



Specification
For
LCD Module
KD096064A2F01--A02

MODULE: KD096064A2F01--A02
CUSTOMER: _____

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1 Overview

KD096064A2F01--A02 is a full color OLED display module with 96(RGB)×64 dot matrix. The characteristics of this display module are high brightness, self-emission, high contrast ratio, slim/thin outline, wide viewing angle, wide temperature range, and low power consumption.

2 Features

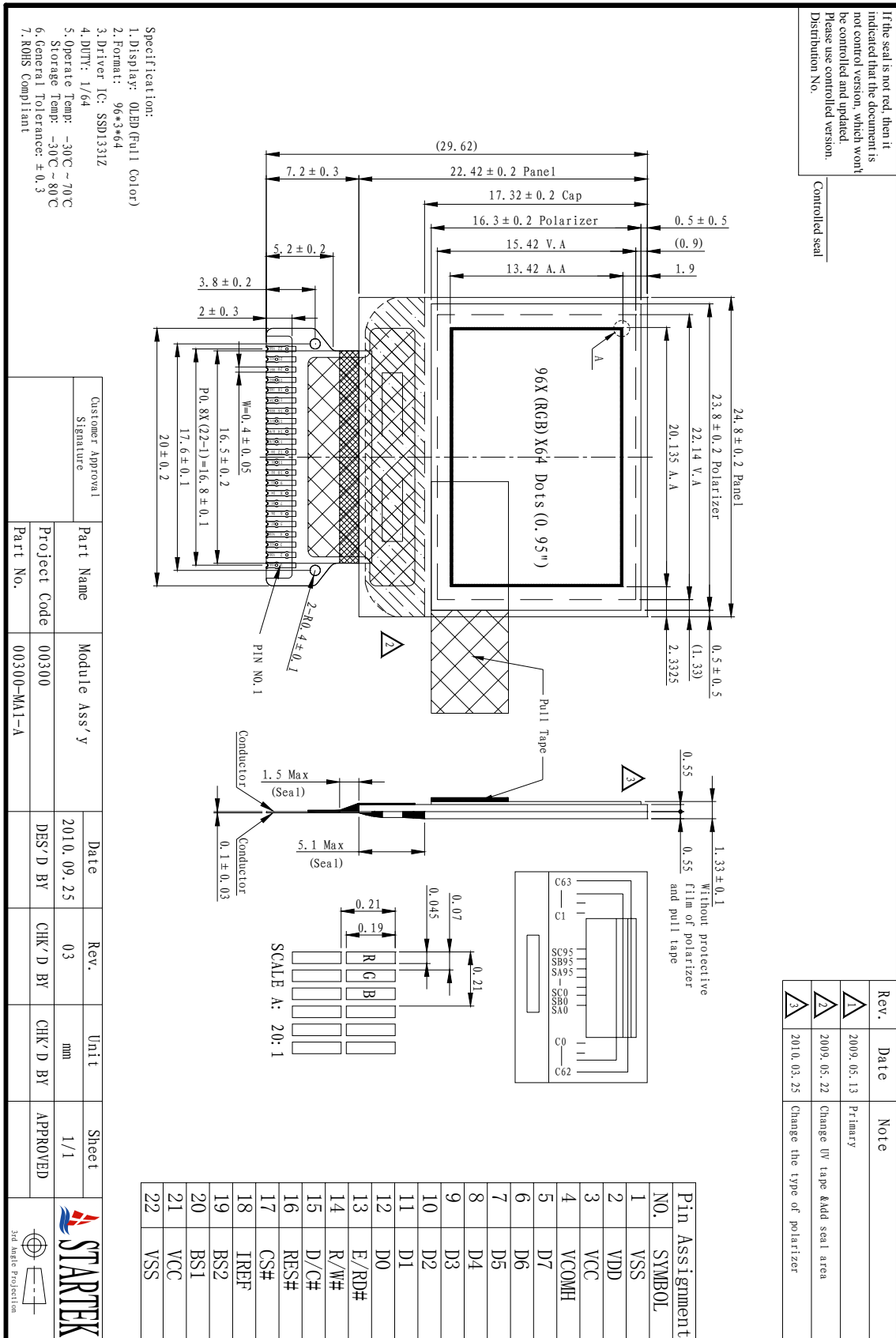
- Display Color: 65k Full Color
- Dot Matrix: 96(RGB)×64
- Driver IC: SSD1331Z
- Interface: 8-bit 6800, 8-bit 8080, SPI
- Wide range of operating temperature: -30°C to 70°C
- Storage Temp: -30°C to 80°C

3 Mechanical Data

NO.	ITEM	SPECIFICATION	UNIT
1	Dot Matrix	96(W)(RGB)×64(H)	-
2	Dot Size	0.045(W)×0.19 (H)	mm ²
3	Dot Pitch	0.07(W)×0.21 (H)	mm ²
4	Aperture Rate	58	%
5	Active Area	20.135(W)×13.42 (H)	mm ²
6	Panel Size	24.8(W)×22.42(H) ×1.1(T)	mm ³
7	Module Size	24.8(W)×29.62(H) ×1.33(T)	mm ³
8	Diagonal A/A Size	0.95	inch
9	Module Weight	1.46 ± 10%	gram



4 Mechanical Drawing





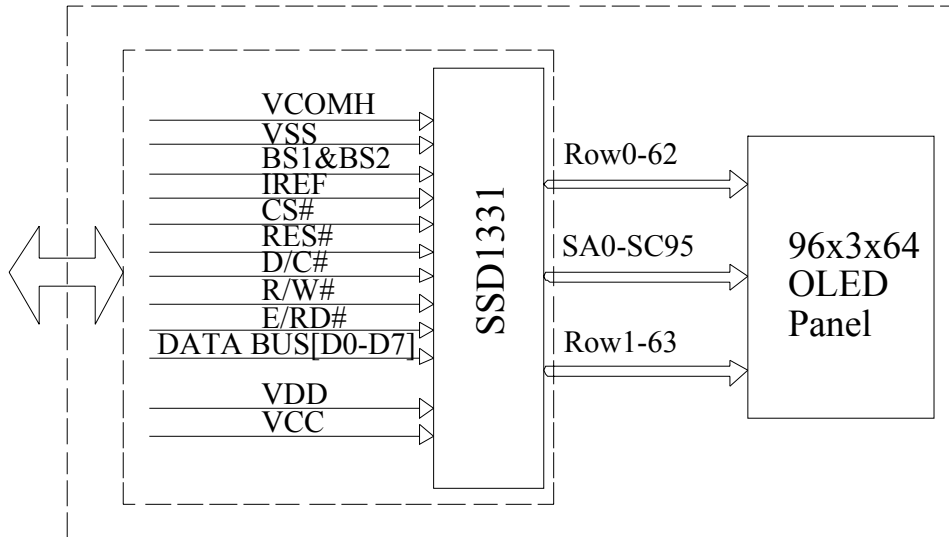
5 Module Interface

PIN NO.	PIN NAME	DESCRIPTION												
1	VSS	Ground.												
2	VDD	Power Supply pin for logic operation of the driver.												
3	VCC	This is the most positive voltage supply pin of the chip.												
4	VCOMH	A capacitor should be connected between this pin and VSS.												
5~12	D7~D0	These are 8-bit bi-directional data bus to be connected to the microprocessor's data bus. When serial interface mode is selected, D0 will be the serial clock input, SCLK; D1 will be the serial data input: SDIN and D2 should be left opened.												
13	E/RD#	This pin is MCU interface input. When interfacing to a 6800-series microprocessor, this pin will be used as the Enable (E) signal. Read/write operation is initiated when this pin is pulled high and the chip is selected.												
14	R/W#	This pin is MCU interface input. When interfacing to a 6800-series microprocessor, this pin will be used as Read/Write (R/W) selection input. Read mode will be carried out when this pin is pulled high and write mode when low.												
15	D/C#	This pin is Data/Command control pin. When the pin is pulled high, the data at D7-D0 is treated as display data. When the pin is pulled low, the data at D7-D0 will be transferred to the command register.												
16	RES#	Reset pin, active low.												
17	CS#	Chip select pin, active low.												
18	IREF	A resistor should be connected between this pin and VSS.												
19	BS2	These are MCU interface input selection pins. See the following table for selecting different interfaces: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Pin Name</th> <th>6800-parallel Interface</th> <th>8080-parallel interface</th> <th>Serial Interface</th> </tr> </thead> <tbody> <tr> <td>BS1</td> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>BS2</td> <td>1</td> <td>1</td> <td>0</td> </tr> </tbody> </table>	Pin Name	6800-parallel Interface	8080-parallel interface	Serial Interface	BS1	0	1	0	BS2	1	1	0
Pin Name	6800-parallel Interface		8080-parallel interface	Serial Interface										
BS1	0		1	0										
BS2	1	1	0											
20	BS1													
21	VCC	This is the most positive voltage supply pin of the chip.												
22	VSS	Ground.												

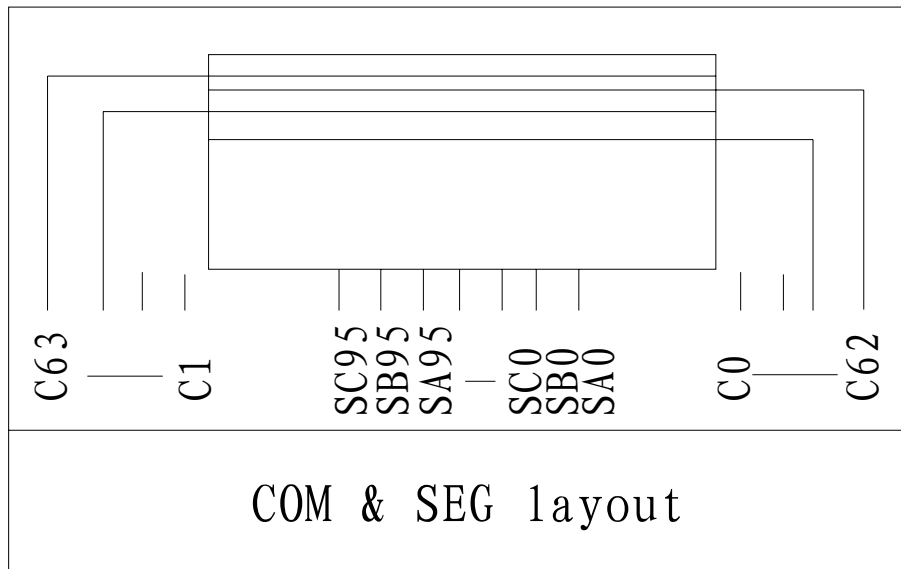


6 Function Block Diagram

6.1 Function Block Diagram



6.2 Panel Layout Diagram





7 Absolute Maximum Ratings

ITEM	SYMBOL	MIN	MAX	UNIT	REMARK
Logic supply voltage	V _{DD}	-0.3	4	V	IC maximum rating
OLED Operating voltage	V _{CC}	0	18	V	IC maximum rating
Operating Temp.	Top	-30	70	°C	-
Storage Temp	Tstg	-30	80	°C	-

Note (1): All of the voltages are on the basis of “VSS = 0V”.

Note (2): Permanent breakage of module may occur if the module is used beyond the maximum rating. The module can be normal operated under the conditions according to Section 8 “Electrical Characteristics”. Malfunctioning of the module may occur and the reliability of the module may deteriorate if the module is used beyond the conditions.



8 Electrical Characteristics

8.1 DC Electrical Characteristics

ITEM	SYMBOL	TEST CONDITION	MIN	TYPE	MAX	UNIT
Logic Supply Voltage	V_{DD}	22±3°C, 55±15%R.H	2.4	2.7	3.5	V
OLED Driver Supply Voltage	V_{CC}	22±3°C, 55±15%R.H	12.5	13	13.5	V
High-level Input Voltage	V_{IH}	-	$0.8 \times V_{DD}$	-	-	V
Low-level Input Voltage	V_{IL}	-	0	-	$0.2 \times V_{DD}$	V
High-level Output Voltage	V_{OH}	-	$0.9 \times V_{DD}$	-	V_{DD}	V
Low-level Output Voltage	V_{OL}	-	0	-	$0.1 \times V_{DD}$	V

Note : The V_{CC} input must be kept in a stable value; ripple and noise are not allowed.



8.2 Electro-optical Characteristics

ITEM	SYMBOL	TEST CONDITION	MIN	TYPE	MAX	UNIT
Normal Mode Brightness	L _{br}	All pixels ON(1)	80	100		cd/m ²
Standby Mode Brightness		Standby Mode 10% pixels ON(2)		10		cd/m ²
Normal Mode Power Consumption	Pt	All pixels ON(1)		170	200	mW
Standby Mode Power Consumption		Standby Mode 10% pixels ON(2)		15		mW
C.I.E(White)	(x)	x,y(CIE1931)	0.26	0.30	0.34	-
	(y)		0.28	0.32	0.36	-
C.I.E(Red)	(x)	x,y(CIE1931)	0.61	0.65	0.69	-
	(y)		0.30	0.34	0.38	-
C.I.E(Green)	(x)	x,y(CIE1931)	0.25	0.29	0.33	-
	(y)		0.54	0.58	0.62	-
C.I.E(Blue)	(x)	x,y(CIE1931)	0.10	0.14	0.18	-
	(y)		0.12	0.16	0.20	-
Dark Room Contrast	CR	-	≥2000:1	-	-	-
Response Time	-	-	---	10	-	μ s
View Angle	-	-	≥160	-	-	Degree

Note(1): Normal Mode test conditions are as follows:

- Driving voltage : 13V
- Contrast setting : R:0xc0 G:0x65 B:0x95
- Frame rate : 105Hz
- Duty setting : 1/64

Note(2): Standby Mode test conditions are as follows:

- Driving voltage : 13V
- Contrast setting : R:0x02 G:0x02 B:0x02
- Frame rate : 105Hz
- Duty setting : 1/64

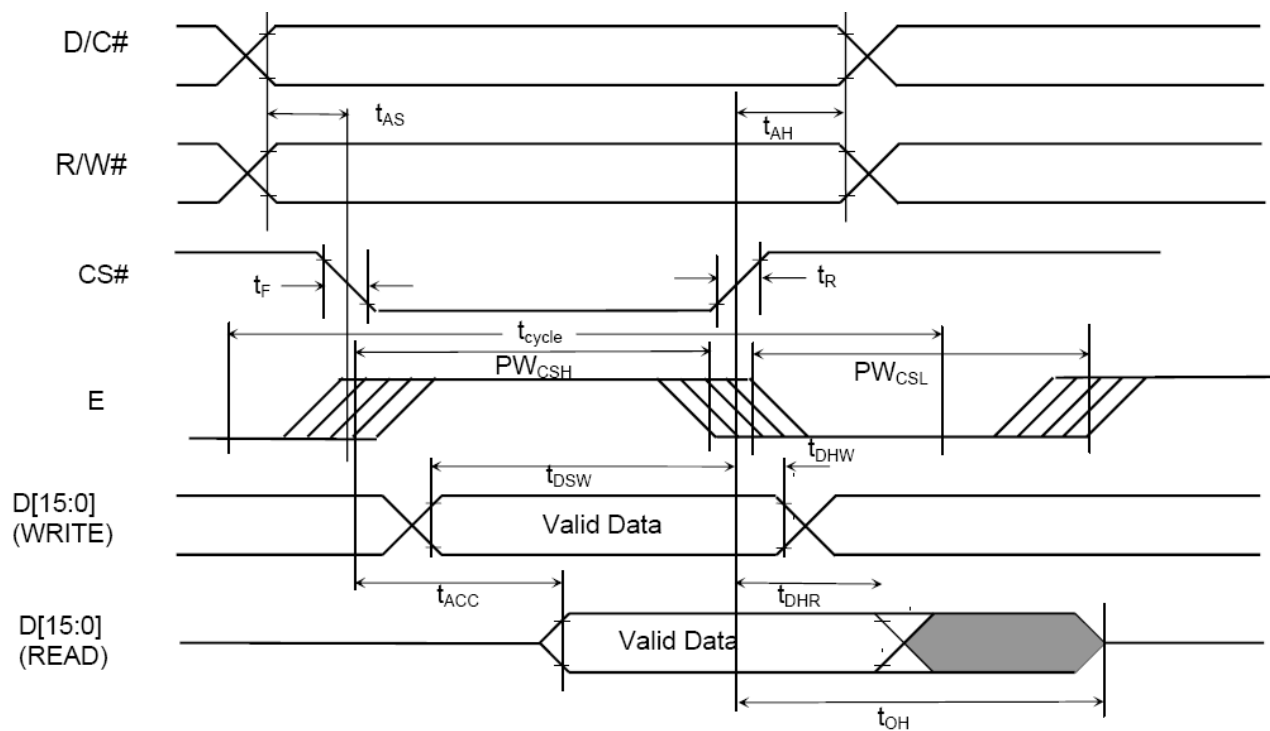


8.3 AC Electrical Characteristics

(1)6800-Series MPU Parallel Interface Timing Characteristics

(VDD - VSS = 2.4V to 3.5V, TA = 25°C)

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time (write cycle)	130	-	-	ns
PW_{CSL}	Control Pulse Low Width (write cycle)	60	-	-	ns
PW_{CSH}	Control Pulse High Width (write cycle)	60	-	-	ns
t_{cycle}	Clock Cycle Time (read cycle)	200	-	-	ns
PW_{CSL}	Control Pulse Low Width (read cycle)	100	-	-	ns
PW_{CSH}	Control Pulse High Width (read cycle)	100	-	-	ns
t_{AS}	Address Setup Time	0	-	-	ns
t_{AH}	Address Hold Time	10	-	-	ns
t_{DSW}	Data Setup Time	40	-	-	ns
t_{DHW}	Data Hold Time	10	-	-	ns
t_{ACC}	Data Access Time	-	-	140	ns
t_{OH}	Output Hold time	-	-	70	ns
t_{R}	Rise Time	-	-	15	ns
t_{F}	Fall Time	-	-	15	ns



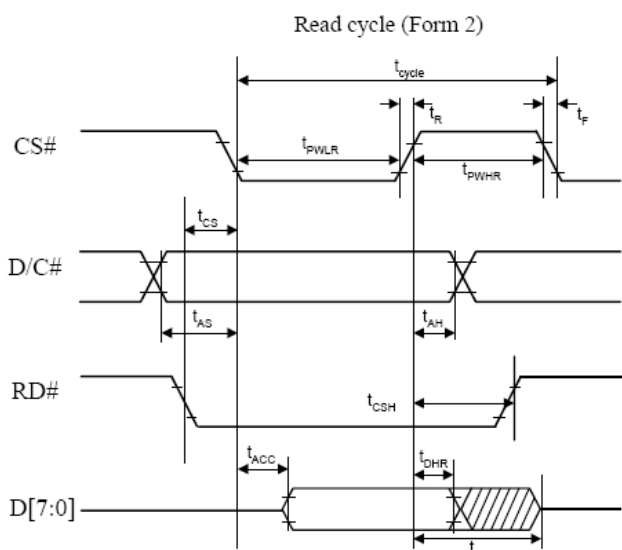
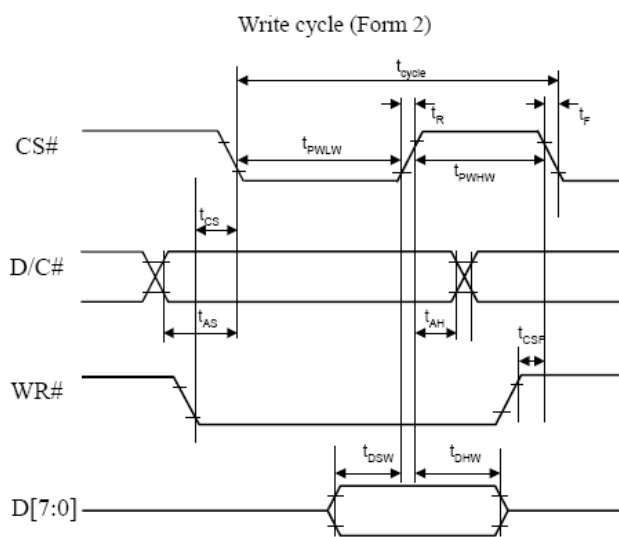
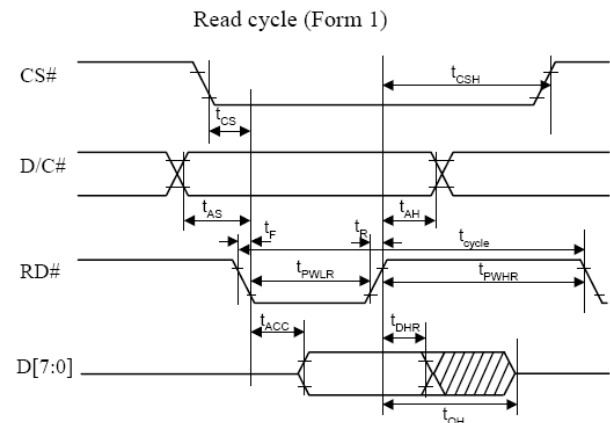
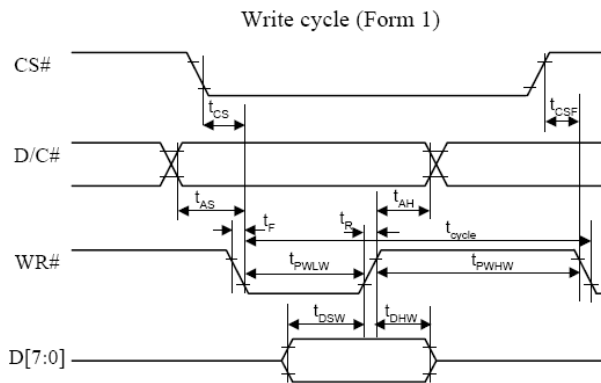
6800-series parallel interface characteristics



(2)8080-Series MPU Parallel Interface Timing Characteristics

(VDD - VSS = 2.4V to 3.5V, TA = 25°C)

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	130	-	-	ns
t_{AS}	Address Setup Time	10	-	-	ns
t_{AH}	Address Hold Time	0	-	-	ns
t_{DSW}	Write Data Setup Time	40	-	-	ns
t_{DHW}	Write Data Hold Time	10	-	-	ns
t_{DHR}	Read Data Hold Time	20	-	-	ns
t_{OH}	Output Disable Time	-	-	70	ns
t_{ACC}	Access Time	-	-	140	ns
t_{PWLR}	Read Low Time	150	-	-	ns
t_{PWLW}	Write Low Time	60	-	-	ns
t_{PWHR}	Read High Time	60	-	-	ns
t_{PWHW}	Write High Time	60	-	-	ns
t_r	Rise Time	-	-	15	ns
t_f	Fall Time	-	-	15	ns
t_{CS}	Chip select setup time	0	-	-	ns
t_{CSH}	Chip select hold time to read signal	0	-	-	ns
t_{CSF}	Chip select hold time	20	-	-	ns



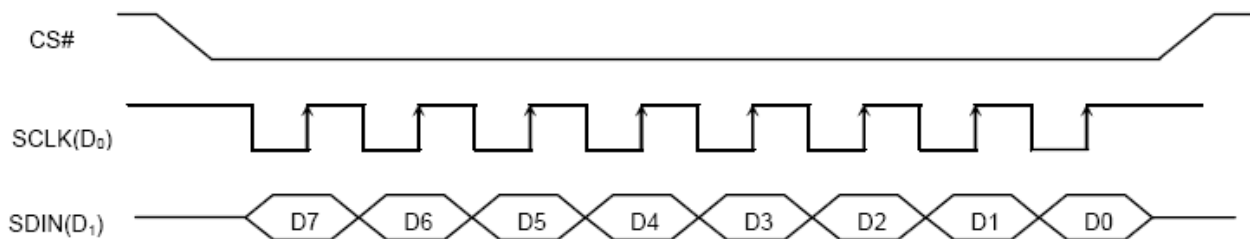
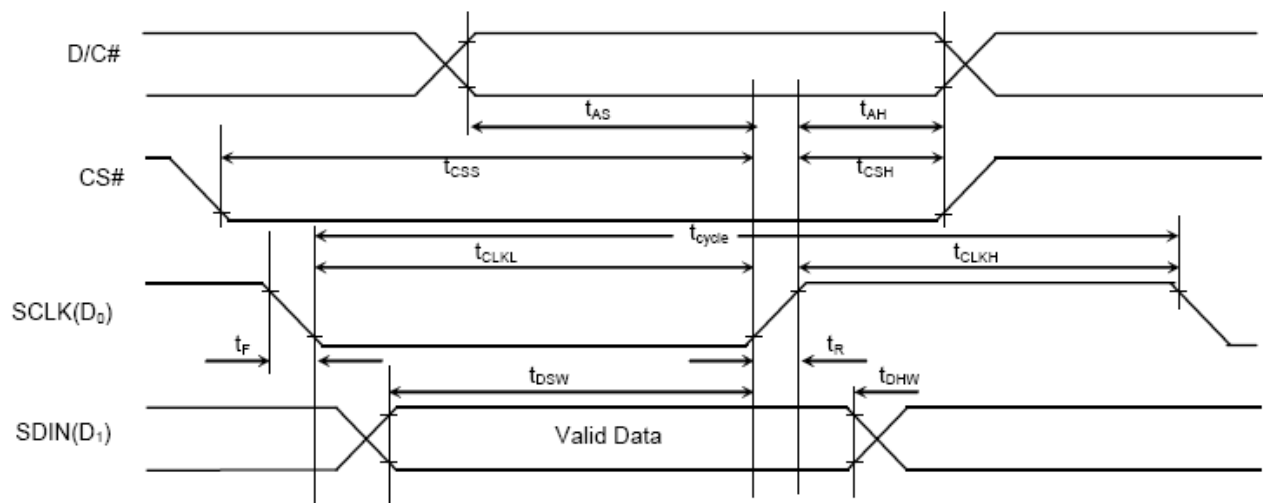
8080-series parallel interface characteristics



(3)-Serial Interface Timing Characteristics

(VDD - VSS = 2.4V to 3.5V, TA = 25°C)

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	150	-	-	ns
t_{AS}	Address Setup Time	40	-	-	ns
t_{AH}	Address Hold Time	40	-	-	ns
t_{CSS}	Chip Select Setup Time	75	-	-	ns
t_{CSH}	Chip Select Hold Time	60	-	-	ns
t_{DSW}	Write Data Setup Time	40	-	-	ns
t_{DHW}	Write Data Hold Time	40	-	-	ns
t_{CLKL}	Clock Low Time	75	-	-	ns
t_{CLKH}	Clock High Time	75	-	-	ns
t_R	Rise Time	-	-	15	ns
t_F	Fall Time	-	-	15	ns



Serial interface characteristics

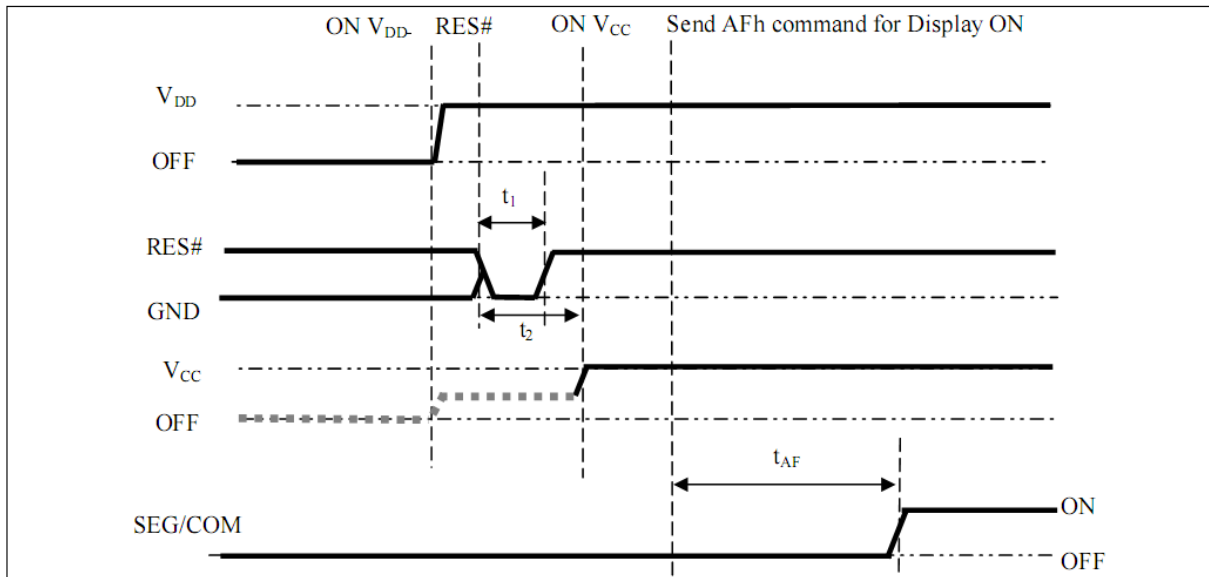


9 Functional Specification and Application Circuit

9.1 Power ON and Power OFF Sequence

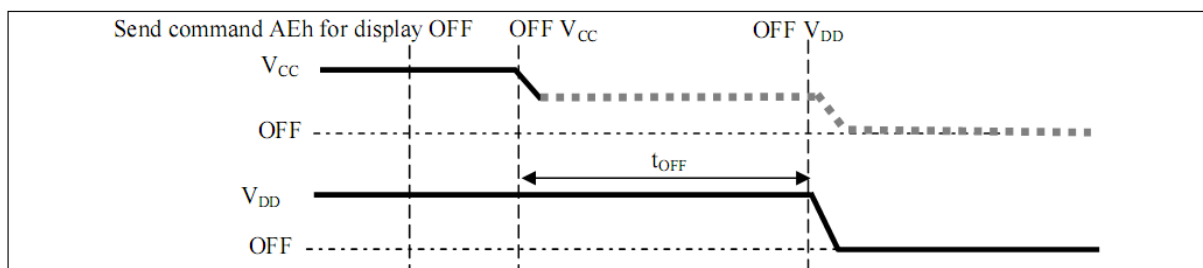
Power ON Sequence:

1. Power ON V_{DD} .
2. After V_{DD} become stable, set RES pin LOW (logic low) for at least $3\mu s$ (t_1)⁽⁴⁾ and then HIGH (logic high).
3. After set RES# pin LOW (logic low), wait for at least $3\mu s$ (t_2). Then Power ON V_{CC} ⁽¹⁾.
4. After V_{CC} become stable, send command AFh for display ON. SEG/COM will be ON after $100ms$ (t_{AF}).



Power OFF Sequence:

1. Send command AEh for display OFF.
2. Power OFF V_{CC} ^{(1),(2),(3)}.
3. Power OFF V_{DD} after t_{OFF} ⁽⁵⁾. (Typical $t_{OFF}=100ms$)



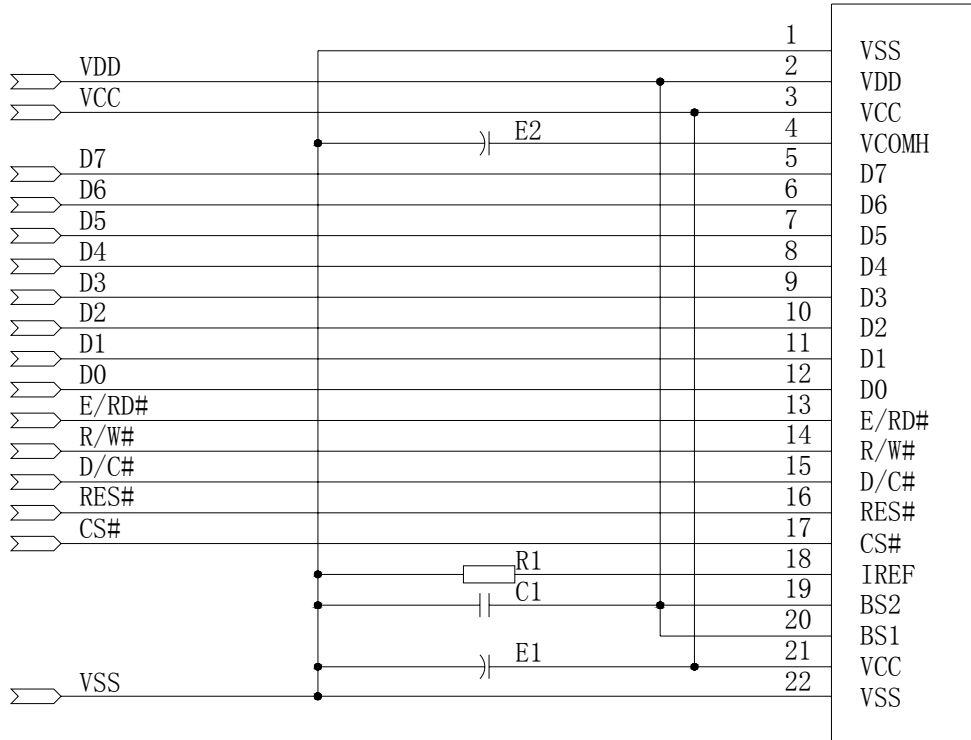
Note:

- (1) Since an ESD protection circuit is connected between V_{DD} and V_{CC} , V_{CC} becomes lower than V_{DD} whenever V_{DD} is ON and V_{CC} is OFF as shown in the dotted line of V_{CC} in above figures.
- (2) V_{CC} should be kept float (disable) when it is OFF.
- (3) Power Pins (V_{DD} , V_{CC}) can never be pulled to ground under any circumstance.
- (4) The register values are reset after t_1 .
- (5) V_{DD} should not be Power OFF before V_{CC} Power OFF.



9.2 Application Circuit

00300



Note: Pin connected to MCU interface: D[7:0], E/RD#, R/W#, D/C#, RES#, CS#

Recommended components

E1, E2: 4.7μF/25V. ROHS (Tantalum Capacitors)

C1: 1uF-0603-X7R ± 10%. ROHS

R1: 910kΩ-0603-1/10W.ROHS



9.3 Display Control Instruction

Refer to SSD1331 IC Specification.

9.4 Recommended Software Initialization

```
void init_SSD1331()
{
    int pwm, delta;
    write_com(0xfd); // command lock
    write_com(0x12);
    write_com(0xae); // display off
    write_com(0xa4); // Normal Display mode
    write_com(0x15); //set column address
    write_com(0x00); //column address start 00
    write_com(0x5f); //column address end 95
    write_com(0x75); //set row address
    write_com(0x00); //row address start 00
    write_com(0x3f); //row address end 63
    write_com(0x87); //master current control
    write_com(0x06); //9/16(160uA)
    write_com(0x83); //Set Contrast for Color R
    write_com(0xc0);
    write_com(0x82); //Set Contrast for Color G
    write_com(0x65);
    write_com(0x81); //Set Contrast for Color B
    write_com(0x95);
    write_com(0x8a);
    write_com(0x61);
    write_com(0x8b);
    write_com(0x62);
    write_com(0x8c);
    write_com(0x63);
    write_com(0xa0); //set re-map & data format
    write_com(0x72); //Horizontal address increment
    write_com(0xa1); //set display start line
    write_com(0x00); //start 00 line
    write_com(0xa2); //set display offset
    write_com(0x00);
    write_com(0xa8); //set multiplex ratio
    write_com(0x3f); //64MUX
```




```
write_com(0xad);
write_com(0x8f);
write_com(0xb0); //set power save
write_com(0x1a); //
write_com(0xb1);
write_com(0xf1); // Phase 2 period Phase 1 period
write_com(0xb3); // Set Display Clock Divide Ratio/ Oscillator Frequency
write_com(0xd0); // 0.97MHZ
write_com(0xbb); // set pre-charge
write_com(0x3e); //
write_com(0xbe); //set Vcomh
write_com(0x3e); //0.83Vref
write_com(0xB9);
write_com(0xB8); //SET Gray Scale Table
pwm = 1;
delta=1;
pwm=pwm; write_com(pwm);//pw1
pwm=pwm+delta; write_com(pwm);//pw3
pwm=pwm+delta; write_com(pwm);//pw5
pwm=pwm+delta; write_com(pwm);//pw7
delta=2;
pwm=pwm+delta; write_com(pwm);//pw9
pwm=pwm+delta; write_com(pwm);//pw11
pwm=pwm+delta; write_com(pwm);//pw13
pwm=pwm+delta; write_com(pwm);//pw15
delta=2;
pwm=pwm+delta; write_com(pwm);//pw17
pwm=pwm+delta; write_com(pwm);//pw19
pwm=pwm+delta; write_com(pwm);//pw21
pwm=pwm+delta; write_com(pwm);//pw23
delta=3;
pwm=pwm+delta; write_com(pwm);//pw25
pwm=pwm+delta; write_com(pwm);//pw27
pwm=pwm+delta; write_com(pwm);//pw29
pwm=pwm+delta; write_com(pwm);//pw31
delta=4;
pwm=pwm+delta; write_com(pwm);//pw33
pwm=pwm+delta; write_com(pwm);//pw35
```

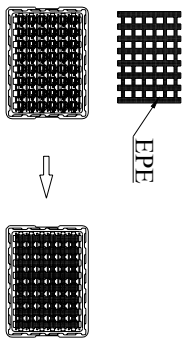
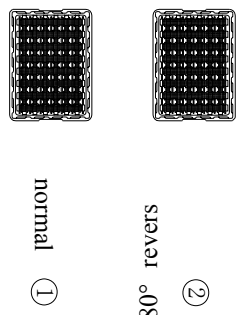
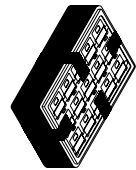
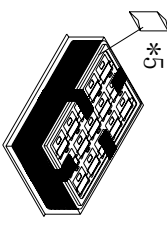
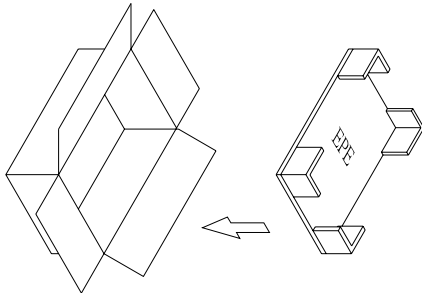
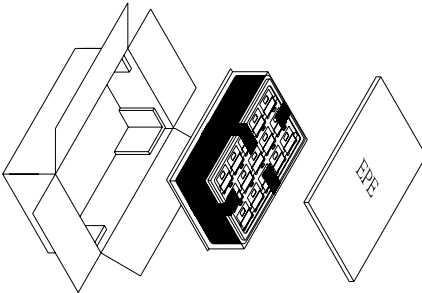
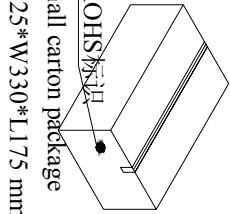
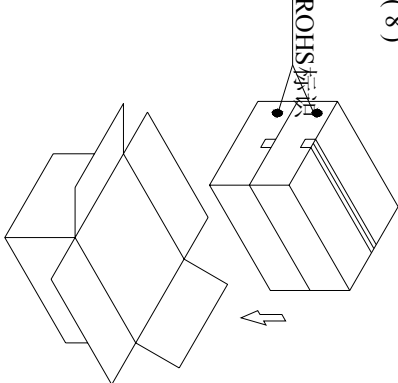
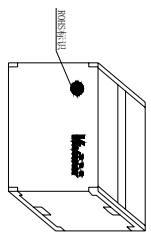


```
pwm=pwm+delta; write_com(pwm);//pw37
pwm=pwm+delta; write_com(pwm);//pw39
delta=5;
pwm=pwm+delta; write_com(pwm);//pw41
pwm=pwm+delta; write_com(pwm);//pw43
pwm=pwm+delta; write_com(pwm);//pw45
pwm=pwm+delta; write_com(pwm);//pw47
delta=6;
pwm=pwm+delta; write_com(pwm);//pw49
pwm=pwm+delta; write_com(pwm);//pw51
pwm=pwm+delta; write_com(pwm);//pw53
pwm=pwm+delta; write_com(pwm);//pw55
delta=7;
pwm=pwm+delta; write_com(pwm);//pw57
pwm=pwm+delta; write_com(pwm);//pw59
pwm=pwm+delta; write_com(pwm);//pw61
pwm=pwm+delta; write_com(pwm);//pw63
TMOD=0X01;
TH0=0x3c;
TL0=0xb0;
EA=1;
ET0=1;
TR0=1;
write_com(0xad);    //Select external VCC supply at Display ON
write_com(0x8e);    //Select External VP voltage supply
write_com(0xaf);    //display on
}
```



10 Package Specification

Package order(1)~(9)

<p>(1) Tray: 370*273 t=0.8mm Add EPE in every contained tray</p> 	<p>(2)</p>  <p>normal ① sliver ②</p> <p>TRAY</p>	<p>(3) order ①、②、①、② fix trays with tape Package quantity products: 702 pcs of 1 small carton 1 tray contain 54 pcs 13 contained trays, 1 empty tray</p> 	<p>(4) package with plastic bags add five desiccants create a power vacuum</p>  <p>*5</p>
<p>(5)</p> 	<p>(6)</p> 	<p>(7)</p>  <p>ROHS 标识 small carton package L425*W330*L175 mm</p>	<p>(8)</p>  <p>ROHS 标识 2 small cartons in 1 big carton</p>
<p>(9)</p> <p>26 contained trays, 2 empty trays, Package quantity products: 1404 pcs of 1 big carton</p>  <p>Package finished L450*W350*L360 mm</p>	<p>NOTE:Tape on the small carton & big carton</p>		



11 Reliability

11.1 Reliability Test

NO.	ITEM	CONDITION	QUANTITY
1	High Temperature (Non-operation)	80°C,240hrs	4
2	Low Temperature (Non-operation)	-30°C,240hrs	4
3	High Temperature (Operation)	70°C,240hrs	4
4	Low Temperature (Operation)	-30°C,240hrs	4
5	High Temperature / High Humidity (Operation)	60°C,90%RH,240hrs	4
6	Thermal shock (Non-operation)	-30°C~80°C(-30°C/30min;transit/3min;80°C/30min;transit/3min) 1cycle: 66min,30cycles	4
7	Vibration	Frequency: 5~50Hz,0.5G Scan rate: 1 oct/min Time: 2 hrs/axis Test axis: X,Y, Z	1 Carton
8	Drop	Height: 100 cm Sequence: 1 angle, 3 edges and 6 faces	1 Carton

Test and measurement conditions

- All measurements shall not be started until the specimens attain to temperature stability, the stable time is at least 15 minutes.
- The degradation of polarizer is ignored for item 5.
- The tolerance of temperature is $\pm 3^{\circ}\text{C}$, and the tolerance of relative humidity is $\pm 5\%$.

Evaluation criteria

- The function test is OK.
- No observable defects.
- Luminance: $\geq 50\%$ of initial value.
- Current consumption: within $\pm 50\%$ of initial value.

11.2 Lifetime

End of lifetime is specified as 50% of initial brightness and the test pattern at operating condition is 50% alternating checkerboard.

ITEM	MIN	MAX	UNIT	CONDITION
Operation Life Time	16000	-	hrs	100 cd/m ² ,50% Checkerboard



13 Outgoing Quality Control Specifications

13.1 Sampling Method

- (1) GB/T 2828.1-2003/ISO2859-1: 1999, inspection level II , normal inspection, single sample inspection
- (2) AQL: Major 0.65; Minor 1.0

13.2 Inspection Conditions

The environmental conditions for test and measurement are performed as follows.

Temperature: $22\pm 3^{\circ}\text{C}$

Humidity: $55\pm 15\%\text{R.H}$

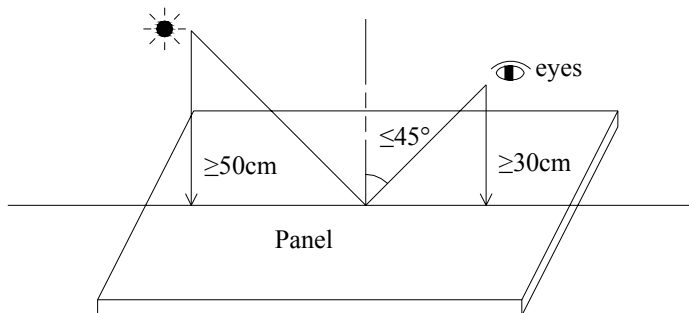
Fluorescent Lamp: 30W

Distance between the Panel & Lamp: $\geq 50\text{cm}$

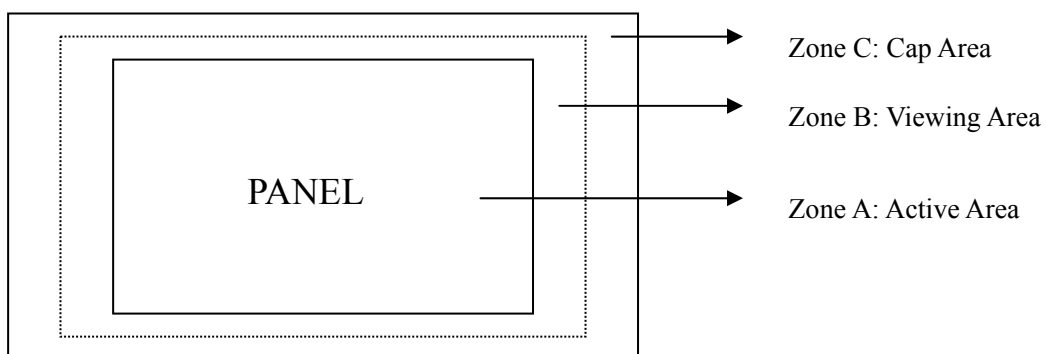
Distance between the Panel & Eyes: $\geq 30\text{cm}$

Viewing angle from the vertical in each direction: $\leq 45^{\circ}$

(See the sketch below)



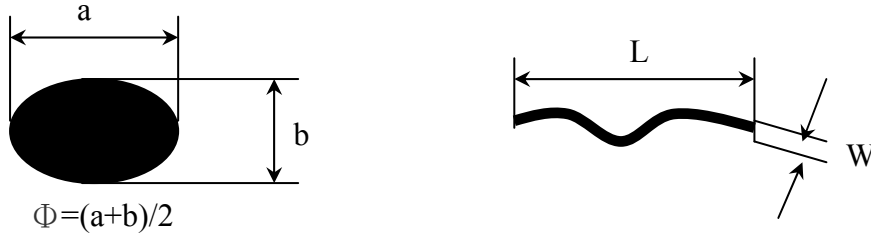
13.3 Quality Assurance Zones





13.4 Inspection Standard

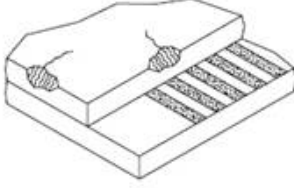
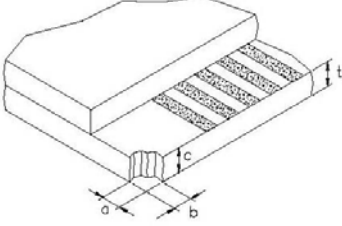
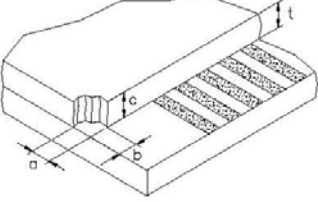
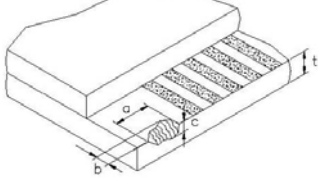
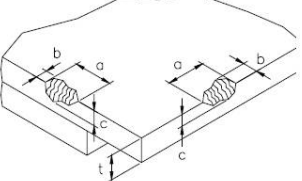
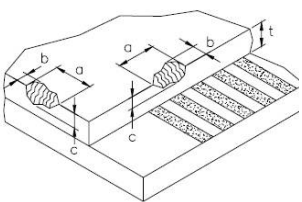
Definition of Φ &L&W (Unit: mm)



I . Appearance Defects

NO.	ITEM	CRITERIA	CLASSIFICATION																
1	Polarizer Black or White spot, Dirty spot, Foreign matter, Dent on the polarizer	<table border="1"> <thead> <tr> <th rowspan="2">Average Diameter (mm)</th> <th colspan="2">Acceptable Number</th> </tr> <tr> <th>Zone A,B</th> <th>Zone C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.15$</td> <td>Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td>$0.15 < \Phi \leq 0.30$</td> <td>3</td> </tr> <tr> <td>$\Phi > 0.30$</td> <td>0</td> </tr> </tbody> </table>	Average Diameter (mm)	Acceptable Number		Zone A,B	Zone C	$\Phi \leq 0.15$	Ignore	Ignore	$0.15 < \Phi \leq 0.30$	3	$\Phi > 0.30$	0	Minor				
Average Diameter (mm)	Acceptable Number																		
	Zone A,B	Zone C																	
$\Phi \leq 0.15$	Ignore	Ignore																	
$0.15 < \Phi \leq 0.30$	3																		
$\Phi > 0.30$	0																		
2	Scratch/line on the glass/Polarizer	<table border="1"> <thead> <tr> <th rowspan="2">Width (mm)</th> <th rowspan="2">Length (mm)</th> <th colspan="2">Acceptable Number</th> </tr> <tr> <th>Zone A,B</th> <th>Zone C</th> </tr> </thead> <tbody> <tr> <td>$W \leq 0.03$</td> <td>---</td> <td>Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td>$0.03 < W \leq 0.08$</td> <td>$L \leq 5.0$</td> <td>3</td> </tr> <tr> <td>$W > 0.08$</td> <td>---</td> <td>0</td> </tr> </tbody> </table>	Width (mm)	Length (mm)	Acceptable Number		Zone A,B	Zone C	$W \leq 0.03$	---	Ignore	Ignore	$0.03 < W \leq 0.08$	$L \leq 5.0$	3	$W > 0.08$	---	0	Minor
Width (mm)	Length (mm)	Acceptable Number																	
		Zone A,B	Zone C																
$W \leq 0.03$	---	Ignore	Ignore																
$0.03 < W \leq 0.08$	$L \leq 5.0$	3																	
$W > 0.08$	---	0																	
3	Polarizer Bubble	<table border="1"> <thead> <tr> <th rowspan="2">Average Diameter (mm)</th> <th colspan="2">Acceptable Number</th> </tr> <tr> <th>Zone A,B</th> <th>Zone C</th> </tr> </thead> <tbody> <tr> <td>$\Phi > 0.5$</td> <td>0</td> <td rowspan="3">Ignore</td> </tr> <tr> <td>$0.2 < \Phi \leq 0.5$</td> <td>3</td> </tr> <tr> <td>$\Phi \leq 0.2$</td> <td>Ignore</td> </tr> </tbody> </table>	Average Diameter (mm)	Acceptable Number		Zone A,B	Zone C	$\Phi > 0.5$	0	Ignore	$0.2 < \Phi \leq 0.5$	3	$\Phi \leq 0.2$	Ignore	Minor				
Average Diameter (mm)	Acceptable Number																		
	Zone A,B	Zone C																	
$\Phi > 0.5$	0	Ignore																	
$0.2 < \Phi \leq 0.5$	3																		
$\Phi \leq 0.2$	Ignore																		
4	Any Dirt & Scratch on Polarizer's Protective Film	Ignore for not affect the polarizer.	Acceptable																
5	Any Dirt on Cap Glass	<table border="1"> <thead> <tr> <th>Average Diameter (mm)</th> <th>Acceptable Number</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.5$</td> <td>Ignore</td> </tr> <tr> <td>$0.5 < \Phi \leq 1.0$</td> <td>3</td> </tr> <tr> <td>$\Phi > 1.0$</td> <td>0</td> </tr> </tbody> </table>	Average Diameter (mm)	Acceptable Number	$\Phi \leq 0.5$	Ignore	$0.5 < \Phi \leq 1.0$	3	$\Phi > 1.0$	0	Minor								
Average Diameter (mm)	Acceptable Number																		
$\Phi \leq 0.5$	Ignore																		
$0.5 < \Phi \leq 1.0$	3																		
$\Phi > 1.0$	0																		



5	Glass Crack	 <p>Propagation crack is not acceptable.</p>	Major
6	Corner Chip	 <p>t= Glass thickness Accept $a \leq 2.0\text{mm}$ or $b \leq 2.0\text{mm}$, $c \leq t$</p>	Minor
7	Corner Chip on Cap Glass	 <p>t= Glass thickness Accept $a \leq 1.5\text{mm}$ or $b \leq 1.5\text{mm}$, $c \leq t$</p>	Minor
8	Chip on Contact Pad	 <p>t= Glass thickness Accept $a \leq 3.0\text{mm}$ or $b \leq 0.8\text{mm}$, $c \leq t$ (on the contact pin) $a \leq 3.0\text{mm}$ or $b \leq 1.5\text{mm}$, $c \leq t$ (outside of the contact pin)</p>	Minor
9	Chip on Face of Display	 <p>t= Glass thickness Accept $a \leq 1.5\text{mm}$ or $b \leq 1.5\text{mm}$, $c \leq t$</p>	Minor
10	Chip on Cap Glass	 <p>t= Glass thickness Accept $a \leq 3.0\text{mm}$ or $b \leq 3.0\text{mm}$, $c \leq t/2$ $a \leq 1.5\text{mm}$ or $b \leq 1.5\text{mm}$, $t/2 \leq c \leq t$</p>	Minor
11	Stain on Surface	Stain removable by soft cloth or air blow is acceptable.	Minor
12	TCP/FPC Damage	<p>(1) Crack, deep scratch, deep hole and deep pressure mark on the TCP/FPC are not acceptable.</p> <p>(2) Terminal lead twisted or broken is not allowable.</p> <p>(3) Copper exposed is not allowed by naked eye inspection.</p>	Minor
13	Dimension Unconformity	Checking by mechanical drawing.	Major



II. Displaying Defects

NO.	ITEM	CRITERIA	CLASSIFICATION												
1	Black/White spot Dirty spot Foreign matter	<table border="1"><thead><tr><th rowspan="2">Average Diameter (mm)</th><th colspan="2">Pieces Permitted</th></tr><tr><th>Zone A,B</th><th>Zone C</th></tr></thead><tbody><tr><td>$\Phi \leq 0.10$</td><td>Ignore</td><td rowspan="3">Ignore</td></tr><tr><td>$0.10 < \Phi \leq 0.20$</td><td>3</td></tr><tr><td>$\Phi > 0.20$</td><td>0</td></tr></tbody></table>	Average Diameter (mm)	Pieces Permitted		Zone A,B	Zone C	$\Phi \leq 0.10$	Ignore	Ignore	$0.10 < \Phi \leq 0.20$	3	$\Phi > 0.20$	0	Minor
		Average Diameter (mm)		Pieces Permitted											
			Zone A,B	Zone C											
		$\Phi \leq 0.10$	Ignore	Ignore											
$0.10 < \Phi \leq 0.20$	3														
$\Phi > 0.20$	0														
2	No Display	Not allowable.	Major												
3	Irregular Display	Not allowable.	Major												
4	Missing Line (row or column)	Not allowable.	Major												
5	Short	Not allowable.	Major												
6	Flicker	Not allowable.	Major												
7	Abnormal Color	Refer to the SPEC.	Major												
8	Luminance NG	Refer to the SPEC.	Major												
9	Over Current	Refer to the SPEC.	Major												



14 Precautions for operation and Storage

14.1 Precautions for Operation

- (1) Since OLED panel is made of glass, do not apply any mechanical shock or impact or excessive force to it when installing the OLED module. Any strong mechanical impact due to falling dropping etc. may cause damage (breakage or cracking).
- (2) The polarizer on the OLED surface is made of soft material and is easily scratched. Please take most care when handing. When the surface of the polarizer of OLED Module is contaminated, please wipe it off gently by using moisten soft cloth with isopropyl alcohol, do not use water, ketone or aromatics. If there is saliva or water on the OLED surface, please wipe it off immediately.
- (3) When handling OLED module, please be sure that the body and the tools are properly grounded. And do not touch I/O pins with bare hands or contaminate I/O pins, it will cause disconnection or defective insulation of terminals.
- (4) Do not attempt to disassemble or process the OLED module.
- (5) OLED module should be used under recommended operating conditions shown in the specification. Since the higher voltage leads to the shorter lifetime, be sure to use the specified operating voltage.
- (6) Foggy dew, moisture condensation or water droplets deposited on surface and contact terminals will cause polarizer stain or damage, the deteriorated display quality and electrochemical reaction then leads to shorter life time and permanent damage to the module probably. Please pay attention to the environmental temperature and humidity.
- (7) An afterimage is created by the difference in brightness between unused dot and the fixed dot, according to the decrease of brightness of the emitting time. Therefore, to avoid having an afterimage, the full set should be thoroughly used instead of using a fixed dot. When the fixed dot emits, an afterimage can be created.
- (8) Flicker could be come out at full on display. And it disappears when frame frequency increase, but brightness decreases too.

14.2 Soldering

- (1) Soldering should be performed only on the I/O terminals.
- (2) Use soldering irons with proper grounding and no leakage.
- (3) Iron: no higher than 300°C and 3~4 sec during soldering.

14.3 Precautions for Storage

- (1) Please store OLED module in a dark place. Avoid exposure to sunlight, the light of fluorescent lamp or any ultraviolet ray.
- (2) Keep the environment temperature between 10°C and 35°C and the relative humidity less than 60%. Avoid high temperature and high humidity.
- (3) Keep the OLED modules stored in the container when shipped from supplier before using them is recommended.
- (4) Do not leave any article on the OLED module surface for an extended period of time.

14.4 Warranty period

Visionox Display Co., Ltd. warrants for a period of 12 months from the shipping date when stored or used under normal condition.