

Stand 8.2018

MINIATUR GRAFIKDISPLAYS

128x64 INKL. KONTROLLER ST7565



Displayabmessungen

-6X9: 56x43mm (MINI, Abbildung)

-6X8: 34x25 bzw. 38x26mm (MICRO)

TECHNISCHE DATEN

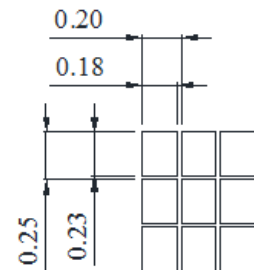
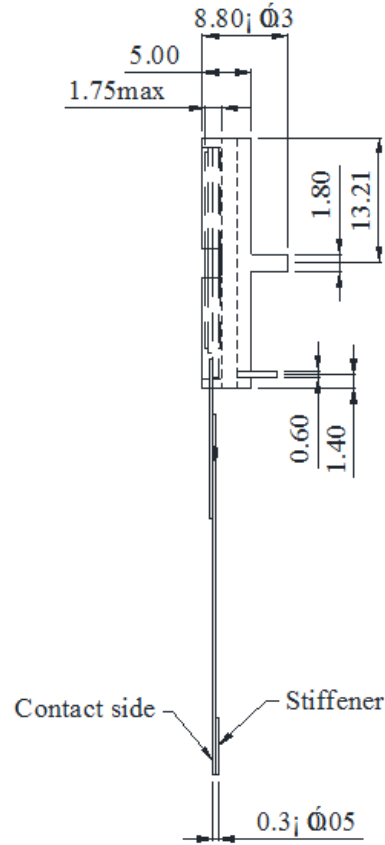
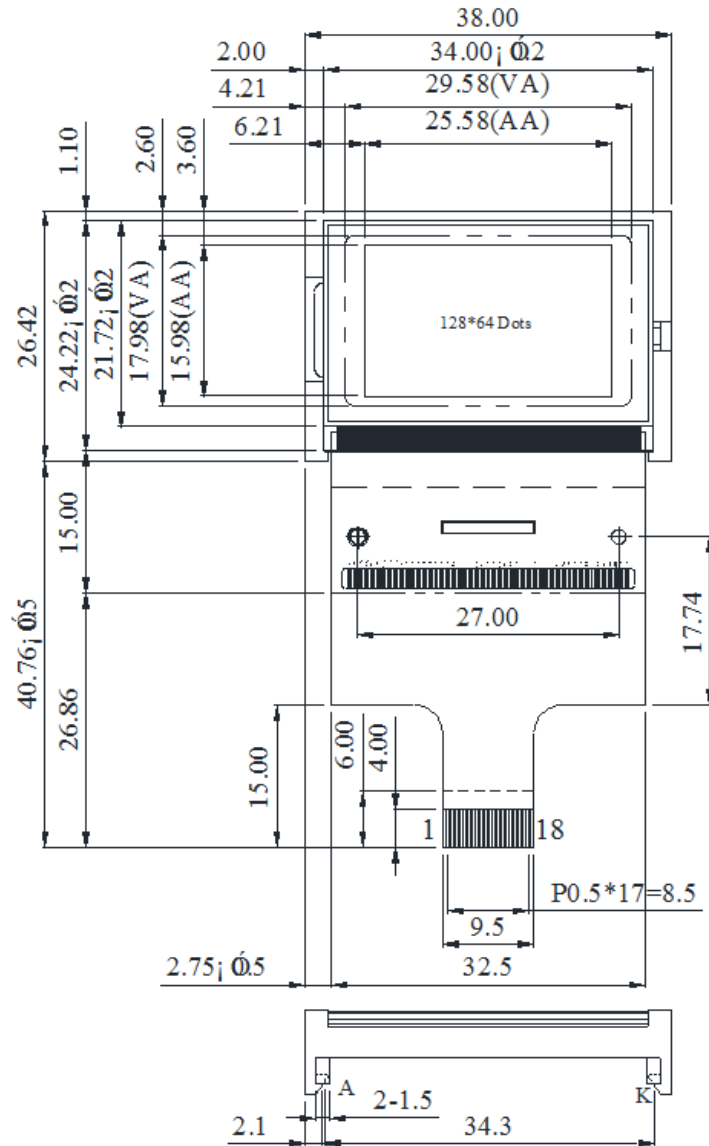
- * INKL. KONTROLLER ST7565
- * VDD = 2,7 ... 3,3V
- * LOW POWER, ALSO IDEAL FÜR HANDHELD / TYP. 250µA@3,3V
- * 2 GRÖSSEN: 65x43mm und 34x25mm (AUSSENABMESSUNGEN)
- * SINGLE SUPPLY: NEGATIV-SPANNUNGSERZEUGUNG ON CHIP
- * INTEGRIERTE TEMPERATURKOMPENSATION
- * DIGITALE KONTRASTEINSTELLUNG
- * DISPLAY RAM ONBOARD
- * EINGANG SERIELL (SI, SCL, A0) ODER PARALLEL (DB0 ... DB7)
- * UNTERSTÜTZT Z80- UND 6800- MODE
- * 0,5mm FFC KABEL FÜR STECKBAREN ANSCHLUSS
- * LED-BELEUCHTUNG 15~60mA
- * BETRIEBSTEMPERATURBEREICH -20..+70°C

BESTELLBEZEICHNUNG

MICRO GRAFIK 128x64, ST7565 MIT FFC-KABEL, WEISSE LED
MINI GRAFIK 128x64, ST7565 MIT FFC-KABEL, WEISSE LED
ZIFF-STECKER PASSEND DAZU (BOTTOM CONTACT)

EA W127W-6X8HLW
EA W127W-6X9HLW
EA WF050-18S

MICRO: EA W127W-6X8HLW (FSTN, BLACK&WHITE, WEISSE LED-BELEUCHTUNG)
mit FFC Kabel für ZIF Stecker



DOT SIZE
SCALE 20/1

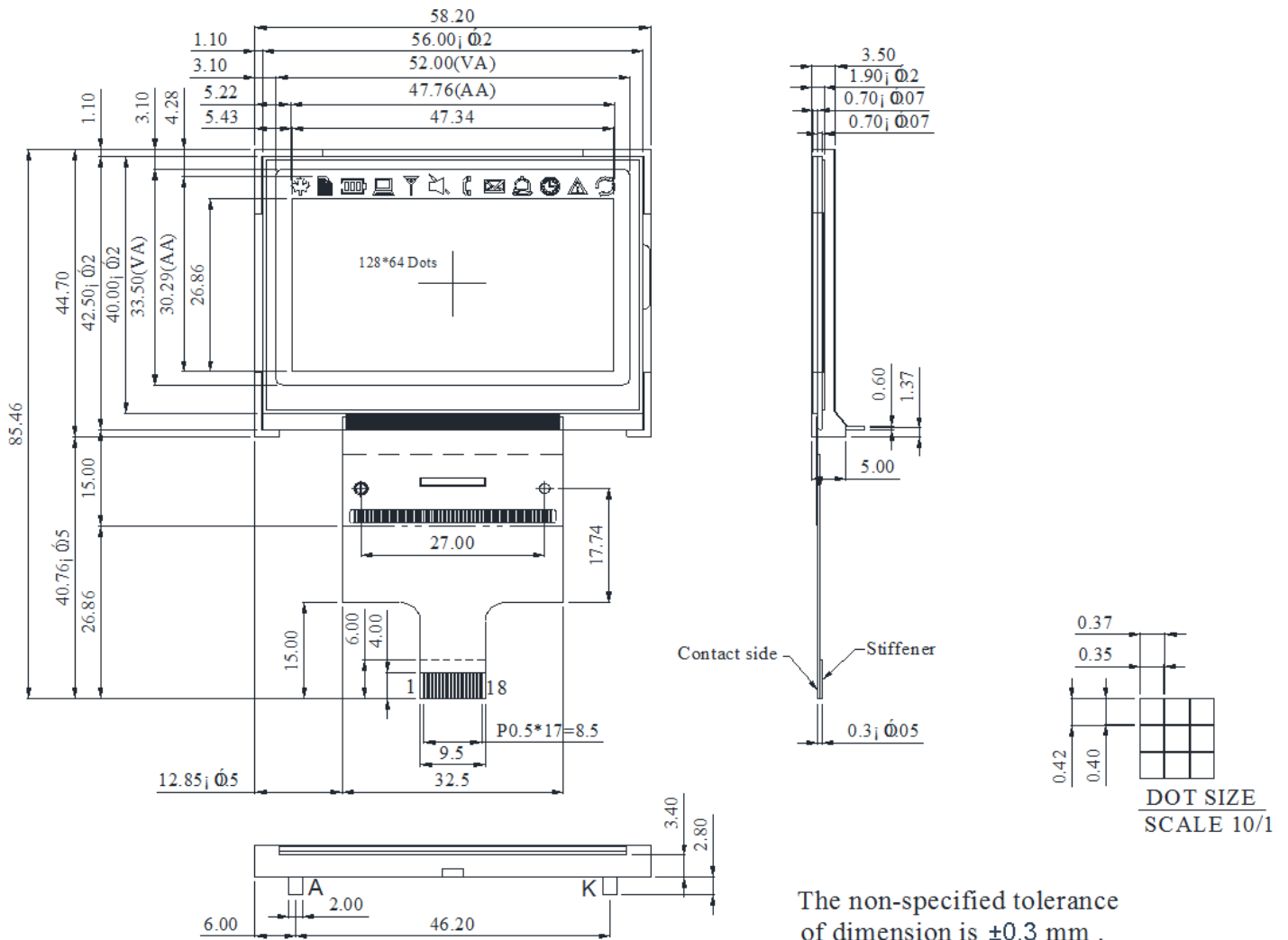
The non-specified tolerance of dimension is $\pm 0.3\text{mm}$.

Optical characteristics FSTN						
Item	Symbol	Condition	min	typ	max	Unit
Viewing angle	θ	CR>2	0	-	30	$\Phi=180^\circ$
	θ	CR>2	0	-	60	$\Phi=180^\circ$
	θ	CR>2	0	-	45	$\Phi=180^\circ$
	θ	CR>2	0	-	45	$\Phi=180^\circ$
Contrast ratio	CR		-	5	-	
Response time	T rise	20°C	-	200	300	ms
	T fall	20°C	-	250	350	ms

7,\$07	14,\$0E	21,\$15	22,\$16	23,\$17	24,\$18	36,\$24	51,\$33
62,\$3E	65,\$41	74,\$4A	84,\$54	95,\$5F	106,\$6A	117,\$75	127,\$7F

$I_{LED} = 24/32/40\text{mA}@25^\circ\text{C}$ (min/typ/max), $V_{F_{LED}} = 3.4/3.5/3.6\text{V}$ (min/typ/max)
LED is driven by current, $V_{F_{LED}}$ is for reference only
Consider derating for temperatures $> 25^\circ\text{C}$. Life time typ. 30,000 hours

MINI: EA W127W-6X9HLW (FSTN, BLACK&WHITE, WEISSE LED-BELEUCHTUNG)
 mit FFC Kabel für ZIF Stecker



The non-specified tolerance of dimension is ± 0.3 mm .

Optical characteristics FSTN						
Item	Symbol	Condition	min	typ	max	Unit
Viewing angle	θ	CR>2	0	-	30	$\Phi=180^\circ$
	θ	CR>2	0	-	60	$\Phi=180^\circ$
	θ	CR>2	0	-	45	$\Phi=180^\circ$
	θ	CR>2	0	-	45	$\Phi=180^\circ$
Contrast ratio	CR		-	5	-	
Response time	T rise	20°C	-	200	300	ms
	T fall	20°C	-	250	350	ms

$I_{LED} = 15/48/60\text{mA} @ 25^\circ\text{C}$ (min/typ/max), $V_{F_{LED}} = 3.4/3.5/3.6\text{V}$ (min/typ/max)

LED is driven by current, $V_{F_{LED}}$ is for reference only

Consider derating for temperatures $> 25^\circ\text{C}$. Life time typ. 50,000 hours

7,\$07	14,\$0E	21,\$15	22,\$16	23,\$17	24,\$18	36,\$24	51,\$33
62,\$3E	65,\$41	74,\$4A	84,\$54	95,\$5F	106,\$6A	117,\$75	127,\$7F

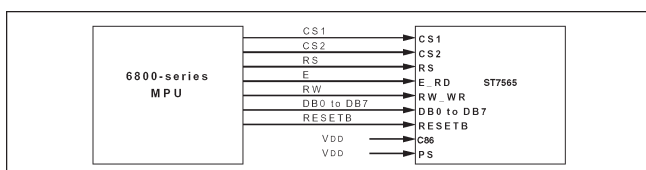
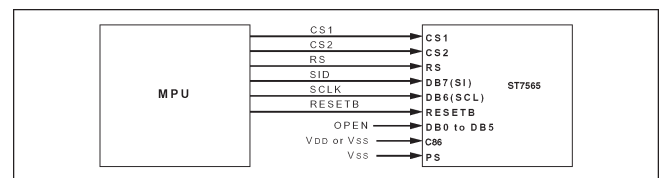
ANSCHLUSS ÜBER ZIF-STECKER

Der Anschluss erfolgt steckbar über ein 18-poliges FFC Kabel im Raster 0,5mm. Über den Pin 17 (C86) kann zwischen 6800- und Z80-Interface umgeschaltet werden. Der Pin 18 (P/S) bestimmt über Parallel- oder Seriellebetrieb.

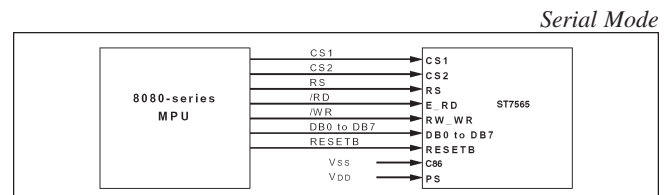
Pinout				
Pin	Symbol	I/O	Description	
1	VDD		Power supply pin for logic	
2	VSS		Ground pin, connected to 0V	
3	CS1	I	Chip select input pins Data/Instruction I/O is enabled only when CS1 is "L" and CS2 is "H" When chip select is non-active, DB0 TO DB7 may be high impedance	
4	CS2	I	Chip select input pins Data/Instruction I/O is enabled only when CS1 is "L" and CS2 is "H" When chip select is non-active, DB0 TO DB7 may be high impedance	
5	RES	I	Reset input pin When RESETB is "L", initialization is executed	
6	A0	I	Register select input pin A0 = "H": D0 to D7 are display data A0 = "L": D0 to D7 are control data	
7	WR R/W	I	When connected to Z80-family MPU: Write enable input pin. The data on D0~D7 are latched at the rising edge of the WR When connected to 68-family MPU: R/W = "H": read, R/W = "L": write	
8	RD E	I	When connected to Z80-family MPU: Read enable clock input pin. When /RD is "L", D0~D7 are in an output status When connected to 68-family MPU: R/W = "H": When E is "H", D0~D7 are in an output status R/W = "L": The data on D0~D7 are latched at the falling edge of the E signal	
9	D0	I/O	8-bit bi-directional data bus that is connected to the standard 8-bit microprocessor data bus. When chip select is not active, D0~D7 may be high impedance. When the serial interface selected (P/S="L"): D0~D5 are high impedance D6: serial input clock (SCL) D7: serial input data (SI)	
10	D1			
11	D2			
12	D3			
13	D4			
14	D5			
15	D6			
16	D7			
17	C86	I	Microprocessor interface selects pin C86 = "H": 6800-series MPU interface C86 = "L": Z80-series MPU interface Parallel/Serial data input select pin	
18	P/S	I	P/S = "H":	Interface
			P/S = "L":	Serial
			In serial mode it is impossible to read data from the on-chip RAM. D0~D5 are high impedance and E_RD and RW_WR must be fixed to either "H" or "L"	
			Data	Read/Write
			D0~D7	E_RD, RW_WR
			SI(D7)	Write only
				Serial clock
				-
				SCL(D6)

APPLIKATIONSBEISPIELE

Genauere Spezifikationen zum Timing und zur Programmierung entnehmen Sie bitte dem Usermanual zum ST7565. Zu finden auf unserer Website unter <https://www.lcd-module.de/eng/pdf/zubehoer/st7565r.pdf>



6800-er Interface



Z80 Interface

ONBOARD KONTROLLER ST7565

Command	Command Code											Function
	A0	/RD	/WR	D7	D6	D5	D4	D3	D2	D1	D0	
(1) Display ON/OFF	0	1	0	1	0	1	0	1	1	1	0	LCD display ON/OFF 0: OFF, 1: ON
(2) Display start line set	0	1	0	0	1	Display start address					Sets the display RAM display start line address	
(3) Page address set	0	1	0	1	0	1	1	Page address				Sets the display RAM page address
(4) Column address set upper bit Column address set lower bit	0	1	0	0	0	0	1	Most significant column address				Sets the most significant 4 bits of the display RAM column address.
	0	1	0	0	0	0	0	Least significant column address				Sets the least significant 4 bits of the display RAM column address.
(5) Status read	0	0	1	Status				0	0	0	0	Reads the status data
(6) Display data write	1	1	0	Write data							Writes to the display RAM	
(7) Display data read	1	0	1	Read data							Reads from the display RAM	
(8) ADC select	0	1	0	1	0	1	0	0	0	0	0	Sets the display RAM address SEG output correspondence 0: normal, 1: reverse
(9) Display normal/ reverse	0	1	0	1	0	1	0	0	1	1	0	Sets the LCD display normal/ reverse 0: normal, 1: reverse
(10) Display all points ON/OFF	0	1	0	1	0	1	0	0	1	0	0	Display all points 0: normal display 1: all points ON
(11) LCD bias set	0	1	0	1	0	1	0	0	0	1	0	Sets the LCD drive voltage bias ratio 0: 1/9 bias, 1: 1/7 bias (ST7565)
(12) Read/modify/write	0	1	0	1	1	1	0	0	0	0	0	Column address increment At write: +1 At read: 0
(13) End	0	1	0	1	1	1	0	1	1	1	0	Clear read/modify/write
(14) Reset	0	1	0	1	1	1	0	0	0	1	0	Internal reset
(15) Common output mode select	0	1	0	1	1	0	0	0	*	*	*	Select COM output scan direction 0: normal direction 1: reverse direction
(16) Power control set	0	1	0	0	0	1	0	1	Operating mode			Select internal power supply operating mode
(17) Vo voltage regulator internal resistor ratio set	0	1	0	0	0	1	0	0	Resistor ratio			Select internal resistor ratio(Rb/Ra) mode
(18) Electronic volume mode set Electronic volume register set	0	1	0	1	0	0	0	0	0	0	1	Set the Vo output voltage electronic volume register
				0	0	Electronic volume value						
(19) Static indicator ON/OFF Static indicator register set	0	1	0	1	0	1	0	1	1	0	0	0: OFF, 1: ON
				0	0	0	0	0	0	0	0	
(20) Booster ratio set	0	1	0	1	1	1	1	1	0	0	0	select booster ratio 00: 2x,3x,4x 01: 5x 11: 6x
				0	0	0	0	0	0	0	step-up value	
(21) Power saver												Display OFF and display all points ON compound command
(22) NOP	0	1	0	1	1	1	0	0	0	1	1	Command for non-operation
(23) Test	0	1	0	1	1	1	1	*	*	*	*	Command for IC test. Do not use this command

Display Data RAM

Page Address P3,P2,P1,P0	Data	RAM address										Line Address (HEX)	Com Output					
0,0,0,0	DB0											00	COM1					
	DB1											01	COM2					
	DB2											02	COM3					
	DB3											03	COM4					
	DB4											04	COM5					
	DB5											05	COM6					
	DB6											06	COM7					
	DB7											07	COM8					
}												}	}					
0,1,1,1	DB0											38	COM57					
	DB1											39	COM58					
	DB2											3A	COM59					
	DB3											3B	COM60					
	DB4											3C	COM61					
	DB5											3D	COM62					
	DB6											3E	COM63					
	DB7											3F	COM64					
0,1,1,1	DB0											40	COM65					
Column Address	ADC=0	83	82	81	80	7F	7E	7D	7C	7B	7A	~	3	4	3	2	1	0
Address	ADC=1	0	1	2	3	4	5	6	7	8	9	~	7E	7F	80	81	82	83
Segment Output		132	131	130	129	128	127	126	125	124	123	~	6	5	4	3	2	1

Eine genauere Beschreibung zur Programmierung entnehmen Sie bitte dem Usermanual zum ST7565. Zu finden auf unserer Website unter

<https://www.lcd-module.de/eng/pdf/zubehoer/st7565r.pdf>

INITIALISIERUNGSBEISPIEL

```

;-----
; Konstanten fuer Display Kommandos ST7665
;-----
DISPOFF      .EQU      10101110b ; (1) Wert fuer Display OFF
DISPON       .EQU      10101111b ; (1) Wert fuer Display ON
DISPSTART    .EQU      01000000b ; (2) Basiswert fuer Display Start Line
PAGEADDR     .EQU      10110000b ; (3) Basiswert fuer Page Address Set
COLADRL      .EQU      00000000b ; (4) Basiswert fuer LSB Column Address Set
COLADRH      .EQU      00010000b ; (4) Basiswert fuer MSB Column Address Set
ADCSELECT    .EQU      10100000b ; (8)
REVERSEDISP  .EQU      10100110b ; (9)
DISPALLON    .EQU      10100100b ; (10)
LCDBIAS      .EQU      10100010b ; (11)
SETMODIFYRD  .EQU      11100000b ; (12)
RESMODIFYRD  .EQU      11101110b ; (13)
RESET        .EQU      11100010b ; (14)
COMMODE      .EQU      11001000b ; (15)
POWERCTRL    .EQU      00101000b ; (16)
VOLTAGEREG   .EQU      00100000b ; (17)
VOLUMESET    .EQU      10000001b ; (18)
STATICINDI   .EQU      10101100b ; (19)

#define COLOFF
#ifdef COLOFF
COLADROFF    .EQU      4          ; Offset der Spaltenadresse fuer Displayinhalt
DSPRAMOFF    .EQU      0          ; Spaltenadresse fuer Display-RAM zur freien Benutzung
#else
COLADROFF    .EQU      0          ; Offset der Spaltenadresse fuer Displayinhalt
DSPRAMOFF    .EQU      128       ; Spaltenadresse fuer Display-RAM zur freien Benutzung
#endif

;-----
; Makros fuer Displayausgaben
;-----
#define DISPBEF CLR RS ; Befehlsmodus fuer Display
#define DISPDAT SETB RS ; Datenmodus fuer Display
#define DISPOUTA MOVX @R0,A
#define DISPINA MOVX A,@R0
#define DISPBEFOUTA LCALL DSPBEFOUT ; Befehl zum Display ausgeben
#define DISPDATOUTA LCALL DSPDATOUT ; Daten zum Display ausgeben
#define DISPDATINA LCALL DSPDATIN ; Daten vom Display lesen
#define COLADR LCALL SETCOLOFF

;-----
; Das Display initialisieren
;-----
DISPINIT:
    CLR DRES ; Display Reset
    NOP
    SETB DRES

    MOV A,#50
    LCALL WARTEMS

    MOV A,#DISPSTART
    DISPBEFOUTA

    MOV A,#DISPON
    DISPBEFOUTA

    MOV A,#DISPALLON
    DISPBEFOUTA

    MOV A,#COMMODE
    DISPBEFOUTA

    MOV A,#ADCSELECT+1
    DISPBEFOUTA

    MOV A,#VOLUMESET; Kontrast einstellen
    DISPBEFOUTA
    MOV A,#33 ; 0..63
    DISPBEFOUTA

    MOV A,#LCDBIAS+1
    DISPBEFOUTA

    MOV A,#POWERCTRL+111b
    DISPBEFOUTA

    MOV A,#VOLTAGEREG+100b
    DISPBEFOUTA

    RET

;-----
; Befehl im A zum Display ausgeben
;-----
DSPBEFOUT:
    DISPBEF
    DISPOUTA
    RET

;-----
; Daten im A zum Display ausgeben
;-----
DSPDATOUT:
    DISPDAT
    DISPOUTA
    RET

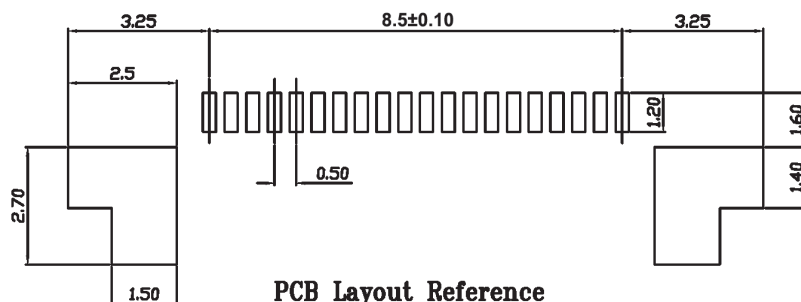
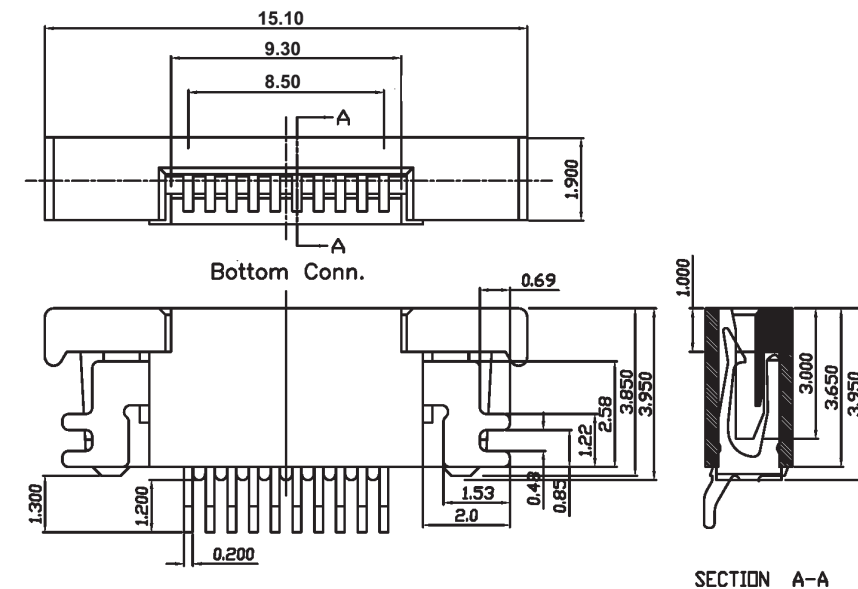
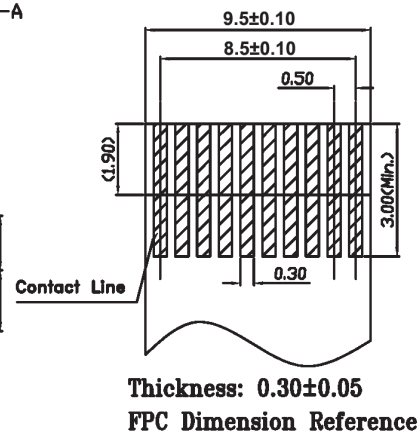
;-----
; Ein Byte vom Display in den A lesen
;-----
DSPDATIN:
    DISPDAT
    DISPINA ; ersmal ein Dummy-Read
    DISPINA ; Daten lesen
    RET
    
```

ZUBEHÖR: ZIFF-STECKER 0.5mm
Specifications:

Current rating:0.5 Amps
 Voltage Rating:50V DC
 Dielectric Withstanding:AC 500V
 Operating Temperature:-25°C ~ +85°C
 Contact resistance:20mohm max.
 Insulation resistance:50Mohm min.

Materials:

Insulator:Nylon 6T
 Actuator:PPS
 Contact material:Phosphor Bronze
 Leg:Phosphor Bronze
 Plating:100u" Tin/Lead over
 45u" min. Nickel


PCB Layout Reference

**Thickness: 0.30±0.05
FPC Dimension Reference**

alle Masse in mm

BESTELLBEZEICHNUNG

ZIFF-STECKER PASSEND FÜR EA W127W-6X9 / W127W-6X8,
 BOTTOM CONTACT

EA WF050-18S