



TFT GRAPHIC DISPLAY MODULE DATASHEET



Datasheet Release Date 2023-08-14
for

**CFAF80160A0-0096TN and CFAF80160A0-
0096TW**

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1. General Information

Datasheet Revision

Datasheet Release: **2023-08-14**

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 full color TFT graphic display module with a white LED backlight, TFT panel, integrated controller/driver, and a Flexible Printed Circuit (FPC) tail. This display requires only a single source for both power supply and logic. This display module has a built-in Sitronix ST7735S, 262K Color Single-Chip TFT Controller.

The CFAF80160A0-0096TN does not include a touch panel. The CFAF80160A0-0096TW includes an overhanging capacitive touch panel with included 3M mounting tape on the overhanging edge.

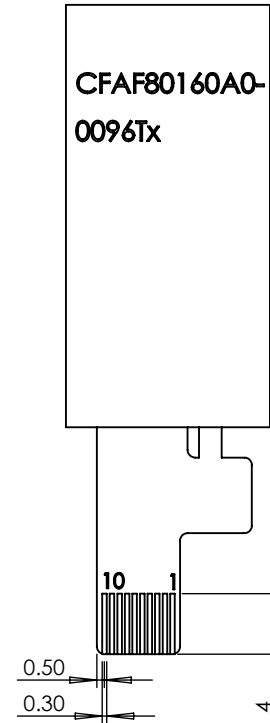
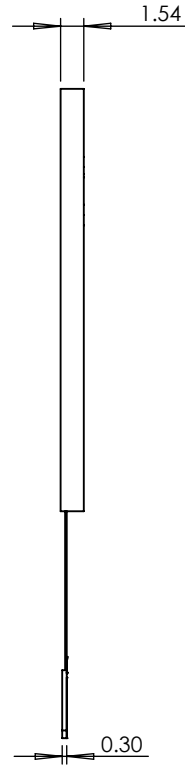
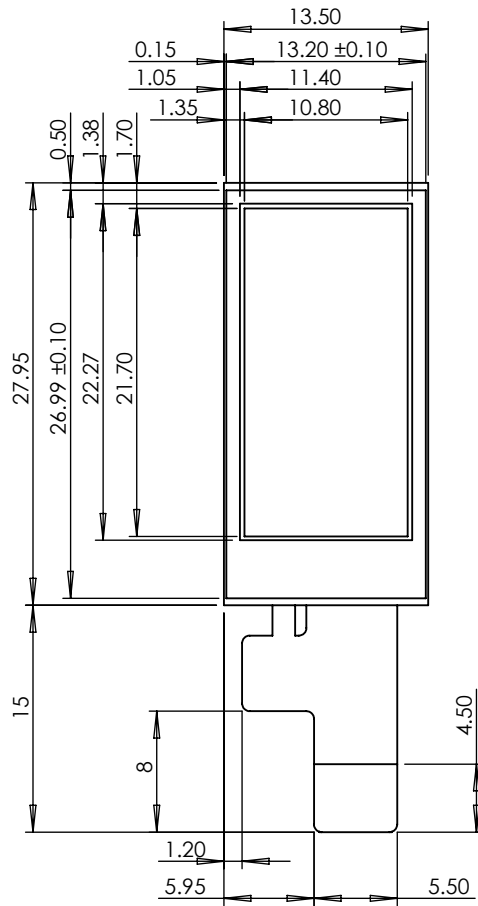
Please see [Sitronix ST7735S LCD Controller Datasheet](#) for further reference.

3. Features

- 80x160 Dot Matrix
- +3.3V Power Supply
- Viewing Direction: All
- Built-in Controller: Sitronix ST7735S (or equivalent)
 - TW: FT3267 capacitive touch controller
- Operating Temperature: -20°C to +70°C
- Storage Temperature: -30°C to +80°C
- Display Interface: SPI
- Touch Interface (TW only): I²C

4. Mechanical Data

Item	Specification (mm)	Specification (inch, reference)
TFT Module Dimension (CFAF80160A0-0096TN)	13.5 (W) x 27.95 (H) x 1.54 (D)	0.53 (W) x 1.1 (H) x 0.06 (D)
Touch TFT Module Dimension (CFAF80160A0-0096TW)	18.7 (W) x 31.9 (H) x 2.64 (D)	0.74 (W) x 1.26 (H) x 0.10 (D)
Active Area	10.8 (W) x 21.696 (H)	0.43 (W) x 0.85 (H)
Dot Pitch	0.135 (W) x 0.1356 (H)	0.005 (W) x 0.005 (H)
TFT Weight (CFAF80160A0-0096TN)	1.3 grams	0.05 ounces
Touch TFT Weight (CFAF80160A0-0096TW)	2.4 grams	0.08 ounces



Pin	Function
1	A (LED+)
2	K (LED-)
3	SPI4W / SPI3W
4	VDD
5	GND
6	CS
7	RST
8	SDA
9	SCL
10	D/ C

Display Controller	ST7735S
Brightness	500 nits
Viewing Direction	All
Operating Temperature	-20 to 70°C
Voltage Levels	3.3v

Units: millimeters
Tolerance: ±0.3



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Part Number:

CFAF80160A0-0096TN

Date:

8/3/2023

Filename:

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Revision:

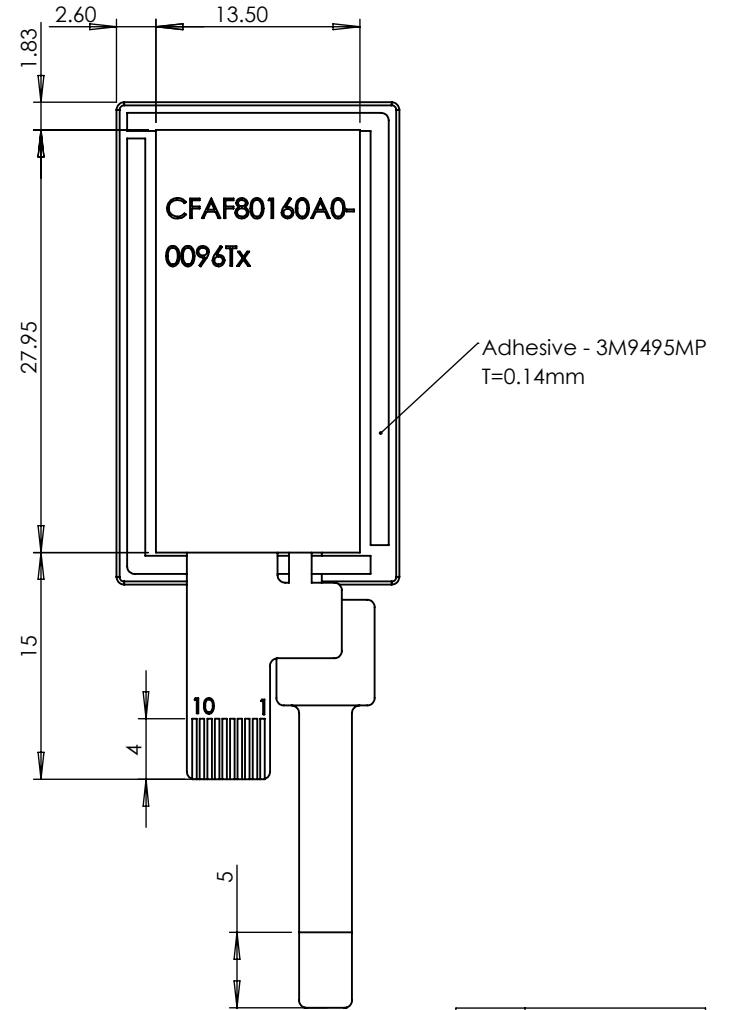
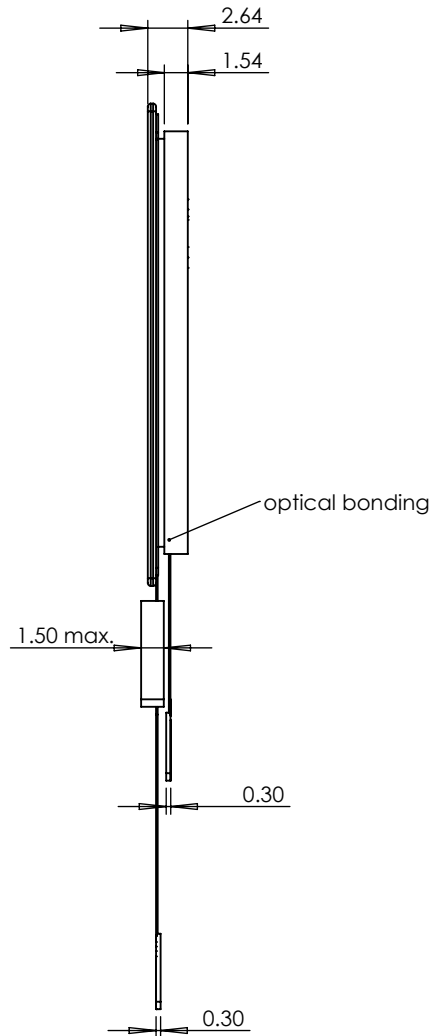
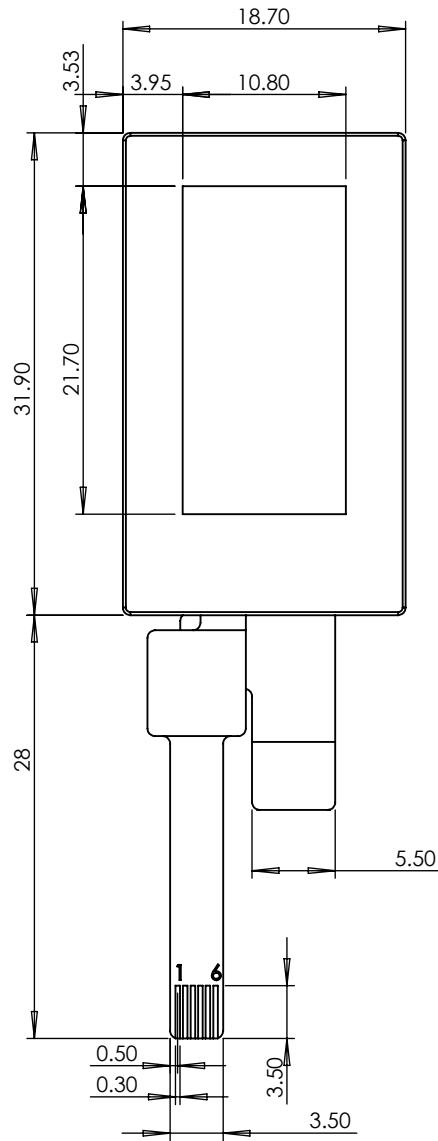
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Display Controller	ST7735S
Brightness	400 nits
Viewing Direction	All
Operating Temperature	-20 to 70°C
Voltage Levels	3.3v

Touch Pin	Function
1	VDDT
2	SCL
3	SDA
4	INT
5	RESET
6	VSS

Pin	Function
1	A (LED+)
2	K (LED-)
3	SPI4W / SPI3W
4	VDD
5	GND
6	CS
7	RST
8	SDA
9	SCL
10	D/ C

Units: millimeters
Tolerance: ±0.3



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6. Interface Pin Function

6.1. Display

Pin	Symbol	Function	
1	A (LED+)	Backlight anode	
2	K (LED-)	Backlight cathode	
3	SPI4W / $\overline{\text{SPI3W}}$	SPI4W / $\overline{\text{SPI3W}}$	
		0	3-wire, 9-bit SPI mode. The $\overline{\text{D/C}}$ pin is not used. The 9th SPI bit selects the data or command register.
		1	4-wire, 8-bit SPI mode. The $\overline{\text{D/C}}$ pin is used to select the data or command register.
4	V _{DD}	Digital Logic Supply and Input/Output Supply	
5	GND	Ground. Must be connected to an external ground.	
6	$\overline{\text{CS}}$	Chip Select Low: Controller chip is selected. Communications with host is possible. High: Controller chip is not selected.	
7	$\overline{\text{RST}}$	Controller hardware reset pin, active low.	
8	SDA	Serial data, in or out (bi-directional)	
9	SCL	Serial Clock – rising edge.	
10	$\overline{\text{D/C}}$	Data/Command Pin for 4-wire SPI. 1 – High: Addresses the data register. 0 – Low: Addresses the command register.	

6.2. Touch Panel (CFAF80160A0-0096TW only)

Pin	Symbol	Function
1	VDDT	Power Supply
2	SCL	I ² C clock signal. External pull-up required.
3	SDA	I ² C data signal. External pull-up required.
4	INT	External interrupt to host
5	RESET	External reset, active low
6	VSS	Power Ground

7. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Operating Temperature	T _{OPR}	-10	-	+60	°C	-
Storage Temperature	T _{STG}	-10	-	+60	°C	-

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 DC Characteristics table below.

8. Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage for Logic	V _{DD}		3.0	3.3	3.6	V
Supply Current for LCM	I _{DD}	V _{DD} =3.3v	-	-	2.0	mA
Capacitive Touch Voltage Supply	V _{DDT}	-	2.8	-	3.3	V
Capacitive Touch Current	I _{VDDT}	-	-	2	3	mA
Input High Voltage	V _{IH}	-	0.7 x V _{DD}	-	V _{DD}	V
Input Low Voltage	V _{IL}	-	GND	-	0.3 x V _{DD}	V

9. Optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit	Notes
Contrast Ratio	CR	Θ=0 Normal Viewing Angle	-	800	-	-	(1)(2)
Response Time	T _{rise} T _{fall}	-	-	30	40	ms	(1)(3)
White Chromaticity	x	CR ≧ 10	0.255	0.305	0.355	-	-
	y		0.275	0.325	0.375	-	-
Viewing Angle (Horizontal)	θ _{x+}	CR ≧ 10	-	80	-	deg	-
	θ _{y-}		-	80	-	deg	-
Viewing Angle (Vertical)	θ _{x+}		-	80	-	deg	-
	θ _{y-}		-	80	-	deg	-

Notes: (1)Measuring Surrounding: Dark Room (2)Ambient Temperature: 25 ± 2°C (3)Warm Up Time: 30-Minutes

10. Backlight Characteristics

Item	Condition	Symbol	Min	Typ	Max	Unit
Supply Current	V=3.2v	I	-	20	-	mA
Supply Voltage	I _F =20mA	V	2.8	3.0	3.3	V
Luminous Intensity for LCM (CFAF80160A0-0096TN)		-	400	500	-	cd/m ²
Luminous Intensity for LCM with Touch (CFAF80160A0-0096TW)		-	300	400	-	cd/m ²
Uniformity for LCM		-	75	-	-	%
LED Lifetime		-	50K	-	-	Hours
Color	White					

Note: LED Lifetime is defined as the amount of time when the luminance has decayed to <50% of the initial value (20K hours is an estimate for reference only).

11. LCD Module Precautions

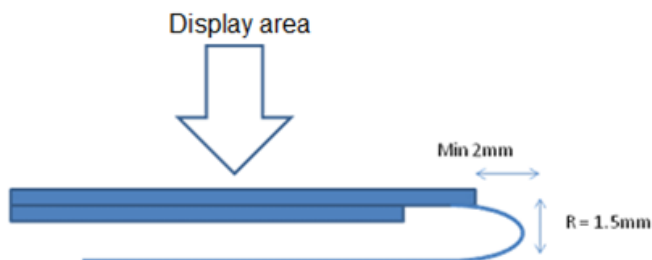
The precautions below should be followed when using LCD modules to help ensure personal safety, module performance, and compliance of environmental regulations.

11.1. Modules

- Avoid applying excessive shocks to module or making any alterations or modifications to it.
- Do not make extra holes on the printed circuit board, modify its shape or change the components of LCD display module.
- Do not disassemble the LCD display module.
- Do not operate the LCD display module above the absolute maximum rating.
- Do not drop, bend or twist the LCD display module.
- Do not solder. Use only an appropriate ZIF connector designed for FPC.
- ZIF connector should have gold flash contacts to maximize reliability/
- Store in an anti-static electricity container and clean environment.
- Crystalfontz may change passive components -- resistors, capacitors and other passive components may have different appearance and color due to different suppliers.
- Crystalfontz may change the flex PCB revision. An appropriate PCN will be issued if there is change to the form, fit or function. You can subscribe to PCNs on the module's web page.

11.2. Handling Precautions

- Since the display panel is made of glass, do not apply mechanical impacts or drop it.
- If the display panel is accidentally broken, and the internal organic substance leaks out, be careful not to inhale or touch the organic substance.
- If pressure is applied to the display surface or its neighborhood of the LCD display module, the cell structure may be damaged, so be careful not to apply pressure to these sections.
- The polarizer covering the surface of the LCD display module is soft and can be easily scratched. Please be careful when handling the LCD display module.
- Do not use any solvents (even water) to clean the LCD's polarizer. Using a cloth to rub the polarizer can cause small scratches that may reduce performance.
- If you need to clean the LCD's front surface, you can carefully apply and remove normal office tape. The contaminates will adhere to the tape and be removed from the LCD's polarizer.
- Ensure that your mounting secures the LCD and protects it from mechanical stresses
- The LCD module is sensitive to ESD. Treat the LCD module as you would a bare IC. Use appropriate ESD precautions when handling.
- Observe humidity limits. Do not operate the LCD if there is condensation.
- Do not make sharp bends in the FPC (Flexible Printed Circuit). Observe the following diagram:



- Dispose of this module -- and any electronics -- properly. Do not place in the normal trash. Check with your local disposal company for procedures to recycle or dispose of electronics.