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MCOT096096AY-RGBM	96 x 96	OLED Module
Specification		
Version: 1	Date: 18/08/2013	
Revision		
1	16/08/2013	First Issue

Display Features	
Resolution	96 x 96
Appearance	RGB on Black
Logic Voltage	2.8V
Interface	Multi
Module Size	25.90 x 30.10 x 1.30mm
Operating Temperature	-40°C ~ +80°C
Construction	COT

RoHS compliant

Box Quantity	Weight / Display
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* - For full design functionality, please use this specification in conjunction with the SEPS114A specification. (Provided Separately)

Display Accessories	
Part Number	**Description**

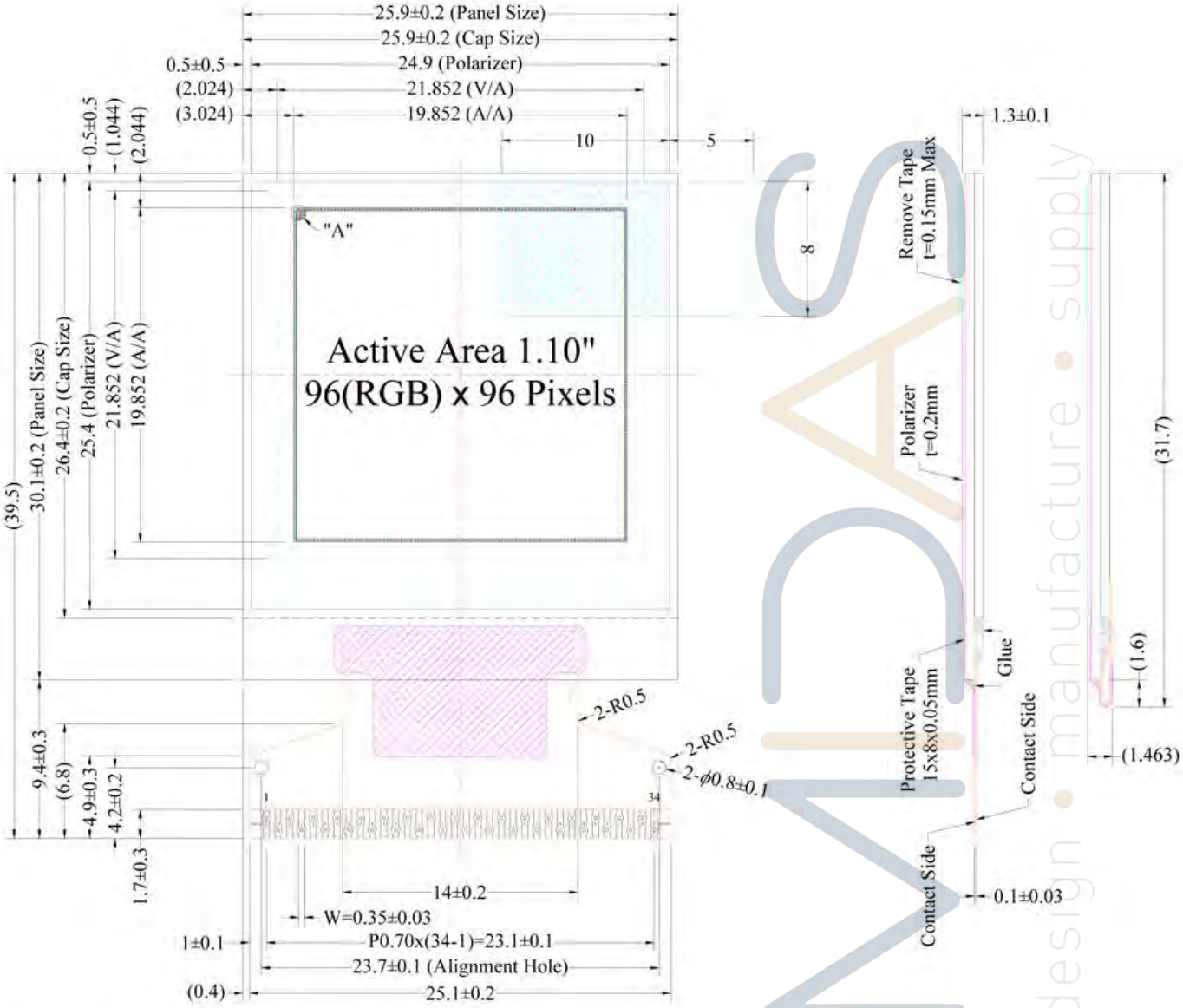
Optional Variants	
Appearance	**Voltage**

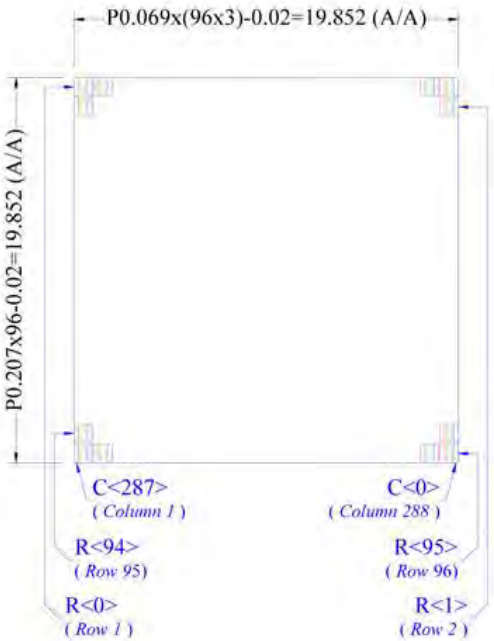
Functions and Features

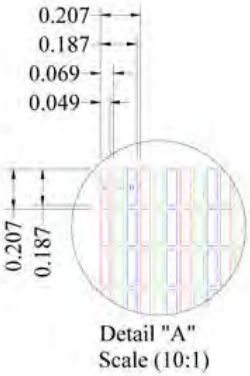
- 96X96 Graphic
- Built-in controller
- viewing angle Free
- Wide Temperature -40℃ ~ +80℃ (Operating)
- RoHS compliant

Mechanical Specification

Item	Description	
Product No.	MCOT096096AY-RGBM	
Inch	1.1”	
Color	65,536 Colors	
Active Area	19.852(W)×19.852(H)	mm
Panel Size	25.90(W)×30.10(H)×1.30(D)	mm
Dot Size	0.049(W)×0.187(H)	mm
Dot Pitch	0.069(W)×0.207(H)	mm
Display Format	96×96	
Duty Ratio	1/96 Duty	Duty
Controller	SEPS114A or Equivalent	
Operation Temperature	-40~80	°C
Storage Temperature	-40~85	°C
Response Time	≤10	us
Assembly	Connector	







Pin	Symbol
1	N.C. (GND)
2	VSSH
3	VCC_R
4	VCC_C
5	VDDR
6	VDD
7	PSEL
8	VDDIO
9	RSTB
10	WRB
11	RDB
12	CSB
13	A0
14	D0
15	D1
16	D2
17	D3
18	D4
19	D5
20	D6
21	D7
22	PS
23	C80
24	OSC1
25	OSC2
26	IREF
27	VSS
28	BPRE
29	GPRE
30	RPRE
31	VCC_C
32	VCC_R
33	VSSH
34	N.C. (GND)

Notes:

1. Driver IC: SEPS114A
2. FPC Number: UT-0814-P10
3. Interface:
   8-bit 68XX/80XX Parallel, 4-wire SPI
4. General Tolerance: ±0.30
5. The total thickness (1.40 Max) is without polarizer protective film & remove tape.
   The actual assembled total thickness with above materials should be 1.65 Max.

Pin Description

Power Supply

Pin Number	Symbol	Type	Function
6	VDD	P	**Power Supply for Operation** This is a voltage supply pin. It must be connected to external source.
5	VDDR		**Power Supply for Core Logic Circuit** This is a voltage supply pin. It can be supplied externally or regulated internally from VDD. A capacitor should be connected between this pin & VSS under all circumstances.
8	VDDIO		**Power Supply for I/O Pin** This pin is a power supply pin of I/O buffer. It should be connected to VDD or external source. All I/O signal should have VIH reference to VDDIO. When I/O signals pins (C80, PS, D0~D7, control signals…) pull high, they should be connected to VDDIO.
27	VSS		**Ground of Logic Circuit** A reference for the logic pins. It must be connected to external ground.
4,31	VCC_C		**Power Supply for OEL Panel** This is the most positive voltage supply pin of the chip.It must be connected to external source.
2.33	VSSH		**Ground of OEL Panel** This is the ground pins for analog circuits. It must be connected to external ground.

Driver

Pin Number	Symbol	Type	Function
30 29 28	RPRE GPRE BPRE	I/O	**External Voltage Reference for Pre-charge Signal** This is the precharge driving voltages for OEL driving segment pins respectively. A zener diode should be connected between this pin and VSS.
26	IREF		**Current Reference for Brightness Adjustment** This is the current reference pin to generate recharge and driving current. A 39kΩ resistor should be connected between this pin and VSS.
3,32	VCC_R	P	**Voltage Output High Level for Scan Signal** This is the scan driver power supply pin. A tantalum capacitor should be connected between this pin and VSS.

Clock

Pin Number	Symbol	Type	Function
24 25	OSC1 OSC2	I O	**Fine Adjustment for Oscillation** The frequency is controlled by external 27kΩ resistor between OSC1 and OSC2. The oscillator signal is used for system clock generation. When the external clock mode is selected, OSC1 is used external clock input.

Configuration

Pin Number	Symbol	Type	Function
7	PSEL	I	**Regulator Enable/Disable for Logic Power Supply** This pin is the regulator enable/disable input of VDDR. If it is connected to VDD, the internal regulator is used. Otherwise, an external voltage supplier should be used.

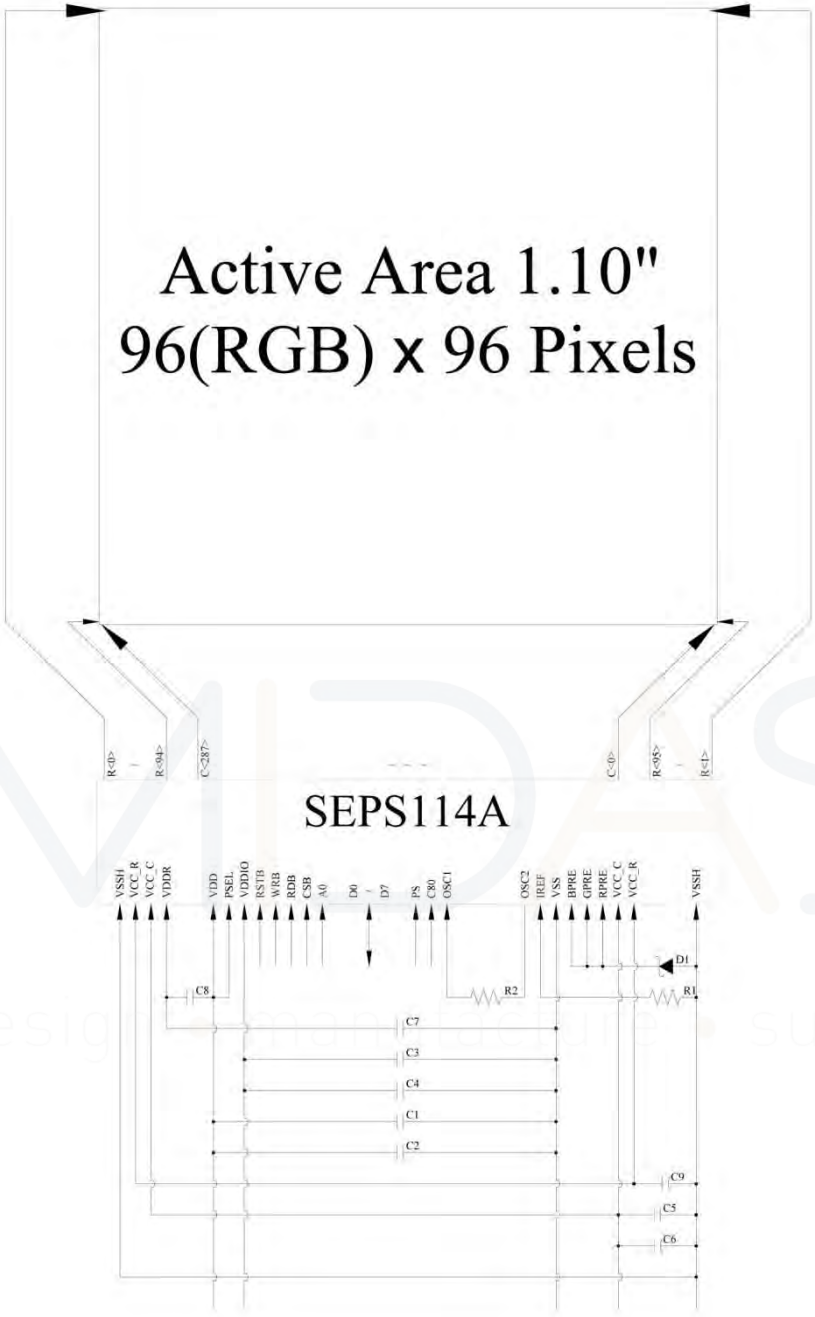
MCU Interface

<table>
<tr><th>Pin Number</th><th>Symbol</th><th>Type</th><th>Function</th></tr>
<tr><td>23</td><td>C80</td><td rowspan="6">I</td><td>Select the CPU Type
Low: 80XX-Series MCU High: 68XX-Series MCU.</td></tr>
<tr><td>22</td><td>PS</td><td>Select Parallel/Serial Interface Type
Low: Serial Interface High: Parallel Interface</td></tr>
<tr><td>9</td><td>RSTB</td><td>Power Reset for Controller and Driver
This pin is reset signal input. When the pin is low, initialization of the chip is executed.</td></tr>
<tr><td>12</td><td>CSB</td><td>Chip Select
Low: SEPS114A is selected and can be accessed.
High: SEPS114A is not selected and cannot be accessed.</td></tr>
<tr><td>13</td><td>A0</td><td>Data/Command Control
Low: Command High: Parameter/Data</td></tr>
<tr><td>11</td><td>RDB</td><td>Read or Read/Write Enable
68XX Parallel Interface: Bus Enabled Strobe (Active High)
80XX Parallel Interface: Read Strobe Signal (Active Low)
While using SPI, it must be connected to VDD or VSS</td></tr>
<tr><td>10</td><td>WRB</td><td>Write or Read/Write Select
68XX Parallel Interface: Read (Low)/Write (High) Select
80XX Parallel Interface: Write Strobe Signal(Active Low)
While using SPI, it must be connected to VDD or VSS.</td></tr>
<tr><td rowspan="4">14~21</td><td rowspan="4">D0~D7</td><td rowspan="4">I/O</td><td>Host Data Input/Output Bus
These pins are 9-bit bi-directional data bus to be connected to the microprocessor’s data bus.</td></tr>
<tr><td>PS | Description
0 | D[0] SCL: Synchronous Clock Input
D[1] SDI: Serial Data Input
D[2] SDO: Serial Data Output
D[3] R/W: Serial Read (High)/Write (Low)
1 | 8-bit Bus: D[7:0]</td></tr>
<tr><td>While using SPI, the unused pins must be connected to VSS.</td></tr>
</table>

Reserve

Pin Number	Symbol	Type	Function
1,34	N.C. (GND)	-	**Reserved Pin (Supporting Pin)** The supporting pins can reduce the influences from stresses on the function pins. These pins must be connected to external ground.

Block Diagram



MCU Interface Selection: PS, C80

Pins connected to MCU interface: RSTB, WRB, RDB, CSB, A0, and D0~D7

C1, C3, C5: 0.1μF

C2, C4, C8: 4.7μF

C6, C9: 4.7μF / 25V Tantalum Capacitor

C7: 2.2μF

R1: 39kΩ

R2: 27kΩ

D1: 2.7V, 0.5W Zener Diode

DC Characteristics

Item	Symbol	Condition	Min.	Type	Max.	Unit
Supply Voltage for Logic	VDD		2.4	2.8	3.3	Volt
Supply Voltage for I/O Pins	VDDIO		1.65	2.8	VDD	Volt
Supply Voltage for Display	VCC_C	Note 3	11.5	12	12.5	Volt
Operating Current for VDD	IDD		-	1.5	3.5	mA
Operating Current for VCC_C	ICC_C	Note 4	-	6.6	8.3	mA
		Note 5	-	10.5	13.1	mA
		Note 6	-	19.2	24.0	mA
Sleep Mode Current for VDD	IDD, SLEEP		-	3	5	μA
Sleep Mode Current for Vcc_c	ICC_C, SLEEP		-	2	10	μA

Note 3: Brightness (Lbr) and Supply Voltage for Display (VCC_C) are subject to the change of the panel characteristics and the customer's request.

Note 6: VDD = 2.8V, VCC_C = 12.0V, 30% Display Area Turn on.

Note 7: VDD = 2.8V, VCC_C = 12.0V, 50% Display Area Turn on.

Note 8: VDD = 2.8V, VCC_C = 12.0V, 100% Display Area Turn on.

Optical Characteristics

Item	Symbol	Conditions	Min.	Typ	Max.	Unit
Brightness(White)	Lbr	With Polarizer Note 3	80	100	-	cd/㎡
C.I.E. (White)	(X)	With Polarizer	0.26	0.30	0.34	
	(Y)		0.29	0.33	0.37	
C.I.E. (Red)	(X)	With Polarizer	0.60	0.64	0.68	
	(Y)		0.30	0.34	0.38	
C.I.E. (Green)	(X)	With Polarizer	0.27	0.31	0.35	
	(Y)		0.58	0.62	0.66	
C.I.E. (Blue)	(X)	C With Polarizer	0.10	0.14	0.18	
	(Y)		0.12	0.16	0.20	
Dark Room Contrast	CR	-	-	>10000:1	-	
Viewing anglerange	-	-	-	Free	-	Degree

* Optical measurement taken at VDD = 2.8V, VCC_C= 12.0V.

Absolute Maximum rating

Item	Symbol	Min.	Typ.	Max.	Unit	Notes
Supply Voltage for Logic	VDD	-0.3	-	4	Volt	1,2
Supply Voltage for I/O Pins	VDDIO	-0.3	-	4	Volt	1,2
Supply Voltage for Display	Vcc	-0.3	-	16	Volt	1,2
Life Time (65 cd/㎡)		---	30,000	---	Hour	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. Also, for normal operations, it is desirable to use this module under the conditions according to Section 3. “Optics Characteristics”. If this module is used beyond these conditions, malfunctioning of the module can occur and the reliability of the module may deteriorate.

Note 3: VCC_C = 12.0V, Ta = 25°C, 50% Checkerboard.

AC Characteristics

Please refer “SEPS114A” specification.

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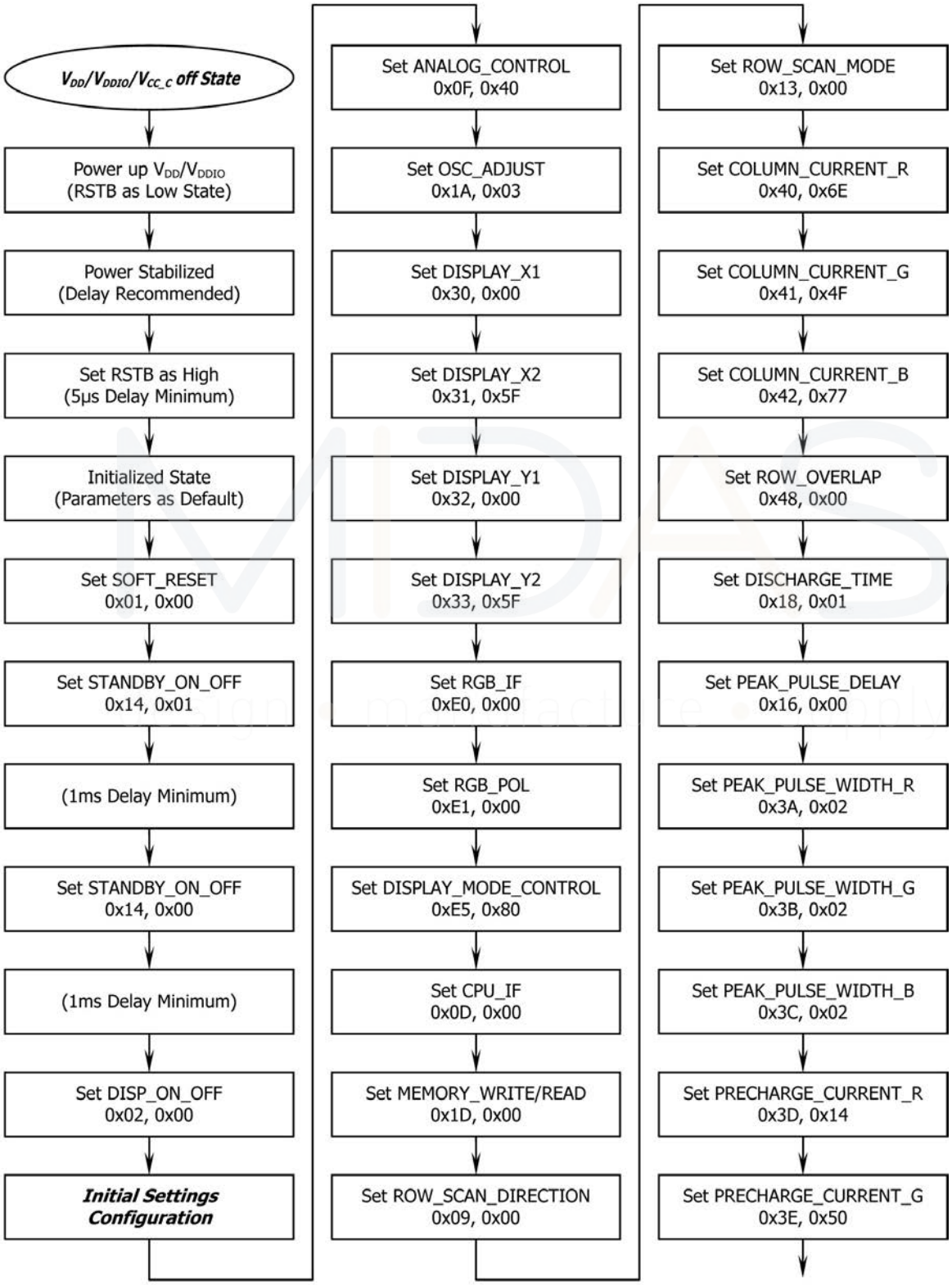
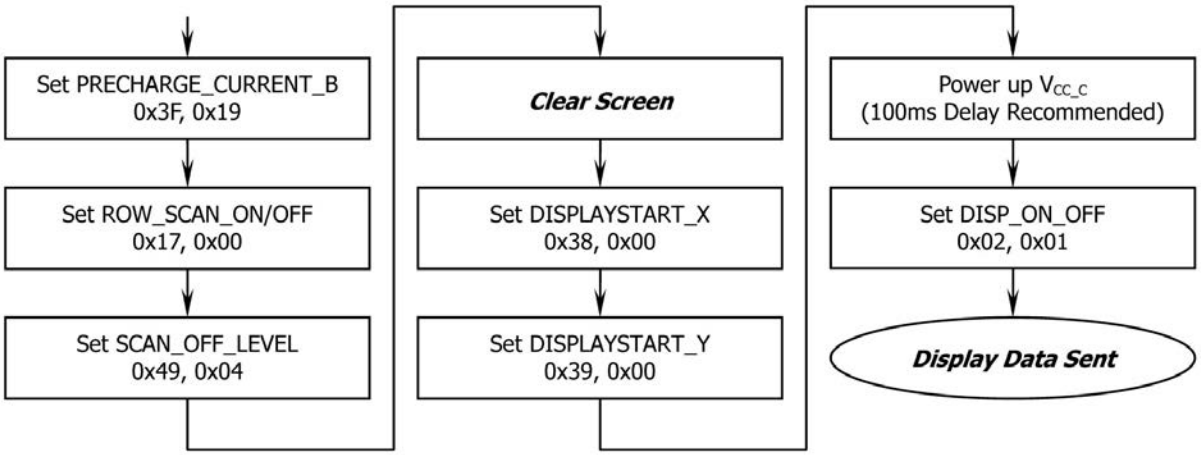
Actual Application Example

Command usage and explanation of an actual example

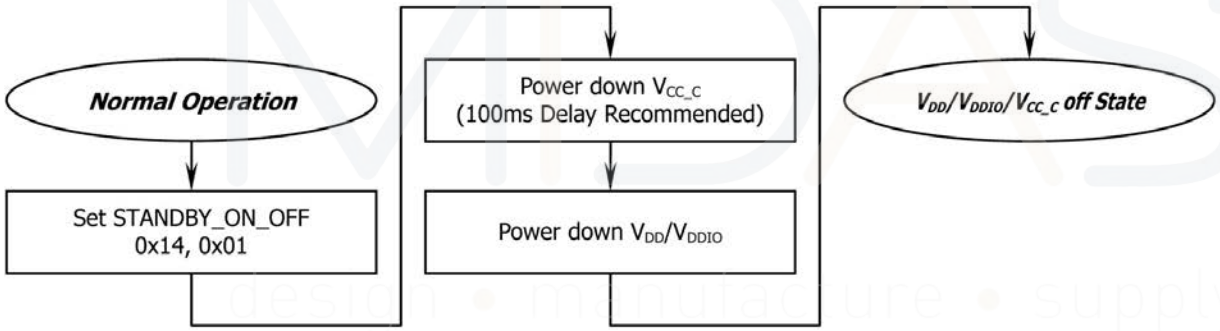
< Power up Sequence> >



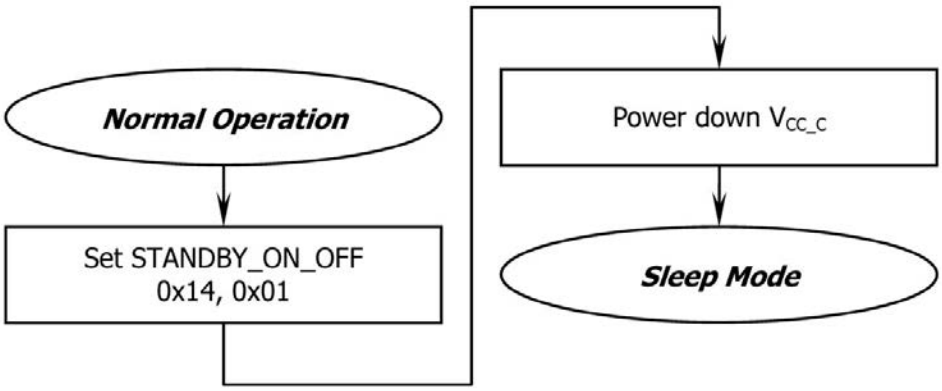


If the noise is accidentally occurred at the displaying window during the operation, please reset the display in order to recover the display function.

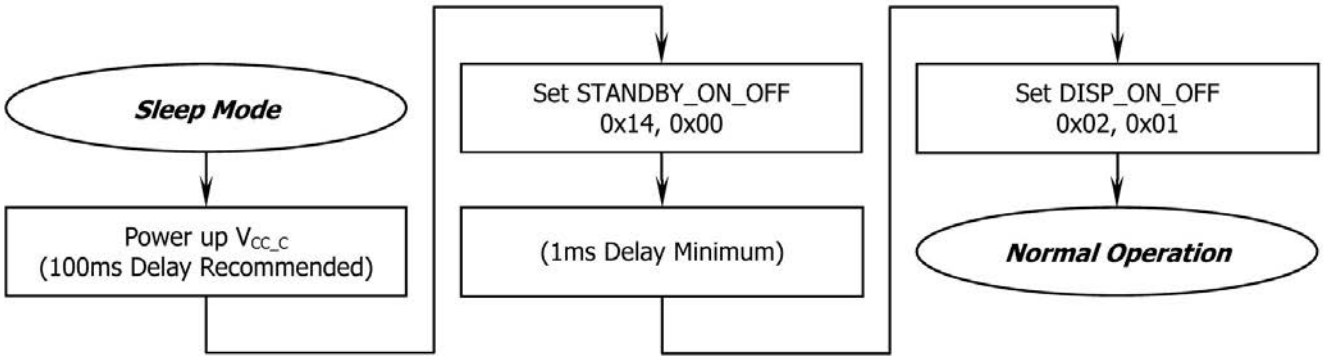
<Power down Sequence>



<Entering Sleep Mode>



<Exiting Sleep Mode>



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