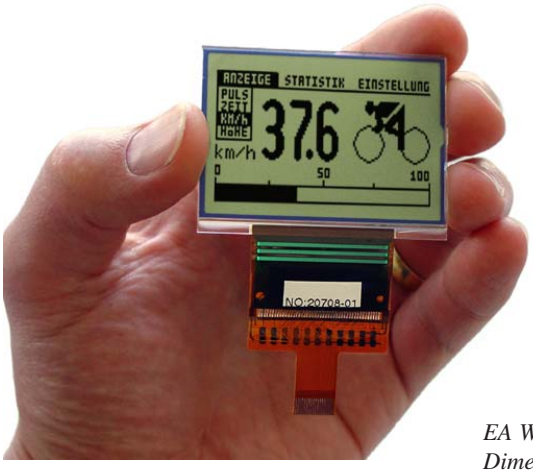
Issue 3.2020

MINIATURE GRAPHIC DISPLAY

128x64 INCL. CONTROLLER ST7565P



EA W129W-6X9HLW (miniature):
Dimension 58.2 x 44.7 x 3.9mm

FEATURES

* INCL. CONTROLLER ST7565P (BUILT-IN)
* NEW COG DESIGN
* 2 SIZES MINIATURE -6X9HLW AND SUB-MINIATURE -6X8HLW
* VDD = 2.7 ... 3.3V
* LOW POWER, THEREFORE PERFECT FOR HANDHELD / TYP. 250µA@3.3V
* CONTRASTY FSTN TECHNOLOGY BLACK&WHITE
* SINGLE SUPPLY: NEGATIVE POWER GENERATOR ONCHIP
* INTEGRATED TEMPERATURE COMPENSATION
* DIGITALLY CONTRAST ADJUSTMENT
* DISPLAY RAM ONBOARD
* SPI SERIAL INTERFACE (SI, SCL, A0) AND PARALLEL (DB0 ... DB7)
* SUPPORTS Z80- AND 6800- MODE
* 0.5mm FFC CABLE FOR ZIF CONNECTOR (18 PINS)
* LED BACKLIGHT 24~60mA
* OPERATING TEMPERATUR RANGE -20..+70°C

ORDERING CODES

SUB-MINI GRAPHIC 128x64, ST7565P WITH FFC CABLE, WHITE LED	**EA W129W-6X8HLW**
MINI GRAPHIC 128x64, ST7565P WITH FFC CABLE, WHITE LED	**EA W129W-6X9HLW**
ZIF CONNECTOR (BOTTOM CONTACT)	**EA WF050-18S**

CONNECTION VIA ZIF CONNECTOR

Connection is done via 18-pin FFC cable (0.5mm pitch). Pin 17 (C86) changes interface between 6800 and Z80 interface. Pin 18 (P/S) is for parallel or serial interface.

Pinout

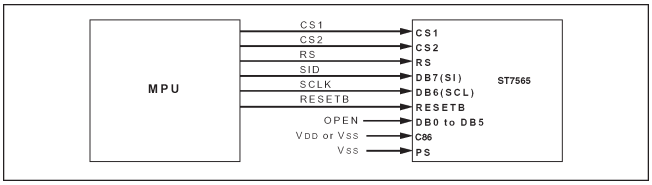
Pin	Symbol	I/O	Description
1	VDD		Power supply pin for logic
2	VSS		Ground pin, connected to 0V
3	CS1	I	Chip select input pins Data/Instruction I/O is enabled only when CS1 is "L" and CS2 is "H" When chip select is non-active, DB0 TO DB7 may be high impedance
4	CS2	I	Chip select input pins Data/Instruction 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
18	P/S	I	Parallel/Serial data input select pin

	Interface	Data	Read/Write	Serial clock
P/S = "H":	Parallel	D0~D7	E_RD,RW_WR	-
P/S = "L":	Serial	SI(D7)	Write only	SCL(D6)

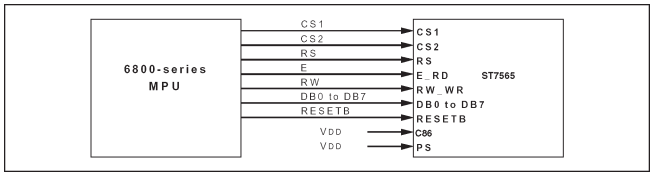
In serial mode it is impossible to read data from the on-chip RAM. D0~D5 are high impedance and E_RD and RW_WR must be fixed to either "H" or "L"

APPLICATION EXAMPLE

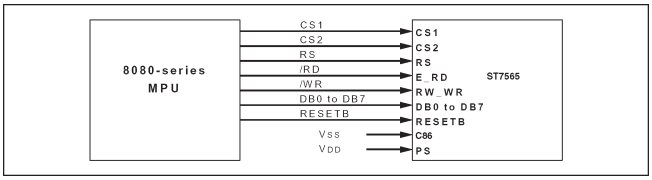
All specification and timing are defined in user manual for ST7565P. You can find it on our website at: https://www.lcd-module.de/eng/pdf/zubehoer/ST7565P-V2.3.pdf



Serial Mode



6800-er Interface



Z80 Interface

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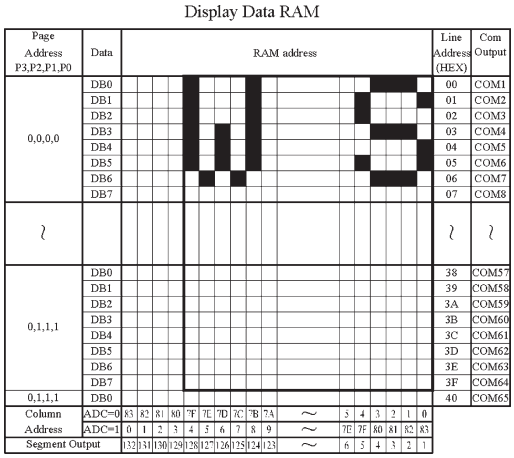
ONBOARD CONTROLLER ST7565P

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 1	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 0	1 1	0 0	0 0	0 0	0 0	1 0	Most significant column address Least significant column address				Sets the most significant 4 bits of the display RAM 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 1	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 1	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 1	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 1	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 1	*	*	*	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) V_0 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 Electronic volume value	0	0	0	0	1	Set the V_0 output voltage electronic volume register
(19) Static indicator ON/OFF Static indicator register set	0	1	0	1 0	0 0	1 0	0 0	1 0	1 0	0 0	0 1 Mode	0: OFF, 1: ON Set the flashing mode
(20) Booster ratio set	0	1	0	1 0	1 0	1 0	1 0	1 0	0 0	0 step-up value	0	select booster ratio 00: 2x,3x,4x 01: 5x 11: 6x
(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



A detailed desciption on porgramming is mentioned in user manual for ST7565P. You can find it on our website at: https://www.lcd-module.de/eng/pdf/zubehoer/ST7565P-V2.3.pdf

INITIALISATION EXAMPLE

```
;-----------------------------------------------------------------------------
; 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
PAGEADR         .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 Benut-
zung
#else
COLADROFF       .EQU        0           ; Offset der Spaltenadresse fuer Displayinhalt
DSPRAMOFF       .EQU        128         ; Spaltenadresse fuer Display-RAM zur freien Benut-
zung
#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
```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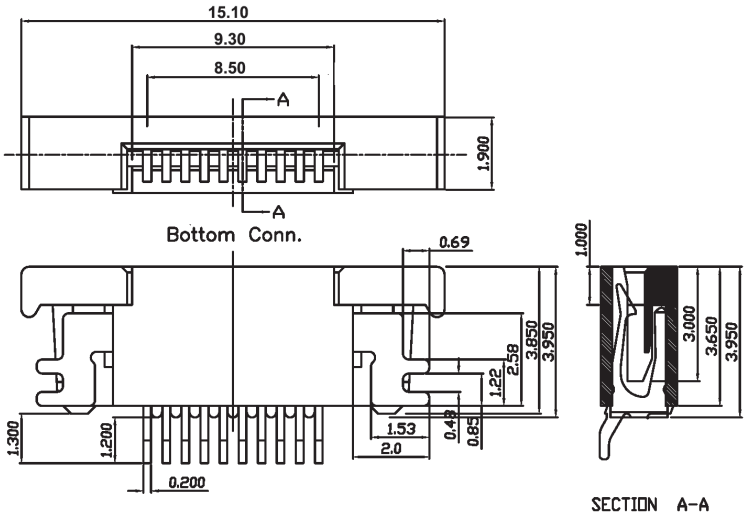
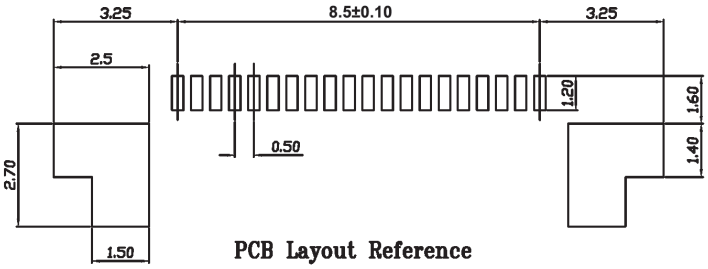
ACCESSORY: ZIF CONNECTOR 0.5mm

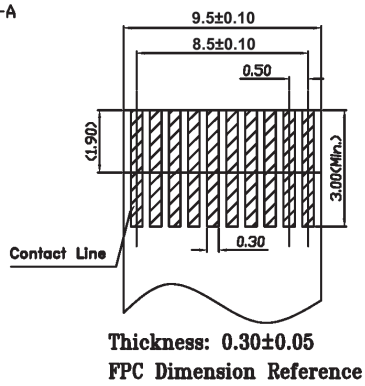


Specifications:
Current rating:0.5 Amps
Voltage Rating:50V DC
Dielectric Withstanding:AC 500V
Operating Temperature:−25°C ~ +85°C
Contact resistance:20mohm max.
Insulation resistance:50Mohm min.

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



PCB Layout Reference



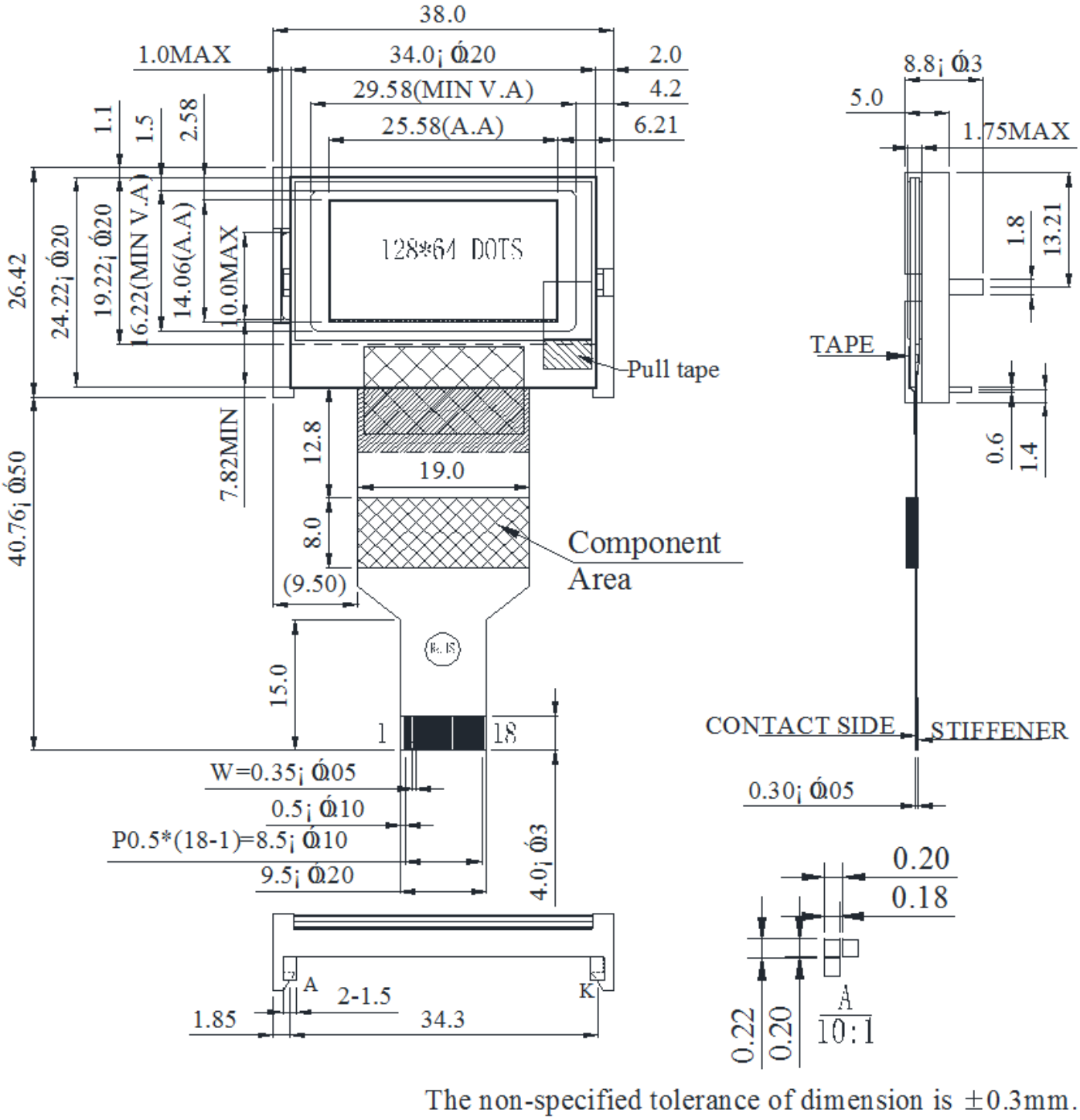
Thickness: 0.30±0.05
FPC Dimension Reference

alle Masse in mm

ORDERING CODE

ZIF CONNECTOR (BOTTOM CONTACT) **EA WF050-18S**

DIMENSION -6X8HLW



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

Optical characteristics FSTN						
Item	Symbol	Condition	min	typ	max	Unit
Viewing angle	θ	CR>2	0	-	30	Φ=180°
	θ	CR>2	0	-	60	Φ=0°
	θ	CR>2	0	-	45	Φ=90°
	θ	CR>2	0	-	45	Φ=270°
Contrast ratio	CR		-	5	-	
Response time	T rise	20°C	-	200	300	ms
	T fall	20°C	-	250	350	ms

I_{LED}= 24/32/40mA@25°C (min/typ/max), VF_{LED}= 3.5V (typ)
LED is driven by current, VF_{LED} is for reference only
Consider derating for temperatures > 25°C. Life time typ. 30,000 hours

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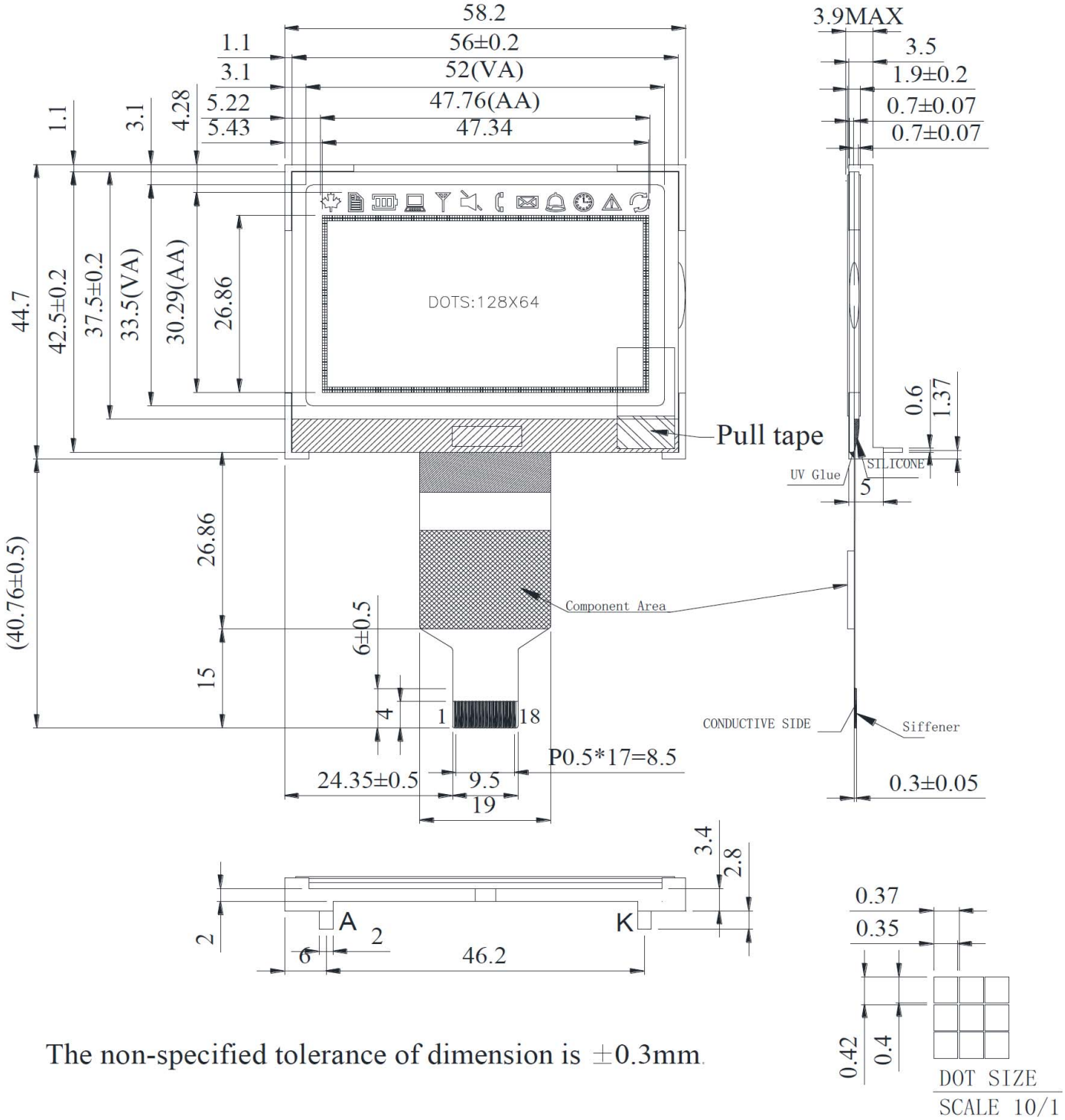
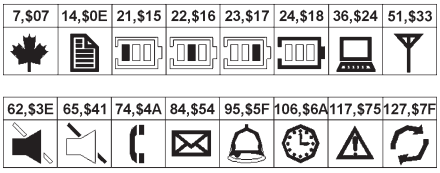
DIMENSION -6X9HLW



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

Optical characteristics FSTN						
Item	Symbol	Condition	min	typ	max	Unit
Viewing angle	θ	CR>2	0	-	30	Φ=180°
	θ	CR>2	0	-	60	Φ=0°
	θ	CR>2	0	-	45	Φ=90°
	θ	CR>2	0	-	45	Φ=270°
Contrast ratio	CR		-	5	-	
Response time	T rise	20°C	-	200	300	ms
	T fall	20°C	-	250	350	ms



I_{LED}= 36/48/60mA@25°C (min/typ/max), VF_{LED}= 3.5V (typ)
LED is driven by current, VF_{LED} is for reference only
Consider derating for temperatures > 25°C. Life time typ. 30,000 hours