# LCD / LCM SPECIFICATION




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

Represented by:

first FC components
**FIRST Components s.r.l.**
www.first-components.com
technical@first-components.com
+39 0332 1888005

Winstar Display Co., LTD
華凌光電股份有限公司

# SPECIFICATION

**CUSTOMER :** _____

**MODULE NO.: WG240128E-TFH-VZ#**

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

| SALES BY | APPROVED BY | CHECKED BY | PREPARED BY |
|---|---|---|---|
| first FC components | | | |

| VERSION | DATE | REVISED PAGE NO. | SUMMARY |
|---|---|---|---|
| L | 2021/05/12 | | Add Interface<br>IC change to RA6963-N1 version |

# General Specification

| Item | Dimension | Unit |
|---|---|---|
| Number of dots | 240 x 128 | — |
| Module dimension | 144.0 x 104.0 x 14.3(MAX) | mm |
| View area | 114.0 x 64.0 | mm |
| Active area | 107.98 x 57.58 | mm |
| Dot size | 0.43 x 0.43 | mm |
| Dot pitch | 0.45 x 0.45 | 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 | 1/128 | |
| View direction | 6 o'clock | |
| Backlight Type | LED, White | |
| IC | RA6963 | |
| Interface | 80 series | |

first components

# Absolute Maximum Ratings

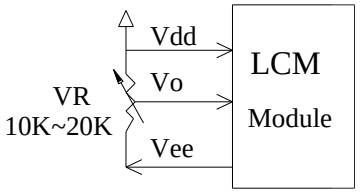
| Item | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Temperature | $T_{OP}$ | -20 | — | +70 | ℃ |
| Storage Temperature | $T_{ST}$ | -30 | — | +80 | ℃ |
| Input Voltage | $V_{IN}$ | -0.3 | — | $V_{DD}$+0.3 | V |
| Supply Voltage For Logic | $V_{DD}$-$V_{SS}$ | -0.3 | — | +7.0 | V |

first FC components

# 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℃ | — | — | 21.7 | V |
| | | Ta=25℃ | 18.9 | 19.5 | 20.1 | V |
| | | Ta=70℃ | 17.6 | — | — | V |
| Input High Volt. | $V_{IH}$ | — | 0.8$V_{DD}$ | — | $V_{DD}$ | V |
| Input Low Volt. | $V_{IL}$ | — | 0 | — | 0.15 $V_{DD}$ | V |
| Output High Volt. | $V_{OH}$ | — | $V_{DD}$-0.3 | — | $V_{DD}$ | V |
| Output Low Volt. | $V_{OL}$ | — | 0 | — | 0.3 | V |
| Supply Current | $I_{DD}$ | — | 45 | 55 | 60 | mA |

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

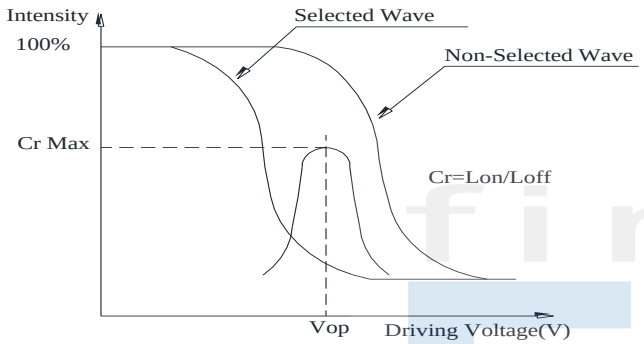


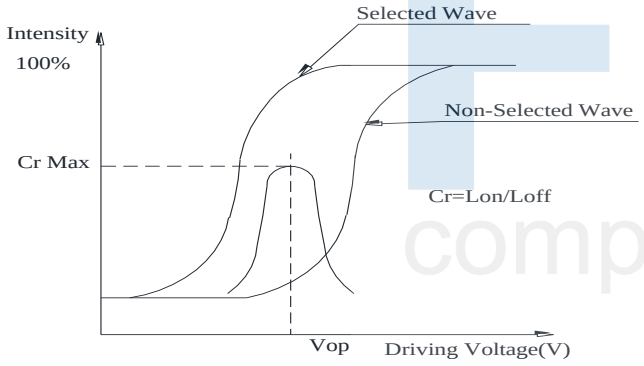

first components

# Optical Characteristics

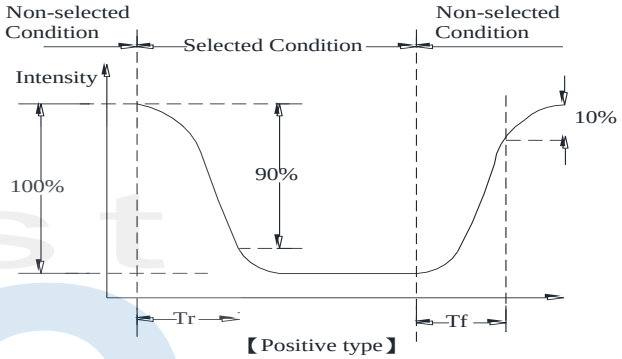
| Item | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| View Angle | $\theta$ | CR≧2 | 0 | — | 30 | $\phi$ = 180° |
| | $\theta$ | CR≧2 | 0 | — | 60 | $\phi$ = 0° |
| | $\theta$ | CR≧2 | 0 | — | 45 | $\phi$ = 90° |
| | $\theta$ | CR≧2 | 0 | — | 45 | $\phi$ = 270° |
| Contrast Ratio | CR | — | — | 5 | — | — |
| Response Time | T rise | — | — | 200 | 300 | ms |
| | T fall | — | — | 250 | 350 | ms |

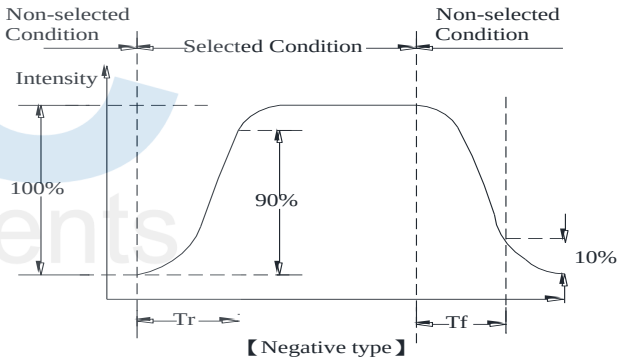
**Definition of Operation Voltage (Vop)**




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



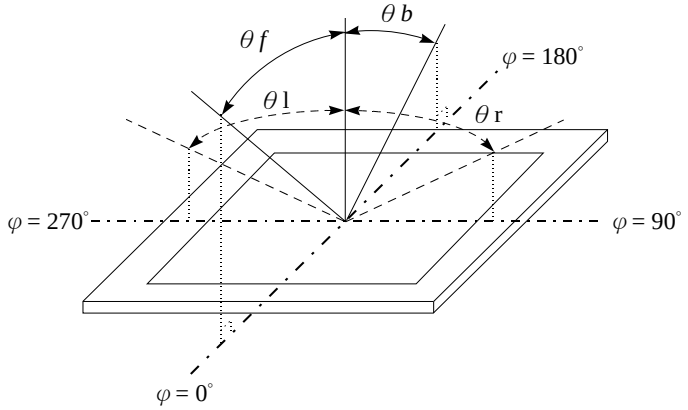




**Conditions :**

Operating Voltage : Vop　　Viewing Angle( $\theta$ ， $\varphi$ ) : 0°， 0°

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

**Definition of viewing angle(CR≧2)**



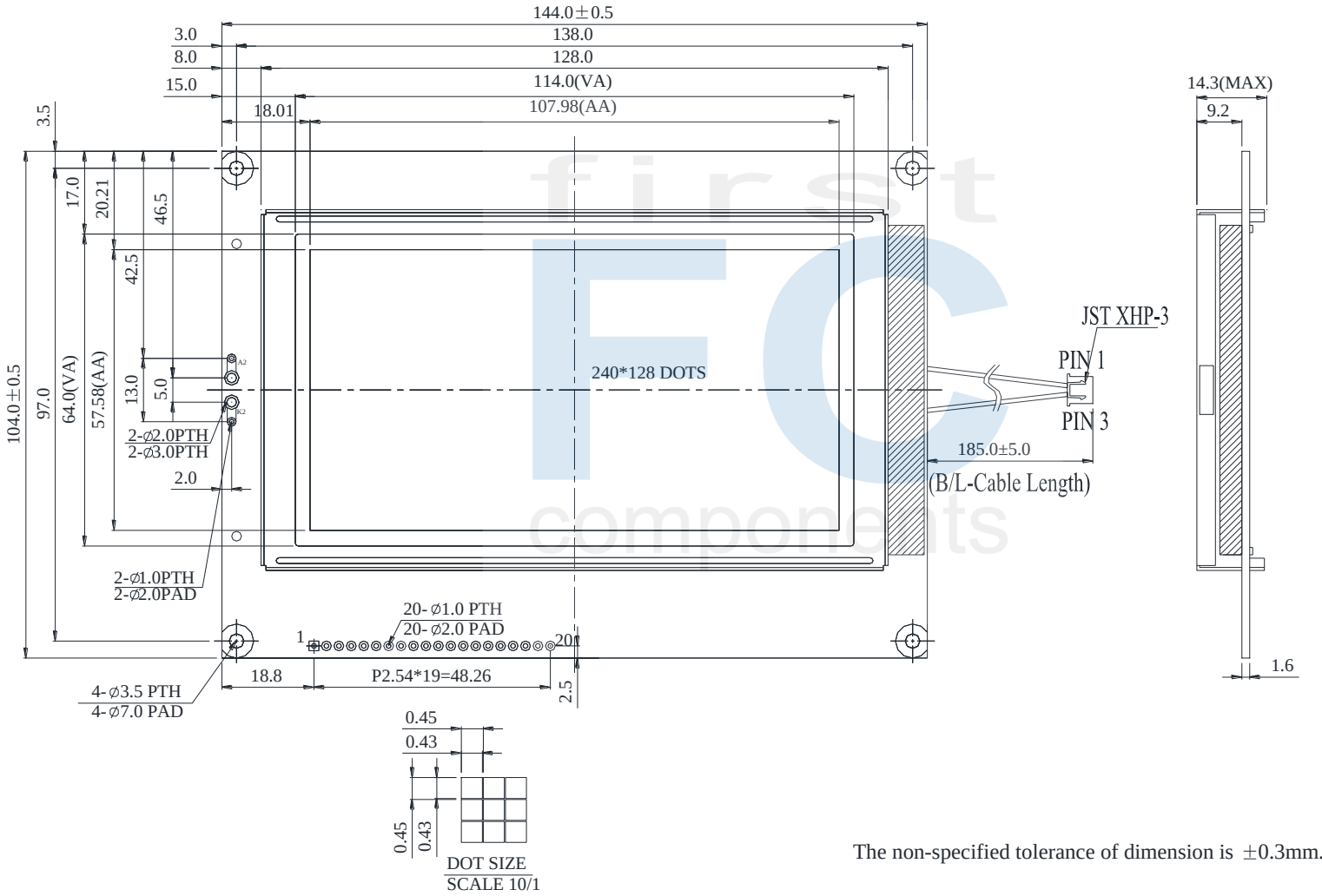

first components

# Interface Pin Function

| Pin No. | Symbol | Level | Description |
|---|---|---|---|
| 1 | Vee | — | Negative Voltage Output |
| 2 | Vss | — | GND |
| 3 | Vdd | — | Power supply |
| 4 | Vo | — | Power supply for LCD driver |
| 5 | /WR | L | Data write. Write data into RA6963when WR = L |
| 6 | /RD | L | Data read. Read data from RA6963when RD = L |
| 7 | /CE | L | L : Chip enable |
| 8 | C/D | H / L | WR=L , C/D=H : Command Write C/D=L: Data write<br>RD=L , C/D=H : Status Read C/D=L: Data read |
| 9 | RST | — | Display Data signal |
| 10 | DB0 | H / L | Data bus line |
| 11 | DB1 | H / L | Data bus line |
| 12 | DB2 | H / L | Data bus line |
| 13 | DB3 | H / L | Data bus line |
| 14 | DB4 | H / L | Data bus line |
| 15 | DB5 | H / L | Data bus line |
| 16 | DB6 | H / L | Data bus line |
| 17 | DB7 | H / L | Data bus line |
| 18 | FS | — | Pins for selection of font; H : 6 * 8 , L : 8 * 8 |
| 19 | NC | — | No connection |
| 20 | NC | — | No connection |

first components

# Contour Drawing &Block Diagram




| PIN NO. | SYMBOL |
|---|---|
| 1 | Vee |
| 2 | VSS |
| 3 | VDD |
| 4 | VO |
| 5 | $\overline{WR}$ |
| 6 | $\overline{RD}$ |
| 7 | $\overline{CE}$ |
| 8 | C/$\overline{D}$ |
| 9 | $\overline{RST}$ |
| 10 | DB0 |
| 11 | DB1 |
| 12 | DB2 |
| 13 | DB3 |
| 14 | DB4 |
| 15 | DB5 |
| 16 | DB6 |
| 17 | DB7 |
| 18 | FS |
| 19 | NC |
| 20 | NC |

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