LCM Simple Instruction Guide

1. Mechanical Specification

ITEM	STANDARD VALUE	UNIT
NUMBER OF CHARACTERS	20 CHARACTERS X 2 LINES	--
CHARACTER FORMAT	5 X 8 DOTS	--
MODULE DIMENSION EDGE LED BACKLIGHT	167.0 (W) X 46.0 (H) X 18.5(Max) (T)	mm
VIEWING DISPLAY AREA	123.0 (W) X 23.0 (H)	mm
ACTIVE DISPLAY AREA	118.85 (W) X 19.0 (H)	mm
CHARACTER SIZE	4.85 (W) X 9.32 (H)	mm
CHARACTER PITCH	6.00 (W) X 9.77 (H)	mm
DOT SIZE	0.93 (W) X 1.11 (H)	mm
DOT PITCH	0.98 (W) X 1.16 (H)	mm

2. Mechanical Diagram
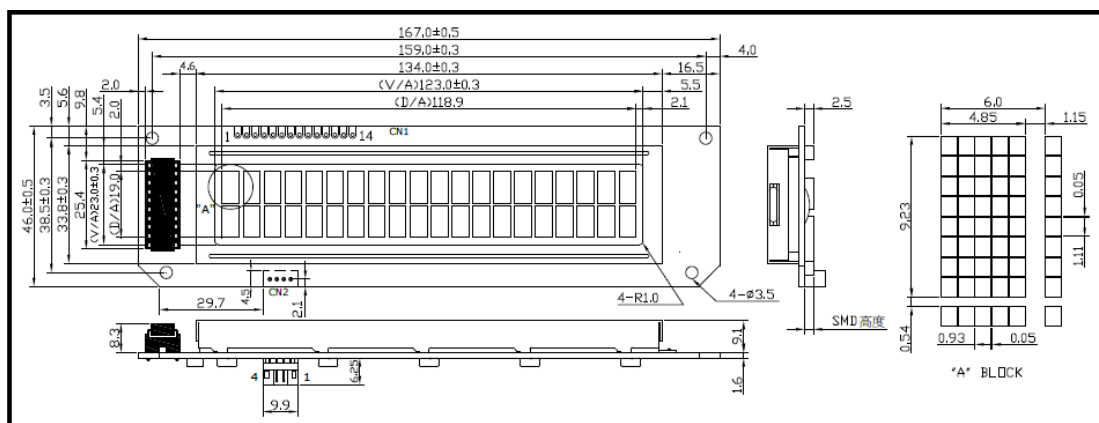
3. Interface Pin Connections (CN2)

NO	SYMBOL	FUNCTION
1	VDD	DC +5V
2	VSS	GND (0V)
3	DI	Series Data Input
4	FGND	FRAME GND

4. Block Diagram
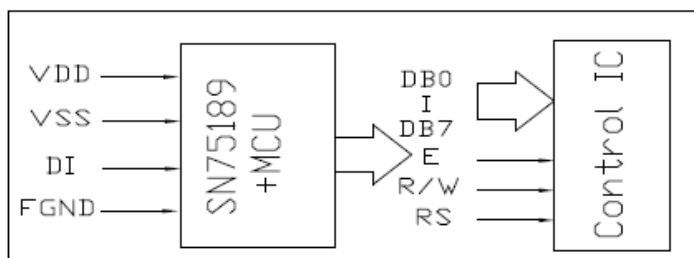
5. Command Set:

Command	Code (hex)	Description
ESC @	1B 40	Initialize.
ESC _ n	1B 5F n n=0, 1	Cursor hide/Show.
HT	09	Cursor right.
BS	08	Cursor left.
LF	0A	Cursor down.
ESC [C	1B 5B 43	Cursor right.
ESC [D	1B 5B 44	Cursor left.
ESC [A	1B 5B 41	Cursor up.
ESC [B	1B 5B 42	Cursor down.
HOM	0B	Cursor to the top-left
CR	0D	Cursor home
ESC [H	1B 5B 48	Cursor to the top-left
ESC [R	1B 5B 52	Cursor end.
ESC [L	1B 5B 4C	Cursor home.
ESC [K	1B 5B 4B	Cursor to the bottom-right.
ESC C n d0....d7	1B 43 n d0....d7 00h<=n<=07h	Create custom character patterns
ESC l x y	1B 6C x y 1≤ x≤ 1E, 1≤ y≤ 4	Cursor to specified position.
CLR	0C	Clear screen.
ESC Q A	1B 51 41 [datax15] 0D	Set string display mode,write string to upper line.
ESC Q B	1B 51 42 [datax15] 0D	Set string display mode,write string to lower line.
ESC DC1	1B 11	Overwrite mode
ESC DC2	1B 12	Vertical scroll mode
ESC DC3	1B 13	Horizontal scroll mode

6. Instruction Description

1. ESC @

ASCII Format：ESC @

DEC Format：[027][064]

HEX Format：[1BH][40H]

Description：Clear the data in the input buffer and reset setting to power on defaults.

2．CLR

ASCII Format：CLR

DEC Format：[012]

HEX Format：[0CH]

Description：Clear all the characters displayed, clear string mode.

3．CAN

ASCII Format：CAN

DEC Format：[024]

HEX Format：[18H]

Description：Clear the line where the cursor is at, clear string mode.

4．ESC Q A d1d2d3…dn CR

ASCII Format：ESC Q A d1d2d3…dn CR

DEC Format：[027][081][065]d1d2d3…dn[013]

{20h<=dn<=ffh ，1<=n<=20}

HEX Format：[1BH][51H][41H]d1d2d3…dn[0DH]

Description：

a. set string display mode, write to upper line.

b. the string display mode can be cancelled with CLR or CAN.

5．ESC Q B d1d2d3…dn CR

ASCII Format：ESC Q B d1d2d3…dn CR

DEC Format：[027][081][066]d1d2d3…dn[013]

{20h<=dn<=ffh ，1<=n<=20}

HEX Format：[1BH][51H][42H]d1d2d3…dn[0DH]

Description：

a. set string display mode, write to lower line.

b. the string display mode can be cancelled with CLR or CAN.

6．ESC [A

ASCII Format：ESC [A

DEC Format：[027][091][065]

HEX Format：[1BH][5BH][41H]

Description：move the cursor up one line.

When the cursor is at the upper line, this command operates differently depending on the display mode:

1.) Overwrite mode:

THE cursor is moved to the same column on the lower line.

2.) Vertical scroll mode:

The characters displayed on the upper line are scrolled to the lower line, and the upper line is cleared. The cursor remains at the same position.

3.) Horizontal scroll mode:

The cursor is not moved.

7．ESC [B

ASCII Format：ESC [B

DEC Format：[027][091][066]

[010]

HEX Format：[1BH][5BH][42H]

[0AH]

Description：move the cursor down one line.

When the cursor is at the lower line, this command operates differently depending on the display mode:

1.) Overwrite mode:

THE cursor is moved to the same column on the upper line

2.) Vertical scroll mode:

The characters displayed on the upper line are scrolled to the lower line, and the upper line is cleared. The cursor remains at the same position.

3.) Horizontal scroll mode:

The cursor is not moved.

8．ESC [C

ASCII Format：ESC [C

DEC Format：[027][091][067]

[009]

HEX Format：[1BH][5BH][43H]

[09H]

Description：Move the cursor one position to the right.

When the cursor is at the right end, this command operates differently depending on the display mode:

1.) Overwrite mode:

THE cursor moves to the left end of the other line.

2.) Vertical scroll mode:

When the cursor is at the upper right end, it is moved to the lower left end.

When the cursor is at the lower right end, the lower line message is moved to the upper line. The lower line is cleared, and the cursor moved to the lower right end.

3.) Horizontal scroll mode:

All characters on the current line are scrolled one to the left in the window.

The cursor is not moved but the character area at the right end of the windows is cleared.

9．ESC [D

ASCII Format：ESC [D

DEC Format：[027][091][068]

[008]

HEX Format：[1BH][5BH][44H]

[08H]

Description：Move the cursor one position to the left.

When the cursor is at the left end, this command operates differently depending on the display mode:

1.) Overwrite mode:

THE cursor moves to the right end of the other line.

2.) Vertical scroll mode:

When the cursor is at the lower left end, it is moved to the upper right end.

When the cursor is at the upper right end, the upper line message is moved to the lower line. The upper line is cleared, and the cursor moved to the upper right end.

3.) Horizontal scroll mode:

All characters on the current line are scrolled one to the right in the window.

The cursor is not moved but the character area at the left end of the windows is cleared.

10．ESC [H

ASCII Format：ESC **[H**

DEC Format：[027][091][072]

[011]

HEX Format：[1BH][5BH][48H]

[0BH]

Description： Move the cursor to the left -most position on the upper line.

11．ESC [H

ASCII Format：ESC **[H**

DEC Format：[027][091][072]

[011]

HEX Format：[1BH][5BH][48H]

[0BH]

Description： Move the cursor to the left -most position on the upper line.

12. ESC [L

ASCII Format：ESC **[L**

DEC Format：[027][091][076]

[013]

HEX Format：[1BH][5BH][4CH]

[0DH]

Description： Move the cursor to the left -most position on the current line.

13. ESC [R

ASCII Format：ESC **[R**

DEC Format：[027][091][082]

HEX Format：[1BH][5BH][52H]

Description： Move the cursor to the right -most position on the current line.

14. ESC [K

ASCII Format：ESC **[K**

DEC Format：[027][091][075]

HEX Format：[1BH][5BH][4BH]

Description： Move the cursor to the right -most position on the lower line.

15. ESC l X Y

ASCII Format：ESC l **X Y**

DEC Format：[027][108] X Y

{01H<=X<=14H, 01H <=Y<=02H}

HEX Format：[1BH][6CH] X Y

Description： Move the cursor to the X-th column on the Y-th line.

16. ESC W s x1 x2 y

ASCII Format：ESC W **s x1 x2 y**

DEC Format：[027][087][000]

[027][087][001] x1 x2 y {01h<=x<=14h, 01h<=y<=02h}

HEX Format：[1BH][57H][00H]

[1BH][57H][01H] x1 x2 y

Description： Set or cancel the window range on the display screen.

When s = 0, window is cancelled.

When s = 1, window is set, where x1 and x2 set the position of the left-most and the right -most columns of the window.

y sets the upper or lower line.

The window is effective in the horizontal scroll mode.

17．ESC C n d0….d7

ASCII Format：ESC C **n d0….d7**

DEC Format：[027][067] **n d0….d7 {00h<=n<=07h}**

HEX Format：[1BH][43H] **n d0….d7**

Description： Create custom character patterns.

n specifies which custom character to be generated.

d0..d7 specify the bit pattern for the character to be generated.

There are eight customer definable characters. They are numbered from 0 to 7, corresponding to character codes 00h to 07h, and are duplicated at character codes 08h to 0fh.

The relation between n and the character codes is as below:

n	Char code	n	Char code
0	00h	0	08h
1	01h	1	09h
2	02h	2	0Ah
3	03h	3	0Bh
4	04h	4	0Ch
5	05h	5	0Dh
6	06h	6	0Eh
7	07h	7	0Fh

Below is an example for generating   □ as a custom character:

NO	Bit Pattern								Data Value in hex
	7	6	5	4	3	2	1	0	
d0	*	*	*	1	1	1	1	1	1FH
d1	*	*	*	1	0	0	0	1	11H
d2	*	*	*	1	0	0	0	1	11H
d3	*	*	*	1	0	0	0	1	11H
d4	*	*	*	1	0	0	0	1	11H
d5	*	*	*	1	0	0	0	1	11H
d6	*	*	*	1	0	0	0	1	11H
d7	*	*	*	1	1	1	1	1	1FH

The asterisks (*) in the bit pattern are unused bits.

To generate the above character as character 3, the following command would be sent to the display:

[1BH][43H][03H][1FH][11H][11H][11H][11H][11H] [11H][1FH]

7. User Font Patterns (CG RAM Character)

Character Code (DD RAM data)		CG RAM Address		Character Pattern (CG RAM data)		
Hi 76543210 Lo		543 210		Hi 765 4 3 2 1 0 Lo		
0000x000		000	000	xxx 1 1 1 1 0		
			001	xxx 1 0 0 0 1		
			010	xxx 1 0 0 0 1		
			011	xxx 1 1 1 1 0		
			100	xxx 1 0 1 0 0		
			101	xxx 1 0 0 1 0		
			110	xxx 1 0 0 0 1		
			111	xxx 0 0 0 0 0		
0000x001		001	000	xxx 1 0 0 0 1		
			001	xxx 0 1 0 1 0		
			010	xxx 1 1 1 1 1		
			011	xxx 0 0 1 0 0		
			100	xxx 1 1 1 1 1		
			101	xxx 0 0 1 1 0		
			110	xxx 0 0 1 0 0		
			111	xxx 0 0 0 0 0		
-----------------		----------------		----------------------------------		
0000x111		111	000			
			001			
			010			
			011			
			100			
			101			
			110			
			111			

8. Character Generator ROM Map

8.1 SBS02002D0LEW10 (English-Japanese)Font Table

Lower 4 bit \ Higher 4 bit	CHARACTER PATTERN CHART (5x7DOTS+CURSOR)

The chart columns are labelled (Higher 4 bit): 0000, 0010, 0011, 0100, 0101, 0110, 0111, 1010, 1011, 1100, 1101, 1110, 1111

The rows are labelled (Lower 4 bit): xxxx0000 (CG RAM (1)), xxxx0001 (2), xxxx0010 (3), xxxx0011 (4), xxxx0100 (5), xxxx0101 (6), xxxx0110 (7), xxxx0111 (1), xxxx1000 (1), xxxx1001 (2), xxxx1010 (3), xxxx1011 (4), xxxx1100 (5), xxxx1101 (6), xxxx1110 (7), xxxx1111

Left vertical label: Lower 4-bit (D0-D3) of Character Code (Hexadecimal)

8.2 SBS02002D0LEW20 (English-European)Font Table

8.3   SBS02002D0LEW30 (English-Russian)Font Table

CHARACTER PATTERN CHART(5x7DOTS+CURSOR)