

MODEL NO. : TM101DDHG04**ISSUED DATE: 2017-01-18****VERSION : Ver 1.2**

- ☐ Preliminary Specification
☒ Final Product Specification

Customer : _____

Approved by	Notes

TIANMA Confirmed :

Prepared by	Checked by	Approved by
Jinzhao Xian	Xiaoxing Ding	Xiaoxing Ding

This technical specification is subjected to change without notice

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Record of Revision

[illegible]

1 General Specifications

1.1 Display Spec & Electrical Characteristics

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
	With /Without TSP	Without TSP
	LED Numbers	30 LED (JuFei)
	Weight (g)	210(typ), 220 (max)
Electrical Characteristics	Interface	6/8 bit LVDS
	Color Depth	16.7M
	Driver IC	HX8282*1+HX8677*2
	Module Power Consumption(W)	2.43(max)

Note 1: Requirements on Environmental Protection: Q/S0002

Note 2: LCM weight tolerance: ± 5%

Note 3: Power Consumption measure at Black image

1.2 Mechanical Characteristics

Item		Min	Typ	Max
LCM (W x H x D) (mm)	With Tape	232.85x136.85x2.8	233.1x137.1x3.05	233.35x137.35x3.3
	Without Tape	232.8x136.8x2.8	233.0x137.0x3.0	233.2x137.2x3.2
Bezel Opening Area (mm)		225.52x128.08	225.72x128.28	225.92x128.48
Active Area(mm)		222.52x125.08	222.72x125.28	222.92x125.48

2 Input/Output Terminals

Recommended connector: IMSA-9637S-40Y801

Pin	Symbol	I/O	Description	Remark
1	VCOM	P	VCOM Power supply	
2	VDD	P	Power supply(3.3V typ)	
3	VDD	P	Power supply(3.3V typ)	
4	NC	P	No connection(Reserved for TM test)	
5	RESET (GRB)	I	Global Reset.Normally pull high.	
6	STBYB	I	Standby mode control.Normally pull high.	
7	GND	P	Ground	
8	Rxin0-	I	LVDS differential data input	
9	Rxin0+	I		
10	GND	P	Ground	
11	Rxin1-	I	LVDS differential data input	
12	Rxin1+	I		
13	GND	P	Ground	
14	Rxin2-	I	LVDS differential data input	
15	Rxin2+	I		
16	GND	P	Ground	
17	RxCLK-	I	LVDS differential clock input	
18	RxCLK+	I		
19	GND	P	Ground	
20	Rxin3-	I	LVDS differential data input	
21	Rxin3+	I		
22	GND	P	Ground	
23	NC		No connection	
24	NC		No connection	
25	GND	P	Ground	
26	NC		No connection	
27	NC		No connection	
28	SELB(HSD)	I	LVDS 6/8 bit selection control SEL="L":8bit Use only 8 bit	

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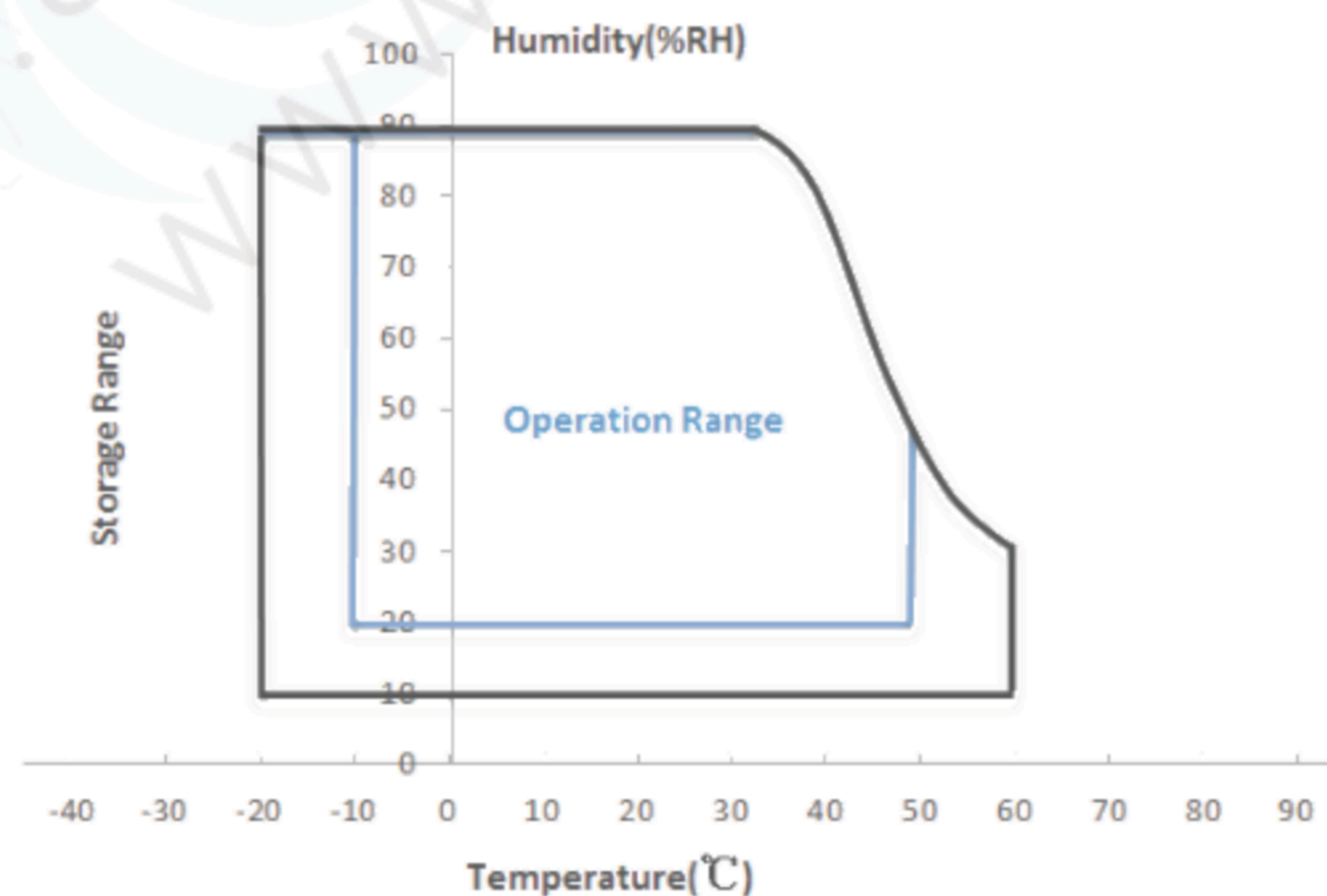
29	AVDD	P	Analog power	
30	GND	P	Ground	
31	LED-	P	Back light cathode	
32	LED-	P		
33	L/R	P	Source Driver internal shift register is controlled by this pin as shown below: Normally pull high.	
34	U/D	I	Gate Driver Up/down Scan setting. Normally pull low.	
35	VGL	I	Negative power of TFT	
36	NC		No connection	
37	NC		No connection	
38	VGH	P	Positive power of TFT	
39	LED+	P	Back light anode	
40	LED+	P		

3 Absolute Maximum Ratings

GND=0V, Ta =25℃

Item	Symbol	Min	Max	Unit	Remark
Power Voltage	VDD	2.8	3.6	V	
Operating Ambient Temperature	TOPR	-10	50	℃	
Storage Ambient Temperature	TSTG	-20	60	℃	
Operating and Storage Humidity	HSTG	10%	90%	% (RH)	

Note: LCM surface Temperature reach 60℃ is ok, When Operating condition.



4 Electrical Characteristics

4.1 Driving TFT LCD Panel

VDD=3.3V, GND=0V, Ta=25°C

Item		Symbol	Min	Typ	Max	Unit	Remark
Power Supply Voltage		VDD	2.80	3.30	3.60	V	
Power For Analog Circuit		AVDD	10.72	11.02	11.34	V	
Gate On Voltage		VGH	20.46	21.14	23.54	V	
Gate Off Voltage		VGL	-7.35	-7	-6.65	V	
Common Voltage		Vcom	--	4.33	--	V	
Input Signal Voltage	Low Level	VIL	GND	--	0.2xVDD	V	
	High Level	VIH	0.8xVDD	--	VDD	V	
Current of digital supply voltage		IVDD	--	--	22	mA	VDD=3.3V
Current of analog supply voltage		IAVDD	--	--	40	mA	AVDD=11.02V
Current of Gate on voltage		IVGH	--	--	0.8	mA	VGH=21.14V
Current of Gate off voltage		IVGL	--	--	0.8	mA	VGL=-7.0V
Current of Vcom		Ivcom	--	--	0.01	mA	

Note: The current of supply voltage measure at black image.

4.2 Driving Backlight

Ta=25°C

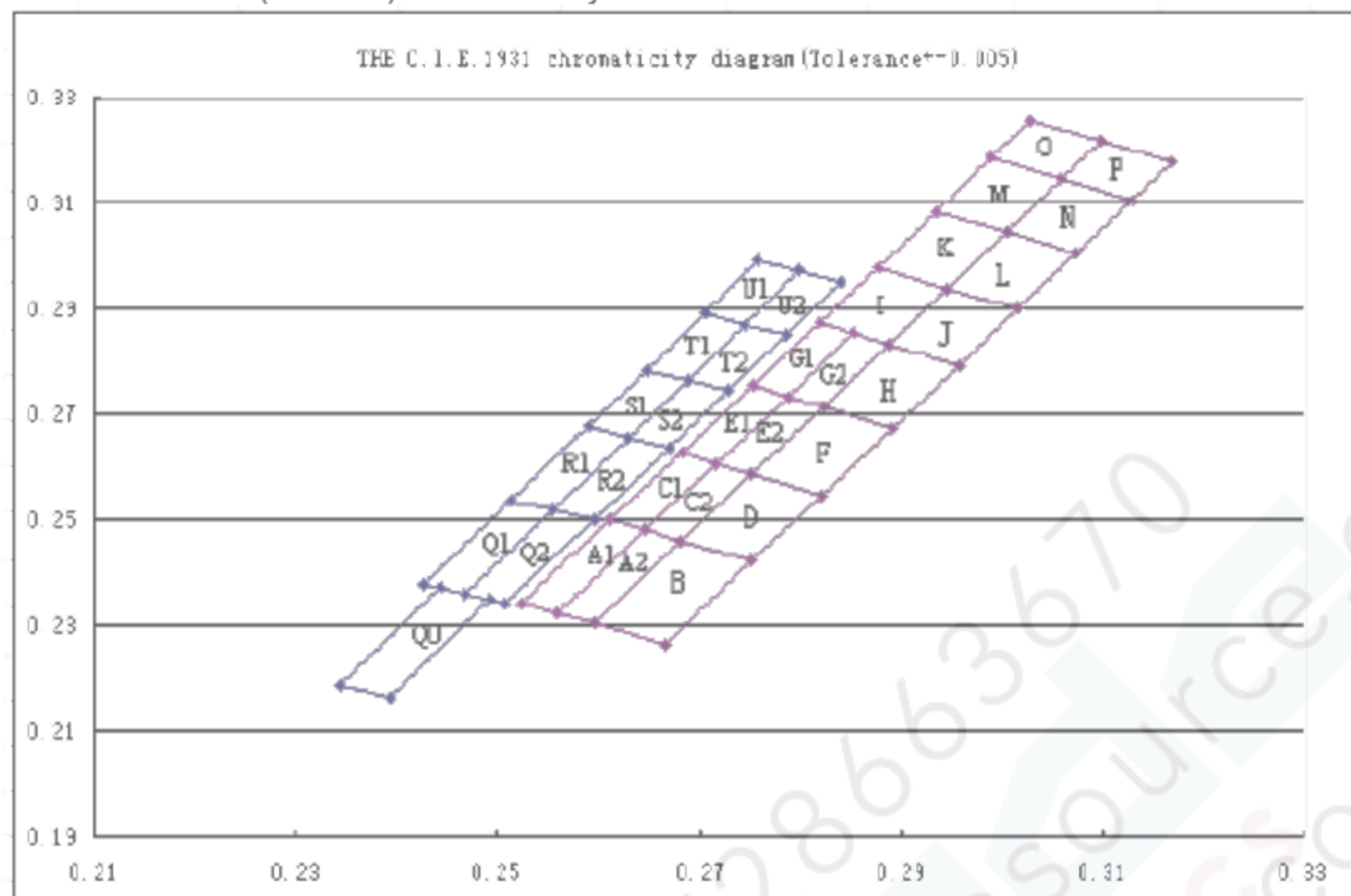
Item	Symbol	Min	Typ	Max	Unit	Remark
Forward Current	IF	--	200	--	mA	30 LEDs(3 LED Serial,10 LED Parallel)
Forward Current Voltage	VF	8.4	9.0	9.45	V	
Backlight Power Consumption	WBL	--	1800	--	mW	
LED lifetime	--	15000	--	--	hrs	

Note1: The LED driving condition is defined for each LED module (3 LED Serial,10 LED Parallel).

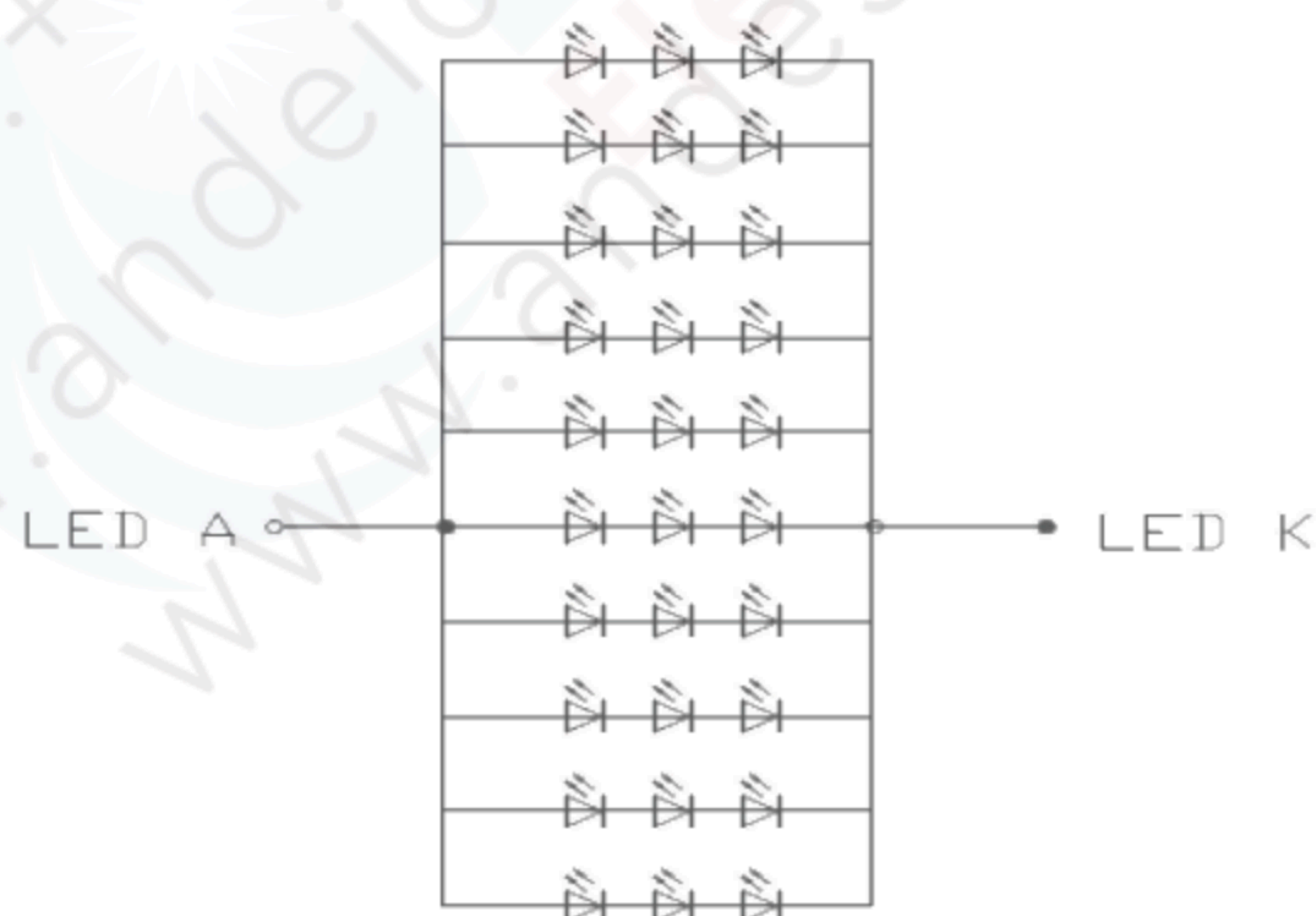
Note2: Under LCM operating, the stable forward current should be input. And forward voltage is for reference only.

Note3: Optical performance should be evaluated at only Ta=25°C, 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.

Note4: LED C(C1+C2) chromaticity and BIN code 5-2~6-2.

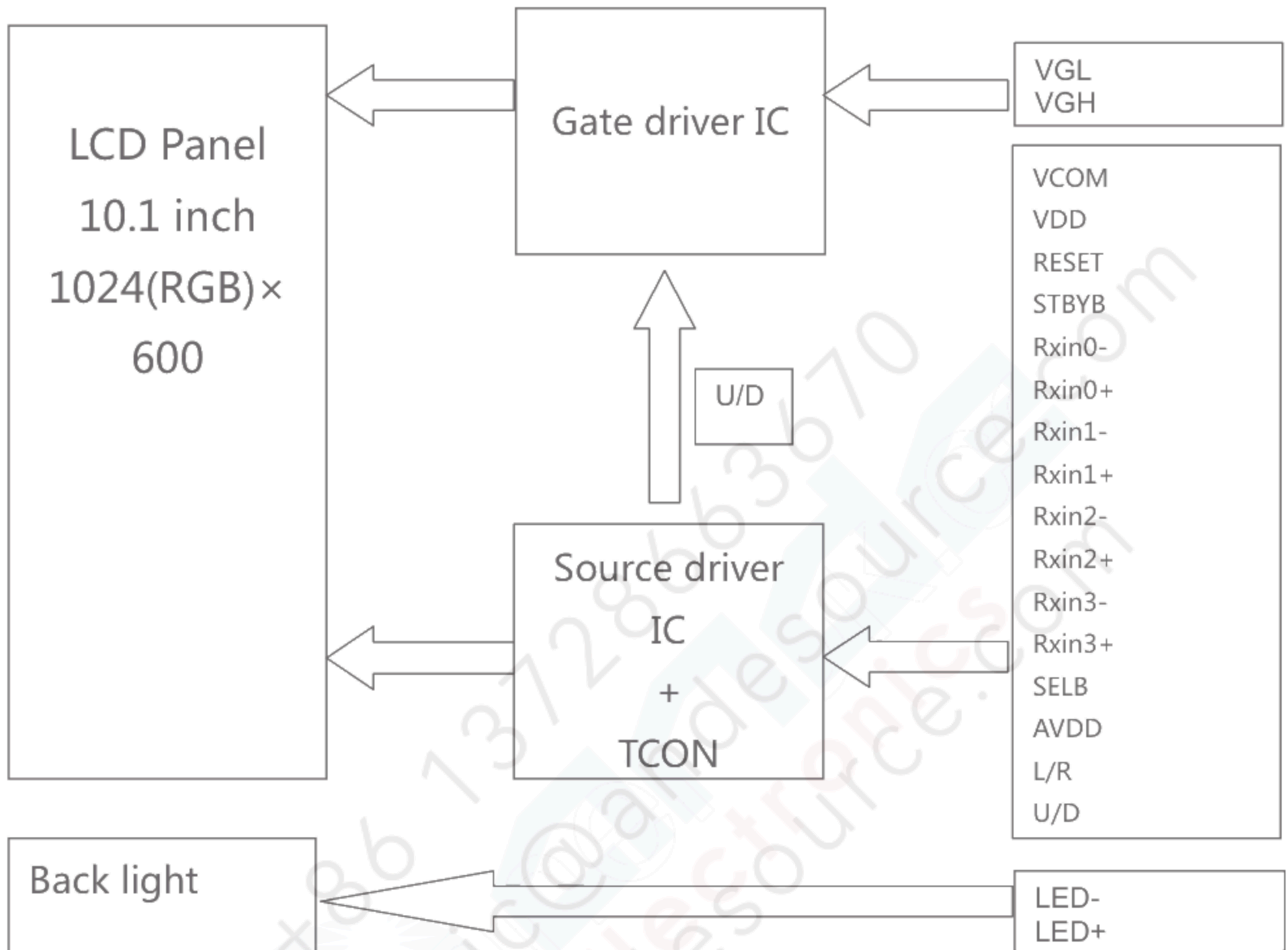


BIN CODE	Min.(v)	Max.(v)
5-2	2.8	2.9
6-1	2.9	3.0
6-2	3.0	3.1



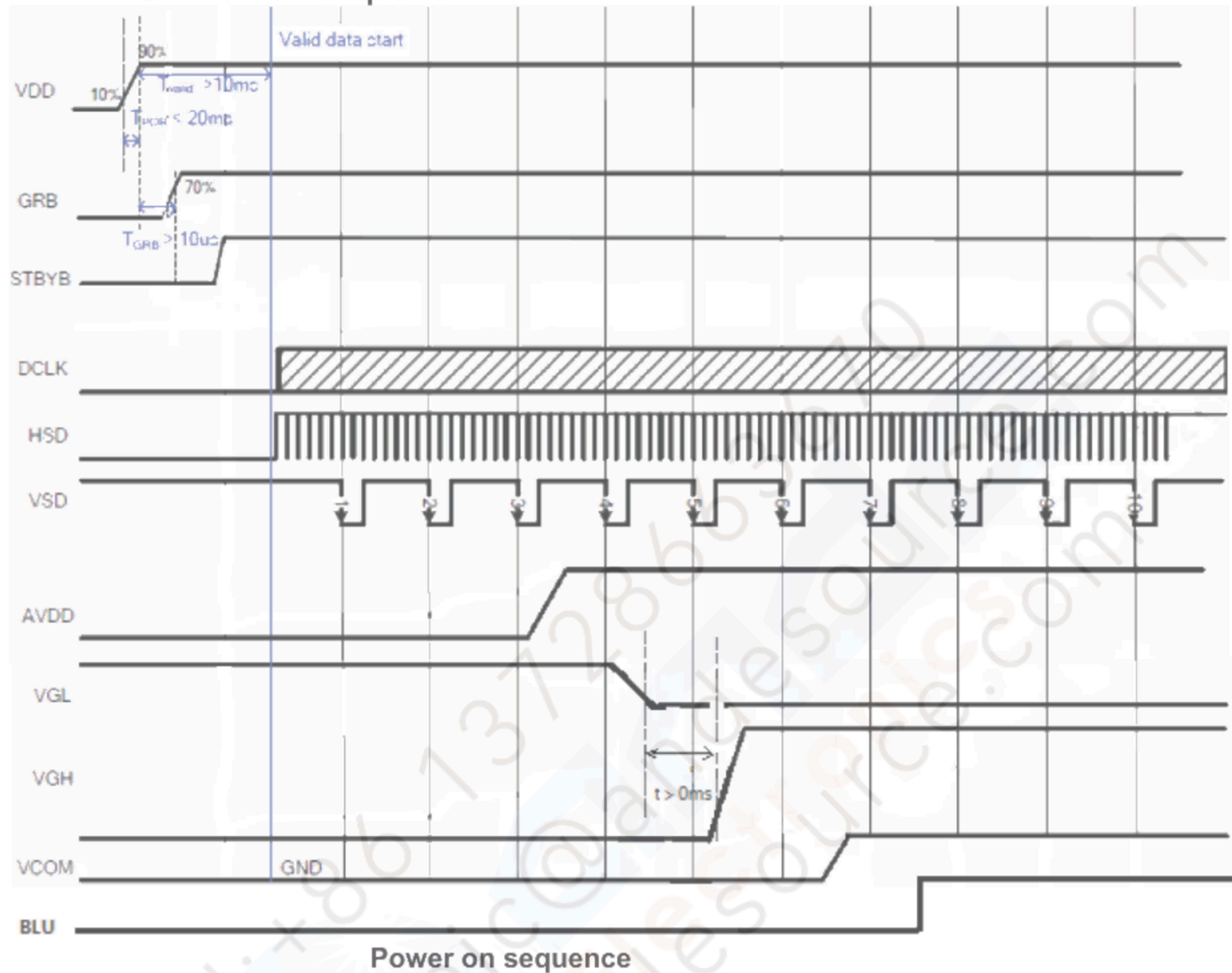
CIRCUIT
DIAGRAM

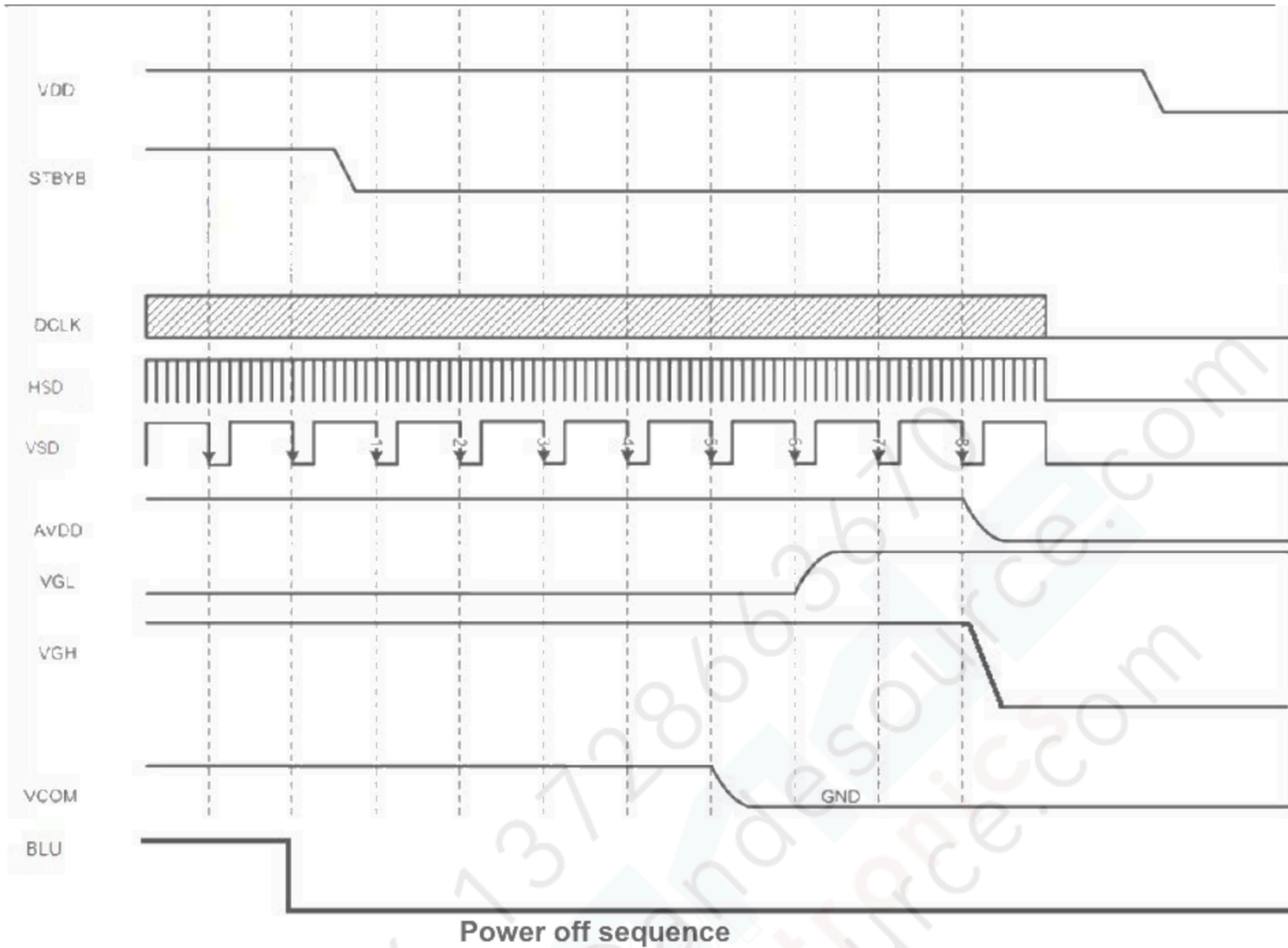
4.3 Block Diagram



5 Timing Chart

5.1 Power on/off sequence



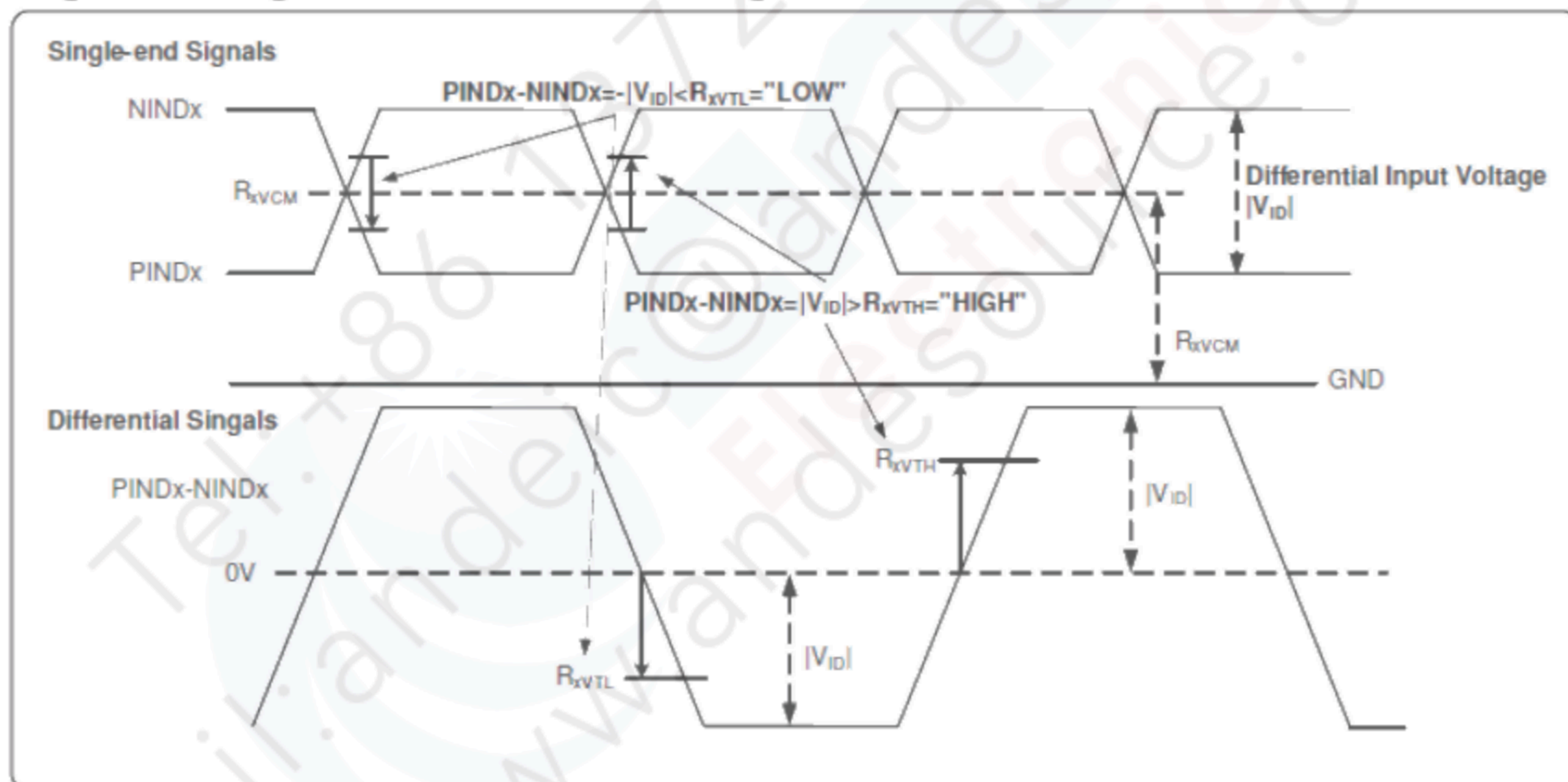


5.2 LVDS signal timing characteristic

Electrical characteristics

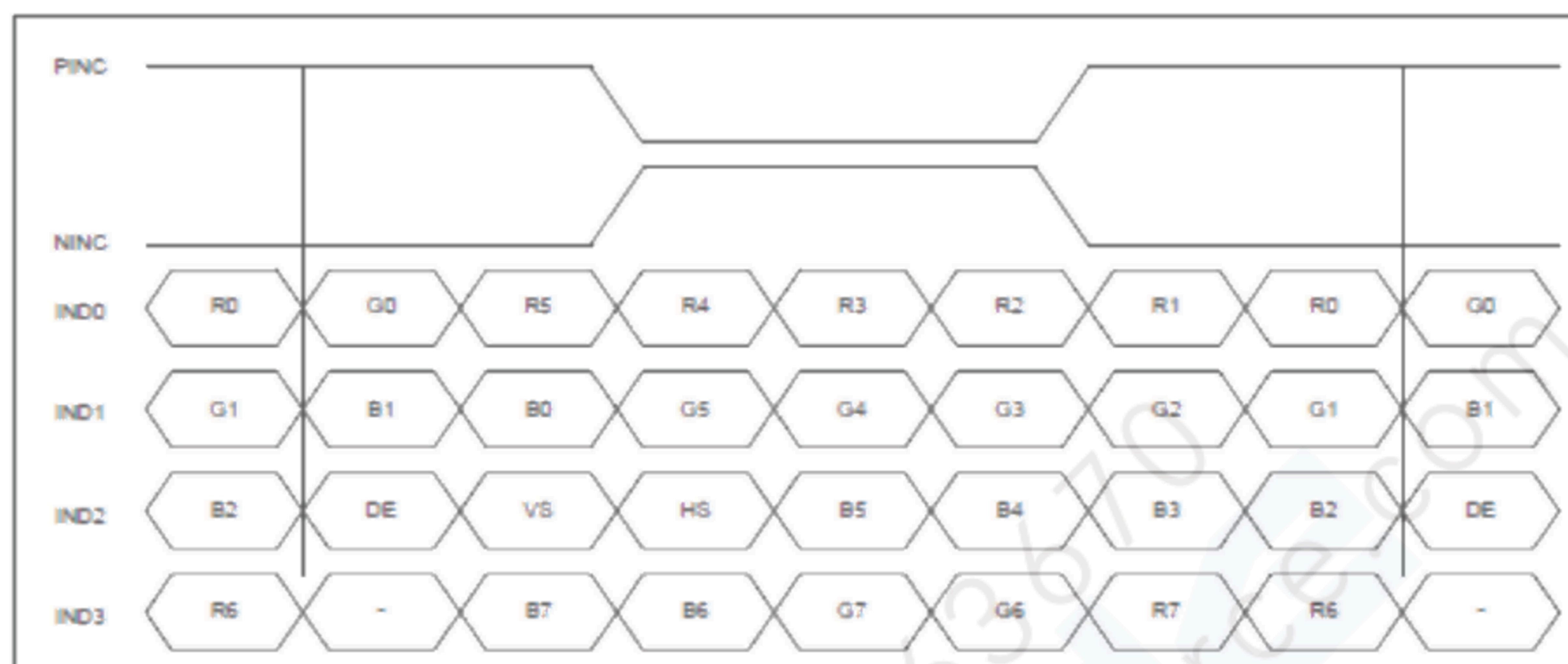
Parameter	Symbol	Condition	Min.	Spec. Typ.	Max.	Unit
Differential input high Threshold voltage	R_{XVTH}	$R_{XVCM}=1.2V$	-	-	+0.1	V
Differential input low threshold voltage	R_{XVTL}	-	-0.1	-	-	V
Input voltage range (Single-end)	R_{XVIN}	-	0	-	$V_{DD}-1.2+ V_{ID} /2$	V
Differential input common mode voltage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

Single-end signals & Differential singals



5.3 LVDS mode data input format

8-bit LVDS input Timing



DE mode

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

5.4 Display colors and input data signals

This product can display in equivalent to 16,777,216 colors in 256 gray scales. Also the relation between display colors and input data signals is as the following table.

Display colors		Data signal (0: Low level, 1: High level)																							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Red gray scale	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	dark	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑																								
	↓																								
	bright	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Green gray scale	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	↑																								
	↓																								
	bright	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
Blue gray scale	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	↑																								
	↓																								
	bright	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
Blue		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

6 Optical Characteristics

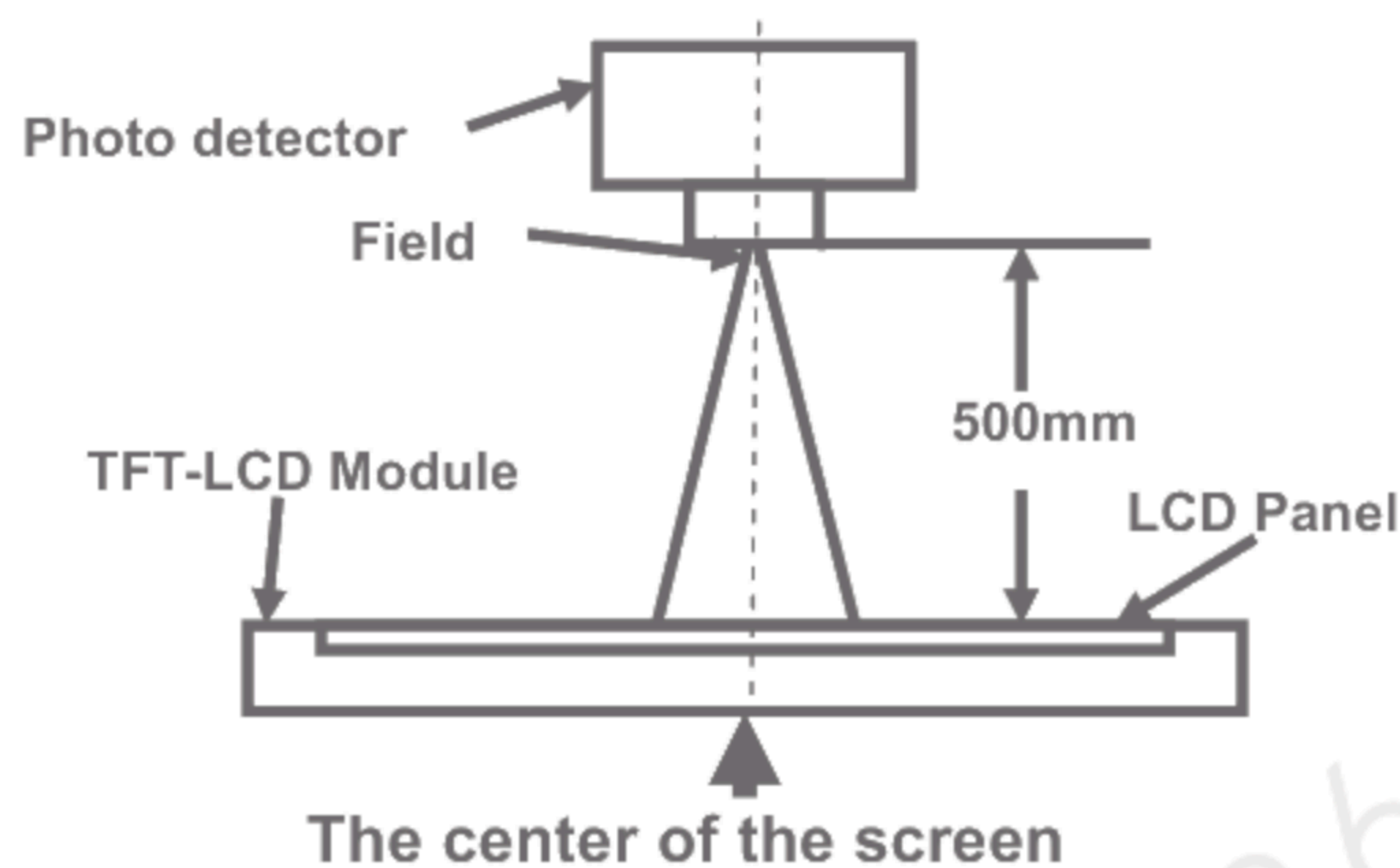
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	65	75	-	Degree	Note2,3
		θB		70	80	-		
		θL		70	80	-		
		θR		70	80	-		
Contrast Ratio		CR	θ=0°	600	800	-		Note 3
Response Time		T _{ON}	25℃	-	7	10	ms	Note 4
		T _{OFF}		-	9	18		
Chromaticity	White	x	Backlight is on	0.241	0.281	0.321		Note 1,5
		y		0.260	0.300	0.340		
	Red	x		0.518	0.558	0.598		Note 1,5
		y		0.288	0.328	0.368		
	Green	x		0.276	0.316	0.356		Note 1,5
		y		0.522	0.562	0.602		
	Blue	x		0.115	0.155	0.195		Note 1,5
		y		0.074	0.114	0.154		
Uniformity		U		70	80	-	%	Note 6
NTSC				40	50	-	%	Note 5
Luminance		L		250	300	-	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.

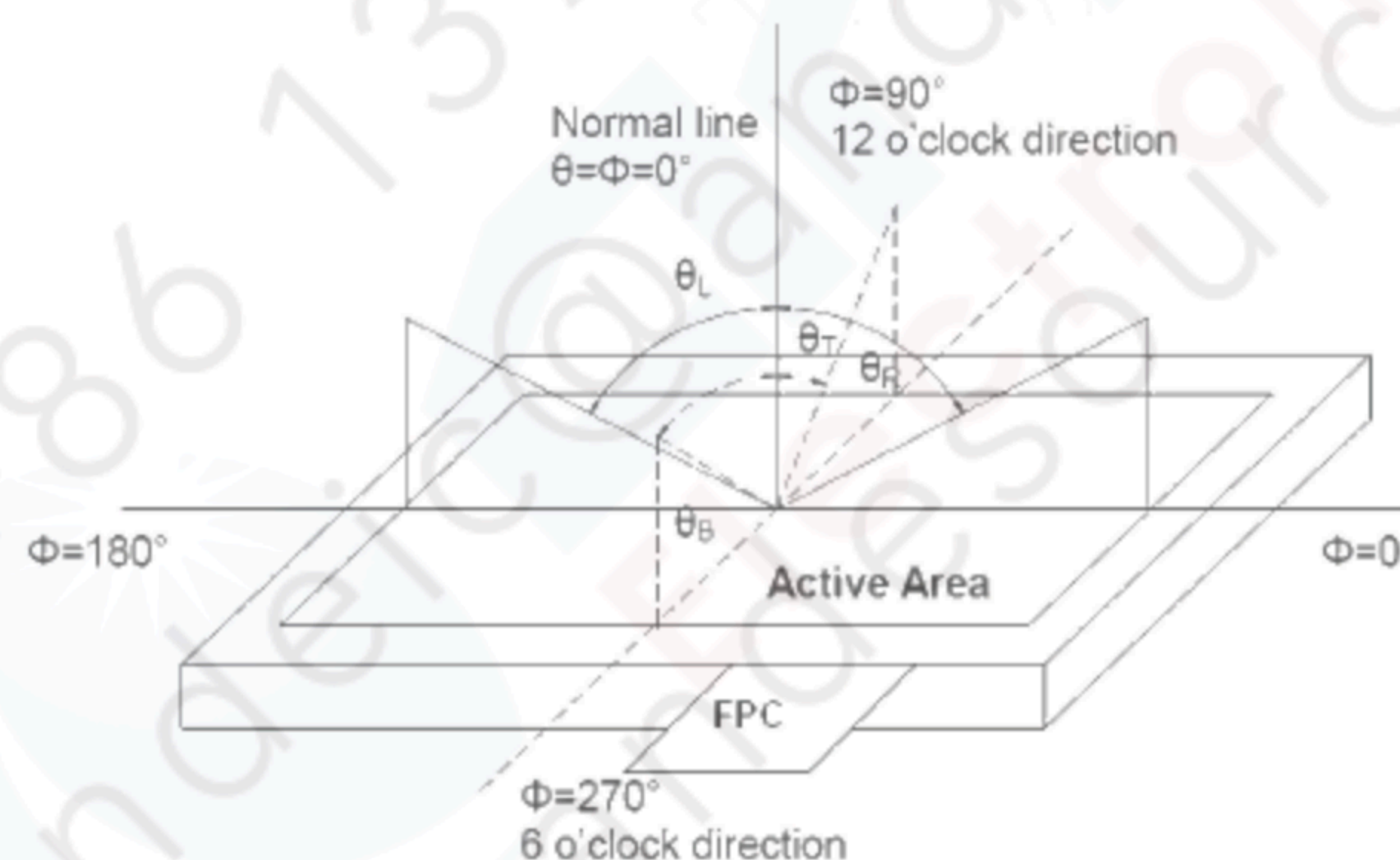
The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen.



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 voltage of white.

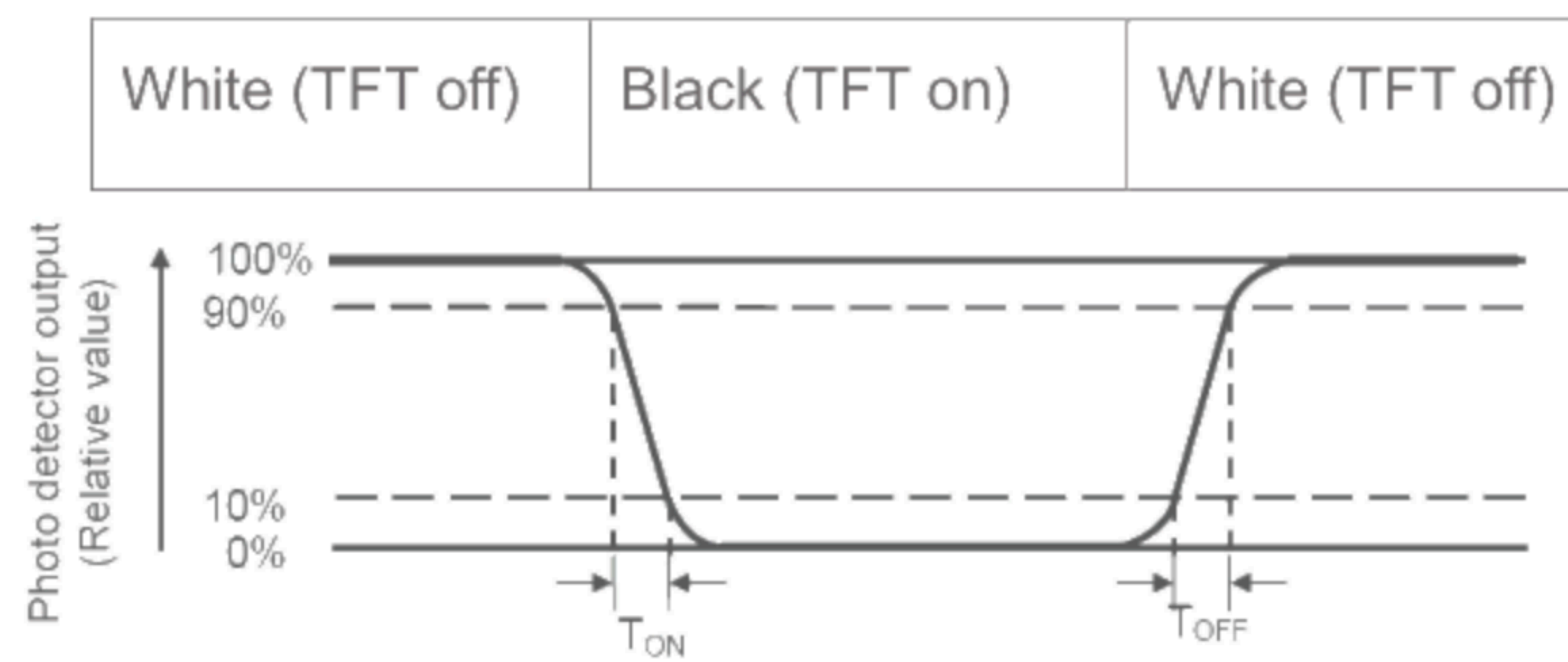
“Black state”: The state is that the LCD should drive by voltage of black.

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%

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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 as below. Every measuring point is placed at the center of each measuring area.

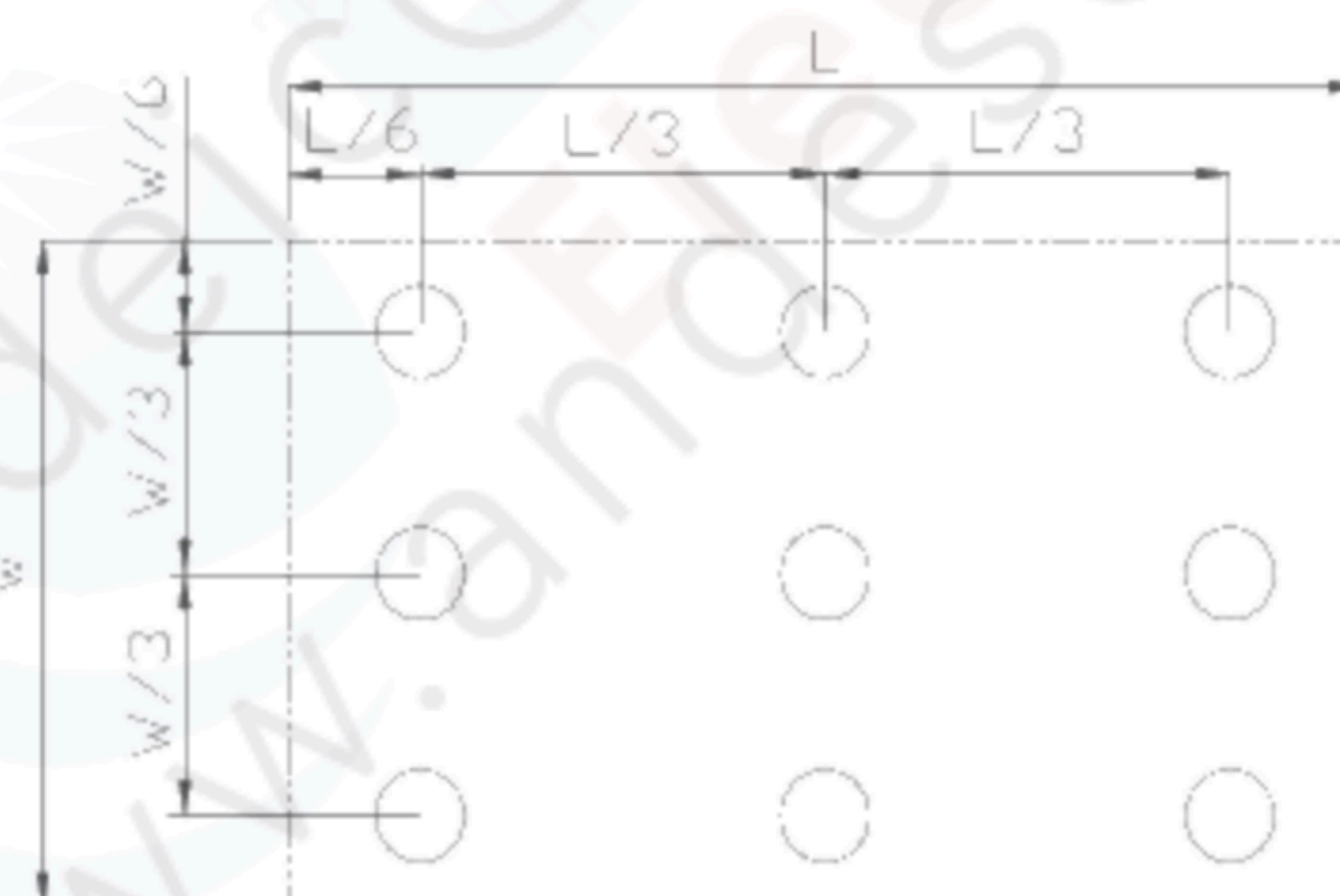
Luminance Uniformity (U) = L_{min} / L_{max}

L_{max} : The measured Maximum luminance of all measurement position.

L_{min} : The measured Minimum luminance of all measurement position.

L-----Active area length

W-----Active area width



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	Ta= +50℃,240hrs	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta= -10℃,240hrs	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta = +60℃,240hrs	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta = -20℃,240 hrs	IEC60068-2-1:2007 GB2423.1-2008
5	Storage and Operation at high Temperature and Humidity	Ta=+60℃, 90% RH 240 hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-20℃ 30 min~+60℃ 30 min, Change time:5min,100 Cycles	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,G B2423.22-2002
7	ESD	MM model : 0Ω / 200pF ±200 V HBM model : 1.5kΩ / 100pF ±1500 V	IEC61000-4-2:2001 GB/T17626.2-2006
8	Vibration Test	Stroke:1.5G Sweep:10Hz~500 Hz 0.5 hours for each direction of X.Y.Z. (1.5 hours for total)	IEC60068-2-6:1982 GB/T2423.10—1995
9	Mechanical Shock (Non OP)	60G 6ms, ± X,± Y,± Z 3times, for each direction	IEC60068-2-27:1987 GB/T2423.5—1995

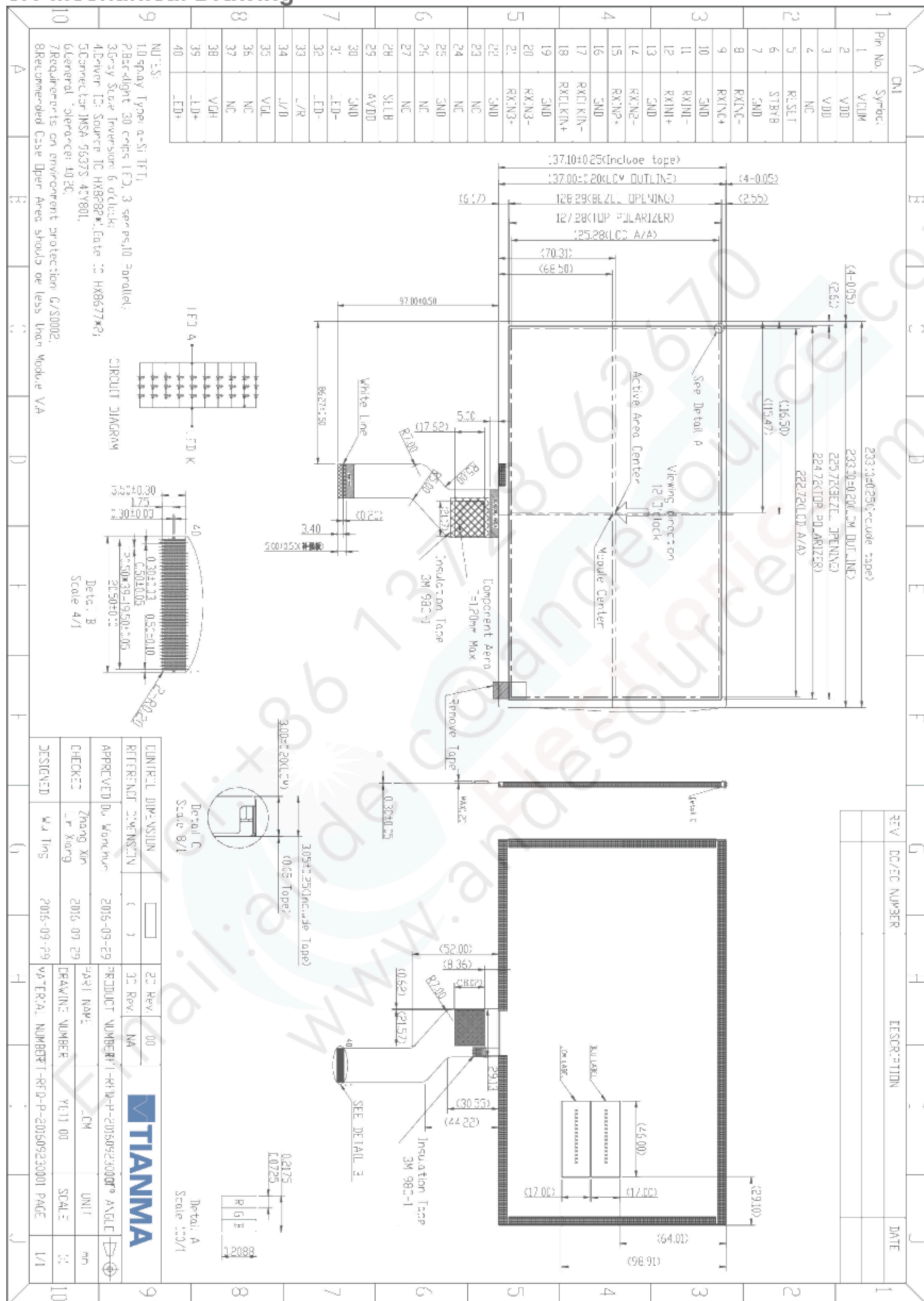
Note1: Ta is the ambient temperature of sample.

Note2: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

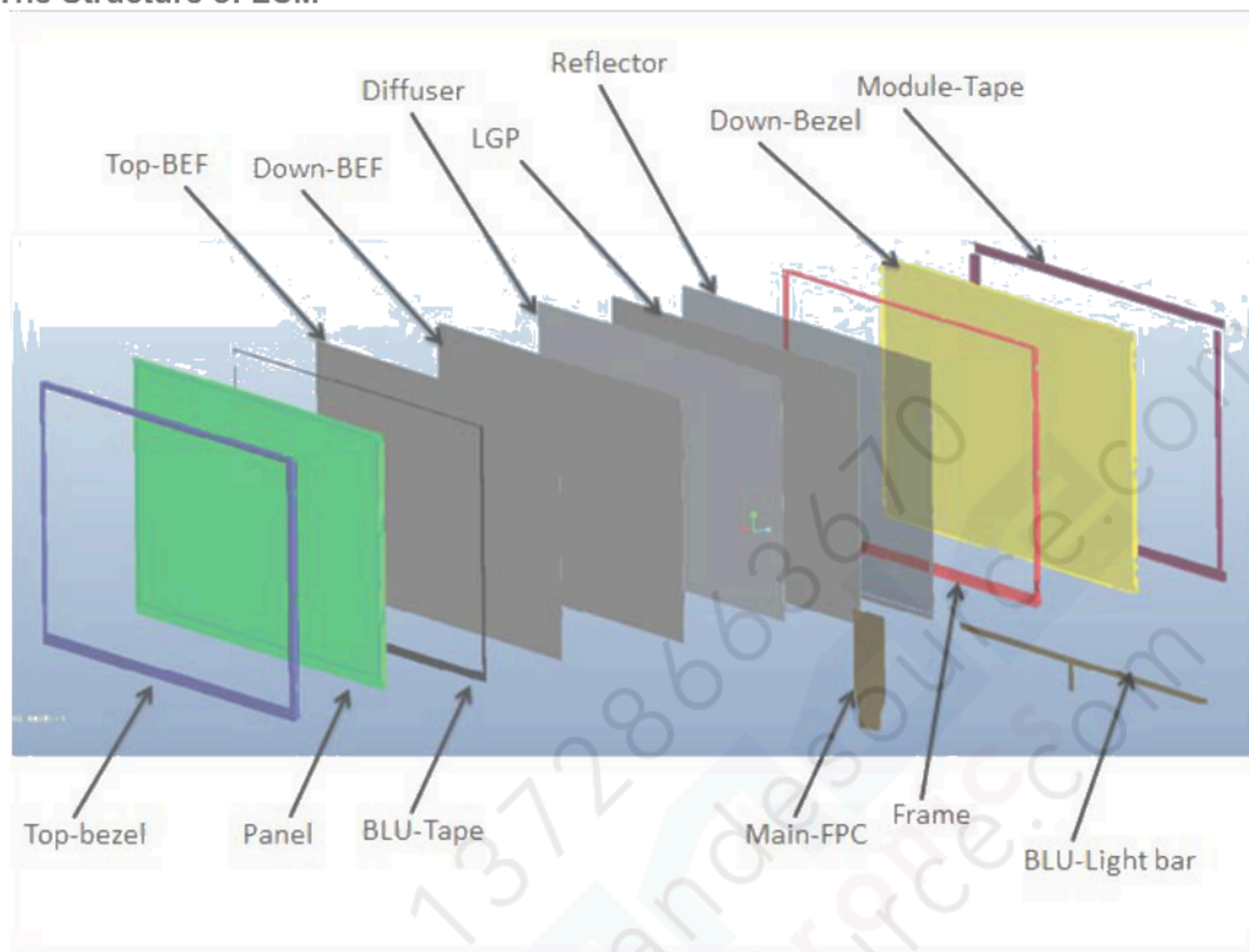
Note3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation.

8 Mechanical Drawing

8.1 Mechanical Drawing



8.3 The Structure of LCM



Part List

NO	Parts	Parts No.	Supplier	Material	Supplier	Parts NO. of Supplier
1	Top Bezel	1610315671	Huqun	Top Bezel	Huqun	1610315670
2	Top Pol	1040325450	Sanlipu	Top Pol	Sanlipu	1040325450
3	Bottom pol	1040325460	Sanlipu	Bottom pol	Sanlipu	1040325460
4	TFT-Glass	1017000170	Nippon Electric Glass	TFT-Glass	Nippon Electric Glass	1100*1300
5	Color Filter	F1Y10B050	Inesa	Color Filter	Inesa	T101DSG01T1A
6	Liquid crystal	1057000380	HCCH	Liquid crystal	HCCH	HAG635137-A
7	Source IC	1590322930	HIMAX	Chip	Maxchi	Silicon
				Gold bump	ChipMOS	Gold

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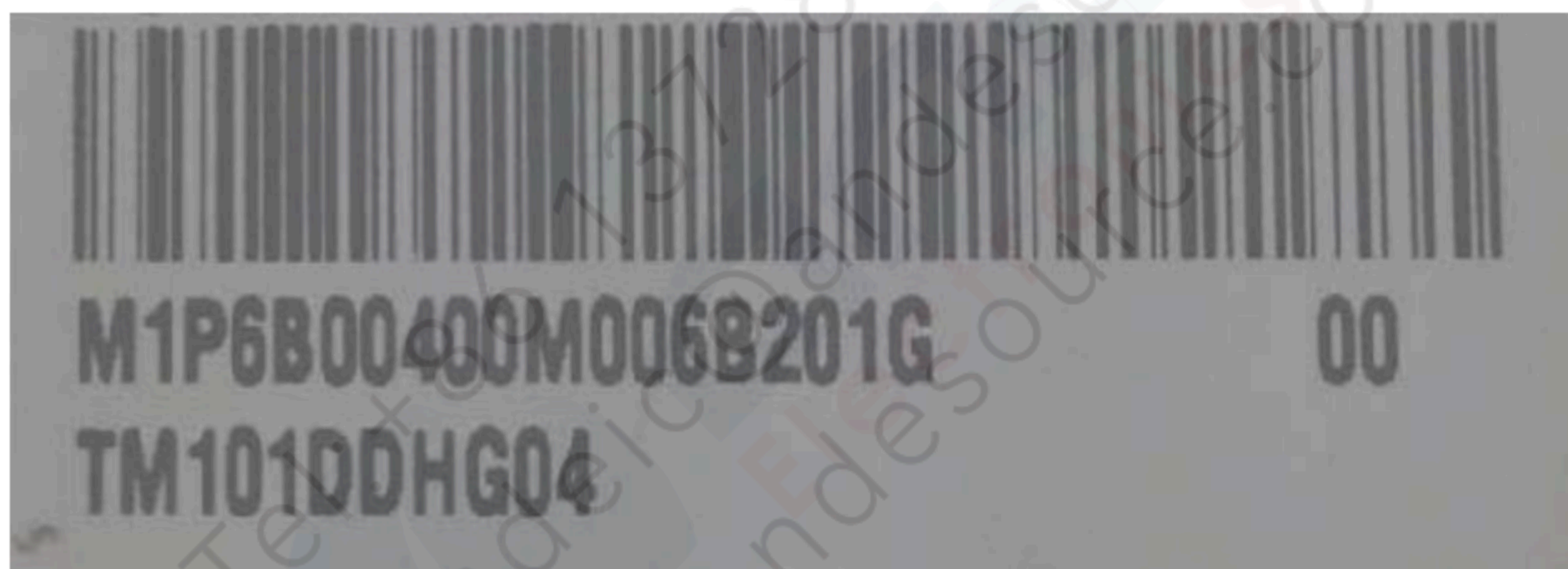
NO	Parts	Parts No.	Supplier	Material	Supplier	Parts NO. of Supplier
8	Gate IC	1590003320	HIMAX	Chip	UMC	Silicon
				Gold bump	Chipbond	Gold
8	Backlight	1580327041	Weizhi	FPC	Jinpeng	FPC
				Housing	Chuguang	URZ2501
				Reflector	Tianlihui	LXQ1-100
				LGP	Yuanli	PMMA
				Diffuser	Jizhi	B100s2
				Prism Down	Guangyao	KL77-150
				Prism Up	Guangyao	SH26-150
				LED	Jufei	CBS206W
				Bezel-Down	Dacheng	SUS304
				Black-White double side tape	Zongyan	SK-8960WB
				Double side tape	Zhongyi	5072
				Transparent PET	Lianchu	LC-100D
				Double side tape	Jishui	550P5BS
				Blue release paper	Zhongyi	Blue release paper
				Black-White side tape	Zhongyi	3G-BW650M
				Release film	Zongbang	Z-75140L
				Black-Black double side tape	Jishui	550MBS
				Double side tape	Tianlihui	3803BH
				Solder	Yongan	LF-RMAF8F2
				Black ink	Anjieta	70000-00030

NO	Parts	Parts No.	Supplier	Material	Supplier	Parts NO. of Supplier
9	FOG-ACF	1510000260	Sony	ACF	Sony	CP1220 IS 50M
10	COG-ACF	1510290460	UKC	ACF	UKC	ACF-CP34531-18YA
11	FPC	1540344300	Sandeguan	Base Film	Xinyang	W-1003ED-N2
				Protect Film	Taihong	FHT0515
				PI	Yaseng	AHIPI820XSS1
				Thermosetting Adhesive	Dongyi	P40-250A1
				Ink	Taiyang	S-411W
				NI	Xiejia	KG-531
				Au	Xiejia	KG-545
				Resistance	Dayi	RM04FTN6490 RM04FTN5230
				Capacitance	Murata	GRM155R61C105KA12D GRM155R61A105KE15D GRM155R61E104KA87D GRM155R61E105KA12D
				Capacitance	Samsung	CL05A104KP5NNC CL05A104K05NNC CL05A225K05NQC
				Resistance	Guoju	RC0402FR-07511RL RC0402FR-07475RL RC0402FR-071K02L RC0402FR-07287RL RC0402FR-07316RL RC0402FR-07619RL RC0402FR-07324RL RC0402FR-07590RL RC0402FR-07390RL RC0402FR-071K3L RC0402FR-07143RL RC0402FR-070RL RC0402FR-0710KL RC0402FR-07100RL RC0402FR-074K7L
				IC	Seiko	S-80825CNNB-B8KT2U
				Solder	Tamura	TLF-204-NH

NO	Parts	Parts No.	Supplier	Material	Supplier	Parts NO. of Supplier
12	UV glue	1520000180	Hitachi	UV glue	Hitachi	TF-3348-50F
13	UV glue	1520000120	DYMAX	UV glue	DYMAX	DYMAX-3069-T-moto HF
14	Tape	1670000940	Juxiang	Tape	Huangguan	7965 7982
				Red tape	Xianchu	-
15	Insulation tape	1670319790	Hongju	Insulation Tape	3M	3M 98C-12
				PET	Xianchu	-
16	Insulation tape (Bul)	1670319860	Renhong	Insulation tape	3M	98C-1

8.4 Product Code

8.4.1 Bar Code definition on module



Note: Bar Code definition

Definition label is Panel ID, and it is unique and includes manufacture relevant information, for instance TM101DDHG04. Label definition as below:

M 1 P 6B00400M00 6 B 2 01G

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Means shop code A(Array)、C(Cell)、F(CF)、M(Module)

② Means Fab ID 1~9

③ Means Production Type P(production)、E(Engineering)、D(Dummy)、T(Test)

④ Means Lot ID

⑤ Means Years, 0(2010)~9(2019)

⑥ Means Months 1~9,A(Otc)、B(Nov)、C(Dec)

- ⑦ Means Day1~31 Day means 1~9 and A~X (Not included I and O)
- ⑧ Means Serial Number 001~ZZZ (Not included I and O)

8.4.2 Product Name Criterion

TFT Module Code		Active Area(size)	Resolution	Product Type	Producing Area	Serial NO.1		Serial NO.2	
T	M	XXX	X	X	H	X	X	X	X

Note: Serial NO.2 will vary as product material change, and serial number manage product inside of factory.

For Instance: TM:TIANMA Active Area(size): 3.5inch ---035;10.4inch---104;

Producing Area: H means shanghai Tianma

Resolution	480x240	640x240	960x240	1024x600	128x128	128x160	176x220	240x320
Symbol	A	B	C	D	E	F	G	H
Kind	Delta	Delta	Delta	Stripe	Stripe	Stripe	Stripe	Stripe
Resolution	176x220	1366x800	320x240	240x400	1440x900	400x240	480x234	320x480
Symbol	G	J	K	L	M	N	U	P
Kind	Stripe	Stripe	Stripe	Stripe	Stripe	Stripe	Stripe	Stripe
Resolution	640x480	800x480	800x600	1024x768	others			
Symbol	Q	R	S	T	X			
Kind	Stripe	Stripe	Stripe	Stripe	--			

8.4.3 Product Name Criterion

TSP+BL(CCFL)+FPC+M4	A
TSP+BL(LED)+FPC+M4	B
BL(CCFL)+FPC+M4	C
BL(LED)+FPC+M4	D
BL(LED)+FPC+M4.Dual Display	E
FPC+M4	F
M4	G
M3	H
M2	Y
M1	J
BL(CCFL)+FPC+M4+PCB	K

BL(LED)+FPC+M4+PCB	L
TSP+BL(CCFL)+FPC+M4+PCB	M
TSP+BL(LED)+FPC+M4+PCB	N
Others	X
M1:Panel(array+CF)	
M2:Panel(array+CF+LC)	
M3:Panel(array+CF+LC+PLZ)	
M4:Panel(array+CF+LC+PLZ+Driver)	

Note:

CF: Color Filter, LC: Liquid Crystal, PLZ: Polarization Plate.

8.4.4 Product Manufacture Area

Cell Manufacturer: Shanghai AVIC Optoelectronics Co.,Ltd.

Address: 3388th Huaning Rd.Minhang District,Shanghai.China 201108

Country of Origin: China

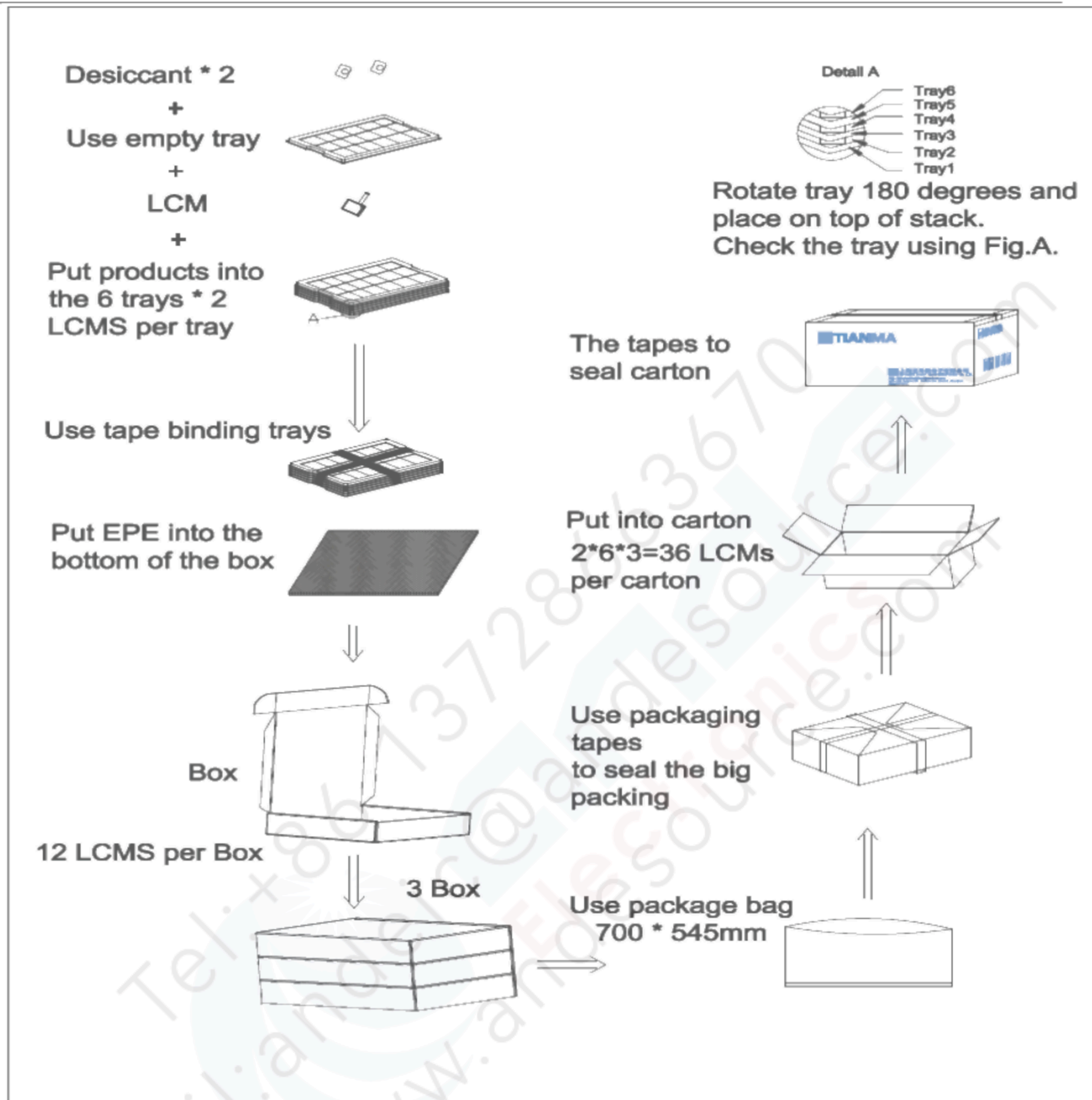
Module Manufacturer: ShanghaiTianma Micro-Electronics Co.,Ltd.

Address: 889 huiqing Rd.Pudong District,Shanghai.China 201201

Country of Origin: China

9 Packing Drawing

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	TM101DDHG04	233×137×3.00mm	0.210	36	
2	Tray	PET (Transmit)	485×330×14.00mm	0.150	21	
3	Dust-Proof Bag	PE	700×545x0.05mm	0.021	1	
4	EPE	EPE	485*330*5mm	0.545	3	
5	Box	CORRUGATED PAPER	520*345*74mm	0.227	3	
6	Desiccant	DESICCANT	45×35	0.002	6	
7	Carton	CORRUGATED PAPER	544*365*250mm	1.01	1	
8	Total weight	14.07 ±5% Kg				



Carton ID



Note: Customer G-code L5EDDYY00948 and will print in Carton label.

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Tray Drawing



10 Precautions for Use of LCD Modules

10.1 Handling Precautions

- a. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- b. 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.
- c. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- d. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- e. 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

- f. Do not attempt to disassemble the LCD Module.
- g. If the logic circuit power is off, do not apply the input signals.
- h. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
1. Be sure to ground the body when handling the LCD Modules.
2. Tools required for assembly, such as soldering irons, must be properly ground.
3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
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

- a. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.
- b. 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%

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

10.3 Transportation Precautions

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

11 Outgoing Inspection Report

 QQC成品出货检验报告 OUTGOING INSPECTION REPORT				保存部门 Dept.	QC
				保存期限 Save	管理日期+3年
				保存方式 How	纸档/电子档
物料名称 Model NO		检查日期 Check Date		出货数量 Outgoing Numbers	
客户 Customer P/N		订单号 Order NO		结果 Result	[] OK [] NG
供应商 Supplier P/N	上海天马微电子股份有限公司	☐ 正常检查 Normal Inspection ☐ 放宽检查 Reduced Inspection ☐ 加严检查 Tightened Inspection ☐ 全数检查注 Total Inspection			
检查项目 Items of Inspection		规格标准 Standard		检验结果记录 Result	
外观检查 Visual Inspection		"TFT-LCD Module出货检验标准 TFT-LCD Module outgoing inspection standards"		[] OK [] NG	
电性检查 ET		TFT-LCD Module出货检验标准 TFT-LCD Module outgoing inspection standards		[] OK [] NG	
包装检查项目 Item of Packaging Inspection					
检查项目 Items of Inspection				检验结果记录 Result	
1、检查产品型号、等级、工单与入库单是否一致 1.check the product name,level and work order is consistent with shipping order or not				[] OK [] NG	
2、检查内箱数量与外箱标签数量是否一致 2.check the number of innerbox is consistent with the record on lable or not				[] OK [] NG	
3、检查包装方式是否与包装式样书规范一致 3.check the packing method is the same as packed sample or not				[] OK [] NG	
4、检查外箱标签是否齐全、整洁、符合要求 4.check the label on outer box is complete, clean and compliance or not				[] OK [] NG	
5、确认客户有无特殊需求，有特殊需求需根据客户特殊需求作业。 5. recognize the special needs of customer, and whether operating according to the needs				[] OK [] NG	
仓库检查项目 Warehouse inspection items					
检查项目 Items of Inspection				检验结果记录 Result	
1、检查出货型号、数量、等级与出货通知单是否一致。 1.check the shipment module name,quantity,level and shipment notification is consistent.				[] OK [] NG	
2、检查仓库唛头信息内容及贴附方式是否正确。 2.check the content of warehouse marks and the method of attached is correct ot not				[] OK [] NG	
3、检查每托产品外箱表面是否清洁、平整、无明显破损、变形。 3.check each outer-box is clean,smooth and without obvious damage and deformation				[] OK [] NG	
4、确认客户有无特殊需求，有特殊需求需根据客户特殊需求作业。 4.recognize the special needs of customer, and whether operating according to the needs				[] OK [] NG	
备注：此批产品出货满足客户的环保要求 Notes: This batch of products meets the customer's HSF requirements .					
				OQC Prepared	Check
				/	Approved
SH-J-FM0100703 Rev1.3					

Note: This Outgoing Inspection Report what is suitable for all lot of modules is give to customer.

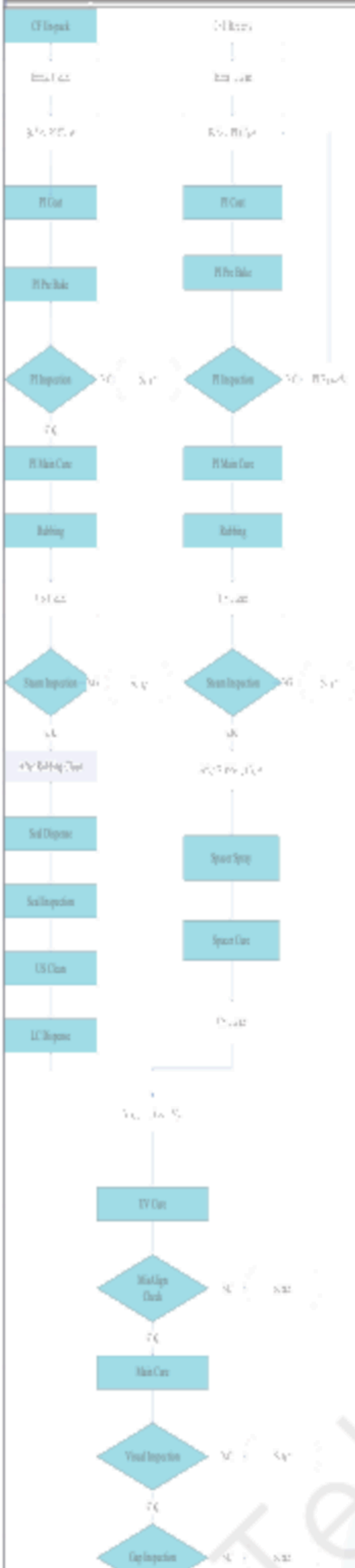
12 QC Flow Chart

12.1 Array QC Flow Chart

QC flow chart									
Module Name:TM101DDHG03				Revision:1.0		Responsibility:QC			
Date(Orig.): 2016-1-04				Date(Rev.):		Prepared by:Zhangheng Xiang		Approved by:Dongjin Song	
Process		Management Item	Quality Spec	Measuring instrument/ Inspection method	Sample size &frequency		Control method	Responsibility	Reaction Plan
					LOT ID	SLOT ID			
PVD	pre-depo PVD AOI KS GATE Thickness	1.2V Comp(1-2)	all: OK	by meter	all		Recipe setting PQA check	Engineer	stop production and intern shift Engineer
		2. Transfer speed	1100-1200 rn/min		all			Engineer	
		1. discharge pressure	refer to recipe card	by meter	all		Recipe setting PQA check	Engineer	stop production and intern shift Engineer
		2. Ar flow			all				
		3. discharge power			all				
		4. magnet scan times			all				
		5.100-110 temperature 8-13-130 temperature			20% 2		PQ Parameter Check List		
		1. Gate Defect number	1. Gate Defect<10	AOI	2, 7	1. Gate 1-2		Recipe setting	Engineer
		2. S.D. Defect number	2. S.D. Defect<30			2. S.D. 1-2-3			
		3. TD. Defect number	3. TD. Defect<10			3. TD. 1-2-3-4			
		1. Gate RS	RS < 0.15+0.074-1	ESQ100	1, 6	1. Gate 1-2	Recipe setting	Engineer	stop production and intern shift Engineer
		2. S.D. RS	RS < 0.50+0.26-1	ESQ100	1, 6	2. S.D. 1-2-3	Recipe setting	Engineer	stop production and intern shift Engineer
		3. TD. RS	RS < 0.85+0.64-1	ESQ100	1, 6	3. TD. 1-2-3-4	Recipe setting	Engineer	stop production and intern shift Engineer
		Thickness & uniformity	Thickness: 2000 Uniformity: 10%	AISPH100	1, 6	1-12-23	Recipe setting	Engineer	stop production and intern shift Engineer
		CVD	pre-depo cleaning CVD AOI Thickness measure	1.2V Comp(1-2)	all: OK	by meter	all		Recipe setting PQA check
2. Transfer speed	1100-1200 rn/min			all			Engineer		
Deposition time	refer to Array recipe card			by meter	all		Recipe setting PQA check	Engineer	stop production and intern shift Engineer
Gas ingredients					all			Engineer	
Pressure					all			Engineer	
Speed					all			Engineer	
P.A. power					all			Engineer	
Chamber temperature					all			Engineer	
1. Active Defect number	1. Active Defect<30			AOI	2, 7	1-2	Recipe setting	Engineer	stop production and intern shift Engineer
2. Passivation Defect number	2. Passivation Defect<30				2, 7	1-2		Engineer	stop production and intern shift Engineer
1. Active Thickness & uniformity	Thickness: SiNx: 3000 +3005 a-Si: 2000 +2005 n-Si: 500 +505 Uniformity: 10% -10%			AIFI100 AISPH100	1, 6	1-2-3	Recipe setting	Engineer	stop production and intern shift Engineer
2. Passivation Thickness & uniformity	Thickness: P-SiNx: 2000 +2005 Uniformity: 10% -10%			AISPH100		1-2-3		Engineer	stop production and intern shift Engineer

Process	Management Item	Quality Spec	Measuring instrument/ Inspection method	Sample size & frequency		Control method	Responsibility	Reaction Plan
				LOT ID	SLOT ID			
PHOTO	Cleaning	EUC :Hartnace	53062 212- 1ml, 12%	DEI CS1000	1 week	DEI intensity measurement	Engineer	adjust the recipe
	Bake							
	Cooling							
	PR Coating	PR	1.5~3.05um, Tol: +1%	SA	1/2weeks	FTIR (bond chart)	Engineer	adjust the recipe
	Bake	MR Parameter		all		Recipe setting	Engineer	stop machine
		SR Parameter	refer to Array recipe card	all		Recipe setting IQS check	Engineer	test note and rework
		HR Parameter		all		Recipe setting IQS check	Engineer	test note and rework
	Cooling							
	Exposure	scan speed		all		Recipe setting	Engineer	adjust the recipe
		exposure :Hartnace	refer to Array recipe card	all		DEI intensity Unit:3	Engineer	adjust the recipe
		Step Parameter		all		Recipe setting	Engineer	adjust the recipe
		Developer Temperature	23±0.5℃	TEMP 4081200	1 Shift	EQ Parameter Check List	Engineer	stop machine
		Developer concentration	2.380±0.02%	MAGAS 4081200	1 Shift	EQ Parameter Check List	Engineer	stop machine
		Developer flow	19.4ml/min ±1	MAGAS 4081200	1 Shift	EQ Parameter Check List	Engineer	adjust the recipe
		Developer time	refer to Array recipe card	all		Recipe setting IQS check	Engineer	test note and rework
	ADI	Defect number	1. Lrate: Defect<10	1. Initial workpiece Center 2. 2, 7	1, 2, 23	daily Process Chart	Engineer	test note and rework
			2. S.R: Defect<20		1, 2, 23	daily Process Chart	Engineer	test note and rework
			3. S.R: Defect<20		1, 2, 23	daily Process Chart	Engineer	test note and rework
			4. Passivation Defect<20		1, 2, 23	daily Process Chart	Engineer	test note and rework
			5. LDR: Defect<10		1, 2, 23	daily Process Chart	Engineer	test note and rework
	CD Measure	CD/CDU	CD: ±0.5um	1. Initial workpiece Center 2. 1	1, 2, 23	SPC	Engineer	review and adjust the recipe
			CD bar: ±0.5um		1, 2, 23	SPC	Engineer	review and adjust the recipe
			CD bar: ±0.5um overlay: <1.2um		1, 2, 23	SPC	Engineer	review and adjust the recipe
			Area: ±0.5um overlay: <1.2um		1, 2, 23	SPC	Engineer	review and adjust the recipe
			CD bar: ±0.5um overlay: <1.2um		1, 2, 23	SPC	Engineer	review and adjust the recipe
WET	EUV	EUC :Hartnace	10um 1ml2	by meter	1 shift	EQ Parameter Check List	Engineer	intern shift: engineer
	Etching	Etch time	refer to Array recipe card	by meter	all	Recipe setting IQS check	Engineer	intern shift: engineer
		Etch temperature	refer to Array recipe card	by meter	1 shift	EQ Parameter Check List	Engineer	
	Rinse	Chemical concentration	refer to Array recipe card	by EDS	1 shift	EQ Parameter Check List	Engineer	intern shift: engineer
		Spray Flow	refer to Array recipe card	by meter	all	EQ Parameter Check List	Engineer	intern shift: engineer
	Air Knife	Air Knife flow	refer to Array recipe card	by meter	1/2 shift	EQ Parameter Check List	Engineer	intern shift: engineer
	Stripper	oscillation time	refer to Array recipe card	by meter	all	Recipe setting IQS check	Engineer	intern shift: engineer
		Tank temperature	refer to Array recipe card	by meter	1 shift	Recipe setting IQS check	Engineer	intern shift: engineer
	Rinse	Spray Flow	refer to Array recipe card	by meter	1 shift	EQ Parameter Check List	Engineer	intern shift: engineer
	Air Knife	Air Knife flow	refer to Array recipe card	by meter	1 shift	EQ Parameter Check List	Engineer	intern shift: engineer
	AEI	1. Lrate Defect number	1. Lrate Defect<10	1. Initial workpiece Center 2. 2, 7	later: 1, 2, 23	Recipe setting	Engineer	intern shift: engineer
		2. S.R Defect number	2. S.R: Defect<20		5. 10: 1, 2, 23		Engineer	intern shift: engineer
		3. LDR Defect number	3. LDR: Defect<10		10. 1: 1, 2, 23		Engineer	intern shift: engineer
	CD Measure	1. Lrate CD	CD: ±0.5um	1. Initial workpiece Center 2. 2, 7	1, 2, 23	Recipe setting	Engineer	intern shift: engineer
		2. CD	CD bar: ±0.5um					
		3. S.R CD	CD: ±0.5um					
		4. LDR CD	CD bar: ±0.5um					

12.2 Cell QC Flow Chart

Module Name:TM101DDHG03				Revision:1.0		Responsibility:QC		
Date(Orig.): 2016-1-04				Date(Rev.):		Prepared by:Zhangheng Xiang		Approved by:Dongjin Song
process	process name	Management Item	Quality Spec	Measuring instrument/ Inspection method	Sample size &frequency	Control Method	Responsibility	Reaction Plan
	CF Impact	1. CF corner abrasion 2. Corner height	1. Impact 2. 100µm	PD rate inspection Visual inspection	100%	EQ adjust alternative	Inspector	Inform Engineer and EQ
	PI Post	1. Thickness 2. plating resistance	1. 100±10µm 2. 100Ω	1. Re-Arrow SP 2. OVD Visual Comp	1. 25sheet/lot 2. 15 lot change	Process Card	Inspector	Inspect 1st Sheet and Inform Engineer
	PI Pre-bake	1. Preheat Temperature 2. Preheat Time	1. 100±3℃ 2. 120s	PG Setting	First Lot, 1 sheet/lot	Process Card	Inspector	Inspect 1st Sheet and Inform Engineer
	PI inspection	1. plating quality	1. IRI inspection class rate	MC inspection	100%	MC inspection record list	Inspector	Inspect 1st Sheet and Inform Engineer
	PI Main & Fe	1. Mainframe Temperature 2. Mainframe Time 3. Cooling Time	1. 250℃±5℃ 2. 780s 3. 60s	PG Setting	First Lot, 1 sheet/lot	Process Card	Inspector	Inspect 1st Sheet and Inform Engineer
	Folding	1. Pre-tilt angle	1. Process card	ADB Cell Gap Instrument	1. 2 sheet/lot	SPC control	Inspector	Inspect 1st Sheet and Inform Engineer
	Pattern Inspection	1. Film appearance	1. As defined	1. Slit inspection	1. 1 sheet/lot	Reference inspection record list	Inspector	product hold, Inform Engineer
	Gold Dispense	1. Gold Area Accuracy 2. V2 pressure 3. coating speed	1. Process card 2. 6-150µm±10µm 3. 60mm/s	1. Re-Arrow SP 2. PG setting	1. 1 sheet/lot 2. and 1 lot change time	1. First Press Check Gold dispensing credit limit direct record sheet 2. 4000 lot start change check sheet	Inspector	product continuous and restart after adjust to normal
	Spacer Spray	1. spacer coating 2. Spray location 3. Cluster number 4. Bonding inspection point number	1. 250±25nm 2. 0-10 3. 120-200 4. 1.50µ	1. Spray gun test 2. 400nm microscope setting after time change	1. 100% 2. 1 sheet/lot 1 lot	1. All inspect to EQ 2. 4000 lot start change check sheet	OP	product continuous and restart after adjust to normal
	Spacer Cure	1. Cure Temperature 2. Cure Time	1. 120±3℃ 2. 600s	1. PG rate inspection 2. 400nm microscope setting after time change	1. 1st Lot	ADB time start change check sheet	OP	product continuous and EQ stop, inform Engineer
	IC Dispense	1. Disp Measurement 2. Disp amount 3. Disp accuracy 4. Disp rate	1. 1.0-0.1µm 2. Process card 3. Auto adjust test 4. 0.1% show produce time 4. Process card	1. Cell gap 2. Disp Setting 3. PG auto Recalibrate	1. 2 sheet/lot 2. check after time change 1. Process 2. 5 sheet/lot	1. SPC control 2. 4000 lot start change check sheet 1. 40 auto sampling and record	Inspector & OP	Inform Engineer to confirm EQ status
	IC Cure	1. Light intensity 2. UV Lighting Time	1. 100mW/cm² 2. 300s	Recipe Setting	First Lot, 1 Time	ADB time start change check sheet	Inspector	Product hold, Inform Engineer and EQ status
	PhotoMm Inspection	1. Pattern Assembly System & PhotoMm sockets	±5µm	PhotoMm checker	1 sheet/lot	SPC control	Inspector	Product hold, Inform Engineer and EQ status
	Rebonding	1. Cure Temperature 2. Cure Time	1. 120±3℃ 2. 7000s	EQ rate check	First Lot, 1 Time	ADB time start change check sheet	Inspector	Product hold, Inform Engineer and EQ status
	Cosmetic Inspection	1. IRI display 2. display alignment 3. IT bubble	1. As	Visual inspection	100%	Inspection record	Inspector	Product hold, Inform Engineer and EQ status
	Cell Inspection	cell gap	Process card	PG auto measure	2 sheet/lot	SPC control	Inspector	Product hold, Inform Engineer and EQ status
process	process name	Management Item	Quality Spec	Measuring instrument/ Inspection	Sample size &frequency	Control Method	Responsibility	Reaction Plan
	Inline Scribe	1. Panel Appearance	Q S 4697 2008 Cell 1-1 outgoing inspection standards	Visual Check	100%	Process Flow List	operator	Hold Products, Stop Producing Inform Engineer
	Cell Scribe	1. Cutting Precision	1. ±0.15mm Recipe Card	1. 40I	1 per machine	initial workpiece confirm switch mode	OP Engineer	Hold Products, Stop Producing Inform Engineer
	Cosmetic Inspection	1. Panel Appearance	1. Q S 4697 2008 TFT LUT Cell outgoing inspection standards	Visual Check	100%	Process Flow List	operator	Hold Products, Stop Producing Inform Engineer
	1st Visual Test	1. display quality	1. Q S 4697 2008 TFT LUT Cell outgoing inspection standards	Jig	100%	1. 1st V T yield data	operator	Hold Products, Stop Producing Inform Engineer
	Pol Attach	1. Pol Attach Position Accuracy 2. Particle 3. VMI 4. Black gap 5. Broken	1. Recipe Card 2. Q S 4697 2008 TFT LUT Cell outgoing inspection standards	1. First lot check 2. Jig 3. Visual Check	SPUS LOT	POL attach check record	operator	Hold Products, Stop Producing Inform Engineer
	Auto Clave	1. Temp 2. pressure 3. Time	1. Recipe Card	Parameter Check	1. 1 Time class	Process Flow List	operator	Hold Products, Stop Producing Inform Engineer
	2nd Visual Test	1. display quality	Q S 4697 2008 TFT LUT Cell outgoing inspection standards	Jig	100%	2st V T yield data	operator	Hold Products, Stop Producing Inform Engineer
	Cosmetic Inspection	1. Appearance quality	Q S 4697 2008 TFT LUT Cell outgoing inspection standards	Visual Check	100%	Cosmetic yield data	operator	Hold Products, Stop Producing Inform Engineer

12.3 Module QC Flow Chart

Module Name:TM101DDHG03			Revision:1.0		Responsibility:QC			
Date(Orig.): 2016-1-04			Date(Rev.):		Prepared by:Zhanghang Xiang		Approved by:Dongjin Song	
Process	Process name	Management Item	Quality Spec	Measuring instrument/ Inspection method	Sample size &frequency	Control method	Responsibility	Reaction Plan
COG	COG Bonding	1.Panel cleanliness 2.Line 3.Pressure 4.Temperature 5.Parallelism	1.water angle≤15° 2.process card 3.process card&COG profile 4.process card&COG profile 5.pressure standard	1.water angle instrument 2.3.5.COG instrument 3.21.21 paper	Initial workpiece confirm switch mode	COG switch line list3 Module COG Bonding list3	Operator PQC	1.inform engineer 2.adjust and confirm sample again
AOI	AOI	1.ACF Bonding effect 2.IC bonding accuracy	1.Module test standard	Microscope	100%	Machine alarm	Operator	1. confirm again 2.adjust and confirm sample again
ACF	ACF	1.Temp 2.Pressure 3.Line	1.thermometer Record Clerk	1.Microscope	First Piece Check	1. EVOC4492 MODULE FOG ACF list3	Operator	1.check one and test20 pieces 2.if find more than one defective products,inform engineer
FOG	FOG	1.Attachment State 2.Parallelism 3.Temperature 4.Line 5. FOG pulling force	1.process card&FOG profile 2.pressure standard 3.process card&FOG profile 4.process card 5. above 0.6N/mm	1. Load Cell Pressure Tester D0 Parameter 2.21.21 paper 3. 1.1mm Tester D0 Parameter 3.Pull Tester	Initial workpiece confirm switch mode	1MODULE FOG BONDING list3 2FOG pressure list3 3Pull test list3	Operator	1.inform engineer 2.adjust and confirm sample again
MI	MI	1.FOG Bonding effect 2.IC bonding accuracy	1.Module test standard	1.Microscope 2.SPC control	10%	1Module COG BONDING list3 2IC 41 Record3 3Module SPC list3	Operator	1.check one and test20 pieces 2.if find more than one defective products,inform engineer
Glue coating&UV cure	Glue coating&UV cure	1.Glue code 2.UV energy 3.BFV appearance	1.2.process card&SOP 3.process card	1.appearance 2.UV tester 3.calipers	1.initial workpiece confirm 2.1 time shift 3.initial workpiece confirm 6pieces/lot 10pieces 2hours	1MODULE glue coating list3 2Equipment maintenance list3	Operator PQC	1.adjust check and inform engineer
ET1	ET1	1.Test tool 2.Display quality 3.Light intensity	1.press card 2. 3 TFT-LCD Module test standard3	1.ET tool 2.electrical test 3.illuminometer	1.Initial workpiece Confirm: 6pieces 1 time 1 lot 2.all lot 3.1 time/month	1 Electrical Property list3 2Light intensity list3	Operator	1.adjust check and inform engineer
BL Assembly	BL Assembly	assembly quality	process card&SOP	visual check	1.initial workpiece confirm: 6pieces lot 2.all lot	1MODULE ASSY list3	Operator	1.adjust check and inform engineer
Bezel Assembly	Bezel Assembly	1.Bezel Model 2.Bezel Assembly State	1.2.process card&SOP	visual check	1.initial workpiece confirm: 6pieces lot 2.all lot	1MODULE ASSY list3	Operator	1.adjust check and inform engineer
Tape Affixed	Tape Affixed	attaching quality	process card&SOP	visual check	1.initial workpiece confirm: 6pieces lot 2.all lot	1MODULE ASSY list3	Operator	1.adjust check and inform engineer
ET2	ET2	1.Test tool 2.Display quality 3.Light intensity	1.press card 2. 3 TFT-LCD Module test standard3	1.ET tool 2.electrical test 3.illuminometer	1.Initial workpiece Confirm: 6pieces 1 time 1 lot 2.all lot 3.spot check:1 time 1 month	1 Electrical defect property list3 2Light intensity list3	Operator	1.adjust check and inform engineer
Cosmetic inspection	Cosmetic inspection	1.Appearance quality 2.Light intensity	1.press card 2. TFT-LCD Module test standard3	1.visual test 2.illuminometer	1.Initial workpiece Confirm: 6pieces 1 time 1 lot 2.all lot 3.spot check:1 time 1 month	1Visual defect property list3 2Light intensity list3	Operator	1.adjust check and inform engineer
OQC	OQC	1.Test tool 2.Display quality 3.Appearance quality 4.Light intensity	1.press card 2. 3 TFT-LCD Module test standard3	1.ET VI tool 2.electrical test 3.visual test 4.illuminometer	1.AQL: 3.25 2.1 time 1 month	1OQC inspection list3 2Light intensity list3	OQC	goods reported
Packing	package	1.packing method 2.packing quality	1.press card 2. process card&SOP304	1.visual check	1.2. Initial workpiece Confirm: 6pieces 1 time 1 lot	1 MODULE packing list 3	Operator	adjust and confirm sample again

12.4 Rework QC Flow Chart

QC flow chart								
TM101DDHG04-00			Revision:1.0		Responsibility:QC			
Date(Orig.):			Date(Rev.):		Prepared by:Zhangheng Xiang		Approved by:Dongjin Song	
Process	Process name	Management Item	Quality Spec	Measuring instrument/ Inspection method	Sample size &frequency	Control method	Responsibil ity	Reaction Plan
Process 1								
Check								
OK								
NG								
FA								
Disassemble								
Scrap								
Process 2								

13. Incoming Inspection Standard

13.1. Scope:

The incoming inspection standards shall be applied to TFT-LCD Modules (hereinafter called "Modules") that supplied by Shanghai Tianma Micro-Electronics Corporation.

13.2. Incoming Inspection

The customer shall inspect the modules within twenty calendar days of the delivery date (the "inspection period") at its own cost. The result of the inspection (acceptance or rejection) shall be recorded in writing, and a copy of this writing will be promptly sent to the seller, If the results of the inspecting from buyer does not send to the seller within twenty calendar days of the delivery date. The modules shall be regards as acceptance. Should the customer fail to notify the seller within the inspection period, the buyers right to reject the modules. Shall be lapsed and the modules shall be deemed to have been accepted by the buyer.

13.3. Inspection Sampling Method

13.1. Lot size: Quantity per shipment lot per model

13.2. Sampling type: Normal inspection, Single sampling

13.3. Inspection level:

Please see the detail information as below:

Lot Size	Cosmetic Check			Function Check		Dimension Check	
N	n	Ac: Re (Major defects)	Ac: Re (Minor defects)	n	Ac: Re	n	Ac:Re
2~500	50	0:1	1:2	5	0:1	5	0:1
501~1200	75		2:3				
1201~3200	120						
3201~10000							
10001~35000	135						
35001~150000	170						
150001~500000	200						
≥500001	245						

Notes :

Cosmetic check :

Cosmetic defects are classified as major defects and minor defects according to the degree of defectiveness.

Item No	Items to be inspected	
Major defects	missing	Missing function component
	Crack	Glass Crack
Minor defects	Obvious cosmetic defect, but do not influence product' finally using	1) Protective film broken 2) Pol scratch

Function check :

Item No	Items to be inspected	
Function defect	Function	1) No display 2) Display abnormally 3) Short circuit 4) line defect

Dimension check :

Item No	Items to be inspected	
Dimension	Important product's size which may influence costumer side assembly	

14. Inspection Conditions

14.1 Ambient conditions:

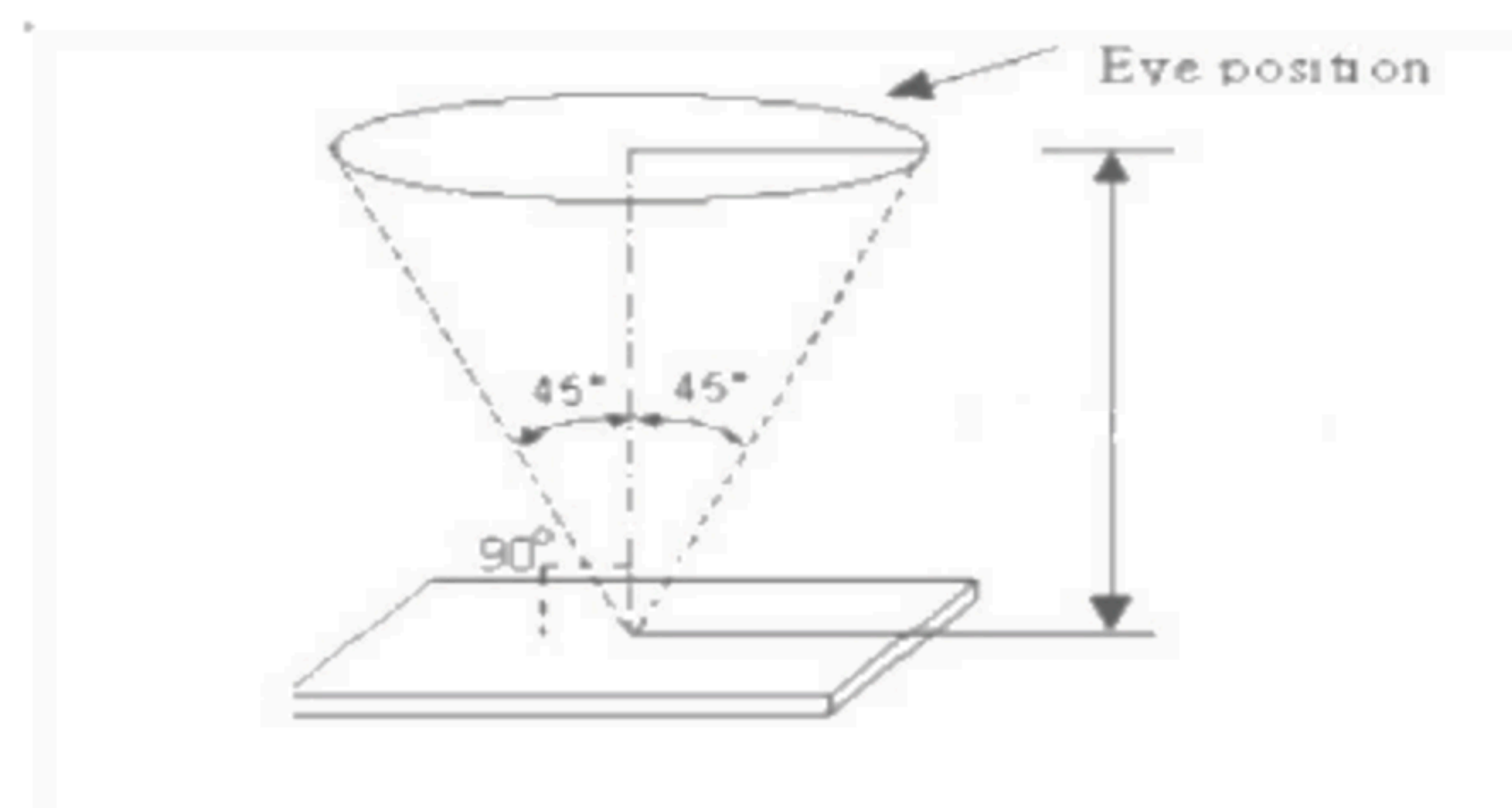
- Temperature: Room temperature $25\pm 5^{\circ}\text{C}$
- Humidity: $(60\pm 10)\ \% \text{RH}$
- Illumination: Appearance $700\pm 100 \text{ Lux}$, Display $100\pm 50 \text{ Lux}$ (The luminance at an inspection desk surface with single non-directive fluorescent lamp)

14.2 Viewing distance

The distance between the LCD and the inspector's eyes shall be at least $30\pm 5 \text{ cm}$.

14.3 Viewing Angle

U/D: $45^{\circ}/45^{\circ}$, L/R: $45^{\circ}/45^{\circ}$



15. Inspection Criteria

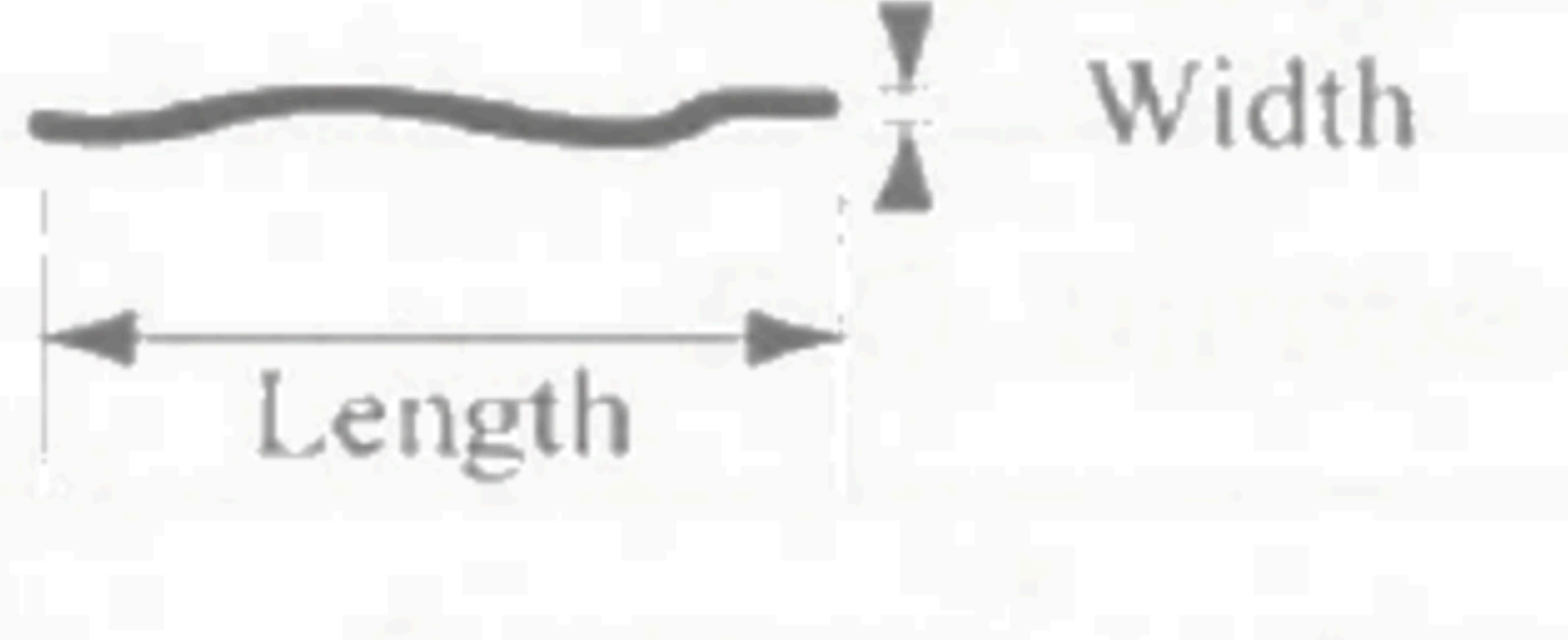
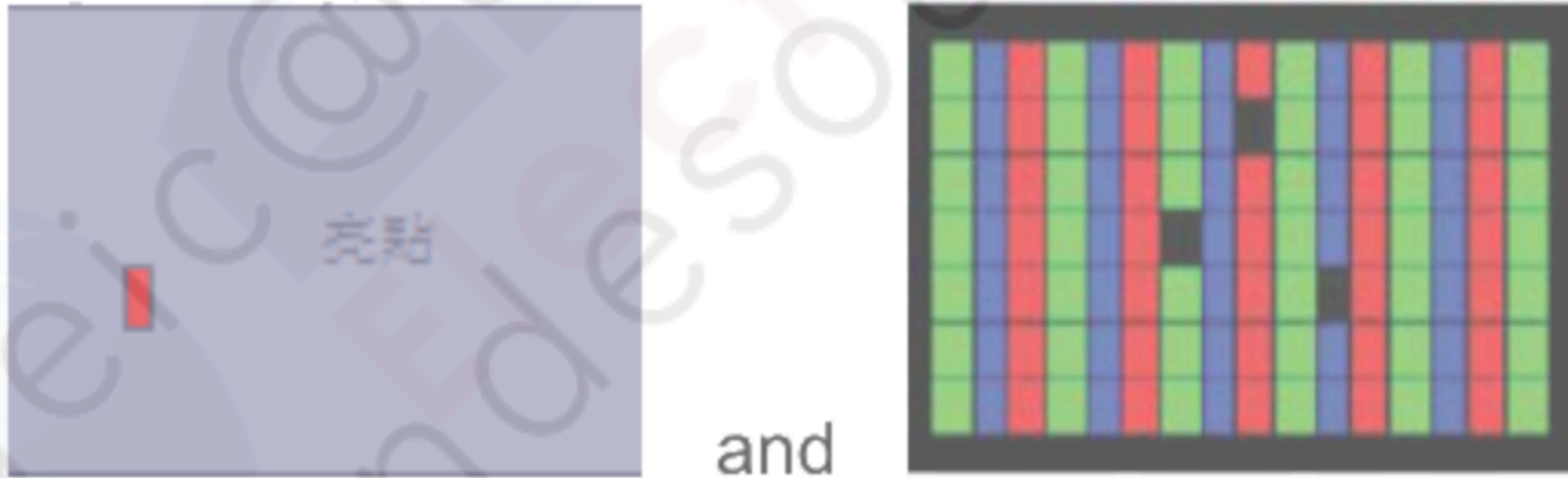
Defects are classified as major defects and minor defects according to the degree of defectiveness defined herein.

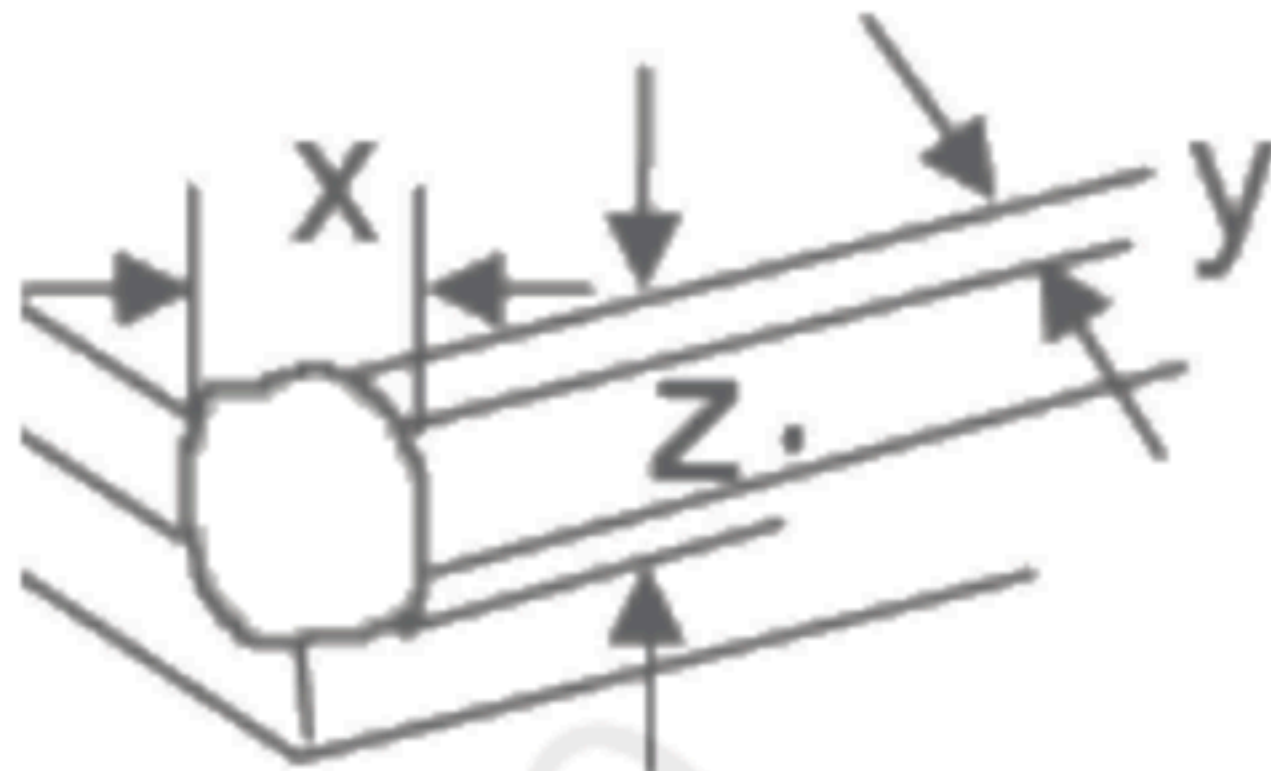
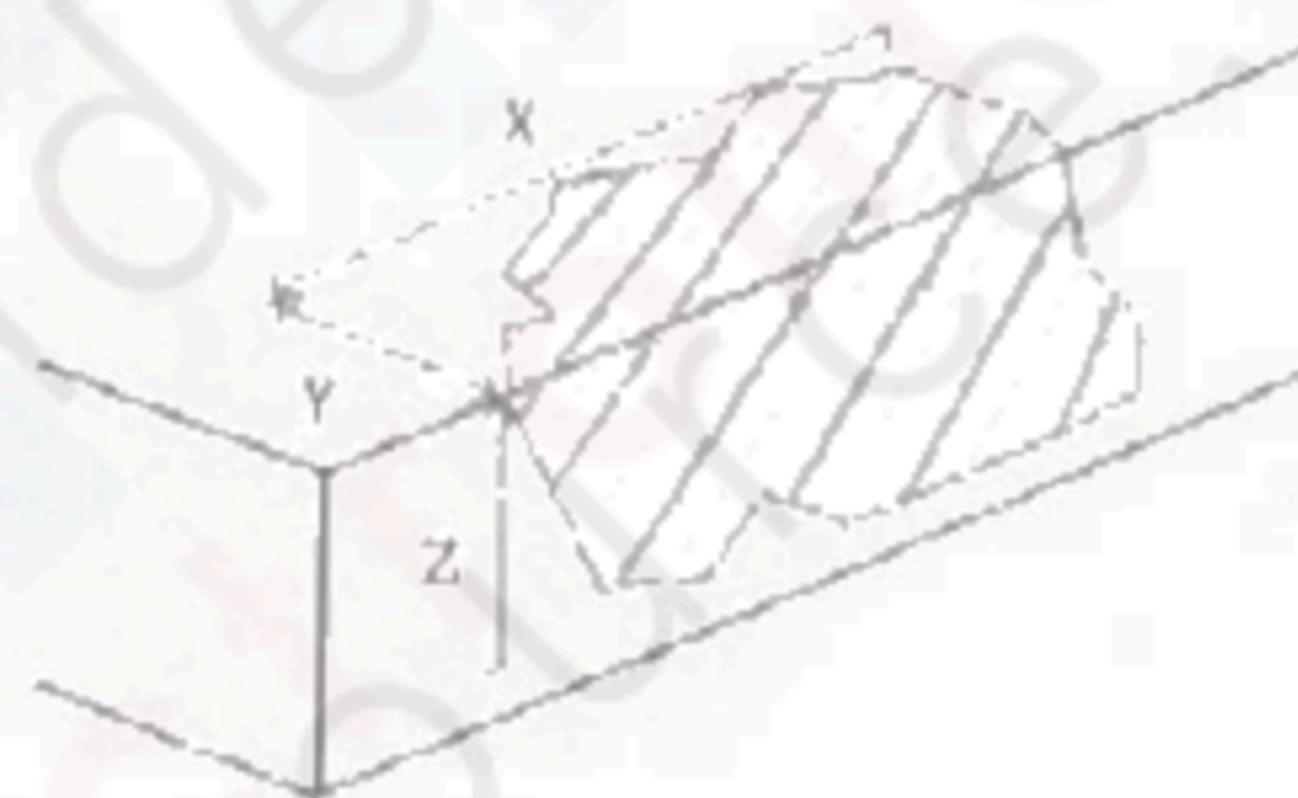
15.1 Major defect

Item No	Items to be inspected	Inspection Standard
15.1.1	All functional defects	1) No display 2) Display abnormally 3) Short circuit 4) line defect
15.1.2	missing	Missing function component
15.1.3	Crack	Glass Crack

15.2 Minor defect

Item No	Items to be inspected	Inspection standard	
15.2.1	Spot Defect Including Black spot White spot Pinhole Foreign particle Polarizer dirt	For dark/white spot is defined $\phi = (x + y) / 2$  $\phi > 0.20$ distance between spot must be larger than $\geq 5\text{mm}$	
		Size $\phi(\text{mm})$	Acceptable Quantity
		$\phi \leq 0.20$	Ignore
		$0.20 < \phi \leq 0.50$	3
		$0.50 < \phi$	Not allowed
15.2.2	Line Defect	Define:	

	Including Black line White line Scratch	 Distance between line defect $\geq 5\text{mm}$	
		Width(mm) Length(mm)	Acceptable Quantity
		$W \leq 0.05$	Ignore
		$0.05 < W \leq 0.1$ $L \leq 2.0$	4
		$0.1 < W$	Follow 5.2.1
15.2.3	Polarizer Dent/Bubble	Size $\varphi(\text{mm})$	Acceptable Quantity
		$\varphi \leq 0.20$	Ignore
		$0.20 < \varphi \leq 0.5$	3
		$0.5 < \varphi$	0
15.2.4	Sub Pixel Electrical Defect	Bright and Black Sub Pixel define: 	
		Item	Acceptable Quantity
		Black Sub Pixel defect	2
		Bright Sub Pixel defect	0(include Bright foreign particle)
		Total Sub Pixel defect	2
		Distance between black Sub Pixel	$> 15\text{mm}$
15.2.5	FPC	Broken	Not allowed
		Crease	Can't resume is not allowed
15.2.6	Bezel	Dirt	No harm

		Wrap	
		Broken	
		Sunken	
15.2.7	Glass defect	1. Corner Fragment:	
			
		Size(mm)	Acceptable Quantity
		$X \leq 3\text{mm}$ $Y \leq 3\text{mm}$ $Z \leq T$	Ignore T : Glass thickness X: Length Y: Width Z: thickness
		2. Side Fragment:	
			
		Size(mm)	Acceptable Quantity
		$X \leq 6.0\text{mm}$ $Y \leq 1.0\text{mm}$ $Z \leq T$	Ignore T : Glass thickness X: Length Y: Width Z: thickness

Note:

1. The AQL inspection sample method is applied for customer, not for SHTM. For SHTM does full inspection in production line.
2. Dot defect is defined as the defective area of the dot area is larger than 50% of the dot area.
3. Mura is checker by 6% ND filter. ND application method: the parallel vertical distance between ND and panel is 3~5cm , the distance of eyes look squarely to the panel is 30±5cm , checked by 3s .

4. Foreign particle on the surface of the LCM should be ignore.
5. The phenomenon that can be seen in all screen(Black、White、R、G、B),which seems like BL LED light directly sending out through the panel ,need to be less than 1/3 dot.

16. Mechanics specification:

As for the outside dimension, weight of the modules, please refer to product specification for more details

17. Precaution

Please pay attention to the following items when you use the LCD Modules:

- a. Do not twist or bend the module and prevent the unsuitable external force for display module during assembly.
- b. Adopt measures for good heat radiation. Be sure to use the module with in the specified temperature.
- c. Avoid dust or oil mist during assembly.
- d. Following the correct power sequence while operating. Do not apply the invalid signal, otherwise, it will cause improper shut down and damage the module.
- e. Less EMI: it will be more safety and less noise.
- f. Please operate module in suitable temperature. The response time & brightness will drift by different temperature.
- g. Avoid to display the fixed pattern (exclude the white pattern) in a long period, otherwise, it will cause image stains.
- h. Be sure to turn off the power when connection of disconnecting the circuit.
- i. Polarizer scratches easily, please handle it carefully.
- j. Display surface never likes dirt of stains.
- k. A dew drop may lead to destruction. Please wipe off and moisture before using module.
- l. Sudden temperature changes cause condensation, and it will cause polarizer damaged.
- n. High temperature and humidity may degrade performance. Please do not expose the module to the direct sunlight and so on.
- m. Acetic acid or chlorine compounds are not friends with TFT display module.
Static electricity will damage the module; please do not touch the module without any grounded device.
- o. Do not disassemble and reassemble the module by self.
- p. Be careful do not touch the rear side directly.
- q. Not strong vibration or shock. It will cause module broken.
- r. Storage the modules in suitable environment with regular packing.
- s. Be careful or injury from a broken display module.
- t. Please avoid the pressure adding to the surface (front or rear side) of modules, because it will cause the display non-uniformity of other function issue.