SPECIFICATION

OF

LIQUID CRYSTAL DISPLAY MODULE

CUSTOMER :

Model No. : **UMSH-3267MD-UB**

Model version : **0**

Document Revision : **0**

TENTATIVE

CUSTOMER APPROVED SIGNATURE			

This specification need to be signed by purchaser or customer as a specification of products production and delivery from Microtips. 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.

MICROTIPS USA TECHNOLOGY

Allen Wang	**George Tseng**	**Angus Chiu**	**Sharon Tsai**	**Aug-21-2009**
APPROVED	CHECKED	CHECKED	PREPARED	Date

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This document has been signed by Digital Signature Approval System

Revision record				
Document Revision	Model No. Version No.	Description		Revision by
0	UMSH-3267MD-UB (UBSH-M150EN) Version No. 0			Ken Lin Wen-Chie Chi 21-Aug-2009

Revision 0 ; UMSH-3267MD-UB Ver. 0 ; August-21-2009   **Page: 2**

CONTENTS:

1. BASIC SPECIFICATION

1.1 Mechanical specifications

Items	Nominal Dimension	Unit
Character Line	20×2 Chars	Pixel
Module Size (W x H x T)	37.0 x 116.0 x 17.2	mm.
Viewing Area (W×H)	73.8 x 16.5	mm.
Active Area (W x H)	70.8 x 11.5	mm.
Character Font (W × H)	5×8 dots	mm.
Character Size (W × H)	3.065 × 5.56	mm.
Character Pitch (W × H)	3.565 × 5.94	mm.
Dot Size (W×H)	0.585 x 0.66	mm.
Dot Pitch (W x H)	0.62 x 0.7	mm.
Driving Method	1/ 8	Duty
	1/ 4	Bias
Driving IC Package	COB	-
Module Weight	46	g

1.2 Display specification

Display	Descriptions	Note
LCD Type	2.95" UB	-
LCD Mode	Negative	-
Polarizer Mode	Transmissive	-
Polarizer UV - Cutting	Without	
Polarizer Surface	Normal	-
Backlight Type	LED	-
Backlight Color	White	
Viewing Direction	6 O'clock Direction	-

Color tone is slightly changed by temperature and driving voltage.

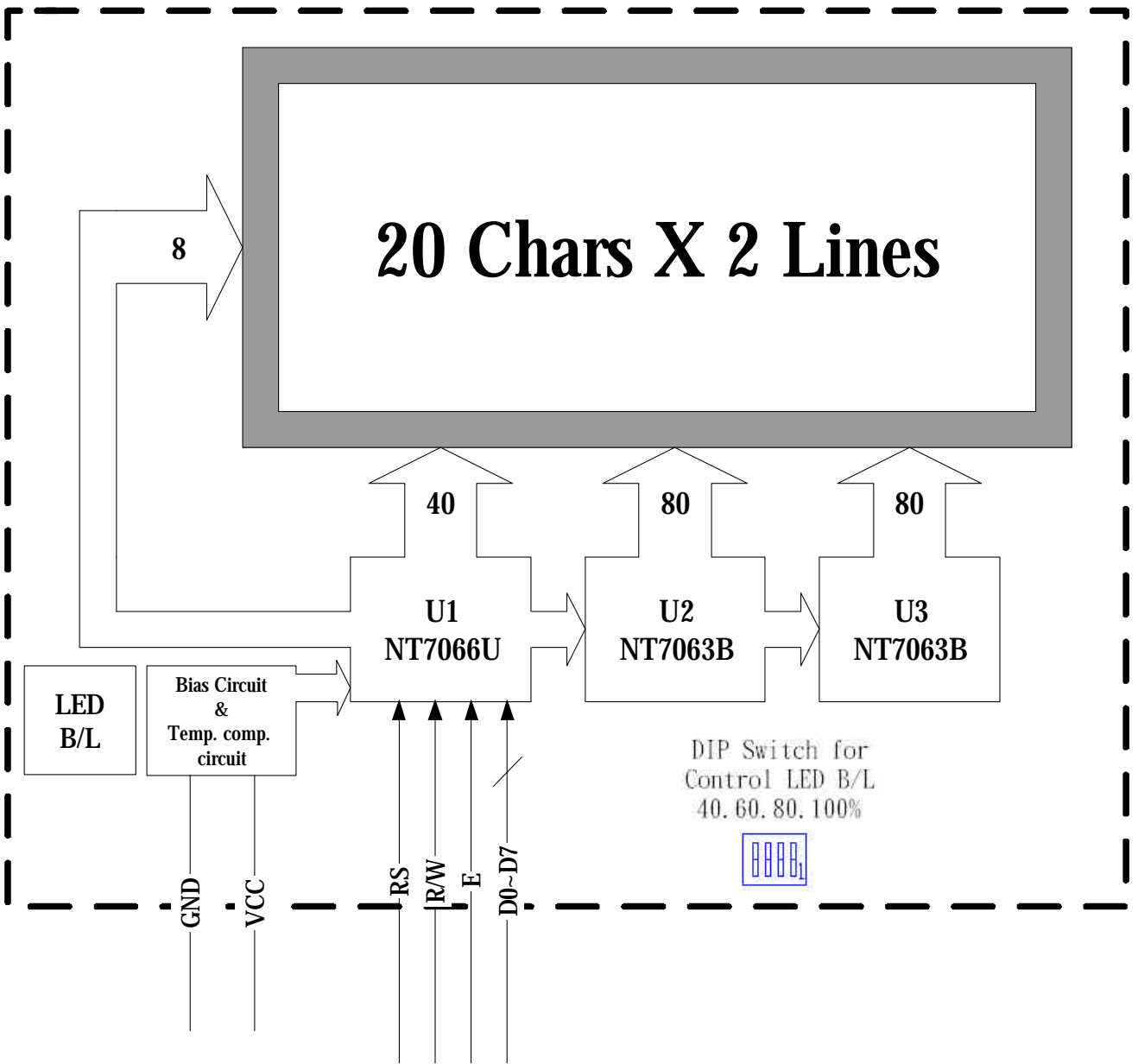## 1.3 Outline dimension
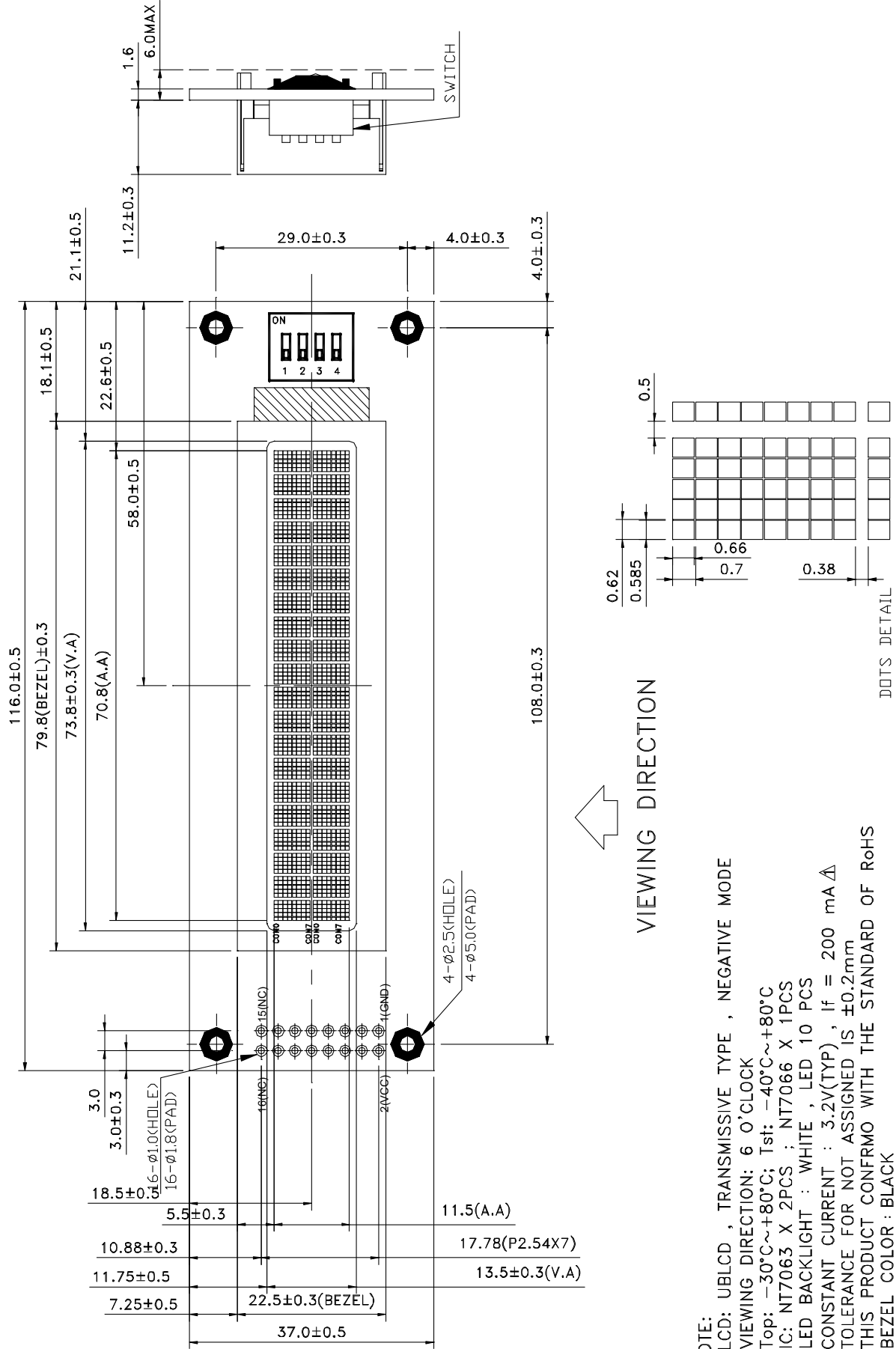
NOTE:
1. LCD: UBLCD , TRANSMISSIVE TYPE , NEGATIVE MODE
2. VIEWING DIRECTION: 6 O'CLOCK
3. Top: -30°C~+80°C; Tst: -40°C~+80°C
4. IC: NT7063 X 2PCS ; NT7066 X 1PCS
5. LED BACKLIGHT : WHITE , LED 10 PCS
6. CONSTANT CURRENT : 3.2V(TYP) , If = 200 mA
7. TOLERANCE FOR NOT ASSIGNED IS ±0.2mm
8. THIS PRODUCT CONFRMO WITH THE STANDARD OF RoHS
9. BEZEL COLOR : BLACK

VIEWING DIRECTION

DOTS DETAIL

1.4 Block diagram:

20 Chars X 2 Lines

8

40

80

80

U1
NT7066U

U2
NT7063B

U3
NT7063B

LED
B/L

Bias Circuit
&
Temp. comp.
circuit

DIP Switch for
Control LED B/L
40.60.80.100%

GND

VCC

RS

R/W

E

D0~D7

1.5 Interface pin :

Pin No.	Pin Name	I/O	Description
1	GND	P	Ground.(0V)
2	VCC	P	Power supply.(+5V)
3	NC	-	Not connection.
4	RS	I	Register select signal: 0: Instruction register. 1: Data register.
5	R/W	I	Read/Write control signal: 0:Write 1: Read
6	E	I	Read/Write enable signal.
7~14	D0~D7	I	Data bus(8-bits).
15-16	NC	-	Not connection.

Dip switch for B/L Brightness Control PIN:

1	40 % Brightness of the Backlight.
2	60 % Brightness of the Backlight.
3	80 % Brightness of the Backlight.
4	100 % Brightness of the Backlight.

2. ELECTRICAL CHARACTERISTICS

2.1 Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit
Supply voltage	VDD	-0.3	+7.0	V
Supply voltage for driving LCD	VLCD-V5	VDD-15	VDD+0.3	V
Input voltage	VIN	-0.3	VDD+0.3	V
Operate temperature range	T_{OP}	-30	80	℃
Storage temperature range	T_{ST}	-40	80	℃

2.2 Command Sequence

INITIALIZING BY INSTRUCTION
8-bit interface mode

Condition: f_{osc}= 270KHz

```
┌─────────────────┐
│    Power on      │
└─────────────────┘
```

Wait for moe than 20ms after V_{DD} rises to 4.5V
wait for more than 30ms after V_{DD} rises to 2.7V
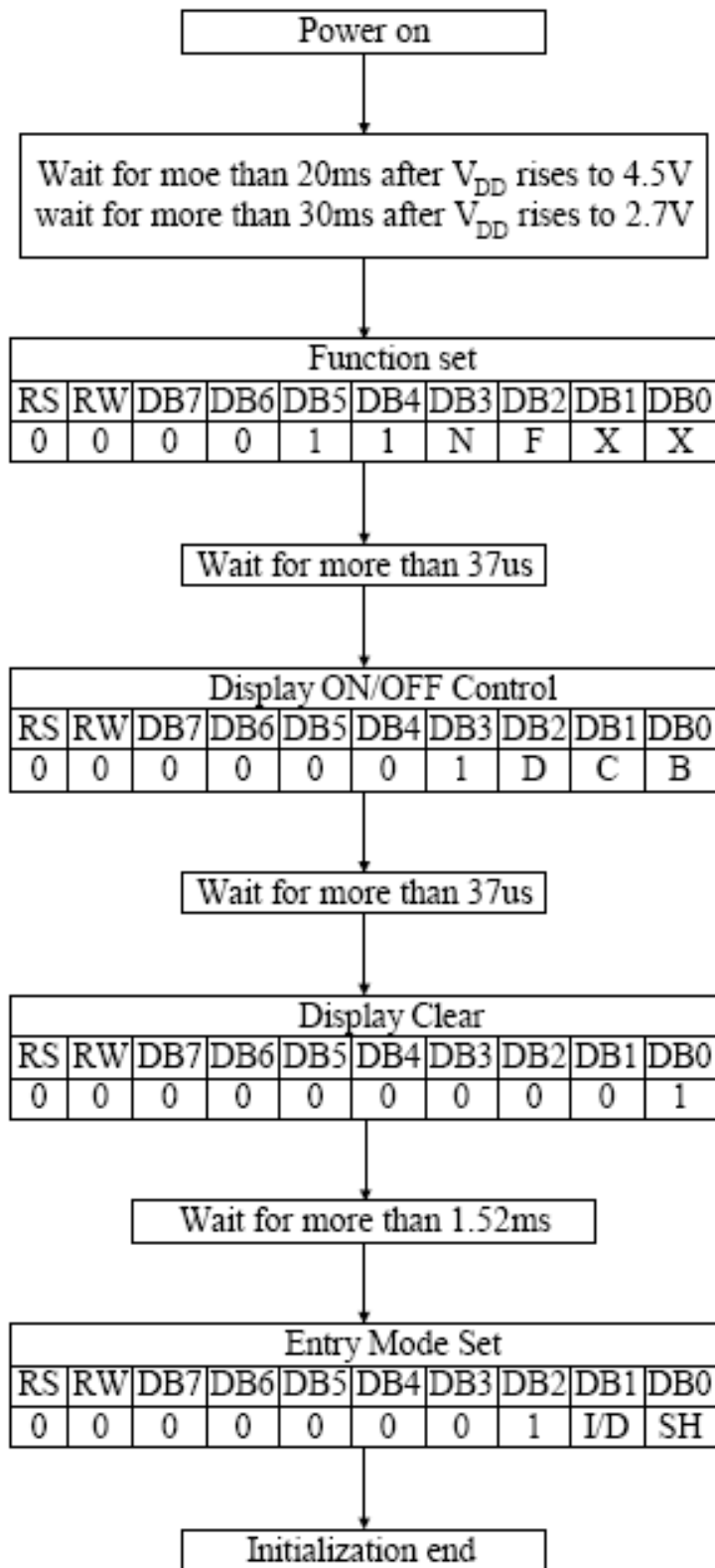
N	0	1-line mode
	1	2-;ine mode

F	0	5X8 dots
	1	5X11 dots

Function set

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	1	1	N	F	X	X

Wait for more than 37us

D	0	display off
	1	display on

C	0	cursor off
	1	cursor on

B	0	blink off
	1	blink on

Display ON/OFF Control

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	0	0	1	D	C	B

Wait for more than 37us

Display Clear

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	0	0	0	0	0	1

Wait for more than 1.52ms

I/D	0	decreament mode
	1	increament mode

SH	0	entire shift off
	1	entire shift on

Entry Mode Set

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	0	0	0	1	I/D	SH

```
┌─────────────────┐
│ Initialization end │
└─────────────────┘
```

2.3 Standard Character Pattern

Higher 4-bit of character code (Hex.)

Lower 4-bit of character code (Hex.)

2.4 DC Characteristics

Items	Symbol	Min.	Typ.	Max.	Unit	Condition
Supply voltage (Logic)	VDD	4.5	5.0	5.5	V	
Supply Voltage (LCD)	VLCD	6.55	6.85	7.15	V	Top = 80℃
		6.55	6.85	7.15	V	*NOTE1
		6.75	7.05	7.35	V	Top = -30℃
Input logic HIGH	V_{IH}	VDD-1.0	-	VDD	V	
Input logic LOW	V_{IL}	-0.2	-	1.0	V	
Power supply current	I_{DD}	-	TBD	TBD	mA	*NOTE2
Backlight Voltage	Vee	2.8	3.2	3.6	V	
Backlight current	Iee	--	200	--	mA	*NOTE4

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

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

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

*NOTE4:The Back light is constant current.

*NOTE3 :

Measuring Condition :

Standard Value MAX.

Ta   = 25℃
VDD-VSS   = 5.0V
VEE-VSS   = About 3.2V (200mA)
Fosc   = 270 KHz
Bias   = 1/4 Bias
Duty   = 1/8 Duty
Display Patten = Checkered pattern

2.5 Back-light Characteristics

PARAMETER	SYMBOL	MIN	TYP	MAX	Unit	Test Condition	NOTE
Supply Current	If	--	200	--	mA	Ta=25℃	8
Supply Voltage	Vs	2.8	3.2	3.6	V	Ta=25℃	-

Note 8：The Back light is constant current.

2.6 AC Characteristics

AC Characteristics

(V_{DD} = 4.5V~5.5V)

Mode	Characteristic	Symbol	Min.	Typ.	Max.	Unit
Write mode	E cycle time	t_C	500	-	-	ns
	E rise/fall time	t_R, t_F	-	-	20	
	E pulse width (high, low)	t_W	230	-	-	
	R/W and RS setup time	t_{SU1}	40	-	-	
	R/W and RS hold time	t_{H1}	10	-	-	
	Data setup time	t_{SU2}	60	-	-	
	Data hold time	t_{H2}	10	-	-	
Read mode	E cycle time	t_C	500	-	-	ns
	E rise/fall time	t_R, t_F	-	-	20	
	E pulse width (high, low)	t_W	230	-	-	
	R/W and RS setup time	t_{SU}	40	-	-	
	R/W and RS hold time	t_H	10	-	-	
	Data output delay time	t_D	-	-	120	
	Data hold time	t_{DH}	5	-	-	

2.6 AC Characteristics（Cont.）
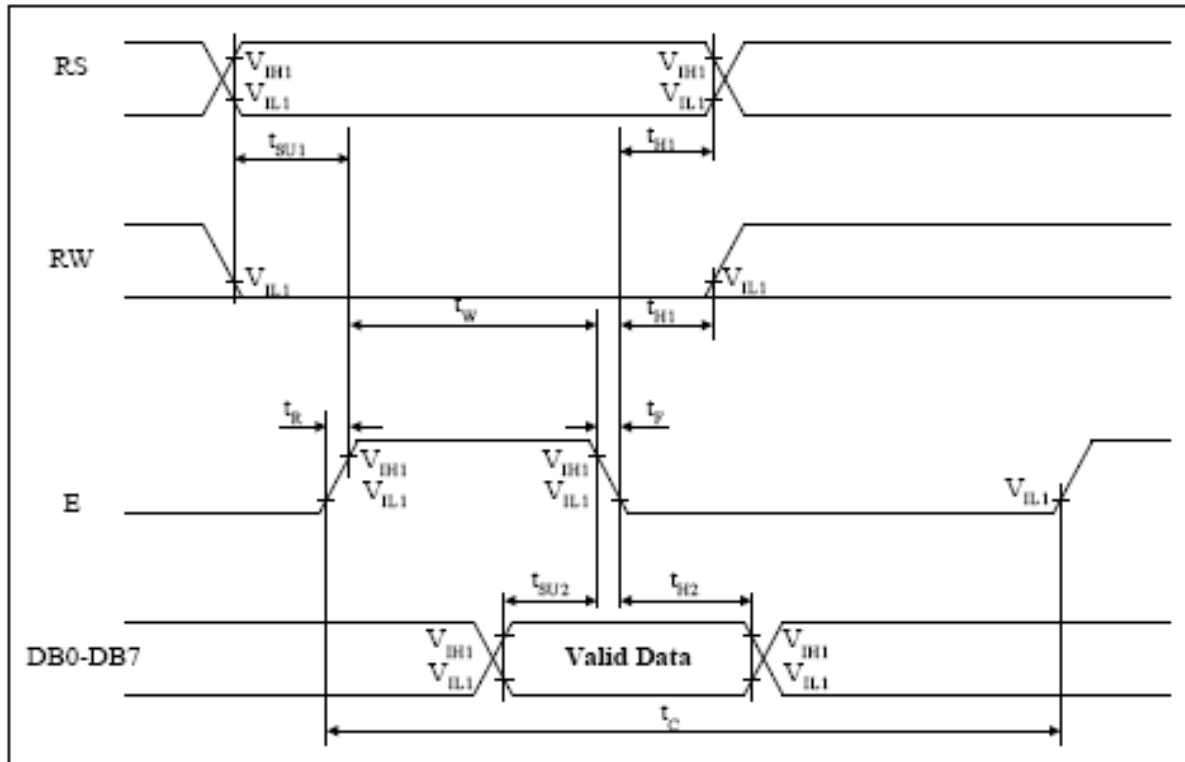
Write mode timing diagram
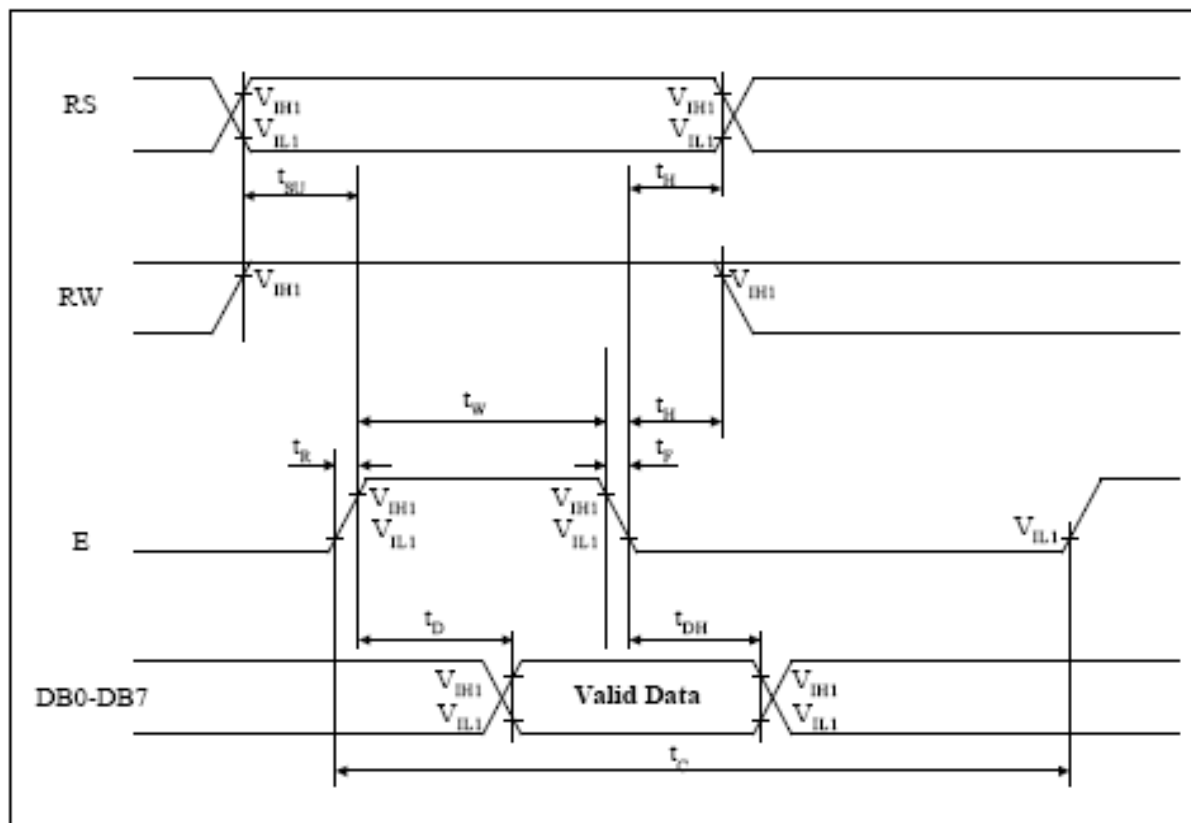
Read mode timing diagram

3. OPTICAL CHARACTERISTICS

3.1 Characteristics

Electrical and Optical Characteristics

No.	Item			symbol / temp.		Min.	Typ.	Max.	Unit	Note
1	Response Time			Tr	25 ℃	-	80	160	ms	2
				Tf	25 ℃	-	35	70		
2	Viewing Angle	Hor.	Cr>=2	Θ_{2+}	0°	60	75	-	degree	3
				Θ_{2-}	180°	60	75	-		
		Ver.		Θ_{1+}	270°	60	75	-		
				Θ_{1-}	90°	40	50	-		
3	Contrast Ratio			Cr	25 ℃	400	800	-	-	4
4	Brightness			Y		240	400	-	cd/m^2	

3.2 Definition of optical characteristics

Measurement condition :

Transmissive and Transflective type

PHOTAL LCD-5000
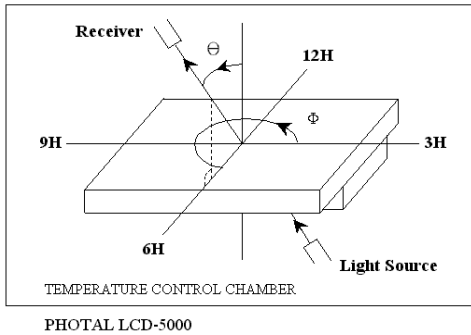
[Note 1] Definition of LCD Driving Vop and Waveform :
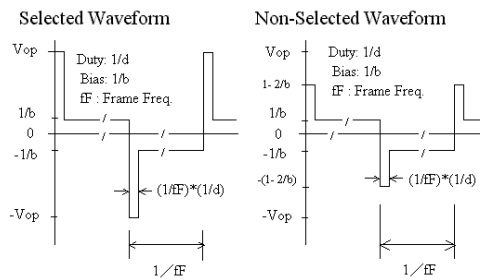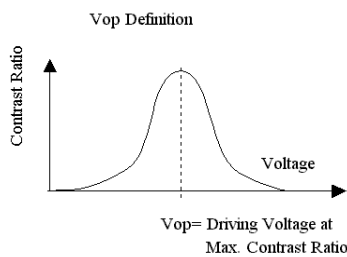
[Note 2] Definition of Response Time
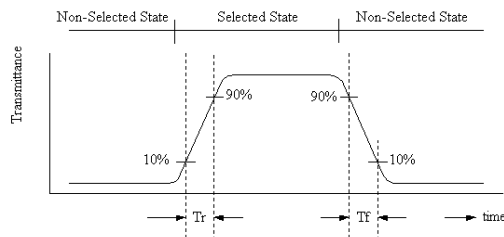
[Note 3] Definition of Viewing Angle :   [Note 4] Definition of Contrast Ratio :
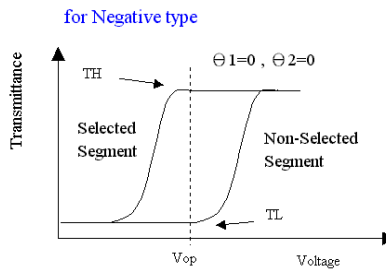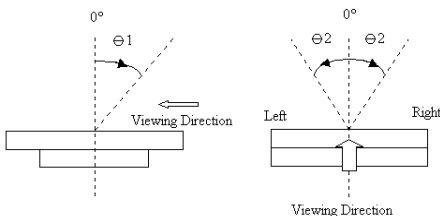
$$\text{Contrast Ratio} = \frac{TH}{TL}$$

4. RELIABILITY :

Item No	Items	Condition
1	High temperature operating	80 ℃ , 200 hours
2	Low temperature operating	-30 ℃ , 200 hours
3	High temperature storage	80 ℃ , 200 hours
4	Low temperature storage	-40 ℃ , 200 hours
5	High temperature & humidity storage	60℃, 90%RH, 100 hours
6	Thermal Shock storage	-40℃, 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 :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 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 us is required. We will not responsible for any damage or loss which caused by the products without any authorization given by us.

● 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 :
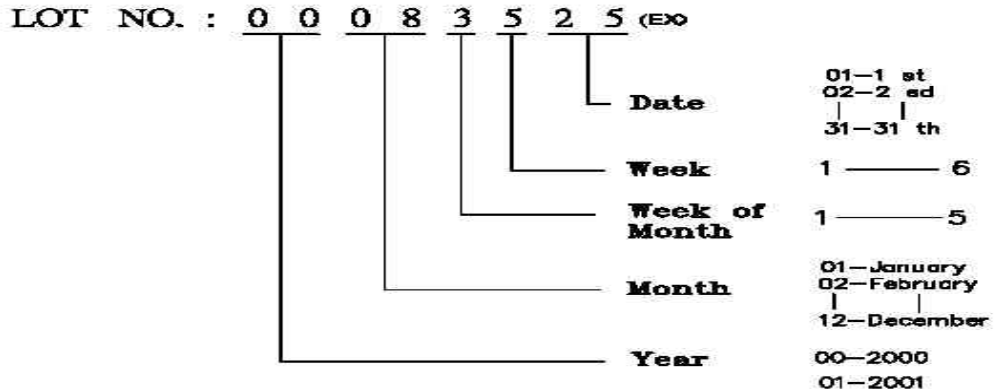
● <u>YY</u> <u>MM</u> <u>DD</u> - <u>XXXX</u>

Year Month Day - Production lots

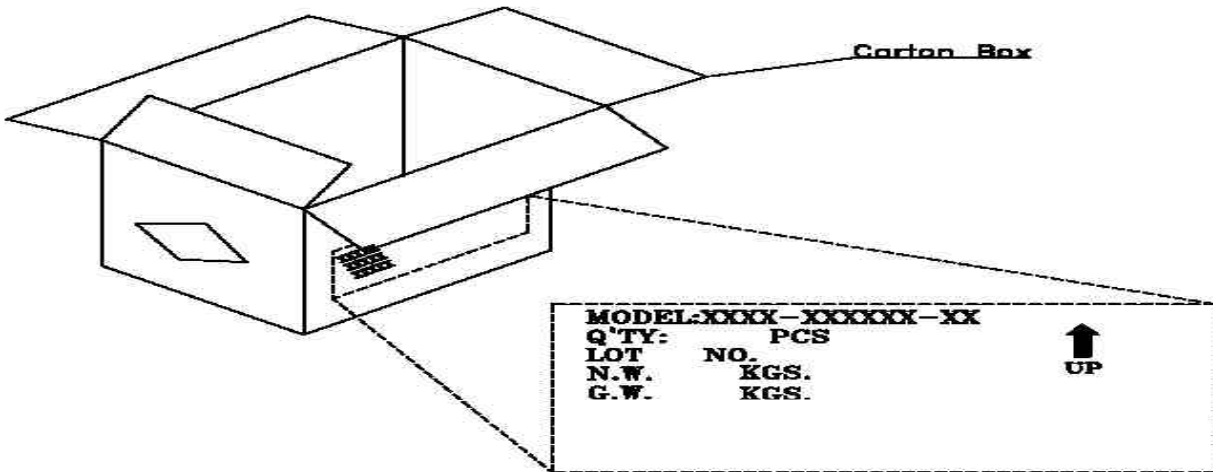● Example: 090508 - 0 0 0 3 ==>Year 2009, May.,08rd , Batch no.03

7. PACKING

Instruction of lot number:

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

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

Lable of carton:

Carton Box

```
MODEL:XXXX-XXXXXX-XX
Q'TY:         PCS
LOT    NO.
N.W.          KGS.
G.W.          KGS.
```

UP

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

Not Allowed

OK

Not Allowed

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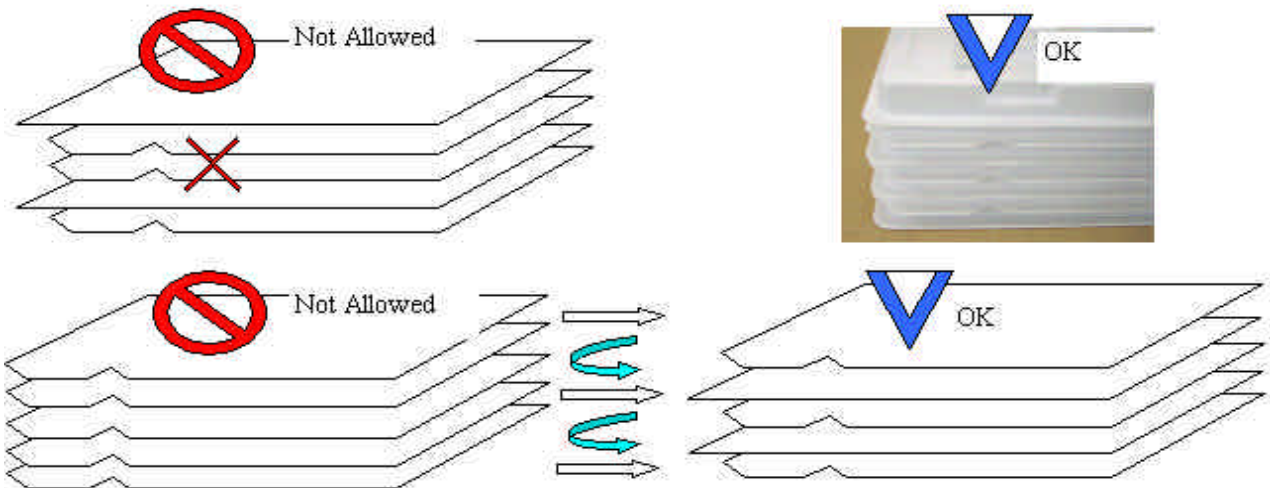
MODEL NO: UM*
  T.B.D. pcs / Tray
  T.B.D. Tray / Box
  T.B.D. Box / Carton
  T.B.D. pcs / Carton

NOTE:
  (1) Be warned ,the direction of
      the tray has to turn it by 180 degree
      before stack it up.Otherwise,
      it will be packager's responsibility!!
  (2) Safe Stack : 5 cartons only

1 foamed plastic in each box

TAPE

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

Corrugated board
protection

Model	No.
Q'ty	pcs
*	
Lot	No.
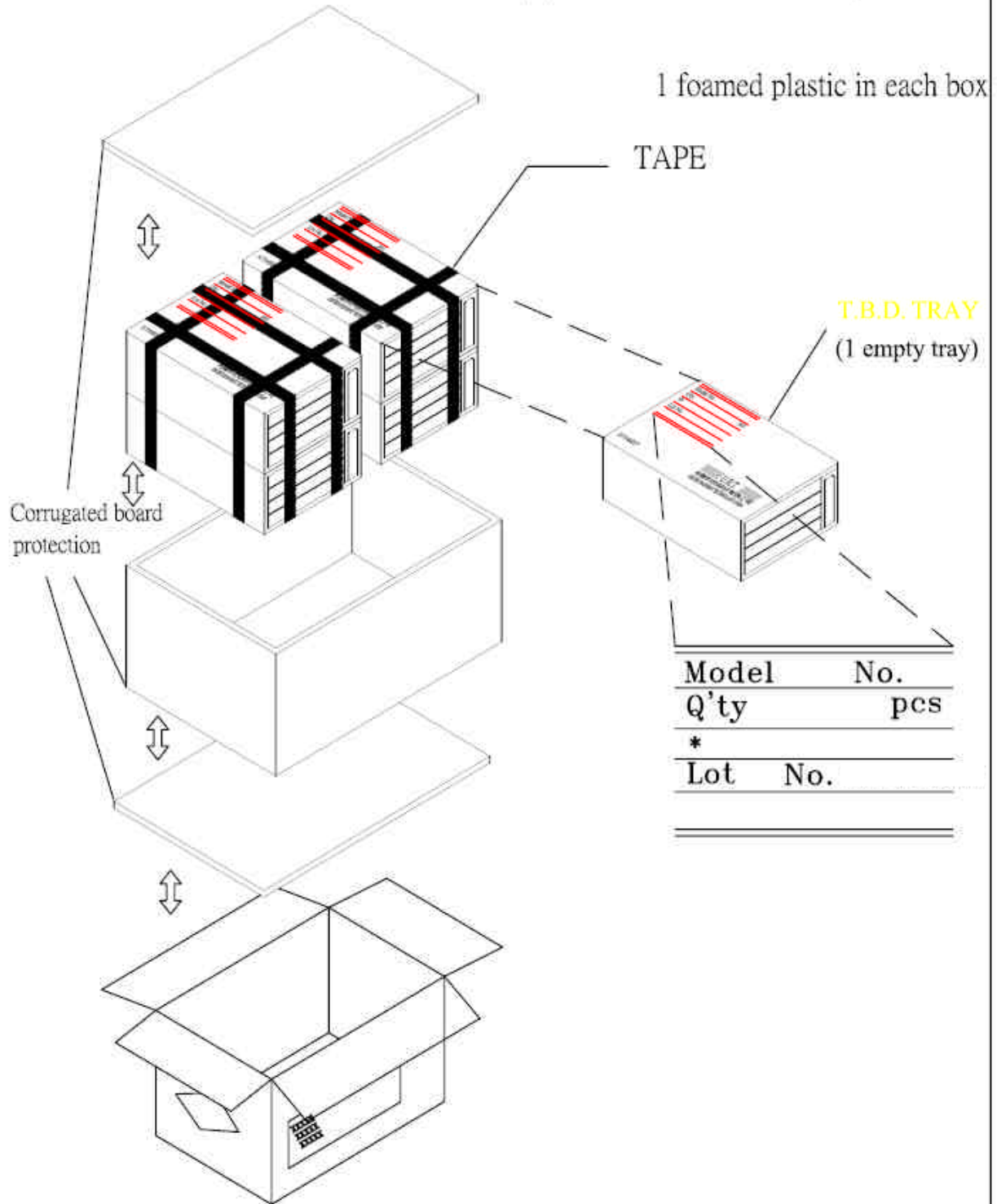
8. INSPECTION STANDARD

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 US. 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

WE WILL PROVIDE ONE-YEAR WARRANTY FOR THE PRODUCTS ONLY IF UNDER SPECIFICATION

OPERATING CONDITIONS. WE WILL REPLACE NEW PRODUCTS FOR THESE DEFECT PRODUCTS

WHICH UNDER WARRANTY PERIOD AND BELONG TO THE RESPONSIBILITY OF US.

8.2. CHECKING CONDITION

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

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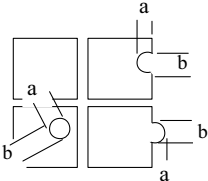
8.3. INSPECTION PLAN :

CLASS	ITEM	JUDGEMENT	CLASS
PACKING & INDICATE	1. OUTSIDE AND INSIDE PACKAGE	"MODEL NO." , "LOT NO." AND "QUANTITY" SHOULD INDICATE ON THE PACKAGE.	Minor
	2. MODEL MIXED AND QUANTITY	OTHER MODEL MIXED................REJECTED QUANTITY SHORT OR OVER......REJECTED	Critical
	3. PRODUCT INDICATION	"MODEL NO." SHOULD INDICATE ON THE PRODUCT	Major
ASSEMBLY	4. DIMENSION, LCD GLASS SCRATCH AND SCRIBE DEFECT.	ACCORDING TO SPECIFICATION OR DRAWING.	Major
APPEARANCE	5. VIEWING AREA	POLARIZER EDGE OR LCD'S SEALING LINE IS VISABLE IN THE VIEWING AREA ……..REJECTED	Minor
	6. BLEMISH、BLACK SPOT、 WHITE SPOT IN THE LCD AND LCD GLASS CRACKS	ACCORDING TO STANDARD OF VISUAL INSPECTION (INSIDE VIEWING AREA)	Minor
	7. BLEMISH、BLACK SPOT WHITE SPOT AND SCRATCH ON THE POLARIZER	ACCORDING TO STANDARD OF VISUAL INSPECTION (INSIDE VIEWING AREA)	Minor
	8. BUBBLE IN POLARIZER	ACCORDING TO STANDARD OF VISUAL INSPECTION (INSIDE VIEWING AREA)	Minor
	9. LCD'S RAINBOW COLOR	STRONG DEVIATION COLOR (OR NEWTON RING) OF LCD......REJECTED. OR ACCORDING TO LIMITED SAMPLE (IF NEEDED, AND INSIDE VIEWING AREA)	Minor
ELECTRICAL	10. ELECTRICAL AND OPTICAL CHARACTERISTICS (CONTRAST、VOP、 CHROMATICITY … ETC)	ACCORDING TO SPECIFICATION OR DRAWING . (INSIDE VIEWING AREA)	Critical
	11.MISSING LINE	MISSING DOT、LINE、CHARACTER ....REJECTED	Critical
	12.SHORT CIRCUIT、 WRONG PATTERN DISPLAY	NON DISPLAY、WRONG PATTERN DISPLAY、CURRENT CONSUMPTION OUT OF SPECIFICATION...... REJECTED	Critical
	13. PIN HOLE、PATTERN DEFORMITY	ACCORDING TO STANDARD OF VISUAL INSPECTION	Minor
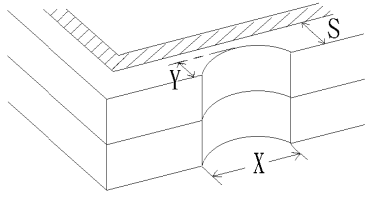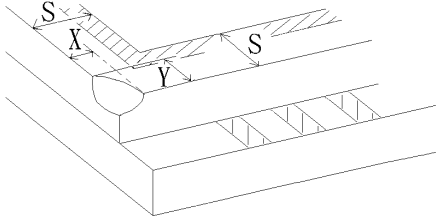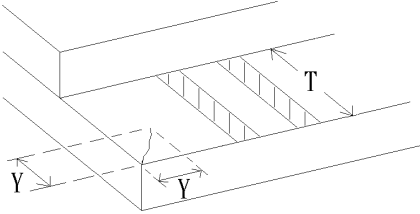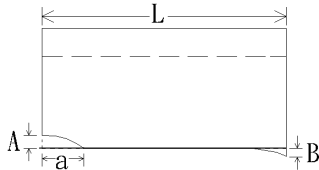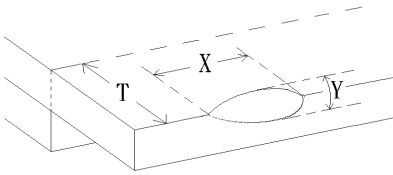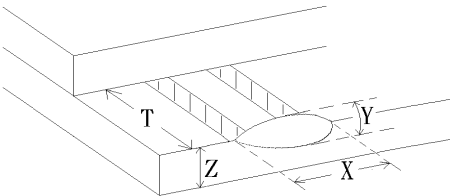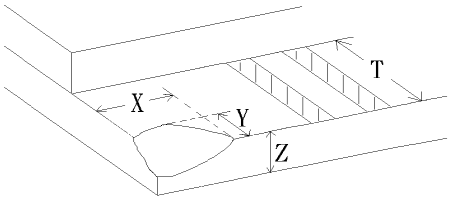
8.4. STANDARD OF VISUAL INSPECTION

NO.	CLASS	ITEM	JUDGEMENT
8.4.1	MINOR	· BLEMISH 、BLACK SPOT 、 WHITE SPOT IN THE LCD. · BLEMISH 、BLACK SPOT 、 WHITE SPOT AND SCRATCH ON THE POLARIZER	(A) ROUND TYPE: unit : mm.
8.4.2	MINOR	BUBBLE IN POLARIZER	unit : mm.
8.4.3	MINOR	PIN HOLE 、 PATTERN DEFORMITY	unit : mm.

8.4.1 (A) ROUND TYPE: unit : mm.

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

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

(B) LINER TYPE: unit : mm.

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

8.4.2   unit : mm.

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

8.4.3   unit : mm.

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

$\Phi = (a+b)/2$

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. $a > L/3$, $A > 1.5$ mm. REJ. 2. B : ACCORDING TO DIMENSION
8.4.8	MINOR	CHIPPING (ON THE TERMINAL AREA)		$\Phi = (x+y)/2 > 2.5$ mm REJ.
8.4.9	MINOR	CHIPPING (ON THE TERMINAL SURFACE)		$Y > (1/3) T$ REJ.
8.4.10	MINOR	CHIPPING		$Y > T$ REJ.

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