PRODUCT SPECIFICATION FOR LCD MODULE

Revision: 1.0

Model No: LS028I31-M-V1

Module Type: COG+FPC+B/L

APPROVED SIGNATURE

■ Approved Product Specification only

□ Approved Product Specification and Samples

Prepared By	Checked By	Approved By

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1. General Description

LS028I31-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.

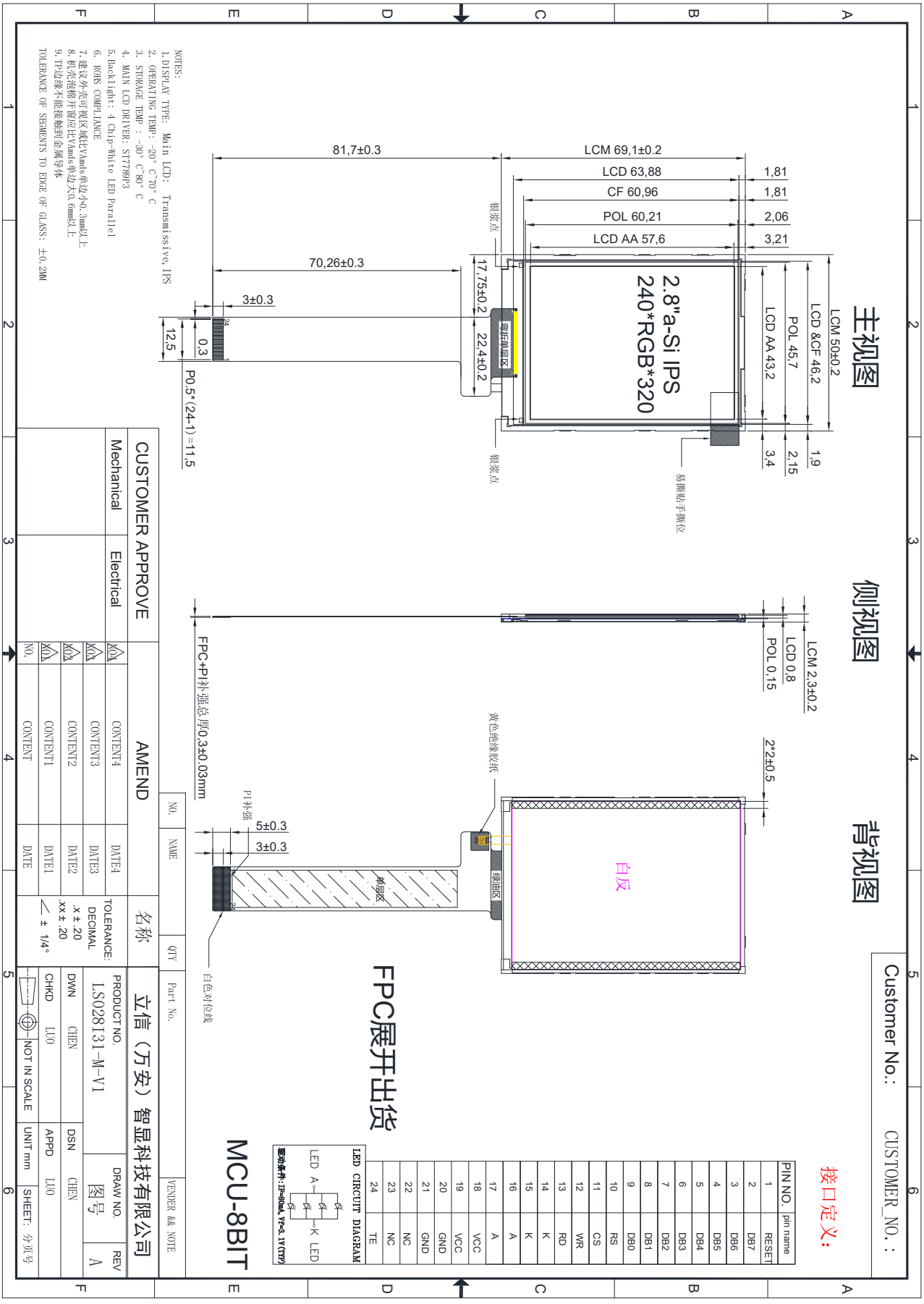
2. Physical Features

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

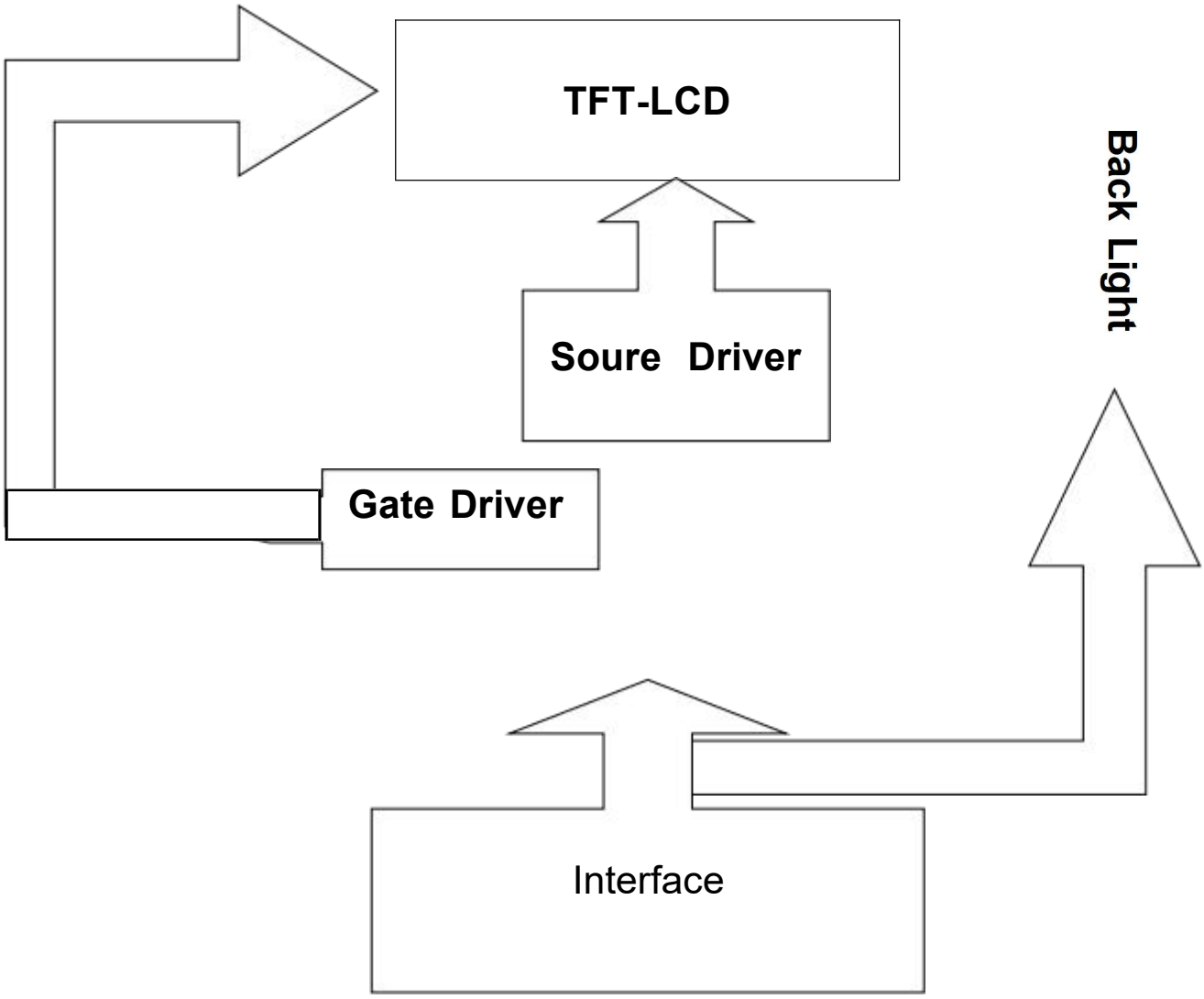
Item	Symbol	Min	Max	Unit	Remark
Supply voltage	VCC	-0.3	4.6	V	Note1 Note2
Supply voltage	IOVCC	-0.3	4.0	V	
Operating temperature	TOPR	-20	70	℃	
Storage temperature	TSTR	-30	80	℃	

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	D7	I	interface data bus.
3	D6	I	interface data bus.
4	D5	I	interface data bus.
5	D4	I	interface data bus.
6	D3	I	interface data bus.
7	D2	I	interface data bus.
8	D1	I	interface data bus.
9	D0	I	interface data bus.
10	RS	I	Display data/command selection pin in parallel interface.
11	CS	I	Chip selection pin
12	WR	I	Write enable in MCU parallel interface.
13	RD	I	Read enable in 8080 MCU parallel interface
14	K	P	Power for LED backlight cathode
15	K	P	Power for LED backlight cathode
16	A	P	Power for LED backlight anode
17	A	P	Power for LED backlight anode
18	VCC	P	Power Supply
19	VCC	P	Power Supply
20	GND	P	Ground
21	GND	P	Ground
22	NC		
23	NC		
24	TE	O	Tearing effect signal is used to synchronize MCU to frame memory writing.

7-3 Timing Characteristics

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

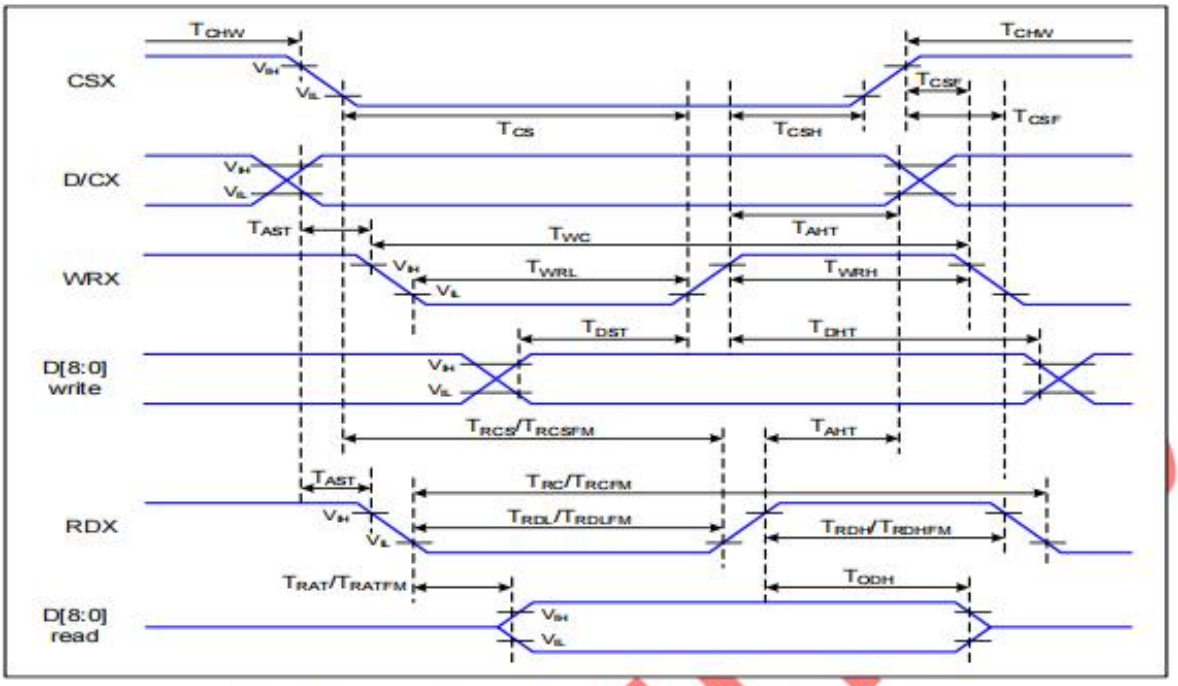


Figure 1 Parallel Interface Timing Characteristics (8080-Series MCU Interface)

VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=25℃

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_{RCS}	Chip select setup time (Read ID)	TBD	-	ns	
	T_{RCSFM}	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

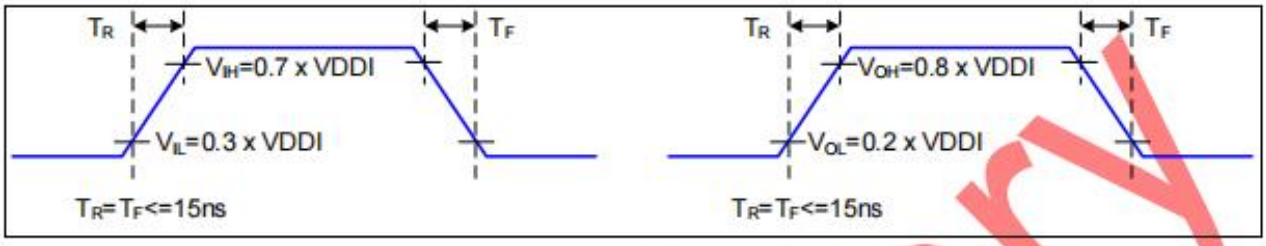


Figure 2 Rising and Falling Timing for I/O Signal

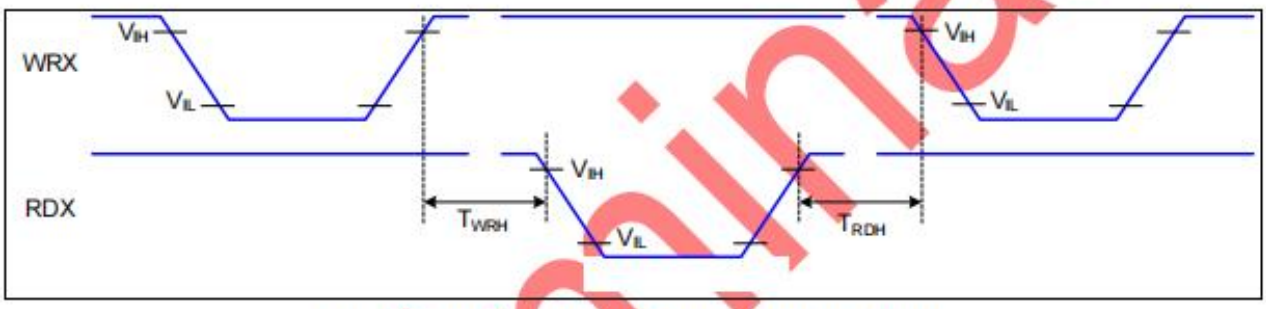


Figure 3 Write-to-Read and Read-to-Write Timing

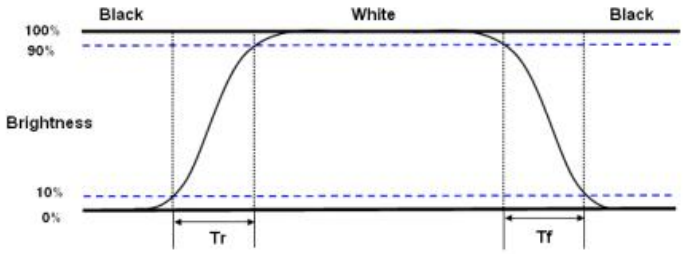
Note: The rising time and falling time (Tr, Tf) of input signal and fall time are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

8. Electro-Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response time		Tr +Tf	θx = θy =0	---	---	35	ms	Note 1
Contrast Ratio		CR		1000	1500	---	---	Note 2
Transmittance		T%		4.5	4.8	---	%	
Color Chromaticity (CIE1931)	White	W x	θx = θy =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	---		

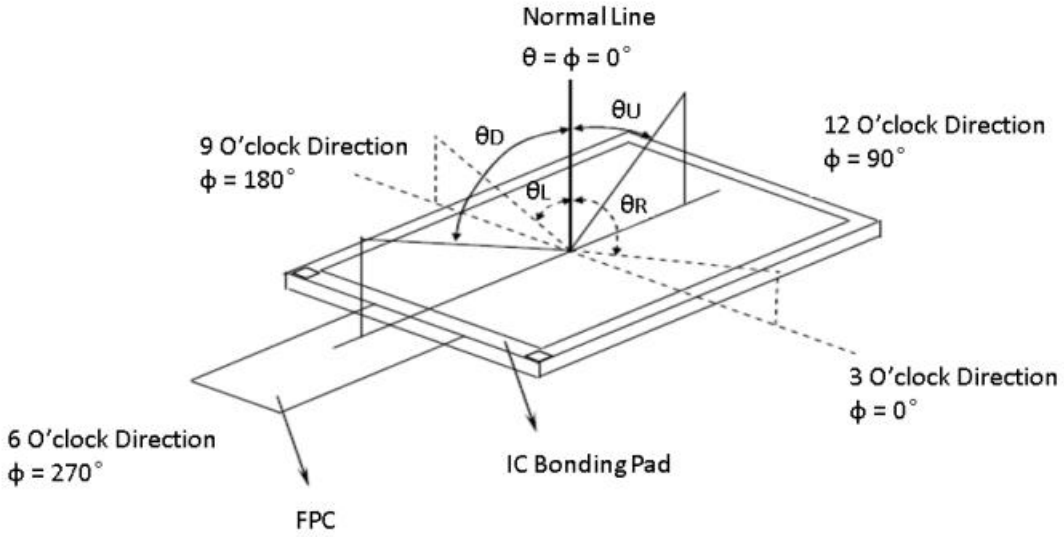
Note 3: Definition of response time:

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 fail time (Tf) is the time between photo detector out intensity changed from 90% to 10%.

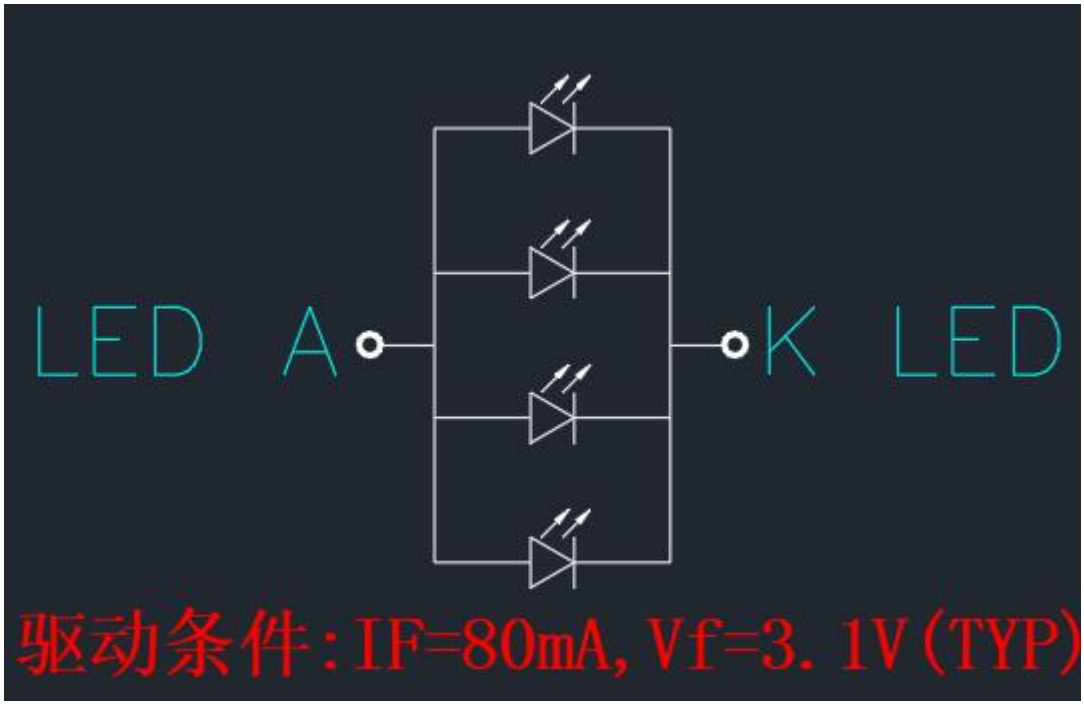


: Definition of viewing angle range and measurement system:

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	2026-1-23	ALL	New released