Specification	
Part Number:	MCOB22005AX-EBP
Version:	10/08/2015
Date:	1
Revision	

Content

Midas Displays OLED Part Number System

MCO	B	21605	A	*	V	-	E	W	I	*
1	2	3	4	5	6		7	8	9	10

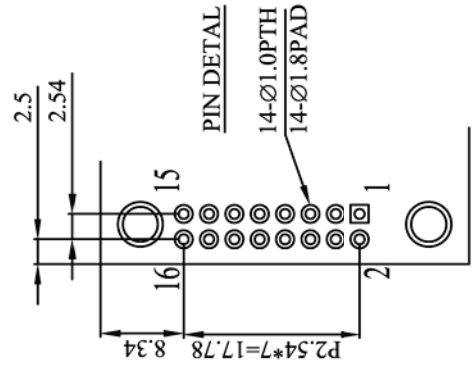|			
1	=	**MCO:**	Midas Displays OLED
2	=	**Blank:**	**B**: COB (Chip on Board) **T**: TAB (Taped Automated Bonding)
3	=	**No of dots:**	(e.g. 240064 = 240 x 64 dots) (e.g. 21605 = 2 x 16 5mm C.H.)
4	=	**Series**	A to Z
5	=	**Series Variant:**	A to Z and 1 to 9 **– see addendum**
6	=	**Operating Temp Range:**	**A:** -30+85° C **V:** -40+80° C **Y:** -40 +70° C **Z:** -30+70° C **X:** -40 +85° C
7	=	**Character Set:**	**Blank**: Not Applicable **E**: Multi European Font Set (English/Japanese – Western European (K) – Cyrillic (R))
8	=	**Colour:**	**Y:** Yellow **W:** White **B:** Blue **R:** Red **G:** Green **RGB**: Full Colour
9	=	**Interface:**	**P:** Parallel **I:** I²C **S:** SPI **M:** Multi
10	=	**Voltage Variant:**	e.g. **3** = 3v
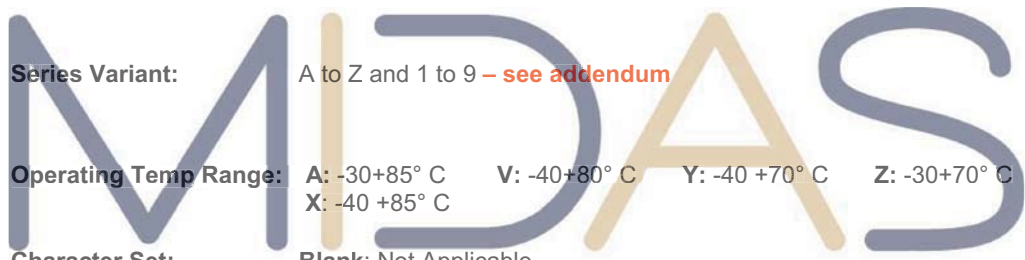
Functions and Features

- 2 lines x 20 characters
- Built-in   controller
- Parallel or serial MPU interface (Default 6800 MPU parallel)
- +2.8V ~ +5.3V Power Supply
- viewing angle "Free"
- Wide Temperature   -40℃ ~ +80℃ (Operating)
- Sunlight Readable Technology
- RoHS compliant

Mechanical Specification

Item	Description	
Product No.		
Viewing Area	75.52(W)×13.52(H)	mm
Module Size	116.0(W)×37.0(H)×9.0 (D)	mm
Dot Size	0.62(W)×0.67(H)	mm
Dot Pitch	0.65(W)×0.70(H)	mm
Display Format	20 characters (W)×2 lines (H)	
Duty Ratio	1/16	Duty
Controller	SSD1311 or Equivalent	
Interface	6800 (Default) 8Bit 8080 (Option) SPI (Option) I2C (Option)	

PIN NO.	SYMBOL
1	VSS
2	VDD
3	Vo
4	RS
5	R/W#
6	E
7-14	DB0-7
15-16	NC

9.0
1.6
4.9

31.2
13.52(VA)
11.52(AA)
2.9

4-Ø3.5 PTH
4-Ø5.5 PAD

116.0±0.5
75.52(VA)
73.52(AA)
91.2
59.0

0.48
3.7
3.22
0.65
0.62

SCALE:5/1
Dot Size

0.38
0.67
0.7
5.57
5.95

21.24
22.24
4.0
18.5
29.0
37.0±0.5
13.4
4.0

15
16
2
1

2.5
2.54

PIN DETAL
14-Ø1.0PTH
14-Ø1.8PAD

15
16
2
1

P2.54*7=17.78
8.34
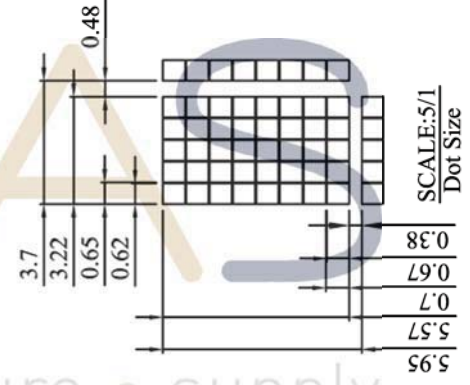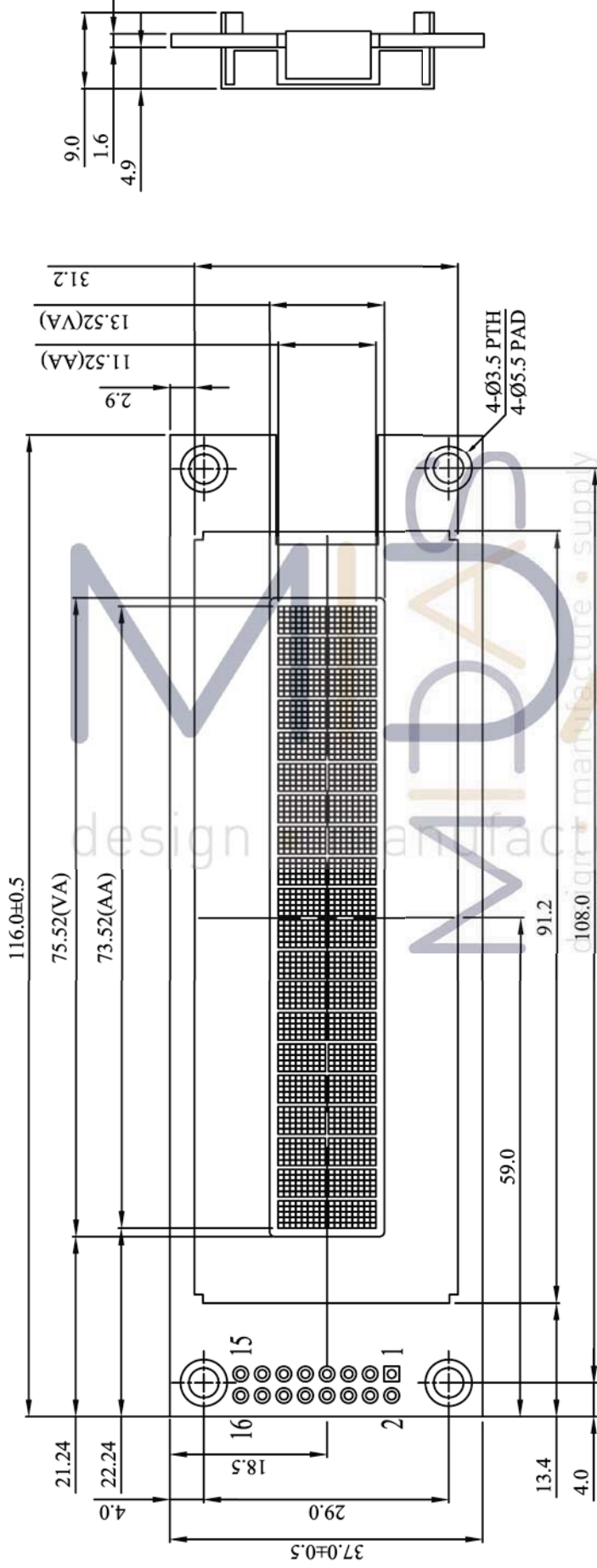
Pin Description

Parallel Interface (default):

Pin No.	Symbol	External Connection	Description
1	VSS	Power Supply	Ground
2	VDD	Power Supply	Supply Voltage for OLED and logic
3	Vo	-	Contrast Adjustment
4	RS(D/C#)	MPU	Register select signal. H: DATA, L: Command
5	R/W# (WR#)	MPU	6800-interface: Read/Write select signal, R/W=1: Read R/W: =0: Write 8080-interface: Active LOW Write signal.
6	E or /RD	MPU	6800-interface: Operation enable signal. Falling edge triggered. 8080-interface: Active LOW Read signal.
7-14	DB0~DB7	MPU	8-bit Bi-directional data bus lines
15-16	NC	-	No Connect

DC Characteristics

Item	Symbol	Condition	Min.	Type	Max.	Unit
Power Supply for Logic	VDD	(Wide Voltage I/O Application)	2.8	5.0	5.3	Volt
Input Voltage for I/O Pins	Vi	(Wide Voltage I/O Application)	2.8	5.0	5.3	Volt
Input Voltage	VIL	L level	0	-	0.2 VDD	Volt
Input Voltage	VIH	H level	0.8 VDD	-	VDD	Volt
Output Voltage	VOL	L level	0	-	0.1 VDD	
Output Voltage	VOH	H level	0.9 VDD	-	VDD	
Power Supply Current for OLED	IDD	Note	-	30		mA
Sleep Mode Current for VDD	IDD,SLEEP			1	10	μA

Note:

VDD = 5.0V, 25% Display Area Turn on.100 cd/m^2

When random texts pattern is running , averagely , about 1/4 of pixels will be on.

Optical Characteristics

Item	Symbol	Min.	Typ	Max.	Unit
Viewing angle range			Free		Degree
Dark Room Contrast	Cr		>10,000:1		
Brightness	Lbr		140		cd/m^2
Peak Emission Wavelength	C.I.E 1931	X=0.12 Y=0.22	X=0.16 Y=0.26	X=0.20 Y=0.30	

Electrical Absolute Ratings

Item	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply for Logic	VDD	-0.3	5.0	5.5	Volt	1,2
Input Voltage for I/O Pins	VI	-0.3	5.0	5.5	Volt	1,2
Life Time (100 cd/m^2)		---	70,000	---	Hours	3

Note 1: All the above voltages are on the basis of "VSS = 0V".

Note 2: When this module is used beyond the above absolute maximum ratings, permanent breakage of the module may occur.

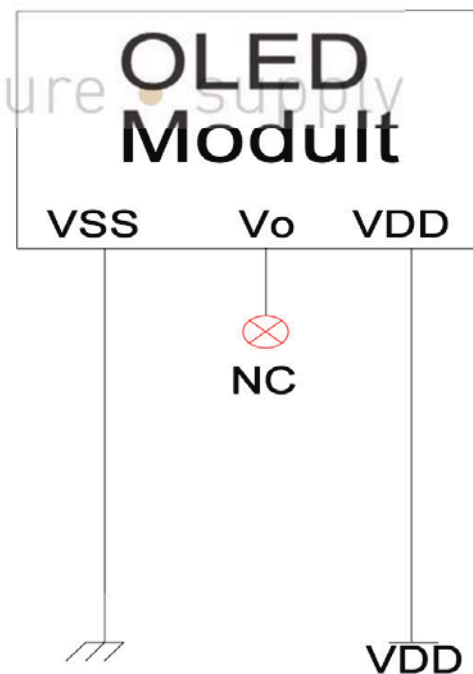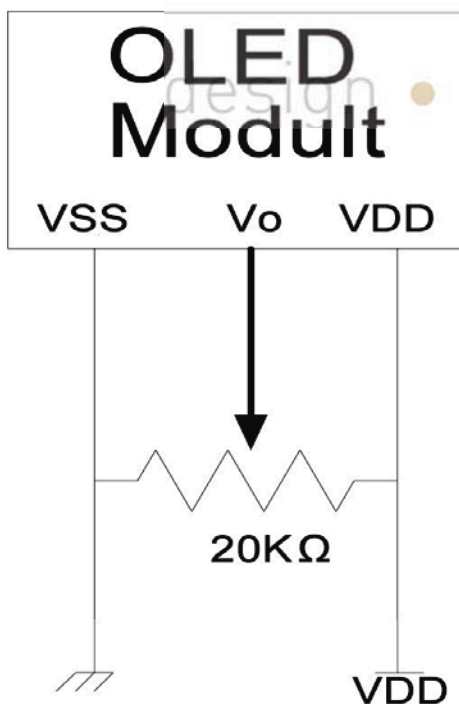Note 3:Ta = 25°C, 25% Checkerboard.

Software configuration follows Section ACTUAL APPLICATION EXAMPLE Initialization.

End of lifetime is specified as 50% of initial brightness reached. The average operating lifetime at room temperature is estimated by the accelerated operation at high temperature conditions.
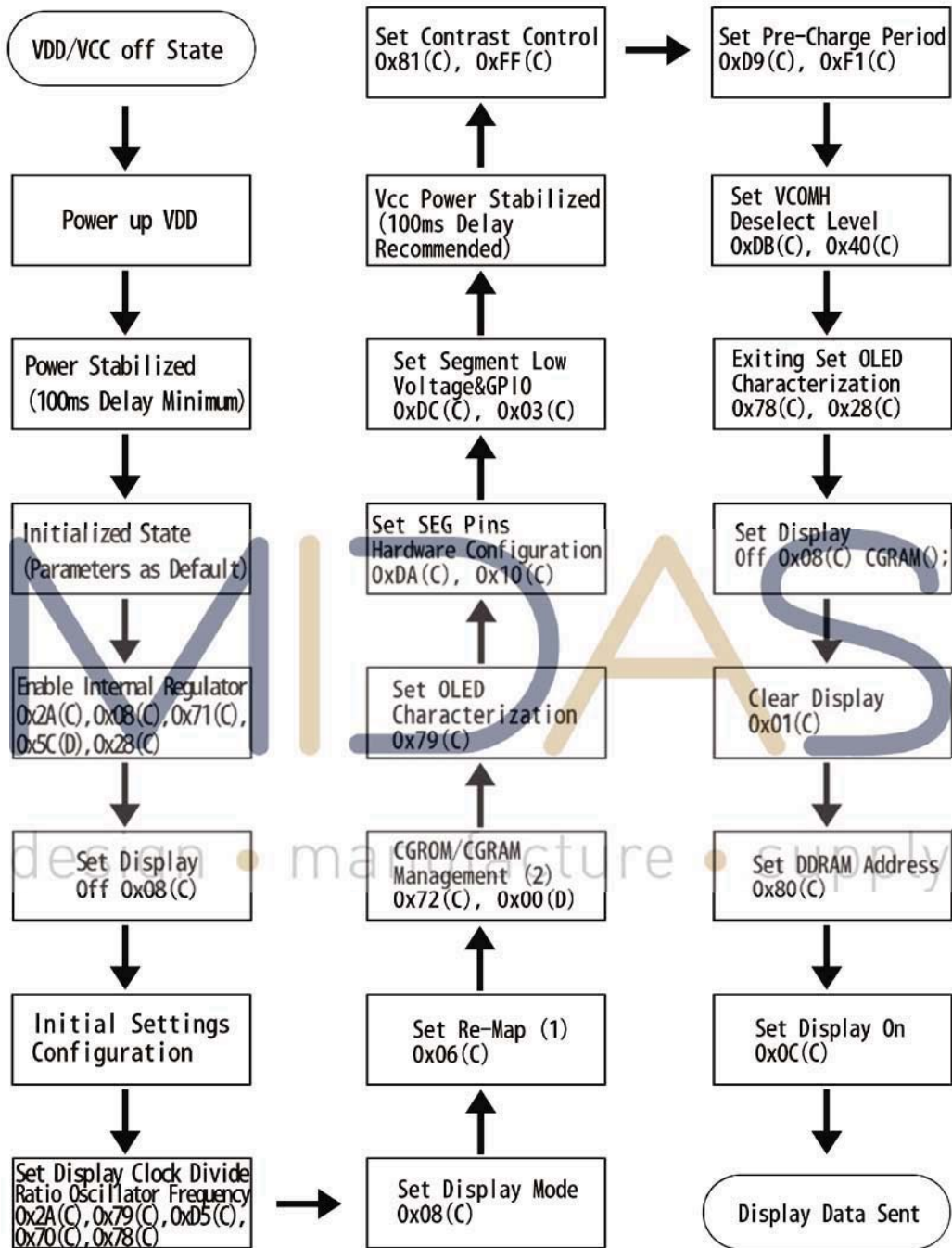
POWER SUPPLY

Adjust Brightness by Software & Hardware(VR)　　　Adjust Brightness by Software(Only)

Application

Power up Sequence

```
┌─────────────────────┐      ┌─────────────────────┐      ┌─────────────────────┐
│  VDD/VCC off State   │      │ Set Contrast Control │ ───► │ Set Pre-Charge Period│
└─────────────────────┘      │ 0x81(C), 0xFF(C)     │      │ 0xD9(C), 0xF1(C)     │
           │                 └─────────────────────┘      └─────────────────────┘
           ▼                           ▲                            │
┌─────────────────────┐      ┌─────────────────────┐               ▼
│    Power up VDD      │      │ Vcc Power Stabilized │      ┌─────────────────────┐
└─────────────────────┘      │ (100ms Delay         │      │ Set VCOMH            │
           │                 │ Recommended)         │      │ Deselect Level       │
           ▼                 └─────────────────────┘      │ 0xDB(C), 0x40(C)     │
┌─────────────────────┐                ▲                  └─────────────────────┘
│  Power Stabilized    │      ┌─────────────────────┐               │
│ (100ms Delay Minimum)│      │ Set Segment Low      │               ▼
└─────────────────────┘      │ Voltage&GPIO         │      ┌─────────────────────┐
           │                 │ 0xDC(C), 0x03(C)     │      │ Exiting Set OLED     │
           ▼                 └─────────────────────┘      │ Characterization     │
┌─────────────────────┐                ▲                  │ 0x78(C), 0x28(C)     │
│  Initialized State   │      ┌─────────────────────┐     └─────────────────────┘
│ (Parameters as       │      │ Set SEG Pins         │               │
│  Default)            │      │ Hardware Configuration│              ▼
└─────────────────────┘      │ 0xDA(C), 0x10(C)     │      ┌─────────────────────┐
           │                 └─────────────────────┘      │ Set Display          │
           ▼                           ▲                  │ Off 0x08(C) CGRAM(); │
┌─────────────────────┐      ┌─────────────────────┐     └─────────────────────┘
│Enable Internal Regulator│  │ Set OLED             │               │
│0x2A(C),0x08(C),0x71(C),│   │ Characterization     │               ▼
│0x5C(D),0x28(C)       │     │ 0x79(C)              │      ┌─────────────────────┐
└─────────────────────┘      └─────────────────────┘      │ Clear Display        │
           │                           ▲                  │ 0x01(C)              │
           ▼                 ┌─────────────────────┐      └─────────────────────┘
┌─────────────────────┐      │ CGROM/CGRAM          │               │
│   Set Display        │      │ Management (2)       │               ▼
│   Off 0x08(C)        │      │ 0x72(C), 0x00(D)     │      ┌─────────────────────┐
└─────────────────────┘      └─────────────────────┘      │ Set DDRAM Address    │
           │                           ▲                  │ 0x80(C)              │
           ▼                 ┌─────────────────────┐      └─────────────────────┘
┌─────────────────────┐      │ Set Re-Map (1)       │               │
│  Initial Settings    │      │ 0x06(C)              │               ▼
│  Configuration       │      └─────────────────────┘      ┌─────────────────────┐
└─────────────────────┘                ▲                  │ Set Display On       │
           │                 ┌─────────────────────┐      │ 0x0C(C)              │
           ▼                 │ Set Display Mode     │      └─────────────────────┘
┌─────────────────────┐      │ 0x08(C)              │               │
│Set Display Clock Divide│ ──►└─────────────────────┘               ▼
│Ratio Oscillator Frequency│                           ┌─────────────────────┐
│0x2A(C),0x79(C),0x05(C),│                             │  Display Data Sent   │
│0x70(C),0x78(C)       │                              └─────────────────────┘
└─────────────────────┘
```
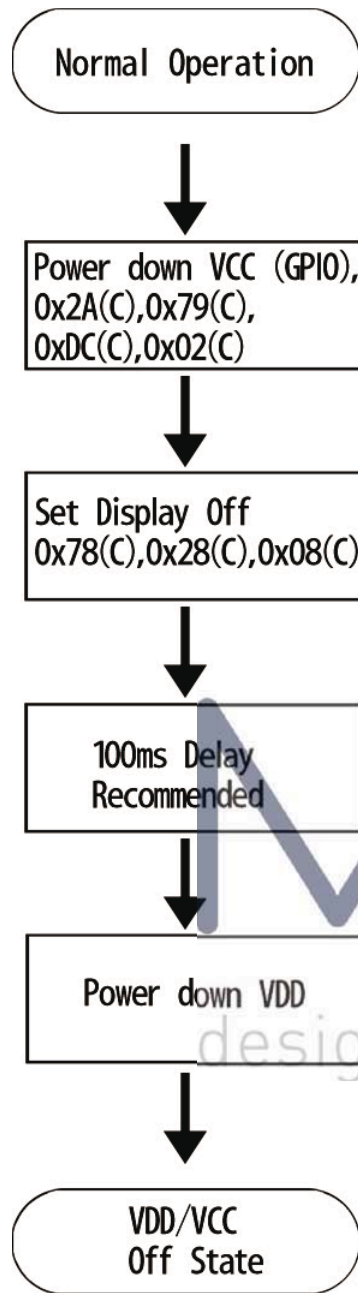
(1) This command could be programmable or defined by pin configuration.

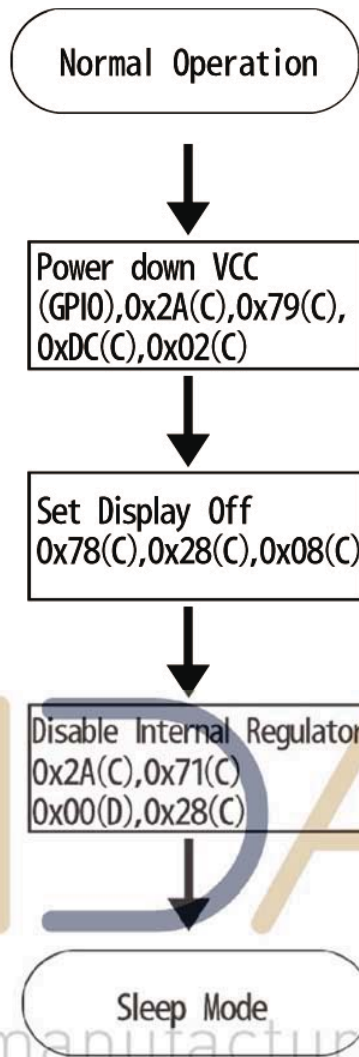(2) This command could be programmable or defined by pin configuration.

※（C）：Write Command   ※（D）：Write Data

If the noise is accidentally occurred at the displaying window during the operation, please reset the display in order to recover the display function.
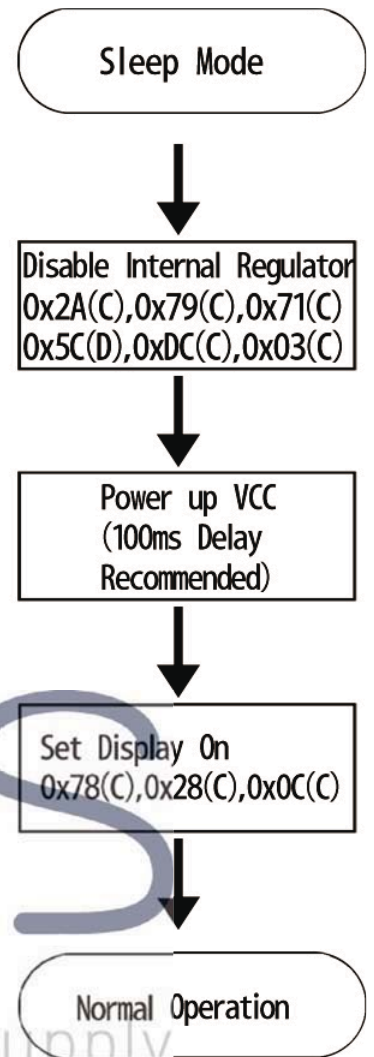
Power down Sequence

```
┌─────────────────────┐
│  Normal Operation   │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Power down VCC (GPIO),│
│ 0x2A(C),0x79(C),     │
│ 0xDC(C),0x02(C)      │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Set Display Off      │
│ 0x78(C),0x28(C),0x08(C)│
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ 100ms Delay          │
│ Recommended          │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Power down VDD       │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ VDD/VCC              │
│ Off State            │
└─────────────────────┘
```

Entering Sleep Mode

```
┌─────────────────────┐
│  Normal Operation   │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Power down VCC       │
│ (GPIO),0x2A(C),0x79(C),│
│ 0xDC(C),0x02(C)      │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Set Display Off      │
│ 0x78(C),0x28(C),0x08(C)│
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Disable Internal Regulator│
│ 0x2A(C),0x71(C)      │
│ 0x00(D),0x28(C)      │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│     Sleep Mode      │
└─────────────────────┘
```

Exiting Sleep Mode

```
┌─────────────────────┐
│     Sleep Mode      │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Disable Internal Regulator│
│ 0x2A(C),0x79(C),0x71(C)│
│ 0x5C(D),0xDC(C),0x03(C)│
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Power up VCC         │
│ (100ms Delay         │
│ Recommended)         │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Set Display On       │
│ 0x78(C),0x28(C),0x0C(C)│
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│  Normal Operation   │
└─────────────────────┘
```

SSD1311 CGROM CHARACTER CODE

ROM A

ROM B

ROM C

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