

PRODUCT SPECIFICATION **FOR LCD MODULE**

Revision: 1.0

Model No: LS096I05-S-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

LS096I05-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 0.96 inch and the resolution is 80(RGB)*160, the panel can display up to 262k colors.

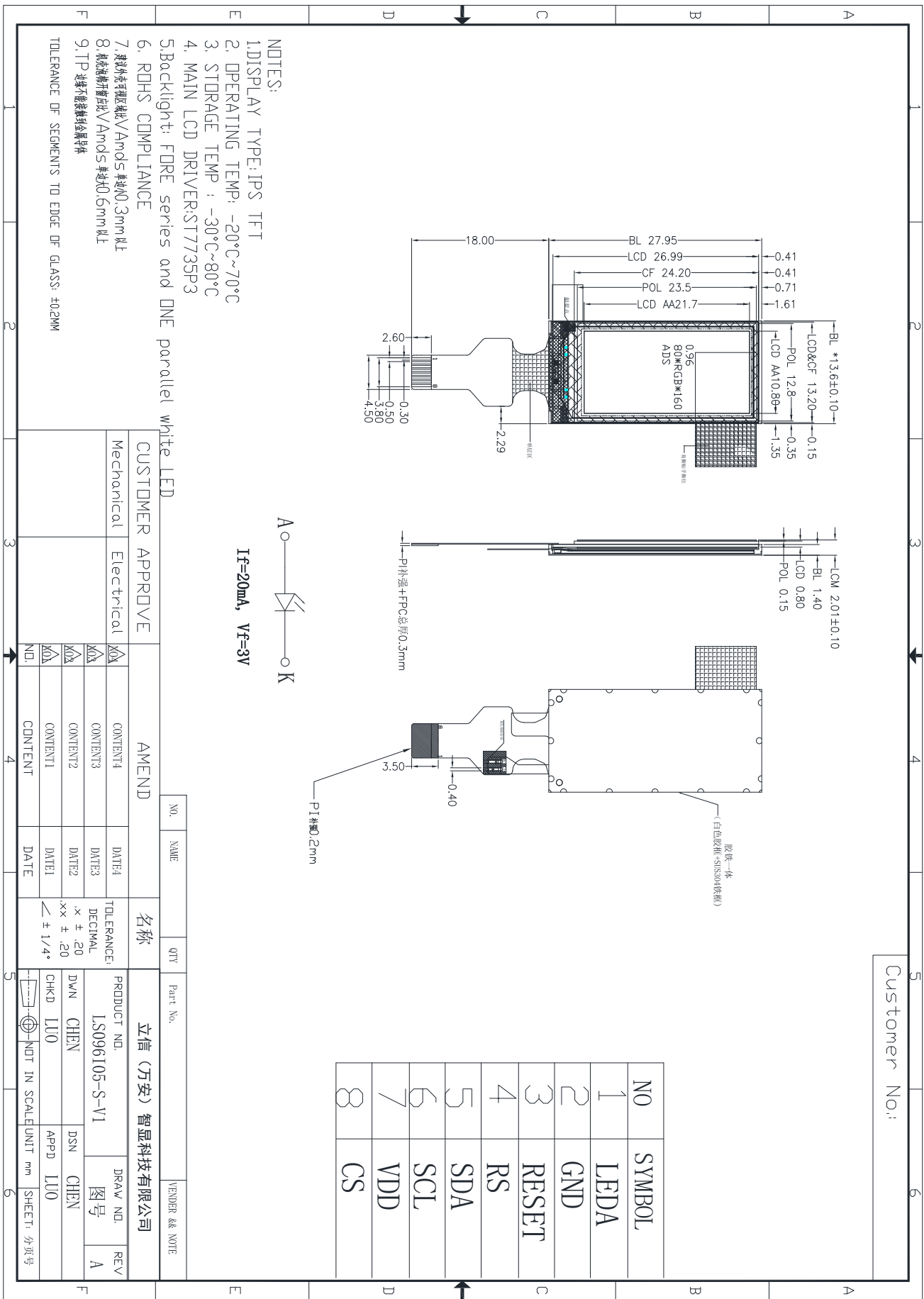
2. Physical Features

Display Mode	TFT-LCD Module
	Active matrix TFT, Transmissive type
Display Format	Graphic 80(RGB)×160 Dot-matrix
Input Data	4-line serial interface
Viewing Direction (Grayscale Inversion)	Free (IPS)
Drive	ST7735P3

3. Mechanical Specification

Item	Specification	Unit
Module size (H×V×D)	13.6 ×27.95 ×2.01	mm
Number of dots	80(RGB) ×160	pixel
Active area (H×V)	10.80×21.7	mm

4. Outline Dimension



5. Absolute Maximum Ratings

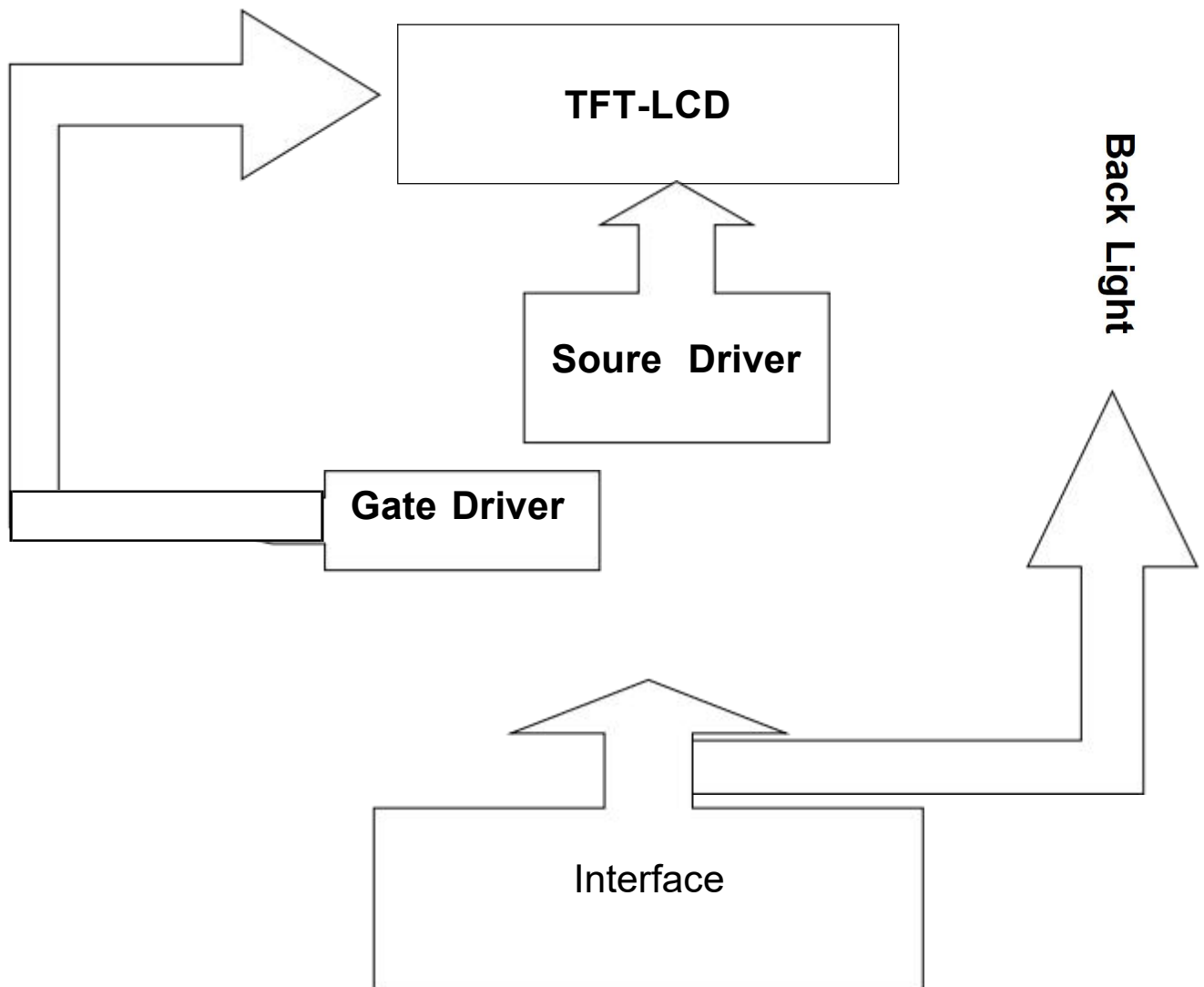
Item	Symbol	Min	Max	Unit	Remark
Supply voltage	VCC	-0.3	4.6	V	Note1 Note2
Supply voltage	IOVCC	-0.3	4.6	V	
Operating temperature	TOPR	-20	70	°C	
Storage temperature	TSTR	-30	80	°C	

6. Electrical Characteristics

Item		Symbol	Rating			Unit	Remark
			Min	Typ	Max		
Supply voltage		VCC	2.5	2.75	3.7	V	Note1
Supply voltage		IOVCC	1.65	1.8	3.7	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	LED A	P	Power for LED backlight anode
2	GND	P	Ground
3	RESRT	I	Reset pin.
4	RS	I	Command and Data select pin
5	SDA	I/O	Serial data input/output PIN
6	SCL	I	Serial clock pin
7	VDD	P	power supply
8	CS	I	Chip select pin

7-3 Timing Characteristics

8.4 Serial Interface Characteristics (4-line Serial)

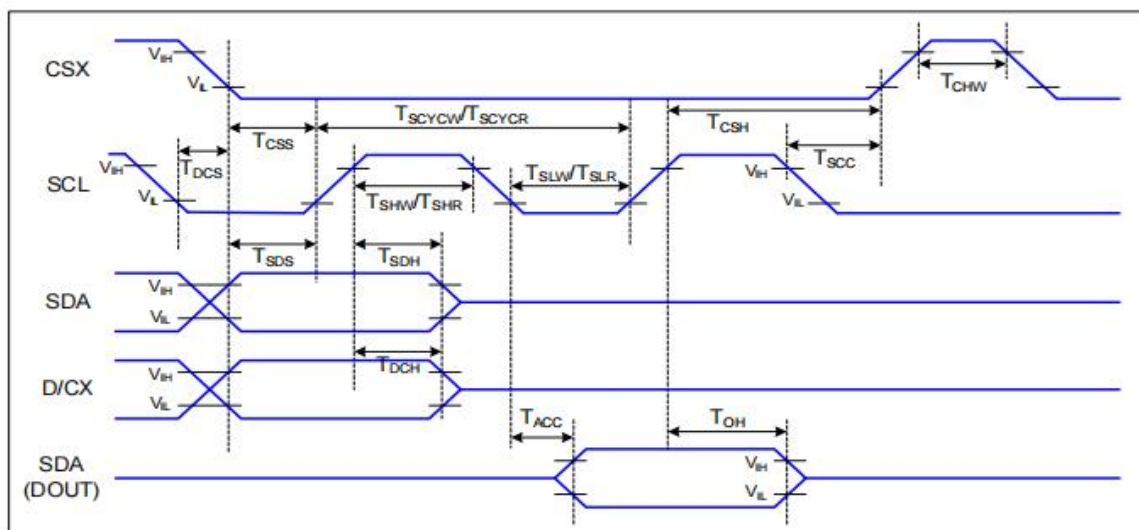


Figure 7 4-line Serial Interface Timing

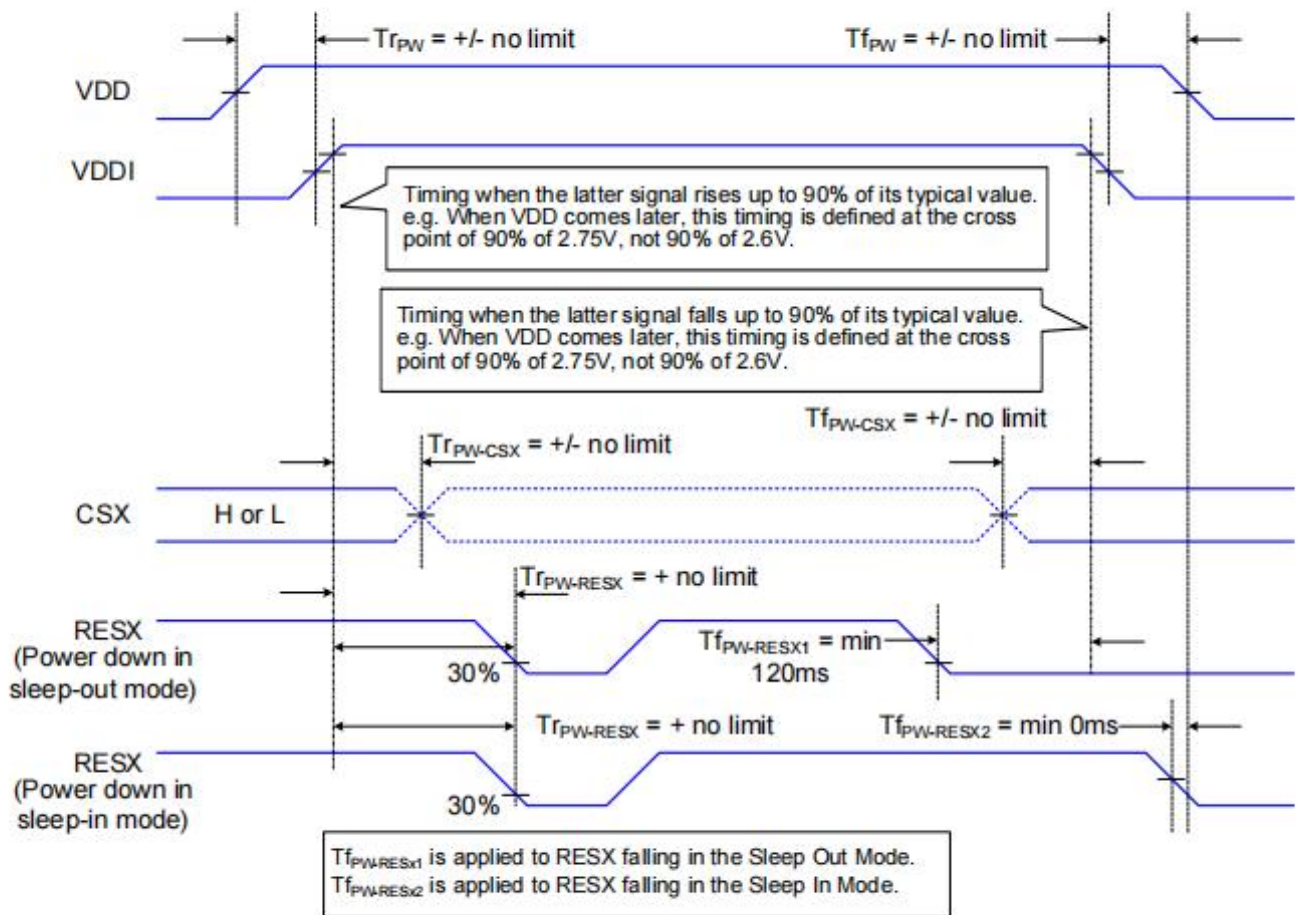
Ta=25 °C, VDDI=1.65~3.7V, VDD=2.5~3.7V

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	T _{CSS}	Chip Select Setup Time (Write)	45		ns	
	T _{CSH}	Chip Select Hold Time (Write)	45		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 _{SCYC}	Serial Clock Cycle (Write)	20		ns	-Write Command & Data Ram
	T _{SHW}	SCL "H" Pulse Width (Write)	10		ns	
	T _{SLW}	SCL "L" Pulse Width (Write)	10		ns	
	T _{SCYC}	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 _{DCS}	D/CX Hold Time	10		ns	
SDA (DIN) (DOUT)	T _{SDS}	Data Setup Time	10		ns	For Maximum CL=30pF For Minimum CL=8pF
	T _{SDH}	Data Hold Time	10		ns	
	T _{ACC}	Access Time	10	50	ns	
	T _{OH}	Output Disable Time	15	50	ns	

Table 7 4-line Serial Interface Characteristics

Note : The rising time and falling time (Tr, Tf) of input signal are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

The power on/off sequence is illustrated below



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		700	800	---	---	Note 2
Transmittance		T%		4.3	4.8	---	%	
Color Chromaticity (CIE1931)	White	W x	$\theta_x = \theta_y = 0$	---	TBD	---	---	
		W y		---	TBD	---	---	
Viewing angle	θ_T		CR > 10	80	85	---	Deg.	Note 3
	θ_B			80	85	---		
	θ_L			80	85	---		
	θ_R			80	85	---		
Luminance ($I_F = 20mA$)		L		280	300	---	cd/m2	Note4

Note:

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing 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 FIG.1). Viewing angle measuring is based on WV Pol attached.

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. (See FIG. 1) Luminance Contrast Ratio (CR) is defined mathematically.

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

3. Transmittance is the value without APF.

4. The color chromaticity coordinates specified in Table1 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 C/F.

Measurement condition is C - light source & Halogen Lamp

5. The electro-optical response time measurements shall be made as FIG.2 by switching the "data" input signal ON and OFF.

The times needed for the luminance to change from 10% to 90% is T_f , and 90% to 10% is T_r .

Figure 1. Measurement Set Up

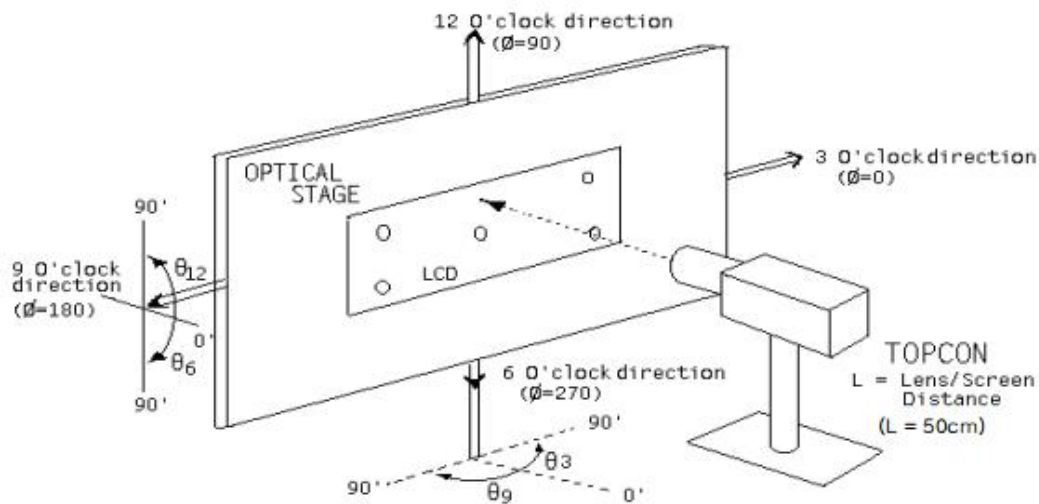
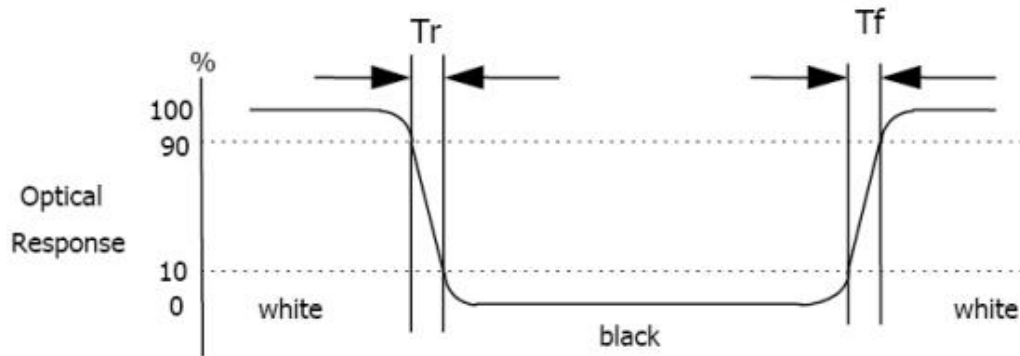
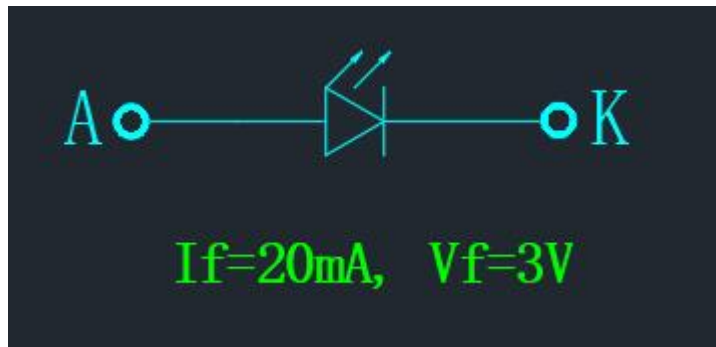


Figure 2. Response Time Testing



Note(4) Backlight circuit



9.Records Of Version

Version	Revise Date	Page	Content
00	2025.4.28	ALL	New released