



ORIENT DISPLAY

MAKE THINGS POSSIBLE

Specification for Embedded TFT

AGU240320B00-2.8N12NSM

Revision 01

| | |
|--------|---|
| A | Orient Display |
| GU | GUS System |
| 240320 | Resolution 240 * 320 |
| B00 | Serial B00 |
| 2.8 | 2.8"(Screen), Module Dimension 60.6×69.2x7.75mm(PCB) |
| N | TN Display |
| 12 | 12 o'clock |
| N | Top: -20~+70°C; Tstr: -30~+80°C |
| S | Standard Configuration |
| M | Medium Brightness, 300cd/m2 |
| / | No Touch Panel |
| / | Controller ST7789T3 + STM32G030/NP9158 + W25Q32 |
| / | UART Interface |



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| DATE | DESCRIPTION |
|----------|---------------|
| 2024-5-9 | First release |
| | |
| | |

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1. DISPLAY CHARACTERISTICS

| Item | Contents | Note |
|---------------------|--|------|
| Resolution(H*V) | 240×320 Dots | |
| Colors | 65k(R5G6B5) | |
| Active area (L*W) | 43.2mm(L)×57.6 mm(W) | |
| Viewing area (L*W) | 43.9mm(L)×58.3 mm(W) | |
| Module size (L*W*H) | 60.6mm(L)×69.2mm(W)×7.75(H) | |
| Back light type | LED | |
| Touch Panel Type | without TP | |
| Controller IC | ST7789T3 + STM32G030/NP9158 + W25Q32 | |
| Viewing Direction | 12 o'clock | |
| Contrast Ratio | 500(typ.) | |

2. Pin Description

| Pin No. | Symbol | External Connection | Function Description |
|---------|--------|---------------------|----------------------------|
| 1 | GND | Power Supply | GND |
| 2 | RX | MPU | UART232_RX, 3.3V TTL level |
| 3 | TX | MPU | UART232_TX, 3.3V TTL level |
| 4 | VDD | Power Supply | 3.3V |

3. Electrical Characteristics

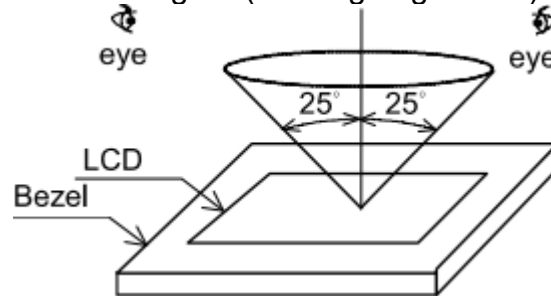
| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|-----------------------------|--------|--------------|---------|------|---------|------|
| Operating Temperature Range | Top | Absolute Max | -20 | - | +70 | °C |
| Storage Temperature Range | Tst | Absolute Max | -30 | - | +80 | °C |
| Supply Voltage | VDD | | 3.0 | 3.3 | 3.6 | V |
| Input High Voltage | VIH | | 0.8*VDD | - | VDD | V |
| Input Low Voltage | VIL | | 0 | - | 0.2*VDD | V |
| Supply Current | IVCI | | - | 90 | - | mA |
| Power Consumption | PLCM | | - | 280 | - | mW |

4. Appearance Standard

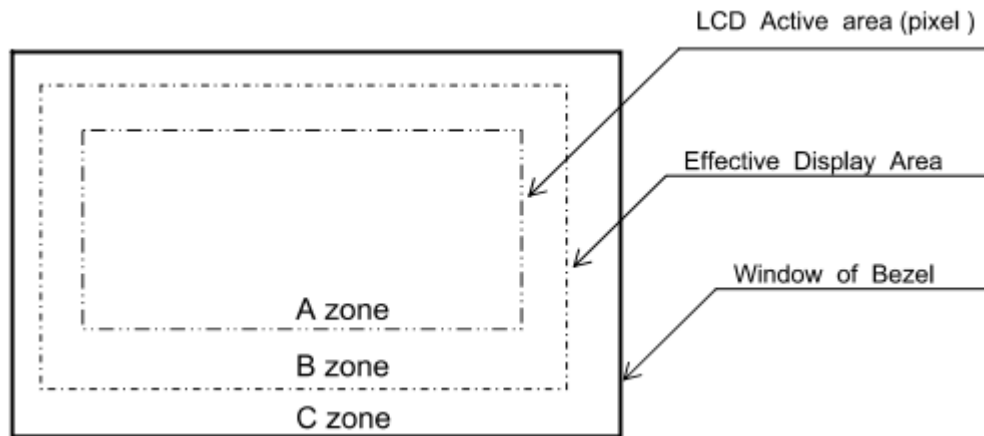
4.1 Appearance Inspection Condition

Visual inspection should be done under the following condition.

- 1) The inspection should be done under in the dark room (about 1000lx, 500lx min, and non-directive)
- 2) The distance between eyes of an inspector and the LCD module is 30cm.
- 3) The Viewing zone is shown the figure. (Viewing angle $\leq 25^\circ$)



4.2 Definition Of Each Zone

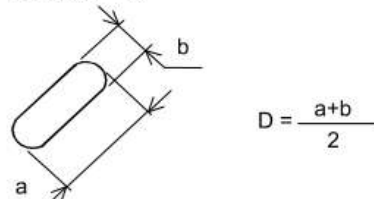


4.3 Appearance Specification

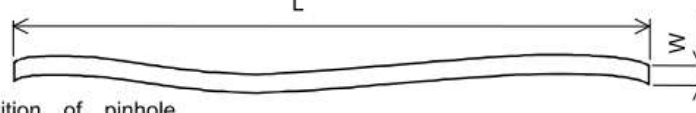
Note: if a problem occurs in respect to any of these items, both parties will discuss in more detail.

Note

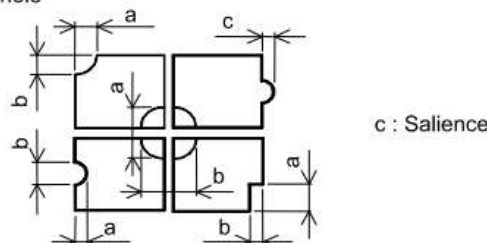
- (1) Definition of average diameter D



- (2) Definition of length L and width W



- (3) Definition of pinhole



| No. | ITEM | CRITERIA | | A | B | | |
|--|--|----------------------------|---------------------------|---------------------------|---|------|---|
| L C D | Scratches | Serious one is not allowed | | * | - | | |
| | Dent | Serious one is not allowed | | * | - | | |
| | Wrinkles in Polarizer | Serious one is not allowed | | * | - | | |
| | Bubbles | Average diameter D(mm) | | Maximum number acceptable | ○ | - | |
| | | $D \leq 0.2$ | | Ignore | | | |
| | | $0.2 < D \leq 0.3$ | | 12 | | | |
| | | $0.3 < D \leq 0.5$ | | 3 | | | |
| | | $0.5 < D$ | | None | | | |
| | Stains, Foreign Materials, Dark Spot | Filamentous | | | ○ | - | |
| | | Length L(mm) | Width W(mm) | Maximum number acceptable | | | |
| | | $L \leq 2.0$ | $W \leq 0.03$ | Ignore | | | |
| | | $L \leq 3.0$ | $0.03 < W \leq 0.05$ | 6 | | | |
| | | $L \leq 2.5$ | $0.05 < W \leq 0.1$ | 1 | | | |
| | | Round | | | ○ | - | |
| | | Average diameter D(mm) | Maximum number acceptable | Minimum space | | | |
| | | $D < 0.2$ | Ignore | - | | | |
| | | $0.2 \leq D < 0.33$ | 8 | 10mm | | | |
| | | $0.33 \leq D$ | None | - | | | |
| | Total | | Filamentous + Round = 10 | | | | |
| | Those wiped out easily are acceptable | | | | | ○ | ○ |
| | Pinhole | Average diameter D(mm) | | Maximum number acceptable | ○ | - | |
| | | $D \leq 0.15$ | | Ignore | | | |
| | | $0.15 < D \leq 0.3$ | | 10 | | | |
| | | $C \leq 0.015$ | | ignore | | | |
| Contrast Irregularity (Spot) | Average diameter D(mm) | Maximum number acceptable | Minimum space | ○ | - | | |
| | $D \leq 0.25$ | Ignore | - | | | | |
| | $0.25 < D \leq 0.35$ | 10 | 20mm | | | | |
| | $0.35 < D \leq 0.5$ | 4 | 20mm | | | | |
| | $0.5 < D$ | None | - | | | | |
| Contrast Irregularity (Line) (Filamentous) | Width D(mm) | Length L(mm) | Maximum number acceptable | ○ | - | | |
| | $W \leq 0.25$ | $L \leq 1.2$ | 2 | | | 20mm | |
| | $W \leq 0.2$ | $L \leq 1.5$ | 3 | | | 20mm | |
| | $W \leq 0.15$ | $L \leq 2.0$ | 3 | | | 20mm | |
| | $W \leq 0.1$ | $L \leq 3.0$ | 4 | | | 20mm | |
| | Total | | 6 | | | | |

| No. | ITEM | CRITERIA | | | APPLIED ZONE |
|--|----------------------|---------------------------|------------------------------|------------------------------|--------------|
| T O U C H P A N E L | Scratches | Width W(mm) | Length L(mm) | Maximum number acceptable | A,B |
| | | $W > 0.1$ | $L \geq 10$ | None | |
| | | $0.10 \geq W > 0.05$ | $L < 10$ | 4 pcs max. | |
| | | $0.05 \geq W$ | $L < 10$ | Ignored | |
| | Foreign Materials | Filamentous (Line shape) | | | A,B |
| | | Width W(mm) | Length L(mm) | Maximum number acceptable | |
| | | $W > 0.10$ | - | Dust (circular) | |
| | | $0.10 \geq W > 0.05$ | $3 < L$ | None | |
| | | $0.05 \geq W$ | $L \leq 3$ | Ignored | |
| | | Round(Dot shape) | | | A,B |
| | | Average diameter D(mm) | Maximum number acceptable | | |
| | | $D > 0.35$ | None | | |
| $0.35 \geq D > 0.25$ | 6 psc max. | | | | |
| | $D \leq 0.25$ | Ignored | | A,B | |

5. Reliability Test Conditions

| No. | Test item | Test condition | Inspection after test |
|-----|----------------------------|--|-----------------------|
| 1 | High temperature storage | 80±2°C/120 hours | Note 1,2 |
| 2 | Low temperature storage | -30±2°C/120 hours | |
| 3 | High temperature operating | 70±2°C/120 hours | |
| 4 | Low temperature operating | -20±2°C/120 hours | |
| 5 | Temperature cycle | -20±2°C~25°C~70±2°C*10cycles (30min.) (5min.) (30min.) | |
| 6 | Damp proof test | 60°C*90% RH/96 hours | |
| 7 | Vibration test | Frequency : 10Hz~55Hz~10Hz Amplitude : 1.5mm , X , Y , Z direction for total 3hours (Packing condition) | |
| 8 | Dropping test | Drop to the ground from 1m height, one time, every side of carton. (Packing condition) | |
| 9 | ESD test | Voltage : ±800V R : 330Ω C : 150pF Air discharge, 1 time | |

Remark :

Note 1: No condensation to be observed.

Note 2: Conducted after 4 hours of storage at 25°C, 0%RH.

6. HANDLING PRECAUTIONS

6.1 Mounting method

The LCD module consists of two thin glass plates with polarizers which easily be damaged. And since the module is so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

6.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent

[recommended below] and wipe lightly :

- .Isopropyl alcohol

- .Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent :

- .Water

- .Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated :

- .Soldering flux

- .Chlorine (Cl) , Sulfur (S)

If goods were sent without being silicon coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happens by miss-handling or using some materials such as Chlorine (Cl), Sulfur (S) from customer,

Responsibility is on customer.

6.3 Caution against static charge

The LCD module uses C-MOS LSI drivers, so we recommend that you :

Connect any unused input terminal to V_{dd} or V_{ss}, do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

6.4 Packing

Module employs LCD elements and must be treated as such.

- .Avoid intense shock and falls from a height.

- .To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity.

6.5 Caution for operation

- .It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage than the limit causes the shorter LCD life.

- .An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.

- .Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.

- .If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.

- .A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

- .Usage under the maximum operating temperature, 50%Rh or less is required.

- .When fixed patterns are displayed for a long time, remnant image is likely to occur.

6.6 Storage

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- .Storing in an ambient temperature 10°C to 30°C, and in a relative humidity of 45% to 75%. Don't expose to sunlight or fluorescent light.

- .Storing in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it . And with no desiccant.

- .Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.

- .Storing with no touch on polarizer surface by anything else.

It is recommended to store them as they have been contained in the inner container at the time of delivery from us.

6.7 Safety

- .It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.

- .When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water.

7. PRECAUTION FOR USE

7.1 A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

7.2 On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- .When a question is arisen in this specification.
- .When a new problem is arisen which is not specified in this specifications.
- .When an inspection specifications change or operating condition change in customer is reported to ORIENTDISPLAY, and some problem is arisen in this specification due to the change.
- .When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

8. PACKING SPECIFICATION

---TBD

9.Mechanical Drawing (Unit mm, Un-tolerated ±0.3mm)

