深圳市勋瑞光电科技有限公司

Xunrui photoelectric technology（shenzhen）CO,.LTD.

Product Specification

ustomer	Standard Module
Model Name	H062HWV60E5001
Description	TFT LCD Module 6.2" WVGA 800(RGB)x480 Dots
Date	2019/3/25
Version	V1.0

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**

Table of Contents

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1. Record of Revision

Rev	Issued Date	Description	Editor
1.0	2020/03/09	First Release.	Rich Liang

2 General Specifications

Feature		Spec
Characteristics	Size	6.2 inch
	Resolution	800(horizontal)*480(Vertical)
	Interface	24-bit RGB
	Connect type	Connector
	Color Depth	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.1719 x 0.1609
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally White
	Driver IC	-
	Luminance	500 nits
	Viewing Direction	12 O'clock
	Gray Scale Inversion Direction	6 O'clock
Mechanical	LCM (W x H x D) (mm)	155.2X88.2X5
	Active Area(mm)	137.52x 77.232
	With /Without TSP	Without
	Weight (g)	TBD
	LED Numbers	21LEDs (3S7P))

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	AGND	Analog Ground
2	AVDD	Analog Power
3	VCC	Digital Power
4	R0~R7	Data Input
12~19	G0~G7	Data Input
20~27	B0~B7	Data Input
28	DCLK	Clock input
29	DE	Data Enable signal
30	HSD	Horizontal sync input. Negative polarity
31	VSD	Vertical sync input. Negative polarity
32	MODE3	DE/SYNC mode select .normally pull high H:DE Mode L:HSD/VSD mode
33	RSTB	Global reset pin. Active low to enter reset state. suggest to Connecting with an RC reset circuit for stability .normally pull High.
34	STBYB	standby mode, normally pull high STBYB="1",normal operation STBYB="0",timming control ,source driver will turn off, all output are high-Z
35	SHLR	Source right or left sequence control. SHLR="L", shift left: last data=S1<-S2…S1200=first data SHLR="H", shift right: first data=S1->SS2…S1200=last data
36	VCC	Digital Power
37	UPDN	Gate up or down scan control. UPDN="L" , DOWN shift : G1->G2…->G480 ; UPDN="H", up shift: G1<-G2…<-G480
38	GND	Digital Ground
39	AGND	Analog Ground
40	AVDD	Analog Power
41	VCOM	For external VCOM DC input (Adjustable)
42	DITH	Dithering setting: DITH="H" 6bit resolution (last 2 bits of input data truncated) (default setting) DITH="L" 8bit resolution
43~44	NC	Not connect
45	V10	Gamma correction voltage reference

46	V9	Gamma correction voltage reference
47	V8	Gamma correction voltage reference
48	V7	Gamma correction voltage reference
49	V6	Gamma correction voltage reference
50	V5	Gamma correction voltage reference
51	V4	Gamma correction voltage reference
52	V3	Gamma correction voltage reference
53	V2	Gamma correction voltage reference
54	V1	Gamma correction voltage reference
55	NC	Not connect
56	VGH	Positive Power for TFT
57	VCC	Digital Power
58	VGL	Negative Power for TFT
59	GND	Digital Ground
60	NC	Not connect

Note 1: DE/SYNC mode select. Normally pull high.
When select DE mode, MODE="1", VS and HS must pull high.
When select SYNC mode, MODE= "0", DE must be grounded.
Note 2: When input 18 bits RGB data, the two low bits of R,G and B data must be grounded.
Note 3: Data shall be latched at the falling edge of DCLK.

Note 4: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	L/R	
GND	DV_{DD}	Up to down, left to right
DV_{DD}	GND	Down to up, right to left
GND	GND	Up to down, right to left
DV_{DD}	DV_{DD}	Down to up, left to right

Note 5: Definition of scanning direction.
Refer to the figure as below:
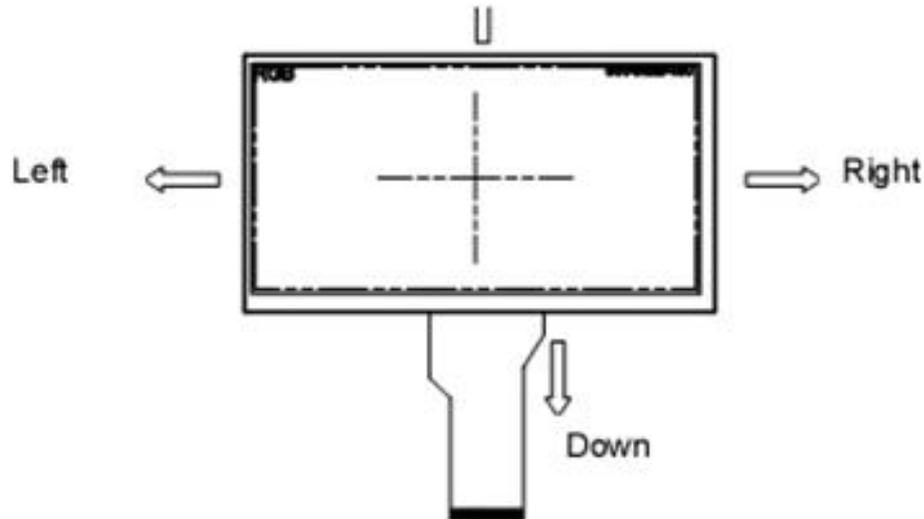
Note 6: Global reset pin. Active low to enter reset state. Suggest to connect with an RC reset circuit for stability. Normally pull high.

Note 7: Dithering function enable control, normally pull high.
When DITHB="1",Disable internal dithering function,
When DITHB="0",Enable internal dithering function,

Note 8: Reserve for LED power input.

4 Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit
Supply Voltage	V_{DD}	-0.5	6	V
Operating Temperature	T_{OPR}	-20	70	℃
Storage Temperature	T_{STG}	-30	80	℃
Power supply voltage 1	VDD	-0.3	7	V
Power supply voltage 2	VGH	-0.3	42	V
Power supply voltage 3	VEE	VGH-42	+0.3	V
Input voltage V	IN	-0.3	VDD+0.3	V

5 Electrical Characteristics

5.1 Driving TFT LCD Panel

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	V_{cc}	3.0	3.3	3.6	V	
	V_{GH}	12	15	23	V	
	V_{GL}	-12	-7	-5	V	
	AV_{DD}	9.9	10	10.1	V	
VCOM	VCOMin	-	3.4	-	V	
Input signal voltage	V_{IH}	0.7 Vcc	-	Vcc	V	Note (1)
	V_{IL}	0	-	0.3 Vcc	V	
Current of power supply	I_{DD}	-	12.37	-	mA	Vcc =3.3V
	I_{ADD}	-	13.599	-	mA	AV_{DD}=10 V (Black)
	I_{GH}	-	0.099	-	mA	V_{GH}=15V
	I_{GL}	-	0.371	-	mA	V_{GL}= -7V
Input level of V1~V5	Vx	AVDD/2-		AVDD-0.1-	V	
Input level of V6~V10	Vx	0.1-		AVDD/2-	V	

Note (1): HSYNC, VSYNC, DE, Digital Data

Note (2): Be sure to apply the power voltage as the power sequence spec.

Note (3): DGND=AGND=0V,)

5.2.1 Interface Timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
HS setup time	T_{hst}	8	-	-	ns
HS hold time	T_{hhd}	8	-	-	ns
VS setup time	T_{vst}	8	-	-	ns
VS hold time	T_{vhd}	8	-	-	ns
Data setup time	T_{dsu}	8	-	-	ns
Data hold time	T_{dhd}	8	-	-	ns
DE setup time	T_{esu}	8	-	-	ns
DE hold time	T_{ehd}	8	-	-	ns
VDD Power On Slew rate	T_{POR}	-	-	20	ms
RSTB pulse width	T_{Rst}	10	-	-	us
CLKIN cycle time	T_{cph}	20	-	-	ns
CLKIN pulse duty	T_{cwh}	40	50	60	%
Output stable time	T_{sst}	-	-	6	us

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLKIN Frequency	Fclk	-	40	50	MHz	VDD=3.0V~3.6V
CLKIN Cycle Time	Tclk	20	25	-	ns	-
CLKIN Pulse Duty	Tcwh	40	50	60	%	Tclk
Time from HSD to Source Output	Thso		64		CLKIN	-
Time from HSD to LD	Thld		64		CLKIN	-
Time from HSD to STV	Thstv		2		CLKIN	-
Time from HSD to CKV	Thckv		20		CLKIN	-
Time from HSD to OEV	Thoev		4		CLKIN	-
LD Pulse Width	Twld		10		CLKIN	-
CKV Pulse Width	Twckv		66		CLKIN	-
OEV Pulse Width	Twoev		74		CLKIN	-

Table 10. 1 Parallel 24-bit RGB mode

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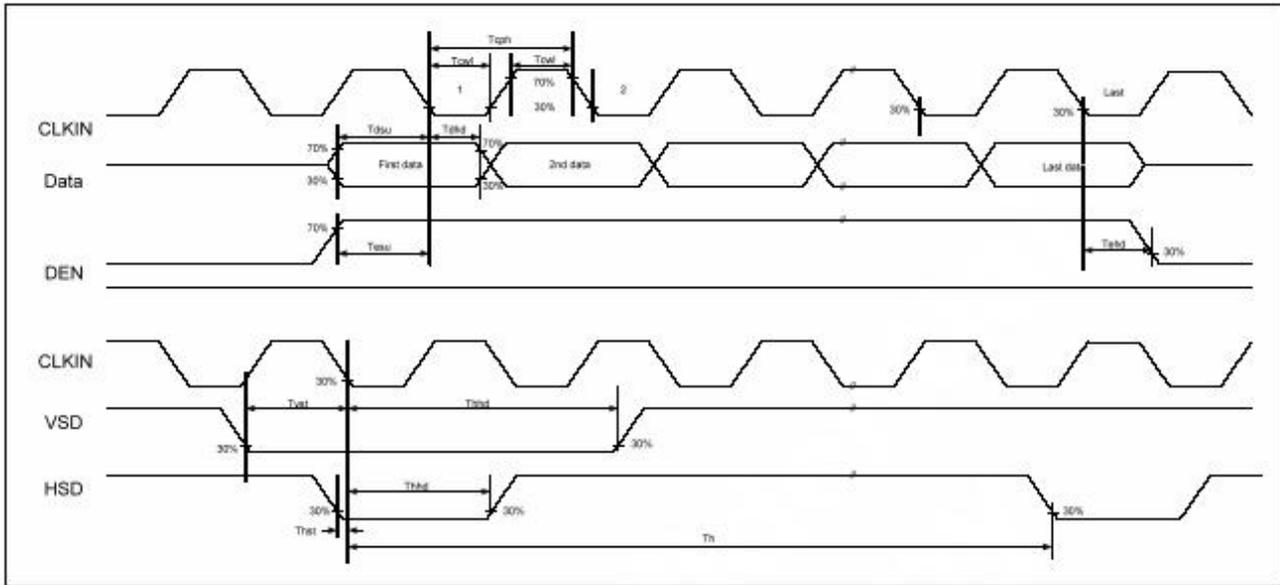Xunrui photoelectric technology （shenzhen）CO,.LTD.

Figure 10. 1 Input Clock and Data Timing Diagram
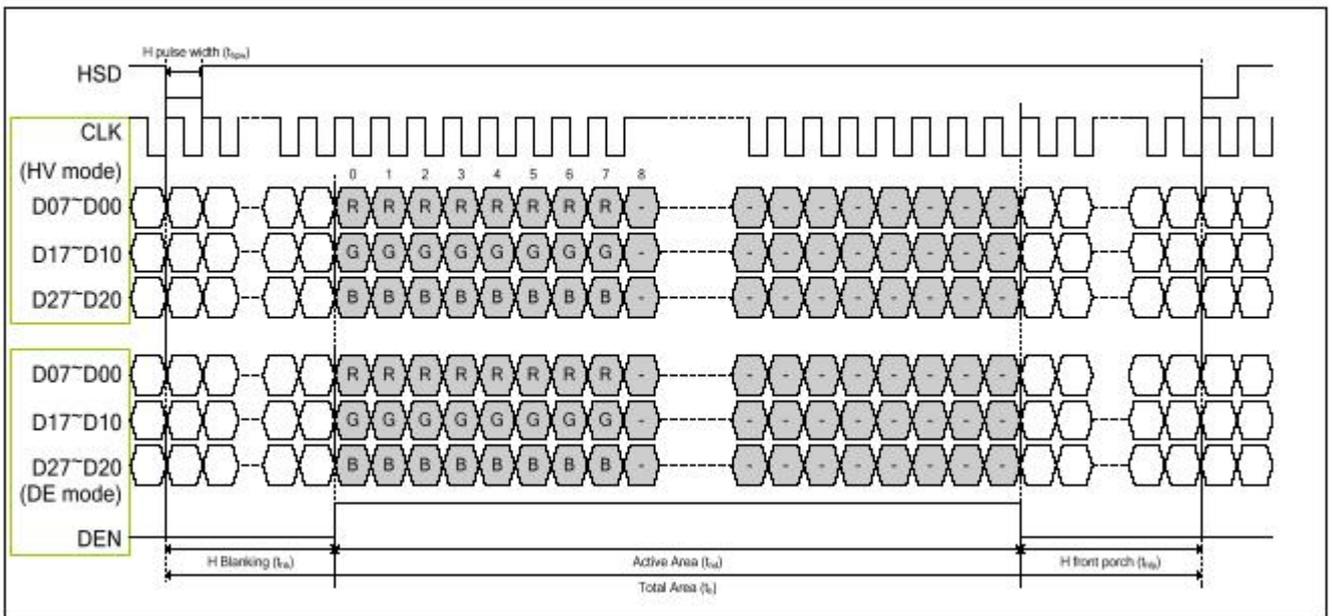
● **Horizontal timing**

Figure 9. 1 Horizontal Input Timing Diagram

● **Vertical timing**

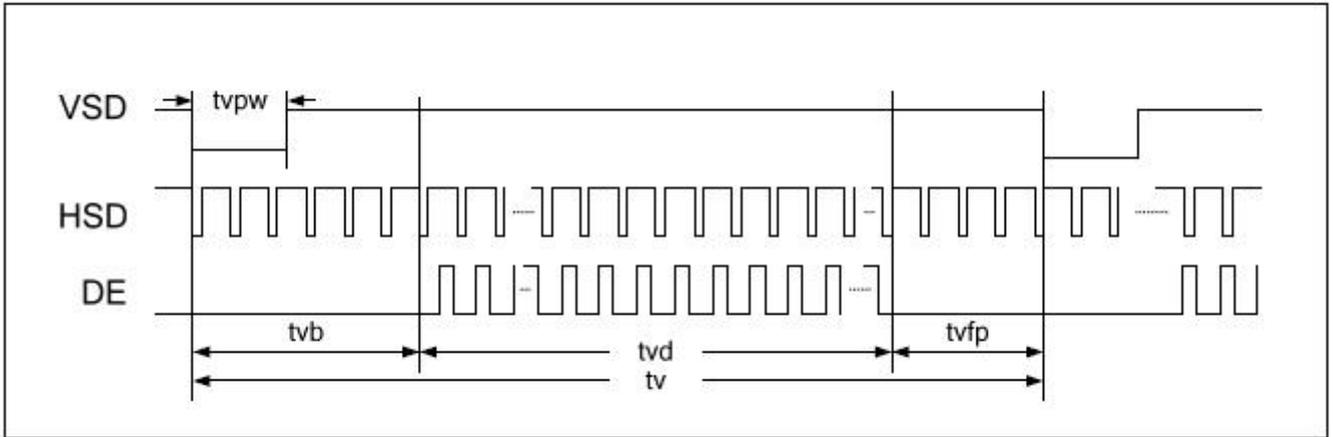

Figure 9. 2 Vertical Input Timing Diagram

● **Horizontal timing**

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Horizontal Display Area	thd		800		DCLK
DCLK frequency	fclk	-	30	50	MHz
One Horizontal Line	th	889	928	1143	DCLK
HS pulse width	thpw	1	48	255	DCLK
HS Back Porch (Blanking)	thb		88		DCLK
HS Front Porch	thfp	1	40	255	DCLK
DE mode Blanking	th-thd	85	128	512	DCLK

● **Vertical timing**

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd		480		T_H
VS period time	tv	513	525	767	T_H
VS pulse width	tvpw	3	3	255	T_H
VS Back Porch (Blanking)	tvb		32		T_H
VS Front Porch	tvfp	1	13	255	T_H
DE mode Blanking	tv-tvd	4	45	255	T_H

5.2. Power Sequence
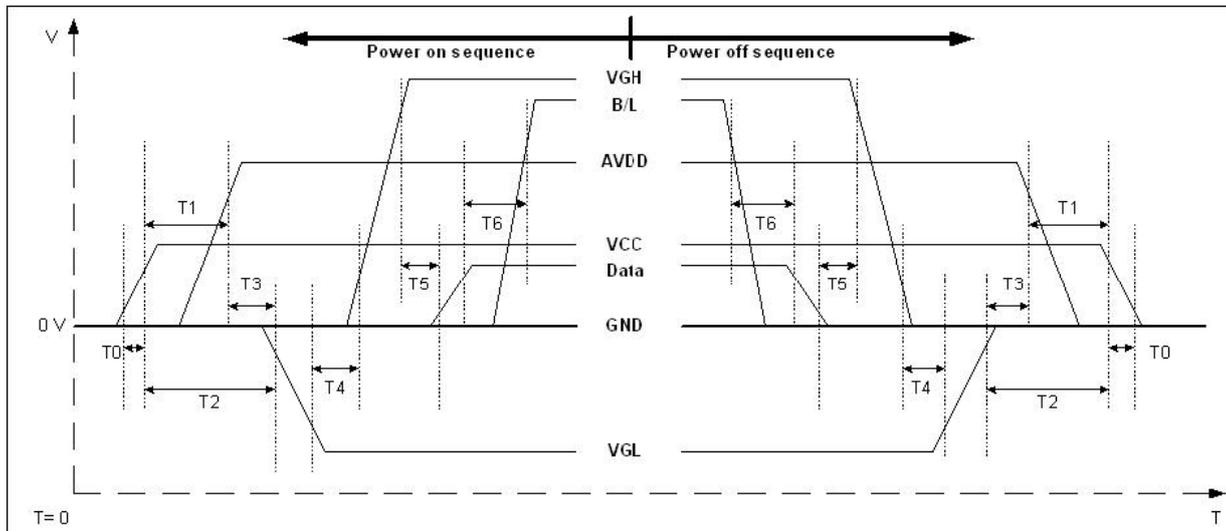
Item	Min.	Typ.	Max.	Unit
T0	0.5	--	20	msec
T1	16			msec
T2	20			msec
T3	**0**			msec
T4	**20**		--	msec
T5	**20**			msec
T6	**50**			msec
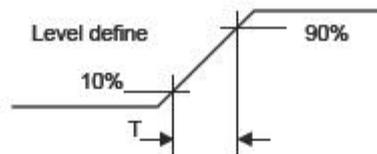
Power On Sequence: VCC-> AVDD -> VGL -> VGH -> Data -> B/L
Power Off Sequence: B/L-> Data -> VGH -> VGL -> AVDD -> VCC

Notes: Data include R0~R7, G0~G7, B0~B7, HSD, VSD, DCLK, SHLR, UPDN, DE
MODE, RSTB, STBYB, SHLR, UPDN, DITH

5.3 Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	280	-	mA	
Forward Voltage	V_F		9		V	
Backlight Power consumption	W_{BL}	-	TBD	-	W	

Note 1: Each LED : IF =40 mA, VF =9V.

Note 2: Optical performance should be evaluated at Ta=25℃ 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.
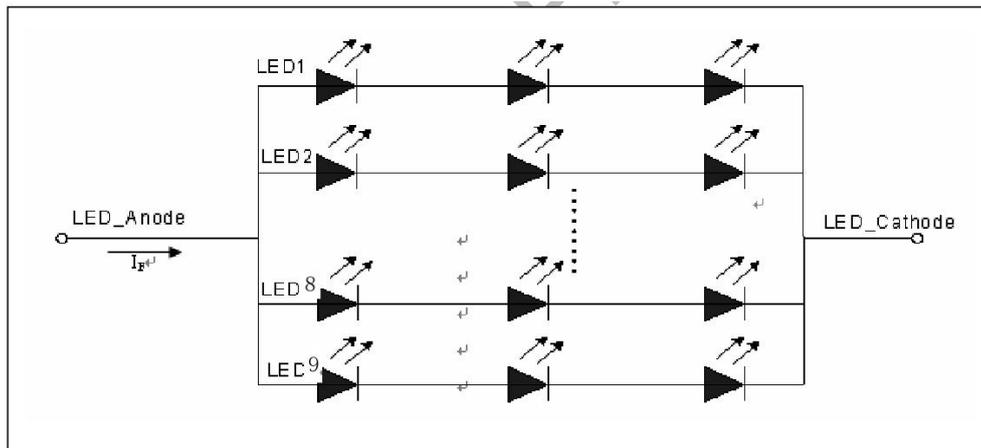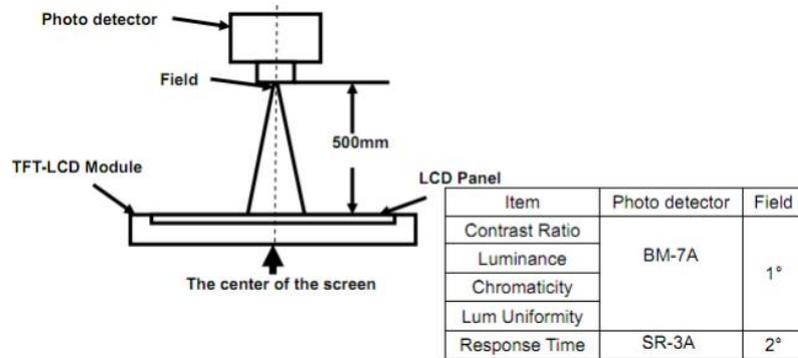
6 Optical Characteristics

Items		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angles		θ_T	Center CR≥10	60	70	-	Degree.	Note2
		θ_B		60	70	-		
		θ_L		65	75	-		
		θ_R		65	75	-		
Contrast Ratio		CR	Θ =0	480	600	-	-	Note1, Note3
Response Time		T_{ON}	25°C	-	30	35	ms	Note1, Note4
		T_{OFF}		-	35	40		
Chromaticity	White	X_W	Backlight is on	0.260	0.310	0.360	-	Note1, Note5
		Y_W		0.280	0.330	0.380	-	
Uniformity		U		80	-	-	%	Note1, Note6
NTSC					50		%	Note5
Luminance		L			500			Note1, Note7

Test Conditions:

1. IF= 20mA(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.

Item	Photo detector	Field
Contrast Ratio	BM-7A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	SR-3A	2°

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).
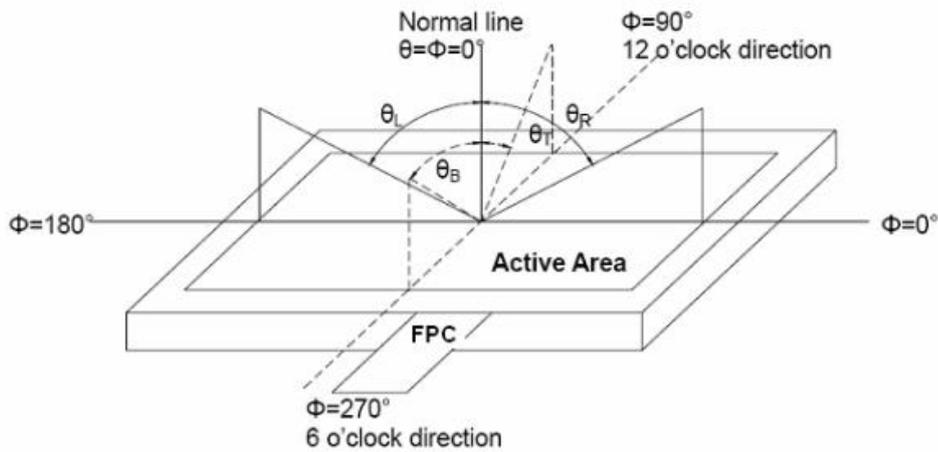

Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$
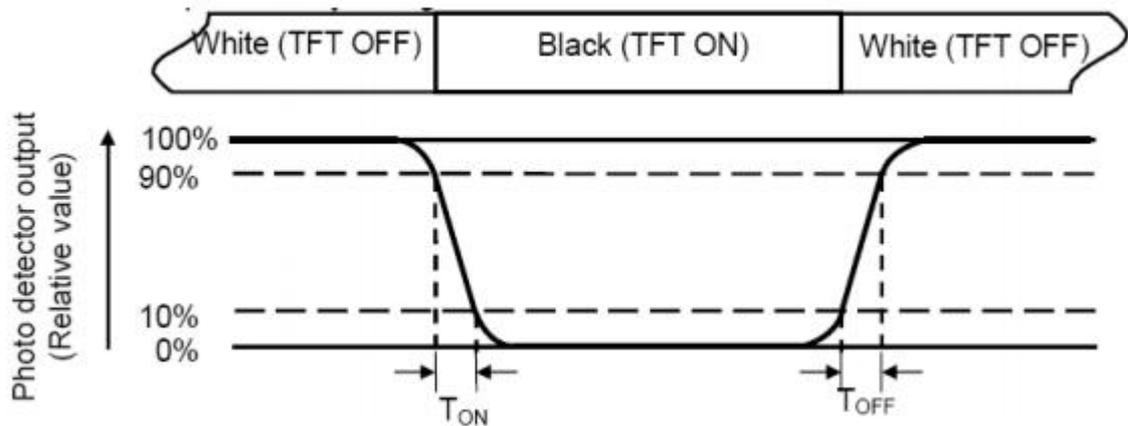
Note 4: Definition of Response time
The response time is defined as the LCD optical switching time interval between "White" state and "Black" state Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.

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

Luminance Uniformity (U) = Lmin/ Lmax 100%

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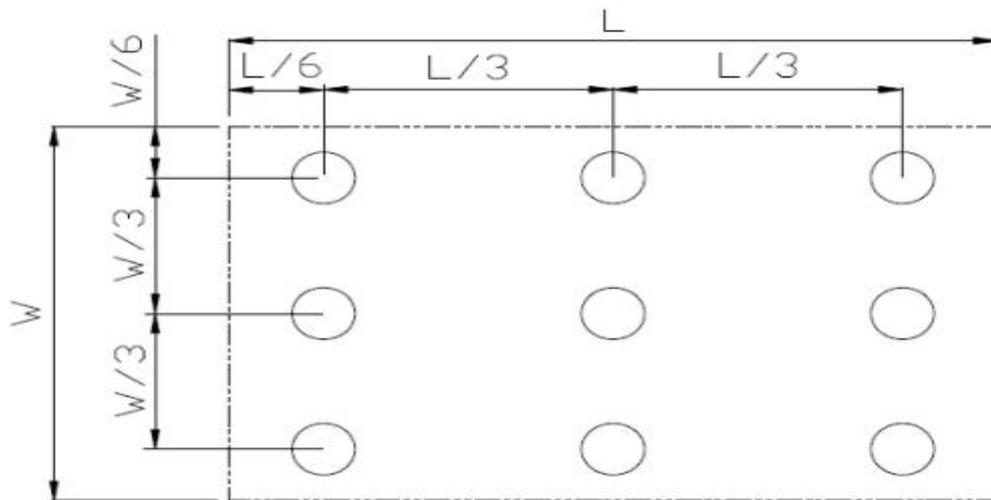

Fig. 2 Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.

Lmin: The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance:
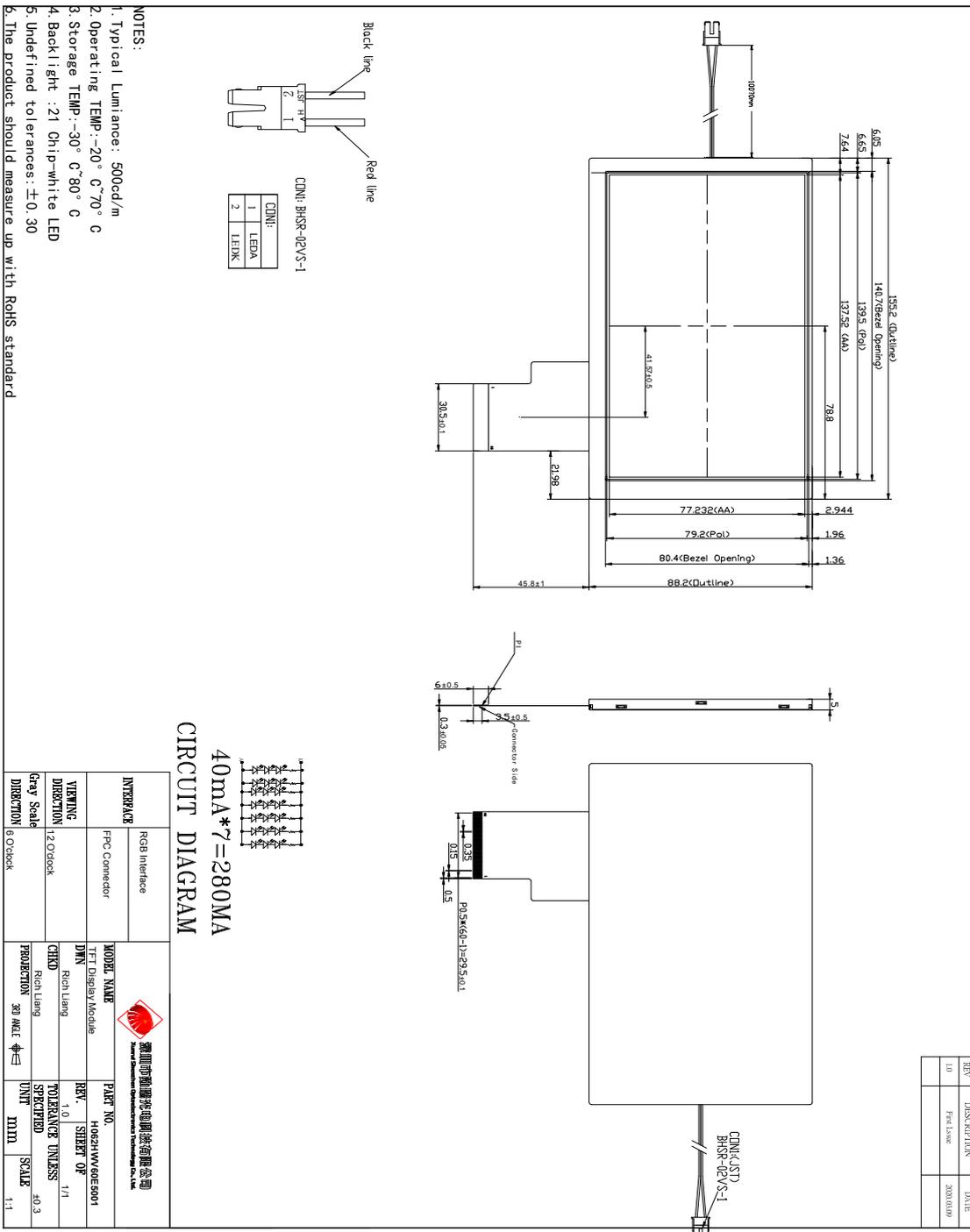
Measure the luminance of white state at center point.

7 Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +70℃, 240hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	Ta= -20℃, 240hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +80℃, 240hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -30℃, 240hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	Ta= +60℃, 90% RH max, 160 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-30℃ 30 min ~ +80℃ 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 (Opeartion)	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15℃ ~ 35℃, 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. Ta is the ambient temperature of sample.

8 Mechanical Drawing

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NOTES:
1. Typical Lumiance: 500cd/m
2. Operating TEMP:-20°C~70°C
3. Storage TEMP:-30°C~80°C
4. Backlight:21 Chip-white LED
5. Undefined tolerances:±0.30
6. The product should measure up with RoHS standard

Black line

Red line

CON1:BHSR-02VS-1

CON1:	
1	LEDA
2	LEDK

CON1:	
1	LEDA
2	LEDK

CIRCUIT DIAGRAM

40mA*7=280MA

INTERFACE	RGB Interface
	FPC Connector
VIEWING DIRECTION	12 O'clock
Gray Scale	
DIRECTION	6 O'clock

MODEL NAME	TFT Display Module
DOWN	Rich Liang
CHKD	Rich Liang
PROJECTION	3rd ANGLE

PART NO.	H062HWW60E5001
REV.	1.0
SHEET OF	1/1
TOLERANCE UNLESS SPECIFIED	±0.3
UNIT	mm
SCALE	1:1

| REV | DESCRIPTION | DATE |
| 1.0 | First Issue | 2020.03.09 |

155.2 (Outline)
140.7(Bezel Opening)
139.5 (Pol)
137.52 (AA)
41.97±0.5
78.8
21.98
6.05
6.65
7.64
30.5±0.1
77.232(AA)
79.2(Pol)
80.4(Bezel Opening)
2.944
1.96
1.36
45.8±1
88.2(Outline)
100?m

P1
6±0.5
3.5±0.5
0.3±0.05
Connector Side
5
0.35
0.15
0.5
P0.5×(60-1)=29.5±0.1

CON1(JST)
BHSR-02VS-1

9 Packing

TBD

10. Precautions for Use of LCD modules

10.1 Handling Precautions

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

10.1.2. 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.

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

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

10.1.5. 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 - Ketene
  - Aromatic solvents

10.1.6. Do not attempt to disassemble the LCD Module.

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

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

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

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

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

10.1.8.4. 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.

10.2 Storage Precautions

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

10.2.2. 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%

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

10.3 Transportation Precautions

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