



# Product Specification

2.1"ROUND(320RGB\*320)TFT-LCM

Revision: A

Customer Name:

Approved by:

Prepared by:

Checked by:

Approved by:

Product Part No. : TFT-H021BN315B

Product ID:

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## 1、GENERAL INFORMATION

### 1.1 LCM Parameter

| Item                       | Contents                      | Unit     |
|----------------------------|-------------------------------|----------|
| LCD Type                   | TFT Transmissive              | /        |
| Viewing Direction          | Full viewing angle            | O' Clock |
| LCM Outline Dimension      | 58.78(H) x64.38 (V) x2.13 (T) | mm       |
| Active Area                | Φ 53.38(Diameter)             | mm       |
| Pixel Pitch (mm)           | 0.1668 (H) x0.1668(V)         | mm       |
| Number of Dots             | 320 (H)×3(RGB)×320(V)         | /        |
| Driver IC                  | HX8357-D                      | /        |
| Backlight Type             | LED                           | /        |
| Electrical Interface(Data) | MIPI                          | /        |

## 2、ABSOLUTE MAXIMUM RATINGS

### 2.1 LCD Driver IC Parameter

| Parameter             | Symbol | Min. | Max.         | unit |
|-----------------------|--------|------|--------------|------|
| Power Supply          | VCC    | -0.3 | 4.6          | V    |
| I/O Power Supply      | IOVCC  | -0.3 | 4.6          | V    |
| Operating Temperature | Top    | -20  | 70           | °C   |
| Storage Temperature   | Tst    | -30  | 80           | °C   |
| Humidity              | RH     | -    | 90%(Max60°C) | RH   |

## 3、ELECTRICAL CHARACTERISTICS

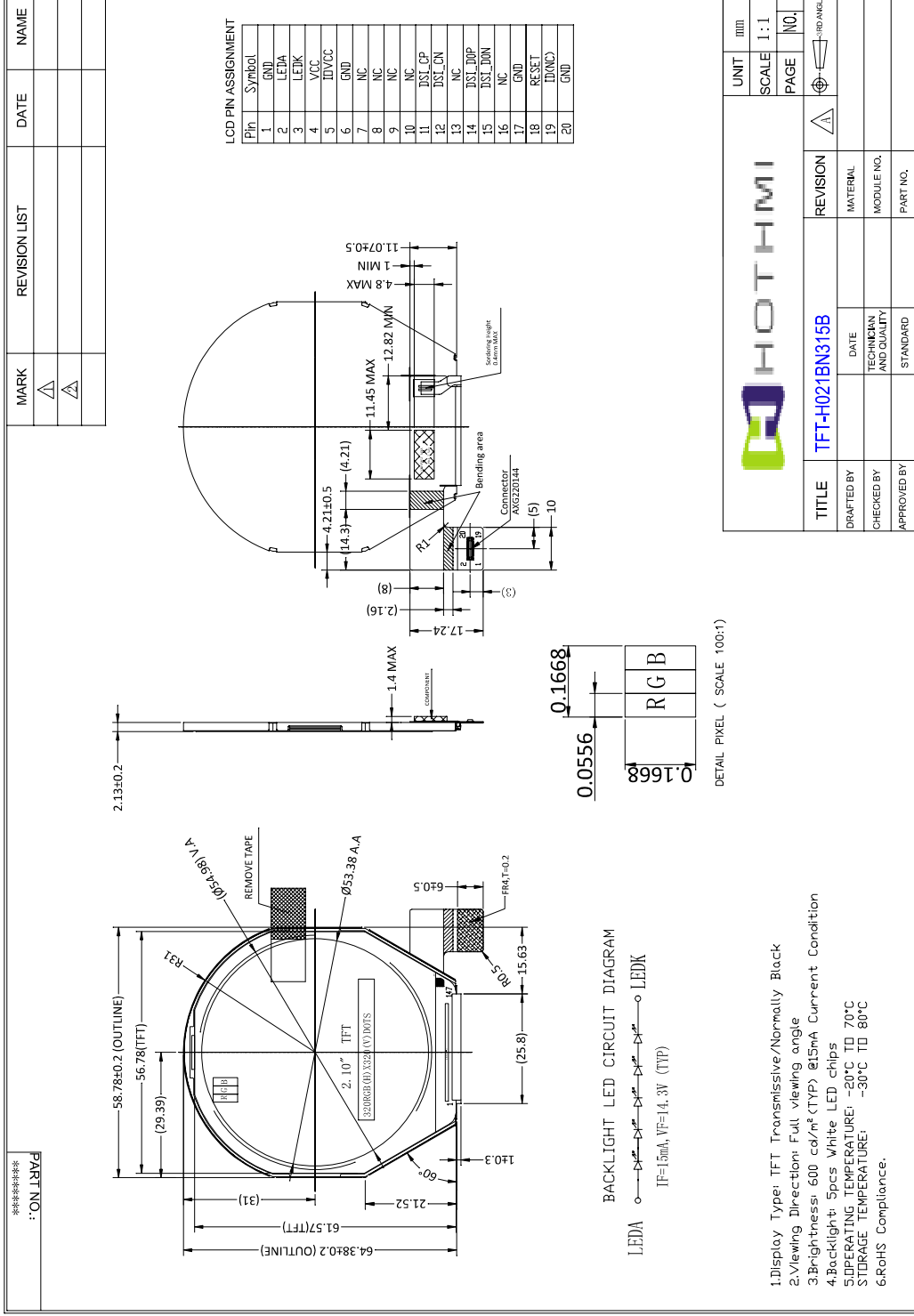
### 3.1 LCD Characteristics

| Parameter                   | Symbol          | Min.     | Typ.    | Max.     | Unit |
|-----------------------------|-----------------|----------|---------|----------|------|
| Supply Voltage for Logic    | VCC             | 2.5      | 2.8     | 3.3      | V    |
| Interface Operation Voltage | IOVCC           | 1.65     | 1.8/2.8 | 3.3      | V    |
| Input Current               | I <sub>dd</sub> | -        | 20      | 24       | mA   |
| Input Voltage ' H ' Level   | V <sub>IH</sub> | 0.7IOVCC | -       | IOVCC    | V    |
| Input Voltage ' L ' Level   | V <sub>IL</sub> | GND      | -       | 0.3IOVCC | V    |
| Output Voltage ' H ' Level  | V <sub>OH</sub> | 0.8IOVCC | -       | IOVCC    | V    |
| Output Voltage ' L ' Level  | V <sub>OL</sub> | GND      | -       | 0.2IOVCC | V    |

## 4、BACKLIGHT SYSTEM CHARACTERISTICS

| Symbol                   | Function  | Min. | TYP  | Max. | unit  |
|--------------------------|---|------|------|------|-------|
| I <sub>F</sub>           | Forward Current   | -    | 15   | -    | mA    |
| V <sub>F</sub>           | Forward Voltage   | 11   | 14.3 | 17.5 | V     |
| Quantity of LED          | -   | 5    |      |      | Piece |
| LED Circuit Construction | <p style="text-align: center;">BL LED CIRCUIT DIAGRAM</p> <p style="text-align: center;">A ○ ———▶▶▶▶▶———○ K</p> |      |      |      |       |

## 6. EXTERNAL DIMENSION



1. Display Type: TFT Transmissive/Normally Black
2. Viewing Direction: Full viewing angle
3. Brightness: 600 cd/m² (TYP) @15mA Current Condition
4. Backlight: 5pcs White LED chips
5. OPERATING TEMPERATURE: -20°C TO 70°C
6. STORAGE TEMPERATURE: -30°C TO 80°C
6. RoHS Compliance.

|                       |                         |
|-----------------------|-------------------------|
| <b>HOTTHMI</b>        |                         |
| UNIT: mm              | SCALE: 1:1              |
| PAGE: 1               | TOTAL: 1                |
| NO.                   | NO.                     |
| TITLE: TFT-H021BN315B | REVISION: A             |
| DRAFTED BY:           | DATE:                   |
| CHECKED BY:           | TECHNICIAN AND QUALITY: |
| APPROVED BY:          | STANDARD:               |
| MATERIAL:             | MODULE NO.:             |
| MODULE NO.:           | PART NO.:               |



## 7、ELECTRO-OPTICAL CHARACTERISTIC

| Item                       |            | Symbol     | Condition  | Min    | Typ    | Max    | Unit                  | Note |
|----------------------------|------------|------------|--|--------|--------|--------|-----------------------|------|
| Response Time              |            | Tr +Tf     | Viewing<br>Normal Angle<br>$\Theta X = \Theta Y = 0^\circ$ | -      | 40     | 60     | ms                    | 4    |
| Contrast Ratio             |            | Cr         |  | 300    | 900    | -      | -                     | 1    |
| Luminance Uniformity       |            | $\Delta L$ |  | 70     | -      | -      | %                     | 3    |
| Surface Luminance          |            | Lw         |  | 470    | 600    | -      | cd/<br>m <sup>2</sup> | 2    |
| Viewing Angle<br>Range     | Vertical   | $\Theta$   | CR $\geq$ 10   | 160    | -      | -      | deg                   | 6    |
|                            | Horizontal | $\Theta$   |  | 160    | -      | -      |                       |      |
| CIE (x, y)<br>Chromaticity | RED        | X          | -  | 0.5790 | 0.6290 | 0.6790 | -                     | 5    |
|                            |            | Y          |  | 0.3010 | 0.3510 | 0.4010 |                       |      |
|                            | GREEN      | X          |  | 0.2811 | 0.3311 | 0.3811 |                       |      |
|                            |            | Y          |  | 0.5639 | 0.6139 | 0.6639 |                       |      |
|                            | BLUE       | X          |  | 0.1009 | 0.1509 | 0.2009 |                       |      |
|                            |            | Y          |  | 0.0482 | 0.0982 | 0.1482 |                       |      |
|                            | WHITE      | X          |  | 0.2518 | 0.3118 | 0.3718 |                       |      |
|                            |            | Y          |  | 0.2827 | 0.3427 | 0.4027 |                       |      |
| NTSC Ratio                 |            | S          | -  | -      | 60%    | -      | -                     | -    |

Note1. Contrast Ratio (CR) is defined mathematically by the following formula. For more information see FIG 1.:

$$\text{Contrast Ratio} = \frac{\text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Average Surface Luminance with all black pixels (P1, P2, P3, P4, P5)}}$$

Note2. Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information see FIG 1.

$$L_v = \text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}$$

Note3. The uniformity in surface luminance ( $\delta_{\text{WHITE}}$ ) is determined by measuring luminance at each test position 1 through 5, and then dividing the maximum luminance of 5 points luminance by minimum luminance of 5 points luminance. For more information see FIG 1.

$$\delta_{\text{WHITE}} = \frac{\text{Minimum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Maximum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}$$

Note4. Response time is the time required for the display to transition from White to black(Rise Time, Tr) and from black to white(Decay Time, Tf). For additional information see FIG 2..

Note5. CIE (x, y) chromaticity ,The x,y value is determined by screen active area position 5. For more information see FIG 1.

Note6. Viewing angle is the angle at which the contrast ratio is greater than 2. For TFT module the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 3.



## 8、 INTERFACE PIN ASSIGNMENT

| PinNo. | Symbol  | Description   |
|--------|---------|---|
| 1      | GND     | Ground  |
| 2      | LEDA    | LED Anode   |
| 3      | LEDK    | LED Cathode   |
| 4      | VCC     | Power supply to liquid crystal power supply analog circuit. Connect to external power supply.2.8V(typ)                      |
| 5      | IOVCC   | Power supply to interface pins. Connect to external power supply (I/O POWER1.8V/2.8V(typ)).                                 |
| 6      | GND     | Ground  |
| 7      | NC      | No connect.   |
| 8      | NC      | No connect.   |
| 9      | NC      | No connect.   |
| 10     | NC      | No connect.   |
| 11     | DSI_CP  | Positive polarity of low voltage differential clock signal (+) .  |
| 12     | DSI_CN  | Negative polarity of low voltage differential clock signal (-) .  |
| 13     | NC      | No connect.   |
| 14     | DSI_DOP | Positive polarity of low voltage differential data signal (+) .   |
| 15     | DSI_DON | Negative polarity of low voltage differential data signal (-) .   |
| 16     | NC      | No connect.   |
| 17     | GND     | Ground  |
| 18     | RESET   | The external reset input. Initializes the chip with a low input. Be sure to execute a power-on reset after supplying power. |
| 19     | ID(NC)  | No connect  |
| 20     | GND     | Ground  |

**9、RELIABILITY TEST**

| Item  | Test condition   | Inspection after test   |
|---|--|---|
| High Temp.<br>Operation Test                  | +70 °C /96 hours   | 1.For humidity test, DI water should be used.<br>Inspection Standard:<br>Inspect after 1-2hrs storage at room temperature, the sample shall be free from the following defects:<br>* Air bubble in the LCD<br>* Seal Leakage<br>* Non-display<br>*Missing Segment<br>*Glass Crack<br>*IDD is greater than twice initial value.<br>*Others as per QA Inspection Criteria<br>2. No defect is allowed after testing.<br>3.ESD should be applied to LCD glass panel, not other areas (such as on IC and so on) IDD should be within twice initial value. In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part. |
| Low Temp.<br>Operation Test                   | -20 °C/96 hours  |   |
| High Temperature and High Humidity(Operation) | +50 °C, 90%RH/96 hours   |   |
| Thermal Shock Test                            | -20°C (30min) – +70°C (30min) 10cycles   |   |
| Vibration Test (for Packaging)                | Frequency: 10Hz to 55Hz to 10Hz,<br>Swing:1.5mm,time: X,Y,Z each 2H. 6 hours . |   |
| Packing Drop test (for Packaging)             | 1 drop on a corner,<br>1 drop on three arris,<br>1 drop on six sides           |   |
| ESD(On Final Product)                         | 150pF,330 Ω , ±10KV, air test ,<br>150pF, 330 Ω , ±8KV, contact test.          |   |