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To :
Date :

TFT LCD

NDS7G50PIPS-3.5

ACCEPTED BY :

V 0.1

APPROVED BY	CHECKED BY	PREPARED BY

Doc.No:		Issue Date:	2013/03/22

REVISION STATUS

Revision Notice	Description	Page	Rev. Date
0.0	First Revision (Tentative)	--	2013/01/08
0.1	Modify Typical Operation Conditions NOTE1	6	2013/03/22

CONTENTS

1. OVERVIEW

NDS7G50PIPS-3.5 is 7.0" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) OLB module (finish outer lead bonding) composed of LCD panel and driver ICs (the

The 7.0" screen produces 1024(*3)X600 WSVGA resolution image. By applying R.G.B. input signal, full color images are displayed.

General specifications are summarized in the following table：

ITEM	SPECIFICATION
Display Area (mm)	154.2144(H)*85.92(v)
Number of Pixels	1024(H) × 3(RGB)× 600(V)
Pixel Pitch (mm)	0.1506(H) × 3(RGB) × 0.1432(V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally Black, FFS
Number of color	16.7M
Viewing Direction	FFS mode
Response Time (Tr+Tf)	30ms(typ.),50ms(max)
Panel Transmittance (%)	4.1 (typ.) /3.8(min)
Power Consumption(W)	1.386W(typ.)
Interface	TTL
Panel Dimension	164.9 X 100 X 3.5
Surface Treatment	Anti-Glare, Hardness:3H

2. ABSOLUTE MAXIMUM RATINGS

The following are maximun values which, if exceeded, may cause faulty operation or damage to the unit.

Item	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	DVDD	-0.3	3.96	V	-
Analog Supply Voltage	AVDD	-0.5	14.85	V	-
Gate On Voltage	VGH	-0.3	40	V	-
Gate Off Voltage	VGL	-20	0.3	V	-
Gate On-Gate Off Voltage	VGH-VGL	12	40	V	-
Operating Temperature	Topa	-20	70	℃	Note1
Storage Temperature	Tstg	-30	80	℃	Note1

Note1：If users use the product out off the environmemtal operation range（temperature and humidity,it will have visual quality concerns.

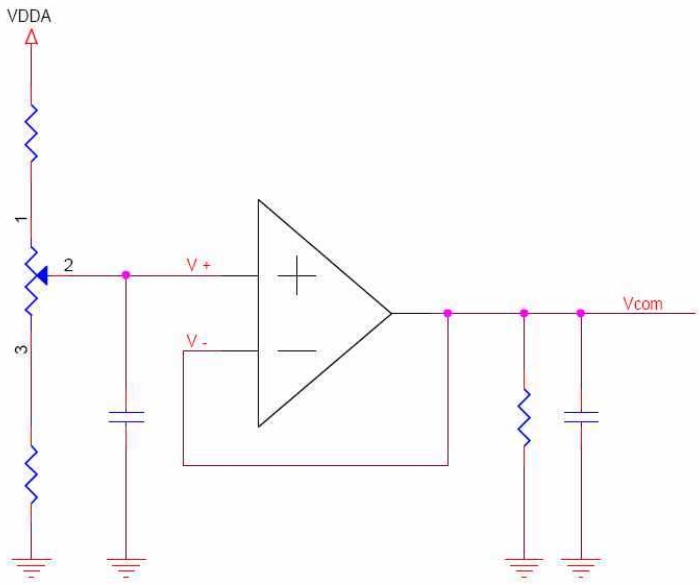
3. ELECTRICAL CHARACTERISTICS

3.1 Typical Operation Conditions

Ta=25℃

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Digital Power Supply Voltage For LCD	DVDD	3	3.3	3.6	V	-
Analog Power Supply Voltage	AVDD	9.4	9.6	9.8	V	-
Gate On Power Supply Voltage	VGH	17	18	19	V	-
Gate Off Power Supply Voltage	VGL	-6.6	-6	-5.4	V	-
Common Power Supply Voltage	VCOM	2.85		3.45	V	Note1
Logic Input Voltage	VIH	0.7*DVDD	-	DVDD	V	-
	VIL	GND	-	0.3*DVDD	V	

【Note1】TYP VCOM is only reference value. It must be optimized according to each LCM. Be sure to use VR and OP buffer on VCOM output. Please adjust VCOM to make the flicker level be minimum for getting excellent image.

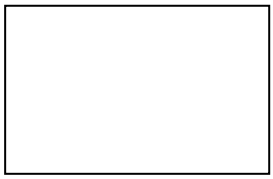


3.2 TFT-LCD Current Consumption

ITEM	SYMBOL	CONDITION	MIN	TYPE	MAX	UNIT	NOTE
Gate On Power Current	IVGH	VGH =18V	- -	0.5	1	mA	Note1
Gate Off Power Current	IVGL	VGL= -6V	- -	0.5	1	mA	Note1
Digital Power Current	IDVDD	DVDD = 3.3V	- -	30	45	mA	Note1
Analog Power Current	IAVDD	AVDD = 9.6V	- -	35	45	mA	Note1
Total Power Consumption	PC		- -	447	604	mW	Note1

Note1: Typ. specification：Gray-level test Pattern
Max. specification：White test Pattern

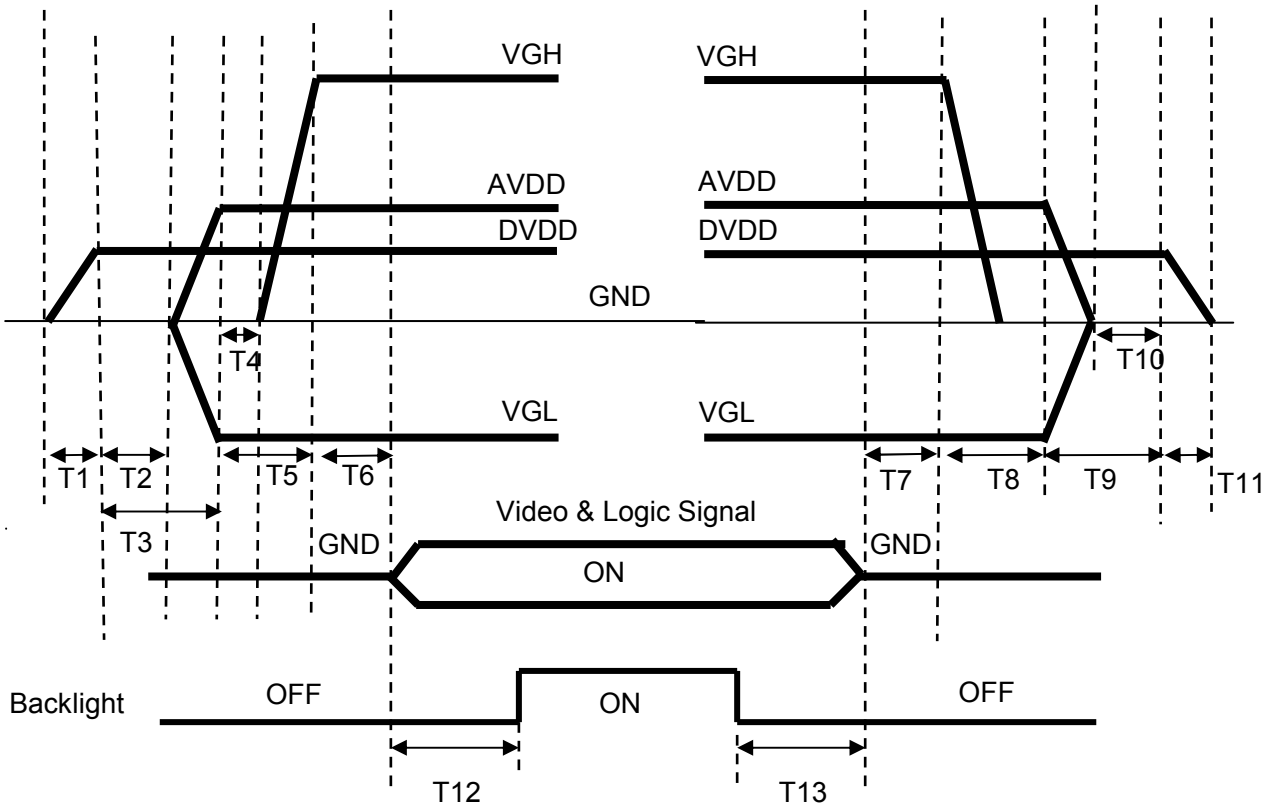
256 gray pattern



White Pattern

3.3 Power、Signal Sequence

Power On：DVDD→AVDD/VGL →VGH →Video &Logic Signal→Backlight
Power Off：Backlight→Video &Logic Signal→ VGH→AVDD/VGL→DVDD



0<T1≦10ms
T2>0ms
T3>20ms
T4>0ms
T5>10ms
0<T6≦10ms
T12≧200ms

T7>0ms
T8>0ms
T9>0ms
T10>0ms
0<T11≦10ms
T13≧200ms

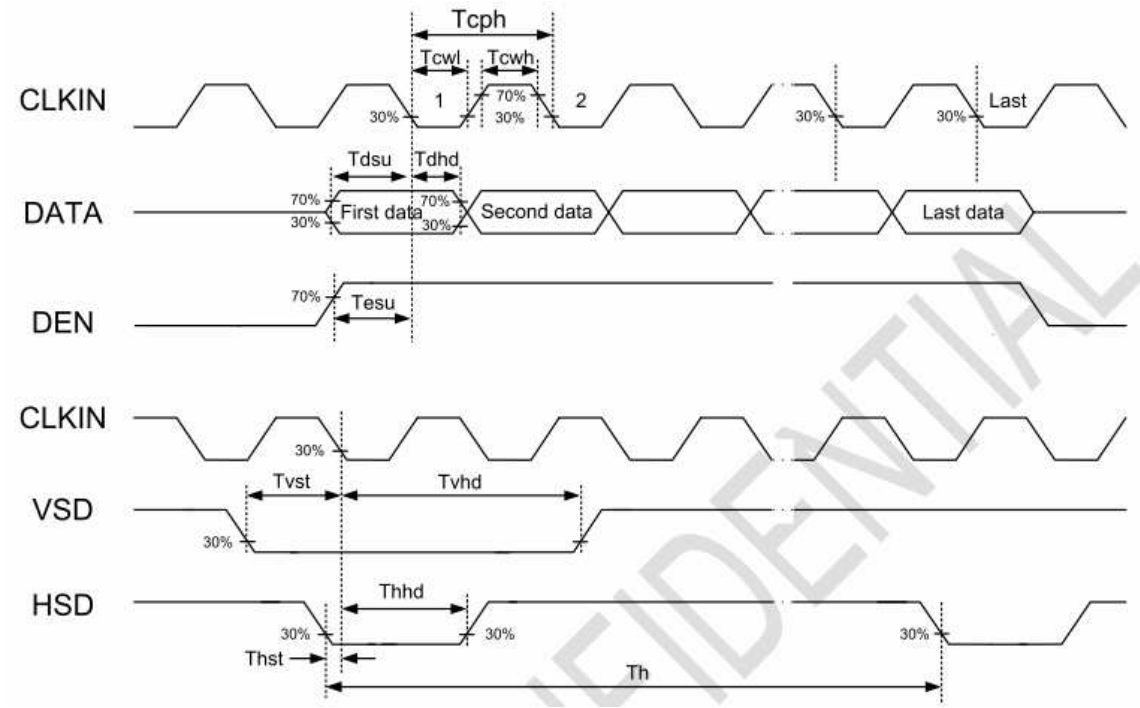
3.4 Timing Characteristics of Input Signals

3.4.1 Input Timing Table

ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
DE MODE	Dot Clock	1/tCLK	45	51.2	57	MHz	
	DCLK Pulse Duty	Tcwh	40	50	60	%	
	Horizontal Total Time	tH	1324	1344	1364	tCLK	
	Horizontal Effective Time	tHA		1024		tCLK	
	Horizontal Blank Time	tHB	300	320	340	tCLK	
	Vertical Total Time	tV	625	635	645	tH	
	Vertical Effective Time	tVA		600		tH	
	Vertical Blank Time	tVB	25	35	45	tH	
SYNC MODE	Horizontal Total Time	TH	1324	1344	1364	tCLK	
	Horizontal Pulse Width	Thpw		20	-	tCLK	thb + thpw =160DCLK is fixed
	Horizontal Back Porch	Thb		140	-	tCLK	
	Horizontal Front Porch	Thfp	140	160	180	tCLK	
	Horizontal Effective Time	THA		1024		tCLK	
	Vertical Total Time	TV	625	635	645	tH	
	Vertical Pulse Width	Tvpw		3	-	th	tvpw + tvb =23th is fixed
	Vertical Back Porch	Tvb	-	20	-	th	
	Vertical Front Porch	Tvfp	2	12	22	th	
	Vertical Valid	Tvd		600		th	

3.4.2 Input Clock and Data Timing Diagram

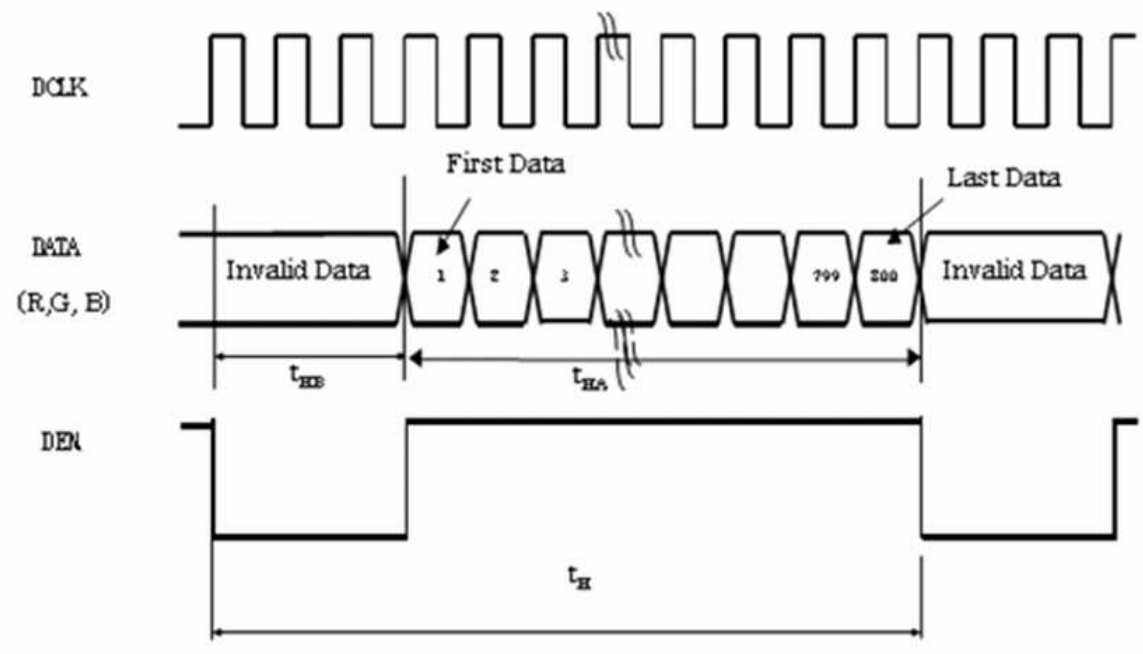
Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
DVDD Power On Slew Rate	TPOR	-	-	20	ms	From 0V to 90% DVDD
RSTB Pulse Width	TRst	50	-	-	us	DCLK=65MHz
DCLK Cycle Time	Tcph	14	-	-	ns	
DCLK Pulse Duty	Tcwh	40	50	60	%	
VSD Setup Time	Tvst	5	-	-	ns	
VSD Hold Time	Tvhd	5	-	-	ns	
HSD Setup Time	Thst	5	-	-	ns	
HSD Hold Time	Thhd	5	-	-	ns	
Data Setup Time	Tdsu	5	-	-	ns	D0[7:0],D1[7:0],D2[7:0] to DCLK
Data Hold Time	Tdhd	5	-	-	ns	D0[7:0],D1[7:0],D2[7:0] to DCLK
DEN Setup Time	Tesu	5	-	-	ns	
DEN Hold Time	Tehd	5	-	-	ns	



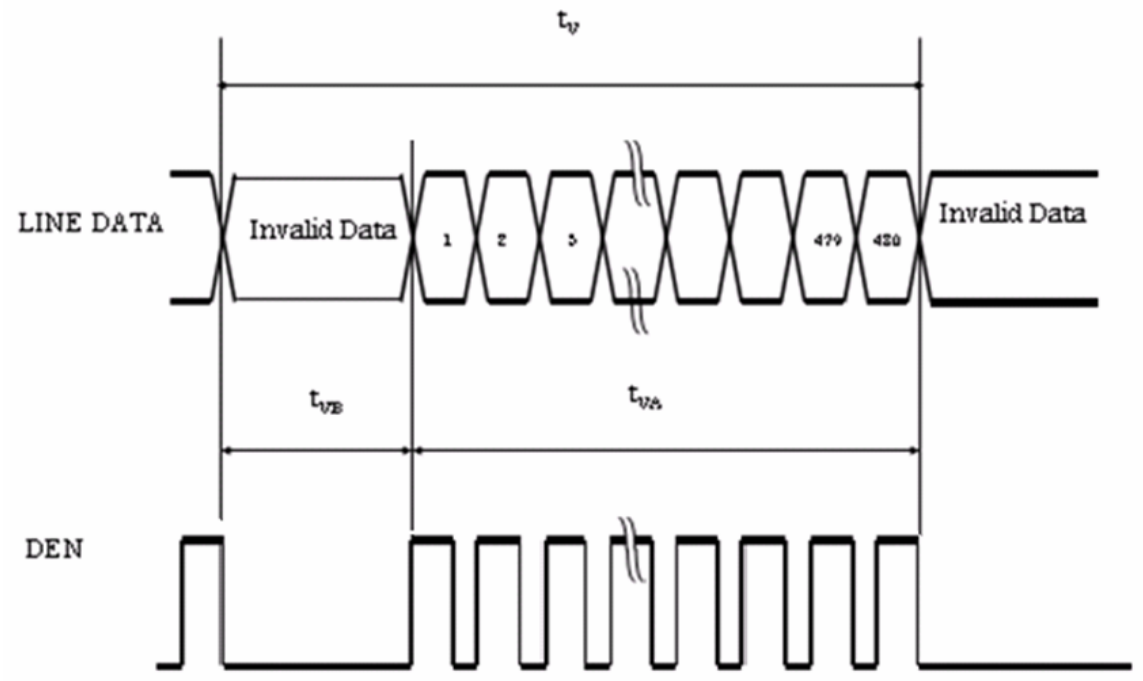
3.5 Timing Sequence(Timing Chart)

3.5.1 DE Mode

Horizontal timing：

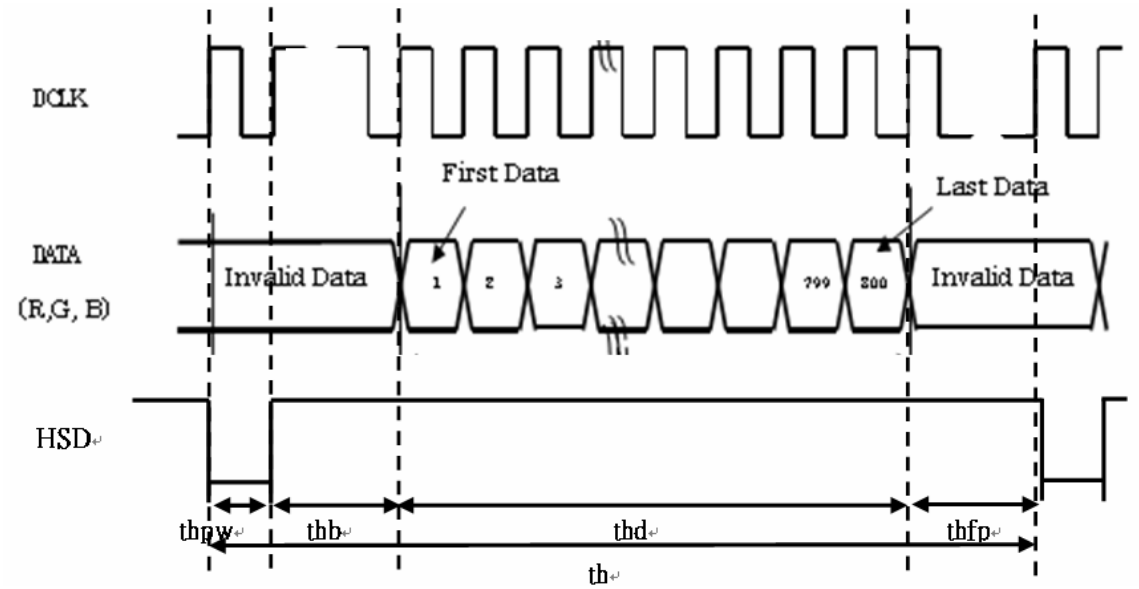


Vertical timing：

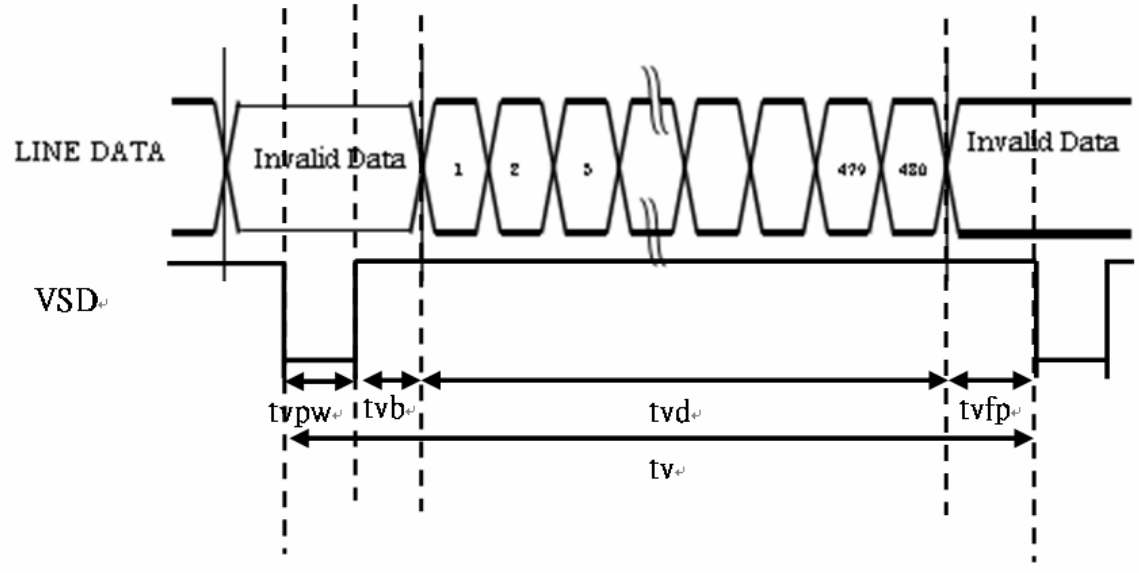


3.5.2 SYNC Mode

Horizontal timing：

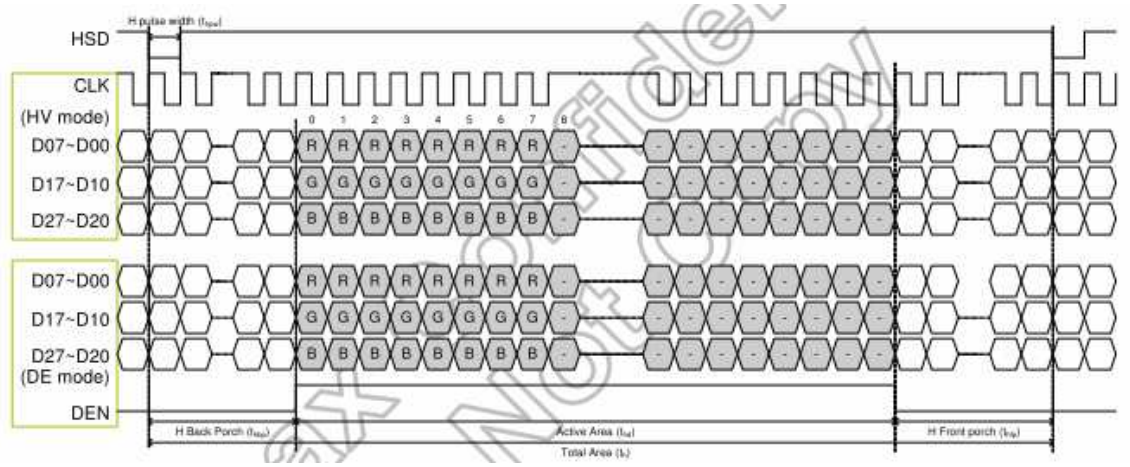


Vertical timing：

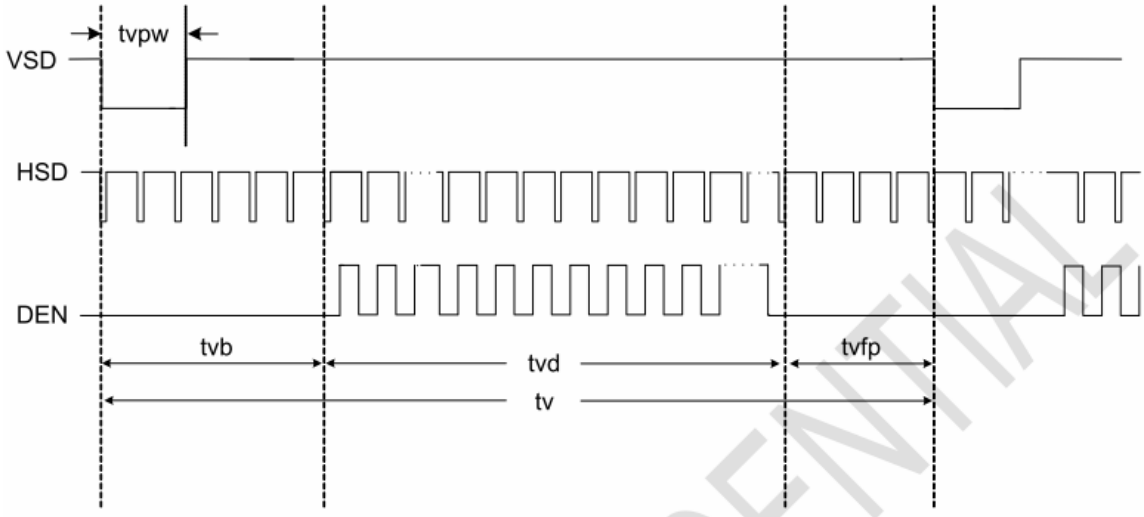


3.5.3 Data Input Format

Horizontal timing：



Vertical timing：



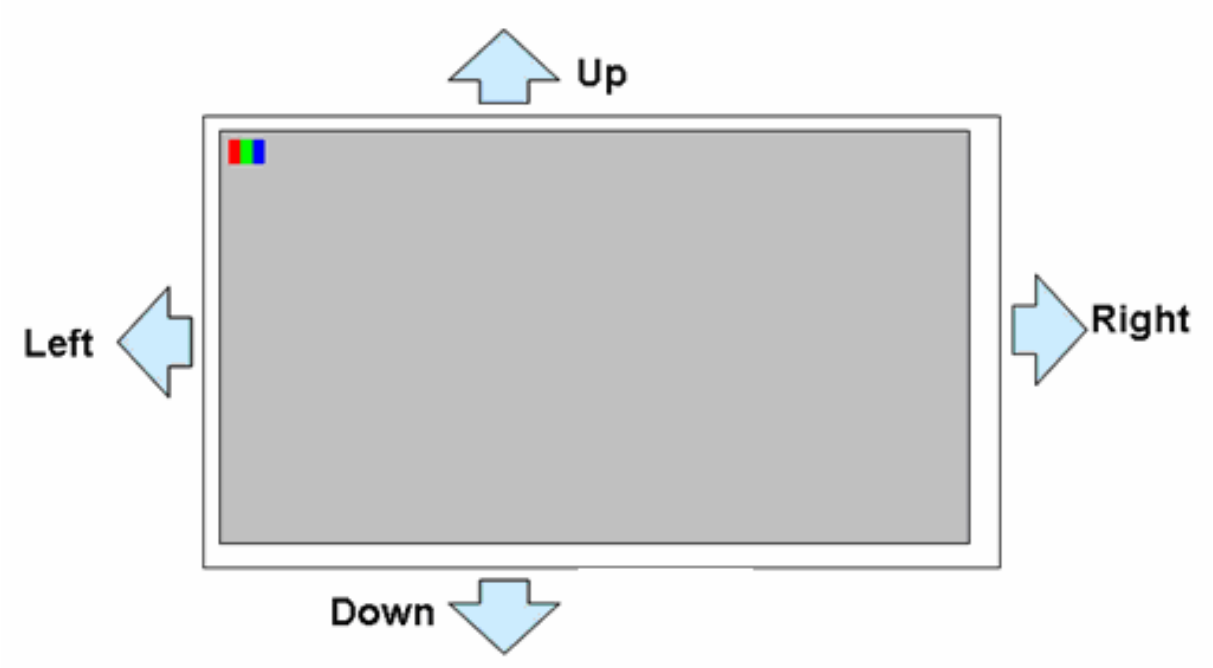
4. INTERFACE CONNECTION

4.1 CN1 (Input Signal)

Pin NO.	SYMBOL	DESCRIPTION
1	LED+	LED Anode
2	LED+	LED Anode
3	LED-	LED Cathode
4	LED-	LED Cathode
5	GND	Ground
6	VCOM	Common Voltage
7	DVDD	Digital Power
8	MODE	DE/SYNC Mode Select. Normally Pull High H: DE mode. L: HSD/VSD mode
9	DEN	Data Enable signal
10	VSD	Vertical sync input. Negative polarity
11	HSD	Horizontal sync input. Negative polarity
12	B7	Blue Data Input(MSB)
13	B6	Blue Data Input
14	B5	Blue Data Input
15	B4	Blue Data Input
16	B3	Blue Data Input
17	B2	Blue Data Input
18	B1	Blue Data Input
19	B0	Blue Data Input(LSB)
20	G7	Green Data Input(MSB)
21	G6	Green Data Input
22	G5	Green Data Input
23	G4	Green Data Input
24	G3	Green Data Input
25	G2	Green Data Input
26	G1	Green Data Input
27	G0	Green Data Input(LSB)
28	R7	Red Data Input(MSB)
29	R6	Red Data Input
30	R5	Red Data Input
31	R4	Red Data Input
32	R3	Red Data Input
33	R2	Red Data Input
34	R1	Red Data Input
35	R0	Red Data Input(LSB)
36	GND	Power Ground
37	DCLK	Clock Input
38	GND	Power Ground
39	SHLR	Left or Right Display Control
40	UPDN	Up / Down Display Control
41	VGH	Positive Power for TFT
42	VGL	Negative Power for TFT
43	AVDD	Analog Power
44	RESET	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high. (R=10KΩ，C=1μF)
45	NC	Not Connect
46	VCOM	Common Voltage
47	DITH	Dithering function enable control. Normally pull low DITHER = “1”, Enable internal dithering function DITHER = “0”, Disable internal dithering function
48	GND	Power Ground
49	NC	Not Connect
50	NC	Not Connect

【Note1】SHLR：left or right setting
UPDN：up or down setting

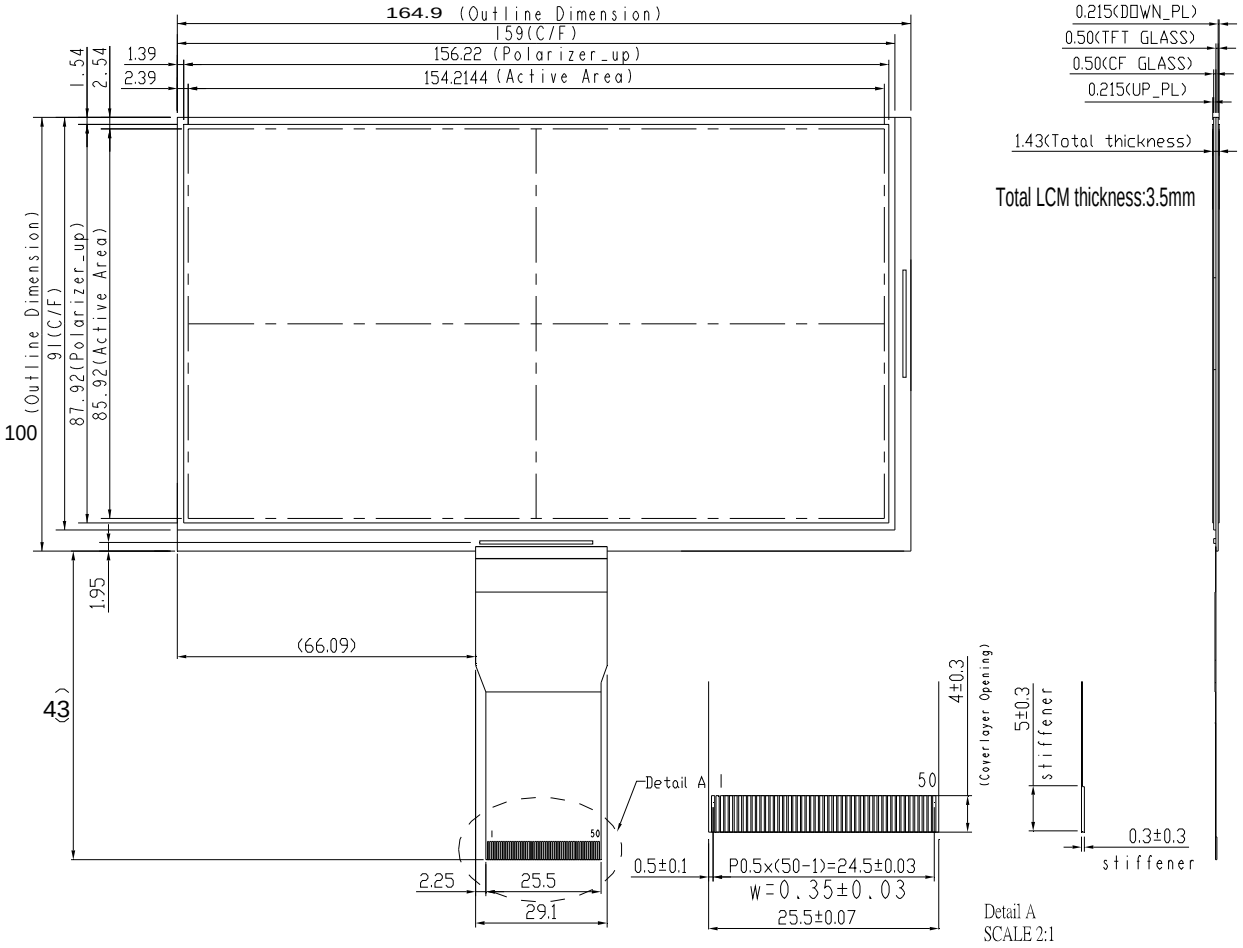
UPDN	SHLR	FUNCTION
0	1	Normal Display
0	0	Inverse Left and Right
1	1	Inverse Up and Down
1	0	Inverse Left and Right Inverse Up and Down



5. MECHANICAL DIMENSION

5.1 Front Side

(Unit： mm)



Backlight Information

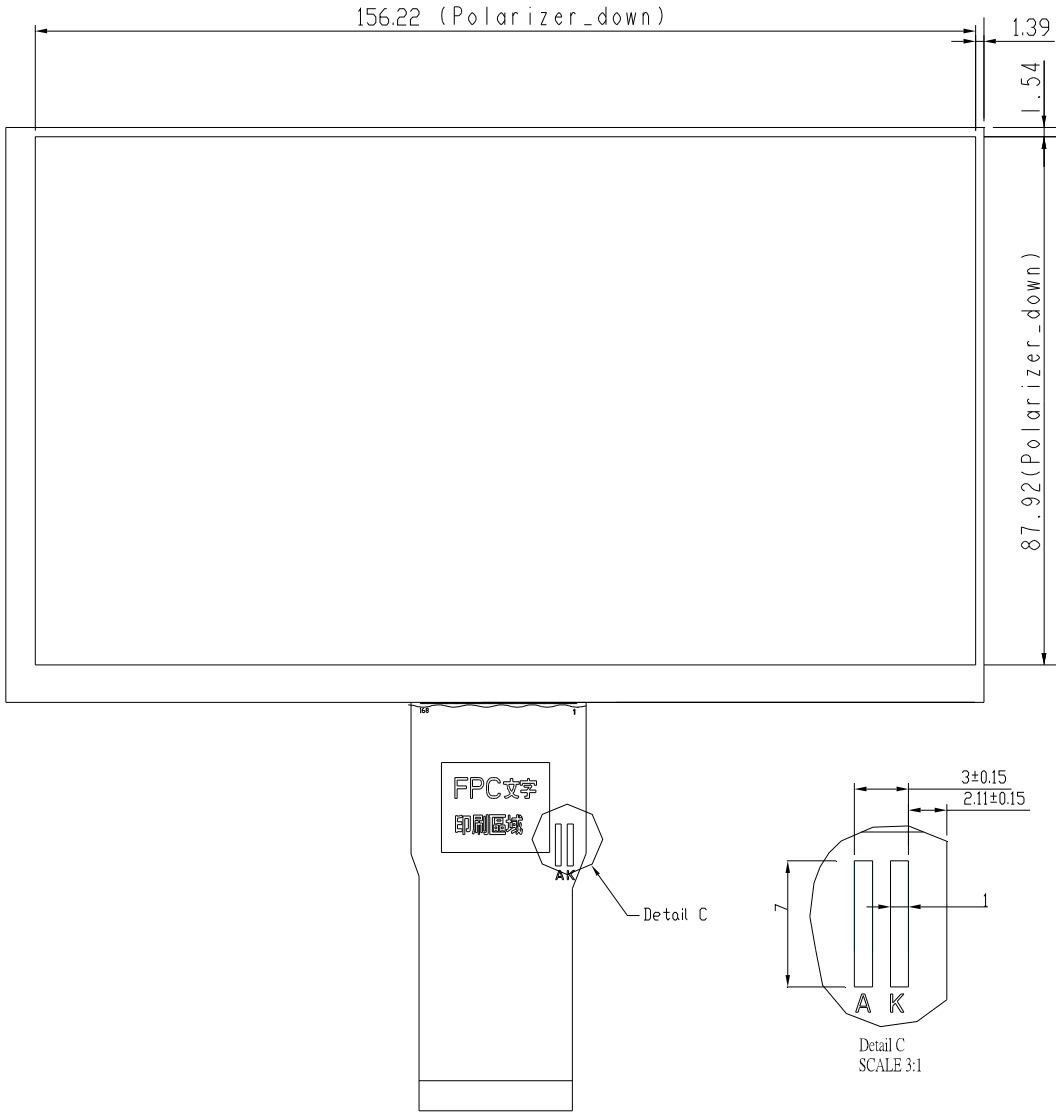
Backlight In total 27LEDS (3 LEDS In series and 9 leds in parallel)

Led backlight voltage 9.6V

LED backlight current 180mA

5.2 Rear Side

(Unit： mm)



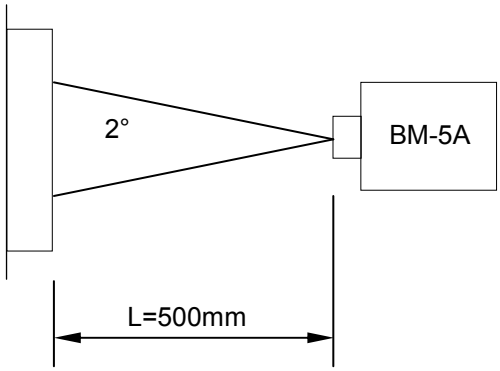
[Note]：Tolerance is ±0.3mm unless noted

6. OPTICAL CHARACTERISTICS

(Use CPT LED Backlight) Ta=25℃

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Panel Transmittance		T	--	3.8	4.1	--	%	
Contrast Ratio		CR	Point-5	600	800	--	--	2
Response Time		Tr +Tf	Point-5	--	30	50	ms	3
NTSC				45%	50%	--		
Viewing Angle	Left	ϕ	Point-5 CR≧10	80	85			4
	Right	ϕ		80	85			4
	Upper	θ		80	85			4
	Lower	θ		80	85			4
Color Filter Chromacicity	White	x	θ=ϕ= 0°	0.270	0.290	0.310		
		y		0.311	0.331	0.351		
	Red	x	θ=ϕ= 0°	0.612	0.632	0.652		
		y		0.291	0.311	0.331		
	Green	x	θ=ϕ= 0°	0.277	0.297	0.317		
		y		0.516	0.536	0.556		
	Blue	x	θ=ϕ= 0°	0.120	0.140	0.160		
		y		0.134	0.154	0.174		

Note1: Measure condition：25℃±2℃，60±10%RH，under10 Lux in the dark room.BM-5A (TOPCON)，viewing angle2°。Mmeasurement after lighting on 10 mins.



Note2: Definition of contrast ratio：

Contrast Ratio (CR)= (White) Luminance of ON ÷ (Black) Luminance of OFF

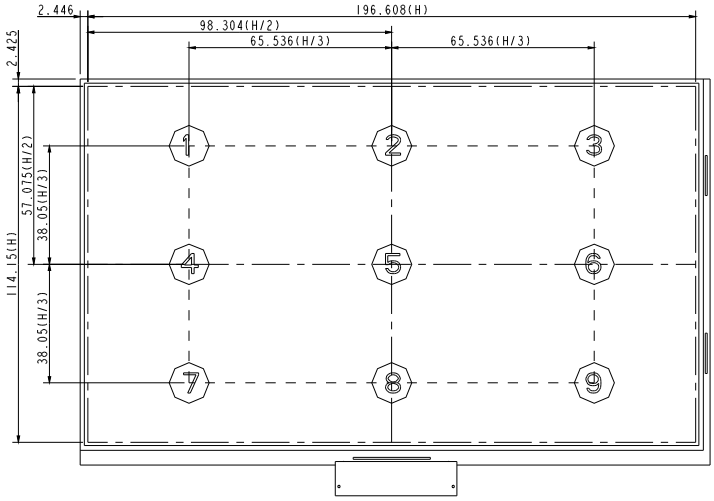


Fig. 6-1 Measuring point

Note 3: Definition of Response Time.(White-Black)
The response time is defined as the time interval between the 10% and 90% amplitudes.

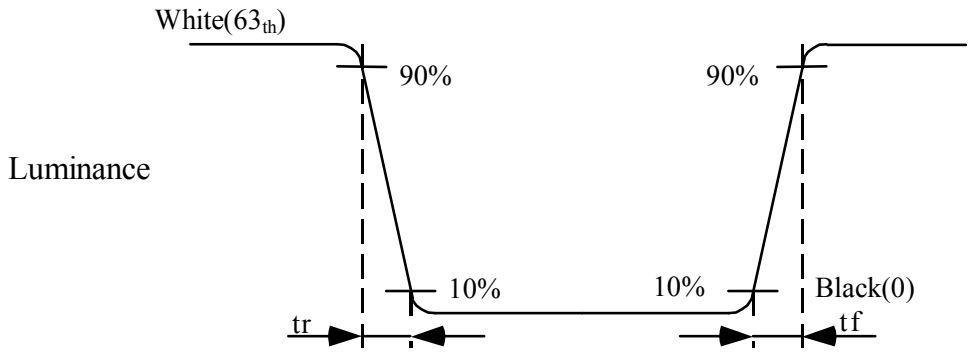


Fig. 6-2 Measuring point

Note 4: Definition of Viewing Angle(θ,ψ),refer to Fig.6 as below：

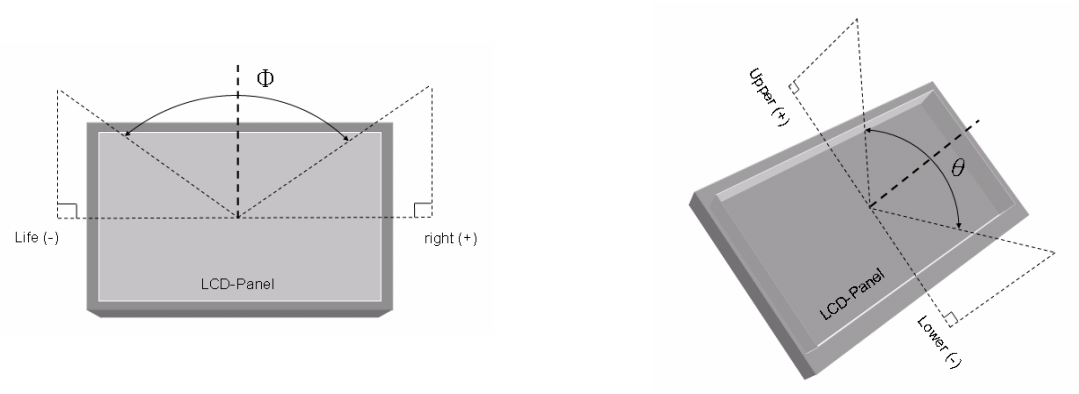


Fig.6-3 Definition of Viewing Angle

7. RELIABILITY TEST

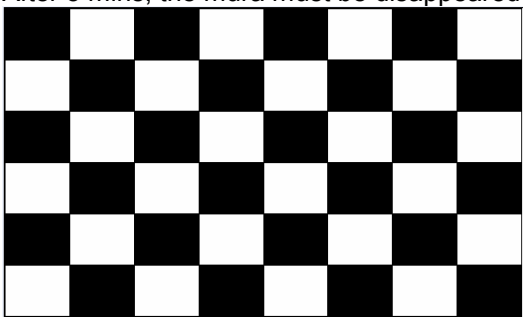
(These tests are conducted with CPT backlight.)

7.1 Temperature and Humidity

TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	70℃ ; 240hrs	
High Temperature Storage	80℃ ; 240hrs	
High Temperature High Humidity Operation	60℃ ; 90%RH ; 240hrs (No condensation)	
Low Temperature Operation	-20℃ ; 240hrs	
Low Temperature Storage	-30℃ ; 240hrs	
Thermal Shock	–30℃(0.5hr) ~ 80℃(0.5hr) ; 200 Cycles	Non-Operating
Image Sticking	25℃ ; 4hrs	1
MTBF	200,00hrs	

Note 1: Condition of Image Sticking test：25 ℃± 2 ℃

Operation with test pattern sustained for 4 hrs, then change to gray pattern immediately.
After 5 mins, the mura must be disappeared completely .



(a) Test Pattern (chess board Pattern)

(b) Gray Pattern

7.2 Shock and Vibration

ITEMS	CONDITIONS
Shock (Non-Operation)	● Shock level： 980m/s^2(equal to 100G). ● Waveform： 1/2 Sine wave,6msec ● ±X，±Y，±Z，each axis 1 times
Vibration (Non-Operation)	● Frequency range：8~33.3Hz ● Stoke：1.3 mm ● Vibration： sinusoidal wave, perpendicular axis (both x, z axis:2Hrs, y axis 4Hrs). ● Sweep： 2.9G, 33.3 Hz -400 Hz ● Cycle： 15 min

7.3 Electrostatic Discharge

TEST ITEM	CONDITIONS	NOTE
ESD	150pF，330Ω，±8kV&±15kV Air& Contact test	1
	200pF，0Ω，±200V Contact test	2

Note: Measure Point :

1. LCD glass and metal bezel
2. IF connector pins

7.4 Judgment Standard

The judgment of the above test should be made as follow:

Pass: Normal display image and no line defect.

Partial transformation of the module parts should be ignored.

Fail: No display image, function NG, or line defects.

8. PACKING

TBD

9. WARRANTY

91 The period is within 12 months since the date of shipping out under normal using and storage conditions.

9.2 The warranty will be avoided in case of defect induced by customer.