深圳市勋瑞光电科技有限公司
Xunrui photoelectric technology （shenzhen）CO,.LTD.

Product Specification

Customer: _____

ModelName: H043IWQ40E3595

Date: 2023-11-06

Version: V1.0

■ **Preliminary Specification**

☐ **Final Specification**

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by

Contents

1. Record of Revision

Version	Revise Date	Content	Editor
V1.0	2023/11/06	FirstRelease.	gl.Liu

2 General Specifications

Feature		Spec
Characteristics	LCD Size	4.3 inch
	Display Format	480 (RGB) × 272
	Interface	MCU/SPI
	Color Depth	16.7M
	Technology type	a-Si
	Display Spec.	0.198 x 0.198
	Display Mode	Normally White
	Driver IC	NV3041A
	Surface Treatment	HC
	ViewingDirection	6O'clock
	Gray Viewing Direction	12O'clock
Mechanical	LCM(WxHxD)(mm)	105.40*67.15*3
	Active Area(mm)	95.04 x 53.856
	With /Without TSP	Without TSP
	Weight (g)	TBD
	LED Numbers	7 LEDs

Note 1: Viewing direction is following 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	XL/NC	TP pin XR
2	YU/NC	TP pin YU
3	XR/NC	TP pin XR
4	YD/NC	TPpinYD
5	GND	System Ground
6	IOVCC	Power supply for digital interface I/O pins
7	VCI	Power supply for analog circuit
8	TE	Tearing effect output pin is used to synchronize MCU frame writing,
9	CSX/SPI_CS	Chip Select PIN
10	DCX/A0	Data or Command flag ,DCX = “H” is data, DCX = “L” is command
11	WR /SCL	Write signal/ serial clock input signal
12	RD	Read Signal And Read Data
13	SPI_SDI /SDA	SPI input and output pin
14	IM1	Interface Mode Select Note1
15	RESET	Reset signal input PIN
16	GND	System Ground
17~32	DB0~ DB15	Data Bus
33	LEDA	Power supply Anode input for backlight
34~36	LEDK	Power supply Cathode input for backlight
37	GND	System Ground
38	IM0	Interface Mode Select Note1
39	SPI4W	Std SPI 3/4 wire selection. SPI4W=“H”, 4 wire SPI, SPI4W=“L”, 3wire SPI.
40	IM2	Interface Mode Select Note1

Note1:

Selection of these interface are set by IM<2:0> pins as shown below Table 6-1-1.

IM2	IM1	IM0	Interface	Read Back Data Bus Selection
0	0	0	8080 series 8bit	DG3-2, DB7-2
			8080 series 16bit	DR5-2, DG7-2, DB7-2
0	0	1	3/4-wire Std SPI	SDA: In/Out
0	1	0	Dual SPI	SDA:In/Out DCX:In
0	1	1	Quad SPI	SDA:In/Out DCX:In DB[2]:In DB[3]:In

4 Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
SupplyVoltage	VCI	-0.3	4.6	V	
IO Supply Voltage	IOVCC	-0.3	4.6	V	
InputSignal Voltage	V_{in}	-0.3	IOVCC+0.3	V	
LogicOutputVoltage	V_{OUT}	-0.3	IOVCC+0.3	V	
Operating Temperature	T_{OPR}	-20	70	℃	
Storage Temperature	T_{STG}	-30	80	℃	

5 Electrical Characteristics

5.1 Operating conditions:

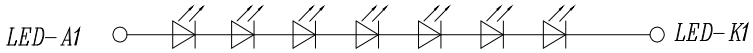
Parameter	Symbol	MIN	TYP	MAX	Unit	Remark
PowerVoltage	VCI	3.0	3.3	3.6	V	
IO Supply Voltage	IOVCC	1.65	-	VCI	V	
DigitalOperationCurren	Ioc	-	30	-	mA	
Standby Current	Isc	-	70	-	uA	
Gate On Power	V_{GH}	13	15	16	V	
Gate Off Power	V_{GL}	-11	-9	-7	V	

Note: (1) Vcom must be adjusted to optimize display quality: cross-talk, contrast ratio and etc.
(2) VGH is TFT gate operating voltage
(3) VGL is TFT gate operating voltage

5.2 Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
LED current	I_F	15	20	25	mA	
Power Consumption	p	-	420	560	mW	
LED Voltage	V_F	19.6	21	22.4	V	Note 1
LED Life Time	W_{BL}	50000	-	-	Hr	Note 2,3

Note 1 : There are 1 Groups LED

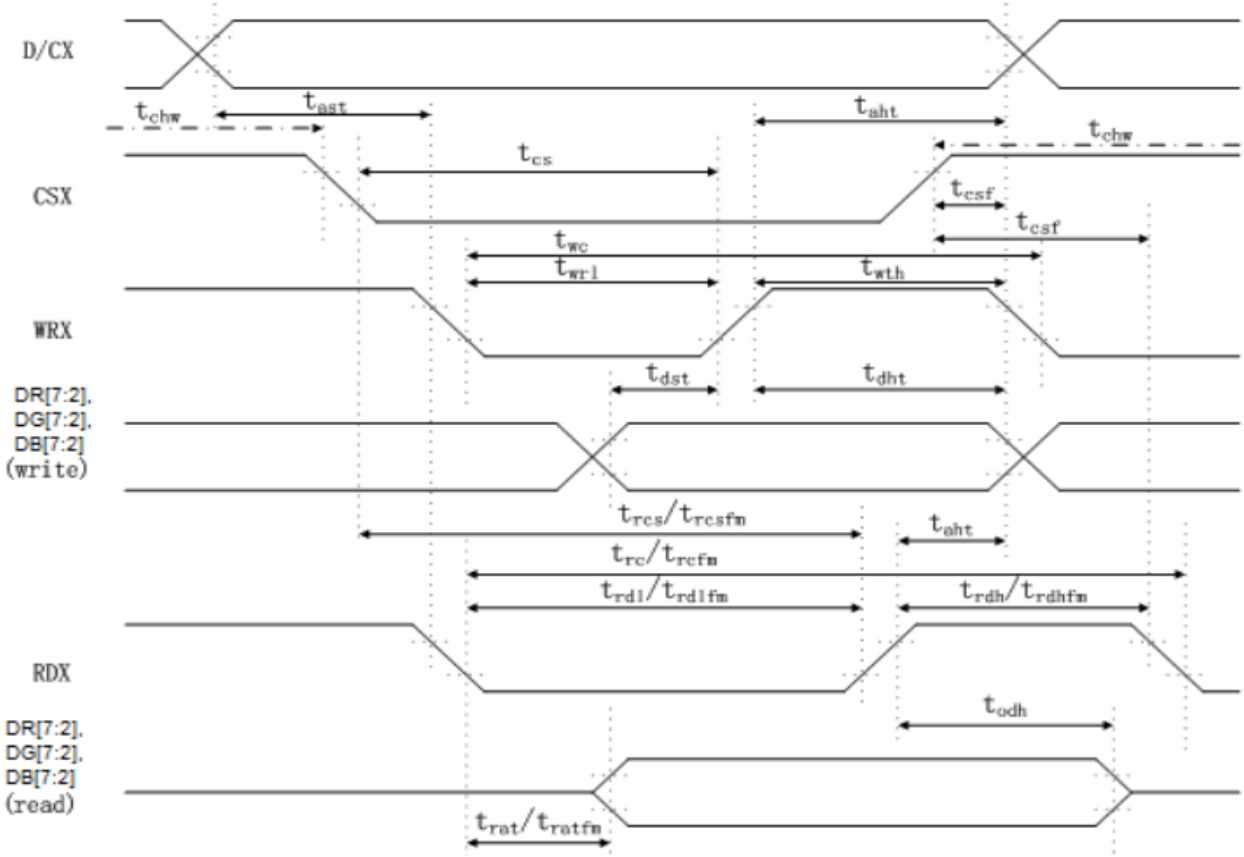


Note 2 : Ta = 25℃

Note 3 : Brightness to be decreased to 50% of the initial value

6 Interface Timing

6.1 Parallel MCU 16/8-bit BUS



Note: Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals.

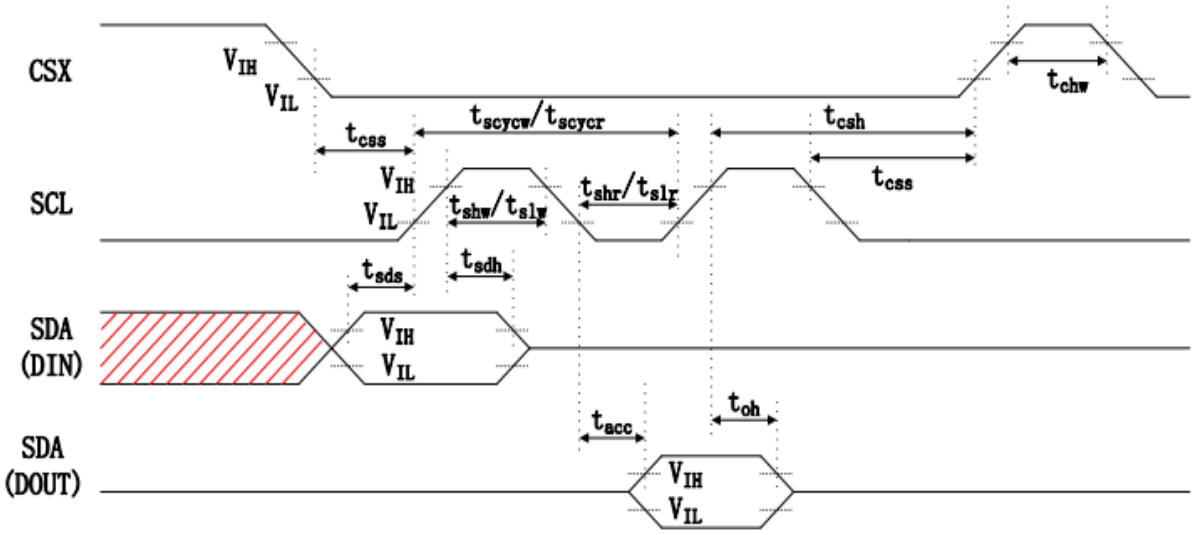
Signal	Symbol	Parameter	MIN	MAX	UNIT	Description
D/CX	T_{AST}	Address Setup Time	0		ns	
	T_{AHT}	Address Hold Time (W/R)	10		ns	
CSX	T_{CHW}	“S” “H” Pulse Width	25		ns	
	T_{CS}	Chip Select Setup Time(W)	10		ns	
	T_{RCS}	Chip Select Setup Time (Read ID)	45		ns	
	T_{RCSFM}	Chip Select Setup Time (Read FM)	355		ns	
	T_{CSF}	Chip Select Wait Time (W/R)	10		ns	
WRX	T_{WC}	Write Cycle	50		ns	MCU 16 Bit Format (5-6-5):

Signal	Symbol	Parameter	MIN	MAX	UNIT	Description
						Twc>100ns (see “6.4.8.”) MCU 16 Bit Format (6-6-6): Twc>66ns (see “6.4.9.” Figure 6.4.9.4) Other Format Twc>50ns
	T_{WRH}	Control Pulse H Duration	T_{WC} /2		ns	
	T_{WRL}	Control Pulse L Duration	T_{WC} /2		ns	
RDX	T_{RC}	Read Cycle(ID)	160		ns	When Read ID
	T_{RDH}	Control Pulse H Duration(ID)	T_{RC} /2		ns	
	T_{RDL}	Control Pulse L Duration(ID)	T_{RC} /2		ns	
RDX	T_{RCFM}	Read Cycle(FM)	450		ns	When Read From Frame Memory
	T_{RDHFM}	Control Pulse H Duration(FM)	T_{RCFM} /2		ns	
	T_{RDLFM}	Control Pulse L Duration(FM)	T_{RCFM} /2		ns	
DR[7:2], DG[7:2], DB[7:2]	T_{DST}	Data Setup Time	10		ns	CLmax=30pF Clmin=8pF
	T_{DHT}	Data Hold Time	10		ns	
	T_{RAT}	Read Access Time(ID)		40	ns	
	T_{RATFM}	Read Access Time(FM)		340	ns	
	T_{ODH}	Output Disable Time	20		ns	

Table 8-3-1 AC characteristics of parallel MCU in asynchronous mode

Note 1: IOVCC 1.65 to 3.3V, VCI=2.6 to 3.3V, AGND=DGND=0V, Ta=-30 to 70 ℃ (to +85 ℃ no damage)
Note 2: This input signal rise time and fall time (Tr, Tf) is specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of IOVCC for input signals

6.2 Display Serial Interface (SPI/Dual-SPI/Quad-SPI)



Signal	Symbol	Parameter	MIN	MAX	UNIT	Description
CSX	T_{CSS}	Chip Select Setup Time	10		ns	
	T_{CSH}	Chip Select Hold Time	30		ns	
	T_{CHW}	Chip Select "H" Pulse Width	30		ns	
SCL	T_{SCYCW}	Serial Clock Cycle(Write)	12.5		ns	QSPI 4 lane format (5-6-5): T_{SCYCW} >25ns (see "6.4.12.") QSPI 4 lane format (6-6-6): T_{SCYCW} >16ns(see "6.4.13") Other Format T_{SCYCW} >12.5ns
	T_{SHW}	S"L" "H" Pulse Width(Write)	T_{SCYCW} /2		ns	
	T_{SLW}	S"L" "L" Pulse Width(Write)	T_{SCYCW} /2		ns	
	T_{SCYCR}	Serial Clock Cycle(Read)	150		ns	
	T_{SHR}	S"L" "H" Pulse Width(Read)	T_{SCYCR} /2		ns	
	T_{SLR}	S"L" "L" Pulse Width(Read)	T_{SCYCR} /2		ns	
SDA(DIN) /(DOUT)	T_{SDS}	Data Setup Time	5		ns	
	T_{SDH}	Data Hold Time	5		ns	
	T_{ACC}	Access Time	5		ns	CLmax=30pF CLmin=8pF
	T_{OH}	Output Disable Time	10		ns	

Table 8-3-2-1: Serial Interface Characteristics

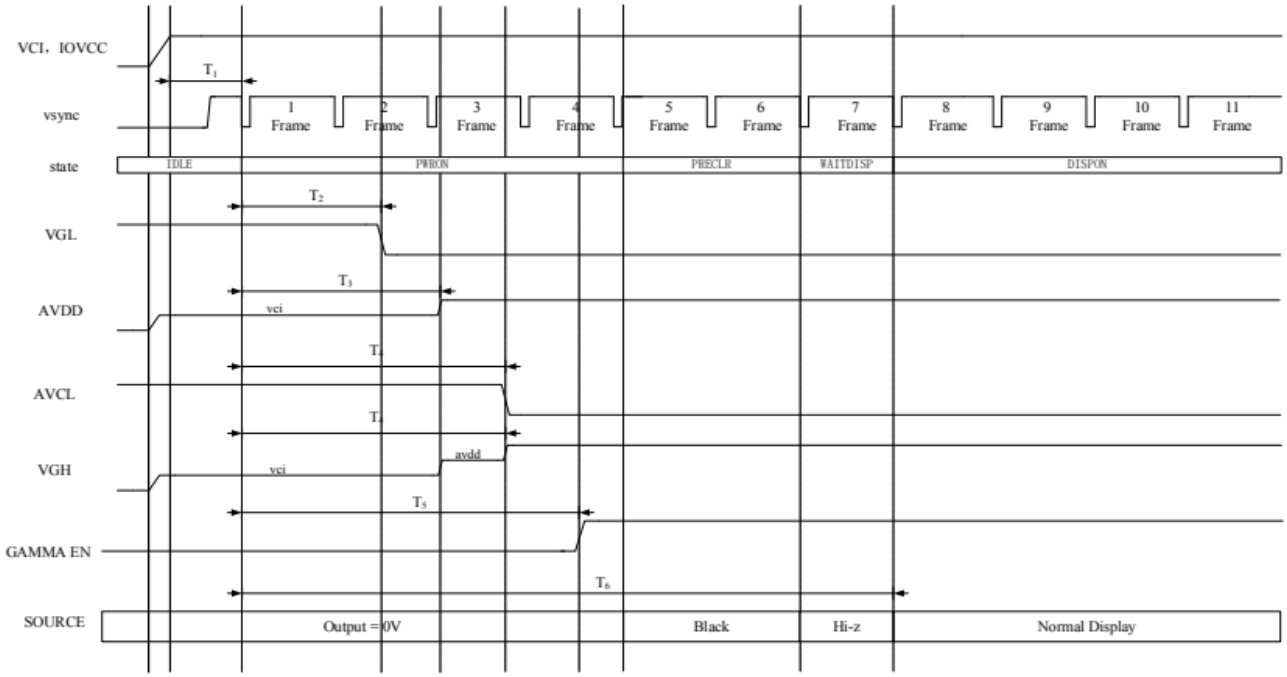
Note 1: IOVCC=1.65 to 3.3V, VCI=2.6 to 3.3V, AGND=GND=0V. Ta=-30 to 70°C (to +85°C no damage)
Note 2: The input signal rise time and fall time(Tr, Tf) is specified at 15 ns or less. Logic high and low levels are specified as 10% and 90% of IOVCC for Input signals.

Signal	Symbol	Parameter	MIN	MAX	UNIT	Description
CSX	T_{CSS}	Chip Select Setup Time	10		ns	
	T_{CSH}	Chip Select Hold Time	30		ns	
	T_{CHW}	Chip Select “H” Pulse Width	30		ns	
SCL	T_{SCYCW}	Serial Clock Cycle(Write)	12.5		ns	
	T_{SHW}	S “L” “H” Pulse Width(Write)	T_{SCYCW} /2		ns	
	T_{SLW}	S “L” “L” Pulse Width(Write)	T_{SCYCW} /2		ns	
	T_{SCYCR}	Serial Clock Cycle(Read)	150		ns	
	T_{SHR}	S “L” “H” “Pulse Width(Read)	T_{SCYCR} /2		ns	
	T_{SLR}	S“L” “L” Pulse Width(Read)	T_{SCYCR} /2		ns	
D/CX	T_{DCS}	D/CX Setup Time	5		ns	
	T_{DCH}	D/CX Hold Time	5		ns	
SDA(DIN) (DOUT)	T_{SDS}	Data Setup Time	5		ns	
	T_{SDH}	Data Hold Time	5		ns	
	T_{ACC}	Access Time	5		ns	CLmax=30pF CLmin=8pF
	T_{OH}	Output Disable Time	10		ns	

Table 8-3-2-2: 4 wire Serial Interface Characteristics

Note 1: IOVCC=1.65 to 3.3V, VCI=2.6 to 3.3V, AGND=GND=0V. Ta=-30 to 70°C (to +85°C no damage)
Note 2: The input signal rise time and fall time (tr, tf) is specified at 15 ns or less. Logic high and low levels are specified as 10% and 90% of IOVCC for Input signals.

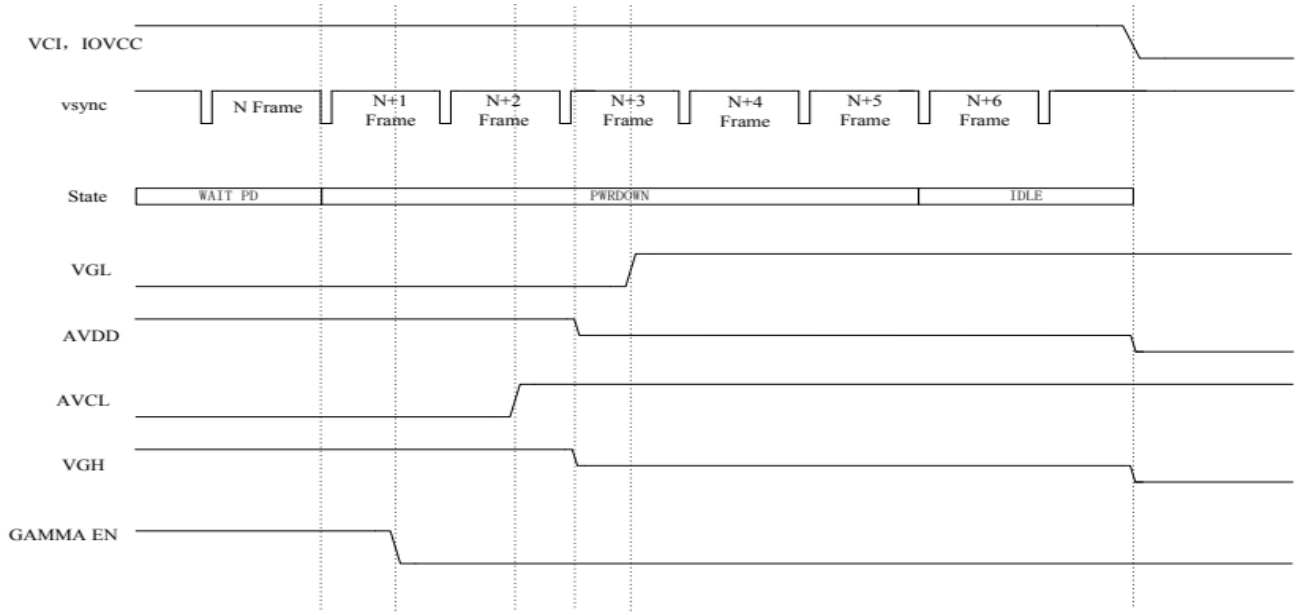
6.3 Power On Sequence



Symbol	Description	Min. Time	Unit
T_1	Time from stable VCI，IOVCC (reset finished) set-up to Command “11H”	Decide by 11H command	ms
T_2	Time from Command “11H” to VGL voltage stabilization	23	ms
T_3	Time from Command “11H” to AVDD voltage stabilization	30.7	ms
T_4	Time from Command “11H” to AVCL/VGH voltage stabilization	40.8	ms
T_5	Gamma output enable	55.3	ms
T_6	Source normal display	Decide by 29H command	ms

6.4 Power Off Sequence

When host sends “10H” command, State from WAIT_PD to PWRDOWN, in which power disabled sequentially.

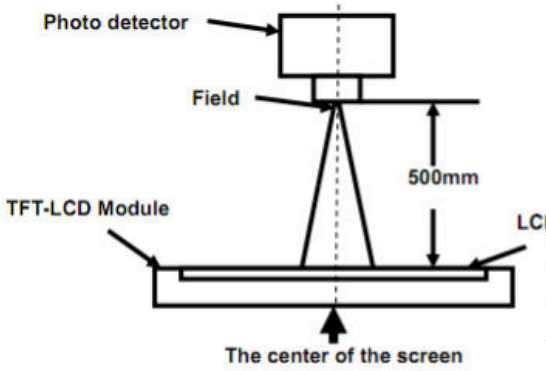


7 Optical Characteristics

Items		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angles		θ_T	Center CR≥10	-	50	-	Degree.	Note2
		θ_B		-	70	-		
		θ_L		-	70	-		
		θ_R		-	70	-		
Contrast Ratio		CR	Θ =0	-	500	-		Note1, Note3
Response Time		T_{ON}	25° C	-	30	45	ms	Note1, Note4
		T_{OFF}		-	30	45		
Chromaticity	White	X_W	Backlight is on	0.282	0.312	0.342	-	Note1, Note5
		Y_W		0.319	0.349	0.379	-	
	Red	X_R		0.609	0.639	0.669	-	
		Y_R		0.314	0.344	0.374	-	
	Green	X_G		0.264	0.294	0.324	-	
		Y_G		0.557	0.587	0.617	-	
	Blue	X_B		0.102	0.132	0.162	-	
		Y_B		0.106	0.136	0.166	-	
Uniformity		U		75	80	-	%	Note1, Note6
NTSC					50		%	Note5
Luminance		L		300	350			Note1, Note7

Test Conditions:
1. IF= 20Ma (one channel),the ambient temperature is 25°C.
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).

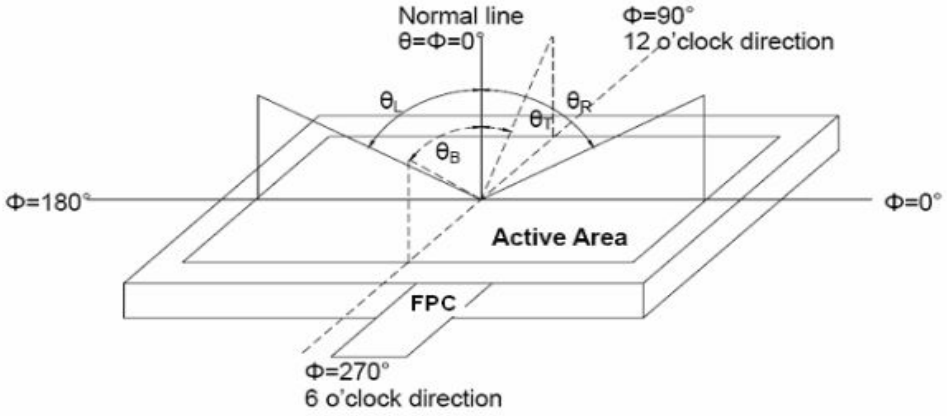


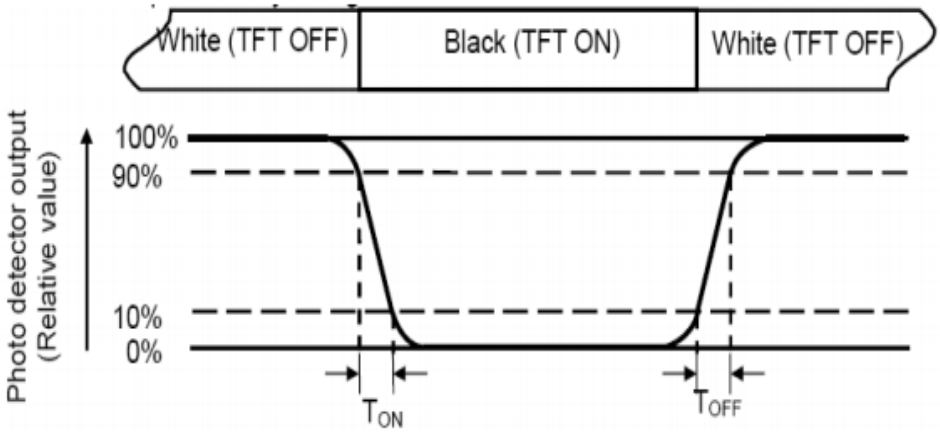
Fig. 1 Definition of viewing angle

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 X100%
L-------Active area length W----- Active area width

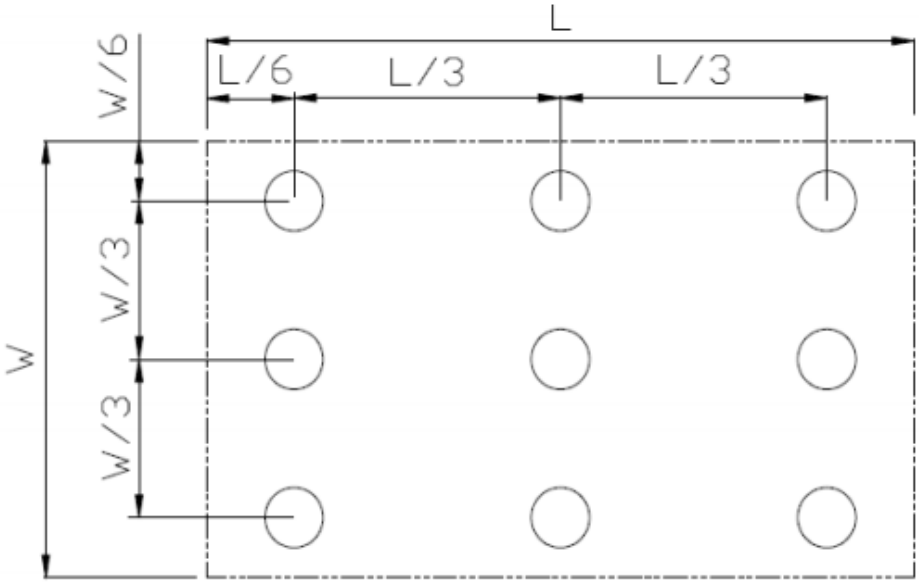


Fig. 2 Definition of uniformity
Lmax: The measured maximum luminance of all measurement position.
Lmin: The measured minimum luminance of all measurement position.
Note 7: Definition of Luminance:
Measure the luminance of white state at center point.

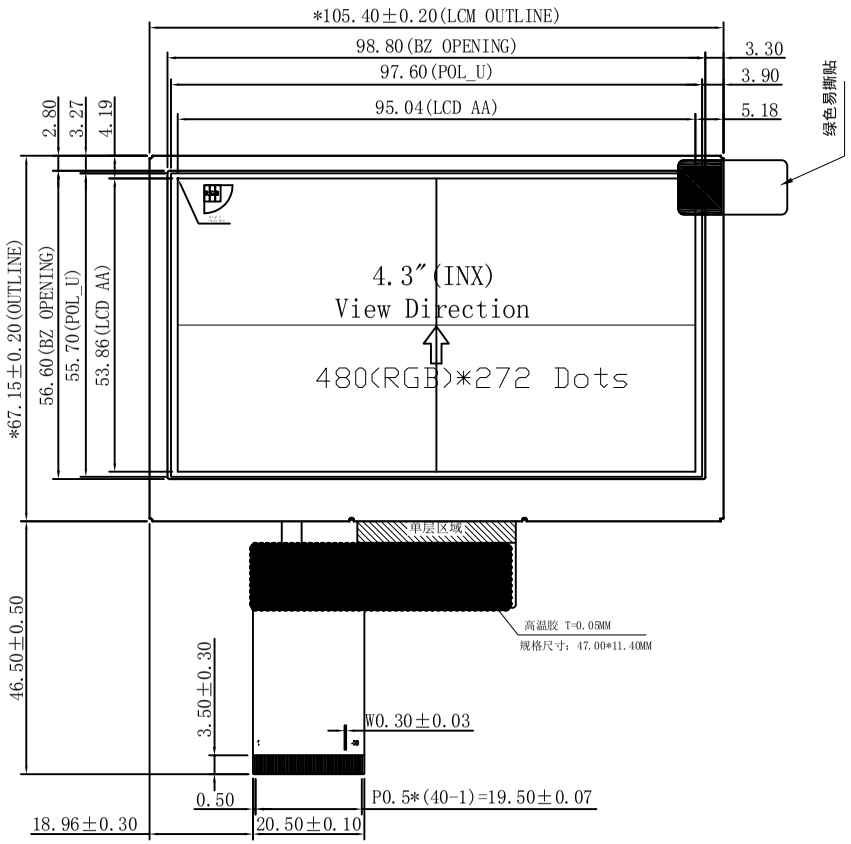
8 Environmental / Reliability Tests

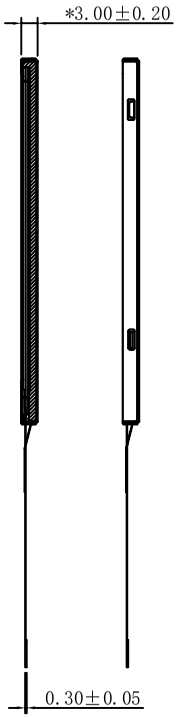
No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +70℃,96hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	Ta= -20℃,96hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +80℃,96hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -30℃,96hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	Ta= +60℃,90%RHmax,96hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-30℃ 30 min ~ +80℃ 30 min Changetime:5min,20Cycle	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℃ ~ 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: 60 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8-1995

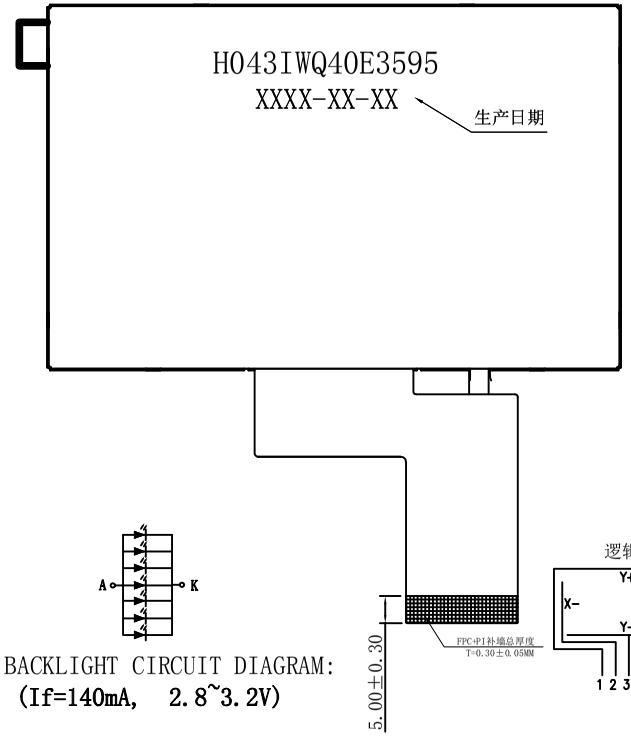
Note: 1. T_S is the temperature of panel's surface.
2. Ta is the ambient temperature of sample.

9 Mechanical Drawing

V0	2023/06/28	First issue

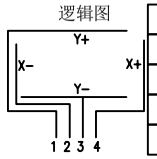






BACKLIGHT CIRCUIT DIAGRAM:
(If=140mA, 2.8~3.2V)

逻辑图



PIN	OUT
1	Y+
2	X-
3	Y-
4	X+

PIN	SYMBLE
1	XL/NC
2	YU/NC
3	XR/NC
4	YD/NC
5	GND
6	IOVCC
7	VCI
8	TE
9	CSX/SPI_
10	DCX/A0
11	WR/SCL
12	RDX
13	SPI_SDI/
14	IM1
15	RESET
16	GND
17	DB0
18	DB1
19	DB2
20	DB3
21	DB4
22	DB5
23	DB6
24	DB7
25	DB8
26	DB9
27	DB10
28	DB11
29	DB12
30	DB13
31	DB14
32	DB15
33	LEDA
34	LEDK
35	LEDK
36	LEDK
37	GND
38	IM0
39	SPI4W
40	IM2

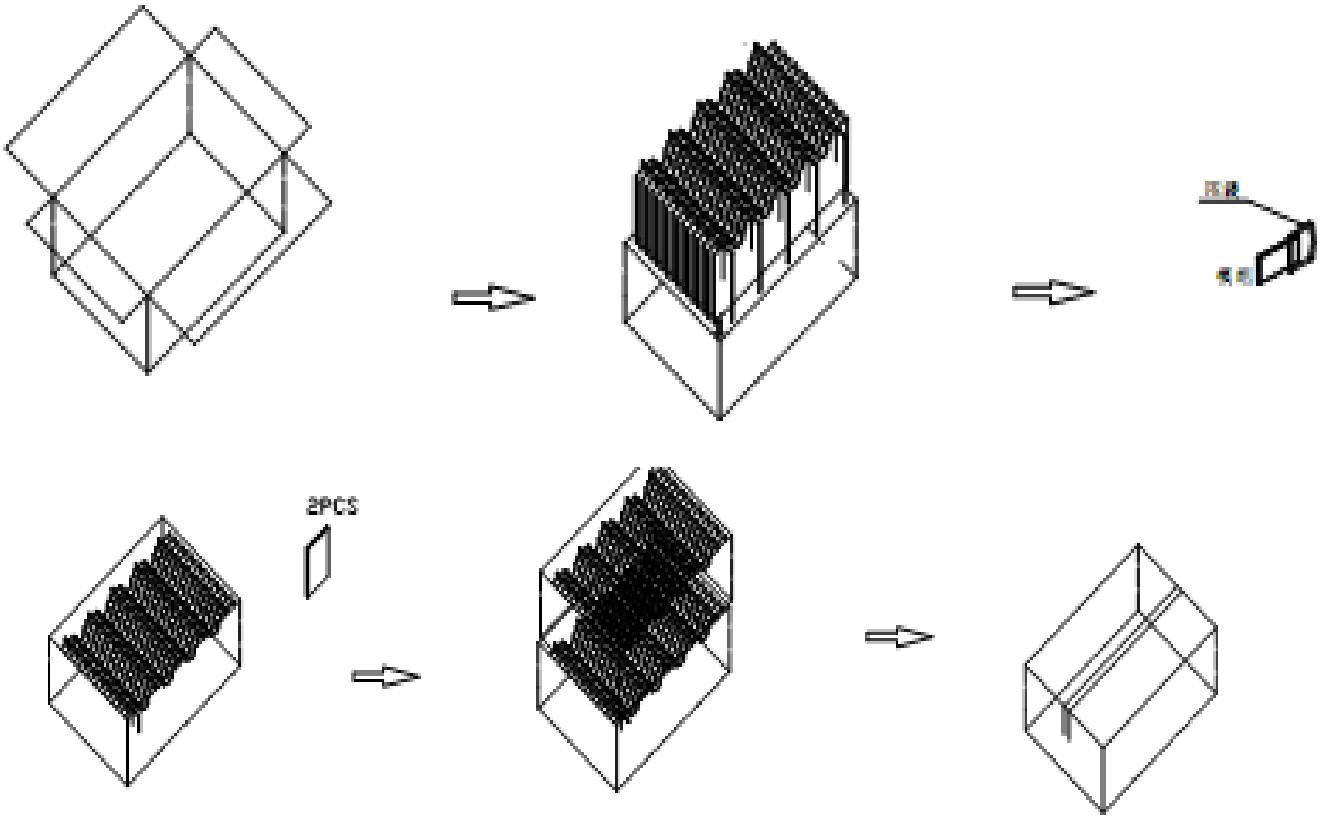
Interface	IM0	IM1	IM2	SPI4W	DADE
MCU16BIT	0	0	0	0	DB0~DB15
MCU 8BIT	0	0	0	0	DB0~DB7
3SPI 1	1	0	0	0	CS, SCL, SDA
4SPI 2	1	0	0	1	CS, SCL, SDA, DCX
QSPI	1	1	0	0	CS, SCL, SDA, DCX, DB0, DB1

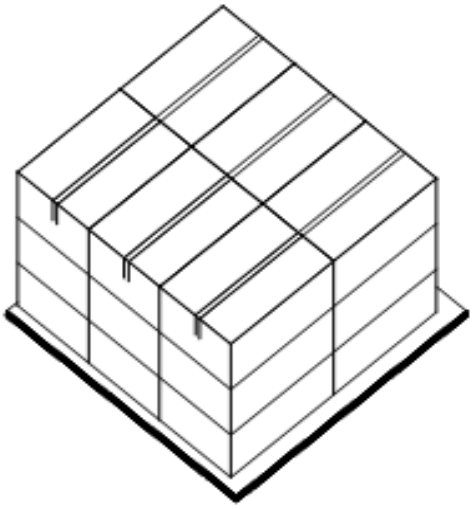
NOTES:
1. DISPLAY TYPE:4.3 INCH TFT /TRANSMISSIVE
2. BACKLIGHT: 7 CHIP WHITE LED, IN PARALLEL
3. OPERATING TEMP: -20° C~+70° C
4. STORAGE TEMP: -30° c~+80° c
5. RESOLUTION: 480xRGBx272
6. LCM Luminous instensity(Center):270cd/m2(TYP.)
7. Uniformity:75%(Min)
8. LCD IC:TBD
9. "( )"reference dimension. "*"critical dimension
10. RoHS Compliant

INTERFACE	MCU/SPI Interface	深圳市翔瑞光电科技有限公司 Xiangrui photoelectric technology (shenzhen) CO.,LTD.	
	FPC Connector	MODEL NAME TFT Display Module	PART NO. H043IWQ40E3595
VIEWING DIRECTION	6 0'clock	DWN	REV. A1 / SHEET OF 1/1
		CHKD	TOLERANCE UNLESS SPECIFIED ±0.3
Gray Scale DIRECTION	12 0'clock	PROJECTION 3RD ANGLE	UNIT mm / SCALE 1:1

1 0.Packing

Packing Method





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 ； Ketene ； 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.