# SPECIFICATION

## OF

## LIQUID CRYSTAL DISPLAY MODULE

**25-Jul-2007**

**CUSTOMER : URT-STD**

**Model No. : UMSH-8065MD-6T**

**Model version : 0**

**Document Revision : 6**

| CUSTOMER APPROVED SIGNATURE | | | |
|---|---|---|---|
| | | | |

This specification need to be signed by purchaser or customer as a specification of products production and delivery from URT. Without signature of this specification , any purchase order for this model no. will be treated and considered that this specification is automatically acknowledged and accepted by purchaser or customer.

### ▬ U.R.T. ▬ UNITED RADIANT TECHNOLOGY CORPORATION

| Allen Wang | George Tseng | Angus Chiu | Sharon Tsai | Jul-25-2007 |
|---|---|---|---|---|
| APPROVED | CHECKED | CHECKED | PREPARED | Date |

*This document have been signed by Digital Signature Approval System*

| Document Revision | Model No. Version No. | Description | Revision by |
|---|---|---|---|
| 0 | UMSH-8065MD-T Version No. 0 | | Tony Chan Jeffry Chen 18-Jul-2007 |
| 1 | UMSH-8065MD-1T Version No. 0 | 1.Modify the FPC interface pins. | H.C. Lin Jeffry Chen |
| 2 | UMSH-8065MD-2T Version No. 0 | 1. Add AD board on LCM. 2. Modify the module number from UMSH-8065MD-1T to UMSH-8065MD-2T. | H.C. Lin Jeffry Chen |
| 3 | UMSH-8065MD-3T Version No. 0 | 1. Add touch panel on LCM. 2. Modify the module number from UMSH-8065MD-1T to UMSH-8065MD-3T. | H.C. Lin Jeffry Chen |
| 4 | UMSH-8065MD-4T Version No. 0 | 1. Change to car-using specification. 2. Modify the module number from UMSH-8065MD-1T to UMSH-8065MD-4T. | H.C. Lin Jeffry Chen |
| 5 | UMSH-8065MD-5T Version No. 0 | Add heater on LCM. 2. Modify the module number from UMSH-8065MD-4T to UMSH-8065MD-5T. | H.C. Lin Jeffry Chen |
| 6 | UMSH-8065MD-6T Version No. 0 | 1.Add touch panel on LCM. | Tony Chan Jeffry Chen 25-Jul-2007 |
| | | | |

**U.R.T**   Revision 6 ;  UMSH-8065MD-6T  Ver. 0 ; 25-July-2007    **Page:  2**

# CONTENTS:

# 1. BASIC SPECIFICATION

### 1.1 Mechanical specifications

| Items | Nominal Dimension | Unit |
|---|---|---|
| Dot Matrix | 320*RGB*240 | dots |
| Module Size (W x H x T) | 76.9 x 63.9 x 4.3 | mm. |
| Active Area (W x H) | 70.08 x 52.56 | mm. |
| Dot Pitch (W x H) | 0.219 x 0.219 | mm. |
| Driving IC Package | COG | |

### 1.2 Display specification

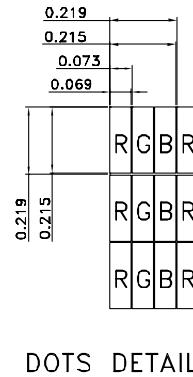| Display | Descriptions | Note |
|---|---|---|
| LCD Type | 3.5" TFT | |
| LCD Mode | Normally White | |
| Polarizer Mode | Transmissive | |
| Polarizer UV - Cutting | With | |
| Polarizer Surface | Normal | |
| Background Color | White | |
| Backlight Type | LED | |
| Backlight Color | White | |
| Viewing Direction | 6 O'clock Direction | |

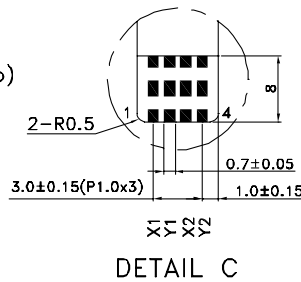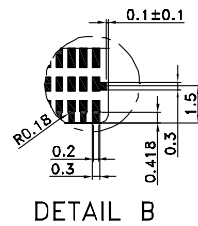* Color tone is slightly changed by temperature and driving voltage.

# 1.3 Outline dimension
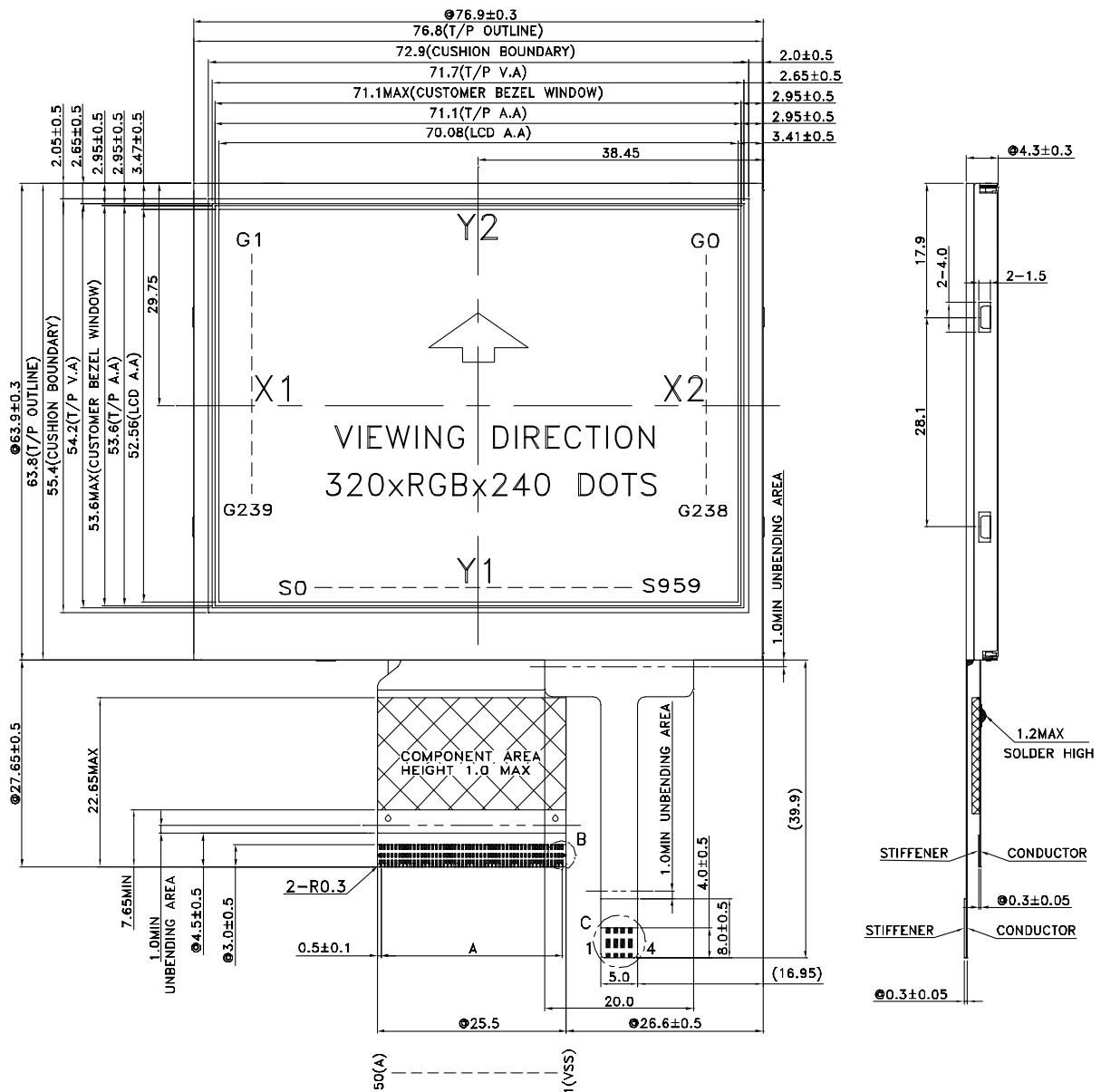


NOTE :
1. LCD:TFT TRANSMISSIVE MODE,NORMAL WHITE
2. VIEWING DIRECTION : 6 O'CLOCK
3. Top : −20~70°C , Tst : −30~80°C
4. DRIVER IC : HX8238-A
5. "⊙"KEY DIMENSION.
6. TOLERANCE FOR NOT ASSIGNED:±0.2
7. LED COLOR : WHITE , 6PCS DICE
   CONSTANT CURRENT IF=20.0mA ; VLED=20.4V(Typ)
8. A:24.5±0.05(p0.5x49) , W=0.3±0.05
9. THE MINIMUM BENDING RADIUS (INNER) OF THE
   FPC IS 0.5mm.
10. CUSTOMER BEZEL WINDOW MUST BE
    71.1mm X 53.6mm OR SMALLER THAN THIS
11. CUSTOMER CUSHION WINDOW MUST BE
    72.7mm X 55.2mm OR LARGER THAN THIS

## 1.4 Block diagram:



TFT-LCD
320xRGBx240 Dots
262K colors

G1  G0
G239  G238
S0  S959

120  120

960

HX8238-A

Touch Panel

LED B/L

Power Generation Circuit

A  K

NC  VDDIO  VCI  PINV  CPE  SEL2  SEL1  SEL0  BGR  RL  REV  TB  DOTCLK  VSYNC  HSYNC  DEN  RR0~RR7  GG0~GG7  BB0~BB7  SDI  SCK  CSB  RESB  SDO  POL  VSS

X1  Y1  X2  Y2
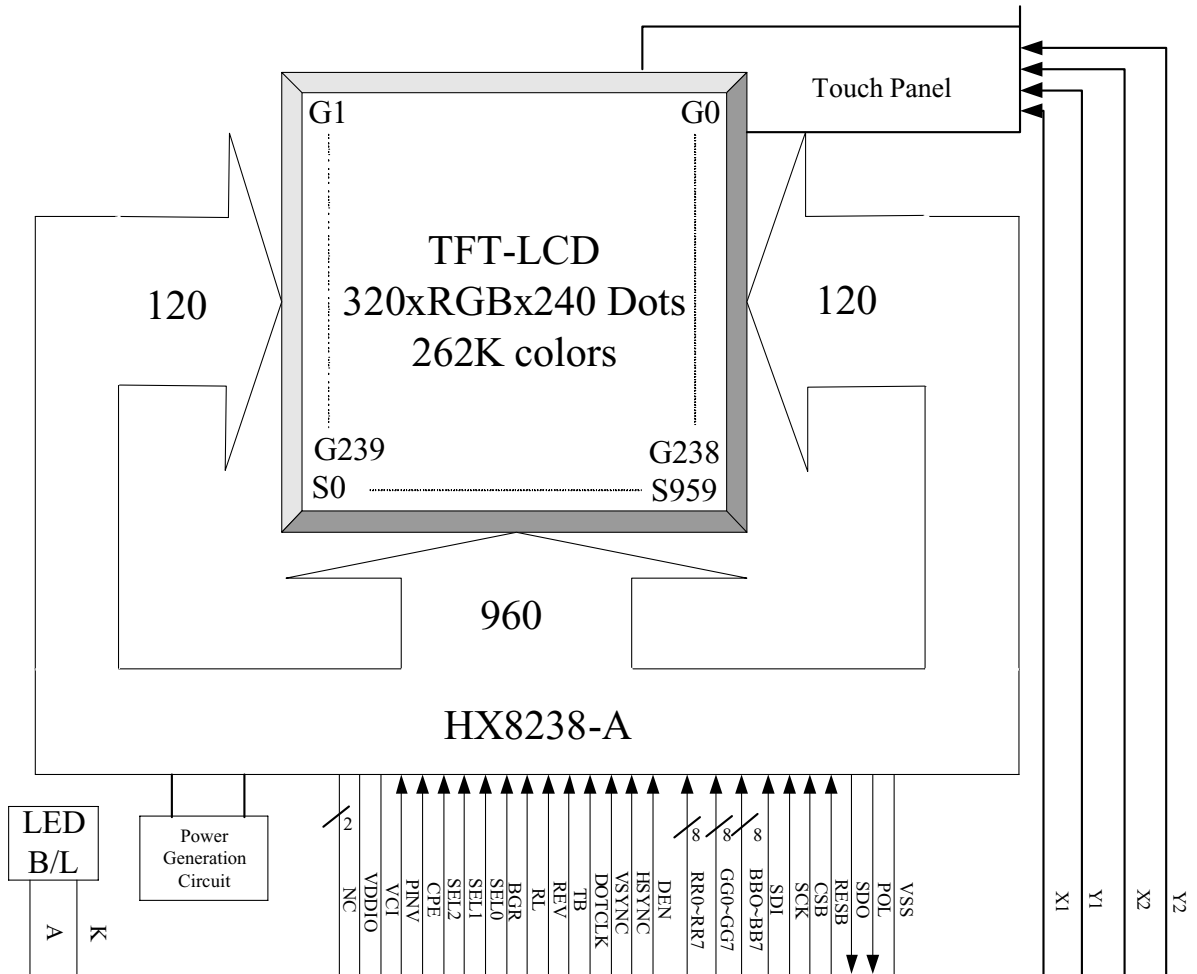
## 1.5 Interface pin :

| Pin No. | Pin Name | I/O | Description |
|---|---|---|---|
| 1 | VSS | P | System ground pin of the IC. - Connect to system ground |
| 2 | POL | O | Polarity signal to monitor VCOM signal. |
| 3 | SDO | O | Data output pin in serial mode.<br>- Leave it OPEN when not used |
| 4 | RESB | I | System reset pin. Internal pull high. |
| 5 | CSB | I | Chip select pin of serial interface. Internal pull high.<br>- Leave it OPEN when not used. |
| 6 | SCK | I | Clock pin of serial interface. Internal pull high.<br>- Leave it OPEN when not used |
| 7 | SDI | I | Data input pin in serial mode. Internal pull high.<br>- Leave it OPEN when not used |
| 8~31 | BB [0:7]<br>GG [0:7]<br>RR [0:7] | I | Graphic Data Input Pins. Internal pull low.<br>- RR [0:7]: Red Data - 8-bits<br>- GG [0:7]: Green Data - 8-bits<br>- BB [0:7]: Blue Data - 8-bits<br>For 8 bit interface, only RR[0:7] are used. For unused pins, please connect to VSS or floating. |
| 32 | DEN | I | Display enable pin from controller. |
| 33 | HSYNC | I | Line synchronization signal. Internal pull high.<br>- Fixed to VDDID or floating if not used |
| 34 | VSYNC | I | Frame synchronization signal. Internal pull high.<br>- Fixed to VDDID or floating if not used. |
| 35 | DOTCLK | I | Dot-clock signal and oscillator source. |
| 36 | TB | I | Input pin to select the Gate driver scan direction.<br>- Connect to VSS for Gate scan from G239 to G0 (reverse scan)<br>- Connect to VDDIO for Gate scan from G0 to G239 (normal scan) |
| 37 | REV | I | Input pin to select the display reversion.<br>- Connect to VDDIO mapping data '0' to maximum pixel voltage for normally white panel<br>- Connect to VSS for mapping data '0' to minimum pixel voltage for normally black panel |

| Pin No. | Pin Name | I/O | Description |
|---|---|---|---|
| 38 | RL | I | Input pin to select the Source driver data shift direction.<br>- Connect to VDDIO for display first RGB data at S0-S2.<br>- Connect to VSS for display first RGB data at S959-S957. |
| 39 | BGR | I | Input pin to select the color mapping.<br>- Connect to VDDIO for Blue-Green-Red mapping.<br>- Connect to VSS for Red-Green-Blue mapping. |
| 40~42 | SEL0~2 | I | Input pin to select input interface mode. (see table below) |

| SEL2 | SEL1 | SEL0 | Format | Operating Frequency |
|---|---|---|---|---|
| 0 | 0 | 0 | Parallel-RGB data format (only supports stripe type color filter) | 6.5MHz |
| 0 | 0 | 1 | Serial-RGB data format | 19.5MHz |
| 0 | 1 | 0 | CCIR 656 data format (640RGB) | 24.54MHz |
| 0 | 1 | 1 | CCIR 656 data format (720RGB) | 27MHz |
| 1 | 0 | 0 | YUV mode A data format (Cr-Y-Cb-Y) | 24.54MHz |
| 1 | 0 | 1 | YUV mode A data format (Cr-Y-Cb-Y) | 27MHz |
| 1 | 1 | 0 | YUV mode B data format (Cb-Y-Cr-Y) | 27MHz |
| 1 | 1 | 1 | YUV mode B data format (Cb-Y-Cr-Y) | 24.54MHz |

| Pin No. | Pin Name | I/O | Description |
|---|---|---|---|
| 43 | CPE | I | Input pin to enable internal charge pump circuit. Internal pull high.<br>- Connect to VDDIO to enable internal charge pump.<br>- Connect to VSS to disable internal charge pump |
| 44 | PINV | I | Control the polarity of POL signal. Internal pull low.<br>- Connect to VDDIO, POL phase is reversed with internal VCOM signal.<br>- Connect to VSS, POL phase is same with internal VCOM signal. |
| 45 | VCI | P | Power Supply for Analog Circuits. |
| 46 | VDDIO | P | Voltage input pin for I/O logic. |
| 47 | NC | - | No connection. |
| 48 | NC | - | No connection. |
| 49 | K | P | Backlight LED's cathode. |
| 50 | A | P | Backlight LED's anode. |

Touch screen panel pin:

| Pin No. | Pin Name | I/O | Description |
|---------|----------|-----|-------------|
| 1 | X1 | I/O | Touch screen. |
| 2 | Y1 | I/O | Touch screen. |
| 3 | X2 | I/O | Touch screen. |
| 4 | Y2 | I/O | Touch screen. |

## 2. ELECTRICAL CHARACTERISTICS

**2.**1 Absolute Maximum Ratings

| Items | Symbol | Min. | Max. | Unit |
|---|---|---|---|---|
| Power supply voltage | $V_{DDIO}$ | -0.3 | 4.0 | V |
| Input voltage | $V_{CI}$ | VSS-0.3 | 5.0 | V |
| Operate temperature range | $T_{OP}$ | -20 | 70 | ℃ |
| Storage temperature range | $T_{ST}$ | -30 | 80 | ℃ |

## 2.2 DC Characteristics

| Items | Symbol | Min. | Typ. | Max. | Unit | Condition |
|-------|--------|------|------|------|------|-----------|
| Power supply voltage | VCI | 2.5 or VDDIO | 3.3 | 3.6 | V | |
| Power supply voltage | VDDIO | 1.4 | 3.3 | 3.6 | V | |
| Current for Driver | IVCC | - | - | 36 | mA | NOTE2 |

*NOTE1: If change the VDD, the voltage boost and contrast need to be set again.

*NOTE2: Min. and Max. Voltage is mean within the range will has optimum contrast at Ta:25℃

Typ. Voltage is specified as module driving condition: Ta=25℃,$V_{OP}$ at Optimum Contrast, the measuring condition as below, this value is URT recommend when customer change the set condition , the $V_{LCD}$ will be change.

NOTE2 :

Measuring Condition :

Standard Value MAX.

| | | |
|---|---|---|
| Ta | = | 25℃ |
| $V_{CI}$ | = | 3.3V |
| $V_{DDIO}$ | = | 3.3V |
| Display Patten | = | Checkered pattern |

### 2-2.1  Back-light Characteristics

| Parameter | Symbol | Min | Typ | Max | Unit | Test Condition | Note |
|-----------|--------|-----|-----|-----|------|----------------|------|
| Supply Current | If | - | 20 | - | mA | Ta=25℃ | - |
| Supply Voltage | VF | - | 20.4 | -- | V | Ta=25℃ | - |
| Brightness | Br | 2550 | 3150 | -- | cd/m$^2$ | Ta=25℃ If=20mA | 1 |
| Half-Life Time | Lf | - | 10000 | - | hrs | Ta=25℃ | 2 |

Note 1:Back-light only.

Note 2:The " Half-Life Time "is defined as the module brightness decrease to 50% original brightness.

## 2.4 AC Characteristics

**AC Characteristics**

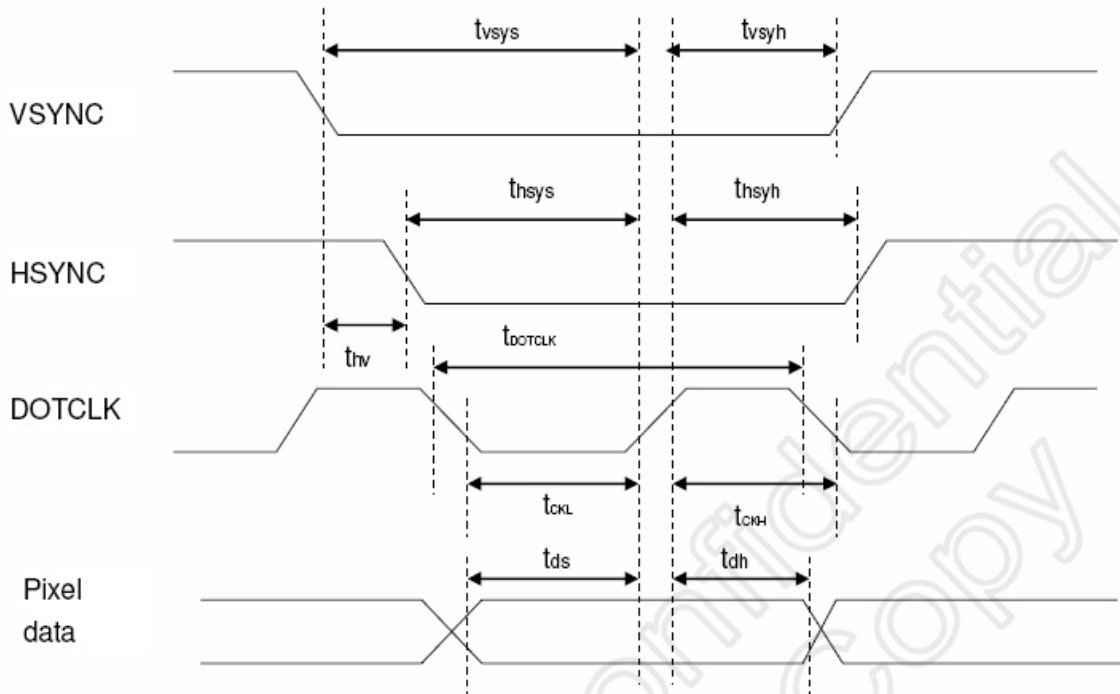(Unless otherwise specified, Voltage Referenced to $V_{SS}$, $V_{DDIO}$ = 2.2V, $T_A$ = 25℃ )
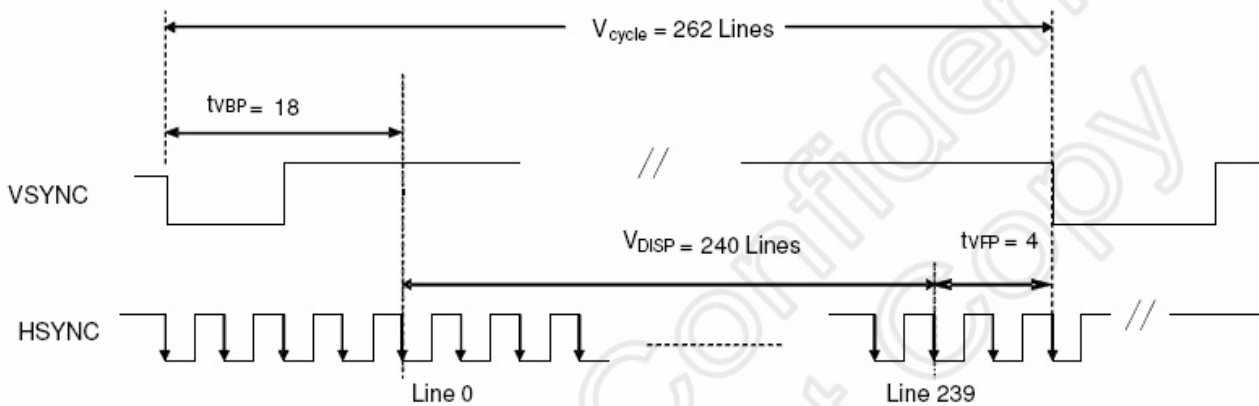


Figure 14. 1 Pixel timing

| Characteristics | Symbol | Min | | Typ | | Max | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | 24 bit | 8 bit | 24 bit | 8 bit | 24 bit | 8 bit | |
| DOTCLK Frequency | fDOTCLK | - | | 6.5 | 19.5 | 10 | 30 | MHz |
| DOTCLK Period | tDOTCLK | 100 | 33.3 | 154 | 51.3 | - | | ns |
| Vertical Sync Setup Time | tvsys | 20 | 10 | - | | - | | ns |
| Vertical Sync Hold Time | tvsyh | 20 | 10 | - | | - | | ns |
| Horizontal Sync Setup Time | thsys | 20 | 10 | - | | - | | ns |
| Horizontal Sync Hold Time | thsyh | 20 | 10 | - | | - | | ns |
| Phase difference of Sync Signal Falling Edge | thv | 1 | | - | | 240 | | tDOTCLK |
| DOTCLK Low Period | tCKL | 50 | 15 | - | | - | | ns |
| DOTCLK High Period | tCKH | 50 | 15 | - | | - | | ns |
| Data Setup Time | tds | 12 | 10 | - | | - | | ns |
| Data hold Time | tdh | 12 | 10 | - | | - | | ns |
| Reset pulse width | tRES | 10 | | - | | - | | us |

**Note:** External clock source must be provided to DOTCLK pin of HX8238-A. The driver will not operate if absent of the clocking signal.

Table 14. 1 Pixel timing
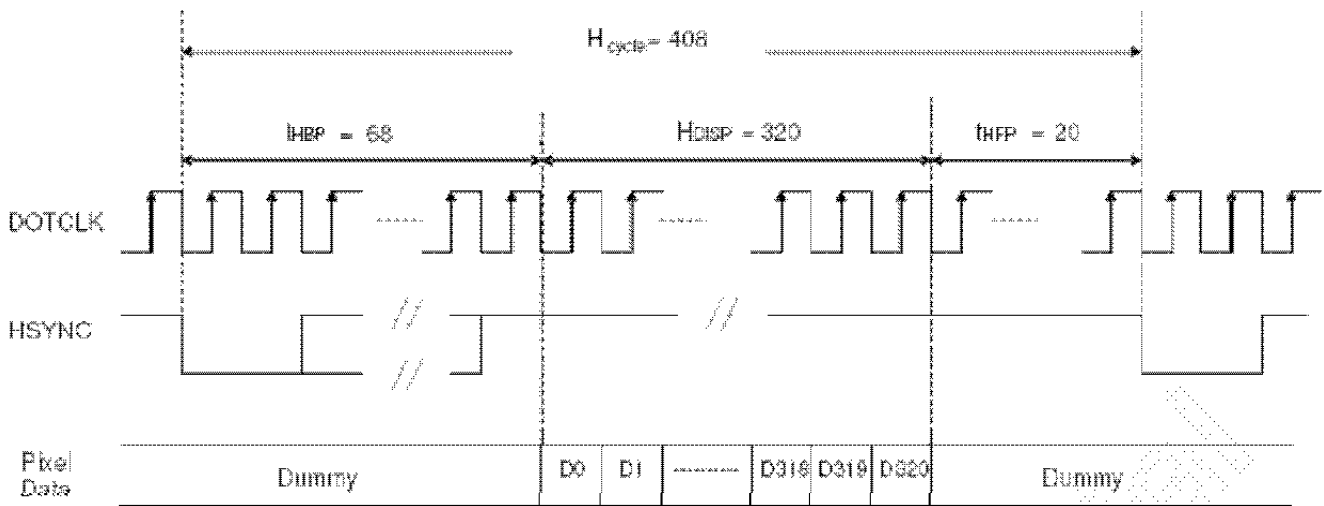
a) Horizontal Data Transaction Timing



b) Vertical Data Transaction Timing

Figure 14. 2 Data transaction timing in parallel RGB (24 bit) interface (SYNC mode)

| Characteristics | | Symbol | Min | | Typ | | Max | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | 24 bit | 8 bit | 24 bit | 8 bit | 24 bit | 8 bit | |
| DOTCLK Frequency | | fDOTCLK | - | - | 6.5 | 19.5 | 10 | 30 | MHz |
| DOTCLK Period | | tDOTCLK | 100 | 33.3 | 154 | 51.3 | - | - | ns |
| Horizontal Frequency (Line) | | fH | - | | 14.9 | | 22.35 | | KHz |
| Vertical Frequency (Refresh) | | fV | - | | 60 | | 90 | | Hz |
| Horizontal Back Porch | | tHBP | - | - | 68 | 204 | - | - | tDOTCLK |
| Horizontal Front Porch | | tHFP | - | - | 20 | 60 | - | - | tDOTCLK |
| Horizontal Data Start Point | | tHBP | - | - | 68 | 204 | - | - | tDOTCLK |
| Horizontal Blanking Period | | tHBP + tHFP | - | - | 88 | 264 | - | - | tDOTCLK |
| Horizontal Display Area | | HDISP | - | - | 320 | 960 | - | - | tDOTCLK |
| Horizontal Cycle | | Hcycle | - | - | 408 | 1224 | 450 | 1350 | tDOTCLK |
| Vertical Back Porch | | tVBP | - | | 18 | | - | | Lines |
| Vertical Front Porch | | tVFP | - | | 4 | | - | | Lines |
| Vertical Data Start Point | | tVBP | - | | 18 | | - | | Lines |
| Vertical Blanking Period | | tVBP + tVFP | - | | 22 | | - | | Lines |
| Vertical Display Area | NTSC | VDISP | - | | 240 | | - | | Lines |
| | PAL | | | | 280(PALM=0) | | | | |
| | | | | | 288(PALM=1) | | | | |
| Vertical Cycle | NTSC | Vcycle | - | | 262 | | 350 | | Lines |
| | PAL | | | | 313 | | | | |

Table 14. 2 Data transaction timing in normal operating mode

# 3. OPTICAL CHARACTERISTICS

## 3.1 Characteristics

Electrical and Optical Characteristics

| No. | Item | | symbol / temp. | | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Response Time | | Tr | 25 ℃ | - | 15 | 20 | ms | 2 |
| | | | Tf | 25 ℃ | - | 35 | 50 | | |
| 2 | Viewing Angle | Front-Rear | Θ1 | Φ = 270° | -15 | - | 35 | degree | 3 |
| | | Left-Right | Θ2 | | -45 | - | 45 | | |
| 3 | Contrast Ratio | | Cr | 25 ℃ | 150 | 250 | - | - | 4 |
| 4 | Red x-code | | Rx | 25 ℃ | 0.40 | 0.45 | 0.50 | - | 5 |
| | Red y-code | | Ry | | 0.31 | 0.36 | 0.41 | | |
| | Green x-code | | Gx | | 0.25 | 0.30 | 0.35 | | |
| | Green y-code | | Gy | | 0.37 | 0.42 | 0.47 | | |
| | Blue x-code | | Bx | | 0.10 | 0.15 | 0.20 | | |
| | Blue y-code | | By | | 0.06 | 0.11 | 0.16 | | |
| | White x-code | | Wx | | 0.24 | 0.29 | 0.34 | | |
| | White y-code | | Wy | | 0.26 | 0.31 | 0.36 | | |
| | Brightness | | Y | | 200 | 250 | - | cd/m$^2$ | |
| 5 | Brightness Uniformity | | | 25 ℃ | 80 | - | - | % | 6 |

## 3.2 Definition of optical characteristics

**Measurement condition :**

Transmissive and Transflective type
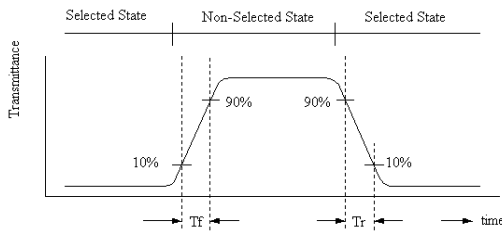


PHOTAL LCD-5000
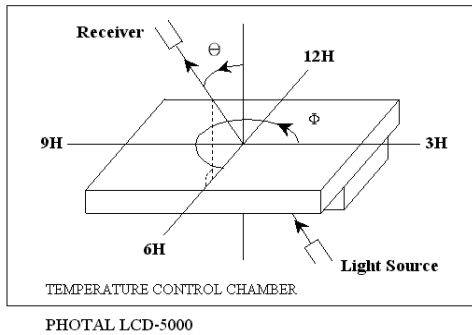
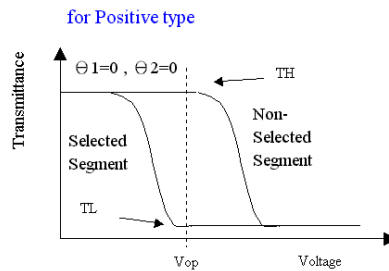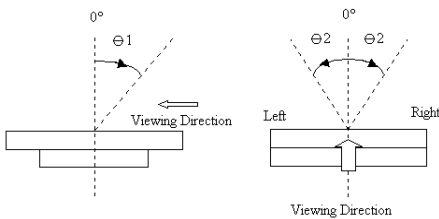**[Note 1]  Definition of LCD Driving Vop and Waveform :**
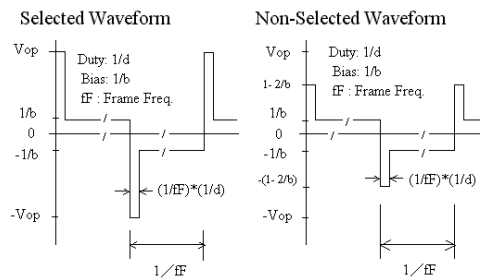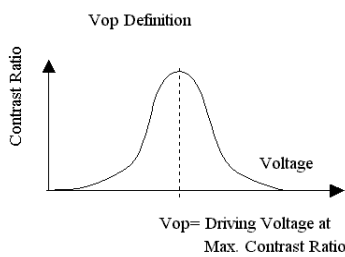


**[Note 2]  Definition of Response Time**

for  Positive type  :



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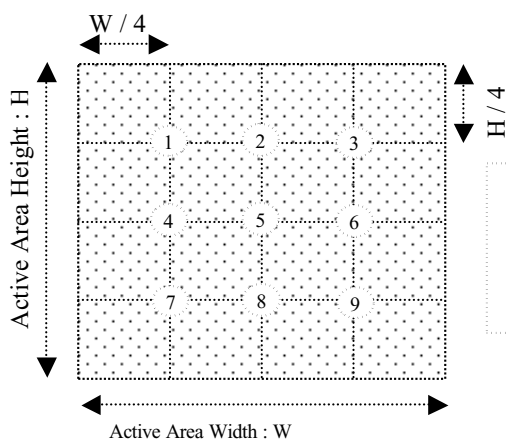


for Positive type

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

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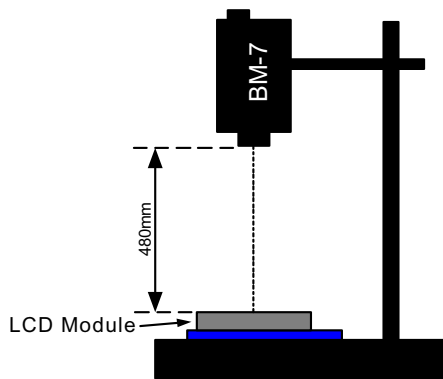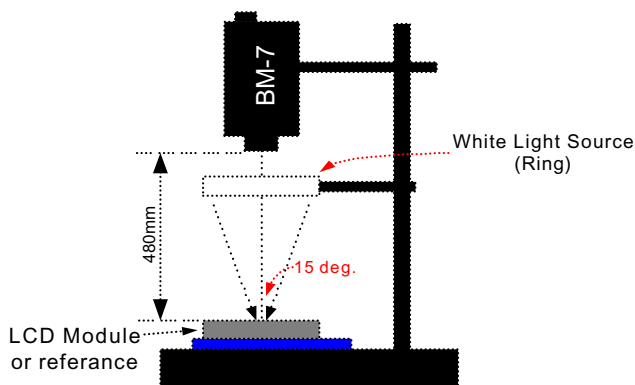


**[Note 6]  Definition of Brightness Uniformity**



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

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

# 4. RELIABILITY :

| Item No | Items | Condition | Remark |
|---------|-------|-----------|--------|
| 1 | High temperature operating | 70 ℃ , 200 hours | Finish product (With polarizer) |
| 2 | Low temperature operating | -20 ℃ , 200 hours | Finish product (With polarizer) |
| 3 | High temperature storage | 80 ℃ , 200 hours | Finish product (With polarizer) |
| 4 | Low temperature storage | -30 ℃ , 200 hours | Finish product (With polarizer) |
| 5 | High temperature & humidity storage | 60℃, 90%RH, 100 hours | Finish product (With polarizer) |
| 6 | Thermal Shock storage | -30℃, 30min.<=> 80℃, 30min. 10 Cycles | Finish product (With polarizer) |
| 7 | Vibration test | 10 => 55 =>10 => 55 => 10 Hz , within 1 minute Amplitude : 1.5mm. 15 minutes for each Direction ( X,Y,Z ) | Finish product (With polarizer) |
| 8 | Drop test | Packed, 100CM free fall, 6 sides, 1 corner, 3edges | Finish product (With polarizer) |
| 9 | Life time | 50,000 hours 25℃ , 70%RH below , specification condition driving | Finish product (With polarizer) |

 * 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 HANDING 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 :280℃±10℃.
   Soldering time : 3~4sec./ terminals.
   Type of solder : Eutectic solder(rosin flux filled).

☐ **PRECAUTION IN USE OF LCD**

● Do not contact or scratch the front surface and the contact pads of a LCD panel 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 LCD panels away from direct sunlight , also avoid them in high-temperature & high humidity environment for a long period.

● Do not drive LCD panels by DC voltage.

● Do not expose LCD panels to organic solvent.

● Liquid in LCD 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 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℃)

☐ 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 URT is required. URT will not responsible for any damage or loss which caused by the products without any authorization given by URT.

● 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.

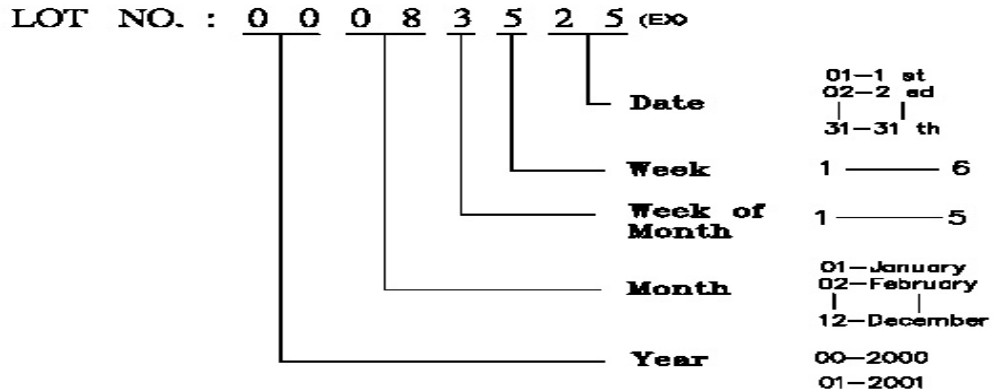## 6. DATE CODE OF PRODUCTS

● Date code will be shown on each product :
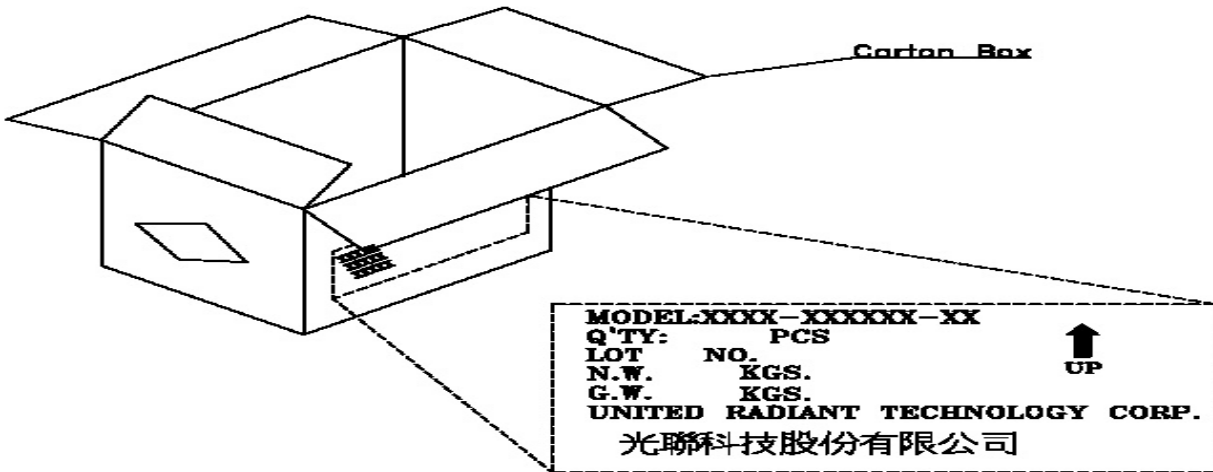
● **Y MM DD - XXX**

Year Month Day - Production lots

● Example: 2 1 2 2 3 - 0 0 3 ==>Year 2002, Dec.,23rd , Batch no.03

# 7. PACKING

Instruction of lot number:

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

- Date
  - 01—1 st
  - 02—2 ad
  - 31—31 th
- Week 1 ———— 6
- Week of Month 1 ———— 5
- Month
  - 01—January
  - 02—February
  - 12—December
- Year
  - 00—2000
  - 01—2001

Lable of carton:

Carton Box

```
MODEL:XXXX-XXXXXX-XX
Q'TY:        PCS
LOT    NO.
N.W.       KGS.                    ↑
G.W.       KGS.                    UP
UNITED  RADIANT  TECHNOLOGY  CORP.
光聯科技股份有限公司
```

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
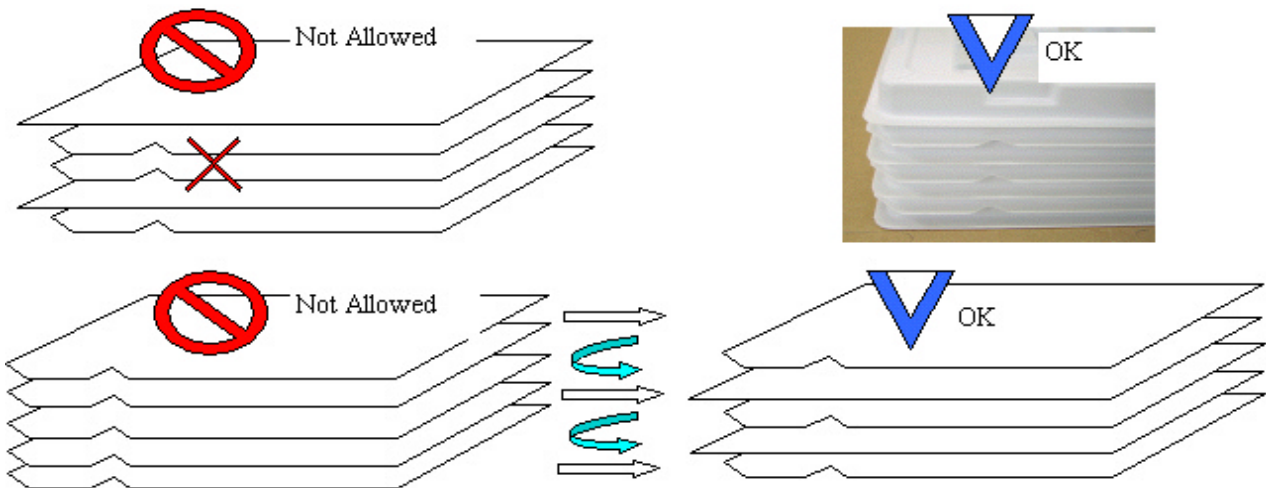
MODEL NO: UM*
T.B.D. pcs / Tray
T.B.D. Tray / Box
T.B.D. Box / Carton
T.B.D. pcs / Carton

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

1 foamed plastic in each box

TAPE

T.B.D. TRAY
(1 empty tray)

Corrugated board
protection

| Model | | No. | |
|---|---|---|---|
| Q'ty | | | pcs |
| * | | | |
| Lot | | No. | (U.R.T. DATE CODE) |
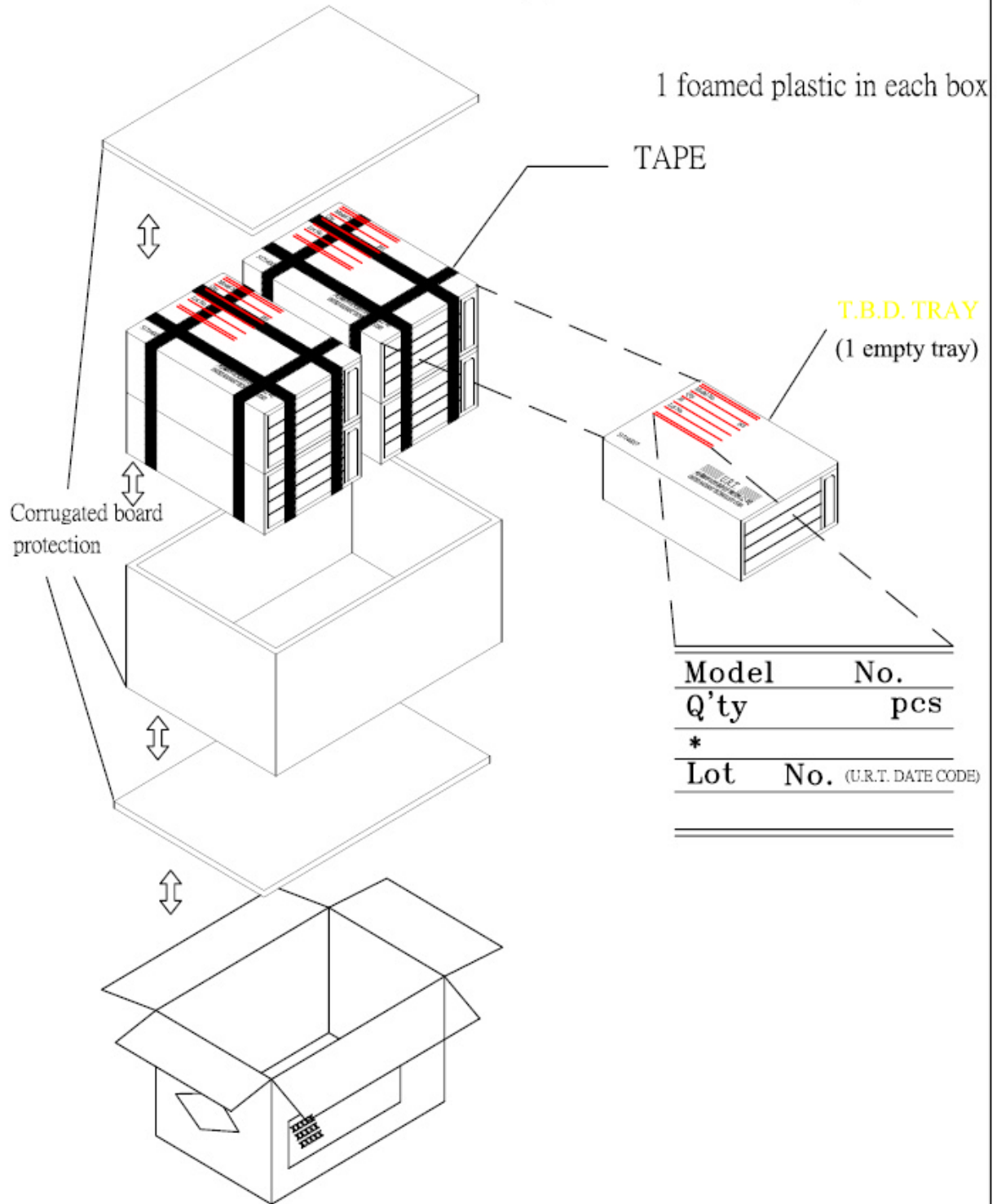
# 8. INSPECTION STANDARD

## 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 U.R.T. TO PURCHASER. PURCHASER SHALL CONTROL THE LCM AT -10 ℃ ～ 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-105D ) , 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

U.R.T. WILL PROVIDE ONE-YEAR WARRANTY FOR THE PRODUCTS ONLY IF UNDER SPECIFICATION OPERATING CONDITIONS. U.R.T. WILL REPLACE NEW PRODUCTS FOR THESE DEFECT PRODUCTS WHICH UNDER WARRANTY PERIOD AND BELONG TO THE RESPONSIBILITY OF U.R.T.

## 8.2. CHECKING CONDITION
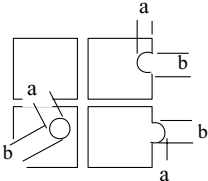
**8.2.1.** CHECKING DIRECTION SHALL BE IN THE 45 DEGREE AREA TO FACE THE SAMPLE.

**8.2.2.** CHECKER SHALL SEE OVER 30 cm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS. OF 20W FLUORESCENT LAMP.
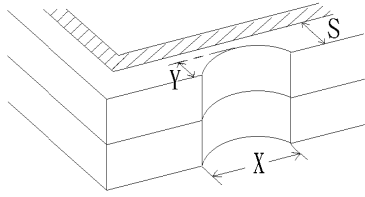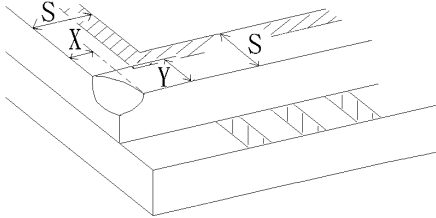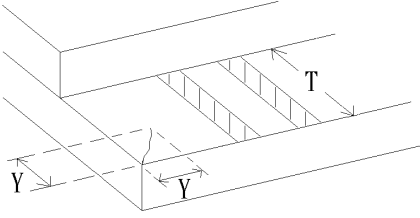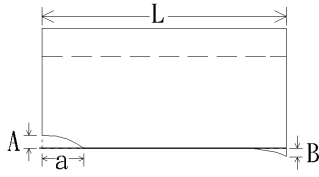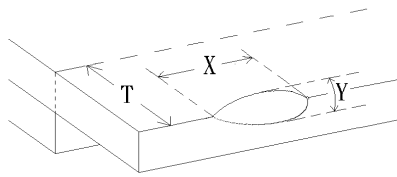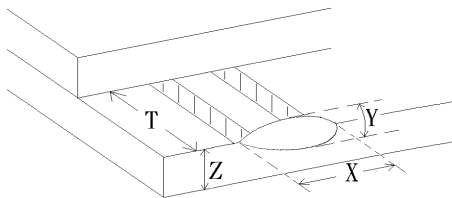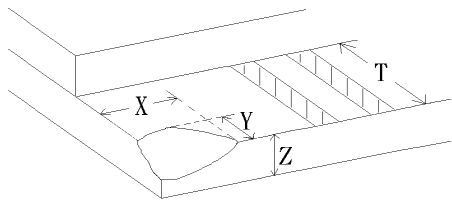
## 8.3. INSPECTION PLAN :

| 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 | NON DISPLAY、WRONG PATTERN DISPLAY、CURRENT CONSUMPTION OUT OF SPECIFICATION...... REJECTED | Critical |
| | 13. PIN HOLE、PATTERN DEFORMITY | ACCORDING TO STANDARD OF VISUAL INSPECTION | Minor |

## 8.4. STANDARD OF VISUAL INSPECTION

| NO. | CLASS | ITEM | JUDGEMENT |
|---|---|---|---|
| 8.4.1 | MINOR | · BLEMISH、BLACK SPOT、WHITE SPOT IN THE LCD.<br><br>· BLEMISH、BLACK SPOT、WHITE SPOT AND SCRATCH ON THE POLARIZER | (A) ROUND TYPE: unit : mm.<br><br>**See table A below**<br><br>(B) LINER TYPE: unit : mm.<br><br>**See table B below** |
| 8.4.2 | MINOR | BUBBLE IN POLARIZER | unit : mm.<br><br>**See table 8.4.2 below** |
| 8.4.3 | MINOR | PIN HOLE、PATTERN DEFORMITY | unit : mm.<br><br>$\Phi=(a+b)/2$<br><br>**See table 8.4.3 below** |

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

| DIAMETER (mm.) | | ACCEPTABLE Q'TY |
|---|---|---|
| $\Phi \leqq 0.1$ | | DISREGARD |
| $0.1 < \Phi \leqq 0.2$ | | 2 |
| $0.2 < \Phi \leqq 0.25$ | | 1 |
| $0.25 < \Phi$ | | 0 |

NOTE: $\Phi=(\text{LENGTH}+\text{WIDTH})/2$

**(B) LINER TYPE:** unit : mm.

| LENGTH | WIDTH | ACCEPTABLE Q'TY |
|---|---|---|
| ------ | $W \leqq 0.03$ | DISREGARD |
| $L \leqq 5.0$ | $0.03 < W \leqq 0.05$ | 3 |
| $L \leqq 5.0$ | $0.05 < W \leqq 0.07$ | 1 |
| ------ | $0.07 < W$ | FOLLOW ROUND TYPE |

**8.4.2** unit : mm.

| DIAMETER | | ACCEPTABLE Q'TY |
|---|---|---|
| $\Phi \leqq 0.15$ | | DISREGARD |
| $0.15 < \Phi \leqq 0.5$ | | 2 |
| $0.5 < \Phi$ | | 0 |

**8.4.3** unit : mm. $\Phi=(a+b)/2$

| DIAMETER | | ACC. Q'TY |
|---|---|---|
| $\Phi \leqq 0.1$ | | DISREGARD |
| $0.1 < \Phi \leqq 0.25$ | | 3 |
| $0.25 < \Phi$ | | 0 |

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