



Hunan Huayuan display technology CO.,LTD

VISLCD-035HYA54C

(HY-T035A54C)

3.5inchTFT

SPECIFICATION

Standard code	Department	Re No.
Checked by	Written by	Date

Table of Contents

1. General Specification.....	3
2. Mechanical Drawing.....	4
3. Pin Assignment.....	5-7
4. Operation Specifications.....	8
4.1. Absolute Maximum Rating.....	8
4.2 Electrical Characteristics.....	8
4.3 Block Diagram.....	9
4.4 Timing Chart.....	10
4.4.1 Timing Parameter.....	10
5. Optical Specifications.....	16-19
6. Reliability Test Items.....	20
7. General Precautions.....	21
7.1 Safety.....	21
7.2 Handling.....	21
7.3 Static Electricity.....	21
7.4 Storage.....	21
7.5 Cleaning.....	21
8. Packing Drawing.....	22

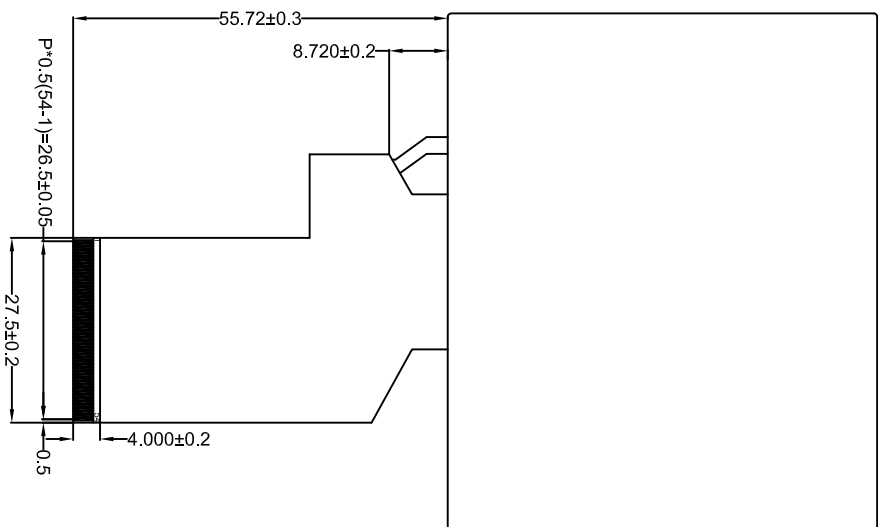
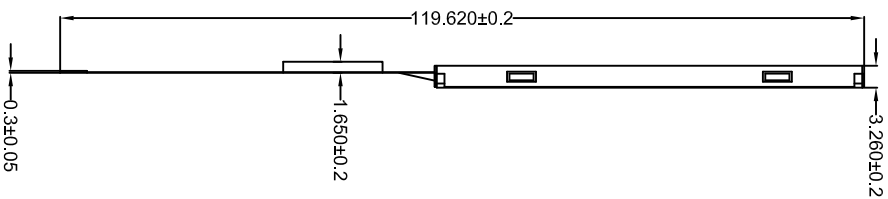
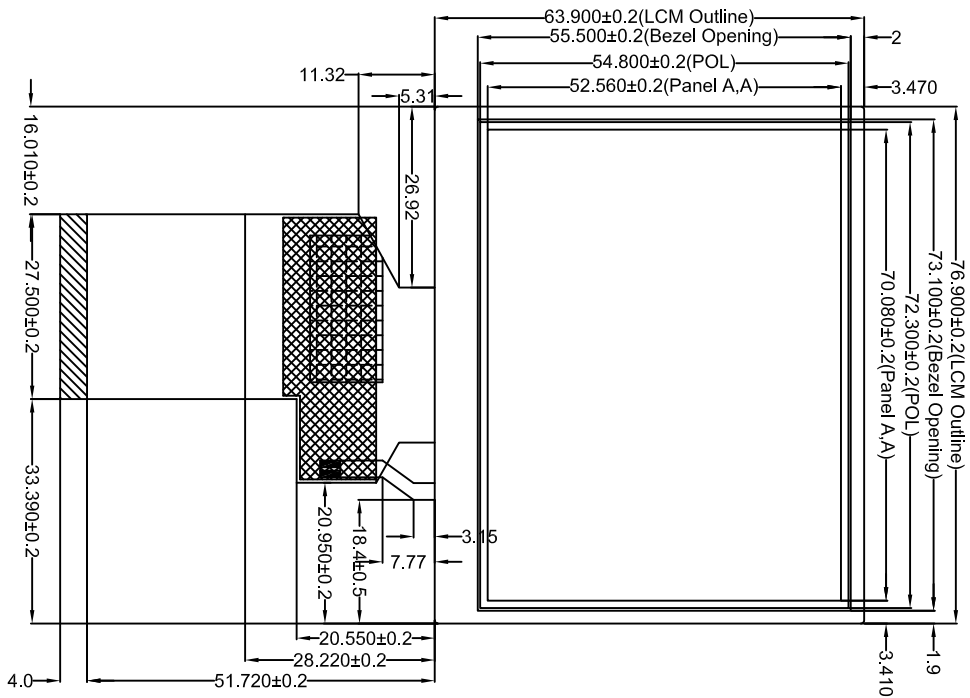
1. General Specifications

NO	Item	Specification	Remark
1	LCD size	3.5inch	
2	Driver element		
3	Resolution	320(RGB)X240	
4	Display mode	CMO with Normally White	
5	Dot Pitch	0.219 x 0.219	
6	Active area	70.08 x 52.56mm	
7	Module Size	76.9*63.9*3.26mm	
8	Viewing Direction	12 CLOCK	
9	Color arrangement	16.7M Dithering	
10	Interface	RGB	
11	Driver IC	HX8238-D	
12	LED Numbers	6 LEDs	
13	Luminance	400cd/m2	
14	With /Without TP	Without	

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

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



设计	郭峰	产品型号		更改单号	更改内容	签名	日期
审核		规格名称	液晶屏	比例	单位	第 1 页	版 次
批准		产品代码	HY-T035A54C	1:1	mm	共 1 页	A0
日期	2016-08-25	制订部门	研发部	湖南省华源显示技术有限公司			

3.PIN Assignment

No	Symbol	I/O/P	Description	Remarks
1	LED_Cathode	P	LED_Cathode	Note2-1
2	LED_Cathode	P	LED_Cathode	
3	LED_Anode	P	LED_Anode	
4	LED_Anode	P	LED_Anode	
5	NC	-	No Connect	
6	NC	-	No Connect	
7	NC	-	No Connect	
8	RESET	I	Reset	
9	SPENA	I	Serial port data enable signal	
10	SPCK	I	SPI Serial Clock	
11	SPDA	I/O	SPI Serial Data Input/output	
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 (3.3V)	
42	VDD	P	power supply (3.3V)	
43	NC	-	No Connect	
44	NC	-	No Connect	
45	NC	-	No Connect	
46	NC	-	No Connect	
47	NC	-	No Connect	
48	NC	-	No Connect	
49	NC	-	No Connect	
50	NC	-	No Connect	
51	NC	-	No Connect	
52	DEN	I	Data enabling signal	
53	GND	P	Ground	
54	GND	P	Ground	

Note2-1: I/O definition:

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

Note2-2:

Mode	D(23:16)	D(15:08)	D(07:00)	HSYNC	VSYNC
ITU-R BT 656	D(23:16)	GND	GND	NC	NC
ITU-R BT 601	D(23:16)	GND	GND	HSYNC	VSYNC
8 Bit RGB	D(23:16)	GND	GND	HSYNC	VSYNC
24 Bit RGB	R(7:0)	G(7:0)	B(7:0)	HSYNC	VSYNC

4.Operation Specifications

4.1 Absolute Maximum Ratings

Ta = 25℃

Item	Symbol	MIN	MAX	Unit	Remark
Supply Voltage	VDD	-0.3	5.0	V	
Operating Temperature	T _{OPR}	-20	60	℃	
Storage Temperature	T _{STG}	-30	70	℃	

4.2 Electrical Characteristics

GND=0V, Ta=25℃

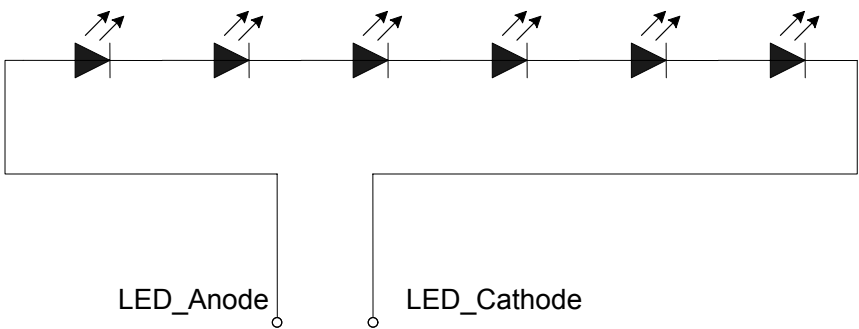
Item		Symbol	MIN	TYP	MAX	Unit	Remark
Supply Voltage		VDD	3.0	3.3	3.6	V	
Input Signal Voltage	Low Level	V _{IL}	GND	-	0.2* VDD	V	
	High Level	V _{IH}	0.8* VDD	-	VDD	V	
Output Signal Voltage	Low Level	V _{OL}	GND	-	0.2* VDD	V	
	High Level	V _{OH}	0.8* VDD	-	VDD	V	
(Panel+LSI) Power Consumption		Black Mode(60HZ)	-	TBD	-	mW	
		Stand-by Mode	-	TBD	-	mW	

Driving Backlight

Ta=25℃

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I _F	--	20	25	mA	
Forward Current Voltage	V _F	--	19.2	20.4	V	
Backlight Power Consumption	W _{BL}	--	384	510	mW	

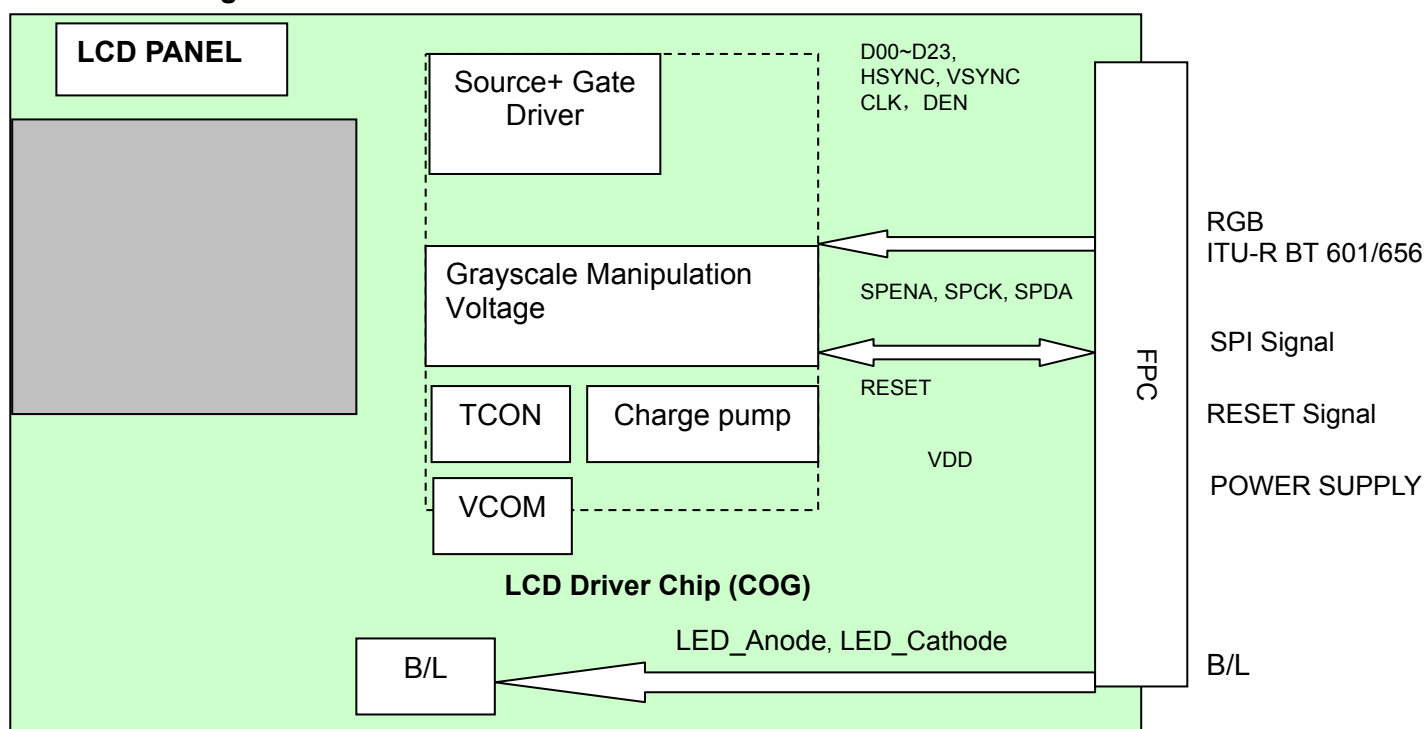
Note 1: The figure below shows the connection of backlight LED.



Note 2: One LED : I_F =20 mA, V_F =3.2V

Note 3: The minimal life of LED : 20,000 hours

4.3 Block Diagram

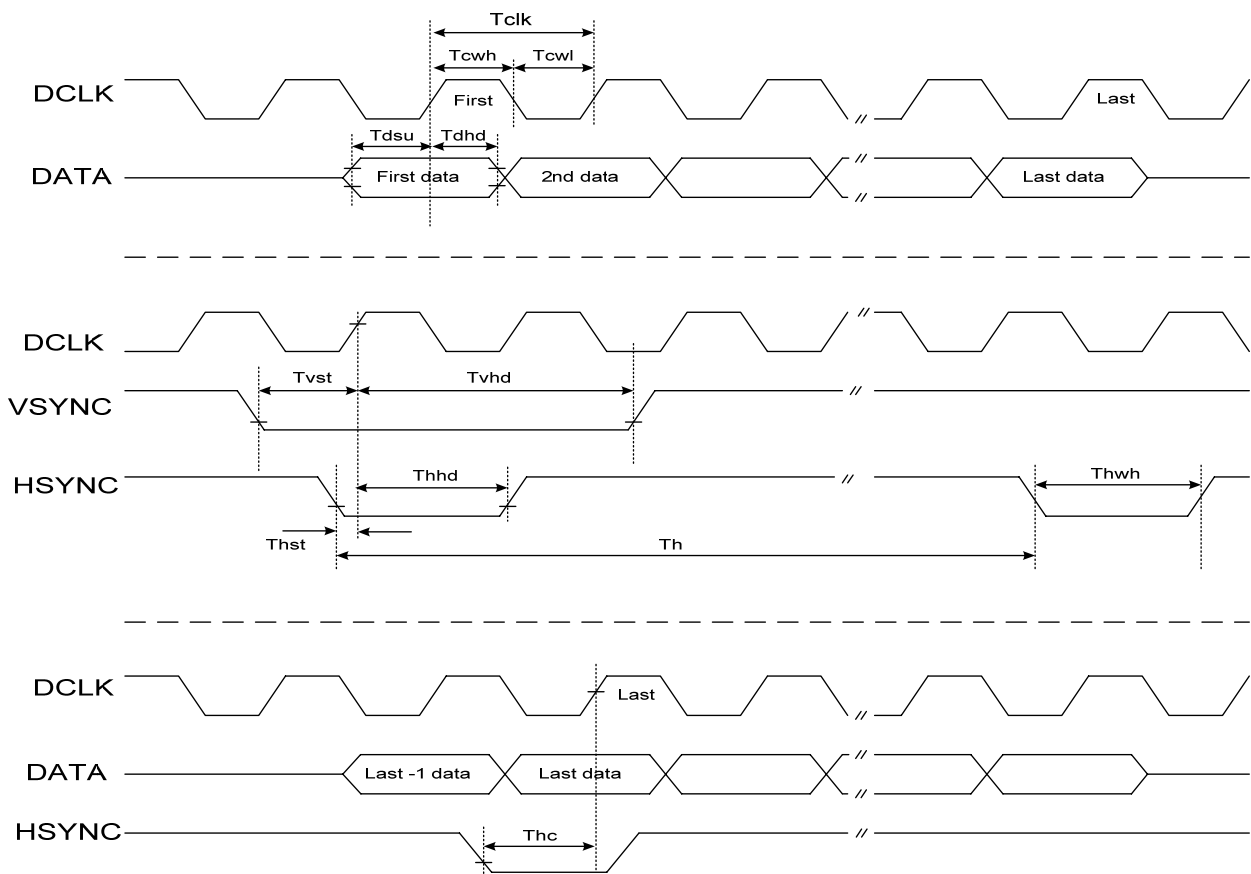


4.4 Timing Chart

4.4.1 Timing Parameter

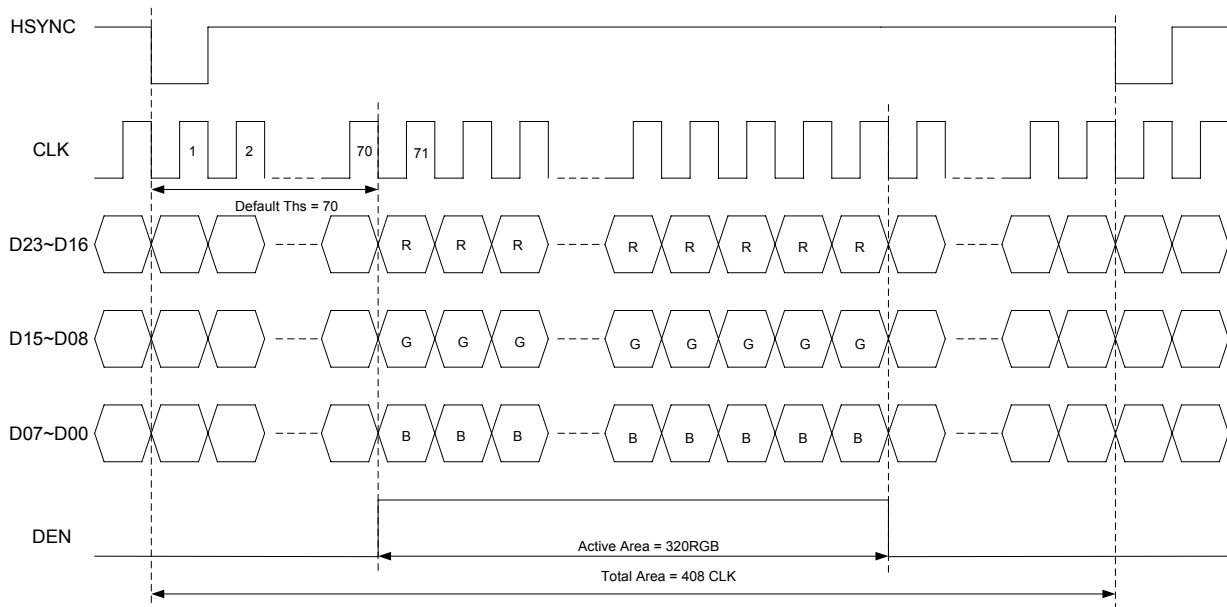
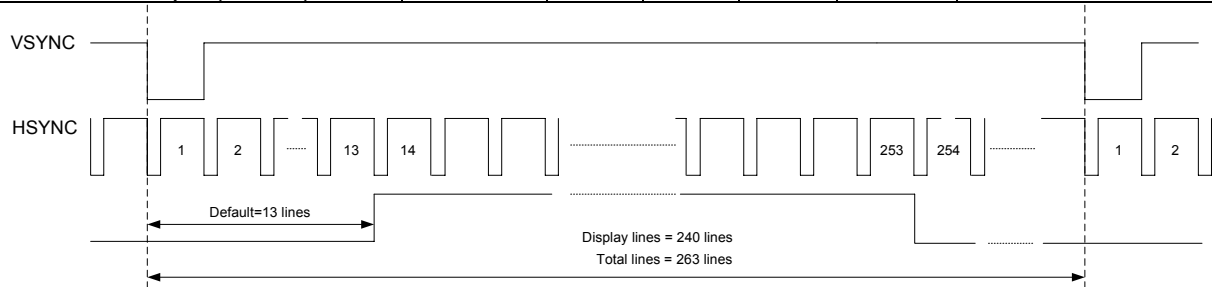
5.1.1 AC Electrical Characteristics (VDD=3.3V, GND= 0V, Ta=25°C)

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	Tesd	12	-	-	ns	DEN to CLK



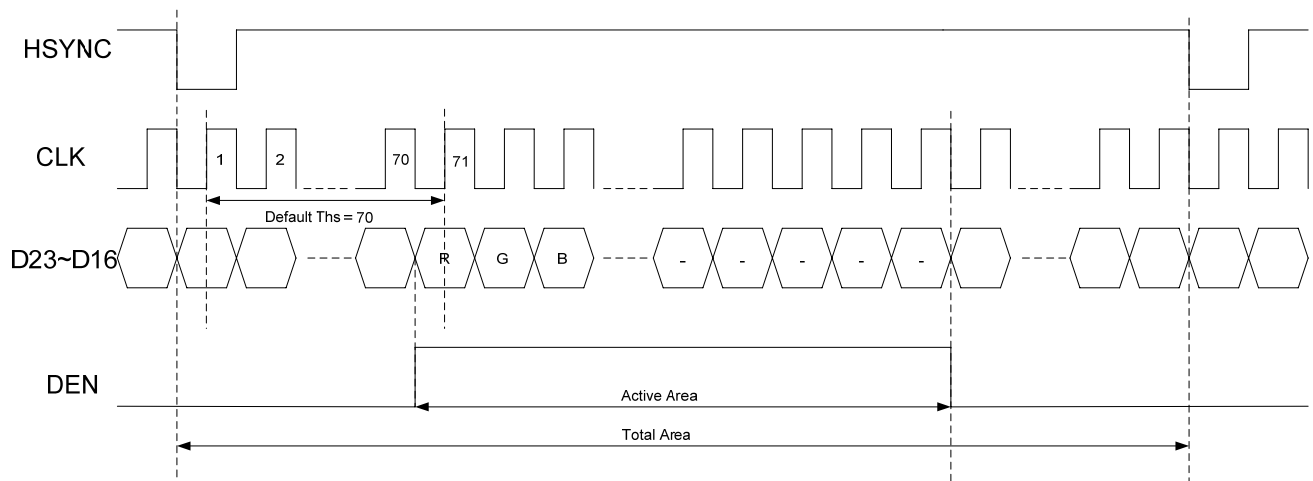
24 bit RGB mode for 320RGB x 240

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	

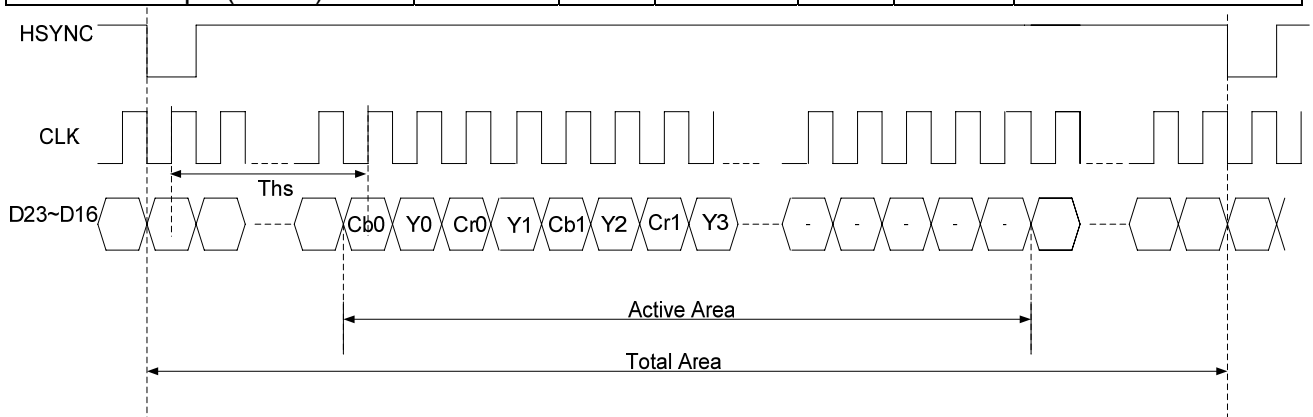


8 bit RGB mode for 320RGB x 240

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)	T _{hs}	35	70	255	CLK	

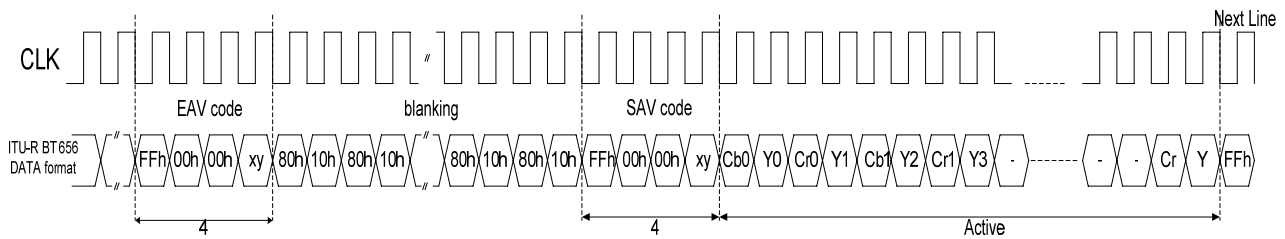
**ITU-R BT 601**

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 that HSYNC to 1'st data input(PAL)	T _{hs}	128	264	-	CLK	
Time that HSYNC to 1'st data input(NTSC)	T _{hs}	128	244	-	CLK	



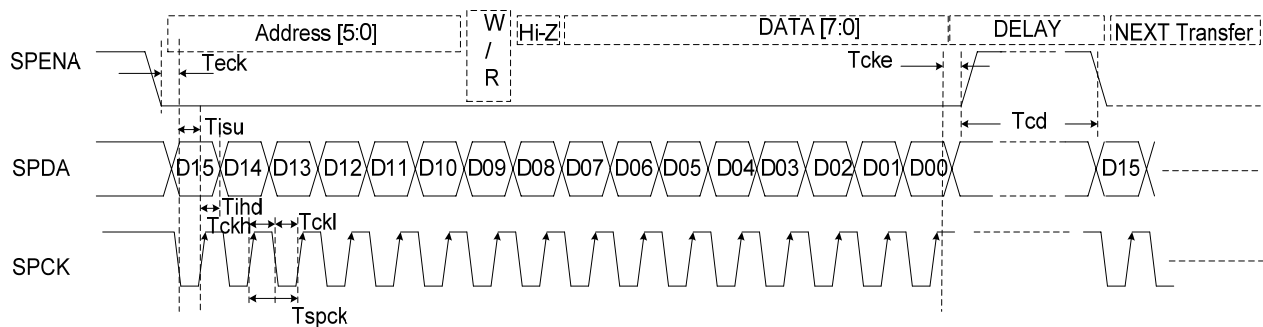
ITU-R BT 656

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



3-wire serial communication AC timing

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
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	
Chip select distinguish	Tcd	1	-	-	us	



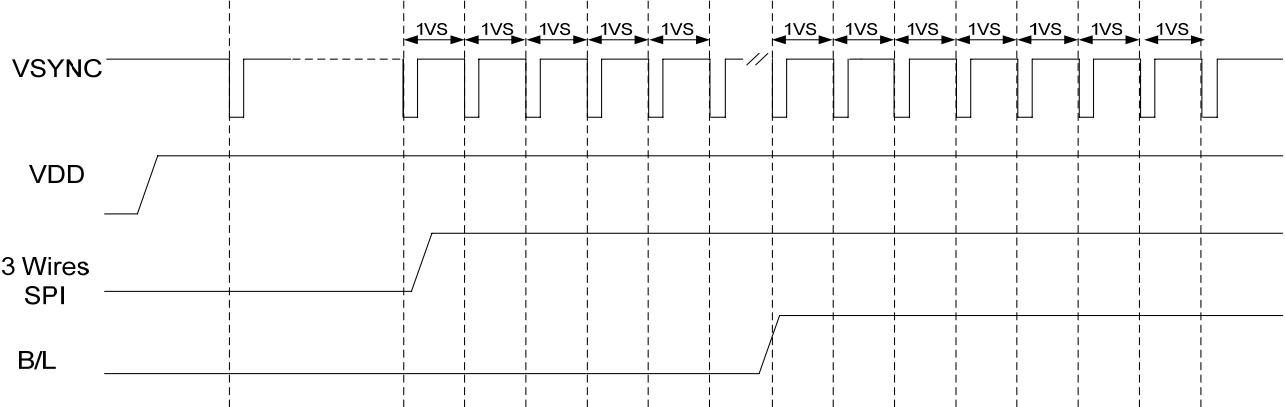
3-Wire Control Registers List

3-Wire Register		Register Description		
D[15:8]	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	68h	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	VCOMDC Trim function control register
100000b	R20	00h	R/W	Wide and narrow display mode control register

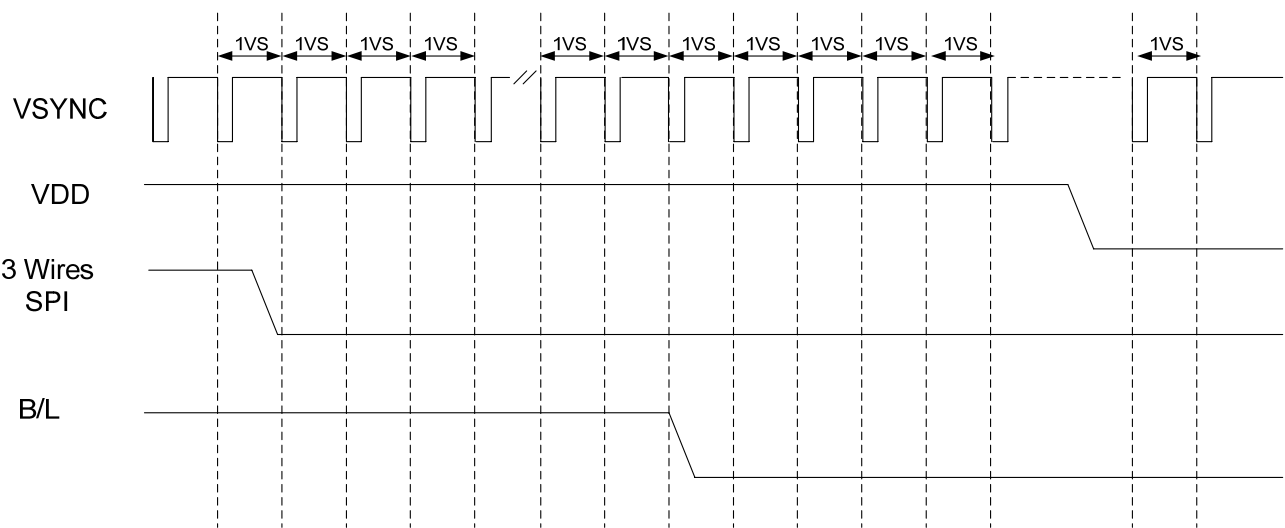
Note :

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)

power on sequence



power off sequence



5. Optical Specifications

Ta=25°C

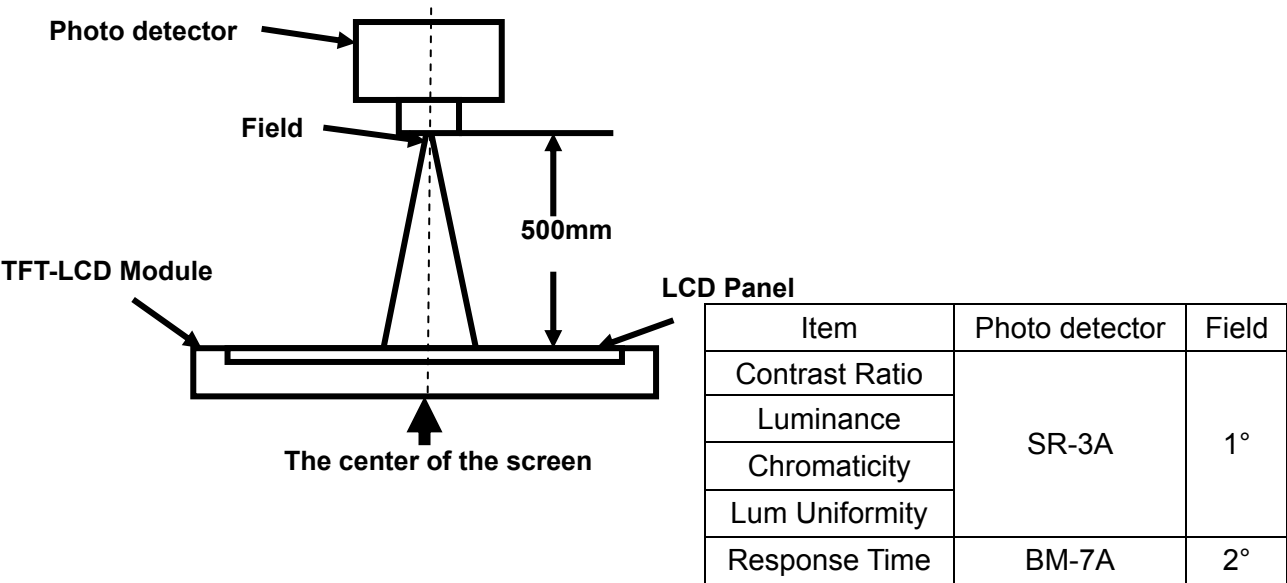
Item		Symbol	Condition	Min	Typ.	Max.	Unit	Remark
View Angles		θT	CR≥ 10	30	40	-	Degree	Note 2
		θB		50	60	-		
		θL		50	60	-		
		θR		50	60	-		
Contrast Ratio		CR	θ=0°	200	300	-		Note1 Note3
Response Time		T _{ON}	25℃	-	25	40	ms	Note1
		T _{OFF}						Note4
Chromaticity	White	x	Backlight is on	0.282	0.312	0.342		Note5, Note1
		y		0.314	0.344	0.374		
	RED	x		0.609	0.639	0.669		
		y		0.314	0.344	0.374		
	GREEN	x		0.264	0.294	0.324		
		y		0.557	0.587	0.617		
	BLUE	x		0.102	0.132	0.162		
		y		0.106	0.136	0.166		
Uniformity		U		75	80	-	%	Note1 Note6
NTSC				-	50	-	%	Note 5
Luminance		L		340	400	-	cd/m ²	Note1 Note7

Test Conditions:

1. $V_F = 3.2V$, $I_F = 20mA$ (LED current), the ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note2.

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.



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).

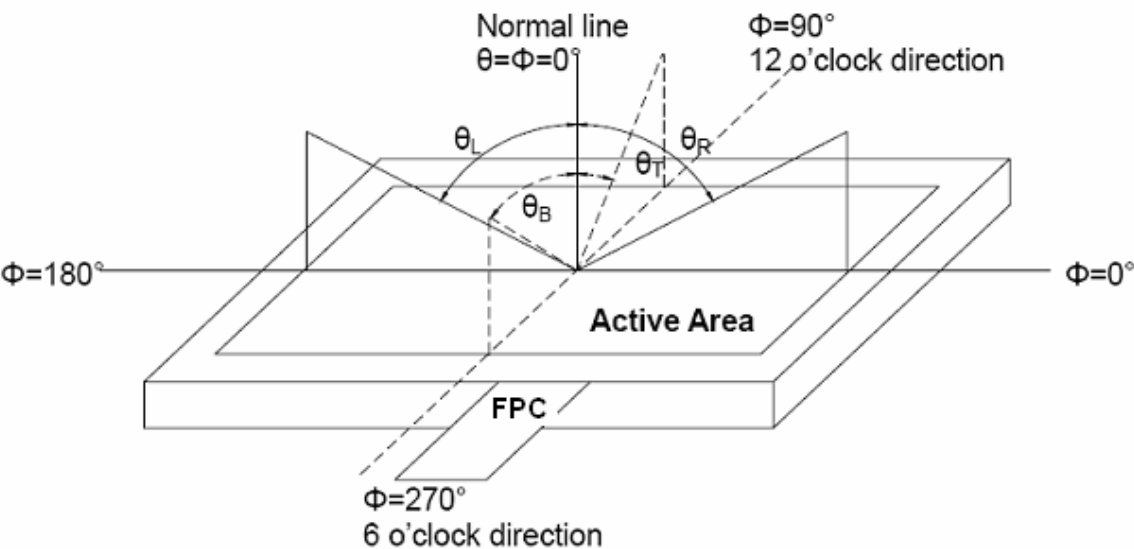


Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

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

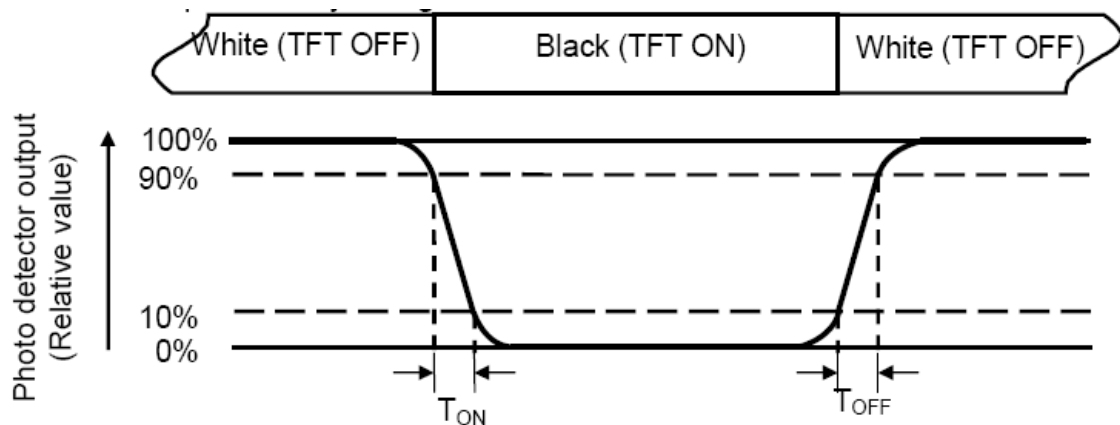
"White state": The state is that the LCD should driven by Vwhite.

"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) = L_{min} / L_{max}

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

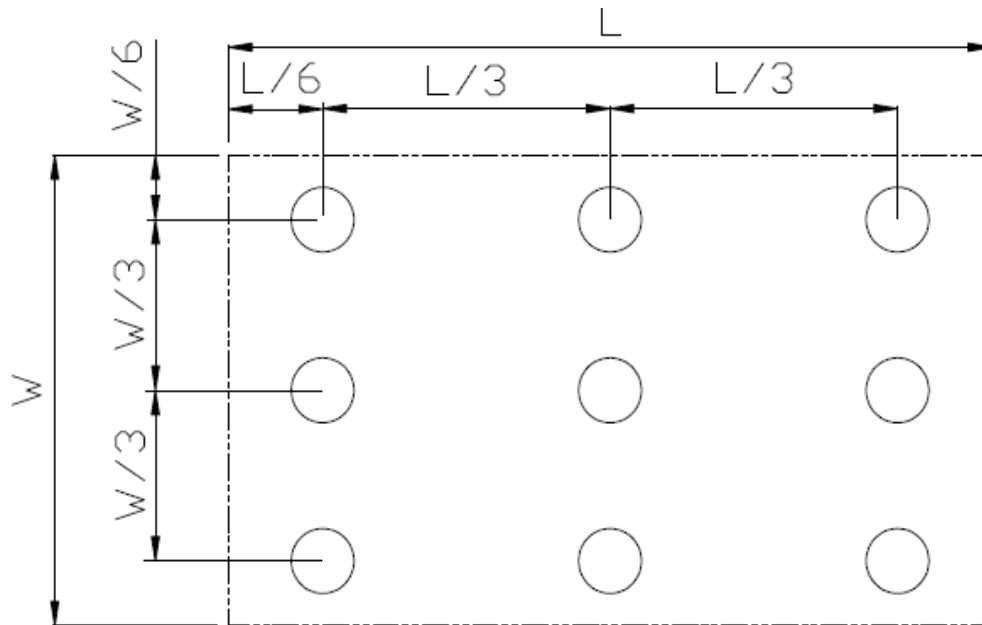


Fig. 2 Definition of uniformity

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.

6. Reliability Test Items

No	Test Item	Condition	Remarks
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 Storage	+60℃,90% RH max,160 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,5times; (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

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

Note2: Ta is the ambient temperature of sample.

7. General Precautions

7.1. Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

7.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

7.3. Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

7.4. Storage

1. Store the module in a dark room where must keep at $25\pm 10^{\circ}\text{C}$ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

7.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

8.Packing Drawing

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

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

图示说明

