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TFT | OLED | CHARACTER | GRAPHIC | UWVD | SEGMENT | CUSTOM

Character OLED Module

Part Number

O162A1-CW-SS3

Overview:

- 16x2 Graphic OLED
- White Pixel Color
- 85.00x30.00mm Module
- 8-Bit 6800 Parallel Interface
- Reflective Polarizer
- Wide Temp Range
- 3.3V
- LCD IC: KS0066
- RoHS Compliant

Character OLED LCD Features

Resolution: 16x2 Dots
Interface(s): 8-Bit 6800 Parallel
RoHS Compliant

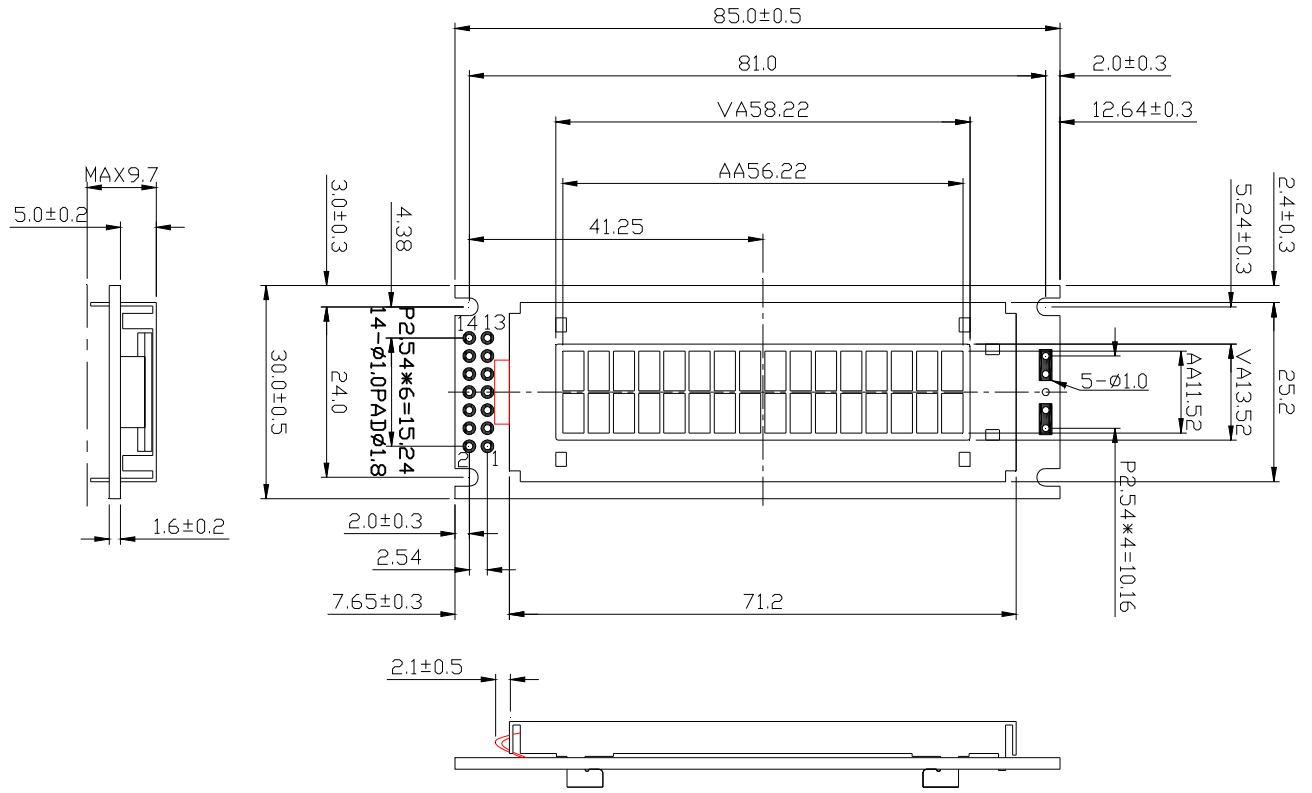
General Information Items	Specification	Unit	Note
	Main Panel		
Viewing Area (VA)	58.22 (H) x 13.52 (V)	mm	--
Pixel Color	White	--	--
Viewing Angle	Bottom View	degrees	--
Polarizer	Reflective	--	--
Controller IC	KS0066	--	--
Operating Temperature	-40 to +70	°C	--
Storage Temperature	-40 to +85	°C	--
Voltage	3.3	V	--
Resolution	16x2	--	--

Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	--	85.00	--	mm	--
	Vertical (V)	--	30.00	--	mm	--
	Depth (D)	--	9.70	--	mm	--
Weight		--	21.95	--	g	Approximate

1. Outline Dimensions

Rev.	Description	Date
1.0	First	06/24/2025



NO	PIN
1	VDD
2	VSS
3	NC
4	RS
5	R/W
6	E
7	DB0
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7

NOTES:
1. DISPLAY TYPE: 16x2 WHITE GRAPHIC OLED
2. POLARIZER: ANTI-GLARE
3. VIEWING ANGLE: BOTTOM VIEW
4. OPERATING TEMPERATURE: -40°C TO +70°C
   STORAGE TEMPERATURE: -40°C TO +85°C
5. CONTROLLER IC: KS0066
6. ROHS COMPLIANT.

Model Name: O162A1-CW-SS3			
General Tol: ±0.3			
Approvals	Date	Drawing No.:	Scale:
DWN:			
CHK:		Size:	Unit: mm / Page: 1/1
APP:			

2. Input Terminal Pin Assignment

NO.	Symbol	Description	I/O
1	VDD	Power supply voltage.	P
2	VSS	Power supply ground.	P
3	NC	No connection.	--
4	RS	Register select.	I
5	R/W	Read / write.	I
6	E	Enable signal.	I
7	DB0	Data bit 0.	I/O
8	DB1	Data bit 1.	I/O
9	DB2	Data bit 2.	I/O
10	DB3	Data bit 3.	I/O
11	DB4	Data bit 4.	I/O
12	DB5	Data bit 5.	I/O
13	DB6	Data bit 6.	I/O
14	DB7	Data bit 7.	I/O

3. Absolute Maximum Ratings

3.1 Electrical Absolute Ratings

Parameter	Symbol	Min.	Max.	Unit	Note
Power Supply for Logic	V_{DD}-V_{SS}	-0.3	5.6	V	
Power Supply for OLED	V_{CC}-V_{SS}	-0.3	14.5	V	
Input Voltage	V_I	-0.3	V_{DD}	V	
Life Time (80 cd/m^2)	Ta = 25°C 50% RH	50,000	---	Hour	Note 1

3.2 Environmental Absolute Maximum Ratings

Item	Wide Temperature			
	Operating		Storage	
	Min.	Max.	Min.	Max.
Ambient Temperature	-40℃	+70℃	-40℃	+85℃
Humidity (without condensation)	Note 2,3		Note 2,3	

Note 1: Software configuration follows. 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.

Note 2: Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

Note 3: The defined temperature ranges do not include the polarizer. The maximum withstood temprature of the polarizer should be 80°C.

4. Electrical Characteristics

4.1 DC Electrical Characteristics

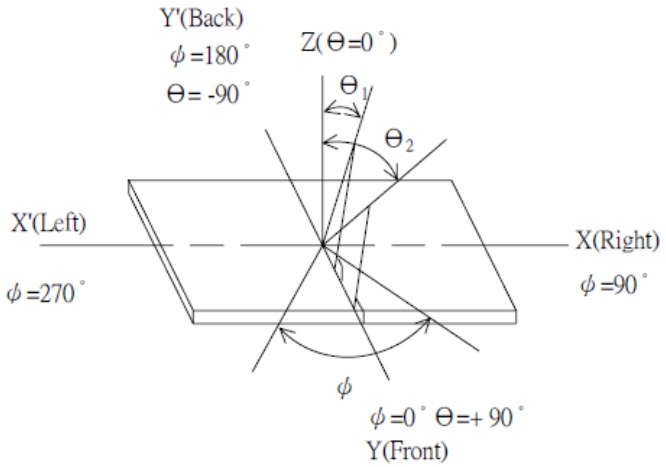
Characteristics	Symbol	Condition	Min.	Typ	Max.	Unit	Note
Power Supply for Logic	V_{DD}-V_{SS}	-	2.7	3.3	3.5	V	
Power Supply for OLED	V_{CC}-V_{SS}	-	8.5	9.0	9.5	V	Note 5
Input Voltage	V_{IL}	L level	0	-	0.2V_{DD}	V	
	V_{IH}	H level	0.8V_{DD}	-	V_{DD}	V	
Output Voltage	V_{OL}	L level	0	-	0.2V_{DD}		
	V_{OH}	H level	0.8V_{DD}	-	V_{DD}		
Operating Current for Vpp	I_{PP}	Note 6	-	27.5	35.8	mA	
		Note 7	-	30.8	43.6		
		Note 8	-	39.5	52.7		
Power Supply Current for OLED	I_{DD}	V_{DD} = 3.3V Vpp = 9.0V	-	38.8	65.0	mA	

Note 5: Brightness (Lbr) and Supply Voltage for Display (Vpp) are subject to the change of the panel characteristics and the customer's request.
Note 6: V_{DD} = 3.3V, Vpp =9.0V generated by internal DC/DC converter, 30% Display Area Turn on.
Note 7: V_{DD} = 3.3V, Vpp =9.0V generated by internal DC/DC converter, 50% Display Area Turn on. (POR)
Note 8: V_{DD} = 3.3V, Vpp =9.0V generated by internal DC/DC converter, 100% Display Area Turn on.

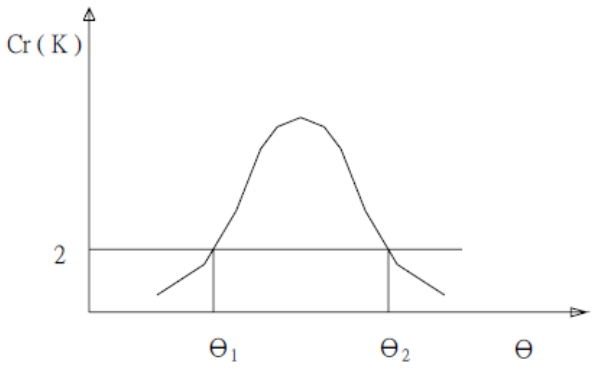
5. Optical Characteristics

Characteristics	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle Range	Θ2－Θ1	Ta＝25℃	80	-	-	deg.	1,2
	ϕ		80	-	-	deg.	
Contrast Ratio	CR	Ta＝25℃	CR >10000:1			-	3
Response Time(rise)	Tr	Ta＝25℃	-	10	-	us	4
Response Time(fall)	Tf	Ta＝25℃	-	10	-	us	4
Brightness	L	Check Board Brightness	60	80	-	cd/m^2	
Chromaticity Coordinate	C.I.E (White)		X=0.25 Y=0.29	X=0.28 Y=0.32	X=0.31 Y=0.35		

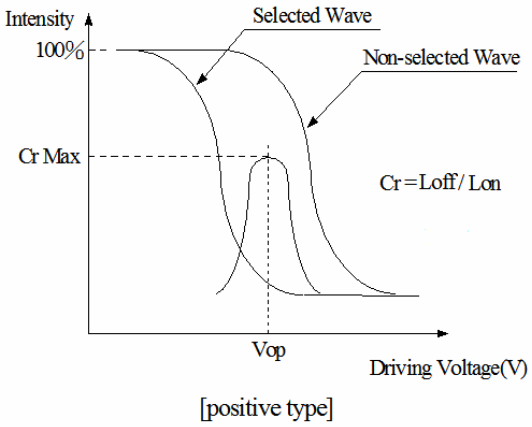
Note1 Definition of angle θ and Φ



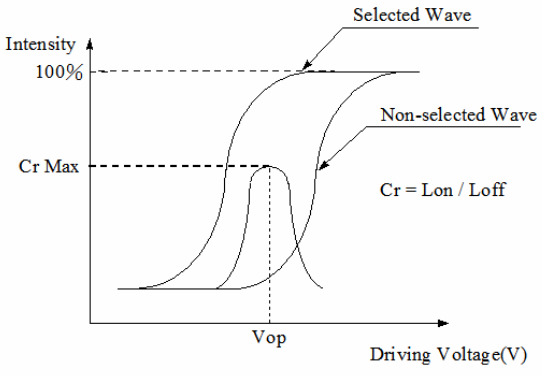
Note2 Definition of viewing angle θ



Note3 Definition of contrast CR

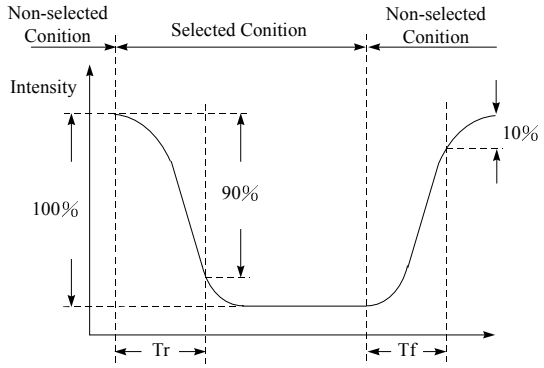


[positive type]

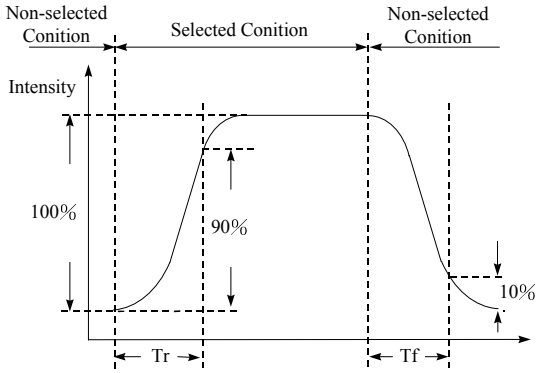


[Negative type]

Note4 Definition of Response Time (Tr, Tf)



[positive type]

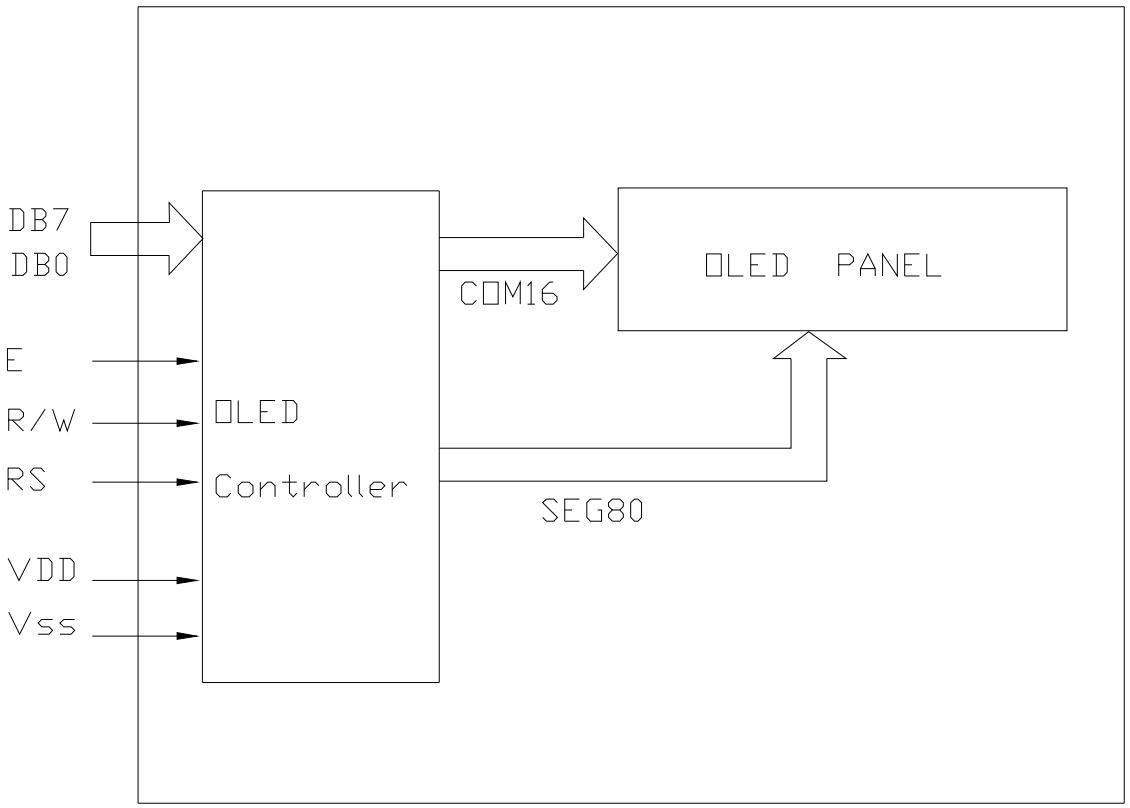


[Negative type]

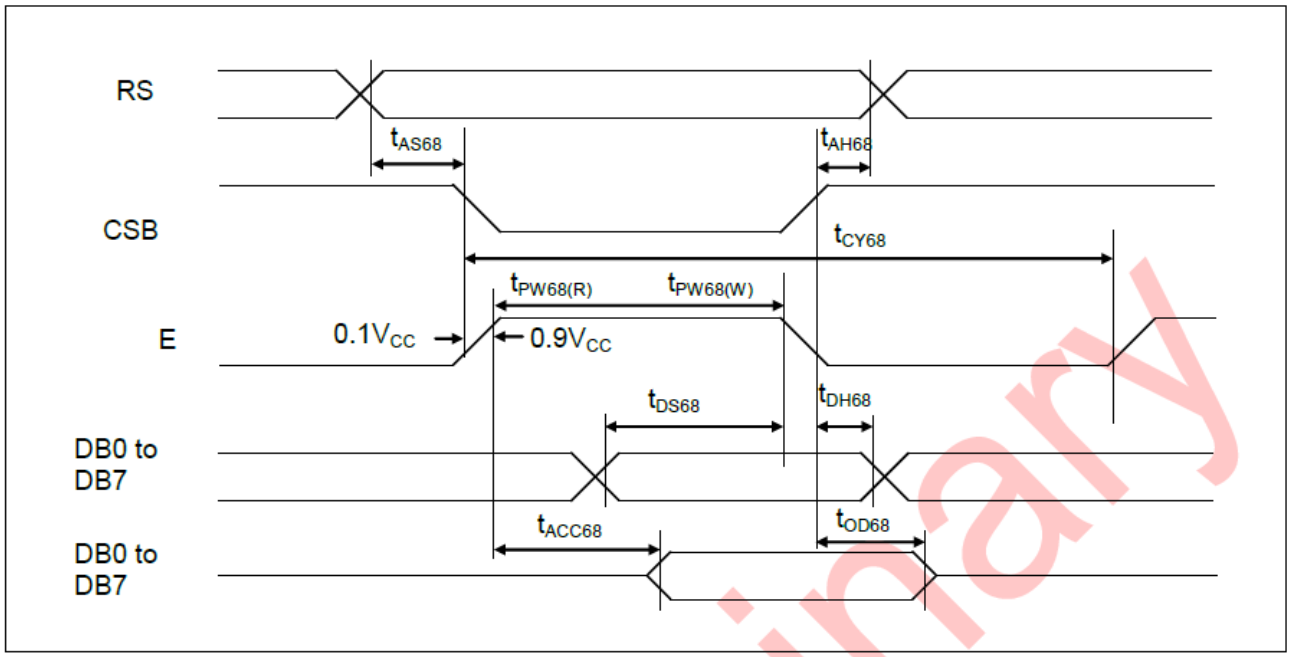
Conditions: Operating Voltage: VOP
Frequency: 64Hz

Viewing Angle(θ φ): 0°,0° Frame
Driving Wave Form: 1N duty,1/a bias

6. Block Diagram



7. Read/Write Timing Chart



8. AC Characteristics

(Vcc = 2.7 to 5.5V, Ta = -30 to +80℃)

Item	Signal	Symbol	Min.	Typ.	Max.	Unit	Remark
Address setup time Address hold time	RS	t_{AS68} t_{AH68}	20 0	-	-	ns	
System cycle time		t_{CY68}	500	-	-	ns	
Pulse width (E)	E_RDB	t_{PW68}(W)	250	-	-	ns	
Pulse width (E)	E_RDB	t_{PW68}(R)	250	-	-	ns	
Data setup time Data hold time	DB7 to DB0	t_{DS68} t_{DH68}	40 20	-	-	ns	
Read access time Output disable time		t_{ACC68} t_{OD68}	- 10	-	180 -	ns	C_L = 100pF

9. Function Specification

Instruction	Code										Description
	RS	R/WB	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	
Clear Display	0	0	0	0	0	0	0	0	0	1	Clears entire display. It takes max. 6.2ms for execution this command @fosc=250KHZ
Return Home	0	0	0	0	0	0	0	0	1	0	Sets DDRAM Address 0 into the Address Counter. Returns shifted display to original position .DDRAM contents remain unchanged.(DB0 is test bit. User should set DB0=0 all the time)
Entry Mode Set	0	0	0	0	0	0	0	1	I/D	S	Sets curs or move direction and specifies display shift (These operations are performed during data write and read.)
Display ON/OFF Control	0	0	0	0	0	0	1	D	C	B	Sets entire Display (D)ON/OFF. Sets Cursor(C) ON/OFF. Sets Blinking(B) of Cursor. Position Character.
Cursor/ Display Shift/ Mode/ Pwr	0	0	0	0	0	1	S/C	R/L	0	0	Moves cursor & shifts display without changing DDRAM contents. Sets internal power on/off
							0	PWR	1	1	
Function Set	0	0	0	0	1	DL	N	F	FT1	FT0	Sets inter face data length(DL). Sets number of display lines(N). Sets Character Font(F).Sets Font Table (FT) *Forbids to set FT=01 or 11 when RT1305 be operated in 4-bit interface.
Set CGRAM Address	0	0	0	1	ACG	ACG	ACG	ACG	ACG	ACG	Sets CGRAM Address. CGRAM Data is sent and received after this setting.
Set DDRAM Address	0	0	1	ADD	ADD	ADD	ADD	ADD	ADD	ADD	Sets DDRAM Address. The DDRAM data Is sent and received after this setting.
Read Busy Flag & Address	0	1	BF	AC	AC	AC	AC	AC	AC	AC	Reads Busy Flag(BF)indicating that internal operation is being performed. Reads Address Counter contents.
Write data into the CGRAM or DDRAM	1	0	WriteData								Writes data into the CGRAM or DDRAM
Read Data from the CGRAM or DDRAM	1	1	ReadData								Read data from the CGRAM or DDRAM
Enter TEST command	0	0	0	0	0	0	0	0	1	1	Enter TEST command，all test command working in this mode.
DVR,BVR internal or external select	0	0	0	1	1	1	0	0	PHSLC	IFENON	PHSLC=0:external DVR PHSLC=1:internal digital DVR IFENON=0:external BVR IFENON=1:internal BVR
Internal digital DVR control register	0	0	1	1	1	1	1	0	1	1	This command set DVR precharge timing. PNUM setting range 0x01~0xB3.
	0	0	PNUM	PNUM	PNUM	PNUM	PNUM	PNUM	PNUM	PNUM	
Internal BVR control register	0	0	1	1	1	1	1	0	1	0	This command set internal BVR current CT setting range 0x01~0xFF.
	0	0	CT	CT	CT	CT	CT	CT	CT	CT	
SPI4/IIC read data enable	0	0	0	1	1	1	1	1	0	0	Spi4/IIC interface read data enable
SPI4/IIC read command enable	0	0	0	1	1	1	1	1	0	1	Spi4/IIC interface read command enable
Exit test mode	0	0	0	0	0	0	0	0	0	0	This command exit test mode

10. DDRAM Addressing

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DDRAM Address	0 0	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F

11. Reset Function

INTERNAL RESET CIRCUIT INITIALIZATION

When power is turned ON,RT1305CA1-B is initialized automatically by an internal reset circuit. The following items are set (default) during the initialization.

1.Displayclear

2.Functionset:
DL="1":8-bit interface data
N="0": 1-line display
F="0":5x8 dot character font

3. Power turn off
PWR="0"

4.Display on/off control:
D="0":Display off
C="0":Cursor off
B="0":Blinking off

5.Entry mode set
I/D="0":Decrement by1
S="0":No shift

6. Cursor/Display shift/Mode / Pwr
S/C="0", R/L="1": Shifts cursor position to the right
G/C="0": Character mode
Pwr="1": Internal DCDC power on

The Busy Flag(BF) is in a busy state until the initialization is completed(BF="1").The busy state will be In effect 10 ms after VDD stabilization.

12. Initializing by Instruction

(1)8-bit mode

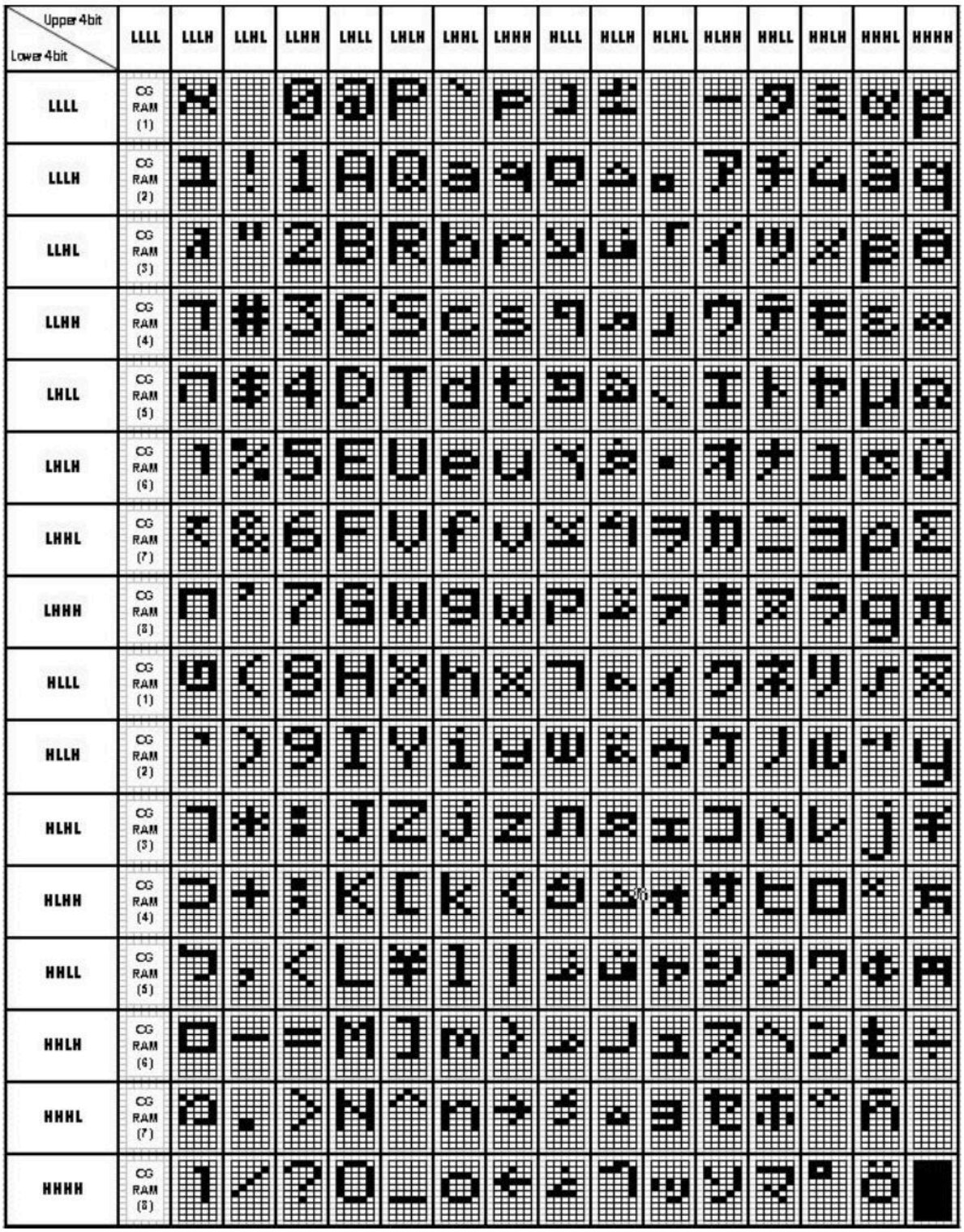
13. CGRAM Mapping

RELATIONSHIP BETWEEN CGRAM ADDRESS, DDRAM CHARACTER CODE AND CGRAM CHARACTER PATTERNS (FOR5 X 8DOT CHARACTERPATTERN)

Character Codes (DDRAM Data)									CGRAM Address						Character Patterns (CGRAM Data)								
7	6	5	4	3	2	1	0		5	4	3	2	1	0	7	6	5	4	3	2	1	0	
High						Low			High				Low		High						Low		
0	0	0	0	*	0	0	0		0	0	0	0	0	0	*	*	*	1	1	1	1	0	Character pattern 1
												0	0	1	*	*	*	1	0	0	0	1	
												0	1	0	*	*	*	1	0	0	0	1	
												0	1	1	*	*	*	1	1	1	1	0	
												1	0	0	*	*	*	1	0	1	0	0	
												1	0	1	*	*	*	1	0	0	1	0	
												1	1	0	*	*	*	1	0	0	0	1	
												1	1	1	*	*	*	0	0	0	0	0	Cursor Position
0	0	0	0	*	0	0	1		0	0	1	0	0	0	*	*	*	1	0	0	0	1	Character pattern 2
												0	0	1	*	*	*	0	1	0	1	0	
												0	1	0	*	*	*	1	1	1	1	1	
												0	1	1	*	*	*	0	0	1	0	0	
												1	0	0	*	*	*	1	1	1	1	1	
												1	0	1	*	*	*	0	0	1	0	0	
												1	1	0	*	*	*	0	0	1	0	0	
												1	1	1	*	*	*	0	0	0	0	0	Cursor position
0	0	0	0	*	.	.	.		.	.	.	.	.	.	*	*	*	.	.	.	.	.	Character pattern 3~7
					.	.	.		.	.	.	.	.	.				.	.	.	.	.	
					.	.	.		.	.	.	.	.	.				.	.	.	.	.	
					.	.	.		.	.	.	.	.	.				.	.	.	.	.	
0	0	0	0	*	1	1	1		1	1	1	0	0	0	*	*	*	0	0	0	0	0	Character pattern 8
												0	0	1	*	*	*	0	1	0	1	0	
												0	1	0	*	*	*	0	0	0	0	0	
												0	1	1	*	*	*	0	0	0	0	0	
												1	0	0	*	*	*	1	0	0	0	1	
												1	0	1	*	*	*	0	1	1	1	0	
												1	1	0	*	*	*	0	0	1	0	0	
												1	1	1	*	*	*	0	0	0	0	0	Cursor position

14. Character Font Table

ENGLISH_JAPANESE CHARACTER FONT TABLE (default FT[1:0]= 00)



15. Cautions and Handling Precautions

15.1 Handling and Operating the Module

1. When the module is assembled, it should be attached to the system firmly. Do not warp or twist the module during assembly work.
2. Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
3. Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.
4. Do not allow drops of water or chemicals to remain on the display surface. If you have the droplets for a long time, staining and discoloration may occur.
5. If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
6. The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane. Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
7. If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.
8. Protect the module from static; it may cause damage to the CMOS ICs.
9. Use fingerstalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
10. Do not disassemble the module.
11. Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
12. Pins of I/F connector shall not be touched directly with bare hands.
13. Do not connect, disconnect the module in the “Power ON” condition.
14. Power supply should always be turned on/off by the item Power On Sequence & Power Off Sequence.

15.2 Storage and Transportation

1. Do not leave the panel in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35 ℃ and relative humidity of less than 70%.
2. Do not store the OLED module in direct sunlight.
3. The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.
4. It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module. In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.
5. This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.