



TFT DISPLAY MODULE DATA SHEET



Data Sheet Release 2015-01-23
for
[CFAF240320A-030T](#)

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Data Sheet Revision History

Data Sheet Release: 2015-01-23

- Removed "Preliminary" watermark on Data Sheet.
- On this page, notices *About Variations* and *About Volatility* were added.
- Display module weight is added to [Mechanical Specifications \(Pg. 5\)](#) (23 grams).
- See important note added at the bottom of [Display Module Outline Drawing \(Pg. 6\)](#). This drawing shows the TFT with the touch screen ([CFAF240320A-032T-TS](#)). Except for the "TP" dimensions and the overall depth, all other dimensions are identical. The depth for CFAF240320-032T listed in the preliminary Data Sheet under [Mechanical Specifications \(Pg. 5\)](#) was correct and has not changed.
- Operating and storage temperature range was corrected in [Absolute Maximum Ratings \(Pg. 8\)](#). The temperature range now matches what was previously stated in [General Specifications \(Pg. 5\)](#).
- In [Details Of Interface Pin Functions \(Pg. 9\)](#), changed touch panel (touch screen) pins to NC (No Connect.) The CFAF240320A-032T has no touch screen. However, we do sell a touch screen version of this TFT module [CFAF240320A-032T-TS](#).
- In addition to *Reliability Test Results*, additional information was added in new section [RELIABILITY AND LONGEVITY \(Pg. 14\)](#). Box drop test results was removed.
- Text for cautions and handling precautions was rewritten in new section [CARE AND HANDLING PRECAUTIONS \(Pg. 16\)](#).

Preliminary Data Sheet Release: 2012-04-25
New product.

Hardware Updates

To see update notices, check the Product Notices tab on the product page. Product pages without a tab do not have product notices.

About Variations

We work continuously to improve our products. Because display technologies are quickly evolving, these products may have component or process changes. Slight variations (for example, contrast, color, or intensity) between lots are normal. If you need the highest consistency, whenever possible, order and arrange delivery for your production runs at one time so your displays will be from the same lot.

About Volatility

This display module has volatile memory.



The Fine Print

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All specifications in Data Sheets and on our website are, to the best of our knowledge, accurate but not guaranteed. Corrections to specifications are made as any inaccuracies are discovered.

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GENERAL CHARACTERISTICS

This is a full color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This display module is composed of a transmissive TFT-LCD panel, driver circuit, and backlight unit. The active area diagonal is 3.2-inches.

GENERAL SPECIFICATIONS

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	48.6(H) *64.8(V) (3.2 inch)	mm	-
Driver element	a-Si TFT active matrix	-	-
Display colors	262K	colors	-
Number of pixels	240(RGB) *320	dots	-
Pixel arrangement	RGB vertical stripe	-	-
Pixel pitch	0.2052(H) *0.2052(V)	mm	-
Viewing angle	9	o'clock	-
Drive IC	OTM3225A	-	-
Display mode	Transmissive/ Normally White	-	-
Operating temperature	-20~+70°C	-	-
Storage temperature	-30~+80°C	-	-

MECHANICAL SPECIFICATIONS

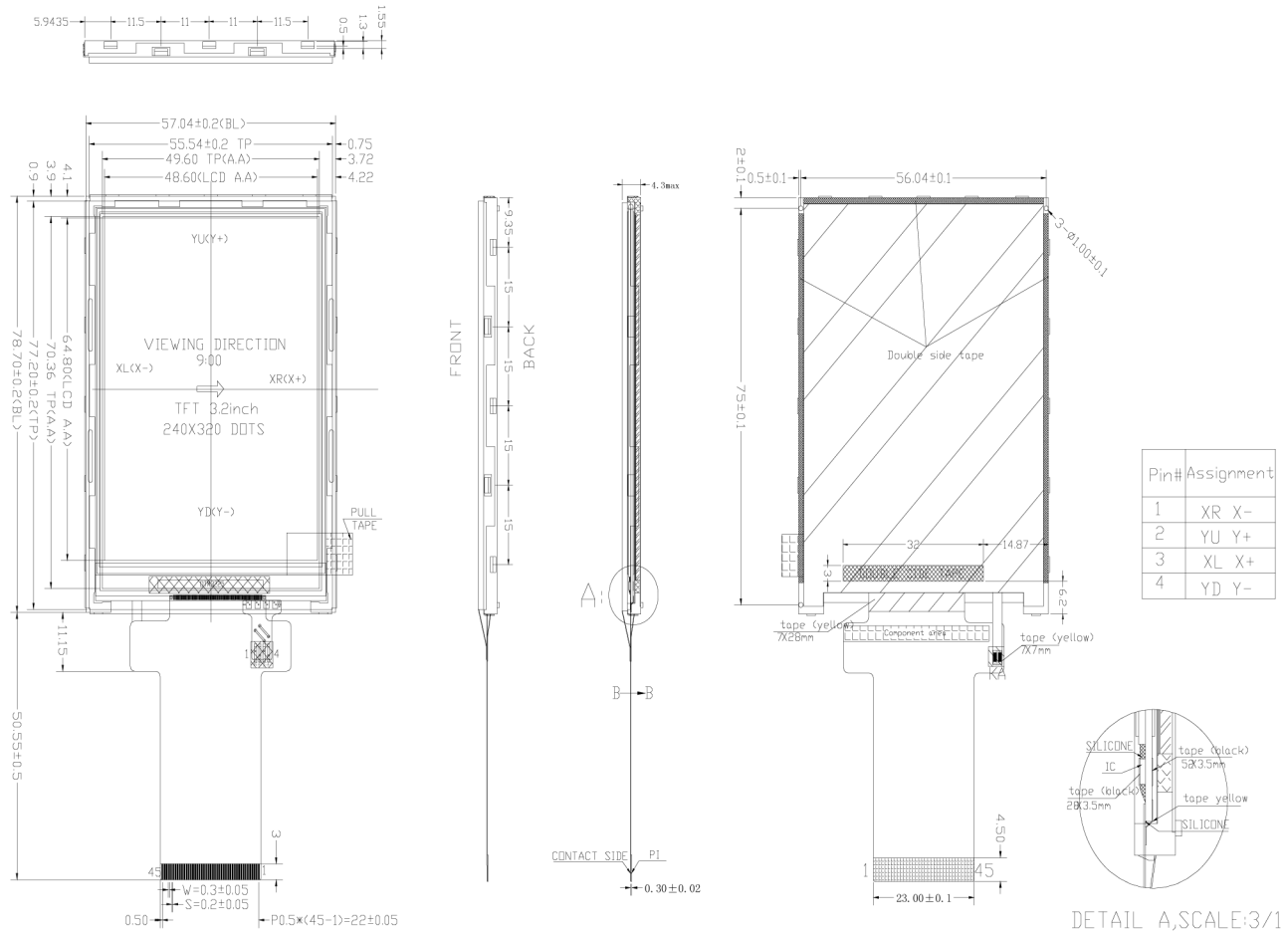
Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)	-	57.04	-	mm	-
	Vertical(V)	-	78.7	-	mm	-
	Depth(D)	-	-	3.1	mm	-
Weight		-	23	-	g	-

ADDITIONAL FEATURES

- Low Input Voltage: V_{CC} : 2.8-3.3v
- Host Interface: 16-bit 8080 parallel
- Internal Power Supply Circuit.
- For interface information and other details on the Orise Tech OTM3225A driver, see [controller datasheets](#) on our website.
- RoHS compliant. Factory is ISO certified. Crystalfontz has a current Certificate of Conformance for ISO 9001:2008.



DISPLAY MODULE OUTLINE DRAWING



Display type:TFT/Normal white
 Display mode:Transmissive
 Viewing direction: 9:00
 Driver IC:TM3225C
 Interface to customer Define
 Logic volatage: 2.8V±3.3
 Backlight: White LED(4-LED serial)
 Vled=12.8±0.5V Iled=20mA
 Operating temperature: -20°C ~ +70°C
 Storage temperature: -30°C ~ +80°C
 Interface connector: FPC

CIRCUIT DIAGRAM

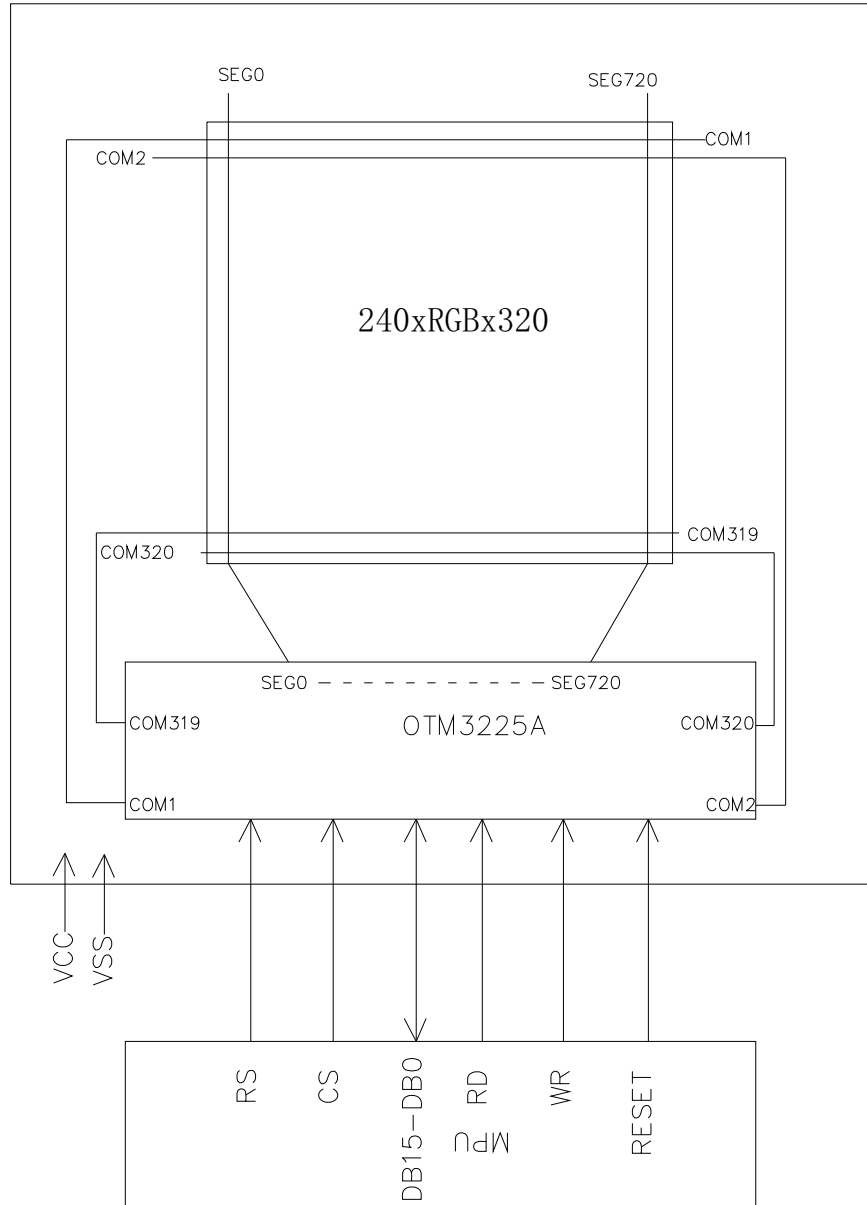


This drawing shows the touch screen (TP) on CFAF240320A-032T-TS.
 The CFAF240320A-032T has identical dimensions except it has no touch screen. Without the touch screen, depth is 3.1 mm.

Drawing deemed accurate but not guaranteed.



SYSTEM BLOCK DIAGRAM





ELECTRICAL SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Supply voltage for Logic	V_{CC}	2.7	2.8	+3.3	V	-
Logic signal input voltage	V_{IN}	-0.3	-	$V_{CCI}+0.3$	V	-
Operating temperature	T_{OP}	-20	-	+70	°C	1,2
Storage temperature	T_{ST}	-30	-	+80	°C	1,2

Note1: Background color changes slightly depending on ambient temperature.
This phenomenon is reversible. $T_a 70^{\circ}\text{C}$: 75%RH max

$T_a > 70^{\circ}\text{C}$: absolute humidity must be lower than the humidity of 75%RH at 70°C

Note2: T_a at -30°C will be <48hrs, at 80°C will be <120hrs

RECOMMENDED DC CHARACTERISTICS (3.0V OPERATION)

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Supply voltage for Logic	V_{CC}	2.7	2.8	3.3	V	-
Current consumption	$I_{CC}+I_{CI}$	-	8		mA	-
Level input voltage	V_{IH}	$0.7V_{CCI}$	-	V_{CCI}	V	-
	V_{IL}	V_{SS}	-	$0.3V_{CCI}$	V	-
Level output voltage	V_{OH}	V_{SS}	-	V_{CCI}	V	-
	V_{OL}	V_{SS}	-	$0.2V_{CCI}$	V	-



DETAILS OF INTERFACE PIN FUNCTIONS

Pin NO.	Symbol	Level	Function
1	IM1	H/L	Interface selected pin 1
2	IM0	H/L	Interface selected pin 0
3	IM3	H/L	Interface selected pin 3
4	IM2	H/L	Interface selected pin 2
5	RESET	L	Hardware reset pin
6	VSYNC	H/L	Vertical sync. Signal in RGB I/F mode.
7	HSYNC	H/L	Horizontal sync. signal in RGB I/F mode
8	DOTCLK	H/L	Pisel clock signal in RGB I/F Mode
9	DEN	H/L	Data enable signal in RGB I/F mode.
10-27	DB17-DB0	H/L	DATA BUS
28	RD	H/L	Read enable clock pin
29	WR	H/L	Write enable clock input pin
30	RS	H/L	A register select signal
31	SDO	H/L	Serial DATA Output
32	SDI	H/L	Serial DATA Input
33	NC	-	NC
34	CS	H/L	Chip select input pin
35	GND	L	Ground
36	VCC	H	Power supply
37	K	H/L	Power supply LED Backlight1-
38	A	H/L	Power supply LED Backlight+
39	GND	L	Ground
40	NC	-	NC
41	NC		NC
42	NC		NC
43	NC		NC
44	NC		NC
45	NC	-	NC

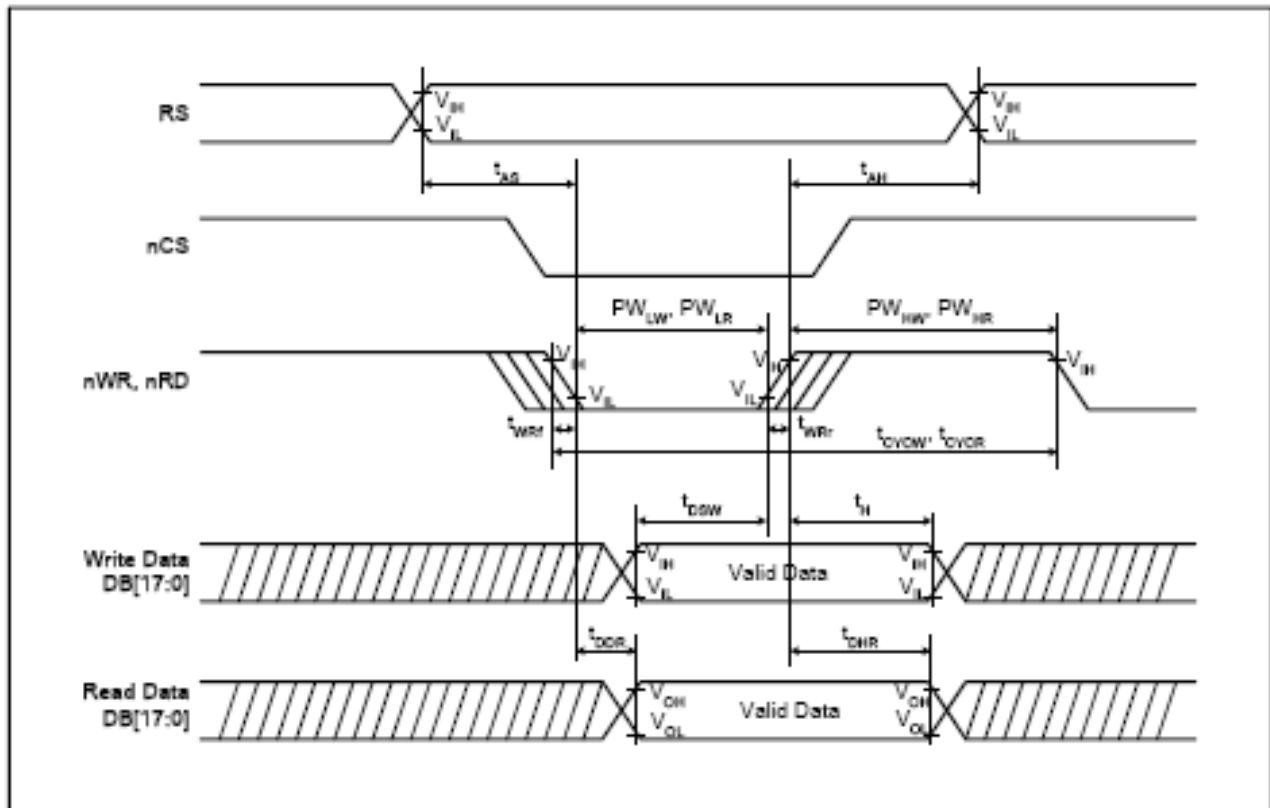
ESD (ELECTRO-STATIC DISCHARGE)

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.



OPERATING PRINCIPLE AND METHODS

- ❑ 80-system bus operation interface timing characteristics.
- ❑ Normal write operation ($V_{CC}=2.5V\sim 3.30v$)
- ❑ Please refer to Orise Tech OTM3225A driver datasheet for more details. See [controller datasheets](#) on our website.



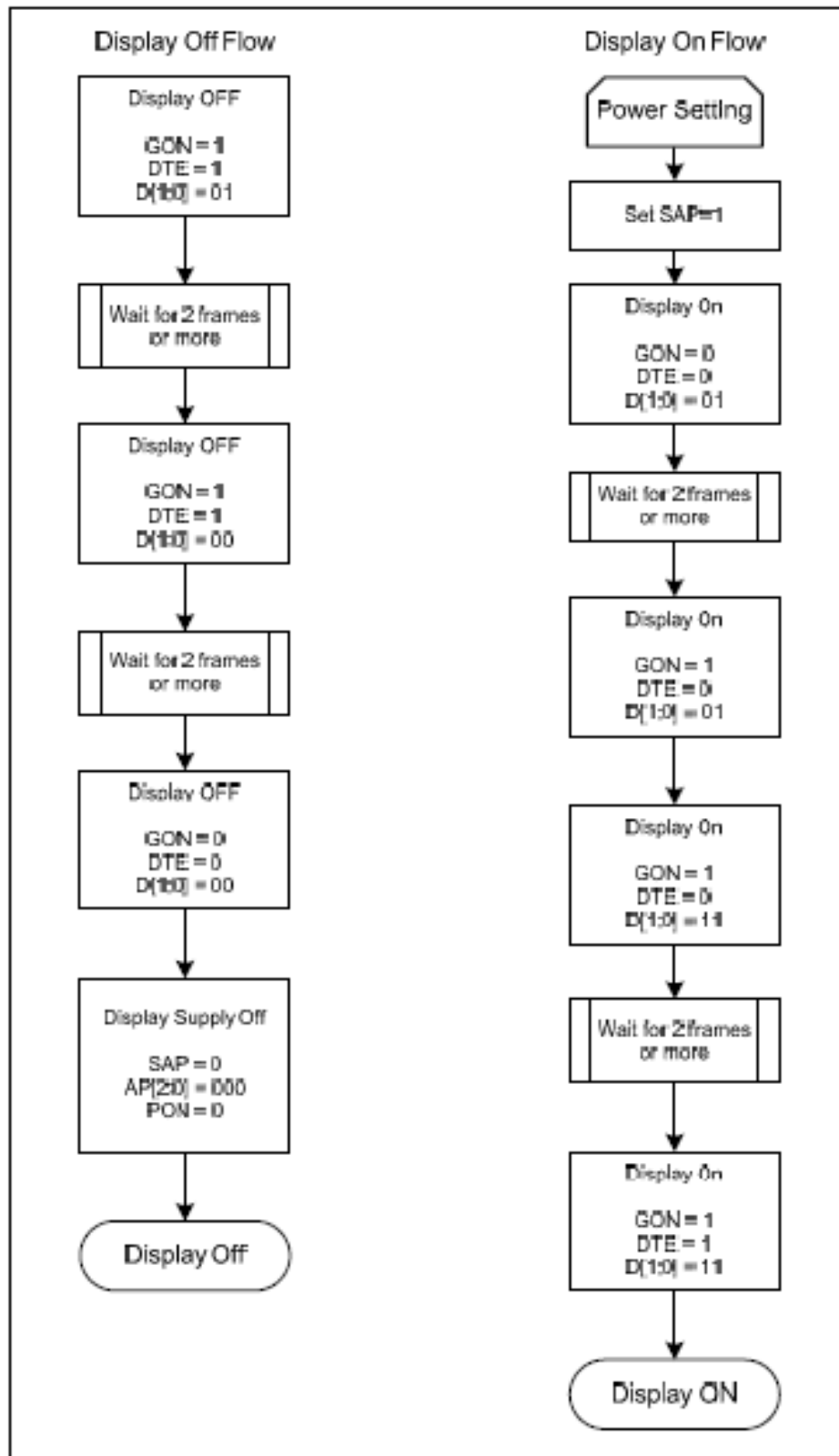


Normal Write Mode (IOVCC = 1.65~3.3V)

Item	Symbol	Unit	Min.	Typ.	Max.	Test Condition
Bus cycle time	Write	t_{CYW}	ns	100	-	-
	Read	t_{CYR}	ns	300	-	-
Write low-level pulse width		PW_{LW}	ns	50	-	-
Write high-level pulse width		PW_{HW}	ns	50	-	-
Read low-level pulse width		PW_{LR}	ns	150	-	-
Read high-level pulse width		PW_{HR}	ns	150	-	-
Write / Read rise / fall time		t_{WR}/t_{WR}	ns	-	-	25
Setup time	Write (RS to nCS, E/nWR)	t_{AS}	ns	10	-	-
	Read (RS to nCS, RW/nRD)			5	-	-
Address hold time		t_{AH}	ns	5	-	-
Write data set up time		t_{DOW}	ns	10	-	-
Write data hold time		t_H	ns	15	-	-
Read data delay time		t_{DDR}	ns	-	-	100
Read data hold time		t_{DHR}	ns	5	-	-



DISPLAY ON/OFF SEQUENCE

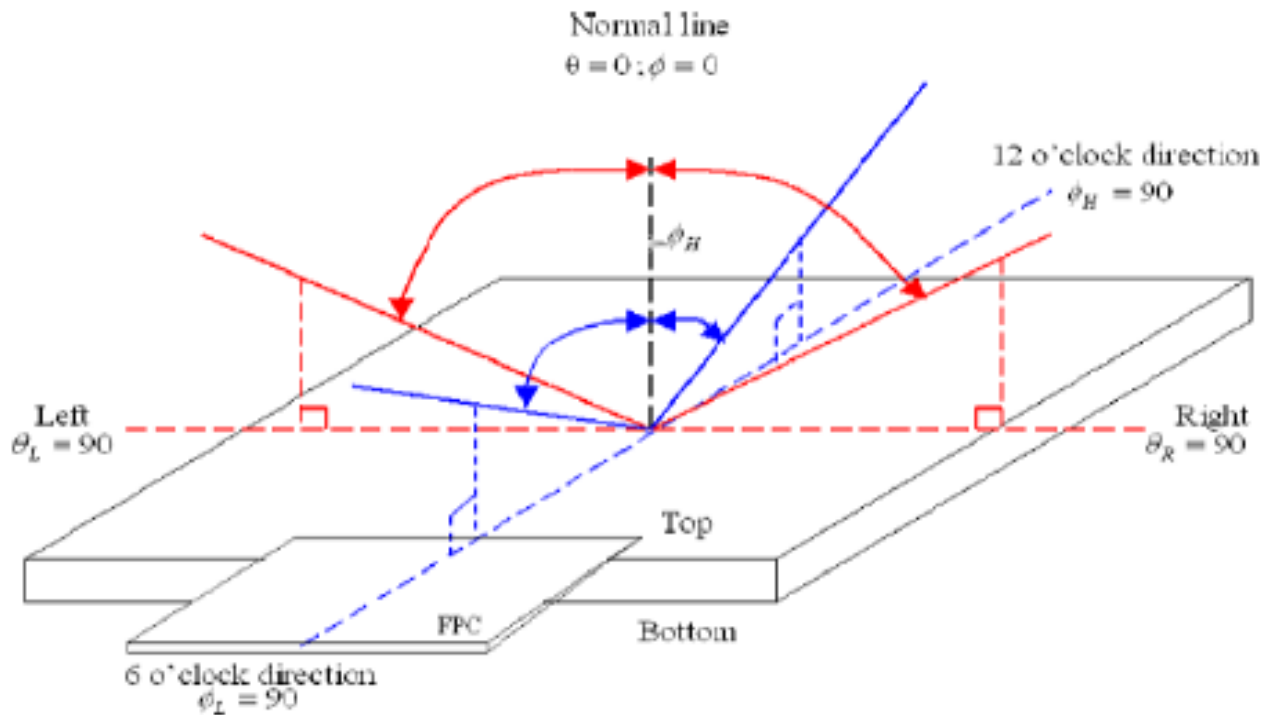




OPTICAL SPECIFICATIONS

The following items are measured under stable conditions. The optical characteristics are measured in a dark room with measuring equipment: LCD-7200, BM-5A, BM-7, PR-650, EZ-Contrast.

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	
Color Filter Chromaticity	White	x	$\theta = \phi = 0^\circ$	0.292	0.312	0.332
		y		0.321	0.341	0.361
	Red	x	$\theta = \phi = 0^\circ$	0.621	0.641	0.661
		y		0.327	0.347	0.367
	Green	x	$\theta = \phi = 0^\circ$	0.284	0.304	0.324
		y		0.553	0.573	0.593
	Blue	x	$\theta = \phi = 0^\circ$	0.115	0.135	0.155
		y		0.101	0.121	0.141
	Gamut			60%		
	Measured by C light					



LED BACKLIGHT CHARACTERISTICS

The backlight is edge-lit with 4 white LEDs in parallel.

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I_F	–	20	–	mA	
Forward Voltage	V_F	12.3	12.8	13.3	V	–
LCM Luminance	L_V		TBD	–	cd/m ²	
Uniformity	AVg	80	–	–	%	–

RELIABILITY AND LONGEVITY

DISPLAY MODULE RELIABILITY TEST RESULTS

Item	Condition	Sample Size	Test Result	Note
Low Temperature Operating Life test	-20 °C, 96HR	3ea	pass	-
Thermal Humidity Operating Life test	40 °C, 90%RH, 96HR	3ea	pass	-
Temperature Cycle ON/OFF test	-20 °C ↔ 70 °C, ON/OFF, 20CYC	3ea	pass	(1)
High Temperature Storage test	80 °C, 96HR	3ea	pass	-
Low Temperature Storage test	- 30 °C, 96HR	3ea	pass	-
Thermal Shock Resistance	The sample should be allowed to stand the following 5 cycles of operation: TSTL for 30 minutes -> normal temperature for 5 minutes -> TSTH for 30 minutes -> normal temperature for 5 minutes, as one cycle, then taking it out and drying it at normal temperature, and allowing it stand for 24 hours	3ea	pass	

Note: On and off >10 seconds each.



DISPLAY MODULE RELIABILITY

PART NUMBER	SPECIFICATION
CFAF240320A-032T	Brightness will be >50% of a new display module's initial brightness for at least 10,000 hours of operation when supply to each LED is below 20 mA.
<p><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></p> <p><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></p>	

DISPLAY MODULE LONGEVITY (EOL/REPLACEMENT POLICY)

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

We recognize that discontinuing a display 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 display module. For example, we must occasionally discontinue a display module when a supplier discontinues a component or a manufacturing process becomes obsolete. When we discontinue a display module, we will do our best to find an acceptable replacement display 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 display module to the discontinued display module. However, sometimes a change in component or process for the replacement display module results in a slight variation, perhaps an improvement, over the previous design.

Although the replacement display module is still within the stated Data Sheet specifications and tolerances of the discontinued display 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.* Display 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 display module whenever possible; we only discontinue a display 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.



CARE AND HANDLING PRECAUTIONS

For optimum operation of the display module and to prolong its life, please follow the precautions below.

Excessive voltage will shorten the life of the display module. You must drive the display within the specified voltage limit. See [Absolute Maximum Ratings \(Pg. 8\)](#).

HANDLING CAUTION FOR DISPLAY MODULES SHIPPED IN TRAYS

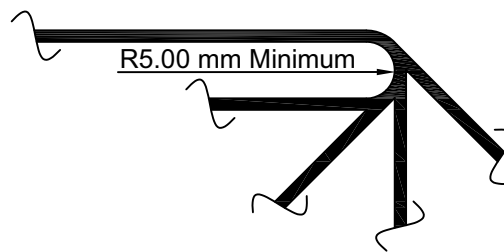
If you receive display modules packed in trays, handle trays carefully by supporting the entire tray. Trays were made to immobilize the display modules inside their packing carton. Trays are not designed to be rigid. Do not carry trays by their edges; trays and display modules may be damaged.

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.

DESIGN AND MOUNTING

- The Orise Tech OTM3226A driver maintains its internal operating modes until something happens to change it. Excessive external noise can change these internal modes. In your packaging and system design, suppress or prevent the noise from influencing the controller. Also, refresh the operating modes periodically to prevent the effects of unanticipated noise.
- The exposed surface of the “glass” is actually a polarizer laminated on top of the glass. To protect the soft plastic polarizer from damage, the display module ships with a protective film over the polarizer. Please peel off the protective film slowly. Peeling off the protective film abruptly may generate static electricity.
- The polarizer is made out of soft plastic and is easily scratched or damaged. When handling the display module, avoid touching the polarizer. Finger oils are difficult to remove.
- To protect the soft plastic polarizer from damage, place a transparent plate (for example, acrylic, polycarbonate, or glass) in front of the display module, leaving a small gap between the plate and the display surface. We use GE HP-92 Lexan, which is readily available and works well.
- Do not disassemble or modify the display module.
- Do not reverse polarity to the power supply connections. Reversing polarity will immediately ruin the display module.
- Sharp bends can damage the FFC/FPC flexible cable. Do not crease the cables. Do not bend the cable tightly against the edge of the LCD panel. Do not repeatedly bend the cable beyond its elastic region. Limit bend radius to at least R5.00 mm.



- Do not repeatedly bend the FFC/FPC flexible tail beyond its elastic region.



AVOID SHOCK, IMPACT, TORQUE, OR TENSION

- Do not expose the display module to strong mechanical shock, impact, torque, or tension.
- Do not drop, toss, bend, or twist the display module.
- Do not place weight or pressure on the display module.

IF TFT PANEL BREAKS

All electronics may contain harmful substances. Avoid contamination by using care to avoid damage during handling. If any residues, gases, powders, liquids, or broken fragments come in contact with your skin, eyes, mouth, or lungs, immediately contact your local poison control or emergency medical center.

HOW TO CLEAN

1. Turn display off.
2. Use the removable protective film to remove smudges (for example, fingerprints) and any foreign matter. If you no longer have the protective film, use standard transparent office tape (for example, Scotch® brand “Crystal Clear Tape”).
3. If the polarizer is dusty, you may carefully blow it off with clean, dry, oil-free compressed air.
4. If you must clean with a liquid, never use glass cleaners, as they may contain ammonia or alcohol that will damage the polarizer over time. Never apply liquids directly on the polarizer. Long contact with moisture may permanently spot or stain the polarizer. Use filtered water to slightly moisten a clean lint-free microfiber cloth designed for cleaning optics. (For example, use a cloth sold for cleaning plastic eyeglasses.)
5. The plastic is easily scratched or damaged. Use a light touch as you clean the polarizer. Wipe gently.
6. Use a dry microfiber cloth to remove any trace of moisture before turning on the TFT.
7. Gently wash the microfiber cloths in warm, soapy water and air dry before reuse.

OPERATION

- We do not recommend connecting this display module to a PC's parallel port as an end product. This display module is not “user friendly” and connecting it to a PC's parallel port is often difficult, frustrating, and can result in a “dead” display due to mishandling. For more information, see our forum thread at <http://www.crystalfontz.com/forum/showthread.php?s=&threadid=3257>.
- Your circuit should be designed to protect the display module from ESD and power supply transients.
- Observe the operating temperature limitations. Operation outside of these limits may shorten life and/or harm display. Changes in temperature can result in changes in contrast.
 - At lower temperatures of this range, response time is delayed.
 - At higher temperatures of this range, display becomes dark. (You may need to adjust the contrast.)
- Operate away from dust, moisture, and direct sunlight.

STORAGE AND RECYCLING

- Store in an ESD-approved container away from dust, moisture, and direct sunlight, fluorescent lamps, or any strong ultraviolet radiation.
- Observe the storage temperature limitations. Rapid temperature changes can cause moisture to form, resulting in permanent damage.
- Do not allow weight to be placed on the display modules while they are in storage.
- Please recycle your outdated Crystalfontz modules at an approved facility.



APPENDIX A: QUALITY ASSURANCE STANDARDS

INSPECTION CONDITIONS

- Environment
 - Temperature: 25±5°C
 - Humidity: 30~85% RH (noncondensing)
- For visual inspection of active display area
 - Source lighting: two 20-Watt or one 40-Watt fluorescent light
 - Display adjusted for best contrast
 - Viewing distance: 30±5 cm (about 12 inches)
 - Viewing angle: inspect at 45° angle of vertical line right and left, top and bottom

COLOR DEFINITIONS

We try to describe the appearance of our modules as accurately as possible. For the photos, we adjust for optimal appearance. Actual display appearance may vary due to (1) different operating conditions, (2) small variations of component tolerances, (3) inaccuracies of our camera, (4) color interpretation of the photos on your monitor, and/or (5) personal differences in the perception of color.

ACCEPTANCE SAMPLING

DEFECT TYPE	AQL*
Major	≤.65%
Minor	<1.0%
* Acceptable Quality Level: maximum allowable error rate or variation from standard	

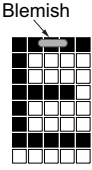
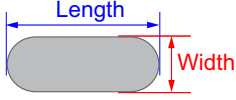
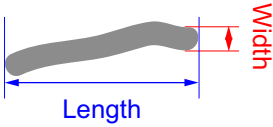
DEFECTS CLASSIFICATION

Defects are defined as:

- Major Defect: results in failure or substantially reduces usability of unit for its intended purpose.
- Minor Defect: deviates from standards but is not likely to reduce usability for its intended purpose.



ACCEPTANCE STANDARDS

#	DEFECT TYPE	ACCEPTANCE STANDARDS CRITERIA			MAJOR/ MINOR	
1	Electrical defects	1. No display, display malfunctions, or shorted segments. 2. Current consumption exceeds specifications.			Major	
2	Viewing area defect	Viewing area does not meet specifications).			Major	
3	Contrast adjustment defect	Contrast adjustment fails or malfunctions.			Major	
4	Blemishes or foreign matter on display segments		<i>Defect Size (mm)</i>	<i>Acceptable Qty</i>	Minor	
			≤0.3	3		
			≤2 defects within 10 mm of each other			
5	Other blemishes or foreign matter outside of display segments	Defect size = $(A + B)/2$ 	<i>Defect Size (mm)</i>	<i>Acceptable Qty</i>	Minor	
			≤0.15	Ignore		
			0.15 to 0.20	3		
			0.20 to 0.25	2		
			0.25 to 0.30	1		
6	Dark lines or scratches in display area		<i>Defect Width (mm)</i>	<i>Defect Length (mm)</i>	<i>Acceptable Qty</i>	Minor
			≤0.03	≤3.0	3	
			0.03 to 0.05	≤2.0	2	
			0.05 to 0.08	≤2.0	1	
			0.08 to 0.10	≤3.0	0	
			≥0.10	>3.0	0	
7	Bubbles between polarizer film and glass		<i>Defect Size (mm)</i>	<i>Acceptable Qty</i>	Minor	
			≤0.20	Ignore		
			0.20 to 0.40	3		
			0.40 to 0.60	2		
			≥0.60	0		



#	DEFECT TYPE	ACCEPTANCE STANDARDS CRITERIA (Continued)	MAJOR/ MINOR							
8	Display pattern defect		Minor							
		<table border="1"> <thead> <tr> <th>Dot Size (mm)</th> <th>Acceptable Qty</th> </tr> </thead> <tbody> <tr> <td>$((A+B)/2) \leq 0.2$</td> <td rowspan="5"> ≤ 3 total defects ≤ 2 pinholes per digit </td> </tr> <tr> <td>$C > 0$</td> </tr> <tr> <td>$((D+E)/2) \leq 0.25$</td> </tr> <tr> <td>$((F+G)/2) \leq 0.25$</td> </tr> </tbody> </table>		Dot Size (mm)	Acceptable Qty	$((A+B)/2) \leq 0.2$	≤ 3 total defects ≤ 2 pinholes per digit	$C > 0$	$((D+E)/2) \leq 0.25$	$((F+G)/2) \leq 0.25$
		Dot Size (mm)		Acceptable Qty						
		$((A+B)/2) \leq 0.2$		≤ 3 total defects ≤ 2 pinholes per digit						
		$C > 0$								
$((D+E)/2) \leq 0.25$										
$((F+G)/2) \leq 0.25$										
9	Backlight defects	<ol style="list-style-type: none"> 1. Light fails or flickers.* 2. Color and luminance do not correspond to specifications.* 3. Exceeds standards for display's blemishes or foreign matter (see test 5, Pg. 19), and dark lines or scratches (see test 6, Pg. 19). <p><i>*Minor if display functions correctly. Major if the display fails.</i></p>	Minor							
10	COB defects	<ol style="list-style-type: none"> 1. Pinholes > 0.2 mm. 2. Seal surface has pinholes through to the IC. 3. More than 3 locations of sealant beyond 2 mm of the sealed areas. 	Minor							
11	PCB defects	<ol style="list-style-type: none"> 1. Oxidation or contamination on connectors.* 2. Wrong parts, missing parts, or parts not in specification.* 3. Jumpers set incorrectly. 4. Solder (if any) on bezel, LED pad, zebra pad, or screw hole pad is not smooth. <p><i>*Minor if display functions correctly. Major if the display fails.</i></p>	Minor							
12	Soldering defects	<ol style="list-style-type: none"> 1. Unmelted solder paste. 2. Cold solder joints, missing solder connections, or oxidation.* 3. Solder bridges causing short circuits.* 4. Solder balls. <p><i>*Minor if display functions correctly. Major if the display fails.</i></p>	Minor							



APPENDIX B: TFT MODULE TERMS AND SYMBOLS

Term / Symbol	Description
A (LED +)	Supply pin for LED. "A" (anode) or "+" of LED backlight. If more than one, may be labeled as A ₁ , A ₂ , ...
cd/m ² lumen nits	Candela per square meter. A unit of measurement used to measure Luminous Intensity. cd/m ² = 1 lumen.
$\overline{\text{CS}}$ CS# CSX	Chip select input. <i>Low</i> : Controller chip is selected. Communications with host are possible. <i>High</i> : Controller chip is not selected. Host interface signals are ignored by the controller.
COF	Chip On Flex. Controller is on the FPC. Similar in appearance to "TAB". The flex circuit on COF is typically much thinner than the flex of a "flex tail".
COG	Chip On Glass. Controller is on the glass panel.
DB0 ~ DBn D0 ~ Dn	Parallel databus.
$\overline{\text{D/C}}$ RS DCX A0 CD D/C#	Data/Command control. Determines whether data bits are data or command. <i>1 – High</i> : Addresses the data register. <i>0 – Low</i> : Addresses the command register.
DE DEN	Data Enable signal for RGB / DPI mode.
DPI DOTCLK parallel	Displays Pixel Interface
DCLK	Dot-clock signal and oscillator source. A non-stop external clock must be provided to that pin even at front or back porch non-display period. RGB interface only.
ESD	Electro-Static Discharge. Sudden and brief electrical current that flows between two objects. ESD between a human and a TFT module can cause permanent damage.
FFC	Flat Flexible Cable. Also called "flex tail" or "pigtail". Typically thinner than the "flex" film of COG (Chip On Glass).
FPC	Flexible Printed Circuit. Also called "flex tail". Typically much thicker than the "flex" film of COF (Chip On Flex).
GND V _{SS}	Ground. Must be connected to an external ground.
H _{SYNC}	Horizontal frame/RAM write synchronizing signal used for RGB mode only.



Term / Symbol	Description																														
I _{DD}	Typical power supply current for TFT. Total electrical current (I) in the Drains of a CMOS circuit																														
I _{LED}	Current used by LED backlight.																														
IM _n	Interface mode select pin where <i>n</i> is the corresponding number.																														
I _{OP} V _{CCI}	Current for normal OPERATION, typically measured in milliamperes (mA). 1 mA = 0.001A (Ampere)																														
I _{ST}	Current for STANDby mode, typically measured in microampere (μA). 1 μA = 0.000001A (Ampere)																														
I/O IO	Input/Output																														
K (LED -)	Supply pin for LED. “K” (cathode or kathode for German and original Greek spelling) or “-” of LED backlight. If more than one, may be labeled as K ₁ , K ₂ , ...																														
MIPI	Mobile Industry Processor Interface. See MIPI Alliance .																														
MISO SDO D _{OUT}	Data output signal in serial SPI interface: Master In Slave Out. Serial Data Out.																														
MOSI SDI SI DINI_SDA	Data output signal in serial SPI interface: Master Out Slave In. Serial Data In.																														
mm	Millimeter or millimetre. Unit of length equal to one thousandth of a meter. 1 millimeter = 0.0394 inches.																														
mW	Milliwatt is equal to one thousandth of a Watt. Watts = Volts x Amps.																														
NC nc	Make No Connection.																														
P _{CLK}	Pixel clock signal for RGB / DPI mode.																														
PS _n -PS ₀	<table border="1"> <thead> <tr> <th>PS3</th> <th>PS2</th> <th>PS1</th> <th>PS0</th> <th>Interface Mode</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>16-bit 6800 parallel interface. (if available)</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>8-bit 6800 parallel interface. (if available)</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>0</td> <td>16-bit 8080 parallel interface.</td> </tr> <tr> <td colspan="5" style="text-align: center;">.....</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>1</td> <td>8-bit 8080 parallel interface. (if available)</td> </tr> </tbody> </table>	PS3	PS2	PS1	PS0	Interface Mode	0	0	0	0	16-bit 6800 parallel interface. (if available)	0	0	0	1	8-bit 6800 parallel interface. (if available)	0	0	1	0	16-bit 8080 parallel interface.					0	0	1	1	8-bit 8080 parallel interface. (if available)
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Term / Symbol	Description
PWM	Pulse Width Modulation is a way to simulate intermediate levels by switching a level between full on and full off. PWM is typically used to control the brightness of LED backlights, relying on the natural averaging by the human eye.
\overline{RD}_{8080} (E_{6800}) \overline{RD} (E) E (RD) E RDX	Host interface input. <i>8080 Host</i> : Active low. Signal on the databus is latched at the rising edge of \overline{RD} . <i>6800 Host (if available)</i> : Enable control signal input active high. E = <i>High</i> : Read or Write operation is active E = <i>Low</i> : No operation
RGB	Typically used to indicate that Red, Green, and Blue are combined to produce a broad array of colors.
RH Rh	Relative Humidity
RoHS	Restriction of Hazardous Substances Directive, an environmental standard.
\overline{RST} RES RST# RES# RESET#	Reset signal. <i>Low</i> : Display controller is reset. The \overline{RST} pin should be pulsed low shortly after power is applied. <i>High</i> : The \overline{RST} pin should be brought high for normal operation.
SCK SCL	Serial Clock
Ta TA	"Ambient temperature" is the temperature of the air that surrounds a component.
Tf	Unit of measurement for TFT response time. f = falling edge.
TFT	Thin-Film Transistor fabricated directly on the display substrate.
TOP	OPERating Temperature.
Tr	Unit of measurement for TFT response time. r = rising edge.
T _{ST} T _{STG}	STorage Temperature.
V _{ANALOG} V _{CI}	Analog supply,
V _{IH} V _{ICH}	High level input voltage.
V _{IL} V _{LCH}	Low level input voltage.



Term / Symbol	Description
V_{IN} V_T	Input voltage
V_{LED}	Forward voltage for LED backlight.
V_{LOGIC} V_{CC} V_{DD} V_{CI}	Power supply input. Must be connected to an external source.
$V_{LOGIC\ I/O}$ V_{CCIO} IO_{VCC}	Digital Logic Supply and Input/Output Supply
V_O V_{ADJ}	Supply voltage for driving LCD (contrast adjustment).
V_{OH} V_{OHC}	High level output voltage.
V_{OL} V_{OLC}	Low level output voltage.
V_{SSD}	Digital ground.
V_{SYNC}	Vertical frame/RAM write synchronizing signal used for RGB mode only.
\overline{WR}_{8080} R/\overline{W} (\overline{WR}) \overline{WR} (R/ \overline{W}) $R/\overline{W}\#$	Host interface input. <i>8080 Host:</i> Active low. Signal on the databus is latched at the rising edge of \overline{WR} signal. <i>6800 Host (if available):</i> Read/Write control signal output. R/\overline{W} = High: Read (Host←Module) R/\overline{W} = Low: Write (Host→Module)
$\overline{WR_SCK}$	<i>DBI Type-B:</i> Serves as a write signal and write data at the low level. <i>DBI Type-C:</i> it serves as SCK (Serial Clock). If unused, tie to $V_{LOGIC\ I/O}$.