LCD MODULE 4x20 - 3.75mm

INCL. CONTROLLER SSD1803



FEATURES

- * HIGH CONTRAST LCD SUPERTWIST DISPLAY
- * CONTROLLER SSD1803 (NEARLY 100% COMPATIBLE WITH HD44780)
- * INTERFACE FOR 4- AND 8-BIT DATA BUS
- * SERIAL SPI INTERFACE (SID, SOD, SCLK)
- * POWER SUPPLY +2.7 V ~ +3.45V / 1.5mA
- * LED BACKLIGHT Y/G max. 150mA@+25°C LED BACKLIGHT BLUE-WHITE AND BLACK-WHITE max. 45mA@+25°C
- * OPERATING TEMPERATURE RANGE -20..+70°C
- * BUILT-IN TEMPERATURE COMPENSATION
- * SOME MORE MODULES WITH SAME SIZE AND SAME PINOUT:
 - DOTMATRIX 1x8, 2x16
 - GRAPHIC 122x32
- * NO SCREWS REQUIRED: SOLDER ONTO PCB ONLY
- * DETACHABLE VIA 9-PIN SOCKET EA B200-9 (2 PCS REQUIRED)

ORDERING INFORMATION

LCD MODULE 4x20 - 3.73mm WITH LED BACKLIGHT Y/G
BLUE-WHITE
BLACK-WHITE
9-PIN SOCKET, HEIGHT 4.3mm (1 PC.)

EA DIP203G-4NLED
EA DIP203B-4NLW
EA B200-9



PINOUT

Pin	Symbo	Level	Function	Pin	Symbo	Level	Function
1	VSS	L	Power Supply 0V (GND)	10	D3	H/L	Display Data
2	VDD	Н	Power Supply +3.3V	11	D4 (D0)	H/L	Display Data
3	VEE	-	Contrast adjustment, input	12	D5 (D1)	H/L	Display Data
4	RS (CS)	H/L	H=Data, L=Command	13	D6 (D2)	H/L	Display Data
5	R/W (SID)	H/L	H=Read, L=Write	14	D7 (D3)	H/L	Display Data, MSB
6	E (SCLK)	Η	Enable (falling edge)	15	-	-	NC (see EA DIP122-5N)
7	D0 (SOD)	H/L	Display Data, LSB	16	RES	L	Reset (internal Pullup 10k)
8	D1	H/L	Display Data	17	Α	-	LED B/L+ Resistor required
9	D2	H/L	Display Data	18	С	-	LED B/L-

BACKLIGHT

Using the LED backlight requires a current source or external current-limiting resistor. Forward voltage for yellow/green backlight is $3.9\sim4.2V$ and for white LED backlight is $3.0\sim3.6V$. Please take care of derating for $T_a>+25$ °C.

Note: Do never connect backlight directly to 5V; this may destroy backlight immediately!

TABEL OF COMMAND (SSD1803, IE=HIGH)

						C od	e						Execute
Instruction	RE Bit	RS	R/W	DB 7			DB 2			Description	Time (270kHz)		
Clear Display	*	0	0	0	0	0	0	0	0	0	1	Clears all display and returns the cursor to the home position (Address 0).	1.53ms
Cursor At Home	0	0	0	0	0	0	0	0	0	1	*	Returns the Cursor to the home position (Address 0). Also returns the display being shifted to the original position. DD RAM contents remain unchanged.	1.53ms
Power Down Mode	1 0		0	0	0	0	0	0	0	1	PD	Set Power down mode bit. PD=0: powerdown mode disable PD=1: powerdown mode enable	39μs
Entry Mode Set	0	0	0	0	0	0	0	0	1	I/D	s	Cursor moving direction (I/D=0: dec; I/D=1: inc) shift enable bit (S=0: disable; S=1: enable shift)	39µs
Entry Wode Set	1	0	0	0	0	0	0	0	1	1	BID	Segment bidirectional function (BID=0: Seg1->Seg60; BID=1: Seg60->Seg1)	39µs
Display On/Off Control	0	0	0	0	0	0	0	1	D	С	В	D=0: display off; D=1: display on C=0: cursor off; C=1: cursor on B=0: blink off; B=1: blink on	39μs
extended Function Set	1	0	0	0	0	0	0	1	FW	ВW	NW	FW=0: 5-dot font width; FW=1: 6-dot font width BW=0: normal cursor; BW=1: inverting cursor NW=0: 1- or 2-line (see N); NW=1: 4-line display	39μs
Cursor / Display Shift	0	0	0	0	0	0	1	S/C	R/L	*	*	Moves the Cursor or shifts the display S/C=0: cursor Shift; S/C=1: display shift R/L=0: shift to left; R/L=1: shift to right	39μs
Scroll Enable	1	0	0	0	0	0	1	H4	НЗ	H2	H1	Determine the line for horizontal scroll	39µs
Function Set	0	0	0	0	0	1	DL	N	RE	DH	RE	sets interface data length (DL=0:4-bit; DL=1:8-bit) number of display lines (N=0: 1-line; N=1: 2-line) extension register (RE= 0/1) scroll/shift (DH=0: dot scroll; DH=1: display shift) reverse bit (REV=0:normal; REV=1:inverse display)	39µs
	1	0	0	0	0	1	DL	N	RE	BE	LP	CG-/SEG-RAM blink (BE=0: disable; BE=1: enable) LP=0: normal mode; LP=1: low power mode	39µs
CG RAM Address Set	0	0	0	0	1			Α	C			Sets the CG RAM address. CG RAM data is sent and received after this setting.	39µs
SEG RAM Address Set	1	0	0	0	1	*	*		Α	C		Sets the SEG RAM address. SEG RAM data is sent and received after this setting.	39µs
DD RAM Address Set	0	0	0	1				AC				Sets the DD RAM address. DD RAM data is sent and received after this setting.	39µs
Set Scroll Quantity	1	0	0	1	*			S	Q			Sets the quantity of horizontal dot scroll (DH=0)	39µs
Busy Flag / Address Read	*	0	1	BF				AC				Reads Busy flag (BF) indicating internal operation is being performed and reads address counter contents.	-
Write Data	*	1	0			١	Vrite	Dat	а			Writes data into internal RAM (DD RAM / CG RAM / SEGRAM)	43µs
Read Data	*	1	1			F	Read	l Dat	а			Reads data from internal RAM (DD RAM / CG RAM / SEGRAM)	43µs



		II.	ITIV	AL	SA	TIO	N E	ΣXΑ	MP	LE	FΟ	R 8 BIT MODE
Command	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Hex	Description
Function Set	0	0	0	0	1	1	0	1	0	0	\$34	8 bit data length, extension bit RE=1
ext. Function Set	0	0	0	0	0	0	1	0	0	1	\$09	4 line mode
Function Set	0	0	0	0	1	1	0	0	0	0	\$30	8 bit data length, extension bit RE=0
Display ON/OFF	0	0	0	0	0	0	1	1	1	1	\$0F	display on, cursor on, cursor blink
Clear Display	0	0	0	0	0	0	0	0	0	1	\$01	clear display, cursor 1st. row, 1st. line
Entry Mode Set	0	0	0	0	0	0	0	1	1	0	\$06	cursor will be automatically incremented

Addressing:

 1st. line
 \$00..\$13

 2nd. line
 \$20..\$33

 3rd. line
 \$40..\$53

 4th. line
 \$60..\$73

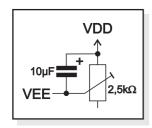
CHARACTER SET

A full character set is built-in already. Additionally to that 8 more characters can be defined individually.

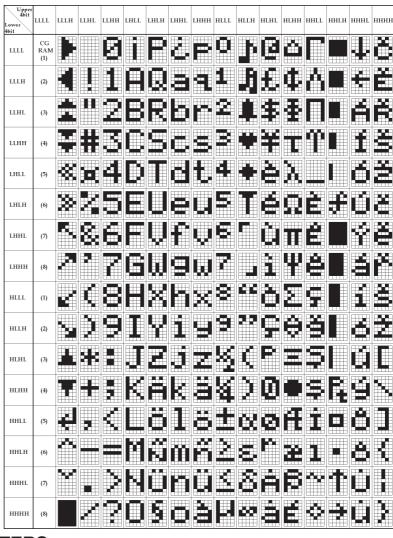
CONTRAST ADJUSTMENT

Pin 3 requires driving voltage for contrast VEE. Adjustment can be done by external potentiometer for example. The capacitor is for a better startup behaviour.

Note: In contrast to many other dotmatrix lcd modules input is supplied with VDD level here!



All versions do have a built-in temperature compensation; so there's no more need for contrast adjustment during operation anymore.



CREATING YOUR OWN CHARACTERS

All these character display modules got the feature to create 8 own characters (ASCII Codes 0..7) in addition to the 240 ROM fixed codes.

Set CG RAM Address

Data

- 1.) The command "CG RAM Address Set" defines the ASCII code (Bit 3,4,5) and the dot line (Bit 0,1,2) of the new character. Example demonstrates creating ASCII code \$00.
- Doing 8 times the write command "Data Write" defines line by line the new character. 8th. byte stands for the cursor line.

	S	et CG RA	M	4 dd	Ires	s												Da	ata			
I		Adress									Hex											
ķ		Auress							_	7	6	5	4	3	2	1	0	пех				
			0	0	0	\$40											0	0	7	0	0	\$04
I			0	0	1	\$41											0	0	7	0	0	\$04
ı			0	1	0	\$42											0	0	1	0	0	\$04
	0 1	0 0 0	0	1	1	\$43								Х	~	v .	0	0	1	0	0	\$04
l	0 1	0 0 0	1	0	0	\$44								^	^	^	7	0	1	0	1	\$15
/			1	0	1	\$45											0	1	7	1	0	\$0E
r			1	1	0	\$46											0	0	7	0	0	\$04
'			1	1	1	\$47											0	0	0	0	0	\$00

3.) The newly defined character can be used as a "normal" ASCII code (0..7); use with "DD RAM Address Set" and "Data Write".



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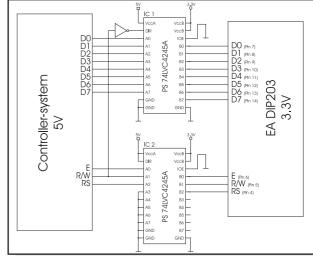
DRIVING WITH 5V-SYSTEMS

The supply voltage of the display is necessarily 3.3V. If a 5V-system is used, the level have to be adapted. For example you can use a bidirectional levelshifter (e.g. PS 74LVC4245A), like shown in the opposite figure.

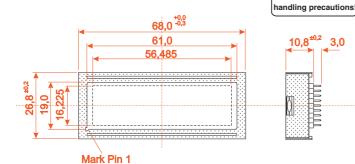
COMPATIBILITY WITH EA DIP204-4

The displays of EA DIP203 and EA DIP204 series are electrically and mechanically identical to each other running with 3.3V supply mode.

Merely a 5V supply is not acceptable with the new EA DIP203 series.

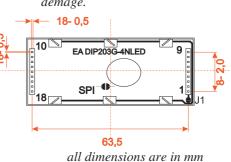


EA DIP203G-4NLED

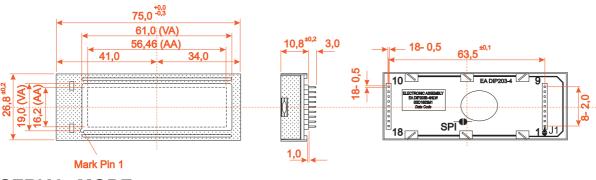


Note:

LC-Displays are generally not suited to wave or reflow soldering. Temperatures of over 80°C can cause lasting demage.



EA DIP203B-4NLW and EA DIP203J-4NLW



SERIAL MODE

◆ SPI

Factory setting for interface is parallel with 4 bit or 8 bit data bus. Alternatively the module can be used with serial data stream. For that, solder link **SPI** has to be closed. Specification for serial operation mode is described in user manual for SSD1803:

http://www.lcd-module.de/fileadmin/eng/pdf/zubehoer/ssd1803 2 0.pdf



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