| MCCOG128064B12W-FPTLRGB | 128 x 64 | | LCD Module |
|---|---|---|---|

| Specification | |
|---|---|
| Version:   4 | Date:  30/06/2021 |

| Revision | | | |
|---|---|---|---|
| 1 | 26/01/2016 | First issue. | |
| 2 | 25/02/2016 | Modify Precautions in use of LCD Modules & Static electricity test. | |
| 3 | 11/07/2019 | Modify Contour Drawing | |
| 4 | 30/06/2021 | Fixed small error | |

| Display Features | | | |
|---|---|---|---|
| Resolution | 128 x 64 | | |
| Appearance | Black on RGB | | |
| Logic Voltage | 3.3V | | |
| Interface | Parallel/SPI | | |
| Font Set | --- | | |
| Display Mode | Transflective | | |
| LC Type | FSTN | | |
| Module Size | 54.6 x 42.2 x 4.48mm | | |
| Operating Temperature | -20°C ~ +70°C | | |
| Construction | COG | Box Quantity | Weight / Display |
| LED Backlight | RGB | --- | --- |

RoHS compliant

* - For full design functionality, please use this specification in conjunction with the ST7565P specification. (Provided Separately)

| Display Accessories | |
|---|---|
| Part Number | Description |
| MCIB-12 | UNO 32 Breakout Board with SD Card and LED BKL driver. |
| MPBV-7 | 30-Way FFC to Cable and Wires 0.5mm Pitch. |
| MCCOG128064B-BEZEL | Bezel made for the MCCOG12064B series |
| MDC28-0.5-BC | 28 way connector with 0.5mm pitch. |

| Optional Variants | | |
|---|---|---|
| Appearances | | Voltage |
| Black on White Black on Yellow/Green White on Blue | | |

# General Specification

The Features is described as follow:

- Module dimension: 54.6 x 42.2 x 4.48 mm

- View area: 50.6 x 31.0 mm

- Active area: 46.577 x 27.697 mm

- LCD type: FSTN Positive Transflective

- Duty/ Bias: 1/65 DUTY,1/7BIAS

- View direction: 12 o'clock

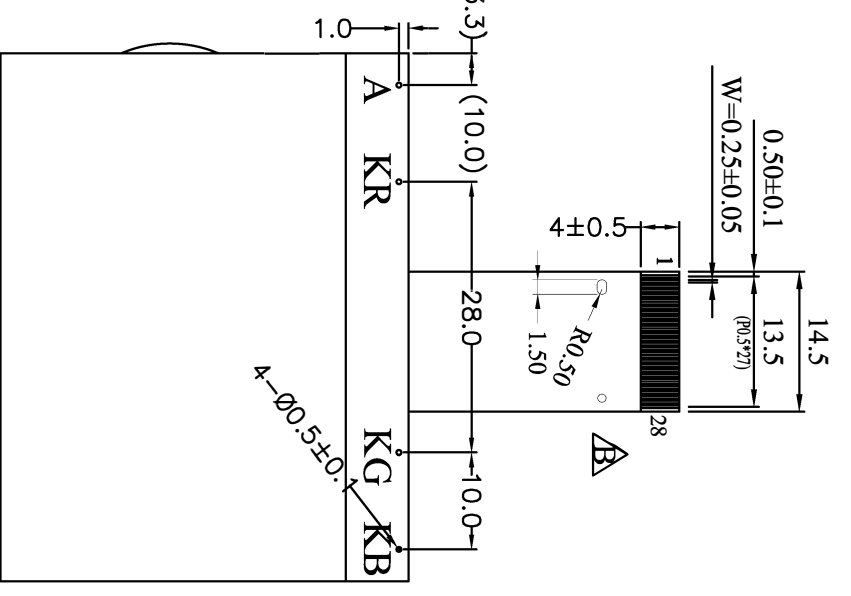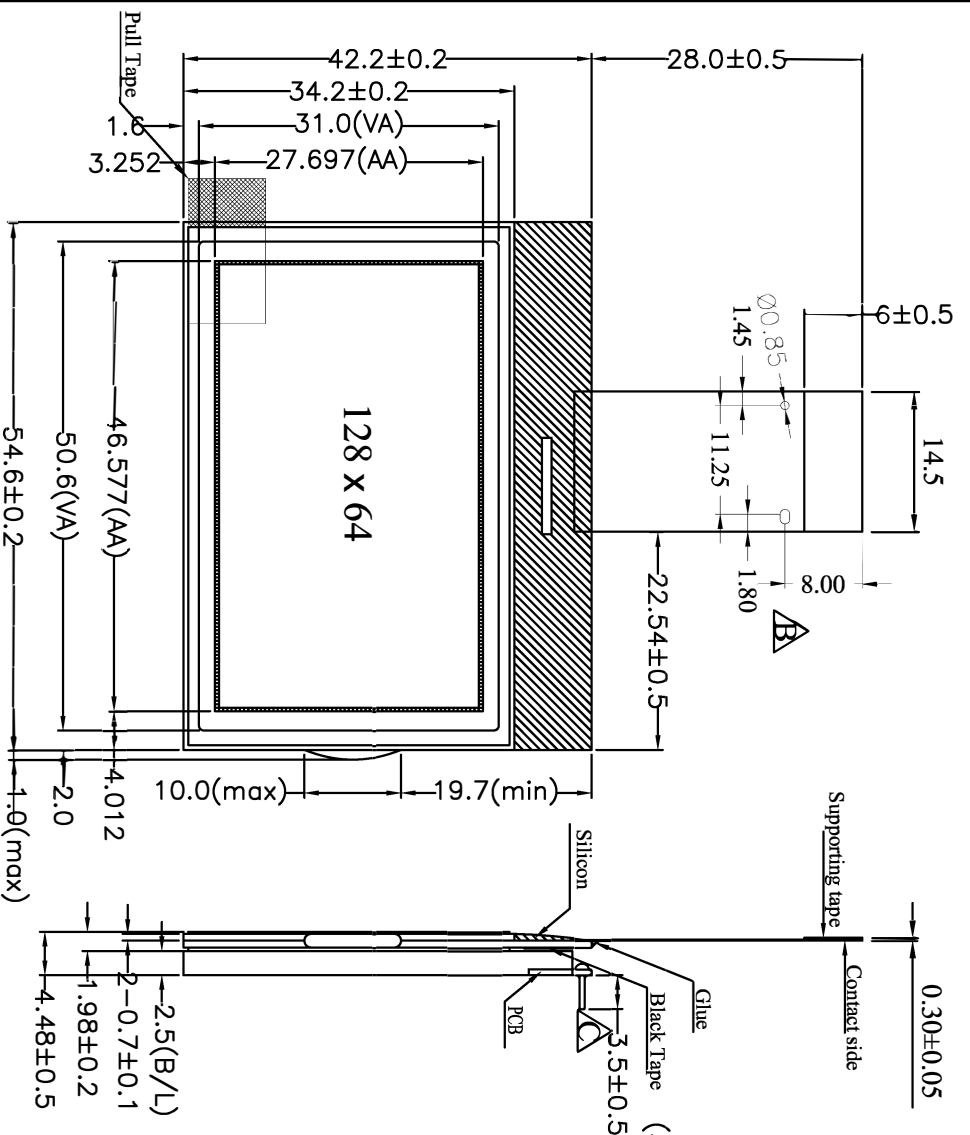- Backlight Type: LED, Full color

- IC: ST7565P

# Interface Pin Function

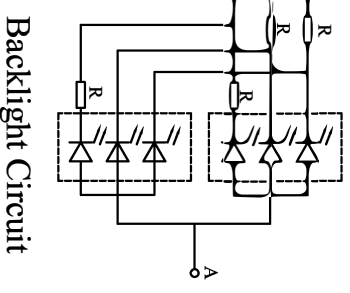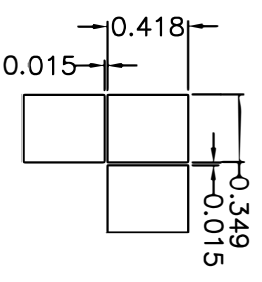| Pin No. | Symbol | Description |
|---------|--------|-------------|
| 1 | P/S | This pin configures the interface to be parallel mode or serial mode.<br>P/S = "H": Parallel data input/output.<br>P/S = "L": Serial data input. |
| 2 | C86 | This is the MPU interface selection pin.<br>C86 = "H": 6800 Series MPU interface.<br>C86 = "L": 8080 Series MPU interface. |
| 3 | V0 | This is a multi-level power supply for the liquid crystal drive. The voltage Supply applied is determined by the liquid crystal cell, and is changed through the use of a resistive voltage divided or through changing the impedance using an op. amp. |
| 4 | V1 | |
| 5 | V2 | |
| 6 | V3 | Voltage levels are determined based on Vss, and must maintain the relative magnitudes shown below. |
| 7 | V4 | $V0 \geqq V1 \geqq V2 \geqq V3 \geqq V4 \geqq Vss$ |
| 8 | C2- | DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2P terminal |
| 9 | C2+ | DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2N terminal. |
| 10 | C1+ | DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1N terminal. |
| 11 | C1- | DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1P terminal. |
| 12 | C3+ | DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1N terminal. |
| 13 | VOUT | Voltage converter input/output pin<br>Connect this pin to VSS through capacitor. |
| 14 | VSS | Ground |
| 15 | VDD | Power supply: 3.3V |
| 16 | D7 | This is an 8-bit bi-directional data bus that connects to an 8-bit or 16-bit Standard MPU data bus.<br>When the serial interface (SPI-4) is selected (P/S = "L") :<br>D7 : serial data input (SI) ; D6 : the serial clock input (SCL).<br>D0 to D5 should be connected to VDD or floating. |
| 17 | D6 | |
| 18 | D5 | |
| 19 | D4 | |

| 20 | D3 | When the chip select is not active, D0 to D7 are set to high impedance. |
|---|---|---|
| 21 | D2 | |
| 22 | D1 | |
| 23 | D0 | |
| 24 | E(/RD) | When connected to 8080 series MPU, this pin is treated as the "/RD" signal of the8080 MPU and is LOW-active.<br>The data bus is in an output status when this signal is "L".<br>When connected to 6800 series MPU, this pin is treated as the "E" signal of the 6800 MPU and is HIGH-active. This is the enable clock input terminal of the 6800 Series MPU. |
| 25 | R/W(/WR) | When connected to 8080 series MPU, this pin is treated as the "/WR" signal of the 8080 MPU and is LOW-active.<br>The signals on the data bus are latched at the rising edge of the /WR signal.<br>When connected to 6800 series MPU, this pin is treated as the "R/W" signal of the 6800 MPU and decides the access type :<br>When R/W = "H": Read. When R/W = "L": Write |
| 26 | D/C | Data/Command select pin (also reffered to as A0 or RS).<br>If D/C = High (H) -> Select Data<br>If D/C = Low (L) -> Select Command |
| 27 | /CS1 | This is the chip select signal |
| 28 | /RES | When /RES is set to "L", the register settings are initialized (cleared).<br>The reset operation is performed by the /RES signal level. |

| NO. | | |
|---|---|---|
| 1 | Lcd Type | FSTN White |
| 2 | Viewing Direction | 12 O'clock |
| 3 | Drive Method | 1/65DUTY,1/7BIAS |
| 4 | Polarizer Mode | Transflective/Positive |
| 5 | Vdd | 3.3V |
| 6 | Vop | 8.65V±0.2 |
| 7 | Operating Temperature | -20°C~70°C |
| 8 | Storage Temperature | -30°C~80°C |
| 9 | Backlight | LED 2Dices RGB |
| 10 | Controller IC | ST7565P |

**128 x 64**

Pull Tape

Contact Side
SCALE 1/20

0.418
0.015
0.349
0.015

Backlight Circuit

KR
KG
KB
A
R R R

Silicon
PCB
Glue
Black Tape
Supporting tape
Contact side

A
KR
KG
KB

| NO. | SYMBOL | NO. | SYMBOL |
|---|---|---|---|
| 1 | P/S | 15 | VDD |
| 2 | C86 | 16 | D7 |
| 3 | C86 | 17 | D6 |
| 4 | V1 | 18 | D5 |
| 5 | V0 | 19 | D4 |
| 6 | V2 | 20 | D3 |
| 7 | V3 | 21 | D2 |
| 8 | V4 | 22 | D1 |
| 9 | C2- | 23 | D0 |
| 10 | C1+ | 24 | E(RD) |
| 11 | C1- | 25 | R/W(WR) |
| 12 | C3+ | 26 | D/C |
| 13 | VOUT | 27 | CS1 |
| 14 | VSS | 28 | RES |

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

**Midas Displays**

| | |
|---|---|
| MODEL | MCCOG128064B12W-FPTLRGB. |
| TITLE | LCM DRAWING |
| DWG NO. | 20151211002 |
| REV: | C |
| SCALE: | 1/1 |
| UNIT: | mm |
| PAGE: | 1/1 |
| APPROVE | 杨强 2019/7/10 |
| CHECK | 杨强 2019/7/10 |
| DRAW | DING 2019/7/10 |

# Optical Characteristics

| Item | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| View Angle | θ | CR≧2 | 0 | ─ | 45 | ψ= 180° |
| | θ | CR≧2 | 0 | ─ | 25 | ψ= 0° |
| | θ | CR≧2 | 0 | ─ | 35 | ψ= 90° |
| | θ | CR≧2 | 0 | ─ | 35 | ψ= 270° |
| Contrast Ratio | CR | ─ | 3 | ─ | ─ | ─ |
| Response Time | T rise | ─ | ─ | ─ | 250 | ms |
| | T fall | ─ | ─ | ─ | 250 | ms |

**Definition of Operation Voltage (Vop)**　　　**Definition of Response Time ( Tr , Tf )**
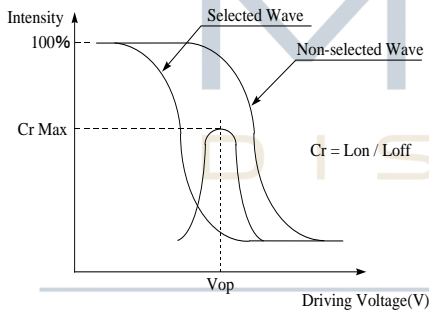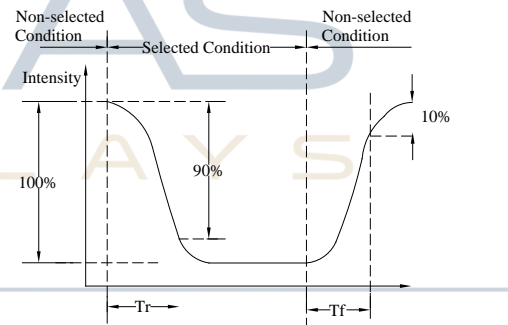


**Conditions :**

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)
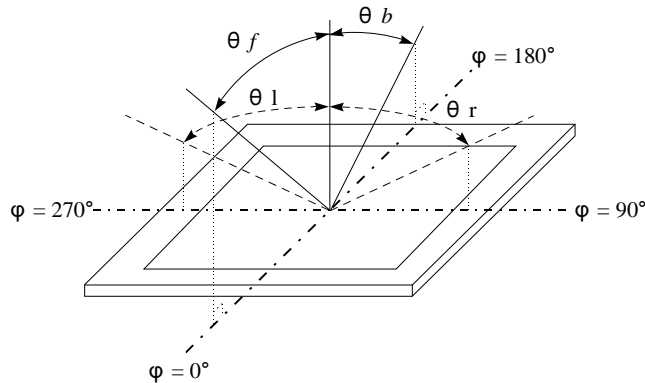
# Absolute Maximum Ratings

| Item | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Temperature | $T_{OP}$ | -20 | — | +70 | ℃ |
| Storage Temperature | $T_{ST}$ | -30 | — | +80 | ℃ |
| Power Supply Voltage | VDD | -0.3 | — | 3.6 | V |
| Power supply voltage (VDD standard) | V0, VOUT | -0.3 | — | 14.5 | V |
| Power supply voltage (VDD standard) | V1, V2, V3, V4 | -0.3 | — | V0+0.3 | V |

# Electrical Characteristics

| Item | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Supply Voltage For Logic | $V_{DD}$-$V_{SS}$ | — | 3.2 | 3.3 | 3.4 | V |
| Supply Voltage For LCM | $V_{OP}$ | Ta=-20℃ | — | — | — | V |
| | | Ta=25℃ | 8.45 | 8.65 | 8.85 | V |
| | | Ta=70℃ | — | — | — | V |
| Supply Current | $I_{DD}$ | $V_{DD}$=3.3V | — | 0.1 | — | mA |

Please kindly consider to design the Vop to be adjustable while programing the software to match LCD contrast tolerance

# Backlight Information
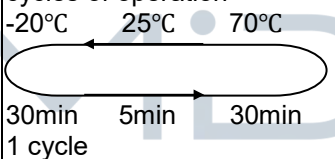
## Specification

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNIT | TEST CONDITION |
|-----------|--------|-----|-----|-----|------|----------------|
| Supply Current | ILED_RED | — | 32 | — | mA | V=1.9~2.3V |
| Supply Current | ILED_GREEN | — | 32 | — | mA | V=2.8~3.4V |
| Supply Current | ILED_BULE | — | 32 | — | mA | V=2.8~3.4V |
| Supply Voltage | V_RED | 1.9 | 2.1 | 2.3 | V | |
| Supply Voltage | V_GREEN | 2.8 | 3.1 | 3.4 | V | |
| Supply Voltage | V_BLUE | 2.8 | 3.1 | 3.4 | V | |
| Reverse Voltage | VR | — | 5 | — | V | — |
| Luminance | IV_RED | 36 | 45 | — | CD/M$^2$ | ILED=32mA |
| Luminance | IV_GREEN | 224 | 280 | — | CD/M$^2$ | ILED=32mA |
| Luminance | IV_BLUE | 72 | 90 | — | CD/M$^2$ | ILED=32mA |
| Wave Length | λp _RED | 620 | — | 632 | nm | ILED=32mA |
| Wave Length | λp _GREEN | 520 | — | 530 | nm | ILED=32mA |
| Wave Length | λp _ BLUE | 465 | — | 475 | nm | ILED=32mA |
| LED Life Time | R | — | 50K | — | Hr. | ILED=32mA |
| | G | — | 50K | — | | |
| | B | — | 50K | — | | |
| Colour | RED, GREEN, BLUE | | | | | |

# 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 storage | The module should be allowed to stand at 60℃,90%RH max<br>For 96hrs under no-load condition excluding the polarizer,<br>Then taking it out and drying it at normal temperature. | 60℃,90%RH 96hrs | 1,2 |
| Thermal shock resistance | The sample should be allowed stand the following 10 cycles of operation<br>-20℃　　25℃ ● 70℃<br><br>30min　　5min　　30min<br>1 cycle | -20℃/70℃ 10 cycles | ―― |
| Vibration test | Endurance test applying the vibration during transportation and using. | Total fixed amplitude : 1.5mm<br>Vibration Frequency : 10~55Hz<br>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 | ―― |
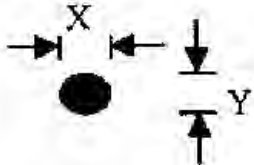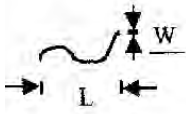
**Note1: No dew condensation to be observed.**

**Note2: The function test shall be conducted after 4 hours storage at the normal**
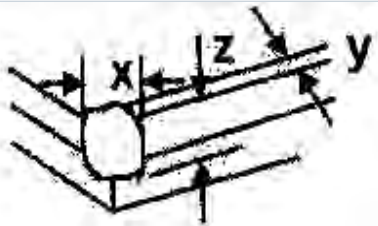   **Temperature and humidity after remove from the test chamber.**
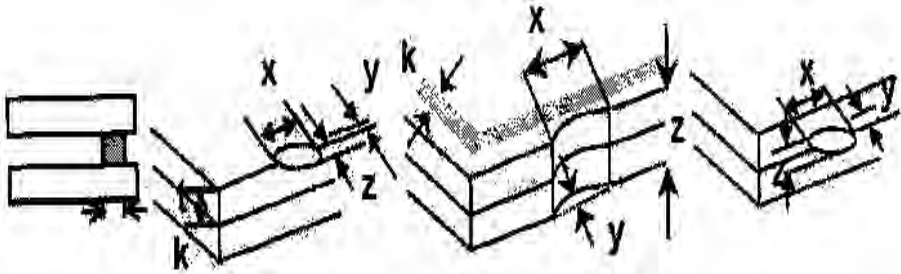
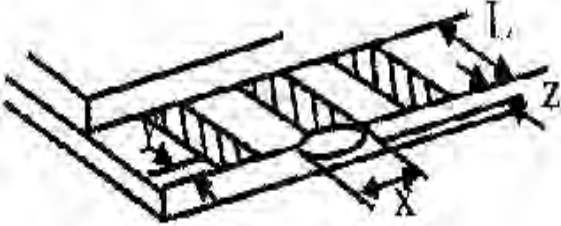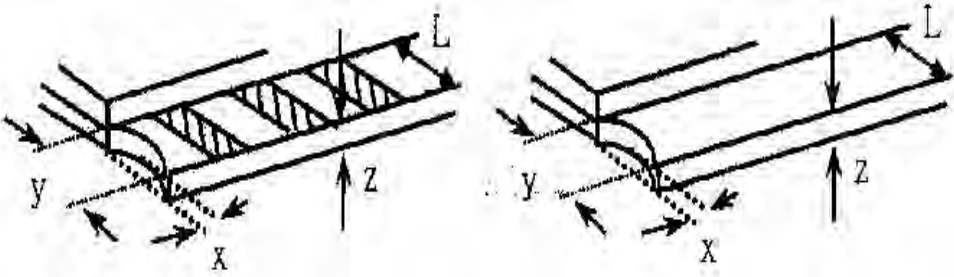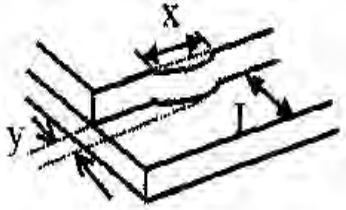**Note3: The packing have to including into the vibration testing.**

# Inspection specification

| NO | Item | Criterion | AQL |
|---|---|---|---|
| 01 | Electrical Testing | 1.1 Missing vertical, horizontal segment, segment contrast defect.<br>1.2 Missing character , dot or icon.<br>1.3 Display malfunction.<br>1.4 No function or no display.<br>1.5 Current consumption exceeds product specifications.<br>1.6 LCD viewing angle defect.<br>1.7 Mixed product types.<br>1.8 Contrast defect. | 0.65 |
| 02 | Black or white spots on LCD (display only) | 2.1 White and black spots on display $\leqq$0.25mm, no more than three white or black spots present.<br>2.2 Densely spaced: No more than two spots or lines within 3mm | 2.5 |

### 03 — LCD black spots, white spots, contamination (non-display)

3.1 Round type : As following drawing

$$\Phi = ( x + y ) / 2$$

| SIZE | Acceptable Q TY |
|---|---|
| $\Phi \leqq 0.10$ | Accept no dense |
| $0.10 < \Phi \leqq 0.20$ | 2 |
| $0.20 < \Phi \leqq 0.25$ | 1 |
| $0.25 < \Phi$ | 0 |



AQL: 2.5

3.2 Line type : (As following drawing)



| Length | Width | Acceptable Q TY |
|---|---|---|
| --- | $W \leqq 0.02$ | Accept no dense |
| $L \leqq 3.0$ | $0.02 < W \leqq 0.03$ | 2 |
| $L \leqq 2.5$ | $0.03 < W \leqq 0.05$ | 2 |
| --- | $0.05 < W$ | As round type |

AQL: 2.5

### 04 — Polarizer bubbles

If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction.

| Size $\Phi$ | Acceptable Q TY |
|---|---|
| $\Phi \leqq 0.20$ | Accept no dense |
| $0.20 < \Phi \leqq 0.50$ | 3 |
| $0.50 < \Phi \leqq 1.00$ | 2 |
| $1.00 < \Phi$ | 0 |
| Total Q TY | 3 |

AQL: 2.5

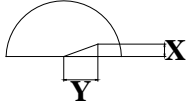| NO | Item | Criterion | AQL |
|----|------|-----------|-----|
| 05 | Scratches | Follow NO.3 LCD black spots, white spots, contamination | |
| 06 | Chipped glass | Symbols Define:<br><br>x: Chip length　　　y: Chip width　　　z: Chip thickness<br><br>k: Seal width　　　t: Glass thickness　a: LCD side length<br><br>L: Electrode pad length:<br><br>6.1 General glass chip :<br><br>6.1.1 Chip on panel surface and crack between panels:<br><br><br><br>| z: Chip thickness | y: Chip width | x: Chip length |<br>\|---\|---\|---\|<br>\| $Z \leq 1/2t$ \| Not over viewing area \| $x \leq 1/8a$ \|<br>\| $1/2t < z \leq 2t$ \| Not exceed 1/3k \| $x \leq 1/8a$ \|<br><br>⊙If there are 2 or more chips, x is total length of each chip.<br><br>6.1.2 Corner crack:<br><br><br><br>| z: Chip thickness | y: Chip width | x: Chip length |<br>\|---\|---\|---\|<br>\| $Z \leq 1/2t$ \| Not over viewing area \| $x \leq 1/8a$ \|<br>\| $1/2t < z \leq 2t$ \| Not exceed 1/3k \| $x \leq 1/8a$ \|<br><br>⊙If there are 2 or more chips, x is the total length of each chip. | 2.5 |

| NO | Item | Criterion | AQL |
|---|---|---|---|
| 06 | Glass crack | Symbols :<br>x: Chip length     y: Chip width     z: Chip thickness<br>k: Seal width     t: Glass thickness   a: LCD side length<br>L: Electrode pad length<br>6.2 Protrusion over terminal :<br>6.2.1 Chip on electrode pad :<br><br><br><br>| 2.5 |

6.2.1 table:

| y: Chip width | x: Chip length | z: Chip thickness |
|---|---|---|
| $y \leqq 0.5mm$ | $x \leqq 1/8a$ | $0 < z \leqq t$ |

6.2.2 Non-conductive portion:



| y: Chip width | x: Chip length | z: Chip thickness |
|---|---|---|
| $y \leqq L$ | $x \leqq 1/8a$ | $0 < z \leqq t$ |

⊙If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.

⊙If the product will be heat sealed by the customer, the alignment mark not be damaged.

6.2.3 Substrate protuberance and internal crack.



| y: width | x: length |
|---|---|
| $y \leqq 1/3L$ | $x \leqq a$ |

| NO | Item | Criterion | AQL |
|---|---|---|---|
| 07 | Cracked glass | The LCD with extensive crack is not acceptable. | 2.5 |
| 08 | Backlight elements | 8.1 Illumination source flickers when lit.<br>8.2 Spots or scratched that appear when lit must be judged. Using LCD spot, lines and contamination standards.<br>8.3 Backlight doesn't light or color wrong. | 0.65<br>2.5<br><br>0.65 |
| 09 | Bezel | 9.1 Bezel may not have rust, be deformed or have fingerprints, stains or other contamination.<br>9.2 Bezel must comply with job specifications. | 2.5<br>0.65 |
| 10 | PCB、COB | 10.1 COB seal may not have pinholes larger than 0.2mm or contamination.<br>10.2 COB seal surface may not have pinholes through to the IC.<br>10.3 The height of the COB should not exceed the height indicated in the assembly diagram.<br>10.4 There may not be more than 2mm of sealant outside the seal area on the PCB. And there should be no more than three places.<br>10.5 No oxidation or contamination PCB terminals.<br>10.6 Parts on PCB must be the same as on the production characteristic chart. There should be no wrong parts, missing parts or excess parts.<br>10.7 The jumper on the PCB should conform to the product characteristic chart.<br>10.8 If solder gets on bezel tab pads, LED pad, zebra pad or screw hold pad, make sure it is smoothed down.<br>10.9 The Scraping testing standard for Copper Coating of PCB<br><br>X * Y<=2mm2 | 2.5<br><br>2.5<br>0.65<br><br>2.5<br><br><br>2.5<br>0.65<br><br><br>0.65<br><br>2.5<br><br>2.5 |
| 11 | Soldering | 11.1 No un-melted solder paste may be present on the PCB.<br>11.2 No cold solder joints, missing solder connections, oxidation or icicle.<br>11.3 No residue or solder balls on PCB.<br>11.4 No short circuits in components on PCB. | 2.5<br>2.5<br><br>2.5<br>0.65 |

| NO | Item | Criterion | AQL |
|----|------|-----------|-----|
| 12 | General appearance | 12.1 No oxidation, contamination, curves or, bends on interface Pin (OLB) of TCP. | 2.5 |
| | | 12.2 No cracks on interface pin (OLB) of TCP. | 0.65 |
| | | 12.3 No contamination, solder residue or solder balls on product. | 2.5 |
| | | 12.4 The IC on the TCP may not be damaged, circuits. | 2.5 |
| | | 12.5 The uppermost edge of the protective strip on the interface pin must be present or look as if it cause the interface pin to sever. | 2.5 |
| | | 12.6 The residual rosin or tin oil of soldering (component or chip component) is not burned into brown or black color. | 2.5 |
| | | 12.7 Sealant on top of the ITO circuit has not hardened. | 2.5 |
| | | 12.8 Pin type must match type in specification sheet. | 0.65 |
| | | 12.9 LCD pin loose or missing pins. | 0.65 |
| | | 12.10 Product packaging must the same as specified on packaging specification sheet. | 0.65 |
| | | 12.11 Product dimension and structure must conform to product specification sheet. | 0.65 |
| | | 12.12 Visual defect outside of VA is not considered to be rejection. | |

# Precautions in use of LCD Modules

(1)    Avoid applying excessive shocks to the module or making any alterations or modifications to it.

(2)    Don't make extra holes on the printed circuit board, modify its shape or change the components of LCD module.

(3)    Don't disassemble the LCM.

(4)    Don't operate it above the absolute maximum rating.

(5)    Don't drop, bend or twist LCM.

(6)    Soldering: only to the I/O terminals.

(7)    Storage: please storage in anti-static electricity container and clean environment.

(8)    Midas have the right to change the passive components, including R3,R6 & backlight adjust resistors. (Resistors,capacitors and other passive components will have different appearance and color caused by the different supplier.)

(9)    Midas have the right to change the PCB Rev. (In order to satisfy the supplying stability, management optimization and the best product performance...etc, under the premise of not affecting the electrical characteristics and external dimensions, Midas have the right to modify the version.)

(10)  To ensure the stability of the display screen, please apply screen saver after showing 30 mins of fixed display content.

DESIGN • MANUFACTURE • SUPPLY

# Material List of Components for RoHs

1. Midas hereby declares that all of or part of products (with the mark "#"in code), including, but not limited to, the LCM, accessories or packages, manufactured and/or delivered to your company (including your subsidiaries and affiliated company) directly or indirectly by our company (including our subsidiaries or affiliated companies) do not intentionally contain any of the substances listed in all applicable EU directives and regulations, including the following substances.

   Exhibit A：The Harmful Material List

| Material | (Cd) | (Pb) | (Hg) | (Cr6+) | PBBs | PBDEs |
|---|---|---|---|---|---|---|
| Limited Value | 100 ppm | 1000 ppm | 1000 ppm | 1000 ppm | 1000 ppm | 1000 ppm |
| Above limited value is set up according to RoHS. | | | | | | |

2. Process for RoHS requirement：(only for RoHS inspection)
   (1) Use the Sn/Ag/Cu soldering surface：the surface of Pb-free solder is rougher than we used before.
   (2) Heat-resistance temp.：
       Reflow：250℃,30 seconds Max.；
       Connector soldering wave or hand soldering：320℃, 10 seconds max.
   (3) Temp. curve of reflow, max. Temp.：235±5℃；
       Recommended customer's soldering temp. of connector：280℃, 3 seconds.


# Recommendable Storage

1. Place the panel or module in the temperature 25°C±5°C and the humidity below 65% RH
2. Do not place the module near organics solvents or corrosive gases.
3. Do not crush, shake, or jolt the module.