



## OLED DISPLAY MODULE DATASHEET



Datasheet Release Date 2019-09-27

for

**CFAL12832C-0091B-Y**

Revision 1v1

### **Crystalfontz America, Inc.**

12412 East Saltese Avenue  
Spokane Valley, WA 99216-0357

Phone: 888-206-9720

Fax: 509-892-1203

Email: [support@crystalfontz.com](mailto:support@crystalfontz.com)

URL: [www.crystalfontz.com](http://www.crystalfontz.com)



## CONTENTS

1. General Information .....	3
2. Module Description .....	4
3. Features .....	4
4. Mechanical Data .....	4
5. Mechanical Drawings .....	5
6. Interface Pin Function .....	6
7. Interface Pinout for SPI and I <sup>2</sup> C .....	7
8. Absolute Maximum Ratings .....	7
9. DC Characteristics .....	8
10. Optical Characteristics .....	8
11. OLED Lifetime .....	8
12. OLED Module Precautions.....	9



## 1. General Information

### Datasheet Revision History

Datasheet Release: **2019-09-27**  
Datasheet for the CFAL12832C-0091-B-Y OLED graphic display module.

### Product Change Notifications

You can check for or subscribe to [Part Change Notices](#) for this display module on our website.

### Variations

Slight variations between lots are normal (e.g., contrast, color, or intensity).

### Volatility

This display module has volatile memory.

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## 2. Module Description

This is a very small yellow-on-black OLED graphic display module with high resolution. This display was engineered for high volume production. This display has a Solomon Systech SSD1306 or compatible controller with I<sup>2</sup>C, 3-wire SPI, or 4-wire SPI. The Solomon Systech SSD1306 controller only requires a single 3.3v supply for power and logic.

Please see [Solomon Systech SSD1306 LCD Controller Datasheet](#) for further reference.

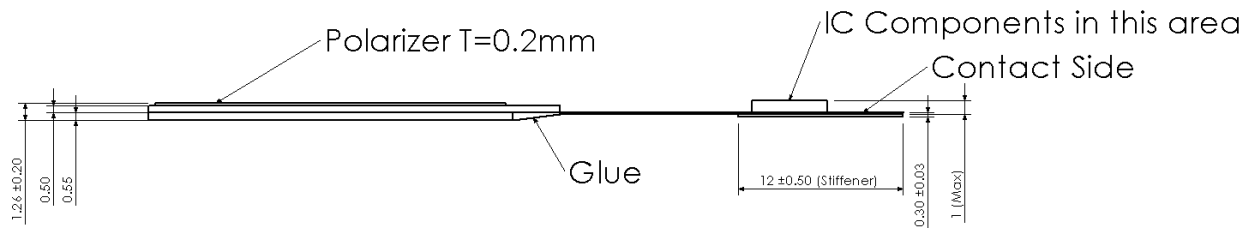
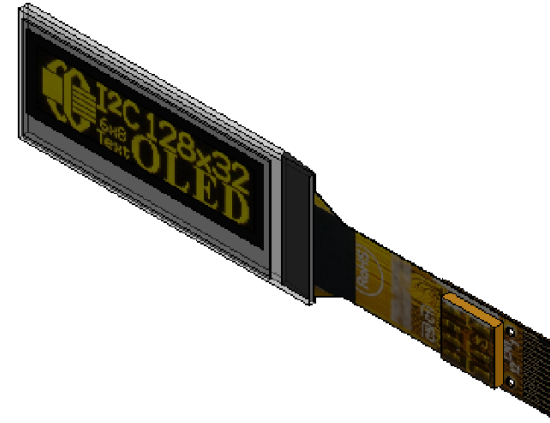
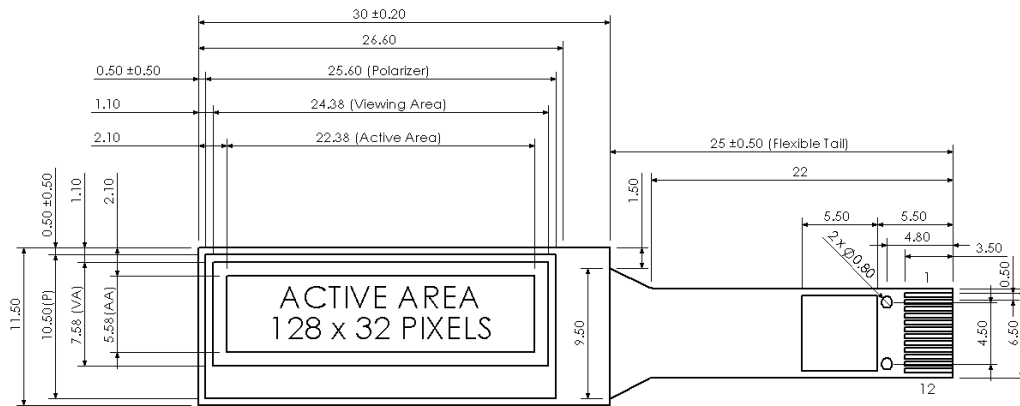
## 3. Features

- 128\*32 Dot Matrix
- Built-in Controller: SSD1306 (or compatible controller)
- Easy ZIF Connection
- +3V Power Supply
- 1/32 Duty
- Interface: I<sup>2</sup>C, SPI
- Temperature Operation: -40° to +80°C
- Storage Temperature: -40° to +80°C

## 4. Mechanical Data

Item	Specification (mm)	Specification (inches, reference)
Module Dimension with FPC Folded	30.0 (W) x 11.5 (H) x 1.26 (D)	1.181 (W) x 0.453 (H) x 0.050 (D)
Viewing Area	24.38 (W) x 7.58 (H)	0.959 (W) x 0.298 (H)
Active Area	22.38 (W) x 5.58 (H)	0.881 (W) x 0.219 (H)
Dot Pitch	0.175 (W) x 0.175 (H)	0.007 (W) x 0.007 (H)
Dot Size	0.152 (W) x 0.152 (H)	0.006 (W) x 0.006 (H)
Module Connector Pitch	0.50	0.02
Weight (Typical)	1 gram	0.0352 ounces

## 5. Mechanical Drawings



PIN FUNCTION REFERENCE	
PIN	FUNCTION
1	GND
2	D2
3	D1
4	D0
5	D/C#
6	RES#
7	CS#
8	BS1
9	BS0
10	VDD
11	VBAT
12	GND

Units: Millimeters  
Tolerance:  $\pm 0.3\text{mm}$  Unless Specified



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Sheet:

1 of 1



## 6. Interface Pin Function

Pin No.	Symbol	Function												
1	GND	Ground 1 of 2, both must be connected. Must be connected to external ground.												
2	D2	These are 3-bit bi-directional data bus to be connected to the microprocessor's data bus. When serial interface mode is selected, D0 will be the serial clock input: SCLK: D1 will be the serial data input: SDIN and D2 should be kept NC. When I <sup>2</sup> C mode is selected, D2, D1 should be tied together and serve as SDA <sub>OUT</sub> , SDA <sub>IN</sub> in application and D0 is the serial clock input, SCL.												
3	D1													
4	D0													
5	D/C#	Data/Command Control Pin. When the pin is pulled high and serial interface mode is selected, the data at SD <sub>IN</sub> is treated as data. When it is pulled low, the data at SD <sub>IN</sub> will be transferred to the command register.  For detail relationship to MCU interface signals, please refer to the Timing Characteristics Diagrams. I <sup>2</sup> C Mode: D/C# is used to set the I <sup>2</sup> C slave address as follows: 0 = 0x78 1 = 0x7A												
6	RST#	Reset Signal Input Pin. When the pin is low, initialization of the chip is executed.												
7	CS#	Chip Select Input Pin. The chip is enabled for MCU communication only when CS# is pulled low.												
8	BS1	<table border="1"> <thead> <tr> <th>SSD1306 Pin Name</th> <th>I<sup>2</sup>C Interface</th> <th>4-Wire Serial Interface</th> <th>3-Wire Serial Interface</th> </tr> </thead> <tbody> <tr> <td>BS0</td> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>BS1</td> <td>1</td> <td>0</td> <td>0</td> </tr> </tbody> </table>	SSD1306 Pin Name	I <sup>2</sup> C Interface	4-Wire Serial Interface	3-Wire Serial Interface	BS0	0	0	1	BS1	1	0	0
SSD1306 Pin Name	I <sup>2</sup> C Interface		4-Wire Serial Interface	3-Wire Serial Interface										
BS0	0		0	1										
BS1	1	0	0											
9	BS0													
10	V <sub>DD</sub>	Power Supply Inputs, 3.3v nominal. Connect V <sub>DD</sub> and V <sub>BAT</sub> together.												
11	V <sub>BAT</sub>													
12	GND	Ground 2 of 2, both must be connected. Must be connected to external ground.												



## 7. Interface Pinout for SPI and I<sup>2</sup>C

		Interface		
Pin No	Sym	3 Wire SPI	4 Wire SPI	I2C
1	GND	<b>GND</b>	<b>GND</b>	<b>GND</b>
2	D2	NC	NC	SDA*
3	D1	SDA	SDA	SDA*
4	D0	SCLK	SCLK	SCL
5	D/C#	NC	D/C	I2C Address***
6	RES#	RESET	RESET	RESET
7	CS#	<b>GND</b>	<b>GND</b>	<b>GND</b>
8	BS1	<b>GND</b>	<b>GND</b>	Vcc
9	BS0	Vcc	<b>GND</b>	<b>GND</b>
10	Vdd	Vcc**	Vcc**	Vcc**
11	Vbat	Vcc**	Vcc**	Vcc**
12	GND	<b>GND</b>	<b>GND</b>	<b>GND</b>

<b>Microcontroller</b>	Control lines defined by layout / code
<b>+3.3v</b>	Supply voltage
<b>Ground</b>	Supply ground

Notes:			
*	Tie D2 and D1 together		
**	Tie Vdd and Vbat together		
***	D/C#	Vcc	<b>GND</b>
	I2C Address	0x7A	0x78

## 8. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Notes
Supply Voltage for Logic	V <sub>DD</sub> - V <sub>BAT</sub>	0	4	V	(1)(2)
Operating Temperature	T <sub>OP</sub>	-40	+80	°C	-
Storage Temperature	T <sub>STG</sub>	-40	+80	°C	-

(1)

Notes:

- (2) These are stress ratings only. Extended exposure to the absolute maximum ratings listed above may affect device reliability or cause permanent damage.
- (3) Functional operation should be restricted to the limits in the DC Characteristics table below.



## 9. DC Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage for Logic	$V_{DD} - V_{BAT}$ (Connect Together)	-	2.8	3.3	3.3	V
High-level Input	$V_{IH}$	-	$0.8 \times V_{DD}$	-	$V_{DD}$	V
Low-level Input	$V_{IL}$	-	0 (GND)	-	$0.2 \times V_{DD}$	V
High-level Output	$V_{OH}$	-	$0.9 \times V_{DD}$	-	$V_{DD}$	V
Low-level Output	$V_{OL}$	-	0 (GND)	-	$0.1 \times V_{DD}$	V
50% Check Board Operating Current	$I_{BAT}$	-	-	13	16	mA

**NOTE:** These are stress ratings only. Extended exposure to the absolute maximum ratings listed above may affect device reliability or cause permanent damage.

## 10. Optical Characteristics

Item	Symbol	Condition	Min	Typical	Max
View Angle	$(V)\theta$	Vertical	-	$\geq 160^\circ$	-
	$(H)\phi$	Horizontal			
Contrast Ratio	CR	Dark	-	2000:1	-
Response Time	T rise	$T_a = 25^\circ\text{C}$	-	10 $\mu\text{s}$	-
	T fall	$T_a = 25^\circ\text{C}$			
Display with 50% Checkerboard Brightness	-	-	100 $\text{cd}/\text{m}^2$	120 $\text{cd}/\text{m}^2$	-
CIE <sub>x</sub> Yellow	-	CIE1931	-	0.47	-
CIE <sub>y</sub> Yellow	-		-	0.50	-

## 11. OLED Lifetime

Item	Conditions	Min	Typical	Notes
Operating Lifetime	$T_a = 25^\circ\text{C}$ Initial 50% Check Board Brightness Typical Value	50,000 Hrs	-	(1)(2)(3)

(4) Notes:

- (1) Lifetime is defined as the amount of time when the luminance has decayed to <50% of the initial value.
- (2) This analysis method uses life data obtained under accelerated conditions to extrapolate an estimated Probability Density Function (PDF) for the product under normal use conditions.
- (3) Screen saving mode will extend OLED lifetime.





## 12. OLED Module Precautions

The precautions below should be followed when using OLED modules to help ensure personal safety, module performance and compliance of environmental regulations.

### 12.1. Modules

- Avoid applying excessive shocks to the module or making any modifications to it.
- Do not make extra holes on the printed circuit board, modify its shape or change the components of the OLED display module.
- Do not disassemble the OLED module.
- Do not drop, bend or twist the OLED module.
- Do not operate the OLED module above its absolute maximum ratings described in this datasheet.
- Solder only to the I/O terminals. Use care when removing solder—it is possible to damage the PCB, for modules with an FPC, use an appropriate ZIF connector.
- Do not reverse polarity to the power supply connections. Reversing polarity will immediately ruin the module.
- Store OLED modules in a clean and static safe environment.
- Do not reverse polarity to the power supply connections. Reversing polarity will immediately ruin the module.

### 12.2. Handling Precautions

- Take care to not damage the glass display panel
- If the display panel is broken, organic liquid crystal may leak out, avoid bodily contact with this fluid and dispose of the broken module properly.
- Avoid the application of pressure to the display module, as pressure may damage the LCD module's cell structure.
- Polarizers installed on OLED modules are soft and susceptible to scratching, avoid contact between the polarizer and abrasive surfaces.
- Do not use any solvents or liquid to clean the OLED display module, should an OLED need cleaning, contaminants can be removed with plain office tape or oil free compressed air.
- Ensure any mounting solution of the OLED module secures the module fully and protects the module from mechanical stresses
- Do not operate OLED modules in the presence of excessive humidity or condensation
- Dispose of any electronic waste properly. Do not place this module in the normal trash. Please contact local waste management from procedures to dispose of electronic waste.
- Do not place weight or pressure on the module

The limitation of FPC bending:

