MODEL NO.   :   TM104SDH03

ISSUED DATE: 2010-08-30

VERSION   :   Ver 1.2

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

Customer :

Approved by	Notes

SHANGHAI TIANMA Confirmed :

Prepared by	Checked by	Approved by

This technical specification is subjected to change without notice

Table of Contents

Record of Revision

Rev	Issued Date	Description	Editor
1.0	2010-04-20	Preliminary Release	Xing Nie
1.1	2010-06-28	Mechanical Drawing	Xing Nie
1.2	2010-8-30	Revise Driving TFT LCD Panel& Driving Backlight	Xing Nie

1   General Specifications

Feature		Spec
Display Spec.	Size	10.4 inch
	Resolution	800(RGB) x 600
	Interface	LVDS 8-bit/6-bit
	Color Depth	16.7M/262K
	Technology Type	a-Si
	Pixel Pitch (mm)	0.264x0.264
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	TM with Normally White
	Surface Treatment(Up Polarizer)	Anti-Glare(3H)
	Viewing Direction	12 o'clock
	Gray Scale Inversion Direction	6 o'clock
Mechanical Characteristics	LCM (W x H x D) (mm)	243.00x179.40x8.5（Max）
	Active Area(mm)	211.20x158.40
	With /Without TSP	Without TSP
	Weight (g)	432.89

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 LCD Panel

CN1 Connector type: 107A20-0021RA-G3-R

| No	Symbol	I/O	Description	Comment
1	VDD	P	Power Supply	
2	VDD	P	Power Supply	
3	GND	P	Ground	
4	DPS	I	Reverse Scan Function [H: Enable; L/NC: Disable]	Note3
5	RxIN0-	I	LVDS receiver signal channel 0. LVDS Differential Data Input (R0, R1, R2, R3, R4, R5, G0)	Note2
6	RxIN0+	I		
7	GND	P	Ground	
8	RxIN1-	I	LVDS receiver signal channel 1. LVDS Differential Data Input (G1, G2, G3, G4, G5, B0, B1)	Note2
9	RxIN1+	I		
10	GND	P	Ground	
11	RxIN2-	I	LVDS receiver signal channel 2 LVDS Differential Data Input (B2, B3, B4, B5, DE)	Note2
12	RxIN2+	I		
13	GND	P	Ground	
14	RxCLKIN-	I	LVDS receiver signal clock	Note2
15	RxCLKIN+	I		
16	GND	P	Ground	
17	RxIN3-	I	LVDS receiver signal channel 3, NC for 6-bit LVDS Input. LVDS Differential Data Input (R6, R7, G6, G7, B6, B7, RSV) for 8-bit LVDS input.	Note2
18	RxIN3+	I		
19	AGMode	I	Aging Mode setting [H: Aging Mode; L/NC: Normal]	
20	SEL68	P	6-bit/8-bit LVDS data input selection [H: 8-bit L/NC: 6-bit]	Note2

P: Power/GND; I: input pin;

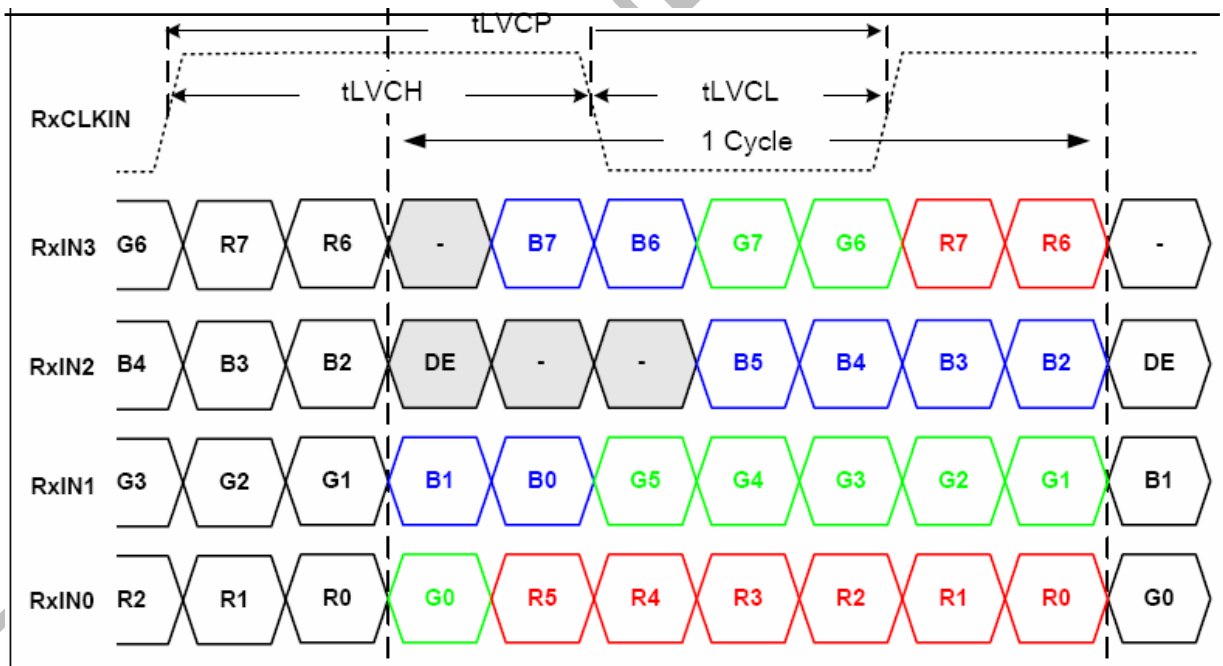**Table 2.1 input terminal pin assignment**

Note1: CN1 Match Connector type: DF19G-20S-1C or compatible

Note2: LVDS 6-bit data mapping when SEL68=L/NC as follows:

Figure 2.1.1 Input signal data mapping
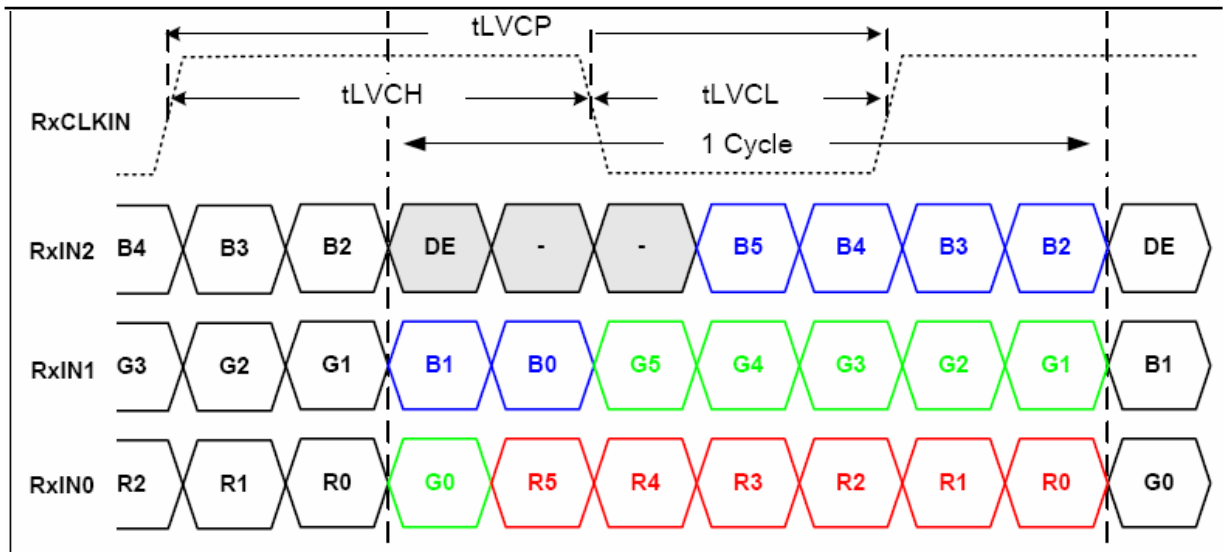
LVDS 8-bit data mapping when SEL68=H as follows:

Figure 2.1.2 Input signal data mapping

Note3: DPS: Scan direction setting

DPS	Horizontal Scan direction	Vertical Scan direction
High	Right to left	Down to up
Low/NC	Left to right	Up to down

2.2 CN2(Backlight Connector)

Connector type: 3808K-F05N-03R (ENTERY)

No	Symbol	I/O	Description	Remark
1	VCC	P	Power for LED driving circuit.12.0V input.	
2	PGND	P	Ground for LED driving circuit. 0V input.	
3	EN	I	Backlight enable setting. High: enabled; Low: disable.	
4	Dimming	I	PWM signal for adjusting luminance of backlight.	
5	NC	-	No connection	

Match connector: H208K–P05N-02B (ENTERY)

3 Absolute Maximum Ratings

3.1 Driving TFT LCD Panel

GND=0V, Ta = 25°C

Item	Symbol	Min	Max	Unit	Remark
Power Voltage	VDD	-0.3	5.0	V	
Power for LED driving circuit	VCC	-0.3	13.5	V	
Input voltage	V$_{IN}$	-0.3	5.0	V	Note1
Input voltage for backlight	V$_t$	-0.5	7.0	V	Note2
Operating Temperature	T$_{OPR}$	-30	80	℃	
Storage Temperature	T$_{STG}$	-30	85	℃	

Note1: V$_{IN}$ represents RxIN0±, RxIN1±, RxIN2±, RxIN3±, RxCLKIN±, DPS, AGMode, SEL68.

Note2: V$_t$ represents EN and Dimming.

4 Electrical Characteristics

4.1 Driving TFT LCD Panel

GND=0V, Ta=25℃

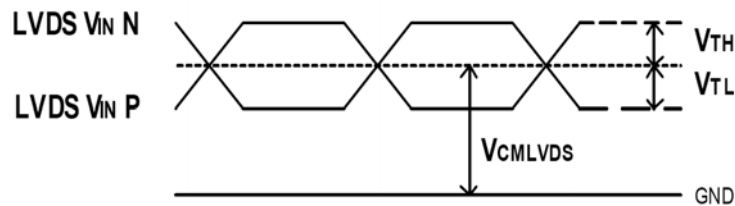| Item	Symbol	Min	Typ	Max	Unit	Remark
Supply Voltage	VDD	3.0	3.3	3.6	V	
LVDS Differential input high threshold	V$_{TH}$	-	-	+100	mV	V$_{CMLVDS}$=1.2V
LVDS Differential input low threshold	V$_{TL}$	-100	-	-	mV	V$_{CMLVDS}$=1.2V
Differential input voltage	| V$_{ID}$ |	0.1	-	0.6	V	
LVDS input common mode voltage	V$_{CMLVDS}$	|V$_{ID}$|/2	-	1.4-(|V$_{ID}$|/2)	V	
Common Electrode Driving Signal	VCOM	-	4.30	-	V	Note1
Sync Frequency	FVD	-	60	70	Hz	
VDD Power Consumption	I$_{VDD}$	-	340	380	mA	Note2

Figure 4.1.1 LVDS DC timing diagram

Note1: For different LCM, the value may have a bit of difference.

Note2: To test the current dissipation, use "all Black Pattern" test pattern.

4.2 Driving Backlight

Ta=25℃

Item	Symbol	Min	Typ	Max	Unit	Remark
Power for LED driving circuit	VCC	10.8	12.0	12.6	V	
Current of Backlight Power	I_{VCC}	-	0.32	-	A	100% PWM Duty
Backlight Power Consumption	W_{BL}	-	3.84	-	W	100% PWM Duty
Dimming Frequency	F_{PWM}	200	-	20K	Hz	
Dimming duty cycle	-	0	-	100%	-	
High Level Input Voltage	V_{IH}	2	-	-	V	For Dimming, EN pin
Low Level Input Voltage	V_{IL}	-	-	0.8	V	For Dimming, EN pin
LED Life Time	-	25000	(50000)	-	hrs	Note 1

Note 1: The LED driving condition is defined for total backlight consumption.

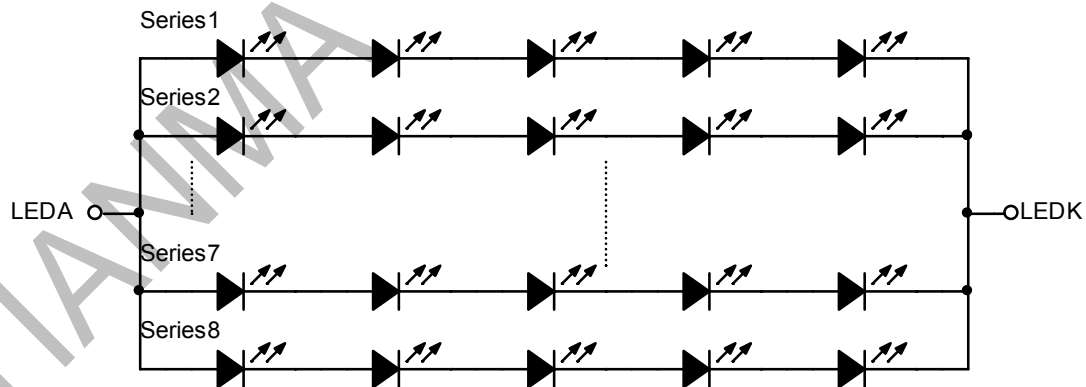Note 2: Forward Voltage adjusting should depend on Forward Current setting.

Figure 2.4 LED connection of backlight

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.
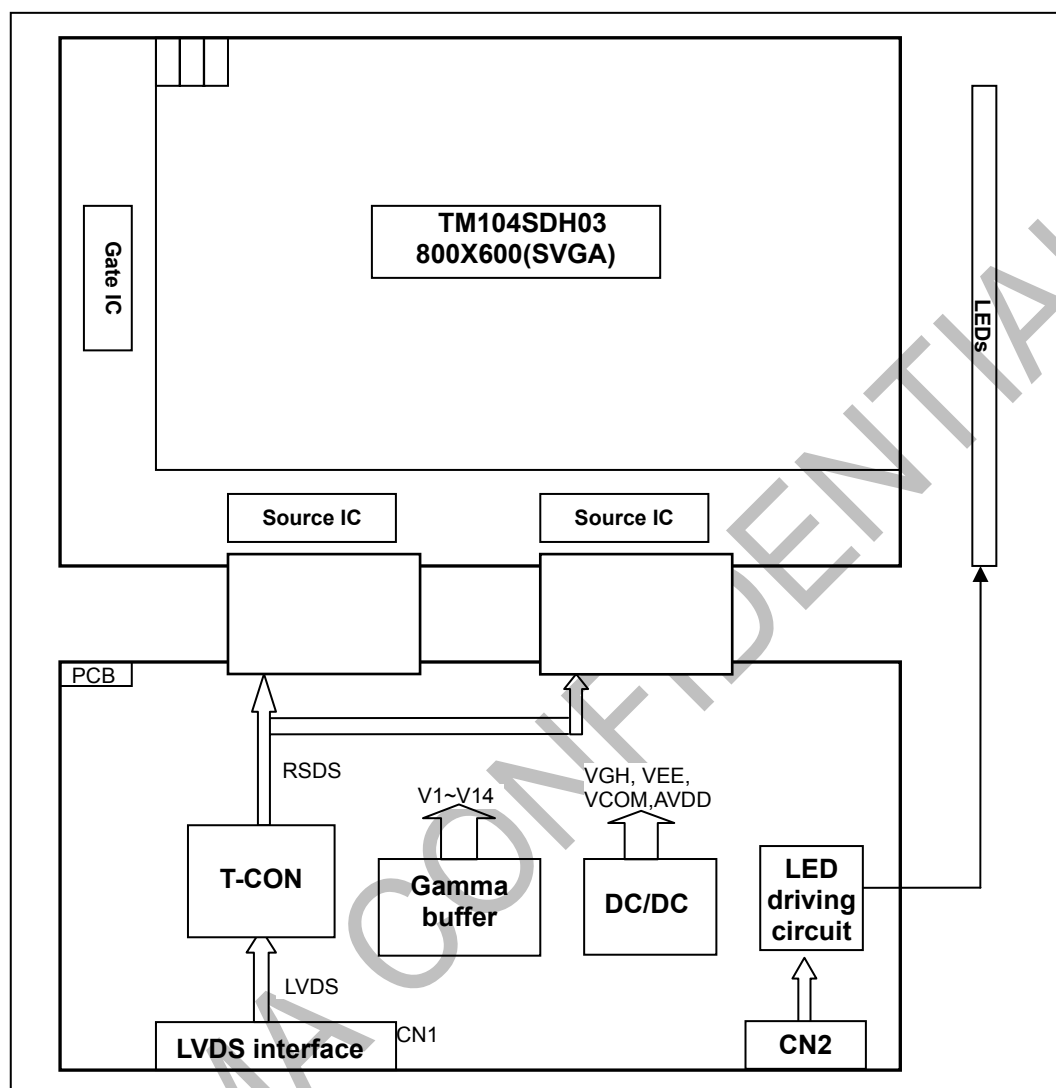
The life time of LED will be reduced.

Operating life means brightness goes down to 50% initial brightness.

Typical operating life time is estimated data.
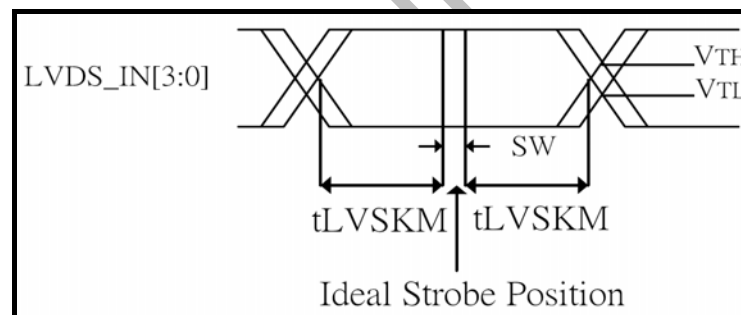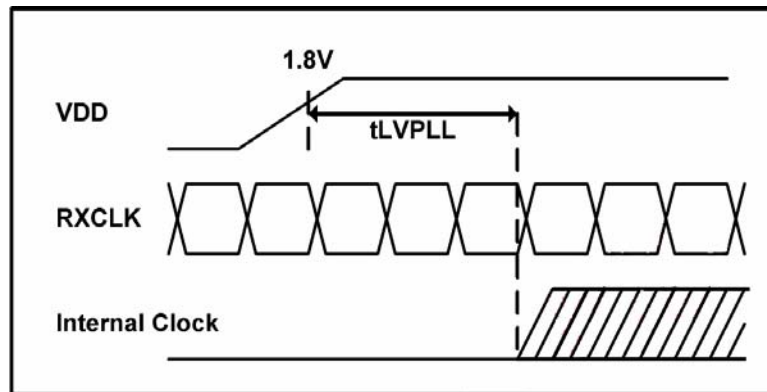
4.3   Block Diagram

5   Timing Chart

5.1   Timing Parameter

Item	Symbol	Min	Typ	Max	Unit	Condition
Clock period	tLVCP	20.0	25	31.25	ns	
Clock high time	tLVCH	-	14.29	-	ns	
Clock low time	tLVCL	-	10.71	-	ns	
PLL wake-up time	tLVPLL	-	-	1	ms	
Input skew marign	tLVSKM	400	-	-	ps	f=85MHz

Table 5.1 timing parameter
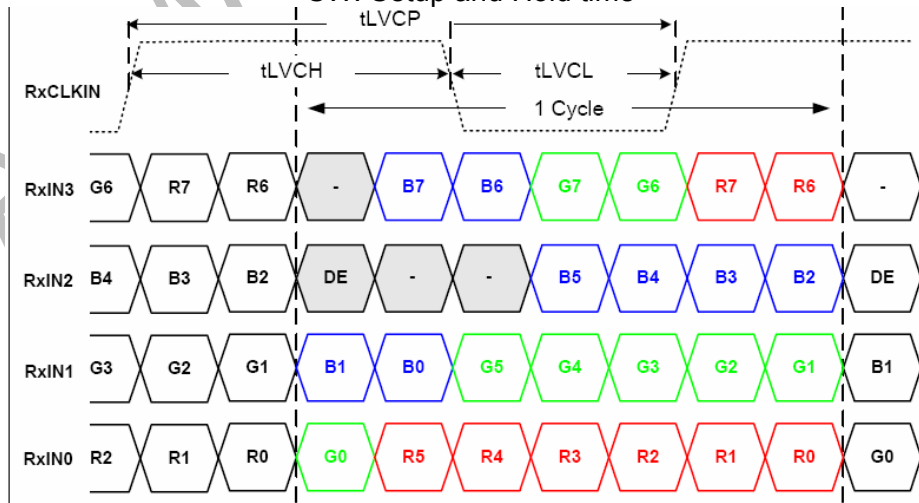
Figure 5.1 Input signal data timing

5.2 Power On/Off Sequence

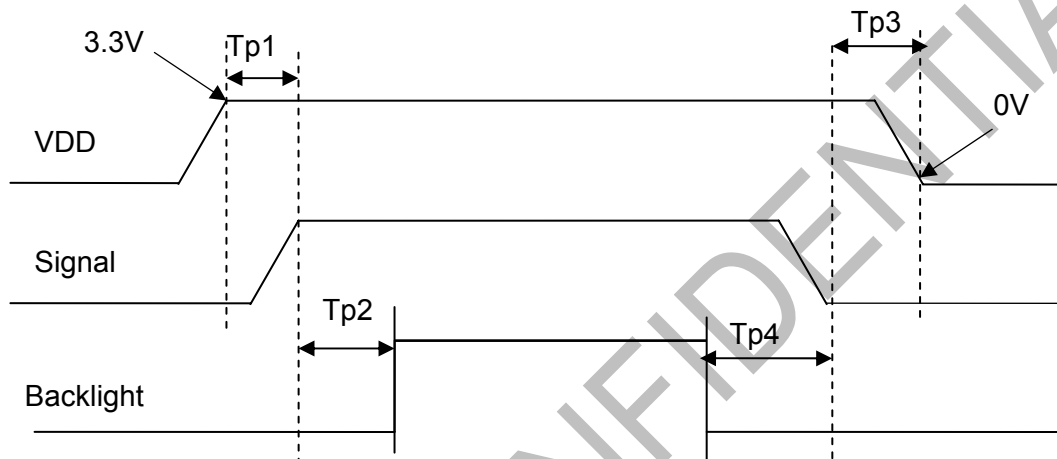| Item	Symbol	Min	Typ	Max	Unit	Remark
VDD 3.0V to signal starting	Tp1	5	-	50	ms	
Signal starting to backlight on	Tp2	150	-	-	ms	
Signal off to VDD 3.0V	Tp3	5	-	50	ms	
Backlight off to signal off	Tp4	150	-	-	ms	

Figure 5.2 Interface power on/off sequence

5.3 Recommended Input Timing of LVDS transmitter

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
Dclk frequency		1/Tclk	32	40	50	MHz	
Horizontal section	Horizontal total	Th	866	1056	1064	Tclk	
	Horizontal blanking	Thb	66	256	264	Tclk	
	Valid Data Width	Thd	800	800	800	Tclk	
Vertical section	Frame rate	-	-	60	70	Hz	
	Vertical total	Tv	604	628	800	Th	
	Vertical blanking	Tvb	4	28	200	Th	
	Valid Data Width	Tvd	600	600	600	Th	

Note: DE signal is necessary.

Input Timing Control Conditions

DE

Tvb

Tvd

Tv

Th

DE

Thb

Thd

DCLK

Tclk

DATA

Valid Data
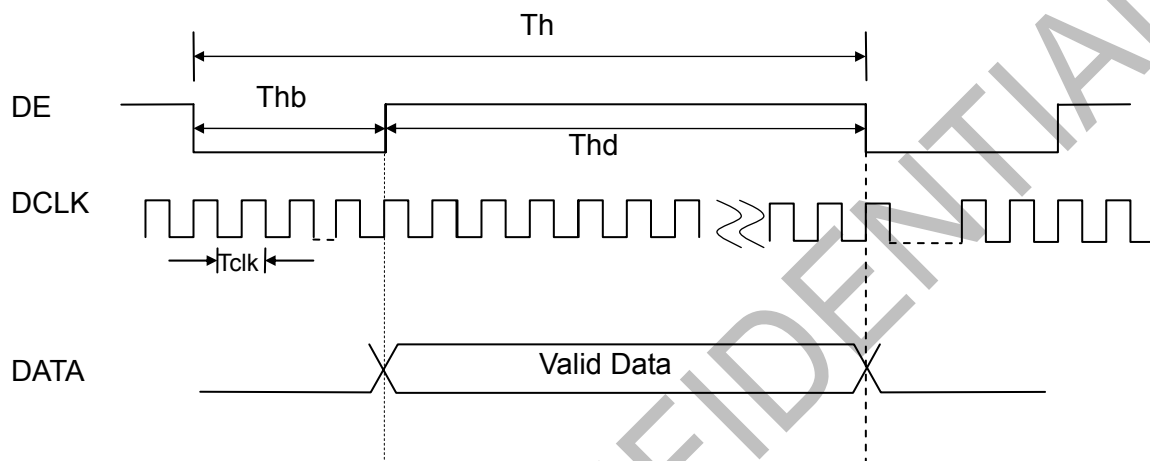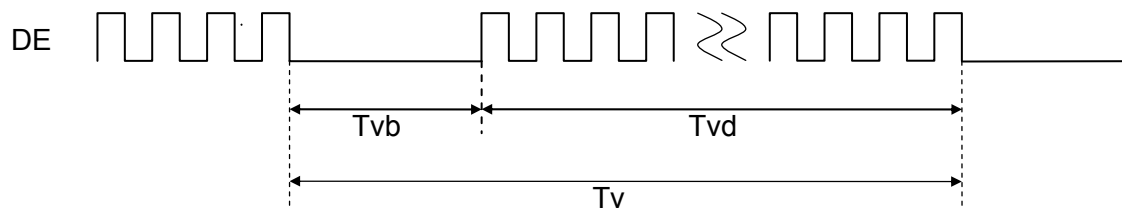
6 Optical Characteristics

6.1 Optical Specification

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°	400	500	-	-	Note1 Note3
Response Time		T_{ON}	25℃	-	10	15	ms	Note1 Note4
		T_{OFF}		-	15	25		
Chromaticity	White	x	Backlight is on	0.2545	0.3045	0.3545	-	Note5 Note1
		y		0.2946	0.3446	0.3946		
	Red	x		0.5592	0.6092	0.6592		
		y		0.3052	0.3552	0.4052		
	Green	x		0.2649	0.3149	0.3649		
		y		0.5053	0.5553	0.6053		
	Blue	x		0.0897	0.1367	0.1897		
		y		0.0896	0.1396	0.1896		
Uniformity		U	-	70	80	-	%	Note1 Note6
NTSC		-	-	-	50	-	%	Note 5
Luminance		L		280	350	-	cd/m^2	Note1 Note7

Test Conditions:

1. 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.

Photo detector

Field

500mm

TFT-LCD Module

LCD Panel

The center of the screen

Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°
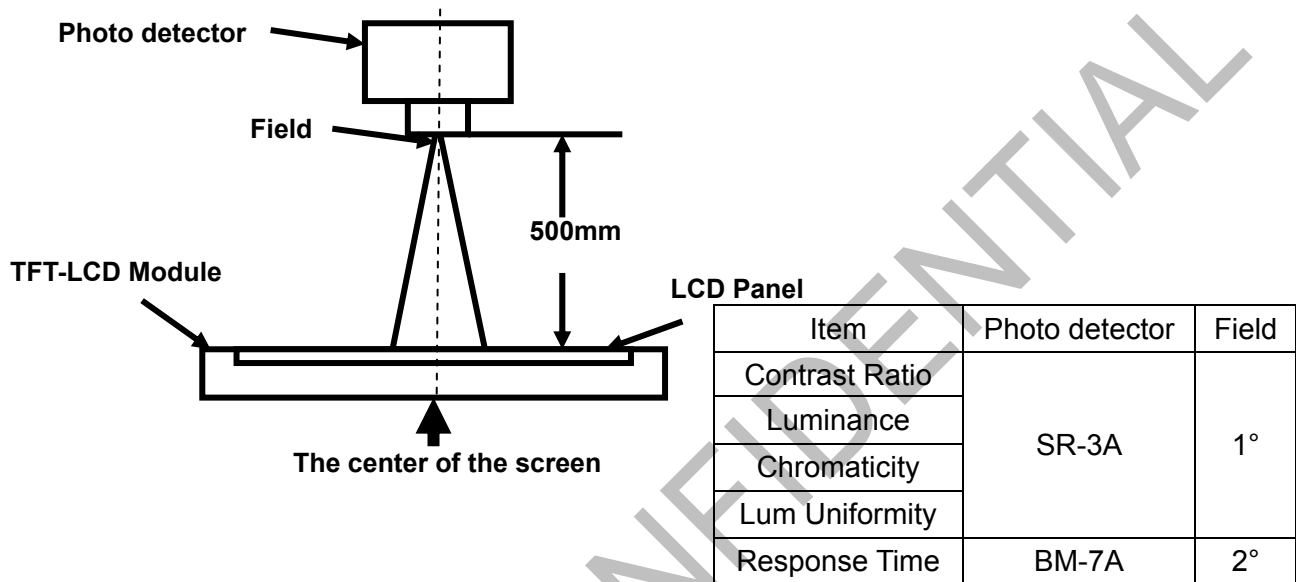
Note 2: Definition of viewing angle range and measurement system.

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

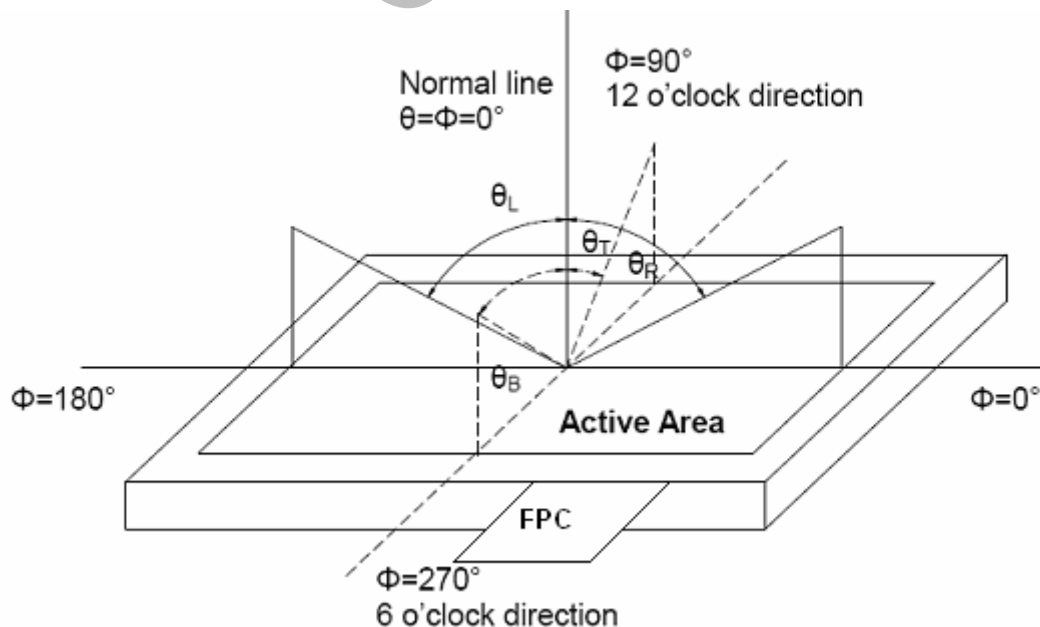Normal line
$\theta=\Phi=0°$

$\Phi=90°$
12 o'clock direction

θ_L

θ_T

θ_R

θ_B

$\Phi=180°$

$\Phi=0°$

Active Area

FPC

$\Phi=270°$
6 o'clock direction

Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

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

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

"Black state": The state is that the LCD should driven by Vblack.

Vwhite: To be determined   Vblack: To be determined.

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.
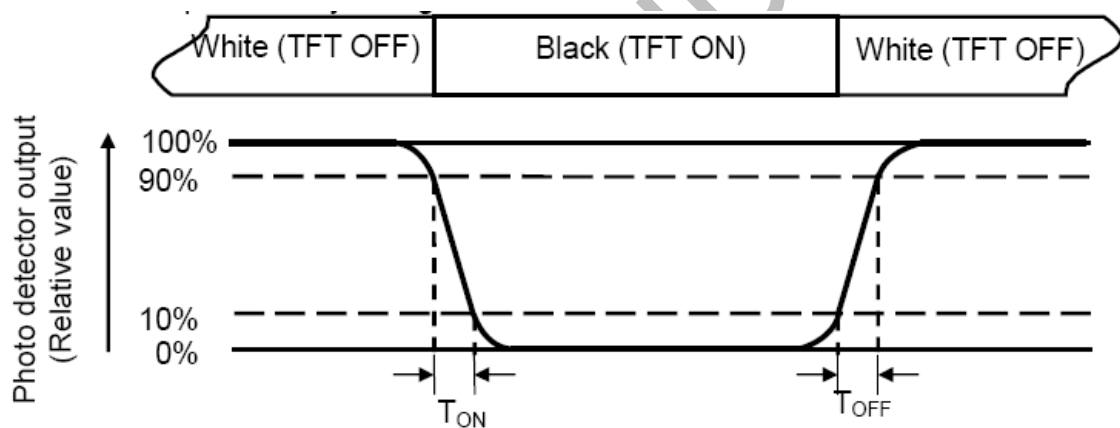
Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

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

Luminance Uniformity(U) = Lmin/ Lmax
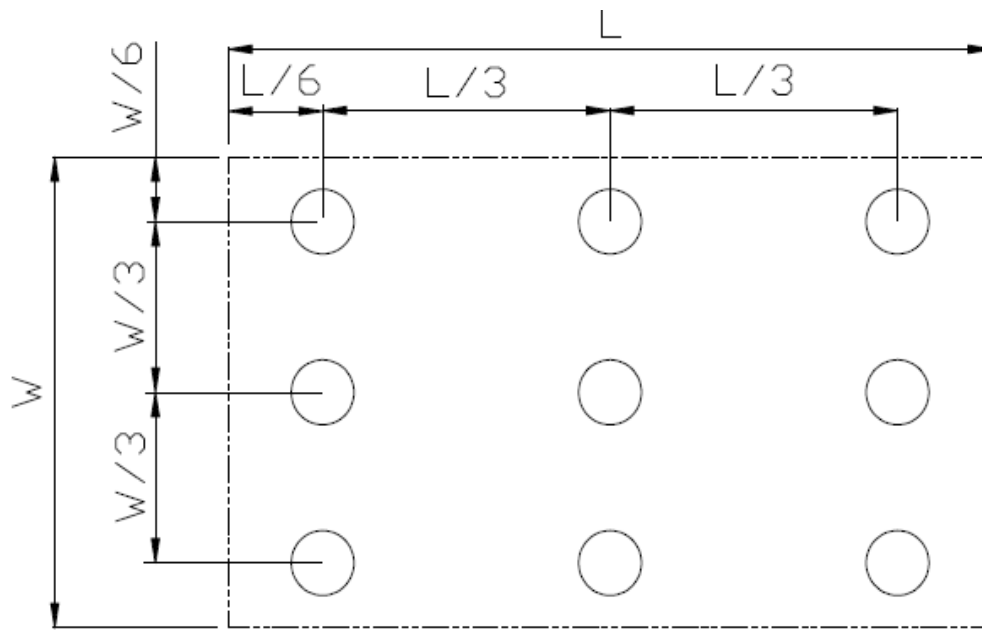
L-------Active area length W----- Active area width

Fig. 2 Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.

Lmin: The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance :

Measure the luminance of white state at center point.
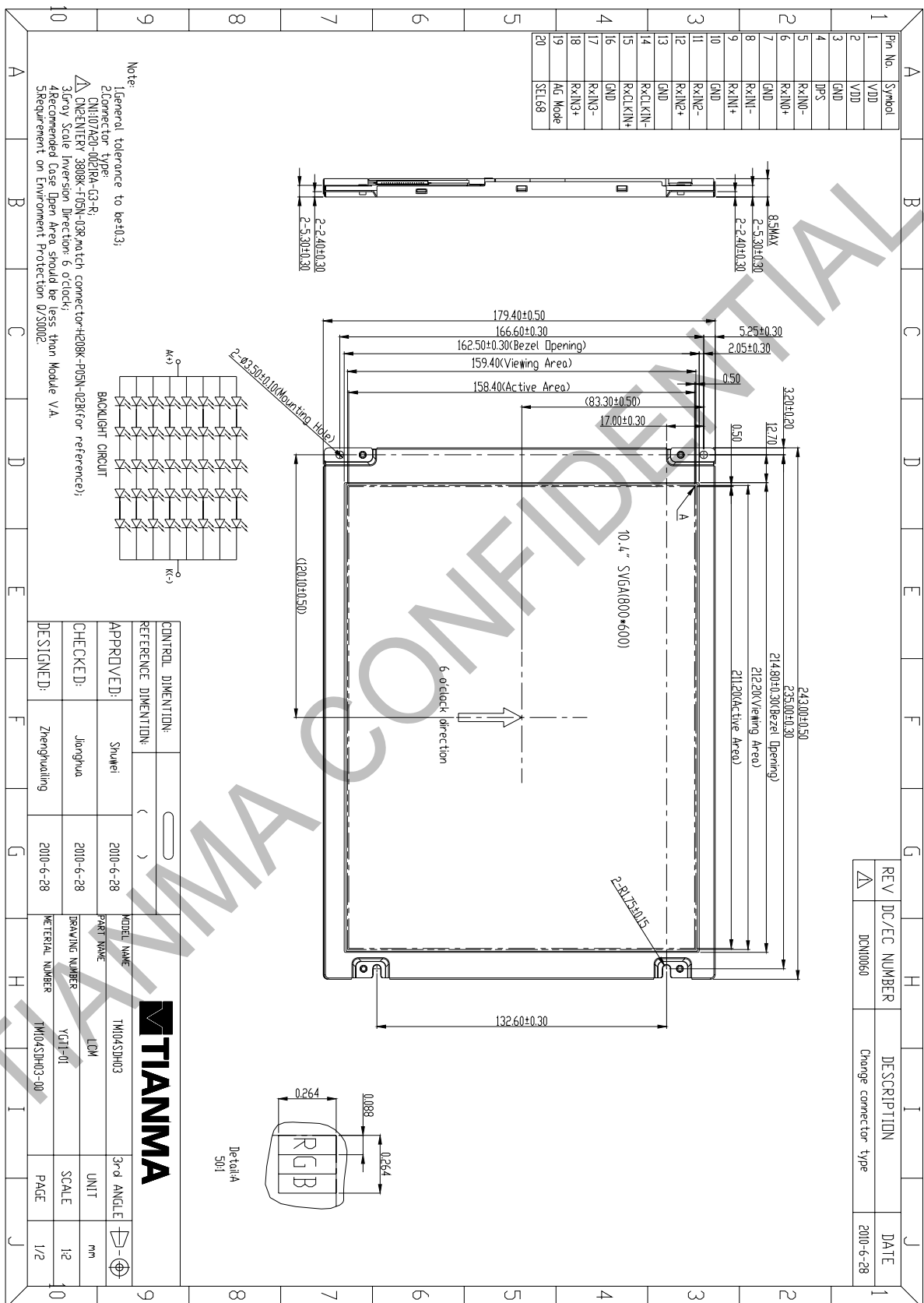
7 Environmental / Reliability Test

No	Test Item	Condition	Remark
1	High Temperature Operation	Ts=+80℃, 240hrs	Note1 IEC60068-2-1,GB2423.2
2	Low Temperature Operation	Ta=-30℃, 240hrs	IEC60068-2-1 GB2423.1
3	High Temperature Storage (non-operation)	Ta=+85℃, 240hrs	IEC60068-2-1 GB2423.2
4	Low Temperature Storage (non-operation)	Ta=-30℃, 240hrs	IEC60068-2-1 GB2423.1
5	High Temperature & High Humidity Operation	Ta = +60℃, 90% RH max,240 hours	Note2 IEC60068-2-78 GB/T2423.3
6	Thermal Shock (non-operation)	-30℃ 30 min~+85℃ 30 min, Change time:5min, 100 Cycles	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,GB2423.22
7	Electro Static Discharge (operation)	C=150pF,R=330Ω, Air:±15Kv, Contact:±8Kv, 10times/terminal	IEC61000-4-2 GB/T17626.2
8	Vibration (non-operation)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2hours for each direction of x.y.z (6 hours for total)	IEC60068-2-6 GB/T2423.10
9	Shock (non-operation)	80G 6ms, ±X,±Y,±Z 3 times for each direction	IEC60068-2-27 GB/T2423.5
10	Package Drop Test	Height:80 cm,1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8
11	Package Vibration Test	Random Vibration: 0.015GxG/Hz for 5-200Hz, -6dB/Octave from 200-500Hz 2 hours for each direction of X,Y,Z (6 hours for total)	IEC60068-2-34 GB/T2423.11

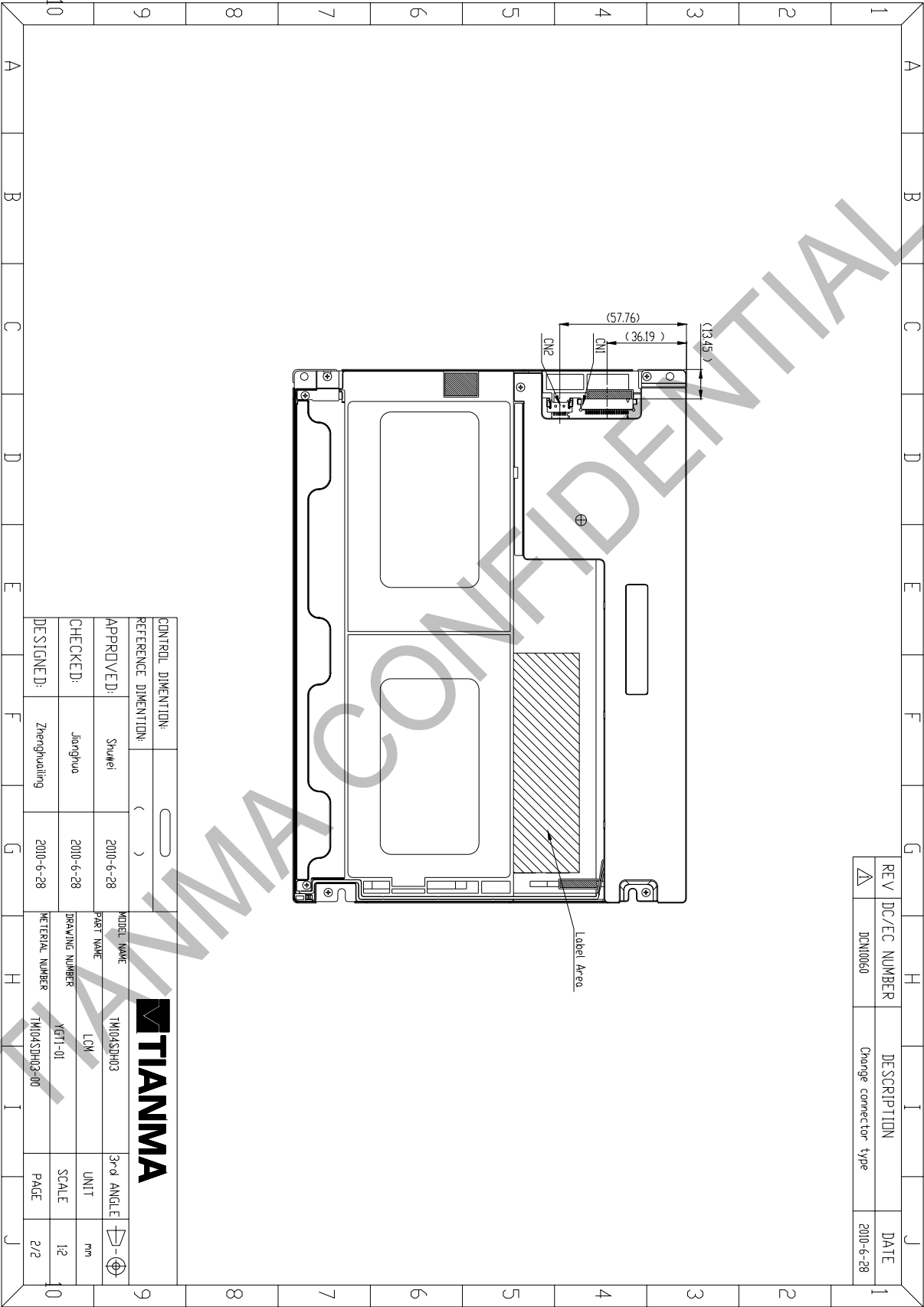Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of sample.

8 Mechanical Drawing

Pin No.	Symbol
1	VDD
2	VDD
3	GND
4	DPS
5	RxIN0-
6	RxIN0+
7	GND
8	RxIN1-
9	RxIN1+
10	GND
11	RxIN2-
12	RxIN2+
13	GND
14	RxCLKIN-
15	RxCLKIN+
16	GND
17	RxIN3-
18	RxIN3+
19	AC Mode
20	SEL68

Note:
1.General tolerance to be±0.3;
2.Connector type:
CN1:107A20-0021RA-G3-R;
⚠CN2:ENTERY 3808K-T05N-03R,match connector+H208K-P05N-02R(for reference);
3.Gray Scale Inversion Direction: 6 o'clock;
4.Recommended Case Open Area should be less than Module V.A;
5.Requirement on Environment Protection 0/S0002

BACKLIGHT CIRCUIT

K(+)

K(-)

A(+)

2-Φ3.50±0.10(Mounting Hole)

179.40±0.50
166.60±0.30
162.50±0.30(Bezel Opening)
159.40(Viewing Area)
158.40(Active Area)
(83.30±0.50)
17.00±0.30
5.25±0.30
2.05±0.30
0.50
3.20±0.20
12.70
0.50

10.4" SVGA(800*600)

(120.10±0.50)

6 o'clock direction

243.00±0.50
235.00±0.30
214.80±0.30(Bezel Opening)
212.20(Viewing Area)
211.20(Active Area)

2-R1.75±0.15

132.60±0.30

8.5MAX
2-2.40±0.30
2-5.30±0.30
2-2.40±0.30
2-5.30±0.30

CONTROL DIMENTION:		
REFERENCE DIMENTION:	( )	
APPROVED:	Shuwei	2010-6-28
CHECKED:	Jianghua	2010-6-28
DESIGNED:	Zhenghuaiting	2010-6-28
MODEL NAME	TM104SDH03	
PART NAME	LCM	
DRAWING NUMBER	YGTJ-01	
METERIAL NUMBER	TM104SDH03-00	
	PAGE	1/2
	SCALE	1:2
	UNIT	mm
	3rd ANGLE	⊕

TIANMA

DetailA
5D1

RGB
0.264
0.088
0.264

REV	DC/EC NUMBER	DESCRIPTION	DATE
⚠	DCN1060	Change connector type	2010-6-28

Label Area

(57.76)
(36.19)
(13.45)

CN2
CN1

CONTROL DIMENTION:						
REFERENCE DIMENTION:	( )					
APPROVED:	ShuWei	2010-6-28	MODEL NAME	TM104SDH03	3rd ANGLE	
CHECKED:	Jionghua	2010-6-28	PART NAME	LCM	UNIT	mm
			DRAWING NUMBER	XGT1-01	SCALE	1:2
DESIGNED:	Zhenghualing	2010-6-28	METERIAL NUMBER	TM104SDH03-00	PAGE	2/2

REV	DC/EC NUMBER	DESCRIPTION	DATE
△	DCN10060	Change connector type	2010-6-28

9 Packing Drawing

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	TM104SDH03	243.00x179.40x8.5（Max）	432.89	20	
2	Partition_1	Corrugated Paper	513x333x217	TBD	1	
3	Anti-static Bag	PE	265×255×0.05	TBD	20	
4	DUST-PROOF BAG	PE	700×530	0.06	1	
5	Partition_2	Corrugated Paper	505x332 x4.0	0.1	1	
6	Corrugated Bar	Corrugated Paper	405 x292	TBD	1	
7	Carton	Corrugated Paper	530x350x250	1.12	1	
8	EPE	EPE	440x213 x4	TBD	1	
9	Total weight(Kg)	TBD				
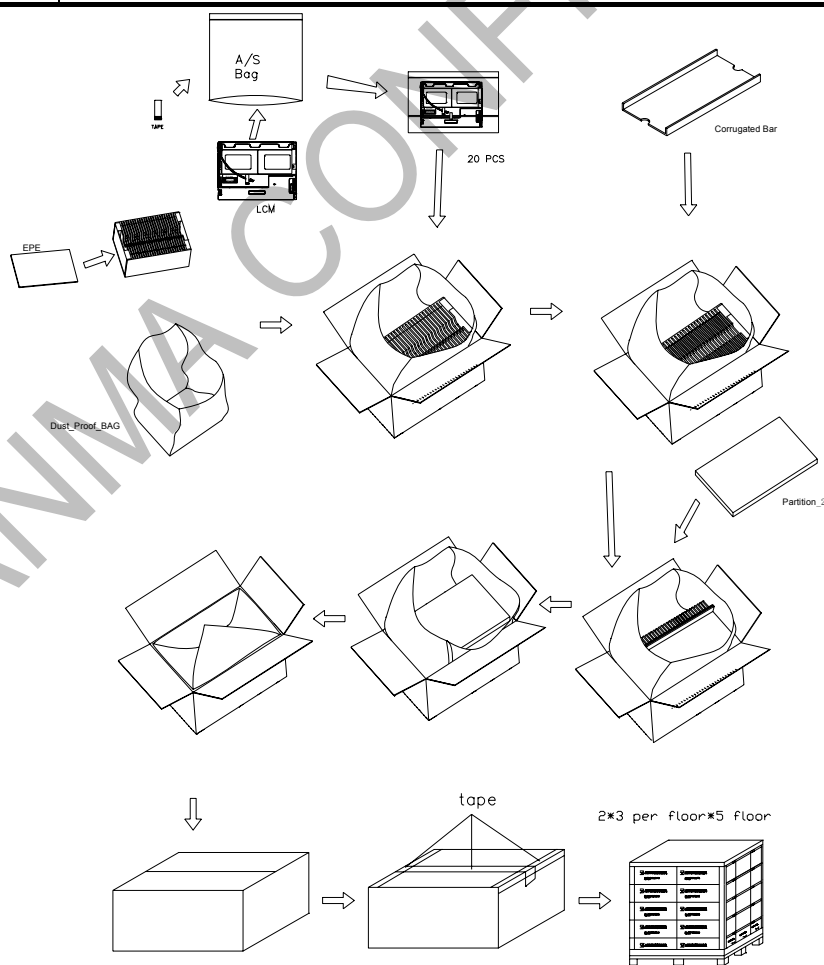
10 Precautions For Use of LCD Modules

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.

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

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