



**SPECIFICATION  
FOR  
LCD Module  
PV05505TD39C**

<b>MODULE:</b>	<b>PV05505TD39C</b>
<b>CUSTOMER:</b>	

<b>KT</b>	<b>INITIAL</b>	<b>DATE</b>
<b>PREPARED BY</b>	<b>Chenzhiwen</b>	<b>2018-8-3</b>
<b>CHECKED BY</b>		
<b>APPROVED BY</b>	<b>Luojiaping</b>	<b>2018-8-3</b>

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

---



## REVISION STATUS

Version	Revise Date	Page	Content	Modified by
V1.0	2018-8-3	-	First Issued.	CHEN
V1.1	2018-9-18	5-6	Update Mechanical Specification	YANG



## TABLE OF CONTENTS

- 1.General Description
  2. Mechanical Characteristics
  3. Pin Description
  4. Electrical Characteristics
  5. Optical Characteristics
  6. Quality Specifications
  7. Reliability
  8. Handling Precaution
-



1. General Description

\* **DESCRIPTION**

PV05505TD39C 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 5.46" TFT-LCD contains 720 x 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-4Lanes
- Internal Power Supply Circuit.

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	68.04(H) *120.96(V) (5.46 inch )	mm	-
Driver element	a-Si TFT active matrix	-	-
Display colors	16.7M	colors	-
Number of pixels	720(RGB) *1280	dots	-
Pixel arrangement	RGB vertical stripe	-	-
Pixel pitch	0.0315(H) *0.0945(V)	mm	-
Viewing angle	All	o'clock	-
Drive IC	ST7703	-	-
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)	-	70.64	-	mm	±0.15
	Vertical(V)	-	129.21	-	mm	±0.15
	Depth(D)	-	1.62	-	mm	±0.1
Weight		-	TBD	-	g	-





### 3.Pin Description

Pin NO.	Symbol	Level	Remark
1	GND	L	Ground
2	NC	/	Not connect
3	TP VCC2.8	H	A supply voltage
4	GND	L	Ground
5	TP-SCL	H	Serial clock input
6	TP-SDA	H	Serial data input pin
7	GND	L	Ground
8	TP-INT	H	Interrupt pin
9	TP-RST	H	Reset pin
10-13	NC	/	Not connect
14	GND	L	Ground
15	VDD 2.85V	H	A supply voltage
16	IOVDD 1.8V	H	A supply voltage
17	GND	L	Ground
18	LCD-ID	/	Read ID
19	RST	H/L	Reset pin
20	TE	H/L	Tearing effect output
21	GND	L	Ground
22	LCM_DATAP1	H/L	MIPI_DP1+ are differential data signal line
23	LCM_DATAN1	H/L	MIPI_DP1- are differential data signal line
24	GND	L	Ground
25	CLKN	H/L	CLOCK Lane negative-end input pin
26	CLKP	H/L	CLOCK Lane positive-end input pin
27	GND	L	Ground
28	LCM_DATAP0	H/L	MIPI_DP0+ are differential data signal line
29	LCM_DATAN0	H/L	MIPI_DP0- are differential data signal line
30	GND	L	Ground
31	LCM_DATAP2	H/L	MIPI_DP2+ are differential data signal line
32	LCM_DATAN2	H/L	MIPI_DP2- are differential data signal line
33	GND	L	Ground
34	LCM_DATAP3	H/L	MIPI_DP3+ are differential data signal line
35	LCM_DATAN3	H/L	MIPI_DP3- are differential data signal line
36	GND	L	Ground



37	LEDK	L	Backlight Cathode
38	LED_A	H	Backlight Anode
39	GND	L	Ground

## 4. ELECTRICAL CHARACTERISTICS

### 4.1 ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Values		Unit	Remark
		Min	Max.		
Supply Voltage for Logic circuit	IOVCC	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°C)

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
Power Supply	Vcc	2.5	2.8	3.3	V	
Power Supply	IOVCC	1.65	1.8	2.0	V	
Normal mode Current consumption	Icc	-	50	-	mA	VCC=2.8V
TFT Gate ON Voltage	VGH	15	-	18	V	
TFT Gate OFF Voltage	VGL	-12	-	-10	V	

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

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
Forward supply Voltage	Vf	19.6	-	23.8	V	
Forward supply Current	If	-	40	-	mA	

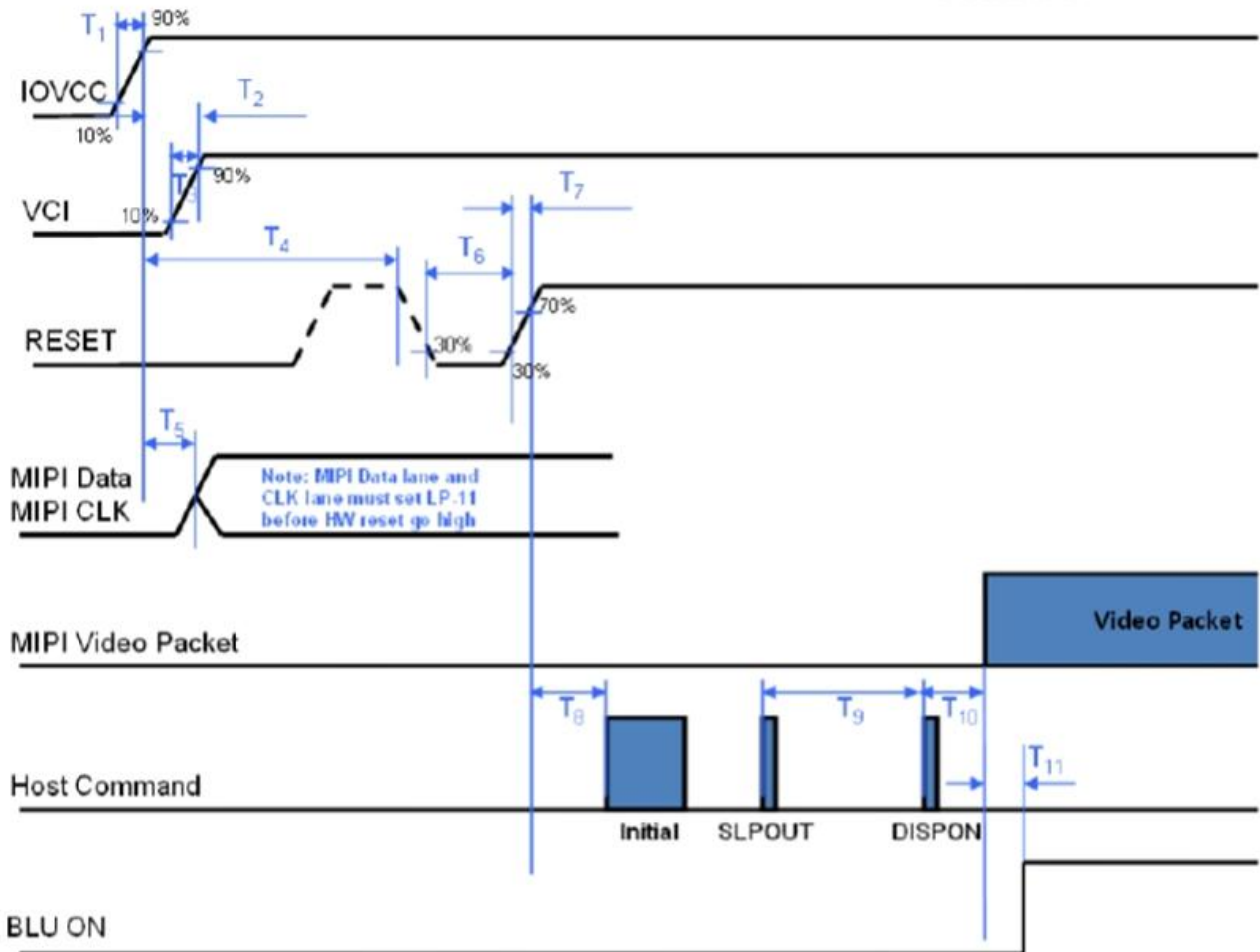


LCM Luminance	$L_v$	380	430	-	cd/m <sup>2</sup>	$I_B=40mA$
Uniformity	/	80			%	-

---



### 4.3 MIPI Interface Characteristics



	Min.	Typ.	Max.	Unit
T1	0.01	-	10	ms
T2	No Limit			ms
T3	0.01	-	10	ms
T4	1	-	-	ms
T5	1	-	-	ms
T6	10	-	-	us
T7	No Limit			ns
T8	15	-	-	ms
T9	120	-	-	ms
T10	No Limit			ms
T11	100	150	-	ms



High Speed Mode

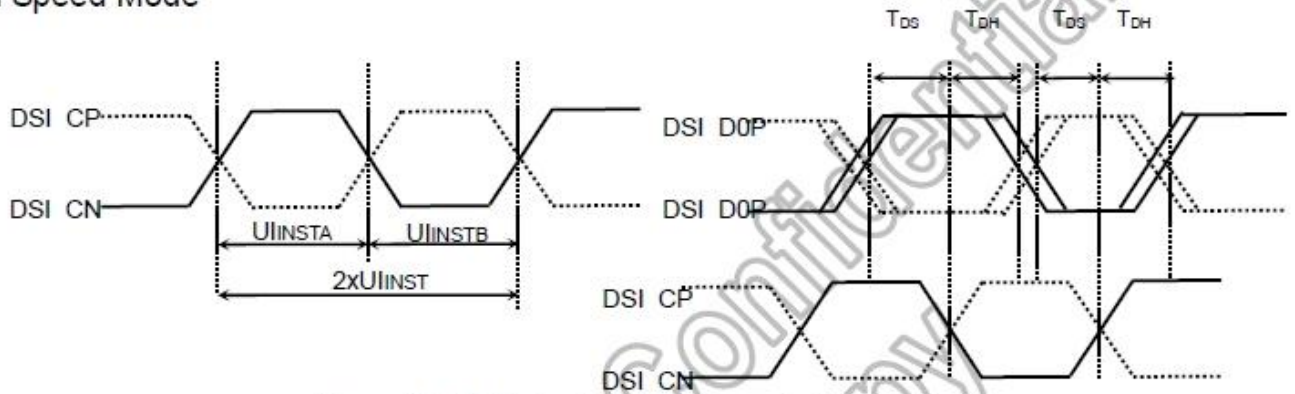


Figure 7.4: DSI clock timing Characteristics

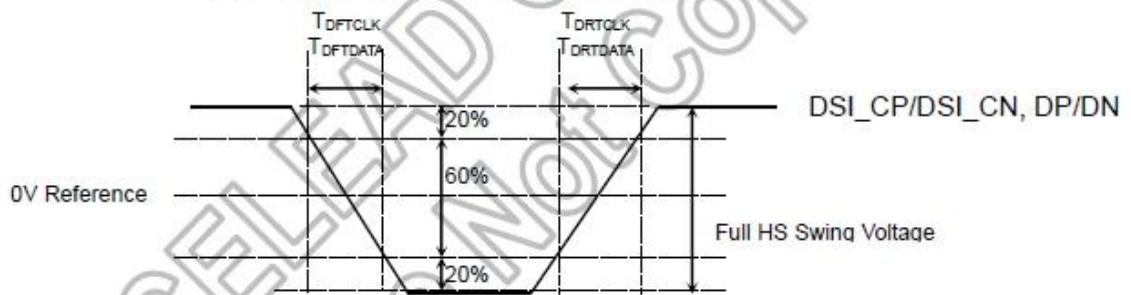


Figure 7.5: Rising and falling time on clock and data channel

(VSSA=0V, IOVCC=1.65V to 3.3V, VCI=2.5V to 3.3V, TA = -30 to 70°C)

Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_CP/ DSI_CN	Double UI instantaneous	2xUIINST	TBD	-	25	ns
	UI instantaneous	UIINSTA UIINSTB	TBD	-	12.5	ns
DP/DN	Data to clock setup time	T <sub>DS</sub>	0.15xUI	-	-	ps
	Data to clock hold time	T <sub>DH</sub>	0.15xUI	-	-	ps
DSI_CP/ DSI_CN	Differential rise time for clock	T <sub>DRTCLK</sub>	150	-	0.3UI	ps
	Differential fall time for clock	T <sub>DFTCLK</sub>	150	-	0.3UI	ps
DP/DN	Differential rise time for data	T <sub>DRTDATA</sub>	150	-	0.3UI	ps
	Differential fall time for data	T <sub>DFTDATA</sub>	150	-	0.3UI	ps

Table 7.3: DSI High Speed Mode Characteristics



Low Power Mode

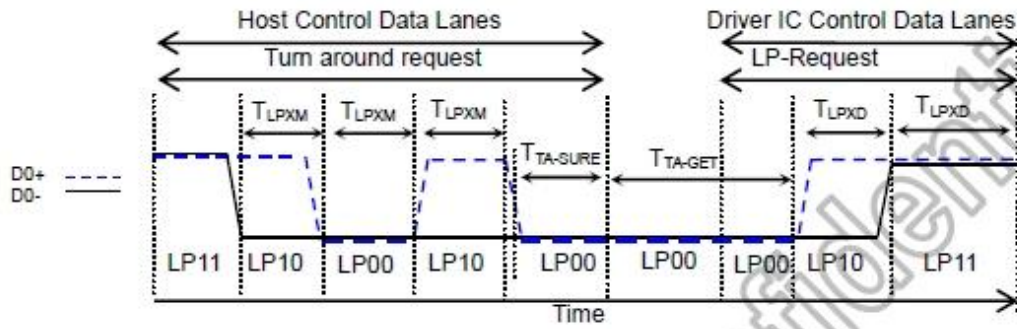


Figure 7.6: BTA from HOST to Display Module Timing

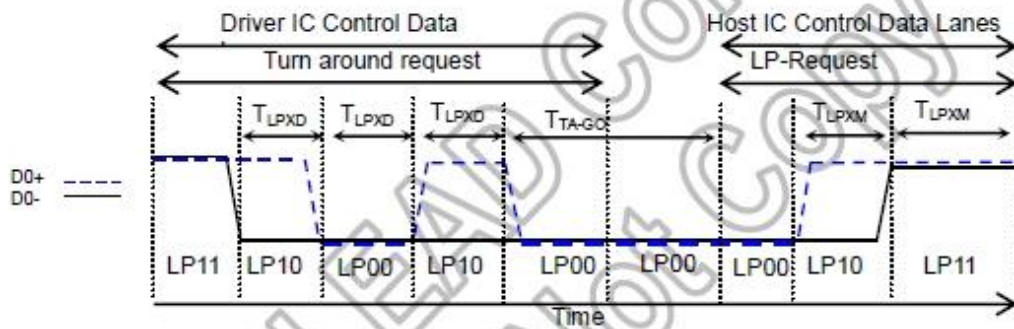
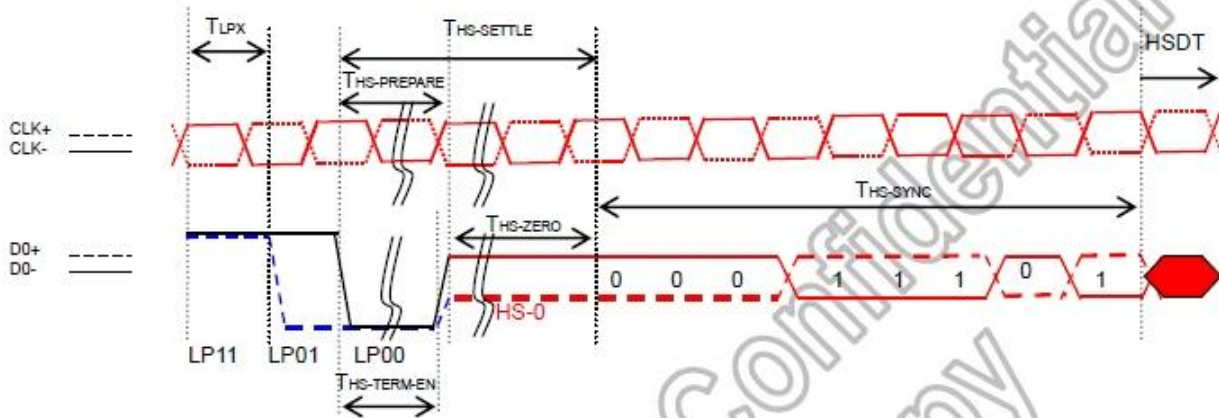


Figure 7.7: BTA from Display Module Timing to HOST

(VSSA=0V, IOVCC=1.65V to 3.3V, VCI=2.3V to 3.3V, TA = -30 to 70°C)

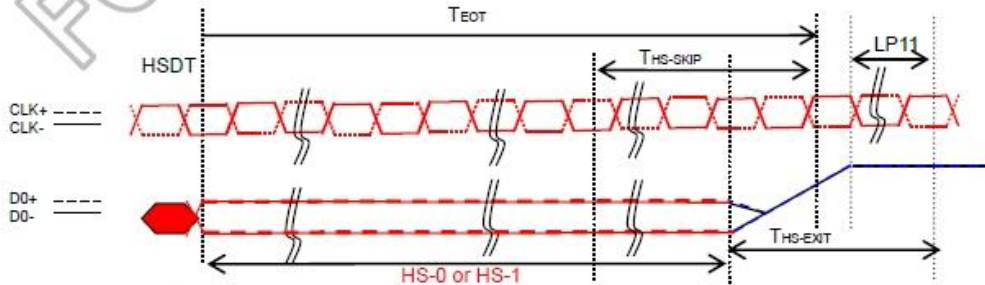
Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_D0P/ DSI_D0P	Length of LP-00/LP01/LP10/LP11 Host → Display module	T <sub>LPXM</sub>	50	-	-	ns
	Length of LP-00/LP01/LP10/LP11 Display module → Host	T <sub>LPXD</sub>	50	-	-	ns
	Time-out before the MPU start driver	T <sub>TA-SURE</sub>	T <sub>LPXD</sub>	-	2xT <sub>LPXD</sub>	ns
	Time to drive LP-00 by display module	T <sub>TA-GET</sub>	5xT <sub>LPXD</sub>	-	-	ns
	Time to drive LP-00 after turnaround request Host	T <sub>TAGO</sub>	4xT <sub>LPXD</sub>	-	-	ns

Table 7.4: DSI Low Power Mode Characteristics



Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_D0P/ DSI_D0P	Length of LP-00/LP01/LP10/LP11	TLPX	50	-	-	ns
	Time to Driver LP-00 to prepare for HS transmission	THS-PREPARE	40+4UI	-	85+6UI	ns
	Time to enable data receiver line termination	THS-TERM-EN	-	-	35+4xUI	ns
	Time to drive LP-00 by display module	T <sub>TA-GET</sub>	5xTLPXD	-	-	ns
	Time to drive LP-00 after turnaround request Host	T <sub>TAGO</sub>	4xTLPXD	-	-	ns

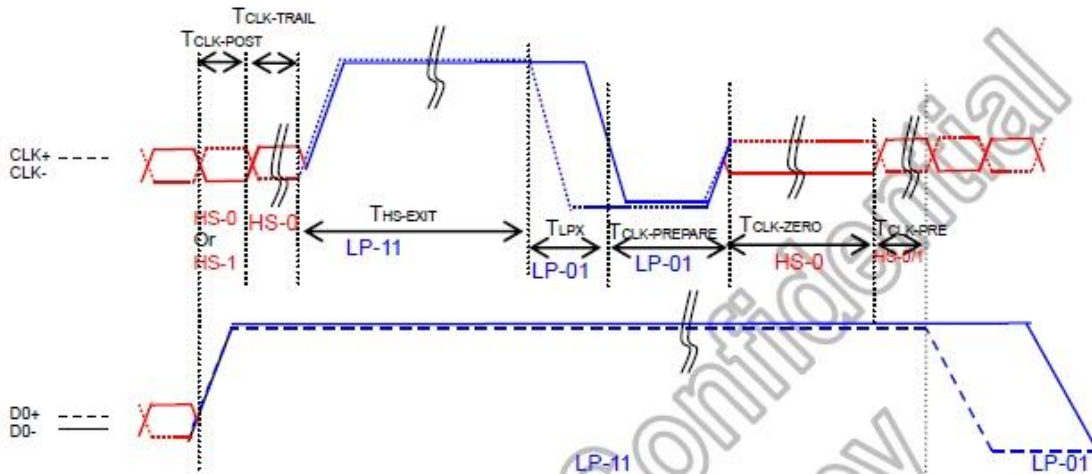
**Table 7.5: DSI Low Power Mode to High Speed Mode Timing**



NOTE:  
If the last bit is HS-0, the transmitter changes from HS-0 to HS-1  
If the last bit is HS-0, the transmitter changes from HS-1 to HS-0

Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_D0P/ DSI_D0P	Time-Out at Display Module to Ignore Transition Period of EoT	THS-SKIP	40	-	55+4xUI	ns
	Time to Driver LP-11 after HS Burst	THS-EXIT	100	-	-	ns

**Table 7.6: DSI Low Power Mode to High Speed Mode Timing**



Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_CP/ DSI_CN	Time that the MCU shall continue sending HS clock after the last associated Data Lane has transitioned to LP mode	TCLK-POST	60+52xUI	-	-	ns
	Time to drive HS differential state after last payload clock bit of a HS transmission burst	TCLK-TRAIL	60	-	-	ns
	Time to drive LP-11 after HS burst	THS-EXIT	100	-	-	ns
	Time to drive LP-00 to prepare for HS transmission	TCLK-PREPARE	38	-	95	ns
	Time-out at Clock Lane Display Module to enable HS Termination	TCLK-TERM-EN	-	-	38	ns
	Minimum lead HS-0 drive period before starting Clock	TCLK-PREPARE + TCLK-ZERO	300	-	-	ns
	Time that the HS clock shall be driven prior to any associated data Lane beginning the transition from LP to HS mode	TCLK-PRE	8xUI			

**Table 7.7: Clock Lanes High Speed Mode to/from Low Power Mode Timing**



## 5. OPTICAL CHARACTERISTICS

(LCD optical characteristics)

Item	Symbol	Conditions	Specifications			Unit	Note
			Min.	Typ.	Max.		
Transmittance (without DBEF)	T%	Viewing normal angle $x = \gamma = 0$		3.5	--	%	All left side data are based on INX's following condition (at 25 °C) 1.LC : AAS 2.Light Source : INX BLU Spectrum. 3.CF / TFT side Film : SRW062APN1HC5 / SRW062APN1 4.Machine : DMS 803 (Cono Scope for View Angle) 5. VLC white > 4.5 V VLC dark < 0.2 V
Contrast Ratio	CR		600	1000	--	--	
Response Time	$T_{on}+T_{off}$		--	25	35	ms	
Viewing Angle	Hor.	$x+$	75	80	--	deg.	
		$x-$	75	80	--		
	Ver.	$y+$	75	80	--		
		$y-$	75	80	--		
CF Only Color Chromaticity (CIE1931)	Red	$X_R$	0.635	0.655	0.675	--	Under C light simulation
		$Y_R$	0.301	0.321	0.341		
	Green	$X_G$	0.237	0.257	0.277		
		$Y_G$	0.539	0.559	0.579		
	Blue	$X_B$	0.119	0.139	0.159		
		$Y_B$	0.071	0.091	0.111		
	White	$X_W$	0.274	0.294	0.314		
		$Y_W$	0.294	0.314	0.334		
Color Gamut	CG		60	68	--	%	

\*Note (1) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L63 / L0$$

L63: Luminance of gray level 63

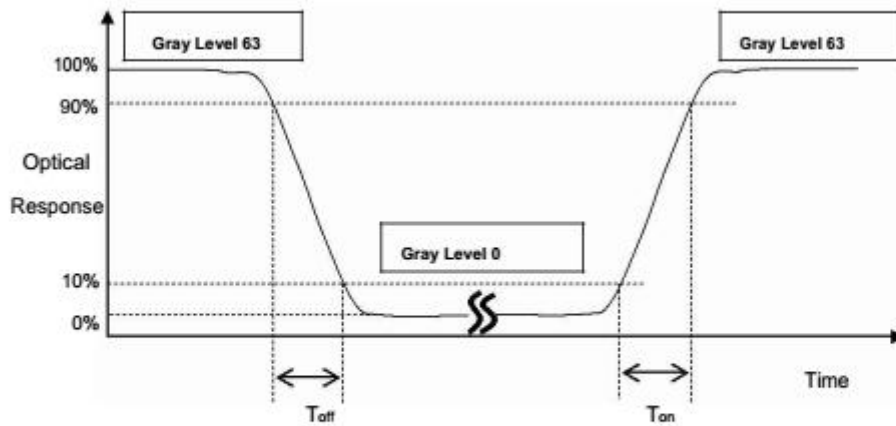
L 0: Luminance of gray level 0

$$CR = CR (5)$$

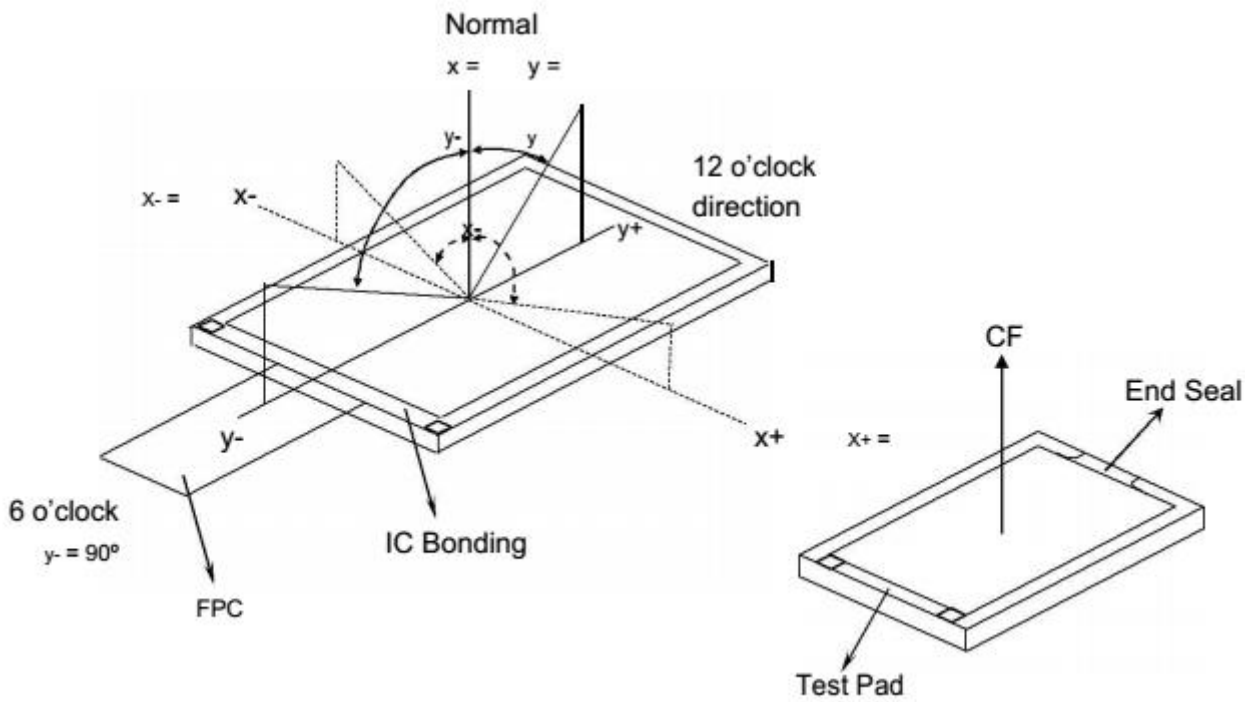
CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).



\*Note (2) Definition of Response Time ( $T_{on}$ ,  $T_{off}$ ):



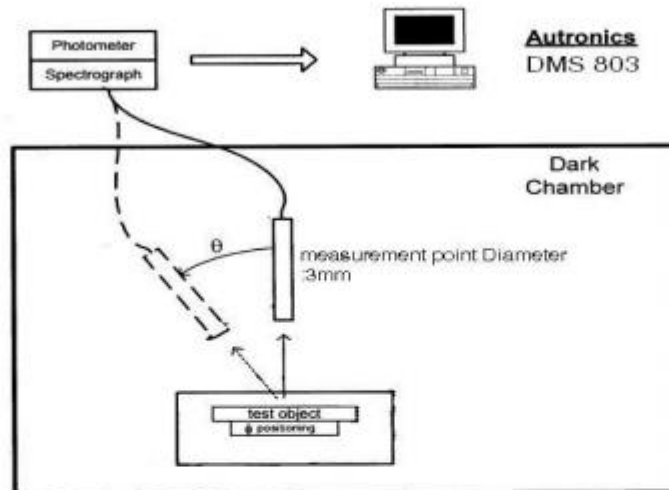
\*Note(3) Definition of Viewing Angle



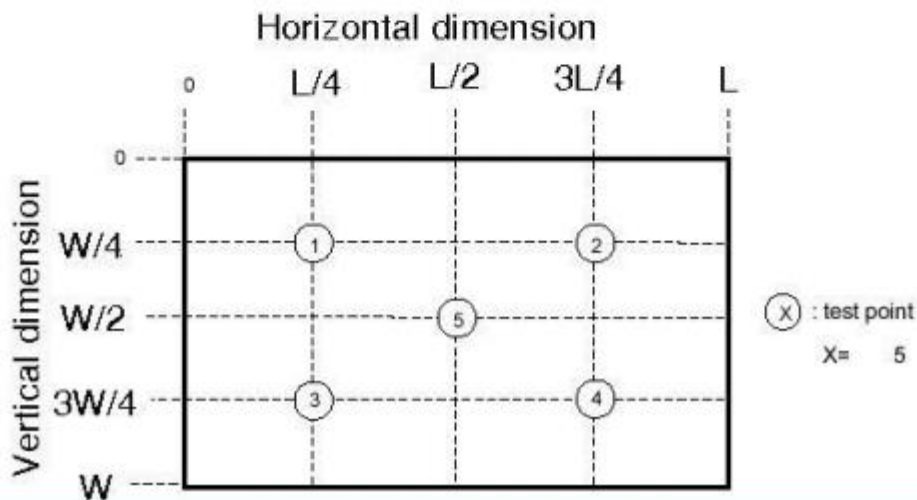


**\*Note (4) Measurement Set-Up:**

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



**\*Note (5)**



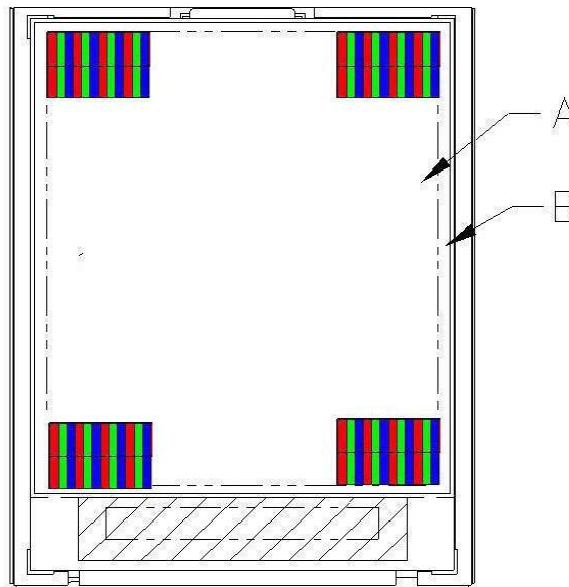


## 6. QUALITY SPECIFICATIONS

### 6.1 INSPECTION CONDITION

- (1) Inspect under 300~500Lux fluorescent light, leaving 30~35cm between panels and eyes, and between panels and lights.
- (2) Inspection condition is  $23\pm 5^{\circ}\text{C}$ ,  $50\pm 20\%\text{RH}$  maximum.

### 6.2 DEFINITION OF AREA

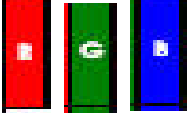



A Area : Viewing area.


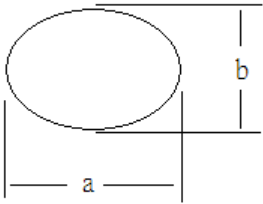
B Area : Out of viewing.(outside viewing area)



**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 one dot.</li> </ul> <div style="text-align: center;">  <p>Sub Pixel (Dot)</p> </div> <p>a&gt; Dark dot ----one Allowed b&gt; Bright dot ---- one Allowed</p> <ul style="list-style-type: none"> <li>● Pixel : Three dots link together doesn't exceed ones</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 0</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.</p> <p>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"> <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> 	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	---	
		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	---																
		<p><b>3-2 Blemish: dot shapes of defect.</b></p> <table border="1"> <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>3</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>	Dimension	Acceptable number	Mini. Space	$\Phi \leq 0.15$	Ignore	---	$0.15 < \Phi \leq 0.20$	3	5 m m	$0.20 < \Phi \leq 0.30$	2	$\Phi > 0.30$	0	---					
		Dimension	Acceptable number	Mini. Space																	
		$\Phi \leq 0.15$	Ignore	---																	
		$0.15 < \Phi \leq 0.20$	3	5 m m																	
$0.20 < \Phi \leq 0.30$	2																				
$\Phi > 0.30$	0	---																			
<p><b>3-3 Polarizer Bubble</b></p> <table border="1"> <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>	Dimension	Acceptable number	Mini. Space	$\Phi \leq 0.25$	Ignore	---	$0.25 < \Phi \leq 0.35$	3	15 m m	$\Phi > 0.35$	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	---																			
<p>Foreign Substances</p>  <p style="text-align: right;"><math>\Phi = (a+b)/2</math></p>																					



NO	Item	Acceptable specification	Judgment Criterion			
3	Cosmetic Inspection	<b>3-4 Scratch</b> <ul style="list-style-type: none"> <li>● Sensate scratch not allowed.</li> <li>● Impassive scratch as below.</li> </ul> <p style="text-align: right; color: red;">Unit:mm</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	
		----		$0.15 < W$	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
High Temperature Operation	70°C for 96 hours
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 Operation Humidity Operation	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) 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 standard, Kingtech will rework or exchange for functional defect goods since within one year.
-