

TEXT DISPLAY

4x20 - 6.45mm

Issue 10.2022

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)	13		not connected
2	VDD	Power Supply +3.3 V	14	VSS	Power Supply 0V (GND)
3	VCI	Contrast Adjustment	15	D0	Display Data, LSB
4	RES	L: Reset	16	D1	Display Data D1
5	RS	H=Data; L=Command	17	D2	Display Data D2
6	R/W	H=Read; L=Write	18	D3	Display Data D3
7	E	Enable	19	D4 (D0)	Display Data D4
8		not connected	20	D5 (D1)	Display Data D5
9		not connected	21	D6 (D2)	Display Data D6
10		not connected	22	D7 (D3)	Display Data, MSB
11		not connected	23	A	LED-B/L + (ext. Resistor requ)
12		not connected	24	C	LED-B/L -

SPI Mode (Solder link "SPI" closed)			Pin Symbol Funktion		
1	VSS	Power Supply 0V (GND)	13		not connected
2	VDD	Power Supply +3.3V	14	VSS	Power Supply 0V (GND)
3	VCI	Contrast Adjustment	15	SOD	Data Out
4	RES	L: Reset	16		not connected
5	CS	Chip Select	17		not connected
6	SID	Data In	18		not connected
7	SCLK	Shift Clock	19		not connected
8		not connected	20		not connected
9		not connected	21		not connected
10		not connected	22		not connected
11		not connected	23	A	LED-B/L + (ext. Resistor requ)
12		not connected	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 ₀ to t ₂)
		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": 8-dot font width. FW="0": 6-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 ₀ to t ₂)
		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	Cursor or 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), 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

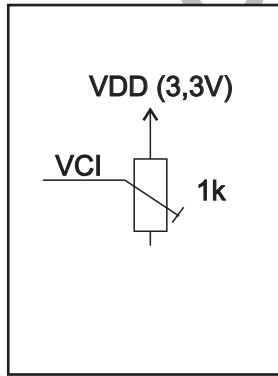
Please make shure that software will check busy-flag before writing any command !

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	LLLL	LLH	LLHL	LLHH	LHLL	LHLH	LHHL	LHHH	HLLL	HLHL	HLHH	HLLH	HHLH	HHLH	HHHL	HHHH
LLLL (1)	CG RAM (1)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
LLH (2)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
LLHL (3)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
LLHH (4)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
LHLL (5)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
LHLH (6)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
LHHL (7)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
LHHH (8)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
HLLL (1)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
HLHL (2)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
HLHL (3)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
HLHH (4)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
HLLH (5)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
HHLH (6)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
HHHL (7)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
HHHH (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".

Set CG RAM Address				Character	Data							
Adresse		Hex	Bit									
7	6	5	4		3	2	1	0	Hex			
0	1	0	0	0	0	0	1	0	0	\$04		
				0	0	1	0	0	\$04			
				0	1	0	1	0	\$04			
				0	1	1	0	0	\$04			
				1	0	0	0	1	\$15			
				1	0	1	1	0	\$0E			
				0	0	1	0	0	\$04			
				0	0	0	0	0	\$00			

EA DIP205-6

DRIVING WITH 5V-SYSTEMS

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

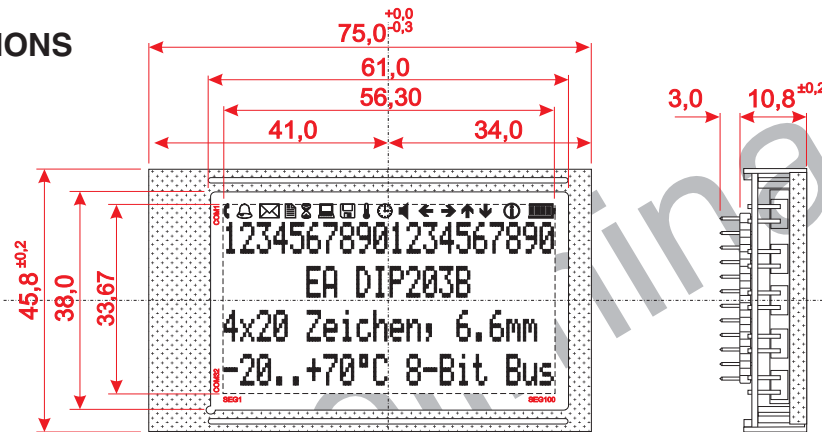
If a 5V-system is used, the display need to be modified by hand:

- remove C3
- add R5 with 0 ohms

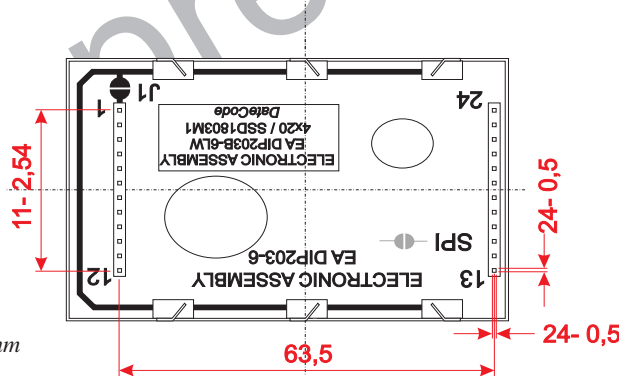
COMPATIBILITY EA DIP203-6, DIP204-6 AND DIP205-6

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.

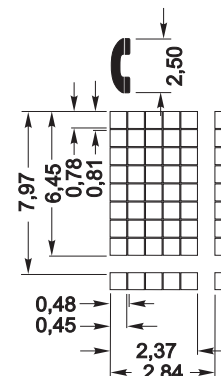
DIMENSIONS



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 adress 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	\$00	\$01	\$02	\$03	\$04	\$05	\$06	\$07	\$08	\$09	\$0A	\$0B	\$0C	\$0D	\$0E	\$0F	\$0F	\$0F	\$0F	\$0F
data solid	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$1F	\$1E	\$1C	\$18	\$10
data blink (BE=1)	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50