

# NV140QUM-N54 V3.0

## Product Specification

Rev. P7

BOE Optoelectronics Technology Co., Ltd

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TFT-LCD

P7

2018.12.05

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REVISION HISTORY

(√)Preliminary Specification  
( )Final Specification

| Revision No. | Page | Description of Changes      | Date       | Prepared |
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| P0           | 34   | Initial Release             | 2018.03.11 | Liu Fei  |
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# 1.0 GENERAL DESCRIPTION

## 1.1 Introduction

NV140QUM- N54 V3.0 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 14.0inch 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 8bit+2bit FRC 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 module. All input signals are eDP interface compatible.

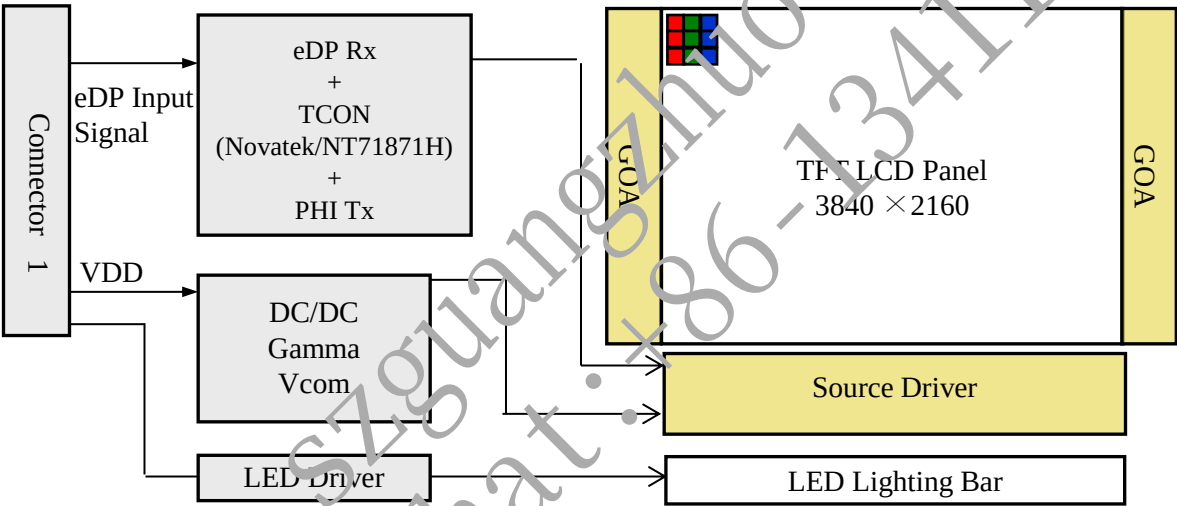


Figure 1. Drive Architecture

## 1.2 Features

- 4 lane eDP 1.4 Interface with 5.4Gbps Link Rates
- Thin and light weight
- 8bit+2bit FRC color depth
- Single LED Lighting Bar. (Down side/Horizontal Direction)
- Data enable signal mode
- Side Mounting Frame
- Green Product (RoHS & Halogen free product)
- On board LED Driving circuit
- Low driving voltage and low power consumption
- On board EDID chip
- HDR400
- Adjust Backlight Brightness With DC Mode

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### 1.3 Application

- Notebook PC (Wide type)

### 1.4 General Specification

The followings are general specifications at the model NV140QUM-N54 V3.0. (listed in Table 1)

<Table 1. General Specifications>

| Parameter           | Specification                                          | Unit   | Remarks         |
|---------------------|--------------------------------------------------------|--------|-----------------|
| Active area         | 309.31(H) × 173.99(V)                                  | mm     |                 |
| Number of pixels    | 3840(H) × 2160(V)                                      | pixels |                 |
| Pixel pitch         | 26.85 x80.55um                                         | um     |                 |
| Pixel arrangement   | RGB Vertical stripe                                    |        |                 |
| Display colors      | 1074M(8bit+2bit FRC)                                   |        |                 |
| Color gamut         | 90%Adobe typ(CIE1976uv) & 95% BT.709 (min(CIE1976uv))  |        |                 |
| Display mode        | Normally black                                         |        |                 |
| Dimensional outline | 315.01(H)*186.14 (V)*2.2Max(W/O PCB) / 4.3 Max (W PCB) | mm     | No PCB side     |
| Weight              | 215(max)                                               | g      |                 |
| Surface treatment   | HC                                                     |        |                 |
| Surface hardness    | 3H                                                     |        |                 |
| Back-light          | Bottom edge side, 1-LED lighting bar type              |        | Note 1          |
| Power consumption   | P <sub>D</sub> : 1.7                                   | W      | Desktop pattern |
|                     | PBL : 5.7                                              | W      | Max             |
|                     | P <sub>Total</sub> : 7.4                               | W      | Max             |

Notes : 1. LED Lighting Bar (80\*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℃

| 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>DI</sub> +0.3 | V    |         |
| Operating Temperature | T <sub>OP</sub> | 0                    | +50                  | ℃    | Note 2  |
| Storage Temperature   | T <sub>ST</sub> | -20                  | +70                  | ℃    |         |

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.

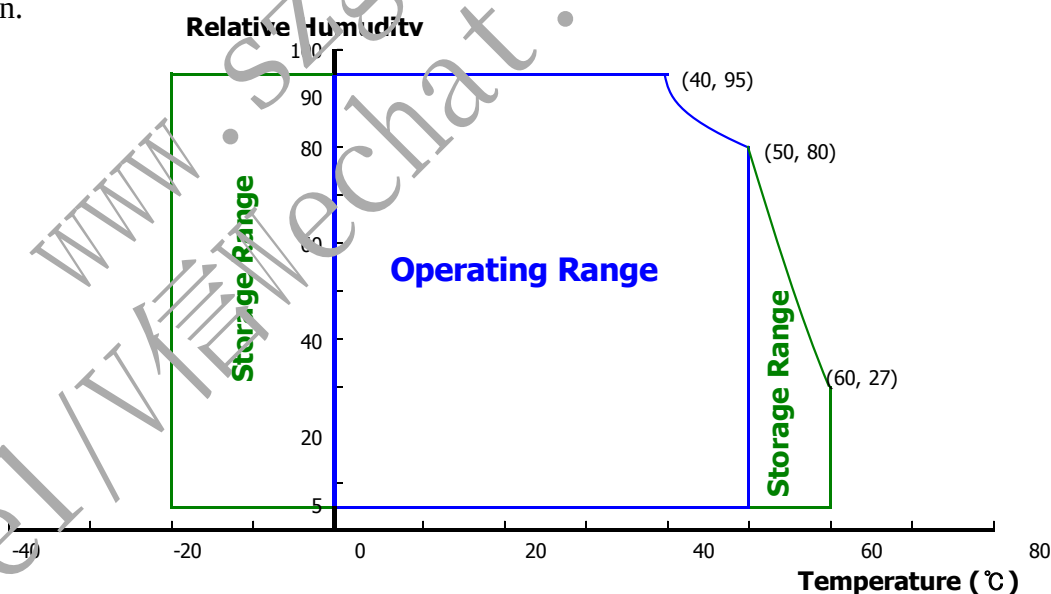


Figure 2. Temperature and Relative Humidity Range

### 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 <sub>DD</sub>    | 3.0  | 3.3  | 3.6   | V    | Note 1                   |
| Permissible Input Ripple Voltage | V <sub>RF</sub>    | -    | -    | 660   | mV   | @ V <sub>DD</sub> = 3.3V |
| BIST Control Level               | High Level         | 2    | -    | 3.6   | V    |                          |
|                                  | Low Level          | 0    | -    | 0.8   | V    |                          |
| Power Supply Current             | I <sub>DD</sub>    | -    | 515  | 566.7 | mA   | Note 1                   |
| Power Supply Inrush Current      | Inrush             | -    | -    | 1.5   | A    | Note3                    |
| Power Consumption                | P <sub>D</sub>     | -    | -    | 1.7   | W    | Note 1                   |
|                                  | P <sub>BL</sub>    | -    | -    | 5.7   | W    | Note 2                   |
|                                  | P <sub>total</sub> | -    | -    | 7.4   | W    | Note 1                   |

- Notes :
- 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.  
Pattern type : Desktop pattern
  - Calculated value for reference (V<sub>LED</sub> × I<sub>LED</sub>)
  - When peak current is 1.5A, V<sub>DD</sub> should be more than 2.75V
  - Measure condition (Figure 4)

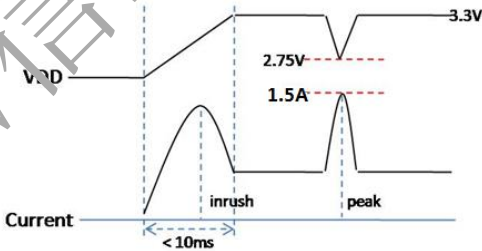


Figure 4. Inrush Measure Condition

### 3.2 Backlight Unit

< Table 4. LED Driving Guideline Specifications > Ta=25+/-2°C

| Parameter                                  |                         | Min.   | Typ. | Max.  | Unit | Remarks                 |
|--------------------------------------------|-------------------------|--------|------|-------|------|-------------------------|
| LED Forward Voltage                        | V <sub>F</sub>          | -      | -    | 2.9   | V    |                         |
| LED Forward Current                        | I <sub>F</sub>          | -      | 21.4 | -     | mA   |                         |
| LED Power Consumption                      | P <sub>LED</sub>        | -      | -    | 5.7   | W    | Note 1                  |
| LED Life-Time                              | N/A                     | 15,000 | -    |       | Hour | I <sub>F</sub> = 21.4mA |
| Power Supply Voltage for LED Driver        | V <sub>LED</sub>        | 5      | 12   | 21    | V    |                         |
| Power Supply Voltage for LED Driver Inrush | I <sub>led</sub> inrush | -      | -    | 1.5   | A    | Note 4                  |
| EN Control Level                           | Backlight On            | 1.2    | -    | -     | V    |                         |
|                                            | Backlight Off           | 0      | -    | 0.6   | V    |                         |
| PWM Control Level                          | High Level              | 1.2    | -    | -     | V    |                         |
|                                            | Low Level               | 0      | -    | 0.6   | V    |                         |
| PWM Control Frequency                      | F <sub>PWM</sub>        | 200    | -    | 2,000 | Hz   |                         |
| Duty Ratio                                 |                         | 1      | -    | 100   | %    | Note 3                  |
| PWM control resolution                     |                         | 0.5    |      |       | %    | @1Khz<br>Note5          |

Notes :

- Power supply voltage12V for LED driver.  

Calculator value for reference

$$IF \times VF \times 80 / \text{driver efficiency} = P_{LED}$$
- The LED life-time define as the estimated time to 50% degradation of initial luminous.
- 1% duty cycle is achievable with a dimming frequency less than 2KHz.
- Measure condition (Figure 5)
- 0.5% PWM duty change can be detected when Fpwm is 1Khz.

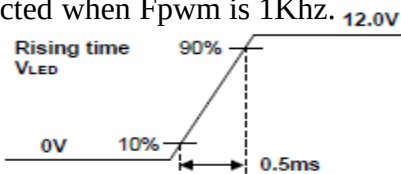


Figure 5. Inrush Measure Condition



|                                                                                                             |               |         |             |
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3.3 LED Structure

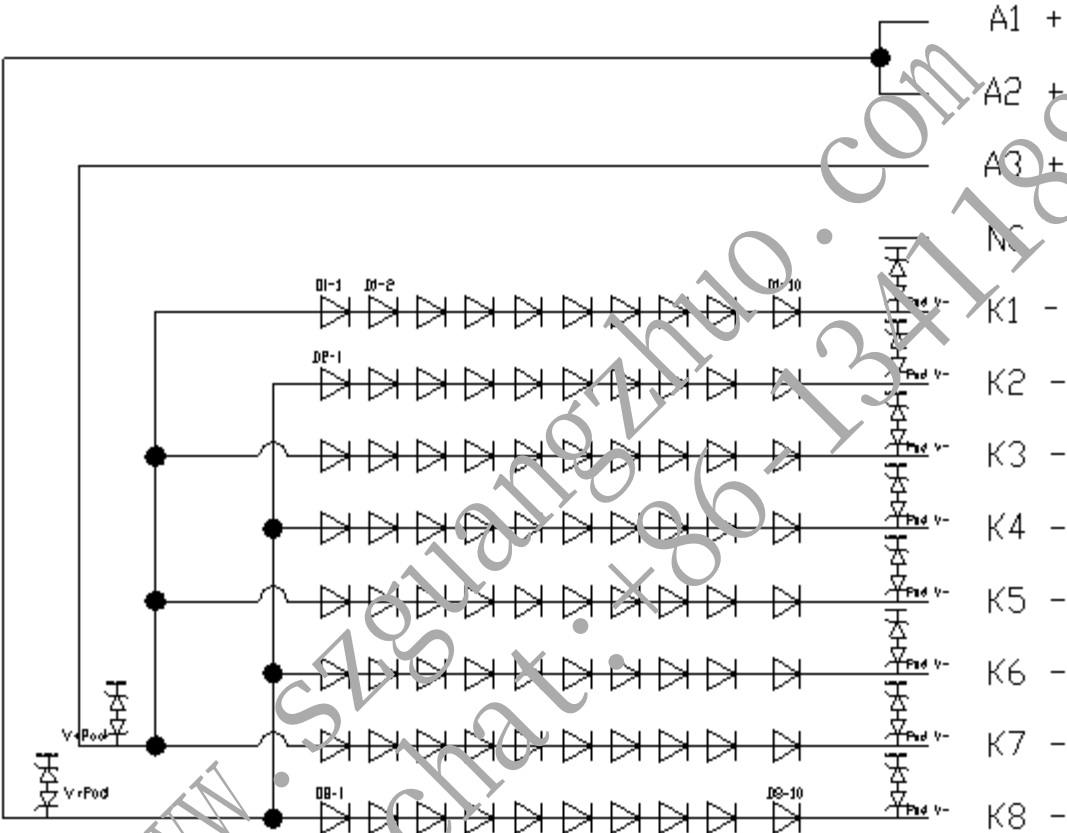


Figure 6. LED Structure

|                                                                                   |                                                 |         |
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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 (PR730&PR810) 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  $\theta=0$  ( $=03$ ) as the 3 o'clock direction (the "right"),  $\theta=90$  ( $=012$ ) as the 12 o'clock direction ("upward"),  $\theta=180$  ( $=09$ ) as the 9 o'clock direction ("left") and  $\theta=270$  ( $=06$ ) 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. VDD shall be  $3.3 \pm 0.3\text{V}$  at  $25^\circ\text{C}$ . Optimum viewing angle direction is 6 o'clock.

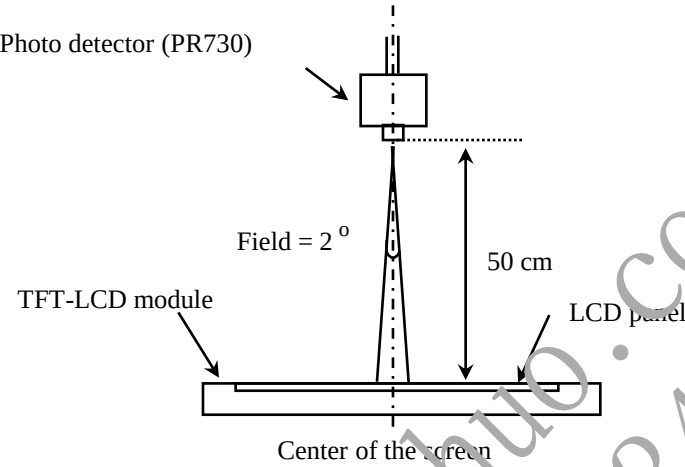
### 4.2 Optical Specifications

<Table 5. Optical Specifications>

| Parameter                        |            | Symbol          | Condition                           | Min.                      | Typ.                     | Max.   | Unit              | Remark  |
|----------------------------------|------------|-----------------|-------------------------------------|---------------------------|--------------------------|--------|-------------------|---------|
| Viewing Angle Range              | Horizontal | $\Theta_3$      | CR > 10                             | -                         | 89                       | -      | Deg.              | Note 1  |
|                                  |            | $\Theta_9$      |                                     | -                         | 89                       | -      | Deg.              |         |
|                                  | Vertical   | $\Theta_{12}$   |                                     | -                         | 89                       | -      | Deg.              |         |
|                                  |            | $\Theta_6$      |                                     | -                         | 89                       | -      | Deg.              |         |
| Luminance Contrast Ratio         |            | CR              | $\Theta = 0^\circ$                  | 1200                      | 1400                     |        |                   | Note 2  |
| Luminance of White               | 5 Points   | $Y_w$           | $\Theta = 0^\circ$<br>ILED = 21.4mA | 425                       | 500                      | -      | cd/m <sup>2</sup> | Note 3  |
| White Luminance Uniformity       | 5 Points   | $\Delta Y_5$    |                                     | 80                        | -                        | -      |                   | Note 4  |
|                                  | 13 Points  | $\Delta Y_{13}$ |                                     | 60                        | -                        | -      |                   |         |
| White Chromaticity               |            | $W_x$           | $\Theta = 0^\circ$                  | -0.03                     | 0.313                    | +0.03  |                   | Note 5  |
|                                  |            | $W_y$           |                                     |                           | 0.329                    |        |                   |         |
| Reproduction of Color            | Red        | $R_x$           | $\Theta = 0^\circ$                  | -0.025                    | 0.664                    | +0.025 |                   | CIE1931 |
|                                  |            | $R_y$           |                                     |                           | 0.328                    |        |                   |         |
|                                  | Green      | $G_x$           |                                     |                           | 0.270                    |        |                   |         |
|                                  |            | $G_y$           |                                     |                           | 0.662                    |        |                   |         |
|                                  | Blue       | $B_x$           |                                     |                           | 0.142                    |        |                   |         |
|                                  |            | $B_y$           |                                     |                           | 0.062                    |        |                   |         |
| Color Gamut                      |            |                 |                                     | 95% BT.709 min(CIE1976uv) | 90%Adobe typ (CIE1976uv) | -      | %                 |         |
| Response Time (Rising + Falling) |            | T <sub>RT</sub> | Ta= 25°C<br>$\Theta = 0^\circ$      | -                         | 25                       | 30     | ms                | Note 6  |
| Cross Talk                       |            | CT              | $\Theta = 0^\circ$                  | -                         | -                        | 4.0    | %                 | Note 7  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                   |                                     |                                              |
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| <div>Notes :</div> <div>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 7).</div> <div>2. Contrast measurements shall be made at viewing angle of <math>\Theta=0</math> 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 7) Luminance Contrast Ratio (CR) is defined mathematically.</div> <div> <div>CR =</div> <div> <div>Luminance when displaying a white raster</div> <div>Luminance when displaying a black raster</div> </div> </div> <div>3. Center Luminance of white is defined as luminance values of 5 point average 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 8 for a total of the measurements per display.</div> <div>4. The White luminance uniformity on LCD surface is then expressed as : <math>\Delta Y</math> =Minimum Luminance of 5(or 13) points / Maximum Luminance of 5(or 13) points.(see Figure 8 and Figure 9).</div> <div>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.</div> <div>6. The electro-optical response time measurements shall be made as Figure 10 by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tf, and 90% to 10% is Tr.</div> <div>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 levell(L0/L255), to the luminance (YB) of that same area when any adjacent area is driven white or dark. (See Figure 11).</div> |                                                                                   |                                     |                                              |
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4.3 Optical Measurements



Optical characteristics measurement setup

Figure 7. Measurement Set Up

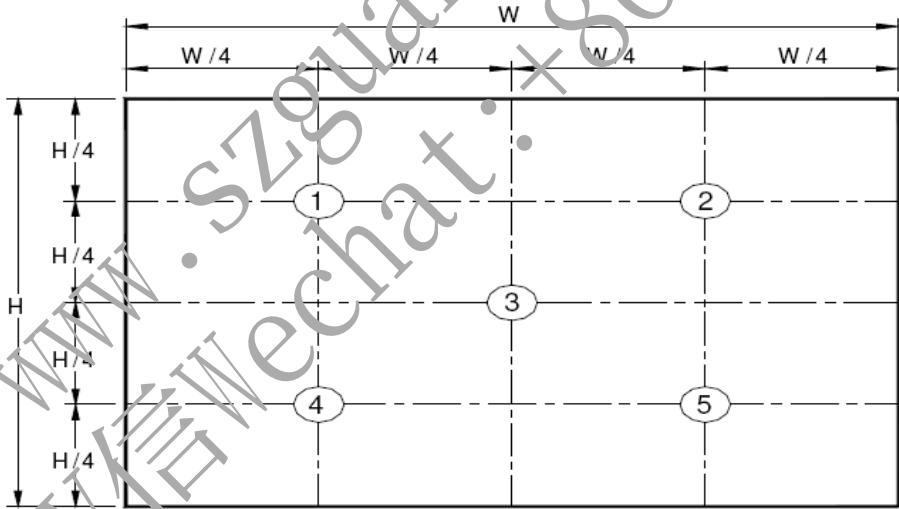


Figure 8. White Luminance and Uniformity Measurement Locations (5 points)

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 7 for a total of the measurements per display.

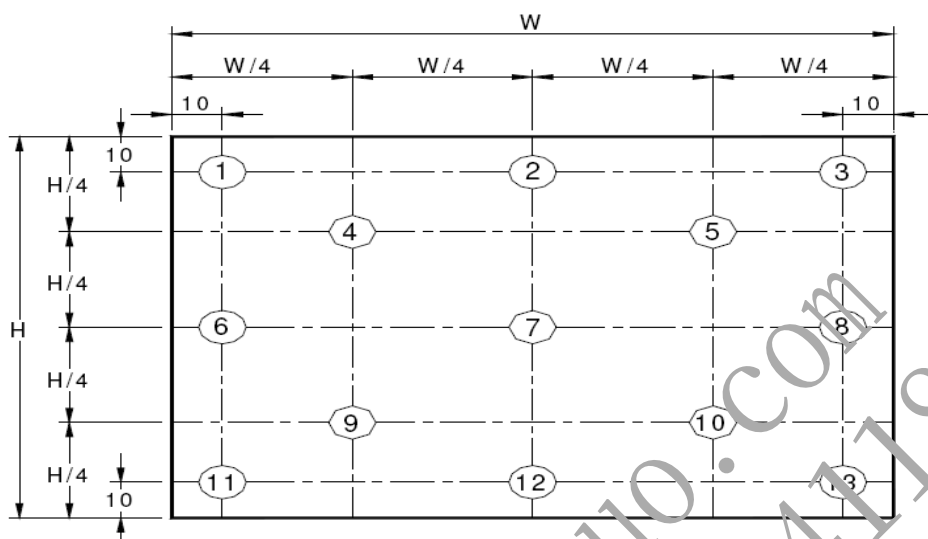


Figure 9. Uniformity Measurement Locations (13 points)

The White luminance uniformity on LCD surface is then expressed as :  $\Delta Y5$  = Minimum Luminance of five points / Maximum Luminance of five points (see Figure 8) ,  $\Delta Y13$  = Minimum Luminance of 13 points / Maximum Luminance of 13 points (see Figure 9).

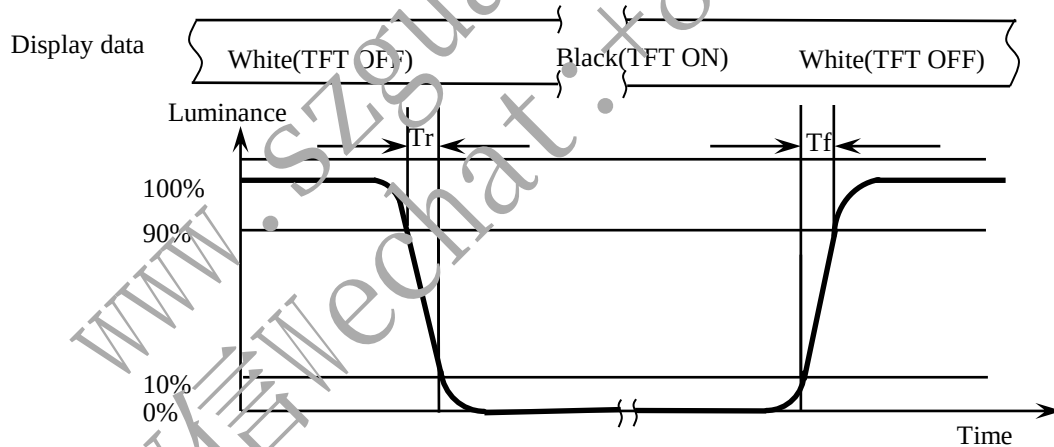
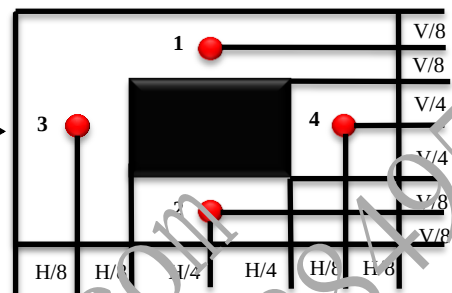
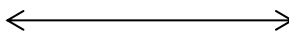
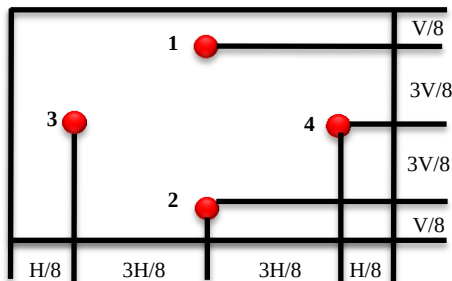


Figure 10. Response Time Testing

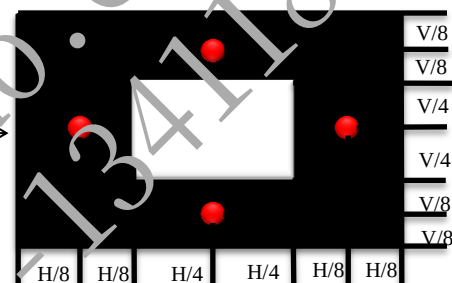
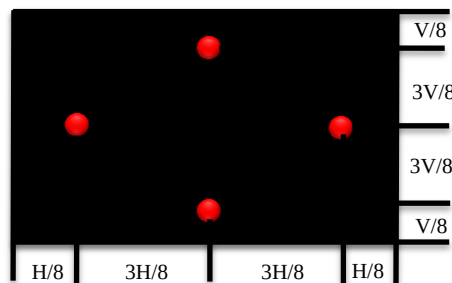
The electro-optical response time measurements shall be made as shown in Figure 10 by switching the “data” input signal ON and OFF. Tr: The luminance to change from 90% to 10% ,Tf: The luminance to change from 10% to 90% .

The test system : PR810

## Condition A



## Condition B



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

Figure 11. Cross Talk Modulation Test Description

Where:

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

The location 1/2/3/4 measured will be exactly the same in both patterns. The test background gray is L255 and L0.

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 11). Both condition should be spec in ( $\leq 4\%$ )

The test system: PR730

5.0 INTERFACE CONNECTION

5.1 Electrical Interface Connection

The electronics interface connector is STM MSAK24025P40.  
The connector interface pin assignments are listed in Table 6.

<Table 6. Pin Assignments for the Interface Connector>

| Terminal | Symbol              | Functions                               |
|----------|---------------------|-----------------------------------------|
| PIN No.  | Symbol              | Description                             |
| 1        | NC                  | NC                                      |
| 2        | H_GND               | eDP lane<br>Up to 5.4G                  |
| 3        | Lane3_N             |                                         |
| 4        | Lane3_P             |                                         |
| 5        | H_GND               |                                         |
| 6        | Lane2_N             |                                         |
| 7        | Lane2_P             |                                         |
| 8        | H_GND               |                                         |
| 9        | Lane1_N             |                                         |
| 10       | Lane1_P             |                                         |
| 11       | H_GND               |                                         |
| 12       | Lane1_N             |                                         |
| 13       | Lane1_P             |                                         |
| 14       | H_GND               |                                         |
| 15       | AUX_CH_P            | LCD Logic Power<br>(3.3±0.3V)           |
| 16       | AUX_CH_N            |                                         |
| 17       | H_GND               |                                         |
| 18       | LCD_VCC             |                                         |
| 19       | LCD_VCC             |                                         |
| 20       | LCD_VCC             | BIST (IN Port)                          |
| 21       | LCD_VCC             |                                         |
| 22       | LCD Self Test(BIST) | Logic GND<br>(Connect to GND in Module) |
| 23       | LCD_GND             |                                         |
| 24       | LCD_GND             |                                         |
| 25       | LCD_GND             |                                         |
| 26       | LCD_GND             |                                         |
| 27       | HPD                 | HPD (OUT Port 2.5V/3.3V)                |
| 28       | BL_GND              | BLU GND<br>(Connect to GND in Module)   |
| 29       | BL_GND              |                                         |
| 30       | BL_GND              |                                         |
| 31       | BL_GND              |                                         |
| 32       | BL_ENABLE           | IN Port                                 |
| 33       | BL_PWM              | IN Port                                 |
| 34       | NC                  | NC                                      |
| 35       | NC                  | NC                                      |
| 36       | BL_PWR              | BLU Power<br>(5~21V)                    |
| 37       | BL_PWR              |                                         |
| 38       | BL_PWR              |                                         |
| 39       | BL_PWR              |                                         |
| 40       | NC                  | NC                                      |

### 5.2 eDP Interface

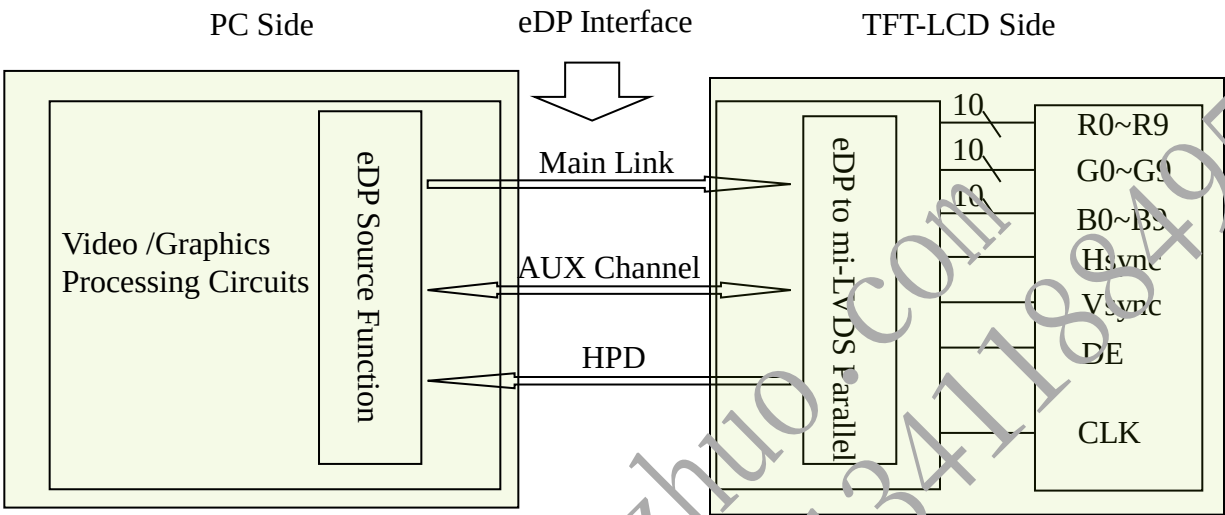
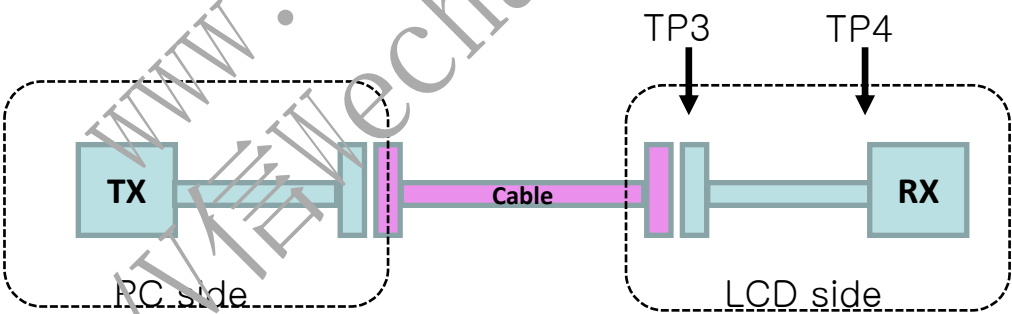


Figure 12. eDP Interface Architecture

### 5.3 eDP Mainlink eye diagram test point



Mainlink eye diagram test point

Notes: Mainlink eye diagram at TP3 needs to be measured on the sink side(LCD Panel). The spec of sink eye vertices at TP3 should follow VESA DisplayPort™ Standard Version1. Revision 1a and Vesa Embedded DisplayPort Standard Version 1.3.



5.4 Data Input Format

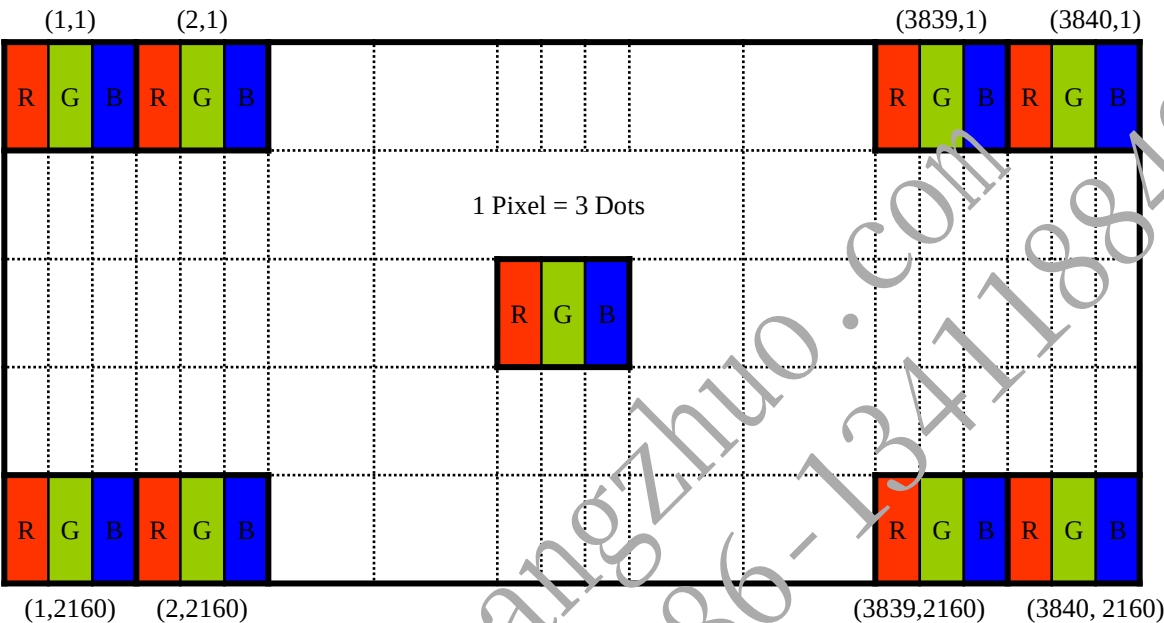


Figure 13. Display Position of Input Data (V-H)

5.5 Back-light & LCM Interface Connection

BLU Interface Connector: STM MSAK24037P12.

<Table 7. Pin Assignments for the BLU Connector>

| Pin No. | Symbol | Description            | Pin No. | Symbol | Description            |
|---------|--------|------------------------|---------|--------|------------------------|
| 1       | LED    | LED cathode connection | 7       | LED    | LED cathode connection |
| 2       | LED    | LED cathode connection | 8       | LED    | LED cathode connection |
| 3       | LED    | LED cathode connection | 9       | NC     | No Connection          |
| 4       | LED    | LED cathode connection | 10      | Vou    | LED anode connection   |
| 5       | LED    | LED cathode connection | 11      | Vout   | LED anode connection   |
| 6       | LED    | LED cathode connection | 12      | Vout   | LED anode connection   |

## 6.0 SIGNAL TIMING SPECIFICATION

### 6.1 The NV140QUM-N54 V3.0 Is Operated By The DE Only

< Table 8. Signal Timing Specification >

| Item                      |           | Symbols | Min    | Typ    | Max   | Unit   |
|---------------------------|-----------|---------|--------|--------|-------|--------|
| Clock                     | Frequency | 1/Tc    | 355.52 | 533.25 | 586.6 | MHz    |
|                           |           |         | -      | 4/7Tc  | -     |        |
|                           |           |         | -      | 3/7Tc  | -     |        |
| Frame Period              |           | Tv      | 3900   | 4000   | 4050  | lines  |
|                           |           |         | -      | 60     | -     | Hz     |
|                           |           |         | 25     | 16.67  | 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 : The above is as optimized setting.

### 6.2 eDP Rx Interface Timing Parameter

The specification of the eDP Rx interface timing parameter is shown in Table 9.

<Table 9. eDP Main-Link RX TP4 Package Pin Parameters>

| Item                                                                            | Symbol              | Min | Typ | Max  | Unit | Remark |
|---------------------------------------------------------------------------------|---------------------|-----|-----|------|------|--------|
| Spread spectrum clock<br>(Link clock down-spreading)                            | SSC                 | -   | -   | 0.5  | %    |        |
| Differential peak-to-peak input voltage at package pins                         | VRX-DIFFp-p         | 70  | -   | 1320 | mV   |        |
| Rx input DC common mode voltage                                                 | VRX_DC_CM           | -   | GND | -    | V    |        |
| Differential termination resistance                                             | RRX-DIFF            | 80  | -   | 100  | Ω    |        |
| Single-ended termination resistance                                             | RRX-SE              | 40  | -   | 60   | Ω    |        |
| Rx short circuit current limit                                                  | IRX_SHORT           | -   | -   | 50   | mA   |        |
| Intra-pair skew at Rx package pins (HBR)<br>RX intra-pair skew tolerance at HBR | LRX_SKEW_INTRA_PAIR | -   | -   | 50   | ps   |        |

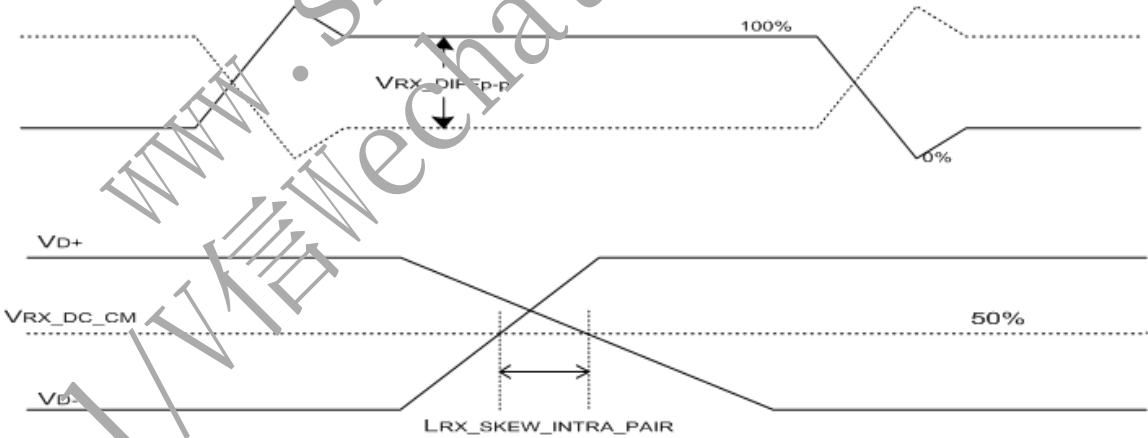


Figure 14. VRX-DIFFp-p & LRX\_SKEW\_INTRA\_PAIR

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

&lt;Table 10. Input Signal &amp; Basic Display Colors &amp; Gray Scale of Colors &gt;

|                             | Colors &   | Data signal |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----------------------------|------------|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|                             | Gray scale | R0          | R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | R9 | G0 | G1 | G2 | G3 | G4 | G5 | G6 | G7 | G8 | G9 | B0 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 |
| 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  | 0  | 0  | 0  | 0  | 0  | 0  |
|                             | Blue       | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
|                             | Green      | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                             | Light Blue | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
|                             | Red        | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                             | Purple     | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
|                             | Yellow     | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                             | White      | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| 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  |
|                             | △          | 1           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                             | Darker     | 0           | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                             | △          | ↑           |    |    |    |    |    |    |    |    |    | ↑  |    |    |    |    |    |    |    |    |    | ↑  |    |    |    |    |    |    |    |    |    |
|                             | ▽          | ↓           |    |    |    |    |    |    |    |    |    | ↓  |    |    |    |    |    |    |    |    |    | ↓  |    |    |    |    |    |    |    |    |    |
|                             | Brighter   | 1           | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                             | ▽          | 0           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                             | Red        | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 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  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                             | Darker     | 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  | 0  | 0  |
|                             | △          | ↑           |    |    |    |    |    |    |    |    |    | ↑  |    |    |    |    |    |    |    |    |    | ↑  |    |    |    |    |    |    |    |    |    |
|                             | ▽          | ↓           |    |    |    |    |    |    |    |    |    | ↓  |    |    |    |    |    |    |    |    |    | ↓  |    |    |    |    |    |    |    |    |    |
|                             | Brighter   | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 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  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                             | Green      | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 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  | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                             | Darker     | 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  |
|                             | △          | ↑           |    |    |    |    |    |    |    |    |    | ↑  |    |    |    |    |    |    |    |    |    | ↑  |    |    |    |    |    |    |    |    |    |
|                             | ▽          | ↓           |    |    |    |    |    |    |    |    |    | ↓  |    |    |    |    |    |    |    |    |    | ↓  |    |    |    |    |    |    |    |    |    |
|                             | Brighter   | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
|                             | ▽          | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
|                             | Blue       | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| 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  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                             | △          | 1           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                             | Darker     | 0           | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                             | △          | ↑           |    |    |    |    |    |    |    |    |    | ↑  |    |    |    |    |    |    |    |    |    | ↑  |    |    |    |    |    |    |    |    |    |
|                             | ▽          | ↓           |    |    |    |    |    |    |    |    |    | ↓  |    |    |    |    |    |    |    |    |    | ↓  |    |    |    |    |    |    |    |    |    |
|                             | Brighter   | 1           | 0  | 1  | 1  | 1  | 1  | 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  | 1  | 1  | 1  | 1  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
|                             | White      | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |

## 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.

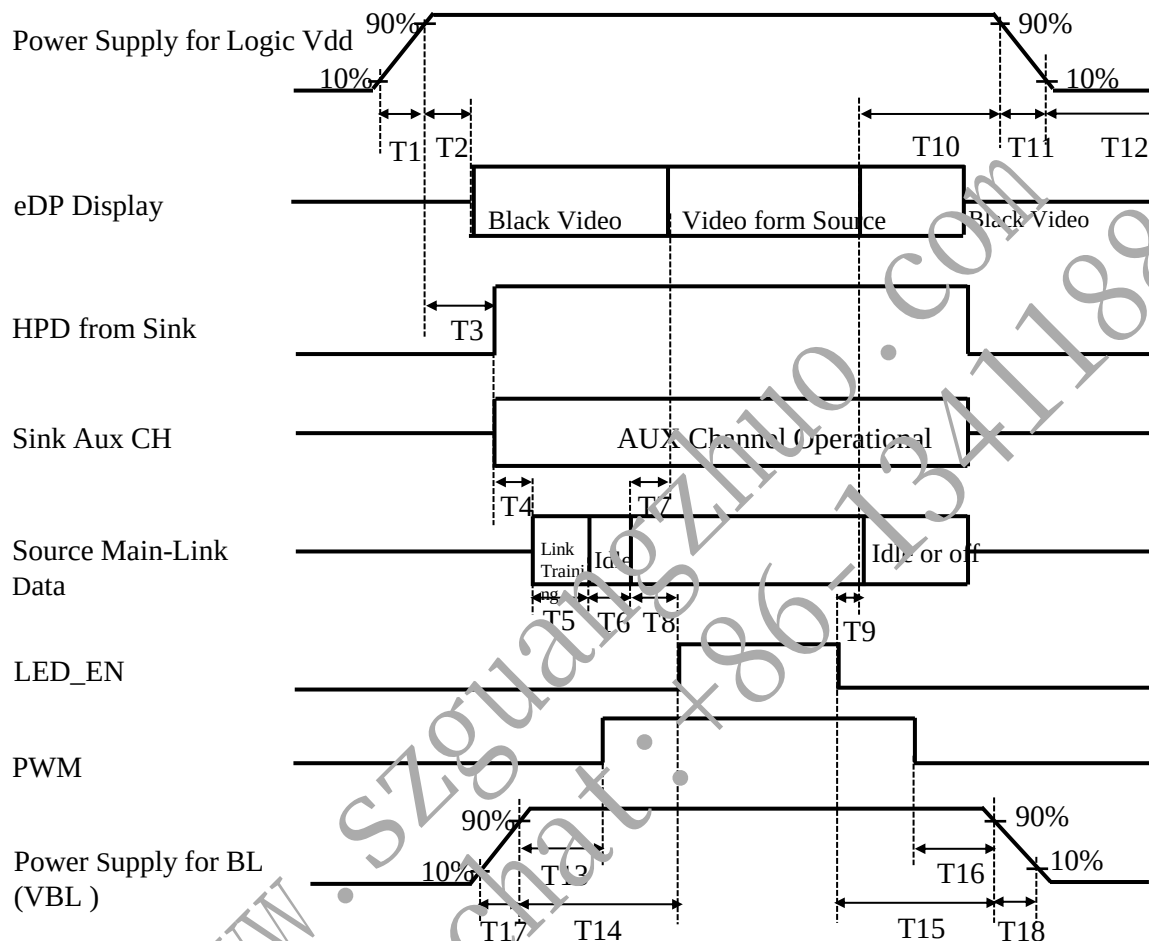


Figure 15. Power Sequence

- $0.5\text{ms} \leq T1 \leq 10\text{ms}$
- $0\text{ms} < T2 \leq 200\text{ms}$
- $0\text{ms} < T3 \leq 200\text{ms}$
- $T3+T4+T5+T6+T8 > 200\text{ms}$
- $0\text{ms} < T7 \leq 50\text{ms}$
- $T7 < T8$
- $0\text{ms} < T9$
- $0\text{ms} < T10 < 500\text{ms}$
- $0.5\text{ms} \leq T11 \leq 10\text{ms}$
- $500\text{ms} \leq T12$
- $0\text{ms} < T13$
- $0\text{ms} < T14$
- $0\text{ms} < T15$
- $0\text{ms} < T16$
- $0.5\text{ms} \leq T17$
- $0.5\text{ms} \leq T18$

### Notes:

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. Back Light must be turn on after power for logic and interface signal are valid.

Power Supply for Logic Vdd

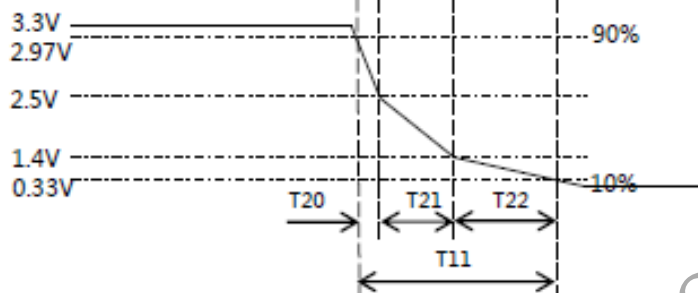


Figure 16. T11 timing requirements

- $0.5\text{ms} \leq T11 \leq 10\text{ms}$
- $0.225\text{ms} \leq T21$
- $T11 = T20 + T21 + T22$

## 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

&lt; Table 11. Signal Connector &gt;

| Connector Name /Description | For Signal Connector |
|-----------------------------|----------------------|
| Manufacturer                | STM                  |
| Type/ Part Number           | MSAK24025P40         |
| Mating Housing/ Part Number | I-PEX 20455-040E     |

10.0 MECHANICAL CHARACTERISTICS

10.1 Dimensional Requirements

Figure 21 shows mechanical outlines for the model NVQ140UM-N54 V3.0.  
Other parameters are shown in Table 12.

<Table 12. Dimensional Parameters>

| Parameter           | Specification                                          | Unit   |
|---------------------|--------------------------------------------------------|--------|
| Active Area         | 309.31(H) × 173.99(V)                                  | mm     |
| Number of pixels    | 3840(H) × 2160(V)(1 pixel = R + G + B dots)            | pixels |
| Pixel pitch         | 26.85 x80.55um                                         | um     |
| Pixel arrangement   | RGB Vertical stripe                                    |        |
| Display colors      | 1074M(3bit+2FRC)                                       |        |
| Display mode        | Normally black                                         |        |
| Dimensional outline | 315.01(H)*186.14 (V)*2.2Max(W/O PCB )/ 4.3 Max (W PCB) | mm     |
| Weight              | 215 (max)                                              | g      |

10.2 Mounting

See Figure 21.

10.3 Anti-Glare and Polarizer Hardness.

The surface of the LCD has an Glare coating 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 250lux.



## 11.0 RELIABILITY TEST

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

<Table 13. Reliability Test>

| No | Test Items                                      | Conditions                                                                     |
|----|-------------------------------------------------|--------------------------------------------------------------------------------|
| 1  | High temperature storage test                   | Ta = 50°C , 80%RH, 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  | Low temperature operation test                  | Ta = 0 °C , 240 hrs                                                            |
| 5  | Thermal shock                                   | Ta = -20 °C ↔ 60 °C (0.5 hr), 60%±3%RH, 100 cycle                              |
| 6  | Vibration test (non-operating)                  | Ta = 25°C , 60%RH, 1.47G, 5~200Hz, Half Sine X,Y,Z / Sweep rate : 30 min       |
| 7  | Drop test (non-operating)                       | 根据 BCX重量<br>1Angle, 3Edge, 6Face                                               |
| 8  | Electro-static discharge test (non-operating)   | Air : 150 pF, 330Ω, 15 KV<br>Contact : 150 pF, 330Ω, 8 KV<br>Ta = 25°C , 60%RH |

## 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.

|                                                                                 |               |         |             |
|---------------------------------------------------------------------------------|---------------|---------|-------------|
|  | PRODUCT GROUP | REV     | ISSUE DATE  |
|                                                                                 | Customer Spec | Rev. P7 | 2018. 12.05 |

- (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) Product Label



- 标签尺寸 48mm × 12mm，厚度0.08mm
 
  - FG-CODE: NV140QUM-N54 V3.0
  - MDL ID
  - PPI
  - PPI对应二维码
  - MDL ID对应条形码

Figure 17. Product Label

|              |                                                 |          |
|--------------|-------------------------------------------------|----------|
| SPEC. NUMBER | SPEC. TITLE                                     | PAGE     |
|              | NV140QUM-N54 V3.0 Product Specification Rev. P7 | 26 OF 34 |

(2) Box Label

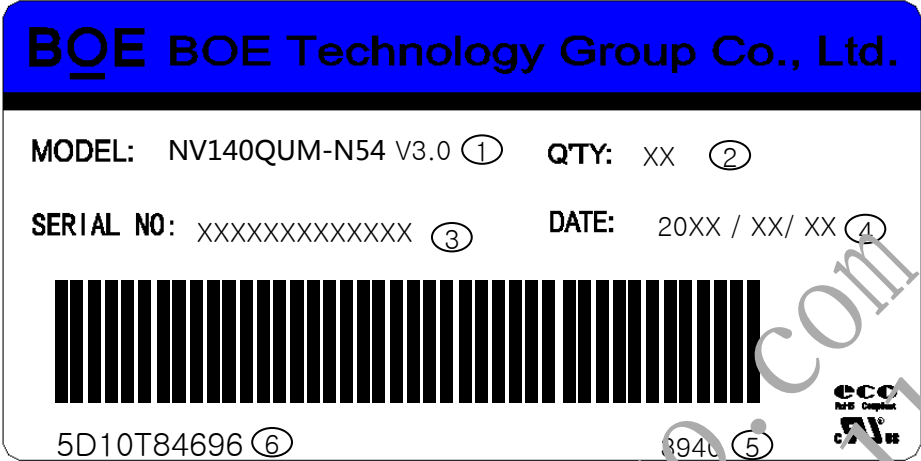


Figure 18. Box Label

Serial number marked part needs to print, show as follows:

1. FG-CODE(Before 12 bit)

2. Product quantity

3. Box ID

4. Date

5. FG-Code After four

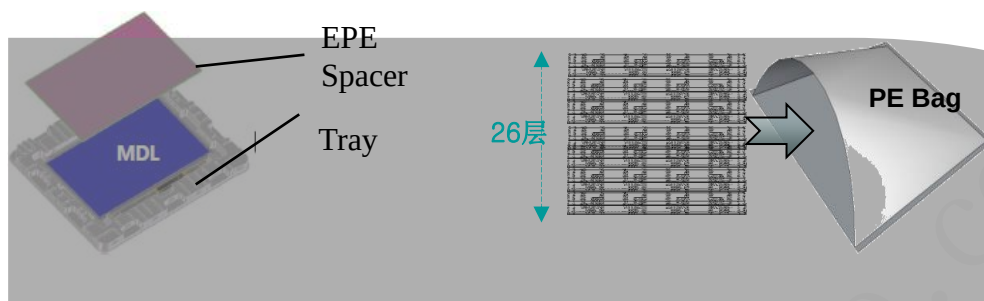
6. Customer Number

| 序号号 | 1   | 2 | 3     | 4  | 5    | 6 | 7     | 8   | 9         | 10 | 11 | 12 | 13 |
|-----|-----|---|-------|----|------|---|-------|-----|-----------|----|----|----|----|
| 代码  | X   | X | S     | 3  | 1    | 5 | B     | 0   | 0         | 0  | 1  | H  | D  |
| 描述  | GBN |   | Grade | 33 | Year |   | Month | Rev | Serial No |    |    |    |    |

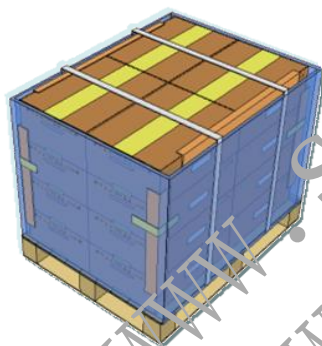
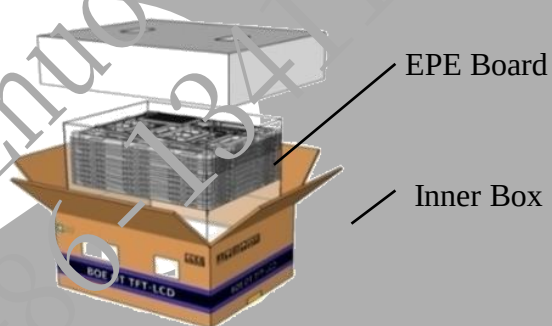
<Table 15. Box Label Naming Rule >

## 14.0 PACKING INFORMATION

### 14.1 Packing Order



- Put 1 pcs MDL in tray and 1 pcs Spacer on MDL
- Put 26 pcs tray and 1 pcs tray cover in PE bag.
- Put PE bag with 2 EPE cover in the inner box.
- 25pcs/Box, 12Box/Pallet, 300pcs MDL/Pallet.



### 14.2 Note

- Box dimension: 500mm\*400mm\*300mm
- Package quantity in one box: 25pcs

|                                                                                                              |               |         |             |
|--------------------------------------------------------------------------------------------------------------|---------------|---------|-------------|
| <div>BOE</div> <div>www.szguangzhuo.com 广卓液晶屏 echodeng61@hotmail.com jimei@jimeihk.com +86-13411884959</div> | PRODUCT GROUP | REV     | ISSUE DATE  |
|                                                                                                              | Customer Spec | Rev. P7 | 2018. 12.05 |

15.0 MECHANICAL OUTLINE DIMENSION

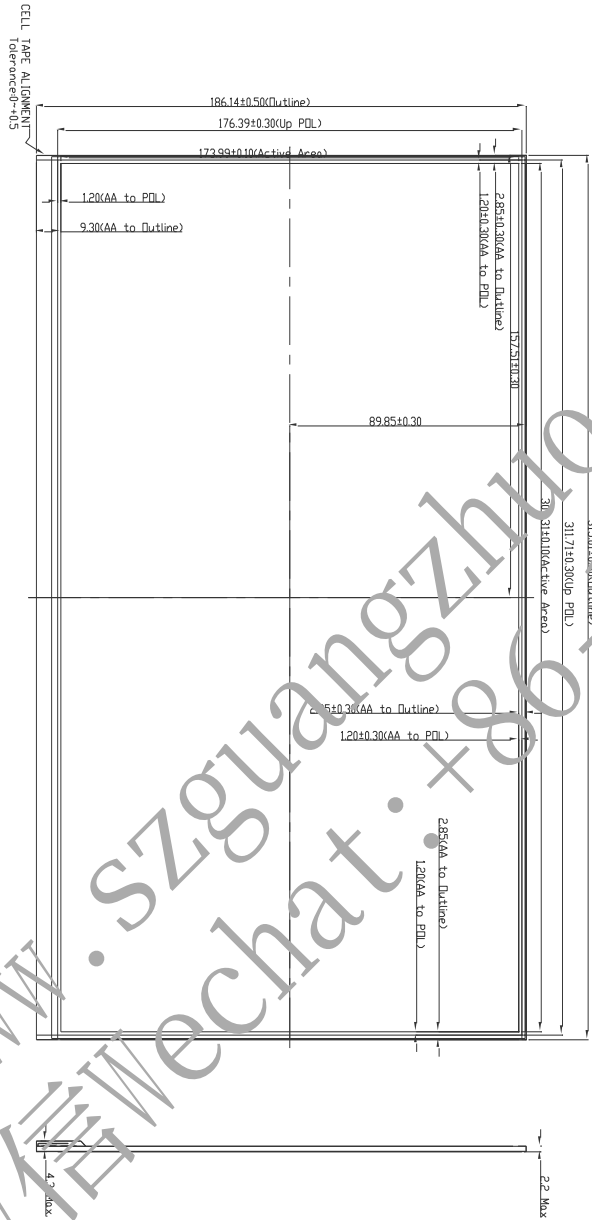


Figure 21. TFT-LCD Module Outline Dimension (Front View)

- Note:
- 1.PCB side is lower than top polarizer and PCB component is lower than top polarizer
  - 2.Warps and deformation are +/-0.8mm.

|                                                                                    |                                                 |          |
|------------------------------------------------------------------------------------|-------------------------------------------------|----------|
| SPEC. NUMBER                                                                       | SPEC. TITLE                                     | PAGE     |
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|                                                                                                              |               |         |             |
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|                                                                                                              | Customer Spec | Rev. P7 | 2018. 12.05 |

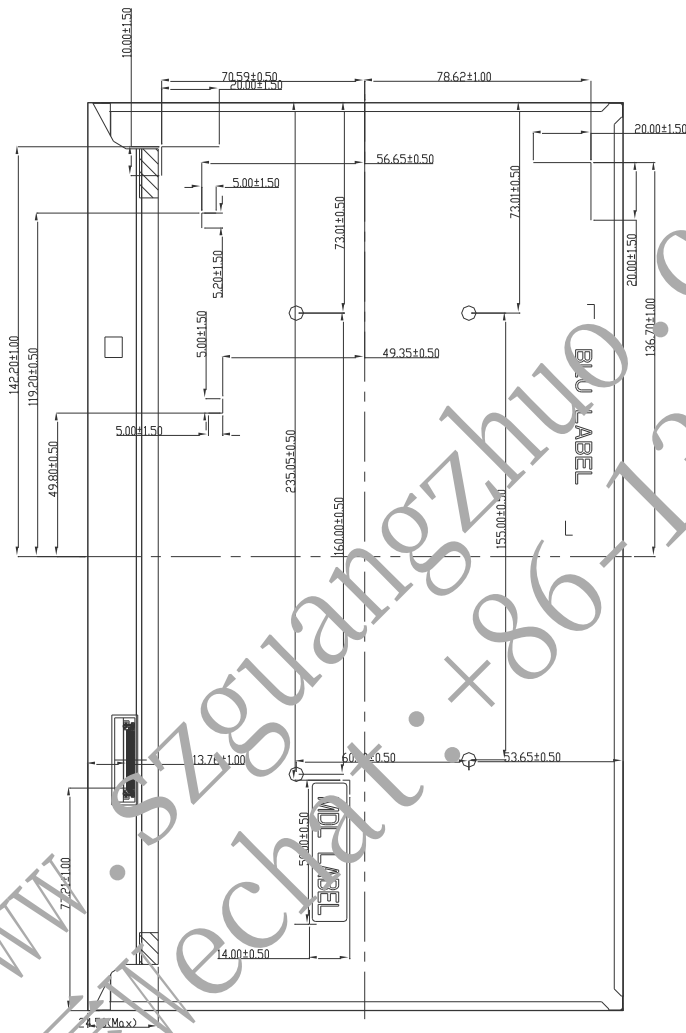


Figure 22. TFT-LCD Module Outline Dimensions (Rear view)

|                                                                                    |                                                 |          |
|------------------------------------------------------------------------------------|-------------------------------------------------|----------|
| SPEC. NUMBER                                                                       | SPEC. TITLE                                     | PAGE     |
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## 16.0 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        | 21  | 33  |     | 2081          | ID = 2081                    |
| 0B            |                        | 08  | 8   |     |               |                              |
| 0C            | 32-bit serial No.      | 00  | 0   |     | 0             |                              |
| 0D            |                        | 00  | 0   |     | 0             |                              |
| 0E            |                        | 00  | 0   |     | 0             |                              |
| 0F            |                        | 00  | 0   |     | 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 | B5  | 181 |     | -             | Refer to right table         |
| 15            | Max H image size       | 1F  | 31  |     | 31            | 31 cm (Approx)               |
| 16            | Max V image size       | 11  | 17  |     | 17            | 17 cm (Approx)               |
| 17            | Display Gamma          | 78  | 120 |     | 2.2           | Gamma curve = 2.2            |
| 18            | Feature support        | 03  | 3   |     | -             | Refer to right table         |
| 19            | Red/Green low bits     | F1  | 241 |     | -             | Red / Green Low Bits         |
| 1A            | Blue/White low bits    | 70  | 112 |     | -             | Blue / White Low Bits        |
| 1B            | Red x high bits        | A4  | 170 | 679 | 0.664         | Red (x) = 10101010 (0.664)   |
| 1C            | Red y high bits        | 54  | 84  | 335 | 0.328         | Red (y) = 01010100 (0.328)   |
| 1D            | Green x high bits      | 45  | 69  | 276 | 0.270         | Green (x) = 01000101 (0.27)  |
| 1E            | Green y high bits      | A9  | 169 | 677 | 0.662         | Green (y) = 10101001 (0.662) |
| 1F            | Blue x high bits       | 24  | 36  | 145 | 0.142         | Blue (x) = 00100100 (0.142)  |
| 20            | Blue y high bits       | 0F  | 15  | 63  | 0.062         | Blue (y) = 00001111 (0.062)  |
| 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   |     | -             | Refer to right table         |
| 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   |  |       |                                                     |
| 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 | 50 | 80  |  | 533.3 | 533.28MHz 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 = 2160                                   |
| 3C |                                       | 3E | 62  |  | 62    | Ver Blanking = 62                                   |
| 3D |                                       | 80 | 123 |  | -     | 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 |                                       | 35 | 53  |  | 3     | V sync Offset = 3 line                              |
| 41 |                                       | 03 | 0   |  | 5     | V Sync Pulse width : 5 line                         |
| 42 |                                       | 35 | 53  |  | 309   | Horizontal Image Size = 309 mm (Low 8 bits)         |
| 43 |                                       | AE | 174 |  | 174   | Vertical Image Size = 174 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 | 00 | 0   |  |   | MHz Main clock                                      |
| 49 |                                       | 00 | 0   |  |   |                                                     |
| 4A |                                       | 00 | 0   |  |   | Hor Active =                                        |
| 4B |                                       | 00 | 0   |  |   | Hor Blanking =                                      |
| 4C |                                       | 00 | 0   |  | - | 4 bits of Hor. Active + 4 bits of Hor. Blanking     |
| 4D |                                       | 00 | 0   |  |   | Ver Active =                                        |
| 4E |                                       | 00 | 0   |  |   | Ver Blanking =                                      |
| 4F |                                       | 00 | 0   |  | - | 4 bits of Ver. Active + 4 bits of Ver. Blanking     |
| 50 |                                       | 00 | 0   |  |   | Ho Sync Offset                                      |
| 51 |                                       | 00 | 0   |  |   | H Sync Pulse Width =                                |
| 52 |                                       | 00 | 0   |  |   | V sync Offset = line                                |
| 53 |                                       | 00 | 0   |  |   | V Sync Pulse width : line                           |
| 54 |                                       | 00 | 0   |  |   | Horizontal Image Size = mm (Low 8 bits)             |
| 55 |                                       | 00 | 0   |  |   | Vertical Image Size = mm (Low 8 bits)               |
| 56 |                                       | 00 | 0   |  |   | 4 bits of Hor Image Size + 4 bits of Ver Image Size |
| 57 |                                       | 00 | 0   |  |   | Hor Border (pixels)                                 |
| 58 |                                       | 00 | 0   |  |   | Vertical Border (Lines)                             |
| 59 |                                       | 1A | 26  |  | - | Refer to right table                                |
| 5A | Detailed timing/monitor descriptor #3 | 00 | 0   |  |   | Indicates descriptor #3 is a display Descriptor     |
| 5B |                                       | 00 | 0   |  |   |                                                     |
| 5C |                                       | 00 | 0   |  |   |                                                     |
| 5D |                                       | FE | 254 |  |   | Tag : ASCII String                                  |
| 5E |                                       | 00 | 0   |  |   | Reserved                                            |
| 5F |                                       | 43 | 66  |  | B | Manufacture name : BOEHF                            |
| 60 |                                       | 4F | 79  |  | O |                                                     |
| 61 |                                       | 45 | 69  |  | E |                                                     |
| 62 |                                       | 20 | 32  |  |   |                                                     |
| 63 |                                       | 43 | 72  |  | H |                                                     |
| 64 |                                       | 46 | 70  |  | F |                                                     |
| 65 |                                       | 0A | 10  |  |   |                                                     |
| 66 |                                       | 20 | 32  |  |   |                                                     |
| 67 |                                       | 20 | 32  |  |   |                                                     |
| 68 |                                       | 20 | 32  |  |   |                                                     |
| 69 |                                       | 20 | 32  |  |   |                                                     |
| 6A |                                       | 20 | 32  |  |   |                                                     |
| 6B |                                       | 20 | 32  |  |   |                                                     |

|    |                                       |    |     |    |   |                                                 |
|----|---------------------------------------|----|-----|----|---|-------------------------------------------------|
| 6C | Detailed timing/monitor descriptor #4 | 00 | 0   |    |   | Indicates descriptor #4 is a display Descriptor |
| 6D |                                       | 00 | 0   |    |   |                                                 |
| 6E |                                       | 00 | 0   |    |   | Reserved                                        |
| 6F |                                       | FE | 254 |    |   | Tag : ASCII String                              |
| 70 |                                       | 00 | 0   |    |   | Reserved                                        |
| 71 |                                       | 4E | 78  |    | N | Model name : NV140QUM-N54 V3.0                  |
| 72 |                                       | 56 | 86  |    | V |                                                 |
| 73 |                                       | 31 | 49  |    | 1 |                                                 |
| 74 |                                       | 34 | 52  |    | 4 |                                                 |
| 75 |                                       | 30 | 48  |    | 0 |                                                 |
| 76 |                                       | 51 | 81  |    | Q |                                                 |
| 77 |                                       | 55 | 85  |    | U |                                                 |
| 78 |                                       | 4D | 77  |    | M |                                                 |
| 79 |                                       | 2D | 45  |    | - |                                                 |
| 7A |                                       | 4E | 78  |    | N |                                                 |
| 7B |                                       | 35 | 53  |    | 5 |                                                 |
| 7C |                                       | 34 | 52  |    | 4 |                                                 |
| 7D |                                       | 0A | 10  |    |   |                                                 |
| 7E | Extension flag                        | 01 | 1   |    | 1 | 0 : 1个EDID ; N : N+1个EDID                       |
| 7F | Checksum                              | 4A | 74  | 74 | - |                                                 |