



**SPECIFICATION  
FOR  
LCD Module  
PV05038T0245K**

<b>MODULE:</b>	PV05038T0245K
<b>CUSTOMER:</b>	

<b>KT</b>	<b>INITIAL</b>	<b>DATE</b>
<b>PREPARED BY</b>		20230721
<b>CHECKED BY</b>		20230721
<b>APPROVED BY</b>		20230721

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



## REVISION STATUS

Version	Revise Date	Page	Content	Modified by
V1.0	20230721	-	First Issued.	YANG



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# 1. General Description

**\* DESCRIPTION**

PV05038T0245K is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This model is composed of a Transmissive type TFT-LCD Panel, driver circuit, back-light unit. The resolution of a 5.0" TFT-LCD contains 480 x 854 pixels, and can display up to 16.7M colors.

**\* Features**

- Low Input Voltage: IOVCC: 1.65~3.3V;VCC: 2.5~3.6V
- Display Colors of TFT LCD: 16.7M colors
- Interface: RGB-24BIT
- Internal Power Supply Circuit.

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	61.56(H) *109.53 (V)	mm	-
Driver element	a-Si TFT active matrix	-	-
Display colors	16.7M	colors	-
Number of pixels	480(RGB) *854	dots	-
Pixel arrangement	RGB vertical stripe	-	-
Pixel pitch	0.12825 (H) *0.12825 (V)	mm	-
Viewing angle	All	o'clock	-
Drive IC	ST7701S	-	-
Display mode	Normally black	-	-
Operating temperature	-20~+70	°C	-
Storage temperature	-30~+80	°C	-

**Mechanical Information**

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)	-	66.30	-	mm	±0.15
	Vertical(V)	-	120.05	-	mm	±0.15
	Depth(D)	-	2.2	-	mm	±0.15
Weight		-	TBD	-	g	-



## 2. MECHANICAL SPECIFICATION

保存期限: 三年

版本号: A/1

表格受控编号:

1		2		3		4		5		6		7		D																											
<p><b>一. 产品特征 (Features):</b></p> <p>1. 产品规格: (Product specifications):</p> <table border="1"> <tr> <td>显示类型 (Display mode):</td> <td>TFT/NORMALLY BLACK</td> </tr> <tr> <td>驱动芯片 (Driver IC):</td> <td>ST7701S</td> </tr> <tr> <td>A屏驱动电压 (Viewing Direction):</td> <td>ALL</td> </tr> <tr> <td>接口类型 (Interface Types):</td> <td>SPH/RGB24 BIT</td> </tr> <tr> <td>背光类型 (Backlight Types):</td> <td>12pcs 6Pin并 (0mA/20mA/LED), 电压为1.2~2.0V</td> </tr> <tr> <td>模组亮度 (LCD Brightness):</td> <td>300 cd/m2 Min, 380 cd/m2 Typ</td> </tr> <tr> <td>模组色坐标 (LCD Color Coordinate):</td> <td>(X=0.30±0.04, Y=0.33±0.04)</td> </tr> <tr> <td>模组均匀度 (LCD Uniformity):</td> <td>80% MIN</td> </tr> <tr> <td>操作温度 (Operating Temperature):</td> <td>-20 °C ~ 70 °C</td> </tr> <tr> <td>储存温度 (Storage Temperature):</td> <td>-30 °C ~ 80 °C</td> </tr> <tr> <td>平面翘曲度 (Planar Warpage Rate):</td> <td>&lt;0.3MM</td> </tr> <tr> <td>阻抗匹配:</td> <td>100Ω ±10%</td> </tr> <tr> <td>连接器型号:</td> <td>/</td> </tr> </table> <p>2. 一般公差: ±0.2mm. (GENERAL TOLERANCE: ±0.2)</p> <p>3. 尺寸中带有"*"为重点管控尺寸. (* "Dimensions of the key control and Control Dimensions.")</p> <p>4. 图纸中带有"☞"特别注明及重点确认位置. (Special Note And Key Confirmation Position)</p> <p>5. 产品所有物料符合 <b>ROHS</b> 规定要求. <b>(All The Products Comply With The ROHS Requirements).</b></p> <p>6. 可视区开窗设计要求: 建议外壳可视区域比模快VA单边小0.3mm以上. (Visual Area Windows Design Requirements: The Proposed Shell Visual Area Than The Module VA Unilateral Small 0.3mm Above.).</p> <p>二. 防静电PCB A设计建议及要求: (The Antistatic PCB A Design Suggestions And Requests)</p> <p>1. 在RESET信号脚上接TVS管, 连接TVS管GND要补完整. (TVS Tube Feet, Then The RESET Signal, Connect The TVS Tube GND To Shop Complete).</p> <p>2. 信号走线, 同时两侧包GND线. (Signal Go Line, While Both Sides Of The Package GND Line).</p>																显示类型 (Display mode):	TFT/NORMALLY BLACK	驱动芯片 (Driver IC):	ST7701S	A屏驱动电压 (Viewing Direction):	ALL	接口类型 (Interface Types):	SPH/RGB24 BIT	背光类型 (Backlight Types):	12pcs 6Pin并 (0mA/20mA/LED), 电压为1.2~2.0V	模组亮度 (LCD Brightness):	300 cd/m2 Min, 380 cd/m2 Typ	模组色坐标 (LCD Color Coordinate):	(X=0.30±0.04, Y=0.33±0.04)	模组均匀度 (LCD Uniformity):	80% MIN	操作温度 (Operating Temperature):	-20 °C ~ 70 °C	储存温度 (Storage Temperature):	-30 °C ~ 80 °C	平面翘曲度 (Planar Warpage Rate):	<0.3MM	阻抗匹配:	100Ω ±10%	连接器型号:	/
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<p><b>规格书 (Mechanical Drawing):</b></p> <p>背光喇叭码 LCM喇叭码 74 Pin 202 1005 PV05038T0245K 导电胶面胶厚: 0.05mm 导电胶面胶厚: 0.05mm Assign connector 客户机波注意避开PC管焊处 FPC弯折出货 LED1 LED2 LEDK2 BL CIRCUIT</p>																																									
<p><b>Kingtech Group Co., Ltd</b></p> <p>Title: LCM</p> <table border="1"> <tr> <td>视角 (View):</td> <td>比例 (Proportion):</td> <td>1:1</td> <td>设计 (DESIGN):</td> <td>批准 (APPROVED)</td> </tr> <tr> <td>单位 (Unit):</td> <td>页 面 (Page):</td> <td>1 / 1</td> <td>设计 (DESIGN):</td> <td>审核 (AUDITING)</td> </tr> <tr> <td>日期 (Date):</td> <td>产品型号 (Product Type):</td> <td>PV05038T0245K</td> <td>日期 (Date):</td> <td>2023.07.20</td> </tr> <tr> <td>版本号 (Version):</td> <td>符号 (Symbol):</td> <td>变更记录 (Change History)</td> <td>日期 (Date):</td> <td>2023.07.20</td> </tr> </table>																视角 (View):	比例 (Proportion):	1:1	设计 (DESIGN):	批准 (APPROVED)	单位 (Unit):	页 面 (Page):	1 / 1	设计 (DESIGN):	审核 (AUDITING)	日期 (Date):	产品型号 (Product Type):	PV05038T0245K	日期 (Date):	2023.07.20	版本号 (Version):	符号 (Symbol):	变更记录 (Change History)	日期 (Date):	2023.07.20						
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### 3. Pin Description

Pin NO.	Symbol	Level	Function
1	GND	L	Ground
2	LED_A	H	Backlight+
3	LED_K	L	Backlight-
4	VCC	H	Supply Voltage
5	VCCIO	H	Supply Voltage
6	FMARK	H/L	Tearing effect output pin
7	GND	L	Ground
8	SDI	H/L	Serial data input pin
9	WRX(SCL)	H/L	Serial clock input.
10	CSX	H/L	Chip select input pin
11	RESX	H/L	Reset pin
12	GND	L	Ground
13-36	D23-D0	H/L	Data bus
37	DE	H/L	Data enable signal in RGB interface
38	PCLK	H/L	RGB clock
39	HS	H/L	Horizontal synchronizing signal
40	VS	H/L	Vertical synchronizing signal
41	GND	L	Ground
42	XR	H/L	TP PIN
43	YD	H/L	TP PIN
44	XL	H/L	TP PIN
45	YU	H/L	TP PIN



## 4. ELECTRICAL CHARACTERISTICS

### 4.1 ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Values		Unit	Remark
		Min	Max.		
Supply Voltage for Logic circuit	VDDIO	1.65	3.3	V	
Supply Voltage for analog circuit	Vcc	2.5	3.6	V	

### 4.2 DC ELECTRICAL CHARACTERISTICS

#### 4.2.1 OPERATING CONDITIONS

Typical Operating Conditions (Ta=25°C)

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
Power Supply	Vcc	2.5	2.8	3.6	V	
Power Supply	VDDIO	1.65	1.8	3.3	V	
Normal mode Current consumption	Icc	-	-	50	mA	VCC=3.3V
TFT Gate ON Voltage	VGH	-	15	-	V	
TFT Gate OFF Voltage	VGL	-	-10	-	V	

#### 4.2.2 BACKLIGHT UNIT (GND=0V)

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
Forward supply Voltage	Vf	17.4	-	20.4	V	
Forward supply Current	If	-	40	-	mA	
LCM Luminance	Lv	340	380	-	cd/m2	I <sub>B</sub> =40mA
Uniformity	/	80			%	-



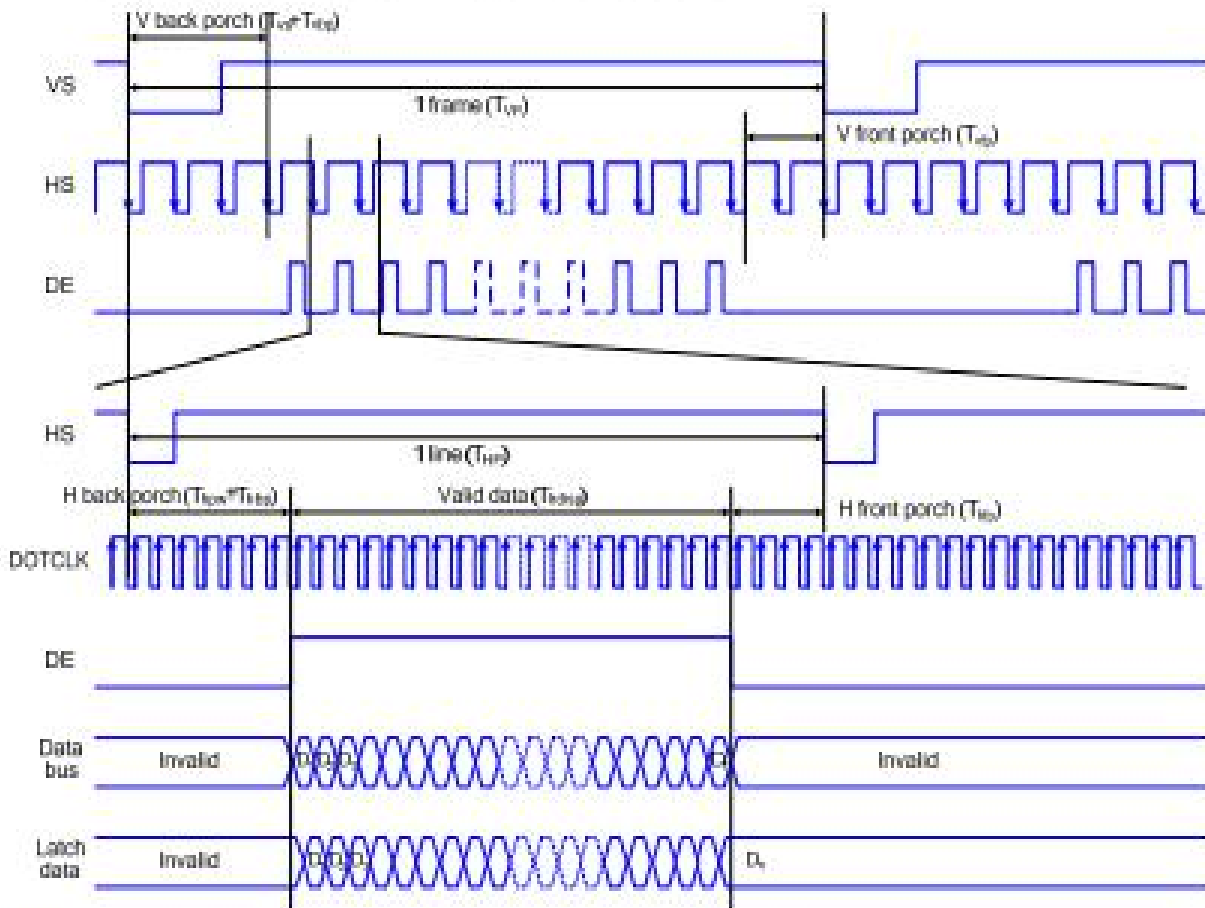
### 4.3 RGB Interface Characteristics

ST7701S supports two kinds of RGB interface, DE mode and HV mode. The table shown below uses command C3h to select RGB interface mode.

DE/Sync	RGB Mode
0	DE mode
1	HV mode

#### 8.6.4 RGB Interface Timing

The timing chart of RGB interface DE mode is shown as follows.



Note: The setting of front porch and back porch in host must match that in IC as this mode.

Figure 23 Timing Chart of Signals in RGB Interface DE Mode





The timing chart of RGB interface HV mode is shown as follows.

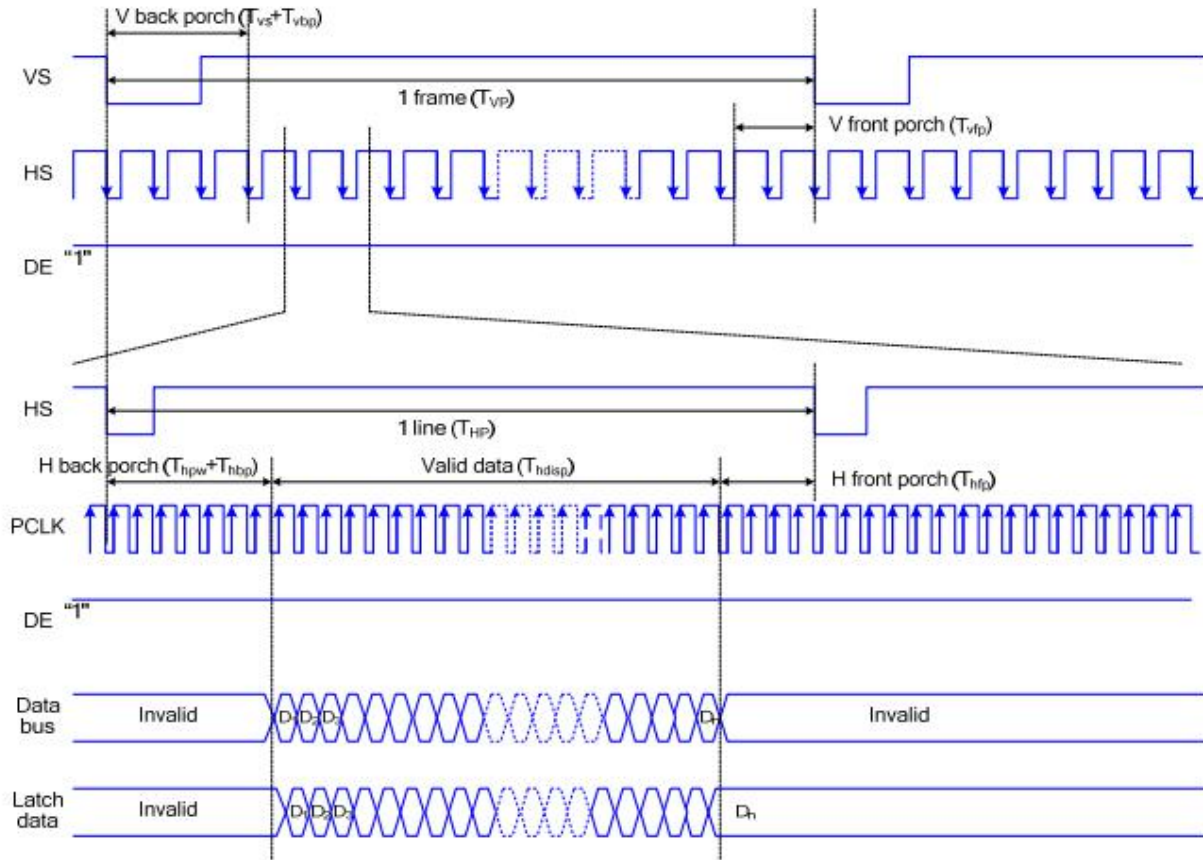


Figure 24 Timing chart of RGB interface HV mod



## 5. OPTICAL CHARACTERISTICS

(LCD optical characteristics)

### 4.0 OPTICAL CHARACTERISTICS

#### 4.1 Optical specification

9080I908		Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Transmittance (with Polarizer)		T (%)	$\Theta=0$ Normal viewing angle	—	4.47	—	%	Measuring with Polarizer · Reference Only	
Transmittance (without Polarizer)		T (%)		—	14.2	—	%		
Contrast		CR		640	800	—	—	(1)(2)	
Response time	Rising	$T_R$		—	16	21	msec	(1)(3)	
	Falling	$T_F$	—	19	24				
Color gamut (%)			—	70	—	%	C-light		
Color chromaticity (CIE1931)	White	$W_x$	-0.02	0.305	+0.02	—	—	(1)(4) CF glass	
		$W_y$							
	Red	$R_x$							0.665
		$R_y$							0.327
	Green	$G_x$							0.276
		$G_y$							0.594
	Blue	$B_x$							0.134
		$B_y$							0.118
Viewing angle	Hor.	$\Theta_L$	CR>10	—	80	—	—	(1)(4) Measuring with Polarizer · Reference Only	
		$\Theta_R$		—	80	—			
	Ver.	$\Theta_U$		—	80	—			
		$\Theta_D$		—	80	—			
Optima View Direction				Free				(5)	

#### 4.2 Measuring Condition

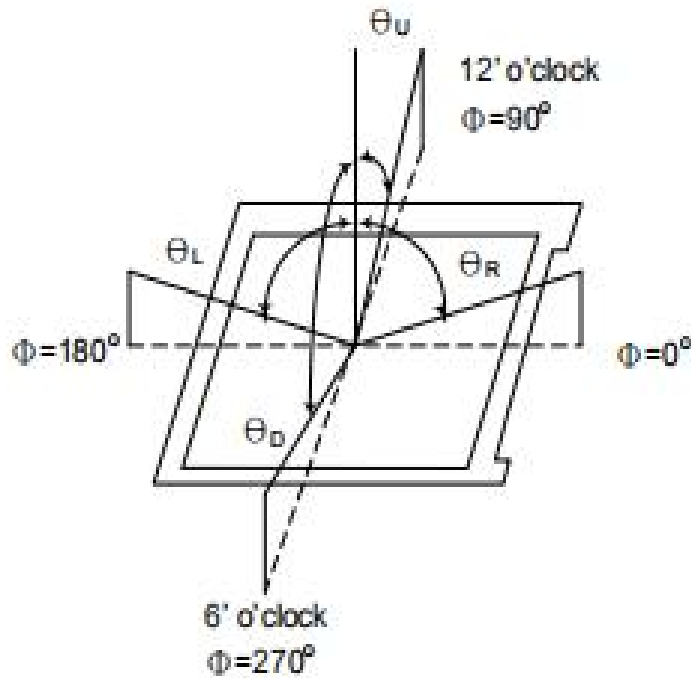
- Measuring surrounding : dark room
- Ambient temperature : 25±2°C
- 15min. warm-up time.



**4.3 Measuring Equipment**

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

Note (1) Definition of Viewing Angle:



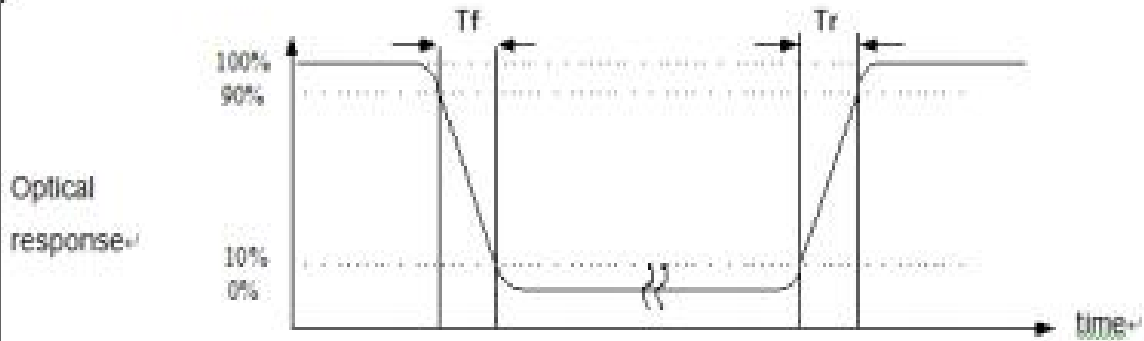
Note (2) Definition of Contrast Ratio (CR) :

measured at the center point of panel

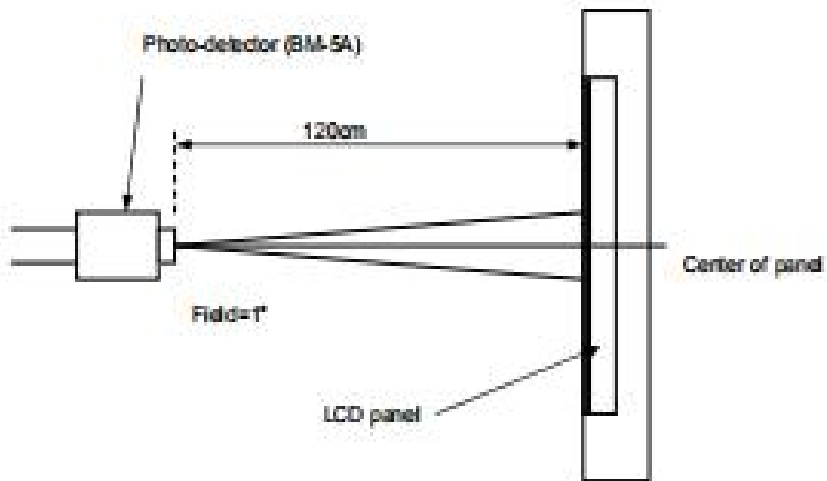
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$



Note (3) Definition of Response Time : Sum of  $T_R$  and  $T_F$



Note (4) Definition of optical measurement setup

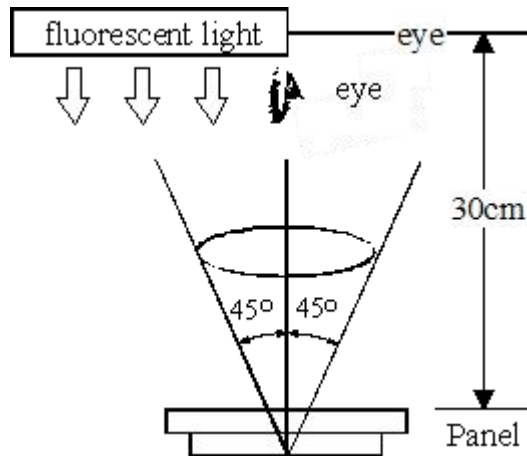




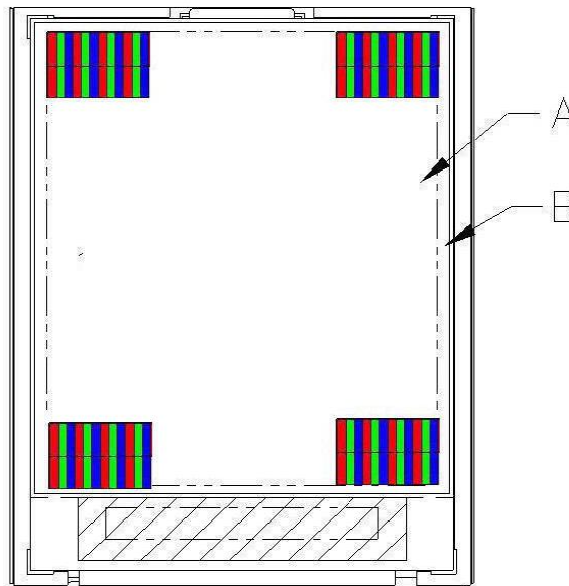
## 6. QUALITY SPECIFICATIONS

### 6.1 INSPECTION CONDITION

- (1) Inspect under 800-1200Lux fluorescent light, leaving 30~35cm between panels and eyes, and between panels and lights.
- (2) Inspection condition is  $23\pm 5^{\circ}\text{C}$ ,  $50\pm 20\%RH$  maximum.



### 6.2 DEFINITION OF AREA





A Area : Viewing area.

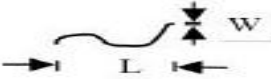
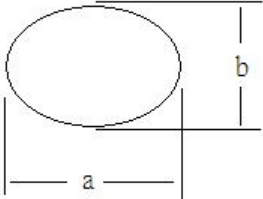
B Area : Out of viewing.(outside viewing area)



**6.3 INSPECTION SPECIFICATION**

NO	Item	Acceptable specification	Judgment Criterion
1	Electrical Testing	<p><b>1-1 sub pixel classification</b></p> <ul style="list-style-type: none"> <li>● Sub Pixel: Number of sub pixel doesn't exceed two dot.</li> </ul> <div style="text-align: center;">  <p>Sub Pixel (Dot)</p> </div> <p>a &gt; Dark dot ----two Allowed b &gt; Bright dot ---- two Allowed</p> <ul style="list-style-type: none"> <li>● Pixel : Three dots link together doesn't exceed twos</li> </ul> <div style="text-align: center;">  <p>Pixel</p> </div> <p><b>1-2 Leakage to light</b></p> <ul style="list-style-type: none"> <li>● Leakage to light be not allowed.</li> </ul> <p><b>1-3 Picture to shake</b></p> <ul style="list-style-type: none"> <li>● Picture had shake, twinkle and noise etc. instable of defect that be not allowed.</li> </ul> <p><b>1-4 Function</b></p> <ul style="list-style-type: none"> <li>● No display or No function.</li> <li>● Source Line, Gate Line.</li> <li>● Contrast Ratio</li> <li>● Current consumption exceeds product specifications.</li> <li>● Display malfunction.</li> </ul>	<p><math>N \leq 2</math></p> <p><math>N \leq 2</math></p> <p><math>N=0</math></p> <p><math>N=0</math></p> <p><math>N=0</math></p>
2	Mechanical Dimension	<p>2-1 Mechanical Dimension exceeds product specifications. 2-2 Out of frame and boss of plastic changed shape that be not allowed.</p>	<p><math>N=0</math></p>



NO	Item	Acceptable specification	Judgment Criterion																																												
3	Cosmetic Inspection	<p><b>3-1 Blemish: Line shapes of defect</b></p> <table border="1" data-bbox="362 353 1315 707"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Acceptable number</th> <th>Mini. space</th> </tr> </thead> <tbody> <tr> <td>---</td> <td><math>W \leq 0.05</math></td> <td>Ignore</td> <td rowspan="3">5 m m</td> </tr> <tr> <td><math>L \leq 3.0</math></td> <td><math>0.05 &lt; W \leq 0.08</math></td> <td>4</td> </tr> <tr> <td><math>L \leq 3.0</math></td> <td><math>0.08 &lt; W \leq 0.15</math></td> <td>3</td> </tr> <tr> <td>--</td> <td><math>W &gt; 0.15</math></td> <td>Not allowed</td> <td>---</td> </tr> </tbody> </table> <p>L: length(mm) W: width(mm)</p>  <p><b>3-2 Blemish: dot shapes of defect.</b></p> <table border="1" data-bbox="434 965 1283 1200"> <thead> <tr> <th>Dimension</th> <th>Acceptable number</th> <th>Mini. Space</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.15</math></td> <td>Ignore</td> <td>---</td> </tr> <tr> <td><math>0.15 &lt; \Phi \leq 0.20</math></td> <td>2</td> <td rowspan="2">5 m m</td> </tr> <tr> <td><math>0.20 &lt; \Phi \leq 0.30</math></td> <td>2</td> </tr> <tr> <td><math>\Phi &gt; 0.30</math></td> <td>0</td> <td>---</td> </tr> </tbody> </table> <p><b>3-3 Polarizer Bubble</b></p> <table border="1" data-bbox="434 1272 1283 1435"> <thead> <tr> <th>Dimension</th> <th>Acceptable number</th> <th>Mini. Space</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.25</math></td> <td>Ignore</td> <td>---</td> </tr> <tr> <td><math>0.25 &lt; \Phi \leq 0.35</math></td> <td>3</td> <td>15 m m</td> </tr> <tr> <td><math>\Phi &gt; 0.35</math></td> <td>0</td> <td>---</td> </tr> </tbody> </table> <p>Foreign Substances</p>  <p style="text-align: right;"><math>\Phi = (a+b)/2</math></p>	Length	Width	Acceptable number	Mini. space	---	$W \leq 0.05$	Ignore	5 m m	$L \leq 3.0$	$0.05 < W \leq 0.08$	4	$L \leq 3.0$	$0.08 < W \leq 0.15$	3	--	$W > 0.15$	Not allowed	---	Dimension	Acceptable number	Mini. Space	$\Phi \leq 0.15$	Ignore	---	$0.15 < \Phi \leq 0.20$	2	5 m m	$0.20 < \Phi \leq 0.30$	2	$\Phi > 0.30$	0	---	Dimension	Acceptable number	Mini. Space	$\Phi \leq 0.25$	Ignore	---	$0.25 < \Phi \leq 0.35$	3	15 m m	$\Phi > 0.35$	0	---	
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NO	Item	Acceptable specification	Judgment Criterion			
3	Cosmetic Inspection	<b>3-4 Scratch</b> ● Sensate scratch not allowed. ● Impassive scratch as below. <span style="color: red;">Unit:mm</span>				
		Length		Width	Acceptable number	Mini. space
		-----		$W \leq 0.05$	Ignore	5 m m
		$L \leq 3.0$		$0.05 < W \leq 0.08$	4	
		$L \leq 3.0$		$0.08 < W \leq 0.15$	3	---
		----		$0.15 < W$	Not allowed	
		$L > 3.0$		----	Not allowed	
		4		Package	4-1 Mixed product types 4-2 Shipping q'ty should be the same as "shipping notice form" q'ty. 4-3 Outer box can't broken.	N=0
5	LCD Mura	LCD Mura according to ND 5% keep out to determine, if keep out distance at 30cm be seen by eyes is NG, otherwise will be ok if invisible.				





## 7. RELIABILITY

Test Item	Test Condition	Inspection after test
High Temperature Operation	70°C for 96 hours	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 试验结束后, 已测试的 LCD 样品必须在室内正常温湿度环境下放置 2~4 个小时以上才能进行功能和外观检查, 样品不允许有以下缺陷: 1. 无功能不良, 例: 缺划, 显异, 严重爆灯等 2. 外观无偏光片气泡, OCA 气泡等不良: 2. The test samples should be applied to only one test item. 每个被测试的模块只能用于其中的一个测试项目。
Low Temperature Operation	-20°C for 96 hours	
High Temperature Storage	80°C for 96 hours	
Low Temperature Storage	-30°C for 96 hours	
High Temperature Storage Humidity Storage	60°C, 90%RH for 72 hours	
Thermal Shock	-10°C (30min) ~+25°C (5min)~ +60°C (30min) for 10 cycles	
Vibration Test (No Operation)	Frequency: 10~55Hz Amplitude:1.0mm Sweep Time: 11min Test Period: 6 Cycles for each direction of X, Y, Z	
Static electricity test	Touch ±4KV, air touch ±8KV	



## 8. HANDLING PRECAUTION

### 8.1 SAFETY

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

### 8.2 STORAGE CONDITIONS

- (1) Store the panel or module in a dark place where the temperature is  $23\pm 5^{\circ}\text{C}$  and the humidity is below  $50\pm 20\% \text{RH}$ .
- (2) Store in anti-static electricity container.
- (3) Store in clean environment, free from dust, active gas, and solvent.
- (4) Do not place the module near organics solvents or corrosive gases.
- (5) Do not crush, shake, or jolt the module.

### 8.3 HANDLING PRECAUTIONS

- (1) Avoid static electricity which can damage the CMOS LSI.
- (2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
- (3) Do not give external shock.
- (4) Do not apply excessive force on the surface.
- (5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- (6) Do not use ketonic solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (7) Do not operate it above the absolute maximum rating.
- (8) Do not remove the panel or frame from the module.

### 8.4 WARRANTY

- 1) From the Kingtech shipping date, customers need to be up and running within 6 months. 从Kingtech发货之日起，客户需要6个月内上线并且使用。
- 2) According to Kingtech TFT LCD quality standard, Kingtech will rework or exchange for functional defect goods sine within one year. 依据Kingtech TFT LCD质量标准，Kingtech将在一年内保修或置换功能缺陷产品。
- 3) strictly prohibit the display in the whole machine for a long time point a fixed screen (display by the LCD residual shadow determination criteria); suggest that the entire machine more than 2 minutes without the use of LCM automatically into hibernation, more than 30 minutes without the use of the system to force LCM into hibernation. 严禁显示屏在整机长期点一个固定画面（显示屏依LCD残影判定标准）；建议整机超过2分钟不使用LCM自动进入休眠，超过30分钟不使用系统强制LCM进入休眠



状态。

- 4) Display is strictly prohibited to work continuously for more than 8 hours on the whole machine. 严禁显示屏在整机连续工作8小时以上。
- 5) Please take the module under static protection. 请在有静电防护情况下，拿取模组。
- 1) LCM in special scenarios (such as high concentration of chemicals, strong magnetic field, extreme cold, and other use scenarios) use in advance to contact us to confirm. LCM在特殊场景（比如高浓度化学品，强磁场，极寒等使用场景）使用时提前联系我们确认。