



TRANSFLECTIVE DISPLAY

P/N: DTA-4770-S000

3.5" 240XRGBX320 DISPLAY

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1. Introduction

1.1 Scope of application

This specification applies to the Negative type TFT transfective dot matrix LCD module.

LCD specification: Dots 240xRGBx320.

As to basic specification of the driver IC, refer to the IC (ILI9341) specification and datasheet.

1.2 Structure:

Double display structure:

TFT Module + FPC +BL

262K FULL Dithering Color3.5 inch TFT LCD size for main LCD;

One bare chip with gold bump (COG) TECH;

1.3 TFT features:

Structure: TFT PANNEL+IC+FPC+BL;

Transflective Type LCD

240 dot-source and 320 dot-gate outputs;

White LED back light;

2. General specification

ITEM	Standard value	UNIT
LCD Type	TFT Transflective	---
Driver element	a-Si TFT	
Number of Dots	240*(RGB)*320	Dots
Pixel Arrangement	RGB Vertical Stripe	
Active Area	53.64x71.52	mm
Viewing Area (W*H)	/	mm
Viewing Direction	6 O' clock	
Driver IC	ILI9341	
LCM Module Size(W*H*T)	64.0x85.0x3.0MAX	mm
Approx. Weight	TBD	g
Back Light	6 White LEDS	
System interface	RGB 18 bit+SPI	

3. Mechanical drawing



4. ABSOLUTE MAXIMUM RATINGS

DRIVING TFT LCD PANEL

Item	Symbol	Min	Max	Unit
Supply voltage	VSHD	-0.3	4.6	V
Driver Supply voltage	VGH-VGL	-0.3	+32	V
Logic Supply voltage	VDDI	-0.3	4.6	V
Operating temperature	T _{OP}	-20	+70	°C
Storage temperature	T _{ST}	-30	+80	°C

5. ELECTRICAL CHARACTERISTICS

BACKLIGHT

Item	Symbol	Min	Typ	Max	Unit	REMARK
Forward Current	I _F		20		mA	
Forward voltage	V _{BL}	18	19.2	21	V	With 6 LEDS
Backlight Power Consumption	W _{BL}		390	600	mW	
CTE	X	0.240		0.300		IF=20 mA
	Y	0.240		0.300		
LIFE TIME			25000		HRS	

TFT LCD PANEL

Item	Symbol	Min	TYP	Max	Unit	REMARK
Supply voltage	VSHD	2.3	2.8	3.3	V	
Logic Supply voltage	VDDI	1.65	2.8	3.3	V	



6. Data input timing

6.1 Signal AC Timing

(VSHD=2.5~3.2V, Ta=25°C)

Parameter	Description	Min	Max	Unit
tSYNCS	VSYNC/HSYNC setup time	15		ns
tSYNCH	VSYNC/HSYNC	15		ns
tENS	ENAB	15		ns
tENH	ENAB	15		ns
tPOS	Data	15		ns
tPDH	Data	15		ns
PWDH	DCLK high-level period	15		ns
PWDL	DCLK low-level period	15		ns
tCYCD	DCLK cycle time	100		ns
trgbr , trgbf	DCLK,HSYNC,VSYNC rise/fall		15	ns

Table 6.1 RGB Interface Characteristics

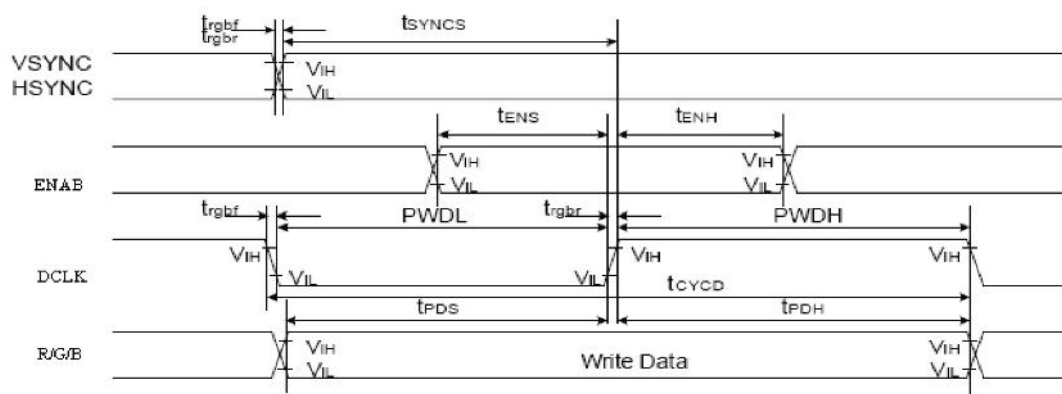


Fig.6-1 RGB Interface Timing

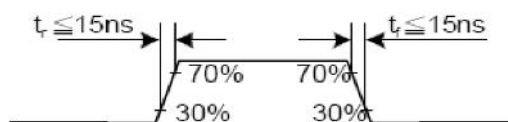


Fig.6-2 Input signal's rise and fall times



6.2 Recommend RGB Interface Timing

(VSHD=2.5~3.2V, Ta=25°C)

Parameter	Symbol	Symbol	Min	Typ	Max	Unit
DCLK	DCLK frequency	fDCYC		5.64	10	MHz
	DCLK period	tDCYC	100	177.15		ns
HSYNC	Horizontal	Thd		240		DCLK
	1horizontalline	Th		310		
	Horizontal blank	Thb	56	60		
	Horizontal front porch	Thfp	2	10	16	
VSYNC	Vertical display area	Tvd		320		Line
	Vsync period time	Tv		328		
	Vsync blank	Tvb	2	4		
	Vsync Front porch	Tvfp	2	4		

Tab.6-2 Recommend Input Timing (DCLK, HSYNC, VSYNC, ENAB)

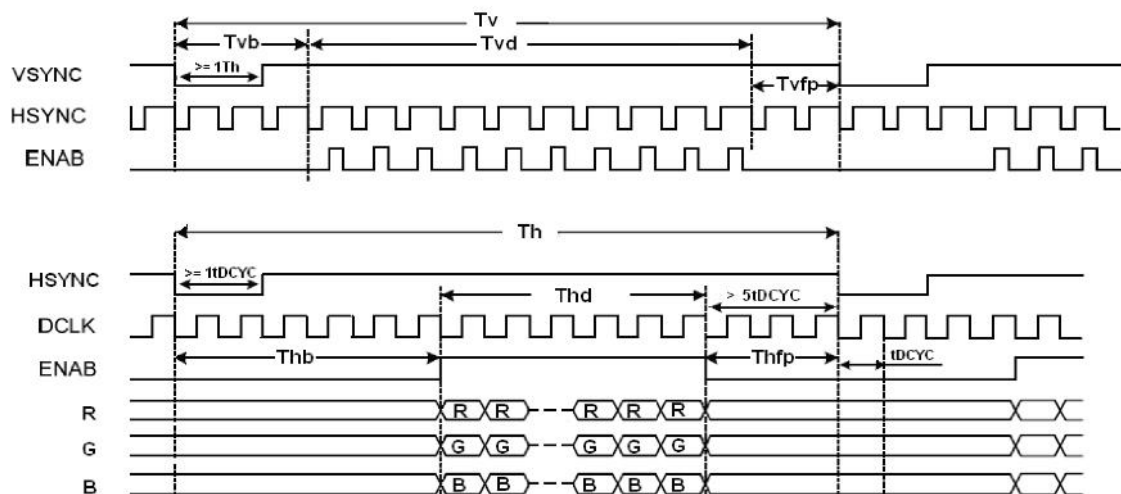


Fig.6-3 Recommend RGB Interface Timing

6.2 3-Wire 9-BIT Serial Interface

6.2.1 3-Wire 9-Bit data serial interface write mode

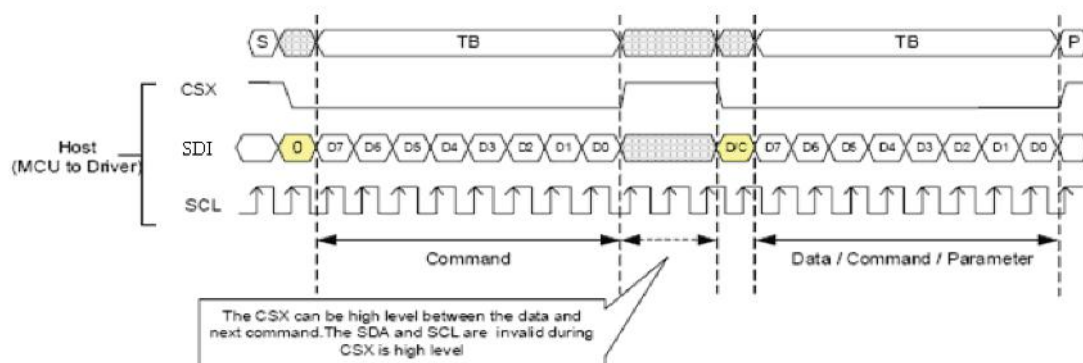


Figure.6-4 3-Wire 9-Bit Serial Interface I Bus Protocol, Write to Register or Display RAM

Note: D/C=0, Transfer Command; D/C=1, Transfer Data.

6.2.2 3-Wire 9-Bit data serial interface read 1-byte mode

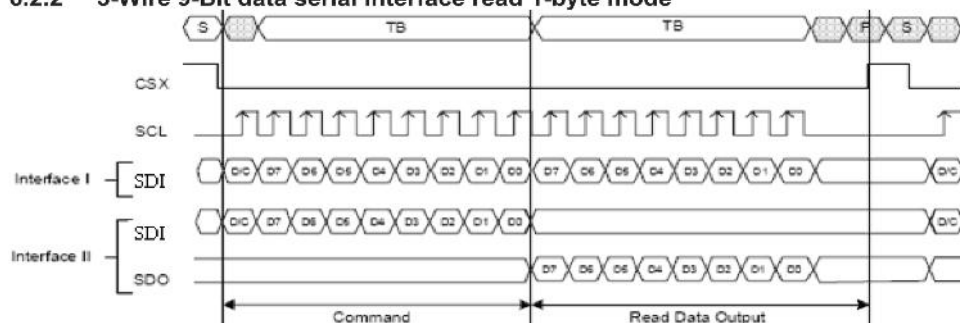


Figure. 6-5 3-Wire 9-Bit Serial Interface I/II Bus Protocol, Read 1-Byte From Register

Note: D/C=0, Transfer Command; D/C=1, Transfer Data.

6.2.3 3-Wire 9-Bit data serial interface read 3-byte mode

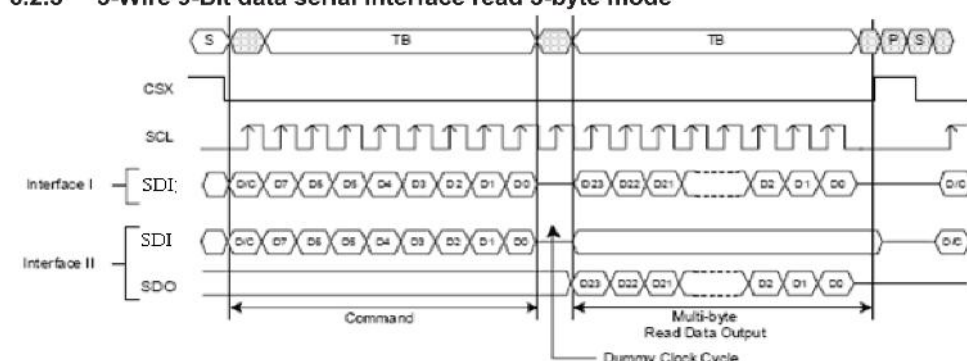


Figure. 6-6 3-Wire 9-Bit Serial Interface I/II Bus Protocol, Read 3-Byte From Register

Note: D/C=0, Transfer Command; D/C=1, Transfer Data.

6.2.4 3-Wire 9-Bit serial interface Timing

(VSHD=2.5~3.2V, Ta=25°C)

Parameter	Symbol	Conditions	Min	Max	Unit	Remark
Serial Clock Cycle(Write)	tscycw	SCL	100		ns	
SCL "H" pluse width(Write)	tshw	SCL	40		ns	
SCL "L" pluse width(Write)	tslw	SCL	40		ns	
Data setup time(Write)	tsds	SDI	30		ns	
Data hold time(Write)	tsdh	SDI	30		ns	
Serial Clock Cycle(Read)	tscyrc	SCL	150		ns	
SCL "H" pluse width(Read)	tshr	SCL	60		ns	
SCL "L" pluse width(Read)	tslr	SCL	60		ns	
Access time	tacc	SDO(Read)	10		ns	
Output disable time	toh	SDO(Read)	10	50	ns	
CS "H" pluse width	tchwh	CS	40		ns	
CS-SCL time	tcss	CS(write)	60		ns	
	tcswh	CS(write)	65		ns	

Tab.6-3 AC Characteristics of 3-Wire 9-Bit Serial Interface

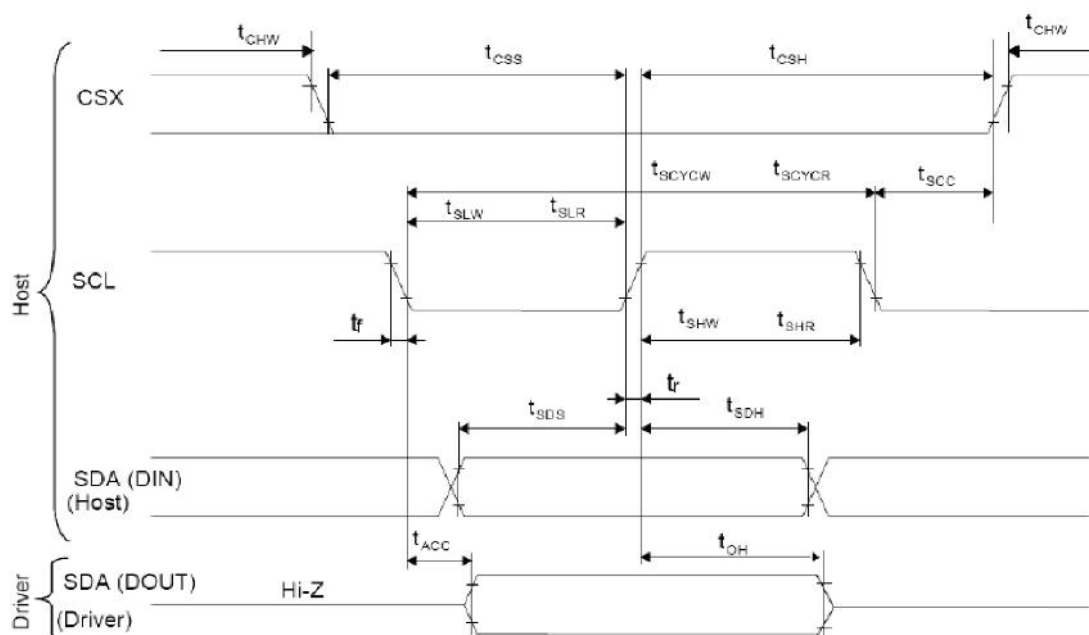


Fig.6-7 AC Characteristics of 3-Wire 9-Bit Serial Interface timing

6.3 Reset Timing

Parameter	Symbol	MIN	TYP	MAX	Unit	Remark
RESET	tRW	10			us	
	tRT			5	ms	note 1
				120	ms	note 2

Tab.6-4 Reset input timing

Note1: When Reset applied during Sleep In Mode.

Note2: When Reset applied during Sleep Out Mode.

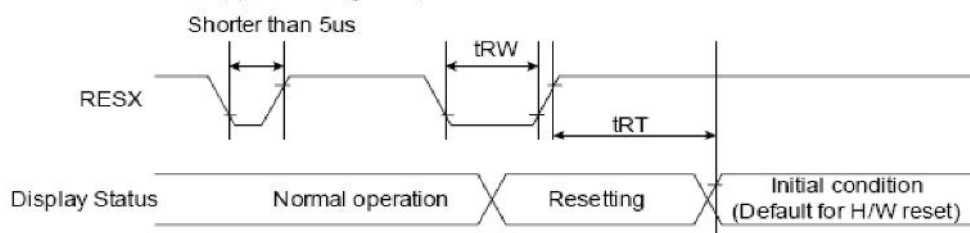


Fig.6-8 Reset timing

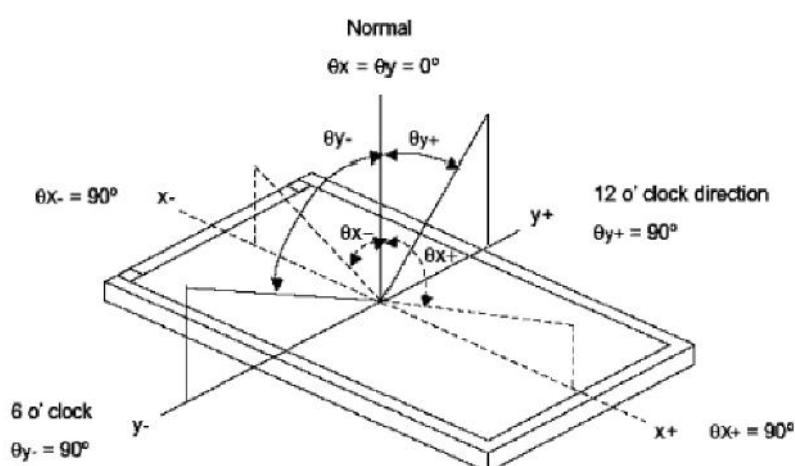


7. OPTICAL CHARACTERISTICS

Ta=25℃

ITEM	SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
			MIN.	TYP.	MAX		
Brightness	B	Viewing normal angle	100	110	—	Cd/m ²	All left side data are based on TIANMA's product reference only
Contrast Ratio	CR		100	150	—	—	
Response Time	Tr+Tf			35		ms	
CIE Color coordinate	Red			0.624			
				0.368			
	Green			0.35			
				0.55			
	Blue			0.143			
				0.119			
	White			0.310			
				0.320			
Viewing Angle	Hor.	Center CR>=10		40	—	Deg.	
				45	—		
	Ver.			55	—		
				40			
Uniformity	Un		80	90		%	

Note 1 : Definition of Viewing Angle θ_x and θ_y :

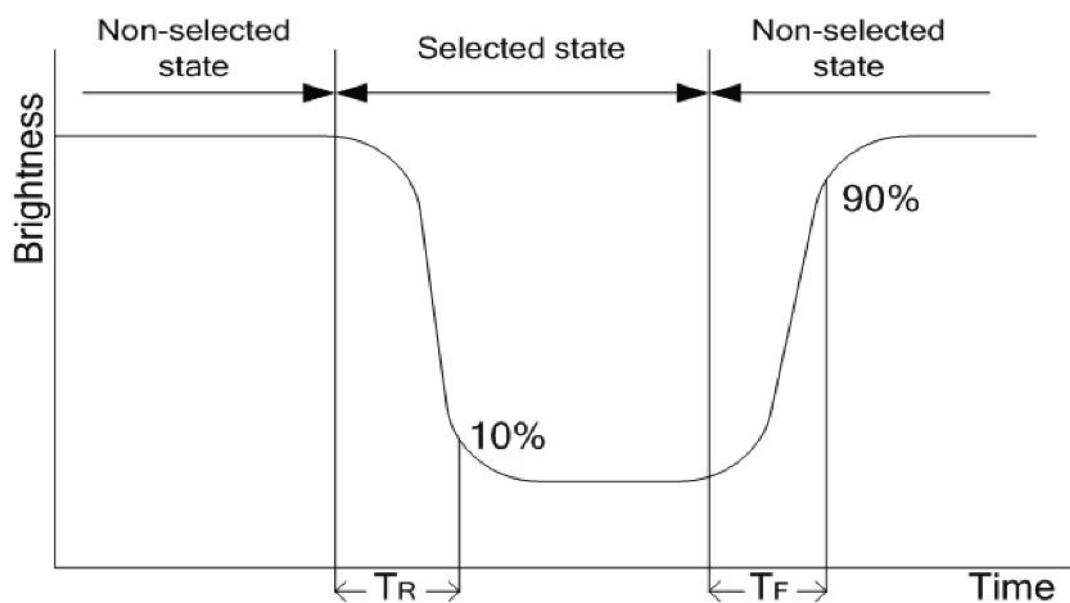




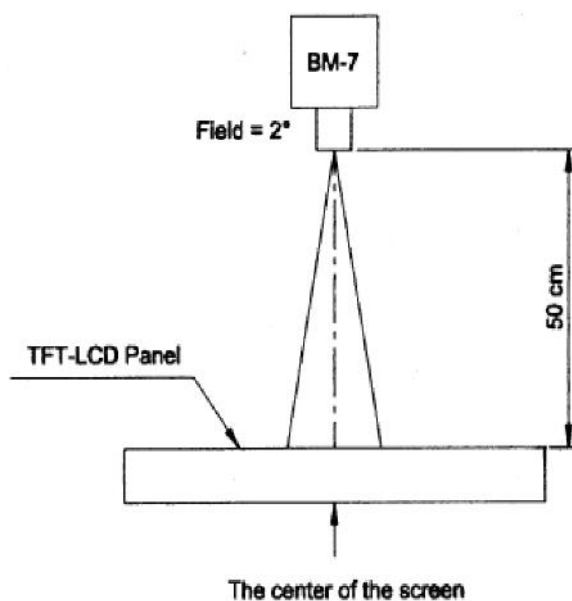
Note 2: Definition of contrast ratio CR:

$$CR = \frac{\text{Brightness of non-selected dots (white)}}{\text{Brightness of selected dots (black)}}$$

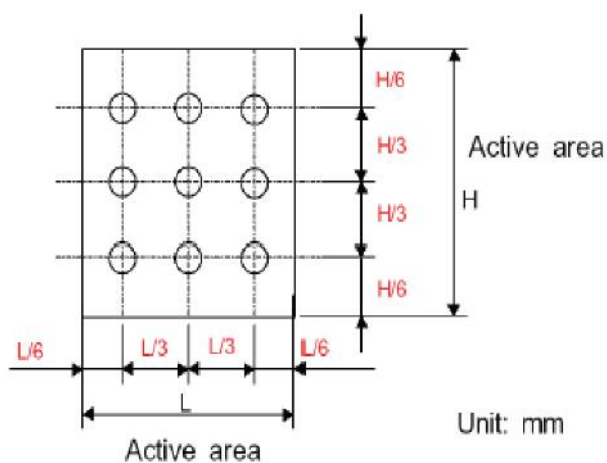
Note 3: Definition of response time (T_R , T_F)



The brightness test equipment setup
20mA Field=2° (As measuring "black" image, field=2° is the best testing condition)



Note 4 :





8. Interface Pin Function

. Table 2: Pin assignment

Pin No.	Symbol	Description
1	GND	Ground
2	YU	TP YU
3	XR	TP XR
4	YD	TP YD
5	XL	TP XL
6	GND	Ground
7	NC	NO CONNECT
8	NC	NO CONNECT
9	GND	Ground
10	NC	NO CONNECT
11	NC	NO CONNECT
12	NC	NO CONNECT
13	NC	NO CONNECT
14	NC	NO CONNECT
15	GND	Ground
16	NC	NO CONNECT
17	RESET	Reset(Low active)
18	NC	NO CONNECT
19	NC	NO CONNECT
20	VSHD	Analog Supply Voltage 2.8V
21	GND	Ground
22	B0	Blue data input(LSB)
23	B1	Blue data input
24	B2	Blue data input
25	B3	Blue data input
26	B4	Blue data input
27	B5	Blue data input(MSB)
28	GND	Ground
29	G0	Green data input(LSB)
30	G1	Green data input
31	G2	Green data input
32	G3	Green data input
33	G4	Green data input
34	G5	Green data input(MSB)
35	GND	Green data input



36	R0	Red data input(LSB)
37	R1	Green data input
38	R2	Green data input
39	R3	Green data input
40	R4	Green data input
41	R5	Red data input(MSB)
42	GND	Ground
43	VDDI	Logic Supply Voltage 2.8V
44	NC	NO CONNECT
45	GND	Ground
46	DCLK	Pixel clock signal in RGB mode
47	GND	Ground
48	ENABLE	Data enable
49	GND	Ground
50	CS	Chip select input(Low enable)
51	SDI	Serial data input
52	NC	NO CONNECT
53	SCL	Serial interface clock input
54	VSYNC	Vertical SYNC input
55	HSYNC	Horizontal sync in RGB mode
56	NC	NO CONNECT
57	NC	NO CONNECT
58	LED-	Power supply for LED(Low voltage)
59	LED+	Power supply for LED(High voltage)
60	GND	Ground

Note:

1. The PIN connect is :AXK6F60347YG.



9. BLOCK DIAGRAM

CL

