SPECIFICATION

OF

LIQUID CRYSTAL DISPLAY MODULE

Feb-13-2023

CUSTOMER : **URT-STD**

Model No. : **UMSH-8247MD-1T(REV2G)**

Model version : **0**

Document Revision : **6**

CUSTOMER APPROVED SIGNATURE			

This specification need to be signed by purchaser or customer as a specification of products production and delivery from URT. Without signature of this specification , any purchase order for this model no. will be treated and considered that this specification is automatically acknowledged and accepted by purchaser or customer.

U.R.T. **UNITED RADIANT TECHNOLOGY CORPORATION**

Joe Wu	Ashin Chiu	Jenny Wang	Feb-13-2023
APPROVED	CHECKED	PREPARED	Date

COMPANY : No. 2,Fu-hsing Road,Taichung Tanzi Technology Industrial Park,Tantzu,Taichung,Taiwan,R.O.C.
TEL: 886-4-25314277   FAX: 886-4-25313067

This document has been signed by Digital Signature Approval System

Revision record

Document Revision	Model No. Version No.	Description	Revision by
0	UMSH-8247MD-T (UFNH-K080EY-1FT) Version No. 0		Albert Lin Nick Liu
1	UMSH-8247MD-1T (UFNH-K080EY-1FT) Version No. 0	1. Remove the MPU board. 2. Modify the module number from UMSH-8247MD-T to UMSH-8247MD-1T.	Albert Lin Nick Liu 03-Mar-2009
2	UMSH-8247MD-1T (UFNH-K080EY-1FT) Version No. 1	Modify the ADJ pin from low level to high level.	Albert Lin Nick Liu 03-Apr-2009
3	UMSH-8247MD-1T (UFNH-K080EY-1FT) Version No. 2	Modify the AC Characteristics (page 9, 10, 11 and 12).	Albert Lin Nick Liu 19-Nov-2012
4	UMSH-8247MD-1T(REV2) (UFNH-K080EY-6FT) Version No.0	1. Modify PCB. 2. Modify module number from UMSH-8247MD-1T to UMSH-8247MD-1T(REV2).	H.F. Kuo Danny Jhuaung 27-Apr-2015
5	UMSH-8247MD-1T(REV2) Version No.1	Add description of B/L adjustment.	Ai Ching Cheng George Pan 15-Jun-2022
6	UMSH-8247MD-1T(REV2G) Version No.0	1.Change TFT LCD. 2. Modify module number from UMSH-8247MD-1T(REV2) to UMSH-8247MD-1T(REV2G).	Ai Ching Cheng George Pan 13-Feb-2023

CONTENTS:

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)	127.0 x 98.43 x 8.96	mm.
Active Area (W x H)	115.2 x 86.4	mm.
Pixel Size (WxH)	0.18 x 0.18	mm.
Color depth	262K	color
Interface	Parallel 18-bit RGB	-
Driving IC Package	COG	-
Driving IC	HX8250-A (Source Driver) *2 + HX8678-A (Gate Driver) *1	-
Module weight	106±10%	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	-
Viewing Direction (Gray scale inversion)	6 O'clock Direction	-

Color tone is slightly changed by temperature and driving voltage.

1.3 Outline dimension

46.87±1.0

67.47±1.0

8.96 MAX (including component height)

5.9

UMSH-8247MD-1T(REV2G)
U.R.T. NO.XXXXXX-XXXX

LABEL

1(U/D)

40(L/R)

CN1

PIXEL SIZE

0.18

0.06

0.18

R G B R
R G B R

4-R3.0

127.0

116.6 (Bezel Window)

115.2 (A.A)

64.525±0.5

S1

S1920
G480

G1

VIEWING DIRECTION
640xRGBx480 DOTS

A.A Center

6.22

6.92±0.5

9.03±0.5

8.33

52.23±0.5

86.4 (A.A)

87.8 (Bezel Window)

98.43
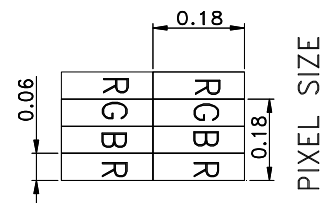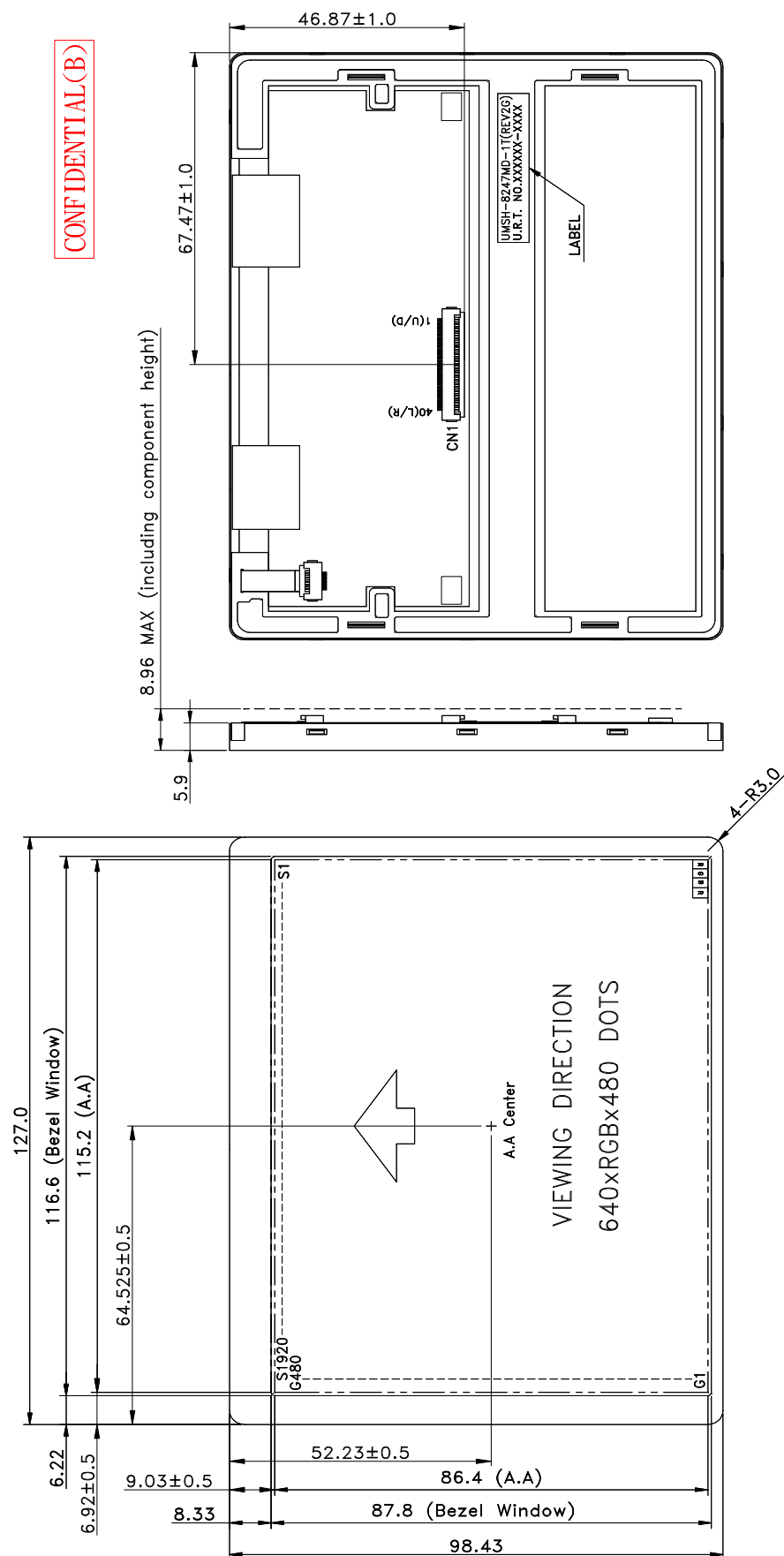
NOTE :
1. LCD : TFT TRANSMISSIVE TYPE , NORMAL WHITE
2. VIEWING DIRECTION : 6 O'CLOCK
3. Top : -20~70°C , Tst : -30~80°C
4. LED BACKLIGHT COLOR : WHITE
5. CONSTANT VOLTAGE FOR LED DRIVER : VLED=5.0 V, ILED=380.0mA(TYP.)
6. TOLERANCE FOR NOT ASSIGNED : ±0.3mm
7. RoHS-COMPLIANT
8. CN1 : 6705-E40N-00R(E&T)

1.4 Block diagram:
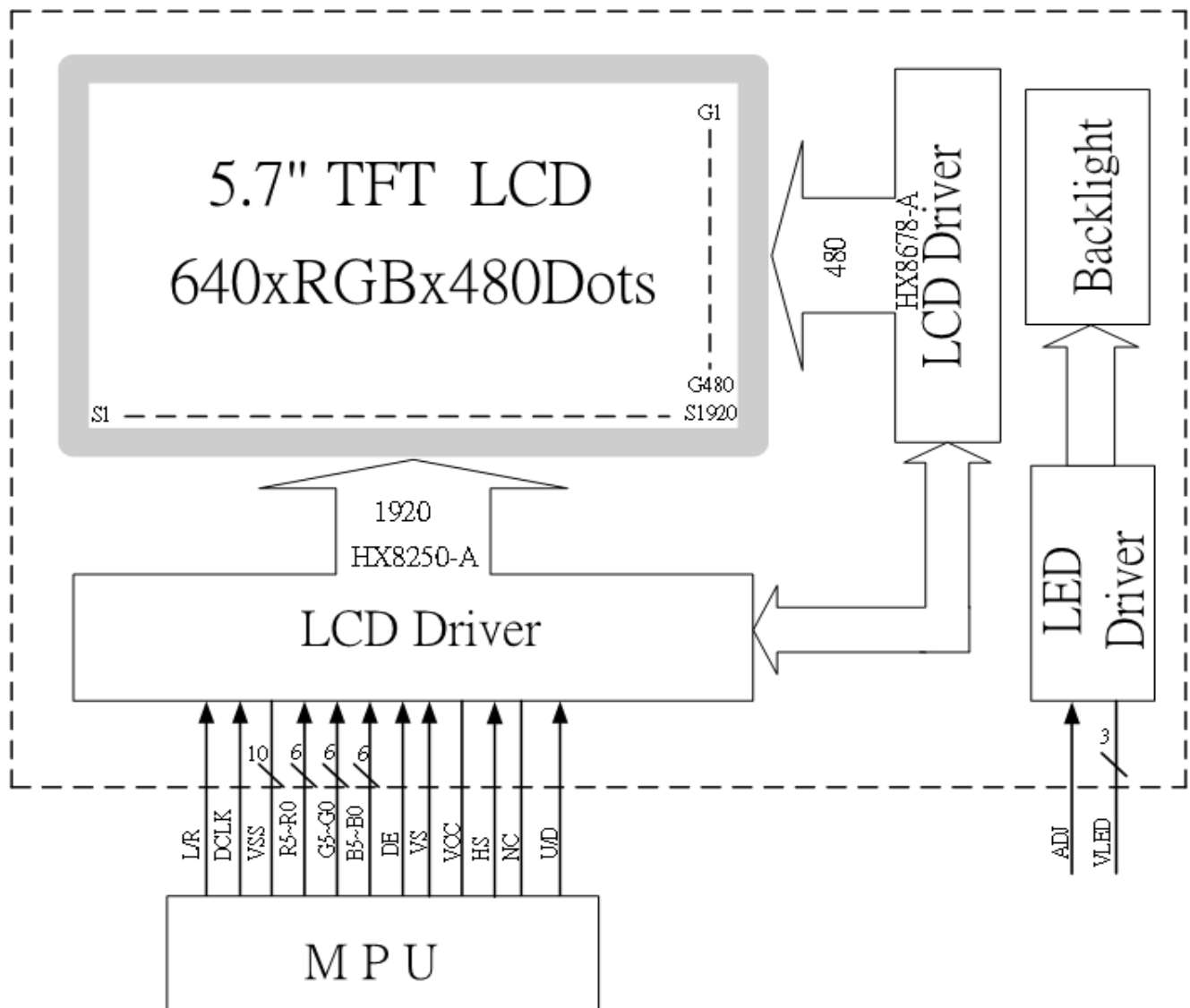
1.5 Interface Pin Connection:

Pin No.	Pin Symbol	I/O	Description
1	U/D	I	Up or Down Display Control.
2	NC	-	Customer non-connect.
3	HS	I	Hsync Horizontal SYNC.
4~6	VLED	P	Power supply for digital circuit LED.(+5.0V)
7	VCC	P	Power supply for digital circuit LCD. (+3.3V)
8	VS	I	Vsync Vertical SYNC.
9	DE	I	Data enable.
10~11	VSS	P	Power ground.
12	ADJ	I	Adjust for LED brightness (PWM), HIGH active. (+5.0V)
13	B5	I	Blue data input. (MSB)
14、15	B4、B3	I	Blue data input.
16	VSS	P	Power ground.
17、18	B2、B1	I	Blue data input.
19	B0	I	Blue data input. (LSB)
20	VSS	P	Power ground.
21	G5	I	Green data input. (MSB)
22、23	G4、G3	I	Green data input.
24	VSS	P	Power ground.
25、26	G2、G1	I	Green data input.
27	G0	I	Green data input. (LSB)
28	VSS	P	Power ground.

Pin No.	Pin Symbol	I/O	Description
29	R5	I	Red data input. (MSB)
30、31	R4、R3	I	Red data input.
32	VSS	P	Power ground.
33、34	R2、R1	I	Red data input.
35	R0	I	Red data input. (LSB)
36~37	VSS	P	Power ground.
38	DCLK	I	Clock signals.
39	VSS	P	Power ground.
40	L/R	I	Left or Right Display Control.

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	TOP	-20	70	℃
Storage temperature range	TST	-30	80	℃

2.2 DC Characteristics

$T_a = 25℃$

Items	Symbol	Min.	Typ.	Max.	Unit	Condition
Supply voltage	V_{CC}	-	3.3	-	V	-
Input Voltage	V_{IL}	0	-	$0.3V_{CC}$	V	L level
	V_{IH}	$0.7V_{CC}$	-	V_{CC}	V	H level
Current consumption	I_{CC}	-	100	150	mA	Note 1

*Note1 :

Measuring Condition:

Standard Value MAX.

Ta = 25℃

VCC -GND = 3.3V

Display Pattern = Check pattern

0 gray black pattern

2.2.1 Back-light Characteristics

PARAMETER	SYMBOL	MIN	TYP	MAX	Unit	Test Condition	NOTE
Supply Current for LED Driver	I_{LED}	-	380	760	mA	Ta=25°C	-
Supply Voltage for LED Driver	V_{LED}	-	5	-	V	Ta=25°C	-
LED Forward Voltage	V_F	-	9.9	-	V	-	-
LED Forward Current	I_F	-	140	-	mA	-	-
Input Voltage	V_{IL}	0	-	0.4	V	L level	-
	V_{IH}	1.4	-	5	V	H level	-
Half-Life Time	Lf	-	50000	-	hrs	Ta=25°C 60 RH%	1

Note 1 : The " Half-Life Time "is defined as the module brightness decrease to 50% original brightness.

Wide PWM Dimming Range : 100Hz to 200KHz
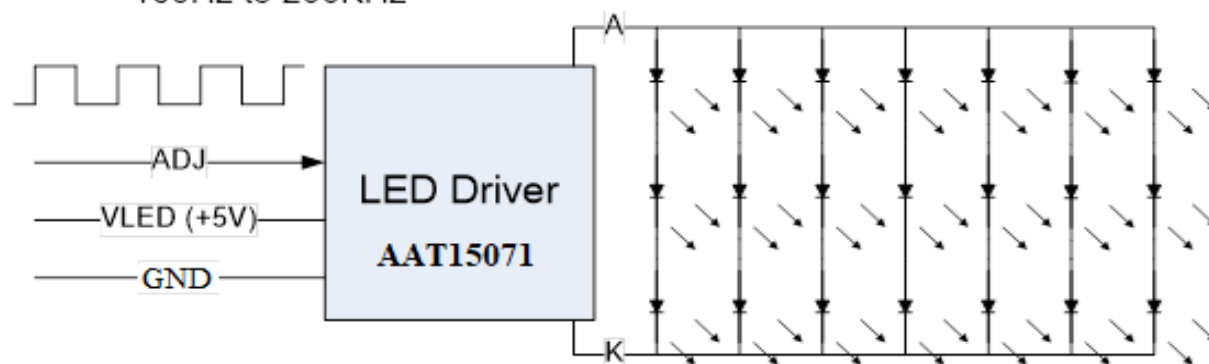
For interface pin12 (ADJ)

ADJ signal=0~5V, operating frequency=100Hz~200K Hz (Duty=5%~100%)

B/L adjustment:

The backlight can be on from 1.4V through 5.0V range, can be off under 0.4V, in between 0.4 to 1.4V there is no function. As long as the input voltage is over 1.4V, the LED driver will sense it as "high".

Then customer can adjust the frequency to adjust the brightness.

The frequency from 100 to 200K HZ is for dimming speed and power consumption.

The frequency can be adjusted to allocate the ratio of the time of being on and being off for having the brightness adjusted.

2.3 AC Characteristics ：

2.3.1 AC Electrical Characteristics：

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	µs
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

2.3.2 Digital Parallel RGB interface (1920x480 resolution)：

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
CLK frequency	F_{CPH}	-	25.175	-	MHz
CLK period	T_{CPH}	-	39.7	-	ns
CLK pulse duty	T_{CWH}	40	50	60	%
HS period	T_H	-	800	-	T_{CPH}
HS pulse width	T_{WH}	5	30	-	T_{CPH}
HS-first horizontal data time	T_{HS}	112	144	175	T_{CPH}
DEN pulse width	T_{EP}	-	640	-	T_{CPH}
VS pulse width	T_{WV}	1	3	5	T_H
VS-DEN time	T_{STV}	-	35	-	T_H
VS period	T_V	-	525	-	T_H

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

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

2.3.3 Hardware reset timing ：

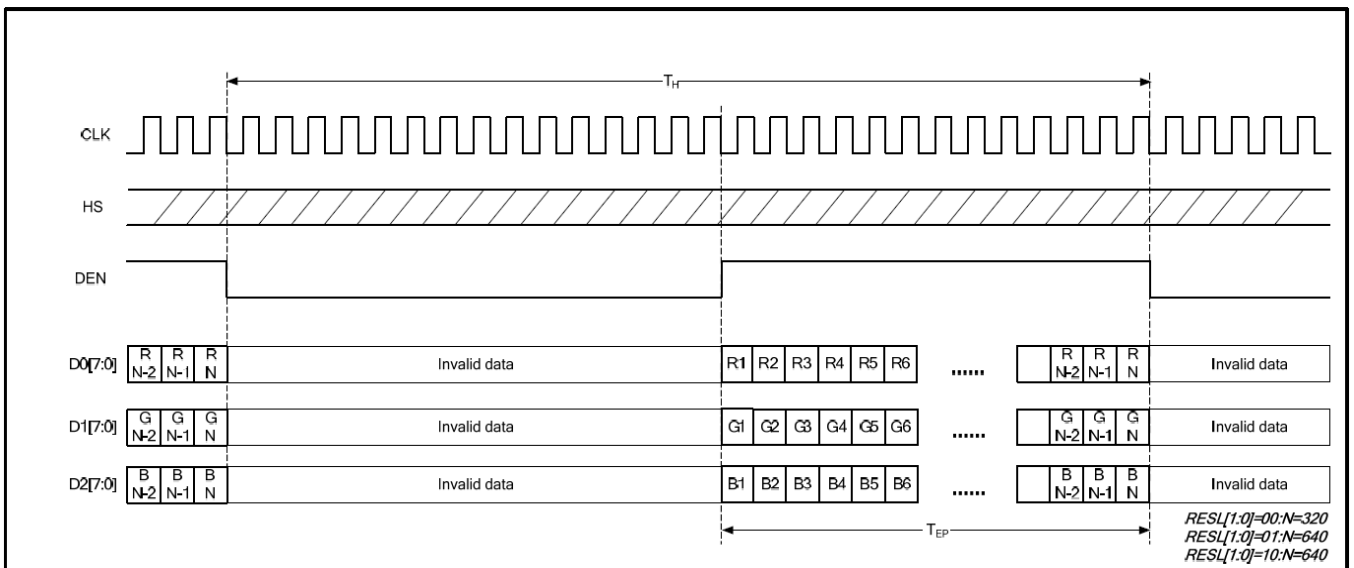| PARAMETER	Symbol	Spec. Min.	Spec. Typ.	Spec. Max.	Unit
RESETB low pulse width	T_{rstw}	10	-	-	µs
Negative noise pulse width	T_{nr}		-	2	µs
Reset start time	T_{st}	2	-		µs
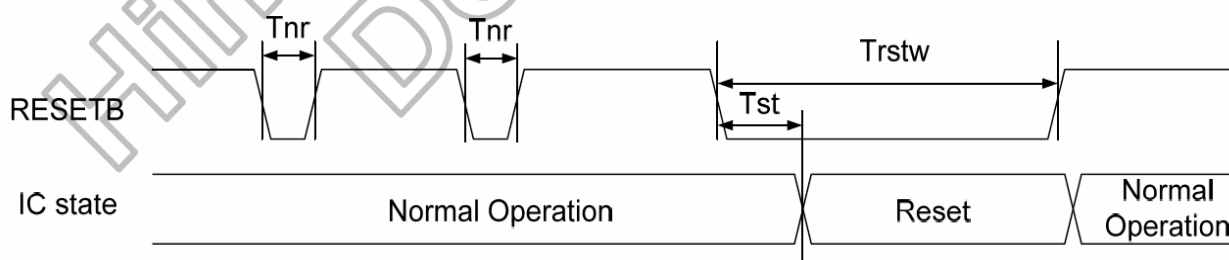
2.3.4 Interface Timing Chart:
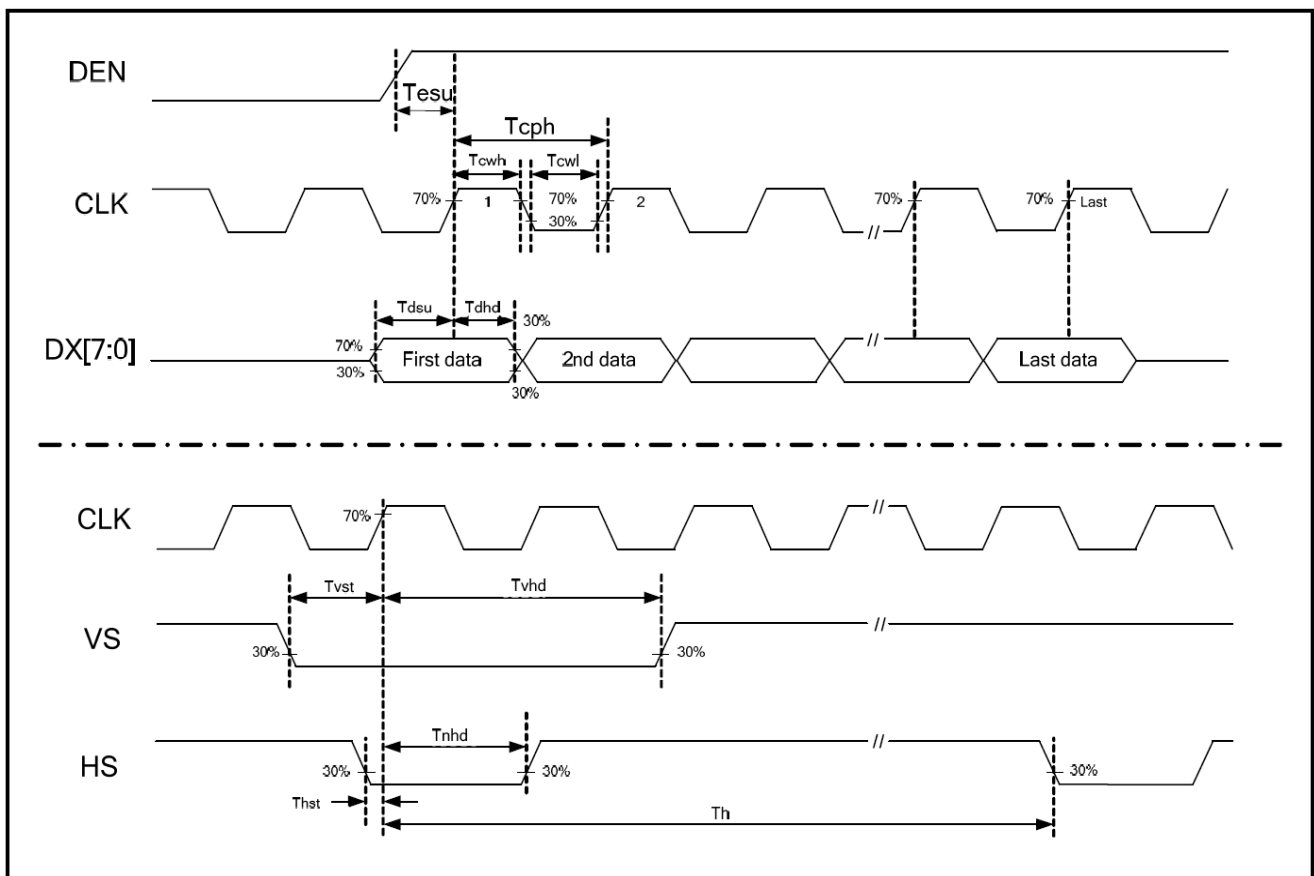
2.3.5 Data input format for RGB Mode:

Parallel RGB SYNC Mode Horizontal Data Format：
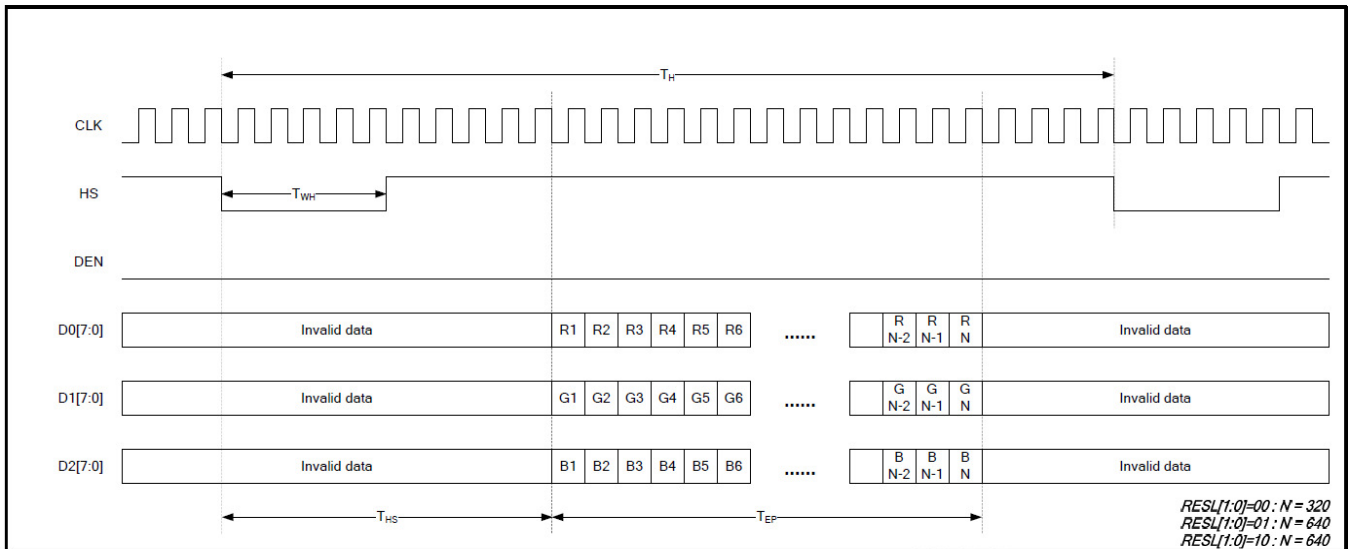
Parallel RGB DE Mode Horizontal Data Format：

3. OPTICAL CHARACTERISTICS

3.1 Characteristics

Electrical and Optical Characteristics

No.	Item			symbol / temp.		Min.	Typ.	Max.	Unit	Note
1	Response Time			Tr	25 ℃	-	10	20	ms	2
				Tf	25 ℃	-	15	30		
2	Viewing Angle	Hor.	Cr.≧10	θ_{2+}	Φ = 0°	-	70	-	degree	3
				θ_{2-}	Φ = 180°	-	70	-		
		Ver.		θ_{1+}	Φ = 270°	-	60	-		
				θ_{1-}	Φ = 90°	-	50	-		
3	Contrast Ratio			Cr	25 ℃	400	600	-	-	4
4	Red x-code			Rx	25 ℃	0.560	0.610	0.660	-	5
	Red y-code			Ry		0.312	0.362	0.412		
	Green x-code			Gx		0.310	0.360	0.410		
	Green y-code			Gy		0.522	0.572	0.622		
	Blue x-code			Bx		0.100	0.150	0.200		
	Blue y-code			By		0.065	0.115	0.165		
	White x-code			Wx		0.255	0.305	0.355		
	White y-code			Wy		0.290	0.340	0.390		
	Brightness			Y		400	600	-	cd/m^2	
5	Brightness Uniformity				25 ℃	75	80	-	%	6

3.2 Definition of optical characteristics

Measurement condition :

Transmissive and Transflective type

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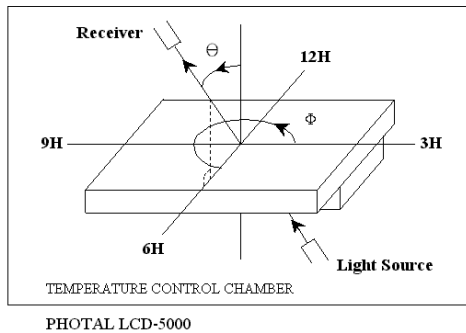
[Note 1] Definition of LCD Driving Vop and Waveform :
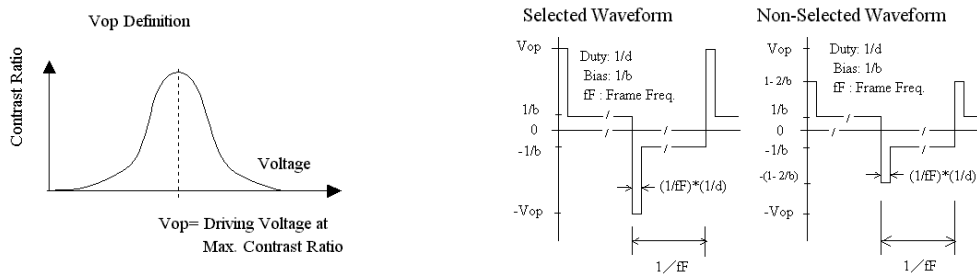
[Note 2] Definition of Response Time
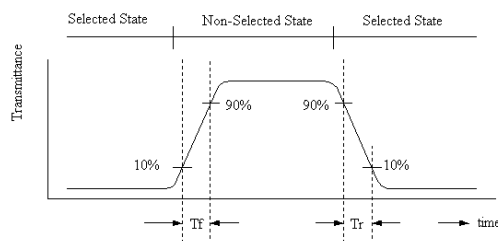
[Note 3] Definition of Viewing Angle :   [Note 4] Definition of Contrast Ratio :
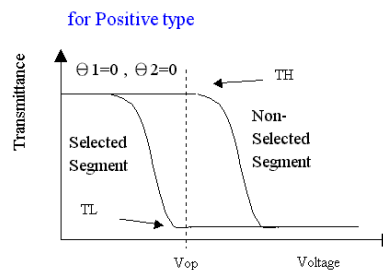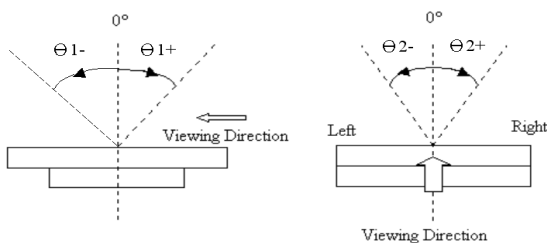
$$\text{Contrast Ratio} = \frac{TH}{TL}$$

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

BM-7

500mm

LCD Module
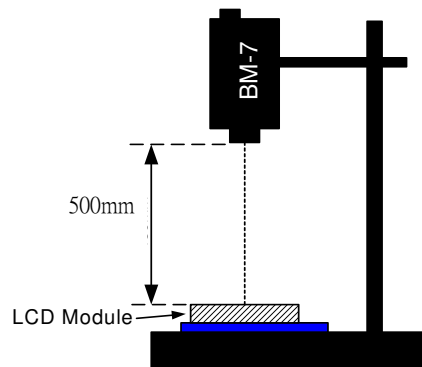
[Note 6] Definition of Brightness Uniformity

W / 4

Active Area Height : H

H / 4

1	2	3
4	5	6
7	8	9

Active Area Width : W
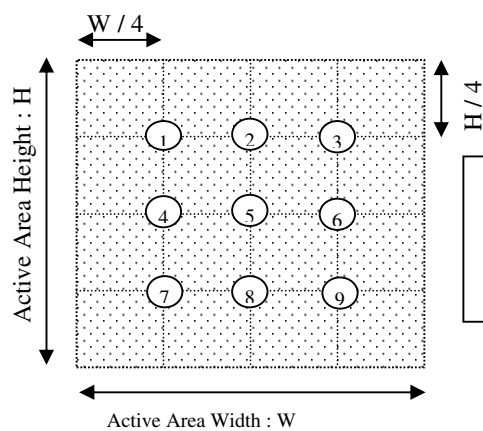
$$\text{Brightness Uniformity} = \frac{\text{Minimum Brightness of Point 1~9}}{\text{Maximum Brightness of Point 1~9}}$$

[Note 7] Definition of Measurement of Reflectance

BM-7

White Light Source
(Ring)

500mm

15 deg.

LCD Module
or referance
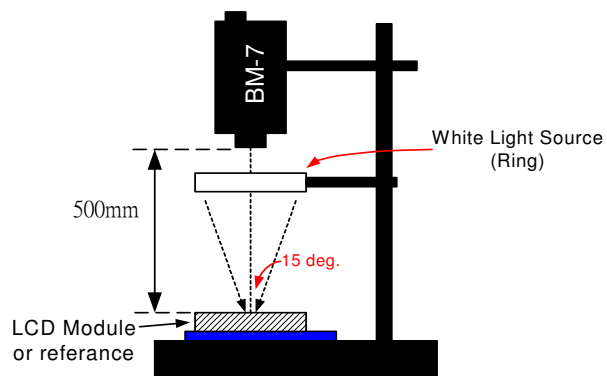
4. RELIABILITY :

Item No	Items	Condition	Note
1	High temperature operating	70 ℃ ，200 hours	1
2	Low temperature operating	-20 ℃ ，200 hours	1
3	High temperature storage	80 ℃ ，200 hours	1
4	Low temperature storage	-30 ℃ ，200 hours	1
5	High temperature & humidity storage	60℃，90%RH，100 hours	2
6	Thermal Shock storage	-30℃, 30min.<=> 80℃, 30min. 10 Cycles	1
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	

Note 1：The product move into the room temperature for at least 2 hours with no condensation.

Note 2：The product move into the room temperature for at least 24 hours with no condensation.

　　* 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

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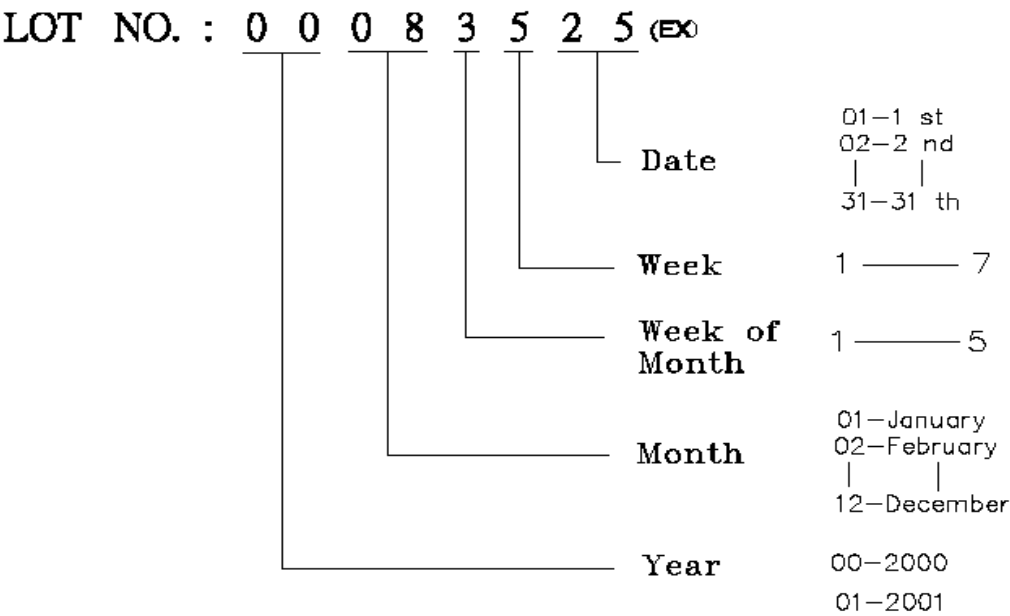
● <u>YY</u> <u>MM</u> <u>DD</u> - <u>XXXX</u>

Year Month Day - Serial No.

● Example: 121108 - 0 0 0 3 ==> Year 2012, November,8th , Serial No.0003
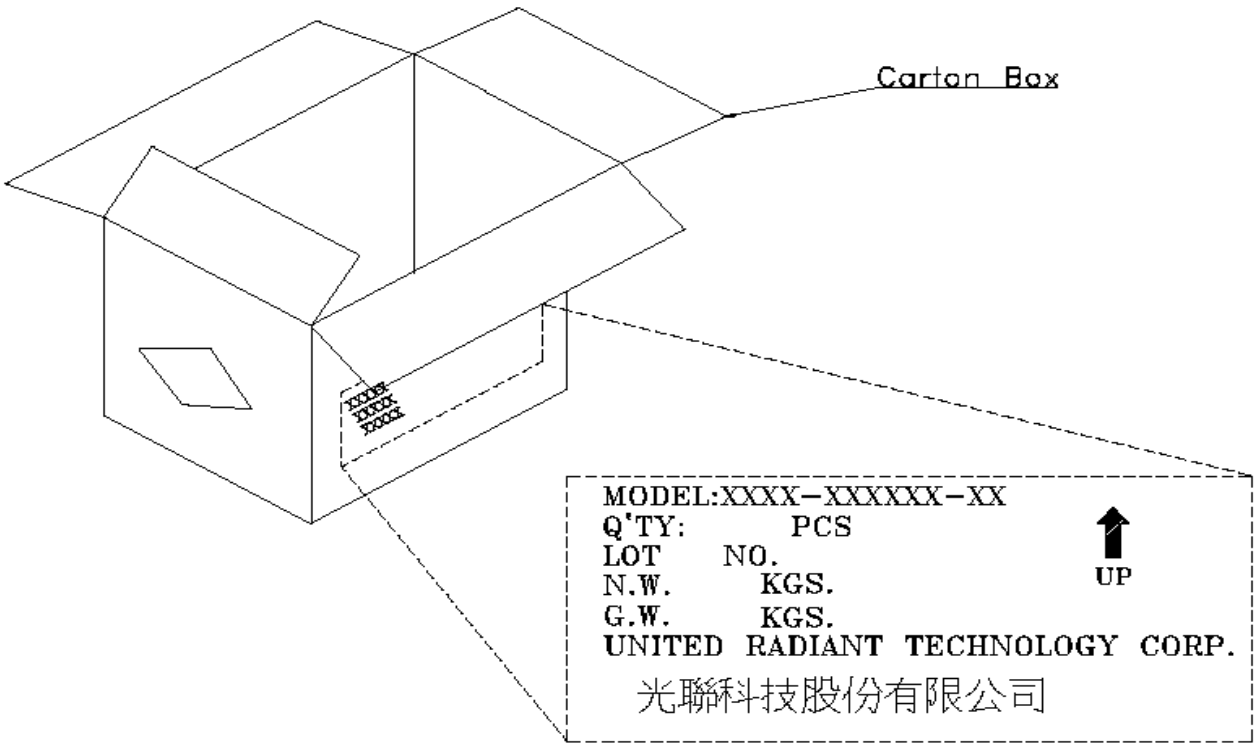
Note ： The lot no. attached on the packing box will be used for tracking once
the part is too small to print the date code.

7. LOT NO

Instruction of lot number:

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

- Date
  - 01—1 st
  - 02—2 nd
  - |
  - 31—31 th
- Week 1 —— 7
- 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.
UNITED  RADIANT  TECHNOLOGY  CORP.
光聯科技股份有限公司
```

UP

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 ℃ TO 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 (SAME AS MIL-STD-105E) , LEVEL Ⅱ SINGLE PLAN.

CLASS	AQL(%)
CRITICAL	0.4 %
MAJOR	1.0 %
MINOR	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. VIEWING DISTANCE IS APPROXIMATELY：30 ± 5 CM.

8.2.2. VIEWING ANGLE IS NORMAL TO THE LCD PANEL WITH 45°.

8.2.3. AMBIENT ILLUMINANCE：2 PCS OF 20W FLUORESCENT LAMPS(DISTANCE TO THE SAMPLE >100CM)
OR 1000±200 LUX.
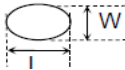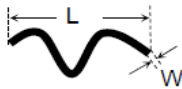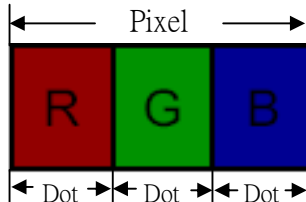
8.2.4. DEFINITION OF INSPECTION A.A.(ACTIVE AREA)
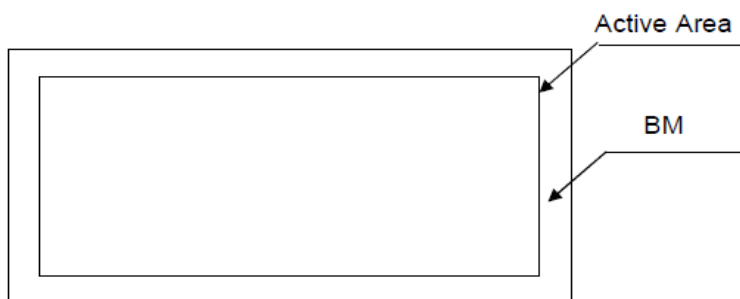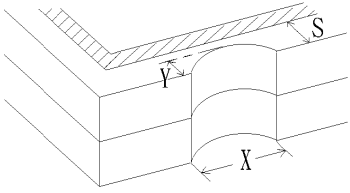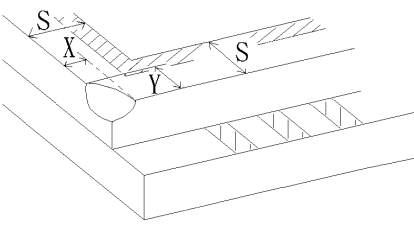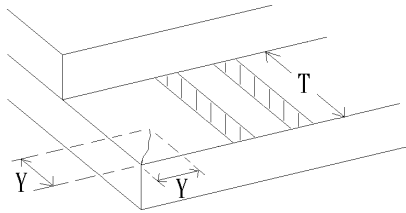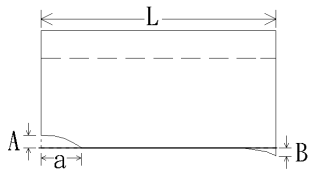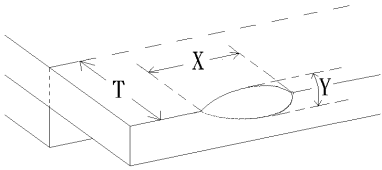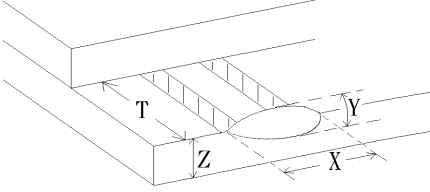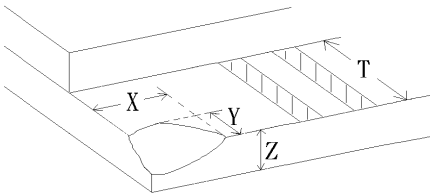
8.3. INSPECTION PLAN :

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	NO DISPLAY、WRONG PATTERN DISPLAY、CURRENT CONSUMPTION OUT OF SPECIFICATION...... REJECTED	Critical
	13. DOT DEFECT (FOR COLOR AND TFT)	ACCORDING TO STANDARD OF VISUAL INSPECTION	Minor

8.4. STANDARD OF VISUAL INSPECTION

NO.	CLASS	ITEM	JUDGEMENT
8.4.1	MINOR	BLACK AND WHITE SPOT FOREIGN MATERIEL DUST IN THE CELL BLEMISH SCRATCH ROUND TYPE: Disregard if out of A.A. LINER TYPE: Disregard if out of A.A.	(A) ROUND TYPE: unit : mm. See tables below (B) LINER TYPE: unit : mm.
8.4.2	MINOR	FIBER 1.L: Length, W: Width 2. Disregard if out of A.A.	unit : mm. See table below
8.4.3	MINOR	BUBBLE IN POLARIZER	unit : mm. See table below
8.4.4	MINOR	Dot Defect	See tables and notes below
8.4.5	MINOR	MURA	By 2% ND filter invisible

8.4.1 (A) ROUND TYPE: unit : mm.

DIAMETER (mm.)	ACCEPTABLE Q'TY
$\Phi \leqq 0.15$	DISREGARD
$0.15 < \Phi \leqq 0.50$	3
$0.50 < \Phi$	0

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

8.4.1 (B) LINER TYPE: unit : mm.

LENGTH	WIDTH	ACCEPTABLE Q'TY
------	$W \leqq 0.03$	DISREGARD
$L \leqq 10$	$0.03 < W \leqq 0.07$	4
$L > 10$	$0.07 < W$	0

8.4.2 FIBER: unit : mm.

LENGTH	WIDTH	ACCEPTABLE Q'TY
$L \leqq 1.5$	$W \leqq 1.0$	4
$L > 1.5$	$W > 1.0$	0

8.4.3 BUBBLE IN POLARIZER: unit : mm.

DIAMETER	ACCEPTABLE Q'TY
$\Phi \leqq 0.2$	DISREGARD
$0.2 < \Phi \leqq 0.5$	3
$0.5 < \Phi$	0

8.4.4 Dot Defect:

Items	ACC. Q'TY
Bright dot	$N \leqq 4$
Dark dot	$N \leqq 4$

Pixel Define

Not 1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.

Not 2: Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.

Not 3: Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green ,blue pattern.

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