



深圳市勋瑞光电科技有限公司

Xunrui Shenzhen Optoelectronics Technology Co., Ltd.

Product Specification

Customer: _____

Model Name: _____ H050BWQ40E3513-T _____

Date: _____ 2021-04-21 _____

Version: _____ V0 _____

☒ **Preliminary Specification**

☐ **Final Specification**

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by



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1 Record of Revision

Rev	Issued Date	Description	Editor
V0	2021/04/22	First Release.	



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2 General Specifications

Feature		Spec
Characteristics	Size	5 inch
	Resolution	480(horizontal)*272(Vertical)
	Interface	24bit-RGB
	Connect type	Connector
	Color Depth	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.231 x 0.231
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally White
	Driver IC	ST7257
	Viewing Direction	6 O'clock
	GSI Direction	12 O'clock
Mechanical	LCM (W x H x D) (mm)	120.7*75.8*4.2
	Active Area(mm)	110.88 x62.83
	With /Without TSP	With
	Weight (g)	TBD
	LED Numbers	12 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%



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3 Input/Output Terminals

No.	Symbol	Description
1	LEDK	Backlight LED Cathode
2	LEDA	Backlight LED Anode.
3	GND	Ground
4	VDD	Power supply
5~12	R0~R7	Data bus
13~20	G0~G7	Data bus
21~28	B0~B7	Data bus
29	GND	Ground
30	DCLK	Dot clock signal input. Latching input data at its rising edge.
31	DISP	Standby mode. Normally pulled high. DISP="1": Normally operation (Default) DISP="0": Timing controller, source driver will turn off ,all output are High-Z.
32	HSYNC	Horizontal sync input. Negative polarity.
33	VSYNC	Vertical sync input. Negative polarity..
34	DE	Data enable input. Active high to enable the input data bus under "DE Mode."
35	NC	No connected
36	GND	Ground
37	XR	The right side signal of TP
38	YD	The down side signal of TP
39	XL	The left side signal of TP
40	YU	The up side signal of TP



4 Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
Supply Voltage	V_{DD}	-0.3	5	V	
Operating Temperature	T_{OPR}	-20	70	°C	
Storage Temperature	T_{STG}	-30	80	°C	

5 Electrical Characteristics

5.1 Driving TFT LCD Panel

$T_a = 25^{\circ}\text{C}$

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Supply Voltage	V_{DD}	3.0	3.3	3.6	V	
Input Signal Voltage	Low Level	V_{IL}	GND	-	0.3x VDD	V
	High Level	V_{IH}	0.7x VDD	-	VDD	V
Output Signal Voltage	Low Level	V_{IL}	-	-	VSS+0.4	V
	High Level	V_{IH}	VDD-0.4	-	-	V

5.2 Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	40	50	mA	
Forward Voltage	V_F	16.8	18	19.2	V	
Backlight Power consumption	W_{BL}	-	0.72	0.96	W	
LED Lifetime		-	25000	-	Hrs	

Note 1: Each LED : $I_F = 20\text{ mA}$, $V_F = 3.0\text{V}$.

Note 2: Optical performance should be evaluated at $T_a = 25^{\circ}\text{C}$ 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.

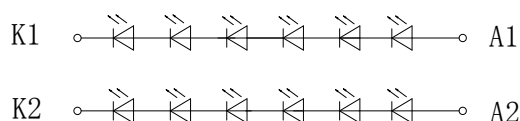
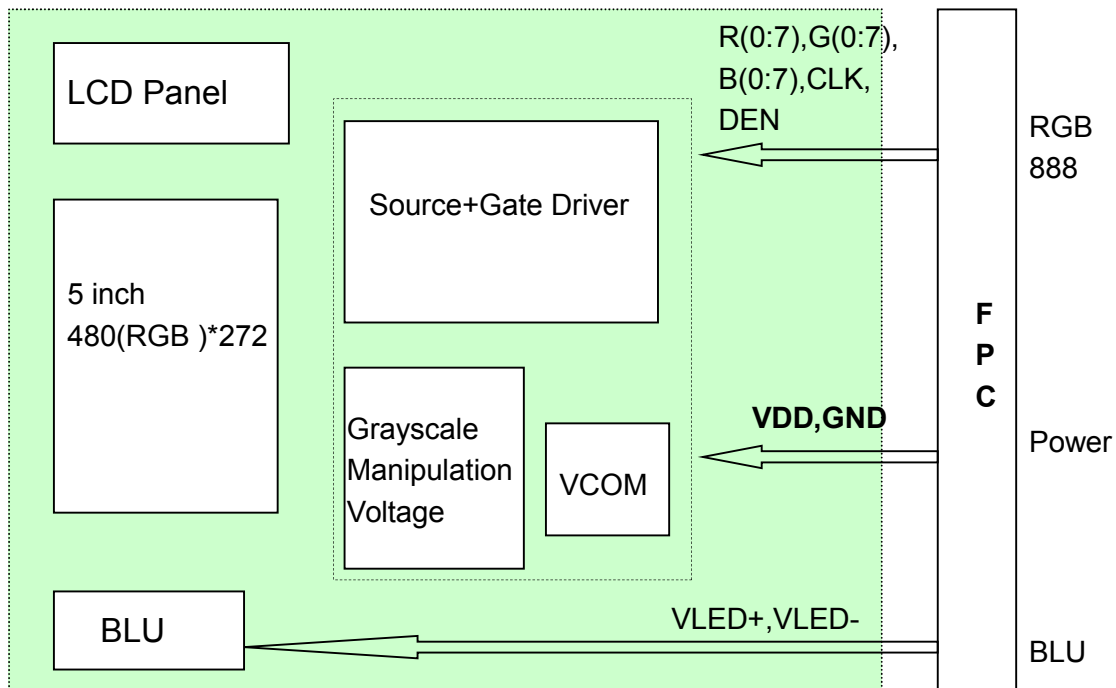


Figure : LED connection of backlight



5.3 Block Diagram





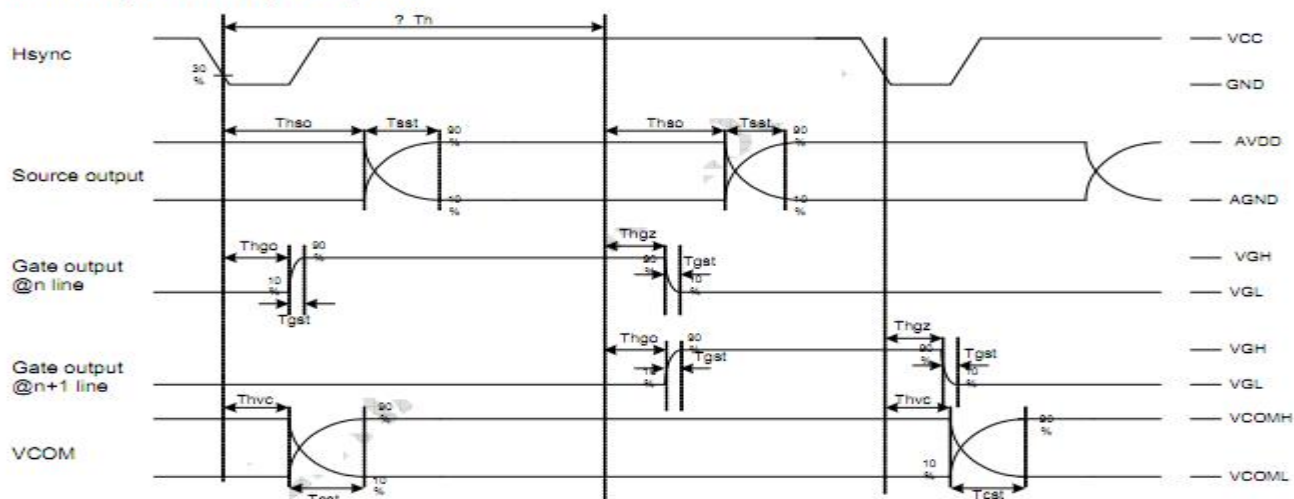
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6 Interface Timing

6.1 Timing relationship among DE, Source Output, Gate Output, Vcom

6.1 Output Timing Diagram



6.2 Parallel RGB Data Format

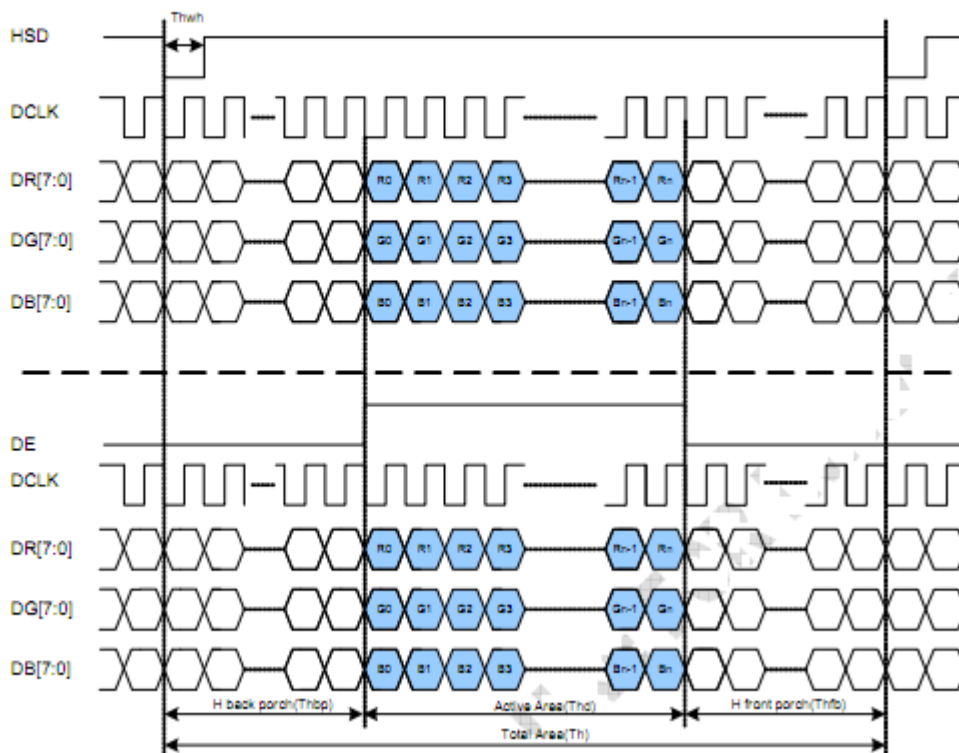


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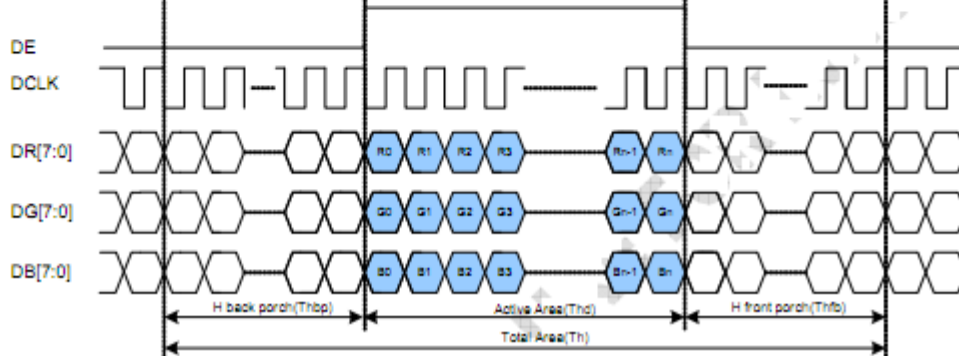
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Parallel RGB Mode Data format

(HV Mode)



(DE Mode)



Parallel RGB input timign table

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	5	9	12	MHz
VSD period time	Tv	277	288	400	H
VSD display area	Tvd	272			H
VSD back porch	Tvb	3	8	31	H
VSD front porch	Tvfp	2	8	97	H
HSD period time	Th	520	525	800	DCLK
HSD display area	Thd	480			DCLK
HSD back porch	Thbp	36	40	255	DCLK
HSD front porch	Thfp	4	5	65	DCLK



Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	-	27	-	MHz
VSD period time	Tv	277	288	400	H
VSD display area	Tvd	272			H
VSD back porch	Tvb	3	8	31	H
VSD front porch	Tvfp	2	8	97	H
HSD period time	Th	-	1728	-	DCLK
HSD display area	Thd	1440			DCLK

The top diagram shows the timing for DCLK, DE, and DATA. DCLK is a clock signal. DE is an enable signal that transitions from low to high. DATA is a bus signal showing multiple data transfers labeled '1st data', '2nd data', and 'Last data'. Key timing parameters include T_{owh} (output width high), T_{owl} (output width low), T_{oh} (output high), T_{ol} (output low), T_{osw} (output setup), T_{ohd} (output hold), T_{ok} (output clock), and T_{okl} (output clock low).

The bottom diagram shows the timing for DCLK, Vsync, and Hsync signals. DCLK is a clock signal. Vsync is a vertical sync signal that transitions from low to high. Hsync is a horizontal sync signal that transitions from low to high. Key timing parameters include T_{vwh} (vertical sync width high), T_{vwl} (vertical sync width low), T_{vh} (vertical sync high), T_{vl} (vertical sync low), T_{vsw} (vertical sync setup), T_{vhd} (vertical sync hold), T_{hwh} (horizontal sync width high), T_{hw} (horizontal sync width), T_{hsw} (horizontal sync setup), and T_{hhd} (horizontal sync hold).

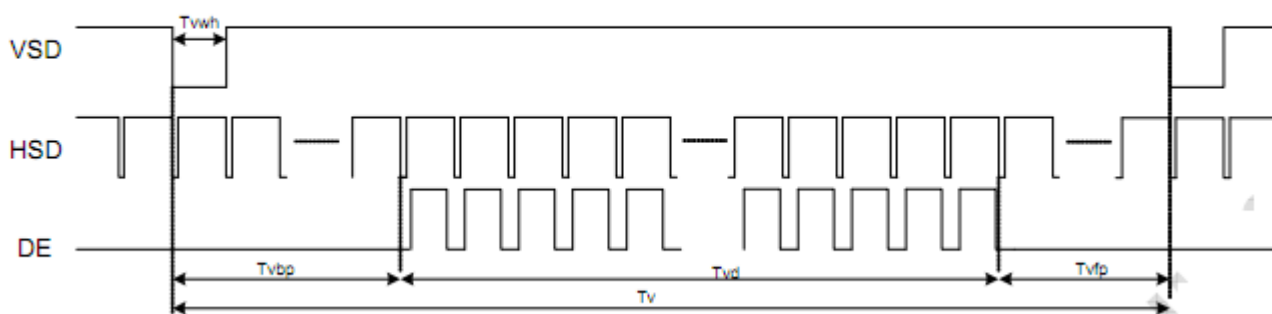


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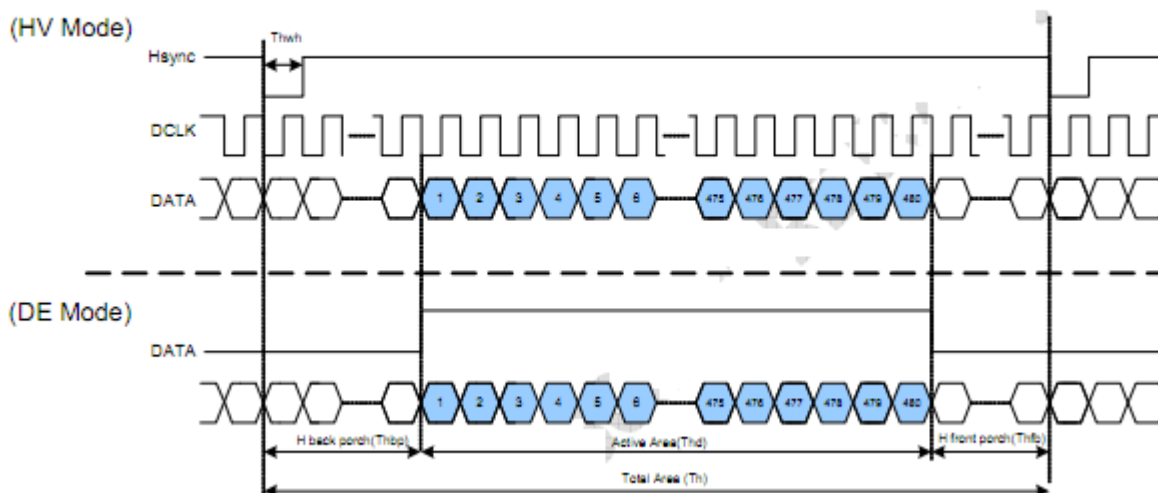
6.4 Data Input Format

Vertical input timing

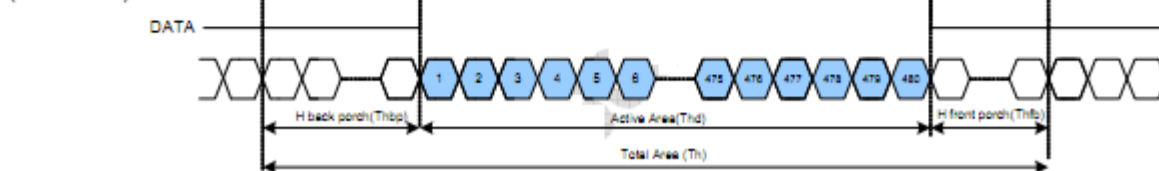


Serial 8-bit RGB Mode Data format

(HV Mode)



(DE Mode)



Parameters	Symbol	Min.	Typ.	Max.	Unit	Conditions
DCLK frequency	Fclk	24	27	30	MHz	
DCLK cycle time	Tclk	83	110	200	ns	
DCLK pulse duty	Tcwh	40	50	60	%	
Time from HSD to source output	Thso	-	13	-	DCLK	
Time from HSD to gate output	Thgo	-	27	-	DCLK	
Time from HSD to gate output off	Thgz	-	3	-	DCLK	
Time from HSD to VCOM	Thvc	-	12	-	DCLK	



7 Optical Characteristics

Items	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angles	θ_T	Center CR $\geq$ 10	-	50	-	Degree.	Note2
	θ_B		-	70	-		
	θ_L		-	70	-		
	θ_R		-	70	-		
Contrast Ratio	CR	$\Theta = 0$	350	500		-	Note1, Note3
Response Time	T_{ON}	25°C	-	20	30	ms	Note1, Note4
	T_{OFF}						
Color Chromaticity	W_X	Normal $\theta = \Phi = 0^\circ$	0.29	0.30	0.31	-	Note1, Note5
	W_Y		0.33	0.34	0.35	-	
Uniformity	U		80	-	-	%	Note1, Note6
NTSC				50		%	Note5
Luminance (LCM+RTP)	L		-	260	-	CD/M2	Note1, Note7

Test Conditions:

1. IF= 40mA(one channel),the ambient temperature is 25.
2. The test systems refer to Note 1 and Note 2.

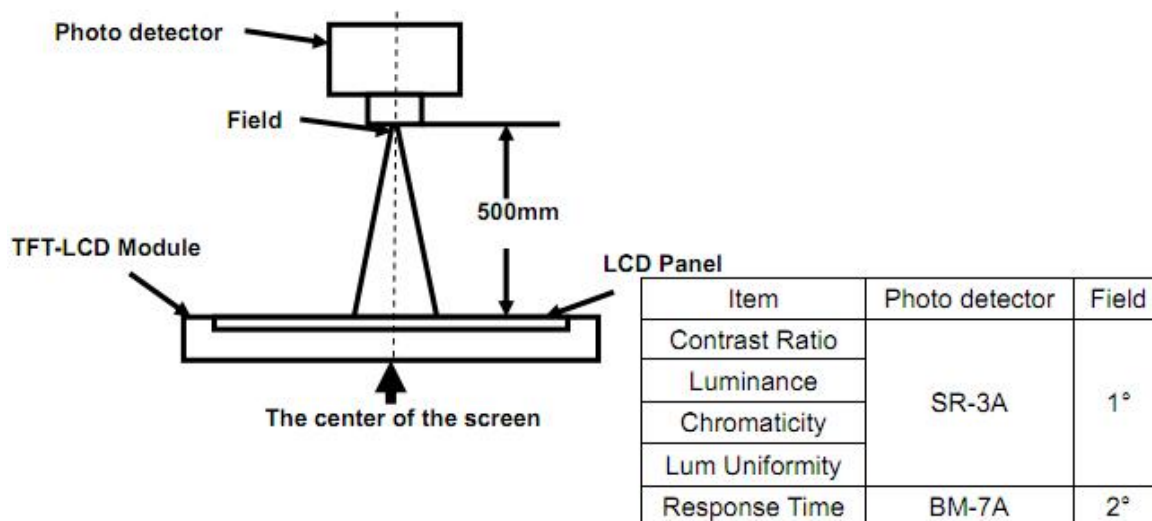
Note 1: Definition of optical measurement system.

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.

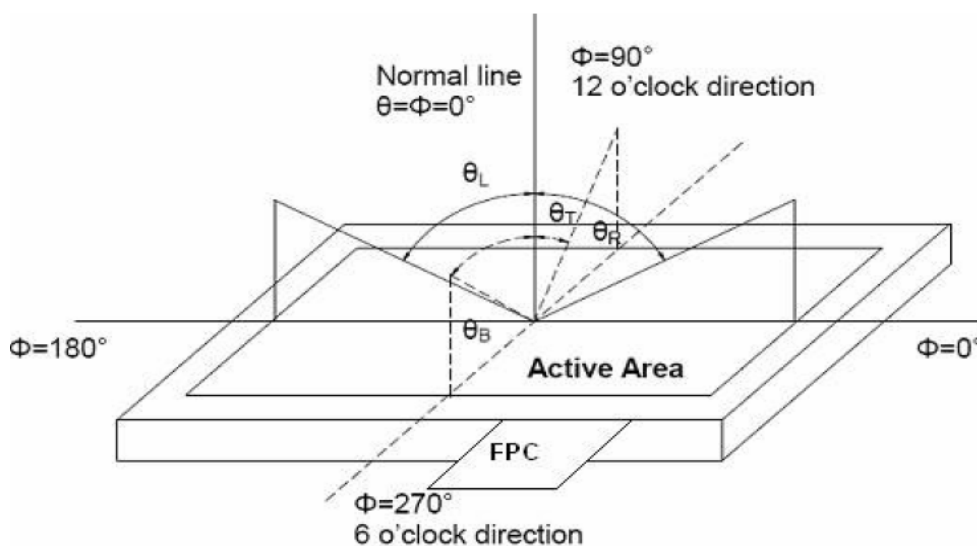


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Note 2: Definition of viewing angle range and measurement system.
viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).



Note 3: Definition of contrast ratio

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

“White state “:The state is that the LCD should driven by Vwhite.

“Black state”: The state is that the LCD should driven by Vblack.

Vwhite: To be determined Vblack: To be determined.

Note 4: Definition of Response time

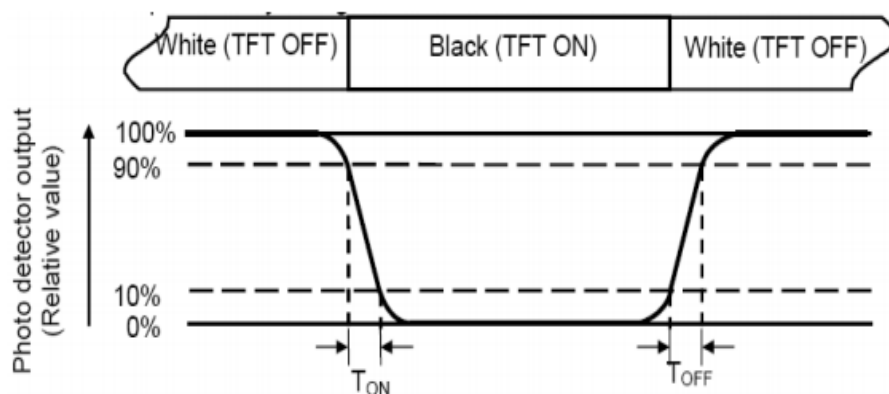
The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (TON) is the time between photo detector output intensity changed from



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90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.



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

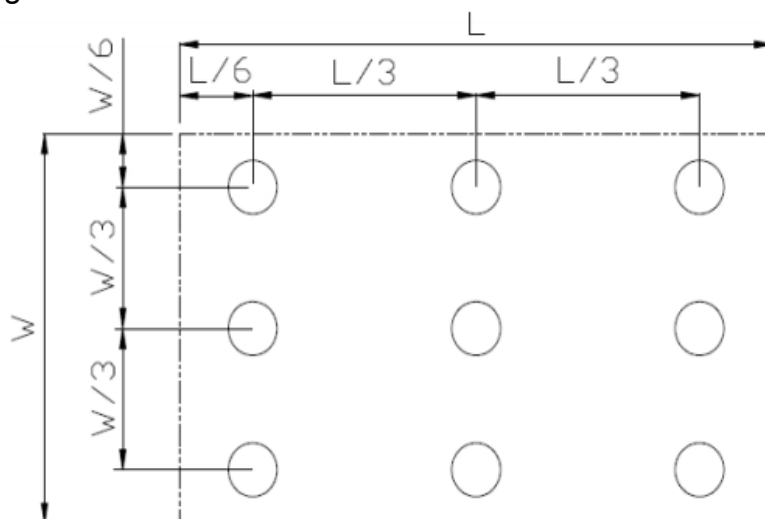


Fig. 2 Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.

Lmin: 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

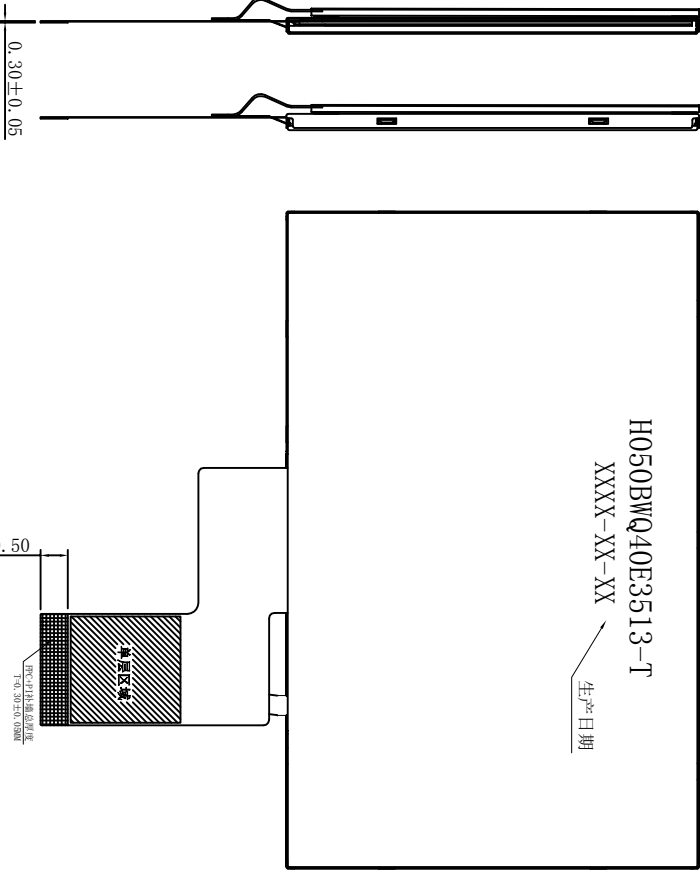
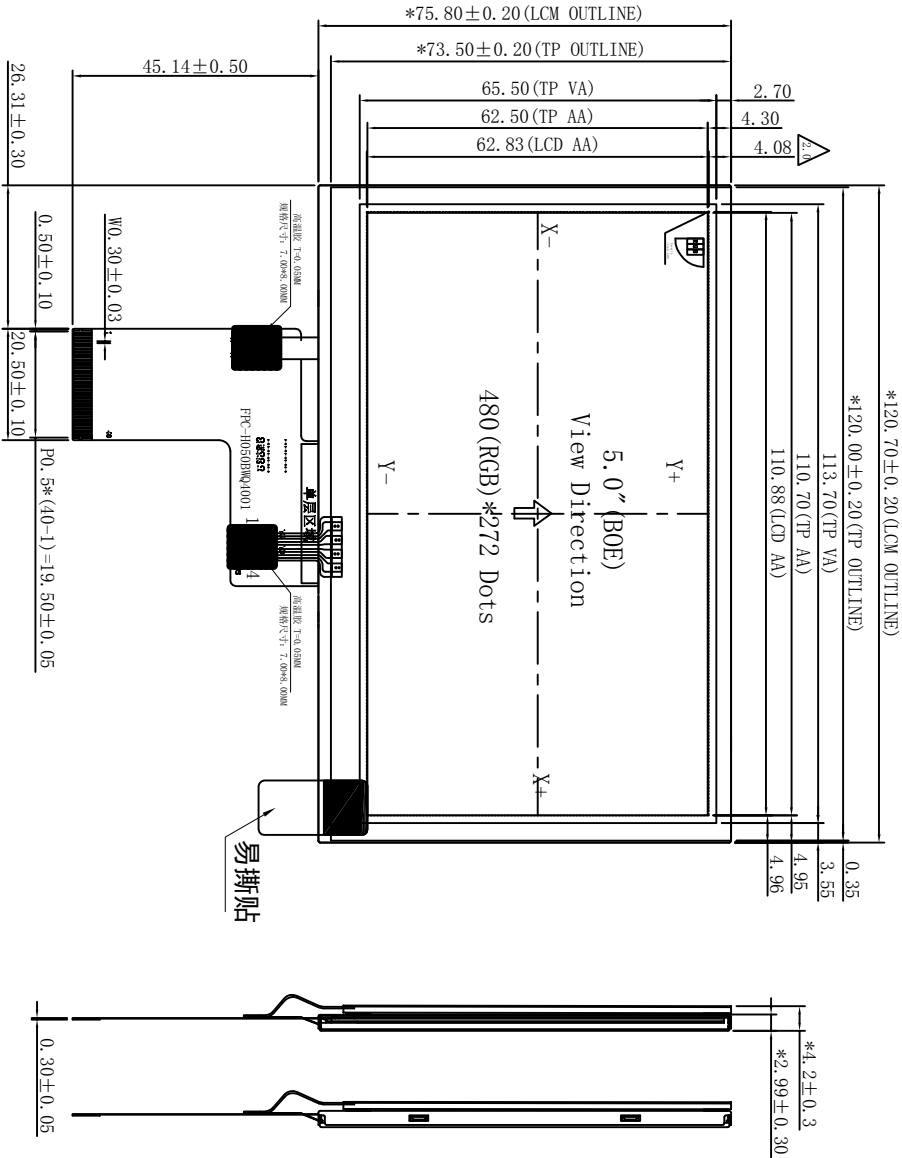
No	Test Item	Condition	Remarks
1	High Temperature Operation	$T_s = +70^{\circ}\text{C}$, 240hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	$T_a = -20^{\circ}\text{C}$, 240hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	$T_a = +80^{\circ}\text{C}$, 240hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	$T_a = -30^{\circ}\text{C}$, 240hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	$T_a = +60^{\circ}\text{C}$, 90% RH max, 160 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-30°C 30 min ~ $+80^{\circ}\text{C}$ 30 min Change time: 5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Discharge (Operation) Static	$C=150\text{pF}$, $R=330\ \Omega$, 5 points/panel Air: $\pm 8\text{KV}$, 5 times; Contact: $\pm 4\text{KV}$, 5 times; (Environment: $15^{\circ}\text{C} \sim 35^{\circ}\text{C}$, 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2 GB/T17626.2-1998
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1mm 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, $\pm X$, $\pm Y$, $\pm Z$ 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.

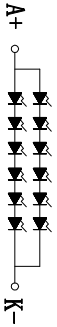
2. T_a is the ambient temperature of sample.

9 Mechanical Drawing

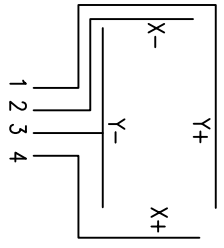
.....			First Issue
1.0	2021/11/05	玻璃AA区尺寸下移0.2mm	
2.0	2022/03/05		



逻辑图



BACKLIGHT CIRCUIT DIAGRAM:
(If=40mA, 16.8V~19.2V)



PIN	OUT	
1	Y+	33 VSYNC
2	X-	34 DE
3	Y-	35 NC
4	X+	36 GND
		37 NC/ XR
		38 NC/ YD
		39 NC/ XL
		40 NC/ YU



- NOTES:
- DISPLAY TYPE: 5.0 INCH TFT /TRANSMISSIVE
 - BACKLIGHT: 12 CHIP WHITE LED, IN PARALLEL
 - OPERATING TEMP: -20° C~+70° C
 - STORAGE TEMP: -30° C~+80° C
 - RESOLUTION: 480 (RGB) x272
 - LCD IC: ST7257
 - LCM+TP Typical Luminance: 260cd/m2(TYP)
 - "()" reference dimension, "*" critical dimension
 - Rohs Compliant

- TP技术参数:
- 结构: film+glass+tail
film: 亮面防牛 (0.188mm)
glass: 500Ω / □ 普通0.7mm
tail: FPC (pitch1.3)
产品总厚度: 触摸屏 1.2 ± 0.1mm
 - 电路等级: DC5V
 - 绝缘阻抗: ≥ 20MΩ (25V DC)
 - 线性: ≤ 1.5%
 - 透光率: ≥ 76%
 - 操作压力: 50-120g
 - 使用寿命: ≥ 1,000,000次
 - 笔划寿命: ≥ 50,000次
 - 工作环境: -20℃~+70℃,
 - 储存环境: -30℃~+80℃,
 - X: 150-900Ω Y: 150-900Ω,
 - 未注尺寸公差按 ± 0.20

INTERFACE	RGB Interface	MODEL NAME		PART NO	
	FPC Connector				
VIEWING DIRECTION	6 O'clock	DMN	H050BWQ40E3513-T	REV. 2.0	SHEET OF 1/1
Gray Scale DIRECTION	12 O'clock	CHMD	TOLERANCE UNLESS SPECIFIED	±0.1	
		PROJECTION	3RD ANGLE	UNIT mm	SCALE 1:1



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10 Packing

TBD



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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℃ ~ 40℃ 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.