

PRODUCT SPECIFICATION **FOR LCD MODULE**

Revision: 1.0

Model No: LS028I13-M-V1

Module Type: COG+FPC+B/L

APPROVED SIGNATURE

- ☒ Approved Product Specification only
- ☐ Approved Product Specification and Samples

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1. General Description

LS028I13-M-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.

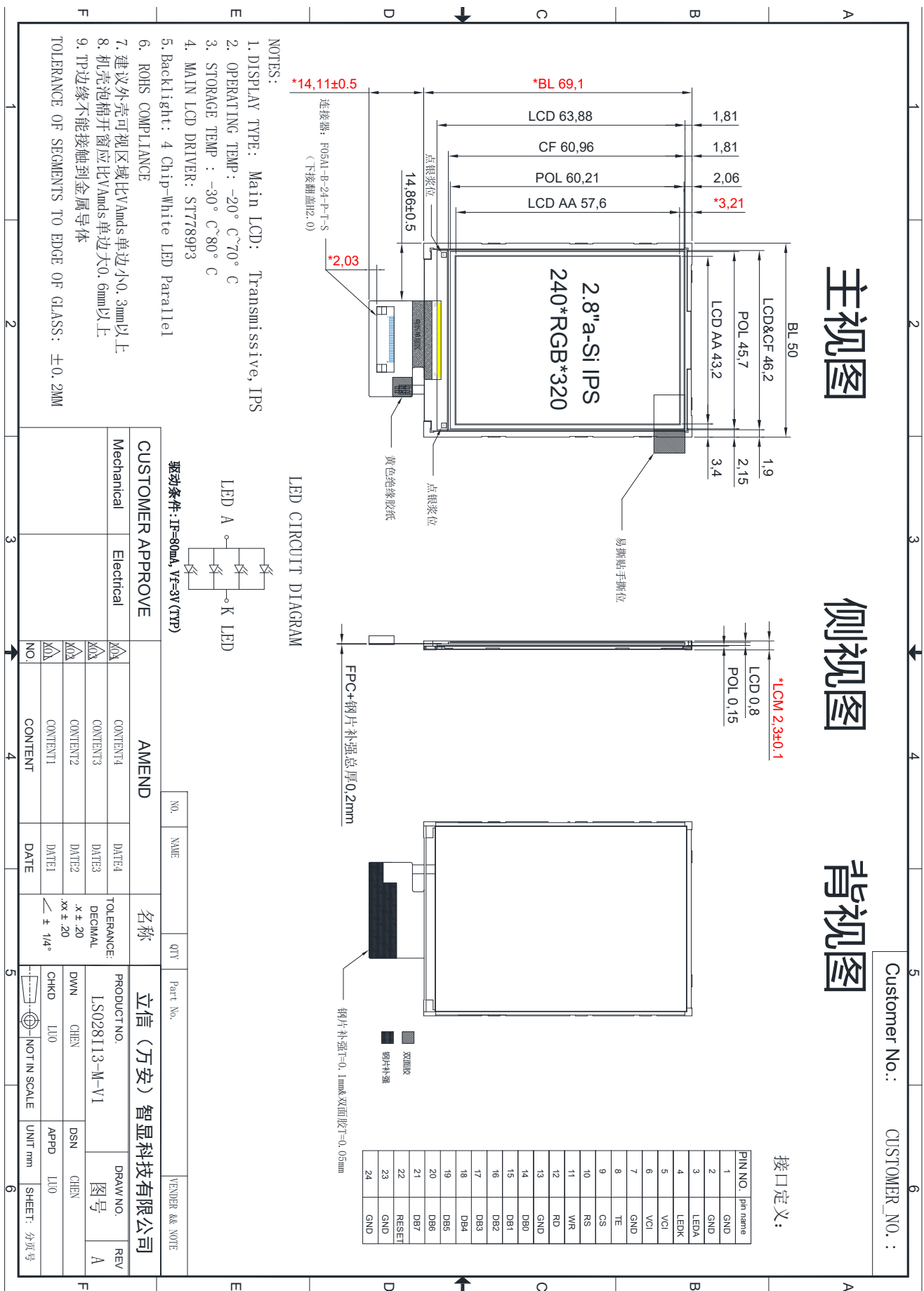
2. Physical Features

Display Mode	TFT-LCD Module
	Active matrix TFT, Transmissive type
Display Format	Graphic 240(RGB)×320 Dot-matrix
Input Data	8bit 8080
Viewing Direction (Grayscale Inversion)	Free (IPS)
Drive	ST7789P3

3. Mechanical Specification

Item	Specification	Unit
Module size (H×V×D)	50.0 ×69.1 ×2.3	mm
Number of dots	240(RGB) ×320	pixel
Active area (H×V)	43.2×57.6	mm

4. Outline Dimension



5. Absolute Maximum Ratings

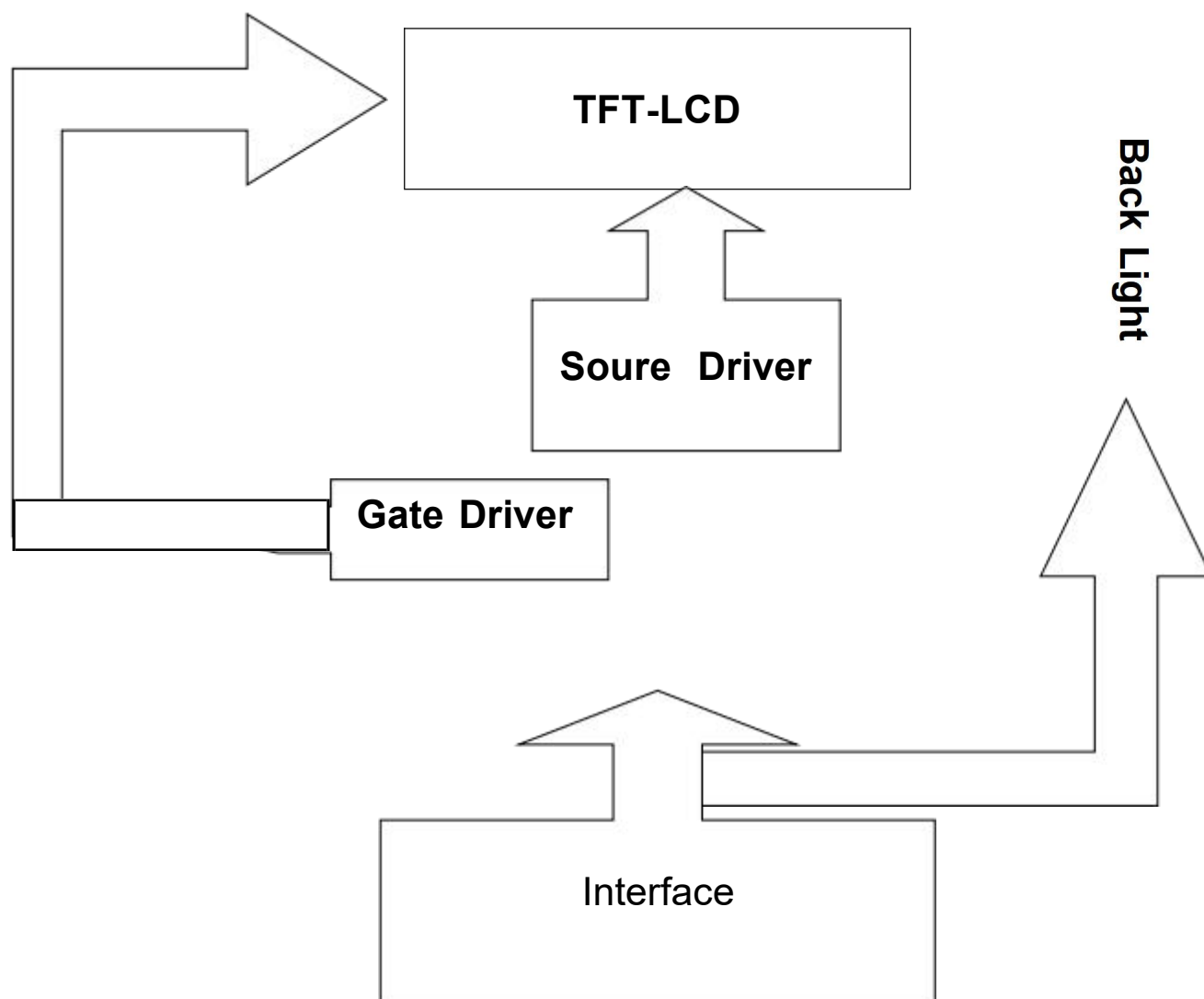
Item	Symbol	Min	Max	Unit	Remark
Supply voltage	VCC	-0.3	4.6	V	Note1 Note2
Supply voltage	IOVCC	-0.3	4.0	V	
Operating temperature	TOPR	-20	70	°C	
Storage temperature	TSTR	-30	80	°C	

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	GND	P	Ground
2	GND	P	Ground
3	LEDA	P	Power for LED backlight anode
4	LEDK	P	Power for LED backlight cathode
5	VCI	P	Power Supply
6	VCI	P	Power Supply
7	GND	P	Ground
8	TE	O	Tearing effect signal is used to synchronize MCU to frame memory writing.
9	CS	I	Chip selection pin
10	RS	I	Display data/command selection pin in parallel interface.
11	WR	I	-Write enable in MCU parallel interface.
12	RD	I	Read enable in 8080 MCU parallel interface
13	GND	P	Ground
14	D0	I	interface data bus.
15	D1	I	interface data bus.
16	D2	I	interface data bus.
17	D3	I	interface data bus.
18	D4	I	interface data bus.
19	D5	I	interface data bus.
20	D6	I	interface data bus.
21	D7	I	interface data bus.
22	RESET	I	This signal will reset the device and it must be applied to properly initialize the chip.
23	GND	P	Ground
24	GND	P	Ground

7-3 Timing Characteristics

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

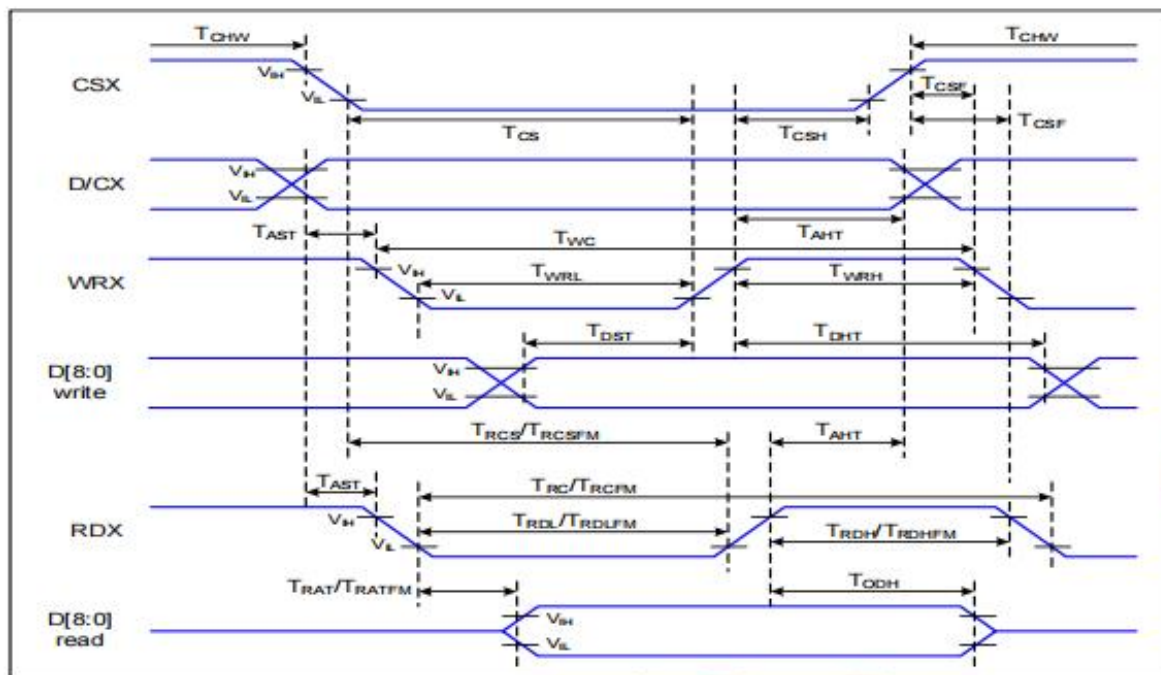


Figure 1 Parallel Interface Timing Characteristics (8080-Series MCU Interface)

VDDI=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	TBD	-	ns	
	T _{AHT}	Address hold time (Write/Read)	TBD	-	ns	
CSX	T _{CHW}	Chip select "H" pulse width	TBD	-	ns	
	T _{CS}	Chip select setup time (Write)	TBD	-	ns	
	T _{RC}	Chip select setup time (Read ID)	TBD	-	ns	
	T _{RCFM}	Chip select setup time (Read FM)	TBD	-	ns	
	T _{CSF}	Chip select wait time (Write/Read)	TBD	-	ns	
	T _{CSH}	Chip select hold time	TBD	-	ns	
WRX	T _{WC}	Write cycle	TBD	-	ns	
	T _{WRH}	Control pulse "H" duration	TBD	-	ns	
	T _{WRL}	Control pulse "L" duration	TBD	-	ns	
RDX (ID)	T _{RC}	Read cycle (ID)	TBD	-	ns	When read ID data
	T _{RDH}	Control pulse "H" duration (ID)	TBD	-	ns	
	T _{RDL}	Control pulse "L" duration (ID)	TBD	-	ns	
RDX (FM)	T _{RCFM}	Read cycle (FM)	TBD	-	ns	When read from frame memory
	T _{RDHFM}	Control pulse "H" duration (FM)	TBD	-	ns	
	T _{RDLFM}	Control pulse "L" duration (FM)	TBD	-	ns	
D[8:0]	T _{DST}	Data setup time	TBD	-	ns	For CL=30pF

	T_{DHT}	Data hold time	TBD	-	ns
	T_{RAT}	Read access time (ID)	-	TB-D	ns
	T_{RATFM}	Read access time (FM)	-	TBD	ns
	T_{ODH}	Output disable time	TBD	TBD	ns

Table 4 8080 Parallel Interface Characteristics



Figure 2 Rising and Falling Timing for I/O Signal

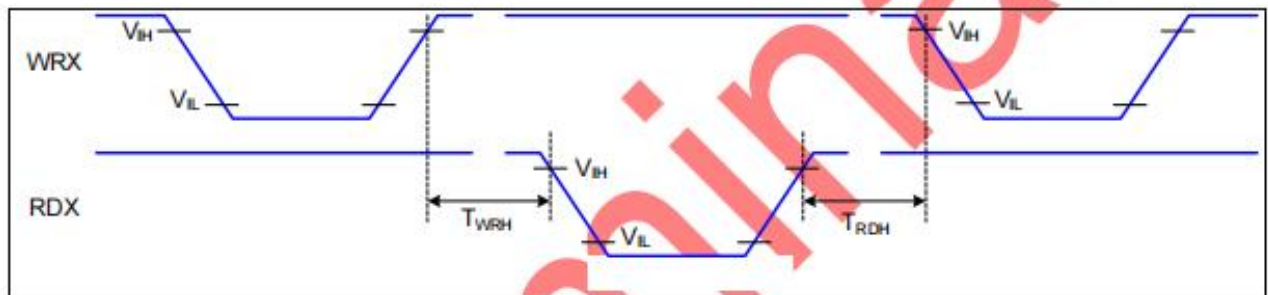


Figure 3 Write-to-Read and Read-to-Write Timing

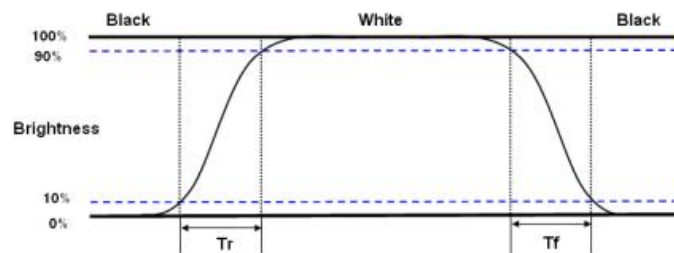
Note: The rising time and falling time (T_r , T_f) of input signal and fall time are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of V_{DDI} for Input signals.

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

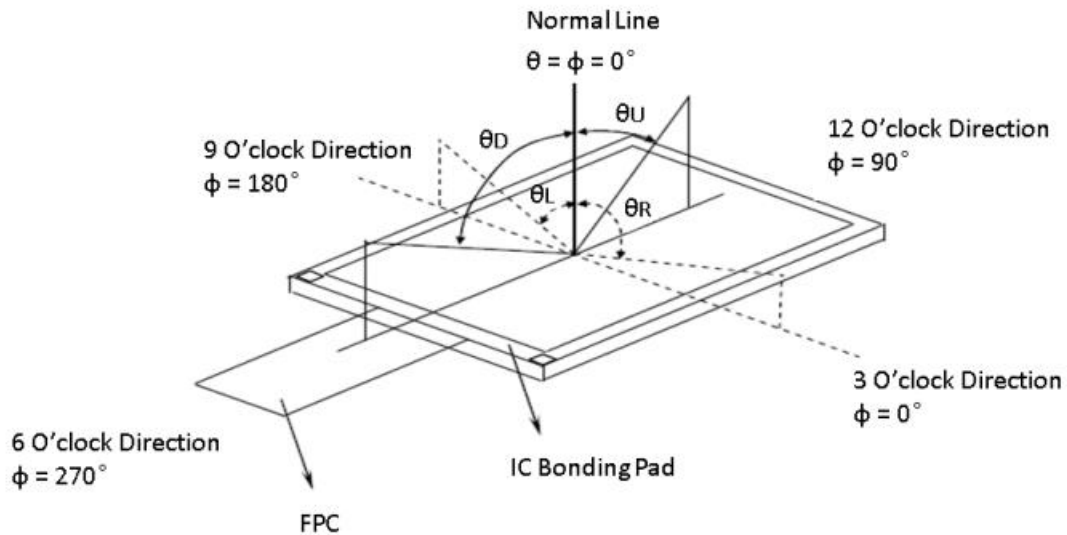
Note 3: Definition of response time:

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%.

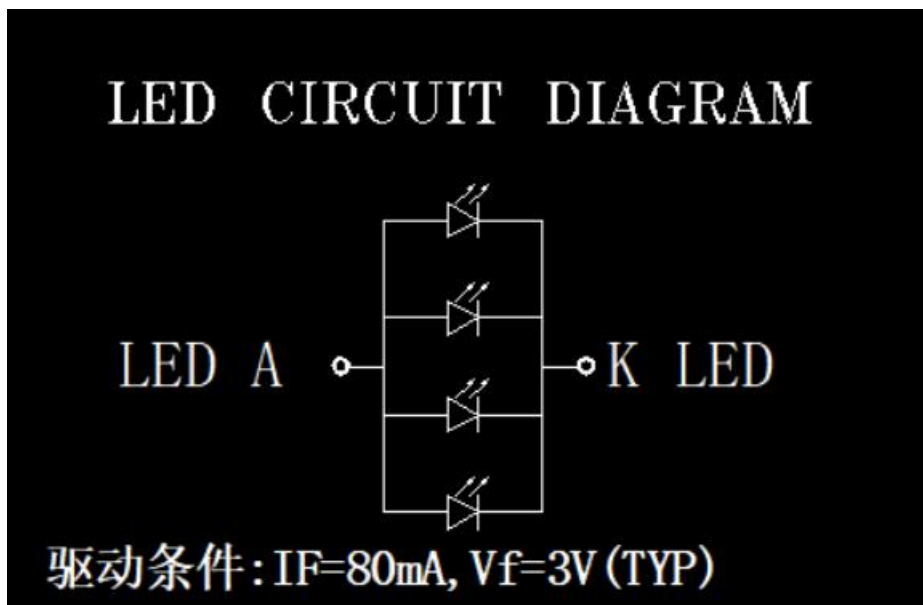


: Definition of viewing angle range and measurement system:

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



Note(4) Backlight circuit



9. Reliability

NO.	测试分类	检验内容	主要参数	检验周期
1	环境测试	盐雾测试	$35^{\circ}\text{C} \pm 2^{\circ}\text{C}$	48H
2		温度冲击	70°C , -40°C	48H
3		高温高湿存储	$60^{\circ}\text{C} \pm 2^{\circ}\text{C} / \text{RH}(95 \pm 2)\%$	48H
4		高温存储	80°C	24H
5		低温存储	-25°C	24H
6		高低温循环	60°C 、95%RH	2H+2H
7		高温高湿工作	$55 \pm 2^{\circ}\text{C}$ 、95%RH	12H
8		低温工作	$-25 \pm 2^{\circ}\text{C} - 10 - 2^{\circ}\text{C}$	24H
9		高温工作	I级: $55^{\circ}\text{C} \pm 2^{\circ}\text{C}$ II级: $70^{\circ}\text{C} - 2^{\circ}\text{C}$	24H

Notes:

1. Judgments should be made after exposure in room temperature for two hours.
2. The distill water is used for the high temperature/humidity test.
3. The sample above is individually for every reliability tests condition.

10.Records Of Version

Version	Revise Date	Page	Content
00	2025-7-28	ALL	New released