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# Datasheet

## **BOE**

### **NE156QUM-N63**

BO-01-006

SPEC. NUMBER  
S8-65-8B-064PRODUCT GROUP  
TFT-LCDRev.  
P0ISSUE DATE  
2018.07.05PAGE  
1 OF 33**NE156QUM-N63 V5.0****Preliminary Product Specification****Rev. P0**

HEFEI XINSHENG OPTOELECTRONICS TECHNOLOGY CO.,LTD

**BOE**

**PRODUCT GROUP**

REV

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P0

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**REVISION HISTORY**

| REV. | ECN No. | DESCRIPTION OF CHANGES | DATE       | PREPARED |
|------|---------|------------------------|------------|----------|
| P0   | -       | Initial Release        | 2018.05.24 | 马睿       |
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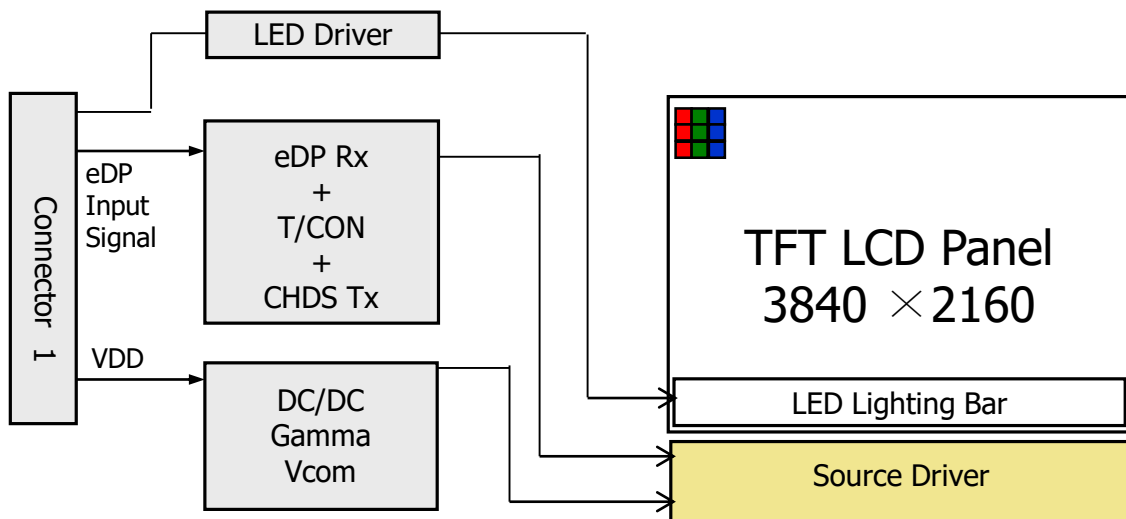
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## 1.0 GENERAL DESCRIPTION

### 1.1 Introduction

NE156QUM-N63 V5.0 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 15.6 inch diagonally measured active area with UHD resolutions (3840 horizontal by 2160 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical Stripe and this module can display 16,777,216 colors. The TFT-LCD panel used for this module is a low reflection and higher color type. Therefore, this module is suitable for Notebook PC. The LED Driver for back-light driving is built in this model.

All input signals are eDP 1.4a interface compatible.



### 1.2 Features

- 4 lane eDP Interface with 5.4Gbps Link Rates
- Thin and light weight
- 8-bit color depth, display 16.7M colors
- Single LED Lighting Bar. (Down side/Horizontal Direction)
- Green Product (RoHS & Halogen free product)
- On board LED Driving circuit
- Low driving voltage and low power consumption
- On board EDID chip

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### 1.3 Application

- Notebook PC (Wide type)

### 1.4 General Specification

The followings are general specifications at the model NE156QUM-N63. (listed in Table 1.)

<Table 1. General Specifications>

| Parameter           | Specification                                   | Unit   | Remarks  |
|---------------------|---|--------|----------|
| Active area         | 344.2176 (H) × 193.6224 (V)                     | mm     |          |
| Number of pixels    | 3840 (H) × 2160 (V)                             | pixels |          |
| Pixel pitch         | 0.08964(H) X 0.08964 (V)                        | mm     |          |
| Pixel arrangement   | RGB Vertical stripe                             |        |          |
| Display colors      | 16.7M   | colors |          |
| Display mode        | Normally Black                                  |        |          |
| Dimensional outline | 350.66±0.3(H)*216.45±0.5(V)<br>(W/PCB)*2.6(Max) | mm     |          |
| Weight              | 320 (max)                                       | g      |          |
| Surface treatment   | AG  |        |          |
| Back-light          | Lower Down side, 1-LED Lighting Bar type        |        | Note 1   |
| Power consumption   | P <sub>D</sub> : 1.4 (max.)                     | W      | @ mosaic |
|                     | P <sub>BL</sub> :4.05(max)                      | W      |          |
|                     | P <sub>total</sub> :5.45 (max)                  | W      | @ mosaic |

Notes : 1. LED Lighting Bar (60\*LED Array)

## 2.0 ABSOLUTE MAXIMUM RATINGS

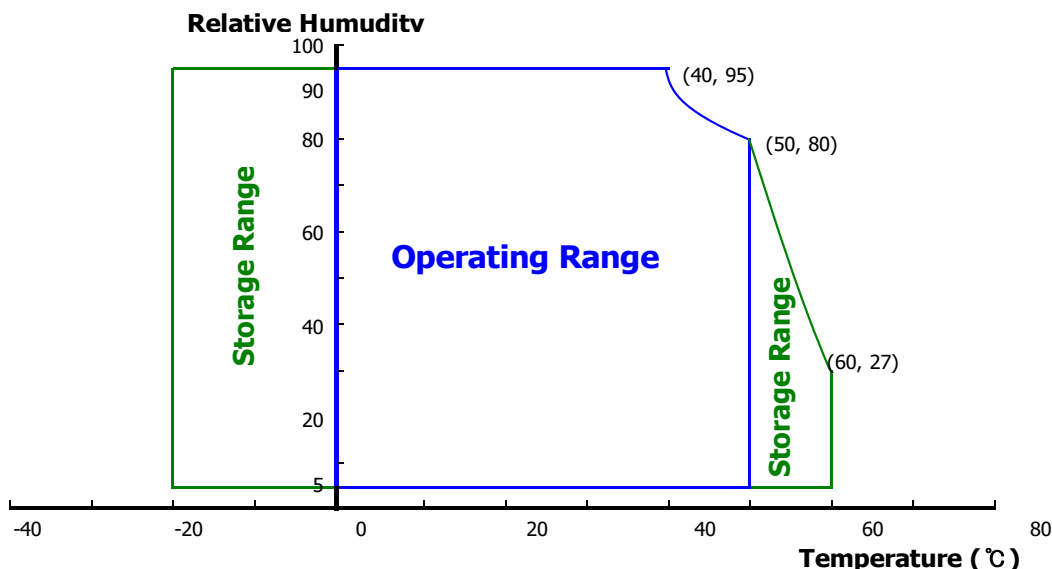
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. Absolute Maximum Ratings >

Ta=25+/-2°C

| Parameter             | Symbol          | Min.                 | Max.                 | Unit | Remarks |
|-----------------------|-----------------|----------------------|----------------------|------|---------|
| Power Supply Voltage  | V <sub>DD</sub> | -0.3                 | 4.0                  | V    | Note 1  |
| Logic Supply Voltage  | V <sub>IN</sub> | V <sub>SS</sub> -0.3 | V <sub>DD</sub> +0.3 | V    |         |
| Operating Temperature | T <sub>OP</sub> | 0                    | +50                  | °C   | Note 2  |
| Storage Temperature   | T <sub>ST</sub> | -20                  | +60                  | °C   |         |

- Notes : 1. Permanent damage to the device may occur if maximum values are exceeded functional operation should be restricted to the condition described under normal operating conditions.
2. Temperature and relative humidity range are shown in the figure below.  
 95 % RH Max. ( 40 °C ≥ Ta)  
 Maximum wet - bulb temperature at 39 °C or less. (Ta > 40 °C) No condensation.





### 3.0 ELECTRICAL SPECIFICATIONS

#### 3.1 Electrical Specifications

< Table 3. Electrical specifications >

Ta=25+/-2°C

| Parameter                        |             | Min. | Typ. | Max. | Unit | Remarks            |
|----------------------------------|-------------|------|------|------|------|--------------------|
| Power Supply Voltage             | $V_{DD}$    | 3.0  | 3.3  | 3.6  | V    | Note 1             |
| Permissible Input Ripple Voltage | $V_{RF}$    | -    | 90   | 100  | mV   | At $V_{DD} = 3.3V$ |
| Power Supply Current             | $I_{DD}$    | -    | 409  | -    | mA   | Note 1             |
| Differential Input Voltage       | $V_{ID}$    | 200  | 400  | 600  | mV   |                    |
| Power Consumption                | $P_D$       | -    | 1.35 | 1.4  | W    | Note 1             |
|                                  | $P_{BL}$    | -    | 3.95 | 4.05 | W    | Note 2             |
|                                  | $P_{total}$ | -    | 5.3  | 5.45 | W    | Note 1             |

Notes : 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 @mosaic.



2. Calculated value for reference ( $V_{LED} \times I_{LED}$ )

**3.2 Backlight Unit**

&lt; Table 4. LED Driving guideline specifications &gt;

Ta=25+/-2°C

| Parameter                           |                | Min.      | Typ.   | Max. | Unit  | Remarks |              |
|-------------------------------------|----------------|-----------|--------|------|-------|---------|--------------|
| LED Forward Voltage                 |                | $V_F$     | -      | -    | 2.9   | V       | -            |
| LED Forward Current                 |                | $I_F$     | -      | 20.3 | -     | mA      | -            |
| LED Power Consumption               |                | $P_{LED}$ | -      | -    | 3.53  | W       | Note 1       |
| LED Life-Time                       |                | N/A       | 15,000 | -    | -     | Hour    | $I_F = 19mA$ |
| Power supply voltage for LED Driver |                | $V_{LED}$ | 5      | 12   | 21    | V       |              |
| EN Control Level                    | Backlight on   |           | 2.5    |      | 5.0   | V       |              |
|                                     | Backlight off  |           | 0      |      | 1.0   | V       |              |
| PWM Control Level                   | PWM High Level |           | 2.5    |      | 5.0   | V       |              |
|                                     | PWM Low Level  |           | 0      |      | 0.1   | V       |              |
| PWM Control Frequency               |                | $F_{PWM}$ | 200    | -    | 2,000 | Hz      |              |
| Duty Ratio                          |                | -         | 1      | -    | 100   | %       | Note3        |

Notes : 1. Power supply voltage 12V for LED Driver

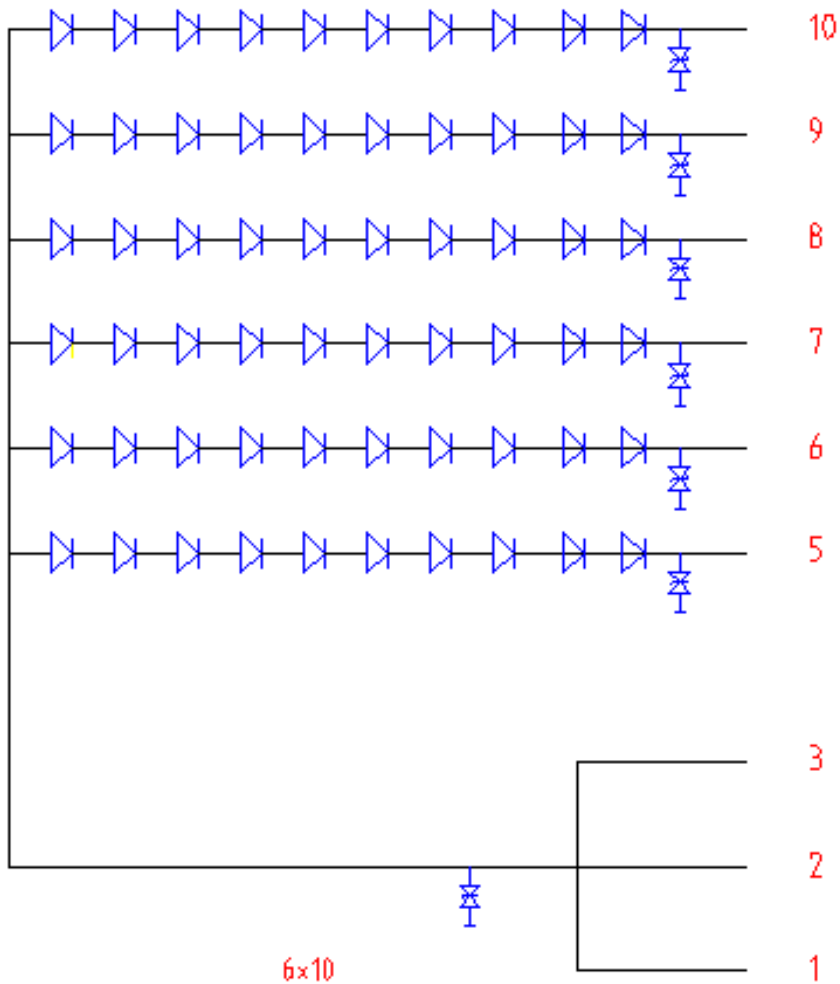
Calculator Value for reference  $I_F \times V_F \times 60 / \text{efficiency} = P_{LED}$ 

2. The LED Life-time define as the estimated time to 50% degradation of initial luminous.

3. 1% duty cycle is achievable with a dimming frequency less than 1KHz.

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### 3.3 LED structure



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## 4.0 OPTICAL SPECIFICATION

### 4.1 Overview

The test of Optical specifications 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 (Goniometer system and PR730) 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  $\theta\emptyset=0$  ( $=\theta_3$ ) as the 3 o'clock direction (the "right"),  $\theta\emptyset=90$  ( $=\theta_{12}$ ) as the 12 o'clock direction ("upward"),  $\theta\emptyset=180$  ( $=\theta_9$ ) as the 9 o'clock direction ("left") and  $\theta\emptyset=270$  ( $=\theta_6$ ) as the 6 o'clock direction ("bottom"). While scanning  $\theta$  and/or  $\emptyset$ , the center of the measuring spot on the Display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement. VDD shall be  $3.3\pm 0.3\text{V}$  at  $25^\circ\text{C}$ . Optimum viewing angle direction is 6 o'clock.

### 4.2 Optical Specifications

<Table 5. Optical Specifications>

| Parameter                        |            | Symbol          | Condition                                    | Min.  | Typ.  | Max.  | Unit              | Remark |
|----------------------------------|------------|-----------------|--|-------|-------|-------|-------------------|--------|
| Viewing Angle range              | Horizontal | $\Theta_3$      | CR > 10                                      | -     | 85    | -     | Deg.              | Note 1 |
|                                  |            | $\Theta_9$      |  | -     | 85    | -     | Deg.              |        |
|                                  | Vertical   | $\Theta_{12}$   |  | -     | 85    | -     | Deg.              |        |
|                                  |            | $\Theta_6$      |  | -     | 85    | -     | Deg.              |        |
| Luminance Contrast ratio         |            | CR              | $\Theta = 0^\circ$                           | 700   | 1000  |       |                   | Note 2 |
| Luminance of White               | 5 Points   | $Y_w$           | $\Theta = 0^\circ$<br>ILED = 19mA            | 289   | 340   | -     | cd/m <sup>2</sup> | Note 3 |
| White Luminance uniformity       | 5 Points   | $\Delta Y_5$    |  | 80%   | -     | -     |                   | Note 4 |
|                                  | 13 Points  | $\Delta Y_{13}$ |  | 63%   | 70%   | -     |                   |        |
| White Chromaticity               |            | $x_w$           | $\Theta = 0^\circ$                           | 0.283 | 0.313 | 0.343 |                   | Note 5 |
|                                  |            | $y_w$           |  | 0.299 | 0.329 | 0.359 |                   |        |
| Reproduction of color            | Red        | $x_R$           | $\Theta = 0^\circ$                           | -0.03 | 0.644 | +0.03 |                   |        |
|                                  |            | $y_R$           |  |       | 0.336 |       |                   |        |
|                                  | Green      | $x_G$           |  |       | 0.300 |       |                   |        |
|                                  |            | $y_G$           |  |       | 0.612 |       |                   |        |
|                                  | Blue       | $x_B$           |  |       | 0.151 |       |                   |        |
|                                  |            | $y_B$           |  |       | 0.069 |       |                   |        |
| Gamut                            |            |                 |  |       | 72    |       | %                 |        |
| Response Time (Rising + Falling) |            | $T_{RT}$        | Ta= $25^\circ\text{C}$<br>$\Theta = 0^\circ$ | -     | 25    | 30    | ms                | Note 6 |
| Cross Talk                       |            | CT              | $\Theta = 0^\circ$                           | -     | -     | 2.0   | %                 | Note 7 |

|                              |  |     |                  |
|------------------------------|--|-----|------------------|
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Notes :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles 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 FIGURE 1).

2. Contrast measurements shall be made at viewing angle of  $\Theta = 0$  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) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

4. The White luminance uniformity on LCD surface is then expressed as :  $\Delta Y = \text{Minimum Luminance of 5(or 13) points} / \text{Maximum Luminance of 5(or 13) points}$ .  
(see FIGURE 2 and FIGURE 3).

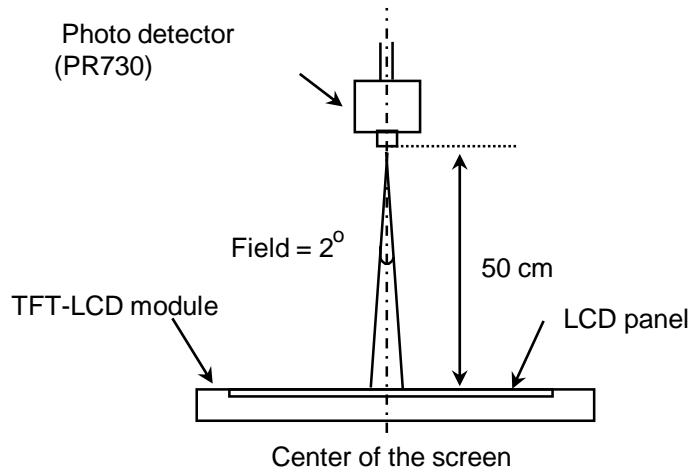
5. The color chromaticity coordinates specified in Table 5 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

6. The electro-optical response time measurements shall be made as FIGURE 4 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  $T_d$ .

7. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (YA) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (YB) of that same area when any adjacent area is driven dark.  
(See FIGURE 5).

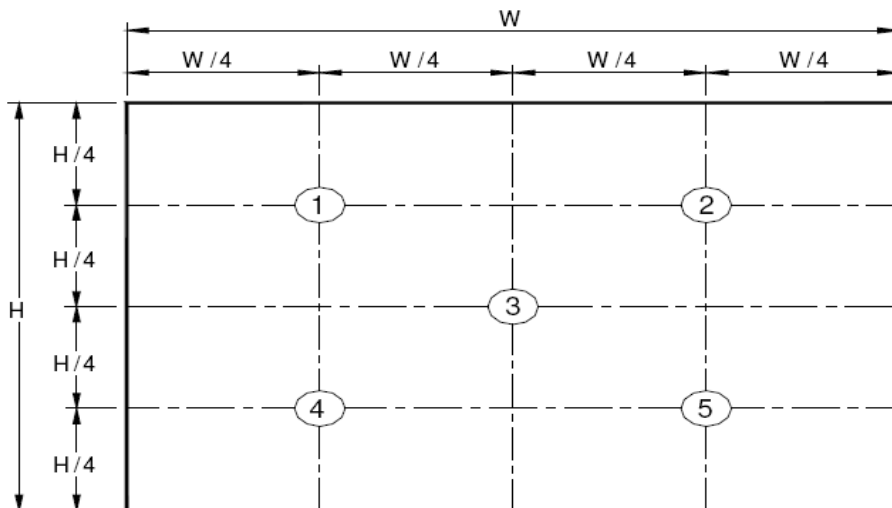
**4.3 Optical measurements**

**Figure 1. Measurement Set Up**



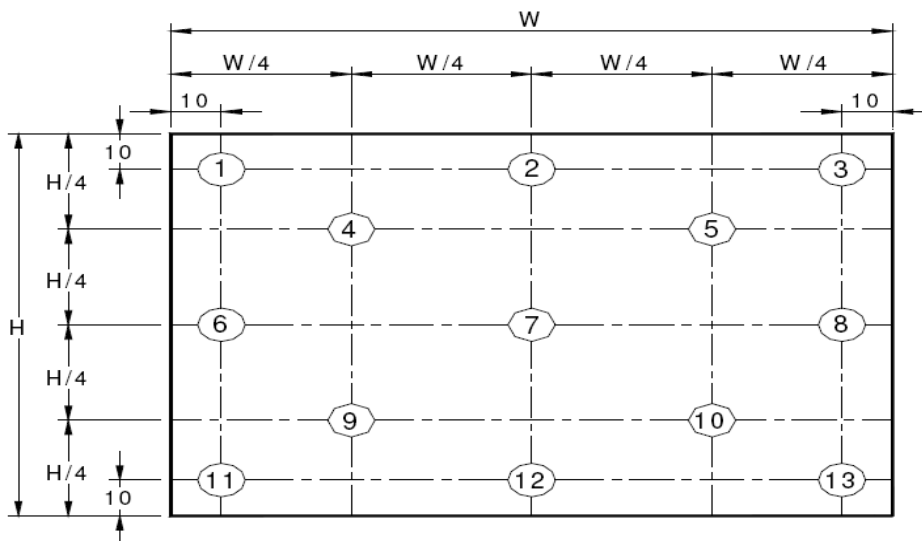
Optical characteristics measurement setup

**Figure 2. White Luminance and Uniformity Measurement Locations (5 points)**



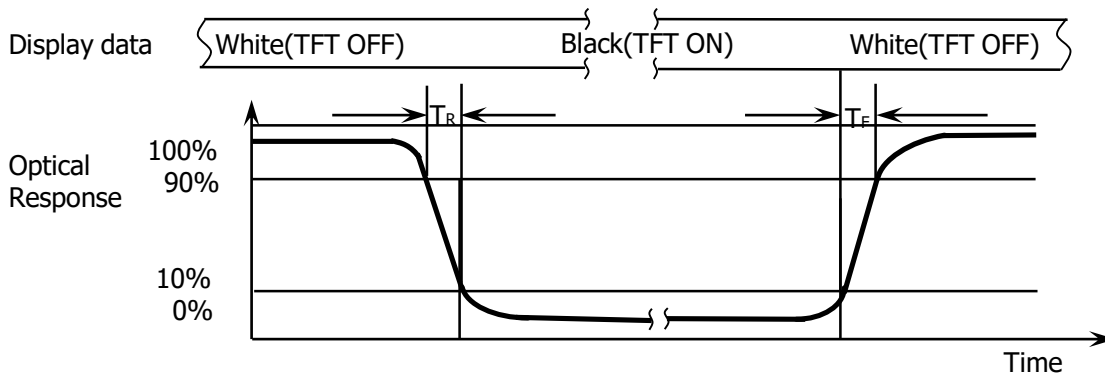
Center Luminance of white is defined as luminance values of center 5 points across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

**Figure 3. Uniformity Measurement Locations (13 points)**

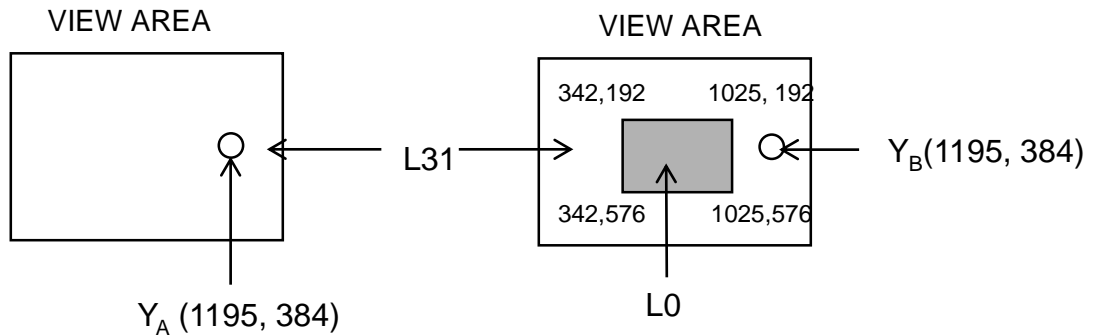


The White luminance uniformity on LCD surface is then expressed as :  $\Delta Y5 = \text{Minimum Luminance of five points} / \text{Maximum Luminance of five points}$  (see FIGURE 2) ,  $\Delta Y13 = \text{Minimum Luminance of 13 points} / \text{Maximum Luminance of 13 points}$  (see FIGURE 3).(W&H is AA area side).

**Figure 4. Response Time Testing**



The electro-optical response time measurements shall be made as shown in FIGURE 4 by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is  $T_d$  and 90% to 10% is  $T_r$ .

**Figure 5. Cross Modulation Test Description**

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

Where:

$Y_A$  = Initial luminance of measured area ( $\text{cd}/\text{m}^2$ )

$Y_B$  = Subsequent luminance of measured area ( $\text{cd}/\text{m}^2$ )

The location measured will be exactly the same in both patterns

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).



**5.0 INTERFACE CONNECTION.****5.1 Electrical Interface Connection**

The electronics interface connector is IPEX-20455-040E-66.

The connector interface pin assignments are listed in Table 6.

<Table 6. Pin Assignments for the Interface Connector>

| Pin No. | Symbol     | Description                                | I/O |
|---------|------------|--|-----|
| 1       | NC(G_SYNC) | Reserved for LCD manufacturer' s use       | P   |
| 2       | H_GND      | High Speed Ground                          | -   |
| 3       | Lane3_N    | eDP RX channel 3 negative                  | O   |
| 4       | Lane3_P    | eDP RX channel 3 positive                  | O   |
| 5       | H_GND      | High Speed Ground                          | -   |
| 6       | Lane2_N    | eDP RX channel 2 negative                  | O   |
| 7       | Lane2_P    | eDP RX channel 2 positive                  | O   |
| 8       | H_GND      | High Speed Ground                          | -   |
| 9       | Lane1_1N   | eDP RX channel 1 negative                  | O   |
| 10      | Lane1_1P   | eDP RX channel 1 positive                  | O   |
| 11      | H_GND      | High Speed Ground                          | -   |
| 12      | Lane1_0N   | eDP RX channel 0 negative                  | O   |
| 13      | Lane1_0P   | eDP RX channel 0 positive                  | O   |
| 14      | H_GND      | High Speed Ground                          | -   |
| 15      | AUX_CH_P   | True Signal Auxiliary Channel              | I/O |
| 16      | AUX_CH_N   | Complement Signal Auxiliary Channel        | I/O |
| 17      | H_GND      | High Speed Ground                          | -   |
| 18      | LCD_VCC    | 3.3VDC                                     | P   |
| 19      | LCD_VCC    | 3.3VDC                                     | P   |
| 20      | LCD_VCC    | 3.3VDC                                     | P   |
| 21      | LCD_VCC    | 3.3VDC                                     | P   |
| 22      | BIST       | VDC LCD Panel Self Test Enable (max2.5VDC) | -   |
| 23      | LCD_GND    | LCD logic and driver ground                | -   |
| 24      | LCD_GND    | LCD logic and driver ground                | -   |
| 25      | LCD_GND    | LCD logic and driver ground                | -   |

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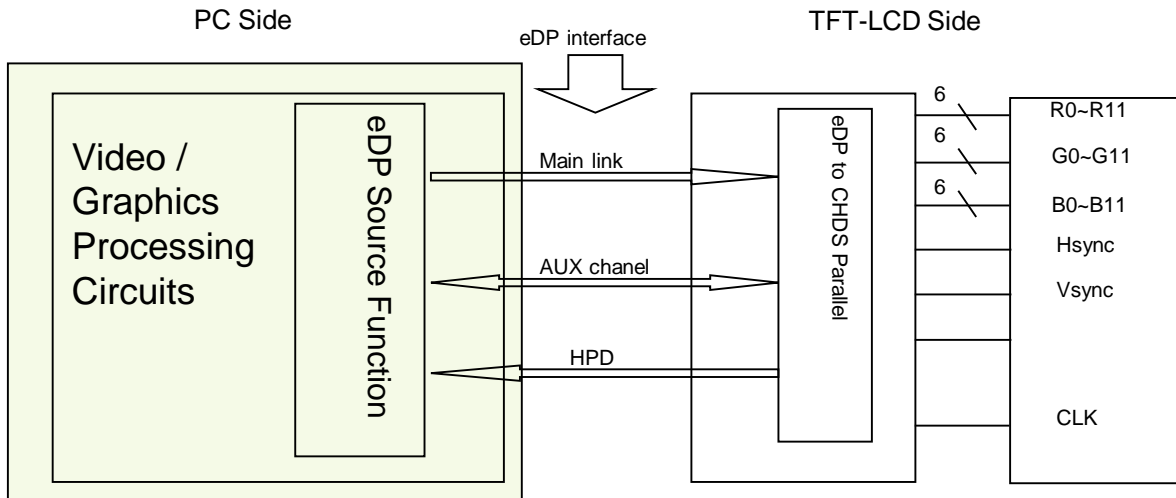
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| <b>Pin No.</b> | <b>Symbol</b>   | <b>Description</b>                   | <b>I/O</b> |
|----------------|-----------------|--------------------------------------|------------|
| 26             | LCD_GND         | LCD logic and driver ground          | -          |
| 27             | HPD             | HPD signal pin                       | I/O        |
| 28             | BL_GND          | Backlight ground                     | -          |
| 29             | BL_GND          | Backlight ground                     | -          |
| 30             | BL_GND          | Backlight ground                     | -          |
| 31             | BL_GND          | Backlight ground                     | -          |
| 32             | BL_ENABLE       | 3.3VDC from system                   | I/O        |
| 33             | BL_PWM          | PWM Input                            | I/O        |
| 34             | NC(H_SYNC)      | Reserved for LCD manufacturer' s use | I/O        |
| 35             | NC(DBC)         | Reserved for LCD manufacturer' s use | I/O        |
| 36             | BL_PWR          | 12VDC                                | P          |
| 37             | BL_PWR          | 12VDC                                | P          |
| 38             | BL_PWR          | 12VDC                                | P          |
| 39             | BL_PWR          | 12VDC                                | P          |
| 40             | NC(COLOUR ENIN) | Reserved for LCD manufacturer' s use | I/O        |

### 5-2. eDP Interface



Note. Transmitter : **CRX1200A**.

Transmitter is not contained in Module.

### 5.3.eDP Input signal

| Lane 0 | Lane 1 | Lane 2  | Lane 3  |
|--------|--------|---------|---------|
| R0-7:0 | R1-7:0 | R2-7:0  | R3-7:0  |
| G0-7:0 | G1-7:0 | G2-7:0  | G3-7:0  |
| B0-7:0 | B1-7:0 | B2-7:0  | B3-7:0  |
| R4-7:0 | R5-7:0 | R6-7:0  | R7-7:0  |
| G4-7:0 | G5-7:0 | G6-7:0  | G7-7:0  |
| B4-7:0 | B5-7:0 | B6-7:0  | B7-7:0  |
| R8-7:0 | R9-7:0 | R10-7:0 | R11-7:0 |
| G8-7:0 | G9-7:0 | G10-7:0 | G11-7:0 |
| B8-7:0 | B9-7:0 | B10-7:0 | B11-7:0 |

**5.4 Back-light & LCM Interface Connection**Interface Connector: **MSK24022P10**

&lt;Table 7. Pin Assignments for the BLU &amp; LCM Connector&gt;

| Pin No. | Symbol | Description            | Pin No. | Symbol | Description            |
|---------|--------|------------------------|---------|--------|------------------------|
| 1       | Vout   | LED anode connection   | 6       | LED2   | LED cathode connection |
| 2       | Vout   | LED anode connection   | 7       | LED3   | LED cathode connection |
| 3       | Vout   | LED anode connection   | 8       | LED4   | LED cathode connection |
| 4       | NC     | No Connection          | 9       | LED5   | LED cathode connection |
| 5       | LED1   | LED cathode connection | 10      | LED6   | LED cathode connection |

## 6.0 SIGNAL TIMING SPECIFICATION

### 6.1 The NE156QUM-N63 V5.0 is operated by the DE only.

| Item                      |           | Symbols | Min    | Typ    | Max   | Unit   |
|---------------------------|-----------|---------|--------|--------|-------|--------|
| Clock                     | Frequency | 1/Tc    | 355.52 | 533.25 | 586.6 | MHz    |
|                           | High Time | Tch     | -      | 4/7    | -     | Tc     |
|                           | Low Time  | Tcl     | -      | 3/7    | -     | Tc     |
| Frame Period              |           | Tv      | 3900   | 4000   | 4050  | lines  |
|                           |           |         | -      | 60     | -     | Hz     |
|                           |           |         | 25     | 16.7   | 15.15 | ms     |
| Vertical Display Period   |           | Tvd     | -      | 2160   | -     | lines  |
| One line Scanning Period  |           | Th      | 2180   | 2222   | 2240  | clocks |
| Horizontal Display Period |           | Thd     | -      | 3840   | -     | clocks |

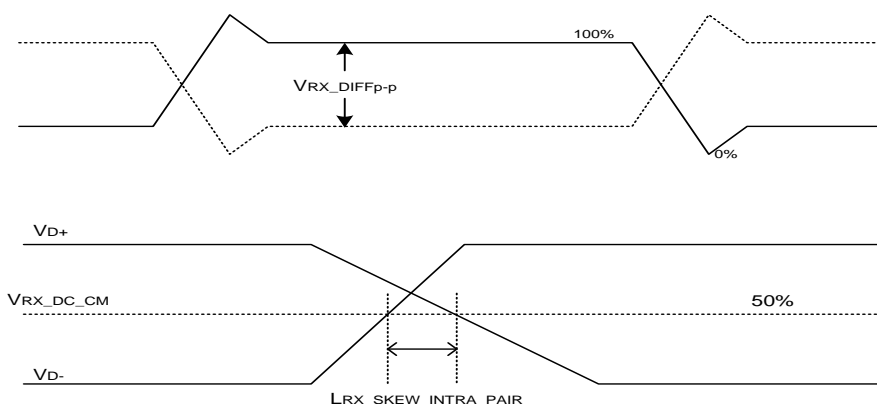
Note\*: This Module can support low frame refresh rate 60Hz & 40Hz.

### 6.2 eDP Rx Interface Timing Parameter

The specification of the eDP Rx interface timing parameter is shown in Table 8.

<Table 8. eDP Rx Interface Timing Specification>

| Item  | Symbol              | Min | Typ | Max  | Unit     | Remark |
|---|---------------------|-----|-----|------|----------|--------|
| Spread spectrum clock   | SSC                 |     | 0.5 |      | %        |        |
| Differential peak-to-peak input voltage at package pins                         | VRX-DIFFp-p         | 100 | 0   | 1320 | mV       |        |
| Rx input DC common mode voltage   | VRX_DC_CM           | -   | GND | -    | V        |        |
| Differential termination resistance   | RRX-DIFF            | 80  | -   | 100  | $\Omega$ |        |
| Single-ended termination resistance   | RRX-SE              | 40  | -   | 60   | $\Omega$ |        |
| Rx short circuit current limit  | IRX_SHORT           | -   | -   | 20   | mA       |        |
| Intra-pair skew at Rx package pins (HBR)<br>RX intra-pair skew tolerance at HBR | LRX_SKEW_INTRA_PAIR | -   | -   | 150  | ps       |        |

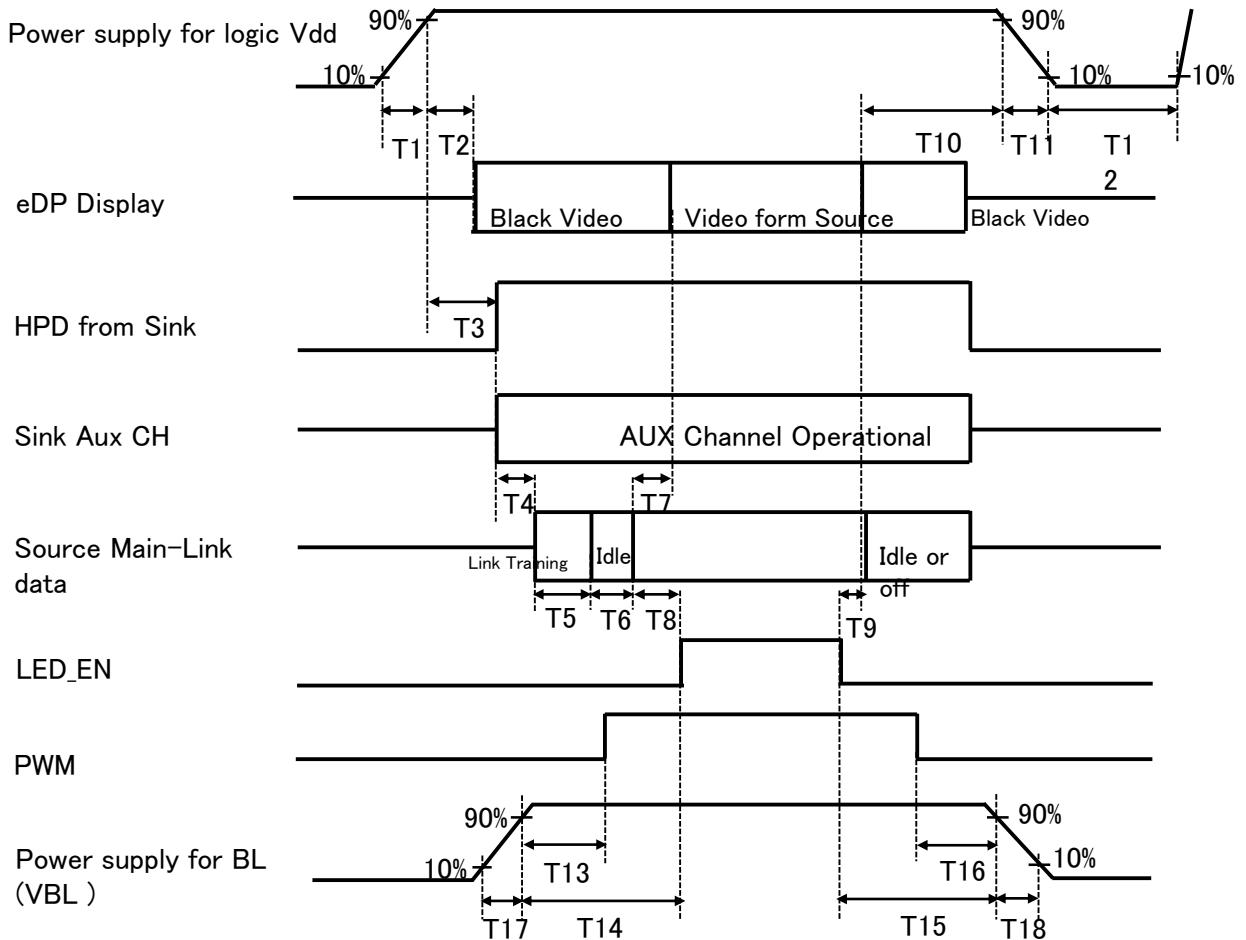


### 7.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

| Color & Gray Scale  |          | Input Data Signal |    |    |    |    |    |            |    |    |    |    |    |           |    |    |    |    |    |    |    |    |    |    |    |   |
|---------------------|----------|-------------------|----|----|----|----|----|------------|----|----|----|----|----|-----------|----|----|----|----|----|----|----|----|----|----|----|---|
|                     |          | Red Data          |    |    |    |    |    | Green Data |    |    |    |    |    | Blue Data |    |    |    |    |    |    |    |    |    |    |    |   |
|                     |          | 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 Colors        | 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  |   |
|                     | Blue     | 0                 | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |   |
|                     | Green    | 0                 | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 1  | 1  | 1  | 1  | 1         | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |   |
|                     | Cyan     | 0                 | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 1  | 1  | 1  | 1  | 1         | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |   |
|                     | Red      | 1                 | 1  | 1  | 1  | 1  | 1  | 1          | 1  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |   |
|                     | Magenta  | 1                 | 1  | 1  | 1  | 1  | 1  | 1          | 1  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |   |
|                     | Yellow   | 1                 | 1  | 1  | 1  | 1  | 1  | 1          | 1  | 1  | 1  | 1  | 1  | 1         | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |   |
|                     | White    | 1                 | 1  | 1  | 1  | 1  | 1  | 1          | 1  | 1  | 1  | 1  | 1  | 1         | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |   |
| 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  | 0  |   |
|                     | △        | 0                 | 0  | 0  | 0  | 0  | 0  | 0          | 1  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |   |
|                     | Darker   | 0                 | 0  | 0  | 0  | 0  | 0  | 1          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |   |
|                     | △        | ↑                 |    |    |    |    |    | ↑          |    |    |    |    |    | ↑         |    |    |    |    |    |    |    |    |    |    |    |   |
|                     | ▽        | ↓                 |    |    |    |    |    | ↓          |    |    |    |    |    | ↓         |    |    |    |    |    |    |    |    |    |    |    |   |
|                     | Brighter | 1                 | 1  | 1  | 1  | 1  | 1  | 0          | 1  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |   |
|                     | ▽        | 1                 | 1  | 1  | 1  | 1  | 1  | 1          | 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  | 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  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |   |
|                     | Darker   | 0                 | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |   |
|                     | △        | ↑                 |    |    |    |    |    | ↑          |    |    |    |    |    | ↑         |    |    |    |    |    |    |    |    |    |    |    |   |
|                     | ▽        | ↓                 |    |    |    |    |    | ↓          |    |    |    |    |    | ↓         |    |    |    |    |    |    |    |    |    |    |    |   |
|                     | Brighter | 0                 | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 1  | 1  | 1  | 1  | 1         | 1  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |   |
|                     | ▽        | 0                 | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 1  | 1  | 1  | 1  | 1         | 1  | 1  | 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  | 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  | 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  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  |   |
|                     | △        | ↑                 |    |    |    |    |    | ↑          |    |    |    |    |    | ↑         |    |    |    |    |    |    |    |    |    |    |    |   |
|                     | ▽        | ↓                 |    |    |    |    |    | ↓          |    |    |    |    |    | ↓         |    |    |    |    |    |    |    |    |    |    |    |   |
|                     | Brighter | 0                 | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 1 |
|                     | ▽        | 0                 | 0  | 0  | 0  | 0  | 0  | 0          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 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  | 1  | 1 |
| Gray Scale of White | 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          | 1  | 0  | 0  | 0  | 0  | 0         | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  |   |
|                     | Darker   | 0                 | 0  | 0  | 0  | 0  | 0  | 1          | 0  | 0  | 0  | 0  | 0  | 0         | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  |   |
|                     | △        | ↑                 |    |    |    |    |    | ↑          |    |    |    |    |    | ↑         |    |    |    |    |    |    |    |    |    |    |    |   |
|                     | ▽        | ↓                 |    |    |    |    |    | ↓          |    |    |    |    |    | ↓         |    |    |    |    |    |    |    |    |    |    |    |   |
|                     | Brighter | 1                 | 1  | 1  | 1  | 1  | 1  | 0          | 1  | 1  | 1  | 1  | 1  | 1         | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 1  |   |
|                     | ▽        | 1                 | 1  | 1  | 1  | 1  | 1  | 1          | 0  | 1  | 1  | 1  | 1  | 1         | 1  | 0  | 1  | 1  | 1  | 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  | 1  | 1  | 1  | 1  | 1  | 1  |   |

## 8.0 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



- 0.5ms ≤ T1 ≤ 10 ms
- 0ms ≤ T2 ≤ 200 ms
- 0ms ≤ T3 ≤ 200 ms
- 0ms ≤ T13
- 0ms ≤ T14
- 0ms ≤ T17
- 0ms ≤ T7 ≤ 50ms
- 0ms ≤ T10 ≤ 500 ms
- 0 ms ≤ T11 ≤ 10 ms
- 150ms ≤ T12
- 0ms ≤ T15
- 0ms ≤ T16
- 0ms ≤ T18

### Notes:

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



## 9.0 Connector Description

Physical interface is described as for the connector on LCM.

These connectors are capable of accommodating the following signals and will be following components.

### 9.1 TFT LCD Module

| Connector Name /Description | For Signal Connector          |
|-----------------------------|-------------------------------|
| Manufacturer                | I-PEX                         |
| Type/ Part Number           | IPEX-20455-040E-66            |
| Mating housing/ Part Number | IPEX-20455-040T or equivalent |

## 10.0 MECHANICAL CHARACTERISTICS

### 10.1 Dimensional Requirements

FIGURE 6 shows mechanical outlines for the model NE156QUM-N63. Other parameters are shown in Table 9.

<Table 9. Dimensional Parameters>

| Parameter           | Specification                                  | Unit |
|---------------------|--|------|
| Active Area         | 344.2176 (H) × 193.6224(V)                     |      |
| Number of pixels    | 3840 (H) X 2160 (V) (1 pixel = R + G + B dots) |      |
| Pixel pitch         | 0.08964 (H) X 0.08964 (V)                      | mm   |
| Pixel arrangement   | RGB Vertical stripe                            |      |
| Display colors      | 16.7M  |      |
| Display mode        | Normally Black                                 |      |
| Dimensional outline | 350.66±0.3(H)*216.45±0.5(V) (W/PCB)*2.6(Max)   | mm   |
| Weight              | 320(Max)                                       | gram |
| Back Light          | Connector :MSK24022P10                         |      |
|                     | LED, Horizontal-LED Array type                 |      |

### 10.2 Mounting

See FIGURE 6.

### 10.3 Anti-Glare and Polarizer Hardness.

The surface of the LCD has an AG coating to minimize reflection and a coating to reduce scratching.

### 10.4 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 350lux.

## 11.0 RELIABILITY TEST

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

<Table 10. Reliability test>

| No | Test Items                                       | 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, 240 hrs                                       |
| 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 (0.5 hr), 100 cycle                          |
| 7  | Vibration test<br>(non-operating)                | 1.5G, 10~500Hz, Half Sine<br>X,Y,Z / Sweep rate : 1 hour         |
| 8  | Shock test<br>(non-operating)                    | 220G, Half Sine Wave 2msec<br>±X, ±Y, ±Z Once for each direction |
| 9  | Electro-static discharge test<br>(non-operating) | Air : 150 pF, 330Ω, 15 KV<br>Contact : 150 pF, 330Ω, 8 KV        |

## 12.0 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

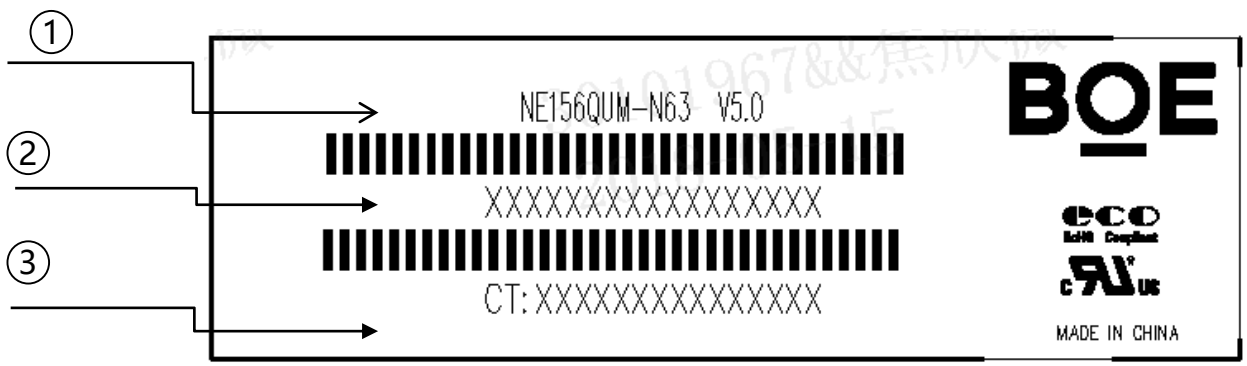
- When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the LCD panel would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.

|                              |  |     |                  |
|------------------------------|--|-----|------------------|
| <b>BOE</b>                   | <b>PRODUCT GROUP</b>                                   | REV | ISSUE DATE       |
|                              | TFT- LCD PRODUCT                                       | P0  | 2018.07.05       |
| SPEC. NUMBER<br>S8-65-8B-064 | SPEC. TITLE<br>NE156QUM-N63 V5.0 Product Specification |     | PAGE<br>26 OF 33 |

- (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.

### 13.0 LABEL

(1) MDL label



序列号标注部分需打印, 说明如下:

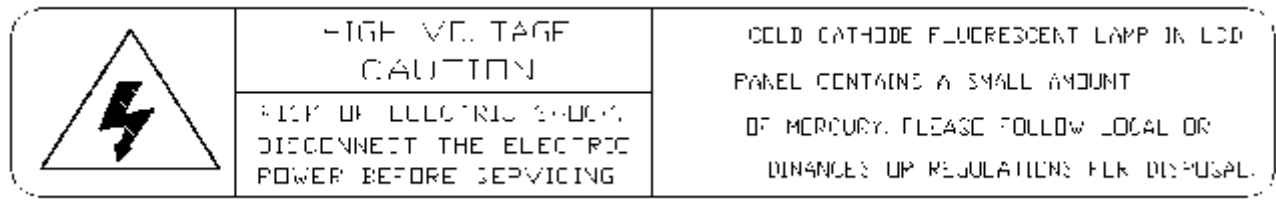
1. FG-CODE(前12位)
2. MDL ID 及其条形码
3. CT码及其条形码

Total Size:80×25mm

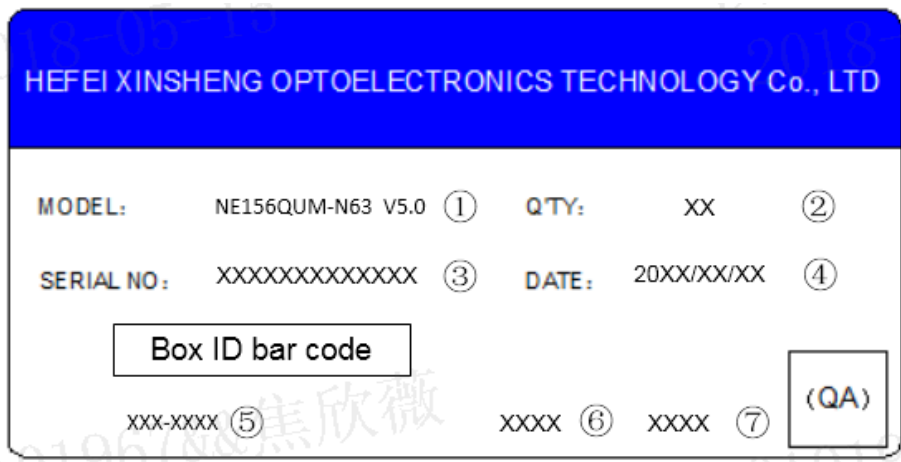
| Digit       | 1               | 2 | 3     | 4    | 5    | 6 | 7     | 8   | 9 | 10 | 11 | 12                     | 13 | 14 | 15 | 16 | 17 |
|-------------|-----------------|---|-------|------|------|---|-------|---|---|----|----|------------------------|----|----|----|----|----|
| Code        | S               | L | S     | 5    | 1    | 2 | 3     | 5   | 9 | 4  | 2  | 0                      | 0  | 0  | 1  | D  | B  |
| Description | Model Code /GBN |   | Grade | Line | Year |   | Month | Model Extension Code (Last 4 Digits Of FGCOD) |   |    |    | Serial No 00001-ZZZZZZ |    |    |    |    |    |

|                              |  |     |                  |
|------------------------------|--|-----|------------------|
| <b>BOE</b>                   | <b>PRODUCT GROUP</b>                                   | REV | ISSUE DATE       |
|                              | TFT-LCD PRODUCT  | P0  | 2018.07.05       |
| SPEC. NUMBER<br>S8-65-8B-064 | SPEC. TITLE<br>NE156QUM-N63 V5.0 Product Specification |     | PAGE<br>27 OF 33 |

(2) High voltage caution label



(3) Box label



**Serial number marked part needs to print, As follows**

1. FG-CODE
2. Product Quantity
3. Box ID
4. Packing Date
5. Customer Part No.--Empty
6. the last four numbers FG-Code
7. Vendor Code --- Empty

Total Size:110×55mm

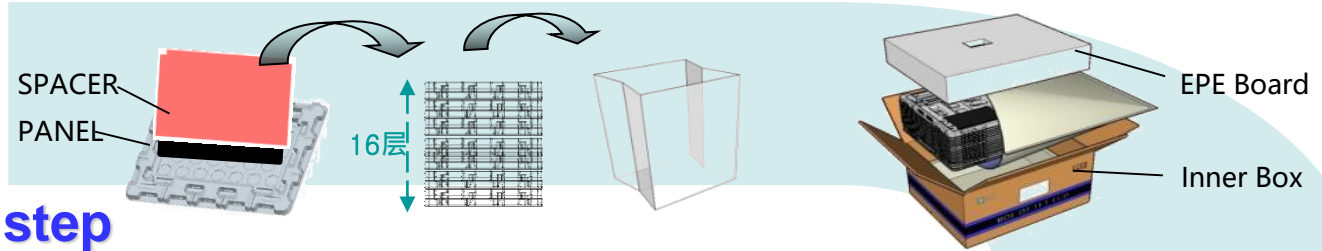
Box ID编码规则如下：

| Digit       | 1            | 2 | 3     | 4    | 5    | 6 | 7     | 8             | 9        | 10 | 11 | 12 | 13 |
|-------------|--------------|---|-------|------|------|---|-------|---------------|----------|----|----|----|----|
| Code        | S            | L | S     | 5    | 1    | 2 | 3     | D             | 0        | 0  | 0  | 6  | 8  |
| Description | Products GBN |   | Grade | Line | Year |   | Month | Revision Code | SerialNo |    |    |    |    |

|                              |  |                  |            |
|------------------------------|--|------------------|------------|
| <b>BOE</b>                   | <b>PRODUCT GROUP</b>                                   | REV              | ISSUE DATE |
|                              | TFT- LCD PRODUCT                                       | P0               | 2018.07.05 |
| SPEC. NUMBER<br>S8-65-8B-064 | SPEC. TITLE<br>NE156QUM-N63 V5.0 Product Specification | PAGE<br>28 OF 33 |            |

## 15.0 PACKING INFORMATION

### 15.1 Packing order



#### step

**1**

- 将1pcs MDL放入Tray中,每个MDL放置1pcs Spacer (置于顶部)
- 将15EA装满 MDL & Spacer的Tray依次堆叠,其上放置1EA空Tray,并将堆码16EA Tray放置于PE Bag中
- 容量:1pcs/Tray

#### Step 2

- 将装满Tray的PE Bag放入Inner Box 上下放置EPE Board
- 容量: 15pcs MDL/Inner Box



#### step

**3**

- 将 4EA Box码放于Pallet上,共堆叠3层  
堆码高度:1015mm (包含Pallet高度)
- 单Pallet用8ea纸护角防护,捆扎带固定,缠绕膜包裹
- 容量: 4 EA Box/层,共3层,180pcs MDL/Pallet

### 15.2 Notes

- Box Dimension: 540mm\*410mm\*295mm
- Package Quantity in one Box: 15 pcs
- Total Weight of One Box: 10.8 kg
- Pallet 四边及打包带位置放置纸护角

## 16.0 MECHANICAL OUTLINE DIMENSION

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

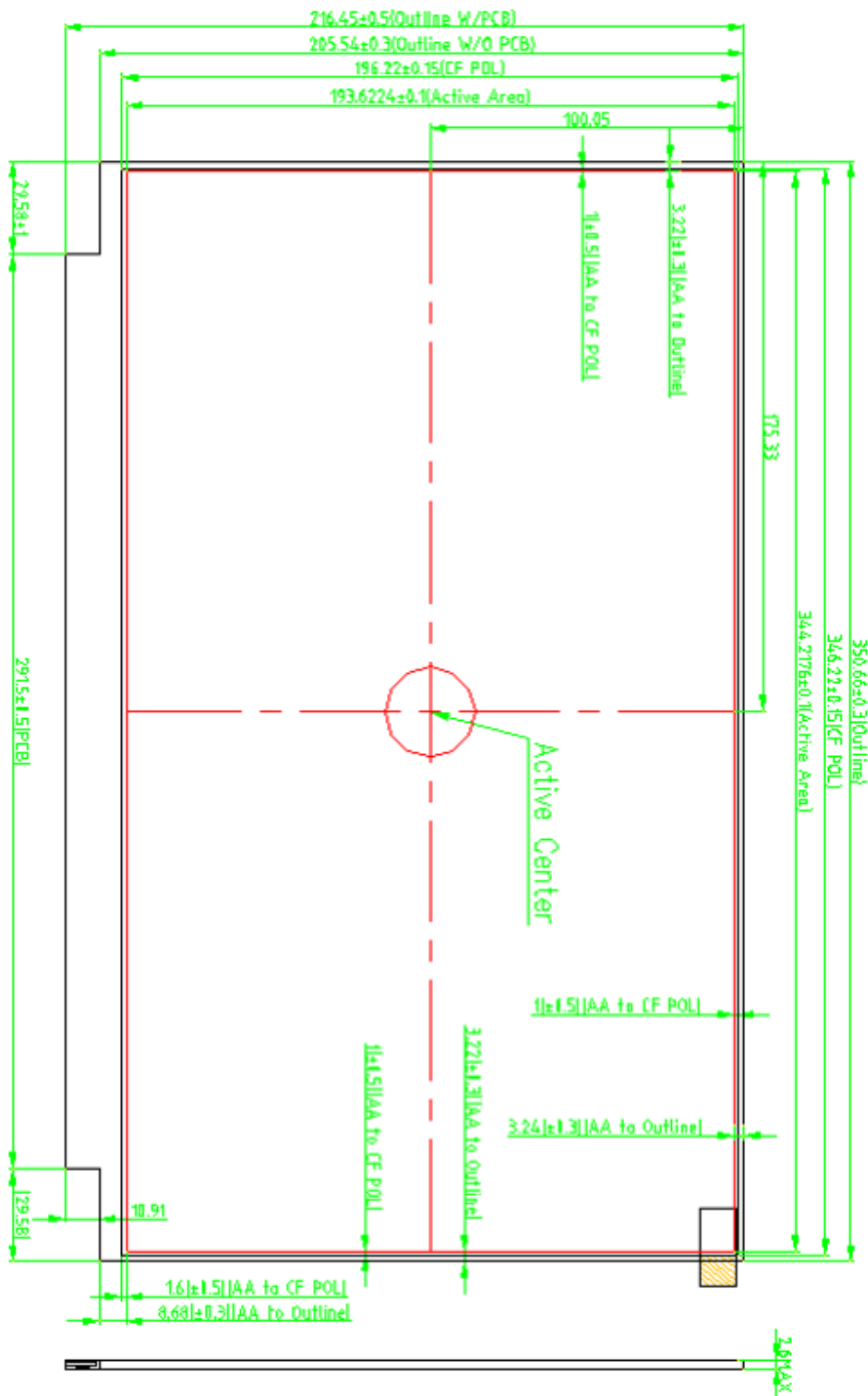
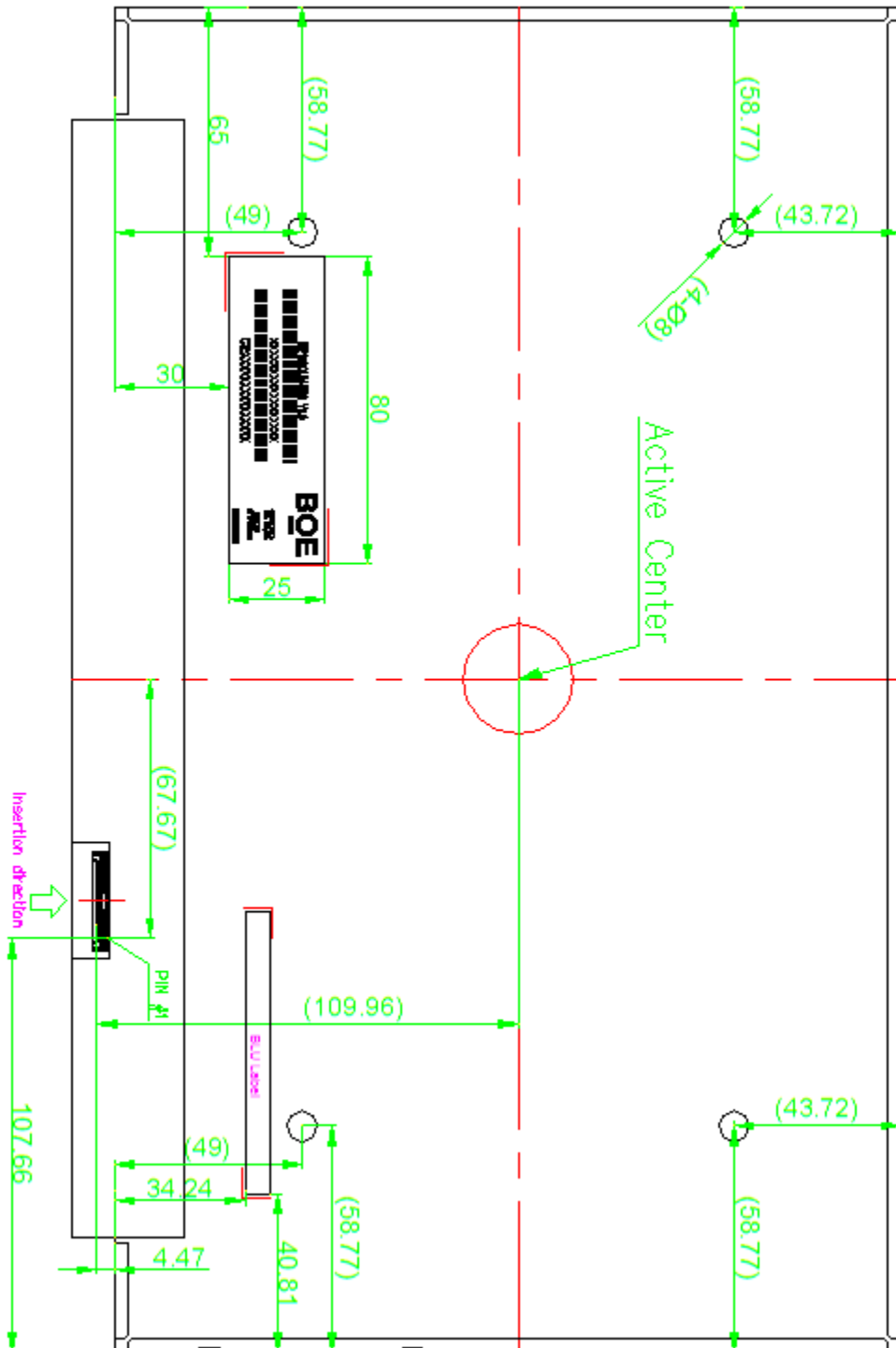


Figure 7. TFT-LCD Module Outline Dimensions (Rear view)





SPEC. NUMBER  
S8-65-8B-064

SPEC. TITLE  
NE156QUM-N63 V5.0 Product Specification

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## 17.0 EDID Table

| Address (HEX) | Function               | Hex | Dec | crc | Input values. | Notes                               |
|---------------|------------------------|-----|-----|-----|---------------|-------------------------------------|
| 00            | Header                 | 00  | 0   |     | 0             | EDID Header                         |
| 01            |                        | FF  | 255 |     | 255           |                                     |
| 02            |                        | FF  | 255 |     | 255           |                                     |
| 03            |                        | FF  | 255 |     | 255           |                                     |
| 04            |                        | FF  | 255 |     | 255           |                                     |
| 05            |                        | FF  | 255 |     | 255           |                                     |
| 06            |                        | FF  | 255 |     | 255           |                                     |
| 07            |                        | 00  | 0   |     | 0             |                                     |
| 08            | ID Manufacturer Name   | 09  | 9   |     | BOE           | ID = BOE                            |
| 09            |                        | E5  | 229 |     |               |                                     |
| 0A            | ID Product Code        | F4  | 244 |     | 2036          | ID = 2036                           |
| 0B            |                        | 07  | 7   |     |               |                                     |
| 0C            | 32-bit serial No.      | 00  | 0   |     |               |                                     |
| 0D            |                        | 00  | 0   |     |               |                                     |
| 0E            |                        | 00  | 0   |     |               |                                     |
| 0F            |                        | 00  | 0   |     |               |                                     |
| 10            | Week of manufacture    | 01  | 1   |     | 1             |                                     |
| 11            | Year of Manufacture    | 1C  | 28  |     | 2018          | Manufactured in 2018                |
| 12            | EDID Structure Ver.    | 01  | 1   |     | 1             | EDID Ver 1.0                        |
| 13            | EDID revision #        | 04  | 4   |     | 4             | EDID Rev. 0.4                       |
| 14            | Video input definition | A5  | 165 |     | -             |                                     |
| 15            | Max H image size       | 22  | 34  |     | 34            | 34 cm (Approx)                      |
| 16            | Max V image size       | 13  | 19  |     | 19            | 19 cm (Approx)                      |
| 17            | Display Gamma          | 78  | 120 |     | 2.2           | Gamma curve = 2.2                   |
| 18            | Feature support        | 02  | 2   |     |               | RGB display, Preferred Timming mode |
| 19            | Red/Green low bits     | 7B  | 123 |     | -             | Red / Green Low Bits                |
| 1A            | Blue/White low bits    | 80  | 128 |     | -             | Blue / White Low Bits               |
| 1B            | Red x high bits        | A6  | 166 | 665 | 0.65          | Red (x) = 10100110 (0.65)           |
| 1C            | Red y high bits        | 54  | 84  | 335 | 0.328         | Red (y) = 01010100 (0.328)          |
| 1D            | Green x high bits      | 4D  | 77  | 310 | 0.303         | Green (x) = 01001101 (0.303)        |
| 1E            | Green y high bits      | 9B  | 155 | 619 | 0.605         | Green (y) = 10011011 (0.605)        |
| 1F            | Blue x high bits       | 26  | 38  | 154 | 0.151         | Blue (x) = 00100110 (0.151)         |
| 20            | BLue y high bits       | 11  | 17  | 68  | 0.067         | Blue (y) = 00010001 (0.067)         |
| 21            | White x high bits      | 50  | 80  | 320 | 0.313         | White (x) = 01010000 (0.313)        |
| 22            | White y high bits      | 54  | 84  | 336 | 0.329         | White (y) = 01010100 (0.329)        |
| 23            | Established timing 1   | 00  | 0   |     | -             |                                     |
| 24            | Established timing 2   | 00  | 0   |     | -             |                                     |
| 25            | Established timing 3   | 00  | 0   |     | -             |                                     |
| 26            | Standard timing #1     | 01  | 1   |     |               | Not Used                            |
| 27            |                        | 01  | 1   |     |               |                                     |
| 28            | Standard timing #2     | 01  | 1   |     |               | Not Used                            |
| 29            |                        | 01  | 1   |     |               |                                     |
| 2A            | Standard timing #3     | 01  | 1   |     |               | Not Used                            |
| 2B            |                        | 01  | 1   |     |               |                                     |

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## 17.0 EDID Table

|    |                                       |                                       |     |     |                         |   |                     |
|----|---------------------------------------|---------------------------------------|-----|-----|-------------------------|---|---------------------|
| 2C | Standard timing #4                    | 01                                    | 1   |     |                         | Not Used  |                     |
| 2D |                                       | 01                                    | 1   |     |                         |   |                     |
| 2E | Standard timing #5                    | 01                                    | 1   |     |                         | Not Used  |                     |
| 2F |                                       | 01                                    | 1   |     |                         |   |                     |
| 30 | Standard timing #6                    | 01                                    | 1   |     |                         | Not Used  |                     |
| 31 |                                       | 01                                    | 1   |     |                         |   |                     |
| 32 | Standard timing #7                    | 01                                    | 1   |     |                         | Not Used  |                     |
| 33 |                                       | 01                                    | 1   |     |                         |   |                     |
| 34 | Standard timing #8                    | 01                                    | 1   |     |                         | Not Used  |                     |
| 35 |                                       | 01                                    | 1   |     |                         |   |                     |
| 36 | Detailed timing/monitor descriptor #1 | 4D                                    | 77  |     | 533.3                   | 533.25MHz Main clock                                |                     |
| 37 |                                       | D0                                    | 208 |     |                         |   |                     |
| 38 |                                       | 00                                    | 0   |     | 3840                    | Hor Active = 3840                                   |                     |
| 39 |                                       | A0                                    | 160 |     | 160                     | Hor Blanking = 160                                  |                     |
| 3A |                                       | F0                                    | 240 |     | -                       | 4 bits of Hor. Active + 4 bits of Hor. Blanking     |                     |
| 3B |                                       | 70                                    | 112 |     | 2160                    | Ver Active = 1080                                   |                     |
| 3C |                                       | 3E                                    | 62  |     | 62                      | Ver Blanking = 62                                   |                     |
| 3D |                                       | 80                                    | 128 |     | -                       | 4 bits of Ver. Active + 4 bits of Ver. Blanking     |                     |
| 3E |                                       | 30                                    | 48  |     | 48                      | Hor Sync Offset = 48                                |                     |
| 3F |                                       | 20                                    | 32  |     | 32                      | H Sync Pulse Width = 32                             |                     |
| 40 |                                       | A5                                    | 165 |     | 10                      | V sync Offset = 10 line                             |                     |
| 41 |                                       | 00                                    | 0   |     | 5                       | V Sync Pulse width : 5 line                         |                     |
| 42 |                                       | 58                                    | 88  |     | 344                     | Horizontal Image Size = 344 mm (Low 8 bits)         |                     |
| 43 |                                       | C2                                    | 194 |     | 194                     | Vertical Image Size = 194 mm (Low 8 bits)           |                     |
| 44 |                                       | 10                                    | 16  |     | -                       | 4 bits of Hor Image Size + 4 bits of Ver Image Size |                     |
| 45 |                                       | 00                                    | 0   |     | 0                       | Hor Border (pixels)                                 |                     |
| 46 |                                       | 00                                    | 0   |     | 0                       | Vertical Border (Lines)                             |                     |
| 47 |                                       | 1A                                    | 26  |     | -                       | Refer to right table                                |                     |
| 48 |                                       | Detailed timing/monitor descriptor #2 | DE  | 222 |                         | 355.5   | 355.5MHz Main clock |
| 49 |                                       |                                       | 8A  | 138 |                         |   |                     |
| 4A | 00                                    |                                       | 0   |     | 3840                    | Hor Active = 3840                                   |                     |
| 4B | A0                                    |                                       | 160 |     | 160                     | Hor Blanking = 160                                  |                     |
| 4C | F0                                    |                                       | 240 |     | -                       | 4 bits of Hor. Active + 4 bits of Hor. Blanking     |                     |
| 4D | 70                                    |                                       | 112 |     | 2160                    | Ver Active = 2160                                   |                     |
| 4E | 3E                                    |                                       | 62  |     | 62                      | Ver Blanking = 62                                   |                     |
| 4F | 80                                    |                                       | 128 |     | -                       | 4 bits of Ver. Active + 4 bits of Ver. Blanking     |                     |
| 50 | 30                                    |                                       | 48  |     | 48                      | Hor Sync Offset = 48                                |                     |
| 51 | 20                                    |                                       | 32  |     | 32                      | H Sync Pulse Width = 32                             |                     |
| 52 | A5                                    |                                       | 165 |     | 10                      | V sync Offset = 10 line                             |                     |
| 53 | 00                                    |                                       | 0   |     | 5                       | V Sync Pulse width : 5 line                         |                     |
| 54 | 58                                    |                                       | 88  |     | 344                     | Horizontal Image Size = 344 mm (Low 8 bits)         |                     |
| 55 | C2                                    |                                       | 194 |     | 194                     | Vertical Image Size = 194 mm (Low 8 bits)           |                     |
| 56 | 10                                    |                                       | 16  |     | -                       | 4 bits of Hor Image Size + 4 bits of Ver Image Size |                     |
| 57 | 00                                    | 0                                     |     | 0   | Hor Border (pixels)     |   |                     |
| 58 | 00                                    | 0                                     |     | 0   | Vertical Border (Lines) |   |                     |
| 59 | 1A                                    | 26                                    |     | -   |                         |   |                     |

### 17.0 EDID Table

|    |                                       |     |     |    |   |  |                               |   |
|----|---------------------------------------|-----|-----|----|---|--|-------------------------------|---|
| 5A | Detailed timing/monitor descriptor #3 | 00  | 0   |    |   | Nvidia nvDPS<br>Lowest refresh rate that does not cause any visual/optical side effect |                               |   |
| 5B |                                       | 00  | 0   |    |   |  |                               |   |
| 5C |                                       | 00  | 0   |    |   |  |                               |   |
| 5D |                                       | 00  | 0   |    |   |  |                               |   |
| 5E |                                       | 00  | 0   |    |   |  |                               |   |
| 5F |                                       | 00  | 0   |    |   |  |                               |   |
| 60 |                                       | 00  | 0   |    |   |  |                               |   |
| 61 |                                       | 00  | 0   |    |   |  |                               |   |
| 62 |                                       | 00  | 0   |    |   |  |                               |   |
| 63 |                                       | 00  | 0   |    |   |  |                               |   |
| 64 |                                       | 00  | 0   |    |   |  |                               |   |
| 65 |                                       | 00  | 0   |    |   |  |                               |   |
| 66 |                                       | 00  | 0   |    |   |  |                               |   |
| 67 |                                       | 00  | 0   |    |   |  |                               |   |
| 68 |                                       | 00  | 0   |    |   |  |                               |   |
| 69 | 00                                    | 0   |     |    |   |  |                               |   |
| 6A | 00                                    | 0   |     |    |   |  |                               |   |
| 6B | 00                                    | 0   |     |    |   |  |                               |   |
| 6C | Detailed timing/monitor descriptor #4 | 00  | 0   |    | 0 | Detailed Timing Description #4   |                               |   |
| 6D |                                       | 00  | 0   |    |   | 0  | Flag                          |   |
| 6E |                                       | 00  | 0   |    |   |  | 0                             | Reserved  |
| 6F |                                       | 02  | 2   |    |   |  |                               | For Brightness Table and Power consumption        |
| 70 |                                       | 00  | 0   |    |   |  | 0                             | Flag  |
| 71 |                                       | 0B  | 11  |    |   |  | 11                            | PWM % [7:0] @ Step 0                              |
| 72 |                                       | 2F  | 47  |    |   |  | 47                            | PWM % [7:0] @ Step 5                              |
| 73 |                                       | FF  | 255 |    |   |  | 255                           | PWM % [7:0] @ Step 10                             |
| 74 |                                       | 0F  | 15  |    |   |  | 15                            | Nits [7:0] @ Step 0                               |
| 75 |                                       | 3C  | 60  |    |   |  | 60                            | Nits [7:0] @ Step 5                               |
| 76 |                                       | AA  | 170 |    |   |  | 170                           | Nits [7:0] @ Step 10                              |
| 77 |                                       | 23  | 35  |    |   |  | 1400                          | Panel Electronics Power @32x32 Chess Pattern=1400 |
| 78 | 11                                    | 17  |     |    |   | 715  | Backlight Power @60 nits=715  |   |
| 79 | 32                                    | 50  |     |    |   | 4050   | Backlight Power @Step 10=4050 |   |
| 7A | AA                                    | 170 |     |    |   | 170  | Nits @ 100% PWM Duty =170     |   |
| 7B | 00                                    | 0   |     |    |   | 0  | Flags                         |   |
| 7C | 00                                    | 0   |     |    |   | 0  | Flags                         |   |
| 7D | 00                                    | 0   |     |    |   | 0  | Flags                         |   |
| 7E | Extension flag                        | 00  | 0   |    |   |  |                               |   |
| 7F | Checksum                              | 2C  | 44  | 44 |   | -  |                               |   |

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