# CUSTOMER APPROVAL SHEET

<table>
<thead>
<tr>
<th>Company Name</th>
<th>MODEL</th>
<th>A070VW05 V0</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUSTOMER</td>
<td>APPROVED</td>
<td></td>
</tr>
<tr>
<td>Title :</td>
<td>Name :</td>
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</tr>
</tbody>
</table>

- [ ] APPROVAL FOR SPECIFICATIONS ONLY (Spec. Ver. ___)
- [ ] APPROVAL FOR SPECIFICATIONS AND ES SAMPLE (Spec. Ver. ___)
- [ ] APPROVAL FOR SPECIFICATIONS AND CS SAMPLE (Spec. Ver. ___)
- [ ] CUSTOMER REMARK :

AUO PM :
P/N : ______________________
Comment :

Doc. version : 0.2
Total pages : 24
Date : 2008/09/25
# Product Specification

## 7.0" COLOR TFT-LCD MODULE/PANEL

<table>
<thead>
<tr>
<th>Model Name</th>
<th>A070VW05 V0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planned Lifetime</strong>:</td>
<td>From 2008/Sep To 2010/Dec</td>
</tr>
<tr>
<td><strong>Phase-out Control</strong>:</td>
<td>From 2010/Jul To 2010/Dec</td>
</tr>
<tr>
<td><strong>EOL Schedule</strong>:</td>
<td>2010/Dec</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Version</th>
<th>Revise Date</th>
<th>Page</th>
<th>Content</th>
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</thead>
<tbody>
<tr>
<td>0.0</td>
<td>2008/08/07</td>
<td></td>
<td>First Draft</td>
</tr>
<tr>
<td>0.1</td>
<td>2008/09/17</td>
<td>3, 6, 8-10, 10, 11-12</td>
<td>Correct “A. General Information”. Delete recommended connector. Change panel pin definition of GND. Modify Max capability and driving condition of VLED and LEDPWM. Correct symbol of “$t_{est}$” and “$T_{ehd}$”. Update input timing. Update ESD driving condition. Add item 22 of “H. Precautions”.</td>
</tr>
<tr>
<td>0.2</td>
<td>2008/09/25</td>
<td>4-5, 10</td>
<td>Update Clear drawing. Correct “LEDPWM frequency”.</td>
</tr>
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</table>
Contents

A. General Information .....................................................................................................................................3
B. Outline Dimension .......................................................................................................................................4
  1. TFT-LCD Module – Front View ....................................................................................................................4
  2. TFT-LCD Module – Rear View ....................................................................................................................5
C. Electrical Specifications ..............................................................................................................................6
  1. TFT LCD Panel Pin Assignment ..................................................................................................................6
  2. Absolute Maximum Ratings .........................................................................................................................8
  3. Electrical DC Characteristics .......................................................................................................................9
  4. Electrical AC Characteristics .......................................................................................................................9
  6. Power On/Off Characteristics ....................................................................................................................13
D. Optical Specification ..................................................................................................................................14
E. Reliability Test Items ..................................................................................................................................17
F. Packing and Marking ..................................................................................................................................20
  1. Packing Form ............................................................................................................................................20
  2. Module/Panel Label Information ................................................................................................................21
  3. Carton Label Information ...........................................................................................................................21
G. Application Note .........................................................................................................................................21
  1. Application Circuit ......................................................................................................................................21
  2. System block .............................................................................................................................................21
H. Precautions ...............................................................................................................................................22
A. General Information

A070VW05 V0 is an a-Si type Thin Film Transistor Liquid crystal Display (TFT-LCD). This model is composed of a TFT-LCD, driver IC, FPC (flexible printed circuit), PCB with LCD driving circuit, and a backlight unit. This product is mainly for car after-market, and other suitable application.

<table>
<thead>
<tr>
<th>NO.</th>
<th>Item</th>
<th>Unit</th>
<th>Specification</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Screen Size</td>
<td>inch</td>
<td>7.0(Diagonal)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Display Resolution</td>
<td>dot</td>
<td>800RGB(H)×480(V)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Overall Dimension</td>
<td>mm</td>
<td>165(H) × 104(V) × 5.465(T)</td>
<td>Note 1</td>
</tr>
<tr>
<td>4</td>
<td>Active Area</td>
<td>mm</td>
<td>152.40(H)×91.44(V)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Pixel Pitch</td>
<td>mm</td>
<td>0.1905(H)×0.1905(V)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Color Configuration</td>
<td>--</td>
<td>R. G. B. Stripe</td>
<td>Note 2</td>
</tr>
<tr>
<td>7</td>
<td>Color Depth</td>
<td>--</td>
<td>16.7M Colors</td>
<td>Note 3</td>
</tr>
<tr>
<td>8</td>
<td>NTSC Ratio</td>
<td>%</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Display Mode</td>
<td>--</td>
<td>Normally White</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Panel surface Treatment</td>
<td>--</td>
<td>Anti-Glare, 3H</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Weight</td>
<td>g</td>
<td>TBD</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Power Consumption</td>
<td>W</td>
<td>TBD</td>
<td>Note 4</td>
</tr>
<tr>
<td>13</td>
<td>Viewing direction</td>
<td></td>
<td>6 o’clock (gray inversion)</td>
<td></td>
</tr>
</tbody>
</table>

Note 1: Not include FPC and protect film. Refer next page to get further information.
Note 2: Below figure shows dot stripe arrangement.

Note 3: The full color display depends on 24-bit data signal (pin 5~28).
Note 4: Please refer to Electrical Characteristics chapter.
B. Outline Dimension

1. TFT-LCD Module – Front View

Notes:
1. Overall tolerance is ± 0.3
2. The bending radius of FFC should be larger than 0.6
3. Unit: mm
### C. Electrical Specifications

#### 1. TFT LCD Panel Pin Assignment

<table>
<thead>
<tr>
<th>Pin no</th>
<th>Symbol</th>
<th>I/O</th>
<th>Description</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>P</td>
<td>System Ground</td>
<td>Note 1</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>P</td>
<td>System Ground</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>VCC</td>
<td>P</td>
<td>System Power Supply</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>VCC</td>
<td>P</td>
<td>System Power Supply</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>DR0</td>
<td>I</td>
<td>Graphic Data R0 (LSB)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>DR1</td>
<td>I</td>
<td>Graphic Data R1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>DR2</td>
<td>I</td>
<td>Graphic Data R2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>DR3</td>
<td>I</td>
<td>Graphic Data R3</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>DR4</td>
<td>I</td>
<td>Graphic Data R4</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>DR5</td>
<td>I</td>
<td>Graphic Data R5</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>DR6</td>
<td>I</td>
<td>Graphic Data R6</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>DR7</td>
<td>I</td>
<td>Graphic Data R7 (MSB)</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>DG0</td>
<td>I</td>
<td>Graphic Data G0 (LSB)</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>DG1</td>
<td>I</td>
<td>Graphic Data G1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>DG2</td>
<td>I</td>
<td>Graphic Data G2</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>DG3</td>
<td>I</td>
<td>Graphic Data G3</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>DG4</td>
<td>I</td>
<td>Graphic Data G4</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>DG5</td>
<td>I</td>
<td>Graphic Data G5</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>DG6</td>
<td>I</td>
<td>Graphic Data G6</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>DG7</td>
<td>I</td>
<td>Graphic Data G7 (MSB)</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>DB0</td>
<td>I</td>
<td>Graphic Data B0 (LSB)</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>DB1</td>
<td>I</td>
<td>Graphic Data B1</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>DB2</td>
<td>I</td>
<td>Graphic Data B2</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>DB3</td>
<td>I</td>
<td>Graphic Data B3</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>DB4</td>
<td>I</td>
<td>Graphic Data B4</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>DB5</td>
<td>I</td>
<td>Graphic Data B5</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>DB6</td>
<td>I</td>
<td>Graphic Data B6</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>DB7</td>
<td>I</td>
<td>Graphic Data B7 (MSB)</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>GND</td>
<td>P</td>
<td>System Ground</td>
<td>Note 1</td>
</tr>
<tr>
<td>30</td>
<td>DCLK</td>
<td>I</td>
<td>Data clock Input</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>NC</td>
<td>-</td>
<td>No connection. Please leave it open</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>HSYNC</td>
<td>I</td>
<td>Horizontal sync input</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>VSYNC</td>
<td>I</td>
<td>Vertical sync input</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>DE</td>
<td>I</td>
<td>Data enable Input (Low active)</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Pin</td>
<td>Type</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>------</td>
<td>------</td>
<td>------------------------------------</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>VLED</td>
<td>P</td>
<td>LED Circuit power supply</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>VLED</td>
<td>P</td>
<td>LED Circuit power supply</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>GND</td>
<td>P</td>
<td>System Ground</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>GND</td>
<td>P</td>
<td>System Ground</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>LEDPWM</td>
<td>I</td>
<td>LED system PWM signal</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>GNDLED</td>
<td>P</td>
<td>GND for LED Circuit</td>
<td></td>
</tr>
</tbody>
</table>

I: Input pin; P: Power pin; G: Ground pin;

Note 1. GND and GNDLED are connected together in AUO module.

![Diagram of the circuit](image-url)
### 2. Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Condition</th>
<th>Min.</th>
<th>Max.</th>
<th>Unit</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power voltage</td>
<td>VCC</td>
<td>GND=0</td>
<td>-0.5</td>
<td>5.0</td>
<td>V</td>
<td>System Power Supply</td>
</tr>
<tr>
<td></td>
<td>VLED</td>
<td>LEDGND</td>
<td>-0.5</td>
<td>6.0</td>
<td>V</td>
<td>LED Circuit Power Supply</td>
</tr>
<tr>
<td>Input signal voltage</td>
<td>Data</td>
<td>GND=0</td>
<td>-0.3</td>
<td>3.6</td>
<td>V</td>
<td>Digital Signals</td>
</tr>
</tbody>
</table>

Note 1: Functional operation should be restricted under ambient temperature (25°C).

Note 2: Maximum ratings are those values beyond which damages to the device may occur. Functional operation should be restricted to the limits in the Electrical Characteristics chapter.
3. Electrical DC Characteristics

a. Typical Operation Condition (GND = GNDLED = 0V)

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Voltage</td>
<td>VCC</td>
<td>3.0</td>
<td>3.3</td>
<td>3.6</td>
<td>V</td>
<td>System Power Supply</td>
</tr>
<tr>
<td></td>
<td>VLED</td>
<td>4.5</td>
<td>5.0</td>
<td>5.5</td>
<td>V</td>
<td>LED Circuit Power Supply</td>
</tr>
<tr>
<td>Input Signal Voltage</td>
<td>H Level</td>
<td>VIH</td>
<td>0.7xVCC</td>
<td>--</td>
<td>VCC</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>L Level</td>
<td>VIL</td>
<td>GND</td>
<td>0.3xVCC</td>
<td>V</td>
<td></td>
</tr>
</tbody>
</table>

b. Current Consumption (LEDGND=GND=0V)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Current for VCC</td>
<td>I_{VCC}</td>
<td>VCC = 3.3V</td>
<td>-</td>
<td>TBD</td>
<td>TBD</td>
<td>mA</td>
<td>Note 1, 2</td>
</tr>
<tr>
<td>Input Current for VLED</td>
<td>I_{VLED}</td>
<td>VLED = 5.0V</td>
<td>-</td>
<td>TBD</td>
<td>TBD</td>
<td>mA</td>
<td>Note 1, 2</td>
</tr>
</tbody>
</table>

Note 1: Test Condition is under typical Electrical DC and AC characteristics.
Note 2: Test pattern is the following picture.

4. Electrical AC Characteristics

a. Signal AC Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCLK duty cycle</td>
<td>--</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>%</td>
<td>t_{low} / t_{DCLK} x100%</td>
</tr>
<tr>
<td>VSYNC setup time</td>
<td>t_{vst}</td>
<td>0</td>
<td>--</td>
<td>--</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>Symbol</td>
<td>Value</td>
<td>Unit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------</td>
<td>-------</td>
<td>------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VSYNC hold time</td>
<td>$t_{vhd}$</td>
<td>2</td>
<td>ns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSYNC setup time</td>
<td>$t_{hst}$</td>
<td>5</td>
<td>ns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSYNC hold time</td>
<td>$t_{hhd}$</td>
<td>10</td>
<td>ns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Enable setup time</td>
<td>$t_{est}$</td>
<td>4</td>
<td>ns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Enable hold time</td>
<td>$T_{ehd}$</td>
<td>2</td>
<td>ns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data setup time</td>
<td>$t_{dst}$</td>
<td>5</td>
<td>ns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data hold time</td>
<td>$t_{dhd}$</td>
<td>10</td>
<td>ns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEDPWM frequency</td>
<td>--</td>
<td>1</td>
<td>kHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEDPWM duty cycle</td>
<td>--</td>
<td>10</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$t_{cw}$: HSYNC period
$t_{DCLK}$: DCLK period
$t_{cw}$: the width of DCLK high
b. Input Timing

Horizontal input timing. (HV mode)

Horizontal input timing. (DE mode)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCLK frequency</td>
<td>FDCLK</td>
<td>25</td>
<td>33</td>
<td>40</td>
<td>MHz</td>
<td></td>
</tr>
<tr>
<td>DCLK period</td>
<td>TDCLK</td>
<td>25</td>
<td>30.3</td>
<td>40</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Hsync Period (=THD+THBL)</td>
<td>TH</td>
<td>TBD</td>
<td>1056</td>
<td>1088</td>
<td>DCLK</td>
<td></td>
</tr>
<tr>
<td>Active Area</td>
<td>THD</td>
<td>--</td>
<td>800</td>
<td>--</td>
<td>DCLK</td>
<td></td>
</tr>
<tr>
<td>Horizontal Blanking</td>
<td>THBL</td>
<td>TBD</td>
<td>256</td>
<td>288</td>
<td>DCLK</td>
<td></td>
</tr>
<tr>
<td>Hsync Front Porch</td>
<td>THF</td>
<td>TBD</td>
<td>40</td>
<td>72</td>
<td>DCLK</td>
<td></td>
</tr>
<tr>
<td>Delay from Hsync to 1st data</td>
<td>THE</td>
<td>--</td>
<td>216</td>
<td>--</td>
<td>DCLK</td>
<td></td>
</tr>
<tr>
<td>Hsync Pulse Width</td>
<td>THW</td>
<td>1</td>
<td>128</td>
<td>136</td>
<td>DCLK</td>
<td></td>
</tr>
<tr>
<td>Hsync Back Porch</td>
<td>THB</td>
<td>80</td>
<td>88</td>
<td>215</td>
<td>DCLK</td>
<td></td>
</tr>
</tbody>
</table>
Vertical timing. (HV mode)

Vertical timing. (DE mode)

Vertical Input Timing

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vsync Period (=TVD+TVBL)</td>
<td>TV</td>
<td>--</td>
<td>505</td>
<td>525</td>
<td>Th</td>
<td></td>
</tr>
<tr>
<td>Active lines</td>
<td>TVD</td>
<td>--</td>
<td>480</td>
<td>--</td>
<td>Th</td>
<td></td>
</tr>
<tr>
<td>Vertical blanking (=TVF+TVE)</td>
<td>TVBL</td>
<td>--</td>
<td>25</td>
<td>45</td>
<td>Th</td>
<td></td>
</tr>
<tr>
<td>Vsync Front Porch</td>
<td>TVF</td>
<td>--</td>
<td>1</td>
<td>21</td>
<td>Th</td>
<td></td>
</tr>
<tr>
<td>GD Start Pulse Delay</td>
<td>TVE</td>
<td>--</td>
<td>24</td>
<td>--</td>
<td>HS</td>
<td></td>
</tr>
<tr>
<td>Vsync Pulse Width</td>
<td>TVW</td>
<td>1</td>
<td>3</td>
<td>16</td>
<td>Th</td>
<td></td>
</tr>
<tr>
<td>Hsync/Vsync Phase Shift</td>
<td>TVPD</td>
<td>2</td>
<td>320</td>
<td>--</td>
<td>DCLK</td>
<td></td>
</tr>
</tbody>
</table>
6. Power On/Off Characteristics

Vcc power and LED on/off sequence is as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when Vcc is off.

Power Sequence Timing

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min.</td>
<td>Typ.</td>
</tr>
<tr>
<td>T1</td>
<td>0.5</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>T3</td>
<td>200</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>T5</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>T6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T7</td>
<td>1000</td>
<td>-</td>
</tr>
</tbody>
</table>
### D. Optical Specification

All optical specification is measured under typical condition (Note 1, 2)

<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>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rise</td>
<td>Tr</td>
<td>$\theta=0^\circ$</td>
<td>--</td>
<td>12</td>
<td>20</td>
<td>ms</td>
<td>Note 3</td>
</tr>
<tr>
<td>Fall</td>
<td>Tf</td>
<td>$\theta=0^\circ$</td>
<td>--</td>
<td>18</td>
<td>30</td>
<td>ms</td>
<td></td>
</tr>
<tr>
<td>Contrast ratio</td>
<td>CR</td>
<td>At optimized</td>
<td>250</td>
<td>350</td>
<td>--</td>
<td></td>
<td>Note 4</td>
</tr>
<tr>
<td>Viewing Angle</td>
<td>Top</td>
<td>CR 10</td>
<td>35</td>
<td>45</td>
<td>--</td>
<td>deg.</td>
<td>Note 5</td>
</tr>
<tr>
<td></td>
<td>Bottom</td>
<td></td>
<td>55</td>
<td>65</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Left</td>
<td></td>
<td>55</td>
<td>65</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td></td>
<td>55</td>
<td>65</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brightness</td>
<td>$Y_L$</td>
<td>$\theta=0^\circ$</td>
<td>300</td>
<td>375</td>
<td>--</td>
<td>cd/m$^2$</td>
<td>Note 6</td>
</tr>
<tr>
<td>Chromaticity</td>
<td>White</td>
<td>$X$</td>
<td>0.26</td>
<td>0.31</td>
<td>0.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$Y$</td>
<td>0.28</td>
<td>0.33</td>
<td>0.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>$X$</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$Y$</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>$X$</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$Y$</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Blue</td>
<td>$X$</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$Y$</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uniformity</td>
<td>$\Delta Y_L$</td>
<td>%</td>
<td>70</td>
<td>75</td>
<td>--</td>
<td>%</td>
<td>Note 7</td>
</tr>
</tbody>
</table>

**Note 1:** Ambient temperature = 25°C, and LED lightbar voltage $V_L = 12$ V. To be measured in the dark room.

**Note 2:** To be measured on the center area of panel with a viewing cone of $1^\circ$ by Topcon luminance meter BM-5A, after 15 minutes operation.
Note 3: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from “black” to “white” (falling time) and from “white” to “black” (rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.

![Response Time Diagram](image)

Note 4: Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

\[
\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" status}}{\text{Photo detector output when LCD is at "Black" status}}
\]

Note 5: Definition of viewing angle, \( \theta \), Refer to figure as below.

![Viewing Angle Diagram](image)

Note 6: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Note 7: Luminance Uniformity of these 9 points is defined as below:
9 points: 1 to 9

Uniformity = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}
### E. Reliability Test Items

<table>
<thead>
<tr>
<th>No.</th>
<th>Test items</th>
<th>Conditions</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>High Temperature Storage</td>
<td>Ta= 80</td>
<td>240Hrs</td>
</tr>
<tr>
<td>2</td>
<td>Low Temperature Storage</td>
<td>Ta= -30</td>
<td>240Hrs</td>
</tr>
<tr>
<td>3</td>
<td>High Temperature Operation</td>
<td>Tp= 70</td>
<td>240Hrs</td>
</tr>
<tr>
<td>4</td>
<td>Low Temperature Operation</td>
<td>Ta= -20</td>
<td>240Hrs</td>
</tr>
<tr>
<td>5</td>
<td>High Temperature &amp; High Humidity</td>
<td>Tp= 50</td>
<td>240Hrs</td>
</tr>
<tr>
<td>6</td>
<td>Heat Shock</td>
<td>-20 ~70</td>
<td>50 cycle, 2Hrs/cycle</td>
</tr>
<tr>
<td>7</td>
<td>Electrostatic Discharge</td>
<td>Contact = ± 4 kV, class B</td>
<td>Note 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air = ± 8 kV, class B</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Image Sticking</td>
<td>25 , 4hrs</td>
<td>Note 6</td>
</tr>
<tr>
<td>9</td>
<td>Vibration</td>
<td>Frequency range : 8~33.3Hz</td>
<td>Non-operation JIS C7021, A-10 condition A : 15 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stoke : 1.3mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sweep : 2.9G ,33.3~400Hz</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 hours for each direction of X,Y,Z</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 hours for Y direction</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Mechanical Shock</td>
<td>100G . 6ms, ±X,±Y,±Z</td>
<td>Non-operation JIS C7021, A-7 condition C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 times for each direction</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Vibration (With Carton)</td>
<td>Random vibration: 0.015G³/Hz from 5~200Hz</td>
<td>IEC 68-34</td>
</tr>
<tr>
<td></td>
<td></td>
<td><del>6dB/Octave from 200</del>500Hz</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Drop (With Carton)</td>
<td>Height: 60cm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 corner, 3 edges, 6 surfaces</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Pressure</td>
<td>5kg, 5sec</td>
<td>Note 7</td>
</tr>
</tbody>
</table>

Note 1: Ta: Ambient Temperature. Tp: Panel Surface Temperature

Note 2: In the standard conditions, there is not display function NG issue occurred. All the cosmetic specification is judged before the reliability stress.

Note 3: All the cosmetic specification is judged before the reliability stress.

Note 4: Temperature and relative humidity range is shown in the figure below.
Note 5: All test techniques follow IEC61000-4-2 standard.

<table>
<thead>
<tr>
<th>Test Condition</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pattern</strong></td>
<td>![Color Pattern]</td>
</tr>
<tr>
<td><strong>Procedure And Set-up</strong></td>
<td>![Discharge Procedures]</td>
</tr>
<tr>
<td><strong>Criteria</strong></td>
<td>B – Some performance degradation allowed. No data lost. Self-recoverable hardware failure.</td>
</tr>
</tbody>
</table>

Note 6: Operate with chess board pattern as figure and lasting time and temperature as the conditions. Then judge with 50% gray level, the mura is not worse than AUO defined limited sample.

Note 7: The panel is tested as figure. The jig is ⌀ 10 mm made by Cu with rubber and the loading speed is 3mm/min on position A~E. After the condition, no glass crack will be found and panel
function check is OK. (no guarantee LC mura · LC bubble)

Loading

![Diagram of loading and time graph](image)

Loading (Kg)

Time (sec)

5 kg

5 sec

E
F. Packing and Marking
1. Packing Form
2. Module/Panel Label Information

The module/panel (collectively called as the “Product”) will be attached with a label of Shipping Number which represents the identification of the Product at a specific location. Refer to the Product outline drawing for detailed location and size of the label. The label is composed of a 22-digit serial number with the following definition:

  - For internal system usage and production serial numbers.
  - AUO Module or Panel factory code, represents the final production factory to complete the Product
  - Product version code, ranging from 0-9 or A-Z for Version after 9
  - Week Code, the production week when the product is finished at its production process

Example:

501M06ZL06123456781Z05:
- Product Manufacturing Week Code: WK50
- Product Version: Version 1
- Product Manufacturing Factory: M06

3. Carton Label Information

The packing carton will be attached with a carton label where packing Q’ty, AUO Model Name, AUO Part Number, Customer Part Number (Optional) and a series of Carton Number in 13 or 14 digits are printed. The Carton Number is appearing in the following format:

- ABC-DEFG-HIJK-LMN
  - DEFG appear after first “.” represents the packing date of the carton
  - Date from 01 to 31
  - Month, ranging from 1~9, A~C. A for Oct, B for Nov and C for Dec.
  - A.D. year, ranging from 1~9 and 0. The single digit code represents the last number of the year

Refer to the drawing of packing format for the location and size of the carton label.

G. Application Note

1. Application Circuit
2. System block
H. Precautions

1. Do not twist or bend the module and prevent the unsuitable external force for display module during assembly.
2. Adopt measures for good heat radiation. Be sure to use the module with in the specified temperature.
3. Avoid dust or oil mist during assembly.
4. Follow the correct power sequence while operating. Do not apply the invalid signal, otherwise, it will cause improper shut down and damage the module.
5. Less EMI: it will be more safety and less noise.
6. Please operate module in suitable temperature. The response time & brightness will drift by different temperature.
7. Avoid to display the fixed pattern (exclude the white pattern) in a long period, otherwise, it will cause image sticking.
8. Be sure to turn off the power when connecting or disconnecting the circuit.
9. Polarizer scratches easily, please handle it carefully.
10. Display surface never likes dirt or stains.
11. A dewdrop may lead to destruction. Please wipe off any moisture before using module.
12. Sudden temperature changes cause condensation, and it will cause polarizer damaged.
13. High temperature and humidity may degrade performance. Please do not expose the module to the direct sunlight and so on.
14. Acetic acid or chlorine compounds are not friends with TFT display module.
15. Static electricity will damage the module, please do not touch the module without any grounded device.
16. Do not disassemble and reassemble the module by self.
17. Be careful do not touch the rear side directly.
18. No strong vibration or shock. It will cause module broken.
19. Storage the modules in suitable environment with regular packing.
20. Be careful of injury from a broken display module.
21. Please avoid the pressure adding to the surface (front or rear side) of modules, because it will cause the display non-uniformity or other function issue.
22. Please use SSCG(Spread Spectrum Clock Generator) at system for EMI reduction.