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SPECIFICATION
FOR
LCD Module
PV07011TD30L

MODULE:	**PV07011TD30L**
CUSTOMER:	

KINGTECH	INITIAL	DATE
PREPARED BY	杨荣武	**20190318**
CHECKED BY	陈志文	**20190318**
APPROVED BY	罗教平	**20190318**

CUSTOMER	INITIAL	DATE
APPROVED BY		

Add: 2nd Floor, Building C, Jia Huang Yuan Technical Park, Tiegang, Xixiang, Bao'an District, Shenzhen city, Guangdong province, P.R.China 518126.
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REVISION STATUS

Version	Revise Date	Page	Content	Modified by
V1.0	2019-3-18	-	First Issued.	YANG
V1.1	2019-5-28		更新为模组图	XIAO
V1.2	2019-9-21	14~19	更改品质标准和实验条件	YANG

TABLE OF CONTENTS

1. General Description

* DESCRIPTION

PV07011TD30L s 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 7.0" TFT-LCD contains 800x 1280 pixels, and can display up to 16.7M colors.

* Features

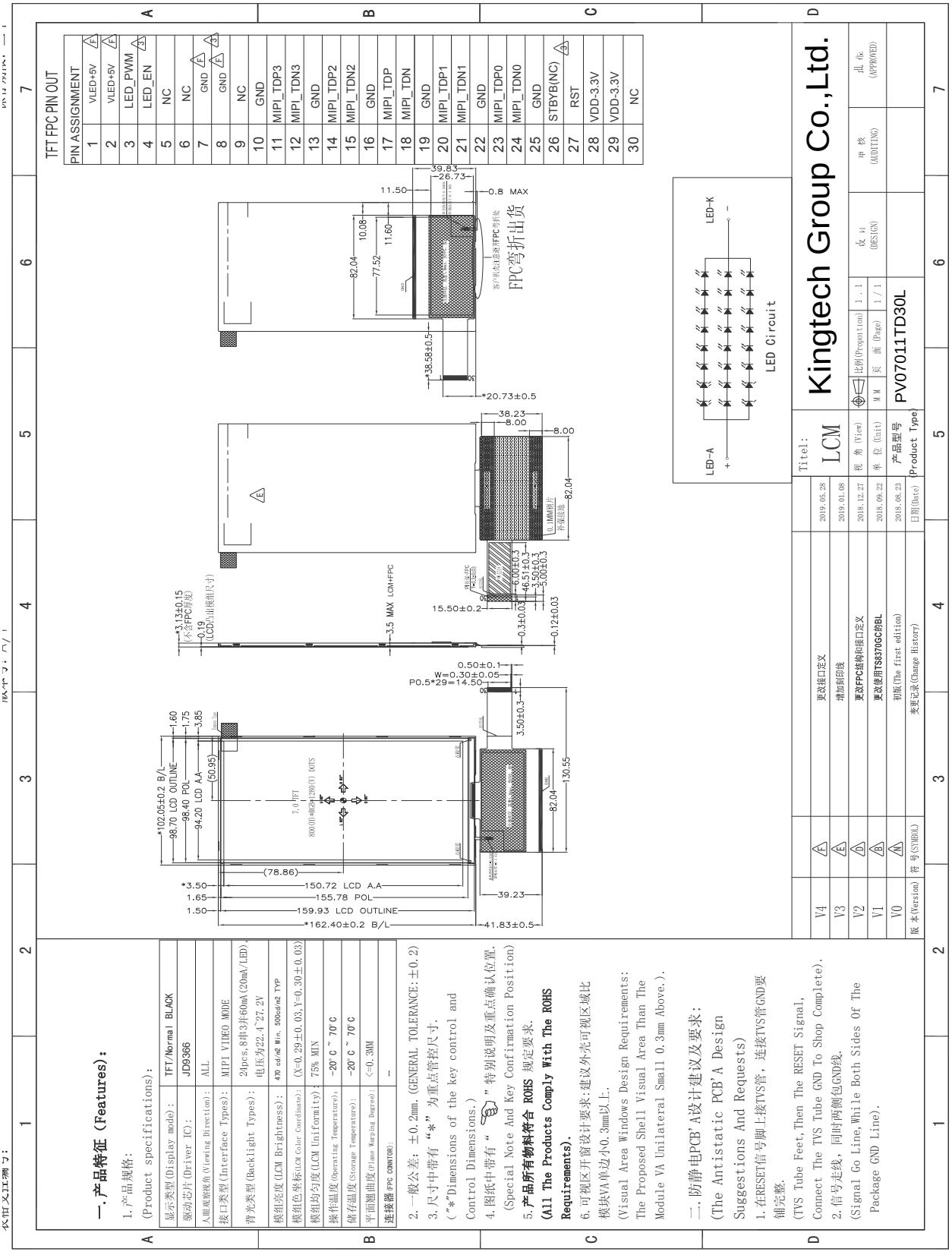
-Low Input Voltage: IOVCC: 1.65~3.3V;VCC: 2.5~3.3V
-Display Colors of TFT LCD: 16.7M colors
- Interface: MIPI-4 Lanes
-Internal Power Supply Circuit.

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	94.2(H) *150.72(V)	mm	-
Driver element	a-Si TFT active matrix	-	-
Display colors	16.7M	colors	-
Number of pixels	800(RGB) *1280	dots	-
Pixel arrangement	RGB vertical stripe	-	-
Pixel pitch	0.03925 (H) *0.11775 (V)	mm	-
Viewing angle	All	o'clock	-
Drive IC	JD9366	-	-
Display mode	Normally black	-	-
Operating temperature	-20～+70	℃	-
Storage temperature	-20～+70	℃	-

Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)	-	102.05	-	mm	±0.2
	Vertical(V)	-	162.40	-	mm	±0.2
	Depth(D)	-	3.13	-	mm	±0.15
Weight		-	TBD	-	g	-

2. MECHANICAL SPECIFICATION



3.Pin Description

Pin NO.	Symbol	Level	Remark
1	VLED+ 5V(NC)	H	No connection
2	VLED+ 5V(NC)	H	No connection
3	LED_PWM	H	PWM control the LED backlight PWM
4	LED_EN	H/L	turning ON/OFF the LED backlight
5	NC	/	No connection
6	NC	/	No connection
7	VLED GND(NC)	H	No connection
8	VLED GND(NC)	H	No connection
9	NC	/	No connection
10	GND	L	Ground
11	MIPI_TDP3	H/L	MIPI Positive data signal (+)
12	MIPI_TDN3	L	MIPI Negative data signal (-)
13	GND	L	Ground
14	MIPI_TDP2	H/L	MIPI Positive data signal (+)
15	MIPI_TDN2	L	MIPI Negative data signal (-)
16	GND	L	Ground
17	MIPI_TDP	H/L	MIPI Positive data signal (+)
18	MIPI_TDN	L	MIPI Negative clock signal (-)
19	GND	L	Ground
20	MIPI_TDP1	H/L	MIPI Positive data signal (+)
21	MIPI_TDN1	L	MIPI Negative data signal (-)
22	GND	L	Ground
23	MIPI_TDP0	H/L	MIPI Positive data signal (+)
24	MIPI_TDN	L	MIPI Negative data signal (-)
25	GND	L	Ground
26	STBYB(NC)	/	No connection
27	RST	H/L	Reset signal active low
28	VDD3.3V	/L	Power Supply Voltage
29	VDD3.3V	L	Power Supply Voltage
30	NC	/	No connection

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	3.3	V	

4.2 DC ELECTRICAL CHARACTERISTICS

4.2.1 OPERATING CONDITIONS

Typical Operating Conditions (Ta=25℃)

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
Power Supply	Vcc	2.5	2.8	3.3	V	
Power Supply	VDDIO	1.65	1.8	3.3	V	
Normal mode Current consumption	Icc	-	-	-	mA	VCC=2.8V
TFT Gate ON Voltage	V_{GH}	14	-	16	V	
TFT Gate OFF Voltage	V_{GL}	-13	-	-10	V	

4.2.2 BACKLIGHT UNIT (GND=0V)

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
Forward supply Voltage	V_f	22.4	-	27.2	V	
Forward supply Current	I_f	-	60	-	mA	
LCM Luminance	L_V	470	500	–	cd/m2	I_B=60mA
Uniformity	/	75			%	-

4.3 MIPI Interface Characteristics

7.1.11.5.Escape Mode

Escape mode is a special mode of operation for Data Lanes using Low-Power states. With this mode some additional functionality becomes available. A Data Lane shall enter Escape mode via an Escape mode Entry procedure (LP-11, LP-10, LP-00, LP-01, LP-00). As soon as the final Bridge state (LP-00) is observed on the Lines the Lane shall enter Escape mode in Space state (LP-00). If an LP-11 is detected at any time before the final Bridge state (LP-00), the Escape mode Entry procedure shall be aborted and the receive side shall wait for, or return to, the Stop state.

For Data Lanes, once Escape mode is entered, the transmitter shall send an 8-bit entry command, by Spaced-One-Hot coding, to indicate the requested action. Table 7.5 lists all supported Escape mode commands and actions.

Spaced-One-Hot coding means that each Mark state is interleaved with a Space state. Each symbol consists therefore of two parts: a One-Hot phase (Mark-0 or Mark-1) and a Space phase. The TX shall send Mark-0 followed by a Space to transmit a 'zero-bit' and it shall send a Mark-1 followed by a Space to transmit a 'one-bit'. A Mark that is not followed by a Space does not represent a bit. The last phase before exiting Escape mode with a Stop state shall be a Mark-1 state that is not part of the communicated bits, as it is not followed by a Space state.

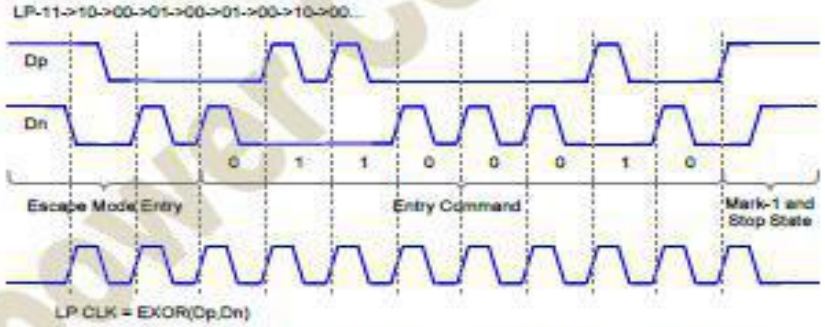


Figure 7.27: Trigger-Reset Command in Escape Mode

Escape Mode Action	Command Type	Entry Command Pattern (first bit transmitted to last bit transmitted)
Low-Power Data Transmission	mode	11100001
Ultra-Low power State	mode	00011110
Reset-Trigger	Trigger	01100010
TE-Trigger	Trigger	01011101
Acknowledge	Trigger	00100001

Table 7.5: Escape Entry Codes

7.1.11.5.1. Remote Trigger

Trigger signaling is the mechanism to send a flag to the protocol at the receiving side, on request of the protocol on the transmitting side. This can be either in the Forward or Reverse direction depending on the direction of operation and available Escape mode functionality. Trigger signaling requires Escape mode capability and at least one matching Trigger Escape Entry Command on both sides of the interface. Any bit received after a Trigger Command but before the Lines go to Stop state shall be ignored. Therefore, dummy bytes can be concatenated in order to provide Clock information to the receive side.

7.1.11.5.2. Low-Power Data Transmission(LPDT)

If the Escape mode Entry procedure is followed-up by the Entry Command for Low-Power Data Transmission (LPDT), Data can be communicated by the protocol at low speed, while the Lane remains in Low-Power mode. Data shall be encoded on the lines with the same Spaced-One-Hot code as used for the Entry Commands. The data is self-clocked by the applied bit encoding and does not rely on the Clock Lane. The Lane can pause while using LPDT by maintaining a Space state on the Lines. A Stop state on the Lines stops LPDT, exits Escape mode, and switches the Lane to Control mode. The last phase before Stop state shall be a Mark-1 state, which does not represent a data-bit. At the end of LPDT the Lane shall return to the Stop state.

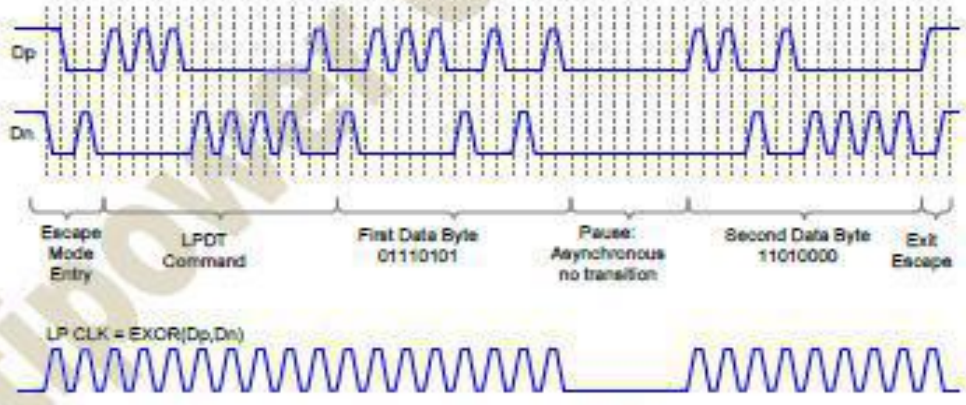


Figure 7.28: Two Data Byte Low-Power Data Transmission Example

5. OPTICAL CHARACTERISTICS

(LCD MONOMER PARAMETERS)

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = 25±2℃) with the equipment of Luminance meter system (CA-310、BM-5A) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. We refer to $\theta_{Ø=0}$ (=θ_3) as the 3 o'clock direction (the "right"), $\theta_{Ø=90}$ (= θ_{12}) as the 12 o'clock direction ("upward"), $\theta_{Ø=180}$ (= θ_9) as the 9 o'clock direction ("left") and $\theta_{Ø=270}$(= θ_6) as the 6 o'clock direction ("bottom"). While scanning θ and/or Ø, the center of the measuring spot on the Display surface shall stay fixed. The measurement shall be executed after 30 minutes warm-up period. VDD shall be 3.3V +/-10% at 25°C. Optimum viewing angle direction is 6 'clock.

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	80	89	-	Deg.	Note 1
		Θ_9		80	89	-	Deg.	
	Vertical	Θ_{12}		80	89	-	Deg.	
		Θ_6		80	89	-	Deg.	
Color Gamut				45	50	55	%	-
Tr.				-	6.8	-	%	With APF
Luminance Contrast ratio		CR	Θ = 0°	700	850	-	-	Note 2
Luminance of White	Center Points	Y_w	Θ = 0°	-	-	-	cd/m²	Note 3
White Luminance uniformity	9 Points	ΔY5		-	-	-	%	Note 4
White balance		Color Temp	Θ = 0°	-	-	-	K	Note 5
		Δuv		-	-	-	-	
Reproduction of color	Red	R_x	Θ = 0°		0.610		-	Note6
		R_y			0.350			
	Green	G_x			0.340			
		G_y			0.570			
	Blue	B_x			0.160			
		B_y			0.120			
Response Time (Rising + Falling)		T_{RT}	Ta= 25° C Θ = 0°	-	30	35	ms	Note 7
Gamma Scale		CT	Θ = 0°	-	-	-	-	-

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Note :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).

2. Contrast measurements shall be made at viewing angle of Θ= 0 and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Center Luminance of white is defined as luminance values of 1point average across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display. The luminance is measured by CA310 when the LED current is set at 16.8mA.

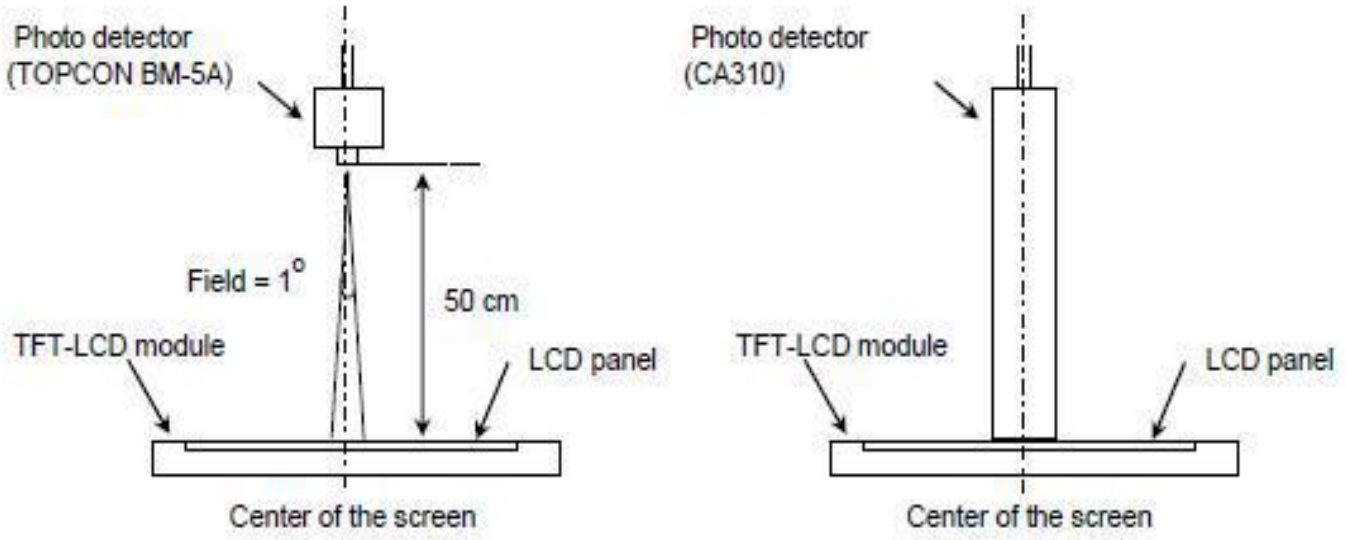
4. The White luminance uniformity on LCD surface is then expressed as : ΔY = Minimum Luminance of 9points / Maximum Luminance of 9points (see FIGURE 2).

5. The color chromaticity coordinates specified shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

6. The color chromaticity coordinates specified shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

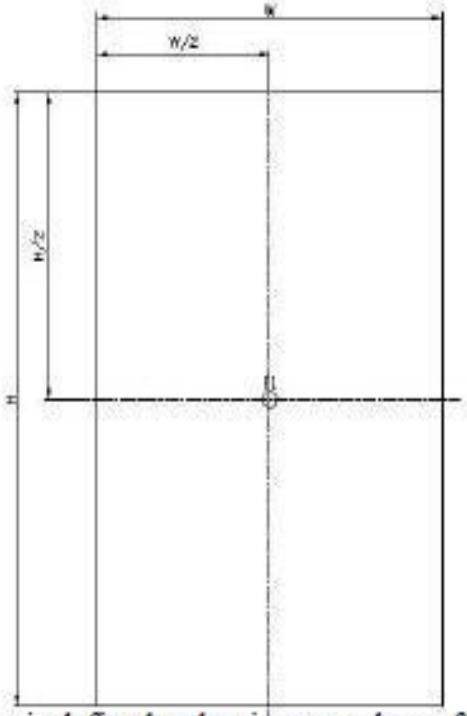
7. The electro-optical response time measurements shall be made as FIGURE 4 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

Figure 1. Measurement Set Up



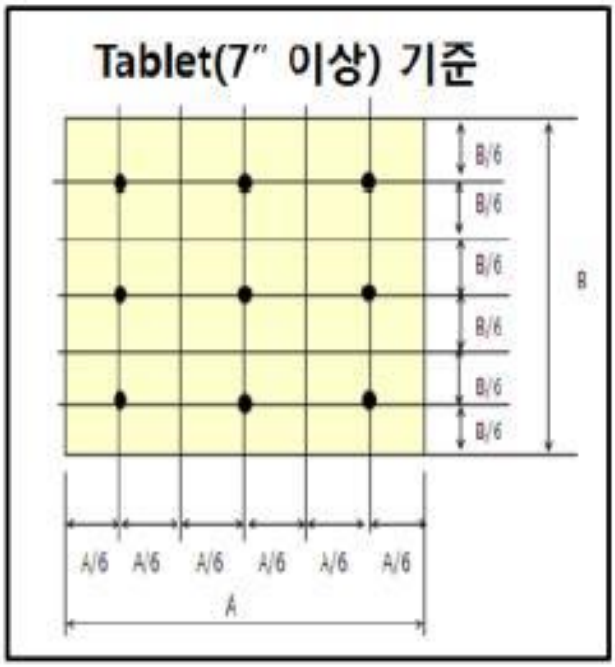
View angel range measurement setup Luminance , uniformity and color measurement setup

Figure 2. White Luminance and Uniformity Measurement Locations (Center point)



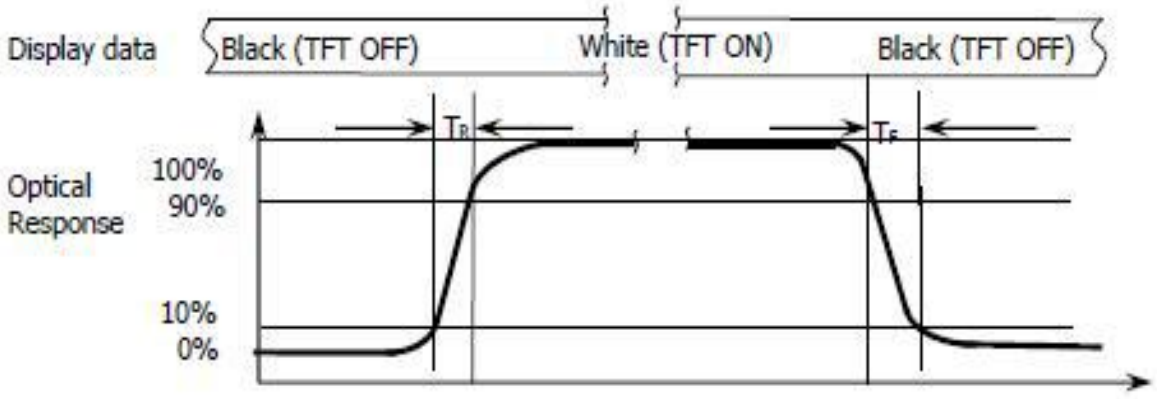
Center Luminance of white is defined as luminance values of center point across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE for a total of the measurements per display.

Figure 3. Uniformity Measurement Locations (9 points)



The White luminance uniformity on LCD surface is then expressed as : ΔY9= Minimum Luminance of five points / Maximum Luminance of five points (see FIGURE 3)

Figure 4. Response Time Testing

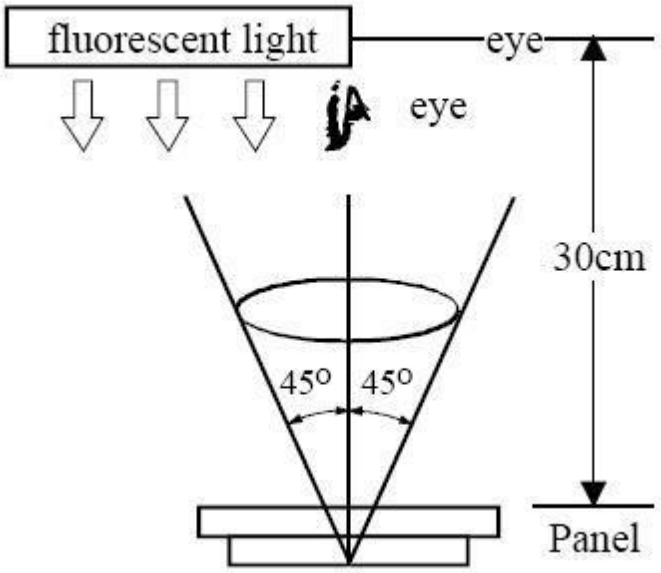


The electro-optical response time measurements shall be made as shown in FIGURE 3 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr and 90% to 10% is Td.

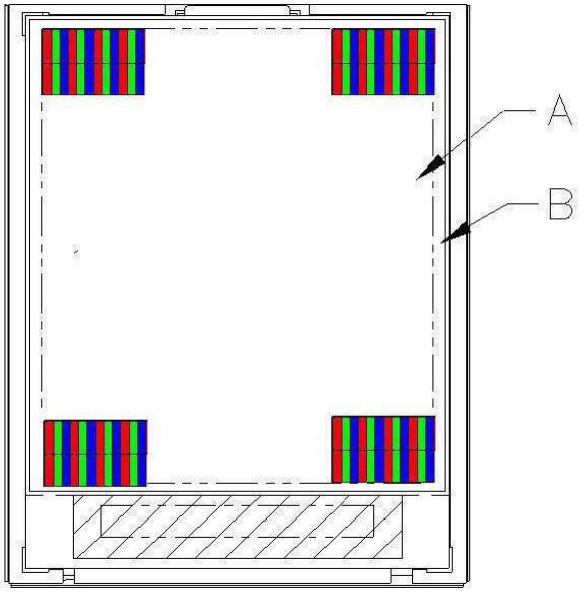
6. QUALITY SPECIFICATIONS

6.1 INSPECTION CONDITION

(1) Inspect under 1000~1200Lux fluorescent light, leaving 30~35cm between panels and eyes, and between panels and lights.
(2) Inspection condition is 23±5°C, 50±20%RH maximum.



6.2 DEFINITION OF AREA



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

6.3 INSPECTION SPECIFICATION

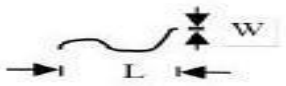
NO	Item	Acceptable specification	Judgment Criterion
1	Electrical Testing	**a) sub pixel classification** ● Sub Pixel: Number of sub pixel doesn't exceed one dot.  **Sub Pixel (Dot)** **a> Dark dot ----one Allowed** **b> Bright dot ---- one Allowed**	N≦3
		● Pixel : Three dots link together doesn't exceed ones  **Pixel**	N≦1
		b) Leakage to light ● Leakage to light be not allowed.	N=0
		c) Picture to shake ● Picture had shake, twinkle and noise etc. instable of defect that be not allowed.	N=0
		d) Function ● No display or No function. ● Source Line, Gate Line. ● Contrast Ratio ● Current consumption exceeds product specifications. ● Display malfunction.	N=0
2	Mechanical Dimension	2-1 Mechanical Dimension exceeds product specifications.	N=0

<table>
<tr><th>NO</th><th>Item</th><th>Acceptable specification</th><th>Judgment Criterion</th></tr>
<tr><td>3</td><td>Cosmetic Inspection</td><td>

3-1 Blemish: Line shapes of defect

<table>
<tr><th>Length</th><th>Width</th><th>Acceptable number</th><th>Mini. space</th></tr>
<tr><td>---</td><td>W≦0.032</td><td>Ignore</td><td rowspan="3">10MM</td></tr>
<tr><td>L≦3MM</td><td>0.02<W≦0.03</td><td>1</td></tr>
<tr><td>L≦3MM</td><td>0.03<W≦0.05</td><td>1</td></tr>
<tr><td>--</td><td>W＞0.05</td><td>Not allowed</td><td>---</td></tr>
</table>

L: length(mm)
W: width(mm)



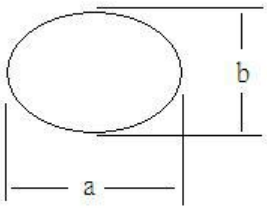
3-2 Blemish: dot shapes of defect.

<table>
<tr><th>Dimension</th><th>Acceptable number</th><th>Mini. Space</th></tr>
<tr><td>Φ≦0.1</td><td>Ignore</td><td>---</td></tr>
<tr><td>0.10＜Φ≦0.2</td><td>2</td><td rowspan="2">5 m m</td></tr>
<tr><td>0.2＜Φ≦0.25</td><td>1</td></tr>
<tr><td>Φ＞0.25</td><td>0</td><td>---</td></tr>
</table>

3-3 Polarizer Bubble

<table>
<tr><th>Dimension</th><th>Acceptable number</th><th>Mini. Space</th></tr>
<tr><td>Φ≦0.20</td><td>Ignore</td><td>---</td></tr>
<tr><td>0.20＜Φ≦0.30</td><td>2</td><td>15 m m</td></tr>
<tr><td>Φ＞0.30</td><td>0</td><td>---</td></tr>
</table>

Foreign Substances



Φ=(a+b)/2

</td><td></td></tr>
</table>

<table>
<tr><th>NO</th><th>Item</th><th>Acceptable specification</th><th>Judgment Criterion</th></tr>
<tr><td>3</td><td>Cosmetic Inspection</td><td>
3-4 Scratch
● Sensate scratch not allowed.
● Impassive scratch as below.
Unit:mm
<table>
<tr><th>Length</th><th>Width</th><th>Acceptable number</th><th>Mini. space</th></tr>
<tr><td>-----</td><td>W≦0.032</td><td>Ignore</td><td rowspan="3">10 m m</td></tr>
<tr><td>L≦10</td><td>0.02<W≦0.03</td><td>5</td></tr>
<tr><td>L≦10</td><td>0.03<W≦0.05</td><td>4</td></tr>
<tr><td>----</td><td>0.05＜W</td><td>Not allowed</td><td rowspan="2">---</td></tr>
<tr><td>L>3.5</td><td>----</td><td>Not allowed</td></tr>
</table>
</td><td></td></tr>
<tr><td>4</td><td>Package</td><td>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.</td><td>N=0</td></tr>
</table>

7. RELIABILITY

Test Item	Test Condition
High Temperature Operation	70℃ for 120 hours
Low Temperature Operation	-20℃ for 120 hours
High Temperature Storage	70℃ for 120 hours
Low Temperature Storage	-20℃ for 120 hours
High Temperature Operation Humidity Operation	60℃, 90%RH for 120 hours
Thermal Shock	-10℃(30min) ~+25℃(5min)~ +60℃(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 stal 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±5℃ and thehumidity is below 50±20%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 ketonics solvent & Aromatic solvent, use with a soft cloth soaked with acleaning 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) The period is within twelve months since the date of shipping out under normal using and storage conditions.
2) According to Kingtech TFT LCD quality standrad,Kingtech will rework or exchange for functional defect goods sine within one year。