MODEL NO.   :   TM035KBH02

ISSUED DATE: 2009-08-11

VERSION   :   Ver1.3

☐ Preliminary Specification
■ Final Product Specification

Customer :_____

Approved by	Notes

SHANGHAI TIANMA Confirmed :

Prepared by	Checked by	Approved by
陈艳光 2009.8.11	姚明珍 09.8.11	徐昀 09.8.11

This technical specification is subjected to change without notice

Table of Contents

Record of Revision

Rev	Issued Date	Description	Editor
1.0	2008-10-14	Rev 1.0 was issued. Change the model number from TS035KAAVB02-00 to TM035KBH02Modify the input signal voltage.	Lei Peng
1.1	2009-04-13	Color filter design change,modify the chromaticity	Yan Song
1.2	2009-04-20	Add the mechanical design guide.	Lei Peng
1.3	2009-08-11	Update power on/off sequence	ChenYanguang

1   General Specifications

Feature		Spec
Display Spec.	Size	3.5inch
	Resolution	320(RGB) x 240
	Interface	RGB/CCIR656/601
	Color Depth	16.7M dithering
	Technology Type	a-Si TFT
	Dot Pitch (mm)	0.073 x 0.219
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	TM with Normally White
	Surface Treatment(Up Polarizer)	Clear type (3H)
	Surface Treatment(TSP)	Anti-glare type (3H)
	Viewing Direction	12 o'clock
	Gray Scale Inversion Direction	6 o'clock
Mechanical Characteristics	LCM (W x H x D) (mm)	76.90 x 63.90 x 4.00
	Active Area(mm)	70.08 x 52.56
	With /Without TSP	With TSP
	Weight (g)	38.3
	LED Numbers	6 LEDs Serial
Electronic	Driver IC	Novatek NT39016D

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: RoHS

2   Input/Output Terminals

2.1 TFT LCD Panel

Recommend connector: Kyocera elco: 6240 serials

No	Symbol	I/O	Description	Remark
1,2	LED_Cathode	I	LED_Cathode	Note 2-1
3,4	LED_Anode	I	LED_Anode	Note 2-1
5	NC	-	No Connect	
6	RESET	I	Reset	
7	NC	-	No Connect	
8	YU	I	Y_Up	
9	XR	I	X_Right	
10	YD	I	Y_Bottom	
11	XL	I	X_Left	
12	D00	I	Data 00	Note 2-2
13	D01	I	Data 01	Note 2-2
14	D02	I	Data 02	Note 2-2
15	D03	I	Data 03	Note 2-2
16	D04	I	Data 04	Note 2-2
17	D05	I	Data 05	Note 2-2
18	D06	I	Data 06	Note 2-2
19	D07	I	Data 07	Note 2-2
20	D08	I	Data 08	Note 2-2
21	D09	I	Data 09	Note 2-2
22	D10	I	Data 10	Note 2-2
23	D11	I	Data 11	Note 2-2
24	D12	I	Data 12	Note 2-2
25	D13	I	Data 13	Note 2-2
26	D14	I	Data 14	Note 2-2
27	D15	I	Data 15	Note 2-2
28	D16	I	Data 16	Note 2-2
29	D17	I	Data 17	Note 2-2
30	D18	I	Data 18	Note 2-2
31	D19	I	Data 19	Note 2-2
32	D20	I	Data 20	Note 2-2
33	D21	I	Data 21	Note 2-2
34	D22	I	Data 22	Note 2-2

35	D23	I	Data 23	Note 2-2
36	HSYNC	I	Horizontal Synchronous Signal	
37	VSYNC	I	Vertical Synchronous Signal	
38	CLK	I	Data Clock	
39	NC	-	No Connect	
40	NC	-	No Connect	
41	VDD	P	power supply	
42	VDD	P	power supply	
43	SPENA	I	Serial port data enable signal	
44	NC	-	No Connect	
45	NC	-	No Connect	
46	NC	-	No Connect	
47	NC	-	No Connect	
48	NC	-	No Connect	
49	SPCK	I	SPI Serial Clock	
50	SPDA	I/O	SPI Serial Data Input/output	
51	NC	-	No Connect	
52	DEN	I	Data enabling signal	
53	GND	P	Ground	
54	GND	P	Ground	

I: input   O: output   P: power

Note 2-1: The figure below shows the connection of LED
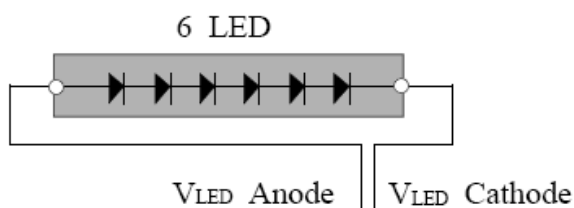
Note 2-2:

Mode	D(23:16)	D(15:8)	D(7:0)	HSYNC	VSYNC	DEN
CCIR 656	D(23:16)	GND	GND	NC	NC	NC
CCIR 601	D(23:16)	GND	GND	HSYNC	VSYNC	NC
8 Bit RGB	D(23:16)	GND	GND	HSYNC	VSYNC	NC for HV mode
						DEN for DEN mode
24 Bit RGB	R(7:0)	G(7:0)	B(7:0)	HSYNC	VSYNC	NC for HV mode
						DEN for DEN mode

3   Absolute Maximum Ratings

Ta = 25℃

Item	Symbol	MIN	MAX	Unit	Remark
Power Supply Voltage	VDD	-0.3	5.0	V	
Back Light Forward Current	ILED		25	mA	One LED
Operating Temperature	T_{OPR}	-20	60	℃	
Storage Temperature	T_{STG}	-30	70	℃	

4 Electrical Characteristics

4.1. Driving TFT LCD Panel

GND=0V, Ta=25℃

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Power Supply Voltage		VDD	3.0	3.3	3.6	V	
Input Signal Voltage	Low Level	V_{IL}	0		0.2xVCC	V	
	High Level	V_{IH}	0.8xVCC		VCC	V	
(Panel+LSI) Power Consumption	Black Mode(60HZ)			35	50	mW	
	Standby Mode			0.1	0.15	mW	

4.2 Driving Backlight

Ta=25℃

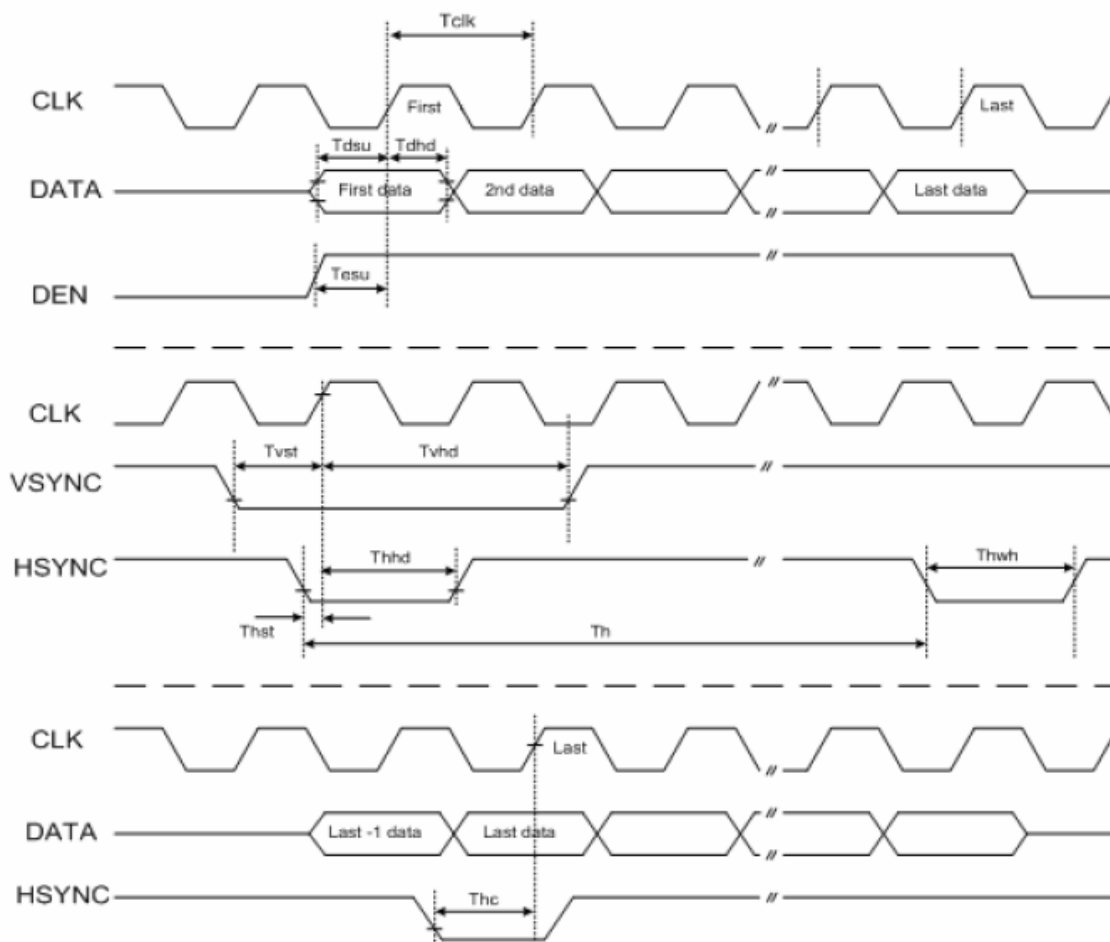| Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	--	20	25	mA	
Forward Current Voltage	V_F	16.8	19.2	21.6	V	
Backlight Power Consumption	W_{BL}	--	384	--	mW	

4.3   Block Diagram

LCD module diagram
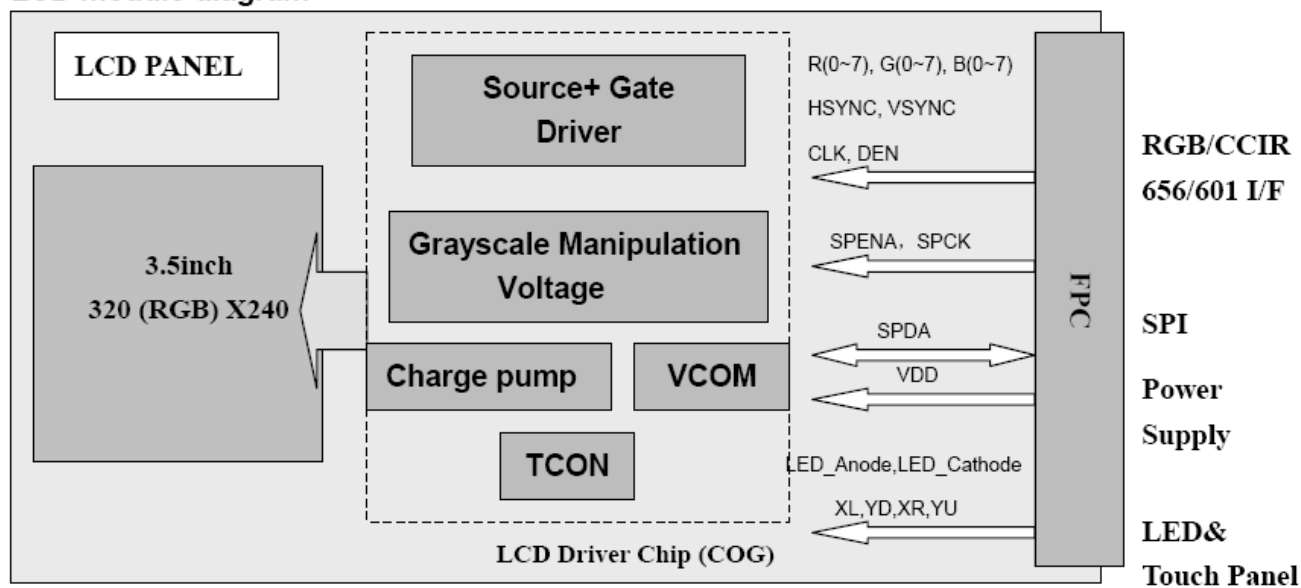
5 Timing Chart

5.1 AC Electrical Characteristics (VDD=3.3V, GND= 0V,Ta=25℃)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK clock time	Tclk	-	-	35.7	ns	CLK=28MHz
CLK pulse duty	Tchw	40	50	60	%	Tclk
HSYNC to CLK	Thc	-	-	1	CLK	
HSYNC width	Thwh	1	-	-	CLK	
VSYNC width	Tvwh	1	-	-	Th	
HSYNC period time	Th	60	63.56	67	us	
VSYNC setup time	Tvst	12	-	-	ns	
VSYNC hold time	Tvhd	12	-	-	ns	
HSYNC setup time	Thst	12	-	-	ns	
HSYNC hold time	Thhd	12	-	-	ns	
Data set-up time	Tdsu	12	-	-	ns	D[23:00] to CLK
Data hold time	Tdhd	12	-	-	ns	D[23:00] to CLK
DEN setup time	Tesu	12	-	-	ns	DEN to CLK

5.2 24 bit RGB mode for 320RGB x 240
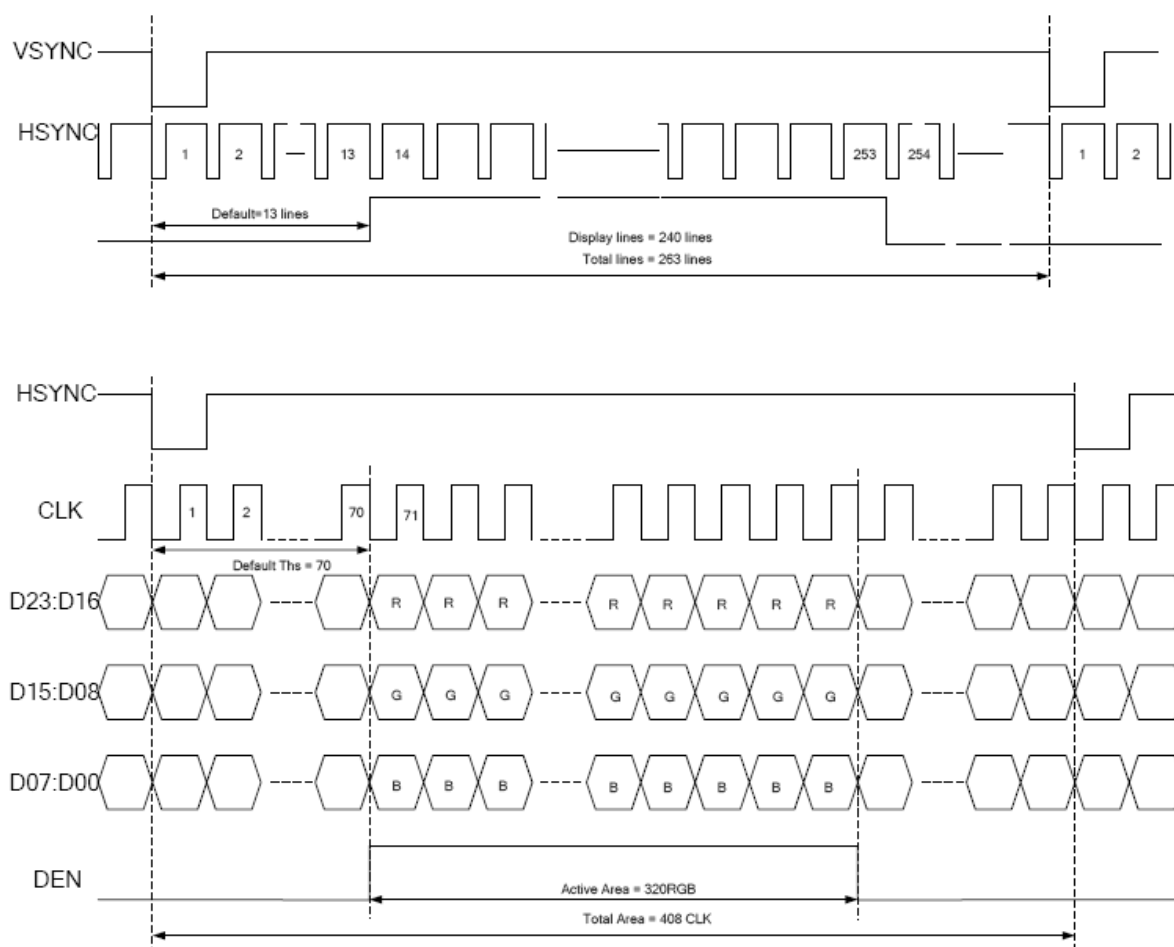
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK frequency	Fclk	-	6.4	-	MHz	VDD=3.0~3.6V
CLK cycle time	Tclk	-	156	-	ns	
Time that HSYNC to 1'st data input(NTSC)	Ths	40	70	255	CLK	

5.3   8 bit RGB mode for 320RGB x 240
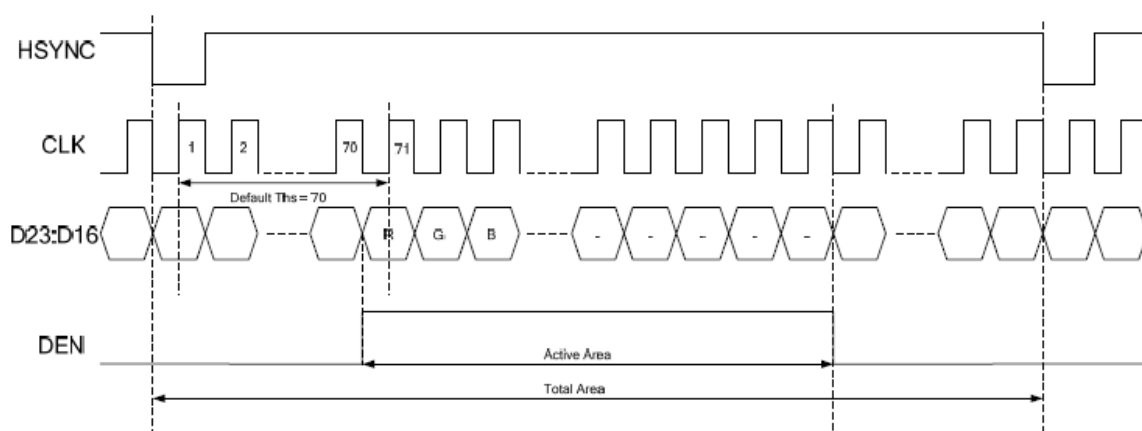
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK frequency	Fclk	-	27	-	MHz	VDD=3.0~3.6V
CLK cycle time	Tclk	-	37	-	ns	
Time that HSYNC to 1'st data input(NTSC)	Ths	35	70	255	CLK	

5.4   ITU-R BT 601
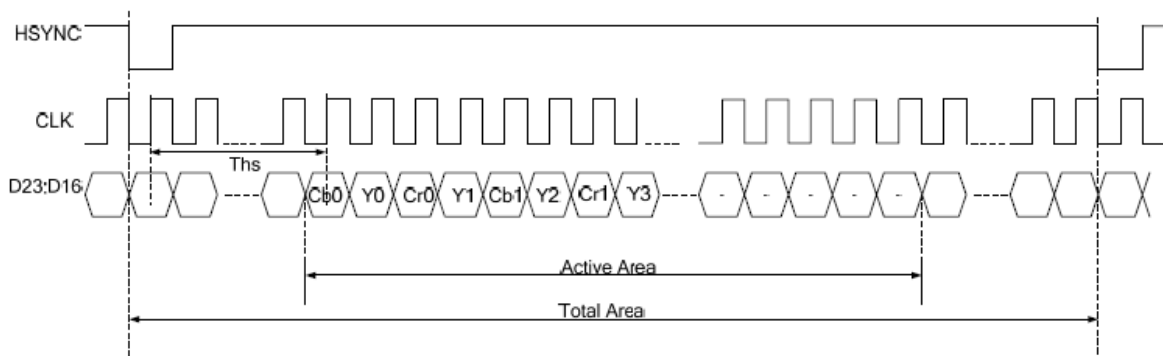
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK frequency	Fclk	-	24.54/27	-	MHz	VDD=3.0~3.6V
CLK cycle time	Tclk	-	40/37	-	ns	
Time from HSYNC to 1'st data input(PAL)	Ths	128	264	-	CLK	
Time from HSYNC to 1'st data input(NTSC)	Ths	128	244	-	CLK	

5.5 ITU-R BT 656
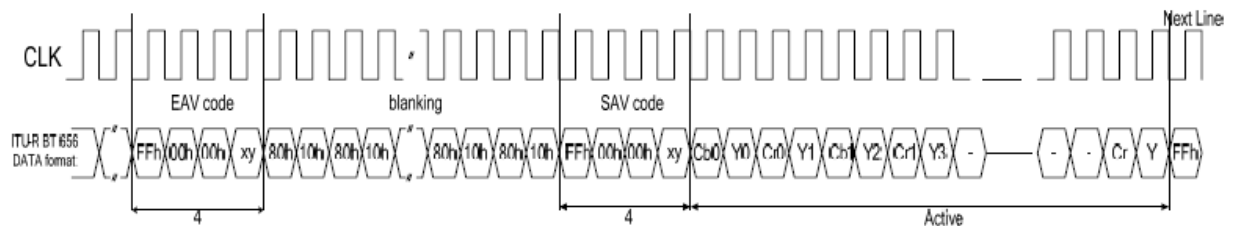
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK frequency	Fclk	-	27	-	MHz	VDD=3.0~3.6V
CLK cycle time	Tclk	-	37	-	ns	
Time from EAV to 1'st data input(PAL)	Ths	128	288	-	CLK	
Time from EAV to 1'st data input (NTSC)	Ths	128	276	-	CLK	

5.6 3-Wire Serial Communication AC Timing
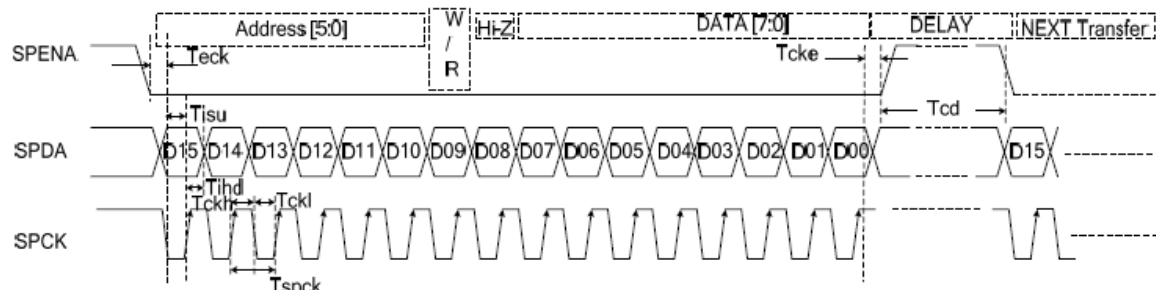
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
SPCK cycle time	Tspck	320	-	-	ns	
SPCK pulse duty	Tscdut	40	50	60	%	
Serial data setup time	Tisu	120	-	-	ns	
Serial data hold time	Tihd	120	-	-	ns	
Serial clock high/low	Tssw	120	-	-	ns	
Chip select distinguish	Tcd	1	-	-	us	

5.7 3-Wire Control Registers List

| 3-Wire Register		Register Description			
D[15:10]	Name	Init	R/W	Function Description	
000000b	R00	07h	R/W	System control register	
000001b	R01	00h	R/W	Timing Controller function register	
000010b	R02	03h	R/W	Operation control register	
000011b	R03	CCh	R/W	Input data Format control register	
000100b	R04	46h	R/W	Source Timing delay control register	
000101b	R05	0Dh	R/W	Gate Timing delay control register	
000110b	R06	00h	R/W	Reserved	
000111b	R07	00h	R/W	Internal function control register	
001000b	R08	08h	R/W	RGB Contrast control register	
001001b	R09	40h	R/W	RGB Brightness control register	
001010b	R0A	88h	R/W	Hue / Saturation control register	
001011b	R0B	88h	R/W	R / B Sub-Contrast control register	
001100b	R0C	20h	R/W	R Sub-Brightness control register	
001101b	R0D	20h	R/W	B Sub-Brightness control register	
001110b	R0E	10h	R/W	VCOMDC Level control register	
001111b	R0F	A4h	R/W	VCOMAC Level control register	
010000b	R10	04h	R/W	VGAM2 Level control register	
010001b	R11	24h	R/W	VGAM3/4 Level control register	
010010b	R12	24h	R/W	VGAM5/6 Level control register	
011110b	R1E	00h	R/W	Reserved	
100000b	R20	00h	R/W	Wide and narrow display mode control register	

Note 5-1:

R03: c4h:ITU-R BT 656 Mode

c2h:ITU-R BT 601 Mode

c8h:8 bit RGB Mode(HV Mode)

c9h:8 bit RGB Mode(DE Mode)

cch(default):24 bit RGB Mode (HV mode)

cdh:24 bit RGB Mode (DE mode)

5.8 Power on/off sequence
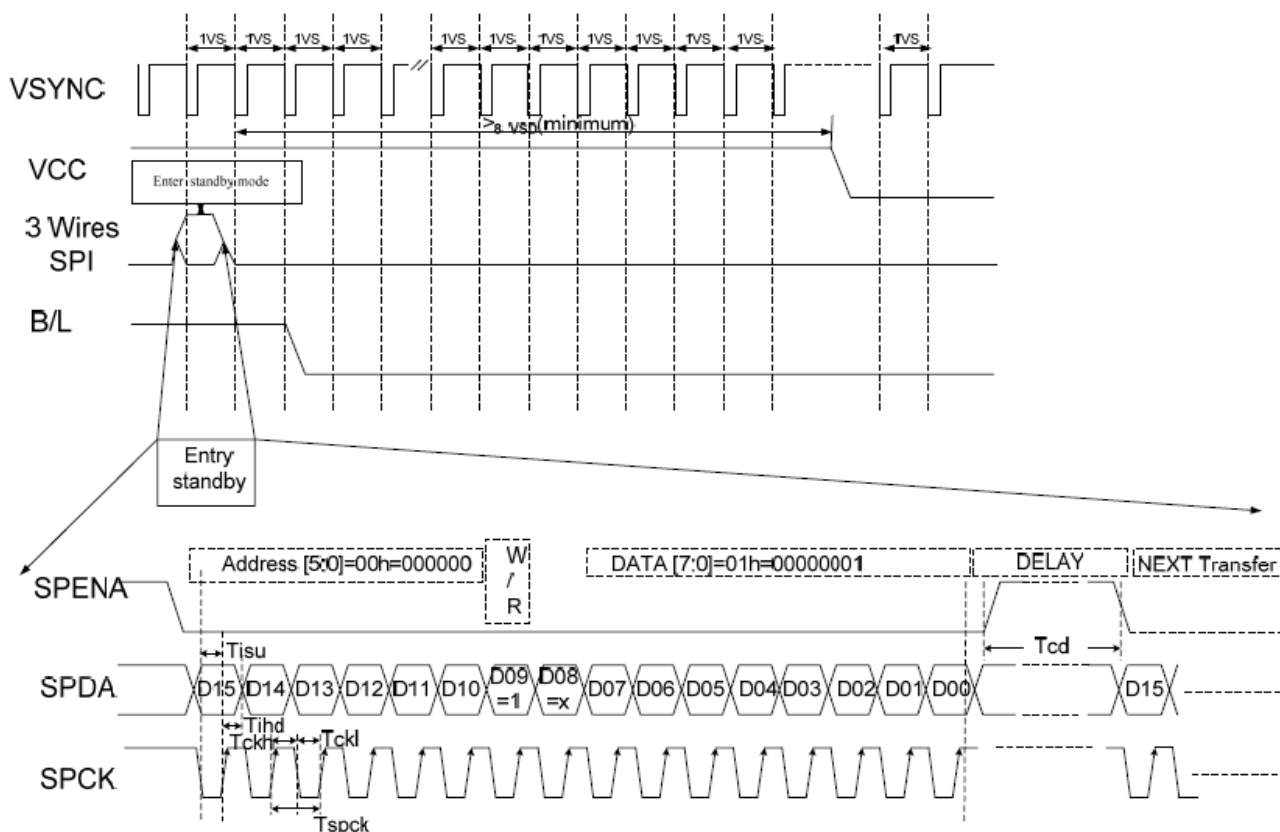
Power on sequence
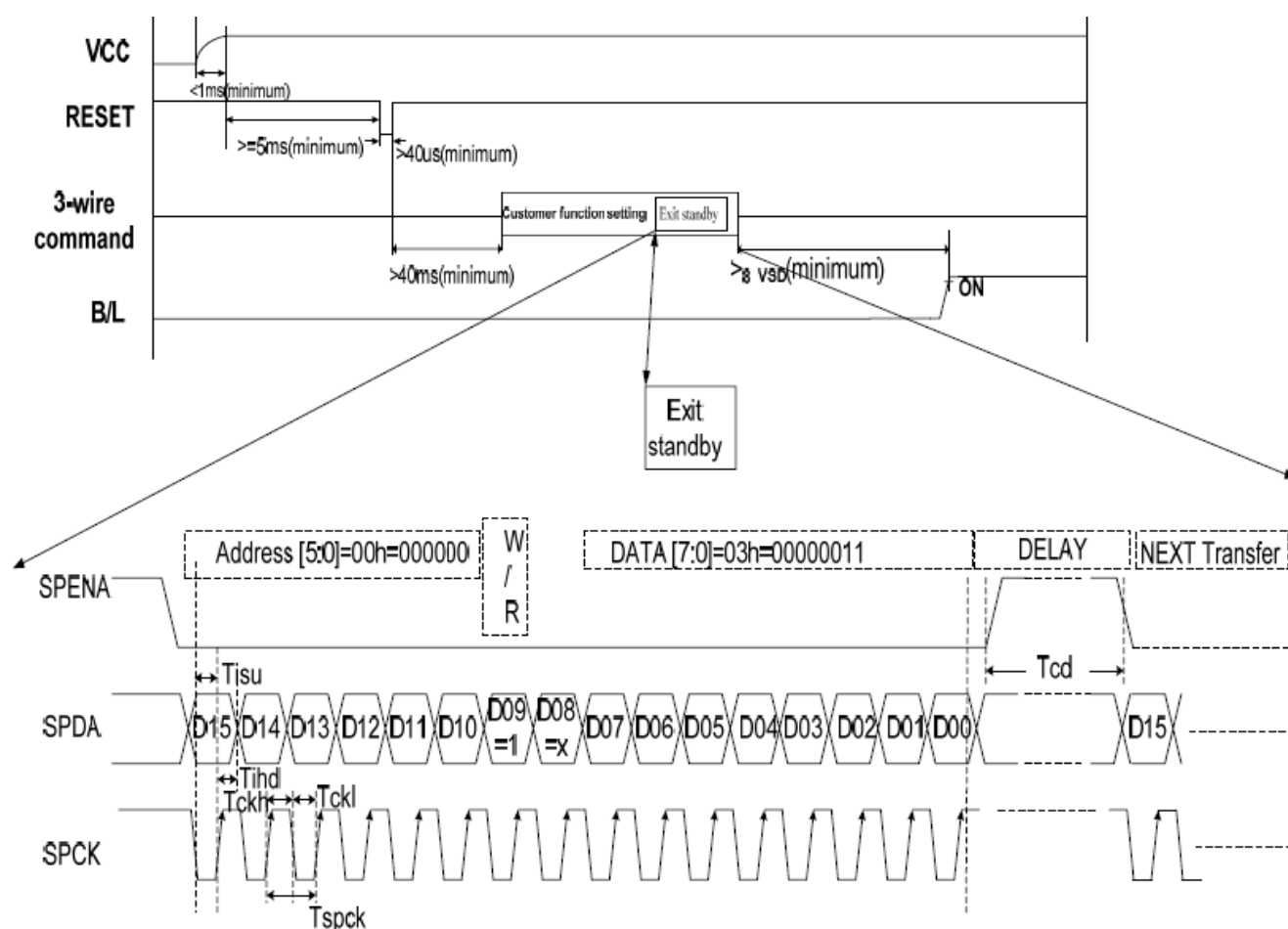
Note

1. Please exit to Standby Mode through 3-wire command, detail sequence that exit to Standby Mode under power on mode presentation as below.

2. Exit to standby mode , you can write data "0x03" to Register R00,D09=1 for writing data to register. D09=0 for reading data from register.

   Under SPI write mode D08=X , and 'X' means don't care D08='1' or '0'.

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Serial Clock	Tspck	320	-	-	ns	
SPCK Pulse Duty	Tscdut	40	50	60	%	
Serial Data Setup Time	Tisu	120	-	-	ns	
Serial Data Hold Time	Tihd	120	-	-	ns	
Serial Clock High/Low	Tssw	120	-	-	ns	Tckh or Tckl
Chip Select Distinguish	Tcd	1	-	-	us	

Power off sequence

Note

1. 1Vs=1vsync, Please enter the standby mode through 3-wire command, detail sequence which enter standby mode under power off sequence as below.

2. Enter standby mode ,you can write data "0x01" to register "R00", D09=1 for write data to register, D09=0 for reading data from register.

    Under SPI write mode D08=X , and 'X' means don't care D08='1' or '0'.

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Serial clock	Tspck	320	-	-	ns	
SPCK pulse duty	Tscdut	40	50	60	%	
Serial data setup time	Tisu	120	-	-	ns	
Serial data hold time	Tihd	120	-	-	ns	
Serial clock high/low	Tssw	120	-	-	ns	Tckh or Tckl
Chip select distinguish	Tcd	1	-	-	us	

6 Optical Characteristics

6.1 Optical Specification

Ta=25℃

| Item		Symbol	Condition	Min	Typ.	Max.	Unit	Remark
View Angles		θT	CR≧10	30	40		Degree	Note 2
		θB		50	60			
		θL		50	60			
		θR		50	60			
Contrast Ratio		CR	θ=0o		350			Note1,3
Response Time		Ton	25℃		25	40	ms	Note1,4
		Toff						
Chromaticity	White	x		0.240	0.290	0.340		Note1,5
		y		0.270	0.320	0.370		
	RED	x		0.500	0.550	0.600		
		y		0.270	0.320	0.370		
	GREEN	x		0.300	0.350	0.400		
		y		0.520	0.570	0.620		
	BLUE	x		0.100	0.150	0.200		
		y		0.045	0.095	0.145		
Uniformity		U		75	80		%	Note1,6
NTSC					50		%	Note 5
Luminance(w TSP)		L		280	350		cd/m2	Note1,7

Test Conditions:

1. VDD=3.3V, I_L =20mA(Backlight current), 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. All input terminals LCD panel must be ground when measuring the center area of the panel.
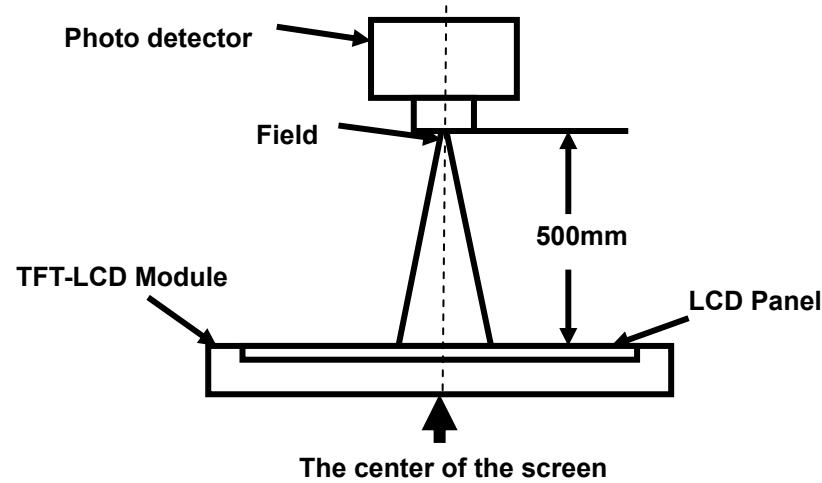
Item	Photo Detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

Photo detector

Field

500mm

TFT-LCD Module

LCD Panel

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 by CONOSCOPE(ergo-80)。

Normal line
$\theta=\Phi=0°$

$\Phi=90°$
12 o'clock direction

θ_L θ_R

θ_T

θ_B

$\Phi=180°$ $\Phi=0°$

Active Area

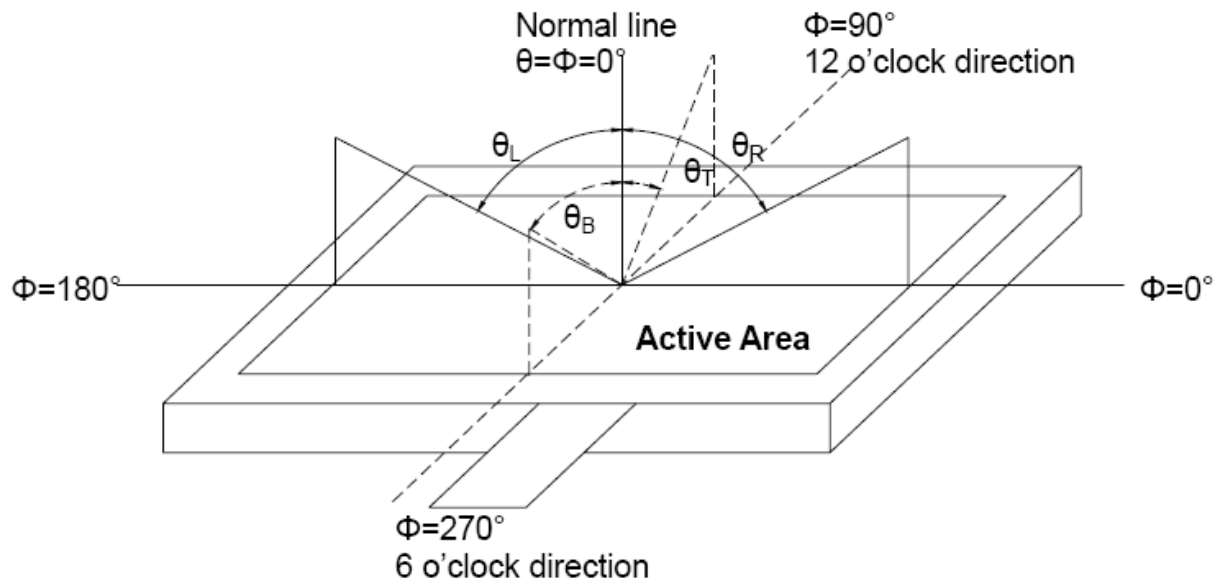$\Phi=270°$
6 o'clock direction

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 is driven by V_{white}.

"Black state": The state is that the LCD is driven by V_{black}.

V_{white}: To be determined V_{black}: 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%.
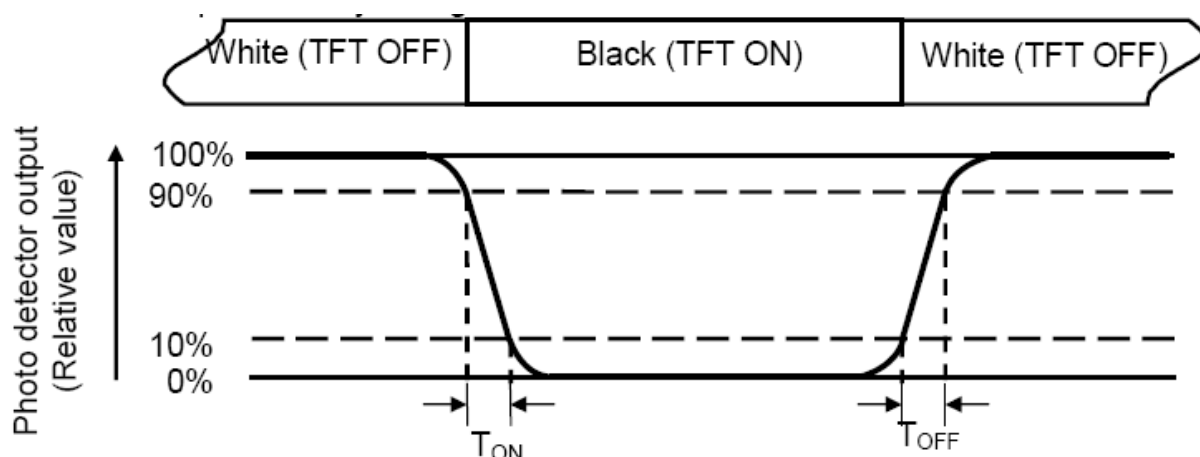
Note 5: Definition of color chromaticity (CIE1931)

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) = L_{min} / L_{max}

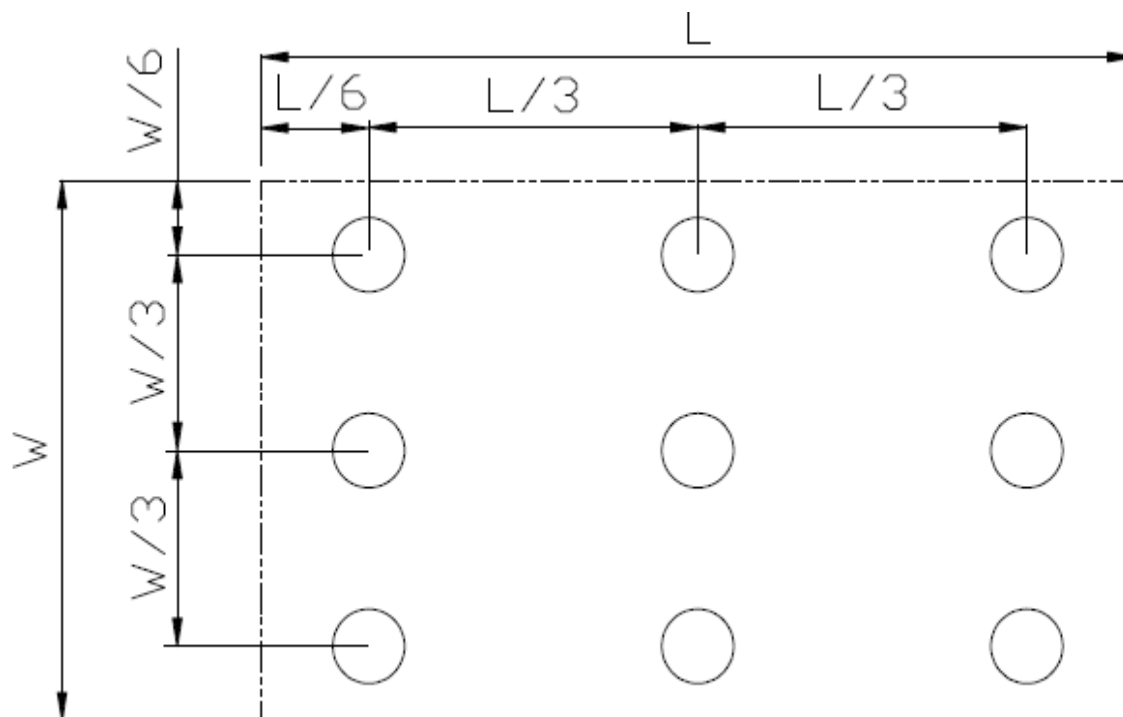L-------Active area length W----- Active area width

Fig. 2 Definition of uniformity

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

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

Note 7: Definition of Luminance :

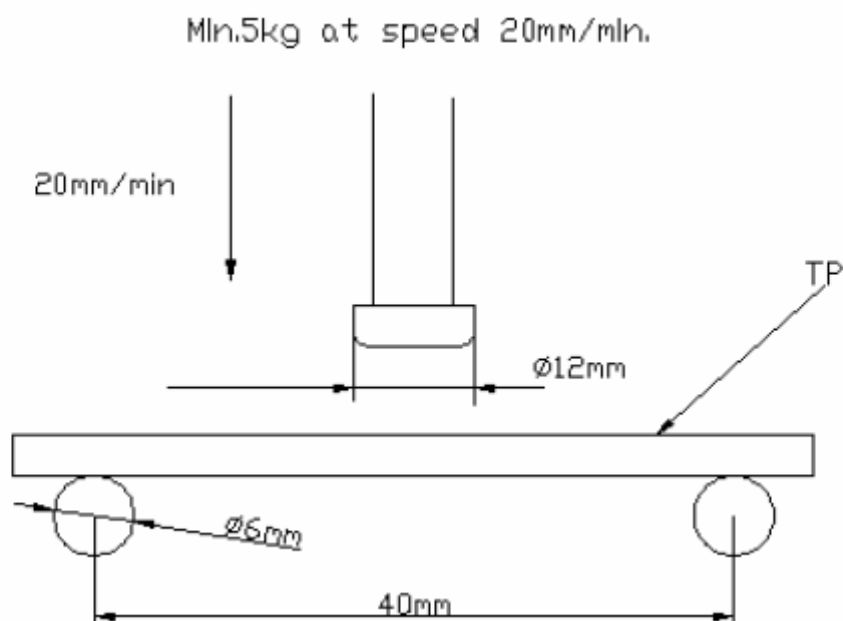Measure the luminance of white state at center point

7 Environmental / Reliability Tests

No	Test Item	Condition	Remark
1	High Temperature Operation	Ts=+60℃, 240hrs	Note1 IEC60068-2-2,GB2423.2—89
2	Low Temperature Operation	Ta=-20℃, 240hrs	Note 2, IEC60068-2-1 GB2423.1—89
3	High Temperature Storage	Ta=+70℃, 240hrs	IEC60068-2-2, GB2423.2—89
4	Low Temperature Storage	Ta=-30℃, 240hrs	IEC60068-2-1 GB2423.1—89
5	High Temperature & High Humidity（Non-Operation）	+60℃, 90% RH max,240 hours	IEC60068-2-3, GB/T2423.3—2006
6	Thermal Shock (Non-operation)	-30℃ 30 min~+70℃ 30 min, Change time:5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14,GB2423.22—87
7	Electro Static Discharge (Operation)	C=150pF, R=330Ω，5points/panel Air:±8KV，5times;Contact:±4KV，5 times;（Environment: 15℃～35℃，30%～60%，86Kpa～106Kpa）	IEC61000-4-2 GB/T17626.2—1998
8	Vibration (Non-operation)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z.(package condition)	IEC60068-2-6 GB/T2423.10—1995
9	Shock (Non-operation)	60G 6ms, ±X,±Y,±Z 3times for each direction	IEC60068-2-27 GB/T2423.5—1995
10	Package Drop Test	Height:80 cm，1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8—1995
11	Impact Resistance	No glass break when Φ9.0mm steel ball is dropped on the panel film surface which places on the plastic board directly from 30 cm height at one time	
12	Static Load Test	Min 5 Kg at speed of 20mm/min	Note 3

Note1: Ts is the temperature of panel's surface.
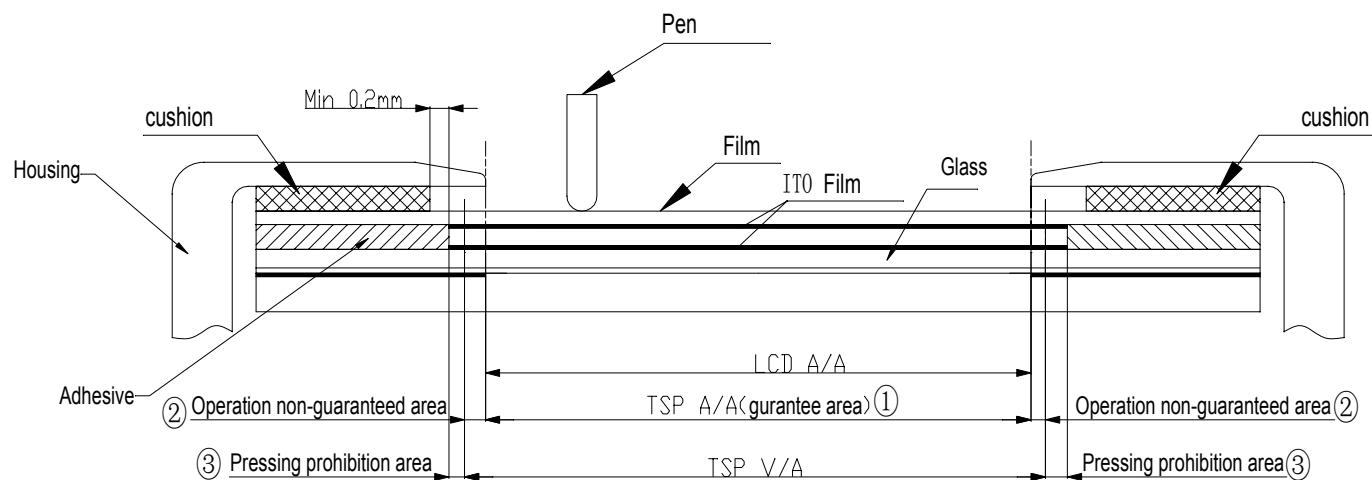
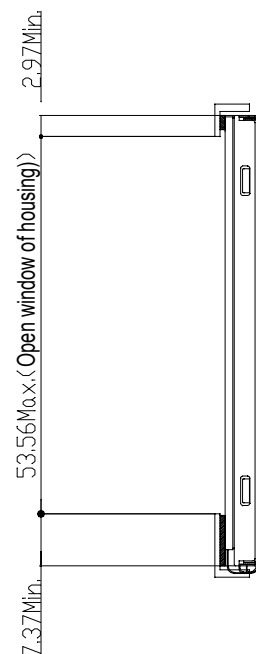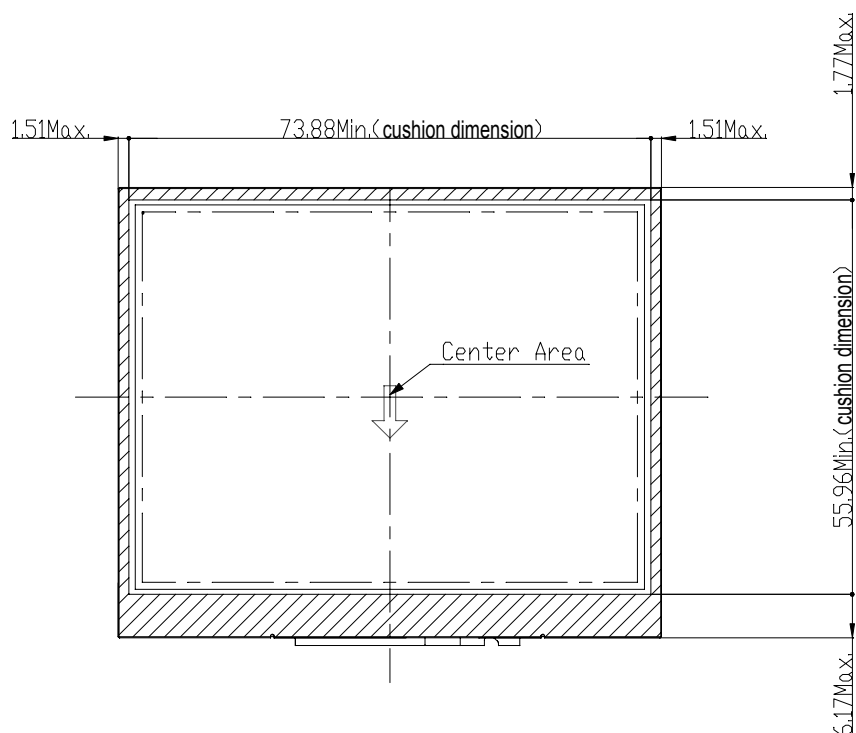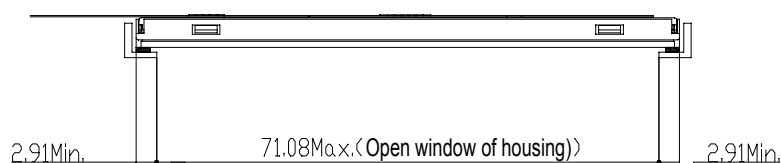Note2: Ta is the ambient temperature of sample.

Note3:

Min.5kg at speed 20mm/min.

20mm/min

∅12mm

TP

∅6mm

40mm

8 Mechanical Drawing

NOTES:
1.Display:TFT;
2.View Direction:1200;
3.General Tolerance:±0.20;
4.IC:NT39016D
5.The product accords with Shanghai
TianMa Micro-Electronics Co.,Ltd environment
protection B level.

NO.	PIN NAME
1	LED Cathode
2	LED Cathode
3	LED Anode
4	LED Anode
5	NC
6	RESET
7	NC
8	XR
9	YU
10	YD
11	XL
12	D00
13	D01
14	D02
15	D03
16	D04
17	D05
18	D06
19	D07
20	D08
21	D09
22	D10
23	D11
24	D12
25	D13
26	D14
27	D15
28	D16
29	D17
30	D18
31	D19
32	D20
33	D21
34	D22
35	D23
36	HSYNC
37	VSYNC
38	CLK
39	NC
40	NC
41	NC
42	VDD
43	VDD
44	SPENA
45	NC
46	NC
47	NC
48	NC
49	SPCK
50	SPDA
51	NC
52	DEN
53	GND
54	GND

DETAIL: A
SCALE: 601

R G B
0.219
0.073
0.219

DETAIL: B
SCALE: 51
1.75
0.35±0.05
0.50
0.20
P=0.50±0.03
0.125
0.35±0.03
3.00±0.30

37.00±0.50
63.90(Outline Dimension)
61.40±0.30(TSP Outline) (0.20)
54.56(TSP V/A) (2.12)
53.56(TSP A/A) (2.62)
52.56(LCD A/A) (3.12)
25.50±0.50
5.00±0.30
(29.40)
(3.4) (2.9) (2.4) (0.20)
27.50±0.07
76.50±0.30(TSP Dimension)
72.08(TSP V/A)
71.08(TSP A/A)
70.08(LCD A/A)
(38.45)
76.90(Outline Dimension)

Bending Area
SEE DETAIL A
Center Area
Component Area
Insulation Tape
2-R0.2

Stiffener
Contact Side
0.30±0.05
1.0Max.
1.20(TSP)
4.00

p0.5*(54-1)=26.50±0.05
SEE DETAIL B
Insulation Tape
Print Block
XXXXXXXXXXXXXX
35.00
54
R=0.20/50
0.50
4.55
3.57±0.50
22.07±0.50
29.50±0.50

CONTROL DIMENTION
REFERENCE DIMENTION
APPROVED: Yao Wen Hui 08.11.14
CHECKED: Gao Ming 08.11.14
DESIGNED: Lei Peng 08.11.14

Shanghai TianMa Micro-Electronics Co.,Ltd.
889 Huiping Rd, Pudong New District, Shanghai, China.
MODEL NAME TM035KBH02
PART NAME LCM
DRAWING NUMBER YGT1-01
MATERIAL NUMBER TM035KBH02-00
UNIT mm
SCALE 1:1
3rd ANGLE
PAGE 1/1

REV	EC NUMBER	DESCRIPTION	DATE
△		Modify the insulation tape	08.02.19

9   Mechanical Design Guide

Pen

cushion

Min. 0.2mm

Film

ITO Film

Glass

cushion

Housing

Adhesive

LCD A/A

② Operation non-guaranteed area

TSP A/A（gurantee area）①

Operation non-guaranteed area②

③ Pressing prohibition area

TSP V/A

Pressing prohibition area③

Propositional Dimension

2.91Min.

71.08Max.（Open window of housing）

2.91Min.

1.77Max.

1.51Max.

73.88Min.（cushion dimension）

1.51Max.

2.97Min.

55.96Min.（cushion dimension）

Center Area

53.56Max.（Open window of housing）

6.17Max.

7.37Min.

9.1.1. Explain:

①Active area

The area which guarantees a touch panel operation normally when pressed.

②Operation non-guaranteed area

The area which does not guarantee a touch panel operation and its function. When this area is

pressed, touch panel shows degradation of its performance and durability such as a pen sliding

durability becomes about one-tenth compared. With the active area(Area-(a) as guaranteed area)

and its operation force requires about double. About 0.5mm~1mm out side form a boundary of the

active corresponds to this area.

③Pressing prohibition area

The area which forbids pressing, because an excessive load is applied a transparent electrode and

a serious damage is given to touch panel function by pressing.

④Non-Active area

The area which does not activate even if passed.

9.1.2. The handling of sensitive area:

（1） The sensitive area is between the edge of the double-side tape and the edge of the active

area. Because the double-side tape has a certain height, the more transformative the ITO layer is

pressed, the easier it would be to be broken. So it is suggested that pointed tools should be put

away from the sensitive area to avoid them touching the sensitive area during operation.

（2）When assembling the touch panel, it would be better to add a protective gasket on the surface

of the product before assembling on to the housing. The gasket should be placed on the

double-side tape and should not go beyond it.

（3）If the housing is designed bigger than the active area, the edge of the sensitive area would be

left outside of it. In addition, the protective gasket adds the thickness of this area, so do not use

pens or other pointed tools to score along with the screen edge which may cause the damage of the

ITO layer. If the panel is drawn with large force, the glass would even be broken.

（4）If the housing is designed smaller than the active area, it can cover the sensitive area

completely, in which case the scoring along with screen edge does no harm to the ITO layer.

Nevertheless, due to the housing extending into the active area, the thickness of the gasket is very

important. If it is too thick, the gap between the housing and the ITO film surface would be too wide

which may affect the appearance of the product. If it is too thin, the housing would be pressed on

the film surface which may cause short-circuit. The gap between the housing and the film should

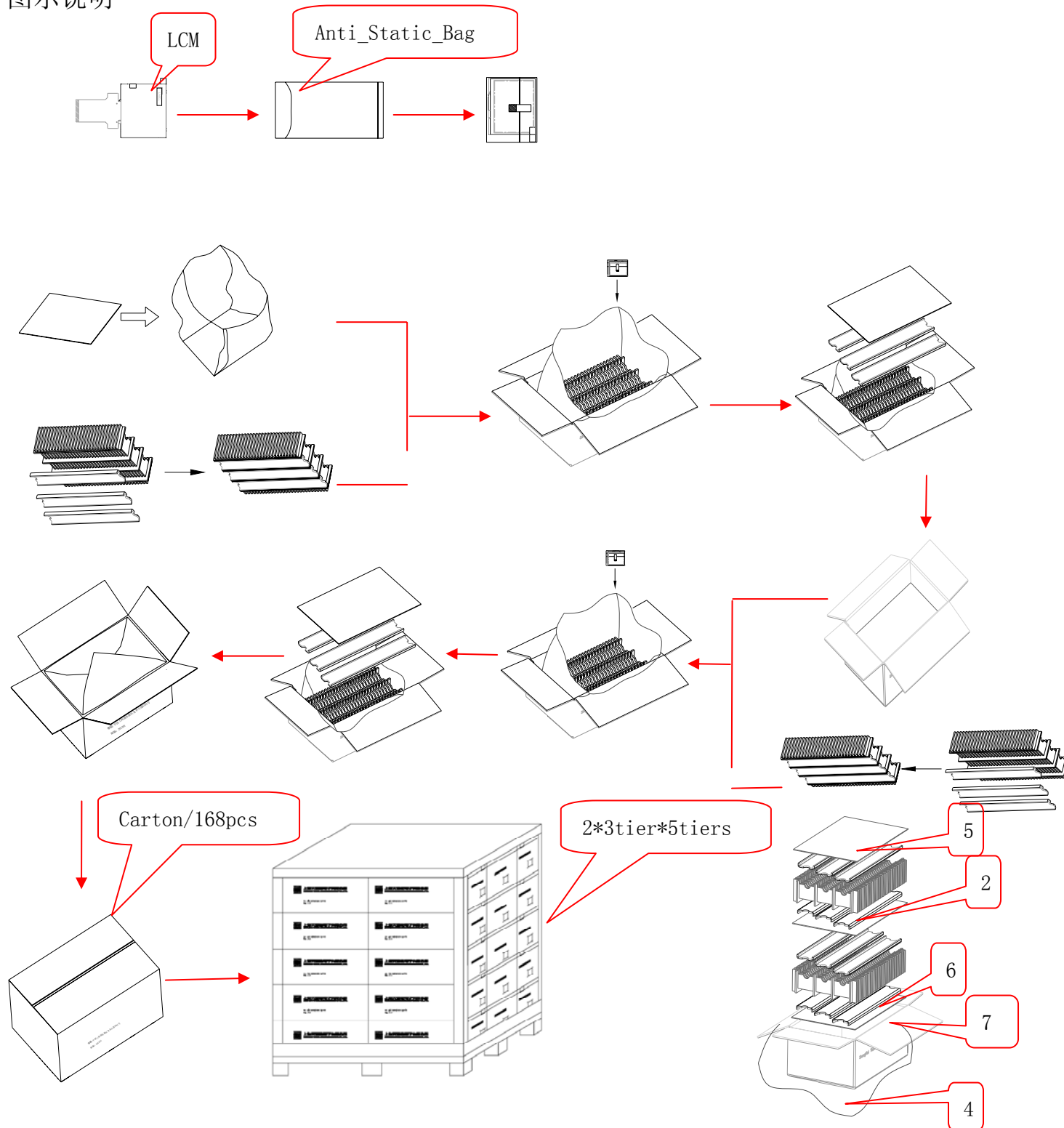better be kept between 0.2mm and 0.3mm.

10 Packing Drawing

LCM quantity per Partition: 3rows x 28 pcs = 84 pcs

Total quantity in carton: 2 layers x 84 pcs per partition= 168 pcs

图示说明

LCM

Anti_Static_Bag

Carton/168pcs

2*3tier*5tiers

5

2

6

7

4

Per carton:

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	TM035KBH02	76.90 x 63.90 x 4.00	0.04	168	
2	Partition_1	Corrugated Paper	513 x 333 x 106	0.782	2	
3.	Anti-Static Bag	PE	155 x 85 x 0.05	0.003	168	Anti-static
4	Dust-Proof Bag	PE	--------------------	0.060	1	
5	Partition_2	Corrugated Paper	505 x 332 x 4.00	0.095	3	
6	Corrugated Bar	Corrugated Paper	513 x 117 x 4	0.032	12	
7	Carton	Corrugated Paper	530 x 350 x 250	1.1000	1	
8	Total weight	10.617±5%				

11   Precautions for Use of LCD Modules

11.1 Handling Precautions

11.1.1.   The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

11.1.2.   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.

11.1.3.   Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

11.1.4.   The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

11.1.5.   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

11.1.6.   Do not attempt to disassemble the LCD Module.

11.1.7.   If the logic circuit power is off, do not apply the input signals.

11.1.8.   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.

11.2   Storage precautions

11.2.1.   When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

11.2.2.   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%

11.2.3.   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.