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# **TITLE : HV056WX1-100**

## **Preliminary Product Specification**

### **Rev. P0**

## **BOE HYDIS TECHNOLOGY**

SPEC. NUMBER  
S864-1338

PRODUCT GROUP  
TFT LCD

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## REVISION HISTORY

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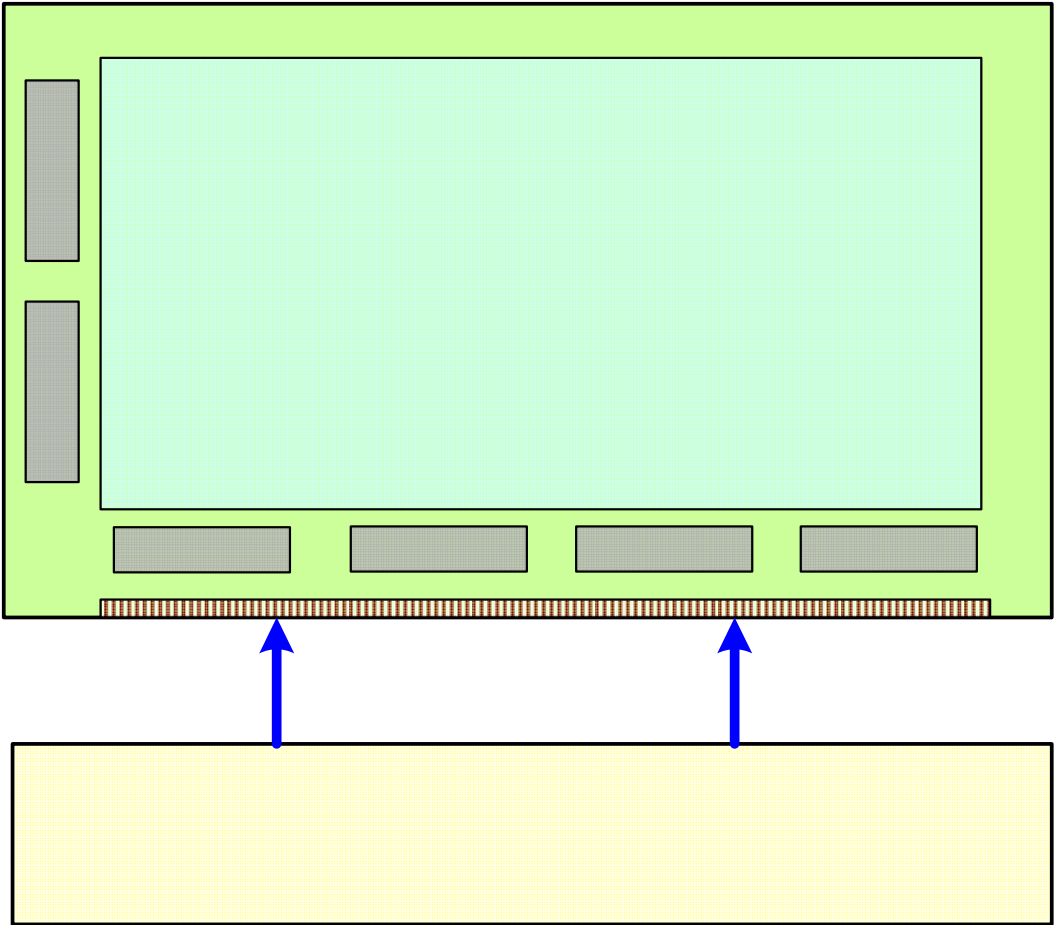
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1.0 GENERAL DESCRIPTION

1.1 Introduction

HV056WX1-100 is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 5.6 inch diagonally measured active area with WXGA resolutions (1280 horizontal by 800 vertical pixel array).

Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 262,144 colors. The TFT-LCD panel used for this module is adapted for a low reflection and higher color type.



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### 1.2 Features

- High Resolution & Wide View (HFFS Technology)
- 3.3 V Logic Power & 12V LED Power Supply
- 1 Channel LVDS Interface
- 262,144 Colors
- Low Weight (Slimming Glass & Slim LGP LED Backlight Technology)
- Compact Design (Source & Gate IC of the COG Type)
- Green Product (RoHS Compliant)

### 1.3 Applications

- Display terminals for Ultra Mobility Personal Computer.

### 1.4 General Specification

The followings are general specification at the model HV056WX1-100.

< Table 1. General Specification >

| Parameter           | Specification                                 | Unit   | Remarks   |
|---------------------|---|--------|-----------|
| Active area         | 120.96(H) × 75.60(V)                          | mm     |           |
| Number of pixels    | 1280(H) × 800(V)                              | pixels |           |
| Pixel pitch         | 94.5(H) × 94.5(V)                             | um     |           |
| Pixel arrangement   | RGB Vertical stripe                           |        |           |
| Display colors      | 262,144                                       | colors |           |
| Display mode        | Normally Black                                |        |           |
| Dimensional outline | 131.7 ± 0.4(H) × 87.7 ± 0.4(V) × 4.7 ± 0.3(T) | mm     |           |
| Weight              | TBD (Typ.)                                    | gram   |           |
| Back-light          | Bottom edge side, 16-LEDs type                |        | White LED |

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## 2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. Absolute Maximum Ratings >

[VSS=GND=0V]

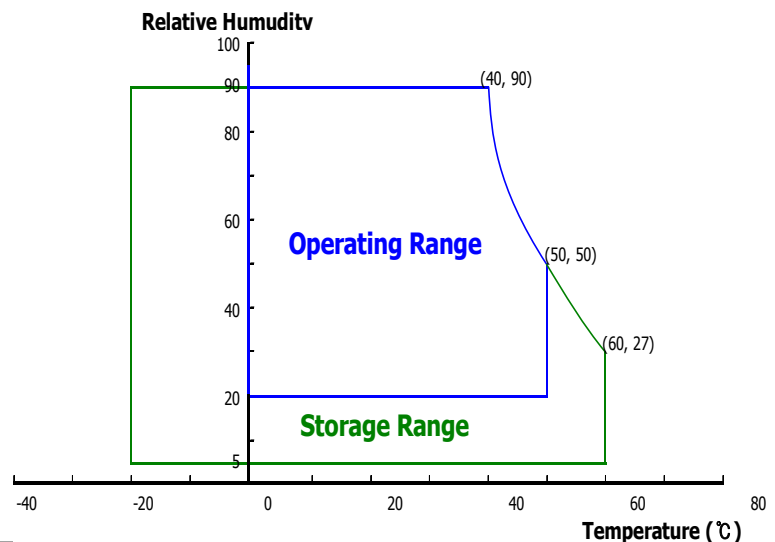
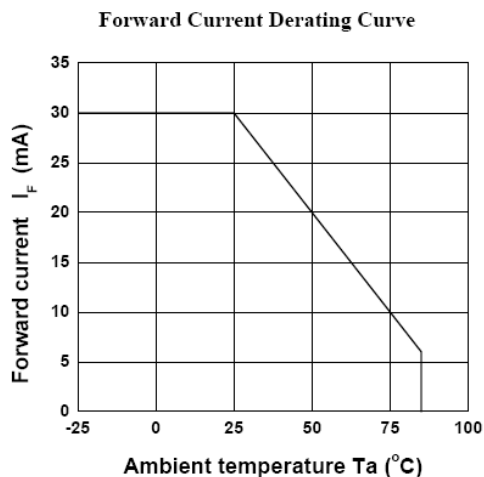
| Parameter                      |         | Symbol    | Min.    | Max. | Unit | Remarks    |
|--------------------------------|---------|-----------|---------|------|------|------------|
| Logic Power Supply             |         | $V_{DD}$  | VSS-0.3 | 5.0  | V    | Ta = 25 °C |
| Back-light Power Supply        |         | $HV_{DD}$ | -0.3    | 40.0 | V    |            |
| Back-Light LED Reverse Voltage |         | $V_R$     | -       | 5    | V    |            |
| Back-light LED Current         | + 25 °C | $I_{LED}$ | -       | 30   | mA   | Note 1     |
|                                | + 50 °C | $I_{LED}$ | -       | 20   | mA   |            |
| Operating Temperature          |         | $T_{OPR}$ | 0       | 60   | °C   | Note 1, 2  |
| Storage Temperature            |         | $T_{STG}$ | -20     | 70   | °C   |            |

Note :

1. Ambient temperature vs allowable forward current are shown in the figure below.
2. Temperature and relative humidity range are shown in the figure below.

90% RH Max. ( 40°C ≥ Ta)

Maximum wet - bulb temperature at 39°C or less. ( > 40°C ) No condensation.



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## 3.0 OPTICAL SPECIFICATION

The test of Optical specification shall be measured in a dark room (ambient luminance  $\leq 1$  lux and temperature =  $25 \pm 2^\circ\text{C}$ ) with the equipment of Luminance meter system (Goniometric system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of  $\Theta$  and  $\Phi$  equal to  $0^\circ$ . We refer to  $\Theta_{\phi=0}$  ( $=\Theta_3$ ) as the 3 o'clock direction (the "right"),  $\Theta_{\phi=90}$  ( $=\Theta_{12}$ ) as the 12 o'clock direction ("upward"),  $\Theta_{\phi=180}$  ( $=\Theta_9$ ) as the 9 o'clock direction ("left") and  $\Theta_{\phi=270}$  ( $=\Theta_6$ ) as the 6 o'clock direction ("bottom"). While scanning  $\Theta$  and/or  $\Phi$ , the center of the measuring spot on the Display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement.

< Table 3. Optical Specifications >

| Parameter                     |            | Symbol        | Condition  | Min | Typ | Max | Unit              | Remark   |
|-------------------------------|------------|---------------|--|-----|-----|-----|-------------------|----------|
| Viewing Angle                 | Horizontal | $\Theta_3$    | CR > 10  | 80  | 85  | -   | Deg.              | Note 1   |
|                               |            | $\Theta_9$    |  | 80  | 85  | -   | Deg.              |          |
|                               | Vertical   | $\Theta_{12}$ |  | 80  | 85  | -   | Deg.              |          |
|                               |            | $\Theta_6$    |  | 80  | 85  | -   | Deg.              |          |
| Contrast ratio                |            | CR            | $\Theta = 0^\circ$   | -   | 500 | -   |                   | Note 2   |
| Luminance of White            |            | $Y_w$         |  | 250 | 300 | -   | cd/m <sup>2</sup> | Note 4,5 |
| White Luminance uniformity    |            | $\Delta Y9$   |  | 75  | -   | -   | %                 |          |
| Reproduction of color         | White      | $W_x$         | $\Theta = 0^\circ$<br>(Center)<br>Normal<br>Viewing<br>Angle |     | TBD |     |                   | Note 3   |
|                               |            | $W_y$         |  |     | TBD |     |                   |          |
|                               | Red        | $R_x$         |  |     | TBD |     |                   |          |
|                               |            | $R_y$         |  |     | TBD |     |                   |          |
|                               | Green      | $G_x$         |  |     | TBD |     |                   |          |
|                               |            | $G_y$         |  |     | TBD |     |                   |          |
|                               | Blue       | $B_x$         |  |     | TBD |     |                   |          |
|                               |            | $B_y$         |  |     | TBD |     |                   |          |
| Response Time ( $T_r + T_d$ ) |            |               | Ta= 25° C  |     | 30  |     | ms                | Note 6   |
| Cross Talk                    |            | CT            | $\Theta = 0^\circ$   | -   | -   | 2.0 | %                 | Note 7   |

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## Note :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface. (see Figure1 in Appendix).
2. Contrast measurements shall be made at viewing angle of  $\theta = 0^\circ$  and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (See Figure 1 in Appendix) Luminance Contrast Ratio (CR) is defined mathematically as  
$$CR = \text{Luminance when displaying a white raster} / \text{Luminance when displaying a black raster}.$$
3. Reference only / Standard Front Surface Treatment Measured with green cover glass. The color chromaticity coordinates specified in Table 3 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.
4. The White luminance uniformity on LCD surface is then expressed as :  
$$\Delta Y = ( \text{Minimum Luminance of 9 points} / \text{Maximum Luminance of 9 points} ) * 100$$
  
(See Figure 2 shown in Appendix).
5. The electro-optical response time measurements shall be made as Figure 3 shown in Appendix by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is  $T_r$ , and 90% to 10% is  $T_d$ .
6. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance ( $Y_A$ ) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance ( $Y_B$ ) of that same area when any adjacent area is driven dark  
(Refer to Figure 5 in Appendix)

$$\text{Cross-Talk (\%)} = \left| \frac{Y_B - Y_A}{Y_B} \right| \times 100$$

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## 4.0 ELECTRICAL SPECIFICATION

### 4.1 TFT LCD Module

< Table 4. LCD Module Electrical Specification >

[Ta =25 ± 2 °C]

| Parameter                            |                   | Symbol           | Values |      |       | Unit | Remark                |
|--------------------------------------|-------------------|------------------|--------|------|-------|------|-----------------------|
|                                      |                   |                  | Min    | Typ  | Max   |      |                       |
| Logic Power Supply                   |                   | V <sub>DD</sub>  | 3.0    | 3.3  | 3.6   | V    |                       |
| Power Consumption                    | Window XP         | P <sub>TYP</sub> |        | TBD  |       | mW   | Note 1                |
|                                      | Vertical Sub Line | P <sub>MAX</sub> |        | TBD  |       | mW   |                       |
|                                      | EBL               | P <sub>EBL</sub> |        | TBD  |       | mW   |                       |
| Vsync Frequency                      |                   | f <sub>V</sub>   | -      | 60   | 75    | Hz   |                       |
| Hsync Frequency                      |                   | f <sub>H</sub>   |        | 49.2 |       | KHz  |                       |
| Main Clock Frequency                 |                   | fclk             |        | 71.1 |       | MHz  |                       |
| High Level Differential Input Signal |                   | V <sub>IH</sub>  | -      | -    | + 100 | mV   | V <sub>CM</sub> =1.2V |
| Low Level Differential Input Signal  |                   | V <sub>IL</sub>  | - 100  | -    | -     | mV   |                       |

#### Note :

1. The supply voltage is measured and specified at the interface connector of LCM.

The current draw and power consumption specified is for 3.3V at 25°C.

- a) Typ : Window XP pattern,      b) Max : Vertical Sub line pattern
- c) EBL : Mosaic pattern ( 32 X 32 )

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## 4.2 Back-Light Unit

< Table 5. Back-Light Unit Electrical Specification >

[Ta =25 ± 2 °C]

| Parameter  | Symbol                               | Values |               |      | Unit | Remark    |
|--|--------------------------------------|--------|---------------|------|------|-----------|
|  |                                      | Min    | Typ           | Max  |      |           |
| Back-Light Power Supply                                  | HV <sub>DD</sub>                     | 4.5    | 12.0          | 16.0 | V    |           |
| Power Consumption  | P <sub>BL</sub>                      |        | TBD           |      | mW   | Note 1, 4 |
| LED Driver's Efficiency                                  | $\eta$                               | -      | 85            | -    | %    | Note 2    |
| Back-light PWM Frequency                                 | F <sub>PWM</sub>                     | 100    | 200           | 1000 | Hz   |           |
| High Level PWM Signal Voltage                            | V <sub>PWMH</sub>                    | 1.4    | -             | 5.0  | V    |           |
| Low Level PWM Signal Voltage                             | V <sub>PWML</sub>                    | 0      | -             | 0.2  | V    |           |
| Back-light LED Voltage /<br>Back-light LED Total Voltage | V <sub>LED</sub><br>/V <sub>BL</sub> | -      | 3.3<br>/ 26.4 |      | V    | Note 4    |
| Back-light LED Current /<br>Back-light LED Total Current | I <sub>LED</sub><br>/I <sub>BL</sub> | -      | 15<br>/ 30    |      | mA   | Note 4    |
| Life Time  |                                      | 10,000 | -             | -    | Hrs  | By LED    |

### Note :

1. The power supply voltage and current is measured and specified at the interface connector of LCM including LED Driver.
2. Reference value, which is measured with LED Driver for 12V.
3. Reference value, which is measured without LED Driver.
4. Calculated value for reference (V<sub>LED</sub> × I<sub>LED</sub> × # of LEDs (16EA) ).

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#### 4.3 PWM Duty Ratio vs Brightness

TBD

**Note :**

In case of duty ratio 0%, LED can't illuminate itself so this state is LED off.

In case of duty ratio 100%, the brightness of LED is maximum and the state is LED on.

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## 5.0 INTERFACE CONNECTION.

### 5.1 Electrical Interface Connection

< Table 6. Electrical Interface Connection Specification >

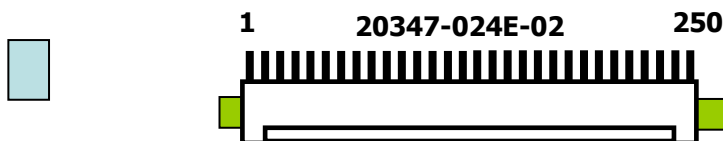
(CN1 :20347-025E-02, I-PEX)

| Pin No | Symbol             | Description              | Pin No | Symbol | Description                   |
|--------|--------------------|--------------------------|--------|--------|-------------------------------|
| 1      | LED <sub>VDD</sub> | Back-light Power Supply  | 14     | IN1+   | LVDS Receiver Signal (+)      |
| 2      | LED <sub>VDD</sub> | Back-light Power Supply  | 15     | IN2-   | LVDS Receiver Signal (-)      |
| 3      | NC                 | No Connection            | 16     | IN2+   | LVDS Receiver Signal (+)      |
| 4      | LED <sub>GND</sub> | Back-light Ground        | 17     | CLK-   | LVDS Receiver Clock Signal(-) |
| 5      | LED <sub>GND</sub> | Back-light Ground        | 18     | CLK+   | LVDS Receiver Clock Signal(+) |
| 6      | PWM                | PWM Brightness Control   | 19     | GND    | Ground                        |
| 7      | ON/OFF             | LED Drive ON/OFF         | 20     | TEST   | TEST PIN                      |
| 8      | GND                | GROUND                   | 21     | GND    | GROUND                        |
| 9      | GND                | GROUND                   | 22     | NC     | NON-CONNECTION                |
| 10     | GND                | GROUND                   | 23     | VDD    | Logic Power Supply            |
| 11     | IN0-               | LVDS Receiver Signal (-) | 24     | VDD    | Logic Power Supply            |
| 12     | IN0+               | LVDS Receiver Signal (+) | 25     | VDD    | Logic Power Supply            |
| 13     | IN1-               | LVDS Receiver Signal (-) |        |        |                               |

#### Note :

1. NC : This pins are only used for BOE HYDIS internal operations
2. Start from left side

#### Rear view of LCM



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## 5.2 LVDS Interface

< Table 7. LVDS Interface Specification >

[LVDS Transmitter : THC63LVDM83A]

| Input signal | Transmitter |          | Interface      |              | 20347-024E-02 | Remark |
|--------------|-------------|----------|----------------|--------------|---------------|--------|
|              | Pin No      | Pin No   | System (Tx)    | TFT-LCD (Rx) | Pin No.       |        |
| R0           | 51          | 48<br>47 | OUT0-<br>OUT0+ | IN0-<br>IN0+ | 11<br>12      |        |
| R1           | 52          |          |                |              |               |        |
| R2           | 54          |          |                |              |               |        |
| R3           | 55          |          |                |              |               |        |
| R4           | 56          |          |                |              |               |        |
| R5           | 3           |          |                |              |               |        |
| G0           | 4           |          |                |              |               |        |
| G1           | 6           | 46<br>45 | OUT1-<br>OUT1+ | IN1-<br>IN1+ | 13<br>14      |        |
| G2           | 7           |          |                |              |               |        |
| G3           | 11          |          |                |              |               |        |
| G4           | 12          |          |                |              |               |        |
| G5           | 14          |          |                |              |               |        |
| B0           | 15          |          |                |              |               |        |
| B1           | 19          |          |                |              |               |        |
| B2           | 20          | 42<br>41 | OUT2-<br>OUT2+ | IN2-<br>IN2+ | 15<br>16      |        |
| B3           | 22          |          |                |              |               |        |
| B4           | 23          |          |                |              |               |        |
| B5           | 24          |          |                |              |               |        |
| HSYNC        | 27          |          |                |              |               |        |
| VSYNC        | 28          |          |                |              |               |        |
| DE           | 30          |          |                |              |               |        |
| MCLK         | 31          | 40       | CLKOUT-        | CLKIN-       | 17            |        |
|              |             | 39       | CLKOUT+        | CLKIN+       | 18            |        |

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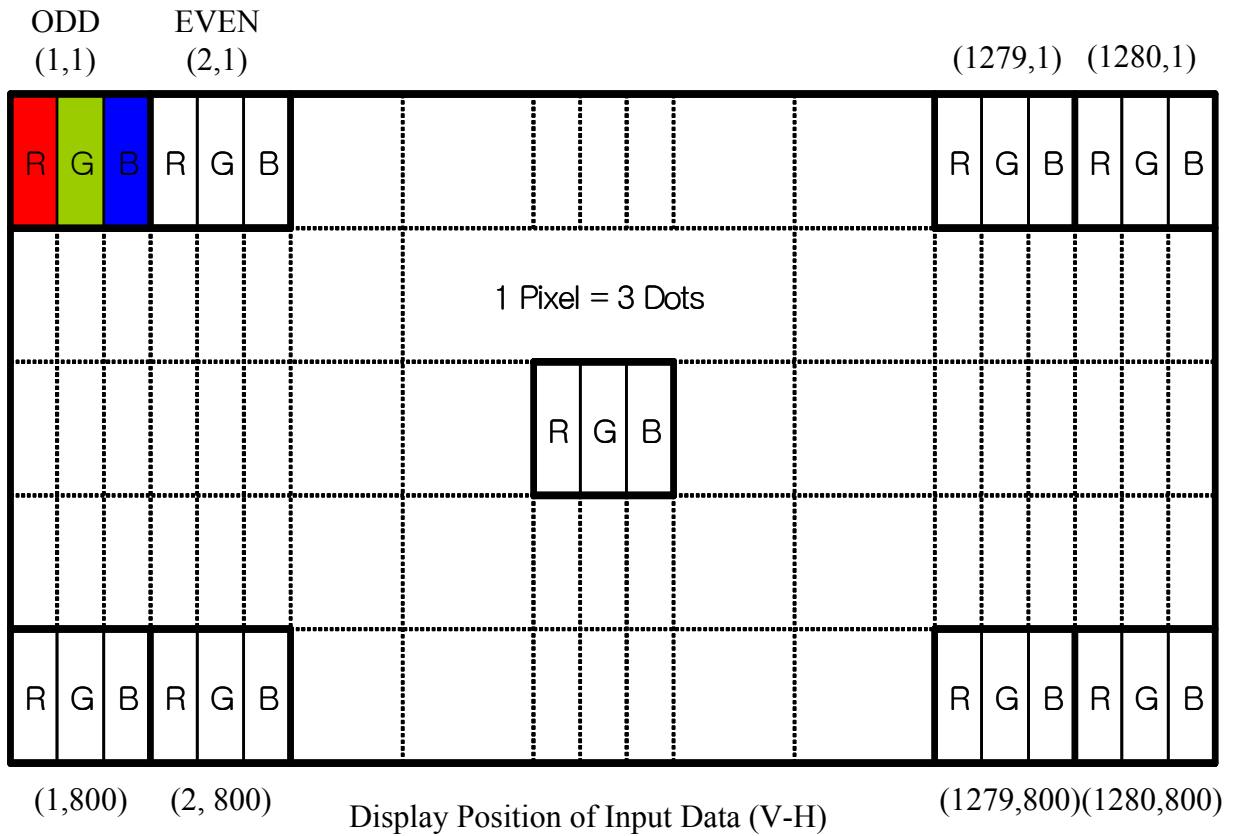
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### 5.3 Data Input Format





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## 6.0 SIGNAL TIMING SPECIFICATION

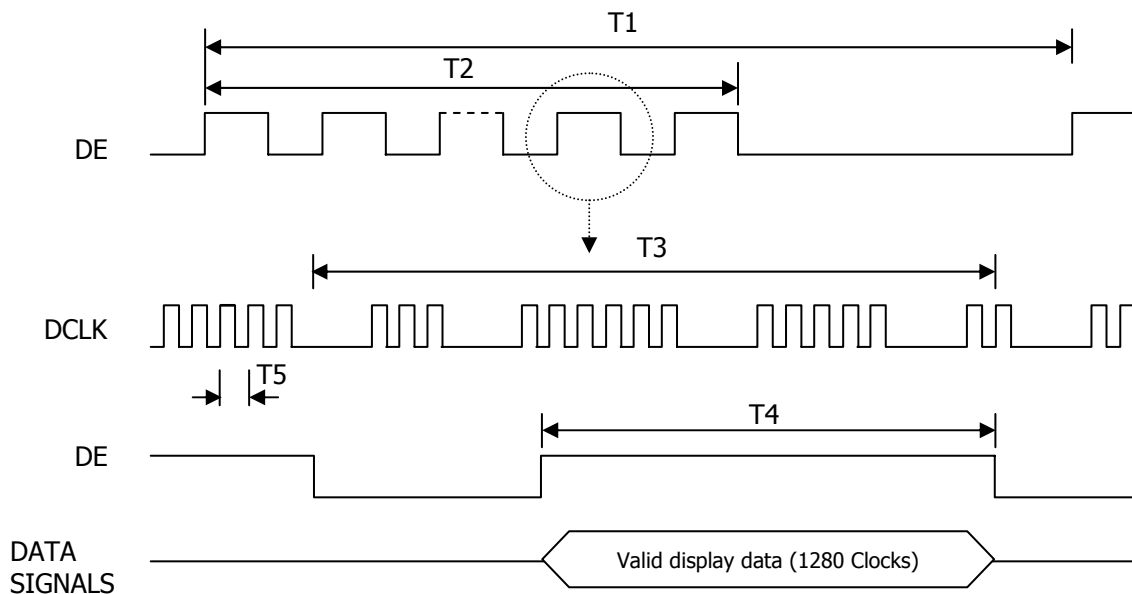
### 6.1 Timing Parameters of TFT LCD Module Input Signal

< Table 8. Input Timing Parameters Specification >

[ DE only, VDD=3.3V, GND=0V, TA=25℃]

| Parameter                 | Symbol | Min  | Typ  | Max | Unit   | Note |
|---------------------------|--------|------|------|-----|--------|------|
| Frame Period              | T1     | 810  | 823  | -   | Lines  |      |
| Vertical Display Period   | T2     | -    | 800  | -   | Lines  |      |
| One line Scanning Period  | T3     | 1350 | 1440 | -   | Clocks |      |
| Horizontal Display Period | T4     | -    | 1280 | -   | Clocks |      |
| Clock Frequency           | 1/T5   | -    | 71.1 | -   | MHz    |      |

### 6.2 Timing Waveforms of TFT LCD Module Input Signal





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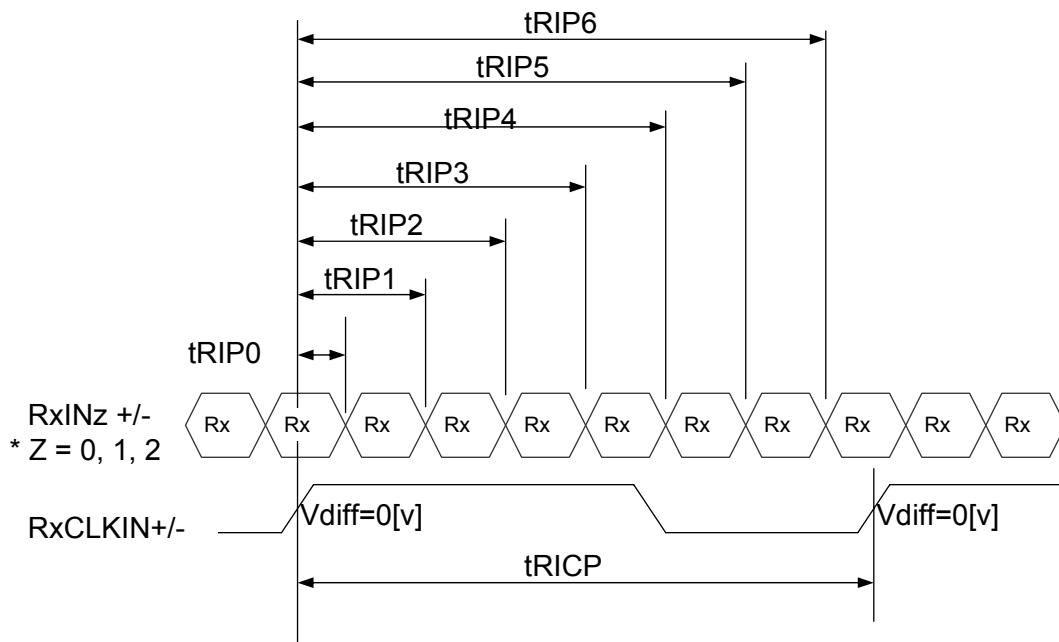
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### 6.3 LVDS Rx Interface Timing Parameter

The specification of the LVDS Rx interface timing parameter

< Table 9. LVDS Rx Interface Timing Specification >

| Item         | Symbol | Min.                          | Typ.                      | Max.                          | Unit | Remarks |
|--------------|--------|-------------------------------|---------------------------|-------------------------------|------|---------|
| CLKIN Period | tRICP  | 12.50                         | 14.43                     | 25.00                         | nsec |         |
| Input Data 0 | tRIP0  | -0.4                          | 0.0                       | +0.4                          | nsec |         |
| Input Data 1 | tRIP1  | tRICP/7-0.4                   | tRICP/7                   | tRICP/7+0.4                   | nsec |         |
| Input Data 2 | tRIP2  | $2 \times \text{tRICP}/7-0.4$ | $2 \times \text{tRICP}/7$ | $2 \times \text{tRICP}/7+0.4$ | nsec |         |
| Input Data 3 | tRIP3  | $3 \times \text{tRICP}/7-0.4$ | $3 \times \text{tRICP}/7$ | $3 \times \text{tRICP}/7+0.4$ | nsec |         |
| Input Data 4 | tRIP4  | $4 \times \text{tRICP}/7-0.4$ | $4 \times \text{tRICP}/7$ | $4 \times \text{tRICP}/7+0.4$ | nsec |         |
| Input Data 5 | tRIP5  | $5 \times \text{tRICP}/7-0.4$ | $5 \times \text{tRICP}/7$ | $5 \times \text{tRICP}/7+0.4$ | nsec |         |
| Input Data 6 | tRIP6  | $6 \times \text{tRICP}/7-0.4$ | $6 \times \text{tRICP}/7$ | $6 \times \text{tRICP}/7+0.4$ | nsec |         |







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### 6.4 Input Signals, Basic Display Colors & Gray Scale Of Colors

Each color is displayed in sixty-four gray scales from a 6 bit data signal input. A total of 262,144 colors are derived from the resultant 18 bit data.

| Colors & Gray Scale         |          | Red Data |    |    |    |    |    | Green Data |    |    |    |    |    | Blue Data |    |    |    |    |    |
|-----------------------------|----------|----------|----|----|----|----|----|------------|----|----|----|----|----|-----------|----|----|----|----|----|
|                             |          | R5       | R4 | R3 | R2 | R1 | R0 | G5         | G4 | G3 | G2 | G1 | G0 | B5        | B4 | B3 | B2 | B1 | B0 |
| Basic Colors                | Black    | 0        | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  |
|                             | Blue     | 0        | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 1         | 1  | 1  | 1  | 1  | 1  |
|                             | Green    | 0        | 0  | 0  | 0  | 0  | 0  | 1          | 1  | 1  | 1  | 1  | 1  | 0         | 0  | 0  | 0  | 0  | 0  |
|                             | Cyan     | 0        | 0  | 0  | 0  | 0  | 0  | 1          | 1  | 1  | 1  | 1  | 1  | 1         | 1  | 1  | 1  | 1  | 1  |
|                             | Red      | 1        | 1  | 1  | 1  | 1  | 1  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  |
|                             | Magenta  | 1        | 1  | 1  | 1  | 1  | 1  | 0          | 0  | 0  | 0  | 0  | 0  | 1         | 1  | 1  | 1  | 1  | 1  |
|                             | Yellow   | 1        | 1  | 1  | 1  | 1  | 1  | 1          | 1  | 1  | 1  | 1  | 1  | 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  |
| Gray Scale Of Red           | Black    | 0        | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  |
|                             | △        | 0        | 0  | 0  | 0  | 0  | 1  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  |
|                             | Darker   | 0        | 0  | 0  | 0  | 1  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  |
|                             | △        | ↓        |    |    |    |    |    | ↓          |    |    |    |    |    | ↓         |    |    |    |    |    |
|                             | ▽        |          |    |    |    |    |    |            |    |    |    |    |    |           |    |    |    |    |    |
|                             | Brighter | 1        | 1  | 1  | 1  | 0  | 1  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  |
|                             | ▽        | 1        | 1  | 1  | 1  | 1  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  |
|                             | Red      | 1        | 1  | 1  | 1  | 1  | 1  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  |
| Gray Scale Of Green         | Black    | 0        | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  |
|                             | △        | 0        | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 1  | 0         | 0  | 0  | 0  | 0  | 0  |
|                             | Darker   | 0        | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 1  | 0  | 0         | 0  | 0  | 0  | 0  | 0  |
|                             | △        | ↓        |    |    |    |    |    | ↓          |    |    |    |    |    | ↓         |    |    |    |    |    |
|                             | ▽        |          |    |    |    |    |    |            |    |    |    |    |    |           |    |    |    |    |    |
|                             | Brighter | 0        | 0  | 0  | 0  | 0  | 0  | 1          | 1  | 1  | 1  | 0  | 1  | 0         | 0  | 0  | 0  | 0  | 0  |
|                             | ▽        | 0        | 0  | 0  | 0  | 0  | 0  | 1          | 1  | 1  | 1  | 1  | 0  | 0         | 0  | 0  | 0  | 0  | 0  |
|                             | Green    | 0        | 0  | 0  | 0  | 0  | 0  | 1          | 1  | 1  | 1  | 1  | 1  | 0         | 0  | 0  | 0  | 0  | 0  |
| Gray Scale Of Blue          | Black    | 0        | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  |
|                             | △        | 0        | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 1  |
|                             | Darker   | 0        | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 1  | 0  |
|                             | △        | ↓        |    |    |    |    |    | ↓          |    |    |    |    |    | ↓         |    |    |    |    |    |
|                             | ▽        |          |    |    |    |    |    |            |    |    |    |    |    |           |    |    |    |    |    |
|                             | Brighter | 0        | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 1         | 1  | 1  | 1  | 0  | 1  |
|                             | ▽        | 0        | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 1         | 1  | 1  | 1  | 1  | 0  |
|                             | Blue     | 0        | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 1         | 1  | 1  | 1  | 1  | 1  |
| Gray Scale Of White & Black | Black    | 0        | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  |
|                             | △        | 0        | 0  | 0  | 0  | 0  | 1  | 0          | 0  | 0  | 0  | 0  | 1  | 0         | 0  | 0  | 0  | 0  | 1  |
|                             | Darker   | 0        | 0  | 0  | 0  | 1  | 0  | 0          | 0  | 0  | 0  | 1  | 0  | 0         | 0  | 0  | 0  | 1  | 0  |
|                             | △        | ↓        |    |    |    |    |    | ↓          |    |    |    |    |    | ↓         |    |    |    |    |    |
|                             | ▽        |          |    |    |    |    |    |            |    |    |    |    |    |           |    |    |    |    |    |
|                             | Brighter | 1        | 1  | 1  | 1  | 0  | 1  | 1          | 1  | 1  | 1  | 0  | 1  | 1         | 1  | 1  | 1  | 0  | 1  |
|                             | ▽        | 1        | 1  | 1  | 1  | 1  | 0  | 1          | 1  | 1  | 1  | 1  | 0  | 1         | 1  | 1  | 1  | 1  | 0  |
|                             | White    | 1        | 1  | 1  | 1  | 1  | 1  | 1          | 1  | 1  | 1  | 1  | 1  | 1         | 1  | 1  | 1  | 1  | 1  |

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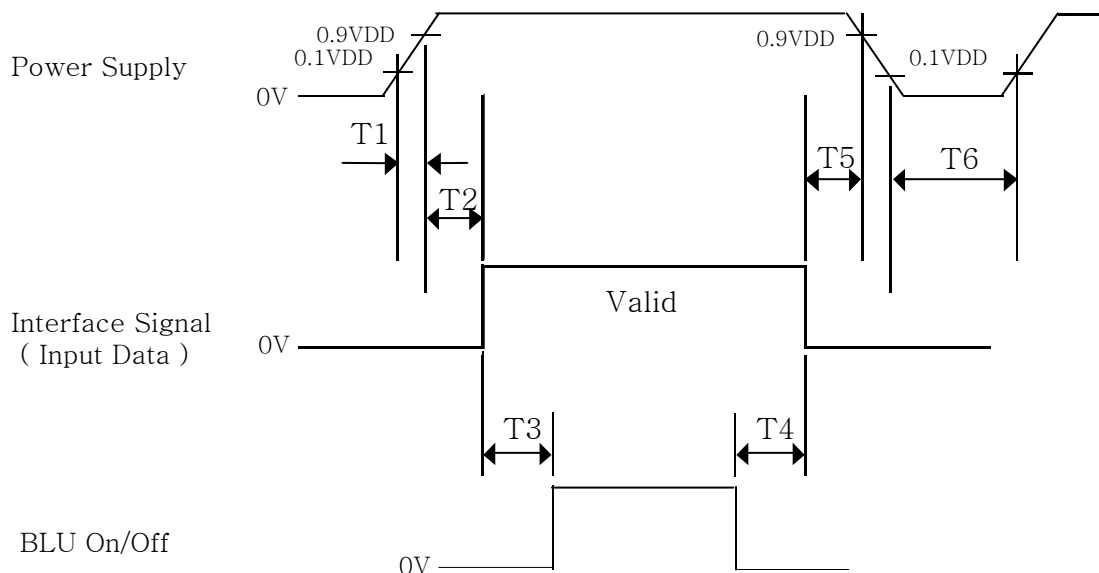
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## 6.5 Power Sequence

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below



| Parameter | Values |     |     | Units |
|-----------|--------|-----|-----|-------|
|           | Min    | Typ | Max |       |
| T1        | 0.5    | -   | 10  | ms    |
| T2        | 0.5    | -   | 50  | ms    |
| T3        | 200    | -   | -   | ms    |
| T4        | 200    | -   | -   | ms    |
| T5        | 0.5    | -   | 50  | ms    |
| T6        | 3.0    | -   | -   | s     |

### Note :

1. When the power supply VDD is 0V, Keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on.
3. Back Light must be turn on after power for logic and interface signal are valid.



## 7.0 MECHANICAL CHARACTERISTICS

### 7.1 Dimensional Requirements

Figure 5 (located in Appendix) shows mechanical outlines for the model HV056WX1-100. Other parameters are shown in Table 10.

<Table 10. Dimensional Parameters Specification >

| Parameter           | Specification  | Unit   |
|---------------------|--|--------|
| Dimensional outline | $131.7 \pm 0.4(\text{H}) \times 87.7 \pm 0.4(\text{V}) \times 4.7 \pm 0.3(\text{T})$ | mm     |
| Weight              | 66 (typ)   | gram   |
| Active area         | $120.96(\text{H}) \times 75.60(\text{V})$  | mm     |
| Pixel pitch         | $94.5(\text{H}) \times 94.5(\text{V})$   | um     |
| Number of pixels    | $1280(\text{H}) \times 800(\text{V})$ (1 pixel = R + G + B dots)                     | pixels |
| Back-light          | Edge side 16-LEDs type ( 2 X 8 Array)  |        |

### 7.2 Clearness and Polarizer Hardness.

The surface of the LCD has an clear film to increase visibility and a hard coating to reduce scratching.

### 7.3 Light Leakage

There shall not be visible light from the back-lighting system around the edges of the screen as seen from a distance 50cm from the screen with an overhead light level of 350 [lux.]



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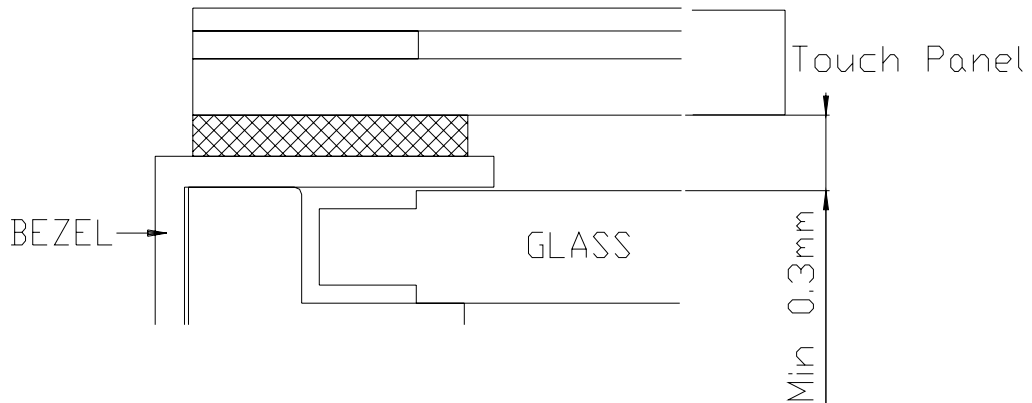
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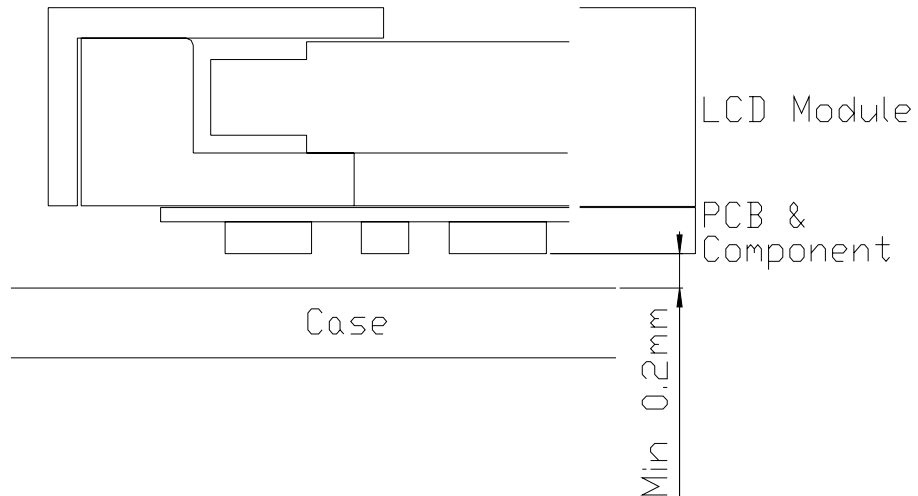
2008.01.30

#### 7.4 Design Guide

Give enough clearance (over 0.3mm) Between the Touch Panel and LCD Module glass to protect a display



Give enough clearance (over 0.2mm) Between the Case and LCD Module component to protect a display





## 8.0 RELIABILITY TEST

The Reliability test items and its conditions are shown in below.

<Table 12. Reliability Test Conditions >

| No | Test Item  | Conditions  |
|----|--|---|
| 1  | High temperature storage test                    | Ta = 60 °C, 240 hrs   |
| 2  | Low temperature storage test                     | Ta = -20 °C, 240 hrs  |
| 3  | High temperature & high humidity operation test  | Ta = 50 °C, 80%RH, 240hrs   |
| 4  | High temperature operation test                  | Ta = 50 °C, 240 hrs   |
| 5  | Low temperature operation test                   | Ta = 0 °C, 240 hrs  |
| 6  | Thermal shock                                    | Ta = -20 °C ↔ 60 °C (30 min), 100 cycle   |
| 7  | Vibration test<br>(non-operating)                | Frequency : 10~500Hz<br>Gravity/AMP : 1.5G<br>Period : X,Y,Z 30min                        |
| 8  | Shock test<br>(non-operating)                    | Gravity : 220G<br>Pulse width : 2ms, half sine wave<br>±X, ±Y, ±Z Once for each direction |
| 9  | Electro-static discharge test<br>(non-operating) | Air : 150pF, 330ohm, 15KV<br>Contact : 150pF, 330ohm, 8KV                                 |

|  |                 |     |            |
|--|-----------------|-----|------------|
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9.0 Product Serial Number







HV056WX1-100

CP210452-XXXXX



MADE IN KOREA

xxxxxxxxxxxxxxxxxx

xxxx

BOE HYDIS Barcode

1

2

3

4

5

6

7

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

- No 1. Control Number

No 2. Rank / Grade

No 3. Line Classification  
(BOE HYDIS : H, LCM : L, BOE OT : A/B/C)

No 4. Year (8 : 2008, 9 : 2009, ...)

No 5. Month (1, 2, 3,..., 9, X, Y, Z)

No 6. FG Code

No 7. Serial Number

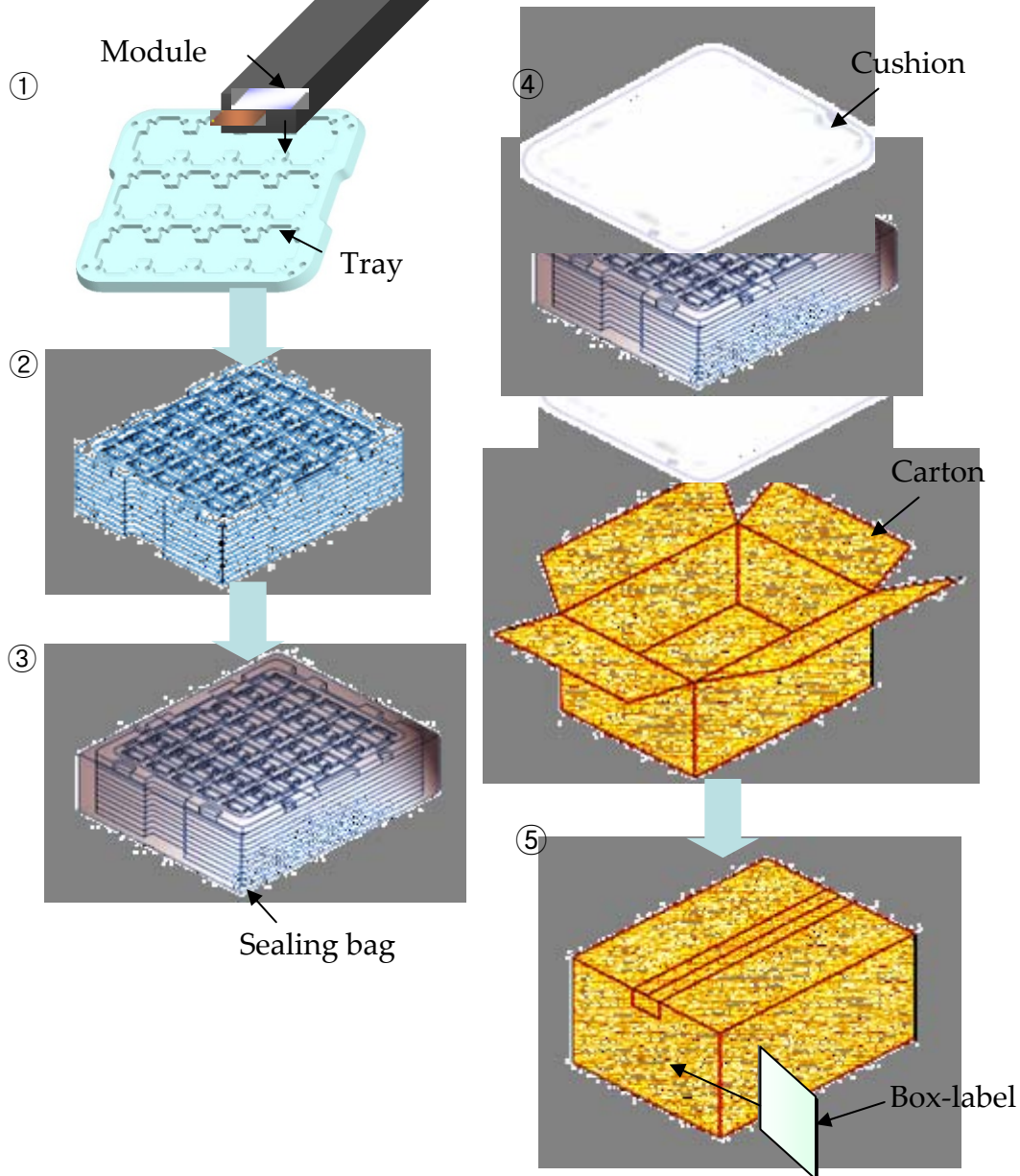
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|---------------------------|--|------------------|



## 10.0 PACKING INFORMATION

BOEHydis provides the standard shipping container for customers, unless customer specifies their packing information. The standard packing method and Barcode information are shown in below.

### 10.1 Packing Order





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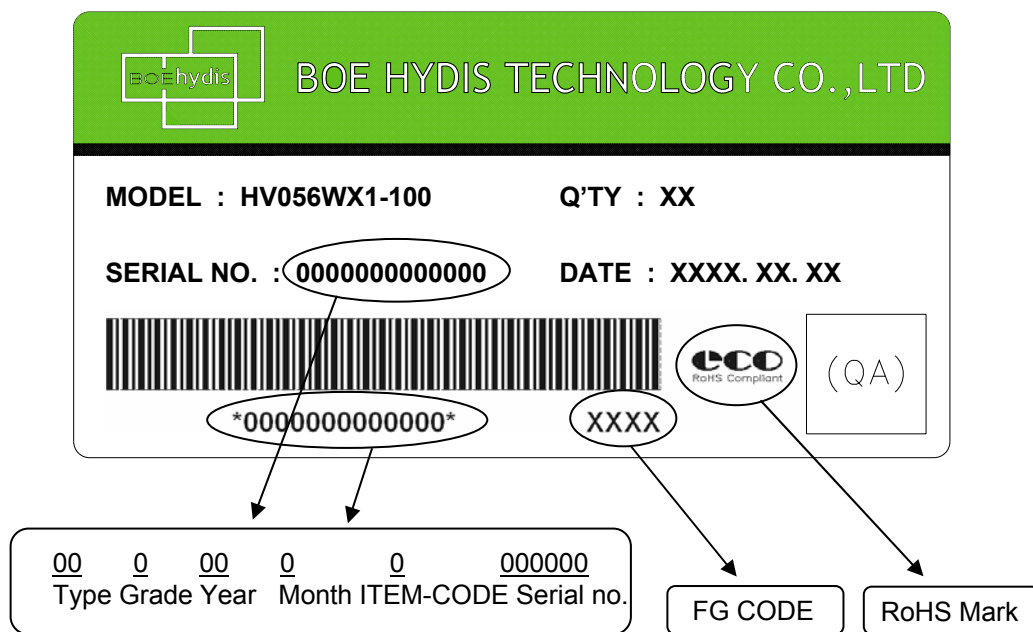
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## 10.2 Packing Note

- Box Dimension : 387 X 335 X 130 mm
- Package Quantity in one Box :

## 10.3 Box label

- Label Size : 108 mm (L) X 56 mm (W)
- Contents  
Model : HV056WX1-100  
Q'ty : Module Q'ty in one box  
Serial No. : Box Serial No. See next page for detail description.  
Date : Packing Date  
FG Code : FG Code of Product







## 11.0 HANDLING & CAUTIONS

### (1) Cautions when taking out the module

- Pick the pouch only, when taking out module from a shipping package.

### (2) Cautions for handling the module

- As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
- As the LCD panel and back - light element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.
- As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
- Do not pull the interface connector in or out while the LCD module is operating.
- Put the module display side down on a flat horizontal plane.
- Handle connectors and cables with care.

### (3) Cautions for the operation

- When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the LCD panel would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.

### (4) Cautions for the atmosphere

- Dew drop atmosphere should be avoided.
- Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer packing pouch and under relatively low temperature atmosphere is recommended.

### (5) Cautions for the module characteristics

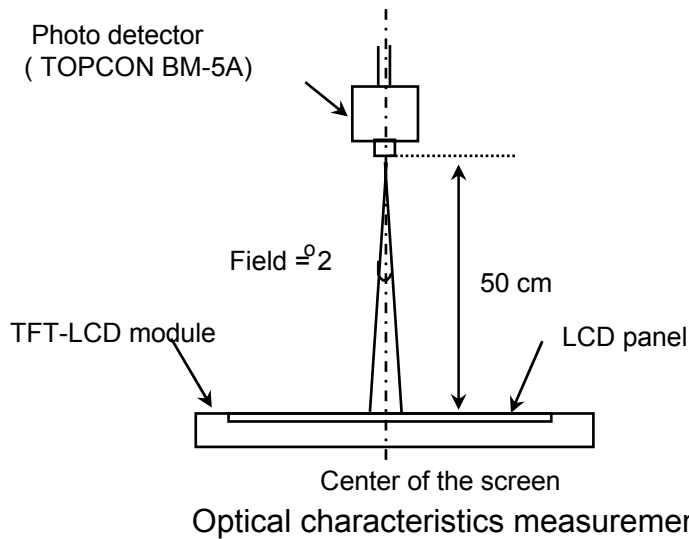
- Do not apply fixed pattern data signal to the LCD module at product aging.
- Applying fixed pattern for a long time may cause image sticking.

### (6) Other cautions

- Do not disassemble and/or re-assemble LCD module.
- Do not re-adjust variable resistor or switch etc.
- When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages

## 12.0 APPENDIX

**Figure 1. Measurement Set Up**



**Figure 2. White Luminance and Uniformity Measurement Locations (9 points)**

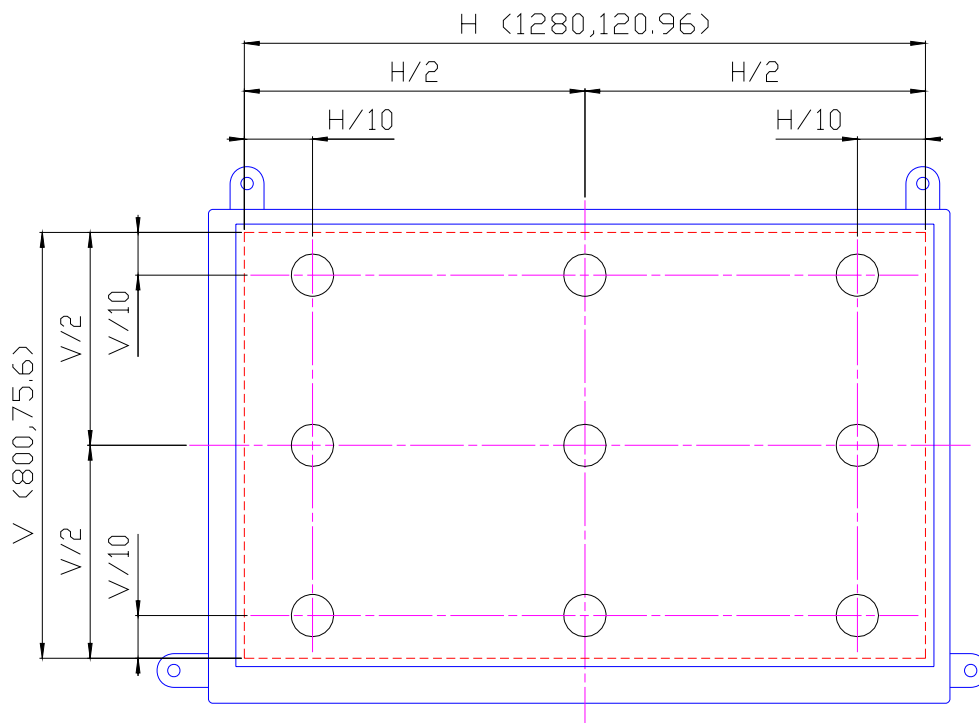


Figure 3. Response Time Testing

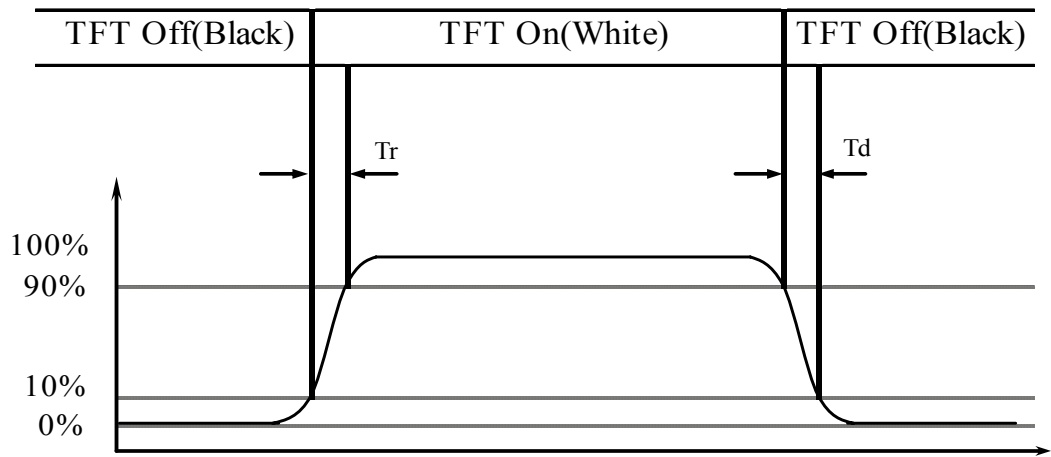
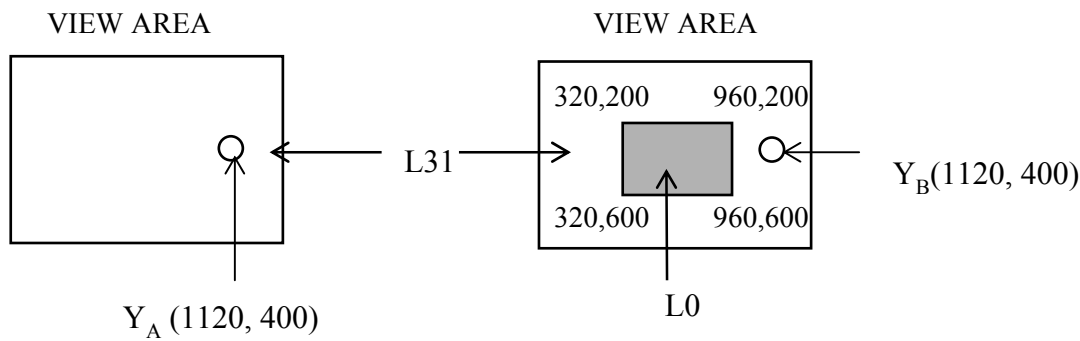


Figure 4. Cross Modulation Test Description



$$\text{Cross-Talk (\%)} = \left| \frac{Y_B - Y_A}{Y_B} \right| \times 100$$

Where:

Y<sub>A</sub> = Initial luminance of measured area (cd/m<sup>2</sup>)

Y<sub>B</sub> = Subsequent luminance of measured area (cd/m<sup>2</sup>)

The location measured will be exactly the same in both patterns



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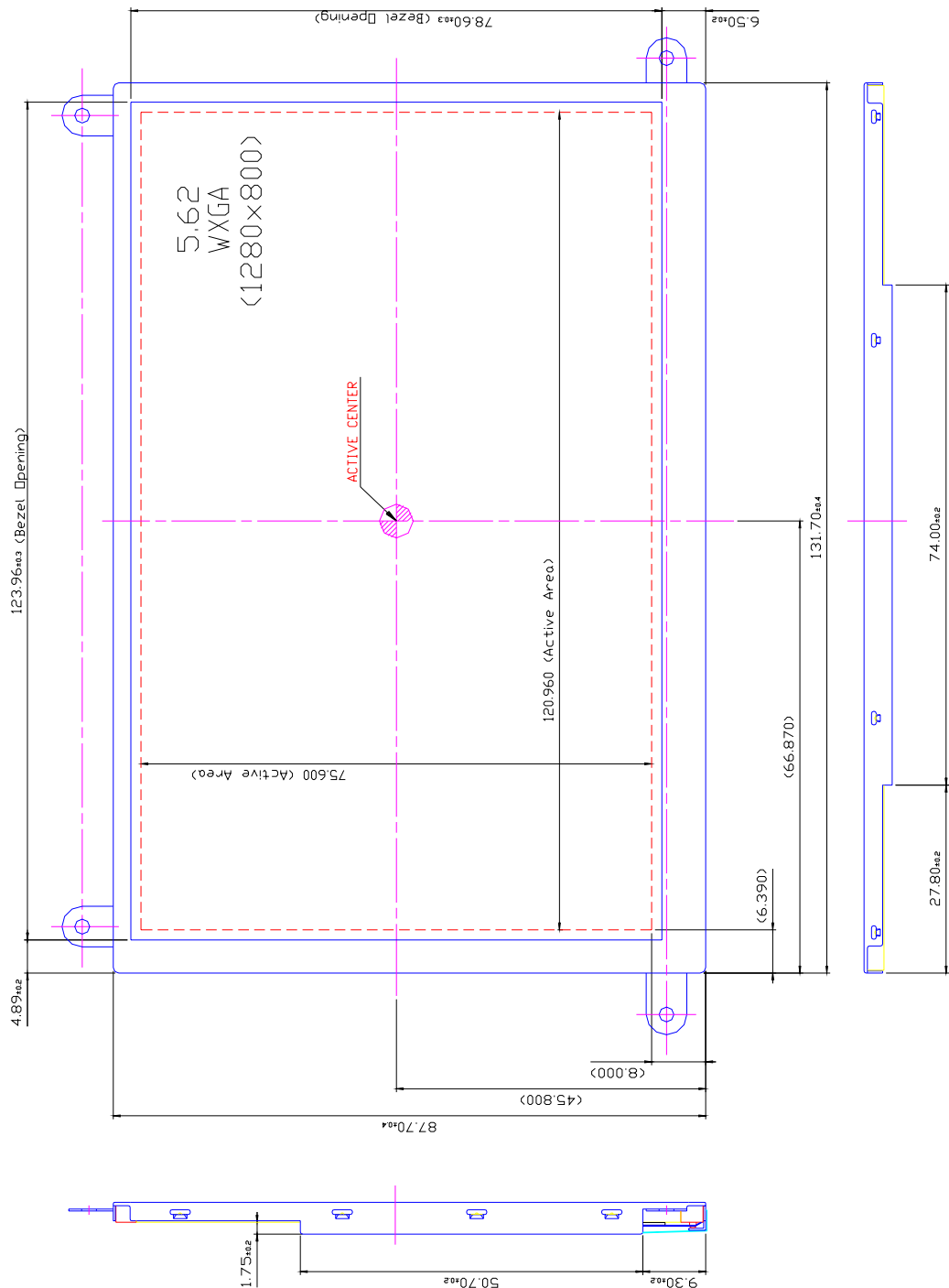
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Figure 5. TFT-LCD Module Outline Dimension (Front View)

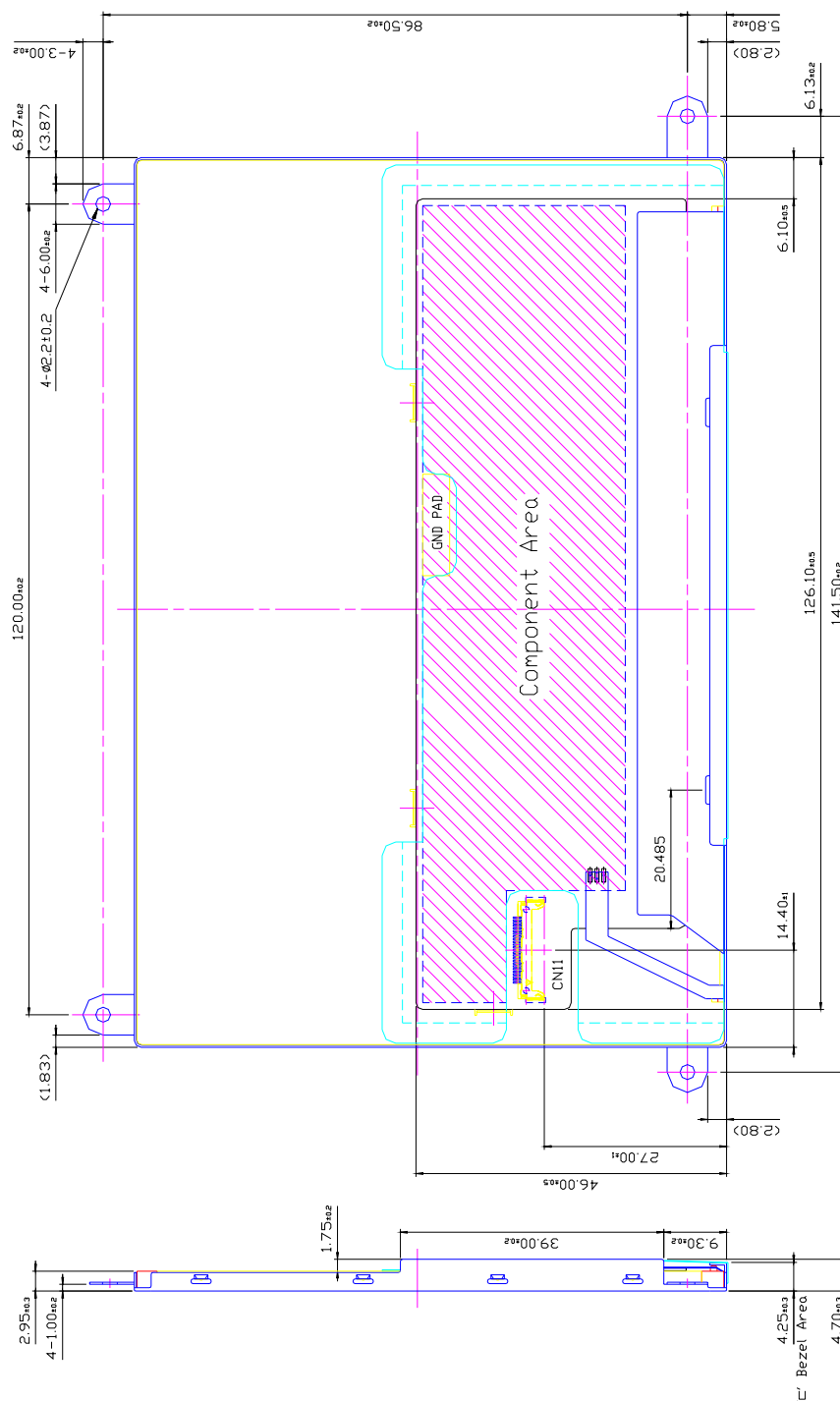


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**Figure 6. TFT-LCD Module Outline Dimension (Rear View)**



## NOTE

1. CNI1 : I-PEX 20347-025E-12  
2. COMPONENT AREA : 4.7±0.3  
3. OTHER SPECIFICATION : REFERS TO SPEC SHEET  
4. GENERAL TOLERANCE : ±0.3