

Display Elektronik GmbH

# DATA SHEET

**STANDARD OLED/PLED**

**DEP 128128D - Y**

*Product Specification*

*Version : 01*

17.07.2009

## History of Version

Version	Contents	Date	Note
01	NEW VERSION	2009/07/17	SPEC.

## **C O N T E N T S**

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## 1. Numbering System

## 2. General Specification

### (1) Mechanical Dimension

Item	Standard Value	Unit
Number of dots	128x128	dots
Module dimension (L*W*H)	33.8*36.5*1.41(MAX)	mm
Active area	26.86*26.86	mm
Dot size	0.19(W)×0.19(H)	mm
Dot pitch	0.21(W)×0.21 (H)	mm
Color	Yellow	

### (2) Controller IC: SSD1327 Controller

### (3) Temperature Range

Operating	-40 ~ +70°C
Storage	-40 ~ +85°C

## 3. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-40	—	+70	°C
Storage Temperature	TST	-40	—	+85	°C
Humidity		—	—	85	%
Supply Voltage For Logic	VDD	-0.3	—	3.5	V
Supply Voltage For Panel	Vcc	8	—	18	V
Operating lifetime(Yellow)			40,000(*)		Hrs

\*:60cd/m<sup>2</sup> light on

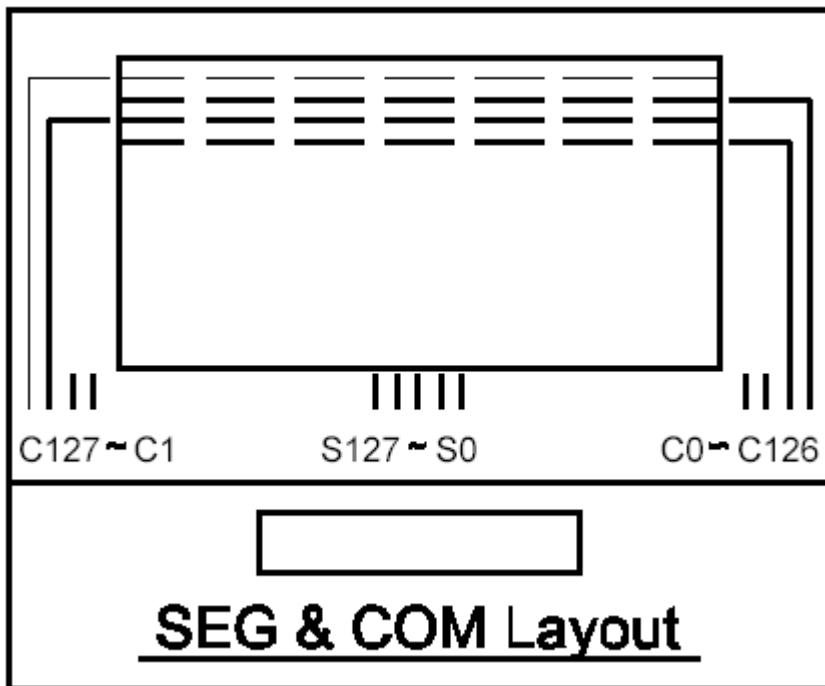
#### 4. Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage For Logic	$V_{DD}-V_{SS}$	—	2.6	3.3	3.5	V
Supply Voltage For Panel	$V_{CC}-V_{SS}$	—	14.5	15	15.5	V
Input High Vol	$V_{IH}$	—	$0.8V_{DD}$	—	$V_{DD}$	V
Input Low Vol	$V_{IL}$	—	0	—	$0.2V_{DD}$	V
Output High Vol	$V_{OH}$	—	$0.9V_{DD}$	—	$V_{DD}$	V
Output Low Vol.	$V_{OL}$	—	0	—	$0.1V_{DD}$	V
Supply Current (with built-in positive voltage)	$I_{DD}$	—	—	160	—	mA

#### 5. Optical Characteristics

Item	Min.	Typ.	Max.	Unit
View Angle	160	—	—	deg
Dark Room contrast	2000:1	—	—	—
Response Time	—	10	—	us

## 6. Panel Layout Diagram



## 7. Interface Pin Function

Pin No.	Symbol	Level	Description
1	V <sub>ss</sub>	0V	Ground
2	V <sub>dd</sub>	3.3V	Supply voltage for logic
3	CS	H/L	Chip select pin
4	/RES	H/L	Hardware Reset pin
5	D/C	H/L	H: Data; L: Command.
6	WR	H/L	write signal pin
7	RD	H/L	Read signal pin
8	DB0	H/L	Data bus line
9	DB1	H/L	Data bus line
10	DB2	H/L	Data bus line
11	DB3	H/L	Data bus line
12	DB4	H/L	Data bus line
13	DB5	H/L	Data bus line
14	DB6	H/L	Data bus line
15	DB7	H/L	Data bus line
16	DISPOFF/ VCC	— H/L	DISPOFF: Active L VCC: supply voltage for panel(optional)

**Default: Parallel 8-Bit 8080 Interface**

**68j : Parallel 8-Bit 6800 Interface Special Code**

**20i : SPI Interface Special Code**

**20a: I2C Interface Special Code**

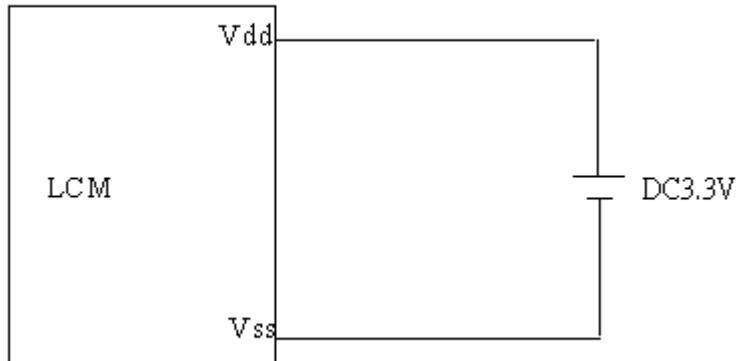
MCU interface assignment under different bus interface mode

Pin Name Bus Interface	Data/Command Interface								Control Signal				
	D7	D6	D5	D4	D3	D2	D1	D0	E	R/W#	CS#	D/C#	RES#
8-bit 8080	D[7:0]								RD#	WR#	CS#	D/C#	RES#
8-bit 6800	D[7:0]								E	R/W#	CS#	D/C#	RES#
4-wire SPI	Tie LOW				NC	SDIN	SCLK	Tie LOW		CS#	D/C#	RES#	
I <sup>2</sup> C	Tie LOW				SDA <sub>OUT</sub>	SDA <sub>IN</sub>	SCL	Tie LOW		SA0	RES#		



## 8. Power Supply For LCD Module

\* LCM operating on "DC 3.3V " input with built-in positive voltage



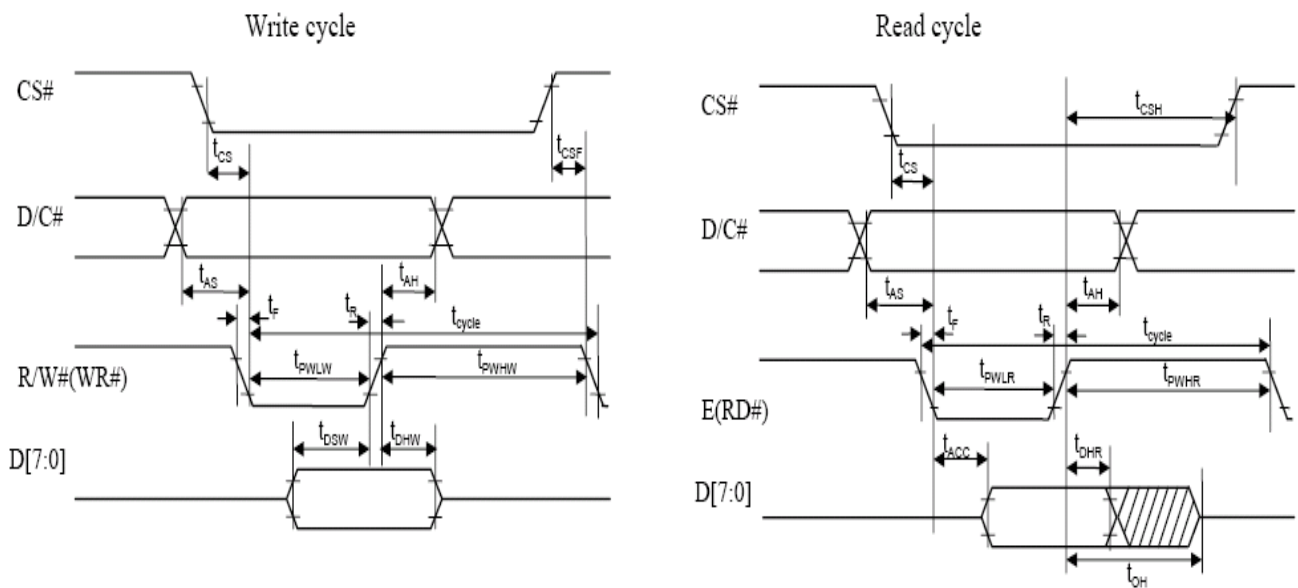
## 9. Timing Characteristics

### 9-1.8080 MPU Interface

( $V_{CI} - V_{SS} = 1.65V$  to  $3.5V$ ,  $T_A = 25^\circ C$ )

Symbol	Parameter	Min	Typ	Max	Unit
$t_{cycle}$	Clock Cycle Time	300	-	-	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	7	-	-	ns
$t_{DHR}$	Read Data Hold Time	20	-	-	ns
$t_{OH}$	Output Disable Time	-	-	70	ns
$t_{ACC}$	Access Time	-	-	140	ns
$t_{PWLW}$	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

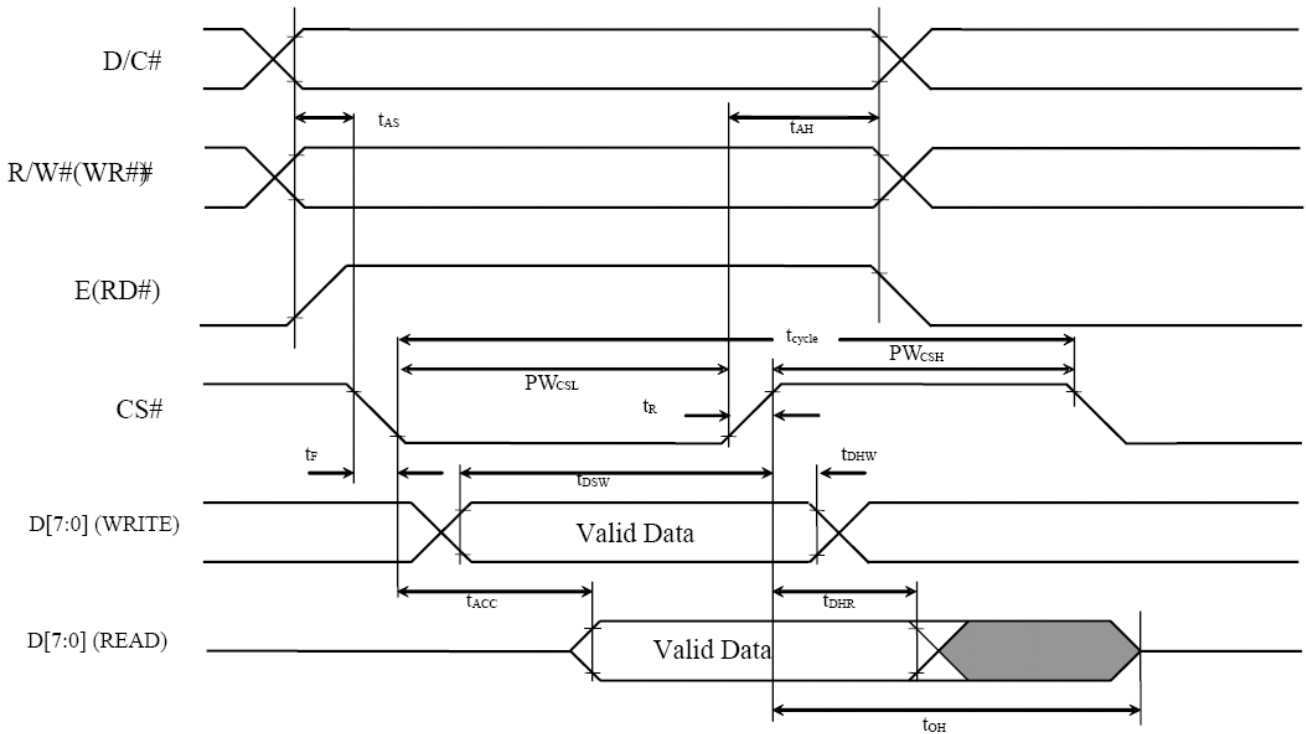


## 9-2.6800 MPU Interface

( $V_{CI} - V_{SS} = 1.65V$  to  $3.5V$ ,  $T_A = 25^\circ C$ )

Symbol	Parameter	Min	Typ	Max	Unit
$t_{cycle}$	Clock Cycle Time	300	-	-	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	7	-	-	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)	120	-	-	ns
	Chip Select Low Pulse Width (write)	60	-	-	ns
$PW_{CSH}$	Chip Select High Pulse Width (read)	60	-	-	ns
	Chip Select High Pulse Width (write)	60	-	-	ns
$t_R$	Rise Time	-	-	15	ns
$t_F$	Fall Time	-	-	15	ns

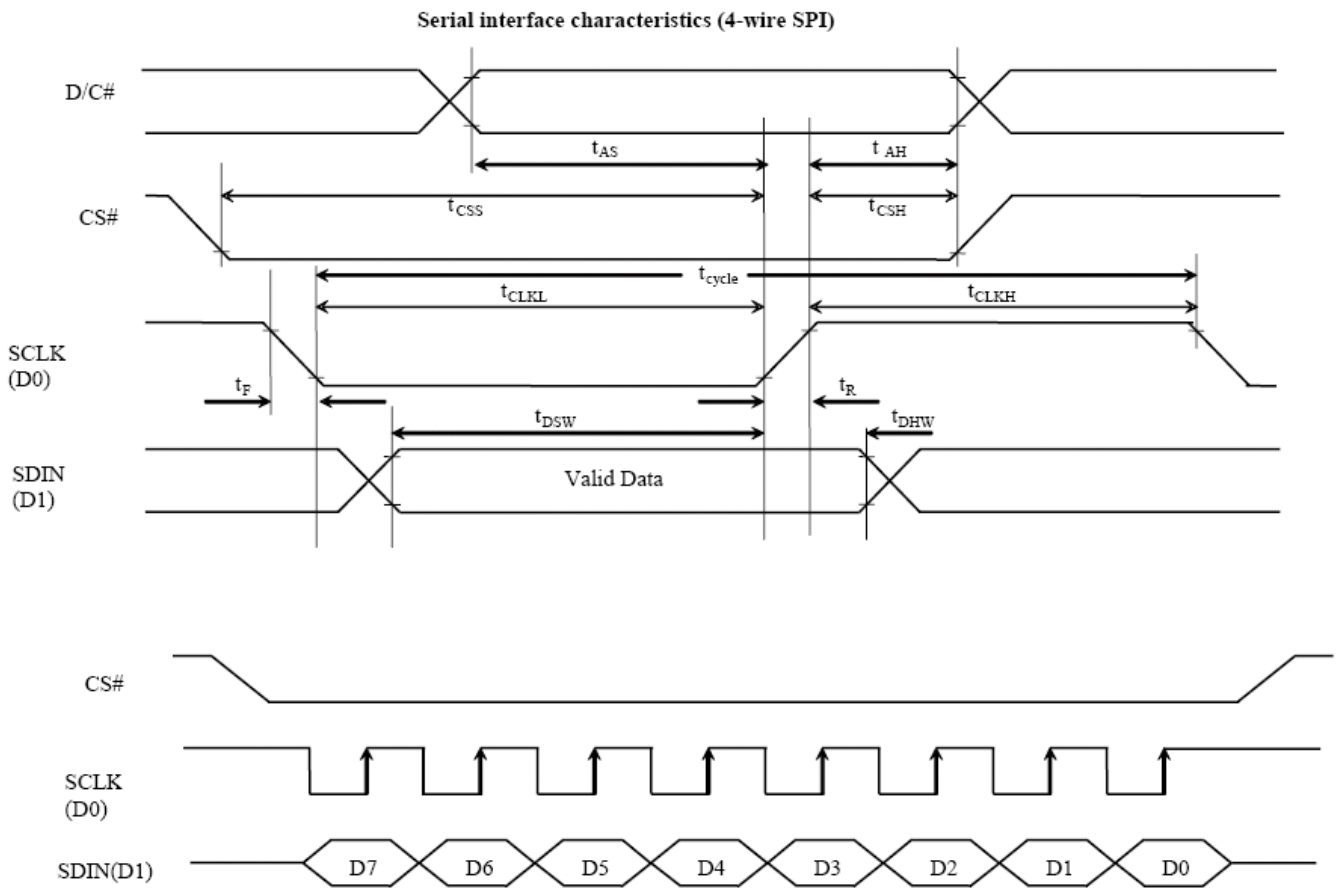
6800-series MCU parallel interface characteristics



### 9-3.Serial Interface

( $V_{CI} - V_{SS} = 1.65V$  to  $3.5V$ ,  $T_A = 25^\circ C$ )

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	15	-	-	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	15	-	-	ns
$t_{CLKL}$	Clock Low Time	20	-	-	ns
$t_{CLKH}$	Clock High Time	20	-	-	ns
$t_R$	Rise Time	-	-	15	ns
$t_F$	Fall Time	-	-	15	ns

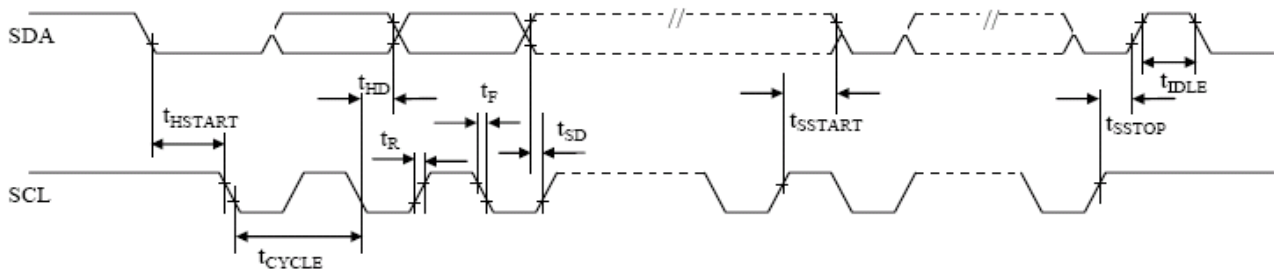


### 9-3.I2C Interface

( $V_{CI} - V_{SS} = 1.65V$  to  $3.5V$ ,  $T_A = 25^\circ C$ )

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 <sub>OUT</sub> ” pin)	0	-	-	ns
	Data Hold Time (for “SDA <sub>IN</sub> ” pin)	300	-	-	ns
$t_{SD}$	Data Setup Time	100	-	-	ns
$t_{SSSTART}$	Start condition Setup Time (Only relevant for a repeated Start condition)	0.6	-	-	us
$t_{SSSTOP}$	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

I<sup>2</sup>C interface Timing characteristics

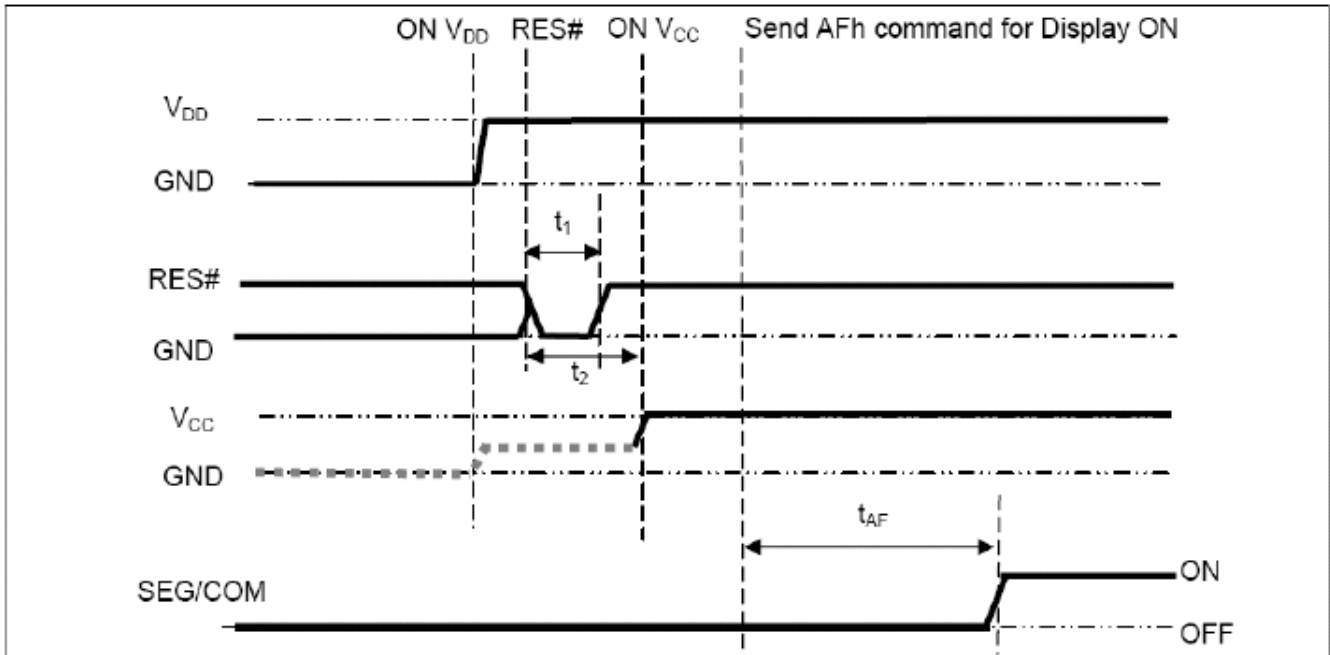


## 10. Power ON / OFF Sequence & Application Circuit

### 10.1 POWER ON / OFF SEQUENCE

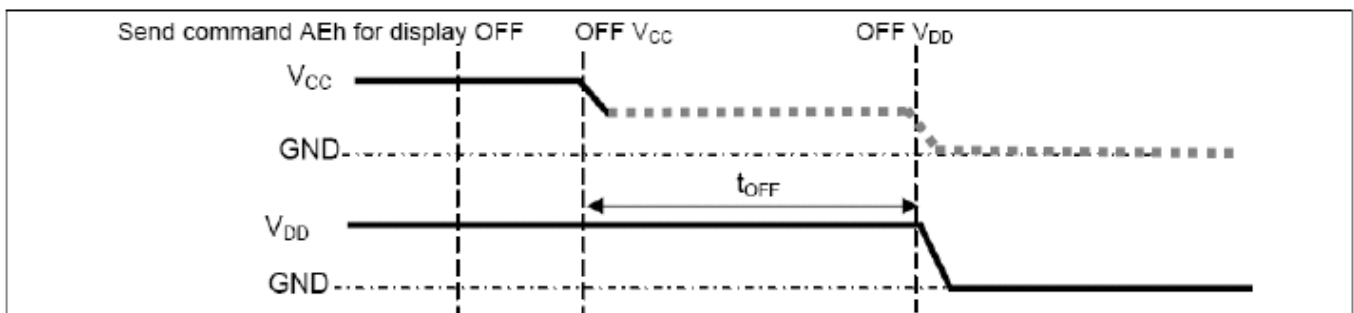
#### Power ON sequence:

1. Power ON VDD.
2. After VDD becomes stable, set wait time at least 1ms ( $t_0$ ) for internal VDD 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 VCC.(1)
4. After VCC become stable, send command AFh for display ON. SEG/COM will be ON after 200ms( $t_{AF}$ ).



#### Power OFF sequence:

1. Send command AEh for display OFF.
2. Power OFF VCC.(1), (2), (3)
3. Wait for  $t_{OFF}$ . Power OFF VDD. (where Minimum  $t_{OFF}$ =80ms (5), Typical  $t_{OFF}$ =100ms)



#### Note:

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

# 11. Display Control Instruction

(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[5:0] B[5:0]	0 * *	0 * *	0 A <sub>5</sub> A <sub>5</sub>	1 A <sub>4</sub> A <sub>4</sub>	0 A <sub>3</sub> A <sub>3</sub>	1 A <sub>2</sub> A <sub>2</sub>	0 A <sub>1</sub> A <sub>1</sub>	1 A <sub>0</sub> A <sub>0</sub>	Set Column Address	Setup Column 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 0	75 A[6:0] B[6:0]	0 * *	0 A <sub>6</sub> A <sub>6</sub>	0 A <sub>5</sub> A <sub>5</sub>	1 A <sub>4</sub> A <sub>4</sub>	0 A <sub>3</sub> A <sub>3</sub>	1 A <sub>2</sub> A <sub>2</sub>	0 A <sub>1</sub> A <sub>1</sub>	1 A <sub>0</sub> A <sub>0</sub>	Set Row Address	Setup Row 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	81 A[7:0]	1 A <sub>7</sub>	0 A <sub>6</sub>	0 A <sub>5</sub>	0 A <sub>4</sub>	0 A <sub>3</sub>	0 A <sub>2</sub>	0 A <sub>1</sub>	1 A <sub>0</sub>	Set Contrast Control	Double byte command to select 1 out of 256 contrast steps. Contrast increases as the value increases. (RESET = 7Fh )
0	84 ~ 86	1	0	0	0	0	1	X <sub>1</sub>	X <sub>0</sub>	Reserved	Command for no operation
0 0	A0 A[7:0]	1 0	0 A <sub>6</sub>	1 0	0 A <sub>4</sub>	0 0	0 A <sub>2</sub>	0 A <sub>1</sub>	0 A <sub>0</sub>	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[3] = 0b, Reserved (RESET)  A[4] = 0b, Disable COM Re-map (RESET) A[4] = 1b, Enable COM Re-map  A[5] = 0b, Reserved (RESET)  A[6] = 0b, Disable COM Split Odd Even (RESET) A[6] = 1b, Enable COM Split Odd Even  A[7] = 0b, Reserved (RESET)
0 0	A1 A[6:0]	1 *	0 A <sub>6</sub>	1 A <sub>5</sub>	0 A <sub>4</sub>	0 A <sub>3</sub>	0 A <sub>2</sub>	0 A <sub>1</sub>	1 A <sub>0</sub>	Set Display Start Line	A[6:0]: Vertical shift by setting the starting address of display RAM from 0 ~ 127 (RESET = 00h)

1. Fundamental Command Table											
D/C#	Hex	D7	D6	D5	D4	D3	D2	D1	D0	Command	Description
0 0	A2 A[6:0]	1 *	0 A <sub>6</sub>	1 A <sub>5</sub>	0 A <sub>4</sub>	0 A <sub>3</sub>	0 A <sub>2</sub>	1 A <sub>1</sub>	0 A <sub>0</sub>	Set Display Offset	A[6:0]: Set vertical offset by COM from 0 ~ 127 (RESET = 00h)  e.g. Set A[6:0] to 010000b to move COM16 towards COM0 direction for 16 row
0	A4 ~ A7	1	0	1	0	0	1	X <sub>1</sub>	X <sub>0</sub>	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[6:0]	1 *	0 A <sub>6</sub>	1 A <sub>5</sub>	0 A <sub>4</sub>	1 A <sub>3</sub>	0 A <sub>2</sub>	0 A <sub>1</sub>	0 A <sub>0</sub>	Set MUX Ratio	A[6:0]: Set MUX ratio from 16MUX ~ 128MUX:  A[6:0] = 15 represents 16MUX A[6:0] = 16 represents 17MUX : A[6:0] = 126 represents 127MUX A[6:0] = 127 represents 128MUX (RESET)  It should be noted that A[6:0]=0~14 is not allowed
0 0	AB A[0]	1 0	0 0	1 0	0 0	1 0	0 0	1 0	1 A <sub>0</sub>	Function Selection A	A[0]=0b, Select external V <sub>DD</sub> (i.e. Disable internal V <sub>DD</sub> regulator)  A[0]=1b, Enable internal V <sub>DD</sub> regulator (RESET)
0	AE / AF	1	0	1	0	1	1	1	A <sub>0</sub>	Set Display ON/OFF	A[0] = 0b, AEh = Display OFF (sleep mode) (RESET)  A[0] = 1b, AFh = Display ON in normal mode
0 0	B1 A[7:0]	1 A <sub>7</sub>	0 A <sub>6</sub>	1 A <sub>5</sub>	1 A <sub>4</sub>	0 A <sub>3</sub>	0 A <sub>2</sub>	0 A <sub>1</sub>	1 A <sub>0</sub>	Set Phase Length	A[3:0]: Phase 1 period of 1~15 DCLK's e.g. A[3:0] = 1111b, 15 DCLK Clock (RESET = 0100b)  A[7:4]: Phase 2 period of 1~15 DCLK's e.g. A[7:4] = 1111b, 15 DCLK Clocks (RESET = 0111b)  <b>Note</b> ( <sup>1</sup> ) 0 DCLK is invalid in phase 1 & phase 2  ( <sup>2</sup> ) GS15 level pulse width must be set larger than the period of phase 1 + phase 2
0	B2	1	0	1	1	0	0	1	0	NOP	Command for no operation



1. Fundamental Command Table											
D/C#	Hex	D7	D6	D5	D4	D3	D2	D1	D0	Command	Description
0 0	B3 A[7:0]	1 A <sub>7</sub>	0 A <sub>6</sub>	1 A <sub>5</sub>	1 A <sub>4</sub>	0 A <sub>3</sub>	0 A <sub>2</sub>	1 A <sub>1</sub>	1 A <sub>0</sub>	Set Front Clock Divider /Oscillator Frequency	A[3:0]: Define divide ratio (D) of display clock (DCLK) Divide ratio=A[3:0]+1 (RESET is 0000b, i.e. divide ratio = 1)  A[7:4]: Set the Oscillator Frequency, F <sub>OSC</sub> . Oscillator Frequency increases with the value of A[7:4] and vice versa. (Range:0000b~1111b) (RESET = 0000b)
0 0	B5 A[1:0]	1 0	0 0	1 0	1 0	0 0	1 0	0 A <sub>1</sub>	1 A <sub>0</sub>	GPIO	A[1:0] = 00b represents GPIO pin HiZ, input disable (always read as low) A[1:0] = 01b represents GPIO pin HiZ, input enable A[1:0] = 10b represents GPIO pin output Low (RESET) A[1:0] = 11b represents GPIO pin output High
0 0	B6 A[3:0]	1 *	0 *	1 *	1 *	0 A <sub>3</sub>	1 A <sub>2</sub>	1 A <sub>1</sub>	0 A <sub>0</sub>	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)  <b>Note</b> ( <sup>1</sup> ) This command is used to adjust the second pre-charge period after enabling the second pre-charge by setting A[1] = 1b in command D5h
0 0 0 ... ... ... 0 0	B8 A1[5:0] A2[5:0] ... ... A14[5:0] A15[5:0]	1 * * ... ... * *	0 * * ... ... * *	1 A1 <sub>5</sub> A2 <sub>5</sub> ... ... A14 <sub>5</sub> A15 <sub>5</sub>	1 A1 <sub>4</sub> A2 <sub>4</sub> ... ... A14 <sub>4</sub> A15 <sub>4</sub>	1 A1 <sub>3</sub> A2 <sub>3</sub> ... ... A14 <sub>3</sub> A15 <sub>3</sub>	0 A1 <sub>2</sub> A2 <sub>2</sub> ... ... A14 <sub>2</sub> A15 <sub>2</sub>	0 A1 <sub>1</sub> A2 <sub>1</sub> ... ... A14 <sub>1</sub> A15 <sub>1</sub>	0 A1 <sub>0</sub> A2 <sub>0</sub> ... ... A14 <sub>0</sub> A15 <sub>0</sub>	Set Gray Scale Table	The next 15 data bytes set the gray scale pulse width in unit of DCLK's.  A1[5:0], value for GS1 level Pulse width A2[5:0], value for GS2 level Pulse width ... A14[5:0], value for GS14 level Pulse width A15[5:0], value for GS15 level Pulse width  <b>Note</b> ( <sup>1</sup> ) The pulse width value of GS1, GS2, ..., GS15 should not be equal. i.e. 0<GS1<GS2 ... <GS15  ( <sup>2</sup> ) GS15 level pulse width must be set larger than the period of phase 1 + phase 2
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 = 0; GS2 level pulse width = 2; GS3 level pulse width = 4; : : GS14 level pulse width = 26; GS15 level pulse width = 28

1. Fundamental Command Table																																
D/C#	Hex	D7	D6	D5	D4	D3	D2	D1	D0	Command	Description																					
0	BB	1	0	1	1	1	0	1	1	NOP	Command for no operation																					
0 0	BC A[3:0]	1 0	0 0	1 0	1 0	1 A <sub>3</sub>	1 A <sub>2</sub>	0 A <sub>1</sub>	0 A <sub>0</sub>	Set Pre-charge voltage	Set pre-charge voltage level.  <table border="1"> <thead> <tr> <th>A[3:0]</th> <th>Hex code</th> <th>Pre-charge voltage</th> </tr> </thead> <tbody> <tr> <td>0000</td> <td>00h</td> <td>0.20 x V<sub>CC</sub></td> </tr> <tr> <td>:</td> <td>:</td> <td>:</td> </tr> <tr> <td>0101</td> <td>05h</td> <td>0.5 x V<sub>CC</sub> (RESET)</td> </tr> <tr> <td>:</td> <td>:</td> <td>:</td> </tr> <tr> <td>0111</td> <td>07h</td> <td>0.613 x V<sub>CC</sub></td> </tr> <tr> <td>1xxx</td> <td>08h</td> <td>V<sub>COMH</sub></td> </tr> </tbody> </table>	A[3:0]	Hex code	Pre-charge voltage	0000	00h	0.20 x V <sub>CC</sub>	:	:	:	0101	05h	0.5 x V <sub>CC</sub> (RESET)	:	:	:	0111	07h	0.613 x V <sub>CC</sub>	1xxx	08h	V <sub>COMH</sub>
A[3:0]	Hex code	Pre-charge voltage																														
0000	00h	0.20 x V <sub>CC</sub>																														
:	:	:																														
0101	05h	0.5 x V <sub>CC</sub> (RESET)																														
:	:	:																														
0111	07h	0.613 x V <sub>CC</sub>																														
1xxx	08h	V <sub>COMH</sub>																														
0 0	BE A[2:0]	1 0	0 0	1 0	1 0	1 0	1 A <sub>2</sub>	1 A <sub>1</sub>	0 A <sub>0</sub>	Set V <sub>COMH</sub>	Set COM deselect voltage level.  <table border="1"> <thead> <tr> <th>A[2:0]</th> <th>Hex code</th> <th>V<sub>COMH</sub></th> </tr> </thead> <tbody> <tr> <td>000</td> <td>00h</td> <td>0.72 x V<sub>CC</sub></td> </tr> <tr> <td>:</td> <td>:</td> <td>:</td> </tr> <tr> <td>101</td> <td>05h</td> <td>0.82 x V<sub>CC</sub> (RESET)</td> </tr> <tr> <td>:</td> <td>:</td> <td>:</td> </tr> <tr> <td>111</td> <td>07h</td> <td>0.86 x V<sub>CC</sub></td> </tr> </tbody> </table>	A[2:0]	Hex code	V <sub>COMH</sub>	000	00h	0.72 x V <sub>CC</sub>	:	:	:	101	05h	0.82 x V <sub>CC</sub> (RESET)	:	:	:	111	07h	0.86 x V <sub>CC</sub>			
A[2:0]	Hex code	V <sub>COMH</sub>																														
000	00h	0.72 x V <sub>CC</sub>																														
:	:	:																														
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:	:	:																														
111	07h	0.86 x V <sub>CC</sub>																														
0 0	D5 A[2:0]	1 0	1 1	0 1	1 0	0 0	1 0	0 A <sub>1</sub>	1 A <sub>0</sub>	Function Selection B	A[1] = 0b: Disable second precharge (RESET) A[1] = 1b: Enable second precharge  A[0] = 0b: Internal VSL (RESET) A[0] = 1b: Enable external VSL  <b>Note</b> <sup>(1)</sup> Refer to Table 7-1 for VSL pin details																					
0 0	FD A[2]	1 0	1 0	1 0	1 1	1 0	1 A <sub>2</sub>	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  <b>Note</b> <sup>(1)</sup> The locked OLED driver IC MCU interface prohibits all commands and memory access except the FDh command																					

2. Scrolling Command Table										
D/C#Hex	D7	D6	D5	D4	D3	D2	D1	D0	Command	Description
0 26 / 27	0	0	1	0	0	1	1	X <sub>0</sub>	Continuous Horizontal Scroll Setup	26h, X[0]=0, Right Horizontal Scroll
0 A[7:0]	0	0	0	0	0	0	0	0		27h, X[0]=1, Left Horizontal Scroll (Horizontal scroll by 1 column)
0 B[6:0]	*	B <sub>6</sub>	B <sub>5</sub>	B <sub>4</sub>	B <sub>3</sub>	B <sub>2</sub>	B <sub>1</sub>	B <sub>0</sub>		A[7:0]: Dummy byte (Set as 00h)
0 C[2:0]	*	*	*	0	0	C <sub>2</sub>	C <sub>1</sub>	C <sub>0</sub>		B[2:0]: Define start row address; range:00h~7Fh, (RESET = 00h)
0 D[6:0]	*	D <sub>6</sub>	D <sub>5</sub>	D <sub>4</sub>	D <sub>3</sub>	D <sub>2</sub>	D <sub>1</sub>	D <sub>0</sub>		C[2:0]: Set time interval between each scroll step in terms of frame frequency
0 E[5:0]	*	*	E <sub>5</sub>	E <sub>4</sub>	E <sub>3</sub>	E <sub>2</sub>	E <sub>1</sub>	E <sub>0</sub>		000b – 6 frames      100b – 3 frames
0 F[5:0]	*	*	F <sub>5</sub>	F <sub>4</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>1</sub>	F <sub>0</sub>		001b – 32 frames      101b – 4 frames
0 G[7:0]	0	0	0	0	0	0	0	0		010b – 64 frames      110b – 5 frame
										011b – 256 frames      111b – 2 frame
									D[2:0]: Define end row address; range:00h~7Fh, (RESET = 7Fh) The value of D[2:0] must be larger or equal to B[2:0]	
									E[7:0]: Define start column address; range:00h~3Fh, (RESET = 00h)	
									F[7:0]: Define end column address; range:00h~3Fh, (RESET = 3Fh) The value of F[2:0] must be larger or equal to E[2:0]	
									G[7:0]: Dummy byte (Set as 00h)	
0 2E	0	0	1	0	1	1	1	0	Deactivate scroll	Stop scrolling that is configured by command 26h/27h  <b>Note</b> (1) After sending 2Eh command to deactivate the scrolling action, the ram data needs to be rewritten.
0 2F	0	0	1	0	1	1	1	1	Activate scroll	Start scrolling that is configured by the scrolling setup commands :26h/27h with the following valid sequences:  Valid command sequence 1: 26h ;2Fh. Valid command sequence 2: 27h ;2Fh.

**Note**

(1) “\*” stands for “Don’t care”.

## 12. Reliability

### ■Content of Reliability Test

NO.	Items.	Specification	Applicable Standard
1	High temp. (Non-operation)	85°C, 240hrs	—
2	High temp. (Operation)	70°C, 120hrs	—
3	Low temp. (Operation)	-40°C, 120hrs	—
4	High temp. / High. humidity (Operation)	65°C, 90%RH, 120hrs	—
5	Thermal shock(Non-operation)	-40°C ~85°C (-40°C /30min; transit /3min; 85°C /30min; transit /3min) 1cycle: 66min, 100 cycles.	—
6	Vibration	Frequency : 5~50HZ, 0.5G Scan rate : 1 oct/min Time : 2 hrs/axis Test axis : X, Y, Z	—
7	Drop	Height: 120cm Sequence : 1 angle 、 3 edges and faces Cycles: 1	—
8	ESD (Non-operation)	Air discharge model, ±8kV, 10 times	—

### 13. Appendix ( Drawing )

