



深圳市一众显示科技有限公司

SHEN ZHEN TEAM SOURCE DISPLAY TECH. CO, TD.

TFT-LCD Module Specification

Module NO.: TST043WVBI-69

Version: V1.0

APPROVAL FOR SPECIFICATION

APPROVAL FOR SAMPLE

For Customer' s Acceptance:	
Approved by	Comment

Team Source Display:		
Presented by	Reviewed by	Organized by

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1. LCM Specification

1.1 Description

TST043WVBI-69 is a transmissive type color active matrix liquid crystal display(LCD) which uses amorphous thin film transistor(TFT) as switching devices. This product is composed of a TFT LCD panel, a drive IC, a FPC and a LED-backlight unit. The active display area is 4.3 inches diagonally measured and the native resolution is 480*RGB*800.Features of this product are listed in the following table.

1.2 Functions & Features

Table 1.1 Module Functions & Features

Parameter	Value	Unit
LCD Mode	TFT/Transmissive	-
Color Depth	16.7M	-
Display Resolution	480RGB*800	pixels
Module Size	104.5(H)*60.9(W)*1.9(T)(Exclude FPC)	mm
Active Area (A.A)	93.55(H)*56.16(W)	mm
Pixel Arrangement	RGB-stripe	-
Viewing Direction	ALL	
Display Mode	Normally white	
LCD Controller/Driver	ILI9806E	-
IC Package Type	COG	-
Interface	MIPI	-
Power Supply Voltage	2.8~3.6	V
LCM Brightness	260	cd /m ²
Back-light	White LED 5*2	PCS

3. Pin Descriptions

Pin No.	Symbol	I/O	Functional	Remark
1	LEDA	P	LED Power supply +	
2	LEDA	P	LED Power supply +	
3	LEDK	P	LED Power supply -	
4	LEDK	P	LED Power supply -	
5	LCDID	-	No Connection.	
6	VCC	P	Analog voltage, 2.5-3.6V	
7	VDDIO	P	I/O supply voltage, 1.65~3.6V	
8	GND	P	System ground.	
9	LCD_TE0	O	Tearing effect output	
10	LCD_RST_N	I	External reset input	
11	GND	P	System ground.	
12	MIPI_D1_P	I/O	DSI differential data1 +	
13	MIPI_D1_N	I/O	DSI differential data1 -	
14	GND	P	System ground.	
15	MIPI_D0_N	I/O	DSI differential data0 -	
16	MIPI_D0_P	I/O	DSI differential data1 +	
17	GND	P	System ground.	
18	MIPI_CLK_P	I/O	DSI differential clock +	
19	MIPI_CLK_N	I/O	DSI differential clock -	
20	GND	P	System ground.	

4. Electrical Units

4.1 Absolute Maximum Ratings

The absolute maximum ratings are list on Table 4.1. When used out of the absolute maximum ratings, the LCM may be permanently damaged. Using the LCM within the following electrical characteristics limit is strongly recommended for normal operation. If these electrical characteristic conditions are exceeded during normal operation, the LCM will malfunction and cause poor reliability.

Table 4.1 Module Absolute Maximum Ratings

Item	Symbol	Unit	Value	Note
Power Supply Voltage (1)	Vdd	V	-0.3 to +4.0	
Power Supply Voltage (2)	VGH ~ VSS	V	-0.3 to +18.0	
Power Supply Voltage (3)	VSS ~ VGL	V	0 to -15.0	
Operating Temperature	Top	°C	-20 to +70	
Storage Temperature	Tst	°C	-30 to +80	
Operating Humidity	Hop	%(RH)	10~85	

(VSS=0V)

4.2 Electrical characteristics (Ta=25°C)

Table 4.2:DC Characteristic (Vcc = 3.0 ~ 3.6V)

Item		Symbol	Condition	Min.	Type.	Max.	Unit
Supply Voltage	Logic	Vdd	---	2.8	3.3	3.6	V
Input Voltage	H level	V _{IH}	---	0.7V _{dd}	---	V _{dd}	V
	L level	V _{IL}		0	---	0.3V _{dd}	
Current Consumption		I _{DD}	With internal voltage generation; VDD=3.3V; Tamb=25°C;	---	--	---	mA

4.3 Back-light Specification

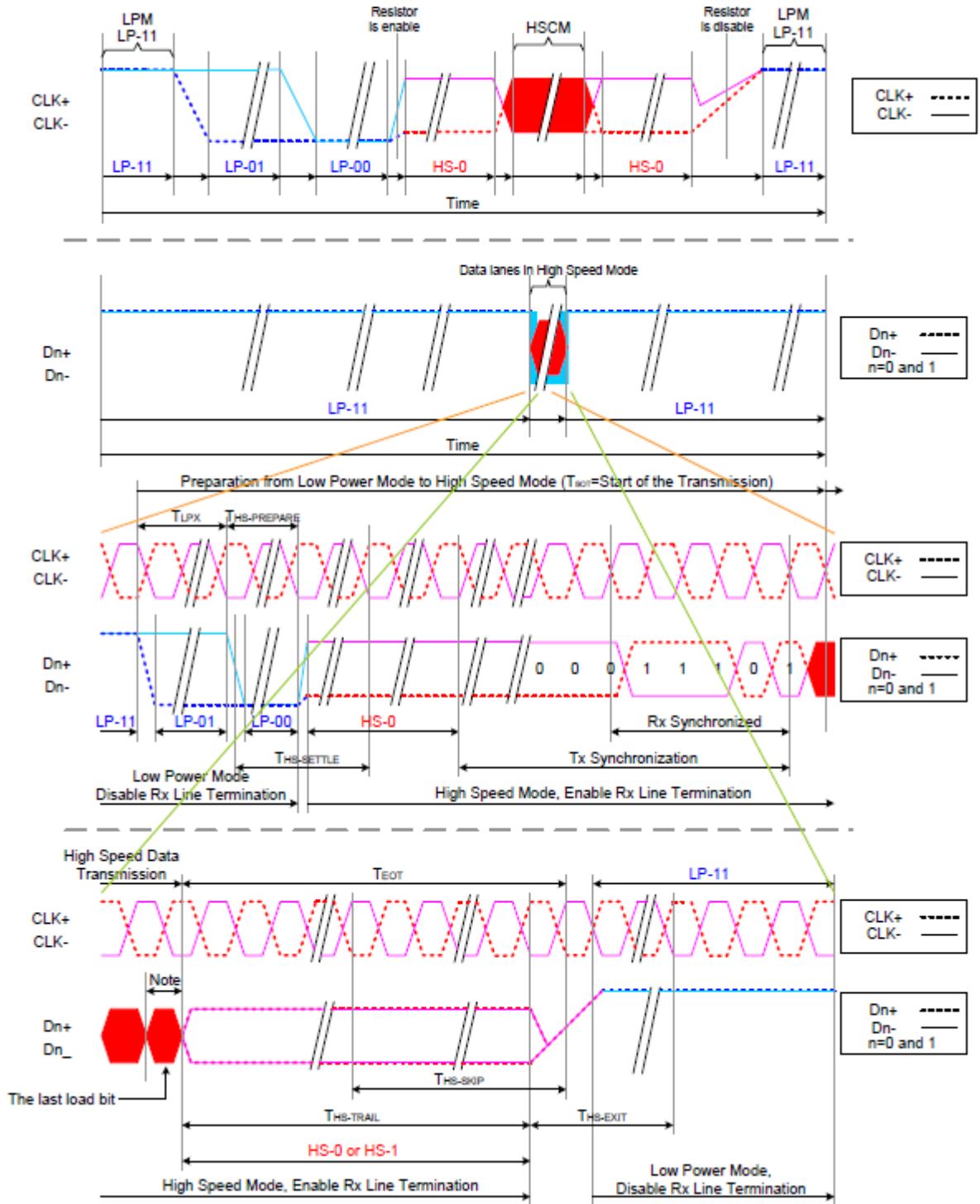
Table 4.3 Back-light Characteristics

Item	Symbol	Conditions	Min.	Type.	Max.	Unit
Supply Voltage	VF	Only Backlight	14.5	-	17.0	V
Supply Current	IF		40			mA
Average Brightness	IV	Backlight Current IF=40mA	-	8000	-	Cd/ m ²
CIE Color Coordinate (Without LCD)	X	Backlight Current IF=40mA	0.260	--	0.31	-
	Y		0.260	--	0.31	
Uniformity	B	Backlight Current IF=40mA	--	80%	-	%
Color	White					

Note: 5 LEDs in series 2 parallel connection.

5. AC Characteristics

5.1 DSI Timing



High Speed Mode – Clock Channel Timing

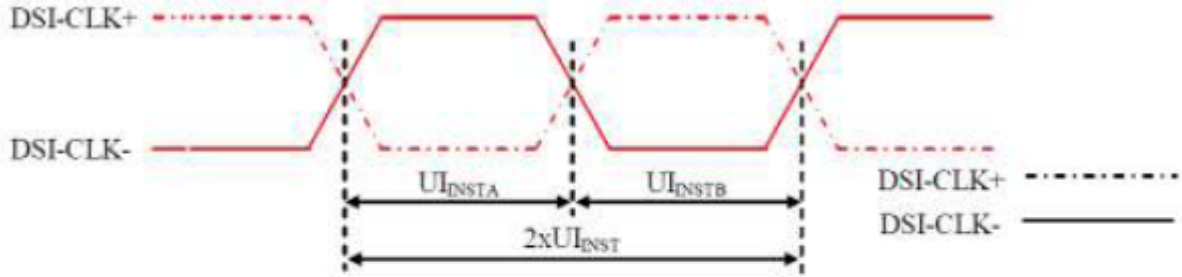


Figure 114 DSI Clock Channel Timing

Table 45 DSI Clock Channel Timing

Signal	Symbol	Parameter	Min	Max	Unit
DSI-CLK+/-	$2xUI_{INST}$	Double UI instantaneous	4	25	ns
DSI-CLK+/-	UI_{INSTA}, UI_{INSTB}	UI instantaneous Half	2	12.5	ns

Note: $UI = UI_{INSTA} = UI_{INSTB}$

High Speed Mode – Data Clock Channel Timing

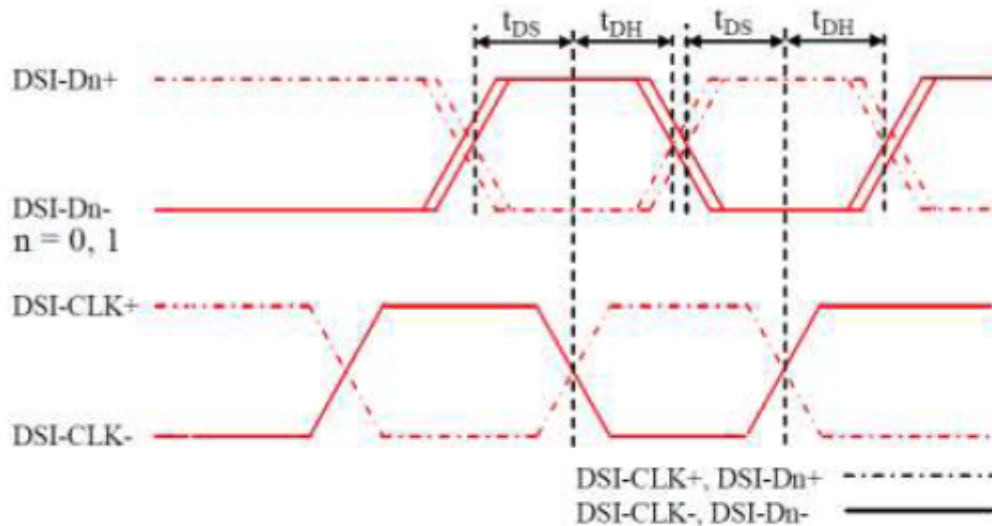


Figure 115 DSI Data to Clock Channel Timings

Table 46 DSI Data to Clock Channel Timings

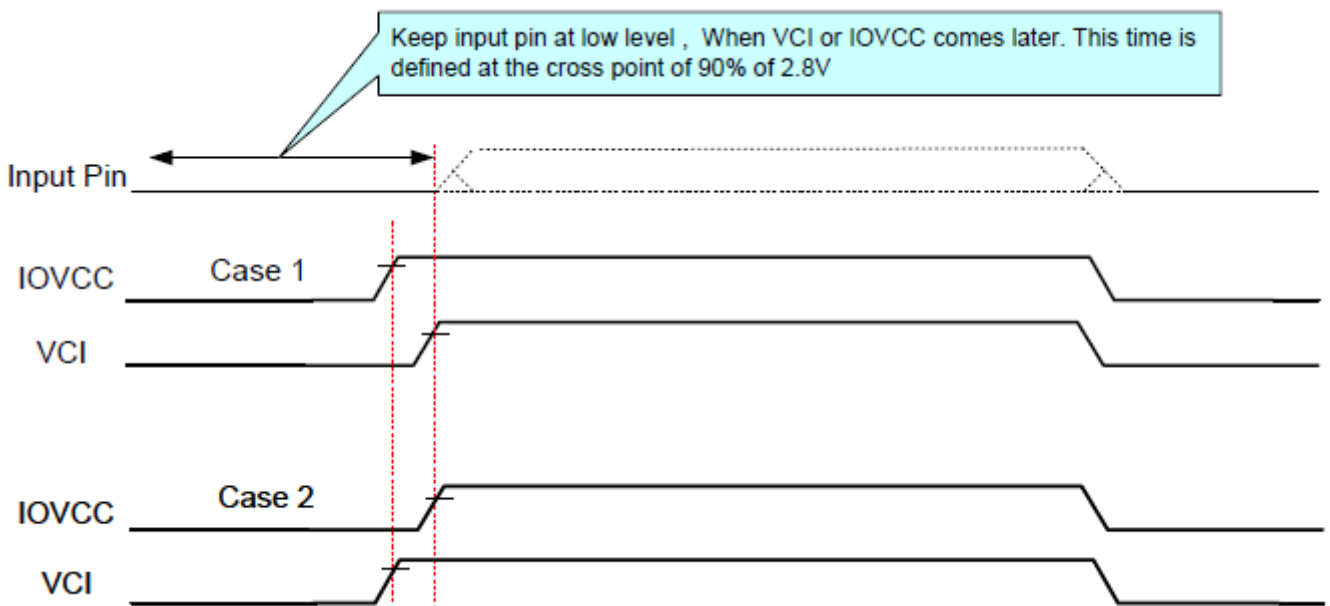
Signal	Symbol	Parameter	Min	Max
DSI-Dn+/- , n=0 and 1	t_{DS}	Data to Clock Setup time	$0.15xUI$	-
	t_{DH}	Clock to Data Hold Time	$0.15xUI$	-

5.2 TBD.

5.3 TBD.

6. Power On/Off Sequence

IOVCC and VCC can be applied in any order. During the power off sequences, if LCD is in the Sleep Out mode, VCC and IOVCC must be powered down with minimum 120msec. And if LCD is in the Sleep In mode, VCC and IOVCC can be powered down with minimum 0msec after RESET has been released. CS can be applied at any timing or can be permanently grounded. Reset has priority over CS.



7. Optical Specifications

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 30 minutes in a dark environment at 25°C. The values specified are at an approximate distance 50cm from the TFT-LCD surface at a viewing angle of Φ and θ equal to 0° .

Measurement condition: Refer to next pages (C-light source, Halogen Lamp)

*1): with Polarizer *2): without Polarizer *3): Only Color Filter glass

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle	θ_L	C.R. • •10	70	80	-	degree
	θ_R		70	80	-	
	θ_U		70	80	-	
	θ_D		70	80	-	
Contrast Ratio	-	T = 25°C	650	800	-	-
Transmittance	T%(with polarizer + D65 light)	T = 25°C	4.1	4.3	-	%
Response time	Tr	T = 25°C	35		40	ms
	Tf					

Item	Symbol	Condition	Min.	Typ.	Max.
Red Color	Rx	T=25°C (CF、C light)	0.625	0.645	0.665
	Ry		0.302	0.322	0.342
Green Color	Gx		0.257	0.277	0.297
	Gy		0.572	0.592	0.612
Blue Color	Bx		0.115	0.135	0.155
	By		0.078	0.098	0.118
White Color	Wx		0.280	0.300	0.320
	Wy		0.313	0.333	0.353
Black Color	Wx		-	-	-
	Wy		-	-	-
NTSC	%		64.7%	69.7%	74.7%

Notes : 1. Contrast Ratio(CR) is defined mathematically as :

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

2. Surface luminance is the center point across the TFT-LCD surface 500mm from the surface with all pixels displaying white. For more information see FIG 1.
3. Response time is the time required for the display to transition from white to black(Rise Time, Tr) and from black to white(Falling Time, Tf). For additional information see FIG 3.
4. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the TFT-LCD surface. For more information see FIG 4.
5. Optimum contrast is obtained by adjusting the TFT-LCD Threshold voltage(Vth & Vsat)

FIG. 1 Optical Characteristic Measurement Equipment and Method

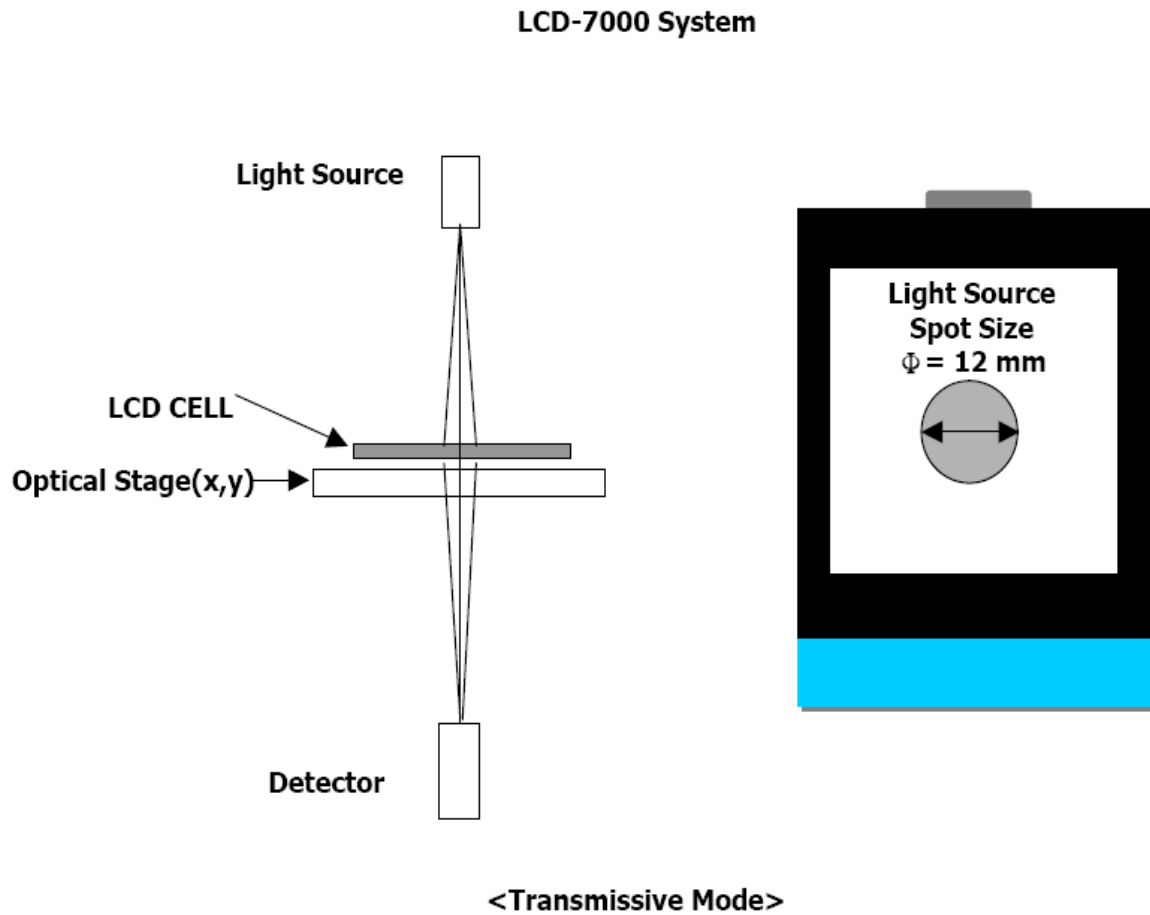


FIG. 2 The definition of Vth and Vsat

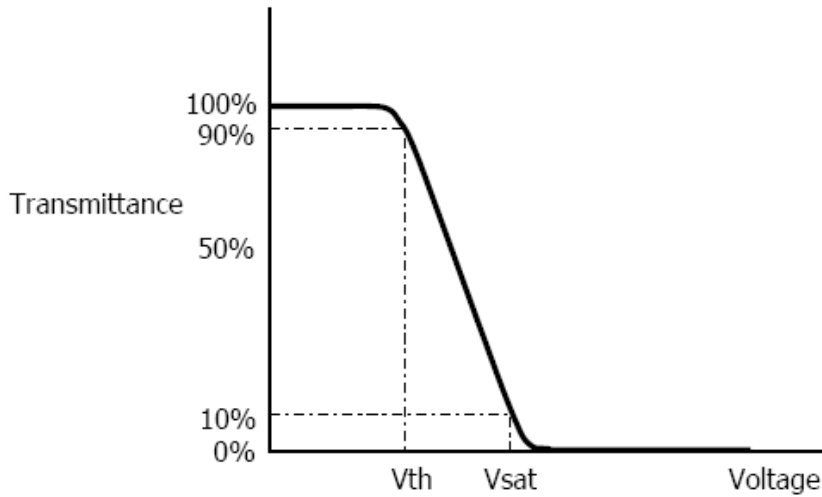
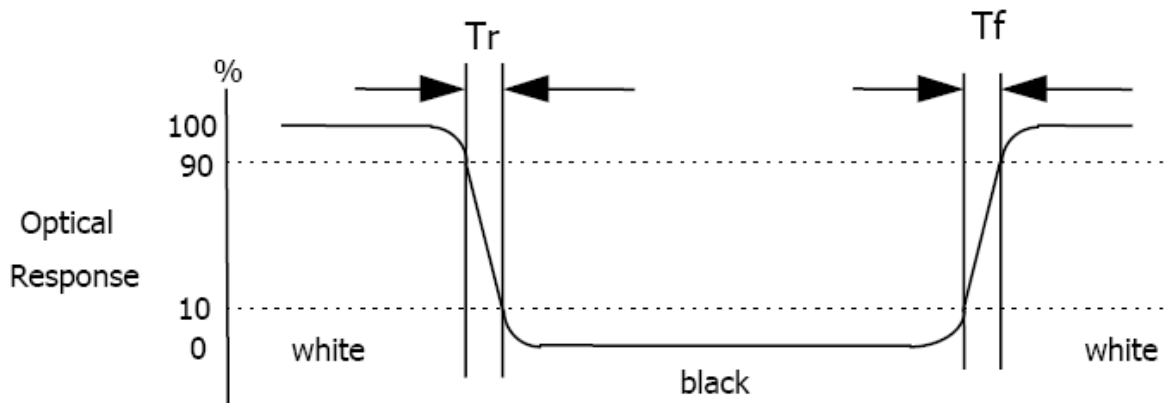


FIG. 3 The definition of Response Time

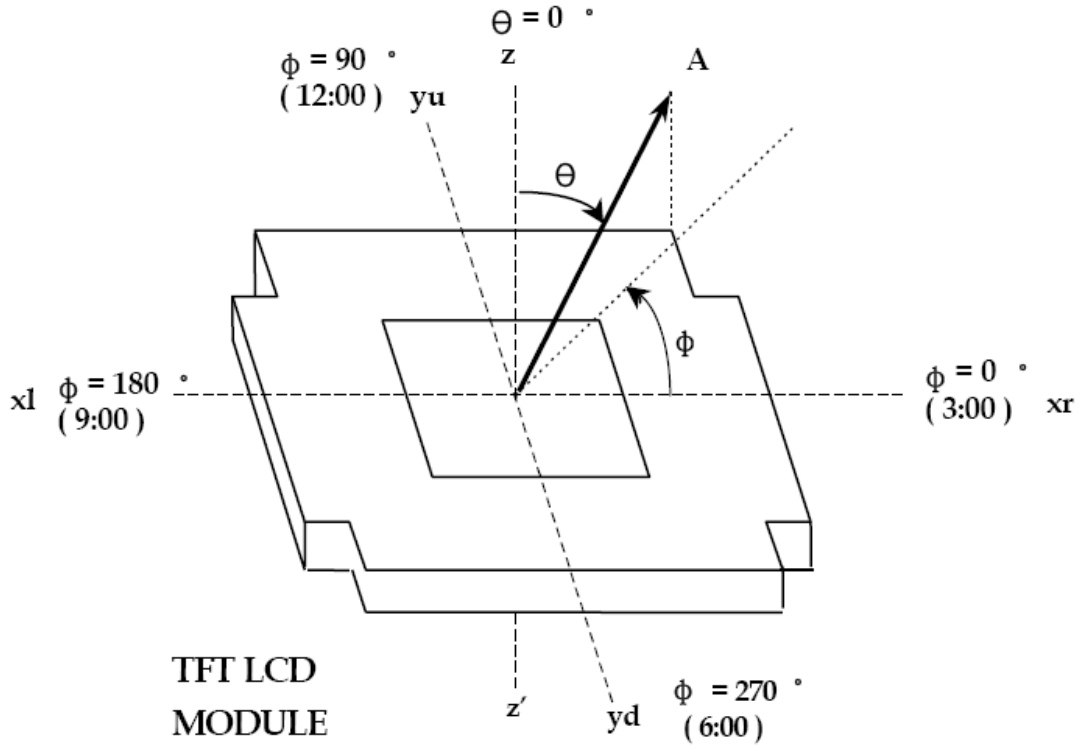
The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".



* Voltage conditions for Response time
 Vgate : 19V DC
 Vdata : 0V~3.3V DC
 Vcom : 0V (Ground)

FIG. 4 The definition of viewing angle

<dimension of viewing angle range>



8. Reliability Test Items

No.	Test Item	Test Condition	Check Time
1	High temp storage	T=80°C	72Hrs
2	Low temp storage	T=-30°C	72Hrs
3	High temp operation	T=70°C	72Hrs
4	Low temp operation	T=-20°C	72Hrs
5	High temp & high humidity	T=50°C H=90%	72Hrs

Reliability Test Criteria:

Display function should be no change under normal operating condition.

9. Handling Precautions

9.1 Safety

The liquid crystal in the LCD is poisonous. Keep away from your mouth and eyes. If the liquid crystal contacts with your skin, mouse or clothes, use soap to wash it off immediately.

9.2 Handling

- i. The LCD panel is made of very thin glass. Mechanical impact or extrusion to the surface should be prevented.
- ii. The polarizer attached on the display is very easy to be damaged, handle it with special attention.
- iii. To avoid contamination on the display surface, do not touch the display surface with bare hands.
- iv. The transparent electrodes may be disconnected if you use the LCD panel under dew-condensing environment.
- v. The characteristics of the semiconductor devices may be affected when they are exposed to light, possibly resulting in malfunctioning of the ICs. To prevent such malfunctioning of the ICs, make sure the application and the mounting of the panel are designed so that the IC is not exposed to light.

9.3 Static Electricity

Ground soldering iron tips, tools and testers when you operate. Also ground your body when handling the products and store the products in an anti-electrostatic container.

9.4 Storage

Store the products in a dark place where the temperature is within the range of $25\pm 10^{\circ}\text{C}$ and with low humidity (60%RH or less). Do not store the LCD product in an atmosphere containing organic solvents or corrosive gases.

9.5 Cleaning

Do not wipe the polarizer with dry cloth, as it might cause scratching. Wipe the polarizer with a soft cloth soaked with petroleum IPA. Other chemical might damage the panel.