

SPECIFICATION

OF

LIQUID CRYSTAL DISPLAY MODULE



CUSTOMER : U.R.T. STANDARD

Model No. : UMSH-7567JD-10F

Model version : 1

Document Revision : 9

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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28-May-2007
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Revision record

Document Revision	Model No. Version No.	Description	Revision by
0	UMSH-7567JD-F (USSH-E914J-F) Version No. 0		K.W Ho Neo Hor 30-Dec-2004
1	UMSH-7567JD-F (USSH-E914J-F) Version No. 1	1. Modify supply voltage for driving LCD on Absolute Maximum Ratings. 2. Modify Block Diagram. 3. Modify Power supply current(LED) from 20mA to 100mA. 4. Modify Optical Characteristics.	K.W Ho Neo Hor 11-Jan-2005
2	UMSH-7567JD-F (USSH-E914J-F) Version No. 2	Modify the define Supply voltage for LCD from (VLCD-VSS) to (VEE-VSS) in DC Characteristics.	K.W Ho Neo Hor 7-Apr-2005
3	UMSH-7567JD-F (USSH-E914J-F) Version No. 3	Add Back-light Specification	K.W Ho Neo Hor 8-Jun-2005
4	UMSH-7567JD-1F (USSH-E914J-3F) Version No. 0	Add DC/DC converter from UMSH-7567JD-F	K.W Ho Neo Hor 23-Jun-2005
5	UMSH-7567JD-2F (USSH-E914J-3F) Version No. 0	Add thuch pannel from UMSH-7567JD-F	K.W Ho Neo Hor 23-Jun-2005
6	UMSH-7567JD-3F (USSH-E914J-3F) Version No. 0	Add touch pannel from UMSH-7567JD-1F	K.W Ho Neo Hor 1-Jul-2005
7	UMSH-7567JD-8F (USSH-E914J-14F) Version No. 0	Modify LCD Ground color	Eric Chen W.L.Tsai 2-Aug-2006
8	UMSH-7567JD-8F (USSH-E914J-14F) Version No. 1	1.Remove touch panel 2.Modify storage temperature range	Tony Chen W.L.Tsai 3-Apr-2007
9	UMSH-7567JD-10F (USSH-E914J-14F) Version No. 1	1.Change the supplier of TCP 2.Modify the module number from UMSH-7567JD-8F to UMSH-7567JD-10F	Tony Chen W.L.Tsai 28-May-2007
		Revision 9 ; UMSH-7567JD-10F Ver. 1 ; 28-May-2007	Page: 2

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1. BASIC SPECIFICATION

1.1 Mechanical specifications

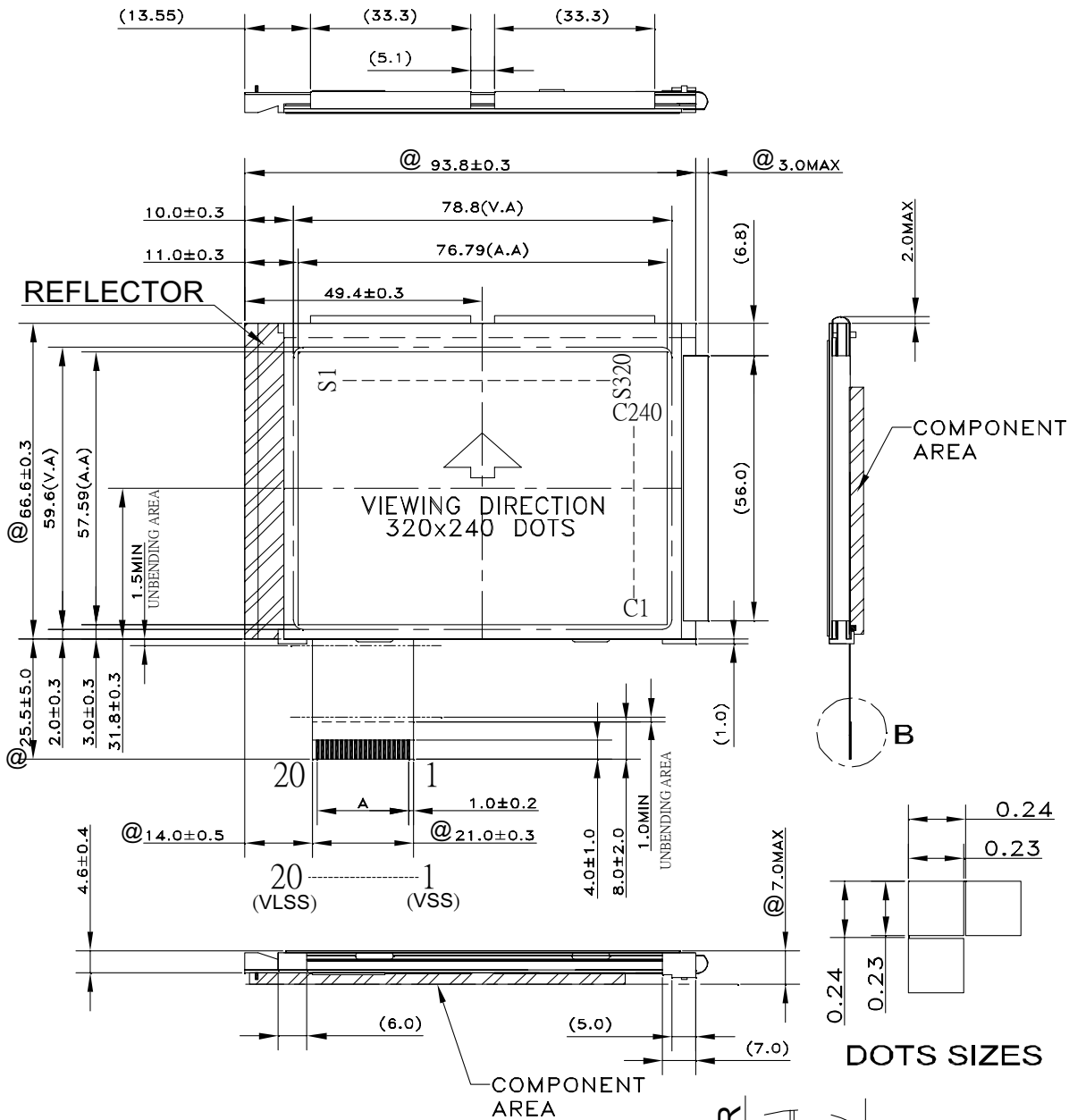
Items	Nominal Dimension	Unit
Dot Matrix	320 x 240	dots
Module Size (W x H x T)	93.8 x 66.6 x 8.5	mm.
Viewing Area (W x H)	78.8 x 59.6	mm.
Active Area (W x H)	76.79 x 57.59	mm.
Dot Size (W x H)	0.23 x 0.23	mm.
Dot Pitch (W x H)	0.24 x 0.24	mm.
Driving method	1/240	Duty
	1/15	Bias
Driving IC Package	TAB+SMD	

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

1.2 Display specification

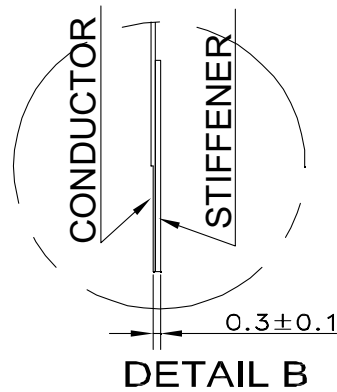
Display	Descriptions	Note
LCD Type	FSTN	
LCD Mode	Positive	
Polarizer Mode	Transflective	
Polarizer UV-Cutting	With	
Polarizer Surface	Normal	
Background Color	Gray	
Backlight Type	LED	
Backlight Color	White	
Viewing Direction	6 O'clock Direction	

1.3 Outline dimension

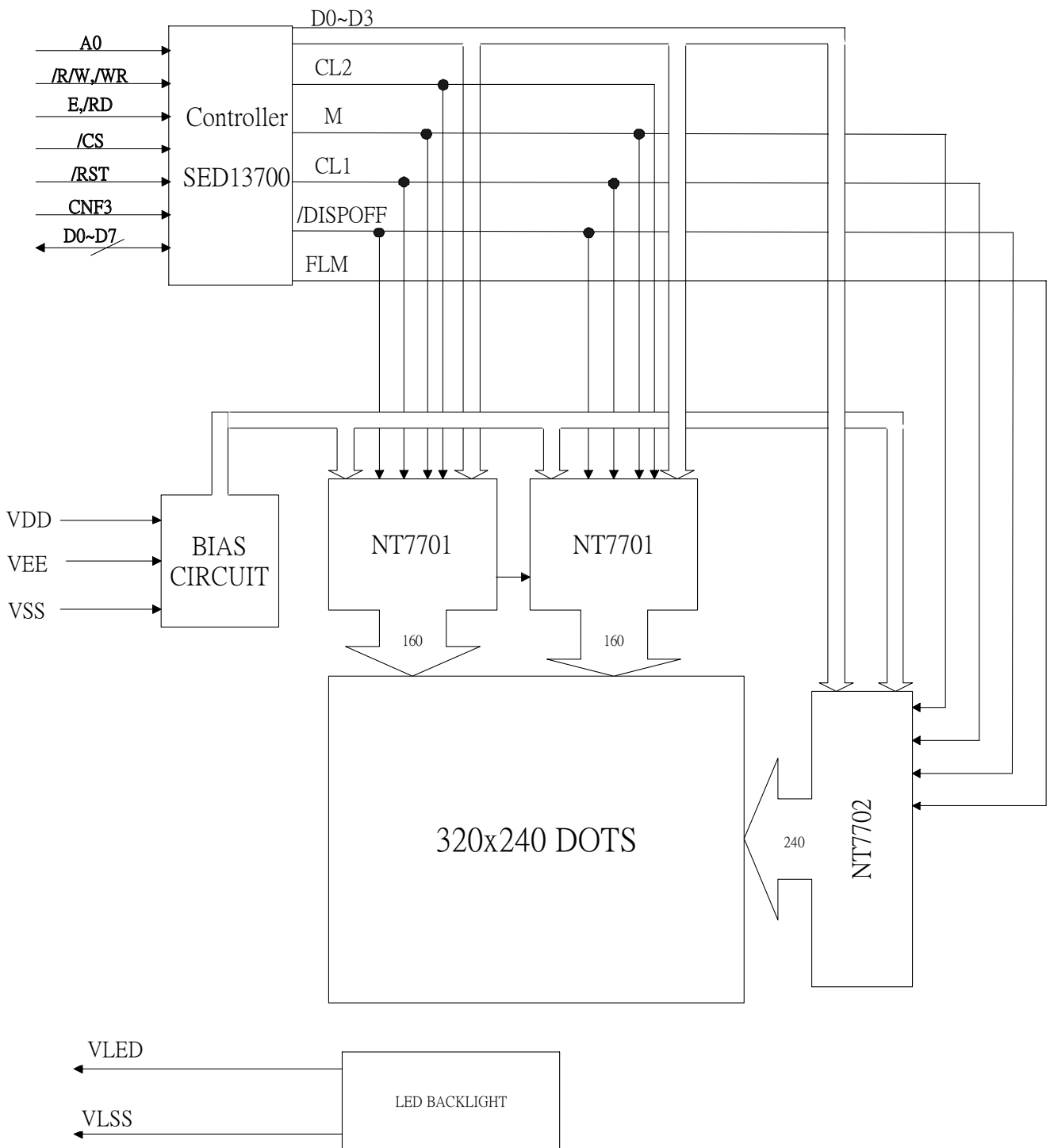


NOTE:

1. LCD : FSTN TRANSFLECTIVE TYPE, POSITIVE, GLARE, PAPERWHITE POLARIZER
2. VIEWING DIRECTION 6 O'CLOCK
3. Top : -20 ~ 70°C ; Tst : -20 ~ 70°C
4. DRIVER IC : NT7701+ NT7702
CONTROLLER IC : SED13700
5. LED COLOR : WHITE 5 PCS
6. VLED : 5.0 V , IF=100±25 mA
7. A: 19.0±0.1 (P1.0x19; W=0.6±0.1)
8. TOLERANCE NOT ASSIGN: ±0.5
9. THE MINIMUM BENDING RADIUS(INNER) OF THE FFC IS 0.5 mm.
10. "@" : KEY DIMENSIONS.



1.4 Block diagram:



1.5 Interface pin :

Pin No.	Pin Symbol	I/O	Description
1	VSS	P	Ground.
2	VDD	P	Power supply for logic.
3	N.C	-	No connection.
4	A0	I	System Address pin 0. <ul style="list-style-type: none"> • For Direct addressing mode, this pin is used for system address bit 0. • For Indirect addressing mode, this pin in conjunction with RD# and WR# determines the type of data present on the data bus.
5	/WR,(R/W)	I	When connected to an 8080 MPU, this is active LOW. This terminal connects to the 8080 MPU /WR signal. The signal on the data bus are latched at the rising edge of the /WR signal. When connected to a 6800 series MPU, this is the read/write control signal input terminal. When /WR = "H": Read; When /WR = "L": Write.
6	/RD,(E)	I	When connected to an 8080 MPU, it is active L. When connected to a 6800 MPU, it is active H.
7~14	D0~D7	I/O	This is an 8-bit bi-directional data bus.
15	/CS	I	This is the chip select signal.
16	/RST	I	When /RES is set to "L", the settings are initialized.
17	VEE	P	Voltage for LCD driver.
18	CNF3	I	8080 or 6800 family interface select, H:6800, L:8080
19	VLED	P	Power supply for backlight(+).
20	VLSS	P	Power supply for backlight(-).

2. ELECTRICAL CHARACTERISTICS

2.1 Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit
Supply voltage for logics	VDD	-0.3	4.0	V
Supply voltage for driving LCD	VEE-VSS	-0.3	30.0	V
Input voltage	VIN	-0.3	VDD+0.5	V
Operating temperature range	T _{OP}	-20	+70	°C
Storage temperature range	T _{STR}	-20	+70	°C

2.2 DC Characteristics

Items	Symbol	Min.	Typ.	Max.	Unit	Condition
Supply voltage (Logic)	VCC	3.0	3.3	3.6	V	
Supply voltage (LCD)			22.5		V	Top=-20°C
	VEE-VSS Δ	20.5	20.8	21.2	V	
			18.0		V	Top=+70°C
Input high level voltage	V _{IH}	2.0	-	-	V	
Input low level voltage	V _{IL}	-	-	0.8	V	
Output low level voltage	V _{oH}	VDD-0.4			V	
Output high level voltage	V _{oL}			0.4	V	
Power supply current	IDD	-	40	80	mA	*NOTE1
Power supply current(LED)	I _{LED}	-	100	-	mA	*NOTE1

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

NOTE1 : Min. and Max. Voltage is mean within the range will has optimum contrast at Ta:25°C
 Typ. Voltage is specified as module driving condition: Ta=25°C, V_{OP} at Optimum Contrast,
 the measuring condition as below, this value is URT recommend when customer change the set
 condition ,the VLCD will be change.

2-2.1 Backlight Specification :

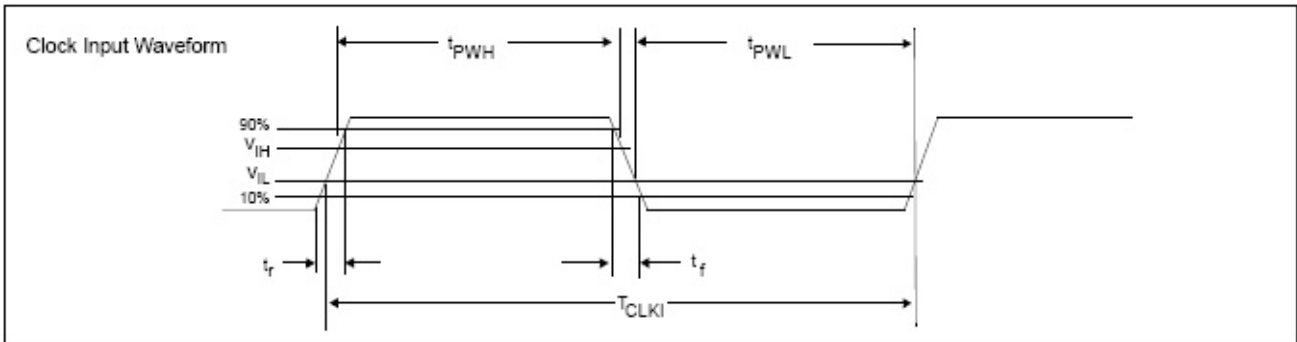
SYMBOL	MIN	TYP	MAX	Unit	Test Condition	NOTE
VBAT Current	-	-	-	mA	Ta=25°C	-
VBAT	-	-	-	V	Ta=25°C	-

PARAMETER	SYMBOL	MIN	TYP	MAX	Unit	Test Condition	NOTE
Supply Current	If	-	100	-	mA	Ta=25°C	-
Supply Voltage	VF	-	5.0	-	V	Ta=25°C	-
Brightness	Br	280	310	-	cd/m ²	Ta=25°C If=20mA	-
Half-Life Time	Lf	-	10000	-	hrs	Ta=25°C	9

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

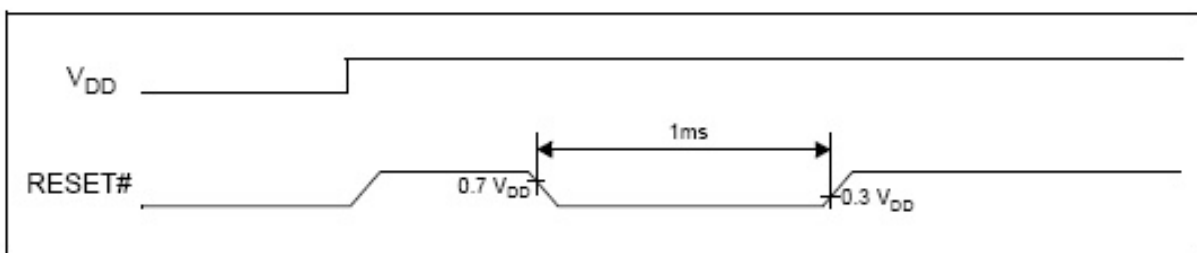
2.3 AC Characteristics

INPUT CLOCK:

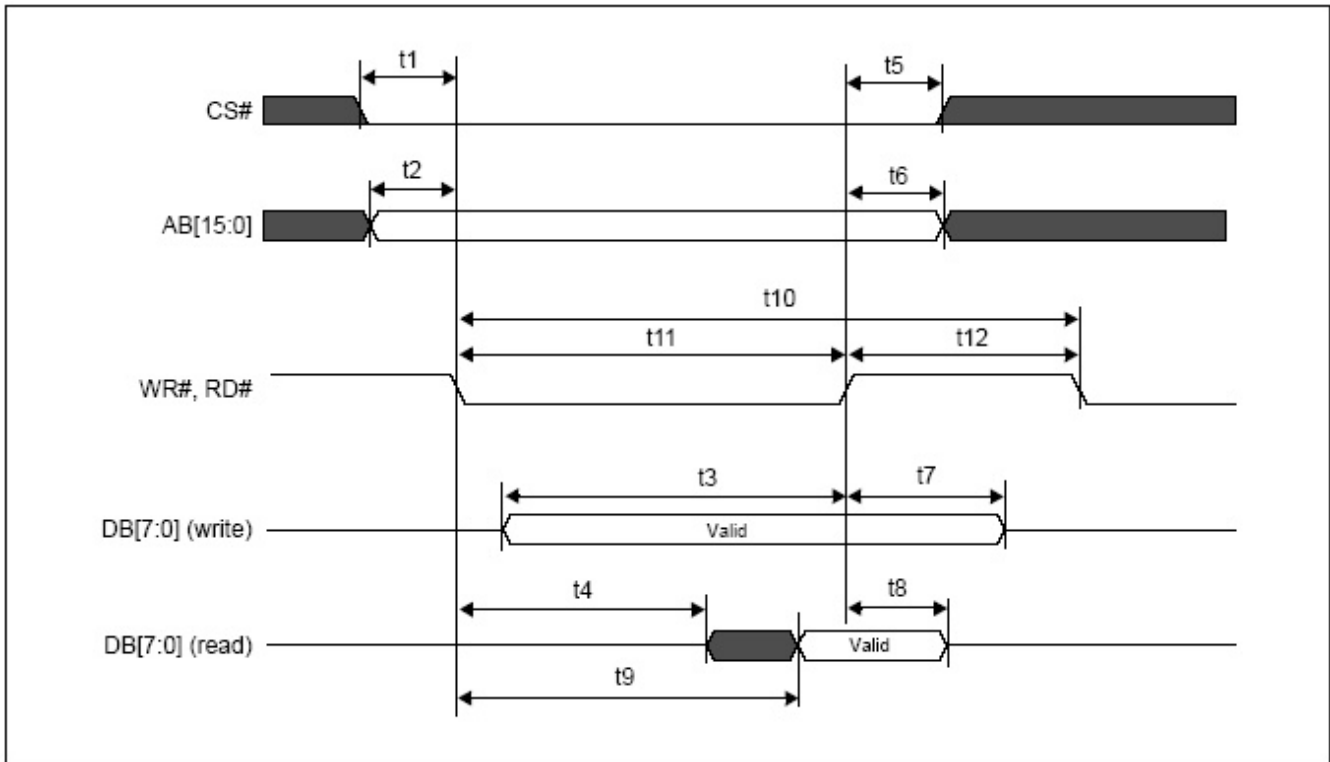


Symbol	Parameter	3.0V		5.0V		Units
		Min	Max	Min	Max	
f_{CLKI}	Input Clock Frequency (CLKI)	—	60	—	60	MHz
T_{CLKI}	Input Clock period (CLKI)	$1/f_{OSC}$	—	$1/f_{OSC}$	—	ns
t_{PWH}	Input Clock Pulse Width High (CLKI)	$0.4T_{CLKI}$	—	$0.4T_{CLKI}$	—	ns
t_{PWL}	Input Clock Pulse Width Low (CLKI)	$0.4T_{CLKI}$	—	$0.4T_{CLKI}$	—	ns
t_f	Input Clock Fall Time (10% - 90%)	—	2	—	2	ns
t_r	Input Clock Rise Time (10% - 90%)	—	2	—	2	ns

Reset Timing



Generic Bus Direct/Indirect Interface



Symbol	Parameter	3.3 Volt		5.0 Volt		Units
		Min	Max	Min	Max	
t1	CS# setup time	5	—	5	—	ns
t2	AB[15:0] setup time	5	—	5	—	ns
t3	DB[7:0] setup time to WR# rising edge (write cycle)	Note 2	—	Note 2	—	ns
t4	RD# falling edge to DB[7:0] driven (read cycle)	3	—	3	—	ns
t5	CS# hold time	7	—	7	—	ns
t6	AB[15:0] hold time	7	—	7	—	ns
t7	DB[7:0] hold time from WR# rising edge (write cycle)	5	—	5	—	ns
t8	DB[7:0] hold time from RD# rising edge (read cycle)	3	14	3	14	ns
t9	RD# falling edge to valid Data (read cycle)	—	Note 3	—	Note 3	ns
t10	RD#, WR# cycle time	Note 4	—	Note 4	—	ns
t11	RD#, WR# pulse active time	5	—	5	—	Ts
t12	RD#, WR# pulse inactive time	Note 5	—	Note 5	—	ns

1. T_s = System clock period
2. t_{3min} = $2T_s + 5$
3. t_{9max} = $4T_s + 18$ (for 3.3V)
= $4T_s + 20$ (for 5.0V)
4. t_{10min} = $6T_s$ (for a read cycle followed by a read or write cycle)
= $7T_s + 2$ (for a write cycle followed by a write cycle)
= $10T_s + 2$ (for a write cycle followed by a read cycle)
5. t_{12min} = $1T_s$ (for a read cycle followed by a read or write cycle)
= $2T_s + 2$ (for a write cycle followed by a write cycle)
= $5T_s + 2$ (for a write cycle followed by a read cycle)

3. OPTICAL CHARACTERISTICS

3.1 Characteristics

Driving condition

Item	Duty	Bias	Note
Value	1/240	1/15	1

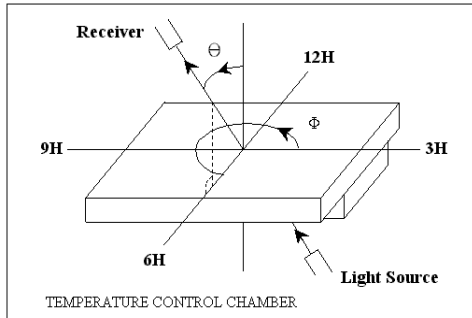
Electrical and Optical Characteristics

No.	Item		symbol / temp.		Min.	Typ.	Max.	Unit	Note
1	Response Time		Tr	25 °C	-	195	390	ms	2
			Tf	25 °C	-	270	540		
2	Viewing Angle	Front-Rear	$\Theta 1$	$\Phi = 270^\circ$	-10	-	30	degree	3
		Left-Right	$\Theta 2$		-30	-	30		
3	Contrast Ratio		Cr	25 °C	-	3	-	-	4

3.2 Definition of optical characteristics

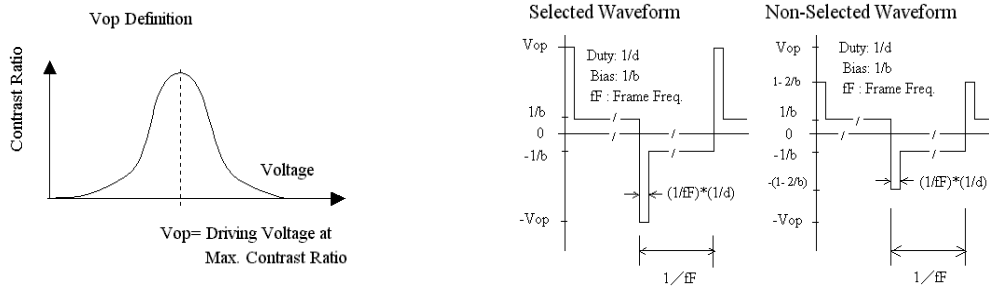
Measurement condition :

Transmissive and Transflective type

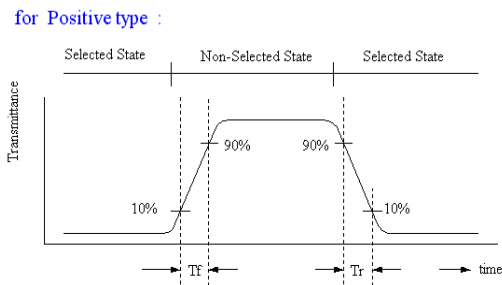


PHOTAL LCD-5000

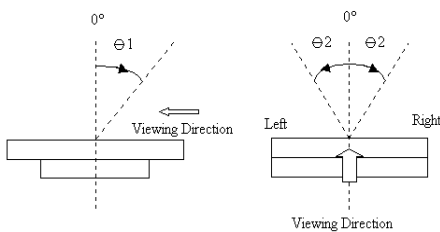
[Note 1] Definition of LCD Driving Vop and Waveform :



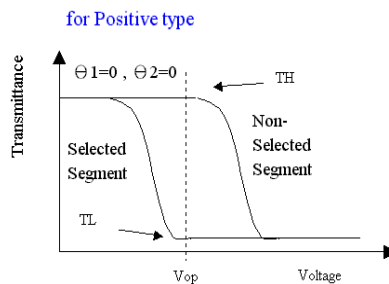
[Note 2] Definition of Response Time



[Note 3] Definition of Viewing Angle :



[Note 4] Definition of Contrast Ratio :



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

4. RELIABILITY :

Item No	Items	Condition	Remark
1	High temperature operating	70 °C , 200 hours	Finish product (With polarizer)
2	Low temperature operating	-20 °C , 200 hours	Finish product (With polarizer)
3	High temperature storage	70 °C , 200 hours	Finish product (With polarizer)
4	Low temperature storage	-20 °C , 200 hours	Finish product (With polarizer)
5	High temperature & humidity storage	60°C, 90%RH, 100 hours	Finish product (With polarizer)
6	Thermal Shock storage	-20°C, 30min.<=> 70°C, 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°C , 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 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 :280°C±10°C.
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°C)

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.

6. DATE CODE OF PRODUCTS

- Date code will be shown on each product :

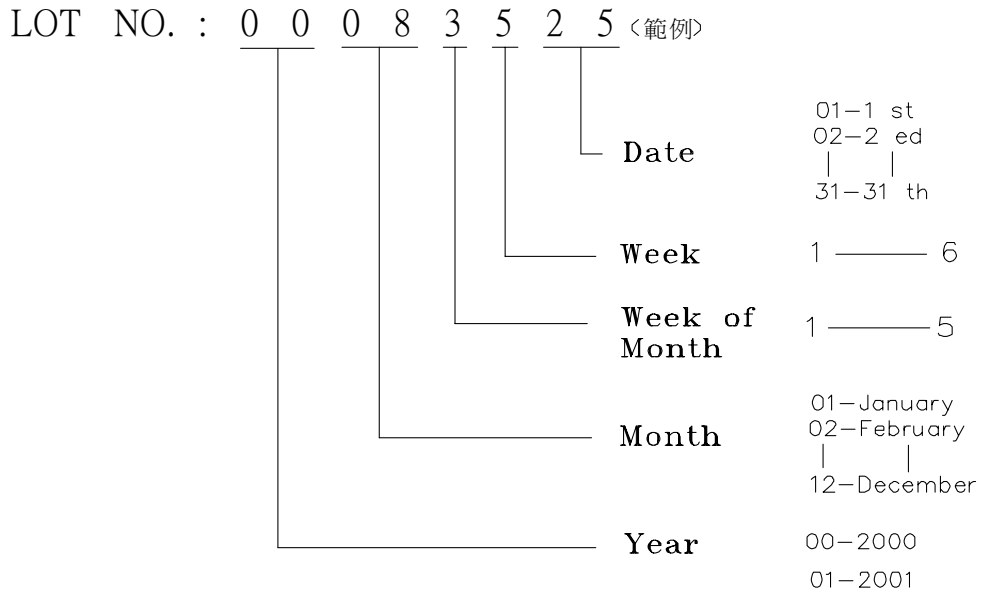
- Y MM DD - XXX

Year Month Day - Production lots

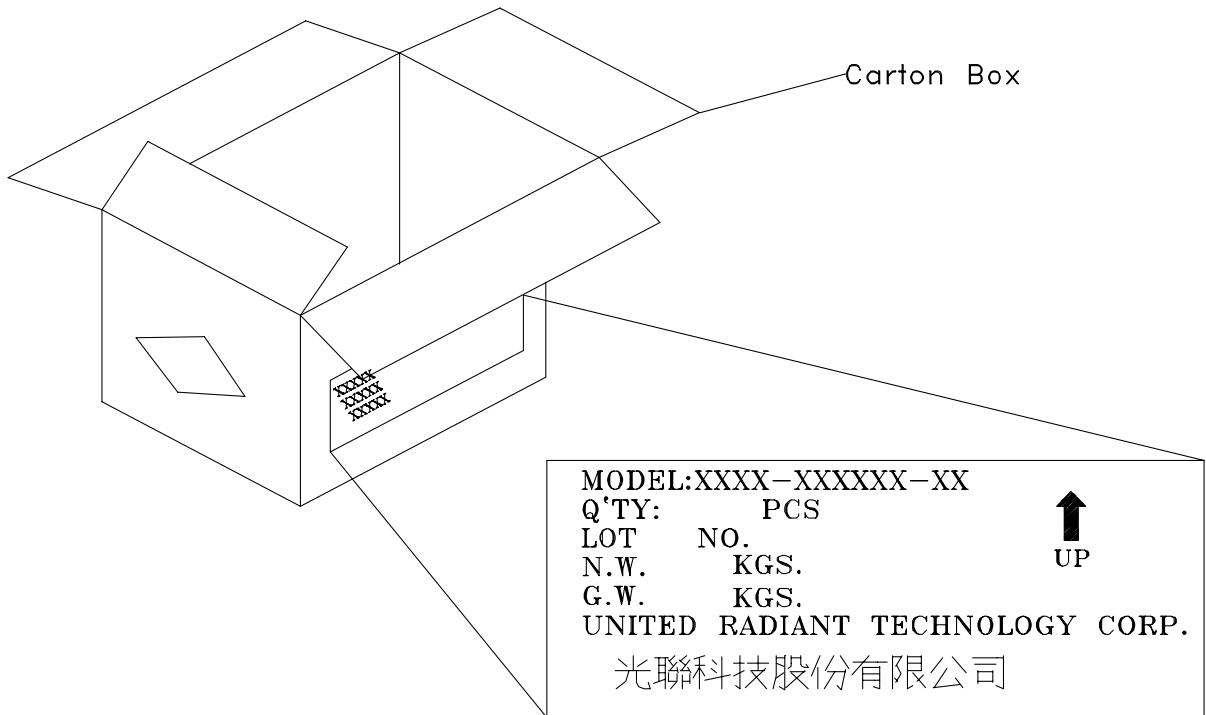
- Example: 2 1 2 2 3 - 0 0 3 ==>Year 2002, Dec.,23rd , Batch no.03

7. PACKING

Instruction of lot number:

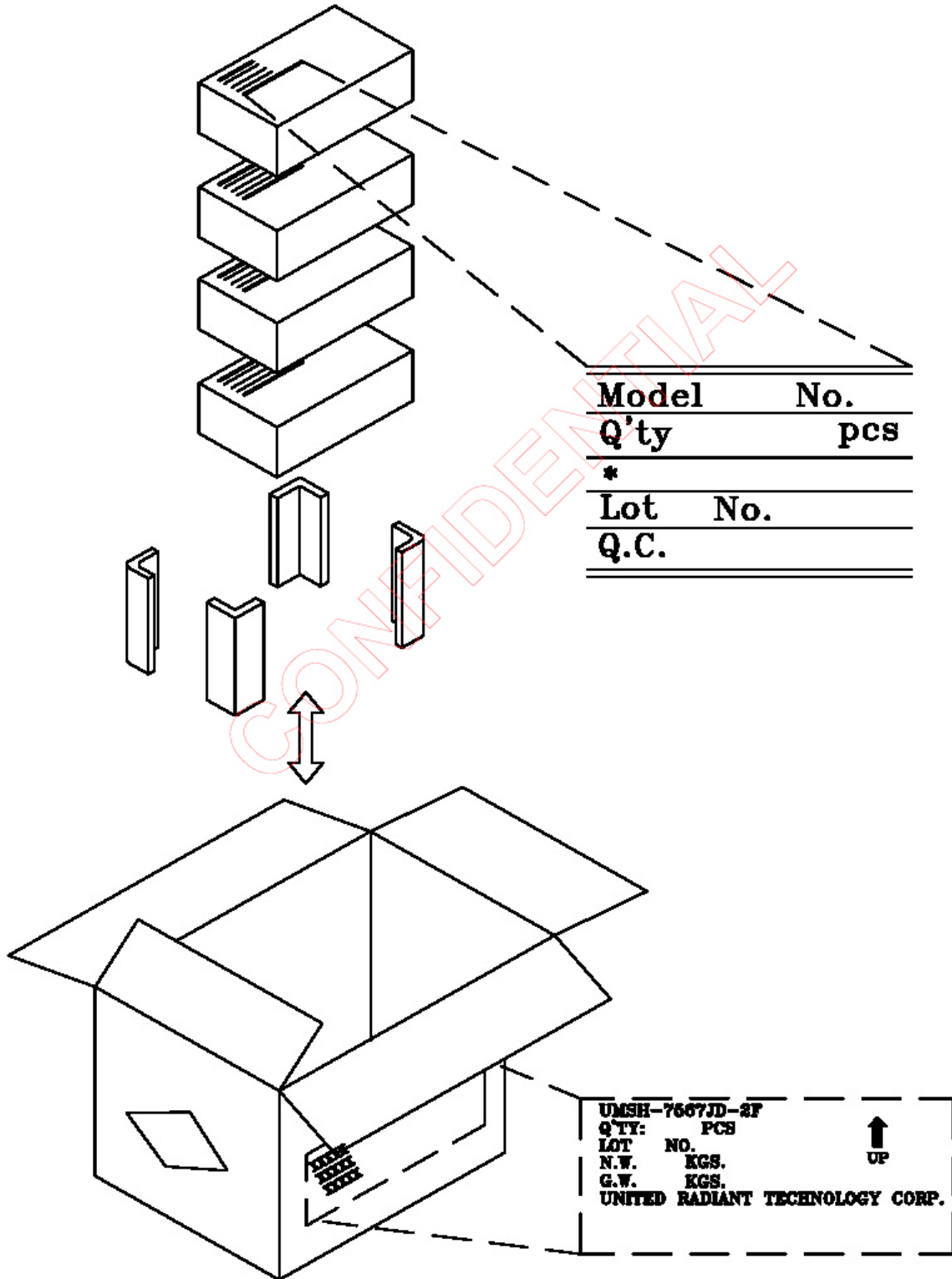


Lable of carton:



NOTE: (1) 請勿彎折 FPC

24 PCS/INDEX BOX
4 INDEX BOX/STACK
96 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 °C ~ 40 °C ,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	2.5 %
TOTAL	2.5 %

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

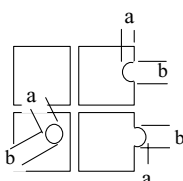
8.2.1. CHECKING DIRECTION SHALL BE IN THE 45 DEGREE AREA TO FACE THE SAMPLE.

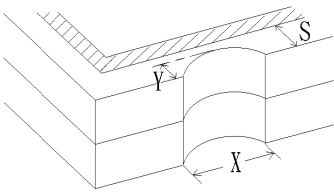
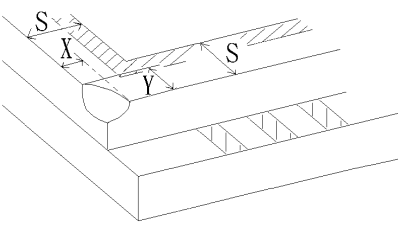
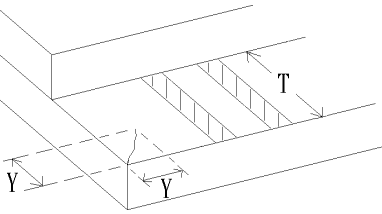
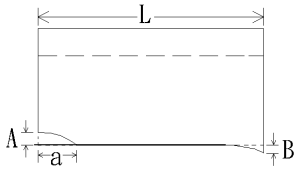
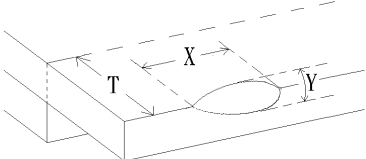
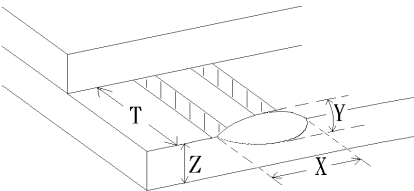
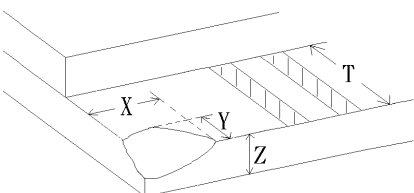
8.2.2. CHECKER SHALL SEE OVER 30 cm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS. OF 20W FLUORESCENT LAMP.

8.3. INSPECTION PLAN :

CLASS	ITEM	JUDGEMENT	CLASS
PACKING & INDICATE	1. OUTSIDE AND INSIDE PACKAGE INDICATIONS	"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	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	· BLEMISH · BLACK SPOT · WHITE SPOT IN THE LCD. · BLEMISH · BLACK SPOT · WHITE SPOT AND SCRATCH ON THE POLARIZER	(A) ROUND TYPE: unit : mm. <table border="1"> <thead> <tr> <th>DIAMETER (mm.)</th> <th>ACCEPTABLE Q'TY</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.1$</td> <td>DISREGARD</td> </tr> <tr> <td>$0.1 < \Phi \leq 0.2$</td> <td>5</td> </tr> <tr> <td>$0.2 < \Phi \leq 0.3$</td> <td>3</td> </tr> <tr> <td>$0.3 < \Phi$</td> <td>0</td> </tr> </tbody> </table> (B) LINER TYPE: unit : mm. <table border="1"> <thead> <tr> <th>LENGTH</th> <th>WIDTH</th> <th>ACCEPTABLE Q'TY</th> </tr> </thead> <tbody> <tr> <td>-----</td> <td>$W \leq 0.03$</td> <td>DISREGARD</td> </tr> <tr> <td>$L \leq 5.0$</td> <td>$0.03 < W \leq 0.05$</td> <td>5</td> </tr> <tr> <td>$L \leq 5.0$</td> <td>$0.05 < W \leq 0.07$</td> <td>2</td> </tr> <tr> <td>-----</td> <td>$0.07 < W$</td> <td>FOLLOW ROUND TYPE</td> </tr> </tbody> </table>	DIAMETER (mm.)	ACCEPTABLE Q'TY	$\Phi \leq 0.1$	DISREGARD	$0.1 < \Phi \leq 0.2$	5	$0.2 < \Phi \leq 0.3$	3	$0.3 < \Phi$	0	LENGTH	WIDTH	ACCEPTABLE Q'TY	-----	$W \leq 0.03$	DISREGARD	$L \leq 5.0$	$0.03 < W \leq 0.05$	5	$L \leq 5.0$	$0.05 < W \leq 0.07$	2	-----	$0.07 < W$	FOLLOW ROUND TYPE
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-----	$0.07 < W$	FOLLOW ROUND TYPE																										
8.4.2	MINOR	BUBBLE IN POLARIZER	unit : mm. <table border="1"> <thead> <tr> <th>DIAMETER</th> <th>ACCEPTABLE Q'TY</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.3$</td> <td>DISREGARD</td> </tr> <tr> <td>$0.3 < \Phi \leq 0.5$</td> <td>3</td> </tr> <tr> <td>$0.5 < \Phi \leq 1.0$</td> <td>1</td> </tr> <tr> <td>$1.0 < \Phi$</td> <td>0</td> </tr> </tbody> </table>	DIAMETER	ACCEPTABLE Q'TY	$\Phi \leq 0.3$	DISREGARD	$0.3 < \Phi \leq 0.5$	3	$0.5 < \Phi \leq 1.0$	1	$1.0 < \Phi$	0															
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8.4.3	MINOR	PIN HOLE · PATTERN DEFORMITY	unit : mm.  <table border="1"> <thead> <tr> <th>DIAMETER</th> <th>ACC. Q'TY</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.1$</td> <td>DISREGARD</td> </tr> <tr> <td>$0.1 < \Phi \leq 0.25$</td> <td>3</td> </tr> <tr> <td>$0.25 < \Phi$</td> <td>0</td> </tr> </tbody> </table> $\Phi = (a+b)/2$	DIAMETER	ACC. Q'TY	$\Phi \leq 0.1$	DISREGARD	$0.1 < \Phi \leq 0.25$	3	$0.25 < \Phi$	0																	
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NO.	CLASS	ITEM	JUDGEMENT
8.4.4	MINOR	CRACK	 $Y > S$ REJ.
8.4.5	MINOR	CRACK	 or $Y > S$ REJ.
8.4.6	MAJOR	GLASS SCRATCH	 $Y > (1/2) T$ REJ.
8.4.7	MAJOR	SCRIBE DEFECT	 $a > L/3, A > 1.5\text{mm.}$ REJ. B : ACCORDING TO DIMENSION
8.4.8	MINOR	CRACK (ON THE TERMINAL AREA)	 $\Phi = (x+y)/2 > 2.5 \text{ mm}$ REJ.
8.4.9	MINOR	CRACK (ON THE TERMINAL SURFACE)	 $Y > (1/3) T$ REJ.
8.4.10	MINOR	CRACK	 $Y > T$ REJ.