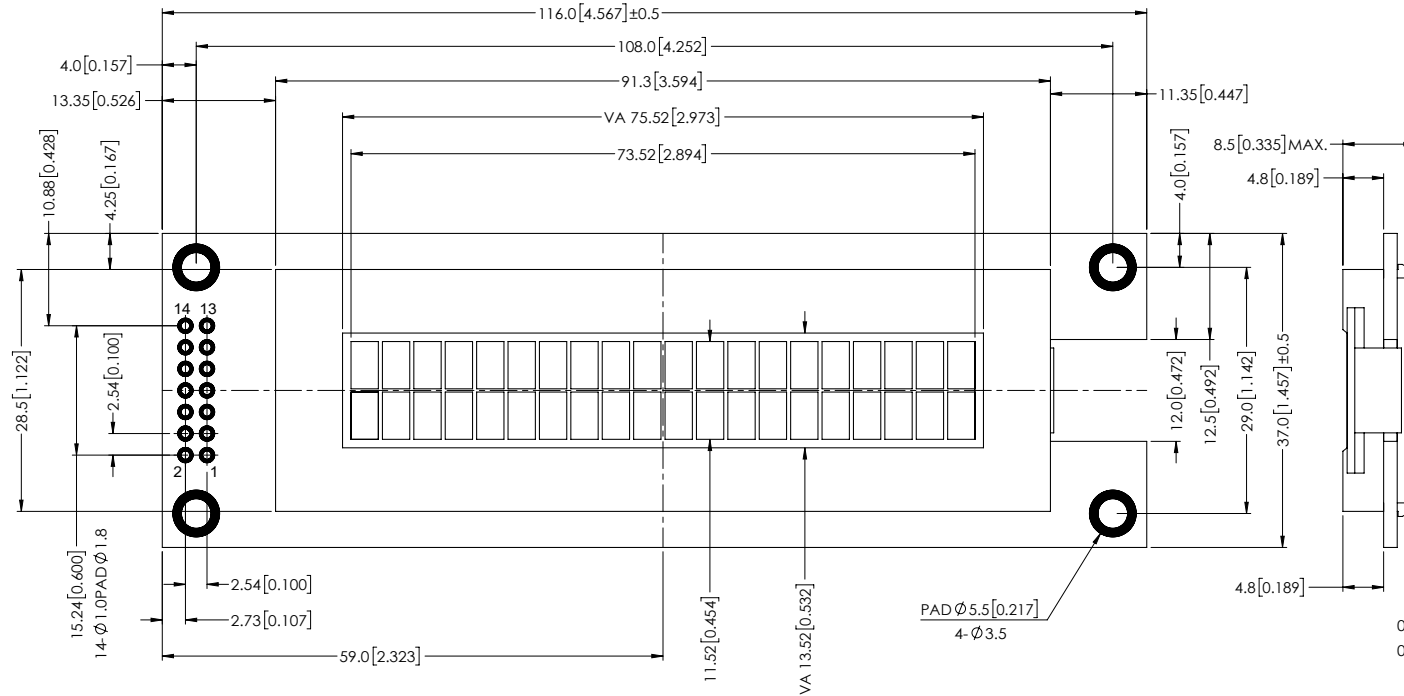


PART NUMBER

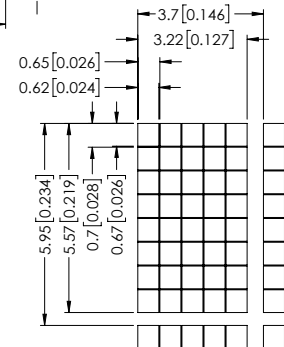
LOD-H02002DPY-IC3S

REV

--



PIN NO	SIGNAL
1	VSS
2	VDD
3	/CS
4	SA0
5	NC
6	NC
7	SCL
8	SDA
9	NC
10	NC
11	NC
12	NC
13	NC
14	NC



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Creating LED and LCD Solutions Together™

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116(L)*8.5(W)*37(H)mm, 5.57mm CHARACTER HEIGHT, 5*8 DOT MATRIX, OLED 20x2 YELLOW COLOR, 3.3V, HIGH TEMP

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DATE : 2017.09.05

DRAWN BY : C.C.

PAGE : 1 OF 7

CHKD BY : R.C.

SCALE : NTF

APRVD BY : E.C.

UNIT : mm [INCH]

Ⓢ

MECHANICAL SPECIFICATION

ITEM	DESCRIPTION
Viewing Area	75.52(W)mm×13.52(H)mm
Module Size	116.0(W)×37.0(H)×8.5 max(D)
Dot Size	0.62(W)mm×0.67(H)mm
Dot Pitch	0.65(W)mm×0.70(H)mm
Display Format	20 characters (W)×2 lines (H)
Duty Ratio	1/16 Duty
Interface	I2C Serial
Controller	US2066 or Equivalent

ABSOLUTE MAXIMUM RATING

(1) Electrical Absolute Ratings

Item	Symbol	Min.	Max.	Unit	Note
Power Supply for Logic	V _{DD} -V _{SS}	-0.3	5.5	Volt	
Power Supply for OLED	V _{DE} -V _{CC}	-0.3	13.0	Volt	
Input Voltage	V _I	-0.3	V _{DD}	Volt	
Life Time (100 cd/m ²)	V _{CC} = 7.25V I _A = 25°C 50% RH	50,000	---	Hour	

ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ	Max.	Unit	note
Power Supply for Logic	V _{DD} -V _{SS}	-	2.4	3.3	3.6	Volt	
Power Supply for OLED	V _{CC} -V _{SS}	BUILT_IN	11.5	12.0	12.5	Volt	
Input Voltage	V _{IL}	L level	0	-	0.2 V _{DD}	Volt	
	V _{IH}	H level	0.8 V _{DD}	-	V _{DD}	Volt	
Output Voltage	V _{OL}	L level	0	-	0.1 V _{DD}		
	V _{OH}	H level	0.9 V _{DD}	-	V _{DD}		
LCM Recommend OLED Module Driving Voltage	V _O -V _{SS}	Ta=0°C	-	-	-	Volt	
		Ta=25°C	9.0	10.0	11.5		
		Ta=50°C	-	-	-		
Power Supply Current for OLED	I _{DD}	V _{DD} =3.3V V _{CC} -V _{SS} =10.0V	-	50.0	80.0	mA	

INTERFACE PIN ASSIGNMENT

Pin No.	Pin Out	Level	Description
1	VSS	0V	Power Supply Ground
2	VDD	3.3V	Power Supply Voltage
3	/CS	L	Chip Select Signal , Default Low
4	SA0	H	Slave address , Default Hi
5	NC	---	No Connection
6	NC	---	No Connection
7	SCL	H/L	IIC Bus Serial Clock Input
8	SDA	H/L	IIC Bus Serial Data Input
9~14	NC	---	No Connection

(2) Environmental Absolute Maximum Ratings

Item	Wide Temperature			
	Operating		Storage	
	Min.	Max.	Min.	Max.
Ambient Temperature	-40°C	+70°C	-40°C	+85°C
Humidity(without condensation)	Note 4,5		Note 4,6	

- Note 2 Ta ≤ 50°C : 80% RH max
Ta > 50°C : Absolute humidity must be lower than the humidity of 85%RH at 50°C
- Note 3 Ta at -20°C will be <48hrs at 70°C will be <120hrs when humidity is higher than 70%.
- Note 4 Background color changes slightly depending on ambient temperature. This phenomenon is reversible.
- Note 5 Ta ≤ 70°C : 75RH max
Ta > 70°C : absolute humidity must be lower than the humidity of 75%RH at 70°C
- Note 6 Ta at -30°C will be <48hrs, at 80 °C will be <120hrs when humidity is higher than 70%.

OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ	Max.	Unit	note
Viewing angle range	Φr(12 o'clock)	When Cr ≥ 20	-	75	-	Degree	9,10
	Φb(6 o'clock)		-	75	-		
	Φl(9 o'clock)		-	65	-		
	Φr(3 o'clock)		-	65	-		
Rise Time	Tr	V _{DD} -V _{SS} =10.0V Ta=25°C	-	40	-	mS	
Fall Time	Tf		-	40	-		
Frame frequency	Frm		-	64	-	Hz	8,10
Contrast	Cr		-	20	-	-	7
Brightness	L		120	150	-	cd/m ²	
Peak Emission Wavelength	C.I.E (Yellow)		X=0.46 Y=0.45	X=0.50 Y=0.49	X=0.54 Y=0.53	nm	

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 425 N. GARY AVE. CAROL STREAM, IL 60188 PHONE : 800-278-5666 FAX : 630-315-2150 WEB : WWW.LUMEX.COM	116(L)×8.5(W)×37(H)mm, 5.57mm CHARACTER HEIGHT, 5*8 DOT MATRIX, OLED 20x2 YELLOW COLOR, 3.3V, HIGH TEMP		DATE : 2017.09.05	DRAWN BY : C.C.
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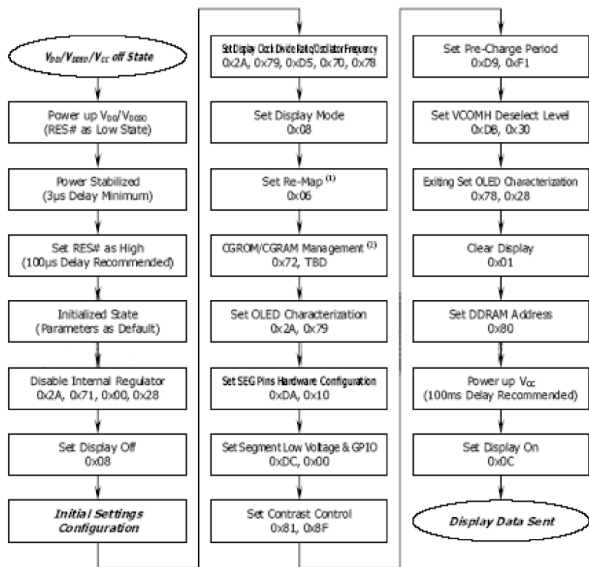
RESET CIRCUIT

When RES# input is low, the chip is initialized with the following status:

1. Display off, Cursor off, Blink off.
2. Power Down off.
3. 5-dot font is default.
4. Display Shift Disable.
5. CGRAM address is 00h. SEGGRAM address is 00h.
6. DDRAM address is 00h.
7. Display start line is set at display RAM address 0
8. Column address counter is set at 0
9. Normal scan direction of the COM outputs
10. Contrast control register is set at 7Fh

ACTUAL APPLICATION EXAMPLE

POWER UP SEQUENCE



US2066 CGROM CHARACTER CODE

ROM A (ROM[1:0] = [0:0])

0000	0001	0002	0003	0004	0005	0006	0007	0008	0009	000A	000B	000C	000D	000E	000F
0000	0001	0002	0003	0004	0005	0006	0007	0008	0009	000A	000B	000C	000D	000E	000F
0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	001A	001B	001C	001D	001E	001F
0020	0021	0022	0023	0024	0025	0026	0027	0028	0029	002A	002B	002C	002D	002E	002F
0030	0031	0032	0033	0034	0035	0036	0037	0038	0039	003A	003B	003C	003D	003E	003F
0040	0041	0042	0043	0044	0045	0046	0047	0048	0049	004A	004B	004C	004D	004E	004F
0050	0051	0052	0053	0054	0055	0056	0057	0058	0059	005A	005B	005C	005D	005E	005F
0060	0061	0062	0063	0064	0065	0066	0067	0068	0069	006A	006B	006C	006D	006E	006F
0070	0071	0072	0073	0074	0075	0076	0077	0078	0079	007A	007B	007C	007D	007E	007F
0080	0081	0082	0083	0084	0085	0086	0087	0088	0089	008A	008B	008C	008D	008E	008F
0090	0091	0092	0093	0094	0095	0096	0097	0098	0099	009A	009B	009C	009D	009E	009F
00A0	00A1	00A2	00A3	00A4	00A5	00A6	00A7	00A8	00A9	00AA	00AB	00AC	00AD	00AE	00AF
00B0	00B1	00B2	00B3	00B4	00B5	00B6	00B7	00B8	00B9	00BA	00BB	00BC	00BD	00BE	00BF
00C0	00C1	00C2	00C3	00C4	00C5	00C6	00C7	00C8	00C9	00CA	00CB	00CC	00CD	00CE	00CF
00D0	00D1	00D2	00D3	00D4	00D5	00D6	00D7	00D8	00D9	00DA	00DB	00DC	00DD	00DE	00DF
00E0	00E1	00E2	00E3	00E4	00E5	00E6	00E7	00E8	00E9	00EA	00EB	00EC	00ED	00EE	00EF
00F0	00F1	00F2	00F3	00F4	00F5	00F6	00F7	00F8	00F9	00FA	00FB	00FC	00FD	00FE	00FF

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SCALE : NTF

APRVD BY : E.C.

UNIT : mm [INCH]



COMMANDS

Instruction	Instruction code										Description	Execution Time(Fosc is 540 kHz)	POR Hex
	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0			
IS=X, RE=X, SD=0													
Clear Display	0	0	0	0	0	0	0	0	0	1	Write"20H"toDDRAMand set DDRAM address to"00H" from AC	1.52 mS	
IS=X, RE=0, SD=0													
Return Home	0	0	0	0	0	0	0	0	1	*	Set DDRAM address to "00H" from AC and return cursor to its original position if shifted. The contents of DDRAM are not changed.	1.52 mS	
Entry Mode Set	0	0	0	0	0	0	0	1	I/D	S	Sets cursor move direction and specifies display shift. These operations are performed during data write and read.	37 μS	06H
Display ON/OFF	0	0	0	0	0	0	1	D	C	B	D=1 : entire display on C=1 : cursor on B=1 : blink on	37 μS	08H
Function Set	0	0	0	0	1	*	N	DH	RE (0)	IS	N : number of line is 2/1 DH : Double height font control for 2-line mode enable/disable Extension register RE Extension register IS	37 μS	20H
IS=0, RE=0, SD=0													
Cursor or Display Shift	0	0	0	0	0	1	S/C	R/L	*	*	Set cursor moving and display shift control bit, and the direction, without changing DDRAM data.	37 μS	10H
Set CG RAM Address	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0	Set CGRAM address in address counter.	37 μS	
IS=0, RE=X, SD=0													
Set DDRAM RAM Address	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Set DDRAM address in address counter.	37 μS	
Read Busy Flag and Address	0	1	BF	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Whether during internal operation or not can be known by reading BF. The contents of address counter can also be read.	0 μS	
Write Data	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write data into internal RAM (DDRAM/CGRAM)	37 μS	
Read Data	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read data from internal RAM (DDRAM/CGRAM)	37 μS	

Instruction	Instruction code										Description	Execution Time(Fosc is 540 kHz)	POR Hex	
	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0				
IS=0, RE=1, SD=0														
Function Set	0	0	0	0	1	*	N	BE	RE (1)	REV	N : Number of line is 2/1 BE : CGRAM blink enable RE(1) : Extension register REV : Reverse bit	37 μS	20H	
Entry Mode Set	0	0	0	0	0	0	0	0	1	BDC	BDS	Common bi-direction function BDC= "0" : COM31->COM0 BDC= "1" : COM0->COM31 Segment bi-direction function BDS= "0" : SEG99-> SEG0 BDS= "1" : SEG0-> SEG99	37 μS	06H
Set Scroll Quantity	0	0	1	*	SQ5	SQ4	SQ3	SQ2	SQ1	SQ0	Set the quantity of horizontal dot scroll Scroll Quantity (0 - 48)	37 μS	80H	
OLED Characterization	0	0	0	1	1	1	1	0	0	SD	SD=0 : Normal register SD=1 : Extension register	37 μS	78H	
Double Height (4-line)/ Display-dot shift	0	0	0	0	0	1	UD2	UD1	*	DH	UD2, UD1: Assign different double height formats, DH : Display shift enable selection bit	37 μS	1CH	
IS=1, RE=1, SD=0														
Shift / Scroll Enable	0	0	0	0	0	1	DS4/ HS4	DS3/ HS3	DS2/ HS2	DS1/ HS1	When DH=1 Shift Enable DS : Display shift per line enable When DH=0 Scroll Enable HS : Horizontal scroll per line enable	37 μS	1FH	

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COMMANDS

Instruction	Instruction code										Description	Execution Time (Fosc is 540 kHz)	POR Hex																									
	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0																												
IS=X, RE=1, SD=0																																						
Extended Function Set	0	0	0	0	0	0	1	FW	B/W	NW	FW : Font Width control B/W : Black/White Inversion enable bit NW : 4 Line mode enable bit	37 μ S	08H																									
Function Selection A	0	0	0	1	1	1	0	0	0	1	This double byte command enable or disable the internal VDD	37 μ S	71H [5CH]																									
Function Selection B	0	0	0	1	1	1	0	0	1	0	Beside using CGROM <table><tr><th>OP(10)</th><th>CGROM</th><th>CGRAM</th></tr><tr><td>00b</td><td>240</td><td>5</td></tr><tr><td>01b</td><td>245</td><td>8</td></tr><tr><td>10b</td><td>250</td><td>6</td></tr><tr><td>11b</td><td>255</td><td>0</td></tr></table> Select character ROM <table><tr><th>RO(10)</th><th>ROM</th></tr><tr><td>00b</td><td>A</td></tr><tr><td>01b</td><td>B</td></tr><tr><td>10b</td><td>C</td></tr><tr><td>11b</td><td>Invalid</td></tr></table>	OP(10)	CGROM	CGRAM	00b	240	5	01b	245	8	10b	250	6	11b	255	0	RO(10)	ROM	00b	A	01b	B	10b	C	11b	Invalid	37 μ S	72H [0FH]
OP(10)	CGROM	CGRAM																																				
00b	240	5																																				
01b	245	8																																				
10b	250	6																																				
11b	255	0																																				
RO(10)	ROM																																					
00b	A																																					
01b	B																																					
10b	C																																					
11b	Invalid																																					
Set Contrast Control	0	0	1	0	0	0	0	0	0	1	This command sets the Contrast Setting of the display.	37 μ S	81H [7FH]																									
Set Display Clock Divide Ratio/Oscillator Frequency	0	0	1	1	0	1	0	1	0	1	Display Clock Divide Ratio (A[3:0]) Oscillator Frequency (A[7:4])	37 μ S	D5H [70H]																									
Set Phase Length	0	0	1	1	0	1	1	0	0	1	This double byte command sets the length of phase 1 and 2 of segment waveform of the driver.	37 μ S	D9H [78H]																									
Set SEG Pins Hardware Configuration	0	0	1	1	0	1	1	0	1	0	This double byte command changes the mapping between the display	37 μ S	DAH [10H]																									
Set VCOMH Deselect Level	0	0	1	1	0	1	1	0	1	1	<table><tr><th>A[6:4]</th><th>Hex</th><th>VCOMH deselection level</th></tr><tr><td>000b</td><td>00h</td><td>$\sim 0.65 \times V_{CC}$</td></tr><tr><td>001b</td><td>10h</td><td>$\sim 0.71 \times V_{CC}$</td></tr><tr><td>010b</td><td>20h</td><td>$\sim 0.77 \times V_{CC}$</td></tr><tr><td>011b</td><td>30h</td><td>$\sim 0.83 \times V_{CC}$</td></tr><tr><td>100b</td><td>40h</td><td>$\sim 1 \times V_{CC}$</td></tr></table>	A[6:4]	Hex	VCOMH deselection level	000b	00h	$\sim 0.65 \times V_{CC}$	001b	10h	$\sim 0.71 \times V_{CC}$	010b	20h	$\sim 0.77 \times V_{CC}$	011b	30h	$\sim 0.83 \times V_{CC}$	100b	40h	$\sim 1 \times V_{CC}$	37 μ S	DBH [40H]							
A[6:4]	Hex	VCOMH deselection level																																				
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100b	40h	$\sim 1 \times V_{CC}$																																				
Function Selection C	0	0	1	1	0	1	1	1	0	0	This double byte command consists of two functions	37 μ S	DCH [00H]																									
Crosstalk Compensation	0	0	1	1	0	1	1	1	1	1	TBD	37 μ S	DFH																									
Note (1) POR stands for Power On Reset Values (2) ""and "" stand for "Don't care" (3) The locked OLED driver IC MCU interface prohibits all commands except logic bit SD is set to 1b (4) Refer to Table 0-1 and (5) Table 0-2 for the details of logic bits IS , RE and SD. (6) Cursor & Blink is ON, that performs alternate between all the high data and display character at the cursor position. If fosc has 540kHz frequency, blinking has 370 ms interval.																																						

Note
(1) POR stands for Power On Reset Values
(2) "*" and "x" stand for "Don't care"
(3) The locked OLED driver IC MCU interface prohibits all commands access except logic bit SD is set to 1b
(4) Refer to Table 0-1 and
(5) Table 0-2 for the details of logic bits IS, RE and SD.
(6) Cursor & Blink is ON, that performs alternate between all the high data and display character at the cursor position.
If fosc has 540kHz frequency, blinking has 370 ms interval.

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