Product Specification

Customer	
Model Name	RV123Z7P-700-50
Ver	Ver 1.0

Date: 1. Mar. 2022

(√) Preliminary Specification

( ) Final Specification

Any modification is not allowed without RJOYTEK's permission

Customer's Approval	**MianYang**
Signature Date	Approved By RD Director Date: Name: Signature:
	Reviewed By PM Manager Date: Name: Signature:
	Reviewed By RD Manager Date: Name: Signature:
	Reviewed By RD Owner Date: Name: Signature:

Contents

Revision History

Version	Date	Page (New)	Section	Description	Revision by
01	2022/3/1	-	All	Preliminary Specification first update	

1. GENERAL DESCRIPTION

1.1 General Description

The specification is applied to 12.3 inch model (RV123Z7M-700-50) TFT Liquid Crystal Display.

The matrix uses a-Si Thin Film Transistor as a switching device. This TFT LCD has a 12.3 inch diagonally measured active display area with FHD resolution (1920 horizontal by 720 vertical pixels array). All input signals are LVDS interface compatible.

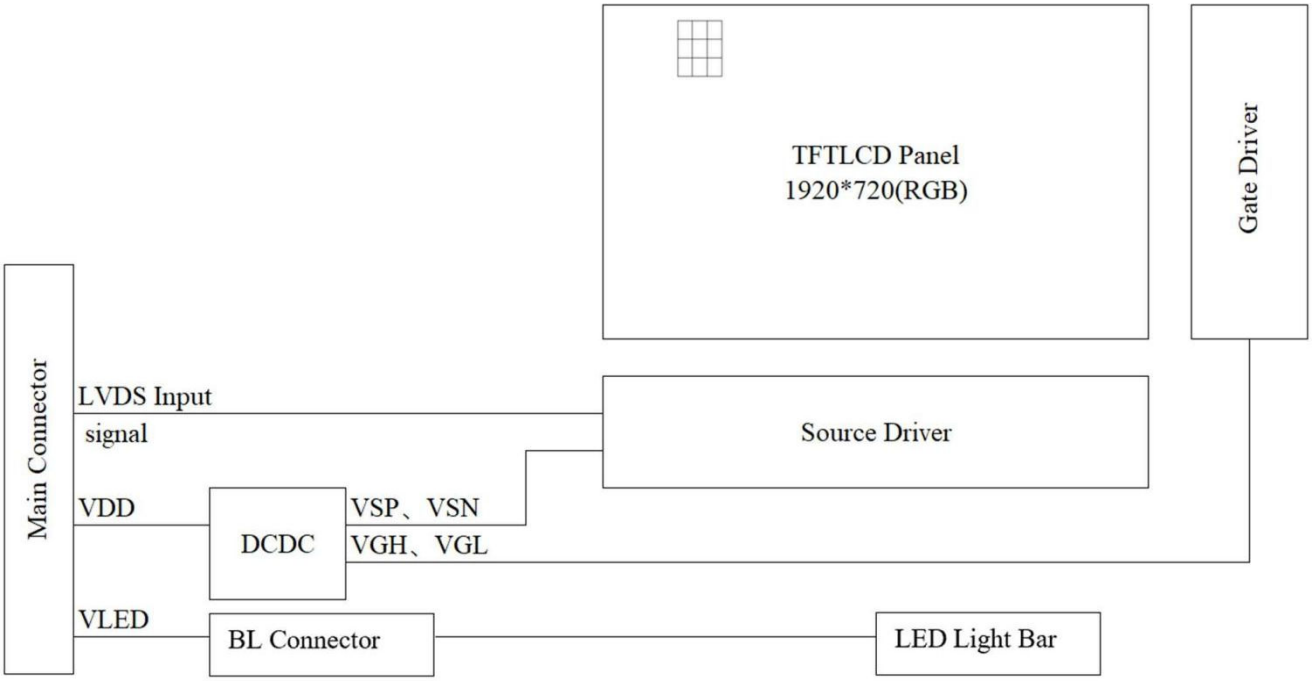


Figure 1. Drive Architecture

1.2 Features

（1）2 Port LVDS interface

（2）16.7M (8bit) color depth, color gamut 75%

（3）Green product (RoHS & Halogen free product)

1.3 General Specifications

The followings are general specifications at the model PV123CS01-1. (listed in Table 1)

<Table 1. General Specifications>

Item	Specification	Unit	Note
Active area	292.032 (H) ×109.512 (V)	mm	-
Number of pixels	1920(H) ×720(V)	pixels	-

Pixel pitch		0.1521 (H) ×0.1521 (V)	mm	-
Pixel arrangement		RGB Vertical stripe	-	-
Display colors		16.7M(8bits)	-	-
Color gamut		NTSC 75% Typ, 70% min	-	-
Display mode		Normally black	-	-
Outline Dimension	Without PCBA	302.53±0.2(H)*123.51±0.2(V)*6.45	mm	-
	With PCBA	302.53±0.3(H)*123.51±0.5(V)*9.65Max	mm	
Surface treatment		HC	-	-
Surface hardness		3H	-	-
Logic Power Consumption		PD:0.5（Max）	W	@Mosaic

2. ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit.

The operational and non-operational maximum voltage and current values are listed in Table 2.

<Table 2. Absolute Maximum Ratings>

Ta=25+/-2°C

Parameter	Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	-0.3	4	V	(1),(2) (3),(4)
Logic Supply Voltage	V_{IN}	- 0.3	V_{DD} +0.3	V	
Operating Temperature	T_{OP}	-30	85	°C	
Storage Temperature	T_{ST}	-40	95	°C	

Note (1) All the parameters specified in the table are absolute maximum rating values that may cause faulty operation or unrecoverable damage, if exceeded. It is recommended to follow the typical value.

Note (2) All the contents of electro-optical specifications and display fineness are guaranteed under Normal Conditions. All the display fineness should be inspected under normal conditions. Normal conditions are defined as follow: Temperature: 25°C, Humidity: 55± 10%RH.

Note (3) Unpredictable results may occur when it was used in extreme conditions. Ta= Ambient Temperature, Tgs= Glass Surface Temperature. All the display fineness should be inspected under normal conditions.

Note (4) Temperature and relative humidity range are shown in the figure below. Wet bulb temperature should be lower than 57.8°C, and no condensation of water. Besides, protect the module from static electricity.

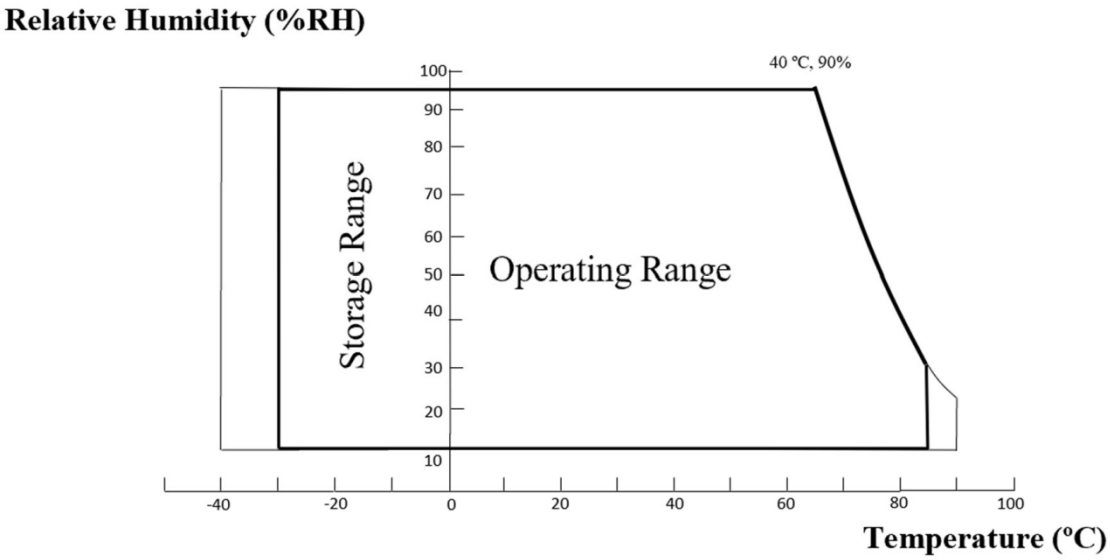


Figure 2. Absolute Ratings of Environmentof the LCD Module

3. ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

<Table 3. Electrical Specifications>

Ta=25+/-2°C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
Power Supply Voltage	VDD	-	3.3	-	V	Note(2)
Permissible Input Ripple Voltage	VRF	-	-	200	mV	-
Power Supply Current	IDD	-	-	150	mA	Note(1)
Power Supply Inrush Current	Inrush	-	-	1.0	A	Note(2)
Power Consumption	mosaic	-	-	0.5	W	Note(1)

Notes :

(1) The supply voltage is measured and specified at the interface connector of OC. The current draw and power consumption specified is for 3.3V at 25 °C.

Mosaic 10*8 pattern

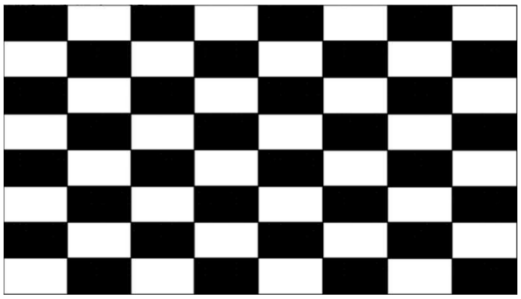


Figure 3. Power Measure Patterns

(2) Measure condition (Figure 4)

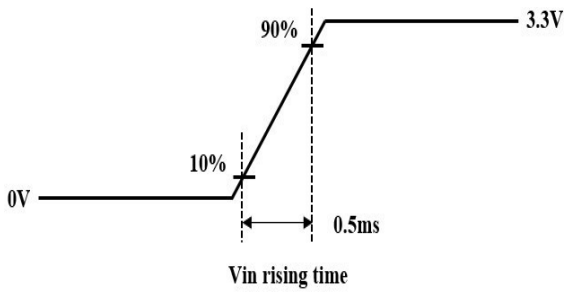
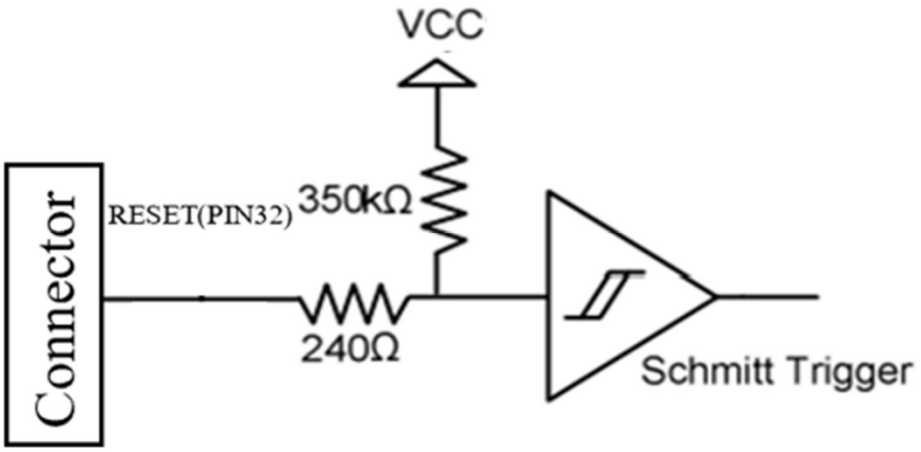
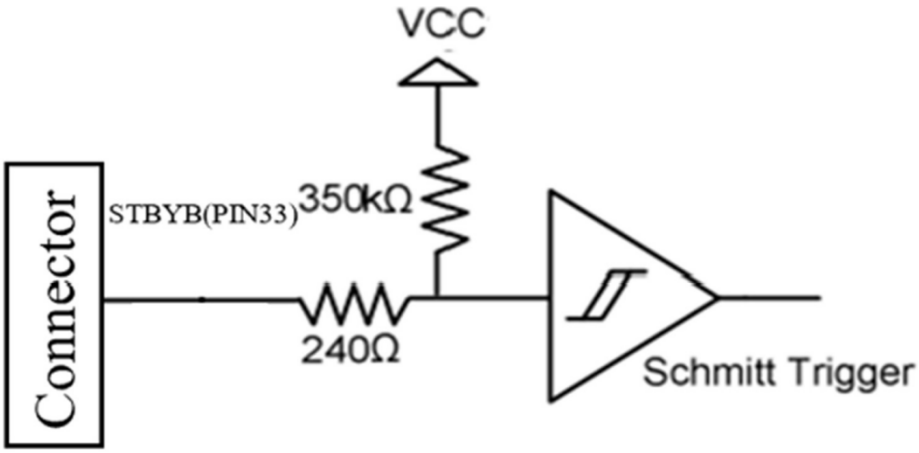
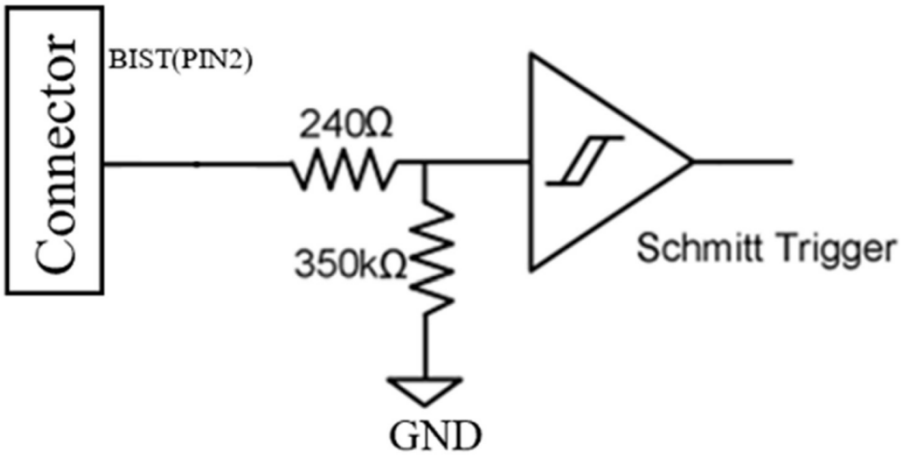


Figure 4. Inrush Measure Condition

(3) I/O structure







4. OPTICAL SPECIFICATION

4.1 Measurement Conditions

The table below is the test condition of optical measurement.

<Table 4. the test condition of optical measurement >

Item	Symbol	Value	Unit
Ambient Temp.	T_A	23±5	ºC
Ambient Humidity	H_A	50±20	% RH
Supply Voltage	V_{CC}	3.3	V
Driving Signal	Refer to the typical value in Chapter 3: Electrical Specification		
Vertical Refresh Rate	F_v	60	Hz
Warm up time	Twarm	>15 min	min
Dark room	ED	＜1 lux	lux

4.2 Optical Specifications

<Table 5. Optical Specifications>

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Only CF Color Chromaticity(CIE1931) Under C-light	Red	Rx	θx=0°,θy=0°	Typ. -0.03	(0.657)	Typ. +0.03	-	(1)
		Ry			(0.320)			
	Green	Gx			(0.283)			
		Gy			(0.606)			
	Blue	Bx			(0.138)			
		By			(0.104)			
	White	Wx			(0.302)			
		Wy			(0.329)			
Color Gamut		CG		70	75	-	%	
Contrast Ratio		CR	θx=0°,θy=0°	1200:1	1500:1	-	-	(2)
Response Time		Tg=25℃		-	-	(30)	ms	(3)
		Tg=-20℃		-	-	(250)	ms	
		Tg=-30℃		-	-	(450)	ms	
Viewing Angle	Horizontal	θx+	CR≧10 θx=0°,θy=0°	80	85	-	Deg.	(4)
		θx-		80	85	-		
	Vertical	θy+		80	85	-		
		θy-		80	85	-		
Transmittance		Tr	θx=0°,θy=0°	3.3	3.8	-	%	

Notes:

(1) The chromaticity coordinates specified in Table 5 should be calculated from the measurement spectrum of all pixels in red, green, blue, and white, which need to be converted to C-light standard light source, and should be measured at the center of the panel.

(2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression,

Contrast Ratio (CR): □ =□□/□□

CRW : Luminance of LCD module with full screen white pattern (255,255, 255) at center point.

CRD : Luminance of LCD module with full screen Dark pattern (0, 0, 0) at center point.

The measure point of the Contrast Ratio is the center of the panel.

(3) Definition of Response time (RT):

The response time is defined as the LCD optical switching time interval between “Bright state” and “Dark state”, TR is the rise time between Luminance rate changed from 10% to 90%, TF is the fall time between Luminance rate changed from 90% to 10%.

<Table 6. Switching time of luminance ratios matrix>

Measured Response time		To	
		10%	90%
From	10%		$T_{10\%to90\%}$
	90%	$T_{90\%\ to\ 10\%}$	

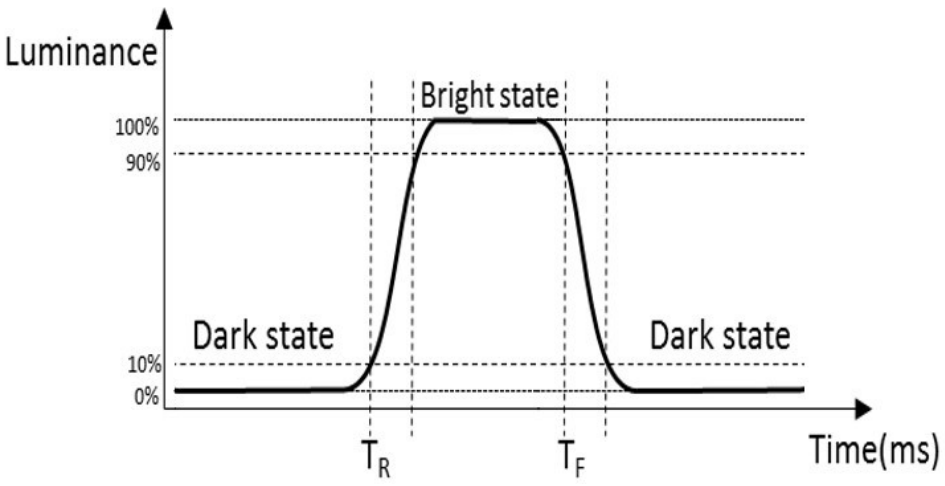


Figure 5. The definition of TR and TF

Measured response time is determined by rise time (T_R) and fall time (T_F) , and shown in Figure 5.

(4) Definition of Viewing angle:

As CR definition is stated in Note(2), the viewing angles are defined when the viewing angle is larger than 10° in four directions relative to the perpendicular direction of the HKC's module (two vertical angles: up θy+ and down θy-; and two horizontal angles: right θx+ and left θx-). The standard setup of measurement is shown in Figure 6

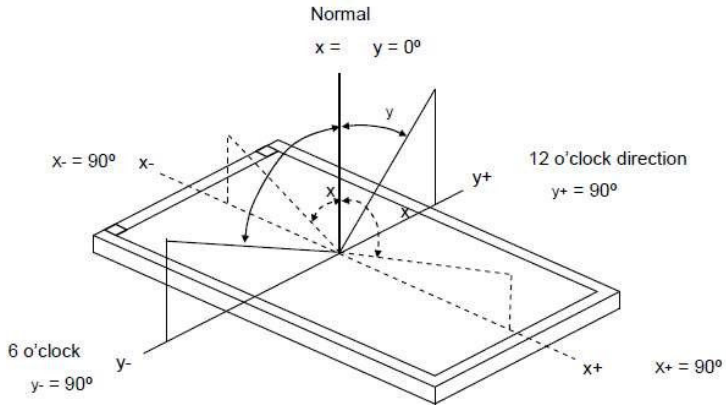


Figure 6. Definition of Viewing angle

4.3 Optical Measurements

SR-UL2

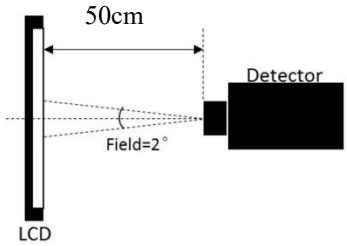


Figure 7. Measurement equipment

Center Luminance of white is defined as luminance value at the center of the display.

This optical measurement is shown in Figure 7.

5. INTERFACE CONNECTION

5.1 Electrical Interface Connection

The electronics interface connector is 昶通 F05047-50P-U;The BL connector is 昶通 F05047-10P-U

The connector interface pin assignments are listed in Table 7; The connector BL interface pin assignments are listed in Table 8.

<Table 7. Pin Assignments for the Interface Connector>

Terminal	Symbol	Functions
Pin No.	Symbol	Description
1	GND	Digital ground
2	BIST	LCD Panel Self Test Enable, When it is not used, connecting to GND is recommended, don't floating
3	VCC	Digital Power/Vin =3.3V
4	VCC	Digital Power/Vin =3.3V
5	GND	Power ground
6	GND	Power ground
7	OTP	Serial interface OTP power
8	NC	No connector
9	GND	Power ground
10	ORXIN0-	Negative LVDS differential data input(Odd data)
11	ORXIN0+	Positive LVDS differential data input(Odd data)
12	ORXIN1-	Negative LVDS differential data input(Odd data)
13	ORXIN1+	Positive LVDS differential data input(Odd data)
14	ORXIN2-	Negative LVDS differential data input(Odd data)
15	ORXIN2+	Positive LVDS differential data input(Odd data)
16	ORXCLKIN-	Negative LVDS differential data input(Odd clock)
17	ORXCLKIN+	Positive LVDS differential data input(Odd clock)
18	ORXIN3-	Negative LVDS differential data input(Odd data)
19	ORXIN3+	Positive LVDS differential data input(Odd data)
20	ERXIN0-	Negative LVDS differential data input(Even data)
21	ERXIN0+	Positive LVDS differential data input(Even data)
22	ERXIN1-	Negative LVDS differential data input(Even data)
23	ERXIN1+	Positive LVDS differential data input(Even data)
24	ERXIN2-	Negative LVDS differential data input(Even data)

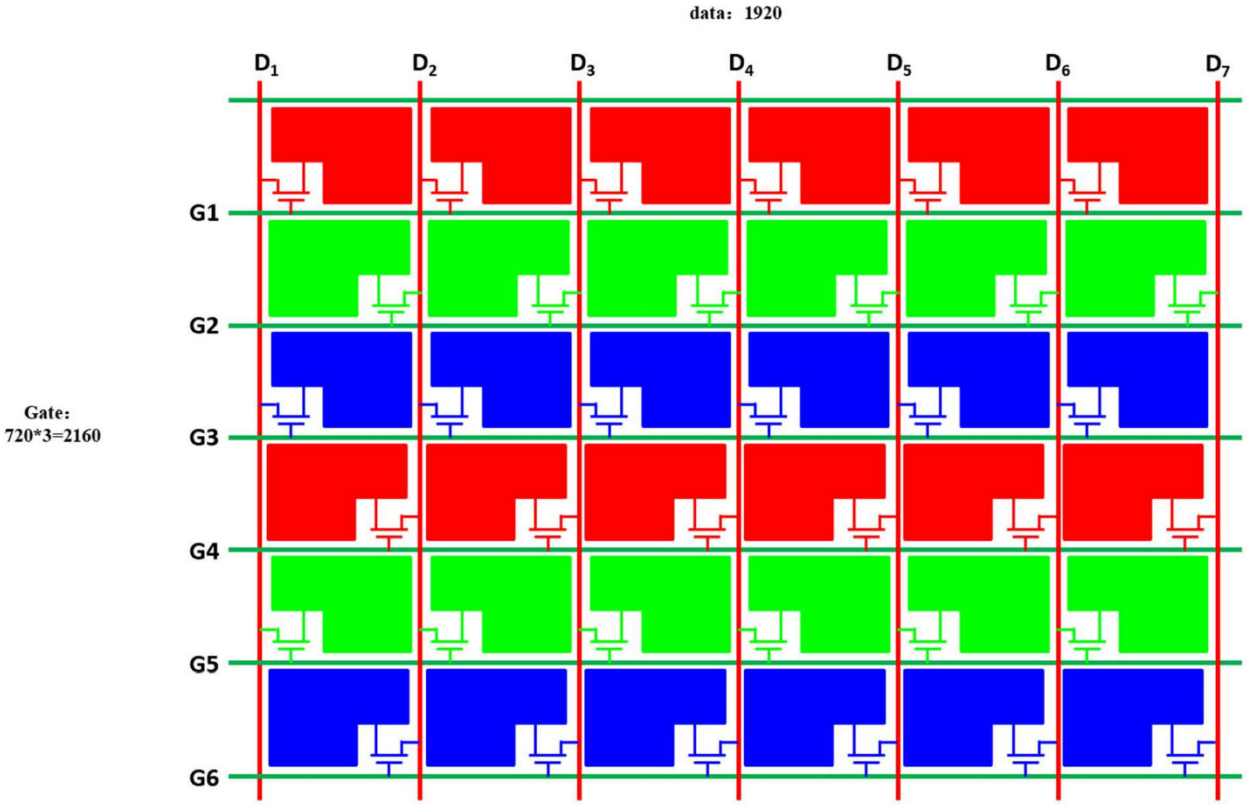
25	ERXIN2+	Positive LVDS differential data input(Even data)
26	ERXCLKIN-	Negative LVDS differential data input(Even clock)
27	ERXCLKIN+	Positive LVDS differential data input(Even clock)
28	ERXIN3-	Negative LVDS differential data input(Even data)
29	ERXIN3+	Positive LVDS differential data input(Even data)
30	GND	Power ground
31	FAULT	FAULT signal output(normal=H,abnormal=L)
32	RESET	Global reset pin,active High.
33	STBYB	Standby mode,active High.
34	CSB	Serial interface chip enable
35	SCL	Serial interface clock input
36	SDAI	Serial interface data input
37	SDAO	Serial interface data output.
38	GND	Power ground
39	GND	Power ground
40	NC	No connector
41	LEDA	LED power(Anode)
42	LEDA	LED power(Anode)
43	LEDA	LED power(Anode)
44	NC	No connector
45	LEDK	Cathode1
46	LEDK	Cathode2
47	LEDK	Cathode3
48	LEDK	Cathode4
49	NTC_A	NTC_Anode
50	NTC_K	NTC_Cathode

<Table 8. Pin Assignments for BL Connector>

Terminal	Symbol	Functions
Pin No.	Symbol	Description
1	LEDA	LED power(Anode)
2	LEDA	LED power(Anode)
3	LEDA	LED power(Anode)
4	NC	No connector

5	LEDK	Cathode1
6	LEDK	Cathode2
7	LEDK	Cathode3
8	LEDK	Cathode4
9	NTC_A	NTC_Anode
10	NTC_K	NTC_Cathode

5.2 Pixel Structure



5.3 SPI interface

In normal write mode, the read/write control bit must be set to 0, and SAl is address input and data pin.

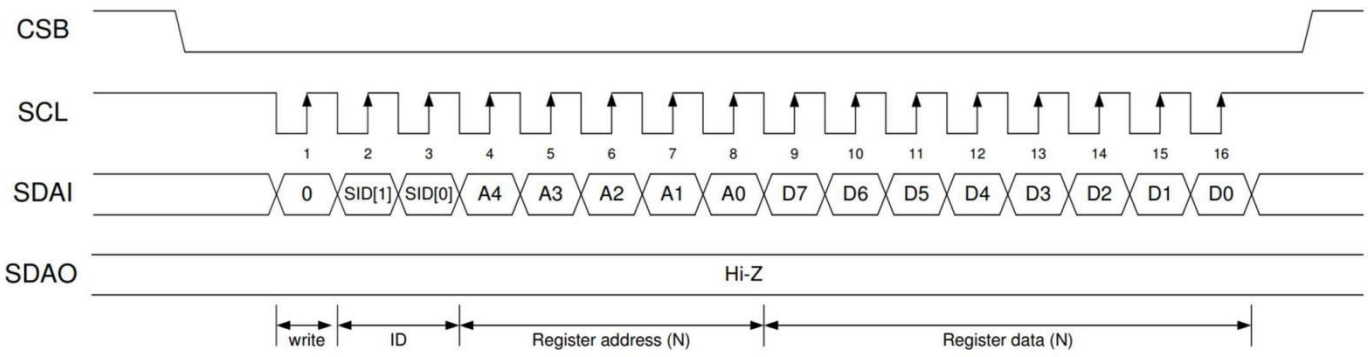


Figure 8. SPI Signals, normal write mode

In normal read mode, the read/write control bit must be set to 1. The SAl is address input pin and SDAO is data output pin

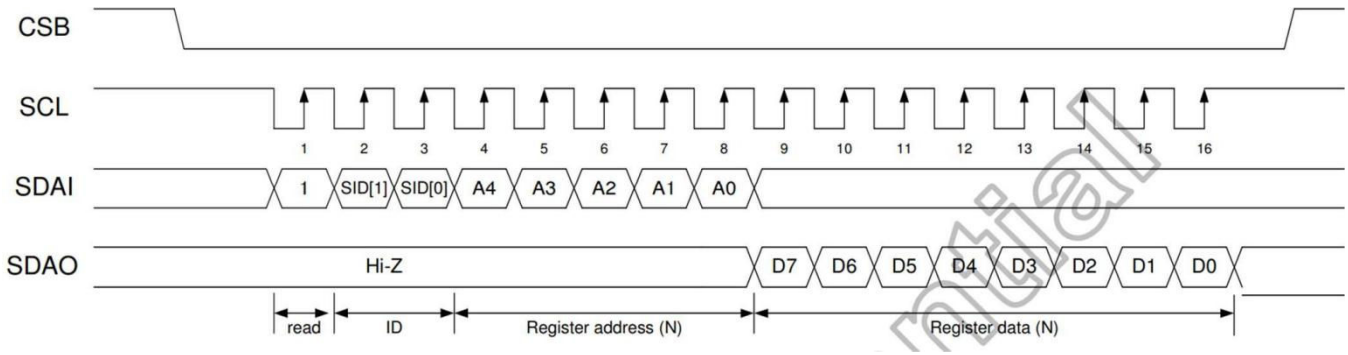


Figure 9. SPI Signals,normal read mode

6. SIGNAL TIMING SPECIFICATION

6.1 Signal Timing Specification

<Table 9. Signal Timing Specification>

Parameter	Symbols	Panel Resoiution			Unit
		1920RGB*720 (2 port)			
		Min	Typ.	Max	
DCLK frequency	Fdclk	-	45.3	-	MHz
Horizontal valid data	Thd	-	960	-	DCLK
1 horiaontal line	Th	1015	1026	1248	DCLK
Vertical valid data	Tvd	-	720	-	H
1 vertical field	Tv	730	736	756	H
Frame rate	FR	-	60	-	Hz

6.2 Signal Electrical Characteristics for LVDS Receiver

The built-in LVDS receiver is compatible with (ANSI/TIA/TIA-644) standard.

<Table 10. LVDS mode DC electrical characteristics >

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Differential input high Threshold voltage	Vth	Vcm=1.2V	+0.10	-	-	V
Differential input low threshold voltage	Vtl	Vcm=1.2V	-	-	-0.10	V
Differential input common Mode voltage	V_{CM}	-	1	1.2	1.7-|V_{id}|/2	V
LVDS input voltage	V_{INLV}		0.7		1.7	V
Differential input voltage	|Vid|	-	0.1	-	0.6	V
Differential input leakage Current	Ilvleak	-	-10	-	+10	μA

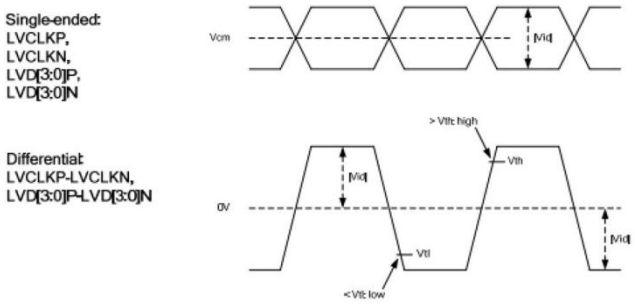


Figure 10. LVDS mode DC electrical characteristics

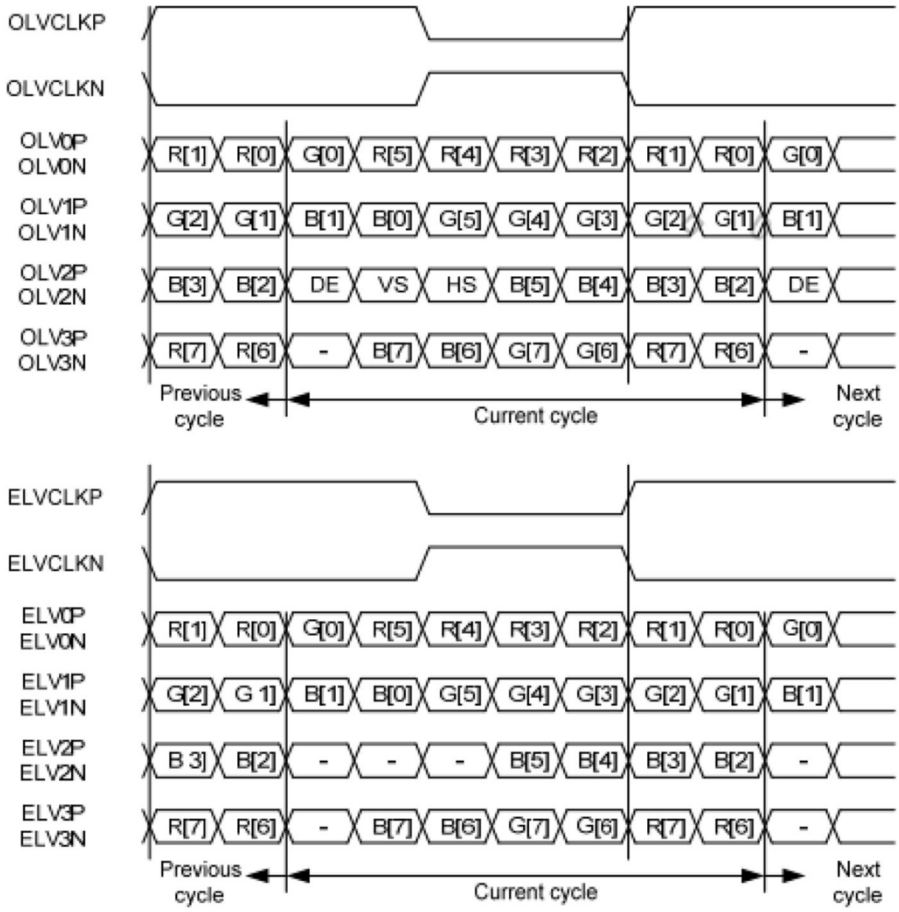


Figure 11. 2-port LVDS signals, VESA format (8-bit)

6.3 LVDS Receiver Internal Circuit

Figure 12 shows the internal block diagram of the LVDS receiver. This LCD module equips termination resistors for LVDS link

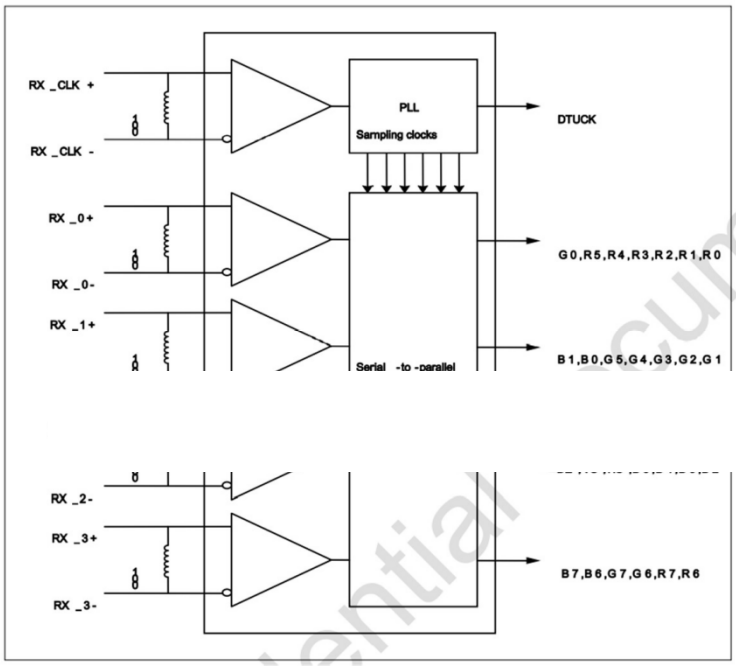


Figure 12. LVDS Receiver Internal Circuit

7. POWER SEQUENCE

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below.

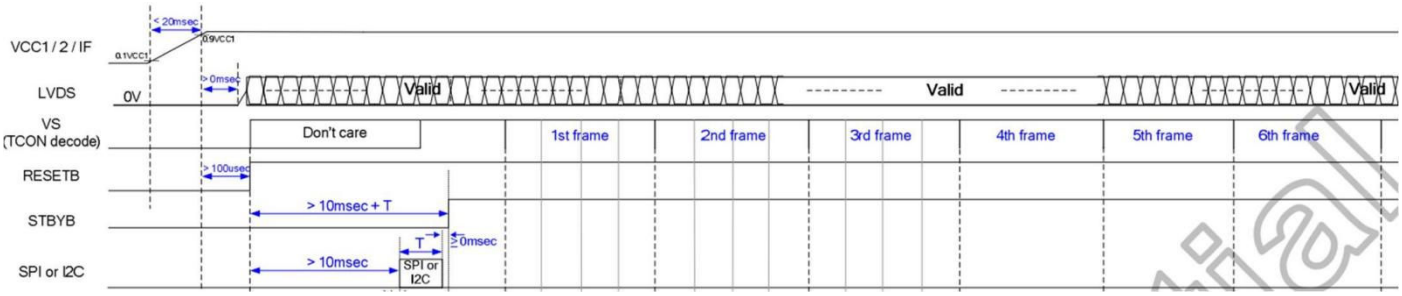


Figure 13. Power-on Sequence

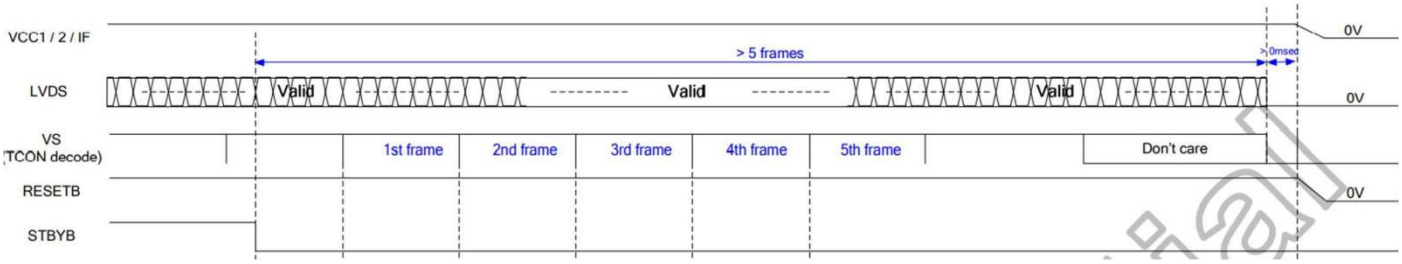


Figure 14. Power-off Sequence

8. CONNECTOR DESCRIPTION

Physical interface is described as for the connector on OC.

These connectors are capable of accommodating the following signals and will be following components.

8.1 TFT LCD Module

<Table 11. Connector>

Connector Name /Description	Connector
Manufacturer	昶通
Type/ Part Number	F05047-50P-U
BL Type/ Part Number	F05047-10P-U

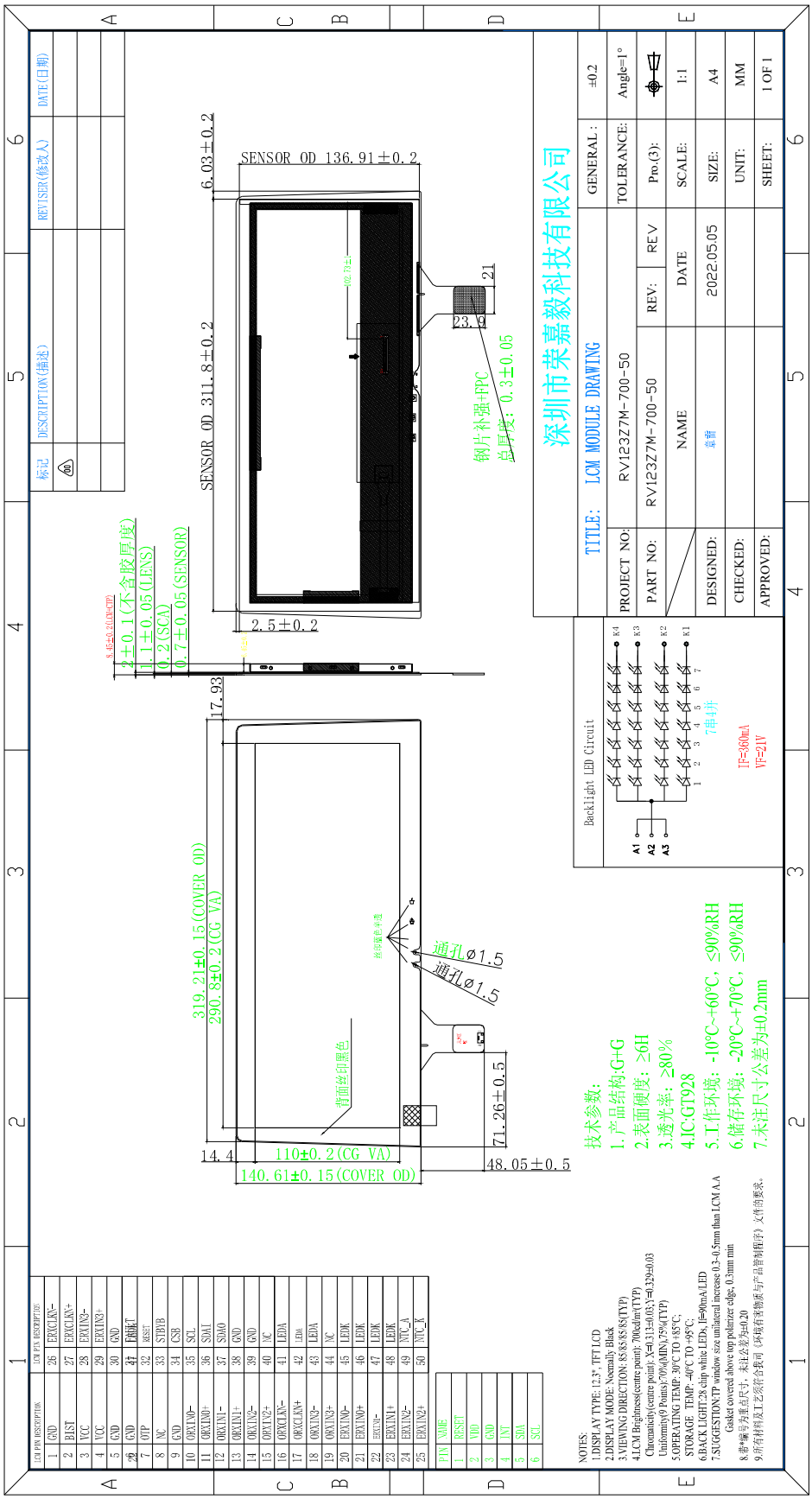
9. MECHANICAL CHARACTERISTICS

9.1 Dimensional Requirements

<Table 12. Dimensional Parameters>

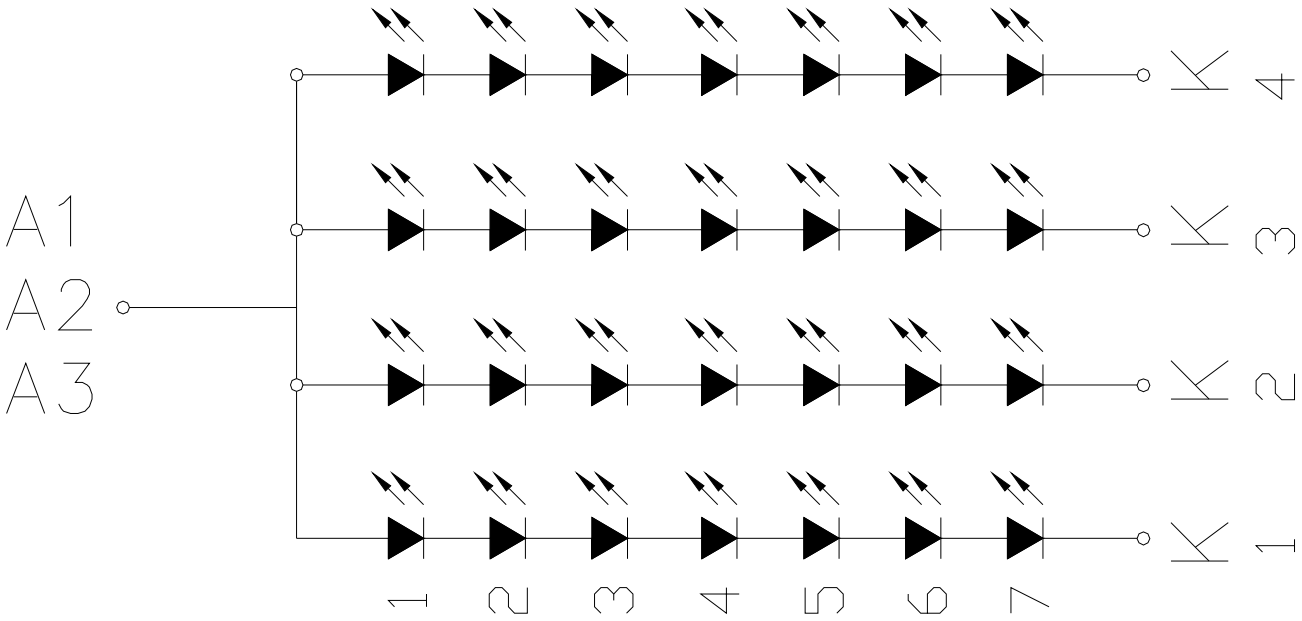
Parameter	Specification	Unit
LCM size	302.53(H) × 123.51(V)× 6.45(T)	mm
Active Area	292.032(H) × 109.512(V)	mm
Number of pixels	1920(H) × 720(V)	pixels
Pixel pitch	0.1521(H) × 0.1521(V)	mm
Pixel arrangement	RGB Vertical stripe	-
Display colors	16.7M(8bit)	-
Display mode	Normally Black	-
Weight	400(max)	g

10.MODULEOUTLINEDRAWING



11.BACKLIGHT CHARACTERISTICS

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage	Vf	--	**21**	--	V	**If=360mA T=25℃**
Luminance	Avg	--	700	--	cd/m^2	
Number of LED	-	4X7			Piece	-
Connection mode	S/P	4Serial/7Parallel			-	-



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12.RELIABILITY TEST

The reliability test items and its conditions are shown in below.

<Table 13. Reliability Test>

No	Test Items	Conditions
1	High temperature storage test	90°C, 500hrs
2	Low temperature storage test	-40°C, 500hrs
3	High temperature operating test	85°C, 500hrs
4	Low temperature operating test	-30°C, 500hrs
3	High temperature & high humidity operation test	65°C,95%, 500hrs
5	Thermal shock	-40~90°C, per 30min, 100cycle, Storage
6	Vibration test (Box)	Random 0.015G2/Hz from 5-200Hz -6dB/octave from 200-500Hz 1hrs for X/Y/Z,total 3hrs
7	Shock test (Box)	With package , one corner/three edge/six face Height: 76.20cm 0.45~9.52Kg 60.96cm 9.52~18.59Kg 45.72cm 18.59~27.66Kg 30.48cm 27.66~45.35 kg
8	ESD test (operating)	Air: 150pF, 330Ω, ±4kV Contact: 150pF, 330Ω, ±4kV