

PRODUCTION SPECIFICATION

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1. REVISION HISTORY

| Version | Modification Record | Issue Date |
|---------|--|------------|
| - | RELEASED | 2006-11-9 |
| A | Add the description of LCM lifetime in MAXIMUM RATINGS | 2006-12-30 |
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2. GENERAL DESCRIPTION

The **PSG12864CD-FNW1GDZ** is a **128x64** dot-matrix LCD module. It has a **FSTN** panel composed of **128** segments and **64** commons. The LCM can be easily accessed by microcontroller via parallel interface. Attribute to the advanced CMOS process of the driver IC ,the **PSG12864CD-FNW1GDZ** can operating with very low current consumption. The **PSGG12864CD-FNW1GDZ** has a build-in voltage convertor ,it can operate without external LCD driving power supply. This Module complies with the **RoHS** instructions of EU.

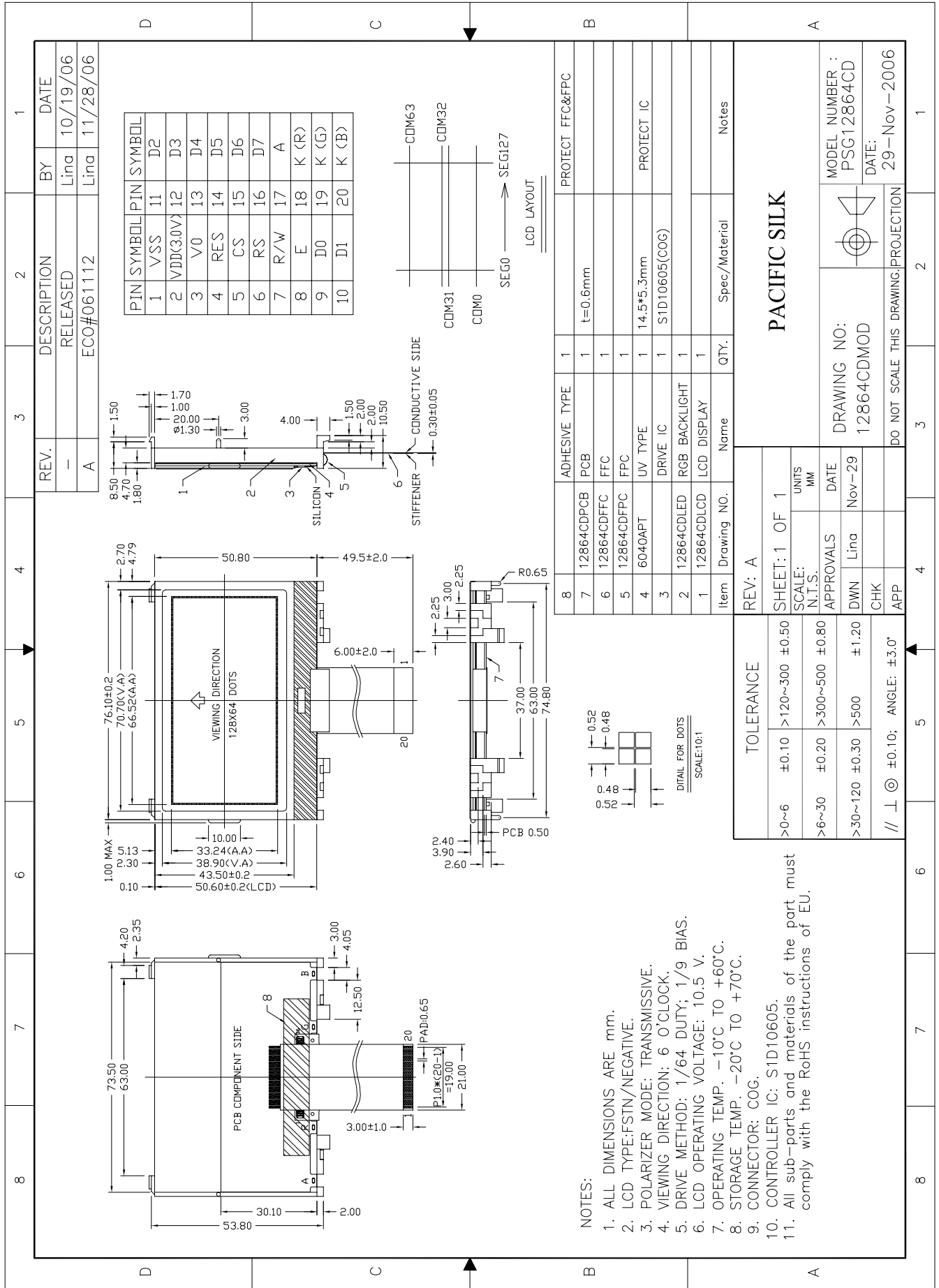
3. FEATURES

| | |
|----------------------|------------------------------|
| Display Mode | FSTN |
| | NEGATIVE TRANSMISSIVE |
| Display Format | GRAPHIC 128X64DOTS |
| MCU Interface | 6800-PARALLEL |
| Multiplexing Ratio | 1/64 |
| Bias | 1/9 |
| OperatingTemperature | -10°C~+60°C |
| Storage Temperature | -20 °C~+70°C |
| View Direction | 6:00 |
| BLU Color | RGB TRIPLE COULORS |

4. MECHANICAL SPECIFICATION

| Item | Specification | Unit |
|---------------------|---|-----------|
| Dimensional Outline | 76.1(W) ×100.3(H) ×10.5(T) (include component of FFC) | mm |
| View Area | 70.7(W)×38.9(H) | mm |
| Active Area | 66.52(W)×33.24(H) | mm |
| Dots Pitch | 0.52(W)×0.52(H) | mm |
| Dots Size | 0.48(W)×0.48(H) | mm |

5 . MECHANICAL SPECIFICATION



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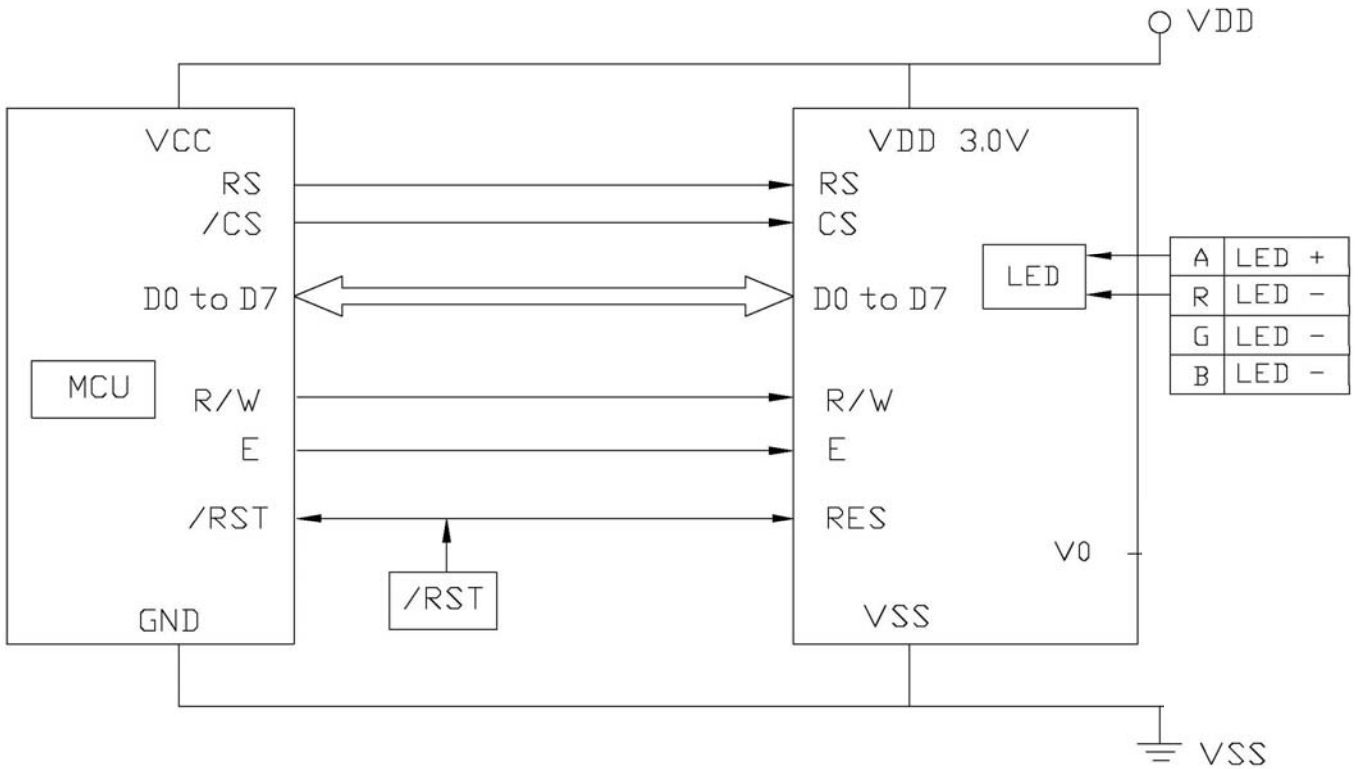
6. MODULE FUNCTION DESCRIPTION

6. 1. PINS DESCRIPTION

| Pin NO. | Symbol | Description |
|---------|------------------|---|
| 1 | VSS | GND |
| 2 | VDD(3.0V) | Positive power supply terminal |
| 3 | V0 | Internal DC/DC voltage converter output |
| 4 | RES | Reset Pin. When RES is set to LOW, the LCM settings are initialized. |
| 5 | CS | Chip select signal for LCD driving IC |
| 6 | RS | This determines whether the data bits are data or a command. RS=HIGH: Indicates that D0 to D7 are display data. RS=LOW: Indicates that D0 to D7 are control data. |
| 7 | R/W | When connected to a 6800 series MPU This is the read/write control signal input terminal When R/W=HIGH: Read. When R/W=LOW: Write. |
| 8 | E | When connected to a 6800 Series MPU, this is active HIGH. This is the 6800 Series MPU enable clock input terminal. |
| 9~16 | D0~D7 | This is an 8-bit bi-directional data bus that connects to an 8-bit or 16-bit standard MPU data bus. When the chip select is inactive, D0 to D7 are set to high impedance. |
| 17 | A | Power supply for LED backlight(0V) |
| 18 | K(R) | Power supply for LED backlight(-4V) |
| 19 | K(G) | Power supply for LED backlight(-6V) |
| 20 | K(B) | Power supply for LED backlight(-6V) |

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6.2. REFERENCE CIRCUIT



6.3. TABLE OF INSTRUCTIONS

| Command | Command Code | | | | | | | | Function | | | | |
|----------------------------------|--------------|-----|-----|----------------------------------|----|-----------------------|----|----------------------------------|----------|----|----|---|---|
| | A0 | /RD | /WR | D7 | D6 | D5 | D4 | D3 | | D2 | D1 | D0 | |
| (1) Display ON/OFF | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | LCD display ON/OFF 0:OFF, 1:ON |
| (2) Display start line set | 0 | 1 | 0 | 0 | 1 | Display start address | | | | | | Sets the display RAM display start line address | |
| (3) Page address set | 0 | 1 | 0 | 1 | 0 | 1 | 1 | Page address | | | | Sets the display RAM page address | |
| (4) Column address set upper bit | 0 | 1 | 0 | Most significant column address | | | | Least significant column address | | | | Sets the most significant 4 bits of the display RAM column address. Sets the least significant 4 bits of the display RAM column address. | |
| Column address set lower bit | 0 | 1 | 0 | Least significant column address | | | | | | | | | |
| (5) Status read | 0 | 0 | 1 | Status | | | | 0 | 0 | 0 | 0 | 0 | Reads the status data |
| (6) Display data write | 1 | 1 | 0 | Write data | | | | | | | | Writes to the display RAM | |
| (7) Display data read | 1 | 0 | 1 | Read data | | | | | | | | Reads from the display RAM | |
| (8) ADC seckect | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Sets the display RAM address SEG output correspondence 0: normal, 1: reverse |
| (9) Display normal/reverse | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | Sets the LCD display normal/reverse |

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| | | | |
|---|----------------|--|--|
| | | | 0: normal, 1:reverse |
| (10) Display all points ON/OFF | 0 1 0 | 1 0 1 0 0 1 0 0 1 | Display all points 0: normal display, 1:all points ON |
| (11) LCD bias set | 0 1 0 | 1 0 1 0 0 0 1 0 1 | Sets the LCD drive voltage Bias ratio S1D10605*****.....0:1/9, 1: 1/7 S1D10606***** /S1D10608***** /S1D10609*****.....0: 1/8, 1: 1/6 S1D10607*****..... 0: 1/6, 1: 1/5 |
| (12) Read/modify/write | 0 1 0 | 1 1 1 0 0 0 0 0 | Column address increment At write: +1 At read: 0 |
| (13) End | 0 1 0 | 1 1 1 0 1 1 1 0 | Clear read/modify/write |
| (14) Reset | 0 1 0 | 1 1 1 0 0 0 1 0 | Internal reset |
| (15) Common output mode select | 0 1 0 | 1 1 0 0 0 * * * 1 | Select COM output scan direction 0: normal direction. 1: reverse direction |
| (16) Power control set | 0 1 0 | 0 0 1 0 1 | Operating mode Select internal power supply operating mode |
| (17) V5 voltage Regulator internal Resistor ratio set | 0 1 0 | 0 0 1 0 0 | Resistor ratio Select internal resistor ratio (Rb/Ra) mode |
| (18) Electronic volume Mode set Electronic volume Register set | 0 1 0 0 1 0 | 1 0 0 0 0 0 0 1 * * Electronic volume value | Set the flashing mode |
| (19) Static indicator ON/OFF Static indicator Register set | 0 1 0 0 1 0 | 1 0 0 0 0 0 0 1 * * * * * mode | 0: OFF, 1: ON Set the flashing mode |
| (20) Power saver | | | Display OFF and display all Point ON compound command |
| (21) NOP | 0 1 0 | 1 1 1 0 0 0 1 1 | Command for non-operation |
| (22) Test | 0 1 0 | 1 1 1 1 * * * * | Command for IC test. Do not use this command |

(Note): *: disabled data

More detail please refer to the datasheet of **S1D10605 OR COMPATIBLE IC**

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7. MAXIMUM RATINGS

| Item | Symbol | Rating | Unit |
|-------------------------------------|---------------------------------|--|------|
| Power Supply Voltage | V _{DD} | -0.3 to +6.0 | V |
| Power Supply voltage (VDD standard) | V ₅ V _{OUT} | -18.0 to 0.3 | V |
| Input voltage range | V _{IN} | -0.3 to VDD + 0.3 | |
| BLU Reverse Voltage | V _r | V _{rR} =4 V _{rG} =5 V _{rB} =5 | V |
| BLU Power Description | P _d | pd _R =320 pd _G =320 pd _B =320 | mW |
| Operating Temperature Range | T _{OPR} | -10°C TO +60°C | °C |
| Storage Temperature Range | T _{STR} | -20°C TO +70°C | °C |
| LIFE TIMES(NOTES) | | 50,000 | h |

NOTES: Under rating conditions, the life time large than 50000hrs.

8. ELECTRICAL CHARACTERISTICS

8. 1. DC CHARACTERISTICS OF LOGICAL OPERATION

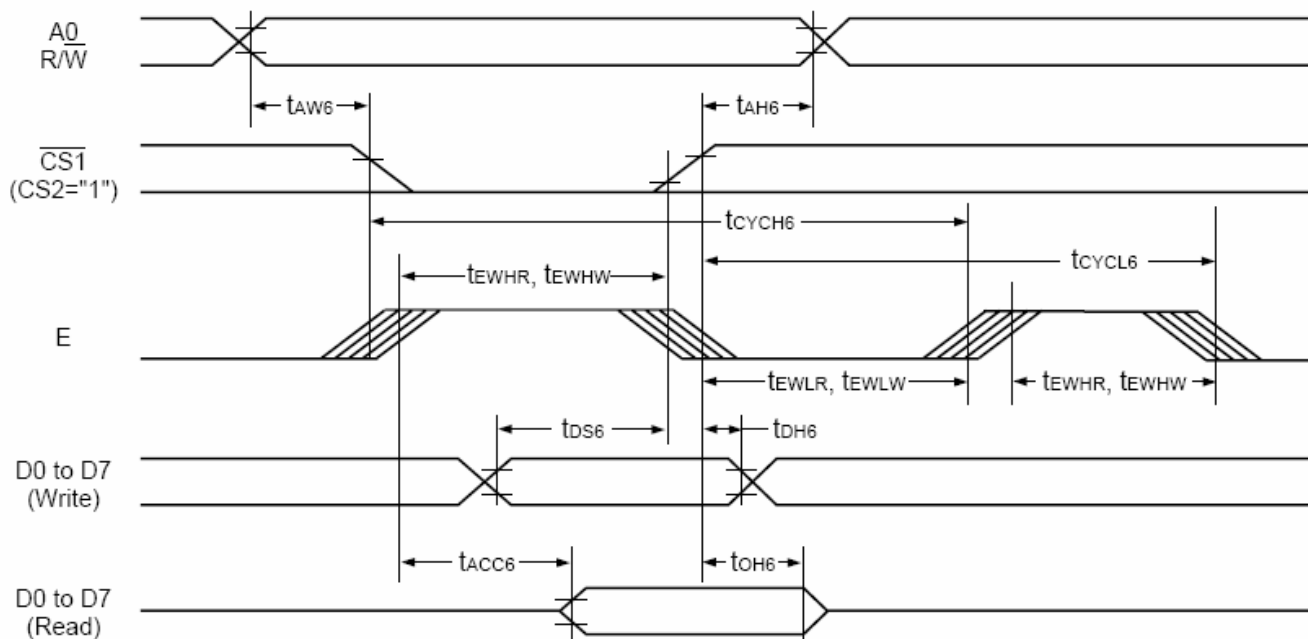
| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|----------------------------------|------------------|--------------|-----------|------|-----------|------|
| Logical Operating Supply Voltage | V _{DD} | T=25°C | 2.7 | - | 3.3 | V |
| Input Voltage H Level | V _{IH} | T=25°C | 0.8 x VDD | - | VDD | V |
| Input Voltage L Level | V _{IL} | T=25°C | VSS | - | 0.2 x VDD | V |
| Current Consumption | I _{DD} | Standby Mode | - | 160 | 270 | μA |
| LCD Driving Voltage | V _{LCD} | T=25°C | 10.4 | 10.5 | 10.6 | V |

8. 2. CHARACTERISTICS OF BLU

| Item | Symbol | BLUE | | | GREEN | | | RED | | | Unit | Condition |
|--------------------------|----------------|------|-----|-----|-------|-----|-----|-----|-----|-----|-------------------|--|
| | | min | typ | max | min | typ | max | min | typ | max | | |
| Forward Voltage | V _f | 5.7 | 6.0 | 6.3 | 5.7 | 6.0 | 6.3 | 3.8 | 4.0 | 4.2 | V | If _B =80mA If _G =80mA If _R = 40mA |
| Reverse Current | I _r | | 40 | 200 | | 40 | 200 | | 40 | 200 | uA | V _{rB} =5 V _{rG} =5 V _{r,R} =4 |
| Peak wave length | λ _p | 465 | | 470 | 520 | | 525 | 620 | | 625 | nm | If _B =80mA If _G =80mA If _R = 40mA |
| Spectral Line Half width | Δλ | | 20 | | | 20 | | | 35 | | nm | If _B =80mA If _G =80mA If _R = 40mA |
| Luminance | L _v | | 30 | | | 110 | | | 25 | | CD/m ² | If _B =80mA If _G =80mA If _R = 40mA |

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8. 3. TIMING CHARACTERISTICS



System Bus Read/Write Characteristics (6800 Series MPU)

(VDD = 2.7 V to 3.6 V, Ta = -40 to +85°C)

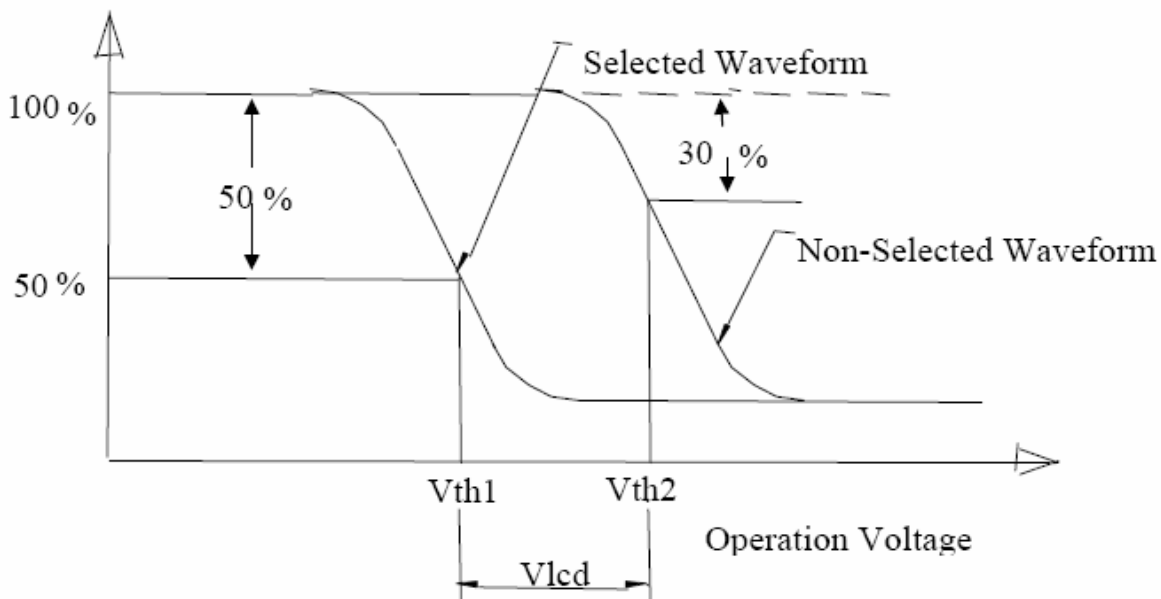
| Item | Signal | Symbol | Condition | Rating | | Units |
|------------------------|---------------|--------|-------------|--------|------|-------|
| | | | | Min. | Max. | |
| Address hold time | A0 | tAH6 | | 0 | — | ns |
| Address setup time | A0 | tAW6 | | 0 | — | ns |
| System cycle time 1 | A0 | tCYCH6 | | 300 | — | ns |
| System cycle time 2 | A0 | tCYCL6 | | 300 | — | ns |
| Data setup time | D0 to D7 | tDS6 | | 40 | — | ns |
| Data hold time | | tDH6 | | 15 | — | ns |
| Access time | | tACC6 | CL = 100 pF | — | 140 | ns |
| Output disable time | | tOH6 | | 10 | 100 | ns |
| Enable HIGH pulse time | Read Write | E | tEWHR | 120 | — | ns |
| | | | tEWHW | 60 | — | ns |
| Enable LOW pulse time | Read Write | E | tEWLR | 60 | — | ns |
| | | | tEWLW | 60 | — | ns |

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9. ELECTRO-OPTICAL CHARACTERISTICS

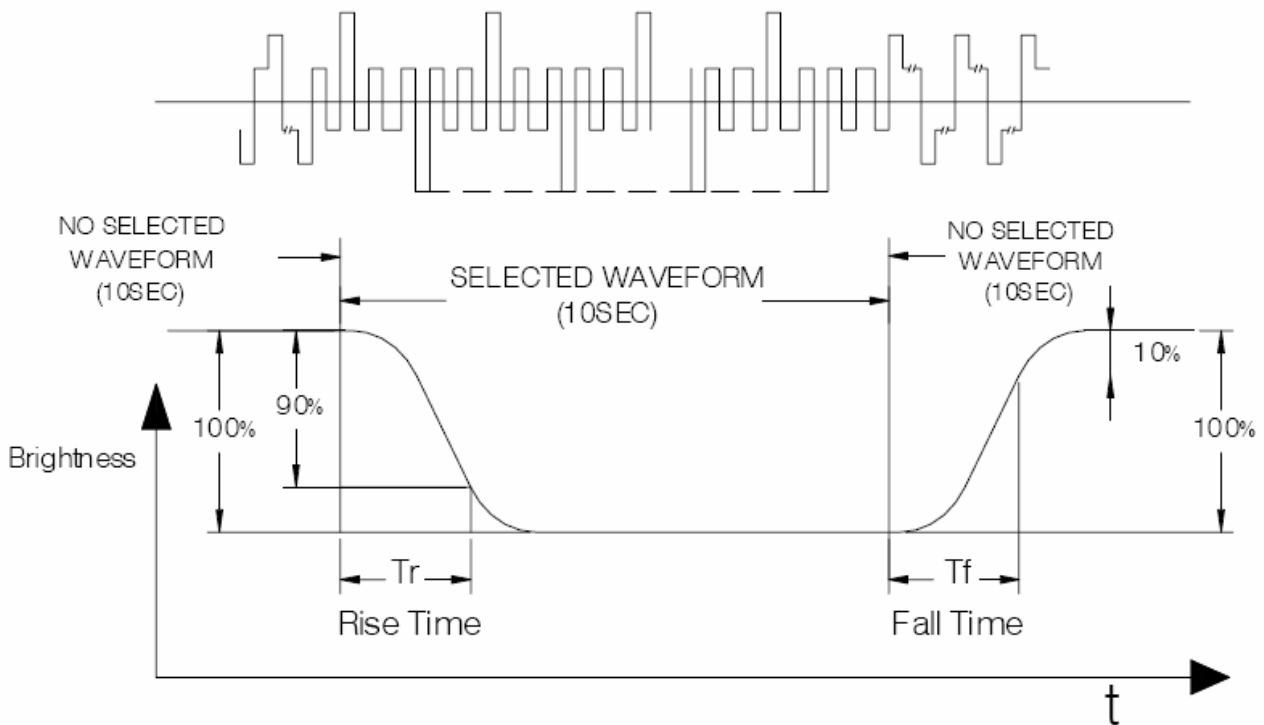
| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|----------------------------|-----------------------------------|----------------------------|------|----------|------|------|
| LCD driving Voltage(NOTE1) | VLCD | T=0°C | | | | V |
| | | T=25°C | 10.4 | 10.5 | 10.6 | V |
| | | T=50°C | | | | V |
| Response Time(NOTE2) | Rise Time (Tr) | T=25°C | 150 | 190 | 250 | ms |
| | Fall Time (Tf) | | 150 | 200 | 200 | ms |
| Contrast Ratio(NOTE4) | Cr | T=25°C $\theta = \psi = 0$ | | ≥ 4 | | --- |
| Viewing Angle Range(NOTE3) | $\theta (\psi = 0^\circ)$ (6") | T=25°C CR ≥ 2 | | 45 | | Deg |
| | $\theta (\psi = 90^\circ)$ (3") | | | 42 | | Deg |
| | $\theta (\psi = 180^\circ)$ (12") | | | 35 | | Deg |
| | $\theta (\psi = 270^\circ)$ (9") | | | 42 | | Deg |

NOTE1 Definition of Driving Voltage(Vlcd) :

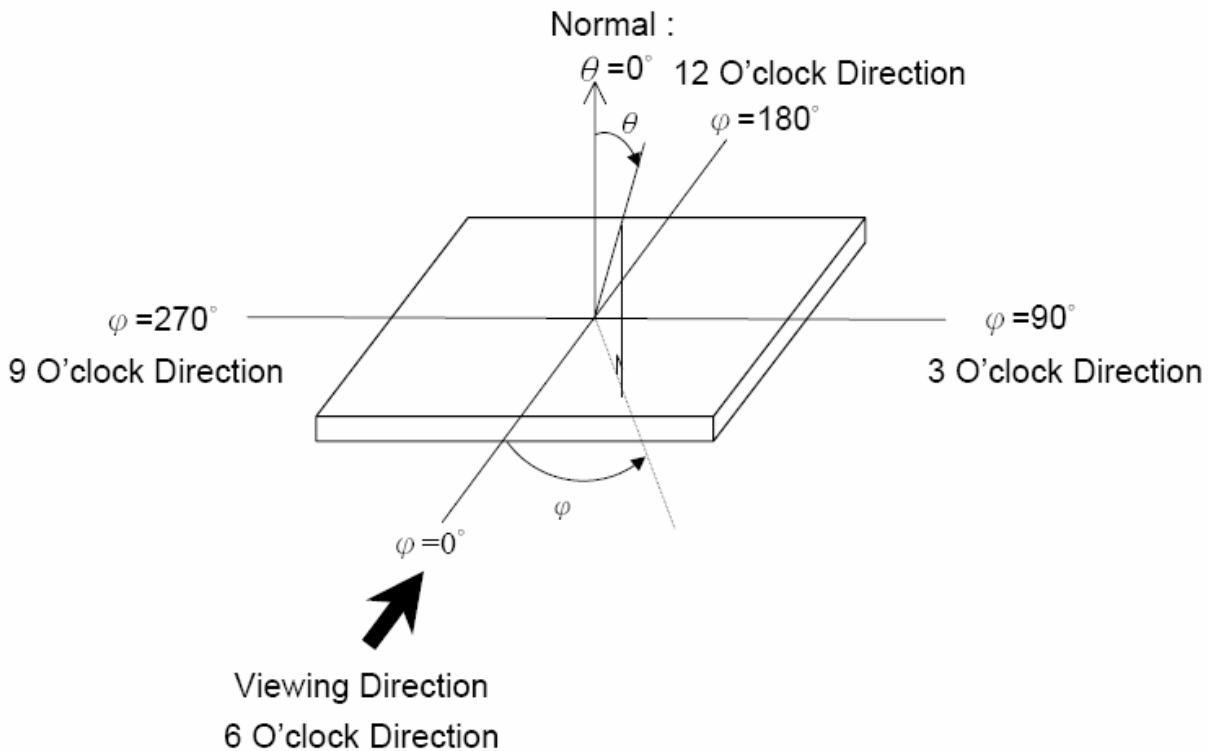


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NOTE2 Definition of Optical Response Time :



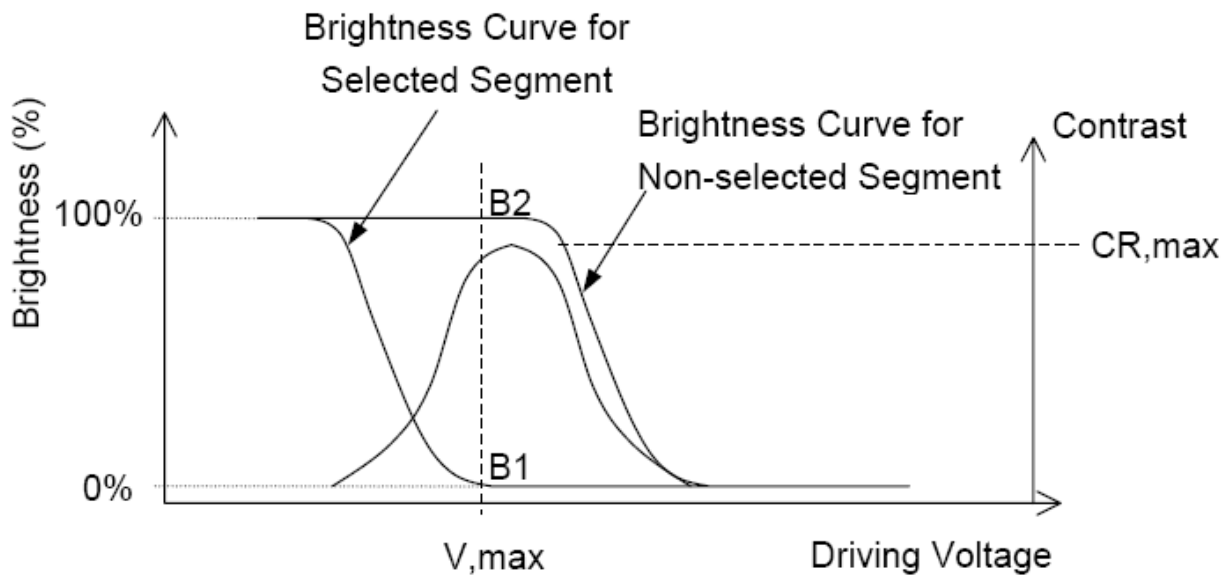
NOTE3 Definition of Viewing Angle θ and ψ :



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NOTE4 Definition of Contrast ratio(CR) :

$$CR = \frac{\text{Brightness of Non-selected Segment (B2)}}{\text{Brightness of Selected Segment (B1)}}$$



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10. RELIABILITY TESTS

| NO. | Item | Condition | Criterion |
|-----|-------------------------------|--|--|
| 1 | High temperature operation | +60°C 8h | Total current consumption should be below double of initial value. Cosmetic defects should not be happened. No Defect Of Operational Function In Room Temperature Are Allowable. |
| 2 | Low temperature operation | -10°C 8h | |
| 3 | Humidity (without polarizer) | 40°C 90%RH 24h | |
| 4 | High temperature storage | +70°C 8h | |
| 5 | Low temperature storage | -20°C 8h | |
| 6 | Thermal shock storage | -10°C→25°C→80°C→25°C 30min→5min→30min→5min 3 cycle | |
| 7 | Vibration (Package state) | 10~150Hz 5m/s2 45min | |
| 8 | Falling test (Packaged state) | 1000mm | |
| 9 | | | |

Notes: Judgments should be made after exposure in room temperature for two hours.

11. PRECAUTIONS FOR USING LCD MODULES

11.1. HANDLING PRECAUTIONS

(1) The display panel is made of glass. Do not subject it to a mechanical shock or impact by dropping it.

(2) If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.

(3) Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

(4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

(5) If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten a cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

(6) Solvents other than those above mentioned may damage the polarizer.

Especially, do not use the following:

- Water
- Ketone
- Aromatic solvents

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(7) Extra care to minimize corrosion of the electrode. Water droplets, moisture condensation or a current flow in a high-humidity environment accelerates corrosion of the electrode.

(8) Install the LCD Module by using the mounting holes. When mounting the LCD Module, make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.

(9) Do not attempt to disassemble or process the LCD Module.

(10) NC terminal should be open. Do not connect anything.

(11) If the logic circuit power is off, do not apply the input signals.

(12) To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

- Be sure to ground the body when handling the LCD Module.

- Tools required for assembling, such as soldering irons, must be properly grounded.

-To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions.

-The LCD Module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

11.2. STORAGE CONDITIONS

When storing, avoid the LCD module to be exposed to direct sunlight of fluorescent lamps. For stability, to keep it away from high temperature and high humidity environment (The best condition is : $23\pm 5^{\circ}\text{C}$, $45\pm 20\%\text{RH}$). ESD protection is necessary for long-term storage also.

11.3. OTHERS

(1) Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.

(2) If the LCD Module have been operating for a long time showing the same display patterns the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear.

(3) A normal operating status can be recovered by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

(4) To minimize the performance degradation of the LCD Module resulting from destruction caused by static electricity etc. exercise care to avoid holding the following sections when handling the modules.

- Exposed area of the printed circuit board.

- Terminal electrode sections.

12. USING LCD MODULES

12.1 LIQUID CRYSTAL DISPLAY MODULES

LCD is composed of glass and polarizer. Pay attention to the following items when handling.

(1) Please keep the temperature within specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.

(2) Do not touch, push or rub the exposed polarizers with anything harder than a HB pencil

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lead (glass, tweezers, etc).

(3) N-hexane is recommended for cleaning the adhesives used to attach front/rear polarizers and reflectors made of organic substances, which will be damaged by chemicals such as acetone, toluene, ethanol and isopropyl alcohol.

(4) When the display surface becomes dusty, wipe gently with absorbent cotton or other soft material like chamois soaked in petroleum ether. Do not scrub hard to avoid damaging the display surface.

(5) Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading.

(6) Avoid contacting oil and fats.

(7) Condensation on the surface and contact with terminals due to cold will damage, stain or polarizers. After products are tested at low temperature they must be warmed up in a container before coming in contact with room temperature air.

(8) Do not put or attach anything on the display area to avoid leaving marks on.

(9) Do not touch the display with bare hands. This will stain the display area and degrade insulation between terminals (some cosmetics are determinate to the polarizers).

(10) As glass is fragile, it tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring.

12.2 INSTALLING LCD MODULE

Attend to the following items when installing the LCM.

(1) Cover the surface with a transparent protective plate to protect the polarizer and LC cell.

(2) When assembling the LCM into other equipment, the spacer to the bit between the LCM and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements. The measurement tolerance should be $\pm 0.1\text{mm}$.

12.3 ELECTRO-STATIC DISCHARGE CONTROL

Since this module uses a CMOS LSI, the same careful attention should be paid for electrostatic discharge as for an ordinary CMOS IC.

(1) Make certain that you are grounded when handling LCM.

(2) Before removing LCM from its packing case or incorporating it into a set, be sure the module and your body have the same electric potential.

(3) When soldering the terminal of LCM, make certain the AC power source for the soldering iron does not leak.

(4) When using an electric screwdriver to attach LCM, the screwdriver should be of ground potential to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.

(5) As far as possible, make the electric potential of your work clothes and that of the workbenches to the ground potential.

(6) To reduce the generation of electro-static discharge, be careful that the air in the work is not too dried. A relative humidity of 50%-60% is recommended

12.4 PRECAUTIONS FOR OPERATION

(1) Viewing angle varies with the change of liquid crystal driving voltage (V_0). Adjust V_0 to show the best contrast.

(2) Driving the LCD in the voltage above the limit will shorten its lifetime.

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(3) Response time is greatly delayed at temperature below the operating temperature range. However, this does not mean the LCD will be out of the order. It will recover when it returns to the specified temperature range.

(4) If the display area is pushed hard during operation, the display will become abnormal. However, it will return to normal if it is turned off and then on.

(5) Condensation on terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore, this product must be used and stored within the specified condition of $23\pm 5^{\circ}\text{C}$, $45\pm 20\%\text{RH}$.

(6) When turning the power on, input each signal after the positive/negative voltage becomes stable.

12.5 SAFETY

(1) It is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.

(2) If any liquid leaks out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

13 Inspection Standard

13.1 Inspection conditions

13.1.1 The environment conditions for inspection shall be as follows:

Room temperature: $25\pm 5^{\circ}\text{C}$

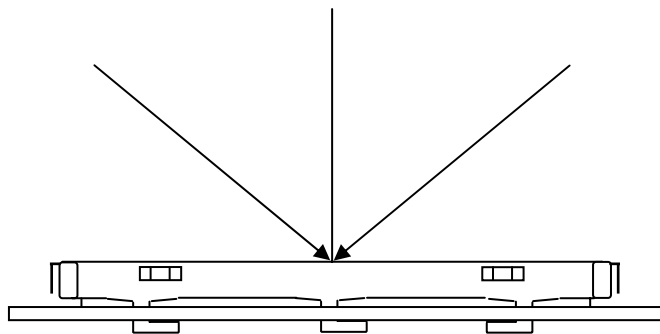
Humidity: $65\pm 20\%\text{RH}$

13.1.2 Manner of appearance test

13.1.2.1 The test must be under 20w X2 or 40w fluorescent light, and the distance of view must be at $30\pm 5\text{ cm}$.

13.1.2.2 When test the model of transmissive product must add the reflective plate.

13.1.2.3 The test direction is base on about around 45° of vertical line.

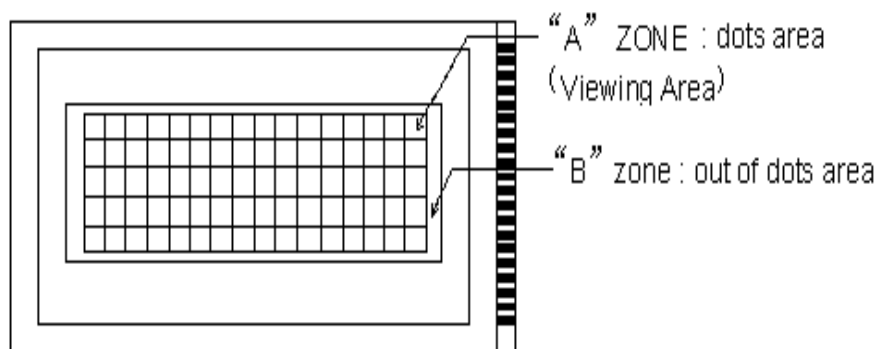


13.1.2.4 Definition of area:

A area: view area.

B area: out of view area (outside dots area).

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13.2. Sampling procedures for each item's acceptance level table

| Defect type | Sampling procedures | AQL |
|--------------|--|------|
| Major defect | MIL-STD-105E single sampling plans for normal inspection | 0.65 |
| Minor defect | MIL-STD-105E single sampling plans for normal inspection | 1.00 |

13.3. Classification of defects

13.3.1 Major defect

A major defect refers to a defect that is considered to substantially degrade usability for product applications.

13.3.2 Minor defect

A minor defect refers to a defect that is not considered to substantially degrade product application, or a defect that deviates from existing standards almost unrelated to the effective use of the product or its operation

13.4. Basic sampling principle

13.4.1 It will accord to the AQL when the standard can not be described.

13.4.2 The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.

13.4.3 Must add new item on time when it is necessary.

13.5. Nonconforming analysis and Deal With Manner

13.5.1 Nonconforming analysis

13.5.1.1 Customer should supply the detail data of nonconforming sample and the unsuitable sample.

13.5.1.2 After accepting the detail from the customer, the analysis of nonconforming should be finished in two weeks.


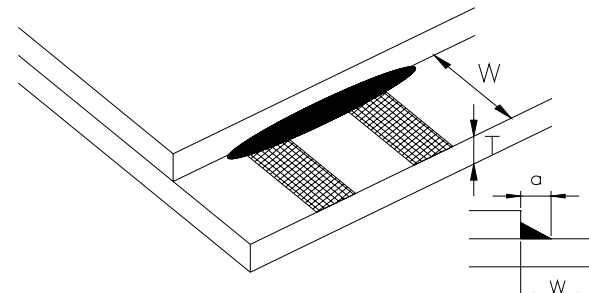
13.5.2 Disposition of nonconforming

Both supplier and customer should analyze the reason together and discuss the disposition of nonconforming when the reason of nonconforming is not sure.

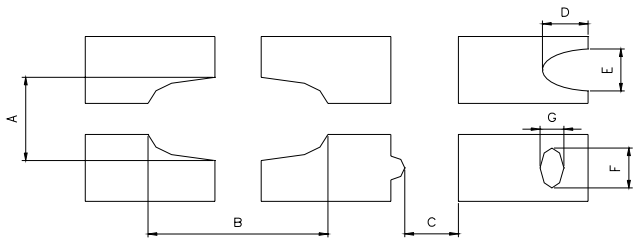
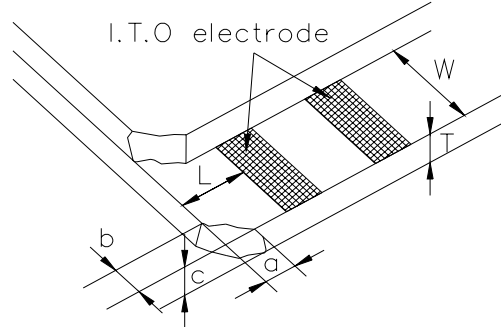
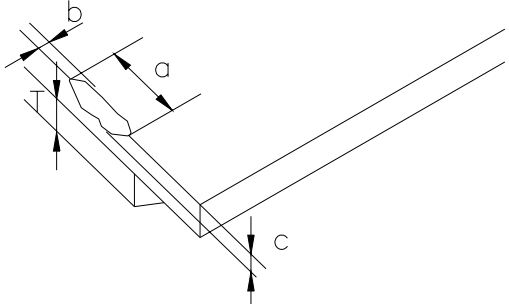
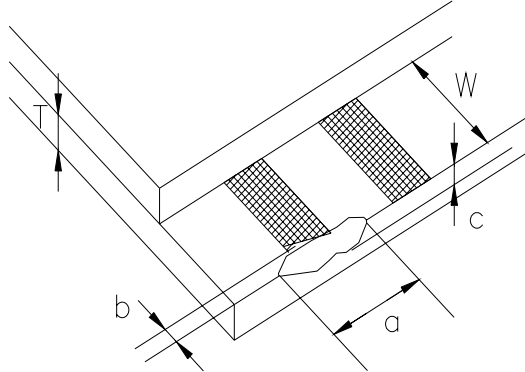
13.6 Standard of inspection (unit: mm)

| NO | Items | Criterion of defects | AQL |
|----|------------|-----------------------------------|-------|
| 01 | Electrical | 1.Display missing, Short-circuit; | Minor |

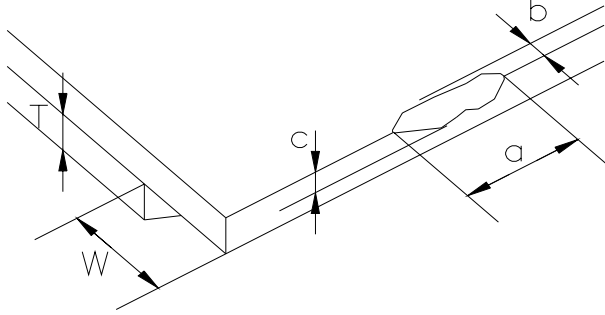
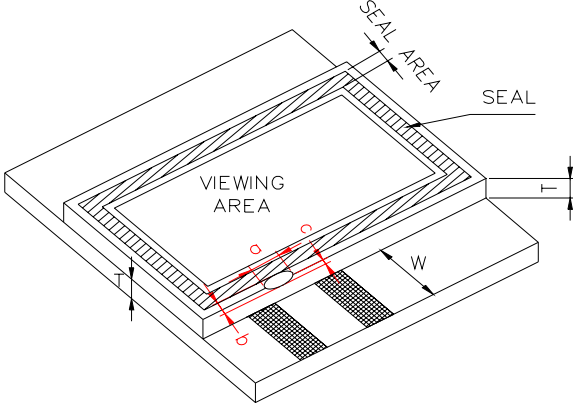
PRODUCTION SPECIFICATION

| | testing | 2.No display, display malfunction; 3.Current consumption exceeds product specifications; 4.LCD viewing angle fault; 5.Mixed wrong type products; 6.Contrast fault. | | | | | | | | | | | | | | | | | | | |
|----------------------|---|--|--|-------------------|-------------------|---------------|----------------------|----------------------|----------------------|----------------------|------------|----------------------|---------------|--------------|----------------------|---------------|---|------------|------------|---|--------------|
| 02 | Black or white spots on LCD (display only) | 1.Spots on display should be less than (\cong) 0.25mm on display 2.No more than 3 white or black spots present. 3.No more than 2 spots or lines within 3mm. | | | Minor | | | | | | | | | | | | | | | | |
| 03 | Black or white spots (non-display) Contamination (non-display) | $D=(A+B)/2$  | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Size D</th> <th style="text-align: center;">Acceptable number</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$D \leq 0.15$</td> <td style="text-align: center;">Ignore</td> </tr> <tr> <td style="text-align: center;">$0.15 < D \leq 0.20$</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">$0.20 < D \leq 0.25$</td> <td style="text-align: center;">2</td> </tr> <tr> <td style="text-align: center;">$0.25 < D \leq 0.30$</td> <td style="text-align: center;">1</td> </tr> </tbody> </table> | Size D | Acceptable number | $D \leq 0.15$ | Ignore | $0.15 < D \leq 0.20$ | 3 | $0.20 < D \leq 0.25$ | 2 | $0.25 < D \leq 0.30$ | 1 | Minor | | | | | | | |
| Size D | Acceptable number | | | | | | | | | | | | | | | | | | | | |
| $D \leq 0.15$ | Ignore | | | | | | | | | | | | | | | | | | | | |
| $0.15 < D \leq 0.20$ | 3 | | | | | | | | | | | | | | | | | | | | |
| $0.20 < D \leq 0.25$ | 2 | | | | | | | | | | | | | | | | | | | | |
| $0.25 < D \leq 0.30$ | 1 | | | | | | | | | | | | | | | | | | | | |
| 04 | Dark lines And scratches | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Width</th> <th style="text-align: center;">Length</th> <th style="text-align: center;">Acceptable number</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$W \leq 0.03$</td> <td style="text-align: center;">$L \leq 3.00$</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">$0.03 < W \leq 0.05$</td> <td style="text-align: center;">$L \leq 2.00$</td> <td style="text-align: center;">2</td> </tr> <tr> <td style="text-align: center;">$0.05 < W \leq 0.08$</td> <td style="text-align: center;">$L \leq 2.00$</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">$0.08 < W \leq 0.10$</td> <td style="text-align: center;">$L \leq 3.00$</td> <td style="text-align: center;">0</td> </tr> <tr> <td style="text-align: center;">$W > 0.10$</td> <td style="text-align: center;">$L > 3.00$</td> <td style="text-align: center;">0</td> </tr> </tbody> </table> | Width | Length | Acceptable number | $W \leq 0.03$ | $L \leq 3.00$ | 3 | $0.03 < W \leq 0.05$ | $L \leq 2.00$ | 2 | $0.05 < W \leq 0.08$ | $L \leq 2.00$ | 1 | $0.08 < W \leq 0.10$ | $L \leq 3.00$ | 0 | $W > 0.10$ | $L > 3.00$ | 0 | Minor |
| Width | Length | Acceptable number | | | | | | | | | | | | | | | | | | | |
| $W \leq 0.03$ | $L \leq 3.00$ | 3 | | | | | | | | | | | | | | | | | | | |
| $0.03 < W \leq 0.05$ | $L \leq 2.00$ | 2 | | | | | | | | | | | | | | | | | | | |
| $0.05 < W \leq 0.08$ | $L \leq 2.00$ | 1 | | | | | | | | | | | | | | | | | | | |
| $0.08 < W \leq 0.10$ | $L \leq 3.00$ | 0 | | | | | | | | | | | | | | | | | | | |
| $W > 0.10$ | $L > 3.00$ | 0 | | | | | | | | | | | | | | | | | | | |
| 05 | Bubble in polarizer | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Size D</th> <th style="text-align: center;">Acceptable number</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$D \leq 0.20$</td> <td style="text-align: center;">Ignore</td> </tr> <tr> <td style="text-align: center;">$0.20 < D \leq 0.40$</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">$0.40 < D \leq 0.60$</td> <td style="text-align: center;">2</td> </tr> <tr> <td style="text-align: center;">$0.60 < D$</td> <td style="text-align: center;">0</td> </tr> </tbody> </table> | Size D | Acceptable number | $D \leq 0.20$ | Ignore | $0.20 < D \leq 0.40$ | 3 | $0.40 < D \leq 0.60$ | 2 | $0.60 < D$ | 0 | Minor | | | | | | | | |
| Size D | Acceptable number | | | | | | | | | | | | | | | | | | | | |
| $D \leq 0.20$ | Ignore | | | | | | | | | | | | | | | | | | | | |
| $0.20 < D \leq 0.40$ | 3 | | | | | | | | | | | | | | | | | | | | |
| $0.40 < D \leq 0.60$ | 2 | | | | | | | | | | | | | | | | | | | | |
| $0.60 < D$ | 0 | | | | | | | | | | | | | | | | | | | | |
| 06 | Glass rest |  <p style="text-align: right;">$a \cong$</p> | | | Minor | | | | | | | | | | | | | | | | |
| | | $1/4W$ | | | | | | | | | | | | | | | | | | | |

PRODUCTION SPECIFICATION

| | | | | | | | | | | | | | | | |
|---------------------|----------------------------|--|--------------|---|---|------------|---------------------|---------------------|------------|--------|---------------------|-----------------------|------------|---|--------------|
| 07 | Display Pattern |  <p> $(A+B)/2 \leq 0.25$ $C \geq 0$ <i>Dot type (unit: mm)</i> $(D+E)/2 \leq 0.25$ $(F+G)/2 \leq 0.25$ Note: (1) Acceptable up to 3 damages. (2) If there're two or more pinholes per digit, it is rejected. </p> | Minor | | | | | | | | | | | | |
| 08 | Chip in corner |  <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tbody> <tr> <td style="text-align: center;">a</td> <td style="text-align: center;">b</td> <td style="text-align: center;">c</td> <td style="text-align: center;">Acceptable</td> </tr> <tr> <td style="text-align: center;">$a < 4\text{mm}$</td> <td style="text-align: center;">$b \leq W$</td> <td style="text-align: center;">$C \leq T$</td> <td style="text-align: center;">3</td> </tr> </tbody> </table> | a | b | c | Acceptable | $a < 4\text{mm}$ | $b \leq W$ | $C \leq T$ | 3 | Minor | | | | |
| a | b | c | Acceptable | | | | | | | | | | | | |
| $a < 4\text{mm}$ | $b \leq W$ | $C \leq T$ | 3 | | | | | | | | | | | | |
| 09 | Chip in other sides |  <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tbody> <tr> <td style="text-align: center;">a</td> <td style="text-align: center;">b</td> <td style="text-align: center;">b</td> <td style="text-align: center;">Acceptable</td> </tr> <tr> <td style="text-align: center;">$a \leq 3\text{mm}$</td> <td style="text-align: center;">$b \leq 1\text{mm}$</td> <td style="text-align: center;">$c \leq T$</td> <td style="text-align: center;">Ignore</td> </tr> <tr> <td style="text-align: center;">$a \leq 4\text{mm}$</td> <td style="text-align: center;">$b \leq 1.5\text{mm}$</td> <td style="text-align: center;">$c \leq T$</td> <td style="text-align: center;">3</td> </tr> </tbody> </table> | a | b | b | Acceptable | $a \leq 3\text{mm}$ | $b \leq 1\text{mm}$ | $c \leq T$ | Ignore | $a \leq 4\text{mm}$ | $b \leq 1.5\text{mm}$ | $c \leq T$ | 3 | Minor |
| a | b | b | Acceptable | | | | | | | | | | | | |
| $a \leq 3\text{mm}$ | $b \leq 1\text{mm}$ | $c \leq T$ | Ignore | | | | | | | | | | | | |
| $a \leq 4\text{mm}$ | $b \leq 1.5\text{mm}$ | $c \leq T$ | 3 | | | | | | | | | | | | |
| 10 | Chip in pad (1) |  | Minor | | | | | | | | | | | | |

PRODUCTION SPECIFICATION

| | | a | b | c | Acceptable | |
|----|--------------------|---|-----------------------|---------------|------------|--------------------------------------|
| | | $a \leq 2\text{mm}$ | $b \leq W/4$ | $c \leq T$ | Ignore | |
| | | $a \leq 3\text{mm}$ | $b \leq W/4$ | $c \leq T$ | 3 | |
| 11 | Chip in pad (2) |  | | | | Minor |
| | | a | b | b | Acceptable | |
| | | $a \leq 3\text{mm}$ | $b \leq 1\text{mm}$ | $c \leq T$ | Ignore | |
| | | $a \leq 4\text{mm}$ | $b \leq 1.5\text{mm}$ | $c \leq T$ | 3 | |
| 12 | Chip in seal area |  | | | | Minor |
| | | a | b | c | Acceptable | |
| | | $A < 3\text{mm}$ | $b \leq 1.5\text{mm}$ | $c \leq 1/2T$ | 3 | |
| | | Chip is not acceptable if c is greater than 50% of the glass thickness or the seal area is damaged. | | | | |
| 13 | Backlight | 1.Lumination source flickers. 2.Using spot, lines and contamination standard of LCD to judge the spots or scratches defect on backlight. 3.Not allow unlighted on backlight. 4.Color and luminance of backlight should correspond its specification. | | | | Major Minor Major Major |

PRODUCTION SPECIFICATION

| | | | |
|-----------|---------------------------|--|---|
| 14 | PCB, COB | <p>1.COB seal may not have pinholes larger than 0.2mm or contamination.</p> <p>2.COB seal surface may not have pinholes through to the IC.</p> <p>3.The height of the COB should not exceed.</p> <p>4.Beyond 2mm of the seal area, there may not have sealant on the PCB, and the sealant should be no more than three places.</p> <p>5.No oxidation or contamination on PCB connector.</p> <p>6.Parts on PCB should correspond the characteristic, and not allow wrong parts, missing parts or additional parts.</p> <p>7.The jumper on the PCB should correspond to the characteristic.</p> <p>8.The solder which gets on bezel, LED pad, zebra pad or screw hole pad should be smoothed down.</p> | <p>Minor</p> <p>Minor</p> <p>Minor</p> <p>Minor</p> <p>Minor</p> <p>Major</p> <p>Minor</p> <p>Major</p> |
| 15 | Soldering | <p>1.No un-melted solder pastes on the PCB.</p> <p>2.No cold solder joints, solder connection missing, oxidation of solder.</p> <p>3.No short circuits in components on PCB.</p> | <p>Minor</p> <p>Minor</p> <p>Minor</p> |
| 16 | General Appearance | <p>1.No oxidation, contamination, curves or bends on interface Pin of TCP.</p> <p>2.No cracks on interface pin of TCP.</p> <p>3.No solder residue or solder balls on product.</p> <p>4.The IC on the TCP may not be damaged.</p> <p>5.The top edge of the protective strip on the interface pin must be present or look as if it causes the interface pin to sever.</p> <p>6.The residual rosin or tin oil of soldering (component or chip component) is not turned into brown or black color.</p> <p>7.Sealant on top ITO circuit is not hard.</p> <p>8.Pin type must correspond the specification.</p> <p>9.LCD pin loose or pin missing.</p> <p>10.Packing method correspond the specification.</p> <p>11.Dimension and structure correspond the specification sheet.</p> <p>12.No dirt and break on the heat seal.</p> | <p>Major</p> <p>Minor</p> <p>Minor</p> <p>Minor</p> <p>Minor</p> <p>Minor</p> <p>Major</p> <p>Major</p> <p>Major</p> <p>Major</p> <p>Major</p> <p>Major</p> |