



OLED DISPLAY MODULE DATASHEET



Datasheet Release Date 2025-04-14
for
CFAL32128A0-0171B-WC

Crystallfontz America, Inc.

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1. General Information

Datasheet Revision History
Datasheet Release: 2025-04-14 Datasheet for the CFAL32128A0-0171B-WC 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 white monochrome OLED display module that supports 4-key touch plus up and down swipe detection. This display includes in-cell capacitive touch detection. This display has a built in Solomon Systech SSD7317 controller. Please see the [Solomon Systech SSD7317 Controller Datasheet](#) for further reference.

Additional resources including 3D models, the most up-to-date datasheet, and sample code can be found on the product page for this part: crystallfontz.com/product/cfal32128a00171bwc

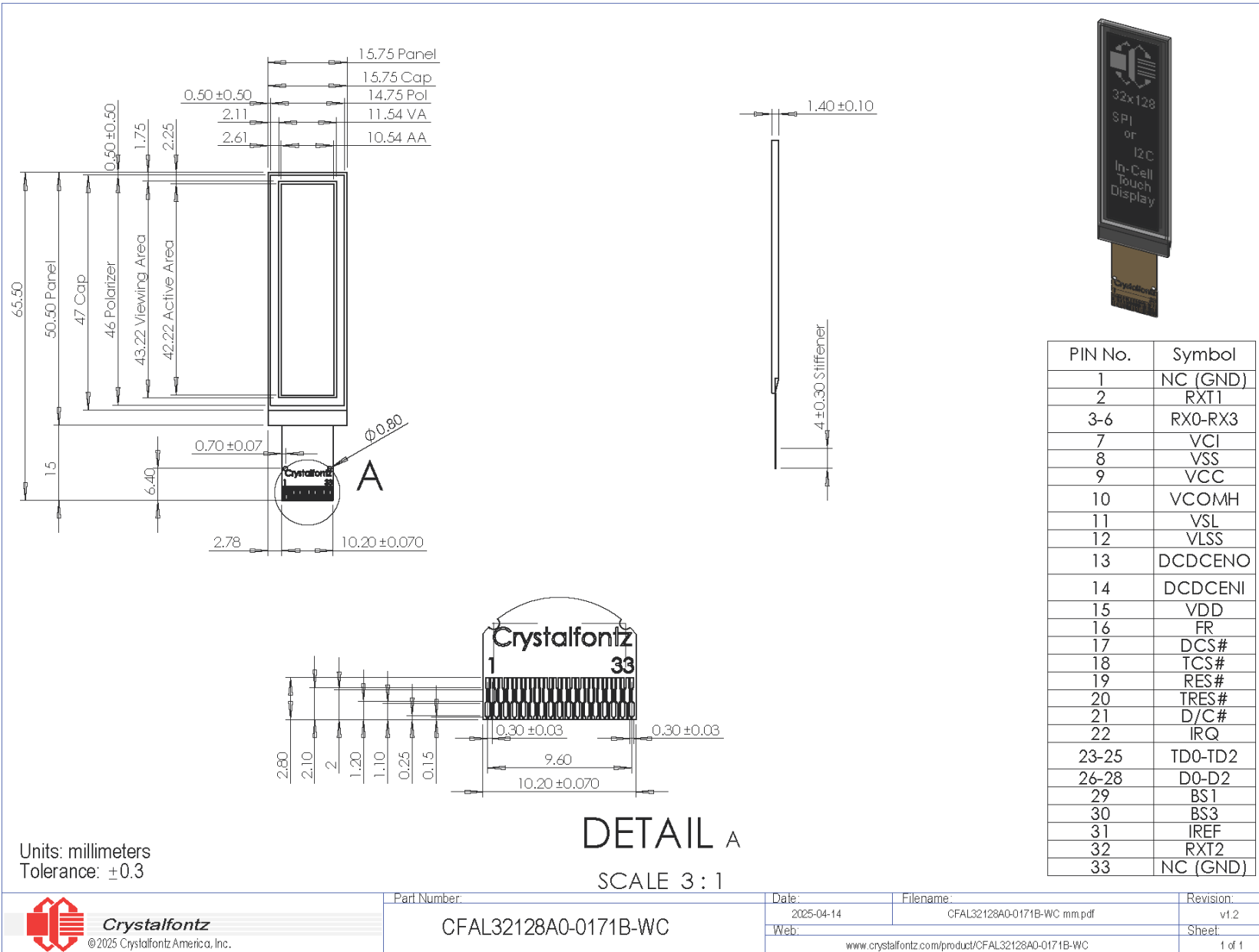
3. Features

- 32*128 Dot Matrix
- Built-in Controller: SSD7317 (or equivalent)
- +3V Power Supply
- Polarized
- 1/32 Duty
- 4 key touch, plus 2 out-cell
- Interface: SPI, I2C

4. Mechanical Data

Item	Specification (mm)	Specification (inch, reference)
Overall Size (Including tail)	15.75 (W) x 65.5 (H) x 1.4 (D)	0.62 (W) x 2.58 (H) x 0.06 (D)
Display Size	15.75 (W) x 50.5 (H) x 1.4 (D)	0.62 (W) x 2.00 (H) x 0.06 (D)
Active Area	10.54 (W) x 42.22 (H)	0.41 (W) x 1.66 (H)
Pixel Size	0.27 (W) x 0.27(H)	0.011 (W) x 0.011 (H)
Pixel Pitch	0.33 (W) x 0.33 (H)	0.013 (W) x 0.013 (H)
Weight (Typical)	2.3 grams	0.08 ounces

5. Mechanical Drawing





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7. Interface Pin Function

PIN No.	Symbol	Function																				
1	NC (GND)	Reserved.																				
2	RXT1	2D Out-cell 1																				
3-6	RX0-RX3	Connect to external touch keys for out-cell touch																				
7	V _{CI}	Power supply for touch analog driving. Connect to external source. Must be greater than or equal to V _{DD} .																				
8	V _{SS}	Ground. Connect to external ground.																				
9	V _{CC}	Power Supply for Display. Most positive voltage. Connect to external source.																				
10	V _{COMH}	Voltage output high level for COM signals. Connect capacitor (typ. 4.7μF) between this pin and GND.																				
11	V _{SL}	Segment voltage reference pin. When external V _{SL} is not used, connect externally to V _{LSS} . When external V _{SL} is used, connect with resistor and diode to ground (see controller datasheet).																				
12	V _{LSS}	Analog Ground pin. Connect externally to V _{SS} .																				
13	DCDCENO	Enable output pin for external DCDC circuit. NC if not used.																				
14	DCDCENI	Enable input pin for external DCDC circuit. Tie low if not used.																				
15	V _{DD}	Power supply for Logic. Connect to external source.																				
16	FR	Frame Frequency Triggering signal. This pin is for testing. Leave open when not in use.																				
17	DCS#	Display chip select. The chip is enabled for MCU communication when DCS# is pulled low																				
18	TCS#	Touch chip select. The chip is enabled for MCU communication when TCS# is pulled low																				
19	RES#	Display power reset. When the pin is low, the chip is initialized.																				
20	TRES#	Touch power reset. When the pin is low, the chip is initialized.																				
21	D/C#	Data/Command control pin. In SPI mode when this pin is high, the data at SDI will be interpreted as data; when the pin is low, data will be interpreted as a command. In I2C mode this pin acts as SA0 for slave address selection.																				
22	IRQ	Interrupt signal for touch reporting																				
23-25	TD0-TD2	Serial Data Input/Output and clock for Touch In SPI mode TD2 serves as SDOUT, TD1 serves as SDIN, and TD0 serves as the serial clock SCLK. In I2C mode TD2 and TD1 should be tied together and serve as SDA and TD0 is the serial clock SCL. External pull up resistors (typ. 5.1kΩ) required.																				
26-28	D0-D2	Serial Data Input/Output and clock for Display In SPI mode D2 and D1 should be tied together to serve as SDIN, and D0 serves as the serial clock SCLK. In I2C mode D2 and D1 should be tied together and serve as SDA and D0 is the serial clock SCL. External pull up resistors (typ. 5.1kΩ) required.																				
29	BS1	MCU Interface Selection <table><tr><td>BS3</td><td>BS1</td><td>Touch</td><td>Display</td></tr><tr><td>0</td><td>0</td><td>4-wire SPI</td><td>4-wire SPI</td></tr><tr><td>0</td><td>1</td><td>4-wire SPI</td><td>I2C</td></tr><tr><td>1</td><td>0</td><td>I2C</td><td>4-wire SPI</td></tr><tr><td>1</td><td>1</td><td>I2C</td><td>I2C</td></tr></table>	BS3	BS1	Touch	Display	0	0	4-wire SPI	4-wire SPI	0	1	4-wire SPI	I2C	1	0	I2C	4-wire SPI	1	1	I2C	I2C
BS3	BS1	Touch	Display																			
0	0	4-wire SPI	4-wire SPI																			
0	1	4-wire SPI	I2C																			
1	0	I2C	4-wire SPI																			
1	1	I2C	I2C																			
30	BS3																					
31	I _{REF}	This pin is the brightness adjustment current reference pin. Connect a resistor between this pin and ground (typ. 560kΩ). The current should not exceed 18.75μA.																				
32	RXT2	2D Out-cell 2																				
33	NC (GND)	Reserved.																				



8. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage for Logic	V _{DD}	-0.3	4.0	V
Supply Voltage for Display	V _{CC}	0	15	V
Supply Voltage for Touch	V _{CI}	-0.3	4.0	V
Operating Temperature	T _{OP}	-40	+70	°C
Storage Temperature	T _{STG}	-40	+85	°C
Lifetime (250 cd/m ²)		15,000		hours

Note: These are stress ratings only. Extended exposure to the absolute maximum ratings listed above may affect device reliability or cause permanent damage. Functional operation should be restricted to the limits in the Electrical Characteristics table below.

9. Optical Characteristics

Item	Symbol	Min	Typ	Max	Unit
Brightness	L _{br}	100	120	-	Cd/m ²
C.I.E. 1931 (White)	(x) (y)	0.25 0.27	0.29 0.31	0.33 0.35	
Dark Room Contrast	CR		>10,000:1		
Viewing Angle			Free		

10. Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage for Logic	V _{DD}		1.65	3.3	3.5	V
Supply Voltage for Touch	V _{CI}		3.0	3.3	3.5	V
Supply Voltage for Display	V _{CC}		11.5	12	12.5	V
High-level Input	V _{IH}		0.8*V _{DD}	-	V _{DD}	V
Low-level Input	V _{IL}		0	-	0.2*V _{DD}	V
High-level Output	V _{OH}	I _{OUT} =100μA, 3.3MHz	0.8*V _{DD}	-	V _{DD}	V
Low-level Output	V _{OL}	I _{OUT} =100μA, 3.3MHz	0	-	0.2*V _{DD}	V
Operating Current for V _{CI} +V _{DD}	I _{CIDD}		-	0.65	1.29	mA
Operating Current for V _{CC}	I _{CC}	30% display on	-	4.8	6.0	mA
		50% display on	-	7.8	9.8	mA
		100% display on	-	13.6	17.0	mA
Sleep Mode Current for V _{CI} +V _{DD}	I _{CID,sleep}		-	35	55	μA
Sleep Mode Current for V _{CC}	I _{CC,sleep}		-	1	10	μA



11. Implementation Notes

The in-cell touch sensing is extremely sensitive to noise including even the slightest movement of the panel or materials within 3mm of the panel in any direction. **The OLED panel must be firmly fixed in place relative to any conductive items before the touch controller is initialized.** Any movement of the panel in relation to these conductive items, even a fraction of a millimeter, can interfere with touch sensing and require the touch controller be reinitialized. It is recommended to fix a non-conductive insulation plane such as an air gap (min. 3mm) or plastic (min. 5mm) between the module and PCB. If the display must be mounted directly to the PCB ensure there is no conductive material under the module (no copper pour plane or traces).

If adding a cover glass, 2mm is the recommended maximum thickness. It is preferred to use optical bonding with a 0.125-0.175mm OCA. If air bonding is used, it is recommended to use a 0.2mm maximum air gap.

Ensure V_{CI} has a clean power input. Avoid sharing power with other ICs. Noise on all power lines should be minimized (under 100mV peak to peak). If excess noise occurs, the display may require a reset in order to recover the expected functionality.

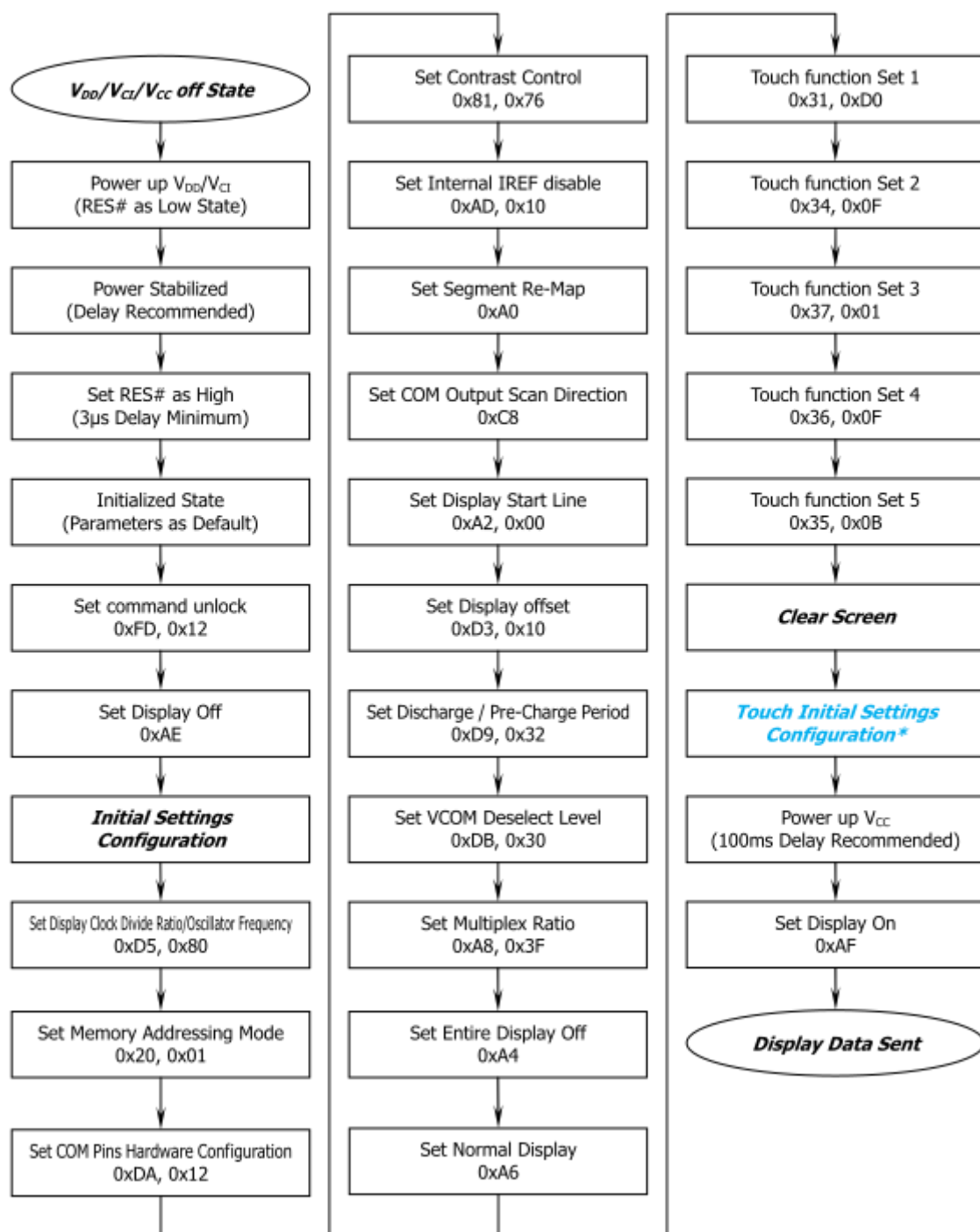
If the out-cell inputs are not being used, disable them following the touch controller initialization to prevent false touch reports. More information is available in the [SSD7317 controller datasheet](#) appendices and shown in the [demo code available on CrystalFontz's Github](#). The demo code also includes examples on touch sensing feature enabling, touch sensitivity configuration, low power modes and more.



12. Power ON and OFF Sequences

12.1. Power ON

<Power up Sequence>



Refer to the sample code for the touch initial settings.

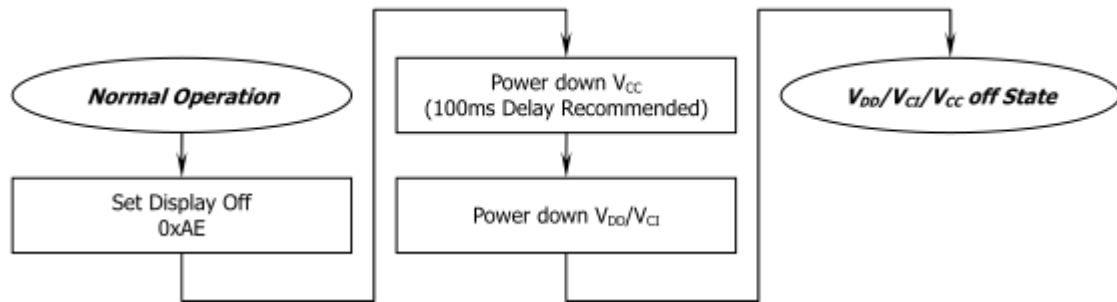
For power on and power off, it is important to include a delay between the application of high voltage and low voltage power sources to give the panel time to correctly charge and discharge. Refer to the SSD7317 Controller datasheet for additional timing information.

The display initialization must be sent after every display reset (RES# pulled low).



12.2. Power OFF

<Power down Sequence>

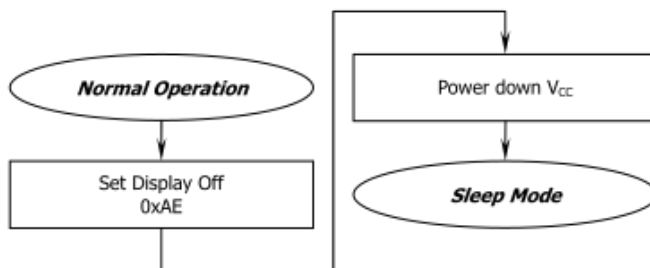


Note: V_{CC} should be floated when OFF.

12.3. Low Power Mode

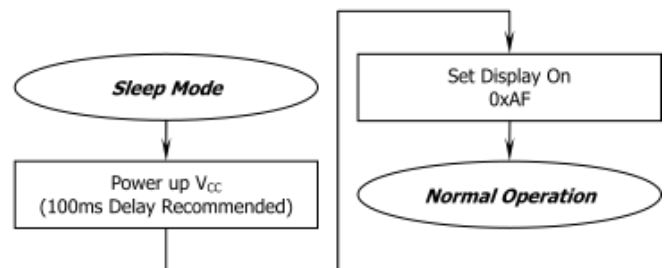
Enter

<Entering Low Power Mode>



Exit

<Exiting Low Power Mode>





13. Module Precautions

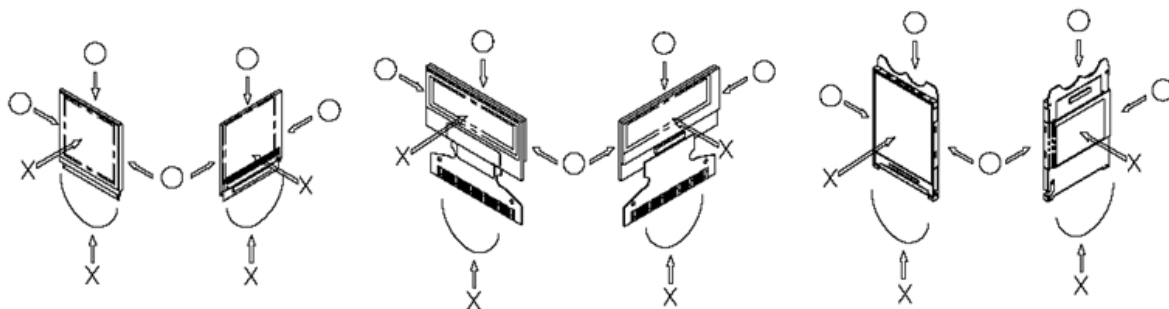
These precautions help ensure personal safety, module performance, and compliance of environmental regulations when using an OLED module.

13.1. Modules

- Avoid excessive physical and electrical shocks to module.
- Do not drop, bend, or twist the OLED display module.
- Do not make extra holes, modify the shape, or change the components of the printed circuit board.
- Do not disassemble the OLED display module.
- Do not operate the OLED display module outside the absolute maximum rating.
- Only solder to the I/O terminals.
- Store in an anti-static electricity container and clean environment.
- Do not display static information for long periods of time to avoid burn in.
- Crystalfontz has the right to change passive components on the display module. Resistors, capacitors and other passive components may have different appearance and color.
- Crystalfontz has the right to change the PCB revision/version in order to satisfy the supply stability, management optimization, the best product performance, etc., under the premise of not affecting the electrical characteristics and external dimensions.

13.2. Handling Precautions

- The display panel is made of glass. Do not apply mechanical impacts, stress or pressure to the OLED display module.
- Pressure applied to or near the display surface may damage the cell structure.
- If the display panel is accidentally broken and the internal organic substance leaks out, do not inhale or touch the organic substance.
- The polarizer covering the surface of the OLED display module is soft and can be easily scratched. Cover the polarizer in the final design.
- Clean the surface of the polarizer using Scotch Mending Tape No. 810 or an equivalent
 - Never breathe on the surface or wipe the surface using a cloth containing solvent such as ethyl alcohol, as the surface of the polarizer will become cloudy.
 - Water, ketone, and aromatic solvents may ruin the polarizer.
- Do not over bend the film with electrode pattern layouts. This can effect the display performance.



- Do not apply stress to the LSI chips and the surrounding molded sections.
- Do not apply input signals while the logic power is off.
- Prevent damage by electrostatic discharge (ESD) when handling the OLED display module:
 - Ground personnel handling OLED display modules.
 - Ground tools used for assembly such as soldering irons.
 - To suppress generation of ESD, avoid carrying out assembly work under dry environments.
 - Remove the protective film applied to the display panel slowly as ESD may be generated when removing the film.
- Protective film is applied to the surface of the display panel. Remove the film before assembly. If the OLED display module has been stored for a long period of time, residue adhesive material of the protection film may remain on the surface of the display panel after the film has been removed. In such a case, remove the residue material as discussed above.

13.3. Storing Precautions

- Store the OLED display modules in ESD preventative bags. Avoid exposure to direct sunlight and fluorescent lamps. Avoid high temperature and high humidity environments and low temperature (less



than 0°C) environments. We recommend storing these modules in the packaged state in which they were shipped from Crystallfontz.

- Do not let water drops or dew adhere to the packages or bags.
- If electric current is applied when water is on the surface of the OLED display module, the module may become dewed. If a dewed OLED display module is placed under high humidity environments the electrodes may become corroded.

13.4. Designing Precautions

- The absolute maximum ratings cannot be exceeded for OLED display module. If these values are exceeded, panel damage may happen.
- Satisfy the VIL and VIH specifications and, ensure the signal line cable is as short as possible to avoid signal noise.
- Install excess current preventative unit (fuses, etc.) to the power circuit. Recommend value: 0.5A
- Avoid occurrence of mutual noise interference with the neighboring devices.
- When fastening the OLED display module, fasten the external plastic housing section.
If the power supply to the OLED display module is forcibly shut down, by such errors as taking out the main battery while the OLED display panel is in operation, we cannot guarantee the quality of this OLED display module.
- Connection (contact) to any other potential than the above may lead to rupture of the IC.

13.5. Disposing Precautions

- Request qualified companies handle the industrial waste when disposing of the OLED display modules. Observe all relevant laws and regulations.

13.6. Other Precautions

- When an OLED display module is operated for a long period of time with a fixed pattern, the fixed pattern may remain as an after image or a slight contrast deviation may occur.
 - If the operation is interrupted and left unused for a while, normal state can be restored.
 - This will not cause a problem in the reliability of the module.
- To protect the OLED display module from performance drops by static electricity rapture, etc., do not touch the following sections whenever possible while handling the OLED display modules.
 - Pins and electrodes
 - Pattern layouts such as the TCP & FPC
- With this OLED display module, the OLED driver is exposed. If this OLED driver is exposed to light, malfunctioning may occur. Design the product and installation method so that the OLED driver may be shielded from light in actual usage and during the inspection processes.
- Although this OLED display module stores the operation state data by the commands and the indication data, when excessive external noise, etc. enters into the module, the internal status may be changed. Therefore, it is necessary to take appropriate measures to suppress noise generation or to protect from influences of noise on the system design.
- Periodically refresh the operation statuses in the software (reset the commands and retransfer the display data), to cope with catastrophic noise.
- Resistors, capacitors, and other passive components will have different appearance and color caused by the different supplier.
- Crystallfontz has the right to upgrade and modify the product function.
- The limitation of FPC bending:

