MODEL NO : TM070JDHG34

MODEL VERSION: 00

SPEC VERSION : 1.1

ISSUED DATE: 2019-07-29

■**Preliminary Specification**

□**Final Product Specification**

Customer :

Approved by	Note

TIANMA Confirmed :

Prepared by	Checked by	Approved by
Xiaohui Zhou	Feng Tan	Kevin Kim

This technical specification is subjected to change without notice.

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Record of Revision

Rev	Issued Date	Description	Editor
1.0	2018-04-02	First release	Dongliang Xie
1.1	2019-07-29	Update Power on/off timing	Xiaohui Zhou

1 General Specification

Feature		Spec
Display Spec.	Size	7.0inch
	Resolution	1280(RGB) x 800
	Technology Type	a-Si
	Pixel Configuration	R.G.B. Vertical Stripe
	Pixel Pitch (mm)	0.117(H)x 0.117(V)
	Display Mode	SFT with Normally Black
	Surface Treatment(Up Polarizer)	HC
	Viewing Direction	All direction
Mechanical Characteristics	LCM (W x H x D) (mm)	161.00 x107.00
	Active Area(mm)	149.76 x 93.60
	With /Without TSP	Without TSP
	Module Connection Type	CN1:F1-SE20P-HFE-E3000 CN2:F1-S6P-HFE-E1500
	Weight (g)	TBD
Electrical Characteristics	Interface	LVDS 6/8bits
	Color Depth	262K/16.7M
	Driver IC	3*ST5821C and 1*ST5084C

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 TFT CN pin assignment

Connector type: **CN1:JAE F1-SE20P-HFE-E3000 CN2:JAE F1-S6P-HFE -E1500**

No	Symbol	I/O	Description	Comment
CN1				
1	IND3+	I	Positive LVDS Differential data input(3)	
2	IND3-	I	Negative LVDS Differential data input(3)	
3	NC	-	No Connection	
4	SEL6/8	I	6bit/8bit mode select H : 6-bit mode L : 8-bit mode	
5	VSS	P	Power Ground	
6	PINC	I	Positive LVDS Differential clock input	
7	NINC-	I	Negative LVDS Differential clock input	
8	VSS	P	Power Ground	
9	IND2+	I	Positive LVDS Differential data input(2)	
10	IND2-	I	Negative LVDS Differential data input(2)	
11	VSS	P	Power Ground	
12	IND1+	I	Positive LVDS Differential data input(1)	
13	IND1-	I	Negative LVDS Differential data input(1)	
14	VSS	P	Power Ground	
15	IND0+	I	Positive LVDS Differential data input(0)	
16	IND0-	I	Negative LVDS Differential data input(0)	
17	VSS	P	Power Ground	
18	NC	-	No Connection	
19	VDD	P	Power Supply	
20	VDD	P	Power Supply	
CN2				
1	VLED	P	Backlight power supply	
2	VLED	P	Backlight power supply	
3	VLSS	P	VLED Ground	
4	VLSS	P	VLED Ground	
5	LED_EN	I	Backlight on/off control	
6	LED_PWM	I	Backlight dimming control	

Note1: I/O definition.
I---Input, O---Output, P--- Power/Ground, N--- No connection

3. Absolute Maximum Ratings

3.1 Driving TFT LCD Panel

GND=0V, Ta = 25℃

Item	Symbol	Min	Max	Unit	Remark
Power Voltage	VDD	-0.5	5.0	V	
Backlight Forward Current	I_{LED}	-	25	mA	For each LED
Operating Temperature	T_{OPR}	-20	70	℃	
Storage Temperature	T_{STG}	-30	80	℃	

Table 3.1 absolute maximum rating

4. Electrical Characteristics

4.1 Driving TFT LCD Panel

Ta = 25℃

Item	Symbol	Min	Typ	Max	Unit	Remark
Digital Supply Voltage	VDD	3.0	3.3	3.6	V	

Table 4.1 LCD module electrical characteristics

4.2 TFT Driving Backlight

Item		Symbol	Min	Typ	Max	Unit	Remark
Backlight power supply voltage		VLED	11	12	13	V	
Backlight power supply current		I_Total	-	185	-	mA	Note1
Backlight power consumption		P_Total	-	2220	-	mW	
Input voltage for VLED_PWM signal	High level		-	2.0	-	5.0	V
	Low level		-	0	-	0.4	V
Input voltage for VLED_EN	High level		-	2.0	-	5.0	V
	Low level		-	0	-	0.4	V
VLED_PWM frequency		Fpwm	200	-	20k	HZ	
VLED_PWM duty		D	5		100	%	Note2
Operating Life Time		--	--	50000	--	hrs	Note3

Note 1: I_Total is the power supply current of LED driver, P_Total is the power consumption of LED driver and backlight.

Note 2: According to LED driver IC characteristics, the minimum value of VELD_PWM duty may vary with VLED_PWM frequency, higher the frequency, bigger the duty.

Note 3: 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% of initial brightness.
Typical operating life time is estimated data.

4.3 TFT Block Diagram

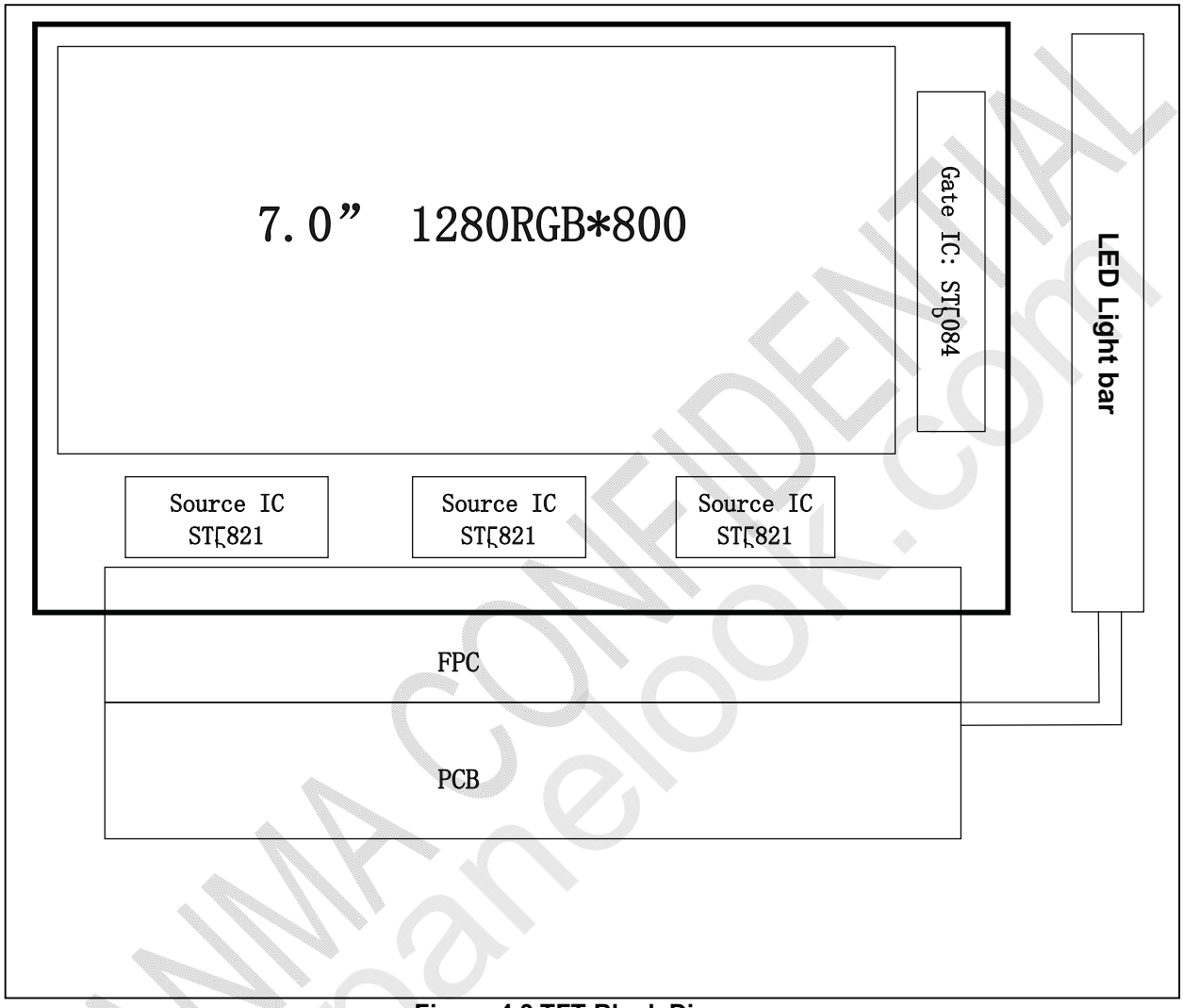


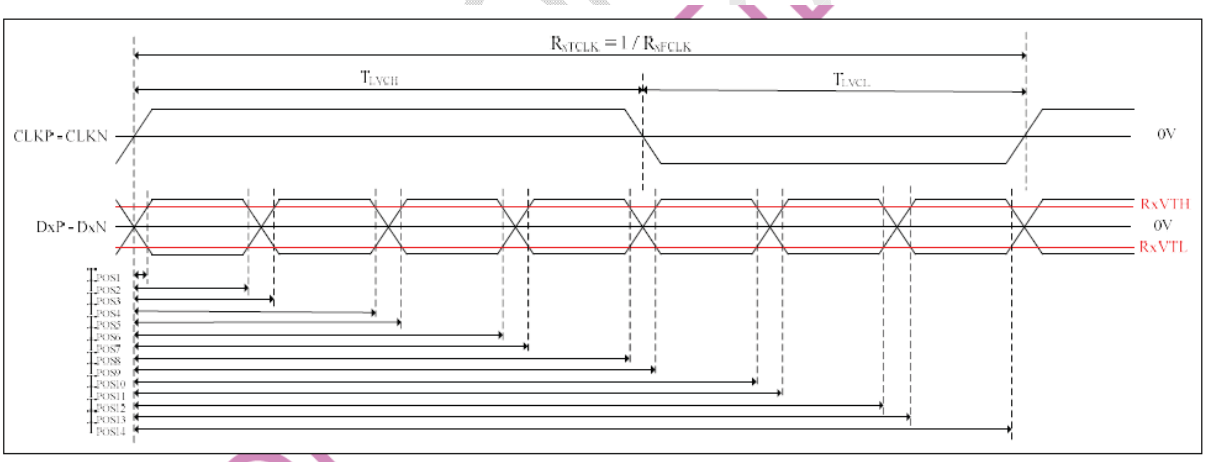
Figure 4.3 TFT Block Diagram

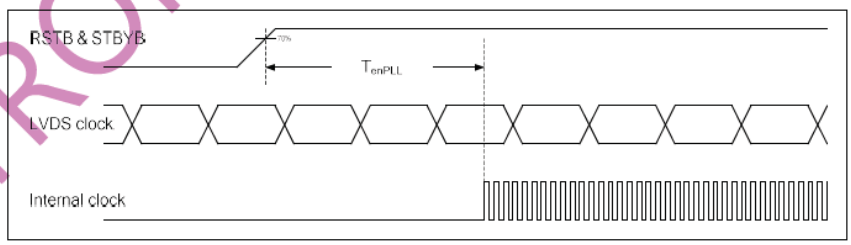
5. Timing Chart

5.1 AC Electrical Characteristics

LVDS AC characteristic (VDD=VDD_LVDS=3.0~3.6V, GND=GND_LVDS=0V, TA=-20~85℃)

Parameter	Symbol	Min	Typ.	Max.	Unit	Conditions
Clock Frequency	R_{XFCLK}	20		80	MHz	
Clock Period	R_{XTCLK}	12.5		50	ns	
1 data bit time	UI	-	1/7	-	R_{XTCLK}	
Clock high time	T_{LVCH}		4		UI	
Clock low time	T_{LVCL}		3		UI	
Position 1	T_{POS1}	-0.25	0	0.25	UI	
Position 2	T_{POS2}	0.75	-	1.25	UI	
Position 3	T_{POS3}	0.75	1	1.25	UI	
Position 4	T_{POS4}	1.75	-	2.25	UI	
Position 5	T_{POS5}	1.75	2	2.25	UI	
Position 6	T_{POS6}	2.75	-	3.25	UI	
Position 7	T_{POS7}	2.75	3	3.25	UI	
Position 8	T_{POS8}	3.75	-	4.25	UI	
Position 9	T_{POS9}	3.75	4	4.25	UI	
Position 10	T_{POS10}	4.75	-	5.25	UI	
Position 11	T_{POS11}	4.75	5	5.25	UI	
Position 12	T_{POS12}	5.75	-	6.25	UI	
Position 13	T_{POS13}	5.75	6	6.25	UI	
Position 14	T_{POS14}	6.75	-	7.25	UI	
PLL wake-up time	TenPLL			150	us	

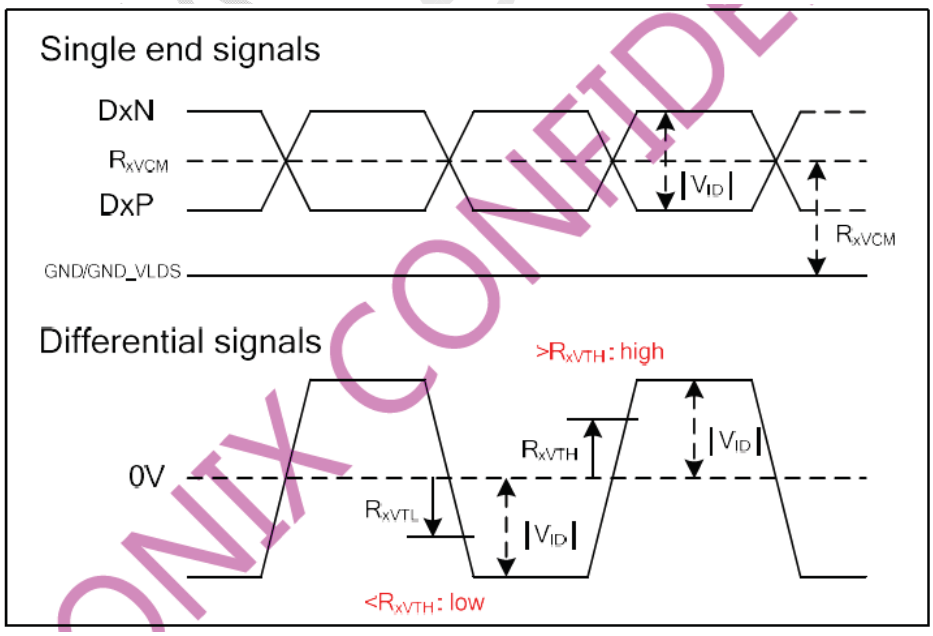




5.2 DC Electrical Characteristics

VDD=3.3V, AGND=GND=0V, Ta=25℃

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Differential input high Threshold voltage	R_{XVTH}	–	–	+0.1	V	R_{XVCM}=1.2V
Differential input Low Threshold voltage	R_{XVTL}	-0.1	–	–	V	
Input voltage range	R_{XVIN}	0	–	VDD-1.0	V	
Differential input common Mode voltage	R_{XVCM}	0.6	1.2	2.4-$\|V_{ID}\|$/2	V	
Differential input voltage	$\|V_{ID}\|$	0.2	0.4	0.6	V	
Differential input leakage Current	RV_{Xliz}	-10	--	+10	uA	
LVDS Digital Operating Current	Iddlvds	–	10	15	mA	Fclk=65MHz; VDD_LVDS=3.3V; Data pattern=55/H->AA/H (loop)
LVDS Digital Stand-by Current	Istlvds	–	10	50	uA	RSTB=0 or STBYB=0; All functions are stopped ; ClKx & D0x Connect to GND



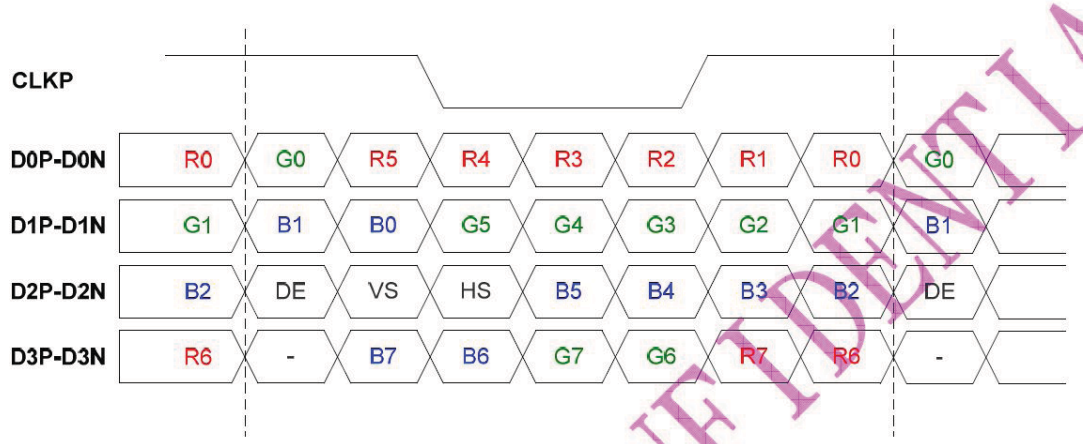
5.3 Input timing

1280x800 (RES[3:0] = 0010)

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
CLK frequency	t_{CLK}	68.4	71.9	78.1	Mhz	
Horizontal blanking time	t_{HBT}	136	144	164	t_{CLK}	$t_{HBP} + t_{HFP}$
Horizontal back porch	t_{HBP}	5	5	164- t_{HFP}	t_{CLK}	
Horizontal display area	t_{HD}	1280	1280	1280	t_{CLK}	
Horizontal front porch	t_{HFP}	131	139	159	t_{CLK}	
Horizontal period	t_H	1416	1424	1444	t_{CLK}	
Horizontal pulse width	t_{HPW}	1	1	256	t_{CLK}	
Vertical blanking time	t_{VBT}	5	42	101	t_H	$t_{VBP} + t_{VFP}$
Vertical back porch	t_{VBP}	2	2	101- t_{VFP}	t_H	
Vertical display area	t_{VD}	800	800	800	t_H	
Vertical front porch	t_{VFP}	3	40	99	t_H	
Vertical period	t_V	805	842	901	t_H	
Vertical pulse width	t_{VPW}	1	1	128	t_H	

5.4 Data Input Format

VESA data mapping



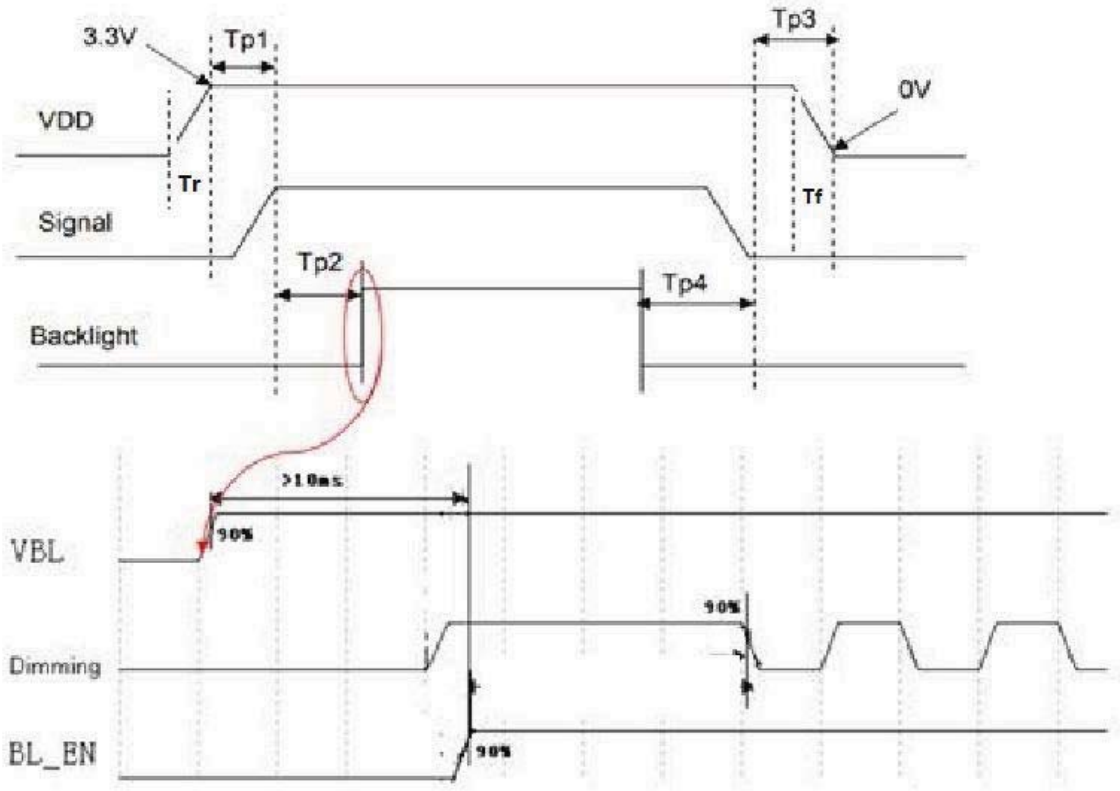
Note 1 : for 6 bit mode, MSB are R/G/B[5] and R/G/B[0] are LSB
Note 2 : for 8 bit mode, MSB are R/G/B[7] and R/G/B[0] are LSB

5.5 Power On/Off Timing

To prevent the device damage from latch up, the power on/off sequence shown below must be followed.

Power ON& Power Off:

Item	Symbol	Min	Typ	Max	Unit	Remark
VDD 3.3 to LVDS signal starting	TP1	3.5	-	50	ms	
VDD rising time	Tr	-	-	3	ms	
LVDS signal starting to backlight on	TP2	150	-	-	ms	
LVDS signal off to VDD 0V	TP3	120	-	-	ms	
Backlight off to signal off	TP4	150	-	-	ms	
VDD failing time	Tf	1	-	5	ms	



6. Optical Characteristics

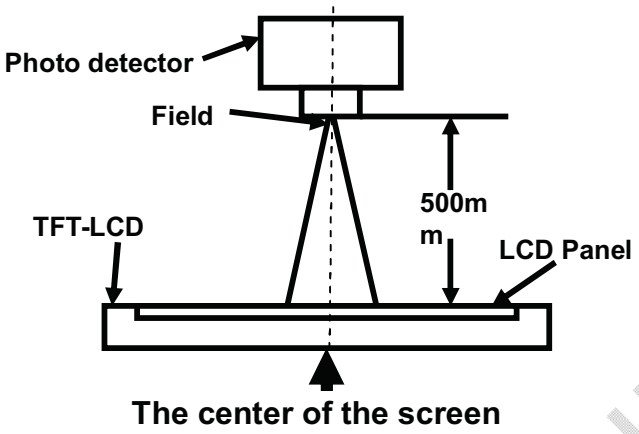
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≥10	75	85	-	Degree	Note 2
		θB		75	85	-		
		θL		75	85	-		
		θR		75	85	-		
Contrast Ratio		CR	θ=0°	600	800	-		
Response Time		T_{ON}	25℃	-	35	40	ms	Note1 Note4
		T_{OFF}						
Chromaticity	White	x	Backlight is on	0.265	0.315	0.365		Note5 Note1
		y		0.291	0.341	0.391		
	Red	x		0.526	0.576	0.626		
		y		0.291	0.341	0.391		
	Green	x		0.297	0.347	0.397		
		y		0.547	0.597	0.647		
	Blue	x		0.103	0.153	0.203		
		y		0.050	0.100	0.150		
Uniformity		U		70	75	-	%	Note1、Note6
NTSC				45	50	-	%	
Luminance		L			600	-	cd/m^2	Note7

Test Conditions:

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

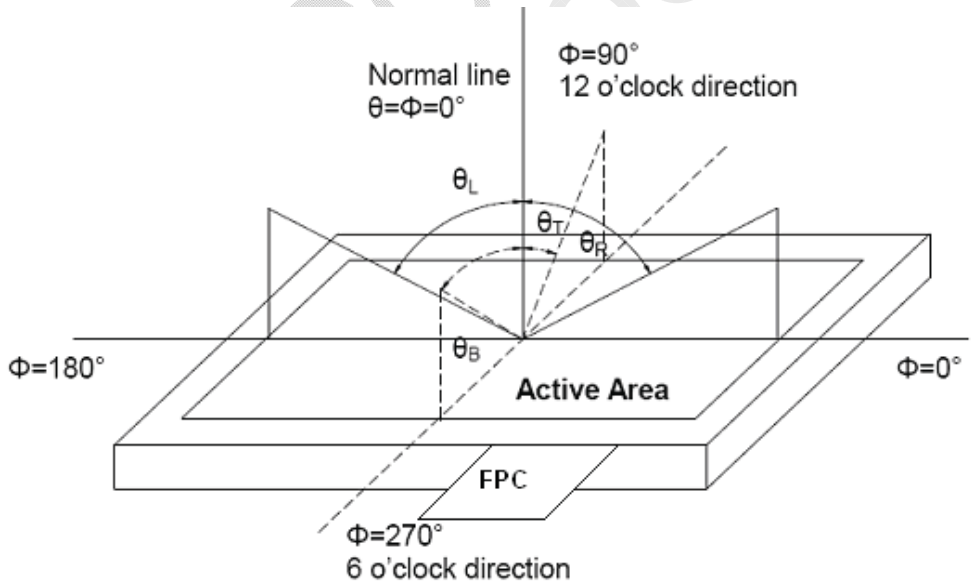
Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 10 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



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

viewing angle is measured at the center point of the LCD.



Note 3: Definition of contrast ratio

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

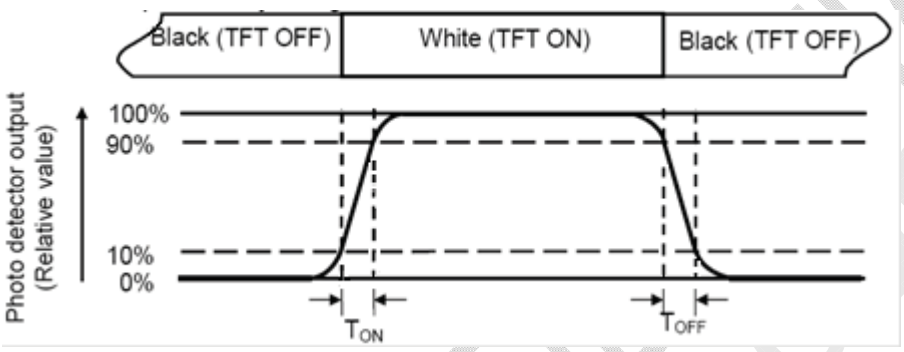
"White state ": The state is that the LCD should drive by Vwhite.

"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 10% to 90%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 90% to 10%.



Note 5: Definition of color chromaticity (CIE1931)

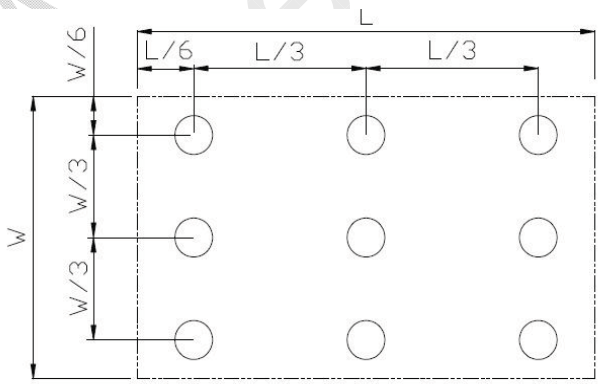
Color coordinates measured at center point of LCD.

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. Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ta = +70℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta = -20℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta = +80℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta = -30℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
5	Operate at High Temperature and Humidity	Ta=+60℃、RH=90%, 240 hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃（30min）⇔80℃（30min）,Change Time:5min,20cycle	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,GB2423.22-2002
7	ESD	C=150pF、R=330Ω Air: ±8KV Contact:±4KV 5point/panel, 5times (Environment:15℃~35℃, 30%~60%.86Kpa~106Kpa)	IEC61000-4-2:2001 GB/T17626.2-2006
8	Package Drop Test	Height: tbd cm, 1corner,3edges,6surfaces	IEC60068-2-32:1990 GB/T2423.8—1995

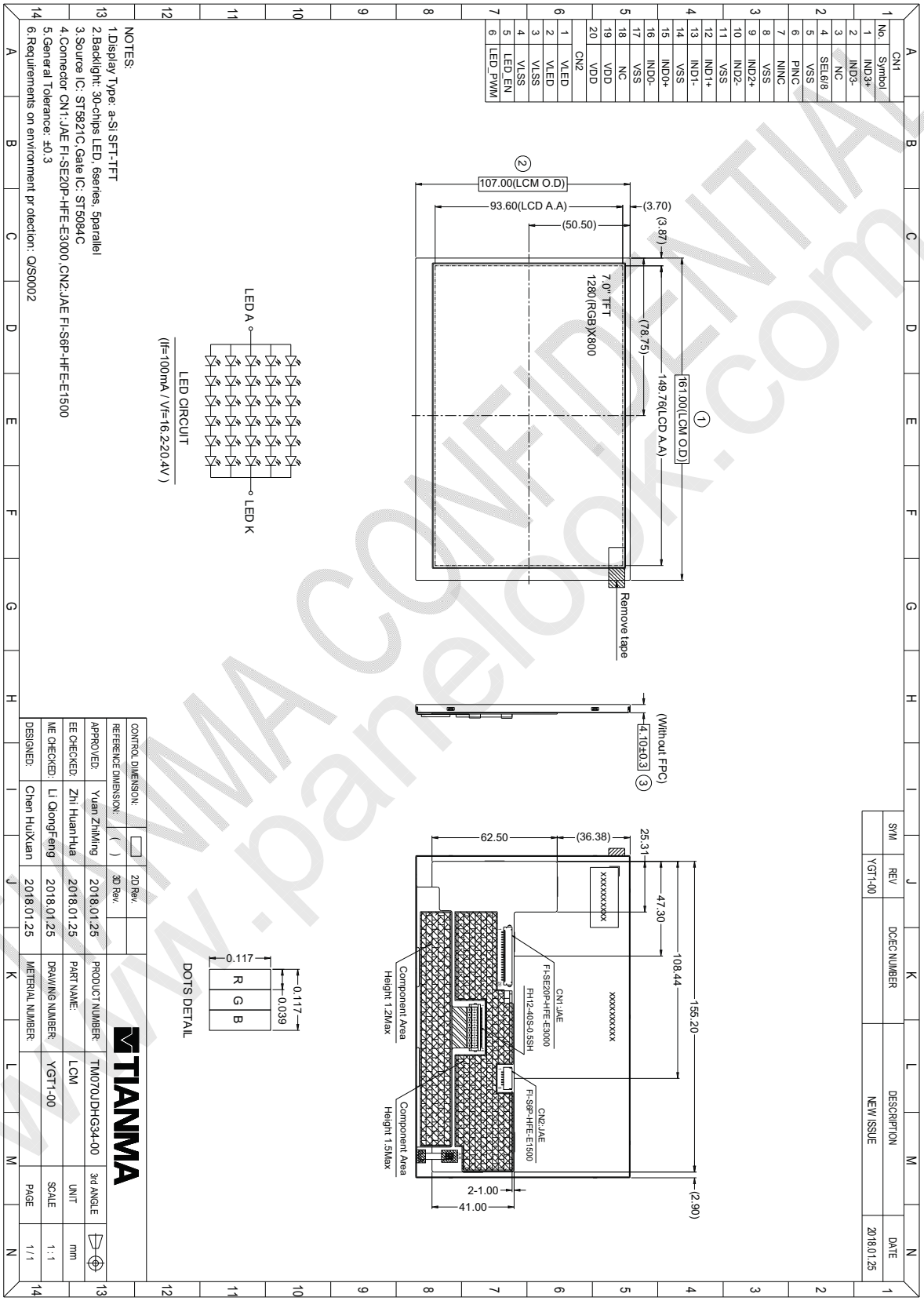
Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of sample.

Note3: Before cosmetic and function test, the product must have enough recovery time, at least 24 hours at room temperature.

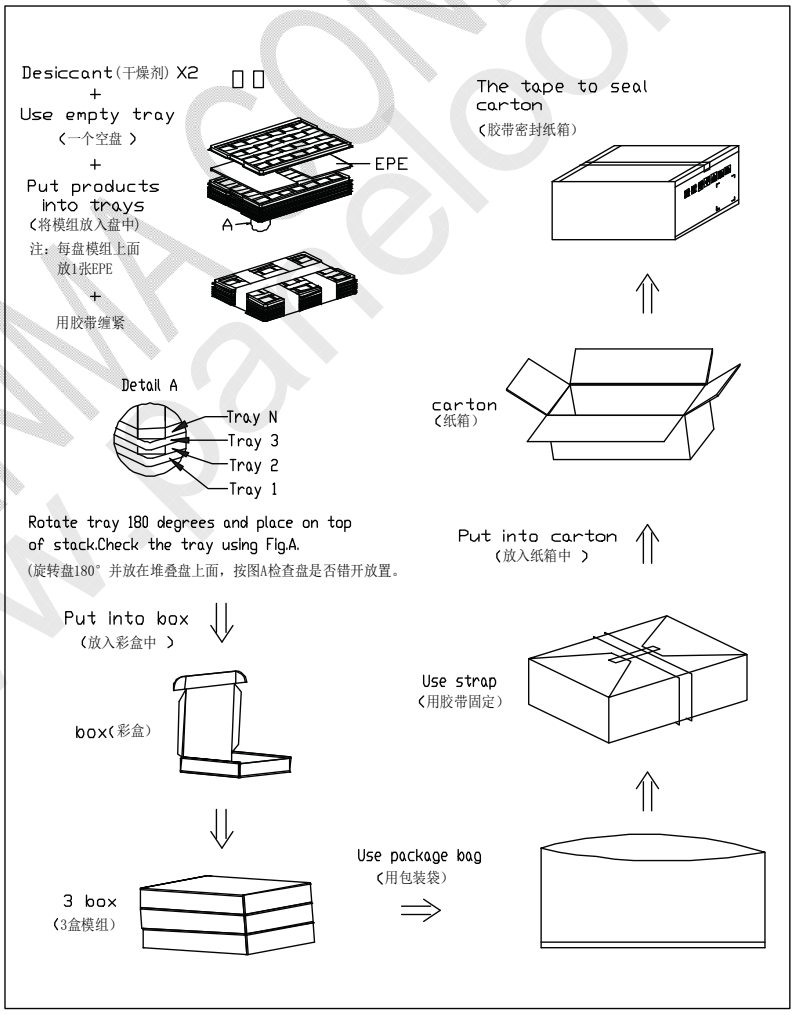
Note4: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

8. Mechanical Drawing



9. Packing Drawing

No	Item	Model (Materiel)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	TM070JDHG34-00	161.0×107.0×4.1	TBD	48	
2	Tray	PET（Transmit）	485×330×17	TBD	15	
3	Dust-proof Bag	PE	700×545×0.05	TBD	1	
4	BOX	CORRUGATED PAPER	520×345×74	TBD	3	
5	Desiccant	Desiccant	45×35	TBD	6	
6	EPE	EPE	357.6x238.6x1.0	TBD	12	
7	Label	Label	100X52	TBD	1	
8	Carton	CORRUGATED PAPER	544×365×250	TBD	1	
9	Total weight	TBD				



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.

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

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

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

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