MODEL NO : TM050RDZG03-00

SPEC VERSION : 5.0

ISSUED DATE: 2020-05-20

□**Preliminary Specification**

■**Final Product Specification**

Customer :_____

Approved by	Notes

TIANMA Confirmed :

Prepared by	Checked by	Approved by
JACK_HUA	Guangkun_An	

Table of Contents

Record of Revision

Rev	Issued Date	Description	Editor
1.0	2017-10-30	Preliminary release.	Beibei Pan
2.0	2018-07-12	Modify drawing, update BL datasheet, update match connector.	Jack Hua
3.0	2019-01-07	Modify backlight, update BL driving condition and drawing	Jack Hua
4.0	2020-05-12	Add module consumption and package materials weight	Jack Hua
5.0	2020-05-20	Correct connector P.N. on page 5	Jack Hua

1 General Specifications

Feature			Spec
Display Spec.	Size		5.0 inch
	Resolution		800(RGB) x 480
	Technology Type		a-Si
	Pixel Configuration		R.G.B. Vertical Stripe
	Pixel pitch(mm)		0.135*0.135
	Display Mode		Normally White (TN)
	Surface Treatment		AG
	Viewing Direction		12 o'clock
	Gray Scale Inversion Direction		6 o'clock
Mechanical Characteristics	LCM (W x H x D) (mm)		120.70x77.80x5.7
	Active Area(mm)		108.00x64.80
	With /Without TSP		Without TSP
	Matching Connection Type		FH52E-40S-0.5SH
	LED Numbers		18 LEDs
	Weight (g)		TBD
Electrical Characteristics	Interface		RGB 24bits
	Color Depth		16.7M
	Driver IC	Gate IC	HX8664-B00APD400-LT
		Source IC	HX8264-D03DPD400-A-LTP

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

Matching Connector : FH52E-40S-0.5SH

No	Symbol	I/O	Description	Comment
1	NC	--	No connection	
2	NC	--	No connection	
3	GND	P	Ground	
4	VDD	P	Power supply voltage	
5	R0	I	Data input	
6	R1	I	Data input	
7	R2	I	Data input	
8	R3	I	Data input	
9	R4	I	Data input	
10	R5	I	Data input	
11	R6	I	Data input	
12	R7	I	Data input	
13	G0	I	Data input	
14	G1	I	Data input	
15	G2	I	Data input	
16	G3	I	Data input	
17	G4	I	Data input	
18	G5	I	Data input	
19	G6	I	Data input	
20	G7	I	Data input	
21	B0	I	Data input	
22	B1	I	Data input	
23	B2	I	Data input	
24	B3	I	Data input	
25	B4	I	Data input	
26	B5	I	Data input	
27	B6	I	Data input	
28	B7	I	Data input	
29	GND	P	Ground	
30	CLKIN	I	Clock for input data. Data latched at falling edge of this signal.	
31	STBYB	I	Standby mode. STBYB="1": Normally operation. STBYB="0": Standby mode .Timing controller, source driver will turn off, all output are High-Z.	
32	HSD	I	Horizontal sync input.	
33	VSD	I	Vertical sync input	
34	DEN	I	Data input enable. Active high to enable the data input bus under "DE Mode ".	
35	NC	--	No connection	
36	GND	P	Ground	
37	LED_A	P	Back light anode	
38	LED_K1	P	Back light cathode	
39	LED_K2	P	Back light cathode	
40	LED_K3	P	Back light cathode	

Note1：Please add the FPC connector type and matched one if necessary.
Note2：I——Input, O——Output, P——Power/Ground

3 Absolute Maximum Ratings

GND=0V

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VDD	-0.5	4.5	V	Note1
Operating Temperature	Top	-30	85	℃	
Storage Temperature	Tst	-40	90	℃	

Table 3 Absolute Maximum Ratings

Note1: Input voltage include R0~R5, G0~G5, B0~B5, Dotclk, Hsync, Vsync, Enable, R/L, U/D

4 Electrical Characteristics

4.1 Driving TFT LCD Panel

Item		Symbol	Min	Typ	Max	Unit	Remark
Supply Voltage		VDD	3.2	3.3	3.4	V	
Input Signal Voltage	Low Level	V_{IL}	0	--	0.3xVDD	V	
	High Level	V_{IH}	0.7xVDD	--	VDD	V	
Output Signal Voltage	Low Level	V_{OL}	--	--	GND+0.4	V	
	High Level	V_{OH}	VDD-0.4	--	--	V	
(Panel+LSI) Power Consumption		Black Mode (60Hz)		320		mW	
		Standby Mode		110		mW	

Note1: For different LCM, the value may have a bit of difference.
Note2: To test the current dissipation, use “all Black Pattern”.

4.2 Backlight Unit

Item	Symbol	Min	Typ	Max	Unit	Remark
Forward Current	I_F	-	175	-	mA	Note 1
Forward Voltage	V_F	8.7	9.3	9.9	V	
Backlight Power Consumption	W_{BL}	-	1627.5	-	mW	
Life Time	-	-	(50,000)	-	Hrs	Note 3

Table 4.2 LED backlight characteristics

Note1: The LED driving condition is defied for each LED module (3 LED Serial, 6LED Parallel).
Note2: Under LCM operating, the stable forward current should be inputted. And forward voltage is for reference only.
Note3: I_F is defined for one 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.
Note4: The LED driving condition is defined for each LED module.

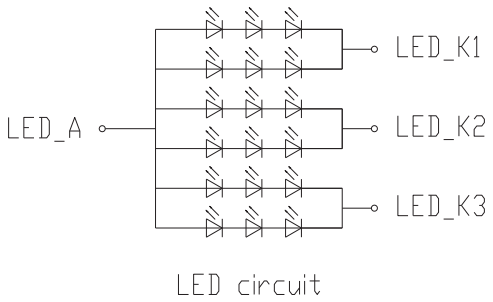
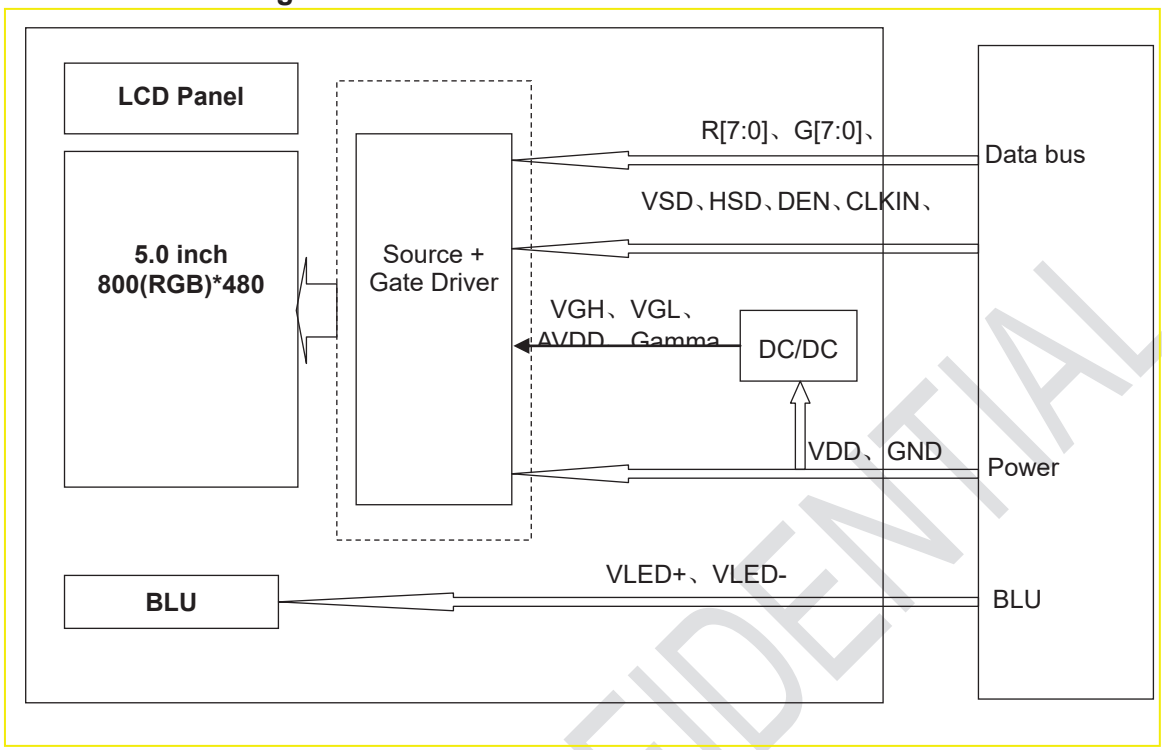


Figure 4.2 LED connection of backlight

4.3 Block Diagram

LCD Module diagram



5 Timing Chart

5.1 Input Clock and Data Timing

Parameter	Symbol	Min	Typ	Max	Unit	Remark
HSD Setup Time	T_{hst}	8			ns	
HSD Hold Time	T_{hhd}	8	-	-	ns	
VSD Setup Time	T_{vst}	8			ns	
VSD Hold Time	T_{vhd}	8	-	-	ns	
Data Setup Time	T_{dsu}	8			ns	
Data Hold Time	T_{dhd}	8	-	-	ns	
DE Setup Time	T_{esu}	8			ns	
DE Hold Time	T_{ehd}	8	-	-	ns	
CLKIN Cycle Time	T_{cph}	20	-	-	ns	
CLKIN Pulse Width	T_{cwh}	40	50	60	%	
Output stable time	Tsst	-	-	6	us	
VDD Power ON Slew rate	Tpor			20	ms	
RSTB pulse width	TRst	10	-	-	us	

Table 5.1 Input Clock and Data Timing

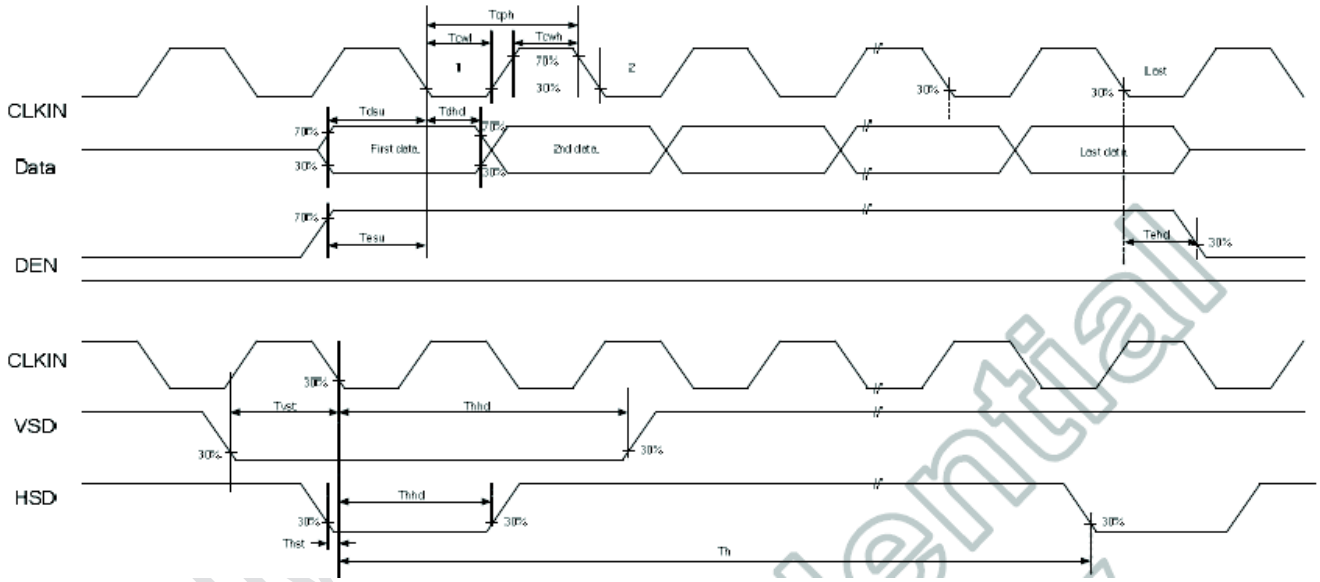


Figure 5.1 Input Clock and Data Timing Diagram

5.2 Data Input Format

5.2.1 Parameter Setting Of Timing

Parameter	Symbol	Spec			Unit
		Min	Typ	Max	
Horizontal display area	t_{hd}		800		CLKIN
CLKIN frequency (60Hz)	f_{clk}	-	30	50	MHZ
One Horizontal Line	t_h	889	928	1143	CLKIN
HSD pulse width	t_{hpw}	1	48	255	CLKIN
HSD blanking	t_{hb}		88		CLKIN
HSD front porch	t_{hfp}	1	40	255	CLKIN
Vertical display area	t_{vd}		480		T_H
VSD period time	t_v	513	525	767	T_H
VSD pulse width	t_{vpw}	3	3	255	T_H
VSD Blanking(tvb)	t_{vb}		32		T_H
VSD Front porch (tvfp)	t_{vfp}	1	13	255	T_H

Table 5.2 Parameter Setting Of Timing

5.2.2 Horizontal Input Timing Diagram

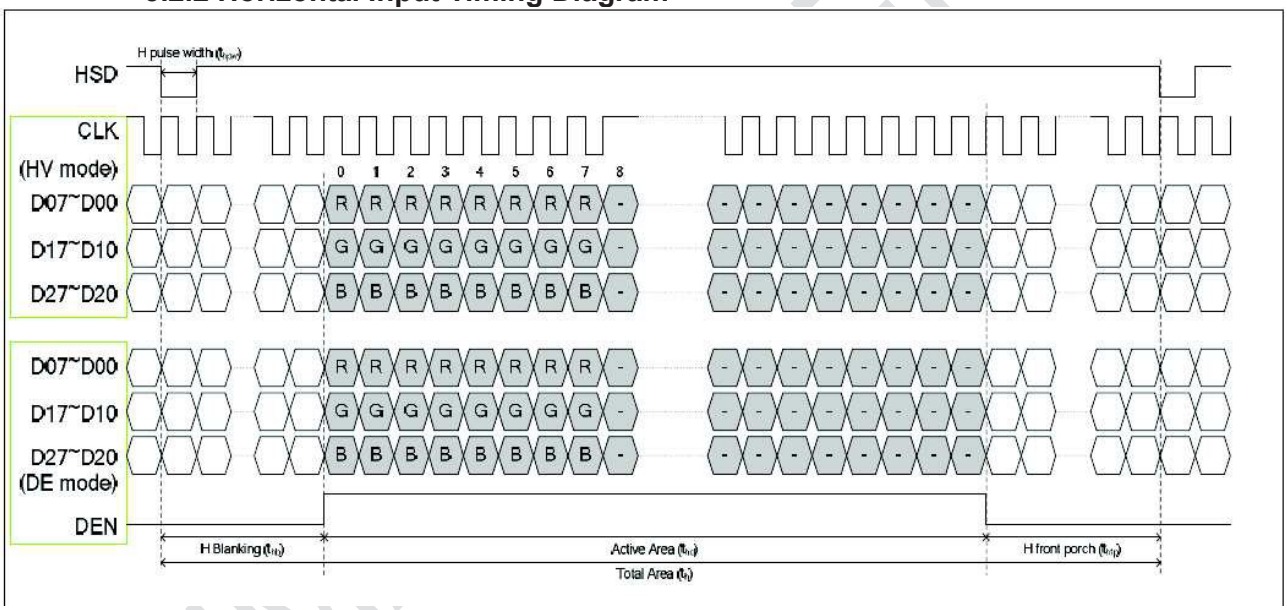


Figure 5.2 Horizontal Input Timing Diagram

5.2.3 Vertical Input Timing Diagram

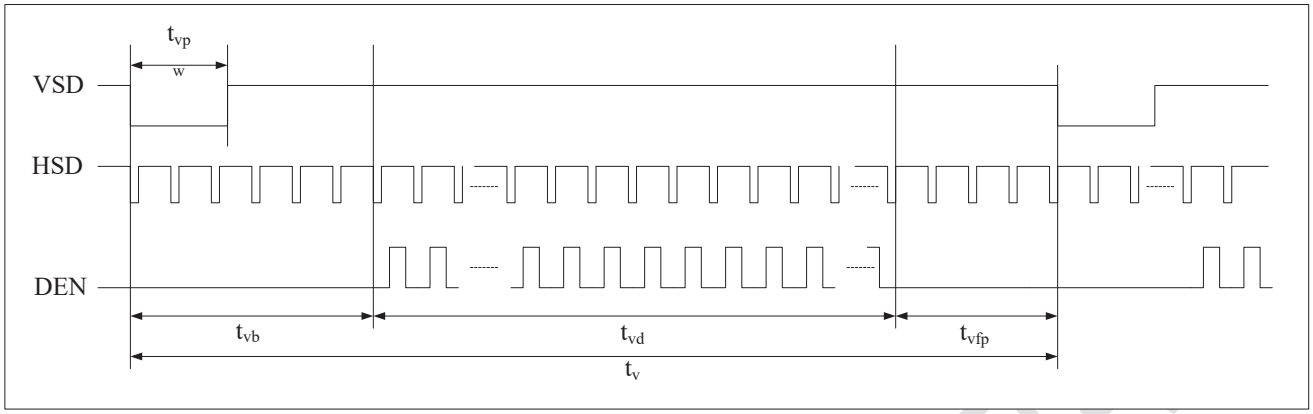


Figure 5.2.3 Vertical Input Timing Diagram

5.3 Power ON/OFF Sequence

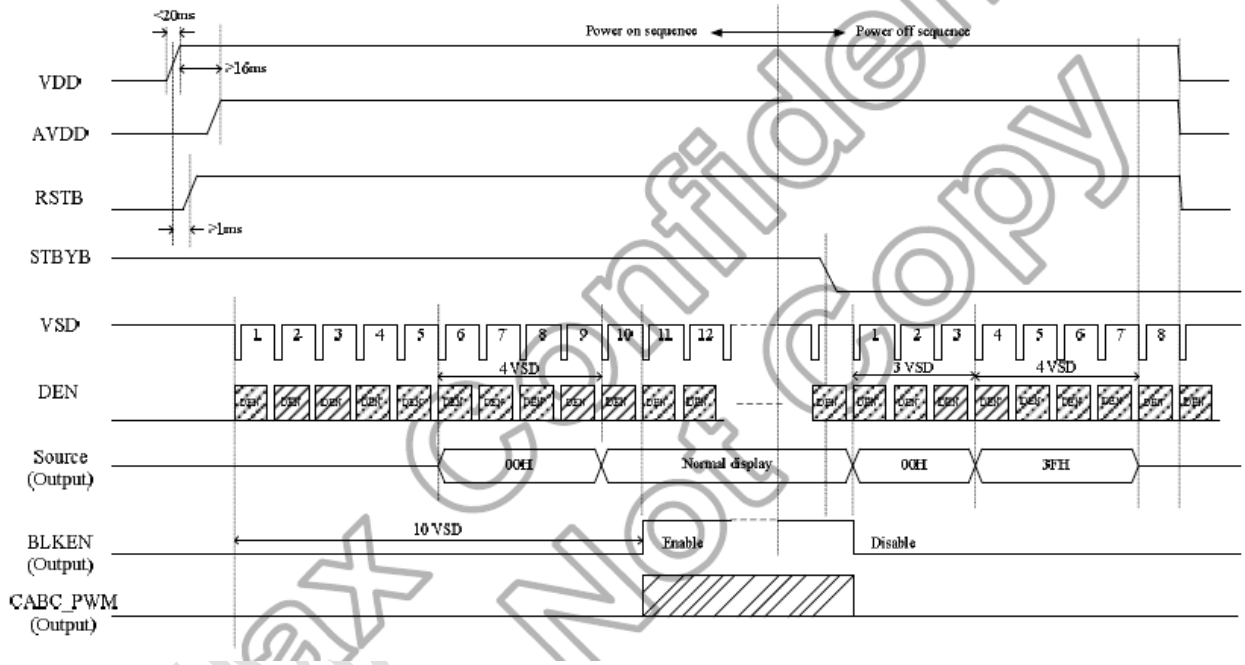


Figure 5.3.1 Power On/Off Sequence

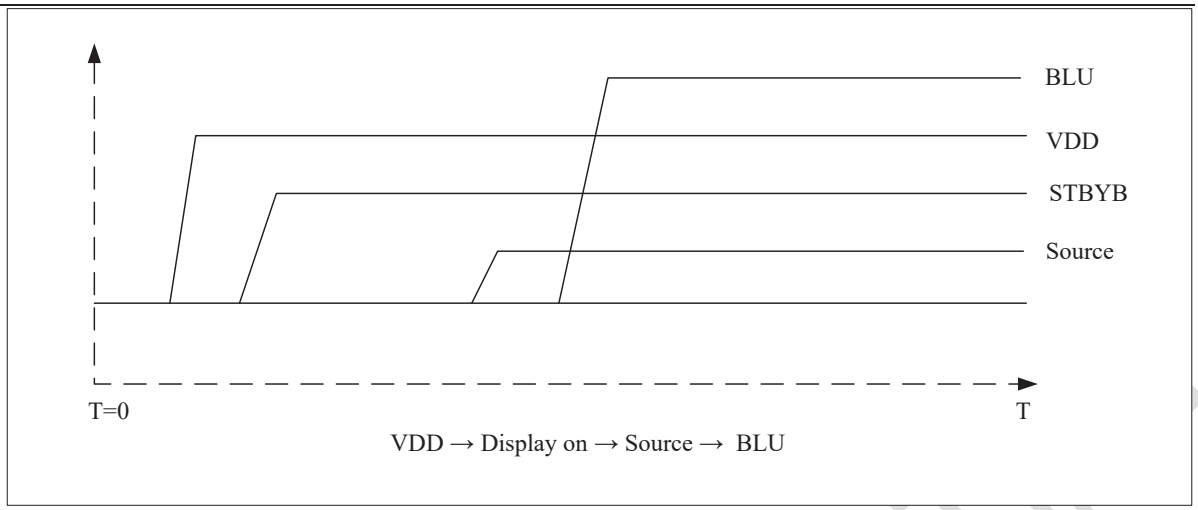


Figure 5.3.2 Power On Sequence

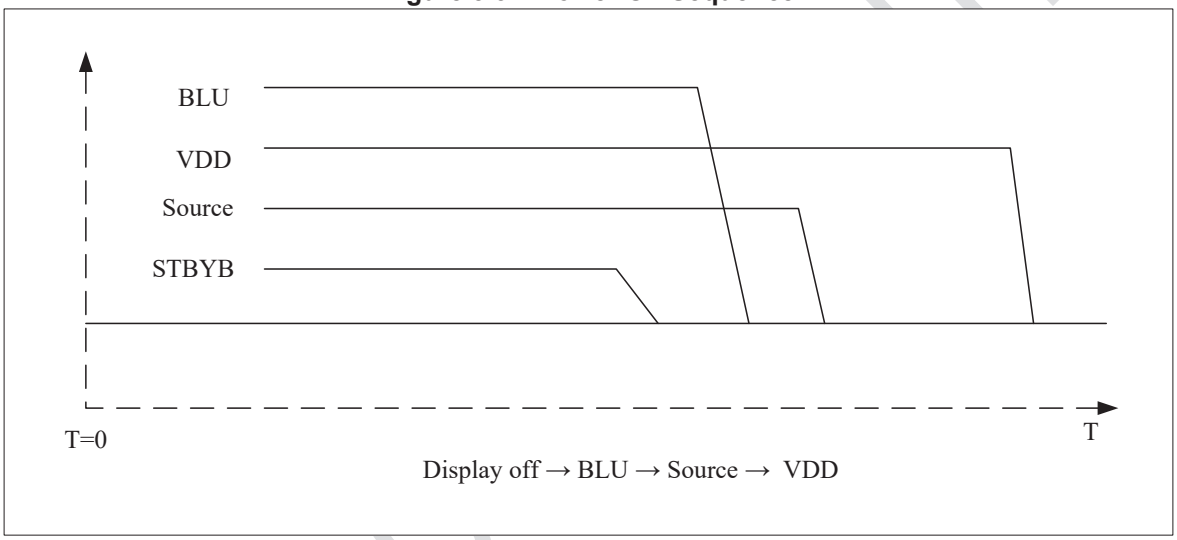


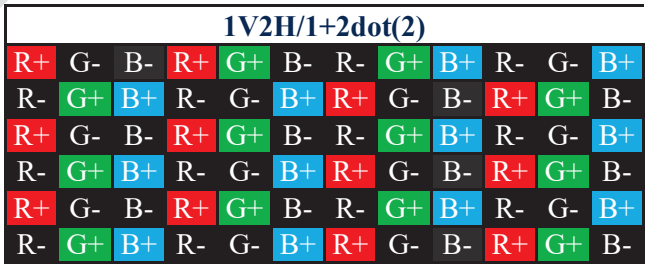
Figure 5.3.3 Power Off Sequence

6 Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	60	70	-	Degree	Note2,3
		θB		70	80	-		
		θL		70	80	-		
		θR		70	80	-		
Contrast Ratio		CR	θ=0°	600	750	-		Note 3
Response Time		T_{ON}	25℃	-	20	30	ms	Note 4
		T_{OFF}						
Chromaticity	White	x	Backlight is on	0.268	0.318	0.368		Note 1,5
		y		0.302	0.352	0.402		
	Red	x		0.547	0.597	0.647		Note 1,5
		y		0.298	0.348	0.398		
	Green	x		0.279	0.329	0.379		Note 1,5
		y		0.553	0.603	0.653		
	Blue	x		0.101	0.151	0.201		Note 1,5
		y		0.065	0.115	0.165		
Uniformity		U		75	80	--	%	Note 6
NTSC				--	50	--	%	Note 5
Luminance		L		800	1000	--	cd/m^2	Note 7

Test Conditions:

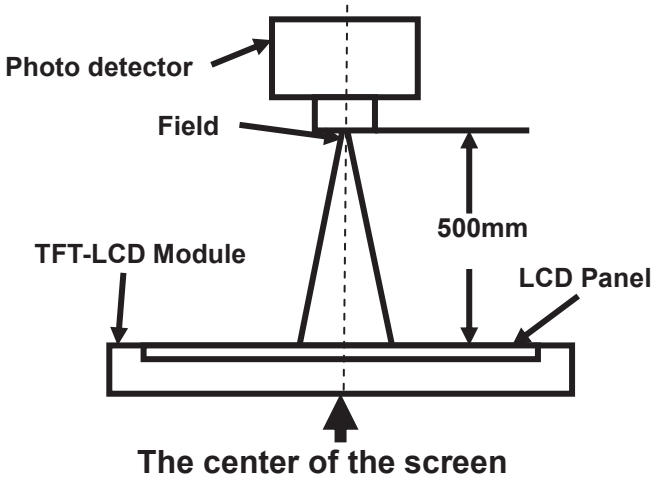
1. IF= 30 mA, and the ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.
3. Flicker pattern: 128 Grayscale



Note 1: Definition of optical measurement system.

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

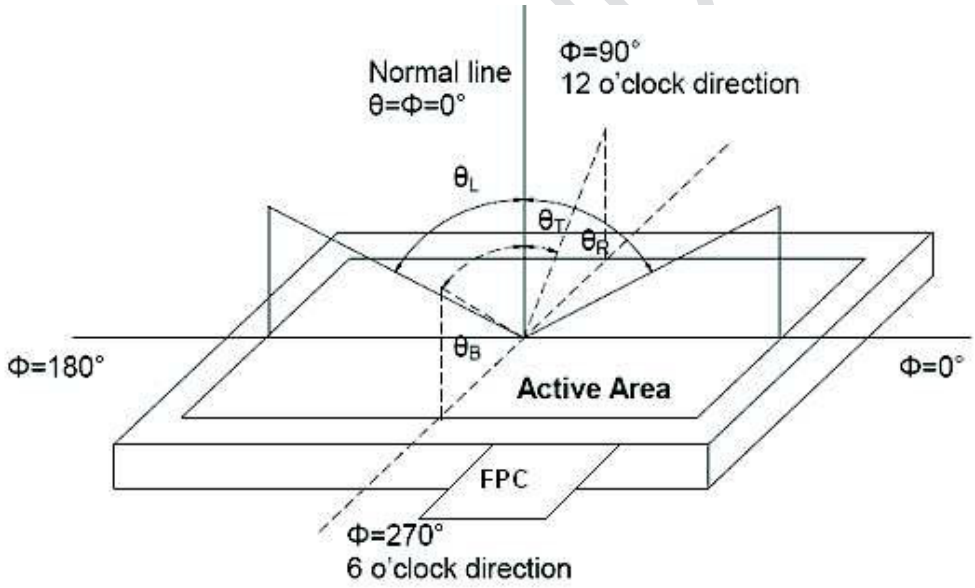
be ground when measuring the center area of the panel.



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

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

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



Note 3: Definition of contrast ratio

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

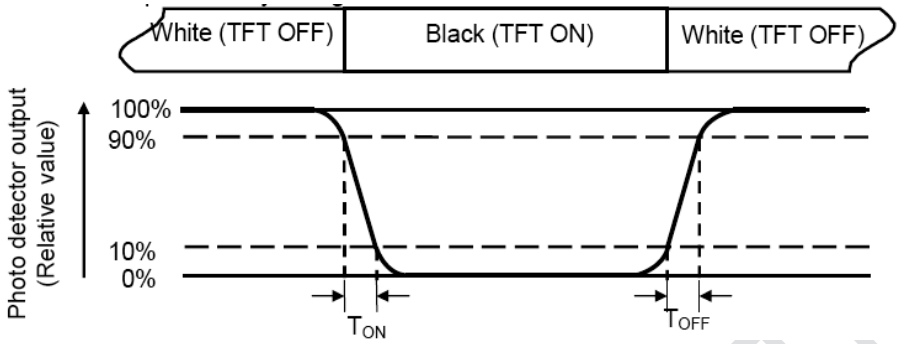
“White state “: The state is that the LCD should drive by Vwhite.

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

Vwhite: To be determined Vblack: To be determined.

Note 4: Definition of Response time

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



Note 5: Definition of color chromaticity (CIE1931)

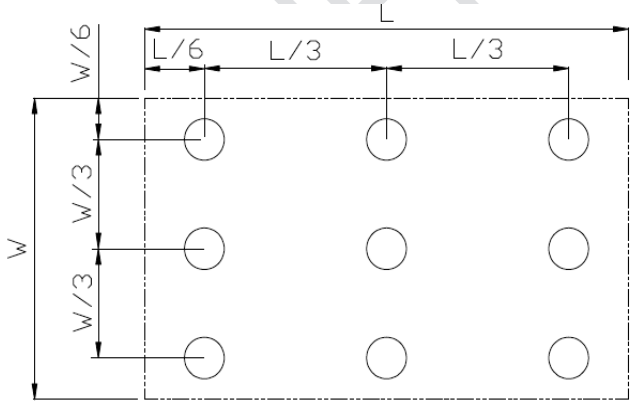
Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

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

Luminance Uniformity (U) = Lmin/ Lmax

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



Lmax: The measured Maximum luminance of all measurement position.

Lmin: The measured Minimum luminance of all measurement position.

Note 7: Definition of Luminance:

Measure the luminance of white state at center point.

7 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ta = +85℃,500hrs	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta= -30℃,500hrs	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta = +90℃,500hrs	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta = -40℃,500 hrs	IEC60068-2-1:2007 GB2423.1-2008
5	High Temperature & Humidity Storage	Ta=+60℃, 90% RH 500 hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-35℃ 30 min~+80℃ 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，5points/panel Air:±8KV, 5times; Contact:±4KV, 5 times; （Environment: 15℃～35℃, 30%～60%, 86Kpa～106Kpa）	IEC61000-4-2:2001 GB/T17626.2-2006
8	Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2H for each direction of X.Y.Z.(6 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
10	Package Vibration	频率（Hz）5~20-200Hz,PSD:0.01-0.01-0.001 Total:0.781g2/Hz，时间：X/Y/Z 各轴 30min	IEC60068-2-27:1987 GB/T2423.5—1995
11	Package Drop	Height:80cm;1corner,3edges,6surfaces	IEC60068-2-27:1987 GB/T2423.5—1995
12	Image sticking test	40℃(Oven real temperature) Times: fixed 6hours Checkboard image (total Number:6X8)Criteria: 25℃, 50% gray scale ,disappear in 15 minutes or have no	Criteria: 25℃, 50% gray scale ,disappear in 15 minutes or have no

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

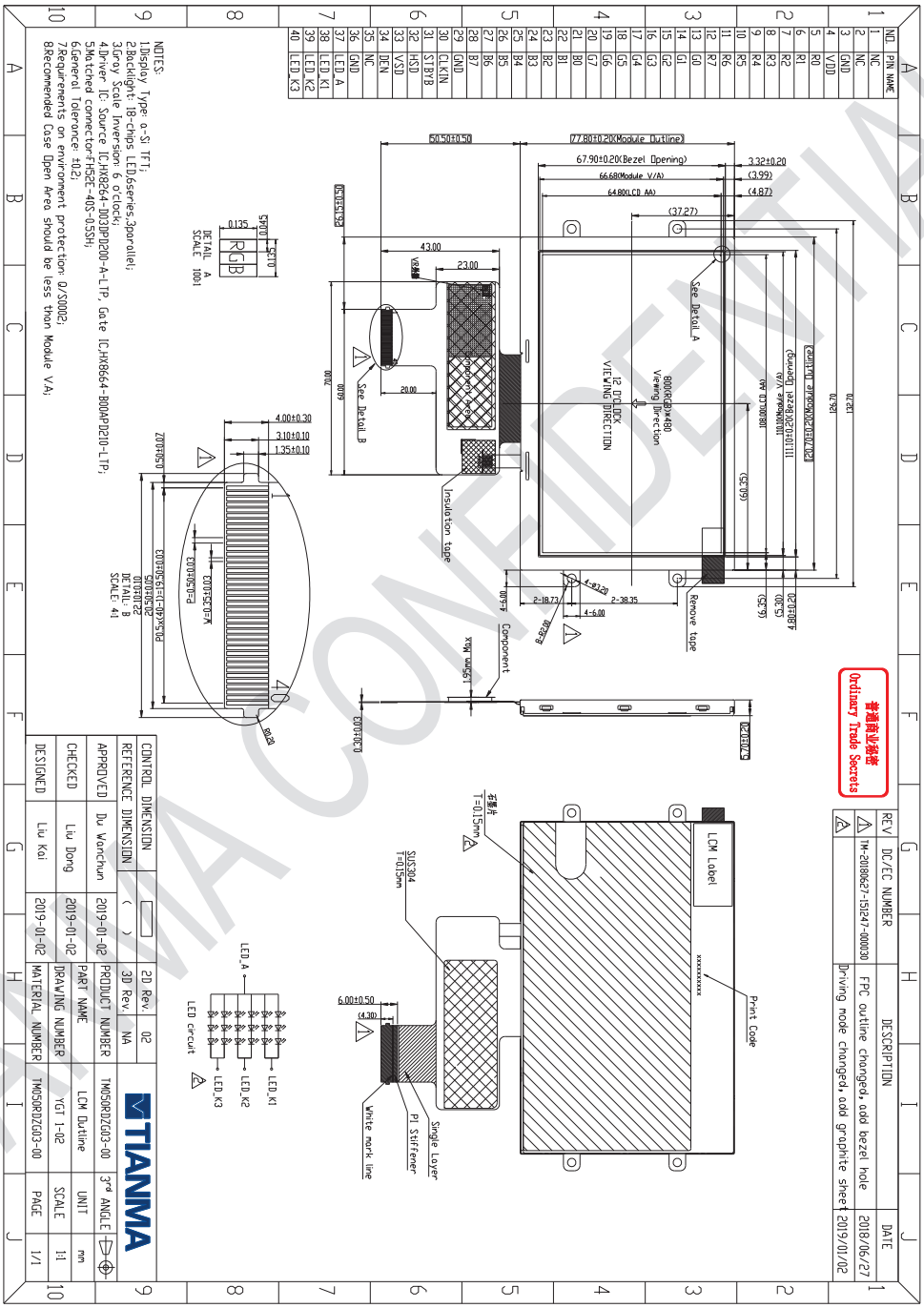
Note2: Ta is the ambient temperature of sample.

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.

Note5: Image sticking test is as below.

8 Mechanical Drawing



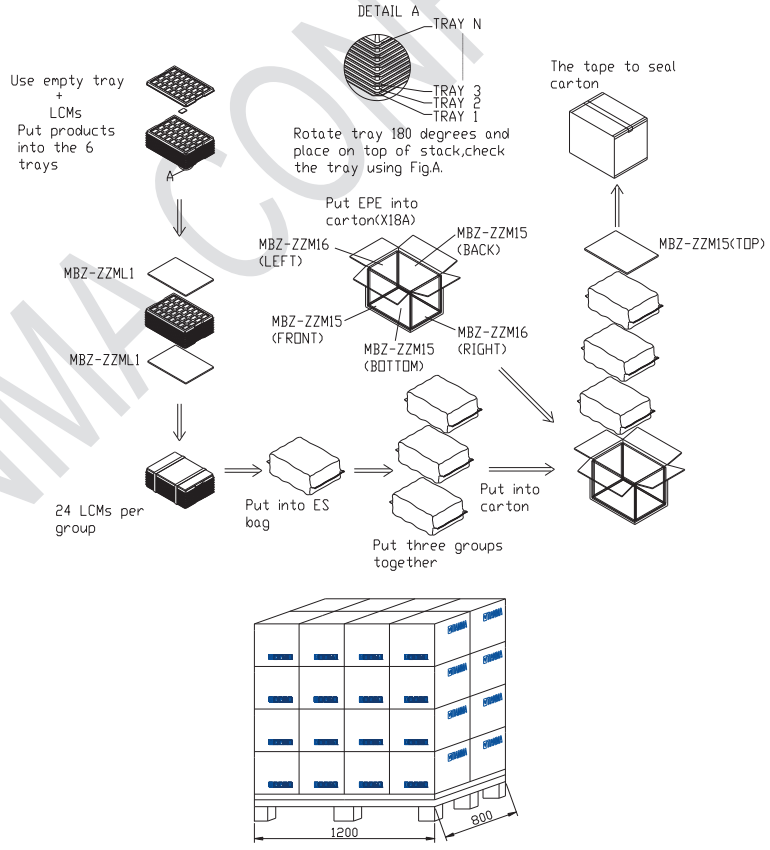
9 Packing Drawing

9.1 Packaging Material

No	Item	Model(Material)	Dimensions (mm)	Unit Weight (Kg)	Quantity	Remark
1	LCM Module	TM050RDZG03-00	120.7*77.8*5.7	0.076	72	
2	Tray	TM050RDZG03-00-YBZ 1-00	356*256*15.6	0.12	21	
3	EPE（珍珠棉1）	MBZ-ZZML1	336*246*6	0.01	6	Anti-static
4	EPE（珍珠棉2）	MBZ-ZZM15	375*275*10	0.014	4	
5	EPE（珍珠棉3）	MBZ-ZZM16	250*280*12	0.015	2	
6	Carton	X18A	395*290*315	0.58	1	
7	Es bag（防静电真空包装袋）	JD13	400*520	0.042	3	
10	Total weight	8.84±5%				

Note: Packaging Specification and Quantity
Module quantity in a carton：2pcs (per row) x 2 (per column) x 6 x3= 72pcs

9.2 Packing Instruction



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.