

TEXT DISPLAY

4x20 - 6.45mm

Issue 3.2023

INCL. CONTROLLER RW1073

**no mounting
required**

EA DIP205B-6NLW



EA DIP205J-6NLW:
Dimension 75 x 46 mm

FEATURES

- * HIGH-CONTRAST LCD-SUPERTWIST DISPLAY
- * BLUE BACKGROUND WITH WHITE CHARACTERS
- * BLACK&WHITE FSTN
- * EXTREME COMPACT WITH 75mm WIDTH
- * BUILT-IN CONTROLLER RW1073 (VERY SIMILAR TO SSD1803 AND HD44780)
- * 4- AND 8-BIT INTERFACE FOR DATABUS
- * SERIAL SPI-INTERFACE (SID, SOD, SCLK, CS)
- * POWER SUPPLY +3.3V / TYP. 4mA (w./o. B./L.)
- * ALTERNATIVELY +5V (NEED TO CHANGE 2 COMPONENTS)
- * OPERATING TEMP. RANGE -20..+70°C
- * AUTOMATIC TEMPERATURE COMPENSATION BUILT-IN
- * LED-BACKLIGHT WHITE, max. 75mA@+25°C
- * 16 ICONS (BATTERY, ARROWS ETC.) AT THE TOP EDGE
- * NO MONTING IS REQUIRED: JUST SOLDER INTO PCB
- * SINGLE ROW SOCKET AVAILABLE: EA B254-12 (1 PC.)
- * 128x64 GRAPHIC WITH SAME DIMENSION AND SAME PINOUT: EA DIP128

ORDERING INFORMATION

LCD-MODULE 4x20 - 6.45mm WITH LED-B./L. BLUE
FSTN BLACK ON WHITE
SOCKET 4.5mm HEIGHT, 12 POSITIONS (1 PC.)

EA DIP205B-6NLW
EA DIP205J-6NLW
EA B254-12

PINOUT

4-/8-Bit Mode (Factory Set)		
Pin	Symbol	Function
1	VSS	Power Supply 0V (GND)
2	VDD	Power Supply +3.3 V
3	VCI	Contrast Adjustment
4	RES	L: Reset
5	RS	H=Data; L=Command
6	RW	H=Read, L=Write
7	E	Enable
8		not connected
9		not connected
10		not connected
11		not connected
12		not connected

4-/8-Bit Mode (Factory Set)		
Pin	Symbol	Function
13		not connected
14	VSS	Power Supply 0V (GND)
15	D0	Display Data, LSB
16	D1	Display Data D1
17	D2	Display Data D2
18	D3	Display Data D3
19	D4 (D0)	Display Data D4
20	D5 (D1)	Display Data D5
21	D6 (D2)	Display Data D6
22	D7 (D3)	Display Data, MSB
23	A	LED-B/L + (ext. Resistor requ)
24	C	LED-B/L -

SPI Mode (Solder link "SPI" closed)		
Pin	Symbol	Function
1	VSS	Power Supply 0V (GND)
2	VDD	Power Supply +3.3V
3	VCI	Contrast Adjustment
4	RES	L: Reset
5	CS	Chip Select
6	SID	Data In
7	SCLK	Shift Clock
8		not connected
9		not connected
10		not connected
11		not connected
12		not connected

SPI Mode (Solder link "SPI" closed)		
Pin	Symbol	Funktion
13		not connected
14	VSS	Power Supply 0V (GND)
15	SOD	Data Out
16		not connected
17		not connected
18		not connected
19		not connected
20		not connected
21		not connected
22		not connected
23	A	LED-B/L + (ext. Resistor requ)
24	C	LED-B/L -

BACKLIGHT

Using the LED backlight requires a current source or external current-limiting resistor. Forward voltage for white LED backlight is 2.8~3.4V (NICHIA LED NHSW157AT). Please take care of derating for $T_a > +50^\circ\text{C}$

Attention: Do never drive backlight directly to VDD; this may damage backlight immediately !
The blue display cannot be read without backlight. For direct sunlight we suggest to use the J-type.

TABLE OF COMMAND (RW1073)

Instruction	RE	Instruction Code										Description	Execution Time (t _{pac} ≈ 270kHz)
		RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		
Clear Display	X	0	0	0	0	0	0	0	0	0	1	Write "00H" to DDRAM and set DDRAM address to "00H" from AC.	1.53ms
Return Home	0	0	0	0	0	0	0	0	0	1	X	Set DDRAM address "00H" from AC and return cursor to its original position if shifted. The contents of DDRAM are not changed.	1.53ms
Power Down Mode	1	0	0	0	0	0	0	0	0	1	PD	Set power down mode bit PD="1": power down mode set. PD="0": power down mode disable.	39uS
Entry Mode Set	0	0	0	0	0	0	0	0	1	I/D	S	Assign cursor moving direction. I/D="1": increment. I/D="0": decrement. and display shift enable bit. S="1": make display shift of the enabled lines by the DS4-DS1 bits in the Shift Enable instruction. S="0": display shift disable.	39uS
	1	0	0	0	0	0	0	0	1	1	BID	Segment bidirectional function. BID="1": Seg0->Seg1. BID="0": Seg1->Seg0.	39uS
Display ON/OFF Control	0	0	0	0	0	0	0	1	D	C	B	Set display/cursor/blink on/off D="1": display on. D="0": display off. C="1": cursor on. C="0": cursor off. B="1": blink on. B="0": blink off.	39uS
Extended Function set	1	0	0	0	0	0	0	1	FW	BW	NW	Assign font width; black/white inverting of cursor, and 4-line display mode bit. FW="1": 6-dot font width. FW="0": 5-dot font width. BW="1": black/white inverting of cursor enable. BW="0": black/white inverting of cursor disable. NW="1": 4-line display mode. NW="0": 1-line or 2-line display mode.	39uS

Instruction	RE	Instruction Code										Description	Execution Time (t _{pac} ≈ 270kHz)
		RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		
Cursor or Display Shift	0	0	0	0	0	0	1	S/C	R/L	X	X	Determine the line for display shift. S/C="1": display shift. S/C="0": cursor shift. R/L="1": shift to right. R/L="0": shift to left.	39uS
Shift Enable	1	0	0	0	0	0	1	DS4	DS3	DS2	DS1	(When DH="1") Determine the line for display shift. DS1="1/0": 1st line display shift enable/disable. DS2="1/0": 2nd line display shift enable/disable. DS3="1/0": 3rd line display shift enable/disable. DS4="1/0": 1th line display shift enable/disable.	39uS
Function Set	0	0	0	0	0	1	DL	N	RE (0)	DH	REV	Set interface data length. (DL="1": 8 bit, DL="0": 4bit). Number of display line when NW="0", (N="1": 2-line, N="0": 1-line), extension register, RE(0), shift enable. (DH="1": display enable, DH="0": display disable), and reverse bit (REV="1": reverse display, REV="0": normal display)	39uS
	1	0	0	0	0	1	DL	N	RE (1)	BE	0	Set DLN, RE("1") and CGRAM/SEGRAM blink enable (BE) (BE="1": CGRAM/SEGRAM blink enable. BE="0": CGRAM/SEGRAM blink disable)	39uS
Set CGRAM Address	0	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0	Set CGRAM address in address counter.	39uS
Set SEGRAM Address	1	0	0	0	1	X	X	AC3	AC2	AC1	AC0	Set SEGRAM address in address counter.	39uS
Set DDRAM Address	0	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Set DDRAM address in address counter.	39uS
Read Busy Flag and Address	X	0	1	BF	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Can be known whether during internal operation or not by reading BF. The contents of address counter can also be read. (BF="1": busy state, BF="0": ready state)	0uS
Write Data	X	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write data into internal RAM (DDRAM/CGRAM/SEGRAM)	43uS
Read Data	X	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read data into internal RAM (DDRAM/CGRAM/SEGRAM)	43uS

SERIAL MODE SPI

Factory set for interface is parallel with 4-bit or 8-bit data bus. Alternative module can be programmed with serial data stream. For that solder link **SPI** has to be closed. Hardware specification for serial operation mode is written down in user manual for RW1073:

https://www.lcd-module.de/fileadmin/eng/pdf/zubehoer/RW1073-0B-002_Rev0.0-20121029.pdf

Software for initialisation and programming is same as for 8-bit.

Example of initialisation, 8 bit mode and SPI

Command	RE Bit	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Hex	Note
Function Set	0	0	0	0	0	1	1	0	0	0	0	\$30	8 bit data length, extension bit RE=0
Entry Mode Set	0	0	0	0	0	0	0	0	1	1	0	\$06	Cursor Auto-Increment
Function Set	0	0	0	0	0	1	1	0	1	1	0	\$36	8 bit data length, RE =1, blink enable BE =1
ext. Function Set	1	0	0	0	0	0	0	1	0	0	1	\$09	4 line mode
Set SEGRAM adr	1	0	0	0	1	0	0	0	0	0	0	\$40	Icon RAM address: \$00
16 x Write Data	1	1	0	0	0	0	0	0	0	0	0	\$00	to clear all icons: write 16x \$00
Function Set	1	0	0	0	0	1	1	0	0	0	0	\$30	8 bit data length, bit RE =0
Display ON/OFF	0	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	0	1	\$01	Clear display, place cursor to 1st. col. /1st. row

Address:

- 1st. line \$00..\$13
- 2nd. line \$20..\$33
- 3rd. line \$40..\$53
- 4th. line \$60..\$73

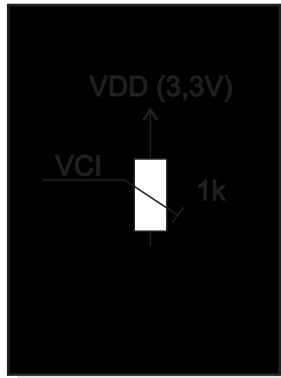
Please make shure that software will check busy-flag before writing any command !

CHARACTER SET

Beside there's a copy of built.in character set. In addition to that up to 8 individual character can be created.

CONTRAST ADJUSTMENT

Contrast will be set by pin 3 (VCI). Module EA DIP205 comes with built-in temperature compensation for -20..+70°C as a standard; any contrast adjustment during operation is no longer required.



Upper 4bit / Lower 4bit	CG RAM	LLLL	LLH	LLHL	LLHH	LHL	LHLH	LHLL	LHHL	LHLL	LHHL	HLHL	HLHL	HLHL	HLHL	HHHL	HHHL
LLLL	(1)	CG RAM (1)	!	1	A	Q	a	a	!	!	!	!	!	!	!	!	!
LLH	(2)	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
LLHL	(3)	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
LLHH	(4)	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
LHL	(5)	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
LHLH	(6)	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
LHLL	(7)	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
LHHL	(8)	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
HLHL	(1)	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
HLH	(2)	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
HLHL	(3)	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
HLHL	(4)	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
HLL	(5)	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
HLLH	(6)	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
HHHL	(7)	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
HHHL	(8)	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!

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".

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Adresse	Hex																																																																																									
0 1 0 0 0	0 0 0 \$40	<table border="1"> <thead> <tr> <th colspan="8">Data</th> </tr> <tr> <th colspan="8">Bit</th> </tr> <tr> <th>7</th> <th>6</th> <th>5</th> <th>4</th> <th>3</th> <th>2</th> <th>1</th> <th>0</th> <th>Hex</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>\$04</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>\$04</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>\$04</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>\$04</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>\$04</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>\$04</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>\$00</td> </tr> </tbody> </table>	Data								Bit								7	6	5	4	3	2	1	0	Hex	0	0	0	0	0	0	0	0	\$04	0	0	0	0	0	0	0	0	\$04	0	0	0	0	0	0	0	0	\$04	0	0	0	0	0	0	0	0	\$04	0	0	0	0	0	0	0	0	\$04	0	0	0	0	0	0	0	0	\$04	0	0	0	0	0	0	0	0	\$00
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EA DIP205-6

DRIVING WITH 5V-SYSTEMS

The supply voltage of the display ex work is 3.3V.

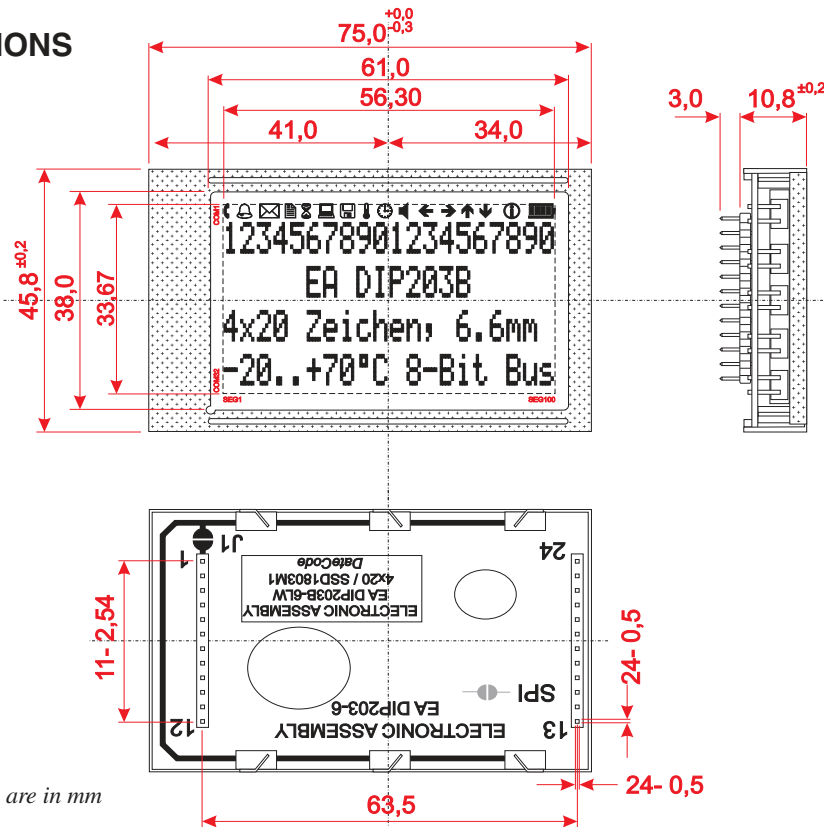
If a 5V-system is used, the display need to be modified by hand:

- remove C3
- add R5 with 0 ohms

COMPATIBILITY EA DIP203-6, DIP204-6 AND DIP205-6

The displays of DIP203, DIP204 and DIP205 series are electrically and mechanically identical to each other running with 3.3V supply mode. Merely a 5V supply is not acceptable with the EA DIP203 series.

DIMENSIONS



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

all dimensions are in mm

DRIVING THE SYMBOLS

After power-on symbols will be set accidental. To switch off them all please refer to the example of initializing on page 3. To display an individual symbol have a look at the program example at the right.

Each symbol can be displayed in normal (solid) and blinking style.

Example program to display an icon (8 bit / SPI)													
Command	RE Bit	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Hex	Note
Busy-Flag / Address read	0	0	1	BF	AC							perhaps store current DDRAM address: read AC and save as LASTADR=AC	
Function Set	0	0	0	0	0	1	1	0	1	1	0	\$36	Set to 8 bit data length, RE=1, Blink enable BE=1
Set SEGRAM adr	1	0	0	0	1	0	0	0	0	1	0	\$42	Set Icon-RAM address to \$02 (letter symbol)
Write Data	1	1	0	0	0	0	1	0	0	0	0	\$10	Write \$10 to display symbol
Function Set	1	0	0	0	0	1	1	0	0	0	0	\$30	Set to 8 bit data length, extension bit RE=0
Set DDRAM adr	0	0	0	1	LASTADR						\$80	Restore DDRAM address	

Icon - Symbols															
SEGRAM address	☎	📞	✉	📄	🕒	💻	📁	🔥	🕒	🔊	⬅	➡	⬆	⬇	🔍
data solid	\$00	\$01	\$02	\$03	\$04	\$05	\$06	\$07	\$08	\$09	\$0A	\$0B	\$0C	\$0D	\$0E
data blink (BE=1)	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50