

SPECIFICATION

OF

LIQUID CRYSTAL DISPLAY MODULE



CUSTOMER : Microtips USA

Model No. : UMNH-8229MD-T(REV1)

Model version : 1

Document Revision : 2

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**

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To Whom It May Concern:

In continuing to develop and promote the strategic partnership between United Radiant Technology (URT) and Microtips USA (MTUSA), URT is please to announce that we have entered into an agreement with MTUSA to support some key projects only through MTUSA and as such the attached spec with URT Part no. will be manufactured by URT but support and logistic of the sales will be handled by MTUSA.

URT is confident that this arrangement between our two companies will ultimately benefit the end customer.

Thank You.

Raymond Chen

A handwritten signature in cursive script that reads "Raymond Chen". The signature is written in black ink and is positioned above a horizontal line.

Sales Manager: URT

Revision record

Document Revision	Model No. Version No.	Description	Revision by
0	UMNH-8229MD-T (UFNH-K080EY-6FT) Version No. 0		Eric Chen Chih Hao Huang 27-Jul-2009
1	UMNH-8229MD-T(REV1) (UFNH-K080EY-6FT) Version No. 0	1. Change L1 from 4.7uH to 10uH 2. Change the p/n sticker on the back of the LCD to MTUA-8229MD-T .	Eric Chen Chih Hao Huang 14-Aug-2009
2	UMNH-8229MD-T(REV1) (UFNH-K080EY-6FT) Version No. 1	Add the ESD test function.	Eric Chen Chih Hao Huang 19-Aug-2009

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1. BASIC SPECIFICATION

1.1 Mechanical specifications

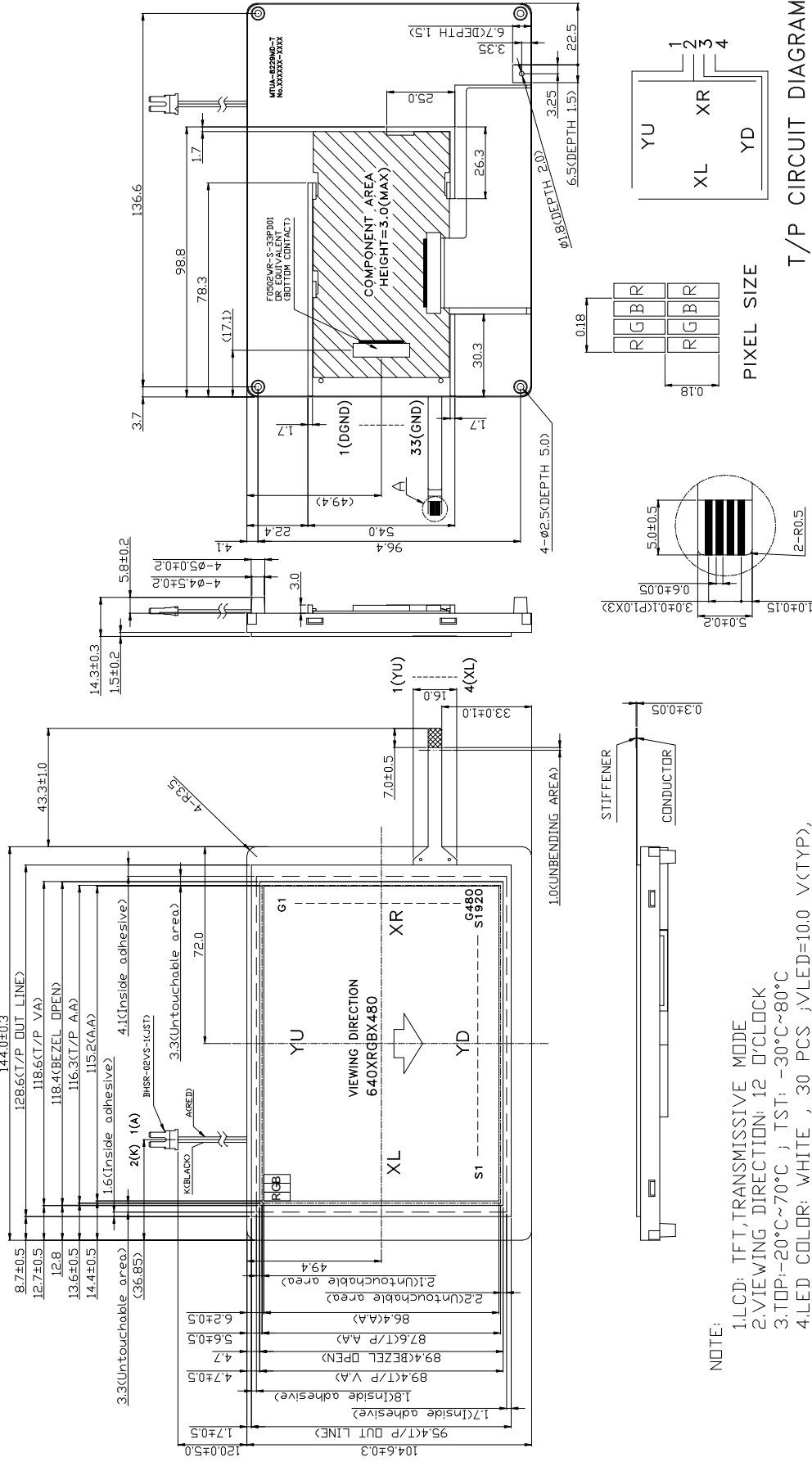
Items	Nominal Dimension	Unit
Active screen size	5.7" diagonal	-
Dot Matrix	640 x RGB x 480	Pixel
Module Size (W x H x T)	144.0 x 104.6 x 14.3	mm.
Active Area (W x H)	115.2 x 86.4(LCD)	mm.
	116.3 x 87.6(Touch panel)	mm.
Pixel Size (W×H)	0.18 x 0.18	mm.
Color depth	262K	color
Interface	Parallel 18-bit RGB	-
Driving IC Package	COG	-
Module weight	182	g

1.2 Display specification

Display	Descriptions	Note
LCD Type	a-Si TFT	-
LCD Mode	TN / Normal white	-
Polarizer Mode	Transmissive	-
Polarizer Surface	Normal	-
Pixel arrangement	RGB-stripe	
Backlight Type	LED	-
Backlight Color	White	
Viewing Direction	12 O'clock Direction	-

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

1.3 Outline dimension



DETAIL A

T/P CIRCUIT DIAGRAM

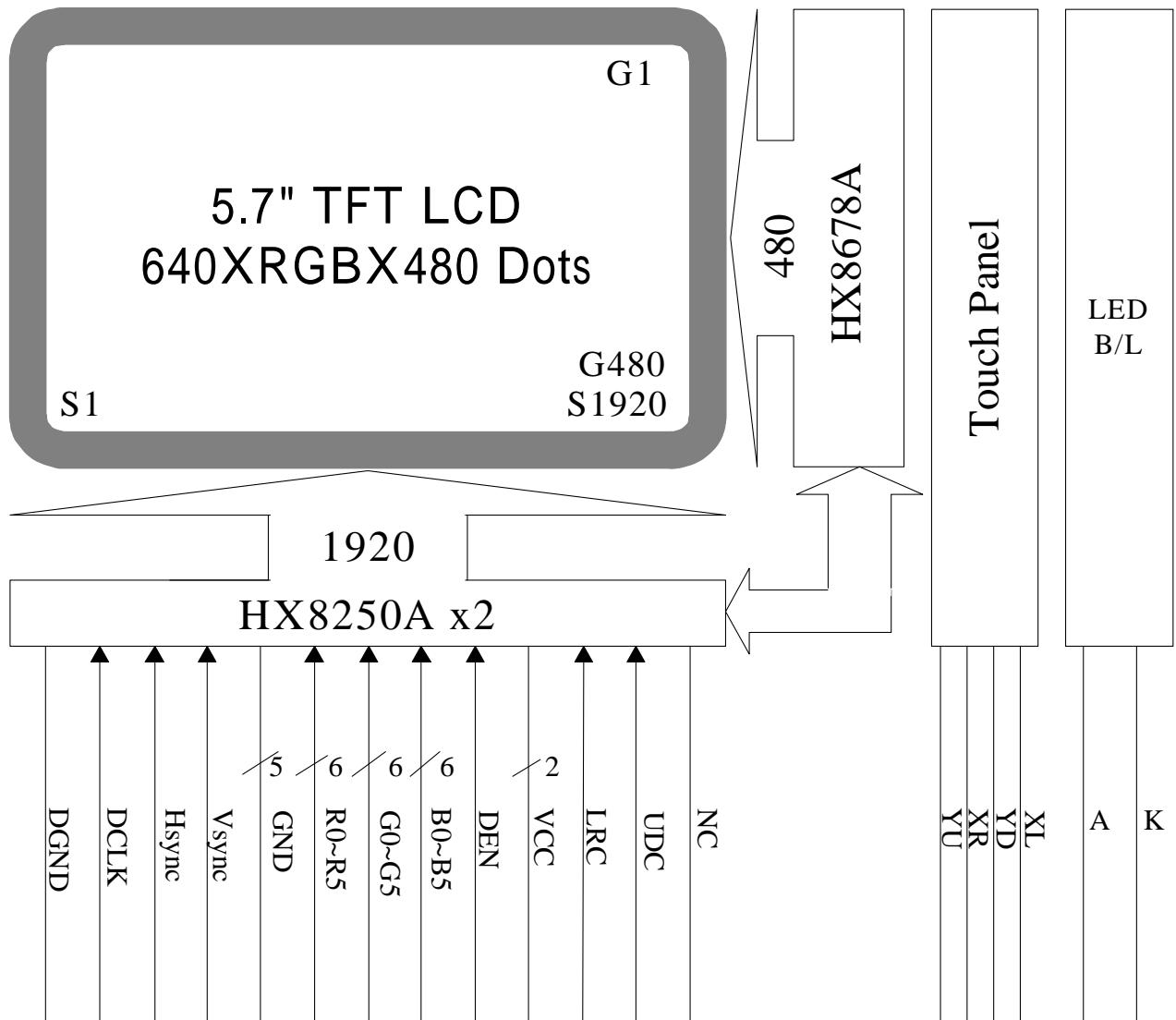
PIXEL SIZE

NOTE:

- 1.LCD: TFT, TRANSMISSIVE MODE
- 2.VIEWING DIRECTION: 12 O'CLOCK
- 3.TOP: -20°C~70°C ; TST: -30°C~80°C
- 4.LED COLOR: WHITE , 30 PCS ; VLED=10.0 V(TYP), IF=200.0mA(CONSTANT CURRENT)
- 5.GENERAL TOLERANCE ±0.3mm
- 6.THE MINIMUM BENDABLE RADIUS(INNER) OF THE FPC IS 0.5 mm
- 7.THE CUSHION BETWEEN CASE AND TOUCHPANEL WHICH IS DESIGNED BY CUSTOMER MUST BE WITHIN INSIDE ADHESIVE AREA.
- 8.DRIVER IC: HX8250AX2 HX8678A
- 9.LCM BRIGHTNESS: 450 cd/m²(TYP) , WITH T/P 360 cd/m²(TYP)

DISPLAY	DESCRIPTIONS
TYPE (DOUBLE LAYER ITO FILM)	4-WIRES ANALOG RESISTIVE TOUCH PANEL
SURFACE HARDNESS	3H
INPUT MODE	STYLUS OR FINGER
CONNECTOR TYPE	FPC
LINEARITY	1.5%
OPERATING FORCE	15g~40g(20g TYP)(9 point average)
INSULATION RESISTANCE	RI:20M Ω (MIN) ID(25V)
TRANSPARENT	80(MIN)

1.4 Block diagram:



1.5 Interface pin :

Pin No.	Pin Symbol	I/O	Description
1	DGND	P	GND.
2	DCLK	I	Clock signal for sampling each data signal.
3	Hsync	I	Horizontal synchronous signal (Negative).
4	Vsync	I	Vertical synchronous signal (Negative).
5	GND	P	GND.
6	R0	I	RED data signal (LSB).
7	R1	I	RED data signal.
8	R2	I	RED data signal.
9	R3	I	RED data signal.
10	R4	I	RED data signal.
11	R5	I	RED data signal (MSB).
12	GND	P	GND.
13	G0	I	GREEN data signal (LSB).
14	G1	I	GREEN data signal.
15	G2	I	GREEN data signal.
16	G3	I	GREEN data signal.
17	G4	I	GREEN data signal.
18	G5	I	GREEN data signal (MSB).
19	GND	P	GND.
20	B0	I	BLUE data signal(LSB).
21	B1	I	BLUE data signal.
22	B2	I	BLUE data signal.
23	B3	I	BLUE data signal.
24	B4	I	BLUE data signal.
25	B5	I	BLUE data signal(MSB).
26	GND	P	GND.
27	DEN	I	Signal to settle the horizontal display position (Positive).
28	Vcc	P	+ 3.3V power supply.
29	Vcc	P	+ 3.3V power supply.
30	LRC	I	Horizontal display mode select signal. L: Normal H: Left / Right reverse mode
31	UDC	I	Vertical display mode select signal. H: Normal L: Up / Down reverse mode
32	NC	--	No Connection.
33	GND	P	GND.

Backlight pin:

Pin No.	Pin Symbol	I/O	Description
1	LEDA	P	Power Supply for LED backlight.
2	LEDK	P	GND for LED backlight.

Touch panel pin:

Pin No.	Pin Symbol	I/O	Description
1	YU	--	Touch Screen.
2	XR	--	Touch Screen.
3	YD	--	Touch Screen.
4	XL	--	Touch Screen.

2. ELECTRICAL CHARACTERISTICS

2.1 Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit
Power supply voltage	VCC	-0.3	7.0	V
Input voltage	Vin	-0.3	VCC+0.3	V
Operate temperature range	T _{OP}	-20	70	°C
Storage temperature range	T _{ST}	-30	80	°C

2.2 DC Characteristics

Items	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply voltage	V_{CC}	--	3.3	--	V	-
Input Voltage	V_{IL}	0	-	$0.3V_{CC}$	V	
	V_{IH}	$0.7V_{CC}$	-	V_{CC}	V	
Current consumption	I_{CC}	-	-	360	mA	Note 1

*Note1 :

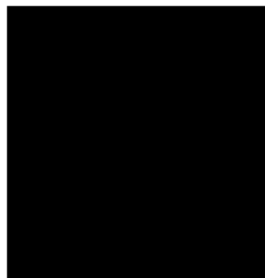
Measuring Condition:

Standard Value MAX.

$T_a = 25^\circ\text{C}$

$V_{CC} - \text{GND} = 3.3\text{V}$

Display Pattern = Check pattern



0 gray black pattern

2.2.1 Back-light only Specification

PARAMETER	SYMBOL	MIN	TYP	MAX	Unit	Test Condition	NOTE
Supply Current	I_f	--	200	--	mA	$T_a = 25^\circ\text{C}$	-
Supply Voltage	V_f	--	10	--	V	$T_a = 25^\circ\text{C}$	-
Brightness	Br	-	360	-	cd/m^2	$T_a = 25^\circ\text{C}$ $I_f = 200\text{mA}$ With T/P	-
Half-Life Time	L_f	-	50000	-	hrs	$T_a = 25^\circ\text{C}$	1

Note 1 : The " Half-Life Time "is defined as the module brightness decrease to 50% original brightness. Base on $T_a = 25^\circ\text{C}$, $V_f = 10.0\text{V}$, $I_f = 200\text{mA}$, $60 \pm 10\%$ RH condition.

2.3 AC Characteristics

Digital Parallel RGB interface (1920x480 resolution) (sync mode)

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
CLK frequency	F_{CPH}	22.66	25.175	27.69	MHz
CLK period	T_{CPH}	36.11	39.7	44.13	ns
CLK pulse duty	T_{CWH}	40	50	60	%
HS period	T_H	750	800	850	T_{CPH}
HS pulse width	T_{WH}	5	30	-	T_{CPH}
HS-first horizontal data time	T_{HS}	112	144	175	T_{CPH}
Horizontal active data area	T_{HA}	-	640	-	T_{CPH}
VS pulse width	T_{WV}	1	3	5	T_H
First Line Data input time	T_{STV}	-	35	-	T_H
VS period	T_V	515	525	535	T_H

Note: When SYNC mode is used, 1st data start from 144th CLK after HS falling (when $STHD[5:0]=00000$)

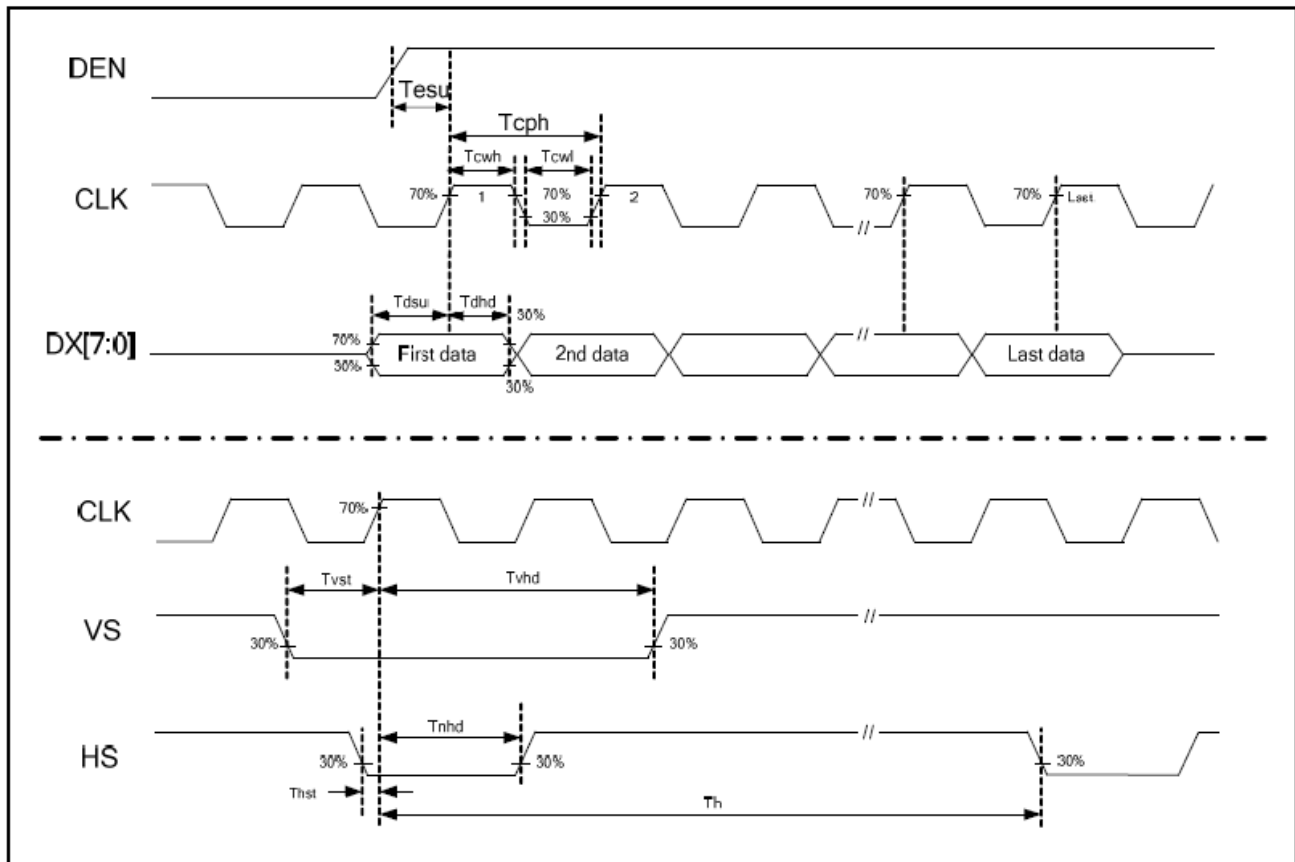
(DE mode)

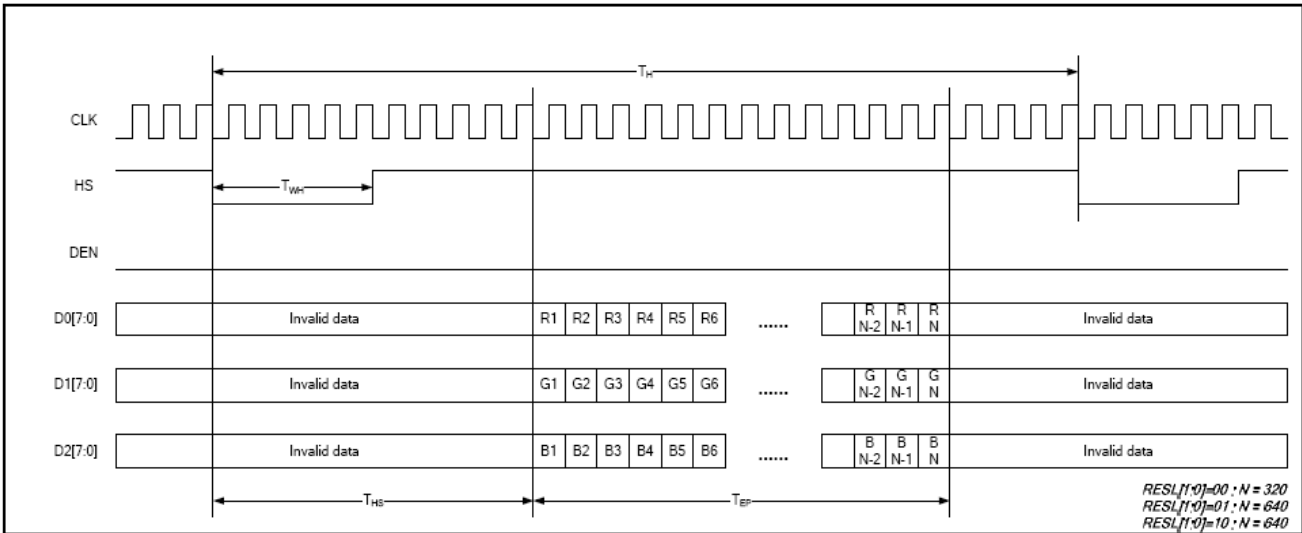
PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
CLK frequency	F_{CPH}	22.66	25.175	27.69	MHz
CLK period	T_{CPH}	36.11	39.7	44.13	ns
CLK pulse duty	T_{CWH}	40	50	60	%
DEN period	T_{DEN}	750	800	850	T_{CPH}
DEN pulse width	T_{EP}	-	640	-	T_{CPH}
DEN frame active time	T_{DEA}	-	480	-	T_{DEN}
DEN frame blanking time	T_{DEB}	10	45	110	T_{DEN}

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
OEV pulse width	T_{OEV}	-	100	-	T_{CPH}
CKV pulse width	T_{CKV}	-	96	-	T_{CPH}
HS-CKV time	T_1	-	52	-	T_{CPH}
HS-OEV time	T_2	-	8	-	T_{CPH}
HS-POL time	T_3	-	72	-	T_{CPH}
STV setup time	T_{SUV}	-	46	-	T_{CPH}
STV pulse width	T_{WSTV}	-	1	-	T_H

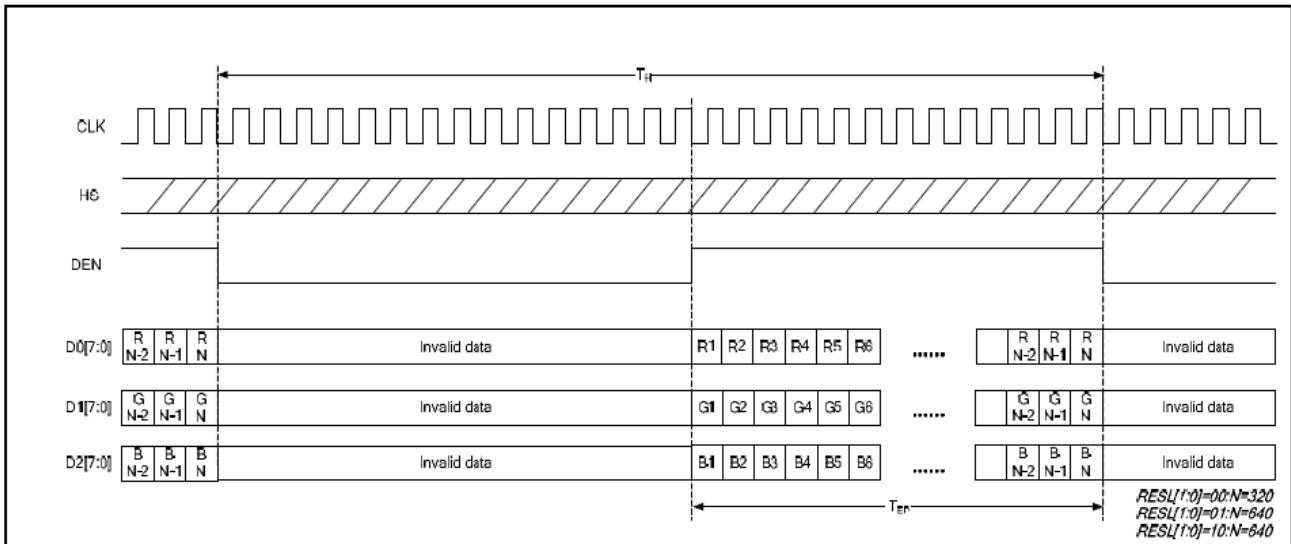
PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
HS setup time	T_{hst}	10	-	-	ns
HS hold time	T_{hhd}	10	-	-	ns
VS setup time	T_{vst}	10	-	-	ns
VS hold time	T_{vhd}	10	-	-	ns
Data setup time	T_{dsu}	10	-	-	ns
Data hold time	T_{dhd}	10	-	-	ns
DEN setup time	T_{esu}	10	-	-	ns
VS falling to HS falling time on odd field @ RGB mode	T_{HV_O}	-4	0	+4	T_{CPH}
VS falling to HS falling time on even field @ RGB mode	T_{HV_E}	0.4	0.5	0.6	T_H
Source output settling time	T_{ST}	-	12	20	μ s
Source output loading R	R_{SL}	-	2	-	K ohm
Source output loading C	C_{SL}	-	60	-	pF
POL output delay time	T_{DP}	-	-	40	ns

Clock and Data input waveforms





Parallel RGB SYNC Mode Horizontal Data Format



Parallel RGB DE Mode Horizontal Data Format

2.4 Touch Panel Specifications

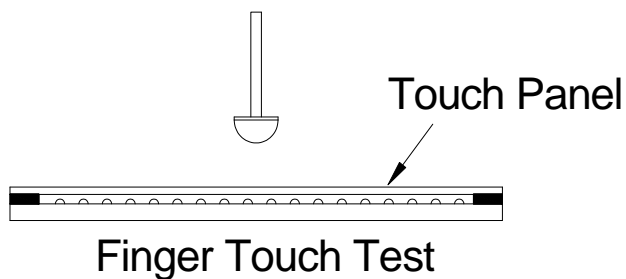
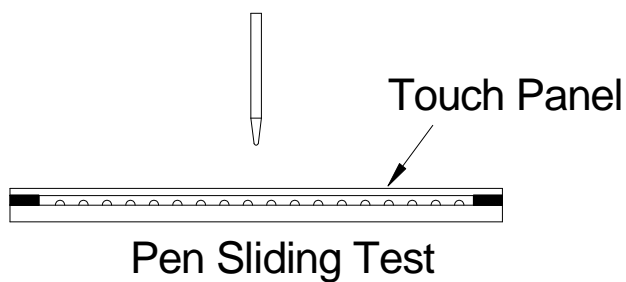
Display	Descriptions	Note
Type	4-wires Analog Resistive Touch Panel	-
Structure	ITO Film : T=0.180mm	-
	ITO Glass : T=1.1mm	-
Surface Hardness	3H	3H pencil, pressure 500g/45? (JIS-K5600)
Input mode	Stylus or Finger	-
Operating Force (Minimum Active Force)	15g~40g(20g Typ)(9 point overage)	Stylus R0.8mm
Connector Type	FPC	-
Linearity	1.5%	-
Insulation resistance	RI : 20M O(MIN) ID(25V)	-
Transparent	80(MIN)	-

2.4.1 Electric Characteristics

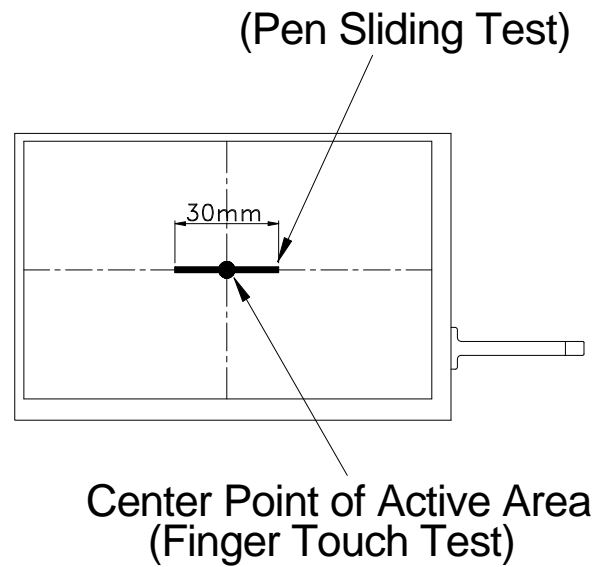
Items	Descriptions
Linearity	X-axis $\pm 1.5\%$
	Y-axis $\pm 1.5\%$
Terminal Resistance	X-axis : 50 6500
	Y-axis : 50 6500

2.4.2 Durability Test

Items	Condition
Finger Touch Test	Repeating impact the surface of touch panel 1,000k times by R8.0 silicon rubber under 250g loading and 2 times/sec speed.
Pen Sliding Test	Drawing line in 30mm length at same location of touch panel surface 100k times by R0.8mm plastic stylus under 250g loading and 60mm/sec moving speed.

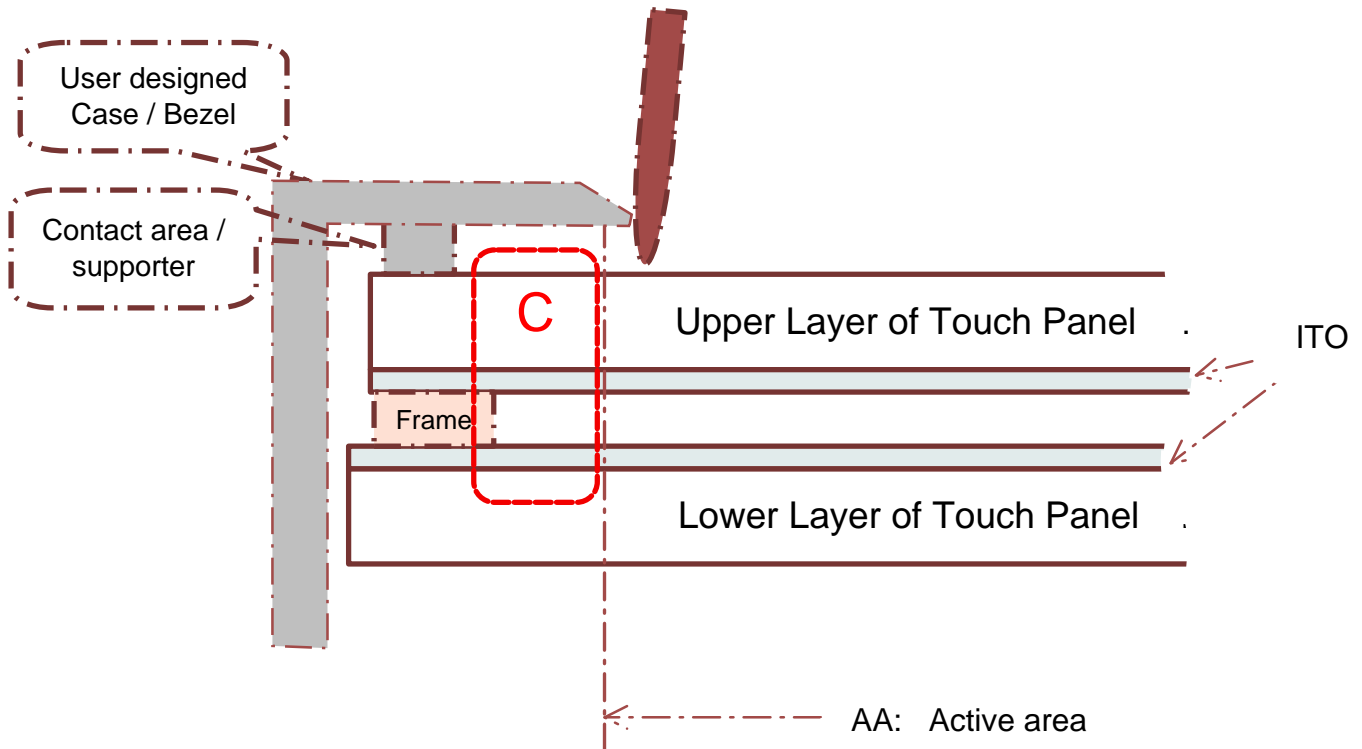


(Durability Test Position)



2.4.3 Attention for Assembly and Operation

Touch Panel as illustrated in the followings:



2.4.3.1 In order to make sure the touch activity is happened on the AA area , the case/bezel opening should cover the AA area.

2.4.3.2 Apply any stress on the C area would damage or reduce the functional performance of touch panel.

- (1). Never apply any stress on this C area during inspection or assembly .
- (2). Design on opening of the case should cover the AA area in order to prevent any probability to touch the C area.
- (3). Neither let the case above the panel touch the C nor the AA areas.
- (4). Never let the contact area of case cover " C " area.

2.4.3.3 Do not use double sided sticker or glues , in order to prevent stress hurt the upper layer / ITO / Frame structures.

3. OPTICAL CHARACTERISTICS

3.1 Characteristics

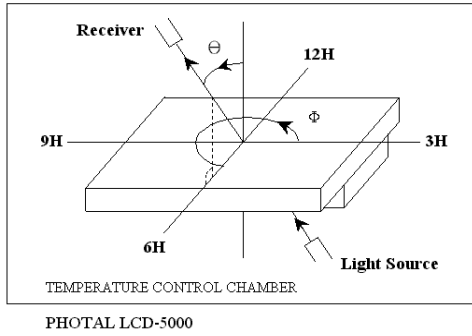
Electrical and Optical Characteristics

No.	Item			symbol / temp.	Min.	Typ.	Max.	Unit	Note	
1	Response Time			Tr	25	-	15	ms	2	
				Tf	25	-	35			
2	Viewing Angle	Hor.	Cr>=10	2+	0°	60	75	-	degree	3
				2-	180°	60	75	-		
		Ver.		1+	270°	60	75	-		
				1-	90°	45	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		0.31	0.36	0.41		
	Green x-code			Gx		0.29	0.34	0.39		
	Green y-code			Gy		0.50	0.55	0.60		
	Blue x-code			Bx		0.09	0.14	0.19		
	Blue y-code			By		0.04	0.09	0.14		
	White x-code			Wx		0.24	0.29	0.34		
	White y-code			Wy		0.26	0.31	0.36		
	Brightness			Y		280	360	-	cd/m ²	
5	Brightness Uniformity				25	80	-	-	%	6

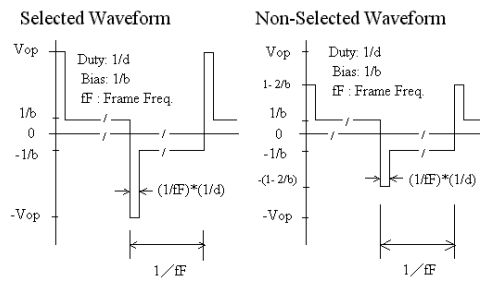
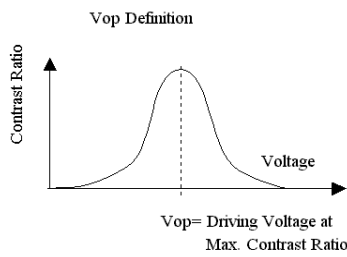
3.2 Definition of optical characteristics

Measurement condition :

Transmissive and Transflective type

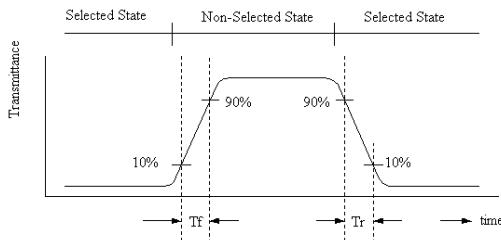


[Note 1] Definition of LCD Driving Vop and Waveform :



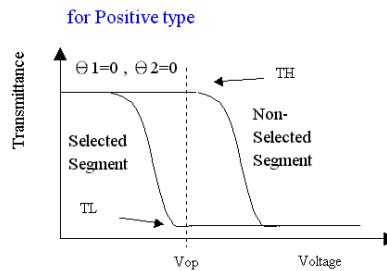
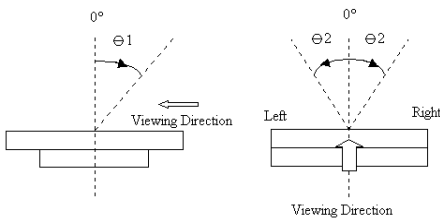
[Note 2] Definition of Response Time

for Positive type :



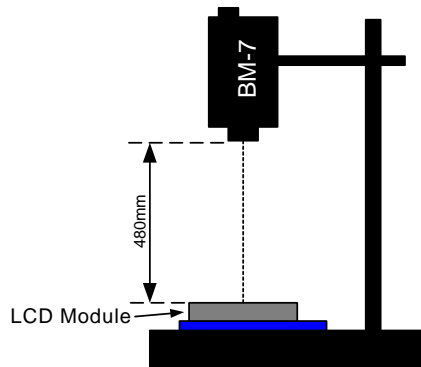
[Note 3] Definition of Viewing Angle :

[Note 4] Definition of Contrast Ratio :

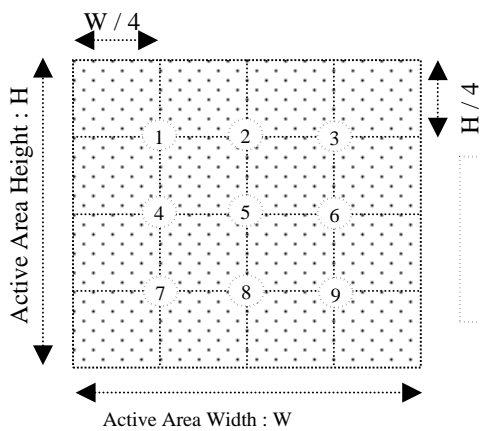


$$\text{Contrast Ratio} = \frac{TH}{TL}$$

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

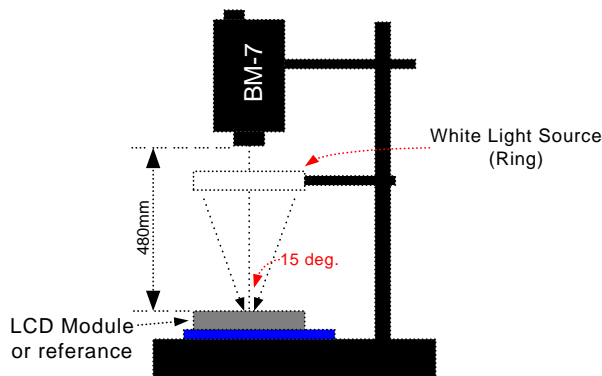


[Note 6] Definition of Brightness Uniformity



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

[Note 7] Definition of Measurement of Reflectance



4. RELIABILITY :

Item No	Items	Condition
1	High temperature operating	70 °C , 200 hours
2	Low temperature operating	-20 °C , 200 hours
3	High temperature storage	80 °C , 200 hours
4	Low temperature storage	-30 °C , 200 hours
5	High temperature & humidity storage	60°C, 90%RH, 100 hours
6	Thermal Shock storage	-30°C, 30min.<=> 80°C, 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°C , 70%RH below , specification condition driving
10	ESD test	Air : ±15kv, Reset OK Contact : ±8kv , Reset OK

* 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

* ESD test only for module test

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 equipment 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 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 wipe 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 occurred, 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 products 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.

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 :

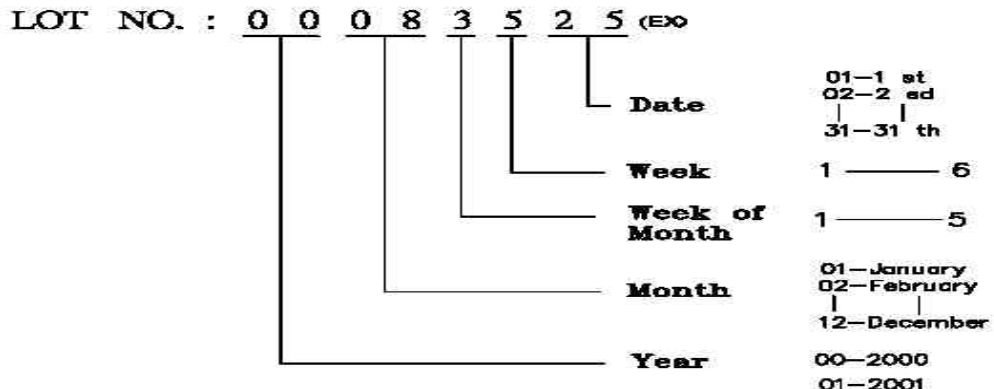
YY MM DD - XXXX

| | | |
Year Month Day - Production lots

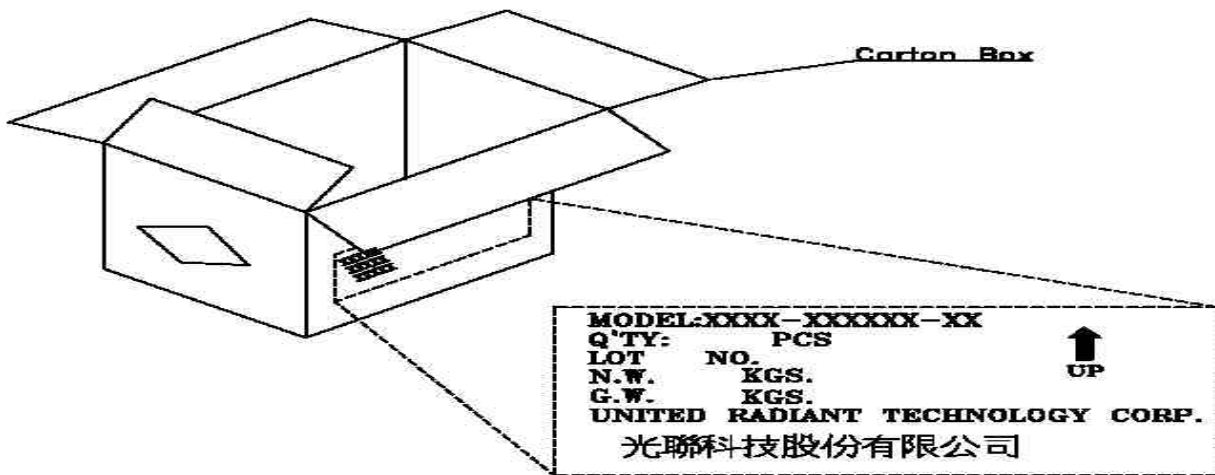
Example: 090508 - 0 0 0 3 ==>Year 2009, May.,08rd , Batch no.03

7. PACKING

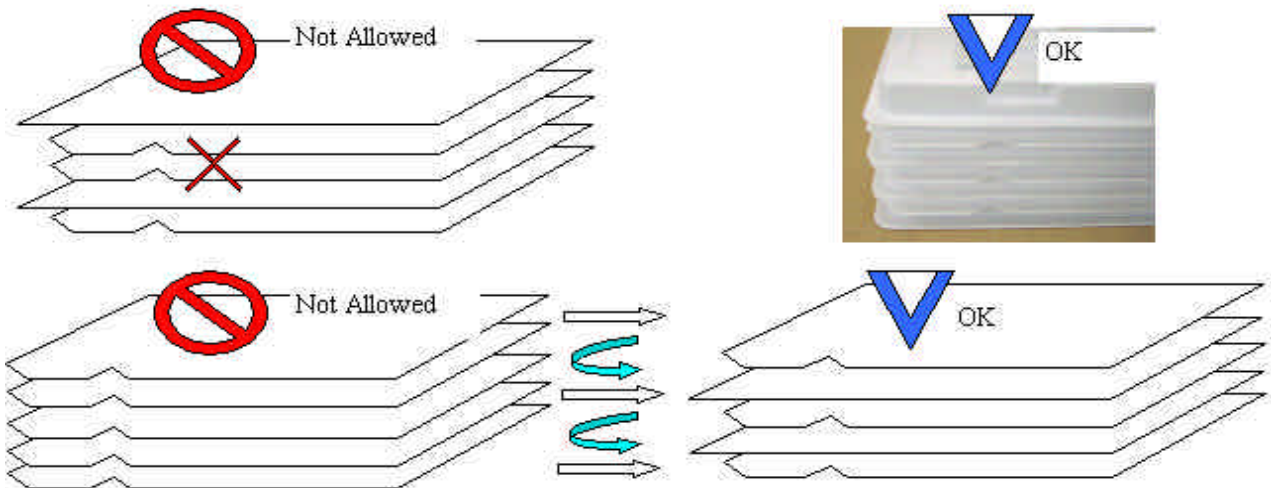
Instruction of lot number:



Label 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

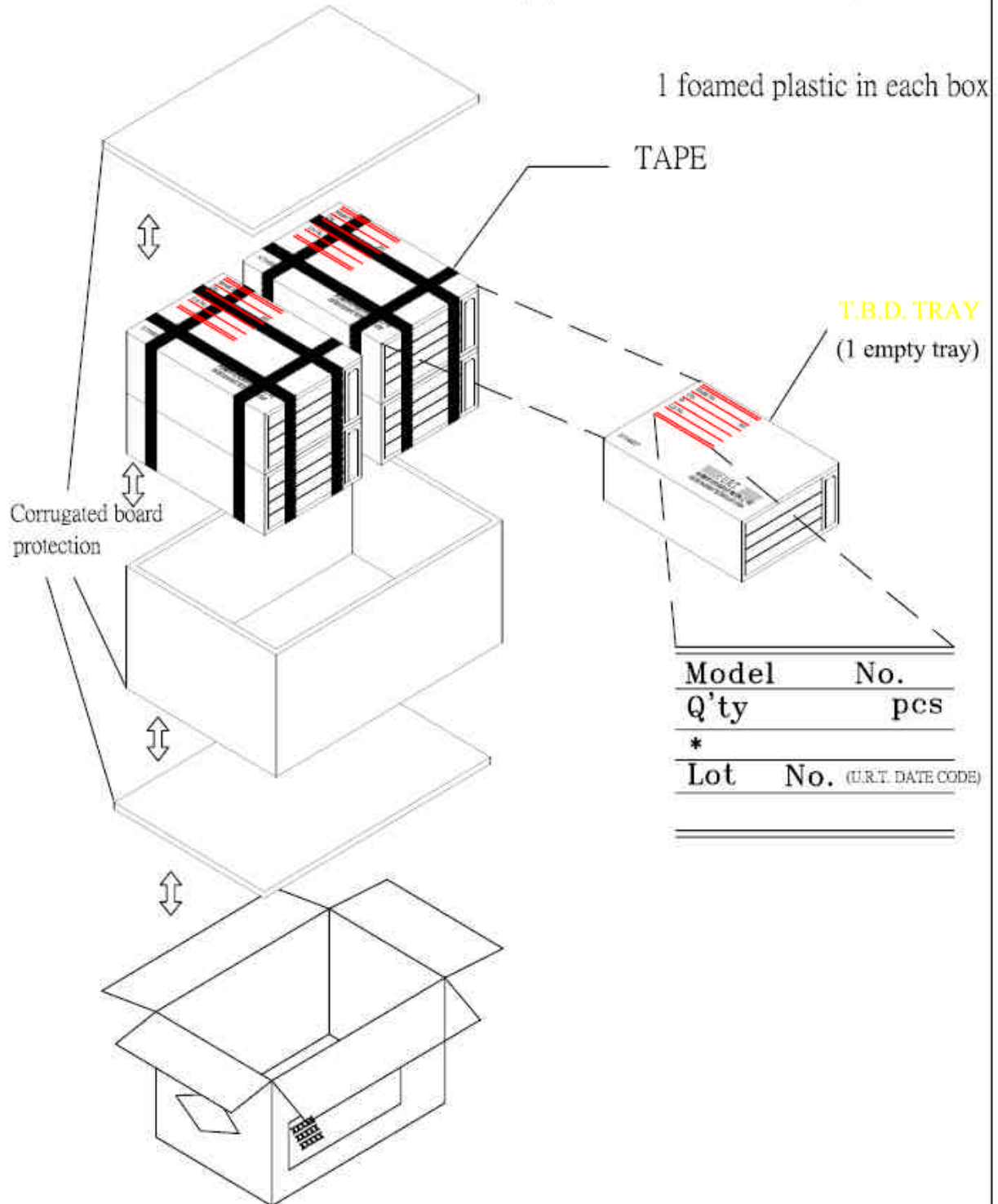
T.B.D. Box / Carton

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 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

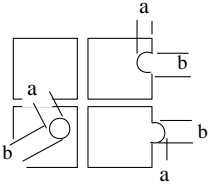
8.2.1. CHECKING DIRECTION SHALL BE IN THE 45 DEGREE AREA TO FACE THE SAMPLE.

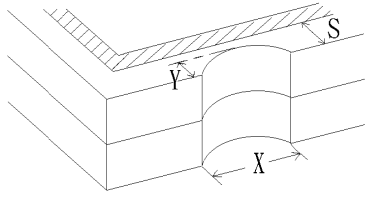
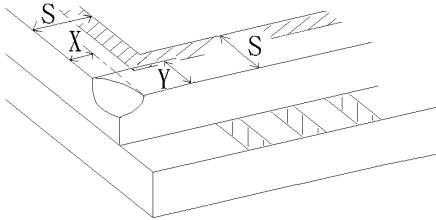
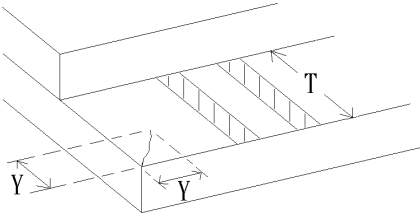
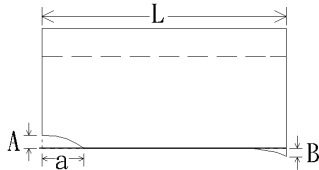
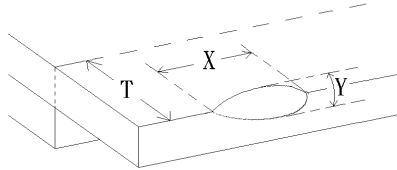
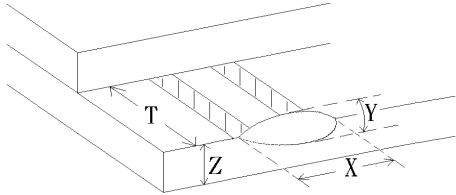
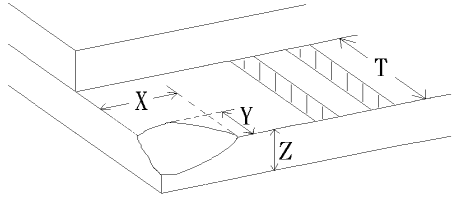
8.2.2. CHECKER SHALL SEE OVER 30 cm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS. OF 20W FLUORESCENT LAMP.

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 AREAREJECTED	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, CHARACTERREJECTED	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	<p>. BLEMISH, BLACK SPOT, WHITE SPOT IN THE LCD.</p> <p>. BLEMISH, BLACK SPOT, WHITE SPOT AND SCRATCH ON THE POLARIZER</p>	<p>(A) ROUND TYPE: unit : mm.</p> <table border="1"> <thead> <tr> <th colspan="2">DIAMETER (mm.)</th> <th>ACCEPTABLE Q'TY</th> </tr> </thead> <tbody> <tr> <td colspan="2">0.1</td> <td>DISREGARD</td> </tr> <tr> <td>0.1 <</td> <td>0.2</td> <td>2</td> </tr> <tr> <td>0.2 <</td> <td>0.25</td> <td>1</td> </tr> <tr> <td>0.25 <</td> <td></td> <td>0</td> </tr> </tbody> </table> <p>NOTE: $=(\text{LENGTH}+\text{WIDTH})/2$</p> <p>(B) LINER TYPE: unit : mm.</p> <table border="1"> <thead> <tr> <th>LENGTH</th> <th colspan="2">WIDTH</th> <th>ACCEPTABLE Q'TY</th> </tr> </thead> <tbody> <tr> <td>-----</td> <td>W</td> <td>0.03</td> <td>DISREGARD</td> </tr> <tr> <td>L 5.0</td> <td>0.03 <</td> <td>W 0.05</td> <td>3</td> </tr> <tr> <td>L 5.0</td> <td>0.05 <</td> <td>W 0.07</td> <td>1</td> </tr> <tr> <td>-----</td> <td>0.07 <</td> <td>W</td> <td>FOLLOW ROUND TYPE</td> </tr> </tbody> </table>	DIAMETER (mm.)		ACCEPTABLE Q'TY	0.1		DISREGARD	0.1 <	0.2	2	0.2 <	0.25	1	0.25 <		0	LENGTH	WIDTH		ACCEPTABLE Q'TY	-----	W	0.03	DISREGARD	L 5.0	0.03 <	W 0.05	3	L 5.0	0.05 <	W 0.07	1	-----	0.07 <	W	FOLLOW ROUND TYPE
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NO.	CLASS	ITEM	JUDGEMENT
8.4.4	MINOR	CHIPPING	 $Y > S$ REJ.
8.4.5	MINOR	CHIPPING	 $X \text{ or } Y > S$ REJ.
8.4.6	MAJOR	GLASS CRACK	 $Y > (1/2) T$ REJ.
8.4.7	MAJOR	SCRIBE DEFECT	 <ol style="list-style-type: none"> $a > L/3$, $A > 1.5\text{mm}$. REJ. B : ACCORDING TO DIMENSION
8.4.8	MINOR	CHIPPING (ON THE TERMINAL AREA)	 $= (x+y)/2 > 2.5 \text{ mm}$ REJ.
8.4.9	MINOR	CHIPPING (ON THE TERMINAL SURFACE)	 $Y > (1/3) T$ REJ.
8.4.10	MINOR	CHIPPING	 $Y > T$ REJ.