SPECIFICATION

OF

LIQUID CRYSTAL DISPLAY MODULE

CUSTOMER : U.R.T. STANDARD

Model No. : UMSH-7511MD-5T

Model version : 0

Document Revision : 6

CUSTOMER APPROVED SIGNATURE			

U.R.T. UNITED RADIANT TECHNOLOGY CORP.

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.

Rex Li	Kelly Tseng	I-Feng Wu	3-Nov-2005
APPROVED	CHECKED	PREPARED	Date

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Revision record

Document Revision	Model No. Version No.	Description	Revision by
0	UMSH-7511MD-T (UFSH-E880EY-FT) Version No. 0		Lingling Chen 20-Aug-2004
1	UMSH-7511MD-1T (UFSH-E880EY-FT) Version No. 0	1. Change IC number HD66773R to HX8303APD4. 2. Change module number from UMSH-7511MD-T to UMSH-7511MD-1T.	Lingling Chen 15-Oct-2004
2	UMSH-7511MD-2T (UFSH-E880EY-FT) Version No. 0	1. Change IC number HX8303APD4 to NT3911. 2. Change module number from UMSH-7511MD-1T	Lingling Chen 15-Oct-2004
3	UMSH-7511MD-2T (UFSH-E880EY-FT) Version No. 0	Modify back-light specification.	Alex Fang 6-Dec-2004
4	UMSH-7511MD-3T (UFSH-E880EY-FT) Version No. 0	1. This product conform with the standard of Rohs (HD66773R).	Alex Fang Jeason Wang 2-Aug-2005
5	UMSH-7511MD-4T (UFSH-E880EY-FT) Version No. 0	1. This product conform with the standard of Rohs (NT 3911).	Alex Fang Jeason Wang 2-Aug-2005
6	UMSH-7511MD-5T (UFSH-E880EY-1FT) Version No. 0	1.Improve the view angel. 2.Modify the module number from UMSH-7511MD-3T to UMSH-7511MD-5T.	Alex Fang Jeason Wang 3-Nov-2005

CONTENTS:

1. BASIC SPECIFICATION

1.1 Mechanical specifications

Items	Nominal Dimension	Unit
Dot Matrix	128 x RGB x 160(TFT)	dots
Module Size (W x H x T)	34.0 x 47.0 x 2.8	mm.
Viewing Area (W x H)	30.0 x 38.43	mm.
Active Area (W x H)	28.412 x 35.512	mm.
Dot Size (W x H)	0.218 x 0.214	mm.
Dot Pitch (W x H)	0.222 x 0.222	mm.
Driving method	1	Duty
	1	Bias
Driving IC Package	COG	

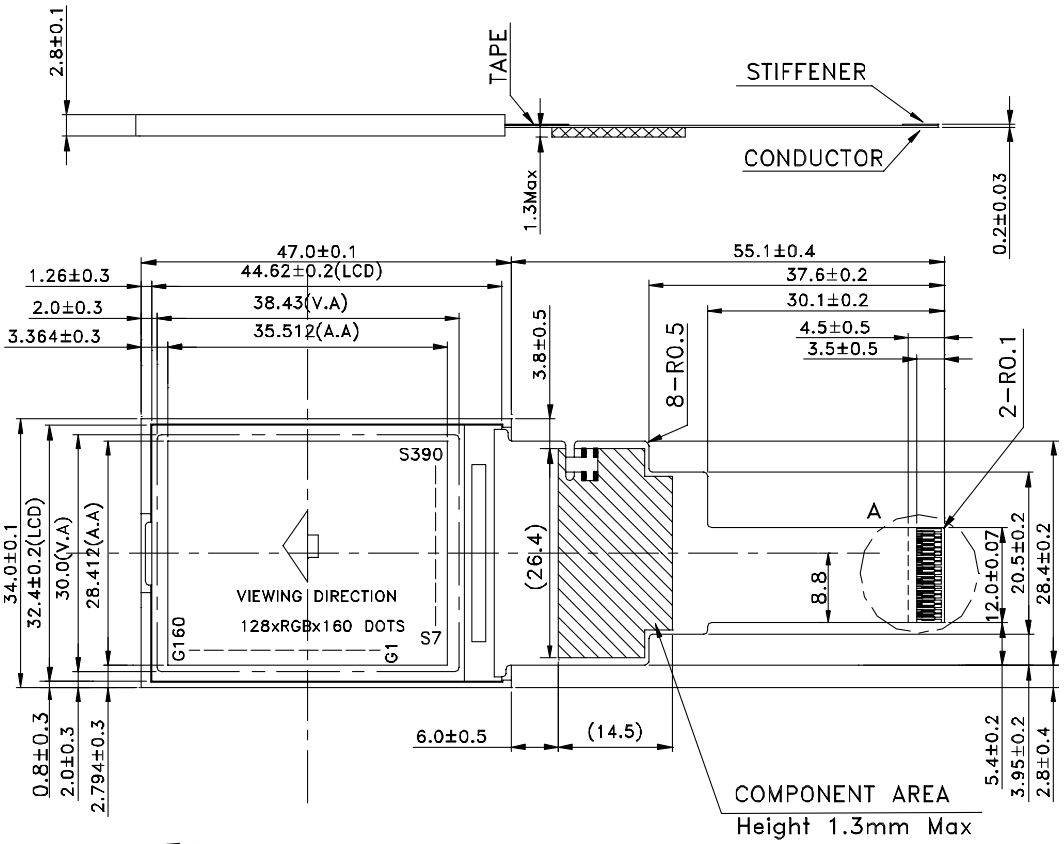
* Expose the driver IC under blaze (luminosity over than 1 cd) when using the LCM may cause IC operating failure.

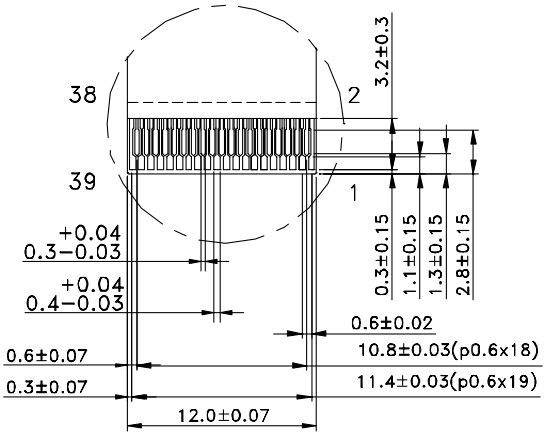
1.2 Display specification

Display	Descriptions	Note
LCD Type	TFT	
LCD Mode	Negative	
Polarizer Mode	Transmissive	
Polarizer UV-Cutting	-	
Polarizer Surface	-	
Background Color	White	
Backlight Type	LED	
Backlight Color	White	
Viewing Direction	6 O'clock Direction	

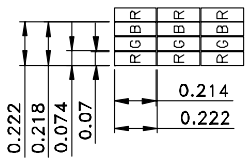
* Color tone is slightly changed by temperature and driving voltage.

1.3 Outline dimension





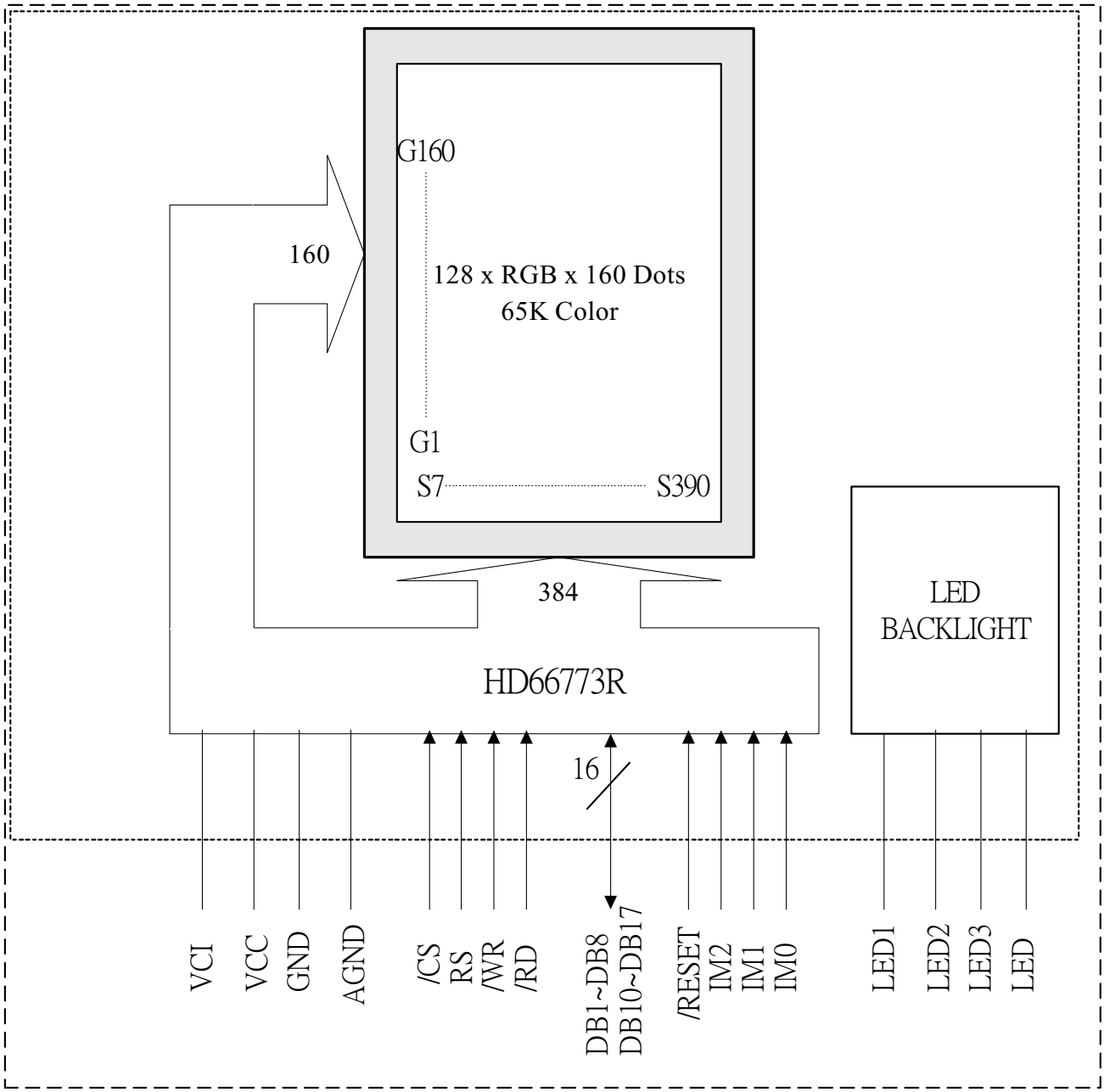
DETAIL"A"



DOTS DETAIL

NOTE:
1.LCD: TFT TRANSMISSIVE TYPE; WIDE VIEWING ANGLE; NEGATIVE
2.VIEWING DIRECTION: 6 O'CLOCK
3.Top: −20~70°C; Tst: −30~80°C
4.IC: HD66773R
5.LED COLOR: WHITE; 3 pcs DICE
6.VLED: 1 pcs,3.6 V, 20 mA
7.This product conform with the standard of RoHS .

1.4 Block diagram:



1.5 Interface pin :

Pin No.	Pin Name	I/O	Description
1	LED1	-	LED anode, +3.6V
2	LED	-	LED cathnode, 0V
3	LED2	-	LED anode, +3.6V
4	LED3	-	LED anode, +3.6V
5	IM0	I	Select the MPU interface mode as listed below IM2 IM1 IM0(ID) MPU interface mode GND GND GND 68-system, 16-bit bus interface GND GND VCC 68-system, 8-bit bus interface GND VCC GND 80-system, 16-bit bus interface GND VCC VCC 80-system, 8-bit bus interface Note: IM2 with internal 47KΩ pull high resistor.
6	IM1	I	
7	IM2	I	
8	/RESET	I	Reset pin, active Low.
9~24	DB17~DB0	I/O	16 bit bi-directional dat bus. For an 8 bit interface mode, DB17~DB10 correspond to DB8~DB1.
25	/RD	I	For a 68-system bus interface, serves as a signal to select data read/write operation. (Low: Write ; High: Read) For an 80-system bus interface, serves as a read strobe signal and reads data at the low level.
26	/WR	I	For a 68-system bus interface, serves as an enable signal to activate data read/write operation. For an 80-system bus interface, serves as a write strobe signal and writes data at the low level.
27	RS	I	Register select signal. Low: Index/Status; High: Control register.
28	/CS	I	Chip select, force Low to active display.
29~31	AGND	P	Analog ground, 0V
32~33	GND	P	Logic ground, 0V
34~37	VCC	P	Power supply for logic, +2.8V
38~39	VCI	P	Power supply for analog circuit, +2.8V

2. ELECTRICAL CHARACTERISTICS

2.1 Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit
Power supply voltage (1)	VCC	-0.3	4.6	V
Power supply voltage (2)	DDVDH	-0.3	6.0	V
Input voltage	VIN	-0.3	VCC+0.3	V
Operating temperature range	T_{OP}	-20	+70	℃
Storage temperature range	T_{STR}	-30	+80	℃

2.2 DC Characteristics

Items	Symbol	Min.	Typ.	Max.	Unit	Condition
Supply voltage (Logic)	VCC	-	2.8	-	V	
Input high level voltage	V_{IH}	0.7xVCC	-	VCC	V	
Input low level voltage	V_{IL}	-0.3	-	0.15xVCC	V	
Output high level voltage	V_{OH}	-0.75VCC	-	-	V	
Output low level voltage	V_{OL}	-	-	0.15VCC	V	
Power supply current (VEE)	Iee	-	-	6.4	mA	*NOTE1

∗ The above spec. may be changed by Rev. No

∗NOTE1 : Min. and Max. Voltage is specified as the voltage within the condition of operational Temperature range -20℃~70℃

Typ. Voltage is specified as module driving condition: Ta=25℃ , Vop at Optimum Contrast.

2.2.1 Back-light Specification :

Data About LED Backlight

PARAMETER	SYMBOL	MIN	TYP	MAX	Unit	Test condition	NOTE
Supply Current	If	-	-	-	mA		
Forward Voltage	V_F	-	3.5	4.0	V		
Reverse Voltage	V_R	-	5	-	V		
Brightness	-		2800		Cd/m		
Uniformity	-	80			%		

2.3 AC Characteristics

(VDD = 2.0V to 2.5V, T_A = -30 to +85 ^oC)

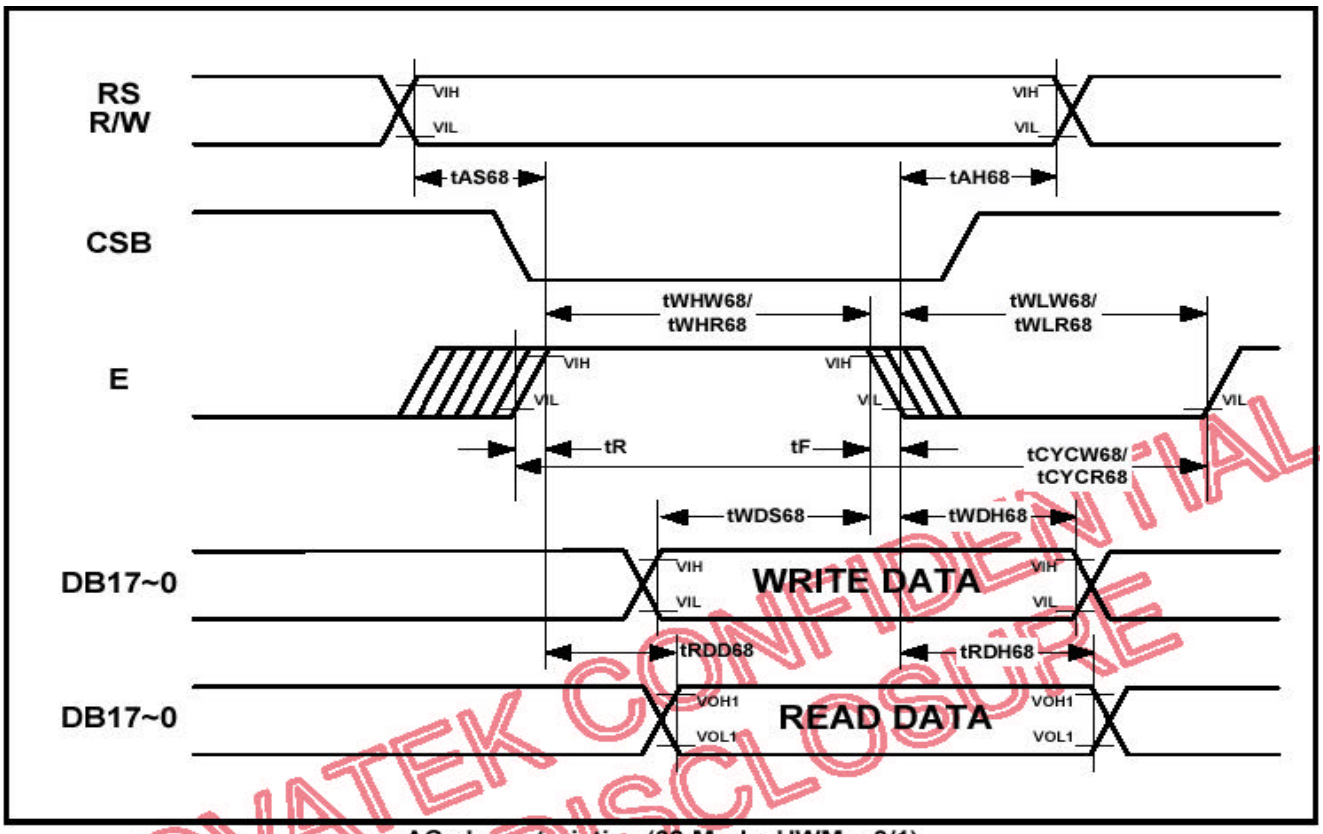
Characteristic		Symbol	VDD3 = 2.5V to 3.3V Min.		Unit
Cycle time	Write	t_{CYCW68}	600	-	ns
	Read	t_{CYCR68}	800		
Pulse rise / fall time		t_R, t_F	-	25	
E pulse width high	Write	t_{WHW68}	90	-	
	Read	t_{WHR68}	350		
E pulse width low	Write	t_{WLW68}	300	-	
	Read	t_{WLR68}	400		
RW, RS and CSB setup time		t_{AS68}	10	-	
RW, RS and CSB hold time		t_{AH68}	5	-	
Write data setup time		t_{WDS68}	60	-	
Write data hold time		t_{WDH68}	15	-	
Read data delay time		t_{RDD68}	-	200	
Read data hold time		t_{RDH68}	5	-	

Table 27. Parallel Write Interface Characteristics (68 Mode, HWM = 0)

(VDD = 2.0V to 2.5V, T_A = -30 to +85 ^oC)

Characteristic		Symbol	VDD3 = 2.5V to 3.3V Min.	Max.	Unit
Cycle time	Write	t_{CYCW68}	200	-	ns
	Read	t_{CYCR68}	800		
Pulse rise / fall time		t_R, t_F	-	25	
E pulse width high	Write	t_{WHW68}	90	-	
	Read	t_{WHR68}	350		
E pulse width low	Write	t_{WLW68}	90	-	
	Read	t_{WLR68}	400		
RW, RS and CSB setup time		t_{AS68}	10	-	
RW, RS and CSB hold time		t_{AH68}	5	-	
Write data setup time		t_{WDS68}	60	-	
Write data hold time		t_{WDH68}	15	-	
Read data delay time		t_{RDD68}	-	200	
Read data hold time		t_{RDH68}	5	-	

Table 28. Parallel Write Interface Characteristics (68 Mode, HWM = 1)



AC characteristics (68 Mode, HWM = 0/1)

(VDD = 2.0V to 2.5V, T_A = -30 to +85 ^oC)

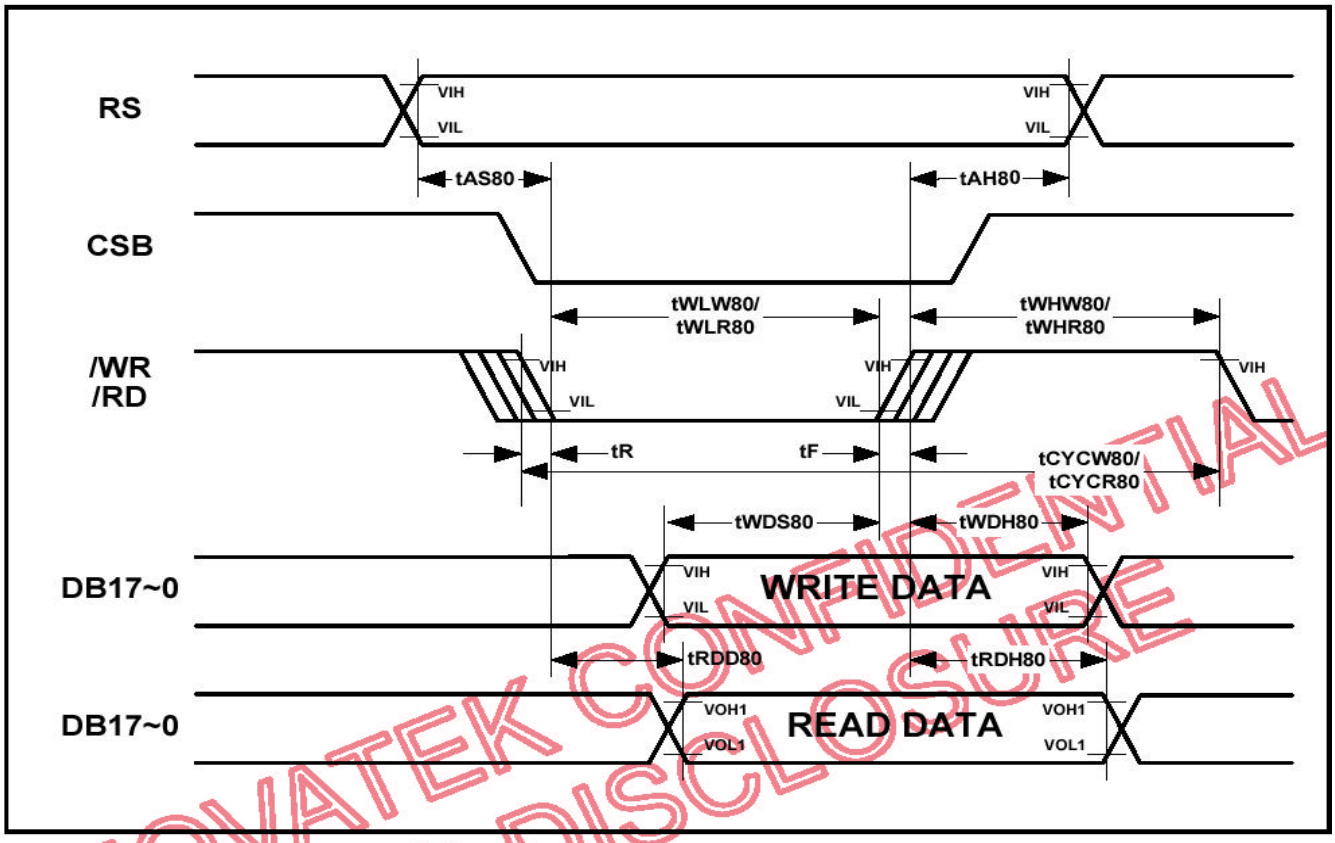
Characteristic			VDD3 = 2.5V to 3.3V		Unit
			Min.	Max.	
Cycle time	Write	t_{CYCW80}	600	-	ns
	Read	T_{CYCR80}	800		
Pulse rise / fall time		t_R, t_F	-	25	
Pulse width low	Write	T_{WHW80}	90	-	
	Read	T_{WHR80}	350		
Pulse width high	Write	T_{WLW80}	300	-	
	Read	T_{WLR80}	400		
RW, RS and CSB setup time		t_{AS80}	10	-	
RW, RS and CSB hold time		t_{AH80}	5	-	
Write data setup time		t_{WDS80}	60	-	
Write data hold time		t_{WDH80}	15	-	
Read data delay time		t_{RDD80}	-	200	
Read data hold time		t_{RDH80}	5	-	

Table 29. Parallel Write Interface Characteristics (80 Mode, HWM = 0)

(VDD = 2.0V to 2.5V, T_A = -30 to +85 ^oC)

Characteristic		Symbol	VDD3 = 2.5V to 3.3V Min.		Unit
Cycle time	Write	t_{CYCW80}	200	-	ns
	Read	T_{CYCR80}	800		
Pulse rise / fall time		t_R, t_F	-	25	
Pulse width low	Write	T_{WHW80}	90	-	
	Read	T_{WHR80}	350		
Pulse width high	Write	T_{WLW80}	90	-	
	Read	T_{WLR80}	400		
RW, RS and CSB setup time		t_{AS80}	10	-	
RW, RS and CSB hold time		t_{AH80}	5	-	
Write data setup time		t_{WDS80}	60	-	
Write data hold time		t_{WDH80}	15	-	
Read data delay time		t_{RDD80}	-	200	
Read data hold time		t_{RDH80}	5	-	

Table 30. Parallel Write Interface Characteristics (80 Mode, HWM = 1)



AC characteristics (80 Mode, HWM = 0/1)

(VDD = 2.0V to 2.5V, T_A = -30 to +85 oC)

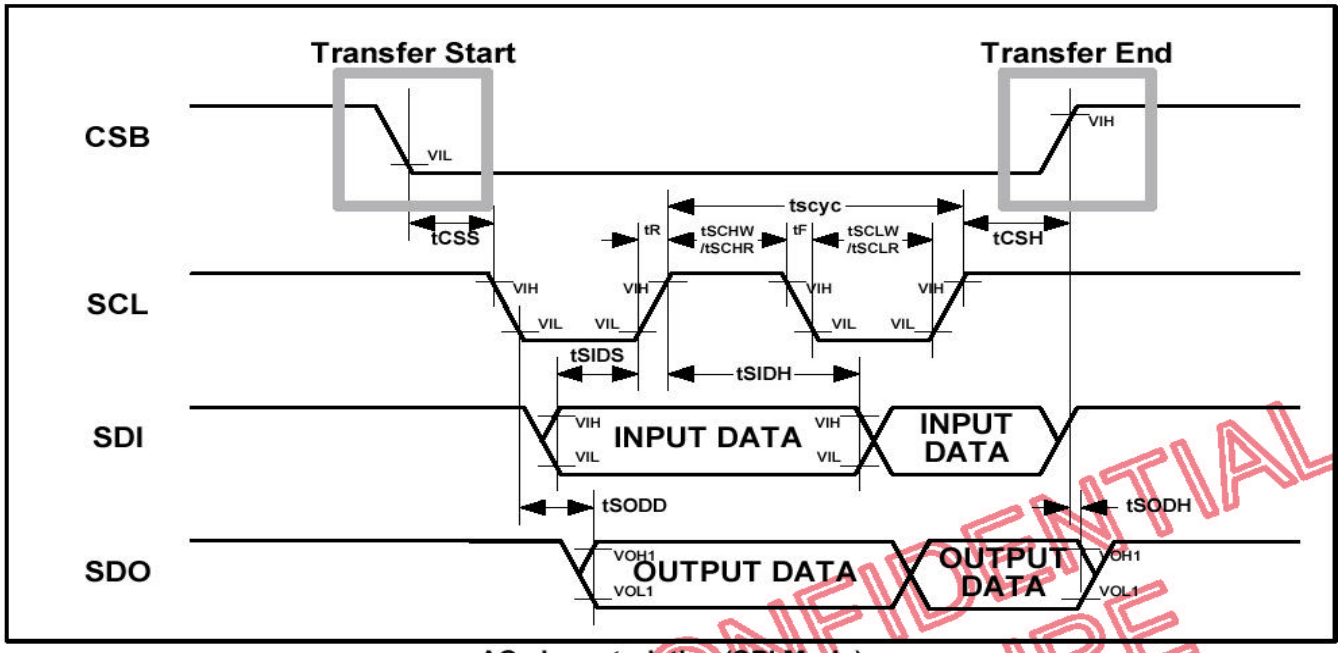
Characteristic	Symbol	VDD3 = 2.5V to 3.3V		Unit
		Min.	Max.	
Serial clock cycle time	tscyc	0.1	20	us
Serial clock rise / fall time	tR, tF	-	20	ns
Pulse width high for write	tSCHW	40	-	ns
Pulse width high for read	tSCHR	230	-	ns
Pulse width low for write	tSCLW	60	-	ns
Pulse width low for read	tSCLR	230	-	ns
Chip Select setup time	tCSS	20	-	ns
Chip Select hold time	tCSH	60	-	ns
Serial input data setup time	tSIDS	30	-	ns
Serial input data hold time	tSIDH	30	-	ns
Serial output data delay time	tSODD	-	200	ns
Serial output data hold time	tSODH	5	-	ns

Table 31. Clock Synchronized Serial Write Mode Characteristics

(VDD = 2.0V to 2.5V, T_A = -30 to +85 oC)

Characteristic	Symbol	VDD3 = 2.5V to 3.3V		Unit
		Min.	Max.	
Reset low pulse width	tRES	1	-	ms

Table 32. Reset Timing Characteristics



AC characteristics (SPI Mode)

AC characteristics (RESET timing)

3. OPTICAL CHARACTERISTICS

3.1 Characteristics

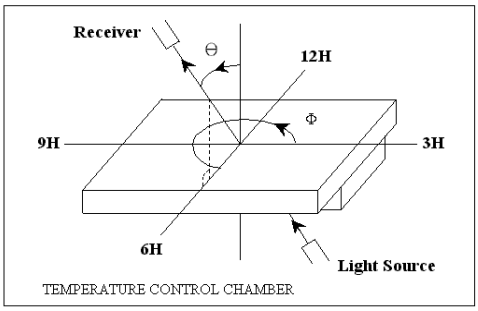
Electrical and Optical Characteristics

No.	Item		symbol	/ temp.	Min.	Typ.	Max.	Unit	Note
1	Response Time		Tr	25 ℃	-	15	-	ms	2
			Tf	25 ℃	-	35	-		
2	Viewing Angle	Front-Rear	Θ1	Φ = 270°	-15	-	35	degree	3
		Left-Right	Θ2		45	-	45		
3	Contrast Ratio		Cr	25 ℃	150	200	-	-	4
4	Red x-code		Rx	25 ℃	0.50	0.55	0.60	-	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		0.49	0.54	0.59		
	Blue x-code		Bx		0.10	0.15	0.20		
	Blue y-code		By		0.10	0.15	0.20		
	White x-code		Wx		0.26	0.31	0.36		
	White y-code		Wy		0.29	0.34	0.39		

3.2 Definition of optical characteristics

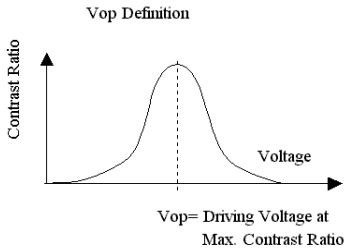
Measurement condition :

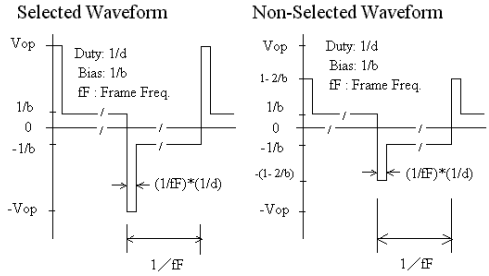
Transmissive and Transflective type



PHOTAL LCD-5000

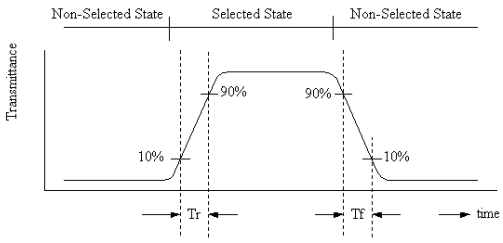
[Note 1] Definition of LCD Driving Vop and Waveform :



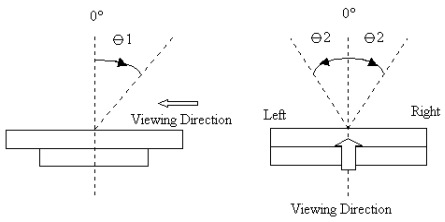


[Note 2] Definition of Response Time

for Negative type :

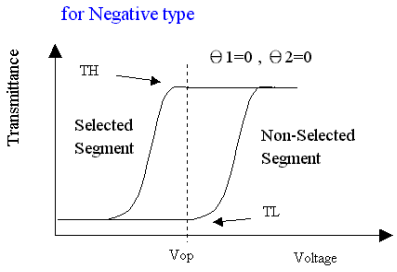


[Note 3] Definition of Viewing Angle :



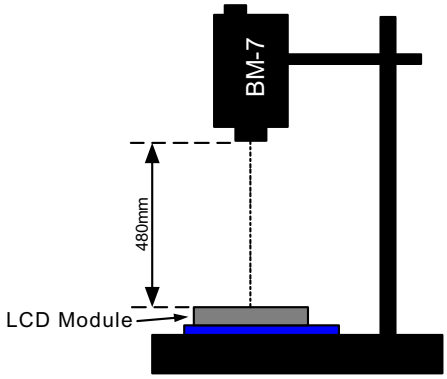
[Note 4] Definition of Contrast Ratio :

for Negative type

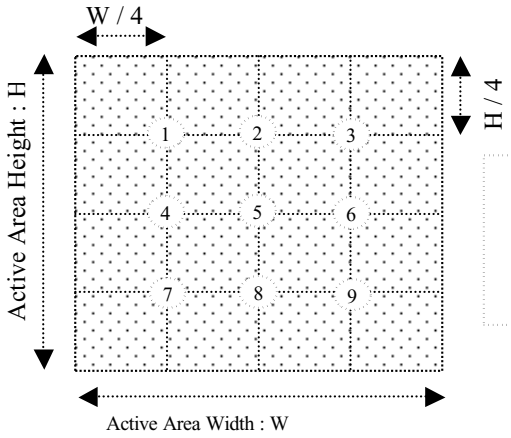


$$\text{Contrast Ratio} = \frac{TH}{TL}$$

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

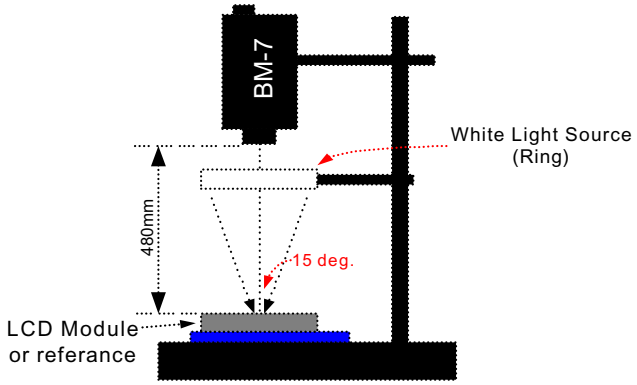


[Note 6] Definition of Brightness Uniformity



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

[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. HANDLING PRECAUTION

☐ PRECAUTION FOR HANDLING LCM

- The LCD module contains a C-MOS LSI. To avoid damage tom the LSI from static electricity generated while working,Ground your body, work/assembly areas and assembly equipment to protect the module against STATIC ELECTRICITY.
- Do not input any signal before power is turned on.
- Do not take LCM from it's packaging bag unit it is assembled.
- Peel off take 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 ac 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 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 , any contacts with liquid crystal materials , wash it off immediately with 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℃)

6. DATE CODE OF PRODUCTS

- Date code will be shown on each product :

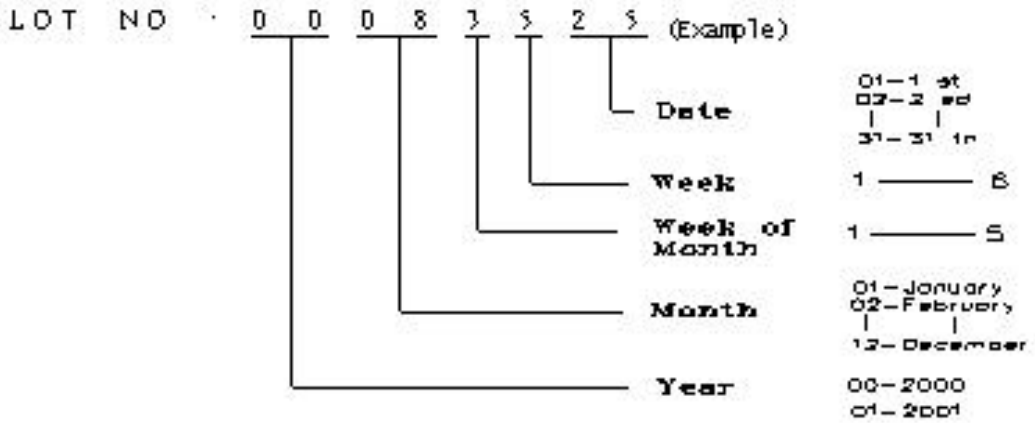
- **Y MM DD - XXX**

  Year Month Day - Production lots

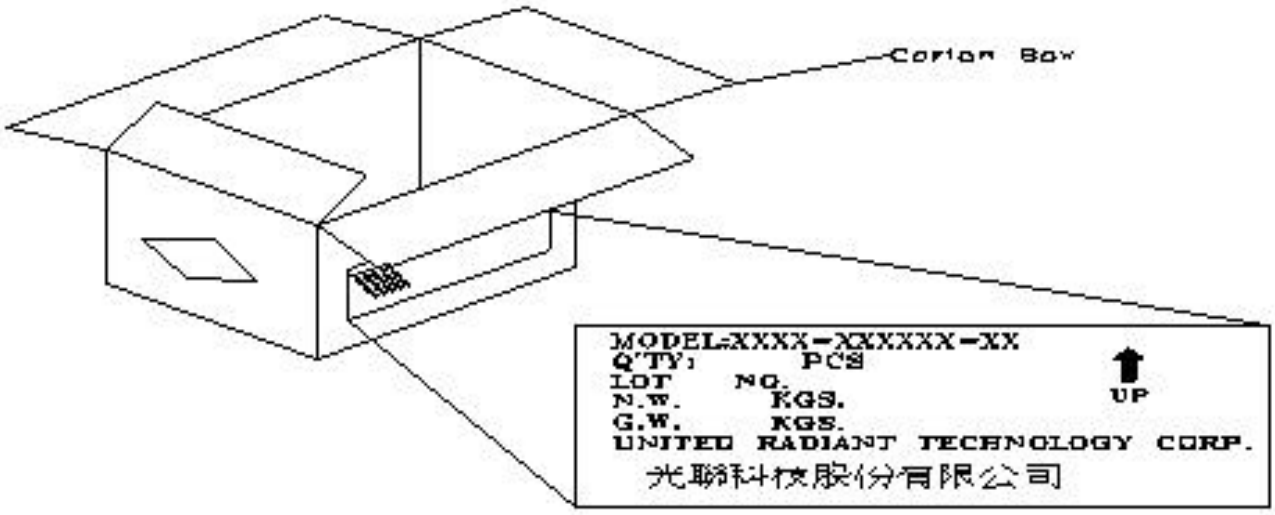
- Example: 2 1 2 2 3 - 0 0 3 ==>Year 2002, Dec.,23rd , Batch no.03

7. PACKING

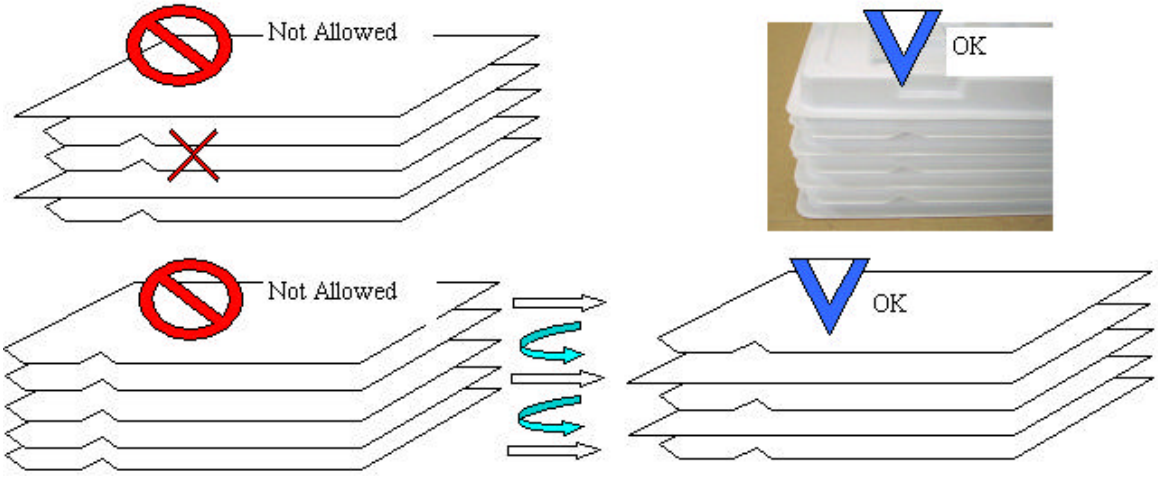
Instruction of lot number:



Lable of carton:



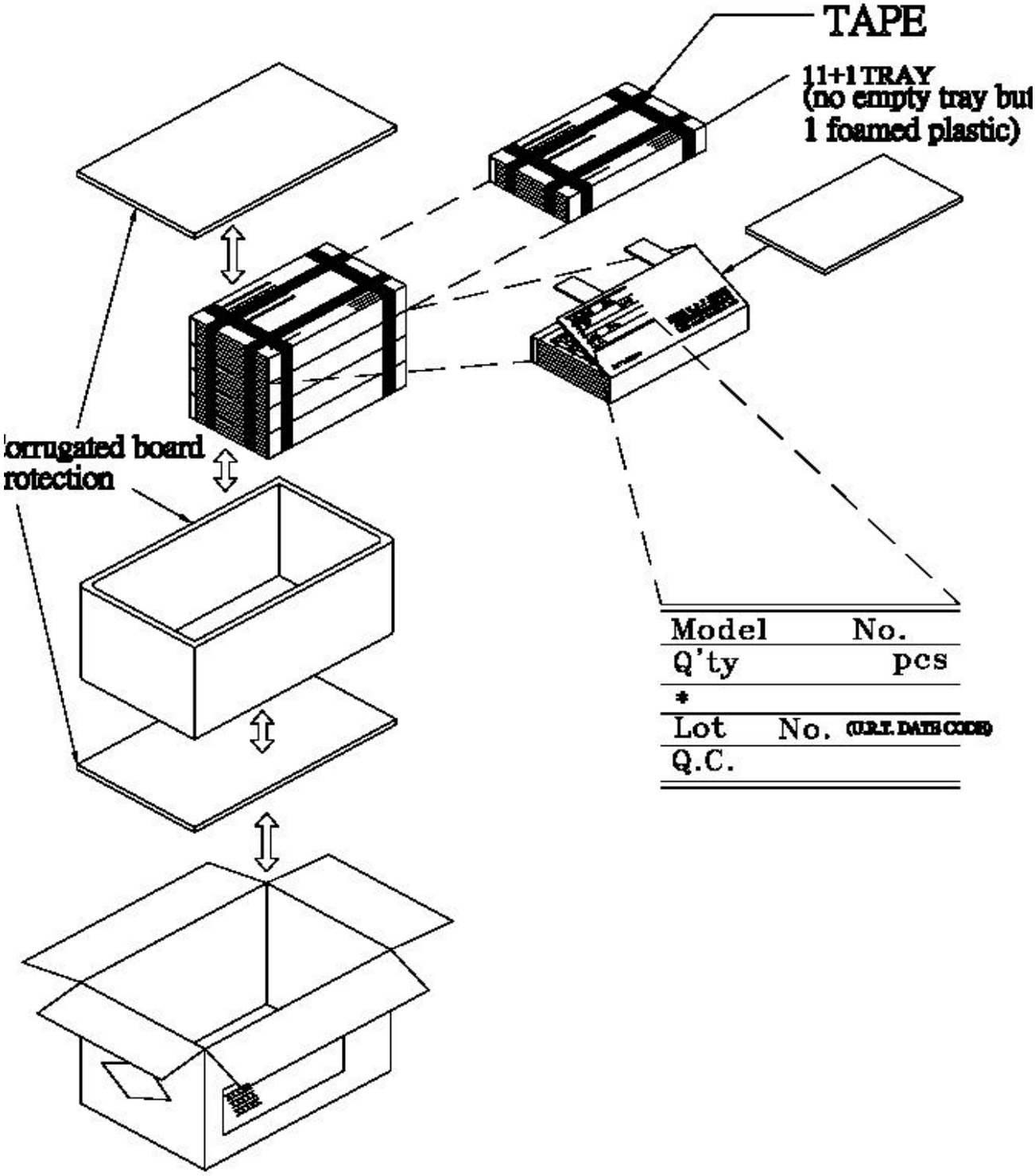
Packing tray must be stacked with alternated direction to each others.
To tacks packing trays in same direction will cause product damaged.



NOTE:

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!!

14 pcs / Tray
11+1 Tray / Box
4 Box / Carton
616 pcs / Carton



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.

8.2. CHECKING CONDITION

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

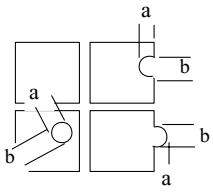
8.2.2. CHECKER SHALL SEE OVER 30 cm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS. OF 20W FLUORESCENT LAMP.

8.3. INSPECTION PLAN :

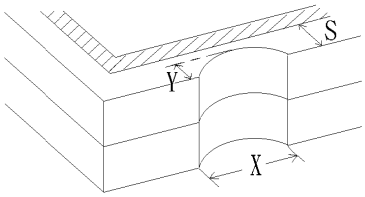
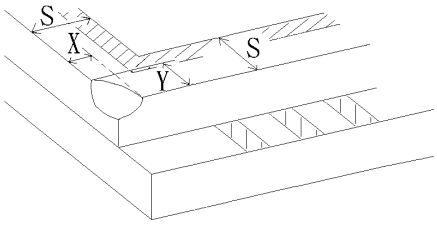
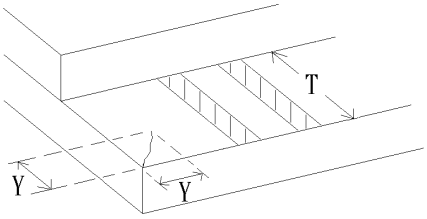
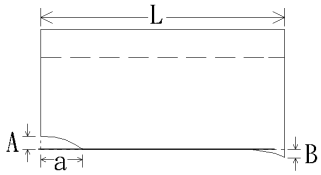
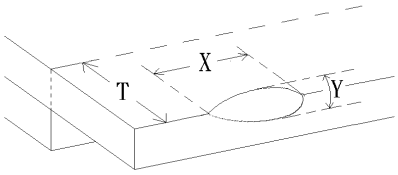
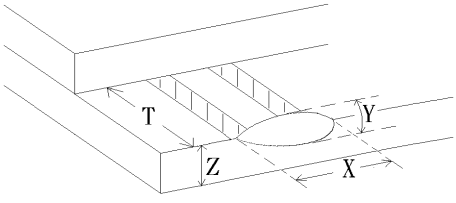
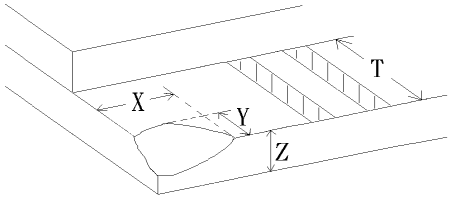
CLASS	ITEM	JUDGEMENT	CLASS
PACKING & INDICATE	1. OUTSIDE AND INSIDE PACKAGE	"MODEL NO." , "LOT NO." AND "QUANTITY" SHOULD INDICATE ON THE PACKAGE.	Minor
	2. MODEL MIXED AND QUANTITY	OTHER MODEL MIXED.....REJECTED QUANTITY SHORT OR OVER.....REJECTED	Critical
	3. PRODUCT INDICATION	"MODEL NO." SHOULD INDICATE 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 SCRTCH 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 PATTERN	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	CRACK	 Y > S REJ.
8.4.5	MINOR	CRACK	 X or Y > S REJ.
8.4.6	MAJOR	GLASS SCRATCH	 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	CRACK (ON THE TERMINAL AREA)	 Φ= (x+y)/2 > 2.5 mm REJ.
8.4.9	MINOR	CRACK (ON THE TERMINAL SURFACE)	 Y > (1/3) T REJ.
8.4.10	MINOR	CRACK	 Y > T REJ.