# Microtips
## TECHNOLOGY

Model No: UMSH-8240MD-8T

| Approved By |
|---|
| |

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# Revision record

| Document Revision | Model No. Version No. | Description | Revision by |
|---|---|---|---|
| 0 | UMSH-8240MD-T Version No. 0 | | Jeffry Chen Y.D. Shie 4-Aug-2008 |
| 1 | UMSH-8240MD-1T Version No. 0 | Add touch panel on LCM. | Jeffry Chen Y.D. Shie 23-Jun-2009 |
| 2 | UMSH-8240MD-1T Version No. 1 | 1. Modify the DC Characteristics.<br>2. Modify the Power on/off sequence. | Jeffry Chen Y.D. Shie 15-Sep-2009 |
| 3 | UMSH-8240MD-1T Version No. 2 | Add touch panel information. | Sharon Tsai 10-Jan-2011 |
| 4 | UMSH-8240MD-1T Version No. 3 | Revise the Outline Dimension. | Jeffry Chen Y.D. Shie 20-Jan-2011 |
| 5 | UMSH-8240MD-1T Version No. 4 | Add T/P defined of area A and B. | Jeffry Chen Y.D. Shie 16-Feb-2011 |
| 6 | UMSH-8240MD-5T Version No. 0 | 1. Modify the module thickness.<br>2. Modify the module number from UMSH-8240MD-1T to UMSH-8240MD-5T. | Jeffry Chen Y.D. Shie |
| 7 | UMSH-8240MD-6T Version No. 0 | 1. Remove the T/P.<br>2. Modify the module number from UMSH-8240MD-5T to UMSH-8240MD-6T. | Jeffry Chen Y.D. Shie 22-Jul-2011 |
| 8 | UMSH-8240MD-7T Version No. 0 | 1. Modify the interface pin.<br>2. Add vcom board on LCM.<br>3. Modify the module number from UMSH-8240MD-5T to UMSH-8240MD-7T. | Jeffry Chen Y.D. Shie 12-Nov-2011 |
| 9 | UMSH-8240MD-8T Version No. 0 | 1. Modify the module thickness.<br>2. Modify the interface pin.<br>3. Modify the module number from UMSH-8240MD-T to UMSH-8240MD-8T | Jeffry Chen Y.D. Shie 08-Feb-2012 |
| 10 | UMSH-8240MD-8T Version No. 1 | 1. Change isolation tape color from brown to blue<br>2. FPC stiffener add white line<br>3. Change FPC stiffener material from PET to PI<br>4. Change FPC thickness from 0.16 mm to 0.12 mm. | C.K.T Chen Titan Lo 06-Nov-2017 |
| | | | |

# CONTENTS:

# 1. BASIC SPECIFICATION

### 1.1 Mechanical specifications

| Items | Nominal Dimension | Unit |
|---|---|---|
| Dot Matrix | 800 x RGB x 600 | dots |
| Module Size (W x H x T) | 183 x 141 x 5.6 | mm. |
| Active Area (W x H) | 162 x 121.5 | mm. |
| Dot Pitch (W x H) | 0.0675 x 0.2025 | mm. |
| Driving IC Package | COG | - |
| Module weight | 241 | g |

### 1.2 Display specification

| Display | Descriptions | Note |
|---|---|---|
| LCD Type | 8" TFT | - |
| LCD Mode | Normally White | - |
| Polarizer Mode | Transmissive | - |
| Polarizer UV - Cutting | With | - |
| Polarizer Surface | Normal | - |
| Background Color | White | - |
| Backlight Type | LED | - |
| Backlight Color | White | - |
| Viewing Direction(Gray inversion | 6 O'clock Direction | 1 |

\* Color tone is slightly changed by temperature and driving voltage.

Note 1 : The viewing direction defined in this specification is according to the rubbing direction
of its TFT surface treatment by the TFT glass manufacturer. The grayscale inversion is at
this direction as well. However, the optimal viewing direction for human view is normally
where the color does NOT change to grayscale inversion, and this would be the opposite
site of the specified viewing direction in this specification. In any case we advise customers
to judge by themselves, and be aware of this phenomenon.

# 1.3 Outline dimension
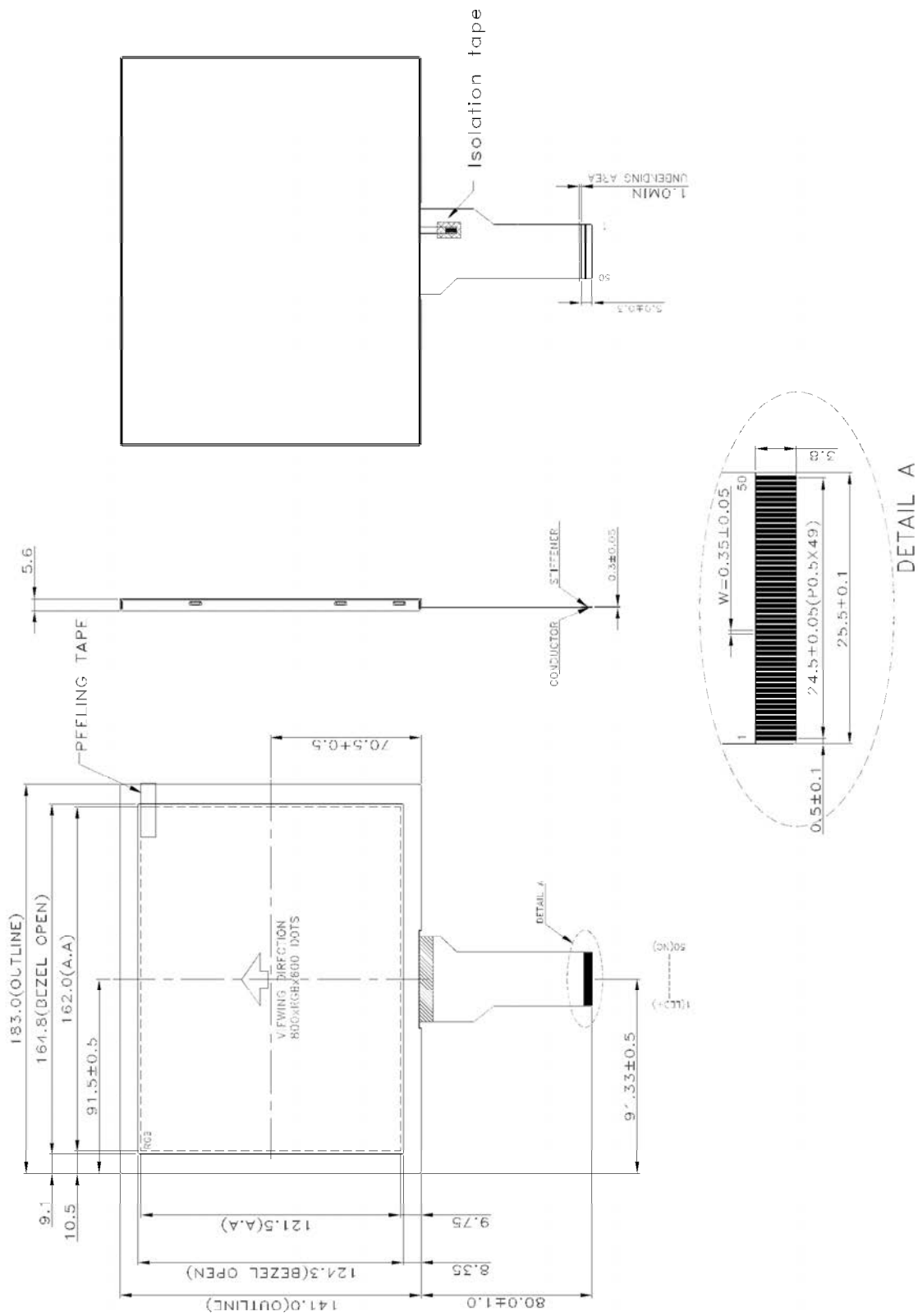
## 1.4 Block diagram:
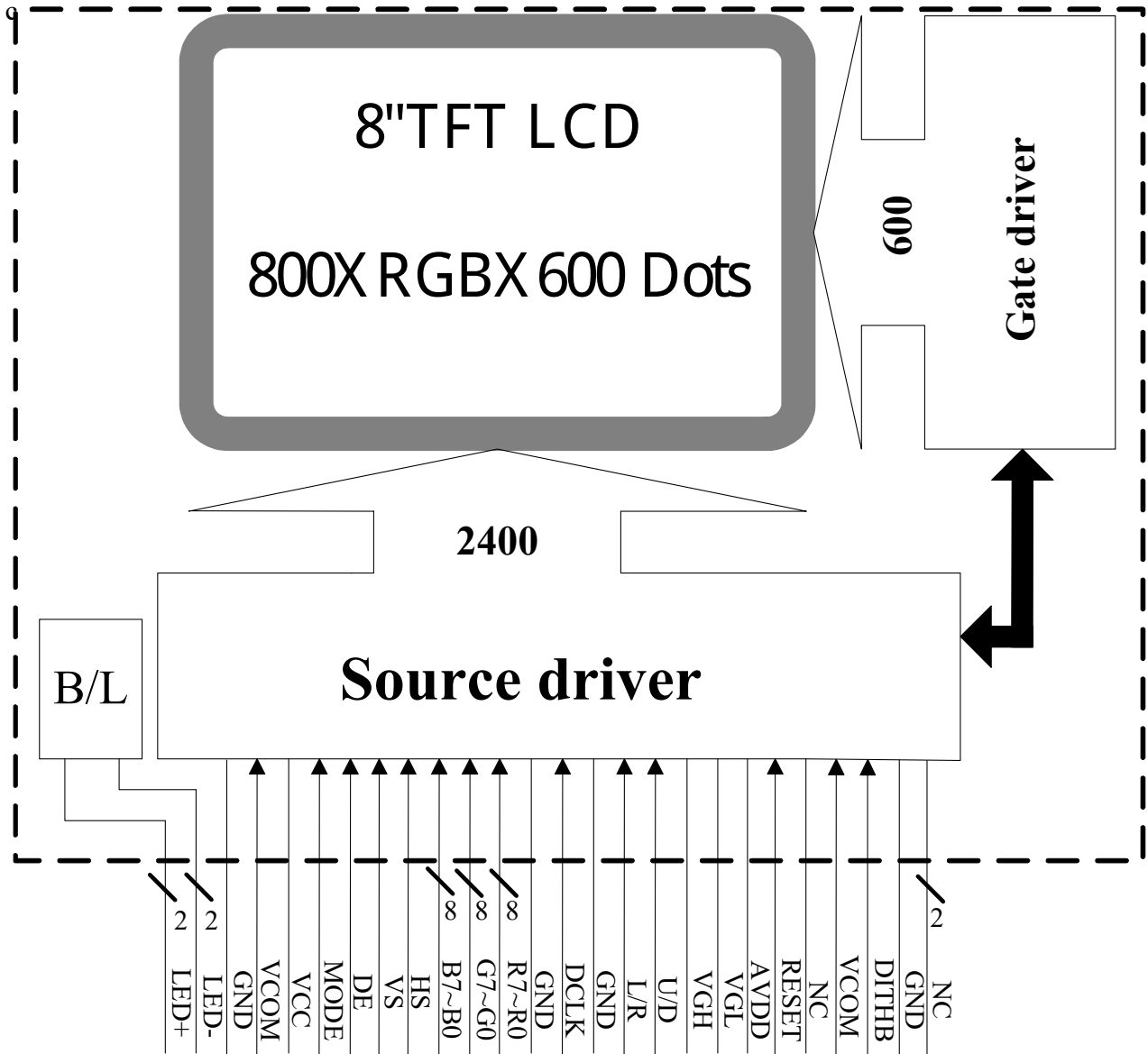
## 1.5 Interface pin :

| Pin No. | Pin Symbol | I/O | Description |
|---------|-----------|-----|-------------|
| 1~2 | LED+ | P | LED Anode. |
| 3~4 | LED- | P | LED Cathode. |
| 5 | GND | P | Power ground. |
| 6 | VCOM | I | Common voltage. |
| 7 | VCC | P | Power for Digital circuit. |
| 8 | MODE | I | DE/SYNC mode select, Normally pull high.<br>H: DE mode.<br>L: HS/VS mode. |
| 9 | DE | I | Data Input Enable. |
| 10 | VS | I | Vertical Sync Input. |
| 11 | HS | I | Horizontal Sync Input. |
| 12~19 | B7~B0 | I | Blue data. |
| 20~27 | G7~G0 | I | Green data. |
| 28~35 | R7~R0 | I | Red data. |
| 36 | GND | P | Power ground. |
| 37 | DCLK | I | Dot clock. |
| 38 | GND | P | Power ground. |
| 39 | L/R | I | Right/ left selection. Note1, 2. |
| 40 | U/D | I | Up/down selection. Note1, 2. |
| 41 | VGH | P | Gate ON voltage. |
| 42 | VGL | P | Gate OFF voltage. |
| 43 | AVDD | P | Power for Analog circuit. |

## 1.5 Interface Pin Connection:(cont.)

| Pin No. | Pin Symbol | I/O | Description |
|---------|-----------|-----|-------------|
| 44 | RESET | I | Global reset pin. Active Low to enter Reset State.<br>Suggest to connecting with an RC reset circuit for stability. Normally pull high. |
| 45 | NC | - | No connection. |
| 46 | VCOM | I | Common voltage. |
| 47 | DITHB | I | Dithering function enable control.Normally pull high.<br>DITHB="1",Disable internal dithering function. For 18bit RGB interface, connect two LSB bits of all the R/G/B data buses to GND.<br>DITHB="0",Enable internal dithering function, For TTL 24bit parallel RGB image data input. |
| 48 | GND | P | Power ground. |
| 49~50 | NC | - | No connection. |

Note 1: Global reset pin. Active Low to enter Reset State. Suggest to connecting with an RC
reset circuit for stability. Normally pull high.

Note 2: Selection of scanning mode

| Setting of scan control input | | Scanning direction |
|---|---|---|
| U/D | R/L | |
| GND | $V_{CC}$ | Up to down, left to right |
| $V_{CC}$ | GND | Down to up, right to left |
| GND | GND | Up to down, right to left |
| $V_{CC}$ | $V_{CC}$ | Down to up, left to right |

Note 3: DE/SYNC mode select, Normally pull high.
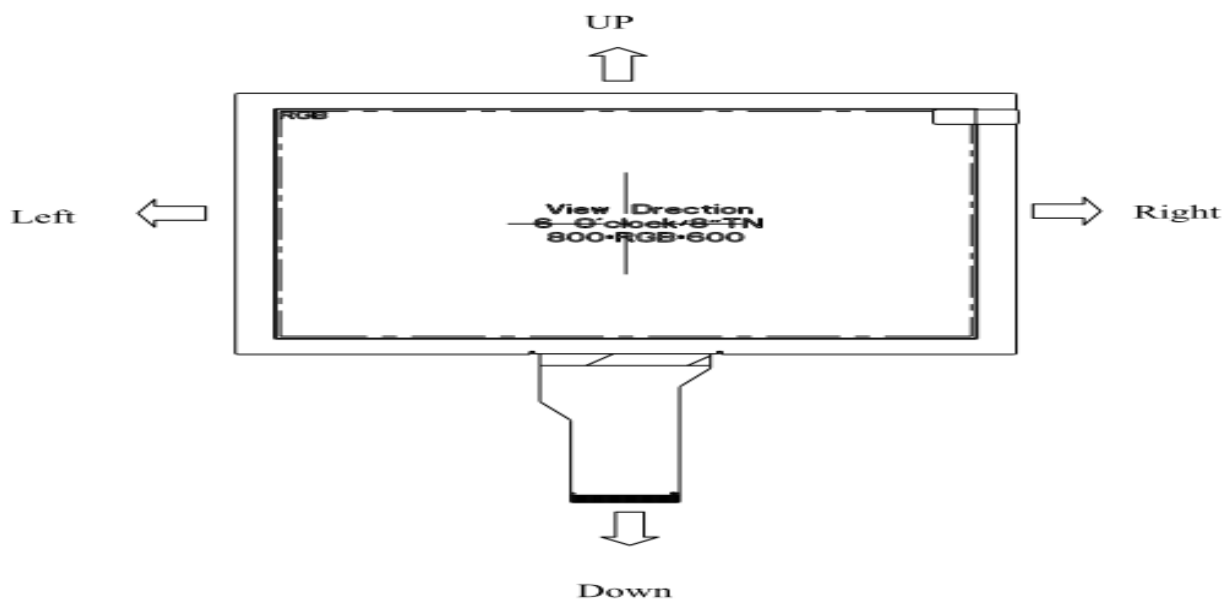    H: DE mode.
    L: HS/VS mode.
Note4: Dithering function enable control. Normally pull high.
    DITHB="1",Disable internal dithering function. For 18bit RGB interface, connect
        two LSB bits of all the R/G/B data buses to GND.
    DITHB="0",Enable internal dithering function, For TTL 24bit parallel RGB   image
        data input.

Note 5: Definition of scanning direction.
    Refer to the figure as below:

# 2. ELECTRICAL CHARACTERISTICS

## 2.1 Absolute Maximum Ratings

(GND=AV$_{SS}$=0V, Note 1)

| Item | Symbol | Values | | Unit | Remark |
|---|---|---|---|---|---|
| | | Min. | Max. | | |
| 5Power voltage | V$_{CC}$ | -0.3 | 5 | V | |
| | AV$_{DD}$ | 6.5 | 13.5 | V | |
| | V$_{GH}$ | -0.3 | 42 | V | |
| | V$_{GL}$ | -20 | 0.3 | V | |
| | V$_{GH}$-V$_{GL}$ | -0.3 | 40 | V | |
| Operation Temperature Storage Temperature | T$_{OP}$ | -20 | 70 | ℃ | |
| | T$_{ST}$ | -30 | 80 | ℃ | |
| LED Reverse Voltage | V$_R$ | - | 1.2 | V | each LED Note 2 |
| LED Forward Current | I$_F$ | - | 25 | mA | each LED |

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

Note 2: V$_R$ Conditions: Zener Diode 20mA

## 2.2 DC Characteristics

| Item | Symbol | Values | | | Unit | Remark |
|------|--------|--------|--------|--------|------|--------|
| | | Min. | Typ. | Max. | | |
| Power voltage | V$_{CC}$ | 3.0 | 3.3 | 3.6 | V | Note 2 |
| | AV$_{DD}$ | 10.2 | 10.4 | 10.6 | V | |
| | V$_{GH}$ | 15.3 | 16.0 | 16.7 | V | |
| | V$_{GL}$ | -7.7 | -7.0 | -6.3 | V | |
| Input signal voltage | V$_{COM}$ | 2.8 | 3.8 | 4.8 | V | Note 4 |
| Input logic high voltage | V$_{IH}$ | 0.7V$_{CC}$ | 0.9Vcc | V$_{CC}$ | V | Note 3 |
| Input logic low voltage | V$_{IL}$ | 0 | 0.1Vcc | 0.3V$_{CC}$ | V | |

Note 1: Be sure to apply V$_{CC}$ and V$_{GL}$ to the LCD first, and then apply V$_{GH}$.
Note 2: V$_{CC}$ setting should match the signals output voltage (refer to Note 3) of customer's system board .
Note 3: DCLK,HS,VS,RSTB,UPDN,STLR,MODE,DITHB.
Note 4: Typical V$_{COM}$ is only a reference value, it must be optimized according to each LCM. Be sure to use VR;
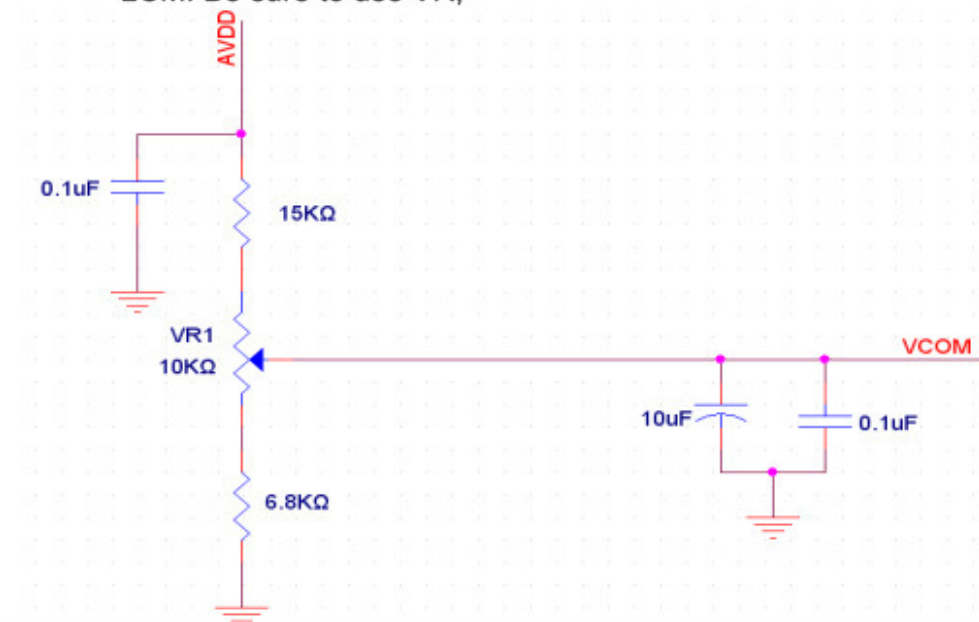
## 2.2.1 Current Consumption:

$(GND=AV_{SS}=0V)$

| Item | Symbol | Values | | | Unit | Remark |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Current for Driver | $I_{GH}$ | 0.05 | 0.2 | 0.5 | mA | $V_{GH} = 16.0V$ |
| | $I_{GL}$ | 0.05 | 0.2 | 1.0 | mA | $V_{GL} = -7.0V$ |
| | $I_{CC}$ | 1 | 5.5 | 10.0 | mA | $V_{CC} = 3.3V$ |
| | $IAV_{DD}$ | 5 | 32.0 | 50.0 | mA | $AV_{DD} = 10.4V$ |

## 2.3 Back-light Specification :

| Item | Symbol | Values | | | Unit | Remark |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Voltage for LED backlight | $V_L$ | 8.4 | 9.3 | 10.5 | V | Note 1 |
| Current for LED backlight | $I_L$ | 162 | 180 | 198 | mA | |
| LED life time | - | 20,000 | - | - | Hr | Note 2 |

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and $I_L$ =180mA.

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and $I_L$ =180mA. The LED lifetime could be decreased if operating $I_L$ is lager than 180 mA.

## 2.4 AC Characteristics

| Item | Symbol | Values | | | Unit | Remark |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| HS setup time | T$_{hst}$ | 8 | 10 | 12 | Ns | |
| HS hold time | T$_{hhd}$ | 8 | 10 | 12 | Ns | |
| VS setup time | T$_{vst}$ | 8 | 10 | 12 | Ns | |
| VS hold time | T$_{vhd}$ | 8 | 10 | 12 | Ns | |

| Item | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|
| Data setup time | T$_{dsu}$ | 8 | 10 | 12 | Ns | |
| Data hold time | T$_{dhd}$ | 8 | 10 | 12 | Ns | |
| DE setup time | T$_{esu}$ | 8 | 10 | 12 | Ns | |
| DE hold time | T$_{ehd}$ | 8 | 10 | 12 | Ns | |
| VDD Power On Slew rate | T$_{POR}$ | 1 | 2 | 20 | ms | |
| RSTB pulse width | T$_{Rst}$ | 10 | 20 | 50 | us | |
| CLKIN cycle time | T$_{coh}$ | 20 | 25 | 30 | Ns | |
| CLKIN pulse duty | T$_{cwh}$ | 40 | 50 | 60 | % | |

**Timing:**

| Item | Symbol | Values | | | Unit | Remark |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Horizontal Display Area | thd | | 800 | | DCLK | |
| DCLK Frequency | fclk | 33 | 40 | 50 | MHz | |
| One Horizontal Line | th | 862 | 1056 | 1200 | DCLK | |
| HS pulse width | thpw | 1 | 6 | 40 | DCLK | |
| HS Back Porch(Blanking) | thb | 46 | 46 | 46 | DCLK | |
| HS Front Porch | thfp | 16 | 210 | 354 | DCLK | |

| Item | Symbol | Values | | | Unit | Remark |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Vertical Display Area | tvd | | 600 | | TH | |
| VS period time | tv | 624 | 635 | 700 | TH | |
| VS pulse width | tvpw | 1 | 3 | 20 | TH | |
| VS Back Porch(Blanking) | tvb | 23 | 23 | 23 | TH | |
| VS Front Porch | tvfp | 1 | 12 | 77 | TH | |

## Timing Diagram:
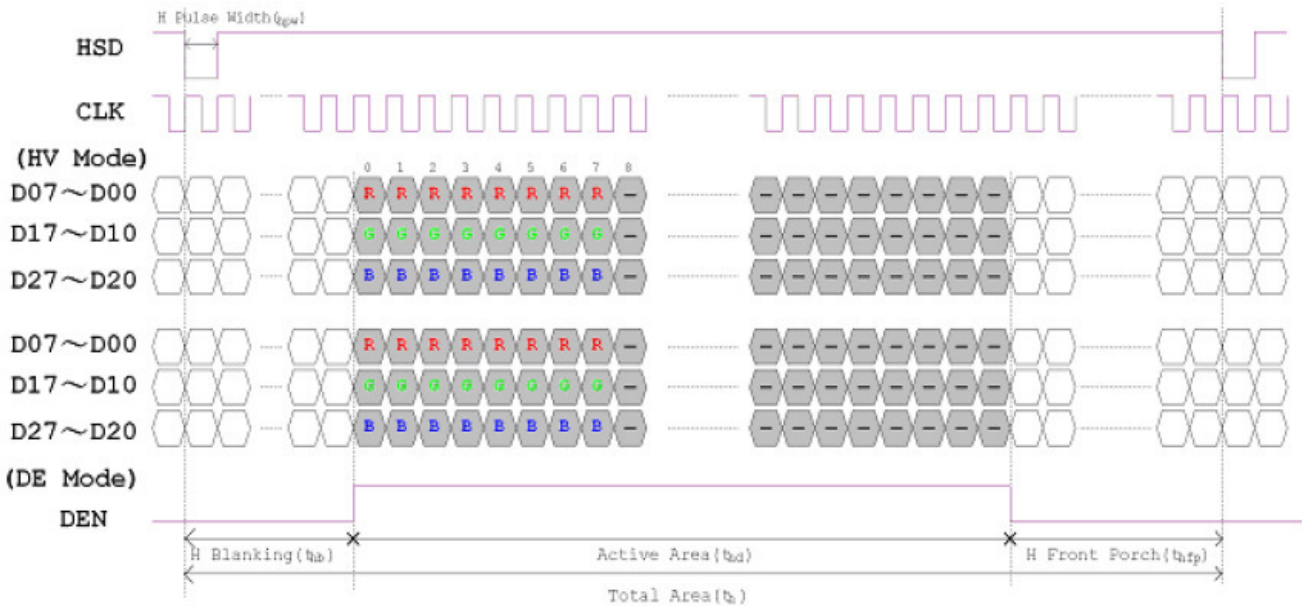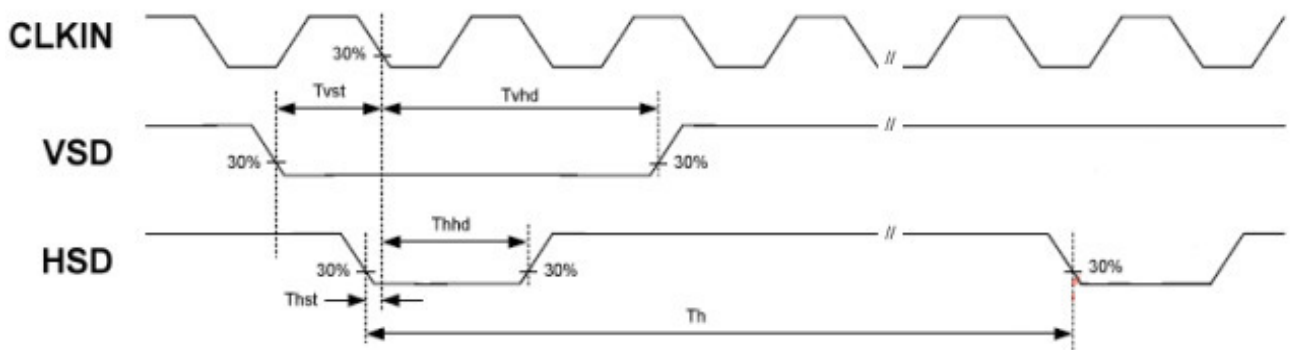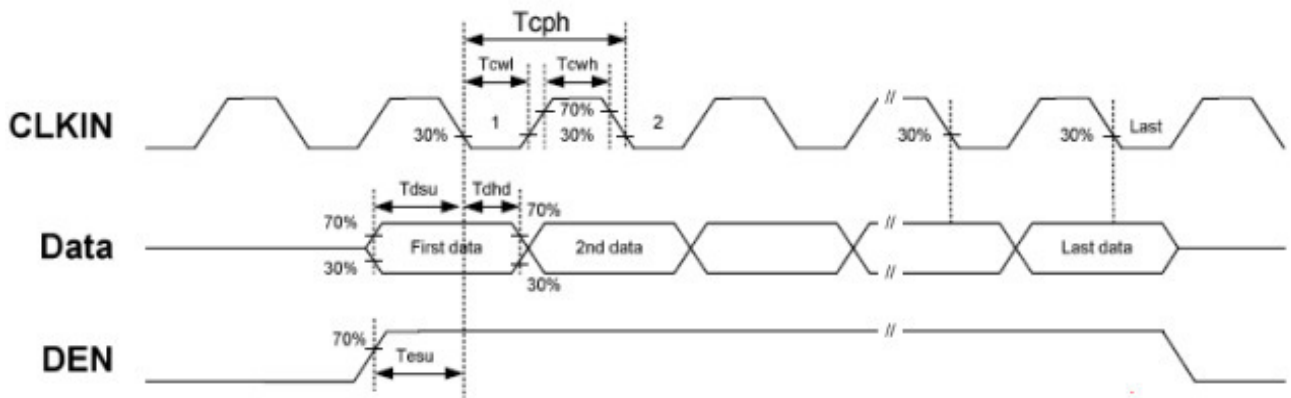
## 2.5 Power Sequence

### 2.5.1 Power On Sequence:
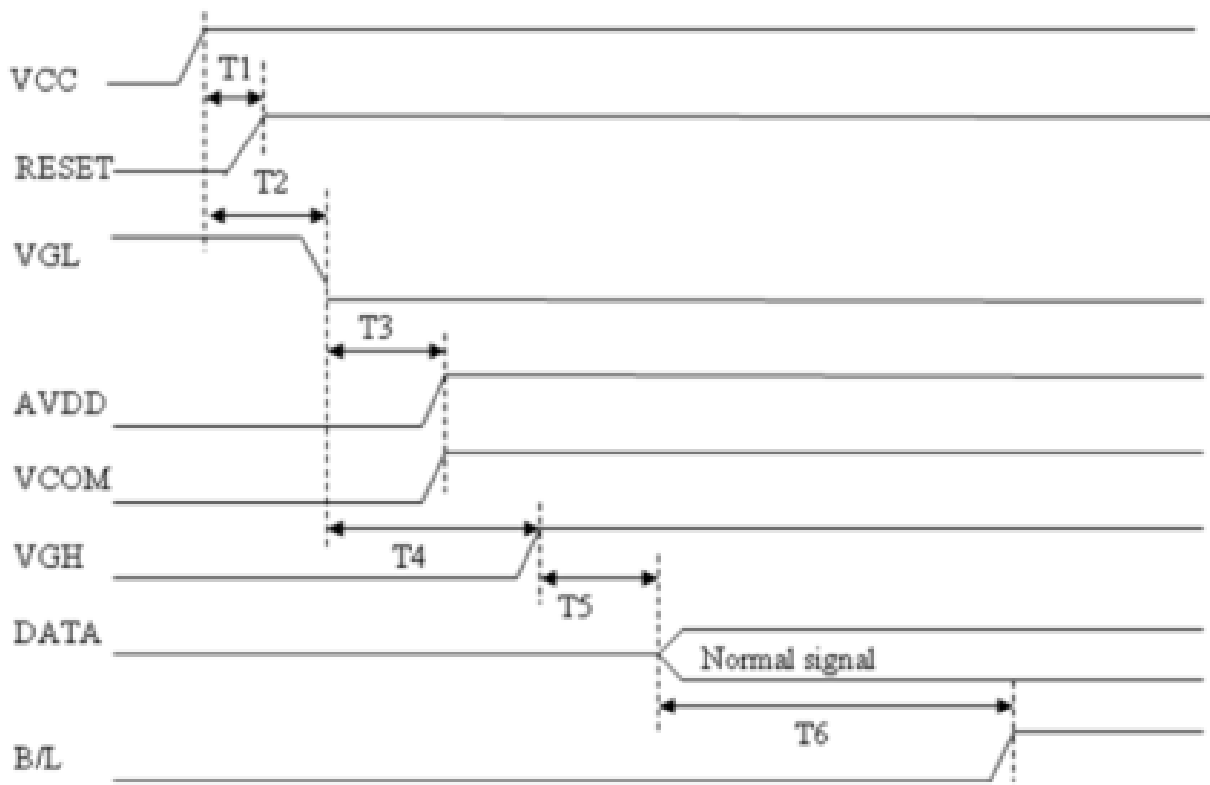


VCC→RESET→DATA→AVDD Gamma →VGL→VGH→B/L

| Symbol | SPEC | | | Unit |
|--------|------|------|------|------|
| | Min. | Typ. | Max. | |
| T1 | 1 | 1 | 1.5 | ms |
| T2 | 20 | 30 | 50 | ms |
| T3 | 5 | 20 | 50 | ms |
| T4 | 10 | 20 | 50 | ms |
| T5 | 10 | 20 | 50 | ms |
| T6 | 200 | 300 | 400 | ms |

Note: Data include R0~R7, B0~B7, G0~G7, UD, LR, DCLK, HS, VS, DE.

## 2.5.2 Power OFF Sequence:
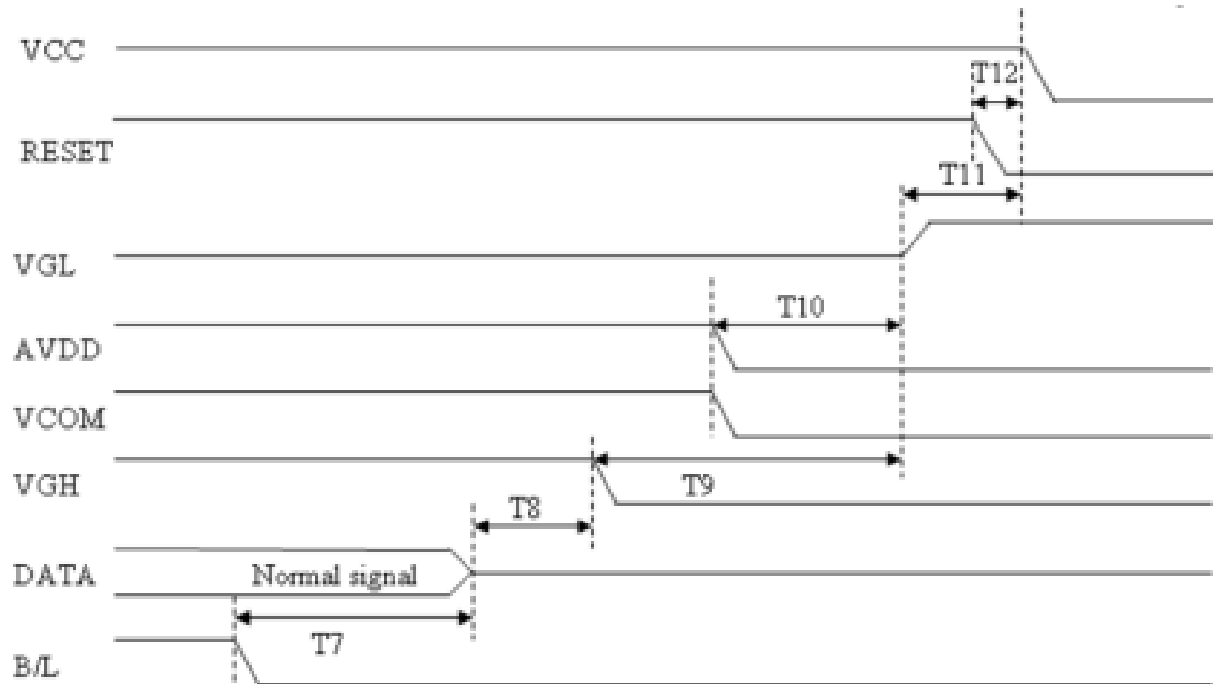


Note: Data include R0~R7, B0~B7, GO~G7, STLR,UPDN, DCLK, HS,VS,DE.

| Symbol | SPEC | | | Unit |
| :---: | :---: | :---: | :---: | :---: |
| | Min. | Typ. | Max. | |
| T7 | 0 | 30 | 50 | ms |
| T8 | 10 | 20 | 50 | ms |
| T9 | 10 | 20 | 50 | ms |
| T10 | 5 | 20 | 50 | ms |
| T11 | 20 | 30 | 50 | ms |
| T12 | 1 | 1.5 | 3 | ms |

# 3. OPTICAL CHARACTERISTICS

## 3.1  Characteristics

Electrical and Optical Characteristics

| No. | Item | | | symbol / temp. | | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Response Time | | | Tr | 25 ℃ | - | 10 | 20 | ms | 2 |
| | | | | Tf | | - | 15 | 30 | | |
| 2 | Viewing Angle | Hor. | Cr ≧ 10 | $\theta_{2+}$ | $\Phi = 0°$ | 60 | 70 | - | degree | 3 |
| | | | | $\theta_{2-}$ | $\Phi = 180°$ | 60 | 70 | - | | |
| | | Ver. | | $\theta_{1+}$ | $\Phi = 270°$ | 60 | 70 | - | | |
| | | | | $\theta_{1-}$ | $\Phi = 90°$ | 40 | 50 | - | | |
| 3 | Contrast Ratio | | | Cr | 25 ℃ | 400 | 500 | - | - | 4 |
| 4 | White x-code | | | Wx | 25 ℃ | 0.26 | 0.31 | 0.36 | | |
| | White y-code | | | Wy | | 0.28 | 0.33 | 0.38 | | |
| | Brightness | | | Y | | 200 | 250 | - | cd/m$^2$ | |
| 5 | Brightness Uniformity | | | | 25 ℃ | 70 | 75 | - | % | 6 |

# 3.2 Definition of optical characteristics

**Measurement condition :**

Transmissive and Transflective type



PHOTAL LCD-5000
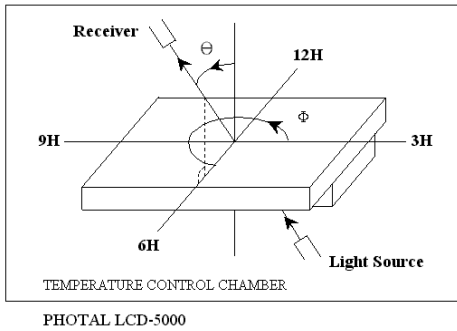
## [Note 1] Definition of LCD Driving Vop and Waveform :
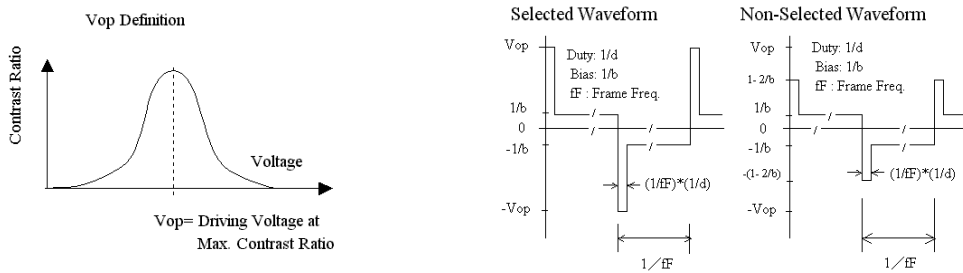


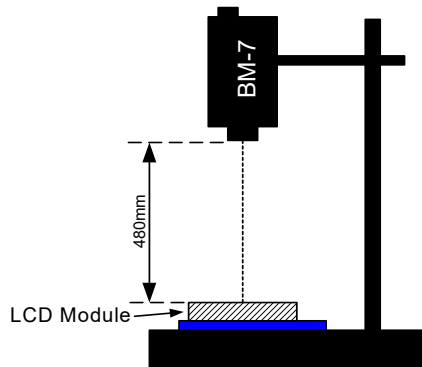## [Note 2] Definition of Response Time
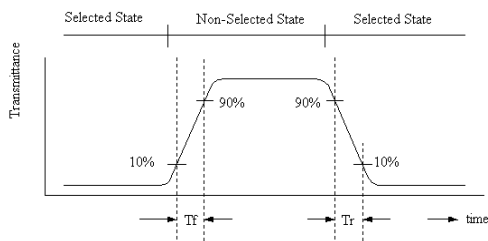


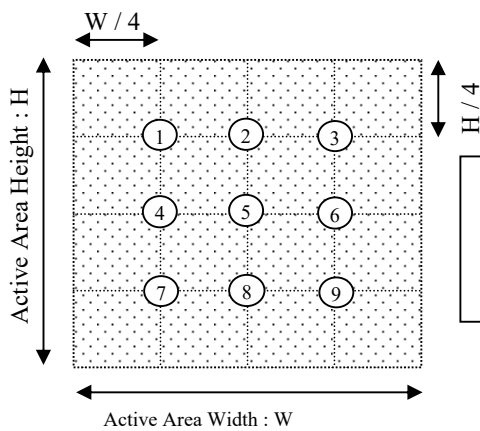## [Note 3] Definition of Viewing Angle :          [Note 4] Definition of Contrast Ratio :
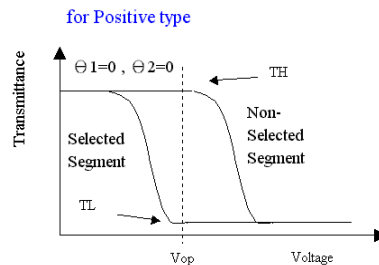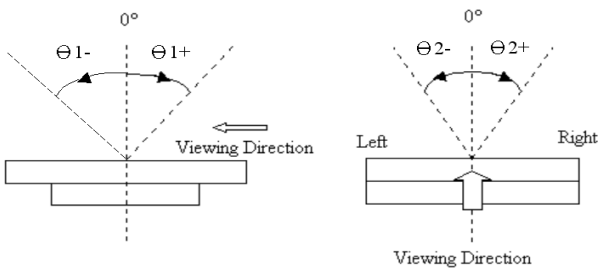


$$\text{Contrast Ratio} = \frac{TH}{TL}$$

**[Note 5]  Definition of measurement of Color Chromaticity and Brightness**

BM-7

480mm

LCD Module

**[Note 6]  Definition of Brightness Uniformity**

W / 4

Active Area Height : H

H / 4

① ② ③

④ ⑤ ⑥

⑦ ⑧ ⑨

Active Area Width : W

$$\text{Brightness Uniformity} = \frac{\text{Minimum Brightness of Point 1~9}}{\text{Maximum Brightness of Point 1~9}}$$

**[Note 7]  Definition of Measurement of Reflectance**

BM-7

White Light Source
(Ring)

480mm

-15 deg.

LCD Module
or referance
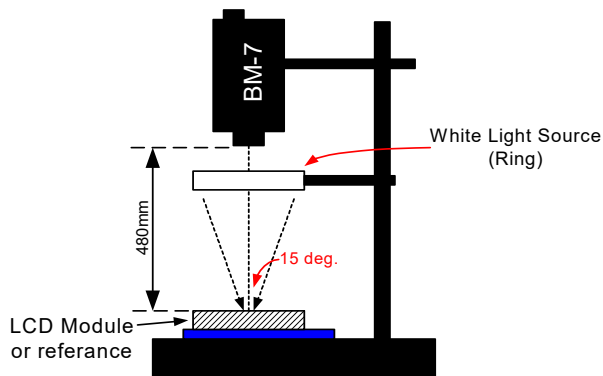
# 4. RELIABILITY :

| Item No | Items | Condition | Note |
|---|---|---|---|
| 1 | High temperature operating | 70 ℃ , 200 hours | 1 |
| 2 | Low temperature operating | -20 ℃ , 200 hours | 1 |
| 3 | High temperature storage | 80 ℃ , 200 hours | 1 |
| 4 | Low temperature storage | -30 ℃ , 200 hours | 1 |
| 5 | High temperature & humidity storage | 40℃, 90%RH, 100 hours | 2 |
| 6 | Thermal Shock storage | -30℃, 30min.<=> 80℃, 30min. 10 Cycles | 1 |
| 7 | Mechanical Shock | 100G 6ms,±X ,±Y ,±Z 3 times for each direction | |
| 8 | Vibration test | 1.5G / 10~500 Hz , 30 min / cycle, 1 cycle for each X. Y. Z. | |
| 9 | Package Vibration test | 10 => 55 =>10 => 55 => 10 Hz , within 1 minute Amplitude : 1.5mm. 15 minutes for each Direction ( X,Y,Z ) | |
| 10 | Drop test | Packed, 100CM free fall, 6 sides, 1 corner, 3edges | |
| 11 | Electro Static Discharge | ± 2KV, Human Body Mode, 100pF/1500Ω | |
| 12 | Life time | 50,000 hours 25℃ , 60%RH , specification condition driving | |

Note 1：The product move into the room temperature for at least 2 hours with no condensation.

Note 2：The product move into the room temperature for at least 24 hours with no condensation.

  * One single product test for only one item.

  * Judgment after test : keep in room temperature for more than 2 hours.

     - Current consumption < 2 times of initial value

     - Contrast > 1/2 initial value

     - Function : work normally

# 5. PRODUCT HANDLING AND APPLICATION

□ **PRECAUTION FOR HANDLING LCM**

- The LCD module contains a C-MOS LSI. People who operate the LCM should wear ESD protection eguipement to prevent ESD hurt on products.
- Do not input any signal before power is turned on.
- Do not take LCM from its packaging bag until it is assembled.
- Peel off the LCM protective film slowly since static electricity may be generated.
- Pay attention to the humidity of the work shop, 50~60%RH is satisfactory.
- Use a non-leak iron for soldering LCM.
- Do not touch the display surface or connection terminals area with bare hands.Smudges on the display surface reduce the insulation between terminals.
- Cautions for soldering to LCM:

  Condition for soldering I/O terminals:
  Temperature at iron tip :350℃±15℃.
  Soldering time : 3~4sec./ terminals.
  Type of solder : Eutectic solder(rosin flux filled).

□ **PRECAUTION IN USE OF LCM**

- Do not contact or scratch the front surface and the contact pads of a LCM with hard materials such as metal or glass or with one's nail.
- To clean the surface , wipe it gently with soft cloth dampened by alcohol.
- Do not attempt to wiped off the contact pads.
- Keep LCM panels away from direct sunlight , also avoid them in high-temperature & high humidity environment for a long period.
- Do not drive LCM by DC voltage.
- Do not expose LCM to organic solvent.
- Liquid in LCM is hazardous substance. In case a contact with liquid crystal material is occured, be sure to immediately wash such material away by soap and water.
- The polarizer is easily damaged and should be handle with special care. Don't press or rub it with hard objects.

□ **PRECAUTION FOR STORING AND USE OF LCM**

- To avoid degradation of the device , do not store the module under the conditions of direct sunlight , high temperature or high humidity . Keep the module in bags designed to prevent static electricity charging under low temperature / normal humidity conditions(avoid high temperature / high humidity and low temperature below 0℃)
- Never use the LCD , LCM under 45 Hz , the liquid crystal will decomposition and cause permently damage on display !!

□ **USING ON MEDICAL CARE , SAFETY OR HAZARDOUS APPLICATION OR SYSTEM**

- For the application in medical care, safety and hazardous prodcuts or systems, an authorization from MT is required. MT will not responsible for any damage or loss which caused by the products without any authorization given by MT.
- This product is not allowed to be designed and used for military application and/or purpose.
- The delivery of this product to the countries and/or regions where the embargoes are imposed by U.N. is prohibited.
- The application and delivery of this product must comply with Startegic High-Tech Commodities (SHTC) export control and the sales to the embargoed and/or sanctioned countries or regions are strictly prohibited.

## 6. DATE CODE OF PRODUCTS

- Date code will be shown on each product :

- **YY MM DD - XXXX**
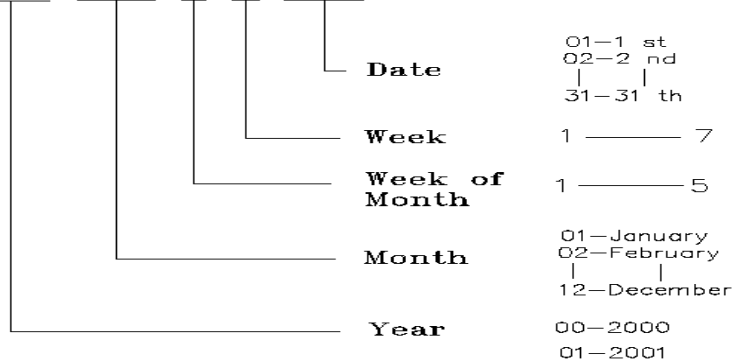
  Year  Month  Day - Production lots

- Example: 121108 - 0003 ==> Year 2012, November,8th , Batch no.0003

Note ： The lot no. attached on the packing box will be used for tracking once the part is too small to print the date code.
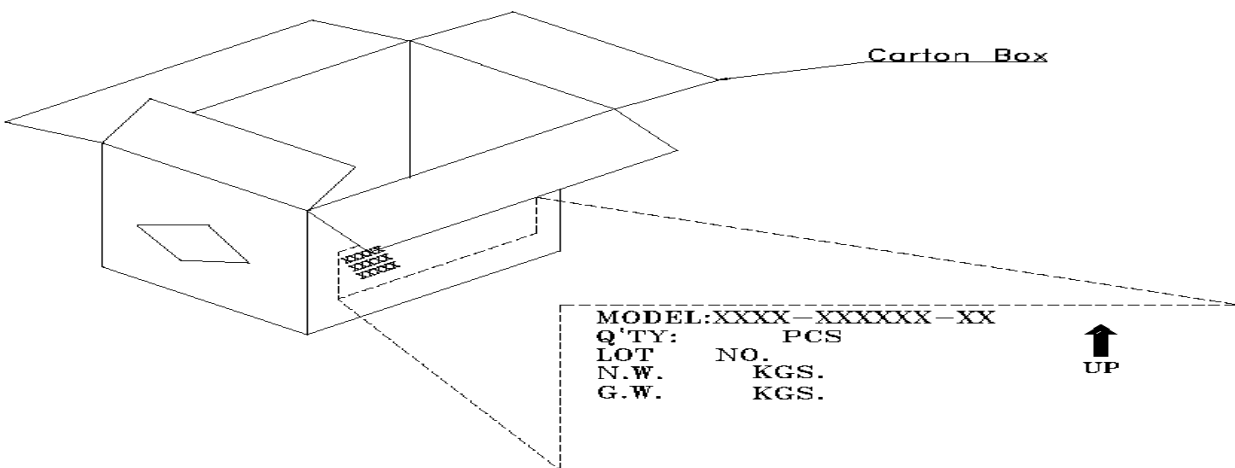
# 7. PACKING

Instruction of lot number:

LOT NO. : 0 0 0 8 3 5 2 5 (EX)

| | |
|---|---|
| Date | 01—1 st<br>02—2 nd<br>\|  \|<br>31—31 th |
| Week | 1 ———— 7 |
| Week of Month | 1 ———— 5 |
| Month | 01—January<br>02—February<br>\|  \|<br>12—December |
| Year | 00—2000<br>01—2001 |

Lable of carton:



Carton Box

MODEL:XXXX—XXXXXX—XX
Q'TY:        PCS
LOT    NO.
N.W.        KGS.
G.W.        KGS.

UP

Packing tray must be stacked with alternated direction to each others.
To tacks packing trays in same direction will cause product damaged.



Not Allowed

OK

Not Allowed

OK
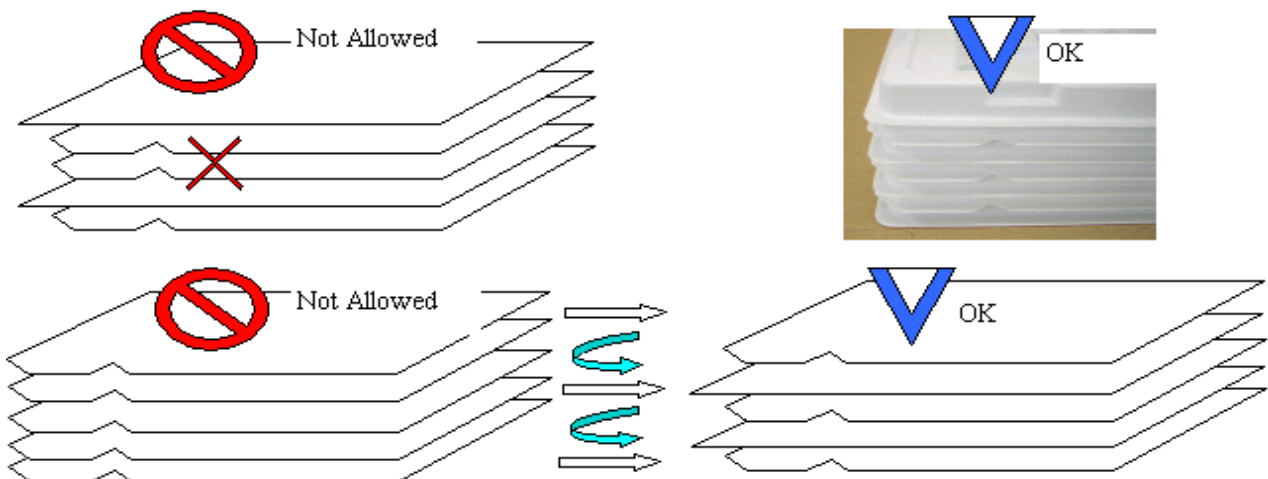
MODEL NO:  UMSH-8240MD-8T

2      pcs / Tray
5+1    Tray / Box
4      Box / Carton
40     pcs / Carton

NOTE:
(1)Be warned ,the direction of
    the tray has to turn it by 180 degree
    before stack it up.Otherwise,
    it will be packager's responsibility!!
(2)Safe Stack : 5 cartons only

TAPE

5+1  TRAY
(1 empty tray)

Corrugated board
protection

| Model | | No. | |
|---|---|---|---|
| Q'ty | | | pcs |
| * | | | |
| Lot | No. | | |
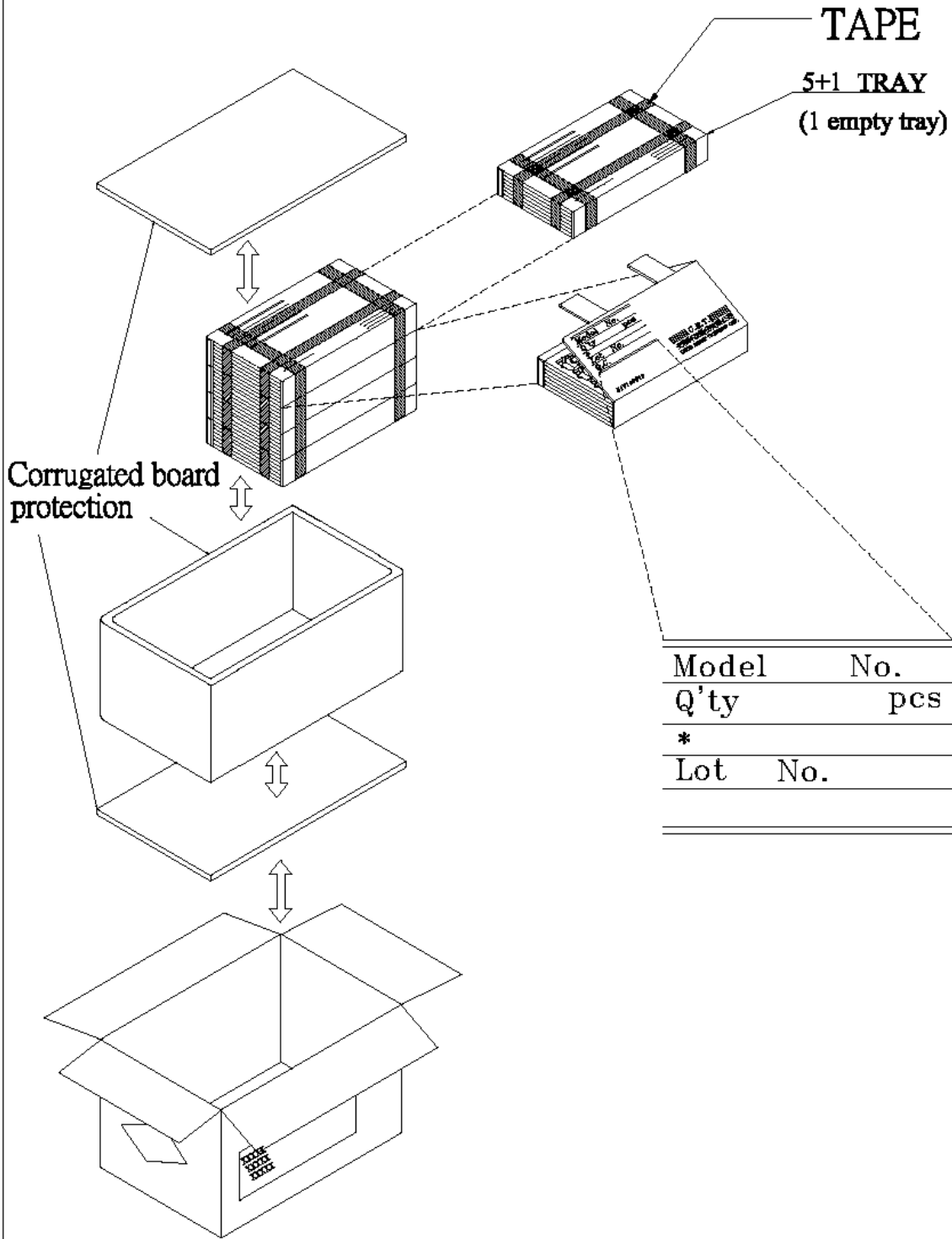
# 8. INSPECTION STANDARD

## 8.1. QUALITY :
THE QUALITY OF GOODS SUPPLIED TO PURCHASER SHALL COME UP TO THE FOLLOWING STANDARD.

### 8.1.1. THE METHOD OF PRESERVING GOODS
AFTER DELIVERY OF GOODS FROM MT TO PURCHASER. PURCHASER SHALL CONTROL THE LCM AT -10 ℃ TO 40 ℃ ,AND IT MIGHT BE DESIRABLE TO KEEP AT THE NORMAL ROOM TEMPERATURE AND HUMIDITY UNTIL INCOMING INSPECTION OR THROWING INTO PROCESS LINE.

### 8.1.2. INCOMING INSPECTION
(A) THE METHOD OF INSPECTION

IF PURCHASER MAKE AN INCOMING INSPECTION , A SAMPLING PLAN SHALL BE APPLIED ON THE CONDITION THAT QUALITY OF ONE DELIVERY SHALL BE REGARDED AS ONE LOT.

(B) THE STANDARD OF QUALITY

ISO-2859-1 ( or MIL-STD-105E ) , LEVEL Ⅱ SINGLE PLAN.

| CLASS | AQL(%) |
|---------|----------|
| CRITICAL | 0.4  % |
| MAJOR | 0.65  % |
| MINOR | 1.5  % |
| TOTAL | 1.5  % |

EVERY ITEM SHALL BE INSPECTED ACCORDING TO THE CLASS.

(C) MEASURE

IF AS THE RESULT OF ABOVE RECEIVING INSPECTION , A LOT OUT IS DISCOVERED. PURCHASER SHALL BE INFORM SELLER OF IT WITHIN SEVEN DAYS. BUT FIRST SHIPMENT WITHIN FOURTEEN DAYS.

### 8.1.3. WARRANTY POLICY
MT WILL PROVIDE ONE-YEAR WARRANTY FOR THE PRODUCTS ONLY IF UNDER SPECIFICATION OPERATING CONDITIONS. MT WILL REPLACE NEW PRODUCTS FOR THESE DEFECT PRODUCTS WHICH UNDER WARRANTY PERIOD AND BELONG TO THE RESPONSIBILITY OF MT.

## 8.2. CHECKING CONDITION
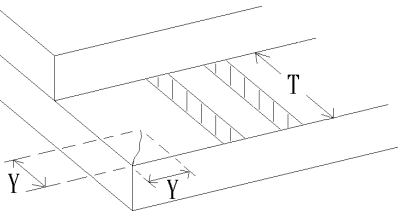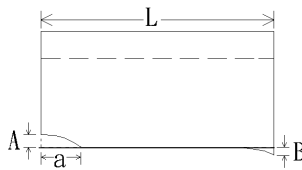**8.2.1.** CHECKING DIRECTION SHALL BE IN THE 45 DEGREE AREA TO FACE THE SAMPLE.
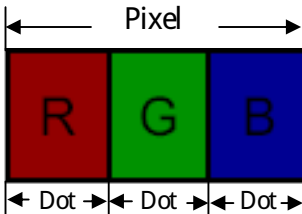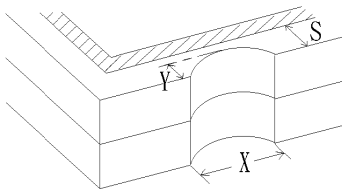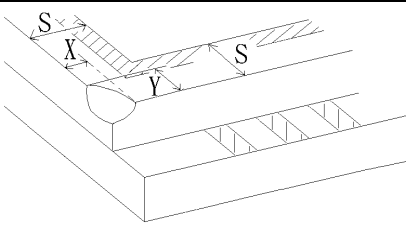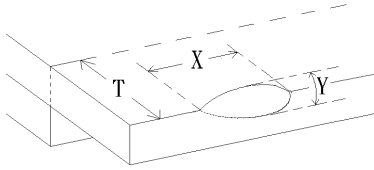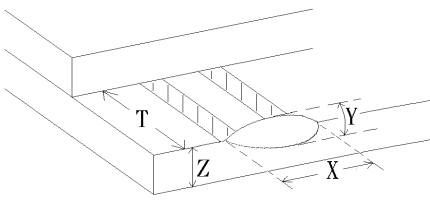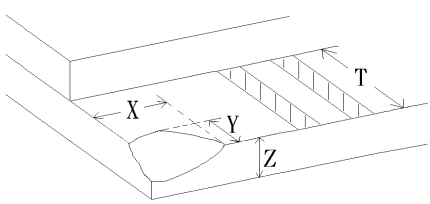
**8.2.2.** CHECKER SHALL SEE OVER 30 cm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS. OF 20W FLUORESCENT LAMP.

## 8.3. INSPECTION PLAN :

| CLASS | ITEM | JUDGEMENT | CLASS |
|---|---|---|---|
| PACKING & INDICATE | 1. OUTSIDE AND INSIDE PACKAGE | "MODEL NO." , "LOT NO." AND "QUANTITY" SHOULD INDICATE ON THE PACKAGE. | Minor |
| | 2. MODEL MIXED AND QUANTITY | OTHER MODEL MIXED...............REJECTED QUANTITY SHORT OR OVER......REJECTED | Critical |
| | 3. PRODUCT INDICATION | "MODEL NO." SHOULD INDICATE ON THE PRODUCT | Major |
| ASSEMBLY | 4. DIMENSION, LCD GLASS SCRATCH AND SCRIBE DEFECT. | ACCORDING TO SPECIFICATION OR DRAWING. | Major |
| APPEARANCE | 5. VIEWING AREA | POLARIZER EDGE OR LCD'S SEALING LINE IS VISABLE IN THE VIEWING AREA ……..REJECTED | Minor |
| | 6. BLEMISH、BLACK SPOT、WHITE SPOT IN THE LCD AND LCD GLASS CRACKS | ACCORDING TO STANDARD OF VISUAL INSPECTION ( INSIDE VIEWING AREA ) | Minor |
| | 7. BLEMISH、BLACK SPOT WHITE SPOT AND SCRATCH ON THE POLARIZER | ACCORDING TO STANDARD OF VISUAL INSPECTION ( INSIDE VIEWING AREA ) | Minor |
| | 8. BUBBLE IN POLARIZER | ACCORDING TO STANDARD OF VISUAL INSPECTION ( INSIDE VIEWING AREA ) | Minor |
| | 9. LCD'S RAINBOW COLOR | STRONG DEVIATION COLOR ( OR NEWTON RING) OF LCD......REJECTED. OR ACCORDING TO LIMITED SAMPLE ( IF NEEDED, AND INSIDE VIEWING AREA ) | Minor |
| ELECTRICAL | 10. ELECTRICAL AND OPTICAL CHARACTERISTICS ( CONTRAST、VOP、CHROMATICITY … ETC ) | ACCORDING TO SPECIFICATION OR DRAWING . ( INSIDE VIEWING AREA ) | Critical |
| | 11.MISSING LINE | MISSING DOT、LINE、CHARACTER ....REJECTED | Critical |
| | 12.SHORT CIRCUIT、WRONG PATTERN DISPLAY | NO DISPLAY、WRONG PATTERN DISPLAY、CURRENT CONSUMPTION OUT OF SPECIFICATION...... REJECTED | Critical |
| | 13. DOT DEFECT (FOR COLOR AND TFT) | ACCORDING TO STANDARD OF VISUAL INSPECTION | Minor |

## 8.4. STANDARD OF VISUAL INSPECTION

| NO. | CLASS | ITEM | JUDGEMENT |
|---|---|---|---|
| 8.4.1 | MINOR | BLACK AND WHITE SPOT<br>FOREIGN MATERIEL<br>DUST IN THE CELL<br>BLEMISH<br>SCRATCH | (A) ROUND TYPE: unit : mm.<br><br>DIAGRAM (see below)<br><br>NOTE: Φ =(LENGTH+WIDTH)/2<br>(B) LINEAR TYPE: unit : mm.<br><br>DIAGRAM (see below) |
| 8.4.2 | MINOR | BUBBLE IN POLARIZER<br>DENT ON POLARIZER | unit : mm.<br><br>DIAGRAM (see below) |
| 8.4.3 | MINOR | Dot Defect | DIAGRAM (see below)<br><br>Pixel Define<br><br>Not 1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.<br>Not 2: Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.<br>Not 3: Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green ,blue pattern. |

**8.4.1 (A) ROUND TYPE:** unit : mm.

| DIAMETER (mm.) | ACCEPTABLE Q'TY |
|---|---|
| Φ ≦ 0.1 | DISREGARD |
| 0.1 < Φ ≦ 0.25 | 3 (Distance>5mm) |
| 0.25 < Φ | 0 |

NOTE: Φ =(LENGTH+WIDTH)/2

**8.4.1 (B) LINEAR TYPE:** unit : mm.

| LENGTH | WIDTH | ACCEPTABLE Q'TY |
|---|---|---|
| ------ | W ≦ 0.03 | DISREGARD |
| L ≦ 5.0 | 0.03 < W ≦ 0.07 | 3 (Distance>5mm) |
| ------ | 0.07 < W | FOLLOW ROUND TYPE |

**8.4.2** unit : mm.

| DIAMETER | ACCEPTABLE Q'TY |
|---|---|
| Φ ≦ 0.2 | DISREGARD |
| 0.2 < Φ ≦ 0.5 | 2 (Distance>5mm) |
| 0.5 < Φ | 0 |

**8.4.3**

| Items | ACC. Q'TY |
|---|---|
| Bright dot | N ≦ 4 (Distance>5mm) |
| Dark dot | N ≦ 4 (Distance>5mm) |

Pixel Define

| NO. | CLASS | ITEM | JUDGEMENT | |
|------|-------|------|-----------|---|
| 8.4.4 | MINOR | LCD GLASS CHIPPING |  $Y > S$ | Reject |
| 8.4.5 | MINOR | LCD GLASS CHIPPING |  $X$ or $Y > S$ | Reject |
| 8.4.6 | MAJOR | LCD GLASS GLASS CRACK |  $Y > (1/2) T$ | Reject |
| 8.4.7 | MAJOR | LCD GLASS SCRIBE DEFECT |  1. $a > L/3$, $A > 1.5mm$. Reject  2. B : ACCORDING TO DIMENSION | |
| 8.4.8 | MINOR | LCD GLASS CHIPPING ( ON THE TERMINAL AREA ) |  $\Phi = (x+y)/2 > 2.5$ mm | Reject |
| 8.4.9 | MINOR | LCD GLASS CHIPPING ( ON THE TERMINAL SURFACE ) |  $Y > (1/3) T$ | Reject |
| 8.4.10 | MINOR | LCD GLASS CHIPPING |  $Y > T$ | Reject |