

# TCB8803-1

## LCD Module Controller Board User Manual

Shenzhen TOPWAY Technology Co., Ltd.

Rev.	Descriptions	Release Date
0.1	Preliminary Release	2005-11-24

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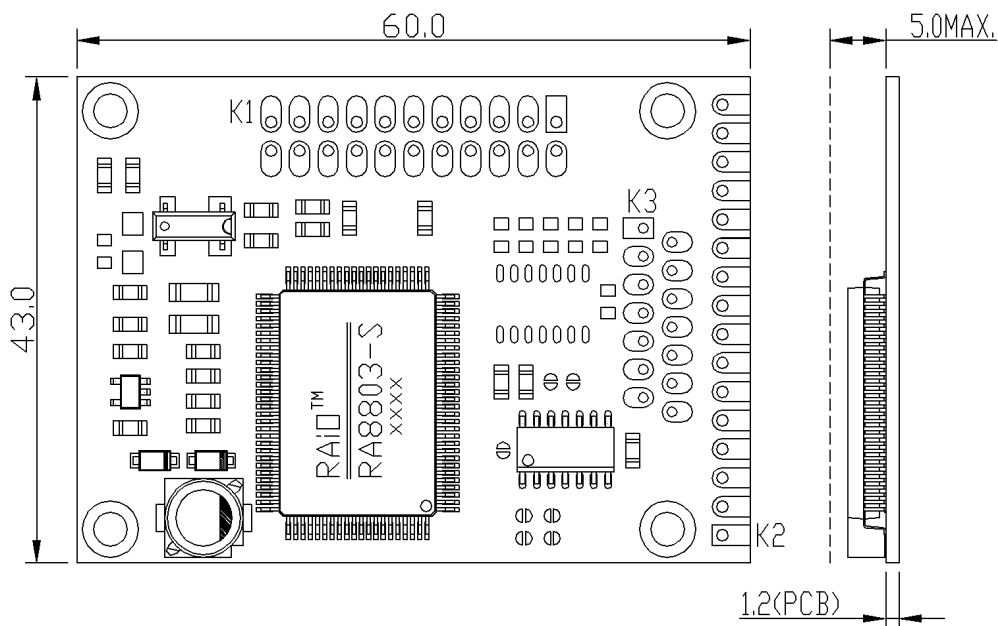
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## 1. Basic Specifications

### 1.1 Product Highlight

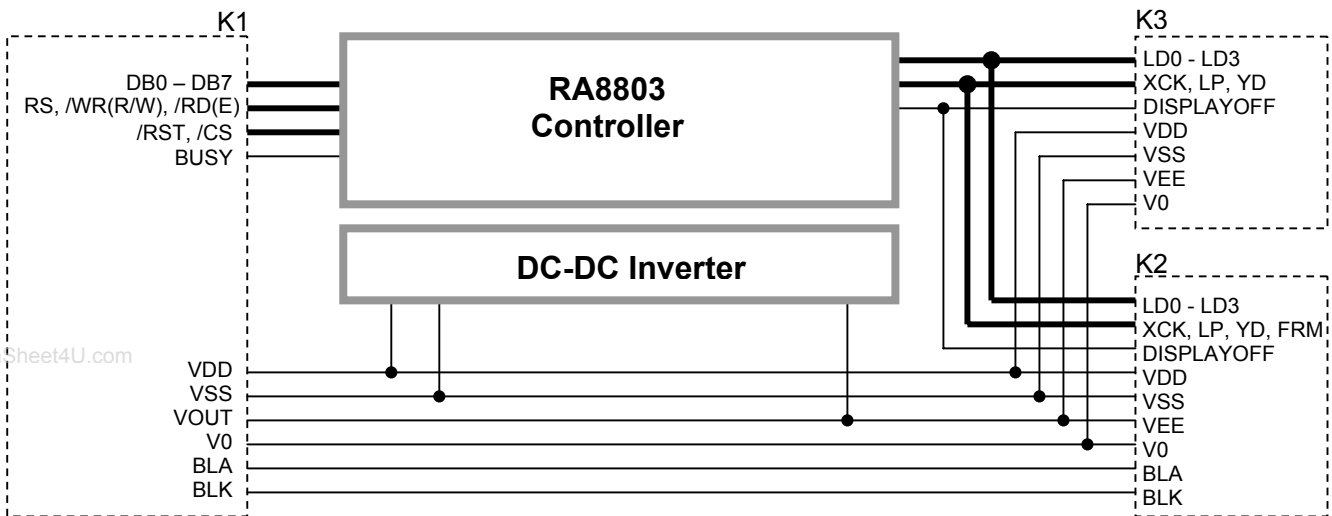
- 1) TCB8803-1 is a LCD Module Controller Board using RAIo RA8803-S LCD controller
- 2) Built in Chinese Characters ROM  
 Simplified Chinese Characters (GB): 7602 char (16x16 dot font)  
 ASCII Characters: 4 set ( 8x16 dot font)
- 3) Support Characters and Graphics mixed display
- 4) Support 4 Gray Scale
- 5) Bold Font function and Large Font function (up to 64x64 dot font)
- 6) Suitable for large size LCD module (up-to 320x240 4GS)
- 7) Direct interface with 8-bit MCU
- 8) Speeding up the development for Chinese Characters Display System
- 9) Interface designed for TOPWAY LM2028, LM24064E LCD module or equivalent
- 10) Embedded SRAM
- 11) On board DC-DC inverter for VLCD supply

### 1.2 Mechanical Specifications



- K1 : suitable for 20pin IDC connector (P2.54mm)
- K2 : suitable for 16pin SIL header (P2.54mm)
- K3 : suitable for 14pin FFC connector (P1.25mm through hole type)

**1.3 Block Diagram**



**1.4 Terminal Functions**

**1.4.1 MCU Terminal K1**

Pin No.	Pin Name	I/O	Descriptions
1	VOUT	Output	DC-DC Inverter Output for V0
2	V0	Input	LCD Module Contrast Reference
3	VSS	Power Input	Power Supply GND (0V)
4	VDD	Power Input	Positive Power Supply
5	BUSY	Output	Controller Busy signal MCU should check this signal before accessing the controller
6	NC	-	No connection, Keep open
7	/CS	Input	Chip Select /CS=LOW: Data IO is enabled
8	RS	Input	Register Select RS=HIGH: data on DB0 to DB7 is display data RS=LOW: data on DB0 to DB7 is control data
9	/WR(R/W)	Input	8080 interface mode (default): Write enable input, active LOW 6800 interface mode: R/W=HIGH: Read mode selected R/W=LOW: Write mode selected
10	/RD(E)	Input	8080 interface mode (default): Read enable input, active LOW 6800 interface mode: Enable Clock Signal, active HIGH
11	DB0	Bi-directional I/O	8-bit bi-directional data bus
:	:		
18	DB7		
19	/RST	Input	Reset Signal Input /RES=LOW: Reset the controller /RES=HIGH: Normal
20	NC	-	No connection, Keep open
21	BLA	Power Input	Backlight Positive power supply
22	BLK	Power Input	Backlight Negative power supply

**1.4.2 LCD Module Terminal K2 (for TOPWAY LM2028 or TOPWAY LM24064E)**

Pin No.	Pin Name	I/O	Descriptions
1	YD	Output	Scan Start Pulse
2	LP	Output	Latch Pulse
3	XCK	Output	X-driver Data Shifting Clock
4	FRM	Output	Frame AC Signal
5	V0	Output	LCD Module Contrast Reference
6	VDD	Power Output	Positive Power supply
7	VSS	Power Output	Power Supply GND (0V)
8	VOUT	Power Output	LCD Driver Supply Output
9	LD0	Output	X-driver Data
:	:		
12	LD3		
13	/DISPLAYOFF	Output	Display On Signal
14	NC	-	No Connection, Leave Open
15	BLA	Power Output	Backlight Positive Supply
16	BLK	Power Output	Backlight Negative Supply

Note:

- Only one of the LCD Module Terminals could be used at a time.
- Never connect two LCD modules to the controller board at the same time.

**1.4.3 LCD Module Terminal K3 (for EPSON EG8503)**

Pin No.	Pin Name	I/O	Descriptions
1	V0	Output	LCD Module Contrast Reference
2	VOUT	Power Output	LCD Driver Supply
3	LD3	Output	X-Driver Data
:	:		
6	LD0		
7	VOUT	Power Output	LCD Driver Supply
8	VSS	Power Output	Power Supply GND (0V)
9	VDD	Power Output	Positive Power Supply
10	XCK	Output	X-driver Data Shifting Clock
11	LP	Output	Latch Pulse
12	YD	Output	Scan Start Pulse
13	NC	-	No Connection, Keep Open
14	/DISPLAYOFF	Output	Display On Signal

Note:

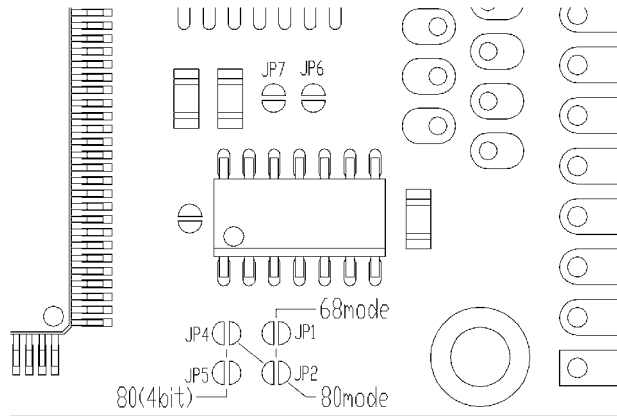
- Only one of the LCD Module Terminals could be used at a time.
- Never connect two LCD modules to the controller board at the same time.

**1.5 Jumper Functions**

**1.5.1 Interfacing Setting**

Jumper Setting				Function	Descriptions
JP1	JP2	JP4	JP5		
OPEN	CLOSE	CLOSE	OPEN	8080 mode	Set to 8080 interface mode (8-bit) <default>
CLOSE	CLOSE	OPEN	OPEN	6800 mode	Set to 6800 interface mode (8-bit)
OPEN	OPEN	CLOSE	CLOSE	4bit mode	Set to 8080 interface mode (4-bit)

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**1.5.2 Operating Voltage Setting**

Jumper Setting		Function	Descriptions
JP6	JP7		
CLOSE	OPEN	5V operation	5V supply and 5V logic I/O <default>
OPEN	CLOSE	3V operation	3V supply and 3V logic I/O

## 2. Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit	Condition
Supply Voltage	$V_{DD}$	-0.3	5.5	V	$V_{SS} = 0V$
Input Voltage	$V_{IN}$	-0.3	$V_{DD}+0.3$	V	$V_{SS} = 0V$
Operating Temperature	$T_{OP}$	0	50	°C	No Condensation
Storage Temperature	$T_{ST}$	-10	60	°C	No Condensation

Cautions:

Any Stresses exceeding the Absolute Maximum Ratings may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

## 3. Electrical Characteristics

### 3.1 DC Characteristics

$V_{SS}=0V, V_{DD}=3.3V, T_{OP}=25^{\circ}C, JP6=CLOSE, JP7=OPEN$

Items	Symbol	MIN.	TYP.	MAX.	Unit	Applicable Pin
Operating Voltage	$V_{DD}$	2.7	3.3	3.6	V	VDD
Input High Voltage	$V_{IH}$	$0.8 \times V_{DD}$	-	VDD	V	Input pins, Bi-direction pins
Input Low Voltage	$V_{IL}$	VSS	-	$0.1 \times V_{DD}$	V	Input pins, Bi-direction pins
Output High Voltage	$V_{OH}$	$0.8 \times V_{DD}$	-	-	V	Output pins, Bi-direction pins
Output Low Voltage	$V_{OL}$	-	-	$0.2 \times V_{DD}$	V	Output pins, Bi-direction pins
DC-DC Inverter Output	$V_{OUT}$	-	22.0	-	V	VOUT
Operating Current	$I_{DD}$	-	TBD	TBD	mA	VDD

$V_{SS}=0V, V_{DD}=5.0V, T_{OP}=25^{\circ}C, JP6=OPEN, JP7=CLOSE$

Items	Symbol	MIN.	TYP.	MAX.	Unit	Applicable Pin
Operating Voltage	$V_{DD}$	4.8	5.0	5.2	V	VDD
Input High Voltage	$V_{IH}$	$0.8 \times V_{DD}$	-	VDD	V	Input pins, Bi-direction pins
Input Low Voltage	$V_{IL}$	VSS	-	$0.1 \times V_{DD}$	V	Input pins, Bi-direction pins
Output High Voltage	$V_{OH}$	$0.2 \times V_{DD}$	-	-	V	Output pins, Bi-direction pins
Output Low Voltage	$V_{OL}$	-	-	$0.2 \times V_{DD}$	V	Output pins, Bi-direction pins
DC-DC Inverter Output	$V_{OUT}$	-	22.0	-	V	VOUT
Operating Current	$I_{DD}$	-	TBD	TBD	mA	VDD

### 3.2 AC Characteristics

Please refer to RAiO RA8803 datasheet for details.

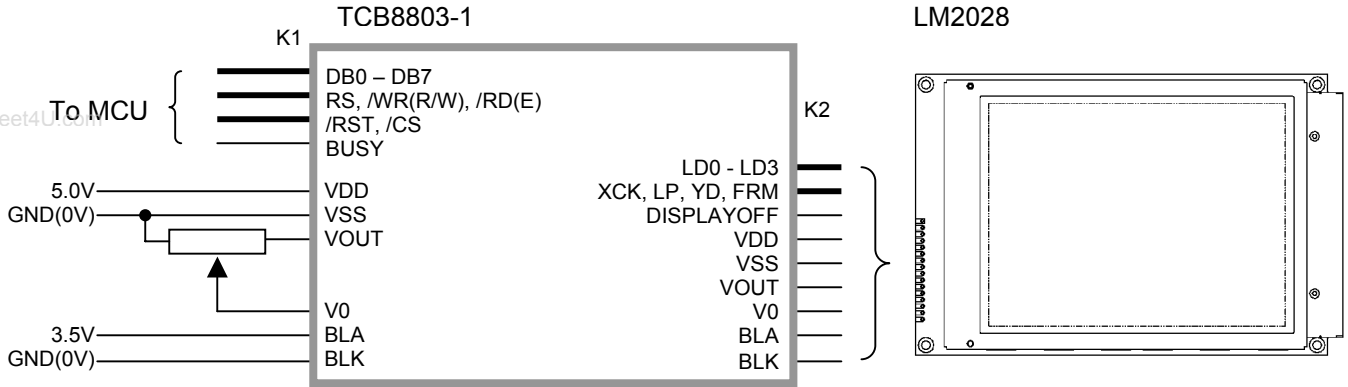
## 4. Function Specifications

### 4.1 Command and Data format

Please refer to RAiO RA8803 for details.

### 4.2 Connection Example and Contrast setting

The basic connect between TCB8803-1 and TOPWAY LM2028 LCD module, could be as follow.  
(The contrast setting VR could be 25k or 50k)



## 5. Design and Handling Precaution

1. Any mechanical shock (eg. dropping form high place) will damage the device.
2. Do not add excessive force on the device.
3. Never attempt to disassemble or rework the device.
4. When mounting the device, make sure that it is free form twisting, warping and distortion.
5. Only hold the device by its side.
6. Never add force to component of the device. It may cause invisible damage or degrade of the reliability.
7. This could be easily damaged by static electricity. Be careful to maintain an optimum anti-static work environment to protect it.
8. Take care and prevent get hurt by the device sharp edge.
9. Never operate the device exceed the absolute maximum ratings.
10. Keep the signal line as short as possible to prevent noisy signal applying to the device.
11. Never apply signal to the device without power supply.
12. Device reliability may be reduced by temperature shock.
13. When storing the device, avoid exposure to the direct sunlight, high humidity, high temperature or low temperature.