



**WINSTAR Display Co.,Ltd.**  
**華凌光電股份有限公司**

## SPECIFICATION

**MODULE NO.: WO12864K1**

### General Specification

Item	Dimension	Unit
Number of dots	128 x 64	—
Module dimension	89.7 x 49.8 x 6.0	mm
View area	66.8 x 35.5	mm
Active area	63.98 x 31.98	mm
Dot size	0.48 x 0.48	mm
Dot pitch	0.50x 0.50	mm
Duty	1/65 Duty , 1/9 Bias	
Backlight Type	LED	
IC	ST7565P	

# Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	$T_{OP}$	-20	—	+70	°C
Storage Temperature	$T_{ST}$	-30	—	+80	°C
Power Supply Voltage	VDD	-0.3	—	3.6	V
Power supply voltage (VDD standard)	V0, VOUT	-0.3	—	14.5	V
Power supply voltage (VDD standard)	V1, V2, V3, V4	-0.3	—	V0+0.3	V

# Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	$V_{DD}-V_{SS}$	—	2.8	3.0	3.2	V
Supply Voltage For LCD *Note	$V_{OP}$	Ta=-20°C	—	—	—	V
		Ta=25°C	9.3	9.5	9.7	V
		Ta=70°C	—	—	—	V
Input High Volt.	$V_{IH}$	—	0.8 $V_{DD}$	—	$V_{DD}$	V
Input Low Volt.	$V_{IL}$	—	$V_{SS}$	—	0.2 $V_{DD}$	V
Output High Volt.	$V_{OH}$	—	0.8 $V_{DD}$	—	$V_{DD}$	V
Output Low Volt.	$V_{OL}$	—	$V_{SS}$	—	0.2 $V_{DD}$	V
Supply Current	$I_{DD}$	$V_{DD}=3.0V$	—	—	2.0	mA

Please kindly consider to design the Vop to be adjustable while programing the software to match LCD contrast tolerance

# Interface Pin Function

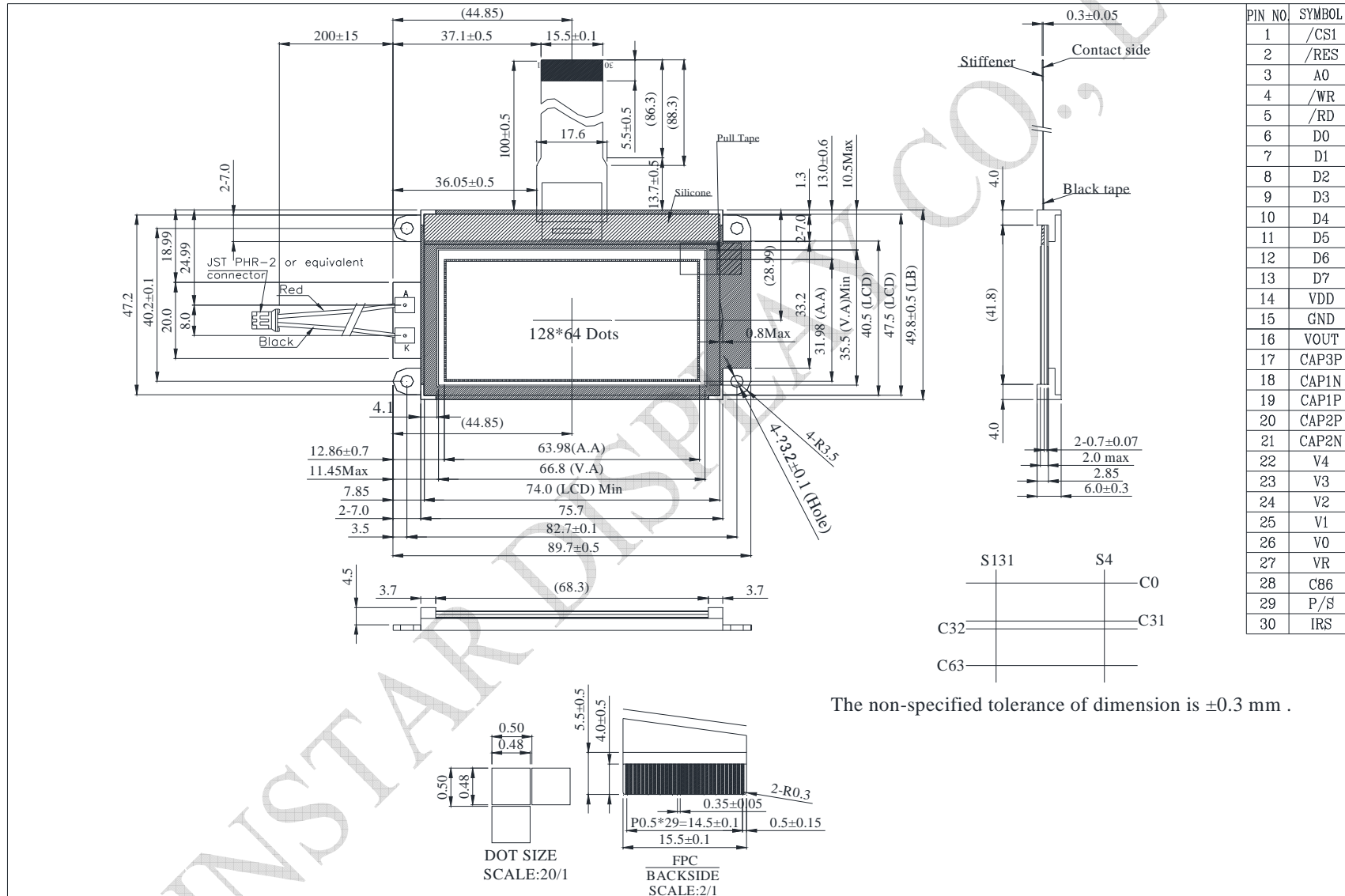
Pin No.	Symbol	Description
1	/CS1	This is the chip select signal. When /CS1 = "L" and CS2 = "H", then the chip select becomes active, and data/command I/O is enabled.
2	/RES	When /RES is set to "L", the register settings are initialized (cleared). The reset operation is performed by the /RES signal level.
3	A0	This is connect to the least significant bit of the normal MPU address bus, and it determines whether the data bits are data or command. A0 = "H": Indicates that D0 to D7 are display data. A0 = "L": Indicates that D0 to D7 are control data.
4	/WR	<ul style="list-style-type: none"> <li>When connected to 8080 series MPU, this pin is treated as the "/WR" signal of the 8080 MPU and is LOW-active.</li> </ul> The signals on the data bus are latched at the rising edge of the /WR signal. <ul style="list-style-type: none"> <li>When connected to 6800 series MPU, this pin is treated as the "R/W" signal of the 6800 MPU and decides the access type : When R/W = "H": Read. When R/W = "L": Write.</li> </ul>
5	/RD	<ul style="list-style-type: none"> <li>When connected to 8080 series MPU, this pin is treated as the "/RD" signal of the 8080 MPU and is LOW-active.</li> </ul> The data bus is in an output status when this signal is "L". <ul style="list-style-type: none"> <li>When connected to 6800 series MPU, this pin is treated as the "E" signal of the 6800 MPU and is HIGH-active.</li> </ul> This is the enable clock input terminal of the 6800 Series MPU.
6	D0	This is an 8-bit bi-directional data bus that connects to an 8-bit or 16-bit standard MPU data bus. When the serial interface (SPI-4) is selected (P/S = "L") : D7 : serial data input (SI) ; D6 : the serial clock input (SCL). D0 to D5 should be connected to VDD or floating. When the chip select is not active, D0 to D7 are set to high impedance.
7	D1	
8	D2	
9	D3	
10	D4	
11	D5	
12	D6	
13	D7	
14	VDD	Power supply Power supply
15	GND	Ground
16	VOUT	DC/DC voltage converter. Connect a capacitor between this terminal and VSS or VDD

17	CAP3+	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1N terminal.															
18	CAP1-	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1P terminal.															
19	CAP1+	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1N terminal.															
20	CAP2+	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2N terminal.															
21	CAP2-	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2P terminal.															
22	V4	This is a multi-level power supply for the liquid crystal drive. The voltage Supply applied is determined by the liquid crystal cell, and is changed through the use of a resistive voltage divided or through changing the impedance using an op. amp. Voltage levels are determined based on Vss, and must maintain the relative magnitudes shown below. $V0 \geq V1 \geq V2 \geq V3 \geq V4 \geq Vss$															
23	V3																
24	V2																
25	V1																
26	V0																
27	VR	Output voltage regulator terminal. Provides the voltage between VSS and V0 through a resistive voltage divider. IRS = "L" : the V0 voltage regulator internal resistors are not used. IRS = "H" : the V0 voltage regulator internal resistors are used.															
28	C86	This is the MPU interface selection pin. C86 = "H": 6800 Series MPU interface. C86 = "L": 8080 Series MPU interface.															
29	P/S	<p>This pin configures the interface to be parallel mode or serial mode. P/S = "H": Parallel data input/output.            P/S = "L": Serial data input.</p> <p>The following applies depending on the P/S status:</p> <table border="1" data-bbox="400 1727 1110 1861"> <thead> <tr> <th>P/S</th> <th>Data/Command</th> <th>Data</th> <th>Read/Write</th> <th>Serial Clock</th> </tr> </thead> <tbody> <tr> <td>"H"</td> <td>A0</td> <td>D0 to D7</td> <td>/RD, /WR</td> <td>X</td> </tr> <tr> <td>"L"</td> <td>A0</td> <td>SI (D7)</td> <td>Write only</td> <td>SCL (D6)</td> </tr> </tbody> </table> <p>When P/S = "L", D0 to D5 must be fixed to "H".            /RD (E) and /WR (R/W) are fixed to either "H" or "L".            The serial access mode does NOT support read operation.</p>	P/S	Data/Command	Data	Read/Write	Serial Clock	"H"	A0	D0 to D7	/RD, /WR	X	"L"	A0	SI (D7)	Write only	SCL (D6)
P/S	Data/Command	Data	Read/Write	Serial Clock													
"H"	A0	D0 to D7	/RD, /WR	X													
"L"	A0	SI (D7)	Write only	SCL (D6)													

30	IRS	This terminal selects the resistors for the V0 voltage level adjustment. IRS = "H": Use the internal resistors IRS = "L": Do not use the internal resistors. The V0 voltage level is regulated by an external resistive voltage divider attached to the VR terminal
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# Contour Drawing



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