Crystalfontz America, Inc.

CUSTOMER : _____

MODULE NO.: CFAL12864L-Y-B2

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
2008/10/03	**Hardware Version: v2.2** **Data Sheet Version: 1.1**		

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REVISION HISTORY

HARDWARE
Current hardware version: **v2.2**

DATA SHEET	
2010/07/22	Current Data Sheet version: **v1.1** Changes since last revision (v1.0): Wherever listed, corrected Hardware Revision from “vA” to “v2.2”. Module has not changed. In “3. General Specification” table, o Corrected Module Dimension width from “74 mm” to “74.80 mm”. o Corrected Viewing Area width from “60.85 mm” to “63.40 mm” and height from “13.7 mm” to “32.70 mm”. Dimensions were correct in the Contour Drawing. Module has not changed.
2008/10/03	Data Sheet version: v1.0 Changes since last revision (no version number): o Corrected error in “5.0 Electrical Specifications, Total Power,” from “Typical” 154 mW to 350 mW “Maximum” 300 mW to 500 mW o Start public tracking.
2008/09/12	New Data Sheet No version number.

Contents

1.Module Classification Information

CFA L 12864 L－Y－ B2
① ② ③ ④ ⑤ ⑥

①	Brand：**CRYSTALFONTZ AMERICA, INCORPORATED**		
②	Display Type：H→Character Type, G→Graphic Type , **L→OLED**		
③	Display's Logical Dimensions：**128** columns by **64** rows.		
④	Model Variant: **L**		
⑤	Color：	**Y→Yellow**	
⑥	Special Code	**B2→PCB**	

2.Precautions in use of OLED Modules

(1)Avoid applying excessive shocks to the module or making any alterations or modifications to it.

(2)Don't make extra holes on the printed circuit board, modify its shape or change the components of OLED module.

(3)Don't disassemble the OLED.

(4)Don't operate it above the absolute maximum rating.

(5)Don't drop, bend or twist OLED.

(6)Solder0 only to the I/O terminals.

(7)Please store in anti-static electricity container and clean environment.

3.General Specification

Item	Dimension	Unit
Number of Characters	128 columns x 64 Rows	—
Module Dimension	74.80 x 53.50x 6.0 (MAX)	mm
Viewing Area	63.40 x 32.70	mm
Active Area	61.41 x 30.69	mm
Dot size	0.45 x 0.45	mm
Dot pitch	0.48 x 0.48	mm
LCD type	OLED , Yellow	
Duty	1/64	

4.Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	T_{OP}	-40	—	+80	℃
Storage Temperature	T_{ST}	-50	—	+85	℃
Input Voltage	V_I	0	—	V_{DD}	V
Supply Voltage	V_{DD}-V_{SS}	2.4	3.0	3.5	V

5.Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	V_{DD}-V_{SS}	—	2.4	3.0	3.5	V
Input High Volt.	V_{IH}	—	2.4	—	3.5	V
Input Low Volt.	V_{IL}	—	0	—	0.2	V
Total Power	P_T	V_{DD}=3.0V	—	350	500	mW

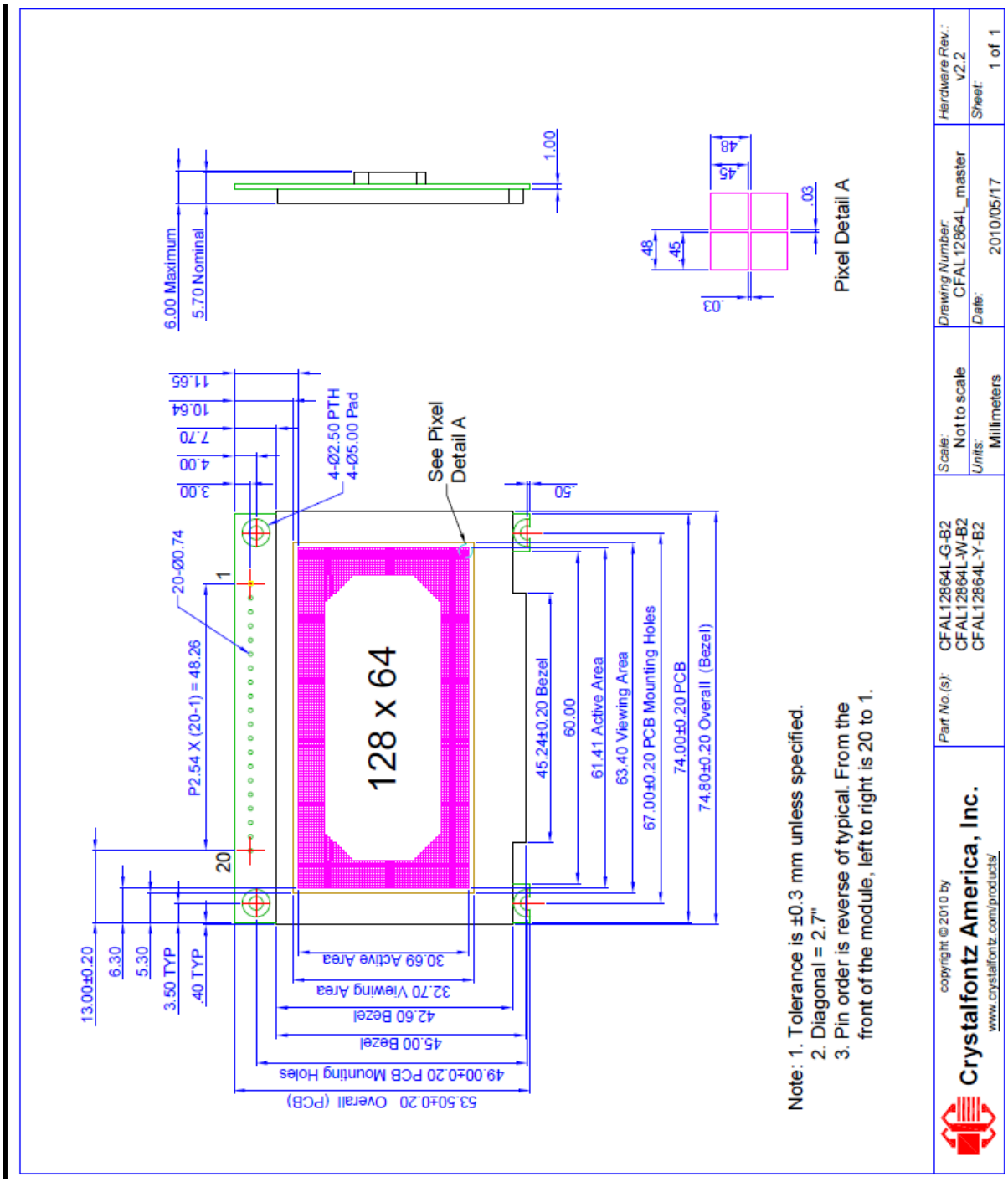
6.Optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
View Angle	(V) θ			160		deg
	(H) φ			160		deg
Contrast Ratio (Dark Room)	CR	80cd/m^2	—	100:1	—	—
Brightness		With polarizer		80		cd/m^2

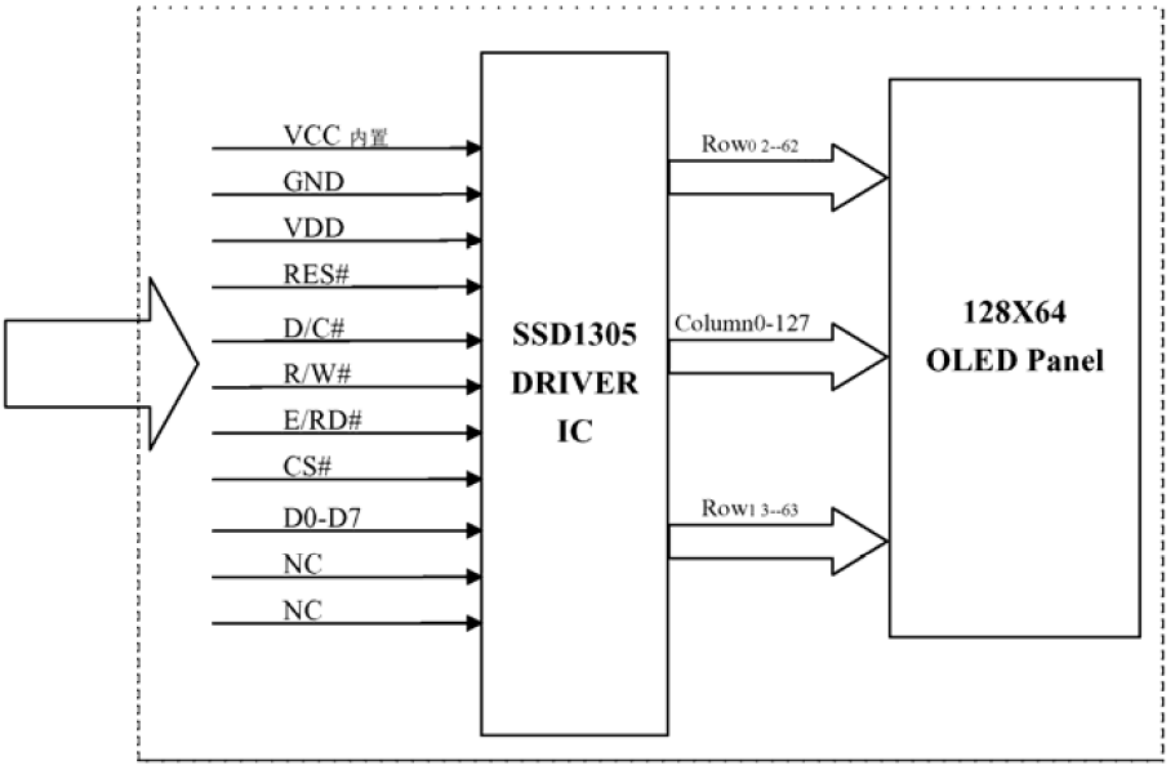
7.Interface Pin Function

<table>
<tr><th>PIN NAME</th><th>PIN NO</th><th>DESCRIPTION</th></tr>
<tr><td>GND</td><td>1</td><td>Ground</td></tr>
<tr><td>VDD</td><td>2</td><td>Logic Voltage +3V</td></tr>
<tr><td>NC</td><td>3</td><td>Not connect</td></tr>
<tr><td>D/C#</td><td>4</td><td>Data/Command Select. This is the Data/Command control pin. When it is pulled HIGH, the input at D7-D0 is treated as display data. When it is pulled LOW, the input at D7-D0 is transferred to the command registers. For detail relationship to MCU interface signals, please refer to the Timing Characteristics Diagrams.</td></tr>
<tr><td>R/W#</td><td>5</td><td>This is a MCU interface input pin. When 6800-series Parallel Interface mode is selected, this pin is used as Read/Write (R/W) selection input. Pull this pin to HIGH for read mode and pull it to LOW for write mode. When 8080-series Parallel Interface mode is selected, this pin is used as Write (WR#) selection input. Pull this pin to LOW for write mode. Data write operation is initiated when this pin is pulled LOW and the CS# is pulled LOW.</td></tr>
<tr><td>E(RD#)</td><td>6</td><td>This is a MCU interface input pin. When 6800-series Parallel Interface is selected, this pin is used as Enable (E) signal. Read/Write operation is initiated when this pin is pulled HIGH and the CS# pin is pulled LOW. When 8080-series Parallel Interface is selected, this pin is used to receive the Read Data (RD#)signal. Data read operation is initiated when this pin is pulled LOW and CS# pin is pulled LOW.</td></tr>
<tr><td>D0-D7</td><td>7-14</td><td>These are 8-bit bi-directional data bus to be connected to the microprocessor’s data bus. When serial interface mode is selected, D1 will be the serial data input, SDIN, and D0 will be the serial clock input, SCLK.</td></tr>
<tr><td>CS#</td><td>15</td><td>Chip Select,active low</td></tr>
<tr><td>RES#</td><td>16</td><td>Reset,active low</td></tr>
<tr><td>M80/68#</td><td>17</td><td>These are MCU interface input selection pins. See the following table for selecting different interfaces:</td></tr>
<tr><td rowspan="3">MS</td><td rowspan="3">18</td><td>Ttable</td><td>6800-paralle interface</td><td>8080-parallel interface</td><td>Serial interface</td></tr>
<tr><td>M80/68#</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>MS</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>NC</td><td>19</td><td>Not connect</td></tr>
<tr><td>FG</td><td>20</td><td>Frame Ground</td></tr>
</table>

8.Contour Drawing &Block Diagram

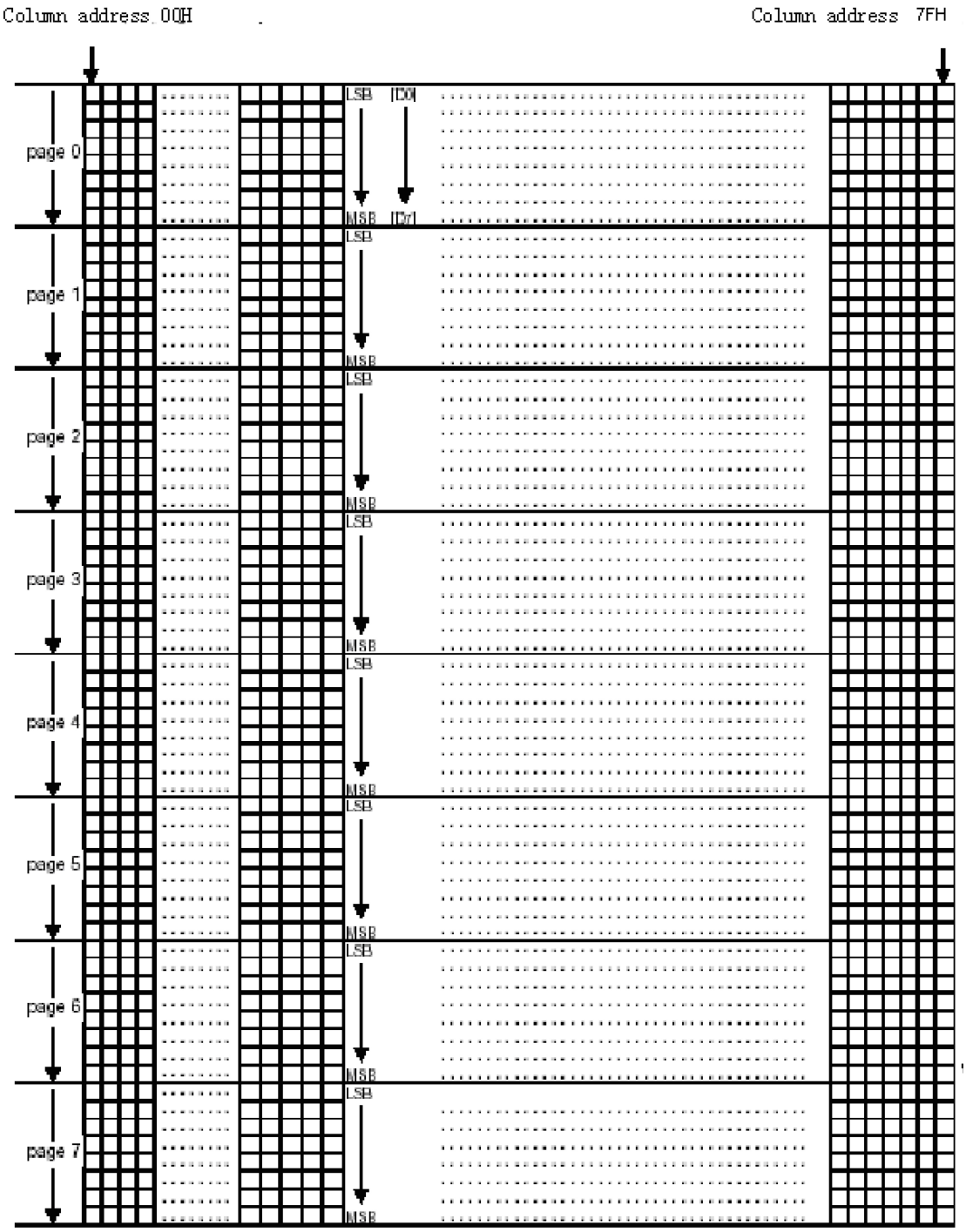


128X64L OLED Module



NOTE: Some pins omitted

9.Graphic Display DDRAM Map



10.Instruction Table

Command table (D/C =0, R/W (WR#)=0, E (RD#)=1)

Bit Pattern	Command	Description
0000 $X_3X_2X_1X_0$	Set Lower Column Address **	Set the lower nibble of the column address register using $X_3X_2X_1X_0$ as data bits. The initial display line register is reset to 0000b after POR.
0001 $X_3X_2X_1X_0$	Set Higher Column Address **	Set the higher nibble of the column address register using $X_3X_2X_1X_0$ as data bits. The initial display line register is reset to 0000b after POR.
00101111	Activate horizontal scroll	Start horizontal scrolling
00101110	Deactivate horizontal scroll	Stop horizontal scrolling
01001100 A[2:0] B[2:0] C[1:0] D[2:0]	Horizontal scroll setup	A[2:0] Set the number of column scroll per step Valid value: 001b, 010b, 011b, 100b B[2:0] Define start page address C[1:0] Set time interval between each scroll step in terms of frame frequency 00b – 12 frame 01b – 64 frames 10b – 128 frames 11b – 256 frames D[2:0] Define end page address Set the value of D[2:0] larger or equal to B[2:0]
10000001 A[7:0]	Set Contrast Control Register **	Double byte command to select 1 out of 256 contrast steps. Contrast increases as the value increases. (POR = 80h)
1010010X_0	Set Entire Display ON/OFF **	X_0=0: normal display (POR) X_0=1: entire display ON
1010011X_0	Set Normal/Inverse Display **	X_0=0: normal display (POR) X_0=1: inverse display
10101000 A[5:0]	Set Multiplex Ratio **	The next command, A[5:0] determines multiplex ratio N from 16MUX-64MUX, POR= 64MUX
1010111X_0	Set Display ON/OFF **	X_0=0: turns OFF OLED panel (POR) X_0=1: turns ON OLED panel
1011 $X_3X_2X_1X_0$	Set Page Address **	Set GDDRAM Page Address (0~7) for read/write using $X_3X_2X_1X_0$
1100X_3 * * *	Set COM Output Scan Direction **	X_3=0: normal mode (POR) Scan from COM 0 to COM [N –1]

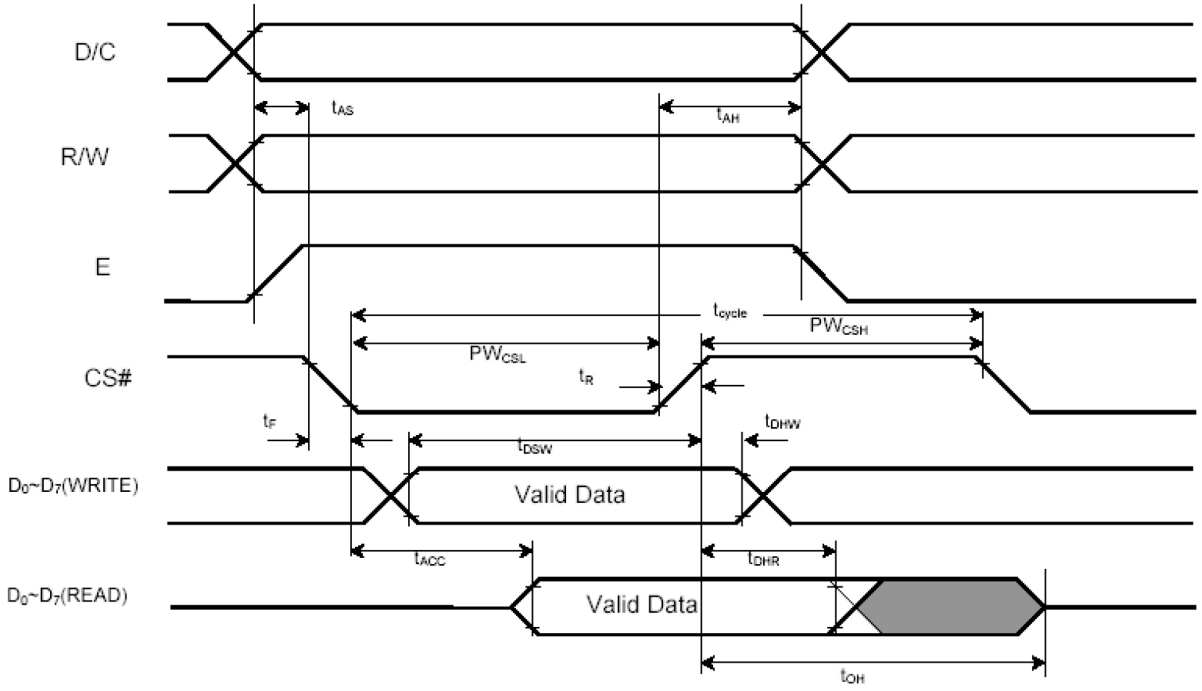
		X_3=1: remapped mode. Scan from COM [N-1] to COM0 Where N is the Multiplex ratio.
11010011 A[5:0]	Set Display Offset **	Set vertical scroll by COM from 0-63. The value is reset to 00H after POR.
11011001 $X_7X_6X_5X_4$0010	Set Pre-charge period	Set length of pre-charge period in number of DCLK Default value of $X_7X_6X_5X_4$ is 0010b
11011010 000$X_4$0010	Set COM pins hardware configuration	X_4=0, Sequential COM pin configuration (i.e. COM31, 30, 29….0 ; SEG0-132; COM31,32….62,63) X_4=1(POR), Alternative COM pin configuration (i.e. COM62,60,58,…2,0; SEG0-132;COM1,3,5…61,63)
11100010	Reserved	Reserved
11100011	NOP **	Command for No Operation

Note:POR mean is power on reset.

11.Timing Characteristics

6800-Series MPU Parallel Interface Timing Characteristics (TA =25°C)

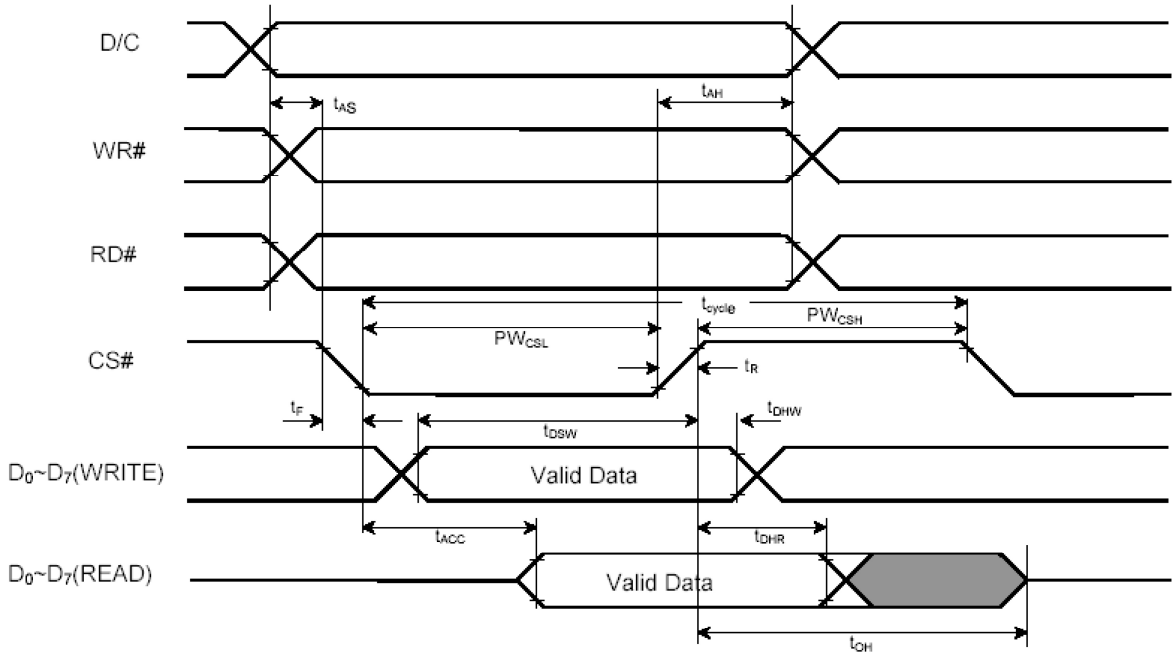
Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	300	-	-	ns
t_{AS}	Address Setup Time	0	-	-	ns
t_{AH}	Address Hold Time	0	-	-	ns
t_{DSW}	Write Data Setup Time	40	-	-	ns
t_{DHW}	Write Data Hold Time	15	-	-	ns
t_{DHR}	Read Data Hold Time	20	-	-	ns
t_{OH}	Output Disable Time	-	-	70	ns
t_{ACC}	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 MPU parallel interface characteristics

8080-Series MPU Parallel Interface Timing Characteristics (TA =25°C)

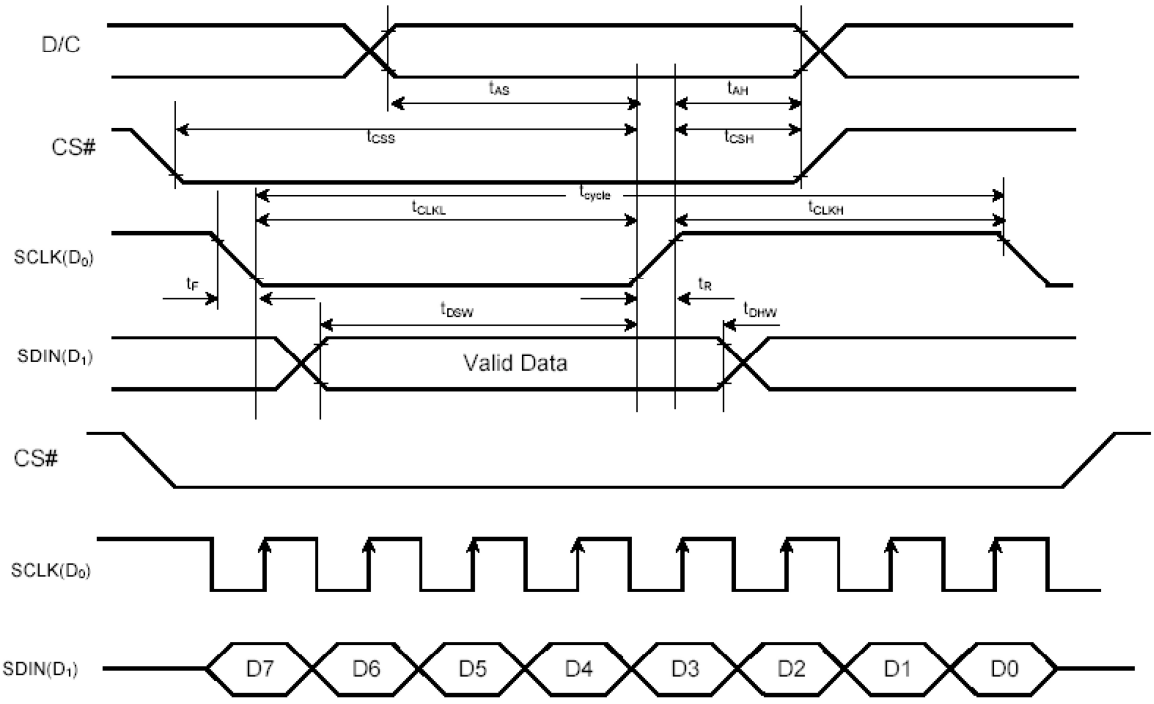
Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	300	-	-	ns
t_{AS}	Address Setup Time	0	-	-	ns
t_{AH}	Address Hold Time	0	-	-	ns
t_{DSW}	Write Data Setup Time	40	-	-	ns
t_{DHW}	Write Data Hold Time	15	-	-	ns
t_{DHR}	Read Data Hold Time	20	-	-	ns
t_{OH}	Output Disable Time	-	-	70	ns
t_{ACC}	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

Serial Interface Timing Characteristics (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

12. OLED Lifetime

Conditions：

Temperature：25℃

Brightness decay to 50％ of original value

Panel lifetime is a function of the brightness as follows：

Average Brightness (cd/m^2**)**	**Lifetime (Hours)**
80	10,000
40	20,000