# LCD / LCM SPECIFICATION




## WINSTAR Display Co.,Ltd.
## 華凌光電股份有限公司

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Winstar Display Co., LTD
華凌光電股份有限公司

# SPECIFICATION

**CUSTOMER :** _____

**MODULE NO.: WH1604A-TFH-JT#**

| APPROVED BY: ( FOR CUSTOMER USE ONLY ) | PCB VERSION: DATA: |
|---|---|

| SALES BY | APPROVED BY | CHECKED BY | PREPARED BY |
|---|---|---|---|
| | | | |

| VERSION | DATE | REVISED PAGE NO. | SUMMARY |
|---|---|---|---|
| L | 2023/02/14 | | Modify B/L information |

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# General Specification

| Item | Dimension | Unit |
|---|---|---|
| Number of Characters | 16 characters x 4Lines | — |
| Module dimension | 87.0 x 60.0 x 13.6 (MAX) | mm |
| View area | 62.0 x 26.0 | mm |
| Active area | 56.2 x 20.8 | mm |
| Dot size | 0.55 x 0.55 | mm |
| Dot pitch | 0.60 x 0.60 | mm |
| Character size | 2.95 x 4.75 | mm |
| Character pitch | 3.55 x 5.35 | mm |
| LCD type | FSTN Positive Transflective<br>(In LCD production, It will occur slightly color difference. We can only guarantee the same color in the same batch.) | |
| Duty | 1/16 | |
| View direction | 6 o'clock | |
| Backlight Type | LED, White | |
| IC | ST7066U | |
| Interface | 68 series | |

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# Absolute Maximum Ratings

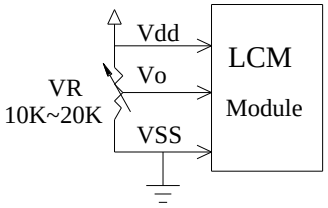
| Item | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Temperature | $T_{OP}$ | -20 | — | +70 | ℃ |
| Storage Temperature | $T_{ST}$ | -30 | — | +80 | ℃ |
| Input Voltage | $V_I$ | $V_{SS}$ | — | $V_{DD}$ | V |
| Supply Voltage For Logic | $V_{DD}$-$V_{SS}$ | -0.3 | — | 7 | V |
| Supply Voltage For LCD | $V_{DD}$-$V_o$ | -0.3 | — | 13 | V |

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# Electrical Characteristics

| Item | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Supply Voltage For Logic | $V_{DD}$-$V_{SS}$ | — | 4.5 | 5.0 | 5.5 | V |
| Supply Voltage For LCD *Note | $V_{DD}$-$V_0$ | Ta=-20℃ | — | — | 5.7 | V |
| | | Ta=25℃ | 4.2 | 4.35 | 4.5 | V |
| | | Ta=70℃ | 3.7 | — | — | V |
| Input High Volt. | $V_{IH}$ | — | 0.7 $V_{DD}$ | — | $V_{DD}$ | V |
| Input Low Volt. | $V_{IL}$ | — | $V_{SS}$ | — | 0.6 | V |
| Output High Volt. | $V_{OH}$ | — | 3.9 | — | $V_{DD}$ | V |
| Output Low Volt. | $V_{OL}$ | — | 0 | — | 0.4 | V |
| Supply Current | $I_{DD}$ | $V_{DD}$=5.0V | 1.0 | 1.2 | 1.5 | mA |

* Note: Please design the VOP adjustment circuit on customer's main board

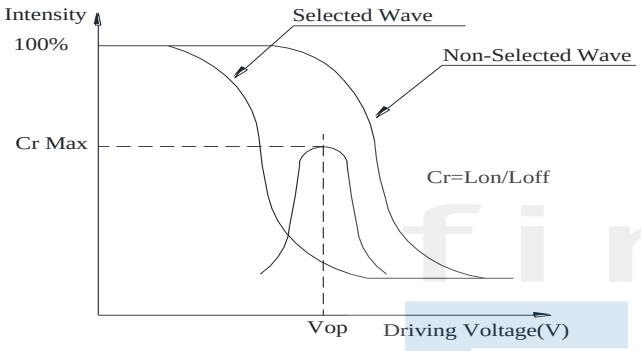


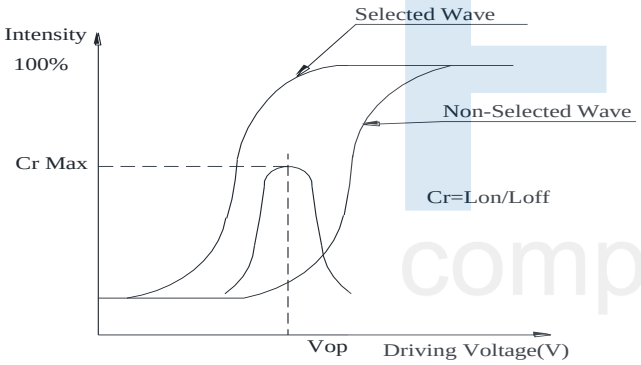

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# Optical Characteristics

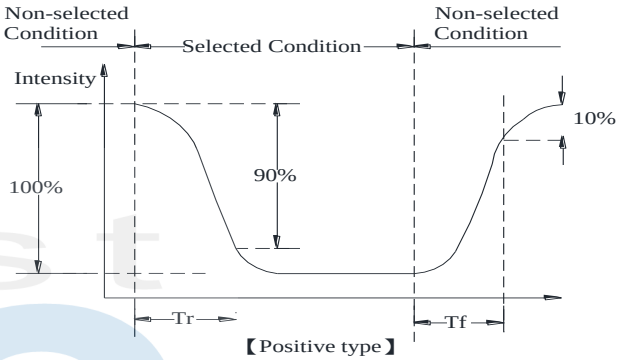
| Item | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| View Angle | θ | CR≧2 | 0 | — | 30 | ψ = 180° |
| | θ | CR≧2 | 0 | — | 60 | ψ = 0° |
| | θ | CR≧2 | 0 | — | 45 | ψ = 90° |
| | θ | CR≧2 | 0 | — | 45 | ψ = 270° |
| Contrast Ratio | CR | — | — | 5 | — | — |
| Response Time | T rise | — | — | 150 | 200 | ms |
| | T fall | — | — | 150 | 200 | ms |

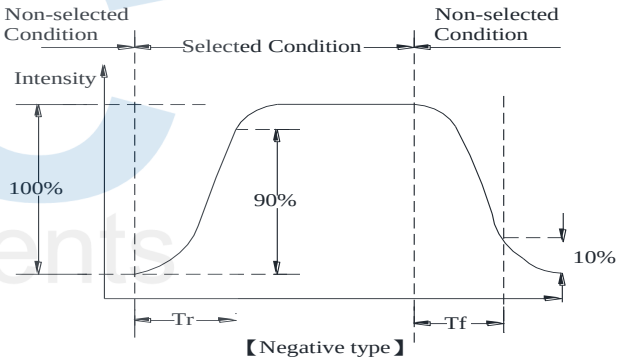
**Definition of Operation Voltage (Vop)**




**Definition of Response Time ( Tr , Tf )**



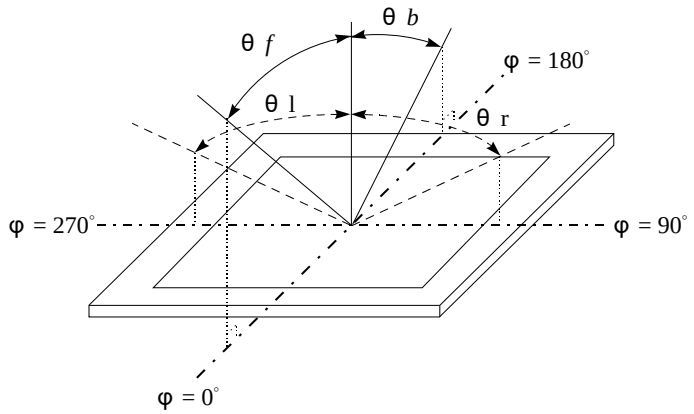




**Conditions :**

Operating Voltage : Vop　　Viewing Angle(θ ，φ ) : 0°， 0°

Frame Frequency : 64 HZ　　Driving Waveform : 1/N duty , 1/a bias

**Definition of viewing angle(CR≧2)**



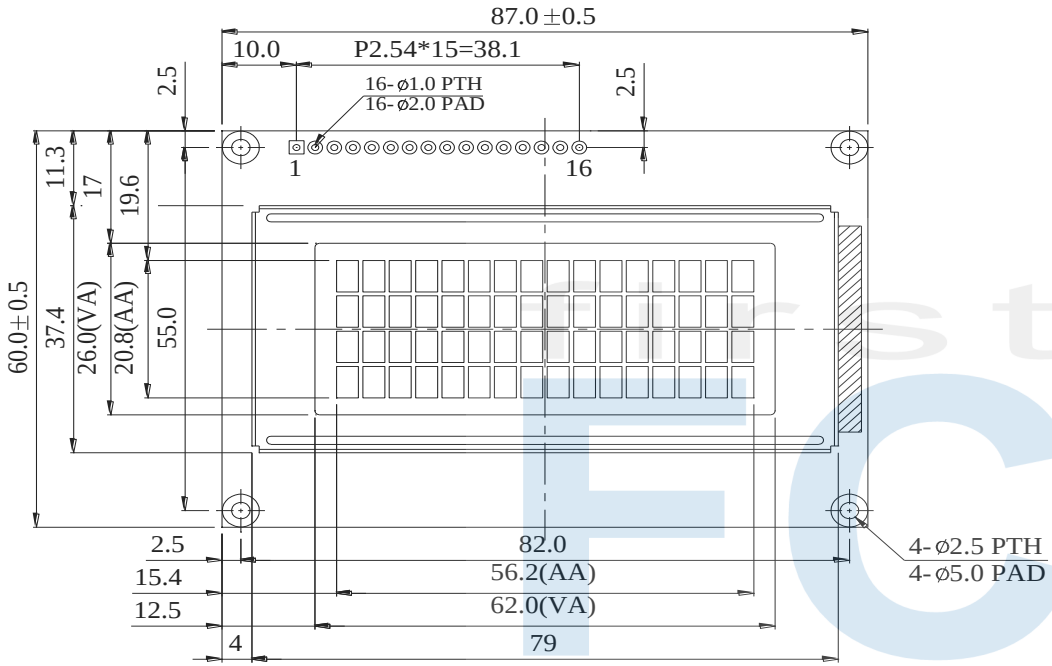

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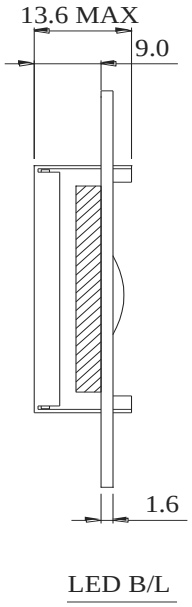
# Interface Pin Function

| Pin No. | Symbol | Level | Description |
|---|---|---|---|
| 1 | $V_{SS}$ | 0V | Ground |
| 2 | $V_{DD}$ | 5.0V | Supply Voltage for logic |
| 3 | VO | (Variable) | Operating voltage for LCD |
| 4 | RS | H/L | H: DATA, L: Instruction code |
| 5 | R/W | H/L | H: Read L: Write |
| 6 | E | H,H→L | Chip enable signal |
| 7 | DB0 | H/L | Data bus line |
| 8 | DB1 | H/L | Data bus line |
| 9 | DB2 | H/L | Data bus line |
| 10 | DB3 | H/L | Data bus line |
| 11 | DB4 | H/L | Data bus line |
| 12 | DB5 | H/L | Data bus line |
| 13 | DB6 | H/L | Data bus line |
| 14 | DB7 | H/L | Data bus line |
| 15 | A | — | Power supply for B/L + |
| 16 | K | — | Power supply for B/L - |

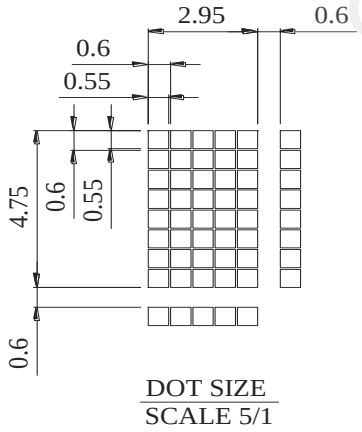
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# Contour Drawing &Block Diagram




| PIN NO. | SYMBOL |
|---|---|
| 1 | Vss |
| 2 | Vdd |
| 3 | Vo |
| 4 | RS |
| 5 | R/$\overline{W}$ |
| 6 | E |
| 7 | DB0 |
| 8 | DB1 |
| 9 | DB2 |
| 10 | DB3 |
| 11 | DB4 |
| 12 | DB5 |
| 13 | DB6 |
| 14 | DB7 |
| 15 | A |
| 16 | K |




The non-specified tolerance of dimension is ±0.3mm.

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