



**SPECIFICATION
FOR
LCD MODULE**

Customer : _____

Product Model: YH070BS5002

Sample code: _____

Designed by	Checked by	Approved by

Final Approval by Customer

<input type="checkbox"/> LCM Machinery OK Checked By _____ <input type="checkbox"/> LCM Display OK Checked By _____	<input type="checkbox"/> LCM OK <input type="checkbox"/> NG , Problem survey: Approved By _____
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※The specification of "TBD" should refer to the measured value of sample . If there is difference between the design specification and measured value, we naturally shall negotiate and agree to solution with customer.



1.0 General Description

YH070BS5002 IPS is 7.0" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) OLB module (finish outer lead bonding) composed of LCD panel and driver ICs (the backlight is not included in this OLB module).

The 7.0" screen produces 1024(*3)X600 WSVGA resolution image. By applying R.G.B. input signal, full color images are displayed.

General specifications are summarized in the following table: ROHS design

1.1. General information

Item	Specification	Unit
Outline Dimension	164 (H) x 100 (V) x3.5 (D)	mm
Display area	154.2144(H) × 85.92 (V)	mm
Number of Pixel	1024(H) × 3(RGB) × 600(V)	pixels
Pixel pitch	0.1506(H) × 3(RGB) × 0.1432(V)	mm
Pixel arrangement	RGB Vertical stripe	
Number of color	16.7M	
Response Time (Tr+Tf)	30ms (typ.), 50ms (max)	
Viewing Direction	162.5 X 95.7 X 1.43	
Color Filter Array	RGB vertical strip	
Surface Treatment	Anti-Glare, Hardness:3H	



2.0 Absolute Maximum Ratings

2.1 TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	DVDD	-0.3	3.96	V	-
Analog Supply Voltage	AVDD	-0.5	14.85	V	-
Gate On Voltage	VGH	-0.3	40	V	-
Gate Off Voltage	VGL	-20	0.3	V	-
Gate On-Gate Off Voltage	VGH-VGL	12	40	V	-
Operating Temperature	Topa	-20	70	°C	Note1
Storage Temperature	Tstg	-30	80	°C	Note1

Note1 : If users use the product out off the environmental operation range (temperature and humidity,it will have visual quality concerns.

2.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	Topa	-20	70	°C	
Storage Temperature	Tstg	-20	70	°C	



3.0 Optical Characteristics

3.1 Optical specification

Item	Symbol	Condition	Min.	Typ.	Max	Unit	NOTE
Panel Transmittance	-	-	(3.8)	(4.1)	-	%	
LCM luminance (Center)	YL	I=120mA	180	230	-	cd/m ²	
Contrast Ratio	CR	Point-5	600	800	--	--	2
Response Time	Tr +Tf	Point-5	--	30	50	ms	3
NTSC			45%	50%	--		
Viewing Angle	Left	ϕ	Point-5 CR \geq 10	80	85		4
	Right	ϕ		80	85		4
	Upper	ϕ		80	85		4
	Lower	ϕ		80	85		4
Color Filter Chromacicity	White	x	$\theta=\phi = 0^\circ$	0.273	0.313	0.353	
		y		0.289	0.329	0.369	
	Red	x	$\theta=\phi = 0^\circ$	TBD	TBD	TBD	
		y		TBD	TBD	TBD	
	Green	x	$\theta=\phi = 0^\circ$	TBD	TBD	TBD	
		y		TBD	TBD	TBD	
	Blue	x	$\theta=\phi = 0^\circ$	TBD	TBD	TBD	
		y		TBD	TBD	TBD	

3.2 Measuring Condition

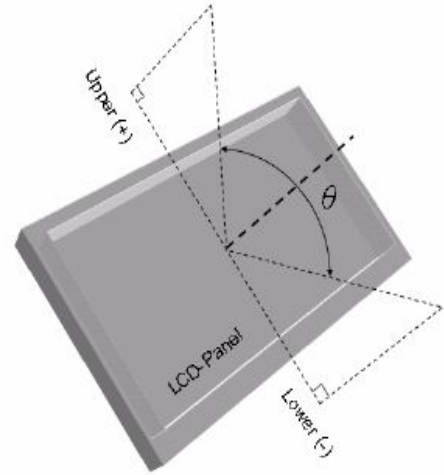
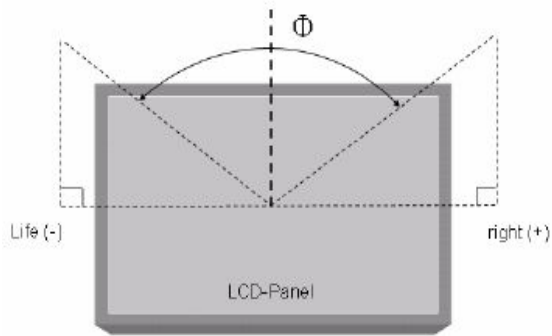
- Measuring surrounding : dark room
- Ambient temperature : $25\pm 2^\circ\text{C}$
- The measured value of luminance and color coordinate bases BM-7

3.3 Measuring Equipment

- TOPCON BM-7
- Measuring spot size : field 2°



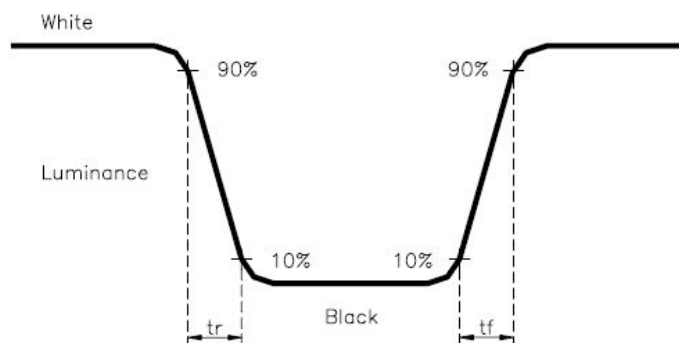
Note (1) Definition of Viewing Angle



Note (2) Definition of Contrast Ratio(CR) :
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

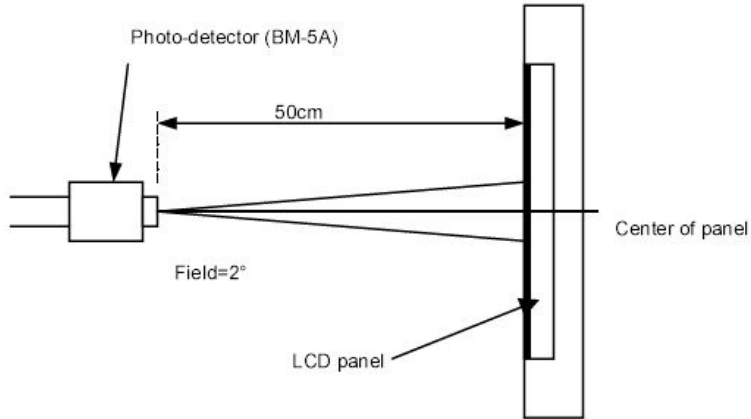
Note (3) Definition of Response Time : Sum of T_r and T_f



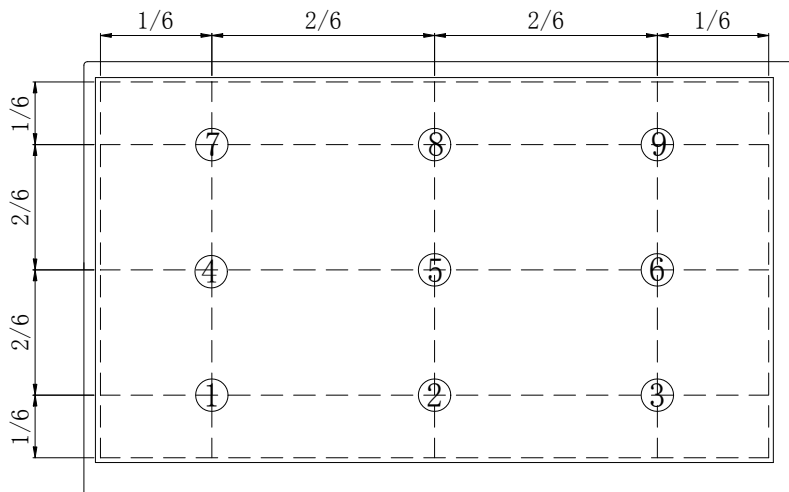
Definition of Response Time



Note (4) Definition of optical measurement setup



Note (5) Definition of brightness uniformity





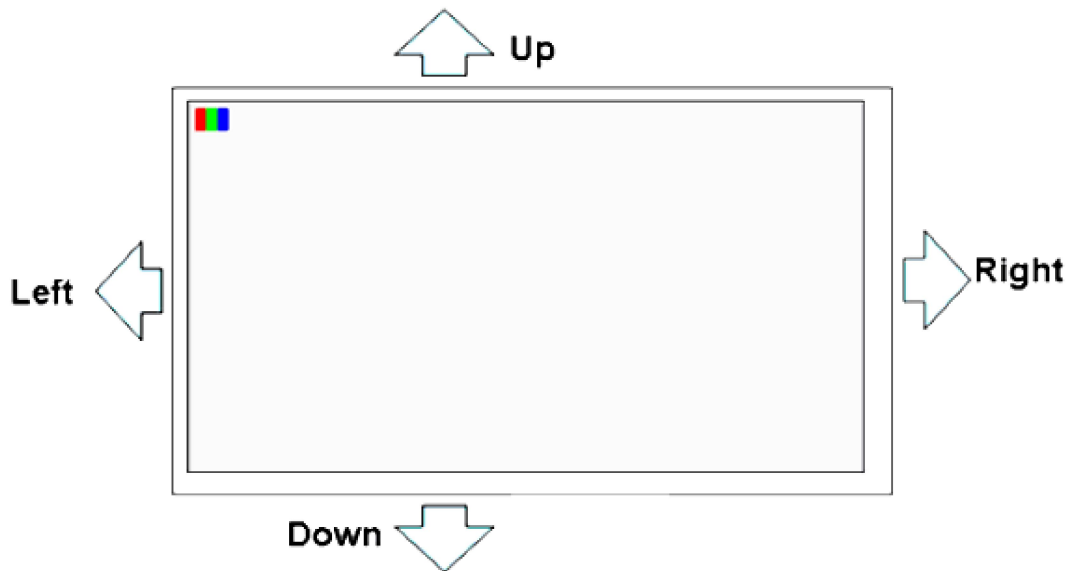
4.0 Interface Pin Connection

Pin NO.	SYMBOL	DESCRIPTION
1	LED+	LED Anode
2	LED+	LED Anode
3	LED-	LED Cathode
4	LED-	LED Cathode
5	GND	Ground
6	VCOM	Common Voltage
7	DVDD	Digital Power
8	MODE	DE/SYNC Mode Select. Normally Pull High H: DE mode. L: HSD/VSD mode
9	DEN	Data Enable signal
10	VSD	Vertical sync input. Negative polarity
11	HSD	Horizontal sync input. Negative polarity
12	B7	Blue Data Input(MSB)
13	B6	Blue Data Input
14	B5	Blue Data Input
15	B4	Blue Data Input
16	B3	Blue Data Input
17	B2	Blue Data Input
18	B1	Blue Data Input
19	B0	Blue Data Input(LSB)
20	G7	Green Data Input(MSB)
21	G6	Green Data Input
22	G5	Green Data Input
23	G4	Green Data Input
24	G3	Green Data Input
25	G2	Green Data Input
26	G1	Green Data Input
27	G0	Green Data Input(LSB)
28	R7	Red Data Input(MSB)
29	R6	Red Data Input
30	R5	Red Data Input
31	R4	Red Data Input
32	R3	Red Data Input
33	R2	Red Data Input
34	R1	Red Data Input
35	R0	Red Data Input(LSB)
36	GND	Power Ground
37	DCLK	Clock Input
38	GND	Power Ground
39	SHLR	Left or Right Display Control
40	UPDN	Up / Down Display Control
41	VGH	Positive Power for TFT
42	VGL	Negative Power for TFT
43	AVDD	Analog Power
44	RESET	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high. (R=10KΩ · C=1μF)
45	NC	Not Connect
46	VCOM	Common Voltage
47	DITH	Dithering function enable control. Normally pull low DITHER = "1", Enable internal dithering function DITHER = "0", Disable internal dithering function
48	GND	Power Ground
49	NC	Not Connect
50	NC	Not Connect



*2)UPDN and SHLR control function

UPDN	SHLR	FUNCTION
0	1	Normal display
0	0	Inverse Left and Right
1	1	Inverse Up and Down
1	0	Inverse Left and Right Inverse Up and Down





5. Electrical Characteristics

5.1 Typical operation conditions

Ta=25°C

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Digital Power Supply Voltage For LCD	DVDD	3	3.3	3.6	V	-
Analog Power Supply Voltage	AVDD	9.4	9.6	9.8	V	-
Gate On Power Supply Voltage	VGH	17	18	19	V	-
Gate Off Power Supply Voltage	VGL	-6.6	-6	-5.4	V	-
Common Power Supply Voltage	VCOM		(3.15)		V	Note1
Logic Input Voltage	VIH	0.7*DVDD	-	DVDD	V	-
	VIL	GND	-	0.3*DVDD	V	

【Note1】 Please adjust VCOM to make the flicker level be minimum.

5.2 Current consumption

ITEM	SYMBOL	CONDITION	MIN	TYPE	MAX	UNIT	NOTE
Gate On Power Current	IVGH	VGH =18V	--	0.5	1	mA	Note1
Gate Off Power Current	IVGL	VGL= -6V	--	0.5	1	mA	Note1
Digital Power Current	IDVDD	DVDD = 3.3V	--	30	45	mA	Note1
Analog Power Current	IAVDD	AVDD = 9.6V	--	35	45	mA	Note1
Total Power Consumption	PC		--	447	604	mW	Note1

Note1: Typ. specification : Gray-level test Pattern
Max. specification : White test Pattern



256 gray pattern



White Pattern

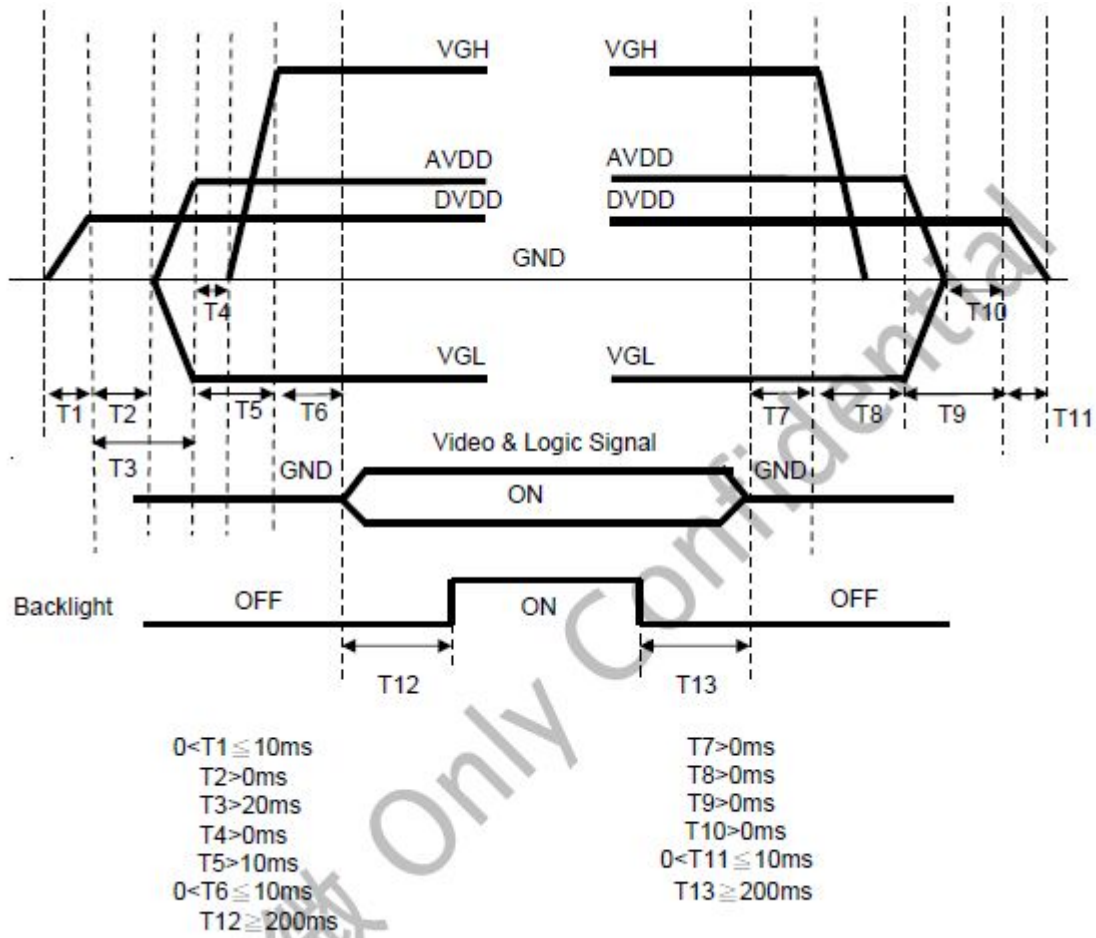
5.3 Power、Signal sequence

Power On: DVDD_AVDD/VGL_VGH_Video & Logic Signal → Backlight

Power Off: Backlight → Video & Logic Signal_VGH_AVDD/VGL_DVDD



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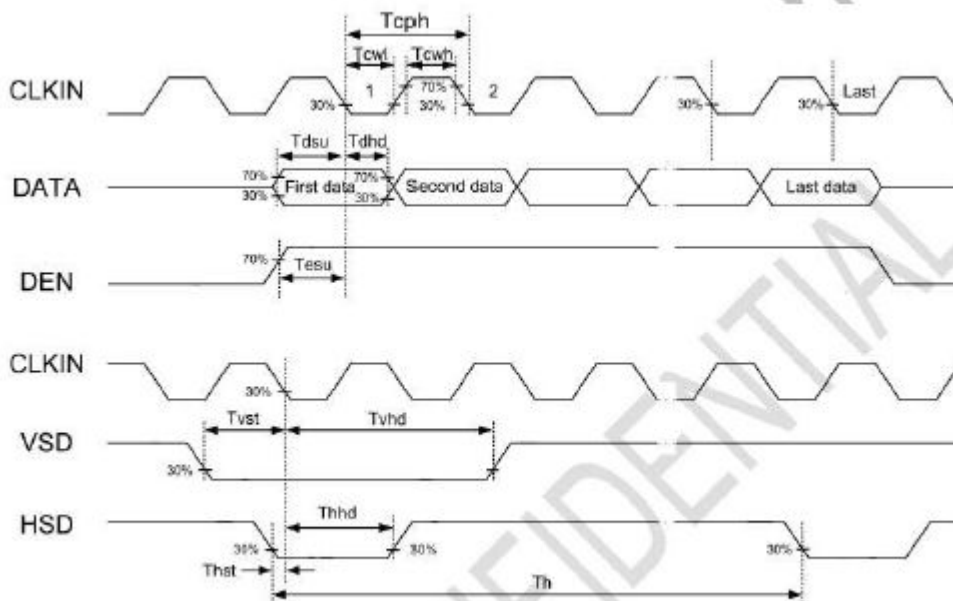
5.4 Timing characteristics of input signals

5.4.1. InputTimingTable

	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
DE MODE	Dot Clock	1/CLK	45	51.2	57	MHz	
	DCLK Pulse Duty	Tcwh	40	50	60	%	
	Horizontal Total Time	tH	1324	1344	1364	tCLK	
	Horizontal Effective Time	tHA		1024		tCLK	
	Horizontal Blank Time	tHB	300	320	340	tCLK	
	Vertical Total Time	tV	625	635	645	tH	
	Vertical Effective Time	tVA		600		tH	
SYNC MODE	Vertical Blank Time	tVB	25	35	45	tH	
	Horizontal Total Time	TH	1324	1344	1364	tCLK	
	Horizontal Pulse Width	Thpw		20	-	tCLK	thb + thpw = 160DCLK is fixed
	Horizontal Back Porch	Thb		140	-	tCLK	
	Horizontal Front Porch	Thfp	140	160	180	tCLK	
	Horizontal Effective Time	THA		1024		tCLK	
	Vertical Total Time	TV	625	635	645	tH	
	Vertical Pulse Width	Tvpw		3	-	th	tpw + tvb = 23th is fixed
	Vertical Back Porch	Tvb	-	20	-	th	
	Vertical Front Porch	Tvfp	2	12	22	th	
Vertical Valid	Tvd		600		th		

5.4.2 Input Clock and Data Timing Diagram

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
DVDD Power On Slew Rate	TPOR	-	-	20	ms	From 0V to 90% DVDD
RSTB Pulse Width	TRst	50	-	-	us	DCLK=65MHz
DCLK Cycle Time	Tcph	14	-	-	ns	
DCLK Pulse Duty	Tcwh	40	50	60	%	
VSD Setup Time	Tvst	5	-	-	ns	
VSD Hold Time	Tvhd	5	-	-	ns	
HSD Setup Time	Thst	5	-	-	ns	
HSD Hold Time	Thhd	5	-	-	ns	
Data Setup Time	Tdsu	5	-	-	ns	D0[7:0],D1[7:0],D2[7:0] to DCLK
Data Hold Time	Tdhd	5	-	-	ns	D0[7:0],D1[7:0],D2[7:0] to DCLK
DEN Setup Time	Tesu	5	-	-	ns	
DEN Hold Time	Tehd	5	-	-	ns	

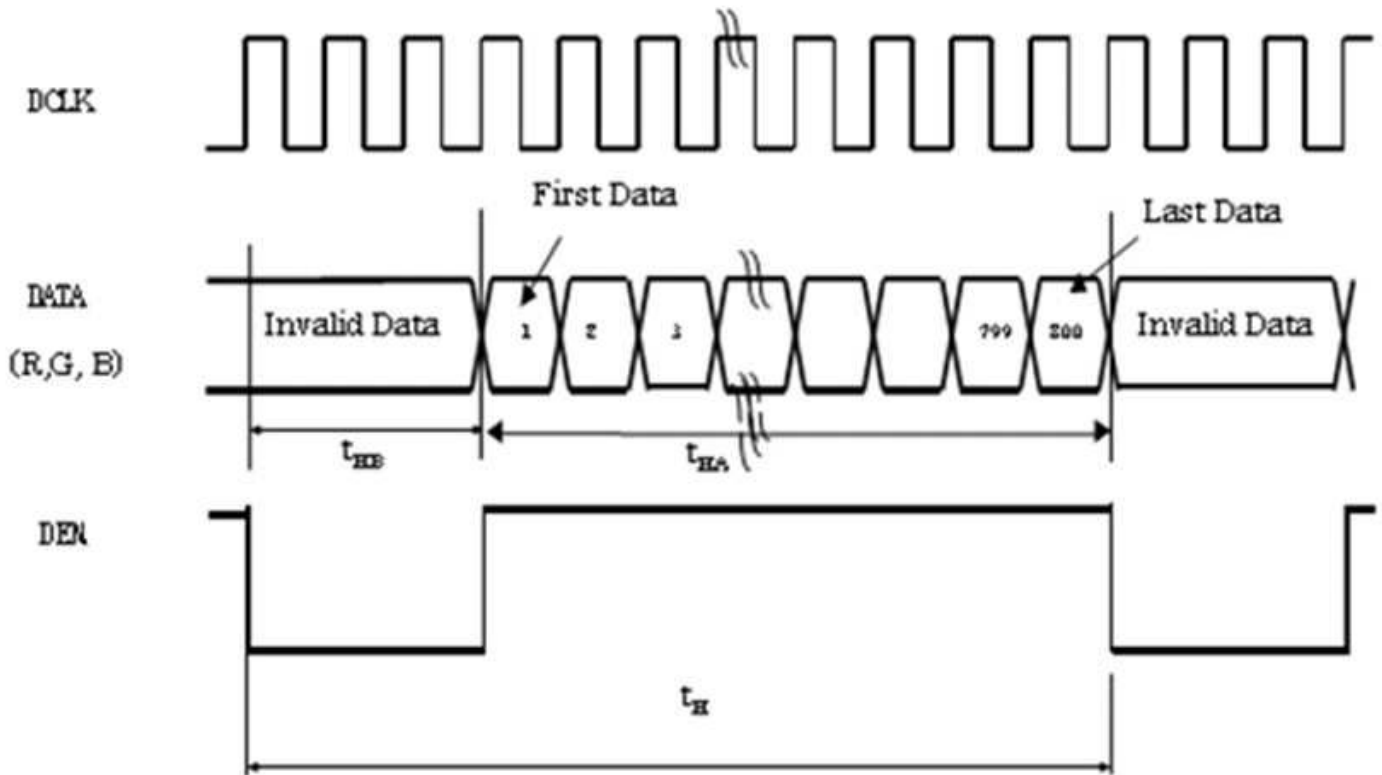




5.5 Timing Sequence (Timing Chart)

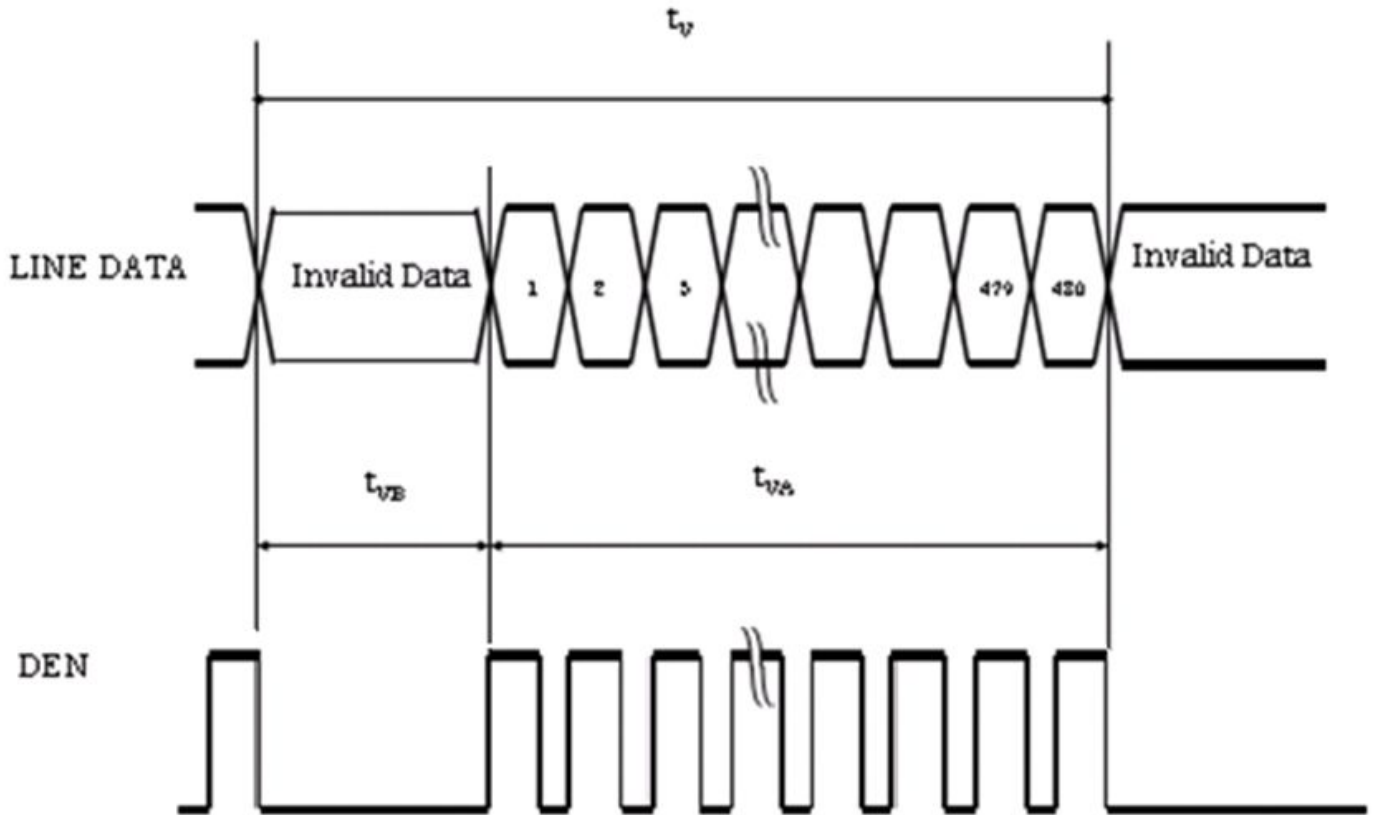
5.5.1 DE Mode

Horizontal timing:



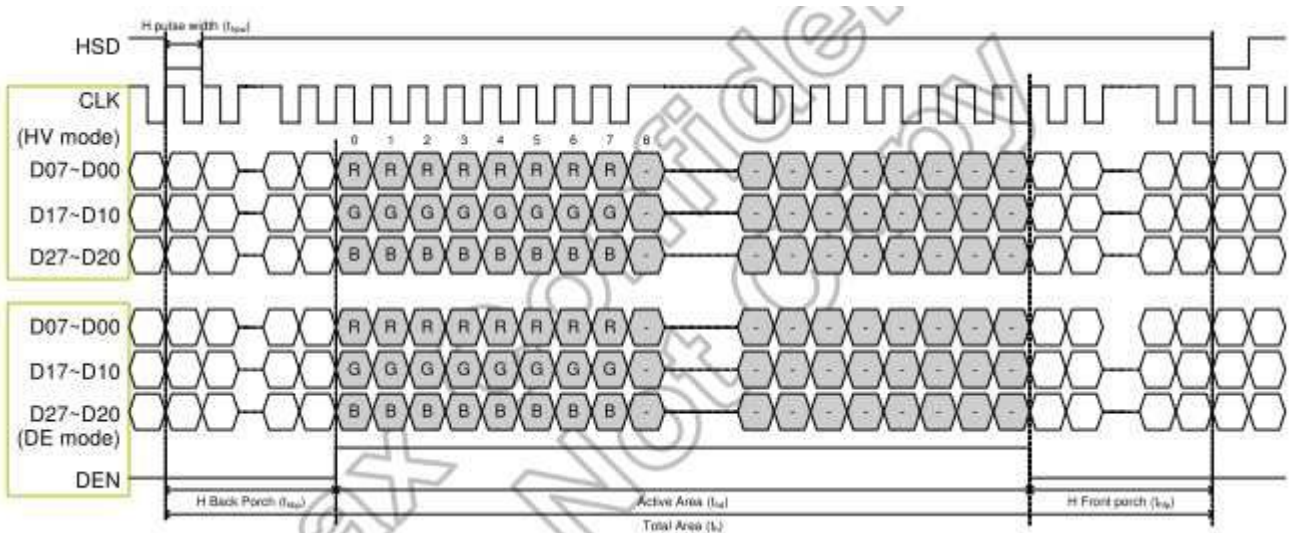
5.5.2 SYNC Mode

Horizontal timing



5.5.3 Data Input Format

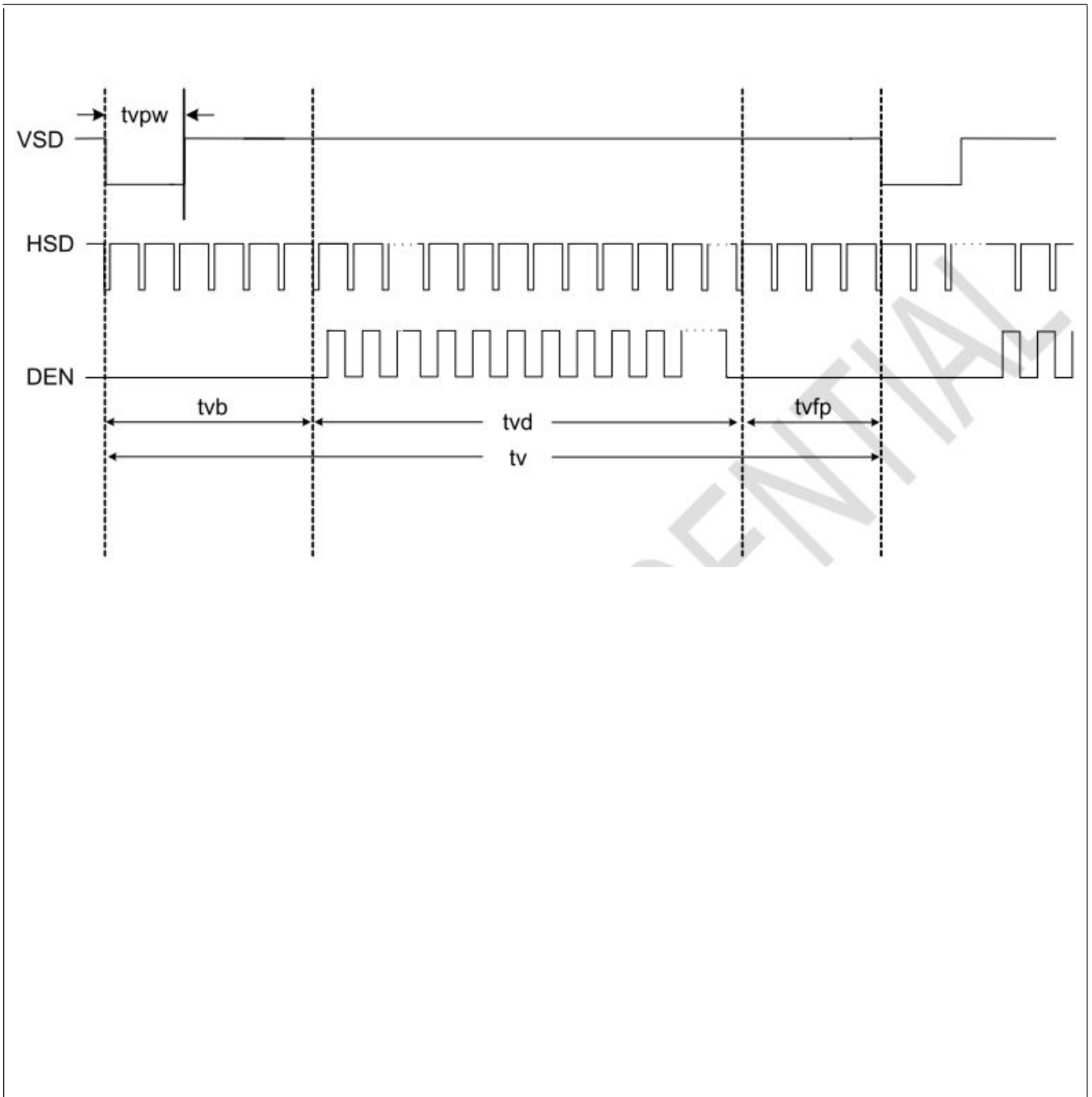
Horizontal timing:



Vertical timing:



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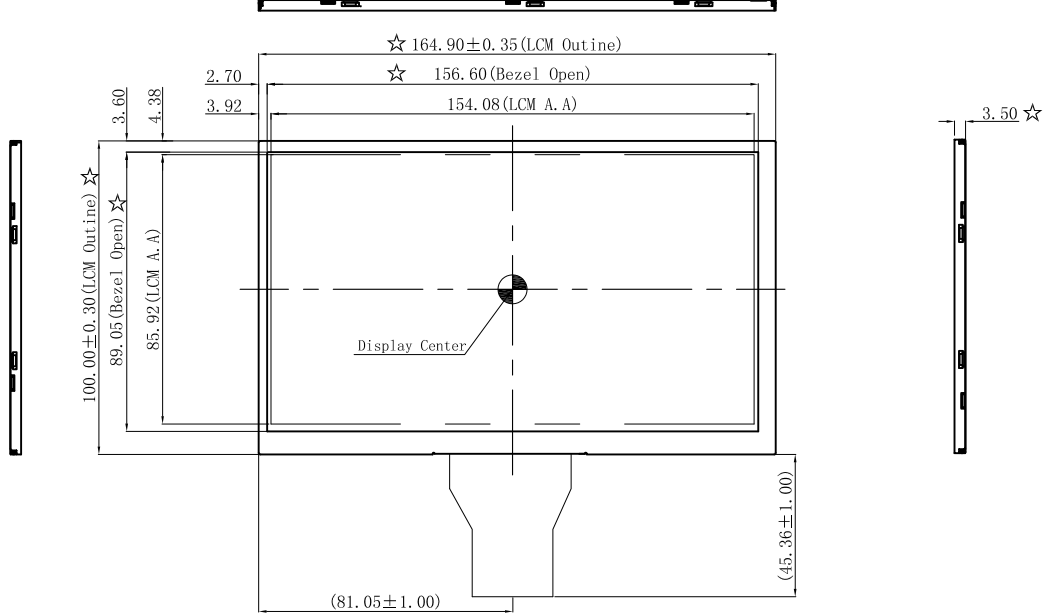


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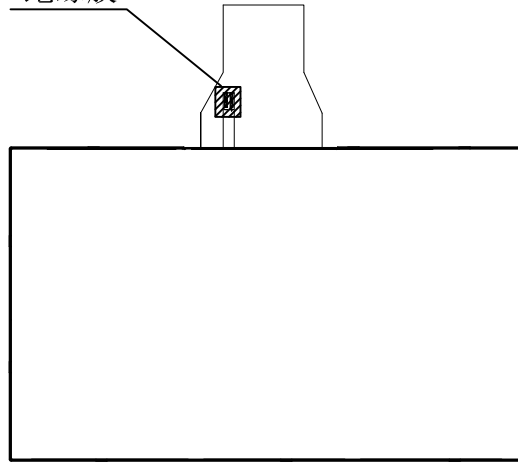
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Drawing Of LCM:
模组图:

未注公差: ± 0.30



绝缘胶



1. Un-dimensioned tolerance is $\pm 0.3\text{mm}$

示注公差 $\pm 0.30\text{mm}$

2. "☆": Important dimension.

标有 ☆ 为重要尺寸

3. 外形测量需测试前、中、后3点。

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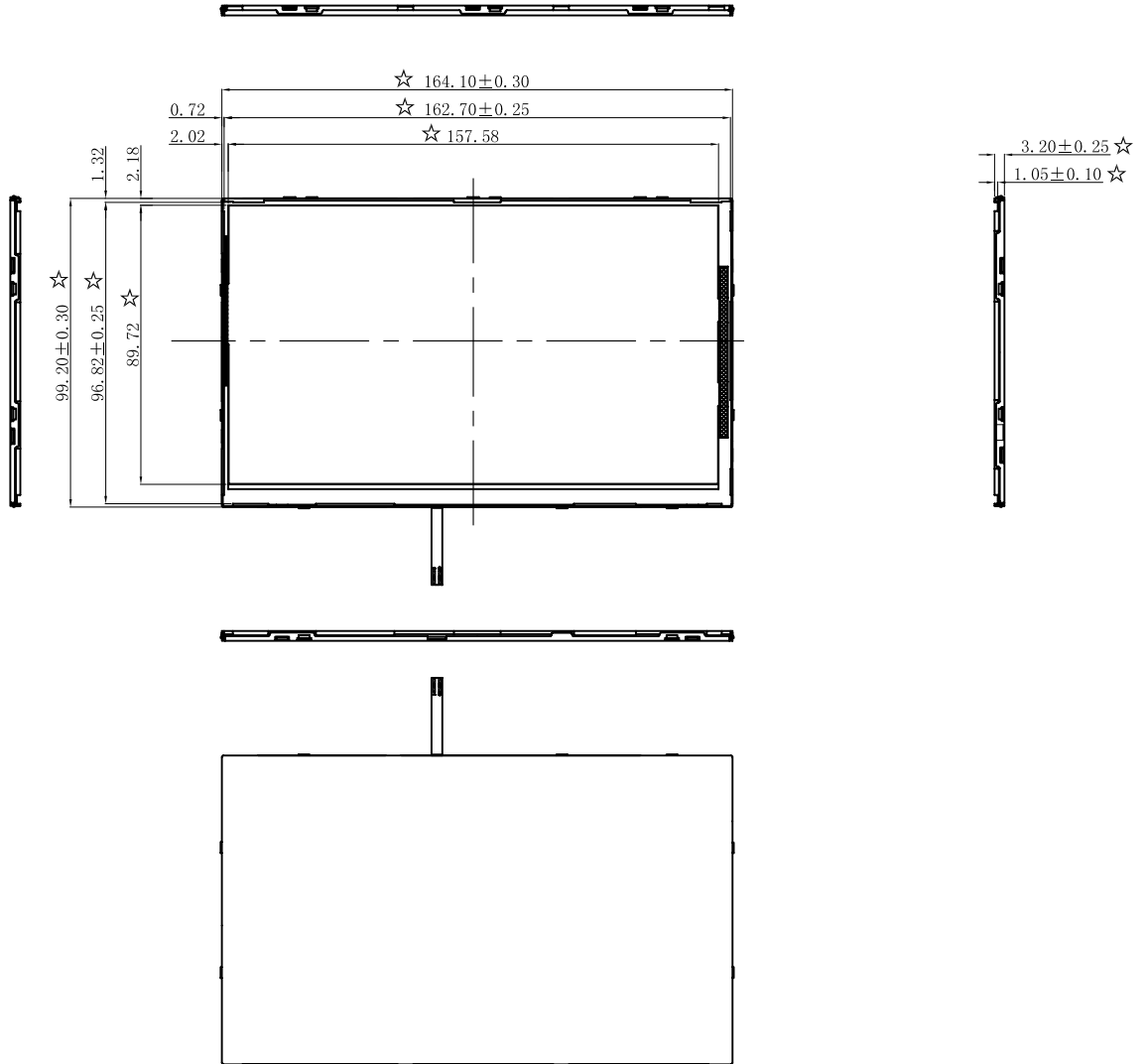


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Drawing Of B/L:
背光图:

未注公差: ± 0.30



1. Un-dimensioned tolerance is $\pm 0.3mm$

示注公差 $\pm 0.30mm$

2. "☆": Important dimension.

标有 ☆ 为重要尺寸

3. 外形测量需测试前、中、后3点。

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3. 极限参数 (ABSOLUTE MAXIMUM RATINGS)

(除非特别说明, 环境温度 Ta=25°C. Unless specified, The Ambient temperature Ta=25°C)

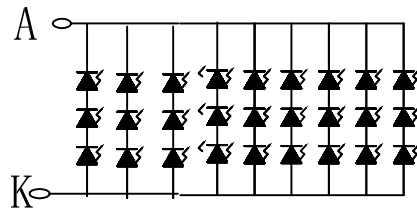
项目 Item	符号 Symbol	条件 Conditions	值 Rating	单位 Unit
* 极限直流正向电流 Absolute maximum forward current	Ifm		20	mA
* 脉冲驱动时极限正向电流 Peak forward current	Ifp	1 msec 脉冲, 1/10 占空比 1 msec Plus 10% Duty Cycle	180	mA
反向电压 Reverse Voltage	Vr		4	V
* 极限功耗 Power dissipation	Pd			mW
工作温度 Operating Temperature Range	Topr		-20~+70°C	°C
贮存温度 Storage Temperature Range	Tstg		-20~+70°C	°C

4 光电特性 (ELECTRICAL-OPTICAL CHARACTERISTICS)

(除非特别说明, 环境温度 Ta=25°C. Unless specified, The Ambient temperature Ta=25°C)

项目 Item	符号 Symbol	最小值 min.	典型值 typ.	最大值 max.	单位 Unit	测定条件 Condition
正向电压 Forward Voltage	Vf	9.0	9.6	10.8	V	If= 180 mA
反向电流 Reverse Current	Ir			15	μA	Vr= 3 V
色坐标 (模组) coordinates (LCM)	X	0.26	0.30	0.36		If= 180 mA
	Y	0.28	0.32	0.38		If= 180 mA
亮度 (模组) Luminance (LCM)	Lv	300	330		cd/m ²	If= 180 mA
均匀性 Lvmin/Lvmax		75	80		%	If= 180 mA

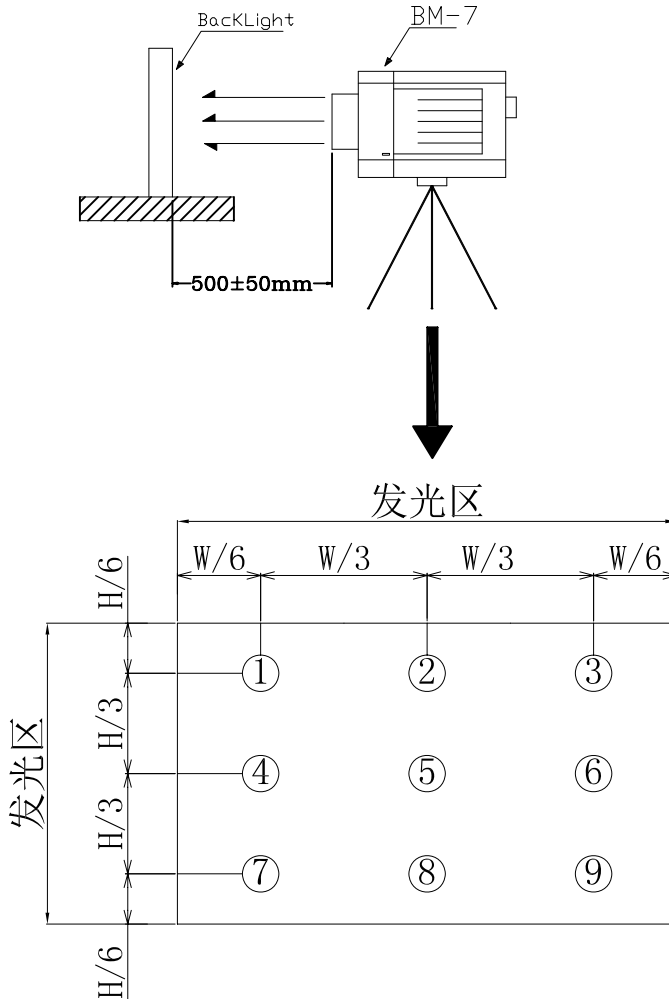
※5. 电路图 (Internal Circuit Diagram)



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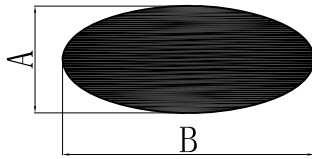
6. 亮度值是9个测量点的平均值，使用BM-7亮度色度仪测量，测量光圈 $\phi 5\text{ mm}$ 。
(The luminance is the average value of 9 points, The measurement instrument is BM-7 luminance, Colorimeter. The aperture is $\phi 5\text{ mm}$.)



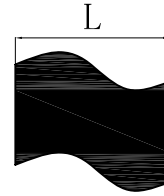
7. 外观标准 (DEFECTIVE APPEARANCE)

项目 (Items)	说明 (SPECIFICATION)	允许 (TOLERANCE)
点状缺陷 spot Whitespot	$0.30 < D$	0
	$0.10 < D \leq 0.30$	3
	$D \leq 0.10$	通过 (Nocheck)
线状缺陷 Foreign Material Line	$2.50 < L$	0
	$1.00 < L \leq 2.50$	3
	$L \leq 1.00$	通过 (Nocheck)
	$W \leq 0.02$	通过 (Nocheck)

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$$D=(A+B)/2$$



L:Length

Whatever the length, if any foreign material line is crossed, which will be as a defective unit. Foreign particle existence other than the light emitting are a need not be checked. It is excluded not to see the foreign particle in light emitting area while separated by 30cm.

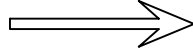
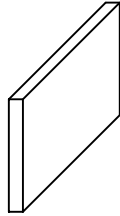
8. 可靠性实验 (Reliability Test)

NO.	项目 (Test Items)	测试条件 (Test Condition)	测试时间 (Test Time)
1	高温储存 High Temperature Storage Test	Ta=70°C	240Hour
2	低温储存 Low Temperature Storage Test	Ta=-20°C	240Hour
3	高温动作 High Temperature Operation Test	Ta=70°C	240Hour
4	低温动作 Low Temperature Operation Test	Ta=-20°C	240Hour
5	高温高湿 High Temperature and High Humidity Operation Test	Ta=60°C 96%RH	120Hour
6	冷热冲击 Thermal Shock Test	-20°C(0%RH)~70°C(96%RH)	120Hour
7	振动测试 Vibration Test (non-Operating)	45Hz	1Hour
8	跌落测试 Package Drop Test	Height:60cm 1 Corner 3Edges 6 Surfaces	

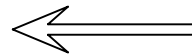
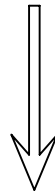
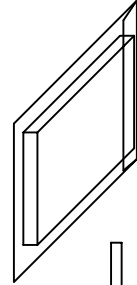
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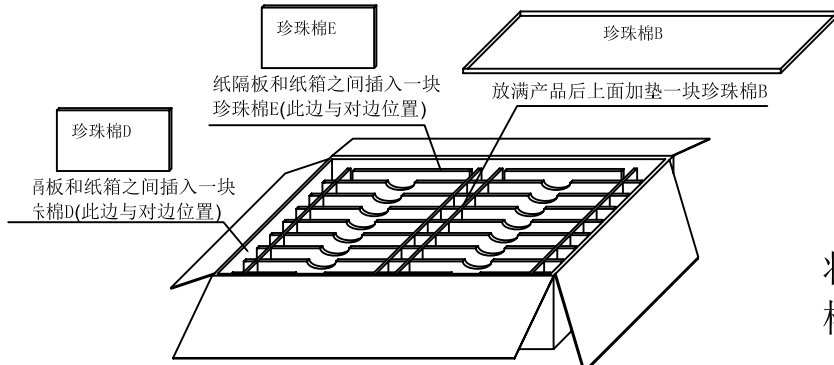
9. 包装方式(packaging)



将成品装在一个开口塑料袋中，将袋口卷折，不封口，要反折。



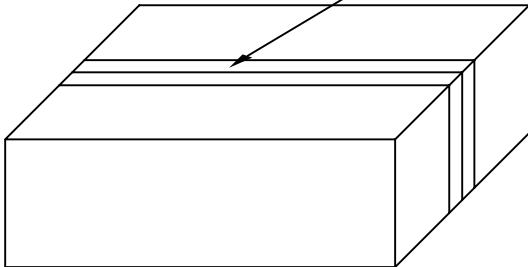
将1片产品放入纸板格子里，共计60pcs



使用封口胶封口



封箱胶纸



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