Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

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EA OLEDS102-6

INCL CONTROLLER SSD1306B FOR SPI AND I²C

Dimension 39x41x3.3mm

FEATURES

- 102X64 DOTS (RELATES TO 8x17 CHARACTER OR 4x12 LARGE CHARACTER)
- HIGH CONTRAST OLED DISPLAY
- INTEGRATED CONTROLLER SSD1306B
- SPI INTERFACE: MOSI, CLK, CS, D/C
- I²C INTERFACE: SDA, SCL
- WIDE TEMPERATURE RANGE (T_{OP} -40°C - +80°C)
- NO MOUNTING REQUIRED: JUST PUT INTO PCB
- 3 VERSIONS (WITH / W.O. POLARISOR AND PROTECTION GLASS) IN VARIOUS COLORS)
- FAST RESPONSE TIME, NO AFTERGLOW

ORDERING CODES

- GRAPHIC 102x64, yellow, black background, incl. protection glass — **EA OLEDS102-6GGA**
- GRAPHIC 102x64, yellow, black background, w./o. protection glass — **EA OLEDS102-6LGA**
- GRAPHIC 102x64, white, black background, w./o. protection glass — **EA OLEDS102-6LWA**

WITH A MINIMUM ORDER QTY. OF 10,000 PCS.

- GRAPHIC 128x64, with Polariser (Standard) — **EA OLEDS102-6LXA**

X: G = Yellow
B = Blue
R = Red

ACCESSORIES

- TEST BOARD WITH USB-INTERFACE — **EA 9781-1USB**
- SOCKET 4.8MM HOCH (2 PCS. ARE REQUIRED) — **EA FL-14P**
- TOUCHPANEL, 4-WIRE ANALOGUE SELF-ADHESIVE — **EA TOUCH102-1*)**
- ZIFF CONNECTOR FOR TOUCH, BOTTOM CONTACT — **EA WF100-04S**

*) ONLY IN COMBINATION WITH EA OLEDS102-6GGA.

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EA OLED SERIES

With its EA OLED series ELECTRONIC ASSEMBLY launched worldwide the first display family with OLED-technology for direct mounting and soldering. In comparison to standard displays there’s no FFC/FPC cable/connector that may lose contact, this OLED series will be soldered directly or put into a standard 2.54 mm precision socket.
It is designed for compact handheld equipment and provides a lot real advantages:

- Extreme compact with a large viewing area
- Super flat with 2.4 mm (without frontal protection glass)
- SPI and I²C interface
- Simple mounting with direct soldering
- Ex stock available from 1 pc. off
- Long life time (80,000 h for yellow)
- Wide temperature range (-40..+80°C)
- Fast response time (10µs), no afterglow

VERSIONS

The EA OLEDS102-6 is available in 3 different versions:
EA OLEDS102-6GGA / Allround
This module is perfect for rough environment. An additional frontal glass protects the display against scratch, shock and UV light. Thanks to its integrated polariser there’s no need for an additionally smoked glass.
EA OLEDS102-6LGA and -6LWA / Flat
This module is the standard module and does fit for the most applications. The flat design (2.4 mm) makes the display perfect for smallest equipment. The background is always deep black for best contrast.

COLORS (CUSTOM MADE)

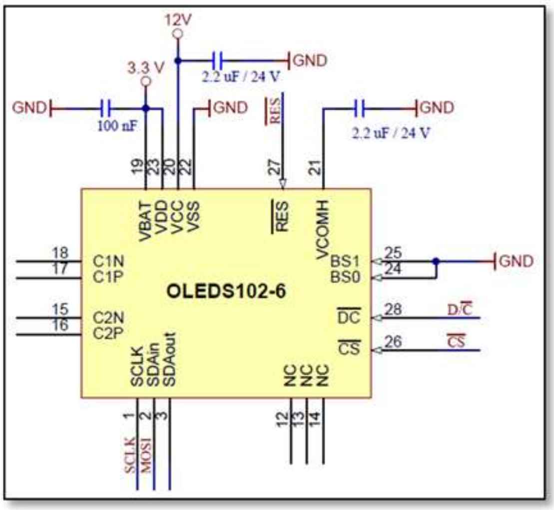
The standard colors are yellow and white.
The flat version EA OLEDS102-6LGA is on customers request available in 3 more colors. The minimum order quantity is 10,000 pcs., lead time is about 20 weeks. Samples are available on request.
Interface and software are 100% compatible. The yellow color provides highest brightness and longest life time.

EA OLEDS102-6LEA

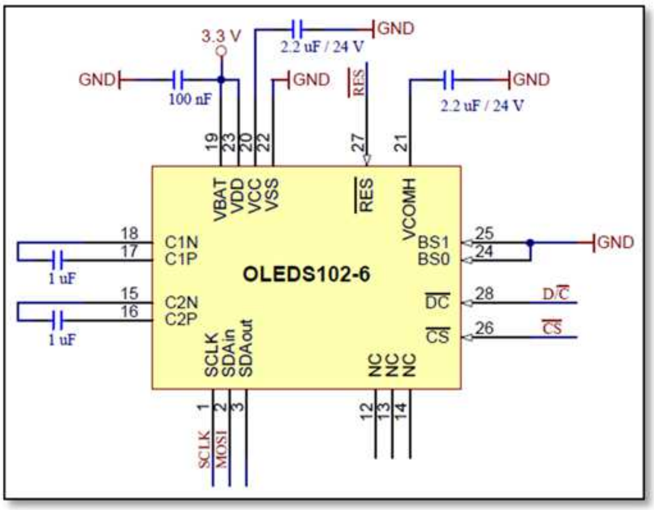
EA OLEDS102-6LRA

EA OLEDS102-6LBA

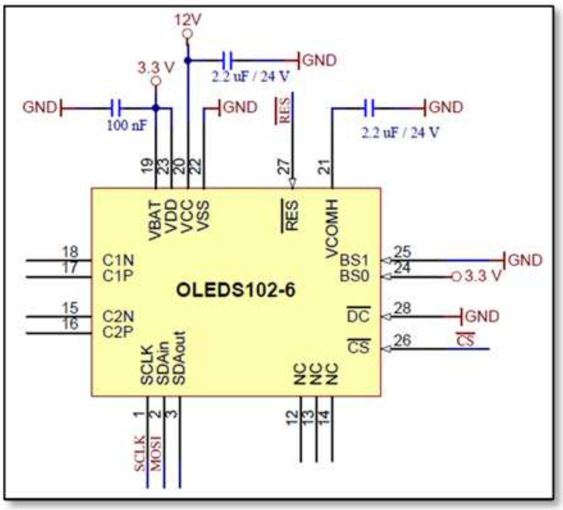
APPLICATION EXAMPLES



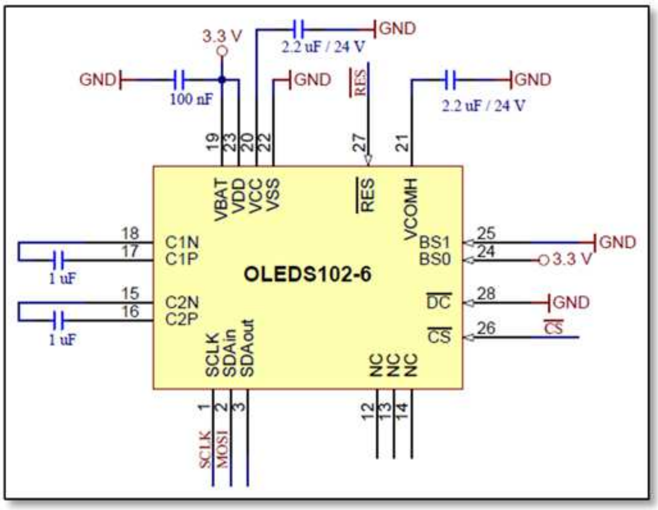
4 wire SPI, disabled charge pump



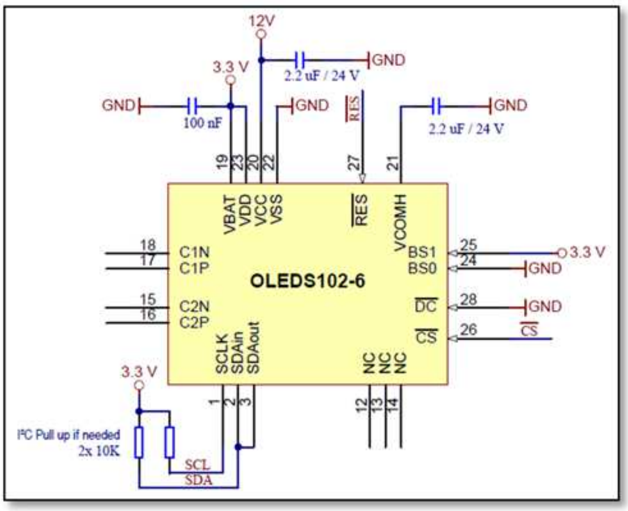
4 wire SPI single supply 3.3V



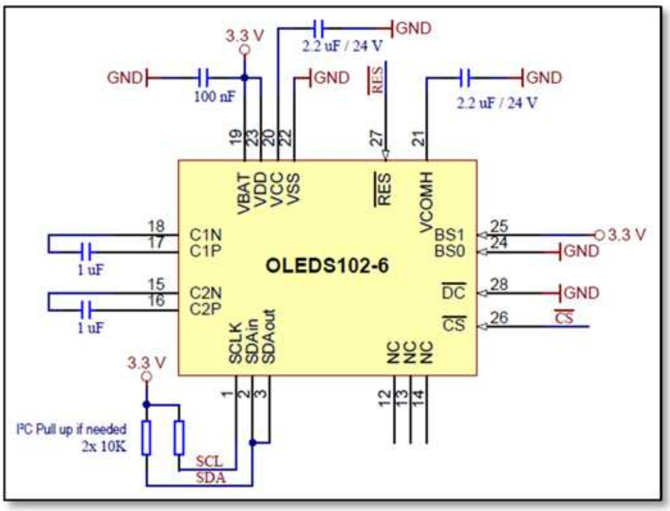
3 wire SPI, disabled charge pump



3 wire SPI single supply 3.3V

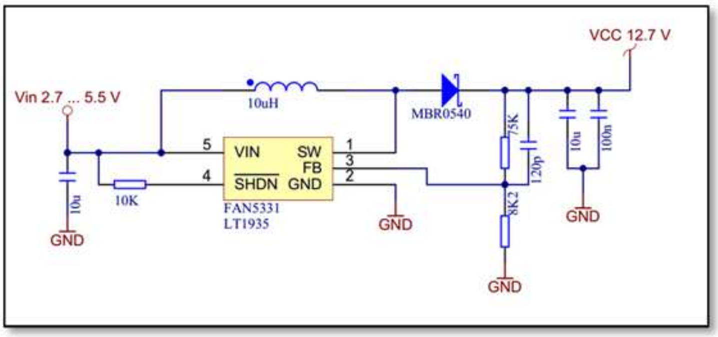


I²C (0x78), disabled charge pump



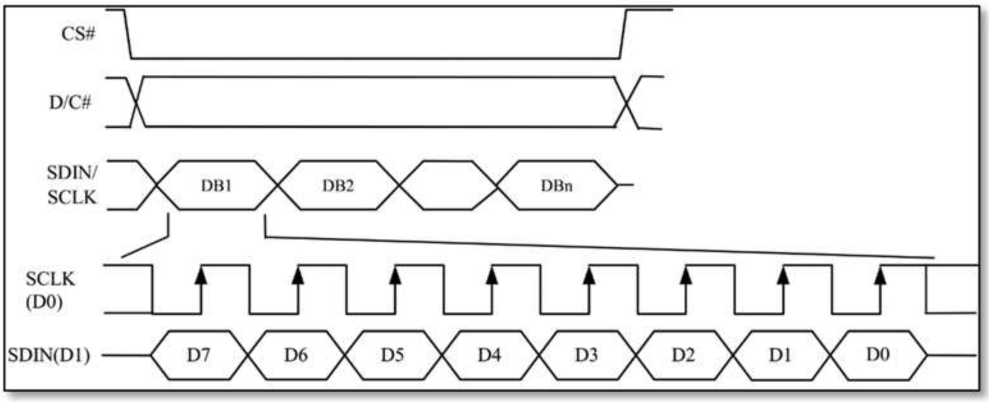
I²C (0x78) single supply 3.3V

POWER SUPPLY GENERATOR



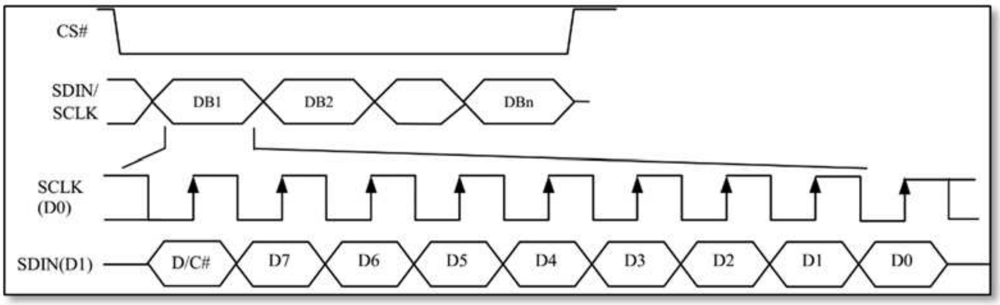
Voltage converter 3.3V-12 V (FAN5331, LT1935)

DATA TRANSFER 4-WIRE SPI (8 BIT)



Data transmission for SPI is unidirectional, that means that data can only be written, there's no data read option. Selection for writing data or command is done with the D/C line. A busy check is not necessary at all. Clock rate may be up to 10 MHz. Data transmission is based on SPI mode 3, MSB first. For more details please refer to the controllers data sheet SSD1309.

DATA TRANSFER 4-WIRE SPI (9 BIT)

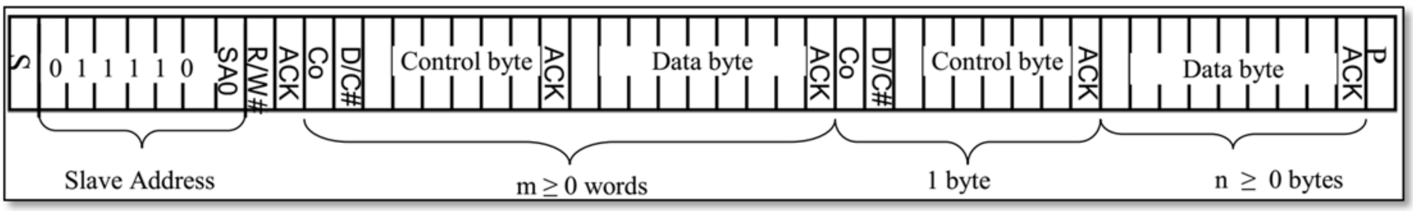


Data transmission for SPI is unidirectional, that means that data can only be written, there's no data read option. Selection for writing data or command is done with the first bit of the 9 bit data transfer. A busy check is not necessary at all. Clock rate may be up to 10 MHz. Data transmission is based on SPI mode 3, MSB first (9 bit). For more details please refer to the controllers data sheet SSD1309.

DATA TRANSFER I²C

The I²C mode provides a bi-directional data transmission: That means that data can be written and read. With the pin SA0 the I²C address can be changed (L: 0x78 or 0x3C, H:0x7A or 0x3D). So up to 2 displays may be driven on 1 bus. The clock rate may be up to 400 KHz. Please make sure when defining the pull-up resistors that the internal resistance of the display is 600..1000 Ω. This affects the low level when reading data and ACK bit.

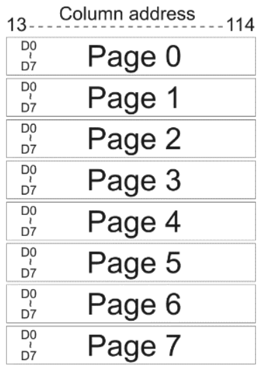
Attention: When reading data, after the command for page- or column address there need to be a dummy read (discard the first byte).



Control byte: C_o (Continuation bit) = 0 → Display data do follow; 1 → refer D/C bit

GRAPHIC RAM

The EA OLEDS102-6 comes with an integrated display RAM. Each byte represents 8 dots. For more details please refer to the controllers data sheet SSD1306B, available on our website at http://www.lcd-module.de/fileadmin/eng/pdf/zubehoer/SSD1306B_1.1.pdf.



COMMAND TABLE (ABSTRACT)

This is a collection of the most important commands. The data sheet SSD1309 provides the full list plus a detailed description.

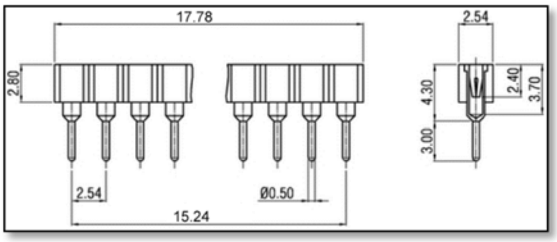
Command	D/C	Command Code									Description
		Hex	D7	D6	D5	D4	D3	D2	D1	D0	
Contrast Control	0 0	81 7F	1 A_7	0 A_6	0 A_5	0 A_4	0 A_3	0 A_2	0 A_1	1 A_0	Double byte command to select 1 out of 256 contrast steps. Contrast increases as the value increases.
Display On / Off	0	AE/ AF	1	0	1	0	1	1	1	X_0	X_0=0: Display OFF (sleep mode) (RESET) X_0=1: Display ON in normal mode
Set Column address	0 0 0	21 0 7F	0 A_7 B_7	0 A_6 B_6	1 A_5 B_5	0 A_4 B_4	0 A_3 B_3	0 A_2 B_2	0 A_1 B_1	1 A_0 B_0	Setup column start and end address A[7:0] : Column start address, range : 0-127d, (RESET = 0) B[7:0]: Column end address, range : 0-127d, RESET = 127) Note: This command is only for horizontal or vertical addressing mode.
Set Page address	0 0 0	22 0 7	0 X X	0 X X	1 X X	0 X X	0 X X	0 A_2 B_2	1 A_1 B_1	0 A_0 B_0	Setup page start and end address A[2:0] : Page start Address, range : 0-7d, (RESET = 0) B[2:0] : Page end Address, range : 0-7d, (RESET = 7) Note: This command is only for horizontal or vertical addressing mode.
Display Start Line	0	40 – 7F	0	1	A_5	A_4	A_3	A_2	A_1	A_0	Set display RAM display start line register from 0-63 using $X_5X_3X_2X_1X_0$. Display start line register is reset to 0 during RESET.
Segment remap	0	A0/ A1	1	0	1	0	0	0	0	X_0	X_0=0: column address 0 is mapped to SEG0 (RESET) X_0=1: column address 127 is mapped to SEG0
Com output scan direction	0	C0/ C8	1	1	0	0	X_3	0	0	0	X_3=0: normal mode (RESET) Scan from COM0 to COM[N –1] X_3=1: remapped mode. Scan from COM[N-1] to COM0 Where N is the Multiplex ratio
RAM Data	1	XX	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0	D_7-D_0 is written to RAM.

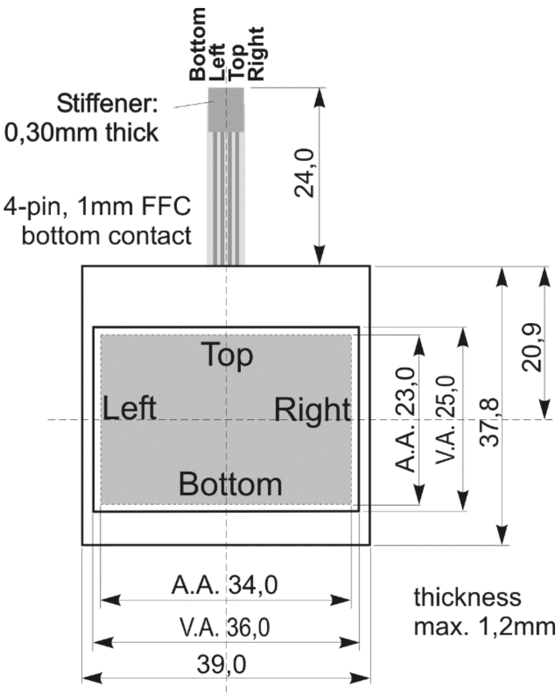
INITIALISATION EXAMPLE

```
void init_OLEDS102(void)
{
   send_command(0x40);                                    //Set Display start line
   send_command(0xA0);                                    //Bottom View no Segment remap
   send_command(0xC0);                                    //Bottom View COM scan direction normal
   send_command(0x2E);                                    //StartColumnAddress
   send_command(0x8D); send_command(0x10);                //Charge Pump Setting
   send_command(0x20); send_command(0x02);                //Set Memory AddressMode
   send_command(0x81); send_command(0xFF);                //Set Brightness
   send_command(0xD5); send_command(0x40);                //Set Display Clock Divide
   send_command(0xD9); send_command(0xF1);                //Set Precharge Periode
   send_command(0xAD); send_command(0x30);                //Set Internal Ref
   send_command(0x21); send_command(0x0D); send_command(0x72);   //Set ColumnAddress
   send_command(0x22); send_command(0x00); send_command(0x3F);   //Set PageAddress
   send_command(0xAF);                                    //Display on
}
```

ACCESSORY: SOCKET EA FL-14P

Using a 14-pin socket makes the display replaceable and adapts the height. Those socket may also be soldered automatically by wave soldering or reflow process. Each display requires 2 pcs.



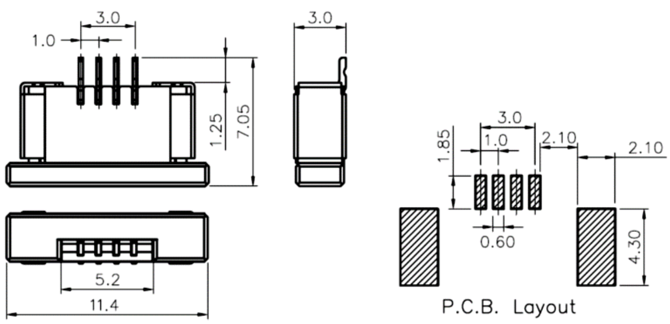


ACCESSORY: TOUCHPANEL EA TOUCH102-1

As an accessory there is an analogue touchpanel available. It comes with a self-adhesive glue on its rear side. Connection is done via FFC, pitch 1.0 mm. Any standard ZIFF connector can be used (e.g. EA WF100-04S). Bending radius is minimum 5 mm. Interfacing to a processor can be either done by an external touch panel controller or with a controller that is featured with analogue input. The touch panel is similar to a potentiometer: connecting a voltage of e.g. 3.3 V to the pins Top-Bottom makes it possible to read out a voltage on pin Left or Right which is linear to the Y-coordinate of the pressed point. The X-coordinate will result when the voltage will be supplied to Left-Right and measurement is done at Top or Bottom. The pinout of the connecting cable is shown in the drawing.
<u>Only in combination with the EA OLEDS102-6GGA.</u>

ACCESSORY: ZIFF CONNECTOR EA WF100-04S

The ZIFF connector matches perfect to the touch panel EA TOUCH128-1. It provides 4 pins with 1.0 mm pitch. Connection is bottom contact.
Top contact version is called EA WF100-04T.



SPECIFICATION

Unless otherwise specified, VSS = 0V , VDD = 1.8 - 3.3V (Ta = 25℃)

Value	Condition	min	typ	max	Unit
Operating Temperature		-40		+80	°C
Storage Temperature		-40		+80	°C
Storage Humidity	<40°C			90	%RH
Operating Voltage VDD logic supply		1.8	3.0	3.3	V
Operating Voltage VCC OLED supply			12.5	13.0	V
High Logic input level		0.8 x VDD			
Low Logic input level				0.2 x VDD	V
Power Supply VCC[1)]	All Pixel off		0,5		mA
	Demo picture[2)]		13		mA
	All Pixel on		32		mA

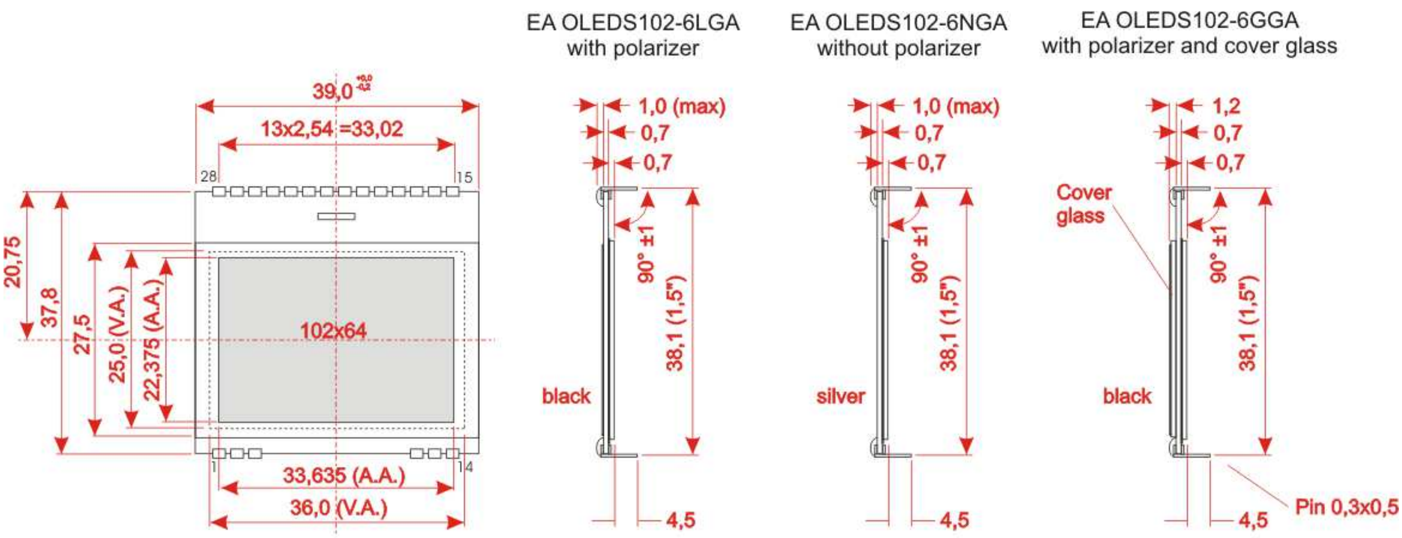
1) VCC= 12V, initialization 0x81,0xFF / 0xD5,0x40 / 0xD9,0x44 / 0xDB,0x20
2) Demo Picture:

OPTICAL DATA

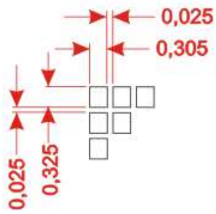
Item	Symbol	Condition	min	typ	max	Unit
View Angle	(V)θ	CR≧2000	160	170		deg
	(H)φ	CR≧2000	160	170		deg
Contrast Ratio	CR	Dark Room	2000:1			
Response Time	T rise			10		µs
	T fall			10		µs
Luminance[1)]	L	-6GGA / -6LGA	90	100		cd/m²
CIE 1931 x(Yellow)		Dark Room	0.45	0.47	0.49	
CIE 1931 y(Yellow)		Dark Room	0.48	0.50	0.52	
Operating Life Time[2)]		Ta=25°C 50% chess board	50000			hrs

1) VDD= 3.3V, incl. booster 1) VDD= 3.3V, incl. booster FAN5331 with VCC= 12.5V
2) Operating life time is defined the amount of time until the luminance has decayed to 50% of the initial value. Screen saving mode is recommended to extend life time
.

DIMENSIONS EA OLEDS102-6



All dimensions are in mm



Pin	Symbol		Pin	Symbol	Description
1	D0	SPI: SCLK, I²C: SCL	15	C2N	Charge pump capacitor 1uF/10V
2	D1	SPI: MOSI, I²C: SDA_{in}	16	C2P	Charge pump capacitor
3	D2	SPI: NC, I²C: SDA_{out}	17	C1P	Charge pump capacitor 1uF/10V
4			18	C1N	Charge pump capacitor
5			19	VBAT	Power supply for charge pump
6			20	VCC	OLED driving voltage
7			21	VCOMH	Common deselect level. (Internally regulated)
8			22	GND	Ground
9			23	VDD	Typ. 3.3 V logic power supply
10			24	BS0	00 = 4-Wire SPI; 01 = 3-Wire SPI 10 = I²C Interface
11			25	BS1	
12	NC		26	CS	Chip Select (active low)
13	NC		27	RES	Reset (active low)
14	NC		28	D/C	SPI (4-Wire): L=Command, H=Data, I²C: SA0 (Address)

Note:
- OLED displays are generally not suited for wave or reflow soldering. Temperatures of over 80°C can cause lasting damage.
- The surfaces of the displays are protected from scratching by self-adhesive protective foil. Please remove before mounting