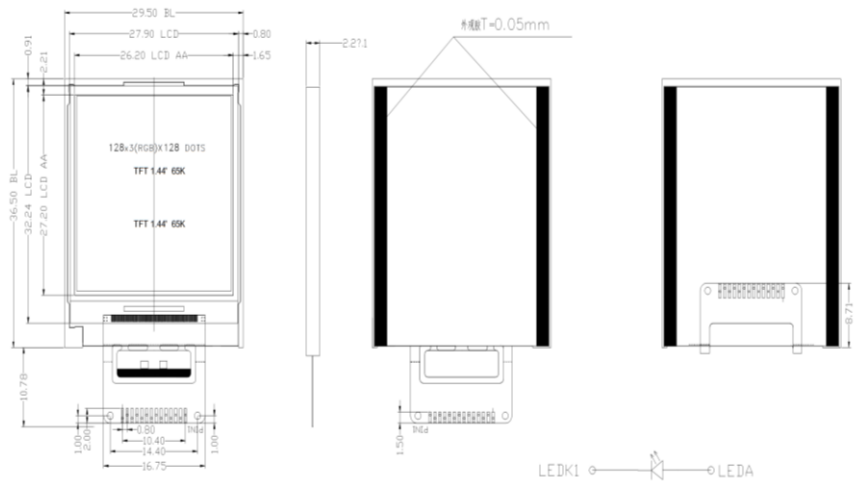


版本	变更日期	变更内容	核准

PIN FUCTION	
PIN	
1	NC
2	GND
3	LED-
4	LED+
5	GND
6	RESET
7	A0
8	SDA
9	SCK
10	VCC
11	IOWCC
12	CS
13	GND
14	NC



1. DISPLAY TYPE	1.44" TFT, TRANSMISIVE	Approve		Unmarked Tolerance	±0.2
2. VIEWING DIRECTION	6 O'CLOCK			Unit	mm
3. DRIVER IC	ST7735S	Checked		Scale	
4. BACKLIGHT	1 Chip-White LED	Drawn		Date	2010/8/12
5. OPERATIVE VOLTAGE	2.8V	Approved		Page	1/1
6. OPERATIVE TEMP.	-10° C TO 60° C				
7. STORAGE TEMP.	-20° C TO 70° C				
8. CONNECTOR	FPC				



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2.General Description

FRD14414B is a transmissive type a-Si TFT-LCD (amorphous silicon thin film transistor liquid crystal display) module, which is composed of a TFT-LCD panel, a driver circuit a backlight unit, The panel size is 1.44 inch and the resolution is 128×128. High image quality a-Si TFT LCD module. Partial-screen display function is available. Sleep and Stand-by modes are available for power saving.

2.1 Features

No	Item	Specification	Remark
1	Display Mode	Normally White	
2	Screen Size	1.44inch (diagonal)	
3	Resolution	128×RGB×128	
4	Color Number	65K	
5	Color Arrangement	TFT Active matrix	
6	Driver IC	ST7735S	
7	Back Light	White LED*1	
8	Viewing Direction	6' clock	
9	Interface	4SPI	
10	Surface Treatment		
11	touch panel		

2.2 Application

- ◆ Mobile phone.
- ◆ Portable multimedia device.

3.Outline Dimension

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

Parameter	Specifications	Unit
Outline dimensions	29.5(W) × 36.5(H) × 2.2(D) (LCM, not include FPC)	mm
Active area	26.2(W) × 27.2(H)	mm
Resolution	128(H)RGB× 128(V) dots	-
Dot size	0.1992(H) x 0.207(V)	mm

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4.TFT-LCM Interface Specification

Pin No	Symbol	Description	Note
1	NC	NC	
2	GND	System Ground	
3	LEDK	Power supply Cathode input for backlight	
4	LEDA	Power supply Anode input for backlight	
5	GND	System Ground	
6	/RESET	Reset signal input Pin	
7	A0	data/ command selection	
8	SDA	Serial input Data BUS	
9	SCL	Serial clock input	
10	VCC	Power supply input for LCM: 2.8V	
11	IOVCC	Power Supply for I/O system:1.8V	
12	CS	Chip select input pin.	
13	GND	System Ground	
14	NC	NC	
15			
16			
17			
18			

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5. Absolute Maximum Ratings

5.1 Electrical Maximum Ratings – for IC Only

Table 3: Electrical Maximum Ratings – for IC

Parameter	Symbol	Min.	Max.	Unit	Note
Power supply voltage (VCI)	VCI	-0.3	+4.0	V	1
Power supply voltage (IOVCC)	IOVCC	-0.3	+3.6	V	1

Note:

- 1.IOVCC,VCI, GND must be maintained.
- 2.The modules may be destroyed if they are used beyond the absolute maximum ratings.

5.2 Environmental Condition

Table 4

Item	Operating temperature (Topr)		Storage temperature (Tstg) (Note 1)		Remark
	Min.	Max.	Min.	Max.	
Ambient temperature	-10°C	+60°C	-20°C	+70°C	Dry
Humidity (Note 1)	80% max. RH for Ta 40°C < 50% RH for 40°C < Ta			Maximum operating temperature	No condensation

Note 1: Product cannot sustain at extreme storage conditions for long time.

6. Electrical Specifications

Typical Electrical Characteristics

At Ta = 25 °C, VCI = 2.6V to 3.3V, IOVCC= 1.65V to 3.3V GND=0V.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (analog)	VCI-GND		2.6	2.8	3.3	V
Supply voltage (logic)	IOVDD-GND		1.65	1.8	3.3	V
Supply current (Logic & LCD)	ICC	VCI=2.8V	-	-	10	mA
Supply voltage of white LED backlight	VLED =V(BL+)-V(BL-)	Forward current =20 mA	2.8	3.2	3.6	V
Luminance (on the module surface)		Number of LED dies = 1	80	100	110	cd/m ²

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7. Timing Characteristics

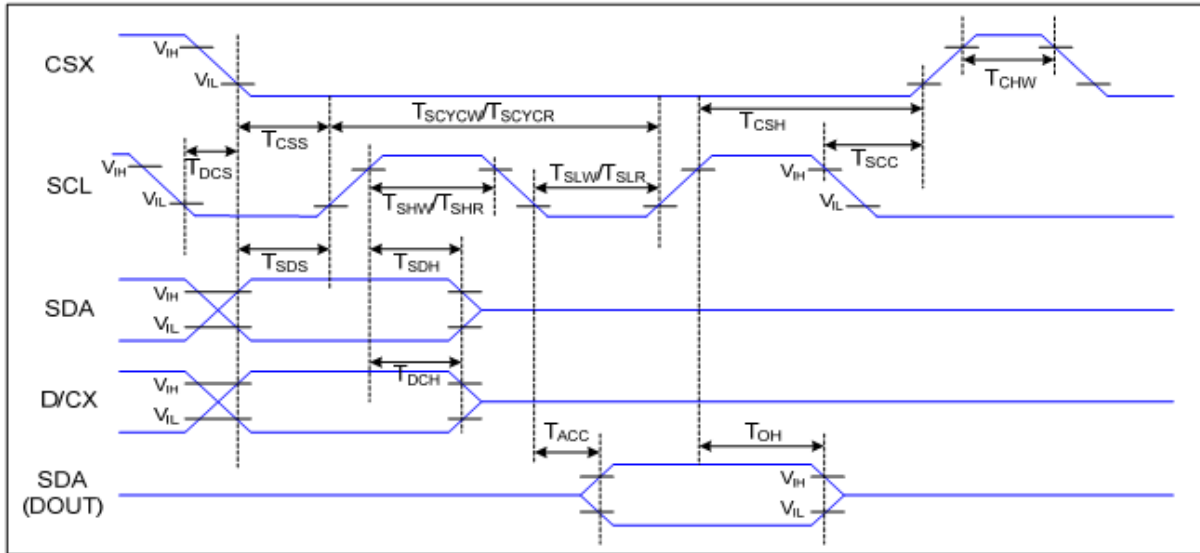


Figure 7 4-line Serial Interface Timing

T_a=25 °C, V_{DDI}=1.65~3.7V, V_{DD}=2.5~4.8V

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	TCSS	Chip Select Setup Time (Write)	45		ns	
	TCSH	Chip Select Hold Time (Write)	45		ns	
	TCSS	Chip Select Setup Time (Read)	60		ns	
	TSCC	Chip Select Hold Time (Read)	65		ns	
	TCHW	Chip Select "H" Pulse Width	40		ns	
SCL	TSCYW	Serial Clock Cycle (Write)	66		ns	-Write Command & Data Ram
	TSHW	SCL "H" Pulse Width (Write)	15		ns	
	TSLW	SCL "L" Pulse Width (Write)	15		ns	
	TSCYCR	Serial Clock Cycle (Read)	150		ns	-Read Command & Data Ram
	TSHR	SCL "H" Pulse Width (Read)	60		ns	
	TSLR	SCL "L" Pulse Width (Read)	60		ns	
D/CX	TDCS	D/CX Setup Time	10		ns	
	TDCH	D/CX Hold Time	10		ns	
SDA (DIN) (DOUT)	TSDS	Data Setup Time	10		ns	For Maximum CL=30pF For Minimum CL=8pF
	TSDH	Data Hold Time	10		ns	
	TACC	Access Time	10	50	ns	
	TOH	Output Disable Time	15	50	ns	

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8. Power Supply Configuration

11.1 Driver IC Operating Voltage Specification

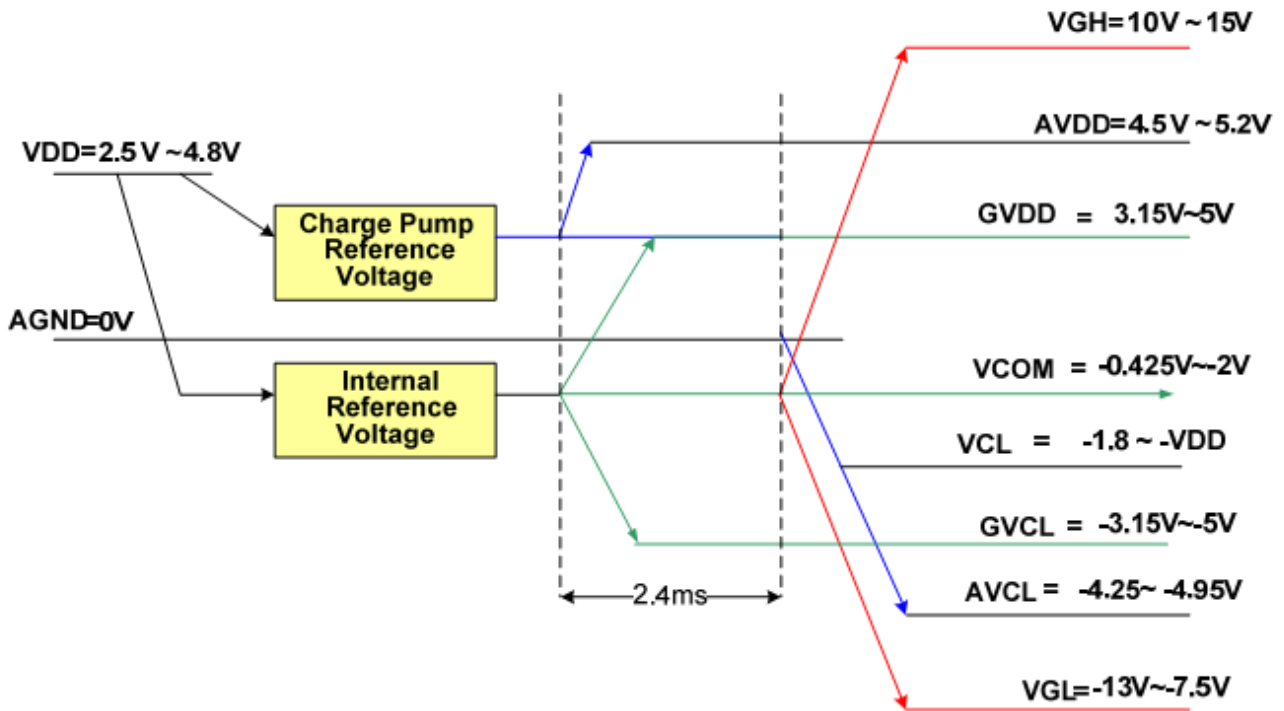


Fig 15 Power Booster Level

Note:

Sleep out flow: AVDD, GVDD, GVCL, VCOM switch on -> 2.4ms -> AVCL, VGH, VGL, VCL switch on -> 78.6ms

scan 2 blank frames

Sleep in flow: Scan 2 blank frames -> All analog power

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9.Optical Specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmittance (without Polarizer)		T(%)	—	—	17.5	—	—	
Contrast Ratio		CR	$\Theta=0$ Normal viewing angle	400	500	—	—	(1)(2) Measuring with EWV Polarizer · Reference Only
Response time	Rising	T_R	—	—	4	8	msec	(1)(3)
	Falling	T_F	—	—	12	24		
Color gamut		S(%)			53		%	
Color chromaticity (CIE1931)	White	W_x		0.273	0.293	0.313		(1)(4) CF glass
		W_y		0.305	0.325	0.345		
	Red	R_x		0.616	0.636	0.656		
		R_y		0.308	0.328	0.348		
	Green	G_x		0.263	0.283	0.303		
		G_y		0.511	0.531	0.551		
Blue	B_x		0.115	0.135	0.155			
	B_y		0.114	0.134	0.154			
Viewing angle	Hor.	Θ_L	CR>10	60	70	—		Measuring with EWV Polarizer · Reference Only
		Θ_R		60	70	—		
	Ver.	Θ_U		60	70	—		
		Θ_D		50	60	—		

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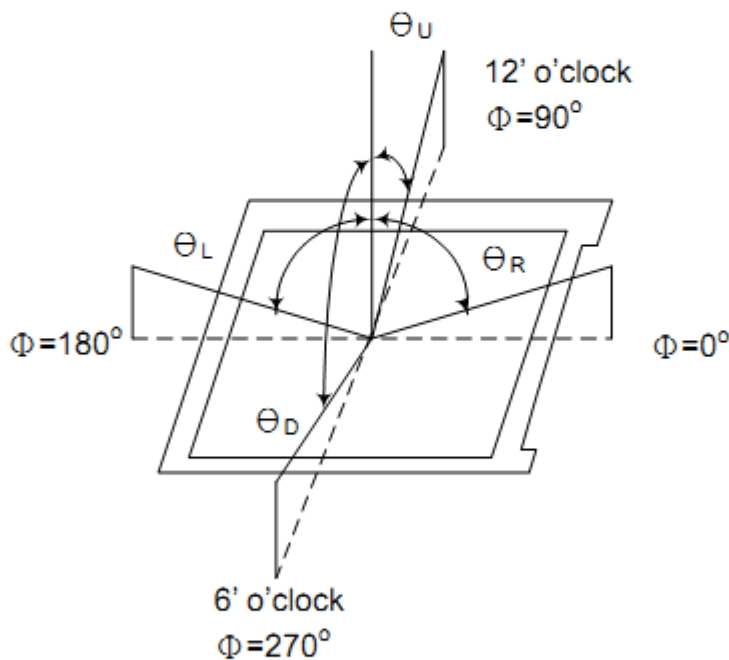
4.2 Measuring Condition

- Measuring surrounding : dark room
- Ambient temperature : 25±2°C
- 15min. warm-up time.

4.3 Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

Note (1) Definition of Viewing Angle :

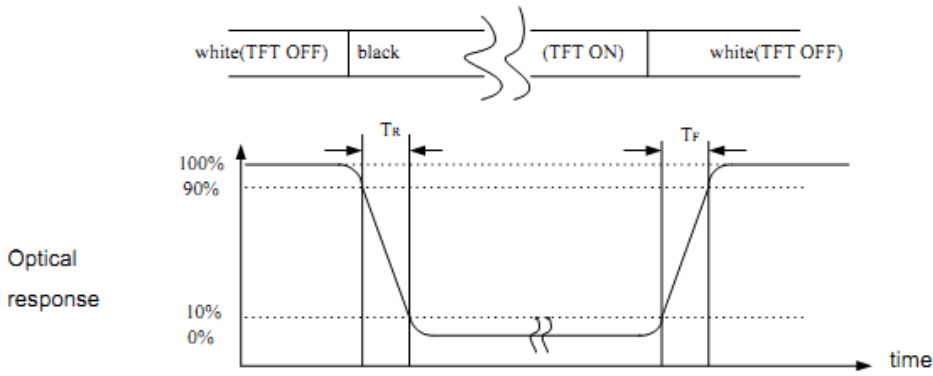


Note (2) Definition of Contrast Ratio(CR) :
measured at the center point of panel

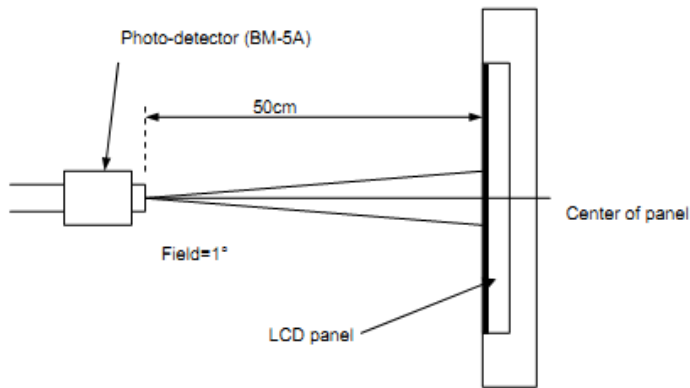
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

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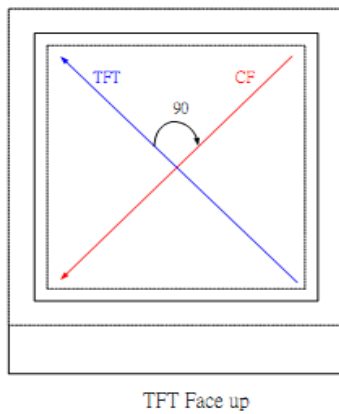
Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup



Note (5) Rubbing Direction (The different Rubbing Direction will cause the different view direction).



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10. Reliability Test Items

Item	Test Condition		Criterion
High Temperature Storage	20 °C, 120 hrs		There should be no change which might affect the practical display function when the display quality test is conducted under normal operating condition.
Low Temperature Storage	-70 °C, 120 hrs		
High Temp. & High Humidity Storage	60 °C, 90% RH, 120 hrs		
Vibration Test (Non-operating)	Freq.:10~55~10 Hz, Amp.:1.5mm 1 hr for each direction of X, Y, Z		
Electrostatic Discharge Test (Non-operating)	Terminals	150 pF, 0 Ω, ±300 V, Contact	
	Panel	150 pF, 330 Ω, ±8 KV, Air	
Thermal Shock (Static)	-30°C, 30 min /80°C, 30 min, 20 cycles		
High Temperature Operation	60 °C, 120 hrs		
Low temperature Operation	-10 °C, 120 hrs		
High Temperature & High Humidity (Operating)	50 °C, 90% RH, 120 hrs		
FPC Peeling Strength Test	Pull speed: 50 mm/min, +90 °,		