


| Product Specification   |                      |          |              |        |
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# Product Specification For LCD Module

**Model : GVIX80MPHJ8R0**

**REV : A**

**Display Type : TFT**

**CUSTOMER :**




| Acceptance |
|------------|
|            |

**Solomon Goldentek Display Corp.**


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**TEL: 886-2-8791-9821**

| Approved and Checked by |
|-------------------------|
|                         |

| Approved by   | Checked by |   | Made by   |
|---|------------|---|---|
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**Product Specification**


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Revise Records

| Rev. | Date       | Contents                  | Written | Approved |
|------|------------|---------------------------|---------|----------|
| A    | 2018/07/17 | Preliminary Specification | Jack    | Oliver   |
|      |            |                           |         |          |
|      |            |                           |         |          |
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|      |            |                           |         |          |

Special Notes


|        |  |
|--------|--|
| Note1. |  |
| Note2. |  |
| Note3. |  |
| Note4. |  |
| Note5. |  |
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### 1. General Description and Features

GVIX80MPHJ8R0 is applied to the 8 inch XGA 1024 (W) x RGB x 768 (H) dots (4:3 aspect ratio) supported TFT-LCD module and can display true 16.7M colors (8 bit/ color). The module is designed for OA, Car TV application and other electronic products which require flat panel display of digital signal interface. This module is composed of a 8" TFT-LCD panel, a driver circuit and backlight unit. The following table described the features of GVIX80MPHJ8R0

#### 1.1 Features

- Transmissive and back-light with 27 LEDs are available.
- LVDS Receiver 6/8 bit Interface.
- LED drive circuit is built in this module to provide PWM Dimmer function
- 4 Wire Resistance Touch Panel.
- ROHS Compliance

#### 1.2 LCD Module


| Item               | Specification                     | Unit     |
|--------------------|-----------------------------------|----------|
| Screen Size        | 8.0 inches                        | Diagonal |
| Display Resolution | 1024 (H) x 768 (V)                | Pixel    |
| Active Area        | 162.05 (H) x 121.54 (V)           | mm       |
| Outline Dimension  | 175.7 (H) x 137.85 (V) x 13.2 (T) | mm       |
| Display Mode       | Normally Black                    | --       |
| Pixel Arrangement  | R,G,B Vertical Stripe             | --       |
| Pixel Size         | 0.15825 x 0.15825                 | mm       |
| Surface Treatment  | Anti-Glare                        |          |
| Display Color      | 16.7M                             | --       |
| Viewing Direction  | Full view angle                   | --       |
| Input Interface    | LVDS Receiver 6/8 bit Interface   | --       |

### 2. Mechanical Information

| Item        | Min.           | Typ.   | Max.   | Unit   | Note |     |
|-------------|----------------|--------|--------|--------|------|-----|
| Module Size | Horizontal (H) | 175.4  | 175.7  | 176    | mm   |     |
|             | Vertical (V)   | 137.55 | 137.85 | 138.15 | mm   |     |
|             | Thickness (T)  | 12.4   | 13.2   | 14.0   | mm   | (1) |
| Weight      | --             | TBD    | --     | g      | --   |     |

Note (1) Include Component. Refer to the Outline Dimension Drawing as attached.

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### 3. Electrical Specifications

#### 3.1 Absolute Max. Ratings

##### 3.1.1 Absolute Ratings of Environment

If the operating condition exceeds the following absolute maximum ratings, the TFT LCD module may be damaged permanently.

(Ta=25±2°C, V<sub>SS</sub>=GND=0)

| Item                  | Symbol           | Min. | Max. | Unit | Note   |
|-----------------------|------------------|------|------|------|--------|
| Storage temperature   | T <sub>STG</sub> | -20  | 60   | °C   | (1)(2) |
| Operating temperature | T <sub>OPR</sub> | -10  | 50   | °C   | (1)(2) |

Note1: Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

Note2: Please refer to item of RELIABILITY.

##### 3.1.2 Electrical Absolute Maximum Ratings

###### 3.1.2.1 TFT-LCD Module

(V<sub>SS</sub>=GND=0)


| Parameter            | Symbol          | Min. | Max. | Unit | Remark |
|----------------------|-----------------|------|------|------|--------|
| Power supply voltage | V <sub>CC</sub> | -0.3 | 5.0  | V    |        |

###### 3.1.2.2 LED DRIVER Absolute Maximum Ratings

| Item                      | Symbol | Value |      | Unit | Note |
|---------------------------|--------|-------|------|------|------|
|                           |        | Min.  | Max. |      |      |
| LED Driver Supply Voltage | VLED   | -     | 15   | V    | (1)  |
| LED Driver PWM            | PWM    | -     | 15   | V    | (1)  |

Note (1) Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded.

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### 3.1.3 DC Electrical Characteristics of the TFT LCD

| Item                                      | Symbol | Value |      |      | Unit | Note |
|---|--------|-------|------|------|------|------|
|   |        | Min.  | Typ. | Max. |      |      |
| Power Supply Voltage                      | VCC    | 3.0   | 3.3  | 3.6  | V    | -    |
| Power Supply Current                      | ICC    | -     | TBD  | TBD  | mA   | (1)  |
| Differential Input High Threshold Voltage | VTH    | -     | -    | 100  | mV   | -    |
| Differential Input Low Threshold Voltage  | VTL    | -100  | -    | -    | mV   | -    |


Note (1) The specified power consumption is under the conditions at VCC=3.3V, FV=60Hz, whereas a power dissipation check pattern below is displayed.

White Pattern / 255 Gray



Active Area

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### 3.2 AC Timing Characteristic of the LCD

#### 3.2.1 AC Electrical Characteristics

| Parameter              | Symbol      | Values |                     |      | Unit | Remark |
|------------------------|-------------|--------|---------------------|------|------|--------|
|                        |             | Min.   | Typ.                | Max. |      |        |
| Clock frequency        | $R_{XFCLK}$ | 20     | -                   | 71   | MHz  |        |
| Input data skew margin | $T_{RSKM}$  | 500    | -                   | -    | ps   |        |
| Clock high time        | $T_{LVCH}$  | -      | $4/(7 * R_{XFCLK})$ | -    | ns   |        |
| Clock low time         | $T_{LVCL}$  | -      | $3/(7 * R_{XFCLK})$ | -    | ns   |        |

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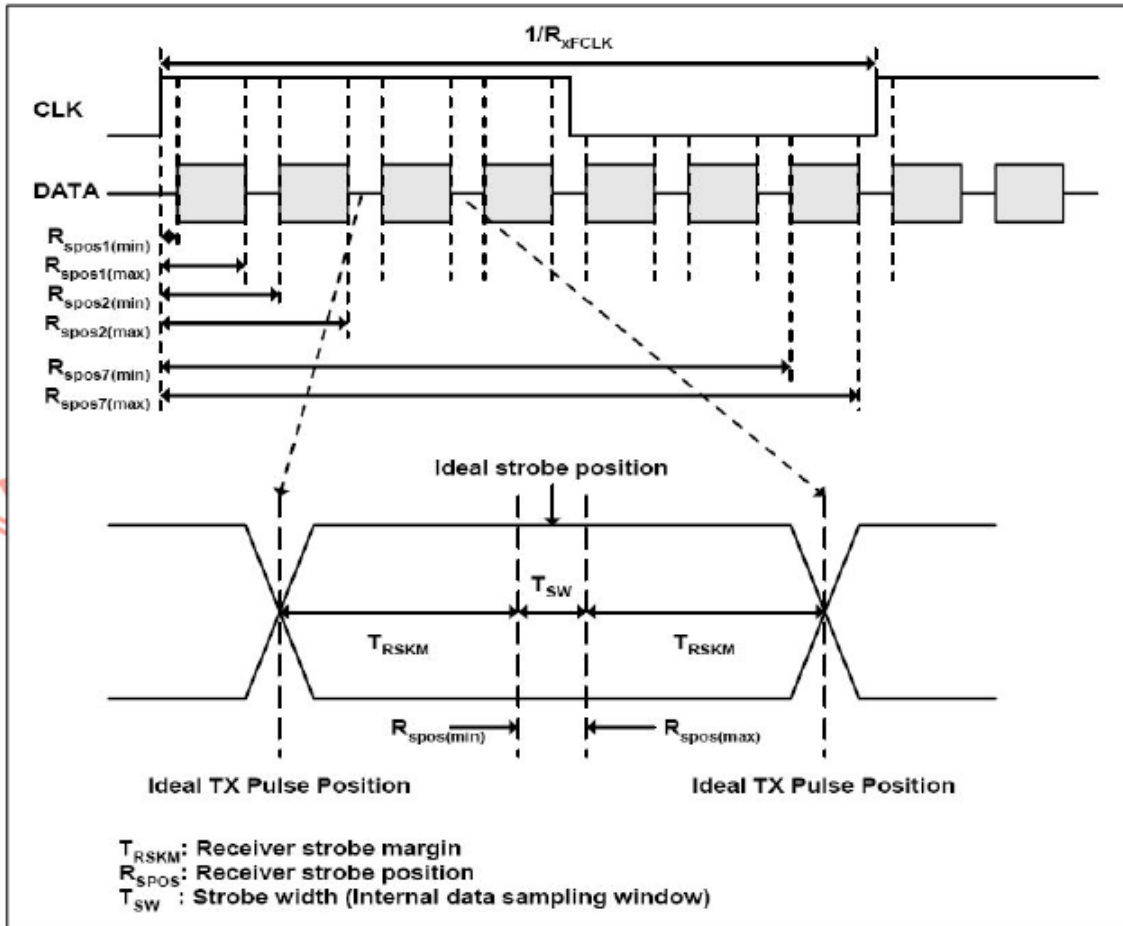
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### 3.2.2 Timing Characteristic

#### Input Clock and Data Timing Diagram





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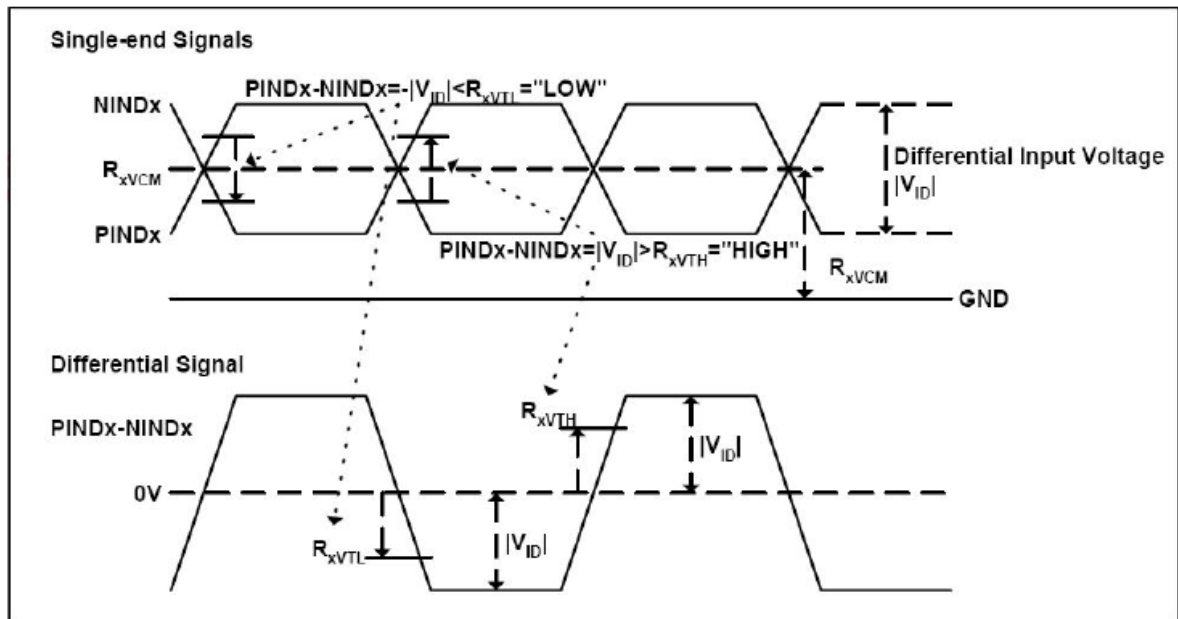
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| Parameter                                 | Symbol         | Values       |      |                  | Unit | Remark |
|---|----------------|--------------|------|------------------|------|--------|
|   |                | Min.         | Typ. | Max.             |      |        |
| Differential input high Threshold voltage | $R_{xVTH}$     | -            | -    | +0.1             | V    |        |
| Differential input low Threshold voltage  | $R_{xVTL}$     | -0.1         | -    | -                | V    |        |
| Input voltage range (singled-end)         | $R_{xVIN}$     | 0            | -    | 2.4              | V    |        |
| Differential input common mode voltage    | $R_{xVCM}$     | $ V_{ID} /2$ | -    | $2.4- V_{ID} /2$ | V    |        |
| Differential voltage                      | $ V_{ID} $     | 0.2          | -    | 0.6              | V    |        |
| Differential input leakage current        | $R_{V_{xIIZ}}$ | -10          | -    | +10              | uA   |        |

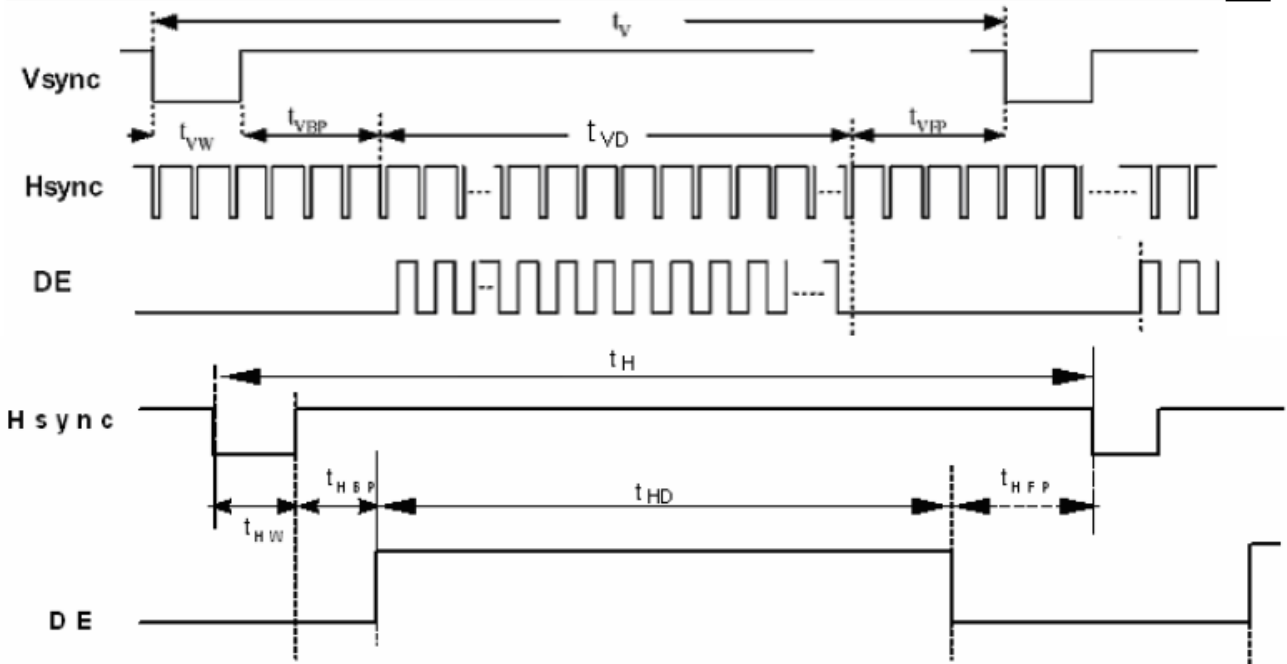


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Timing:

| Item                    | Symbol   | Values |      |      | Unit | Remark          |
|-------------------------|----------|--------|------|------|------|-----------------|
|                         |          | Min.   | Typ. | Max. |      |                 |
| Clock Frequency         | fclk     | 52     | 65   | 71   | MHz  | Frame rate =TBD |
| Horizontal display area | thd      | 1024   |      |      |      |                 |
| HS period time          | th       | 1114   | 1344 | 1400 | DCLK |                 |
| HS Blanking             | thb+thfp | 90     | 320  | 376  | DCLK |                 |
| Vertical display area   | tvd      | 768    |      |      |      |                 |
| VS period time          | tv       | 778    | 806  | 845  | H    |                 |
| VS Blanking             | tvb+tvfp | 10     | 38   | 77   | H    |                 |



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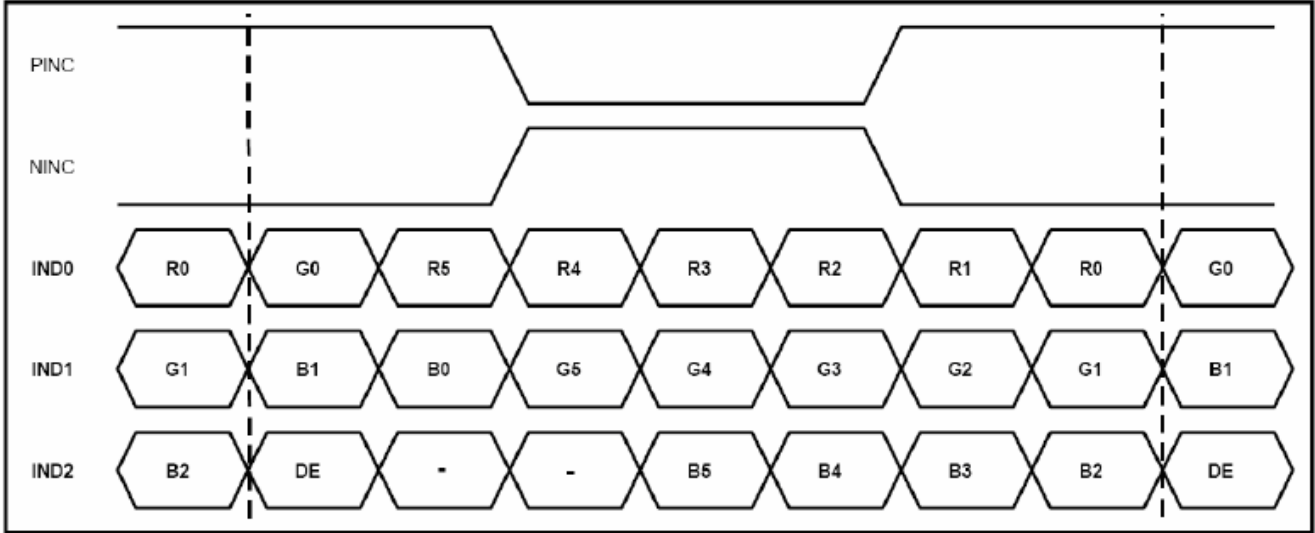
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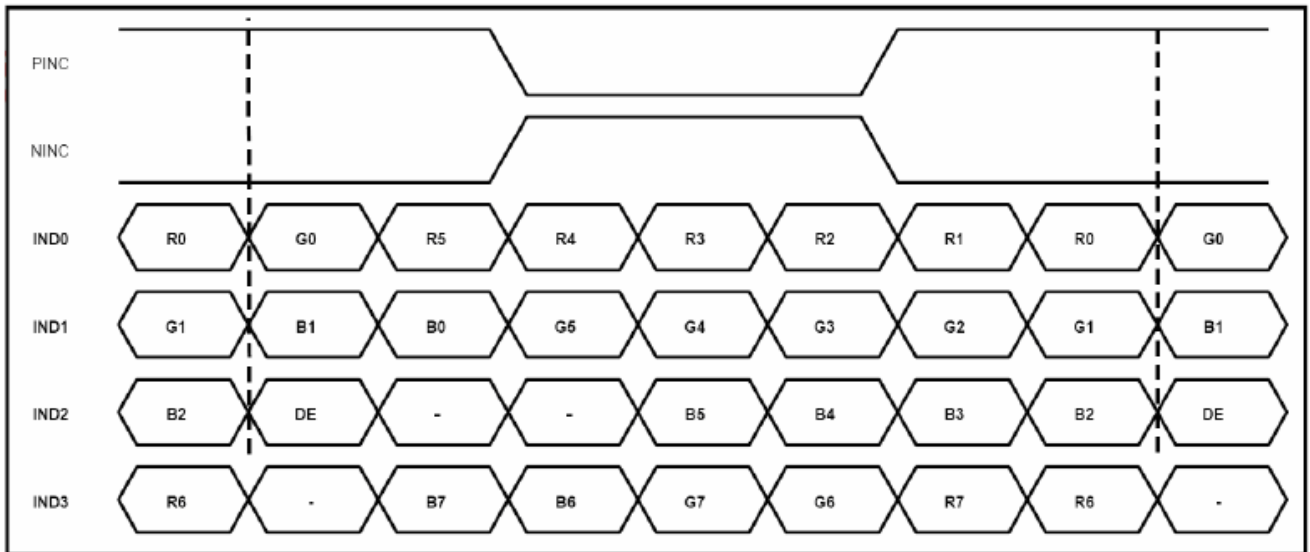
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### 6bit LVDS input



### 8bit LVDS input



Note: Support DE timing mode only, SYNC mode not supported.

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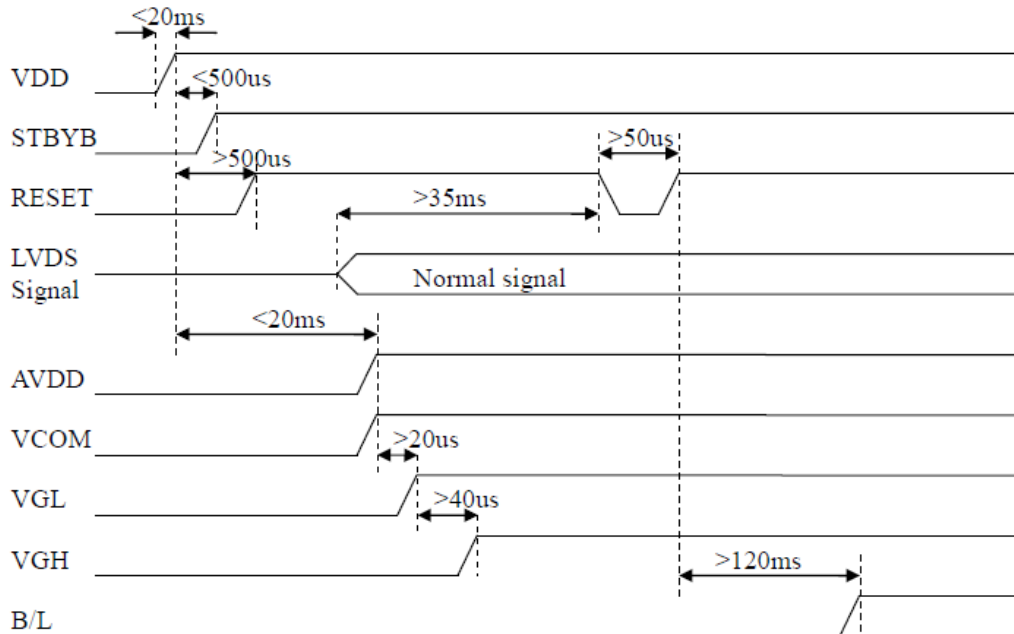
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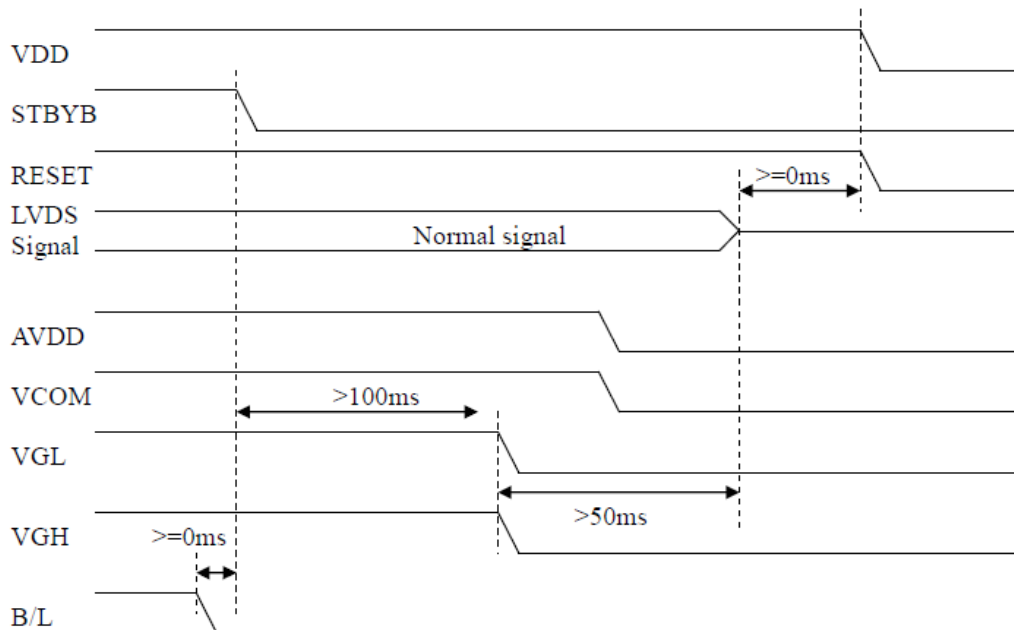
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## Power Sequence


Power on:



Power off:



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### 3.2.3 LED Driver Unit


(Ta= Room Temp)

| Characteristics            | Symbol               | Min.  | Typ.  | Max. | Unit | Note  |
|----------------------------|----------------------|-------|-------|------|------|---|
| Voltage of LED Driver Unit | V <sub>LED(DU)</sub> | 11    | 12    | 13   | V    | -   |
| Current of LED Driver Unit | I <sub>LED(DU)</sub> | -     | TBD   | TBD  | mA   | I <sub>LED</sub> =585mA,<br>V <sub>LED</sub> =12V |
| PWM Input Low Voltage      | V <sub>PWML</sub>    | -     | -     | 0.45 | V    | -   |
| PWM Input High Voltage     | V <sub>PWMH</sub>    | 1.2   | -     | -    | V    | -   |
| Dimmer frequency           | f <sub>PWM</sub>     | -     | 120   | -    | Hz   | -   |
| PWM Pulse width            | T <sub>PWMH</sub>    | 3     | -     | -    | us   | -   |
| LED life time              | -                    | 30000 | 50000 | -    | hr   | (1)(2)  |

Note (1) : LED life time is defined as under 25±2°C , when the average brightness decrease to 50% of original brightness

Note (2) : Lifetime statement is concerning to the max backlight current of 585mA.

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### 4. Optical Characteristics


#### 4.1 Optical characteristic of the LCD

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods.

Measuring equipment: BM-7A

| Item                          | Symbol                          | Condition                  | Min            | Type  | Max   | Unit              | Note   |       |
|-------------------------------|---------------------------------|----------------------------|----------------|-------|-------|-------------------|--------|-------|
| Brightness                    | B                               |                            | 720            | 900   | --    | cd/m <sup>2</sup> |        |       |
| Response time                 | T <sub>r</sub> + T <sub>f</sub> | θ=0°                       | --             | 25    | 50    | ms                | .      |       |
|                               |                                 |                            |                |       |       | ms                |        |       |
| Contrast ratio                | CR                              | At optimized viewing angle | 600            | 800   | --    | --                |        |       |
| Luminance Uniformity          | ΔL                              |                            | 70             | 75    |       | %                 |        |       |
| Color Chromaticity (CIE 1931) | White                           | θ=0° Normal Viewing Angle  | W <sub>x</sub> | 0.260 | 0.310 | 0.360             | --     | BM-7A |
|                               |                                 |                            | W <sub>y</sub> | 0.300 | 0.350 | 0.400             |        |       |
| Viewing Angle (6H)            | Hor.                            | CR≥10                      | θ <sub>R</sub> | 75    | 85    | --                | Degree |       |
|                               |                                 |                            | θ <sub>L</sub> | 75    | 85    | --                |        |       |
|                               | Ver.                            |                            | θ <sub>U</sub> | 75    | 85    | --                |        |       |
|                               |                                 |                            | θ <sub>D</sub> | 75    | 85    | --                |        |       |
| NTSC                          |                                 |                            |                | 50    |       | %                 |        |       |

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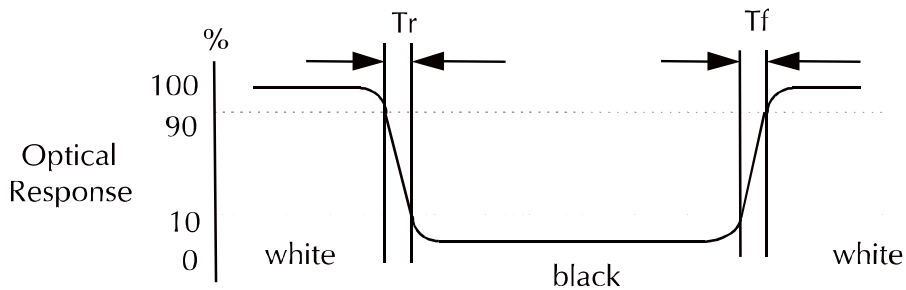
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a. Test equipment setup

After stabilizing and leaving the panel alone shall be warmed up for the stable operation of LCM, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7(fast) with a viewing angle of 2° at a distance of 50cm and normal direction.

b. Definition of response time: Tr and Tf

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".




c. Definition of contrast ratio:

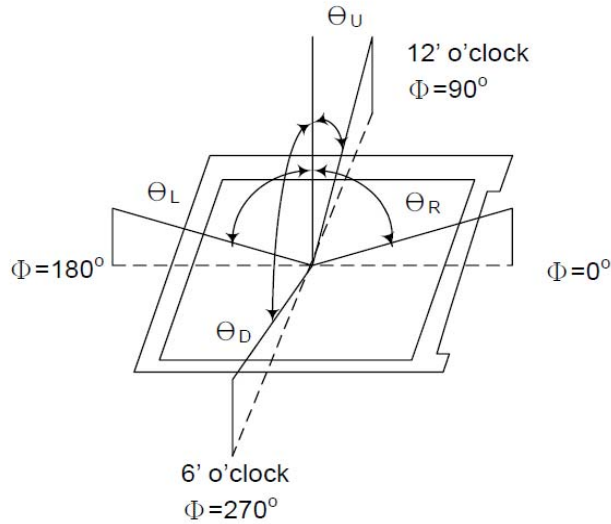
$$\text{Contrast Ratio (CR)} = \frac{\text{Brightness measured when LCD is at "white state"}}{\text{Brightness measured when LCD is at "black state"}}$$

d. Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

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e. View Angle



f. Definition of Luminance of White: Luminance of white at the center points

|                                 |          |
|---------------------------------|----------|
| Light Source of Back-Light Unit | LED Type |
|---------------------------------|----------|

g. Definition of White Uniformity

$$\text{White Uniformity} = \frac{\text{Min. luminance of white among 9-points}}{\text{Max. luminance of white among 9-points}} \times 100\%$$



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### 5. I/O Terminal

#### 5.1 LCD Pin Assignment

| Pin No. | Symbol | I/O | Function                               | Remark |
|---------|--------|-----|--|--------|
| 1       | VCC    | P   | Power Supply +3.3V                     |        |
| 2       | VCC    | P   | Power Supply +3.3V                     |        |
| 3       | VSS    | P   | Ground                                 |        |
| 4       | VSS    | P   | Ground                                 |        |
| 5       | RIN0-  | I   | Negative LVDS differential data input  |        |
| 6       | RIN0+  | I   | Positive LVDS differential data input  |        |
| 7       | VSS    | P   | Ground                                 |        |
| 8       | RIN1-  | I   | Negative LVDS differential data input  |        |
| 9       | RIN1+  | I   | Positive LVDS differential data input  |        |
| 10      | VSS    | P   | Ground                                 |        |
| 11      | RIN2-  | I   | Negative LVDS differential data input  |        |
| 12      | RIN2+  | I   | Positive LVDS differential data input  |        |
| 13      | VSS    | P   | Ground                                 |        |
| 14      | RCLK-  | I   | Negative LVDS differential clock input |        |
| 15      | RCLK+  | I   | Positive LVDS differential clock input |        |
| 16      | VSS    | P   | Ground                                 |        |
| 17      | RIN3-  | I   | Negative LVDS differential data input  |        |
| 18      | RIN3+  | I   | Positive LVDS differential data input  |        |
| 19      | VSS    | P   | Ground                                 |        |
| 20      | VSS    | P   | Ground                                 |        |


User Connector Part No: Hirose DF19G-20P-1H(54) or equivalent.

#### 5.2 Back Light Unit

| Pin No. | Symbol | Function                             | Remark |
|---------|--------|--------------------------------------|--------|
| 1       | VLED   | LED drive circuit power supply (12V) |        |
| 2       | VLED   | LED drive circuit power supply (12V) |        |
| 3       | GND    | Ground                               |        |
| 4       | GND    | Ground                               |        |
| 5       | PWM    | PWM Dimmer                           |        |
| 6       | NC     | NO CONNECTION                        |        |

User Connector Part No: JST SM06B-SHLS-TF or equivalent.

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### 5.3 Touch Panel

| Pin No. | Symbol | Function                | Remark |
|---------|--------|-------------------------|--------|
| 1       | YD     | Touch Panel Bottom Side |        |
| 2       | XR     | Touch Panel Right Side  |        |
| 3       | YU     | Touch Panel Top Side    |        |
| 4       | XL     | Touch Panel Left Side   |        |

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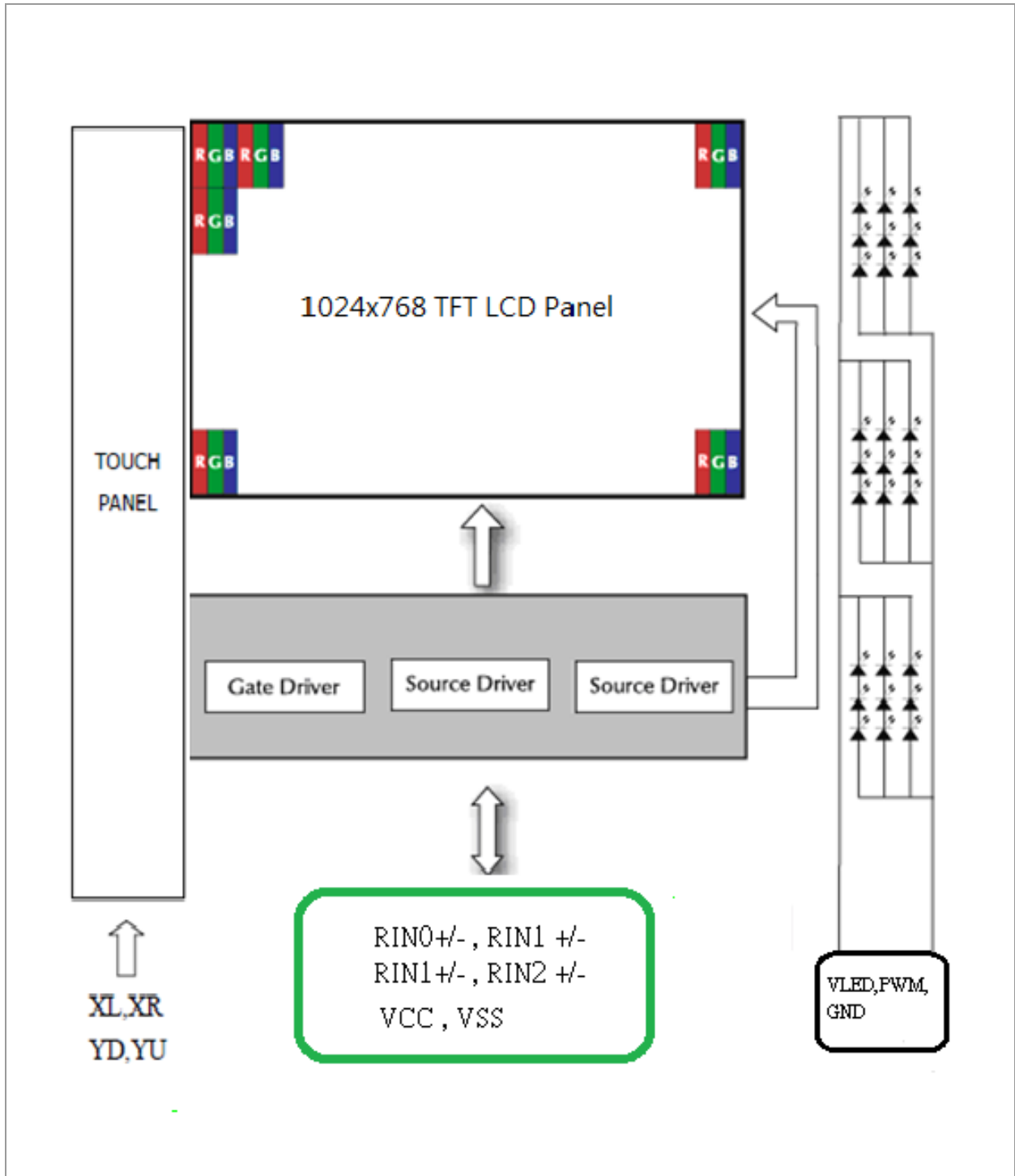
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### 5.4 Block Diagram



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### 6 Displayed Color and Input Data

|             | Color & Gray Scale | Data Signal |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-------------|--------------------|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|             |                    | R7          | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
| Basic Color | Black              | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |
|             | Red                | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |
|             | Green              | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |
|             | Blue               | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |    |
|             | Cyan               | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |    |
|             | Magenta            | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |    |
|             | Yellow             | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |
|             | White              | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |    |
| Red         | Black              | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |    |
|             | Red(1)             | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |    |
|             | Red(2)             | 0           | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |    |
|             | :                  | :           | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  |    |    |
|             | Red(127)           | 0           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |    |
|             | :                  | :           | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  |    |
|             | Red(254)           | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |    |
|             | Red(255)           | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |    |
| Green       | Black              | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |    |
|             | Green(1)           | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  |    |    |
|             | Green(2)           | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |    |
|             | :                  | :           | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  |    |    |
|             | Green(127)         | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  |    |    |
|             | :                  | :           | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  |    |
|             | Green(254)         | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |    |
|             | Green(255)         | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |    |
| Blue        | Black              | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |    |
|             | Blue(1)            | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  |    |    |
|             | Blue(2)            | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  |    |    |
|             | :                  | :           | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  |    |    |
|             | Blue(127)          | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  |    |    |
|             | :                  | :           | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  | :  |    |    |
|             | Blue(254)          | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 0  |    |    |
|             | Blue(255)          | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |    |    |

0 : Low level voltage, 1 :High level voltage

Each basic color can be displayed in 64 gray scales from 6 bit data signals. With the combination of total 18 bit data signals, the 262,144-color display can be achieved on the screen.

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### 7. Touch Screen Panel Specification

#### 7.1 Electrical Characteristics

| Item                  | Min. | Typ. | Max. | Unit       | Note                      |
|-----------------------|------|------|------|------------|---------------------------|
| Linearity             | -1.5 | -    | 1.5  | %          | Analog X and Y directions |
| Terminal resistance   | 200  | -    | 900  | $\Omega$   | Y                         |
|                       | 200  | -    | 900  | $\Omega$   | X                         |
| Insulation resistance | 10   | -    | -    | M $\Omega$ | DC 25V                    |
| Voltage               | 3.0  | -    | 5.0  | V          | DC                        |
| Response time         | -    | -    | 10   | $\leq$ ms  |                           |

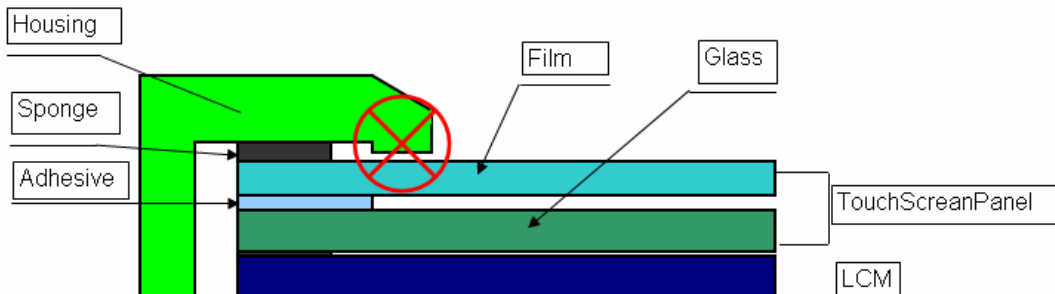
#### 7.2 Mechanical & Reliability Characteristics

| Item                          | Min.          | Typ. | Max. | Unit       | Note                 |
|-------------------------------|---------------|------|------|------------|----------------------|
| Activation force              | 60            |      | 100  | g          |                      |
| Durability-surface scratching | Write 100,000 | -    | -    | characters |                      |
| Durability-surface pitting    | 1,000,000     | -    | -    | touches    |                      |
| Surface hardness              | 3             | -    | -    | H          | JIS K-5600-5-4,150gf |

#### 7.3 Housing Design Guide

Housing design follow as below.

- 1) Avoid the design that housing overlap and press on the active area of the LCM.
- 2) Give enough gap(over 0.5mm at compressed) between the housing and TSP to protect wrong operating.



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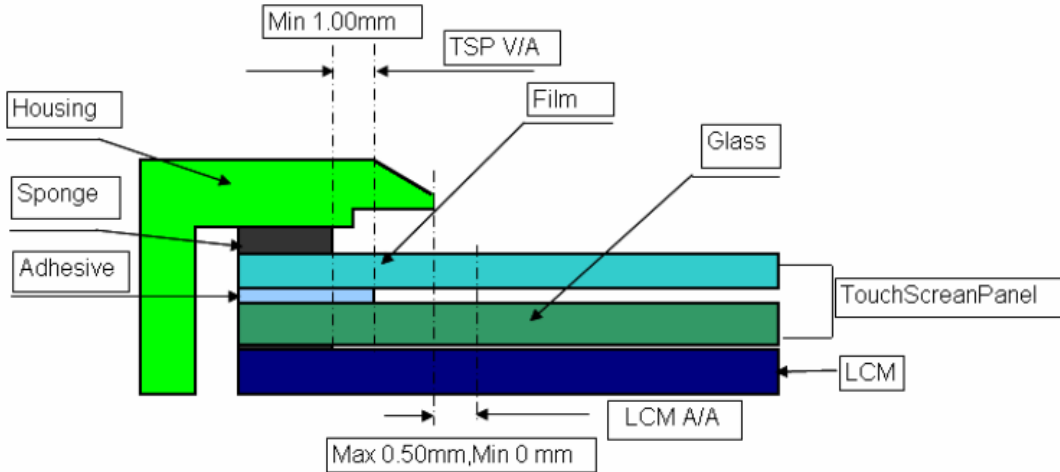
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- 3) Use a buffer material(Gasket) between the TSP and housing to protect damage and wrong operating.
- 4) Avoid the design that buffer material overlap and press on the inside of TSP view area.



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### 8 Reliability Condition

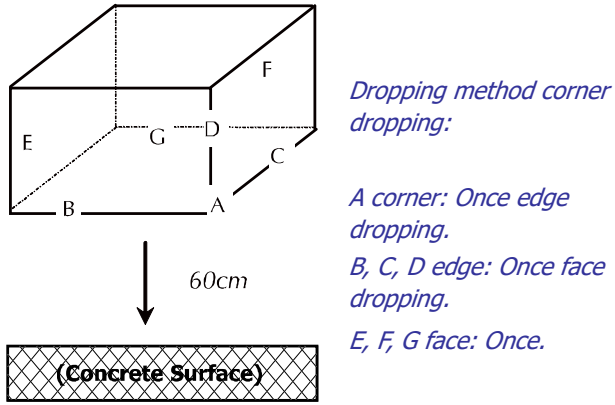
No change on display and in operation under the following test condition.

Condition: Unless otherwise specified, tests will be conducted under the following condition.

Temperature:  $20 \pm 5^\circ\text{C}$ .

Humidity:  $65 \pm 5\% \text{RH}$ .

Tests will be not conducted under functioning state.

| No. | Parameter   | Condition  | Notes |
|-----|---|--|-------|
| 1   | High Temperature Operating                        | $50^\circ\text{C} \pm 2^\circ\text{C}$ , 240hrs.   |       |
| 2   | Low Temperature Operating                         | $-10^\circ\text{C} \pm 2^\circ\text{C}$ , 240hrs.  | 1     |
| 3   | High Temperature Storage                          | $60^\circ\text{C} \pm 2^\circ\text{C}$ , 240hrs.   | 2     |
| 4   | Low Temperature Storage                           | $-20^\circ\text{C} \pm 2^\circ\text{C}$ , 240hrs.  | 1,2   |
| 5   | High Temperature and High Humidity Operation Test | $40^\circ\text{C} \pm 2^\circ\text{C}$ , 90%, 240hrs.  | 1,2   |
| 6   | Thermal Shock (non Operation)                     | $-10^\circ\text{C}/30\text{min} \sim +50^\circ\text{C}/30\text{min}$ for a total 10 cycles.  | 1,2   |
| 6   | Vibration Test                                    | Total fixed amplitude: 1.5mm.<br>Vibration Frequency: 10~55Hz.<br>One cycle 60 seconds to 3 direction of X, Y, Z each 15 minutes.  | 3     |
| 7.  | Drop Test   | To be measured after dropping from 60cm high on the concrete surface in packing state.<br><br> |       |

- Notes:
1. No dew condensation to be observed.
  2. The function test shall be conducted after 4 hours storage at the normal temperature and humidity after removed from the test chamber.
  3. Vibration test will be conducted to the product itself without putting I in a container.

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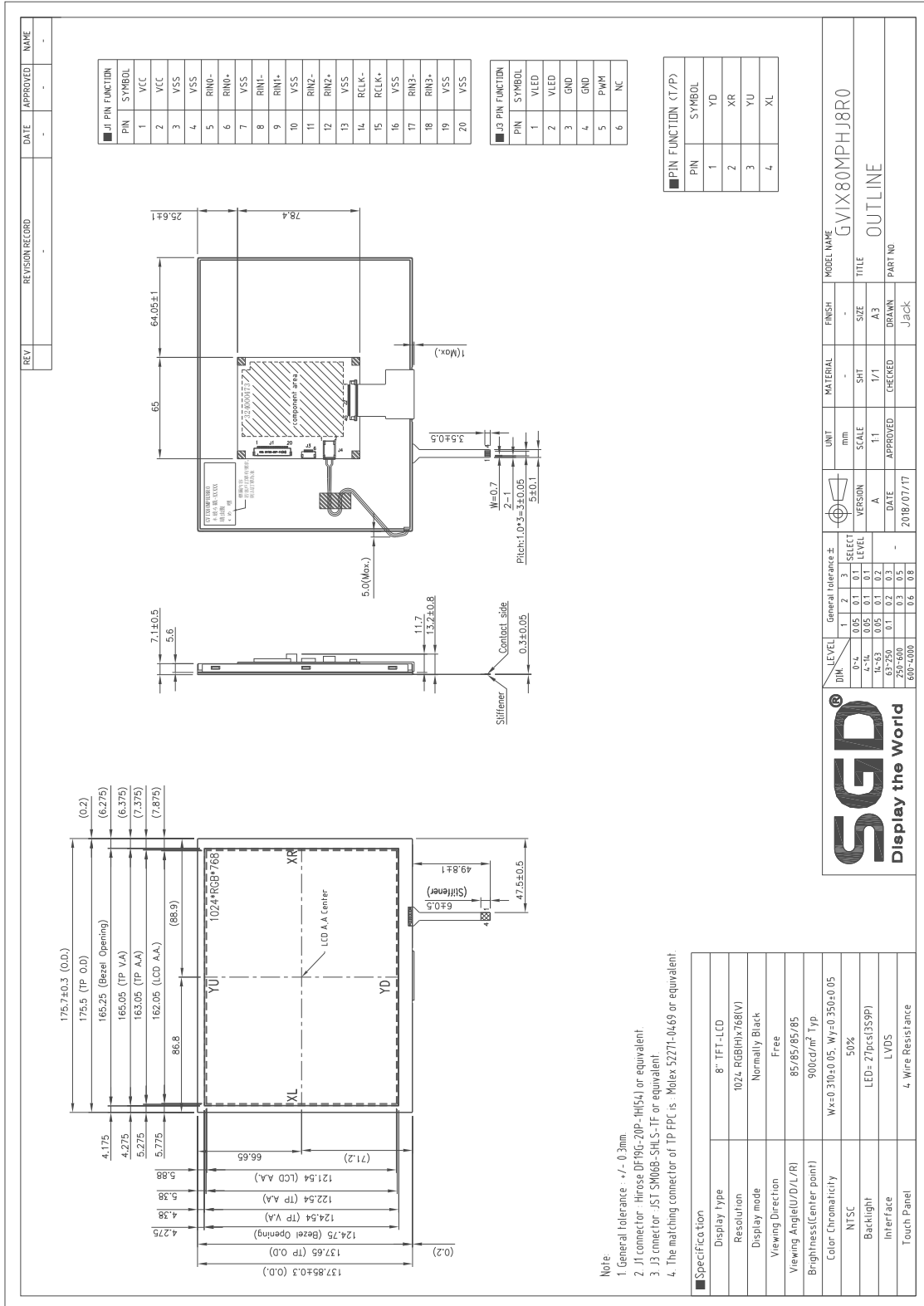
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## 9 Dimensional Outlines





## Product Specification

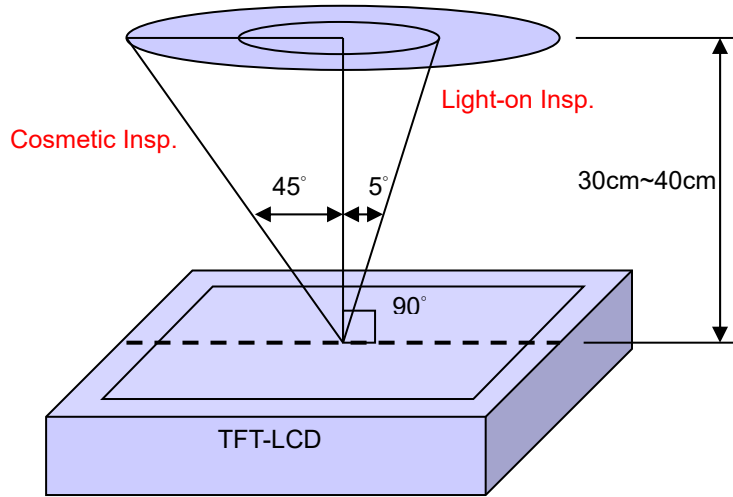
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### 10 Incoming Inspection Standards

#### 10.1 Inspection and Environment Conditions

##### 10.1.1 Inspection Conditions:

- (1) Inspection Distance: 35 cm $\pm$ 5cm
- (2) View Angle : Light-on Inspection Angle :  $\pm 5^\circ$   
Cosmetic Inspection Angle :  $\pm 45^\circ$



( perpendicular to LCD panel surface)

##### 10.1.2 Environment Conditions:

|                      |                       |                                  |
|----------------------|-----------------------|----------------------------------|
| Ambient Temperature  |                       | 23 $^\circ$ C $\pm$ 5 $^\circ$ C |
| Ambient Humidity     |                       | 55 $\pm$ 10%RH                   |
| Ambient Illumination | Cosmetic Inspection   | more than 600 Lux                |
|                      | Functional Inspection | 300~500 Lux                      |


##### 10.1.3 Sampling Conditions:

- (1) Lot Size: Quantity of shipment lot per model
- (2) Sampling Method:

|               |              |                                    |
|---------------|--------------|------------------------------------|
| Sampling Plan |              | MIL-STD-105E                       |
|               |              | Normal Inspection, Single Sampling |
|               |              | Level II                           |
| AQL           | Major Defect | 1.0%                               |
|               | Minor Defect | 1.5%                               |

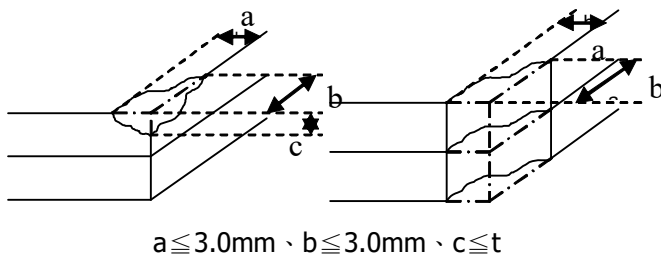
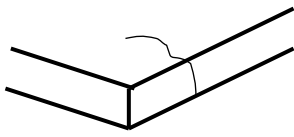
- (3) The classification of Major(MA) and Minor(MI) defects is shown as 3. Inspection Criteria.

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### 10.1.4 Inspection Criteria

#### 10.1.4.1 Cosmetic Inspection(Panel):

| Item                                  | Judgment Criteria   | Classification |
|---------------------------------------|---|----------------|
| Chipping on Panel                     |  <p style="text-align: center;"><math>a \leq 3.0\text{mm}</math>、<math>b \leq 3.0\text{mm}</math>、<math>c \leq t</math><br/>( Bottom glass thickness)</p> | MA             |
| Scratch on Panel<br>*Note-2           | $W \leq 0.05\text{mm}$ or $L < 5\text{mm}$ : Ignored<br>$0.05\text{mm} < W \leq 0.1\text{mm}$ and $L \leq 5\text{mm}$ : $N \leq 5$<br>$W > 0.1\text{mm}$ or $L > 5\text{mm}$ : Not allowed  | MI             |
| Bubble or Dent on Panel<br>*Note-3    | $D \leq 0.2\text{mm}$ : Ignored<br>$0.2\text{mm} < D \leq 0.3\text{mm}$ : $N \leq 5$<br>$D > 0.3\text{mm}$ : Not allowed  | MI             |
| Panel Crack                           |  <p style="text-align: center;">Not Allowed crack</p>  | MA             |
| Bezel Deformation                     | Obvious deformation is not allowed.   | MI             |
| Bezel Oxidation                       | Not allowed if it rusts continuously over 1 cm (It is out of warranty with rusted tin plate)  | MI             |
| Bezel Scratch                         | $L \leq 20\text{mm}$ , $W \leq 0.2$ , $N \leq 3$  | MI             |
| Metal Squash Dent /Flange(Front Side) | $D(W) \leq 1, L \leq 3, N \leq 3;$  | MI             |
| B/L High Voltage Wire Denudation      | Not allowed   | MA             |
| Polarizer flaw or leak out resin      | Defect is defined as the active area.   | MI             |
| Outline Dimension                     | Must in Spec, refer to related product spec.  | MI             |

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### 10.1.4.2 Functional Inspection:

| Item  | Judgment Criteria  |  |                     | Classification |
|---|--|--|---------------------|----------------|
|   | Area(Note1)  | I                                      | O                   |                |
| Point Defect  | Bright dot   | Random                                 | 2                   |                |
|   |  | 2 dots adjacent                        | 0                   | 0              |
|   |  | 3 dots adjacent or more                | 0                   | 0              |
|   | Dark dot   | Random                                 | 3                   |                |
|   |  | 2 dots adjacent                        | 1                   |                |
|   |  | 3 dots adjacent or more                | 0                   | 0              |
|   | Total Dot Defect   |  | 5                   |                |
|   | Distance   | Distance between Bright and Bright dot | $L \geq 5\text{mm}$ |                |
|   |  | Distance between Bright and Dark dot   | $L \geq 5\text{mm}$ |                |
|   |  | Distance between Dark dot              | $L \geq 5\text{mm}$ |                |
| (1) It is defined as Point Defect if defect area $> 0.5\text{dot}$<br>(2) It is ignored if defect area $\leq 0.5\text{dot}$<br>(3) Weak point defect will be defined as Bright Dot if it can be observed through ND filter 5% ( Full Screen Black Inspection) |  |  |                     |                |
| Line Defect   | Obvious vertical or horizontal line defect is not allowed.   |  |                     | MA             |
| Mura  | Not allowed if it can be observed through ND Filter 5 %  |  |                     | MI             |
| Foreign Material in spot shape<br>*Note-3   | $D \leq 0.2\text{mm}$ : Ignored<br>$0.2\text{mm} < D \leq 0.5\text{mm}$ : $N \leq 8$<br>$D > 0.5\text{mm}$ : Not allowed   |  |                     | MI             |
| Foreign Material in line or spiral shape<br>*Note-4   | $W \leq 0.05\text{mm}$ or $L \leq 5\text{mm}$ : Ignored<br>$0.05\text{mm} < W \leq 0.2\text{mm}$ and $L 1.0\text{mm} \leq 5\text{mm}$ : $N \leq 8$<br>$W > 0.2\text{mm}$ or $L > 5\text{mm}$ : Not allowed |  |                     | MI             |
| Display Function Abnormal   | No Malfunction can be allowed  |  |                     | MA             |

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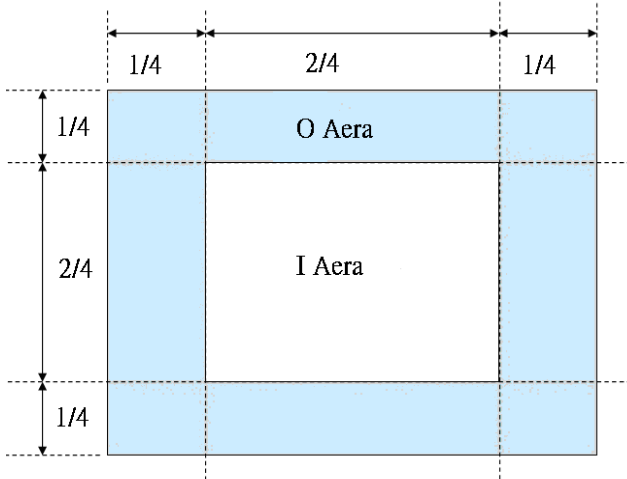
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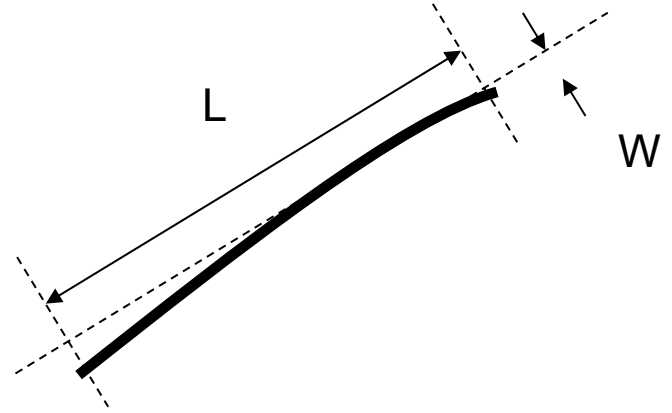
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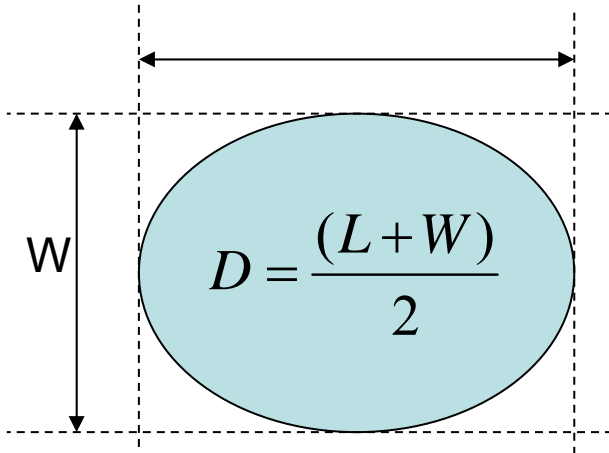
Note-1 : I/O Area Definition



Note-2 : Polarizer Scratch



Note-3 : Spot Foreign Material  
( $W \geq L / 4$ )



Note-4 : Line or Spiral Foreign Material  
( $W < L / 4$ )

