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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



User's Guide

NHD-5.7-320240WFB-ETXI# **LCM**

(Liquid Crystal Display Module)
RoHS Compliant

For product support, contact

Newhaven Display International
2511 Technology Drive, #101
Elgin, IL 60124
Tel: (847) 844-8795 Fax: (847) 844-8796

March 4, 2009



| RECORDS OF REVISION | | | DOC. FIRST ISSUE |
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1. Module Classification Information

NHD 5.7-320240 WFB - E T X I #
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Brand : NEWHAVEN DISPLAY INTERNATIONAL

② Display Size: 5.7inch diagonal, 320xRGBx240 pixels

③ Display Type : WFB: TFT

④ Model serials number: **E : with Epson Controller**

⑤ Backlight Type :

| | |
|---------------------|----------------------|
| N→Without backlight | A→LED, Amber |
| B→EL, Blue green | R→LED, Red |
| D→EL, Green | O→LED, Orange |
| W→EL, White | G→LED, Green |
| F→CCFL, White | T →LED, White |
| Y→LED, Yellow Green | S→LED, Bright White |

⑥ LCD Mode :

| | |
|------------------------------|--------------------------------|
| B→TN Positive, Gray | T→FSTN Negative |
| N→TN Negative, | M→STN Negative, Blue |
| G→STN Positive, Gray | F→FSTN Positive |
| Y→STN Positive, Yellow Green | X : TFT, normally white |

⑦ LCD Polarizer Type/ Temperature range/ View direction

| | |
|----------------------------|------------------------------------|
| A→Reflective, N.T, 6:00 | H→Transflective, W.T,6:00 |
| D→Reflective, N.T, 12:00 | K→Transflective, W.T,12:00 |
| G→Reflective, W. T, 6:00 | C→Transmissive, N.T,6:00 |
| J→Reflective, W. T, 12:00 | F→Transmissive, N.T,12:00 |
| B→Transflective, N.T,6:00 | I →Transmissive, W. T, 6:00 |
| E→Transflective, N.T.12:00 | L→Transmissive, W.T,12:00 |

⑧ Special Code

: RoHS Compliant

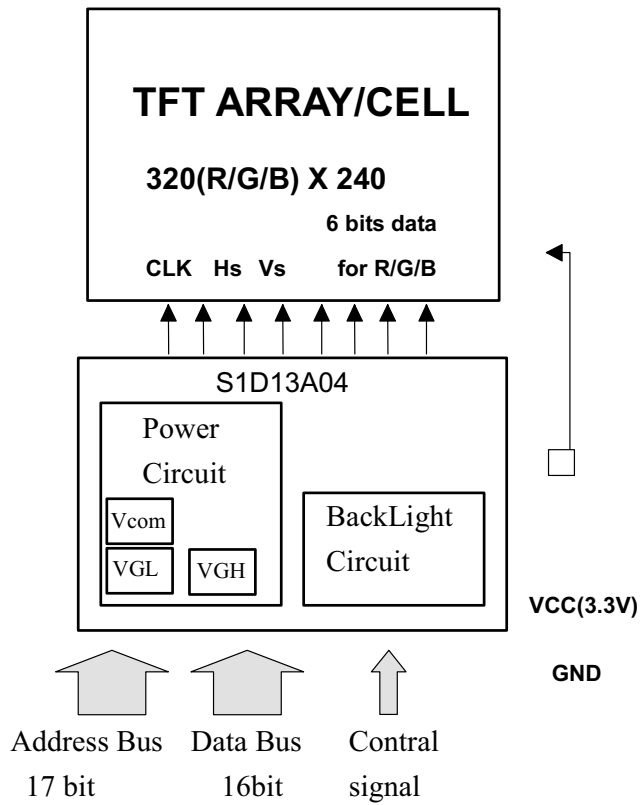
This product is composed of a TFT LCD panel, driver ICs, FPC, Control Board and a backlight unit.

| Item | Dimension | Unit |
|--------------------|-----------------------------|------|
| Dot Matrix | 320 x RGBx240(TFT) | dots |
| Module dimension | 149.0x 109.0 x 11.5 (max) | mm |
| View area | 115.200x 86.40 | mm |
| Dot pitch | 0.12 x 0.36 | mm |
| Driving IC package | COG | |
| LCD type | TFT, Negative, Transmissive | |
| View direction | 6 o'clock | |
| Backlight Type | LED, Normally White | |
| Controller IC | SID13A04 - 16 bit mode only | |

*Expose the IC number blaze (Luminosity over than 1 cd) when using the LCM may cause IC operating failure.

*Color tone slight changed by temperature and driving voltage.

2. Block Diagram



Bit0 ~ Bit4 RED
 Bit5 ~ Bit10 GREEN
 Bit11~ Bit15 BLUE

3.Electrical Characteristics

| Item | Symbol | Condition | Min | Typ | Max | Unit |
|----------------------------|--------------------|-----------------------|---------------------|-----|--------------------|---------|
| Supply Voltage For Logic | VCC | — | 3.0 | 3.3 | 3.6 | V |
| Input High Volt. | V _{IH} | — | 0.7 V _{CC} | — | V _{CC} | V |
| Input Low Volt. | V _{IL} | — | 0 | — | 0.3V _{CC} | V |
| LCD Driving Supply Voltage | V _{GH} *1 | Ta=25°C | | 15 | | V *3 |
| | V _{GL} *2 | | | -10 | | V |
| | V _{comH} | | 2.5 | | 5.5 | |
| | V _{comL} | | -2.0 | | 0 | |
| Supply Current | I _{VDD} | V _{DD} =3.3V | — | 5 | 8 | mA |

Notes:

*1) V_{GH} is TFT Gate on operating Voltage.

*2) V_{GL} is TFT Gate off operating Voltage, V_{GL} signal must be fluctuates with same phase as V_{com} when Storage on Gate structure.

*3) V_{com} must be adjusted to optimize display quality_Crosstalk, Contrast Ratio and etc.

4.Absolute Maximum Ratings

| Item | Symbol | Min | Typ | Max | Unit |
|-----------------------|-----------------|------|-----|-----|------|
| Operating Temperature | T _{OP} | -20 | — | +70 | °C |
| Storage Temperature | T _{ST} | -30 | — | +80 | °C |
| Power Supply Voltage | V _{GH} | -0.3 | — | 18 | V |
| | V _{GL} | -15 | — | 0.3 | V |
| | VCC | -0.3 | — | 6.0 | V |

5. Interface Pin Function

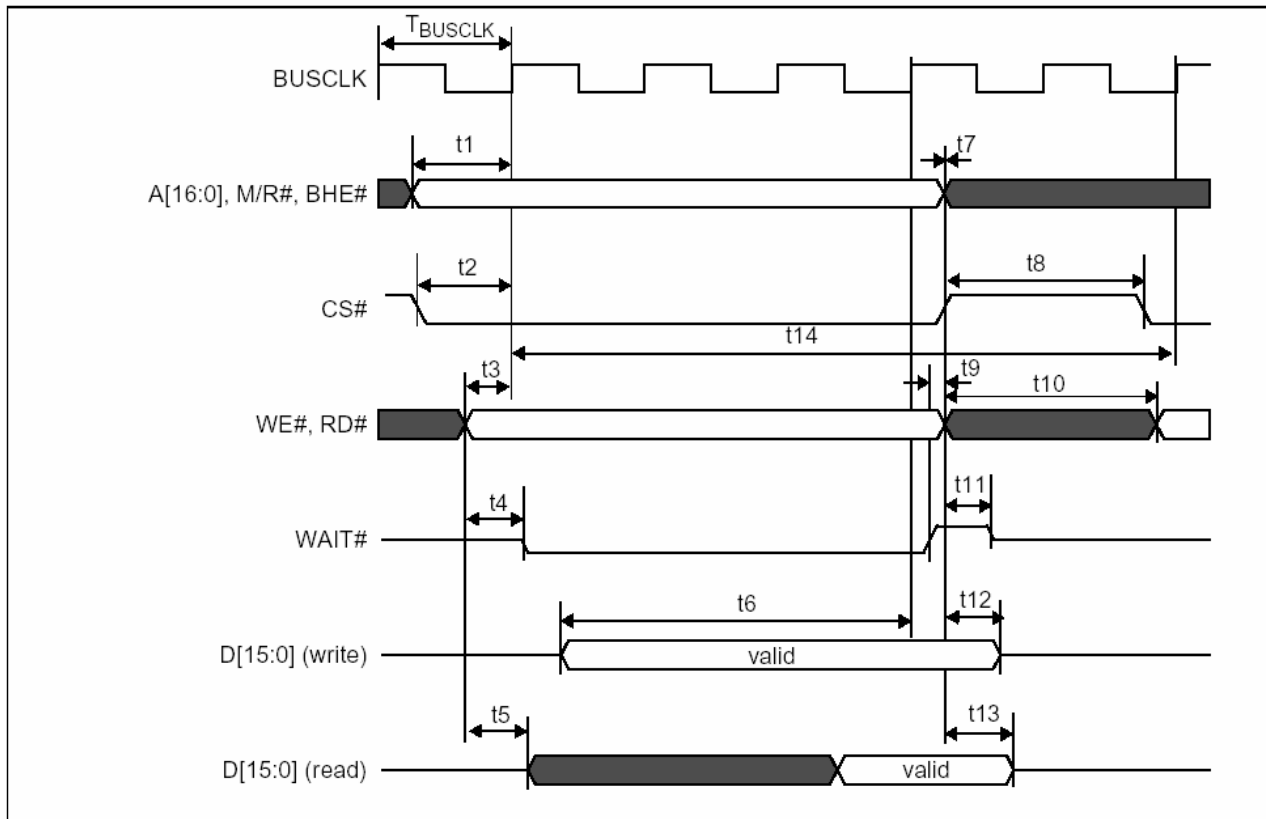
5-1 Pins Connection To Control Board

| P/N | Symbol | Function | P/N | Symbol | Function |
|-----|--------|--|------|--------|--|
| 1 | Vcc | Power Supply : +3.3V | 26 | VCC | Power Supply : +3.3V |
| 2 | Vcc | Power Supply : +3.3V | 27 | CLK | Typically used as input clock source for pixel clock . Normally this pin can be floated |
| 3 | DB0 | Input data from the system data bus. | 28 | GND | Ground for logic circuit |
| 4 | DB1 | | 29 | GND | Ground for logic circuit |
| 5 | DB2 | | 30 | GND | Ground for logic circuit |
| 6 | DB3 | | 31 | AD1 | System address bus bits |
| 7 | DB4 | | 32 | GND | Ground for logic circuit |
| 8 | DB5 | | 33 | AD2 | System address bus bits |
| 9 | DB6 | | 34 | GND | Ground for logic circuit |
| 10 | DB7 | | 35 | AD3 | System address bus bits |
| 11 | DB8 | | 36 | GND | Ground for logic circuit |
| 12 | DB9 | | 37 | AD4 | System address bus bits |
| 13 | DB10 | | 38 | AD5 | |
| 14 | DB11 | | 39 | AD6 | |
| 15 | DB12 | | 40 | AD7 | |
| 16 | DB13 | | 41 | AD8 | |
| 17 | DB14 | | 42 | AD9 | |
| 18 | DB15 | 43 | AD10 | | |
| 19 | CS | Chip select input. | 44 | AD11 | |
| 20 | MR | See Note(1) | 45 | AD12 | |
| 21 | RD | this pin inputs the read command | 46 | AD13 | |
| 22 | WR | write enable signal | 47 | AD14 | |
| 23 | BHE | This pin inputs the byte enable signal for the high data byte *Note (2) | 48 | AD15 | |
| 24 | REST | Active low input to set all internal registers to the default state | 49 | AD16 | |
| 25 | WAIT | This pin outputs the wait signal | 50 | AD17 | |

Note(1): M/R# is set high to access display buffer, low to access the registers.

Note(2): BHE should be set LOW, this display supports Little Endian 16-bit mode only.

6. Timing Characteristics



6-1. Interface Timing

| Symbol | Parameter | Min | Max | Unit |
|---------------------|---|-----------------------|-----|---------------------|
| f_{BUSCLK} | Bus clock frequency | | 50 | MHz |
| T_{BUSCLK} | Bus clock period | $1/f_{\text{BUSCLK}}$ | | ns |
| t1 | A[16:0], M/R#, BHE# setup to first BUSCLK rising edge where CS# = 0 and either RD# = 0 or WE# = 0 | 9 | | ns |
| t2 | CS# setup to BUSCLK rising edge | 9 | | ns |
| t3 | RD#, WE# setup to BUSCLK rising edge | 1 | | ns |
| t4 | RD# or WE# state change to WAIT# driven low | 1 | 10 | ns |
| t5 | RD# falling edge to D[15:0] driven (read cycle) | 2 | 10 | ns |
| t6 | D[15:0] setup to 4th rising BUSCLK edge after CS#=0 and WE#=0 | 1 | | T_{BUSCLK} |
| t7 | A[16:0], M/R#, BHE# and CS# hold from RD#, WE# rising edge | 0 | | ns |
| t8 | CS# deasserted to reasserted | 0 | | ns |
| t9 | WAIT# rising edge to RD#, WE# rising edge | 0 | | ns |
| t10 | WE#, RD# deasserted to reasserted | 1 | | T_{BUSCLK} |
| t11 | Rising edge of either RD# or WE# to WAIT# high impedance | | 0.5 | T_{BUSCLK} |
| t12 | D[15:0] hold from WE# rising edge (write cycle) | 2 | | ns |
| t13 | D[15:0] hold from RD# rising edge (read cycle) | 1 | | ns |
| t14 | Cycle Length | 6 | | T_{BUSCLK} |

7. Optical Characteristics

Ta=25±2°C, ILED=140mA

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark | |
|--------------------|--------|----------------------------|------|--------|--------|-------------------|-------------------|------------|
| Response time | Tr | $\theta=0^\circ$ | - | 15 | 30 | ms | Note 3,5 | |
| | Tf | | - | 35 | 50 | ms | | |
| Contrast ratio | CR | At optimized viewing angle | 150 | 200 | | | Note 4,5 | |
| Color Chromaticity | White | $\theta=0^\circ$ | Wx | (0.25) | (0.30) | (0.35) | | Note 2,6,7 |
| | | | Wy | (0.27) | (0.32) | (0.37) | | |
| Viewing angle | Hor. | CR≥10 | ΘR | 50 | 65 | - | Deg. | Note 1 |
| | | | ΘL | 50 | 65 | - | | |
| | Ver. | | ΘT | 30 | 50 | - | | |
| | | | ΘB | 50 | 55 | - | | |
| Brightness | - | - | 300 | 350 | - | cd/m ² | Center of display | |

7.1 Definition of optical characteristics

Note 1: Definition of viewing angle

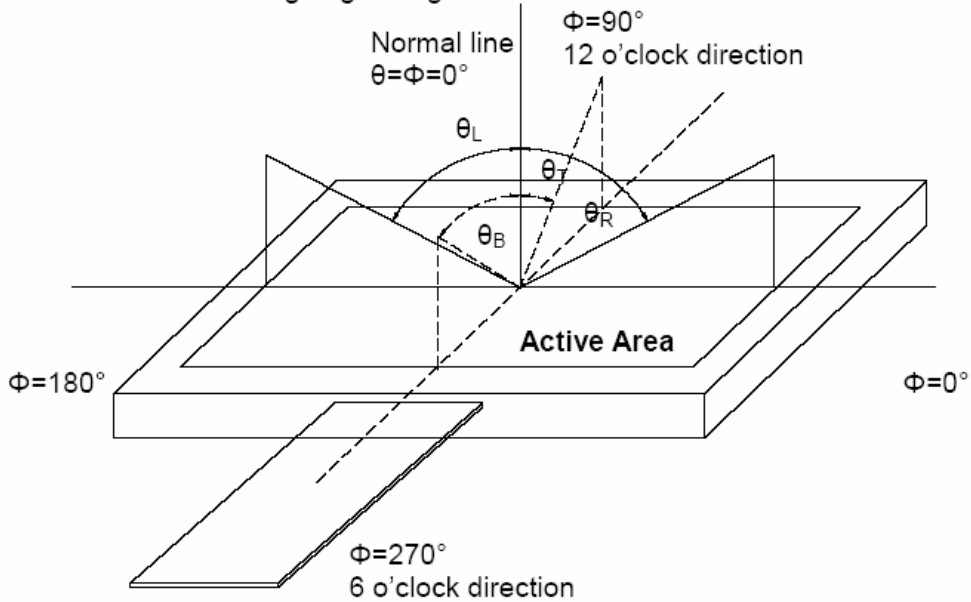


Fig. 5-1 Definition of viewing angle

Note 2: Definition of optical measurement system.

The optical characteristics should be measured in dark room. The optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° /Height: 500mm.)

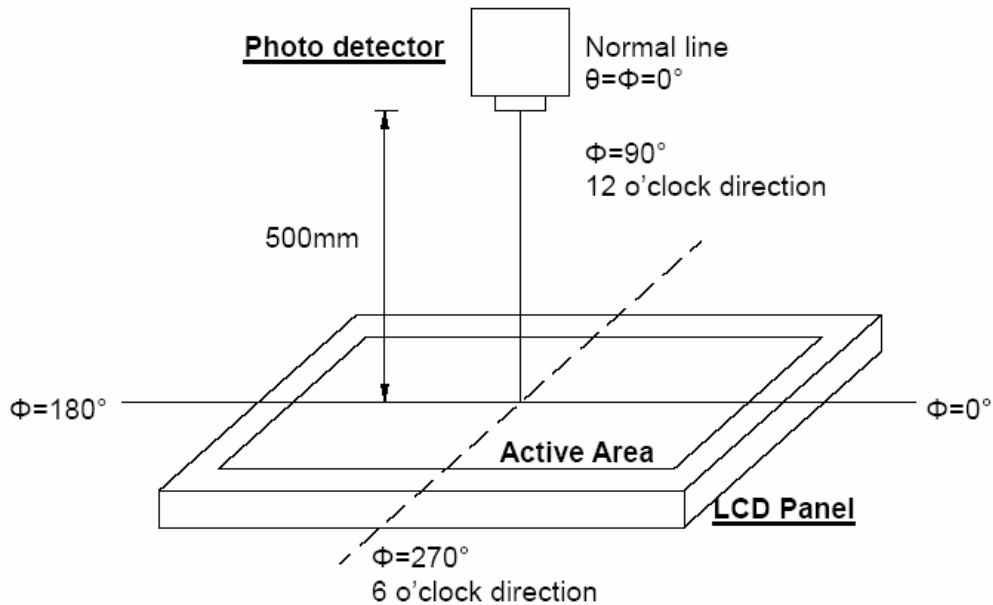


Fig. 5-2 Optical measurement system setup

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Note 3: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.

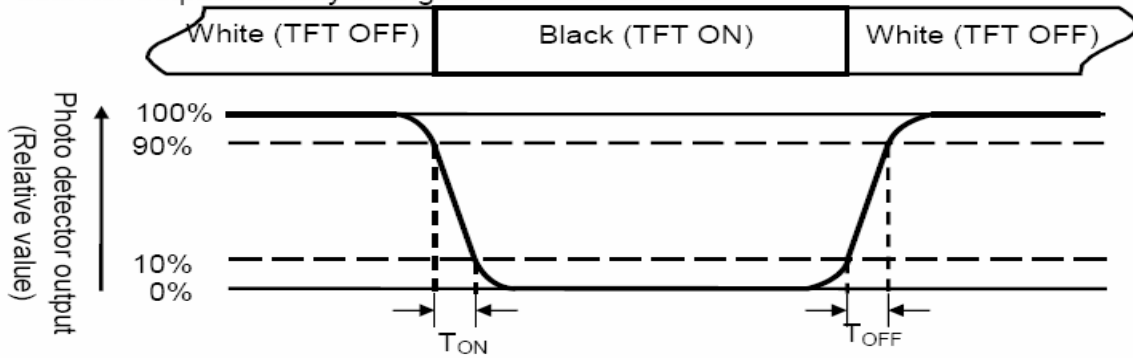


Fig. 5-3 Definition of response time

Note 4: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground when measuring the center area of the panel.

Note 7: Definition of Luminance Uniformity

To test for uniformity, the tested area, which is inside the active area, is divided into 3 rows and 3 columns. The measurement spot is placed at the center of each box.

$$\text{Luminance Uniformity (Yu)} = \frac{B_{min}}{B_{max}}$$

L-----Active area length W----- Active area width

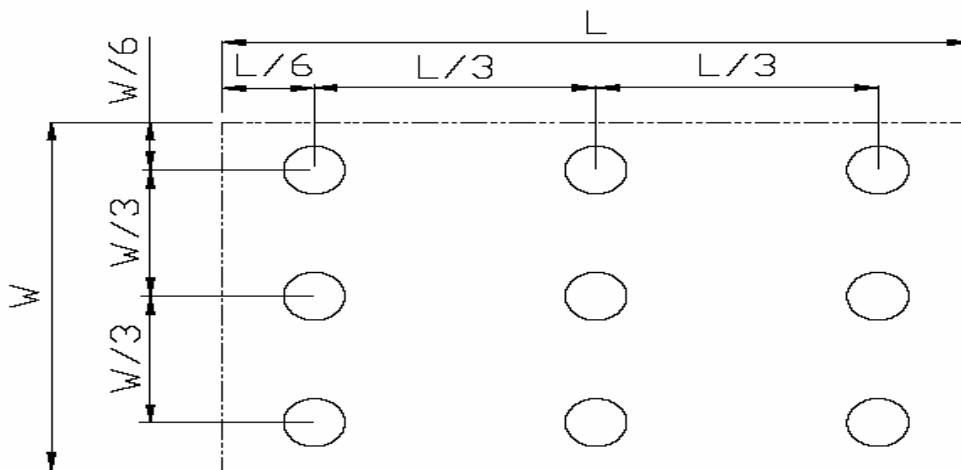
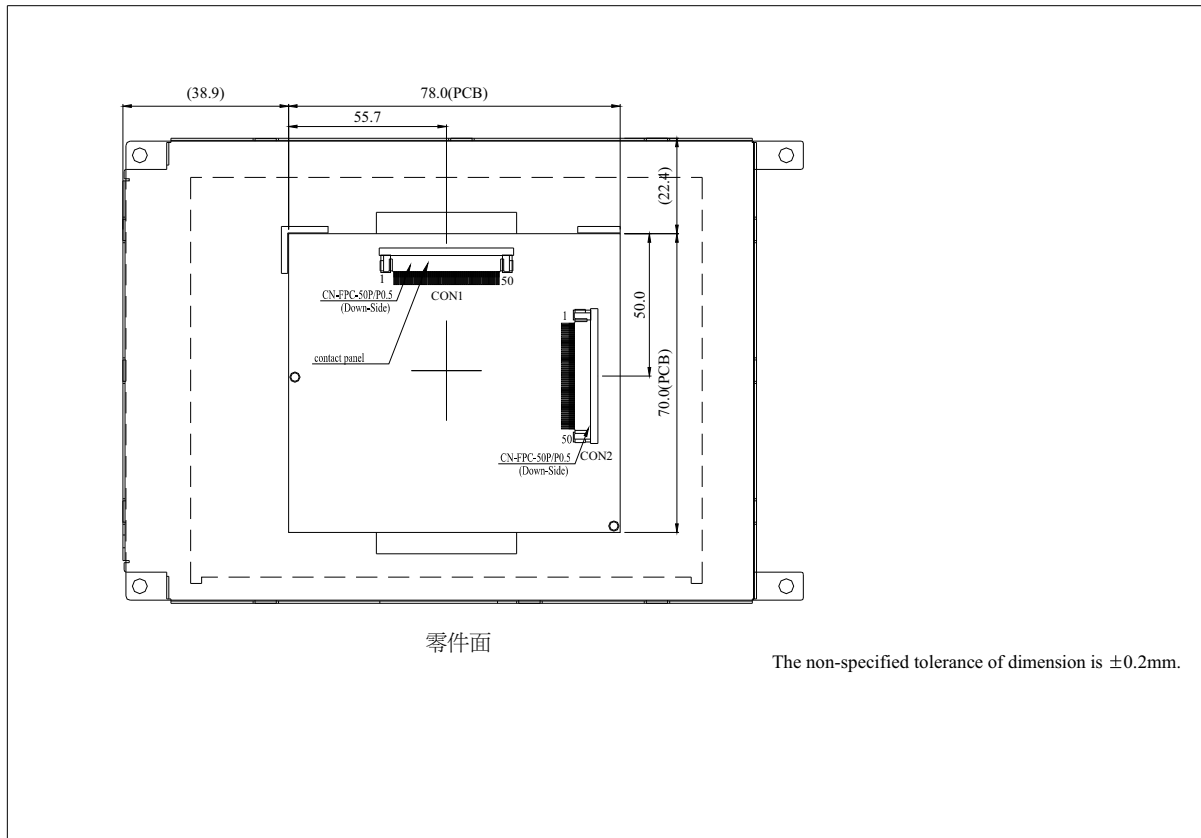
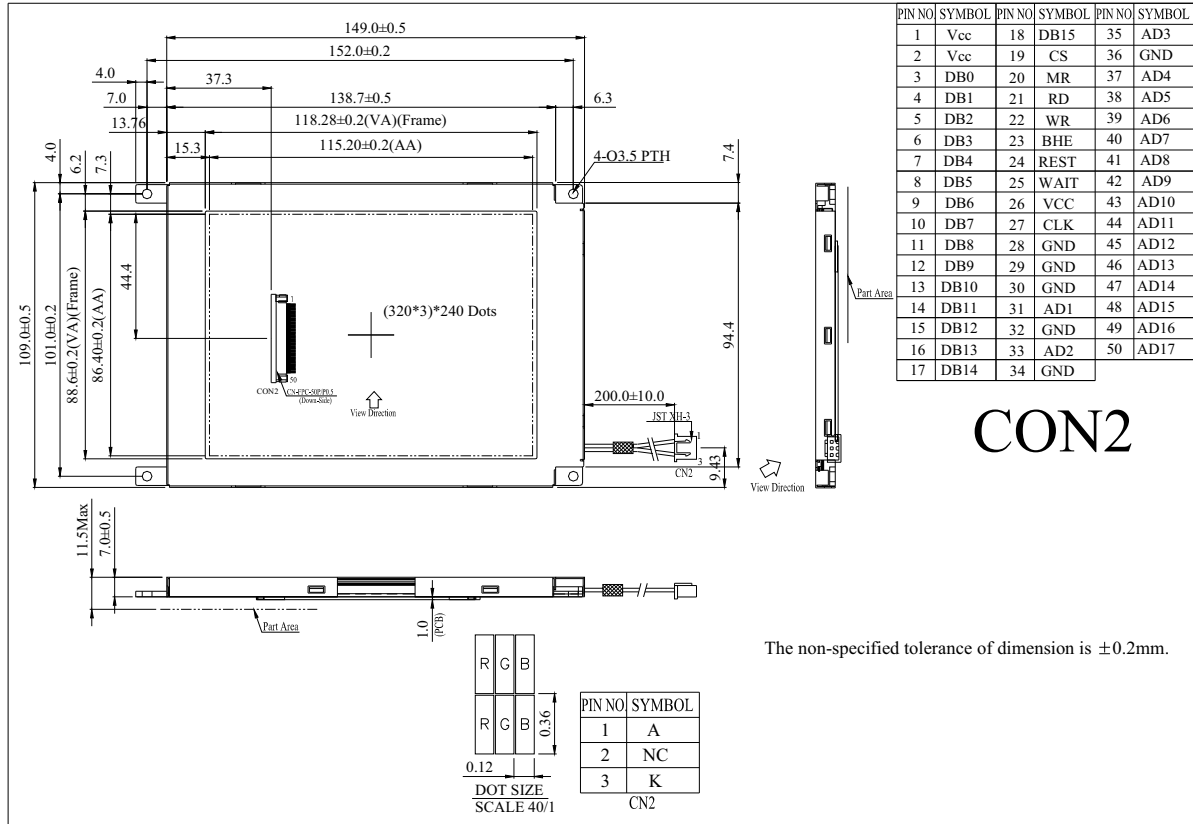


Fig. 5-4 Definition of uniformity

B_{max} : The measured maximum luminance of all measurement position.

B_{min} : The measured minimum luminance of all measurement position.

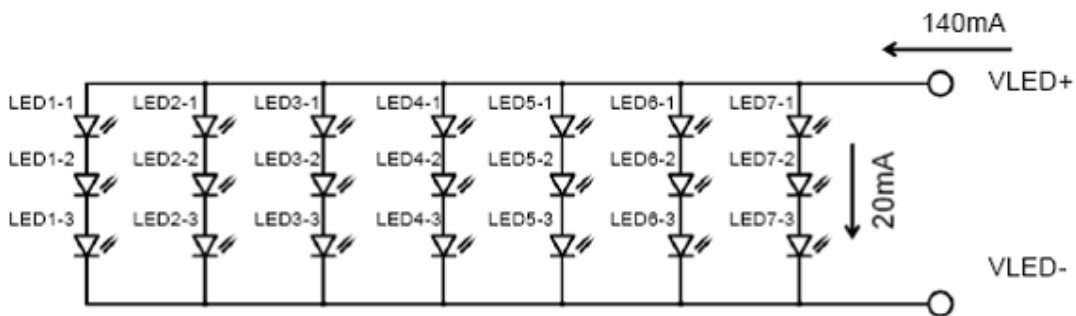
8. Contour Drawing



9. LED driving conditions

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
|--------------------|-----------|----------|-------|------|-------------------|----------|
| LED Current | I_{LED} | ---- | 140 | 210 | mA | Note1 |
| LED voltage | V_{LED} | 9.0 | ---- | 10.5 | V | |
| LED life Time | - | (10,000) | ---- | ---- | - | Note 2,3 |
| Luminous Intensity | IV | 210.2 | 262.8 | ---- | CD/M ² | Note 4 |

Note 1: There are 7 Groups LED shown as below, =9.9 V(Min)

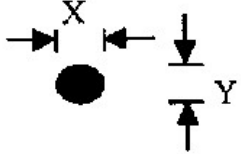
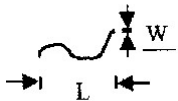


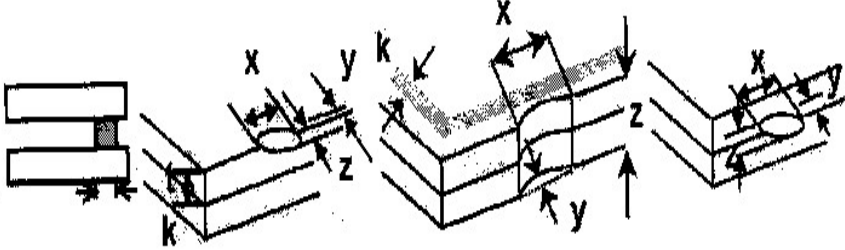
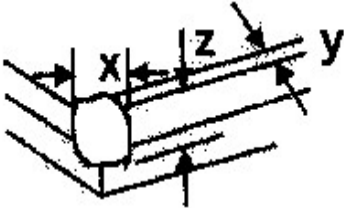
Note 2 : $T_a = 25^{\circ}\text{C}$,

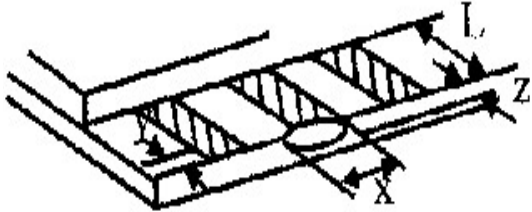
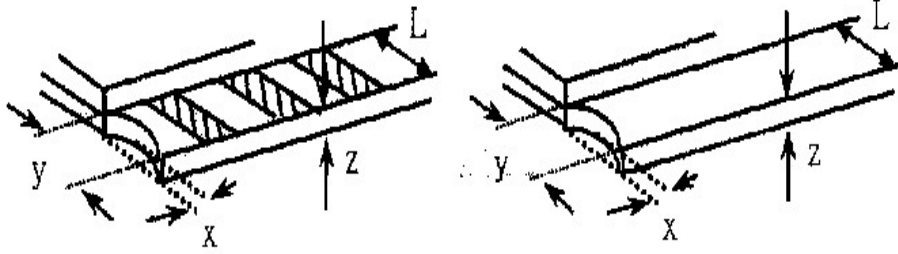
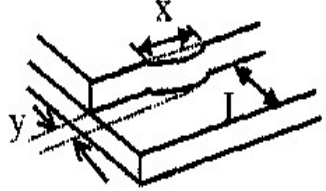
Note 3 : Brightness to be decreased to 50% of the initial value.

Note 4: The luminous is measured through LCD panel.

10. Inspection specification

| NO | Item | Criterion | AQL | | | | | | | | | | | | |
|--|---|--|-----------------|-----------------|------------------|-----------------|-------------------------|----------------------|-------------------------|--------------|----------------------|-----|------------|---------------|-----|
| 01 | Electrical Testing | 1.1 Missing vertical, horizontal segment, segment contrast defect. 1.2 Missing character , dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 LCD viewing angle defect. 1.7 Mixed product types. 1.8 Contrast defect. | 0.65 | | | | | | | | | | | | |
| 02 | Black or white spots on LCD (display only) | 2.1 White and black spots on display $\leq 0.25\text{mm}$, no more than three white or black spots present. 2.2 Densely spaced: No more than two spots or lines within 3mm | 2.5 | | | | | | | | | | | | |
| 03 | LCD black spots, white spots, contamination (non-display) | 3.1 Round type : As following drawing $\Phi = (x + y) / 2$  <table border="1" data-bbox="880 871 1328 1075"> <thead> <tr> <th>SIZE</th> <th>Acceptable Q TY</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.10$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.10 < \Phi \leq 0.20$</td> <td>2</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.25$</td> <td>1</td> </tr> <tr> <td>$0.25 < \Phi$</td> <td>0</td> </tr> </tbody> </table> | SIZE | Acceptable Q TY | $\Phi \leq 0.10$ | Accept no dense | $0.10 < \Phi \leq 0.20$ | 2 | $0.20 < \Phi \leq 0.25$ | 1 | $0.25 < \Phi$ | 0 | 2.5 | | |
| | | SIZE | Acceptable Q TY | | | | | | | | | | | | |
| $\Phi \leq 0.10$ | Accept no dense | | | | | | | | | | | | | | |
| $0.10 < \Phi \leq 0.20$ | 2 | | | | | | | | | | | | | | |
| $0.20 < \Phi \leq 0.25$ | 1 | | | | | | | | | | | | | | |
| $0.25 < \Phi$ | 0 | | | | | | | | | | | | | | |
| 3.2 Line type : (As following drawing)  <table border="1" data-bbox="727 1144 1328 1344"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Acceptable Q TY</th> </tr> </thead> <tbody> <tr> <td>---</td> <td>$W \leq 0.02$</td> <td>Accept no dense</td> </tr> <tr> <td>$L \leq 3.0$</td> <td>$0.02 < W \leq 0.03$</td> <td rowspan="2">2</td> </tr> <tr> <td>$L \leq 2.5$</td> <td>$0.03 < W \leq 0.05$</td> </tr> <tr> <td>---</td> <td>$0.05 < W$</td> <td>As round type</td> </tr> </tbody> </table> | Length | Width | Acceptable Q TY | --- | $W \leq 0.02$ | Accept no dense | $L \leq 3.0$ | $0.02 < W \leq 0.03$ | 2 | $L \leq 2.5$ | $0.03 < W \leq 0.05$ | --- | $0.05 < W$ | As round type | 2.5 |
| Length | Width | Acceptable Q TY | | | | | | | | | | | | | |
| --- | $W \leq 0.02$ | Accept no dense | | | | | | | | | | | | | |
| $L \leq 3.0$ | $0.02 < W \leq 0.03$ | 2 | | | | | | | | | | | | | |
| $L \leq 2.5$ | $0.03 < W \leq 0.05$ | | | | | | | | | | | | | | |
| --- | $0.05 < W$ | As round type | | | | | | | | | | | | | |
| 04 | Polarizer bubbles | If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction. <table border="1" data-bbox="852 1390 1328 1627"> <thead> <tr> <th>Size Φ</th> <th>Acceptable Q TY</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.20$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.50$</td> <td>3</td> </tr> <tr> <td>$0.50 < \Phi \leq 1.00$</td> <td>2</td> </tr> <tr> <td>$1.00 < \Phi$</td> <td>0</td> </tr> <tr> <td>Total Q TY</td> <td>3</td> </tr> </tbody> </table> | Size Φ | Acceptable Q TY | $\Phi \leq 0.20$ | Accept no dense | $0.20 < \Phi \leq 0.50$ | 3 | $0.50 < \Phi \leq 1.00$ | 2 | $1.00 < \Phi$ | 0 | Total Q TY | 3 | 2.5 |
| Size Φ | Acceptable Q TY | | | | | | | | | | | | | | |
| $\Phi \leq 0.20$ | Accept no dense | | | | | | | | | | | | | | |
| $0.20 < \Phi \leq 0.50$ | 3 | | | | | | | | | | | | | | |
| $0.50 < \Phi \leq 1.00$ | 2 | | | | | | | | | | | | | | |
| $1.00 < \Phi$ | 0 | | | | | | | | | | | | | | |
| Total Q TY | 3 | | | | | | | | | | | | | | |

| NO | Item | Criterion | AQL | | | | | | | | | | | | | | | | | | |
|--------------------|-----------------------|--|-------------------|---------------|----------------|---------------|-----------------------|---------------|--------------------|-----------------|---------------|-------------------|---------------|----------------|---------------|-----------------------|---------------|--------------------|-----------------|---------------|-----|
| 05 | Scratches | Follow NO.3 LCD black spots, white spots, contamination | | | | | | | | | | | | | | | | | | | |
| 06 | Chipped glass | <p>Symbols Define: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length:</p> <p>6.1 General glass chip : 6.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="483 709 1328 831"> <thead> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> </thead> <tbody> <tr> <td>$Z \leq 1/2t$</td> <td>Not over viewing area</td> <td>$x \leq 1/8a$</td> </tr> <tr> <td>$1/2t < z \leq 2t$</td> <td>Not exceed 1/3k</td> <td>$x \leq 1/8a$</td> </tr> </tbody> </table> <p>⊙If there are 2 or more chips, x is total length of each chip.</p> <p>6.1.2 Corner crack:</p>  <table border="1" data-bbox="483 1199 1328 1320"> <thead> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> </thead> <tbody> <tr> <td>$Z \leq 1/2t$</td> <td>Not over viewing area</td> <td>$x \leq 1/8a$</td> </tr> <tr> <td>$1/2t < z \leq 2t$</td> <td>Not exceed 1/3k</td> <td>$x \leq 1/8a$</td> </tr> </tbody> </table> <p>⊙If there are 2 or more chips, x is the total length of each chip.</p> | z: Chip thickness | y: Chip width | x: Chip length | $Z \leq 1/2t$ | Not over viewing area | $x \leq 1/8a$ | $1/2t < z \leq 2t$ | Not exceed 1/3k | $x \leq 1/8a$ | z: Chip thickness | y: Chip width | x: Chip length | $Z \leq 1/2t$ | Not over viewing area | $x \leq 1/8a$ | $1/2t < z \leq 2t$ | Not exceed 1/3k | $x \leq 1/8a$ | 2.5 |
| z: Chip thickness | y: Chip width | x: Chip length | | | | | | | | | | | | | | | | | | | |
| $Z \leq 1/2t$ | Not over viewing area | $x \leq 1/8a$ | | | | | | | | | | | | | | | | | | | |
| $1/2t < z \leq 2t$ | Not exceed 1/3k | $x \leq 1/8a$ | | | | | | | | | | | | | | | | | | | |
| z: Chip thickness | y: Chip width | x: Chip length | | | | | | | | | | | | | | | | | | | |
| $Z \leq 1/2t$ | Not over viewing area | $x \leq 1/8a$ | | | | | | | | | | | | | | | | | | | |
| $1/2t < z \leq 2t$ | Not exceed 1/3k | $x \leq 1/8a$ | | | | | | | | | | | | | | | | | | | |

| NO | Item | Criterion | AQL | | | | | | | | | | | | | | | | |
|-----------------------|----------------|--|---------------|----------------|-------------------|-----------------------|---------------|----------------|---------------|----------------|-------------------|------------|---------------|----------------|----------|-----------|---------------|------------|-----|
| 06 | Glass crack | <p>Symbols :</p> <p>x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length</p> <p>6.2 Protrusion over terminal :</p> <p>6.2.1 Chip on electrode pad :</p>  <table border="1" data-bbox="397 619 1247 697"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td>$y \leq 0.5\text{mm}$</td> <td>$x \leq 1/8a$</td> <td>$0 < z \leq t$</td> </tr> </table> <p>6.2.2 Non-conductive portion:</p>  <table border="1" data-bbox="462 1008 1247 1087"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td>$y \leq L$</td> <td>$x \leq 1/8a$</td> <td>$0 < z \leq t$</td> </tr> </table> <p>⊙If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications. ⊙If the product will be heat sealed by the customer, the alignment mark not be damaged.</p> <p>6.2.3 Substrate protuberance and internal crack.</p>  <table border="1" data-bbox="779 1297 1253 1381"> <tr> <td>y: width</td> <td>x: length</td> </tr> <tr> <td>$y \leq 1/3L$</td> <td>$x \leq a$</td> </tr> </table> | y: Chip width | x: Chip length | z: Chip thickness | $y \leq 0.5\text{mm}$ | $x \leq 1/8a$ | $0 < z \leq t$ | y: Chip width | x: Chip length | z: Chip thickness | $y \leq L$ | $x \leq 1/8a$ | $0 < z \leq t$ | y: width | x: length | $y \leq 1/3L$ | $x \leq a$ | 2.5 |
| y: Chip width | x: Chip length | z: Chip thickness | | | | | | | | | | | | | | | | | |
| $y \leq 0.5\text{mm}$ | $x \leq 1/8a$ | $0 < z \leq t$ | | | | | | | | | | | | | | | | | |
| y: Chip width | x: Chip length | z: Chip thickness | | | | | | | | | | | | | | | | | |
| $y \leq L$ | $x \leq 1/8a$ | $0 < z \leq t$ | | | | | | | | | | | | | | | | | |
| y: width | x: length | | | | | | | | | | | | | | | | | | |
| $y \leq 1/3L$ | $x \leq a$ | | | | | | | | | | | | | | | | | | |

| NO | Item | Criterion | AQL |
|----|--------------------|--|---|
| 07 | Cracked glass | The LCD with extensive crack is not acceptable. | 2.5 |
| 08 | Backlight elements | 8.1 Illumination source flickers when lit. 8.2 Spots or scratched that appear when lit must be judged. Using LCD spot, lines and contamination standards. 8.3 Backlight doesn't light or color wrong. | 0.65 2.5 0.65 |
| 09 | Bezel | 9.1 Bezel may not have rust, be deformed or have fingerprints, stains or other contamination. 9.2 Bezel must comply with job specifications. | 2.5 0.65 |
| 10 | PCB、COB | 10.1 COB seal may not have pinholes larger than 0.2mm or contamination. 10.2 COB seal surface may not have pinholes through to the IC. 10.3 The height of the COB should not exceed the height indicated in the assembly diagram. 10.4 There may not be more than 2mm of sealant outside the seal area on the PCB. And there should be no more than three places. 10.5 No oxidation or contamination PCB terminals. 10.6 Parts on PCB must be the same as on the production characteristic chart. There should be no wrong parts, missing parts or excess parts. 10.7 The jumper on the PCB should conform to the product characteristic chart. 10.8 If solder gets on bezel tab pads, LED pad, zebra pad or screw hold pad, make sure it is smoothed down. | 2.5 2.5 0.65 2.5 2.5 0.65 0.65 2.5 |
| 11 | Soldering | 11.1 No un-melted solder paste may be present on the PCB. 11.2 No cold solder joints, missing solder connections, oxidation or icicle. 11.3 No residue or solder balls on PCB. 11.4 No short circuits in components on PCB. | 2.5 2.5 2.5 0.65 |

| NO | Item | Criterion | AQL |
|----|--------------------|---|------|
| 12 | General appearance | 12.1 No oxidation, contamination, curves or, bends on interface Pin (OLB) of TCP. | 2.5 |
| | | 12.2 No cracks on interface pin (OLB) of TCP. | 0.65 |
| | | 12.3 No contamination, solder residue or solder balls on product. | 2.5 |
| | | 12.4 The IC on the TCP may not be damaged, circuits. | 2.5 |
| | | 12.5 The uppermost edge of the protective strip on the interface pin must be present or look as if it cause the interface pin to sever. | 2.5 |
| | | 12.6 The residual rosin or tin oil of soldering (component or chip component) is not burned into brown or black color. | 2.5 |
| | | 12.7 Sealant on top of the ITO circuit has not hardened. | 0.65 |
| | | 12.8 Pin type must match type in specification sheet. | 0.65 |
| | | 12.9 LCD pin loose or missing pins. | 0.65 |
| | | 12.10 Product packaging must the same as specified on packaging specification sheet. | 0.65 |
| | | 12.11 Product dimension and structure must conform to product specification sheet. | |

11. software (Register Initiate code)

```
{ \
  { 0x14,          0x00000000 }, /* Power Save Configuration Register */ \
  { 0x64,          0x28D70000 }, /* GPIO Status and Control Register */ \
  { 0x04,          0x00000000 }, /* Memory Clock Configuration Register */ \
  { 0x08,          0x00000032 }, /* Pixel Clock Configuration Register */ \
  { 0x0C,          0x0000006A }, /* Panel Type and MOD Rate Register */ \
  { 0x10,          0x00000010 }, /* Display Settings Register */ \
  { 0x20,          0x00000030 }, /* Horizontal Total Register */ \
  { 0x24,          0x00000027 }, /* Horizontal Display Period Register */ \
  { 0x28,          0x00000016 }, /* Horizontal Display Period Start Position Register */ \
  { 0x2C,          0x00870156 }, /* FPLINE Register */ \
  { 0x30,          0x00000104 }, /* Vertical Total Register */ \
  { 0x34,          0x000000F0 }, /* Vertical Display Period Register */ \
  { 0x38,          0x00000013 }, /* Vertical Display Period Start Position Register */ \
  { 0x3C,          0x00000000 }, /* FPFAME Register */ \
  { 0x40,          0x00000000 }, /* Main Window Display Start Address Register */ \
  { 0x44,          0x000000A0 }, /* Main Window Line Address Offset Register */ \
  { 0x50,          0x00000000 }, /* PIP+ Window Display Start Address Register */ \
  { 0x54,          0x000000A0 }, /* PIP+ Window Line Address Offset Register */ \
  { 0x58,          0x00000000 }, /* PIP+ Window X Positions Register */ \
  { 0x5C,          0x00000000 }, /* PIP+ Window Y Positions Register */ \
  { 0x60,          0x00000000 }, /* Special Purpose Register */ \
  { 0x70,          0x00000000 }, /* PWM Clock Configuration Register */ \
  { 0x74,          0x00000000 }, /* PWMOUT Duty Cycle Register */ \
  { 0x80,          0x00000000 }, /* Scratch Pad A Register */ \
  { 0x84,          0x00000000 }, /* Scratch Pad B Register */ \
  { 0x88,          0x00000000 }, /* Scratch Pad C Register */ \
  { S1D_REGDELAYON, 0x00000032 }, /* LCD Panel Power On Delay (in ms) */ \
  { 0x64,          0x28D70001 }, /* GPIO Status and Control Register */ \
  { 0x14,          0x00000000 }, /* Power Save Configuration Register */ \
}
```

Newhaven **LCM Sample Estimate Feedback Sheet**

Module Number : _____

Page: 1

1、Panel Specification :

1. Panel Type : Pass NG , _____
2. View Direction : Pass NG , _____
3. Numbers of Dots : Pass NG , _____
4. View Area : Pass NG , _____
5. Active Area : Pass NG , _____
6. Operating Temperature : Pass NG , _____
7. Storage Temperature : Pass NG , _____
8. Others : _____

2、Mechanical Specification :

1. PCB Size : Pass NG , _____
2. Frame Size : Pass NG , _____
3. Material of Frame : Pass NG , _____
4. Connector Position : Pass NG , _____
5. Fix Hole Position : Pass NG , _____
6. Backlight Position : Pass NG , _____
7. Thickness of PCB : Pass NG , _____
8. Height of Frame to PCB : Pass NG , _____
9. Height of Module : Pass NG , _____
10. Others : Pass NG , _____

3、Relative Hole Size :

1. Pitch of Connector : Pass NG , _____
2. Hole size of Connector : Pass NG , _____
3. Mounting Hole size : Pass NG , _____
4. Mounting Hole Type : Pass NG , _____
5. Others : Pass NG , _____

4、Backlight Specification :

1. B/L Type : Pass NG , _____
2. B/L Color : Pass NG , _____
3. B/L Driving Voltage (Reference for LED Type) : Pass NG , _____
4. B/L Driving Current : Pass NG , _____
5. Brightness of B/L : Pass NG , _____
6. B/L Solder Method : Pass NG , _____
7. Others : Pass NG , _____

>> **Go to page 2** <<

5、Electronic Characteristics of Module :

- | | | |
|------------------------------|-------------------------------|-------------------------------------|
| 1. Input Voltage : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 2. Supply Current : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 3. Driving Voltage for LCD : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 4. Contrast for LCD : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 5. B/L Driving Method : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 6. Negative Voltage Output : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 7. Interface Function : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 8. LCD Uniformity : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 9. ESD test : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 10. Others : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |

6、Summary :

Sales signature : _____

Customer Signature : _____

Date : _____ / _____ / _____