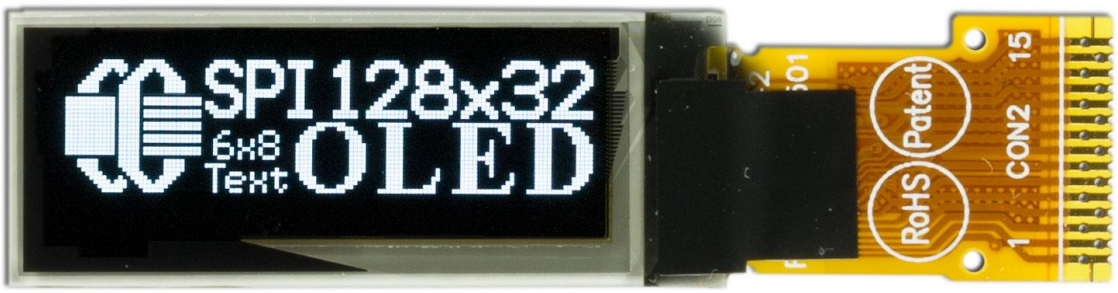
OLED DISPLAY MODULE DATASHEET



Datasheet Release Date 2019-11-15
for
CFAL12832B-0091P-W

Datasheet Revision A2

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CONTENTS

1. General Information

Datasheet Revision History
Datasheet Release: **2019-11-15** Datasheet for the CFAL12832B-0091-P-W 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 white-on-black OLED graphic display module with high resolution and a thin frame. This display has a Solomon Systech SSD1306 or compatible controller with 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.

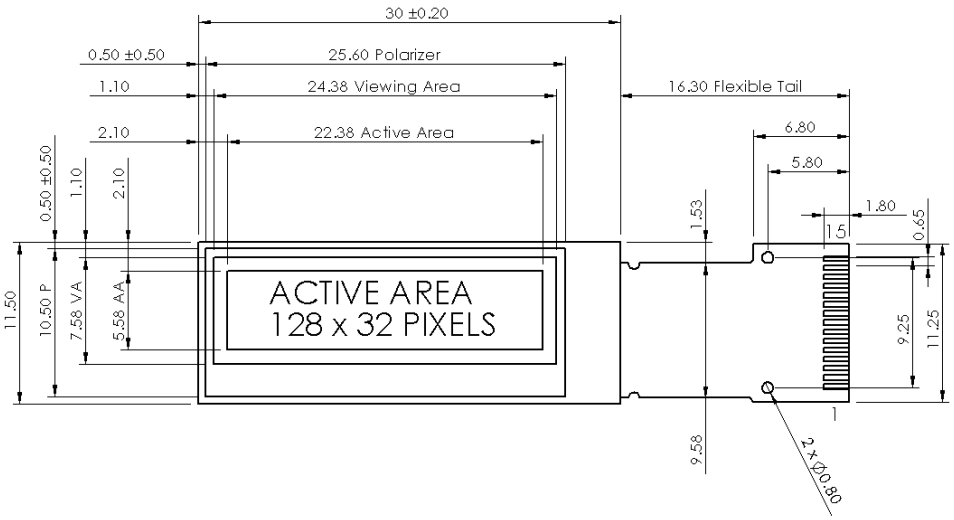
3. Features

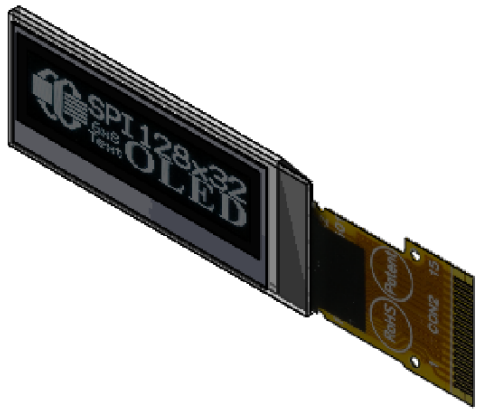
- 128*32 Dot Matrix
- Built-in Controller: SSD1306 (or compatible controller)
- Solder down Connection
- +3V Power Supply
- 1/32 Duty
- Interface: 4-wire SPI
- Temperature Operation: -40° to +80°C
- Storage Temperature: -40° to +85°C

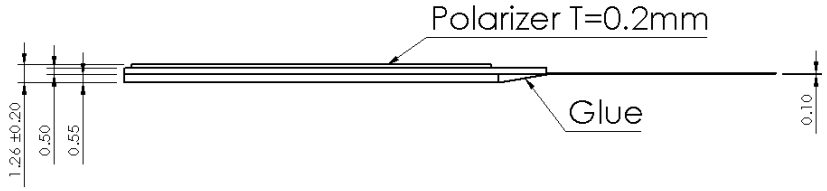
4. Mechanical Data

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)
Weight (Typical)	1 gram	0.0352 ounces

5. Mechanical Drawing





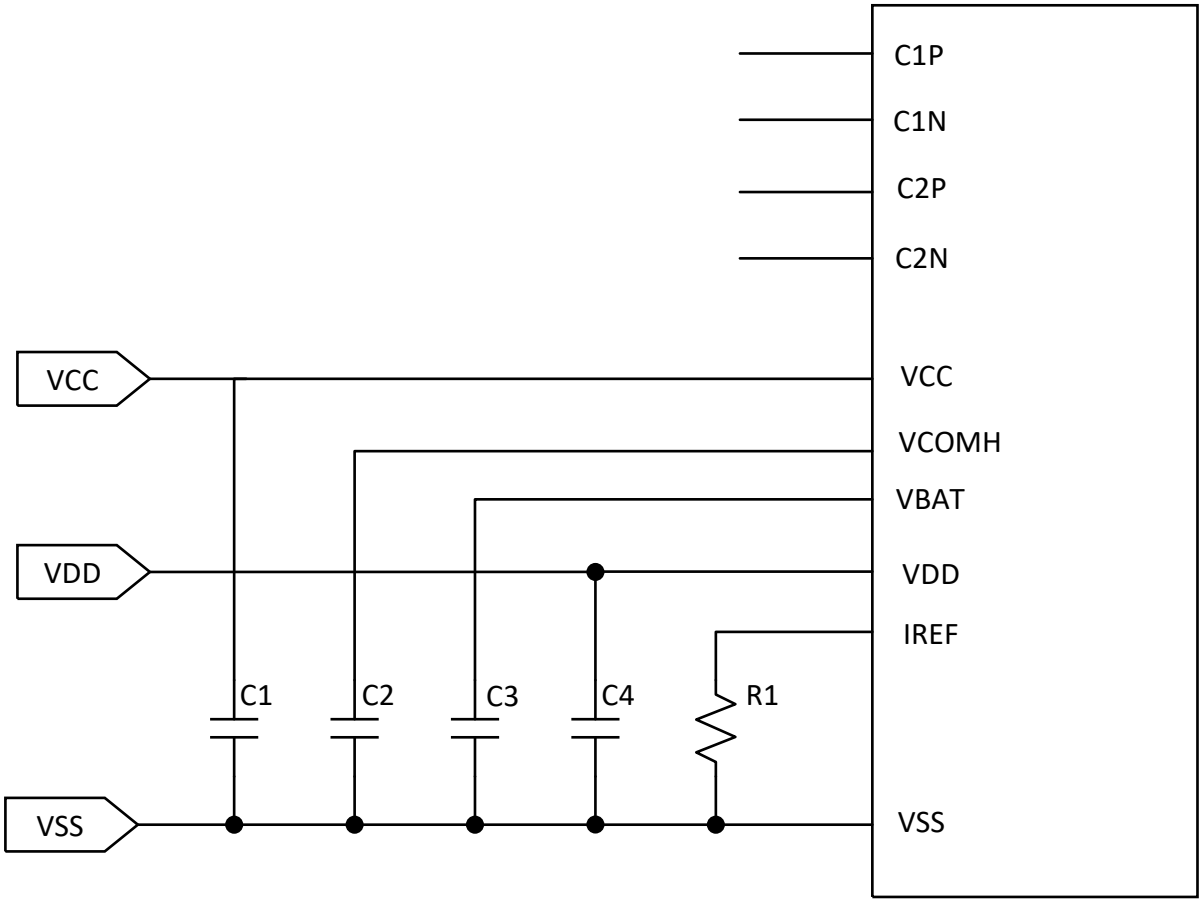


PIN FUNCTION REFERENCE	
PIN	FUNCTION
1	C2P
2	C2N
3	C1P
4	C1N
5	VBAT
6	VSS
7	VDD
8	CS#
9	RST#
10	D/C#
11	SCLK
12	SDIN
13	IREF
14	VCOMH
15	VCC

Units: millimeters
Tolerance: ±0.3 mm

Crystalfontz	Part Number:	Date:	Filename:	Revision:
	CFAL12832B-0091P-W	2019-09-27	CFAL12832B-0091P-W_MM.pdf	v 1.1
		Web:		Sheet:
		www.crystalfontz.com/cfal12832b00919pw		1 of 1

6. Schematic



C1 = C2 = 2.2µF
C3 = C4 = 1.0µF

Bus Interface selection: I2C

$V_{IREF} = V_{CC} - 3V$
For $V_{CC} = 7.25V$, $I_{REF} = 30\mu A$:
$R1 = (V_{IREF} - V_{ss}) / I_{REF}$
$= (7.25 - 3)V / 30\mu A$
$\approx 140\ k\Omega$

7. Interface Pin Function

Pin No.	Symbol	Function
1	C2P	These are the positive and negative terminals of Flying Boost Capacitors and are required between the terminals. They must be floated when the converter is not used.
2	C2N	
3	C1P	
4	C1N	
5	V_{BAT}	Power supply pin for the internal buffer of the DC/DC voltage converter. Connect to external source when the converter is used. Connect to VDD when the converter is not used. A stabilization capacitor (~1.0µF) should be connected between this pin and V_{SS}.
6	V_{SS}	Ground, connect to external ground.
7	V_{DD}	Power supply for logic pin. Connect to external source. A stabilization capacitor (~1.0µF) should be connected between this pin and V_{SS}.
8	CS#	Chip Select Input Pin. The chip is enabled for MCU communication only when CS# is pulled low.
9	RST#	Reset Signal Input Pin. When the pin is low, initialization of the chip is executed.
10	D/C#	Data/Command Control Pin. When the pin is pulled high and serial interface mode is selected, the data at MOSI is transferred to the data register. When it is pulled low, the data at MOSI is transferred to the command register.
11	SCLK	When serial mode is selected, D1 will be the serial data input MOSI and D0 will be the serial clock input SCLK.
12	MOSI	
13	I_{REF}	Current reference for brightness adjustment. Connect to V_{SS} with resistor (~140kΩ, see note 1) to set current lower than 12.5µA.
14	V_{COMH}	Voltage output high level for COM signal input pin. A stabilization capacitor (~2.2µF) should be connected between this pin and V_{SS}.
15	V_{CC}	Power supply for OEL panel. This is the most positive voltage supply pin of the chip. A stabilization capacitor (~2.2µF) should be connected between this pin and V_{SS} when the converter is used. It must be connected to an external source when the converter is not used.

(1) $V_{IREF} = V_{CC}$-3 v for $V_{CC} = 7.25V$, $I_{REF} = 30\mu A$
$R = (V_{IREF}-V_{SS}) / I_{REF} = (7.25-3)V / 30\mu A = 140k\Omega$

8. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Notes
Supply Voltage for Logic	V_{DD}	0	4	V	(1)(2)
Supply Voltage for Display	V_{CC}	0	16	V	(1)(2)
Operating Temperature	T_{OP}	-40	+80	°C	-
Storage Temperature	T_{STG}	-40	+85	°C	-

Notes:

(1) These are stress ratings only. Extended exposure to the absolute maximum ratings listed above may affect device reliability or cause permanent damage.
(2) 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}	-	2.8	3.0	3.3	V
Supply Voltage for Display	V_{CC}	-	7	7.25	8	V
High-level Input	V_{IH}	-	0.8 x V_{DD}	-	V_{DD}	V
Low-level Input	V_{IL}	-	0v (GND)	-	0.2 x V_{DD}	V
High-level Output	V_{OH}	-	0.9 x V_{DD}	-	V_{DD}	V
Low-level Output	V_{OL}	-	0v (GND)	-	0.1 x V_{DD}	V
Operating Current for V_{cc}	I_{CC}	V_{cc}=7.25V	-	7	11	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)θ	Vertical	160°	-	-
	(H)φ	Horizontal			
Contrast Ratio	CR	Dark	2000:1	-	-
Response Time	T rise	Ta = 25°C	-	10 µs	-
	T fall	Ta = 25°C			
Display with Full Pixel on Brightness	-	-	100 cd/m^2	120 cd/m^2	-
CIE_X White	-	CIE1931	0.26	0.28	0.30
CIE_Y White	-		0.30	0.32	0.34

11. OLED Lifetime

Item	Conditions	Min	Typical	Notes
Operating Lifetime	Ta=25°C Initial 50% Check Board Brightness 100 cd/m^2	20,000 Hrs	-	(1)(2)(3)

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: