LCDC Board
with Command-driven
LCD Controller IC

LCDC430C-01

TFT LCD LMTM043WQVNCB Series with 4.3” WQVGA 480x272 Touch Panel
(manufactured by DENSITRON)

Instruction Manual

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(Japanese version)
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(English version)

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■ Safety Precautions

In order to prevent physical harm and property damage to those using and/or installing this circuit board device (the “Product”), the manual describes below the necessary safety precautions.

The severity of harm and damage caused by incorrect usage or installation stemming from ignoring the directions herein are indicated by the following symbols and warnings.

 Danger	This symbol indicates that the possibility of death or serious injury is imminent.
 Warning	This symbol indicates that death or serious injury is possible.
 Caution	This symbol indicates that minor injury or damage to only property is possible.

The types of necessary precautions are classified according to the following symbols. (The symbols below are an example)

	This symbol indicates "Prohibited" actions.
	This symbol indicates "Mandatory" actions.

⚠ Danger

Do not breathe in or swallow the liquid crystal if the LCD is damaged and leaking. If the liquid crystal is sticking to your hands or clothes, wipe with alcohol etc., and wash thoroughly with water.

⚠ Warning

Always use a rated power supply device as per this manual.
Other devices may cause burnout and fire.

When installing, select a well-ventilated and dry area with no risk of water spillage. Otherwise, electrocution, electrical leakage, burnout, or fires may result.

■ Installation and Software Design Precautions

This section covers the precautions when installing the Product (LCDC430C-01 and accompanying LCD panel and touch panel)

Installing the LCD and the PCB

- In order to protect the polarization plate and LCD, place the guard plate on the panel whenever possible.
- Avoid applying external pressure on the LSI when installing.
- Be careful not to warp or contort the LCD panel and PCB.
- When designing your product, assure that the size of the window frame is within the effective display area.
- When using a frame beyond the effective display area for the external appearance of your product, any non-uniform appearance of the product is beyond the scope of the warranty.
- It is possible that there is a burr on the frame edge of the LCD module.
  When designing your product, be careful of any contact with cables so as to prevent damage to the cable insulation.

Static Electricity Precautions

- As CMOS-IC is used in the device, take proper measures to deal with static electricity when handling.
- Consider grounding for workers handling the device. For example, the use of an anti-static wrist strap/mat is recommended.

Handling Precautions

- Avoid placing in areas with high humidity for long periods of time. Be particularly careful of high humidity when the temperature is over 40 degrees Celsius.
- As the LCD polarization plate is easily damaged, be careful when handling. Avoid contact with hard objects.
- When cleaning the LCD surface, wipe lightly with a soft cloth (chamois leather, absorbent cotton etc.) and a drop of petroleum benzene.
- When saliva or a drop of water remains on the LCD polarization plate for a long

time, deformation, discoloration, staining, or fading may occur. Wipe away quickly.

- As the LCD contains glass, chipping and cracking can occur when dropped or hit with a hard object.
- When testing, avoid condensation in the device in order to avoid staining of the polarization plate.

Operating Precautions

- Use of the Product in non-intended, off-specification conditions can cause a decrease in lifespan and a deterioration of visual quality. Always use within specifications.
- Use of the Product in conditions below the rated temperature can cause deterioration of visual quality and/or the formation of air bubbles. Use of the Product in non-intended, off-specification temperatures, can lead to an irreversible change in LCD characteristics. Always use within specifications.
- When the display is subjected to a strong push, a warning light comes on. However, it will return back to normal when left for a while, or if it is rebooted.
- D.C. application causes deterioration of the LCD. Be particularly careful with the connection of the CN3 (interface connector to the LCD), to make sure the contact is complete and not partial.

Storage Precautions

- Store the LCD in a cool, dry place. When keeping the LCD in long-term storage, place in a dark area away from sunlight and fluorescent lighting.
- When storing the LCD and PCB individually, make sure the polarization plate or LSI does not come in contact with other objects.

■ Warranty and Disclaimer

Warranty

- From a manufacturing standpoint, in order to warrant the functionality and reliability of the Product, Kenic System (the "Company") may issue a delivery specification to the purchaser of the Product (the "Customer"). The warranty covers the items outlined in the delivery specification.
- Any modifications to the Product by the Customer will not be covered by the warranty.

Disclaimer

The Customer agrees that the Company shall not be held liable for accidents and damages caused by the Product under the following circumstances.

- Use of the Product in conditions not specified in this instruction manual (the "Manual").
- Breakdown or damage to the Product caused by third-party products not approved and provided by the Company.
- Maintenance and repair work using parts not approved by the Company.
- The Customer did not follow the precautions or operating instructions as set forth in the Manual.
- Use of the Product in situations where the power source, installation environment, and other conditions are beyond the specifications as outlined in the Manual.
- Accidents and damages caused by natural disasters such as fires, earthquakes, floods, and lightning storms.

※Component specifications and external appearance may change without notice. However, if previously agreed to installation dimensions and electrical interface need to be changed due to unforeseen circumstances, the Company will contact the Customer to resolve the issue.

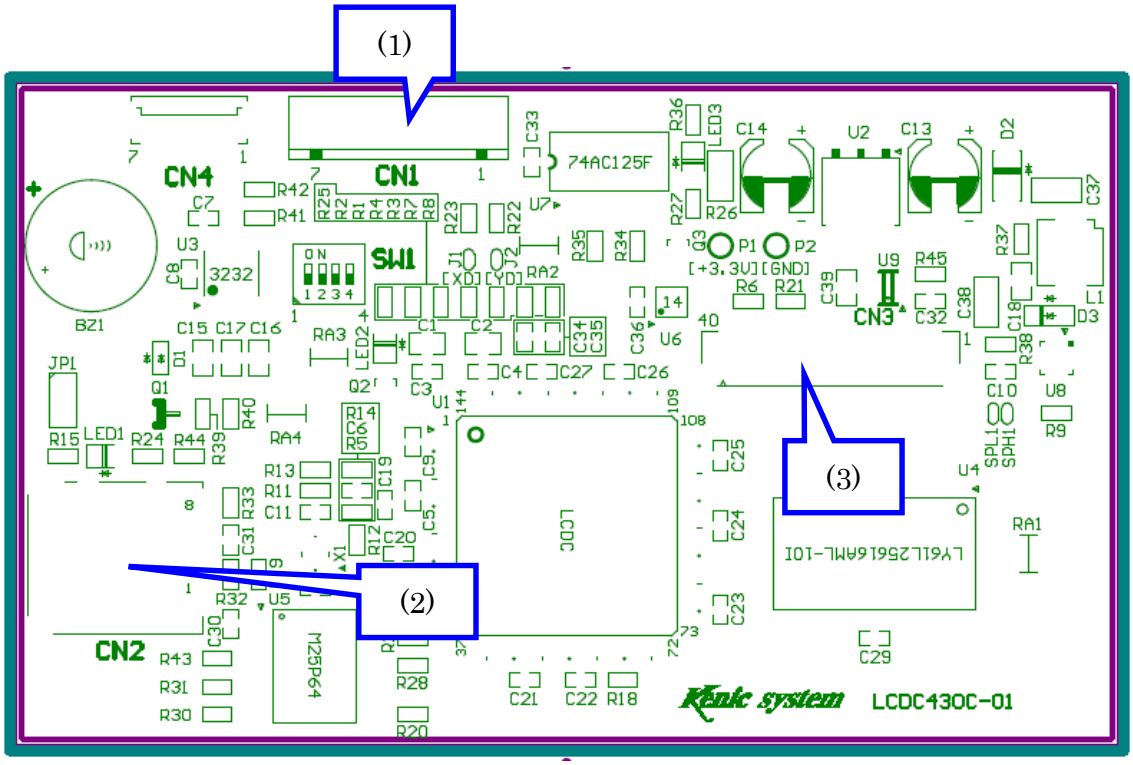
■ Overview and Features of the Product

1. List of Accessories (Nothing)

2. List of Option Accessories

For more information, please check our homepage.

3. Name and Function for the Circuit Board Connectors



(1) CN1: Connector for RS-232C and +5V power supply.

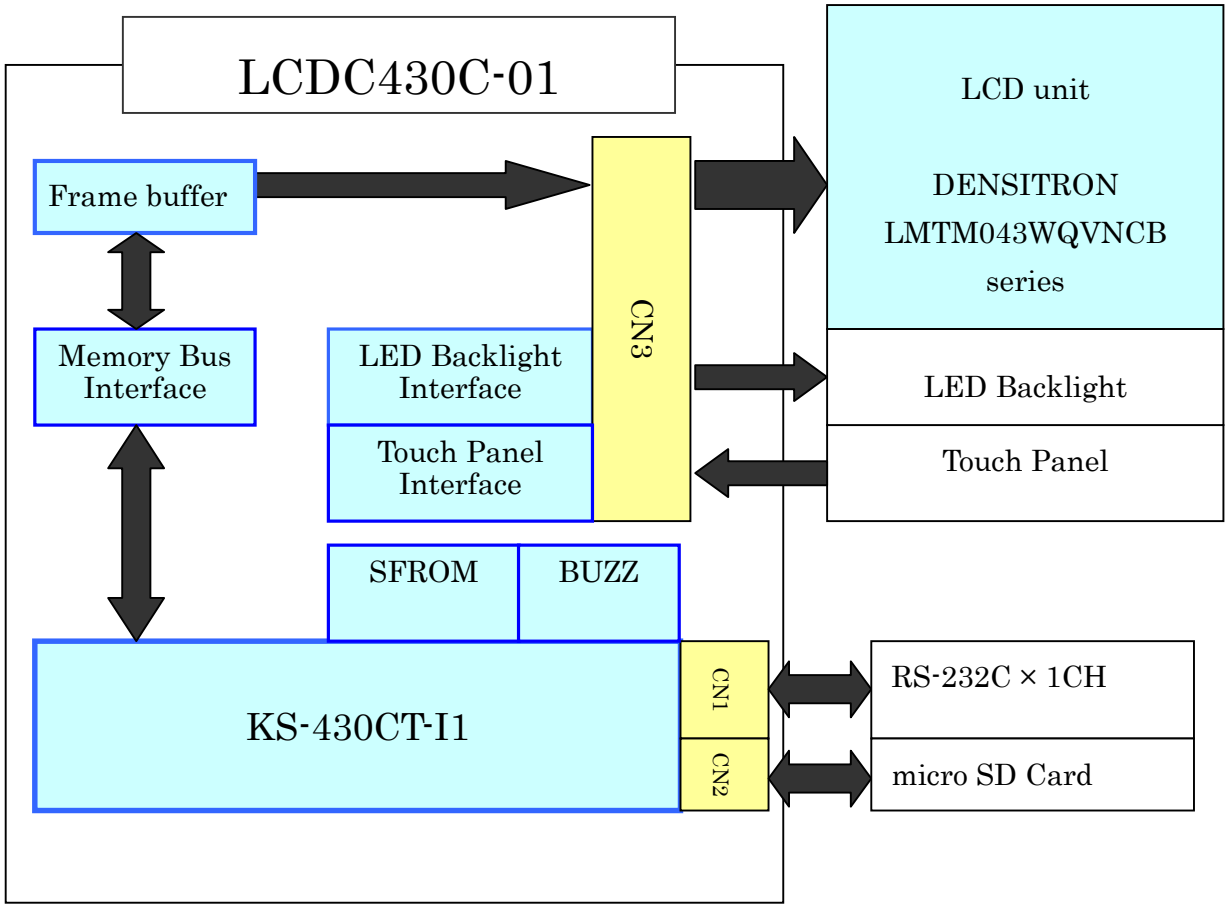
(2) CN2: Connector for microSD card.

(3) CN3: Connector for TFT LCD (WQVGA).

4. Intended Purpose of Product

The LCDC430C-01 is a controller board for the “LMTM043WQVNCB series” TFT color LCD display module manufactured by DENSITRON.

Please refer to the following block diagram.



5. Main Features

- The LCDC board includes the command-driven LCD Controller KS-430CT-I1.
- One RS-232C line is included as standard equipment.
- The board allows one to drive (drawing of dots, straight lines, and rectangles) only with RS-232C commands.
- The board allows one to draw a bitmap image on the maximum size of 8,192 bit screen, with microSD card.
- The board includes a low power consumption function.
- 65,000 colors can be displayed per pixel.
- Touch position data from the touch panel can be directly read out as 10-bit data.
- The 16-dot font data is included in the LCD Controller.
- The 24-dot font data is written in the serial flash memory.
- Compact and lightweight, the Product dimensions are 100mm×60mm (not including protruding cables).

■ Basic Specifications

1. Electrical Specifications

——— LCDC Section ———

●Intended LCD module	LMTM043WQVNCB series (DENSITRON)
●Intended touch panel	The above LCD is included as standard equipment.
●Intended LCD controller	KS-430CT-I1 (Kenic system)
●Intended backlight inverter	As LED is used, it is unnecessary.
●Frame buffer	Two page
●Color representation	65,000 colors
●SRAM (Frame buffer)	LY61L25616AML-10I (Lyontek) etc.
●Serial-Flash-ROM	M25P64-VMF6P (Micron Technology)
●Chinese character fonts	JIS level-1, JIS level-2 (16 dot font, 24 dot font)
●RS-232C	1CH already mounted.

——— Others ———

●Power supply Specifications	5V single supply 1.0A MAX Rated voltage of CPU board 5.0V±0.4V Consumption current of CPU board 130mA (Normal condition) Consumption current of CPU board 15mA (Low power consumption condition) (Not including LCD and micro SD)
●Operating environment	-20℃～70℃
●External dimensions and weight	100×60×13.3mm (not including protruding cables) About 28.2g

2. Specifications for short pins, switches, etc.

(1) J1 [XD] For switching the X axis data of the touch panel.
When short, the X axis data of the touch panel is reversed.

(2) J2 [YD] For switching the Y axis data of the touch panel.
When short, the Y axis data of the touch panel is reversed.

(3) SPL, SPH For setting the LED backlight current
(Factory setting SPL: short, SPH: open)
When shorting SPL and opening SPH, the current (about 20mA) is outputted.
When opening SPL and shorting SPH, the current (about 40mA) is outputted.
Caution) Do not short or open SPL and SPH at the same time.

(4) SW1 For setting the RS232C baud rates of 4-bit Dip switch

Number of SW1		No.2	No.1
Baud Rates (bps)	9600	ON	ON
	19200	ON	OFF
	38400	OFF	ON
	115200 (Factory default)	OFF	OFF

Use switches under conditions that the No.3 and No.4 switches are OFF, because they are not used.

3. CN1 Signal Table for RS-232C Connector

Pin number	Name of signal	Function
1	VCC	Power supply pin +5V
2	NC	
3	TxD	RS-232C sending
4	RTS#	RS-232C sending request
5	RxD	RS-232C receiving
6	GND	RS-232C signal ground
7	GND	Power supply pin GND pin

Connector used: B7B-XH-A (LF) (SN) (JST Mfg. Co., Ltd.)

Compatible connector: XHP-7 (JST Mfg. Co., Ltd.)

4. CN2 Signal Table for Micro SD Connector

Pin number	Name of signal	Function
1	NC	Pull-up only
2	MSDC-CS	Chip select signal
3	MSDC-DI	Data input signal
4	VDD	+3.3V power supply pin
5	MSDC-CLK	Clock signal
6	GND	GND pin
7	MSDC-DO	Data output signal
8	NC	Pull-up only
9	MSDC-CD ET	Insert detection signal
10	GND	GND pin

Connector used: DM3AT-SF-PEJM5 (HIROSE)

5. CN3 Signal Table for LCD Connector

Pin number	Name of signal	Function	Pin number	Name of signal	Function
1	VSS	GND pin	21	B0	Blue data signal (LSB)
2	VSS	GND pin	22	B1	Blue data signal
3	VCC	Power input (+3.3V)	23	B2	Blue data signal
4	VCC	Power input (+3.3V)	24	B3	Blue data signal
5	R0	Red data signal (LSB)	25	B4	Blue data signal
6	R1	Red data signal	26	B5	Blue data signal
7	R2	Red data signal	27	B6	Blue data signal
8	R3	Red data signal	28	B7	Blue data signal (MSB)
9	R4	Red data signal	29	VSS	GND pin
10	R5	Red data signal	30	DCLK	Clock signal
11	R6	Red data signal	31	DISP	DISP signal
12	R7	Red data signal (MSB)	32	HSYNC	HSYNC signal
13	G0	Green data signal (LSB)	33	VSYNC	VSYNC signal
14	G1	Green data signal	34	N.C	No connection
15	G2	Green data signal	35	XR	Touch panel signal XR
16	G3	Green data signal	36	YL	Touch panel signal YL
17	G4	Green data signal	37	XL	Touch panel signal XL
18	G5	Green data signal	38	YU	Touch panel signal YU
19	G6	Green data signal	39	LEDK	LED backlight cathode side
20	G7	Green data signal (MSB)	40	LEDA	LED backlight anode side

Connector used: XF2M-4015-1A-R100 (Omron)

6. Selection and Preparation of Peripheral Parts

(1) Selection of the main power supply device

Power-supply voltage: 5V±0.4V

Consumption current: 1.0A MAX

Boot speed: within 300mS

Ripple noise: within 150mV

(2) Connection of each unit

Refer to the starter kit manual for connecting each of the units.

Use only the minimum length necessary for cables. Unnecessarily long cables may cause a decrease in transmission speeds and/or introduce noise.

(3) Powering on the Product

Before powering on, carefully check all connections first. Loose connections may cause damage to parts.

7. Technical Documentation about the Product

Technical information about the Product is continually updated and posted on the Kenic system website. Please feel free to browse at the URL below.

http://www.kenic.co.jp/w/

8. Dimensional Drawing of the Board