
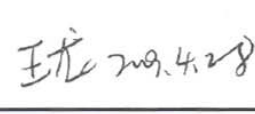
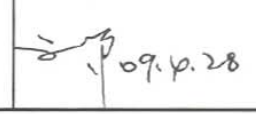
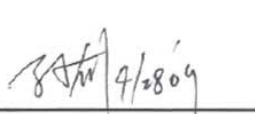


# Product Specification

**Product Name:** VGM128064A0G02

**Product Code:** M00013

<b>Customer</b>
<b>Approved by Customer</b>
<b>Approved Date:</b>

Designed By	Checked By	Approved By	
		R&D	QA
 2009.4.28	 2009.4.28	 2009.4.28	 4/28/09

---

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**REVISION RECORD**

<b>REV.</b>	<b>REVISION DESCRIPTION</b>	<b>REV. DATE</b>	<b>REMARK</b>
E01	Initial release.	2008-11-05	
Y01	Updata content.	2009-04-28	

## 1 Overview

VGM128064A0G02 is an OLED grayscale 128×64 dot matrix display module. 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: Green
- Dot Matrix:128×64
- Driver IC: SSD1325T6R1
- Interface:8-bit 8080,8-bit 6800, SPI
- Wide range of operating temperature: -30°C-70°C

## 3 Mechanical Data

NO.	ITEM	SPECIFICATION	UNIT
1	Dot Matrix	128(W)×64(H)	-
2	Dot Size	0.455(W)×0.455 (H)	mm <sup>2</sup>
3	Dot Pitch	0.48(W)×0.48 (H)	mm <sup>2</sup>
4	Aperture Rate	89.95	%
5	Active Area	61.41(W)×30.69 (H)	mm <sup>2</sup>
6	Panel Size	73.0(W)×41.86 (H)	mm <sup>2</sup>
7	Module Size	According to the annexed mechanical drawing	mm <sup>3</sup>
8	Diagonal A/A Size	2.70	inch
9	Module Weight	12.9±10%	gram

### 4 Mechanical Drawing

如本印章非红色,则表明该文件为非受控版本,不会受到控制和更新.请使用受控文件.  
分发号:

受控章

Dots: 128\*64  
2.7"

73.0±0.2 Panel  
72.0±0.2 Polarizer  
63.4±V.A  
61.4±A.A  
0.5±0.5  
(4.8)  
(5.8)  
0.5±0.5  
2.1±0.1  
Without polarizer protective film and pull tape  
0.7  
1.1

41.86±0.2 Panel  
39.5±0.2 Cap  
38.5±0.2 Polarizer  
32.69 V.A  
30.69 A.A  
0.5±0.5  
2.19  
3.19

14.80±0.3  
9.30±0.3  
4.00±0.2  
1.80±0.3  
0.70±0.3  
22.0±0.1 Hole  
27.83  
31  
w=0.40±0.05  
PQ.845\*(31-1)=25.35±0.05

2°±1 (0.5±0.05)  
Bending Area  
S.1

Display Side  
Pull Tape  
Silicones  
1.0 Max  
1.5 Max  
Conductive

Segment0 Column128  
Comments Remarks  
Rev.1  
Segment4 Column128  
Comments Remarks  
Rev.2

Detail A

0.48  
0.455  
0.48  
0.455

Specification

1. Display: OLED (Green)
2. Format: 128\*64
3. Driver IC: SSD1325T6R1
4. General Tolerance: ±0.3
5. Operate temp: -30°C ~ 70°C
6. Storage temp: -30°C ~ 80°C
7. RoHS Compliant

Customer Approval Signature	Part Name	Module ass'y	Date	Rev.	Unit	Sheet
	Project Code	00013	2009.04.27	02	mm	1/1
	Part No.	00013-MA1-A	DES' D BY	CHK' D BY	CHK' D BY	APPROVED

Rev.	Date	Note
1	2008.11.14	Primary
2	2009.04.27	Modify COM & SEG Layout

No.	SYMBOL	Pin Assignment
1	NC	NC
2	VCC	VCC
3	VCOMH	VCOMH
4	REF	REF
5	D7	D7
6	D6	D6
7	D5	D5
8	D4	D4
9	D3	D3
10	D2	D2
11	D1	D1
12	D0	D0
13	RD	RD
14	R/W	R/W
15	D/C	D/C
16	RES	RES
17	CS	CS
18	NC	NC
19	BS2	BS2
20	BS1	BS1
21	VDD	VDD
22	NC	NC
23	NC	NC
24	NC	NC
25	VBREF	VBREF
26	RESE	RESE
27	FB	FB
28	VDDB	VDDB
29	GDR	GDR
30	VSS	VSS
31	VSL	VSL

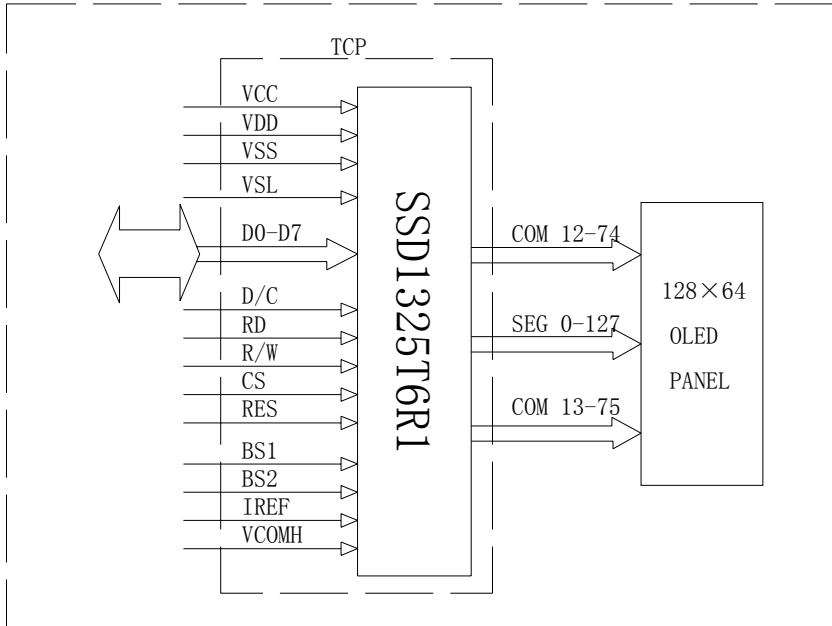
3rd Angle Projection

## 5 Module Interface

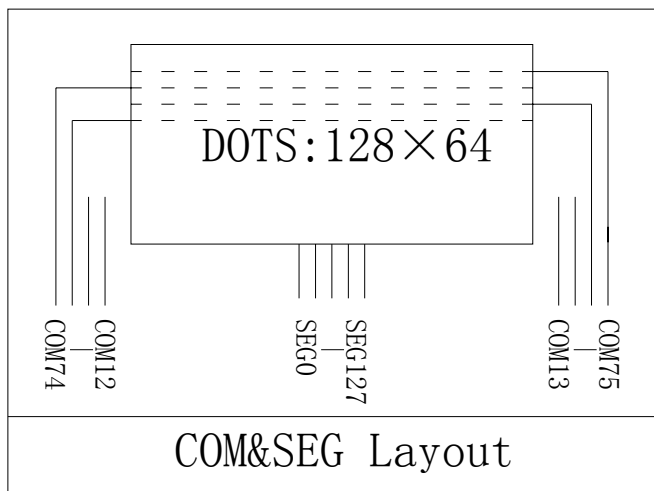
PIN NO.	PIN NAME	DESCRIPTION													
1	NC	No Connection.													
2	VCC	OLED drive voltage, it should be supplied externally.													
3	VCOMH	This is an input pin for the voltage output high level for COM signals. A capacitor should be connected between this pin and VSS.													
4	IREF	This is a segment current reference pin. A resistor should be connected between this pin and VSS. Set the current at 10uA.													
5	D7	Data bus. When serial interface mode is selected, D0 will be the serial clock input, SCLK; D1 will be the serial data input: SDIN.													
6	D6														
7	D5														
8	D4														
9	D3														
10	D2														
11	D1														
12	D0														
13	RD	8080: data read enable pin; 6800: Read/Write enable pin.													
14	R/W	8080: data write enable pin; 6800: Read/Write select pin.													
15	D/C	Data/Command Select. H: Data; L: Command.													
16	RES	Reset, active low.													
17	CS	Chip Select, active low.													
18	NC	No Connection.													
19	BS2	These are MCU interface input selection pins. See the following table for selecting different interfaces:													
20	BS1		<table border="1"> <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												
21	VDD	Power supply pin for core logic operation.													
22	NC	No connection.													
23	NC														
24	NC														
25	VBREF	Reserved pin; No connection and left float.													
26	RESE	This pin connects to the source current pin of the external NMOS of the booster circuit.													
27	FB	This is a reserved pin. It should be kept NC (i.e. Float during normal operation).													
28	VDDDB	This is a reserved pin. It must be connected to VDD.													
29	GDR	This is a reserved pin. It should be kept NC (i.e. Float during normal operation).													
30	VSS	Ground.													
31	VSL	Output pin for the voltage output low level for SEG signals. A capacitor should be connected between this pin and VSS.													

## 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 <sub>DD</sub>	-0.3	+4.0	V	IC maximum rating
OLED Operating voltage	V <sub>CC</sub>	0	+15	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 <sub>DD</sub>	22±3°C, 55±15%R.H	2.4	3.0	3.5	V
OLED Driver Supply Voltage	V <sub>CC</sub>	22±3°C, 55±15%R.H	11.5	12	12.5	V
High-level Input Voltage	V <sub>IH</sub>	-	0.8 × V <sub>DD</sub>	-	-	V
Low-level Input Voltage	V <sub>IL</sub>	-	0	-	0.2 × V <sub>DD</sub>	V
High-level Output Voltage	V <sub>OH</sub>	-	0.9 × V <sub>DD</sub>	-	-	V
Low-level Output Voltage	V <sub>OL</sub>	-	0	-	0.1 × V <sub>DD</sub>	V

Note : The V<sub>CC</sub> 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 <sub>br</sub>	All pixels ON(1)	TBD	60	-	cd/m <sup>2</sup>
Standby Mode Brightness		Standby Mode 10% pixels ON(2)	-	TBD	-	cd/m <sup>2</sup>
Normal Mode Power Consumption	Pt	All pixels ON(1)	-	TBD	TBD	mW
Standby Mode Power Consumption		Standby Mode 10% pixels ON(2)	-	TBD	-	mW
C.I.E(Green)	(x)	x,y(CIE1931)	TBD	TBD	TBD	-
	(y)		TBD	TBD	TBD	-
Dark Room Contrast	CR	-	≥2000:1	-	-	-
Response Time	-	-	---	10	-	μs
View Angle	-	-	≥160	-	-	Degree

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

- Driving voltage : 12V
- Contrast setting : TBD
- Frame rate : TBD
- Duty setting : 1/64

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

- Driving voltage : 12V
- Contrast setting : TBD
- Frame rate : TBD
- Duty setting : 1/64

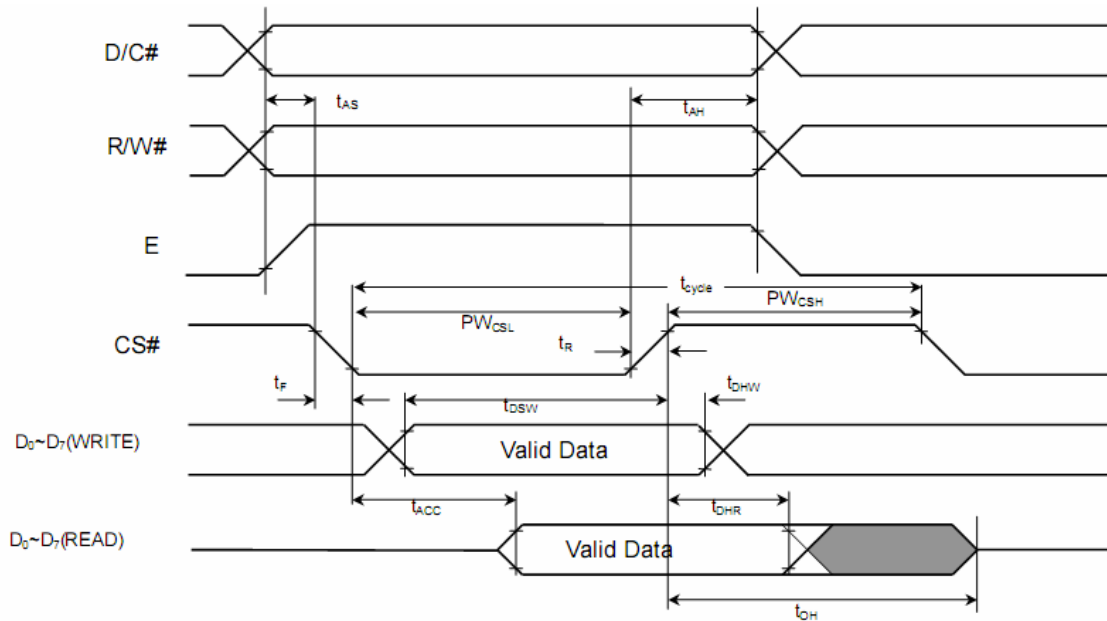
### 8.3 AC Electrical Characteristics

#### (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	300	-	-	ns
$t_{AS}$	Address Setup Time	0	-	-	ns
$t_{AH}$	Address Hold Time	0	-	-	ns
$t_{DSW}$	Write Data Setup Time	40	-	-	ns
$t_{DHW}$	Write Data Hold Time	15	-	-	ns
$t_{DHR}$	Read Data Hold Time	20	-	-	ns
$t_{OH}$	Output Disable Time	-	-	70	ns
$t_{ACC}$	Access Time	-	-	140	ns
$PW_{CSL}$	Chip Select Low Pulse Width (read) Chip Select Low Pulse Width (write)	120 60	-	-	ns
$PW_{CSH}$	Chip Select High Pulse Width (read) Chip Select High Pulse Width (write)	60 60	-	-	ns
$t_R$	Rise Time	-	-	15	ns
$t_F$	Fall Time	-	-	15	ns

6800-series MCU parallel interface characteristics

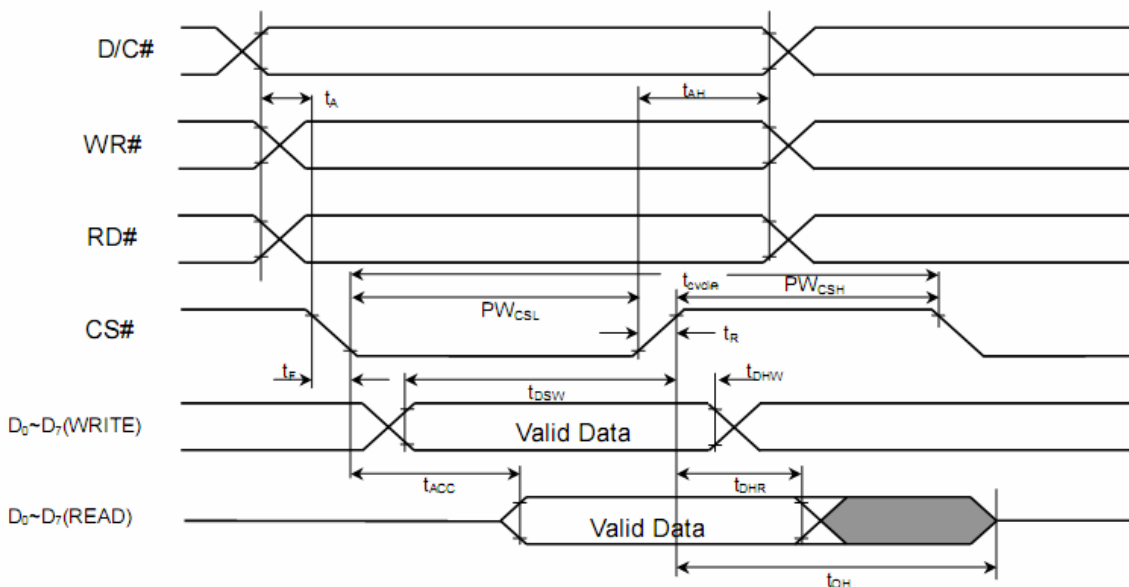


**(2)8080-Series MPU Parallel Interface Timing Characteristics**

(VDD - VSS = 2.4V to 3.5V, TA = 25°C)

Symbol	Parameter	Min	Typ	Max	Unit
$t_{cycle}$	Clock Cycle Time	300	-	-	ns
$t_{AS}$	Address Setup Time	0	-	-	ns
$t_{AH}$	Address Hold Time	0	-	-	ns
$t_{DSW}$	Write Data Setup Time	40	-	-	ns
$t_{DHW}$	Write Data Hold Time	15	-	-	ns
$t_{DHR}$	Read Data Hold Time	20	-	-	ns
$t_{OH}$	Output Disable Time	-	-	70	ns
$t_{ACC}$	Access Time	-	-	140	ns
$PW_{CSL}$	Chip Select Low Pulse Width (read) Chip Select Low Pulse Width (write)	120 60	-	-	ns
$PW_{CSH}$	Chip Select High Pulse Width (read) Chip Select High Pulse Width (write)	60 60	-	-	ns
$t_R$	Rise Time	-	-	15	ns
$t_F$	Fall Time	-	-	15	ns

**8080-series MPU parallel interface characteristics**

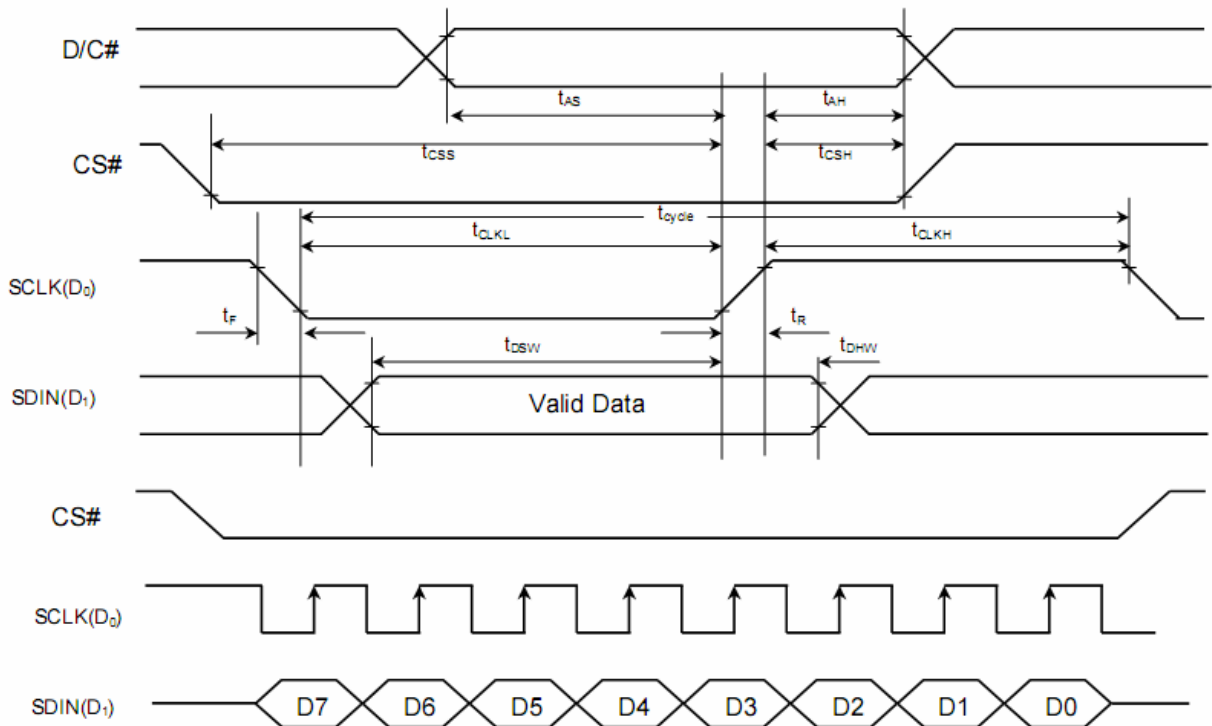


**(3)Serial Interface Timing Characteristics**

(VDD - VSS = 2.4V to 3.5V, TA = 25°C)

Symbol	Parameter	Min	Typ	Max	Unit
$t_{cycle}$	Clock Cycle Time	250	-	-	ns
$t_{AS}$	Address Setup Time	150	-	-	ns
$t_{AH}$	Address Hold Time	150	-	-	ns
$t_{CSS}$	Chip Select Setup Time	120	-	-	ns
$t_{CSH}$	Chip Select Hold Time	60	-	-	ns
$t_{DSW}$	Write Data Setup Time	100	-	-	ns
$t_{DHW}$	Write Data Hold Time	100	-	-	ns
$t_{CLKL}$	Clock Low Time	100	-	-	ns
$t_{CLKH}$	Clock High Time	100	-	-	ns
$t_R$	Rise Time	-	-	15	ns
$t_F$	Fall Time	-	-	15	ns

Serial interface characteristics

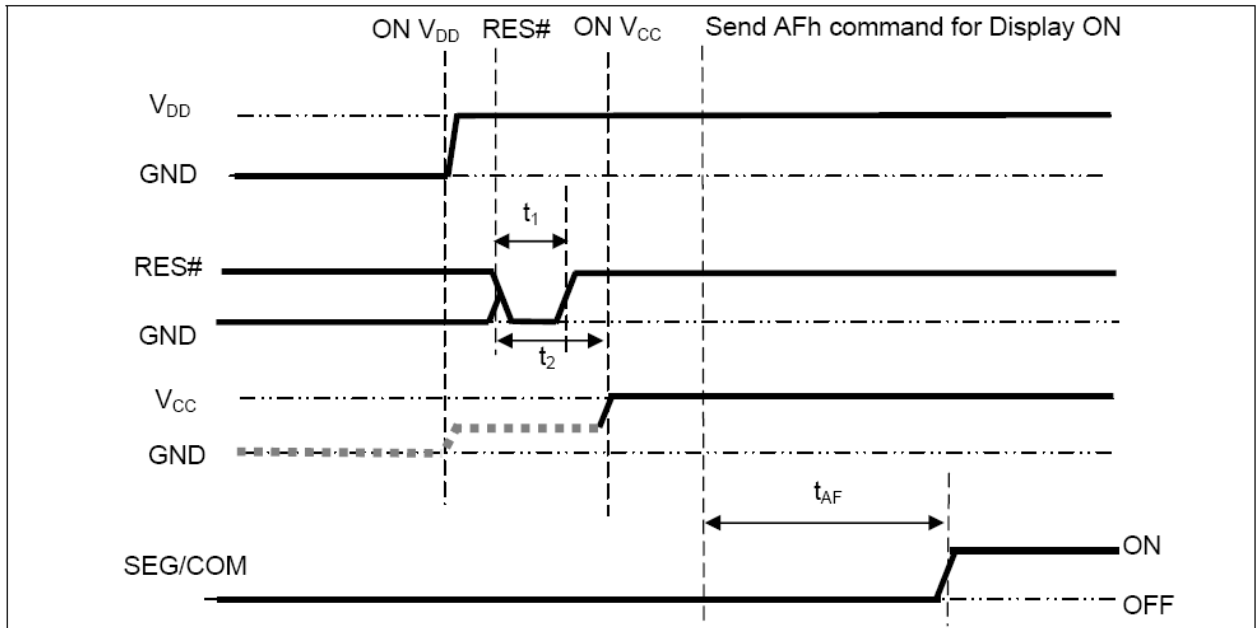


## 9 Functional Specification and Application Circuit

### 9.1 Power ON and Power OFF Sequence

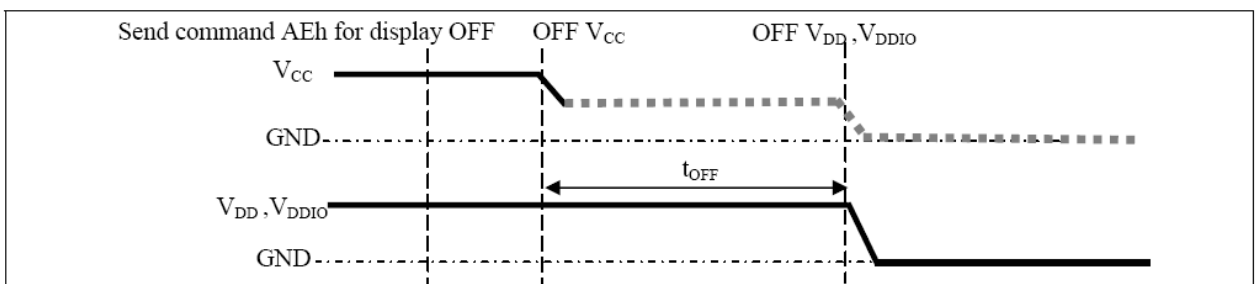
#### Power ON Sequence:

1. Power ON  $V_{DD}$ .
2. After  $V_{DD}$  become stable, set RES# pin LOW (logic low) for at least 3 $\mu$ s ( $t_1$ ) 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. Wait for  $t_{OFF}$ . Power OFF  $V_{DD}$ . (where Minimum  $t_{OFF}$ =0ms, Typical  $t_{OFF}$ =100ms)

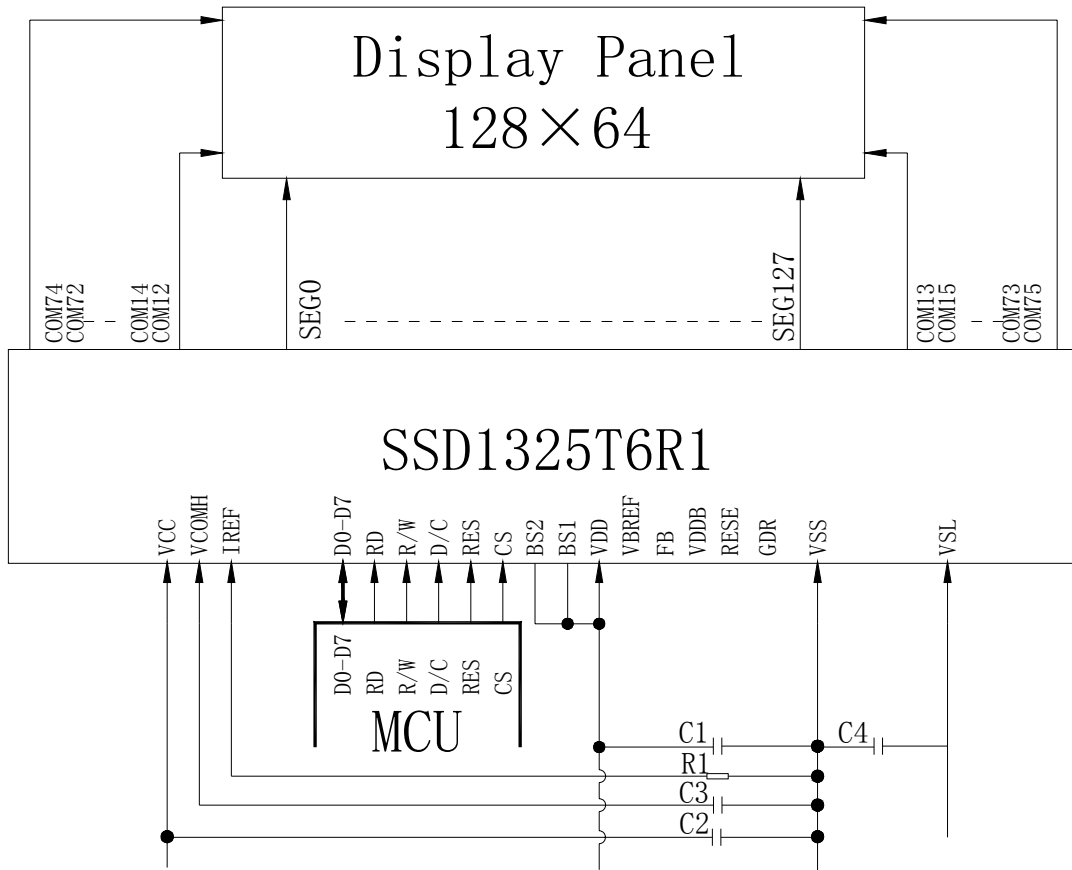


Note:

- (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.

### 9.2 Application Circuit

The configuration for 8080-parallel interface mode, external VCC is shown in the following diagram:



Pin connected to MCU interface: D[7:0], RD, R/W, D/C, CS, RES  
 GDR, VBREF, RESE, FB should be left open.

#### Recommended components

C1~C4: 4.7μF

R1: 910kΩ,  $R1 = (\text{Voltage at IREF} - \text{GND}) / \text{IREF}$

Voltage at IREF pin = VCC-3V

### **9.3 Display Control Instruction**

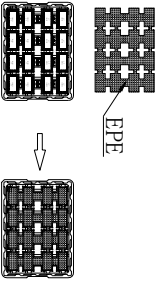
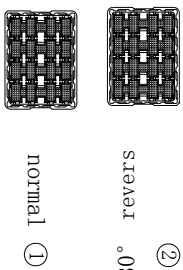

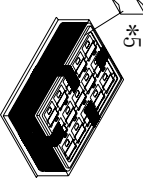
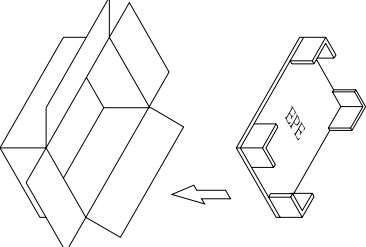
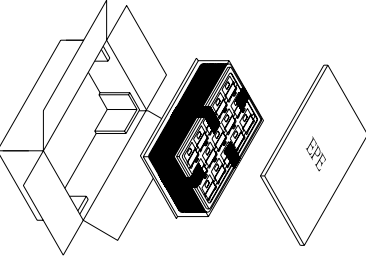
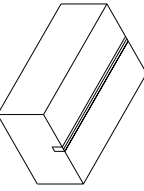
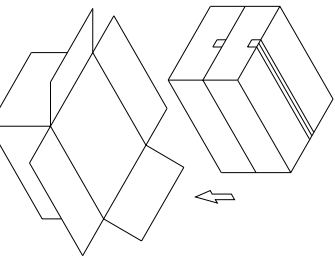
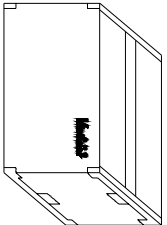
Refer to SSD1305 IC Specification.

### **9.4 Recommended Software Initialization**

TBD

### 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>starvar .081 ② normal ① TRAY</p>	<p>( 3 ) order ①, ②, ①, ② fix trays with tape Package quantity products: 160 pcs of 1 small carton 1 tray contain 16 pcs 10 contained trays, 1 empty tray</p> 	<p>( 4 ) package with plastic bags add five desiccants create a power vacuum *5</p> 
<p>( 5 )</p> 	<p>( 6 )</p> 	<p>( 7 )</p>  <p>small carton package L425*W330*H175 mm</p>	<p>( 8 )</p>  <p>2 small cartons in 1 big carton</p>
<p>( 9 )</p> <p>20 contained trays, 2 empty trays, Package quantity products: 320 pcs of 1 big carton</p>  <p>Package finished L450*W350*H360 mm</p>			

NOTE: Tape on the small carton & big carton



## 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.

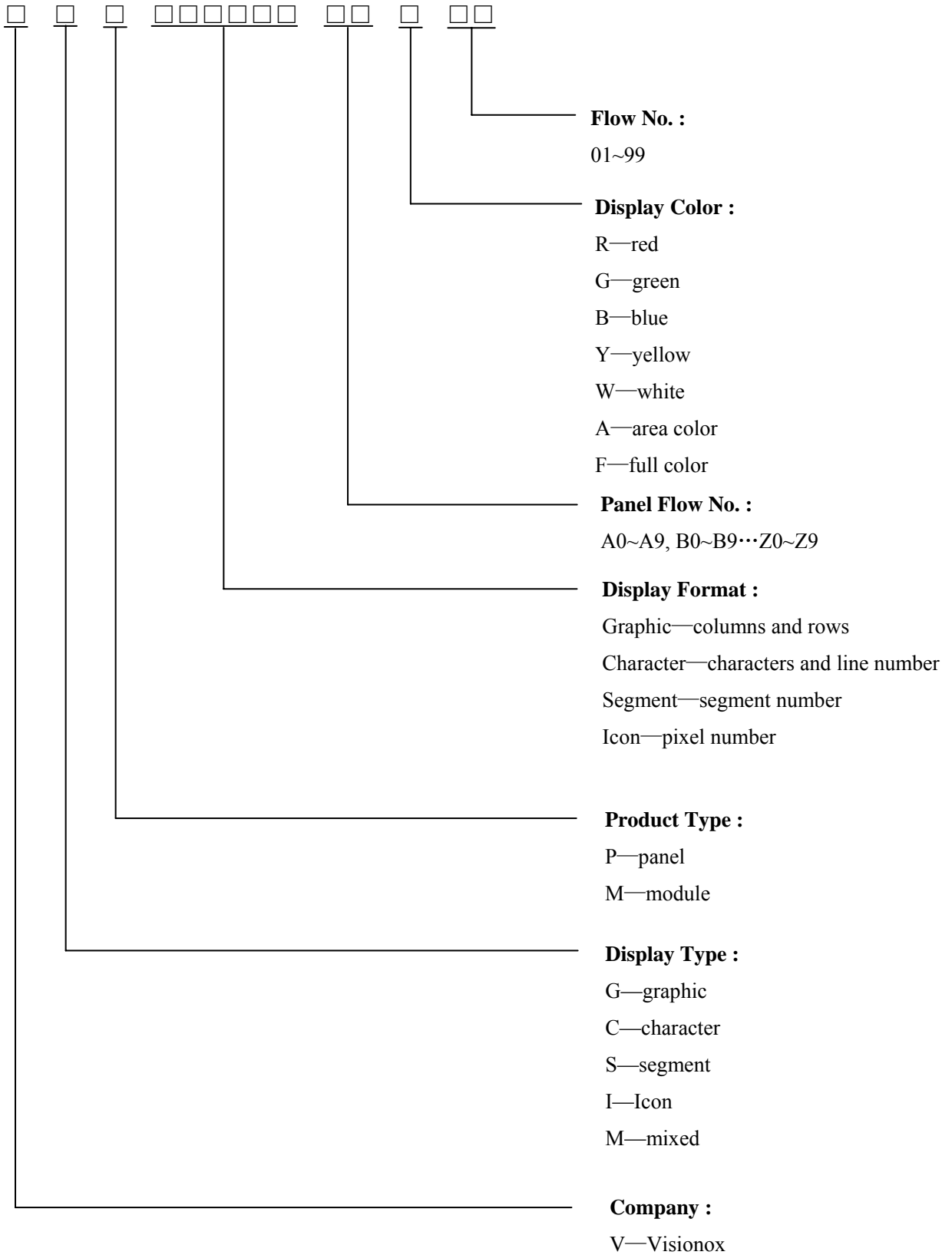
ITEM	MIN	MAX	UNIT	CONDITION
Operation Life Time	TBD	-	hrs	TBD $\text{cd}/\text{m}^2$ ,50% Checkerboard

An average operating lifetime of more than 10,000 hrs (checkerboard) at room temperature is approached by 240 hrs @ 80°C operating.

### 11.3 Failure Check Standard

After the completion of the described reliability test, the samples were left at room temperature for 2 hrs prior to conducting the failure test at  $22\pm 3^{\circ}\text{C}$ ;  $55\pm 15\%$  RH.

**12 Illustration of OLED Product Name**



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

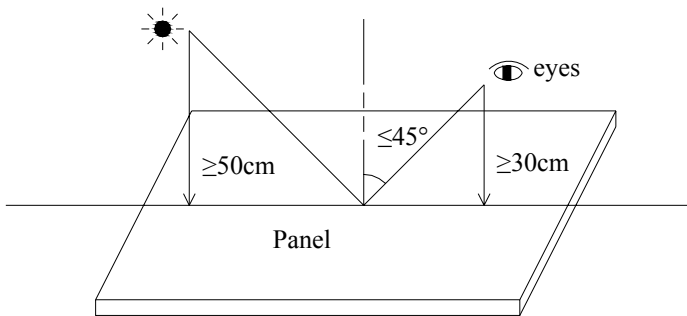
Fluorescent Lamp: 30W

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

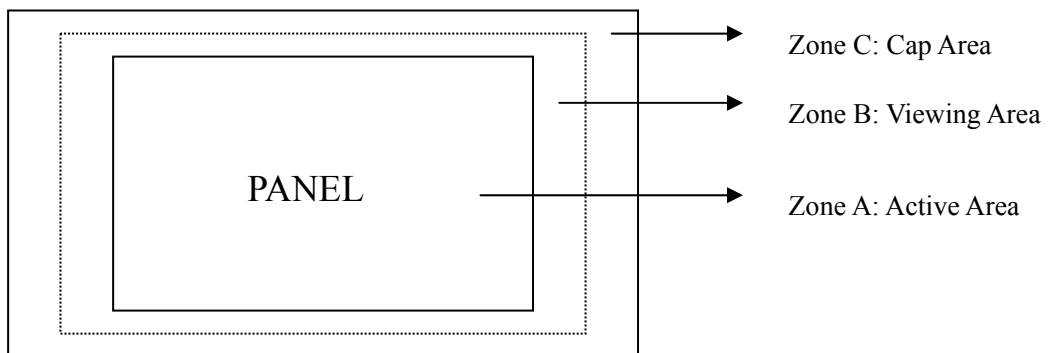
Distance between the Panel & Eyes:  $\geq 30\text{cm}$

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

(See the sketch below)

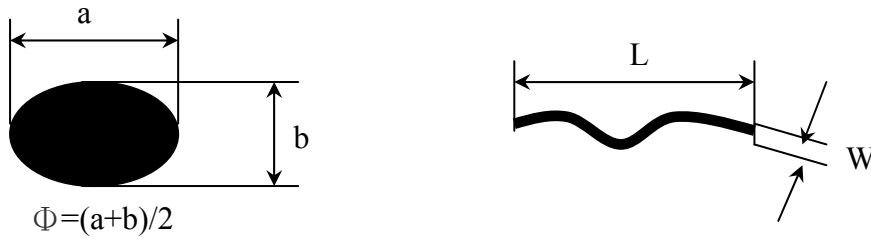


#### 13.3 Quality Assurance Zones

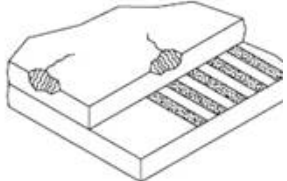


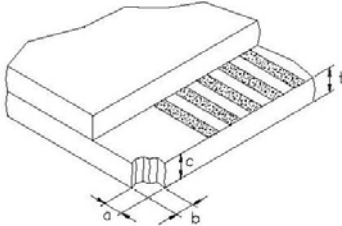
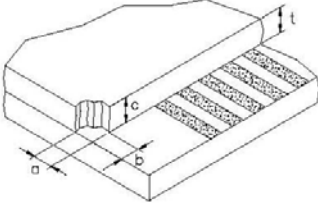
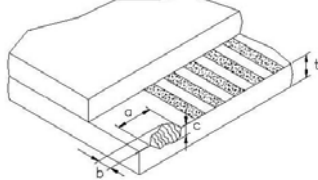
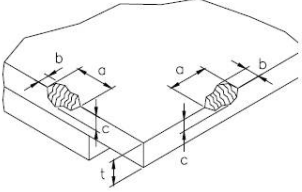
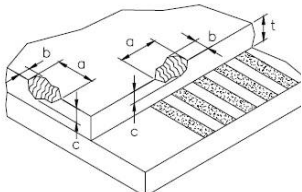
### 13.4 Inspection Standard

Definition of  $\Phi$ &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><math>\Phi \leq 0.15</math></td> <td>Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>0.15 &lt; \Phi \leq 0.30</math></td> <td>3</td> </tr> <tr> <td><math>\Phi &gt; 0.30</math></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><math>W \leq 0.03</math></td> <td>---</td> <td>Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>0.03 &lt; W \leq 0.08</math></td> <td><math>L \leq 5.0</math></td> <td>3</td> </tr> <tr> <td><math>W &gt; 0.08</math></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><math>\Phi &gt; 0.5</math></td> <td>0</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>0.2 &lt; \Phi \leq 0.5</math></td> <td>3</td> </tr> <tr> <td><math>\Phi \leq 0.2</math></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	Glass Crack	 <p>Propagation crack is not acceptable.</p>	Major																

6	Corner Chip	 <p>t= Glass thickness Accept <math>a \leq 2.0\text{mm}</math> or <math>b \leq 2.0\text{mm}</math>, <math>c \leq t</math></p>	Minor
7	Corner Chip on Cap Glass	 <p>t= Glass thickness Accept <math>a \leq 1.5\text{mm}</math> or <math>b \leq 1.5\text{mm}</math>, <math>c \leq t</math></p>	Minor
8	Chip on Contact Pad	 <p>t= Glass thickness Accept <math>a \leq 3.0\text{mm}</math> or <math>b \leq 0.8\text{mm}</math>, <math>c \leq t</math> (on the contact pin) <math>a \leq 3.0\text{mm}</math> or <math>b \leq 1.5\text{mm}</math>, <math>c \leq t</math> (outside of the contact pin)</p>	Minor
9	Chip on Face of Display	 <p>t= Glass thickness Accept <math>a \leq 1.5\text{mm}</math> or <math>b \leq 1.5\text{mm}</math>, <math>c \leq t</math></p>	Minor
10	Chip on Cap Glass	 <p>t= Glass thickness Accept <math>a \leq 3.0\text{mm}</math> or <math>b \leq 3.0\text{mm}</math>, <math>c \leq t/2</math> <math>a \leq 1.5\text{mm}</math> or <math>b \leq 1.5\text{mm}</math>, <math>t/2 \leq c \leq t</math></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. (2) Terminal lead twisted or broken is not allowable. (3) Copper exposed is not allowed by naked eye inspection.</p>	Minor
13	Dimension Unconformity	Checking by mechanical drawing.	Major

## II. Displaying Defects

NO.	Items	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><math>\Phi \leq 0.10</math></td> <td colspan="2">Ignore</td> </tr> <tr> <td><math>0.10 &lt; \Phi \leq 0.20</math></td> <td colspan="2">3</td> </tr> <tr> <td><math>\Phi &gt; 0.20</math></td> <td colspan="2">0</td> </tr> </tbody> </table>	Average Diameter (mm)	Pieces Permitted		Zone A,B	Zone C	$\Phi \leq 0.10$	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														
$0.10 < \Phi \leq 0.20$	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.