Crystalfontz

5" TFT DISPLAY MODULE
WITH CAPACITIVE TOUCH PANEL

DATASHEET

CFAF800480E0-050SC

Datasheet Release: 2019/03/10

Crystalfontz America, Inc.

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1. General Information

Datasheet Revision History
Datasheet Release: 2019/03/10 Datasheet for the CFAF800480E0-050SC 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. Module Description

The CFAF800480E0-050SC is a 5-inch color TFT LCD graphic display module with a high-brightness, sunlight-readable backlight and a capacitive touch panel (CTP) The touch panel can detect up to 5 separate touch points. The CFAF800480E0-050SC is suitable for industrial, media, embedded and other general-purpose display applications.

This module uses an Ilitek ILI6122 LCD driver, and a Goodix GT911 capacitive touch panel controller.

3. Features

- 5-inch 800x480 RGB TFT Dot Matrix LCD
- Multi-Touch Capacitive Touch Panel (CTP)
- 24-bit parallel RGB interface
- +3.3V Logic Power Supply
- Sunlight Readable
- Transmissive LCD
- Bright white LED Backlight
- Operating Temperature: -20°C to +70°C
- Storage Temperature: -30°C to +80°C

4. Mechanical Data

Item	Specification (mm)	Specification (inch)
Overall Module Dimension	120.7 (W) x 76.3 (H) x 5.0 (D)	4.752 (W) x 3.004 (H) x 0.197 (D)
Viewing Area	109.0 (W) x 65.8 (H)	4.292 (W) x 2.591 (H)
Active Area	108.0 (W) x 64.8 (H)	4.252 (W) x 2.551 (H)
Dot Pitch	0.135 (W) x 0.135 (H)	0.0053 (W) x 0.0053 (H)
Weight (Typical)	97.7 grams	3.446 ounces

5. Mechanical Drawings

120.75

5.85

109 Touch Panel VA

6.35

108 LCD AA

4.85

2 Touch Panel

3.41

2.90

64.80 LCD AA

65.80 Touch Panel VA

76.30

35.50

58

B

5.50

26.60

20.50

A

83

Tolerance: ±.5mm Unless Noted
All Dimensions in Millimeters

CFAF800480E0-050SC
800x400 Pixel Resolution
Sunlight Readable
40-pin FPC / ZIF Connection
Capacitive Touchscreen
Standard RGB Interface

| Crystalfontz © 2019 Crystalfontz America, INC. | Part Number: CFAF800480E0-050SC | Date: 2019-03-08 | Filename: CFAF800480E0-050SC | Revision: v 1.1 |
| | | Web: www.crystalfontz.com/CFAF800480E0-050SC | | Sheet: 1 of 2 |

PIN #	FUNCTION
1	LEDK
2	LEDA
3	GND
4	VCC
5	R0
6	R1
7	R2
8	R3
9	R4
10	R5
11	R6
12	R7
13	G0
14	G1
15	G2
16	G3
17	G4
18	G5
19	G6
20	G7
21	B0
22	B1
23	B2
24	B3
25	B4
26	B5
27	B6
28	B7
29	GND
30	PCLCK
31	DISP
32	HSYNC
33	VSYNC
34	NC(DE)
35	NC
36	GND
37	X+(XR)
38	Y-(YD)
39	X-(XL)
40	Y+(YU)

Pin 1 (LCD)
Pin 40 (LCD)

4

Contact: 0.30 (40 Places)

Pitch: 0.50 (39 Places)

Gap: 0.20 (39 Places)

20.50

LCD PIN
DETAIL A
SCALE 4 : 1

Contact: 0.30 (10 Places)

Pitch: 0.50 (9 Places)

Gap: 0.20 (9 Places)

5.50

CAPACITIVE TOUCH PIN
DETAIL B
SCALE 4 : 1
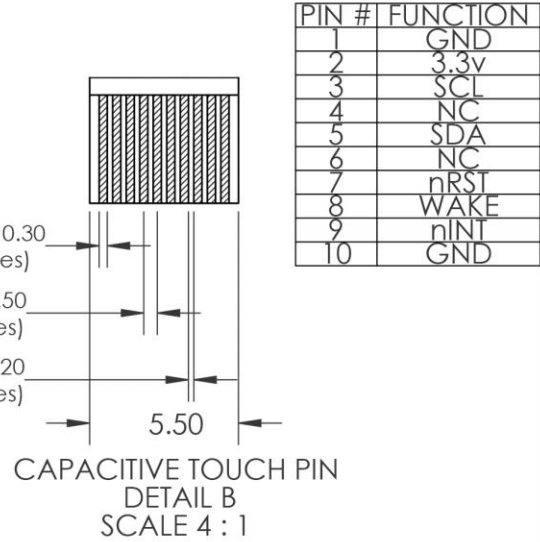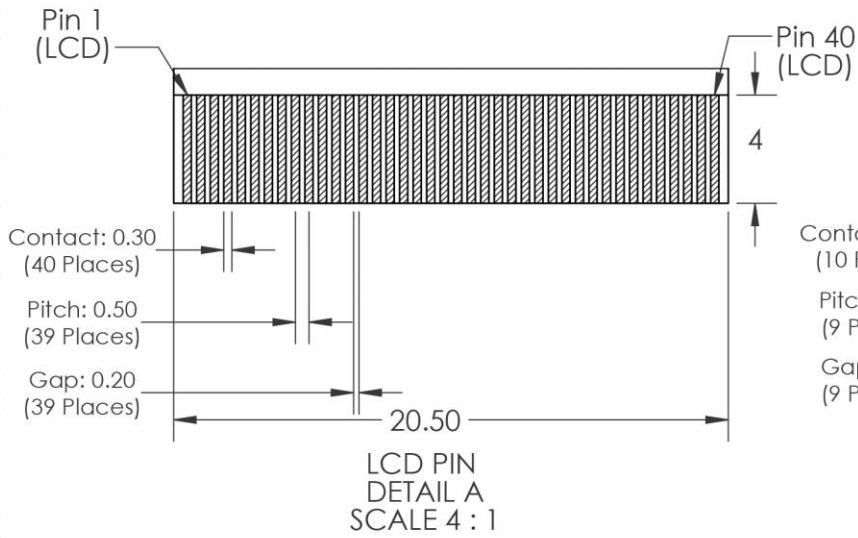
PIN #	FUNCTION
1	GND
2	3.3v
3	SCL
4	NC
5	SDA
6	NC
7	nRST
8	WAKE
9	nINT
10	GND

Tolerance: ±.5mm Unless Noted
All Dimensions in Millimeters

Part Number:	Date:	Filename:	Revision:
CFAF800480E0-050SC	2019-03-08	CFAF800480E0-050SC	v 1.1
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6. TFT LCD Panel

6.1. General Information

The CFAF800480E0-050SC module uses a Ilitek ILI6122 TFT LCD panel controller.

For detailed information on this contoller IC, please see the ILI6122 datasheet which can be found on our website here: https://www.crystalfontz.com/controllers/Ilitek/ILI6122/

6.2. Interface Pin Function

Pin	Symbol	Function
1	VLED-	Backlight LED Cathode
2	VLED+	Backlight LED Anode
3	GND	System Ground
4	VCC	Power Supply for Logic Operation
5-12	R0-R7	Data Bus
13-20	G0-G7	Data Bus
21-28	B0-B7	Data Bus
29	GND	System Ground
30	DCLK	Pixel Clock Signal
31	DISP	Display On/Off Control
32	HSYNC	Horizontal Sync Signal
33	VSYNC	Vertical Sync Signal
34	DEN	Data Enable
35	NC	No Connection
36	GND	System Ground
37	X+	No Connection (resistive touch panel X+)
38	Y-	No Connection (resistive touch panel Y-)
39	X-	No Connection (resistive touch panel X-)
40	Y+	No Connection (resistive touch panel Y+)

6.3. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Logic Power Supply	VCC	-0.3	5	V
Operating Temperature	T_{OP}	-20	+70	°C
Storage Temperature	T_{ST}	-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) Temp. ≦60℃, 90% RH Maximum Temp.＞60℃ Absolute humidity < 90% RH at 60℃

6.4. Electrical Characteristics

Item	Symbol	Min	Typ	Max	Unit
Logic Power Supply	VDD	3.0	3.3	3.6	V
Input Logic High	VIH	0.7 * VDD	-	VDD	V
Input Logic Low	VIL	0	-	0.3 * VDD	V
Logic Supply Current	IVDD	-	100		mA

6.5. Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit
Response Time		T_r	25°C	-	20	30	ms
		T_f		-	20	30	ms
Contrast Ratio		(CR)	θ=0°	500	600	-	-
White Chromaticity		Wx	Backlight On	0.324	0.326	0.328	ms
		Wy		0.364	0.366	0.368	ms
Viewing Angle	Horizontal	θL	CR≧10	60	70	-	Degree
		θR		60	70	-	
	Vertical	θT		40	50	-	
		θB		60	70	-	
Luminance		L	-	1000	1300	-	cd/m^2
Viewing Direction		12 o'clock					

6.6. Backlight Characteristics

Item	Symbol	Min	Typ	Max	Unit
Forward Voltage	VF	-	15 ~ 18	-	V
Forward Current	IF	-	-	120	mA
LED Lifetime			25000		hours

# Constant-Current Backlight Driver
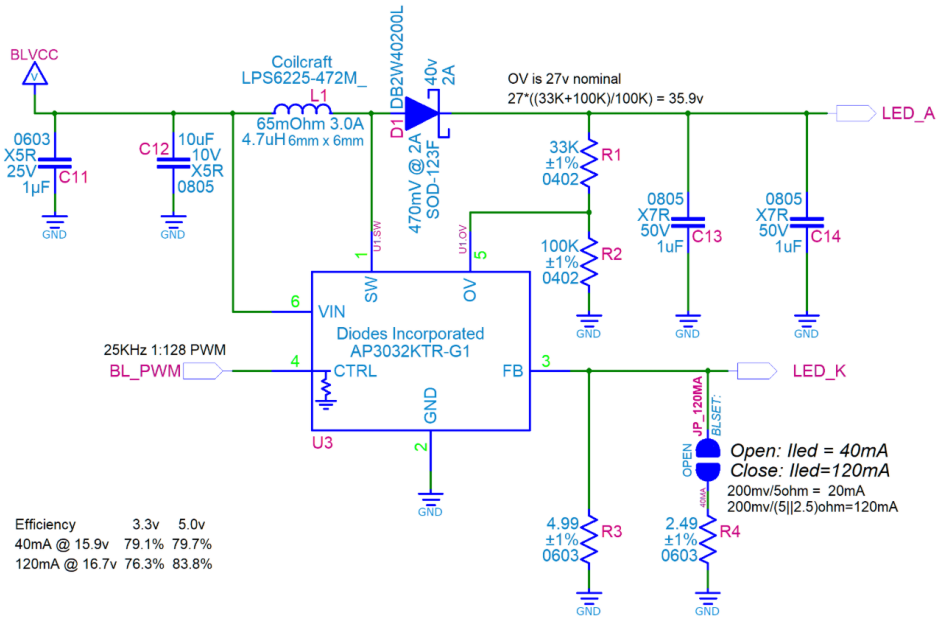
Example backlight driver circuit

6.7. RGB Timing

For additional timing information, please see the Ilitek ILI6122 datasheet.

Horizontal Input Timing					
Item	**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Horizontal display area	tHD		800		CLKIN
CLKIN frequency	fCLK		33.3	50	MHz
1 Horizontal line period	tH	862	1056	1200	CLKIN
HSD pulse width	tHPW	1		40	CLKIN
HSD back porch	tHBP	46	46	46	CLKIN
HSD front porch	tHFP	16	210	354	CLKIN
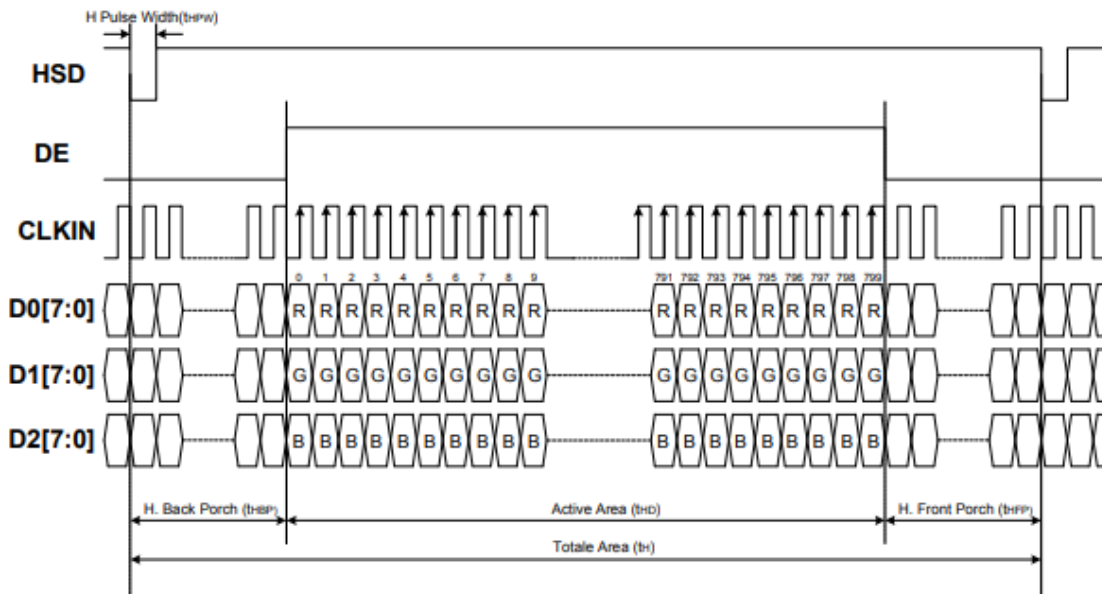
Horizontal Input Timing

Vertical Input Timing

Item	Symbol	Min	Typ	Max	Unit
Vertical display area	tVD		480		HSD
VSD period time	tV	510	525	650	HSD
VSD pulse width	tVPW	1		20	HSD
VSD back porch	tVBP	23	23	23	HSD
VSD front porch	tVFP	7	22	147	HSD
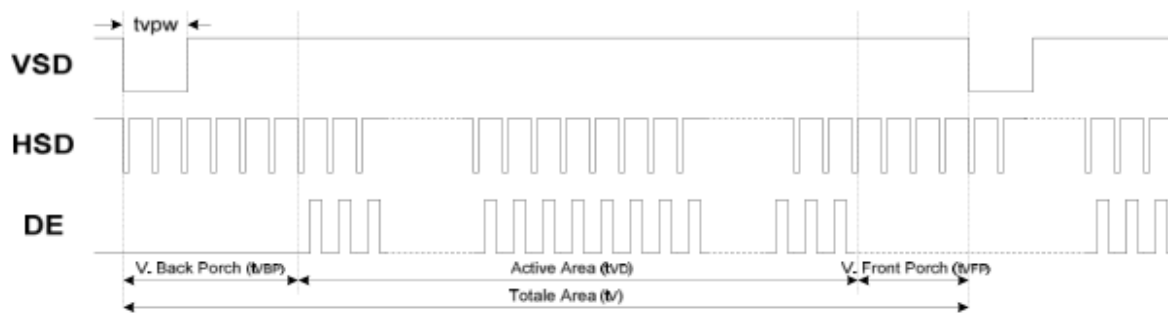
Vertical Input Timing

7. Capacitive Touch Panel

7.1. General Information

The CFAF800480E0-050SC module includes a capacitive touch panel based on a GT911 5-point CTP controller. The GT911 supports up to 5 concurrent touches with real-time tracking of accurate position and motion trajectory as well as touch area.It is able to report such information to the host as required.

GT911 provides a standard I2C interface for SCL and SDA to communicate with the host. GT911 always serves as slave device in the system with all communication being initialized by the host

For more information on the CTP controller IC, please see the GT911 datasheet which can be found on our website here: https://www.crystalfontz.com/controllers/GOODIX/GT911/

7.2. Interface Pin Function

Pin	Symbol	Function
1	VSS	Ground
2	VDDIO	Power Supply
3	SCL	I2C Clock Input
4	VSS	Ground
5	SDA	I2C Data Input and Output
6	VSS	Ground
7	/RST	Reset Pin for CTP
8	WAKE	Wakeup Request (from host)
9	/INT	Interrupt Request (to host)
10	VSS	Ground

7.3. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Power Supply	VDDIO	1.7	3.47	V
Storage Temperature		-60	125	°C
Operating Temperature		-40	85	°C

7.4. Electrical Characteristics

Item	Condition	Symbol	Min	Typ	Max	Unit
Power Supply	-	VDDIO	2.8	-	3.3	V
Input Logic Low	-	VIL	-0.3	-	0.25*VDDIO	V
Input Logic High	-	VIH	0.75*VDDIO	-	VDDIO+0.3	V
Logic Supply Current	(normal mode)	IVDD	-	11	14.5	mA

7.5. I²C Timing

Item	Symbol	Min	Max	Unit
SCL low period	tIO	1.3	-	us
SCL high period	tHI	0.6	-	us
SCL setup time for Start	tST1	0.6	-	us
SCL setup time for Stop	tST3	0.6	-	us
SCL hold time for Start	tHD1	0.6	-	us
SDA setup time	tST2	0.1	-	us
SDA hold time	tHD2	0.0	-	us
(3.3V host interface voltage, 400Kbps transmission rate, 2K pull-up resistor)				
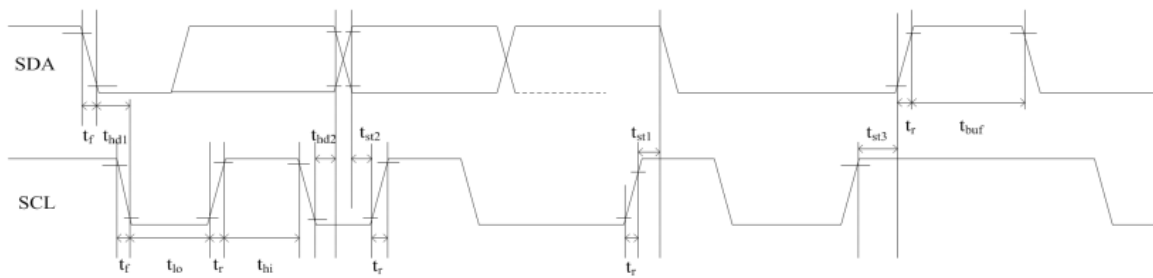
*I2C Timing*

8. 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.

8.1. 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.
    o Do not use the fixed information for long periods of time in real application.
    o 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 passive components on the display module (resistors, capacitors and other passive components may have different appearance and color).
- Crystalfontz has the right to change the PCB revision/version in order to satisfy the supply stability, management optimization, the best product performance, etc., under the premise of not affecting the electrical characteristics and external dimensions.

8.2. 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.
    o Scotch Mending Tape No. 810 or an equivalent
    o 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.
    o 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.
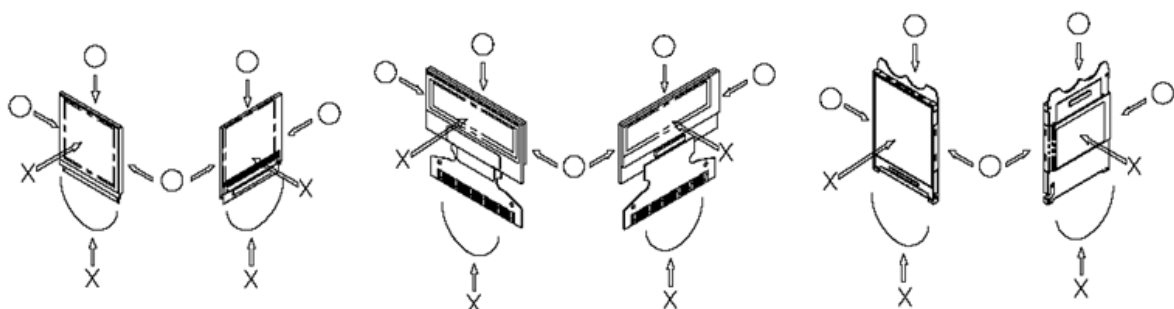
- Do not apply stress to the LSI chips and the surrounding molded sections.
- Do not disassemble or modify the LCD display module.
- Do not apply input signals while the logic power is off.
- Pay sufficient attention to the working environments when handing the LCD display module to prevent occurrence of element breakage accidents by static electricity.
  - o Be sure to make human body grounding when handling LCD display modules.
  - o Be sure to ground tools to use for assembly such as soldering irons.
  - o To suppress generation of static electricity, avoid carrying out assembly work under dry environments.
  - o 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.

8.3. Storing 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.

8.4. 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.
  - o Connection (contact) to any other potential than the above may lead to rupture of the IC.

8.5. 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.

8.6. 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.
    - o   If the operation is interrupted and left unused for a while, normal state can be restored.
    - o   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.
    - o   Pins and electrodes
    - o   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.
    - o   Design the product and installation method so that the LCD driver may be shielded from light in actual usage.
    - o   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: