23.12.98

EA P204-3N/-3NLED

MINIATUR LCD
4x20 ZEICHEN 3mm

65x28,4x8 mm

TECHNISCHE DATEN

* EXTREM KOMPAKTES DISPLAY MIT 4x20 ZEICHEN
* SUPERTWISTTECHNIK YELLOW-MODE
* 3,15mm ZEICHENHÖHE
* +5V VERSORGUNG / typ. 1mA
* DISPLAYSPANNUNG typ. 5V, KONTROLLER 3,0..5,5V
* MIT UND OHNE LED-BELEUCHTUNG typ. 40mA / 4,2V
* 4- UND 8-BIT INTERFACE
* KONTROLLER HD 66712, SEHR ÄHNLICH HD 44780
* KOMPATIBEL ZU BT42003 "Micro-Line" VON BATRON

BESTELLBEZEICHNUNG

MINIATUR DOTMATRIX LCD 4x20, 3,15mm	**EA P204-3N**
MIT LED-BELEUCHTUNG	**EA P204-3NLED**
PASSENDES FLEXKABEL MIT STECKER	**EA KF-16G**

ELECTRONIC ASSEMBLY GMBH
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KONTROLLER HD 66712

Auf den Displays EA P204-3N(LED) und EA 8204-3N(LED) ist der Kontroller-IC HD66712 enthalten. Dieser ist weitgehend kompatibel zu dem weit verbreiteten Standard HD44780. Bei der Verwendung von 4-zeiligen Displaymodulen ist allerdings ausdrücklich "4-zeilig" einzustellen. Andernfalls wird ab dem 13. Zeichen jedes Zeichen doppelt angezeigt. Siehe *Extension function set*.

HD66712

Table 12 Instructions

Instruction	RE Bit	Code RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description	Execution Time (Max) (when f_{cp} or f_{OSC} is 270 kHz)
Clear display	0/1	0	0	0	0	0	0	0	0	0	1	Clears entire display and sets DD RAM address 0 in address counter.	1.52 ms
Return home	0/1	0	0	0	0	0	0	0	0	1	—	Sets DD RAM address 0 IN address counter. Also returns display from being shifted to original position. DDRAM contents remain unchanged.	1.52 ms
Entry mode set	0/1	0	0	0	0	0	0	0	1	I/D	S	Sets cursor move direction and specifies display shift. These operations are performed during data write and read.	37 µs
Display on/off control	0	0	0	0	0	0	0	1	D	C	B	Sets entire display (D) on/off, cursor on/off (C), and blinking of cursor position character (B).	37 µs
Extension function set	1	0	0	0	0	0	0	1	FW	B/W	NW	Sets a font width, a black-white inverting cursor (B/W), and a 4-line display (NW).	37 µs
Cursor or display shift	0	0	0	0	0	0	1	S/C	R/L	—	—	Moves cursor and shifts display without changing DD RAM contents.	37 µs
Scroll enable	1	0	0	0	0	0	1	HSE	HSE	HSE	HSE	Specifies which display lines to undergo horizontal smooth scroll.	37 µs
Function set	0	0	0	0	0	1	DL	N	RE	—	—	Sets interface data length (DL), number of display lines (L), and extension register write enable (RE).	37 µs
	1	0	0	0	0	1	DL	N	RE	BE	LP	Sets CGRAM/SEGRAM blinking enable (BE), and power-down mode (LP). LP is available when the EXT pin is low.	37 µs
Set CGRAM address	0	0	0	0	1	A_{CG}	A_{CG}	A_{CG}	A_{CG}	A_{CG}	A_{CG}	Sets CG RAM address. CG RAM data is sent and received after this setting.	37 µs
Set SEGRAM address set	1	0	0	0	1	*	*	A_{SEG}	A_{SEG}	A_{SEG}	A_{SEG}	Sets SEGRAM address. SEGRAM data is sent and received after this setting.	37 µs
Set DDRAM address	0	0	0	1	A_{DD}	A_{DD}	A_{DD}	A_{DD}	A_{DD}	A_{DD}	A_{DD}	Sets DD RAM address. DD RAM data is sent and received after this setting.	37 µs
Set scroll quantity	1	0	0	1	*	HDS	HDS	HDS	HDS	HDS	HDS	Sets horizontal dot scroll quantity.	37 µs

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Table 12 Instructions (cont)

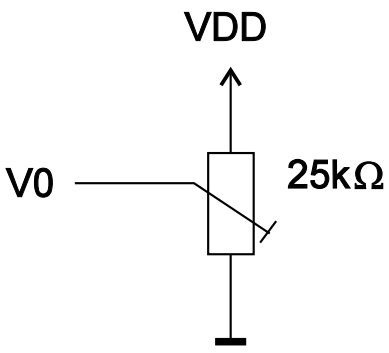
Instruction	RE Bit	Code RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description	Execution Time (Max) (when f_{cp} or f_{OSC} is 270 kHz)
Read busy flag & address	0/1	0	1	BF	AC	AC	AC	AC	AC	AC	AC	Reads busy flag (BF) indicating internal operation is being performed and reads address counter contents.	0 µs
Write data to RAM	0/1	1	0	Write data								Writes data into DD RAM, CG RAM, or SEGRAM.	7 µs t_{ADD} = 5.5 µs*
Read data from RAM	0/1	1	1	Read data								Reads data from DD RAM, CG RAM, or SEGRAM.	37 µs t_{ADD} = 5.5 µs*
	I/D = 1: Increment I/D = 0: Decrement S = 1: Accompanies display shift D = 1: Display on C = 1: Cursor on B = 1: Blink on FW = 1: 6-dot font width B/W = 1: Black-white inverting cursor on NW = 1: Four lines NW = 0: One or two lines S/C = 1: Display shift S/C = 0: Cursor move R/L = 1: Shift to the right R/L = 0: Shift to the left DL = 1: 8 bits, DL = 0: 4 bits N = 1: 2 lines, N = 0: 1 line RE = 1: Extension register access enable BE = 1: CGRAM/SEGRAM blinking enable LP = 1: Low-power mode BF = 1: Internally operating BF = 0: Instructions acceptable											DD RAM: Display data RAM A_{DD}: DD RAM address (corresponds to cursor address) CG RAM: Character generator RAM A_{CG}: CG RAM address SEGRAM: Segment RAM A_{SEG}: Segment RAM address HSE: Specifies horizontal scroll lines HDS: Horizontal dot scroll quantity AC: Address counter used for both DD, CG, and SEG RAM addresses.	

Note: 1. — indicates no effect.

* After execution of the CG RAM/DD RAM data write or read instruction, the RAM address counter is incremented or decremented by 1. The RAM address counter is updated after the busy flag turns off. In figure 17, t_{ADD} is the time elapsed after the busy flag turns off until the address counter is updated.

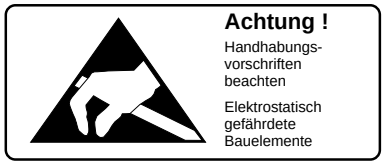
2. Extension time changes as frequency changes. For example, when f is 300 kHz, the execution time is: 37 µs × 270/300 = 33 µs.
3. Execution time in a low-power mode (LP = 1 and EXT = low) becomes four times for a 1-line mode, and twice for a 2- or 4-line mode.

KONTRASTEINSTELLUNG



Adressierung:

1. Zeile	*$00..$13*
2. Zeile	*$20..$33*
3. Zeile	*$40..$53*
4. Zeile	*$60..$73*



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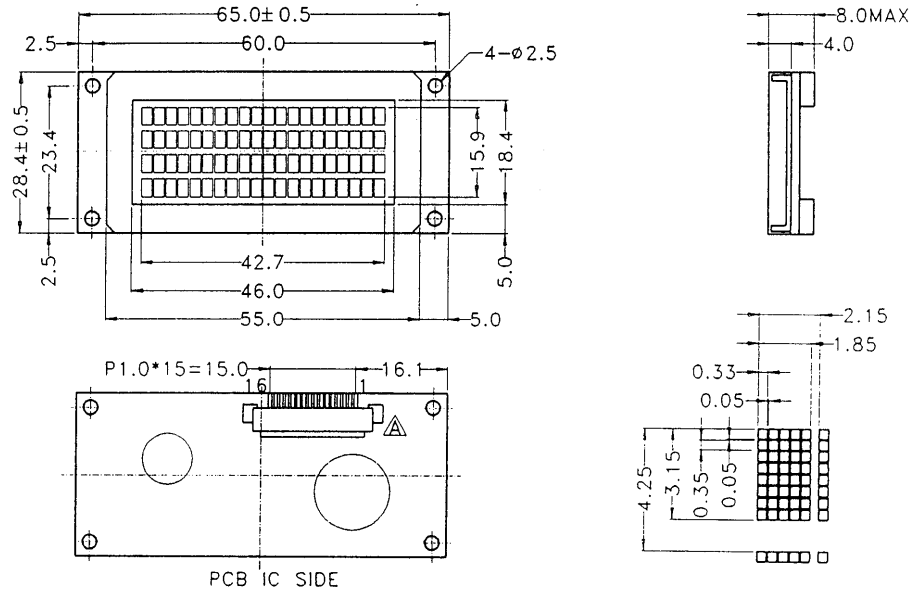
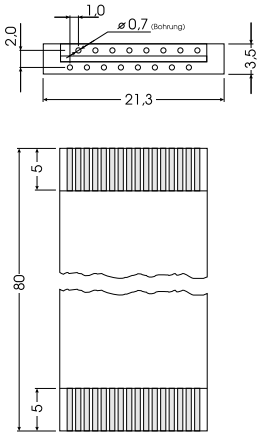
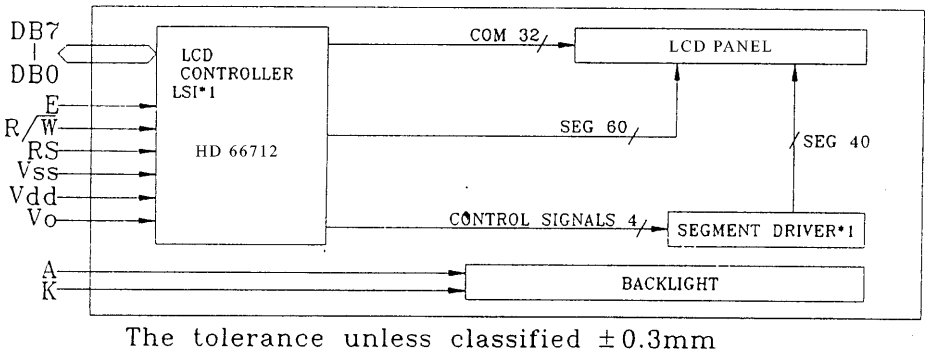
ABMESSUNGEN





Zubehör: EA KF-16G



The tolerance unless classified ±0.3mm

alle Maße in mm

PINBELEGUNG, LED-BELEUCHTUNG

Pinbelegung EA P203-3N / -3NLED			
Pin	**Symbol**	**Pegel**	**Beschreibung**
1	VSS	L	Versorgung 0V, GND
2	VDD	H	Versorgung +5V
3	VEE	-	Displayspg, Kontrasteinstellung
4	RS	H / L	Register Select
5	R/W	H / L	H: Read / L: Write
6	E	H	Enable
7	D0	H / L	Datenleitung 0 (LSB)
8	D1	H / L	Datenleitung 1
9	D2	H / L	Datenleitung 2
10	D3	H / L	Datenleitung 3
11	D4	H / L	Datenleitung 4
12	D5	H / L	Datenleitung 5
13	D6	H / L	Datenleitung 6
14	D7	H / L	Datenleitung 7 (MSB)
15	A	-	LED Backlight + (nur -3NLED)
16	K	-	LED Backlight - (nur -3NLED)

Die Version EA P204-3NLED ist mit einer LED-Hintergrundbeleuchtung ausgestattet. Beachten Sie bitte, daß zum Betrieb der Beleuchtung ein externer Vorwiderstand erforderlich ist. Dieser errechnet sich aus der Formel R=U/I, wobei die Flußspannung der LED´s 4,2V beträgt und der typ. Stromverbrauch 40mA. Somit ergibt sich bei 5V Versorgung R=(5V-4,2V)/40mA=20Ω.
Achtung: Ein Strom von 80mA darf nicht überschritten werden!

Achtung !

Handhabungs-vorschriften beachten

Elektrostatisch gefährdete Bauelemente

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