

PRODUCT SPECIFICATION **FOR LCD MODULE**

Revision: 1.0

Model No: LS028I30-M-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

LS028I30-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.

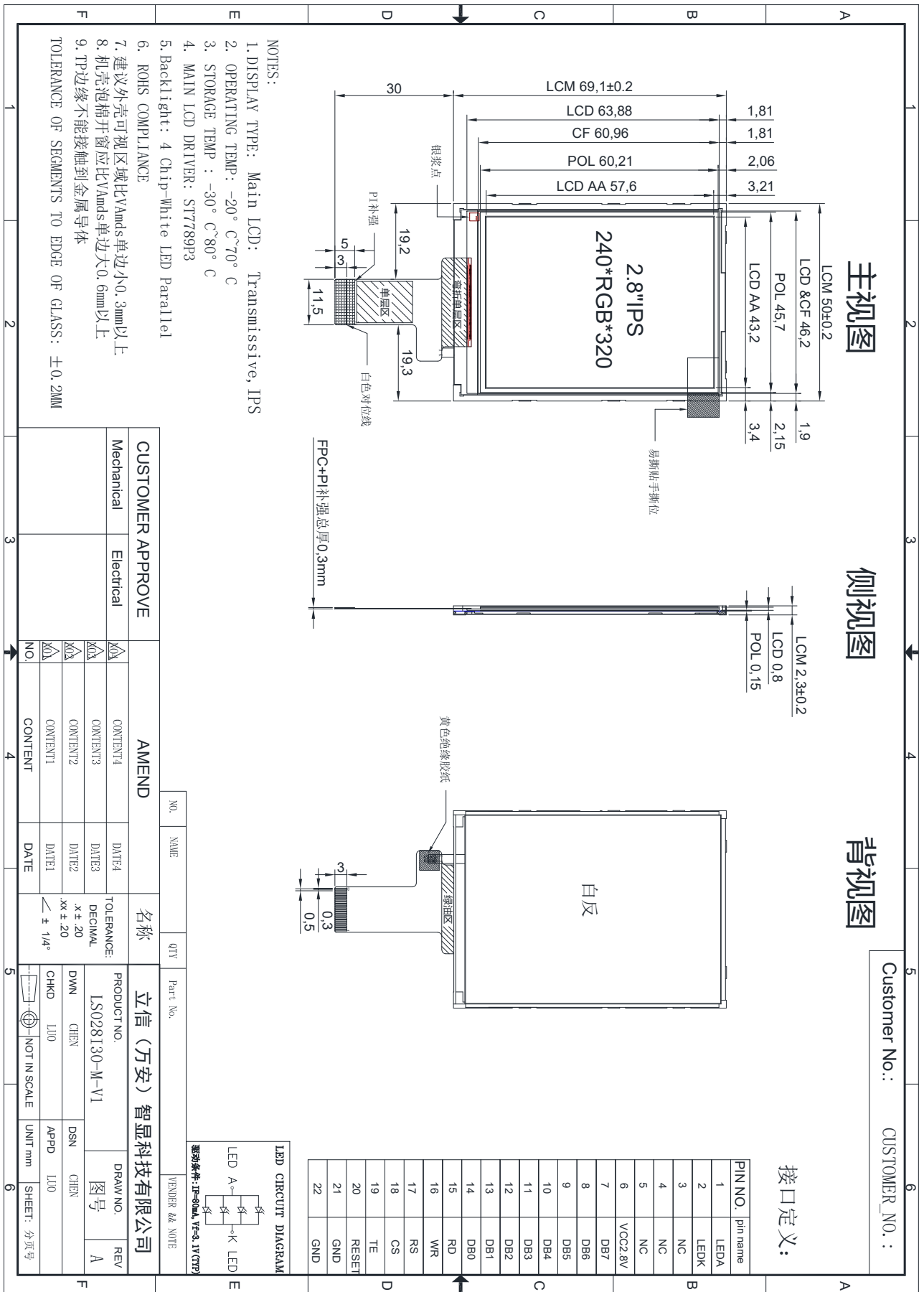
2. Physical Features

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

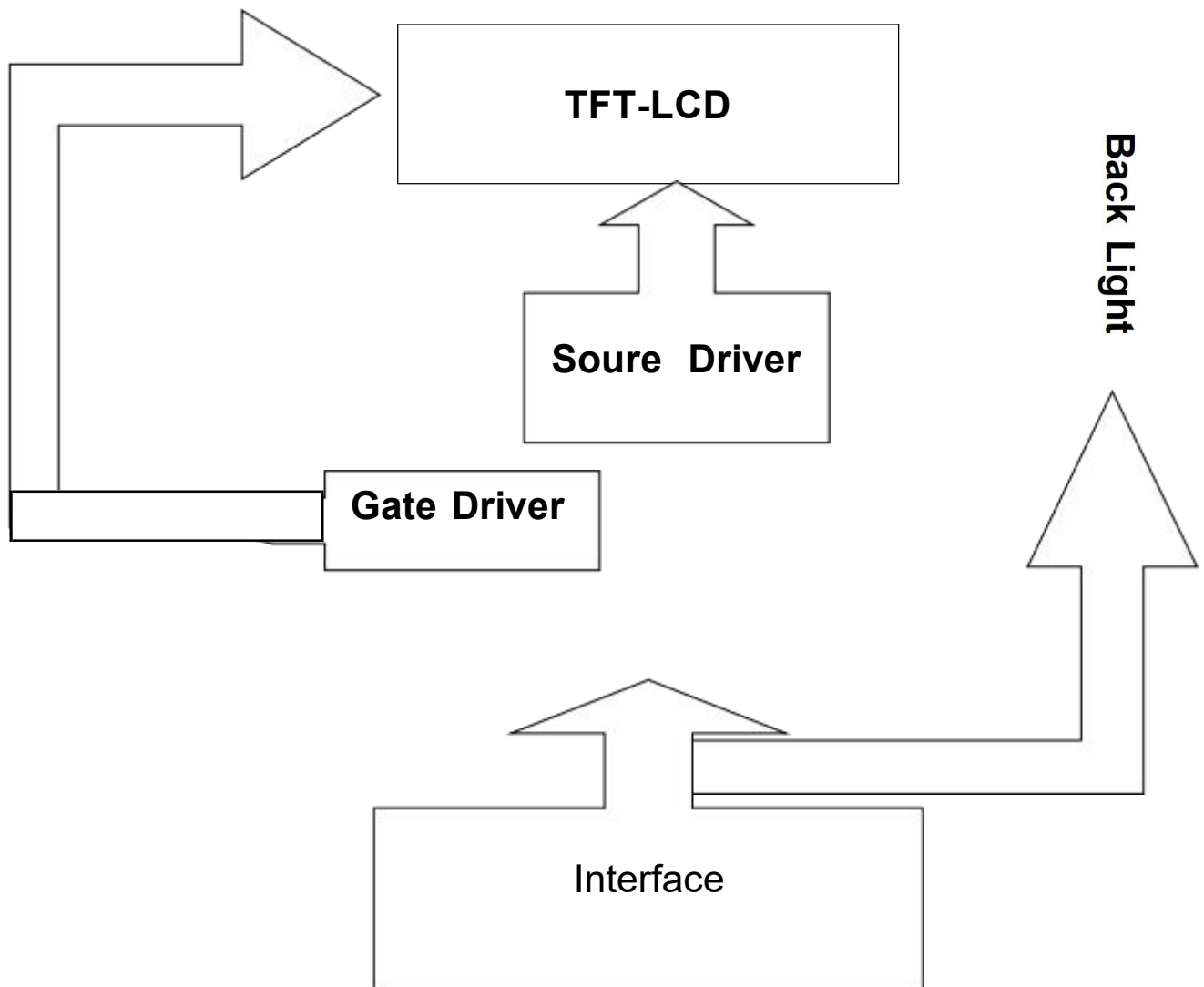
Item	Symbol	Min	Max	Unit	Remark
Supply voltage	VCC	-0.3	4.6	V	Note1 Note2
Supply voltage	IOVCC	-0.3	4.0	V	
Operating temperature	TOPR	-20	70	°C	
Storage temperature	TSTR	-30	80	°C	

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

The diagram illustrates the timing relationships for several signals: CSX, D/CX, WRX, D[8:0] write, RDX, and D[8:0] read. Key timing parameters shown include:

- T_{CHW} and T_{CHV} : CSX setup and hold times relative to D/CX.
- T_{CS} , T_{CSH} , and T_{CSF} : CSX setup, hold, and floating times relative to D/CX.
- T_{AST} : Address setup time relative to D/CX.
- T_{WC} , T_{WRH} , and T_{DHT} : WRX setup, hold, and delay times relative to D/CX.
- T_{DST} : D[8:0] write setup time relative to WRX.
- T_{RCS}/T_{RCSFM} and T_{AHT} : RDX setup and hold times relative to D[8:0] write.
- T_{AST} : Address setup time relative to RDX.
- T_{RC}/T_{RCFM} , T_{RDH}/T_{RDHF} , and T_{RDH}/T_{RDHF} : RDX setup, hold, and delay times relative to D[8:0] read.
- T_{RDL}/T_{RDLFM} : RDX delay time relative to D[8:0] read.
- T_{TRAT}/T_{TRATFM} and T_{ODH} : D[8:0] read setup and hold times relative to RDX.

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

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	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

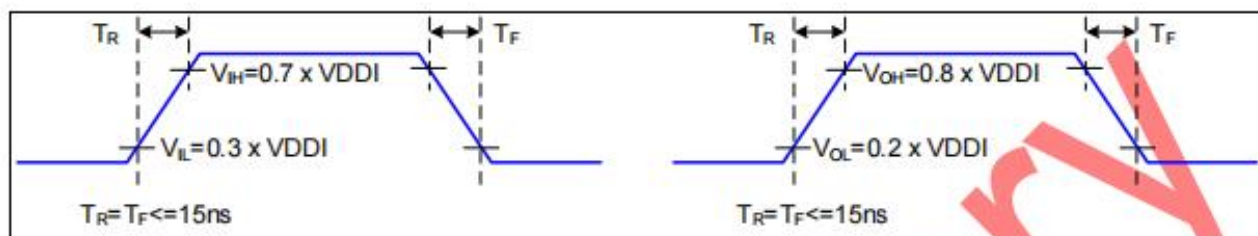


Figure 2 Rising and Falling Timing for I/O Signal

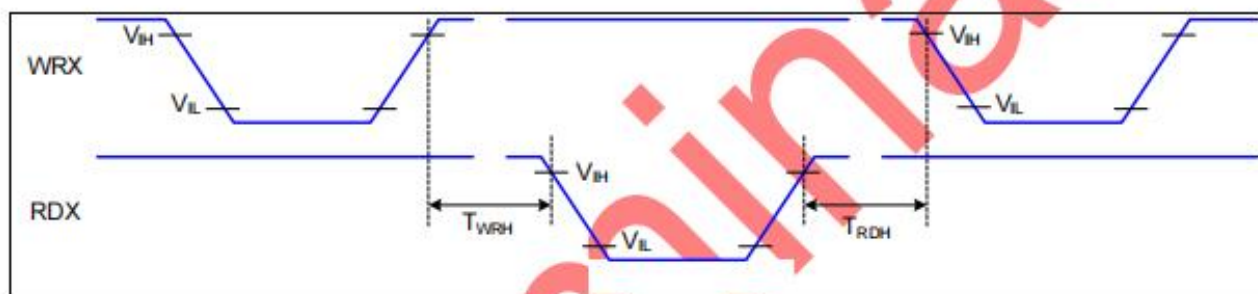


Figure 3 Write-to-Read and Read-to-Write Timing

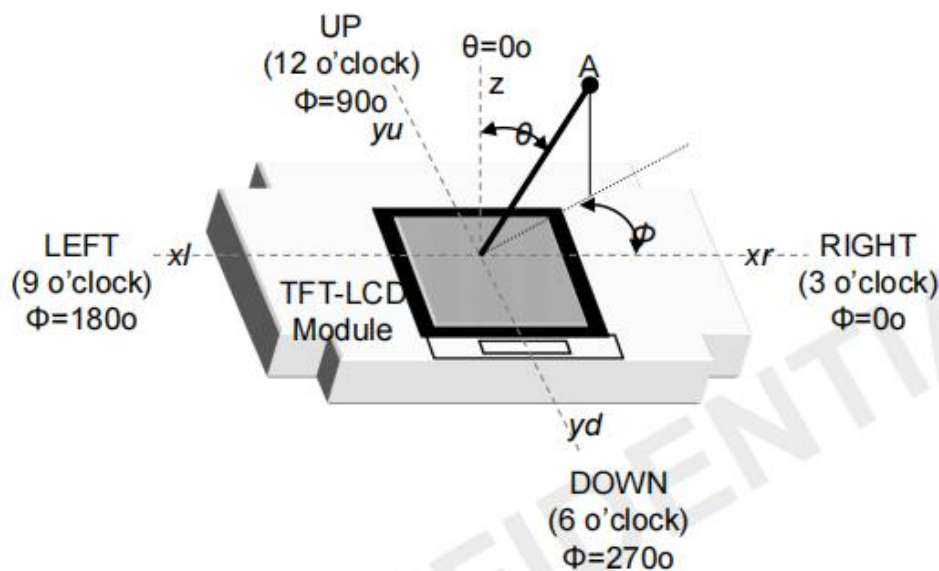
Note: The rising time and falling time (T_R , T_F) of input signal and fall time are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of V_{DDI} for Input signals.

8. Electro-Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response time	Tr +Tf	$\theta_x = \theta_y = 0$	---	30	35	ms	Note 1
Contrast Ratio	CR		1000	1200	---	---	Note 2
Transmittance	T%		4.5	4.8	---	%	
Color Chromaticity (CIE1931)	White	W x	$\theta_x = \theta_y = 0$	0.308	---	---	
		W y		0.339	---	---	
Viewing angle	θ_T	CR > 10	---	80	---	Deg.	Note 3
	θ_B		---	80	---		
	θ_L		---	80	---		
	θ_R		---	80	---		
Luminance ($I_F = 80mA$)	L		---	500	---	cd/m2	Note4

Note 4.1: 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 8).

<Figure 8. Viewing Angle Range Is Defined As Follows>



Note 4.2: 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.

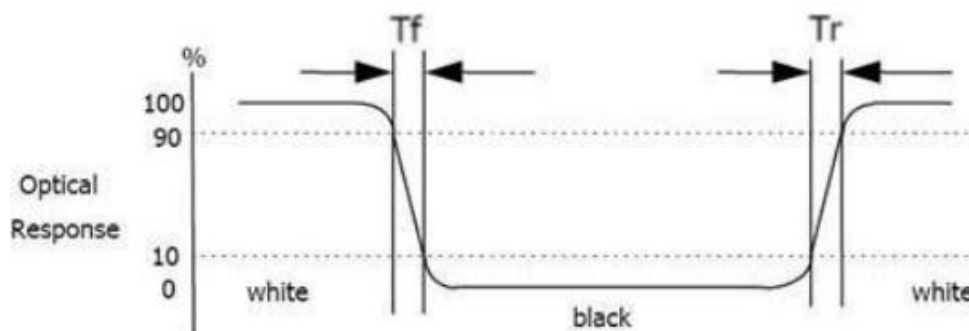
$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

Note 4.3: Transmittance is the Value with Polarizer.

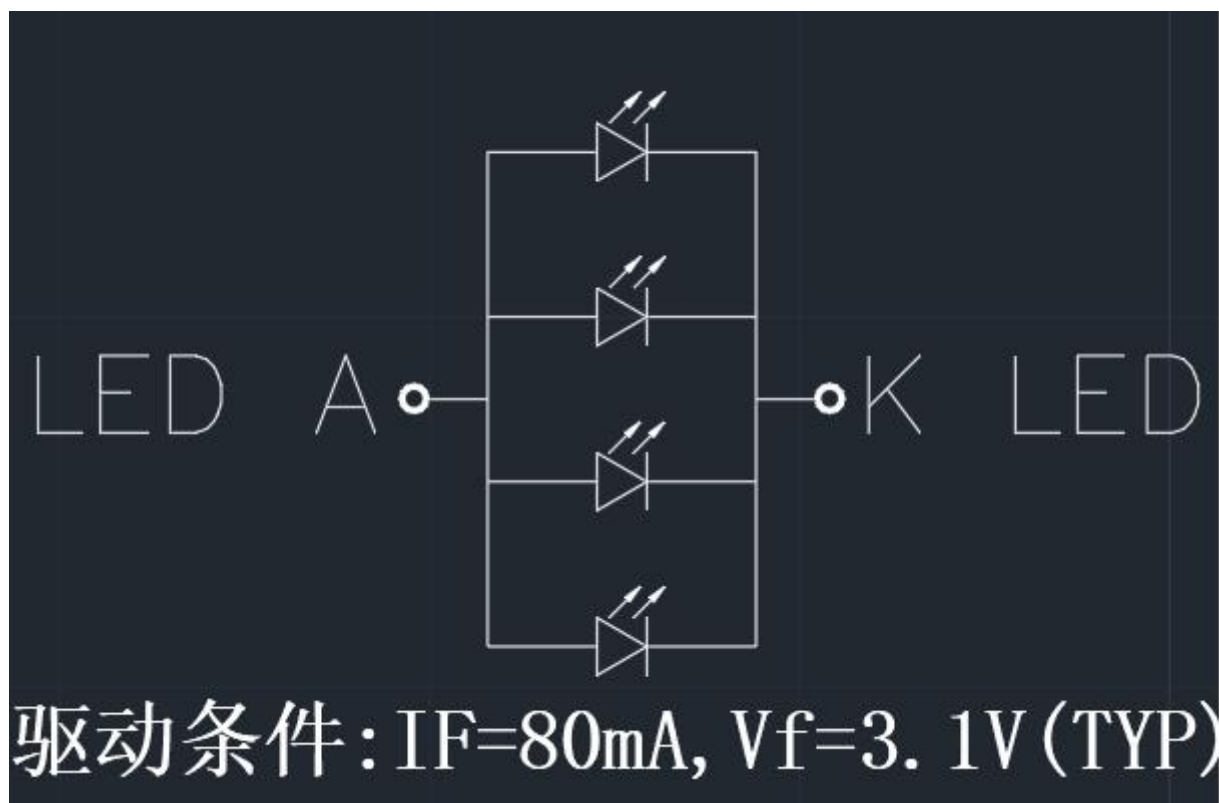
Note 4.4: The color chromaticity coordinates specified in Table 16 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

Note 4.5: The electro-optical response time measurements shall be made as Figure 9 by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is T_r , and 90% to 10% is T_f .

<Figure 9. Response Time Testing>



Note(4) Backlight circuit



9.Records Of Version

Version	Revise Date	Page	Content
00	2026-1-16	ALL	New released