SHARP CORPORATION
SPECIFICATIONS FOR
LCD DISPLAY

MODEL 64L-U7E

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<th>部 長</th>
<th>主 査</th>
<th>係 長</th>
<th>担 当</th>
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Modification History

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Feb. 10, 1997
SHARP CORPORATION
SPECIFICATION FOR LCD DISPLAY MONITOR

GENERAL SPECIFICATION

MODEL : 64L-U7E

1. Input signal
   NTSC Video signal
   Analog RGB signal (Horizontal scan rate 15.734 kHz)

2. Power voltage
   DC 10.5 V ~ 12.0 V

3. Power consumption
   7 W at DC 12.0V

4. Viewing area Dimension
   Diagonal 161.2 mm 6.4 “
   Width 130.6 mm
   Height 94.5 mm

5. Appropriate Viewing angle
   6 O’clock

6. Dimensions (Approx.)
   168 (W) x 123 (H) x 31 (D) mm

7. Weight (Approx.)
   400 g

8. LCD Display Panel
   TFT Active Matrix
   449,280 Dots (1,920 H x 234 V)
   Stripe arrangement

9. Back light
   Cold Cathode Fluorescent Tube
   W-Shaped Lamp
   Direct Lighting System

10. Semiconductors
    (except LCD panel)
    ICs 13 pcs.
    Transistors 17 pcs.
    Diodes 18 pcs.

11. Standards
    Safety standards
    UL 1492 under consideration
    EMI standards
    Fcc under consideration
### 12. External terminal

<table>
<thead>
<tr>
<th>Connector</th>
<th>Description</th>
</tr>
</thead>
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<tr>
<td>A1</td>
<td>H-SYNC OUTPUT (Internal horizontal sync. signal)</td>
</tr>
<tr>
<td>A2</td>
<td>V-SYNC OUTPUT (Internal Vertical sync. signal)</td>
</tr>
<tr>
<td>A3</td>
<td>+5V OUTPUT</td>
</tr>
<tr>
<td>A4</td>
<td>TEST1</td>
</tr>
<tr>
<td>A5</td>
<td>TEST2</td>
</tr>
<tr>
<td>A6</td>
<td>Color adjustment signal</td>
</tr>
<tr>
<td>A7</td>
<td>Brightness adjustment signal</td>
</tr>
<tr>
<td>A8</td>
<td>Tint adjustment signal</td>
</tr>
<tr>
<td>A9</td>
<td>Dimming adjustment signal</td>
</tr>
<tr>
<td>A10</td>
<td>GND</td>
</tr>
<tr>
<td>A11</td>
<td>Video Input (NTSC Composite video signal)</td>
</tr>
<tr>
<td>A12</td>
<td>GND</td>
</tr>
<tr>
<td>A13</td>
<td>Red Signal Input (Analog RGB signal)</td>
</tr>
<tr>
<td>A14</td>
<td>GND</td>
</tr>
<tr>
<td>A15</td>
<td>Green Signal Input (Analog RGB signal)</td>
</tr>
<tr>
<td>A16</td>
<td>GND</td>
</tr>
<tr>
<td>A17</td>
<td>Blue Signal Input (Analog RGB signal)</td>
</tr>
<tr>
<td>A18</td>
<td>GND</td>
</tr>
<tr>
<td>A19</td>
<td>Ys Input (Note1)</td>
</tr>
<tr>
<td>A20</td>
<td>Super Impose (Note2)</td>
</tr>
<tr>
<td>A21</td>
<td>N.C.</td>
</tr>
<tr>
<td>A22</td>
<td>C-Sync Input (Analog RGB signal)</td>
</tr>
<tr>
<td>A23</td>
<td>GND</td>
</tr>
<tr>
<td>A24</td>
<td>GND (for Signal Circuit)</td>
</tr>
<tr>
<td>A25</td>
<td>+12 V Input (for Signal Circuit)</td>
</tr>
<tr>
<td>A26</td>
<td>+12 V Input (for Inverter)</td>
</tr>
<tr>
<td>A27</td>
<td>+12 V Input (for Inverter)</td>
</tr>
<tr>
<td>A28</td>
<td>GND (for Inverter)</td>
</tr>
</tbody>
</table>

**Connector manufacture**: Molex

**Connector name**: 52271-2817
- 1.0 mm pitch 28 poles
- Contact side: Lower

**(Note1)**
- Video Mode: GND
- RGB Mode: High Level

**(Note2)**
- Normal
- Superimpose Mode: Open
- GND
1. General
   1) Power Voltage  DC 12.0 V
   2) Operating temperature Range  25°C  
      (without cabinet of customer)
   3) Storage temperature Range
      -20°C to 80°C
   4) Power Consumption(DC 12.0 V Nominal)  7.0 W ± 20 %

2. Video output characteristics
   1) Video output( at tint, color and brightness control center position with 
      standard half color bars signal)  2.7 V p-p±0.7Vpp
   2) Video fidelity( at 100kHz standard, NTSC video signal )
      1 MHz  ± 0.5 dB
      2 Mhz  ± 0.1 dB
      3 MHz  - 10.0 dB
      3.58MHz - 25.0 dB

3. Picture quality
   1) Resolution( ITC pattern, NTSC video signal )
      Horizontal center  220 lines  180 lines min.
      corner  220  180
      Vertical center  220  180
      corner  220  180
   2) Step response
      rising edge time  500 ns max.
      pre shoot  20 % max.
      over shoot  20 % max.
   3) ACC characteristics
      ACC ( at chroma output level -6 dB )  0 dB
4. Chroma Section

1) Color control range (for information only) 4 dB min.

2) Tint control range (for information only)
   To green  30° 12° min.
   To purple 30° 12° min.

3) Tint stability (for information only)
   Tint drift 3° 12° max.
   Tint shift 3° 12° max.

4) Color killer
   -30 dB -20 dB max.

5. Liquid crystal display

1) Viewing area
   Diagonal  161.2 mm
   Width     130.6 mm
   Height    94.5 mm

2) Number of dots
   449,280 dots (640 x 3 x 234)

3) Pitch of dots
   Horizontal 68 μm
   Vertical   202 μm

4) Pixels arrangement
   RGB stripe arrangement

5) Contrast (best viewing position) 1:60 min.

6) Response time (at 25 °C) 100 msec max.

7) Viewing angle (at contrast 1:10 min.)
   Left / Right -45°/45° min.
   Up / Down  10 °/-30 ° min.
   note: at 6 o’clock viewing mode

8) Over scanning (at NTSC video signal input, information only)
   Horizontal 4 %
   Vertical 2 % (Upper side)
            3 % (Down side)

9) Brightness (at 25 °C, after 30 minutes warming up, at DC 12V, at 100% white video signal, at no dimming mode)
   220 cd/m² 120 cd/m² min.

10) Whole light through rate 3.4 % 2.8 % min.

11) Dimming range
    100～15%
6. Input signal requirement

1) NTSC Video signal (standard signal: luminance order color barsignal with 100% white peak level)

<table>
<thead>
<tr>
<th>Input level</th>
<th>1.0 V p-p</th>
<th>1.0 V p-p ± 0.2 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input impedance</td>
<td>75 Ω ± 10%</td>
<td></td>
</tr>
</tbody>
</table>

2) Analog RGB signal

<table>
<thead>
<tr>
<th>Input level</th>
<th>0.7 V p-p</th>
<th>0.7 V p-p ± 20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input impedance</td>
<td>75 Ω ± 10%</td>
<td></td>
</tr>
</tbody>
</table>

3) Composite sync. signal (RGB signal input)

- Horizontal frequen
- Vertical frequen

4) Ys signal (A19 terminal)

<table>
<thead>
<tr>
<th>input level</th>
<th>L: 0 ~ 0.8 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>input impedance</td>
<td>H: 3.5 ~ 5.3 V</td>
</tr>
</tbody>
</table>

10 k Ω min.

5) Superimpose signal (A20 terminal)

<table>
<thead>
<tr>
<th>input level</th>
<th>L: 0 ~ 0.8 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>input impedance</td>
<td>H: 3.5 ~ 5.3 V</td>
</tr>
</tbody>
</table>

10 k Ω min.

6) Other input signals (picture adjustments)

<table>
<thead>
<tr>
<th>Terminal #</th>
<th>Terminal Name</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A9</td>
<td>Dimming control</td>
<td>1.6</td>
<td>1.6</td>
<td>4.6</td>
</tr>
<tr>
<td>A7</td>
<td>Brightness control</td>
<td>2.2</td>
<td>3.0</td>
<td>4.0</td>
</tr>
<tr>
<td>A6</td>
<td>Color control</td>
<td>1.7</td>
<td>3.1</td>
<td>4.4</td>
</tr>
<tr>
<td>A8</td>
<td>Tint control</td>
<td>2.1</td>
<td>3.2</td>
<td>4.4</td>
</tr>
</tbody>
</table>

5
7) Output signals requirement

+ 5.0 V output (A3 terminal)
  Output voltage level 5.3V ± 10 %
  Maximum output current 10 mA Max.

HSY signal (A1 terminal), VSY signal (A2 terminal)
  Output level TTL level
  Output current ± 20 mA
  Signal polarity Negative
8. Signal input timing (H-sync: micro second, V-sync: # of lines)

(1) Analog RGB mode

\[ <H\ period> \]
\[
\begin{align*}
  C_{sync} & : 63.56 \\
  4.8 & : 50.0 \\
  11.8 & \\
\end{align*}
\]

Analog RGB

\[ <V\ period> \]
\[
\begin{align*}
  V_{sync} & : 262.5 \\
  3 & : 240 \\
  19 & : 55 \\
\end{align*}
\]

Analog RGB

(2) Superimpose

\[ <H\ period> \]
\[
\begin{align*}
  Composite & : Video 63.56 \\
  4.8 & : 50 \\
  11.1 & \\
\end{align*}
\]

Analog RGB

\[ <V\ period> \]
\[
\begin{align*}
  Composite & : Video 234 \\
  20 & : 262.5 \\
  3 & : 234 \\
\end{align*}
\]

Analog RGB

1H
RELIABILITY TEST

MODEL : 64L-U7E

It is required that LCD chassis unit should be designed to comply with all the following reliability test.

1. Drop test
   Drop off the carton, against the floor with 1 corner, 3 edges and 6 surfaces from the height of 60cm.
   The floor should be flat surface with horizontal position and made of concrete, rock, steel plate or equivalent.
   After drop test, the unit should have no safety hazard and operate as normal usage without any damage.

2. Vibration test
   1) Conduct the following vibration test with the carton, should operate as normal usage without any damage after this test.
      Frequency(Hz) : 5 to 50
      1 cycle period : 3 minutes(back and force)
      Acceleration : 1.5G each (X,Y,Z)
      Securement : Banding
      Time : Up/Down 60 minutes
            Forward/Back 15 minutes
            Right/Left 15 minutes
   2) Endurance vibration test
      Conduct the following vibration test with the chassis unit and should operate as normal usage without any damage after this test.
      Frequency(Hz) : 10 to 200
      Acceleration : 2.5G each (X,Y,Z)
      1 cycle period : 20 minutes
      Securement : Screw
      Time : Up/Down 4 hours
             Forward/Back 2 hours
             Right/Left 2 hours
3. Pressure reduction test

Set up the unit in the pressure reduction chamber and reduce the air pressure gradually from the normal pressure to 510hPa (380mmHg) which is equivalent to 5,000m height. There should have no damage to turn on the unit with 10% increased power voltage for 30 minutes and repeat power on and off for 3 times quickly.

4. High temperature storage (without power)

Keep the unit in 80°C temperature chamber for 72 hours without power. Take out the unit to make it normal temperature and make sure that the unit has no safety hazard and operate as normal usage without any damage.

5. Low temperature storage (without power)

Keep the unit in -20°C temperature chamber for 72 hours without power. Take out the unit to make it normal temperature and make sure that the unit has no safety hazard and operate as normal usage without any damage.

6. Humidity test (with power)

Operate the unit in 40°C temperature and 90thru 95% humidity chamber for 90 hours with ± 10% increased power. Make sure that the unit has no safety hazard and operate as normal usage without any damage.

7. High temperature test (with power)

Operate the unit for 72 hours with ± 10% increased power after keeping the unit in 60°C temperature chamber for 2 hours. Make sure that the unit has no safety hazard and operate as normal usage without any damage.

8. Low temperature test (with power)

Operate the unit for 72 hours with ± 10% increased power after keeping the unit in -10°C temperature chamber for 2 hours. Make sure that the unit has no safety hazard and operate as normal usage without any damage.
9. Electrostatic discharge test
Discharge DC8kV under operating, DC15kV under non operating to chassis angle for 10 times of 1 second interval with 500Ω, 200pF prove.
Under operating : The unit should operate without any trouble during operation.
Under non operating exception : No component damage
This will not be applied when the unit recovered from the trouble after powering it off and then on.
This test will not be applied to In/Out connector terminal.

10. Thermal shock test
Keep the unit in the following temperature chamber without power.
Take out the unit to make it normal temperature and make sure that the unit has no safety hazard and operate as normal usage without any damage.

\[
\begin{align*}
+80^\circ C & \quad -20^\circ C \\
\text{3H} & \quad 5M & \quad \text{3H} & \quad 5M \\
\end{align*}
\]
# of Cycle : 10 Cycle
64L-U7E HANDLING PRECAUTIONS

1. Cable Connection

1) Turn off the power to the LCD Display before connecting or disconnecting a cable.

2. Installation

1) For mounting, please refer attached drawing.

2) When the 64L-U7E panel is to be installed directly on the equipment's surface, use the panel's metallic area for installation. If the panel surface is in direct contact with the equipment surface, the resulting stress may damage the panel or cause it to deteriorate.

3. Cautions for Installation

1) Handling the polarizing plate requires the utmost care, as it is easily damaged. To prevent possible damage or contamination, the plate's surface is protected with a protective film (lamination).

2) Cautions for removing the lamination

When removing the lamination from the polarizing plate surface, observe the following cautions. Pay special attention to static electricity.

A. Working Environment

To prevent damage from static electricity, the following working environment is recommended:

- The floor should have a conductive surface (conductive mat or paint) or more than 1M Ω resistance.

- The room should be isolated from the outdoor air, and have an adhesive mat at its entrance to clean shoes.

- The ambient atmosphere should be 15 to 27 °C, 50% to 70% RH.

- The operator should wear conductive shoes, conductive work clothes, conductive gloves, and grounding wrist straps.

B. Work Procedure

- The deionizing blower should be oriented a little downward. Keep it within 20 cm of the LCD panel. (see Fig.1)
To protect the polarizing plate from possible damage, stick adhesive tape (plastic tape, etc.) on the corner of the lamination closest to the blower. (see Fig. 2)

Gently and slowly remove the lamination while pulling the adhesive tape forward (take more than 5 seconds for this work).

After removing the lamination, immediately go to the next process before the panel gathers dust.

3) Cleaning dust off the polarizing plate surface

- Blow dust off the polarizing plate surface with an N₂ blower with anti-static treatment. Use of an ionized air gun (from Hugle Electronics co.) is recommended.

- The polarizing plate surface is so sensitive that it should not be wiped with a cleaning cloth. If it gathers dust, use adhesive plastic tape to pick it up.

4) Contaminants on the shield casing or other metallic areas should be wiped off with a soft, dry cloth.

5) Water drips or fingerprints, if left on the panel surface for long time period, may cause discoloration or spots. They should be cleaned off as soon as possible.

6) The LCD panel is made of glass. Carefully protect it from hard jolts.

7) The LCD module uses CMOS ICs. Operators should properly ground themselves to prevent possible electrostatic damage.
4. Precautions for Alignment

The LCD module and its driver board are adjusted as an integrated unit. If either the module or the driver board is replaced, readjustment will be required. Misalignment will do harm to performance and/or reliability.

5. Miscellaneous

1) Do not leave the LCD panel in direct sunlight or strong ultraviolet light for very long.

2) At temperatures below the rated storage temperature, the liquid crystal inside the panel may be freeze and damage the cells. At temperatures above the rated storage temperature, the liquid crystal may irreversibly turn into an isotropic liquid. We strongly advise that the LCD panel be stored at close to normal room temperature.

3) If the LCD panel is cracked and the liquid within spills, take care not to swallow it. If your hands or clothing become stained with the liquid, immediately clean it off with soap and water.

4) Do not let the monitor constantly display a fixed image for long time, as it may leave an afterimage. In the worst case, the liquid crystal may suffer permanent burn-in damage.

5) Also observe general precautions for handling electronic parts.

Note) The content of this section is subject to change without prior notice.