Coversheet

MODEL NO. : TL055VDXP43-00

ISSUED DATE: 2015-9-09

VERSION : Ver 2.0

□**Preliminary Specification**
■**Final Product Specification**

Approved by	Notes

XIAMEN TIANMA Confirmed :

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This technical specification is subjected to change without notice

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Record of Revision

Rev	Issued Date	Description	Editor
1.0	2015-2-5	Preliminary Specification Release	周磊
2.0	2015-2-5	Preliminary Specification Release	周磊

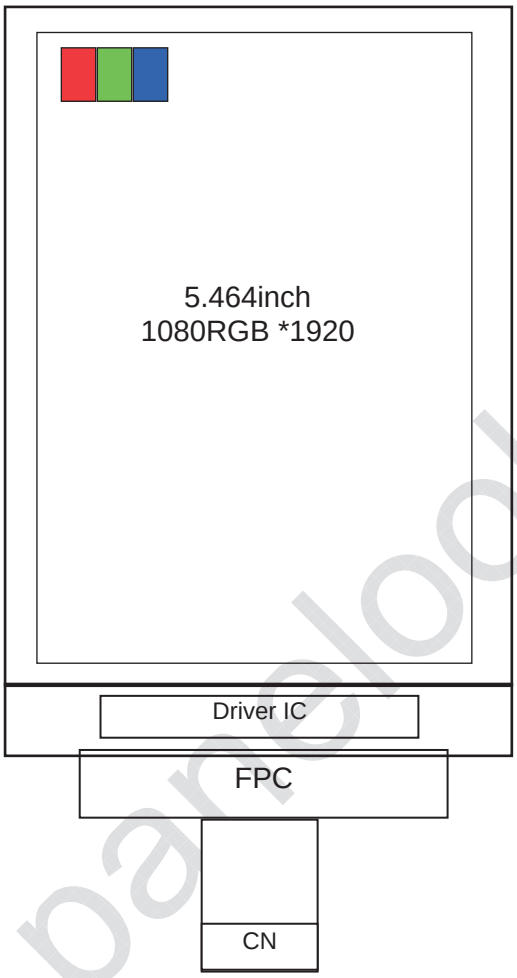
1. General Specifications

Feature		Spec
Display Spec.	Size	5.46inch
	Resolution	1080(RGB) x1920
	Interface	MIPI 4 Lane
	Color Depth	16.7M
	Technology Type	LTPS SFT
	Pixel Pitch (mm)	21um*63um
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	SFT with Normally Black two domain
	Surface Treatment(Up Polarizer)	Clear Type(3H)
Mechanical Characteristics	LCM (W x H x D) (mm)	70.44mm*128.66mm*1.34mm
	Active Area(mm)	68.04mm*120.96mm
	With /Without TSP	Without TSP
	Weight (g)	TBD
	LED Numbers	12LEDs
Electronic	Driver IC	NT35596

Note 1: Requirements on Environmental Protection: Q/S0002

Note 2: LCM weight tolerance : +/- 5%

2. BLOCK DIAGRAM



3. INPUT/OUTPUT TERMINALS PIN ASSIGNMENT

3.1 CN1 of FPC

NO.	Symbol	I/O	Power Rail	Description
1	GND	P	GND	System ground
2	LCM_ID0	I	GND	ID PIN0
3	LCM_ID1	I	IOVCC	ID PIN1
4	RST	I	IOVCC	LCD Reset siganl
5	TE	O	IOVCC	TE signal
6	NC	--	--	NC
7	GND	P	GND	System ground
8	D3+	I/O	--	MIPI DATA lane 3+
9	NC	--	--	NC
10	D3-	I/O	--	MIPI DATA lane 3-
11	GND	P	GND	System ground
12	D2+	I/O	--	MIPI DATA lane 2+
13	NC	--	--	NC
14	D2-	I/O	--	MIPI DATA lane 2-
15	GND	P	GND	System ground
16	CLK+	I/O	--	MIPI CLK lane +
17	NC	--	--	NC
18	CLK-	I/O	--	MIPI CLK lane -
19	GND	P	GND	System ground
20	D1+	I/O	--	MIPI DATA lane 1+
21	NC	--	--	NC
22	D1-	I/O	--	MIPI DATA lane 1-
23	GND	P	GND	System ground
24	D0+	I/O	--	MIPI DATA lane 0+
25	NC	--	--	NC
26	D0-	I/O	--	MIPI DATA lane 0-
27	GND	P	GND	System ground
28	AVDD	P	AVDD	Analog power supply
29	AVEE	P	AVEE	Analog power supply
30	IOVCC	P	IOVCC	I/O power supply
31	GND	P	GND	System ground
32	LED1+	P	--	LED positive power1
33	LED2+	P	--	LED positive power2
34	LED1-	P	--	LED negative power1
35	LED2-	P	--	LED negative power2
36	GND	P	GND	System ground
37	BLU_PWM	O	--	LED driver PWM
38	PWR_EN	--	--	NC
39	OTP	--	--	NC

Note1	I/O definition：I-----Input O---Output P----Power(Ground) NC---No connection

Table 3.1 input terminal pin assignments

4. DC ELECTRICAL CHARACTERISTICS

4.1 Absolute maximum ratings

LEDK=GND=0V, Ta = 25℃

Item	Symbol	Min	Max	Unit	Remark
Logic Supply Voltage	IOVCC	1.65	3.6	V	
Analog Supply Voltage	AVDD	4.5	6	V	
Analog Supply Voltage	AVEE	-6	-4.5	V	
Operating Temperature	TOPR	-30	+75	℃	
Storage Temperature	TSTG	-40	+85	℃	

Table 4.1 absolute maximum rating

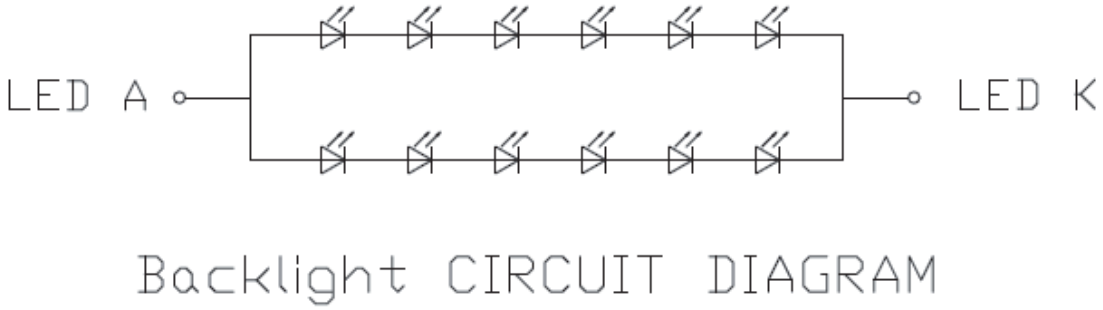
4.2 Recommended Operating Condition

VCC=2.8V,VIO=1.8V,GND=0V, Ta = 25℃

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
Logic Supply Voltage		IOVCC	1.7	1.8	1.9	V	Note 1
Analog Supply Voltage		AVDD	5.3	5.5	5.7	V	Note 1
Analog Supply Voltage		AVEE	-5.7	-5.5	-5.3	V	Note 1
Input Signal Voltage	Low Level	VIL	GND	-	0.3xIOVCC	V	Note 2
	High Level	VIH	0.7xIOVCC	-	IOVCC	V	Note 2
Output Signal Voltage	Low Level	VIL	GND	-	0.2xIOVCC	V	Note 2
	High Level	VIH	0.8xIOVCC	-	IOVCC	V	Note 2
Note3	The DC/AC electrical characteristics of bare die and wafer are guaranteed at +85℃.						
Note4	When the measurements are performed with LCD module, Measurement Points are like below.CSX, RDX, WRX, D[23:0], DCX, RESX, SCL, IM[2 : 0] and Test pins						

Table 4.2 LCD module electrical characteristics

4.3 Recommended Driving Condition for Backlight



Backlight CIRCUIT DIAGRAM

Figure4.3 Driving Backlight circuit diagram

Ta=25℃

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Forward Current	I_F	-	20	-	mA	Note 3,4,5
Forward Voltage	V_F	2.8	3.0	3.2	V	Note 3,4,5
Backlight Power Consumption	W_{BL}	-	720	768	mW	Note 3,4,5
Note 3	The figure above shows the connection of backlight LED.					
Note 4	Each LED : IF =20 mA, VF =3.0V					
Note 5	IF is defined for two channel LED. 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% initial brightness. Typical operating life time is estimated data.					

Table 4.3 Driving Condition for Backlight characteristics

5. AC ELECTRICAL CHARACTERISTICS

5.1 MIPI Interface Characteristics

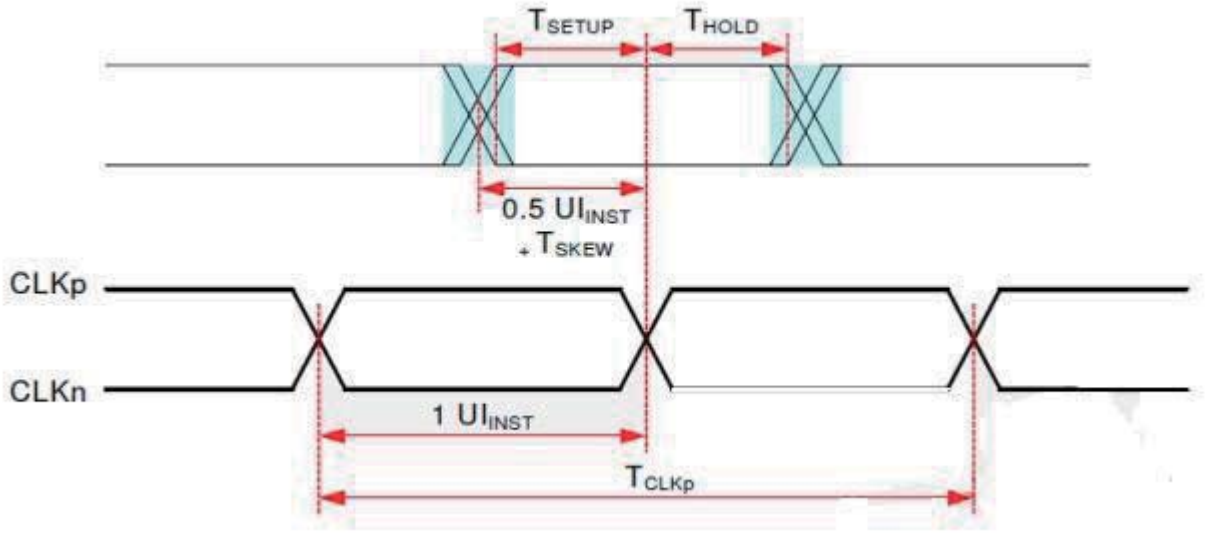


Figure5.1 MIPI Interface characteristics

parameter	Symbol	Min.	Typ.	Max.	Units	Remark
UI instantaneous	UIINST	1		12.5	ns	Note6,7,10
Data to Clock Skew [measured at tansmitter]	TSKEW[TX]	-0.15		0.15	UIINST	Note8
Data to Clock Setup Time [measured at receiver]	TSETUP[RX]	-0.15			UIINST	Note9
Data to Clock Hold Time [measured at receiver]	T HOLD[RX]	-0.15			UIINST	Note9
20% - 80% rise time and fall time	tR / tF	100			Ps	
				0.3	UIINST	

Note6	This value corresponds to a minimum 80 MHz data rate
Note7	The minimum UI shall not be violated for any single bit period, i.e.,any DDR half cycle within a data burst.
Note8	Total silicon and package delay budget of 0.3* UIINST when D-PHY is supporting maximum data rate = 1Gbps.
Note9	Total setup and hole window for receiver of 0.3* UIINST when D-PHY is supporting maximum data rate = 1Gbps..
Note10	For MIPI speed limitation: [1] Per lane bandwidth is 850Mbps, [2] Total Bit Rate: 2Gbps for 8-8-8-; 1.5Gbps for 6-6-6; 1.33Gbps for 5-6-5.

Table 5.1 MIPI Interface characteristics

5.2 MIPI 24 bits RGB Data Format

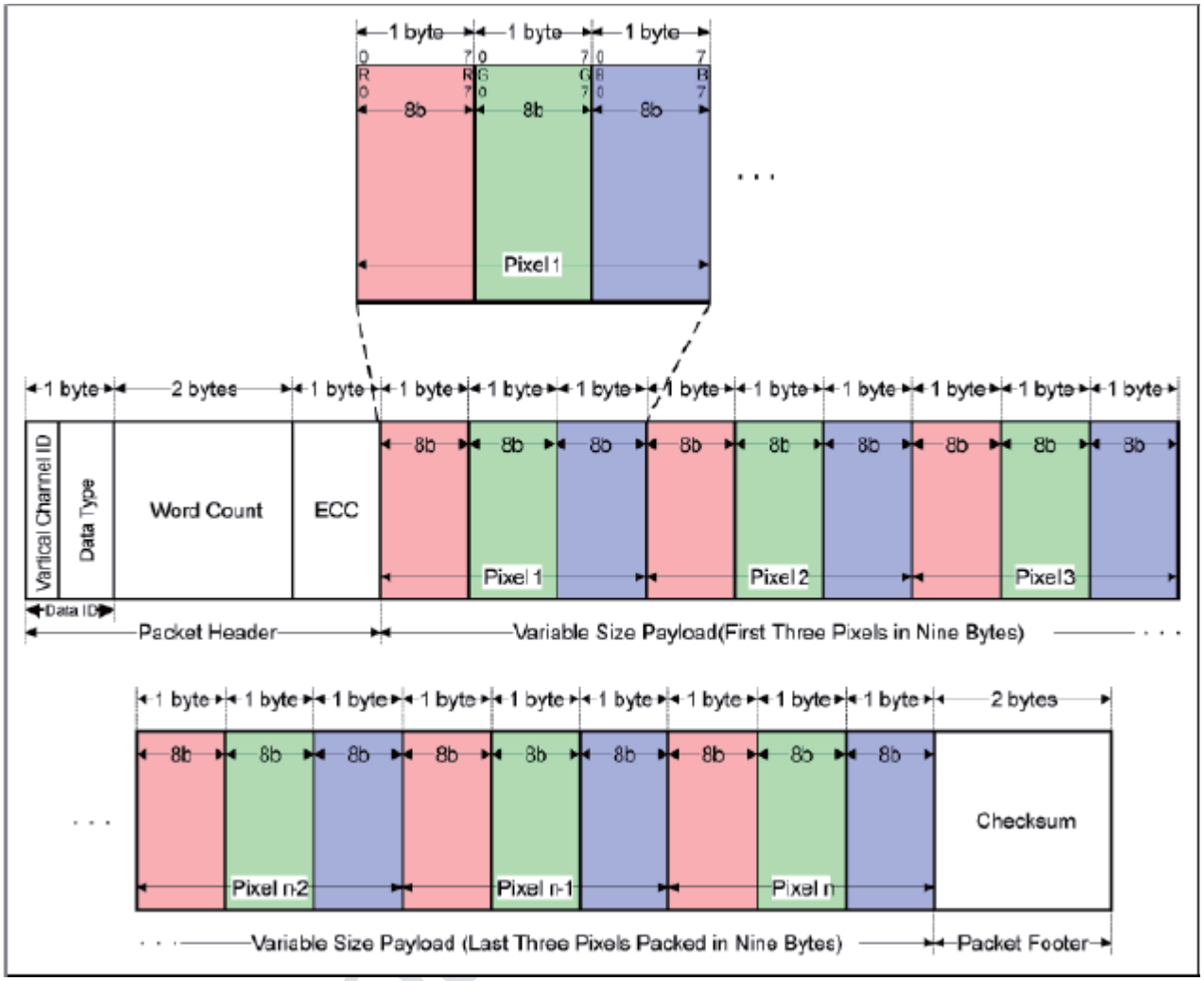


Figure5.2 MIPI RGB 24 bits RGB Data Format

5.3 Reset timing

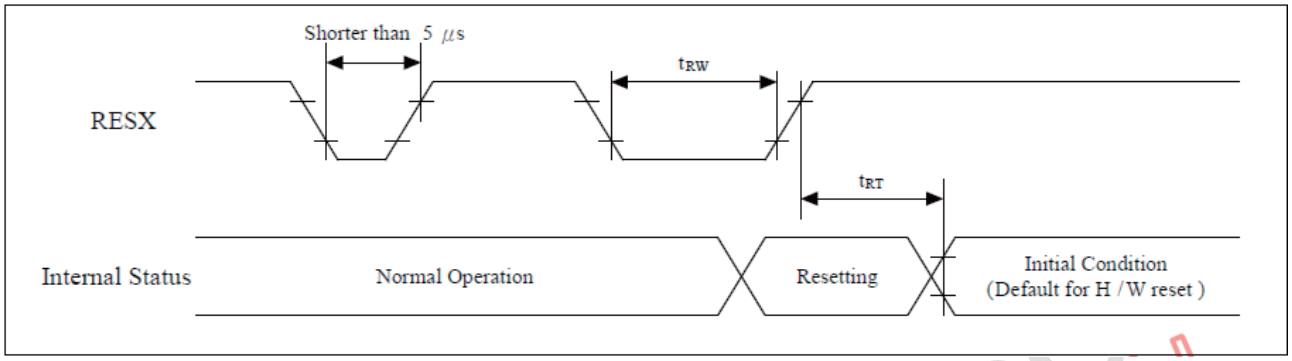


Figure5.3 Reset Timing

Ta=25℃

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
RESET low pulse width	t_{RW}	10	-	-	us	Note 1
Reset complete time (sleep out mode)	t_{RT}		-	10	ms	Note 1
Reset complete time (sleep in mode)				120	ms	Note 1

Table 5.3 RESET Timing Parameter

Note11:The reset cancel also includes required time for loading ID bytes, VCOM setting and other settings from EEPROM (or similar device) to registers.This loading is done every time when there is HW reset cancel time (tRT) within 10 ms after a rising edge of RESX.

6. POWER ON/OFF SEQUENCE

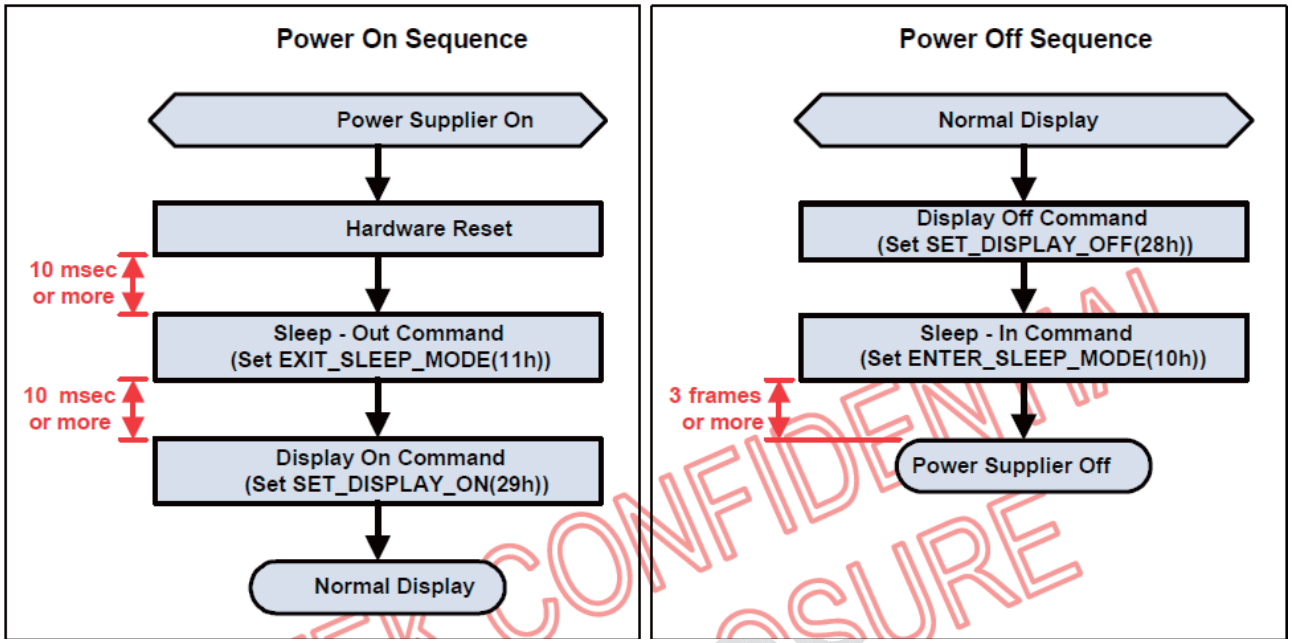


Figure 6.1 Interface power on/off sequence

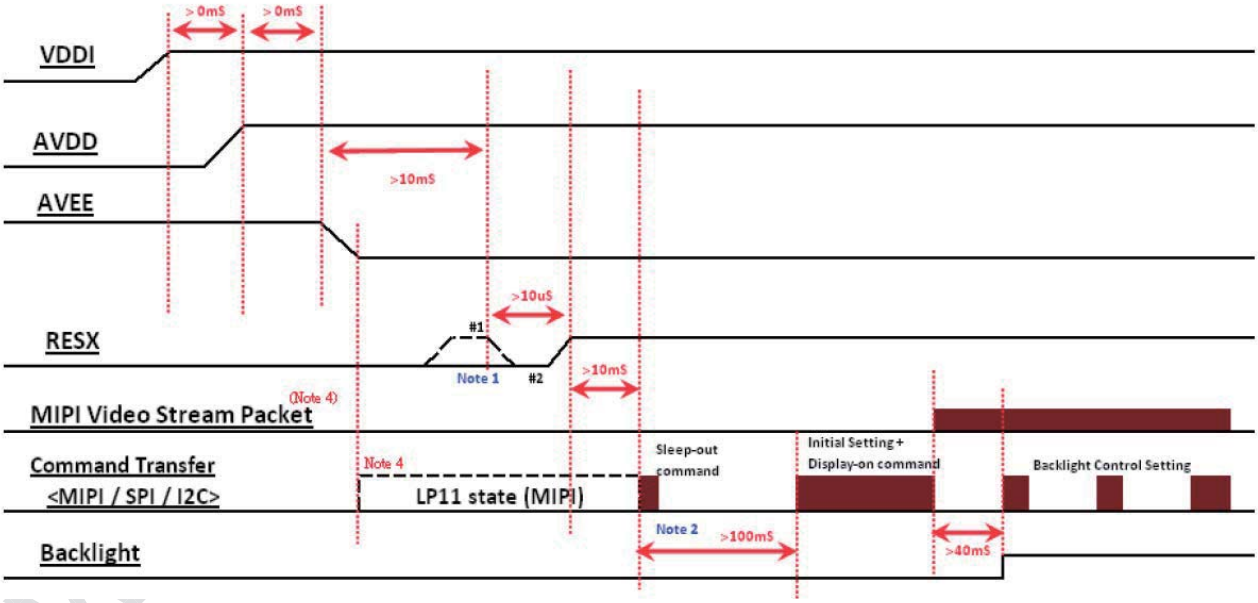


Figure 6. 2 Interface power on/off sequence

7. Optical Characteristics

7.1 Optical Specification

Ta=25℃

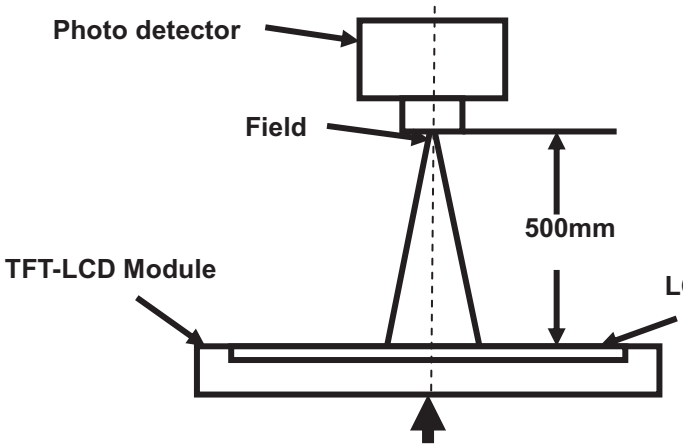
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
View Angles		θT	CR≧10	70	80	-	Degree	Note 2
		θB		70	80	-		
		θL		70	80	-		
		θR		70	80	-		
Contrast Ratio		CR	θ=0°	800	1000	-		Note1 Note3
Response Time		T_{ON}	25℃	-	25	30	ms	Note1 Note4
		T_{OFF}						
Chromaticity	White	x	Backlight is on	0.275	0.30	0.325		Note5, Note1
		y		0.295	0.32	0.345		
	Red	x		0.61	0.64	0.67		
		y		0.30	0.33	0.36		
	Green	x		0.27	0.30	0.33		
		y		0.58	0.61	0.64		
	Blue	x		0.12	0.15	0.18		
		y		0.03	0.06	0.09		
Uniformity		U		80		-	%	Note1 Note6
NTSC				68	72	-	%	Note 5
Luminance		L		360	450	-	cd/m^2	Note1 Note7

Test Conditions:

1. V_F =3.0V, 1/3*I_F = 20mA(Backlight current for each LED), 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	CS2000	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	GLRT	

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

viewing angle is measured at the center point of the LCD by EZcontrastXL88。

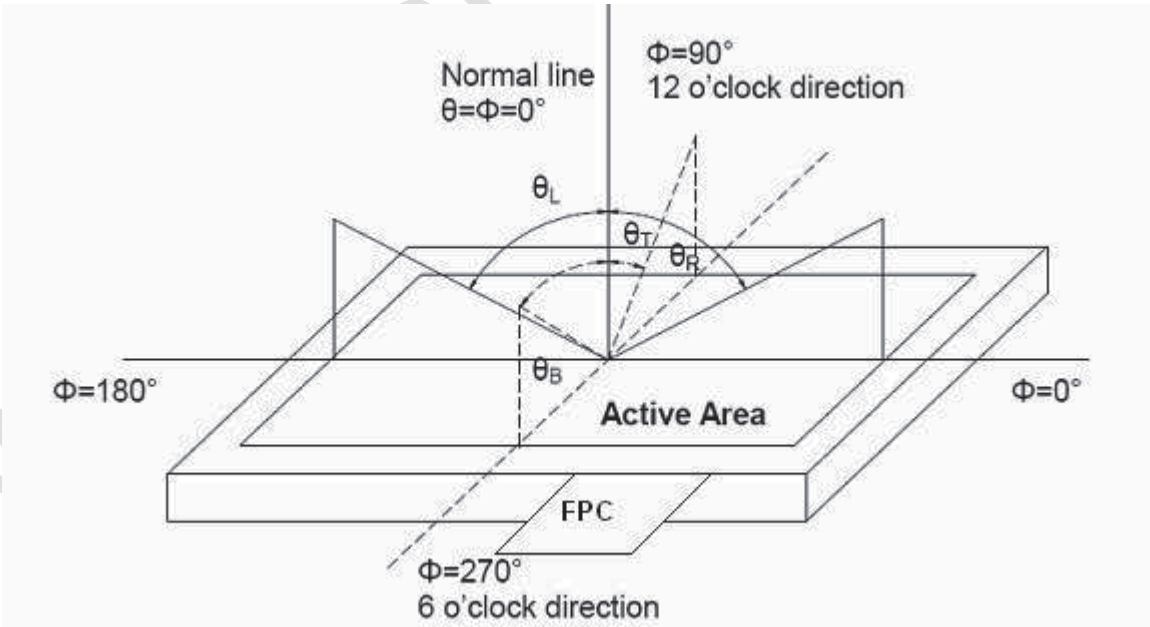


Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

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

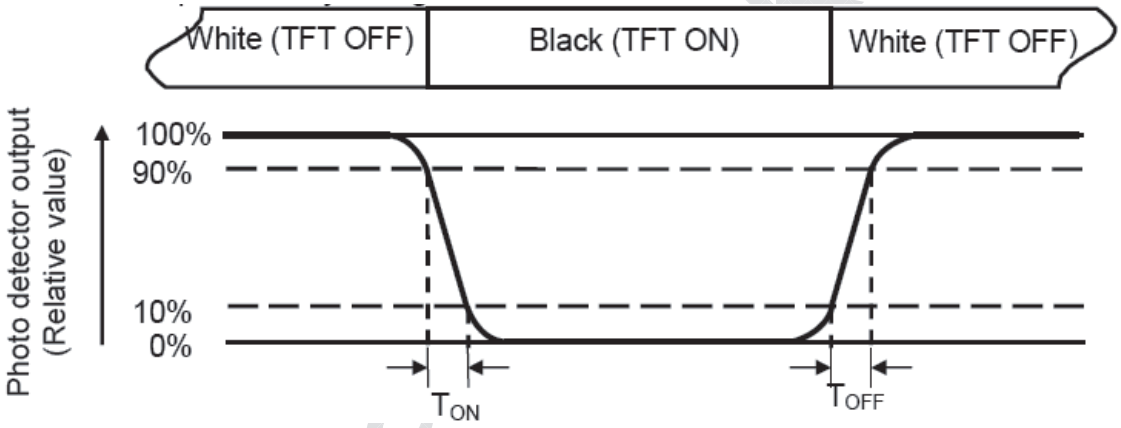
“White state “:The state is that the LCD should be driven by Vwhite.

“Black state”: The state is that the LCD should be driven 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

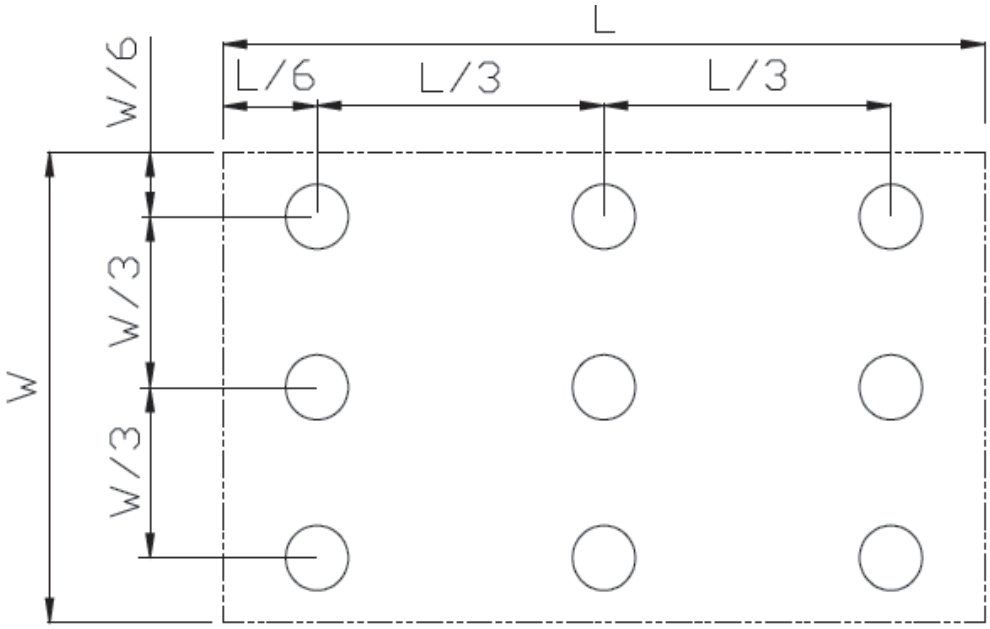


Fig. 2 Definition of uniformity

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.

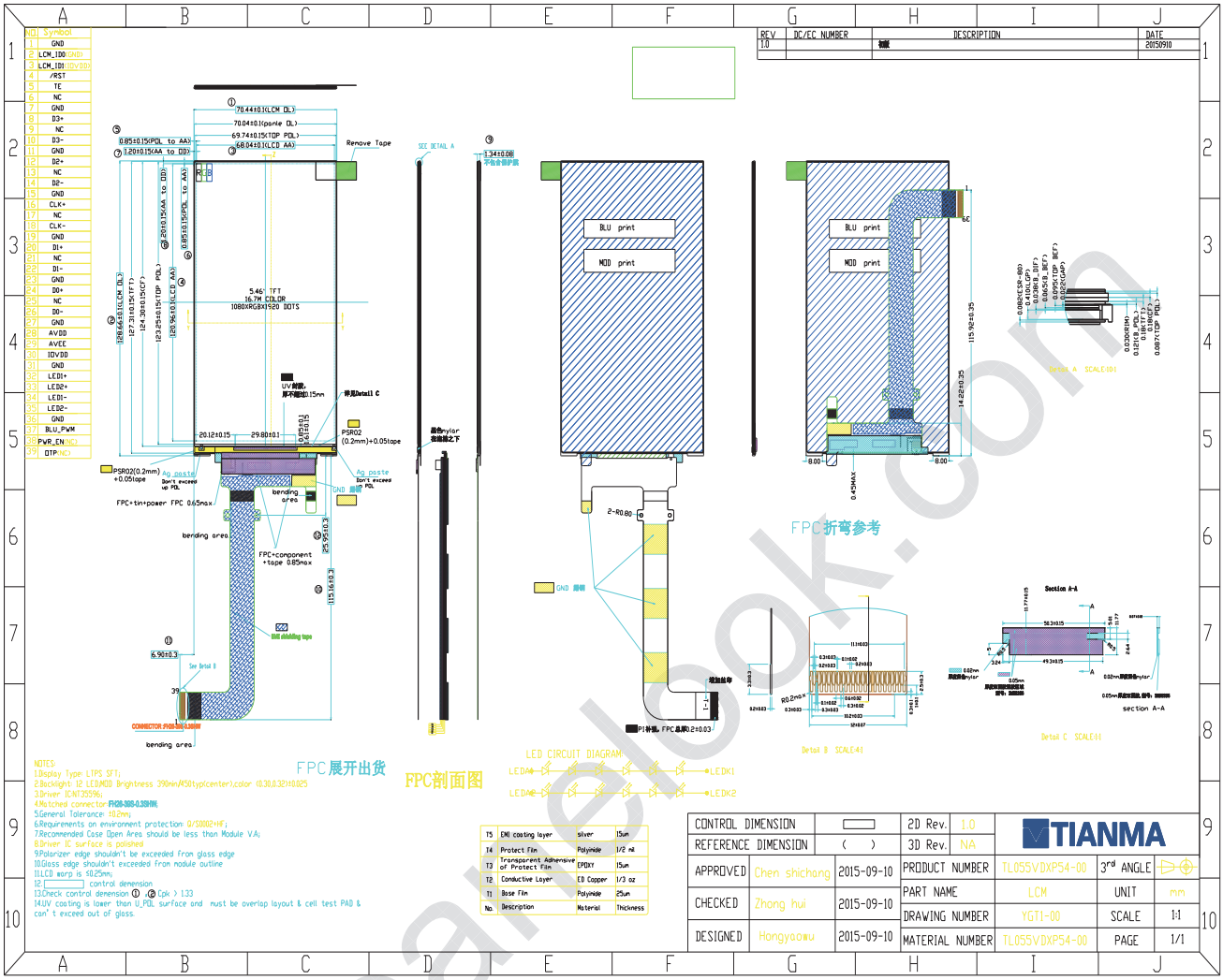
8 . Environmental / Reliability Tests

No.	Item	Test Condition	Sample Mumber	Inspection method	Criteria	Remarks	Reference
1	Low Temperature Operation	Ta=-20℃, 48hrs	5	visual and optical inspection after 2hrs in room temperature	《Reliability Test Standard》		IEC60068-2-1 GB2423.1
2	High Temperature and High Humidity Storage	Ta=+60℃, 90% RH 60 hrs	5				IEC60068-2-78 GB/T2423.3
3	Thermal Shock storage	-40℃ 30 min~+80℃ 30 min, Change time:5min, 32Cycles	5			start with cold temperature,End with high temperature	IEC60068-2-14 GB2423.22
4	High Temperature Operation	Ts=+70℃, 48hrs	5	visual inspection after 2hrs in room temperature			IEC60068-2-2 GB2423.2
5	Low Temperature Storage	Ta=-30℃, 24hrs	5				IEC60068-2-1 GB2423.1
6	High Temperature Storage	Ta=+80℃, 24hrs	5				IEC60068-2-2 GB2423.2
7	Shock (Non-operation)	60G 6ms, ± X,± Y,± Z 3times, for each direction	2				IEC60068-2-27 GB/T2423.5
8	Electro Static Discharge (Operation)	C=150pF,R=330Ω, 5points/panelContact: ±4Kv, 5times; Air: ±8Kv, 5times; (Environment:15℃~35℃, 30%~60%, 86Kpa~106Kpa)	4				IEC61000-4-2 GB/T17626.2
9	Vibration (Non-operation)	Frequency range:10~55Hz,Stroke:1.5mmSweep:10 Hz~55Hz~10Hz 2 hourfor each direction of X.Y.Z.(6 hours for total)(Package condition)	1carton				IEC60068-2-6 GB/T2423
10	Package Drop Test	Height:80 cm 1 corner, 3 edges, 6 surfaces	1carton				IEC60068-2-32 GB/T2423.8

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

Note2: Ta is the ambient temperature of sample.

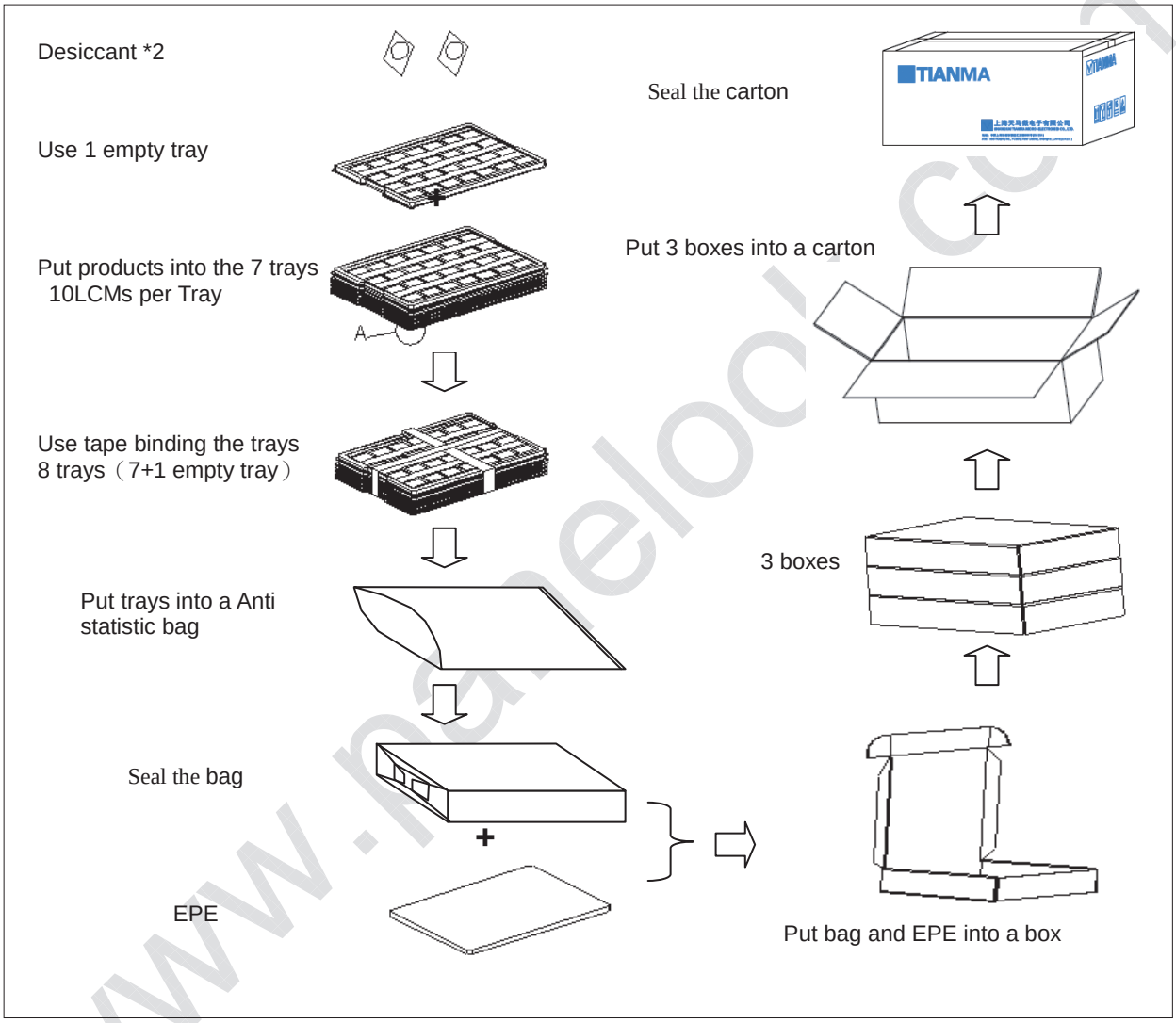
9.Mechanical Drawing



10 . Packing Drawing

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	TL055VDXP43-00	70.44×128.66×1.34	TBD	126	
2	Tray	PET	485×330×0.8	TBD	24	
3	EPE	EPE	485×330x5	0.08	3	
4	EPE	EPE	399.5×248.9×1	TBD	21	
5	Anti-statistic bag	PE	450*700*0.08	0.059	3	

6	BOX	CORRUGATED PAPER	520×345×74	0.44	3	
7	Desiccant	DESICCANT	45×35 (2g)	0. 002	6	12g
8	Carton	CORRUGATED PAPER	544×365×250	1.01	1	
9	Total weight			TBDKg		



11 Precautions for Use of LCD Modules

11.1 Handling Precautions

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

11.1.2 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.

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

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

11.1.5 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

11.1.6 Do not attempt to disassemble the LCD Module.

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

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

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

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

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

11.1.8.4 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.

11.2 Storage precautions

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

11.2.2 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%

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

11.3 Transportation Precautions:

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