TECHNICAL SPECIFICATION
MODEL NO.: PD104ST1

☐ Customer’s Confirmation

Customer Name

Date

By

☐ PVI’s Confirmation

Confirmed By

Prepared By

Date: Mar.28, 2002

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## TECHNICAL SPECIFICATION

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<td>-</td>
<td>Revision History</td>
<td>23</td>
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</tbody>
</table>
1. Application
This data sheet applies to a color TFT LCD module, PD104ST1. PD104ST1 module applies to OA product, car TV (must use Analog to Digital drive board), which require high quality flat panel display. If you must use in high reliability environment can’t over reliability test condition
Prime View assume no responsibility for any damage resulting from the use of the device which dose not comply with the instructions and the precautions in these specification sheet.

2. Features
- Amorphous silicon TFT LCD panel with back-light unit
- Pixel in stripe configuration
- Slim and compact, designed for O/A application
- Display Colors : 262,144 colors
- Optimum Viewing Direction : 6 o’clock
- +3.3V DC supply voltage for TFT LCD panel driving
- Backlight driving DC/AC inverter not included in this module
- Wide Viewing Angle
- TTL transmission interface

3. Mechanical Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specifications</th>
<th>Unit</th>
</tr>
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<tbody>
<tr>
<td>Screen Size</td>
<td>26.4(diagonal)</td>
<td>cm</td>
</tr>
<tr>
<td></td>
<td>10.4 (diagonal)</td>
<td>inch</td>
</tr>
<tr>
<td>Display Format</td>
<td>800× (R, G, B)× 600</td>
<td>dot</td>
</tr>
<tr>
<td>Display Colors</td>
<td>262,144</td>
<td></td>
</tr>
<tr>
<td>Active Area</td>
<td>211.2(H)× 158.4 (V)</td>
<td>mm</td>
</tr>
<tr>
<td>Pixel Pitch</td>
<td>0.264 (H)× 0.264 (V)</td>
<td>mm</td>
</tr>
<tr>
<td>Pixel Configuration</td>
<td>Stripe</td>
<td></td>
</tr>
<tr>
<td>Outline Dimension</td>
<td>243 (w)× 185.1(H)× 11(typ.) (D)</td>
<td>mm</td>
</tr>
<tr>
<td>Weight</td>
<td>490(typ.),</td>
<td>g</td>
</tr>
<tr>
<td>Back-light</td>
<td>CCFL, 2 tubes</td>
<td></td>
</tr>
<tr>
<td>Surface treatment</td>
<td>Anti-glare and hard-coating</td>
<td></td>
</tr>
<tr>
<td>Display mode</td>
<td>Normally white</td>
<td></td>
</tr>
</tbody>
</table>
4. Mechanical Drawing of TFT-LCD Module

Outline Drawing: Front View (unit mm)
### 5. Input Terminals

#### 5-1) TFT-LCD Panel Driving

**Connector type:** UJU 3674A-4101R 41P P=1mm

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Symbol</th>
<th>Function</th>
<th>Remark</th>
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<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>CLK</td>
<td>Clock</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Hsync</td>
<td>Horizontal sync</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Vsync</td>
<td>Vertical sync</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>R0</td>
<td>Red data (LSB)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>R1</td>
<td>Red data</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>R2</td>
<td>Red data</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>R3</td>
<td>Red data</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>R4</td>
<td>Red data</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>R5</td>
<td>Red data (MSB)</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>G0</td>
<td>Green data (LSB)</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>G1</td>
<td>Green data</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>G2</td>
<td>Green data</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>G3</td>
<td>Green data</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>G4</td>
<td>Green data</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>G5</td>
<td>Green data (MSB)</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>B0</td>
<td>Blue data (LSB)</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>B1</td>
<td>Blue data</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>B2</td>
<td>Blue data</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>B3</td>
<td>Blue data</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>B4</td>
<td>Blue data</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>B5</td>
<td>Blue data (MSB)</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>NC</td>
<td>No connect</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>SDS</td>
<td>Scan direction select</td>
<td>Note 5-1</td>
</tr>
<tr>
<td>39</td>
<td>Vcc</td>
<td>Power supply</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Vcc</td>
<td>Power supply</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>NC</td>
<td>No connect</td>
<td></td>
</tr>
</tbody>
</table>

**Note 5-1:** SDS can change scan direction.
- High or open = normal scan, Low = reverse scan
5-2) Backlight driving
Connector type: “BHR-03VS-1” of Japan Solderless Terminal MFG Co. LTD

<table>
<thead>
<tr>
<th>PIN NO.</th>
<th>Symbol</th>
<th>Description</th>
<th>Remark</th>
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<tbody>
<tr>
<td>1</td>
<td>LV</td>
<td>Ground</td>
<td>White</td>
</tr>
<tr>
<td>2</td>
<td>HV</td>
<td>Lamp power input</td>
<td>Pink (or Gray)</td>
</tr>
<tr>
<td>3</td>
<td>HV</td>
<td>Lamp power input</td>
<td>Pink (or Gray)</td>
</tr>
</tbody>
</table>
6. Absolute Maximum Ratings:

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Symbol</th>
<th>MIN.</th>
<th>MAX.</th>
<th>Unit</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>Vcc</td>
<td>-0.3</td>
<td>+3.6</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Backlight Driving Voltage</td>
<td>V_L</td>
<td>-</td>
<td>2000</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Backlight Driving Frequency</td>
<td>F_L</td>
<td>0</td>
<td>100</td>
<td>KHz</td>
<td></td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>T_ST</td>
<td>-20</td>
<td>+60</td>
<td>°C</td>
<td>Note 6-1</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>T_OP</td>
<td>0</td>
<td>+50</td>
<td>°C</td>
<td></td>
</tr>
</tbody>
</table>

Note 6-1: Humidity: 90% RH Max. at Ta ≤ 40°C.
Maximum wet-bulb temperature is at 39°C or less at Ta > 40°C and no condensation.

7. Electrical Characteristics

7-1) Recommended Operating Conditions:

<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>Supply Voltage</td>
<td>VDD</td>
<td>3.0</td>
<td>3.3</td>
<td>3.6</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Current Dissipation</td>
<td>I_{DD}</td>
<td>-</td>
<td>350</td>
<td>450</td>
<td>mA</td>
<td>Note 7-1</td>
</tr>
<tr>
<td>Lamp Current</td>
<td>I_{FL}</td>
<td>6.0</td>
<td>14.0</td>
<td>16.0</td>
<td>mA</td>
<td>Note 7-2</td>
</tr>
<tr>
<td>Lamp Voltage</td>
<td>V_L</td>
<td>400</td>
<td>430</td>
<td>530</td>
<td>Vrms</td>
<td>Note 7-2</td>
</tr>
<tr>
<td>Lamp Initial Voltage</td>
<td>V_{BFL}</td>
<td>-</td>
<td>-</td>
<td>875</td>
<td>Vrms</td>
<td>at Ta=25°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Note 7-3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>at Ta=0°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Note 7-3</td>
</tr>
<tr>
<td>Lamp Driving Frequency</td>
<td>F_L</td>
<td>30</td>
<td>55</td>
<td>60</td>
<td>KHz</td>
<td></td>
</tr>
<tr>
<td>Lamp power consumption</td>
<td></td>
<td>4</td>
<td>8</td>
<td>11</td>
<td>W</td>
<td>Note 7-4</td>
</tr>
<tr>
<td>Lamp Life Time</td>
<td></td>
<td>30000</td>
<td>40000</td>
<td>Hrs</td>
<td></td>
<td>Note 7-5</td>
</tr>
<tr>
<td>LCD Panel Life Time(MTBF)</td>
<td></td>
<td>50000</td>
<td></td>
<td>Hrs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note 7-1: To test the current dissipation of VDD, using the “color bars” testing pattern shown as below.

1  2  3  4  5  6  7  8

1. White
2. Yellow
3. Cyan
4. Green
5. Magenta
6. Red
7. Blue
8. Black

Idd current dissipation testing pattern

Note 7-2: The back-light driving waveform should be as closed to sine-wave as possible.
In order to satisfy the quality of B/L, no matter use what kind of inverter, the output lamp current must between Min. and Max. to avoid the abnormal display image caused by B/L.

Note 7-3: Not including the efficiency of backlight DC/AC inverter

Note 7-4: Lamp current is measured with current meter for high frequency as shown below.
Lamp current dissipation testing configuration

Note 7-5: The life time is determined as the time at which brightness of lamp is 50% compare to that of initial value at the typical lamp current.

### 7-2) Input signal timing chart

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td><strong>Power supply</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vcc</td>
<td>3.0</td>
<td>3.3</td>
<td>3.6</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td><strong>CLK</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/tc</td>
<td>40</td>
<td>MHz</td>
<td>40MHz(Typ.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>tc</td>
<td>9</td>
<td>ns</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>tc(High)</td>
<td>9</td>
<td>ns</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>tc(Low)</td>
<td>9</td>
<td>ns</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hsync</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Period</td>
<td>Hp</td>
<td>26.4</td>
<td>us</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display period</td>
<td>Hd</td>
<td>1056</td>
<td>tc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse width</td>
<td>Hpw</td>
<td>12</td>
<td>128</td>
<td>128 tc</td>
<td></td>
</tr>
<tr>
<td>Back-porch</td>
<td>Hbp</td>
<td>86</td>
<td>86</td>
<td>202 tc</td>
<td></td>
</tr>
<tr>
<td>Front-porch</td>
<td>Hfp</td>
<td>42</td>
<td>tc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hpw+Hbp</td>
<td>214</td>
<td>tc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hsync-CLK</td>
<td>Hhc</td>
<td>10</td>
<td>Tc-10 ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vsync-Hsync</td>
<td>Hv</td>
<td>2</td>
<td>Hp-2 tc</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vsync</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Period</td>
<td>Vp</td>
<td>16.579</td>
<td>ms</td>
<td>60.3Hz(Typ.)</td>
<td></td>
</tr>
<tr>
<td>Display period</td>
<td>Vdp</td>
<td>628</td>
<td>780</td>
<td>Hp</td>
<td></td>
</tr>
<tr>
<td>Pulse width</td>
<td>Vpw</td>
<td>1</td>
<td>4</td>
<td>4 Hp</td>
<td></td>
</tr>
<tr>
<td>Back-porch</td>
<td>Vbp</td>
<td>22</td>
<td>22</td>
<td>25 Hp</td>
<td></td>
</tr>
<tr>
<td>Front-porch</td>
<td>Vfp</td>
<td>2</td>
<td>754</td>
<td>Hp</td>
<td></td>
</tr>
<tr>
<td>Vpw+Vpb</td>
<td>26</td>
<td>Hp</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DATA R0–R5</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLK-DATA</td>
<td>Dcd</td>
<td>10</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DATA-G0–G5</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>DATA-CLK</td>
<td>Ddc</td>
<td>7</td>
<td>ns</td>
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</table>

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(A) CLK, DATA relationship

![Diagram showing the relationship between CLK and DATA]

Duty (a, b): 50 ± 10%

(B) Hsync Timing

![Diagram showing the timing relationship between Hsync and other signals]

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(C) CLK, Hsync relationship:

- CLK........
- Hsync........

(D) Hsync, Vsync relationship

- Hsync....

- Vsync.....

- Hvh........

(E) Vsync Timing:

- Vsync...

- Display period

- Vp...........

- Vbp

- Vdp

- Vfp

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## 7-3) Display Color and Gray Scale Reference

<table>
<thead>
<tr>
<th>Color</th>
<th>Input Color Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Red</td>
</tr>
<tr>
<td></td>
<td>R5</td>
</tr>
<tr>
<td>Black</td>
<td>0</td>
</tr>
<tr>
<td>Red (63)</td>
<td>1</td>
</tr>
<tr>
<td>Green (63)</td>
<td>0</td>
</tr>
<tr>
<td>Blue (63)</td>
<td>0</td>
</tr>
<tr>
<td>Cyan</td>
<td>0</td>
</tr>
<tr>
<td>Magenta</td>
<td>1</td>
</tr>
<tr>
<td>Yellow</td>
<td>1</td>
</tr>
<tr>
<td>White</td>
<td>1</td>
</tr>
</tbody>
</table>

### Red

- **Darker**: ↓
- **Brighter**: ↑

| Red (00) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Red (01) | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Red (02) | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

### Green

- **Darker**: ↓
- **Brighter**: ↑

| Green (00) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Green (01) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Green (02) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

### Blue

- **Darker**: ↓
- **Brighter**: ↑

| Blue (00)  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Blue (01)  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Blue (02)  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |

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7-4) Pixel Arrangement
The LCD module pixel arrangement is the stripe.
8.) Power On Sequence

1. The supply voltage for input signals should be same as $V_{cc}$.

2. When the power is off, please keep whole signals (Hsync, Vsync, CLK, Data) low level or high impedance.
9.) Optical Characteristics

9-1) Specification:

<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>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viewing Angle Horizontal</td>
<td>( \theta )</td>
<td>CR=10</td>
<td>55</td>
<td>60</td>
<td>-</td>
<td>deg</td>
<td>Note 9-1</td>
</tr>
<tr>
<td>Vertical ( \theta )</td>
<td></td>
<td></td>
<td>35</td>
<td>40</td>
<td>-</td>
<td>deg</td>
<td></td>
</tr>
<tr>
<td>( \theta ) (to 12 o'clock)</td>
<td></td>
<td></td>
<td>50</td>
<td>55</td>
<td>-</td>
<td>deg</td>
<td></td>
</tr>
<tr>
<td>( \theta ) (to 6 o'clock)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contrast Ratio</td>
<td>CR</td>
<td>Optimum direction</td>
<td>100</td>
<td>180</td>
<td>-</td>
<td></td>
<td>Note 9-2</td>
</tr>
<tr>
<td>Response time Rise</td>
<td>Tr</td>
<td>( \theta =0^\circ )</td>
<td>-</td>
<td>15</td>
<td>50</td>
<td>ms</td>
<td>Note 9-4</td>
</tr>
<tr>
<td>Fall</td>
<td>Tf</td>
<td>( \phi =0^\circ )</td>
<td>-</td>
<td>25</td>
<td>50</td>
<td>ms</td>
<td></td>
</tr>
<tr>
<td>Luminance</td>
<td>L</td>
<td>( \theta =0^\circ / \phi =0^\circ )</td>
<td>310</td>
<td>350</td>
<td>-</td>
<td>cd/( \text{m}^2 )</td>
<td>Note 9-3</td>
</tr>
<tr>
<td>Luminance Uniformity</td>
<td>U</td>
<td></td>
<td>55</td>
<td>80</td>
<td>-</td>
<td>%</td>
<td>Note 9-5</td>
</tr>
<tr>
<td>White Chromaticity x</td>
<td></td>
<td></td>
<td>0.290</td>
<td>0.340</td>
<td>0.390</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>y</td>
<td></td>
<td></td>
<td>0.290</td>
<td>0.340</td>
<td>0.390</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Cross Talk Ratio</td>
<td>CTK</td>
<td></td>
<td>-</td>
<td>-</td>
<td>3.5</td>
<td>%</td>
<td>Note 9-6</td>
</tr>
</tbody>
</table>

All the optical measurement shall be executed 30 minutes after backlight being turn-on. The optical characteristics shall be measured in dark room (ambient illumination on panel surface less than 1 Lux). The measuring configuration shows as following figure.

![Optical characteristics measuring configuration](image_url)
Note 9-1: The definitions of viewing angles are as follows.

![Diagram of viewing angles](image)

- 12 o’clock
- 3 o’clock
- 6 o’clock
- 9 o’clock

Note 9-2: The definition of contrast ratio
\[
\text{CR} = \frac{\text{Luminance at gray level 63}}{\text{Luminance at gray level 0}}
\]

Note 9-3: Topcon BM-5A luminance meter 2° field of view is used in the testing (after 30 minutes’ operation). The typical luminance value is measured at lamp current 14.0 mA.

Note 9-4: Definition of Response Time Tr and Tf:

![Graph of brightness vs time](image)

Note 9-5: The uniformity of LCD is defined as
\[
U = \frac{\text{The Minimum Brightness of the 9 testing Points}}{\text{The Maximum Brightness of the 9 testing Points}}
\]

Luminance meter: BM-5A or BM-7 fast(TOPCON)
Measurement distance: 500 mm +/- 50 mm
Ambient illumination: < 1 Lux
Measuring direction: Perpendicular to the surface of module
The test pattern is white (Gray Level 63).

Note 8-6: Cross Talk (CTK) = \( \frac{|Y_A - Y_B|}{Y_A} \times 100\% \)

- Y_A: Brightness of Pattern A
- Y_B: Brightness of Pattern B

Luminance meter: BM 5A (TOPCON)
Measurement distance: 500 mm +/- 50 mm
Ambient illumination: < 1 Lux
Measuring direction: Perpendicular to the surface of module

Pattern A
(Gray Level 31)

Pattern B
(Gray Level 31, central black box exclusive)

X: Measuring Point (A and B are at the same point.)
(Gray Level 0)
## 10. Reliability Test

<table>
<thead>
<tr>
<th>No</th>
<th>Test Item</th>
<th>Test Condition</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>High Temperature Storage Test</td>
<td>Ta = +60°C, 240 hrs</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Low Temperature Storage Test</td>
<td>Ta = -20°C, 240 hrs</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Low Temperature Operation Test</td>
<td>Ta = 0°C, 240 hrs</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>High Temperature &amp; High Humidity Operation Test</td>
<td>Ta = +50°C, 80%RH, 240 hrs (No Condensation)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Thermal Cycling Test (non-operating)</td>
<td>0°C ↔ +25°C ↔ +60°C, 50 Cycles</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1Hr 0.5Hr 1Hr</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Vibration Test (non-operating)</td>
<td>Frequency: 10 ~ 57 Hz, Amplitude: 0.15 mm 58~500Hz, 1G</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sweep time: 11 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Test Period: 3 hrs (1 hr for each direction of X, Y, Z)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Shock Test (non-operating)</td>
<td>80G, 6ms, X,Y,Z</td>
<td>1 times for each direction</td>
</tr>
</tbody>
</table>

Ta: ambient temperature

**[Judgement Criteria]**

Under the display quality test conditions with normal operation state, there should be no change which may affect practical display function.
11.) Block Diagram

![Block Diagram of a display system with TTL interface, control circuit, gate driver, power module, and source driver connected via back-light (Lamp 1)].

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12.) Packing

![Diagram of packing process]

ANTI-ELECTRIC BAG
# Revision History

<table>
<thead>
<tr>
<th>Rev.</th>
<th>Issued Date</th>
<th>Revised Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Mar 28, 2002</td>
<td>New</td>
</tr>
</tbody>
</table>