



# SPECIFICATION

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**G240HW01 V1**

24.0" - FHD - LVDS

Version: 1.0

Date: 07.04.2017

Note: This specification is subject to change without prior notice



# Product Specification

G240HW01 V1

AU OPTRONICS CORPORATION

Preliminary Specification

Final Specification

|                   |                     |
|-------------------|---------------------|
| <b>Module</b>     | 24.0" Color TFT-LCD |
| <b>Model Name</b> | G240HW01 V1         |

|  |             |
|--|-------------|
| <b>Customer</b>  | <b>Date</b> |
| _____  | _____       |
| <b>Checked &amp; Approved by</b>                                     |             |
| _____  | _____       |
| <p>Note: This Specification is subject to change without notice.</p> |             |

|   |             |
|---|-------------|
| <b>Approved by</b>  | <b>Date</b> |
| Crystal Hsieh   | 2017/04/07  |
| <b>Prepared by</b>  |             |
| Jimmy Tsai  | 2017/04/07  |
| <p>General Display Business Division / AU Optronics corporation</p> |             |

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Record of Revision

| Version and Date                      | Page                                | Old description   | New Description  | Remark                  |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
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| 0.1 2015/03/23                        | All                                 | First Edition for Customer  | All  |                         |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| 0.2 2015/12/28                        | 5,6                                 | Brightness: 250 nits (Typ.)   | Brightness: 300 nits (Typ.)  |                         |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | 13                                  | Operating Life <sup>1)</sup>  | LTLED <sup>2)</sup> LED Life Time <sup>2)</sup> 30,000 <sup>2)</sup>   |                         |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| 0.3 2016/02/02                        | 5                                   | Temperature Range <sup>1)</sup> Operating <sup>1)</sup> Storage (Shipping) <sup>1)</sup> [°C] <sup>1)</sup> 0 to +50 <sup>1)</sup> -20 to +60 <sup>1)</sup>   | Temperature Range <sup>1)</sup> Operating <sup>1)</sup> Storage (Shipping) <sup>1)</sup> [°C] <sup>1)</sup> -20 to +70 <sup>1)</sup> -30 to +80 <sup>1)</sup>  |                         |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | 10                                  | <table border="1"> <thead> <tr> <th>Item<sup>1)</sup></th> <th>Symbol<sup>1)</sup></th> <th>Min.<sup>1)</sup></th> <th>Max.<sup>1)</sup></th> <th>Unit<sup>1)</sup></th> </tr> </thead> <tbody> <tr> <td>Operating Temperature<sup>1)</sup></td> <td>TOP<sup>1)</sup></td> <td>0<sup>1)</sup></td> <td>+50<sup>1)</sup></td> <td>[°C]<sup>1)</sup></td> </tr> <tr> <td>Operation Humidity<sup>1)</sup></td> <td>HOP<sup>1)</sup></td> <td>5<sup>1)</sup></td> <td>90<sup>1)</sup></td> <td>[%RH]<sup>1)</sup></td> </tr> <tr> <td>Storage Temperature<sup>1)</sup></td> <td>TST<sup>1)</sup></td> <td>-20<sup>1)</sup></td> <td>+60<sup>1)</sup></td> <td>[°C]<sup>1)</sup></td> </tr> <tr> <td>Storage Humidity<sup>1)</sup></td> <td>HST<sup>1)</sup></td> <td>5<sup>1)</sup></td> <td>90<sup>1)</sup></td> <td>[%RH]<sup>1)</sup></td> </tr> </tbody> </table>   | Item <sup>1)</sup>   | Symbol <sup>1)</sup>    | Min. <sup>1)</sup>             | Max. <sup>1)</sup>         | Unit <sup>1)</sup> | Operating Temperature <sup>1)</sup> | TOP <sup>1)</sup>                     | 0 <sup>1)</sup>                    | +50 <sup>1)</sup>                    | [°C] <sup>1)</sup> | Operation Humidity <sup>1)</sup> | HOP <sup>1)</sup>       | 5 <sup>1)</sup>  | 90 <sup>1)</sup>   | [%RH] <sup>1)</sup>           | Storage Temperature <sup>1)</sup> | TST <sup>1)</sup>  | -20 <sup>1)</sup>  | +60 <sup>1)</sup>            | [°C] <sup>1)</sup>                    | Storage Humidity <sup>1)</sup> | HST <sup>1)</sup>              | 5 <sup>1)</sup>                 | 90 <sup>1)</sup>  | [%RH] <sup>1)</sup>      | <table border="1"> <thead> <tr> <th>Item<sup>1)</sup></th> <th>Symbol<sup>1)</sup></th> <th>Min.<sup>1)</sup></th> <th>Max.<sup>1)</sup></th> <th>Unit<sup>1)</sup></th> </tr> </thead> <tbody> <tr> <td>Operating Temperature<sup>1)</sup></td> <td>TOP<sup>1)</sup></td> <td>-20<sup>1)</sup></td> <td>70<sup>1)</sup></td> <td>[°C]<sup>1)</sup></td> </tr> <tr> <td>Operation Humidity<sup>1)</sup></td> <td>HOP<sup>1)</sup></td> <td>5<sup>1)</sup></td> <td>90<sup>1)</sup></td> <td>[%RH]<sup>1)</sup></td> </tr> <tr> <td>Storage Temperature<sup>1)</sup></td> <td>TST<sup>1)</sup></td> <td>-30<sup>1)</sup></td> <td>80<sup>1)</sup></td> <td>[°C]<sup>1)</sup></td> </tr> <tr> <td>Storage Humidity<sup>1)</sup></td> <td>HST<sup>1)</sup></td> <td>5<sup>1)</sup></td> <td>90<sup>1)</sup></td> <td>[%RH]<sup>1)</sup></td> </tr> </tbody> </table> | Item <sup>1)</sup> | Symbol <sup>1)</sup>       | Min. <sup>1)</sup>            | Max. <sup>1)</sup>           | Unit <sup>1)</sup>          | Operating Temperature <sup>1)</sup> | TOP <sup>1)</sup>    | -20 <sup>1)</sup> | 70 <sup>1)</sup> | [°C] <sup>1)</sup>  | Operation Humidity <sup>1)</sup> | HOP <sup>1)</sup> | 5 <sup>1)</sup> | 90 <sup>1)</sup>  | [%RH] <sup>1)</sup>            | Storage Temperature <sup>1)</sup> | TST <sup>1)</sup> | -30 <sup>1)</sup>                 | 80 <sup>1)</sup>  | [°C] <sup>1)</sup> | Storage Humidity <sup>1)</sup> | HST <sup>1)</sup>              | 5 <sup>1)</sup>    | 90 <sup>1)</sup>   | [%RH] <sup>1)</sup>                 |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Item <sup>1)</sup>                    | Symbol <sup>1)</sup>                | Min. <sup>1)</sup>  | Max. <sup>1)</sup>   | Unit <sup>1)</sup>      |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Operating Temperature <sup>1)</sup>   | TOP <sup>1)</sup>                   | 0 <sup>1)</sup>   | +50 <sup>1)</sup>  | [°C] <sup>1)</sup>      |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Operation Humidity <sup>1)</sup>      | HOP <sup>1)</sup>                   | 5 <sup>1)</sup>   | 90 <sup>1)</sup>   | [%RH] <sup>1)</sup>     |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Storage Temperature <sup>1)</sup>     | TST <sup>1)</sup>                   | -20 <sup>1)</sup>   | +60 <sup>1)</sup>  | [°C] <sup>1)</sup>      |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Storage Humidity <sup>1)</sup>        | HST <sup>1)</sup>                   | 5 <sup>1)</sup>   | 90 <sup>1)</sup>   | [%RH] <sup>1)</sup>     |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Item <sup>1)</sup>                    | Symbol <sup>1)</sup>                | Min. <sup>1)</sup>  | Max. <sup>1)</sup>   | Unit <sup>1)</sup>      |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Operating Temperature <sup>1)</sup>   | TOP <sup>1)</sup>                   | -20 <sup>1)</sup>   | 70 <sup>1)</sup>   | [°C] <sup>1)</sup>      |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Operation Humidity <sup>1)</sup>      | HOP <sup>1)</sup>                   | 5 <sup>1)</sup>   | 90 <sup>1)</sup>   | [%RH] <sup>1)</sup>     |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Storage Temperature <sup>1)</sup>     | TST <sup>1)</sup>                   | -30 <sup>1)</sup>   | 80 <sup>1)</sup>   | [°C] <sup>1)</sup>      |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Storage Humidity <sup>1)</sup>        | HST <sup>1)</sup>                   | 5 <sup>1)</sup>   | 90 <sup>1)</sup>   | [%RH] <sup>1)</sup>     |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | 13                                  | <table border="1"> <thead> <tr> <th>Symbol<sup>1)</sup></th> <th>Parameter<sup>1)</sup></th> <th>Min.<sup>1)</sup></th> <th>Typ.<sup>1)</sup></th> <th>Max.<sup>1)</sup></th> <th>Unit<sup>1)</sup></th> <th>Remark<sup>1)</sup></th> </tr> </thead> <tbody> <tr> <td>V<sub>DD</sub><sup>1)</sup></td> <td>Input Voltage<sup>1)</sup></td> <td>10.8<sup>1)</sup></td> <td>12<sup>1)</sup></td> <td>13.2<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td>I<sub>DD</sub><sup>1)</sup></td> <td>Input Current<sup>1)</sup></td> <td>-</td> <td>TBD<sup>1)</sup></td> <td>-</td> <td>A<sup>1)</sup></td> <td>100% Dimming<sup>1)</sup></td> </tr> <tr> <td>P<sub>LED</sub><sup>1)</sup></td> <td>Power Consumption<sup>1)</sup></td> <td>-</td> <td>TBD<sup>1)</sup></td> <td>-</td> <td>Watt<sup>1)</sup></td> <td>100% Dimming<sup>1)</sup></td> </tr> <tr> <td>I<sub>IN</sub><sup>1)</sup></td> <td>Inrush Current<sup>1)</sup></td> <td>-</td> <td>4<sup>1)</sup></td> <td>5<sup>1)</sup></td> <td>A<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>BL_EN<sup>1)</sup></td> <td>On Control Voltage<sup>1)</sup></td> <td>3<sup>1)</sup></td> <td>-</td> <td>5.5<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td></td> <td>Off Control Voltage<sup>1)</sup></td> <td>0<sup>1)</sup></td> <td>-</td> <td>0.5<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td></td> <td>PWM Dimming Frequency<sup>1)</sup></td> <td>20K<sup>1)</sup></td> <td>-</td> <td>20K<sup>1)</sup></td> <td>Hz<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>FPWM<sup>1)</sup></td> <td>High Voltage<sup>1)</sup></td> <td>3.0<sup>1)</sup></td> <td>3.3<sup>1)</sup></td> <td>5.5<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td></td> <td>Low Voltage<sup>1)</sup></td> <td>0<sup>1)</sup></td> <td>-</td> <td>0.5<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td></td> <td>Dimming Duty Cycle<sup>1)</sup></td> <td>10<sup>1)</sup></td> <td>-</td> <td>100<sup>1)</sup></td> <td>%<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>I<sub>F</sub><sup>1)</sup></td> <td>LED Forward Current<sup>1)</sup></td> <td>-</td> <td>50<sup>1)</sup></td> <td>-</td> <td>mA<sup>1)</sup></td> <td>Ta = 25°C<sup>1)</sup></td> </tr> <tr> <td>LT_LED<sup>1)</sup></td> <td>LED Life Time<sup>1)</sup></td> <td>30,000<sup>1)</sup></td> <td>-</td> <td>-</td> <td>hrs<sup>1)</sup></td> <td>Note 4<sup>1)</sup></td> </tr> </tbody> </table> | Symbol <sup>1)</sup>   | Parameter <sup>1)</sup> | Min. <sup>1)</sup>             | Typ. <sup>1)</sup>         | Max. <sup>1)</sup> | Unit <sup>1)</sup>                  | Remark <sup>1)</sup>                  | V <sub>DD</sub> <sup>1)</sup>      | Input Voltage <sup>1)</sup>          | 10.8 <sup>1)</sup> | 12 <sup>1)</sup>                 | 13.2 <sup>1)</sup>      | V <sub>ohm</sub> <sup>1)</sup>   | -                  | I <sub>DD</sub> <sup>1)</sup> | Input Current <sup>1)</sup>       | -                  | TBD <sup>1)</sup>  | -                            | A <sup>1)</sup>                       | 100% Dimming <sup>1)</sup>     | P <sub>LED</sub> <sup>1)</sup> | Power Consumption <sup>1)</sup> | -                 | TBD <sup>1)</sup>        | -   | Watt <sup>1)</sup> | 100% Dimming <sup>1)</sup> | I <sub>IN</sub> <sup>1)</sup> | Inrush Current <sup>1)</sup> | -                           | 4 <sup>1)</sup>                     | 5 <sup>1)</sup>      | A <sup>1)</sup>   | -                | BL_EN <sup>1)</sup> | On Control Voltage <sup>1)</sup> | 3 <sup>1)</sup>   | -               | 5.5 <sup>1)</sup> | V <sub>ohm</sub> <sup>1)</sup> | -                                 |                   | Off Control Voltage <sup>1)</sup> | 0 <sup>1)</sup>   | -                  | 0.5 <sup>1)</sup>              | V <sub>ohm</sub> <sup>1)</sup> | -                  |                    | PWM Dimming Frequency <sup>1)</sup> | 20K <sup>1)</sup>             | -                                  | 20K <sup>1)</sup>                    | Hz <sup>1)</sup>  | -                 | FPWM <sup>1)</sup> | High Voltage <sup>1)</sup> | 3.0 <sup>1)</sup> | 3.3 <sup>1)</sup>      | 5.5 <sup>1)</sup> | V <sub>ohm</sub> <sup>1)</sup> | - |                              | Low Voltage <sup>1)</sup> | 0 <sup>1)</sup> | -                  | 0.5 <sup>1)</sup>  | V <sub>ohm</sub> <sup>1)</sup> | -                        |                 | Dimming Duty Cycle <sup>1)</sup> | 10 <sup>1)</sup> | - | 100 <sup>1)</sup> | % <sup>1)</sup>             | -                    | I <sub>F</sub> <sup>1)</sup> | LED Forward Current <sup>1)</sup> | - | 50 <sup>1)</sup> | -                     | mA <sup>1)</sup> | Ta = 25°C <sup>1)</sup> | LT_LED <sup>1)</sup> | LED Life Time <sup>1)</sup>    | 30,000 <sup>1)</sup> | - | -                | hrs <sup>1)</sup> | Note 4 <sup>1)</sup> | <table border="1"> <thead> <tr> <th>Symbol<sup>1)</sup></th> <th>Parameter<sup>1)</sup></th> <th>Min.<sup>1)</sup></th> <th>Typ.<sup>1)</sup></th> <th>Max.<sup>1)</sup></th> <th>Unit<sup>1)</sup></th> <th>Remark<sup>1)</sup></th> </tr> </thead> <tbody> <tr> <td>V<sub>DD</sub><sup>1)</sup></td> <td>Input Voltage<sup>1)</sup></td> <td>10.8<sup>1)</sup></td> <td>12<sup>1)</sup></td> <td>13.2<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td>I<sub>DD</sub><sup>1)</sup></td> <td>Input Current<sup>1)</sup></td> <td>-</td> <td>TBD<sup>1)</sup></td> <td>-</td> <td>A<sup>1)</sup></td> <td>100% Dimming<sup>1)</sup></td> </tr> <tr> <td>P<sub>LED</sub><sup>1)</sup></td> <td>Power Consumption<sup>1)</sup></td> <td>-</td> <td>TBD<sup>1)</sup></td> <td>-</td> <td>Watt<sup>1)</sup></td> <td>100% Dimming<sup>1)</sup></td> </tr> <tr> <td>I<sub>IN</sub><sup>1)</sup></td> <td>Inrush Current<sup>1)</sup></td> <td>-</td> <td>4<sup>1)</sup></td> <td>5<sup>1)</sup></td> <td>A<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>BL_EN<sup>1)</sup></td> <td>On Control Voltage<sup>1)</sup></td> <td>3<sup>1)</sup></td> <td>-</td> <td>5.5<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td></td> <td>Off Control Voltage<sup>1)</sup></td> <td>0<sup>1)</sup></td> <td>-</td> <td>0.5<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td></td> <td>PWM Dimming Frequency<sup>1)</sup></td> <td>20K<sup>1)</sup></td> <td>-</td> <td>20K<sup>1)</sup></td> <td>Hz<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>FPWM<sup>1)</sup></td> <td>High Voltage<sup>1)</sup></td> <td>3.0<sup>1)</sup></td> <td>3.3<sup>1)</sup></td> <td>5.5<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td></td> <td>Low Voltage<sup>1)</sup></td> <td>0<sup>1)</sup></td> <td>-</td> <td>0.5<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td></td> <td>Dimming Duty Cycle<sup>1)</sup></td> <td>10<sup>1)</sup></td> <td>-</td> <td>100<sup>1)</sup></td> <td>%<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>I<sub>F</sub><sup>1)</sup></td> <td>LED Forward Current<sup>1)</sup></td> <td>-</td> <td>60<sup>1)</sup></td> <td>-</td> <td>mA<sup>1)</sup></td> <td>Ta = 25°C<sup>1)</sup></td> </tr> <tr> <td>LT_LED<sup>1)</sup></td> <td>LED Life Time<sup>1)</sup></td> <td>30,000<sup>1)</sup></td> <td>-</td> <td>-</td> <td>hrs<sup>1)</sup></td> <td>Note 4<sup>1)</sup></td> </tr> </tbody> </table>                  | Symbol <sup>1)</sup> | Parameter <sup>1)</sup> | Min. <sup>1)</sup> | Typ. <sup>1)</sup> | Max. <sup>1)</sup> | Unit <sup>1)</sup> | Remark <sup>1)</sup> | V <sub>DD</sub> <sup>1)</sup> | Input Voltage <sup>1)</sup> | 10.8 <sup>1)</sup> | 12 <sup>1)</sup> | 13.2 <sup>1)</sup> | V <sub>ohm</sub> <sup>1)</sup> | - | I <sub>DD</sub> <sup>1)</sup> | Input Current <sup>1)</sup> | - | TBD <sup>1)</sup> | - | A <sup>1)</sup> | 100% Dimming <sup>1)</sup> | P <sub>LED</sub> <sup>1)</sup> | Power Consumption <sup>1)</sup> | - | TBD <sup>1)</sup>  | -                  | Watt <sup>1)</sup> | 100% Dimming <sup>1)</sup> | I <sub>IN</sub> <sup>1)</sup> | Inrush Current <sup>1)</sup> | - | 4 <sup>1)</sup> | 5 <sup>1)</sup> | A <sup>1)</sup> | - | BL_EN <sup>1)</sup> | On Control Voltage <sup>1)</sup> | 3 <sup>1)</sup> | - | 5.5 <sup>1)</sup> | V <sub>ohm</sub> <sup>1)</sup> | - |  | Off Control Voltage <sup>1)</sup> | 0 <sup>1)</sup> | - | 0.5 <sup>1)</sup> | V <sub>ohm</sub> <sup>1)</sup> | - |  | PWM Dimming Frequency <sup>1)</sup> | 20K <sup>1)</sup> | - | 20K <sup>1)</sup> | Hz <sup>1)</sup> | - | FPWM <sup>1)</sup> | High Voltage <sup>1)</sup> | 3.0 <sup>1)</sup> | 3.3 <sup>1)</sup> | 5.5 <sup>1)</sup> | V <sub>ohm</sub> <sup>1)</sup> | - |  | Low Voltage <sup>1)</sup> | 0 <sup>1)</sup> | - | 0.5 <sup>1)</sup> | V <sub>ohm</sub> <sup>1)</sup> | - |  | Dimming Duty Cycle <sup>1)</sup> | 10 <sup>1)</sup> | - | 100 <sup>1)</sup> | % <sup>1)</sup> | - | I <sub>F</sub> <sup>1)</sup> | LED Forward Current <sup>1)</sup> | - | 60 <sup>1)</sup> | - | mA <sup>1)</sup> | Ta = 25°C <sup>1)</sup> | LT_LED <sup>1)</sup> | LED Life Time <sup>1)</sup> | 30,000 <sup>1)</sup> | - | - | hrs <sup>1)</sup> | Note 4 <sup>1)</sup> |  |
| Symbol <sup>1)</sup>                  | Parameter <sup>1)</sup>             | Min. <sup>1)</sup>  | Typ. <sup>1)</sup>   | Max. <sup>1)</sup>      | Unit <sup>1)</sup>             | Remark <sup>1)</sup>       |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| V <sub>DD</sub> <sup>1)</sup>         | Input Voltage <sup>1)</sup>         | 10.8 <sup>1)</sup>  | 12 <sup>1)</sup>   | 13.2 <sup>1)</sup>      | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| I <sub>DD</sub> <sup>1)</sup>         | Input Current <sup>1)</sup>         | -   | TBD <sup>1)</sup>  | -                       | A <sup>1)</sup>                | 100% Dimming <sup>1)</sup> |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| P <sub>LED</sub> <sup>1)</sup>        | Power Consumption <sup>1)</sup>     | -   | TBD <sup>1)</sup>  | -                       | Watt <sup>1)</sup>             | 100% Dimming <sup>1)</sup> |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| I <sub>IN</sub> <sup>1)</sup>         | Inrush Current <sup>1)</sup>        | -   | 4 <sup>1)</sup>  | 5 <sup>1)</sup>         | A <sup>1)</sup>                | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| BL_EN <sup>1)</sup>                   | On Control Voltage <sup>1)</sup>    | 3 <sup>1)</sup>   | -  | 5.5 <sup>1)</sup>       | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | Off Control Voltage <sup>1)</sup>   | 0 <sup>1)</sup>   | -  | 0.5 <sup>1)</sup>       | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | PWM Dimming Frequency <sup>1)</sup> | 20K <sup>1)</sup>   | -  | 20K <sup>1)</sup>       | Hz <sup>1)</sup>               | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| FPWM <sup>1)</sup>                    | High Voltage <sup>1)</sup>          | 3.0 <sup>1)</sup>   | 3.3 <sup>1)</sup>  | 5.5 <sup>1)</sup>       | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | Low Voltage <sup>1)</sup>           | 0 <sup>1)</sup>   | -  | 0.5 <sup>1)</sup>       | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | Dimming Duty Cycle <sup>1)</sup>    | 10 <sup>1)</sup>  | -  | 100 <sup>1)</sup>       | % <sup>1)</sup>                | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| I <sub>F</sub> <sup>1)</sup>          | LED Forward Current <sup>1)</sup>   | -   | 50 <sup>1)</sup>   | -                       | mA <sup>1)</sup>               | Ta = 25°C <sup>1)</sup>    |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| LT_LED <sup>1)</sup>                  | LED Life Time <sup>1)</sup>         | 30,000 <sup>1)</sup>  | -  | -                       | hrs <sup>1)</sup>              | Note 4 <sup>1)</sup>       |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Symbol <sup>1)</sup>                  | Parameter <sup>1)</sup>             | Min. <sup>1)</sup>  | Typ. <sup>1)</sup>   | Max. <sup>1)</sup>      | Unit <sup>1)</sup>             | Remark <sup>1)</sup>       |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| V <sub>DD</sub> <sup>1)</sup>         | Input Voltage <sup>1)</sup>         | 10.8 <sup>1)</sup>  | 12 <sup>1)</sup>   | 13.2 <sup>1)</sup>      | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| I <sub>DD</sub> <sup>1)</sup>         | Input Current <sup>1)</sup>         | -   | TBD <sup>1)</sup>  | -                       | A <sup>1)</sup>                | 100% Dimming <sup>1)</sup> |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| P <sub>LED</sub> <sup>1)</sup>        | Power Consumption <sup>1)</sup>     | -   | TBD <sup>1)</sup>  | -                       | Watt <sup>1)</sup>             | 100% Dimming <sup>1)</sup> |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| I <sub>IN</sub> <sup>1)</sup>         | Inrush Current <sup>1)</sup>        | -   | 4 <sup>1)</sup>  | 5 <sup>1)</sup>         | A <sup>1)</sup>                | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| BL_EN <sup>1)</sup>                   | On Control Voltage <sup>1)</sup>    | 3 <sup>1)</sup>   | -  | 5.5 <sup>1)</sup>       | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | Off Control Voltage <sup>1)</sup>   | 0 <sup>1)</sup>   | -  | 0.5 <sup>1)</sup>       | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | PWM Dimming Frequency <sup>1)</sup> | 20K <sup>1)</sup>   | -  | 20K <sup>1)</sup>       | Hz <sup>1)</sup>               | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| FPWM <sup>1)</sup>                    | High Voltage <sup>1)</sup>          | 3.0 <sup>1)</sup>   | 3.3 <sup>1)</sup>  | 5.5 <sup>1)</sup>       | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | Low Voltage <sup>1)</sup>           | 0 <sup>1)</sup>   | -  | 0.5 <sup>1)</sup>       | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | Dimming Duty Cycle <sup>1)</sup>    | 10 <sup>1)</sup>  | -  | 100 <sup>1)</sup>       | % <sup>1)</sup>                | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| I <sub>F</sub> <sup>1)</sup>          | LED Forward Current <sup>1)</sup>   | -   | 60 <sup>1)</sup>   | -                       | mA <sup>1)</sup>               | Ta = 25°C <sup>1)</sup>    |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| LT_LED <sup>1)</sup>                  | LED Life Time <sup>1)</sup>         | 30,000 <sup>1)</sup>  | -  | -                       | hrs <sup>1)</sup>              | Note 4 <sup>1)</sup>       |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | 20                                  | 8 <sup>1)</sup> BL_EN <sup>1)</sup> Back light enable, 5V <sup>1)</sup><br>9 <sup>1)</sup> BL_DIM_P <sup>1)</sup> Back light dimming, 3.3V or 5V  | 8 <sup>1)</sup> BL_EN <sup>1)</sup> Back light enable, 3-5.5 V <sup>1)</sup><br>9 <sup>1)</sup> BL_DIM_P <sup>1)</sup> Back light dimming, 3-5.5 V.  |                         |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | 21                                  | old reliability test conditions   | upgrade reliability test conditions  |                         |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | 23                                  | <b>10.2 Carton Package.</b><br>• The outside dimension of carton is 412 x 281x 650 (mm).<br>• 8 pieces per carton box.<br>• 214 boxes per layer. By air, 2 layer/pallet. By sea, refer packing documents. Pallet size (not include carton boxes): 1100 mm x 600 mm x 160 mm.  | <b>10.2 Carton Package.</b><br>• The outside dimension of carton is 412 x 282x 661 (mm).<br>• 8 pieces per carton box.<br>• 214 boxes per layer. By air, 2 layer/pallet. By sea, refer packing documents. Pallet size (not include carton boxes): 1100 mm x 640 mm x 160 mm. |                         |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| 1.0 2017/04/07                        | 5                                   | Power Consumption <sup>1)</sup> [Watt] <sup>1)</sup> TBD<br>Weight <sup>1)</sup> [g] <sup>1)</sup> 2130 (typical) <sup>1)</sup>   | Power Consumption <sup>1)</sup> [Watt] <sup>1)</sup> 23.9 (max)(Cohk E + BL 17.5) <sup>1)</sup><br>Weight <sup>1)</sup> [g] <sup>1)</sup> 2,130 (typ) 1-213 g <sup>1)</sup>  |                         |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | 6                                   | <table border="1"> <thead> <tr> <th>Item<sup>1)</sup></th> <th>Unit<sup>1)</sup></th> <th>Conditions<sup>1)</sup></th> <th>Min.<sup>1)</sup></th> <th>Typ.<sup>1)</sup></th> <th>Max.<sup>1)</sup></th> </tr> </thead> <tbody> <tr> <td>White Luminance<sup>1)</sup></td> <td>[cd/m<sup>2</sup>]<sup>1)</sup></td> <td>I<sub>F</sub> = 100mA<sup>1)</sup></td> <td>240<sup>1)</sup></td> <td>300<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>Uniformity<sup>1)</sup></td> <td>%<sup>1)</sup></td> <td>9 Points<sup>1)</sup></td> <td>75<sup>1)</sup></td> <td>80<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>Contrast Ratio<sup>1)</sup></td> <td>-</td> <td>-</td> <td>3000<sup>1)</sup></td> <td>5000<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>Cross talk<sup>1)</sup></td> <td>%<sup>1)</sup></td> <td>-</td> <td>-</td> <td>-</td> <td>1.5<sup>1)</sup></td> </tr> <tr> <td rowspan="3">Response Time<sup>1)</sup></td> <td rowspan="3">[msec]<sup>1)</sup></td> <td>Rising<sup>1)</sup></td> <td>-</td> <td>-</td> <td>16<sup>1)</sup></td> </tr> <tr> <td>Falling<sup>1)</sup></td> <td>-</td> <td>-</td> <td>9<sup>1)</sup></td> </tr> <tr> <td>Rising + Falling<sup>1)</sup></td> <td>-</td> <td>-</td> <td>25<sup>1)</sup></td> </tr> </tbody> </table>   | Item <sup>1)</sup>   | Unit <sup>1)</sup>      | Conditions <sup>1)</sup>       | Min. <sup>1)</sup>         | Typ. <sup>1)</sup> | Max. <sup>1)</sup>                  | White Luminance <sup>1)</sup>         | [cd/m <sup>2</sup> ] <sup>1)</sup> | I <sub>F</sub> = 100mA <sup>1)</sup> | 240 <sup>1)</sup>  | 300 <sup>1)</sup>                | -                       | Uniformity <sup>1)</sup>   | % <sup>1)</sup>    | 9 Points <sup>1)</sup>        | 75 <sup>1)</sup>                  | 80 <sup>1)</sup>   | -                  | Contrast Ratio <sup>1)</sup> | -                                     | -                              | 3000 <sup>1)</sup>             | 5000 <sup>1)</sup>              | -                 | Cross talk <sup>1)</sup> | % <sup>1)</sup>   | -                  | -                          | -                             | 1.5 <sup>1)</sup>            | Response Time <sup>1)</sup> | [msec] <sup>1)</sup>                | Rising <sup>1)</sup> | -                 | -                | 16 <sup>1)</sup>    | Falling <sup>1)</sup>            | -                 | -               | 9 <sup>1)</sup>   | Rising + Falling <sup>1)</sup> | -                                 | -                 | 25 <sup>1)</sup>                  | <table border="1"> <thead> <tr> <th>Item<sup>1)</sup></th> <th>Unit<sup>1)</sup></th> <th>Conditions<sup>1)</sup></th> <th>Min.<sup>1)</sup></th> <th>Typ.<sup>1)</sup></th> <th>Max.<sup>1)</sup></th> </tr> </thead> <tbody> <tr> <td>White Luminance<sup>1)</sup></td> <td>[cd/m<sup>2</sup>]<sup>1)</sup></td> <td>I<sub>F</sub> = 45 mA<sup>1)</sup></td> <td>240<sup>1)</sup></td> <td>300<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>Uniformity<sup>1)</sup></td> <td>%<sup>1)</sup></td> <td>9 Points<sup>1)</sup></td> <td>75<sup>1)</sup></td> <td>80<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>Contrast Ratio<sup>1)</sup></td> <td>-</td> <td>-</td> <td>3000<sup>1)</sup></td> <td>5000<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>Cross talk<sup>1)</sup></td> <td>%<sup>1)</sup></td> <td>-</td> <td>-</td> <td>-</td> <td>1.5<sup>1)</sup></td> </tr> <tr> <td rowspan="3">Response Time<sup>1)</sup></td> <td rowspan="3">[msec]<sup>1)</sup></td> <td>Rising<sup>1)</sup></td> <td>-</td> <td>-</td> <td>16<sup>1)</sup></td> </tr> <tr> <td>Falling<sup>1)</sup></td> <td>-</td> <td>-</td> <td>9<sup>1)</sup></td> </tr> <tr> <td>Rising + Falling<sup>1)</sup></td> <td>-</td> <td>-</td> <td>25<sup>1)</sup></td> </tr> </tbody> </table> | Item <sup>1)</sup> | Unit <sup>1)</sup>             | Conditions <sup>1)</sup>       | Min. <sup>1)</sup> | Typ. <sup>1)</sup> | Max. <sup>1)</sup>                  | White Luminance <sup>1)</sup> | [cd/m <sup>2</sup> ] <sup>1)</sup> | I <sub>F</sub> = 45 mA <sup>1)</sup> | 240 <sup>1)</sup> | 300 <sup>1)</sup> | -                  | Uniformity <sup>1)</sup>   | % <sup>1)</sup>   | 9 Points <sup>1)</sup> | 75 <sup>1)</sup>  | 80 <sup>1)</sup>               | - | Contrast Ratio <sup>1)</sup> | -                         | -               | 3000 <sup>1)</sup> | 5000 <sup>1)</sup> | -                              | Cross talk <sup>1)</sup> | % <sup>1)</sup> | -                                | -                | - | 1.5 <sup>1)</sup> | Response Time <sup>1)</sup> | [msec] <sup>1)</sup> | Rising <sup>1)</sup>         | -                                 | - | 16 <sup>1)</sup> | Falling <sup>1)</sup> | -                | -                       | 9 <sup>1)</sup>      | Rising + Falling <sup>1)</sup> | -                    | - | 25 <sup>1)</sup> |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Item <sup>1)</sup>                    | Unit <sup>1)</sup>                  | Conditions <sup>1)</sup>  | Min. <sup>1)</sup>   | Typ. <sup>1)</sup>      | Max. <sup>1)</sup>             |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| White Luminance <sup>1)</sup>         | [cd/m <sup>2</sup> ] <sup>1)</sup>  | I <sub>F</sub> = 100mA <sup>1)</sup>  | 240 <sup>1)</sup>  | 300 <sup>1)</sup>       | -                              |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Uniformity <sup>1)</sup>              | % <sup>1)</sup>                     | 9 Points <sup>1)</sup>  | 75 <sup>1)</sup>   | 80 <sup>1)</sup>        | -                              |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Contrast Ratio <sup>1)</sup>          | -                                   | -   | 3000 <sup>1)</sup>   | 5000 <sup>1)</sup>      | -                              |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Cross talk <sup>1)</sup>              | % <sup>1)</sup>                     | -   | -  | -                       | 1.5 <sup>1)</sup>              |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Response Time <sup>1)</sup>           | [msec] <sup>1)</sup>                | Rising <sup>1)</sup>  | -  | -                       | 16 <sup>1)</sup>               |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       |                                     | Falling <sup>1)</sup>   | -  | -                       | 9 <sup>1)</sup>                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       |                                     | Rising + Falling <sup>1)</sup>  | -  | -                       | 25 <sup>1)</sup>               |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Item <sup>1)</sup>                    | Unit <sup>1)</sup>                  | Conditions <sup>1)</sup>  | Min. <sup>1)</sup>   | Typ. <sup>1)</sup>      | Max. <sup>1)</sup>             |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| White Luminance <sup>1)</sup>         | [cd/m <sup>2</sup> ] <sup>1)</sup>  | I <sub>F</sub> = 45 mA <sup>1)</sup>  | 240 <sup>1)</sup>  | 300 <sup>1)</sup>       | -                              |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Uniformity <sup>1)</sup>              | % <sup>1)</sup>                     | 9 Points <sup>1)</sup>  | 75 <sup>1)</sup>   | 80 <sup>1)</sup>        | -                              |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Contrast Ratio <sup>1)</sup>          | -                                   | -   | 3000 <sup>1)</sup>   | 5000 <sup>1)</sup>      | -                              |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Cross talk <sup>1)</sup>              | % <sup>1)</sup>                     | -   | -  | -                       | 1.5 <sup>1)</sup>              |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Response Time <sup>1)</sup>           | [msec] <sup>1)</sup>                | Rising <sup>1)</sup>  | -  | -                       | 16 <sup>1)</sup>               |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       |                                     | Falling <sup>1)</sup>   | -  | -                       | 9 <sup>1)</sup>                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       |                                     | Rising + Falling <sup>1)</sup>  | -  | -                       | 25 <sup>1)</sup>               |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | 10                                  | <b>4.1 TFT LCD Module.</b><br><table border="1"> <thead> <tr> <th>Item<sup>1)</sup></th> <th>Symbol<sup>1)</sup></th> <th>Min.<sup>1)</sup></th> <th>Max.<sup>1)</sup></th> <th>Unit<sup>1)</sup></th> <th>Conditions<sup>1)</sup></th> </tr> </thead> <tbody> <tr> <td>Logic/LCD Drive Voltage<sup>1)</sup></td> <td>V<sub>DD</sub><sup>1)</sup></td> <td>0<sup>1)</sup></td> <td>6.0<sup>1)</sup></td> <td>[V]<sup>1)</sup></td> <td>Note 1, 2<sup>1)</sup></td> </tr> </tbody> </table>  | Item <sup>1)</sup>   | Symbol <sup>1)</sup>    | Min. <sup>1)</sup>             | Max. <sup>1)</sup>         | Unit <sup>1)</sup> | Conditions <sup>1)</sup>            | Logic/LCD Drive Voltage <sup>1)</sup> | V <sub>DD</sub> <sup>1)</sup>      | 0 <sup>1)</sup>                      | 6.0 <sup>1)</sup>  | [V] <sup>1)</sup>                | Note 1, 2 <sup>1)</sup> | <b>4.1 TFT LCD Module.</b><br><table border="1"> <thead> <tr> <th>Item<sup>1)</sup></th> <th>Symbol<sup>1)</sup></th> <th>Min.<sup>1)</sup></th> <th>Max.<sup>1)</sup></th> <th>Unit<sup>1)</sup></th> <th>Conditions<sup>1)</sup></th> </tr> </thead> <tbody> <tr> <td>Logic/LCD Drive Voltage<sup>1)</sup></td> <td>V<sub>DD</sub><sup>1)</sup></td> <td>0<sup>1)</sup></td> <td>5.5<sup>1)</sup></td> <td>[V]<sup>1)</sup></td> <td>Note 1, 2<sup>1)</sup></td> </tr> </tbody> </table> | Item <sup>1)</sup> | Symbol <sup>1)</sup>          | Min. <sup>1)</sup>                | Max. <sup>1)</sup> | Unit <sup>1)</sup> | Conditions <sup>1)</sup>     | Logic/LCD Drive Voltage <sup>1)</sup> | V <sub>DD</sub> <sup>1)</sup>  | 0 <sup>1)</sup>                | 5.5 <sup>1)</sup>               | [V] <sup>1)</sup> | Note 1, 2 <sup>1)</sup>  |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Item <sup>1)</sup>                    | Symbol <sup>1)</sup>                | Min. <sup>1)</sup>  | Max. <sup>1)</sup>   | Unit <sup>1)</sup>      | Conditions <sup>1)</sup>       |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Logic/LCD Drive Voltage <sup>1)</sup> | V <sub>DD</sub> <sup>1)</sup>       | 0 <sup>1)</sup>   | 6.0 <sup>1)</sup>  | [V] <sup>1)</sup>       | Note 1, 2 <sup>1)</sup>        |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Item <sup>1)</sup>                    | Symbol <sup>1)</sup>                | Min. <sup>1)</sup>  | Max. <sup>1)</sup>   | Unit <sup>1)</sup>      | Conditions <sup>1)</sup>       |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Logic/LCD Drive Voltage <sup>1)</sup> | V <sub>DD</sub> <sup>1)</sup>       | 0 <sup>1)</sup>   | 5.5 <sup>1)</sup>  | [V] <sup>1)</sup>       | Note 1, 2 <sup>1)</sup>        |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | 13                                  | <table border="1"> <thead> <tr> <th>Symbol<sup>1)</sup></th> <th>Parameter<sup>1)</sup></th> <th>Min.<sup>1)</sup></th> <th>Typ.<sup>1)</sup></th> <th>Max.<sup>1)</sup></th> <th>Unit<sup>1)</sup></th> <th>Remark<sup>1)</sup></th> </tr> </thead> <tbody> <tr> <td>V<sub>DD</sub><sup>1)</sup></td> <td>Input Voltage<sup>1)</sup></td> <td>10.8<sup>1)</sup></td> <td>12<sup>1)</sup></td> <td>13.2<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td>I<sub>DD</sub><sup>1)</sup></td> <td>Input Current<sup>1)</sup></td> <td>-</td> <td>TBD<sup>1)</sup></td> <td>-</td> <td>A<sup>1)</sup></td> <td>100% Dimming<sup>1)</sup></td> </tr> <tr> <td>P<sub>LED</sub><sup>1)</sup></td> <td>Power Consumption<sup>1)</sup></td> <td>-</td> <td>TBD<sup>1)</sup></td> <td>-</td> <td>Watt<sup>1)</sup></td> <td>100% Dimming<sup>1)</sup></td> </tr> <tr> <td>I<sub>IN</sub><sup>1)</sup></td> <td>Inrush Current<sup>1)</sup></td> <td>-</td> <td>4<sup>1)</sup></td> <td>5<sup>1)</sup></td> <td>A<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>BL_EN<sup>1)</sup></td> <td>On Control Voltage<sup>1)</sup></td> <td>3<sup>1)</sup></td> <td>-</td> <td>5.5<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td></td> <td>Off Control Voltage<sup>1)</sup></td> <td>0<sup>1)</sup></td> <td>-</td> <td>0.5<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td></td> <td>PWM Dimming Frequency<sup>1)</sup></td> <td>20K<sup>1)</sup></td> <td>-</td> <td>20K<sup>1)</sup></td> <td>Hz<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>FPWM<sup>1)</sup></td> <td>High Voltage<sup>1)</sup></td> <td>3.0<sup>1)</sup></td> <td>3.3<sup>1)</sup></td> <td>5.5<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td></td> <td>Low Voltage<sup>1)</sup></td> <td>0<sup>1)</sup></td> <td>-</td> <td>0.5<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td></td> <td>Dimming Duty Cycle<sup>1)</sup></td> <td>10<sup>1)</sup></td> <td>-</td> <td>100<sup>1)</sup></td> <td>%<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>I<sub>F</sub><sup>1)</sup></td> <td>LED Forward Current<sup>1)</sup></td> <td>-</td> <td>50<sup>1)</sup></td> <td>-</td> <td>mA<sup>1)</sup></td> <td>Ta = 25°C<sup>1)</sup></td> </tr> <tr> <td>LT_LED<sup>1)</sup></td> <td>LED Life Time<sup>1)</sup></td> <td>30,000<sup>1)</sup></td> <td>-</td> <td>-</td> <td>hrs<sup>1)</sup></td> <td>Note 4<sup>1)</sup></td> </tr> </tbody> </table> | Symbol <sup>1)</sup>   | Parameter <sup>1)</sup> | Min. <sup>1)</sup>             | Typ. <sup>1)</sup>         | Max. <sup>1)</sup> | Unit <sup>1)</sup>                  | Remark <sup>1)</sup>                  | V <sub>DD</sub> <sup>1)</sup>      | Input Voltage <sup>1)</sup>          | 10.8 <sup>1)</sup> | 12 <sup>1)</sup>                 | 13.2 <sup>1)</sup>      | V <sub>ohm</sub> <sup>1)</sup>   | -                  | I <sub>DD</sub> <sup>1)</sup> | Input Current <sup>1)</sup>       | -                  | TBD <sup>1)</sup>  | -                            | A <sup>1)</sup>                       | 100% Dimming <sup>1)</sup>     | P <sub>LED</sub> <sup>1)</sup> | Power Consumption <sup>1)</sup> | -                 | TBD <sup>1)</sup>        | -   | Watt <sup>1)</sup> | 100% Dimming <sup>1)</sup> | I <sub>IN</sub> <sup>1)</sup> | Inrush Current <sup>1)</sup> | -                           | 4 <sup>1)</sup>                     | 5 <sup>1)</sup>      | A <sup>1)</sup>   | -                | BL_EN <sup>1)</sup> | On Control Voltage <sup>1)</sup> | 3 <sup>1)</sup>   | -               | 5.5 <sup>1)</sup> | V <sub>ohm</sub> <sup>1)</sup> | -                                 |                   | Off Control Voltage <sup>1)</sup> | 0 <sup>1)</sup>   | -                  | 0.5 <sup>1)</sup>              | V <sub>ohm</sub> <sup>1)</sup> | -                  |                    | PWM Dimming Frequency <sup>1)</sup> | 20K <sup>1)</sup>             | -                                  | 20K <sup>1)</sup>                    | Hz <sup>1)</sup>  | -                 | FPWM <sup>1)</sup> | High Voltage <sup>1)</sup> | 3.0 <sup>1)</sup> | 3.3 <sup>1)</sup>      | 5.5 <sup>1)</sup> | V <sub>ohm</sub> <sup>1)</sup> | - |                              | Low Voltage <sup>1)</sup> | 0 <sup>1)</sup> | -                  | 0.5 <sup>1)</sup>  | V <sub>ohm</sub> <sup>1)</sup> | -                        |                 | Dimming Duty Cycle <sup>1)</sup> | 10 <sup>1)</sup> | - | 100 <sup>1)</sup> | % <sup>1)</sup>             | -                    | I <sub>F</sub> <sup>1)</sup> | LED Forward Current <sup>1)</sup> | - | 50 <sup>1)</sup> | -                     | mA <sup>1)</sup> | Ta = 25°C <sup>1)</sup> | LT_LED <sup>1)</sup> | LED Life Time <sup>1)</sup>    | 30,000 <sup>1)</sup> | - | -                | hrs <sup>1)</sup> | Note 4 <sup>1)</sup> | <table border="1"> <thead> <tr> <th>Symbol<sup>1)</sup></th> <th>Parameter<sup>1)</sup></th> <th>Min.<sup>1)</sup></th> <th>Typ.<sup>1)</sup></th> <th>Max.<sup>1)</sup></th> <th>Unit<sup>1)</sup></th> <th>Remark<sup>1)</sup></th> </tr> </thead> <tbody> <tr> <td>V<sub>DD</sub><sup>1)</sup></td> <td>Input Voltage<sup>1)</sup></td> <td>10.8<sup>1)</sup></td> <td>12<sup>1)</sup></td> <td>13.2<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td>I<sub>DD</sub><sup>1)</sup></td> <td>Input Current<sup>1)</sup></td> <td>-</td> <td>TBD<sup>1)</sup></td> <td>-</td> <td>A<sup>1)</sup></td> <td>100% Dimming<sup>1)</sup></td> </tr> <tr> <td>P<sub>LED</sub><sup>1)</sup></td> <td>Power Consumption<sup>1)</sup></td> <td>-</td> <td>14.4<sup>1)</sup></td> <td>17.5<sup>1)</sup></td> <td>Watt<sup>1)</sup></td> <td>100% Dimming<sup>1)</sup></td> </tr> <tr> <td>I<sub>IN</sub><sup>1)</sup></td> <td>Inrush Current<sup>1)</sup></td> <td>-</td> <td>4<sup>1)</sup></td> <td>5<sup>1)</sup></td> <td>A<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>BL_EN<sup>1)</sup></td> <td>On Control Voltage<sup>1)</sup></td> <td>3<sup>1)</sup></td> <td>-</td> <td>5.5<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td></td> <td>Off Control Voltage<sup>1)</sup></td> <td>0<sup>1)</sup></td> <td>-</td> <td>0.5<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td></td> <td>PWM Dimming Frequency<sup>1)</sup></td> <td>20K<sup>1)</sup></td> <td>-</td> <td>20K<sup>1)</sup></td> <td>Hz<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>FPWM<sup>1)</sup></td> <td>High Voltage<sup>1)</sup></td> <td>3.0<sup>1)</sup></td> <td>3.3<sup>1)</sup></td> <td>5.5<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td></td> <td>Low Voltage<sup>1)</sup></td> <td>0<sup>1)</sup></td> <td>-</td> <td>0.5<sup>1)</sup></td> <td>V<sub>ohm</sub><sup>1)</sup></td> <td>-</td> </tr> <tr> <td></td> <td>Dimming Duty Cycle<sup>1)</sup></td> <td>10<sup>1)</sup></td> <td>-</td> <td>100<sup>1)</sup></td> <td>%<sup>1)</sup></td> <td>-</td> </tr> <tr> <td>I<sub>F</sub><sup>1)</sup></td> <td>LED Forward Current<sup>1)</sup></td> <td>-</td> <td>45<sup>1)</sup></td> <td>-</td> <td>mA<sup>1)</sup></td> <td>Ta = 25°C<sup>1)</sup></td> </tr> <tr> <td>LT_LED<sup>1)</sup></td> <td>LED Life Time<sup>1)</sup></td> <td>50,000<sup>1)</sup></td> <td>-</td> <td>-</td> <td>hrs<sup>1)</sup></td> <td>Note 4<sup>1)</sup></td> </tr> </tbody> </table> | Symbol <sup>1)</sup> | Parameter <sup>1)</sup> | Min. <sup>1)</sup> | Typ. <sup>1)</sup> | Max. <sup>1)</sup> | Unit <sup>1)</sup> | Remark <sup>1)</sup> | V <sub>DD</sub> <sup>1)</sup> | Input Voltage <sup>1)</sup> | 10.8 <sup>1)</sup> | 12 <sup>1)</sup> | 13.2 <sup>1)</sup> | V <sub>ohm</sub> <sup>1)</sup> | - | I <sub>DD</sub> <sup>1)</sup> | Input Current <sup>1)</sup> | - | TBD <sup>1)</sup> | - | A <sup>1)</sup> | 100% Dimming <sup>1)</sup> | P <sub>LED</sub> <sup>1)</sup> | Power Consumption <sup>1)</sup> | - | 14.4 <sup>1)</sup> | 17.5 <sup>1)</sup> | Watt <sup>1)</sup> | 100% Dimming <sup>1)</sup> | I <sub>IN</sub> <sup>1)</sup> | Inrush Current <sup>1)</sup> | - | 4 <sup>1)</sup> | 5 <sup>1)</sup> | A <sup>1)</sup> | - | BL_EN <sup>1)</sup> | On Control Voltage <sup>1)</sup> | 3 <sup>1)</sup> | - | 5.5 <sup>1)</sup> | V <sub>ohm</sub> <sup>1)</sup> | - |  | Off Control Voltage <sup>1)</sup> | 0 <sup>1)</sup> | - | 0.5 <sup>1)</sup> | V <sub>ohm</sub> <sup>1)</sup> | - |  | PWM Dimming Frequency <sup>1)</sup> | 20K <sup>1)</sup> | - | 20K <sup>1)</sup> | Hz <sup>1)</sup> | - | FPWM <sup>1)</sup> | High Voltage <sup>1)</sup> | 3.0 <sup>1)</sup> | 3.3 <sup>1)</sup> | 5.5 <sup>1)</sup> | V <sub>ohm</sub> <sup>1)</sup> | - |  | Low Voltage <sup>1)</sup> | 0 <sup>1)</sup> | - | 0.5 <sup>1)</sup> | V <sub>ohm</sub> <sup>1)</sup> | - |  | Dimming Duty Cycle <sup>1)</sup> | 10 <sup>1)</sup> | - | 100 <sup>1)</sup> | % <sup>1)</sup> | - | I <sub>F</sub> <sup>1)</sup> | LED Forward Current <sup>1)</sup> | - | 45 <sup>1)</sup> | - | mA <sup>1)</sup> | Ta = 25°C <sup>1)</sup> | LT_LED <sup>1)</sup> | LED Life Time <sup>1)</sup> | 50,000 <sup>1)</sup> | - | - | hrs <sup>1)</sup> | Note 4 <sup>1)</sup> |  |
| Symbol <sup>1)</sup>                  | Parameter <sup>1)</sup>             | Min. <sup>1)</sup>  | Typ. <sup>1)</sup>   | Max. <sup>1)</sup>      | Unit <sup>1)</sup>             | Remark <sup>1)</sup>       |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| V <sub>DD</sub> <sup>1)</sup>         | Input Voltage <sup>1)</sup>         | 10.8 <sup>1)</sup>  | 12 <sup>1)</sup>   | 13.2 <sup>1)</sup>      | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| I <sub>DD</sub> <sup>1)</sup>         | Input Current <sup>1)</sup>         | -   | TBD <sup>1)</sup>  | -                       | A <sup>1)</sup>                | 100% Dimming <sup>1)</sup> |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| P <sub>LED</sub> <sup>1)</sup>        | Power Consumption <sup>1)</sup>     | -   | TBD <sup>1)</sup>  | -                       | Watt <sup>1)</sup>             | 100% Dimming <sup>1)</sup> |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| I <sub>IN</sub> <sup>1)</sup>         | Inrush Current <sup>1)</sup>        | -   | 4 <sup>1)</sup>  | 5 <sup>1)</sup>         | A <sup>1)</sup>                | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| BL_EN <sup>1)</sup>                   | On Control Voltage <sup>1)</sup>    | 3 <sup>1)</sup>   | -  | 5.5 <sup>1)</sup>       | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | Off Control Voltage <sup>1)</sup>   | 0 <sup>1)</sup>   | -  | 0.5 <sup>1)</sup>       | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | PWM Dimming Frequency <sup>1)</sup> | 20K <sup>1)</sup>   | -  | 20K <sup>1)</sup>       | Hz <sup>1)</sup>               | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| FPWM <sup>1)</sup>                    | High Voltage <sup>1)</sup>          | 3.0 <sup>1)</sup>   | 3.3 <sup>1)</sup>  | 5.5 <sup>1)</sup>       | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | Low Voltage <sup>1)</sup>           | 0 <sup>1)</sup>   | -  | 0.5 <sup>1)</sup>       | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | Dimming Duty Cycle <sup>1)</sup>    | 10 <sup>1)</sup>  | -  | 100 <sup>1)</sup>       | % <sup>1)</sup>                | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| I <sub>F</sub> <sup>1)</sup>          | LED Forward Current <sup>1)</sup>   | -   | 50 <sup>1)</sup>   | -                       | mA <sup>1)</sup>               | Ta = 25°C <sup>1)</sup>    |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| LT_LED <sup>1)</sup>                  | LED Life Time <sup>1)</sup>         | 30,000 <sup>1)</sup>  | -  | -                       | hrs <sup>1)</sup>              | Note 4 <sup>1)</sup>       |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| Symbol <sup>1)</sup>                  | Parameter <sup>1)</sup>             | Min. <sup>1)</sup>  | Typ. <sup>1)</sup>   | Max. <sup>1)</sup>      | Unit <sup>1)</sup>             | Remark <sup>1)</sup>       |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| V <sub>DD</sub> <sup>1)</sup>         | Input Voltage <sup>1)</sup>         | 10.8 <sup>1)</sup>  | 12 <sup>1)</sup>   | 13.2 <sup>1)</sup>      | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| I <sub>DD</sub> <sup>1)</sup>         | Input Current <sup>1)</sup>         | -   | TBD <sup>1)</sup>  | -                       | A <sup>1)</sup>                | 100% Dimming <sup>1)</sup> |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| P <sub>LED</sub> <sup>1)</sup>        | Power Consumption <sup>1)</sup>     | -   | 14.4 <sup>1)</sup>   | 17.5 <sup>1)</sup>      | Watt <sup>1)</sup>             | 100% Dimming <sup>1)</sup> |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| I <sub>IN</sub> <sup>1)</sup>         | Inrush Current <sup>1)</sup>        | -   | 4 <sup>1)</sup>  | 5 <sup>1)</sup>         | A <sup>1)</sup>                | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| BL_EN <sup>1)</sup>                   | On Control Voltage <sup>1)</sup>    | 3 <sup>1)</sup>   | -  | 5.5 <sup>1)</sup>       | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | Off Control Voltage <sup>1)</sup>   | 0 <sup>1)</sup>   | -  | 0.5 <sup>1)</sup>       | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | PWM Dimming Frequency <sup>1)</sup> | 20K <sup>1)</sup>   | -  | 20K <sup>1)</sup>       | Hz <sup>1)</sup>               | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| FPWM <sup>1)</sup>                    | High Voltage <sup>1)</sup>          | 3.0 <sup>1)</sup>   | 3.3 <sup>1)</sup>  | 5.5 <sup>1)</sup>       | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | Low Voltage <sup>1)</sup>           | 0 <sup>1)</sup>   | -  | 0.5 <sup>1)</sup>       | V <sub>ohm</sub> <sup>1)</sup> | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | Dimming Duty Cycle <sup>1)</sup>    | 10 <sup>1)</sup>  | -  | 100 <sup>1)</sup>       | % <sup>1)</sup>                | -                          |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| I <sub>F</sub> <sup>1)</sup>          | LED Forward Current <sup>1)</sup>   | -   | 45 <sup>1)</sup>   | -                       | mA <sup>1)</sup>               | Ta = 25°C <sup>1)</sup>    |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
| LT_LED <sup>1)</sup>                  | LED Life Time <sup>1)</sup>         | 50,000 <sup>1)</sup>  | -  | -                       | hrs <sup>1)</sup>              | Note 4 <sup>1)</sup>       |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |
|                                       | 21                                  | Ta= 70°C, 50%RH, 300hours   | Ta= 70°C, 300hours   |                         |                                |                            |                    |                                     |                                       |                                    |                                      |                    |                                  |                         |  |                    |                               |                                   |                    |                    |                              |                                       |                                |                                |                                 |                   |                          |   |                    |                            |                               |                              |                             |                                     |                      |                   |                  |                     |                                  |                   |                 |                   |                                |                                   |                   |                                   |   |                    |                                |                                |                    |                    |                                     |                               |                                    |                                      |                   |                   |                    |                            |                   |                        |                   |                                |   |                              |                           |                 |                    |                    |                                |                          |                 |                                  |                  |   |                   |                             |                      |                              |                                   |   |                  |                       |                  |                         |                      |                                |                      |   |                  |                   |                      |  |                      |                         |                    |                    |                    |                    |                      |                               |                             |                    |                  |                    |                                |   |                               |                             |   |                   |   |                 |                            |                                |                                 |   |                    |                    |                    |                            |                               |                              |   |                 |                 |                 |   |                     |                                  |                 |   |                   |                                |   |  |                                   |                 |   |                   |                                |   |  |                                     |                   |   |                   |                  |   |                    |                            |                   |                   |                   |                                |   |  |                           |                 |   |                   |                                |   |  |                                  |                  |   |                   |                 |   |                              |                                   |   |                  |   |                  |                         |                      |                             |                      |   |   |                   |                      |  |

## 1. Operating Precautions

- 1) Since front polarizer is easily damaged, pay attention not to scratch it.
- 2) Be sure to turn off power supply when inserting or disconnecting from input connector.
- 3) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
- 4) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
- 5) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.
- 6) Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.
- 7) Do not open or modify the Module Assembly.
- 8) In case if a Module has to be put back into the packing container slot after once it was taken out from the container, take it easily, or the TFT Module may be damaged.
- 9) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.
- 10) After installation of the TFT Module into an enclosure, do not twist nor bend the TFT Module even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.
- 11) Small amount of materials having no flammability grade is used in the LCD module. The LCD module should be supplied by power complied with requirements of Limited Power Source (IEC60950 or UL1950), or be applied exemption.
- 12) Severe temperature condition may result in different luminance, response time and LED life time.
- 13) The data on this specification sheet is applicable when LCD module is placed in landscape position.
- 14) Continuous displaying fixed pattern may induce image sticking. It is recommended to use screen saver or shuffle content periodically if fixed pattern is displayed on the screen.

## 2. General Description

This specification applies to the 24 inch-wide Color TFT-LCD Module G240HW01 V1. The display supports the Full HD - 1920(H) x 1080(V) screen format and 16.7M colors (RGB 8-bits data). All input signals are dual channel LVDS interface.

LED driver board is included. G240HW01 V1 is designed for industrial display applications.

### 2.1 Display Characteristics

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

| ITEMS                      | Unit                 | SPECIFICATIONS                   |
|----------------------------|----------------------|----------------------------------|
| Screen Diagonal            | [mm]                 | 609.7(24.0")                     |
| Active Area                | [mm]                 | 531.36 (H) x 298.89 (V)          |
| Pixels H x V               |                      | 1920(x3) x 1080                  |
| Pixel Pitch                | [um]                 | 276.75 (per one triad) ×276.75   |
| Pixel Arrangement          |                      | R.G.B. Vertical Stripe           |
| Display Mode               |                      | VA Mode, Normally Black          |
| White Luminance ( Center ) | [cd/m <sup>2</sup> ] | 300                              |
| Contrast Ratio             |                      | 5000: 1                          |
| Optical Response Time      | [msec]               | 25                               |
| Nominal Input Voltage VDD  | [Volt]               | +5.0 V                           |
| Power Consumption          | [Watt]               | 23.3 (max) (Cell: 6 + BL: 17.3)  |
| Weight                     | [g]                  | 2,130 (Typ.)+/-213 g             |
| Physical Size              | [mm]                 | 556.0 (W) x 323.2 (H) x 17.0 (D) |
| Electrical Interface       |                      | Dual channel LVDS                |
| Support Color              |                      | 16.7M colors (true 8-bit)        |
| Surface Treatment          |                      | Anti-Glare, 3H                   |
| Temperature Range          |                      |                                  |
| Operating                  | [°C]                 | -20 to +70                       |
| Storage (Shipping)         | [°C]                 | -30 to +80                       |
| RoHS Compliance            |                      | RoHS Compliance                  |

## 2.2 Optical Characteristics

The optical characteristics are measured under stable conditions at 25°C (Room Temperature):

| Item  | Unit                 | Conditions                           | Min.  | Typ.  | Max.  | Note    |
|---|----------------------|--------------------------------------|-------|-------|-------|---------|
| White Luminance                             | [cd/m <sup>2</sup> ] | I <sub>F</sub> = 45 mA               | 240   | 300   | -     | 1       |
| Uniformity                                  | %                    | 9 Points                             | 75    | 80    | -     | 1, 2, 3 |
| Contrast Ratio                              |                      |                                      | 3000  | 5000  | -     | 4       |
| Cross talk                                  | %                    |                                      | -     | -     | 1.5   | 5       |
| Response Time                               | [msec]               | Rising                               | -     | 16    | -     | 6       |
|   |                      | Falling                              | -     | 9     | -     |         |
|   |                      | Rising + Falling                     | -     | 25    | 50    |         |
| Viewing Angle                               | [degree]             | Horizontal (Right)<br>CR = 10 (Left) | 75    | 89    | -     | 7       |
|   | [degree]             |                                      | 75    | 89    | -     |         |
|   | [degree]             | Vertical (Upper)<br>CR = 10 (Lower)  | 75    | 89    | -     |         |
|   | [degree]             |                                      | 75    | 89    | -     |         |
| Color / Chromaticity Coordinates (CIE 1931) |                      | Red x                                | 0.593 | 0.643 | 0.693 |         |
|   |                      | Red y                                | 0.289 | 0.339 | 0.389 |         |
|   |                      | Green x                              | 0.279 | 0.329 | 0.379 |         |
|   |                      | Green y                              | 0.574 | 0.624 | 0.674 |         |
|   |                      | Blue x                               | 0.105 | 0.155 | 0.205 |         |
|   |                      | Blue y                               | 0.000 | 0.048 | 0.098 |         |
|   |                      | White x                              | 0.263 | 0.313 | 0.363 |         |
|   |                      | White y                              | 0.279 | 0.329 | 0.379 |         |
| Color Gamut                                 | %                    |                                      |       | 72    | -     |         |

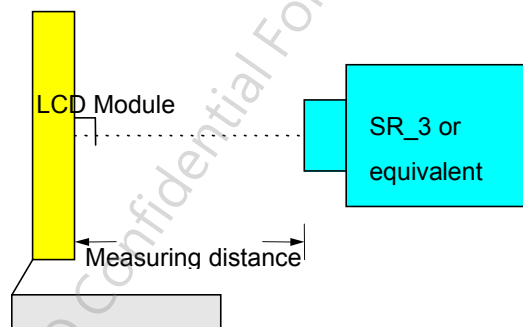
Note 1: Measurement method

Equipment Pattern Generator, Power Supply, Digital Voltmeter, Luminance meter (SR\_3 or equivalent)

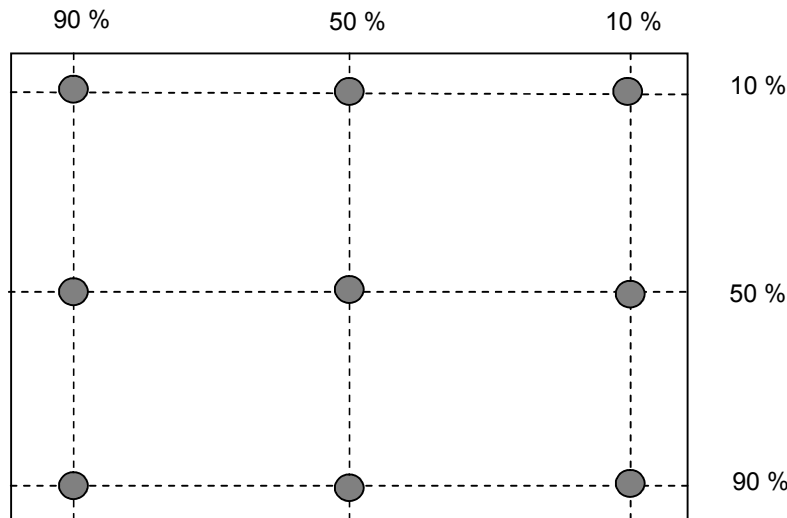
Aperture 1□ with 50cm viewing distance

Test Point Center

Environment < 1 lux



Note 2: Definition of 9 points position. Display active area:



Note 3: The luminance uniformity of 9 points is defined by dividing the minimum luminance values by the maximum test point luminance

$$\delta_{w9} = \frac{\text{Minimum Brightness of nine points}}{\text{Maximum Brightness of nine points}}$$

Note 4 : Definition of contrast ratio (CR):

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "White" state}}{\text{Brightness on the "Black" state}}$$

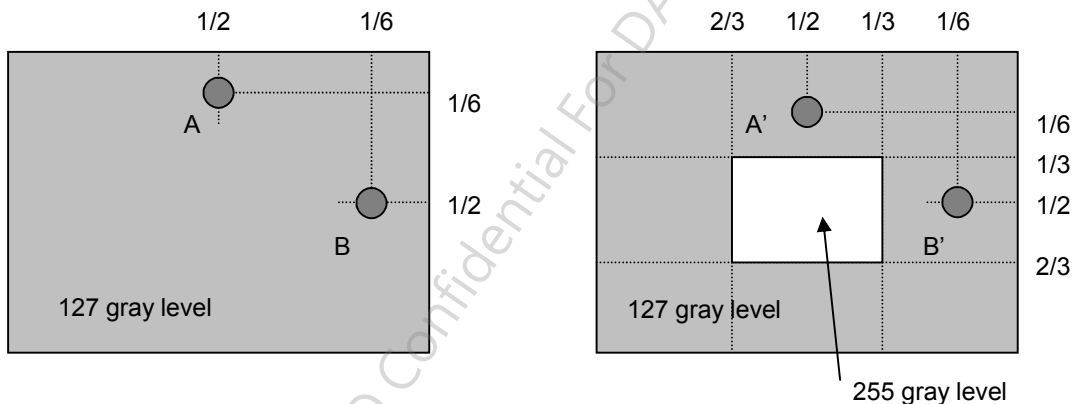
Note 5 : Definition of cross talk (CT)

$$CT = |YB - YA| / YA \times 100 (\%)$$

Where

YA = Luminance of measured location without gray level 255 pattern (cd/m<sup>2</sup>)

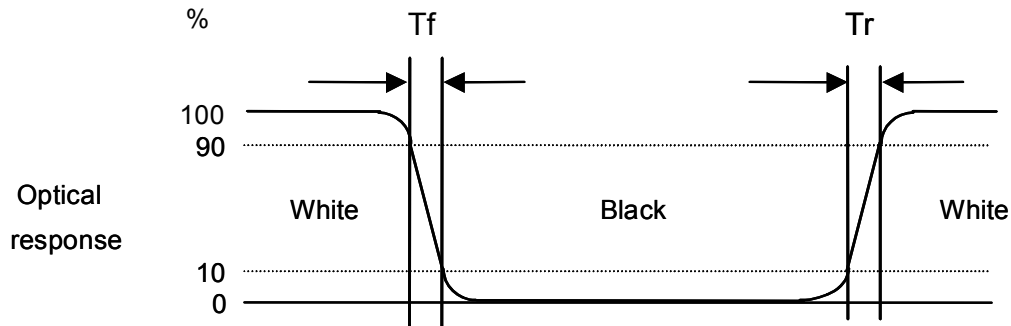
YB = Luminance of measured location with gray level 255 pattern (cd/m<sup>2</sup>)





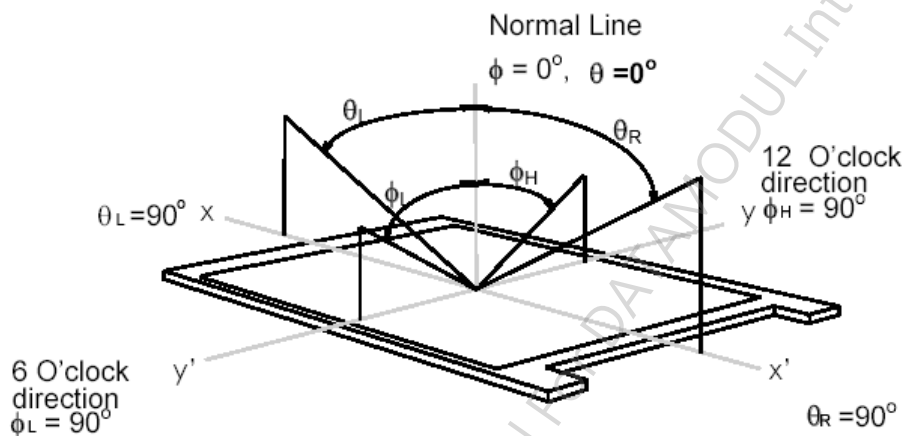
Note 6: Definition of response time:

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



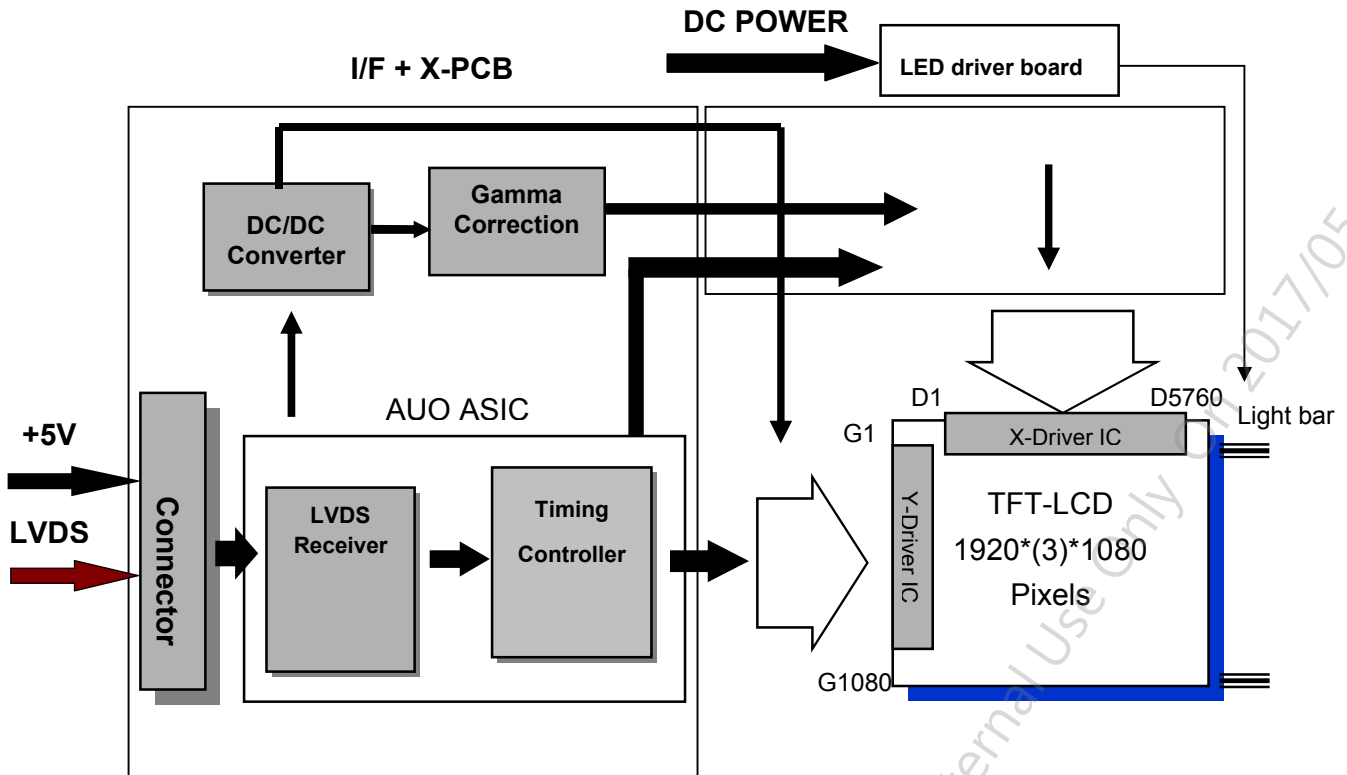
Note 7: Definition of viewing angle

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



### 3. Functional Block Diagram

The following diagram shows the functional block of the 24 inches wide Color TFT-LCD Module:



LVDS Connector: JAE (FI-XB30SRL-HF11) or equivalent.  
 LED Connector: Sin Sheng (MS24049HJ) or equivalent.

## 4. Absolute Maximum Ratings

### 4.1 TFT LCD Module

| Item                    | Symbol | Min | Max | Unit   | Conditions      |
|-------------------------|--------|-----|-----|--------|-----------------|
| Logic/LCD Drive Voltage | VDD    | 0   | 5.5 | [Volt] | <b>Note 1,2</b> |

### 4.2 Backlight Unit

| Item              | Symbol | Min  | Max  | Unit   | Conditions      |
|-------------------|--------|------|------|--------|-----------------|
| LED Input Voltage | Vcc    | 10.8 | 13.2 | [Volt] | <b>Note 1,2</b> |

### 4.3 Absolute Ratings of Environment

| Item                  | Symbol | Min. | Max. | Unit  | Conditions    |
|-----------------------|--------|------|------|-------|---------------|
| Operating Temperature | TOP    | -20  | 70   | [°C]  | <b>Note 3</b> |
| Operation Humidity    | HOP    | 5    | 90   | [%RH] |               |
| Storage Temperature   | TST    | -30  | 80   | [°C]  |               |
| Storage Humidity      | HST    | 5    | 90   | [%RH] |               |

**Note 1:** With in Ta (25°C)

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

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

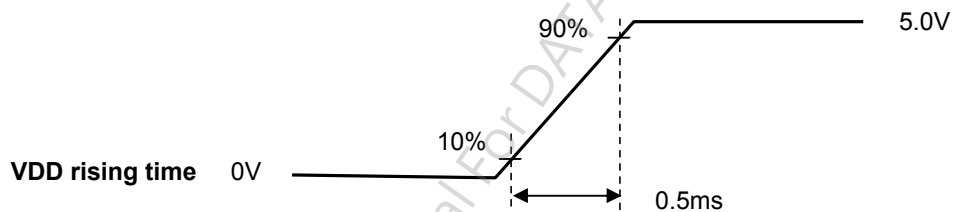
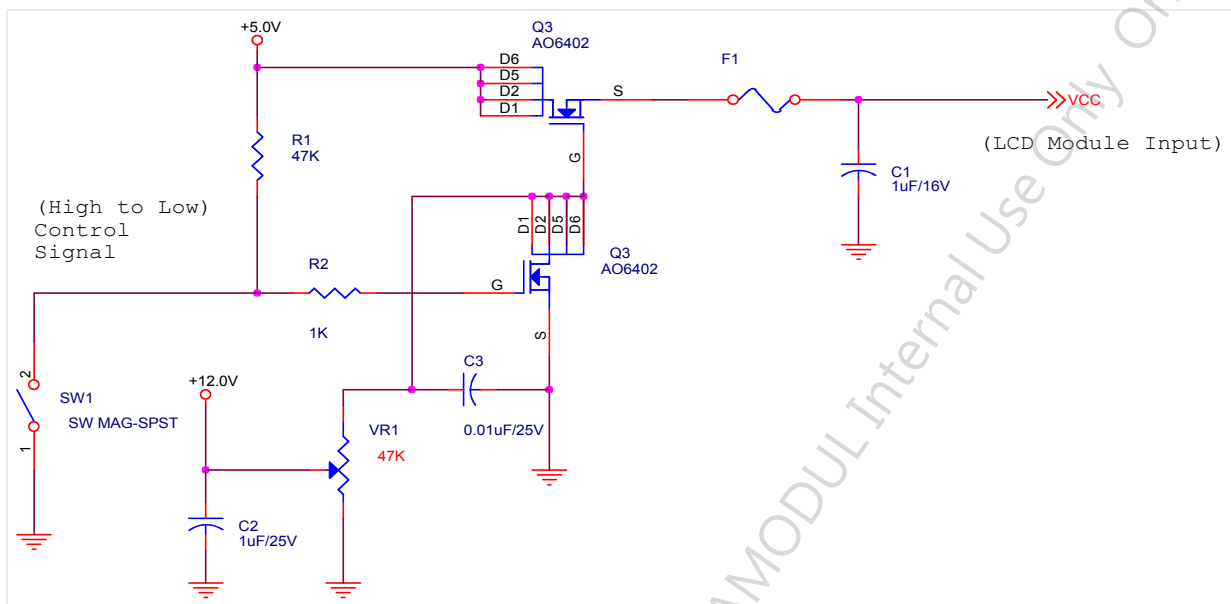
## 5. Electrical Characteristics

### 5.1 TFT LCD Module

#### 5.1.1 Power Specification

| Symbol | Parameter               | Min | Typ | Max  | Units  | Remark                                  |
|--------|-------------------------|-----|-----|------|--------|---|
| VDD    | Logic/LCD Drive Voltage | 4.5 | 5.0 | 5.5  | [Volt] | ± 10%                                   |
| IDD    | VDD Current             | -   | 900 | 1200 | [mA]   | VDD= 5.0V, All White Pattern<br>At 60Hz |
| Irush  | LCD Inrush Current      | -   | -   | 3    | [A]    | Note 1                                  |
| PDD    | VDD Power               | -   | 4.5 | 6    | [Watt] | VDD= 5.0V, All White Pattern<br>At 60Hz |

Note 1: Measurement condition:



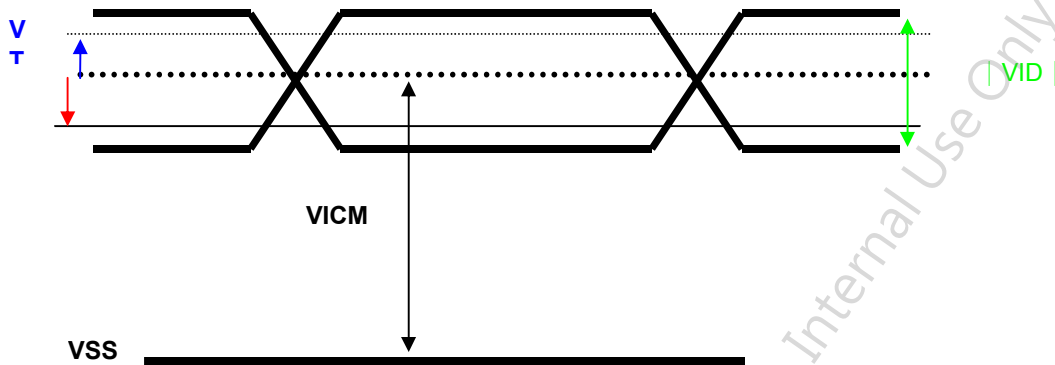


## 5.1.2 Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off.

| Symbol | Item                                   | Min. | Typ. | Max. | Unit | Remark         |
|--------|--|------|------|------|------|----------------|
| VTH    | Differential Input High Threshold      | -    | -    | 100  | [mV] | VCM=1.2V       |
| VTL    | Differential Input Low Threshold       | -100 | -    | -    | [mV] | VCM=1.2V       |
| VID    | Input Differential Voltage             | 100  | 400  | 600  | [mV] |                |
| VICM   | Differential Input Common Mode Voltage | 0.3  | -    | 1.25 | [V]  | VTH/VTL=±100mV |

Note: LVDS Signal Waveform.



## 5.2 Backlight Unit

### 5.2.1 LED Driver

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

| Symbol         | Parameter             | Min    | Typ  | Max  | Units | Remark        |
|----------------|-----------------------|--------|------|------|-------|---------------|
| Vcc            | Input Voltage         | 10.8   | 12   | 13.2 | Volt  |               |
| Ivcc           | Input Current         | -      | 1.2  | -    | A     | 100% Dimming  |
| PLED           | Power Consumption     |        | 14.4 | 17.3 | Watt  | 100% Dimming  |
| Irush          | Inrush Current        | -      | 4    | 5    | A     |               |
| BL_EN          | On Control Voltage    | 3      | -    | 5.5  | Volt  |               |
|                | Off Control Voltage   | 0      | -    | 0.5  | Volt  |               |
| FPWM           | PWM Dimming Frequency | 200    | -    | 20K  | Hz    |               |
|                | High Voltage          | 3.0    | 3.3  | 5.5  | Volt  |               |
|                | Low Voltage           | 0      | -    | 0.5  | Volt  |               |
|                | Dimming Duty Cycle    | 10     | -    | 100  | %     |               |
| I <sub>F</sub> | LED Forward Current   |        | 45   |      | mA    | Ta = 25°C     |
| LTLED          | LED Life Time         | 50,000 | -    | -    | Hrs   | <b>Note 4</b> |

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

**Note 2:** If module is driven by high current or at high ambient temperature & humidity condition. The operating life will be reduced.

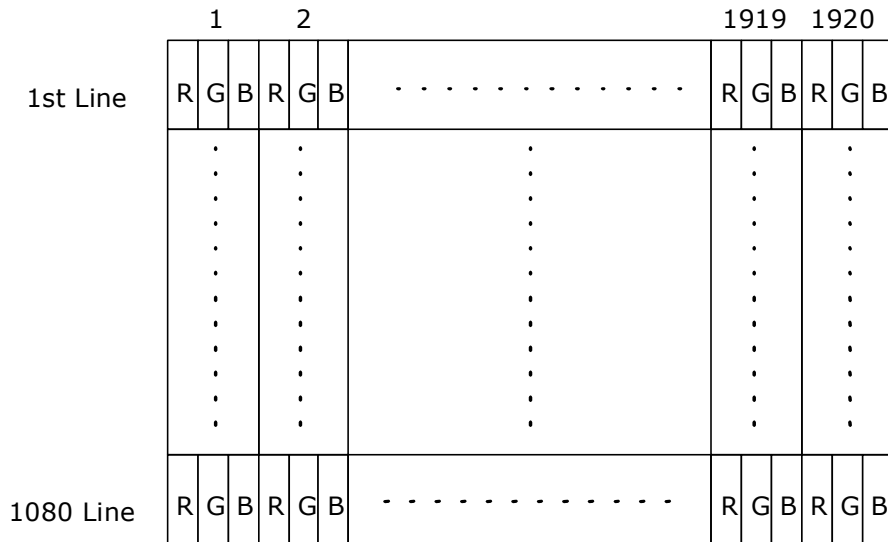
**Note 3:** LED light bar structure: ( 7 strings x 10pcs / string =70pcs LED)

**Note 4:** Definition of life time: Brightness becomes to 50% of its original value. The minimum life time of LED unit is on the condition of I<sub>F</sub> = 45 mA and 25±2°C (Room Temperature).

## 6. Signal Characteristic

### 6.1 Pixel Format Image

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



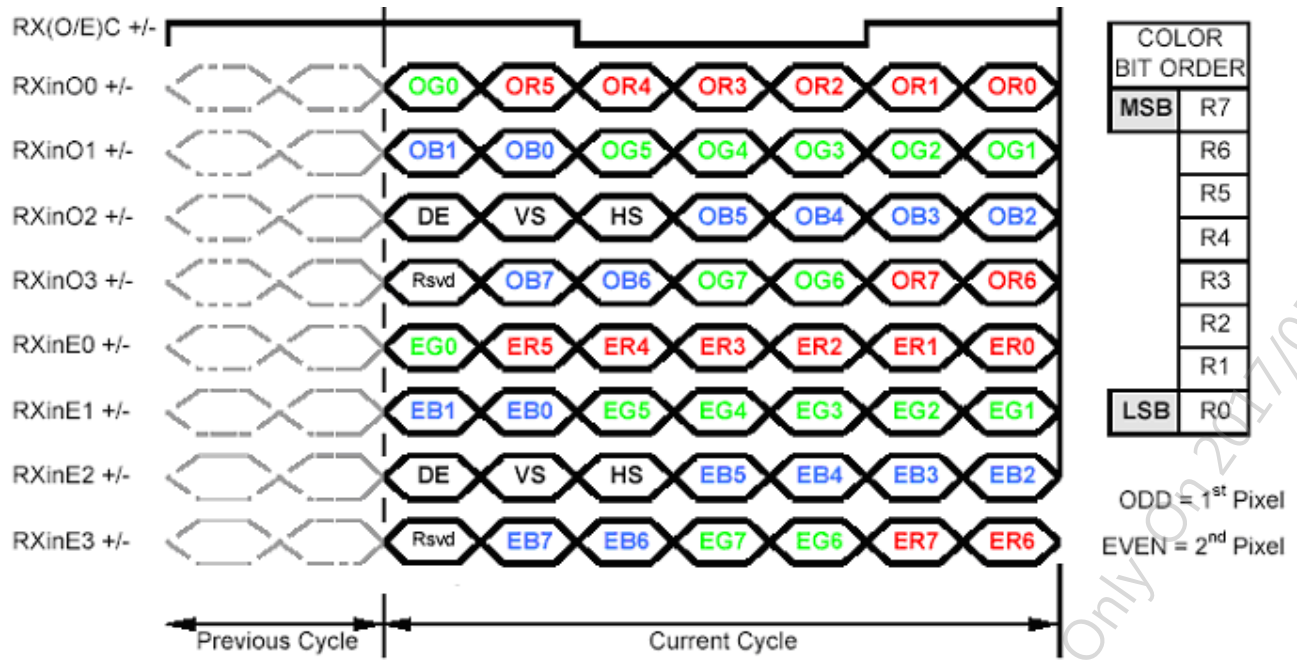
## 6.2 Signal Description

The module using a pair of LVDS receiver SN75LVDS82(Texas Instruments) or compatible. LVDS is a differential signal technology for LCD interface and high speed data transfer device. Transmitter shall be SN75LVDS83(negative edge sampling) or compatible. The first LVDS port(RxOxxx) transmits odd pixels while the second LVDS port(RxExxx) transmits even pixels.

| PIN # | SIGNAL NAME | DESCRIPTION  |
|-------|-------------|--|
| 1     | RXinO0-     | Negative LVDS differential data input (Odd data)                         |
| 2     | RXinO0+     | Positive LVDS differential data input (Odd data)                         |
| 3     | RXinO1-     | Negative LVDS differential data input (Odd data)                         |
| 4     | RXinO1+     | Positive LVDS differential data input (Odd data)                         |
| 5     | RXinO2-     | Negative LVDS differential data input (Odd data, H-Sync, V-Sync, DSPTMG) |
| 6     | RXinO2+     | Positive LVDS differential data input (Odd data, H-Sync, V-Sync, DSPTMG) |
| 7     | GND         | Power Ground   |
| 8     | RxOCLKIN-   | Negative LVDS differential clock input (Odd clock)                       |
| 9     | RxOCLKIN+   | Positive LVDS differential clock input (Odd clock)                       |
| 10    | RXinO3-     | Negative LVDS differential data input (Odd data)                         |
| 11    | RXinO3+     | Positive LVDS differential data input (Odd data)                         |
| 12    | RXinE0-     | Negative LVDS differential data input (Even data)                        |
| 13    | RXinE0+     | Positive LVDS differential data input (Even data)                        |
| 14    | GND         | Power Ground   |
| 15    | RXinE1-     | Negative LVDS differential data input (Even data)                        |
| 16    | RXinE1+     | Positive LVDS differential data input (Even data)                        |
| 17    | GND         | Power Ground   |
| 18    | RXinE2-     | Negative LVDS differential data input (Even data)                        |
| 19    | RXinE2+     | Positive LVDS differential data input (Even data)                        |
| 20    | RxECLKIN-   | Negative LVDS differential clock input (Even clock)                      |
| 21    | RxECLKIN+   | Positive LVDS differential clock input (Even clock)                      |
| 22    | RXinE3-     | Negative LVDS differential data input (Even data)                        |
| 23    | RXinE3+     | Positive LVDS differential data input (Even data)                        |
| 24    | GND         | Power Ground   |
| 25    | NC          | No contact (For AUO test only)   |
| 26    | NC          | No contact (For AUO test only)   |
| 27    | VDD         | Power +5V  |
| 28    | VDD         | Power +5V  |
| 29    | VDD         | Power +5V  |
| 30    | VDD         | Power +5V  |



## 6.3 The Input Data Format



Note1: 8-bits signal input.

Note2: L:NS alike H:Thine alike

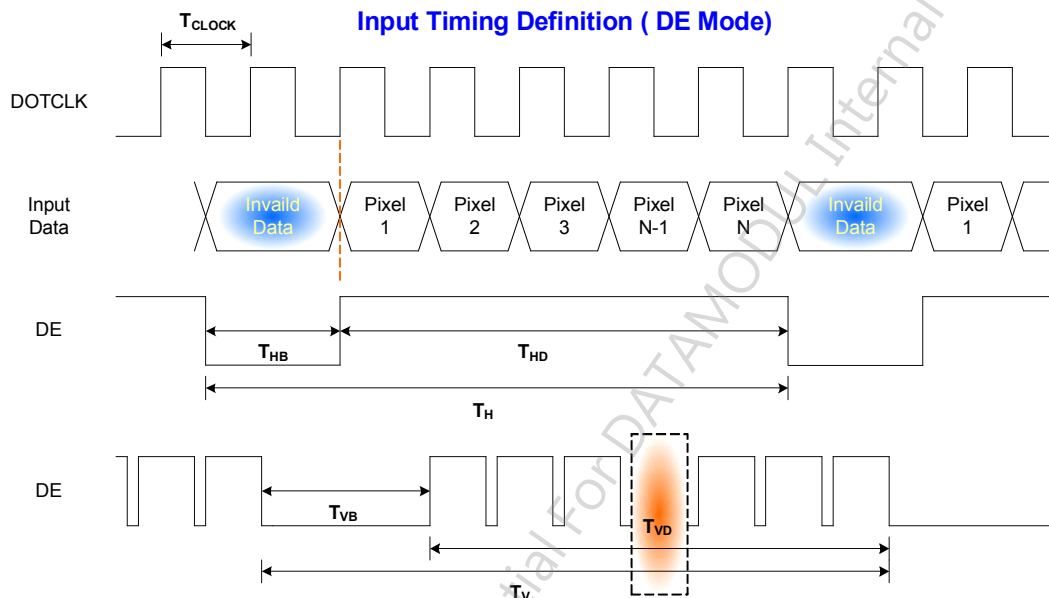
## 6.4 Interface Timing

### 6.4.1 Timing Characteristics

| Signal             | Item      | Symbol               | Min  | Typ  | Max  | Unit               |
|--------------------|-----------|----------------------|------|------|------|--------------------|
| Clock              | Frequency | $1/T_{\text{Clock}}$ | 40   | 72   | 83   | MHz                |
| Frame Rate         | Frequency | $1/T_V$              | 50   | 60   | 75   | Hz                 |
| Vertical Section   | Period    | $T_V$                | 1088 | 1120 | 2047 | $T_{\text{line}}$  |
|                    | Active    | $T_{VD}$             | 1080 | 1080 | 1080 |                    |
|                    | Blanking  | $T_{VB}$             | 8    | 40   | 967  |                    |
| Horizontal Section | Period    | $T_H$                | 1034 | 1060 | 2047 | $T_{\text{clock}}$ |
|                    | Active    | $T_{HD}$             | 960  | 960  | 960  |                    |
|                    | Blanking  | $T_{HB}$             | 74   | 100  | 1087 |                    |

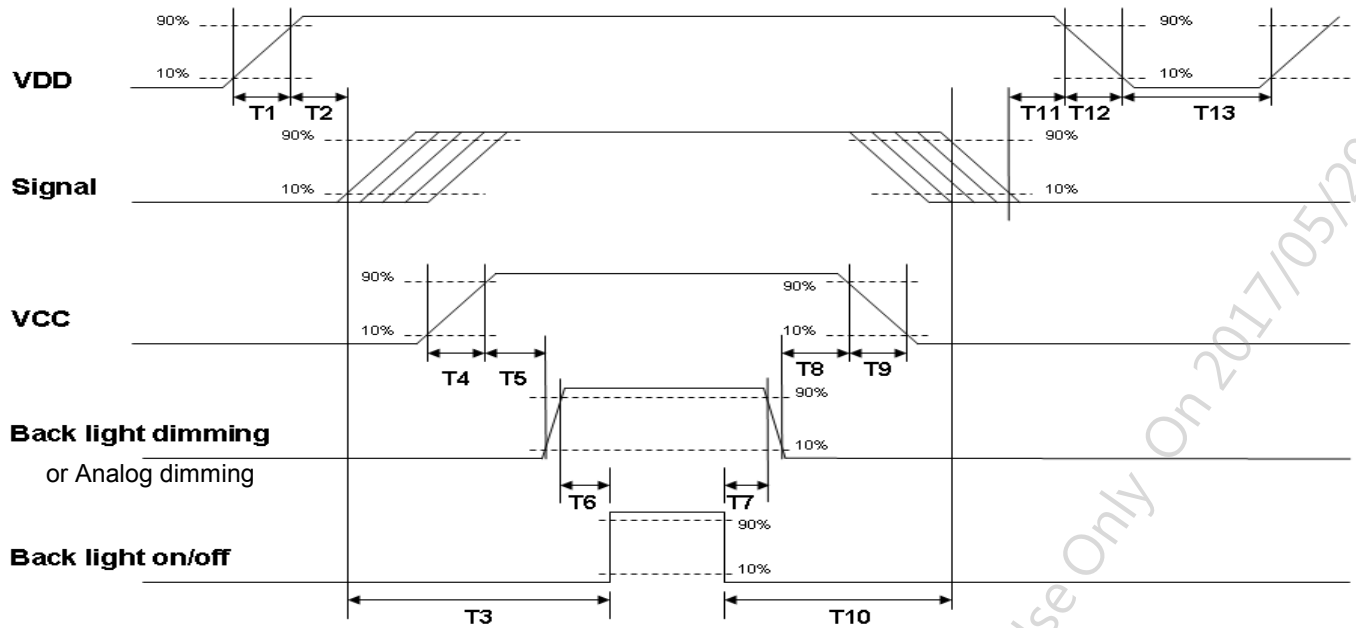
Note: DE mode only.

### 6.4.2 Input Timing Diagram



## 6.5 Power ON/OFF Sequence

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



Power ON/OFF sequence timing

| Parameter | Value |      |      | Units |
|-----------|-------|------|------|-------|
|           | Min.  | Typ. | Max. |       |
| T1        | 0.5   | --   | 10   | [ms]  |
| T2        | 30    | 40   | 50   | [ms]  |
| T3        | 200   | --   | --   | [ms]  |
| T4        | 0.5   | --   | 10   | [ms]  |
| T5        | 10    | --   | --   | [ms]  |
| T6        | 10    | --   | --   | [ms]  |
| T7        | 0     | --   | --   | [ms]  |
| T8        | 10    | --   | --   | [ms]  |
| T9        | --    | --   | 10   | [ms]  |
| T10       | 110   | --   | --   | [ms]  |
| T11       | 0     | 16   | 50   | [ms]  |
| T12       | --    | --   | 10   | [ms]  |
| T13       | 1000  | --   | --   | [ms]  |

The above on/off sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

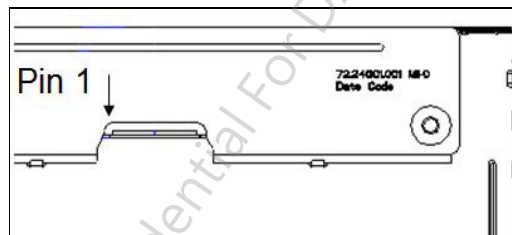
## 7. Connector & Pin Assignment

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

### 7.1 TFT LCD Module: LVDS Connector

| Connector Name / Designation | Interface Connector / Interface card |
|------------------------------|--------------------------------------|
| Manufacturer                 | JAE or compatible                    |
| Type Part Number             | JAE (FI-XB30SRL-HF11) or equivalent. |
| Mating Housing Part Number   | FI-X30HL (JAE) or compatible         |

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

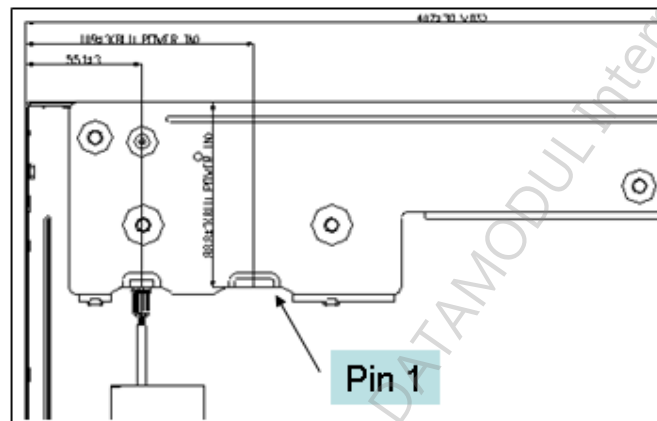




## 7.2 Backlight Unit: LED Connector

|                                     |                         |
|-------------------------------------|-------------------------|
| <b>Connector Name / Designation</b> | <b>LED Connector</b>    |
| Manufacturer                        | Sin Sheng or compatible |
| Connector Model Number              | MS24049HJ               |
| Mating Housing Part Number          | P24049 or compatible    |

| PIN # | SIGNAL NAME | DESCRIPTION                 |
|-------|-------------|-----------------------------|
| 1     | V12         | Input voltage, 12V          |
| 2     | V12         | Input voltage, 12V          |
| 3     | V12         | Input voltage, 12V          |
| 4     | ---         | NC                          |
| 5     | GND         | Ground                      |
| 6     | GND         | Ground                      |
| 7     | GND         | Ground                      |
| 8     | BL_EN       | Back light enable, 3~5.5 V  |
| 9     | BL_DIM_P    | Back light dimming, 3~5.5 V |



## 8. Reliability Test

Environment test conditions are listed as following table.

| Items                             | Required Condition  | Note     |
|-----------------------------------|---|----------|
| Temperature Humidity Bias (THB)   | Ta= 50°C, 80%RH, 300hours   |          |
| High Temperature Operation (HTO)  | Ta= 70□, 300hours   |          |
| Low Temperature Operation (LTO)   | Ta= -20□, 300hours  |          |
| High Temperature Storage (HTS)    | Ta= 80□, 300hours   |          |
| Low Temperature Storage (LTS)     | Ta= -30□, 300hours  |          |
| Vibration Test<br>(Non-operation) | Acceleration: 1.5 Grms<br>Wave: Random<br>Frequency: 10 - 200 Hz<br>Duration: 30 Minutes each Axis (X, Y, Z)  |          |
| Shock Test<br>(Non-operation)     | Acceleration: 50 G<br>Wave: Half-sine<br>Active Time: 20 ms<br>Direction: ±X, ±Y, ±Z (one time for each Axis) |          |
| Drop Test                         | Height: 46 cm, package test   |          |
| Thermal Shock Test (TST)          | -20□/30min, 60□/30min, 100 cycles   |          |
| On/Off Test                       | On/10sec, Off/10sec, 30,000 cycles  |          |
| ESD (Electro Static Discharge)    | Contact Discharge: ± 8KV, 150pF(330Ω ) 1sec,<br>8 points, 25 times/ point.                                    | <b>1</b> |
|                                   | Air Discharge: ± 15KV, 150pF(330Ω ) 1sec<br>8 points, 25 times/ point.  |          |
| Altitude Test                     | Operation:10,000 ft<br>Non-Operation:30,000 ft  |          |

Note 1: According to EN61000-4-2, ESD class B: Some performance degradation allowed. No data lost  
Self-recoverable. No hardware failures.

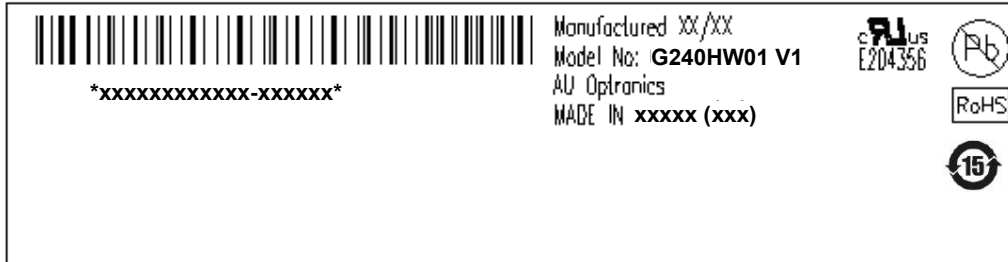
Note2:

- Water condensation is not allowed for each test items.
- Each test is done by new TFT-LCD module. Don't use the same TFT-LCD module repeatedly for reliability test.
- The reliability test is performed only to examine the TFT-LCD module capability.
- To inspect TFT-LCD module after reliability test, please store it at room temperature and room humidity for 24 hours at least in advance.
- No function failure occurs.



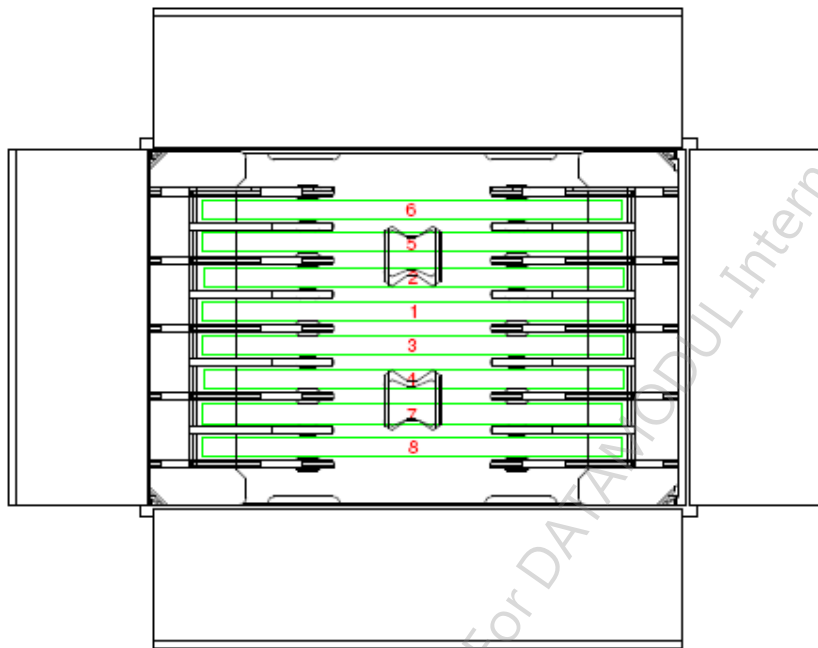
## 10. Label and Packaging

### 10.1 Shipping Label (on the rear side of TFT-LCD display)



### 10.2 Carton Package

- The outside dimension of carton is 413 x 282x 661 (mm).
- 8 pieces per carton box.
- 2\*4 boxes per layer. By air, 2 layer / pallet. By sea, refer packing documents. Pallet size (not include carton boxes):  
 1150 mm \* 840 mm \* 132 mm





## 11. Safety

### 11.1 Sharp Edge Requirements

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

### 11.2 Materials

#### 11.2.1 Toxicity

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

#### 11.2.2 Flammability

All components including electrical components that do not meet the flammability grade UL94-V1 in the module will complete the flammability rating exception approval process.

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

### 11.3 Capacitors

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

### 11.4 National Test Lab Requirement

The display module will satisfy all requirements for compliance to:

**UL 1950, First Edition**

U.S.A. Information Technology Equipment



ALL TECHNOLOGIES. ALL COMPETENCIES. ONE SPECIALIST.



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