ASI-T-1010SA5DN/D

Item	Contents	Unit
Size	10.1	inch
Resolution	1280 x RGB x 800	/
Interface	Digital	/
Technology type	a-Si TFT active matrix	/
Pixel pitch	0.0565x0.0565	mm
Pixel Configuration	RGB stripes	
Outline Dimension (W x H x D)	229.46x149.10x4.80	mm
Active Area	216.96x 135.60	mm
Display Mode	Transmissive, Normally Black	/
Backlight Type	LED	/

Record of Revision

Date	Revision No.	Summary
2014-08-15	1.0	Rev 1.0 was issued

1. Scope

This data sheet is to introduce the specification of ASI-T-1010SA5DN/D active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, FPC and a backlight unit. The 10.1″ display area contains 1280X3(RGB) x 800 pixels.
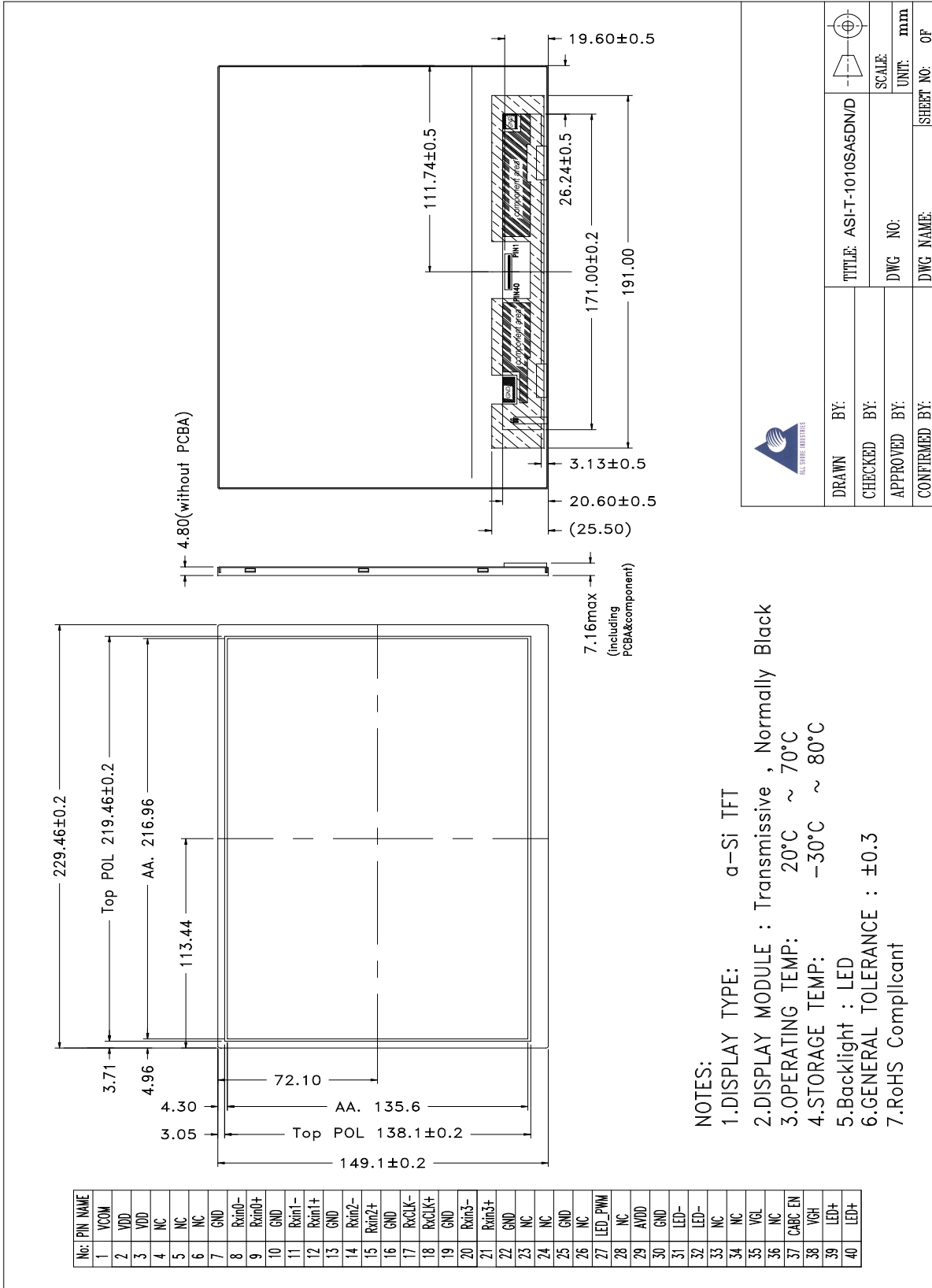
2. Application

Digital equipments which need color display, mobile navigator/video systems, tablet PC.

3. General Information

Item	Contents	Unit
Size	10.1	inch
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Backlight Type	LED	/

4. Outline Drawing

NOTES:
1. DISPLAY TYPE: α-Si TFT
2. DISPLAY MODULE : Transmissive , Normally Black
3. OPERATING TEMP: 20°C ~ 70°C
4. STORAGE TEMP: -30°C ~ 80°C
5. Backlight : LED
6. GENERAL TOLERANCE : ±0.3
7. RoHS Compliant

No.	PIN NAME
1	VCOM
2	VDD
3	VDD
4	NC
5	NC
6	NC
7	GND
8	Rxin0-
9	Rxin0+
10	GND
11	Rxin1-
12	Rxin1+
13	GND
14	Rxin2-
15	Rxin2+
16	GND
17	RxCLK-
18	RxCLK+
19	GND
20	Rxin3-
21	Rxin3+
22	GND
23	NC
24	NC
25	GND
26	NC
27	LED_PWM
28	NC
29	AVDD
30	GND
31	LED-
32	LED-
33	NC
34	NC
35	VGL
36	NC
37	CABC EN
38	VGH
39	LED+
40	LED+

5. Interface signals

Connect Part No: FH33-40S-0.5SH

Pin No.	Symbol	I/O	Function	Remark
1	VCOM	P	Common Voltage	
2	VDD	P	Power Supply	
3	VDD	P	Power Supply	
4	NC	---	No connection	
5	NC	---	No connection	
6	NC	---	No connection	
7	GND	P	Ground	
8	Rxin0-	I	-LVDS Differential Data Input	R0-R5, G0
9	Rxin0+	I	+LVDS Differential Data Input	
10	GND	P	Ground	
11	Rxin1-	I	-LVDS Differential Data Input	G1~G5, B0,B1
12	Rxin1+	I	+LVDS Differential Data Input	
13	GND	P	Ground	
14	Rxin2-	I	-LVDS Differential Data Input	B2-B5,HS,VS, DE
15	Rxin2+	I	+LVDS Differential Data Input	
16	GND	P	Ground	
17	RxCLK-	I	-LVDS Differential Clock Input	LVDS CLK
18	RxCLK+	I	+LVDS Differential Clock Input	
19	GND	P	Ground	
20	Rxin3-	I	-LVDS Differential Data Input	R6, R7, G6, G7, B6, B7
21	Rxin3+	I	+LVDS Differential Data Input	
22	GND	P	Ground	
23	NC	---	No connection	
24	NC	---	No connection	
25	GND	P	Ground	
26	NC	---	No connection	
27	LED_PWM	O	CABC controller signal output for backlight	Note2
28	NC	---	No connection	
29	AVDD	P	Power for Analog Circuit	
30	GND	P	Ground	
31	LED-	P	LED Cathode	
32	LED-	P	LED Cathode	
33	NC	---	No connection	
34	NC	---	No connection	
35	VGL	P	Gate OFF Voltage	
36	NC	---	No connection	
37	CABC_EN	I	CABC Enable Input	Note1
38	VGH	P	Gate ON Voltage	
39	LED+	P	LED Anode	
40	LED+	P	LED Anode	

I: input, O: output, P: Power

Note 1: The settings of CABC function are as follows.

Pin	Enable	Disable
CABC_EN	High Voltage	Low Voltage or open

Note 2: LED_PWM is used to adjust backlight brightness.

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VDD	-0.3	3.9	V	VSS=0V TA=25℃
	AVDD	-0.3	14.0	V	
	VGH	-0.3	42.0	V	
	VGL	-19	0.3	V	
	VGH-VGL	12	40.0	V	
LED Reverse Voltage	VR		5	V	Each LED
LED Forward Current	IF		70	mA	Each LED

6.2. Environment Conditions

Item	Symbol	MIN	MAX	Unit	Remark
Operating Temperature	TOPR	-20	70	℃	
Storage Temperature	TSTG	-30	80	℃	

Note : The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

7. Electrical Specifications

7.1 Electrical characteristics

GND=0V, Ta=25℃

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Power Voltage	VDD	2.3	2.5	2.7	V	
	AVDD	8.0	8.2	8.4	V	
	VGH	21.7	22	22.3	V	
	VGL	-7.3	-7	-6.7	V	
Input Logic Voltage	VIL	0	--	0.2DVDD	V	Note 2
	VIH	0.8VDD	--	3.6	V	
Input signal voltage	VCOM	2.7	3.0	3.3	V	Note 3

Note 1: Be sure to apply VDD and VGL to the LCD first, and then apply VGH.
Note 2: VDD setting should match the signals output voltage (refer to Note 3) of customer's system board.
Note 3: Typical VCOM is only a reference value, it must be optimized according to each LCM. Be sure to use VR.
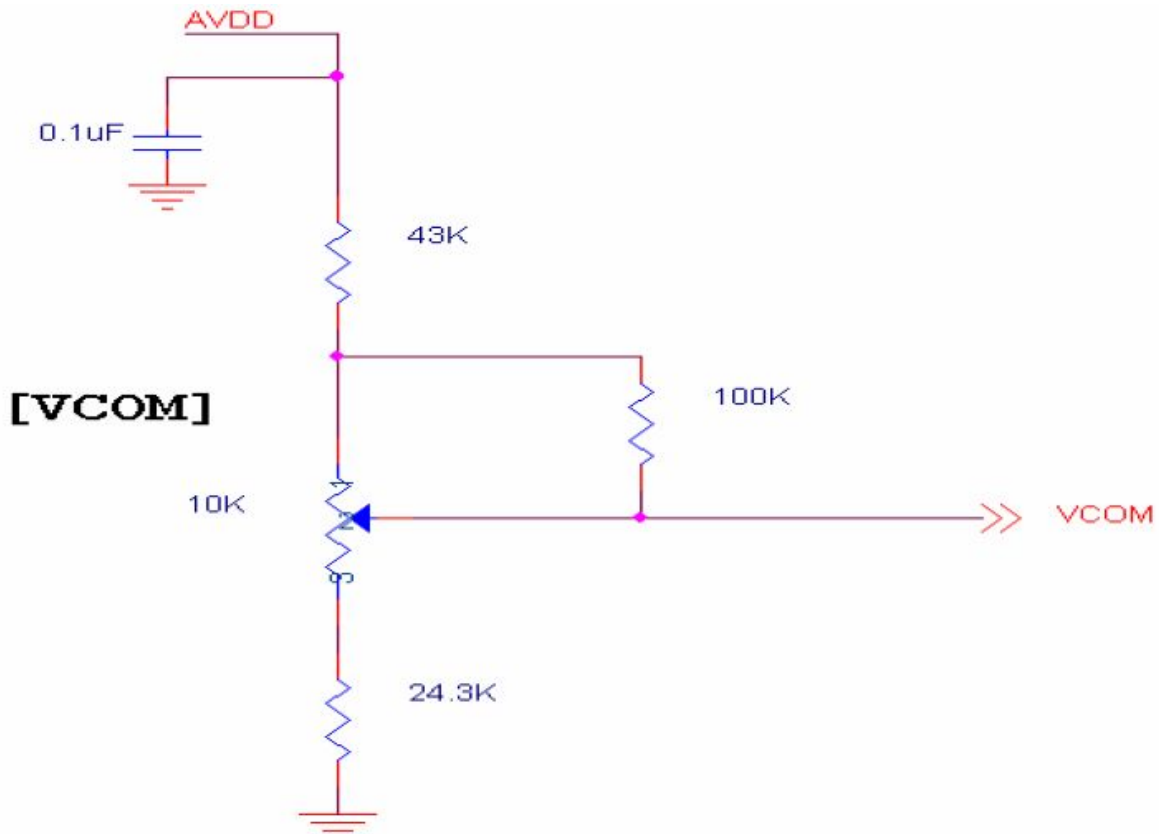
7.2 LED Backlight

Ta=25℃

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Voltage for LED backlight	VL	16.8	19.5	21	V	Note 1
Current for LED backlight	IL	200	240	280	mA	
LED life time	-	50,000	-	-	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and IL =200mA.
Note 2: The "LED life time" is defined as the module brightness decrease to 50% original
brightness at Ta=25℃ and IL =200mA. The LED lifetime could be decreased if
operating IL is lager than 200mA.

7.3   Current Consumption

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Current for Driver	I_{GH}	-	705	1000	uA	V_{GH} =22V
	I_{GL}	-	705	1000	uA	V_{GL} = -7V
	IV_{DD}	-	95	120	mA	V_{DD} =2.5V
	IAV_{DD}	-	45	70	mA	AV_{DD} =8.2V

8. Command/AC Timing

8.1 AC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LVDS Differential input high Threshold voltage	RxVTH	-	-	+100	mV	RXVCM=1.2V
LVDS Differential input low Threshold voltage	RxVTL	-100	-	-	mV	
LVDS Differential input common mode voltage	RxVCM	0.7	-	1.6	V	
LVDS Differential voltage	|VID|	100	-	600	mV	
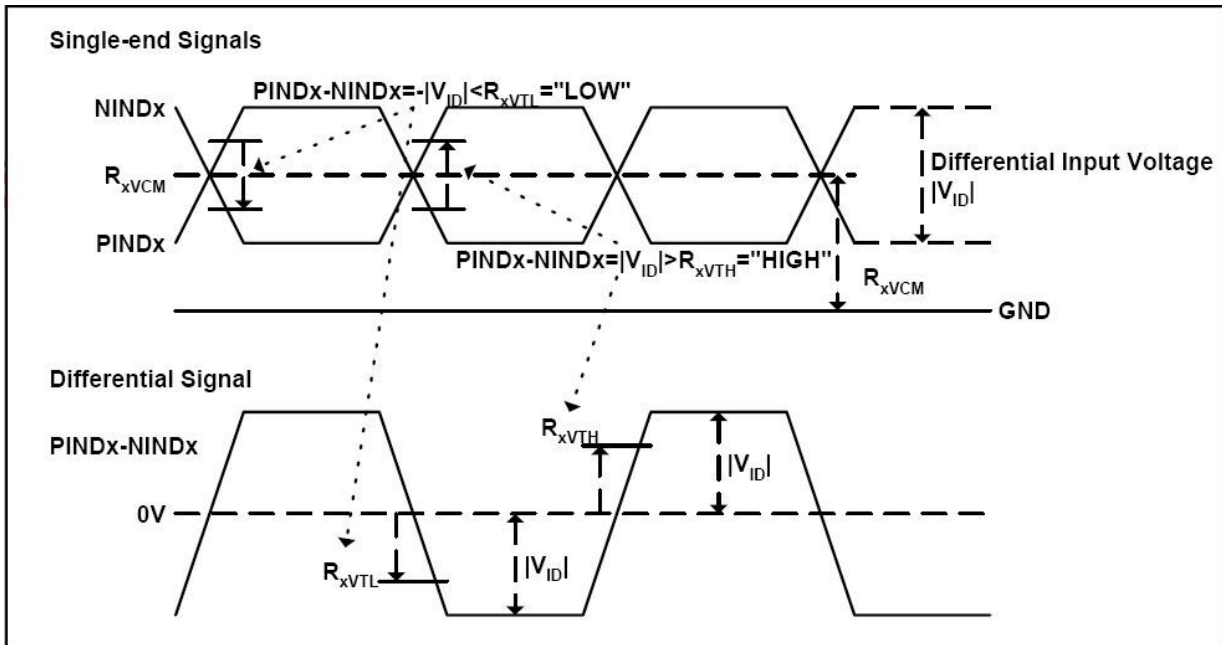
8.2 Timing Table

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	1/Tc	68.9	71.1	73.4	MHz	Frame rate =60Hz
Horizontal display area	tHD		1280		Tc	
HS period time	tH	1410	1440	1470	Tc	
HS Width +Back Porch +Front Porch	tHW+ tHBP +tHFP	130	160	190	Tc	
Vertical display area	tVD		800		tH	
VS period time	tv	815	823	(833	tH	
VS Width +Back Porch +Front Porch	tvW+ tvBP +tvFP	15	23	33	tH	
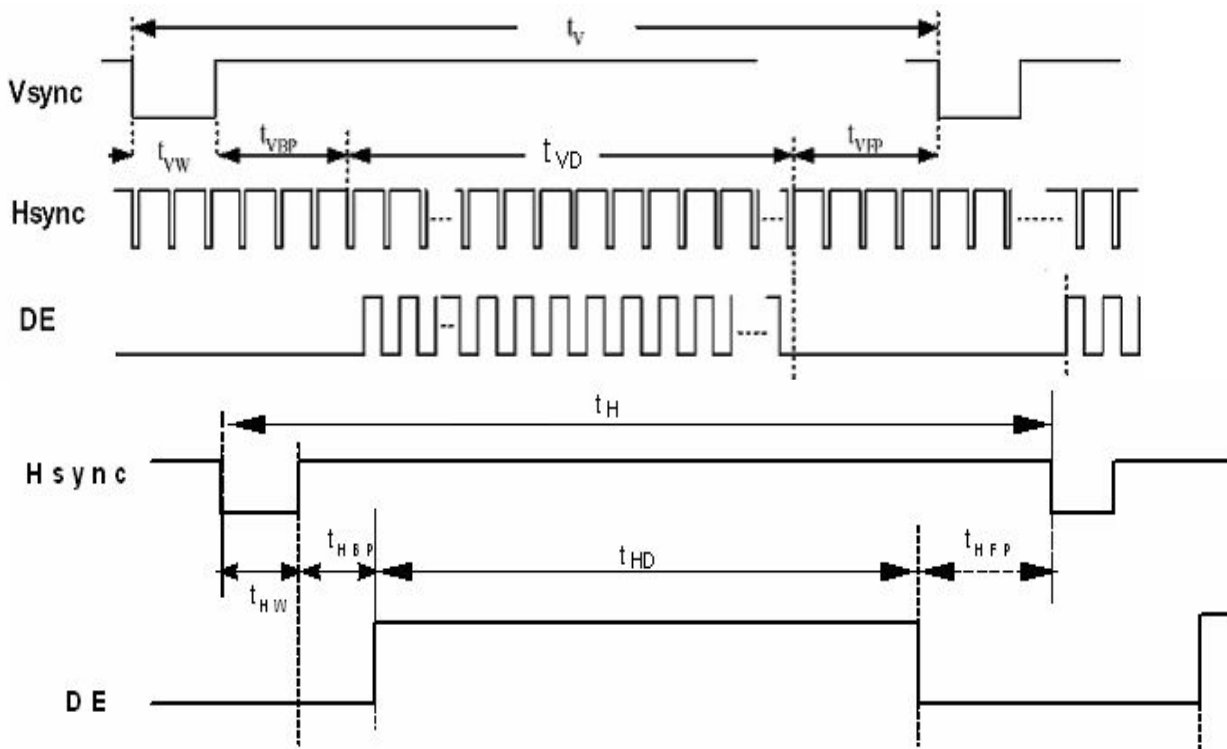
8.3 LVDS Data Input Format
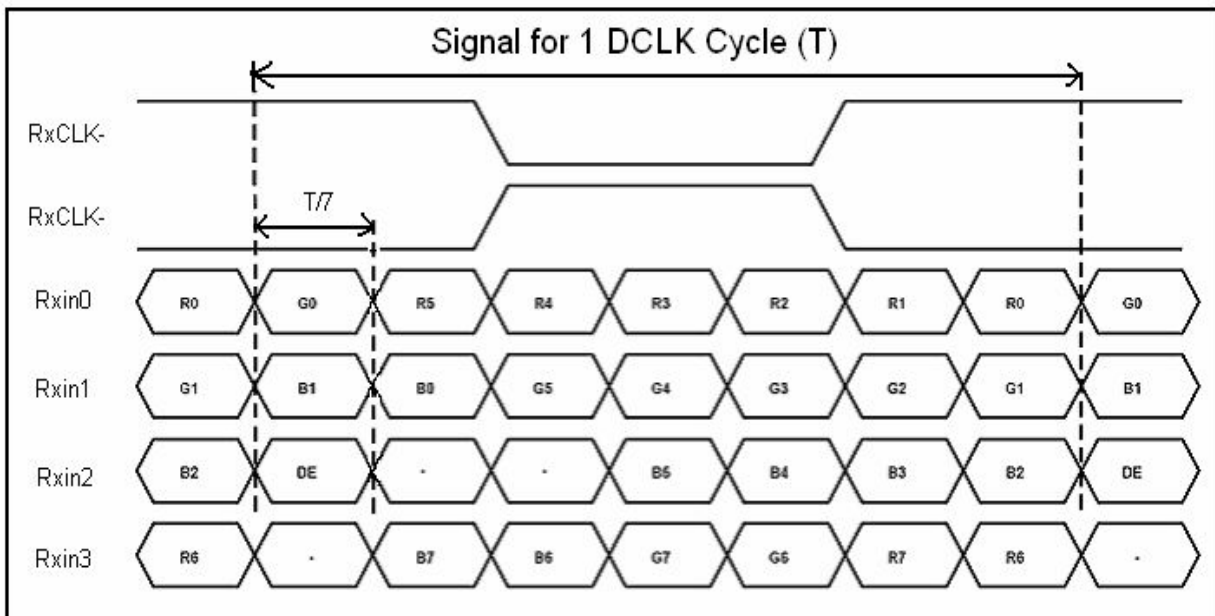
8.4 Power Sequence

8.4.1 Power on:
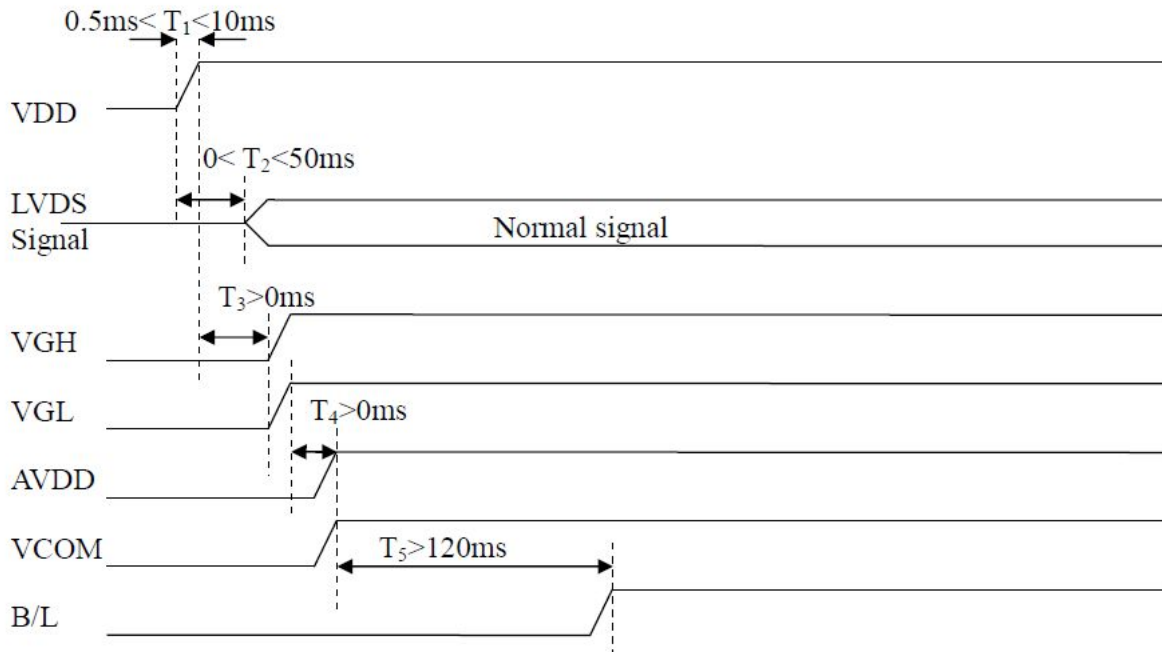
8.4.2 Power off:
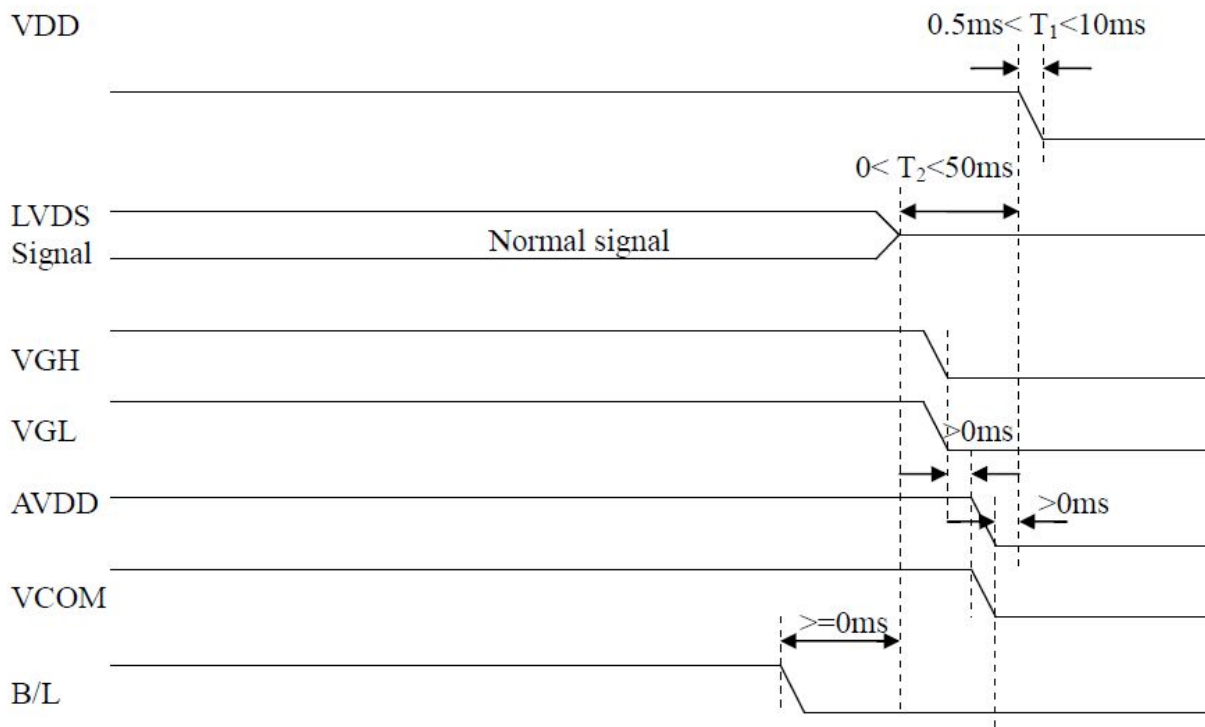
9. Optical Specification

Ta=25℃

Item		Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio		CR	θ=0°	600	800	-		Note1 Note2
Response Time		Tr	25℃	-	10	20	ms	Note1 Note3
		Tf		-	15	30		
View Angles		ΘT	CR≧10	75	85	-	Degree	Note 4
		ΘB		75	85	-		
		ΘL		75	85	-		
		ΘR		75	85	-		
Chromaticity	White	x	Brightness is on	0.28	0.31	0.34		Note5, Note1
		y		0.29	0.32	0.35		
Luminance		L		-	500	-	cd/m²	Note1 Note6
Uniformity		U		75	80	-	%	Note1 Note7

Test conditions: VDD=2.5V, IL=200mA (Backlight current), the ambient temperature is 25℃.Note 1: Definition of optical measurement system.

Temperature = 25℃(±3℃)

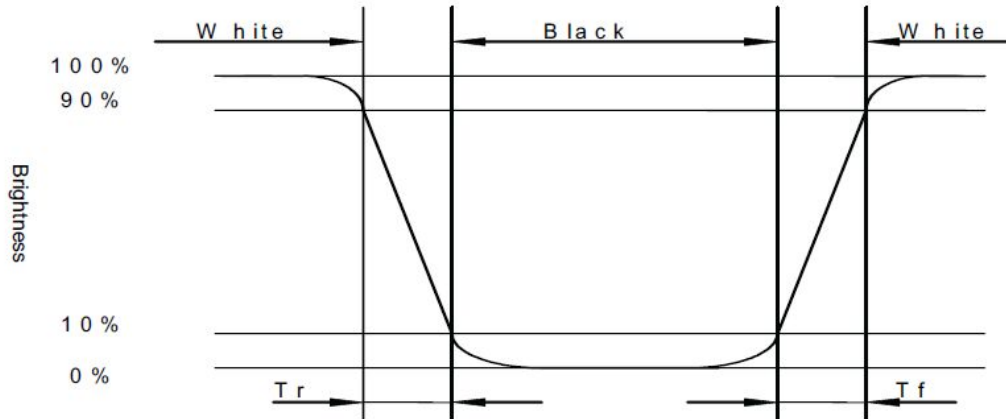LED back-light: ON, Environment brightness < 150 lx
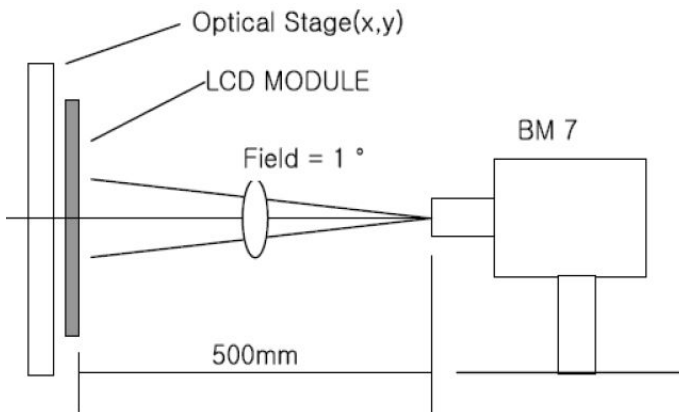
Note 2: Contrast ratio is defined as follow:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$
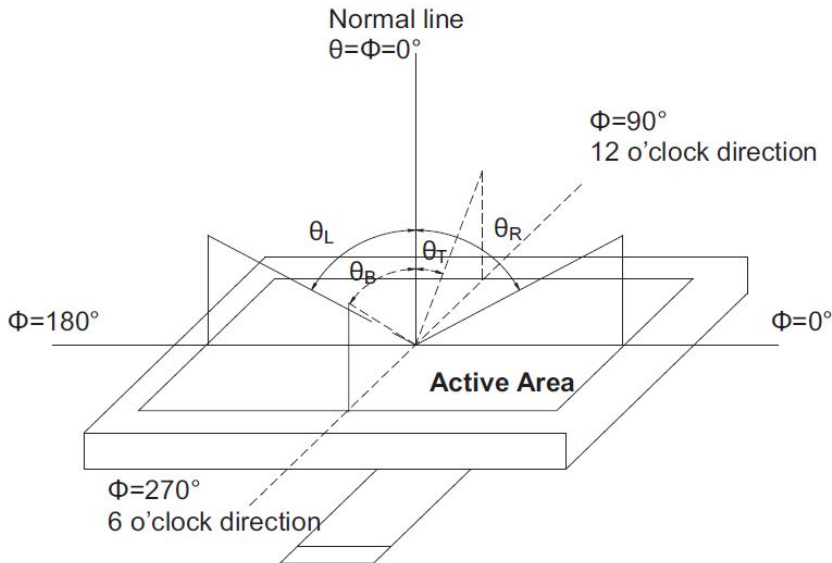
Note 3: Response time is defined as follow:

Response time is the time required for the display to transition from black to white (Rise Time, Tr) and from white to black (Decay Time, Tf).
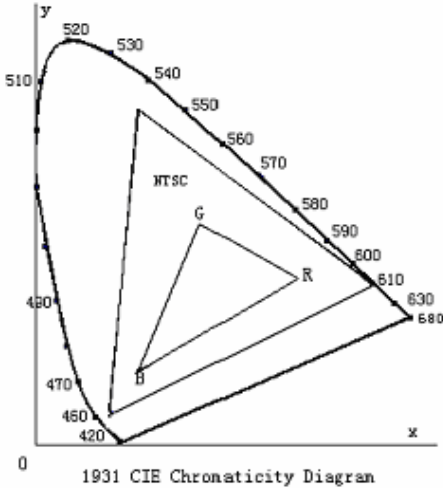

Note 4: Viewing angle range is defined as follow:

Viewing angle is measured at the center point of the LCD.

Note 5: Color chromaticity is defined as follow: (CIE1931)

Color coordinates measured at center point of LCD.

1931 CIE Chromaticity Diagram

$$S = \frac{area\ of\ RGB\ triangle}{area\ of\ NTSC\ triangle} \times 100\%$$

Note 6: Luminance is defined as follow:

Luminance is defined as the brightness of all pixels "White" at the center of display area on optimum contrast.

Note 7: Luminance Uniformity is defined as follow:

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$\text{Uniformity (U)} = \frac{Minimum\ Luminance(\ brightness\ )\ in\ 9\ points}{Maximum\ Luminance(\ brightness\ )\ in\ 9\ points}$$
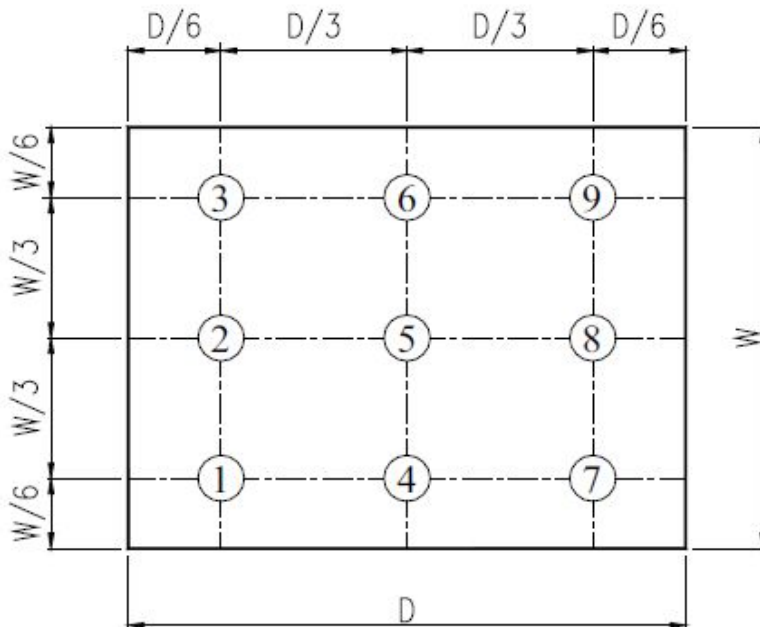

Fig. 2 Definition of uniformity

10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ts=+70℃, 240hrs	Per table in below
2	Low Temp Operation	Ta=-20℃, 240hrs	Per table in below
3	High Temp Storage	Ta=+80℃, 240hrs	Per table in below
4	Low Temp Storage	Ta=-30℃, 240hrs	Per table in below
5	High Temp & High Humidity Storage	Ta=+40℃, 90% RH 240 hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-30℃/30 min ~ +80℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	Per table in below
7	ESD (Operation)	± 2KV, Human Body Mode, 100pF/1500Ω	Per table in below
8	Vibration (Non-operation)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z.	Per table in below
9	Shock (Non-operation)	100G 6ms, ±X,±Y,±Z 3times, for each direction	Per table in below
10	Package Drop Test	Height:60 cm, 1 corner, 3 edges, 6 surfaces	Per table in below
11	Package Vibration Test	Random Vibration : ISTA-3A 1Hz~200Hz,Grms=0.53 Half hours for direction of Z.	Per table in below

INSPECTION	CRITERION(after test)
Appearance	No Crack on the FPC, on the LCD Panel
Alignment of LCD Panel	No Bubbles in the LCD Panel No other Defects of Alignment in Active area
Electrical current	Within device specifications
Function / Display	No Broken Circuit, No Short Circuit or No Black line No Other Defects of Display

11. Precautions for Use of LCD Modules

11.1 Safety

The liquid crystal in the LCD is poisonous. Do not put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.

11.2 Handling

A. The LCD and touch panel is made of plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.

B. Do not handle the product by holding the flexible pattern portion in order to assure the reliability

C. Transparency is an important factor for the touch panel. Please wear clear finger sacks, gloves and mask to protect the touch panel from finger print or stain and also hold the portion outside the view area when handling the touch panel.

D. Provide a space so that the panel does not come into contact with other components.

E. To protect the product from external force, put a covering lens (acrylic board or similar board) and keep an appropriate gap between them.

F. Transparent electrodes may be disconnected if the panel is used under environmental conditions where dew condensation occurs.

G. Property of semiconductor devices may be affected when they are exposed to light, possibly resulting in IC malfunctions.

H. To prevent such IC malfunctions, your design and mounting layout shall be done in the way that the IC is not exposed to light in actual use.

11.3 Static Electricity

A. Ground soldering iron tips, tools and testers when they are in operation.

B. Ground your body when handling the products.

C. Power on the LCD module before applying the voltage to the input terminals.

D. Do not apply voltage which exceeds the absolute maximum rating.

E. Store the products in an anti-electrostatic bag or container.

11.4 Storage

A. Store the products in a dark place at $+25°C \pm 10°C$ with low humidity (40% RH to 60% RH). Don't expose to sunlight or fluorescent light.

B. Storage in a clean environment, free from dust, active gas, and solvent.

11.5 Cleaning

A. Do not wipe the touch panel with dry cloth, as it may cause scratch.

B. Wipe off the stain on the product by using soft cloth moistened with ethanol. Do not allow ethanol to get in between the upper film and the bottom glass. It may cause peeling issue or defective operation. Do not use any organic solvent or detergent other than ethanol.

11.6 Cautions for installing and assembling

Bezel edge must be positioned in the area between the Active area and View area. The bezel may press the touch screen and cause activation if the edge touches the active area. A gap of approximately 0.5mm is needed between the bezel and the top electrode. It may cause unexpected activation if the gap is too narrow. There is a tolerance of 0.2 to 0.3mm for the outside dimensions of the touch panel and tail. A gap must be made to absorb the tolerance in the case and connector.