


| | | | |
|----------------------|------------|------------------|------------|
| MDT0128AIS-SPI | 240 x 240 | SPI Interface | TFT Module |
| Specification | | | |
| Version: 1 | | Date: 13/04/2022 | |
| Revision | | | |
| 1 | 11/04/2022 | First issue | |

| Display Features | |  | |
|-----------------------|------------------------|---|------------------|
| Display Size | 1.28" | | |
| Resolution | 240 x 240 | | |
| Orientation | Round | | |
| Appearance | RGB | | |
| Logic Voltage | 2.8V | | |
| Interface | SPI | | |
| Brightness | 400 cd/m ² | | |
| Touchscreen | --- | | |
| Module Size | 35.60 x 37.74 x 1.56mm | | |
| Operating Temperature | -20°C ~ +70°C | | |
| Pinout | 18 way FFC | | Box Quantity |
| Pitch | 0.5mm | | Weight / Display |

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* - For full design functionality, please use this specification in conjunction with the GC9A01 specification.(Provided Separately)

| Display Accessories | |
|---------------------|-------------|
| Part Number | Description |
| | |
| | |
| | |

| Optional Variants | |
|-------------------|---------|
| Appearances | Voltage |
| | |
| | |
| | |



General Specifications

- Size: 1.28 inch
- Dot Matrix: 240 x RGB x 240 (TFT) dots
- Module dimension: 35.60 x 37.74 x 1.56 mm
- Active area: 32.40 x 32.40 mm
- Dot pitch: 0.043 X 0.135 mm
- LCD type: TFT, Normally Black, Transmissive
- Viewing Angle: 80/80/80/80
- TFT Interface: SPI
- Backlight Type: LED ,Normally White
- Driver IC: GC9A01
- With /Without TP: Without TP
- Surface: Anti-Glare

*Color tone slight changed by temperature and driving voltage.



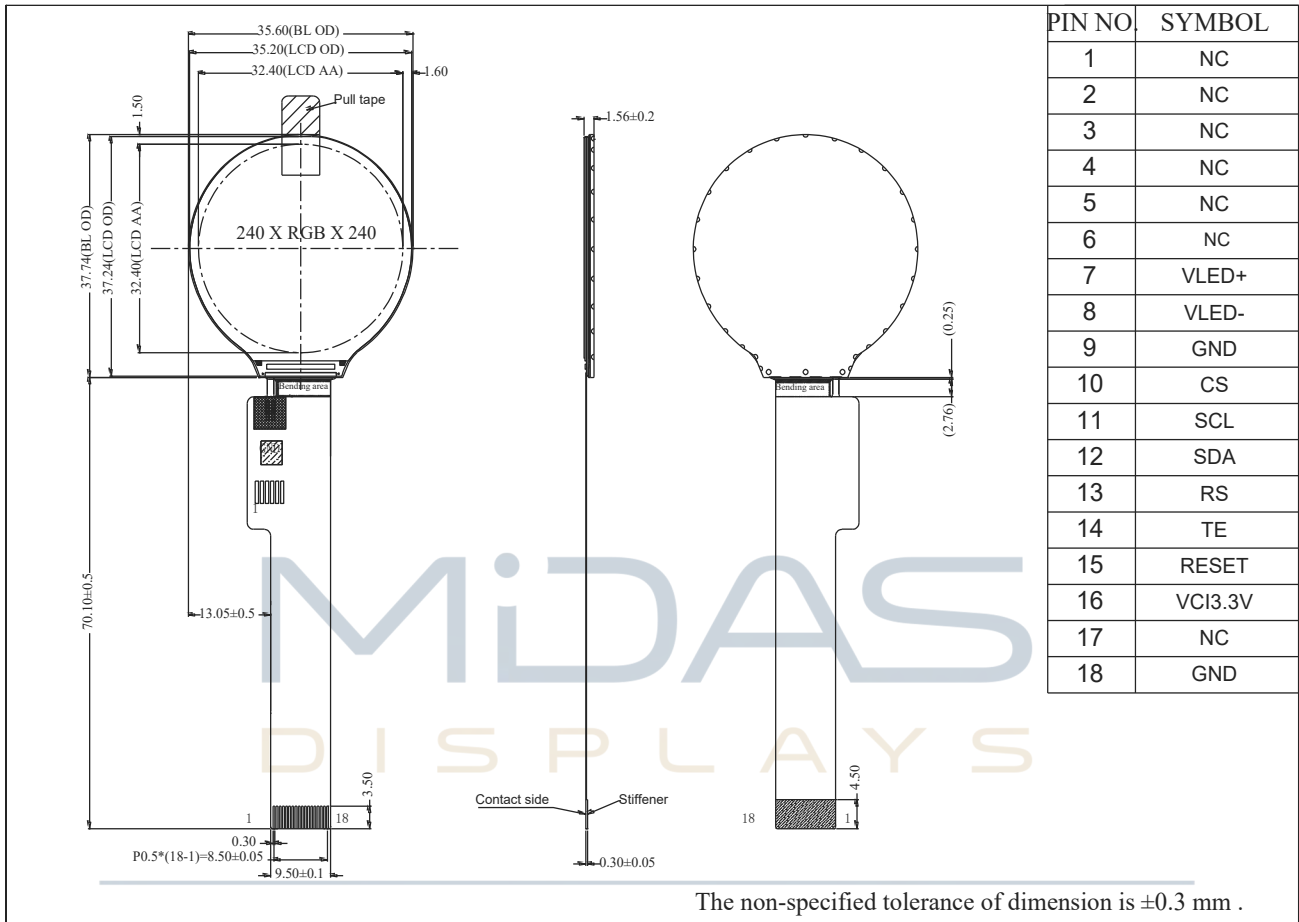
Interface

1. LCM PIN Definition

| Pin | Symbol | Function | Remark |
|-----|---------|------------------------|--------|
| 1-6 | NC | No connection | |
| 7 | VLED+ | Backlit positive | |
| 8 | VLED- | Backlit negative | |
| 9 | GND | Ground | |
| 10 | CS | Chip select signal | |
| 11 | SCL | Serial clock | |
| 12 | SDA | Serial data signal | |
| 13 | RS | Register select signal | |
| 14 | TE | TE signal | |
| 15 | RESET | LCD RESET Signal | |
| 16 | VCI3.3V | LCD Power supply | |
| 17 | NC | No connection | |
| 18 | GND | Ground | |



Contour Drawing



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Absolute Maximum Ratings

| Item | Symbol | Min | Typ | Max | Unit |
|-----------------------|--------|-----|-----|-----|------|
| Operating Temperature | TOP | -20 | — | +70 | □ |
| Storage Temperature | TST | -30 | — | +80 | □ |

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

- Temp. □60□, 90% RH MAX. Temp. >60□, Absolute humidity shall be less than 90% RH at 60□

Electrical Characteristics

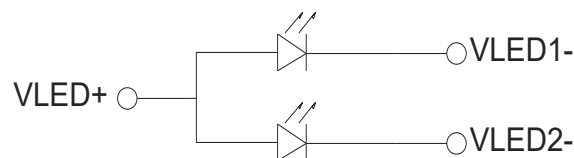
1. Operating conditions

| Item | Symbol | Conditions | Standard Value | | | Unit |
|---------------------------------|--------|------------|----------------|-----|-----------|------|
| | | | Min | Typ | Max | |
| Power Supply Voltage for Analog | VCI | Ta= +25°C | 2.7 | 2.8 | 3.3 | V |
| Input High Voltage for LCD | VIH | - | 0.8lovcc | - | lovcc | V |
| Input Low Voltage for LCD | VIL | - | Vss | - | 0.2 lovcc | V |
| Output High Voltage for LCD | VOH | - | 0.8lovcc | - | lovcc | V |
| Output Low Voltage for LCD | VOL | - | Vss | - | 0.2 lovcc | V |

2. LED driving conditions

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---------------|--------|------|--------|------|------|------------|
| LED current | - | - | 40 | - | mA | - |
| LED voltage | VLED+ | 3.0 | 3.2 | 3.4 | V | Note 1 |
| LED Life Time | - | - | 20,000 | - | Hr | Note 2,3,4 |

Note 1 : There are 1 Groups LED



CIRCUIT DIAGRAM

Note 2 : Ta = 25 °C

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

Note 4 : The single LED lamp case

Optical Characteristics

| Item | Symbol | Condition. | Min | Typ. | Max. | Unit | Remark | |
|--|--------|-----------------------------------|-----------------------------------|-------|-------|-------------------|-------------------|------------|
| Response time | Tr+ Tf | $\theta=0^\circ$ 、 $\phi=0^\circ$ | - | 30 | - | .ms | Note 3 | |
| Contrast ratio | CR | At optimized viewing angle | - | 1000 | - | - | Note 4 | |
| Color Chromaticity | White | Wx | $\theta=0^\circ$ 、 $\phi=0^\circ$ | 0.254 | 0.304 | 0.354 | - | Note 2,5,6 |
| | | Wy | | 0.277 | 0.327 | 0.377 | - | |
| Viewing angle (Gray Scale Inversion Direction) | Hor. | Θ_R | $CR \geq 10$ | - | 80 | - | Deg. | Note 1 |
| | | Θ_L | | - | 80 | - | | |
| | Ver. | Φ_T | | - | 80 | - | | |
| | | Φ_B | | - | 80 | - | | |
| Brightness | - | - | 320 | 400 | - | cd/m ² | Center of display | |
| Uniformity | (U) | - | 75 | - | - | % | Note 5 | |

Ta=25±2°C,

Note 1: Definition of viewing angle range

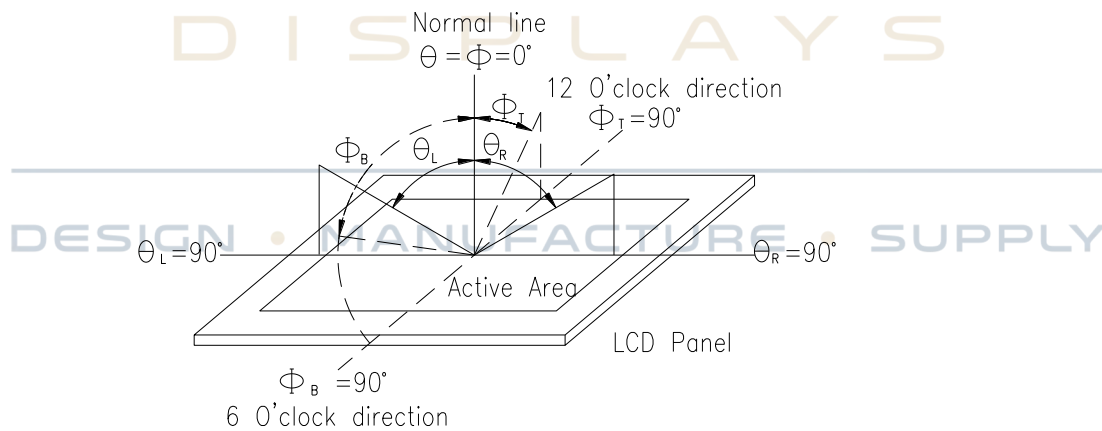


Fig. 7.1. Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7orBM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.



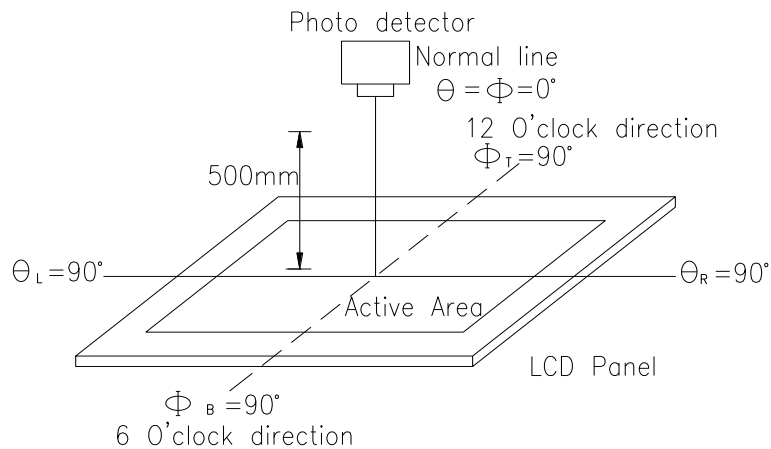
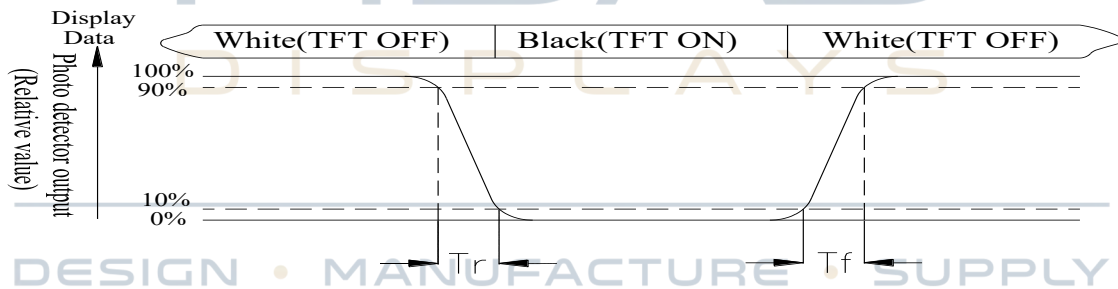


Fig. 7.2. Optical measurement system setup

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_r , is the time between photo detector output intensity changed from 90% to 10%. And fall time, T_f , is the time between photo detector output intensity changed from 10% to 90%



Note 4: Definition of contrast ratio:

The contrast ratio is defined as the following expression.

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



Note 5: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (reference the picture in below). Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (U)} = L_{\min}/L_{\max} \times 100\%$$

L = Active area length

W = Active area width

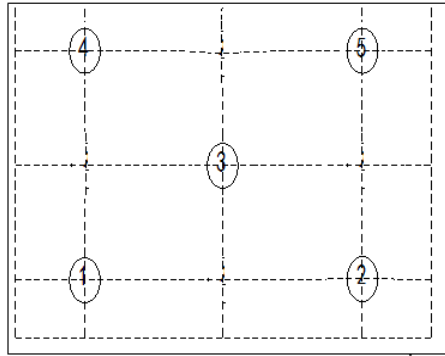


Fig7.3. Definition of uniformity

Note 6: Definition of color chromaticity (CIE 1931)

Color coordinates measured at the center point of LCD

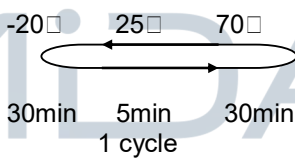
Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

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Reliability

Content of Reliability Test (Wide temperature, -20□70□)

| Environmental Test | | | |
|--------------------------------------|---|---|------|
| Test Item | Content of Test | Test Condition | Note |
| High Temperature storage | Endurance test applying the high storage temperature for a long time. | 80□ 200hrs | 2 |
| Low Temperature storage | Endurance test applying the low storage temperature for a long time. | -30□ 200hrs | 1,2 |
| High Temperature Operation | Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time. | 70□ 200hrs | — |
| Low Temperature Operation | Endurance test applying the electric stress under low temperature for a long time. | -20□ 200hrs | 1 |
| High Temperature/ Humidity Operation | The module should be allowed to stand at 60□,90%RH max | 60□,90%RH 96hrs | 1,2 |
| Thermal shock resistance | The sample should be allowed stand the following 10 cycles of operation  | -20□/70□ 10 cycles | — |
| Vibration test | Endurance test applying the vibration during transportation and using. | Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes | 3 |
| Static electricity test | Endurance test applying the electric stress to the terminal. | VS=±600V(contact) ,±800v(air), RS=330Ω CS=150pF 10 times | — |

Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

Note3: The packing have to including into the vibration testing.