

PRODUCT SPECIFICATION **FOR LCD MODULE**

Revision: 1.0

Model No: LS19I03-SM-V1

Module Type: COG+FPC+B/L

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

LS19I03-SM-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 1.9 inch and the resolution is 170(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 170(RGB)×320 Dot-matrix
Input Data	SPI/8080
Viewing Direction (Grayscale Inversion)	IPS
Drive	ST7789T3

3. Mechanical Specification

Item	Specification	Unit
Module size (H×V×D)	25.8 ×49.73×1.47	mm
Number of dots	170(RGB) × 320	pixel
Active area (H×V)	22.7×42.72	mm

5. Absolute Maximum Ratings

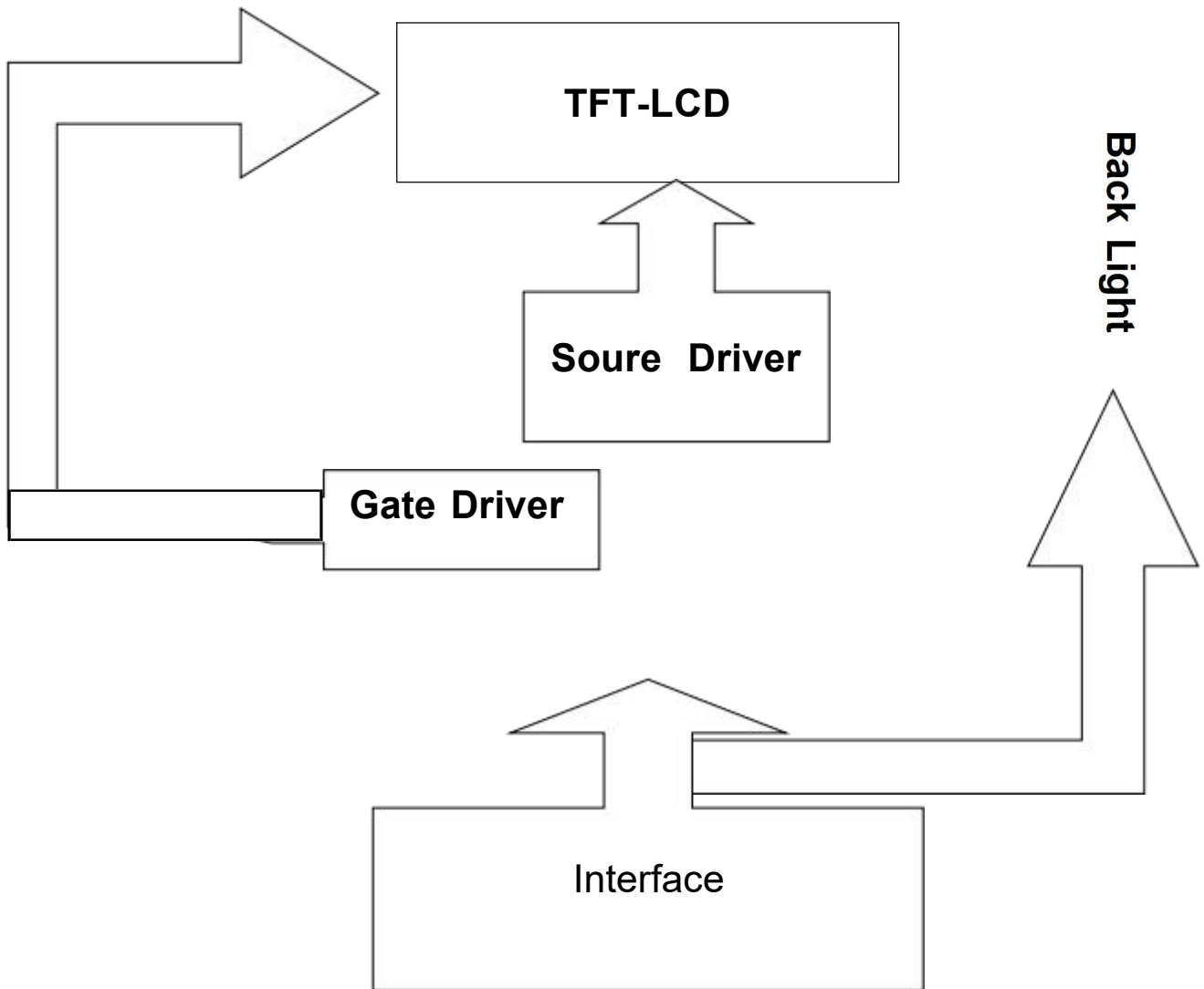
Item	Symbol	Min	Max	Unit	Remark
Supply voltage	VCC	-0.3	4.6	V	Note1 Note2
Supply voltage	IOVCC	-0.3	4.6	V	
Operating temperature	TOPR	-20	70	°C	
Storage temperature	TSTR	-30	80	°C	

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	RESET	I	This signal will reset the device and it must be applied to properly initialize the chip.
2	RS	I	Display data/command selection pin in parallel interface. -This pin is used to be serial interface clock. DCX='1': display data or parameter. DCX='0': command data. -If not used, please fix this pin at VDDI or DGND
3	WR	I	Write enable in MCU parallel interface. - Display data/command selection pin in 4-line serial interface. - Second Data lane in 2 data lane serial interface. -If not used, please fix this pin at VDDI or DGND.
4	RD	I	Read enable in 8080 MCU parallel interface. -If not used, please fix this pin at VDDI or DGND
5	CS	I	Chip selection pin
6	VCC	P	power supply
7	IOVCC	P	power supply
8	IM1/2	I	1:4-line 8bit serial I/F 0:80-8bit parallel I/F
9	SPI_SDA	I/O	SPI interface input/output pin.
10	GND	P	Ground
11	LEDA	P	Power for LED backlight anode
12	LEDA	P	Power for LED backlight anode
13	D7	I	data bus
14	D6	I	data bus
15	D5	I	data bus
16	D4	I	data bus
17	D3	I	data bus
18	D2	I	data bus
19	D1	I	data bus
20	D0	I	data bus
21	TP_VCC	P	NC
22	TP_SCL	I	NC
23	TP_SDA	I	NC

24	TP_RESET	I	NC
25	TP_INT	I	NC
26	GND	P	Ground

7-3 Timing Characteristics

7.4.1 8080 Series MCU Parallel Interface Characteristics: 18/16/9/8-bit Bus

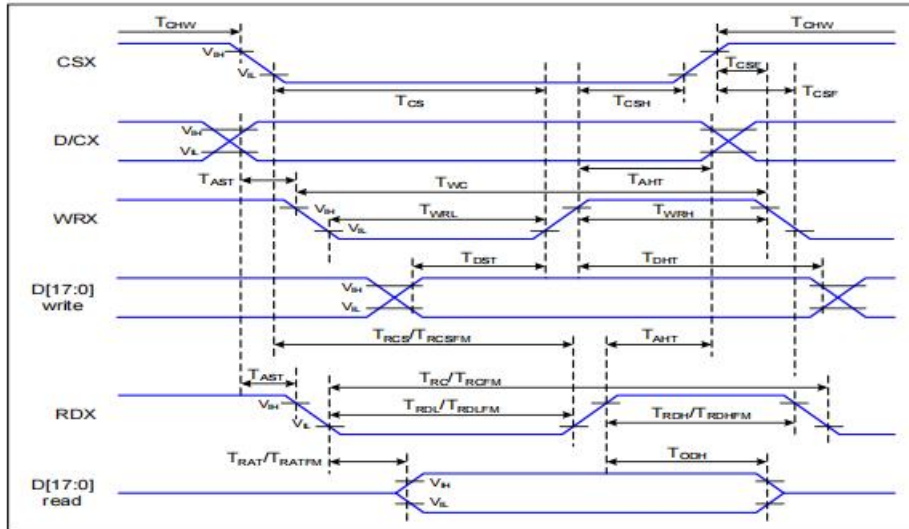


Figure 1 Parallel Interface Timing Characteristics (8080-Series MCU Interface)

VDD=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=25°C

Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	T_{AST}	Address setup time	0		ns	
	T_{AHT}	Address hold time (Write/Read)	10		ns	
CSX	T_{CHW}	Chip select "H" pulse width	0		ns	
	T_{CS}	Chip select setup time (Write)	15		ns	
	T_{RCS}	Chip select setup time (Read ID)	45		ns	
	T_{RCSFM}	Chip select setup time (Read FM)	355		ns	
	T_{CSF}	Chip select wait time (Write/Read)	10		ns	
	T_{CSH}	Chip select hold time	10		ns	
WRX	T_{WC}	Write cycle	66		ns	
	T_{WRH}	Control pulse "H" duration	15		ns	
	T_{WRL}	Control pulse "L" duration	15		ns	
RDX (ID)	T_{RC}	Read cycle (ID)	160		ns	When read ID data
	T_{RDH}	Control pulse "H" duration (ID)	90		ns	
	T_{RDL}	Control pulse "L" duration (ID)	45		ns	
RDX (FM)	T_{RCFM}	Read cycle (FM)	450		ns	When read from frame memory
	T_{RDHFM}	Control pulse "H" duration (FM)	90		ns	
	T_{RDLFM}	Control pulse "L" duration (FM)	355		ns	
D[17:0]	T_{DST}	Data setup time	10		ns	For CL=30pF
	T_{DHT}	Data hold time	10		ns	
	T_{RAT}	Read access time (ID)		40	ns	
	T_{RATFM}	Read access time (FM)		340	ns	
	T_{ODH}	Output disable time	20	80	ns	

Table 4 8080 Parallel Interface Characteristics

7.4.3 Serial Interface Characteristics (4-line serial):

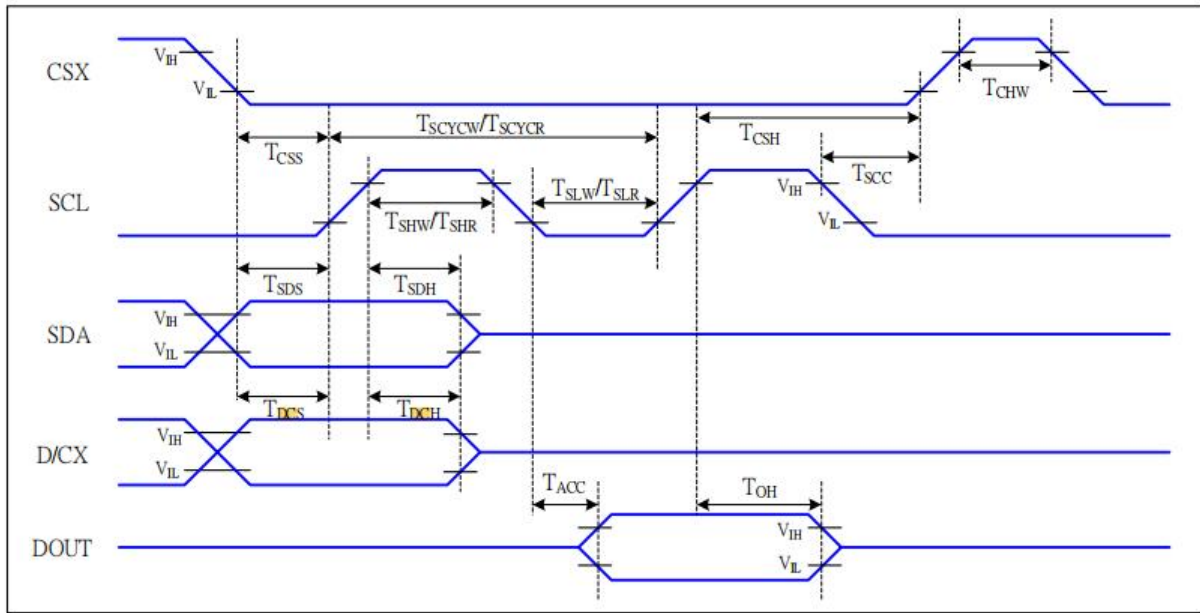


Figure 5 4-line serial Interface Timing Characteristics

$V_{DDI}=1.65$ 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 $CL=8pF$

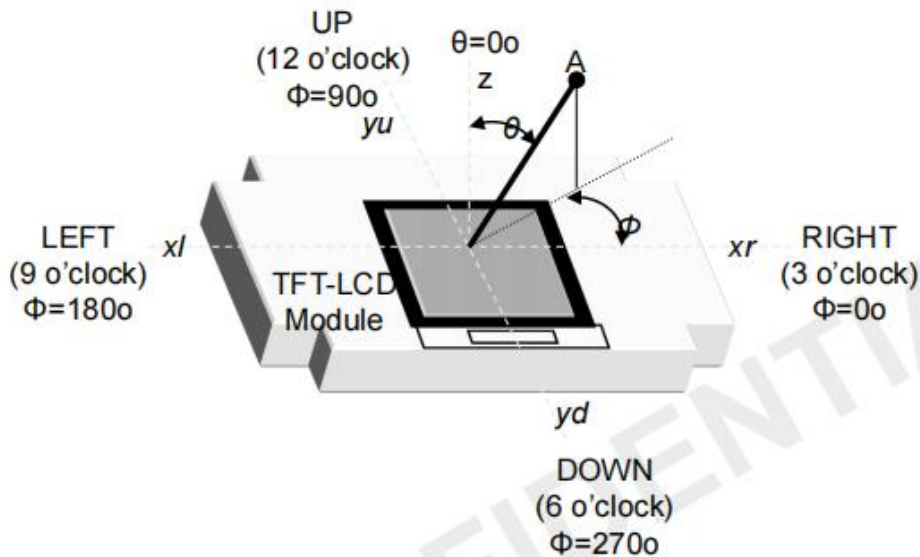
Table 6 4-line serial Interface Characteristics

8. Electro-Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	
Response time	Tr +Tf	$\theta_x = \theta_y = 0$	---	30	40	ms	Note 1	
Contrast Ratio	CR		1000	1200	---	---	Note 2	
Transmittance	T%		4.25	5	---	%		
Color Chromaticity (CIE1931)	White	W x	$\theta_x = \theta_y = 0$	---	0.293	---	---	
		W y		---	0.335	---	---	
Viewing angle	θ_T	CR > 10		---	85	---	Deg.	Note 3
	θ_B			---	85	---		
	θ_L			---	85	---		
	θ_R			---	85	---		

Note 5.1: 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 5).

<Figure 5. Viewing Angle Range Is Defined As Follows>

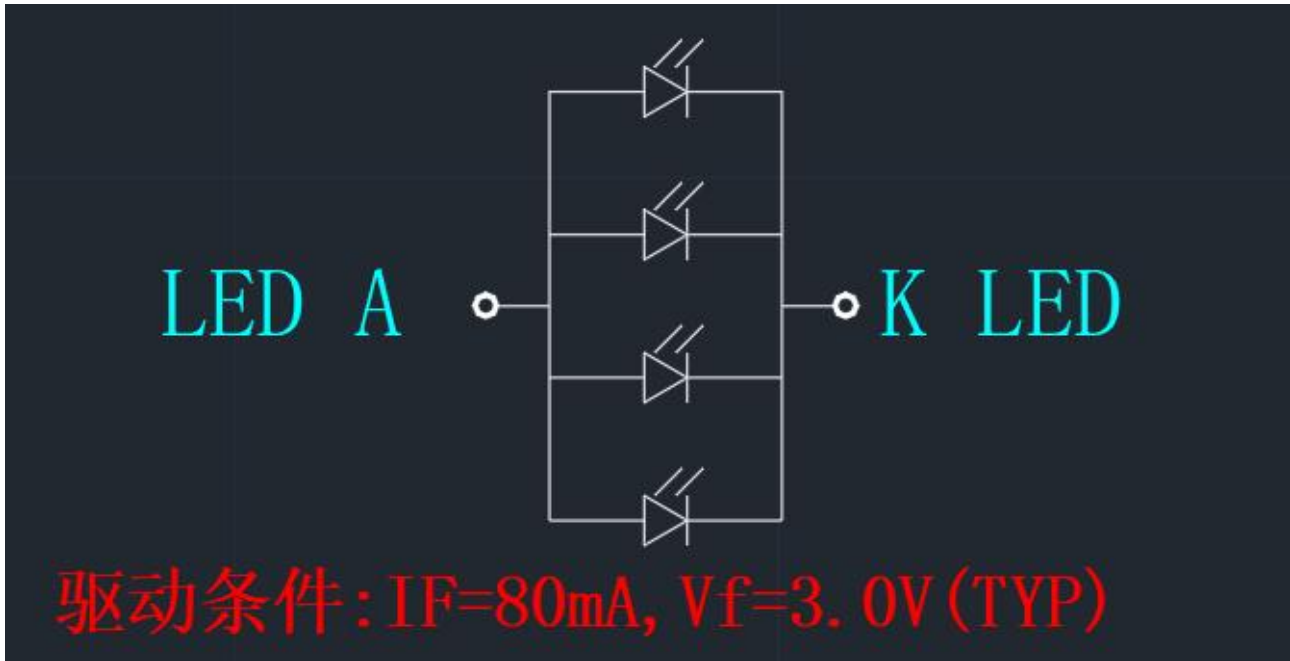


Note 5.2: Contrast measurements shall be made at viewing angle of $\Theta=0^\circ$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. Luminance Contrast Ratio (CR) is defined mathematically.

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

Note 5.3: Transmittance is the Value with Polarizer(AG25+Clear) & silicate BLU (Film structure is on Table 6) .

Note(4) Backlight circuit



9.Records Of Version

Version	Revise Date	Page	Content
00	2025-11-19	ALL	New released