CAUTION
BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.
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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 soft material. (Cleaning with a dirty or rough cloth may damage the panel.)

Leakage Current Hot Check Circuit

- Replaceable batteries

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

<table>
<thead>
<tr>
<th>AC Volt-meter</th>
<th>Good Earth</th>
<th>such as WATER PIPE, CONDUIT etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 Kohm/10W</td>
<td>To Instrument's exposed METALLIC PARTS</td>
<td>0.15uF</td>
</tr>
</tbody>
</table>

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

*Base on Adjustment standard

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

General Soldering Guidelines
1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range of 500ºF to 600ºF.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a small wire-bristle (0.5 inch, or 1.25cm) 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. (500ºF to 600ºF)
   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 (500ºF to 600ºF)
   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.

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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 spec sheet is applied to the 58 cm (23 inch) LCD Monitor TV used LP92E chassis.

2. Specification
   Each part is tested as below without special appointment

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

3. Test method
   3.1 Performance: LGE TV test method followed.
   3.2 Demanded other specification
       Safety: CE, IEC specification
       EMC: CE, IEC
       Safety: IEC/EN60065
       EMI: EN55013
       EMS: EN55020

4. Module Specification
   LGD, LM230WF5-TLA3

<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>Specification</th>
<th>Unit</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Type</td>
<td>TFT Color LCD Module</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Diagonal Size</td>
<td>584.2mm (23 inch) diagonal</td>
<td>mm</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Active Display area</td>
<td>509.184(H) x 286.416(V)</td>
<td>mm</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Outline Dimension</td>
<td>533.2(H) x 312.0(V) x 11.5(D)</td>
<td>mm</td>
<td>Typ.</td>
</tr>
<tr>
<td>5</td>
<td>Aspect Ratio</td>
<td>16:9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Pixel Number</td>
<td>1920 x RGB x 1080</td>
<td>pixel</td>
<td>pixel</td>
</tr>
<tr>
<td>7</td>
<td>Pixel Pitch</td>
<td>0.265(H) x 0.265(V)</td>
<td>mm</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Color arrangement</td>
<td>RGB vertical Stripe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Color Depth</td>
<td>16.7M color (8bit with A-FRC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Electrical Interface</td>
<td>LVDS 2port</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Surface Treatment</td>
<td>Hard coating (3H) &amp; Anti-glare (Haze 25)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Operating Mode</td>
<td>Normally White</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Backlight Unit</td>
<td>WHITE LED (2 CHANNEL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Response Time</td>
<td>Rising Time: 1.3 + Falling Time: 3.7</td>
<td>ms</td>
<td>Typ.</td>
</tr>
<tr>
<td>15</td>
<td>Color Gamut</td>
<td>Normal 68% Panel (CIE1931)</td>
<td></td>
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5. General Specification

### 5.1 TV

<table>
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<th>Specification</th>
<th>Remarks</th>
</tr>
</thead>
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<tr>
<td>1</td>
<td>Market</td>
<td>Central and South America</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Broadcasting system</td>
<td>NTSC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PAL-M</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PAL-N</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Receiving system</td>
<td>BAND</td>
<td>NTSC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VHF</td>
<td>2 ~ 13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UHF</td>
<td>14 ~ 69</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CATV</td>
<td>1 ~ 125</td>
</tr>
<tr>
<td>4</td>
<td>Receiving system</td>
<td>Upper Heterodyne</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Component Input (1EA)</td>
<td>Y/Cb/Cr</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y/Pb/Pr</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>CVBS Input (1EA)</td>
<td>PAL, SECAM, NTSC</td>
<td>4 System(Rear): PAL50, SECAM, NTSC, PAL60</td>
</tr>
<tr>
<td>7</td>
<td>RGB Input</td>
<td>RGB-PC</td>
<td>Analog(D-SUB 15Pin)</td>
</tr>
<tr>
<td>8</td>
<td>HDMI Input (1EA)</td>
<td>HDMI1-DTV/PC</td>
<td>HDMI version 1.3 , Support HDCP</td>
</tr>
<tr>
<td>9</td>
<td>Audio Input (3EA)</td>
<td>RGB-PC/ DVI Audio Component CVBS</td>
<td>L/R Input</td>
</tr>
<tr>
<td>10</td>
<td>Earphone out (1EA)</td>
<td>Antenna, AV, Component, RGB-PC, HDMI1</td>
<td></td>
</tr>
</tbody>
</table>
## 5.2 RGB - PC

<table>
<thead>
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<th>Specification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supported Sync. Type</td>
<td>Separate Sync.(RGB), Digital(DVI)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Operating Frequency</td>
<td>Analog</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Horizontal</td>
<td>30 – 69kHz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>56 – 61 Hz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Digital</td>
<td>Horizontal</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vertical</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Resolution</td>
<td>Analog</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Max.</td>
<td>1600x900 @ 60Hz</td>
<td>M2080A</td>
</tr>
<tr>
<td></td>
<td>Recommend</td>
<td>1600x900 @ 60Hz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Max.</td>
<td>1920x1080 @ 60Hz</td>
<td>M2280A / M2380A / M2380AF</td>
</tr>
<tr>
<td></td>
<td>Recommend</td>
<td>1920x1080 @ 60Hz</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Input Voltage</td>
<td>Voltage : 100 – 240 Vac, 50 or 60Hz</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Inrush Current</td>
<td>Cold Start : 50 A Hot : 120 A</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Operating Condition</td>
<td>Sync (H/V)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>On mode</td>
<td>Typ. Max</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Power S/W On</td>
<td>On/On</td>
<td>Active Blue</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On/On</td>
<td>Active Blue</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On/On</td>
<td>Active Blue</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On/On</td>
<td>Active Blue</td>
</tr>
<tr>
<td></td>
<td>Sleep mode</td>
<td>Off/On</td>
<td>Off Blanking</td>
</tr>
<tr>
<td></td>
<td>Power S/W Off</td>
<td>Off mode</td>
<td>Off</td>
</tr>
<tr>
<td>7</td>
<td>MTBF</td>
<td>30,000 HRS with 50% compared to that of initial value at the typical LED current on condition</td>
<td>LED Life Time</td>
</tr>
<tr>
<td>8</td>
<td>Using Altitude</td>
<td>5,000 m (for Reliability) 3,000m(for FOS)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Operating Environment</td>
<td>Temp : 10°C ~ 35°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Humidity : 20 % ~ 80 %</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Storage Environment</td>
<td>Temp : -10°C ~ 60°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Humidity : 5 % ~ 90 % non condensing</td>
<td></td>
</tr>
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</table>

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## 6. Chroma & Brightness

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Specification</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Remark</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Viewing Angle [CR &gt; 10]</td>
<td>Right/Left</td>
<td>70/70</td>
<td>85/85</td>
<td>-</td>
<td>CR &gt; 10</td>
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<td></td>
<td></td>
<td>Up/Down</td>
<td>60/70</td>
<td>75/85</td>
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<td>2</td>
<td>Luminance</td>
<td>Luminance (cd/m²)</td>
<td>200</td>
<td>250</td>
<td>-</td>
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<td>Variation (%)</td>
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<td>Min/ Max</td>
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<td>3</td>
<td>Contrast Ratio</td>
<td>CR</td>
<td>700</td>
<td>1000</td>
<td>Full white/Full black</td>
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<td>4</td>
<td>Color Coordinates [CIE1931]</td>
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<td>RGB</td>
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<td></td>
<td></td>
<td>W&lt;sub&gt;X&lt;/sub&gt;</td>
<td></td>
<td></td>
<td></td>
<td>Vivid, 6500K</td>
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<td></td>
<td></td>
<td>W&lt;sub&gt;Y&lt;/sub&gt;</td>
<td>Typr</td>
<td>0.313</td>
<td>Typr +0.03</td>
<td>Full white(100IRE)</td>
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<tr>
<td></td>
<td></td>
<td>R&lt;sub&gt;X&lt;/sub&gt;</td>
<td>Typr</td>
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<td>-0.03</td>
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<td>R&lt;sub&gt;Y&lt;/sub&gt;</td>
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<td>0.628</td>
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<td>-0.03</td>
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<td></td>
<td>G&lt;sub&gt;Y&lt;/sub&gt;</td>
<td>Typr</td>
<td>0.615</td>
<td>+0.03</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B&lt;sub&gt;X&lt;/sub&gt;</td>
<td>Typr</td>
<td>0.153</td>
<td>-0.03</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B&lt;sub&gt;Y&lt;/sub&gt;</td>
<td>Typr</td>
<td>0.057</td>
<td>+0.03</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Response Time (ms)</td>
<td>Rise Time</td>
<td>TrR</td>
<td>1.3</td>
<td>2.6</td>
<td>Condition : DVI or RGB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Decay Time</td>
<td>TrD</td>
<td>3.7</td>
<td>7.4</td>
<td>Standard, Backlight 100</td>
</tr>
</tbody>
</table>

* Optical Test Condition
- Surrounding Brightness Level : dark
- Surrounding Temperature : 25 °C ± 5 °C
- warm-up Time : 30 min
- Contrast, Brightness : Outgoing condition
- *Incase of Vivid Mode, high level saturation may be occurred. Check gray linearity at standard mode.

* Active area
1. Active area of LCD PANEL is in bezel of cabinet.
2. Interval between active area and bezel
   IA-Bi<1.0 mm, IC-Di<1.0 mm
   A: Interval between left of active area and bezel
   B: Interval between right of active area and bezel
   C: Interval between top of active area and bezel
   D: Interval between bottom of active area and bezel

![Diagram](image-url)
### 7. SET Optical Feature

#### 7.1 PC Mode
(Measurement Condition: Full white/ Standard/6500k) Measure the black luminance after 30 seconds.

<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>Module</th>
<th>Luminance (cd/m²)</th>
<th>C/R(min)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Min</td>
<td>Typ</td>
<td>Max</td>
</tr>
<tr>
<td>1</td>
<td>20/22/23 inch</td>
<td>LGD</td>
<td>200</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 7.2 AV Mode
(Measurement Condition: Full white/100IRE/ Vivid) Measure the black luminance after 30 seconds.

<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>Luminance(cd/m²)</th>
<th>C/R(min)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Typ</td>
<td>Max</td>
<td>RF, AV, COMPONENT, HDMI</td>
</tr>
<tr>
<td>1</td>
<td>20 inch</td>
<td>170</td>
<td>200</td>
<td>500:1</td>
</tr>
<tr>
<td>2</td>
<td>22 inch</td>
<td>170</td>
<td>200</td>
<td>500:1</td>
</tr>
<tr>
<td>3</td>
<td>23 inch</td>
<td>170</td>
<td>200</td>
<td>500:1</td>
</tr>
</tbody>
</table>

#### 7.3 Special feature (DFC)
- DFC Working Condition: Full Black Pattern (All Black, No pattern (MSPG Pattern#2)) signal in D-sub

<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>module</th>
<th>Luminance(cd/m²)</th>
<th>C/R(min)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Min</td>
<td>Typ</td>
<td>Max</td>
</tr>
<tr>
<td>1</td>
<td>20/22/23 inch</td>
<td></td>
<td>4,000,000:1</td>
<td>5,000,000:1</td>
<td>PC Mode (D-sub) For Checking Black Luminance, wait for over 1 minute.</td>
</tr>
</tbody>
</table>

### 8. Component Video Input (Y, PB, PR)

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

<table>
<thead>
<tr>
<th>No.</th>
<th>Resolution</th>
<th>H-freq(kHz)</th>
<th>V-freq(Hz)</th>
<th>Pixel clock(MHz)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>640*480</td>
<td>31.469</td>
<td>59.94</td>
<td>25.175</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>800*600</td>
<td>37.879</td>
<td>60.317</td>
<td>40.0</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1024*768</td>
<td>48.363</td>
<td>60.0</td>
<td>65.0</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1152*864</td>
<td>54.34</td>
<td>60.05</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1280*960</td>
<td>60</td>
<td>60</td>
<td>108.0</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1280*1024</td>
<td>63.981</td>
<td>60.02</td>
<td>108.0</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1680*1050</td>
<td>64.674</td>
<td>59.883</td>
<td>119.0</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1680*1050</td>
<td>65.290</td>
<td>59.954</td>
<td>146.25</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>1920*1080</td>
<td>67.5</td>
<td>60</td>
<td>148.5</td>
<td></td>
</tr>
</tbody>
</table>

### 10. HDMI Input (DTV)

<table>
<thead>
<tr>
<th>No.</th>
<th>Resolution</th>
<th>H-freq(kHz)</th>
<th>V-freq(Hz)</th>
<th>Pixel clock(MHz)</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>720*480</td>
<td>15.75</td>
<td>60.00</td>
<td>13.514</td>
<td>SDTV, DVD 480I(525i)</td>
</tr>
<tr>
<td>2</td>
<td>720*480</td>
<td>15.73</td>
<td>59.94</td>
<td>13.500</td>
<td>SDTV, DVD 480I(525i)</td>
</tr>
<tr>
<td>3</td>
<td>720*576</td>
<td>15.625</td>
<td>50.00</td>
<td>13.500</td>
<td>SDTV, DVD 576I(625i) 50Hz</td>
</tr>
<tr>
<td>4</td>
<td>720*480</td>
<td>31.47</td>
<td>59.94</td>
<td>27.000</td>
<td>SDTV 480P</td>
</tr>
<tr>
<td>5</td>
<td>720*480</td>
<td>31.50</td>
<td>60.00</td>
<td>27.027</td>
<td>SDTV 480P</td>
</tr>
<tr>
<td>6</td>
<td>720*576</td>
<td>31.25</td>
<td>60.00</td>
<td>27.000</td>
<td>SDTV 576P 50Hz</td>
</tr>
<tr>
<td>7</td>
<td>1280*720</td>
<td>44.96</td>
<td>59.94</td>
<td>74.176</td>
<td>HDTV 720P</td>
</tr>
<tr>
<td>8</td>
<td>1280*720</td>
<td>45.00</td>
<td>60.00</td>
<td>74.250</td>
<td>HDTV 720P</td>
</tr>
<tr>
<td>9</td>
<td>1280*720</td>
<td>37.50</td>
<td>50.00</td>
<td>74.25</td>
<td>HDTV 720P 50Hz</td>
</tr>
<tr>
<td>10</td>
<td>1920*1080</td>
<td>33.72</td>
<td>59.94</td>
<td>74.176</td>
<td>HDTV 1080I</td>
</tr>
<tr>
<td>11</td>
<td>1920*1080</td>
<td>33.75</td>
<td>60.00</td>
<td>74.250</td>
<td>HDTV 1080I</td>
</tr>
<tr>
<td>12</td>
<td>1920*1080</td>
<td>28.125</td>
<td>50.00</td>
<td>74.250</td>
<td>HDTV 1080I 50Hz</td>
</tr>
<tr>
<td>13</td>
<td>1920*1080</td>
<td>67.432</td>
<td>59.94</td>
<td>148.350</td>
<td>HDTV 1080P</td>
</tr>
<tr>
<td>14</td>
<td>1920*1080</td>
<td>67.5</td>
<td>60</td>
<td>148.5</td>
<td>HDTV 1080P</td>
</tr>
<tr>
<td>15</td>
<td>1920*1080</td>
<td>56.250</td>
<td>50</td>
<td>148.5</td>
<td>HDTV 1080P 50Hz</td>
</tr>
</tbody>
</table>
## 11. Mechanical specification

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Content</th>
<th>Unit</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Product Dimension</td>
<td>Width(W)</td>
<td>560.8</td>
<td>mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Length(D)</td>
<td>193.2</td>
<td>mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Height(H)</td>
<td>427</td>
<td>mm</td>
</tr>
<tr>
<td></td>
<td>Before Packing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>After Packing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Product Weight</td>
<td>Only SET</td>
<td>5.6</td>
<td>Kg</td>
</tr>
<tr>
<td></td>
<td>With BOX</td>
<td>7.4</td>
<td>Kg</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Container Loading Quantity</td>
<td>Individual or Wooden</td>
<td>40ft</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Palletizing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Indi. Wooden</td>
<td>630</td>
<td>1260</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20ft Wooden</td>
<td>520</td>
<td>1144</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Stand Assy</td>
<td>Type</td>
<td>Detachable (Base detachable)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Size(W x D x H)</td>
<td>271.2x193.2x108.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tilt Degree</td>
<td>-5~15 degree</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tilt force</td>
<td>0.8~3.5kgf</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Swivel Degree</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Swivel Force</td>
<td>none</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Appearance</td>
<td>General</td>
<td>Refer to Standard of LG(55)G1-1020</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>*Appearance Gap spec</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Front: 0.5 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Back &amp; Bottom: 1.0 m</td>
<td></td>
</tr>
</tbody>
</table>
ADJUSTMENT INSTRUCTION

1. Application
This document is applied to LP92E chassis LCD Monitor TV which is manufactured in Monitor Factory or is produced on the basis of this data.

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: 220V, 60Hz
6) Adjustment equipment: Color Analyzer (CA-210 or CA-110), Pattern Generator (MSPG-925L or Equivalent), DDC Adjustment Jig equipment, SVC remote controller

3. Adjustment items
PCB assembly adjustment items
1) Download the MSTAR main software (IC603, Mstar ISP Utility)
2) Auto Color Balance(ADC) - RGB
3) Auto Color Balance(ADC) – Component
4) Input Tool-Option/Area option.
5) Check SW Version.

SET assembly adjustment items
1) DDC Data input.
2) HDCP data input
3) Adjustment of White Balance.
4) Preset CH information
5) Factoring Option Data input.

4. PCB assembly adjustment method
4.1 Input Tool-Option, Area Option
Option adjustment following BOM (Tool Option 1, Area Option)
* Required Equipments
  - Remote controller for adjustment
* Profile: Must be changed the option value because being different with some setting value depend on module maker, inch and market.

Adjustment method
The input methods are same as other chassis.(Use IN-START Key on the Adjust Remocon.)

<table>
<thead>
<tr>
<th>LW91A</th>
<th>LPL</th>
<th>L22FHD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main</td>
<td>V1.00</td>
<td>HDCP 0</td>
</tr>
<tr>
<td>Tool Option 1</td>
<td>37000</td>
<td></td>
</tr>
<tr>
<td>Tool Option 2</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td>Area Option</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

1) Push the IN-START key in the Adjust R/C.
2) Input the Option Number that was specified in the BOM, into the Shipping area.
3) Select "Tool Option/ Area Option" by using ▼/▲(CH+/-) key and press the number key(0~9) consecutively ex) If the value of Tool Option1 is 7, input the data using number key "7"
   (If not changed the option, the input menu can differ from the model spec.)
* Refer to Job Expression of each main chassis ass’ y (EBTxxxxxxxx) for Option value

* Before PCB check, you have to change the Tool option, Area option and have to AC off/on (Plug out and in)
   (If missing this process, set can operate abnormally)
* Never push the IN-STOP KEY after completing the function inspection.

4.2 S/W program download
(Using MSTAR Download program)
Profile: This is for downloading the s/w to the flash memory of IC603

Connection structure
Connection condition
1) IC name and circuit number : Flash Memory and IC603
2) Use voltage : 3.3V (5 pin)
3) SCL : 15 pin
4) SDA : 12 pin
5) Tact time : about 2min

Equipment
1) PC
2) ISP_tool program
3) Download jig

Download jig
4.2.1 Preliminary steps

(1) Download method 1 (PCB Assy)

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

4.2.2 Download Steps

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

(2) Click the connect button and confirm “Dialog Box”.

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

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

(5) Click “Auto(2)” tab and set as below
(6) click “Run(3)”.  
(7) After downloading, check “OK(4)” message.
4.3. ADC Process

4.3.1 ADC calibration
- MSPG-925
  - Component: series Model : 216 (720P@60Hz)
  - RGB: Model : 60(1024x768@60Hz)

4.3.2 PC input ADC
4.3.2.1 Auto RGB Gain/Offset Adjustment
- Convert to PC in Input-source
- Signal equipment displays
  - Output Voltage: 700 mVp-p
  - Impress Resolution XGA (1024 x 768 @ 60Hz)
  - Model : 60 in Pattern Generator
  - Pattern : 29 in Pattern Generator (MSPG-925 SERIES)

  Adjustment pattern (PC)

  - Adjust by commanding AUTO_COLOR_ADJUST.

4.3.2.2 Confirmation
- We confirm to address “0xF1 (offset), 0xF2 (gain)” in page “0x0E” of EEPROM the value is “0xAA” or not.
- If the value is not “0xAA”, we adjust once more.
- We can write the ADC values from “0x00–0x05” addresses in a page “0x0E”.

*Manual ADC process using Service Remocon. After enter Service Mode by pushing "ADJ" key, execute "Auto-RGBB" by pushing "►" key at "Auto-RGB".

4.3.3 COMPONENT input ADC
4.3.3.1 Component Gain/Offset Adjustment
- Convert to Component in Input-source
- Signal equipment displays
  - Impress Resolution 720p
  - MODEL : 216 in Pattern Generator(720P/60Hz 100% Color Bar Mode)
  - PATTERN : 65 in Pattern Generator( MSPG-925 SERISE)

  Adjustment pattern (COMPONENT)

  - Adjust by commanding AUTO_COLOR_ADJUST.

4.3.3.2 Confirmation
- We confirm to address “0x03 (offset), 0x04 (gain)” in page “0x0E” of EEPROM the value is “0xAA” or not.
- If the value is not “0xAA”, we adjust once more.
- We can write the ADC values from “0x06–0x0B” addresses in a page “0x0E”.

*Manual ADC process using Service Remocon. After enter Service Mode by pushing "ADJ" key, execute "Auto-RGBB" by pushing "►" key at "Auto-RGB".
5. EDID writing and Check HDCP key

5.1 writing EDID (RGB, HDMI)

5.2 Equipment
- Select System control 2 in service menu by Remote controller for adjustment.
- Select EDID All (RGB, HDMI) in system control 2 menu
- Check OK at EDID RGB, EDID HDMI list
- if it is not OK, try one more time
* even though see OK, read EDID data by Adjustment program or MSPG.

5.5 EDID data

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>content</th>
<th>16bit Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manufacturer ID</td>
<td>GSM</td>
<td>1E6D</td>
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<tr>
<td>2</td>
<td>ProductID</td>
<td>22509(Analog)</td>
<td>22510(HDMI)</td>
</tr>
<tr>
<td>3</td>
<td>Year</td>
<td>2010</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>Version</td>
<td>Analog : 1</td>
<td>Digital : 1</td>
</tr>
<tr>
<td>5</td>
<td>Revision</td>
<td>Analog : 3</td>
<td>Digital : 1</td>
</tr>
<tr>
<td>6</td>
<td>Model Name</td>
<td>M2380A</td>
<td></td>
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</tbody>
</table>

5.5.1. RGB EDID Data

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Manufacturer ID</th>
<th>ProductID</th>
<th>Year</th>
<th>Version</th>
<th>Revision</th>
<th>Model Name</th>
</tr>
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<td>22509</td>
<td>2010</td>
<td>1</td>
<td>3</td>
<td>M2380A</td>
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</table>

5.5.2. HDMI EDID Data

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Manufacturer ID</th>
<th>ProductID</th>
<th>Year</th>
<th>Version</th>
<th>Revision</th>
<th>Model Name</th>
</tr>
</thead>
<tbody>
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<td></td>
<td>GSM</td>
<td>22510</td>
<td>2010</td>
<td>1</td>
<td>3</td>
<td>M2380A</td>
</tr>
</tbody>
</table>
6. Check HDCP key

* This model is applied IC written HDCP. So don’t need to write.
* Read HDCP key by adjustment program

7. Adjustment of White Balance

7.1 Purpose and Principle for adjustment of the color temperature

- Remote controller for adjustment
- Color Analyzer : CA-210
- CH : 09 (LCD MNT, Normal) --> M2080A / M2280A/ M2380A
- Auto W/B adjustment instrument (only for Auto adjustment)
- PC (for communication through RGB)
- Pattern Generator (MSPG-925FS series.)

7.2 Connecting diagram of equipment for measuring (For Automatic Adjustment)

8. Function Check

8.1 Check display and sound

* Check Input and Signal items. (cf. work instructions)
1. TV
2. AV (CVBS)
3. COMPONENT (1080i)
4. RGB (PC : 1920 x 1080 @ 60hz)
5. HDMI
6. PC Audio In
* Display and Sound check is executed by Remote controller.

9. Preset CH write condition

1. AC on time on only one after assembled automatically
2. CH recover on SVC OSD manually

<table>
<thead>
<tr>
<th>Mode</th>
<th>Color coordinate X</th>
<th>Color coordinate Y</th>
<th>Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cool</td>
<td>0.283±0.003</td>
<td>0.293±0.003</td>
<td>11,000K</td>
</tr>
<tr>
<td>Medium</td>
<td>0.295±0.003</td>
<td>0.305±0.003</td>
<td>8,000K</td>
</tr>
<tr>
<td>Warm</td>
<td>0.313±0.003</td>
<td>0.329±0.003</td>
<td>6,500K</td>
</tr>
</tbody>
</table>

* Note : x, y coordinates are drifted about 0.007 after 30 mins heat-run. So checking color coordinate within 5-min at total assembly line, consider x, y coordinates might be up to 0.007 than x, y target of each color temperature.

*When doing Adjustment, Please make circumstance as below.
TROUBLESHOOTING

1. NO POWER-MAIN PCBA

1. NO POWER

1. NO

- Output VOLTAGE 19V through 4Pin of JK701?
  - YES
  - NO change adaptor, or find out A short or open point of connection with adaptor

2. YES

- 3.3V at 2pin of IC703
  - YES check the Lines of IC703 or IC707, If there is any problem at Line, Change IC703 or IC707.
  - NO

3. NO

- 5V at the plus pin of C793?
  - YES
  - NO check the Lines of IC701, If there is any problem at Line, Change IC701.

4. YES

- Is 5V at 41 pin of IC701?
  - YES
  - NO check the Lines of IC701, If there is any problem at Line, Change IC701.

5. NO

- 3.3V at 1pin of P203?? when push power key, Is 0v at 3pin of P203?
  - YES Check Line short or open between IC604 and X601, Or change IC604 or change X601
  - NO change control Or check Line short or open of P203

6. YES

- 5V at 3pin of P204?
  - YES
  - NO change IR board Or check Line short or open of P204

- is there any wave at 1pin of P203, when use remote controller?

Insult F/W

4. PMW
   PTM

X601

Copyright © 2010 LG Electronics, Inc. All right reserved.
Only for training and service purposes
2. No raster (Power LED blue, black screen) - LED driver PCBA

**NO RASTER**
(Screen is not displayed)

1. Is 19V at 1pin of P103?
   - NO
     - check that 2pin of IC705 on Main PCBA is 3.3V.
     - Or change IC705 of Main PCBA, check line and wafer between Main to LED PCBA
   - YES

2. Is 5V at 6pin of P103?
   - NO
     - Check that 2pin of Q203 on Main PCBA is 0.7V.
     - Or change Q203 of Main PCBA, check open or short at line and wafer between Main to LED PCBA
   - YES

3. Is waveform at 4pin of P103?
   - NO
     - check open or short at line and wafer between Main to LED PCBA
   - YES

4. Is LED string Voltage at plus pin of C115?
   - 23k41-46.6V
   - 22N54-61.2V
   - 20N45-51V
   - NO
     - If is not 2.3V PWM at R119, change Q103 and IC100.
     - If is not matched with LED voltage of module inch, check inch option resistor. Another is check open or short at line and wafer between module and LED driver PCBA
   - YES

**REPLACE LCD MODULE**

**WAVEFORMS**

4Pin of P103
Brightness 100

4Pin of P103
Brightness 0
3. Abnormal/No screen (All in put)-Main PCBA

Abnormal/No screen (all input)

1. Put into LVDS cable completely? LVDS cable have damage?
   - NO: If LVDS cable isn’t insulted enough, Insult LVDS cable until locking hook.
     If LVDS cable have damage, Change LVDS cable
   - YES: If is not under 1.5V at R752, change Q703 or check open and short of Line among IC705, Q703 and Q705.
     If is under 4.8V at L705, Check open and short of line between IC705 and P201.

2. Is 5V at 1pin of P201?
   - NO: Check open and short of line between IC705 and P201.
     Or Check LVDS cable have damage. Another is change IC604.
   - YES: Change module

WAVEFORMS

3. 10,11,22,23Pin of P201 (Clock line)

4. 8,9,12,13,15,16,18,19,20,21, 25,26,27,28,29,30Pin of P201 (Data Line)
4. Abnormal screen (TV)-Main PCBA

1. Put into RF cable completely?
   - YES
   - NO
     - Insult RF cable tight and then
       Cable nut screw tight.

2. Is 5V at 2,6pin of TU401?
   - YES
   - NO
     - If 4.9V is not at plus pin of L707, check
       It is over 3V at 28pin of IC701,
       if it is not, Check Line between IC701
       and IC604 is open or short. Another is change
       IC701

3. Is I2C waveform at 4,5pin of TU401?
   - YES
   - NO
     - Check Line between TU401 and IC 604
       is open or short, Another is change
       IC604 or TU401

4. Is IF waveform at 33,34 pin of IC604?
   - YES
   - NO
     - Check Line between TU401 and IC 604
       is open or short. Another is change
       IC604 or TU401 or L403

Change Main PCBA

WAVEFORMS

3

4

4Pin of TU401 (SCL)  5Pin of TU401 (SDA)  33,34pin of IC604
5. Abnormal screen (AV)-Main PCBA

1. Abnormal screen (AV)
   - Put into AV cable completely?
     - NO: Insult AV cable tight
     - YES

2. Is input signal timing and format in spec?
   - NO: Change Timing to 480I, 576I or change format CVBS
   - YES

3. Is waveform at R632?
   - NO: Check Line between JK101 and IC604 is open or short. Another is change AV cable
   - YES: Change IC 604

WAVEFORMS

R632 (CVBS)
6. Abnormal screen (Component)-Main PCBA

Abnormal screen (component)

1. Put into component cable completely?
   - NO: insult component cable
   - YES:

2. Is input signal timing and format in spec?
   - NO: Change Timing to 1080iP, 720iP, 576iP, 480iP Or change format to Ycbcr, Ypbr
   - YES:

3. Is waveform at R626, R627, R692?
   - NO: Check Line between JK101 and IC604 is open or short. Another is Change component cable
   - YES: Change IC 604

WAVEFORMS

3. R626(Y)  R632(PB)  R627(PR)
7. Abnormal screen (RGB PC)-Main PCBA

Abnormal screen (RGB PC)

1. Put into RGB cable completely?
   - NO: Inspect RGB cable tight
   - YES

2. Is input signal timing and format in spec?
   - NO: Change timing according to product spec, or change format to RGB
   - YES

3. Is waveform at R636, R637, R639?
   - NO: Check line between JK301 and IC604 is open or short, another is change RGB cable
   - YES: Change IC604

---

WAVES FORMS

R637(G)  R639(R)  R639(B)
8. Abnormal screen (HDMI)-Main PCBA

Abnormal screen (HDMI)

1. Put into HDMI cable completely?
   - NO → Insulted HDMI cable
   - YES → Change Timing according to product spec, change format under 8 bit in Y,PC,B, R, G B

2. Is Input signal timing and format in spec?
   - NO → Check line between JK301 and IC604 is open or short, Another is Change IC301, IC602 or HDMI cable
   - YES → Check line between JK301 and IC604 is open or short, Another is Change IC604 or HDMI cable

3. Can read EDID and HDCP key through 16,15pin of JK301?
   - YES → Check line between JK301 and IC604 is open or short, Another is Change IC604 or HDMI cable

4. Is 5V at 19pin of JK301?
   - YES → Check line between JK301 and IC604 is open or short, Another is Change IC604 or HDMI cable

5. Is waveform at R309, R320?
   - NO → Check line between JK301 and IC604 is open or short, Another is Change HDMI cable
   - YES → Change IC604

6. Is waveform at R322,R311, R324,R321,R313,R30?
   - NO → Check line between JK301 and IC604 is open or short, Another is Change HDMI cable
   - YES → Change IC604
9. No sound (all source)-Main PCBA

- NO sound (AI source)

1. Does wire connect P501 with speaker?
   - NO: Connect wire between P501 and speaker.
   - YES: Is 12V at 39pin of IC501?

2. Is 12V at 39pin of IC501?
   - NO: If it is over 2.8V at 2 pin of IC704, check 1 pin of IC704 is open. If it is not open at 1 pin of IC704, check Line between 5 pin of IC704 and IC501. Another is change IC7042.
   - YES: Is 3.3V at 48pin of IC501?

3. Is 3.3V at 48pin of IC501?
   - NO: If 4.9V is not plus pin of C766, check it is over 3V at 29pin of IC701, if it is not, CheckLine between IC701 and IC708 is open or short. Another is change IC701, IC705 or IC708.
   - YES: Is I2C waveform at 12,13pin of IC501?

4. Is I2C waveform at 12,13pin of IC501?
   - NO: If it is not 1.8V at 2pin of IC702, check Line between IC702 and IC708 is open or short, and then check line between IC702 and IC 501 is open or short. Another is change IC702.
   - YES: Is I2S waveform at R521,R545,R529,R517?

5. Is I2S waveform at R521,R545,R529,R517?
   - NO: CheckLine between IC501 and IC604 is open or short. Another is chang IC501 or IC604.
   - YES: Is there any waveform P501?

6. Is there any waveform P501?
   - NO: CheckLine between IC501 and P501 is open or short. And then check resistance of speaker is under 4ohm. Another is change IC501.
   - YES: Change speaker and wire

Images:
- 13pin of IC501
- 12pin of IC501
- R521(SDO)
- R545(WS)
- R549(SCK)
9. No sound (all source)-Main PCBA

10. Abnormal sound(TV)-Main PCBA

Abnormal sound (TV)

1. Put into RF cable completely? NO

   insulate RF cable tight and then
   Cable nut screw tight.

   YES

2. Is 5V at 2,6pin of TU401? NO

   If 4.9V is not at plus pin of L707, check
   It is over 3V at 29pin of IC701.
   If it is not, Check Line between IC701
   and IC604 is open or short.
   Another is change IC701

   Is I2C waveform at 4,5pin of TU401?

3. NO

   Check Line between TU401 and IC604
   is open or short, Another is change
   IC604 or TU401

4. Is IF waveform at 35
   ,36 pin of IC604?

   NO

   Check Line between TU401 and IC604
   is open or short, Another is change
   IC604 or TU401 or L403

   Change Main PCBA

WAVEFORMS

4Pin of TU401 (SCL)  5Pin of TU401 (SDA)  35,36pin of IC604
11. Abnormal sound (AV) - Main PCBA

Abnormal sound (AV)

1. Put into AV cable completely?
   - NO: Insult AV cable tight
   - YES: Is waveform at C627, C628

2. Is waveform at C627, C628?
   - NO: Check line between JK101 and IC604, is open or short, Another is change AV cable
   - YES: Change IC604

WAVEFORMS

C627, C628 (audio in)
12. Abnormal sound (Component) - Main PCBA

Abnormal sound (component)

1. Put into component cable completely?
   - NO: insulate component cable
   - YES: Is waveform at R626, C625, C626?

2. Is waveform at R626, C625, C626?
   - NO: Check line between JK101 and IC604 is open or short. Another is change component cable
   - YES: Change IC604

WAVEFORMS

C625, C626 (audio in)
13. Abnormal sound (PC audio in)-Main PCBA

Abnormal sound (PC audio in)

1. Put into audio in cable completely?
   - NO: Insult audio cable tightly
   - YES: Is waveform at C655, C639

2. WAVEFORMS
   - C655, C639 (audio in)

3. Is waveform at C655, C639?
   - NO: Check Line between JK102 and IC604 is open or short, Another is Change RGB cable
   - YES: Change IC604
14. Abnormal sound (HDMI) - Main PCBA

Abnormal sound (HDMI)

1. Put into HDMI cable completely?
   - NO: Insulate HDMI cable
   - YES: Change Timing according to product spec, change format to PCM

2. Is input signal timing and format in spec?
   - NO: Change JK301 and IC604 is open or short, Another is IC301, IC602 or HDMI cable
   - YES: Check Line between JK301 and IC604 is open or short, Another is IC604 or HDMI cable

3. Can read EDID and HDCP key through 16,15 pin of JK301?
   - YES: Check Line between JK301 and IC604 is open or short, Another is IC604 or HDMI cable

4. Is 5V at 19 pin of JK301?
   - YES: Check Line between JK301 and IC604 is open or short, Another is IC604 or HDMI cable

5. Is waveform at R309, R320?
   - NO: Check Line between JK301 and IC604 is open or short, Another is Change HDMI cable
   - YES: Change IC604

6. Is waveform at R322, R311, R324, R321, R313, R30?
   - NO: Check Line between JK301 and IC604 is open or short, Another is Change HDMI cable
   - YES: Change IC604
Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ▲ 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.