APPROVAL

PART NO.	DESCRITION	REMARKS
HT5703L	**LCD MODULE** (320 × RGB × 240)	* **This is ROHS compliant**

CUSTOMER APPLICATION P/N	
APPROVED BY	
DATE	

PLEASE KINDLY FIND AND APPROVE THE SPECIFICATIONS INSERTED
HEREIN AND RETURN ONE COPY HERE OF WITH YOUR SIGNATURE OF APPROVAL.

PERPARED BY	CHECKED BY	CONFIRMED BY

HYES Optoelectronics, Inc.
2000 Wyatt Drive Suite 6
Santa Clara, CA 95054 USA

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1. BASIC SPECIFICATION

1.1 Mechanical specifications

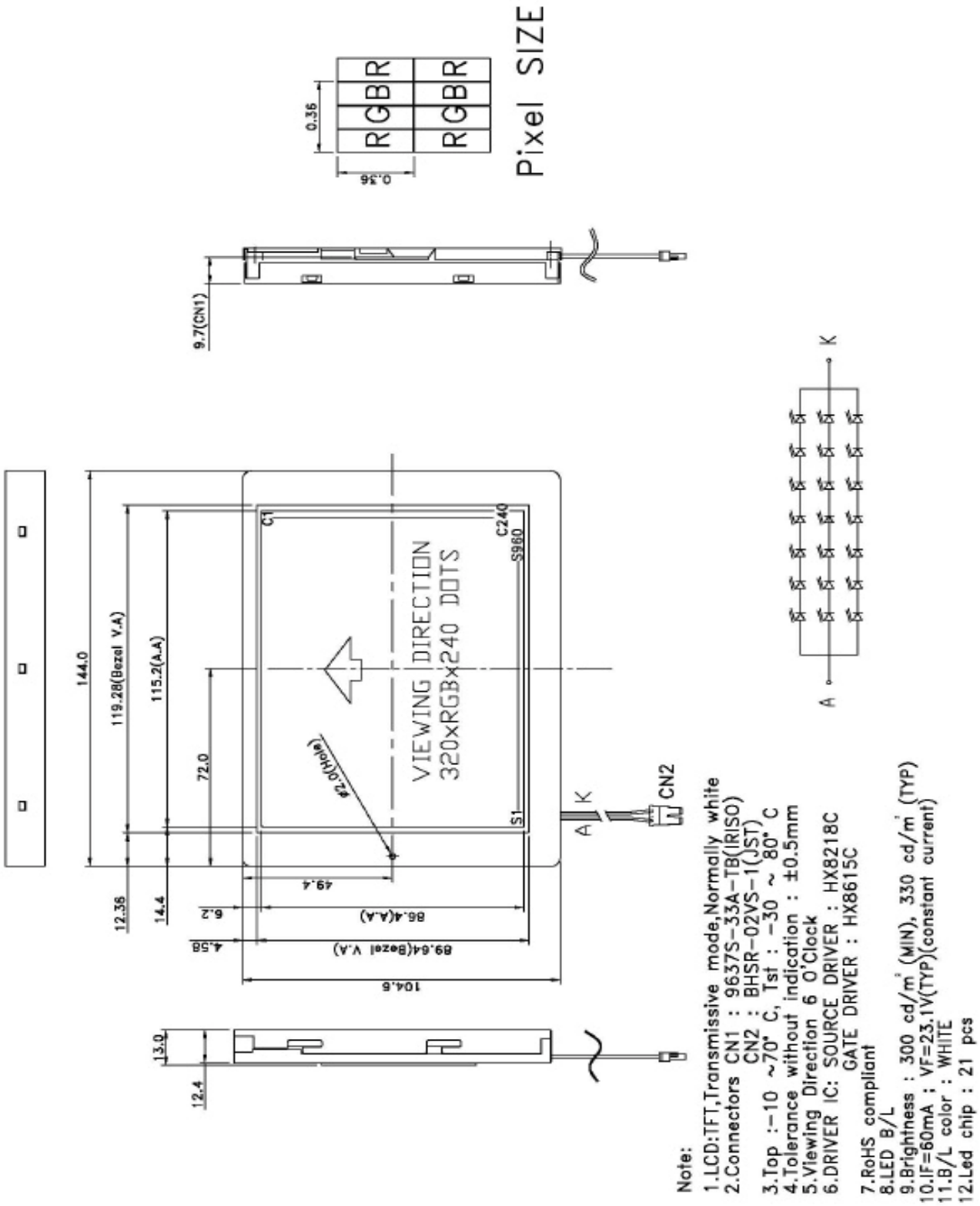
Items	Nominal Dimension	Unit
Active screen size	5.7" diagonal	-
Dot Matrix	320*RGB*240	dots
Module Size (W x H x T)	144.0 x 104.6 x 13.0	mm
Active Area (W x H)	115.2 x 86.4	mm
Dot Size (W x H)	0.36 x 0.36	mm
Color depth	262K	color
Interface	Parallel 18-bit RGB	-
Driving IC Package	COG	-

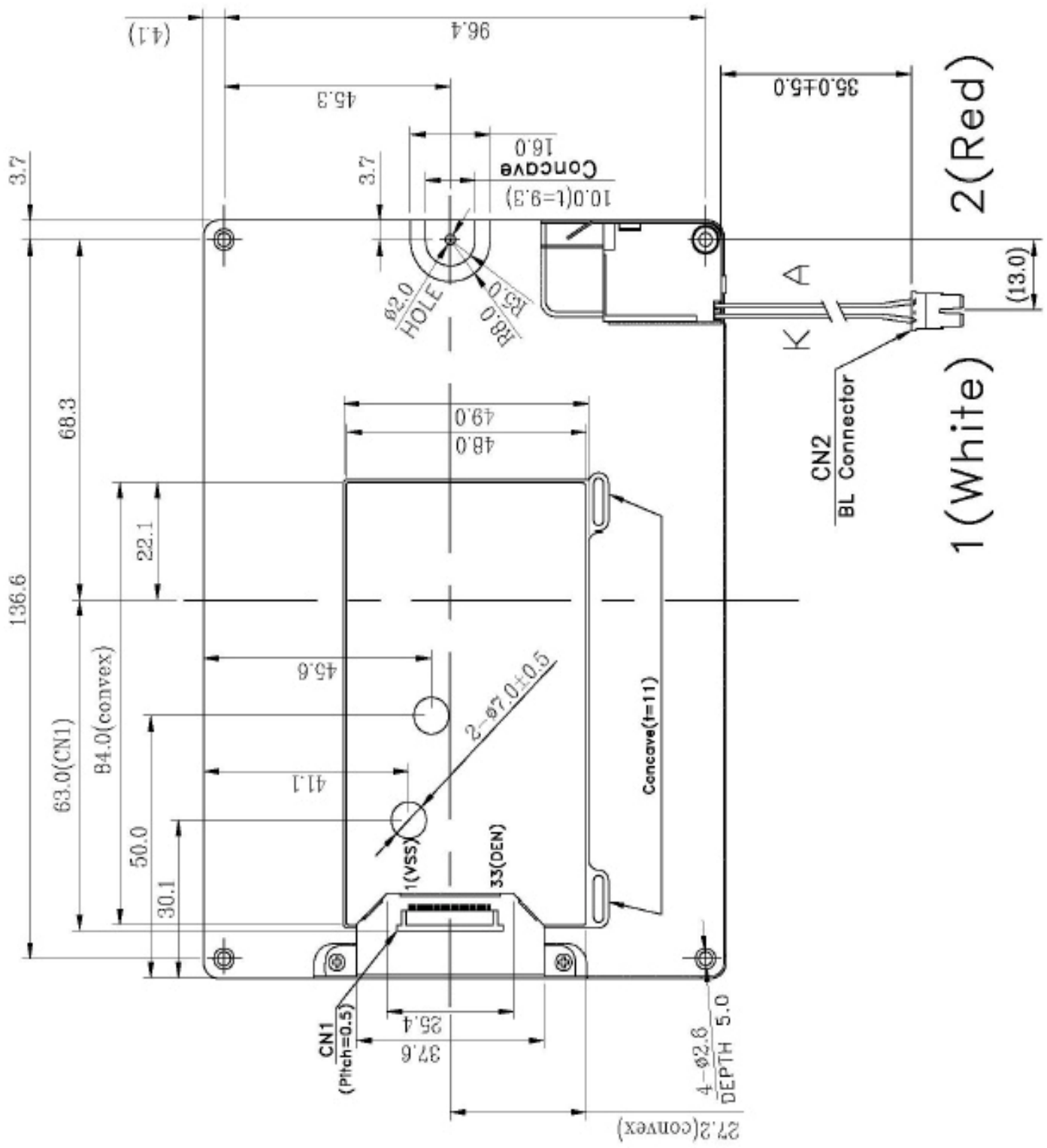
1.2 Display specification

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	6 O'clock Direction	-

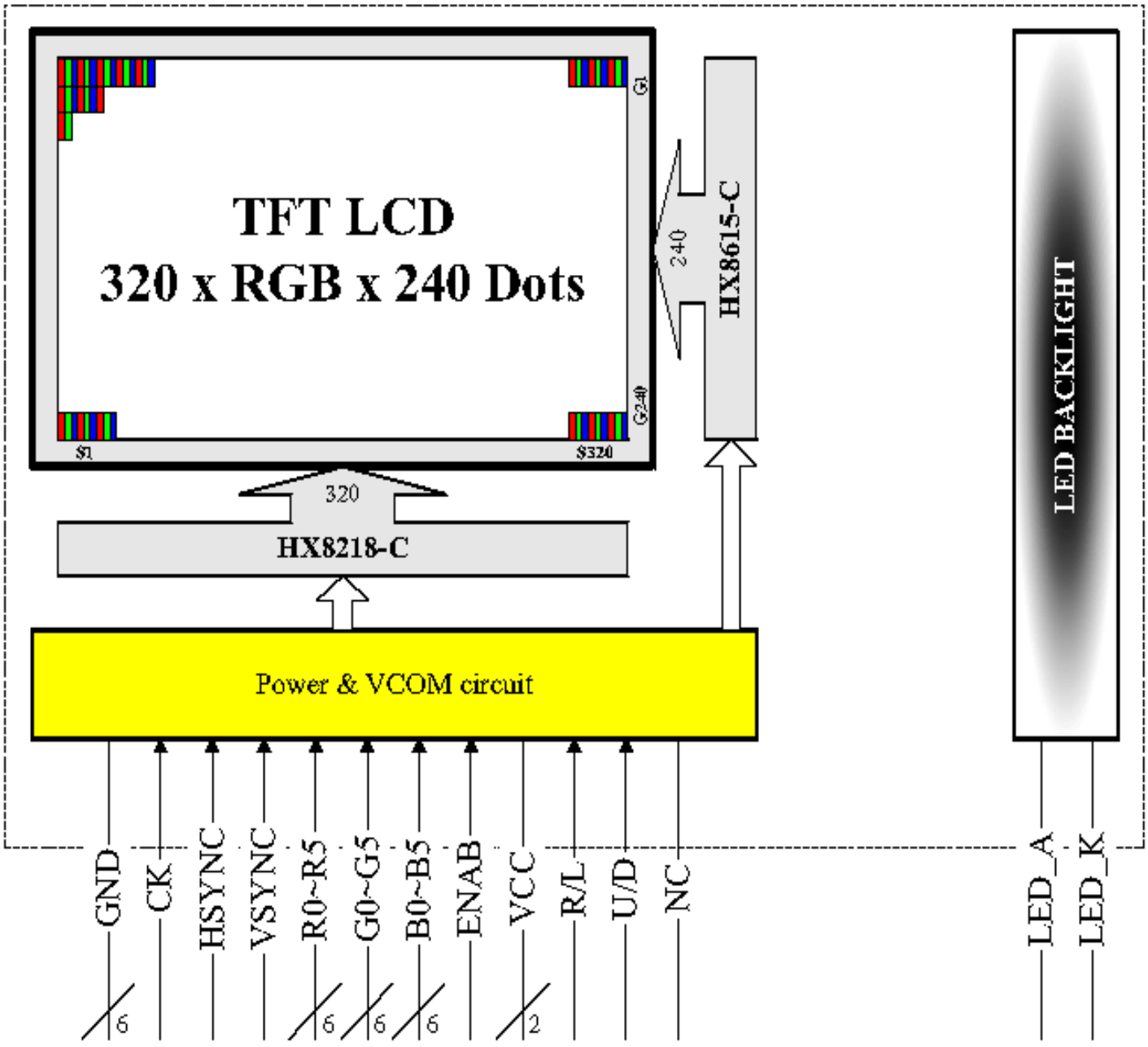
* Color tone is slightly changed by temperature and driving voltage.

1.3 Outline dimension




96.4
45.3
35.0±5.0
2(Red)
1(White)
A
K
(13.0)
CN2
BL Connector
Concave
16.0
10.0(t=9.3)
3.7
3.7
ø2.0
HOLE
R5.0
R8.0
68.3
49.0
48.0
22.1
136.6
63.0(CN1)
84.0(convex)
50.0
30.1
45.6
41.1
2-ø7.0±0.5
Concave(t=11)
1(VSS)
33(DEN)
CN1
(Pitch=0.5)
25.4
37.6
4-ø2.6
DEPTH 5.0
27.2(convex)

1.4 Block diagram:



1.5 Interface pin :

Pin No.	Pin Symbol	I/O	Description
1	GND	P	Ground. (0V).
2	CK	I	Clock signal for sampling each data signal..
3	Hsync	I	Horizontal synchronous signal.
4	Vsync	I	Vertical synchronous signal.
5	GND	P	Ground. (0V).
6-11	R0-R5	I	RED data signal..
12	GND	P	Ground. (0V).
13-18	G0-G5	I	GREEN data signal..
19	GND	P	Ground. (0V).
20-25	B0-B5	I	BLUE data signal..
26	GND	P	Ground. (0V).
27	ENAB	I	Signal to settle the horizontal display position .
28,29	VCC	P	+3.3V power supply..
30	R/L	I	Horizontal display mode select signal
31	U/D	I	Vertical display mode select signal.
*32	NC	-	No connect..
33	GND	P	Ground. (0V).

*This pin doesn't support the V/Q mode as the NO.32 pin of sharp spec.

1	LED_A	P	Power supply input pin for backlight.
2	LED_K	P	Ground pin for backlight.

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}	3.0	3.3	3.6	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}	-	-	80	mA	Note 1

*Note1 :

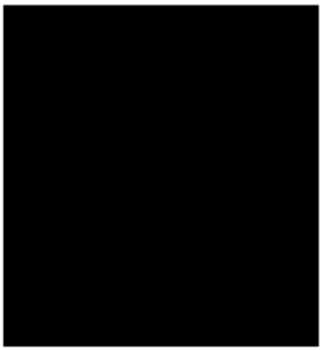
Measuring Condition:

Standard Value MAX.

Ta = 25℃

VCC -GND = 3.3V

Display Pattern = Check pattern



0 gray black pattern

2.3 Back-light Specification

PARAMETER	SYMBOL	MIN	TYP	MAX	Unit	Test Condition	NOTE
Supply Current	If	-	-	60	mA	Ta=25℃	-
Supply Voltage	Vf	-	23 1	-	V	Ta=25℃	-
Brightness	Br	4000	4300	-	cd/m^2	Ta=25℃ If=60mA	-
Half-Life Time	Lf	-	50000	-	hrs	Ta=25℃	1

Note 1：The " Half-Life Time "is defined as the module brightness decrease to 50% original brightness Base on Ta 25±2℃ , 60±10% RH condition.

2.4 AC Characteristics

Digital Parallel RGB interface

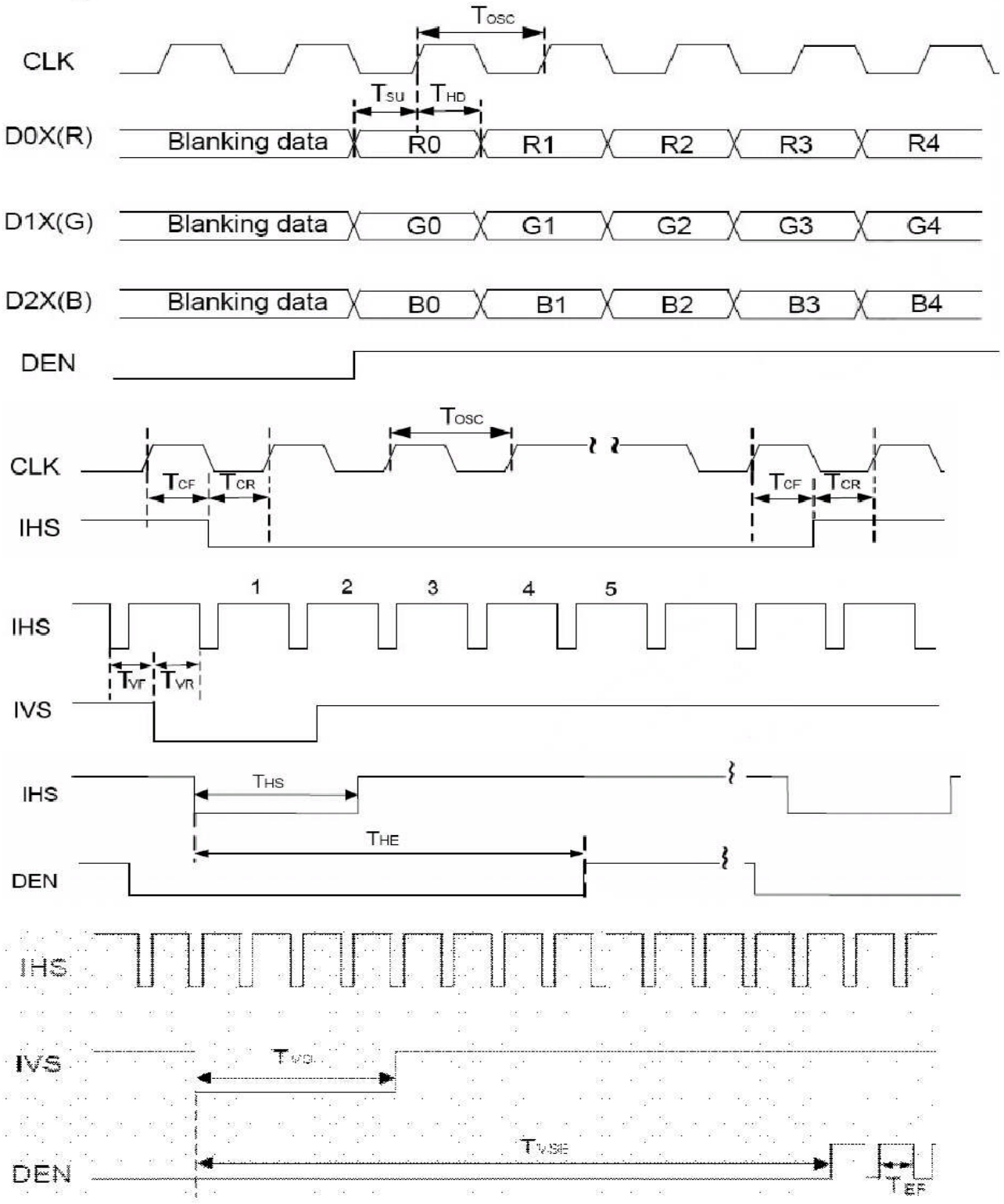
PARAMETER		Symbol	Spec.			Unit
			Min.	Typ.	Max.	
CLK period		T_{OSC}	-	156	-	ns
Data setup time		T_{SU}	12	-	-	ns
Data hold time		T_{HD}	12	-	-	ns
IHS period		T_H	-	408	-	T_{OSC}
IHS pulse width		T_{HS}	5	30	-	T_{OSC}
IHS setup time		T_{Cr}	12	-	-	ns
IHS hold time		T_{Cf}	12	-	-	ns
IVS pulse width		T_{VS}	1	3	5	T_H
IVS setup time		T_{Vr}	12	-	-	ns
IVS hold time		T_{Vf}	12	-	-	ns
IVS-DEN time	NTSC	T_{VSE}	-	18	-	T_H
	PAL	T_{VSE}	-	26	-	T_H
IHS-DEN time		T_{HE}	36	68	88	T_{OSC}
DEN pulse width		T_{EP}	-	320	-	T_{OSC}
IVS period	NTSC	-	-	262.5	-	T_H
	PAL	-	-	312.5	-	T_H

Note: When SYNC mode is used, 1st data start from 68th CLK after IHS falling.

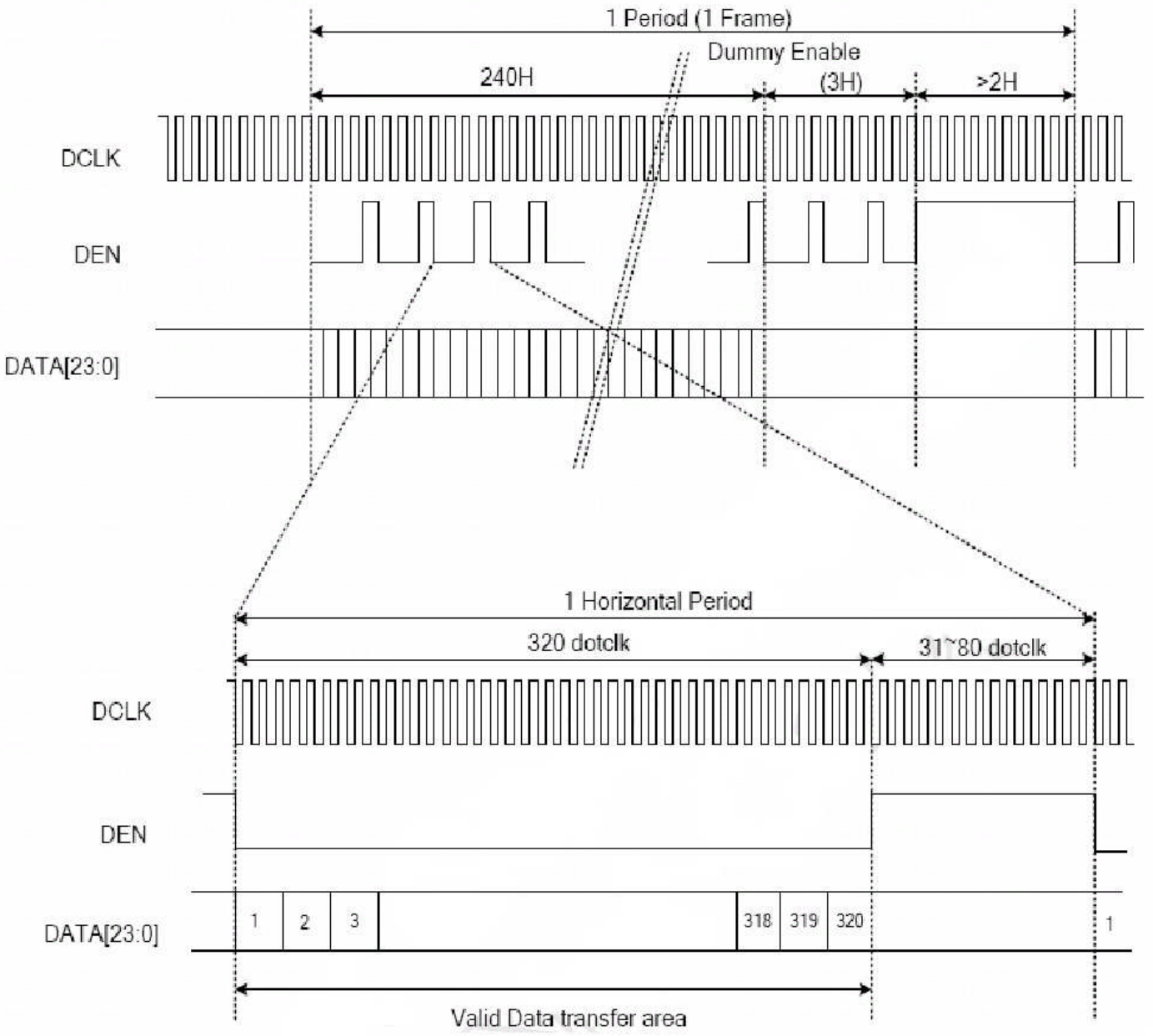
Note：CLK = CK、IHS = Hsync、IVS = Vsync、DEN = ENAB

2-5 Interface Timing Chart

- Digital Parallel RGB



DE Only Mode


1 Period (1 Frame)
Dummy Enable
240H
(3H)
>2H
DCLK
DEN
DATA[23:0]
1 Horizontal Period
320 dotclk
31~80 dotclk
DCLK
DEN
DATA[23:0]
1
2
3
318
319
320
1
Valid Data transfer area

3. OPTICAL CHARACTERISTICS

3.1 Characteristics

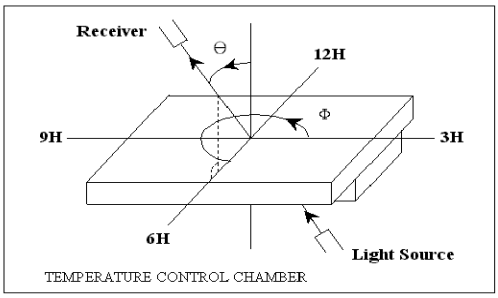
Electrical and Optical Characteristics

No.	Item		symbol / temp.		Min.	Typ.	Max.	Unit	Note
1	Response Time		Tr	25 ℃	-	15	30	ms	2
			Tf	25 ℃	-	35	50		
2	Viewing Angle	Front-Rear	Θ1	Φ = 270°	-15	-	35	degree	3
		Left-Right	Θ2		-45	-	45		
3	Contrast Ratio		Cr	25 ℃	150	250	-	-	4
4	Red x-code		Rx	25 ℃	0.59	0.64	0.69	-	5
	Red y-code		Ry		0.30	0.35	0.40		
	Green x-code		Gx		0.27	0.32	0.37		
	Green y-code		Gy		0.52	0.57	0.62		
	Blue x-code		Bx		0.09	0.14	0.19		
	Blue y-code		By		0.05	0.10	0.15		
	White x-code		Wx		0.26	0.31	0.36		
	White y-code		Wy		0.28	0.33	0.38		
	Brightness		Y		250	300	-	cd/m^2	
5	Brightness Uniformity			25 ℃	80	-	-	%	6

3.2 Definition of optical characteristics

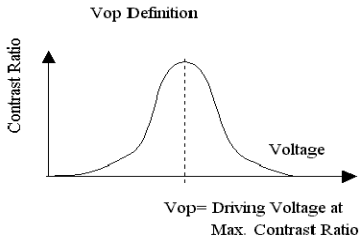
Measurement condition :

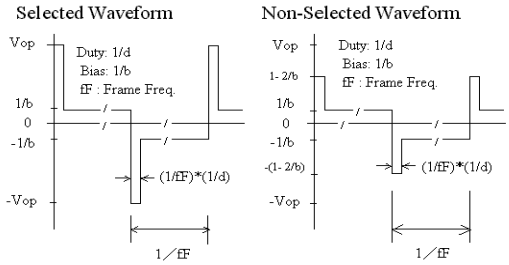
Transmissive and Transflective type



PHOTAL LCD-5000

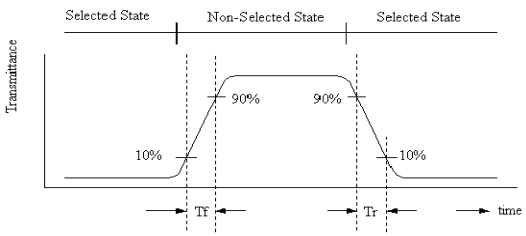
[Note 1] Definition of LCD Driving Vop and Waveform :



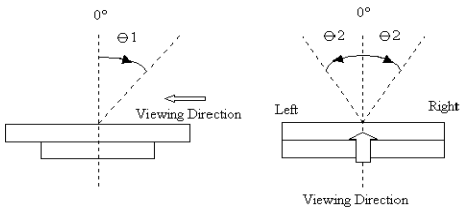


[Note 2] Definition of Response Time

for Positive type :

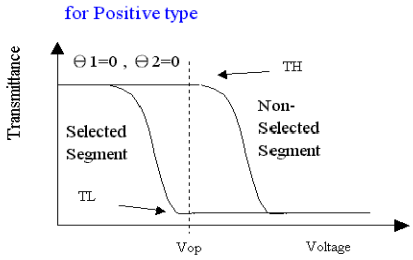


[Note 3] Definition of Viewing Angle :



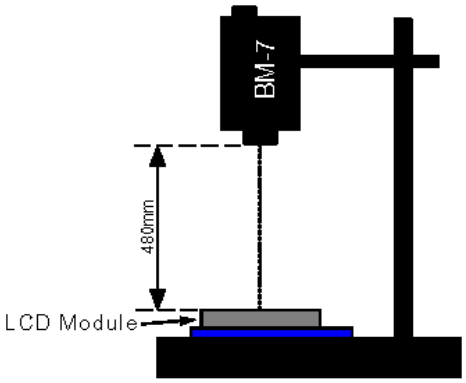
[Note 4] Definition of Contrast Ratio :

for Positive type

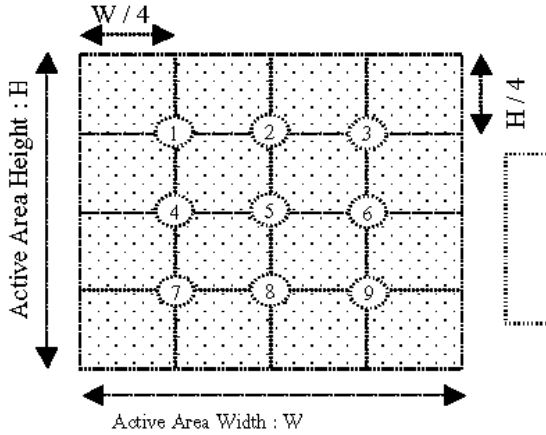


$$\text{Contrast Ratio} = \frac{TH}{TL}$$

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

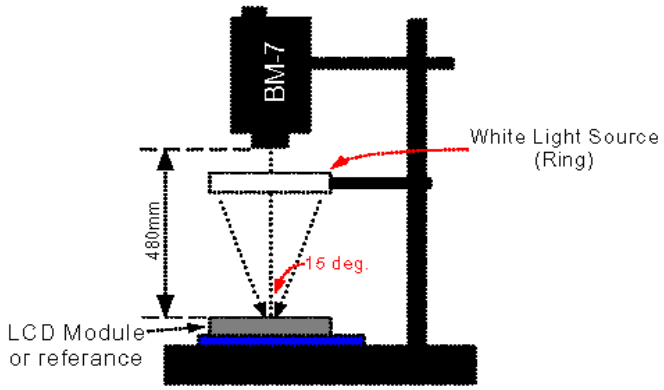


[Note 6] Definition of Brightness Uniformity



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

[Note 7] Definition of Measurement of Reflectance



4. RELIABILITY :

Item No	Items	Condition
1	High temperature operating	70 ℃ , 200 hours
2	Low temperature operating	-10 ℃ , 200 hours
3	High temperature storage	80 ℃ , 200 hours
4	Low temperature storage	-30 ℃ , 200 hours
5	High temperature & humidity storage	60℃, 90%RH, 100 hours
6	Thermal Shock storage	-30℃, 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 :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 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 **HYES** is required. **HYES** will not responsible for any damage or loss which caused by the products without any authorization given by **HYES**.
- 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 :

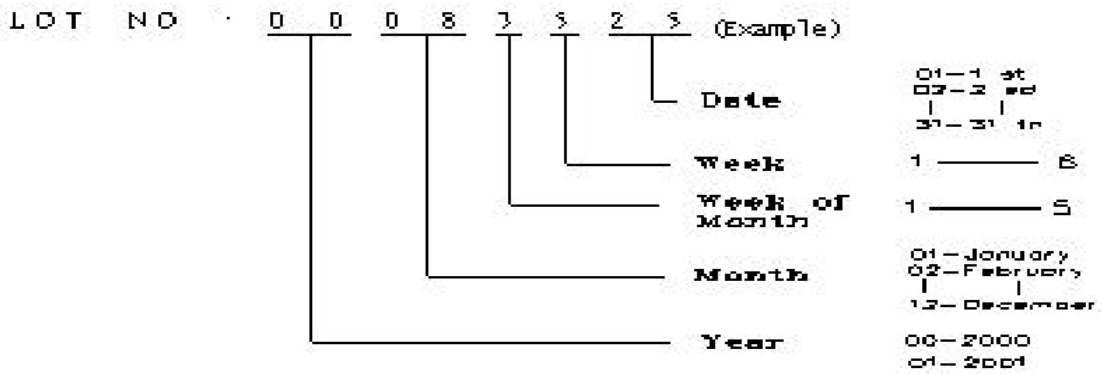
- **Y MM DD - XXX**

  Year Month Day - Production lots

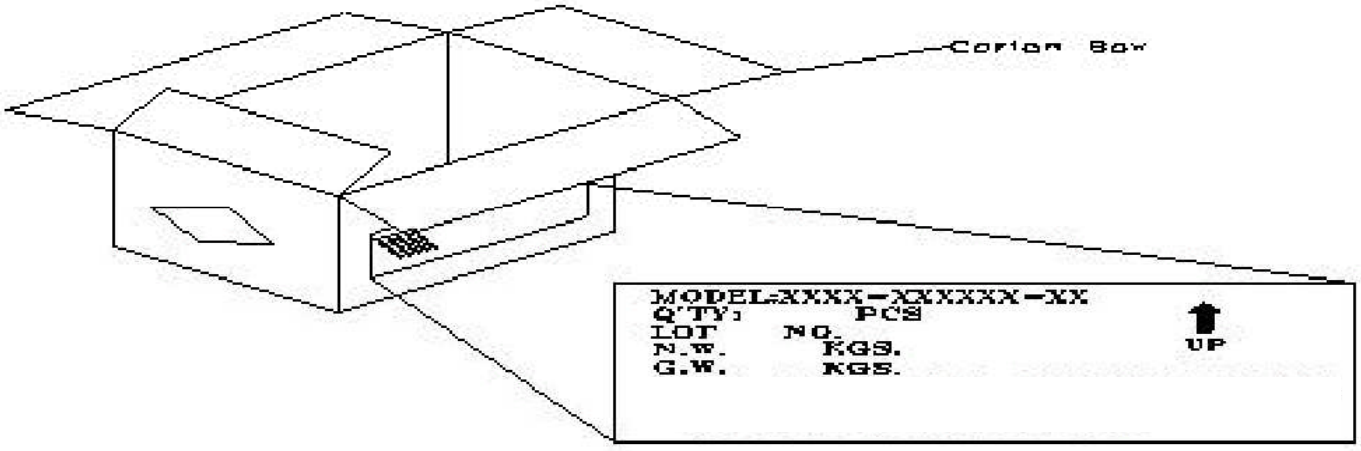
- Example: 2 1 2 2 3 - 0 0 3 ==>Year 2002, Dec.,23rd , Batch no.03

7. PACKING

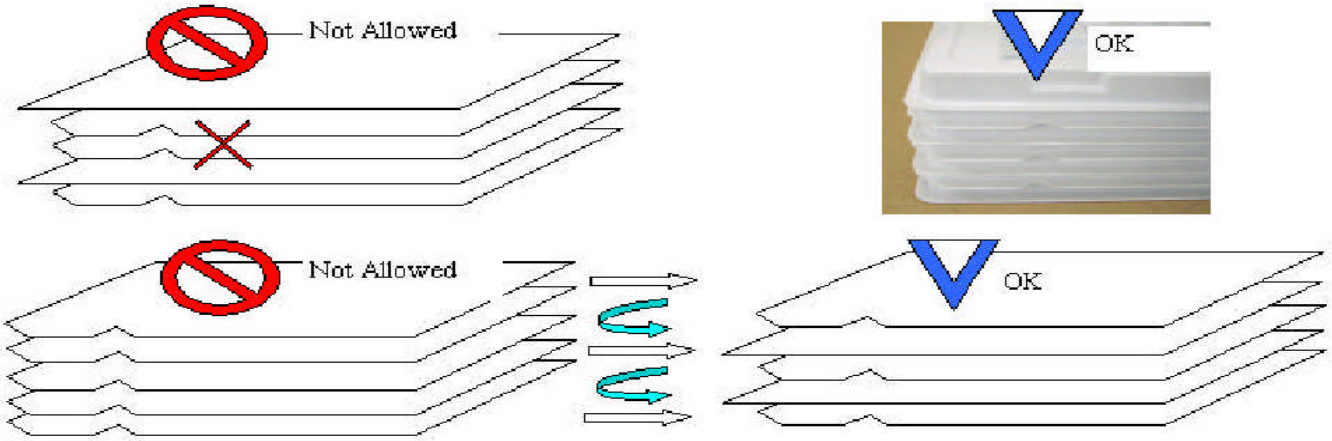
Instruction of lot number:



Lable of carton:



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



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 **HYES** 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

HYES WILL PROVIDE ONE-YEAR WARRANTY FOR THE PRODUCTS ONLY IF UNDER SPECIFICATION OPERATING CONDITIONS. **HYES** WILL REPLACE NEW PRODUCTS FOR THESE DEFECT PRODUCTS WHICH UNDER WARRANTY PERIOD AND BELONG TO THE RESPONSIBILITY OF **HYES**.

8.2. CHECKING CONDITION

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

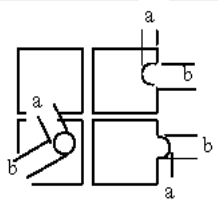
8.2.2. CHECKER SHALL SEE OVER 30 cm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS. OF 20W FLUORESCENT LAMP.

8.3. INSPECTION PLAN :

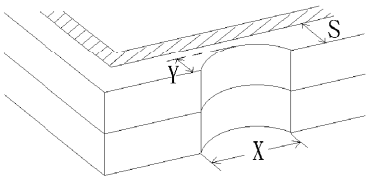
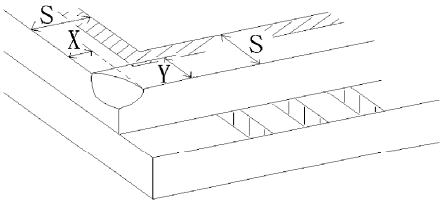
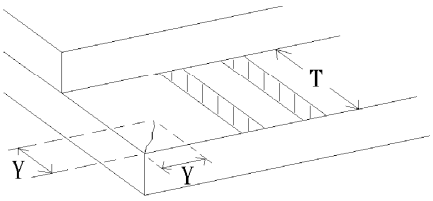
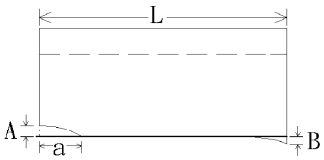
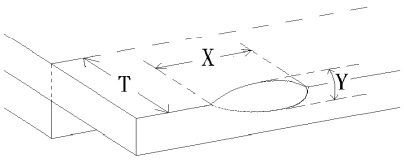
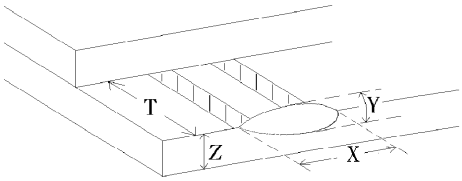
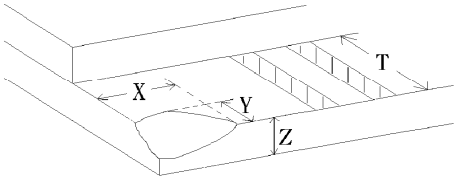
CLASS	ITEM	JUDGEMENT	CLASS
PACKING & INDICATE	1. OUTSIDE AND INSIDE PACKAGE	"MODEL NO." , "LOT NO." AND "QUANTITY" SHOULD INDICATE ON THE PACKAGE.	Minor
	2. MODEL MIXED AND QUANTITY	OTHER MODEL MIXED.....REJECTED QUANTITY SHORT OR OVER.....REJECTED	Critical
	3. PRODUCT INDICATION	"MODEL NO." SHOULD INDICATE 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 colspan="3">DIAMETER (mm.)</th><th>ACCEPTABLE Q'TY</th></tr>
<tr><td colspan="2">Φ</td><td>≤ 0.1</td><td>DISREGARD</td></tr>
<tr><td>0.1 <</td><td>Φ</td><td>≤ 0.2</td><td>2</td></tr>
<tr><td>0.2 <</td><td>Φ</td><td>≤ 0.25</td><td>1</td></tr>
<tr><td>0.25 <</td><td>Φ</td><td></td><td>0</td></tr>
</table>
NOTE: Φ=(LENGTH+WIDTH)/2
(B) LINER TYPE: unit : mm.
<table>
<tr><th>LENGTH</th><th colspan="3">WIDTH</th><th>ACCEPTABLE Q'TY</th></tr>
<tr><td>------</td><td colspan="2">W</td><td>≤0.03</td><td>DISREGARD</td></tr>
<tr><td>L ≤ 5.0</td><td>0.03 <</td><td>W</td><td>≤0.05</td><td>3</td></tr>
<tr><td>L ≤ 5.0</td><td>0.05 <</td><td>W</td><td>≤0.07</td><td>1</td></tr>
<tr><td>------</td><td>0.07 <</td><td>W</td><td></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 colspan="3">DIAMETER</th><th>ACCEPTABLE Q'TY</th></tr>
<tr><td colspan="2">Φ</td><td>≤0.15</td><td>DISREGARD</td></tr>
<tr><td>0.15 <</td><td>Φ</td><td>≤ 0.5</td><td>2</td></tr>
<tr><td>0.5 <</td><td>Φ</td><td></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 colspan="3">DIAMETER</th><th>ACC. Q'TY</th></tr>
<tr><td colspan="2">Φ</td><td>≤ 0.1</td><td>DISREGARD</td></tr>
<tr><td>0.1 <</td><td>Φ</td><td>≤ 0.25</td><td>3</td></tr>
<tr><td>0.25 <</td><td>Φ</td><td></td><td>0</td></tr>
</table></td></tr>
</table>

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>1.5mm. REJ. 2. B : ACCORDING TO DIMENSION
8.4.8	MINOR	CHIPPING (ON THE TERMINAL AREA)	 Φ= (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.