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< ◇ > PRELIMINARY SPECIFICATION

< ◆ > APPROVAL SPECIFICATION

<b>CUSTOMER</b>
<b>APPROVED BY</b>
<b>DATE:</b>

DESIGNED	CHECKED	APPROVED

## **REVISION RECORD**

<b><u>REV NO</u></b>	<b><u>REV DATE</u></b>	<b><u>PAGE</u></b>	<b><u>CONTENTS</u></b>	<b><u>ISSUER</u></b>
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## 1.0 GENERAL SPECIFICATIONS

**070BH5044D3H6II** color active matrix LCD module incorporating amorphous silicon **TFT** (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver IC, FPC and a back light unit. The module display area contains **1024x 600** pixels. This product accords with RoHS environmental criterion.

Item	Contents	Unit
Viewing direction	Full View	
Display mode	Normally Black	
Shape size	164.9*100*3.25	mm
Display Area	154.21*85.92	mm
Number of Pixels	1024(RGB) x600	/
Backlight Type	3*6 chips white LED	/
Interface Type	TTL	/
LCM Luminance	250 (typ)	cd/m <sup>2</sup>
Response Time (Tr+Tf)	25ms (typ)	
Contrast Ratio	700(Typ)	

## 2.0 ABSOLUTE MAXIMUM RATINGS

The following are maximum values which, if exceeded may cause operation or damage to the unit.

Item	Symbol	Min	Max	Unit	Note
Digital Supply Voltage	VDD	-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	

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

## 3.0 ELECTRICAL CHARACTERISTICS

### 3.1 Typical Operation Condition

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Digital Supply Voltage	VDD	3.0	3.3	3.6	V	-
Analog Power Supply Voltage	AVDD	9.2	9.6	10.0	V	-
Gate On Power Supply Voltage	VGH	17	18	19	V	-
Gate Off Power Supply Voltage	VGL	-7.0	-6.0	-5.0	V	-
Common Power Supply Voltage	VCOM	3.6	3.8	4.0	V	-

### 3.2 TFT-LCD Current Consumption

Item	Symbol	Condition	Min.	TYP	Max.	Unit	NOTE
Gate on Current	IVGH	VGH=18		0.22		MA	
Gate off Current	IVGL	VGL=-6.0		0.35		MA	
Digital Current	IVDD	VDD=3.3		7		MA	
Analog Current	IAVDD	AVDD=9.6		16		MA	
LED Current	ILED			20		mA	

## 3.2 BACKLIGHT CHARACTERISTICS

Item	Symbol	Min	Typ	Max	Unit	Condition
Forward voltage	Vf	9.0	9.6	10.5	V	If=120mA
Luminance	Lv	220	250	-	cd/m m²	If=120mA
Number of LED	--	18			Piece	--
Connection mode	P	3chips serial *6			--	--

**070BH5044D3H6II**

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1024RGB600dots

## 5.0 INTERFACE PIN CONNECTIONS

Pin No.	Symbol	Function
1,2	LED+	Power for LED backlight (Anode)
3,4	LED-	Power for LED backlight (Cathode)
5	GND	Power ground
6	VCOM	Common Voltage
7	VDD	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
12-19	B7-B0	Blue Data
20-27	G7-G0	Green Data
28-35	R7-R0	Red Data
36	GND	Ground
37	DCLK	Clock signal
38	GND	Ground
39	SHLR	Left or Right Display Control
40	UPDN	Up / Down Display Control
41	VGH	Gate on voltage
42	VGL	Gate off Voltage
43	AVDD	A Power supply for the analog power
44	RESET	Global reset pin(3.3V)
45	NC	Not connect
46	VCOM	Common Voltage
47	DITH	Dithering setting DITH=" H " 6bit resolution(last 2 bit of input data truncated) DITH=" L " 8bit resolution(default setting)
48	GND	Power ground
49.50	NC	Not connect

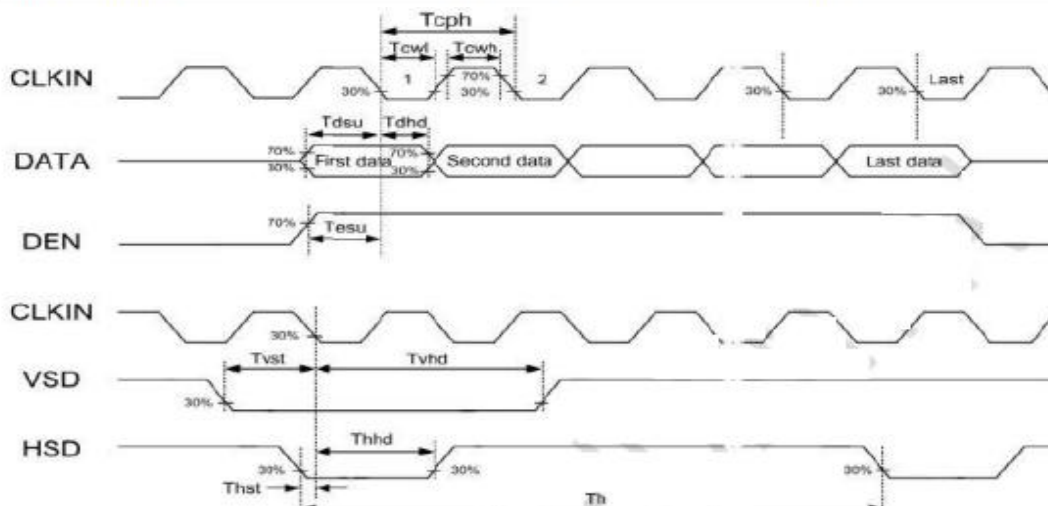
## 6.0 TIMING CHARACTERISTICS OF INPUT SIGNAL

### 6.01 Input Timing Table

	ITEM	SYMBOL	MIN	TYP	MAX	UNIT
	DCLK Frequency	Fclk	40.8	51.2	67.2	MHz
DE mode	Horizontal Display Area	Thd		1024		Dclk
	HSD Period	Th	1114	1344	1600	Dclk
	Horizontal Blank	thb+thfp	90	320	376	Tclk
	Vertical Display Area	tvd		600		TH
	VSD Period	Tv	610	635	800	TH
	vsd Blanking	tvbp+tvfp	10	35	200	TH
HV mode	DCLK Frequency	Fclk	44.9	51.2	63	MHz
	Horizontal Display Area	Thd		1024		Dclk
	HSD Period	Th	1200	1344	1400	Dclk
	HSD Pulse Width	thpw	1	-	140	Dclk
	HSD Back Porch	thpb		160		Dclk
	HSD fornt Porch	thfp	16	160	216	Dclk
Vertical Timing	Vertical Display Area	Tvd		600		Tclk
	VSD Period	Tv	624	635	750	th
	VSD Pulse Width	Tvpw	1	-	20	th
	Vertical Front Porch	Tvb	-	20	-	th
	VSD Back Porch	Tvbp		23		th
	VSD Fornt Porch	Tvfp	1	12	127	th

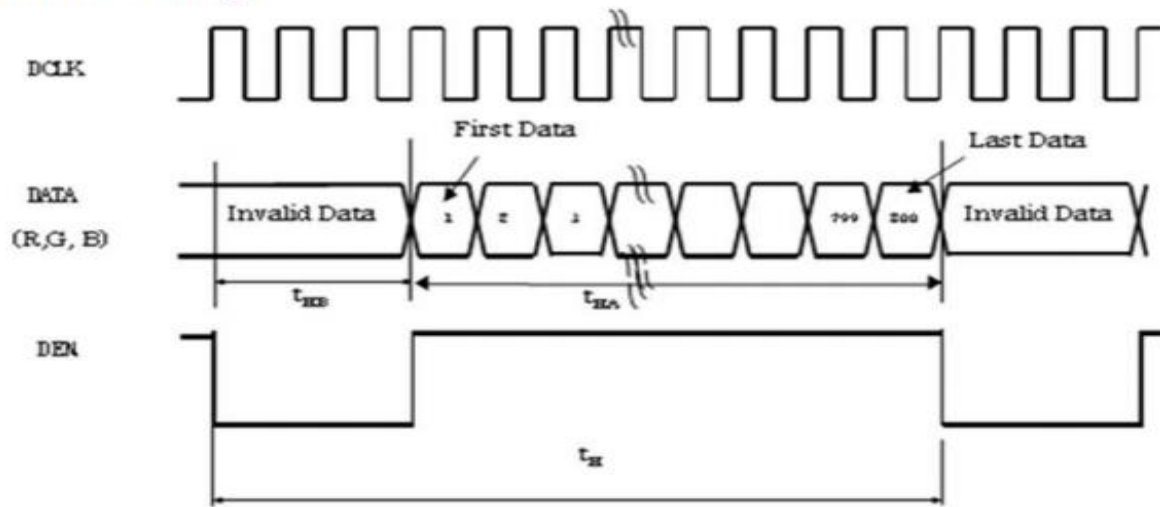
### 6.0 2 Clock and Data Timing Diagram

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	

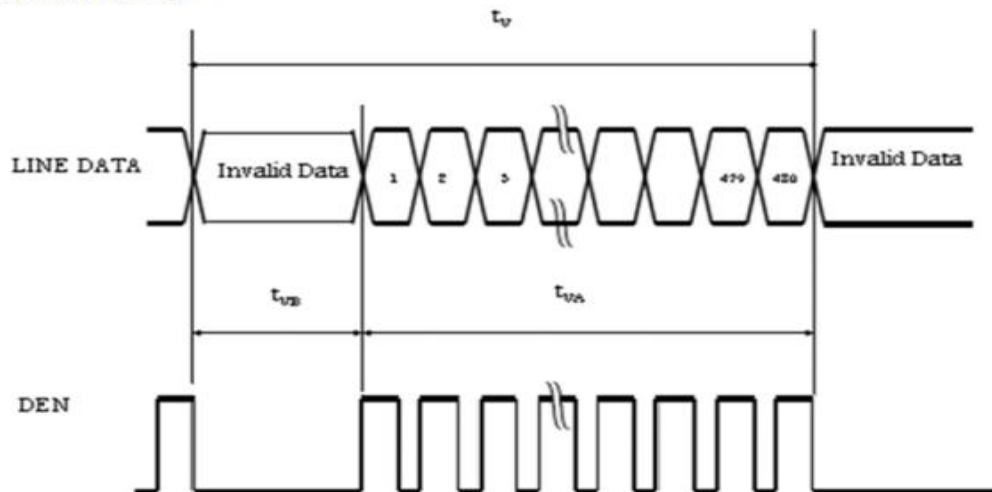




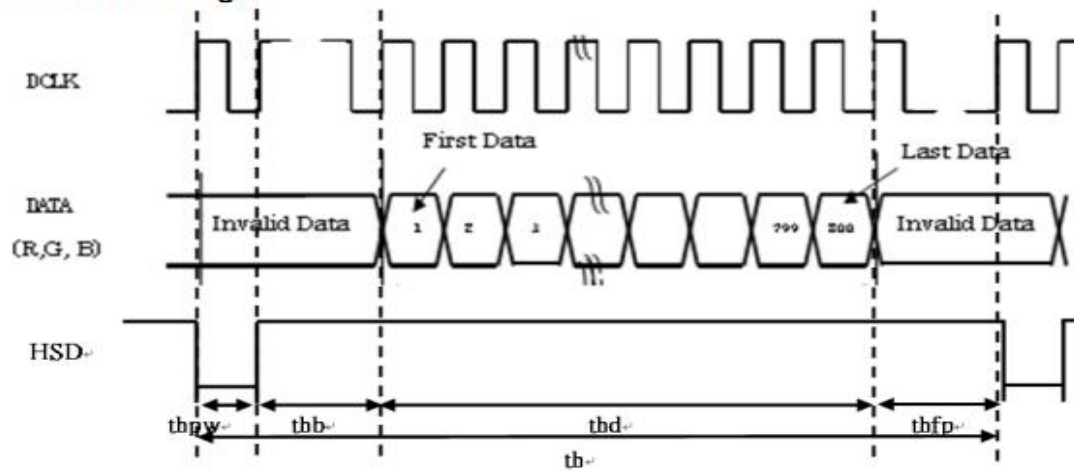
## DE Mode Horizontal timing :



## Vertical timing :

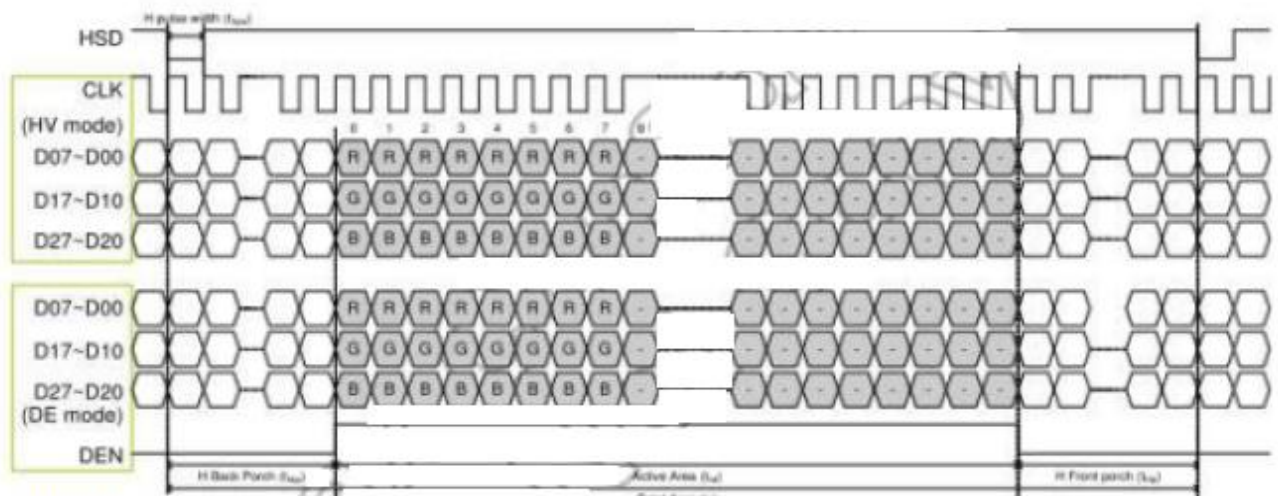


## SYNC Mode Horizontal timing :

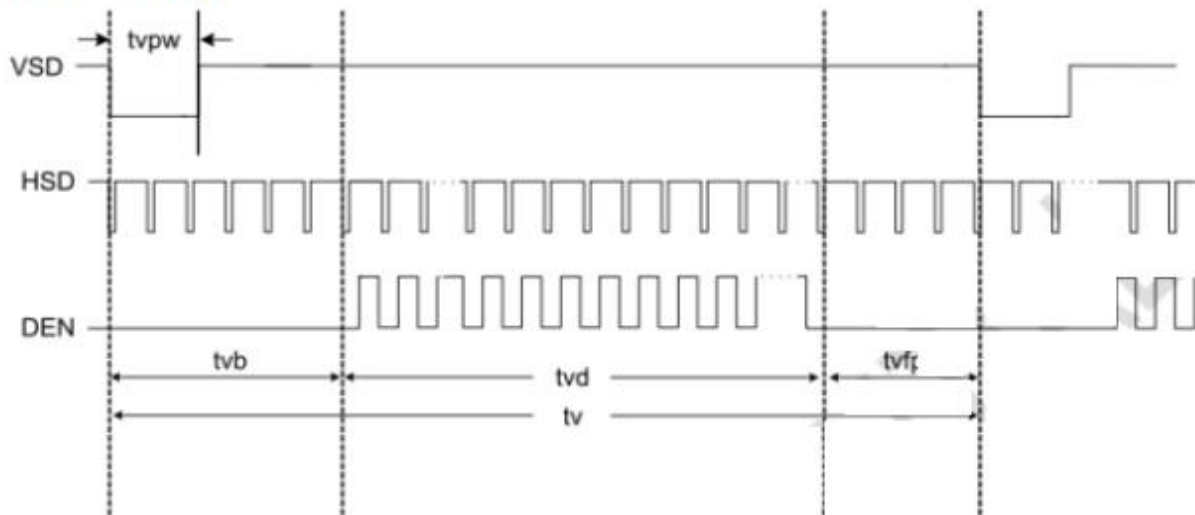


## Data Input Format

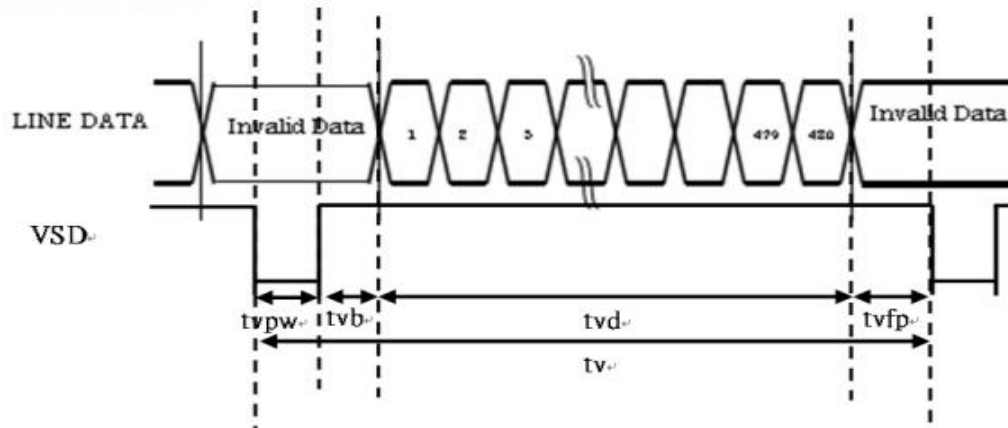
### Horizontal timing :



### Vertical timing :



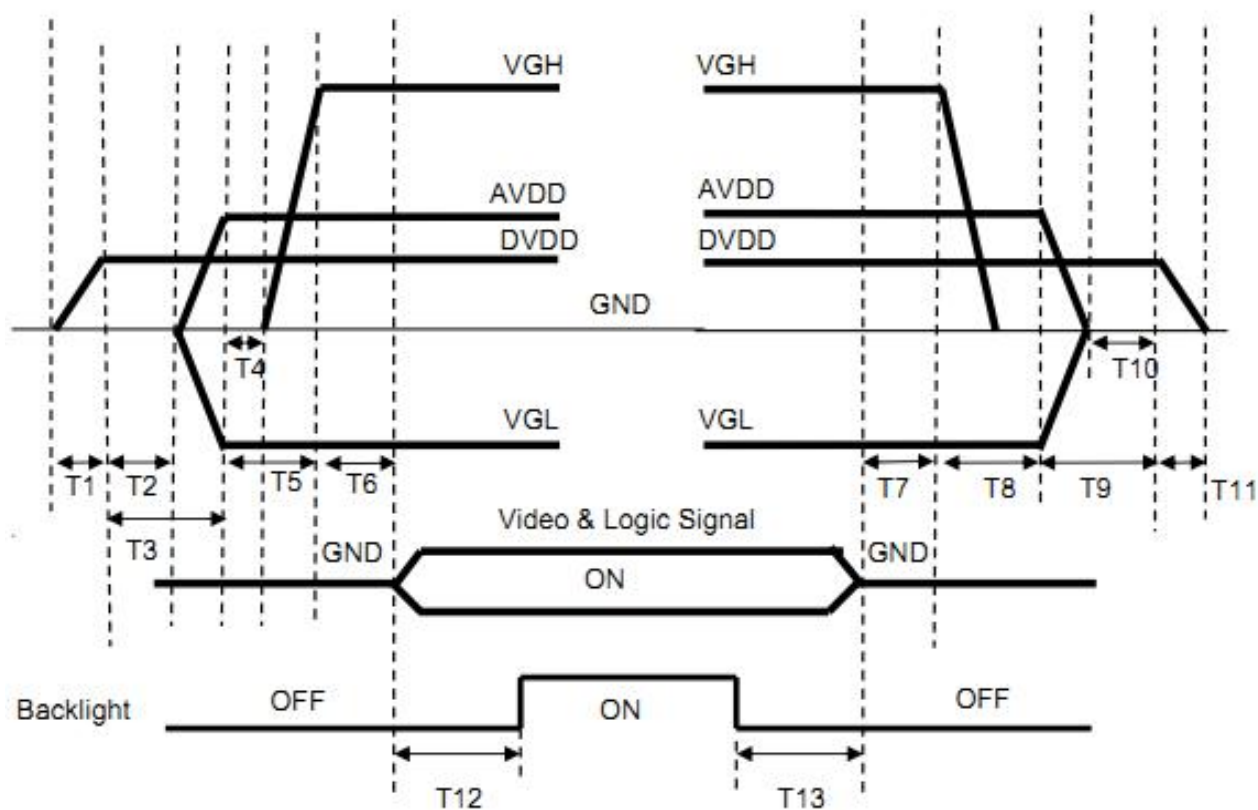
### Vertical timing :



### 6.03 Power 、Signal sequence

Power On : DVDD→AVDD/VGL →VGH →Video & Logic Signal→Backlight

Power Off : Backlight→Video & Logic Signal→ VGH→AVDD/VGL→DVDD



$0 < T1 \leq 10\text{ms}$   
 $T2 > 0\text{ms}$   
 $T3 > 20\text{ms}$   
 $T4 > 0\text{ms}$   
 $T5 > 10\text{ms}$   
 $0 < T6 \leq 10\text{ms}$   
 $T12 \geq 200\text{ms}$

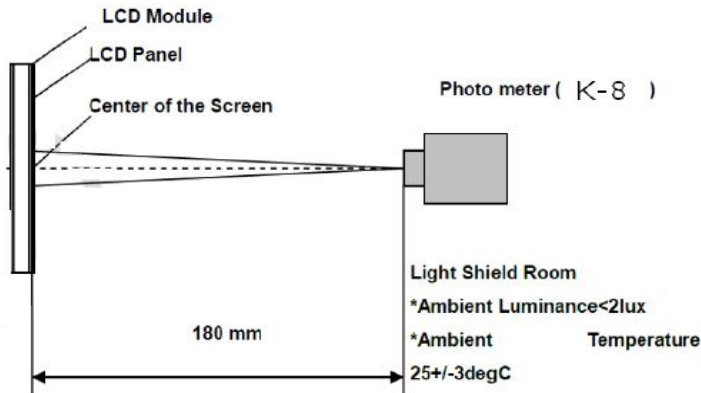
$T7 > 0\text{ms}$   
 $T8 > 0\text{ms}$   
 $T9 > 0\text{ms}$   
 $T10 > 0\text{ms}$   
 $0 < T11 \leq 10\text{ms}$   
 $T13 \geq 200\text{ms}$

## 7.0 ELECTRO-OPTICAL CHARACTERISTICS

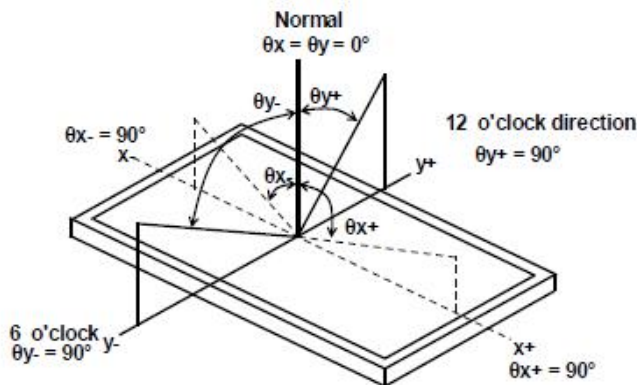
Ta=25°C

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Luminance		L	$\theta=\varphi$ 0°	220	250	--	cd/m²	Note1
Transmittance		L	$\theta=\varphi$ 0°	--	4.5	--	%	Note5
Contrast Ratio		CR	Point-5	--	700	--	-	Note3
Response Time		Rr+Tf	Point-5	--	25	--	ms	Note4
Viewing Angle K=Contrast Ratio>10	Horizontal	ΘL	CR > 10	--	85	--		Note2
		ΘR		--	85	--		
	Vertical	ΘU		--	85	--		
		ΘD		--	85	--	.	
Color Chromaticity	White	X	$\theta=\varphi$ 0°	0.260	0.310	0.360		Note1
		Y		0.350	0.400	0.450		
	Red	X	$\theta=\varphi$ 0°	TBD	TBD	TBD		
		Y		TBD	TBD	TBD		
	Green	X	$\theta=\varphi$ 0°	TBD	TBD	TBD		
		Y		TBD	TBD	TBD		
	Blue	X	$\theta=\varphi$ 0°	TBD	TBD	TBD		
		Y		TBD	TBD	TBD		
Color gamut ( NTSC ratio )					TBD		%	
Color Temperature					TBD			

Note 1 :Measure condition : $25^{\circ} \pm 2^{\circ} \text{C}$ ,  $60 \pm 100\% \text{RH}$ , under 10 Lux in the dark room. K-8, Viewing angle  $2^{\circ}$  .Measurement after lighting on 10 minus



Note2: Definition of Viewing Angle



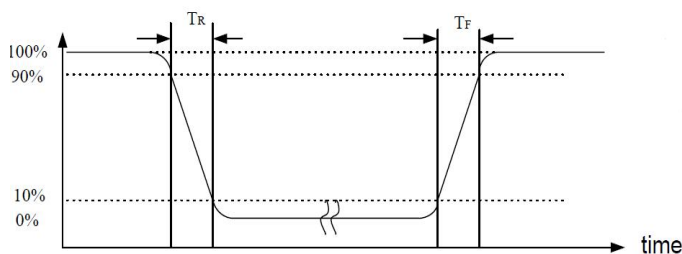
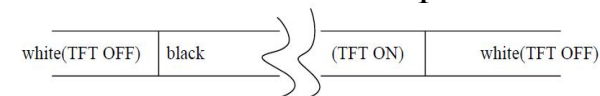
Note3: Definition of contrast ratio:

The contrast ratio can be calculated by the following expression

$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

$L_{255}$ : Luminance of gray level 255,  $L_0$ : Luminance of gray level 0

Note4: Definition of response time



Note (5) Definition of Transmittance( Module is without signal input)

$$\text{Transmittance} = \text{Center Luminance of LCD} / \text{Center Luminance of Back Light} \times 100\%$$

## 8.0 RELIABILITY

### 8.1 MTBF

The LCD module shall be designed to meet a minimum MTBF value of 50000 hours with normal.  
(25°C in the room without sunlight)

### 8.2 TESTS

NO.	Test Item	Test condition	Criterion
1	High Temperature Storage	60°C±2°C 96H Restore 2H at 25°C Power off	
2	Low Temperature Storage	-10°C±2°C 96H Restore 2H at 25°C Power off	
3	High Temperature Operation	50°C±2°C 96H Restore 2H at 25°C Power on	
4	Low Temperature Operation	0°C±2°C 96H Restore 2H at 25°C Power on	
5	High Temperature & Humidity Operation	50°C±2°C 90%RH 96H Power on	
6	Temperature Cycle	-10°C↔25°C↔60°C 30min 5min 30min after 10cycle, Restore 2H at 25°C Power off	After testing, cosmetic and electrical defects should not happen.
7	Vibration Test	10Hz~45Hz, 100m/s <sup>2</sup> , 120min	
8	Shock Test	Half-sinewave, 300m/s <sup>2</sup> , 11ms	
9	Drop Test(package state)	800mm, concrete floor, 1corner, 3edges, 6 sides each time	1.After testing, cosmetic and electrical defects should not happen. 2.the product should remain at initial place 3.Product uncovered or package broken is not permitted.
10	Electro Static Discharge Test (non-operation)	150pF, 330Ω, Contact: ±4KV, Air: ±8KV Measure point :LCD glass and metal bezel 200pF, 0Ω, ±200V contact test Measure point :IF connector pins	IEC61000-4-2: 2001 GB/T17626.2-2006

## 9.0 INSPECTION STANDARDS

### 9.1 Purpose

This incoming inspection standard shall be applied to TFT-LCD supplied by ZHONGSHEN to its customer.

### 9.2 Scope

This inspection standard contains Cosmetic Specifications and Electrical Specifications.

### 9.3 Classification of defects

#### 9.3.1 Major defect.

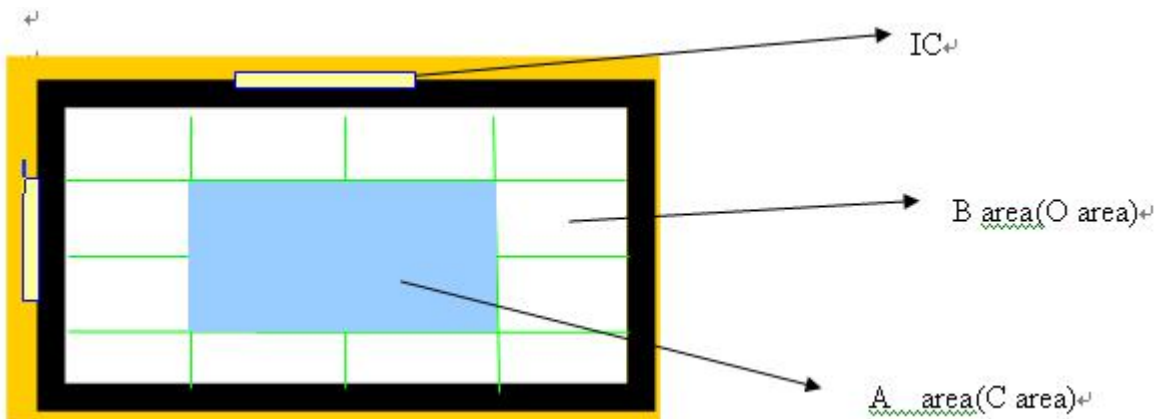
The major defect is a defect that is likely to result in product failure or reduction in Product's intended usage.

#### 9.3.2 Minor defect.

The minor defect is a defect that has little bearing on the effective use or Operation of the product.

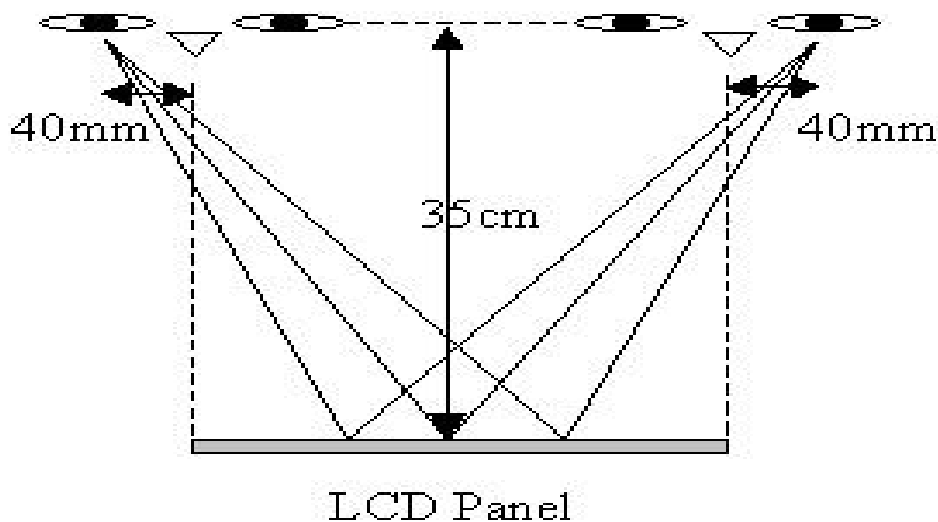
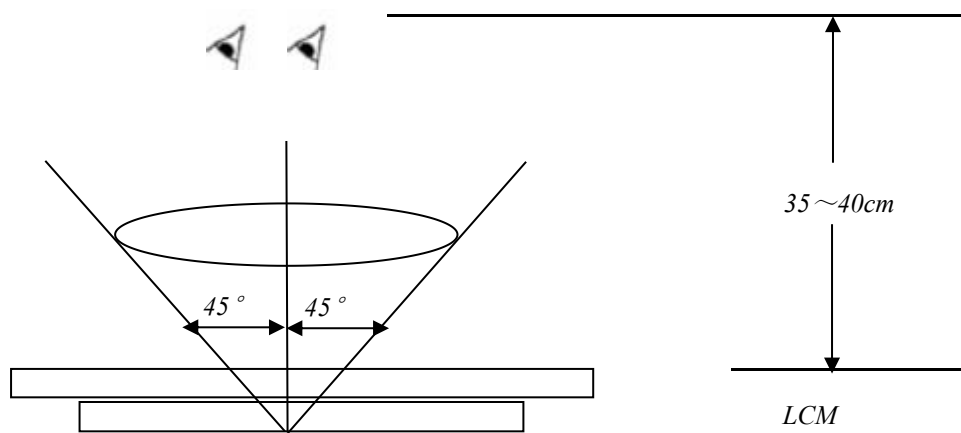
### 9.4 Definition

#### 9.4.1 Display area definition



## 9.5 Inspection conditions is as follows

- 9.5.1 Viewing distance is approximately 35-40 cm
- 9.5.2 Viewing angle is normal to the LCD panel as  $45^\circ$
- 9.5.3 Ambient temperature is approximately  $25 \pm 5^\circ\text{C}$
- 9.5.4 Ambient humidity is  $60 \pm 5\% \text{ RH}$
- 9.5.5 Ambient luminance is from 300-500 Lux.
- 9.5.6 Input signal timing should be typical value(3s-5s).
- 9.5.7 Mura & Light leakage inspection at ND-Filter 6%.





## 9.6 Sampling method

9.6.1 According to the MIL-STD-105E general inspection level , II Sampling plan.

9.6.2 AQL: MA 0.65 MI 1.0

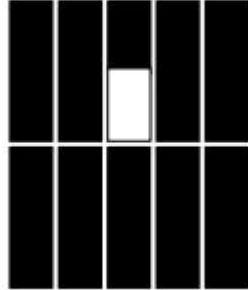
## 9.7 Inspection Criteria

DEFECT TYPE			LIMIT			Defect	Note
VISUAL DEFECT	SCRATCH		W≤0. 05mm and L≤5mm		Ignore	Ma j	NOTE1
			0. 05mm<W≤0. 2mm    L≤10mm		N≤4		
			10mm<L, 0. 1mm<W		N=0		
	INTERNAL	SPOT	Φ ≤0. 2mm		Ignore		
			0. 2mm< Φ ≤0. 5mm		N≤4		
			Φ >0. 5mm		N=0		
		FIBER	0. 1mm≤W≤0. 2mm    L≤2. 5mm		N≤4		
			0. 2mm<W, 2. 5mm<L		N=0		
		POLARIZER BUBBLE	Φ ≤0. 25mm		Ignore		
			0. 25mm< Φ ≤0. 5mm		N≤4		
			Φ >0. 5mm		N=0		
		DENT	Φ <0. 25mm		Ignore		
			0. 25mm≤ Φ ≤0. 5mm		N≤4		
			Φ >0. 5mm		N=0		
ELECTRICAL DEFECT	BRIGHT DOT		C Area	O Area	Total	Ma j	NOTE2 NOTE3
			N≤4（contain C area and O area）		N≤4		
	DARK DOT		N≤5（contain C area and O area）		N≤5		
			TWO ADJACENT DOT		N≤1		
	THREE OR MORE ADJACENT DOT		NOT ALLOWLED				
	LINE DEFECT		NOT ALLOWLED				

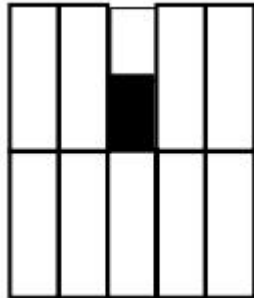
Note1: Minimum distance between dot defects and spot is 5mm;

Note2: The definition of Bright dot and Dark dot

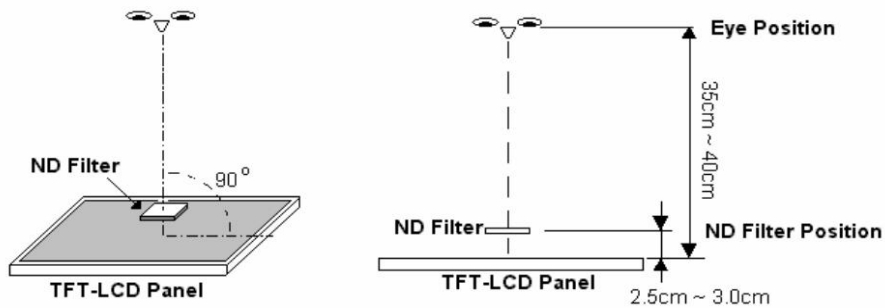
-bright area is more than 50% of one dot



-dark area is more than 50% of one dot



-The bright dot shall be visible under ND-Filter 5% as following:

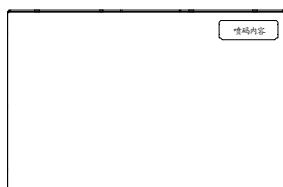


NOTE3:

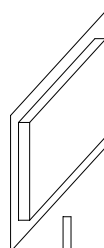
- A bit rate(bright dot model )  $\leq 10\%$ ;
- Class Chipping but not affect the function of quality OK;
- Polarizing film appearance does not affect the function OK;

## 10.0 PACKING DRAWING

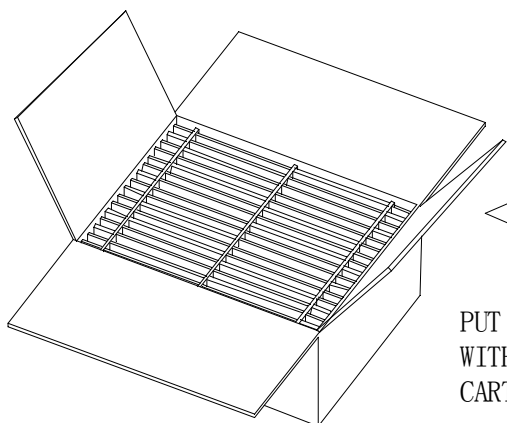
### PACKING DIAGRAM



PUT 1PC OF MODULE INTO  
ONE PE BAG

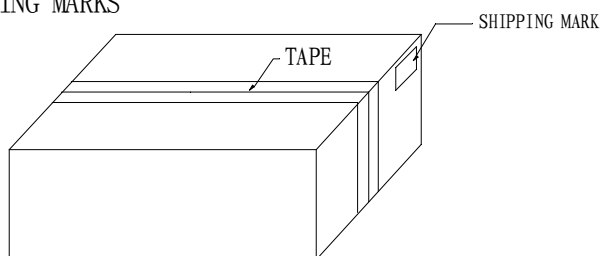


PS: PUT 2PCS OF MODULES  
TOGETHER AND FACE TO FACE  
THE 3rd LCD TO BE BACK TO  
BACK WITH THE 2nd LCD



PUT THE WELL PACKED 3PCS MODULES  
WITH PE BAGS INTO THE MASTER  
CARTON, TOTALLY PUT 90PCS INTO IT.

USE TAPE TO SEAL  
THE OPEN AND STICK  
SHIPPING MARKS



REVISION 版本	A0	<input checked="" type="checkbox"/> 正 式 规格	<input type="checkbox"/> 临 修 订人	MODEL NO 产品料号	CHECKED BY 审核			AUDITING 会签		
DATE 日期	2017-6-1			070BH5044D3H611	APPROVED BY 核准	CHECKED BY 审核	DRAWN BY 绘图	PROCESSING DEPARTMENT 工艺部	QUALITY DEPARTMENT 品质部	STANDARDIZATION-CHECKING 标准化检查
PAGE 页码			程洪涛	客户:						

## 11. 0 HANDLING PRECAUTION

- (1) Don't disassemble and reassemble the module by self.  
(禁止自行拆解)
- (2) Acid, alkali, alcohol or touched directly by hand will damage the display.  
(酸性、碱性、酒精或手的直接接触将会损伤显示面)
- (3) Static electricity will damage the module. Please configure grounding device.  
(静电会损伤模组，请装配接地设备)
- (4) The strong vibration, shock, twist or bend will cause material damage, even module broken.  
(强烈的撞击、震动、扭转或弯曲将会造成原材损伤，甚至面板破裂)
- (5) It is easy to cause image sticking while displaying the same pattern for very long time.  
(长期显示同一画面会造成影像残留)
- (6) The response time, brightness and performance will vary from different temperature.  
(响应时间、亮度与均匀性会因温度而有所改变)
- (7) Starting from the date of shipment in the photoelectric products for a period of 12 months.  
(从出货之日开始产品保质期为 **12** 个月)