

PRODUCT SPECIFICATION **FOR LCD MODULE**

Revision: 1.0

Model No: LSC028I16-S-V1

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

LSC028I16-S-V1 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 2.83 inch and the resolution is 240(RGB)*320, the panel can display up to 262k colors.

2. Physical Features

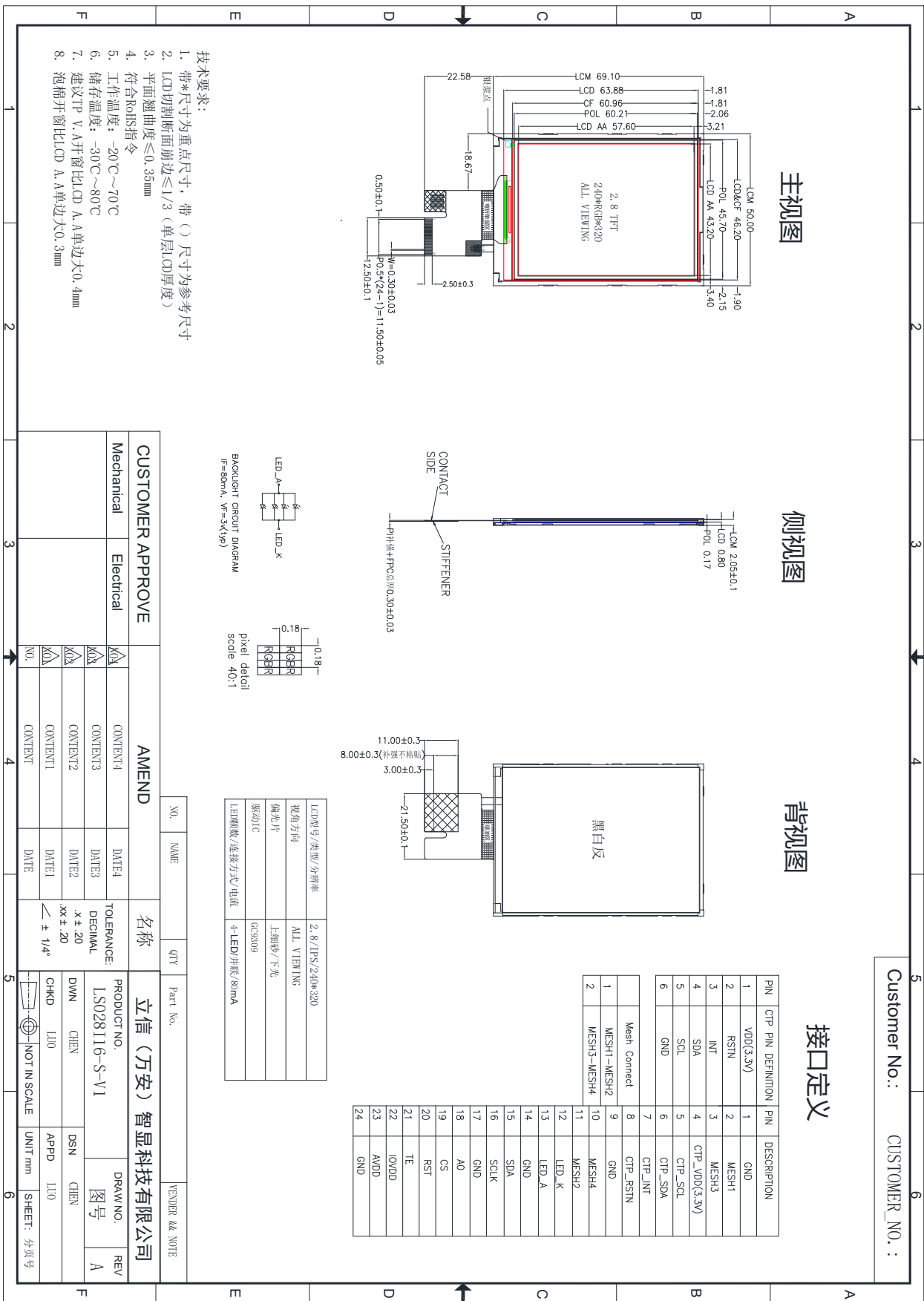
Display Mode	TFT-LCD Module
	Active matrix TFT, Transmissive type
Display Format	Graphic 240(RGB)×320 Dot-matrix
Input Data	SPI
Viewing Direction (Grayscale Inversion)	Free (IPS)
Drive	GC9309NA

3. Mechanical Specification

Item	Specification	Unit
Module size (H×V×D)	55.11 ×80.72×3.54	mm
Number of dots	240(RGB) ×320	pixel
Active area (H×V)	43.2×57.60	mm

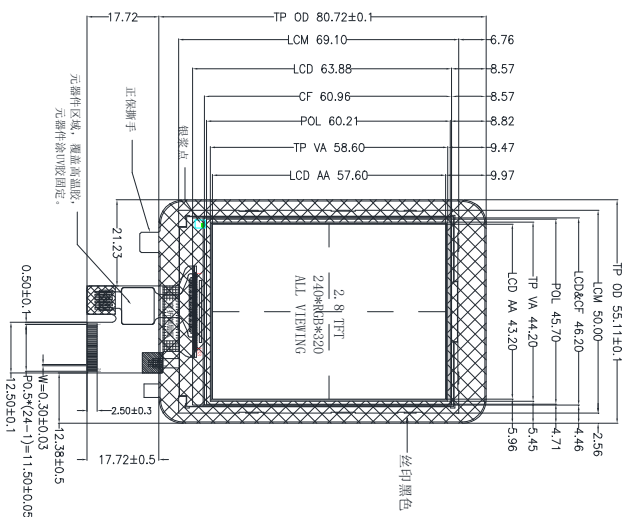
4. Outline Dimension

LCM

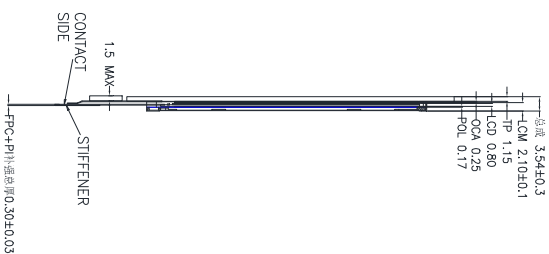


LCM+CTP

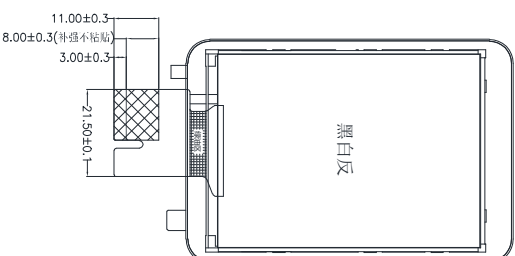
主视图



侧视图



背视图

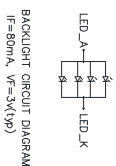


接口定义

CTP PIN DEFINITION	PIN	DESCRIPTION
1	VDD(3.3V)	1 GND
2	RSTN	2 MESH1
3	INT	3 MESH3
4	SDA	4 CTP_VDD(3.3V)
5	SCL	5 CTP_SCL
6	GND	6 CTP_SDA
7		7 CTP_INT
8		8 CTP_RSTN
9		9 GND
10		10 MESH4
11		11 MESH2
12		12 MESH3-MESH4
13		13 LED_A
14		14 GND
15		15 SDA
16		16 SCL
17		17 GND
18		18 AO
19		19 CS
20		20 RST
21		21 TE
22		22 IOVDD
23		23 AVDD
24		24 GND

技术要求:

1. 带*尺寸为重点尺寸, 带 () 尺寸为参考尺寸
2. LCD切割断面崩边 $\leq 1/3$ (单层LCD厚度)
3. 平面翘曲度 $\leq 0.35\text{mm}$
4. 符合RoHS指令
5. 工作温度: $-20^{\circ}\text{C} \sim 70^{\circ}\text{C}$
6. 储存温度: $-30^{\circ}\text{C} \sim 80^{\circ}\text{C}$
7. 建议TP V.A开窗比LCD A.A单边大0.4mm
8. 泡棉开窗比LCD A.A单边大0.3mm



TP技术参数:

1. TP结构: OGS;
2. IC选用: CST726;
3. 透光率: $\geq 85\%$
4. 表面硬度: 4H
5. 工作环境: $-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$, $\leq 85\%\text{RH}$
6. 储存环境: $-30^{\circ}\text{C} \sim +80^{\circ}\text{C}$, $\leq 85\%\text{RH}$
7. 未注尺寸公差按 $\pm 0.2\text{mm}$
8. 产品符合RoHS标准

LCD型号/类型/分辨率	2.8/TFS/240*320
视角方向	ALL VIEWING
偏光片	上细纱/下光
驱动IC	QC9309
LED频数/连接方式/电流	4-LED串联/80mA

CUSTOMER APPROVE

Mechanical	Electrical
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AMEND

NO.	NAME	QTY	名称
1	CONTENT4	DATE4	TOLERANCE: DECIMAL .x ± 20
2	CONTENT3	DATE3	
3	CONTENT2	DATE2	
4	CONTENT1	DATE1	
5	CONTENT	DATE	

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PRODUCT NO.	LSC028116-S-V1	DRAW NO.	图号	REV	A
DWN	CHEN	DSN	CHEN	CHKD	LJ0
UNIT mm		SHEET: 分页数			

Customer No.: CUSTOMER_NO.:

5. Absolute Maximum Ratings

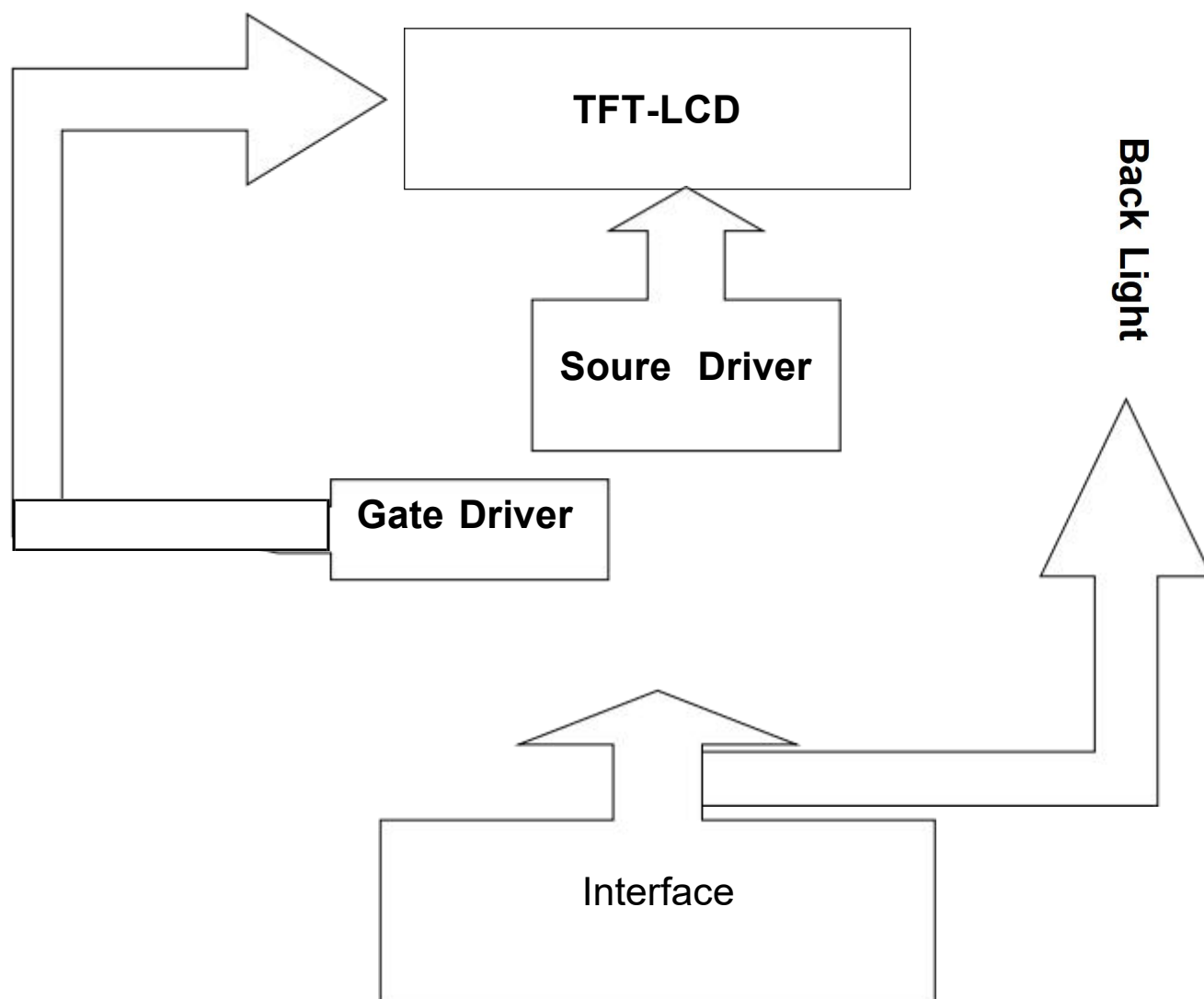
Item	Symbol	Min	Max	Unit	Remark
Supply voltage	VCC	-0.3	4.6	V	Note1 Note2
Supply voltage	IOVCC	-0.3	4.6	V	
Operating temperature	TOPR	-20	70	°C	
Storage temperature	TSTR	-30	80	°C	

6. Electrical Characteristics

Item		Symbol	Rating			Unit	Remark
			Min	Typ	Max		
Supply voltage		VCC	2.6	2.8	3.5	V	Note1
Supply voltage		IOVCC	1.65	2.8	3.5	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	MESH1		NC
3	MESH3		NC
4	CTP_VDD	P	Power Supply
5	CTP_SCL	I	SCL pin for TP
6	CTP_SDA	I/O	SDA pin for TP
7	CTP_INT	I	Interrupt signal for TP
8	CTP_RSTN	I	Reset Pin for TP
9	GND	P	Ground
10	MESH4		NC
11	MESH2		NC
12	LEDK	P	Power for LED backlight cathode
13	LEDA	P	Power for LED backlight anode
14	GND	P	Ground
15	SDA	I/O	Serial data input
16	SCLK	I	serial interface clock
17	GND	P	Ground
18	RS	I	Display data/command selection pin
19	CS	I	Chip select pin
20	RST	I	Reset signal
21	TE	O	-Tearing effect output pin to synchronize MPU to frame writing,activated by S/ command.
22	IOVCC	P	Power Supply
23	VDD	P	Power Supply
24	GND	P	Ground

7-3 Timing Characteristics

7.3. Power ON/OFF Sequence

IOVCC and VCI can be applied in any order.

VCI and IOVCC can be power down in any order.

During power off, if LCD is in the Sleep Out mode, VCI and IOVCC must be powered down minimum 120msec after RESX has been released.

During power off, if LCD is in the Sleep In mode, IOVCC or VCI can be powered down minimum 0msec after

RESX has been released.

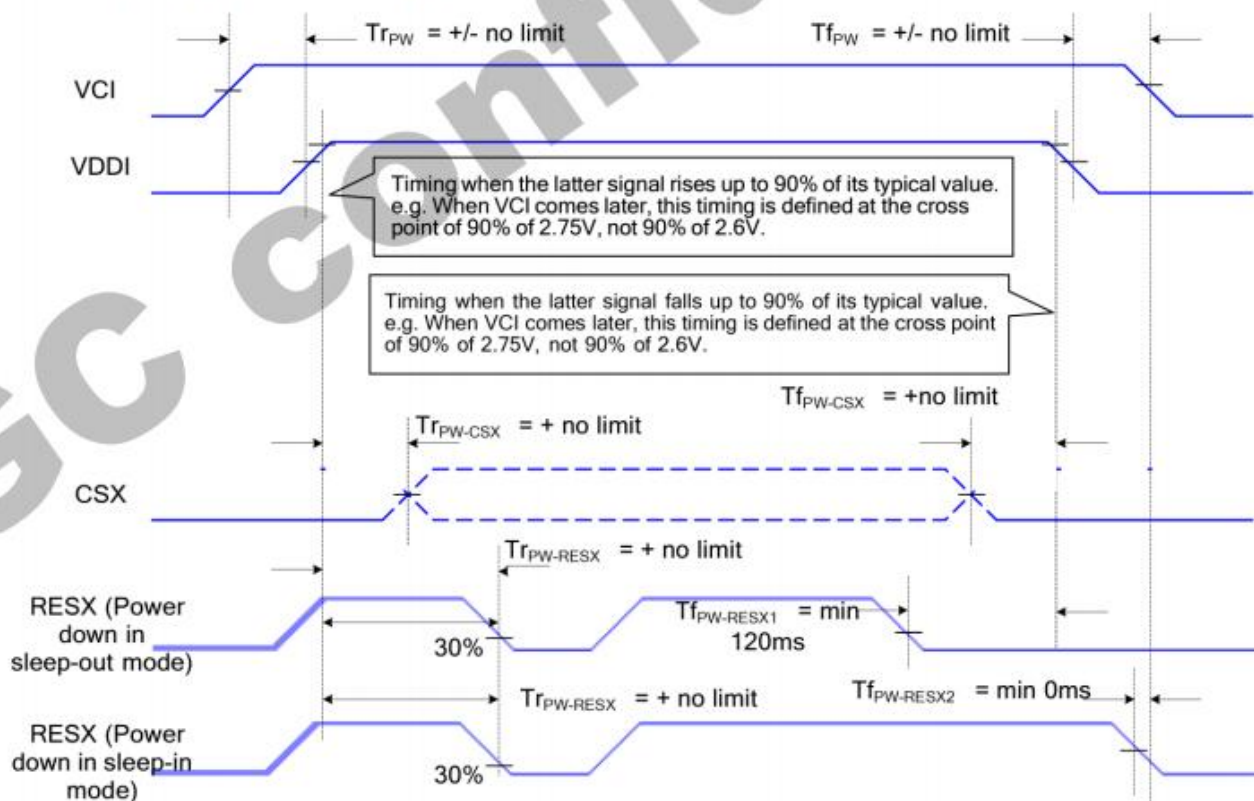
CSX can be applied at any timing or can be permanently grounded. RESX has priority over CSX.

Note 1: There will be no abnormal visible effects on the display panel during the Power On/Off Sequences.

Note 2: There will be no abnormal visible effects on the display between end of Power On Sequence and before receiving Sleep Out command. Also between receiving Sleep In command and Power Off Sequence.

Note 3: If RESX line is not held stable by host during Power On Sequence as defined in the sequence below, then it will be necessary to apply a Hardware Reset (RESX) after Host Power On Sequence is complete to ensure correct operation. Otherwise function is not guaranteed.

The power on/off sequence is illustrated below



7.4.4. Display Serial Interface Timing Characteristics (4-line SPI system)

Figure98.

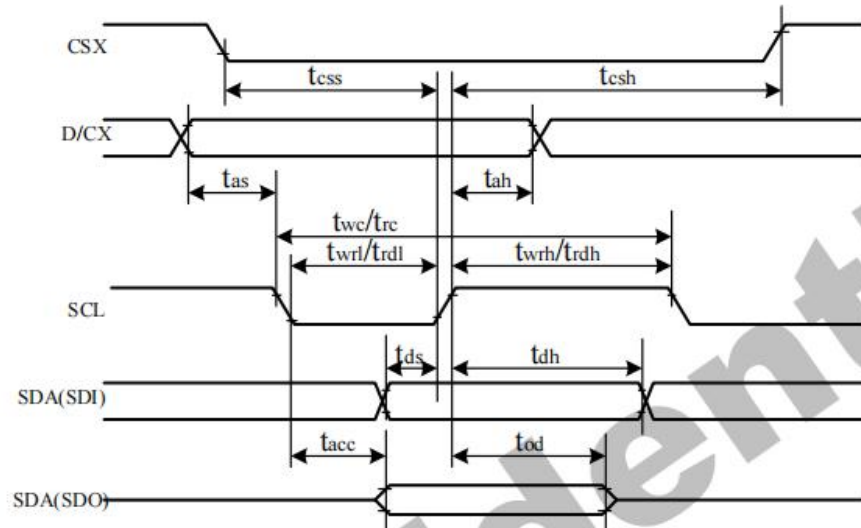
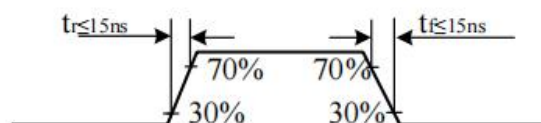


Table48.

Signal	Symbol	Parameter	min	max	Unit	Description
CSX	t_{css}	Chip select time (Write)	20	-	ns	
	t_{csh}	Chip select hold time (Read)	40	-	ns	
SCL	t_{wc}	Serial Clock Cycle (Write)	10	-	ns	
	t_{wrh}	SCL "H" Pulse Width (Write)	5	-	ns	
	t_{wrl}	SCL "L" Pulse Width (Write)	5	-	ns	
	t_{rc}	Serial Clock Cycle (Read)	150	-	ns	
	t_{rdh}	SCL "H" Pulse Width (Read)	60	-	ns	
	t_{rdl}	SCL "L" Pulse Width (Read)	60	-	ns	
D/CX	t_{as}	D/CX setup time	10	-	ns	
	t_{ah}	D/CX hold time (Write/Read)	10	-	ns	
SDA/SDI (Input)	t_{ds}	Data setup time (Write)	5	-	ns	
	t_{dh}	Data hold time (Write)	5	-	ns	
SDA/SDO (Output)	t_{acc}	Access time (Read)	10	-	ns	

Note: $T_a = 25^\circ\text{C}$, $IOVCC=1.65\text{V to }3.3\text{V}$, $VCI=2.5\text{V to }3.3\text{V}$, $AGND=VSS=0\text{V}$

Figure99.

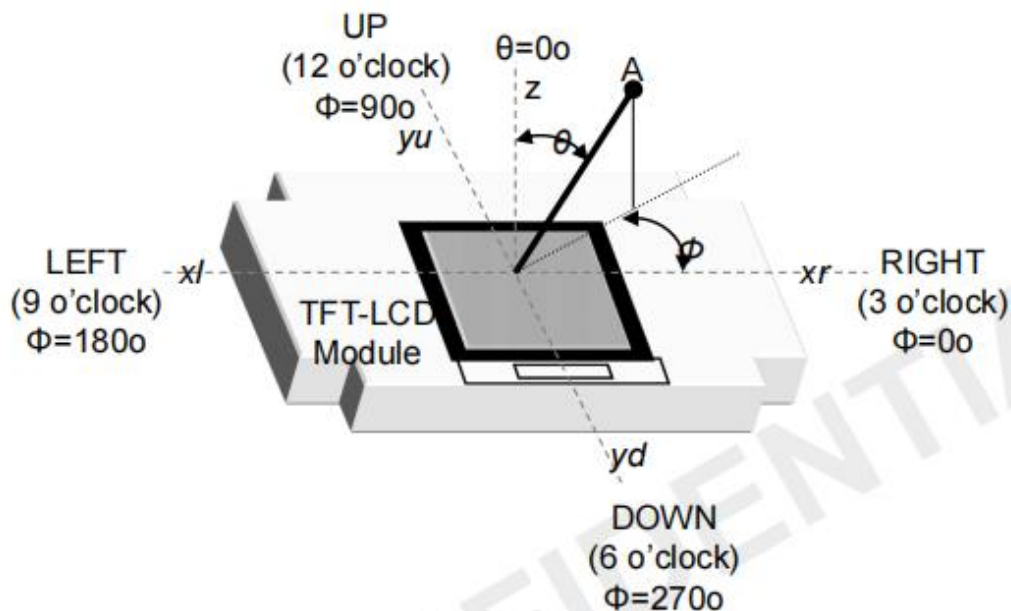


8. Electro-Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response time		Tr +Tf	$\theta_x = \theta_y = 0$	---	30	35	ms	Note 1
Contrast Ratio		CR		1000	1200	---	---	Note 2
Transmittance		T%		4.5	4.8	---	%	
Color Chromaticity (CIE1931)	White	W x	$\theta_x = \theta_y = 0$	---	0.308	---	---	
		W y		---	0.339	---	---	
Viewing angle	θ_T		CR > 10	---	80	---	Deg.	Note 3
	θ_B			---	80	---		
	θ_L			---	80	---		
	θ_R			---	80	---		

Note 4.1: Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see Figure 8).

<Figure 8. Viewing Angle Range Is Defined As Follows>



Note 4.2: Contrast measurements shall be made at viewing angle of $\Theta=0^\circ$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. Luminance Contrast Ratio (CR) is defined mathematically.

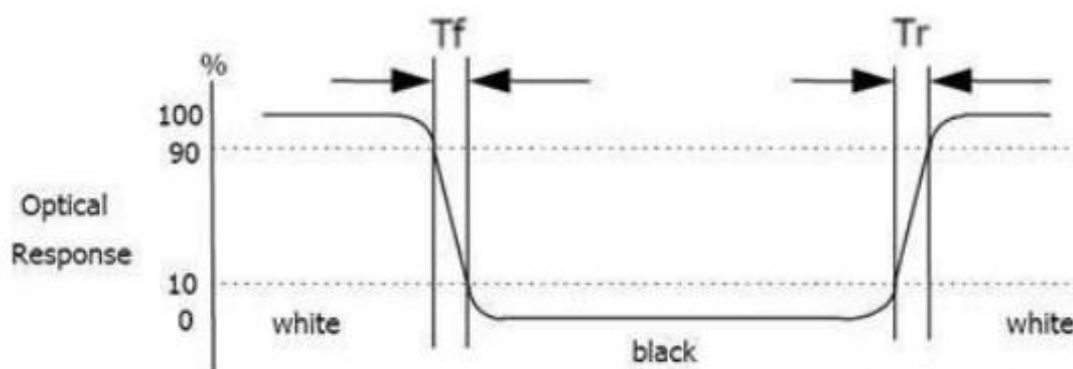
$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

Note 4.3: Transmittance is the Value with Polarizer.

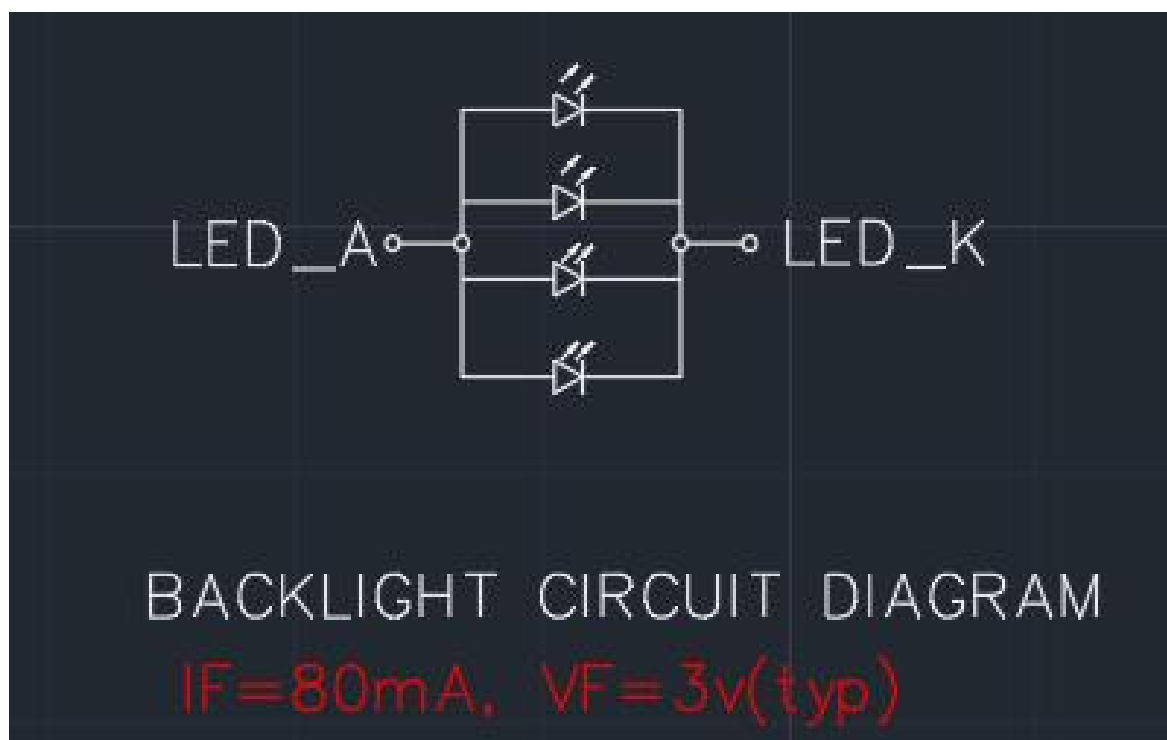
Note 4.4: The color chromaticity coordinates specified in Table 16 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

Note 4.5: The electro-optical response time measurements shall be made as Figure 9 by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is T_r , and 90% to 10% is T_f .

<Figure 9. Response Time Testing>



Note(4) Backlight circuit



9.Records Of Version

Version	Revise Date	Page	Content
00	2025-10-10	ALL	New released