MODEL NO　　: 　TM070RDHG34

MODEL VERSION: 　00

SPEC VERSION : 　Ver 1.0

ISSUED DATE: 　2019-04-02

■Preliminary Specification
□Final Product Specification

Customer :_____

Approved by	Notes

TIANMA Confirmed :

Prepared by	Checked by	Approved by
Gang.Li	Longping.Deng	

This technical specification is subjected to change without notice

Table of Contents

Record of Revision

Rev	Issued Date	Description	Editor
1.0	2019-04-02	Preliminary specification released.	Gang.Li

1 General Specifications

Feature		Spec
Display Spec.	Size	7.0 inch
	Resolution	800(RGB) x 480
	Technology Type	a-Si TFT
	Pixel Configuration	R.G.B. Vertical Stripe
	Pixel pitch(mm)	0.1926 (H) x 0.179(V)
	Display Mode	TM,NW
	Surface Treatment	Anti Glare
	Viewing Direction	12 o'clock
	Gray Scale Inversion Direction	6 o'clock
Mechanical Characteristics	LCM (W x H x D) (mm)	164.9x 100 x 5.7
	Active Area(mm)	154.08 (W) x 85.92 (H)
	With /Without TSP	Without TSP
	Matching Connection Type	FH12A-50S-0.5H
	LED Numbers	24 LEDS
	Weight (g)	TBD
Electrical Characteristics	Interface	RGB 24 bits with TCON
	Color Depth	16.7M
	Driver IC	HX8264D*1+HX8664B*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: Q/S0002

Note 3:   LCM weight tolerance: +/- 5%

2 Input/Output Terminals

2.1 CN1 of FPC

PIN	Symbol	I/O	Description	Remark
1	VLED+	P	Led anode	
2	VLED+	P	Led anode	
3	VLED-	P	Led cathode	
4	VLED-	P	Led cathode	
5	GND	P	Ground	
6	NC	NC		
7	VCC	P	Digital power supply	
8	MODE	I	DE/SYNC mode select. H:DE mode, L:SYNC mode	
9	DE	I	Data enable signal, active high to enable data,if not used,please pull low	
10	VS	I	Vertical sync input, negative polarity,if not used,please pull High	
11	HS	I	Horizontal sync input, negative polarity,if not used,please pull High	
12	B7	I	Blue data（MSB）	
13	B6	I	Blue data	
14	B5	I	Blue data	
15	B4	I	Blue data	
16	B3	I	Blue data	
17	B2	I	Blue data	
18	B1	I	Blue data	
19	B0	I	Blue data（LSB）	
20	G7	I	Green data（MSB）	
21	G6	I	Green data	
22	G5	I	Green data	
23	G4	I	Green data	
24	G3	I	Green data	
25	G2	I	Green data	
26	G1	I	Green data	
27	G0	I	Green data（LSB）	
28	R7	I	Red data（MSB）	
29	R6	I	Red data	
30	R5	I	Red data	
31	R4	I	Red data	
32	R3	I	Red data	
33	R2	I	Red data	
34	R1	I	Red data	
35	R0	I	Red data（LSB）	
36	GND	P	Ground	
37	DCLK	I	Clock for input data	
38	GND	P	Ground	
39	LR	I	Source left or right sequence control	

40	UD	I	Gate up or down scan control	
41	VGH	P	Positive power of TFT	
42	VGL	P	Negative power of TFT	
43	AVDD	P	Analog power supply	
44	RESET	I	Global reset pin	
45	NC	NC		
46	NC	NC		
47	DITHB	I	Dithering setting. H: 6bit resolution, L: 8bit resolution	
48	GND	P	Ground	
49	NC	NC		
50	NC	NC		

I---Input, O---Output, P--- Power/Ground

Table 2.1 terminal pin assignments

2.2 U/D R/L Function Description

Scan control input		Scanning direction
UD	**LR**	
GND	VCC	Up to down, left to right
VCC	GND	Down to up, right to left
GND	GND	Up to down, right to left
VCC	VCC	Down to up, left to right

3　Absolute Maximum Ratings

Ta = 25℃

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VCC	-0.50	3.95	V	
	AVDD	-0.50	14.95	V	
	VGH	-0.30	42.00	V	
	VGL	-20.00	0.30	V	
	VGH-VGL	-0.30	40.00	V	
Operating Temperature	T_{op}	-30	85	℃	
Storage Temperature	T_{st}	-40	90	℃	
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/m^3	Ta＞70℃

Table 3.1 absolute maximum rating

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 Recommended Operating Condition

VCC=3.3V，GND=0V，Ta = 25℃

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Digital supply Voltage		VCC	3.00	3.30	3.60	V	
Analog supply Voltage		AVDD	10.3	10.4	10.5	V	
Gate on voltage		VGH	14.4	16	17.6	V	
Gate off voltage		VGL	-7.70	-7.00	-6.30	V	
Input Signal Voltage	Low Level	V_{IL}	0	-	0.3xVCC	V	R0~R7,G0~G7,0~B7,DE, DCLK,HS,VS,MODE, RESET,LR,UD, DITHB
	High Level	V_{IH}	0.7xVCC	-	VCC	V	

Table 4.1 LCD module electrical characteristics

Note 1: the value is for design stage only.

4.2 Panel Power Consumption

AGND=GND=0V, Ta = 25℃

Item	Symbol	Condition	Min	Typ.	Max	Unit	Remark
Digital Supply Current	I_{VCC}	VCC=3.3V		8	15	mA	-
Analog Supply Current	I_{AVDD}	AVDD=10.4V		20	30	mA	-
Gate On Current	I_{VGH}	VGH=16V		0.2	0.5	mA	-
Gate Off Current	I_{VGL}	VGL=-7V		0.2	0.5	mA	-
Power Consumption	Panel			250	400	mW	-

4.3 Backlight Unit Driving Condition

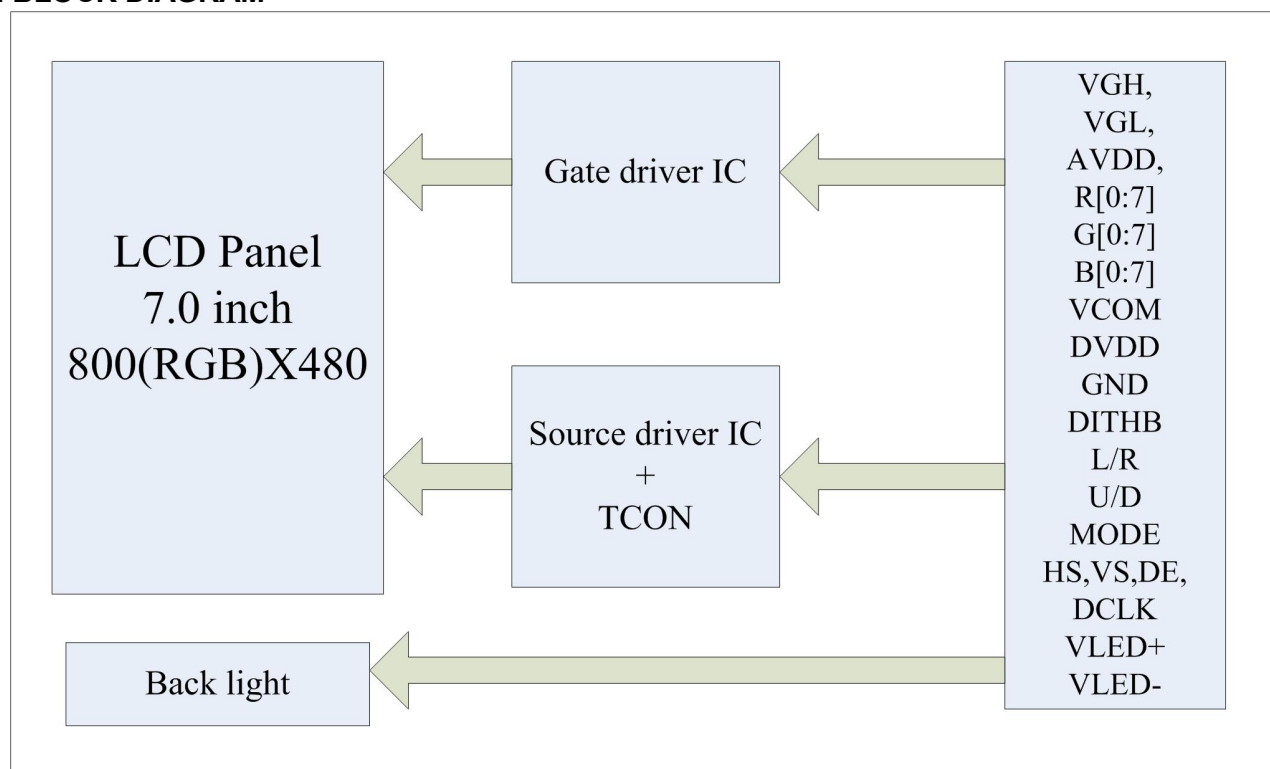| Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	200	-	mA	24 LEDs (3 LED Serial, 8 LED Parallel)
Forward Current Voltage	V_F	-	9.6	10.8	V	
Backlight Power Consumption	W_{BL}	-	1920	-	mW	
Operating Life Time	--	--	50000	--	hrs	Note 2, Note 3

Note1: The LED driving condition is defined for each module (3 LED Serial, 8 LED Parallel).

Note2: When LCM is operated, the stable forward current should be inputted. And forward voltage is for reference only.

Note3: Optical performance should be evaluated at Ta=25℃ When LED is driven at 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.

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4.4 BLOCK DIAGRAM

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┌──────────────────────────────────────────────────────────────┐
│  ┌──────────────┐     ┌──────────────┐     ┌──────────────┐   │
│  │              │ ◄── │ Gate driver IC│ ◄── │   VGH,       │   │
│  │  LCD Panel   │     └──────────────┘     │   VGL,       │   │
│  │  7.0 inch    │                          │   AVDD,      │   │
│  │ 800(RGB)X480 │                          │   R[0:7]     │   │
│  │              │     ┌──────────────┐     │   G[0:7]     │   │
│  │              │ ◄── │Source driver IC│◄── │   B[0:7]     │   │
│  │              │     │      +        │     │   VCOM       │   │
│  │              │     │    TCON       │     │   DVDD       │   │
│  │              │     └──────────────┘     │   GND        │   │
│  └──────────────┘                          │   DITHB      │   │
│  ┌──────────────┐                          │   L/R        │   │
│  │  Back light  │ ◄────────────────────────│   U/D        │   │
│  └──────────────┘                          │   MODE       │   │
│                                            │   HS,VS,DE,   │   │
│                                            │   DCLK       │   │
│                                            │   VLED+      │   │
│                                            │   VLED-      │   │
│                                            └──────────────┘   │
└──────────────────────────────────────────────────────────────┘
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5 Timing Chart

5.1 TFT-LCD Input Timing

VCC=3.3V, GND=0V, Ta=25℃

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK frequency	F_{clk}	28	30.0	40.0	MHz	
DCLK cycle time	T_{cph}	25	33.3	36	ns	
DCLK pulse width	T_{cw}	40%	50%	60%	T_{cph}	
VS setup time	T_{vst}	8			ns	
VS hold time	T_{vhd}	8	-	-	ns	
HS setup time	T_{hst}	8			ns	
HS hold time	T_{hhd}	8	-	-	ns	
Data setup time	T_{dsu}	8			ns	Data to DCLK
Data hold time	T_{dhd}	8	-	-	ns	Data to DCLK
DE setup time	T_{esu}	8	-	-	ns	
DE hold time	T_{ehd}	8	-	-	ns	

Input Clock and Data timing Diagram:
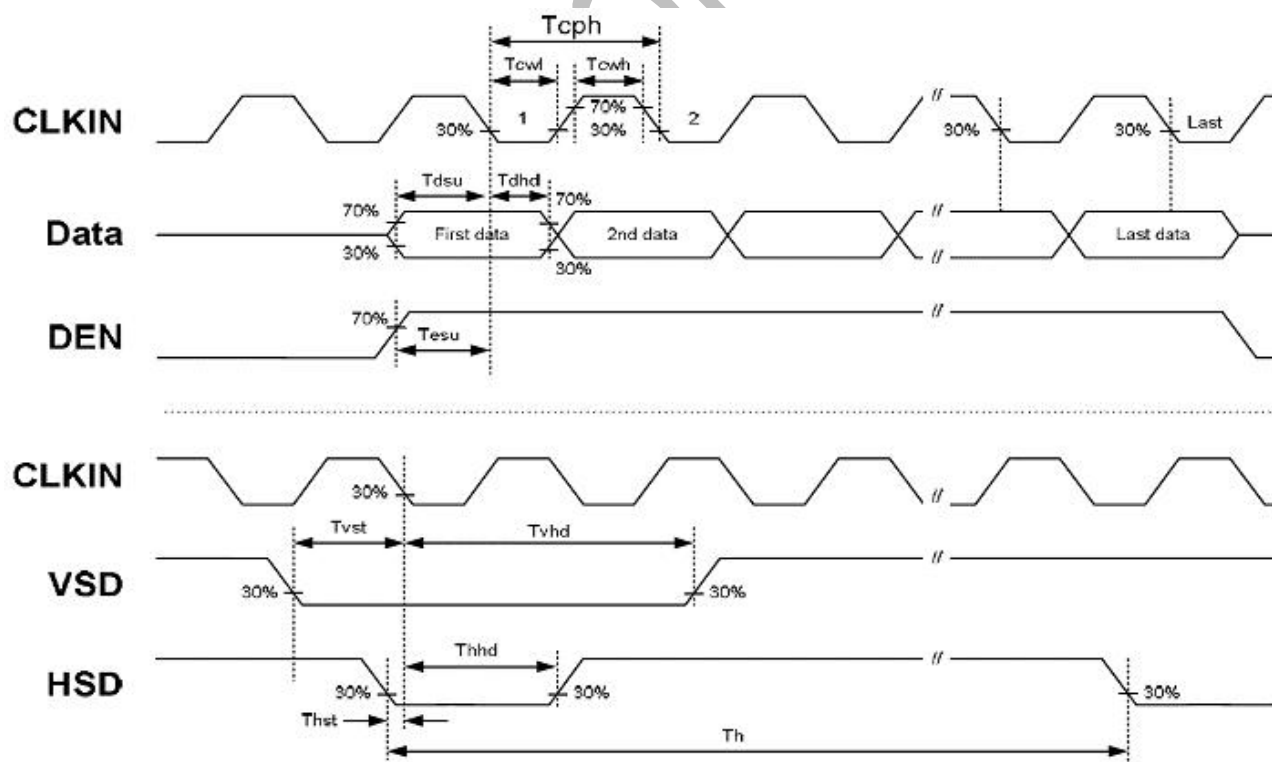
5.2 Recommended Timing Setting Of TCON

**TCON (Embedded In Source IC) Input Timing (DCLK, HS, VS, DE)**

VCC=3.3V, GND=0V, Ta=25℃

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK	F_{clk}	28	30	40	MHZ	
	t_{clk}	20	33.3	36	ns	
HSD	t_h	862	1056	1200	t_{clk}	
	t_{hd}	800	800	800	t_{clk}	
	t_{hpw}	1	-	40	t_{clk}	
	t_{hb}	46	46	46	t_{clk}	
	t_{hfp}	16	210	354	t_{clk}	
VSD	t_v	510	525	650	t_h	
	t_{vd}	480	480	480	t_h	
	t_{vpw}	1	3	20	t_h	
	t_{vb}	23	23	23	t_h	
	t_{vfp}	7	22	147	t_h	

Note 1: DE timing refer to HS, VS input timing.

TCON Vertical Input Timing Diagram HV
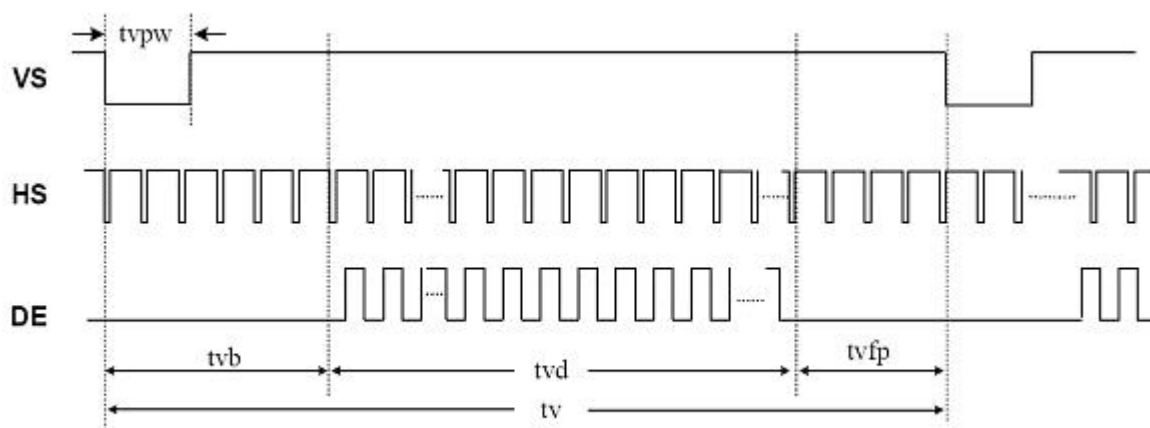
TCON Horizontal Input Timing Diagram
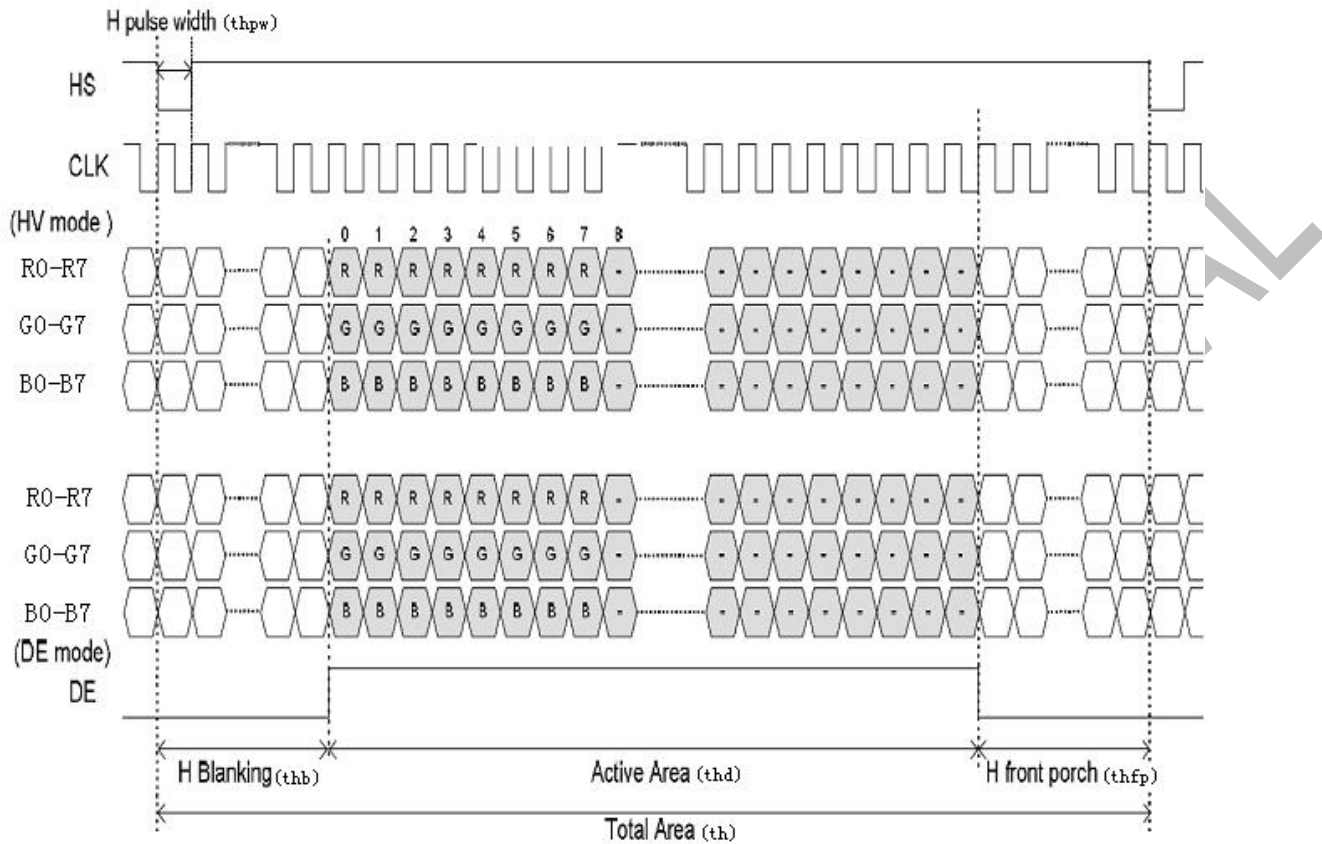
5.3   POWER ON/OFF SEQUENCE
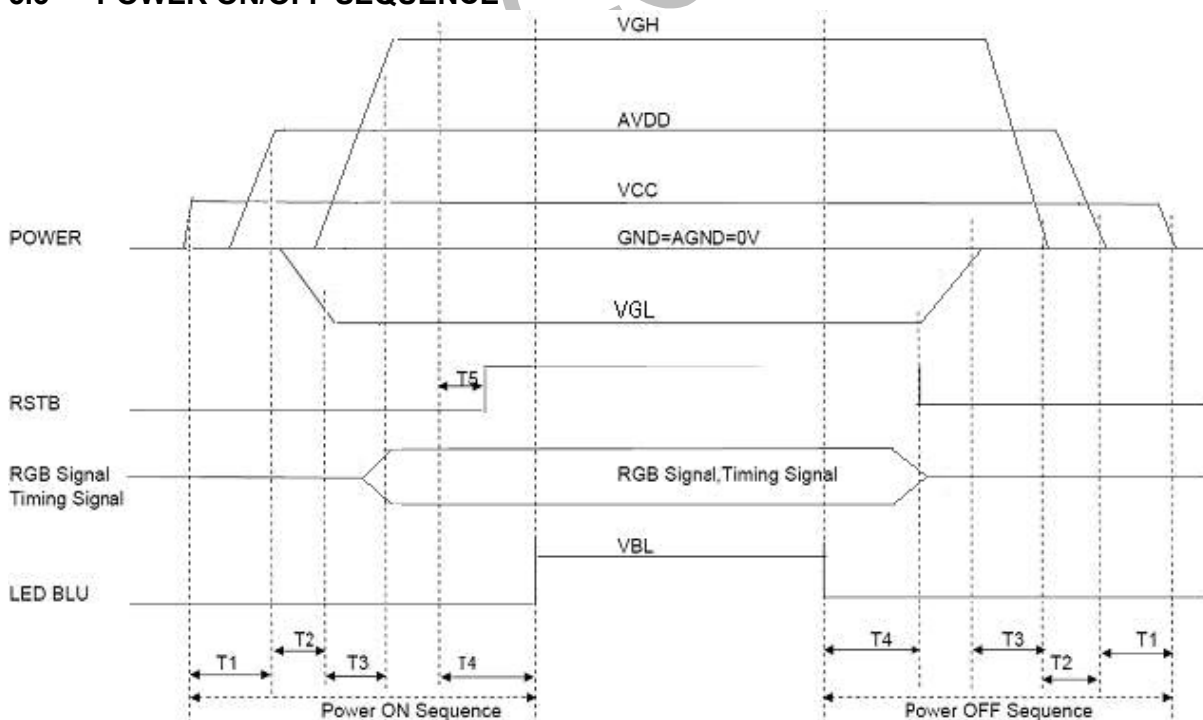
Note 1: T1≥20ms, T2≥20ms, T3≥5ms, T4≥100ms, T5≥5ms.

6 Optical Characteristics

Ta=25℃

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	50	60	-	Degree	Note 2
		θB		60	70	-		
		θL		60	70	-		
		θR		60	70	-		
Contrast Ratio		CR	θ=0°	600	800	-		Note1 Note3
Response Time		T_{ON}	25℃	-	25	-	ms	Note1 Note4
		T_{OFF}						
Chromaticity	White	x	Backlight is on		TBD			Note1 Note5
		y			TBD			
	Red	x			TBD			
		y			TBD			
	Green	x			TBD			
		y			TBD			
	Blue	x			TBD			
		y			TBD			
Uniformity		U		70	75	-	%	Note1 Note6
NTSC				45	50	-	%	Note 5
Luminance		L		800	1000	-	cd/m²	Note1 Note7

Test Conditions:

1. I_F= 160 mA, V_F=9.6 V and the ambient temperature is 25±2℃.humidity is 65±7%

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.
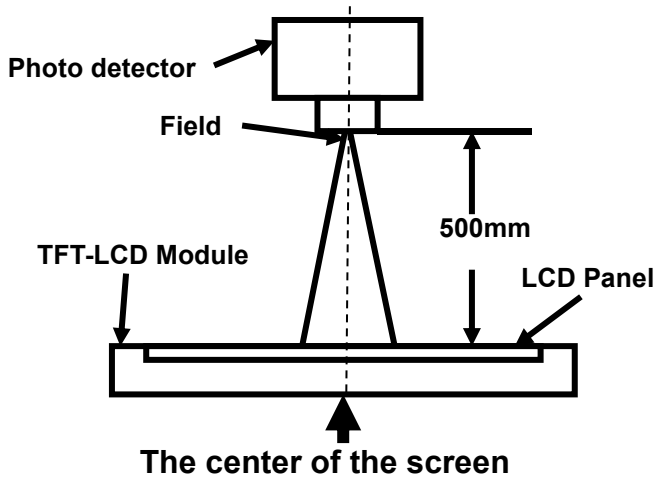
Item	Field
Contrast Ratio	
Luminance	1°
Chromaticity	
Lum Uniformity	
Response Time	2°

The center of the screen

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

viewing angle is measured at the center point of the LCD.
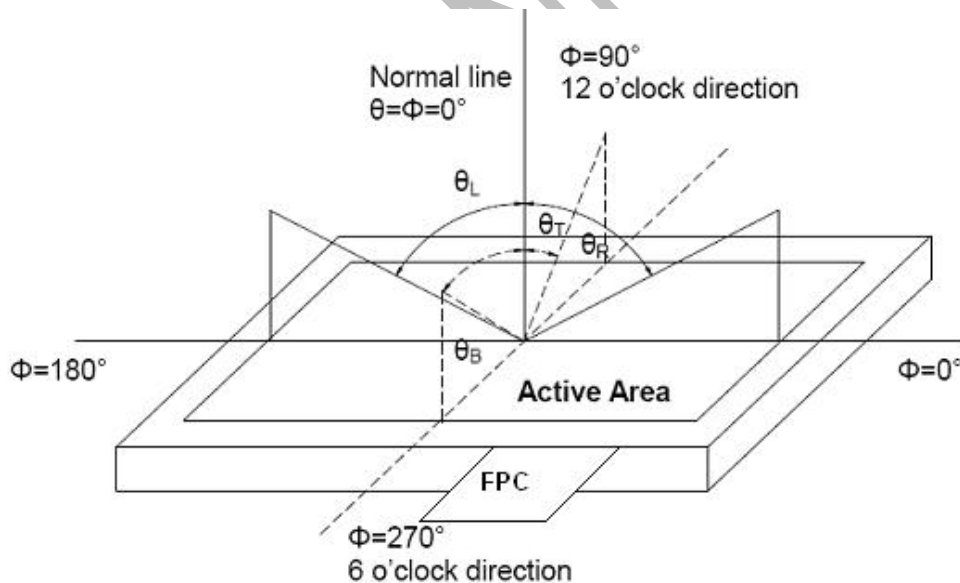
Note 3: Definition of contrast ratio

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

"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%.
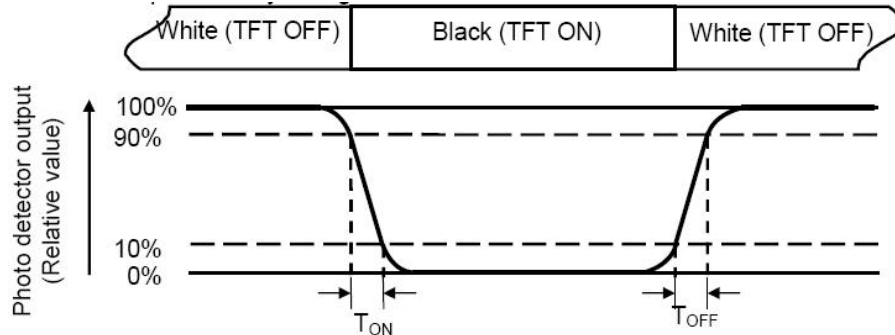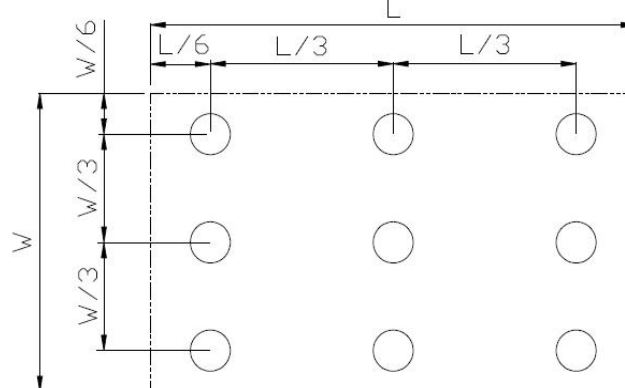

Note 5: Definition of color chromaticity (CIE1931)

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:
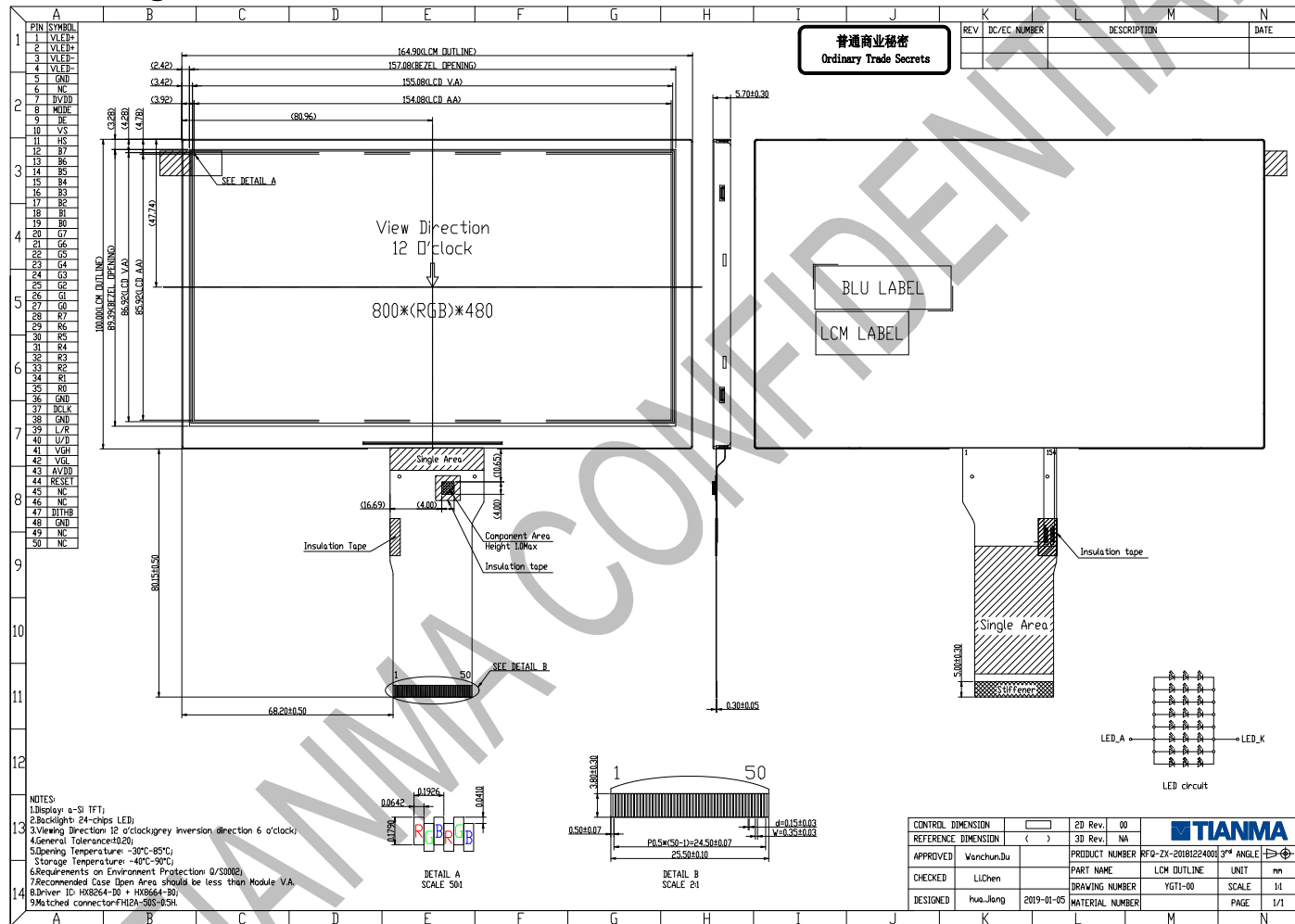
Measure the luminance of white state at center point.

7 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts = +85℃, 240 hours	IEC60068-2-1 GB2423.2
2	Low Temperature Operation	Ta = -30℃, 240 hours	IEC60068-2-1 GB2423.1
3	High Temperature Storage	Ta = +90℃, 240 hours	IEC60068-2-1 GB2423.2
4	Low Temperature Storage	Ta = -40℃, 240 hours	IEC60068-2-1 GB2423.1
5	Storage at High Temperature and Humidity	Ta = +60℃, 90% RH max,240hours	IEC60068-2-78 GB/T2423.3
6	Thermal Shock (non-operation)	-30℃ 30 min~+80℃ 30 min, Change time:5min, 100 Cycle	Start with cold temperature, End with high temperature, IEC60068-2-14,GB2423.22
7	ESD	C=150pF,R=330Ω,5point/panel Air:±8Kv,5times; Contact:±4Kv,5times (Environment:15℃~35℃, 30%~60%.86Kpa~106Kpa)	IEC61000-4-2 GB/T17626.2
8	Vibration Test	Vibration level:66.64m/s²(6.8G) Waveform: sinusoidal Frequency range:20~500HZ Frequency sweep rate:0.5 octave/min Duration:one sweep from 5 to 500HZ in each three mutually perpendicular axis(each x,y,z axis:1 hour, total 3hours)	IEC60068-2-6 GB/T2423.10
9	Shock Test	100G 11ms, ±X,±Y,±Z 100times for each direction	IEC60068-2-27 GB/T2423.5
10	Package Drop Test	Height:80cm, 1corner,3edges,6surfaces	IEC60068-2-32 GB/T2423.8

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

Note2:   Ta is the ambient temperature of samples.

8 Mechanical Drawing

普通商业秘密
Ordinary Trade Secrets

View Direction
12 O'clock

800*(RGB)*480

BLU LABEL

LCM LABEL

SEE DETAIL A

164.90(LCM OUTLINE)
157.08(BEZEL OPENING)
155.08(LCD V.A)
154.08(LCD AA)
(2.42)
(3.42)
(3.92)
(80.96)
5.70±0.30

100.00(LCM OUTLINE)
89.32(BEZEL OPENING)
86.32(LCD V.A)
85.32(LCD AA)
(3.28)
(4.28)
(4.78)
(47.74)

80.15±0.50
68.20±0.50
0.30±0.05

Single Area
Component Area
Height 1.0Max
Insulation Tape
Insulation tape
(16.69)
(4.00)
(4.00)
(10.65)

Insulation tape
Single Area
SHC Cover
5.00±0.30

SEE DETAIL B

1   50

LED_A   LED_K
LED circuit

NOTES:
1.Display: a-Si TFT;
2.Backlight: 24-chips LED;
3.Viewing Direction 12 o'clock;grey inversion direction 6 o'clock;
4.General Tolerance:±0.20;
5.Opening Temperature: -30℃-85℃;
 Storage Temperature: -40℃-90℃;
6.Requirements on Environment Protection: Q/S0002;
7.Recommended Case Open Area should be less than Module V.A.
8.Driver ID: HX8264-D0 + HX8664-B0;
9.Matched connector:FH12A-50S-0.5H.

0.0642
0.1926
0.0410
0.1790
R G B R G B

DETAIL A
SCALE 50:1

0.50±0.07
3.80±0.30
1   50
P0.5*(50-1)=24.50±0.07
25.50±0.10
d=0.15±0.03
W=0.35±0.03

DETAIL B
SCALE 2:1

PIN / SYMBOL
1 VLED+
2 VLED+
3 VLED-
4 VLED-
5 GND
6 NC
7 DVDD
8 MODE
9 DE
10 VS
11 HS
12 B7
13 B6
14 B5
15 B4
16 B3
17 B2
18 B1
19 B0
20 G7
21 G6
22 G5
23 G4
24 G3
25 G2
26 G1
27 G0
28 R7
29 R6
30 R5
31 R4
32 R3
33 R2
34 R1
35 R0
36 GND
37 DCLK
38 GND
39 L/R
40 U/D
41 VGH
42 VGL
43 AVDD
44 RESET
45 NC
46 NC
47 DITHB
48 GND
49 NC
50 NC

CONTROL DIMENSION		2D Rev.	00	
REFERENCE DIMENSION	( )	3D Rev.	NA	
APPROVED	Wanchun.Du	PRODUCT NUMBER	RFQ-ZX-2018122400	3rd ANGLE
CHECKED	Li.Chen	PART NAME	LCM OUTLINE	UNIT mm
DESIGNED	hua.Jiang 2019-01-05	DRAWING NUMBER	YGT1-00	SCALE 1:1
		MATERIAL NUMBER		PAGE 1/1

REV / DC/EC NUMBER / DESCRIPTION / DATE

9 Packing drawing

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	TM070RDHG24-00	164.90x100.00x5.7			
2	Partition_1	Corrugated Paper	513x333x215	2.0	1	
3.	Anti-Static Bag	PE	200x185x0.05	0.01	50	Anti-static
4	Dust-Proof Bag	PE	700x545	0.06	1	
5	Partition_2	Corrugated Paper	505x332	0.1	2	
6	Corrugated Bar	Corrugated Paper	513x148	0.06	4	
7	Dessicant	Dessicant	45x35	0.002	8	
8	Beauty-grain	Tape	30x10	0.00003	100	
9	Carton	Corrugated Paper	530x350x250	1.1000	1	
10	Total weight	TBD±5%Kg				
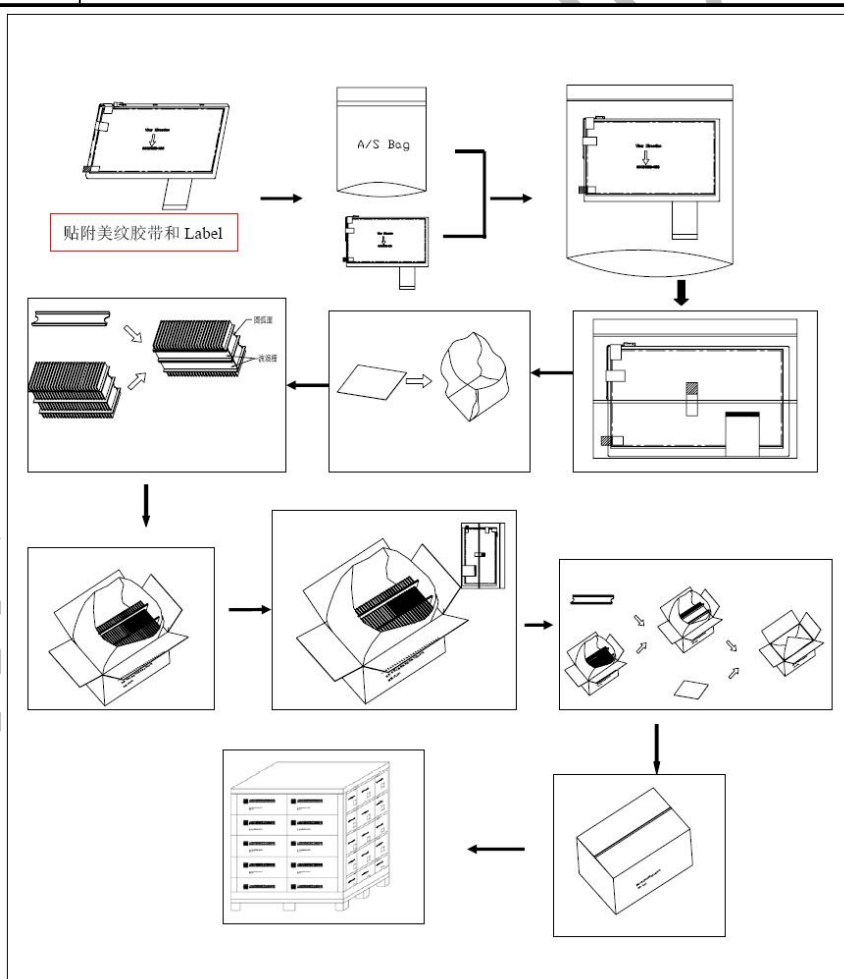
10 Precautions for Use of LCD Modules

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.