# SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY

## CUSTOMER APPROVAL

<table>
<thead>
<tr>
<th>APPROVAL</th>
<th>COMPANY CHOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUSTOMER COMMENTS</td>
<td></td>
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</tbody>
</table>

※ PART NO.: ATM0700L47(AZ DISPLAYS) VER1.0

## AZ DISPLAYS ENGINEERING APPROVAL

<table>
<thead>
<tr>
<th>DESIGNED BY</th>
<th>CHECKED BY</th>
<th>APPROVED BY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td>Change No.</td>
<td>Date</td>
<td>Subject And Reason</td>
</tr>
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<tr>
<td>1</td>
<td>2017.04.15</td>
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</table>
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1. OVERVIEW

ATM0700L47 is 7” color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs, control circuit and LED backlight. By applying 1024×600 images are displayed on the 7” diagonal screen. Display 16.7M colors by R.G.B signal input.

General specification are summarized in the following table:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display Area (mm)</td>
<td>154.2144(H) x 85.92(V)</td>
</tr>
<tr>
<td>Number of Pixels</td>
<td>1024(H) × 3 (RGB) × 600(V)</td>
</tr>
<tr>
<td>Pixel Pitch (mm)</td>
<td>0.1506(H) x 0.1432(V)</td>
</tr>
<tr>
<td>Color Pixel Arrangement</td>
<td>RGB vertical stripe</td>
</tr>
<tr>
<td>Display Mode</td>
<td>Normally white</td>
</tr>
<tr>
<td>Number of Colors</td>
<td>16.7M</td>
</tr>
<tr>
<td>Brightness (cd/m^2)</td>
<td>500nit(typ)</td>
</tr>
<tr>
<td>Response Time (ms)</td>
<td>25ms(typ.)</td>
</tr>
<tr>
<td>Contrast Ratio</td>
<td>800:1</td>
</tr>
<tr>
<td>Viewing Angle (CR ≧ 10)</td>
<td>160degree (Horizontal.)</td>
</tr>
<tr>
<td></td>
<td>130degree (Vertical)</td>
</tr>
<tr>
<td>Power Consumption (W)</td>
<td>TBD</td>
</tr>
<tr>
<td>Interface connection</td>
<td>LVDS 40pin</td>
</tr>
<tr>
<td>Module Size (mm)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Min.</td>
</tr>
<tr>
<td>Horizontal (H)</td>
<td>164.6</td>
</tr>
<tr>
<td>Vertical (V)</td>
<td>99.7</td>
</tr>
<tr>
<td>Depth (D) w/o FPC</td>
<td>5.2</td>
</tr>
<tr>
<td>Assembly size (mm)</td>
<td>164.9(H) x 100.0(V) x 7.1(D)</td>
</tr>
<tr>
<td>Module Weight (g)</td>
<td>TBD</td>
</tr>
<tr>
<td>Backlight Unit</td>
<td>LED</td>
</tr>
<tr>
<td>Surface Treatment</td>
<td>Anti-Glare</td>
</tr>
</tbody>
</table>
2. ABSOLUTE MAXIMUM RATINGS
The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Min.</th>
<th>Max.</th>
<th>Unit</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Supply Voltage</td>
<td>VDD</td>
<td>-0.3</td>
<td>3.96</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VDD_LVDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analog Supply Voltage</td>
<td>AVDD</td>
<td>-0.5</td>
<td>14.85</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Gate On Voltage</td>
<td>VGH</td>
<td>-0.3</td>
<td>40</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Gate Off Voltage</td>
<td>VGL</td>
<td>-20</td>
<td>0.3</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Gate On-Gate Off Voltage</td>
<td>VGH-VGL</td>
<td>12</td>
<td>40</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Signal Input Voltage</td>
<td>NIN0 ~ NIN3</td>
<td>-0.5</td>
<td>5</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PIN0 ~ PIN3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NINC,PINC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward Current (per LED)</td>
<td>If</td>
<td>-</td>
<td>30</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>Reverse Voltage (per LED)</td>
<td>VR</td>
<td>-</td>
<td>5</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Pulse forward current (per LED)</td>
<td>Ifp</td>
<td>-</td>
<td>100</td>
<td>mA</td>
<td>Note *2</td>
</tr>
<tr>
<td>Operation Temperature</td>
<td>Top</td>
<td>-20</td>
<td>70</td>
<td>°C</td>
<td>Note *1</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>T_{stg}</td>
<td>-30</td>
<td>80</td>
<td>°C</td>
<td>Note *1</td>
</tr>
</tbody>
</table>

Note:
*1) If users use the product out of the operation and storage range, it will have quality issue.
*2) Ifp Conditions: Pulse Width ≤ 10msec, Duty ≤ 1/10
*3) Each one of LED operation must be follow diagram of Ambient Temperature and Allowable Forward Current.

*4) If users use the product out of the environmental operation range (temperature and humidity), it will have visual quality concerns.
### 3. ELECTRICAL CHARACTERISTICS

#### 3.1. Typical Operation Conditions

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Power Supply Voltage For LCD</td>
<td>DVDD</td>
<td>3</td>
<td>3.3</td>
<td>3.6</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DVDD_LVDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logic Input Voltage (LVDS:IN+,IN-)</td>
<td>VCM</td>
<td></td>
<td></td>
<td></td>
<td>V</td>
<td>Note 1</td>
</tr>
<tr>
<td></td>
<td>(</td>
<td>V_{VID} ) )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>200</td>
<td></td>
<td></td>
<td></td>
<td>mV</td>
<td>Note 1</td>
</tr>
<tr>
<td></td>
<td>(</td>
<td>V_{VID} ) )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.4 - ( \frac{</td>
<td>V_{VID}</td>
<td>}{2} )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>600</td>
<td></td>
<td></td>
<td></td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VTH</td>
<td></td>
<td></td>
<td>100</td>
<td>mV</td>
<td>VCM=1.2V Note 1</td>
</tr>
<tr>
<td></td>
<td>VTL</td>
<td>-100</td>
<td></td>
<td></td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>Analog Power Supply Voltage</td>
<td>AVDD</td>
<td>9.4</td>
<td>9.6</td>
<td>9.8</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Gate On Power Supply Voltage</td>
<td>VGH</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Gate Off Power Supply Voltage</td>
<td>VGL</td>
<td>-6.6</td>
<td>-6</td>
<td>-5.4</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Common Power Supply Voltage</td>
<td>VCOM</td>
<td>3.7</td>
<td>3.9</td>
<td>4.1</td>
<td>V</td>
<td>Note 2</td>
</tr>
<tr>
<td>Logic Input Voltage</td>
<td>VIH</td>
<td>0.7*DVDD</td>
<td></td>
<td>DVDD</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VIL</td>
<td>GND</td>
<td></td>
<td>0.3*DVDD</td>
<td>V</td>
<td></td>
</tr>
</tbody>
</table>

**Note1:** LVDS signal

**Note2:** Please adjust VCOM to make the flicker level be minimum.
### 3.2. Current Consumption

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gate on power current</td>
<td>IVGH</td>
<td>VGH = 18V</td>
<td>-</td>
<td>0.5</td>
<td>1</td>
<td>mA</td>
<td>Note 1</td>
</tr>
<tr>
<td>Gate off power current</td>
<td>IVGL</td>
<td>VGL = -6V</td>
<td>-</td>
<td>0.5</td>
<td>1</td>
<td>mA</td>
<td>Note 1</td>
</tr>
<tr>
<td>Digital power current</td>
<td>IVDD</td>
<td>VDD = 3.3V</td>
<td>-</td>
<td>30</td>
<td>40</td>
<td>mA</td>
<td>Note 1</td>
</tr>
<tr>
<td>Analog power current</td>
<td>IAVDD</td>
<td>AVDD = 9.6V</td>
<td>-</td>
<td>35</td>
<td>50</td>
<td>mA</td>
<td>Note 1</td>
</tr>
<tr>
<td>Total Power Consumption</td>
<td>PC</td>
<td></td>
<td>-</td>
<td>447</td>
<td>604</td>
<td>mW</td>
<td>Note 1</td>
</tr>
</tbody>
</table>

Note 1: Typical: Under 256 gray pattern  
Maximum: Under black pattern

![256 gray pattern](image1)

![Black pattern](image2)

### 3.3. Power, Signal sequence

Power On:  
DVDD → AVDD/VGL → VGH → Video & Logic Signal → Backlight

Power Off:  
Backlight → Video & Logic Signal → VGH → AVDD/VGL → DVDD
### 3.4. Backlight

<table>
<thead>
<tr>
<th>ITEM</th>
<th>SYMBOL</th>
<th>CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED current</td>
<td>IL</td>
<td>Ta=25℃ (25mA/series)</td>
<td>--</td>
<td>225</td>
<td>--</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>LED voltage</td>
<td>VL</td>
<td>Ta=25℃ (25mA/series)</td>
<td>8.2</td>
<td>8.6</td>
<td>9.2</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>WL</td>
<td>Ta=25℃ (25mA/series)</td>
<td>--</td>
<td>1.935</td>
<td>--</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>LED Lifetime</td>
<td>-</td>
<td>Ta=25℃ IF=25mA</td>
<td>30000</td>
<td>--</td>
<td>--</td>
<td>Hr</td>
<td></td>
</tr>
</tbody>
</table>

Remarks:
*1) LED Circuit Diagram
LED电路图
（3S9P=27LED）

*2) A:Anode(＋), K:Cathode(－)
*3) Suggestion: Using the constant current control to avoid the leakage light and brightness quality issue.
*4) Definition of Led lifetime: Luminance < Initial luminance 50%.
## 4. INTERFACE CONNECTION

### 4.1. CN1 (Input Signal)

<table>
<thead>
<tr>
<th>PIN NO.</th>
<th>SYMBOL</th>
<th>DESCRIPTION</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VCOM</td>
<td>Common voltage</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>DVDD</td>
<td>Digital power</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>DVDD</td>
<td>Digital power</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>NC</td>
<td>Not connect</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>RESET</td>
<td>Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high. (R=10KΩ, C=1μF)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>STBYB</td>
<td>Standby mode, normally pull high STBYB=&quot;1&quot;, normal operation STBYB=&quot;0&quot;, timing control, source driver will turn off, all output are high-Z</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>RXIN0-</td>
<td>Negative LVDS differential data inputs</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>RXIN0+</td>
<td>Positive LVDS differential data inputs</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>RXIN1-</td>
<td>Negative LVDS differential data inputs</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>RXIN1+</td>
<td>Positive LVDS differential data inputs</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>RXIN2-</td>
<td>Negative LVDS differential data inputs</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>RXIN2+</td>
<td>Positive LVDS differential data inputs</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>RXCLKIN-</td>
<td>Negative LVDS differential clock inputs</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>RXCLKIN+</td>
<td>Positive LVDS differential clock inputs</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>RXIN3-</td>
<td>Negative LVDS differential data inputs</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>RXIN3+</td>
<td>Positive LVDS differential data inputs</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>NC</td>
<td>Not connect</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>NC</td>
<td>Not connect</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>NC</td>
<td>Not connect</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>NC</td>
<td>Not connect</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>SELB</td>
<td>6bit/8bit mode select *1)</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>AVDD</td>
<td>Power for Analog Circuit</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>LED-</td>
<td>LED Cathode</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>LED-</td>
<td>LED Cathode</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>L/R</td>
<td>Horizontal inversion *2)</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>U/D</td>
<td>Vertical inversion *2)</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>VGL</td>
<td>Negative power for TFT</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>NC</td>
<td>Not connect</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>NC</td>
<td>Not connect</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>VGH</td>
<td>Positive power for TFT</td>
<td></td>
</tr>
</tbody>
</table>
ATM0700L47(AZ DISPLAYS) TFT MODULE V1.0

<table>
<thead>
<tr>
<th></th>
<th>LED+</th>
<th>LED Anode</th>
</tr>
</thead>
<tbody>
<tr>
<td>39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remarks:
*1) if LVDS input data is 6bits, SELB must be set to High
If LVDS input data is 8bits, SELB must be set to Low
*2) U/D and L/R control function

<table>
<thead>
<tr>
<th>UD</th>
<th>LR</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>Normal display</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>Inverse Left and Right</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>Inverse Up and Down</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>Inverse Left and Right</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inverse Up and Down</td>
</tr>
</tbody>
</table>

Diagram:
- Up
- Left
- Right
- Down
5. INPUT SIGNAL(DE ONLY MODE)

5.1. Timing Specification

<table>
<thead>
<tr>
<th>ITEM</th>
<th>SYMBOL</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVDS input signal sequence</td>
<td>CLK Frequency</td>
<td>tclk</td>
<td>45</td>
<td>51.2</td>
<td>MHz</td>
</tr>
<tr>
<td>LCD input signal sequence (Input LVDS Transmitter)</td>
<td>Horizontal total Time</td>
<td>tH</td>
<td>1324</td>
<td>1344</td>
<td>1364</td>
</tr>
<tr>
<td></td>
<td>Horizontal effective Time</td>
<td>tHA</td>
<td>1024</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Horizontal Blank Time</td>
<td>tHB</td>
<td>300</td>
<td>320</td>
<td>340</td>
</tr>
<tr>
<td></td>
<td>Vertical total Time</td>
<td>tV</td>
<td>625</td>
<td>635</td>
<td>645</td>
</tr>
<tr>
<td></td>
<td>Vertical effective Time</td>
<td>tVA</td>
<td>600</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vertical Blank Time</td>
<td>tVB</td>
<td>25</td>
<td>35</td>
<td>45</td>
</tr>
</tbody>
</table>

5.2. Timing sequence (Timing chart)

5.2.1. Horizontal Timing Sequence:

5.2.2. Vertical Timing Sequence:
5.2.3. LVDS Input Data mapping

6 Bit LVDS input

8 Bit LVDS input
### 6. OPTICAL CHARACTERISTICS

\( Ta = 25^\circ C, VCC=3.3V \)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>SYMBOL</th>
<th>CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel Transmittance</td>
<td>T</td>
<td></td>
<td>3.9</td>
<td>4.2</td>
<td></td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Contrast Ratio</td>
<td>CR</td>
<td>Point-5</td>
<td>600</td>
<td>800</td>
<td></td>
<td>%</td>
<td>1,2,3</td>
</tr>
<tr>
<td>Luminance(CEN)</td>
<td>LW</td>
<td>Point-5</td>
<td>480</td>
<td>500</td>
<td></td>
<td>cd/m^2</td>
<td>1,3</td>
</tr>
<tr>
<td>Luminance Uniformity</td>
<td>( \Delta L )</td>
<td></td>
<td>70</td>
<td>80</td>
<td></td>
<td>%</td>
<td>1,3</td>
</tr>
<tr>
<td>Response Time</td>
<td>Tr + Tf</td>
<td>Point-5</td>
<td>-</td>
<td>25</td>
<td>40</td>
<td>ms</td>
<td>1,3,5</td>
</tr>
<tr>
<td>NTSC</td>
<td>-</td>
<td>Point-5</td>
<td>45</td>
<td>50</td>
<td>-</td>
<td>%</td>
<td>1,3</td>
</tr>
<tr>
<td>Viewing Angle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horizontal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left(( \psi ))</td>
<td></td>
<td>CR ( \geq 10 )</td>
<td>70</td>
<td>80</td>
<td>-</td>
<td>°</td>
<td>1,3</td>
</tr>
<tr>
<td>Right(( \psi ))</td>
<td></td>
<td></td>
<td>70</td>
<td>80</td>
<td>-</td>
<td>°</td>
<td>1,3</td>
</tr>
<tr>
<td>Vertical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper(( \theta ))</td>
<td></td>
<td>Point-5</td>
<td>50</td>
<td>60</td>
<td>-</td>
<td>°</td>
<td>1,2,4</td>
</tr>
<tr>
<td>Down(( \theta ))</td>
<td></td>
<td></td>
<td>60</td>
<td>70</td>
<td>-</td>
<td>°</td>
<td></td>
</tr>
<tr>
<td>Color Coordinate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>Wx</td>
<td>Point-5</td>
<td>0.273</td>
<td>0.313</td>
<td>0.353</td>
<td></td>
<td>1,3</td>
</tr>
<tr>
<td></td>
<td>Wy</td>
<td></td>
<td>0.289</td>
<td>0.329</td>
<td>0.369</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red</td>
<td>Rx</td>
<td></td>
<td>0.573</td>
<td>0.593</td>
<td>0.613</td>
<td></td>
<td>1,3</td>
</tr>
<tr>
<td></td>
<td>Ry</td>
<td></td>
<td>0.315</td>
<td>0.335</td>
<td>0.355</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td>Gx</td>
<td></td>
<td>0.322</td>
<td>0.342</td>
<td>0.362</td>
<td></td>
<td>1,3</td>
</tr>
<tr>
<td></td>
<td>Gy</td>
<td></td>
<td>0.580</td>
<td>0.600</td>
<td>0.620</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue</td>
<td>Bx</td>
<td></td>
<td>0.138</td>
<td>0.158</td>
<td>0.178</td>
<td></td>
<td>1,3</td>
</tr>
<tr>
<td></td>
<td>By</td>
<td></td>
<td>0.091</td>
<td>0.111</td>
<td>0.131</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note1:** Measure condition: 25°C±2°C, 60±10%RH, under10 Lux in the dark room.BM-5A (TOPCON), viewing angle2°, IL=225 mA (Backlight current), measurement after lighting on 10 mins.

Note2: Definition of contrast ratio:
Contrast Ratio \( (CR) = \frac{\text{(White) Luminance of ON}}{\text{(Black) Luminance of OFF}} \)
Note 3: Definition of luminance: Measure white luminance on the point 5 as figure.6-1
Definition of Luminance Uniformity: Measure white luminance on the point 1~9 as figure.6-1
\[ \Delta L = \frac{[L(\text{MIN})/L(\text{MAX})] \times 100}{(H/3)} \]

Fig.6-1 Measuring point

Note 4: Definition of Viewing Angle (θ, ψ), refer to Fig.6-2 as below:

Fig.6-2 Definition of Viewing Angle

Note 5: Definition of Response Time (White-Black)

Fig.6-3 Definition of Response Time (White-Black)
7. RELIABILITY TEST

7.1. Temperature and humidity

<table>
<thead>
<tr>
<th>TEST ITEMS</th>
<th>CONDITIONS</th>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Temperature Operation</td>
<td>70°C ; 240hrs</td>
<td></td>
</tr>
<tr>
<td>High Temperature Storage</td>
<td>80°C ; 240hrs</td>
<td></td>
</tr>
<tr>
<td>High Temperature High Humidity Operation</td>
<td>60°C ; 90%RH ; 240hrs</td>
<td>No condensation</td>
</tr>
<tr>
<td>Low Temperature Operation</td>
<td>-20°C ; 240hrs</td>
<td>Backlight unit always turn on</td>
</tr>
<tr>
<td>Low Temperature Storage</td>
<td>-30°C ; 240hrs</td>
<td></td>
</tr>
<tr>
<td>Thermal Shock</td>
<td>-20°C (0.5hr) ~ 70°C (0.5hr) ; 100 Cycles</td>
<td></td>
</tr>
<tr>
<td>Image Sticking</td>
<td>25°C ; 4hrs</td>
<td></td>
</tr>
<tr>
<td>MTBF</td>
<td>200,00hrs</td>
<td></td>
</tr>
</tbody>
</table>

Note 1:
Condition of Image Sticking test: 25°C ± 2°C
Operation with test pattern sustained for 4 hrs, then change to mid-gray pattern immediately.
After 5 mins, the mura must be disappeared completely.

7.2. Shock and Vibration

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shock (Non-operation)</td>
<td>Shock level: 980m/s²(equal to 100G).</td>
</tr>
<tr>
<td></td>
<td>Waveform: 1/2 Sine wave, 6msec.</td>
</tr>
<tr>
<td>Vibration (Non-operation)</td>
<td>Frequency range: 8~33.3Hz</td>
</tr>
<tr>
<td></td>
<td>Stoke: 1.3 mm</td>
</tr>
<tr>
<td></td>
<td>Vibration: sinusoidal wave, perpendicular axis(both x, z axis: 2Hrs, y axis 4Hrs).</td>
</tr>
<tr>
<td></td>
<td>Sweep: 2.9G, 33.3 Hz -400 Hz</td>
</tr>
<tr>
<td></td>
<td>Cycle: 15 min</td>
</tr>
</tbody>
</table>

7.3. Electrostatic Discharge

<table>
<thead>
<tr>
<th>TEST ITEM</th>
<th>CONDITIONS</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESD</td>
<td>150pF, 330Ω, ±8kV&amp;±15kV air&amp; contact test</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>200pF, 0Ω, ±200V contact test</td>
<td>2</td>
</tr>
</tbody>
</table>

Note:
Measure
1: LCD glass and metal bezel
2: IF connector pins

7.4. Judgment standard
The Judgment of the above test should be made as follow:
Pass: Normal display image and no line defect.
Partial transformation of the module parts should be ignored.
Fail: No display image, Function NG, or line defects.
8. MECHANICAL DIMENSION

8.1. LCD Module

Notes:
1. Units: mm
2. Do not scale drawing
3. All radii without dimension R0.2
4. Uniformity: 75% (Min)
5. Do not use lead-free process
6. Modification rev. number
7. Dimensions in mm
8. General tolerances: ±0.3
9. * For important dimension; ( ) for reference dimension
10. Mark mold cavity identification in recess approximately where indicated.

General:
- RoHS must be complied. (Use lead-free process)
- Uniformity: 75% (Min)
- All radii without dimension R0.2
- Do not scale drawing
- Units: mm

Dimensions:
- Display Center:
  - RGB Resolution: 1024 (RGB) X 600
- Bezel Open:
  - Minimum: 87.92 (polazier_Up)
  - Maximum: 89.10 (Bezel Open)
  - Polarizer Up: 87.92
- Overall size (L x W):
  - Minimum: 164.90 ± 0.30 (LCM Outline)
  - Maximum: 156.70 (Bezel Open)
- Polarizer Up:
  - Minimum: 89.10 (Bezel Open)
  - Maximum: 87.92 (polazier_Up)
- Color coordinates:
  - Minimum: 0.273
  - Maximum: 0.353
- RoHS compliant:
  - Minimum: 0.289
  - Maximum: 0.369
  - TYP: 0.313
  - MAX: 0.329

RoHS:
- Minimum: 0.273
- Maximum: 0.353
- TYP: 0.313
- MAX: 0.329

Alphabet:
- A
- B
- C
- D
- E
- F
- G
- H

Dimensions:
- Width: 49.60 ± 0.07
- Height: 38.00 ± 0.05
- Depth: 1.60 ± 0.05
- Notes:
  - Do not scale drawing
  - Use lead-free process
  - Uniformity: 75% (Min)
  - All radii R0.2

Connection:
- Mating connector:
  - P/N: FH12A-40S-0.5SH (55)
9. Packing form
   TBD

10. WARRANTY
   10.1 The period is within 12 months since the date of shipping out under normal using and storage conditions.
   10.2 The warranty will be avoided in case of defect induced by customer