



## GRAPHIC TFT MODULE DATA SHEET



Preliminary Data Sheet Release Date 2016-09-19  
for  
[CFAF240320H-022T](#)

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### CFAF240320H-022T Data Sheet Revision History

Datasheet Release: 2016-09-19

- Slight change in LED Backlight Characteristics, including adding caution notes. Display has not changed.
- Removed unnecessary sections.

Preliminary Data Sheet Release: 2014-08-01.

Improved [Module Outline Drawing \(Pg. 7\)](#). The AutoCAD 2D file is available for download under the Datasheets&Files tab for this product.

Preliminary Data Sheet Release: 2014-06-16.

Data Sheet is revised to reflect changes for this display. For details, see [Product Notices](#) tab.

Data Sheet Preliminary Release: 2011-08-09.



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### About Volatility

This module has volatile memory.



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# MECHANICAL SPECIFICATIONS

## PHYSICAL CHARACTERISTICS

### \* Description

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This model is composed of a Transmissive type TFT-LCD Panel, driver circuit, back-light unit. The resolution of a 2.2" TFT-LCD contains 240 x 320pixels, and can display up to 262K colors.

### \* Features

- Low Input Voltage: VCI: 2.8V~3.3V
- Display Colors of TFT LCD: 262K colors
- Interface: 8-bits,MCU interface.
- Internal Power Supply Circuit.

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	33.48(H) *44.64(V) (2.2inch )	mm	-
Driver element	TFT active matrix	-	-
Display colors	262K	colors	-
Number of pixels	240(RGB) *320	dots	-
Pixel arrangement		-	-
Pixel pitch	0.1395 (H) x 0.1395 (V)	mm	-
Viewing angle	12	o'clock	-
Controller IC	RM68090	-	-
Display mode	Transmissive/ Normally Black	-	-
Operating temperature	-20~+70	℃	-
Storage temperature	-30~+80	℃	-

### \* Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)		41.70		mm	-
	Vertical(V)		56.16		mm	-
	Depth(D)		2.6		mm	-
Weight			TBD		g	-



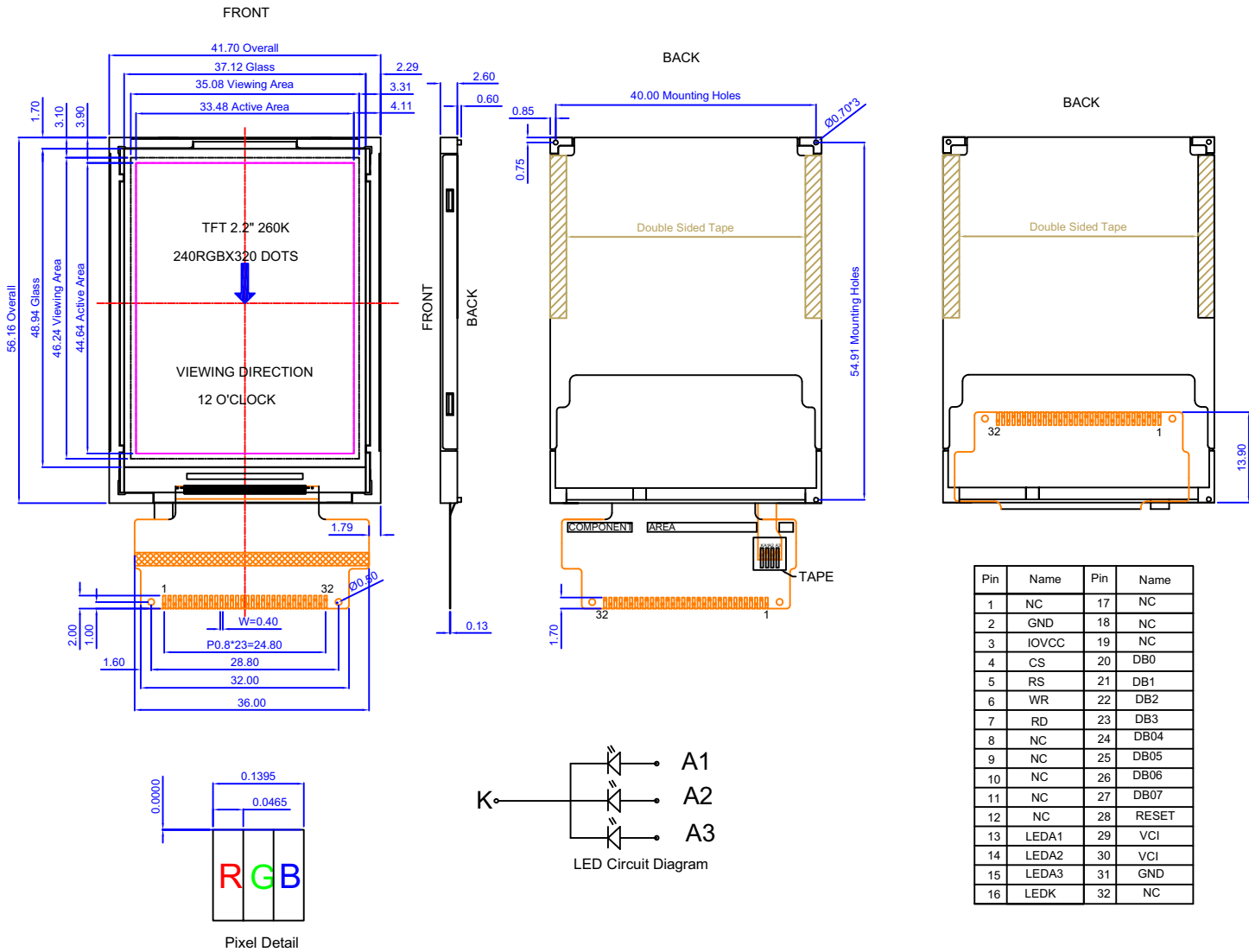
## ADDITIONAL FEATURES

- ❑ These display modules have a Raydium RM68090 Single Chip Driver with 262K color. For interface information and other details, see [controller datasheets](#) on our website.
- ❑ To download the most current Certificate of Compliance for ISO, RoHS, and REACH, go to the DATASHEETS & FILES tab on the part number's website page.



# MODULE OUTLINE DRAWING

Figure 1. Module Outline Drawing





## ELECTRICAL SPECIFICATIONS

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### ABSOLUTE MAXIMUM RATINGS

Characteristics	Symbol	Min.	Max.	Unit	Note
Power supply voltage	V <sub>CI</sub>	-0.3	5.0	V	
Input Voltage	V <sub>i</sub>	-0.3	IOVCC+0.3	V	
Operating temperature	T <sub>OP</sub>	-20	+ 70	°C	
Storage temperature	T <sub>ST</sub>	-30	+ 80	°C	

### RECOMMENDED DC CHARACTERISTICS (3.0V OPERATION)

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Power supply voltage	V <sub>CI</sub>	2.8	3.3	3.6	V	
Normal mode Current consumption	V <sub>CC1</sub>	---	8	--	mA	
Level input voltage	V <sub>IH</sub>	0.8V <sub>DDIO</sub>		-	V	
	V <sub>IL</sub>	-		0.2V <sub>DDIO</sub>	V	
Level output voltage	V <sub>OH</sub>	0.8V <sub>DDIO</sub>		-	V	
	V <sub>OL</sub>	-		0.2V <sub>DDIO</sub>	V	





## DETAILS OF INTERFACE PIN FUNCTIONS

Pin NO.	Symbol	Function
1.	NC	NC
2	GND	
3	IOVCC	Analog power supply, 2.8V~3.3V
4	CS	Chip select signal. Low: chip can be accessed; High: chip cannot be accessed.
5	RS	Data / Command Selection pin If not use, please connect to GND.
6	WR	DBI Type-B: Serves as a write signal and write data at the low level. DBI Type-C: it servers as SCL (Serial Clock). If not use, please connect to GND.
7	RD	DBI Type-B: Serves as a read signal and read data at the low level. If not use, please connect to IOVCC.
8	NC	NC
9	NC	NC
10	NC	NC
11	NC	NC
12	NC	NC
13	LEDA1	Power supply for Backlight.
14	LEDA2	Power supply for Backlight.
15	LEDA3	Power supply for Backlight.
16	LEDK	Power supply for Backlight.
17	NC	NC
18	NC	NC
19	NC	NC



20-27	DB0-DB7	8-bit bus: use DB0-DB7
28	RESET	Reset pin. Setting either pin low initializes the LSI. Must be reset after power is supplied.
29	VCI	Analog power supply, 2.8V~3.3V
30	VCI	Analog power supply, 2.8V~3.3V
31	GND	GND
32	NC	NC

## ESD (ELECTRO-STATIC DISCHARGE)

The circuitry is industry standard CMOS logic and is susceptible to ESD damage. Please use industry standard antistatic precautions as you would for any other static sensitive devices such as expansion cards, motherboards, or integrated circuits. Ground your body, work surfaces, and equipment.



## OPTICAL SPECIFICATIONS

Parameter	Symbol	Values			Unit
		Min	Typ	Max	
*1) Threshold Voltage	Vsat	3.7	3.8	3.9	V
	Vth	1.9	2.0	2.1	V
*1) Transmittance	T(%)	3.86	4.40	-	%
*1) Contrast Ratio	C/R	400	500	-	
*1) Response Time	Tr+Tf	-	35	50	msec
*2) CIE Color Coordinate	Rx	0.640	0.660	0.680	
	Ry	0.297	0.317	0.337	
	Gx	0.240	0.260	0.280	
	Gy	0.555	0.575	0.595	
	Bx	0.121	0.141	0.161	
	By	0.055	0.075	0.095	
	Wx	0.275	0.295	0.315	
	Wy	0.297	0.317	0.337	
*1) Viewing Angle	$\theta_l$	-	80	-	Degree
	$\theta_r$	-	80	-	
	$\theta_u$	-	80	-	
	$\theta_d$	-	80	-	



### Definition of Response Time ( $T_r$ , $T_f$ )

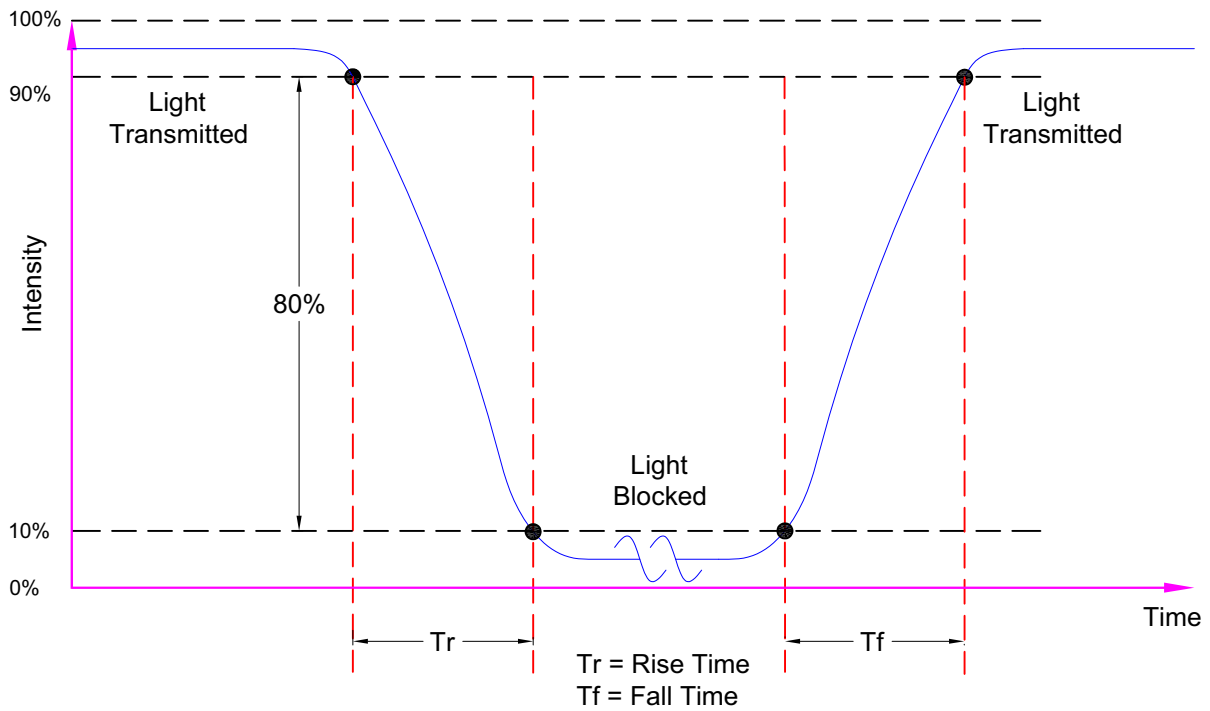


Figure 2. Definition of Response Time ( $T_r$ ,  $T_f$ )

### Definition of Vertical and Horizontal Viewing Angles ( $CR_{\geq 2}$ )

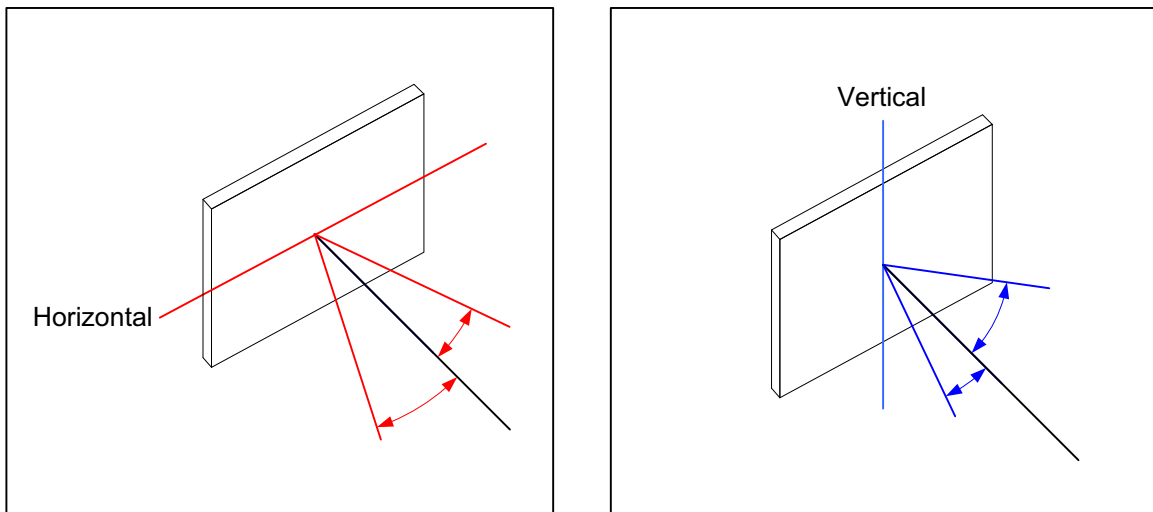


Figure 3. Definition of Horizontal and Vertical Viewing Angles ( $CR_{\geq 2}$ )



## Definition of 6 O'Clock and 12:00 O'Clock Viewing Angles

This module has a 12:00 o'clock viewing angle.

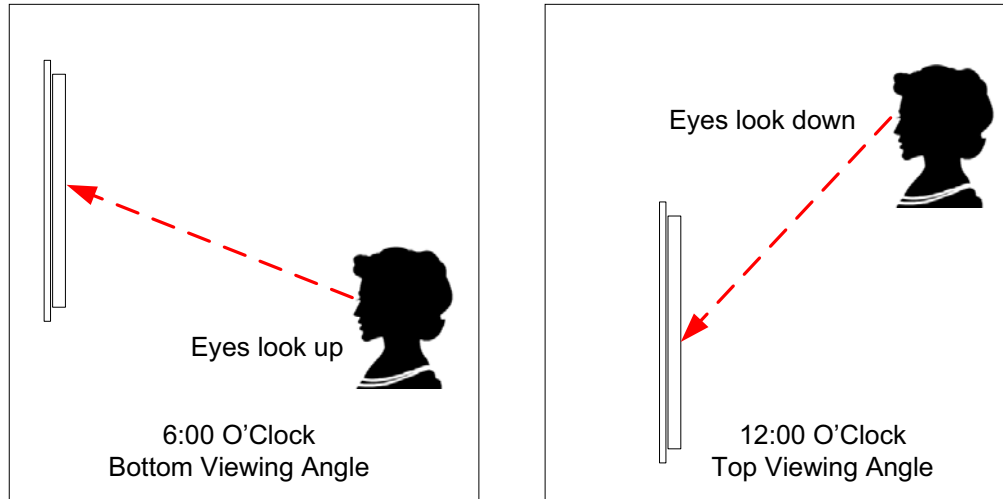
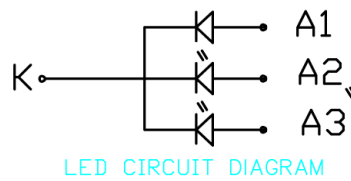


Figure 4. Definition of 6:00 O'Clock and 12:00 O'clock Viewing Angles

## LED BACKLIGHT CHARACTERISTICS

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The back-light system is edge-lighting type with 3 chips White LED in parallel.

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	$I_F$		45	60	mA	
Forward Voltage	$V_F$		3.3 (Typ)		V	-

**CAUTION**

Do not drive the LEDs at any current over their rated maximum of 20mA (15mA recommended for longer life). Be aware that the forward voltage of white LEDs can vary (LED to LED, batch to batch, and over time) by a significant amount. We recommend using a constant current LED power supply such as the AP3036, NCP5007, FAN5333, or similar to drive the LEDs. Do not use a constant voltage source to drive the LEDs.

This display module uses an LED backlight. LED backlights are easy to use, but they are also easily damaged by abuse.

**CAUTION**

Do not connect +5v directly to the backlight terminals. This will ruin the backlight. Ensure that you have proper current and voltage control for your backlight before connecting the backlight circuit.

**NOTE**

We recommend that the LED backlight be dimmed or turned off during periods of inactivity to conserve its lifetime.

LEDs are “current” devices. The important aspect of driving an LED is the current flowing through it, not the voltage across it. Ideally, a current source would be used to drive the LEDs. In practice, a simple current limiting resistor in line from a voltage source will work well in most applications and is much less complex than a current source.



## MODULE RELIABILITY AND LONGEVITY

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### MODULE RELIABILITY

PART NUMBER	SPECIFICATION
CFAF240320H-022TT	Brightness will be >50% of a new module's initial brightness for at least 50,000 hours of operation when supply to each LED is below TBD mA.
<i>Under operating and storage temperature specification limitations, humidity noncondensing) RH up to 65%, and no exposure to direct sunlight. Value listed above is approximate and represents typical lifetime.</i>	
<i>The white LEDs dim over time, especially if driven with high currents. The dimming may not be noticeable when a single display is installed. However, if a new display is installed next to a display that has been on continuously for a very long time, you will see the difference. To preserve the lifetime of white LEDs, we recommend that white LED backlights are dimmed or turned off when not needed. Also, please do not use more current than you need to achieve your brightness requirements.</i>	

### MODULE LONGEVITY (EOL/REPLACEMENT POLICY)

CrystalFontz is committed to making all of our modules available for as long as possible. For each module we introduce, we intend to offer it indefinitely. We do not preplan a module's obsolescence. The majority of modules we have introduced are still available.

We recognize that discontinuing a module may cause problems for some customers. However, rapidly changing technologies, component availability, or low customer order levels may force us to discontinue ("End of Life" EOL) a module. For example, we must occasionally discontinue a module when a supplier discontinues a component or a manufacturing process becomes obsolete. When we discontinue a module, we will do our best to find an acceptable replacement module with the same fit, form, and function.

In most situations, you will not notice a difference when comparing a "fit, form, and function" replacement module to the discontinued module. However, sometimes a change in component or process for the replacement module results in a slight variation, perhaps an improvement, over the previous design.

Although the replacement module is still within the stated Data Sheet specifications and tolerances of the discontinued module, changes may require modification to your circuit and/or firmware. Possible changes include:

- **Backlight LEDs.** Brightness may be affected (perhaps the new LEDs have better efficiency) or the current they draw may change (new LEDs may have a different VF).
- **Controller.** A new controller may require minor changes in your code.
- **Component tolerances.** Module components have manufacturing tolerances. In extreme cases, the tolerance stack can change the visual or operating characteristics.

Please understand that we avoid changing a module whenever possible; we only discontinue a module if we have no other option. We will post Part Change Notices on the product's web page as soon as possible. If interested, you can subscribe to future part change notifications.