

# Datasheet

**AUO**

**G185HAN01.1**

**UP-02-200R1.1**

**FORTEC**  
UNITED STATES

**FORTEC**  
INTEGRATED

**FORTEC**  
UNITED KINGDOM

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☐ Preliminary Specification

☒ Final Specification

|            |                     |
|------------|---------------------|
| Module     | 18.5" Color TFT-LCD |
| Model Name | G185HAN01.1(O4)     |

|             |      |                                                                 |            |
|-------------|------|-----------------------------------------------------------------|------------|
| Customer    | Date | Approved by                                                     | Date       |
|             |      | Elsie Kuo                                                       | 2025/08/26 |
| Approved by | Date | Prepared by                                                     | Date       |
|             |      | Athena Wu                                                       | 2025/08/26 |
|             |      | General Display Business Unit /<br>AUO Display Plus Corporation |            |

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## Record of Revision

| Version & Date    | Page       | Old description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | New Description                                                                                                               |       |        |      |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
|-------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------|--------|------|-----|-----|------|-----------|--------|----|------|------|------|----|--------|----------|------|------|------|----|----------|--------------------|----|----|----|----|-----------|--------|----|------|------|------|------|--------|----------|-----|-----|-----|------|----------|--------------------|----|-----|-----|------|-------|--------|------|-------|-------|-------|----|-----------|------|----|----|------|-----|------------|------------|------|----|----|----|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------|--------|-----|-----|-----|------|-----------|--------|----|------|------|------|----|--------|----------|------|------|------|----|----------|--------------------|----|----|----|----|-----------|--------|----|------|------|------|------|--------|----------|-----|-----|-----|------|----------|--------------------|----|-----|-----|------|-------|--------|------|-------|-------|-------|----|-----------|------|------|------|------|-----|------------|------------|------|----|----|----|----|
| 0.1<br>2024/03/04 |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Final Specification                                                                                                           |       |        |      |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
| 0.2<br>2024/03/19 | 5          | <b>2.1 Display Characteristics</b><br>Operating=>-30~ 80<br>(+80 °Cas panel surface temperature)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>2.1 Display Characteristics</b><br>Operating =>-30~ 80                                                                     |       |        |      |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
|                   | 10         | <b>4.2 Absolute Ratings of Environment</b><br>Note 4: Operation Temperature +70°C is defined as panel surface temperperature.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>4.2 Absolute Ratings of Environment</b><br>Note 4: Operation Temperature +80°C is defined as panel surface temperperature. |       |        |      |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
| 0.3<br>2025/8/26  | 17         | <b>6.4 Timing Characteristics</b> <table><tr><th>Signal</th><th>Item</th><th>Symbol</th><th>Min</th><th>Typ</th><th>Max</th><th>Unit</th></tr><tr><td rowspan="3">V-section</td><td>Period</td><td>Tv</td><td>1090</td><td>1100</td><td>1160</td><td>Th</td></tr><tr><td>Active</td><td>Tdisp(v)</td><td>1080</td><td>1080</td><td>1080</td><td>Th</td></tr><tr><td>Blanking</td><td>Tbp(v)+Tfp(v)+PWvs</td><td>10</td><td>20</td><td>80</td><td>Th</td></tr><tr><td rowspan="3">H-section</td><td>Period</td><td>Th</td><td>1000</td><td>1088</td><td>1120</td><td>Tclk</td></tr><tr><td>Active</td><td>Tdisp(h)</td><td>960</td><td>960</td><td>960</td><td>Tclk</td></tr><tr><td>Blanking</td><td>Tbp(h)+Tfp(h)+PWhs</td><td>40</td><td>128</td><td>160</td><td>Tclk</td></tr><tr><td rowspan="2">Clock</td><td>Period</td><td>Tclk</td><td>11.76</td><td>13.89</td><td>15.38</td><td>ns</td></tr><tr><td>Frequency</td><td>Freq</td><td>60</td><td>72</td><td>87.5</td><td>MHz</td></tr><tr><td>Frame Rate</td><td>Frame Rate</td><td>1/Tv</td><td>50</td><td>60</td><td>75</td><td>Hz</td></tr></table> | Signal                                                                                                                        | Item  | Symbol | Min  | Typ | Max | Unit | V-section | Period | Tv | 1090 | 1100 | 1160 | Th | Active | Tdisp(v) | 1080 | 1080 | 1080 | Th | Blanking | Tbp(v)+Tfp(v)+PWvs | 10 | 20 | 80 | Th | H-section | Period | Th | 1000 | 1088 | 1120 | Tclk | Active | Tdisp(h) | 960 | 960 | 960 | Tclk | Blanking | Tbp(h)+Tfp(h)+PWhs | 40 | 128 | 160 | Tclk | Clock | Period | Tclk | 11.76 | 13.89 | 15.38 | ns | Frequency | Freq | 60 | 72 | 87.5 | MHz | Frame Rate | Frame Rate | 1/Tv | 50 | 60 | 75 | Hz | <b>6.4 Timing Characteristics</b> <table><tr><th>Signal</th><th>Item</th><th>Symbol</th><th>Min</th><th>Typ</th><th>Max</th><th>Unit</th></tr><tr><td rowspan="3">V-section</td><td>Period</td><td>Tv</td><td>1090</td><td>1100</td><td>1160</td><td>Th</td></tr><tr><td>Active</td><td>Tdisp(v)</td><td>1080</td><td>1080</td><td>1080</td><td>Th</td></tr><tr><td>Blanking</td><td>Tbp(v)+Tfp(v)+PWvs</td><td>10</td><td>20</td><td>80</td><td>Th</td></tr><tr><td rowspan="3">H-section</td><td>Period</td><td>Th</td><td>1020</td><td>1088</td><td>1120</td><td>Tclk</td></tr><tr><td>Active</td><td>Tdisp(h)</td><td>960</td><td>960</td><td>960</td><td>Tclk</td></tr><tr><td>Blanking</td><td>Tbp(h)+Tfp(h)+PWhs</td><td>60</td><td>128</td><td>160</td><td>Tclk</td></tr><tr><td rowspan="2">Clock</td><td>Period</td><td>Tclk</td><td>11.15</td><td>13.92</td><td>17.98</td><td>ns</td></tr><tr><td>Frequency</td><td>Freq</td><td>55.6</td><td>71.8</td><td>89.7</td><td>MHz</td></tr><tr><td>Frame Rate</td><td>Frame Rate</td><td>1/Tv</td><td>50</td><td>60</td><td>75</td><td>Hz</td></tr></table> <p>Note 4: The equation is listed as following. Please don't exceed the above recommended value.</p> <p>Clock Frequency (Min.) = Frame Rate (Min.) x Th (Min.) x Tv (Min.)</p> <p>Clock Frequency (Typ.) = Frame Rate (Typ.) x Th (Typ.) x Tv (Typ.)</p> <p>Clock Frequency (Max.) = Frame Rate (Max.) x Th (Typ.) x Tv (Typ.)</p> | Signal | Item | Symbol | Min | Typ | Max | Unit | V-section | Period | Tv | 1090 | 1100 | 1160 | Th | Active | Tdisp(v) | 1080 | 1080 | 1080 | Th | Blanking | Tbp(v)+Tfp(v)+PWvs | 10 | 20 | 80 | Th | H-section | Period | Th | 1020 | 1088 | 1120 | Tclk | Active | Tdisp(h) | 960 | 960 | 960 | Tclk | Blanking | Tbp(h)+Tfp(h)+PWhs | 60 | 128 | 160 | Tclk | Clock | Period | Tclk | 11.15 | 13.92 | 17.98 | ns | Frequency | Freq | 55.6 | 71.8 | 89.7 | MHz | Frame Rate | Frame Rate | 1/Tv | 50 | 60 | 75 | Hz |
| Signal            | Item       | Symbol                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Min                                                                                                                           | Typ   | Max    | Unit |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
| V-section         | Period     | Tv                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1090                                                                                                                          | 1100  | 1160   | Th   |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
|                   | Active     | Tdisp(v)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1080                                                                                                                          | 1080  | 1080   | Th   |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
|                   | Blanking   | Tbp(v)+Tfp(v)+PWvs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 10                                                                                                                            | 20    | 80     | Th   |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
| H-section         | Period     | Th                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1000                                                                                                                          | 1088  | 1120   | Tclk |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
|                   | Active     | Tdisp(h)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 960                                                                                                                           | 960   | 960    | Tclk |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
|                   | Blanking   | Tbp(h)+Tfp(h)+PWhs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 40                                                                                                                            | 128   | 160    | Tclk |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
| Clock             | Period     | Tclk                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 11.76                                                                                                                         | 13.89 | 15.38  | ns   |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
|                   | Frequency  | Freq                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 60                                                                                                                            | 72    | 87.5   | MHz  |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
| Frame Rate        | Frame Rate | 1/Tv                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 50                                                                                                                            | 60    | 75     | Hz   |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
| Signal            | Item       | Symbol                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Min                                                                                                                           | Typ   | Max    | Unit |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
| V-section         | Period     | Tv                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1090                                                                                                                          | 1100  | 1160   | Th   |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
|                   | Active     | Tdisp(v)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1080                                                                                                                          | 1080  | 1080   | Th   |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
|                   | Blanking   | Tbp(v)+Tfp(v)+PWvs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 10                                                                                                                            | 20    | 80     | Th   |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
| H-section         | Period     | Th                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1020                                                                                                                          | 1088  | 1120   | Tclk |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
|                   | Active     | Tdisp(h)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 960                                                                                                                           | 960   | 960    | Tclk |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
|                   | Blanking   | Tbp(h)+Tfp(h)+PWhs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 60                                                                                                                            | 128   | 160    | Tclk |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
| Clock             | Period     | Tclk                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 11.15                                                                                                                         | 13.92 | 17.98  | ns   |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
|                   | Frequency  | Freq                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 55.6                                                                                                                          | 71.8  | 89.7   | MHz  |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |
| Frame Rate        | Frame Rate | 1/Tv                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 50                                                                                                                            | 60    | 75     | Hz   |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |    |    |      |     |            |            |      |    |    |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |        |     |     |     |      |           |        |    |      |      |      |    |        |          |      |      |      |    |          |                    |    |    |    |    |           |        |    |      |      |      |      |        |          |     |     |     |      |          |                    |    |     |     |      |       |        |      |       |       |       |    |           |      |      |      |      |     |            |            |      |    |    |    |    |

## 1.0 Handling Precautions

- 1) Since front polarizer is easily damaged, pay attention not to scratch it.
- 2) Be sure to turn off power supply when inserting or disconnecting from input connector.
- 3) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
- 4) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
- 5) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.
- 6) Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.
- 7) Do not open or modify the Module Assembly.
- 8) Do not press the reflector sheet at the back of the module to any directions.
- 9) In case if a Module has to be put back into the packing container slot after it was taken out from the container, do not press the center of LED lightbar edge. Instead, press at the far ends of the LED light bar edge softly. Otherwise the TFT Module may be damaged.
- 10) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.
- 11) After installation of the TFT Module into an enclosure, do not twist nor bend the TFT Module even momentarily. While designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.
- 12) Small amount of materials having no flammability grade is used in the LCD module. The LCD module should be supplied by power complied with requirements of Limited Power Source (IEC62368-1 or UL62368-1), or be applied exemption.

## 2.0 General Description

This specification applies to the 18.5 inch-wide Color AHVA (IPS-like) TFT-LCD Module G185HAN01.1. The display supports the FHD [1920(H) x 1080(V)] screen format and 16.7M colors (True 8 bit). All input signals are LVDS interface compatible.

## 2.1 Display Characteristics

The following items are characteristics summary on the table under 25°C condition:

| ITEMS                                      | Unit                 | SPECIFICATIONS                          |
|--------------------------------------------|----------------------|-----------------------------------------|
| Screen Diagonal                            | [mm]                 | 469.16(18.47")                          |
| Active Area                                | [mm]                 | 408.96 (H) x 230.04 (V)                 |
| Pixels H x V                               |                      | 1920x1080                               |
| Pixel Pitch                                | [um]                 | 213 (per one triad) × 213               |
| Pixel Arrangement                          |                      | R.G.B. Vertical Stripe                  |
| Display Mode                               |                      | AHVA mode, Normally black               |
| White Luminance ( Center )                 | [cd/m <sup>2</sup> ] | 500 cd/m <sup>2</sup> (Typ.)            |
| Contrast Ratio                             |                      | 1000 (Typ.)                             |
| Optical Response Time                      | [msec]               | 20ms                                    |
| Nominal Input Voltage VDD                  | [Volt]               | 5 V (Typ)                               |
| Power Consumption<br>(VDD line + LED line) | [Watt]               | 28.15W(Max)                             |
| Weight                                     | [Grams]              | 1200 (Typ)                              |
| Physical Size                              | [mm]                 | 430.4 (W) x 254.6 (H) Typ. x 12.0(D)Typ |
| Electrical Interface                       |                      | Dual LVDS                               |
| Support Color                              |                      | 16.7M colors, True 8 bit                |
| Surface Treatment                          |                      | Anti-Glare, 3H                          |
| RoHS Compliance                            |                      | RoHS Compliance                         |
| Temperature Range                          |                      |                                         |
| Operating                                  | [°C]                 | -30~ 80                                 |
| Storage (Shipping)                         | [°C]                 | -30~ 80                                 |

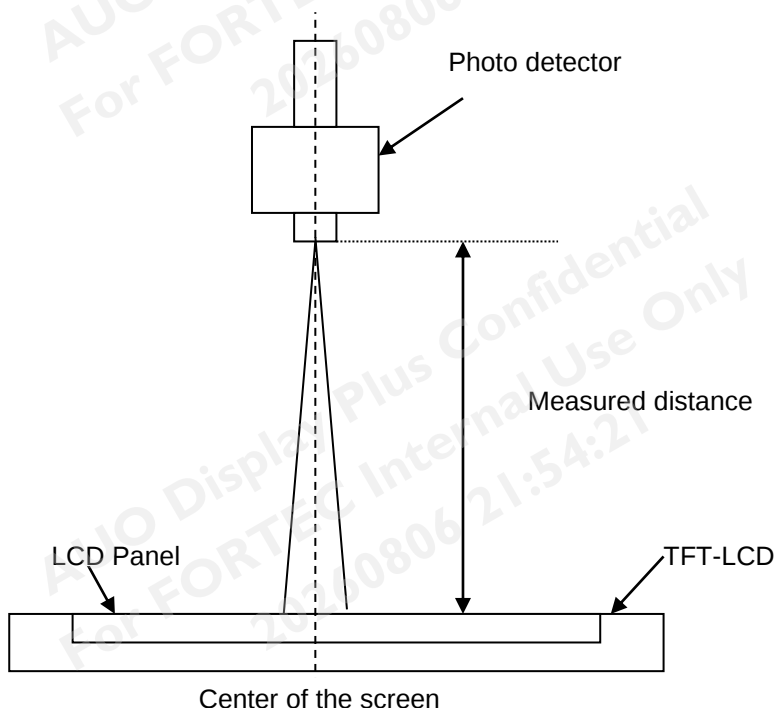
## 2.2 Optical Characteristics

The optical characteristics are measured under stable conditions at 25 °C:

| Item                                   | Unit                 | Conditions                      | Min.  | Typ.  | Max.  | Note |
|----------------------------------------|----------------------|---------------------------------|-------|-------|-------|------|
| Viewing Angle                          | [degree]             | Horizontal (Right)              |       | 89    | -     | 2    |
|                                        |                      | CR >10 (Left)                   |       | 89    | -     |      |
|                                        |                      | Vertical (Up)                   |       | 89    | -     |      |
|                                        |                      | CR > 10 (Down)                  |       | 89    | -     |      |
| Contrast ratio                         |                      | Normal Direction                | 800   | 1000  | -     | 3    |
| Response Time                          | [msec]               | Raising Time (T <sub>rR</sub> ) |       | 10    | 20    | 4    |
|                                        |                      | Falling Time (T <sub>rF</sub> ) |       | 10    | 20    |      |
|                                        |                      | Raising + Falling               |       | 20    | 40    |      |
| Color / Chromaticity Coordinates (CIE) |                      | Red x                           | 0.596 | 0.646 | 0.696 | 5    |
|                                        |                      | Red y                           | 0.283 | 0.333 | 0.383 |      |
|                                        |                      | Green x                         | 0.241 | 0.291 | 0.341 |      |
|                                        |                      | Green y                         | 0.551 | 0.601 | 0.651 |      |
|                                        |                      | Blue x                          | 0.105 | 0.155 | 0.205 |      |
|                                        |                      | Blue y                          | 0.010 | 0.060 | 0.110 |      |
| Color Coordinates (CIE) White          |                      | White x                         | 0.249 | 0.299 | 0.349 |      |
|                                        |                      | White y                         | 0.265 | 0.315 | 0.365 |      |
| Central Luminance                      | [cd/m <sup>2</sup> ] |                                 | 400   | 500   |       | 6    |
| Luminance Uniformity                   | [%]                  |                                 | 80    | 85    |       | 7    |
| Color Gamut                            | %                    |                                 |       | 72    |       |      |

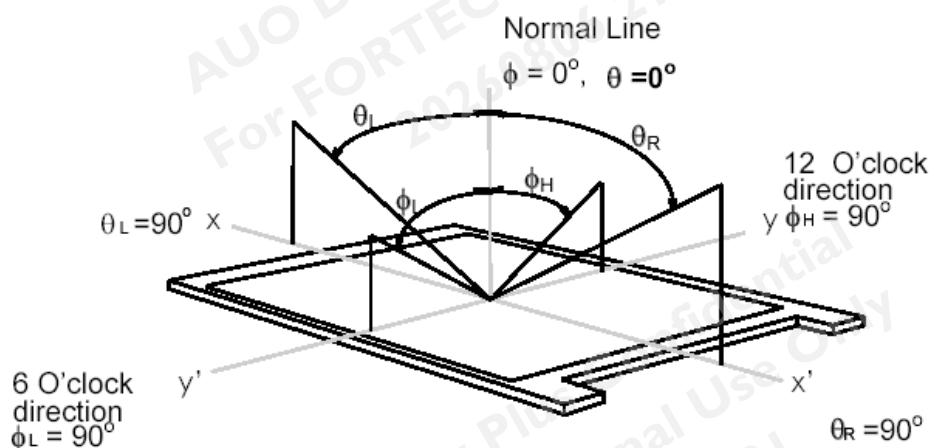
## Note 1: Measurement method

The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring (at surface 35°C). In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a stable, windless and dark room.



## Note 2: Definition of viewing angle measured by ELDIM (EZContrast 88)

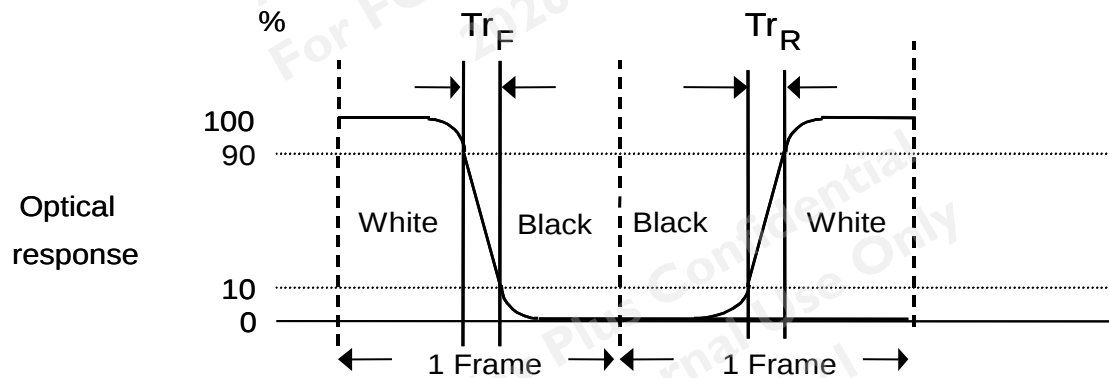
Viewing angle is the measurement of contrast ratio  $\geq 10$ , at the screen center, over a 180° horizontal and 180° vertical range (off-normal viewing angles). The 180° viewing angle range is broken down as follows; 90° ( $\theta$ ) horizontal left and right and 90° ( $\phi$ ) vertical, high (up) and low (down). The measurement direction is typically perpendicular to the display surface with the screen rotated about its center to develop the desired measurement viewing angle.



Note 3: Contrast ratio is measured by TOPCON SR-3

Note 4: Definition of Response time measured by Westar TRD-100A

The output signals of photo detector are measured when the input signals are changed from "Full Black" to "Full White" (rising time,  $T_{rR}$ ), and from "Full White" to "Full Black" (falling time,  $T_{rF}$ ), respectively. The response time is interval between the 10% and 90% (1 frame at 60 Hz) of amplitudes.

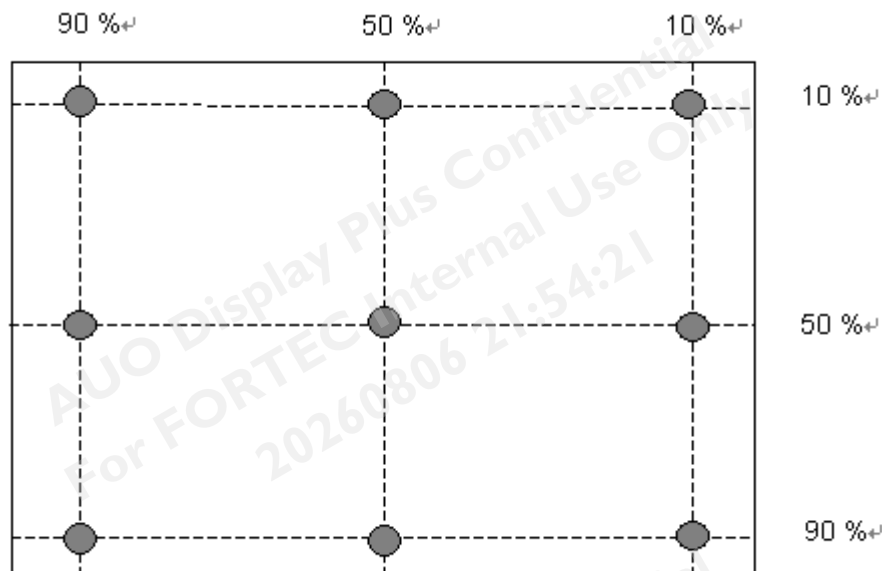


$T_{rR} + T_{rF} = 20 \text{ msec (typ.)}$ .

Note 5: Color chromaticity and coordinates (CIE) is measured by TOPCON SR-3

Note 6: Central luminance is measured by TOPCON SR-3

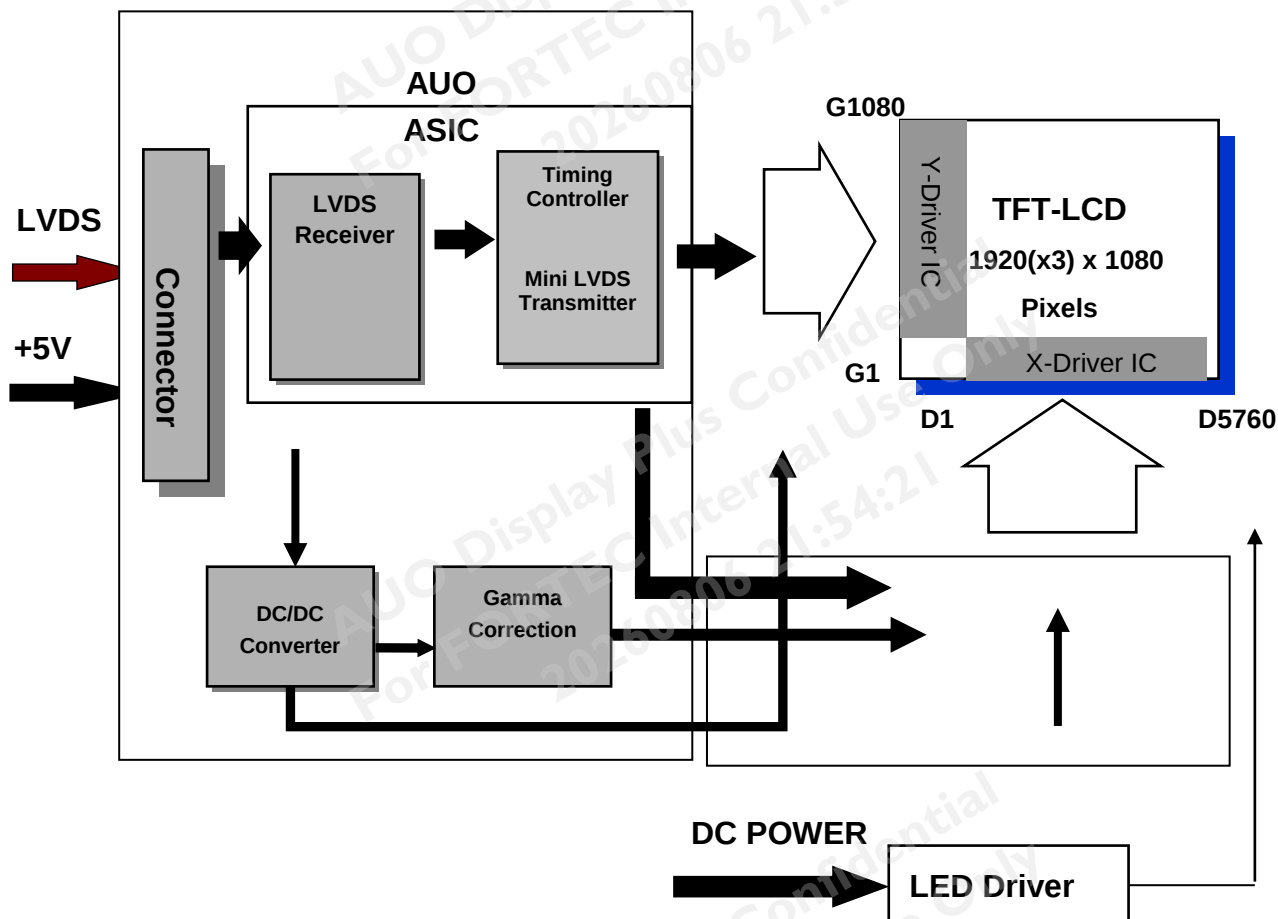
Note 7: Luminance uniformity of these 9 points is defined as below and measured by TOPCON SR-3



$$\text{Uniformity} = \frac{\text{Minimum Luminance in 9 points (1-9)}}{\text{Maximum Luminance in 9 Points (1-9)}}$$

### 3.0 Functional Block Diagram

The following diagram shows the functional block of the 18.5 inch Color TFT-LCD Module:



I/F PCB Interface:

FI-XB30SSRLA-HF-16-R3500 (JAE)

Mating Type:

FI-X30HL or FI-X30C2L-NPB

## 4.0 Absolute Maximum Ratings

Absolute maximum ratings of the module are as following:

### 4.1 TFT LCD Module

| Item                    | Symbol | Min  | Max  | Unit   | Conditions      |
|-------------------------|--------|------|------|--------|-----------------|
| Logic/LCD Drive Voltage | VDD    | -0.3 | +5.5 | [Volt] | <i>Note 1,2</i> |

### 4.2 Absolute Ratings of Environment

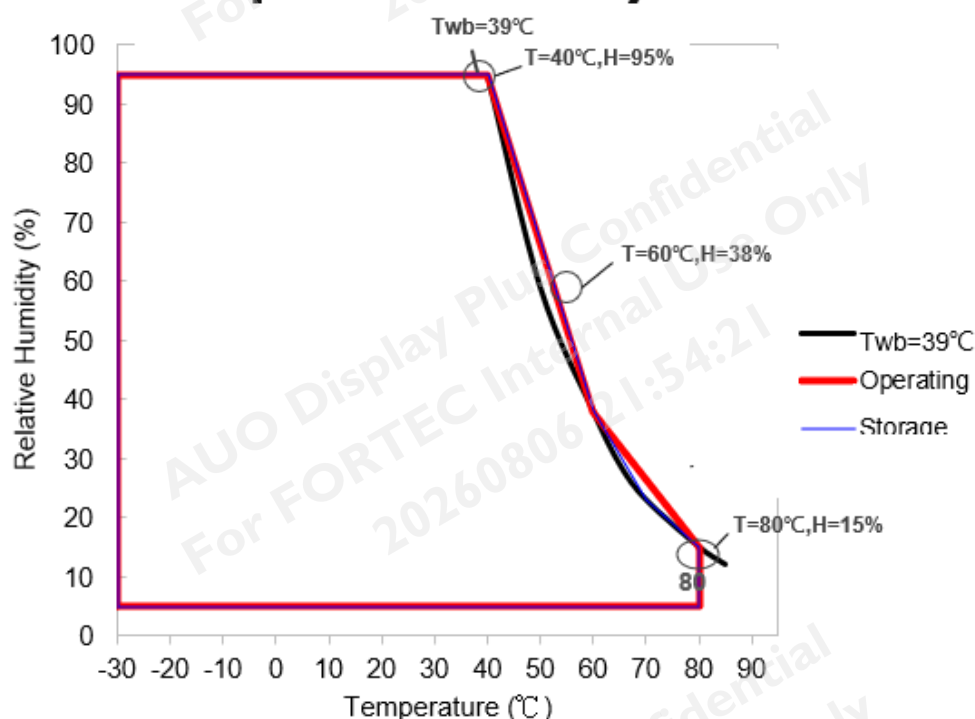
| Item                  | Symbol | Min. | Max. | Unit  | Conditions |
|-----------------------|--------|------|------|-------|------------|
| Operating Temperature | TOP    | -30  | 80   | [°C]  | Note 3 & 4 |
| Operation Humidity    | HOP    | 5    | 95   | [%RH] |            |
| Storage Temperature   | TST    | -30  | 80   | [°C]  |            |
| Storage Humidity      | HST    | 5    | 95   | [%RH] |            |

Note 1: With in Ta (25°C)

Note 2: Permanent damage to the device may occur if exceeding maximum values

Note 3: For quality performance, please refer to AUO IIS(Incoming Inspection Standard).

Note 4: Operation Temperature +80°C is defined as panel surface temperature.



## 5.0 Electrical characteristics

### 5.1 TFT LCD Module

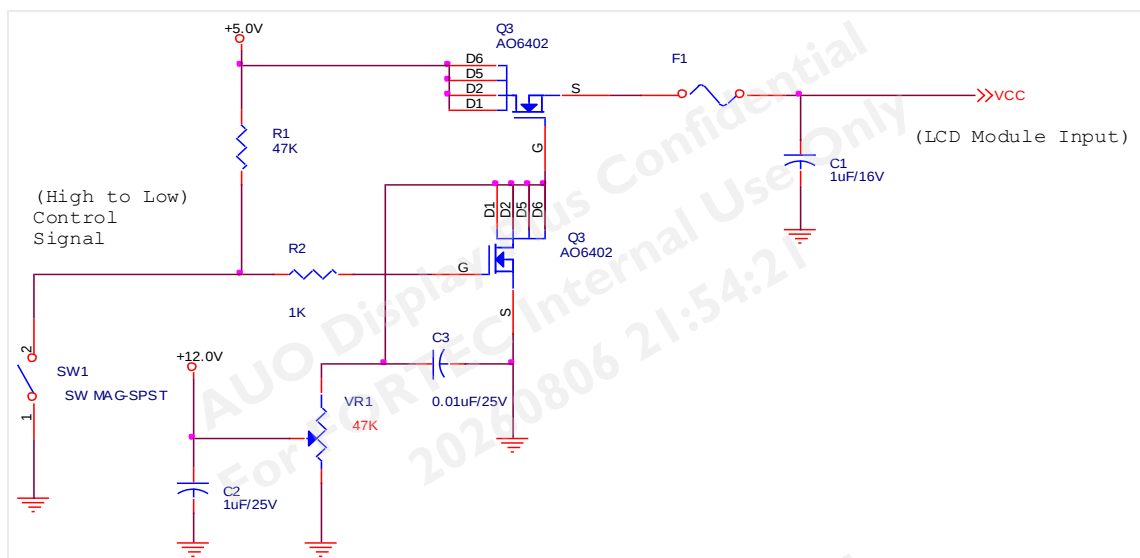
#### 5.1.1 Power Specification

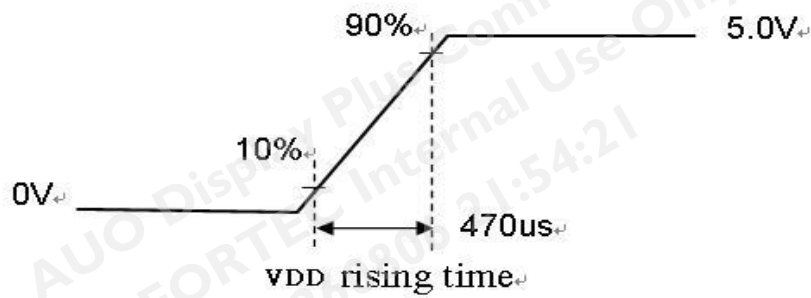
Input power specifications are as follows:

| Symbol | Parameter                                | Min | Typ  | Max  | Unit     | Conditions                            |
|--------|------------------------------------------|-----|------|------|----------|---------------------------------------|
| VDD    | Logic/LCD Drive Voltage                  | 4.5 | 5.0  | 5.5  | [Volt]   | +/-10%                                |
| IDD    | Input Current                            | -   | 0.89 | 1.07 | [A]      | VDD= 5.0V, All White Pattern At 60Hz, |
| PDD    | VDD Power                                | -   | 4.45 | 5.35 | [Watt]   | VDD= 5.0V, All White Pattern At 60Hz  |
| IRush  | Inrush Current                           | -   | 2    | 2.5  | [A]      | Note 1                                |
| VDDrp  | Allowable Logic/LCD Drive Ripple Voltage | -   | -    | 300  | [mV] p-p | VDD= 5.0V, All White Pattern At 60Hz  |

Note 1: Measurement conditions:

The duration of rising time of power input is 470us.





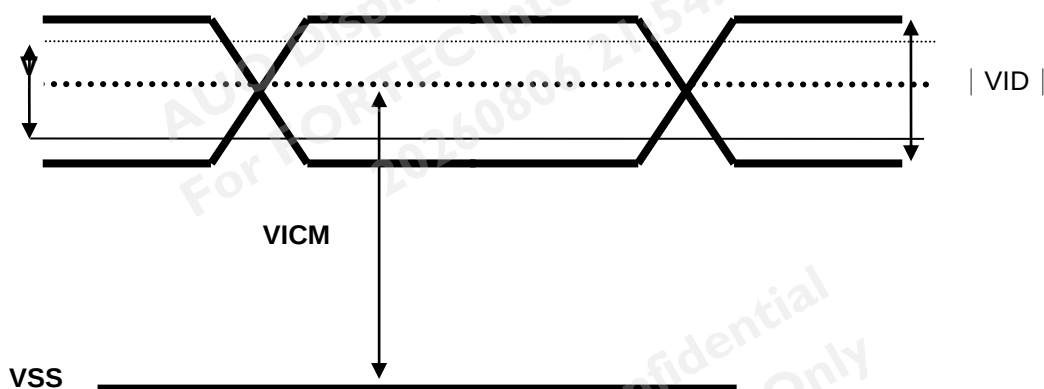
### 5.1.2 Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off. Please refer to specifications of SN75LVDS82DGG (Texas Instruments) in detail.

Characteristics of each signal are as follows:

| Symbol | Parameter                              | Min   | Typ | Max   | Units | Condition                              |
|--------|----------------------------------------|-------|-----|-------|-------|----------------------------------------|
| VTH    | Differential Input High Threshold      | -     |     | 100   | [mV]  | VICM = 1.2V<br><b>Note 1</b>           |
| VTL    | Differential Input Low Threshold       | -100  |     | -     | [mV]  | VICM = 1.2V<br><b>Note 1</b>           |
| VID    | Input Differential Voltage             | 100   | 400 | 600   | [mV]  | VICM = 1.2V<br><b>Note 1</b>           |
| VICM   | Differential Input Common Mode Voltage | 1.125 | -   | 1.375 | [V]   | VTH-VTL = 200mV (max)<br><b>Note 1</b> |

Note 1: LVDS Signal Waveform



## 5.2 Backlight Unit

Following characteristics are measured under a stable condition at 25 °C (Room Temperature):

| Symbol                | Parameter              | Min.   | Typ.  | Max.  | Unit   | Remark                           |
|-----------------------|------------------------|--------|-------|-------|--------|----------------------------------|
| VCC                   | Input Voltage          | 10.8   | 12    | 13.2  | [Volt] |                                  |
| I <sub>VCC</sub>      | Input Current          |        | 1.56  | 1.9   | [A]    | VCC=12V, 100% PWM Duty           |
| P <sub>VCC</sub>      | Power Consumption      |        | 18.72 | 22.8  | [Watt] | VCC=12V, 100% PWM Duty           |
| I <sub>rush LED</sub> | Inrush Current         | -      |       | 3     | [A]    | at rising time=470us             |
| VLED<br>on/off        | On Control Voltage     | 3      | 5     | 5.5   | Volt   |                                  |
|                       | Off Control Voltage    |        |       | 0.8   | Volt   |                                  |
| F <sub>PWM</sub>      | Dimming Frequency      | 200    | -     | 20k   | [Hz]   |                                  |
|                       | Swing Voltage          | 3      | 3.3   | 5     | V      |                                  |
|                       | High Voltage           | 3      | 3.3   | 5     | Volt   |                                  |
|                       | Low Voltage            |        |       | 0.8   | Volt   |                                  |
|                       | Dimming Duty<br>200~5K | 5      | -     | 100   | %      |                                  |
|                       | Dimming Duty<br>5K~20K | 15     | -     | 100   | %      |                                  |
| I <sub>F</sub>        | LED Forward Current    |        | 85    |       | mA     | Ta = 25 °C                       |
| V <sub>F</sub>        | LED Forward Voltage    | -      | 3.0   | 3.3   | Volt   | I <sub>F</sub> =85mA, Ta = 25 °C |
| P <sub>LED</sub>      | LED Power Consumption  | -      | 14.2  | 15.71 | Watt   | I <sub>F</sub> =85mA, Ta = 25 °C |
| LED Lifetime          |                        | 50,000 |       |       | Hrs    | I <sub>F</sub> =85mA, Ta= 25 °C  |

Note 1: Ta means ambient temperature of TFT-LCD module.

Note 2: VCC, I<sub>VCC</sub>, P<sub>VCC</sub>, I<sub>rush LED</sub> are defined for LED B/L.(100% duty of PWM dimming)

Note 3: I<sub>F</sub>, V<sub>F</sub>, P<sub>LED</sub> are defined for single LED.

Note 4: If G185HAN01.1 module is driven by high current or at high ambient temperature & humidity condition. The operating life will be reduced.

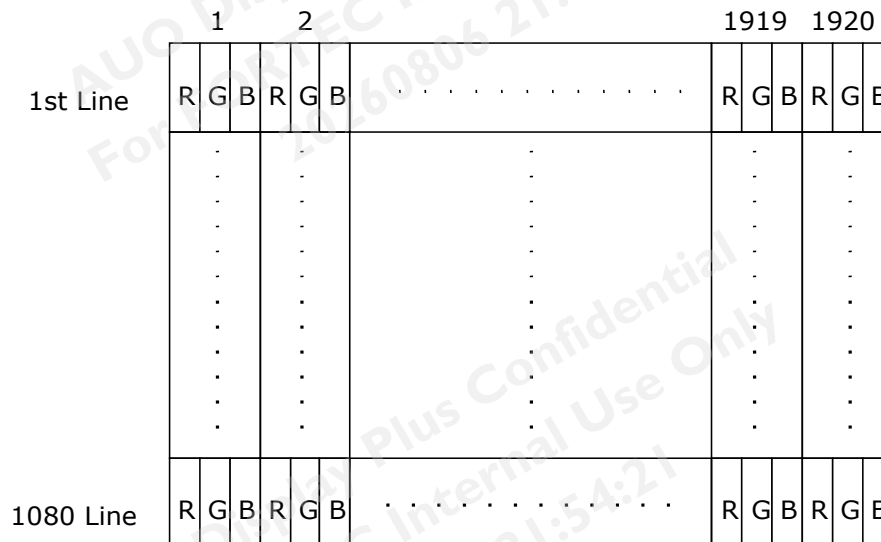
Note 5: Operation life means brightness goes down to 50% initial brightness. Minimum operating life time is estimated data.

Note 6: Each LED light bar consists of 56 pcs LED package ( 7 strings x 8 pcs / string )

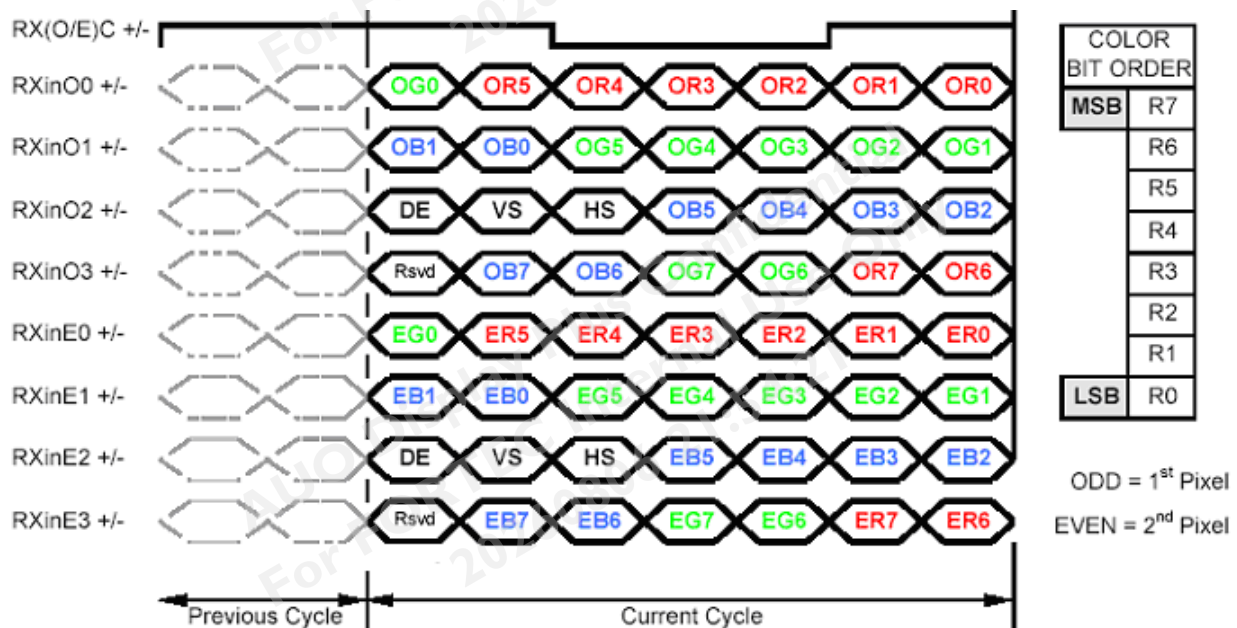
## 6.0 Signal Characteristic

### 6.1 Pixel Format Image

Following figure shows the relationship of the input signals and LCD pixel format.



### 6.2 The input data format



Note1: Normally DE mode only. VS and HS on EVEN channel are not used.

Note2: Please follow VESA.

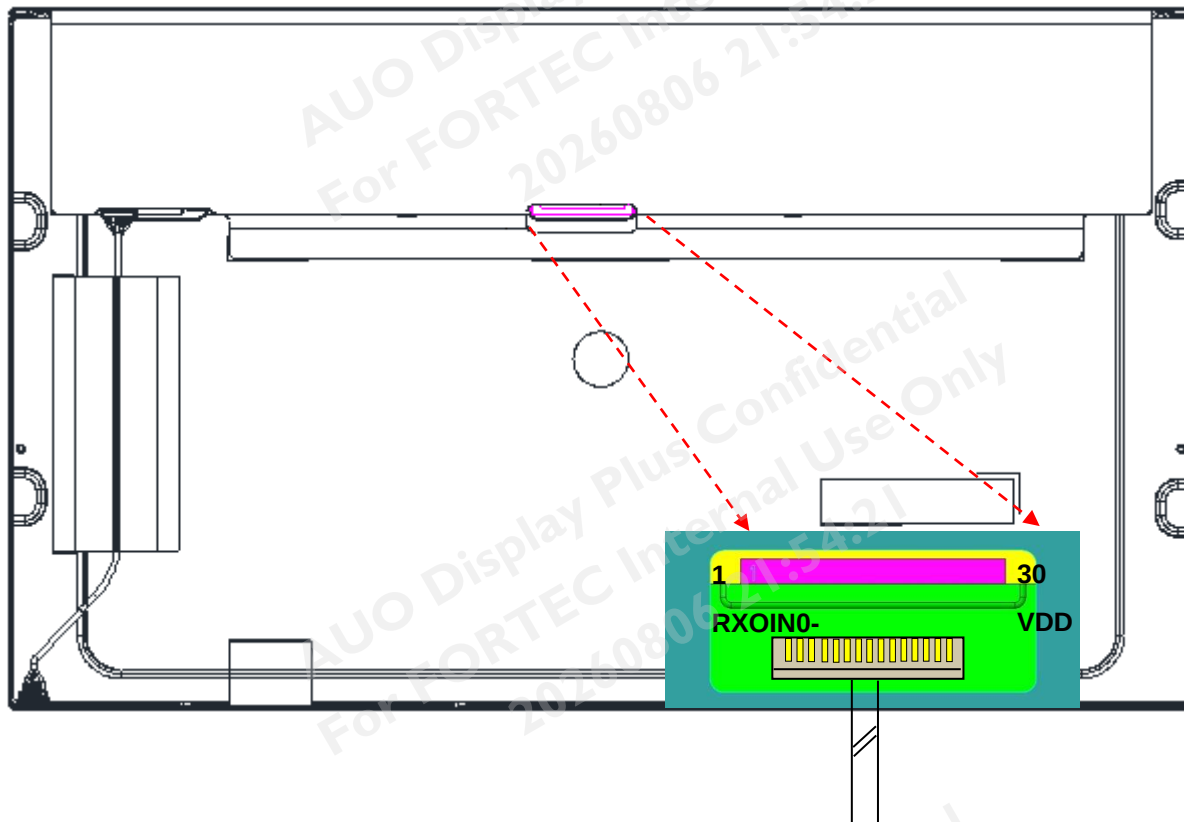
Note3: 8-bits signal input.

## 6.3 Signal Description

The first LVDS port(RxOxxx) transmits odd pixels while the second LVDS port(RxExxx) transmits even pixels.

| PIN # | SIGNAL NAME | DESCRIPTION                                                            |
|-------|-------------|------------------------------------------------------------------------|
| 1     | RXOIN0-     | Negative LVDS differential data input (Odd data)                       |
| 2     | RXOIN0+     | Positive LVDS differential data input (Odd data)                       |
| 3     | RXOIN1-     | Negative LVDS differential data input (Odd data)                       |
| 4     | RXOIN1+     | Positive LVDS differential data input (Odd data)                       |
| 5     | RXOIN2-     | Negative LVDS differential data input (Odd data, H-Sync,V-Sync,DSPTMG) |
| 6     | RXOIN2+     | Positive LVDS differential data input (Odd data, H-Sync,V-Sync,DSPTMG) |
| 7     | GND         | Power Ground                                                           |
| 8     | RXOCLKIN-   | Negative LVDS differential clock input (Odd clock)                     |
| 9     | RXOCLKIN+   | Positive LVDS differential clock input (Odd clock)                     |
| 10    | RXOIN3-     | Negative LVDS differential data input (Odd data)                       |
| 11    | RXOIN3+     | Positive LVDS differential data input (Odd data)                       |
| 12    | RXEIN0-     | Negative LVDS differential data input (Even data)                      |
| 13    | RXEIN0+     | Positive LVDS differential data input (Even data)                      |
| 14    | GND         | Power Ground                                                           |
| 15    | RXEIN1-     | Negative LVDS differential data input (Even data)                      |
| 16    | RXEIN1+     | Positive LVDS differential data input (Even data)                      |
| 17    | GND         | Power Ground                                                           |
| 18    | RXEIN2-     | Negative LVDS differential data input (Even data)                      |
| 19    | RXEIN2+     | Positive LVDS differential data input (Even data)                      |
| 20    | RXECLKIN-   | Negative LVDS differential clock input (Even clock)                    |
| 21    | RXECLKIN+   | Positive LVDS differential clock input (Even clock)                    |
| 22    | RXEIN3-     | Negative LVDS differential data input (Even data)                      |
| 23    | RXEIN3+     | Positive LVDS differential data input (Even data)                      |
| 24    | GND         | Power GND                                                              |
| 25    | NC          | NC                                                                     |
| 26    | NC          | NC                                                                     |
| 27    | NC          | NC                                                                     |
| 28    | VDD         | +5.0V Power Supply                                                     |
| 29    | VDD         | +5.0V Power Supply                                                     |
| 30    | VDD         | +5.0V Power Supply                                                     |

Note1: Start from left side



Note2: Input signals of clock shall be the same timing.

Note3: Please follow TV VESA Pin Assignment.

## 6.4 Timing Characteristics

| Signal     | Item       | Symbol                            | Min   | Typ   | Max   | Unit |
|------------|------------|-----------------------------------|-------|-------|-------|------|
| V-section  | Period     | $T_v$                             | 1090  | 1100  | 1160  | Th   |
|            | Active     | $T_{disp(v)}$                     | 1080  | 1080  | 1080  | Th   |
|            | Blanking   | $T_{bp(v)} + T_{fp(v)} + PW_{vs}$ | 10    | 20    | 80    | Th   |
| H-section  | Period     | $T_h$                             | 1020  | 1088  | 1120  | Tclk |
|            | Active     | $T_{disp(h)}$                     | 960   | 960   | 960   | Tclk |
|            | Blanking   | $T_{bp(h)} + T_{fp(h)} + PW_{hs}$ | 60    | 128   | 160   | Tclk |
| Clock      | Period     | $T_{clk}$                         | 11.15 | 13.92 | 17.98 | ns   |
|            | Frequency  | Freq.                             | 55.6  | 71.8  | 89.7  | MHz  |
| Frame Rate | Frame Rate | $1/T_v$                           | 50    | 60    | 75    | Hz   |

Note 1: Only DE mode operation.

The input of Hsync & Vsync signal does not have an effect upon the LCD normal operation.

Note 2: The performance of the electro-optical characteristics may be influenced by variance of the vertical refresh rates.

Note 3: Horizontal period should be even.

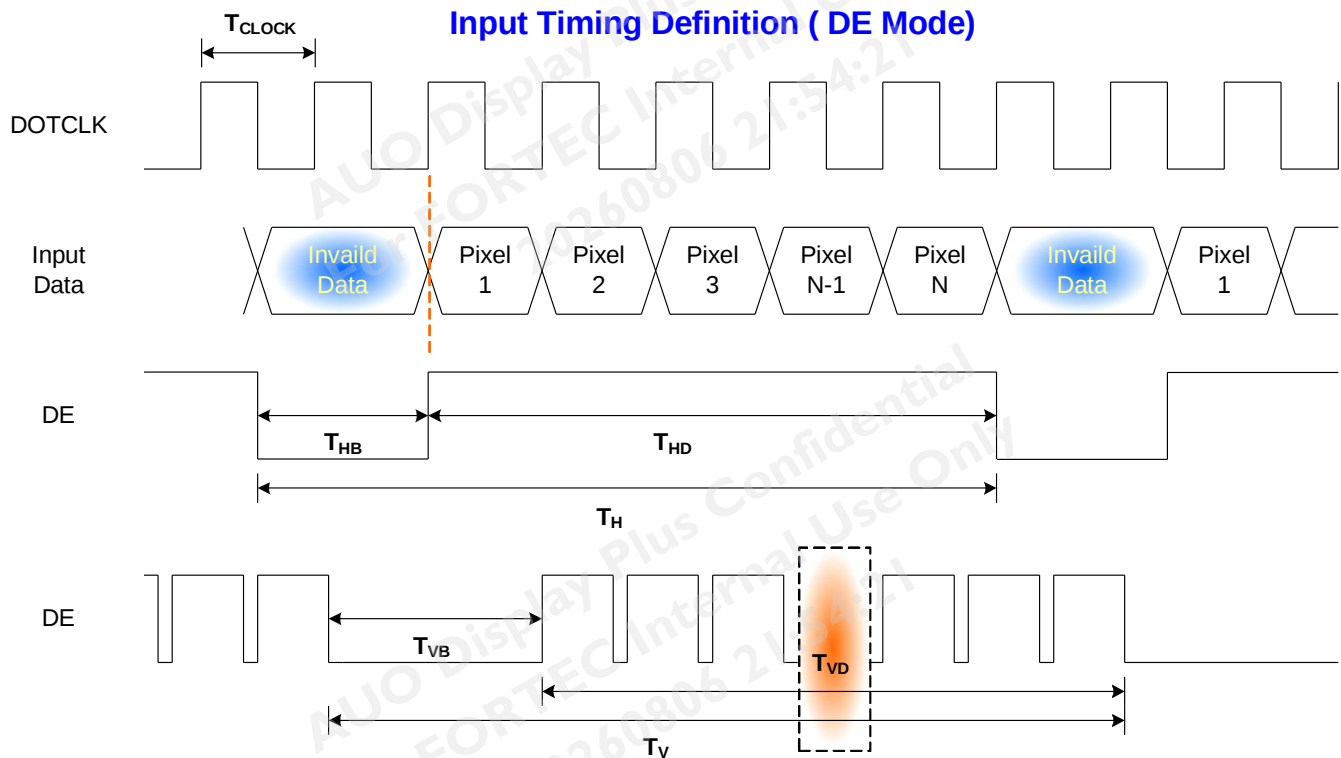
Note 4: The equation is listed as following. Please don't exceed the above recommended value.

Clock Frequency (Min.) = Frame Rate (Min.) x  $T_h$  (Min.) x  $T_v$  (Min.)

Clock Frequency (Typ.) = Frame Rate (Typ.) x  $T_h$  (Typ.) x  $T_v$  (Typ.)

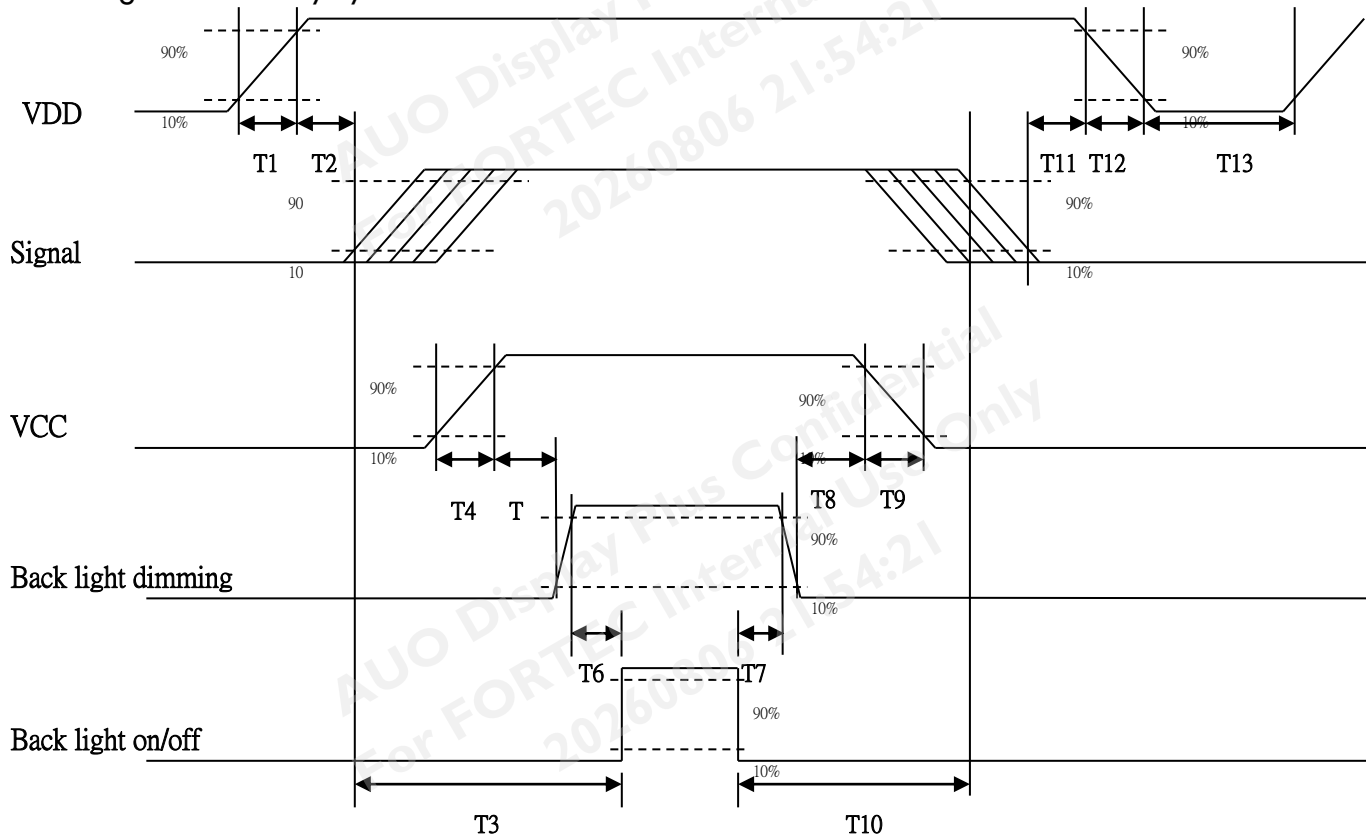
Clock Frequency (Max.) = Frame Rate (Max.) x  $T_h$  (Typ.) x  $T_v$  (Typ.)

## 6.5 Timing diagram



## 6.6 Power ON/OFF Sequence

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



Power ON/OFF sequence timing

| Parameter | Value |      |      | Units |
|-----------|-------|------|------|-------|
|           | Min.  | Typ. | Max. |       |
| T1        | 0.5   | -    | 10   | [ms]  |
| T2        | 0     | 40   | 50   | [ms]  |
| T3        | 200   | -    | -    | [ms]  |
| T4        | 0.5   | -    | 10   | [ms]  |
| T5        | 10    | -    | -    | [ms]  |
| T6        | 10    | -    | -    | [ms]  |
| T7        | 0     | -    | -    | [ms]  |
| T8        | 10    | -    | -    | [ms]  |
| T9        | -     | -    | 10   | [ms]  |
| T10       | 110   | -    | -    | [ms]  |
| T11       | 0.5   | 16   | 50   | [ms]  |
| T12       | -     | -    | 100  | [ms]  |
| T13       | 1000  | -    | -    | [ms]  |

## 7.0 Connector & Pin Assignment

Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be following components.

### 7.1 TFT LCD Module

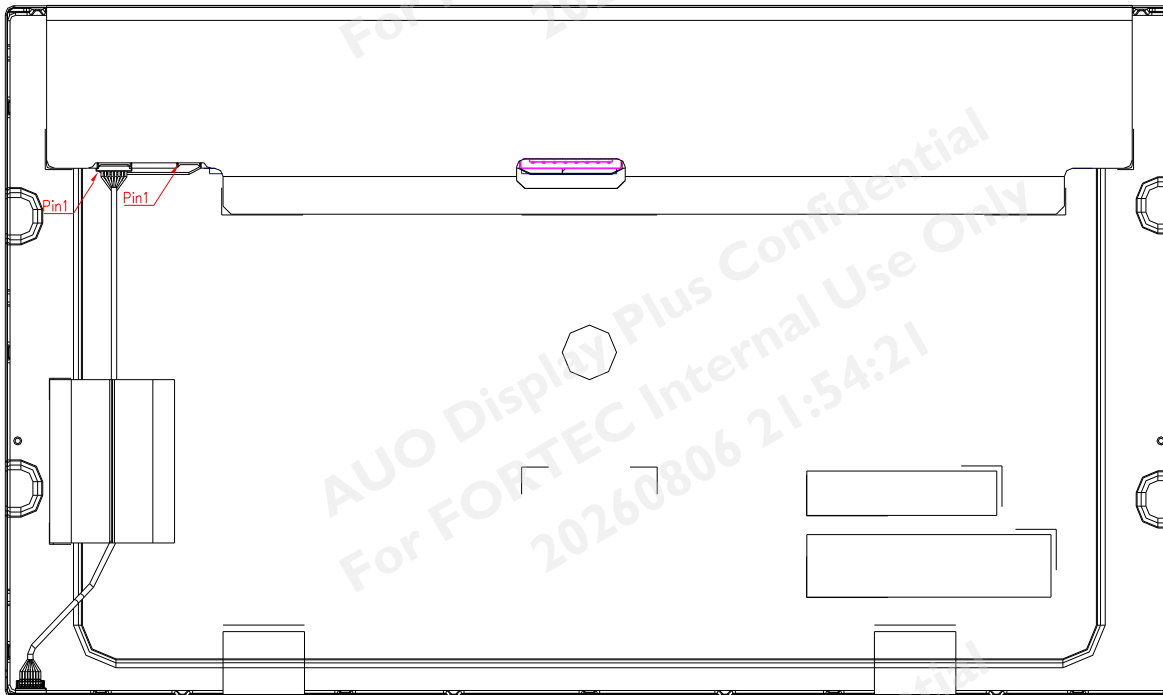
| Connector Name / Designation | Interface Connector / Interface card                                               |
|------------------------------|------------------------------------------------------------------------------------|
| Manufacturer                 | JAE                                                                                |
| Type Part Number             | FI-XB30SSRLA-HF-16-R3500 (JAE)<br><b>Mating Type:</b><br>FI-X30HL or FI-X30C2L-NPB |
| Mating Housing Part Number   | FI-X30HL or FI-X30C2L-NPB                                                          |

#### 7.1.1 Pin Assignment

| Pin# | Signal Name | Pin# | Signal Name |
|------|-------------|------|-------------|
| 1    | RxOIN0-     | 2    | RxOIN0+     |
| 3    | RxOIN1-     | 4    | RxOIN1+     |
| 5    | RxOIN2-     | 6    | RxOIN2+     |
| 7    | GND         | 8    | RxOCLKIN-   |
| 9    | RxOCLKIN+   | 10   | RxOIN3-     |
| 11   | RxOIN3+     | 12   | RxEIN0-     |
| 13   | RxEIN0+     | 14   | GND         |
| 15   | RxEIN1-     | 16   | RxEIN1+     |
| 17   | GND         | 18   | RxEIN2-     |
| 19   | RxEIN2+     | 20   | RxECLKIN-   |
| 21   | RxECLKIN+   | 22   | RxEIN3-     |
| 23   | RxEIN3+     | 24   | GND         |
| 25   | NC          | 26   | NC          |
| 27   | NC          | 28   | VDD         |
| 29   | VDD         | 30   | VDD         |

## 7.2 LED Backlight Unit: LED Driver Connector

| Connector Name / Designation  | LED Connector             |
|-------------------------------|---------------------------|
| Manufacturer                  | STM or compatible         |
| Connector Model Number        | MSB24038P5D or compatible |
| Mating Connector Model Number | P24038P5 or compatible    |



## 7.3 LED Driver Connector Pin Assignment

| Pin# | Symbol  | Signal Name    |
|------|---------|----------------|
| 1    | VCC     | 12V            |
| 2    | GND     | GND            |
| 3    | Enable  | 5V-On / 0V-Off |
| 4    | Dimming | PWM Dimming    |
| 5    | NC      | NC             |

## 8.0 Reliability Test

Environment test conditions are listed as following table.

| Items                            | Required Condition                                                                                                             | Note     |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------|----------|
| Temperature Humidity Bias        | Ta= 50°C, 80%RH, 300hours                                                                                                      |          |
| High Temperature Operation (HTO) | Ta= 80°C, 300hours,                                                                                                            | <b>3</b> |
| Low Temperature Operation        | Ta= -30°C, 300hours                                                                                                            |          |
| High Temperature Storage         | Ta= 80°C, 300hours                                                                                                             |          |
| Low Temperature Storage (LTS)    | Ta= -30°C, 300hours                                                                                                            |          |
| Vibration Test (Non-operation)   | Acceleration: 1.5 G<br>Wave: Random<br>Frequency: 10 - 200 Hz<br>Sweep: 30 Minutes each Axis (X, Y, Z)                         |          |
| Shock Test (Non-operation)       | Acceleration: 50 G<br>Wave: Half-sine<br>Active Time: 20 ms<br>Direction: $\pm X$ , $\pm Y$ , $\pm Z$ (one time for each Axis) |          |
| Drop Test                        | Height: 60 cm, package test                                                                                                    |          |
| Thermal Shock Test (TST)         | -20°C /30min, 60°C /30min, 100 cycles                                                                                          | <b>1</b> |
| On/Off Test                      | On/10sec, Off/10sec, 30,000 cycles                                                                                             |          |
| ESD (Electro Static Discharge)   | Contact Discharge: $\pm 8KV$ , 150pF(330 $\Omega$ ) 1sec,                                                                      | <b>2</b> |
|                                  | Air Discharge: $\pm 15KV$ , 150pF(330 $\Omega$ ) 1sec<br>8 points, 25 times/ point.                                            |          |

Note 1: The TFT-LCD module will not sustain damage after being subjected to 100 cycles of rapid temperature change. A cycle of rapid temperature change consists of varying the temperature from -20°C to 60°C, and back again. Power is not applied during the test. After temperature cycling, the unit is placed in normal room ambient for at least 4 hours before power on.

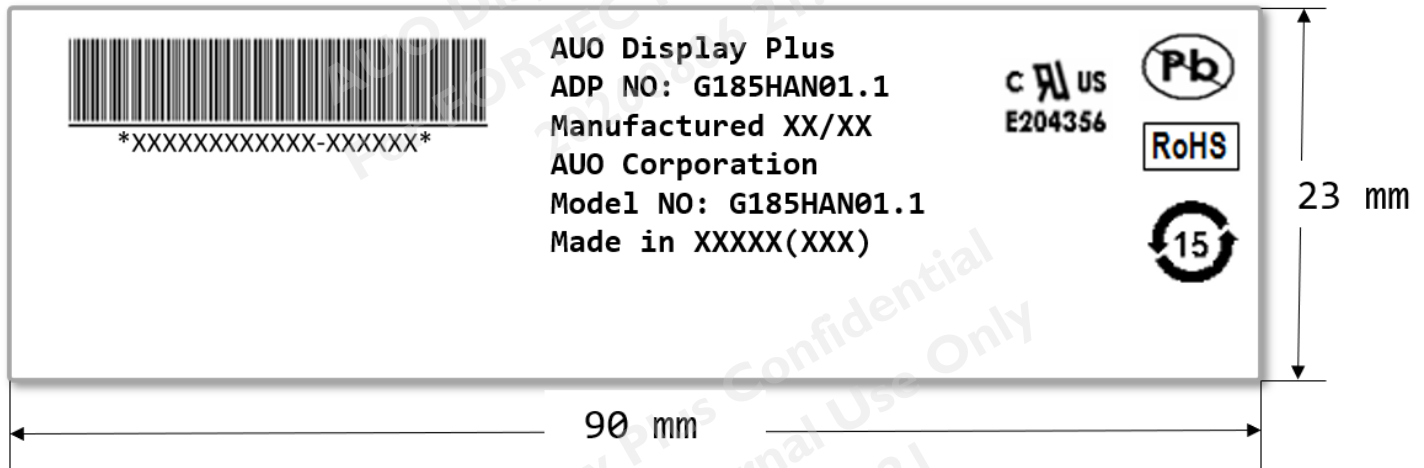
Note 2: According to EN61000-4-2 , ESD class B: Some performance degradation allowed. No data lost. Self-recoverable. No hardware failures.

Note 3: No function occurs Mura shall be ignored after high temperature reliability test.

## 9.0 Shipping Label & Packaging

### 9.1 Shipping Label

The label is on the panel as shown below:



Note 1: For Pb Free products, AUO will add  for identification.

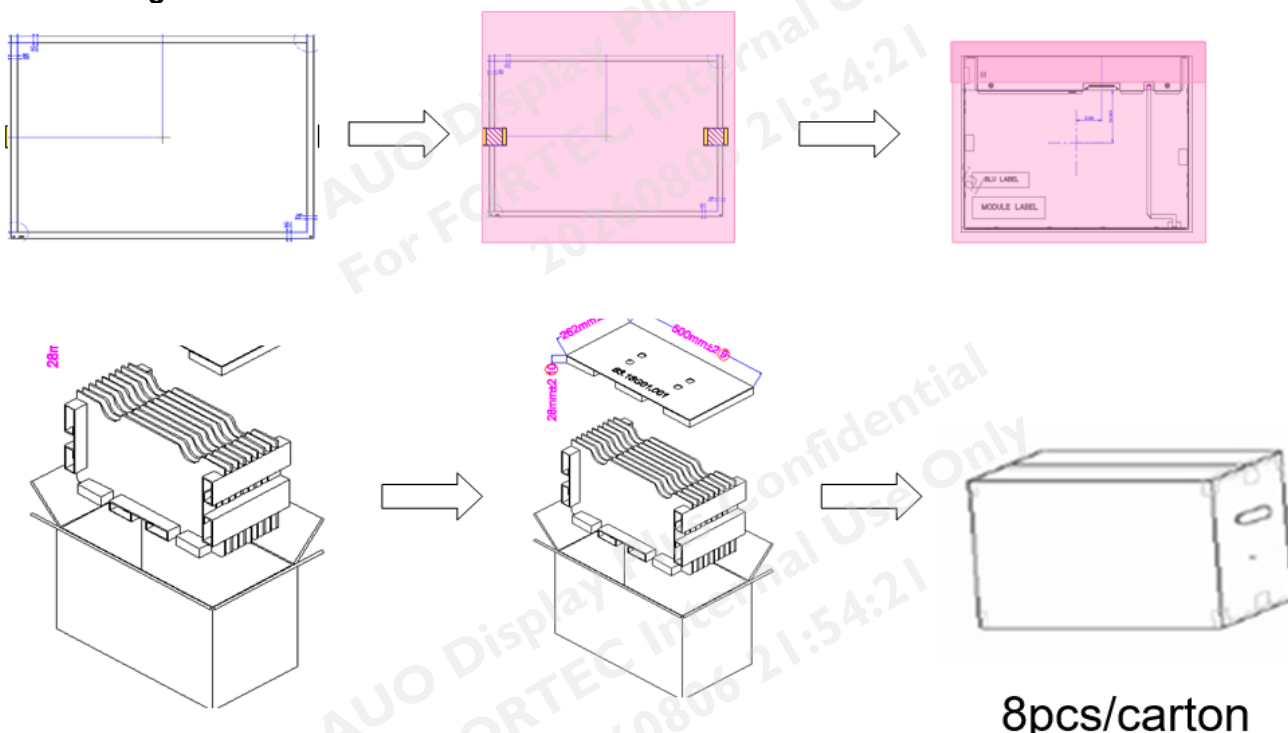
Note 2: For RoHS compatible products, AUO will add  for identification.

Note 3: For China RoHS compatible products, AUO will add  for identification.

Note 4: The Green Mark will be presented only when the green documents have been ready by AUO Internal Green Team.

## 9.2 Packaging

### 9.2.1 Packing of carton



Total 8 pcs panel/carton

Carton size: 520mm(L)\* 280mm(W)\*355mm(H)

### 9.2.2 Packing of Pallet

2cartons/layer, 4 layers/pallet

(8pcs \*8) \* 4 layers; Max 32 boxed/pallet. (256 pcs / Pallet)

Packing size (including pallet): 1150 mm\* 1070mm \*1552 mm

(Pallet size: 1150 mm\* 1070mm \*132 mm)

Note: Automatic storage height limit <=1580mm

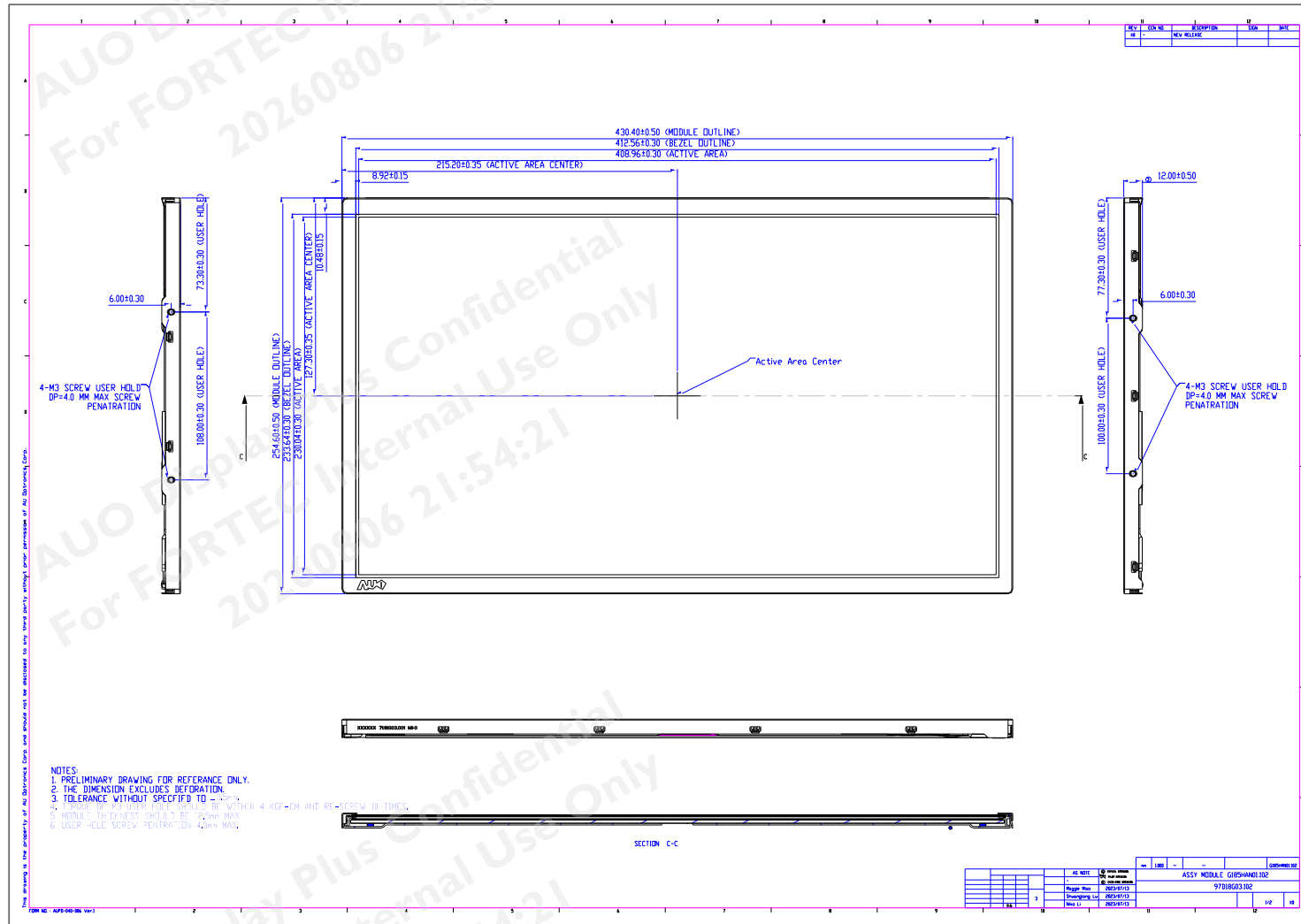


AUO Display+

# Product Specification

G185HAN01.1

## 10.0 Mechanical Characteristics



G185HAN01.1. ver. 0.3





AUO Display+

# Product Specification

G185HAN01.1

## 11. Safety

### 11.1 Keen Edge Requirements

There will be no sharp edges or comers on the display assembly that could cause injury.

### 11.2 Materials

#### 11.2.1 Toxicity

There will be no carcinogenic materials used anywhere in the display module. If toxic materials are used, they will be reviewed and approved by the responsible AUO toxicologist.

#### 11.2.2 Flammability

The printed circuit board will be made from material rated 94-V1 or better. The actual UL flammability rating will be printed on the printed circuit board.

### 11.3 Capacitors

If any polarized capacitors are used in the display assembly, provisions will be made to keep them from being inserted backwards.

### 11.4 International Safety Standard Compliance

The TFT-LCD module will satisfy all requirements for compliance to:IEC/UL 62368-1

Our company network supports you worldwide with offices in Germany, Austria, Switzerland, Benelux, Egypt, the UK and the USA. For more information please contact:

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