

PRODUCT SPECIFICATION **FOR LCD MODULE**

Revision: 1.0

Model No: LSC028T01-S-V2

Module Type: COG+FPC+B/L+CTP

APPROVED SIGNATURE

- Approved Product Specification only
- Approved Product Specification and Samples

<u>Prepared By</u>	<u>Checked By</u>	<u>Approved By</u>

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1. General Description

LSC028T01-S-V2 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 and a backlight unit. The panel size is 2.8 inch and the resolution is 240(RGB)*320, the panel can display up to 262k colors.

2. Physical Features

Display Mode	TFT-LCD Module
	Active matrix TFT, Transmissive type
Display Format	Graphic 240(RGB)×320 Dot-matrix
Input Data	SPI
Viewing Direction (Grayscale Inversion)	TN

3. Mechanical Specification

Item	Specification	Unit
Module size (H×V×D)	56.7×77.7×3.79	mm
Number of dots	240(RGB) × 320	pixel
Active area (H×V)	43.2×57.6	mm



5. Absolute Maximum Ratings

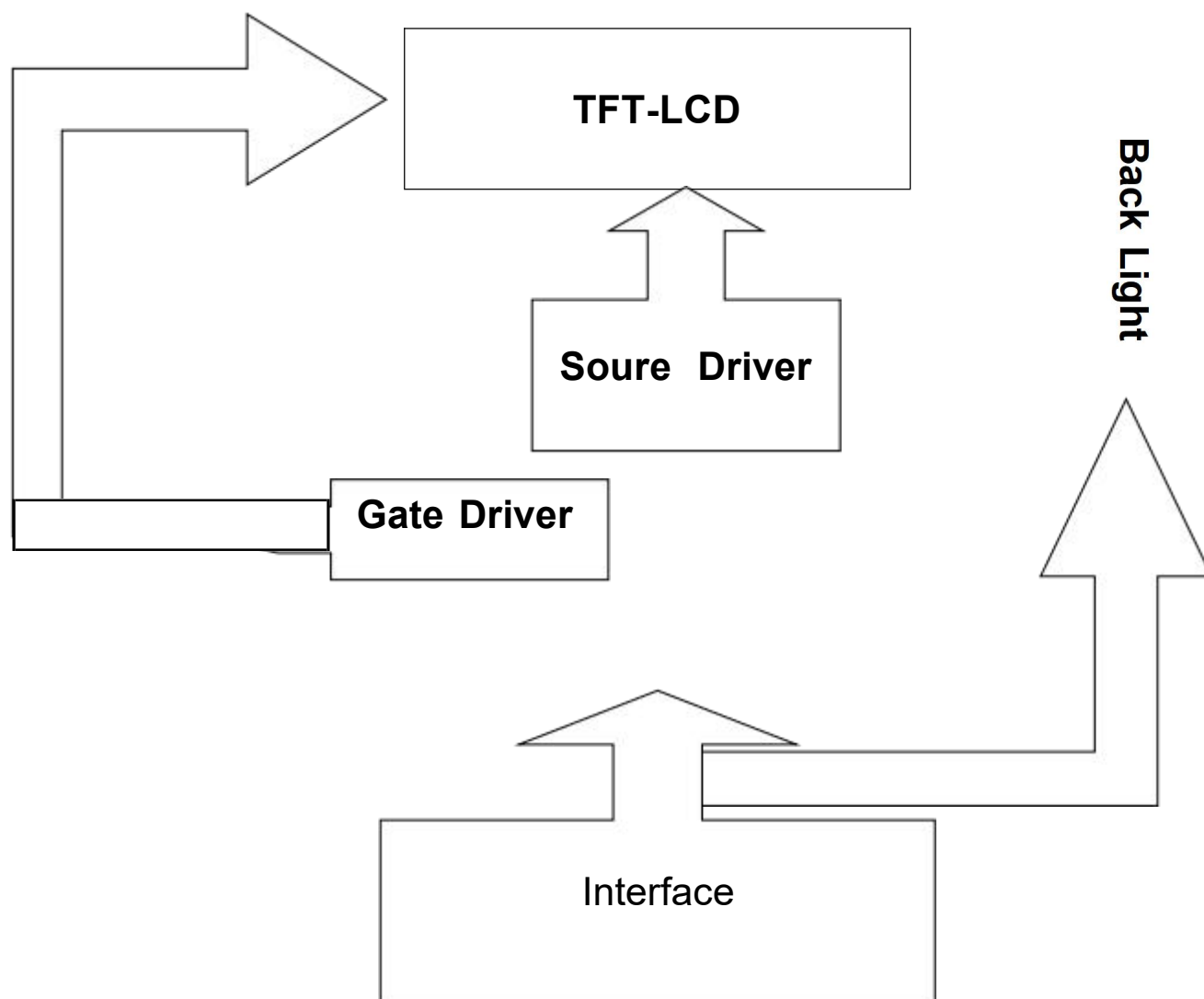
Item	Symbol	Min	Max	Unit	Remark
Supply voltage	VCC	-0.3	4.6	V	Note1 Note2
Supply voltage	IOVCC	-0.3	4.6	V	
Operating temperature	TOPR	-20	70	°C	
Storage temperature	TSTR	-30	80	°C	

6. Electrical Characteristics

Item		Symbol	Rating			Unit	Remark
			Min	Typ	Max		
Supply voltage		VCC	2.4	2.8	3.3	V	Note1
Supply voltage		IOVCC	1.65	1.8	3.3	V	
Input Voltage	L level	VIL	0	---	0.3*IOVCC	V	
	H level	VIH	0.7*IOVCC	---	IOVCC	V	

7. Module Function Description

7- 1. Block Diagram Of LCM



7-2. Pin Description

PIN NO.	Symbol	I/O	Description
1	GND	P	Ground
2	TP_INT	I	Interrupt signal
3	TP_RESET	I	Reset signal pin
4	TP_SDA	I/O	Serial data input/output bidirection pin
5	TP_SCL	I	Serial clock pin
6	TP_3.3V	P	power supply
7	GND	P	Ground
8	GND	P	Ground
9	GND	P	Ground
10	GND	P	Ground
11	GND	P	Ground
12	GND	P	Ground
13	GND	P	Ground
14	GND	P	Ground
15	LEDA	P	Power for LED backlight anode
16	LEDA	P	Power for LED backlight anode
17	GND	P	Interrupt signal
18	SDA	I/O	Serial data input/output PIN
19	IOVCC	P	power supply
20	VCC	P	power supply
21	VCC	P	power supply
22	CS	I	Chip select pin
23	GND	P	Ground
24	RS	I	Command and Data select pin
25	SCL	I	Serial clock pin
26	RESET	I	Reset pin.

CTP Pin

1	TP-VDD
2	TP-RESET
3	TP-INT
4	TP-SDA
5	TP-SCL
6	GND

7-3 Timing Characteristics

7.4.3 Serial Interface Characteristics (4-line serial):

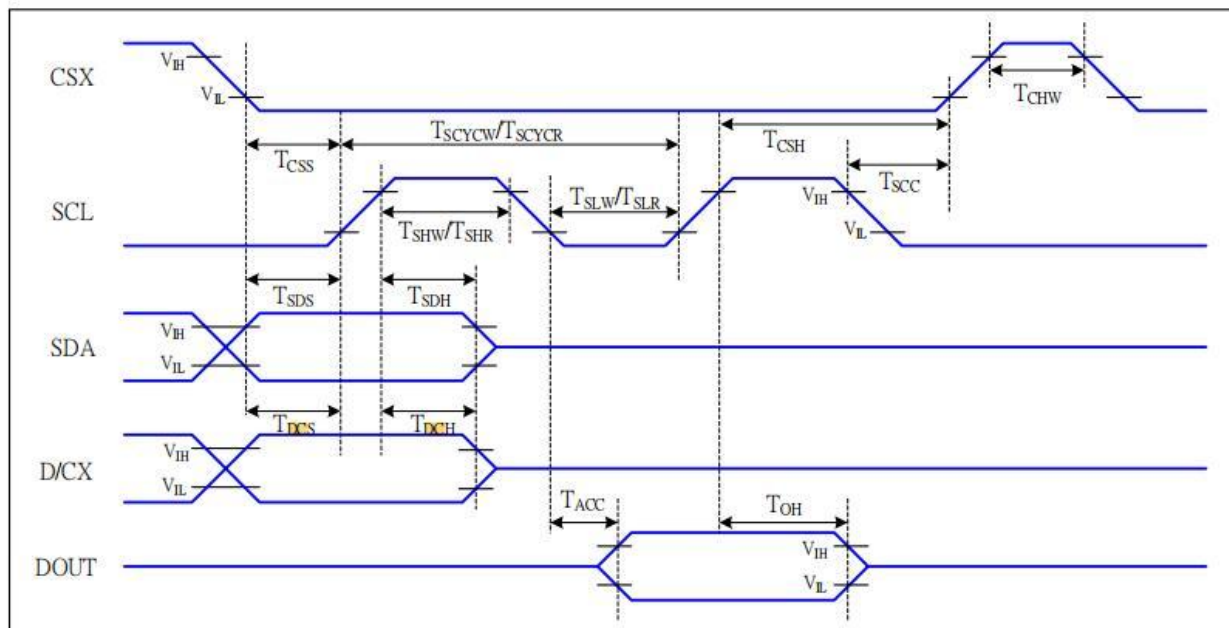


Figure 5 4-line serial Interface Timing Characteristics

$V_{DDI}=1.65$ to $3.3V$, $V_{DD}=2.4$ to $3.3V$, $AGND=DGND=0V$, $T_a=25^{\circ}C$

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	T_{CSS}	Chip select setup time (write)	15		ns	
	T_{CSH}	Chip select hold time (write)	15		ns	
	T_{CSS}	Chip select setup time (read)	60		ns	
	T_{SCC}	Chip select hold time (read)	65		ns	
	T_{CHW}	Chip select "H" pulse width	40		ns	
SCL	T_{SCYCW}	Serial clock cycle (Write)	16		ns	-write command & data ram
	T_{SHW}	SCL "H" pulse width (Write)	7		ns	
	T_{SLW}	SCL "L" pulse width (Write)	7		ns	
	T_{SCYCR}	Serial clock cycle (Read)	150		ns	-read command & data ram
	T_{SHR}	SCL "H" pulse width (Read)	60		ns	
	T_{SLR}	SCL "L" pulse width (Read)	60		ns	
D/CX	T_{DCS}	D/CX setup time	10		ns	
	T_{DCH}	D/CX hold time	10		ns	
SDA (DIN)	T_{SDS}	Data setup time	7		ns	
	T_{SDH}	Data hold time	7		ns	
DOUT	T_{ACC}	Access time	10	50	ns	For maximum $CL=30pF$
	T_{OH}	Output disable time	15	50	ns	For minimum $CL=8pF$

Table 6 4-line serial Interface Characteristics

8. Electro-Optical Characteristics

Item		Symbol	Condi tion	Min.	Typ.	Max.	Unit	Remark	
Response time		Tr +Tf	$\theta_x = \theta_y = 0$	---	16	32	ms	Note 1	
Contrast Ratio		CR		---	500	---	---	Note 2	
Color Chromaticity (CIE1931)	White	W x	$\theta_x = \theta_y = 0$	---	0.303	---	---		
		W y		---	0.325	---	---		
Viewing angle	θ_T		CR > 10	---	50	---	Deg.	Note 3	
	θ_B			---	20	---			
	θ_L			---	45	---			
	θ_R			---	45	---			
Luminance ($I_F = 80mA$)		L			280	---	cd/m2	Note4	

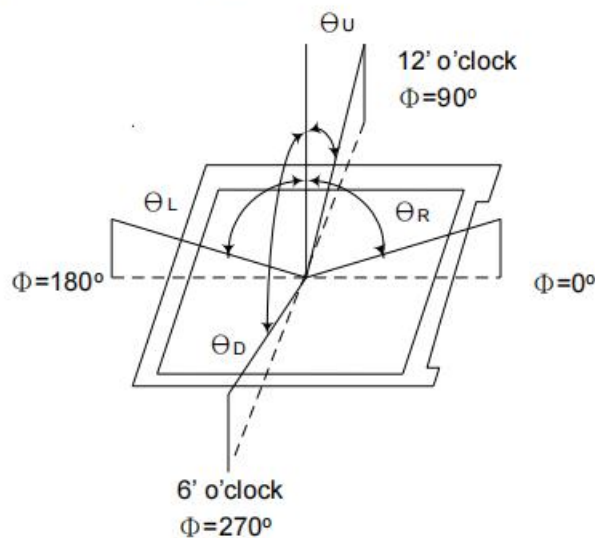
4.2 Measuring Condition

- Measuring surrounding : dark room
- Ambient temperature : $25 \pm 2^\circ\text{C}$
- 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.

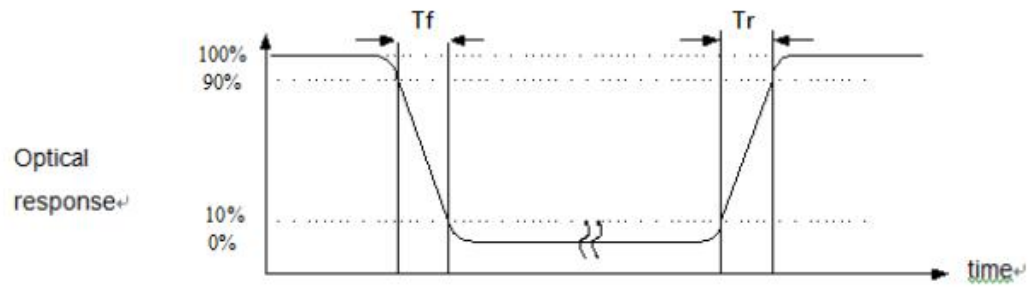
Note (1) Definition of Viewing Angle:



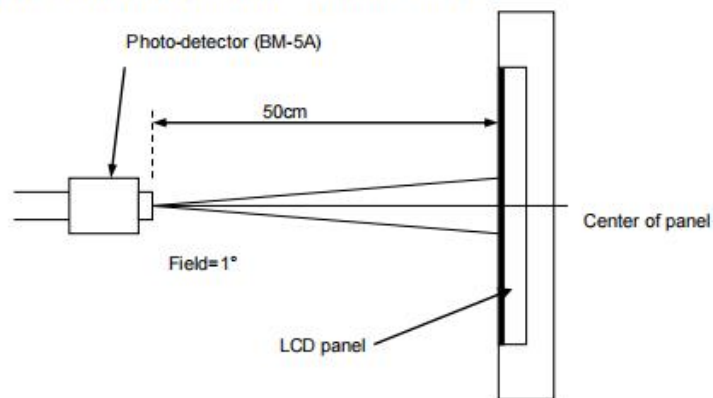
Note (2) Definition of Contrast Ratio (CR):
measured at the center point of panel

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

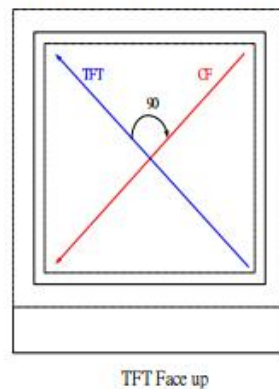
Note (3) Definition of Response Time: Sum of T_R and T_F



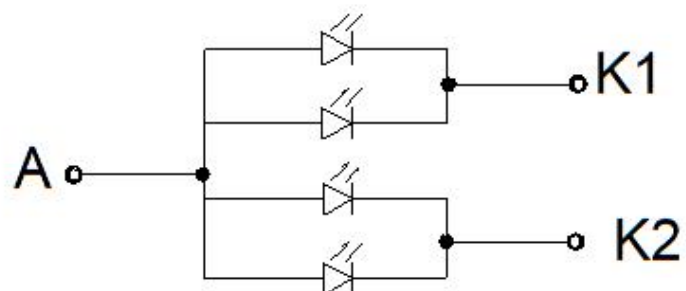
Note (4) Definition of optical measurement setup



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



Note(4) Backlight circuit



背光电路图 (CIRCUIT DIAGRAM)

$I_F=80\text{mA}$, $V_F=3.2 \pm 0.2\text{V}$

9.Records Of Version

Version	Revise Date	Page	Content
00	2024-5-9	ALL	New released