EA DIP204-4

LCD MODULE 4x20 - 3.73mm

INCL. CONTROLLER KS0073

no more mounting required

EA DIP204-4HNLED
Dimension 68 x 27 mm

EA DIP204B-4NLW
Dimension 75 x 27 mm

FEATURES

* HIGH CONTRAST LCD SUPERTWIST DISPLAY
* CONTROLLER KS0073 (NEAR 100% COMPATIBLE WITH HD44780)
* INTERFACE FOR 4- AND 8-BIT DATA BUS
* SERIAL SPI INTERFACE (SID, SOD, SCLK)
* POWER SUPPLY +3.3..+5V (-4NLW, -4NLED)
* POWER SUPPLY +5V (-4HNLED)
* OPERATING TEMPERATURE RANGE 0~+50°C (-20..+70°C: -4NLW, -4HNLED)
* BUILT-IN TEMPERATURE COMPENSATION (-4NLW, -4HNLED)
* LED BACKLIGHT Y/G typ. 150mA@4.1V, max. 200mA (100,000h)
* LOW POWER WITH BLUE-WHITE OPTIC / max. 60mA@3.6V (30,000h)
* SOME MORE MODULES WITH SAME MECHANIC AND SAME PINOUT:
  - DOTMATRIX 1x8, 2x16
  - GRAPHIC 122x32
* NO SCREWS REQUIRED: SOLDER ON IN 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 DIP204-4NLED**
SAME BUT FOR $T_{OP.}$ -20~+70°C / $T_{STOR.}$ -30~+80°C	**EA DIP204-4HNLED**
BLUE-WHITE, $T_{OP.}$ -20~+70°C / $T_{STOR.}$ -30~+80°C	**EA DIP204B-4NLW**
9-PIN SOCKET, HEIGHT 4.3mm (1 PC.)	**EA B200-9**
ADAPTOR PCB WITH STANDARD PINOUT PITCH 2.54mm	**EA 9907-DIP**

ELECTRONIC ASSEMBLY GMBH
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PINOUT

Pin	Symbol	Level	Function	Pin	Symbol	Level	Function
1	VSS	L	Power Supply 0V (GND)	10	D3	H / L	Display Data
2	VDD	H	Power Supply +5V	11	D4 (D0)	H / L	Display Data
3	VEE	-	Contrast adjust. (about 0V)	12	D5 (D1)	H / L	Display Data
4	RS	H / L	H=Command, L=Data	13	D6 (D2)	H / L	Display Data
5	R/W	H / L	H=Read, L=Write	14	D7 (D3)	H / L	Display Data, MSB
6	E	H	Enable (falling edge)	15	-	-	NC (see EA DIP122-5N)
7	D0	H / L	Display Data, LSB	16	-	-	NC (see EA DIP122-5N)
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

Operation of integrated LED backlight requires an external resistor as a current limit. Calculation is R=U/I, i.e. with 5V power supply:

$$R_{yellow/green} = (5{,}0V - 4{,}1V) / 0{,}15A = 6\ Ohms$$
$$R_{blue\text{-}white} = (5{,}0V - 3{,}3V) / 0{,}06A = 28\ Ohms$$

Note: - Do never connect backlight direct to 5V; this may destroy backlight immediately !
- Blue-white displays do always need a backlight for contrast (min. 5mA).

TABEL OF COMMAND (KS0073, IE=HIGH)

Instruction	Code RE Bit	RS	R/W	DB 7	DB 6	DB 5	DB 4	DB 3	DB 2	DB 1	DB 0	Description	Execute 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
	0	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	REV	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

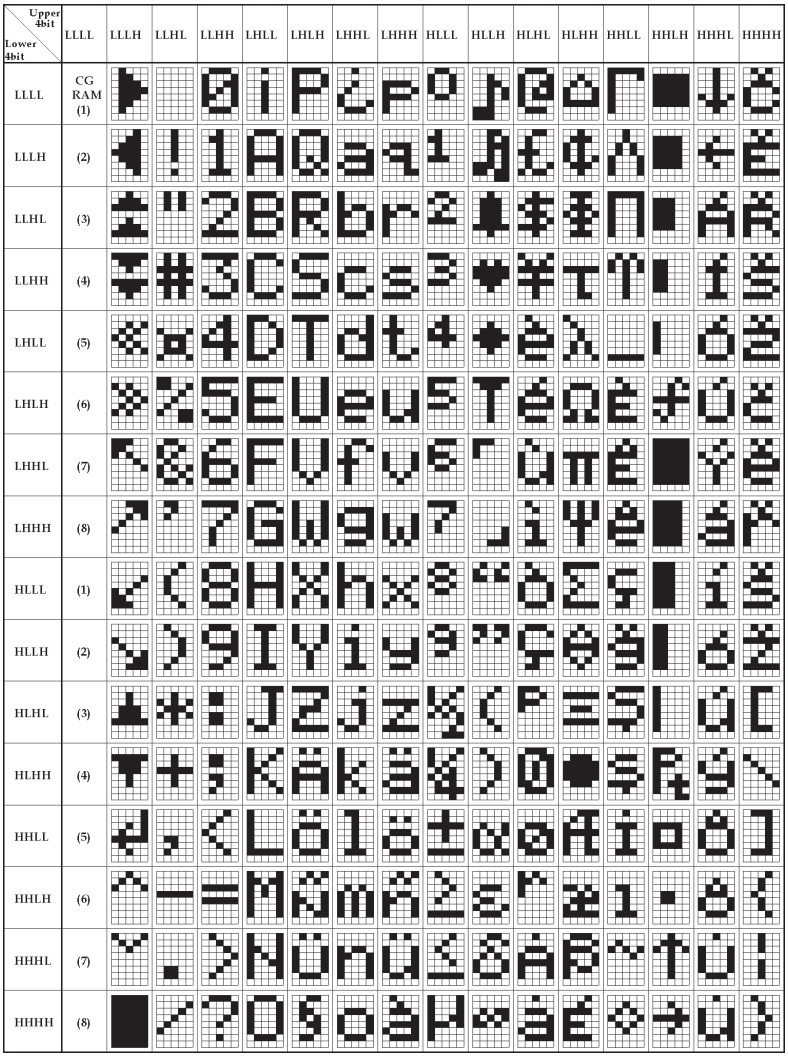
INITIALISATION EXAMPLE FOR 8 BIT MODE											
Command	**RS**	**R/W**	**DB7**	**DB6**	**DB5**	**DB4**	**DB3**	**DB2**	**DB1**	**DB0**	**Hex**	**Description**
Function Set	0	0	0	0	1	1	0	1	0	0	$34	8 bit data length, extension bit RE=1
ext. Function Set	0	0	0	0	0	0	1	0	0	1	$09	4 line mode
Function Set	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

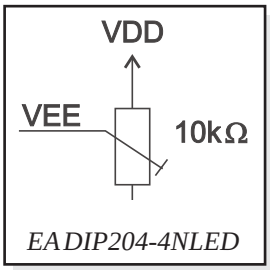
A full character set is built in already. Additionally to that 8 more characters can be defined individually.



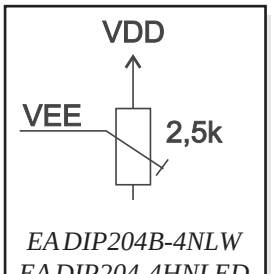
CONTRAST ADJUSTMENT

Pin 3 requires driving voltage for contrast VEE. Adjustment can be done by external potentiometer for example.

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



EA DIP204-4NLED



EA DIP204B-4NLW
EA DIP204-4HNLED

Both versions -4NLW and -4HNLEDdo have a built-in temperature compensatione; so there's no more need for contrats adjustment while 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 new 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	0	0	0	$40	X	X	X	0	0	1	0	0	$04
					0	0	1	$41				0	0	1	0	0	$04
					0	1	0	$42				0	0	1	0	0	$04
					0	1	1	$43				0	0	1	0	0	$04
					1	0	0	$44				1	0	1	0	1	$15
					1	0	1	$45				0	1	1	1	0	$0E
					1	1	0	$46				0	0	1	0	0	$04
					1	1	1	$47				0	0	0	0	0	$00

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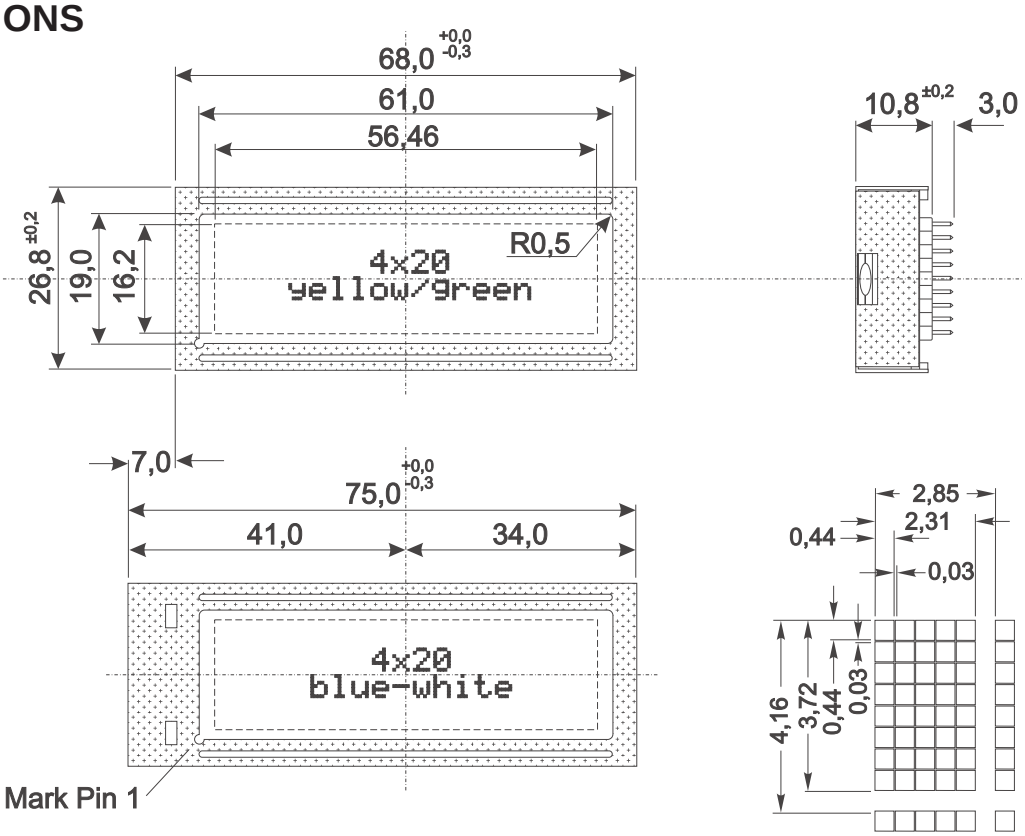
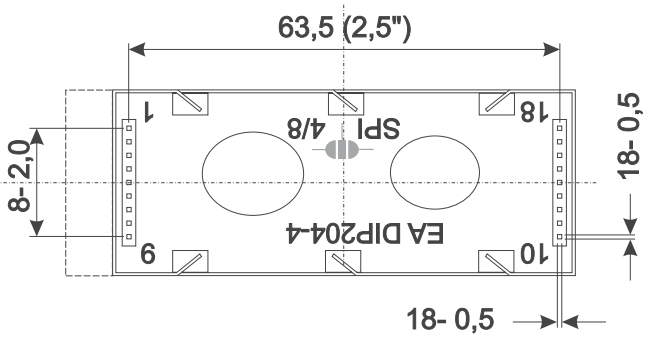
DIMENSIONS





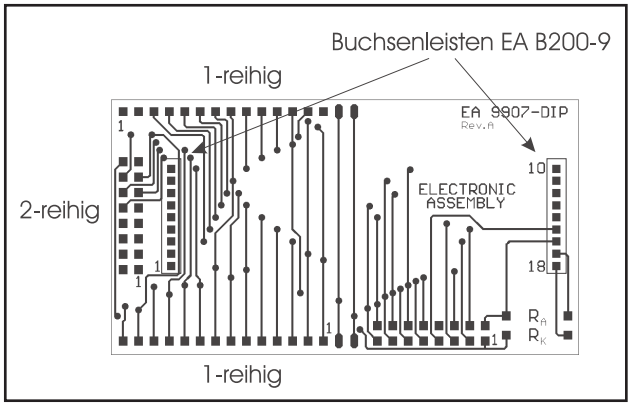
all dimensions are in mm

SERIAL MODE

Factory set for interface is parallel with 4 bit or 8 bit data bus. Alternative module can be programmes with serial data stream. For that solder link **4/8** has to be opened and closed to **SPI** side. Specification for serial operation mode is written down in user manual for KS0073 (http://www.lcd-module.de/eng/pdf/zubehoer/ks0073.pdf)

ADAPTOR PCB

The adaptor pcb EA 9907-DIP is made for a quick function test for all DIP modules. This interface board provides the standard dotmatrix pinout with 1x14, 1x16, 2x7 and 2x8 pins (0.1" pitch).



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