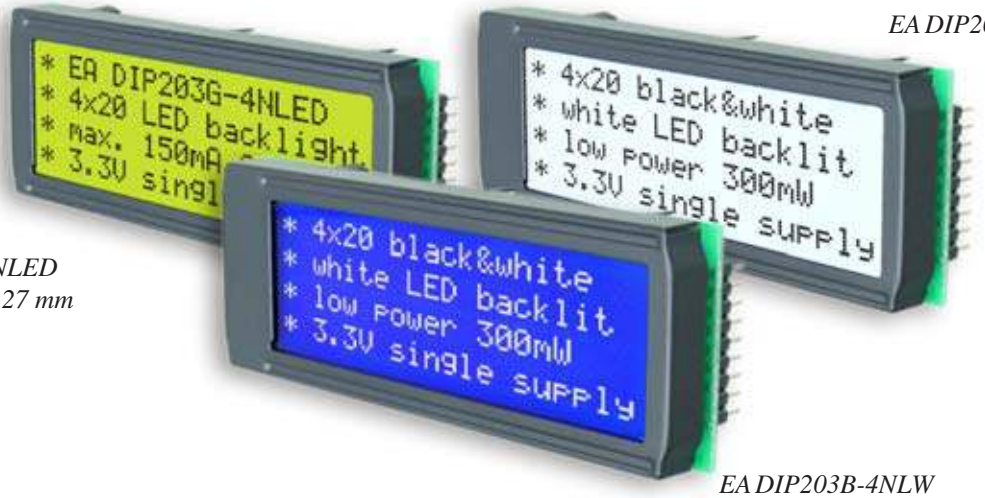
LCD MODULE 4x20 - 3.75mm

Issue 4.2013

INCL. CONTROLLER SSD1803



EA DIP203J-4NLW

EA DIP203G-4NLED
Dimension 68 x 27 mm

EA DIP203B-4NLW
Dimension 75 x 27 mm

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	**EA DIP203G-4NLED**
BLUE-WHITE	**EA DIP203B-4NLW**
BLACK-WHITE	**EA DIP203J-4NLW**
9-PIN SOCKET, HEIGHT 4.3mm (1 PC.)	**EA B200-9**

ELECTRONIC ASSEMBLY
making things easy

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PINOUT

Pin	Symbo	Level	Function		Pin	Symbo	Level	Function
1	VSS	L	Power Supply 0V (GND)		10	D3	H / L	Display Data
2	VDD	H	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)	H	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	A	-	LED B/L+ Resistor required
9	D2	H / L	Display Data		18	C	-	LED B/L-

BACKLIGHT

Using the LED backlight requires a current source or external current-limiting resistor. Forward voltage for yellow/green backlight is 3.9~4.2V and for white LED backlight is 3.0~3.6V. 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)

Instruction	C ode											Description	Execute Time (270kHz)
	RE Bit	RS	R/W	DB 7	DB 6	DB 5	DB 4	DB 3	DB 2	DB 1	DB 0		
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
	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	C	B	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	BW	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	H3	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	AC						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	*	*	AC				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	*	SQ						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	Write Data								Writes data into internal RAM (DD RAM / CG RAM / SEGRAM)	43µs
Read Data	*	1	1	Read Data								Reads data from internal RAM (DD RAM / CG RAM / SEGRAM)	43µs

INITIALISATION EXAMPLE FOR 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*

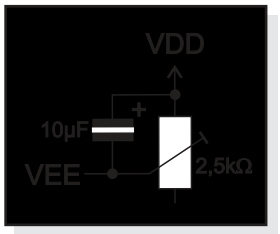
CHARACTER SET

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

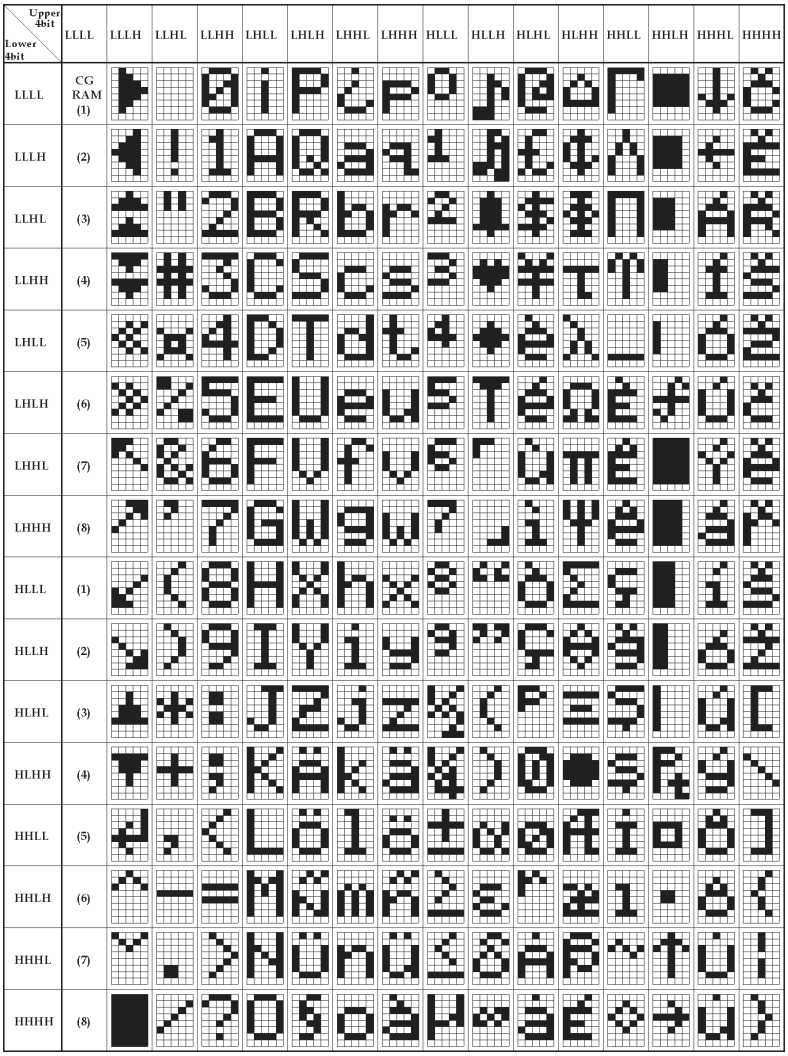
CONTRAST ADJUSTMENT

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.

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.

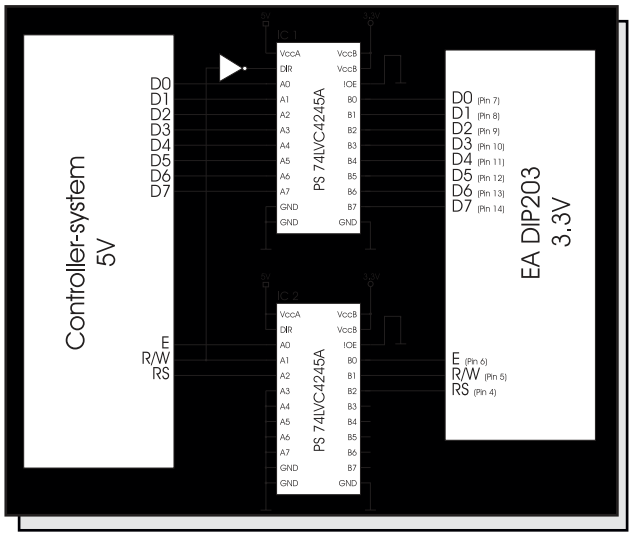
2.) Doing 8 times the write command "Data Write" defines line by line the new character. 8th. byte stands for the cursor line.

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

Set CG RAM Address					Data									
Adresse				Hex				Bit						Hex
					7	6	5	4	3	2	1	0	
0	1	0	0 0	$40				0	0	1	0	0	$04
			0 1	$41				0	0	1	0	0	$04
			1 0	$42				0	0	1	0	0	$04
			1 1	$43				0	0	1	0	0	$04
			0 0	$44	X	X	X	1	0	1	0	1	$15
			0 1	$45				0	1	1	1	0	$0E
			1 0	$46				0	0	1	0	0	$04
			1 1	$47				0	0	0	0	0	$00

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.

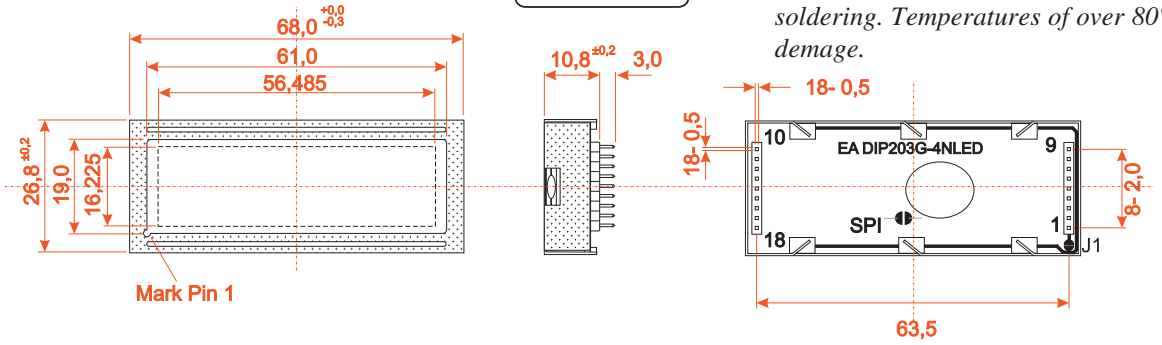


COMPATIBILITY WITH EA DIP204-4

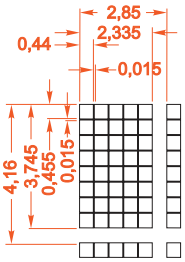
The displays of EA DIP203 and EA DIP204 series are electrically and mechanically identical to each other running with 3.3V supply mode.
Merely a 5V supply is not acceptable with the new EA DIP203 series.

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

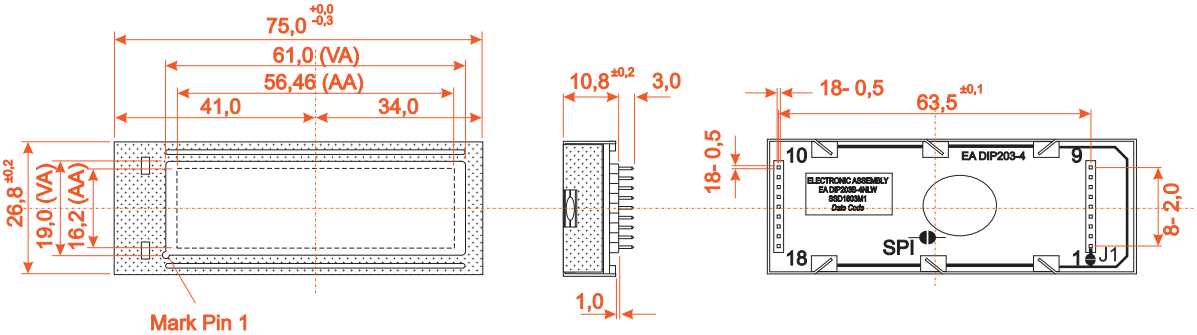
EA DIP203G-4NLED



all dimensions are in mm



EA DIP203B-4NLW and EA DIP203J-4NLW



SERIAL MODE

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