DisplayModule

DM-OLED192-670

2.7" 128 × 160 MONOCHROME
GRAPHIC OLED DISPLAY MODULE
-MCU,SPI, I2C

Contents

1 Revision History

2 Main Features

3 Pin Description

3.1 Panel Pin Description

3.2 FUNCTION BLOCK DIAGRAM

3.3 PANEL LAYOUT DIAGRAM

4 Mechanical Drawing

4.1 Panel Mechanical Drawing

5 Optics & Electrical Characteristics

5.1 Optical Characteristics

5.2 LIFETIME SPECIFICATION

5.3 Absolute Maximum Ratings

5.4 D.C ELECTRICALCHARACTERISTICS

6 INTERFACE

6.1 GRAPHIC DISPLAY DATA RAM ADDRESS MAP

6.2 INTERFACE TIMING CHART

System buses Read/Write characteristics (For the 8080 Series Interface MPU)

7 Power ON/OFF Sequence & Application Circuit

7.1 POWER ON / OFFSEQUENCE

7.2 APPLICATION CIRCUIT

8 Reliability

9 Warranty and Conditions

1 Revision History

Date	Changes
2022-08-15	First release

2 Main Features

Item	Specification	Unit
Diagonal Size	1.92	inch
Display Mode	Passive Matrix OLED	-
Display Colors	Monochrome	Colors
Resolution	128 × 160	pixel
Controller IC	SH1108	-
Interface	8080MCU、SPI、I2C	-
Active Area	28.908 × 39.34	mm
Panel Dimension	32.9 × 46.55	mm
Pixel Size	0.206 × 0.226	mm
Pixel Pitch	0.226 × 0.246	mm
Weight	TBD	g

3 Pin Description

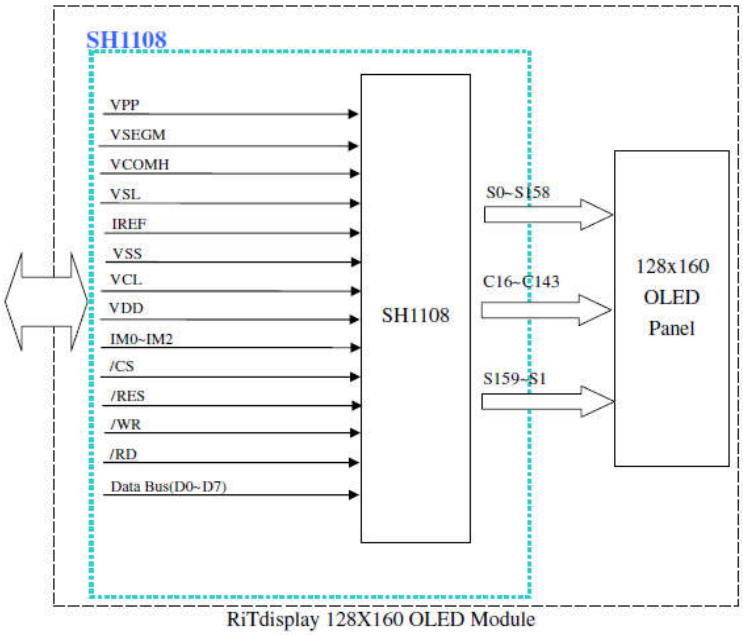
3.1 Panel Pin Description

Pin No.	Symbol	Function Description	8080	SPI	IIC
1	NC(GND)	This is a reserved pin. It should beconnected to VSS.			
2	VPP	Power supply for panel driving voltage.			
3	VSEGM	This is voltage output high level forsegment pre-charge. A capacitor should beconnected between this pin and VSS.			
4	VCOMH	This is voltage output high level forcommon signals. A capacitor should be connectedbetween this pin and VSS.			
5	VSL	This is a segment voltage reference pin.A capacitor should be connectedbetweenthis pin andVSS.			
6	NC	No connection			
7	IREF	This is a segment current reference pin. Aresistor should be connected betweenthispin andVSS.			
8	VPP	Power supply for panel driving voltage.			
9	NC	No connection			
10	VSS	Ground pin.			
11	VCL	This is a common voltage reference pin.This pin should be connected to VSSexternally			
12	VDD	Power supply for logic and input/output.			
13	IM0	This is MPU interface mode select pin.	Low	Low	Low
14	IM1	This is MPU interface mode select pin.	High	Low	High
15	VDD	Power supply for logic and input/output.			
16	IM2	This is MPU interface mode select pin.	High	Low	Low
17	/CS	This pin is the chip select input. When CS= “L”,then the chip select becomes active,and data/command I/O is enabled.	CS#	CS#	Low
18	/RES	This is a reset signal input pin. When RESis set to “L”, the settings are initialized.	/RES	/RES	/RES
19	A0	This is the Data/Command control pin thatdetermines whether the data bits are dataor a command. In I2C interface, this pinserves as SA0 to distinguish the differentaddress of OLED driver.	A0	A0	A0
20	/WR	This is a MPUinterface input pin. Whenconnected to an 8080 MPU, this is activeLOW. This pin connects to the 8080 MPUWR signal. The signals on the data bus arelatched at the rising edge of the WR signal.When connected to a 6800 Series MPU:This is the read/write control signal inputterminal. When R/W = “H”: Read. When R/W = “L”: Write.	/WR	Low	Low
21	/RD	This is a MPU interface input pin. Whenconnected to an 8080 series MPU, it isactive LOW. This pin is connected to theRD signal of the 8080 series MPU, and thedata bus is in an output status when thissignal is “L”. When connected to a 6800series MPU, this is active HIGH. This isused as an enable clock input of the 6800series MPU.	/RD	Low	Low

22	D0	No connection	D0	SCL	SCL
23	D1	This is an 8-bit bi-directional databus thatconnects to an 8-bit or 16-bit standardMPU data bus. When the serial interface is selected, thenD0 serves as the serial clock input pad (SCL) and D1 serves as the serial datainput pad (SI). At this time, D2 to D7 areset to high impedance. When the I2C interface is selected, thenD0serves as the serial clock input pad (SCL)and D1 serves as the serial data input pad (SDA). At this time, D2 to D7 are set tohighimpedance.	D1	SI	SDA
24	D2		D2	Low	Low
25	D3		D3	Low	Low
26	D4		D4	Low	Low
27	D5		D5	Low	Low
28	D6		D6	Low	Low
29	D7		D7	Low	Low
30	VPP	Power supply for panel driving voltage.			

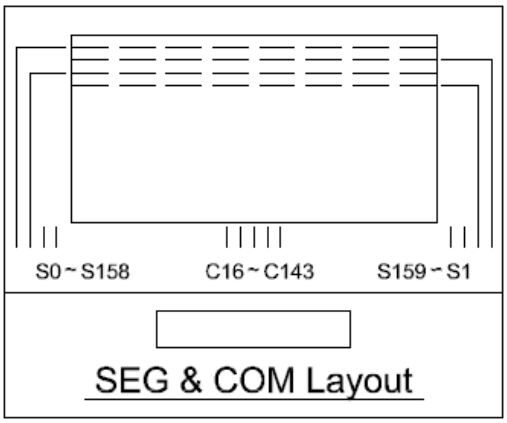
Note
(1)Low is connected toVSS
(2)High is connected toVDD

3.2 FUNCTION BLOCK DIAGRAM



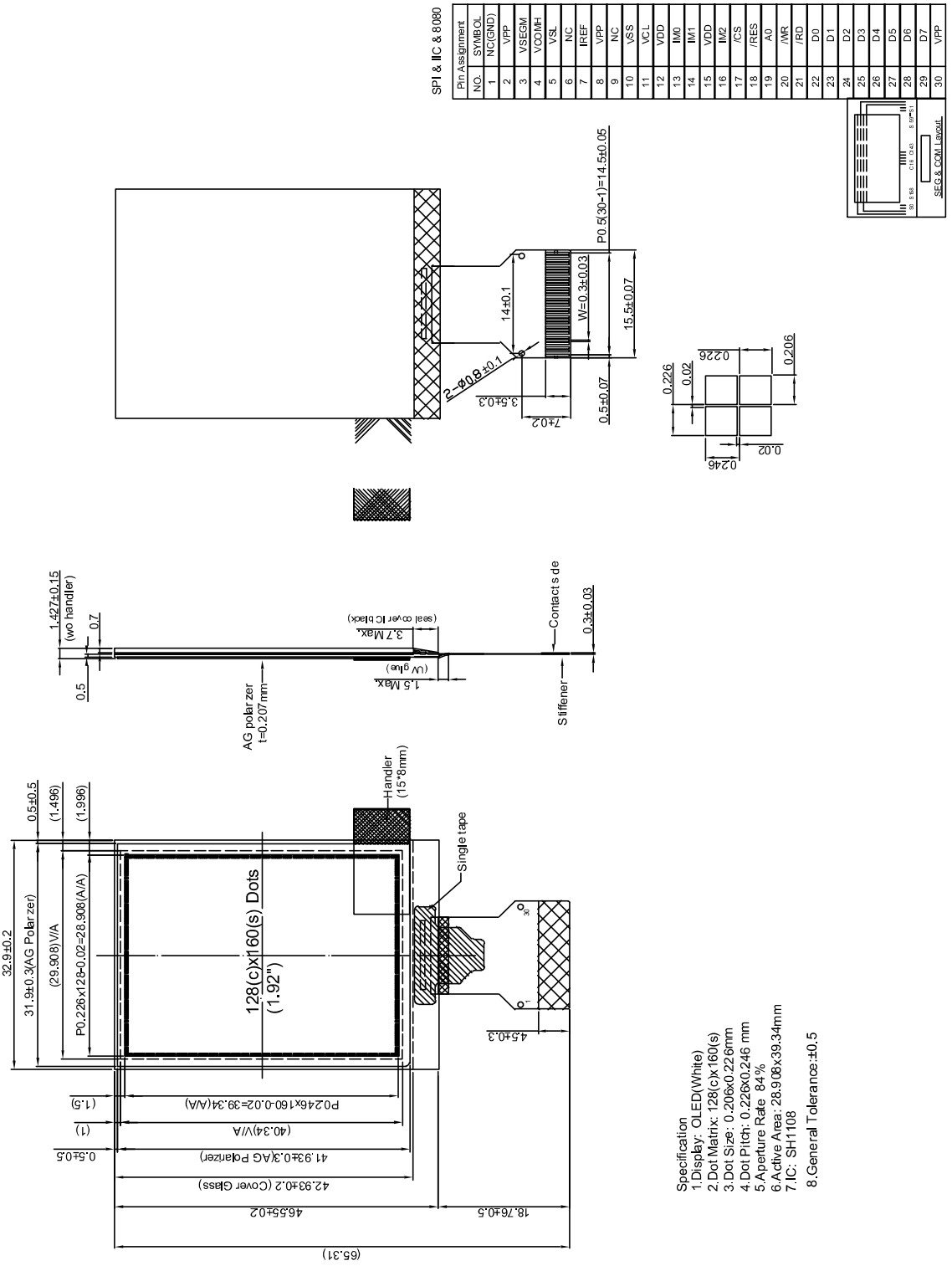
RiTdisplay 128X160 OLED Module

3.3 PANEL LAYOUT DIAGRAM



4 Mechanical Drawing

4.1 Panel Mechanical Drawing



5 Optics & Electrical Characteristics

5.1 Optical Characteristics

Item	Min	Typ	Max	Unit	Remark
Normal mode current (IPP)	-	66	68	mA	All pixels on (1)
	-	16	17	mA	20% pixels on(1)
Standby mode current (IPP)	-	5	6	mA	Standby mode10% pixels on (2)
Normal mode power consumption	-	891	918	mW	All pixels on (1)
	-	216	229.5	mW	20% pixels on (1)
Standby mode power consumption	-	67.5	81	mW	Standby mode10% pixels on (2)
IDD sleep mode current	-	-	5	uA	Sleep mode Current (3)
IPP sleep mode current	-	-	5	uA	Sleep mode Current (3)
Normal mode Luminance	115	145	-		Display Average
Standby Luminance	-	65	-		
View Angles	160	-	-	degree	
C.I.E. (White)	0.32	0.36	0.40	-	C.I.E.1931
C.I.E(White)	0.34	0.38	0.42	-	C.I.E.1931
Response Time	-	10	-	µs	
Dark room Contrast	10000:1	-	-	-	

(1)Normal mode condition:
-Driving Voltage :13.5V
-Contrast setting :0xd0
-Frame rate :105Hz
-Duty setting :1/128
(2)Standby modecondition:
-Driving Voltage :13.5V
-Contrast setting :0x00
-Frame rate :105Hz
-Duty setting :1/128
(3)Sleep mode condition:
When send 0xae command OLED display off and memory data will bemaintained.
(4)Wakeup condition:
When send 0xaf command OLED will be turned on.

5.2 LIFETIME SPECIFICATION

Parameter	Symbol	Min	Max	Unit	Remark
Supply Voltage	V_{DD}	-0.3	3.6	V	Note 1,2
Supply Voltage	V_{PP}	8	1	V	Note 1,2
Operating Temperature	T_{OP}	-40	80	℃	-
Storage Temperature	T_{STG}	-40	85	℃	-

Note:
(A)Under VPP = 13.5V,Ta= 25°C, 50%RH.
(B)Life timeis defined the amount of time when the luminance has decayed
to less than 50% of the initial measuredluminance.
(1)Setting of 145 cd/m²:
-Contrast setting :0xd0
-Frame rate :105Hz
-Duty setting :1/128
(2)Setting of115cd/m²:
-Contrast setting :0x80
-Frame rate :105Hz
-Duty setting :1/128

5.3 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Remark
Supply Voltage	V_{DD}	-0.3	3.6	V	Note 1,2
Supply Voltage	V_{PP}	8	1	V	Note 1,2
Operating Temperature	T_{OP}	-40	80	℃	-
Storage Temperature	T_{STG}	-40	85	℃	-

NNote:
(1)Maximum ratings are those values beyondwhich damages to the OLED
module may occur. The OLED functional operation should be restricted tothe limits in the section 6. Electrical Characteristicstables.
(2)The defined temperature ranges do not include the polarizer. Themaximum

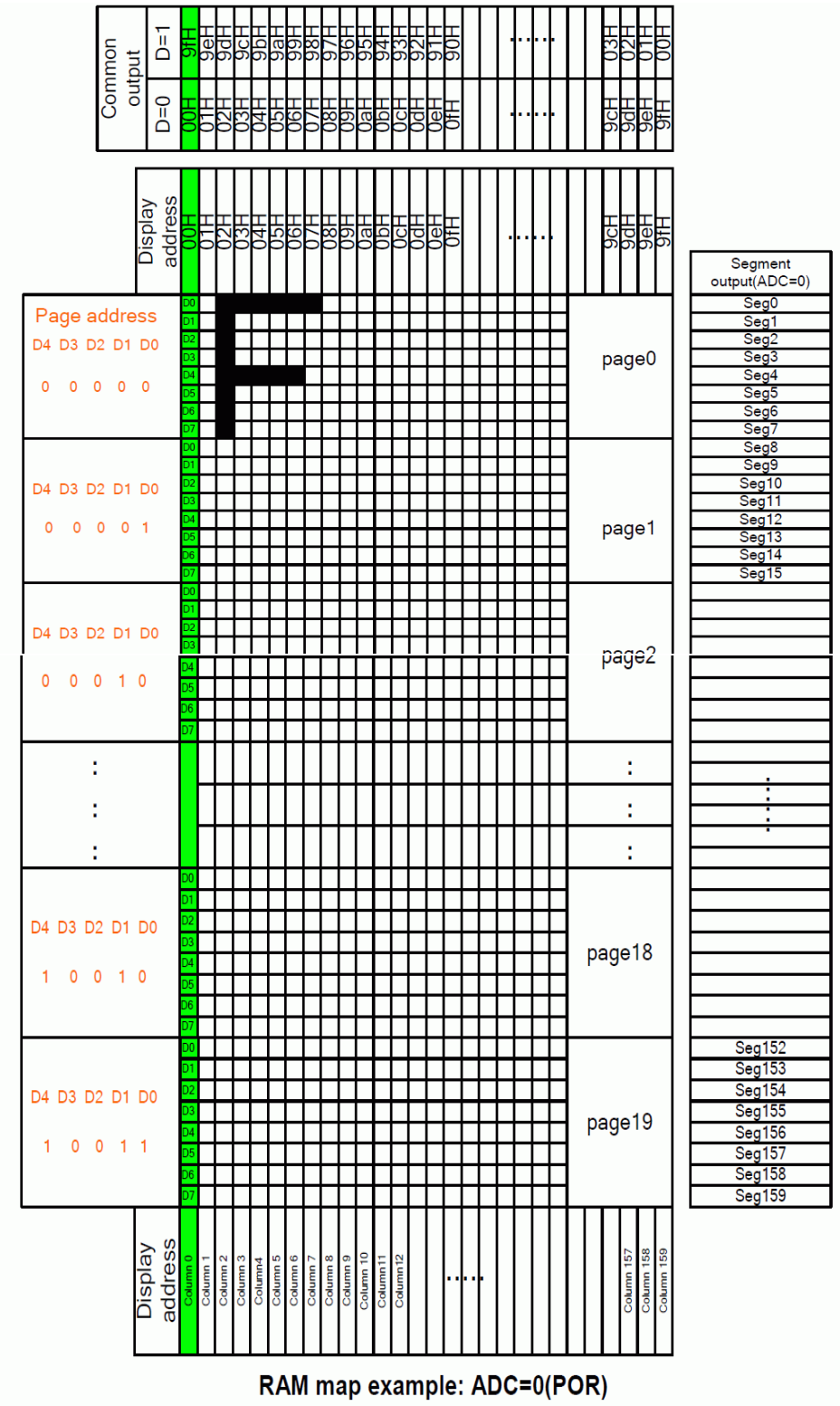
5.4 D.C ELECTRICALCHARACTERISTICS

Item	Symbol	Condition	Min	Typ.	Max	Unit
Logic Supply Voltage for panel	V_{DD}	-	1.65	2.85	3.5	V
Display Supply Voltage for panel	V_{PP}	-	13	13.5	14	V
Low Level Input Voltage	V_{IL}	-	V_{SS}	-	0.2 x V_{DD}	V
High Level Input Voltage	V_{IH}	-	0.8 x V_{DD}	-	V_{DD}	V
Low Level Output Voltage	V_{OL}	I_{OL}=-0.5mA	V_{SS}	-	0.2 x V_{DD}	V
High Level Output Voltage	V_{OH}	I_{OH}=0.5mA	0.8 x V_{DD}	-	V_{DD}	V

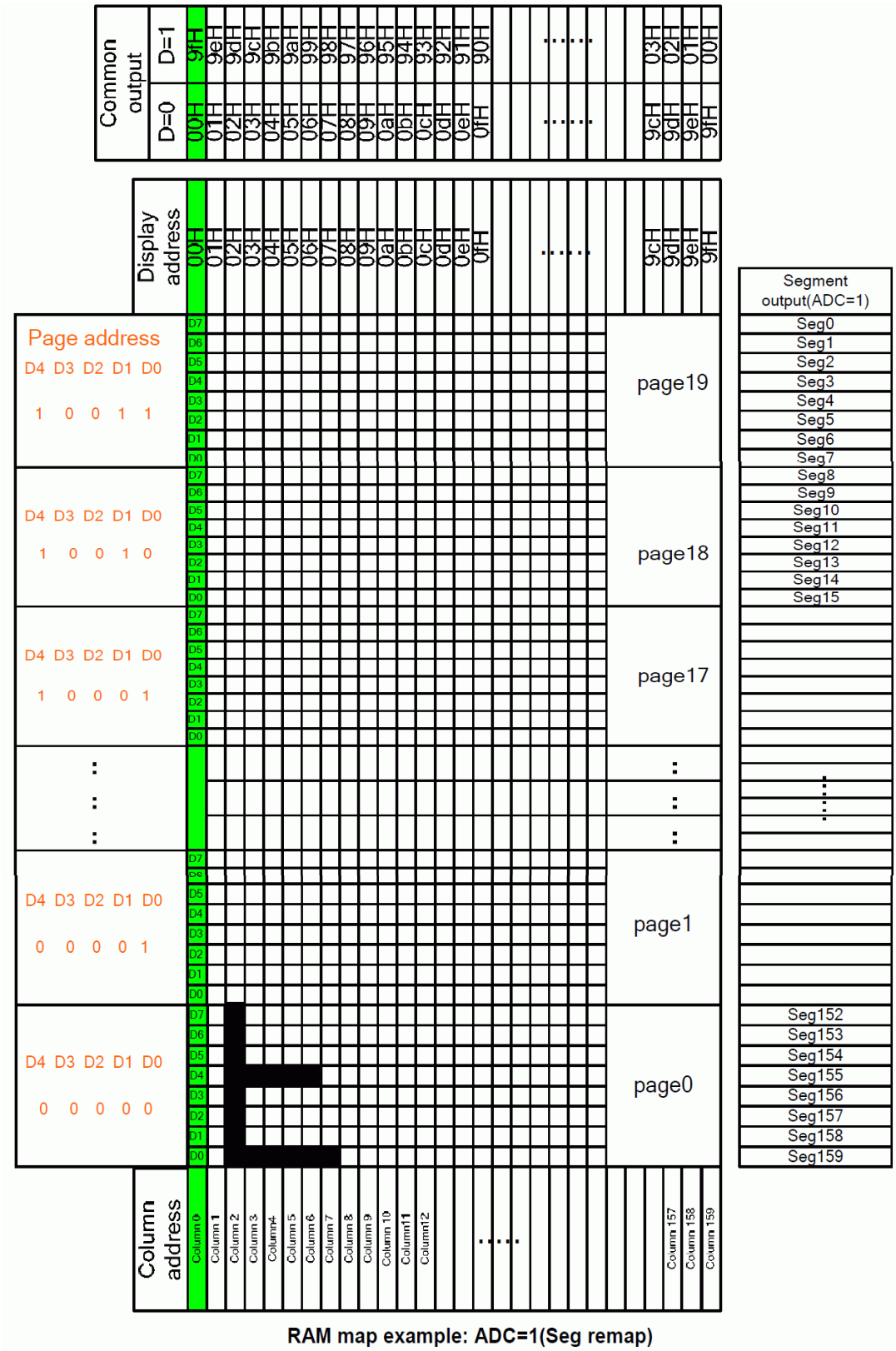
Note: The V_{PP} input must keep in a stable value; ripple and noise are not allowed.

6 INTERFACE

6.1 GRAPHIC DISPLAY DATA RAM ADDRESS MAP



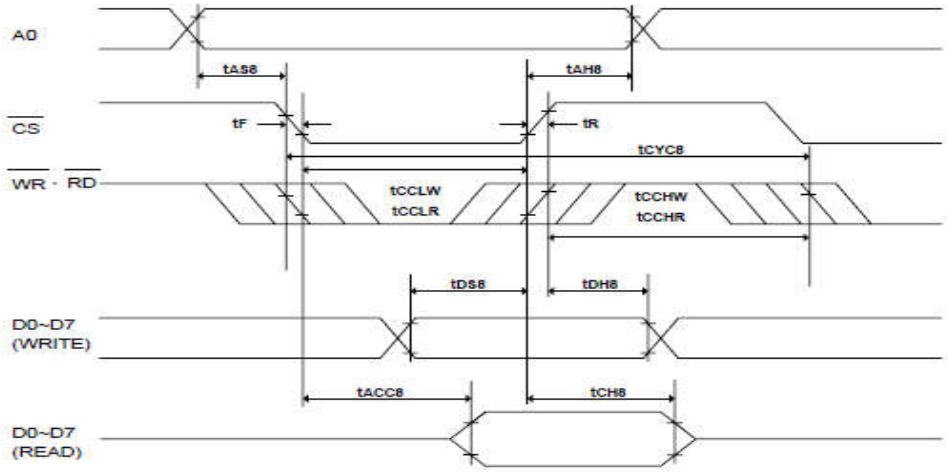
RAM map example: ADC=0(POR)



RAM map example: ADC=1(Seg remap)

6.2 INTERFACE TIMING CHART

System buses Read/Write characteristics (For the 8080 Series Interface MPU)



(V_{DD} = 1.65V – 2.4V, T_A = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
t_{CYC8}	System cycle time	300	-	-	ns	
t_{AS8}	Address setup time	0	-	-	ns	
t_{AH8}	Address hold time	0	-	-	ns	
t_{DS8}	Data setup time	40	-	-	ns	
t_{DH8}	Data hold time	30	-	-	ns	
t_{CH8}	Output disable time	10	-	70	ns	C_L = 100pF
t_{ACC8}	$\overline{RD}$ access time	-	-	280	ns	C_L = 100pF
t_{CCLW}	Control L pulse width (WR)	100	-	-	ns	
t_{CCLR}	Control L pulse width (RD)	120	-	-	ns	
t_{CCHW}	Control H pulse width (WR)	100	-	-	ns	
t_{CCHR}	Control H pulse width (RD)	100	-	-	ns	
t_R	Rise time	-	-	15	ns	
t_F	Fall time	-	-	15	ns	

(V_{DD} = 2.4V – 3.5V, T_A = +25°C)

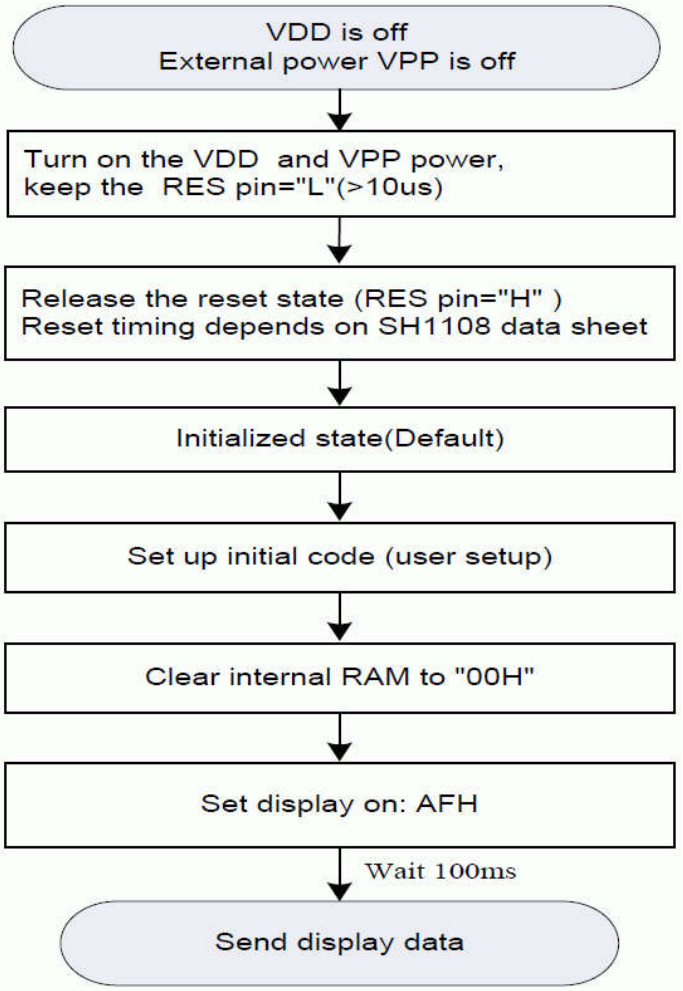
Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
t_{CYC8}	System cycle time	300	-	-	ns	
t_{AS8}	Address setup time	0	-	-	ns	
t_{AH8}	Address hold time	0	-	-	ns	
t_{DS8}	Data setup time	40	-	-	ns	
t_{DH8}	Data hold time	15	-	-	ns	
t_{CH8}	Output disable time	10	-	70	ns	C_L = 100pF
t_{ACC8}	$\overline{RD}$ access time	-	-	140	ns	C_L = 100pF
t_{CCLW}	Control L pulse width (WR)	100	-	-	ns	
t_{CCLR}	Control L pulse width (RD)	120	-	-	ns	
t_{CCHW}	Control H pulse width (WR)	100	-	-	ns	
t_{CCHR}	Control H pulse width (RD)	100	-	-	ns	
t_R	Rise time	-	-	15	ns	
t_F	Fall time	-	-	15	ns	

7 Power ON/OFF Sequence & Application Circuit

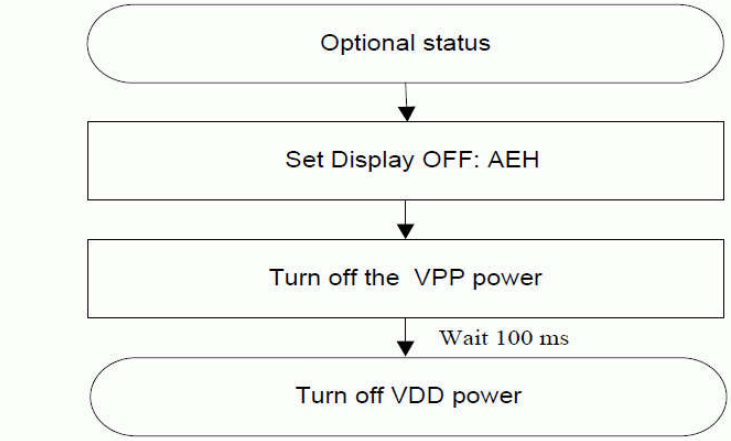
7.1 POWER ON / OFFSEQUENCE

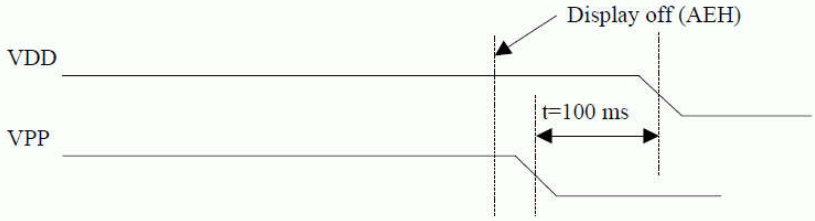
Power on sequence:

External power is being used immediately after turning on the power:

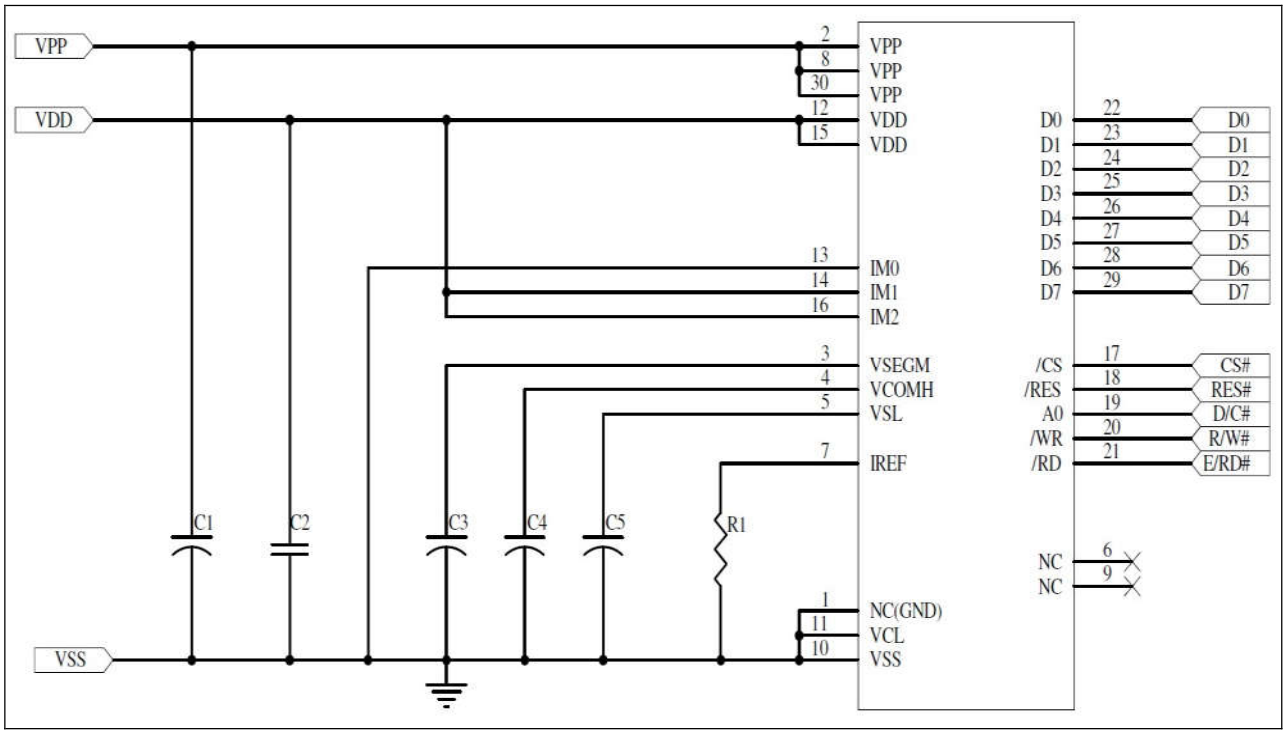


Power off sequence:





7.2 APPLICATION CIRCUIT



Recommend components:

C1, C3,C4,C5: 4.7uF/25V VISHAY (572D475X0025A2T) or (Tantalum type)

C2: 1uF/6.3V(0603)

R1: 750K ohm (0603) 1%

This circuit is for 8080 8bit interface.

9.3 COMMAND TABLE

Refer to IC Spec.: SH1108G

8 Reliability

Test Item	Content of Test	Test Condition	Note
High Temperature Storage	Endurance test applying the high storage temperature for a long time.	85℃ 240hrs	5
Low Temperature Storage	Endurance test applying the high storage temperature for a long time.	-40℃ 120hrs	5
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70℃ 120hrs	5
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-40℃ 120hrs	5
High Temperature/ Humidity Operation	65°C, 90%RH, 120hrs	/	5
Thermal Shock Resistance	-40 ° C ~85 ° C (-40 ° C /30min;transit /3min; 85 ° C /30min; transit/3min) 1cycle: 66min, 100 cycles	/	1 Carton
Drop	Height: 120cm Sequence : 1 angle、3 edges and 6 faces Cycles: 1		1 Carton
ESD (Non-operation)	Air discharge model, ±8kV, 10times	/	5

Test and measurement conditions
1.All measurements shall not be started until the specimens attainto temperaturestability.
2.The degradation of Polarizer are ignored for item 1, 4 &5.
Evaluation criteria
1.The function test isOK.
2.No observabledefects.
3.Luminance: > 50% of initialvalue.
4.Current consumption: within±50% of initialvalue.

9 Warranty and Conditions

http://www.displaymodule.com/pages/faq HYPERLINK "http://www.displaymodule.com/pages/faq"