Internal Use Only

North/Latin America http://aic.lgservice.com
Europe/Africa http://eic.lgservice.com
Asia/Oceania http://biz.lgservice.com

COLOR MONITOR

SERVICE MANUAL

MODEL: FLATRON **E2360S (E2360S-PNW.A**NAP for LGD LM230WF5-TRA1)/**
E2360T (E2360T-PNW.ANAP forLGD LM230WF5-TRA1) **Sales Market**

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

*To apply the **M-STAR Chip**.

CONTENTS

SPECIFICATIONS

E2360S&T

1. LCD CHARACTERISTICS

Type: Flat Panel Active matrix-TFT LCD
Active Display Area: 23.0 inches/58.4 cm
Pixel Pitch: 0.265 mm x 0.265 mm
Surface Treatment: Anti-Glare coating
Resolution: Max: VESA 1920x1080@60Hz.
Recommend: VESA 1920x1080@60Hz.

Video Input:
Signal Input: 15 pin D-Sub Connector;
DVI-D Connector **(Only for E2360T)**

Input Form: RGB Analog (0.7 Vp-p/75 ohm)
Digital **(Only for E2360T)**
Plug&Play: DDC2AB (Analog)
DDC2B (Digital) **(Only for E2360T)**

2. POWER SUPPLY

2-1. Power: 12V==3.0A

2-2. Power Consumption
On Mode: 30W (Typ.)
Sleep Mode: ≤ 1 W
Off Mode: ≤ 0.5 W

3. Sync Input

Horizontal Freq. 30 kHz to 83 kHz (Automatic)
Vertical Freq. 56 Hz to 75 Hz (Automatic)
Input Form Separate Sync.
Digital (**Only for E2360T)**

4. ENVIRONMENT

4-1. Operating
Temperature: 10°C to 35°C
Humidity: 10 % to 80% non-Condensing
4-2. Storage
Temperature: -20°C to 60 °C
Humidity: 5 % to 90 % non-Condensing

5. DIMENSIONS (with Stand)

Width 54.23 cm (21.35 inch)
Height 41.20 cm (16.22 inch)
Depth 17.20 cm (6.77 inch)
DIMENSIONS (without Stand)
Width 54.23 cm (21.35 inch)
Height 40.83 cm (16.07 inch)
Depth 3.10 cm (1.22 inch)

6. WEIGHT (excl. packing)

Weight: 2.6 kg (5.73 lb)

PRECAUTION

WARNING FOR THE SAFETY-RELATED COMPONENT.

- There are some special components used in LCD monitor that are important for safety. **These parts are marked ⚠ on the schematic diagram and the Exploded View.** It is essential that these critical parts should be replaced with the manufacturer's specified parts to prevent electric shock, fire or other hazard.
- Do not modify original design without obtaining written permission from manufacturer or you will void the original parts and labor guarantee.

TAKE CARE DURING HANDLING THE LCD MODULE WITH BACKLIGHT UNIT.

- Must mount the module using mounting holes arranged in four corners.
- Do not press on the panel, edge of the frame strongly or electric shock as this will result in damage to the screen.
- Do not scratch or press on the panel with any sharp objects, such as pencil or pen as this may result in damage to the panel.
- Protect the module from the ESD as it may damage the electronic circuit (C-MOS).
- Make certain that treatment person's body are grounded through wrist band.
- Do not leave the module in high temperature and in areas of high humidity for a long time.
- The module not be exposed to the direct sunlight.
- Avoid contact with water as it may a short circuit within the module.
- If the surface of panel become dirty, please wipe it off with a softmaterial. (Cleaning with a dirty or rough cloth may damage the panel.)

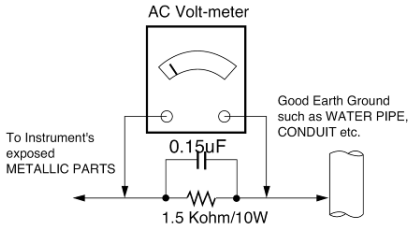
⚠CAUTION
Please use only a plastic screwdriver to protect yourself from shock hazard during service operation.

⚠WARNING

BE CAREFUL ELECTRIC SHOCK !

- If you want to replace with the new backlight (CCFL) or LIPS part, must disconnect the AC power because high voltage appears at inverter circuit about 650Vrms.
- Handle with care wires or connectors of the inverter circuit. If the wires are pressed cause short and may burn or take fire.

Leakage Current Hot Check Circuit



When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1 Ω
*Base on Adjustment standard

- **Replaceable batteries**

  * CAUTION
  RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE.
  DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS

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.
   d. Discharging the picture tube anode.
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. Discharge the picture tube anode only by (a) first connecting one end of an insulated clip lead to the degaussing or kine aquadag grounding system shield at the point where the picture tube socket ground lead is connected, and then (b) touch the other end of the insulated clip lead to the picture tube anode button, using an insulating handle to avoid personal contact with high voltage.
4. Do not spray chemicals on or near this receiver or any of its assemblies.
5. Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10% (by volume) Acetone and 90% (by volume) isopropyl alcohol (90%-99% strength)
   CAUTION: This is a flammable mixture.
   Unless specified otherwise in this service manual, lubrication of contacts in not required.
6. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
7. 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.
8. 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.
9. *Use with this receiver only the test fixtures specified in this service manual.*
   CAUTION: Do not connect the test fixture ground strap to any heat sink in this receiver.

Electrostatically Sensitive (ES) Devices

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

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

General Soldering Guidelines

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range or 500° F to 600° F.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25cm) brush with a metal handle.
   Do not use freon-propelled spray-on cleaners.
5. Use the following unsoldering technique
   a. Allow the soldering iron tip to reach normal temperature.
      (500° F to 600° F)
   b. Heat the component lead until the solder melts.
   c. Quickly draw the melted solder with an anti-static, suction-type solder removal device or with solder braid.
      CAUTION: Work quickly to avoid overheating the circuitboard 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).

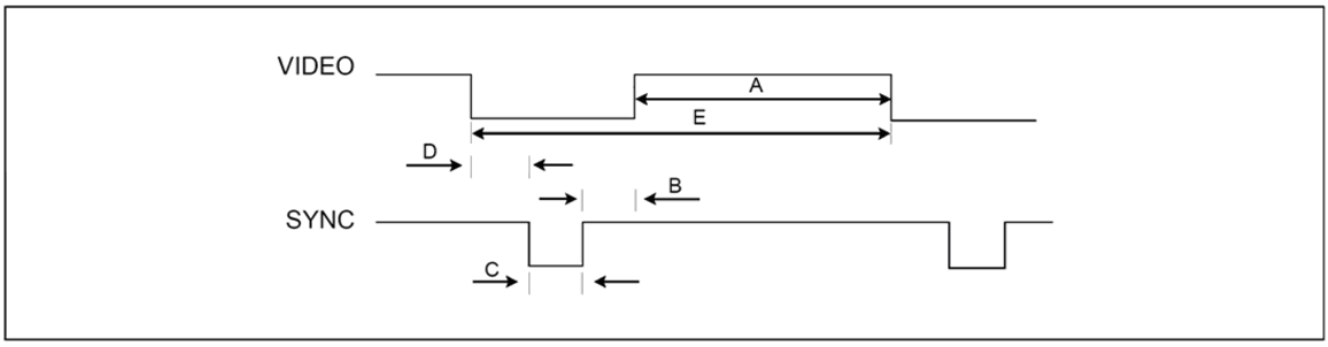
1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire 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.

TIMING CHART



E2360S&T

Display Modes (Resolution)		Horizontal Freq. (kHz)	Vertical Freq. (Hz)
1	720 x 400	31.468	70
2	640 x 480	31.469	60
3	640 x 480	37.500	75
4	800 x 600	37.879	60
5	800 x 600	46.875	75
6	1024 x 768	48.363	60
7	1024 x 768	60.123	75
8	1152 x 864	67.500	75
9	1280 x 1024	63.981	60
10	1280 x 1024	79.976	75
11	1680 x 1050	65.290	60
*12	1920 x 1080	67.500	60

*Recommend Mode

DISASSEMBLY-Set

#1

Put the monitor on a soft flat.

#2

Remove the base ass'y.

Turn the screw by using the screw handle.

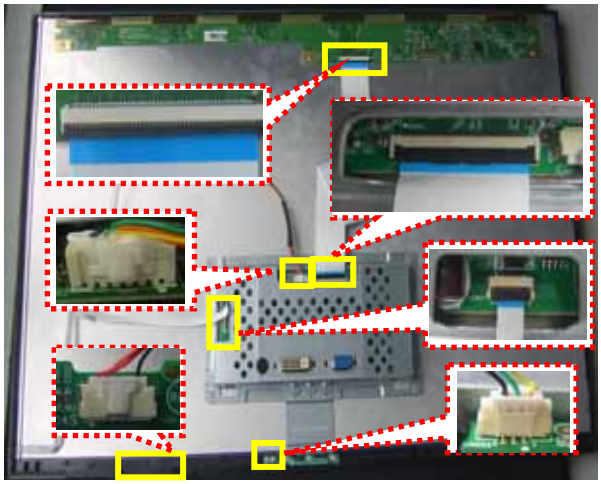
#3

Remove the Rear Cover ass'y.

#4

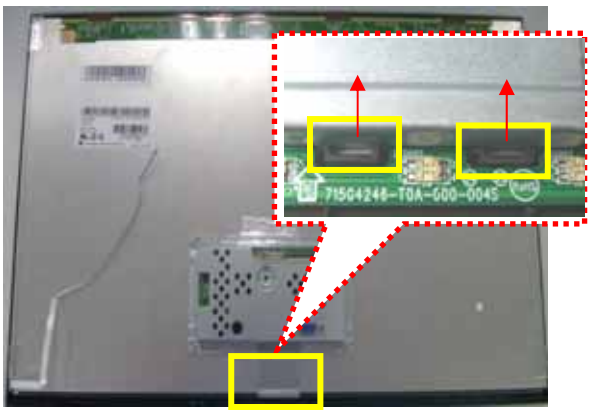
The Rear Cover ass'y.

#5



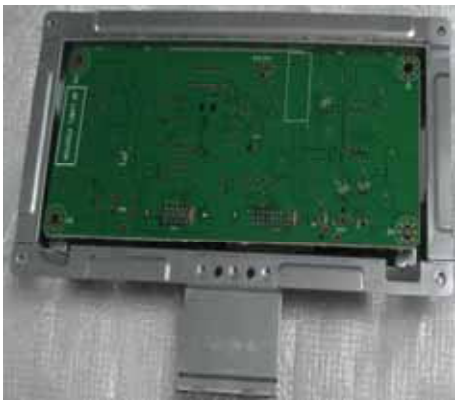
Disconnect all the wires/FFC cable.

#6



Remove the main frame.

#7



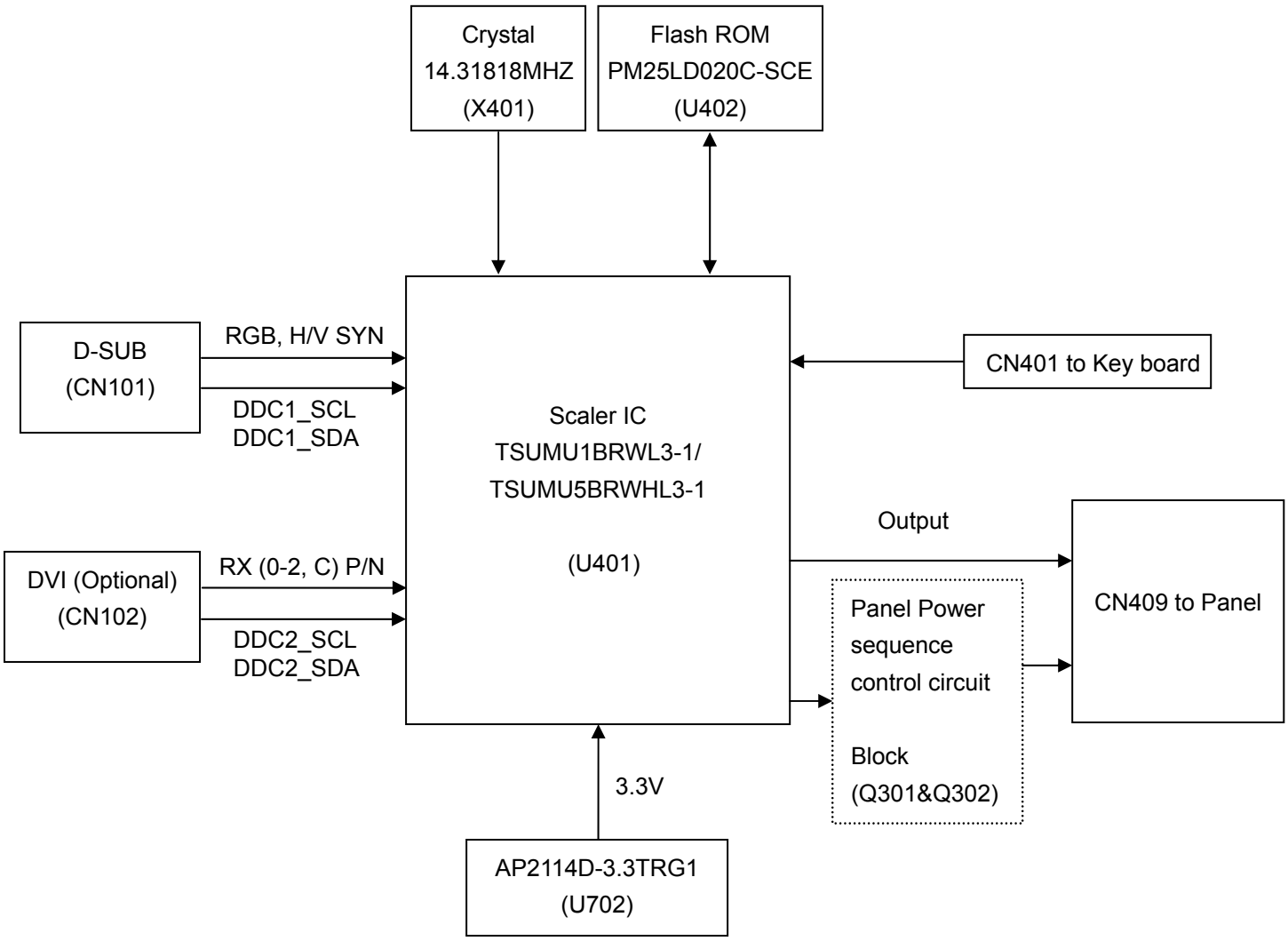
Main frame and main board.

#8

The panel.

Note: DVI only for E2360T.

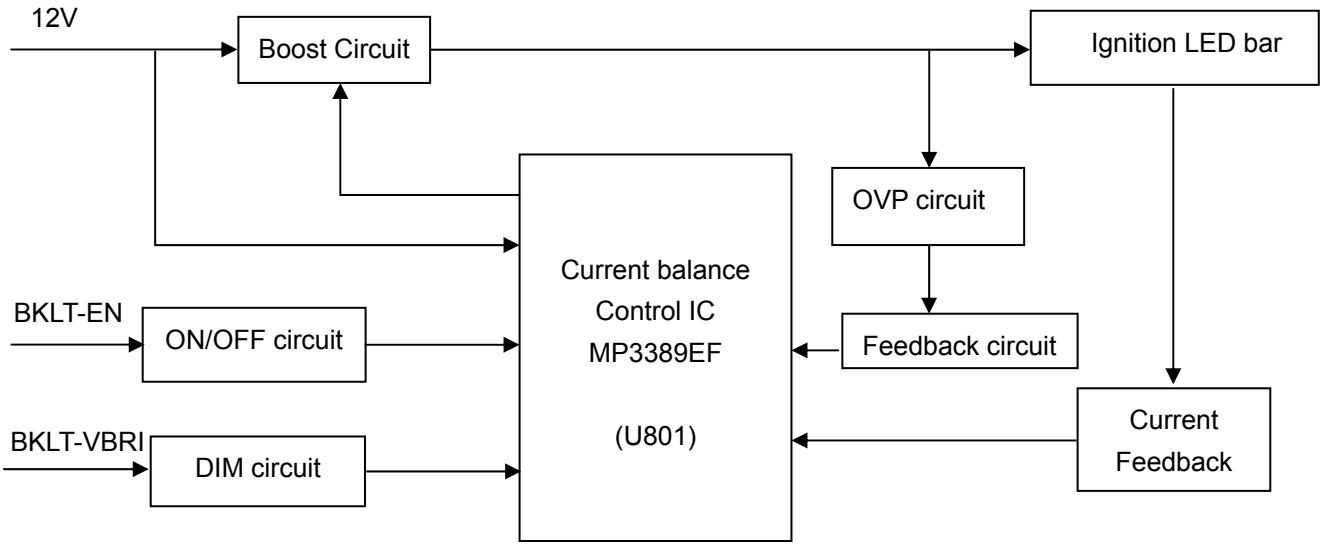
BLOCK DIAGRAM



Note: DVI only for E2360T.

CONVERTER BLOCK DIAGRAM

Converter



DESCRIPTION OF BLOCK DIAGRAM

1. Video Controller Part.

This part amplifies the level of video signal for the digital conversion and converts from the analog video signal to the digital video signal using a pixel clock.

The pixel clock for each mode is generated by the PLL.

The range of the pixel clock is from 25MHz to 149MHz.

This part consists of the Scalar, ADC converter, TMDS receiver.

The Scalar gets the video signal converted analog to digital, interpolates input to 1920 x 1080 resolution signal and outputs 8-bit R, G, B signal to transmitter.

2. Power Part.

This part consists of the one 3.3V regulators to convert power which is provided 12V in Adapter board, 12V is provided for convert circuit.

3. MICOM Part.

This part is including video controller part. And this part consists of Reset IC and the Micom.

The Micom distinguishes polarity and frequencies of the H/V sync are supplied from signal cable.

The controlled data of each mode is stored in scalar.

ADJUSTMENT

Windows EDID V1.0 User Manual

Operating System: DOS, windows98, 2000, XP

1. Parallel port setting

Enter your bios, and do as followings.

a) Integrated peripheral

b) Super IO Device

c) Parallel port mode

you should set the" parallel port mode" to SPP for using the DOS EDID tool surely.

2. EDID Write

1. Connect the signal line of monitor with DDC recorder.

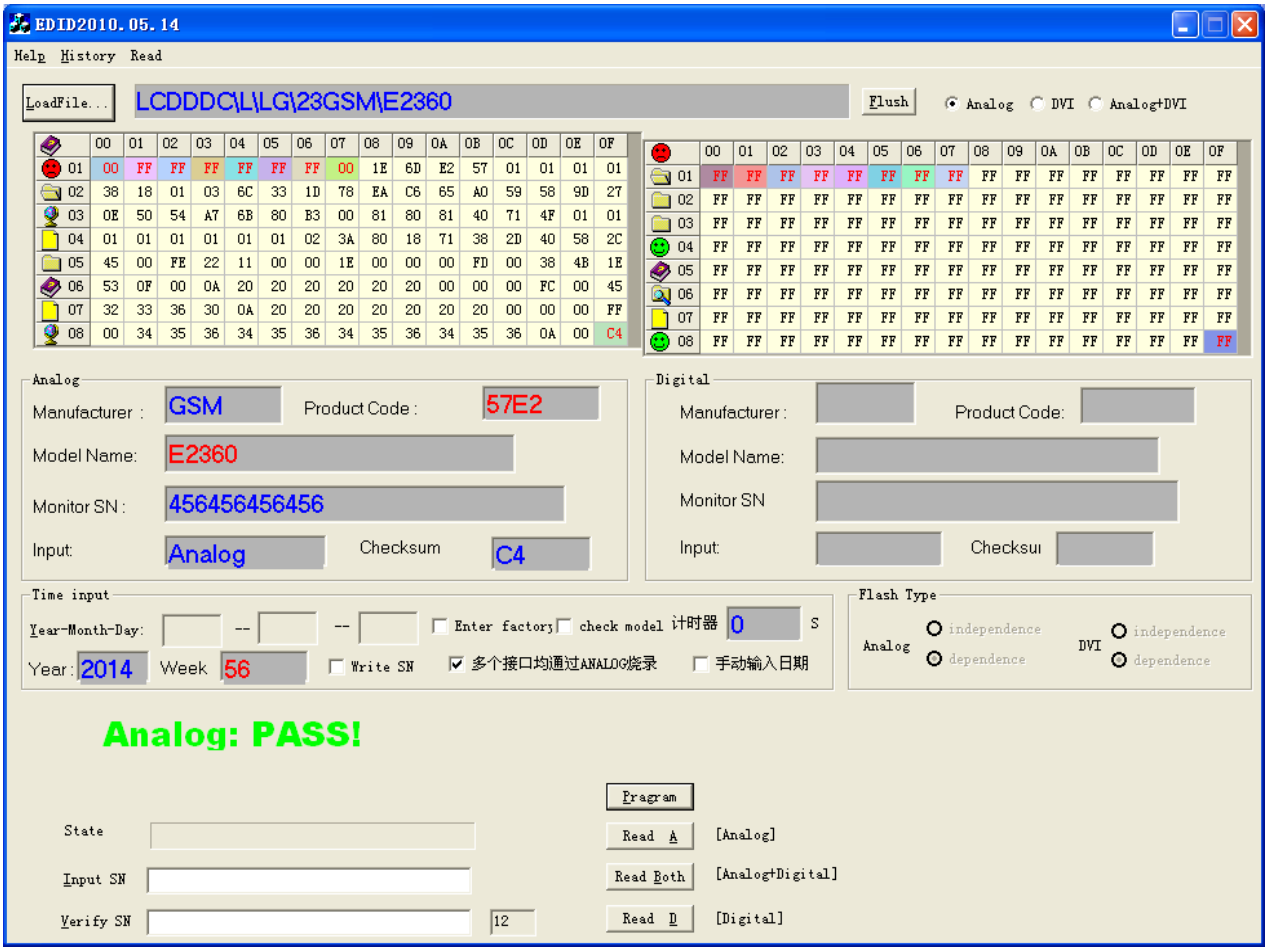
2. Choose the DDC RECORD program, and it shows on the screen, then choose the correct source base on the monitor.

3. Click "LoadFile", then key in the **manufacturer name, model name, product code,** then choose the correct model name base on the monitor.(as Fig.2)

4. Scan serial No. to DDC recorder by Bar Reader, then read again in the Verify SN.

5. According to the message of DDC program, when the picture as fig.1 appears, it will show DDC record has finished.

E2360S (Analog only)



E2360T (Analog&DVI)

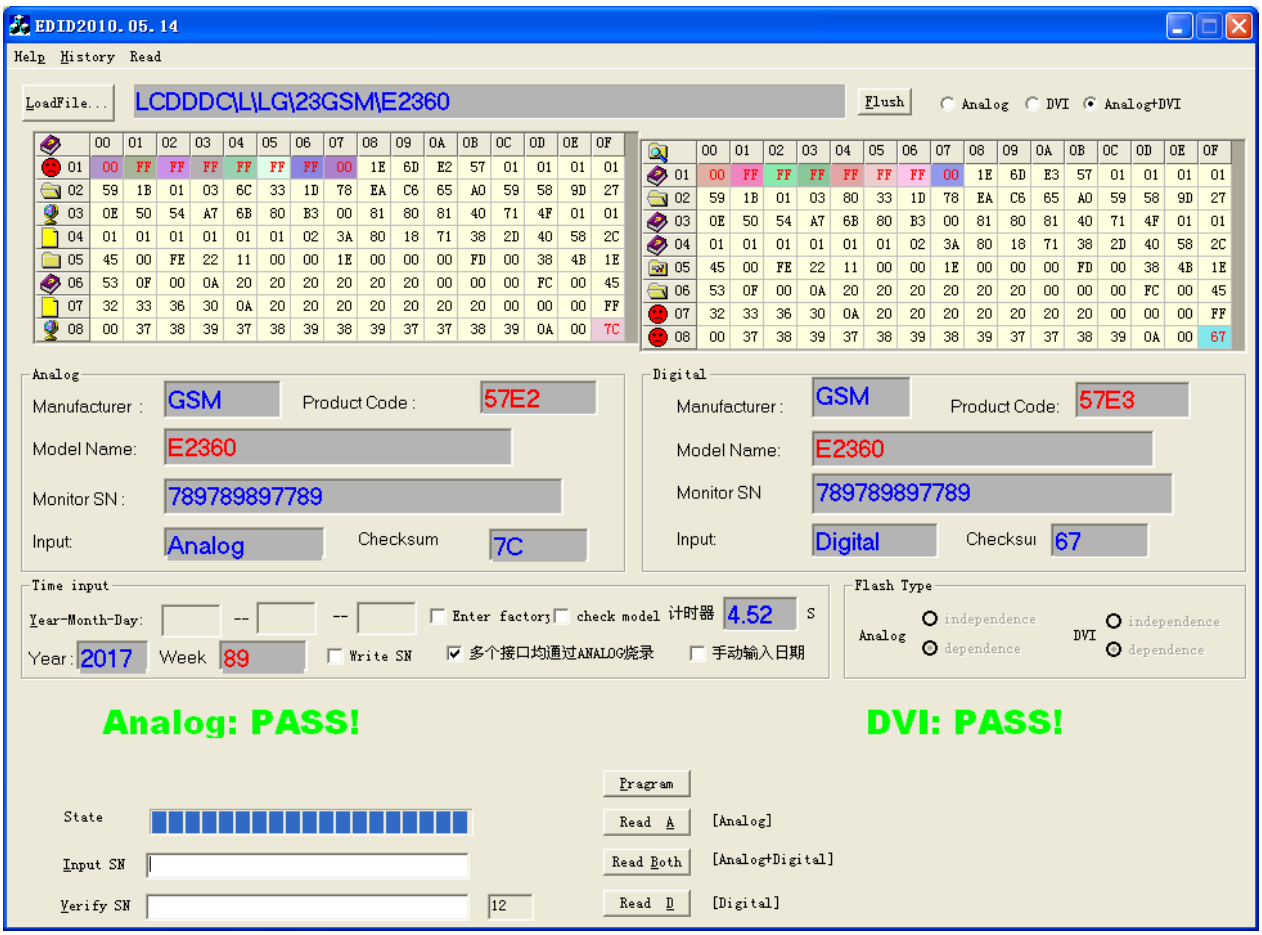
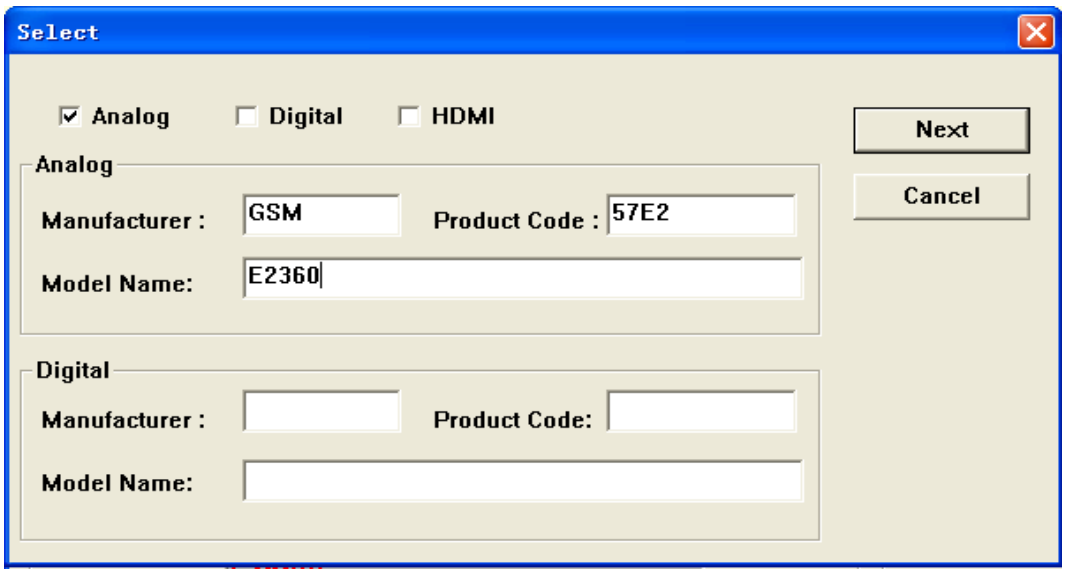


Fig.1

Please check **Manufacturer Name, Vendor Assigned Code, Monitor Name, Serial Number :*******[????????*****] (it must be the same as Bar Code),**Week of Manufacture :****,**Year of Manufacture :******,**Checksum :**** (It must be the same as the last byte of data table, as follows picture shows). Above of all must be right, then if it shows the green “PASS”, it means record succeeds ,the red “Fail” means record fails; Then check the power supply and signal line, and ensure they are connected well ,then do DDC record again from the third step.

E2360S (Analog only)



E2360T (Analog&DVI)

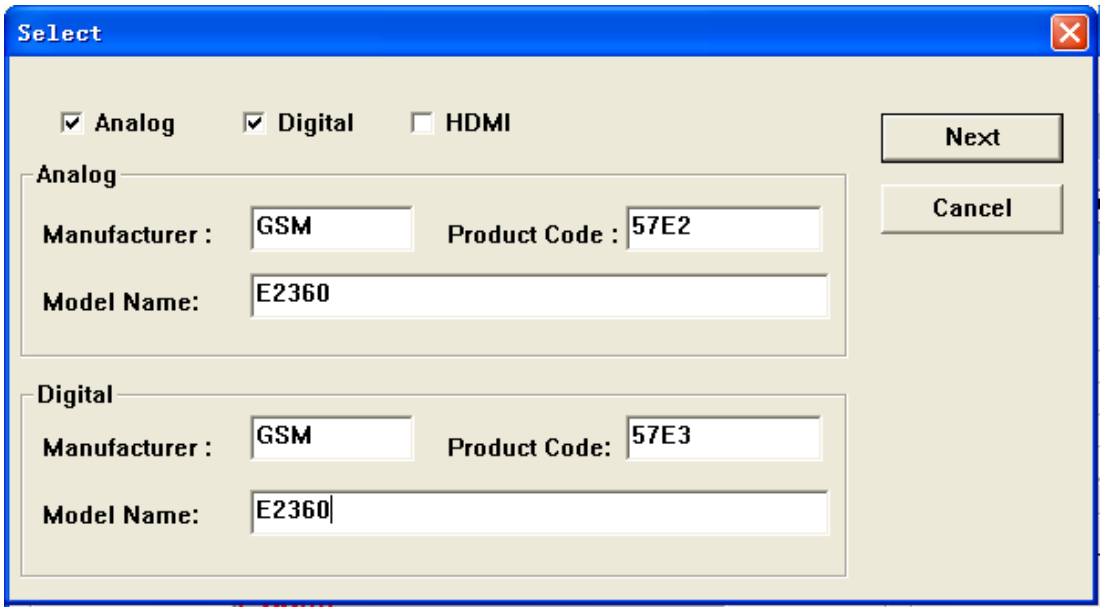


Fig.2

SERVICE MODE

1) Turn off the power switch at the front side of the display.

2) Press MODE, POWER switch with 1 second interval, press MENU.

3) The SVC OSD menu contains additional menus that the User OSD menu as described below.

a) CLEAA ETI: NO

b) Auto Color: NO

c) AGING: Select Aging mode (on/off).

d) PANEL: Used panel type

e) NVRAM INIT: NO

f) R/G/B-9300K: Allows you to set the R/G/B-9300K value manually.

g) R/G/B-6500K: Allows you to set the R/G/B-6500K value manually.

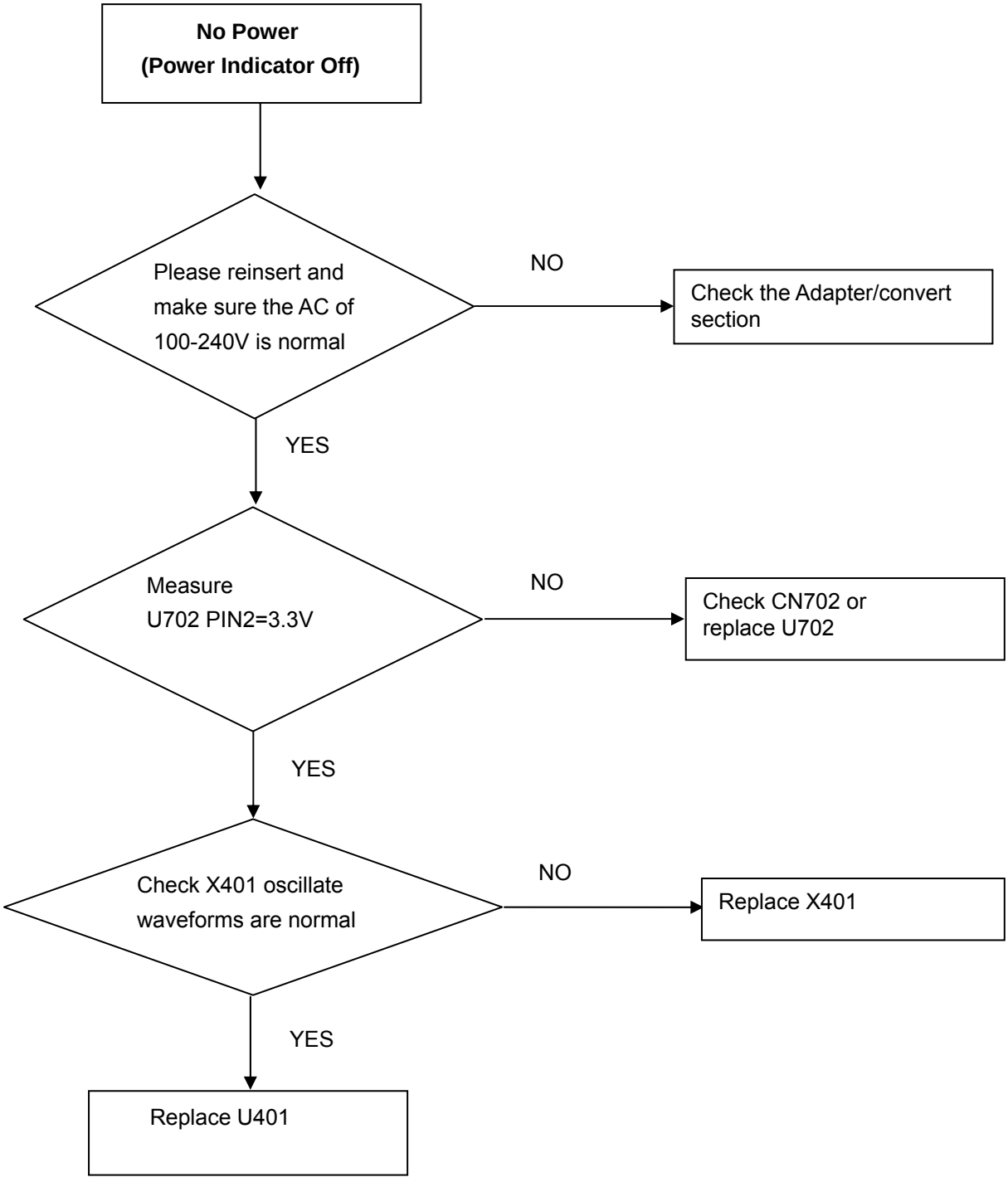
h) R/G/B-Offset: Allows you to set the R/G/B-Offset value manually. (Analog Only)

i) R/G/B-Gain: Allows you to set the R/G/B-Gain value manually. (Analog Only)

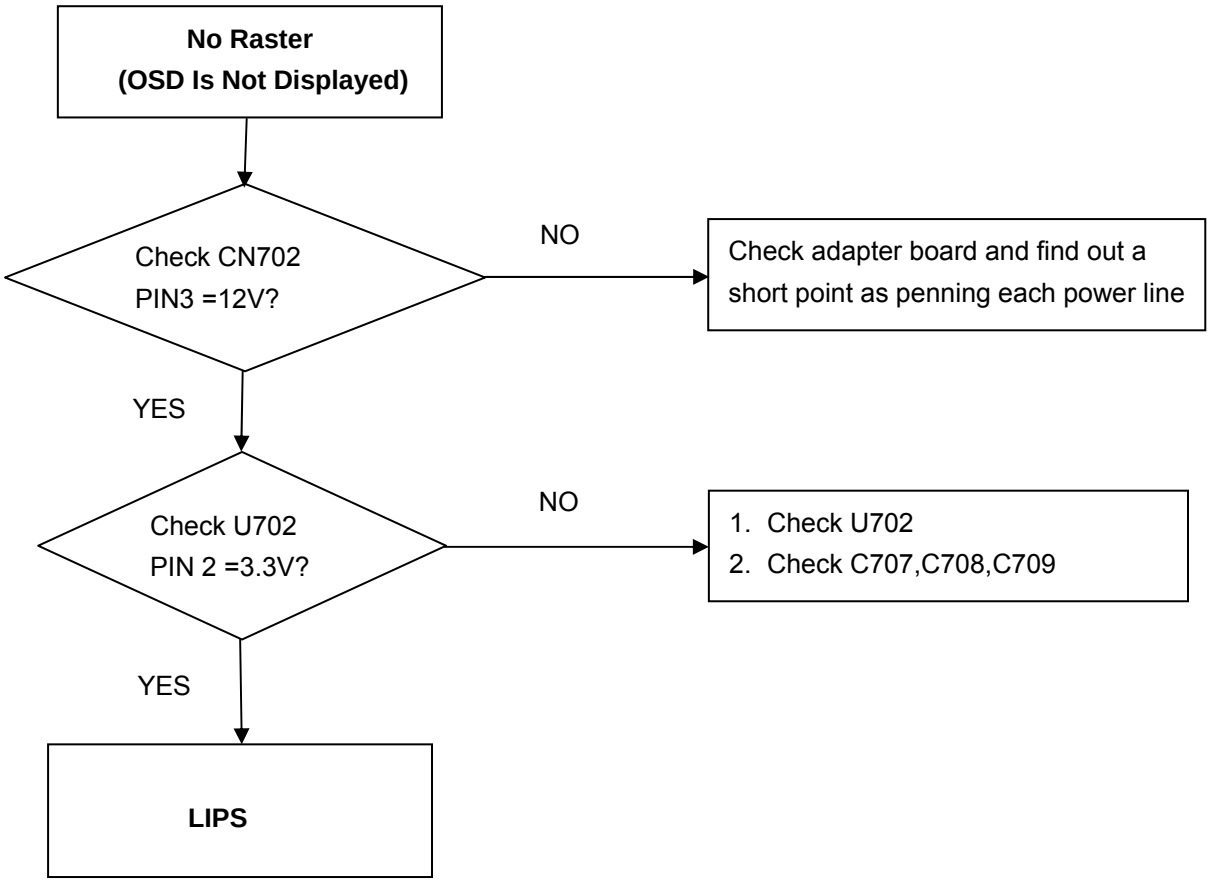
e) R/G/B-sRGB: Allows you to set the R/G/B- sRGB value manually.

TROUBLESHOOTING GUIDE

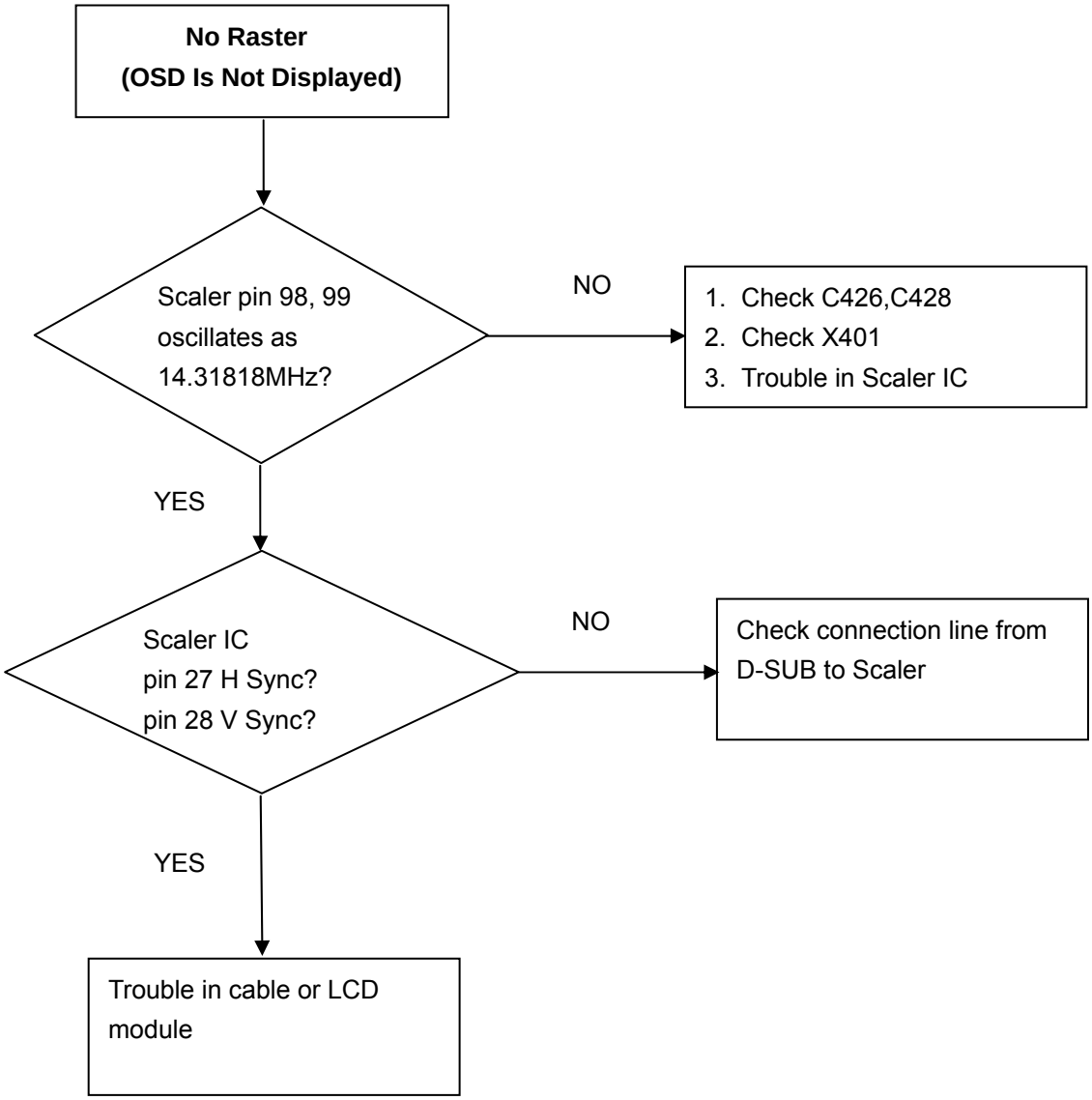
1. NO POWER



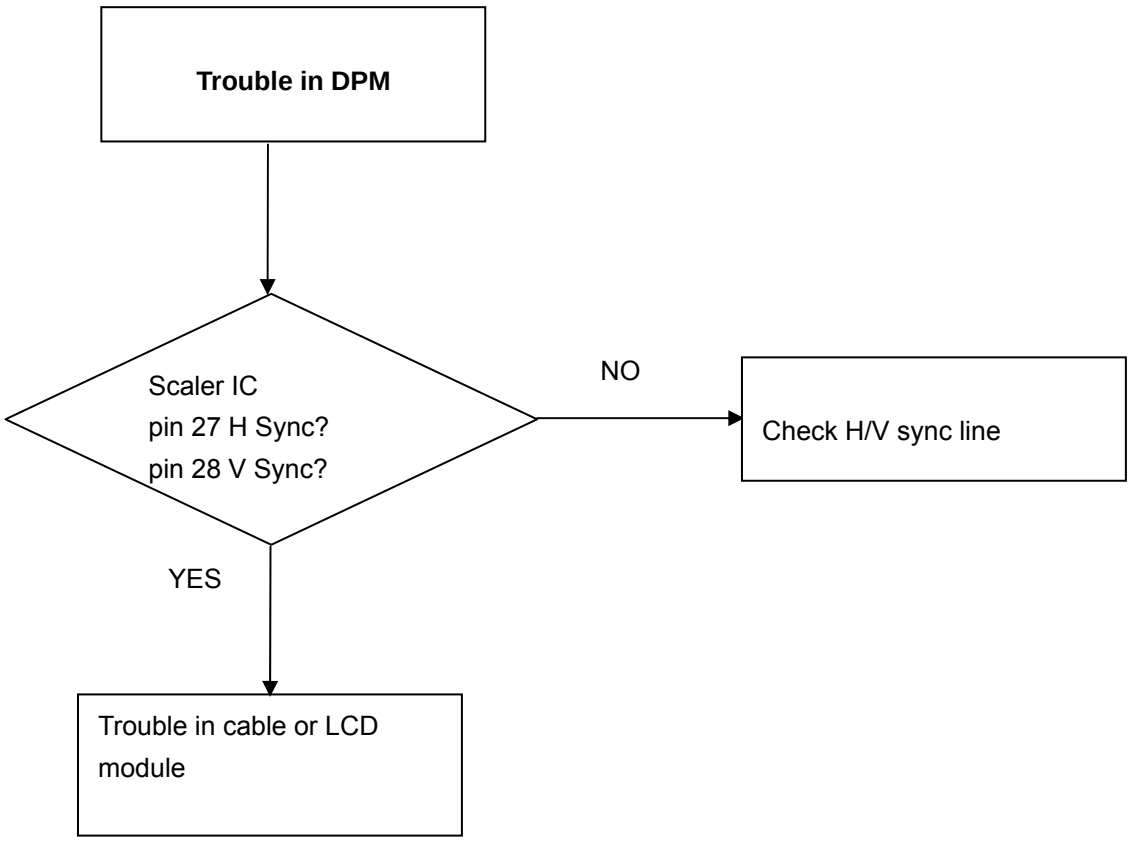
2. NO RASTER (OSD IS NOT DISPLAY)-LIPS



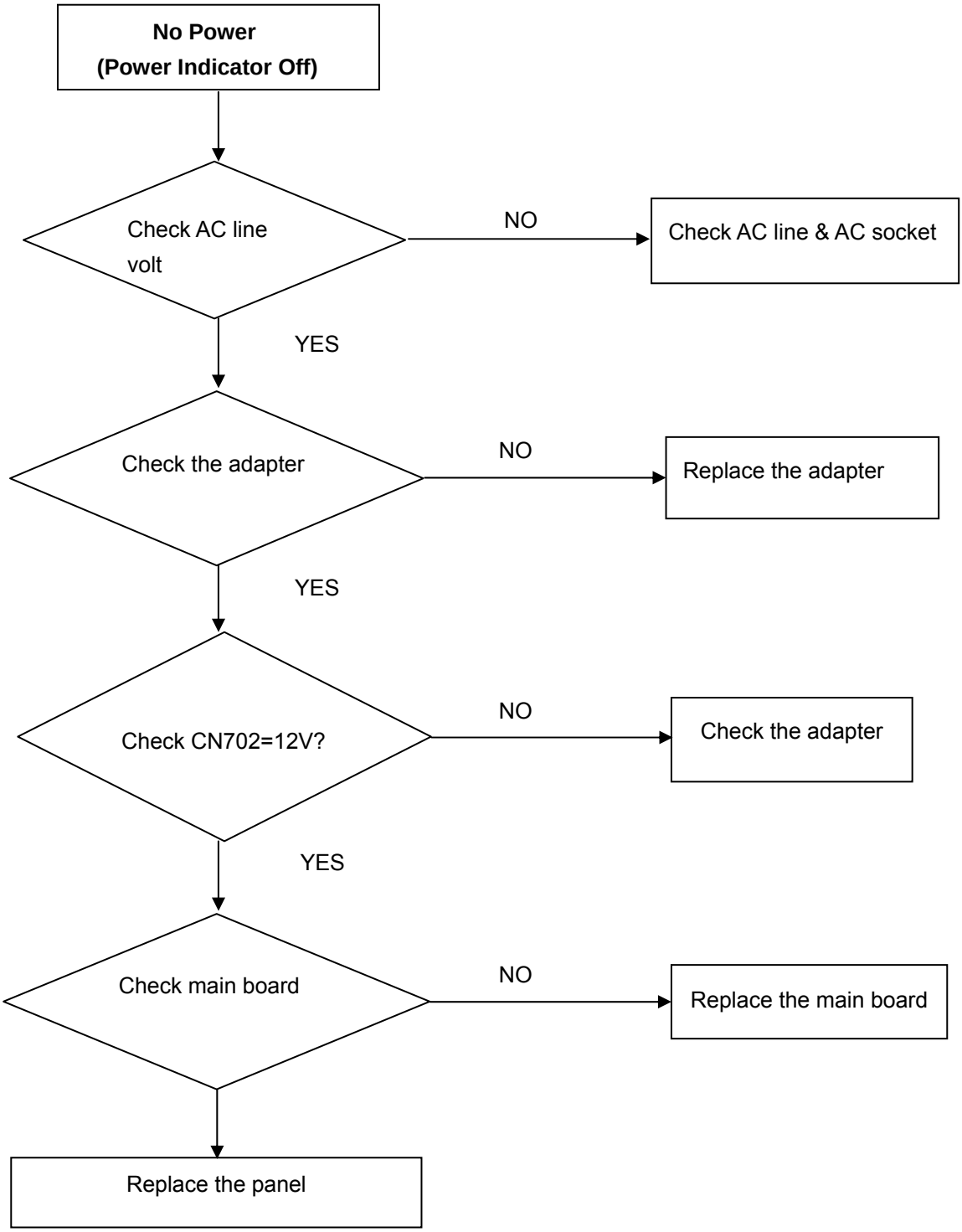
3. NO RASTER (OSD IS NOT DISPLAY)-MSTAR



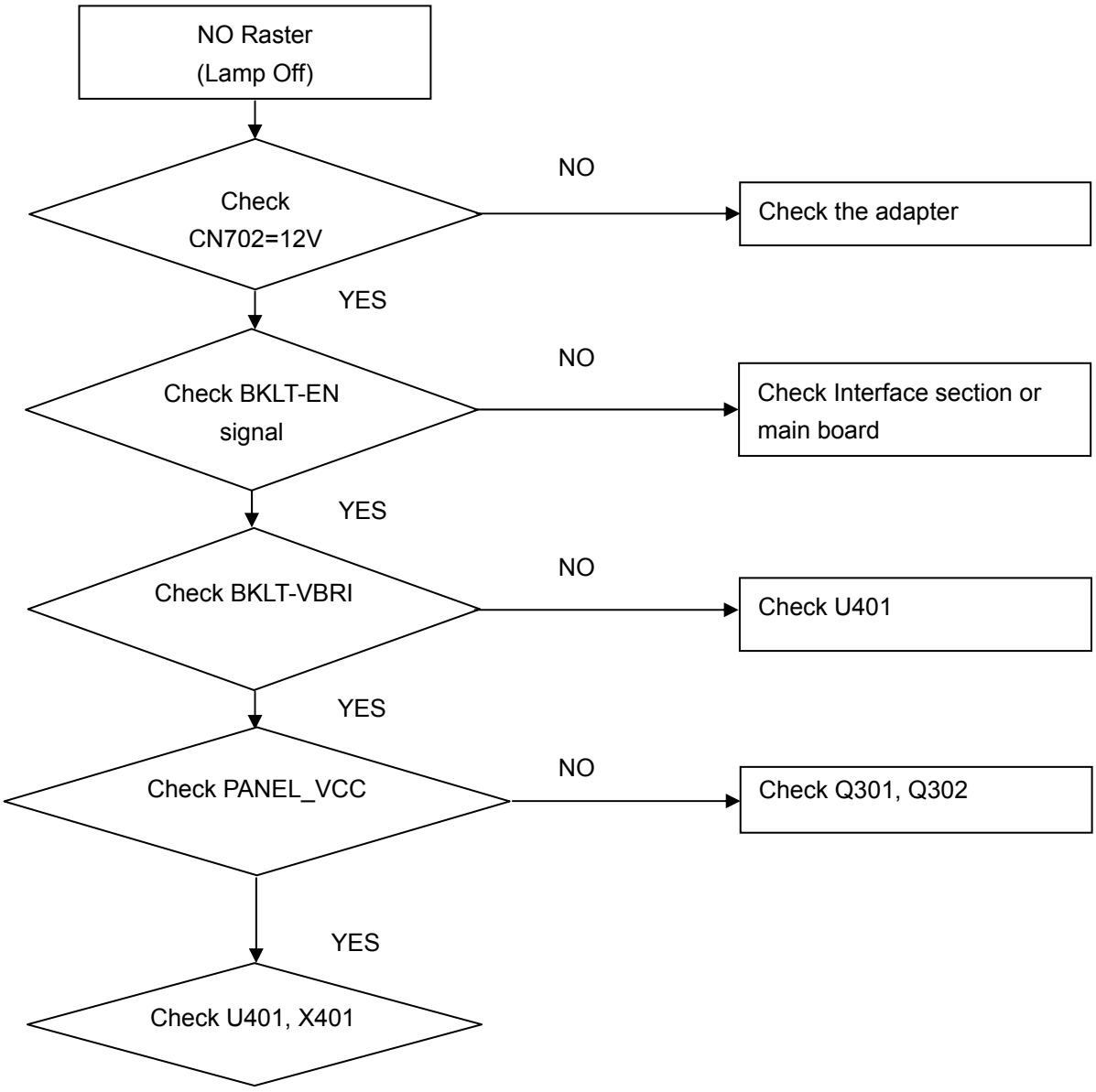
4. TROUBLE IN DPM



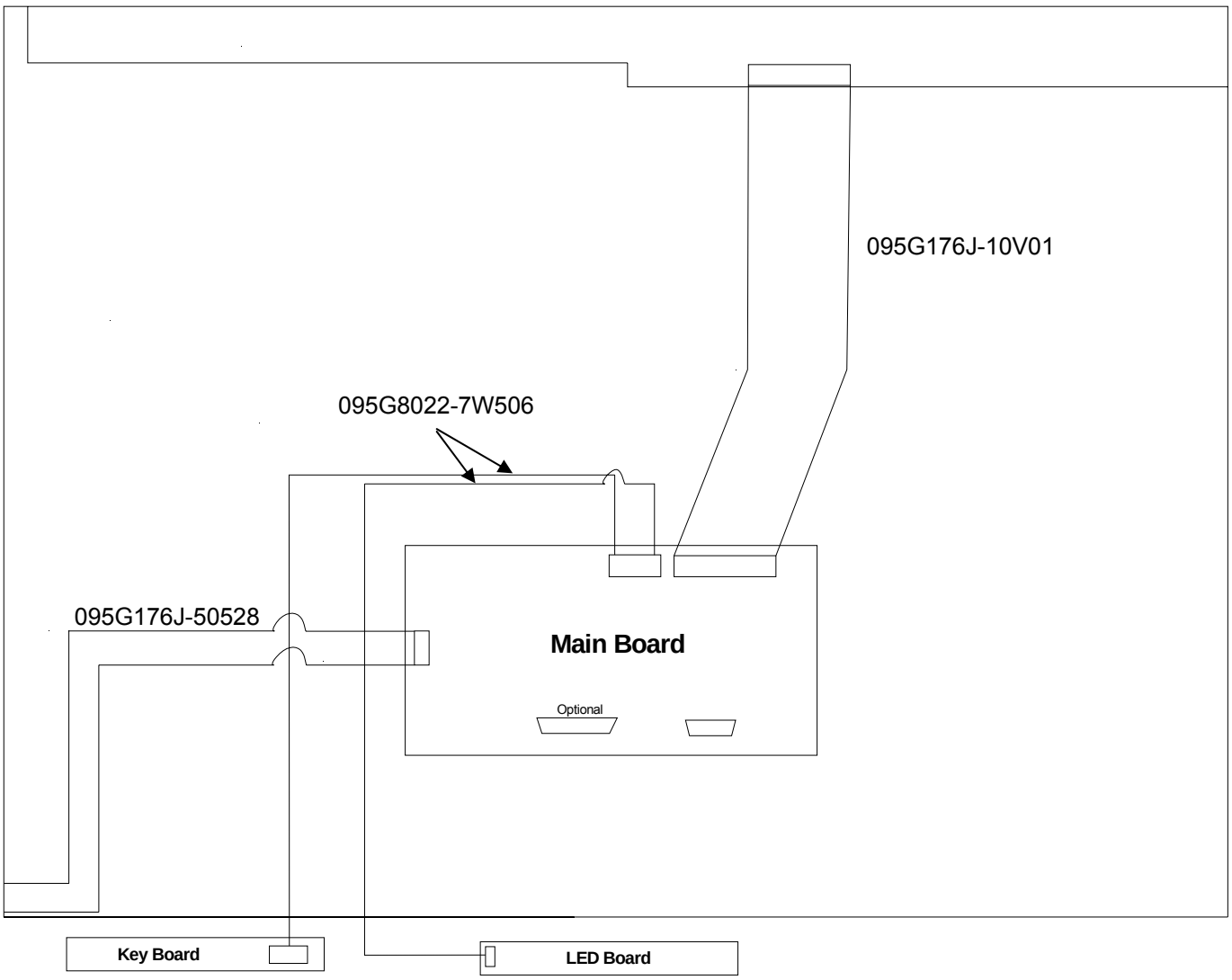
5. POWER



6. RASTER



WIRING DIAGRAM



Note: DVI only for E2360T.

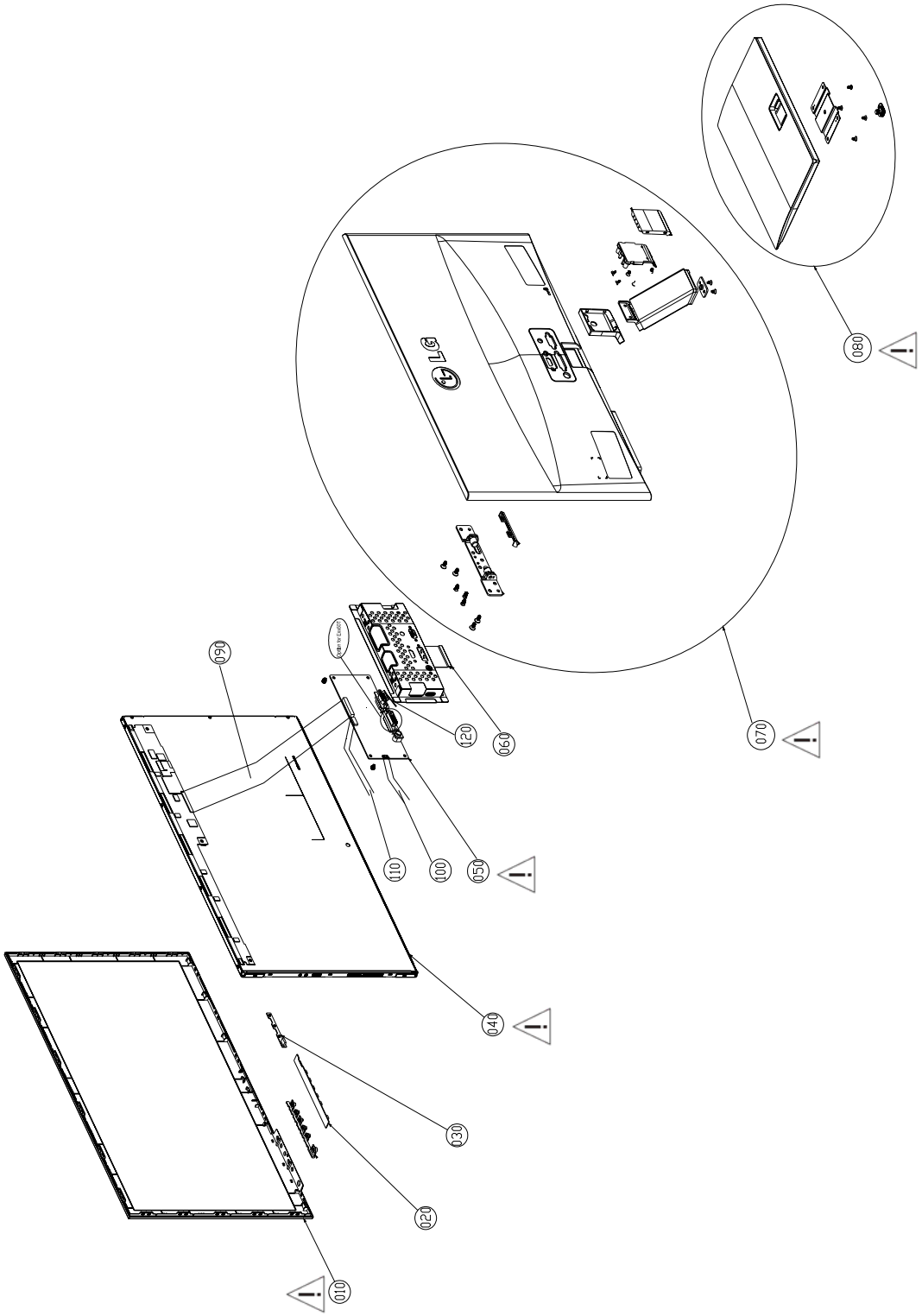
EXPLODED VIEW

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics.

These parts are identified by ⚠ in the 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.



EXPLODED VIEW PARTS LIST

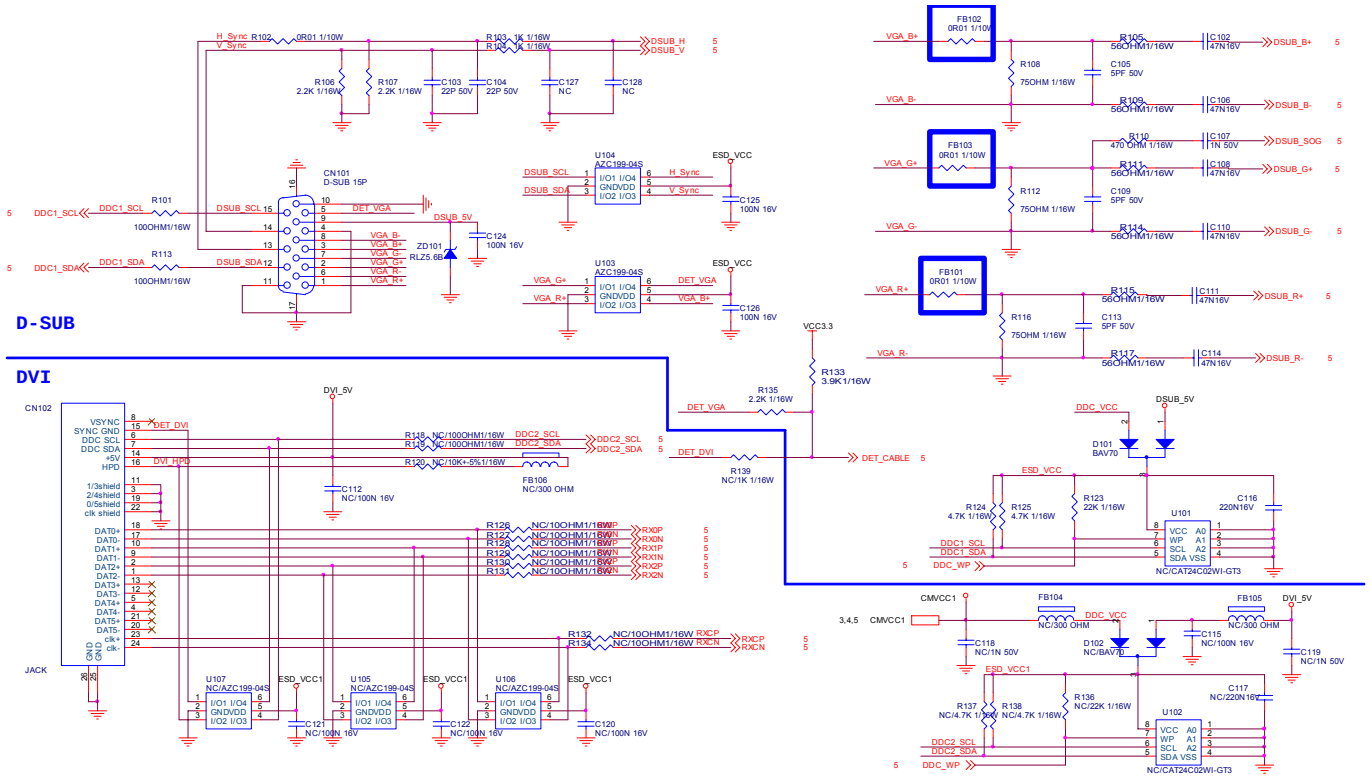
Ref. No.	TPV part No.	LGE part No.	Description
010	705GFACS016	ABJ73308504	BEZEL ASS'Y
020	KEPCAQG1	EBU60704503	KEY BOARD
030	LEPCAQG1	EBU60934810	LED BOARD
040	750GMT230W5A11M0LG	COV30101224	PANEL LM230WF5-TRA1-7F1-A0 FQ LTD
050	756GQACB-KL010--00	EBU60714340	MAIN BOARD(CBPCAAWLGQ3)-E2360S
	756GQACB-KL009--00	EBU60714341	MAIN BOARD(CBPCAARLGQ3)-E2360T
060	Q15G0909101101	MDQ62638101	MAINFRAME-E2360S
	Q15G0909101201	MDQ62638102	MAINFRAME-E2360T
070	705GFACS012	ACQ83873708	REAR COVER ASS'Y-E2360S
	705GFACS013	ACQ83873709	REAR COVER ASS'Y-E2360T
080	705GFACS004	ACQ83873802	BASE ASS'Y
090	095G176J-10V01	COV30101415	FFC CABLE 10PIN 275MM 0.5MM
100	095G176J-50528	COV30101418	FFC CABLE 50 182 0.5
110	095G8022-7W506	N/A	HARNESS 7P-6P+3P 250/300
120	088G-35315FVCL	N/A	D-SUB CABLE 1500MM

SCHEMATIC DIAGRAM

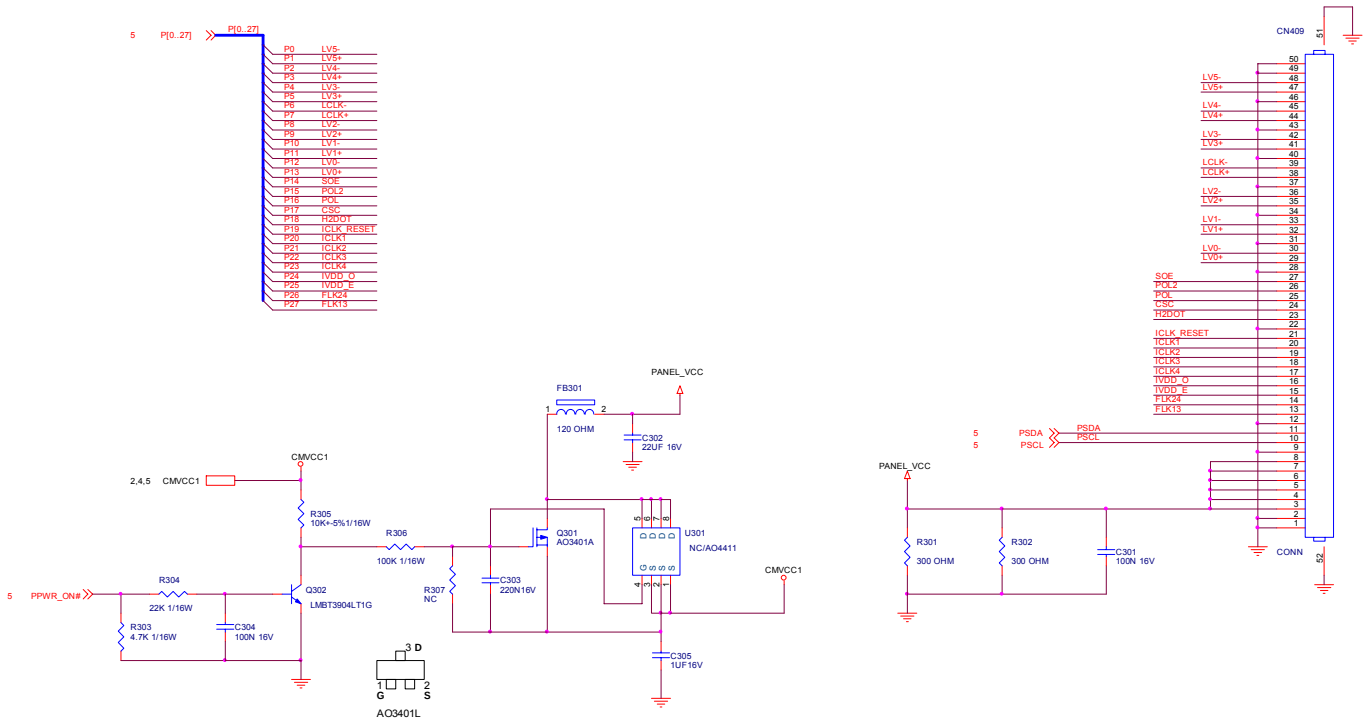
1. Main Board

E2360S&T

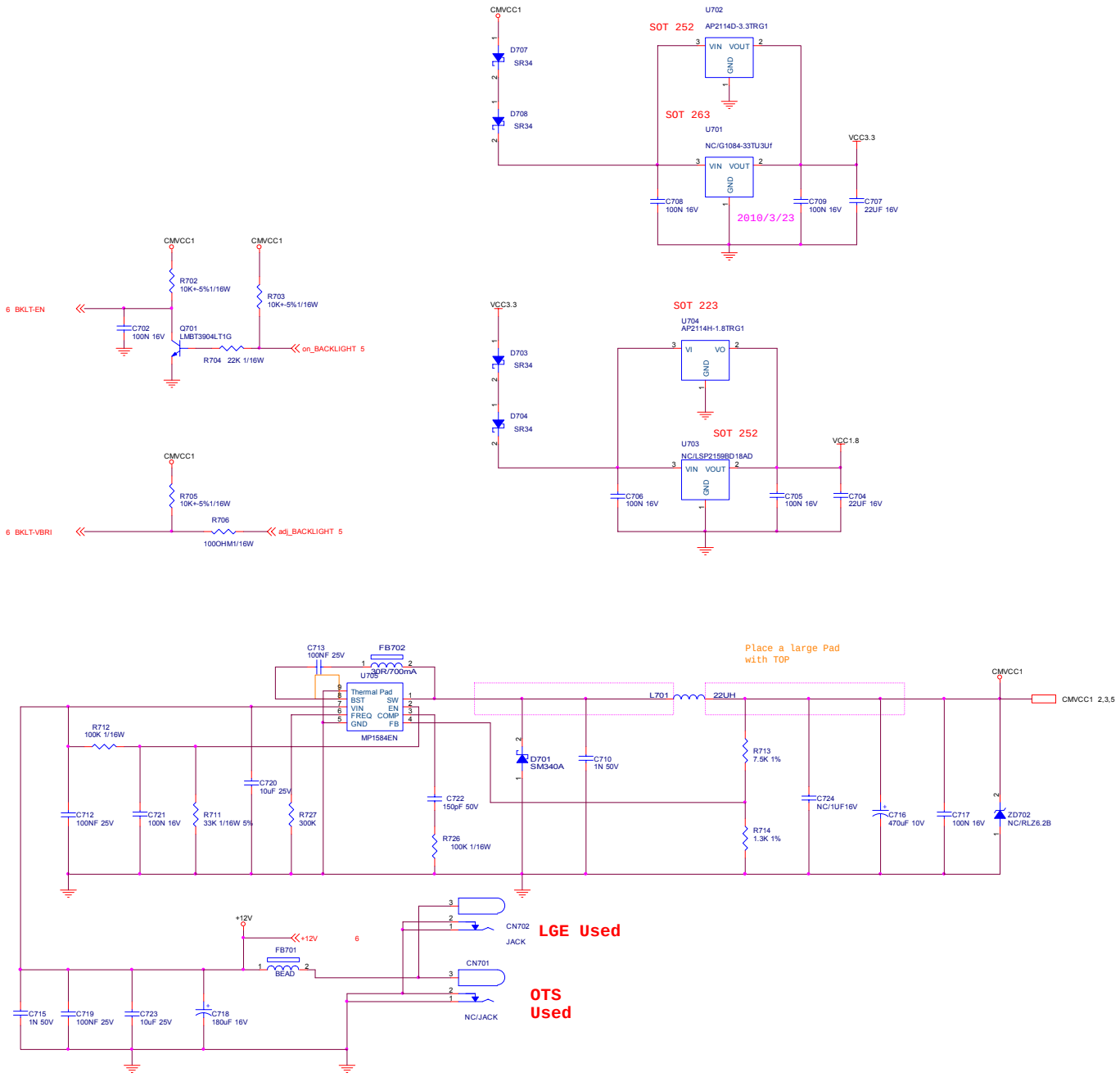
Input (DVI only for E2360T)



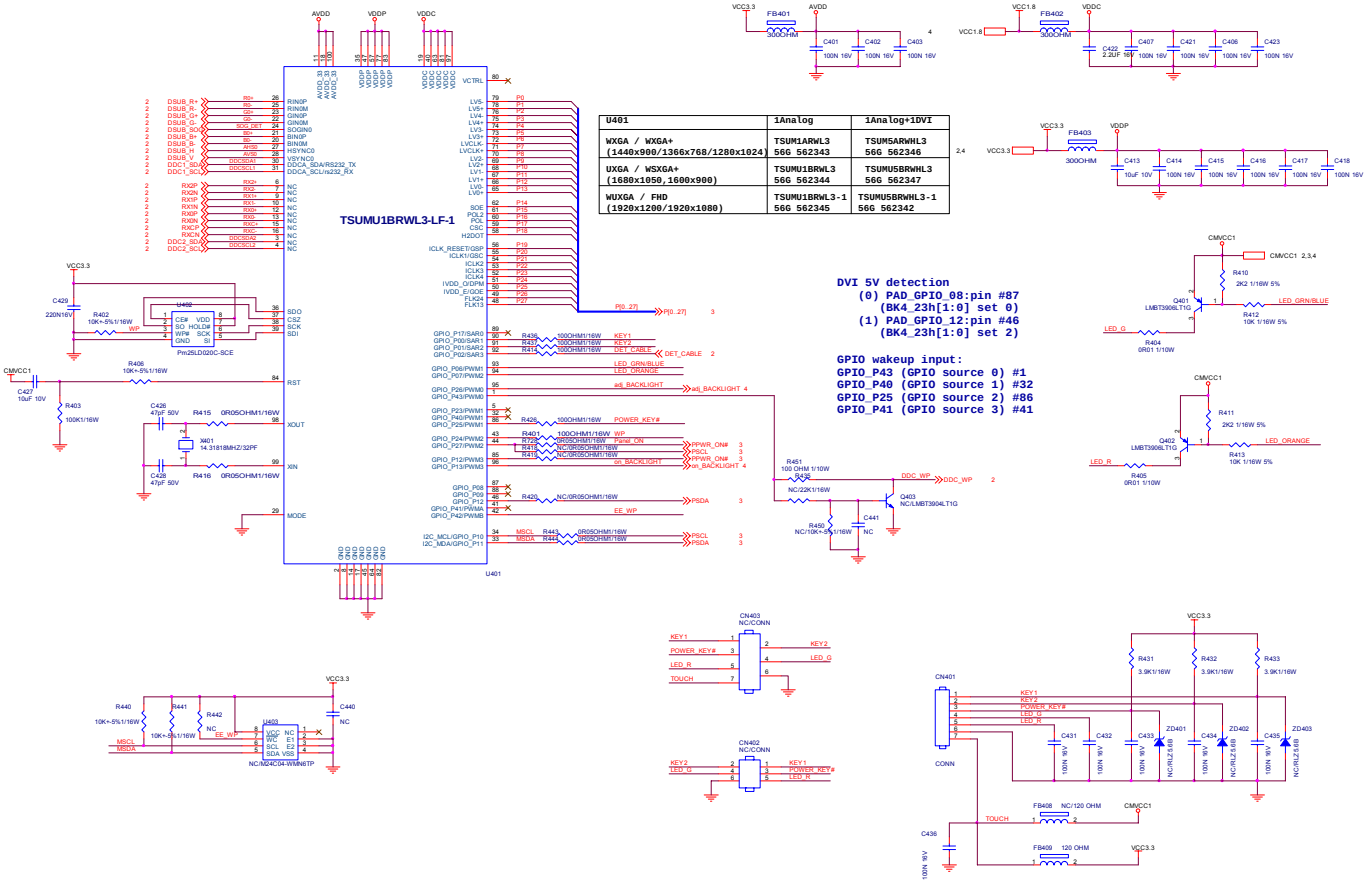
Output



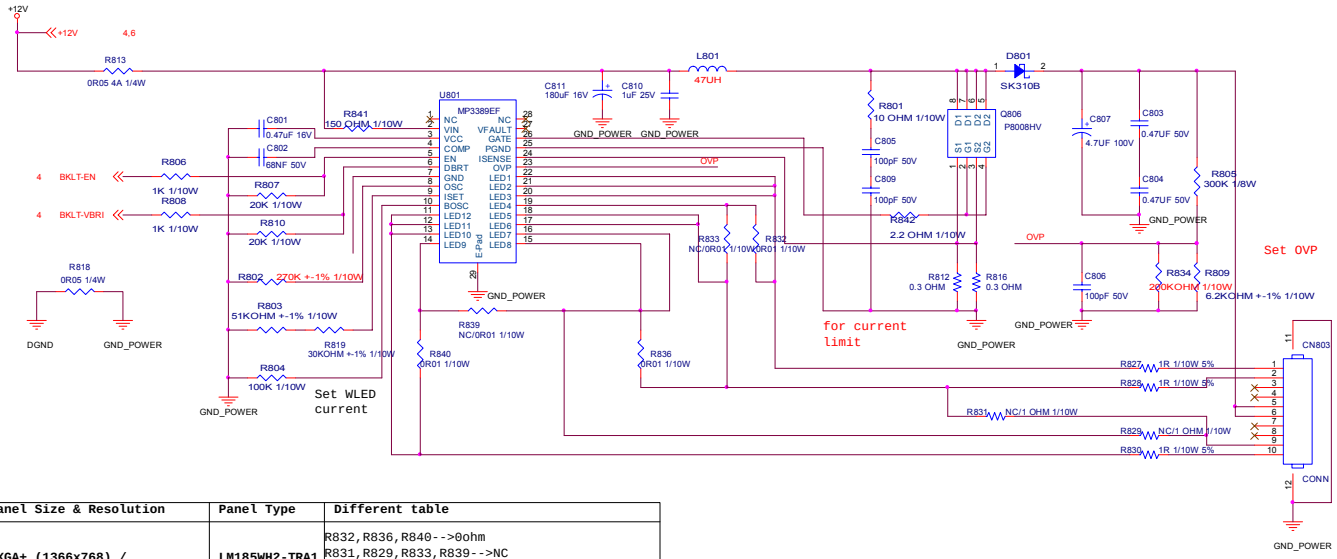
Power



Scaler

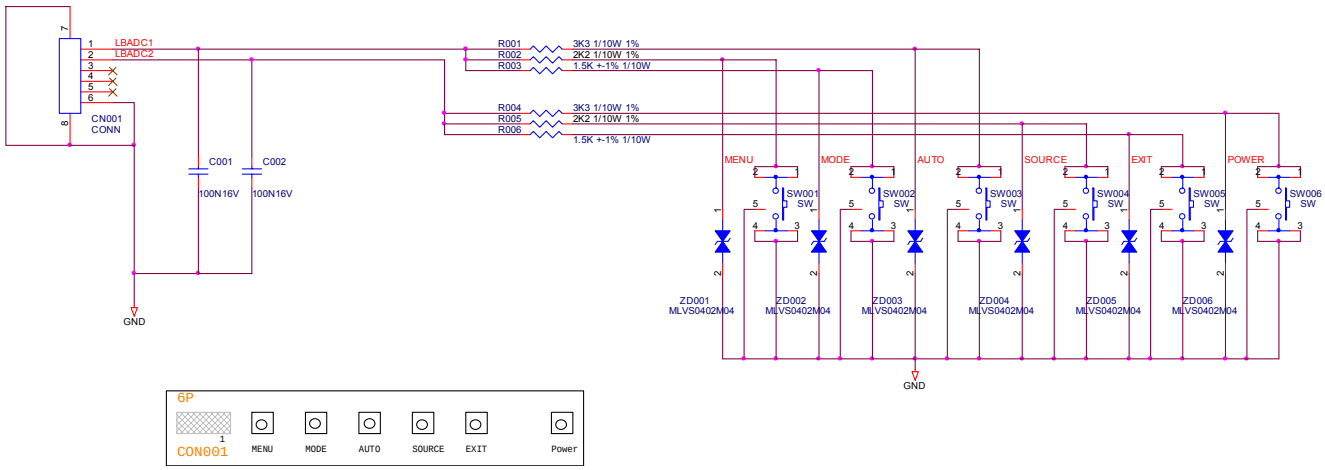


Convert

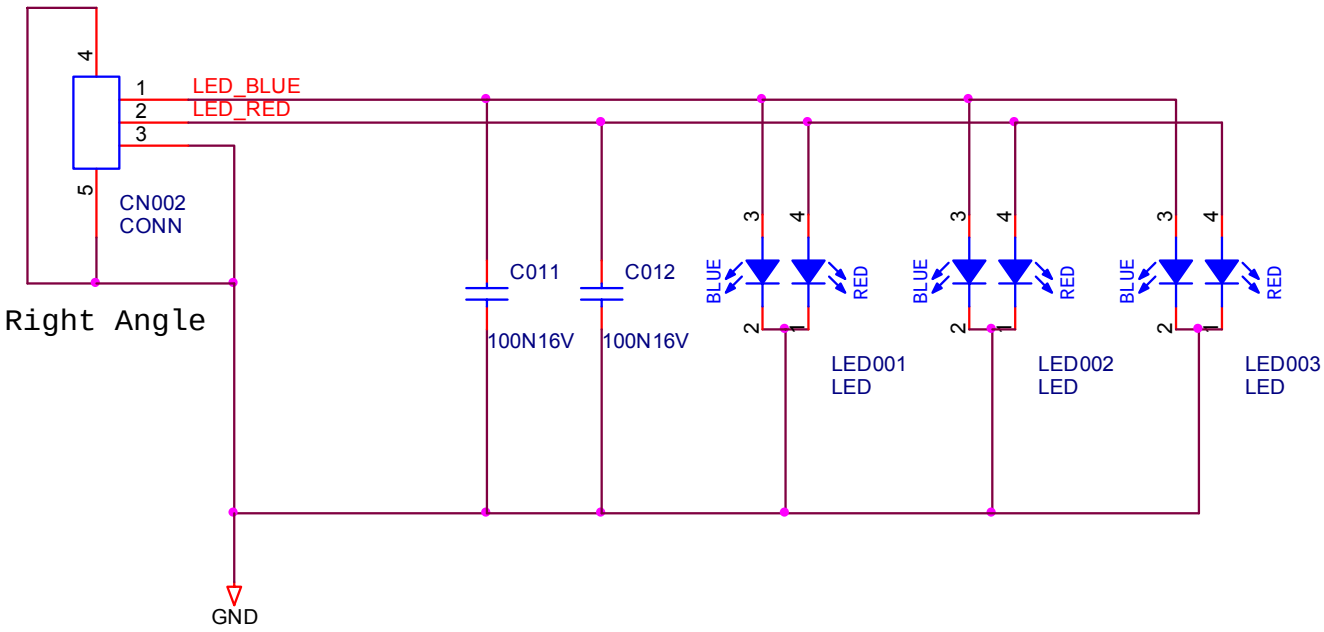


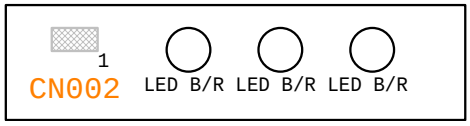
Panel Size & Resolution	Panel Type	Different table
WXGA+ (1366x768) / 18.5〃	LM185WH2-TRA1	R832,R836,R840-->0ohm R831,R829,R833,R839-->NC R828-->1ohm R819-->30K ---Set WLED current R809 5.6K ---Set OVP R812-->0.15ohm for current limit
WSXGA+ (1600x900) / 20〃	LM200WD3-TRA1	
FHD (1920x1080) / 21.5〃	LM215WF4-TRA1	R833,R839-->0ohm R831,R832,R836,R840-->NC R828,R829-->1ohm R819-->10K ---Set WLED current R809 5.6K ---Set OVP R812-->0.15ohm ---for current limit
FHD (1920x1080) / 23〃	LM230WF5-TRA1	

2. Key Board



3. LED Board





Jul.2010

P/NO:

Printed in China