

## Product Specification

<b>Customer</b>	
<b>Model Name</b>	IE-AI-1316CH07R24-C0-1
<b>Description</b>	Standard LCD Module 800(RGB)x480 Dots 5" TFT LCD
<b>Date</b>	2019/08/28
<b>Version</b>	V1.0

<b>Customer Approval</b>	
<b>Date</b>	
<p>The above signature represents that the product specifications, testing regulation, and warranty in the specifications are accepted</p>	

<b>Engineering</b>			
<b>Check</b>	<b>Date</b>	<b>Prepared</b>	<b>Date</b>

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## 1 Record of Revision

<b>Version</b>	<b>Revise Date</b>	<b>Content</b>	<b>Editor</b>
1.0	2019/08/28	First Release.	

## 2 General Specifications

	Feature	Spec
Characteristics	Size	5.0 inch
	Resolution	800(horizontal)*480(Vertical)
	Interface	RGB-24bit
	Connect type	Connector
	Color Depth	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.135 x 0.135
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally Black
	LCD Driver IC	
	Viewing Direction	Free
Mechanical	LCM (W x H x D) (mm)	120.7*76.3*5
	Active Area(mm)	108 x 64.80
	With /Without TSP	With TSP
	Weight (g)	TBD
	LED Numbers	18 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 Pin Definition

#### LCM pin

No.	Symbol	Description
1	VBL-	Backlight LED Cathode
2	VBL+	Backlight LED Anode.
3	GND	System Ground
4	VDD	Power supply for logic operation
5~12	R0~R7	Data bus
13~20	G0~G7	Data bus
21~28	B0~B7	Data bus
29	GND	System Ground
30	DCLK	Pixel clock signal
31	DISP	Display on/off control
32	HSYNC	Horizontal Sync signal
33	VSYNC	Vertical Sync signal
34	DEN	Data Enable
35	NC	No connect
36	GND	System Ground
37	XR(NC)	No connect
38	YD(NC)	No connect
39	XL(NC)	No connect
40	YU(NC)	No connect

### 4 Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
Supply Voltage	$V_{DD}$	-0.3	5.0	V	
Input Signal Voltage	$V_{in}$	-0.3	$V_{DD}+0.3$	V	
Logic Output Voltage	$V_{OUT}$	-0.3	$V_{DD}+0.3$	V	
Operating Temperature	$T_{OPR}$	-20	70	°C	
Storage Temperature	$T_{STG}$	-30	80	°C	

## 5 Electrical Characteristics

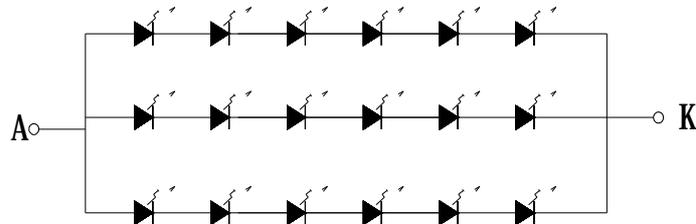
### 5.1 Operating conditions:

Parameter	Symbol	MIN	TYP	MAX	Unit	Remark
Power Voltage	$V_{CC}$	3.0	3.3	3.6	V	
Digital Operation Current	$I_{CC}$		8.6		mA	
Gate On Power	$V_{GH}$	12		18	V	
Gate Off Power	$V_{GL}$	-10		-6	V	
Vcom		0		7	V	Note1

### 5.2 Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
LED current	$I_F$	-	60		mA	Note 1 Note 2,3
Power Consumption			-	-	mW	
LED Voltage	$V_F$	-	19.2	19.8	V	
LED Life Time	$W_{BL}$	25000		-	Hr	

Note 1: There are 2Groups LED



Note 2:  $T_a = 25^\circ\text{C}$

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

## 6 Interface Timing

### 6.1 Power Sequence

HX8264-D02 has a power on/off sequence control function. In order to prevent IC from power on reset fail, the rising time ( $T_{POR}$ ) of the digital power supply VDD should be maintained within the given specifications. Please refer to "AC Characteristics" for more detail on timing.

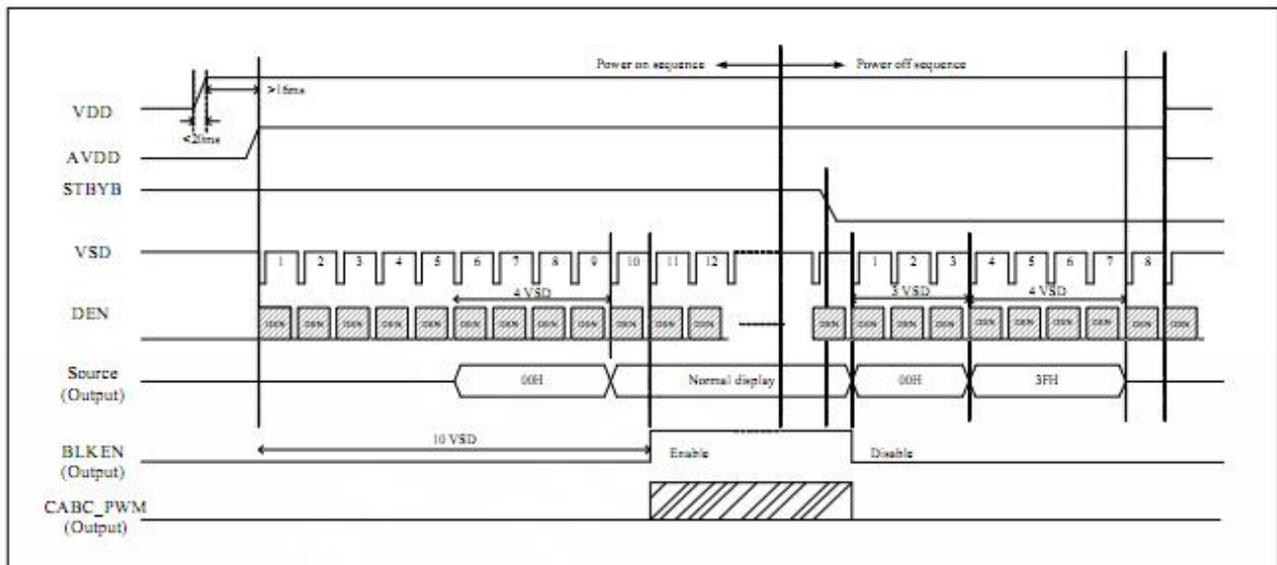


Figure 7. 1 Power on/off Timing Sequence

### 6.2 AC electrical characteristics

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
HS setup time	$T_{hat}$	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

### 6.3 Data input format

- Horizontal timing

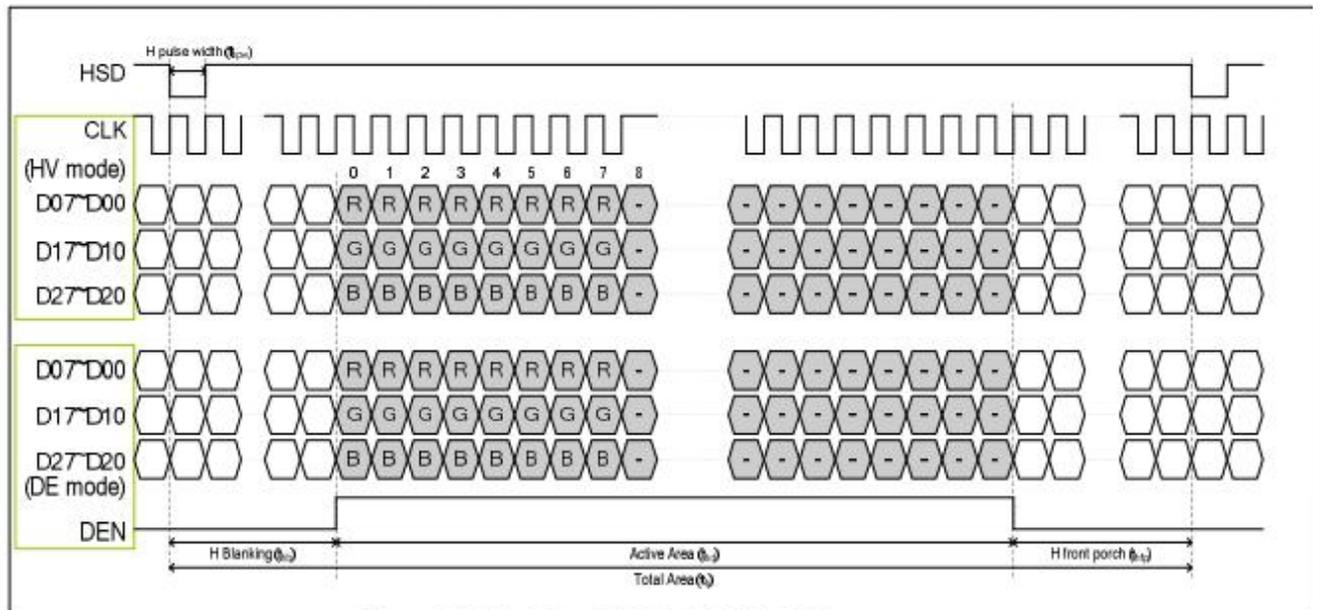


Figure 9. 1 Horizontal Input Timing Diagram

- Vertical timing

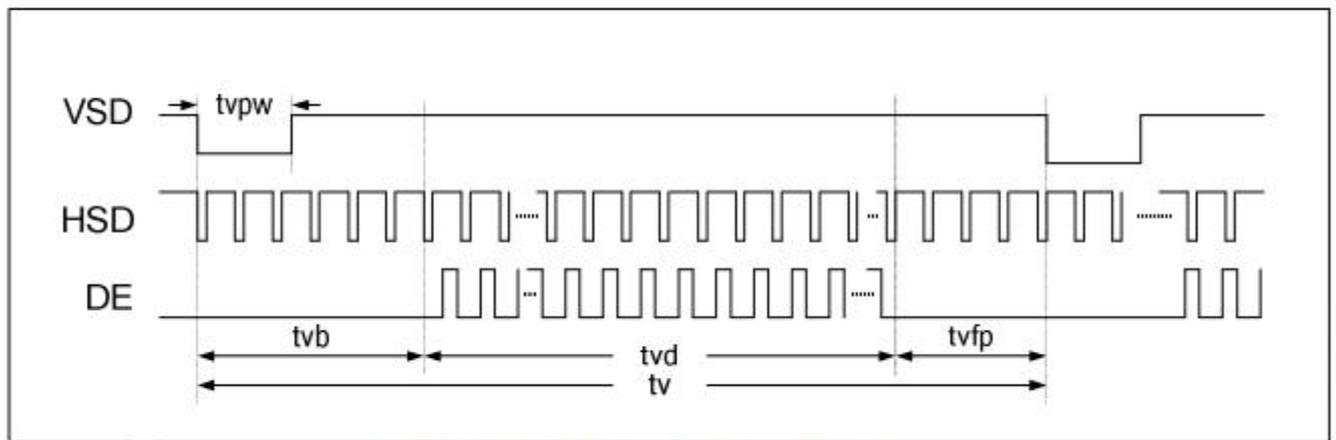


Figure 9. 2 Vertical Input Timing Diagram

## 6.4 Resolution

- 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 <sub>H</sub>
VS period time	tv	513	525	767	T <sub>H</sub>
VS pulse width	tvpw	3	3	255	T <sub>H</sub>
VS Back Porch (Blanking)	tvb	32			T <sub>H</sub>
VS Front Porch	tvfp	1	13	255	T <sub>H</sub>
DE mode Blanking	tv-tvd	4	45	255	T <sub>H</sub>

## 6.5 Parallel 24-bit RGB mode

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

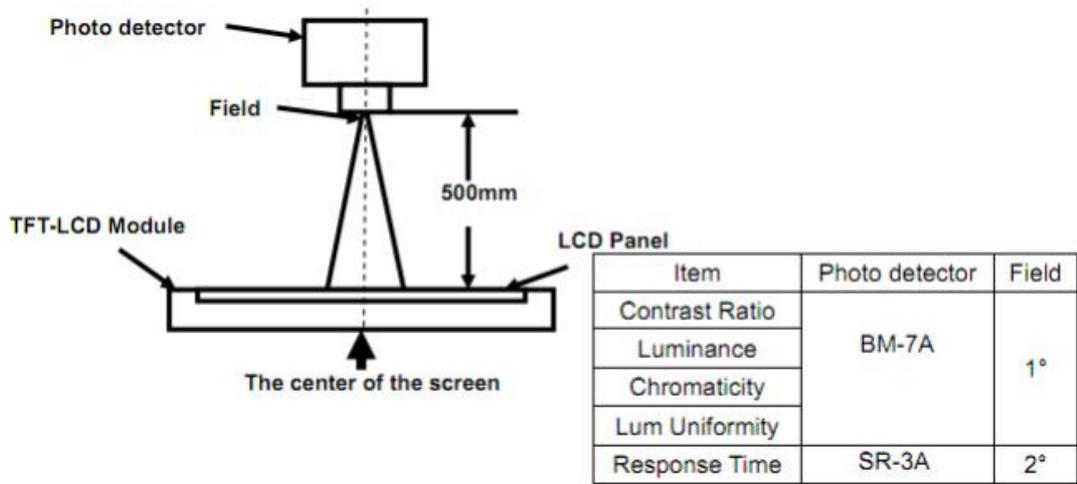


## 7. Optical Characteristics

Items	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	
Viewing angles	$\theta_T$	Center CR $\geq$ 10		80	-	Degree.	Note2	
	$\theta_B$			80	-			
	$\theta_L$			80	-			
	$\theta_R$			80	-			
Contrast Ratio	CR	$\Theta = 0$		800	-	-	Note1, Note3	
Response Time	$T_{ON}$	25°C	-	25	35	ms	Note1, Note4	
	$T_{OFF}$		-	25	35			
Chromaticity	White	Backlight is on	$X_W$	0.324	0.326	0.328	-	Note1, Note5
			$Y_W$	0.364	0.366	0.368	-	
	Red		$X_R$	0.611	0.613	0.615	-	
			$Y_R$	0.333	0.335	0.337	-	
	Green		$X_G$	0.305	0.307	0.309	-	
			$Y_G$	0.558	0.560	0.562	-	
	Blue		$X_B$	0.133	0.135	0.137	-	
			$Y_B$	0.158	0.160	0.162	-	
Uniformity	U		80	-	-	%	Note1, Note6	
NTSC				50		%	Note5	
Luminance	L			450		nits	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 2: Definition of viewing angle range and measurement system. Viewing angle is measured at the center point of the LCD by CONOSCOPE (ergo-80).

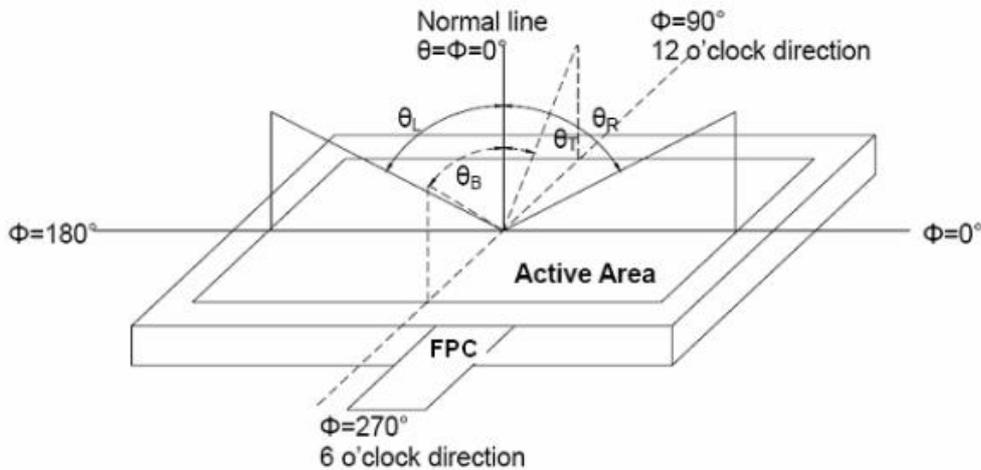


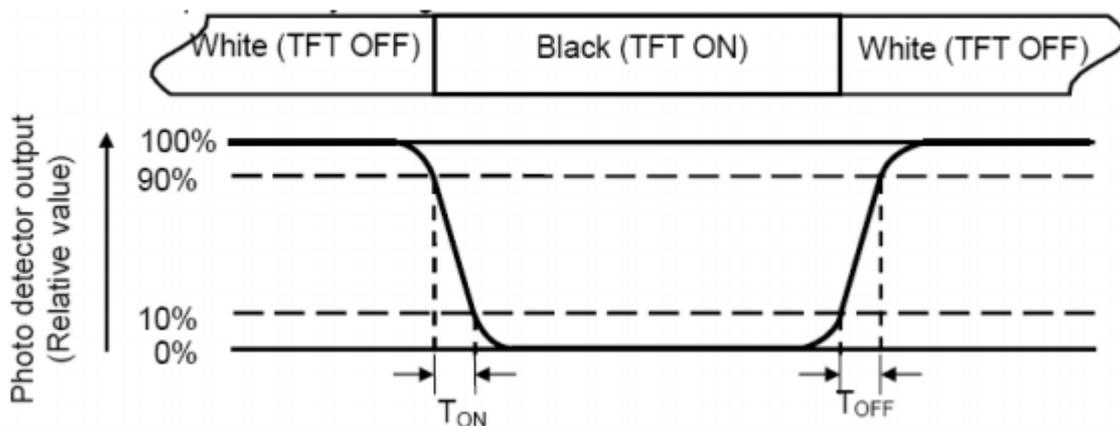
Fig. 1 Definition of viewing angle

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

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

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

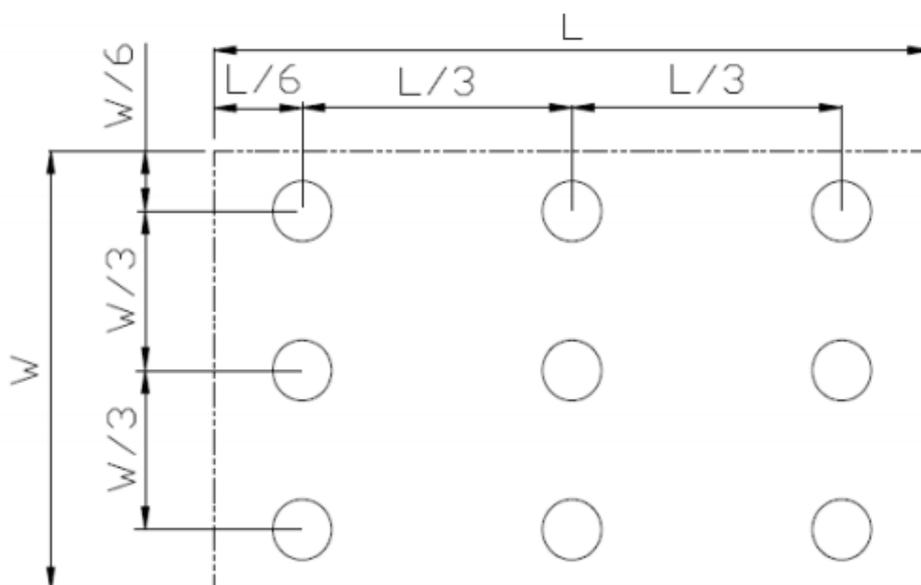


Fig. 2 Definition of uniformity

$L_{\max}$ : 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.

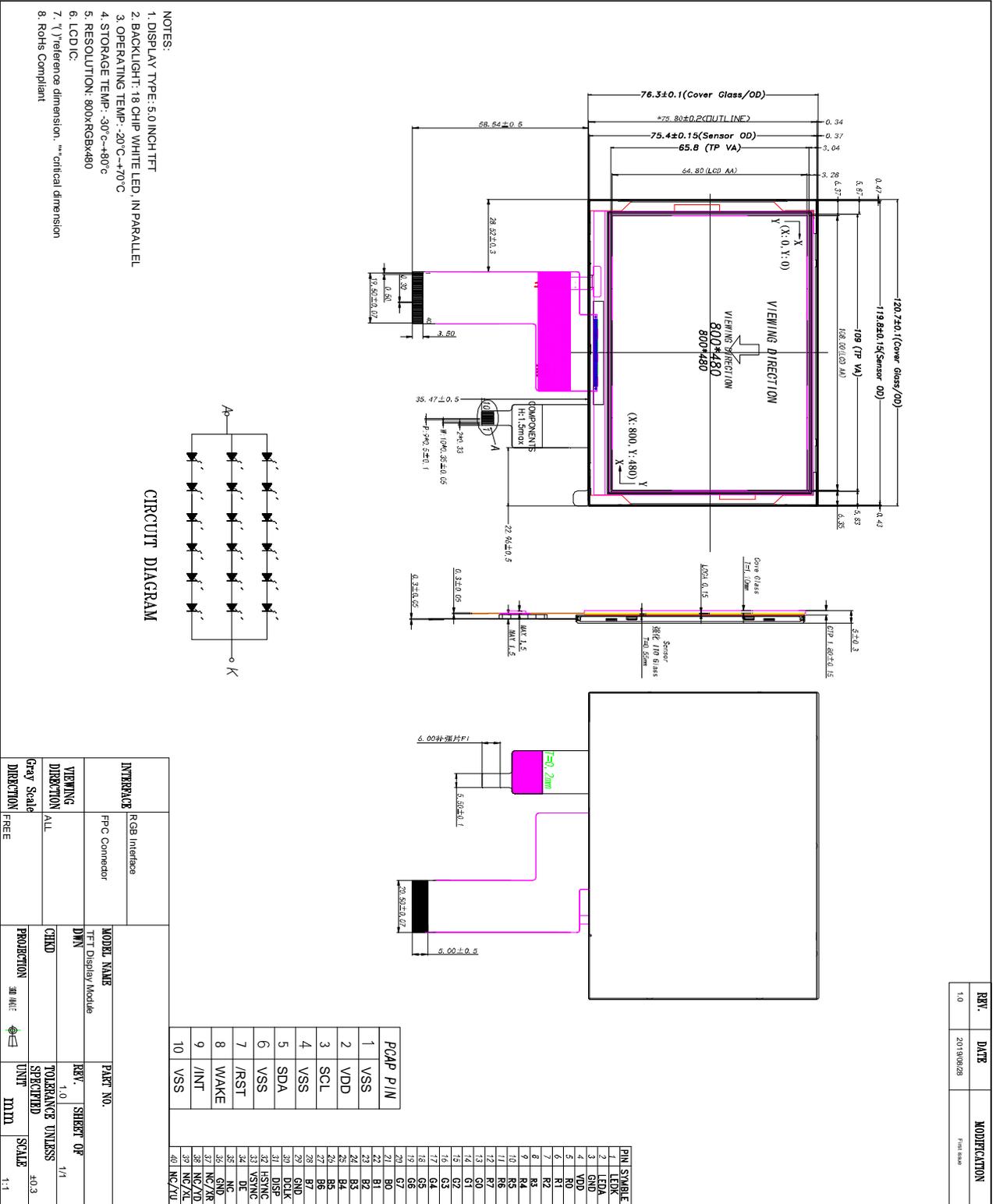
## 8. Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	T <sub>s</sub> = +70°C, 240hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	T <sub>a</sub> = -20°C, 240hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	T <sub>a</sub> = +80°C, 240hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	T <sub>a</sub> = -30°C, 240hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	T <sub>a</sub> = +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<sub>S</sub> is the temperature of panel's surface.

2. T<sub>a</sub> is the ambient temperature of sample.

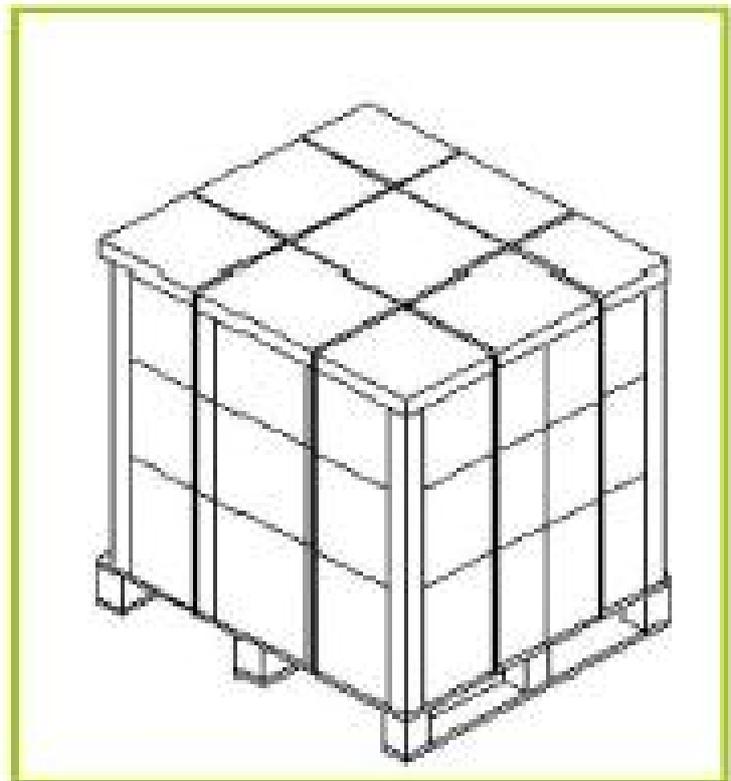
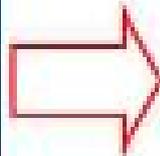
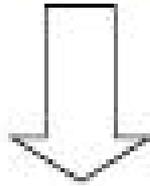
# 9. Mechanical Drawing



REV.	DATE	MODIFICATION
1.0	2019/08/28	Final issue

## 10. 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°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.