MODEL NO : LCDT3213440AL

MODEL VERSION: 01

SPEC VERSION : 2.9

ISSUED DATE: 2015-12-08

□Preliminary Specification
■ Final Product Specification

Customer :_____

App oved by	Notes

LCD Confirmed :

Prepared by	Checked by	Approved by
Tiantian.Zhao	Xiaoxing.Ding	Feng.Qin

This technical specification is subjected to change without notice

Table of Contents

Record of Revision

Rev	Issued Date	Description	Editor
1.0	2010-12-29	First release	Kelly hu
1.1	2011-1-12	Updated pin15 definition	Kelly hu
2.0	2011-9-30	Final spec release.	Jin Zhao
2.1	2012-1-14	Updated supply voltage and IC PN	Jin Zhao
2.2	2012-1-19	Updated drawing and package info	Jin Zhao
2.3	2012-3-22	Update mechanical drawing	Jin Zhao
2.4	2012-4-6	Update mechanical drawing and label info	Jin Zhao
2.5	2012-4-17	Update mechanical drawing and label info	Jin Zhao
2.6	2012-7-30	Update mechanical drawing and label info	Ada Fu
2.7	2012-11-7	Add FPC drawing and update the label info(change Fixed number from 004T to 005T).	Ada Fu
2.8	2015-7-8	Update patent LED and update PN	Jin Zhao
2.9	2015-12-8	Add relative humidity	Tiantian Zhao

1 General Specifications

Feature		Spec
Display Spec.	Size	3.2”
	Resolution	240(RGB)x320
	Technology Type	a-si TFT
	Pixel Configuration	RGB Vertical Stripe
	Pixel pitch(mm)	0.2025 x 0.2025
	Display Mode	HSD,NW
	Surface Treatment	Clear Type
	Viewing Direction	12 o’clock
	Gray Scale Inversion Direction	6 o’clock
Mechanical Characteristics	LCM (W x H x D) (mm)	54.00x77.40x2.40
	Active Area(mm)	48.60x64.80
	With /Without TSP	With RTP
	Matching Connection Type	40pin-0.5mm
	LED Numbers	6
	Weight (g)	24
Electrical Characteristics	Interface	SPI-3/4 WIRE 8/16MCU 6/16/18RGB
	Color Depth	262K
	Driver IC	ILI9341

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%

3 Absolute Maximum Ratings

GND=0V

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VCC	-0.3	4.6	V	Note1
Input voltage	V_{IN}	-0.3	4.6	V	
Operating Temperature	Top	-20	70	℃	
Storage Temperature	Tst	-30	80	℃	
Relative Humidity Note2	RH	--	“95	%	Ta“40℃
		--	“85	%	40℃<Ta“50℃
		--	“55	%	50℃<Ta“60℃
		--	“36	%	60℃<Ta“70℃
		--	“24	%	70℃<Ta“80℃
Absolute Humidity	AH	--	“70	g/m*	Ta>70℃

Table 3 Absolute Maximum Ratings

Note1: Input voltage include R0~R5, G0~G5, B0~B5, Dotclk, Hsync, Vsync, Enable, R/L, U/D.
Note2: Ta means the ambient temperature.
It is necessary to limit the relative humidity to the specified temperature range.
Condensation on the module is not allowed.

4 Electrical Characteristics

4.1 LCD Module

GND=0V,Ta=25?

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Logic Supply Voltage		IOVCC	2.5	2.8	3.3+/-10%	V	
Analog Supply Voltage		VCC	2.5	2.8	3.3+/-10%	V	
Input Signal Voltage	High Level	VIH	0.7 IOVCC	-	IOVCC	V	
	Low Level	VIL	-	-	0.3 IOVCC	V	
Output Signal Voltage	High Level	VOH	0.8 IOVCC	-	-	V	
	Low Level	VOL	-	-	0.2 IOVCC	V	
(Panel+LSI) Power Consumption		Black Mode	-	30	36	mW	
		Sleeping Mode	-	0.047	0.057	mW	

Table 4.1 LCD module electrical characteristics

4.2 Backlight Unit

Ta=25?

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	15	-	mA	One LED
Forward Voltage	V_F	(2.9)	3.2	(3.4)	V	One LED
Backlight Power Consumption	W_{BL}	-	192	-	mW	4 LEDs
Lifetime	T	-	20000	-	Hr	One LED

Table 4.2.1 backlight unit electrical characteristics

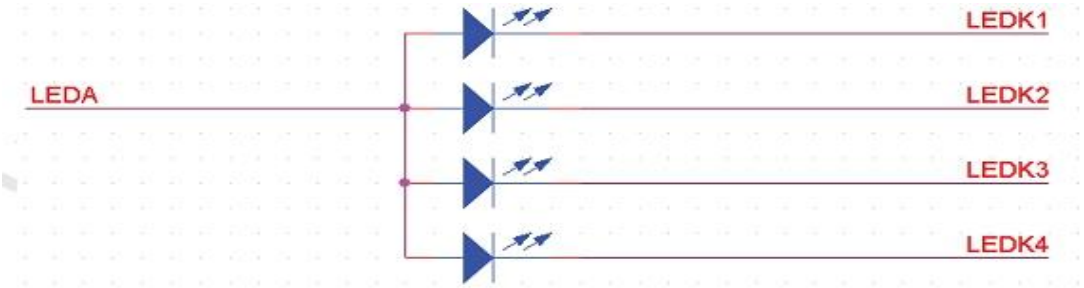
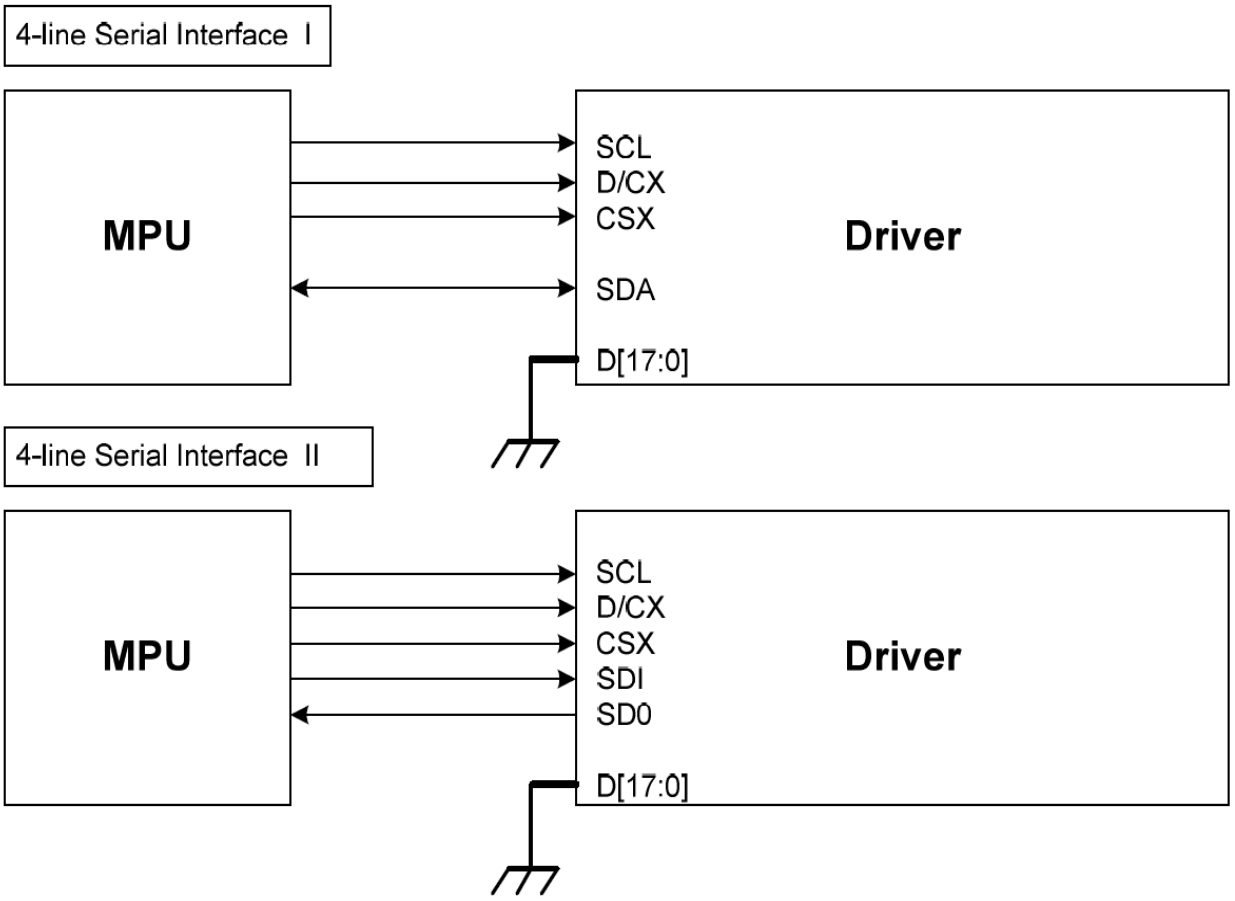
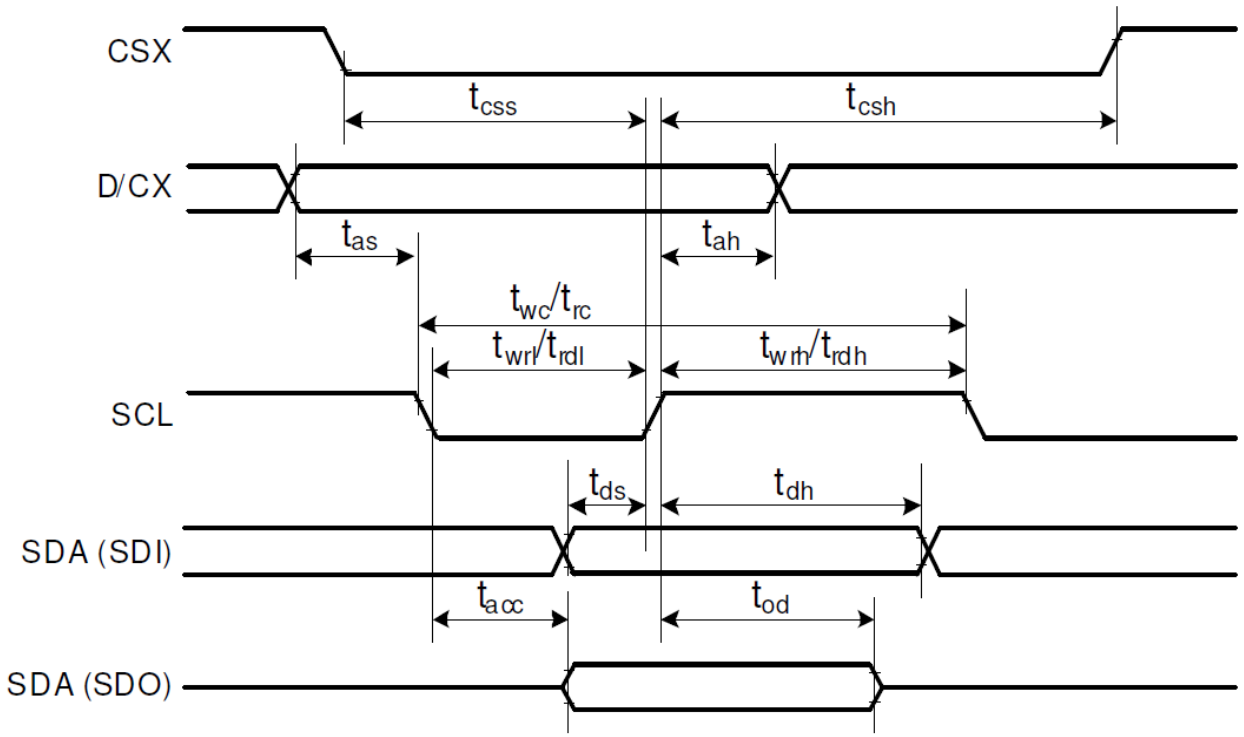


Figure 4.2.1 LED backlight circuit

4.3 Block Diagram



5 Timing Chart



Signal	Symbol	Parameter	min	max	Unit	Description
CSX	tcss	Chip select time (Write)	40	-	ns	
	tcsh	Chip select hold time (Read)	40	-	ns	
SCL	twc	Serial clock cycle (Write)	100	-	ns	
	twrh	SCL “H” pulse width (Write)	40	-	ns	
	twrl	SCL “L” pulse width (Write)	40	-	ns	
	trc	Serial clock cycle (Read)	150	-	ns	
	trdh	SCL “H” pulse width (Read)	60	-	ns	
	trdl	SCL “L” pulse width (Read)	60	-	ns	
D/CX	tas	D/CX setup time	10	-		
	tah	D/CX hold time (Write / Read)	10	-		
SDA / SDI (Input)	tds	Data setup time (Write)	30	-	ns	
	tdh	Data hold time (Write)	30	-	ns	
SDA / SDO (Output)	tacc	Access time (Read)	10	-	ns	For maximum CL=30pF
	tod	Output disable time (Read)	10	50	ns	For minimum CL=8pF

Note: Ta = -30 to 70 °C, VDDI=1.65V to 3.3V, VCI=2.5V to 3.3V, VSS=0V

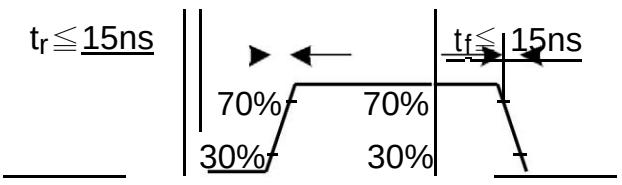


Table 5.1 timing parameter

5.2.Register write / read timing

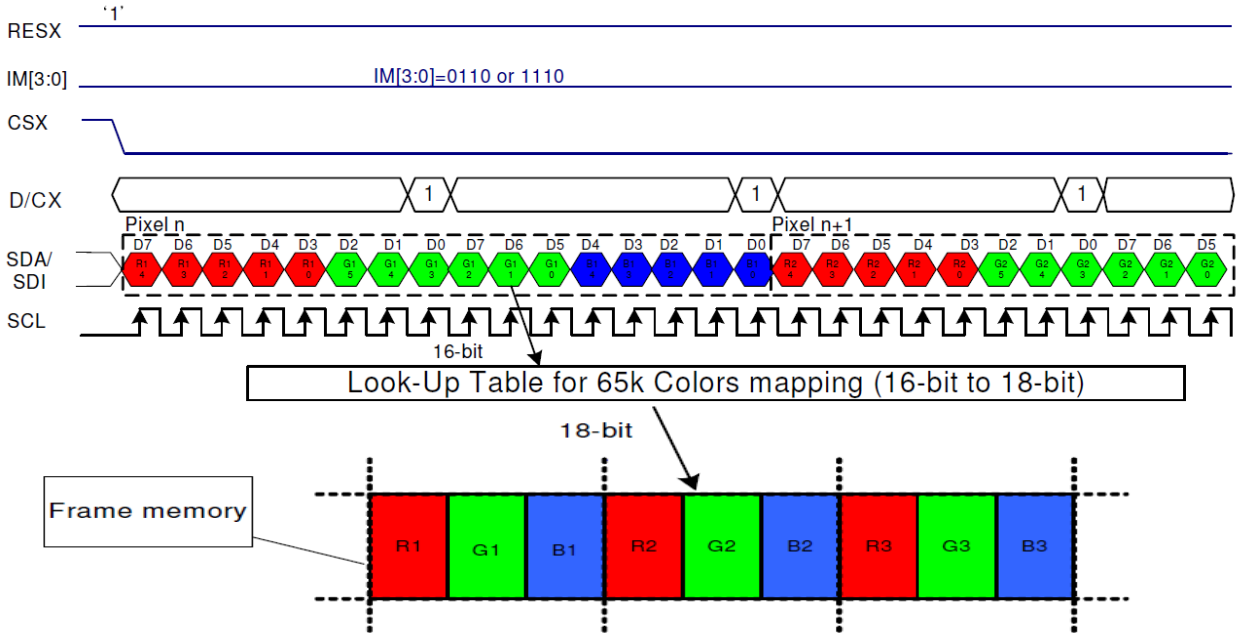
a. Write to register

In 4-line serial interface, different display data format is available for two color depths supported by the LCM listed below.

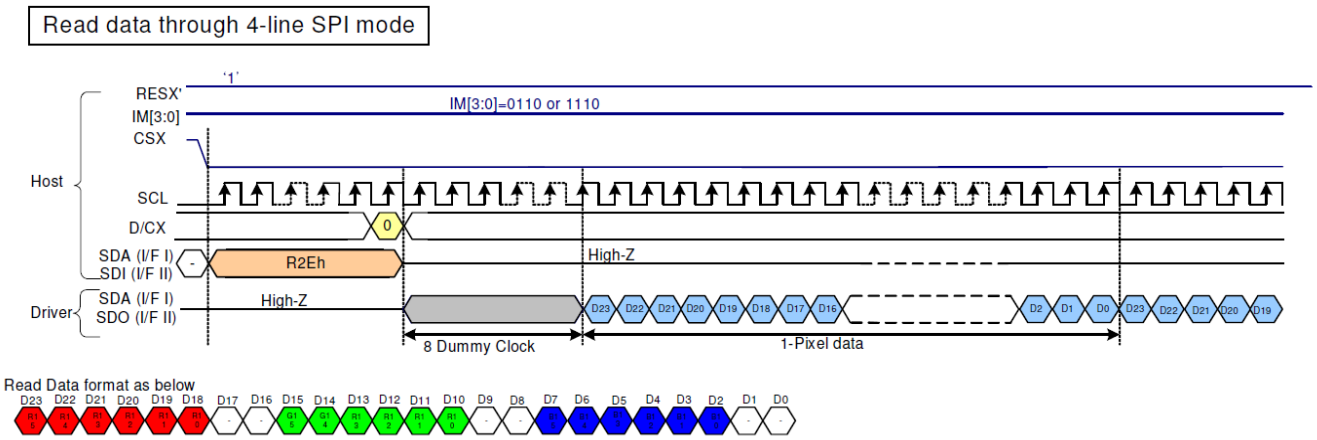
-65k colors, RGB 5, 6, 5 -bits input.

-262k colors, RGB 6, 6, 6 -bits input.

16 bit/pixel color order (R:5-bit, G:6-bit, B:5-bit), 65,536 colors



b.Read from register



Note 1: '-'= Don't care – Can be set "0" or "1".

CS timings

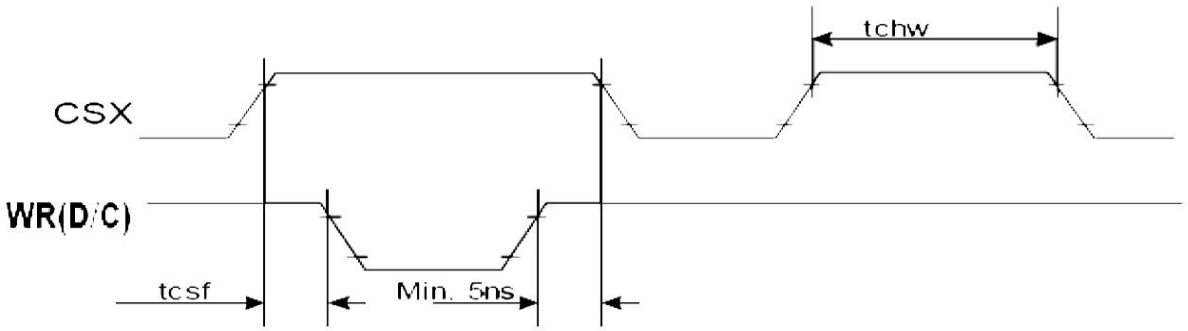


Figure 5.2.3 Chip selection timing

Write to read or read to write timings

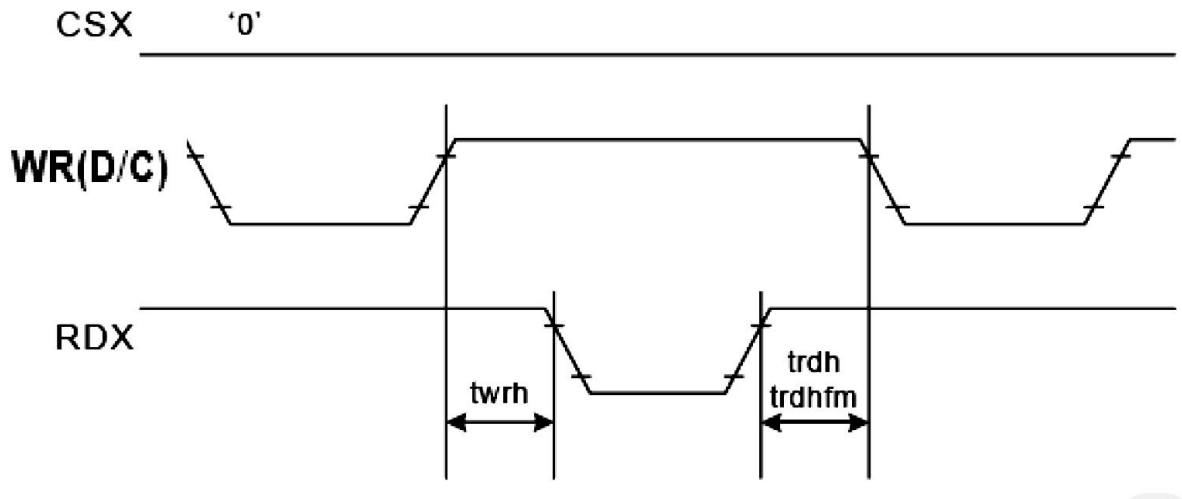
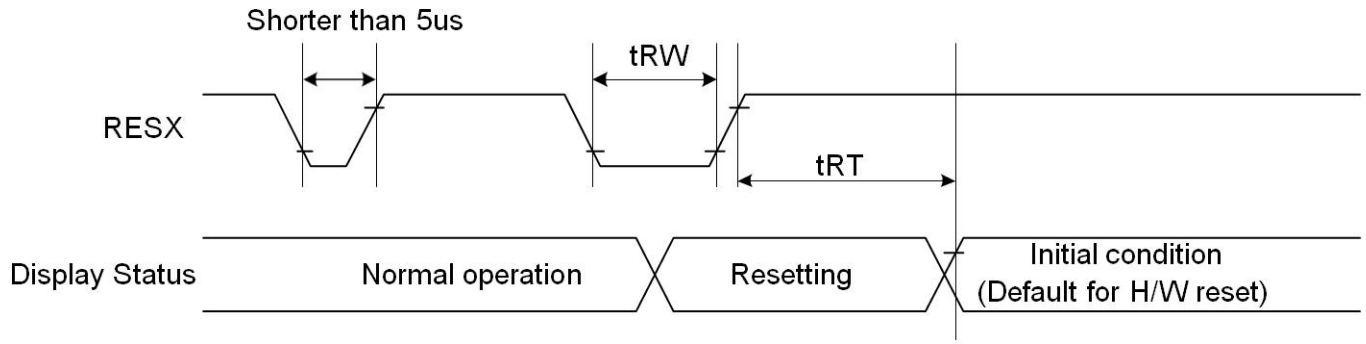


Figure 5.2.4 Write-to-read and read-to-write timing

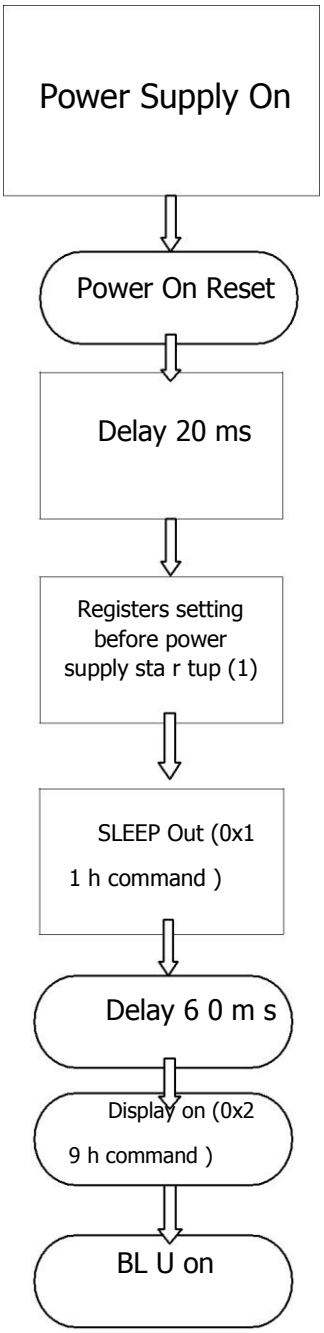
5. 3 Reset Timing Characteristics



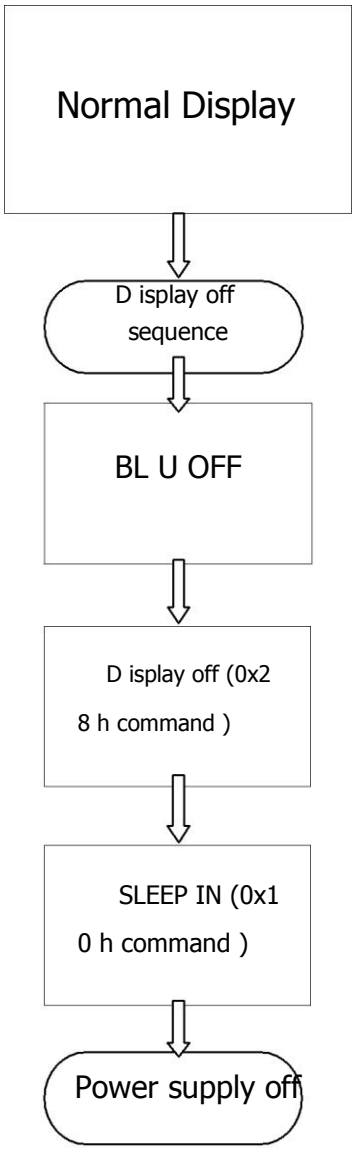
Signal	Symbol	Parameter	Min	Max	Unit
RESX	tRW	Reset pulse duration	10		uS
	tRT	Reset cancel		5 (note 1,5)	mS
				120 (note 1,6,7)	mS

Figure 5.3 RESET Timing

5.4 Power on Sequence



5.5 Power off Sequence



6.Optical Characteristics

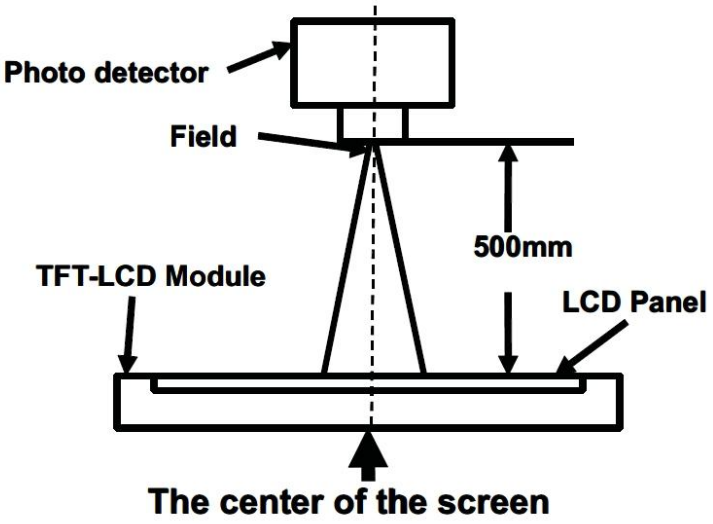
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		0T	CRŠ10	60	70	60	Degree	Note2,3
		0B		50	60	50		
		0L		60	70	60		
		0R		60	70	60		
Contrast Ratio		CR	0=0°	400	500	400		Note 3
Response Time		T_{ON}	25℃		20	30	ms	Note 4
		T_{OFF}						
Chromaticity	**White**	x	Backlight is on	0.236	0.286	0.336		Note 1,5
		y		0.261	0.311	0.361		
	Red	x		0.530	0.580	0.630		Note 1,5
		y		0.270	0.320	0.370		
	Green	x		0.288	0.338	0.388		Note 1,5
		y		0.531	0.581	0.631		
	Blue	x		0.101	0.151	0.201		Note 1,5
		y		0.048	0.098	0.148		
Uniformity		U		-	80%		%	Note 6
NTSC				-	50%		%	Note 5
Luminance		L		180	300		cd/m^2	Note 7

Test Conditions:

1. I_F= **60**mA, and 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°

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)。

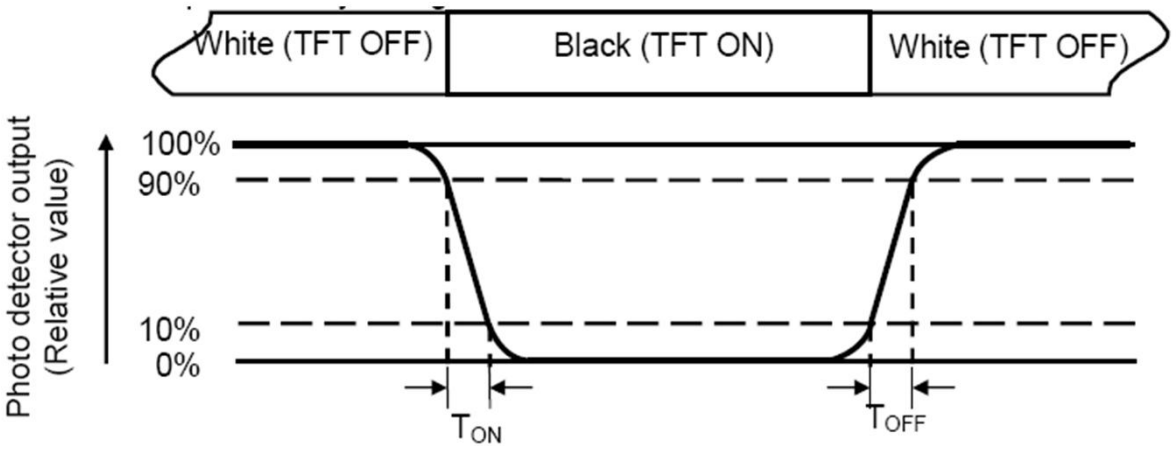
Note 3: Definition of contrast ratio

“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)

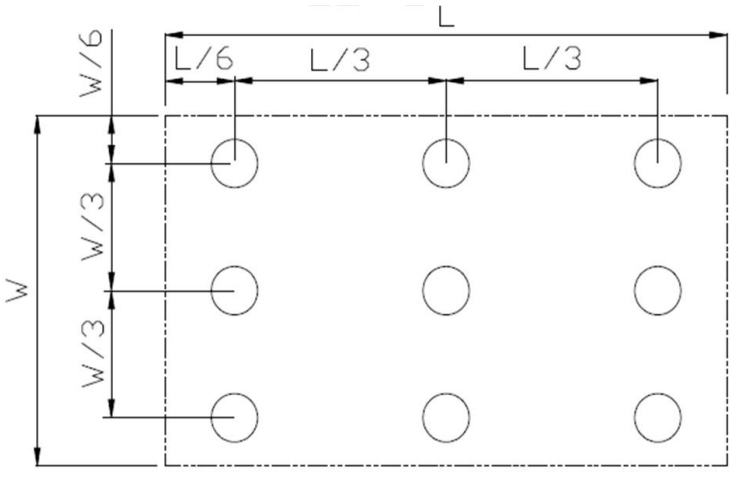
Color coordinates measured at center point of LCD.

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 l Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts=+70℃ 240hrs	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta=-20℃, 240hrs	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta=+80℃, 240hrs	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta=-30℃, 240hrs	IEC60068-2-1:2007 GB2423.1-2008
5	Storage at High Temperature and Humidity	Ta=+60℃, 90% RH 240 hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃ 30 min~+70℃ 30 min, Change time:5min, 20 Cycles	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,GB2423.22-2002
7	ESD	C=150pF, R=330K›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 2 hours for each direction of X.Y.Z. (6 hours for total)(Package condition)	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 Drop Test	Height:80 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32:1990 GB/T2423.8—1995

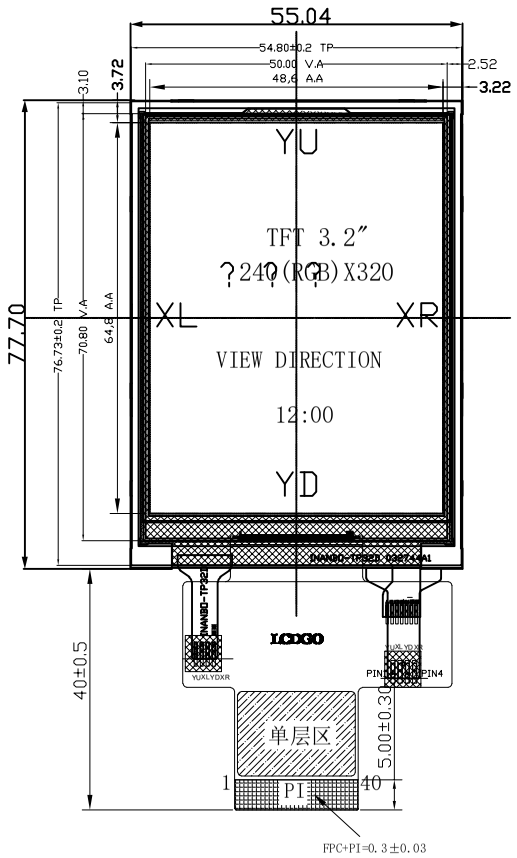
Note1: Ts is the temperature of panel's surface.

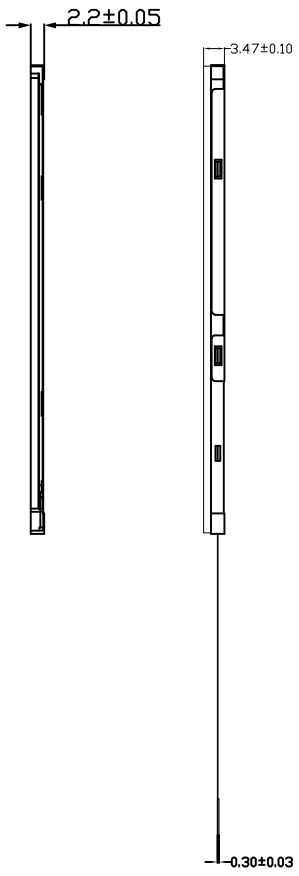
Note2: Ta is the ambient temperature of sample.

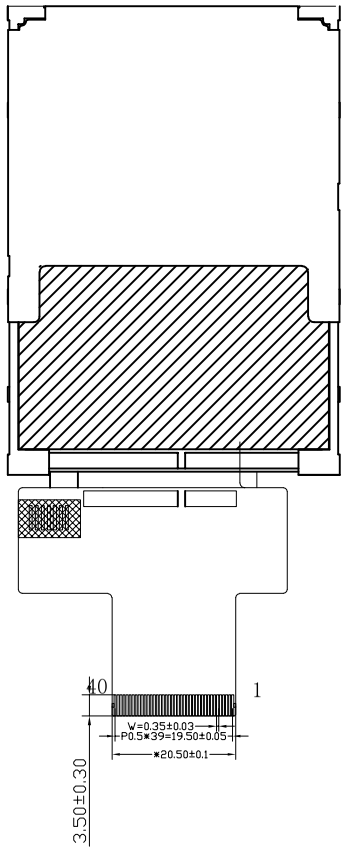
Note3: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note 4: 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.

NO.	SYMBOL
1	LEDK
2	LEDA
3	DB17/GND
4	DB16/GND
5	DB15/GND
6	DB14/GND
7	DB13/GND
8	DB12/GND
9	DB11/GND
10	DB10/GND
11	DB9/GND
12	DB8/GND
13	DB7/GND
14	DB6/GND
15	DB5/GND
16	DB4/GND
17	DB3/GND
18	DB2/GND
19	DB1/GND
20	DB0/GND
21	SDI/GND
22	ENABLE/GND
23	DOTCL/GND
24	HSYNC/GND
25	VSYNC/GND
26	RD/GND
27	WR/SPI-RS
28	RS/SPI-SCL
29	CS
30	RESET
31	IM0
32	IM1
33	IM2
34	IOVCC
35	VCI
36	GND
37	YU
38	XL
39	YD
40	XR







Note:
IM[2:0]=000, MCU DB[7:0];
IM[2:0]=001, MCU DB[15:0];

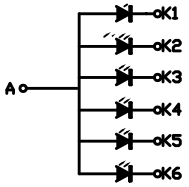
IM[2:0]=101, 3-wire SPI
SCL,SDA（In/out）,CSX;

IM[2:0]=110, 4-wire SPI
SCL,SDA（In/out）,CSX, RS;

6/16/18-bits RGB interface
RGB6-bit VSYNC, HSYNC, DE,
DOTCLK, D[5:0]
RGB 16-bit VSYNC, HSYNC, DE,
DOTCLK,D[17:13] & D[11:1]

If not used,this pin should
be connected to VDDI or VSS

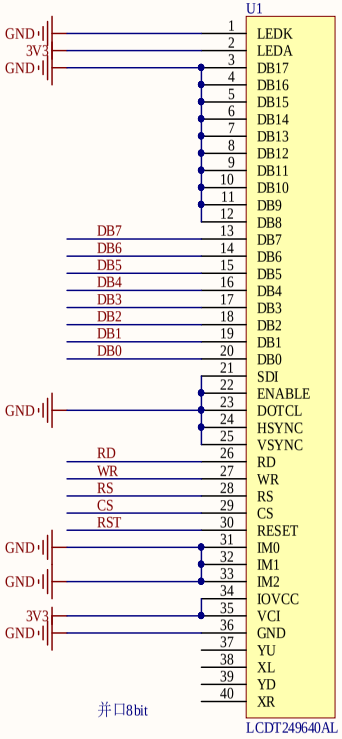
NOTES:
1. DISPLAY TYPE: 3.2″, 240*320 TFT LCD
2. DISPLAY MODE: transmissive Normally White
3. VIEWING DIRECTION: 12 O'clock
4. DRIVER IC:ILI9341V OR ST7789V2
5. LCM (White 9 AVG 1/9) :
   Brightness: TBDcd/m^2 (TYP)
   Uniformity:80%(MIN)
6. Supply Voltage:IO Voltage:1.65-3.3V;VCI Voltage:2.5-3.3V
7. BACK LIGHT: 6 chip white LEDs If=90mA,Vf=2.9-3.3V
8. OPERATING TEMP: -20° C TO 70° C,STORAGE TEMP: -30° C TO 80° C
9. * Critical Parameter,( ) ref Parameter,[ ] cpk Parameter
   Unspecified Tolerances:±0.20mm
   Modification mark:
10. REQUIREMENTS ENVIRONMENTAL PROTECTION: RoHS



MATERIAL			
PROJECTION 3rd			
APPLIED FINISH			
DRWN	MR. Y	DATE	
CHK		DATE	
APVD		DATE	

LCDGO 深圳艾斯迪科技有限公司

PART NAME:	LCDT
DRAW DATE.	LCDT
ERP NO.	
UNIT:mm	SCALE: 1 SIZE:A4



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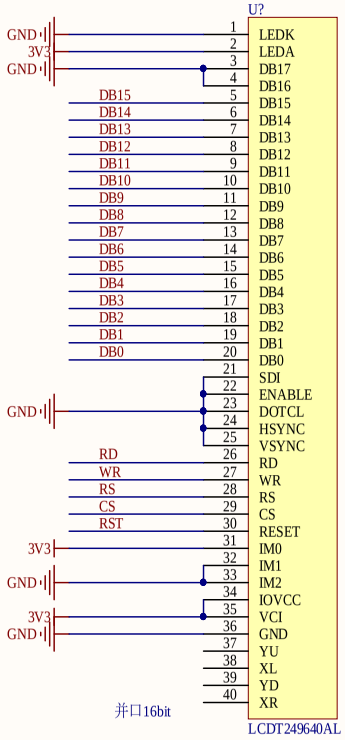

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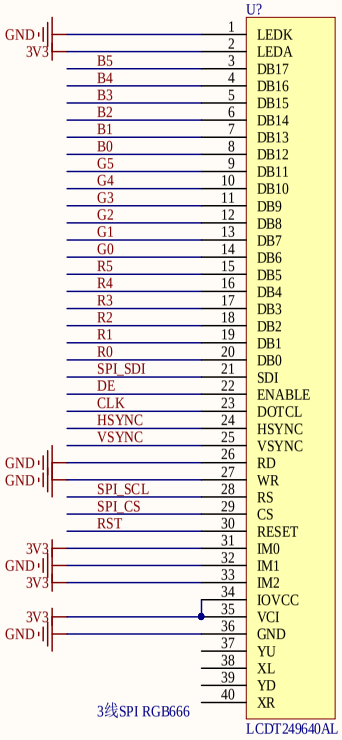
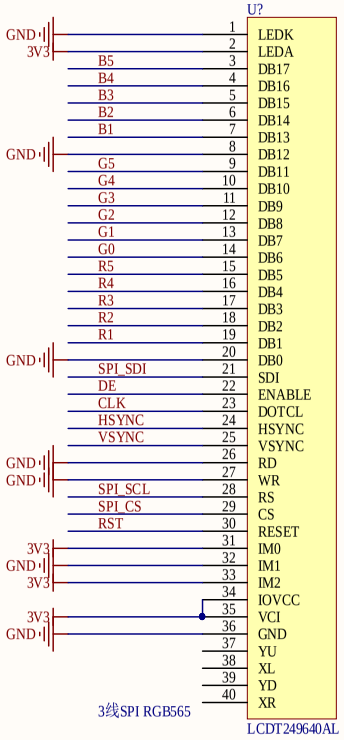
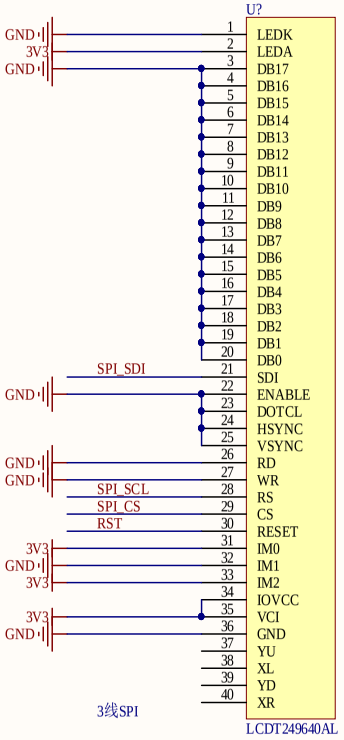


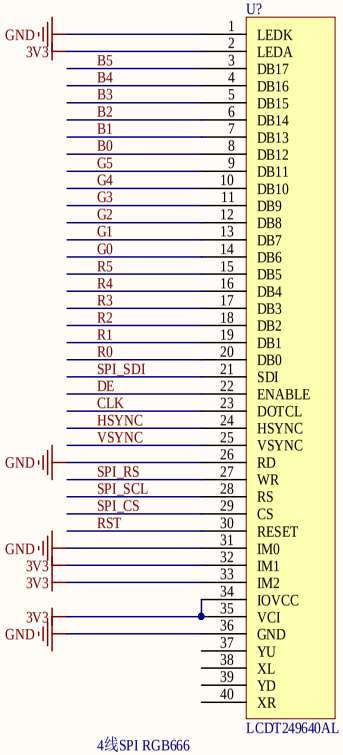
3线SPI RGB666



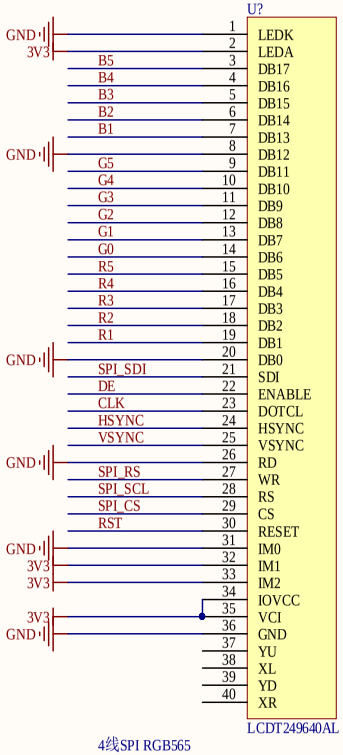
3线SPI RGB565



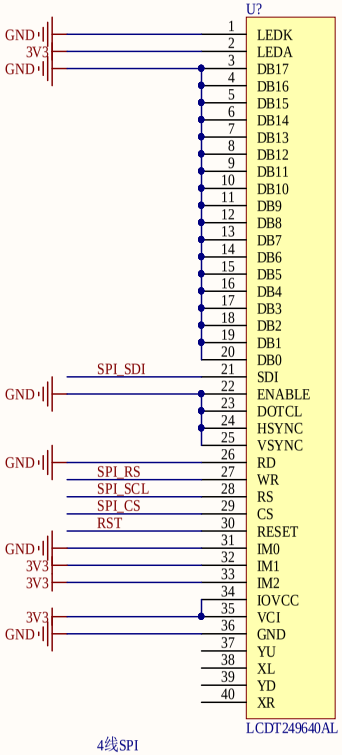
3线SPI



4线SPI RGB666



4线SPI RGB565



4线SPI

各个接口的接线原理图实例

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LCD TECHNOLOGY

9 Precautions for Use of LCD Modules

8.1 Handling Precautions

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

8.1.2 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.

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

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

8.1.5 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

8.1.6 Do not attempt to disassemble the LCD Module.

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

8.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

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

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

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

8.1.8.4 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.

8.2 Storage precautions

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

8.2.2 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%

8.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

8.3 Transportation Precautions

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