Winstar Display Co., LTD
華凌光電股份有限公司
WEB: https://www.winstar.com.tw E-mail: sales@winstar.com.tw

SPECIFICATION

MODULE NO.: WO12864-xxxK1#FC

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	

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Represented by:
first FC components
FIRST Components srl Via Cavour 69, 21020 Buguggiate (VA)
T. +39 0332 1888005 web: www.first-components.com

Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	T_{OP}	-20	—	+70	℃
Storage Temperature	T_{ST}	-30	—	+80	℃
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℃	—	—	—	V
		Ta=25℃	9.3	9.5	9.7	V
		Ta=70℃	—	—	—	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

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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	• When connected to 8080 series MPU, this pin is treated as the “/WR” signal of the 8080 MPU and is LOW-active. The signals on the data bus are latched at the rising edge of the /WR signal. • 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.
5	/RD	• When connected to 8080 series MPU, this pin is treated as the “/RD” signal of the 8080 MPU and is LOW-active. The data bus is in an output status when this signal is “L”. • When connected to 6800 series MPU, this pin is treated as the “E” signal of the 6800 MPU and is HIGH-active. 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

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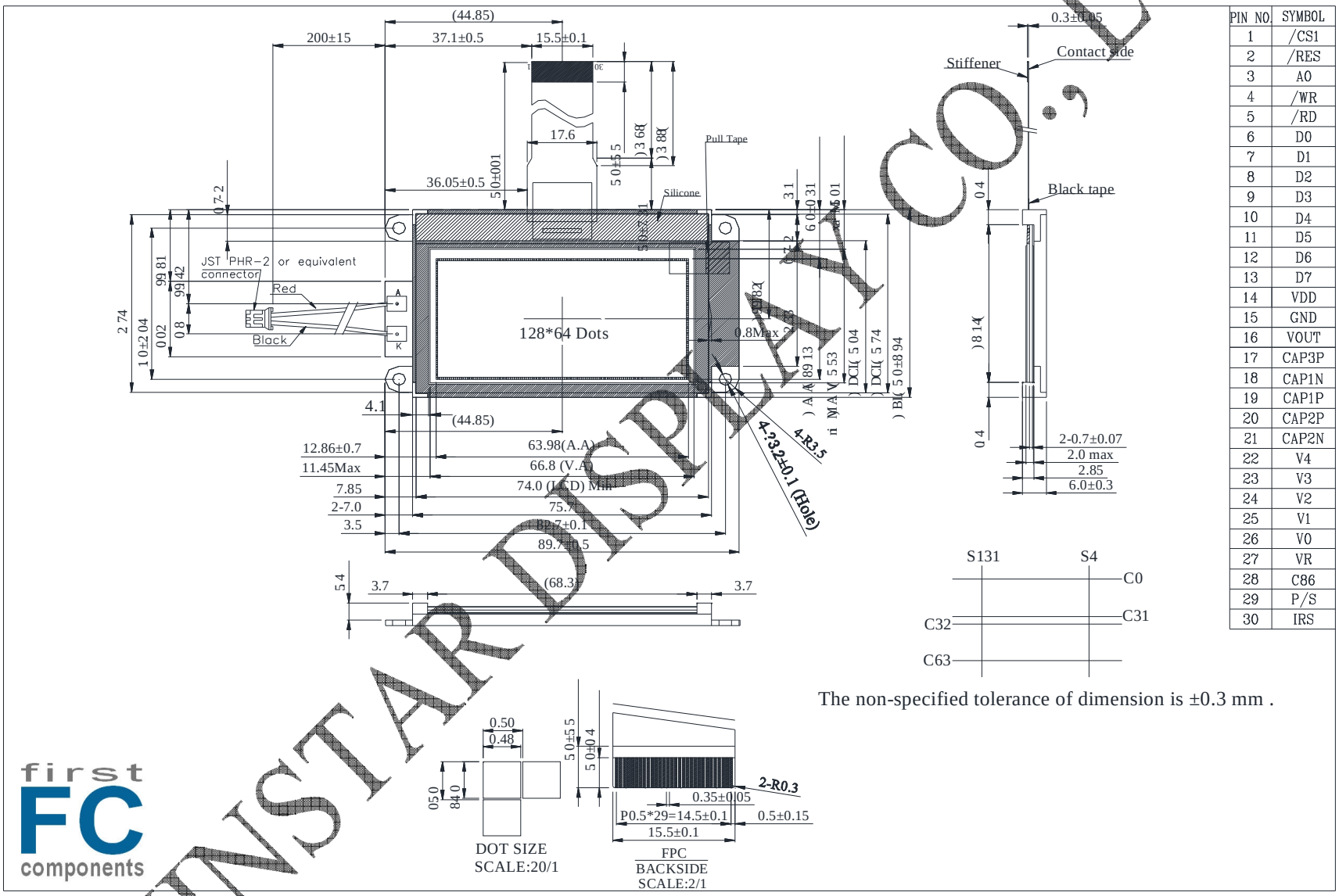
<table>
<tr><td>17</td><td>CAP3+</td><td>DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1N terminal.</td></tr>
<tr><td>18</td><td>CAP1-</td><td>DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1P terminal.</td></tr>
<tr><td>19</td><td>CAP1+</td><td>DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1N terminal.</td></tr>
<tr><td>20</td><td>CAP2+</td><td>DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2N terminal.</td></tr>
<tr><td>21</td><td>CAP2-</td><td>DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2P terminal.</td></tr>
<tr><td>22</td><td>V4</td><td rowspan="5">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 ≧V1 ≧V2 ≧V3 ≧V4 ≧Vss
When the power supply turns ON, the internal power supply circuits produce the V1 to V4 voltages shown below. The voltage settings are selected using the LCD bias set command.</td></tr>
<tr><td>23</td><td>V3</td></tr>
<tr><td>24</td><td>V2</td></tr>
<tr><td>25</td><td>V1</td></tr>
<tr><td>26</td><td>V0</td></tr>
<tr><td>27</td><td>VR</td><td>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.</td></tr>
<tr><td>28</td><td>C86</td><td>This is the MPU interface selection pin. C86 = “H”: 6800 Series MPU interface. C86 = “L”: 8080 Series MPU interface.</td></tr>
<tr><td>29</td><td>P/S</td><td>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.
The following applies depending on the P/S status:
<table>
<tr><th>P/S</th><th>Data/Command</th><th>Data</th><th>Read/Write</th><th>Serial Clock</th></tr>
<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>
</table>
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.</td></tr>
</table>

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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



PIN NO.	SYMBOL
1	/CS1
2	/RES
3	A0
4	/WR
5	/RD
6	D0
7	D1
8	D2
9	D3
10	D4
11	D5
12	D6
13	D7
14	VDD
15	GND
16	VOUT
17	CAP3P
18	CAP1N
19	CAP1P
20	CAP2P
21	CAP2N
22	V4
23	V3
24	V2
25	V1
26	V0
27	VR
28	C86
29	P/S
30	IRS

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

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