

PRODUCT SPECIFICATION **FOR LCD MODULE**

Revision: 1.0

Model No: LS028I25-R-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

LS028I25-R-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	6bit RGB
Viewing Direction (Grayscale Inversion)	Free (IPS)
Drive	JD9853

3. Mechanical Specification

Item	Specification	Unit
Module size (H×V×D)	46.5 ×65.05×2.11	mm
Number of dots	240(RGB) ×320	pixel
Active area (H×V)	43.2×57.60	mm

4. Outline Dimension



5. Absolute Maximum Ratings

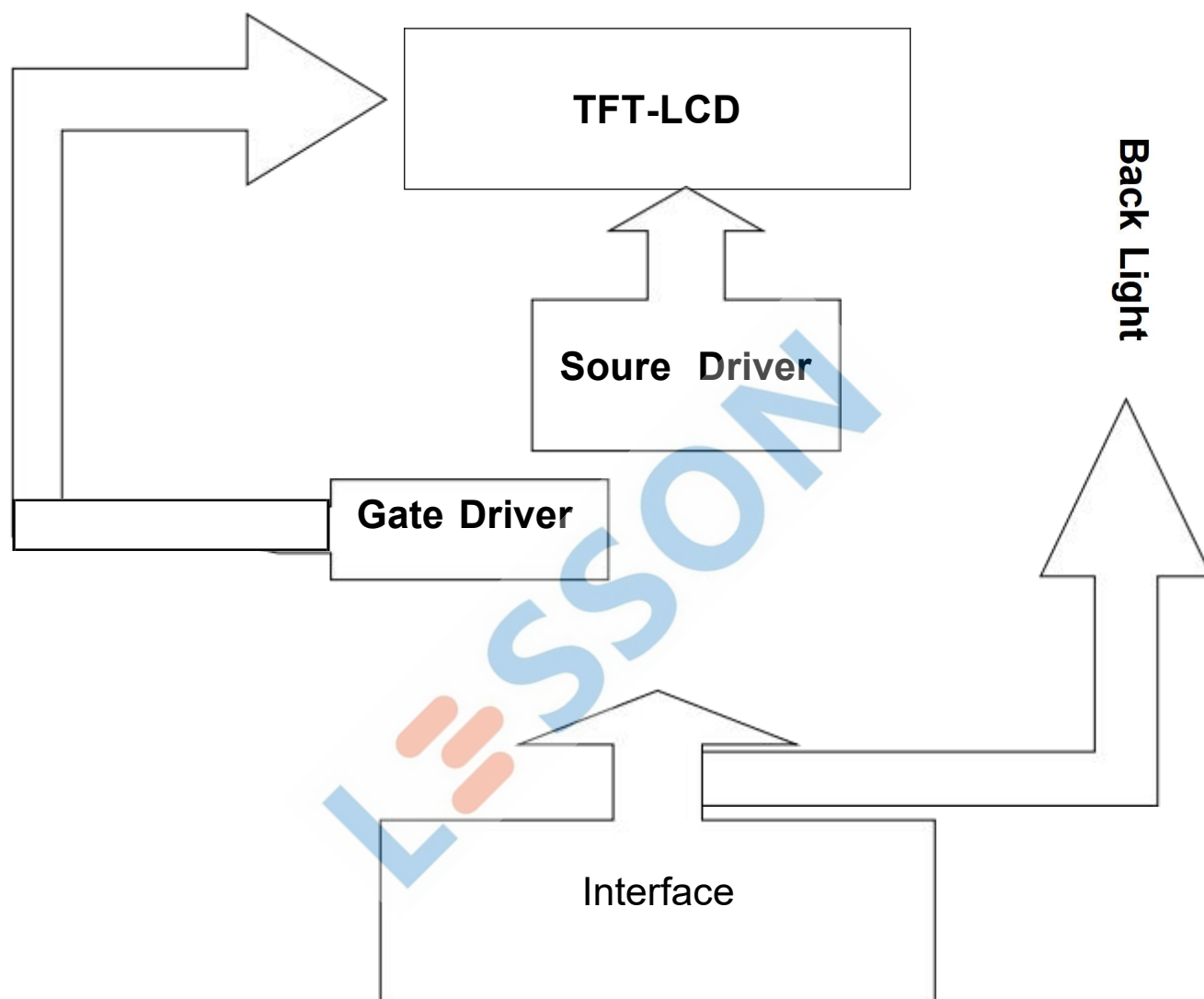
Item	Symbol	Min	Max	Unit	Remark
Supply voltage	VCC	-0.3	4.6	V	Note1 Note2
Supply voltage	IOVCC	-0.3	4.0	V	
Operating temperature	TOPR	-20	70	°C	
Storage temperature	TSTR	-30	80	°C	

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	NC		
2	CS	I	Chip select input pin.
3	SDA	I/O	Serial in/out signal in SPI interface
4	SCL	I	This pin is used to be serial interface clock.
5	HS	I	Line synchronizing signal for RGB interface operation.
6	VS	I	Frame synchronizing signal for RGB interface operation
7	DCLK	I	Dot clock signal for RGB interface operation.
8	D5	I	RGB interface data bus
9	D4	I	RGB interface data bus
10	D3	I	RGB interface data bus
11	D2	I	RGB interface data bus
12	D1	I	RGB interface data bus
13	D0	I	RGB interface data bus
14	NC		
15	NC		
16	GND	P	Ground
17	VDD	P	Power supply
18	VDDIO	P	Power supply
19	NC		
20	NC		
21	NC		
22	NC		
23	NC		
24	NC		
25	NC		
26	NC		

27	NC		
28	NC		
29	NC		
30	NC		
31	NC		
32	NC		
33	GND	P	Ground
34	NC		
35	NC		
36	NC		
37	NC		
38	LED A	P	Power for LED backlight anode
39	LED K	P	Power for LED backlight cathode
40	NC		

7-3 Timing Characteristics

10.3.2. Serial Interface Timing Characteristics (3-line SPI)

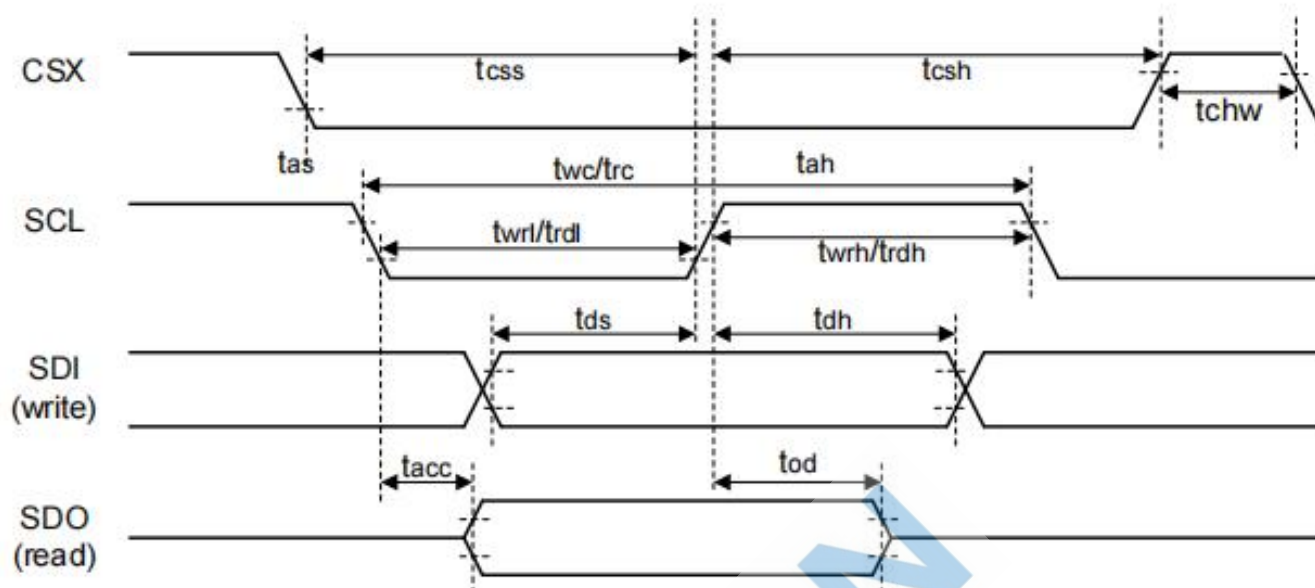
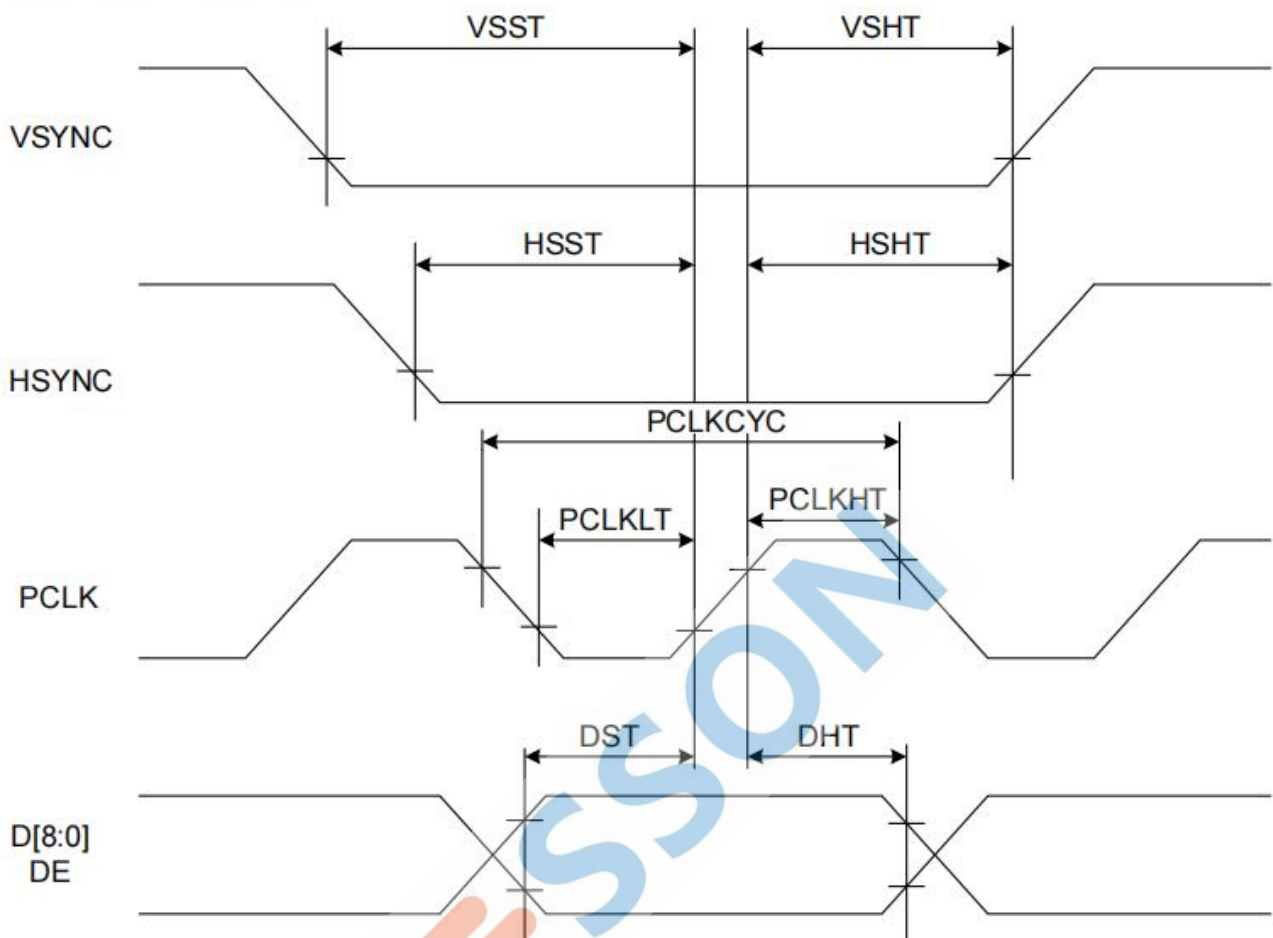


Figure. 10.3 3-line Serial Interface Timing Characteristics

Signal	Symbol	Parameter	Min.	Max.	Unit	Description
CSX	t_{css}	Chip select setup time (Write)	15		ns	
	t_{csh}	Chip select setup time (Write)	15		ns	
	t_{css}	Chip select hold time (Read)	60		ns	
	t_{csh}	Chip select hold time (Read)	65		ns	
	t_{chwh}	Chip select "H" pulse width	40		ns	
SCL (write)	t_{wc}	Write cycle	16		ns	
	t_{wrh}	Control pulse "H" duration	7		ns	
	t_{wrl}	Control pulse "L" duration	7		ns	
SCL (read)	t_{rc}	Read cycle	150		ns	
	t_{rdh}	Control pulse "H" duration	60		ns	
	t_{rdl}	Control pulse "L" duration	60		ns	
SDI/SDO (write)	t_{ds}	Data setup time	7		ns	
	t_{dt}	Data hold time	7		ns	
SDI/SDO (read)	t_{acc}	Read access time	20		ns	
	t_{od}	Output disable time	25		ns	

10.3.5. RGB Interface Timing Characteristics

General Timings for RGB I/F



$T_A=25^{\circ}\text{C}$, $\text{IOVCC}=1.8\text{V}$, $\text{VCI}=2.8\text{V}$

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Vertical sync. setup time	VSST	-	25	-	-	ns
Vertical sync. hold time	VSHT	-	25	-	-	ns
Horizontal sync. setup time	HSST	-	25	-	-	ns
Horizontal sync. hold time	HSHT	-	25	-	-	ns
Pixel clock cycle when RGB I/F is running	PCLKCYC	-	55	-	-	ns
Pixel clock low time	PCLKLT	-	25	-	-	ns
Pixel clock high time	PCLKHT	-	25	-	-	ns
Data setup time D[23:0]	DST	-	25	-	-	ns
Data hold time D[23:0]	DHT	-	25	-	-	ns

Note: (1) Signal rise and fall times are equal to or less than 20 ns.

(2) Measuring of input signals are using 0.30 x IOVCC for low state and 0.70 x IOVCC for high state.

10.3.6. Reset Input Timing

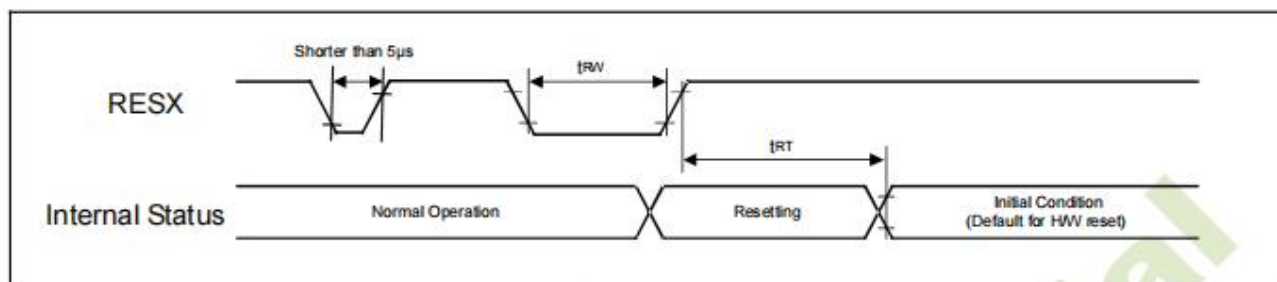


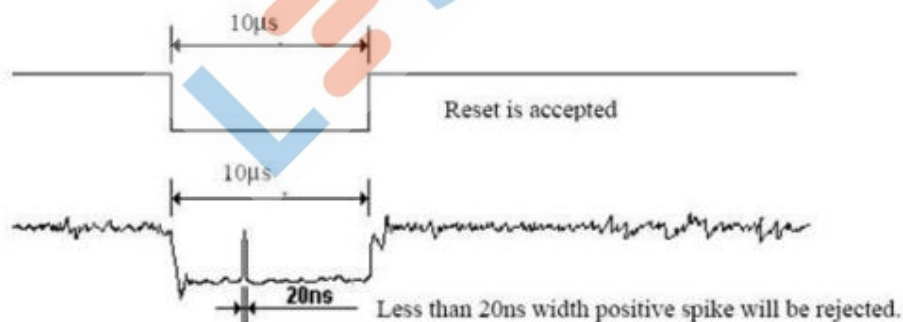
Figure. 10.7 Reset input timings

Symbol	Parameter	Related pins	Min.	Max.	Unit
t_{RW}	Reset pulse width ⁽²⁾	RESX	10	-	μs
t_{RT}	Reset complete time ⁽³⁾	-	-	5 (Note 5)	ms
		-	-	120 (Note 6, 7)	ms

- Note:** (1) The reset complete time also required time for loading ID bytes from OTP to registers. This loading is done every time when there is HW reset cancel time (t_{RT}) within 5 ms after a rising edge of RESX.
 (2) Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.

RESX Pulse	Action
Shorter than 5 μs	Reset Rejected
Longer than 10 μs	Reset
Between 5 μs and 10 μs	Reset Start

- (3) During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out -mode. The display remains the blank state in Sleep In -mode) and then returns to Default condition for H/W reset.
 (4) Spike Rejection also applies during a valid reset pulse as shown below:



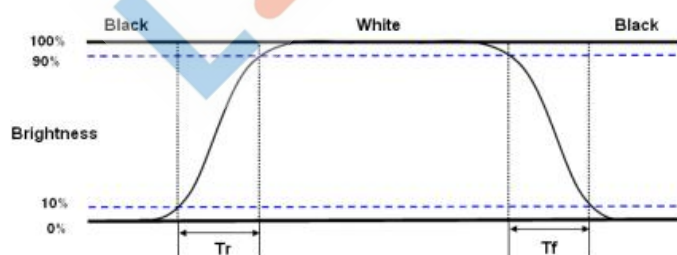
- (5) When Reset is applied during Sleep In Mode.
 (6) When Reset is applied during Sleep Out Mode.
 (7) It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

8. Electro-Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response time		Tr +Tf	$\theta_x = \theta_y = 0$	---	---	35	ms	Note 1
Contrast Ratio		CR		1000	1500	---	---	Note 2
Transmittance		T%		4.5	4.8	---	%	
Color Chromaticity (CIE1931)	White	W x	$\theta_x = \theta_y = 0$	---	0.301	---	---	
		W y		---	0.320	---	---	
Viewing angle	θ_T		CR > 10	---	85	---	Deg.	Note 3
	θ_B			---	85	---		
	θ_L			---	85	---		
	θ_R			---	85	---		
Luminance ($I_F = 80mA$)		L		---	300	---	cd/m2	Note4

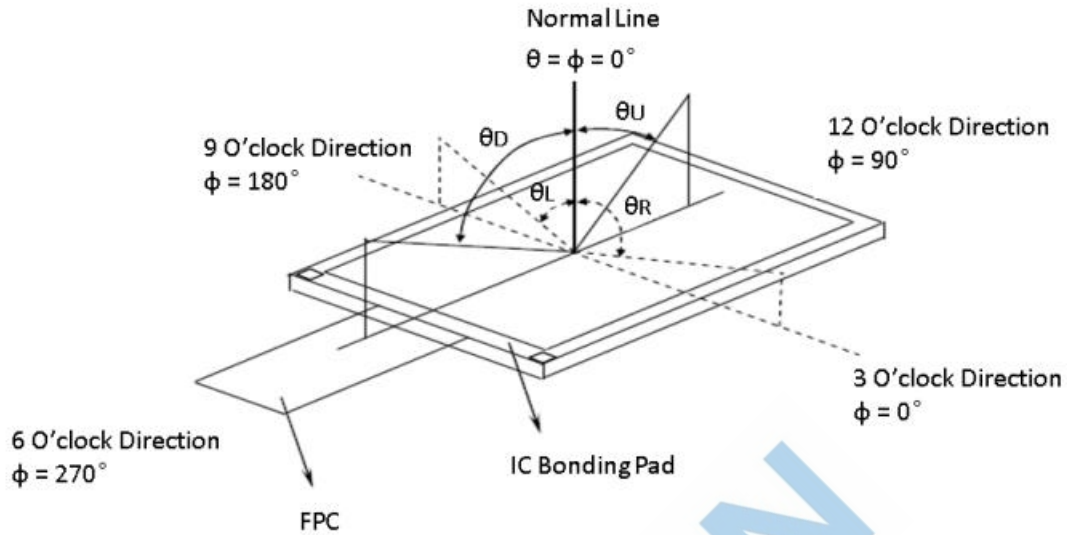
Note 3: Definition of response time:

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (Tr) is the time between photo detector output intensity changed from 10% to 90%. And fall time (Tf) is the time between photo detector out intensity changed from 90% to 10%.

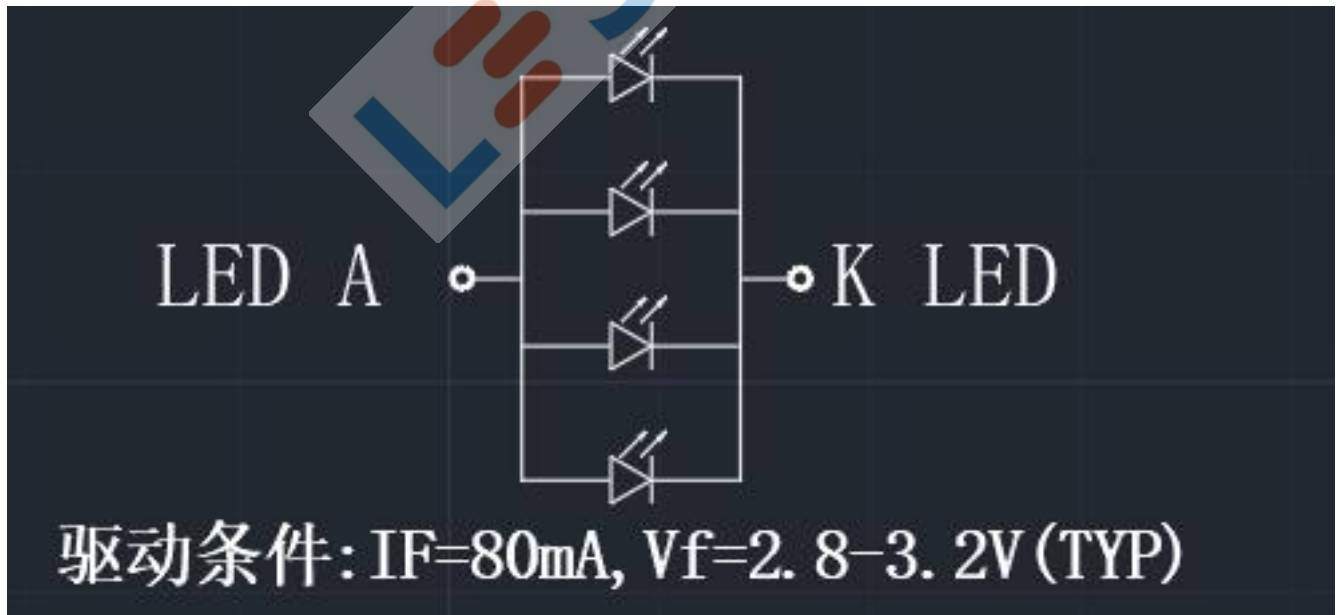


: Definition of viewing angle range and measurement system:

Viewing angle is measured at the center point of the LCD (With Normal Polarizer) by BM-5A.



Note(4) Backlight circuit



9.Records Of Version

Version	Revise Date	Page	Content
00	2026-1-7	ALL	New released

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