SPECIFICATION

OF

LIQUID CRYSTAL DISPLAY MODULE

UNITED RADIANT TECHNOLOGY CORP. 光聯科技 Jul-07-2008 品管部 QC DEPT.

CUSTOMER : URT-STD

Model No. : UMNH-8055MD-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-07-2008
APPROVED	CHECKED	CHECKED	PREPARED	Date

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Revision record

Document Revision	Model No. Version No.	Description	Revision by
0	UMNH-8055MD-T (UFNH-K062EY-6FT) Version No. 0		W.L.Tsai Nick Liu 26-Jun-2007
1	UMNH-8055MD-T (UFNH-K062EY-6FT) Version No. 0	1.Add VCOM board	W.L.Tsai Nick Liu 21-Sep-2007
2	UMNH-8055MD-2T (UFNH-K062EY-8FT) Version No. 0	1. Change PLZ supplier from UMNH-8055MD-T 2. Modify the viewing angle	W.L.Tsai Nick Liu 27-Nov-2007
3	UMNH-8055MD-3T (UFNH-K062EY-8FT) Version No. 0	Add T/P	W.L.Tsai Nick Liu
4	UMNH-8055MD-4T (UFNH-K062EY-8FT) Version No. 0	Change FPC supplier from UMSH-8050MD-2T.	W.L.Tsai Nick Liu 4-Mar-2008
5	UMNH-8055MD-5T (UFNH-K062EY-8FT) Version No. 0	1.Change the FPC and PLZ supplier from UMNH-8055MD-1T	W.L.Tsai Nick Liu 12-Mar-2008
6	UMNH-8055MD-6T (UFNH-K062EY-8FT) Version No. 0	1. Change the FPC and PLZ supplier from UMSH-8055MD-3T 2. Change the Module thickness from 4.4mm to 4.3	W.L.Tsai Nick Liu 7-Jul-2008

CONTENTS:

1. BASIC SPECIFICATION

1.1 Mechanical specifications

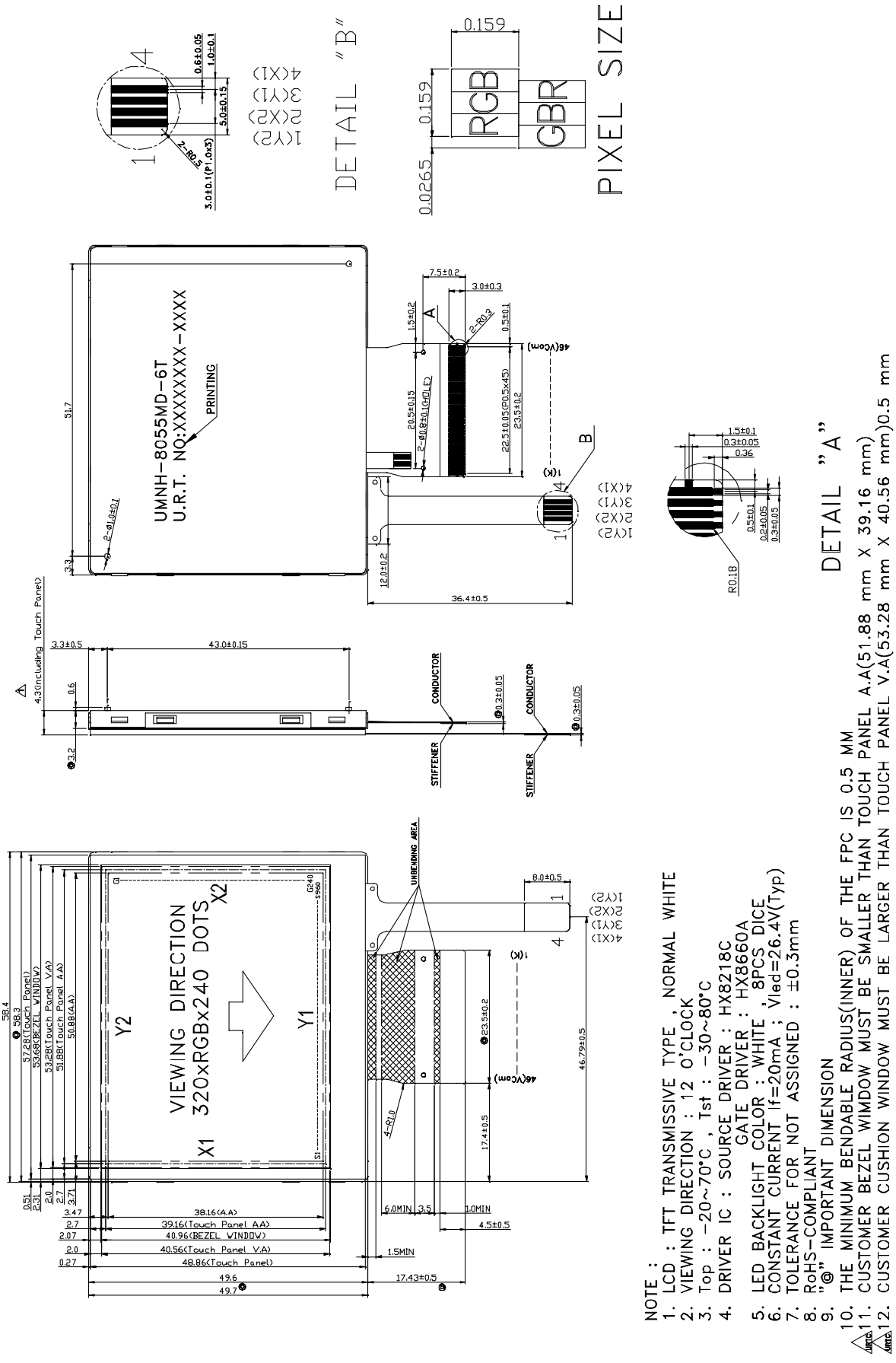
Items	Nominal Dimension	Unit
Dot Matrix	320*RGB*240	dots
Module Size (W x H x T)	58.4 x 49.7 x 4.3	mm.
Viewing Area (W×H)	53.68 x 40.96	mm.
Active Area (W x H)	50.88 x 38.16	mm.
Dot Size (W×H)	0.053 x 0.159	mm.
Dot Pitch (W×H)	0.159 x 0.159	mm.
Pixel Size (W x H)	0.159 x 0.159	mm.
Driving IC Package	COG	-

* Expose the driver IC under blaze (luminosity over than 1 cd) when using the LCM may cause IC operating failure.

1.2 Display specification

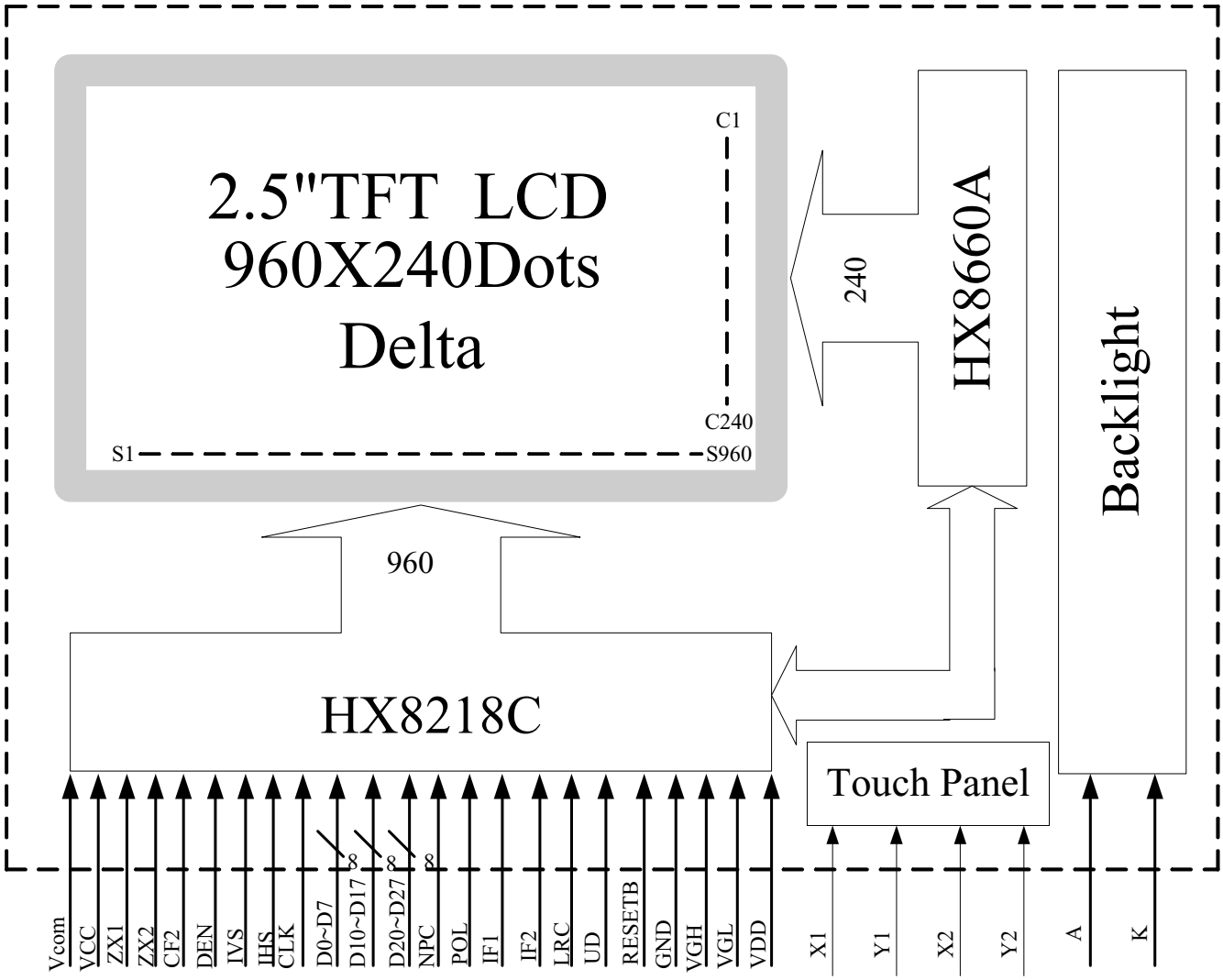
Display	Descriptions	Note
LCD Type	TFT	-
LCD Mode	Transmissive	-
Polarizer Mode	Positive	-
Background Color	Normal White	-
Backlight Type	LED	
Backlight Color	White	-
Viewing Direction	12 O'clock Direction	-

1.3 Outline dimension



NOTE :
1. LCD : TFT TRANSMISSIVE TYPE , NORMAL WHITE
2. VIEWING DIRECTION : 12 O'CLOCK
3. Top : -20~70°C , Tst : -30~80°C
4. DRIVER IC : SOURCE DRIVER : HX8218C
   GATE DRIVER : HX8660A
5. LED BACKLIGHT COLOR : WHITE , 8PCS DICE
6. CONSTANT CURRENT If=20mA ; Vled=26.4V(Typ)
7. TOLERANCE FOR NOT ASSIGNED : ±0.3mm
8. RoHS-COMPLIANT
9. "@" IMPORTANT DIMENSION
10. THE MINIMUM BENDABLE RADIUS(INNER) OF THE FPC IS 0.5 MM
11. CUSTOMER BEZEL WIMDOW MUST BE SMALLER THAN TOUCH PANEL A.A(51.88 mm X 39.16 mm)
12. CUSTOMER CUSHION WINDOW MUST BE LARGER THAN TOUCH PANEL V.A(53.28 mm X 40.56 mm)0.5 mm

1.4 Block diagram:



1.5 Interface pin :

Pin No.	Pin Symbol	I/O	Description
1	K	P	Power supply for LED-
2	A	P	Power supply for LED+
3	VDD	P	Analog power. 4.5V to 5.5V.
4	VGL	P	Power supply for LCM drive output Low
5	VGH	P	Power supply for LCM drive output High
6	GND	P	Ground
7	RESETB	I	Hardware global reset. Low active. Normally pull high.
8	UD	I	Up/down scan setting. When UD=H, reverse scan. When UD=L, normal scan.
9	LRC	I	The shift direction of device internal shift register is controlled by this pin as shown below: LRC=H: STH→OUT1- - - OUT960→STHO LRC=L: STH→OUT960- - -OUT1→STHO
10~11	IF2~IF1	I	IF2,IF1 / Input data format L,H / Parallel RGB H,L / CCIR601 H,H / CCIR656
12	POL	O	Polarity select for the line inversion control signal. When POL=L, output voltage is negative polarity. When POL=H, output voltage is positive polarity.
13	NPC	O	NTSC or PAL mode auto detection result. When NPC=H, NTSC mode is selected. When NPC=L, PAL mode is selected.
14~37	D27~D20 D17~D10 D7~D0	I	Digital data input. DX0 is LSB and DX7 is MSB. 1. If parallel RGB input mode is used, D0X, D1X, and D2X indicate R, G, and B data in turn. 2. If CCIR601/656 input mode is selected, only D07~D00 are used, and others short to GND.

Pin No.	Pin Symbol	I/O	Description
38	CLK	I	Clock signal. Latching data at the rising edge.
39	IHS	I	Horizontal sync input in digital RGB mode.
40	IVS	I	Vertical sync input in digital RGB mode.
41	DEN	I	Input data enable control
42	CF2	I	Define the used delta type color filter.
43~44	ZX2~ZX1	I	Zoom in/out modes setting pin. Zoom function is only active in CCIR601/656 input mode
45	VCC	P	Digital power. 3V to 3.6V.
46	Vcom	I	TFT driver signal. Connect to POL through OP.

Touch Panel:

Pin No.	Pin Symbol	I/O	Description
1	Y2	-	Touch Screen
2	X2	-	Touch Screen
3	Y1	-	Touch Screen
4	X1	-	Touch Screen

2. ELECTRICAL CHARACTERISTICS

2.1 Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit
Power supply voltage	V_{DD}	-0.3	7.0	V
Power supply voltage	V_{CC}	-0.3	7.0	V
Logic power voltage	V_{out}	-0.3	7.0	V
Input voltage	V_{in}	-0.3	V_{DD}+0.3	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	V_{DD}	3.8	5.0	5.5	V	
Power supply voltage	V_{CC}	3.0	3.3	3.6	V	
Power supply voltage	V_{GH}	--	15	--	V	
Power supply voltage	V_{GL}	--	-10	--	V	
Input Voltage	V_{IL}	0	--	0.3 V_{CC}	V	L level
	V_{IH}	0.7 V_{CC}	--	V_{CC}	V	H level
Current for Driver	I_{CC}	--	--	8.0	mA	Vcc=3.3V

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	-	26.4	--	V	Ta=25℃	-
Half-Life Time	Lf	-	10000	-	hrs	Ta=25℃±2℃ 60±10% RH	9

Note 8 : Back-light only.

Note 9：The " Half-Life Time "is defined as the module brightness decrease to 50% original brightness.

2.3AC Characteristics

Digital Parallel RGB interface (960x240 resolution)

PARAMETER		Symbol	Min.	Typ.	Max.	Unit
CLK period		T_{OSC}	-	156	-	ns
Data setup time		T_{SU}	12	-	-	ns
Data hold time		T_{HD}	12	-	-	ns
IHS period		T_{H}	-	408	-	T_{OSC}
IHS pulse width		T_{HS}	5	30	-	T_{OSC}
IHS setup time		T_{Cr}	12	-	-	ns
IHS hold time		T_{Cf}	12	-	-	ns
IVS pulse width		T_{VS}	1	3	5	T_{H}
IVS setup time		T_{Vr}	12	-	-	ns
IVS hold time		T_{Vf}	12	-	-	µs
IVS-DEN time	NTSC	T_{VSE}	-	18	-	T_{H}
	PAL	T_{VSE}	-	26	-	T_{H}
IHS-DEN time		T_{HE}	36	68	88	T_{OSC}
DEN pulse width		T_{EP}	-	320	-	T_{OSC}
DEN-STH time		T_{DES}	-	1	-	T_{OSC}
IVS period	NTSC	-	-	262.5	-	T_{H}
	PAL	-	-	312.5	-	T_{H}

Note: When SYNC mode is used, 1st data start from 68th CLK after IHS falling.

CCIR601/656 Interface

PARAMETER	Symbol	Min.	Typ.	Max.	Unit
CLK period	T_{OSC}	-	37	-	ns
Data setup time	T_{SU}	12	-	-	ns
Data hold time	T_{HD}	12	-	-	ns
IVS falling to IHS rising time for odd field	T_{HVO}	1	-	-	T_{OSC}
IVS falling to IHS falling time for even field	T_{HVE}	1	-	-	T_{OSC}

2-4-1 AC Characteristics

Hardware reset timing

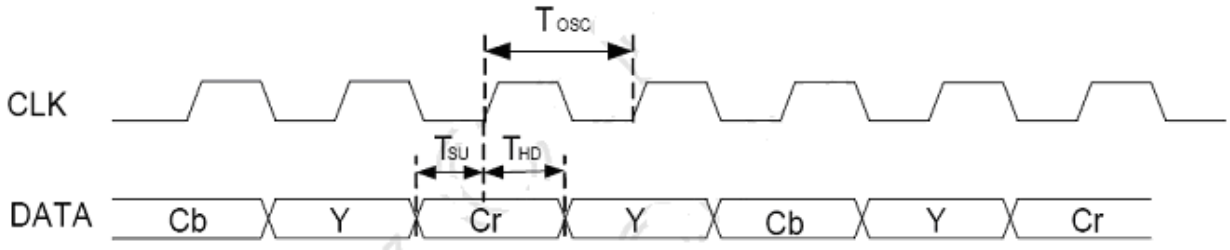
PARAMETER	Symbol	Min.	Typ.	Max.	Unit
RESETB low pulse width	T_{RSB}	10	-	-	μs
STB to Vsync Setup Time	T_{STB}	20	-	-	ns

Output signal characteristics for digital input signal

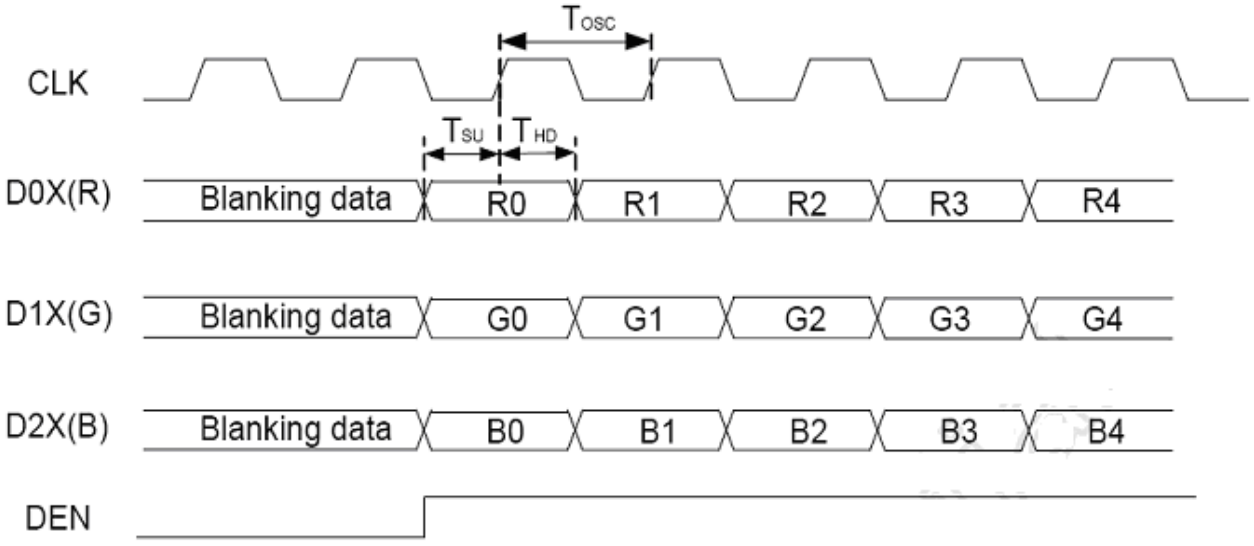
PARAMETER		Symbol	Min.	Typ.	Max.	Unit
Rising time		T_r	-	-	10	ns
Falling time		T_f	-	-	10	ns
Internal STH setup time		T_{SUS}	12	-	-	ns
Internal STH hold time		T_{HDS}	12	-	-	ns
Internal data setup time		T_{SUD}	60	-	-	ns
Internal data hold time		T_{HDD}	40	-	-	ns
OEH pulse width		T_{OEH}	-	1248	-	ns
OEV pulse width		T_{OEV}	-	4992	-	ns
CKV pulse width		T_{CKV}	-	3744	-	ns
IHS-OEH time		T_1	-	4368	-	ns
IHS-CKV time		T_2	-	2496	-	ns
IHS-OEV time		T_3	-	624	-	ns
IHS-POL time		T_4	-	4368	-	ns
STV setup time		T_{SUV}	-	1872	-	ns
STV pulse width		T_{STV}	-	1	-	T_H
IVS-STV time	NTSC	T_{VS1}	-	19	-	T_H
	PAL	T_{VS1}	-	27	-	T_H
OEH-STV time		T_{OES}	-	2	-	T_H
Output settling time		T_{ST}	-	12	20	μs

2-4-2 AC Characteristics

- **CCIR656**

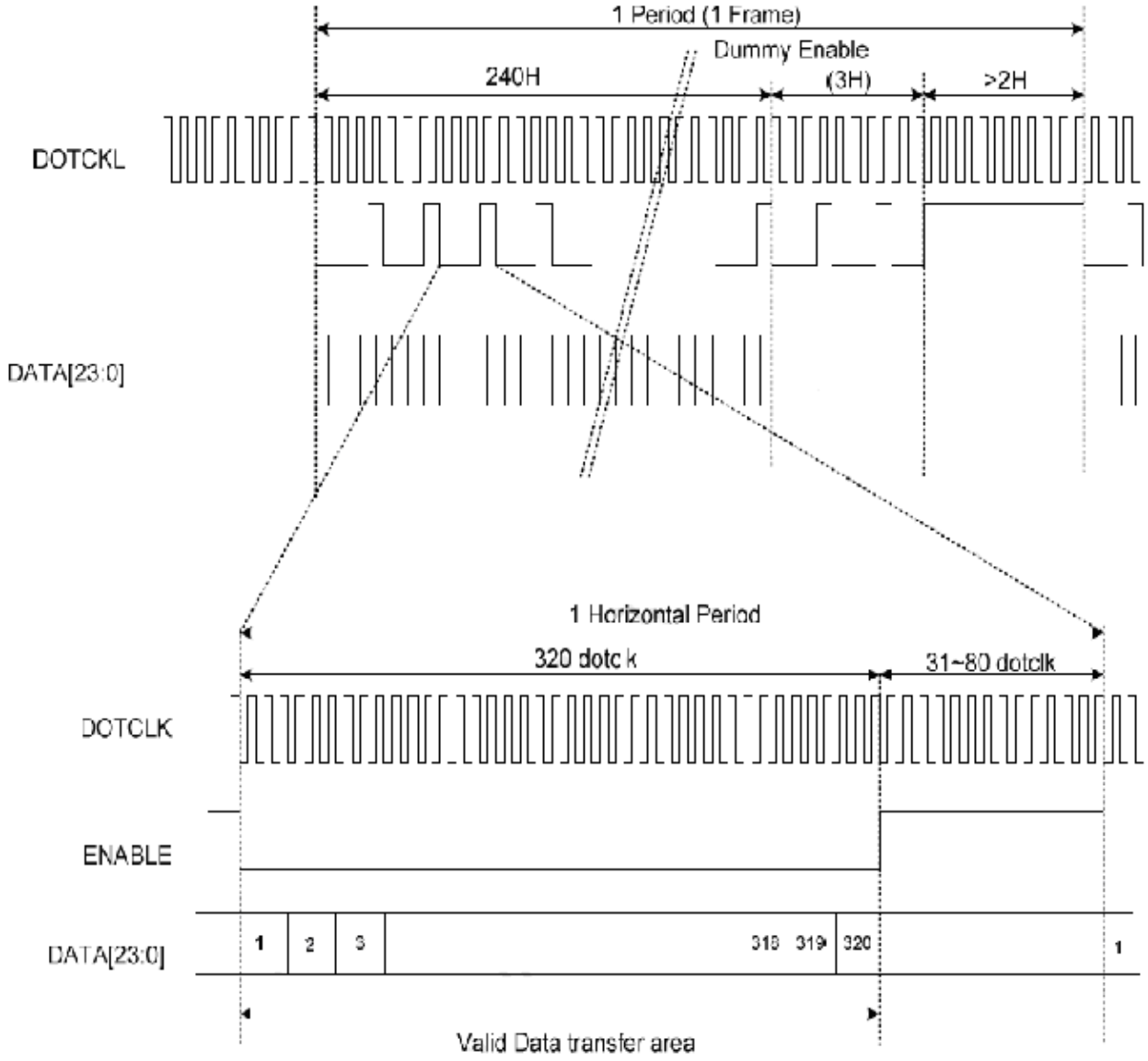


- **Digital Parallel RGB**



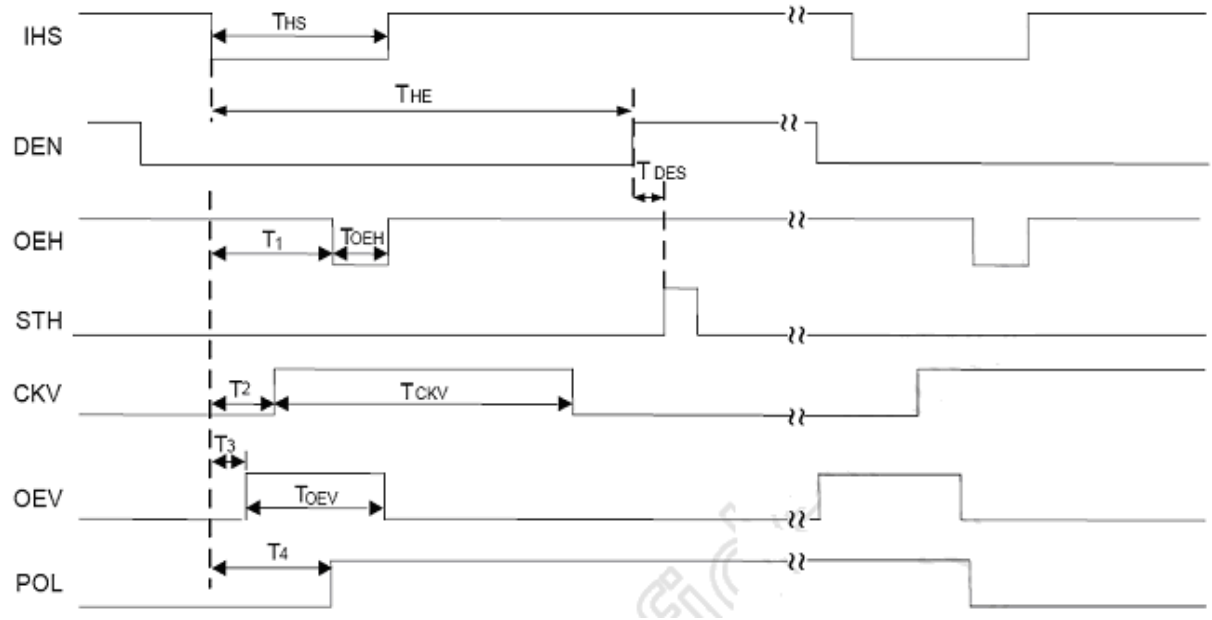
2-4-3 AC Characteristics

Digital RGB timing waveform
DE Only Mode

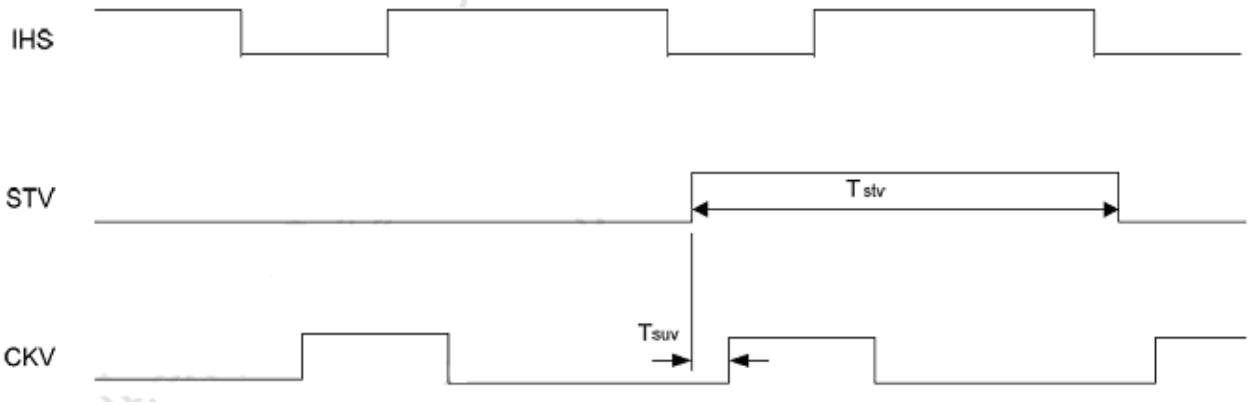


2-4-4 AC Characteristics

IHS and horizontal control timing waveforms



IHS and vertical shift clock timing waveforms



3. OPTICAL CHARACTERISTICS

3.1 Characteristics

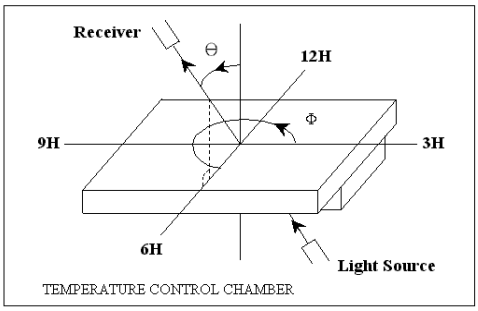
Electrical and Optical Characteristics

No.	Item		symbol	/ temp.	Min.	Typ.	Max.	Unit	Note
1	Response Time		Tr	25 ℃	-	15	30	ms	2
			Tf	25 ℃	-	35	50		
2	Viewing Angle	Front-Rear	Θ1	CR>=10	45	-	60	degree	3
		Left-Right	Θ2		60	-	60		
3	Contrast Ratio		Cr	25 ℃	150	250	-	-	4
4	Red x-code		Rx	25 ℃	0.56	0.61	0.66	-	5
	Red y-code		Ry		0.30	0.35	0.40		
	Green x-code		Gx		0.28	0.33	0.38		
	Green y-code		Gy		0.50	0.55	0.60		
	Blue x-code		Bx		0.10	0.15	0.20		
	Blue y-code		By		0.07	0.12	0.17		
	White x-code		Wx		0.27	0.32	0.37		
	White y-code		Wy		0.28	0.33	0.38		
	Brightness		Y		200	240	-	cd/m^2	
5	Brightness Uniformity			25 ℃	80	-	-	%	6

3.2 Definition of optical characteristics

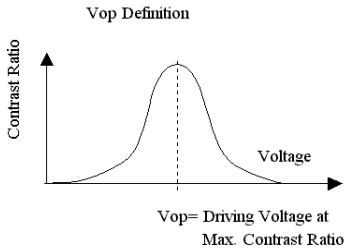
Measurement condition :

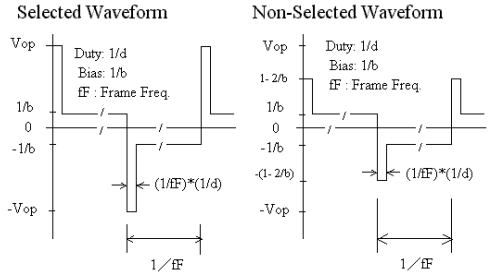
Transmissive and Transflective type



PHOTAL LCD-5000

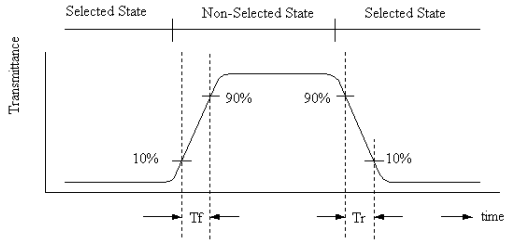
[Note 1] Definition of LCD Driving Vop and Waveform :



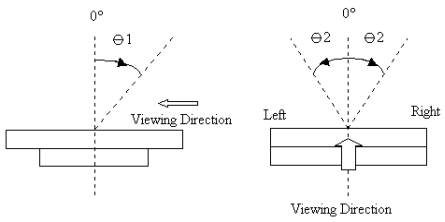


[Note 2] Definition of Response Time

for Positive type :

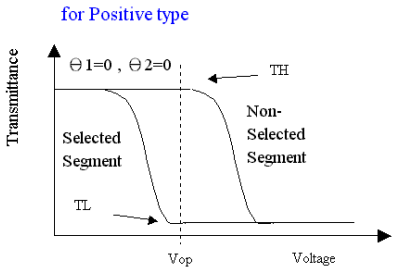


[Note 3] Definition of Viewing Angle :



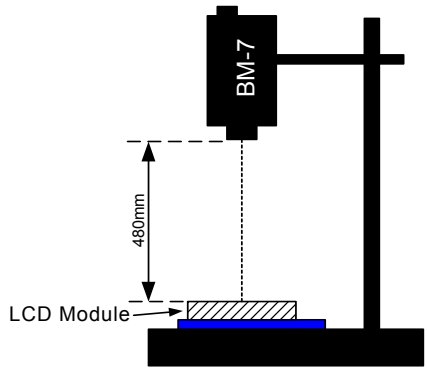
[Note 4] Definition of Contrast Ratio :

for Positive type

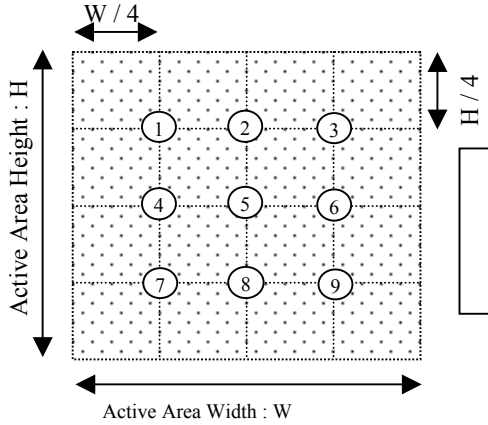


$$\text{Contrast Ratio} = \frac{TH}{TL}$$

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

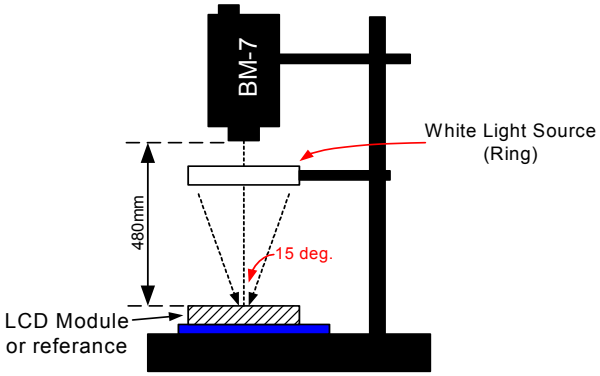


[Note 6] Definition of Brightness Uniformity



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

[Note 7] Definition of Measurement of Reflectance



4. RELIABILITY :

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

* 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 :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 :

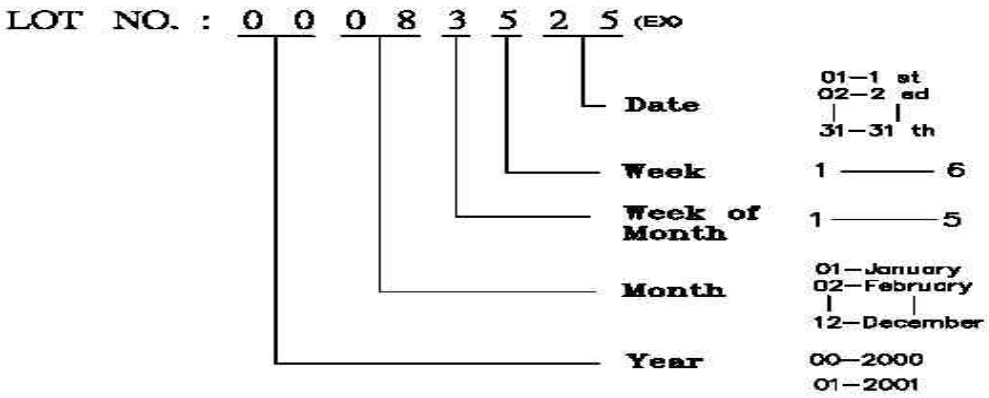
- **Y MM DD - XXX**

  Year Month Day - Production lots

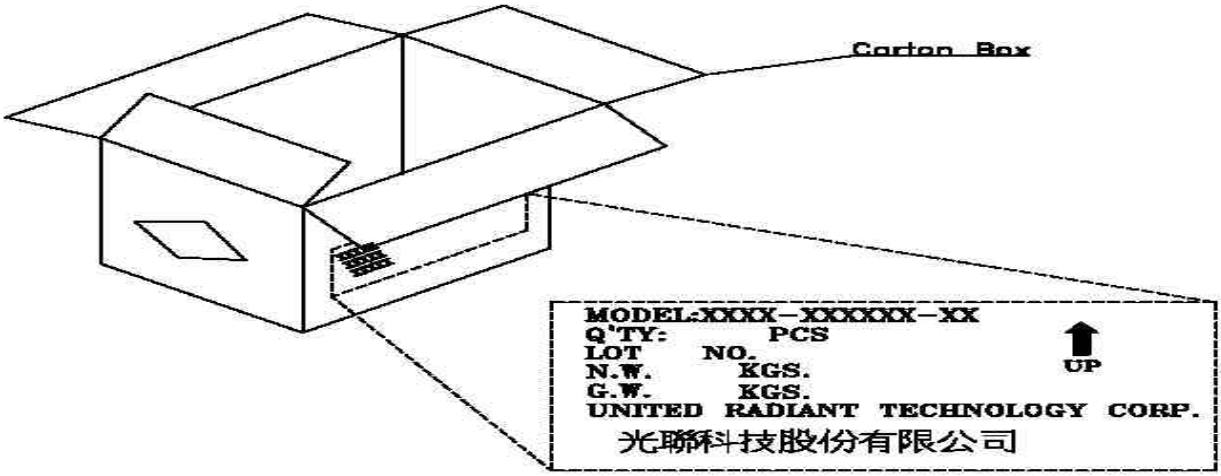
- Example: 2 1 2 2 3 - 0 0 3 ==>Year 2002, Dec.,23rd , Batch no.03

7. PACKING

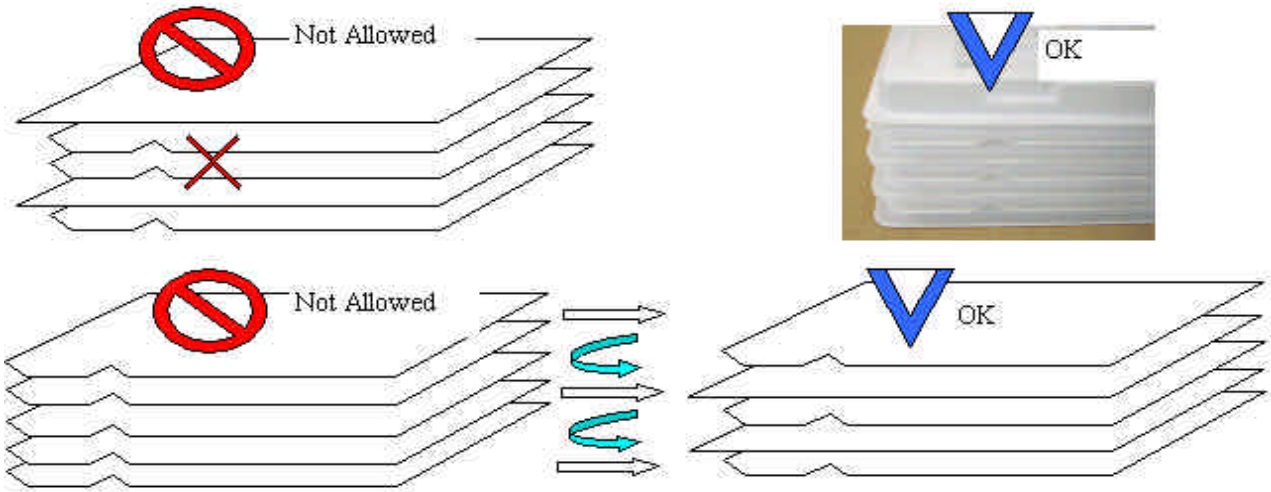
Instruction of lot number:



Lable of carton:



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



MODEL NO: UM*

T B D pcs / Tray

T B D Tray / Box

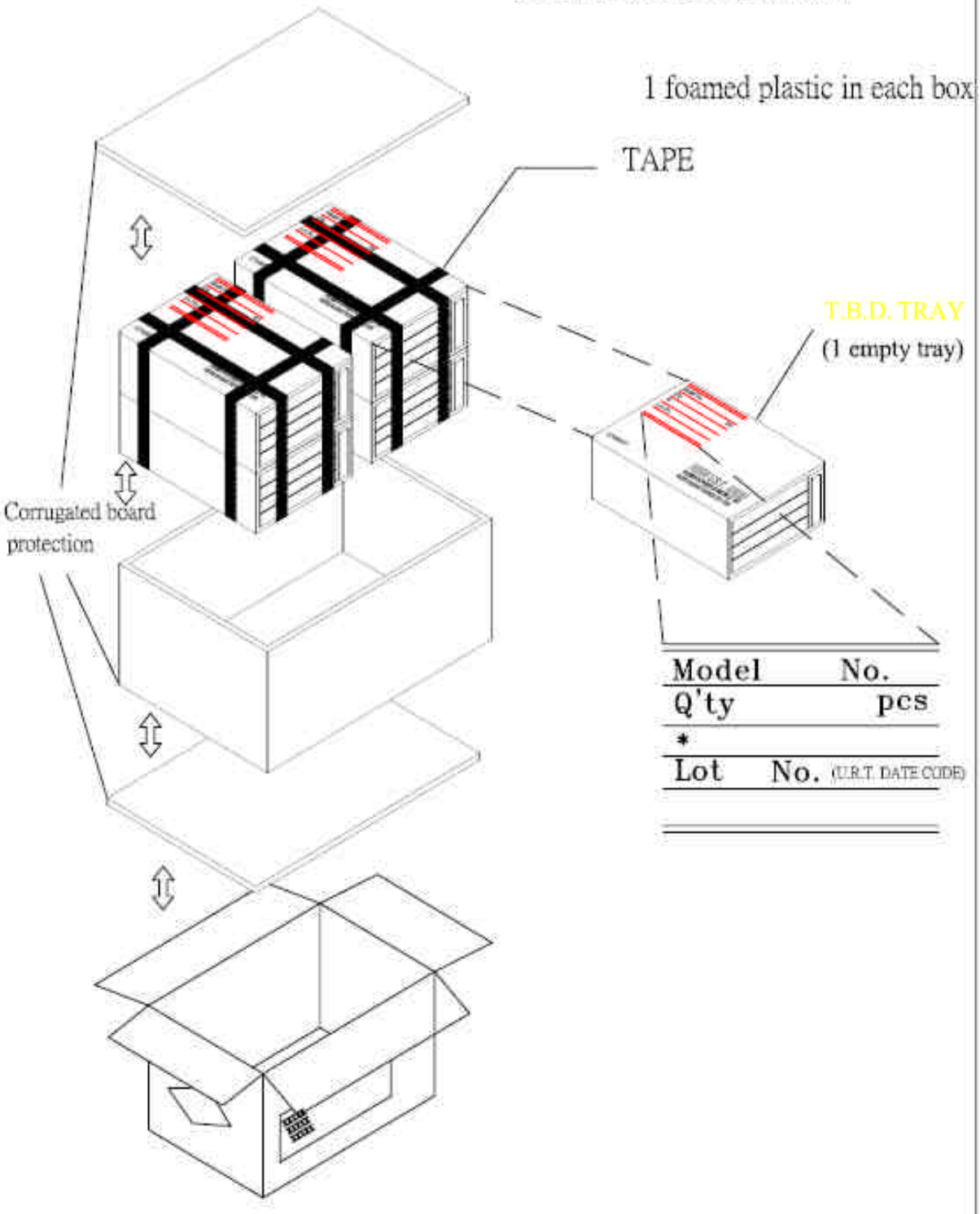
T B D Box / Carton

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



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-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

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.

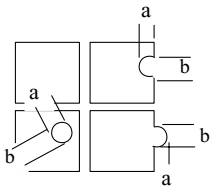
8.2.2. CHECKER SHALL SEE OVER 30 cm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS. OF 20W FLUORESCENT LAMP.

8.3. INSPECTION PLAN :

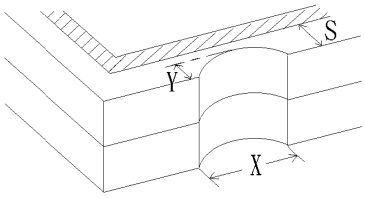
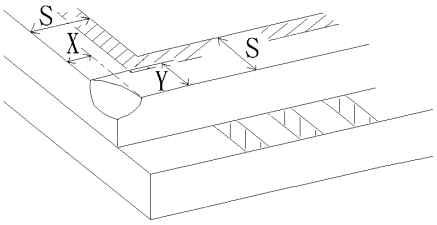
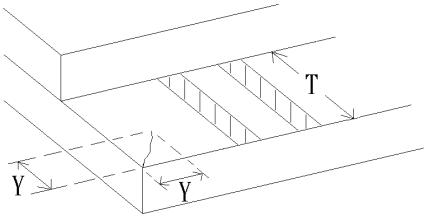
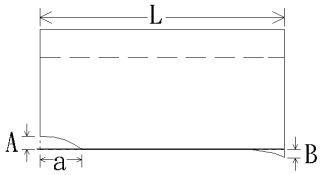
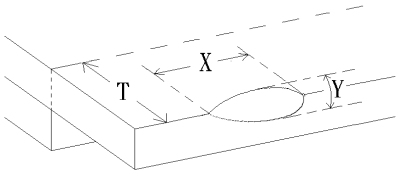
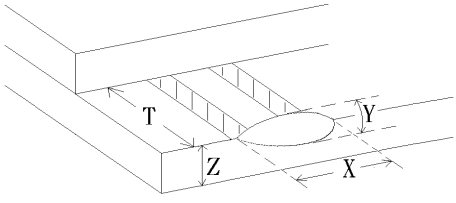
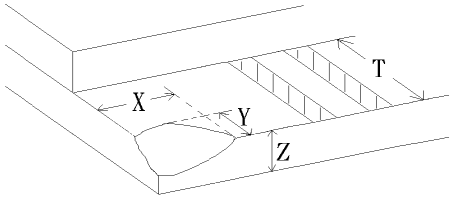
CLASS	ITEM	JUDGEMENT	CLASS
PACKING & INDICATE	1. OUTSIDE AND INSIDE PACKAGE	"MODEL NO." , "LOT NO." AND "QUANTITY" SHOULD INDICATE ON THE PACKAGE.	Minor
	2. MODEL MIXED AND QUANTITY	OTHER MODEL MIXED.....REJECTED QUANTITY SHORT OR OVER.....REJECTED	Critical
	3. PRODUCT INDICATION	"MODEL NO." SHOULD INDICATE 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

<table>
<tr><th>NO.</th><th>CLASS</th><th>ITEM</th><th>JUDGEMENT</th></tr>
<tr><td>8.4.1</td><td>MINOR</td><td>· BLEMISH、BLACK SPOT、
WHITE SPOT IN THE LCD.

· BLEMISH、BLACK SPOT、
WHITE SPOT AND SCRATCH
ON THE POLARIZER</td><td>(A) ROUND TYPE: unit : mm.
<table>
<tr><th>DIAMETER (mm.)</th><th>ACCEPTABLE Q'TY</th></tr>
<tr><td>Φ ≦ 0.1</td><td>DISREGARD</td></tr>
<tr><td>0.1 < Φ ≦ 0.2</td><td>2</td></tr>
<tr><td>0.2 < Φ ≦ 0.25</td><td>1</td></tr>
<tr><td>0.25 < Φ</td><td>0</td></tr>
</table>
NOTE: Φ=(LENGTH+WIDTH)/2
(B) LINER TYPE: unit : mm.
<table>
<tr><th>LENGTH</th><th>WIDTH</th><th>ACCEPTABLE Q'TY</th></tr>
<tr><td>------</td><td>W ≦0.03</td><td>DISREGARD</td></tr>
<tr><td>L ≦ 5.0</td><td>0.03 < W ≦0.05</td><td>3</td></tr>
<tr><td>L ≦ 5.0</td><td>0.05 < W ≦0.07</td><td>1</td></tr>
<tr><td>------</td><td>0.07 < W</td><td>FOLLOW ROUND TYPE</td></tr>
</table></td></tr>
<tr><td>8.4.2</td><td>MINOR</td><td>BUBBLE IN POLARIZER</td><td>unit : mm.
<table>
<tr><th>DIAMETER</th><th>ACCEPTABLE Q'TY</th></tr>
<tr><td>Φ ≦0.15</td><td>DISREGARD</td></tr>
<tr><td>0.15 < Φ ≦ 0.5</td><td>2</td></tr>
<tr><td>0.5 < Φ</td><td>0</td></tr>
</table></td></tr>
<tr><td>8.4.3</td><td>MINOR</td><td>PIN HOLE 、
PATTERN DEFORMITY</td><td> 

Φ=(a+b)/2
unit : mm.
<table>
<tr><th>DIAMETER</th><th>ACC. Q'TY</th></tr>
<tr><td>Φ ≦ 0.1</td><td>DISREGARD</td></tr>
<tr><td>0.1 < Φ ≦ 0.25</td><td>3</td></tr>
<tr><td>0.25 < Φ</td><td>0</td></tr>
</table></td></tr>
</table>

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