



128 x 64 Graphic Display Module with Carrier Board

DATASHEET



CFAG12864T3-TFH-E1-1

Datasheet Release: 2021-02-11

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1. General Information

Datasheet Revision History

Datasheet Release: 2021-02-11
Datasheet for the CFAG12864T3-TFH-E1-1 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. Introduction

The CFAG12864T3-TFH-E1-1 is a 1.4-inch, 128x64 graphic LCD display module with an LED backlight and carrier board. The module is small, thin, and low-power. This display is visible in most lighting situations, including normal office lighting up to bright sunlight.

The graphic LCD is a transfective and positive-mode display, so the backlight may be turned off when there is sufficient ambient light to read the display. Turning the backlight off will further reduce the already low power consumption. This display is well suited for low-power hand-held devices in any lighting environment, including transitioning between daylight and indoors.

This LCD display has an integrated controller ([Sitronix ST7565P LCD driver](#)) and voltage generating components mounted on the flexible tail. The carrier board for this display module breaks the ZIF tail out to a 16-pin 0.1" (2.54mm) header. The backlight is broken out to A and K pins on the backlight frame.

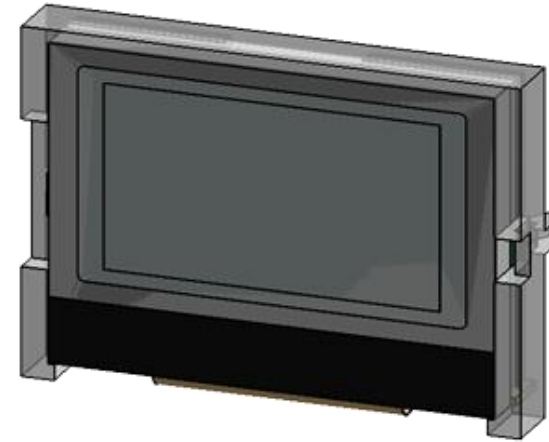
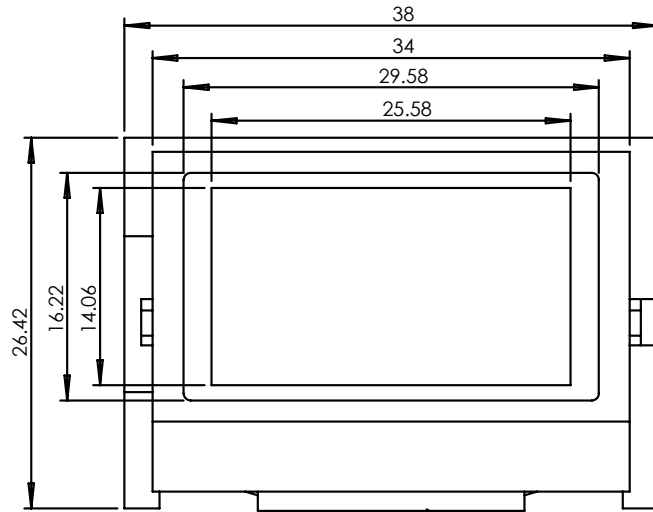
3. Features

- 1.4-inch 128 x 64 graphic LCD display module mounted on a carrier board
- LED backlight
- Simple 4-wire, 8-bit SPI or 8-bit parallel interface
- Ultra-low power consumption
- Wide operating temperature range: -20°C to 70°C (-4°F to 158°F)

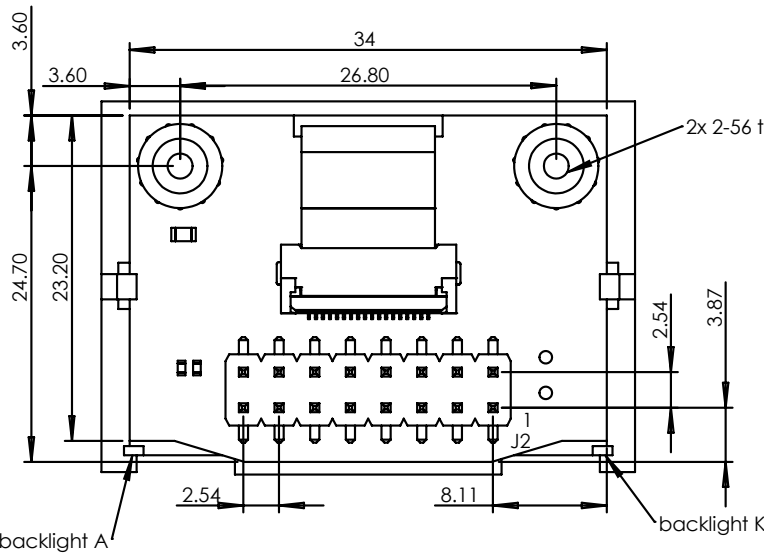
4. Mechanical Data

Item	Specification (mm)	Specification (inch)
Overall Module Dimension	34.0 (W) x 24.22 (H) x 9.05 (D)	1.338 (W) x 0.953 (H) x 0.36 (D)
Viewing Area	29.58 (W) x 16.22 (H)	1.164 (W) x 0.638 (H)
Active Area	25.58 (W) x 14.06 (H)	1.007 (W) x 0.553 (H)
Dot Pitch	0.20 (W) x 0.22 (H)	0.007 (W) x 0.008 (H)
Weight (Typical)	10 grams	0.35 ounces

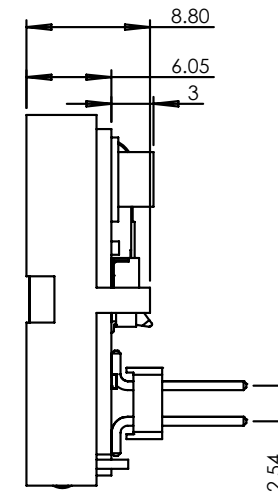
5. Mechanical Drawing



Flex tail extends below in this area.
Avoid pressure on the tail.



2	1
3v3	GND
NC	RES
CS	DC
WR/RW	RD/E
D1	D0
D3	D2
D5	D4
D7	D6



Units: millimeters
Tolerance: ±0.3



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CFAG12864T3-TFH-E1-1

Date:

2021-02-11

Filename:

CFAG12864T3-TFH-E1-1 mm.pdf

Revision:

v1.0

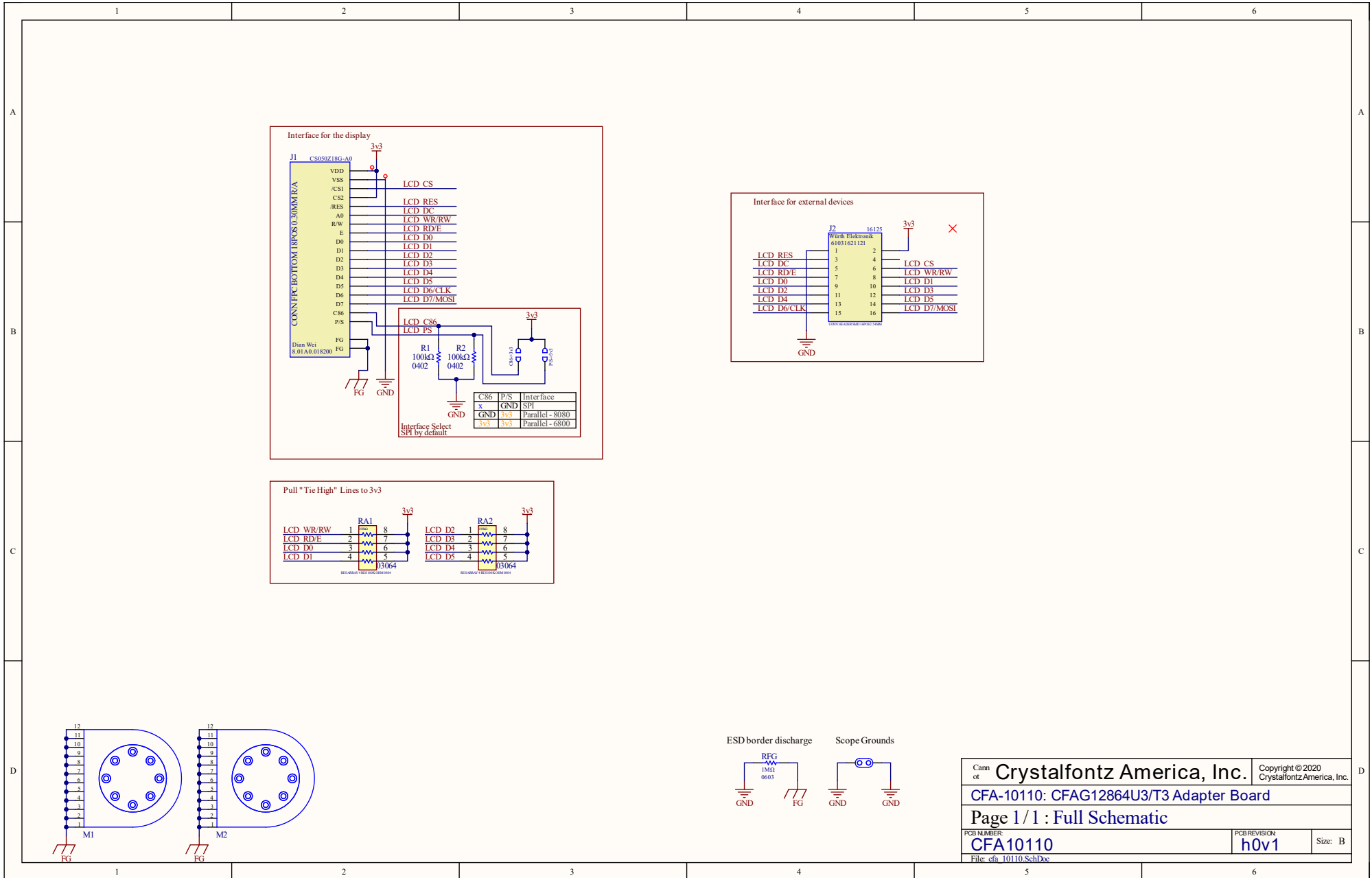
Web:

www.crystallfontz.com/product/CFAG12864T3-TFH-E1-1

Sheet:

1 of 1

7. Schematic



Copyright © 2020 Crystalfontz America, Inc.	Copyright © 2020 Crystalfontz America, Inc.
CFA-10110: CFAG12864U3/T3 Adapter Board	
Page 1 / 1 : Full Schematic	
PCB NUMBER: CFA10110	PCB REVISION: h0v1
File: cfa_10110.SchDoc	Size: B



8. LCD Module

8.1. General Information

The CFAG12864T3-TFH-E1-1 module uses a Sitronix ST7565P LCD driver. For detailed information on this controller IC, see the ST7565P datasheet: www.crystalfontz.com/controllers/Sitronix/ST7565P

8.2. Interface Pin Function

Pin	Symbol	4-wire SPI Interface	6800 Parallel Interface	8080 Parallel Interface
1	GND	System Ground		
2	3v3	Power Supply		
3	RES	Reset pin. Reset is executed when pin is pulled low.		
4	NC	Leave open		
5	DC	Data/Command Pin. When high, data bus is interpreted as data. When low, data bus is interpreted as a command.		
6	CS	Chip Select Pin. Chip is selected when pin is pulled low.		
7	RD/E	Not Used (fix to "H")	Read / Write Select	Write Enable (active low)
8	WR/RW	Not Used (fix to "H")	Read / Write Enable	Read Enable (active low)
9 – 14	D0 – D5	Not Used (fix to "H")	8-bit Bi-Directional Data Bus	
15	D6	SPI Serial Clock Input		
16	D7	SPI Serial Data Input		

Notes:

- The 4-wire SPI serial interface is write-only at all times.

8.3. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Logic Power Supply	3v3	-0.3	3.6	V
Operating Temperature	T _{OP}	-20	+70	°C
Storage Temperature	T _{ST}	-30	+80	°C

Notes:

- These are stress ratings only. Extended exposure to the absolute maximum ratings listed above may affect device reliability or cause permanent damage.
- Temp. ≤60°C, 90% RH Maximum Temp. >60°C Absolute humidity < 90% RH at 60°C



8.4. Electrical Characteristics

Item	Symbol	Min	Typ	Max	Unit
Logic Power Supply	3v3	3.0	3.3	3.3	V
Input Logic High	VIH	0.8 * (3v3)	-	3v3	V
Input Logic Low	VIL	0	-	0.2 * (3v3)	V
Logic Supply Current	I _{3v3}	-	2.0	-	mA

8.5. Backlight Characteristics

Item	Symbol	Conditions	Min	Typ	Max	Unit
Forward Voltage	VF		-	3.5	-	V
Supply Current	I _{LED}	VF=3.5V	24	32	40	mA
LED Lifetime		I _{LED} =32mA @ 25°C	-	30000	-	hours (estimated)
Luminance	IV	I _{LED} =32mA	1200	1500	-	cd/m ²

8.6. Optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Response Time	T _r	25°C	-	200	300	ms
	T _f		-	250	350	ms
Contrast Ratio	CR	θ=0°	-	5	-	-
Viewing Angle	Θ 180°	CR ≥ 2	0	-	30	Degree
	Θ 0°		0	-	60	
	Θ 90°		0	-	45	
	Θ 270°		0	-	45	
Viewing Direction	6 o'clock					

9. LCD Module Precautions

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

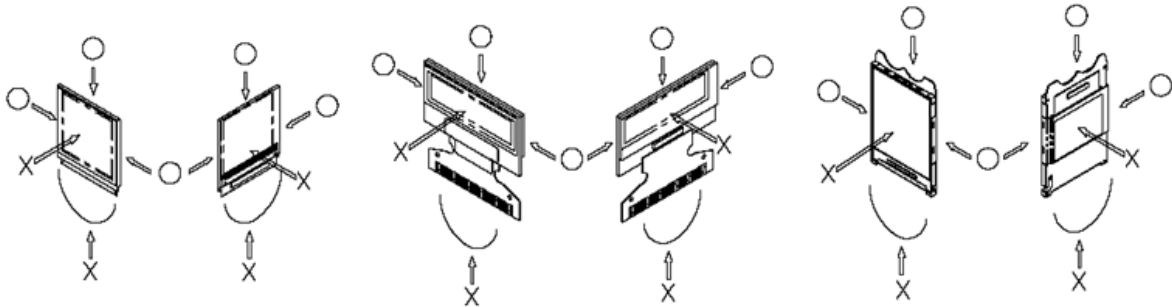
9.1. Modules

- Avoid excessive physical and electrical shocks to module.
- Do not drop, bend, or twist the LCD display module.
- Do not make extra holes, modify the shape, or change the components of the printed circuit board.
- Do not disassemble the LCD display module.
- Do not operate the LCD 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.



9.2. Handling Precautions

- The display panel is made of glass. Do not apply mechanical impacts, stress or pressure to the LCD 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 LCD 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 LCD display module:
 - Ground personnel handling LCD 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 LCD 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.

9.3. Storing Precautions

- Store the LCD 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 Crystalfontz.
- 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 LCD display module, the module may become dewed. If a dewed LCD display module is placed under high humidity environments the electrodes may become corroded.

9.4. Designing Precautions

- The absolute maximum ratings cannot be exceeded for LCD 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 preventive unit (fuses, etc.) to the power circuit. Recommend value: 0.5A
- Avoid occurrence of mutual noise interference with the neighboring devices.
- When fastening the LCD display module, fasten the external plastic housing section. If the power supply to the LCD display module is forcibly shut down, by such errors as taking out the main battery while the LCD display panel is in operation, we cannot guarantee the quality of this LCD display module.



- Connection (contact) to any other potential than the above may lead to rupture of the IC.

9.5. Disposing Precautions

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

9.6. Other Precautions

- When an LCD 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 LCD display module from performance drops by static electricity rapture, etc., do not touch the following sections whenever possible while handling the LCD display modules.
 - Pins and electrodes
 - Pattern layouts such as the TCP & FPC
- With this LCD display module, the LCD driver is exposed. If this LCD driver is exposed to light, malfunctioning may occur. Design the product and installation method so that the LCD driver may be shielded from light in actual usage and during the inspection processes.
- Although this LCD 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.
- Crystalfontz has the right to upgrade and modify the product function.
- The limitation of FPC bending:

