

# ***ILLUMINANT*** 北極光企業有限公司

## **PRODUCT SPECIFICATION FOR TFT LCM**

|                     |                        |
|---------------------|------------------------|
| <b>CUSTOMER:</b>    |                        |
| <b>MODEL NO:</b>    | <b>I2421-7IBT2432B</b> |
| <b>ACCEPTED BY:</b> |                        |

|                                                                                     |                                                                                     |                                                                                       |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>APPROVED BY:</b>                                                                 | <b>CHECKED BY:</b>                                                                  | <b>ORGANIZED BY:</b>                                                                  |
|  |  |  |

☒ **Approval for Specifications Only**

☐ **Approval for Specifications and Sample**

**Note: 1. Version of Specifications : 1**

**2. Others: Rohs Compliment**

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## 1.Mechanical Specification:

| Item                  | Standard Value               | Unit  |
|-----------------------|------------------------------|-------|
| Display size          | 2.4                          | inch  |
| Module Dimension      | 42.72(W)*60.26(H)*3.75MAX(D) | mm    |
| Active Area           | 36.72(W)*48.96(H)            | mm    |
| Number of Dots        | 240RGB*320Dots               | Dot   |
| Pixel Pitch           | 0.153(W)mm*0.153(H)mm        | mm    |
| LCD Type              | Normally White               | -     |
| Viewing Direction     | 12H                          | -     |
| Driver                | ILI9335                      | -     |
| Approx. Weight        | TBD                          | g     |
| Various Color Display | 262                          | k     |
| Brightness            | 200                          | cd/m2 |
| Backlight Type        | 4-LED Parallel               |       |
| Backlight Color       | White                        |       |



## 2.Absolute Maximum Ratings:

| Item                     | Symbol          | Min. | Typ. | Max.                 | Unit | Remark |
|--------------------------|-----------------|------|------|----------------------|------|--------|
| Supply Voltage for Logic | V <sub>DD</sub> | -0.3 |      | +4.0                 | V    |        |
| Input Voltage            | V <sub>IN</sub> | -0.5 |      | V <sub>DD</sub> +0.5 | V    |        |
| Operating Temperature    | T <sub>OP</sub> | -20  | -    | +70                  | °C   | -      |
| Storage Temperature      | T <sub>ST</sub> | -30  | -    | +80                  | °C   | -      |

\*NOTE: Based on V<sub>SS</sub>=0V.

## 3.Electrical Characteristics:

| Item                                     | Symbol           | Condition             | Min.               | Typ. | Max.               | Unit |
|------------------------------------------|------------------|-----------------------|--------------------|------|--------------------|------|
| Supply Voltage for Logic                 | V <sub>DD</sub>  | T <sub>a</sub> =25°C  | 2.2                | 2.8  | 3.3                | V    |
| High-Level Input Voltage                 | V <sub>IHC</sub> | V <sub>DD</sub> =3.0V | 0.8V <sub>DD</sub> |      | V <sub>DD</sub>    |      |
| Low-Level Input Voltage                  | V <sub>ILC</sub> | V <sub>DD</sub> =3.0V | -0.3               |      | 0.2V <sub>DD</sub> |      |
| TFT Gate ON Voltage                      | V <sub>GH</sub>  | V <sub>DD</sub> =3.0V | --                 | 15   | --                 | -    |
| TFT Gate OFF Voltage                     | V <sub>GL</sub>  | V <sub>DD</sub> =3.0V | --                 | -10  | --                 | V    |
| Power Supply Current for V <sub>DD</sub> | I <sub>DD</sub>  | V <sub>DD</sub> =3.0V | -                  | 8.5  |                    | mA   |

## 4. Optical Characteristics:

| Parameter         | Symbol     | Min. | Typ. | Max. | Unit   | Note            |
|-------------------|------------|------|------|------|--------|-----------------|
| Luminance         | I          | 180  | 200  |      | cd/m   |                 |
| Contrast Ratio    | C/R        | 200  | 250  |      |        |                 |
| Response time     | Tr+Tf      |      | 30   | 50   | ms     | Fig.3           |
| *1) Viewing angle | $\theta_l$ | -    | 40   | -    | Degree | C/R>10<br>Fig.4 |
|                   | $\theta_r$ | -    | 40   | -    |        |                 |
|                   | $\theta_u$ | -    | 40   | -    |        |                 |
|                   | $\theta_d$ | -    | 40   | -    |        |                 |

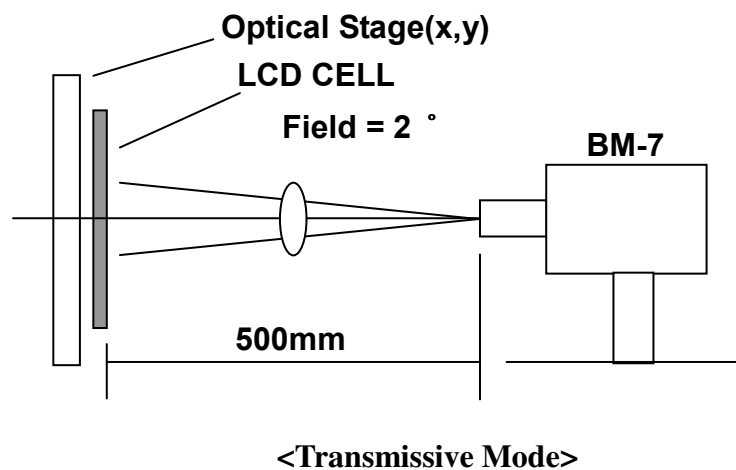
Notes :

1. Contrast Ratio(CR) is defined mathematically as :

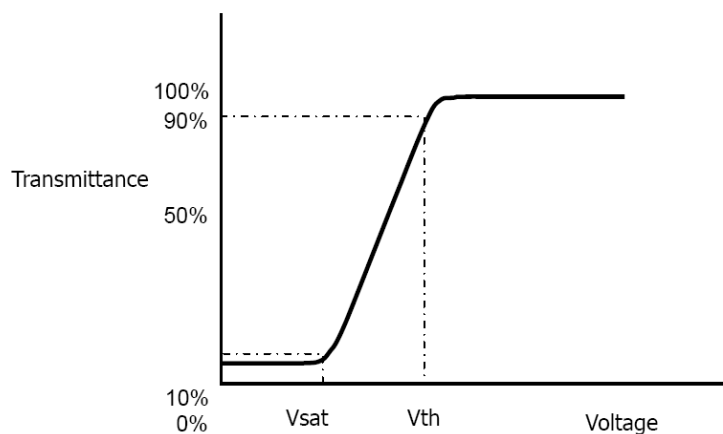
$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

2. Surface luminance is the center point across the LCD surface 500mm from the surface with all pixels displaying white. For more information see FIG 1.
3. Response time is the time required for the display to transition from to black(Rise Time, TrR) and from black to white(Decay Time, TrD). For additional information see FIG 3.
4. Viewing angle is the angle at which 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 5.
5. Optimum contrast is obtained by adjusting the LCD Threshold voltage(Vth & Vsat)

**FIG. 1 Optical Characteristic Measurement Equipment and Method**



**FIG. 2 The definition of  $V_{th}$  and  $V_{sat}$**



**FIG. 3 The definition of Response Time**

The response time is defined as the following figure and shall be measured by switching the input signal for “black” and “white”.

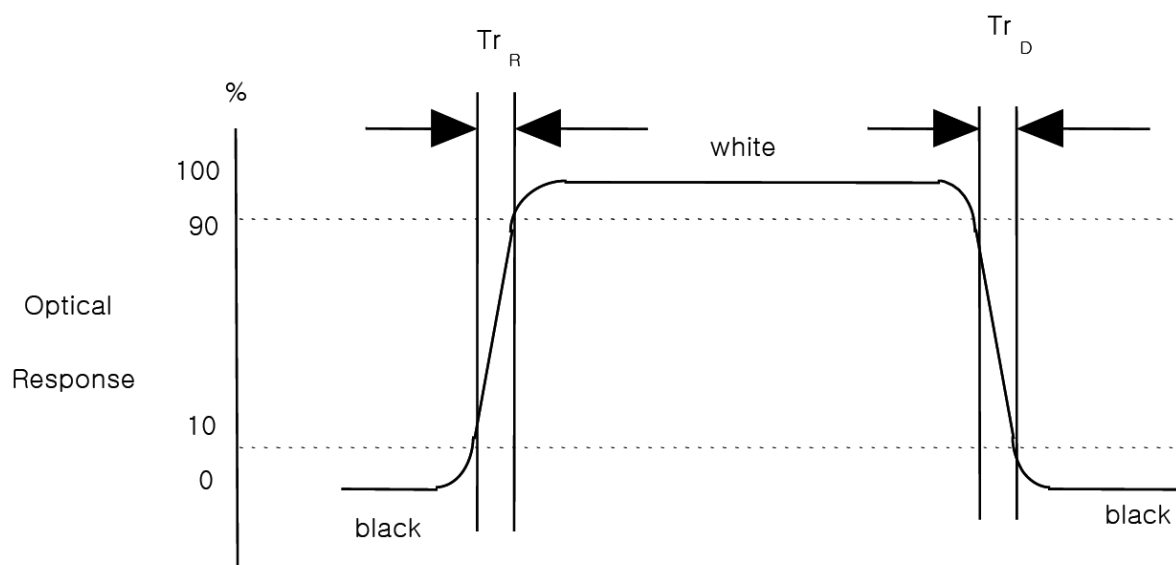
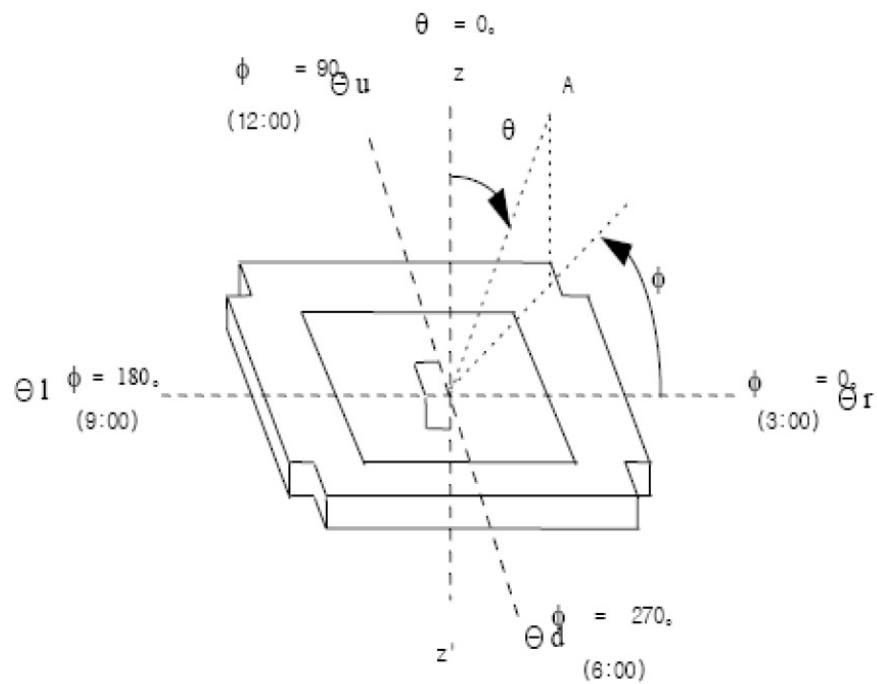


FIG. 4 The definition of viewing angle

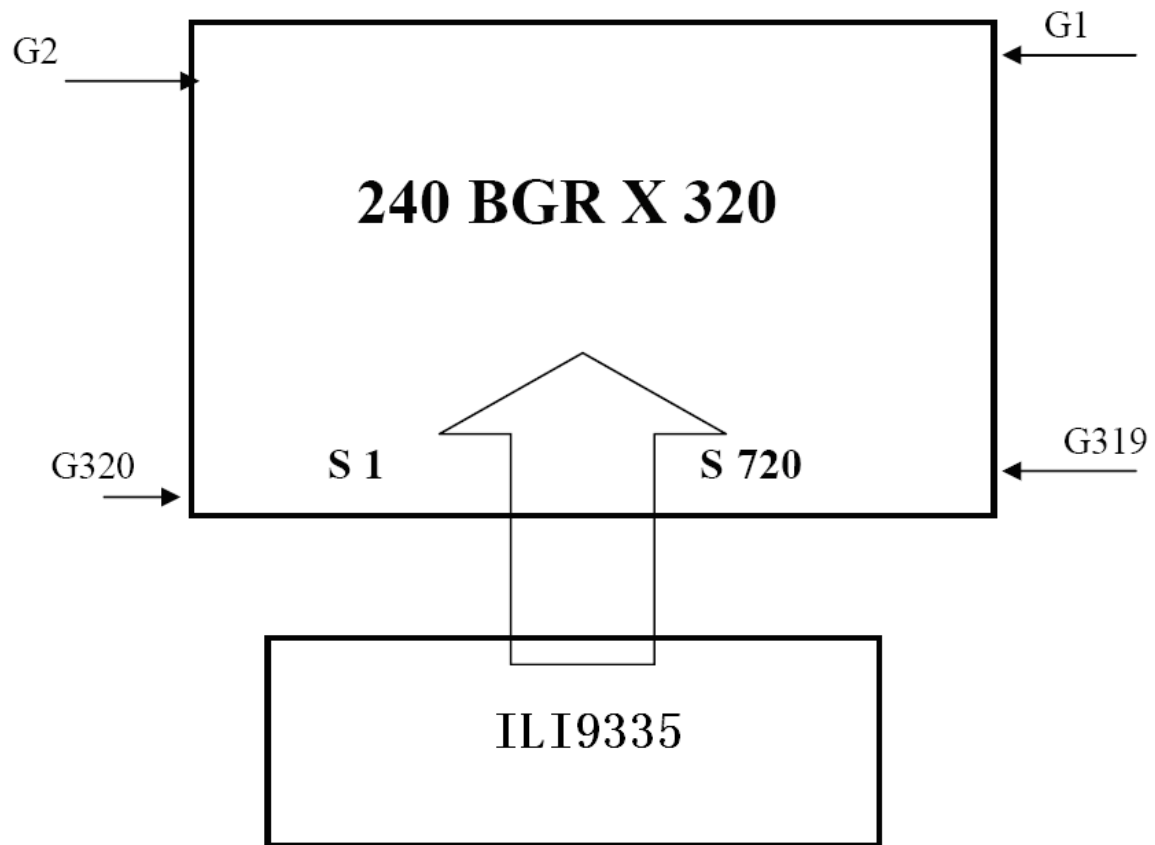
<dimension of viewing angle range>



**5. Interface:**

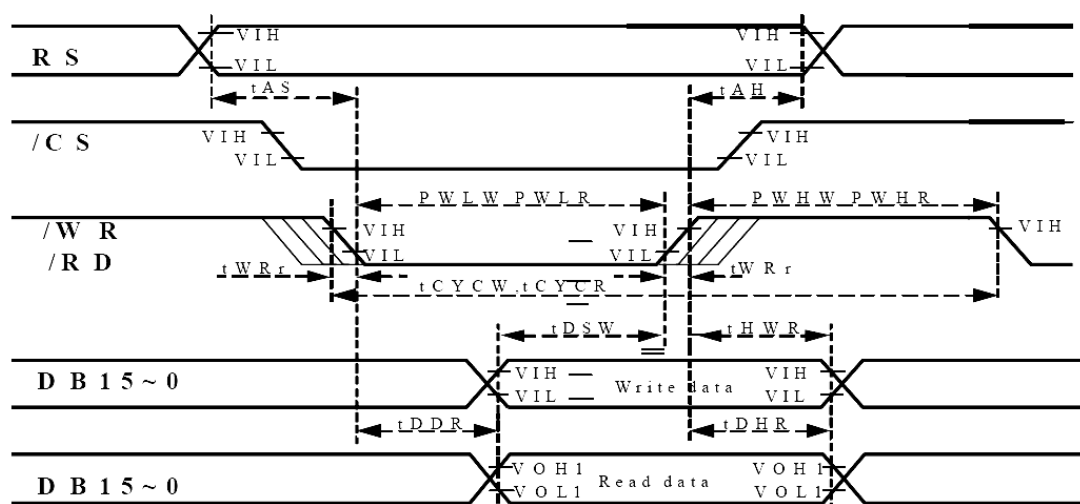
| Pin No. | Symbol | Function                          |
|---------|--------|-----------------------------------|
| 1       | DB0    | DATA BUS                          |
| 2       | DB1    | DATA BUS                          |
| 3       | DB2    | DATA BUS                          |
| 4       | DB3    | DATA BUS                          |
| 5       | GND1   | GROUND                            |
| 6       | VCC1   | POWER SUPPLY                      |
| 7       | /CS    | CHIP SELECTION                    |
| 8       | RS     | COMMAND / DISPLAY DATA SELECT PIN |
| 9       | /WR    | WRITE ENABLE CLOCK INPUT PIN      |
| 10      | /RD    | READ ENABLE CLOCK INPUT PIN       |
| 11      | IM0    | 8/16 BIT SELECT PIN               |
| 12      | X+     | TOUCH PANEL INPUT PIN             |
| 13      | Y+     | TOUCH PANEL INPUT PIN             |
| 14      | X-     | TOUCH PANEL INPUT PIN             |
| 15      | Y-     | TOUCH PANEL INPUT PIN             |
| 16      | LEDA   | LED POWER SUPPLY (+)              |
| 17      | LEDK1  | LED POWER SUPPLY(-)               |
| 18      | LEDK2  | LED POWER SUPPLY(-)               |
| 19      | LEDK3  | LED POWER SUPPLY(-)               |
| 20      | LEDK4  | LED POWER SUPPLY(-)               |
| 21      | NC     | NC                                |
| 22      | DB4    | DATA BUS                          |
| 23      | DB8    | DATA BUS                          |
| 24      | DB9    | DATA BUS                          |
| 25      | DB10   | DATA BUS                          |
| 26      | DB11   | DATA BUS                          |
| 27      | DB12   | DATA BUS                          |
| 28      | DB13   | DATA BUS                          |
| 29      | DB14   | DATA BUS                          |
| 30      | DB15   | DATA BUS                          |
| 31      | /RESET | RESET PIN                         |
| 32      | VCI    | POWER SUPPLY                      |
| 33      | VCC2   | POWER SUPPLY                      |
| 34      | GND    | GROUND                            |
| 35      | DB5    | DATA BUS                          |
| 36      | DB6    | DATA BUS                          |
| 37      | DB7    | DATA BUS                          |

## **6.Block Diagram:**



## 7. Timing Control:

| Item                         | Symbol        | Values     |     |      | Unit | Remark |
|------------------------------|---------------|------------|-----|------|------|--------|
|                              |               | Min        | Typ | Max. |      |        |
| Bus cycle time               | Write         | $t_{CYCW}$ | 100 | -    | ns   |        |
|                              | Read          | $t_{CYCR}$ | 300 | -    | ns   |        |
| Write low-level pulse width  | $PWLW$        | 50         | -   | 500  | ns   |        |
| Read low-level pulse width   | $PWLR$        | 150        | -   | -    | ns   |        |
| Write high-level pulse width | $PWHW$        | 50         | -   | -    | ns   |        |
| Read high-level pulse width  | $PWHR$        | 150        | -   | -    | ns   |        |
| Write/Read rise/fall time    | $t_{WRr,WRf}$ | -          | -   | 25   | ns   |        |
| RS,CS and WR Setup time      | $t_{AS}$      | 5          | -   | -    | ns   |        |
| Address hold time            | $t_{AH}$      | 5          | -   | -    | ns   |        |
| Write data setup time        | $t_{DSW}$     | 10         | -   | -    | ns   |        |
| Write data hold time         | $t_{HWR}$     | 15         | -   | -    | ns   |        |
| Read data delay time         | $t_{DDR}$     | -          | -   | 100  | ns   |        |
| Read data hold time          | $t_{DHR}$     | 5          | -   | -    | ns   |        |



## **8.Backlight:**

### **8.1 Standard Lamp Styles (Edge Lighting Type):**

The LED chips are distributed over the edge light area of the illumination unit, which gives the less power consumption:

### **8.2 The Main Advantages of the LED Backlight are as Following:**

The brightness of the backlight can simply be adjusted.

By a resistor or a potentiometer.

### **8.3 Data About LED Backlight:**

| Item            | Symbol | Conditions                | Min. | Typ. | Max. | Unit |
|-----------------|--------|---------------------------|------|------|------|------|
| Forward Voltage | Vf     | If =72                    | -    | 3.2  | 3.5  | V    |
| Forward Current | If     |                           | -    | 72   |      | mA   |
| Uniformity      | -      | If=72                     | 80%  | -    | -    | -    |
| Luminous Color  | -      | White                     |      |      |      |      |
| Chip Connection | -      | 4-LED parallel connection |      |      |      |      |

NOTE:

- 1.Backlight Only
- 2.Average Luminous Intensity of P1-P9
- 3.Uniformity =  $\text{Min(P1~P9)}/\text{Max(P1~P9)} * 100\% > 80\%$

### **8.4 Measured Method:**

|      |      |      |
|------|------|------|
| P1 ○ | P2 ○ | P3 ○ |
| P4 ○ | P5 ○ | P6 ○ |
| P7 ○ | P8 ○ | P9 ○ |

(Effective spatial Distribution)

Hole Diameter $\pm 1\phi$  ; 1 to 9per Position Measured Luminous