Version: 1.0

FINAL TECHNICAL SPECIFICATION

MODEL NO: 13.3inch e-Paper

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## Revision History

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<td>11-22</td>
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<td>Update the module weight</td>
<td>Update 6. Electrical Characteristics</td>
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<td>Add note into 7. Power Sequence</td>
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<td>Update 8. Optical characteristics</td>
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## TECHNICAL SPECIFICATION

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1. General Description
This display is a reflective electrophoretic E Ink® technology display module based on active matrix TFT substrate. It has 13.3” active area with 1600 x 1200 pixels, the display is capable to display images at 2-16 gray levels (1-4 bits) depending on the display controller and the associated waveform file.

2. Features
- High contrast reflective / electrophoretic technology
- 1600x1200 display
- High reflectance
- Ultra wide viewing angle
- Ultra low power consumption
- Pure reflective mode
- Bi-stable
- Commercial temperature range

3. Mechanical Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specifications</th>
<th>Unit</th>
<th>Remark</th>
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<tbody>
<tr>
<td>Screen Size</td>
<td>13.3</td>
<td>Inch</td>
<td></td>
</tr>
<tr>
<td>Display Resolution</td>
<td>1600 (H) x 1200 (V)</td>
<td>Pixel</td>
<td></td>
</tr>
<tr>
<td>Active Area</td>
<td>270.4 (H) x 202.8 (V)</td>
<td>mm</td>
<td></td>
</tr>
<tr>
<td>Pixel Pitch</td>
<td>0.169 (H) x 0.169 (V)</td>
<td>mm</td>
<td></td>
</tr>
<tr>
<td>Pixel Configuration</td>
<td>Rectangle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outline Dimension</td>
<td>285.80 (W) x 213.65 (H) x 0.78 (D) (panel area height)</td>
<td>mm</td>
<td></td>
</tr>
<tr>
<td>Module Weight</td>
<td>96</td>
<td>g</td>
<td></td>
</tr>
<tr>
<td>Number of Gray</td>
<td>16 Gray Level (monochrome)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display operating mode</td>
<td>Reflective mode</td>
<td></td>
<td></td>
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<tr>
<td>Surface treatment</td>
<td>Hard Coating</td>
<td></td>
<td></td>
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</table>
4. Mechanical Drawing of EPD Module

[Diagram of EPD Module]

- EPD thickness (section drawing): 0.78 ± 0.1 (Without protective film)
- RTV Scale: 10/1
- COF can be bent less or equal to 0.7 mm

- Other dimensions and annotations as shown in the diagram.
### 5. Input/Output Interface

#### 5-1) Pin Assignment

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Description</th>
<th>Remark</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>VNEG</td>
<td>Negative power supply source driver</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>VPOS</td>
<td>Positive power supply source driver</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>VSS</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>VDD</td>
<td>Digital power supply drivers</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>XCL</td>
<td>Clock source driver</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>XLE</td>
<td>Latch enable source driver</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>XOE</td>
<td>Output enable source driver</td>
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</tr>
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<td>8</td>
<td>VSS</td>
<td>Ground</td>
<td></td>
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<tr>
<td>9</td>
<td>VSS</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>NC</td>
<td>No Connection</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>XSTL</td>
<td>Start pulse source driver</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>D0</td>
<td>Data signal source driver</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>D1</td>
<td>Data signal source driver</td>
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</tr>
<tr>
<td>14</td>
<td>D2</td>
<td>Data signal source driver</td>
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<td>15</td>
<td>D3</td>
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<td>D4</td>
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<td>D6</td>
<td>Data signal source driver</td>
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<td>D7</td>
<td>Data signal source driver</td>
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<td>VSS</td>
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<td>22</td>
<td>VCOM</td>
<td>Common connection</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>VGH</td>
<td>Positive power supply gate driver</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>VGL</td>
<td>Negative power supply gate driver</td>
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<td>25</td>
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<td>MODE1</td>
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<td>32</td>
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<td>Start pulse gate driver</td>
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<td>CKV</td>
<td>Clock gate driver</td>
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<td>BORDER</td>
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<td>35</td>
<td>VSS</td>
<td>Ground</td>
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<td>36</td>
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<td>Ground</td>
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<td>37</td>
<td>VSS</td>
<td>Ground</td>
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<td>VSS</td>
<td>Ground</td>
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<td>39</td>
<td>VSS</td>
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5-2) Panels Electrical Connection

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<thead>
<tr>
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<th>CONNECTOR</th>
<th>TYPE NUMBER</th>
<th>NUMBER OF PINS</th>
<th>MATING CONNECTOR</th>
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<tr>
<td>Interface</td>
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<td>Copper foil 0.3mm pitch</td>
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5-3) Panel Scan Direction
6. Electrical Characteristics

6-1) Absolute maximum rating

<table>
<thead>
<tr>
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<th>Symbol</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
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<tbody>
<tr>
<td>Logic Supply Voltage</td>
<td>VDD</td>
<td>-0.3 to +7</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Supply Voltage</td>
<td>VPOS</td>
<td>-0.3 to +18</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Supply Voltage</td>
<td>VNEG</td>
<td>+0.3 to -18</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max Drive Voltage Range</td>
<td>VPOS - VNEG</td>
<td>36</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>VGH</td>
<td>-0.3 to +55</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>VGL</td>
<td>-32 to +0.3</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply Range</td>
<td>VGH-VGL</td>
<td>-0.3 to +55</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Operating Temp. Range</td>
<td>TOTR</td>
<td>0 to +50</td>
<td>℃</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Storage Temperature</td>
<td>TSTG</td>
<td>-25 to +70</td>
<td>℃</td>
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6-2) Panel DC characteristics

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<th>Max</th>
<th>Unit</th>
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<tr>
<td>Signal ground</td>
<td>VSS</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Logic voltage supply</td>
<td>VDD</td>
<td></td>
<td>2.75</td>
<td>3.3</td>
<td>3.6</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>I_Dd</td>
<td>VDD=3.3V</td>
<td>3.2</td>
<td>10</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Gate negative supply</td>
<td>VGL</td>
<td></td>
<td>-19</td>
<td>-20</td>
<td>-21</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>I_GL</td>
<td>VGL=-20V</td>
<td>1.3</td>
<td>4</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Gate Positive supply</td>
<td>VGH</td>
<td></td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>I_GH</td>
<td>VGH=27V</td>
<td>1.3</td>
<td>4</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Source negative supply</td>
<td>VNEG</td>
<td></td>
<td>-15.4</td>
<td>-15</td>
<td>-14.6</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>I_NEG</td>
<td>VNEG=-15V</td>
<td>6</td>
<td>135</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Source Positive supply</td>
<td>VPOS</td>
<td></td>
<td>14.6</td>
<td>15</td>
<td>15.4</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>I_POS</td>
<td>VPOS=15V</td>
<td>6.4</td>
<td>135</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Border supply</td>
<td>Vcom</td>
<td></td>
<td>-3.5</td>
<td>Adjusted</td>
<td>-0.3</td>
<td>V</td>
</tr>
<tr>
<td>Asymmetry source</td>
<td>Vasm</td>
<td>Vpos+Vneg</td>
<td>-800</td>
<td>800</td>
<td></td>
<td>mV</td>
</tr>
<tr>
<td>Common voltage</td>
<td>Vcom</td>
<td></td>
<td>-3.5</td>
<td>Adjusted</td>
<td>-0.3</td>
<td>V</td>
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<tr>
<td></td>
<td>Icom</td>
<td></td>
<td>0.42</td>
<td>0.8</td>
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<td>mA</td>
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<td>Maximum Power panel</td>
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<td></td>
<td></td>
<td>4300</td>
<td>mW</td>
</tr>
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<td>Typical power panel</td>
<td>Ptyp</td>
<td></td>
<td>265</td>
<td></td>
<td></td>
<td>mW</td>
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<td>Standby power panel</td>
<td>Pstby</td>
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<td>0.4</td>
<td></td>
<td></td>
<td>mW</td>
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<tr>
<td>Rush current</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I_Dd</td>
<td>VDD=3.3V</td>
<td>-150</td>
<td>150</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>I_GL</td>
<td>VGL=-20V</td>
<td>-630</td>
<td>630</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>I_GH</td>
<td>VGH=27V</td>
<td>-210</td>
<td>210</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>I_NEG</td>
<td>VNEG=-15V</td>
<td>-430</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>I_POS</td>
<td>VPOS=15V</td>
<td></td>
<td>430</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>I_com</td>
<td></td>
<td>-2.7</td>
<td>2.7</td>
<td></td>
<td>A</td>
</tr>
</tbody>
</table>

- The maximum power consumption is measured at 75 Hz operation with following pattern transition: from pattern of repeated 1 consecutive black scan lines followed by 1 consecutive white scan line to that of repeated 1 consecutive white scan lines followed by 1 consecutive black scan lines. (Note 6-1)

- The Typical power consumption is measured at 75 Hz operation with following pattern transition:
from horizontal 4 gray scale pattern to vertical 4 gray scale pattern.(Note 6-2)
- The standby power is the consumed power when the panel controller is in standby mode.
- The listed electrical/optical characteristics are only guaranteed under the controller & waveform provided by Waveshare.
- Vcom is recommended to be set in the range of assigned value ± 0.1V
- The rush current is for reference only.

Note 6-1
The maximum power consumption

Note 6-2
The typical power consumption

6-3) Refresh Rate
The module is applied at a maximum screen refresh rate of 75Hz.

<table>
<thead>
<tr>
<th>Refresh Rate</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-</td>
<td>75Hz</td>
</tr>
</tbody>
</table>
### 6-4) Panel AC characteristics

VDD=2.75V to 3.6V, unless otherwise specified.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
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<tr>
<td>Clock frequency</td>
<td>fckv</td>
<td>-</td>
<td>-</td>
<td>200</td>
<td>kHz</td>
</tr>
<tr>
<td>Minimum “L” clock pulse width</td>
<td>twL</td>
<td>0.5</td>
<td>-</td>
<td>-</td>
<td>us</td>
</tr>
<tr>
<td>Minimum “H” clock pulse width</td>
<td>twH</td>
<td>0.5</td>
<td>-</td>
<td>-</td>
<td>us</td>
</tr>
<tr>
<td>Clock rise time</td>
<td>trckv</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>ns</td>
</tr>
<tr>
<td>Clock fall time</td>
<td>tfckv</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>ns</td>
</tr>
<tr>
<td>SPV setup time</td>
<td>tSU</td>
<td>100</td>
<td>-</td>
<td>twH-100</td>
<td>ns</td>
</tr>
<tr>
<td>SPV hold time</td>
<td>tH</td>
<td>100</td>
<td>-</td>
<td>twH-100</td>
<td>ns</td>
</tr>
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<td>Pulse rise time</td>
<td>trspv</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>ns</td>
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<tr>
<td>Pulse fall time</td>
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<td>-</td>
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<td>ns</td>
</tr>
<tr>
<td>Clock XCL cycle time</td>
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<td>D0 .. D7 setup time</td>
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<td>XSTL setup time</td>
<td>tstls</td>
<td>8.35</td>
<td>-</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>XSTL hold time</td>
<td>tstlh</td>
<td>8.35</td>
<td>-</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>XLE on delay time</td>
<td>tLEdly</td>
<td>40</td>
<td>-</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>XLE high-level pulse width</td>
<td>tLEw</td>
<td>40</td>
<td>-</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>(When VDD=2.73V to 3.6V)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>XLE off delay time</td>
<td>tLEoff</td>
<td>200</td>
<td>-</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>Output setting time to +/- 30mV(Cload=200pF)</td>
<td>tout</td>
<td>-</td>
<td>-</td>
<td>12</td>
<td>ns</td>
</tr>
<tr>
<td>Frame Sync Length (Mode 1)</td>
<td>t1</td>
<td>1</td>
<td></td>
<td></td>
<td>1 line</td>
</tr>
</tbody>
</table>
GATE OUTPUT TIMING

Frame Sync Length

Note: First gate line on timing
After 5CKV, gate line is on.
6-5) Controller Timing

The timing mode is depicted on Figure 1 and Figure 2 and it refers to timing of Source Driver Output Enable (SDOE) and Gate Driver Clock (GDCK). Note, the controller timing in the mode LGON follows GDCK timing.

---

**Figure 1**  Line Timing in Mode 3

*Note: LCK is an internal signal and it is shown for reference only.*
Timing Parameters Table

<table>
<thead>
<tr>
<th>Mode</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1600x1200</td>
</tr>
</tbody>
</table>

| SDCK [MHz] | 40 |
| Pixels Per SDCK | 4 |

<table>
<thead>
<tr>
<th>Line Parameters [SDCK]</th>
<th>LSL</th>
<th>LBL</th>
<th>LDL</th>
<th>LEL</th>
<th>GDCK_STA</th>
<th>LGONL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line Parameters [us]</td>
<td>0.05</td>
<td>0.25</td>
<td>10.00</td>
<td>0.70</td>
<td>0.45</td>
<td>9.95</td>
</tr>
<tr>
<td>Frame Parameters [lines]</td>
<td>FSL</td>
<td>FBL</td>
<td>FDL</td>
<td>FEL</td>
<td>-</td>
<td>FR [Hz]</td>
</tr>
<tr>
<td>Frame Parameters [us]</td>
<td>11.00</td>
<td>44.00</td>
<td>13200.00</td>
<td>77.00</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Note 1: For Freescale SoC GDOE Low pulse represent FSL and GDSP pulses with the first period of FBL

Note 2:
SDCLK = XCL
SDD[7:0] = D0–D7
SDCE_L = XSTL
GDCK = CKV
GDSP = SPV
GDOE = Mode1
SDOE = XOE
7. Power Sequence

Power Rails must be sequenced in the following order:
1. VSS → VDD → VNEG → VPOS (Source driver) → VCOM
2. VSS → VDD → VGL → VGH (Gate driver)

Note:
- VGL should be turned off after VNEG and VPOS have been turned off and returned to the ground state.
- VGL should be turned off after the Vcom has been turned off and returned to the ground state.
- All of Vcom/VNEG/VPOS/VGN/VGL MUST turn off right after data transfer completes.

POWER ON

Note: If move from standby mode or power down to power on, VDD voltage must be set GND in the period of 700ms before VDD power on.
### POWER OFF

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tsd</td>
<td>30us</td>
<td>-</td>
</tr>
<tr>
<td>Tde</td>
<td>100us</td>
<td>-</td>
</tr>
<tr>
<td>Tep</td>
<td>1000us</td>
<td>-</td>
</tr>
<tr>
<td>Tpv</td>
<td>100us</td>
<td>-</td>
</tr>
<tr>
<td>Tvd</td>
<td>100us</td>
<td>-</td>
</tr>
<tr>
<td>Ten</td>
<td>0us</td>
<td>-</td>
</tr>
<tr>
<td>Tng</td>
<td>1000us</td>
<td>-</td>
</tr>
<tr>
<td>Tgv</td>
<td>100us</td>
<td>-</td>
</tr>
<tr>
<td>Tvd</td>
<td>700ms</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
<td>-----</td>
</tr>
<tr>
<td>Tdv</td>
<td>100μs</td>
<td>-</td>
</tr>
<tr>
<td>Tvg</td>
<td>0μs</td>
<td>-</td>
</tr>
<tr>
<td>Tgp</td>
<td>0μs</td>
<td>-</td>
</tr>
<tr>
<td>Tpn</td>
<td>0μs</td>
<td>-</td>
</tr>
<tr>
<td>Tne</td>
<td>0μs</td>
<td>-</td>
</tr>
<tr>
<td>Ted</td>
<td>0.5s</td>
<td>-</td>
</tr>
</tbody>
</table>

**Note1**: Supply voltages decay through pull-down resistors.
8. Optical characteristics

8-1) Specification

Measurements are made with that the illumination is under an angle of 45 degrees, the detector is perpendicular unless otherwise specified.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ.</th>
<th>Max</th>
<th>Unit</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Reflectance</td>
<td>White</td>
<td>35</td>
<td>45</td>
<td>-</td>
<td>%</td>
<td>Note 8-1</td>
</tr>
<tr>
<td>Gn</td>
<td>N&lt;sub&gt;th&lt;/sub&gt; Grey Level</td>
<td>-</td>
<td>-</td>
<td>DS+(WS-DS) ×n/(m-1)</td>
<td>-</td>
<td>L*</td>
<td>-</td>
</tr>
<tr>
<td>CR</td>
<td>Contrast Ratio</td>
<td>-</td>
<td>10</td>
<td>16</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

WS: White state, DS: Dark state, Gray state from Dark to White: DS, G1, G2…, Gn…, Gm-2, WS m:4, 8, 16 when 2, 3, 4 bits mode

Note 8-1: Luminance meter: Eye – One Pro Spectrophotometer.

8-2) Definition of contrast ratio

The contrast ratio (CR) is the ratio between the reflectance in a full white area (R<sub>I</sub>) and the reflectance in a dark area (R<sub>d</sub>):

\[
CR = \frac{R_I}{R_d}
\]
8-3) Reflection Ratio

The reflection ratio is expressed as:

\[ R = \text{Reflectance Factor}_{\text{white board}} \times \left( \frac{L_{\text{center}}}{L_{\text{white board}}} \right) \]

\( L_{\text{center}} \) is the luminance measured at center in a white area \((R=G=B=1)\). \( L_{\text{white board}} \) is the luminance of a standard white board. Both are measured with equivalent illumination source. The viewing angle shall be no more than 2 degrees.
### 9. HANDLING, SAFETY AND ENVIRONMENTAL REQUIREMENTS

#### WARNING

The display may break when it is dropped or bumped on a hard surface. Handle with care. Should the display break, do not touch the electrophoretic material. In case of contact with electrophoretic material, wash with water and soap.

#### CAUTION

The display module should not be exposed to harmful gases, such as acid and alkali gases, which corrode electronic components.

Disassembling the display module can cause permanent damage and invalidate the warranty agreements.

IPA solvent can only be applied on active area and the back of a glass. For the rest part, it is not allowed.

#### Mounting Precautions

1. It’s recommended that you consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the module.

2. It’s recommended that you attach a transparent protective plate to the surface in order to protect the EPD. Transparent protective plate should have sufficient strength in order to resist external force.

3. You should adopt radiation structure to satisfy the temperature specification.

4. Acetic acid type and chlorine type materials for the cover case are not desirable because he former generates corrosive gas of attacking the PS at high temperature and the latter cause’s circuit break by electro-chemical reaction.

5. Do not touch, push or rub the exposed PS with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment. Do not touch the surface of PS for bare hand or greasy cloth. (Some cosmetics deteriorate the PS)

6. When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach the PS. Do not use acetone, toluene and alcohol because they cause chemical damage to the PS.

7. Wipe off saliva or water drops as soon as possible. Their long time contact with PS causes deformations and color fading.

#### Data sheet status

Product specification

This data sheet contains Preliminary product specifications.
### Limiting values

Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other condition to limiting values for extended periods may affect device reliability.

### Application information

Where application information is given, it is advisory and does not form part of the specification.
## 10. Reliability test

<table>
<thead>
<tr>
<th>TEST</th>
<th>CONDITION</th>
<th>METHOD</th>
<th>REMARK</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Temperature Operation</td>
<td>T = +50°C, RH = 30% for 240 hrs</td>
<td>IEC 60 068-2-2Bp</td>
<td></td>
</tr>
<tr>
<td>Low-Temperature Operation</td>
<td>T = 0°C for 240 hrs</td>
<td>IEC 60 068-2-2Ab</td>
<td></td>
</tr>
<tr>
<td>Low-Temperature Storage</td>
<td>T = -25°C for 240 hrs</td>
<td>IEC 60 068-2-1Ab</td>
<td></td>
</tr>
<tr>
<td>High-Temperature, High-Humidity Operation</td>
<td>T = +40°C, RH = 90% for 168 hrs</td>
<td>IEC 60 068-2-3CA</td>
<td></td>
</tr>
<tr>
<td>High-Temperature Storage</td>
<td>T = +70°C, RH = 23% for 240 hrs</td>
<td>IEC 60 068-2-2Bp</td>
<td></td>
</tr>
<tr>
<td>High-Temperature, High-Humidity Storage</td>
<td>T = +60°C, RH = 80% for 240 hrs</td>
<td>IEC 60 068-2-3CA</td>
<td></td>
</tr>
<tr>
<td>Temperature Cycle</td>
<td>-25°C  (\rightarrow) +70°C, 100 Cycles 30min 30min Test in white pattern</td>
<td>IEC 60 068-2-14</td>
<td></td>
</tr>
<tr>
<td>Solar radiation test</td>
<td>765 W/m² for 168hrs, 40°C Test in white pattern</td>
<td>IEC60 068-2-5Sa</td>
<td></td>
</tr>
<tr>
<td>Package Vibration</td>
<td>1.04G, Frequency: 10~500Hz Direction: X,Y,Z Duration: 1 hours in each direction Full packed for shipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Package Drop Impact</td>
<td>Drop from height of 122 cm on concrete surface. Drop sequence: 1 corner,3 edges,6 faces One drop for each. Full packed for shipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrostatic Effect (non-operating)</td>
<td>(Machine model)+/- 250V 0Ω, 200pF</td>
<td>IEC 62179, IEC 62180</td>
<td></td>
</tr>
<tr>
<td>Stylus Tapping</td>
<td>POLYACETAL Pen: Top R:0.8mm Load: 300gf Speed: 30 times/min Total 13,500times</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Actual EMC level to be measured on customer application

Note: The protective film must be removed before temperature test.

**< Criteria >**

In the standard conditions, there is not display function NG issue occurred. (including : line defect ,no image). All the cosmetic specification is judged before the reliability stress.
12. Packing

NOTE:
1. One layer includes: 1 piece of cushion sheet, 1 pcs panel & 1 piece of tray.
2. QTY: 12 pcs panel/carton.
3. Dimension: 455*375*190mm
4. Weight: 5.0 KG

<table>
<thead>
<tr>
<th>NO.</th>
<th>EASY NAME</th>
<th>CODE 1</th>
<th>CODE 2</th>
<th>DESCRIPTION</th>
<th>DESIGNER</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blank Tray</td>
<td></td>
<td></td>
<td></td>
<td>Jamie Chung</td>
<td>20161104</td>
</tr>
<tr>
<td>2</td>
<td>3P MDM Trays x 2500 [APL0005J2]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3P MDM Trays x 2500 [APL0005U2]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>CARTON INTERNAL</td>
<td></td>
<td></td>
<td></td>
<td>Jamie Chung</td>
<td>20161104</td>
</tr>
<tr>
<td>5</td>
<td>26.250<em>180</em>720mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>EPE CUSHION SHEET</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>PET TRAY</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>EPE FOAM</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MILSPEC: UNSPECIFIED TOOLS: REMARK

APPROVE: Jimmy Chen
CHECK: Jimmy Chen
DESIGN: Jamie Chung

SCALE: 1:1 UNIT: mm SHEET 1 OF 1

PAGE 24
13. Bar Code definition

EGA   00    6     01    1     I      7    4    00361     A     T

1  2 3 4 2 5 6 2 7 2 8

1: EPD model code

2: Internal control codes

3: Internal control codes

4: Internal control codes

5: Year:

6: Month:

7: Serial number
   00000-99999

8: Internal control codes