深圳市拓普微科技开发有限公司
SHENZHEN TOPWAY TECHNOLOGY CO., LTD.

LMB204BDY-4

Intelligence LCD module

Prepared by:	Checked by:	Approved by:
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Date: 2010-05-13	Date:	Date:

Rev.	Descriptions	Release Date
0.1	Prelimiay New Release	2010-05-13

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1. Basic Specifications

1.1 Display Specifications

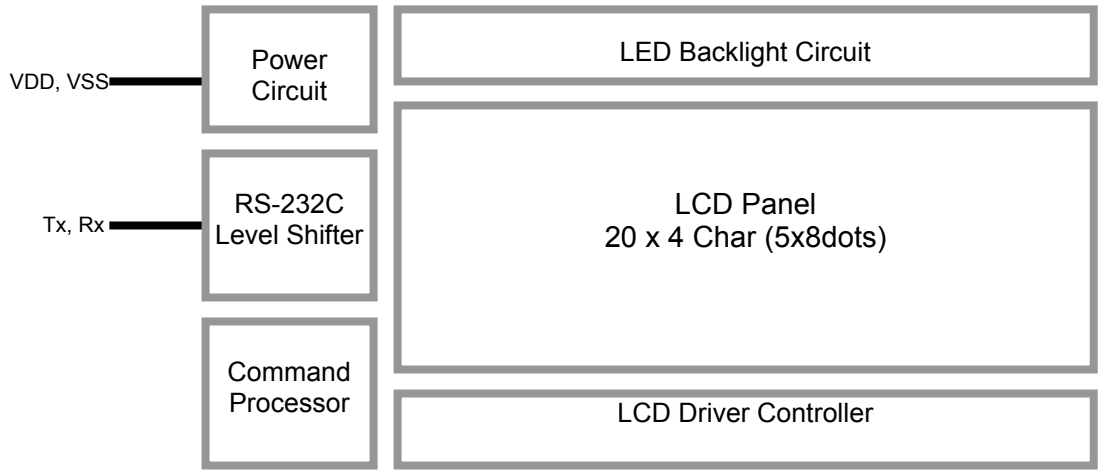
1) LCD Display Mode : STN-Gray, Positive, Transflective
2) Display Color : Display Data = “1” : Dark Blue (*1)
: Display Data = “0” : Light Gray(*2)
3) Viewing Angle : 6H
4) Driving Method : 1/16 duty, 1/5 bias
5) Back Light : Yellow-Green LED backlight

Note:
*1. Color tone may slightly change by Temperature and Driving Condition.
*2. The Color is defined as the inactive / background color

1.2 Mechanical Specifications

1) Outline Dimension : 98.0 x 60.0 x 21.2MAX
(See attached Outline Drawing for details)

1.3 Block Diagram



1.4 Interface Terminal (K3)

Pin No.	Pin Name	I/O	Descriptions
1	TxD	output	Standard RS232C Tx signal output (connect to PC's RS232C terminal (9pin D-connector) pin2)
2	RxD	Input	Standard RS232C Rx signal input (connect to PC's RS232C terminal (9pin D-connector) pin3)
3	VSS	Power	0V supply, GND (connect to PC's RS232C terminal (9pin D-connector) pin5)
4	VSS	Power	
5	VDD	Power	+5V, positive power supply.
6	VDD	Power	

2. Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit	Condition
Supply Voltage	V_{DD}	-0.3	5.5	V	V_{SS} = 0V
RxD Input Voltage	RxD	-6.5	+6.5	V	V_{SS} = 0V
Operating Temperature	T_{OP}	-20	70	°C	No Condensation
Storage Temperature	T_{ST}	-30	80	°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}=5.0V, T_{OP} =25°C

Items	Symbol	MIN.	TYP.	MAX.	Unit	Applicable Pin
Operating Voltage	V_{DD}	+4.8	+5.0	+5.2	V	VDD
RxD Input High	V_{RxDH}	+2.4	-	+6.5	V	RxD
RxD Input Low	V_{RXDL}	-6.5	-	+0.8	V	RxD
TxD Output High	V_{TXDH}	+5.0	+5.4	-	V	TxD
TxD Output Low	V_{TXDL}	-	-5.4	-5.0	V	TxD
Operating Current	I_{DD}		200	350	mA	

3.2 AC Characteristics

Please refer to MAX3232 datasheet for details.

4. Function Specifications

4.1 Contrast Control

LCD contrast control could be adjusted by VR, P1, on the Interface Board.

4.2 Jumpers Setting

JP1	JP2	JP3	JP4	
OPEN	OPEN	--	--	reserved
CLOSE	OPEN	--	--	19200 baud <default>
OPEN	CLOSE	--	--	9600 baud
CLOSE	CLOSE	--	--	4800 baud

Note.

*1. As the jumper is located between the LCM and interface board, user may not possible to access this setting

4.3 RS232C Setting

No. of Bit	Parity	Stop Bit
8	None	1

4.4 Acknowledge Code

It provides a start-up ready signal after the power on (and the re-boot command) to acknowledge that it is ready to receive.

ASCII (dec)	ASCII (hex)	Response Code	Note
062	0x3E	>	Finish Boot-up. Ready to receive

4.5 Power on Default Status

- Cursor Home (top left corner of the display)
- Cursor as Underline
- SCROOL=OFF
- WARP=ON

4.6 Display Addressing

		COLUMN (dec)										
		00	01	02	03	04	.. .. ..	15	16	17	18	19
ROW (dec)	00						.. .. ..					
	01						20 x 4 Characters (5x8 dots font)					
	02											
	03						.. .. ..					

4.7 List of Command & Data Code

Interface board receives ASCII code via RS232 port. The codes interpret as COMMAD or display data. The action and the display content update accordingly

ASCII (dec)	ASCII (hex)	Key Strokes	Function Name	SCROLL	WARP	Action Result
000	0x00	--	Reserved	--	--	Reserved
001	0x01	Ctrl+A	Cursor Home	--	--	Cursor back to top-left corner of the display
002 : 003	0x02 : 0x03	--	Reserved	--	--	Reserved
004	0x04	Ctrl+D	Cursor Hide	--	--	No show cursor
005	0x05	Ctrl+E	Cursor Underline	--	--	Shows cursor as underline
006	0x06	Ctrl+F	Cursor Block	--	--	Shows cursor as block (flashing)
007 : 009	0x07 : 0x09	--	Reserved	--	--	Reserved
010	0x0A	Ctrl+J	Line Feed	OFF	OFF	Cursor moves to next line, display no change (if cursor on last line, cursor no move)
				OFF	ON	Cursor moves to next line, display no change (if cursor on last line, cursor warps to 1st line)
				ON	--	Whole screen content scroll up, last line cleared, cursor no move, stay at the same position.
011	0x0B	--	Reserved	--	--	Reserved
012	0x0C	Ctrl+L	Form Feed (Clear Screen)	--	--	Clear Screen, Cursor backs to top-left corner of the display
013	0x0D	Ctrl+M	Return	--	--	Cursor back to left most of the current line display content no change
014 : 015	0x0E : 0x10	--	Reserved	--	--	Reserved
017	0x11	Ctrl+Q	Set Cursor Position (follow with Line and Column)	--	--	Cursor goes to the target location, display no change (where, line-range = 0~3, column-range = 0~19) Example: /017, /002, /007 : cursor goes 3rd line,8th column
018	0x12	--	Reserved	--	--	Reserved
019	0x13	Ctrl+S	SCROLL=ON	--	--	Enable scroll function
020	0x14	Ctrl+T	SCROLL=OFF	--	--	Disable scroll function
021 : 022	0x15 : 0x16	--	Reserved	--	--	Reserved
023	0x17	Ctrl+W	WARP ON	--	--	Enable Warp function
024	0x18	Ctrl+X	WARP OFF	--	--	Disable Warp function
025	0x19	--	Reserved	--	--	
026	0x1A	Ctrl+Z	Reboot	--	--	Reset to power on status
027 : 030	0x1B : 0x1E	--	Reserved	--	--	Reserved
031	0x1F	Ctrl+"-"	Show Information Screen	--	--	Shows information screen, Cursor Hided, Cursor Homed
032 : 255	0x20 : 0xFF	--	Display Char (*1)	--	OFF	Show the char, cursor moves to successive location (if cursor reach end of the line, cursor no move)
				OFF	ON	Show the char, cursor moves to successive location (if cursor reach end of the line, cursor move to next line left most location, cursor on last line warps to the 1st line)
				ON	ON	Show the Char, cursor moves to successive location (if the cursor reach the end of the last line, whole screen scroll up, last line cleared, cursor move to the left most of the last line)

Note. *1. See the LCM data sheet for characters set
*2. Illegal Command Codes will be ignored

5. Design and Handling Precaution

1. The LCD panel is made by glass. Any mechanical shock (eg. dropping form high place) will damage the LCD module.
2. Do not add excessive force on the surface of the display, which may cause the Display color change abnormally.
3. The polarizer on the LCD is easily get scratched. If possible, do not remove the LCD protective film until the last step of installation.
4. Never attempt to disassemble or rework the LCD module.
5. Only Clean the LCD with Isopropyl Alcohol or Ethyl Alcohol. Other solvents (eg. water) may damage the LCD.
6. When mounting the LCD module, make sure that it is free form twisting, warping and distortion.
7. Ensure to provide enough space (with cushion) between case and LCD panel to prevent external force adding on it, or it may cause damage to the LCD or degrade the display result.
8. Only hold the LCD module by its side. Never hold LCD module by add force on the heat seal or TAB.
9. Never add force to component of the LCD module. It may cause invisible damage or degrade of the reliability.
10. LCD module could be easily damaged by static electricity. Be careful to maintain an optimum anti-static work environment to protect the LCD module.
11. When peeling off the protective film from LCD, static charge may cause abnormal display pattern. It is normal and will resume to normal in a short while.
12. Take care and prevent get hurt by the LCD panel sharp edge.
13. Never operate the LCD module exceed the absolute maximum ratings.
14. Keep the signal line as short as possible to prevent noisy signal applying to LCD module.
15. Never apply signal to the LCD module without power supply.
16. IC chip (eg. TAB or COG) is sensitive to the light. Strong lighting environment could possibly cause malfunction. Light sealing structure casing is recommend.
17. LCD module reliability may be reduced by temperature shock.
18. When storing the LCD module, avoid exposure to the direct sunlight, high humidity, high temperature or low temperature. They may damage or degrade the LCD module