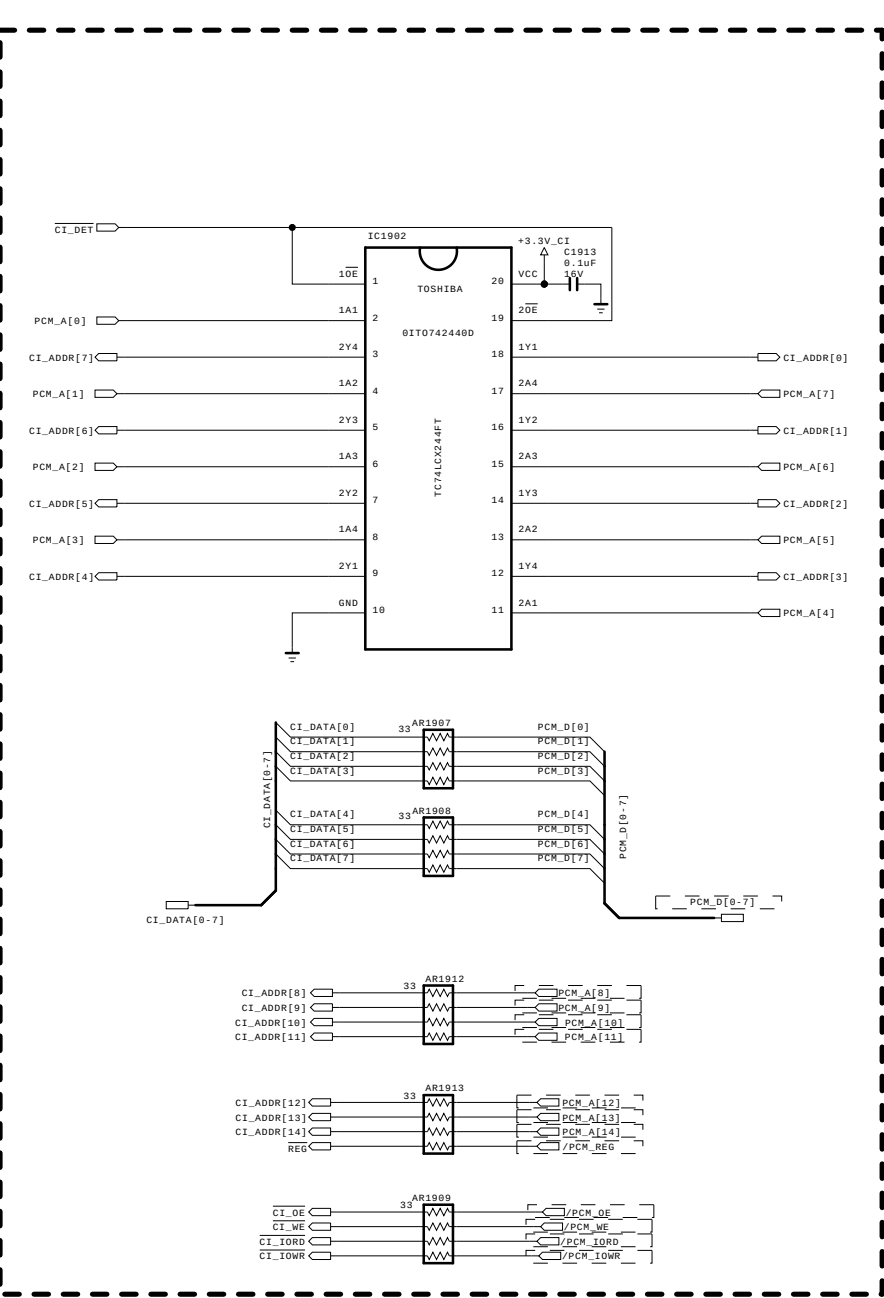
CI Region



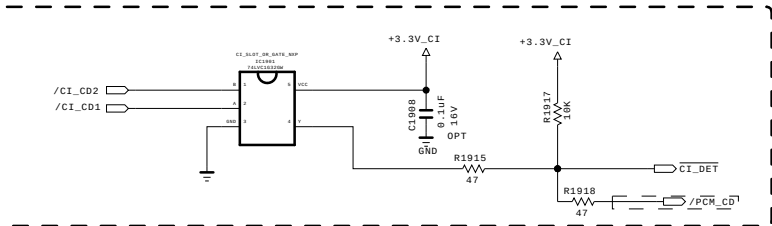
CI TS INPUT



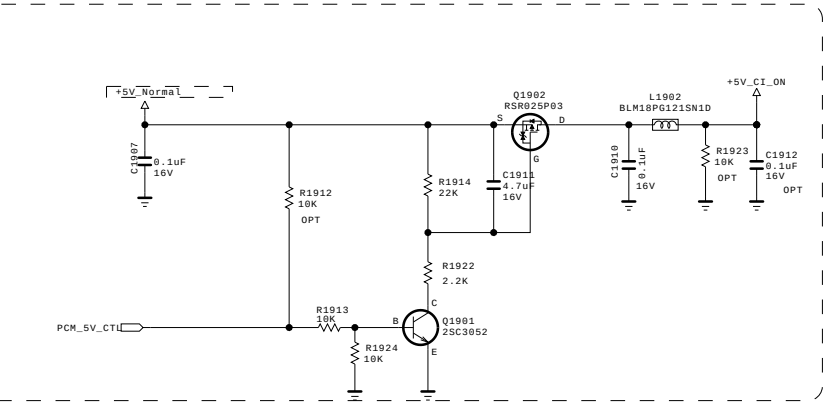
CI HOST I/F



CI DETECT



CI POWER ENABLE CONTROL



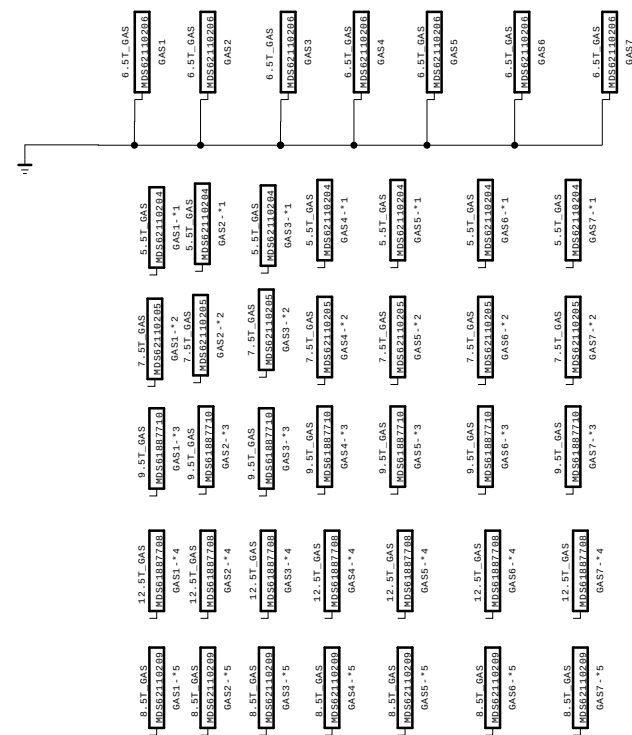
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|       |       |       |          |
|-------|-------|-------|----------|
| MODEL | GP2R  | DATE  | 20101023 |
| BLOCK | PCMCi | SHEET | 20 /     |

SMD GASKET

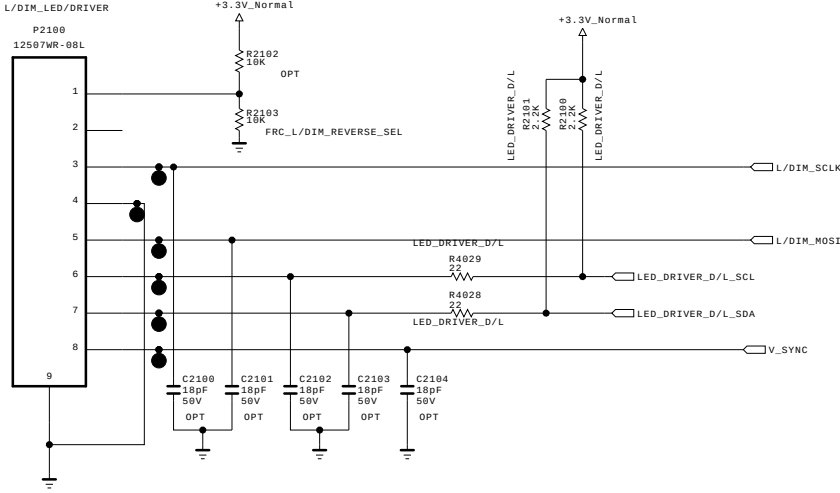


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|       |         |       |          |
|-------|---------|-------|----------|
| MODEL | GP2R    | DATE  | 20101023 |
| BLOCK | SMD_GAS | SHEET | 20 /     |



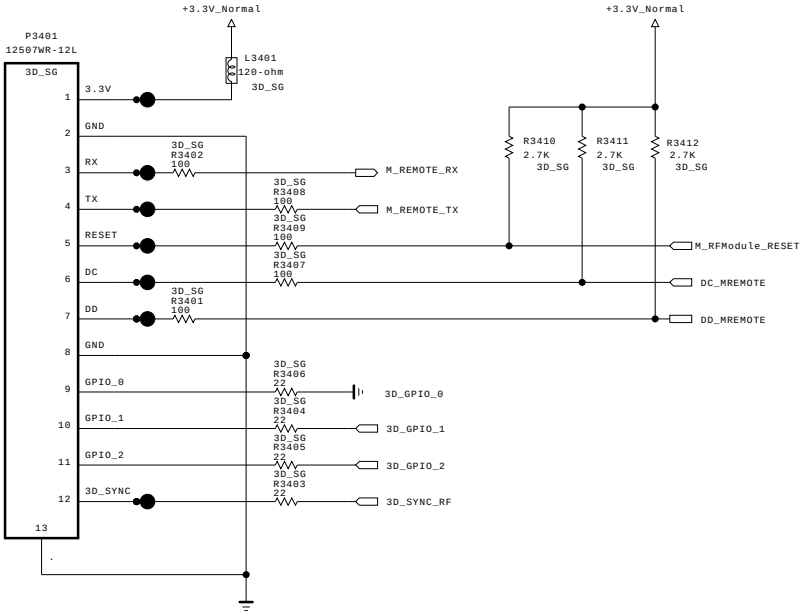
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|       |           |       |          |
|-------|-----------|-------|----------|
| MODEL | GP2R      | DATE  | 20101023 |
| BLOCK | L/DIM_LED | SHEET | 21 /     |

## TI solution RF-3D OPTION



| FREQ.    | GPIO0_0 | GPIO0_1 | GPIO0_2 |
|----------|---------|---------|---------|
| 3D Off   | 0       | 0       | 0       |
| 60Hz     | 0       | 0       | 1       |
| 59.94Hz  | 0       | 1       | 0       |
| 50Hz     | 0       | 1       | 1       |
| RESERVED | 1       | 0       | 0       |
| RESERVED | 1       | 0       | 1       |
| RESERVED | 1       | 1       | 0       |
| RESERVED | 1       | 1       | 1       |

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|       |  |       |   |
|-------|--|-------|---|
| MODEL |  | DATE  |   |
| BLOCK |  | SHEET | / |



## 1. Trouble Shooting

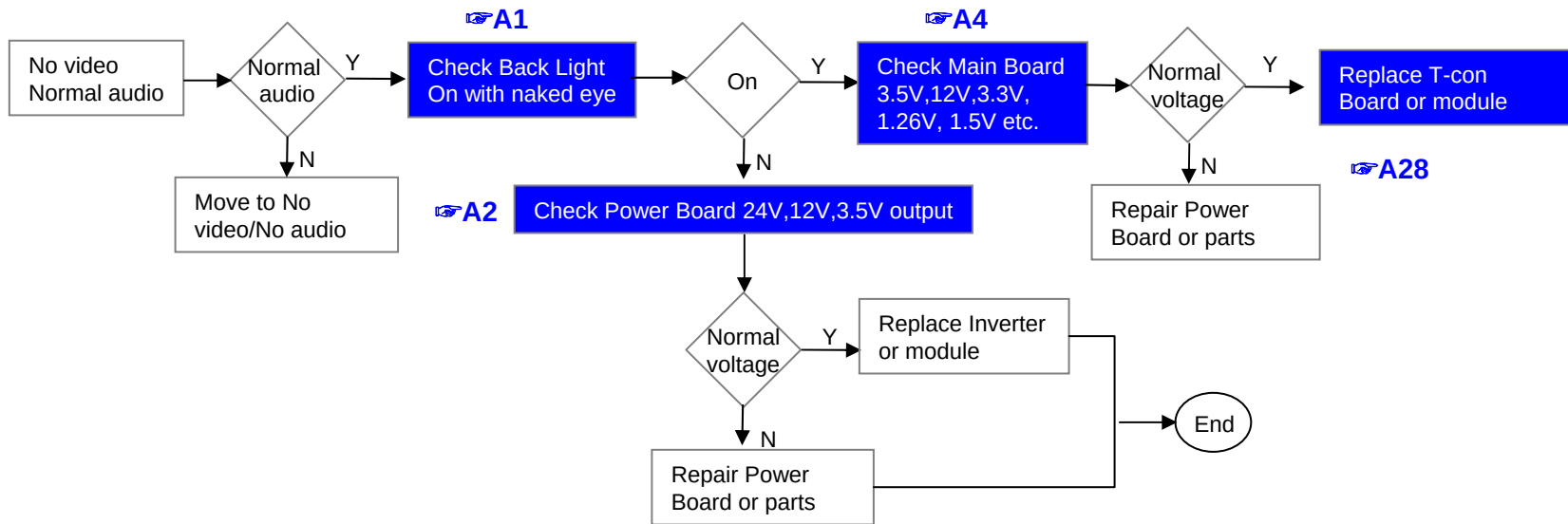
# Contents of LCD TV Standard Repair Process

| No. | Error symptom (High category) | Error symptom (Mid category)                                                     | Page | Remarks |
|-----|-------------------------------|----------------------------------------------------------------------------------|------|---------|
| 1   | A. Video error                | No video/Normal audio                                                            | 1    |         |
| 2   |                               | No video/No audio                                                                | 2    |         |
| 3   |                               | Video error, video lag/stop                                                      | 3    |         |
| 4   |                               | Color error                                                                      | 4    |         |
| 5   |                               | Vertical/Horizontal bar, residual image, light spot, external device color error | 5    |         |
| 6   | B. Power error                | No power                                                                         | 6    |         |
| 7   |                               | Off when on, off while viewing, power auto on/off                                | 7    |         |
| 8   | C. Audio error                | No audio/Normal video                                                            | 8    |         |
| 9   |                               | Wrecked audio/discontinuation/noise                                              | 9    |         |
| 10  | D. Function error             | No response in remote controller, key error, recording error, memory error       | 10   |         |
| 11  |                               | External device recognition error                                                | 11   |         |
| 12  | E. Noise                      | Circuit noise, mechanical noise                                                  | 12   |         |
| 13  | F. Exterior error             | Exterior defect                                                                  | 13   |         |

# Standard Repair Process

| LCD TV | Error symptom | A. Video error         | Established date |  |      |
|--------|---------------|------------------------|------------------|--|------|
|        |               | No video/ Normal audio | Revised date     |  | 1/13 |

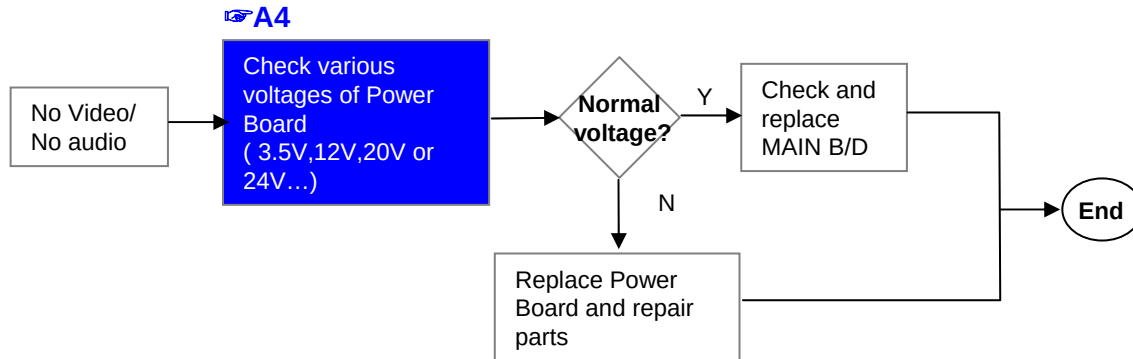
**First of all, Check whether all of cables between board is inserted properly or not.  
(Main B/D ↔ Power B/D, LVDS Cable, Speaker Cable, IR B/D Cable,,)**



※ Precaution A7 & A3



| LCD TV | Error symptom | A. Video error     | Established date |  |      |
|--------|---------------|--------------------|------------------|--|------|
|        |               | No video/ No audio | Revised date     |  | 2/13 |

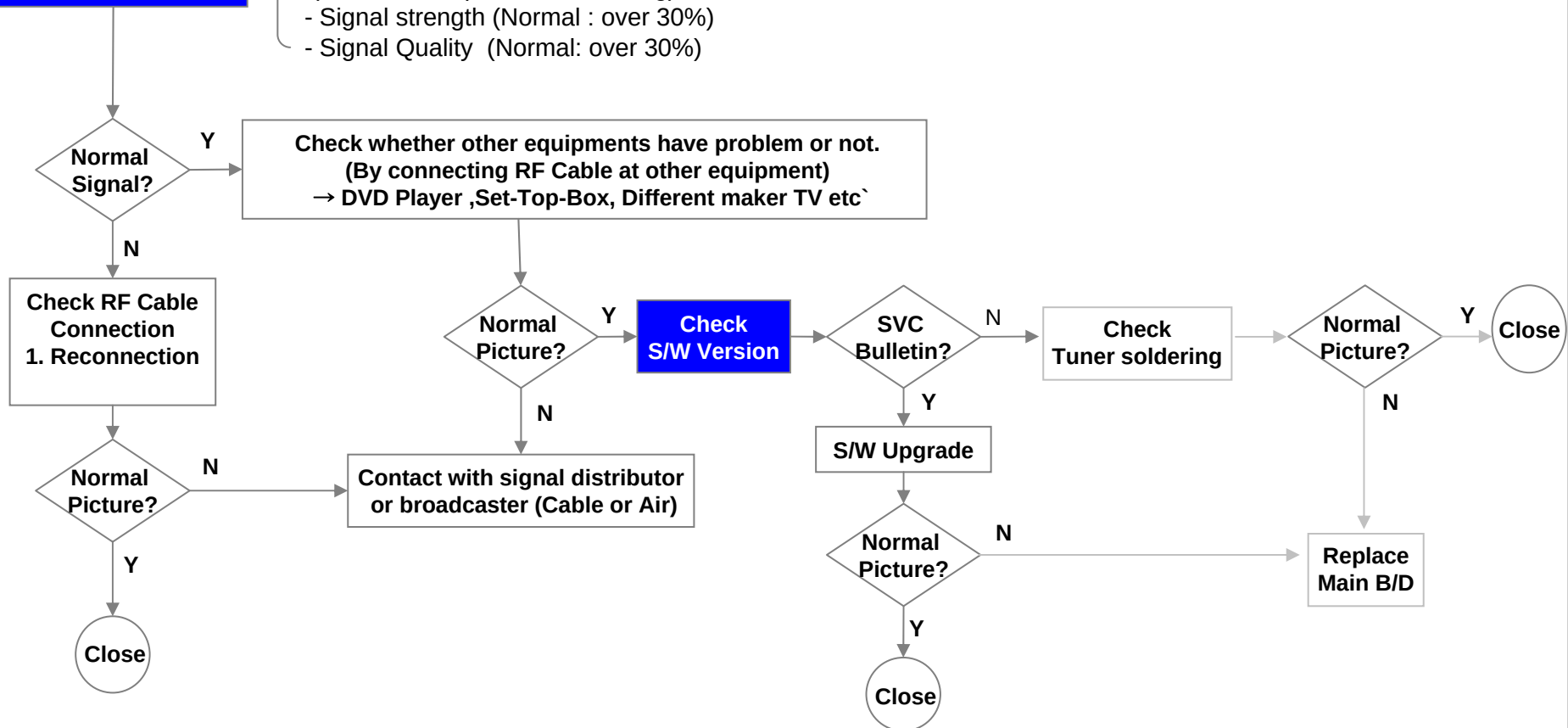




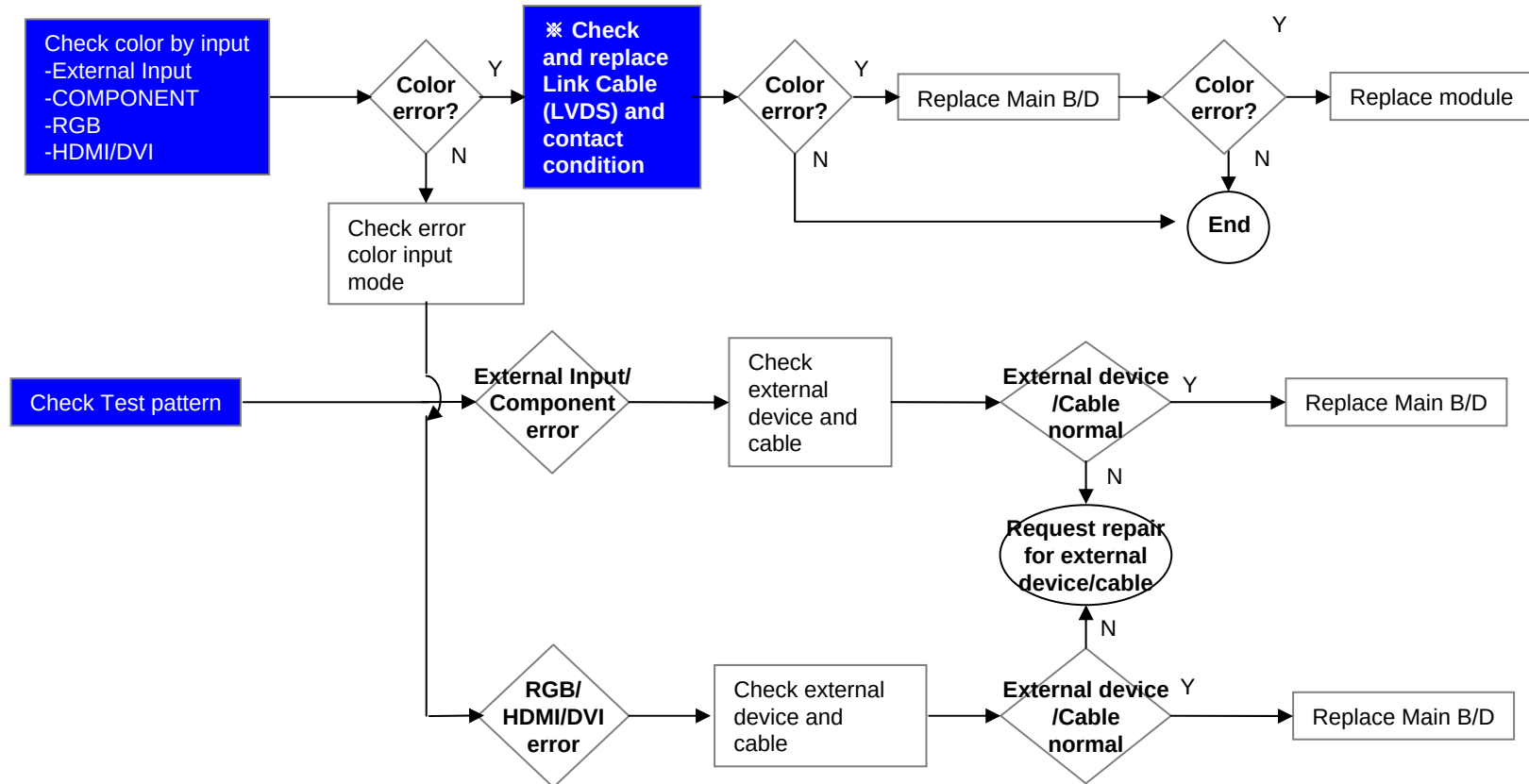
| LCD TV | Error symptom | A. Picture Problem       | Established date |  |      |
|--------|---------------|--------------------------|------------------|--|------|
|        |               | Picture broken/ Freezing | Revised date     |  | 3/13 |

### Check RF Signal level

- . By using Digital signal level meter
- . By using Diagnostics menu on OSD  
( Menu→Setup→Manual Tuning)
- Signal strength (Normal : over 30%)
- Signal Quality (Normal: over 30%)



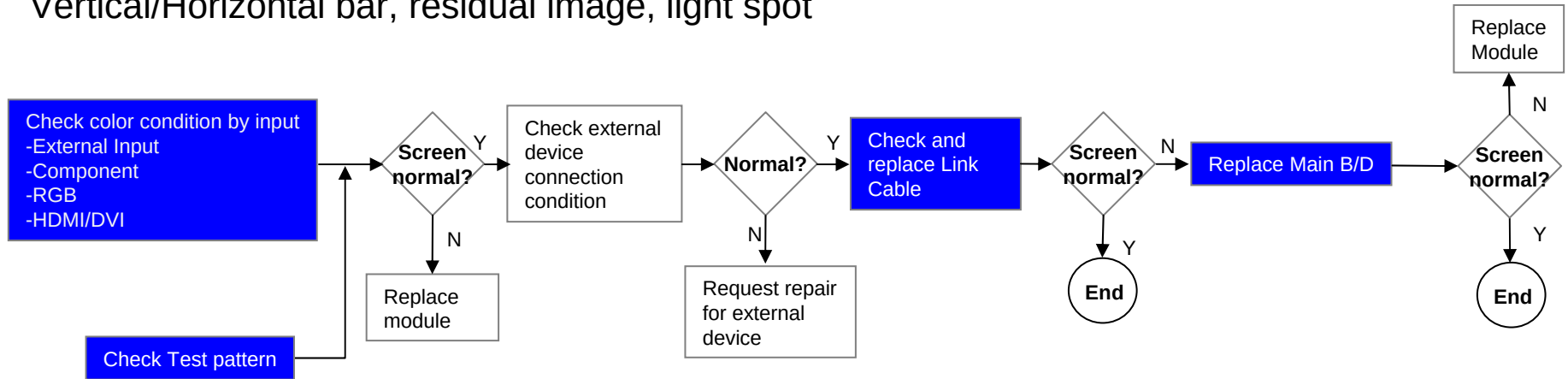
| LCD TV | Error symptom | A. Video error | Established date |  |      |
|--------|---------------|----------------|------------------|--|------|
|        |               | Color error    | Revised date     |  | 4/13 |



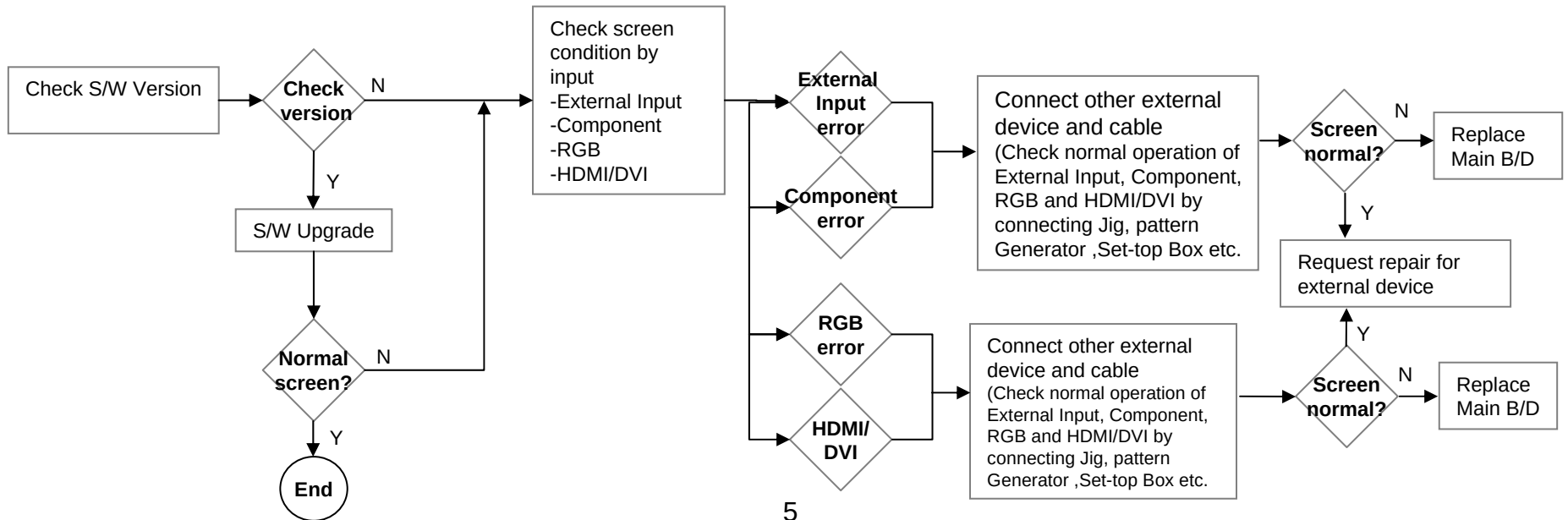
# Standard Repair Process

| LCD TV | Error symptom | A. Video error                                                                     | Established date |  |      |
|--------|---------------|------------------------------------------------------------------------------------|------------------|--|------|
|        |               | Vertical / Horizontal bar, residual image, light spot, external device color error | Revised date     |  | 5/13 |

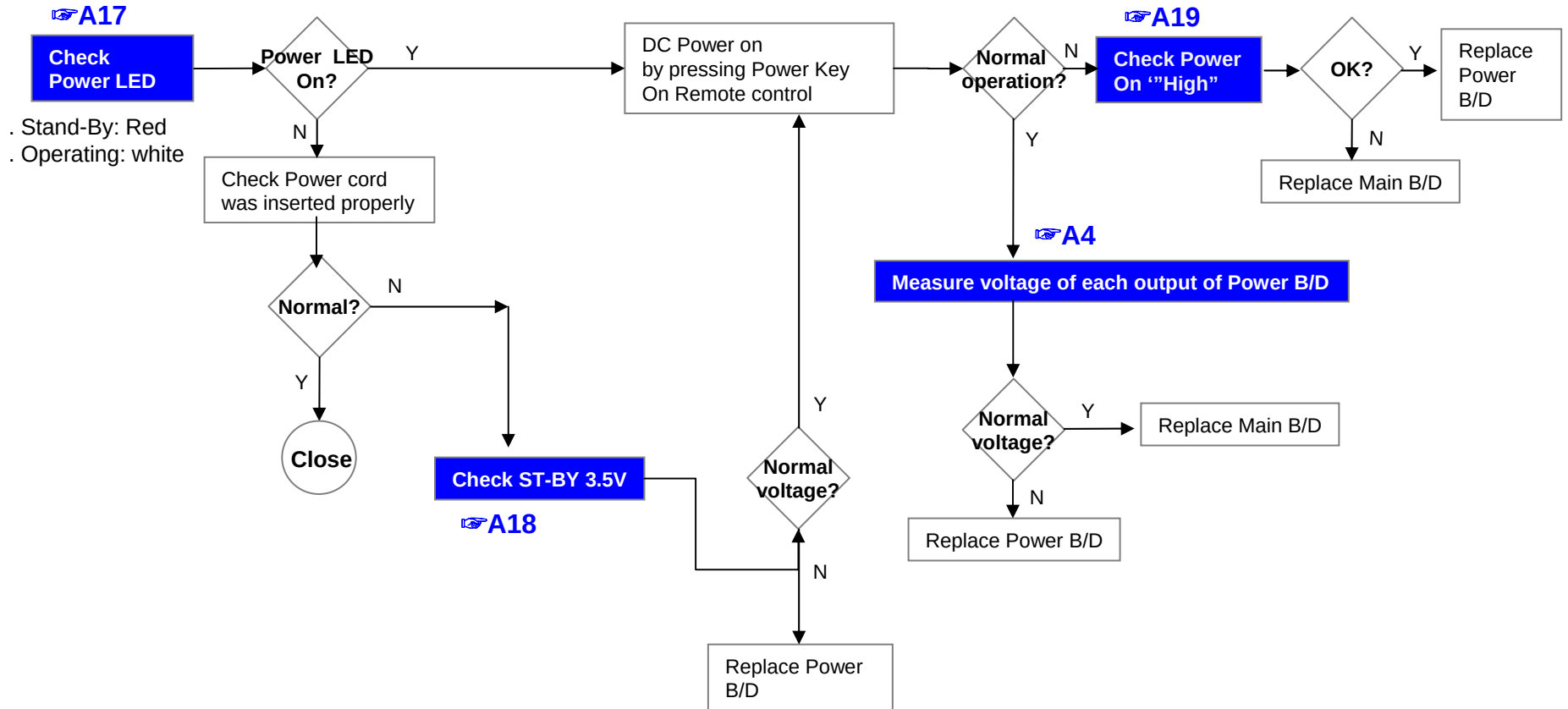
## Vertical/Horizontal bar, residual image, light spot



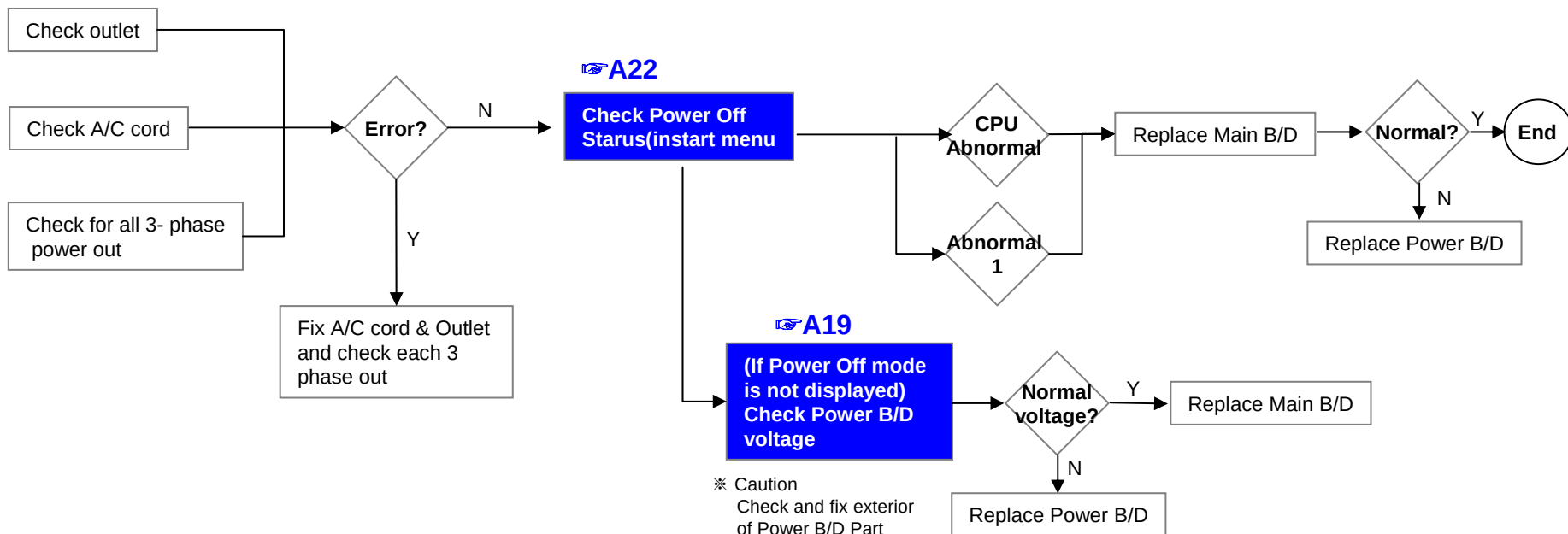
## External device screen error-Color error



| LCD TV | Error symptom | B. Power error | Established date |  |      |
|--------|---------------|----------------|------------------|--|------|
|        |               | No power       | Revised date     |  | 6/13 |



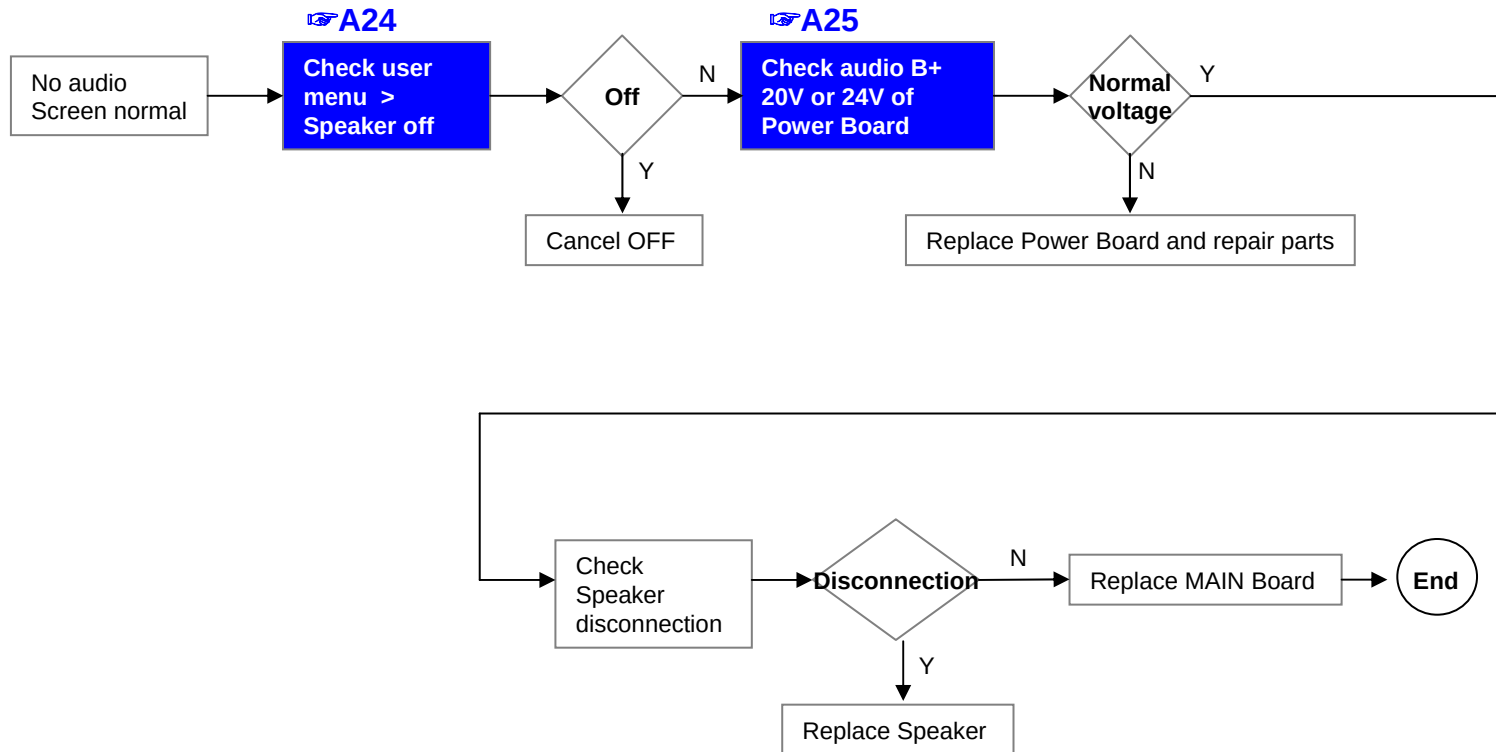
| LCD TV | Error symptom | B. Power error                                    | Established date |  |      |
|--------|---------------|---------------------------------------------------|------------------|--|------|
|        |               | Off when on, off while viewing, power auto on/off | Revised date     |  | 7/13 |



\* Please refer to the all cases which can be displayed on power off mode.

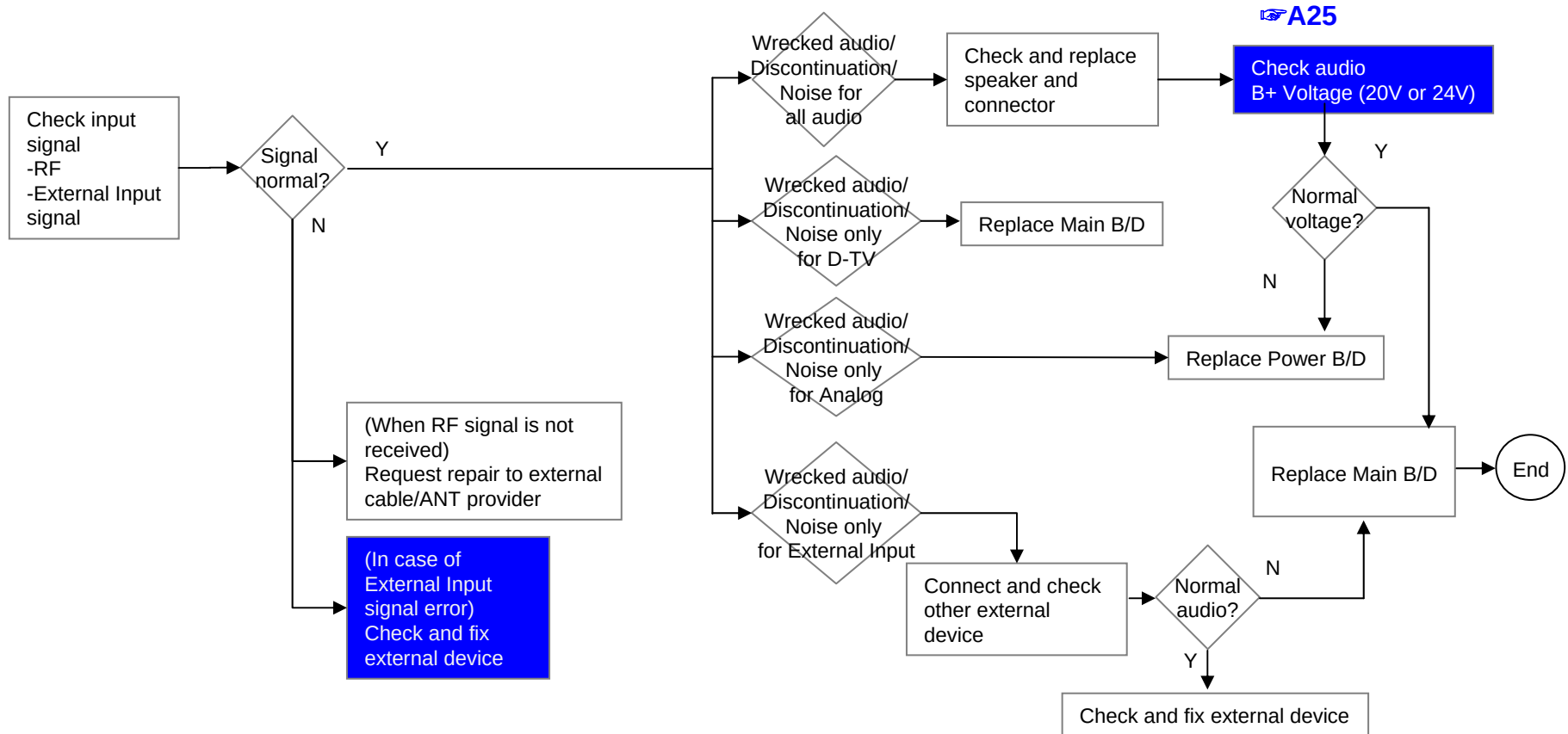
| Status   | Power off List         | Explanation                                     |
|----------|------------------------|-------------------------------------------------|
| Normal   | "POWEROFF_REMOTEKEY"   | Power off by REMOTE CONTROL                     |
|          | "POWEROFF_OFFTIMER"    | Power off by OFF TIMER                          |
|          | "POWEROFF_SLEEPTIMER"  | Power off by SLEEP TIMER                        |
|          | "POWEROFF_INSTOP"      | Power off by INSTOP KEY                         |
|          | "POWEROFF_AUTOOFF"     | Power off by AUTO OFF                           |
|          | "POWEROFF_ONTIMER"     | Power off by ON TIMER                           |
|          | "POWEROFF_RS232C"      | Power off by RS232C                             |
|          | "POWEROFF_RESREC"      | Power off by Reserved Record                    |
|          | "POWEROFF_RECEND"      | Power off by End of Recording                   |
|          | "POWEROFF_SWDOWN"      | Power off by S/W Download                       |
| Abnormal | "POWEROFF_UNKNOWN"     | Power off by unknown status except listed case  |
|          | "POWEROFF_ABNORMAL1"   | Power off by abnormal status except CPU trouble |
|          | "POWEROFF_CPUABNORMAL" | Power off by CPU Abnormal                       |

| LCD TV | Error symptom | C. Audio error         | Established date |  |      |
|--------|---------------|------------------------|------------------|--|------|
|        |               | No audio/ Normal video | Revised date     |  | 8/13 |



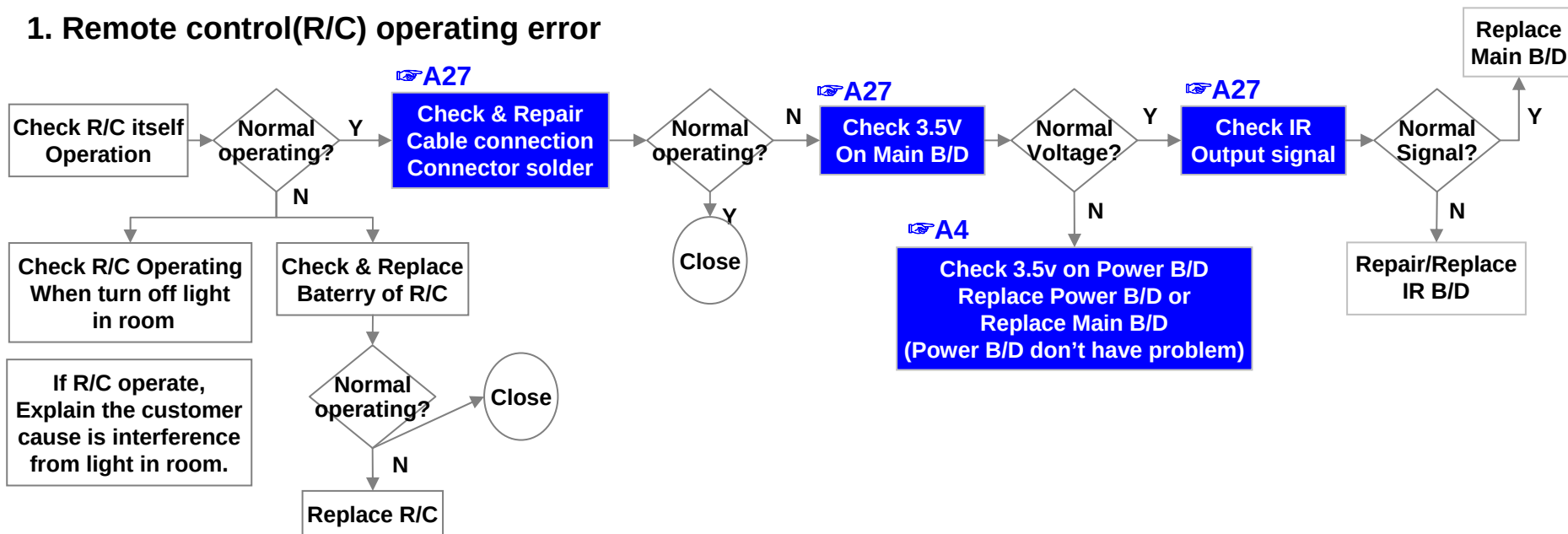
| LCD TV | Error symptom | C. Audio error                       | Established date |  |      |
|--------|---------------|--------------------------------------|------------------|--|------|
|        |               | Wrecked audio/ discontinuation/noise | Revised date     |  | 9/13 |

→ abnormal audio/discontinuation/noise is same after “Check input signal” compared to No audio



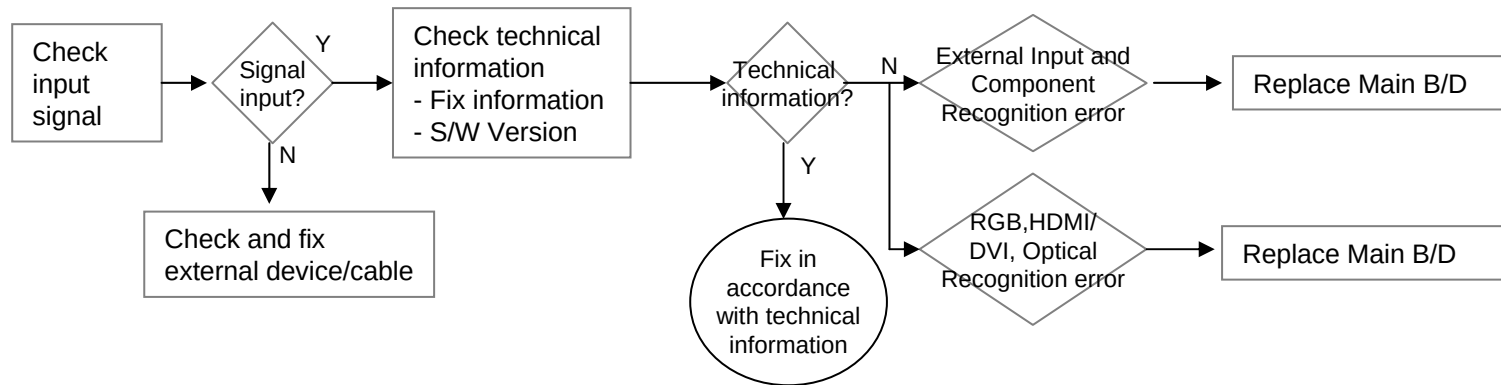
| LCD TV | Error symptom | D. General Function Problem            | Established date |  |       |
|--------|---------------|----------------------------------------|------------------|--|-------|
|        |               | Remote control & Local switch checking | Revised date     |  | 10/13 |

## 1. Remote control(R/C) operating error

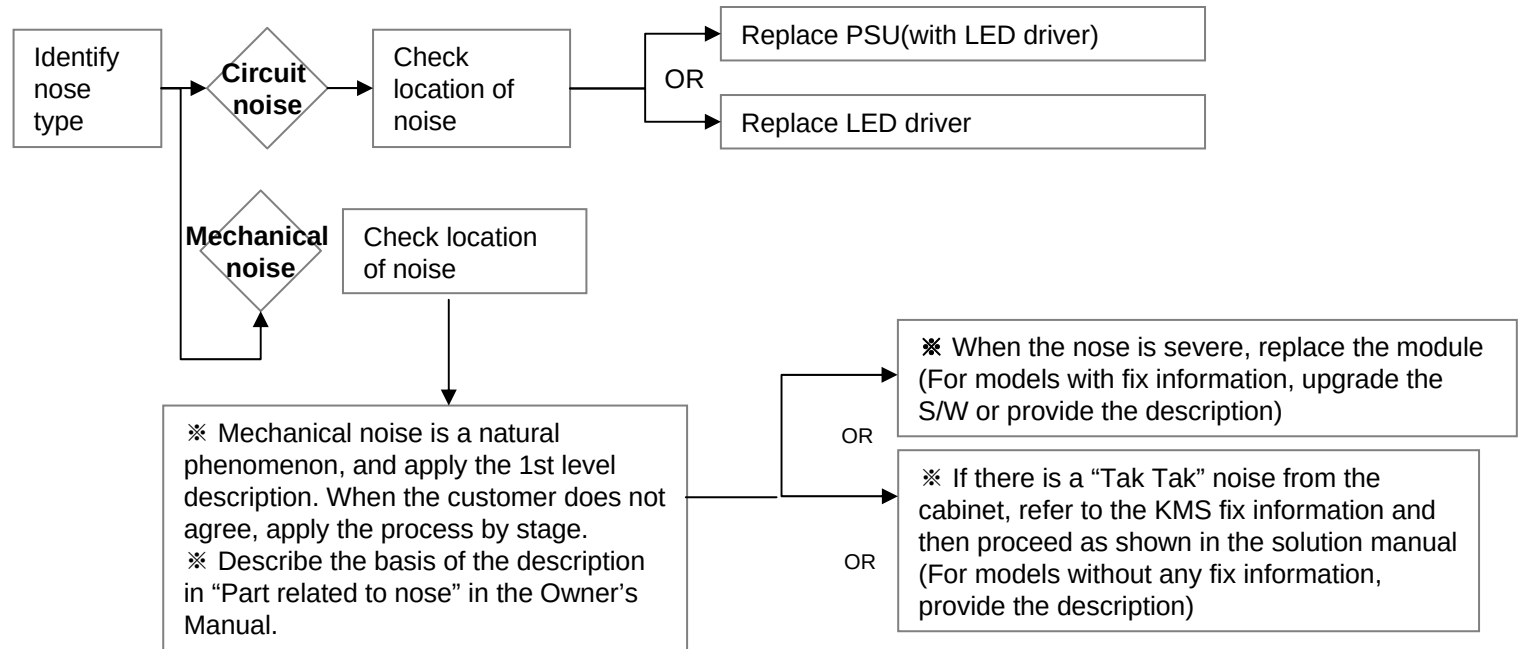




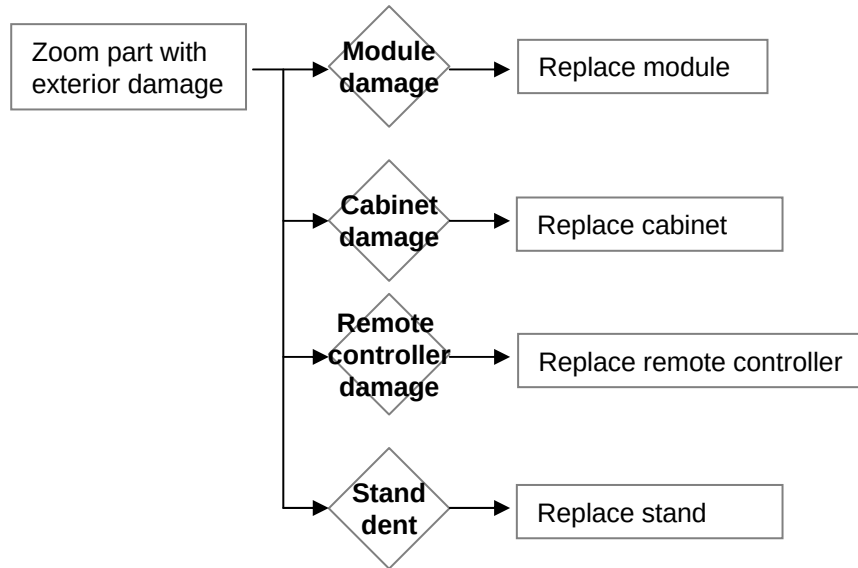
| LCD TV | Error symptom | D. Function error                 | Established date |  |       |
|--------|---------------|-----------------------------------|------------------|--|-------|
|        |               | External device recognition error | Revised date     |  | 11/13 |



| LCD TV | Error symptom | E. Noise                        | Established date |  |       |
|--------|---------------|---------------------------------|------------------|--|-------|
|        |               | Circuit noise, mechanical noise | Revised date     |  | 12/13 |



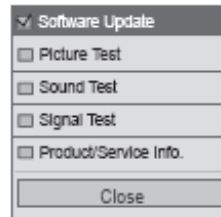
| LCD TV | Error symptom | F. Exterior defect | Established date |  |       |
|--------|---------------|--------------------|------------------|--|-------|
|        |               | Exterior defect    | Revised date     |  | 13/13 |



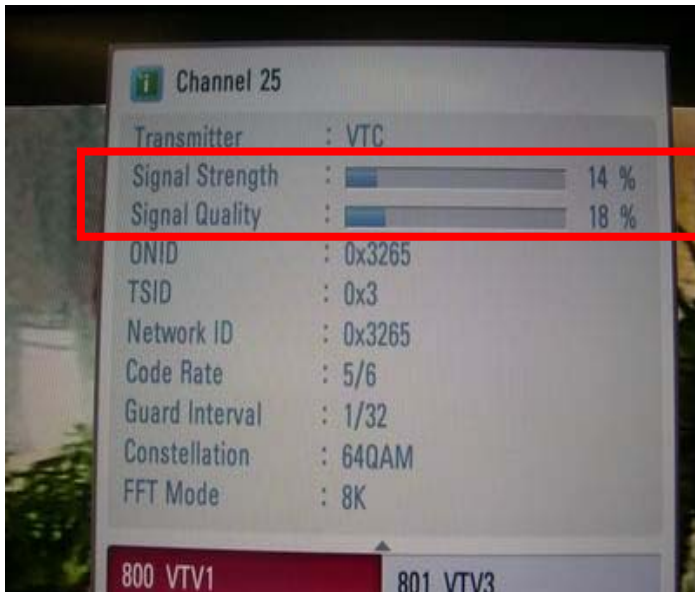
# Standard Repair Process Detail Technical Manual

|        |               |                                             |                  |  |    |
|--------|---------------|---------------------------------------------|------------------|--|----|
| LCD TV | Error symptom | A. Video error_Video error, video lag/stop  | Established date |  |    |
|        | Content       | TUNER input signal strength checking method | Revised date     |  | A6 |

<ALL MODELS>



MENU → red key(customer support → signal test  
→ select channel



When the signal is strong, use the attenuator (-10dB, -15dB, -20dB etc.)



# Standard Repair Process Detail Technical Manual

|        |               |                                            |                  |  |    |
|--------|---------------|--------------------------------------------|------------------|--|----|
| LCD TV | Error symptom | A. Video error_Video error, video lag/stop | Established date |  |    |
|        | Content       | LCD-TV Version checking method             | Revised date     |  | A7 |

<ALL MODELS>

## 1. Checking method for remote controller for adjustment

Version

**IN START**

Model Name : GLOBAL-PLAT2

Serial Number: 912KCEA67924

S/W Version : 02.08.04.01

MICOM Version : 3.03.6

BOOT Version : 1.01.77

FRC Version : 1.50

IR LED Version : 12

EDID Version (RGB) : 0.02

EDID Version (HDMI) : 0.04

Chip Type : BCM 3556

Wireless Host Ver. : 0.00.0

Wireless B/B Ver. : 0.00.0

Wi-Fi Version : 1.0

Wi-Fi Channel : 0

Wi-Fi MAC : 00:00:00:00:00:00

MAC Address : 00:E0:91:C7:09:5F

Local Dimming Ver. : 0x0703

Debug Status : EVENT

UTT : 2

APP History Ver.: 31641

PQL DB : LGD\_EF\_LGT10\_ALLxN42

**Adjust Check**

1. Adjust Check
2. ADC Data
3. Power Off Status
4. System 1
5. System 2
6. Model Number D/L
7. Test Option
8. External ADC
9. Spread Spectrum
10. Sync Level
11. Wireless Ready
12. Stable Count
13. ODC Test
14. Local Dimming

**Adjust Check**

1. Country Group ( Press OK to Save )

Country Group Code : 04

Country Group : EU

Country : ---

2. Tool Option

Tool Option1 : 33024

Tool Option2 : 31795

Tool Option3 : 56364

Tool Option4 : 22958

Tool Option5 : 2870

3. Adjust White Balance : OK(6)

4. Adjust ADC : OK

480i Component : OK

1080p Component : OK

RGB : OK

5. EDID : NG

RGB : NG (0x1D)

HDMI1 : OK (0xD7,0x19)

HDMI2 : OK (0xD7,0x9)

HDMI3 : OK (0xD7,0xF9)

HDMI4 : OK (0xD7,0xE9)

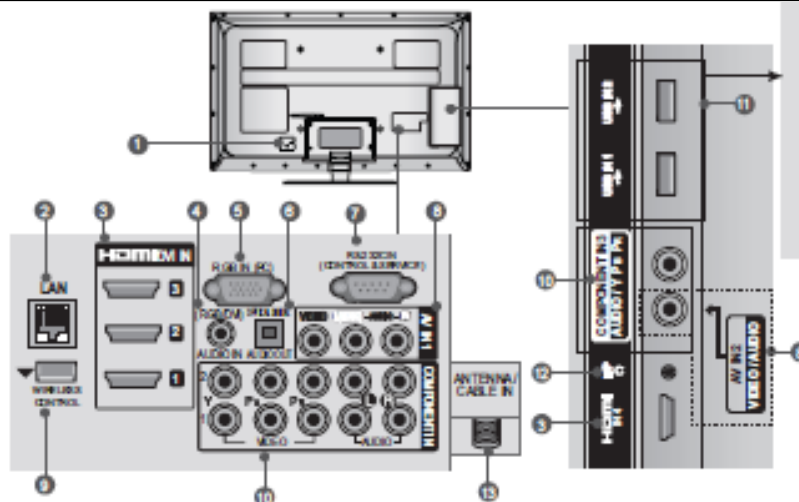
6. CI+ Key : OK(1C58E7247540B1DD)



Press the IN-START with the remote controller for adjustment

# Standard Repair Process Detail Technical Manual

|        |               |                                                                     |                  |  |    |
|--------|---------------|---------------------------------------------------------------------|------------------|--|----|
| LCD TV | Error symptom | A. Video error _Vertical/Horizontal bar, residual image, light spot | Established date |  |    |
|        | Content       | LCD TV connection diagram (1)                                       | Revised date     |  | A8 |

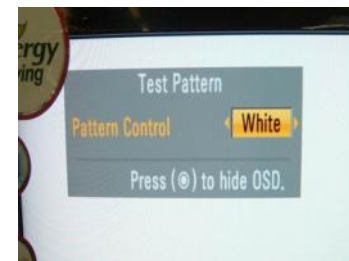
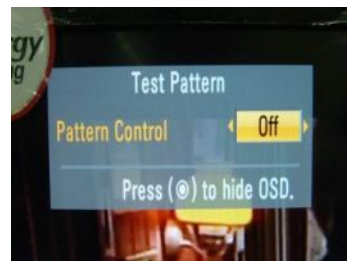
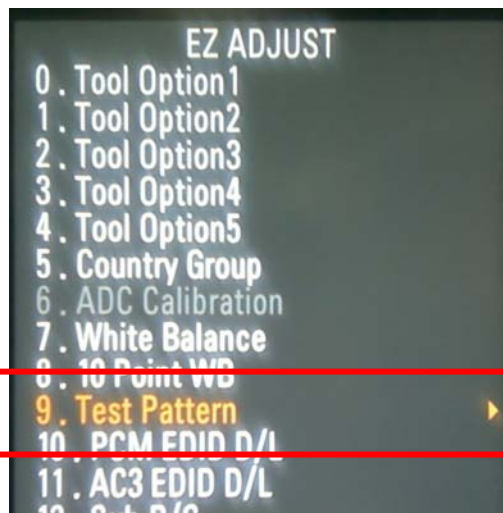


- ❶ Power Cord Socket  
This TV operates on an AC power. The voltage is indicated on the Specifications page. Never attempt to operate the TV on DC power.
- ❷ LAN  
Network connection for Weather info, Photo Album, Movie Online, etc.  
Also used for video, photo and music files on a local network.
- ❸ HDMI/DVI IN Input  
Connect an HDMI signal to HDMI IN. Or DVI (VIDEO) signal to HDMI/DVI port with DVI to HDMI cable.
- ❹ RGB/DVI Audio Input  
Connect the audio from a PC or DTV.
- ❺ RGB IN Input  
Connect the output from a PC.
- ❻ OPTICAL DIGITAL AUDIO OUT  
Connect digital audio to various types of equipment.  
Connect to a Digital Audio Component.  
Use an Optical audio cable.
- ❼ RS-232C IN (CONTROL & SERVICE) PORT  
Connect to the RS-232C port on a PC.  
This port is used for Service or Hotel mode.
- ❽ Audio/Video Input  
Connect audio/video output from an external device to these jacks.
- ❾ WIRELESS Control  
Connect the Wireless Dongle to the TV to control the external input devices connected to Media Box wirelessly.
- ❿ Component Input  
Connect a component video/audio device to these jacks.
- ⓫ USB Input  
Connect USB storage device to this jack.
- ⓬ Headphone Socket  
Plug the headphone into the headphone socket.
- ⓭ Antenna / Cable Input  
Connect antenna or cable to this jack.



# Standard Repair Process Detail Technical Manual

|        |               |                                   |                  |  |     |
|--------|---------------|-----------------------------------|------------------|--|-----|
| LCD TV | Error symptom | A. Video error_Color error        | Established date |  |     |
|        | Content       | Adjustment Test pattern - ADJ Key | Revised date     |  | A12 |



You can view 6 types of patterns using the ADJ Key

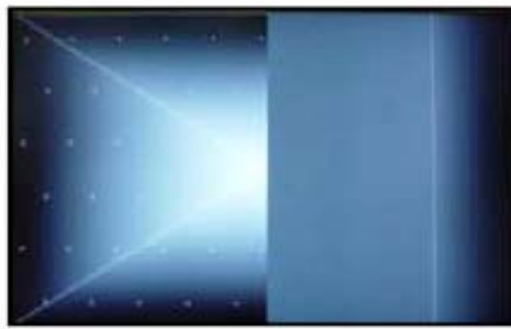
Checking item : 1. Defective pixel 2. Residual image 3. MODULE error (ADD-BAR,SCAN BAR..)  
4.Video error (Classification of MODULE or Main-B/D!)

**A12**

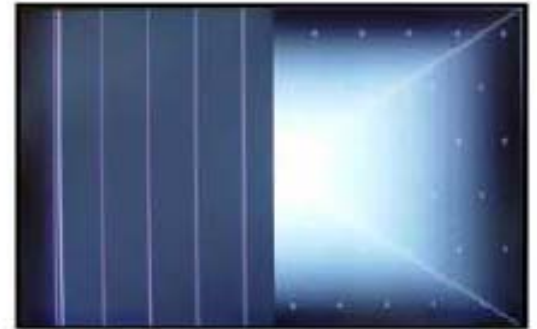
## Appendix : Exchange T-Con Board (1)



Solder defect, CNT Broken



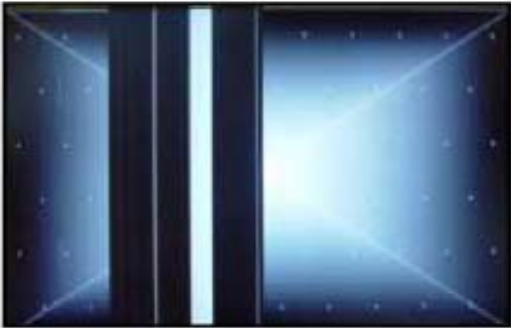
Solder defect, CNT Broken



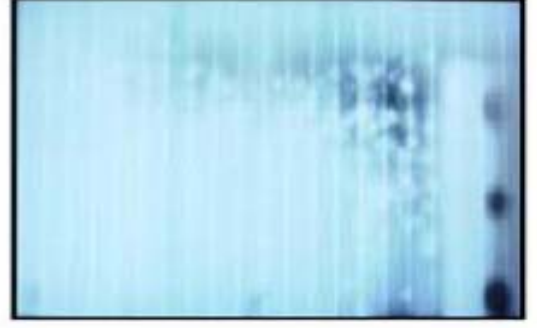
Solder defect, CNT Broken



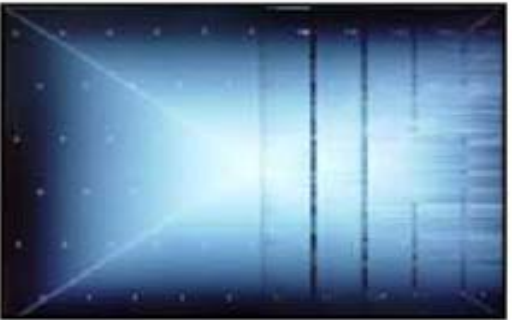
Solder defect, CNT Broken



Solder defect, CNT Broken



Abnormal Power Section



Solder defect, Short/Crack



Abnormal Power Section



Solder defect, Short/Crack



## Appendix : Exchange T-Con Board (2)



Abnormal Power Section



Abnormal Power Section



Solder defect, Short/Crack



Solder defect, Short/Crack



Fuse Open, Abnormal power section



Abnormal Display



GRADATION



Noise



GRADATION

## Appendix : Exchange PSU(LED driver)



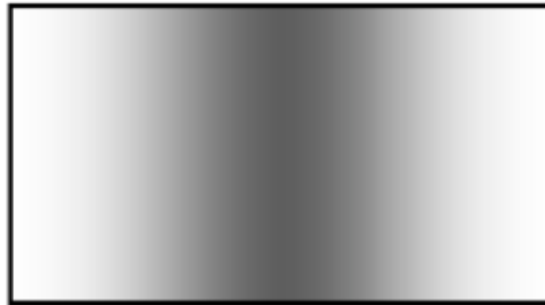
No Light



Dim Light



Dim Light



Dim Light



No picture/Sound Ok

## Appendix : Exchange the Module (1)



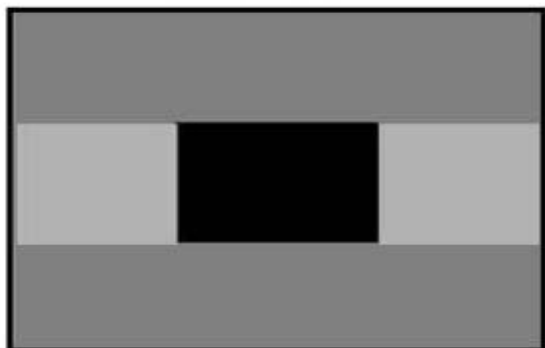
Panel Mura, Light leakage



Panel Mura, Light leakage



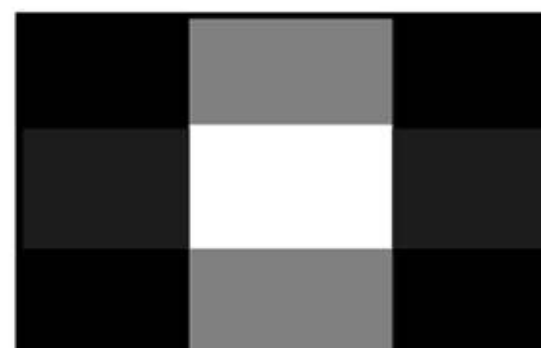
Press damage



Crosstalk



Press damage



Crosstalk

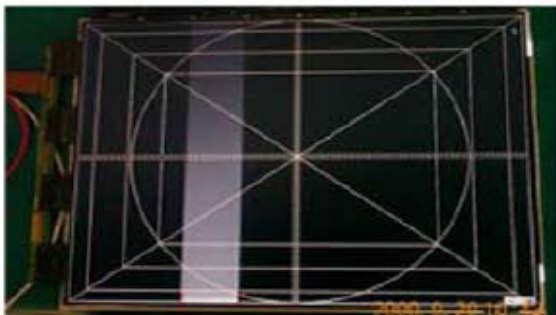


Press damage

### Un-repairable Cases

In this case please exchange the module.

## Appendix : Exchange the Module (2)



Vertical Block  
Source TAB IC Defect



Vertical Line  
Source TAB IC Defect



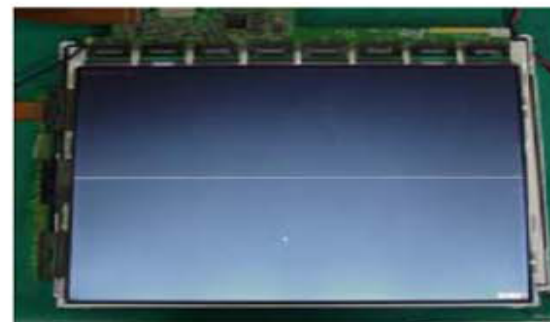
Vertical Block  
Source TAB IC Defect



Horizontal Block  
Gate TAB IC Defect



Horizontal Block  
Gate TAB IC Defect



Horizontal line  
Gate TAB IC Defect



Horizontal Block  
Gate TAB IC Defect

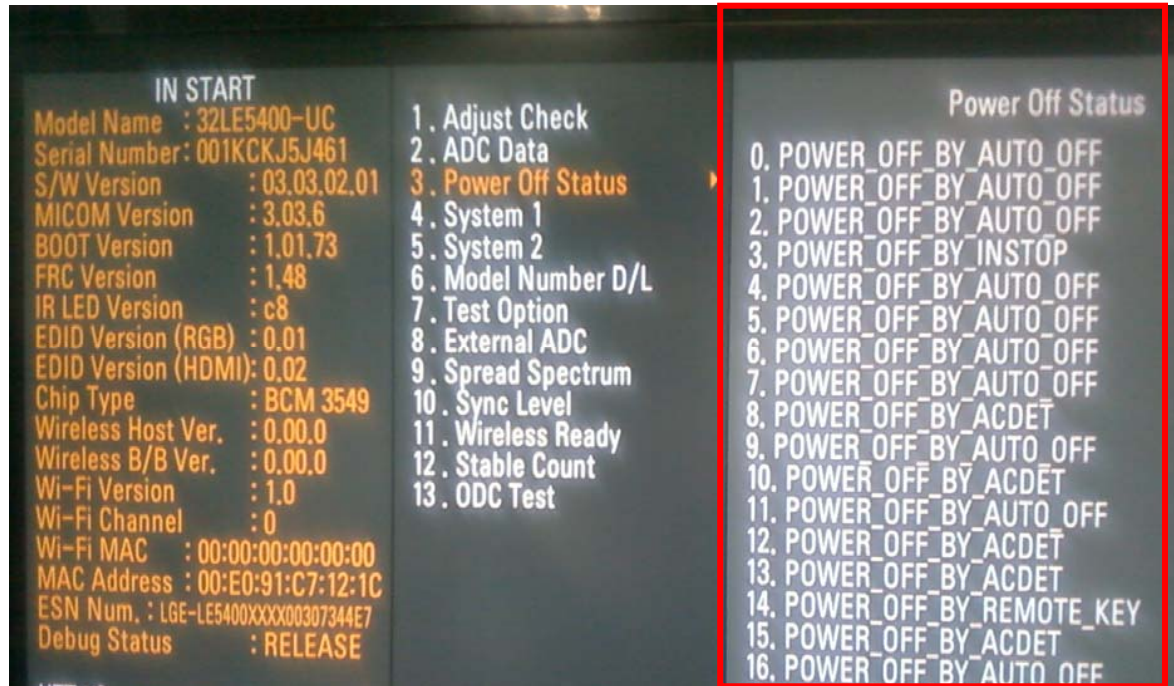
### Un-repairable Cases

In this case please exchange the module.

# Standard Repair Process Detail Technical Manual

|        |               |                                                  |                  |  |     |
|--------|---------------|--------------------------------------------------|------------------|--|-----|
| LCD TV | Error symptom | B. Power error _Off when on, off whiling viewing | Established date |  |     |
|        | Content       | POWER OFF MODE checking method                   | Revised date     |  | A22 |

<ALL MODELS>



## Entry method

1. Press the IN-START button of the remote controller for adjustment
2. Check the entry into adjustment item 3



# Standard Repair Process Detail Technical Manual

|        |               |                                                |                  |  |     |
|--------|---------------|------------------------------------------------|------------------|--|-----|
| LCD TV | Error symptom | C. Audio error_No audio/Normal video           | Established date |  |     |
|        | Content       | Checking method in menu when there is no audio | Revised date     |  | A24 |

<ALL MODELS>



## Checking method

1. Press the MENU button on the remote controller
2. Select the AUDIO function of the Menu
3. Select TV Speaker from Off to On