Crystalfontz

ePAPER DISPLAY MODULE DATASHEET

CFAP960640A0-1020

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1. General Information

Datasheet Revision History
Datasheet Release Date: 2026-06-18 Datasheet for the CFAP960640A0-1020 ePaper Display Module ePaper 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. Description Overview

A rectangle black-and-white 960x640 pixel ePaper display module, perfect for medium, low power, long term display. Once an image is shown on the display, it remains visible while entirely disconnected from power. The display is an active matrix electrophoretic display (AMEPD).

Built-in voltage generation requires only a few external components. An integrated circuit contains a gate buffer, source buffer, interface, timing control logic, oscillator, DC-DC, SRAM, LUT, VCOM, and border. See the CFA10084 ePaper breakout board for an example of implementing this display.

3. Features

- 960x640 Pixels, 113 ppi
- High Contrast
- High Reflectance, Pure Reflective Mode
- Ultra-Wide Viewing Angle
- Ultra-Low Power Consumption, Bi-Stable Display, Ultra Low Current Deep Sleep Mode
- Commercial Temperature Range
- Antiglare Hard-Coated Front-Surface
- On-Chip Display RAM
- Serial Peripheral Interface (SPI)
- On-Chip Booster and Regulator Control for Generating VCOM, Gate and Source Driving Voltage
- I^2C Signal Master Interface to Read External Temperature Sensor
- Full screen update time: 4 seconds
- Partial screen update time: 0.42 seconds
- SSD1677 Controller chip
- Recommended refresh interval: Every 24 hours

4. Mechanical Specifications

Parameter	Specifications (mm)	Specification (in)
Screen Size	259.14	10.2
Active Area	215.52 (W) x 143.68 (H)	8.48 x 5.66
Pixel Pitch	0.225 × 0.225	0.009 x 0.009
Outline Dimension	224 (W) × 157 (H) × 1.0 (D)	8.82 x 6.18 x 0.04
Weight (typical)	62.2 grams	2.19 ounces
Display Resolution	960 (W) x 640 (H)	

5. Pin Functions

Pin #	Type	Single	Description
1	NC	NC	No Connection and Do Not Connect with Other NC Pins
2	O	GDR	N-Channel MOSFET Gate Drive Control
3	I	RESE	Current Sense Input for the Control Loop
4	NC	NC	No Connection and Do Not Connect with Other NC Pins
5	C	VSH2	Positive Source Driving Voltage
6	O	TSCL	I^2C Interface to Digital Temperature Sensor Clock Pin External pull-up resistor required
7	I/O	TSDA	I^2C Interface to Digital Temperature Sensor Data Pin External pull-up resistor required
8	I	BS1	Bus Selection Pin – Low 4-Wire SPI, High 3-Wire SPI
9	O	BUSY	Busy State Output Pin – high when chip is busy
10	I	RES#	Reset Pin – active low
11	I	D/C#	Data /Command Control Pin – Data high, command low Tie low for 3-wire SPI
12	I	CS#	Chip Select Input Pin - active low
13	I	SCL	Serial Clock Pin (SPI)
14	I	SDA	Serial Data Pin (SPI)
15	P	VDDIO	Power for Interface Logic Pins. Connect to VCI
16	P	VCI	Power Supply Pin for the Chip
17	P	VSS	Ground
18	C	VDD	Core Logic Power Pin. This pin is regulated internally. Connect a capacitor between VDD and VSS
19	P	VPP	Power Supply for OTP Programming, leave open if not used
20	C	VSH1	Positive Source Driving Voltage
21	C	VGH	Positive Gate Driving Voltage
22	C	VSL	Negative Source Driving Voltage
23	C	VGL	Negative Gate Driving Voltage
24	C	VCOM	VCOM Driving Voltage

I – Input
O – Output
P – Power
C – Capacitor
NC – No connection, do not connect to other NC pins
See Section 12: Reference Circuits

6. Maximum Ratings

6.1. Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Logic Supply Voltage	V_{CI}	-0.5 to +4.0	V
Operating Temp. Range	T_{OPR}	0 to +50	°C
Storage Temp. Range	T_{STG}	-25 to +70	°C
IMPORTANT: A UV protective film is recommended when operating the module in direct sunlight.			

Recommended Storage temp is 23°C±3, and humidity of 55%RH±10

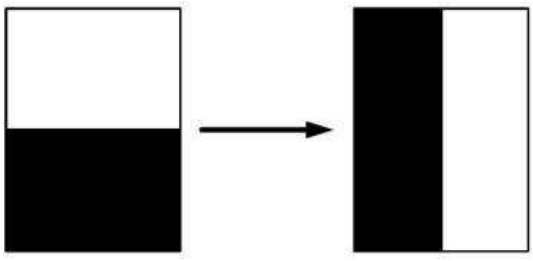
6.2. DC Characteristics

The following specifications apply for: V_{SS} = 0V, V_{CI} = 3.0V, T_{OPR} = 23°C

Parameter	Symbol	Conditions	Module Pin	Min	Typ	Max	Unit
Core Logic Voltage	V_{DD}		V_{DD}	1.7	1.8	1.8	V
Logic Supply Voltage	V_{CI}	-	V_{CI}	2.2	3.0	3.7	V
High Level Input Voltage	V_{IH}	-	SCL, SDA, CS#, D/C#, RES#, BS1	0.8V_{CI}	-	V_{CI}	V
Low Level Input Voltage	V_{IL}	-		-	-	0.2 V_{CI}	V
High Level Output Voltage	V_{OH}	IOH= -100uA	BUSY	0.9 V_{CI}	-	-	V
Low Level Output Voltage	V_{OL}	IOL= 100uA		-	-	0.1 V_{CI}	V
Module Operating Current	I_{UPDATE}	-	-	-	16	160	mA
Deep Sleep Mode	I_{SLEEP}		-	-	3	5	µA
Panel power consumption during Update	-	25°C			48	-	mW
Deep Sleep Mode	-	25°C			0.003	-	mW

The typical power consumption is measured with the following pattern transition: from horizontal pattern to vertical pattern, shown below.

Note: The standby power is the consumed power when the panel controller is in standby mode. The listed electrical/optical characteristics are only guaranteed under the controller & waveform provided by Crystalfontz. V_{COM} is recommended to be set in the range of assigned value ±0.1V.



7. Optical Characteristics

7.1. Specifications

Measurements are made with the illumination under an angle of 45 degrees, the detection is perpendicular unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	Note
R	Reflectance	White	30	34	-	%	13-1
Gn	2Gray Level	-	-	-	-	L*	13-2
CR	Contrast Ratio	Indoor	15:1	20:1	-	-	-
Panel Life	-	0°C~50°C	-	5 years	-	-	13-3

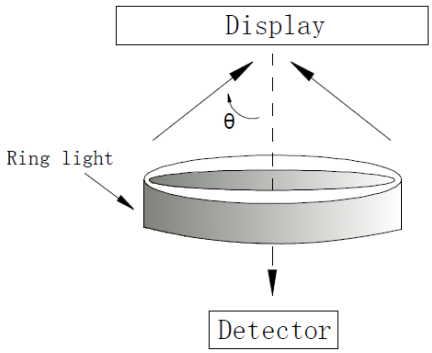
Note (13-1): Luminance meter: Eye – One Pro Spectrophotometer
Note (13-2): WS: White State, DS: Dark State, m: 2
Note (13-3): Panel life is not guaranteed when used outside of conditions described herein, or outside of the 45-70%RH. Display must be updated at least once per day.

7.2. Definition of Contrast Ratio

The contrast ratio (CR) is the ratio between the reflectance in a full white area (R1) and the reflectance in a dark area (Rd) ():

R1: White Reflectance Rd: Dark Reflectance

CR = R1/Rd

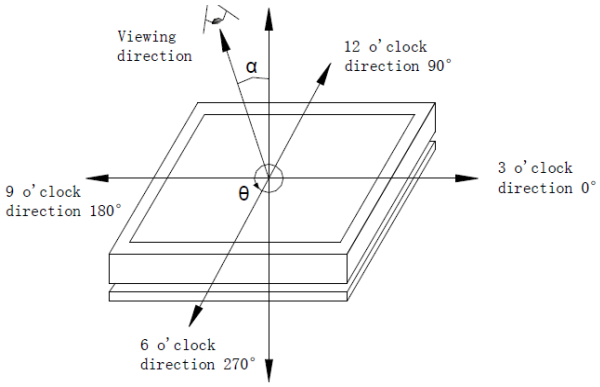


7.3. Reflection Ratio

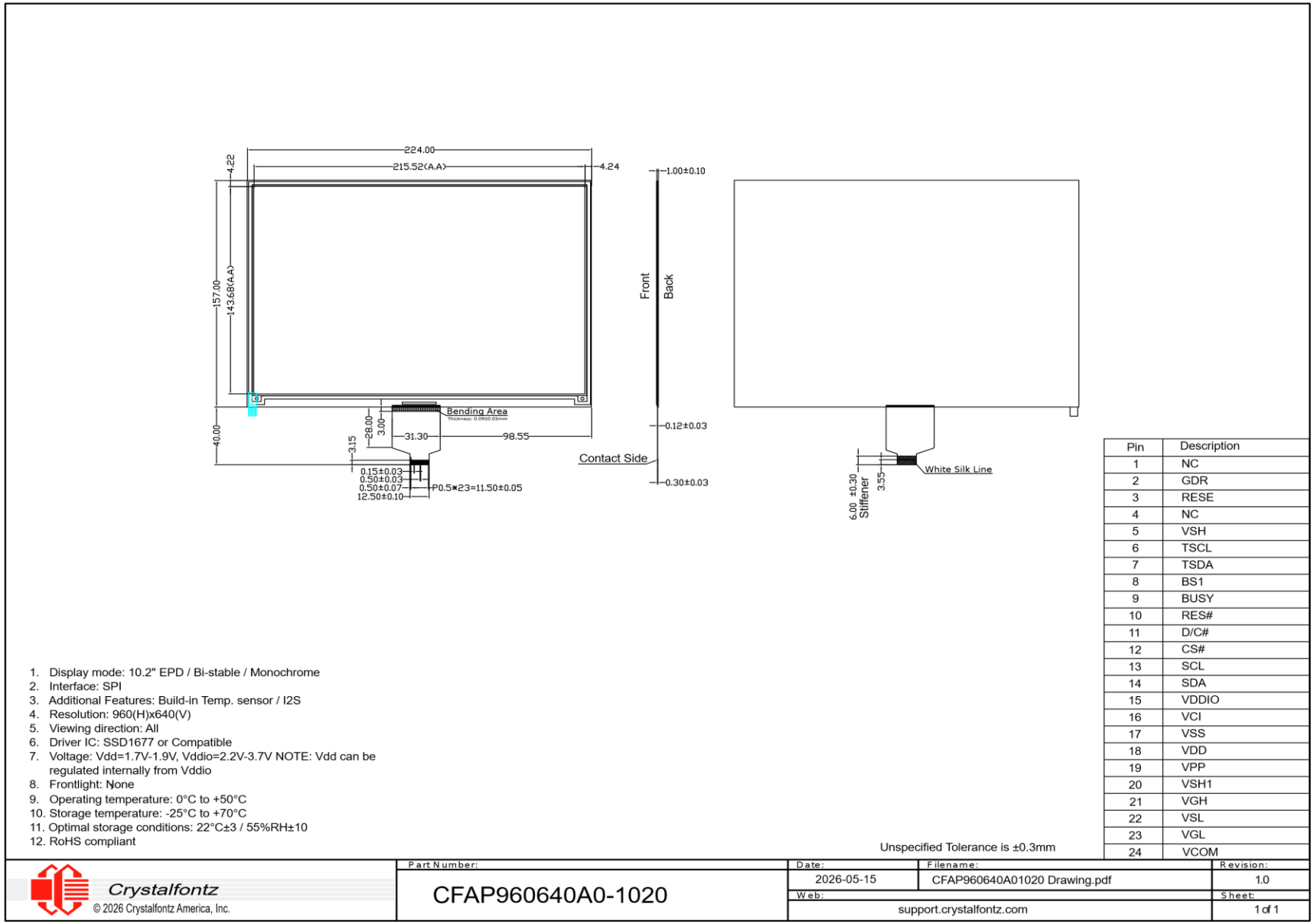
The reflection ratio is expressed as:

$R = \text{Reflectance Factor}_{\text{white board}} \times (L_{CENTER} / L_{WHITE\ BOARD})$

L_{CENTER} is the luminance measured at center in a white area (R=G =B=1). $L_{WHITE\ BOARD}$ is the luminance of a standard white board. Both are measured with equivalent illumination source. The viewing angle shall be no more than 2 degrees.



8. Mechanical Drawing



Pin	Description
1	NC
2	GDR
3	RESE
4	NC
5	VSH
6	TSCL
7	TSDA
8	BS1
9	BUSY
10	RES#
11	D/C#
12	CS#
13	SCL
14	SDA
15	VDDIO
16	VCI
17	VSS
18	VDD
19	VPP
20	VSH1
21	VGH
22	VSL
23	VGL
24	VCOM

1. Display mode: 10.2" EPD / Bi-stable / Monochrome
2. Interface: SPI
3. Additional Features: Build-in Temp. sensor / I2S
4. Resolution: 960(H)x640(V)
5. Viewing direction: All
6. Driver IC: SSD1677 or Compatible
7. Voltage: Vdd=1.7V-1.9V, Vddio=2.2V-3.7V NOTE: Vdd can be regulated internally from Vddio
8. Frontlight: None
9. Operating temperature: 0°C to +50°C
10. Storage temperature: -25°C to +70°C
11. Optimal storage conditions: 22°C±3 / 55%RH±10
12. RoHS compliant

Unspecified Tolerance is ±0.3mm

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	Web:		Sheet:
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9. Reference Circuits

9.1. General

