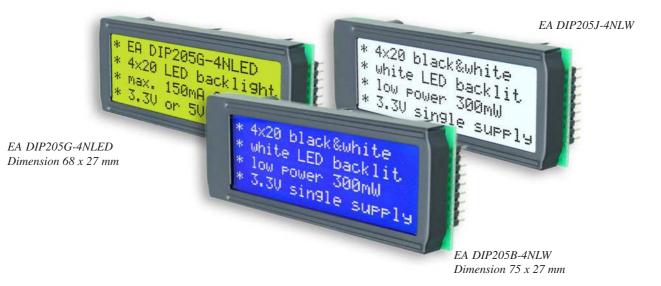


# **TEXT DISPLAY** 4x20 - 3.75mm

Issue 03.2023

# **INCL. CONTROLLER RW1073**



# **FEATURES**

- \* HIGH CONTRAST LCD SUPERTWIST DISPLAY
- \* CONTROLLER RW1073-0B (COMPATIBLE TO SSD1803)
- \* INTERFACE FOR 4- AND 8-BIT DATA BUS
- \* SERIAL SPI INTERFACE (SID, SOD, SCLK)
- \* POWER SUPPLY +3.3V / 1.5mA (W./O. B/L)
- \* ALTERNATIVELY +5V (NEED TO CHANGE 2 COMPONENTS)
- \* 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 - 3.75mm WITH LED BACKLIGHT Y/G BLUE-WHITE BLACK-WHITE 9-PIN SOCKET, HEIGHT 4.3mm (1 PC.) EA DIP205G-4NLED EA DIP205B-4NLW EA DIP205J-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)	Н	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	А	-	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 3.9~4.2V and for white LED backlight is 3.2~3.5V. Please take care of derating for  $T_a > +25^{\circ}C$ .

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

### **TABLE OF COMMAND RW1073**

	-	<u> </u>			Ins	tructi	on Co	de					Execution	1					Ins	tructio	on Co	de					Decemination	Execution
Instruction	RE	RS	RS RW DB7 DB6 DB5 DB4 DB3 DB2 DB1 DB0 =270KH	Time(fosc =270KHz)	Instruction	RE	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	B1	DB0	Description	Time(fose =270KHz)									
Clear Display	x	0	0	0	0	0	0	0	0	0	1	Write "20H" to DDRAM, and set DDRAM address to "00H" from AC.	1.53ms	Cursor or Display	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	39uS
Return										1	~	Set DDRAM address "00H" from AC and return cursor to its	4.50	Shift									4				R/L="1": shift to right. R/L="0": shift to left.	
Home	0	0	0	0	0	0	0	0	0	1	×	original position if shifted. The contents of DDRAM are not changed.	1.53ms														(When DH="1") Determine the line for display shift. DS1="1/0": 1 st line display	
Power Down Mode	1	0	0	O	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	Shift Enable	1	0	0	o	0	0	1	DS4	DS3	DS2	S2	DS1	shift enable/disable. DS2="1/0": 2 nd line display shift enable/disable.	39uS
	0	0	0	o	0	0	0	0	1	١/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	39uS														DS3="1/D": 3 rd line display shift enable/disable. DS4="1/D": 1 th line display shift enable/disable.	
Entry Mode Set												enabled lines by the DS4-DS1 bits in the Shift Enable instruction. S=10°: display shift disable.															Set interface data length, (DL="1": 8 bit, DL="0": 4bit), Number of display line when NW="0",	
	1	0	0	o	o	0	0	0	1	1	BID	Segment bidirectional function. BID="1": Seg60->Seg1. BID="0": Seg1->Seg60.	39uS		0	0	0	0	0	1	DL	N	RE (0)	DH	н	REV	(N="1": 2-line, N="0": 1-line), extension register, RE(0), shift enable,	39uS
Display ON/OFF Control	0	0	0	O	O	0	0	1	D	с	в	Set display/curson/blink on/off D="1": display on. D="0": display off. C="1": cursor on. C="0": cursor off. B="1": blink on.	39uS	Function Set													(DH="1"; display enable, DH="0": display disable), and reverse bit (REV="1": reverse display, REV="0": normal display)	
Extended	1	0	0	0	0	0	0	1	FW	B/W	NW	B=10°: blink off. Assign font width; black/white inverting of cursor, and 4-line display mode bit. FW=11°: 6-dot font width. FW=10°: 5-dot font width. BW=11°: black/white inverting of	39uS		1	0	0	O	o	1	DL	N	RE (1)	BE	E	o	Set DL,N,RE("1") and CGRAM/SEGRAM blink enable (BE) (BE="1": CGRAM/SEGRAM blink enable, BE="0": CGRAM/SEGRAM blink disable)	39uS
set	3	U	U	U		U			E.M.	DIAA	DAAA	cursor enable. B/W="0": black/white inverting of cursor disable.	3905	Set CGRAM Address	0	0	0	0	1	AC5	AC4	AC3	AC2	AC1	01	AC0	Set CGRAM address in address counter.	39uS
												NW="1": 4-line display mode. NW="0": 1-line or 2-line display mode.		SEGRAM Address	1	0	0	0	1	х	х	AC3	AC2	AC1	C1	AC0	Set SEGRAM address in address counter.	39uS
														Set DDRAM Address	0	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	C1	AC0	Set DORAM address in address counter.	39uS
														Read Busy Flag and	x	0	1	BF	AC6	AC5	AC4	AC3	AC2	AC1	C1	ACO	Can be known whether during internal operation or not by reading BF. The contents of address	OuS

Address

Write Data

Read Data

х 1 0 D7 D6 D5 D4 D3 D2 D1 DO

х 1 1 D7 D6 D5

D4 D3 D2 D1 D0

counter can also be read. (BF="1": busy state, BF="0": ready state) Write data into intern (DDRAWCGRAM/

SEGRAM) Read data into inte (DDRAWCGRAM/ SEGRAM) al RAM

al RAN

43uS

43uS



	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 li

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

# CHARACTER SET

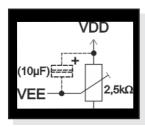
A full character set is built-in already.

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 Icd modules input is supplied with VDD level here !



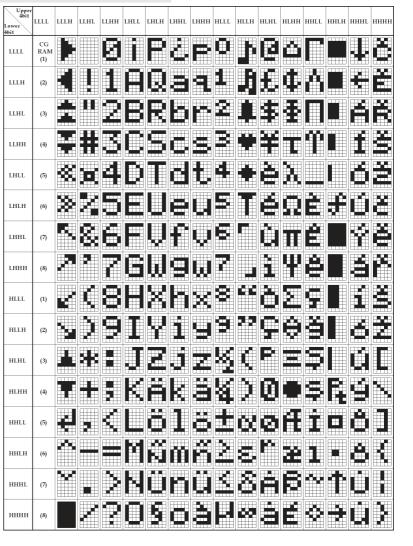
All versions do have a built-in temperature compensation; so there's no more need for contrast adjustment during operation anymore.

# **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 Se defines the ASCII code (Bit 3,4,5) and the defines the ASCII code (Bit 3,4,5) and the defined at line (Bit 0,1,2) of the new character. Example demonstrates creating ASCII code \$00.
- 2.) Doing 8 times the write command "Dat Write" defines line by line the new characte 8th. byte stands for the cursor line.
- 3.) The newly defined character can be used a a "normal" ASCII code (0..7); use with "D RAM Address Set" and "Data Write".

												1								
et"	S	Set (	CG RA	۸M	Adc	fres	S									Da	ata			-
lot			Adress				Hex								В	it				Hex
ble			Auress	e			nex			-	_	7	6	5	4	3	2	1	0	nex
				0	0	0	\$40								0	0	1	0	0	\$04
				0	0	1	\$41								0	0	1	0	0	\$04
ita				0	1	0	\$42								0	0	1	0	0	\$04
er.	0 1	0	0 0	0	1	1	\$43					v	х	v	0	0	1	0	0	\$04
	0 1	0	0 0	1	0	0	\$44					^	^	^	1	0	1	0		\$15
as				1	0	1	\$45								0	1	1		0	\$0E
				1	1	0	\$46								0	0	1	0	0	\$04
D				1	1	1	\$47								0	0	0	0	0	\$00



### **5V OPERATION**

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

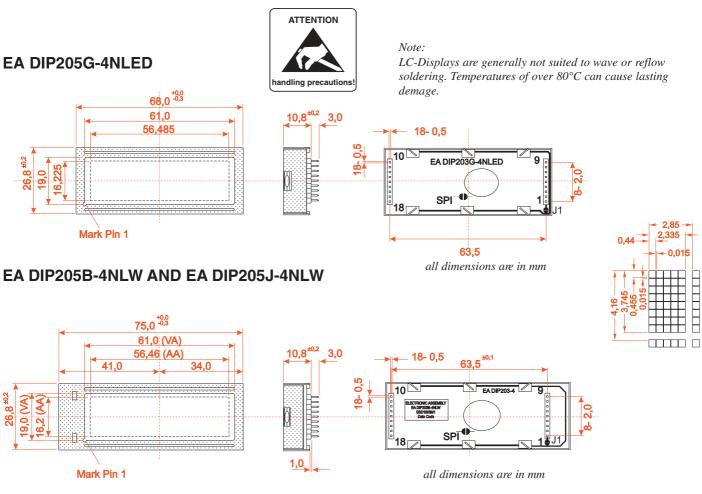
If a 5V-system is used, the display need to be modified by hand:

- remove C2

- add R6 with 0 ohms

## COMPATIBILITY EA DIP203-4, DIP204-4 AND DIP205-4

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.



# SERIAL SPI 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 RW1073: <u>https://www.lcd-module.de/fileadmin/eng/pdf/zubehoer/RW1073-0B-002\_Rev0.0-</u>20121029.pdf

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

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