

Product Specification

# SPECIFICATION FOR APPROVAL

- (    ) Preliminary Specification  
( ● ) Final Specification

|       |                   |
|-------|-------------------|
| TITLE | 27.0" QHD TFT LCD |
|-------|-------------------|

|       |  |
|-------|--|
| BUYER |  |
| MODEL |  |

|          |                      |
|----------|----------------------|
| SUPPLIER | LG Display Co., Ltd. |
| MODEL    | LM270WQA             |
| SUFFIX   | SSC3                 |

\*When you obtain standard approval,  
please use the above model name without suffix

| APPROVED BY   | SIGNATURE | DATE  |
|---------------|-----------|-------|
| _____ / _____ | _____     | _____ |
| _____ / _____ | _____     | _____ |
| _____ / _____ | _____     | _____ |

Please return 1 copy for your confirmation  
with your signature and comments.

| APPROVED BY                  | SIGNATURE          | DATE |
|------------------------------|--------------------|------|
| Sanghoon Lee / G.Manager     | <u>Signed, 4/9</u> |      |
| <b>REVIEWED BY</b>           |                    |      |
| Jaewon Hyun / Manager [C]    | <u>Signed, 4/9</u> |      |
| Changhoon Song / Manager [M] | <u>Signed, 4/9</u> |      |
| Sangho Han / Manager [O]     | <u>Signed, 4/9</u> |      |
| Hwije Cho/ Manager [P]       | <u>Signed, 4/9</u> |      |
| <b>PREPARED BY</b>           |                    |      |
| Hyunchul Jung / Engineer     | <u>Signed, 4/9</u> |      |

**Product engineering dept.**  
**LG Display Co., Ltd**

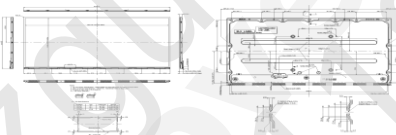
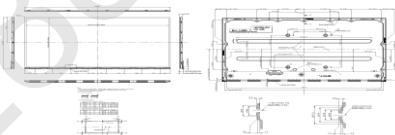
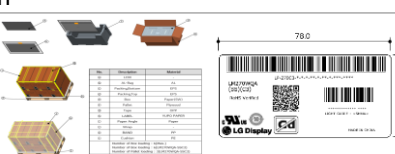
## Product Specification

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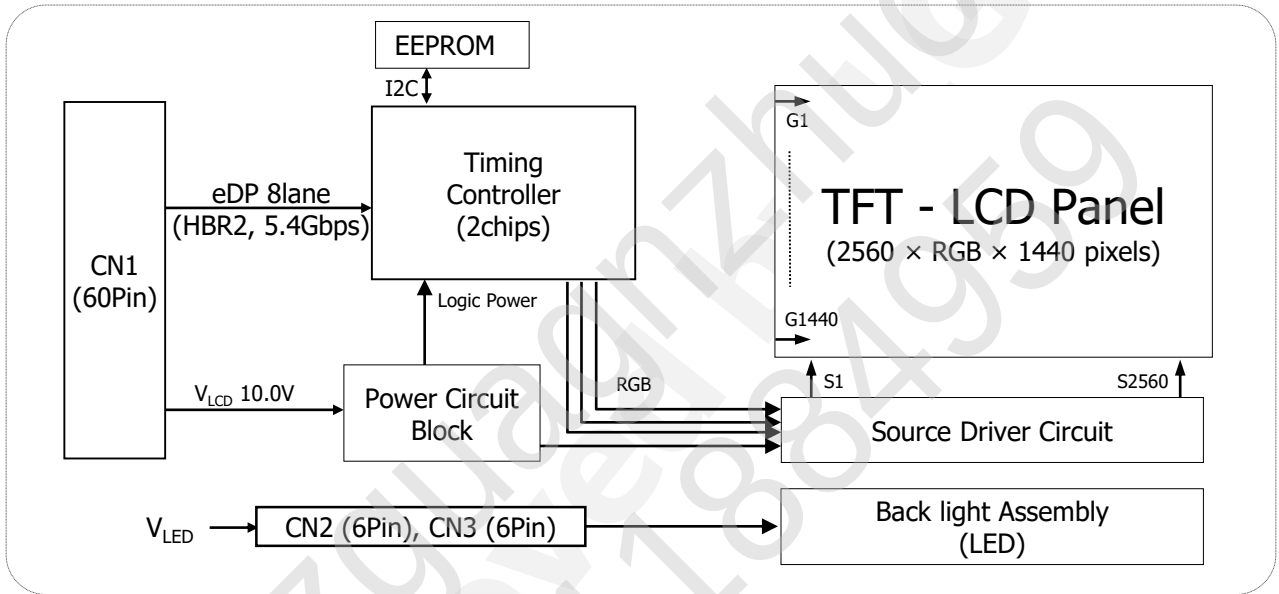
### Record of Revisions

| Revision No                    | Revision Date      | Page             | Before                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | After                                                                                                                                                                                                                                                                  | Application Date |                                 |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
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| 0.1                            | Sep. 7. 2023       | -                | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | First Draft(Preliminary)                                                                                                                                                                                                                                               | Sep. 7. 2023     |                                 |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| 0.2                            | Sep. 20. 2023      | 4, 6             | <div>Update the power consumption</div> <table><thead><tr><th>Parameter</th><th>Symbol</th><th>Min</th><th>Typ</th><th>Max</th><th>Unit</th><th>Notes</th></tr></thead><tbody><tr><td>Module</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Power Supply Input Voltage</td><td>V<sub>in</sub></td><td>9.5</td><td>10.0</td><td>10.5</td><td>Vdc</td><td>4</td></tr><tr><td>Permissible Power Input Ripple</td><td>V<sub>in(r)</sub></td><td>-</td><td>-</td><td>400</td><td>mVp-p</td><td>1</td></tr><tr><td>Power Supply Input Current</td><td>I<sub>in</sub></td><td>-</td><td>TBD</td><td>TBD</td><td>mA</td><td>2</td></tr><tr><td>Power Consumption</td><td>P<sub>in</sub></td><td>-</td><td>TBD</td><td>TBD</td><td>W</td><td>(I<sub>in</sub>=1440A)</td></tr><tr><td>Power Supply Input Current</td><td>I<sub>in</sub></td><td>-</td><td>TBD</td><td>TBD</td><td>mA</td><td>2</td></tr><tr><td>Power Consumption</td><td>P<sub>in</sub></td><td>-</td><td>TBD</td><td>TBD</td><td>W</td><td>(I<sub>in</sub>=1440A)</td></tr></tbody></table>                                                                             | Parameter                                                                                                                                                                                                                                                              | Symbol           | Min                             | Typ | Max | Unit | Notes | Module  |  |  |  |  |  |  | Power Supply Input Voltage | V <sub>in</sub> | 9.5   | 10.0  | 10.5  | Vdc | 4                               | Permissible Power Input Ripple | V <sub>in(r)</sub> | -     | -     | 400   | mVp-p | 1                               | Power Supply Input Current | I <sub>in</sub> | -     | TBD   | TBD    | mA | 2                               | Power Consumption   | P <sub>in</sub> | -     | TBD     | TBD     | W  | (I <sub>in</sub> =1440A)        | Power Supply Input Current | I <sub>in</sub> | -     | TBD   | TBD    | mA | 2                               | Power Consumption    | P <sub>in</sub> | -     | TBD     | TBD     | W  | (I <sub>in</sub> =1440A)        | <table><thead><tr><th>Parameter</th><th>Symbol</th><th>Min</th><th>Typ</th><th>Max</th><th>Unit</th><th>Notes</th></tr></thead><tbody><tr><td>Module</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Power Supply Input Voltage</td><td>V<sub>in</sub></td><td>9.5</td><td>10.0</td><td>10.5</td><td>Vdc</td><td>4</td></tr><tr><td>Permissible Power Input Ripple</td><td>V<sub>in(r)</sub></td><td>-</td><td>-</td><td>400</td><td>mVp-p</td><td>1</td></tr><tr><td>Power Supply Input Current</td><td>I<sub>in</sub></td><td>-</td><td>(540)</td><td>(1200)</td><td>mA</td><td>2</td></tr><tr><td>Power Consumption</td><td>P<sub>in</sub></td><td>-</td><td>(1.400)</td><td>(1.200)</td><td>W</td><td>(I<sub>in</sub>=1440A)</td></tr><tr><td>Power Supply Input Current</td><td>I<sub>in</sub></td><td>-</td><td>(540)</td><td>(1200)</td><td>mA</td><td>2</td></tr><tr><td>Power Consumption</td><td>P<sub>in</sub></td><td>-</td><td>(1.400)</td><td>(1.200)</td><td>W</td><td>(I<sub>in</sub>=1440A)</td></tr></tbody></table>                                                        | Parameter | Symbol | Min | Typ | Max | Unit | Notes | Module  |  |  |  |  |  |  | Power Supply Input Voltage | V <sub>in</sub> | 9.5   | 10.0  | 10.5  | Vdc | 4                               | Permissible Power Input Ripple | V <sub>in(r)</sub> | -     | -     | 400   | mVp-p | 1                               | Power Supply Input Current | I <sub>in</sub> | -     | (540) | (1200) | mA | 2                               | Power Consumption   | P <sub>in</sub> | -     | (1.400) | (1.200) | W  | (I <sub>in</sub> =1440A)        | Power Supply Input Current | I <sub>in</sub> | -     | (540) | (1200) | mA | 2                               | Power Consumption    | P <sub>in</sub> | -     | (1.400) | (1.200) | W  | (I <sub>in</sub> =1440A)        | Sep. 20. 2023 |
| Parameter                      | Symbol             | Min              | Typ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Max                                                                                                                                                                                                                                                                    | Unit             | Notes                           |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Module                         |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                        |                  |                                 |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Supply Input Voltage     | V <sub>in</sub>    | 9.5              | 10.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 10.5                                                                                                                                                                                                                                                                   | Vdc              | 4                               |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Permissible Power Input Ripple | V <sub>in(r)</sub> | -                | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 400                                                                                                                                                                                                                                                                    | mVp-p            | 1                               |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Supply Input Current     | I <sub>in</sub>    | -                | TBD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | TBD                                                                                                                                                                                                                                                                    | mA               | 2                               |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Consumption              | P <sub>in</sub>    | -                | TBD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | TBD                                                                                                                                                                                                                                                                    | W                | (I <sub>in</sub> =1440A)        |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Supply Input Current     | I <sub>in</sub>    | -                | TBD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | TBD                                                                                                                                                                                                                                                                    | mA               | 2                               |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Consumption              | P <sub>in</sub>    | -                | TBD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | TBD                                                                                                                                                                                                                                                                    | W                | (I <sub>in</sub> =1440A)        |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Parameter                      | Symbol             | Min              | Typ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Max                                                                                                                                                                                                                                                                    | Unit             | Notes                           |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Module                         |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                        |                  |                                 |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Supply Input Voltage     | V <sub>in</sub>    | 9.5              | 10.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 10.5                                                                                                                                                                                                                                                                   | Vdc              | 4                               |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Permissible Power Input Ripple | V <sub>in(r)</sub> | -                | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 400                                                                                                                                                                                                                                                                    | mVp-p            | 1                               |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Supply Input Current     | I <sub>in</sub>    | -                | (540)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | (1200)                                                                                                                                                                                                                                                                 | mA               | 2                               |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Consumption              | P <sub>in</sub>    | -                | (1.400)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (1.200)                                                                                                                                                                                                                                                                | W                | (I <sub>in</sub> =1440A)        |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Supply Input Current     | I <sub>in</sub>    | -                | (540)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | (1200)                                                                                                                                                                                                                                                                 | mA               | 2                               |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Consumption              | P <sub>in</sub>    | -                | (1.400)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (1.200)                                                                                                                                                                                                                                                                | W                | (I <sub>in</sub> =1440A)        |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| 0.3                            | Nov. 29. 2023      | 16               | <div>Update the timing table</div> <table><thead><tr><th>Item</th><th>Symbol</th><th>Min</th><th>Typ</th><th>Max</th><th>Unit</th><th>Notes</th></tr></thead><tbody><tr><td>Display</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Horizontal Sync</td><td>Hsync</td><td>1.000</td><td>1.000</td><td>1.000</td><td>ms</td><td>Panel Frequency (Typ: 60.00 Hz)</td></tr><tr><td>Vertical Sync</td><td>Vsync</td><td>1.000</td><td>1.000</td><td>1.000</td><td>ms</td><td>Panel Frequency (Typ: 60.00 Hz)</td></tr><tr><td>Horizontal Back Porch</td><td>HBP</td><td>1.000</td><td>1.000</td><td>1.000</td><td>ms</td><td>Panel Frequency (Typ: 60.00 Hz)</td></tr><tr><td>Vertical Back Porch</td><td>VBP</td><td>1.000</td><td>1.000</td><td>1.000</td><td>ms</td><td>Panel Frequency (Typ: 60.00 Hz)</td></tr><tr><td>Horizontal Front Porch</td><td>HFP</td><td>1.000</td><td>1.000</td><td>1.000</td><td>ms</td><td>Panel Frequency (Typ: 60.00 Hz)</td></tr><tr><td>Vertical Front Porch</td><td>VFP</td><td>1.000</td><td>1.000</td><td>1.000</td><td>ms</td><td>Panel Frequency (Typ: 60.00 Hz)</td></tr></tbody></table> | Item                                                                                                                                                                                                                                                                   | Symbol           | Min                             | Typ | Max | Unit | Notes | Display |  |  |  |  |  |  | Horizontal Sync            | Hsync           | 1.000 | 1.000 | 1.000 | ms  | Panel Frequency (Typ: 60.00 Hz) | Vertical Sync                  | Vsync              | 1.000 | 1.000 | 1.000 | ms    | Panel Frequency (Typ: 60.00 Hz) | Horizontal Back Porch      | HBP             | 1.000 | 1.000 | 1.000  | ms | Panel Frequency (Typ: 60.00 Hz) | Vertical Back Porch | VBP             | 1.000 | 1.000   | 1.000   | ms | Panel Frequency (Typ: 60.00 Hz) | Horizontal Front Porch     | HFP             | 1.000 | 1.000 | 1.000  | ms | Panel Frequency (Typ: 60.00 Hz) | Vertical Front Porch | VFP             | 1.000 | 1.000   | 1.000   | ms | Panel Frequency (Typ: 60.00 Hz) | <table><thead><tr><th>Item</th><th>Symbol</th><th>Min</th><th>Typ</th><th>Max</th><th>Unit</th><th>Notes</th></tr></thead><tbody><tr><td>Display</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Horizontal Sync</td><td>Hsync</td><td>1.000</td><td>1.000</td><td>1.000</td><td>ms</td><td>Panel Frequency (Typ: 60.00 Hz)</td></tr><tr><td>Vertical Sync</td><td>Vsync</td><td>1.000</td><td>1.000</td><td>1.000</td><td>ms</td><td>Panel Frequency (Typ: 60.00 Hz)</td></tr><tr><td>Horizontal Back Porch</td><td>HBP</td><td>1.000</td><td>1.000</td><td>1.000</td><td>ms</td><td>Panel Frequency (Typ: 60.00 Hz)</td></tr><tr><td>Vertical Back Porch</td><td>VBP</td><td>1.000</td><td>1.000</td><td>1.000</td><td>ms</td><td>Panel Frequency (Typ: 60.00 Hz)</td></tr><tr><td>Horizontal Front Porch</td><td>HFP</td><td>1.000</td><td>1.000</td><td>1.000</td><td>ms</td><td>Panel Frequency (Typ: 60.00 Hz)</td></tr><tr><td>Vertical Front Porch</td><td>VFP</td><td>1.000</td><td>1.000</td><td>1.000</td><td>ms</td><td>Panel Frequency (Typ: 60.00 Hz)</td></tr></tbody></table> | Item      | Symbol | Min | Typ | Max | Unit | Notes | Display |  |  |  |  |  |  | Horizontal Sync            | Hsync           | 1.000 | 1.000 | 1.000 | ms  | Panel Frequency (Typ: 60.00 Hz) | Vertical Sync                  | Vsync              | 1.000 | 1.000 | 1.000 | ms    | Panel Frequency (Typ: 60.00 Hz) | Horizontal Back Porch      | HBP             | 1.000 | 1.000 | 1.000  | ms | Panel Frequency (Typ: 60.00 Hz) | Vertical Back Porch | VBP             | 1.000 | 1.000   | 1.000   | ms | Panel Frequency (Typ: 60.00 Hz) | Horizontal Front Porch     | HFP             | 1.000 | 1.000 | 1.000  | ms | Panel Frequency (Typ: 60.00 Hz) | Vertical Front Porch | VFP             | 1.000 | 1.000   | 1.000   | ms | Panel Frequency (Typ: 60.00 Hz) | Nov. 29. 2023 |
| Item                           | Symbol             | Min              | Typ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Max                                                                                                                                                                                                                                                                    | Unit             | Notes                           |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Display                        |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                        |                  |                                 |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Horizontal Sync                | Hsync              | 1.000            | 1.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1.000                                                                                                                                                                                                                                                                  | ms               | Panel Frequency (Typ: 60.00 Hz) |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Vertical Sync                  | Vsync              | 1.000            | 1.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1.000                                                                                                                                                                                                                                                                  | ms               | Panel Frequency (Typ: 60.00 Hz) |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Horizontal Back Porch          | HBP                | 1.000            | 1.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1.000                                                                                                                                                                                                                                                                  | ms               | Panel Frequency (Typ: 60.00 Hz) |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Vertical Back Porch            | VBP                | 1.000            | 1.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1.000                                                                                                                                                                                                                                                                  | ms               | Panel Frequency (Typ: 60.00 Hz) |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Horizontal Front Porch         | HFP                | 1.000            | 1.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1.000                                                                                                                                                                                                                                                                  | ms               | Panel Frequency (Typ: 60.00 Hz) |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Vertical Front Porch           | VFP                | 1.000            | 1.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1.000                                                                                                                                                                                                                                                                  | ms               | Panel Frequency (Typ: 60.00 Hz) |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Item                           | Symbol             | Min              | Typ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Max                                                                                                                                                                                                                                                                    | Unit             | Notes                           |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Display                        |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                        |                  |                                 |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Horizontal Sync                | Hsync              | 1.000            | 1.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1.000                                                                                                                                                                                                                                                                  | ms               | Panel Frequency (Typ: 60.00 Hz) |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Vertical Sync                  | Vsync              | 1.000            | 1.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1.000                                                                                                                                                                                                                                                                  | ms               | Panel Frequency (Typ: 60.00 Hz) |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Horizontal Back Porch          | HBP                | 1.000            | 1.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1.000                                                                                                                                                                                                                                                                  | ms               | Panel Frequency (Typ: 60.00 Hz) |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Vertical Back Porch            | VBP                | 1.000            | 1.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1.000                                                                                                                                                                                                                                                                  | ms               | Panel Frequency (Typ: 60.00 Hz) |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Horizontal Front Porch         | HFP                | 1.000            | 1.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1.000                                                                                                                                                                                                                                                                  | ms               | Panel Frequency (Typ: 60.00 Hz) |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Vertical Front Porch           | VFP                | 1.000            | 1.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1.000                                                                                                                                                                                                                                                                  | ms               | Panel Frequency (Typ: 60.00 Hz) |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| 0.4                            | Jan. 9. 2024       | 4, 6             | <div>Update the power consumption</div> <table><thead><tr><th>Parameter</th><th>Symbol</th><th>Min</th><th>Typ</th><th>Max</th><th>Unit</th><th>Notes</th></tr></thead><tbody><tr><td>Module</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Power Supply Input Voltage</td><td>V<sub>in</sub></td><td>9.5</td><td>10.0</td><td>10.5</td><td>Vdc</td><td>4</td></tr><tr><td>Permissible Power Input Ripple</td><td>V<sub>in(r)</sub></td><td>-</td><td>-</td><td>400</td><td>mVp-p</td><td>1</td></tr><tr><td>Power Supply Input Current</td><td>I<sub>in</sub></td><td>-</td><td>(540)</td><td>(1200)</td><td>mA</td><td>2</td></tr><tr><td>Power Consumption</td><td>P<sub>in</sub></td><td>-</td><td>(1.400)</td><td>(1.200)</td><td>W</td><td>(I<sub>in</sub>=1440A)</td></tr><tr><td>Power Supply Input Current</td><td>I<sub>in</sub></td><td>-</td><td>(540)</td><td>(1200)</td><td>mA</td><td>2</td></tr><tr><td>Power Consumption</td><td>P<sub>in</sub></td><td>-</td><td>(1.400)</td><td>(1.200)</td><td>W</td><td>(I<sub>in</sub>=1440A)</td></tr></tbody></table>                                                   | Parameter                                                                                                                                                                                                                                                              | Symbol           | Min                             | Typ | Max | Unit | Notes | Module  |  |  |  |  |  |  | Power Supply Input Voltage | V <sub>in</sub> | 9.5   | 10.0  | 10.5  | Vdc | 4                               | Permissible Power Input Ripple | V <sub>in(r)</sub> | -     | -     | 400   | mVp-p | 1                               | Power Supply Input Current | I <sub>in</sub> | -     | (540) | (1200) | mA | 2                               | Power Consumption   | P <sub>in</sub> | -     | (1.400) | (1.200) | W  | (I <sub>in</sub> =1440A)        | Power Supply Input Current | I <sub>in</sub> | -     | (540) | (1200) | mA | 2                               | Power Consumption    | P <sub>in</sub> | -     | (1.400) | (1.200) | W  | (I <sub>in</sub> =1440A)        | <table><thead><tr><th>Parameter</th><th>Symbol</th><th>Min</th><th>Typ</th><th>Max</th><th>Unit</th><th>Notes</th></tr></thead><tbody><tr><td>Module</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Power Supply Input Voltage</td><td>V<sub>in</sub></td><td>9.5</td><td>10.0</td><td>10.5</td><td>Vdc</td><td>4</td></tr><tr><td>Permissible Power Input Ripple</td><td>V<sub>in(r)</sub></td><td>-</td><td>-</td><td>400</td><td>mVp-p</td><td>1</td></tr><tr><td>Power Supply Input Current</td><td>I<sub>in</sub></td><td>-</td><td>(540)</td><td>(1200)</td><td>mA</td><td>2</td></tr><tr><td>Power Consumption</td><td>P<sub>in</sub></td><td>-</td><td>(1.400)</td><td>(1.200)</td><td>W</td><td>(I<sub>in</sub>=1440A)</td></tr><tr><td>Power Supply Input Current</td><td>I<sub>in</sub></td><td>-</td><td>(540)</td><td>(1200)</td><td>mA</td><td>2</td></tr><tr><td>Power Consumption</td><td>P<sub>in</sub></td><td>-</td><td>(1.400)</td><td>(1.200)</td><td>W</td><td>(I<sub>in</sub>=1440A)</td></tr></tbody></table>                                                        | Parameter | Symbol | Min | Typ | Max | Unit | Notes | Module  |  |  |  |  |  |  | Power Supply Input Voltage | V <sub>in</sub> | 9.5   | 10.0  | 10.5  | Vdc | 4                               | Permissible Power Input Ripple | V <sub>in(r)</sub> | -     | -     | 400   | mVp-p | 1                               | Power Supply Input Current | I <sub>in</sub> | -     | (540) | (1200) | mA | 2                               | Power Consumption   | P <sub>in</sub> | -     | (1.400) | (1.200) | W  | (I <sub>in</sub> =1440A)        | Power Supply Input Current | I <sub>in</sub> | -     | (540) | (1200) | mA | 2                               | Power Consumption    | P <sub>in</sub> | -     | (1.400) | (1.200) | W  | (I <sub>in</sub> =1440A)        | Jan. 9. 2024  |
| Parameter                      | Symbol             | Min              | Typ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Max                                                                                                                                                                                                                                                                    | Unit             | Notes                           |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Module                         |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                        |                  |                                 |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Supply Input Voltage     | V <sub>in</sub>    | 9.5              | 10.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 10.5                                                                                                                                                                                                                                                                   | Vdc              | 4                               |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Permissible Power Input Ripple | V <sub>in(r)</sub> | -                | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 400                                                                                                                                                                                                                                                                    | mVp-p            | 1                               |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Supply Input Current     | I <sub>in</sub>    | -                | (540)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | (1200)                                                                                                                                                                                                                                                                 | mA               | 2                               |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Consumption              | P <sub>in</sub>    | -                | (1.400)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (1.200)                                                                                                                                                                                                                                                                | W                | (I <sub>in</sub> =1440A)        |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Supply Input Current     | I <sub>in</sub>    | -                | (540)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | (1200)                                                                                                                                                                                                                                                                 | mA               | 2                               |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Consumption              | P <sub>in</sub>    | -                | (1.400)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (1.200)                                                                                                                                                                                                                                                                | W                | (I <sub>in</sub> =1440A)        |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Parameter                      | Symbol             | Min              | Typ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Max                                                                                                                                                                                                                                                                    | Unit             | Notes                           |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Module                         |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                        |                  |                                 |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Supply Input Voltage     | V <sub>in</sub>    | 9.5              | 10.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 10.5                                                                                                                                                                                                                                                                   | Vdc              | 4                               |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Permissible Power Input Ripple | V <sub>in(r)</sub> | -                | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 400                                                                                                                                                                                                                                                                    | mVp-p            | 1                               |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Supply Input Current     | I <sub>in</sub>    | -                | (540)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | (1200)                                                                                                                                                                                                                                                                 | mA               | 2                               |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Consumption              | P <sub>in</sub>    | -                | (1.400)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (1.200)                                                                                                                                                                                                                                                                | W                | (I <sub>in</sub> =1440A)        |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Supply Input Current     | I <sub>in</sub>    | -                | (540)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | (1200)                                                                                                                                                                                                                                                                 | mA               | 2                               |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| Power Consumption              | P <sub>in</sub>    | -                | (1.400)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (1.200)                                                                                                                                                                                                                                                                | W                | (I <sub>in</sub> =1440A)        |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| -                              | -                  | -                | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Final Draft                                                                                                                                                                                                                                                            | -                |                                 |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |
| 1.0                            | Apr. 9. 2024       | 26, 27<br>31, 34 | <div>Update the mechanical drawing</div>  <div>Update the packing and label information</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <div>Update the mechanical drawing</div>  <div>Update the packing and label information</div>  | Apr. 9. 2024     |                                 |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |        |     |     |     |      |       |         |  |  |  |  |  |  |                            |                 |       |       |       |     |                                 |                                |                    |       |       |       |       |                                 |                            |                 |       |       |        |    |                                 |                     |                 |       |         |         |    |                                 |                            |                 |       |       |        |    |                                 |                      |                 |       |         |         |    |                                 |               |

## Product Specification

### 1. General Description

LM270WQA-SSC3 is a color active matrix liquid crystal display with a Light Emitting Diode(LED) backlight assembly without LED driver. The matrix employs a-Si thin film transistor as the active element. It is a transmissive type display operating in the normally black mode. It has a 27 inch diagonally measured active display area with QHD resolution(2560 horizontal by 1440 vertical pixel array). Each pixel is divided into red, green and blue sub-pixels or dots which are arranged in vertical stripes. Gray scale or the brightness of the sub-pixel color is determined with a 10-bit gray scale signal for each dot, thus, presenting a palette of more than 1.07 Billion colors with A-FRC (Advanced Frame Rate Control). It has been designed to apply eDP(HBR2, 5.4Gbps) interface. It is intended to support displays where high brightness, super wide viewing angle, high color saturation, and high color are important.



**FIG.1 Block Diagram**

### General Features

|                        |                                                                             |
|------------------------|-----------------------------------------------------------------------------|
| Active Screen Size     | 27 inches(68.5 cm)(Aspect ratio 16:9)                                       |
| Outline Dimension      | 608.8(H) x 355.1(V) x 15.2(D) mm(Typ.)                                      |
| Pixel Pitch            | 0.2331(H) x 0.2331(V) mm                                                    |
| Pixel Format           | 2560(H) x 1440(V) Pixels. RGB stripes arrangement.                          |
| Color Depth            | 1.07 Billion colors, 10Bit (8Bit+A-FRC)                                     |
| Luminance, White       | 400 cd/m <sup>2</sup> (Center 1Point, Typ.)                                 |
| Viewing Angle(CR>10)   | R/L 178° (Typ.), U/D 178° (Typ.)                                            |
| Power Consumption      | Total 37.2Watt (Typ.)(5.9Watt@ Mosaic_V <sub>LCD</sub> , 31.3Watt@ Is=85mA) |
| Weight                 | 2,550g (Typ.)                                                               |
| Display Operating Mode | Transmissive mode, Normally black (IPS)                                     |
| Panel type             | Reverse type                                                                |
| BLU Type               | Edge Type                                                                   |
| Surface Treatment      | Anti-Glare treatment of the front polarizer(Haze25%, 3H)                    |

## Product Specification

### 2. Absolute Maximum Ratings

The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

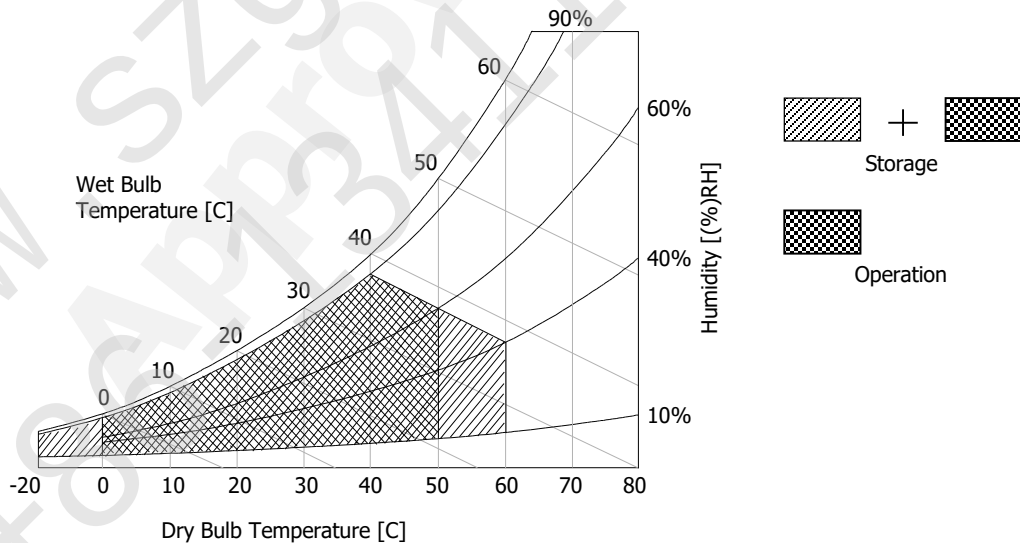
**Table 2-1. Absolute Maximum Ratings**

| Parameter                            | Symbol        | Values |       | Units    | Notes   |
|--------------------------------------|---------------|--------|-------|----------|---------|
|                                      |               | Min    | Max   |          |         |
| Power Supply Input Voltage           | $V_{LCD}$     | -0.3   | +12.0 | $V_{DC}$ | At 25°C |
| Operating Temperature                | $T_{OP}$      | 0      | 50    | °C       | 1,2,3   |
| Storage Temperature                  | $T_{ST}$      | -20    | 60    | °C       |         |
| Operating Ambient Humidity           | $H_{OP}$      | 10     | 90    | %RH      |         |
| Storage Humidity                     | $H_{ST}$      | 10     | 90    | %RH      |         |
| Glass Surface Temperature(Operation) | $T_{surface}$ | 0      | 48    | °C       | 1,4     |

Notes:

- 1) Temperature and relative humidity range are shown in the figure below.  
Wet bulb temperature should be 39°C Max, and no condensation of water.
- 2) Storage condition is guaranteed under packing condition.
- 3) Glass surface temperature should be measured under the condition of  $V_{LCD} = Typ$ ,  $f_v = 144Hz$ ,  $T_a = 25°C$ , no humidity and typical LED string current.

\*  $f_v$  = Frame frequency  
\*  $T_a$  = Ambient temperature



**FIG.2 Temperature And Relative Humidity**

## Product Specification

### 3. Electrical Specifications

#### 3-1. Electrical Characteristics

It requires two power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The other input power for the LED/Backlight, is typically generated by a LED Driver. The LED Driver is an external unit to the LCDs.

**Table 3-1. Electrical Characteristics**

| Parameter                     | Symbol                  | Values |       |       | Unit  | Notes                        |
|-------------------------------|-------------------------|--------|-------|-------|-------|------------------------------|
|                               |                         | Min    | Typ   | Max   |       |                              |
| Module:                       |                         |        |       |       |       |                              |
| Power Supply Input voltage    | V <sub>LCD</sub>        | 9.5    | 10.0  | 10.5  | Vdc   | 4                            |
| Permissive Power Input Ripple | V <sub>RIPPLE</sub>     | -      |       | 400   | mVp-p | 1                            |
| Power Supply Input Current    | I <sub>LCD</sub> Typ.   | -      | 590   | 740   | mA    | 2<br>(f <sub>v</sub> =144Hz) |
|                               | I <sub>LCD</sub> Max.   | -      | 1170  | 1465  | mA    |                              |
|                               | I <sub>LCD</sub> White. | -      | 600   | 750   | mA    |                              |
| Power Consumption             | P <sub>LCD</sub> Typ.   | -      | 5.90  | 7.40  | W     | 2<br>(f <sub>v</sub> =144Hz) |
|                               | P <sub>LCD</sub> Max.   | -      | 11.70 | 14.65 | W     |                              |
|                               | P <sub>LCD</sub> White. | -      | 6.00  | 7.50  | W     |                              |
| Power Supply Input Current    | I <sub>LCD</sub> Typ.   | -      | 650   | 815   | mA    | 2<br>(f <sub>v</sub> =180Hz) |
|                               | I <sub>LCD</sub> Max.   | -      | 1365  | 1700  | mA    |                              |
|                               | I <sub>LCD</sub> White. | -      | 660   | 825   | mA    |                              |
| Power Consumption             | P <sub>LCD</sub> Typ.   | -      | 6.50  | 8.15  | W     | 2<br>(f <sub>v</sub> =180Hz) |
|                               | P <sub>LCD</sub> Max.   | -      | 13.65 | 17.00 | W     |                              |
|                               | P <sub>LCD</sub> White. | -      | 6.60  | 8.25  | W     |                              |
| Rush Current                  | I <sub>RUSH</sub>       | -      | -     | 4.0   | A     | 3                            |

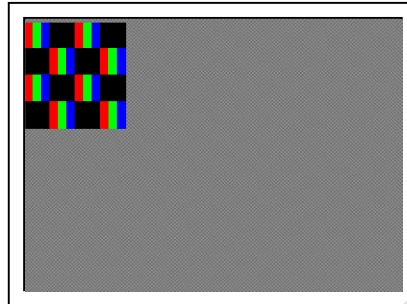
Notes:

- 1) Permissive power ripple should be measured under the condition of  $V_{LCD} = \text{Typ}$ ,  $25 \pm 2^\circ\text{C}$ ,  $f_v = \text{Max}$ . Refer to page 7 for the pattern and more information.
- 2) The specified current and power consumption can be measured under the  $V_{LCD} = \text{Typ}$ ,  $25 \pm 2^\circ\text{C}$ , and the pattern should be changed according to the typical or maximum power condition. The max. current can be measured only with the maximum power pattern. See the page 7 for details.
- 3) Maximum condition of inrush current:  
The duration of rush current is about 5ms and rising time of power input is  $500\mu\text{s} \pm 20\%$ .(Min).
- 4)  $V_{LCD}$  level must be measured between two points on PCB of LCM  $V_{LCD}$ (test point) ~ LCM Ground.  
(Test condition: Maximum power pattern,  $25^\circ\text{C}$ ,  $f_v = 144Hz$ )

- $f_v$  = Frame frequency

## Product Specification

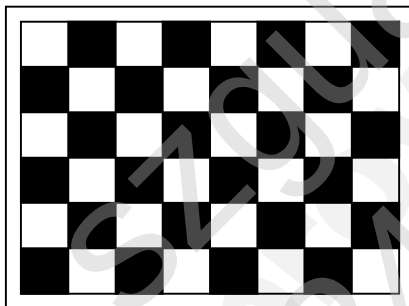
- **Permissive Power Input Ripple**( $V_{LCD} = \text{Typ}$ ,  $25^{\circ}\text{C}$ ,  $f_V(\text{frame frequency}) = \text{Max condition}$ )



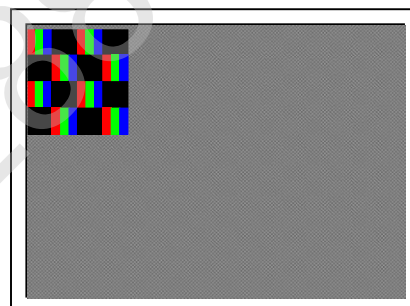
**Maximum power pattern  
(1dot)**

For the exact ripple measurement, the condition of Max 20MHz is recommended in the bandwidth configuration of oscilloscope.

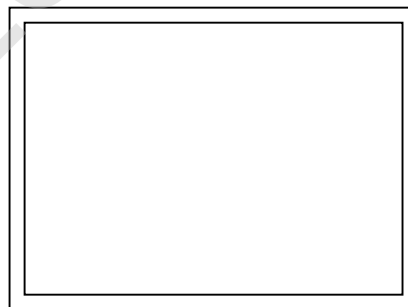
- **Power Consumption**( $V_{LCD} = \text{Typ}$ ,  $25^{\circ}\text{C}$ ,  $f_V(\text{frame frequency}) = 144\text{Hz}$  and  $180\text{Hz}$  condition)



**Typical Power Pattern**



**Maximum power pattern  
(1dot)**



**White Power Pattern**

**FIG.3-1 Pattern For Power Consumption Measurement**

## Product Specification

**Table 3-2. LED Bar Electrical Characteristics**

| Parameter          | Symbol | Values |      |      | Unit | Notes |
|--------------------|--------|--------|------|------|------|-------|
|                    |        | Min    | Typ  | Max  |      |       |
| LED String Current | Is     | -      | 85   | 90   | mA   | 1,2   |
| LED String Voltage | Vs     | 44.4   | 46.0 | 47.6 | V    | 1,3   |
| Power Consumption  | PBar   | -      | 31.3 | 32.4 | Watt | 2,5   |
| LED Life Time      | LED_LT | 30,000 | -    | -    | Hrs  | 4     |

Note: The LED consists of 64 LED packages, 8 strings(parallel) x 8 packages(serial) x 1 bar

Notes:

- 1) The specified values are for single LED bar.
- 2) The specified current is defined as the input current for single LED string with 100% duty cycle.
- 3) The specified voltage is the input LED string voltage at typical current 100% duty cycle.
- 4) The LED life time is defined as the when brightness of LED itself reach to the 50% of initial value under the conditions at  $T_a = 25 \pm 2^\circ\text{C}$  and typical LED string current.
- 5) The power consumption shown above does not include the loss of external LED driver.  
The typical power consumption is calculated as  $P_{\text{bar}} = V_s(\text{Typ.}) \times I_s(\text{Typ.}) \times \text{No. of strings.}$   
The maximum power consumption is calculated as  $P_{\text{bar}} = V_s(\text{Max.}) \times I_s(\text{Typ.}) \times \text{No. of strings.}$

**Table 3-2-1. Absolute Maximum Value of LED Bar and Peak Luminance**

| Parameter               | Symbol | Values | Unit | Notes |
|-------------------------|--------|--------|------|-------|
| Peak LED String Current | Is     | 110    | mA   | 1,2   |
| Peak Luminance          | Lp     | 500    | nit  | 1,2   |

Notes:

- 1) Peak LED string voltage at peak current with 100% duty cycle is  $46.9 \pm 1.6 \text{ V}$  at  $T_a = 25 \pm 2^\circ\text{C}$ .
- 2) Peak luminance 500nit is achieved at (110mA), while the specifications for guarantee remains under the normal operating condition specified in Table 3-2. Specifications and condition for evaluation test and mass production shall be applied with conditions specified in Table 3-2.

## Product Specification

### 3-2. Interface Connections

#### 3-2-1. LCD Module

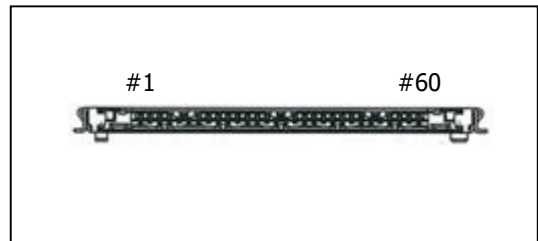
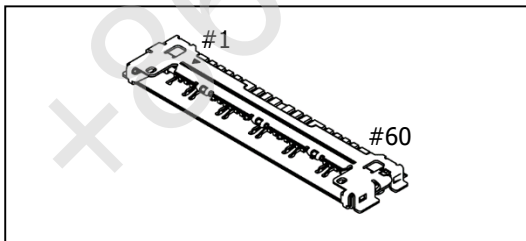
- LCD Connector(Receptacle): 20525-060E-01(Manufactured by I-PEX)
- Mating Connector(Plug): 20523-060T(Manufactured by I-PEX)

**Table 3-3. Module Connector(CN1) Pin Configuration**

| No | Symbol           | Description                                   | No | Symbol    | Description                                  |
|----|------------------|-----------------------------------------------|----|-----------|----------------------------------------------|
| 1  | GND              | Ground                                        | 31 | DP0_L1_N  | Master Component Signal for Main Link 1      |
| 2  | V <sub>LCD</sub> | Power Supply +10.0V                           | 32 | GND       | Ground                                       |
| 3  | V <sub>LCD</sub> | Power Supply +10.0V                           | 33 | DP0_L2_P  | Master True Signal for Main Link 2           |
| 4  | V <sub>LCD</sub> | Power Supply +10.0V                           | 34 | DP0_L2_N  | Master Component Signal for Main Link 2      |
| 5  | V <sub>LCD</sub> | Power Supply +10.0V                           | 35 | GND       | Ground                                       |
| 6  | V <sub>LCD</sub> | Power Supply +10.0V                           | 36 | DP0_L3_P  | Master True Signal for Main Link 3           |
| 7  | V <sub>LCD</sub> | Power Supply +10.0V                           | 37 | DP0_L3_N  | Master Component Signal for Main Link 3      |
| 8  | V <sub>LCD</sub> | Power Supply +10.0V                           | 38 | GND       | Ground                                       |
| 9  | V <sub>LCD</sub> | Power Supply +10.0V                           | 39 | DP1_L0_P  | Slave True Signal for Main Link 0            |
| 10 | GND              | Ground                                        | 40 | DP1_L0_N  | Slave Component Signal for Main Link 0       |
| 11 | GND              | Ground                                        | 41 | GND       | Ground                                       |
| 12 | GND              | Ground                                        | 42 | DP1_L1_P  | Slave True Signal for Main Link 1            |
| 13 | GND              | Ground                                        | 43 | DP1_L1_N  | Slave Component Signal for Main Link 1       |
| 14 | GND              | Ground                                        | 44 | GND       | Ground                                       |
| 15 | GND              | Ground                                        | 45 | DP1_L2_P  | Slave True Signal for Main Link 2            |
| 16 | GND              | Ground                                        | 46 | DP1_L2_N  | Slave Component Signal for Main Link 2       |
| 17 | GND              | Ground                                        | 47 | GND       | Ground                                       |
| 18 | GND              | Ground                                        | 48 | DP1_L3_P  | Slave True Signal for Main Link 3            |
| 19 | NC               | No Connection(I2C serial interface for LCM)   | 49 | DP1_L3_N  | Slave Component Signal for Main Link 3       |
| 20 | NC               | No Connection(I2C serial interface for LCM)   | 50 | GND       | Ground                                       |
| 21 | DP0_HPD          | Master Hot Plug Detect Signal                 | 51 | DP1_AUX_P | Slave True Signal for Auxiliary Channel      |
| 22 | DP1_HPD          | Slave Hot Plug Detect Signal                  | 52 | DP1_AUX_N | Slave Component Signal for Auxiliary Channel |
| 23 | GND              | Ground                                        | 53 | GND       | Ground                                       |
| 24 | DP0_AUX_P        | Master True Signal for Auxiliary Channel      | 54 | NC        | No Connection(I2C serial interface for LCM)  |
| 25 | DP0_AUX_N        | Master Component Signal for Auxiliary Channel | 55 | NC        | No Connection(I2C serial interface for LCM)  |
| 26 | GND              | Ground                                        | 56 | NC        | No Connection                                |
| 27 | DP0_L0_P         | Master True Signal for Main Link 0            | 57 | GND       | Ground                                       |
| 28 | DP0_L0_N         | Master Component Signal for Main Link 0       | 58 | NC        | No Connection                                |
| 29 | GND              | Ground                                        | 59 | GND       | Ground                                       |
| 30 | DP0_L1_P         | Master True Signal for Main Link 1            | 60 | NC        | No Connection                                |

Notes:

- 1) All GND(ground) pins should be connected together to the LCD module's metal frame.
- 2) All V<sub>LCD</sub>(power input) pins should be connected together.



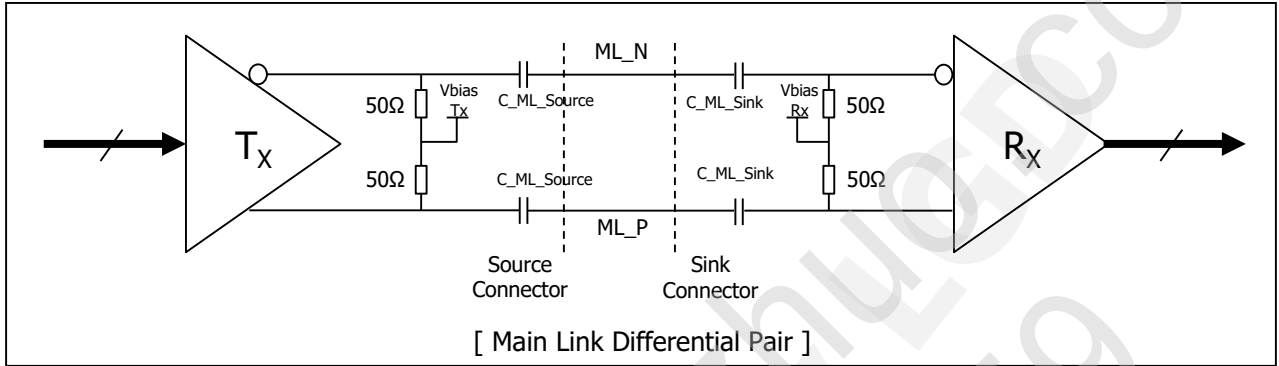
20525-060E-01(I-PEX)

Rear view of LCM

## Product Specification

### 3-2-2. eDP Signal Specifications

#### 1. eDP Main Link Signal



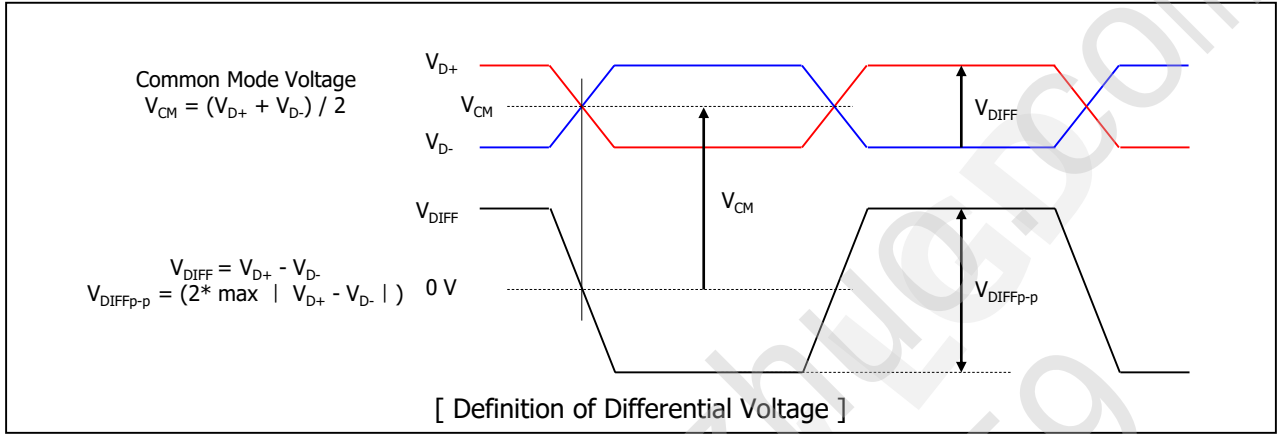
| Parameter                                                | Symbol                    | Min  | Typ | Max        | Unit | Notes       |
|----------------------------------------------------------|---------------------------|------|-----|------------|------|-------------|
| Unit Interval for High Bit Rate (5.4Gbps / Lane)         | UI_HBR2                   | -    | 185 | -          | ps   |             |
| Link Clock Down Spreading                                | Amplitude                 | 0    | -   | 0.5        | %    |             |
|                                                          | Frequency                 | 30   | -   | 33         | kHz  |             |
| Maximum Output Voltage Level at Source Side Connector    | $V_{TX-DIFFp-p-Max}$      | -    | -   | 1.38       | V    | 6           |
| Differential Peak to peak Voltage at Sink Side Connector | $V_{RX-DIFFp-p}$          | 0.09 | -   | -          | V    | 7           |
| EYE width at Sink Side Connector                         | $T_{RX-EYE-CONN}$         | 0.38 | -   | -          | UI   | 6,7         |
| Lane Intra-pair Skew                                     | $L_{RX-SKEW-INTRA\_PAIR}$ | -    | -   | 50         | ps   |             |
| Master Tx to Slave Tx Skew                               | $T_{x-to-Tx\_skew}$       | -    | -   | $\pm 0.25$ | DE   | 8           |
| AC Coupling Capacitor                                    | $C_{SOURCE-ML}$           | 75   | -   | 200        | nF   | Source side |

**Notes:**

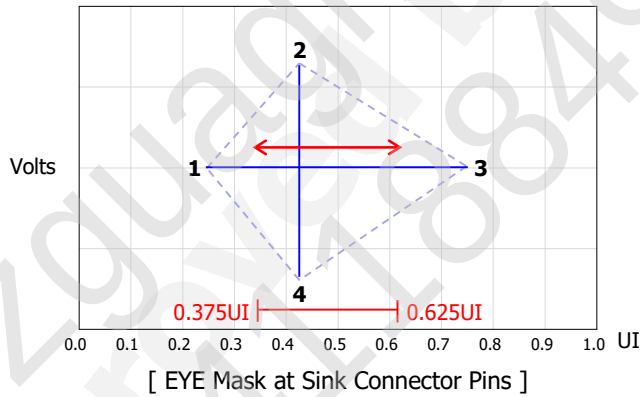
- 1) In cabled embedded system, it is recommended the system designer ensure that EYE width and voltage are met at the sink side connector pins.
- 2) Mismatched common mode voltage will occur abnormal display.
- 3) All eDP electrical spec is measured at sink connector side.

## Product Specification

### Note 6) Definition of Differential Voltage



### Note 7) Main Link EYE Diagram



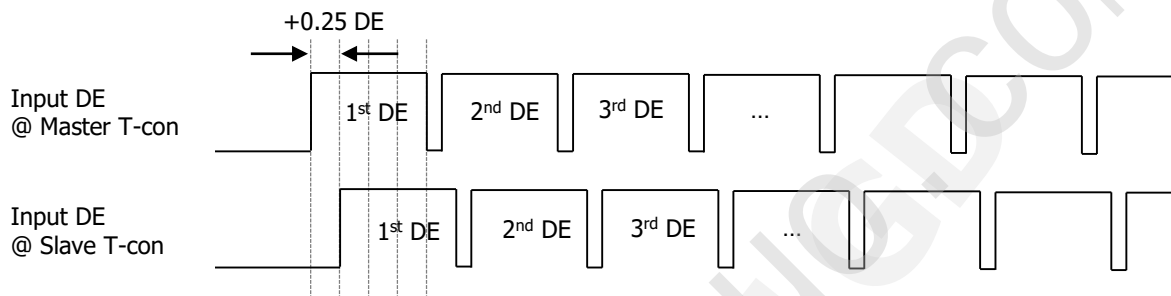
| Point | High Bit Rate 2 @ TP3 EQ                                             |            |
|-------|----------------------------------------------------------------------|------------|
|       | Time(UI)                                                             | Voltage(V) |
| 1     | Any UI location (x) where the eye width is open from x to x + 0.38UI | 0.000      |
| 2     | Any passing UI location between 0.375UI - 0.625UI                    | 0.045      |
| 3     | Point 1 + 0.38UI                                                     | 0.000      |
| 4     | Same as Point 2                                                      | -0.045     |

[ EYE Mask Vertices at embedded DP Sink Connector Pins ]

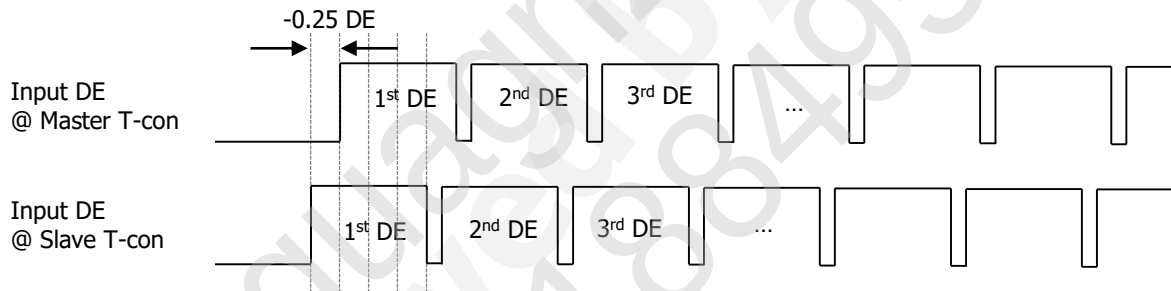
## Product Specification

Note 8) Master Tx to Slave Tx Skew Margin Case

(1) +0.25 DE Skew Case

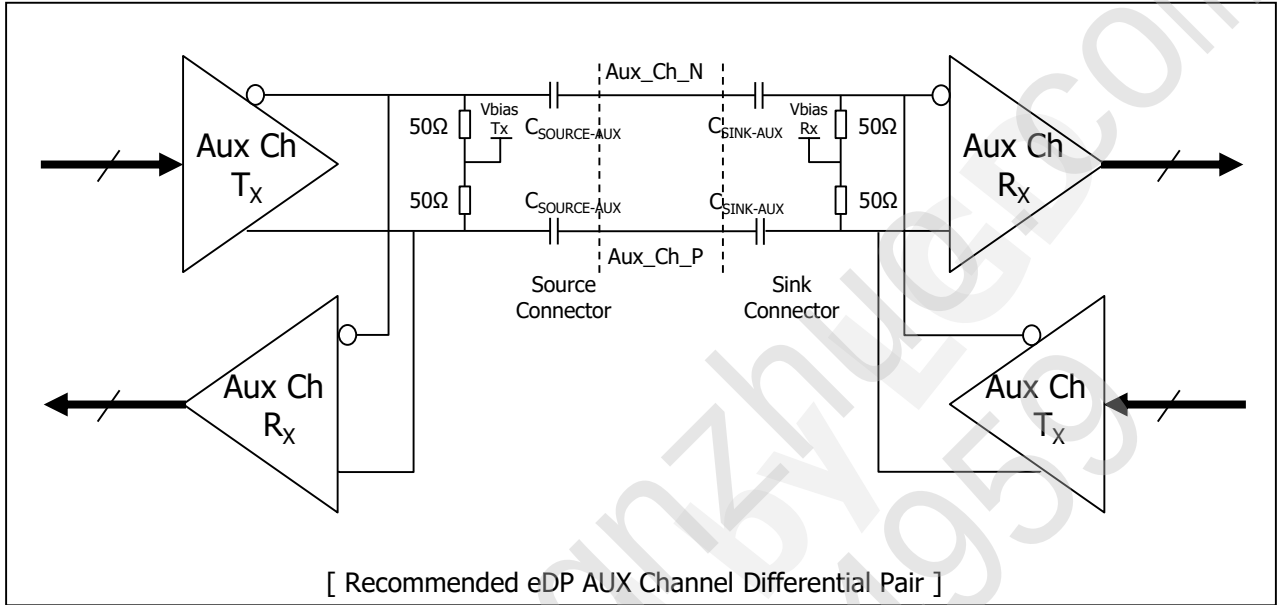


(2) -0.25 DE Skew Case



Product Specification

2. eDP AUX Channel Signal



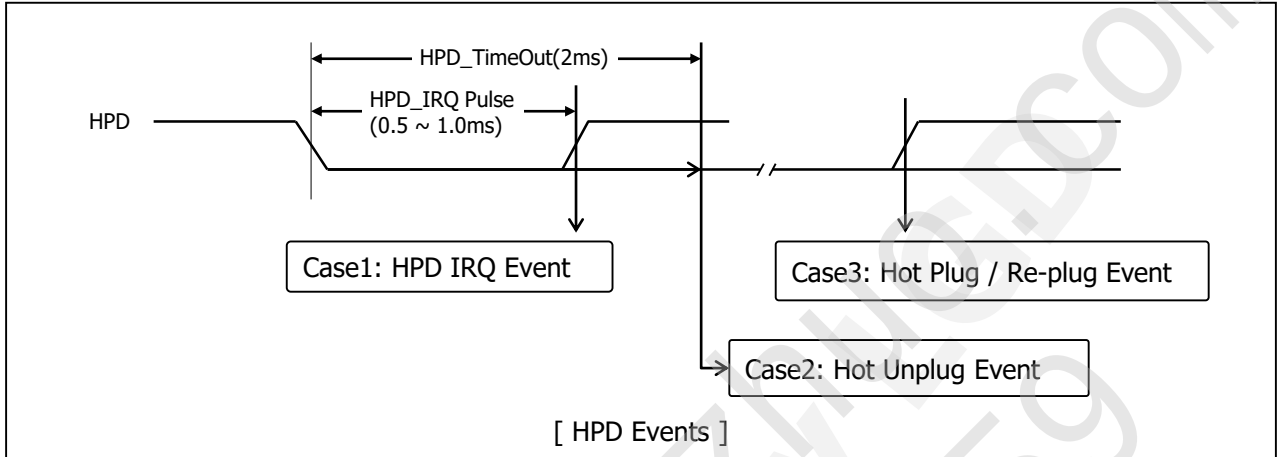
| Parameter                                                  | Symbol            | Min  | Typ | Max  | Unit | Notes         |
|------------------------------------------------------------|-------------------|------|-----|------|------|---------------|
| AUX Unit Interval                                          | UI                | 0.4  | -   | 0.6  | us   |               |
| AUX Jitter at Rx IC Package Pins                           | $T_{jitter}$      | -    | -   | 0.05 | UI   | Equal to 30ns |
| AUX Peak-to-peak Voltage at Connector Pins of Receiving    | $V_{AUX-DIFFp-p}$ | 0.32 | -   | 1.36 | V    |               |
| AUX Peak-to-peak Voltage at Connector Pins of Transmitting |                   | 0.39 | -   | 1.38 | V    |               |
| AUX EYE width at Connector Pins of Tx and Rx               |                   | 0.98 | -   | -    | UI   |               |
| AUX AC Coupling Capacitor                                  | $C_{SOURCE-AUX}$  | 75   | -   | 200  | nF   | Source side   |

Notes:

- 1)  $V_{AUX-DIFFp-p} = 2 * |V_{AUXP} - V_{AUXN}|$
- 2) Termination resistor should be 50ohm  $\pm$  5% at source side to AUX level.
- 3) Mismatched common mode voltage will occur abnormal display.

## Product Specification

### 3. eDP HDP Signal



| Parameter                      | Symbol  | Min  | Typ | Max | Unit | Notes                 |
|--------------------------------|---------|------|-----|-----|------|-----------------------|
| HPD Voltage                    | HPD     | 2.25 | -   | 3.6 | V    | Sink side Driving     |
| Hot Plug Detection Threshold   |         | 2.0  | -   | -   | V    | Source side Detecting |
| Hot Unplug Detection Threshold |         | -    | -   | 0.8 | V    |                       |
| HPD_IRQ Pulse Width            | HPD_IRQ | 0.5  | -   | 1.0 | ms   |                       |
| HPD_TimeOut                    |         | 2.0  | -   | -   | ms   | HPD Unplug Event      |

#### Notes:

- 1) HPD IRQ: Sink device wants to notify the Source device that Sink's status has changed so it toggles HPD line, forcing the Source device to read its Link / Sink Receiver DPCD field via the AUX-CH.
- 2) HPD Unplug: The Sink device is no longer attached to the Source device and the Source device may then disable its Main Link as a power saving mode.
- 3) Plug / Re-plug: The Sink device is now attached to the Source device, forcing the Source device to read its Receiver capabilities and Link / Sink status Receiver DPCD fields via the AUX-CH.

## Product Specification

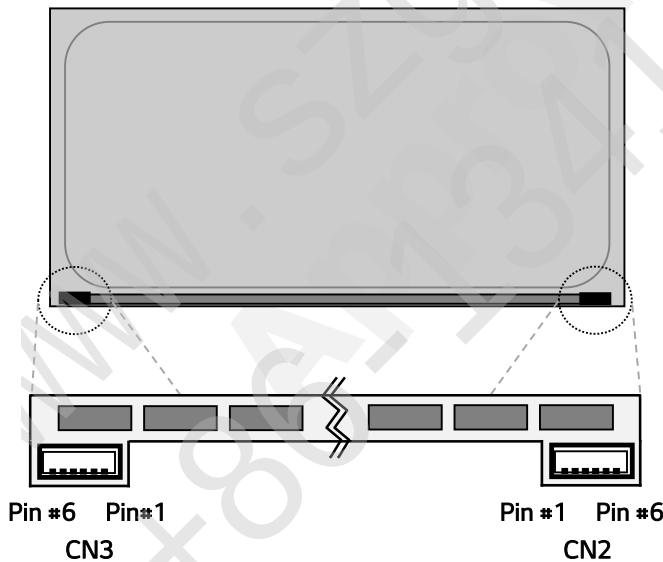
### 3-2-3. Backlight Connector Pin Configuration

The LED interface connector is a 10035WS-H06D(HF)\_wire-locking type manufactured by YEONHO. The mating connector is a SHJP-06V-S(HF) or 10035HS-H06C(HF). The pin configuration for the connector is shown in the table below.

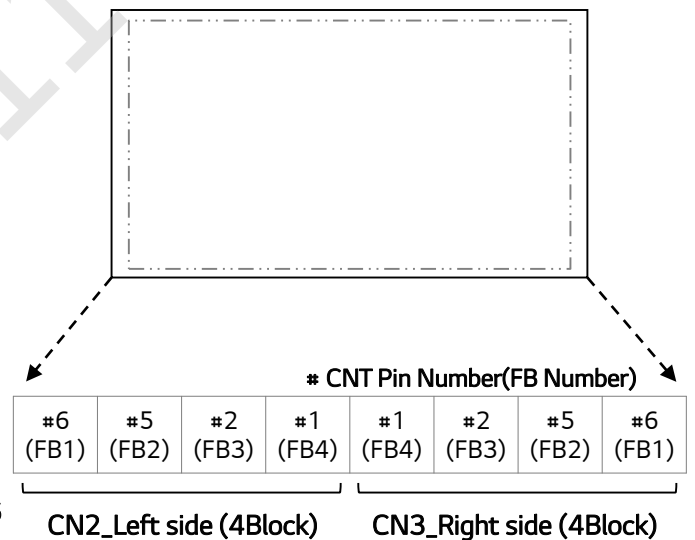
**Table 3-4. LED Connector Pin Configuration**

| Pin | Symbol | Pin-description (CN2)           | Remark                  | Pin | Symbol | Pin-description (CN3)           | Remark                   |
|-----|--------|---------------------------------|-------------------------|-----|--------|---------------------------------|--------------------------|
| #1  | FB4    | Channel 4 current feedback      | Left side in front view | #1  | FB4    | Channel 4 current feedback      | Right side in front view |
| #2  | FB3    | Channel 3 current feedback      |                         | #2  | FB3    | Channel 3 current feedback      |                          |
| #3  | V LED  | LED power supply (common anode) |                         | #3  | V LED  | LED power supply (common anode) |                          |
| #4  | V LED  | LED power supply (common anode) |                         | #4  | V LED  | LED power supply (common anode) |                          |
| #5  | FB2    | Channel 2 current feedback      |                         | #5  | FB2    | Channel 2 current feedback      |                          |
| #6  | FB1    | Channel 1 current feedback      |                         | #6  | FB1    | Channel 1 current feedback      |                          |

[ Rear view of LCM ]



[ Front view of LCM ]



**FIG.3-2 Backlight Connector View**

## Product Specification

### 3-3. Signal Timing Specifications

This is the signal timing requirement from the signal transmitter. All of the interface signal timing should be satisfied with the following specifications for its proper operation.

**Table 3-5. Timing Table**

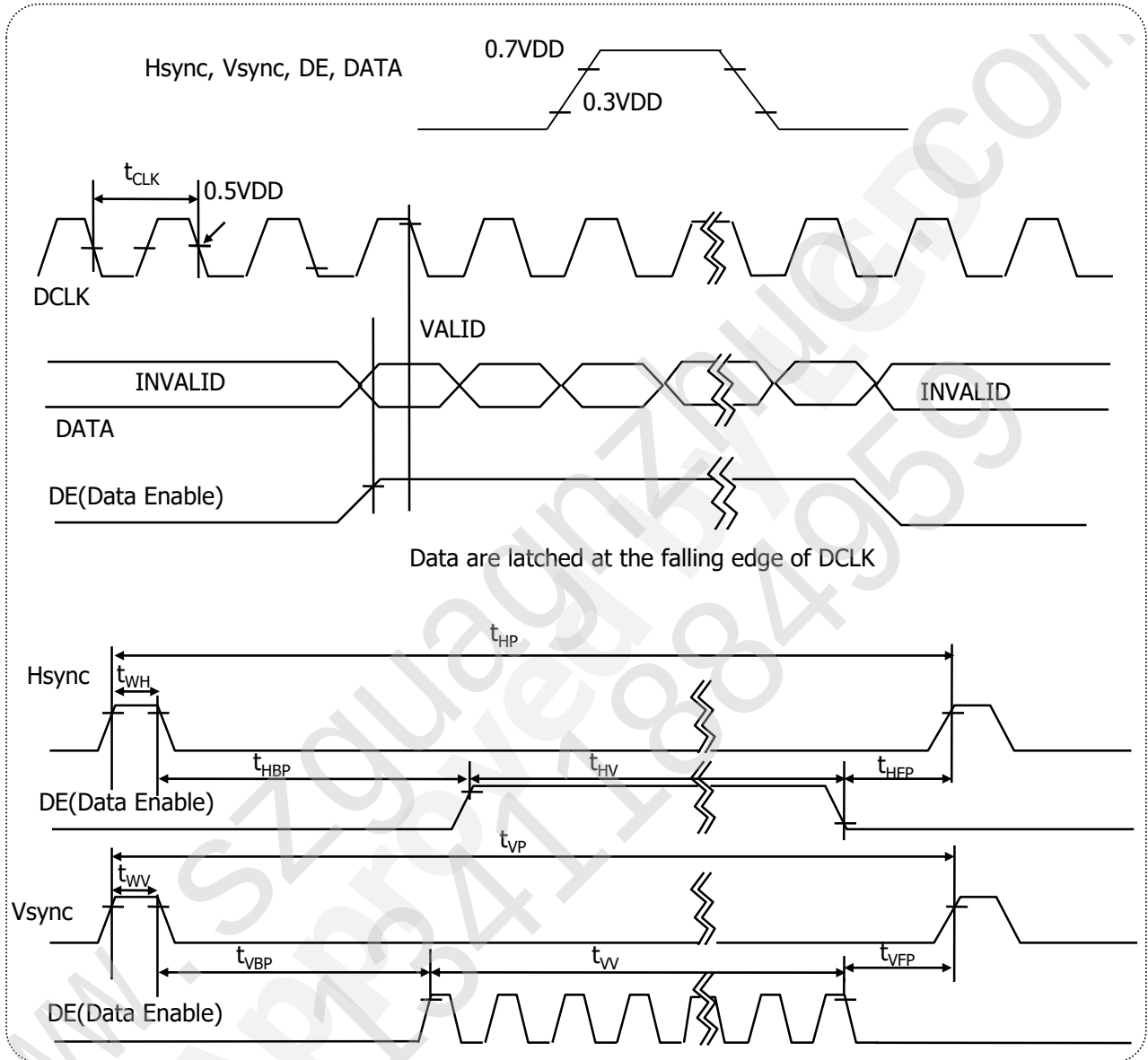
| Item  | Symbol                 | Symbol | Min    | Typ    | Max    | Unit | Notes                                  |
|-------|------------------------|--------|--------|--------|--------|------|----------------------------------------|
| DCLK  | Period                 | tCLK   | 2.50   | 3.28   | 9.85   | ns   | Pixel frequency<br>(Typ. 610.28 MHz)   |
|       | Frequency              | fCLK   | 101.56 | 305.14 | 400.37 | MHz  |                                        |
| Hsync | Period                 | tHP    | 1,408  | 1,408  | 1,472  | tCLK | 1,3,4                                  |
|       | Horizontal Valid       | tHV    | 1,280  | 1,280  | 1,280  | tCLK |                                        |
|       | Horizontal Blank       | tHB    | 128    | 128    | 192    | tCLK |                                        |
|       | Frequency              | fH     | 90.30  | 216.72 | 270.90 | kHz  |                                        |
|       | Width                  | tWH    | 32     | 32     | 32     | tCLK |                                        |
|       | Horizontal Back Porch  | tHBP   | 64     | 64     | 128    | tCLK |                                        |
|       | Horizontal Front Porch | tHFP   | 32     | 32     | 32     | tCLK |                                        |
| Vsync | Period                 | tVP    | 1,475  | 1,505  | 6,051  | tHP  | 2,4<br><br>*Adaptive sync:<br>47~181Hz |
|       | Vertical Valid         | tVV    | 1,440  | 1,440  | 1,440  | tHP  |                                        |
|       | Vertical Blank         | tVB    | 35     | 65     | 4,611  | tHP  |                                        |
|       | Frequency              | fV     | 47     | 144    | 181    | Hz   |                                        |
|       | Width                  | tWV    | 5      | 5      | 5      | tHP  |                                        |
|       | Vertical Back Porch    | tVBP   | 27     | 57     | 4,603  | tHP  |                                        |
|       | Vertical Front Porch   | tVFP   | 3      | 3      | 3      | tHP  |                                        |

**Notes:**

- 1) The value of Hsync Period, Hsync Width and Hsync valid should be even number times of tCLK. If the value is odd number times of tCLK, it can make asynchronous signal timing and cause abnormal display.
- 2) The performance of the electro-optical characteristics may be influenced by variance of the vertical refresh rates.
- 3) The value of Hsync Period, Hsync Width, and Horizontal Back Porch should be divided by 4 without a remainder.
- 4) The polarity of Hsync, Vsync is not restricted.
- 5) The optimal Vertical Frequency is 60~180Hz (normal mode frequency) for best picture quality.

## Product Specification

### 3-4. Signal Timing Waveforms



## Product Specification

### 3-5. Color Data Reference

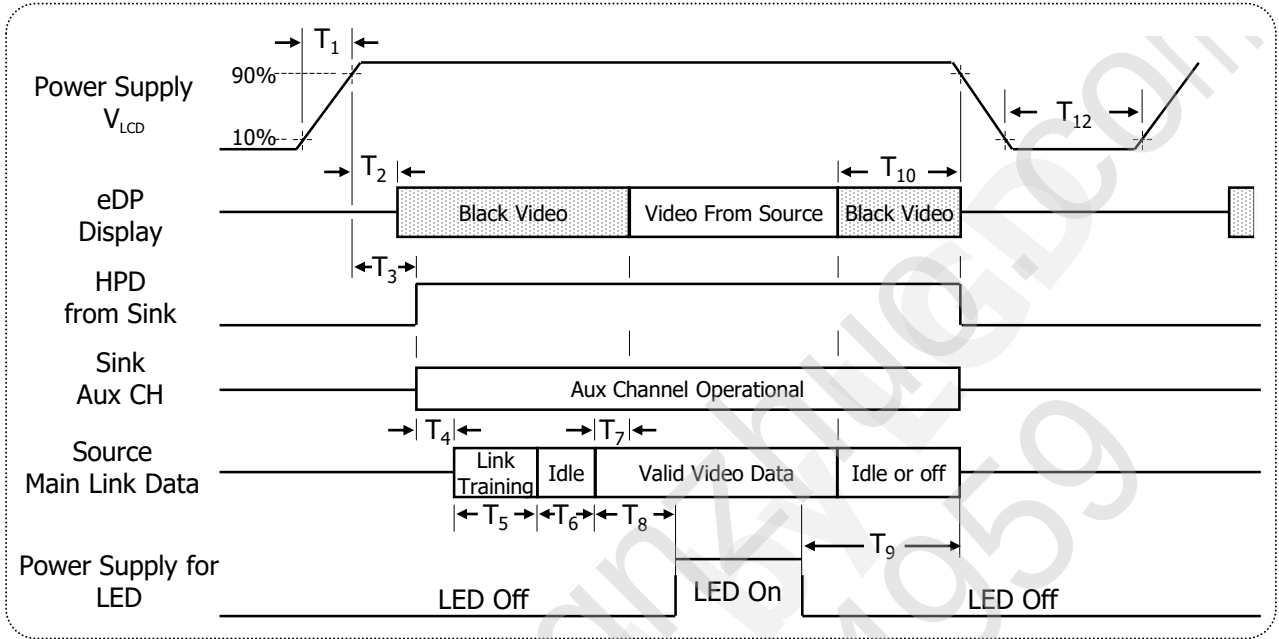
The Brightness of each primary color(Red,Green,Blue) is based on the 10-bit gray scale data input for the color; the higher the binary input, the brighter the color.  
The table below provides a reference for color versus data input.

**Table 3-6. Color Data Reference**

| Color       |              | Input Color Data |    |    |    |    |     |    |    |    |    |       |    |    |    |    |     |    |    |    |    |      |    |    |    |    |     |    |    |    |    |  |  |
|-------------|--------------|------------------|----|----|----|----|-----|----|----|----|----|-------|----|----|----|----|-----|----|----|----|----|------|----|----|----|----|-----|----|----|----|----|--|--|
|             |              | RED              |    |    |    |    |     |    |    |    |    | GREEN |    |    |    |    |     |    |    |    |    | BLUE |    |    |    |    |     |    |    |    |    |  |  |
|             |              | MSB              |    |    |    |    | LSB |    |    |    |    | MSB   |    |    |    |    | LSB |    |    |    |    | MSB  |    |    |    |    | LSB |    |    |    |    |  |  |
|             |              | R9               | R8 | R7 | R6 | R5 | R4  | R3 | R2 | R1 | R0 | G9    | G8 | G7 | G6 | G5 | G4  | G3 | G2 | G1 | G0 | B9   | B8 | B7 | B6 | B5 | B4  | B3 | B2 | B1 | B0 |  |  |
| Basic Color | Black        | 0                | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  |  |  |
|             | Red (1023)   | 1                | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  |  |  |
|             | Green (1023) | 0                | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1  | 0    | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  |  |  |
|             | Blue (1023)  | 0                | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1  |  |  |
|             | Cyan         | 0                | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1  | 1    | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1  |  |  |
|             | Magenta      | 1                | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1  |  |  |
|             | Yellow       | 1                | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1  | 1     | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1  | 0    | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  |  |  |
|             | White        | 1                | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1  | 1     | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1  | 1    | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1  |  |  |
| RED         | RED (0)      | 0                | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  |  |  |
|             | RED (1)      | 0                | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 1  | 0     | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  |  |  |
|             | ...          | ...              |    |    |    |    |     |    |    |    |    | ...   |    |    |    |    |     |    |    |    |    | ...  |    |    |    |    |     |    |    |    |    |  |  |
|             | RED (1022)   | 1                | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 0  | 0     | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  |  |  |
|             | RED (1023)   | 1                | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  |  |  |
| GREEN       | GREEN (0)    | 0                | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  |  |  |
|             | GREEN (1)    | 0                | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 1  | 0    | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  |  |  |
|             | ...          | ...              |    |    |    |    |     |    |    |    |    | ...   |    |    |    |    |     |    |    |    |    | ...  |    |    |    |    |     |    |    |    |    |  |  |
|             | GREEN (1022) | 0                | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 0  | 0    | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  |  |  |
|             | GREEN (1023) | 0                | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1  | 0    | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  |  |  |
| BLUE        | BLUE (0)     | 0                | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  |  |  |
|             | BLUE (1)     | 0                | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 1  |    |  |  |
|             | ...          | ...              |    |    |    |    |     |    |    |    |    | ...   |    |    |    |    |     |    |    |    |    | ...  |    |    |    |    |     |    |    |    |    |  |  |
|             | BLUE (1022)  | 0                | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 0  |  |  |
|             | BLUE (1023)  | 0                | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1  |  |  |

## Product Specification

### 3-6. Power Sequence



**Table 3-7. Power Sequence**

| Timing | Required By | Limits |     | Units | Notes |
|--------|-------------|--------|-----|-------|-------|
|        |             | Min    | Max |       |       |
| $T_1$  | Source      | 0.5    | 10  | ms    |       |
| $T_2$  | Sink        | 10     | 200 | ms    |       |
| $T_3$  | Sink        | 15     | 200 | ms    |       |
| $T_4$  | Source      | -      | -   | ms    | 5     |
| $T_5$  | Source      | -      | -   | ms    | 5     |
| $T_6$  | Source      | -      | 100 | ms    | 6     |
| $T_8$  | Source      | 350    | -   | ms    |       |
| $T_9$  | Source      | 200    | -   | ms    | 4     |

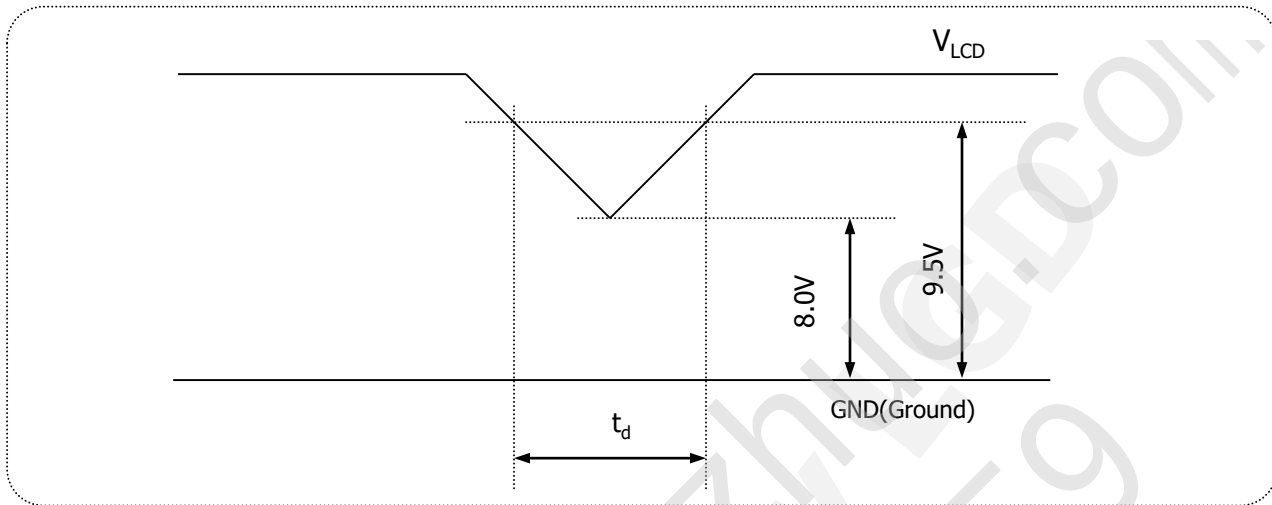
| Timing   | Required By | Limits |     | Units | Notes |
|----------|-------------|--------|-----|-------|-------|
|          |             | Min    | Max |       |       |
| $T_{10}$ | Source      | 0      | 500 | ms    |       |
| $T_{12}$ | Source      | 1000   | -   | ms    |       |

Notes:

- Power sequence should be kept all the time including below cases for normal operation.
  - AC/DC Power On/Off
  - Mode change (resolution, frequency, timing, sleep mode, color depth change, etc.)
 The violation of power sequence can cause a significant trouble in display and reliability.
- Please avoid floating state of interface signal during signal invalid period.
- When the interface signal is invalid, be sure to pull down the  $V_{LCD}$  (0V)
- Please turn off the power supply for LED when the level of  $V_{LCD}$  changes to prevent noise issue.
- Link training duration is dependent on the customer's system.
- It includes Source Frame Synchronization time.
  - Source Frame Synchronization: Time to prepare before Tx(Source) sends valid data(Invalid period).

## Product Specification

### 3-7. Power Dip Condition



**FIG.3-3 Power Dip Condition**

For proper operation, stable power supply of  $V_{LCD}$  is necessary and power dip is allowed only in below condition. Except this condition, power on/off should follow power sequence specification exactly.

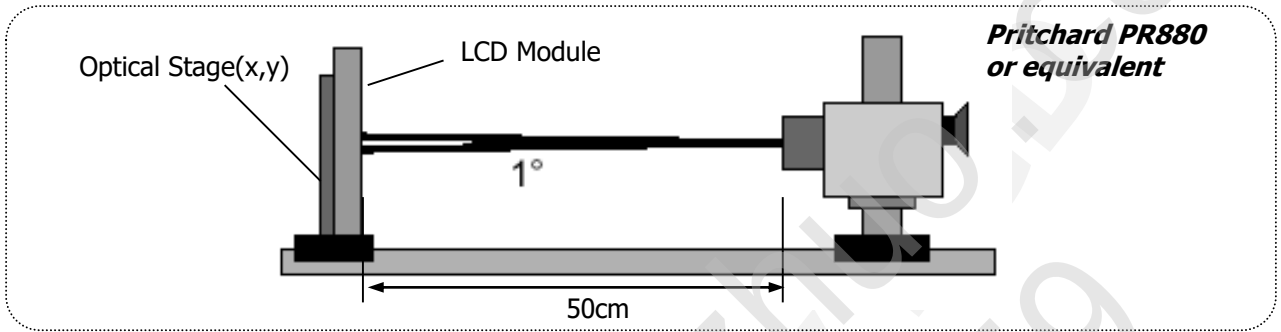
- 1) Dip Condition  
 $8.0V \leq V_{LCD} < 9.5V$  ,  $t_d \leq 20ms$

Product Specification

### 4. Optical Specifications

Optical characteristics are determined after the unit has been 'ON' for approximately 30 minutes in a dark environment at 25±2°C. The values specified are at an approximate distance 50cm from the LCD surface at a viewing angle of  $\Phi$  and  $\theta$  equal to 0° and aperture 1 degree.

FIG.4-1 presents additional information concerning the measurement equipment and method.



**FIG.4-1 Optical Characteristic Measurement Equipment And Method**

**Table 4-1. Optical Characteristics**

( $T_a=25\text{ }^{\circ}\text{C}$ ,  $V_{LCD}=Typ$ ,  $f_v=144\text{Hz}$ ,  $DCLK=Typ$ ,  $I_s=Typ$ )

| Parameter                                            |              | Symbol               | Values       |       |              | Units  | Notes |
|------------------------------------------------------|--------------|----------------------|--------------|-------|--------------|--------|-------|
|                                                      |              |                      | Min.         | Typ.  | Max.         |        |       |
| Contrast Ratio                                       |              | CR                   | 700          | 1000  | -            |        | 1     |
| Surface Luminance, white                             |              | L <sub>WH</sub>      | 320          | 400   | -            | cd/m²  | 2     |
| Luminance Variation                                  |              | δ <sub>WHITE</sub>   | 75           | -     | -            | %      | 3     |
| Response Time                                        | Gray to Gray | T <sub>GTG_AVR</sub> | -            | 4     | 8            | ms     | 4     |
| Color Gamut (CIE 1976)                               |              | DCI                  | 90           | 98    | -            | %      |       |
| Color Coordinates<br>[CIE 1931]<br><i>(By PR650)</i> | Red          | R <sub>x</sub>       | Typ<br>-0.03 | 0.686 | Typ<br>+0.03 |        |       |
|                                                      |              | R <sub>y</sub>       |              | 0.309 |              |        |       |
|                                                      | Green        | G <sub>x</sub>       |              | 0.265 |              |        |       |
|                                                      |              | G <sub>y</sub>       |              | 0.668 |              |        |       |
|                                                      | Blue         | B <sub>x</sub>       |              | 0.150 |              |        |       |
|                                                      |              | B <sub>y</sub>       |              | 0.058 |              |        |       |
|                                                      | White        | W <sub>x</sub>       |              | 0.313 |              |        |       |
|                                                      |              | W <sub>y</sub>       |              | 0.329 |              |        |       |
| Color Temperature                                    |              | -                    | -            | 6500  | -            | K      |       |
| Viewing Angle<br>(CR>10, General)                    | Horizontal   | θ <sub>H</sub>       | 170          | 178   | -            | Degree | 5     |
|                                                      | Vertical     | θ <sub>V</sub>       | 170          | 178   | -            |        |       |
| Gray Scale                                           |              | -                    |              | 2.2   |              |        | 6     |

## Product Specification

Notes:

- 1) **Contrast Ratio(CR)** is defined mathematically as: **(By PR880)**  
It is measured at center point(1)

$$\text{Contrast ratio} = \frac{\text{Surface luminance with all white pixels}}{\text{Surface luminance with all black pixels}}$$

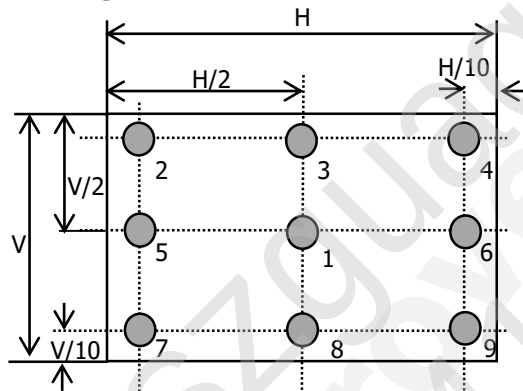
- 2) **Surface Luminance(LWH)** is the luminance value at center 1 point(1) across the LCD surface 50cm from the surface with all pixels displaying white. For more information see FIG.4-1. **(By PR880)**

- 3) The **Variation in Surface Luminance** ,  $\delta_{\text{WHITE}}$  is defined as: **(By PR880)**

$$\delta_{\text{WHITE}} = \frac{\text{Minimum}(LP1, LP2, \dots, LP9)}{\text{Maximum}(LP1, LP2, \dots, LP9)} \times 100(\%)$$

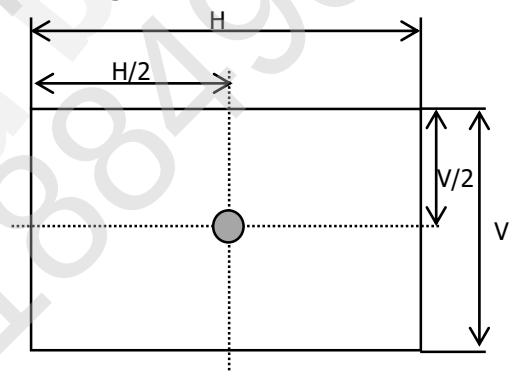
Where L1 to L9 are the luminance with all pixels displaying white at 9 locations.  
For more information see FIG.4-2.

### <Measuring Point For Luminance Variation>



@ H,V: Active Area

### <Measuring Point For Surface Luminance>



**FIG.4-2 Measure Point for Luminance**

## Product Specification

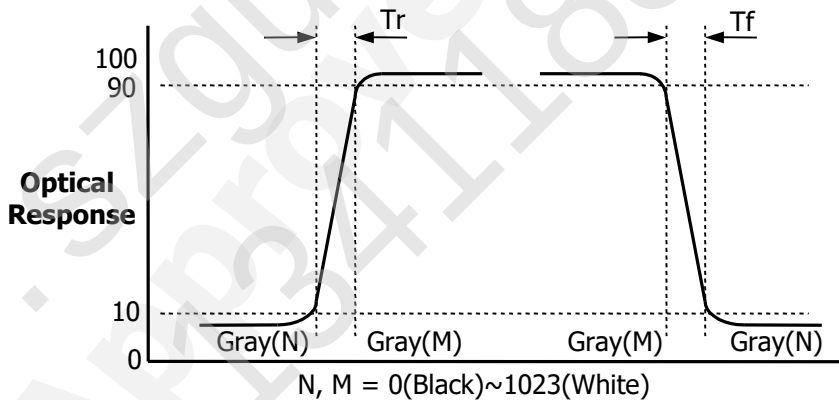
Notes:

- 4) The **Gray To Gray Response Time** is defined as the following figure and shall be measured by switching the input signal for "Gray To Gray". (**By RD80S**)
- Gray step: 5 Step
  - $T_{GTG\_AVR}$  is the total average time at rising time and falling time for "Gray To Gray".
  - For the GTG measurement, the sampling rate of oscilloscope is 500k/s.

**Table 4-2. GTG Gray**

| Gray to Gray |       | Rising Time |      |      |      |    |
|--------------|-------|-------------|------|------|------|----|
|              |       | G1023       | G767 | G511 | G255 | G0 |
| Falling Time | G1023 |             |      |      |      |    |
|              | G767  |             |      |      |      |    |
|              | G511  |             |      |      |      |    |
|              | G255  |             |      |      |      |    |
|              | G0    |             |      |      |      |    |

Response Time is defined as the following figure and shall be measured by switching the input signal for "Gray(N)" and "Gray(M)".

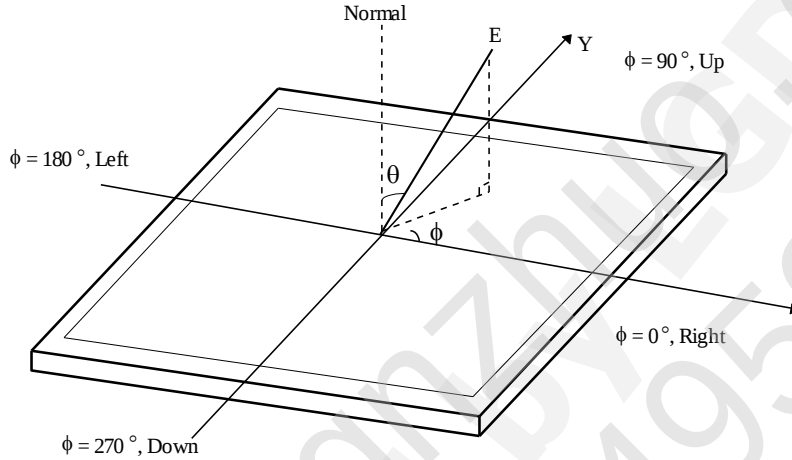


**FIG.4-3 Response Time**

## Product Specification

Notes:

- 5) **Viewing Angle** is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG.4-4. **(By PR880)**



**FIG.4-4 Viewing Angle**

- 6) **Gamma Value** is approximately 2.2. For more information see below table.

**Table 4-3. Gray Scale Specification**

| Gray Level | Relative Luminance [%](Typ) |
|------------|-----------------------------|
| 0          | 0.10                        |
| 63         | 0.30                        |
| 127        | 1.08                        |
| 191        | 2.50                        |
| 255        | 4.72                        |
| 319        | 7.70                        |
| 383        | 11.49                       |
| 447        | 16.20                       |
| 511        | 21.66                       |
| 575        | 28.20                       |
| 639        | 35.45                       |
| 703        | 43.80                       |
| 767        | 53.00                       |
| 831        | 63.30                       |
| 895        | 74.48                       |
| 959        | 86.80                       |
| 1023       | 100                         |

## Product Specification

### 5. Mechanical Characteristics

The contents provide general mechanical characteristics. In addition the figures in the next page are detailed mechanical drawing of the LCD.

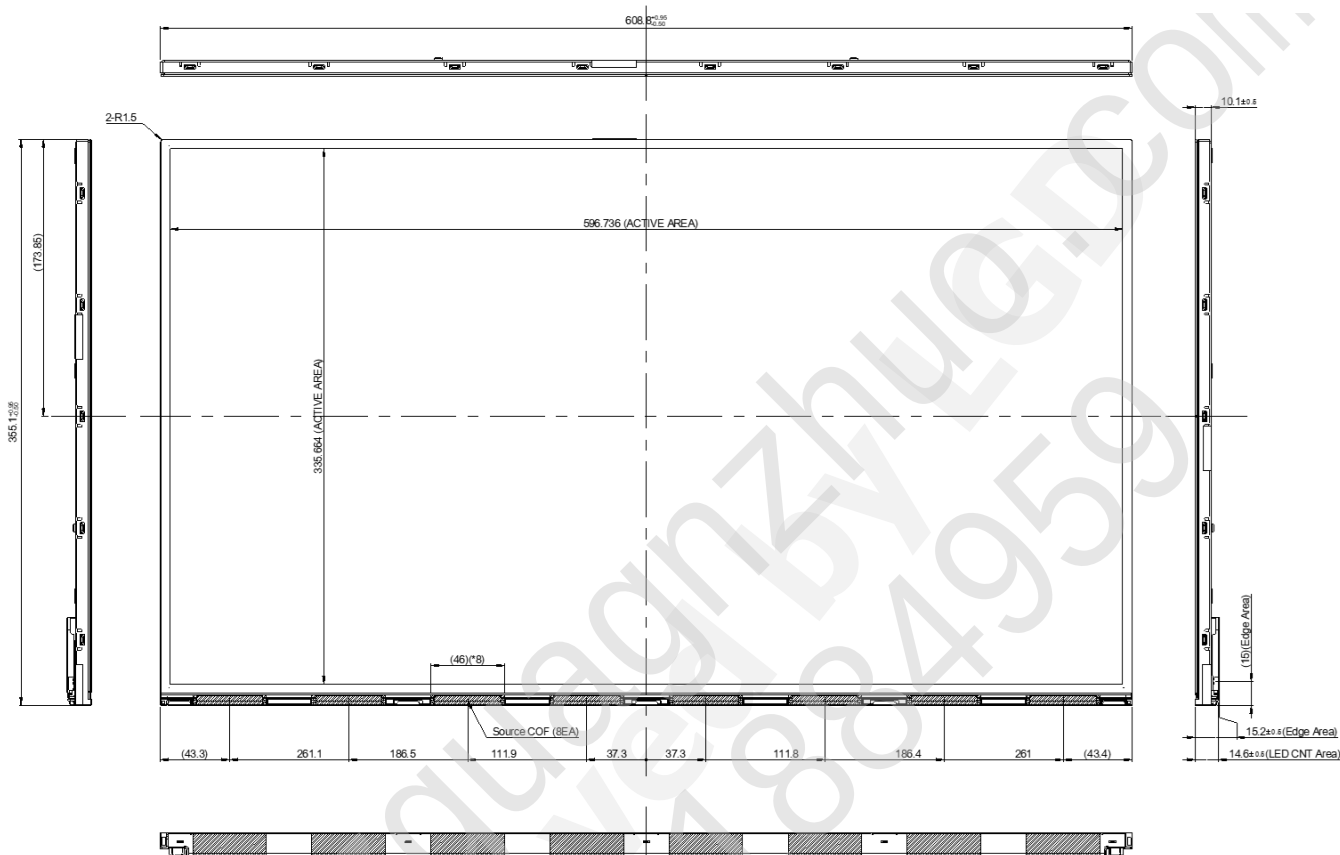
|                     |                                                          |           |
|---------------------|----------------------------------------------------------|-----------|
| Outline Dimension   | Horizontal                                               | 608.80 mm |
|                     | Vertical                                                 | 355.10 mm |
|                     | Depth                                                    | 15.20 mm  |
| Bezel Area          | Horizontal                                               | -         |
|                     | Vertical                                                 | -         |
| Active Display Area | Horizontal                                               | 596.74 mm |
|                     | Vertical                                                 | 335.66 mm |
| Weight              | Typ. : 2,550g, Max. : 2,680g                             |           |
| Surface Treatment   | Anti-Glare treatment of the front polarizer(Haze25%, 3H) |           |

Note: Please refer to a mechanical drawing in terms of tolerance at the next page.

- Outline dimensions (horizontal, vertical and outside depth) are measured by using vernier calipers.
- The inside depth dimensions are measured by using height gauge, when LCM is put face down onto a flat surface.

## Product Specification

<Front View>



## Notes

1. I/F connector specification : 20525-060E-01(Manufactured by I-PEX) or Equivalent  
2. LED connector specification : YEONHO, 10035WS-H06D or Equivalent  
3. Torque of user hole: 3.0~4.0kgf-cm.  
4-1. Tilt Value definition

#### 4-1. Tilt Value definition



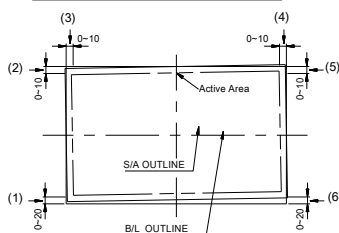
#### 4-2. Tilt Specifications

-, [Case 1] Line ① (Based on B/L)

| Position | Typ   | Tolerance  | Range                     |
|----------|-------|------------|---------------------------|
| (2),(5)  | -0.12 | $\pm 0.45$ | -0.57 $\rightarrow$ +0.33 |
| (3),(4)  | -0.13 | $\pm 0.45$ | -0.58 $\rightarrow$ +0.32 |
| (1),(6)  | -0.22 | $\pm 0.45$ | -0.67 $\rightarrow$ +0.23 |

- [Case 2] Line ② (Based on S/A)

| Position | Typ | Tolerance  | Range                     |
|----------|-----|------------|---------------------------|
| (2),(5)  | 0   | $\pm 0.45$ | -0.45 $\rightarrow$ +0.45 |
| (3),(4)  | 0   | $\pm 0.45$ | -0.45 $\rightarrow$ +0.45 |
| (1),(6)  | 0   | $\pm 0.45$ | -0.45 $\rightarrow$ +0.45 |

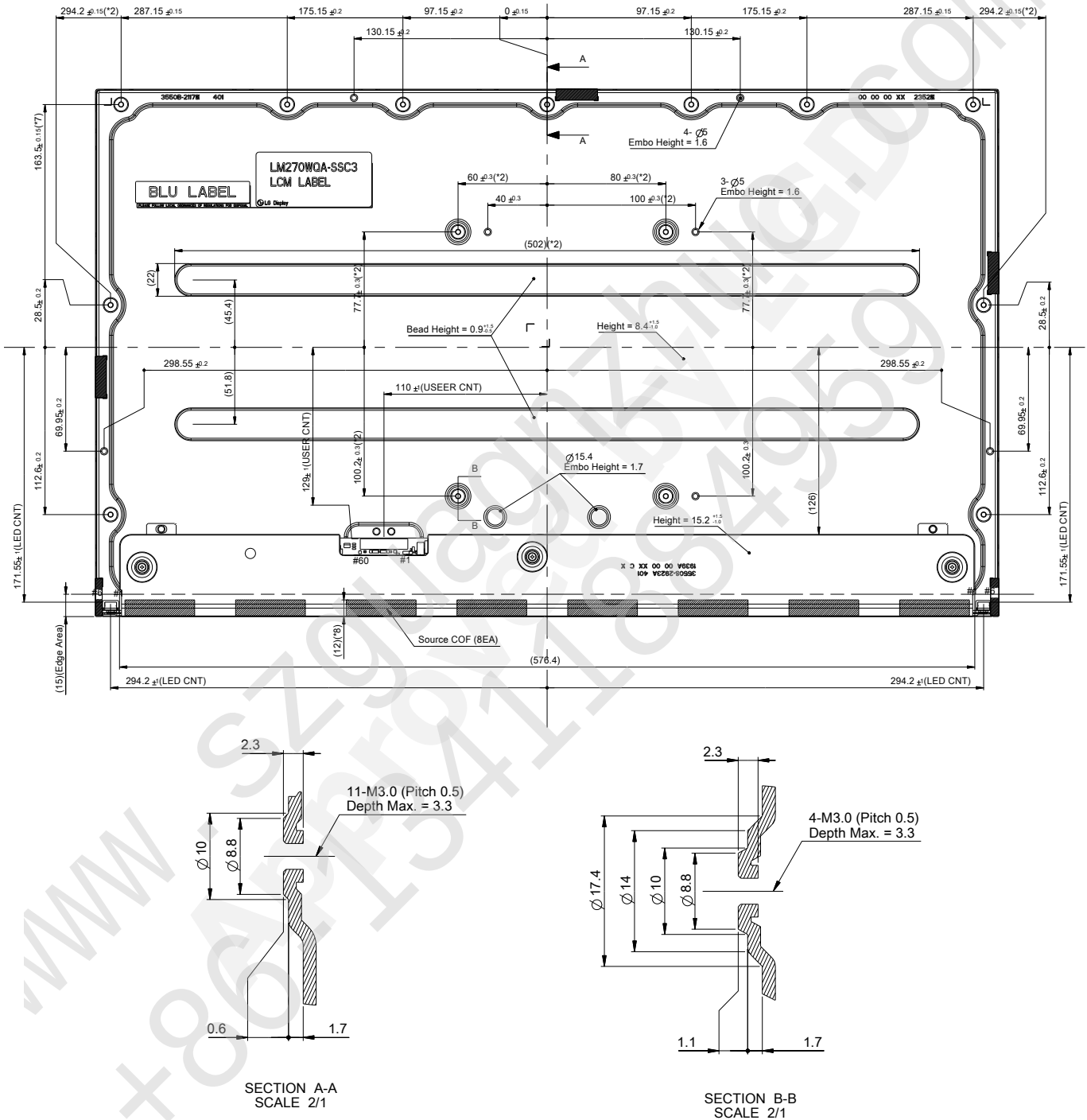


< Measurement Point: (1)~(6) >

5. Unspecified tolerances to be  $\pm 0.5$
6. The LCM warp(warpage) is less than 1.0 on the surface plate
7. The COF area is weak & sensitive, so please don't press the COF area
8. Undefined height should follow the 3D modeling data

## Product Specification

### <Rear View>



LGD Highly recommendation :

System chassis or frame should be designed to keep the IPS Panel flat as it is vulnerable to panel light-leakage caused by deformation.

## Product Specification

### 6. Reliability

Environment test condition

| No | Test Item                                   | Condition                                                                                                                     | Notes |
|----|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------|
| 1  | High temperature storage test               | $T_a = 60^{\circ}\text{C}$ , 240h                                                                                             | 1     |
| 2  | Low temperature storage test                | $T_a = -20^{\circ}\text{C}$ , 240h                                                                                            | 1     |
| 3  | High temperature operation test             | $T_a = 50^{\circ}\text{C}$ , 50%RH, 240h                                                                                      | 1     |
| 4  | Low temperature operation test              | $T_a = 0^{\circ}\text{C}$ , 240h                                                                                              | 1     |
| 5  | Vibration test<br>(non-operating)           | Waveform : Random<br>Vibration level : 1.15Grms<br>Bandwidth : 10-300Hz<br>Duration : X,Y,Z, 10min<br>One time each direction |       |
| 6  | Shock test<br>(non-operating)               | Shock level : 100G<br>Waveform : Half sine wave, 2ms<br>Direction : $\pm X$ , $\pm Y$ , $\pm Z$<br>One time each direction    |       |
| 7  | Altitude<br>Operating<br>Storage / Shipment | 0 - 10,000 feet (3,048m)<br>0 - 40,000 feet (12,192m)                                                                         |       |

Note 1) Result Evaluation Criteria:

TFT-LCD panels test should take place after cooling enough at room temperature.

In the standard condition, there should be no particular problems that may affect the display function.

\*  $T_a$  = Ambient Temperature

## Product Specification

### 7. International Standards

#### 7-1. Safety

- a) IEC 62368-1, The International Electro-technical Commission(IEC).  
Audio/video, Information and Communication Technology Equipment - Safety - Safety Requirements.
- b) EN 62368-1, European Committee for Electro-technical Standardization (CENELEC)  
Audio/video, Information and Communication Technology Equipment - Safety Requirements
- c) UL 62368-1, UL LLC.  
Audio/video, Information and Communication Technology Equipment - Safety Requirements
- d) CAN/CSA C22.2 No.62368-1, Canadian Standards Association (CSA).  
Audio/video, Information and Communication Technology Equipment - Safety Requirements
- e) IEC 60950-1, The International Electro technical Commission (IEC).  
Information Technology Equipment - Safety - Part 1 : General Requirements

#### 7-2. Environment

- a) RoHS, Commission Delegated Directive (EU) 2015/863 of 31 March 2015 amending Annex II to Directive 2011/65/EU of the European Parliament and of the Council

## Product Specification

### 8. Packing

#### 8-1. Designation of Lot Mark

a) Lot Mark

|   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | D | E | F | G | H | I | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

A,B,C: Size(Inch)

E: Month

D: Year

F ~ M: Serial No.

Notes:

1) Year

|      |      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|------|
| Year | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Mark | K    | L    | M    | N    | P    | R    | S    | T    | U    | V    |

2) Month

|       |     |     |     |     |     |     |     |     |     |     |     |     |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Mark  | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | A   | B   | C   |

b) Location of Lot Mark

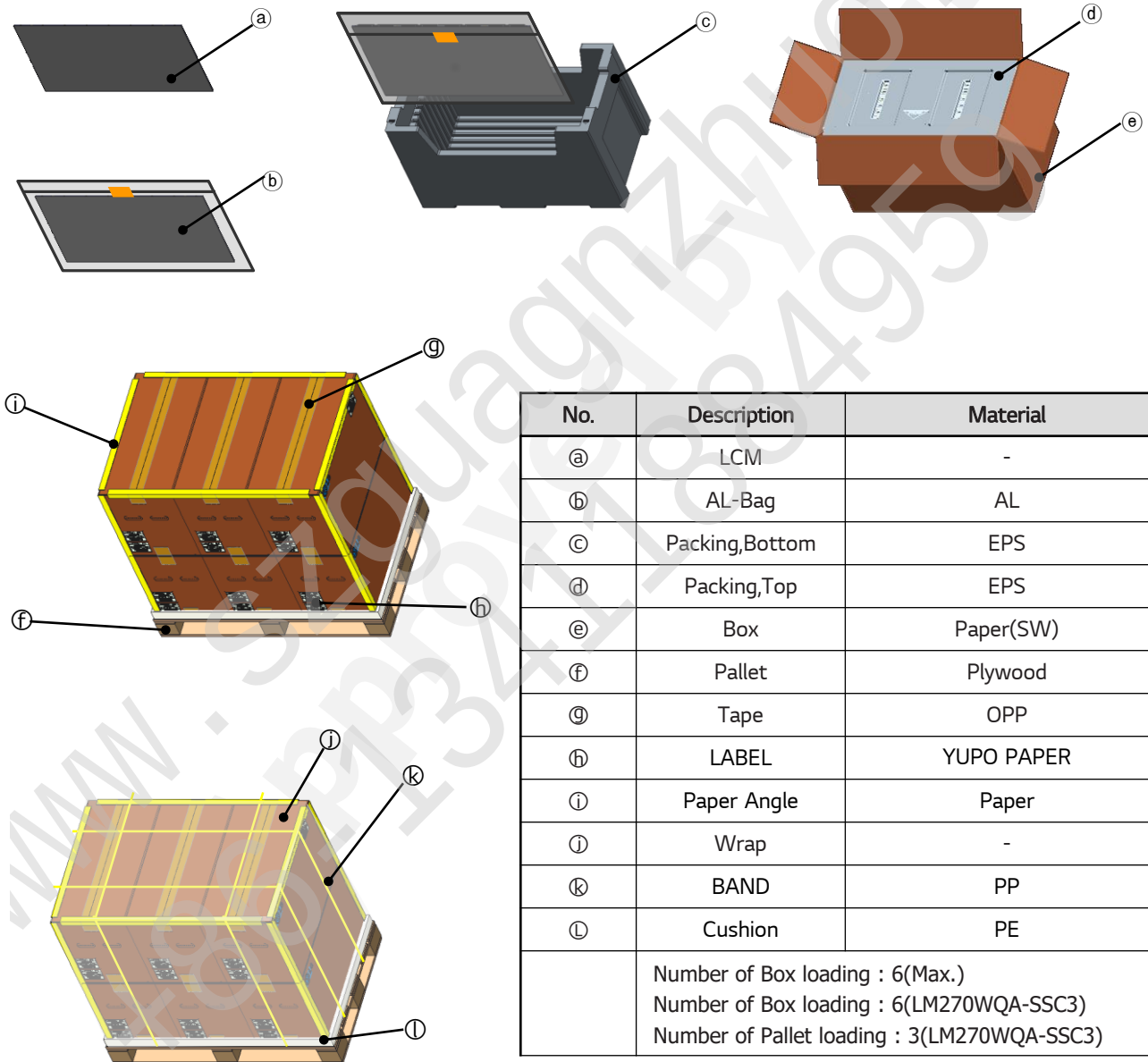
Serial No. is printed on the label. The label is attached to the backside of the LCD module.  
This is subject to change without prior notice.

## Product Specification

### 8-2. Packing Form

- a) Package quantity in one box : 10ea  
Package quantity in one Pallet : 60ea  
b) Box Size : 365mm X 710mm X 448mm  
c) Pallet Ass'y Size: 1140mmX740mmX1069mm

\* LCM Direction(Insert to Bottom Packing): COF Down



## Product Specification

### 9. Precautions

Please pay attention to the followings when you use this TFT LCD module.

#### 9-1. Mounting Precautions

- 1) You must mount a module using holes arranged in rear side.
- 2) You should consider the mounting structure so that uneven force(ex. Twisted stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
- 3) Please attach the surface transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to the resist external force.
- 4) You should adopt radiation structure to satisfy the temperature specification.
- 5) Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
- 6) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment. Do not touch the surface of polarizer for bare hand or greasy cloth.  
(Some cosmetics are detrimental to the polarizer.)
- 7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.
- 8) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
- 9) Do not open the case because inside circuits do not have sufficient strength.
- 10) System frame should not have an interference with panel which can cause LC Leakage/Panel Crack due to the contraction of system frame at low temperature condition or panel damage by any other circumstances.

#### 9-2. Operating Precautions

- 1) Response time depends on the temperature.(In lower temperature, it becomes longer.)
- 2) Brightness depends on the temperature.(In higher temperature, it becomes lower.) And in lower temperature, response time(required time that brightness is stable after turned on) becomes longer.
- 3) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
- 4) When fixed patterns are displayed for a long time, remnant image is likely to occur.
- 5) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.
- 6) Please do not give any mechanical and/or acoustical impact to LCM. Otherwise, LCM can't be operated its full characteristics perfectly.
- 7) A screw which is fastened up the steels should be a machine screw.(if not, it causes metallic foreign material and deal LCM a fatal blow)
- 8) Please do not set LCD on its edge.
- 9) When LCMs are used for public display, defects such as Yogore image sticking phenomenon can be happened. Therefore it is not allowable to use in Public display.
- 10) LCMs cannot support "Interlaced Scan Method"
- 11) When this reverse model is used as a forward-type model (PCB on top side) or a Portrait-type mode at storage and operation, LGD can not guarantee any defects of LCM.
- 12) Please conduct image sticking test after 1-hour aging with white pattern at normal temperature. (25~40°C)

## Product Specification

### 9-3. Electrostatic Discharge Control

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly.

### 9-4. Precautions For Strong Light and Hazardous Materials Exposure

Strong light exposure causes degradation of polarizer and color filter.

The LCM should be avoided direct contact with hazardous materials such as sulfur, acetic acid, chlorine, etc. These materials may cause chemical reaction such as sulfurization, corrosion, discoloration, etc.

### 9-5. Storage

When storing modules as spares for a long time, the following precautions are necessary.

- 1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light.  
Storage condition is guaranteed under packing condition.
- 2) The polarizer surface should not come in contact with any other object.  
It is recommended that they be stored in the container in which they were shipped.

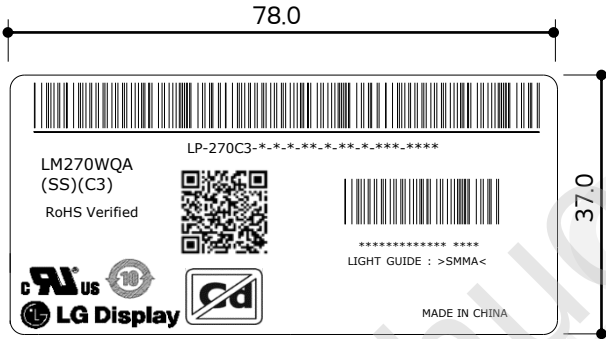
### 9-6. Handling Precautions For Protection Film

- 1) The protection film is attached to the bezel with a small masking tape. When the protection film is peeled off, static electricity is generated between the film and polarizer. This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.
- 2) When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the bezel after the protection film is peeled off.
- 3) You can remove the glue easily. When the glue remains on the bezel surface or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.

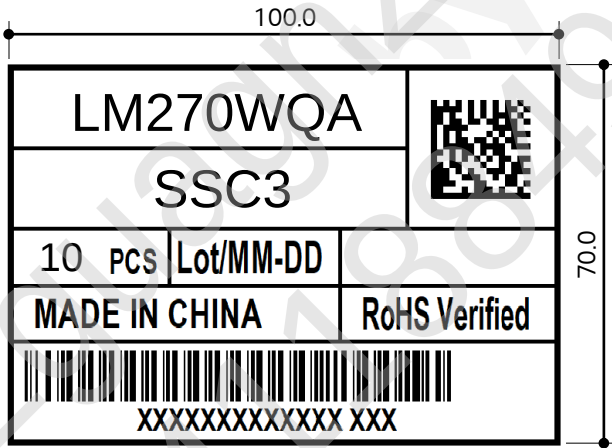
Product Specification

# APPENDIX

■ Serial Label



■ Box Label



■ Pallet Label

