

东茂伟业科技有限公司

深超 7 寸短排模组规格书

SPECIFICATION

承 认 印 Approved by	
审核:	确认:
客户确认结果:	

客 户: _____

品 名: 深超 7D 普清短排

模组外形: 164.9*100*5.5

日 期: 2018.04.20

Approved 核 准	Checked 审 核	Prepared 制 作

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3 玻璃规格书

TFT-LCD CELL SPECIFICATION

Module No: AT070TN92 V.X

Preliminary Specification

Final Specification

Customer	
Prepared by	
Approved by	

Century	
Prepared by	
Approved by	

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A. General Specifications

(1) Overview

The AT070TN92 V.X is a wide 7" LCD FOG with thin film transistors as active elements and contains 800(H) x 480 (V) pixels. Each pixel is divided into red, green and blue dot, which are arrange in vertical stripe. The FOG is normally white mode, and can be applied to the transmission type display. Backlight unit (BLU) is not built in.

(2) Application

LCD Monitor on tablet or other consumer product.

(3) General Specification

NO.	Item	Specification	Remark
1	Display resolution (pixel)	800(H) x 480(V)	
2	Driver element	A-si TFT active matrix	
3	Display mode	Normally White, Transmissive	
4	Active area (mm)	154.08(H) x 85.92(V)	
5	Screen size (inch)	7 inches diagonal	
6	Pixel pitch (mm)	0.1926(H) x 0.1790(V)	
7	Color configuration	R, G, B vertical Stripe	
8	Panel outline (mm)	162.5 (W) x 96.62 (H) x1.43 (Pol) (D)	
9	Weight (g)	45 (Typ.)	
10	Surface treatment	Anti-Glare	
11	Color saturation	50%	
12	Optimum viewing direction	6 o'clock	
13	Glass thickness (mm)	0.5	
14	Transmittance	5.11%	
15	Input signal	8 bit RGB	
16	Panel Power consumption	0.226W (Typ.)	

B. Absolute Maximum Ratings

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	DV _{DD}	-0.3	5.0	V	
	AV _{DD}	6.5	13.5	V	
	V _{GH}	-0.3	40.0	V	
	V _{GL}	-20.0	0.3	V	
	V _{GH} -V _{GL}	-	40.0	V	
Operation Temperature	T _{OP}	-20	70	°C	
Storage Temperature	T _{ST}	-30	80	°C	
LED Reverse Voltage	V _R	-	1.2	V	Each LED Note 2
LED Forward Current	I _F	-	25	mA	Each LED

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

Note 2: V_R Conditions: Zener Diode 20mA

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C. Pin Assignment

Pin No.	Symbol	I/O	Function	Remark
1	V _{LED+}	P	Power for LED backlight (Anode)	
2	V _{LED+}	P	Power for LED backlight (Anode)	
3	V _{LED-}	P	Power for LED backlight (Cathode)	
4	V _{LED-}	P	Power for LED backlight (Cathode)	
5	GND	P	Power ground	
6	V _{COM}	I	Common voltage	
7	DV _{DD}	P	Power for Digital Circuit	
8	MODE	I	DE/SYNC mode select	Note 1
9	DE	I	Data Input Enable	
10	VS	I	Vertical Sync Input	
11	HS	I	Horizontal Sync Input	
12	B7	I	Blue data(MSB)	
13	B6	I	Blue data	
14	B5	I	Blue data	
15	B4	I	Blue data	
16	B3	I	Blue data	
17	B2	I	Blue data	
18	B1	I	Blue data	Note 2
19	B0	I	Blue data(LSB)	Note 2
20	G7	I	Green data(MSB)	
21	G6	I	Green data	
22	G5	I	Green data	
23	G4	I	Green data	
24	G3	I	Green data	
25	G2	I	Green data	
26	G1	I	Green data	Note 2
27	G0	I	Green data(LSB)	Note 2

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28	R7	I	Red data(MSB)	
29	R6	I	Red data	
30	R5	I	Red data	
31	R4	I	Red data	
32	R3	I	Red data	
33	R2	I	Red data	
34	R1	I	Red data	Note 2
35	R0	I	Red data(LSB)	Note 2
36	GND	P	Power Ground	
37	DCLK	I	Sample clock	Note 3
38	GND	P	Power Ground	
39	L/R	I	Left / right selection	Note 4,5
40	U/D	I	Up/down selection	Note 4,5

41	V _{GH}	P	Gate ON Voltage	
42	V _{GL}	P	Gate OFF Voltage	
43	AV _{DD}	P	Power for Analog Circuit	
44	RESET	I	Global reset pin.	Note 6
45	NC	-	No connection	
46	V _{COM}	I	Common Voltage	
47	DITHB	I	Dithering function	Note 7
48	GND	P	Power Ground	
49	NC	-	No connection	
50	NC	-	No connection	

I: input, O: output, P: Power

FPC Connector is used for the module electronics interface. The recommended model is FH12A-50S-0.5SH manufactured by Hirose.

Note 1: DE/SYNC mode select. Normally pull high.

When select DE mode, MODE="1", VS and HS must pull high.

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When select SYNC mode, MODE= "0", DE must be grounded.

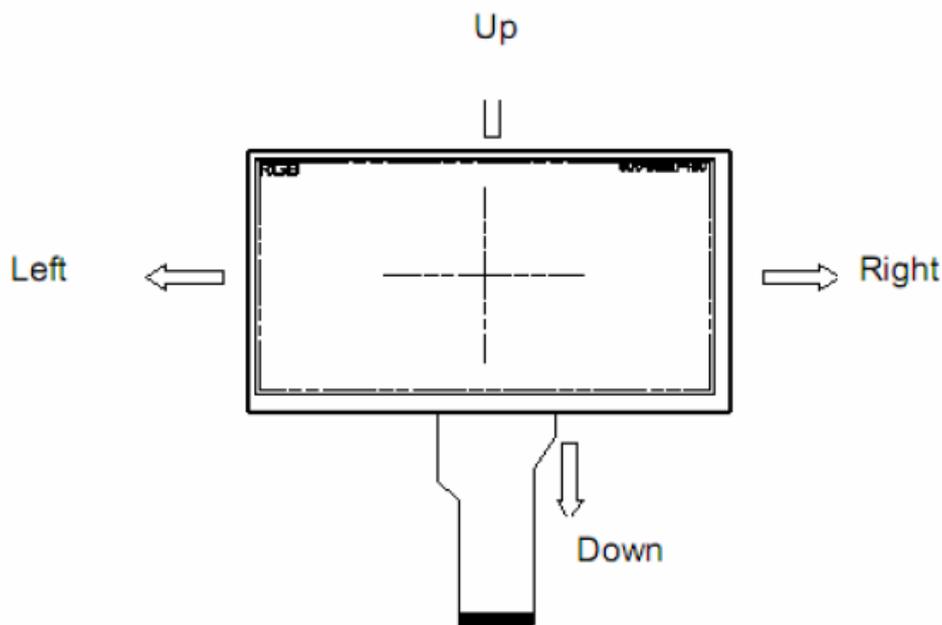
Note 2: When input 18 bits RGB data, the two low bits of R,G and B data must be grounded.

Note 3: Data shall be latched at the falling edge of DCLK.

Note 4: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	L/R	
GND	DV _{DD}	Up to down, left to right
DV _{DD}	GND	Down to up, right to left
GND	GND	Up to down, right to left
DV _{DD}	DV _{DD}	Down to up, left to right

Note 5: Definition of scanning direction. Refer to the figure as below:



Note 6: Global reset pin. Active low to enter reset state. Suggest to connect with an RC reset circuit for stability. Normally pull high.

Note 7: Dithering function enable control, normally pull high.

When DITHB="1",Disable internal dithering function,

When DITHB="0",Enable internal dithering function.

D. Optical specifications

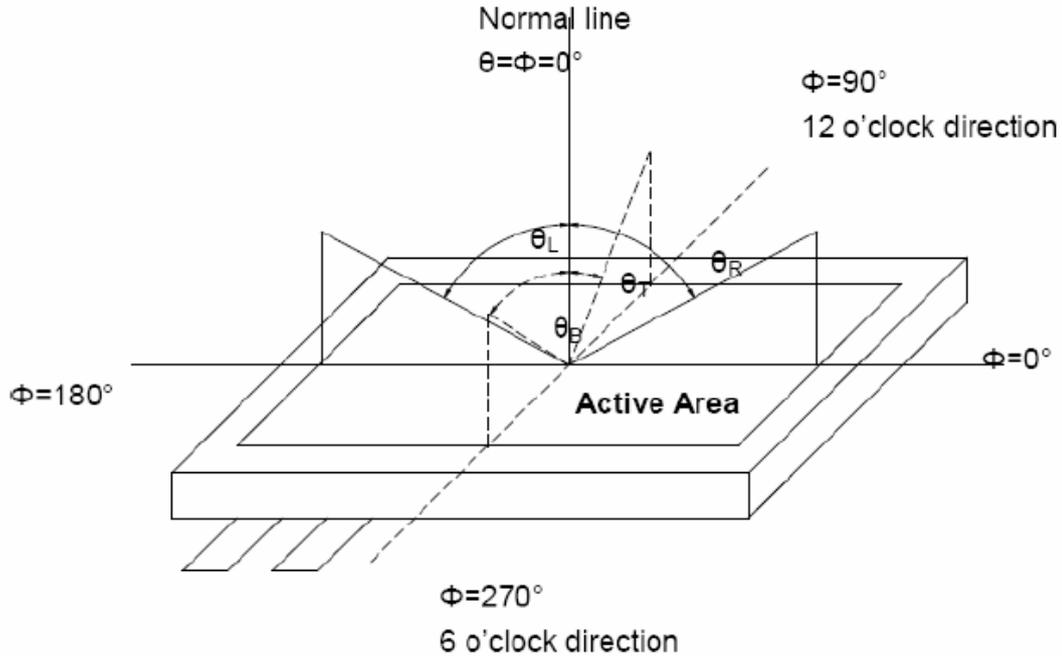
Item	Symbol	Condition	Specification			Unit	Remark
			Min.	Typ.	Max.		
Response time	Ton	$\theta = 0^\circ$	-	10	20	ms	Note 3
	Tof		-	15	30		
Contrast ratio	CR	$\theta = 0^\circ$	400	500	-	-	Note 4
Viewing angle	Top	$CR \geq 10$	40	50	-	deg.	Note 1
	Bottom	$CR \geq 10$	60	70	-		
	Left	$CR \geq 10$	60	70	-		
	Right	$CR \geq 10$	60	70	-		
Brightness (Center)	YL	-	200	250	-	nit	Note 6
Color chromaticity(CIE) (CF only with ITO)	Wx	$\theta = 0^\circ$	-0.05	0.310	+0.05	-	Note 2 Note 5
	Wy			0.330			
	Rx			0.587			
	Ry			0.331			
	Gx			0.344			
	Gy			0.571			
	Bx			0.146			
	By			0.092			
Cross talk	Ct	-	-	-	2	%	Note 8
Color saturation	NTSC	CIE1931		50		%	
Transmittance	Trans	-	4.80	5.11	-	%	Note 7

Test conditions:

1. The ambient temperature is 25°C.
2. The test systems refer to Note 2.
3. All the pertinent Module data measured based on as follow
(Source IC: HX82 64-E COG Himax, IN39419BH-D/4ID COG 聯詠, EK9713BCGA FITI
Gate IC: EK73002ACGA FITI, IN52001H-D/4IC COG Novatek, HX8664-B00BPD400 COG Himax)

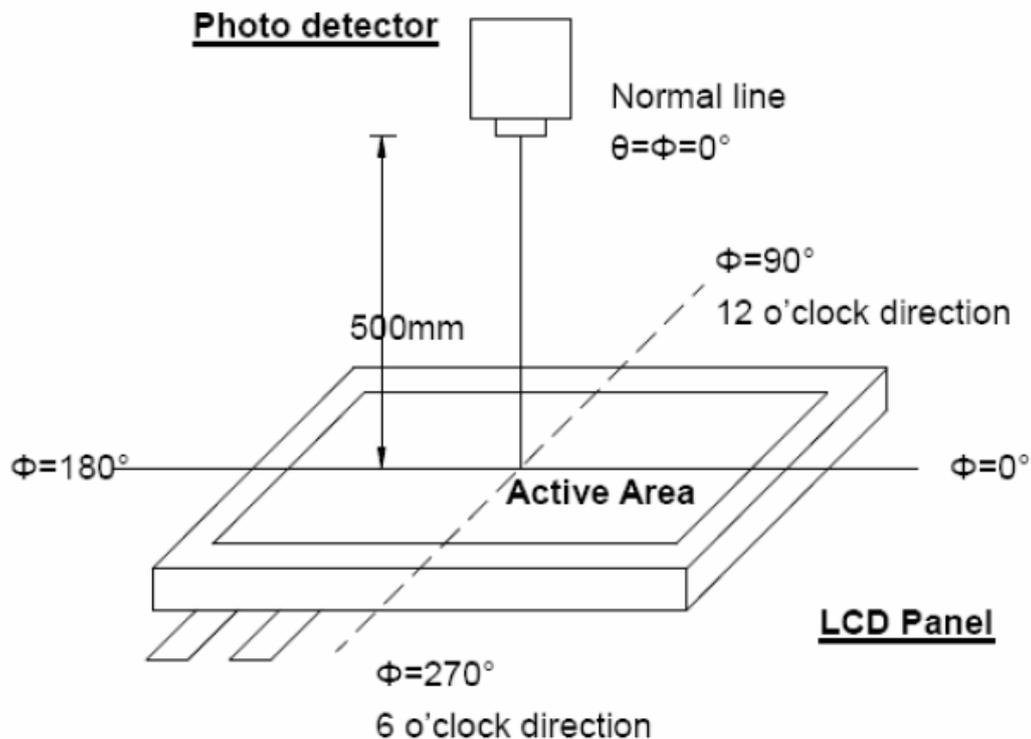
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Note 1: Definition of viewing angle range



Note 2: Definition of optical measurement system.

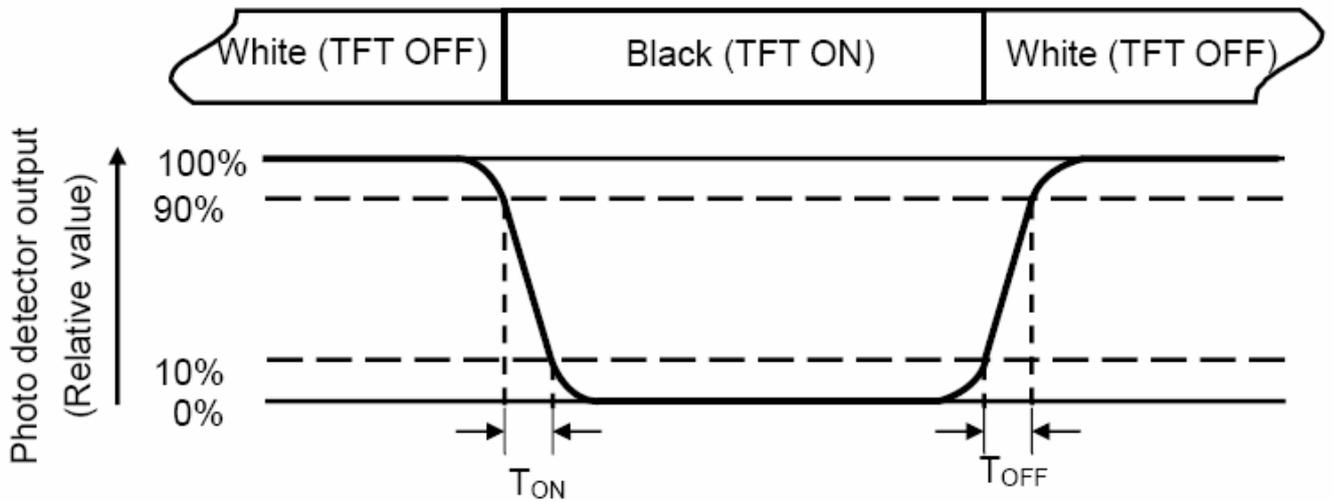
The optical characteristics should be measured in dark room. The optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view : 1° /Height 500mm.)



Note 3: Definition of response time:

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.

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Note 4: Definition of contrast ratio:

Contrast ratio is calculated by the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "white" state}}{\text{Brightness on the "black" state}}$$

Note 5: Definition of color chromaticity (CIE 1931)

Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel.

Note 7: Definition of Transmittance

Where LMOD defined as measured luminance at center point of MOD with "White" state

LBL defined as measured luminance at center point of Backlight Unit with same MOD. The

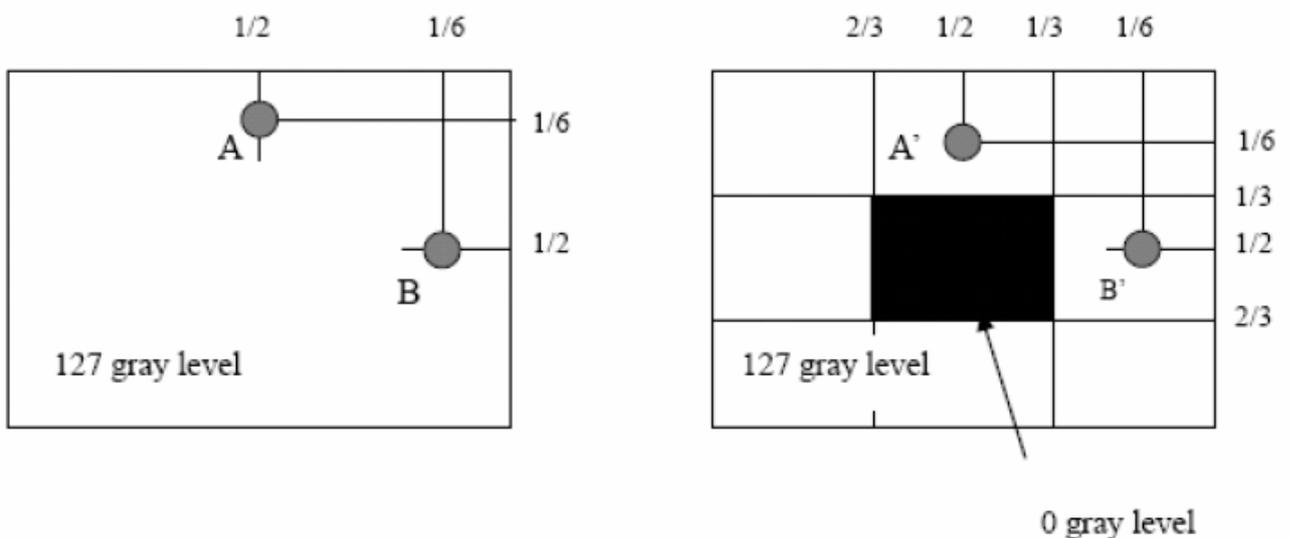
Backlight Unit has composite optical films, except "gain" characteristic optical films.

$$\text{Tr}\% = (\text{LMOD} / \text{LBL}) * 100\%$$

Note 8: Definition of crosstalk:

$$|L_A - L_{A'}| / L_A \times 100\% \leq 2\% \text{ max.}, L_A \text{ and } L_{A'} \text{ are brightness at location A and } A'$$

$$|L_B - L_{B'}| / L_B \times 100\% \leq 2\% \text{ max.}, L_B \text{ and } L_{B'} \text{ are brightness at location B and } B'$$



E. Electronic Specification

(1). Typical Operation Conditions

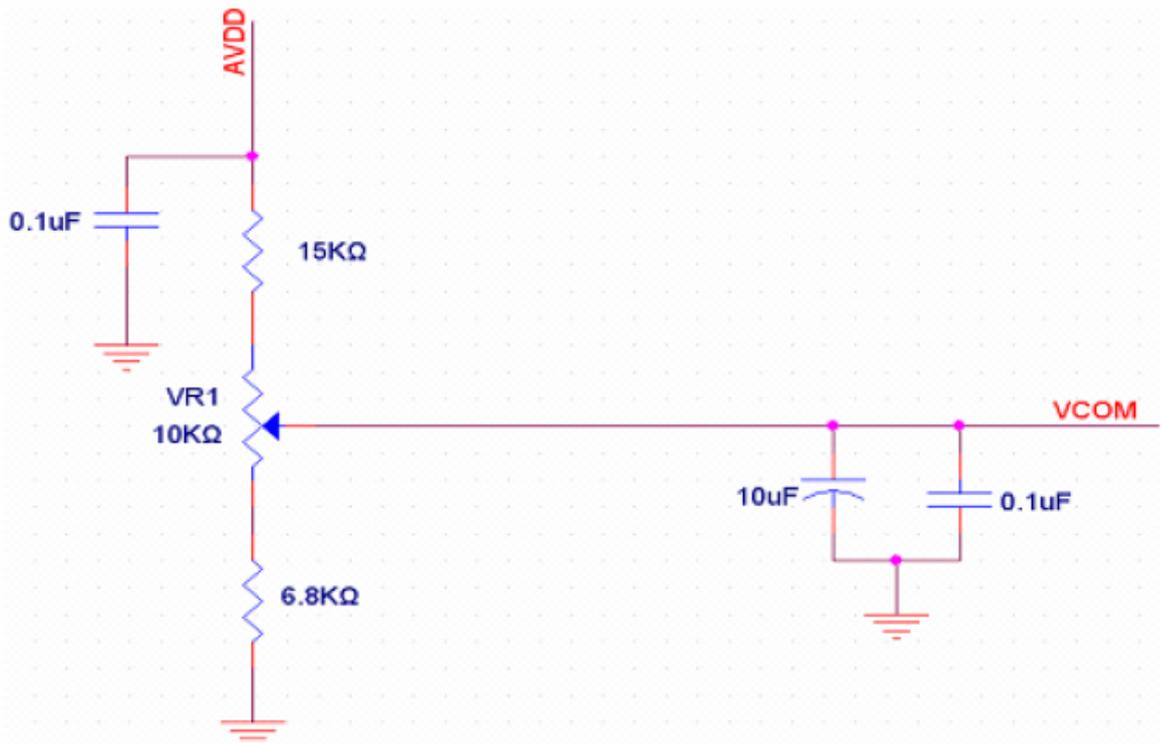
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	DV _{DD}	3.0	3.3	3.6	V	Note 2
	AV _{DD}	10.2	10.4	10.6	V	
	V _{GH}	15.3	16.0	16.7	V	
	V _{GL}	-7.7	-7.0	-6.3	V	
Input signal voltage	V _{COM}	2.6	(3.6)	4.6	V	Note 4
Input logic high voltage	V _{IH}	0.7 DV _{DD}	-	DV _{DD}	V	Note 3
Input logic low voltage	V _{IL}	0	-	0.3 DV _{DD}	V	

Note 1: Be sure to apply DV_{DD} and V_{GL} to the LCD first, and then apply V_{GH}.

Note 2: DV_{DD} setting should match the signals output voltage (refer to Note 3) of customer's system board.

Note 3: DCLK, HS, VS, RESET, U/D, L/R, DE, R0~R7, G0~G7, B0~B7, MODE, DITHB.

Note 4: Typical V_{COM} is only a reference value. It must be optimized according to each LCM. Please use VR and base on below application circuit.



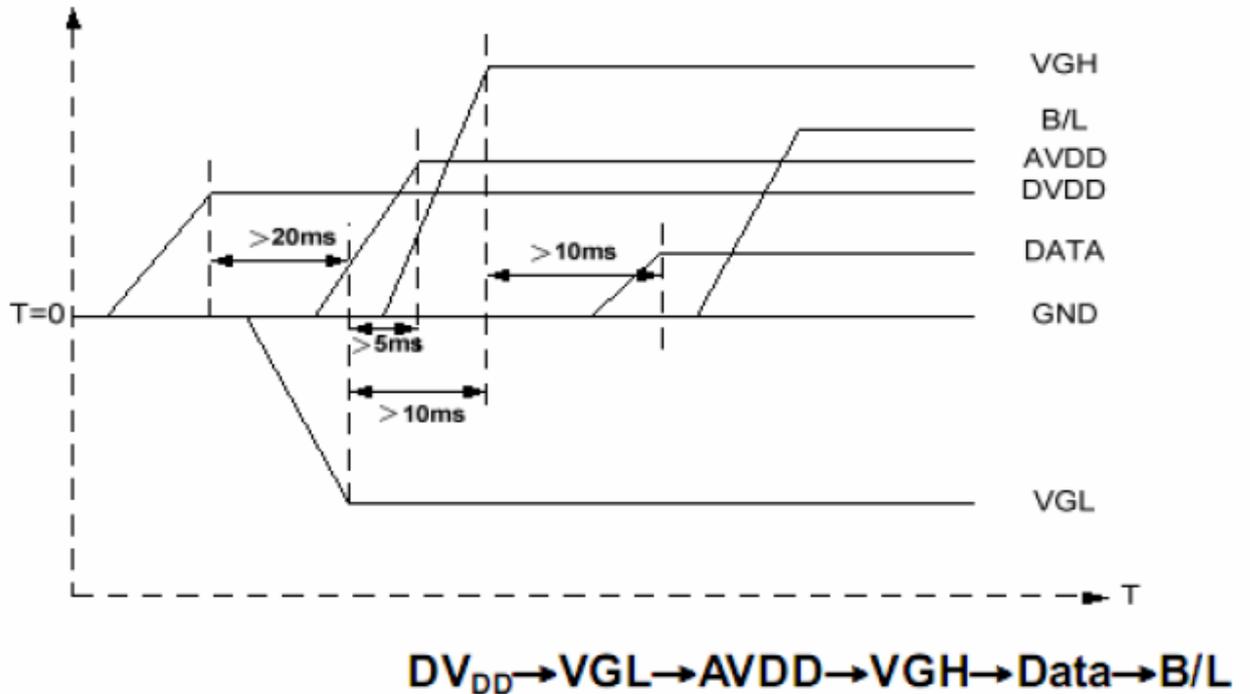
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(2). Current Consumption

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I_{GH}	-	0.2	1.0	mA	$V_{GH} = 16.0V$
	I_{GL}	-	0.2	1.0	mA	$V_{GL} = -7.0V$
	IDV_{DD}	-	4.0	10	mA	$DV_{DD} = 3.3V$
	$I_{AV_{DD}}$	-	20	50	mA	$AV_{DD} = 10.4V$

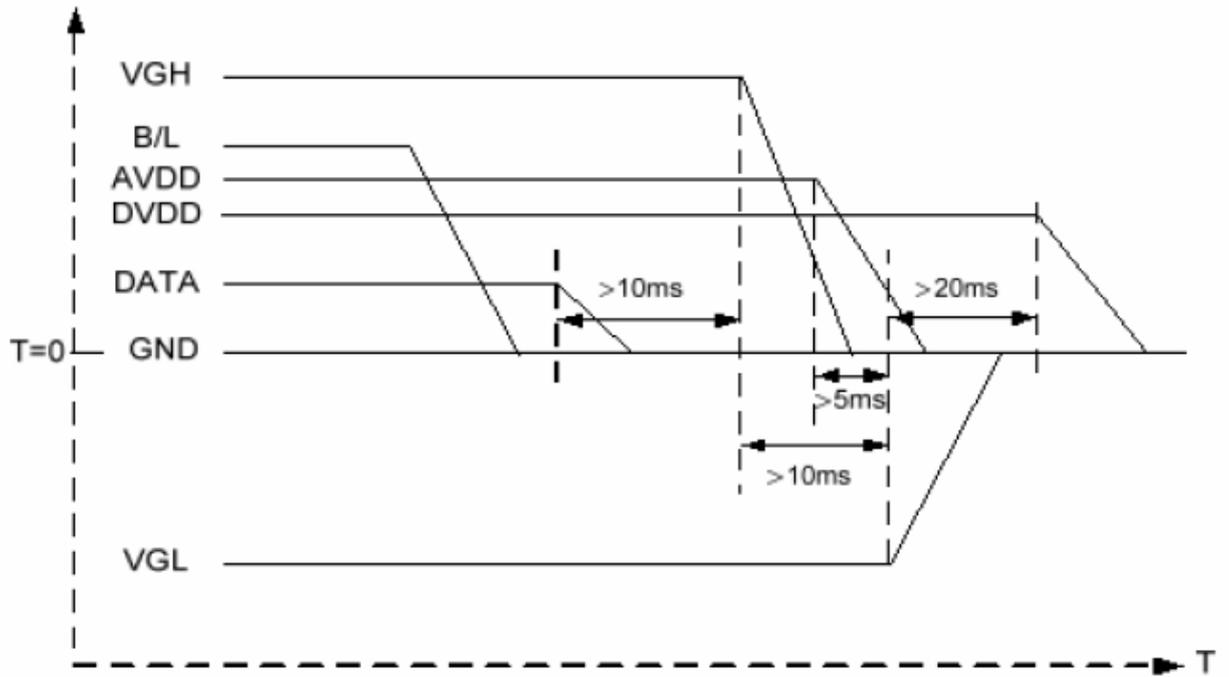
(3). Power Sequence

Power on:



Power off:

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B/L→Data→VGH→AVDD→VGL→DV_{DD}

Note: Data include R0~R7, B0~B7, GO~G7, U/D, L/R, DCLK, HS,VS,DE.

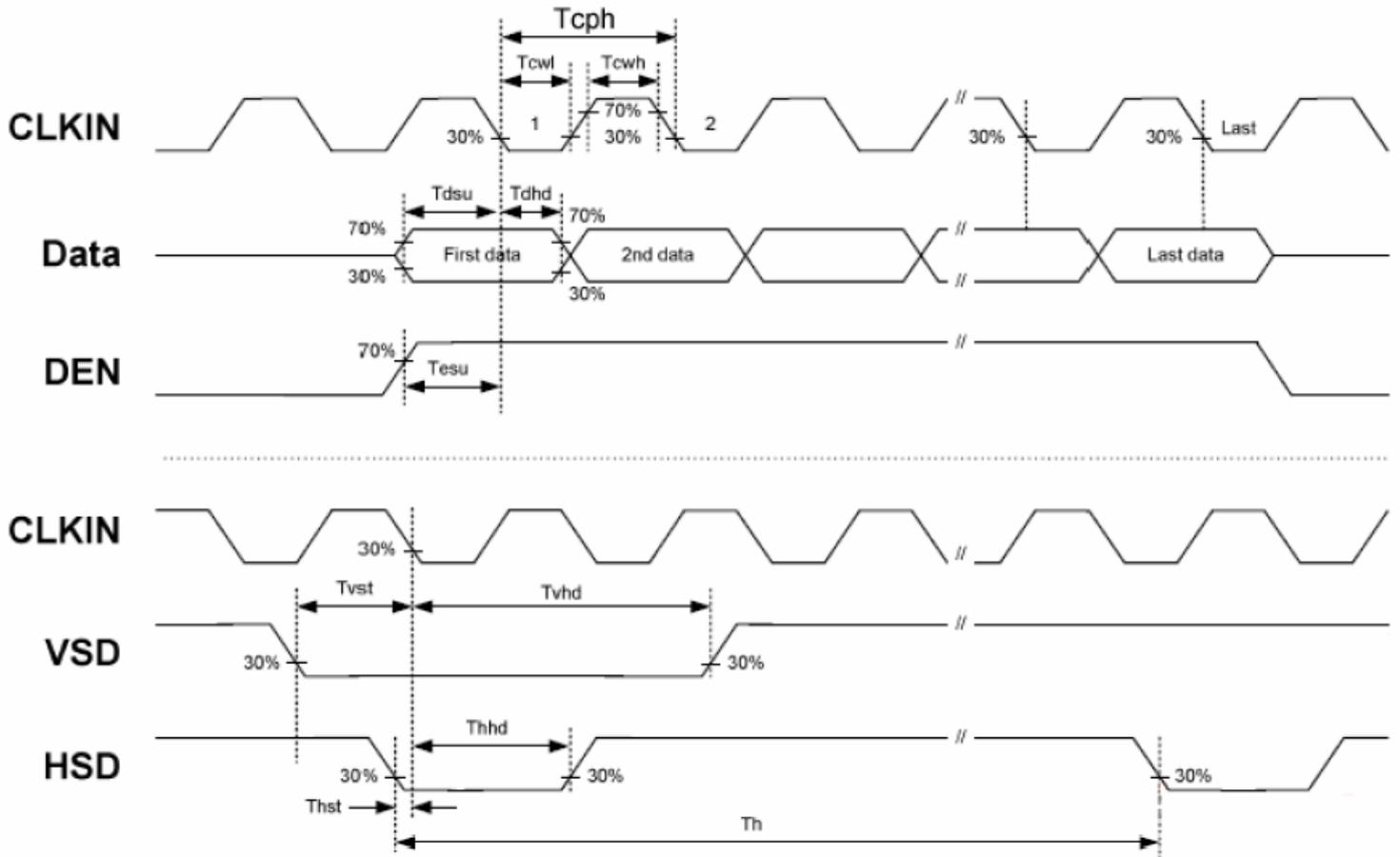
(4). Timing Characteristics

4-1: AC Electrical Characteristics:

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
HS setup time	T_{hst}	8	-	-	ns	
HS hold time	T_{hhd}	8	-	-	ns	
VS setup time	T_{vst}	8	-	-	ns	
VS hold time	T_{vhd}	8	-	-	ns	
Data setup time	T_{dsu}	8	-	-	ns	
Data hole time	T_{dhd}	8	-	-	ns	
DE setup time	T_{esu}	8	-	-	ns	
DE hole time	T_{ehd}	8	-	-	ns	
DV _{DD} Power On Slew rate	T_{POR}	-	-	20	ms	From 0 to 90% DV _{DD}
RESET pulse width	T_{Rst}	1	-	-	ms	
DCLK cycle time	T_{coh}	20	-	-	ns	
DCLK pulse duty	T_{cwh}	40	50	60	%	

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4-2: Input Clock and Data Timing Diagram:



4-3: Timing:

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK Frequency	fclk	26.4	33.3	46.8	MHz	
One Horizontal Line	th	862	1056	1200	DCLK	
HS pulse width	thpw	1	-	40	DCLK	
HS Blanking	thb	46	46	46	DCLK	
HS Front Porch	thfp	16	210	354	DCLK	

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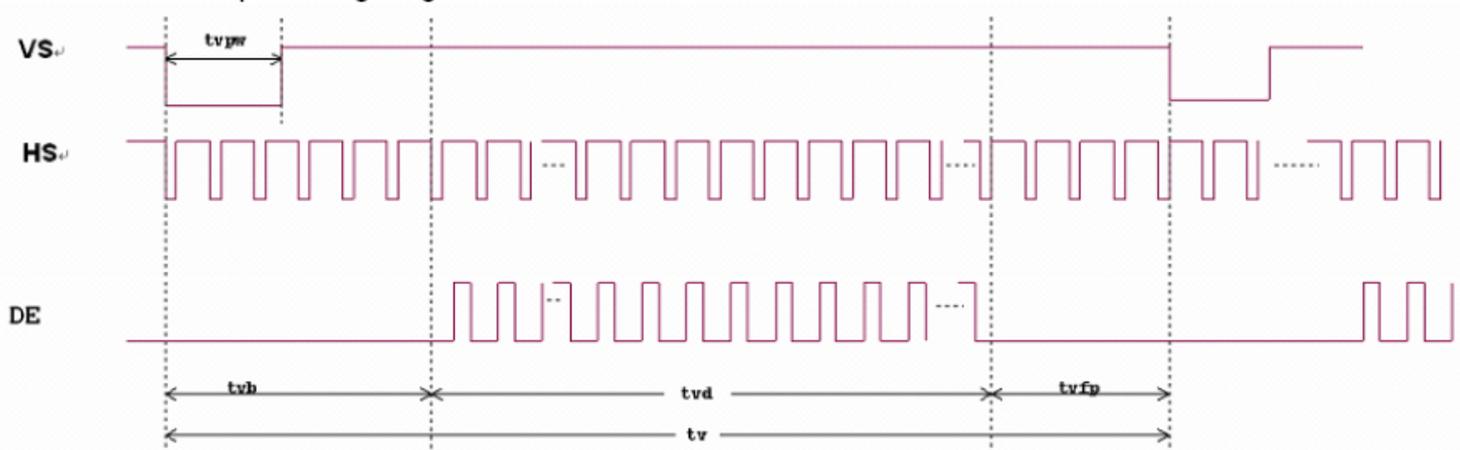
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Vertical Display Area	tvd	-	480	-	TH	
VS period time	tv	510	525	650	TH	
VS pulse width	tvpw	1	-	20	TH	
VS Blanking	tvb	23	23	23	TH	
VS Front Porch	tvfp	7	22	147	TH	

4-4: Data Input Format

Horizontal input timing diagram:



Vertical input timing diagram:



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F. Safety

(1) Sharp Edge Requirements

There will be no sharp edges or corners on the cell that could cause injury.

(2) Materials

There will be no carcinogenic materials used anywhere in the cell. If toxic materials are used, they will be reviewed and approved by the responsible CTC Toxicologist.

G. Display quality

The display quality of the color TFT-LCD FOG should be in compliance with the CTC's Incoming inspection standard.

H. Handling precaution

The Handling of the TFT-LCD should be in compliance with the CTC's handling principle standard.

I. Reliability Assurance Specification

Test Item	Test Condition	Judgment	Remark
High temperature & high humidity storage	60℃, 90%RH, Storage, 240hr	Note 1	Note 2
High temperature & high humidity operation	60℃, 90%RH, Operating, 240hrs	Note 1	Note 2
Low temperature storage	-30℃, Storage, 240hrs	Note 1	Note 2
High temperature storage	80℃, Storage, 240hrs	Note 1	Note 2
Low temperature operation	-20℃, Operating, 240hrs	Note 1	Note 2
High temperature operation	70℃, Operating, 240hrs	Note 1	Note 2
Pressure Cooker Test	121℃, 100%RH, 2atm, 16hr burning	Note 3	Note 2
Image Sticking	45℃, 6hrs	Note 1	Note 2
Thermal Shock (non-operation)	-30℃(0.5hr) <-> 80℃(0.5hr)	Note 1	Note 2
	100cycles		

Note1: Pass: Normal display image with no obvious non-uniformity and no line defect.

Partial transformation of the module parts should be ignored.

Fail: No display image, obvious non-uniformity, or line defects.

Note2: Evaluation should be tested after storage at room temperature for two hours.

Note3: Test Result for reference.

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J. Packing Form

(1) Package material Table

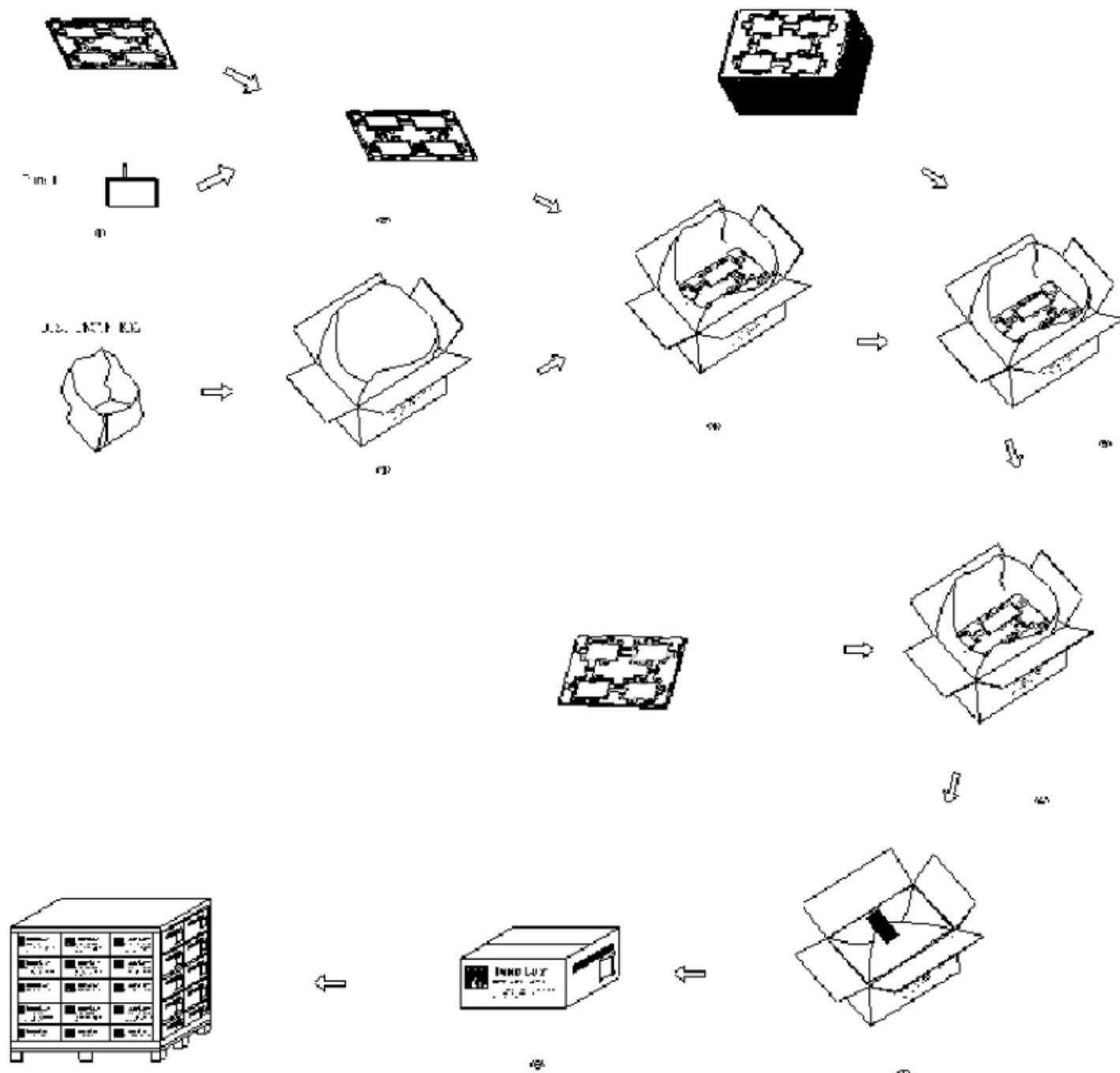
No.	Item	Model (Material)	Dimensions(mm)	Unit Weight (kg)	Quantity (pcs)	Remark
1	Panel Assembly	AT070TN90 V.1	162.5 × 96.3 × 1.43	0.0445	80	
2	Dust-Proof Bag	PE	700 x 530	0.050	1	
3	Tray	PET	505 x 338 x 16.5	0.200	21	Anti-static
4	Partition	Corrugated Paper	512 x 350 x 225	0.290	1	
6	Carton	Corrugated Paper	530 x 355 x 255	0.810	1	
7	Total weight	8.91± 5%Kg				

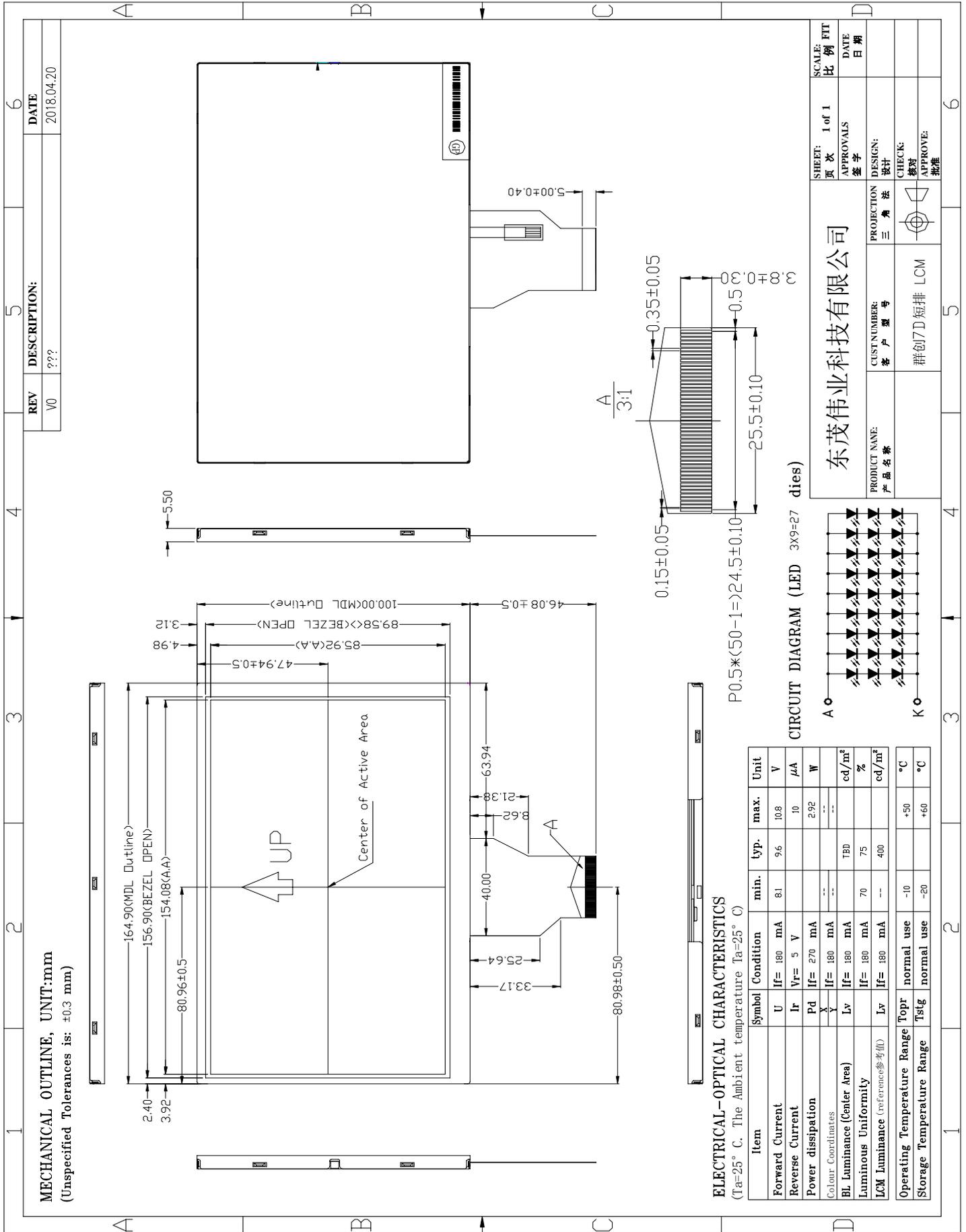
(2) Packaging Quantity

(1) LCM quantity per tray :	2 row x 2column = 4 pcs
(2) Total LCM quantity of per Carton:	4 pcs/ tray x 21 tray / Box = 80 pcs

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(3) Package Drawing





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4. 1 测定条件

在无特别指定条件下，产品于温度 $25 \pm 2^\circ\text{C}$ ，湿度 $60 \pm 10\%$ 环境条件进行测试。

5. 品质要求

5. 1 光学特性

项目	符号	条件	规格			单位	备注
			Min	Typ	Max		
均匀度	ΔI	面内九点	70	75	-	%	
色度	X	中心点					
	Y	中心点					
模组亮度	I	中心点	--	400	-	cd/m ²	

注 1：表内测定点规格需在发光条电流(180)mA，周围环境温度 $25 \pm 2^\circ\text{C}$ 测试。

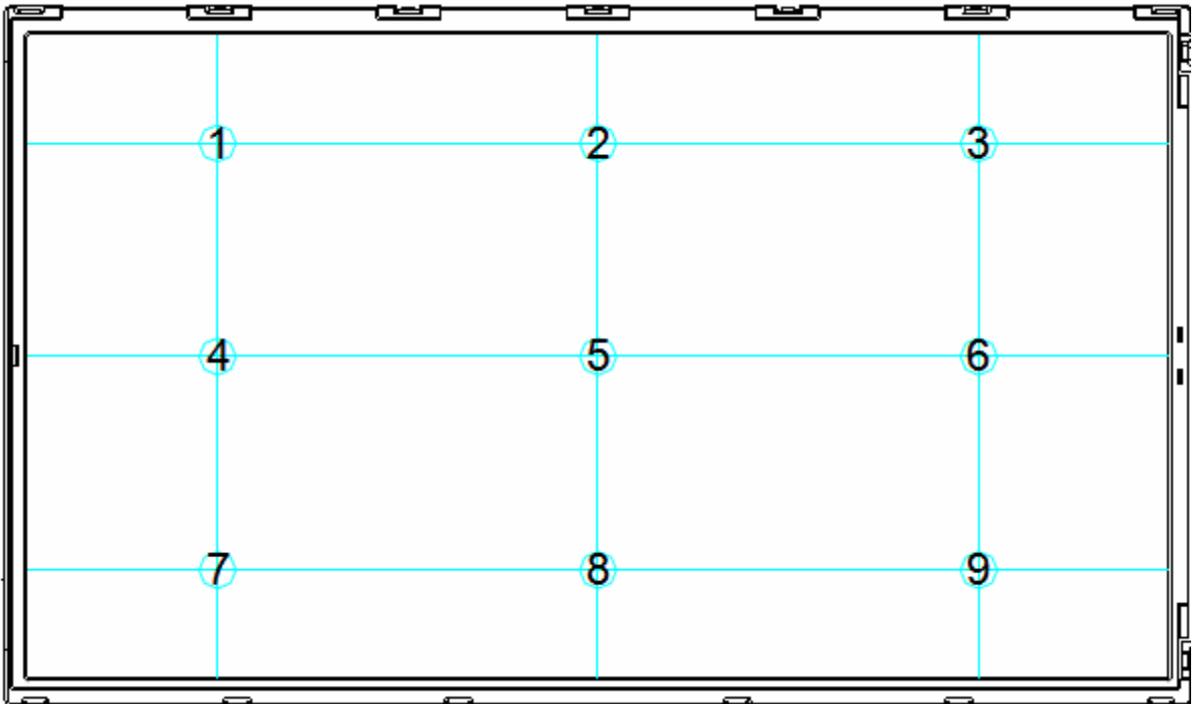
注 2：测试条件：1) 以规定的电流电压正常点亮；

2) 测试环境：暗室（10Lux 以下）

3) 辉度、色坐标测试点：见下图

4) 光学特性测试点图

注 3：均匀性 $\Delta I = (I_{\text{MIN}} \div I_{\text{MAX}}) \times 100\%$



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5. 2 电气特性

5. 2. 1 LED电性规格

项目	符号	条件	规格			单位	备注
			Min	Typ	Max		
LED电流	IL	常温25℃	-	20	30	mA	
LED电压	VL	常温25℃	2.7	3.2	3.6	V	IL=20mA
点亮延迟到	TD	注2				sec	

注1: LED点亮电流不可超过最大电流限定值, 否则LED寿命和亮度将会受到严重影响。

注2: 点亮测试延迟时间: ON 30sec--OFF 30sec

5. 2. 2 LED灯条适用电性规格

项目	符号	条件	规格			单位	备注
			Min	Typ	Max		
灯条电压	VL	常温25℃	8.1	9.6	10.8	Vrms	IL=180mA
灯条电流	IL	常温25℃	-	180	270	mArms	
点亮功率	WL	常温25℃			(2.92)	W	IL=270mA

注1: 灯条点亮功率需在要求范围以内。

5. 3 产品寿命

周围温度+25℃±2℃, 湿度 60±20%RH, 以每灯 20mA 工作电流之推荐使用条件, 背光源之寿命为:

辉度减半平均寿命: 30,000 小时以上

辉度减半保证寿命: 20,000 小时以上

注: 辉度减半平均寿命指背光源平均辉度衰减到初期平均辉度的 50%所需时间。