PRODUCT 产品名称	: OLED MODULE 有机发光显示模块
MODEL NO. 模块型号	: OEL1M0033-W-E
SUPPLIER 生产商	: TRULY SEMICONDUCTORS LTD. 信利半导体有限公司
Data 日期	: Apr 13, 2020

CERT. No. QAC0946535
(ISO9001)

CERT. No. HKG002005
(ISO14001)

OLED SPECIFICATION
OLED 产品说明书

OEL1M0033-W-E

Version:1.0

This module uses ROHS material
模块使用环保材料

If there is no special request from the customer, TRULY SEMICONDUCTORS LTD. will not reserve the tooling of the product under the following conditions:
如有下列情况，但客户又没有特别的要求,信利半导体公司将不储存产品模具：
1. There is no response from the customer in two years after TRULY SEMICONDUCTORS LTD. submit the samples.
从信利提供样品后,两年内客户如果没回应;
2. There is no order in two years after the latest mass production.
在最后一次的批量后两年内没有订单。
And correlated data (including quality records) will be reserved for one year more after tooling is discarded.
相关的数据(包括质量报告)将会被保留一年或更久直到模具放弃。

TRULY SEMICONDUCTORS LTD **信利半导体有限公司**	**CUSTOMER** **客户**
Quality Assurance Department: 质量保证部门：	Approved by: 审批：
Approved by: 审批：	
Technical Department: 技术部门：	

PRODUCT CONTENTS

REVISION RECORD
修订记录

REV NO.	REV DATE	CONTENTS	REMARKS
0.1	2020-01-07	First Release.	Written by Edwin
0.2	2020-01-08	Add electro-optical characteristics on page 14.	Updated by Edwin
1.0	2020-04-13	1. Updated the drawing on page 6. 2. Add recommend contrast setting value on page 14. 3. Add the recommend initialization code on page 23.	Updated by Edwin

WRITTEN BY 编写	CHECKED BY 审核	APPROVED BY 审批
Edwin	Yang Xueyu	Yang Xueyu

■ PHYSICAL DATA（物理参数）

NO.编号	Items 项目	Specification 规格	Unit 单位
1	Diagonal Size 尺寸	3.12	Inch
2	Resolution 分辨率	256 * 64	Dots
3	Active Area 有效显示区域	76.78(W) * 19.18 (H)	mm^2
4	Outline Dimension 外围尺寸	88.00(W) * 27.80(H)	mm^2
5	Pixel Pitch 像素间距	0.30(W) * 0.30(H)	mm^2
6	Pixel Size 像素尺寸	0.28(W) * 0.28(H)	mm^2
7	Driver IC 驱动 IC	SSD1362Z	-
8	Display Color 显示色彩	White	-
9	Gray Scale 灰阶	4	Bit
10	Interface 接口	Parallel / Serial / IIC	-
11	IC Package Type IC 封装类型	COG	-
12	Module Connecting Type 模块连接方式	ZIF	-
13	Thickness 厚度	2.00±0.15	mm
14	Weight 重量	TBD	g
15	Duty 占空比	1/64	-

■ ABSOLUTE MAXIMUM RATINGS（极限参数）

Unless otherwise specified, VSS = 0V
除另行规定外，VSS=0V

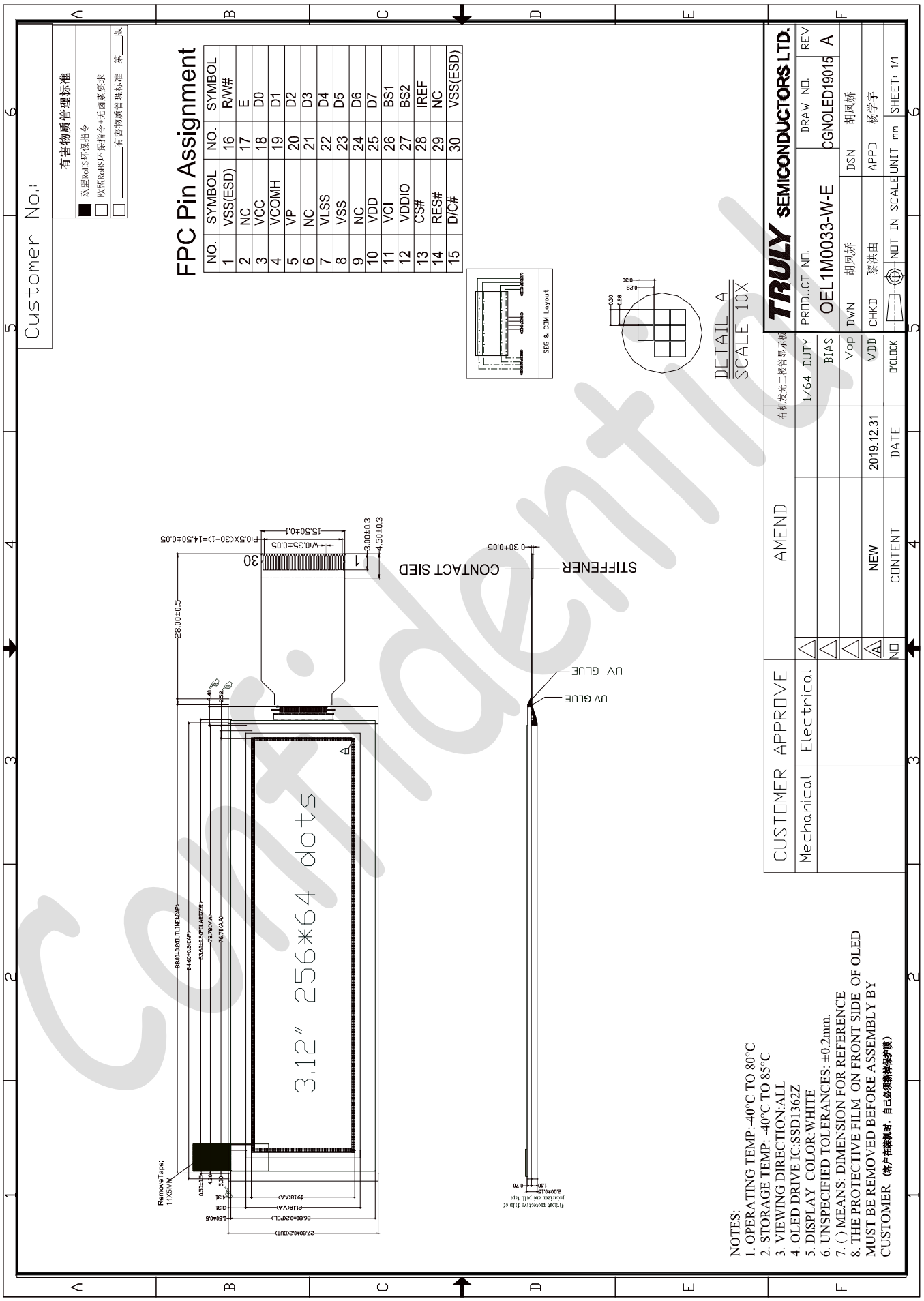
(Ta=25℃)

Items 项目	Min. 最小值	Max. 最大值	Unit 单位	Remark 备注
Supply Voltage(VDD) 逻辑电压（VDD）	-0.5	+2.75	V	IC maximum rating IC 极限参数
Supply Voltage(VCI) 逻辑电压（VCI）	-0.3	5.5	V	IC maximum rating IC 极限参数
Supply Voltage(VCC) 驱动电压（VCC）	-0.5	+21	V	IC maximum rating IC 极限参数
Operating Temperature(T_{OP}) 操作温度（T_{OP}）	-40	80	℃	-
Storage Temperature(T_{ST}) 存储温度（T_{ST}）	-40	85	℃	Note 2

NOTE:

1. Permanent device damage may occur if ABSOLUTE MAXIMUM RATINGS are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect reliability.
   如果超过极限参数可能会导致器件永久性损坏。实际工作条件应仅限于在本数据表格中详述的操作部分。在极限参数条件下长时间工作会影响其可靠性
2. The defined temperature ranges do not include the polarizer. The maximum withstood temperature of the polarizer should be 80°C.
   定义的温度范围不包括偏光片。偏光片的最大值耐温应为 80℃。

■ EXTERNAL DIMENSIONS（外形尺寸）



■ ELECTRICAL CHARACTERISTICS（电气特性）

◆ DC Characteristics（直流特性）

Unless otherwise specified, Voltage referenced to VSS;
除另行规定外，参考电平为 VSS;

(Ta = 22±3℃, 60±10%RH)

Items 项目		Symbol 符号	Min. 最小值	Typ. 典型值	Max. 最大值	Unit 单位
Supply Voltage 供电电压	Logic Supply Voltage IC 逻辑电压	V_{DD}	1.65	-	2.6	V
	Low voltage power supply 低电压输入	V_{CI}	1.65	3.0	3.5	V
	Power supply for I/O pins I/O 电压	V_{DDIO}	1.65	-	V_{CI}	V
	Operating(for OLED panel) 操作电压（供 OLED 面板）	V_{CC}	10.0	13.0	20.0	V
Input Voltage 输入电压	High Voltage 高电平	V_{IH}	$0.8*V_{DDIO}$	-	-	V
	Low Voltage 低电平	V_{IL}	-	-	$0.2*V_{DD}$	V
Output Voltage 输出电压	High Voltage 高电平	V_{OH}	$0.9*V_{DDIO}$	-	-	V
	Low Voltage 低电平	V_{OL}	-	-	$0.1*V_{DDIO}$	V

◆ AC Characteristics（交流特性）

Conditions:

Voltage referenced to V_{SS}
V_{DDIO} = 1.65V to 3.5V
T_A = 25°C

AC Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
F_{OSC} (1)	Oscillation Frequency of Display Timing Generator	V_{CI} = 2.8V, internal V_{DD}	1260	1400	1540	kHz
F_{FRM}	Frame Frequency for 64 MUX Mode	256x64 Graphic Display Mode, Display ON, Internal Oscillator Enabled	-	F_{OSC} * 1 / (D * K * 64)(2)	-	Hz

Note

(1) F_{OSC} stands for the frequency value of the internal oscillator and the value is measured when command B3h A[7:4] is in default value.

(2) D: divide ratio
K: Phase 1 period + Phase 2 period + X
X: DCLKs in current drive period.
Default K is 4 + 16 + 195 = 215

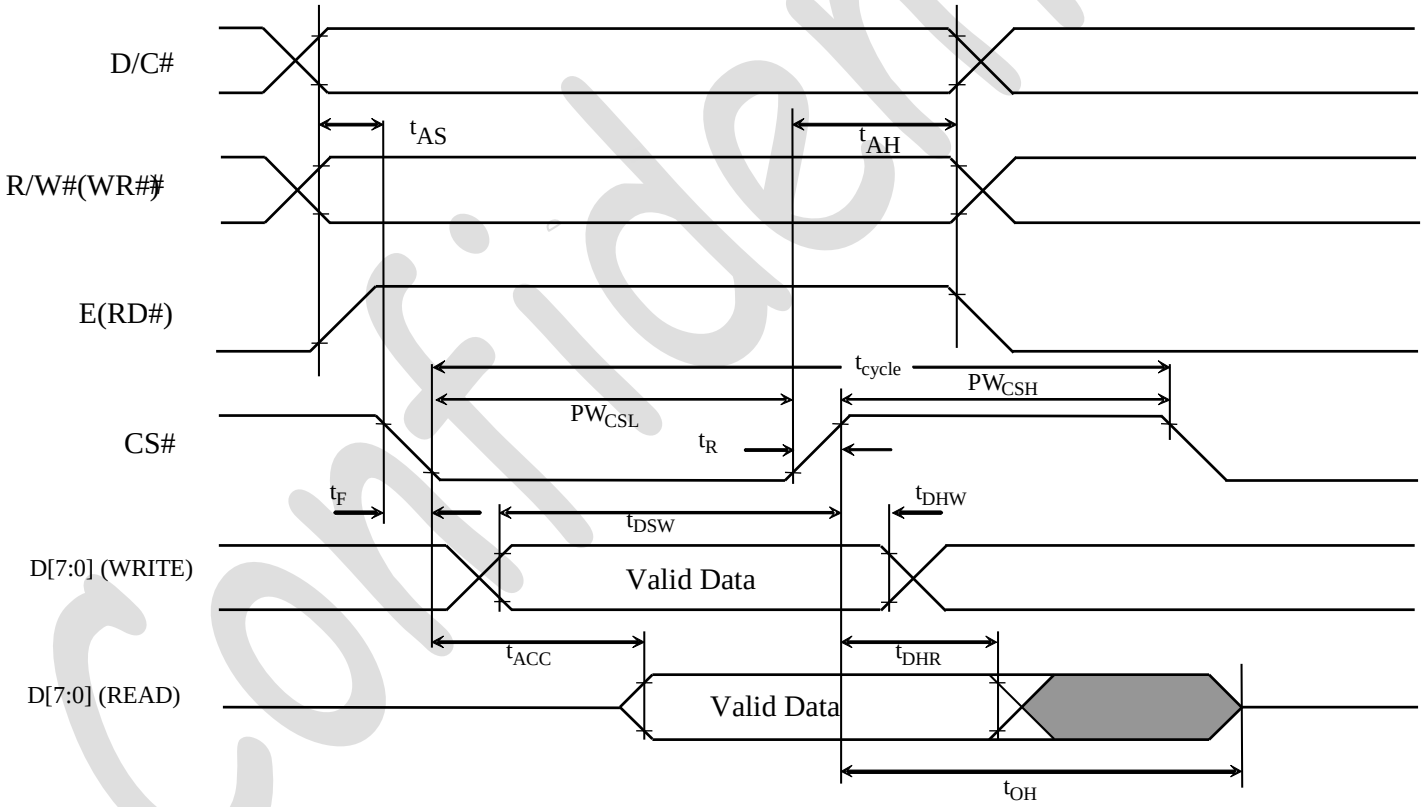
1. 6800-Series MCU Parallel Interface Timing Characteristics

6800-Series MCU Parallel Interface Timing Characteristics

V_{CI} - V_{SS} = 1.65V to 3.5V (T_A = 25°C)

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	320	-	-	ns
t_{AS}	Address Setup Time	25	-	-	ns
t_{AH}	Address Hold Time	0	-	-	ns
t_{DSW}	Write Data Setup Time	40	-	-	ns
t_{DHW}	Write Data Hold Time	45	-	-	ns
t_{DHR}	Read Data Hold Time	20	-	-	ns
t_{OH}	Output Disable Time	-	-	70	ns
t_{ACC}	Access Time	-	-	250	ns
PW_{CSL}	Chip Select Low Pulse Width (read) Chip Select Low Pulse Width (write)	160 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 MCU Parallel Interface Timing Characteristics

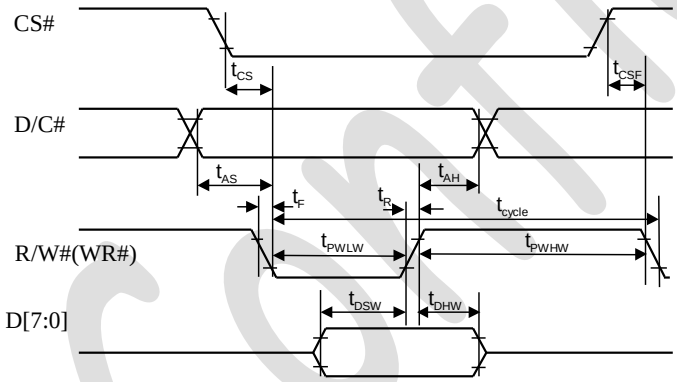
8080-Series MCU Parallel Interface Timing Characteristics

V_{CI} - V_{SS} = 1.65V to 3.5V (T_A = 25°C)

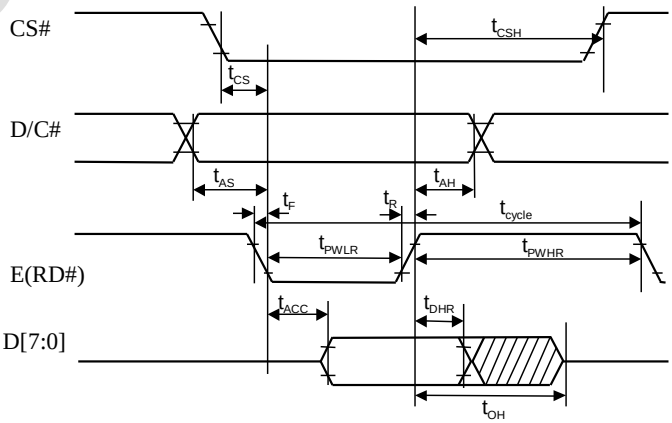
Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	300	-	-	ns
t_{AS}	Address Setup Time	30	-	-	ns
t_{AH}	Address Hold Time	0	-	-	ns
t_{DSW}	Write Data Setup Time	40	-	-	ns
t_{DHW}	Write Data Hold Time	40	-	-	ns
t_{DHR}	Read Data Hold Time	20	-	-	ns
t_{OH}	Output Disable Time	-	-	70	ns
t_{ACC}	Access Time	-	-	180	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 MCU parallel interface characteristics

Write cycle



Read cycle



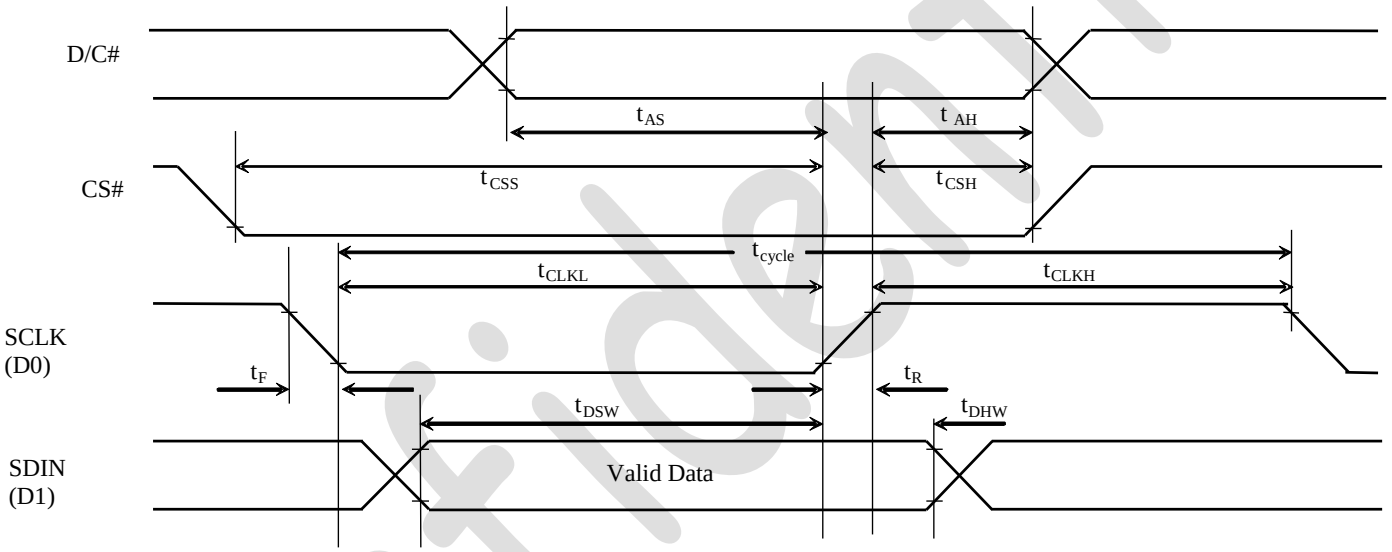
3. Serial Interface Timing Characteristics

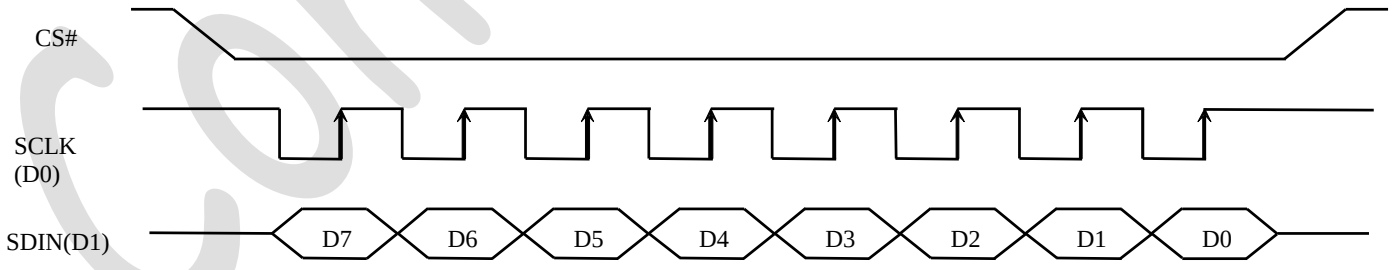
Serial Interface Timing Characteristics (4-wire SPI)

V_{CI} - V_{SS} = 1.65V to 3.5V (T_A = 25°C)

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	100	-	-	ns
t_{AS}	Address Setup Time	15	-	-	ns
t_{AH}	Address Hold Time	40	-	-	ns
t_{CSS}	Chip Select Setup Time	20	-	-	ns
t_{CSH}	Chip Select Hold Time	10	-	-	ns
t_{DSW}	Write Data Setup Time	15	-	-	ns
t_{DHW}	Write Data Hold Time	30	-	-	ns
t_{CLKL}	Clock Low Time	25	-	-	ns
t_{CLKH}	Clock High Time	20	-	-	ns
t_R	Rise Time	-	-	15	ns
t_F	Fall Time	-	-	15	ns

Serial interface characteristics (4-wire SPI)



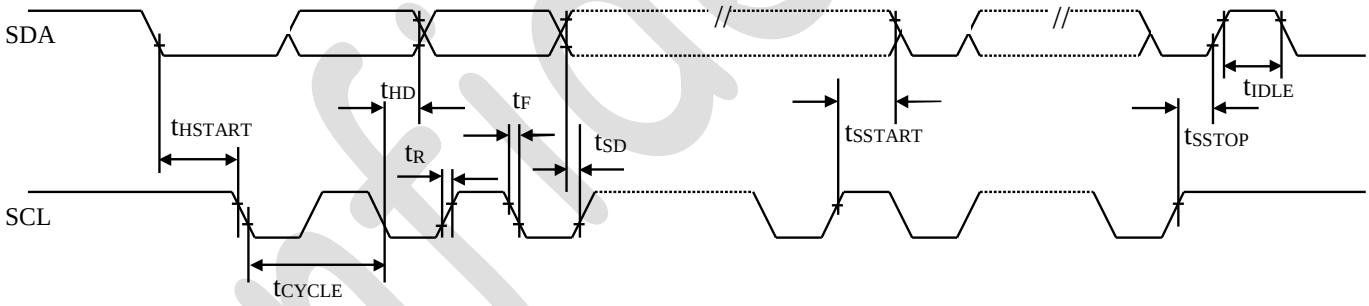


4. I²C Timing Characteristics

(V_{CI} - V_{SS} = 1.65V to 3.5V, T_A = 25°C)

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	2.5	-	-	us
t_{HSTART}	Start condition Hold Time	0.6	-	-	us
t_{HD}	Data Hold Time (for "SDA_{OUT}" pin)	0	-	-	ns
	Data Hold Time (for "SDA_{IN}" pin)	300	-	-	ns
t_{SD}	Data Setup Time	100	-	-	ns
t_{SSTART}	Start condition Setup Time (Only relevant for a repeated Start condition)	0.6	-	-	us
t_{SSTOP}	Stop condition Setup Time	0.6	-	-	us
t_R	Rise Time for data and clock pin	-	-	300	ns
t_F	Fall Time for data and clock pin	-	-	300	ns
t_{IDLE}	Idle Time before a new transmission can start	1.3	-	-	us

I2C interface Timing characteristics



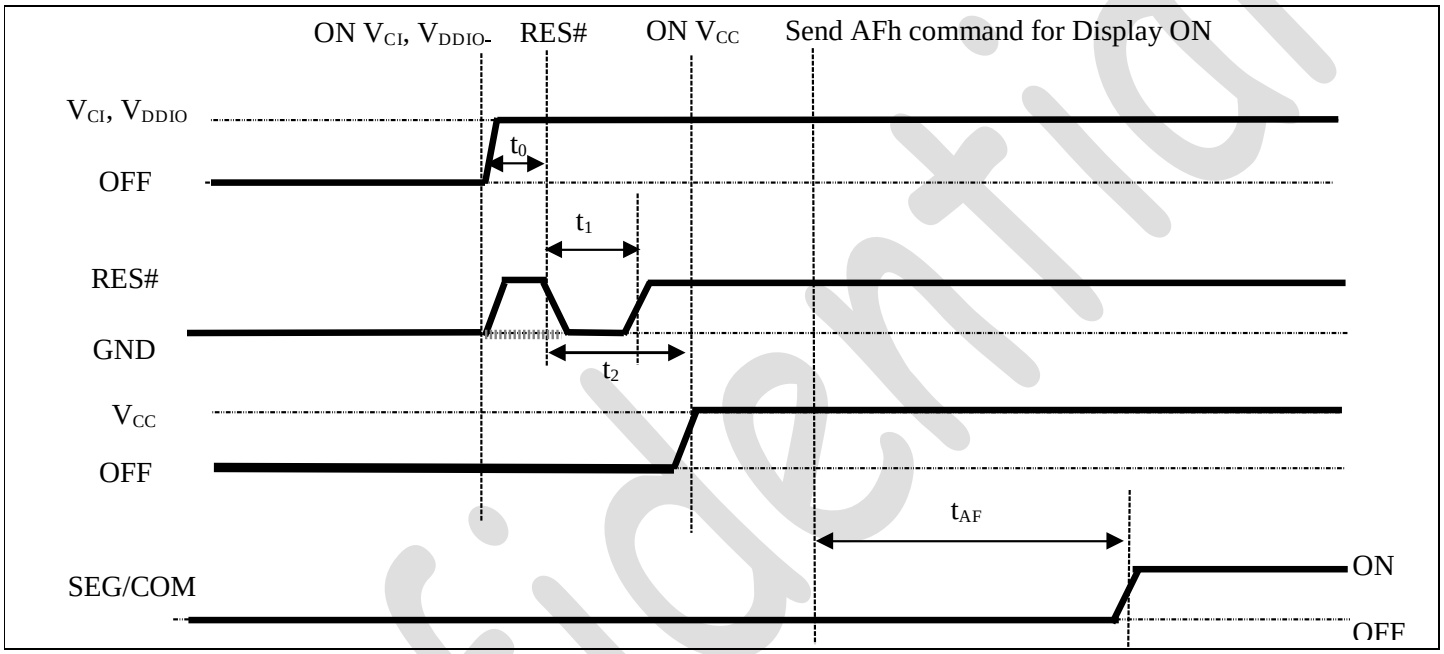
■ TIMING OF POWER SUPPLY（电源时序）

The following figures illustrate the recommended power ON and power OFF sequence of SSD1362 (assume V_{CI} and V_{DDIO} are at the same voltage level and internal V_{DD} is used).

Power ON sequence:

1. Power ON V_{CI}, $V_{DDIO.}$
2. After V_{CI}, V_{DDIO} becomes stable, set wait time at least 1ms (t_0) for internal V_{DD} become stable. Then set RES# pin LOW (logic low) for at least 100us (t_1) (4) and then HIGH (logic high).
3. After set RES# pin LOW (logic low), wait for at least 100us (t_2). Then Power ON $V_{CC.}$
4. After V_{CC} become stable, send command AFh for display ON. SEG/COM will be ON after 200ms (t_{AF}).
5. After V_{CI}, V_{DDIO} become stable, wait for at least 50ms to send command.

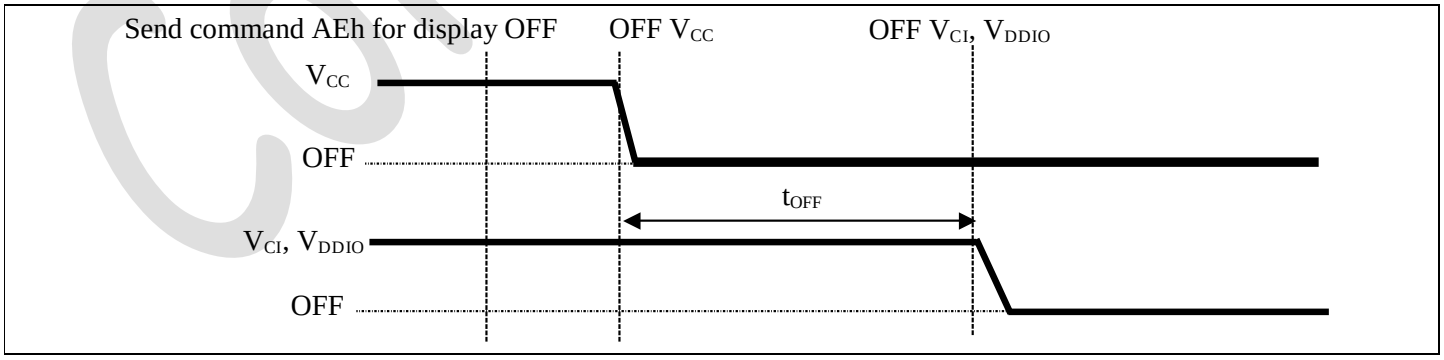
The Power ON sequence.



Power OFF sequence:

1. Send command AEh for display OFF.
2. Power OFF $V_{CC.}$(1), (2)
3. Wait for t_{OFF}. Power OFF $V_{CI.}$ (Typical t_{OFF}=100ms(4))

The Power OFF sequence



Note:

(1) V_{CC} should be kept float (disable) when it is OFF.

(2) Power pins (V_{CI}, V_{DDIO}, V_{CC}) can never be pulled to ground under any circumstance.

(3) The register values are reset after t_1.

(4) V_{CI} and V_{DDIO} should not be Power OFF before V_{CC} Power OFF.

■ ELECTRO-OPTICAL CHARACTERISTICS (光电参数)

All data in below based the condition (Ta = 22±3℃,60±10％RH).
以下参数均基于 Ta = 22±3℃,60±10％RH 的条件。

Items 项目		Symbol 符号	Min. 最小值	Typ. 典型值	Max. 最大值	Unit 单位	Remark 备注
Operating Luminance 工作亮度		L	70	90	-	cd/m^2	100% pixels on
Power Consumption 功耗		P	-	250	300	mW	30% pixels on
			-	850	1000	mW	100% pixels on
Frame Frequency 帧频		Fr	-	100	-	Hz	-
Color Coordinate 色坐标	White	CIE x	0.25	0.29	0.33	CIE1931	Darkroom
		CIE y	0.29	0.33	0.37		
Response Time 响应时间	Rise	Tr	-	10	-	us	-
	Decay	Td	-	10	-	us	-
Contrast Ratio* 对比度		Cr	10000:1	-	-	-	Darkroom
Viewing Angle 可视角		∆θ	160	-	-	Degree	-
Operating Life Time* 工作寿命		Top	22,000	-	-	Hours	L= 90 cd/m2

Note(注意事项):

1. L= 90 cd/m2 is based on VDD=3.0V, VCC=13.0V, Contrast command setting 0xC9.
   L= 90 cd/m2 基于 VDD=3.0V, VCC=13.0V, 对比度设置为 0xC9。
2. **Contrast ratio** is defined as follows(对比度的定义如下):

$$\text{Contrast ratio} = \frac{\text{Photo – detector output with OLED being “white”}\ \text{OLED 显示全屏亮时的亮度}}{\text{Photo – detector output with OLED being “black”}\ \text{OLED 显示全屏黑时的亮度}}$$

3. **Life Time** is defined when the Luminance has decayed to less than 50% of the initial Luminance specification.
   (Odd and even chess board alternately displayed).
   (The initial value should be closed to the typical value after adjusting.)
   寿命的定义为当亮度衰减到初始亮度 50％时所消耗的时间。
   (奇数和偶数棋盘交替显示)。
   (初始亮度值应调试到接近典型值的大小)。

■ INTERFACE PIN CONNECTIONS（引脚接口）

No	Symbol	Description
1	VSS(ESD)	Ground pin. It must be connected to external ground.
2	NC	No connection.
3	VCC	Power supply for panel driving voltage. This is also the most positive power voltage supply pin. It is supplied by external high voltage source.
4	VCOMH	COM signal deselected voltage level. A capacitor should be connected between this pin and VSS. No external power supply is allowed to connect to this pin.
5	VP	This pin is the segment pre-charge voltage reference pin. A capacitor should be connected between this pin and VSS. No external power supply is allowed to connect to this pin.
6	NC	No connection.
7	VLSS	Analog system ground pin. It must be connected to external ground.
8	VSS	Ground pin. It must be connected to external ground.
9	NC	No connection.
10	VDD	Power supply for core logic operation. VDD can be supplied externally (within the range of 1.65V to 2.6V) or regulated internally from VCI when VCI is >2.6V. A capacitor should be connected between VDD and VSS under all circumstances.
11	VCI	Low voltage power supply. VCI must always be equal to or higher than VDD and VDDIO.
12	VDDIO	Power supply for interface logic level. It should match with the MCU interface voltage level and must be connected to external source.
13	CS#	This pin is the chip select input connecting to the MCU. The chip is enabled for MCU communication only when CS# is pulled LOW (active LOW). In I2C mode, this pin must be connected to VSS.
14	RES#	This pin is reset signal input. When the pin is pulled LOW, initialization of the chip is executed. Keep this pin pull HIGH during normal operation.
15	D/C#	This pin is Data/Command control pin connecting to the MCU. When the pin is pulled HIGH, the data at D[7:0] will be interpreted as data. When the pin is pulled LOW, the data at D[7:0] will be transferred to a command register. In I2C mode, this pin acts as SA0 for slave address selection.

<table>
<tr><th>No</th><th>Symbol</th><th>Description</th></tr>
<tr><td>16</td><td>R/W#</td><td>This pin is read / write control input pin connecting to the MCU interface.

When 6800 interface mode is selected, 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.

When 8080 interface mode is selected, this pin will be the Write (WR#) input. Data write operation is initiated when this pin is pulled LOW and the chip is selected.

When serial or I2C interface is selected, this pin must be connected to VSS.</td></tr>
<tr><td>17</td><td>E</td><td>This pin is MCU interface input.

When 6800 interface mode is selected, 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.

When 8080 interface mode is selected, this pin receives the Read (RD#) signal. Read operation is initiated when this pin is pulled LOW and the chip is selected.

When serial or I2C interface is selected, this pin must be connected to VSS.</td></tr>
<tr><td>18~25</td><td>D0 ~ D7</td><td>These pins are bi-directional data bus connecting to the MCU data bus.
Unused pins are recommended to tie LOW.

When serial interface mode is selected, D0 will be the serial clock input: SCLK; D1 will be the serial data input: SID.

When I2C mode is selected, D2, D1 should be tied together and serve as SDAout, SDAin in application and D0 is the serial clock input, SCL.</td></tr>
<tr><td>26 ~ 27</td><td>BS1 ~ BS2</td><td>MCU bus interface selection pins. Select appropriate logic setting as described in the following table. BS2 and BS1 are pin select.

<table>
<tr><td colspan="2">Bus Interface selection</td></tr>
<tr><td>BS[2:1]</td><td>Interface</td></tr>
<tr><td>00</td><td>4 line SPI</td></tr>
<tr><td>11</td><td>8-bit 8080 parallel</td></tr>
<tr><td>10</td><td>8-bit 6800 parallel</td></tr>
<tr><td>01</td><td>I^2C</td></tr>
</table>

Note:
(1) 0 is connected to VSS
(2) 1 is connected to VDDIO</td></tr>
</table>

No	Symbol	Description
28	IREF	This pin is the segment output current reference pin. When external IREF is used, a resistor should be connected between this pin and VSS to maintain current of around 18.75uA. When internal IREF is used, this pin should be kept NC.
29	NC	No connection.
30	VSS(ESD)	Ground pin. It must be connected to external ground.

■ COMMAND TABLE（指令表）

Command Table

(R/W# (WR#) = 0, E(RD#) = 1 unless specific setting is stated)

1. Fundamental Command Table											
D/C#	**Hex**	**D7**	**D6**	**D5**	**D4**	**D3**	**D2**	**D1**	**D0**	**Command**	**Description**
0 0 0	15 A[6:0] B[6:0]	0 * *	0 A_6 B_6	0 A_5 B_5	1 A_4 B_4	0 A_3 B_3	1 A_2 B_2	0 A_1 B_1	1 A_0 B_0	Set Column Address	Setup Column start and end address A[6:0]: Start Address, range:00h~7Fh, (RESET = 00h) B[6:0]: End Address, range:00h~7Fh, (RESET = 7Fh)
0 0 0	75 A[5:0] B[5:0]	0 * *	1 * *	1 A_5 B_5	1 A_4 B_4	0 A_3 B_3	1 A_2 B_2	0 A_1 B_1	1 A_0 B_0	Set Row Address	Setup Row start and end address A[5:0]: Start Address, range:00h~3Fh, (RESET = 00h) B[5:0]: End Address, range:00h~3Fh, (RESET = 3Fh)
0 0	81 A[7:0]	1 A_7	0 A_6	0 A_5	0 A_4	0 A_3	0 A_2	0 A_1	1 A_0	Set Contrast Control	Double byte command to select one of the contrast steps. Contrast increases as the value increases. (RESET = 7Fh)
00 0	A0 A[7:0]	1 A_7	0 A_6	1 0	0 A_4	0 0	0 A_2	0 A_1	0 A_0	Set Re-map	Re-map setting in Graphic Display Data RAM (GDDRAM) A[0] = 0b, Disable Column Address Re-map (RESET) A[0] = 1b, Enable Column Address Re-map A[1] = 0b, Disable Nibble Re-map (RESET) A[1] = 1b, Enable Nibble Re-map A[2] = 0b, Enable Horizontal Address Increment (RESET) A[2] = 1b, Enable Vertical Address Increment A[4] = 0b, Disable COM Re-map (RESET) A[4] = 1b, Enable COM Re-map A[6] = 0b, Disable SEG Split Odd Even A[6] = 1b, Enable SEG Split Odd Even (RESET) A[7] = 0b, Disable SEG left/right remap (RESET) A[7] = 1b, Enable SEG left/right remap
0 0	A1 A[5:0]	1 *	0 *	1 A_5	0 A_4	0 A_3	0 A_2	0 A_1	1 A_0	Set Display Start Line	A[5:0]: Vertical shift by setting the starting address of display RAM from 0 ~ 63 (RESET = 00h)

1. Fundamental Command Table											
D/C#	**Hex**	**D7**	**D6**	**D5**	**D4**	**D3**	**D2**	**D1**	**D0**	**Command**	**Description**
0 0	A2 A[5:0]	1 *	0 *	1 A_5	0 A_4	0 A_3	0 A_2	1 A_1	0 A_0	Set Display Offset	A[5:0]: Set vertical offset by COM from 0 ~ 63 (RESET = 00h) e.g. Set A[5:0] to 010000b to move COM16 towards COM0 direction for 16 row
0 0 0	A3 A[5:0] B[6:0]	1 * *	0 * B_6	1 A_5 B_5	0 A_4 B_4	0 A_3 B_3	0 A_2 B_2	1 A_1 B_1	1 A_0 B_0	Set Vertical Scroll Area	A[5:0]: Number of rows in top fixed area. The No. of rows in top fixed area is referenced to the top of the GDDRAM (i.e. row 0). (RESET = 00h) B[6:0]: Number of rows in the scroll area. This is the number of rows to be used for vertical scrolling. The scroll area starts in the first row below the top fixed area. (RESET = 40h) **Note** (1) A[5:0]+B[6:0] <= MUX ratio (2) B[6:0] <= MUX ratio (3) Set Display Start Line (A[5:0] in A1h) < B[6:0] (4) The last row of the scroll area shifts to the first row of the scroll area. (5) For 64d MUX display A[5:0] = 0, B[5:0]=64 : whole area scrolls A[5:0]= 0, B[5:0] < 64 : top area scrolls A[5:0] + B[5:0] < 64 : central area scrolls A[5:0] + B[5:0] = 64 : bottom area scrolls
0	A4 ~ A7	1	0	1	0	0	1	X_1	X_0	Set Display Mode	A4h = Normal display (RESET) A5h = All ON (All pixels have gray scale of 15, GS15) A6h = All OFF (All pixels have gray scale of 0, GS0) A7h = Inverse Display (GS0 ☐ GS15, GS1 ☐ GS14, GS2 ☐ GS13, …)
0 0	A8 A[5:0]	1 *	0 *	1 A_5	0 A_4	1 A_3	0 A_2	0 A_1	0 A_0	Set MUX Ratio	A[5:0]: Set MUX ratio from 4MUX ~ 64MUX: A[5:0] = 3 represents 4MUX A[5:0] = 4 represents 5MUX : A[5:0] = 62 represents 63MUX A[5:0] = 63 represents 64MUX (RESET) It should be noted that A[5:0]=0~2 is not allowed
0 0	AB A[0]	1 0	0 0	1 0	0 0	1 0	0 0	1 0	1 A_0	Function Selection A	A[0]=0b, Select external V_{DD} (i.e. Disable internal V_{DD} regulator) A[0]=1b, Enable internal V_{DD} regulator (RESET)

1. Fundamental Command Table											
D/C#	**Hex**	**D7**	**D6**	**D5**	**D4**	**D3**	**D2**	**D1**	**D0**	**Command**	**Description**
0 0	AD A[4]	1 1	0 0	1 0	0 A_4	1 1	1 1	0 1	1 0	External / Internal I_{REF} Selection	Select external or internal I_{REF} : A[4] = '0' Select external I_{REF} (RESET) A[4] = '1' Enable internal I_{REF} during display ON
0	AE / AF	1	0	1	0	1	1	1	X_0	Set Display ON/OFF	AEh = Display OFF (sleep mode) (RESET) AFh = Display ON in normal mode
0 0	B1 A[7:0]	1 A_7	0 A_6	1 A_5	1 A_4	0 A_3	0 A_2	0 A_1	1 A_0	Set Phase Length	A[3:0]: Phase 1 period of 2~30 DCLK's (i.e. 2, 4, 6, 8…30) (RESET = 0010b) A[7:4]: Phase 2 period of 2~30 DCLK's (i.e. 2, 4, 6, 8…30) (RESET = 1000b) **Note** (1) GS15 level pulse width must be set larger than the period of phase 1 + phase 2
0 0	B3 A[7:0]	1 A_7	0 A_6	1 A_5	1 A_4	0 A_3	0 A_2	1 A_1	1 A_0	Set Front Clock Divider /Oscillator Frequency	A[3:0]: Define divide ratio (D) of display clock (DCLK) (i.e. 1, 2, 4, 8…256) (RESET is 0001b, i.e. divide ratio = 2) A[7:4]: Set the Oscillator Frequency, F_{OSC}. Oscillator Frequency increases with the value of A[7:4] and vice versa. (Range:0000b~1111b) (RESET = 1010b)
0 0	B5 A[3:0]	1 0	0 0	1 0	1 0	0 A_3	1 A_2	0 A_1	1 A_0	GPIO	A[1:0] = 00b represents GPIO0 pin HiZ, input disable (always read as low) A[1:0] = 01b represents GPIO0 pin HiZ, input enable A[1:0] = 10b represents GPIO0 pin output Low (RESET) A[1:0] = 11b represents GPIO0 pin output High A[3:2] = 00b represents GPIO1 pin HiZ, input disable (always read as low) A[3:2] = 01b represents GPIO1 pin HiZ, input enable A[3:2] = 10b represents GPIO1 pin output Low (RESET) A[3:2] = 11b represents GPIO1 pin output High
0 0	B6 A[3:0]	1 *	0 *	1 *	1 *	0 A_3	1 A_2	1 A_1	0 A_0	Set Second pre-charge Period	A[3:0]: Second Pre-charge period of 1~15 DCLK's e.g. A[3:0] = 1111b, 15 DCLK Clock (RESET = 0100b)

1. Fundamental Command Table

D/C#	Hex	D7	D6	D5	D4	D3	D2	D1	D0	Command	Description
0	B8	1	0	1	1	1	0	0	0	Set Gray Scale Table	The next 15 data bytes set the gray scale pulse width in unit of DCLK's. A1[7:0], value for GS1 level Pulse width A2[7:0], value for GS2 level Pulse width … A14[7:0], value for GS14 level Pulse width A15[7:0], value for GS15 level Pulse width **Note** (1) The pulse width value of GS1, GS2, ... , GS15 should not be equal. i.e. 0<GS1<GS2 … <GS15 (2) GS15 level pulse width must be set larger than the period of phase 1 + phase 2 (3) GS15 level must be set larger than 140 (ie. 8Ch)
0	A1[7:0]	$A1_7$	$A1_6$	$A1_5$	$A1_4$	$A1_3$	$A1_2$	$A1_1$	$A1_0$		
0	A2[7:0]	$A2_7$	$A2_6$	$A2_5$	$A2_4$	$A2_3$	$A2_2$	$A2_1$	$A2_0$		
…	…	...	...	...	...	...	...	...	...		
…	…	...	...	...	...	...	...	...	...		
…	…	...	...	...	...	...	...	...	...		
0	A14[7:0]	$A14_7$	$A14_6$	$A14_5$	$A14_4$	$A14_3$	$A14_2$	$A14_1$	$A14_0$		
0	A15[7:0]	$A15_7$	$A15_6$	$A15_5$	$A15_4$	$A15_3$	$A15_2$	$A15_1$	$A15_0$		
0	B9	1	0	1	1	1	0	0	1	Linear LUT	The default Linear Gray Scale table is set in unit of DCLK's as follow GS0 level pulse width = 0; GS1 level pulse width = 12; GS2 level pulse width =24; GS3 level pulse width = 36; : GS14 level pulse width = 168; GS15 level pulse width = 180
0	BC	1	0	1	1	1	1	0	0	Set Pre-charge voltage	Set pre-charge voltage level.
0	A[4:0]	0	0	0	A_4	A_3	A_2	A_1	A_0		
0	BD	1	0	1	1	1	1	0	0	Pre-charge voltage capacitor Selection	A[0]=0b, Without external V_P capacitor (RESET) A[0]=1b, With external V_P capacitor
0	A[0]	0	0	0	0	0	0	0	A_0		
0	BE	1	0	1	1	1	1	1	0	Set V_{COMH}	Set COM deselect voltage level.
0	A[3:0]	0	0	0	0	A_3	A_2	A_1	A_0		

A[4:0]	Hex code	Pre-charge voltage
00000	00h	0.10 x V_{CC}
:	:	:
00100	04h	0.15 x V_{CC} (RESET)
:	:	:
11111	1Fh	0.51 x V_{CC}

A[3:0]	**Hex code**	**V_{COMH}**
0000	00h	0.72 x V_{CC}
:	:	:
0101	05h	0.82 x V_{CC} (RESET)
:	:	:
0111	07h	0.86 x V_{CC}

1. Fundamental Command Table

D/C#	Hex	D7	D6	D5	D4	D3	D2	D1	D0	Command	Description
0 0	FD A[2]	1 0	1 0	1 0	1 1	1 0	1 A_2	0 1	1 0	Set Command Lock	A[2]: MCU protection status. A[2] = 0b, Unlock OLED driver IC MCU interface from entering command (RESET) A[2] = 1b, Lock OLED driver IC MCU interface from entering command **Note** (1) The locked OLED driver IC MCU interface prohibits all commands and memory access except the FDh command
0 0	23 A[5:0]	0 *	0 *	1 A_5	0 A_4	0 A_3	0 A_2	1 A_1	1 A_0	Set Fade In / Out and Blinking	A[5:4] = 00b, Disable fade mode (RESET) A[5:4] = 01b, Enable fade in mode, Once Fade In Mode is enabled, enter a new contrast setting by 81h command and contrast will increase gradually to the target contrast setting. Output follows the latest contrast setting when Fade mode is disabled. Note: (1) The new contrast setting must be larger than the original contrast setting before Fade In Mode is enabled. A[5:4] = 10b, Enable fade out mode, Once Fade Out Mode is enabled, contrast decrease gradually to all pixels OFF. Output follows RAM content when Fade mode is disabled. A[5:4] = 11b Enable Blinking mode. Once Blinking Mode is enabled, contrast decrease gradually to all pixels OFF and then contrast increase gradually to normal display. This process loop continuously until the Blinking mode is disabled. A[3:0], Set the time interval for each fade step A[3:0] / Time interval / step 0000 / 8 frames 0001 / 16 frames 0010 / 24 frames … / … 1110 / 120 frames 1111 / 128 frames

Note
(1) "*" stands for "Don't care".

Note:
*Do not use any other commands, or the system malfunction may result.
*For the details of the commands, please refer to the driver IC SPEC.

■ INITIALIZATION CODE（初始化代码）

```
void Initialization_code_ssd1362 (void)
{
        Write_Command(0XFD);      //Set Command Lock
        Write_Command(0X12);

        Write_Command(0XAE);      //Display OFF

        Write_Command(0X81);      //Set Contrast Control
        Write_Command(0XC9);

        Write_Command(0XA0);      //Set Re-map
        Write_Command(0XC1);

        Write_Command(0XA1);     //Set Display Start Line
        Write_Command(0X00);

        Write_Command(0XA2);     //Set Display Offset
        Write_Command(0X00);

        Write_Command(0XA4);      // Set Display Mode

        Write_Command(0XA8);      //Set MUX Ratio
        Write_Command(0X3F);

        Write_Command(0XAB);      //Function Selection A
        Write_Command(0X01);

        Write_Command(0XAD);      //External /Internal IREF Selection
        Write_Command(0X8E);

        Write_Command(0XB1);       //Set Phase Length
        Write_Command(0X22);

        Write_Command(0XB3);       //Set Front Clock Divider/Oscillator Frequency
        Write_Command(0XA0);

        Write_Command(0XB6);       //Set Second precharge Period
        Write_Command(0X04);

        Write_Command(0XB9);       //Linear LUT

        Write_Command(0XBC);       //Set Pre-charge voltage
        Write_Command(0X04);

        Write_Command(0XBD);       //Pre-charge voltage capacitor Selection
        Write_Command(0X01);

        Write_Command(0XBE);       //Set VCOMH
        Write_Command(0X05);

        Write_Command(0XAF);       //Display ON
}
```

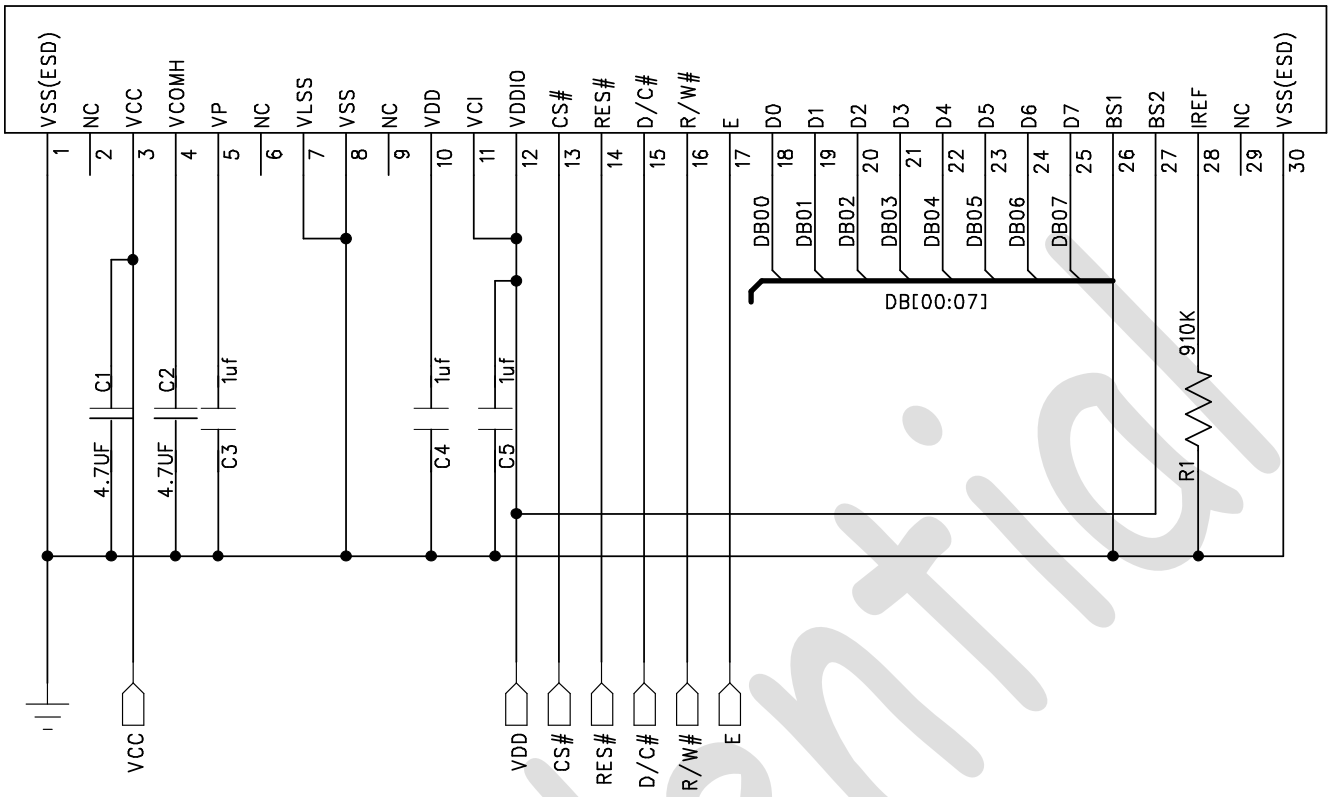
Note：

Please set appropriate parameters of initialization based on actual application.

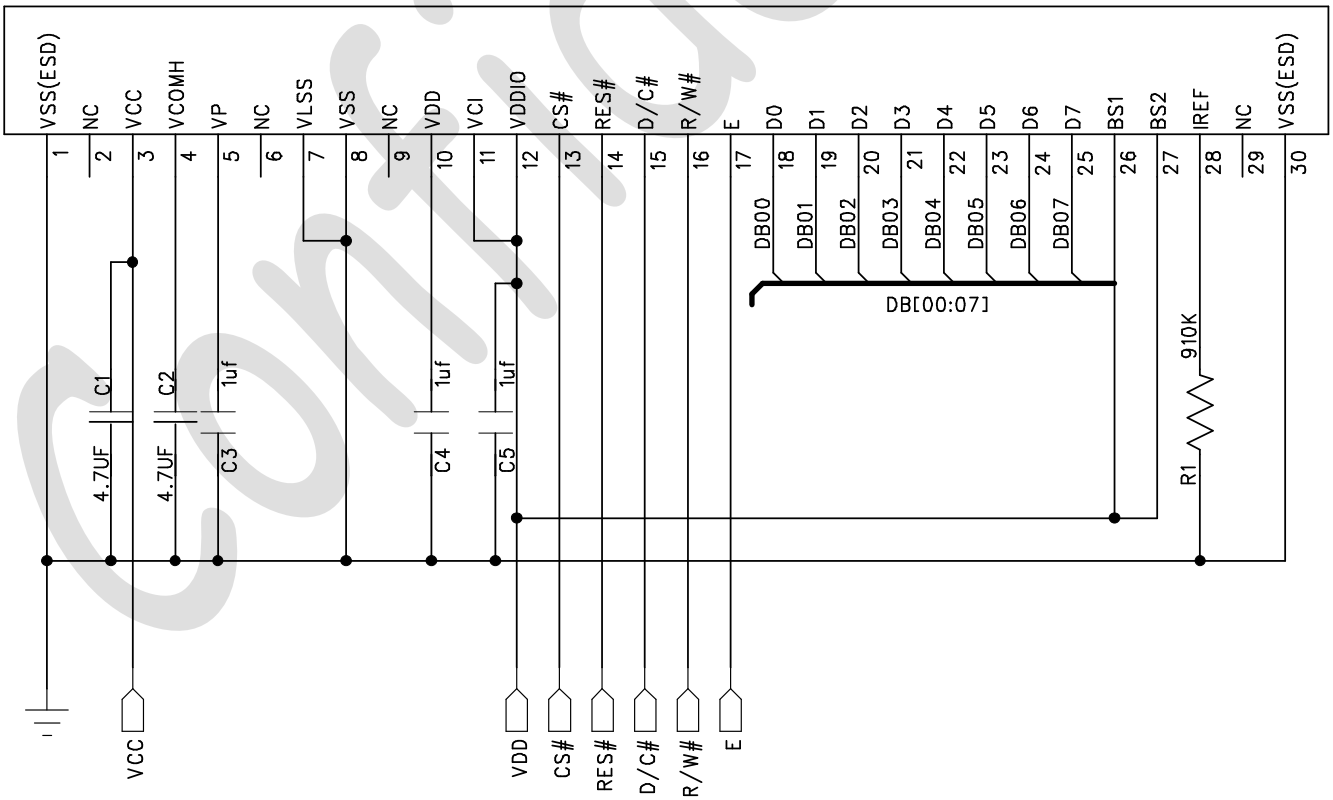
注意：请基于实际的应用程序设置合适的初始化的参数.

■ SCHEMATIC EXAMPLE（应用电路）

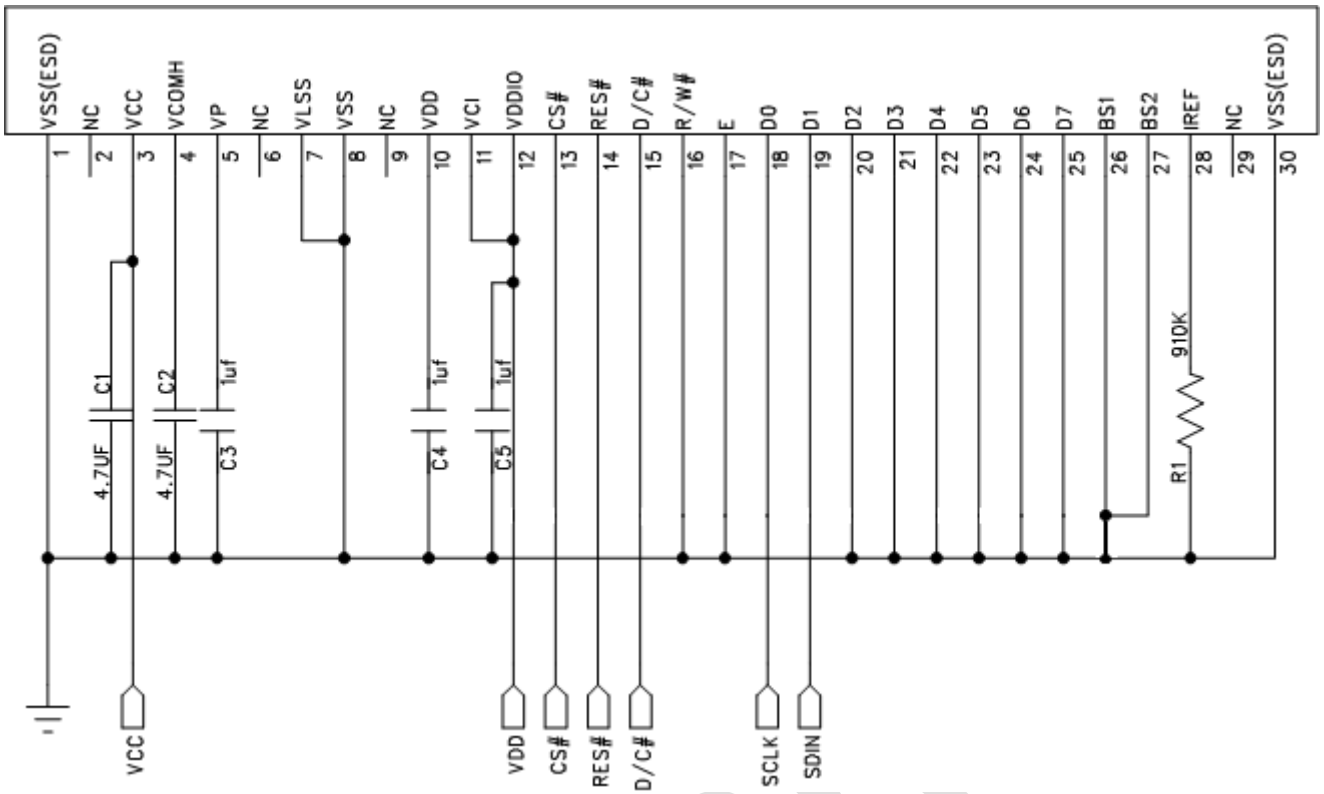
◆ 6800-Series MCU Parallel Interface Application Circuit:



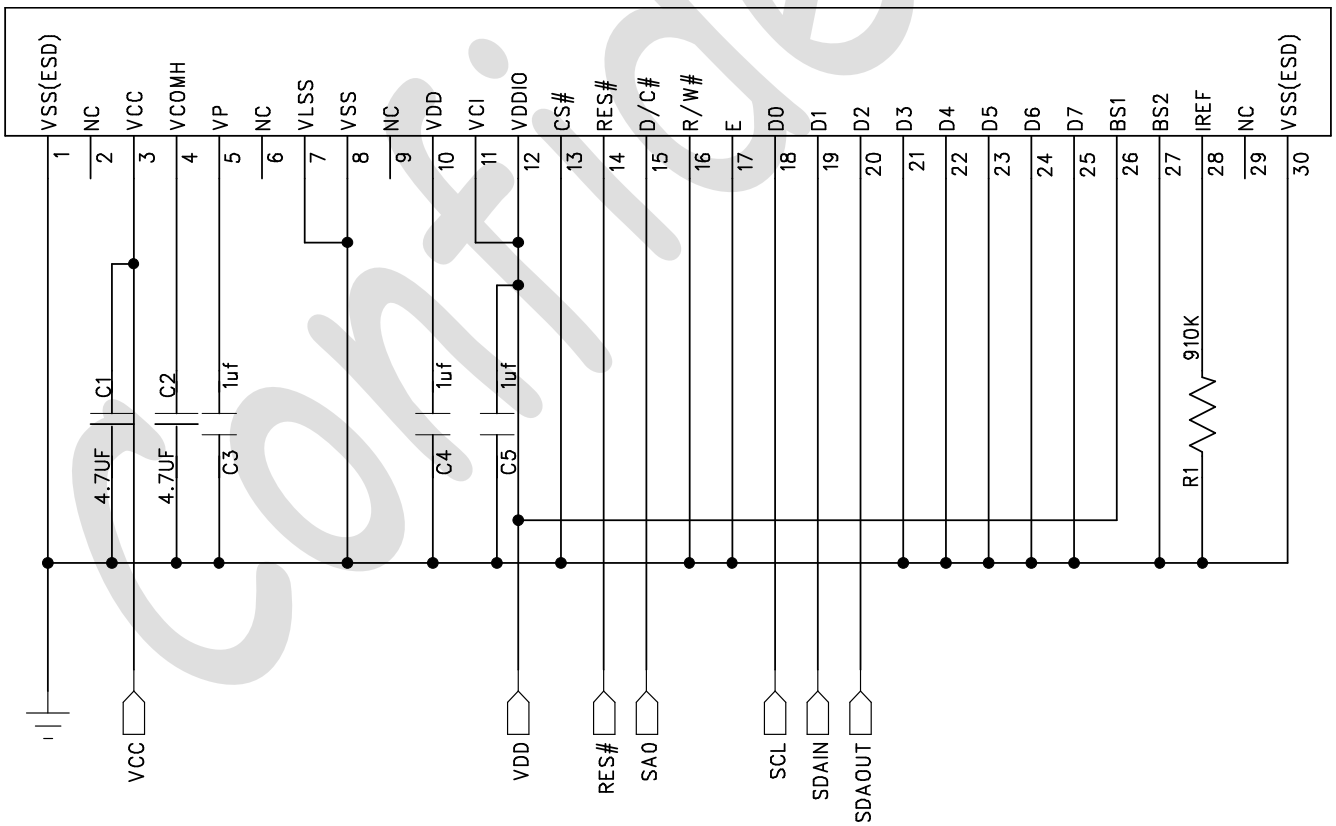
◆ 8080-Series MCU Parallel Interface Application Circuit:



◆ 4-wire SPI Serial Interface Application Circuit:



◆ IIC Interface Application Circuit:



NOTE:

1. C1~C2: 4.7uF/35V+/-10% tantalum capacitor (suggest), C3~ C5:1uF, R1=910 KΩ.
2. The value is recommended value. Select appropriate value against module application.
3. Depends on module application, note that VP may connect with a capacitor to VSS.

■ RELIABILITY TESTS（可靠性测试）

No.	ITEM	Condition	Quantity
1	High Temperature Storage (HTS)	85±2℃, 200 hours	3
2	High Temperature Operating (HTO)	80±2℃, 96 hours	3
3	Low Temperature Storage (LTS)	-40±2℃, 200 hours	3
4	Low Temperature Operating (LTO)	-40±2℃, 96 hours	3
5	High Temperature / High Humidity Storage (HTHHS)	50±3℃, 90%±3%RH, 120 hours	3
6	Thermal Shock (Non-operation) (TS)	-20±2℃ ~ 25℃ ~ 70±2℃ (30min) (5min) (30min) 10cycles	3
7	Vibration (Packing)	10~55~10Hz,amplitude 1.5mm, 1 hour for each direction x, y, z	1 Carton
8	Drop (Packing)	Height : 1 m, each time for 6 sides, 3 edges, 1 angle	1 Carton
9	ESD (finished product housing)	±4KV R:330Ω; C:150pF 10times,air discharge	3

Test and measurement conditions（测试与测量条件）

1. All measurements shall not be started until the specimens attain to temperature stability.
2. The promise temperature range of Polarizers is -30 ° C ~ 80 ° C.

Evaluation criteria（评估标准）

1. The function test is ok.
2. No addition to the defect.
3. The change of luminance should be within ±50% of initial value.
4. The change for the color must be within (±0.02)of initial value based on 1931 CIE coordinates.
5. The change of total current consumption should be within ±50% of initial value.
6. In case of malfunction or defect caused by ESD damage, it would be judged as a good part if it would be recovered to normal state after resetting.

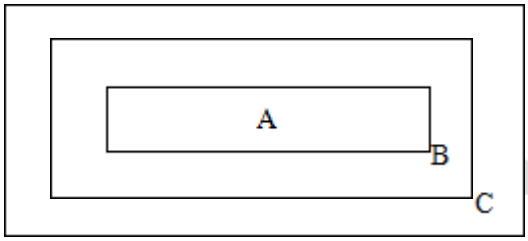
■ OUTGOING QUALITY CONTROL SPECIFICATION（出厂质量控制规范）

◆ Standard（标准）

According to GB/T2828.1-2003/ISO 2859-1：1999 and ANSI/ASQC Z1.4-1993, General Inspection Level II.

◆ Definition（定义）

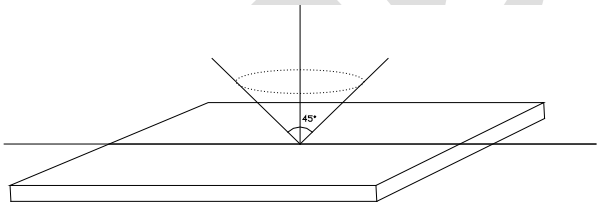
1. Major defect: The defect that greatly affect the usability of product.
2. Minor defect: The other defects, such as cosmetic defects, etc.
3. Definition of inspection zone:



Zone A: Active Area
Zone B: Viewing Area except Zone A
Zone C: Outside Viewing Area
Note: As a general rule, visual defects in Zone C are permissible, when it is no trouble of quality and assembly to customer`s product.

◆ Inspection Methods（检查方法）

1. The general inspection: under 20W x 2 or 40W fluorescent light, about 30cm viewing distance, within 45º viewing angle, under 25±5℃.



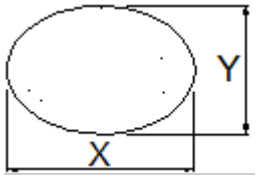
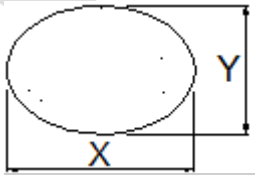
2. The luminance and color coordinate inspection: By CS2000/09A-OLED-117 or the equal equipment, in the dark room, under 25±5℃.

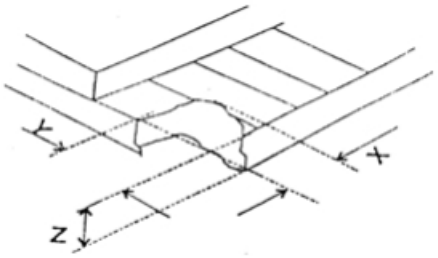
◆ Inspection Criteria（检查标准）

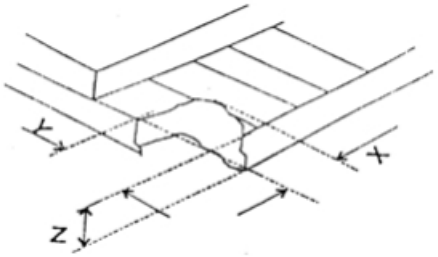
1. Major defect: AQL= 0.65

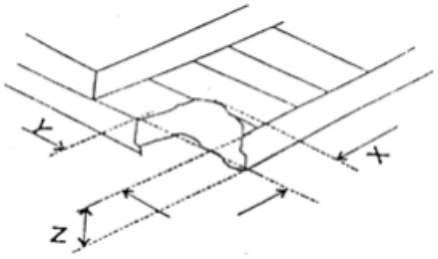
Item	Criterion
Function Defect	1. No display or abnormal display is not accepted
	2. Open or short is not accepted.
	3. Power consumption exceeding the spec is not accepted.
Outline Dimension	Outline dimension exceeding the spec is not accepted.
Glass Crack	Glass crack tends to enlarge is not accepted.

2. Minor Defect: AQL= 1.5

<table>
<tr><th>Item</th><th colspan="4">Criterion</th></tr>
<tr><td rowspan="6">Spot Defect
(dimming and
lighting spot)</td><td colspan="2" rowspan="2">Size (mm)</td><td colspan="2">Accepted Qty</td></tr>
<tr><td>Area A + Area B</td><td>Area C</td></tr>
<tr><td rowspan="4">  </td><td>Φ≦0.10</td><td colspan="2">Ignored</td></tr>
<tr><td>0.10＜Φ≦0.15</td><td>3</td><td rowspan="3">Ignored</td></tr>
<tr><td>0.15＜Φ≦0. 20</td><td>1</td></tr>
<tr><td>0.2＜Φ</td><td>0</td></tr>
<tr><td colspan="4">Note : Φ= (x + y) / 2</td></tr>
<tr><td rowspan="5">Line Defect
(dimming and
lighting line)</td><td>L (Length) : mm</td><td>W (Width) : mm</td><td>Area A + Area B</td><td>Area C</td></tr>
<tr><td>/</td><td>W≦0.02</td><td colspan="2">Ignored</td></tr>
<tr><td>L≦3.0</td><td>0.02＜W≦0.03</td><td>2</td><td rowspan="3">Ignored</td></tr>
<tr><td>L≦2.0</td><td>0.03＜W≦0.05</td><td>1</td></tr>
<tr><td>/</td><td>0.05＜W</td><td>As spot defect</td></tr>
<tr><td colspan="5">Remarks: The total of spot defect and line defect shall not exceed 4 PCS. The distance between two lines defects must exceed 1 mm</td></tr>
<tr><td rowspan="7">Polarizer Scratch</td><td colspan="4">1. If scratch can be seen during operation, according to the criterions of the Spot Defect and the Line Defect.</td></tr>
<tr><td colspan="4">2. If scratch can be seen only under non-operation or some special angle, the criterion is as below:</td></tr>
<tr><td>L (Length) : mm</td><td>W (Width) : mm</td><td>Area A + Area B</td><td>Area C</td></tr>
<tr><td>/</td><td>W≦0.02</td><td colspan="2">Ignore</td></tr>
<tr><td>3.0＜L≦5.0</td><td>0.02＜W≦0.04</td><td>2</td><td rowspan="3">Ignore</td></tr>
<tr><td>L≦3.0</td><td>0.04＜W≦0.06</td><td>1</td></tr>
<tr><td>/</td><td>0.06＜W</td><td>0</td></tr>
<tr><td rowspan="5">Polarizer Air Bubble</td><td colspan="2">Size</td><td>Area A + Area B</td><td>Area C</td></tr>
<tr><td rowspan="4">  </td><td>Φ≦0.20</td><td colspan="2">Ignored</td></tr>
<tr><td>0.20＜Φ≦0.30</td><td>2</td><td rowspan="3">Ignored</td></tr>
<tr><td>0.30＜Φ≦0.50</td><td>1</td></tr>
<tr><td>0.50＜Φ</td><td>0</td></tr>
</table>

<table>
<tr><td rowspan="4">Glass Defect
(Glass Chipped)</td><td>1. On the corner (mm)
 

<table><tr><td>x</td><td>≤1.5</td></tr><tr><td>y</td><td>≤1.5</td></tr><tr><td>z</td><td>≤t</td></tr></table></td></tr>
<tr><td>2. On the bonding edge (mm)
 

<table><tr><td>x</td><td>≤a/4</td></tr><tr><td>y</td><td>≤ s/3 & ≤0.7</td></tr><tr><td>z</td><td>≤t</td></tr></table></td></tr>
<tr><td>3. On the other edges (mm)
 

<table><tr><td>x</td><td>≤ a / 8</td></tr><tr><td>y</td><td>≤ 0.7</td></tr><tr><td>z</td><td>≤t</td></tr></table></td></tr>
<tr><td>Note: t: glass thickness; s: pad width; a: the length of the edge.</td></tr>
<tr><td>TCP Defect</td><td>Crack, deep fold and deep pressure mark on the TCP are not accepted</td></tr>
<tr><td>Pixel Size</td><td>The tolerance of display pixel dimension should be within ±20% of the spec.</td></tr>
<tr><td>Luminance</td><td>Refer to the spec or the reference sample.</td></tr>
<tr><td>Color</td><td>Refer to the spec or the reference sample.</td></tr>
</table>

■ CAUTIONS IN USING OLED MODULE（OLED 模块使用注意事项）

◆ Precautions for Handling OLED Module(处理 OLED 模块的注意事项)

1. The display panel is made of glass and polarizer. As glass is fragile. It tends to become chipped during handling especially on the edges. Please avoid dropping or jarring. Do not subject it to a mechanical shock by dropping it or impact.
   显示屏由玻璃和偏光片组成。由于玻璃是脆弱的，使用过程中要特别防止边缘区损伤。请避免显示屏因跌落或振动而受到机械冲击。

2. Do not apply excessive force to the display surface or the adjoining areas since this may cause abnormal. Do not touch the display with bare hands. This will stain the display area (some cosmetics are determined to the polarizer).
   请勿施加过大的压力于显示屏或连接部位，否则可能会引起显示异常。不要用手接触显示屏，这将弄脏显示区（一些外观是由偏光片决定的）。

3. The polarizer covering the display surface of the OLED module is soft and easily scratched. Handle this polarizer carefully. Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.). Do not put or attach anything on the display area to avoid leaving marks on it. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizer. After products are tested at low temperature they must be warmed up in a container before coming in to contact with room temperature air.
   覆盖 OLED 显示模块显示平面的偏光片是软性的且易被擦伤，请小心，轻拿。请勿用任何硬度大于 HB 铅笔芯的物品（玻璃，镊子等）接触、撞压或摩擦裸露偏光片。不要放置或粘附物体在显示区域上以免留下痕迹。冷凝在表面和端子将会损坏或弄脏偏光片。产品在低温下测试之后，与室温空气接触之前必须在容器内升温。

4. If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents.
   - Isopropyl alcohol
   - Ethyl alcohol
   Do not scrub hard to avoid damaging the display surface.
   如果显示平面受污，可对平面吹热气且轻轻地用软性干布擦除。如果受污严重，用含下列一种溶剂的湿布擦除:
   - 甘油
   - 酒精
   请勿用力擦拭以免损坏显示平面。

5. Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following.
   - Water
   - Ketone
   - Aromatic solvents
   Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading. Avoid contact with oil and fats.
   除以上提到的溶剂外，其他溶剂可能会损坏偏光片，特别要避免使用以下溶剂：
   -水
   -酮
   -芳烃溶剂
   立即擦掉唾液或水滴，长时间与水接触会引起变形或褪色。避免接触油和油脂

6. Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.
   特别注意最小限度地减少电极腐蚀，电极腐蚀会因水滴、湿度冷凝或在高湿环境下通电而加速。

7. When mounting the OLED module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable.
安装 OLED 模块时一定不要弯曲、扭曲和变形。要特别注意不要用力拔，弯曲传输线。

8. Do not attempt to disassemble or process the OLED module.
请勿拆卸 OLED 模块。

9. NC terminal should be open. Do not connect anything.
悬空端应断开，不要连接任何器件。

10. If the logic circuit power is off, do not apply the input signals.
如果逻辑电路电源是断开的，不要施加输入信号。

11. Electro-Static Discharge Control，Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
由于 OLED 显示模块使用 CMOS 集成，要特别注意静电放电问题。对 CMOS 器件，要特别注意静电。为防止静电造成的损坏，注意保持合宜的工作环境。

- Before removing OLED from its packing case or incorporating it into a set, be sure the module and your body have the same electric potential. Be sure to ground the body when handling the OLED modules.
-OLED 模块移出包装盒和安装之前，要保证模块和人体具有相同的电位。处理模块时可靠接地。

- Tools required for assembling, such as soldering irons, must be properly grounded. Make certain the AC power source for the soldering iron does not leak. When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.
- 使用工具如电烙铁，必须正确接地，并确保烙铁使用的交流电不会漏电。用电动螺丝刀固定模块时，电动螺丝刀应接地，尽可能降低电动换向器火花产生的电磁波。

- To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions. To reduce the generation of static electricity be careful that the air in the work is not too dry. A relative humidity of 50%-60% is recommended. As far as possible make the electric potential of your work clothes and that of the work bench the ground potential.
- 为减少静电产生，不要在干燥的条件下进行组装等工作。为降低静电，工作环境一定不要太干燥。建议相对湿度为 50%-60%。尽可能使你的工作服和工作台接地。

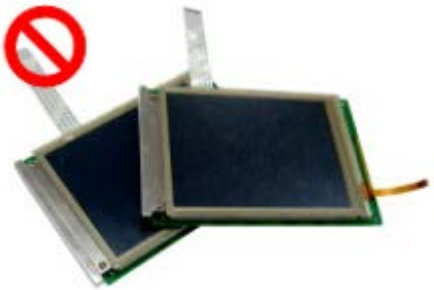
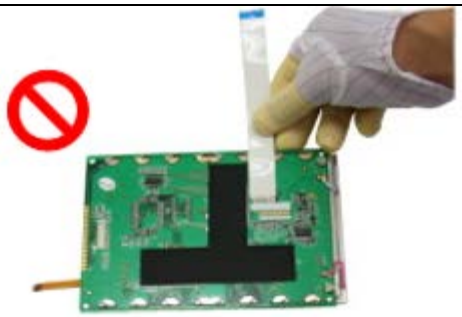
- The OLED module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.
- OLED 模块表面有保护膜。需要小心操作因为撕保护膜时可能产生静电。

12. OLED module is easy to be damaged. Please note below and be careful for handling.
OLED 显示模块很容易被损坏. 请注意以下并小心操作

i Correct handling（正确操作）:

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="2">As above picture, please handle with anti-static gloves around OLED module edges.
像上面的图片,请戴抗静电手套,并拿模块边缘.</td></tr>
</table>

ii. Incorrect handling(错误操作):

<table>
<tr><td> 
Don’t touch IC directly
不要直接触摸 IC</td><td> 
Don’t stack OLED modules
不要堆叠 OLED 模块</td></tr>
<tr><td> 
Don’t hold the surface of panel
不要拿着面板的表面</td><td> 
Don’t stretch interface of input, such as FPC
不要拉扯输入接口，如软排线</td></tr>
<tr><td> 
Don’t hold the surface of IC
不要拿着 IC 的表面</td><td> 
Don’t operate with sharp stick such as pens
不要用尖锐的物体来操作，如笔尖</td></tr>
</table>

◆ Precautions for Storing OLED Module（OLED 模块存储注意事项）

1. When storing the OLED modules, the following precautions are necessary.
   OLED 模块的存储依照以下几点:
   i. Store them in a sealed polyethylene bag with the desiccant.
   使用干燥剂和聚乙烯袋密封包装。
   ii. Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0℃and 35℃, and keep the relative humidity between 40%RH and 60%RH.
   避光保存，避免直接暴露在太阳光或黄光灯下，保持温度在 0~35 摄氏度之间，保持相对湿度在 40%RH 和 60%RH 之间。
   iii. The polarizer surface should not come in contact with any other objects (We advise you to store them in the anti-static electricity container in which they were shipped).
   偏光片表面避免接触其他物质（建议存放在货运防静电包装中）。

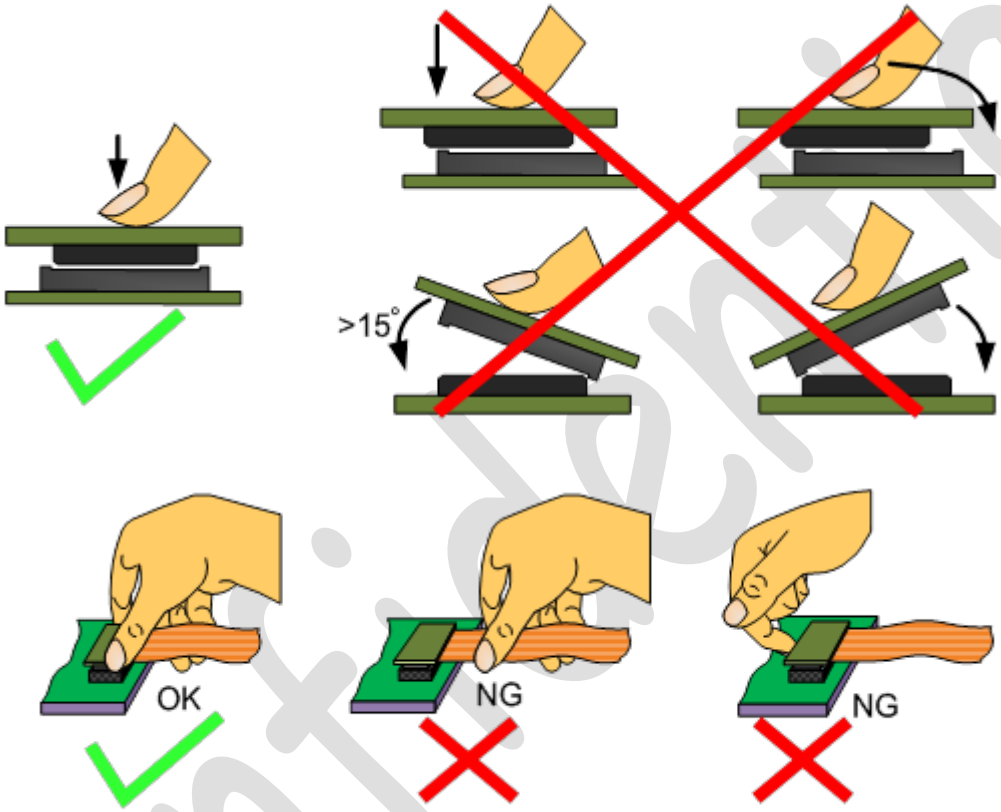
2. Others
   i. If the OLED modules have been operating for a long time，it will cause brightness decay. It is no recommended to showing the same display patterns for a long time, otherwise the display patterns may remain on the screen as ghost images and it is unrecoverable.
   OLED 长时间点亮会有亮度衰减，所以尽量避免长时间工作于同一个显示图案，否则会造成鬼影，这是不可恢复的。
   ii. To minimize the performance degradation of the OLED modules resulting from destruction caused by static electricity etc., exercise care to avoid holding the following sections when handling the modules.
   为最小限度地降低由静电等导致 OLED 模块性能降低，使用模块时慎重使用下列区域：
   - Exposed area of the printed circuit board.
   印制电路板裸露区域。
   -Terminal electrode sections.
   印制电路板引出端子区域。

◆ **Using OLED Modules（OLED 模块使用注意事项）**

Installing OLED Modules（安装 OLED 模块）

i. When assembling the OLED module into other equipment, the spacer to the bit between the OLED module and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements. The measurement tolerance should be ±0.1mm.
将 OLED 模块安装进入其它设备时，模块和安装板之间间隔应有足够的高度以避免模块表面受压。参照专业度量技术标准。量度公差应是±0.1 毫米。

ii. Precaution for assemble the module with BTB connector:
用板对板连接器安装 OLED 显示模块注意事项：
Please note the position of the male and female connector position, don't assemble or assemble like the method which the following picture shows.
请注意连接器的公母及连接位置，请勿出现下图所示的连接方式。



◆ **Precautions for Soldering OLED Module（OLED 模块焊接注意事项）**

	Manual soldering 手工焊接	Machine drag soldering 机器拖焊	Machine press soldering 机器压焊
No RoHS Product 非环保产品	290°C ~350°C. Time: 3-5S.	330°C ~350°C. Speed : 15-17 mm/s.	300°C ~330°C. Time: 3-6S. Press: 0.8~1.2Mpa
RoHS Product 环保产品	340°C ~370°C. Time: 3-5S.	350°C ~370°C. Speed : 15-17 mm/s.	330°C ~360°C. Time: 3-6S. Press: 0.8~1.2Mpa

1. If soldering flux is used, be sure to remove any remaining flux after finishing to soldering operation (This does not apply in the case of a non-halogen type of flux). It is recommended that you protect the OLED surface with a cover during soldering to prevent any damage due to flux spatters.
如果使用助焊剂，完成焊接后一定要清除剩余的助焊剂（除非卤化物助焊剂）。建议焊接时用盖子保护显示屏面以避免因助焊剂溅出造成的任何损坏。

2. When soldering the OLED module and PC board, the panel and board should not be detached more than three times. This maximum number is determined by the temperature and time conditions mentioned above, though there may be some variance depending on the temperature of the soldering iron.
焊接 OLED 模块和线路板时，不应装卸多于三次。尽管焊接温度会有变化，但不应超过上面提到的焊接温度和时间最大值。

3. When remove the OLED module from the PC board, be sure the solder has completely melted, the soldered pad on the PC board could be damaged.
从线路板上移除 OLED 模块时，要保证焊锡已完全熔化，不要损坏线路板上的焊接位。

◆ **Precautions for Operation (工作运行注意事项)**

1. OLED is a self-light device, do not use back character on a white background display mode, otherwise the power consumption will be higher and it will cause crosstalk.
   OLED 是自发光器件，不要使用白底黑字显示模式，否则功耗增大，并且会有交叉效应。

2. It is an indispensable condition to drive OLED's within the specified voltage limit since the higher voltage than the limit will damage the driver IC.
   在 OLED 驱动电压内来操作模块是必要的。超过限定电压会损坏集成电路。

3. The brightness will be lower at lower temperature than the normal temperature and will be higher at higher temperature. However those phenomena do not mean malfunction or out of order with OLED's, which will come back in the normal temperature.
   OLED 亮度在低温时比常温要暗，高温时，会比常温要高。然而,这并不是指 OLED 示屏工作异常，显示屏在恢复常温时，效果会恢复正常.

4. If the display area is pushed hard, the display will cause pixel short, it will become the display defect.
   如果在运行过程中显示区受到挤压,将可能引起像素短路，引起显示缺陷。

5. A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit. Usage under the maximum operating temperature, 50%RH or less is required.
   接线端冷凝会引起电化学反应而断路。因此必须在最大的操作温度之内，湿度小于 50% 的条件下使用 OLED 模块。

6. Input logic voltage before apply analog high voltage such as OLED driving voltage when power on. Remove analog high voltage before logic voltage when power off the module. Input each signal after the positive/negative voltage becomes stable.
   开机时，先接通逻辑电压，再接通模拟高压，比如 OLED 驱动电压。关机时，先断开模拟高压，再关逻辑电压。正负电源都稳定后再送控制信号。

7. Please keep the temperature within the specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.
   模块在操作和存储规格范围内使用。高温高湿可能会引起偏振退化，起泡，偏光片脱落等问题。

◆ **Safety（安全）**

1. It is recommended to crush damaged or unnecessary OLED into pieces.
   建议将损坏的 OLED 显示屏压成碎片。

2. If any solid or powder leaks out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.
   如果任何固体或粉末从玻璃种泄漏出且与手接触,要用肥皂和水彻底清洗。

◆ **Limited Warranty（有限质保）**

Unless agreed between TRULY and the customer, TRULY will replace or repair any of its OLED modules which are found to be functionally defective when inspected in accordance with TRULY OLED acceptance standards (copies available upon request) for a period of one year from date of production. Cosmetic/visual defects must be returned to TRULY within 90 days of shipment. Confirmation of such date shall be based on data code on product. The warranty liability of TRULY limited to repair and/or replace on the terms set forth above. TRULY will not be responsible for any subsequent or consequential events.

除信利和客户之间另有协议外，自生产之日起一年内，根据信利的OLED显示屏品质标准，信利将对有功能缺陷的OLED显示模块换货或返工。外观/视觉缺陷产品，必须在出货后90天内归还信利。以产品上标识日期为准。信利保修责任仅限于对符合上述规定的货品进行返工和/或换货。对此后发生的任何情况，信利均不承担任何责任。

◆ **Return OLED Module under Warranty（OLED 模块返修质保）**

1. No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are :

保修是以上述注意事项未被忽视为先决条件的。典型的违反例子如下:

- Broken OLED glass.

-断裂的 OLED 显示屏玻璃。

- PCB eyelet is damaged or modified.

-印制线路板孔修改或损坏。

-PCB conductors damaged.

-线路板导体损坏。

- Circuit modified in any way, including addition of components.

-线路随意变更，包括元件变化。

- PCB tampered with by grinding, engraving or painting varnish.

-印制电路板已修改，如研磨，雕刻，绘涂等。

- Soldering to or modifying the bezel in any manner.

-焊接或变动模块

2. Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB eyelet, conductors and terminals.

模块维修清单将按双方协议送呈客户。模块详细缺陷描述须模块一并退回。顾客安装的连接器或电缆必须在不破坏线路板孔，线路和引线端条件下全部移去。

■ PRIOR CONSULT MATTER（提前商议事项）

1. For Truly standard products, we keep the right to change material, process ... for improving the product property without prior notice to our customer.
   对于信利的标准产品，我们保留在不通知客户的情况下,为提高产品性能而改变原材料及加工方法等的权利。

2. For OEM products, if any changes are needed which may affect the product property, we will consult with our customer in advance.
   对于 OEM 产品，如果需要做任何会影响到产品性能的改变，我们会提前和客户商议。

3. If you have special requirement about reliability condition, please let us know before you start the test on our samples.
   如对可靠性条件有特殊要求，请在产品测试前通知我们。

■ FACTORY CONTACT INFORMATION（工厂联系信息）

1. FACTORY NAME: TRULY SEMICONDUCTORS LTD.
   工厂名称:信利半导体有限公司

2. FACTORY ADDRESS: Truly Industrial Area, ShanWei City,GuangDong,China
   工厂地址：中国广东省汕尾市信利工业城

3. P.C: 516600 URL: http://www.truly.com.hk; http://www.trulysemi.com
   邮政编码: 516600 网站:http://www.truly.com.hk; http://www.trulysemi.com