MODEL NO : TM101DDHG01

MODEL VERSION: 60

SPEC VERSION : 1.0

ISSUED DATE: 2020-07-17

□Preliminary Specification
■Final Product Specification

Customer :_____

Approved by	Notes

TIANMA Confirmed :

Prepared by	Checked by	Approved by
Xianchen.Fu	Fan.Jiang	Feng.Qin

This technical specification is subjected to change without notice

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Record of Revision

Rev	Issued Date	Description	Editor
1.0	2016-05-25	Preliminary Specification Released.	Xianchen.Fu
2.0	2016-08-16	Final Specification Released.	Xianchen.Fu
2.1	2017-02-16	Add min value of Luminance, View Angles and NTSC on Page 14.	Xianchen.Fu
2.2	2017-03-30	Update Current of VCCS Power Supply on page 8.	Xianchen.Fu
2.3	2017-04-06	Add min value of LED lifetime on page 8.	Gang.li
2.4	2017-07-17	Update power on/off sequence on page9.	Gang.li

1 General Specifications

Feature		Spec
Display Spec.	Size	10.1 inch
	Resolution	1024(RGB) ×600
	Technology Type	a-si TFT
	Pixel Configuration	R.G.B. Vertical Stripe
	Pixel pitch(mm)	0.2175x0.2088
	Display Mode	TM, Normally White
	Surface Treatment	AG,HC(3H)
	Viewing Direction	12 o'clock
	Gray Scale Inversion Direction	6 o'clock
Mechanical Characteristics	LCM (W x H x D) (mm)	235.00 x 143.00 x 4.9
	Active Area(mm)	222.72 x 125.28
	With /Without TSP	Without TSP
	Matching Connection Type	IPEX 20453-040T-01
	LED Numbers	20 LED
	Weight (g)	202
Electrical Characteristics	Interface	6/8 bit LVDS
	Color Depth	16.7M
	Driver IC	HX8282*1+HX8677*2

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: Q/S0002

Note 3: LCM weight tolerance: ± 5%

2 Input/Output Terminals

Recommended connector: IPEX 20453-040T-01 or compatible

Pin	Symbol	I/O	Description	Remark
1	NC	-	No connection(Reserve)	
2	VCCS	P	Power supply(3.3V typ)	
3	VCCS	P	Power supply(3.3V typ)	
4	VEDID	P	DDC 3.3V power	If EDID function is not used, please keep it floating.
5	NC	-	No connection(Reserved for TM test)	
6	CLKEDID	I	DDC clock	If EDID function is not used, please keep it floating.
7	DATAEDID	I	DDC data	
8	Rxin0-	I	LVDS differential data input	
9	Rxin0+	I		
10	VSS	P	Ground	
11	Rxin1-	I	LVDS differential data input	
12	Rxin1+	I		
13	VSS	P	Ground	
14	Rxin2-	I	LVDS differential data input	
15	Rxin2+	I		
16	VSS	P	Ground	
17	RxCLK-	I	LVDS differential clock input	
18	RxCLK+	I		
19	VSS	P	Ground	
20	Rxin3-	I	LVDS receiver signal channel 3. Pin 20&pin 21 connect to GND for 6bit LVDS input.	
21	Rxin3+	I		
22	VSS	P	Ground	
23	NC	-	No connection(Reserved for TM test)	
24	NC	-	No connection(Reserved for TM test)	
25	VSS	P	Ground	
26	NC	-	No connection(Reserved for TM test)	
27	SEL68	I	LVDS 6/8 bit selection control SEL68="H":8bit/SEL68="L" or NC:6bit	

28	VSS	P	Ground	
29	NC	-	No connection(Reserved for TM test)	
30	NC	-	No connection(Reserved for TM test)	
31	LED_GND	P	LED ground	
32	LED_GND	P	LED ground	
33	LED_GND	P	LED ground	
34	NC	-	No connection(Reserve)	
35	LED_PWM	I	PWM control signal of LED converter	
36	LED_EN	I	Enable control signal of LED converter	
37	NC	-	No connection(Reserve)	
38	LED_VCCS	P	LED power supply(12V typ)	
39	LED_VCCS	P	LED power supply(12V typ)	
40	LED_VCCS	P	LED power supply(12V typ)	

Note1: P: Power/GND; I: input pin; O: output
Note2: NC: Please Leave this pin Open.

3 Absolute Maximum Ratings

GND=0V

Item	Symbol	Min	Max	Unit	Remark
Power Voltage	VCCS	2.8	3.6	V	
EDID drive Voltage	VEDID	-0.3	4	V	
Converter Input Voltage	LED_VCCS	4.2	24	V	
Converter Control Signal Voltage	LED_PWM	-0.3	5.3	V	
Converter Control Signal Voltage	LED_EN	-0.3	5.3	V	
Operating Temperature	TOPR	-20	70	℃	
Storage Temperature	TSTG	-30	80	℃	
Relative Humidity Note1	RH	--	≤95	%	Ta≤40℃
		--	≤85	%	40℃＜Ta≤50℃
		--	≤55	%	50℃＜Ta≤60℃
		--	≤36	%	60℃＜Ta≤70℃
		--	≤24	%	70℃＜Ta≤80℃
Absolute Humidity	AH	--	≤70	g/m³	Ta＞70℃

Note1: Ta means the ambient temperature.
It is necessary to limit the relative humidity to the specified temperature range.
Condensation on the module is not allowed.

4 Electrical Characteristics

4.1 Driving TFT LCD Panel

GND=0V, Ta=25℃

Item		Symbol	Min	Typ	Max	Unit	Remark
Power Supply Voltage		VCCS	2.80	3.30	3.60	V	
Current of VCCS Power Supply		I_{VCCS}	-	220	-	mA	Note 1
Input Signal Voltage	Low Level	VIL	GND	-	0.3VCCS	V	
	High Level	VIH	0.7VCCS	-	VCCS	V	

Note1: To test the current dissipation, use “all Black Pattern”

4.2 Driving Backlight

Ta=25℃

Item		Symbol	Min	Typ	Max	Unit	Remark
Power supply voltage		LED_VCC	-	12V	-	V	
Power supply current		I_{LED}	-	400	-	mA	
Input voltage for PWM signal	High	VDFH1	2	-	LED_VCC	V	
	Low	VDFL1	0	-	0.8	V	
Input voltage for EN signal	High	VDFH2	2	-	LED_VCC	V	
	Low	VDFL2	0	-	0.8	V	
PWM frequency		fpwm	100	-	100K	Hz	
PWM duty cycle		Dim(Fpwm=100 ~10khz)	1	-	-	%	Dim setting must be always more than minimum
		Dim(Fpwm=10k hz~100khz)	10	-	-	%	
PWM pulse width		tPWH	5	-	-	us	
LED lifetime		--	20000	30000	-	hrs	

Note1: Optical performance should be evaluated at Ta=25℃ only.
Note2: 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% initial brightness.
Typical operating life time is estimated data.

5 Timing Chart

5.1 Power on/off sequence

Item	Symbol	Min	Typ	Max	Unit	Remark
VCC on to VCC stable	Tp1	0.5	-	10	ms	
VCC stable to signal on	Tp2	0	-	50	ms	
Signal on to LED_EN on	Tp3	200	-	-	ms	
LED_PWM on to LED_EN on	Tp4	0	-	200	ms	
LED_VCCS to LED_PWM on	Tp5	10	-	-	ms	
LED_VCCS on to LED_VCCS stable	Tp6	0.5	-	10	ms	
VCC off time	Tp7	0	-	10	ms	
VCC off to next VCC on	Tp8	500	-	-	ms	
Signal off before VCC off	Tp9	0	-	50	ms	
LED_EN off before signal off	Tp10	200	-	-	ms	
LED_EN off before LED_PWM off	Tp11	0	-	200	ms	
LED_PWM off before LED_VCCS off	Tp12	10	-	-	ms	

Table 5.1 Power on/off sequence

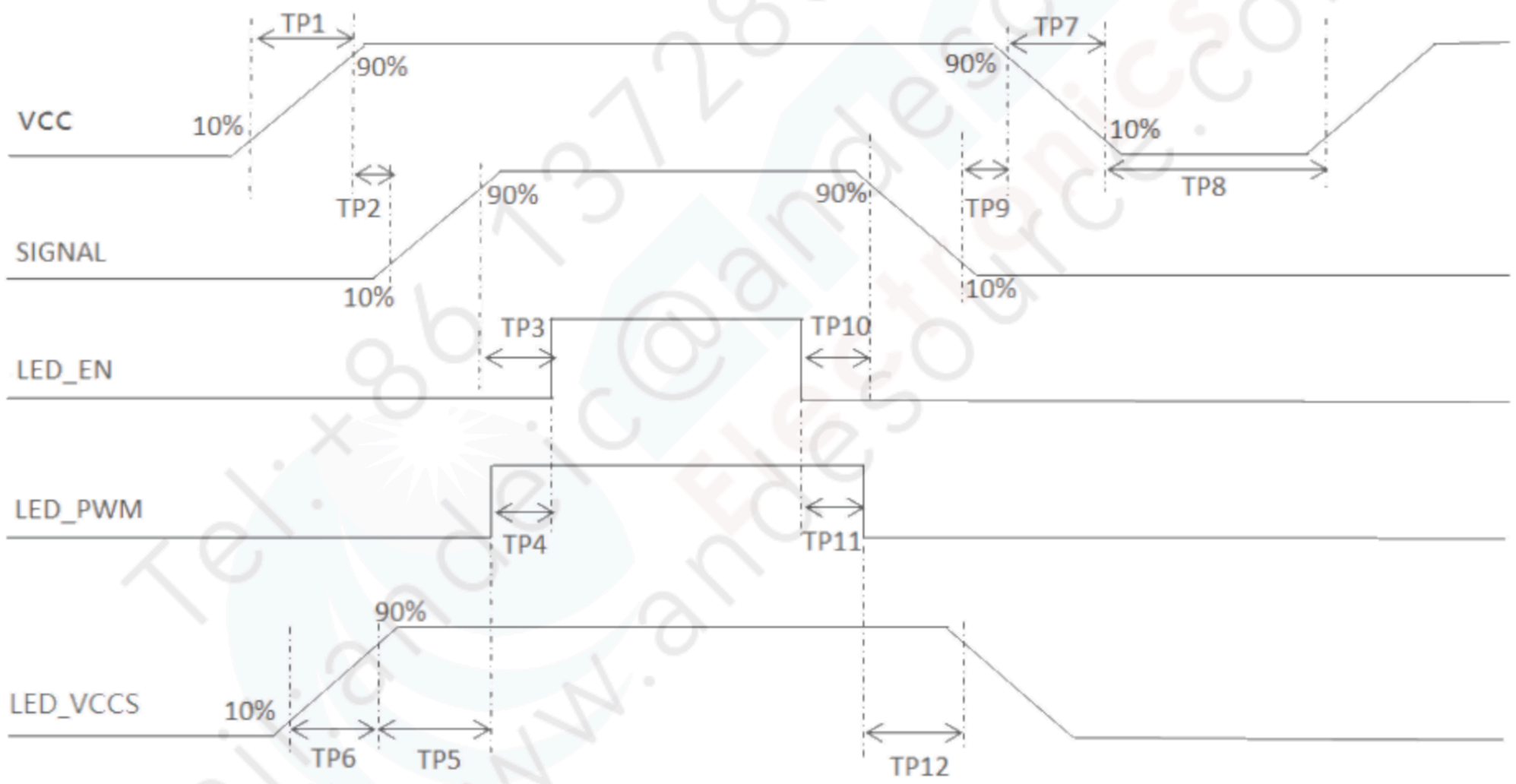


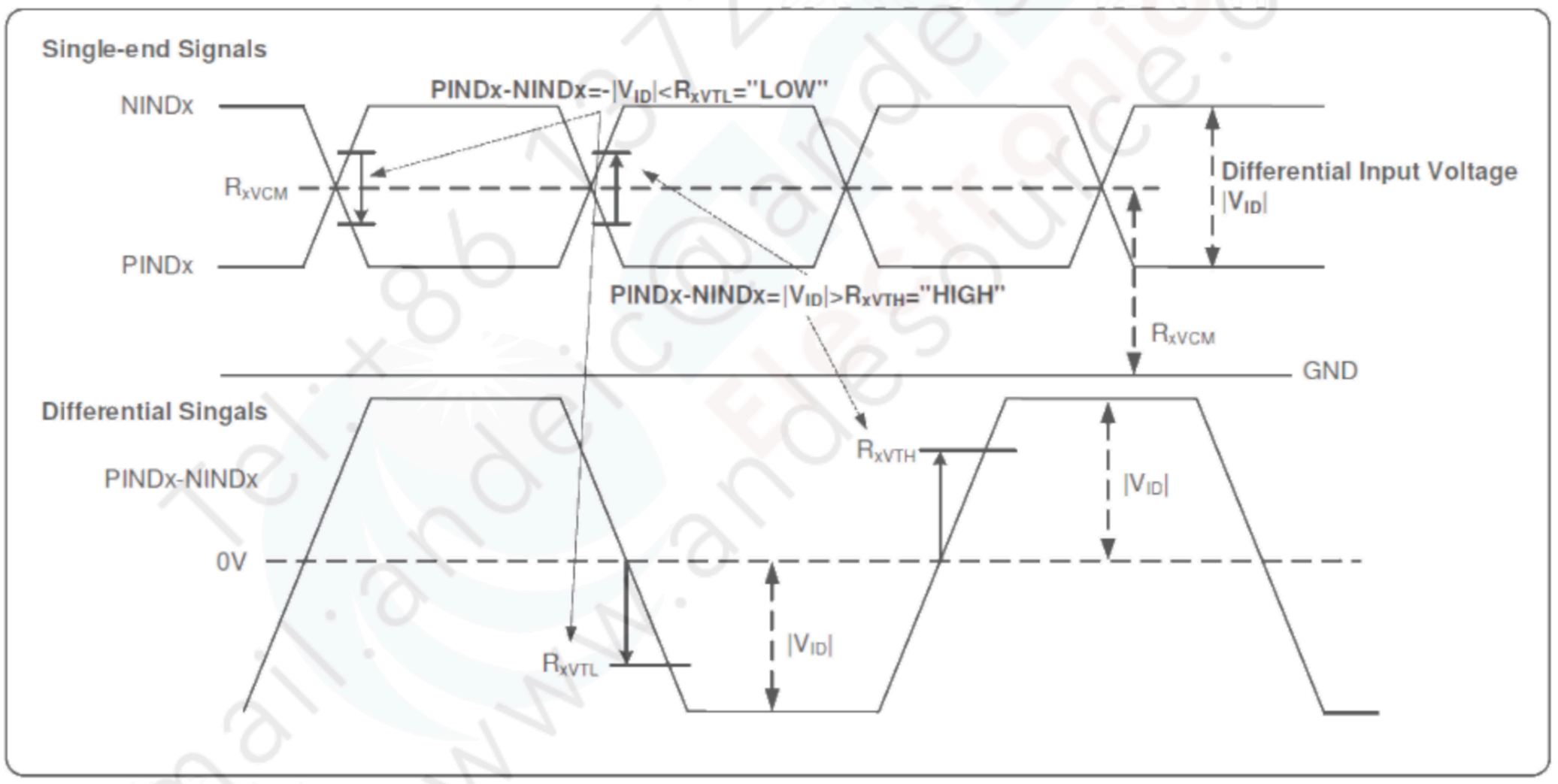
Figure 5.1 Power on/off sequence

5.2 LVDS signal timing characteristics

Electrical characteristics

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Differential input high Threshold voltage	R_{XVTH}	R_{XVCM}=1.2V	-	-	+0.1	V
Differential input low threshold voltage	R_{XVTL}	-	-0.1	-	-	V
Input voltage range **(Singled-end)**	R_{XVIN}	-	0	-	VDD-1.2+ $\|V_{ID}\|/2$	V
Differential input common mode voltage	R_{XVCM}	-	$\|V_{ID}\|/2$	-	VDD-1.2	V
Differential input voltage	$\|V_{ID}\|$	-	0.2	-	0.6	V
Differential input leakage Current	RV_{Xliz}	-	-10	-	+10	μA
LVDS digital operating Current	Iddlvds	Fclk=65MHz, VDD=3.3V	-	15	30	mA
LVDS digital stand-by Current	Istlvds	Clock & all functions are stopped	-	10	50	μA

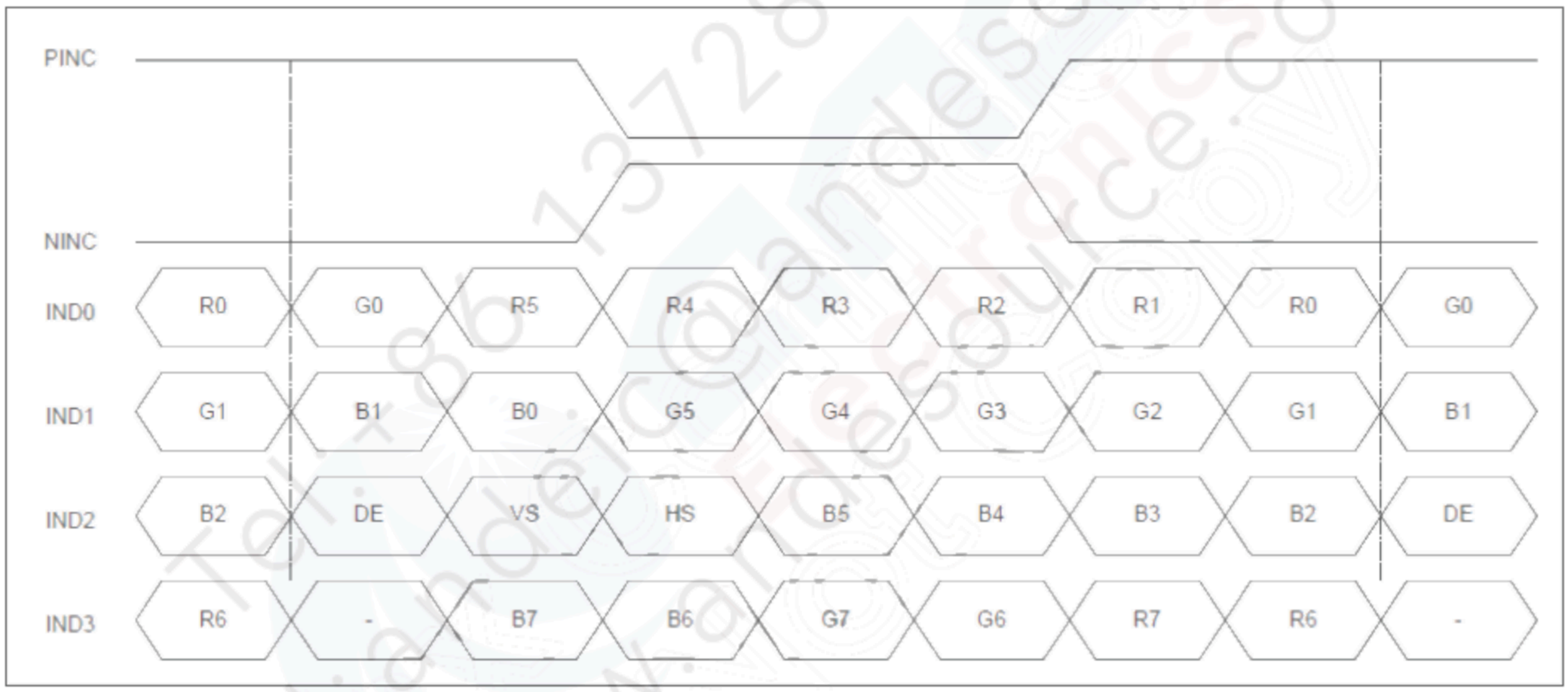
Single-end Signals



5.3 LVDS data input format

6-bit mode data input

8-bit mode data input



5.4 Timing characteristics

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	40.8	51.2	67.2	MHz
Horizontal display area	thd		1024		DCLK
HSD period	th	1114	1344	1400	DCLK
HSD blanking	thb+ thfp	90	320	376	DCLK
Vertical display area	tvd		600		T_H
VSD period	tv	610	635	800	T_H
VSD blanking	tvbp+ tvfp	10	35	200	T_H

6 Optical Characteristics

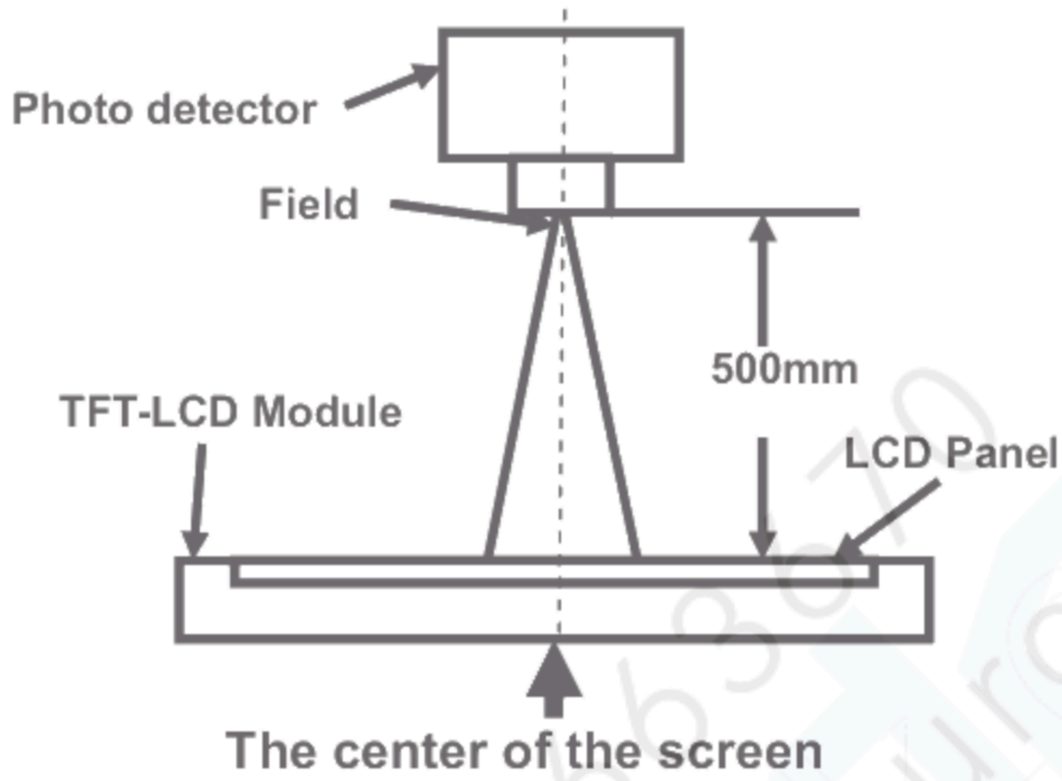
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	65	75	-	Degree	Note2,3
		θB		70	80	-		
		θL		70	80	-		
		θR		70	80	-		
Contrast Ratio		CR	θ=0°	600	800			Note 3
Response Time		T_{ON}	25℃	-	7	10	ms	Note 4
		T_{OFF}		-	9	18		
Chromaticity	White	x	Backlight is on	0.263	0.313	0.363		Note 1,5
		y		0.279	0.329	0.379		
	Red	x		0.524	0.574	0.624		Note 1,5
		y		0.285	0.335	0.385		
	Green	x		0.280	0.330	0.380		Note 1,5
		y		0.525	0.575	0.625		
	Blue	x		0.108	0.158	0.208		Note 1,5
		y		0.090	0.140	0.190		
Uniformity		U		70	80	-	%	Note 6
NTSC				42	47	-	%	Note 5
Luminance		L		380	450	-	cd/m^2	Note 7

Test Conditions:

1. I_F= 20 mA, and the ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.

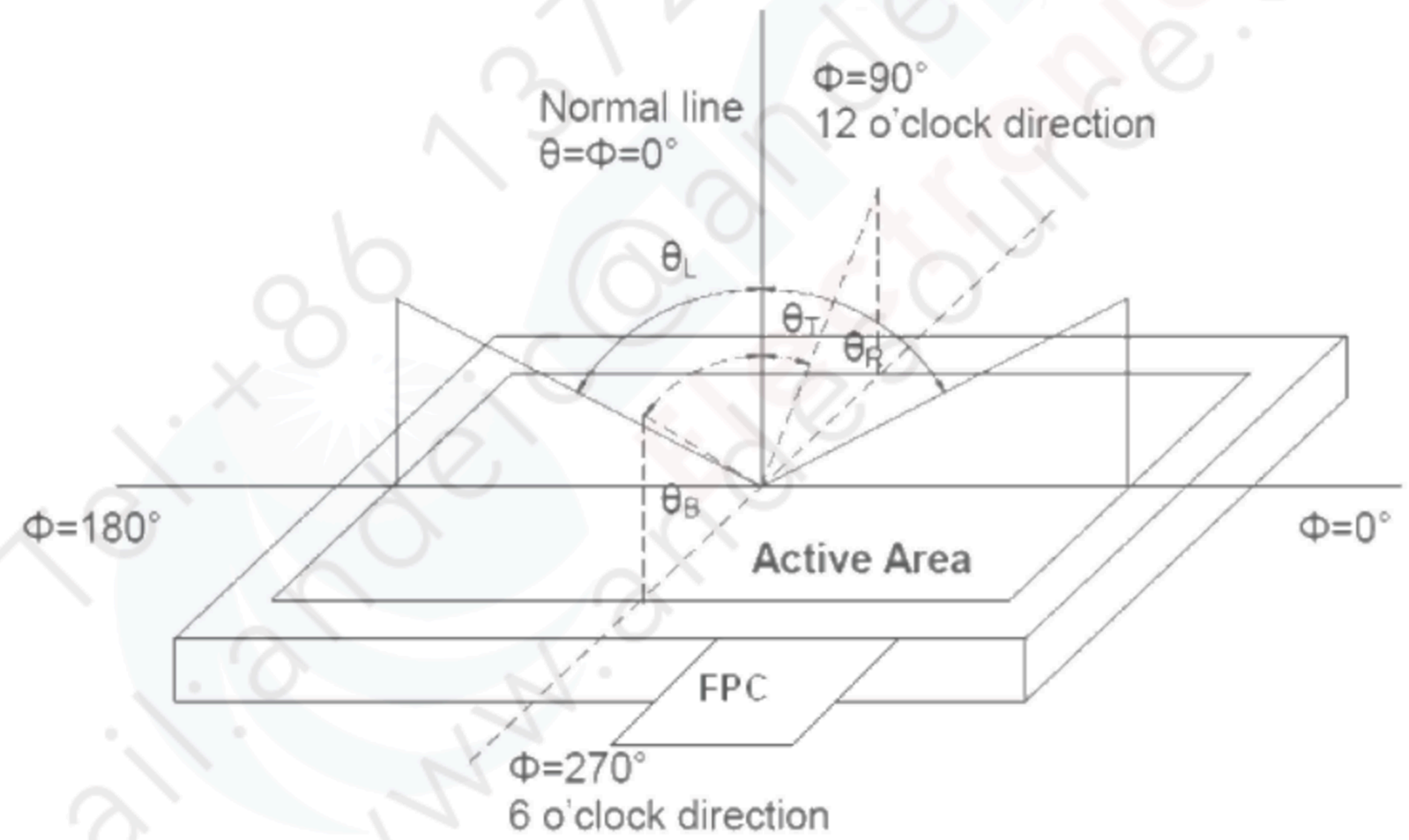
Note 1: Definition of optical measurement system.

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.



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

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

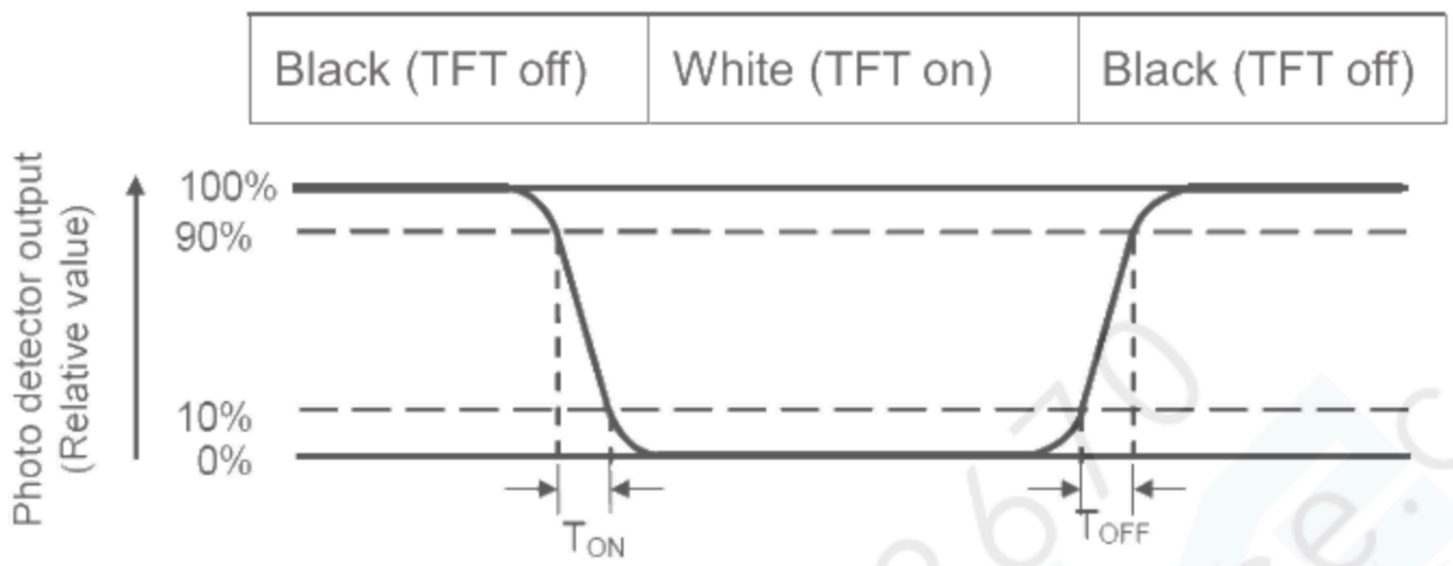
"White state ": The state is that the LCD should drive by Vwhite.

"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)

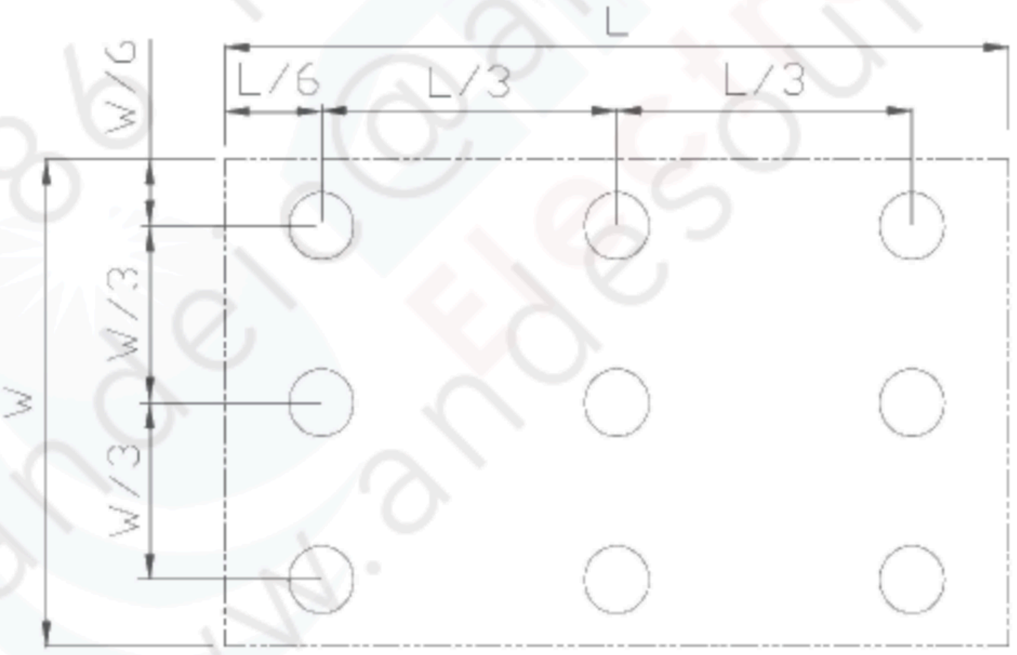
Color coordinates measured at center point of LCD.

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= +70℃,240hrs	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta= -20℃,240hrs	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta = +80℃,240hrs	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta = -30℃,240 hrs	IEC60068-2-1:2007 GB2423.1-2008
5	Storage at High Temperature and Humidity	Ta=+60℃, 90% RH 240 hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃ 30 min~+70℃ 30 min, Change time:5min,100 Cycles	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,GB2423.22-2002
7	ESD	C=150pF, R=330Ω,9points/panel Air:± 15KV, 25times, Contact:± 8KV, 25 times,	IEC61000-4-2:2001 GB/T17626.2-2006
8	Vibration Test	Stroke:1.5G Sweep:10Hz~100Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total)	IEC60068-2-6:1982 GB/T2423.10—1995
9	Mechanical Shock (Non OP)	50G 20ms, ± X,± Y,± Z 3times, for each direction	IEC60068-2-27:1987 GB/T2423.5—1995

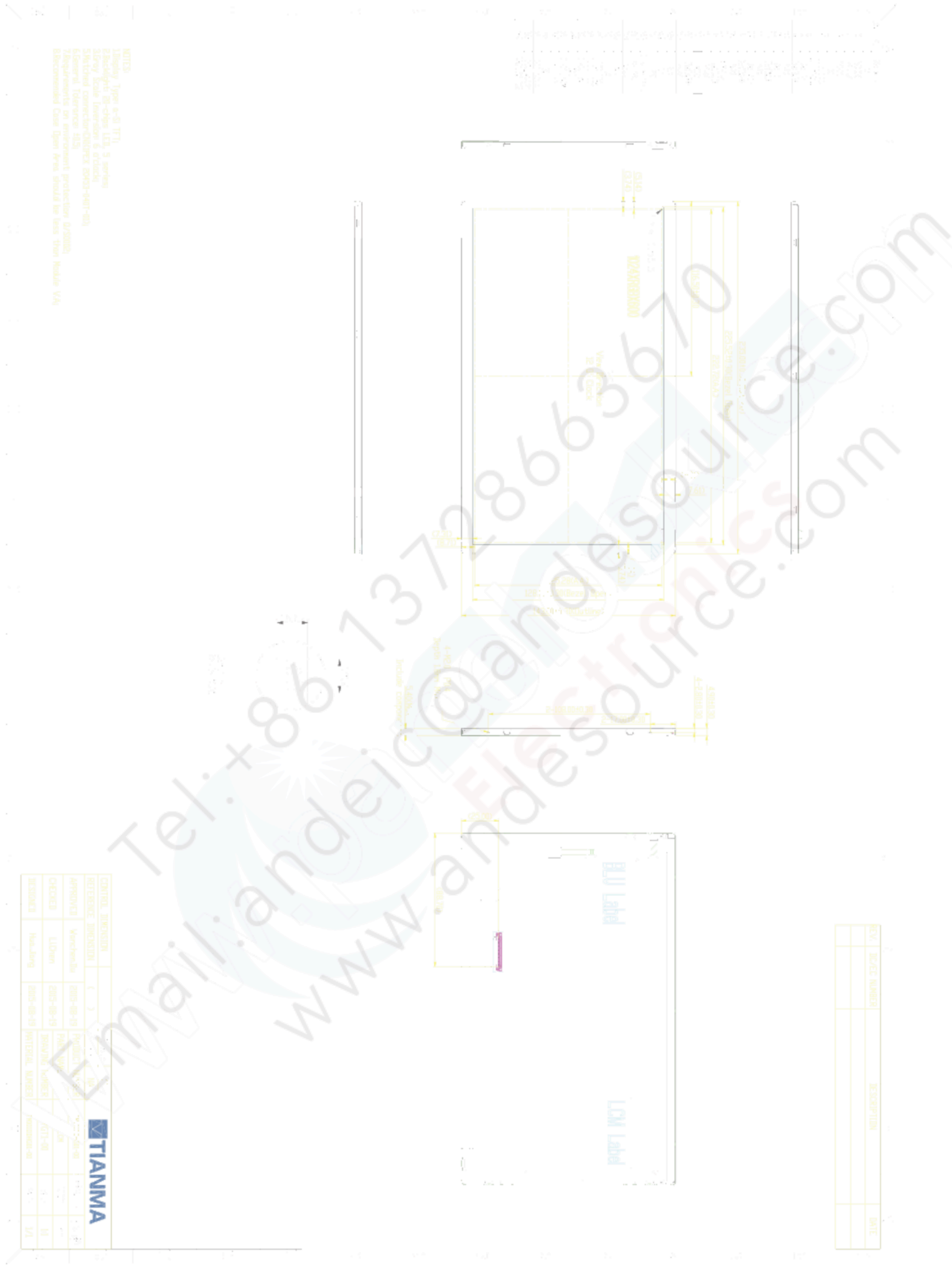
Note1: Ts is the temperature of panel's surface.

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.

Note4: 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

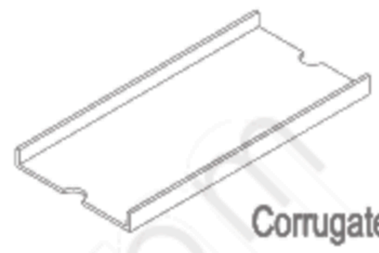


9 Packing Drawing

No	Item	Model(Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	TM101DDHG01-60	235×143×4.9	0.202	20	
2	Partition-1	Corrugated paper	513×333×217	1.42	1	
3	Anti-static Bag	PE	285×245×6	0.011	20	
4	Dust –Proof Bag	PE	700×545	0.05	1	
5	Corrugated Bar	Corrugated paper	409×253×37	0.082	1	
6	Partition-2	Corrugated paper	505×332×7	0.1	1	
7	Carton	Corrugated paper	530×350×250	0.76	1	
8	Total weight	6.65Kg±10%				

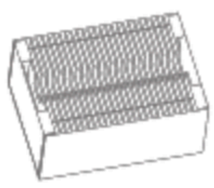
LCM 50Pcs

Beauty-grain Tape

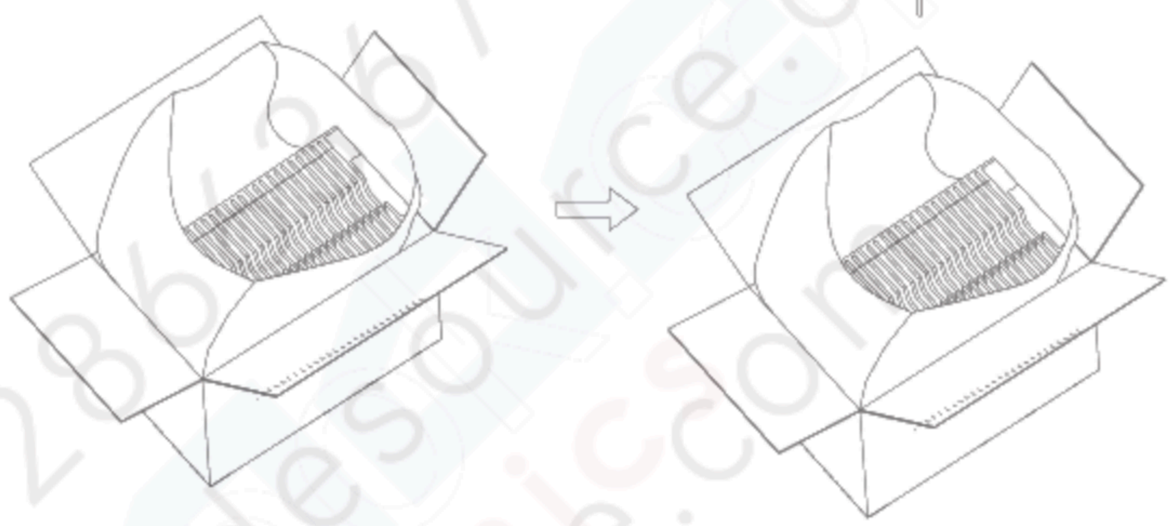


Corrugated Bar

Partition



DUST-PROOF-BAG



Corrugated paper

Use packaging tapes to seal
Package

Use packaging tapes to seal
Carton

2*3 per floor
5 floor

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.