



深圳市海创通科技有限公司

Shenzhen Haichuangtong Technology., Co Ltd

Product Specification

Customer	
Model Name	H028Q03
Description	Standard LCD Module 240(RGB)x320 Dots 2.8" TFT LCD
Date	2016/05/120
Revision	1.0

Customer Approval	
Date	
The above signature represents that the product specifications, testing regulation, and warranty in the specifications are accepted	

Engineering			
Check	Date	Prepared	Date



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2 General Specifications

	Feature	Spec
Characteristics	Size	2.8inch
	Resolution	240(horizontal)*320(Vertical)
	Interface	RGB-18 bit
	Connect type	Connector
	Color Depth	262k
	Technology type	a-Si
	Display Spec.	0.18 x 0.18
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally Black
	Driver IC	ILI9341V
	Surface Treatment	3H
	Viewing Direction	ALL
Mechanical	LCM (W x H x D) (mm)	50.0*69.2*2.3
	Active Area(mm)	43.2*57.6
	With /Without TSP	Without TSP
	Weight (g)	TBD
	LED Numbers	6 LEDs

Note 1: Viewing direction is follow the data which measured by optics equipment.

Note 2: Requirements on Environmental Protection: RoHS

Note 3: LCM weight tolerance: +/- 5%



3 Input/Output Terminals

No.	Symbol	Description
1	DCLK	Dot clock signal for RGB.
2	GND	System Ground
3	VSYNC	Frame synchronizing signal for RGB.
4	HSYNC	Line synchronizing signal for RGB.
5	DE	Display enable signal
6	R5	Data bus
7	R3	Data bus
8	R6	Data bus
9	R4	Data bus
10	B7	Data bus
11	B2	Data bus
12	B3	Data bus
13	B6	Data bus
14	B4	Data bus
15	B5	Data bus
16	GND	System Ground
17	LEDA	Anode A
18	LEDK1	Cathode K
19	LEDK2	Cathode K
20	LEDK3	Cathode K
21	LEDK3	Cathode K
22	LEDK4	Cathode K
23	LEDK5	Cathode K
24	LEDK6	Cathode K
25	IOVCC	Power supply of Digital
26	VDD	Power supply of Digital
27	RESET	Reset signal pin
28	SCL	Serial interface clock.
29	SDA	Serial in/out signal.
30	CS	Chip select pin
31	TE	TE
32	R2	Data bus
33	R7	Data bus
34	GND	Ground
35	G2	Data bus
36	G5	Data bus
37	G3	Data bus
38	G4	Data bus
39	G6	Data bus
40	G7	Data bus



4 Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
Supply Voltage	V _{DD}	-0.3	4.6	V	
Operating Temperature	T _{OPR}	-10	60	°C	
Storage Temperature	T _{STG}	-20	70	°C	

5 Electrical Characteristics

5.1 Driving TFT LCD Panel

Ta = 25 °C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Digital Supply Voltage	V _{DD}	2.5	2.8	3	V	
Input Signal Voltage	Low Level	V _{IL}	-0.3	-	0.2x Vcc	V
	High Level	V _{IH}	0.8x Vcc	-	Vcc	V
TFT Common Electrode	V _{COMH}	3	5	5	V	
TFT Gata ON Voltage	V _{GH}	-	15		V	
TFT Gata ON Voltage	V _{GL}		-10	-	V	

5.2 Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I _F	-	120		mA	
Forward Voltage	V _F	3	3.2		V	
Backlight Power consumption	W _{BL}	-	TBD	-	W	

Note 1: Each LED : I_F =20 mA, V_F =3.2V.

Note 2: Optical performance should be evaluated at Ta=25°C only.

Note 3: If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

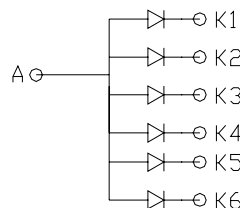


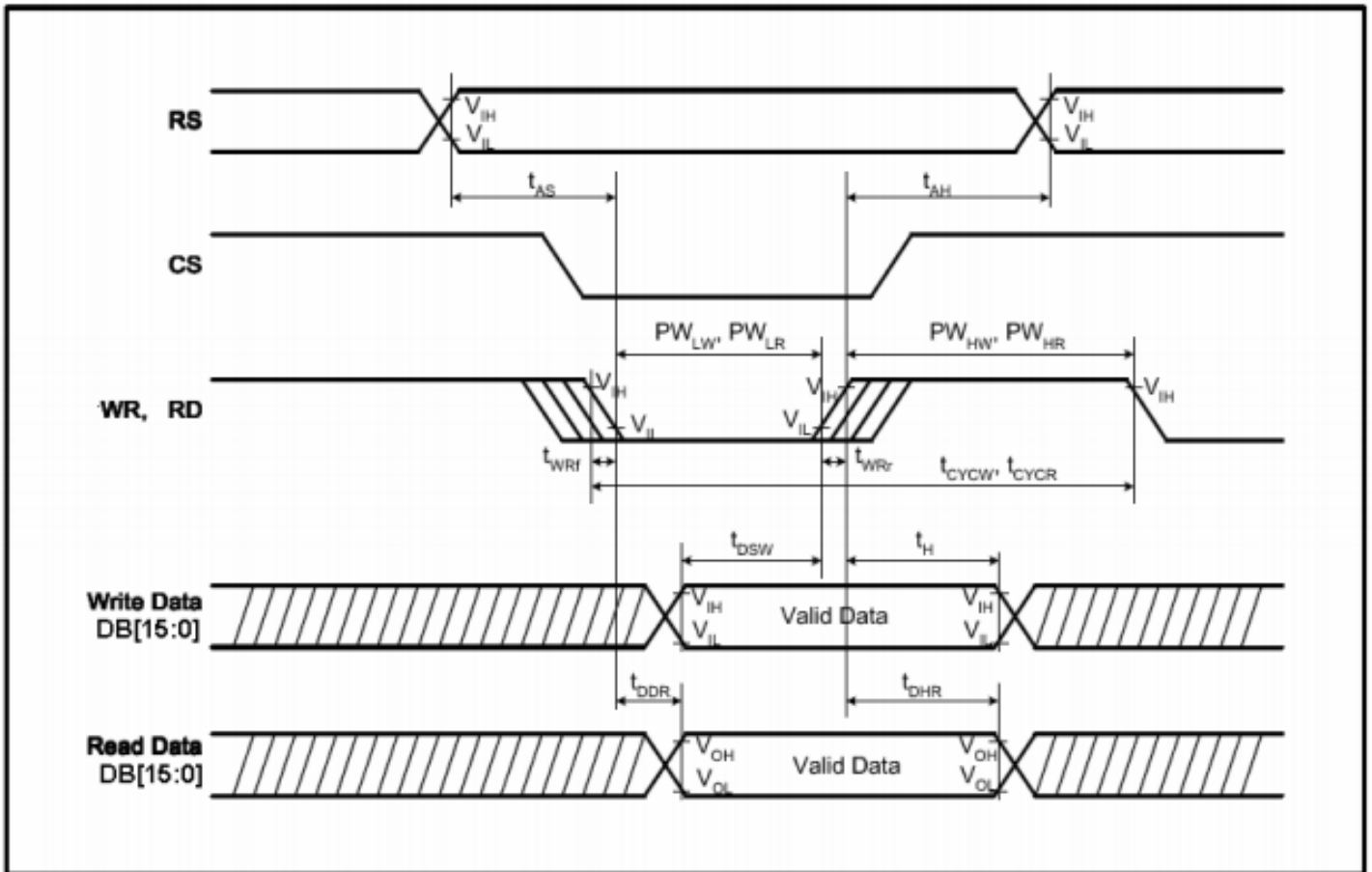
Figure : LED connection of backlight



6 Interface Timing

6.1 Timing Parameter

Item	Symbol	Unit	Min.	Typ.	Max.	Test Condition
Bus cycle time	Write	t_{CYCW}	ns	100	-	-
	Read	t_{CYCR}	ns	300	-	-
Write low-level pulse width	PW_{LW}	ns	50	-	-	-
Write high-level pulse width	PW_{HW}	ns	50	-	-	-
Read low-level pulse width	PW_{LR}	ns	150	-	-	-
Read high-level pulse width	PW_{HR}	ns	150	-	-	-
Write / Read rise / fall time	t_{WR}/t_{WRf}	ns	-	-	25	-
Setup time	Write (RS to CS, E/ WR)	t_{AS}	ns	10	-	-
	Read (RS to CS, WR/ RD)			5	-	-
Address hold time	t_{AH}	ns	5	-	-	-
Write data set up time	t_{DSW}	ns	10	-	-	-
Write data hold time	t_H	ns	15	-	-	-
Read data delay time	t_{DDR}	ns	-	-	100	-
Read data hold time	t_{DHR}	ns	5	-	-	-

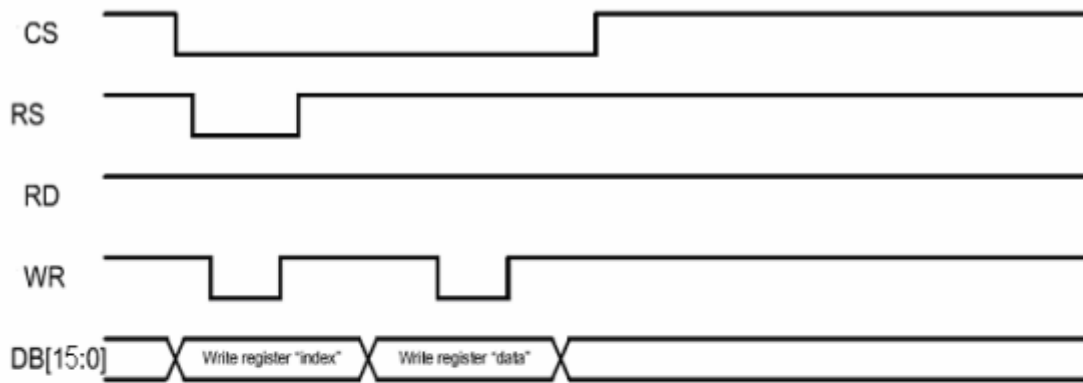


CPU Interface Timing

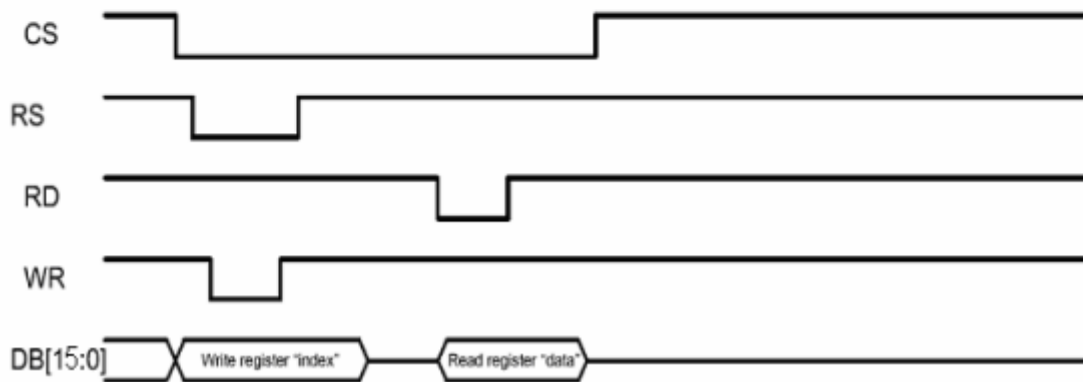


6.2 Register Wite/Read Timing

(a) Write to register



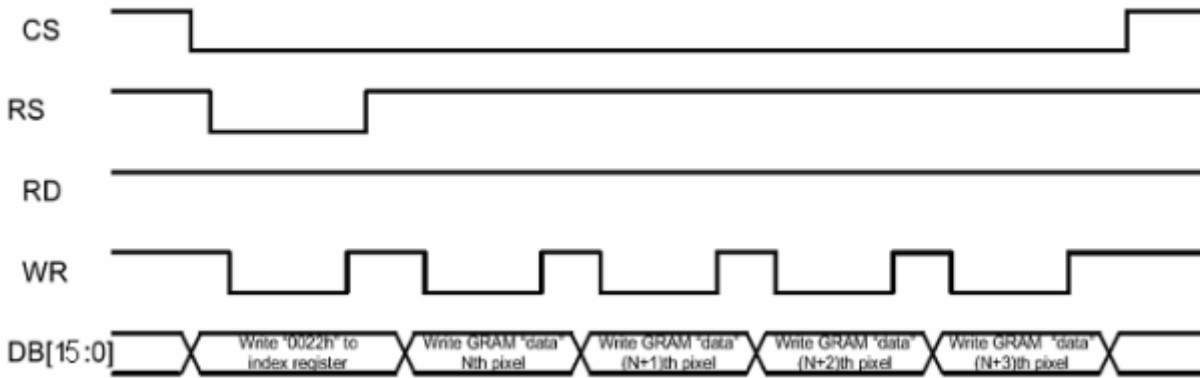
(b) Read from register



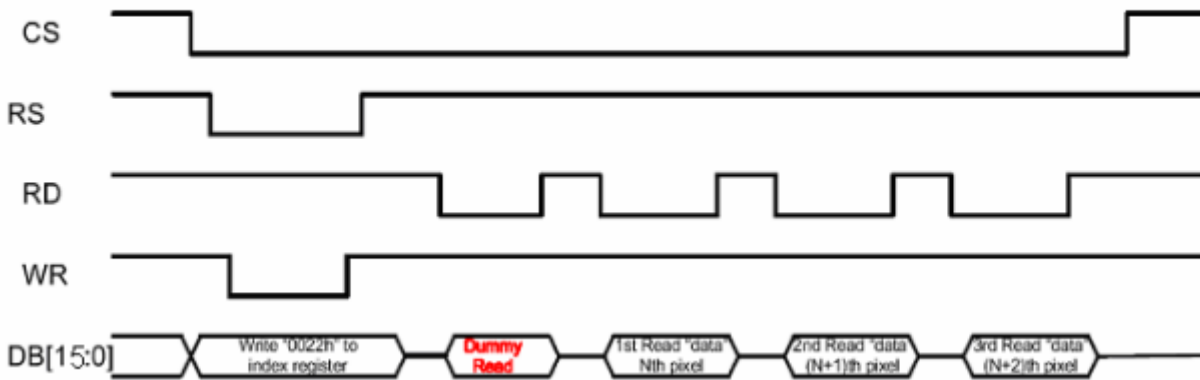


6.3 GRAM Write/Read Timing (16bits BS1=0)

(a) Write to GRAM

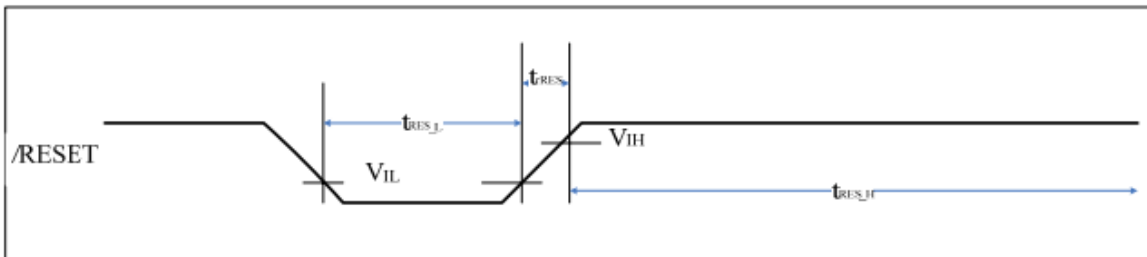


(b) Read from GRAM



6.4 Reset Timing Characteristics

Item	Symbol	Unit	Min.	Typ.	Max.
Reset low-level width	t_{RESL}	ms	1	-	-
Reset rise time	t_{RES}	μs	-	-	10
Reset high-level width	t_{RESH}	ms	50		



Reset timing



7 Optical Characteristics

Items	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	
Viewing angles	θ_T	Center CR \geq 10		85	-	Degree.	Note2	
	θ_B			85	-			
	θ_L			85	-			
	θ_R			85	-			
Contrast Ratio	CR	$\Theta = 0$	-	400	-	-	Note1, Note3	
Response Time	T_{ON}	25°C	-	15	25	ms	Note1, Note4	
	T_{OFF}		-	25	30			
Chromaticity	White	Backlight is on	X_W	0.274	0.304	0.334	-	Note1, Note5
			Y_W	0.304	0.334	0.364	-	
	Red		X_R	0.602	0.632	0.662	-	
			Y_R	0.298	0.328	0.358	-	
	Green		X_G	0.266	0.296	0.326	-	
			Y_G	0.546	0.576	0.606	-	
	Blue		X_B	0.103	0.133	0.152	-	
			Y_B	0.274	0.304	0.334	-	
Uniformity	U		80	-	-	%	Note1, Note6	
NTSC				70		%	Note5	
Luminance	L		350	400			Note1, Note7	

Test Conditions:

1. IF= 15mA(one channel),the ambient temperature is 25.
2. The test systems refer to Note 1 and Note 2.

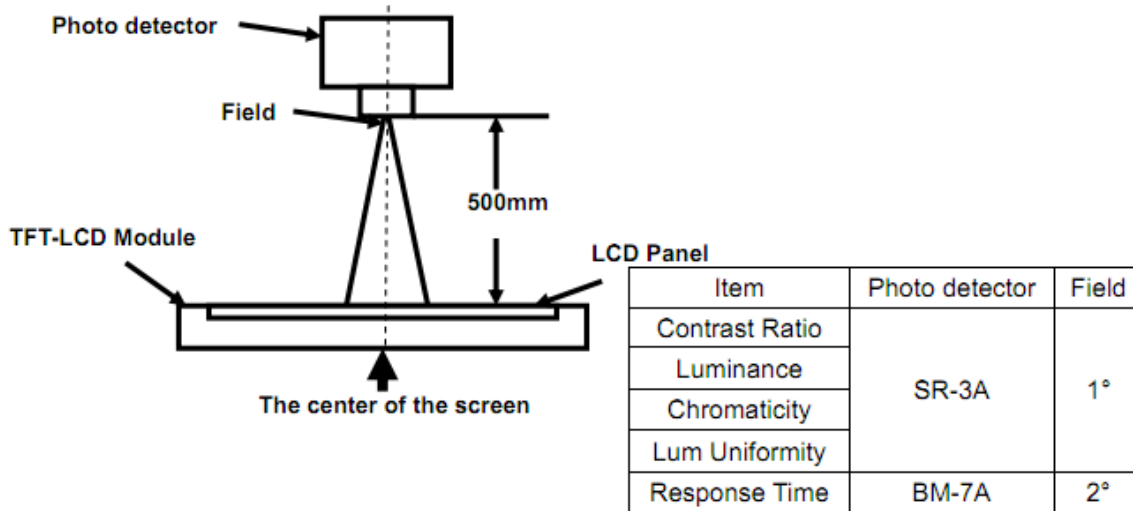


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Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical Properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Note 2: Definition of viewing angle range and measurement system.

Viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).

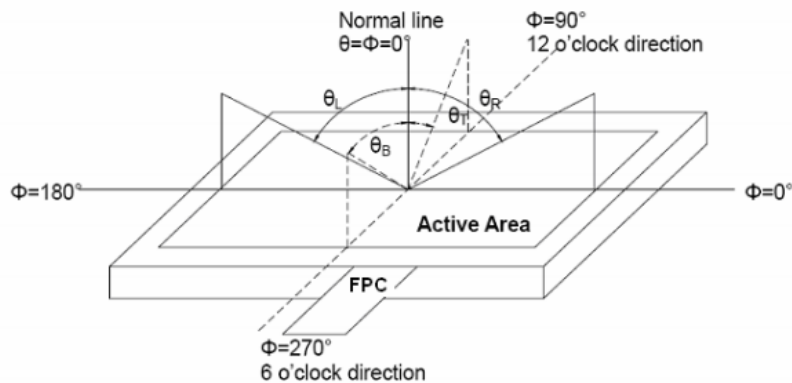


Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

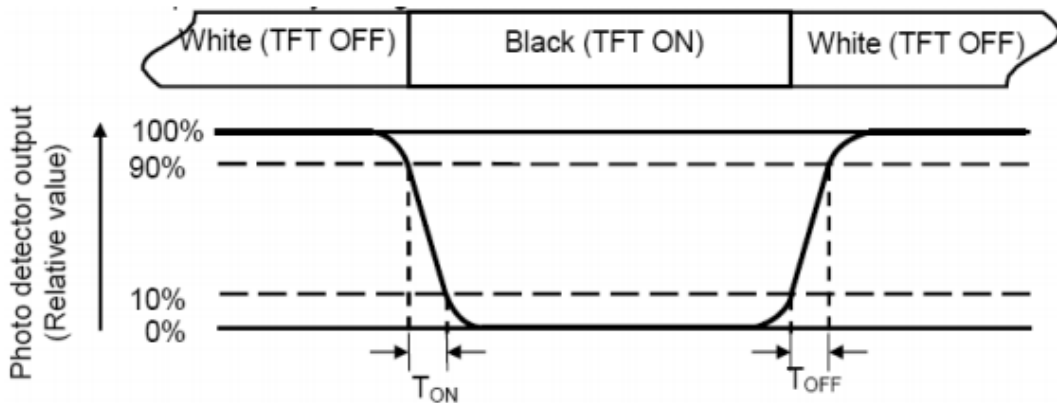
Note 4: Definition of Response time

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



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Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the Center of each measuring area

$$\text{Luminance Uniformity}(U) = L_{\min} / L_{\max} \times 100\%$$

L-----Active area length W----- Active area width

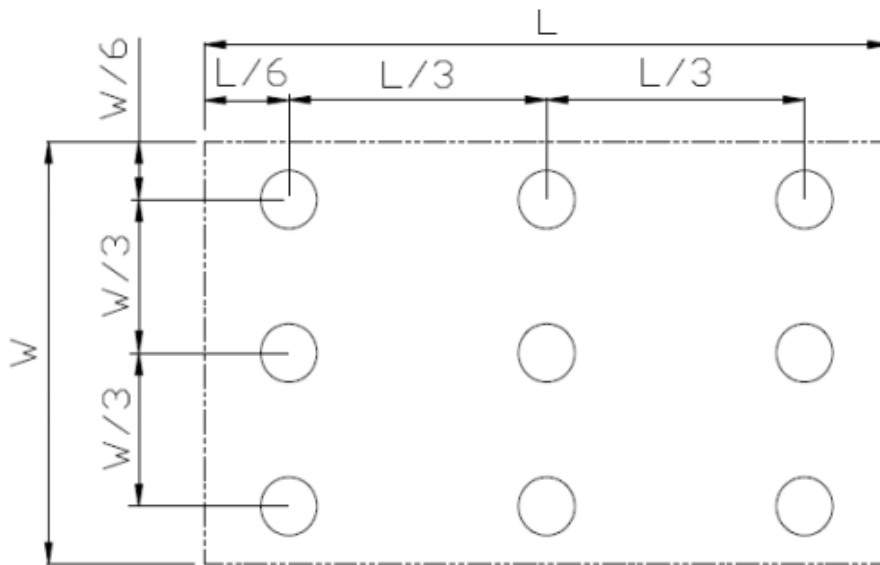


Fig. 2 Definition of uniformity

L_{\max} : The measured maximum luminance of all measurement position.

L_{\min} : The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance:

Measure the luminance of white state at center point.



8 Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	T _s = +60°C , 240hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	T _a = -10°C , 240hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	T _a = +70°C , 240hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	T _a = -20°C , 240hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	T _a = +60°C , 90% RH max, 160 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-30°C 30 min ~ +80°C 30 min Change time: 5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Static Discharge (Operation)	C=150pF, R=330 Ω , 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15°C ~ 35°C, 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2 GB/T17626.2-1998
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (package condition)	IEC60068-2-6 GB/T2423.5-1995
9	Shock (Non-operation)	60G 6ms, ± X, ±Y , ± Z 3 times for each direction	IEC60068-2-27 GB/T2423.5-1995
10	Package Drop Test	Height: 80 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8-1995

Note: 1. T_s is the temperature of panel's surface.
2. T_a is the ambient temperature of sample.



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9 Mechanical Drawing

NOTES:

1. DISPLAY TYPE: 2.8 INCH TFT / TRANSMISSIVE
2. BACKLIGHT: 6 CHIP WHITE LED, IN PARALLEL
3. OPERATING TEMP: -10°C~+60°C
4. STORAGE TEMP: -20°C~+70°C
5. RESOLUTION: 240XRGBX320
6. LCD IC: IL19341V
7. (")reference dimension. ""critical dimension
8. RoHS Compliant

FPC 考新后参考图

LED CIRCUIT DIAGRAM

NO	PIN NAME
1	BLK
2	GND
3	VSYNC
4	HSYNC
5	DE
6	R5
7	R3
8	R6
9	R4
10	B7
11	B2
12	B3
13	B6
14	B4
15	B5
16	GND
17	LEDA
18	LEMB
19	LEMC
20	LEMD
21	LEMA
22	LEMB
23	LEMC
24	LEMD
25	DDVCC
26	VDD
27	RESET
28	SCL
29	SDA
30	CS
31	TE
32	R2
33	R7
34	GND
35	DE
36	G5
37	G3
38	G4
39	G6
40	G7

INTERFACE	RGB Interface	MODEL NAME	PART NO.
FPC Connector		TFT Display Module	H028003

VIEWING DIRECTION	ALL	CHKD	TOLERANCE UNLESS SPECIFIED
Gray Scale DIRECTION	FREE	Ren Liang	±0.3

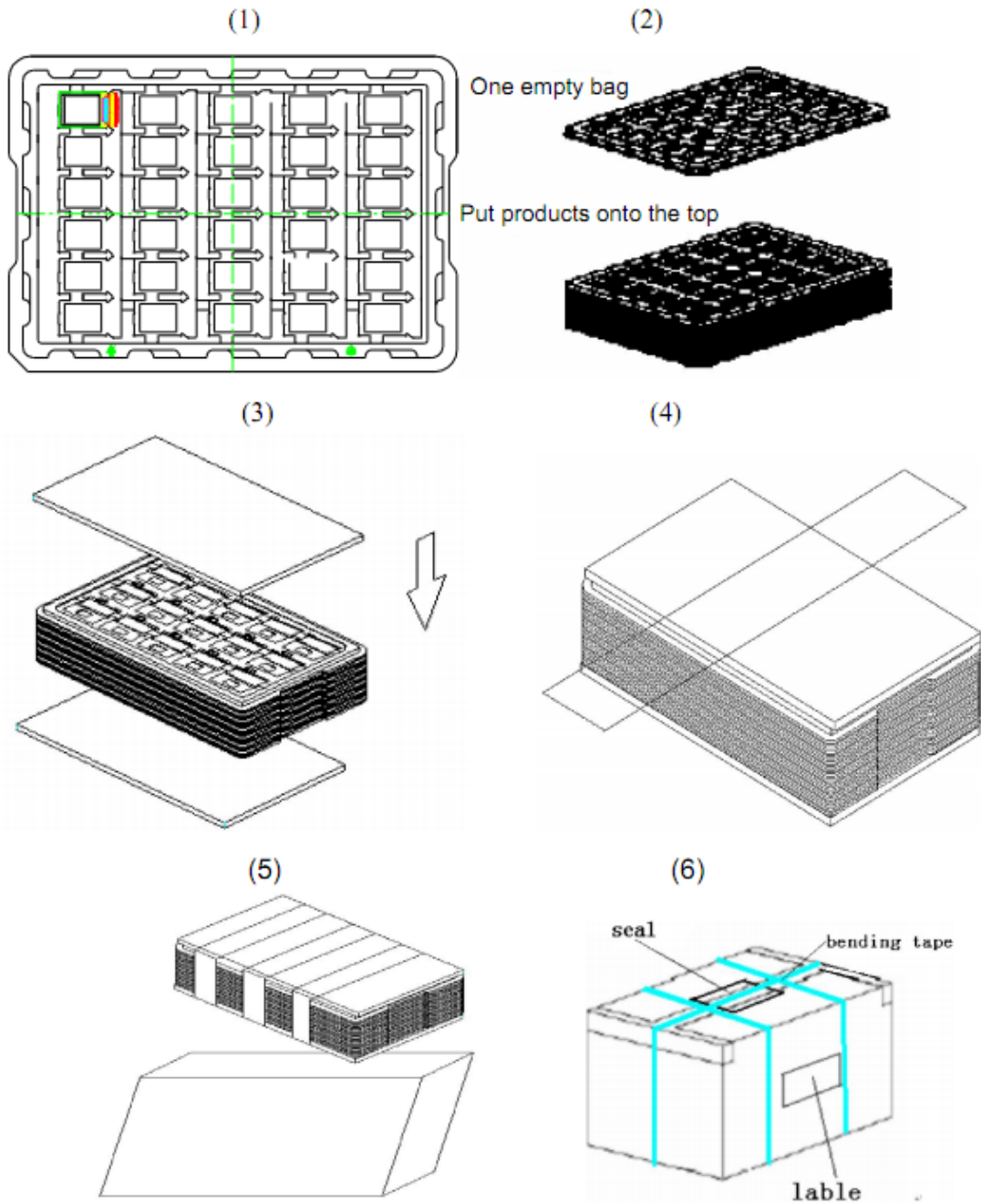
REV.	DATE	MODIFICATION
1.0	2016/09/20	Final Issue

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10 Packing

Packing Method



1. Put module into tray cavity:
2. Tray stacking
3. Put 1 cardboard under the tray stack and 1 cardboard above:
4. Fix the cardboard to the tray stack with adhesive tape:
5. Put the tray stack into carton.
6. Carton sealing with adhesive tape.



11 Precautions for Use of LCD modules

11.1 Handling Precautions

11.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

11.1.2. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

11.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

11.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

11.1.5. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketone
- Aromatic solvents

11.1.6. Do not attempt to disassemble the LCD Module.

11.1.7. If the logic circuit power is off, do not apply the input signals.

11.1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

11.1.8.1. Be sure to ground the body when handling the LCD Modules.

11.1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.

11.1.8.3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

11.1.8.4. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

11.2 Storage Precautions

11.2.1. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

11.2.2. The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0°C ~ 40°C Relatively humidity: ≤80%

11.2.3. The LCD modules should be stored in the room without acid, alkali and harmful gas.

11.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.