TFT GRAPHIC DISPLAY MODULE DATASHEET

Datasheet Release Date 2017-10-04
for
CFAF240320V SERIES

- **CFAF240320V -020T**
- **CFAF240320V -020T-TS**

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1. General Information

Datasheet Revision History
Datasheet Release: **2017-10-04** Datasheet for the CFAF240320V Series graphic display modules.

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

The CFAF240320V series is a full color active matrix TFT (Thin Film Transistor) LCD (Liquid Crystal Display) that uses an amorphous silicon TFT as a switching device. These displays are composed of a transmissive TFT-LCD panel, driver circuit, and an LED backlight. The resolution of these 2.0-inch diagonal active area displays is 240x320 pixels. They can display up to 65/262K colors. This display module has a built-in Sitronix ST7789V Controller.

Please see Sitronix ST7789V LCD Controller Datasheet for further reference.

3. Module Variants

- CFAF240320V-020T (TN TFT without touch screen)
- CFAF240320V-020T-TS (TN TFT with touchscreen)

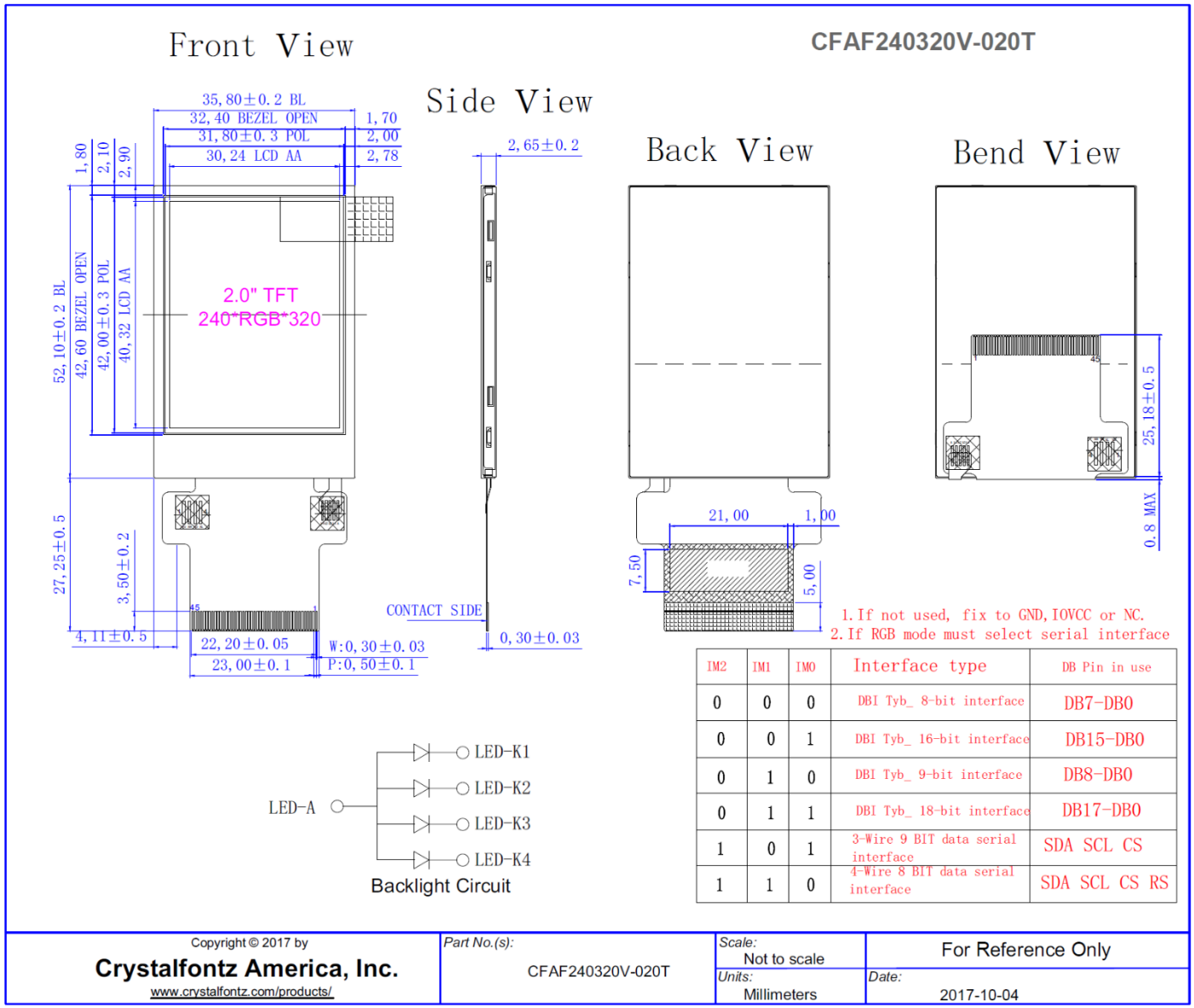
4. Features

- 240*320 Dot Matrix
- +3.3V Power Supply
- Viewing Direction: 12 o'clock
- Built-in Controller: Sitronix ST7789V (or equivalent)
- Operating Temperature: -20°C to +70°C
- Storage Temperature: -30°C to +80°C
- Interface: 8/9/16/18-Bit MCU / 3/4SPI+16/18-Bit RGB / 3-line/4-line Serial

5. Mechanical Data

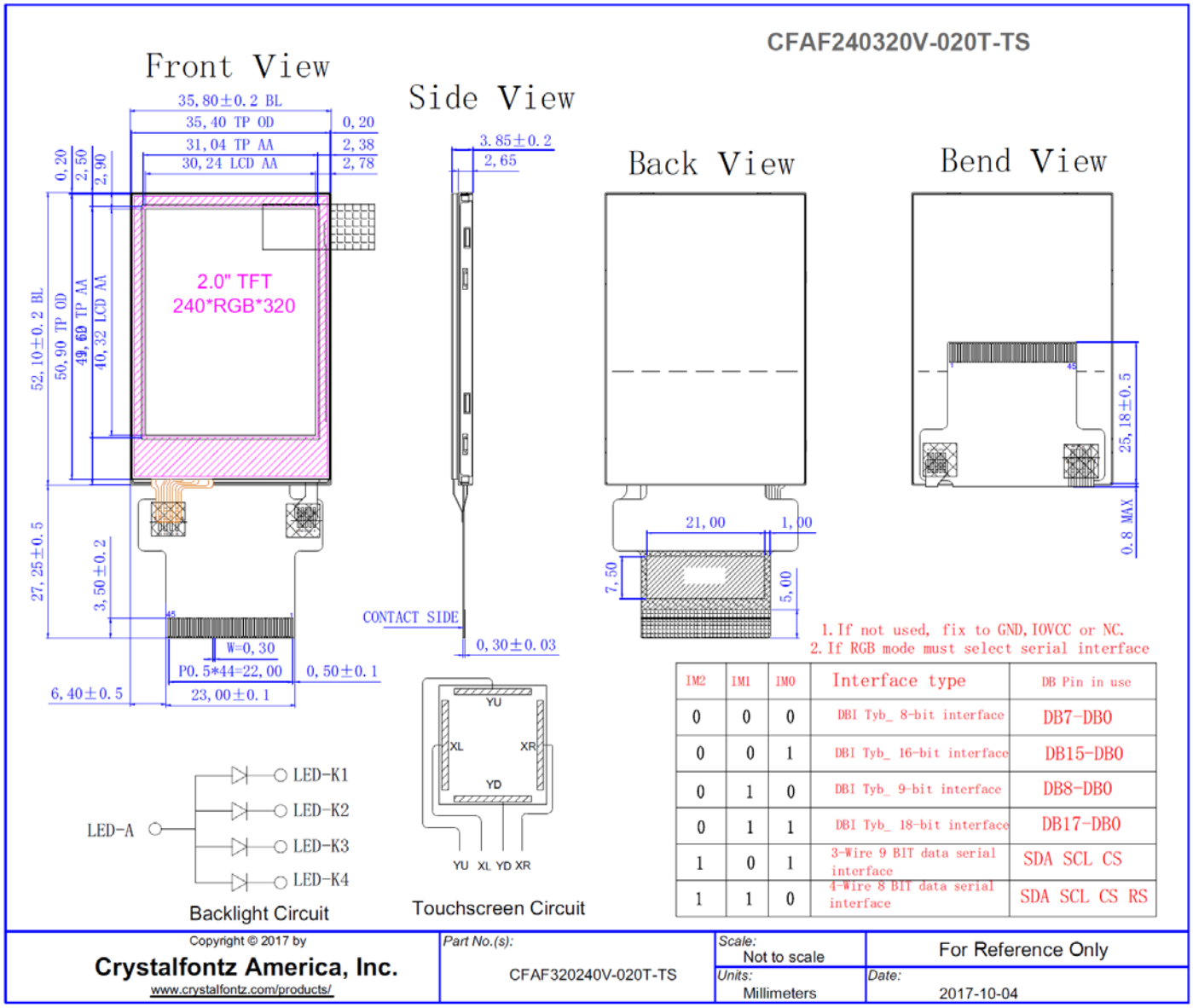
Item	Specification (mm)	Specification (inch, reference)
Overall Module Dimension	35.80 (W) x 52.10 (H) x 2.65 (D)	1.311 (W) x 1.504 (H) x 0.110 (D)
Active Area	30.24 (W) x 40.32 (H)	1.004 (W) x 1.043 (H)
Pixel Pitch	0.126 (W) x 0.126 (H)	0.008 (W) x 0.008 (H)
Pixel Arrangement	RGB Vertical Stripe	-
Display Mode	Transmissive	-
Display Colors	65K/262K	-

6. Mechanical Drawings



IM2	IM1	IM0	Interface type	DB Pin in use
0	0	0	DBI Tyb_ 8-bit interface	DB7-DB0
0	0	1	DBI Tyb_ 16-bit interface	DB15-DB0
0	1	0	DBI Tyb_ 9-bit interface	DB8-DB0
0	1	1	DBI Tyb_ 18-bit interface	DB17-DB0
1	0	1	3-Wire 9 BIT data serial interface	SDA SCL CS
1	1	0	4-Wire 8 BIT data serial interface	SDA SCL CS RS

Copyright © 2017 by **Crystalfontz America, Inc.** www.crystalfontz.com/products/	Part No.(s): CFAF240320V-020T	Scale: Not to scale	For Reference Only
		Units: Millimeters	Date: 2017-10-04



IM2	IM1	IM0	Interface type	DB Pin in use
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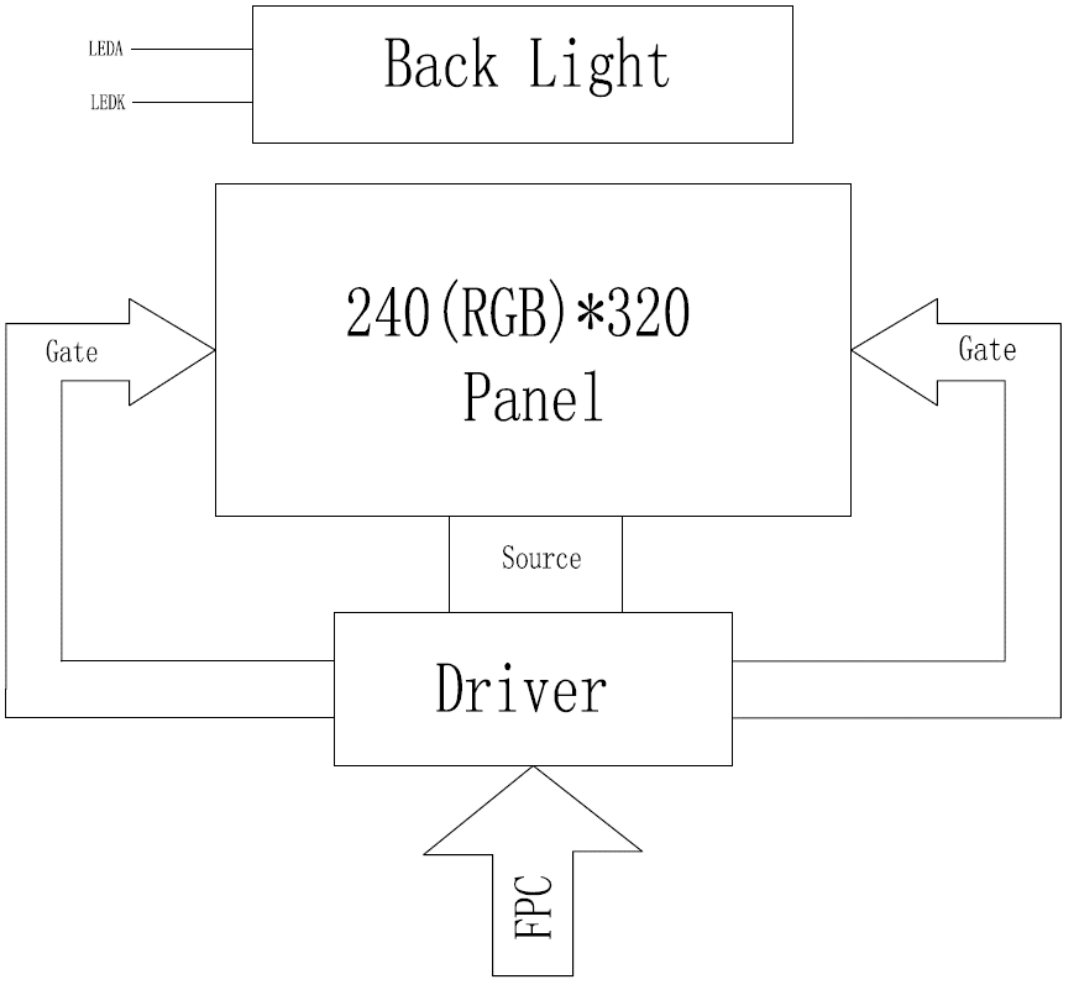
0	0	1	DBI Tyb_ 16-bit interface	DB15-DB0
0	1	0	DBI Tyb_ 9-bit interface	DB8-DB0
0	1	1	DBI Tyb_ 18-bit interface	DB17-DB0
1	0	1	3-Wire 9 BIT data serial interface	SDA SCL CS
1	1	0	4-Wire 8 BIT data serial interface	SDA SCL CS RS

Part No.(s):	Scale:	For Reference Only
CFAF320240V-020T-TS	Not to scale	
	Units: Millimeters	Date: 2017-10-04

7. System Block Diagram



8. Interface Pin Function

Pin No.	Symbol	Level	Function
1	GND	P	Ground
2	VCI	P	Supply Voltage (3.3v)
3	IOVCC	P	Supply Voltage (1.65-3.3v)
4	IM2	I	MPU Parallel Interface Bus and Serial Interface Select. If using RGB Interface you must select serial interface. Fix this pin at VCI and GND.
5	IM1	I	
6	IM0	I	
7	RESET	I	This signal will reset the device. Must be applied to properly initialize the chip.
8	CS	I	Chip Select Input Pin (“Low” enable). Fix this pin at VCI or GND when not in use.
9	DC (SPI-SCL)	I	Display Data/Command Selection Pin in Parallel Interface. This pin is used for Serial Interface Clock. DC=’1’: Display Data or Parameter. DC=’0’: Command Data. If not used, fix this pin at VDDI or DGND.
10	WR (SPI-RS)	I	Write Enable in MCU Parallel Interface. Display Data/Command Selection Pin in 4-line Serial Interface. Second Data Lane in 2 Data Lane Serial Interface. If not used, fix this pin at VDDI or DGND.
11	RD	I	Serves as a Read Signal and MCU Read Data at the Rising Edge. If not used, fix this pin at VCI or GND.
12	VSYNC	I	Frame Synchronizing Signal for RGB Interface Operation. If not used, fix this pin at VCI or GND.
13	HSYNC	I	Line synchronizing signal for RGB interface operation. If not used, fix this pin at VCI or GND.
14	ENABLE	I	Data Enable Signal for RGB Interface Operation. If not used, fix this pin at VCI or GND.
15	DOTCLK	I	Dot Clock Signal for RGB Interface Operation. If not used, fix this pin at VCI or GND.
16	SDA	I	The Data is Latched on the Rising Edge of the SCL Signal. If not used, fix this pin to GND.
17-34	DB0-DB7	I/O	18-Bit Parallel Bi-directional Data Bus for MCU System and RGB Interface Mode.
35	SDO	O	SPI Interface Output Pin The Data is Output on the Falling Edge of the SCL Signal.
36	LEDA	P	Anode Pin of Backlight
37	LEDK1	P	Cathode Pin of Backlight
38	LEDK2	P	Cathode Pin of Backlight
39	LEDK3	P	Cathode Pin of Backlight
40	LEDK4	P	Cathode Pin of Backlight
41	XL	A/D	Touch Panel, Left Glass Terminal (No Touchscreen = No Connection)
42	YU	A/D	Touch Panel, Top Film Glass Terminal (No Touchscreen = No Connection)
43	XR	A/D	Touch Panel, Right Glass Terminal (No Touchscreen = No Connection)
44	YD	A/D	Touch Panel, Bottom Film Glass Terminal (No Touchscreen = No Connection)
45	GND	P	Ground

9. 4-Wire Resistive Touch Screen

The touch screen must be driven in one direction, then read in the other direction.

- Typically, the kind of micro-controller that supports the RGB / DPI interface (ARM9, etc.), will also have ADC pins that can be used directly to read the touch screen.
- TI (Texas Instruments) makes I²C / SPI and low-level touch screen controllers. (Typical: www.ti.com/product/tsc2046e).

BASIC CONCEPT FOR READING 4-WIRE RESISTIVE TOUCH SCREENS

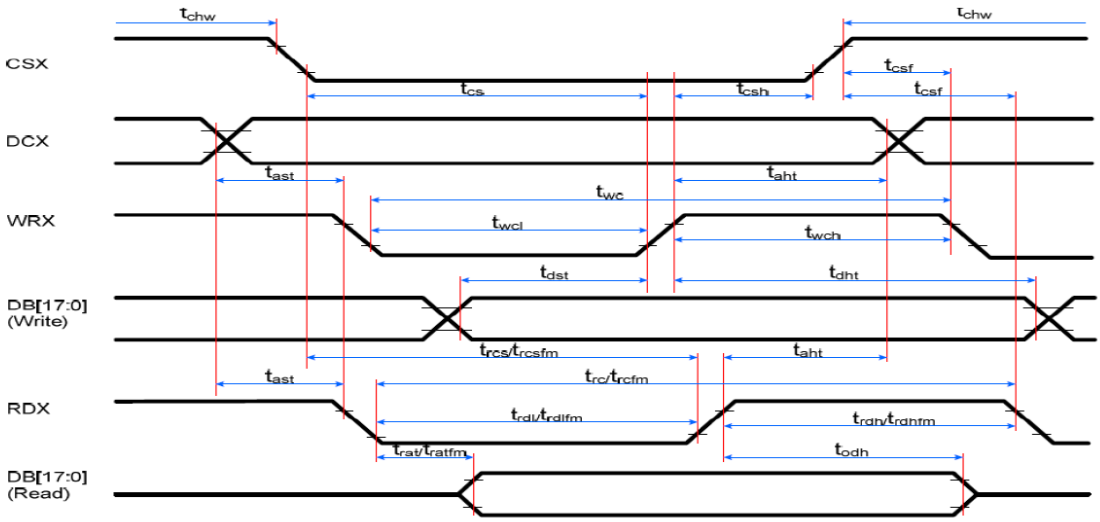
Create a voltage gradient across the X set of electrodes by setting both X pins to digital output, then driving one low and the other high. Set both Y pins to inputs, with one pin configured as an analog input. Use the Y analog pin to read the voltage. This reading will correspond to the X coordinate of the touch. To read the other channel, reverse the process with the Y pins configured as digital and one X pin as analog. Other factors may need to be addressed such as references, calibration, calibration drift, non-contact, taps, and double taps.

TOUCH SCREEN FEATURES

Item	Condition		Note
Temperature range upon operation	Humidity: 20%-90% non-dew, condensation -20°C ~ 70°C		In a simple substance
Temperature range upon storage	Humidity: 20%-90% non-dew, condensation -30°C ~ 80°C		In a simple substance
Item	**Value**		**Note**
Maximum Voltage	DC5v		-
Resistance Between Terminals	X direction [Film Side]: 200-600Ω Y direction [Glass Side]: 300-900Ω		-
Insulation Resistance	DC 25v 20 MΩ or above		Connect X+~Y and Y+~Y, apply 25v DC between X and Y for performance measurements.
Chattering	10 ms or below		-
Rating	Voltage is DC 5v		-
Item	**Performance**		**Note**
Input Method	Using a Stylus or Finger		-
Load Upon Operation	Stylus	60-100g or below	Operation and measurement with a stylus must have the following tip conditions: Stylus material: POM(polyacetal). Tip: Diameter 3.0 mm, SR 0.8 mm
	Finger	60-100g or below	Operation and measurement with a simulated finger must have the following tip conditions: Material: Silicon rubber (Hardness: 30°Hs) Tip: Diameter 12.0 mm, SR 12.5mm
Surface Hardness	Pencil Hardness: 3H or above		Complies with test method JIS K5400.
Item	**Performance**		**Note**
Total Light Transmittance	80% or above		JIS K7105
Haze	5% or below		JIS K7136
Film Specification	Polished type wit hared coated surface		-

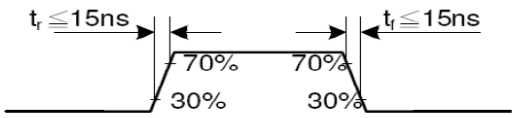
10. AC Characteristics

Parallel 8/16-Bit Interface Timing Characteristics (8080)

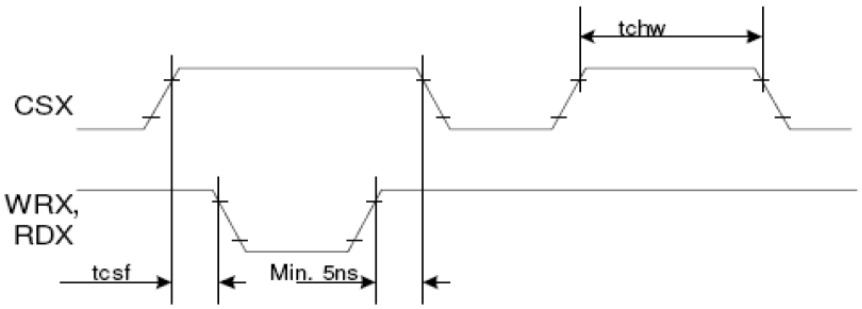


Signal	Symbol	Parameter	min	max	Unit	Description
DCX	tast	Address setup time	0	-	ns	
	taht	Address hold time (Write/Read)	10	-	ns	
CSX	tchw	CSX "H" pulse width	0	-	ns	
	tcs	Chip Select setup time (Write)	15	-	ns	
	trcs	Chip Select setup time (Read ID)	45	-	ns	
	trcsfm	Chip Select setup time (Read FM)	355	-	ns	
	tcsf	Chip Select Wait time (Write/Read)	10	-	ns	
WRX	twc	Write cycle	66	-	ns	
	twrh	Write Control pulse H duration	15	-	ns	
	twrl	Write Control pulse L duration	15	-	ns	
RDX (FM)	trcfm	Read Cycle (FM)	450	-	ns	
	trdhfm	Read Control H duration (FM)	90	-	ns	
	trdlfm	Read Control L duration (FM)	355	-	ns	
RDX (ID)	trc	Read cycle (ID)	160	-	ns	
	trdh	Read Control pulse H duration	90	-	ns	
	trdl	Read Control pulse L duration	45	-	ns	
D[17:0], D[15:0], D[8:0], D[7:0]	tdst	Write data setup time	10	-	ns	For maximum CL=30pF For minimum CL=8pF
	tdht	Write data hold time	10	-	ns	
	trat	Read access time	-	40	ns	
	tratfm	Read access time	-	340	ns	
	trod	Read output disable time	20	80	ns	

Note: Ta = -30 to 70 ℃, IOVCC=1.65V to 2.8V, VCI=2.6V to 3.3V, GND=0V

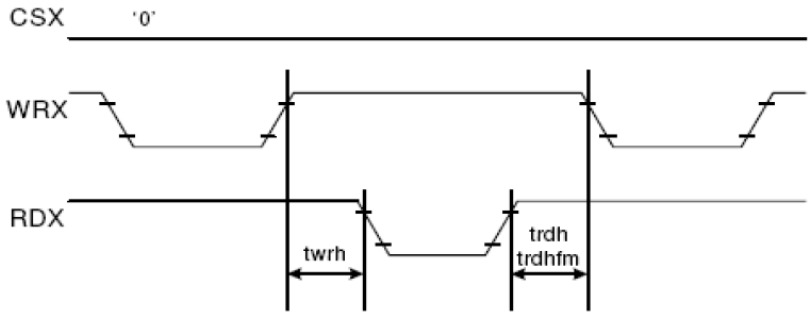


CSX timings :



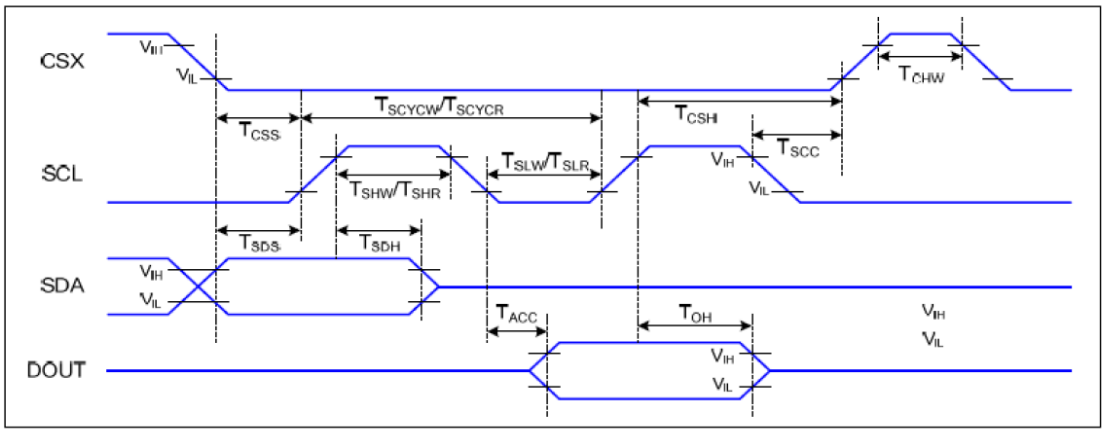
Note: Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals.

Write to read or read to write timings:



Note: Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals.

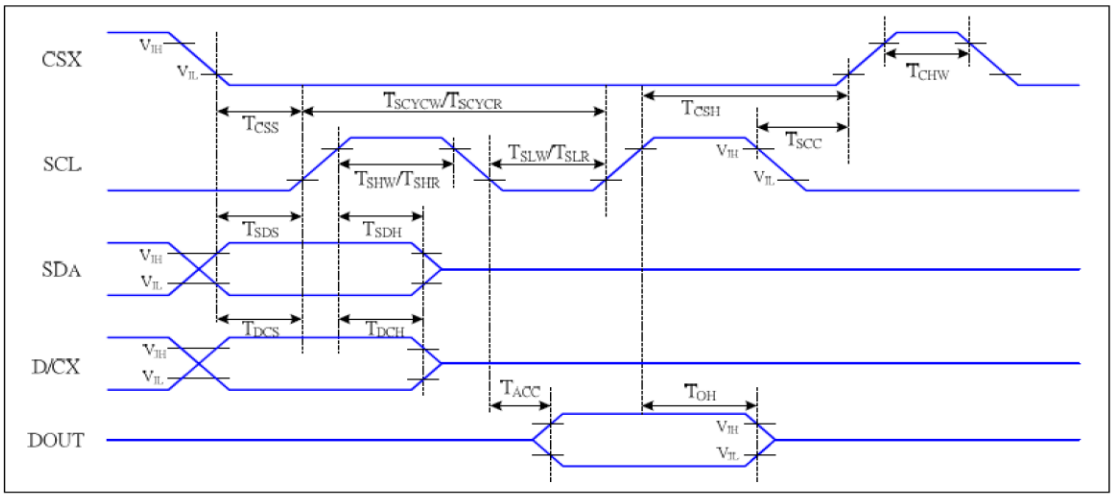
3-Line SPI Interface Timing Characteristics



VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=-30 to 70 ℃

Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	T_{CSS}	Chip select setup time (write)	15		ns	
	T_{CSH}	Chip select hold time (write)	15		ns	
	T_{CSS}	Chip select setup time (read)	60		ns	
	T_{SCC}	Chip select hold time (read)	65		ns	
	T_{CHW}	Chip select “H” pulse width	40		ns	
SCL	T_{SCYCW}	Serial clock cycle (Write)	66		ns	
	T_{SHW}	SCL “H” pulse width (Write)	15		ns	
	T_{SLW}	SCL “L” pulse width (Write)	15		ns	
	T_{SCYCR}	Serial clock cycle (Read)	150		ns	
	T_{SHR}	SCL “H” pulse width (Read)	60		ns	
	T_{SLR}	SCL “L” pulse width (Read)	60		ns	
SDA (DIN)	T_{SDS}	Data setup time	10		ns	
	T_{SDH}	Data hold time	10		ns	
DOUT	T_{ACC}	Access time	10	50	ns	For maximum CL=30pF
	T_{OH}	Output disable time	15	50	ns	For minimum CL=8pF

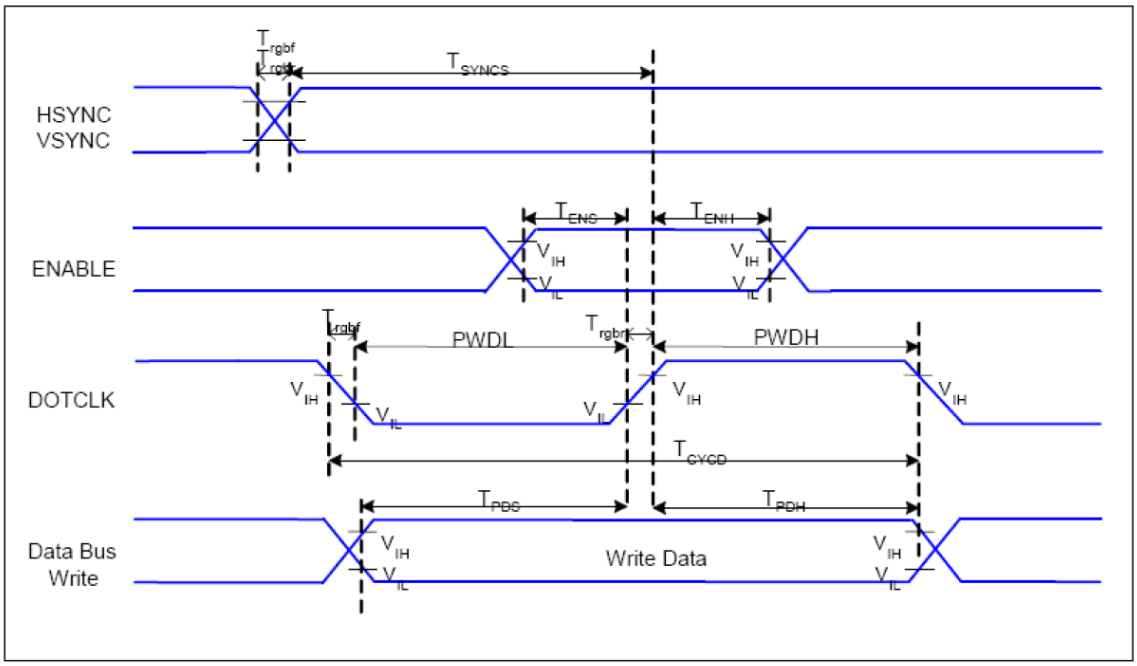
4-Line SPI Interface Timing Characteristics



VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=-30 to 70 ℃

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	T_{CSS}	Chip select setup time (write)	15		ns	
	T_{CSH}	Chip select hold time (write)	15		ns	
	T_{CSS}	Chip select setup time (read)	60		ns	
	T_{SCC}	Chip select hold time (read)	65		ns	
	T_{CHW}	Chip select “H” pulse width	40		ns	
SCL	T_{SCYCW}	Serial clock cycle (Write)	66		ns	-write command & data ram
	T_{SHW}	SCL “H” pulse width (Write)	15		ns	
	T_{SLW}	SCL “L” pulse width (Write)	15		ns	
	T_{SCYCR}	Serial clock cycle (Read)	150		ns	-read command & data ram
	T_{SHR}	SCL “H” pulse width (Read)	60		ns	
	T_{SLR}	SCL “L” pulse width (Read)	60		ns	
D/CX	T_{DCS}	D/CX setup time	10		ns	
	T_{DCH}	D/CX hold time	10		ns	
SDA (DIN)	T_{SDS}	Data setup time	10		ns	
	T_{SDH}	Data hold time	10		ns	
DOUT	T_{ACC}	Access time	10	50	ns	For maximum CL=30pF
	T_{OH}	Output disable time	15	50	ns	For minimum CL=8pF

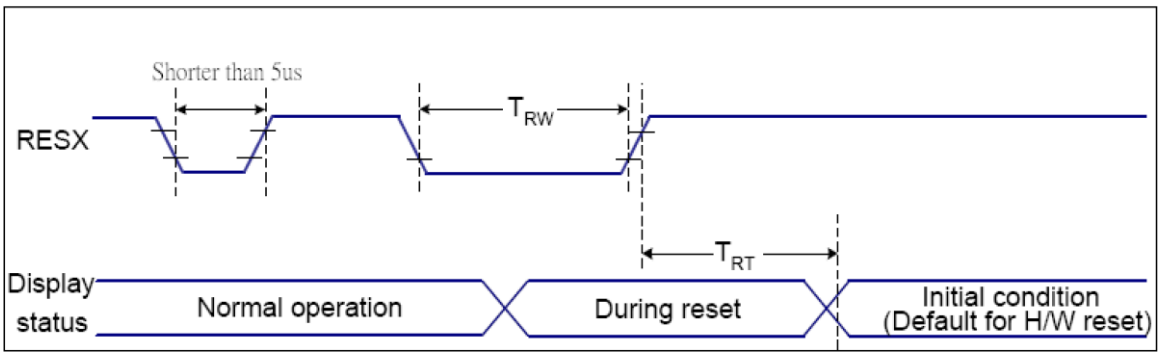
Parallel RGB Interface Timing Characteristics



VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=-30 ~ 70 ℃

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
HSYNC, VSYNC	T_{SYNCS}	VSYNC, HSYNC Setup Time	30	-	ns	
ENABLE	T_{ENS}	Enable Setup Time	25	-	ns	
	T_{ENH}	Enable Hold Time	25	-	ns	
DOTCLK	PWDH	DOTCLK High-level Pulse Width	60	-	ns	
	PWDL	DOTCLK Low-level Pulse Width	60	-	ns	
	T_{CYCD}	DOTCLK Cycle Time	120	-	ns	
	Trghr, Trghf	DOTCLK Rise/Fall time	-	20	ns	
DB	T_{PDS}	PD Data Setup Time	50	-	ns	
	T_{PDH}	PD Data Hold Time	50	-	ns	

Reset Timing Characteristics



VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=-30 ~ 70 ℃

Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
				120 (Note 1, 6, 7)	ms

Notes:

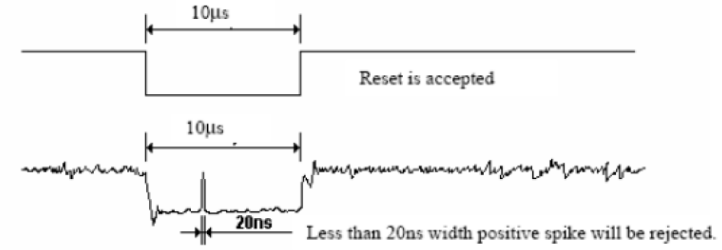
1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.

2. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below:

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 9us	Reset
Between 5us and 9us	Reset starts

3. During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode.) and then return to Default condition for Hardware Reset.

4. Spike Rejection also applies during a valid reset pulse as shown below:



5. When Reset applied during Sleep In Mode.

6. When Reset applied during Sleep Out Mode.

7. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

11. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Digital Supply Voltage	V_{DD}	-0.3	-	4.6	V	(1)(2)
Digital Interface Supply Voltage	V_{DDIO}	-0.3	-	4.6	V	-
Operating Temperature	T_{OPR}	-20	-	+70	°C	-
Storage Temperature	T_{STG}	-30	-	+80	°C	-

Notes:

(1) These are stress ratings only. Extended exposure to the absolute maximum ratings listed above may affect device reliability or cause permanent damage.

(2) Functional operation should be restricted to the limits in the DC Characteristics table below.

12. DC Characteristics

Item	Symbol	Min	Typ	Max	Unit
Digital Supply Voltage	V_{DD}	2.4	3.3	3.3	V
Digital Interface Supply Voltage	V_{DDIO}	1.65	3.3	3.3	V
Normal Mode Current Consumption	I_{DD}	-	7	-	mA
Input High Voltage	V_{IH}	0.7 V_{DDIO}	-	V_{DDIO}	V
Input Low Voltage	V_{IL}	GND	-	0.3 V_{DDIO}	V
Output High Voltage	V_{OH}	0.8 V_{DDIO}	-	V_{DDIO}	V
Output Low Voltage	V_{OL}	GND	-	0.2 V_{DDIO}	V

13. Optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Contrast Ratio	CR	Θ=0 Normal Viewing Angle	400	600	-	-
Response Time	T rise		-	20	30	ms
	T fall		-	20	30	ms
Color Gamut	S(%)	-	-	60	-	%
White Chromaticity	x	Ta = 25°C	-	0.299	-	ms
	y		-	0.335	-	ms
Red Chromaticity	x		-	0.640	-	ms
	y		-	0.321	-	ms
Green Chromaticity	x		-	0.293	-	ms
	y		-	0.579	-	ms
Blue Chromaticity	x		-	0.134	-	ms
	y		-	0.142	-	ms
Viewing Angle, Horizontal	θ_{X+}	CR≥10	50	70	-	deg
	θ_{Y-}		60	70	-	deg
Viewing Angle, Vertical	θ_{X+}		60	70	-	deg
	θ_{Y-}		60	60	-	deg
Viewing Direction	12 o'clock					

14. Backlight Characteristics

Item	Symbol	Min	Typ	Max	Unit
Forward Current	I_F	-	60	80	mA
Forward Voltage	V_F	-	3.2	-	V
LCM Luminous	L_V	450	-	-	cd/m^2
LED Lifetime	Hr.	50K	-	-	Hrs.
Uniformity	AV_G	80	-	-	%

Notes:

(1) Forward current minimum value is only for reference since the LED brightness efficiency keeps enhancing. Current consumption becomes less and less to achieve the same luminance.

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

15. LCD Module Precautions

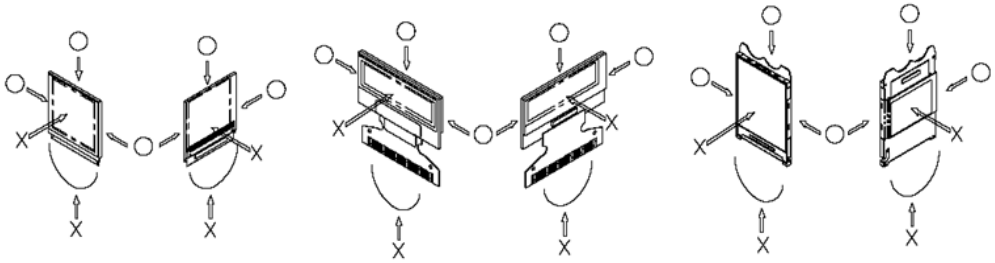
The precautions below should be followed when using LCD modules to help ensure personal safety, module performance, and compliance of environmental regulations.

15.1. 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.
- Soldering: only to the I/O terminals.
- Store in an anti-static electricity container and clean environment.
- It is common to use the "screen saver" to extend the lifetime of the LCD display module.
    - Do not use the fixed information for long periods of time in real application.
    - Do not use fixed information in LCD panel for long periods of time to extend "screen burn" effect time.
- Crystalfontz has the right to change the passive components, including R3, R6 & backlight adjust resistors. (Resistors, capacitors and other passive components will have different appearance and color caused by the different supplier.)
- Crystalfontz have the right to change the PCB Rev. (In order to satisfy the supplying stability, management optimization and the best product performance, etc., under the premise of not affecting the electrical characteristics and external dimensions, Crystalfontz has the right to modify the version.).

15.2. Handling Precautions

- Since the display panel is made of glass, do not apply mechanical impacts such as dropping from a high position.
- If the display panel is accidently 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.
- Clean the surface of the polarizer covering the LCD display module if it becomes soiled using following adhesion tape.
    - Scotch Mending Tape No. 810 or an equivalent
    - Never breathe the soiled surface or wipe the surface using a cloth containing solvent such as ethyl alcohol, since the surface of the polarizer will become cloudy.
    - The following liquids/solvents may spoil the polarizer:
        - Water
        - Ketone
        - Aromatic Solvents
- Hold the LCD display module very carefully when placing the LCD display module into the system housing.
- Do not apply excessive stress or pressure to the LCD display module. And, do not over bend the film with electrode pattern layouts. These stresses will influence the display performance. Also, be sure to secure the sufficient rigidity for the outer cases.



- Do not apply stress to the LSI chips and the surrounding molded sections.
- Do not disassemble or modify the LCD display module.
- Do not apply input signals while the logic power is off.
- Pay sufficient attention to the working environments when handing the LCD display module to prevent occurrence of element breakage accidents by static electricity.
    - Be sure to make human body grounding when handling LCD display modules.
    - Be sure to ground tools to use for assembly such as soldering irons.
    - To suppress generation of static electricity, avoid carrying out assembly work under dry environments.
    - Protective film is being applied to the surface of the display panel of the LCD display module. Be careful since static electricity may be generated when exfoliating the protective film.
- Protection film is being applied to the surface of the display panel and removes the protection film before assembling it. At this time, 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 by the method discussed above.
- If electric current is applied when the LCD display module is being dewed or when it is placed under high humidity environments, the electrodes may become corroded. If this happens proceed with caution when handling the LCD display module.

15.3. Storage Precautions

- When storing the LCD display modules put them in static electricity preventive bags to avoid exposure to direct sunlight and fluorescent lamps. Also avoid high temperature and high humidity environments and low temperatures (less than 0°C) environments. (We recommend you store these modules in the packaged state when they were shipped from Crystalfontz). Be careful not to let water drops adhere to the packages or bags, and do not let dew gather on them.
- If electric current is applied when water drops are adhering to the surface of the LCD display module the LCD display module may have become dewed. If a dewed LCD display module is placed under high humidity environments it may cause the electrodes to become corroded. If this happens proceed with caution when handling the LCD display module.

15.4. Designing Precautions

- The absolute maximum ratings are the ratings that cannot be exceeded for LCD display module. If these values are exceeded, panel damage may happen.
- To prevent occurrence of malfunctioning by noise pay attention to satisfy the VIL and VIH specifications and, at the same time, to make the signal line cable as short as possible.
- We recommend that you install excess current preventive unit (fuses, etc.) to the power circuit (VDD). (Recommend value: 0.5A)
- Pay sufficient attention to avoid occurrence of mutual noise interference with the neighboring devices.
- As for EMI, take necessary measures on the equipment side.
- 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.

15.5. Disposing Precautions

- Request the qualified companies to handle the industrial wastes when disposing of the LCD display modules. Or, when burning them, be sure to observe the environmental and hygienic laws and regulations.

15.6. 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 being exposed. Generally speaking, semiconductor elements change their characteristics when light is radiated according to the principle of the solar battery. Consequently, 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.
  - Design the product and installation method so that the LCD driver may be shielded from light 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.
- We recommend that you construct its software to make periodical refreshment of the operation statuses (re-setting of the commands and re-transference of 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: