MODEL NO : TM101JDHP03

MODEL VERSION: 00

SPEC VERSION : 2.1

ISSUED DATE: 2016-11-02

□ **Preliminary Specification**

■ **Final Product Specification**

Customer :

Approved by	Notes

TIANMA Confirmed :

Prepared by	Checked by	Approved by
Junwen Du	Longping Deng	Feng Qin

This technical specification is subjected to change without notice

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Record of Revision

Rev	Issued Date	Description	Editor
2.0	2016-09-19	Final Specification Released.	Junwen Du
2.1	2016-11-03	Update the power consumption and the connector type	Junwen Du

1 General Specifications

Feature		Spec
Display Spec.	Size	10.1 inch
	Resolution	1280(RGB) x 800
	Technology Type	a-Si TFT
	Pixel Configuration	R.G.B. Vertical Stripe
	Pixel pitch(mm)	0.1695x0.1695
	Display Mode	TM with Normally Black
	Surface Treatment	HC
Mechanical Characteristics	LCM (W x H x D) (mm)	229.46*149.12*2.57
	Active Area(mm)	216.96x135.60
	With /Without TSP	Without TSP
	Matching Connection Type	IPEX 20453-040T-11
	LED Numbers	33 LED
	Weight (g)	(180)
Electrical Characteristics	Interface	1port LVDS, 6/8bit selectable
	Color Depth	262K/16.7M
	Driver IC	ST5821CA*3+ST5084CA*1

Note 1: Viewing direction for best image quality is different from TFT definition. There is a 180 degree shift.

Note 2: Requirements on Environmental Protection: ROHS

Note 3: LCM weight tolerance: ± 5%

2 Input Terminals

Connector: IPEX 20455-040E-66

Pin No.	Symbol	I/O	Function	Remark
1	NC	-	No Connection	
2	VDD	P	Power Supply +3.3V	
3	VDD	P	Power Supply +3.3V	
4	NC	-	No Connection	
5	NC	-	No Connection	
6	NC	-	No Connection	
7	NC	-	No Connection	
8	RXIN0-	I	-LVDS differential data input(R0~R5,G0)	
9	RXIN0+	I	+LVDS differential data input(R0~R5,G0)	
10	GND	P	Power ground	
11	RXIN1-	I	-LVDS differential data input(G1~G5,B0~B1)	
12	RXIN1+	I	+LVDS differential data input(G1~G5,B0~B1)	
13	GND	P	Power ground	
14	RXIN2-	I	-LVDS differential data input(B2~B5,HS,VS,DE)	
15	RXIN2+	I	+LVDS differential data input(B2~B5,HS,VS,DE)	
16	GND	P	Power ground	
17	CLKIN-	I	-LVDS differential data input	
18	CLKIN+	I	+LVDS differential data input	
19	GND	P	Power ground	
20	RXIN3-	I	-LVDS differential data input(R6~R7,G6~G7,B6~B7)	Connect to GND in 6 bit mode
21	RXIN3+	I	+LVDS differential data input(R6~R7,G6~G7,B6~B7)	
22	GND	P	Power ground	
23	NC	-	No Connection	
24	NC	-	No Connection	
25	GND	P	Power ground	
26	NC	-	No Connection	
27	SEL6/8bit	-	SEL6/8=”H”, 6bit; SEL6/8=”L” ,8bit	Default 8bit
28	GND	P	Power ground	
29	NC	-	No Connection	

30	NC	-	No Connection	
31	VLED_GND	P	VLED Ground	
32	VLED_GND	P	VLED Ground	
33	VLED_GND	P	VLED Ground	
34	NC	-	No Connection	
35	VPWM_EN	P	PWM signal for LED dimming control	
36	NC	-	No Connection	
37	NC	-	No Connection	
38	VLED	P	Backlight power supply(4.5V~5.5V)	
39	VLED	P	Backlight power supply(4.5V~5.5V)	
40	VLED	P	Backlight power supply(4.5V~5.5V)	

Note: I/O definition:

I-----Input P----Power/Ground

3 Absolute Maximum Ratings

3.1 Driving TFT LCD Panel

GND=0V,Ta = 25°C

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VCC	-0.50	5.00	V	
Operating Temperature	T_{op}	-10	50	℃	
Storage Temperature	T_{st}	-20	60	℃	
Operating and Storage Humidity	HSTG	--	90	%（RH）	

Table 3.1 absolute maximum rating

4 Electrical Characteristics

4.1 Driving TFT LCD Panel

DC Electrical Characteristics

Item	Symbol	Min	Typ	Max	Unit	Remark
POWER Supply Voltage	VDD	3.20	3.30	3.40	V	
Power For Analog Circuit	AVDD	--	11	--	V	
Gate On Voltage	VGH	--	23	--	V	
Gate Off Voltage	VGL	--	-7.0	--	V	
Common Voltage	Vcom	--	4.3	--		
VDD Power Consumption	PDD	--	--	1.37	W	

Note: GND=0V, Ta=25℃

LVDS receiver characteristic(Receiver Differential Input: RXIN0+~ RXIN3+, RXIN0-~ RXIN3-, CLKIN-, CLKIN+)

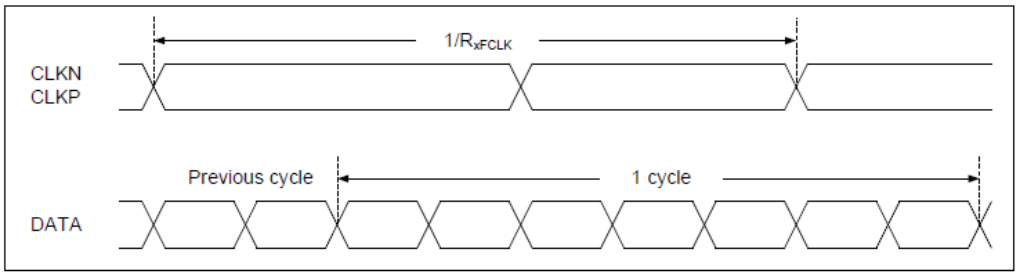
Item	Symbol	Min	Typ	Max	Unit	Remark
Differential input high threshold voltage	R_{xVTH}			0.1	V	R_{xVCM} = 1.2V
Differential input low threshold voltage	R_{xVTL}	-0.1			V	
Differential input voltage	$\lvert V_{ID} \rvert$	0.2		0.6	V	
Differential input common mode voltage	R_{xVCM}	$\lvert V_{ID} \rvert$ /2		2.4- $\lvert V_{ID} \rvert$ /2	V	

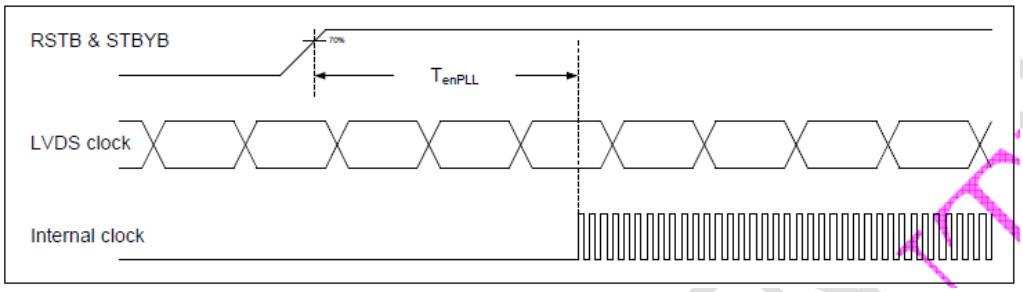
Note: VDD=VDD_LVDS=3.2~3.4V, GND=GND_LVDS=0V, TA=-20~85℃

LVDS AC characteristic

Item	Symbol	Min	Typ	Max	Unit	Remark
Clock Frequency	R_{xFCLK}	20		80	V	
Input data skew margin	T_{RSKM}	500			ps	$\lvert V_{ID} \rvert$ = 400mV, R_{xVCM}=1.2V R_{xFCLK}=80MHz
Clock high time	T_{LVCH}		4/7		RxFCLK	
Clock low time	T_{LVCL}		3/7		RxFCLK	
PLL wake-up time	TenPLL			150	us	

Note: VDD=VDD_LVDS=3.2~3.4V, GND=GND_LVDS=0V, TA=-20~85℃





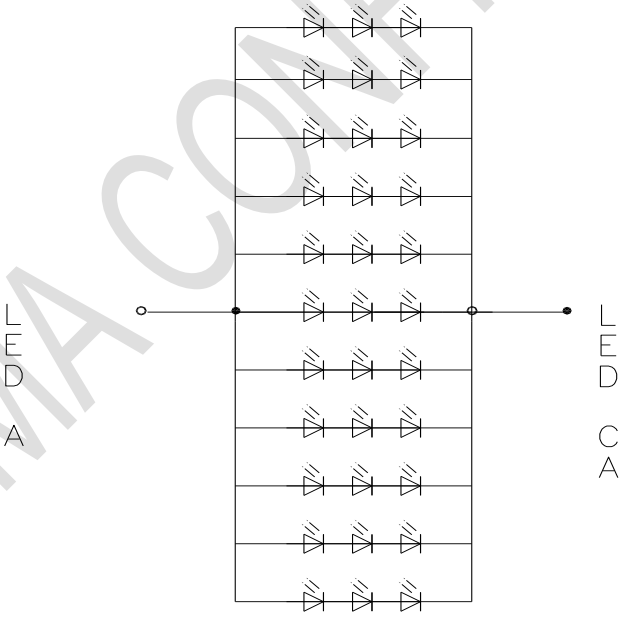
4.2 Driving Backlight

Ta=25℃

Item		Symbol	Min	Typ	Max	Unit	Remark	
Backlight power supply voltage		VLED	4.5	5.0	5.5	V		
Backlight power supply current		I_LED	-	-	0.6	A		
Backlight power consumption		P_LED	-	-	3	W		
Input voltage for VLED_PWM signal	High level	-	2.0	-	5.0	V		
	Low level	-	0	-	0.8	V		
VLED_PWM frequency		Fpwm	100	-	100k	HZ		
VLED_PWM duty		D	1		100	%	Note1	
Operating Life Time		--	--	30000	--	hrs	Note2	

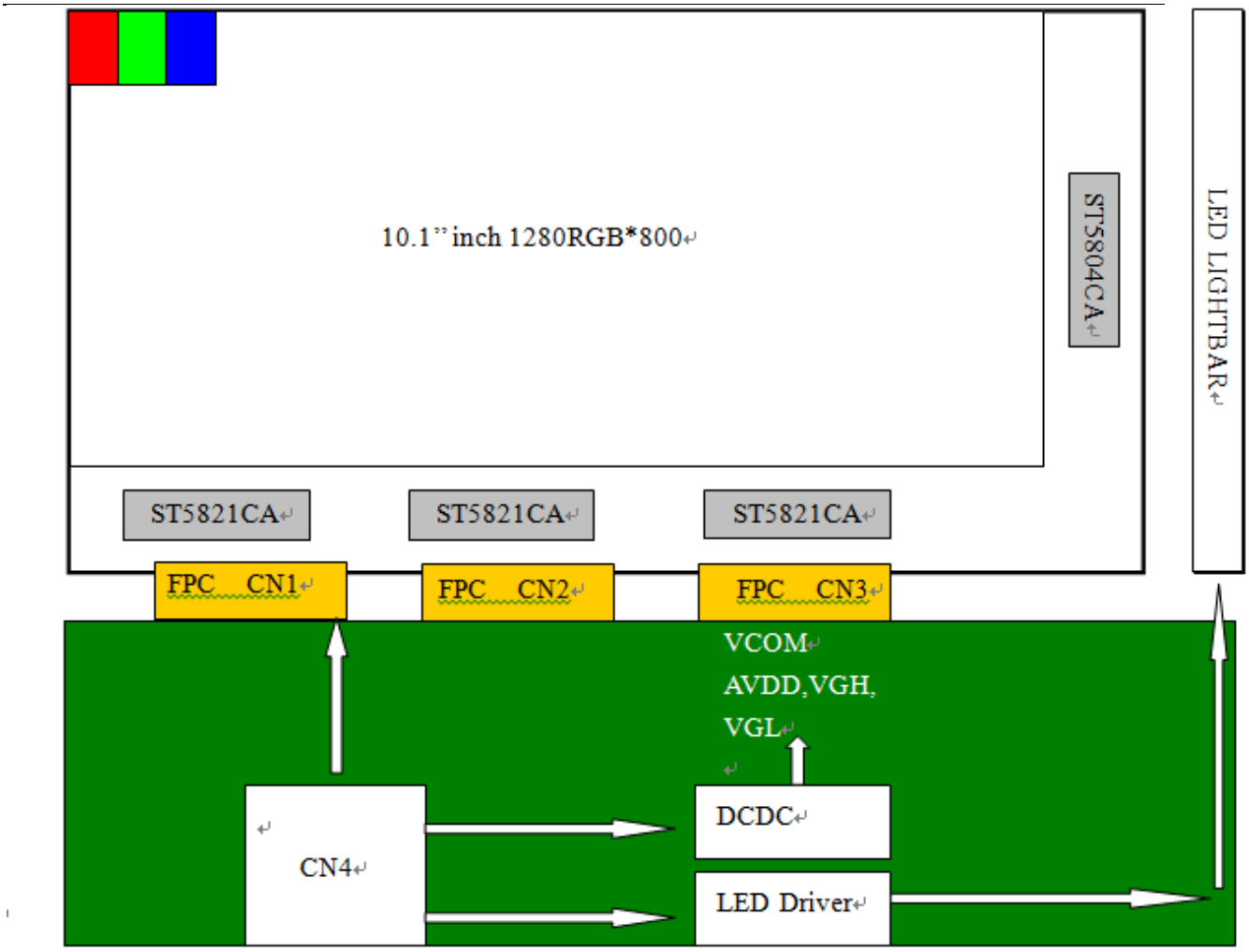
Note 1: According to LED driver IC characteristics, the minimum value of VELD_PWM duty may vary with VLED_PWM frequency, higher the frequency, bigger the duty.

Note 2: Optical performance should be evaluated at Ta=25℃ only.
If LED is driven by high current, high ambient temperature & humidity condition,
The life time of LED will be reduced.
Operating life means brightness goes down to 50% of initial brightness.
Typical operating life time is estimated data.



CIRCUIT DIAGRAM

4.3 Block Diagram



5 Timing Chart

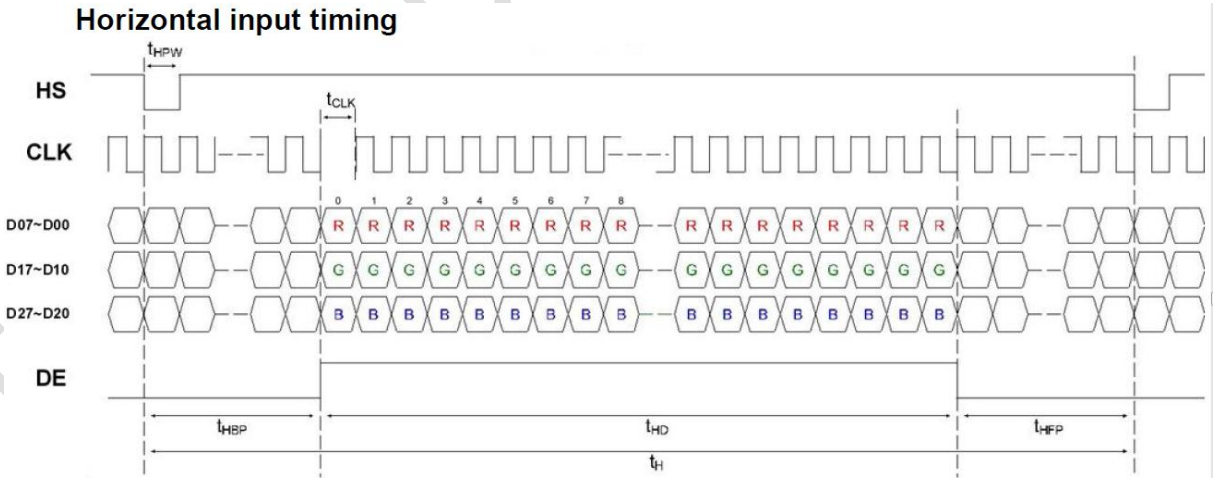
5.1 LVDS signal timing characteristics

VCC=3.3V, GND=0V, Ta=25℃

Parameter	Symbol	Min	Typ	Max	Unit	Remark
CLK frequency	1/tclk	62.6	68.2	78.1	MHz	
Horizontal blanking time	tHBT	20	69	164	tclk	thbp + tHFP
Horizontal back porch	tHBP	5	5	164- tHFP	tclk	
Horizontal display area	tHD	1280	1280	1280-	tclk	
Horizontal front porch	tHFP	15	64	159	tclk	
Horizontal period	tH	1300	1349	1444	tclk	
Horizontal pulse width	tHPW	1	1	256	tclk	
Vertical blanking time	tVBT	5	42	101	tH	tVBP + tVFP
Vertical back porch	tVBP	2	2	101- tVFP	tH	
Vertical display area	tVD	800	800	800	tH	
Vertical front porch	tVFP	3	40	99	tH	
Vertical period	tV	803	842	901	tH	
Vertical pulse width	tVPW	1	1	128	tH	
Frame Rate	F	-	60	-	HZ	

Table 5.1 timing parameter

5.2 Input Clock and Data timing Diagram:



Vertical input timing

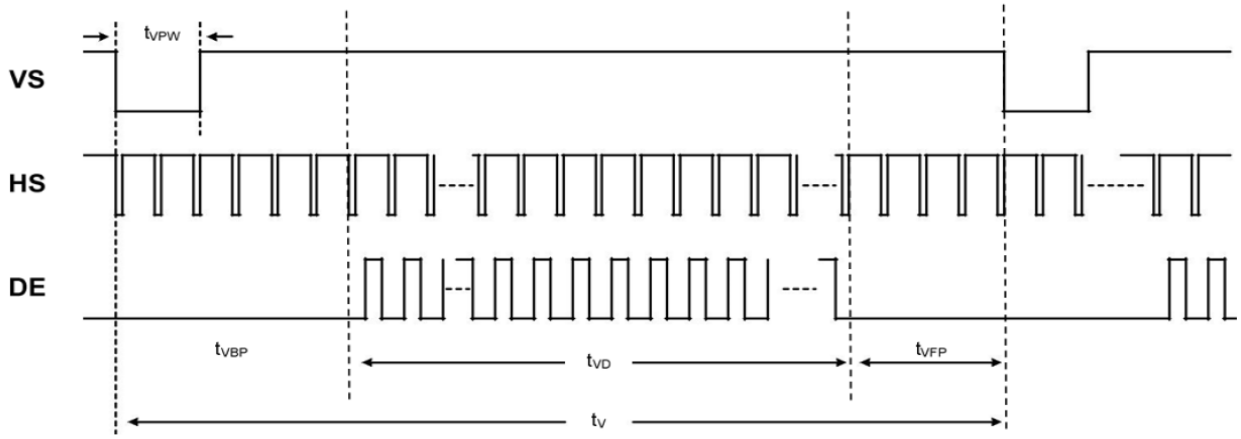
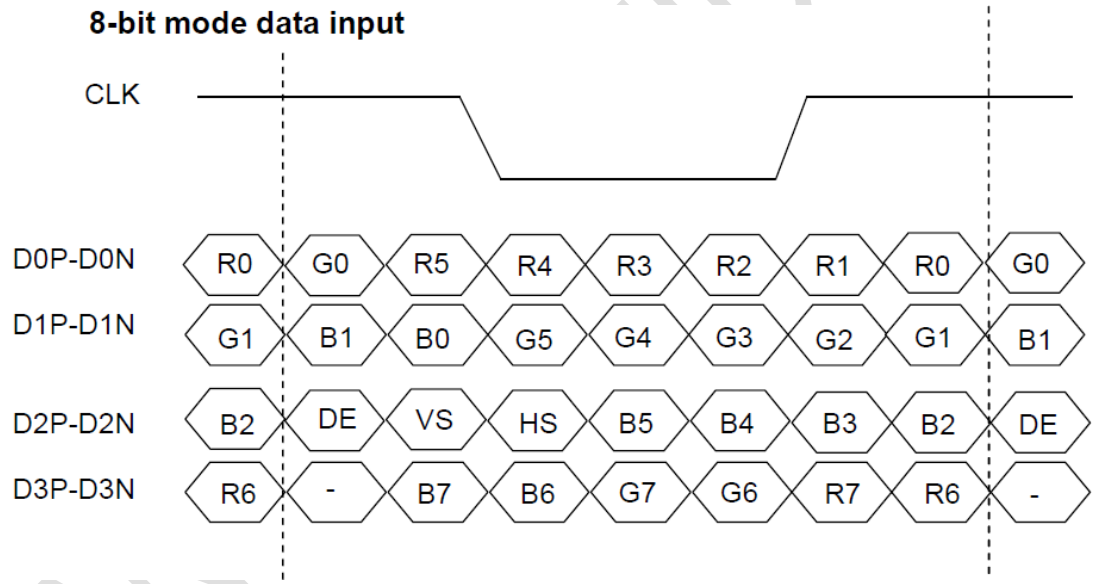


Figure 5.2 Input signal data timing

5.3 LVDS data input format

8-bit mode data input



Note: for 6bit mode, MSB are R/G/B[5] and R/G/B[5] are LSB

5.4 Power On/Off Sequence

Item	Symbol	Min	Typ	Max	Unit	Remark
VDD on to VDD stable	Tp1	0.5	-	10	ms	
VDD stable to signal on	Tp2	0	-	50	ms	
Signal on to BLU on	Tp3	200	-	-	ms	
VDD off time	Tp7	0	-	10	ms	
VDD off to next VDD on	Tp8	500	-	-	ms	
Signal off before VDD off	Tp9	0	-	50	ms	
BLU off before signal off	Tp10	200	-	-	ms	

Table 5.1 Power on/off sequence

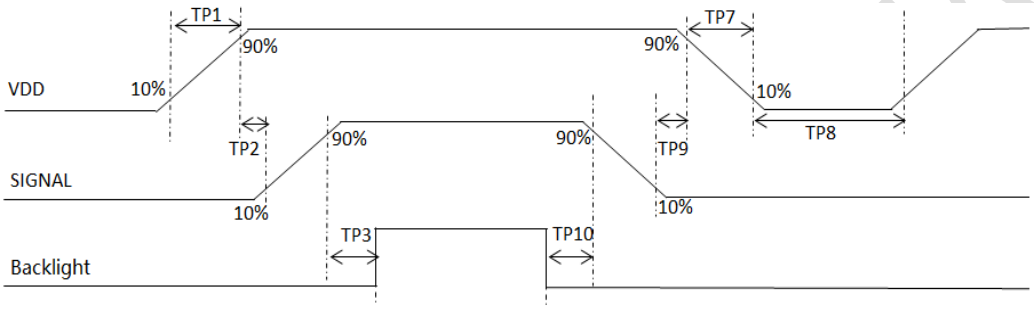


Figure 5.2 Interface power on/off sequence

6 Optical Characteristics

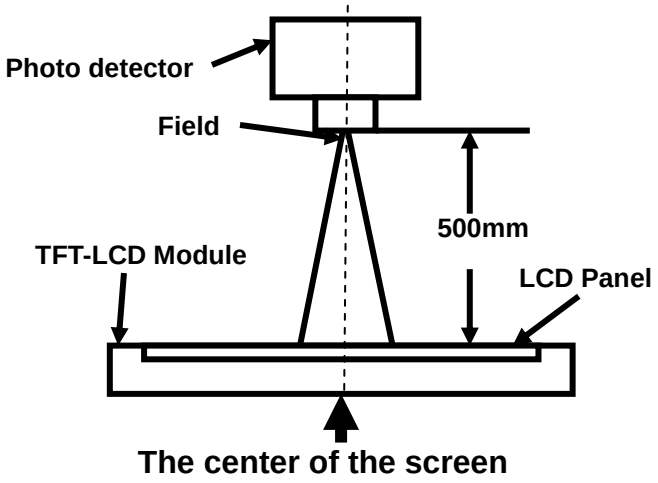
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	75	(85)	-	Degree	Note2,3
		θB		75	(85)	-		
		θL		75	(85)	-		
		θR		75	(85)	-		
Contrast Ratio		CR	θ=0°	600	800			Note 3
Response Time		T_{ON}	25℃	-	25	50	ms	Note 4
		T_{OFF}						
Chromaticity	**White**	x	Backlight is on	0.250	0.300	0.350		Note 1,5
		y		0.274	0.324	0.374		
	Red	x		0.530	0.580	0.630-		Note 1,5
		y		0.274	0.324	0.374		
	Green	x		0.299	0.349	0.399		Note 1,5
		y		0.538	0.588	0.638		
	Blue	x		0.104	0.154	0.204		Note 1,5
		y		0.045	0.095	0.145		
Uniformity		U		75	80	-	%	Note 6
NTSC				-	50	-	%	Note 5
Luminance		L		350	400	-	cd/m^2	Note 7

Test Conditions:

1. I_F=220 mA, and the ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.

Note 1: Definition of optical measurement system.

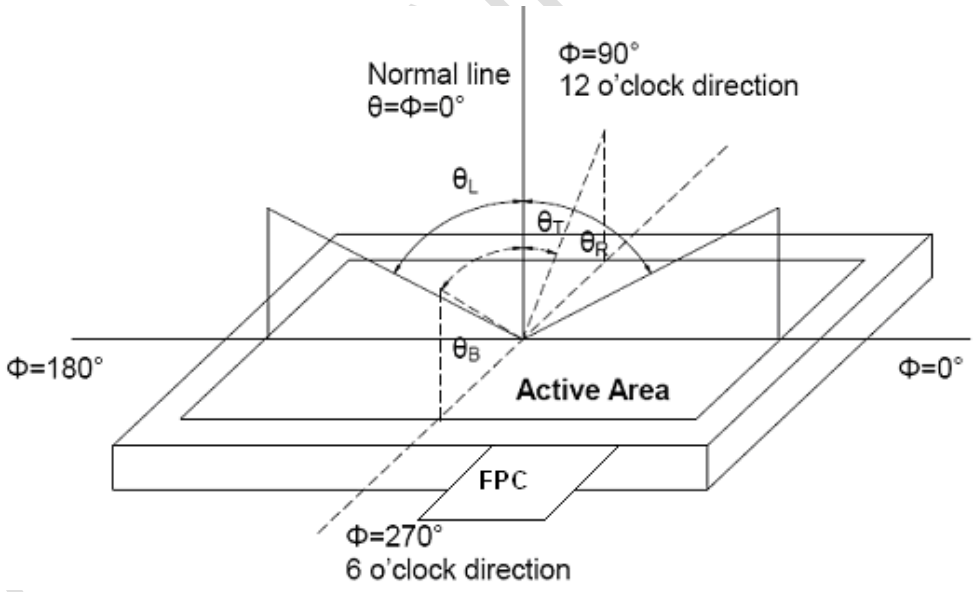
The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

Note 2: Definition of viewing angle range and measurement system.

viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80)。



Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

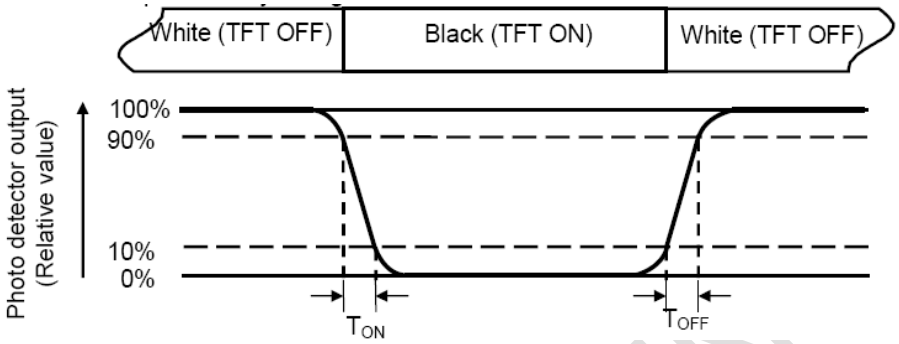
"White state ": The state is that the LCD should drive by Vwhite.

"Black state": The state is that the LCD should drive by Vblack.

Vwhite: To be determined Vblack: To be determined.

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.



Note 5: Definition of color chromaticity (CIE1931)

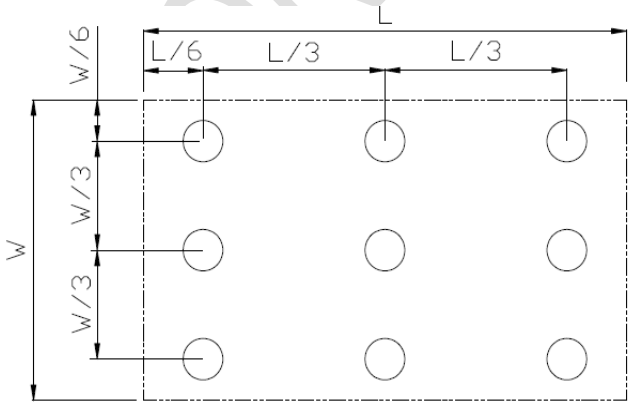
Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

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

Luminance Uniformity (U) = Lmin/ Lmax

L-------Active area length W----- Active area width



Lmax: The measured Maximum luminance of all measurement position.

Lmin: The measured Minimum luminance of all measurement position.

Note 7: Definition of Luminance:

Measure the luminance of white state at center point.

7 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +50℃,120hrs	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta= -10℃,120hrs	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta = +60℃,120hrs	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta = -20℃,120 hrs	IEC60068-2-1:2007 GB2423.1-2008
5	Storage at High Temperature and Humidity	Ta=+40℃, 90% RH 120 hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	0℃ 30 min~+50℃ 30 min, Change time:5min, 20 Cycles	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,GB2423.22-2002
7	ESD	C=100pF, R=1500Ω,5points/panel Air:± 4KV, 5times, Contact:± 2KV, 5 times, （Environment: 15℃～35℃, 30%～60%, 86Kpa～106Kpa）	IEC61000-4-2:2001 GB/T17626.2-2006
8	Vibration Test	Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total)(Package condition)	IEC60068-2-6:1982 GB/T2423.10—1995
9	Mechanical Shock (Non OP)	100G 6ms, ± X,± Y,± Z 3times, for each direction	IEC60068-2-27:1987 GB/T2423.5—1995

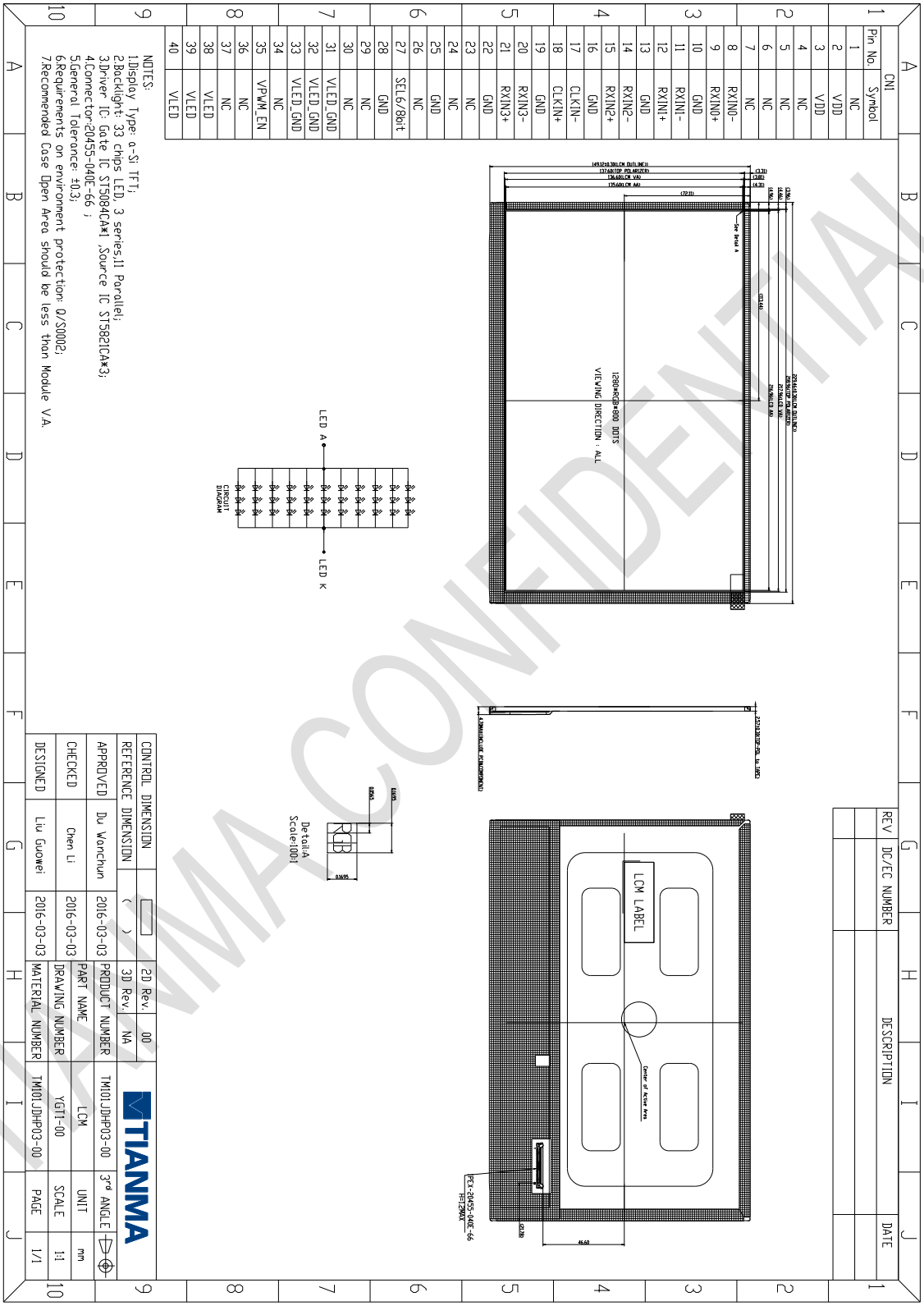
Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of sample.

Note3: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

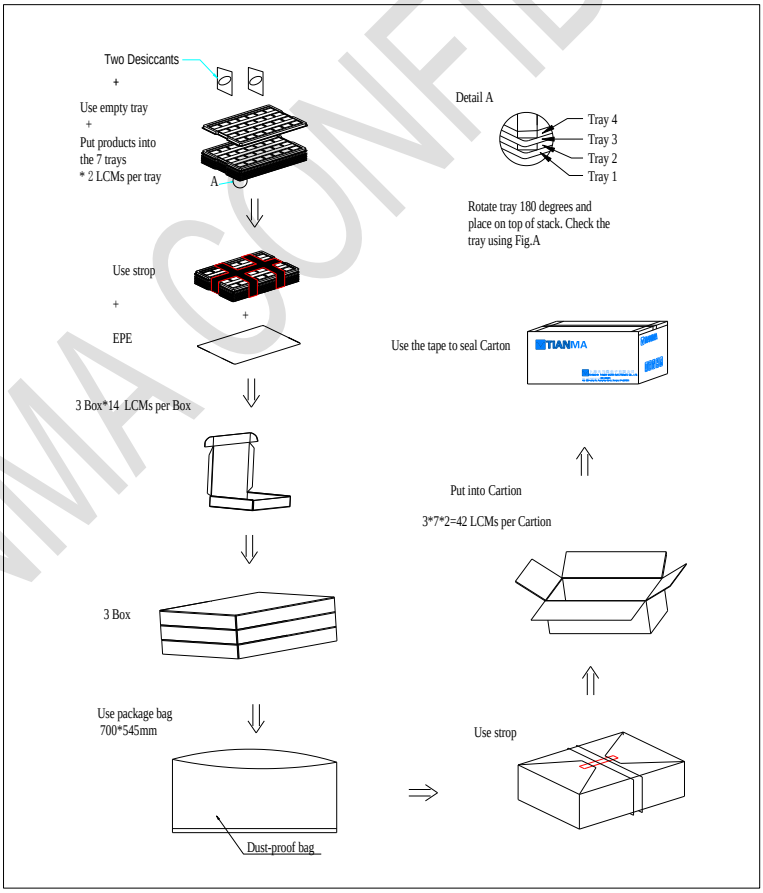
Note 4: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

8 Mechanical Drawing



9 Packing Drawing

No	Item	Model (Materiel)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM Module	TM101JDHP03-00	229.46×149.12×2.57mm	(0.18)	42	
2	Tray	PET（Transmit）	485×330×13.8	TBD	24	Anti-static
3	Dust-Proof Bag	PE	700×545	0.046	1	
4	BOX	Corrugated Paper	520×345×74	0.369	3	
5	Desiccant	Desiccant	45×50	0.002	6	
6	EPE	EPE	485*330*5	TBD	3	
7	Carton	Corrugated Paper	544×365×250	0.76	1	
8	Label	Label	100*52	-	1	
9	Total Weight	TBD				



10 Precautions for Use of LCD Modules

10.1 Handling Precautions

10.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

10.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

10.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

10.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

10.1.5 If the display surface is contaMinated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketone
- Aromatic solvents

10.1.6 Do not attempt to disassemble the LCD Module.

10.1.7 If the logic circuit power is off, do not apply the input signals.

10.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

10.1.8.1 Be sure to ground the body when handling the LCD Modules.

10.1.8.2 Tools required for assembly, such as soldering irons, must be properly ground.

10.1.8.3 To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

10.1.8.4 The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

10.2 Storage precautions

10.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

10.2.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0℃ ～ 40℃ Relatively humidity: ≤80%

10.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

10.3 Transportation Precautions

10.3.1 The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.