# Dalian Good Display Co.,Ltd.

# LCD Module User Manual

# YM16064FSF-1

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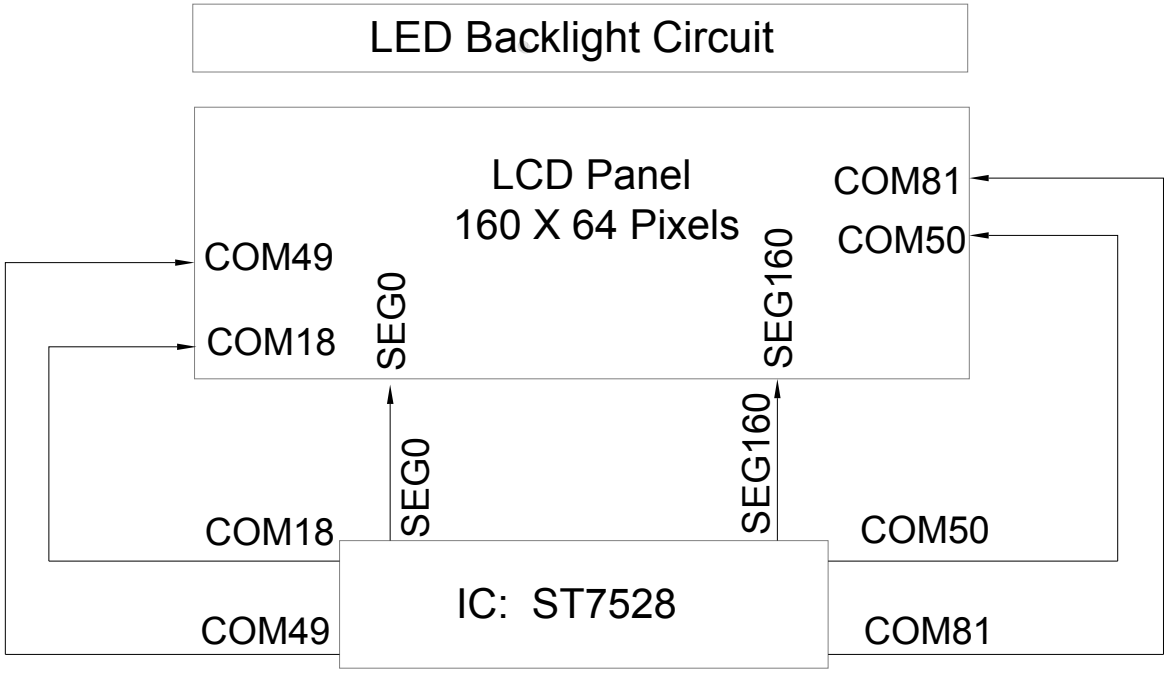
# 1.0 Basic Specification

### 1.1 Display and Mechanical Specification

| ITEM | STANDARD VALUE | UNIT |
|---|---|---|
| Display Type | 160 X 64 | Dots |
| LCD Type | FSTN/ Transflective/Positive | -- |
| LCD Duty | 1/64 | -- |
| LCD Bias | 1/9 | Bias |
| Viewing Direction | 6:00 | Clock |
| Backlight Type | White Color LED Backlight with frame | -- |
| Interface | 6800/8080 series or Serial Interface | -- |
| Driver IC | ST7528 (Gold Bump Chip) | -- |
| IC Package | COG | -- |
| Module Dimension | 56.4(W)×32.9(H) ×5.20(T) (MAX) | mm |
| Visual Area | 52.00(W) ×22.00(H) | mm |
| Dot size | 0.28 ×0.28 | mm |
| Dot Pitch | 0.30 ×0.30 | mm |
| Operating Temperature | -20 ~ 70 | ℃ |
| Storage Temperature | -30 ~ 80 | ℃ |

### 1.2 Block Diagram

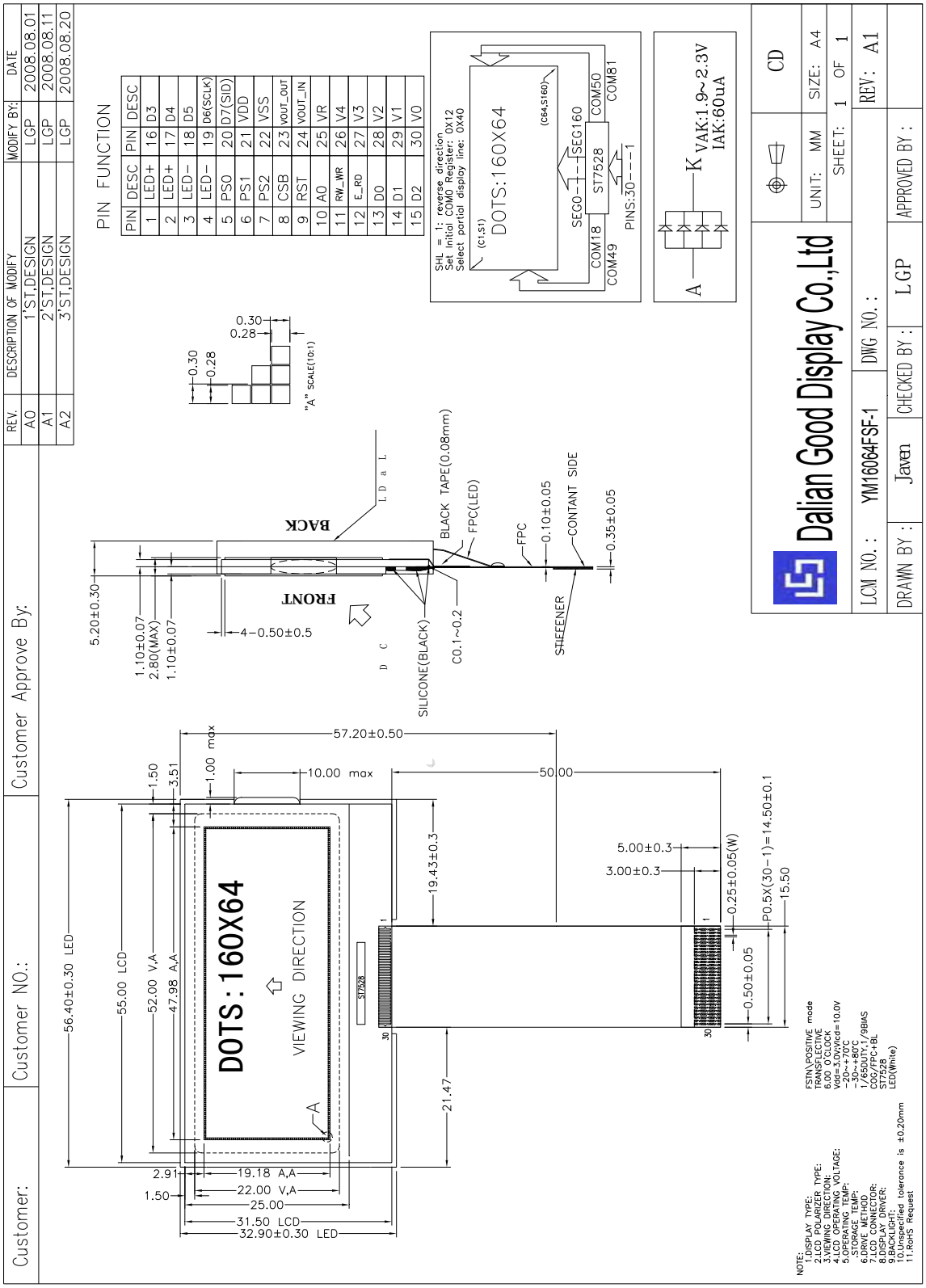


### 1.3 Terminal Functions

<table>
<tr><th>Pin No.</th><th>Pin Name</th><th>I/O</th><th>Descriptions</th></tr>
<tr><td>1</td><td>LED+</td><td>Supply</td><td>Positive Supply for LED backlight</td></tr>
<tr><td>2</td><td>LED+</td><td>Supply</td><td>Positive Supply for LED backlight</td></tr>
<tr><td>3</td><td>LED-</td><td>Supply</td><td>Negative Supply for LED backlight</td></tr>
<tr><td>4</td><td>LED-</td><td>Supply</td><td>Negative Supply for LED backlight</td></tr>
<tr><td>5</td><td>PS0</td><td rowspan="3">I</td><td rowspan="3">Parallel/Serial data input select input
<table>
<tr><th>PS2</th><th>PS1</th><th>PS0</th><th>Interface mode</th><th>Data/ Command</th><th>Data</th><th>Read/Write</th><th>Serial Clock</th></tr>
<tr><td>L</td><td>L</td><td>H</td><td>Parallel 80</td><td>A0</td><td>DB0 to DB7</td><td>RD/WR</td><td>-</td></tr>
<tr><td>L</td><td>H</td><td>H</td><td>Parallel 68</td><td>A0</td><td>DB0 to DB7</td><td>E/RW</td><td>-</td></tr>
<tr><td>L</td><td>L</td><td>L</td><td>3Line Serial</td><td>-</td><td>S1D(DB7)</td><td>Write only</td><td>SCLK(DB6)</td></tr>
<tr><td>L</td><td>H</td><td>L</td><td>4Line Serial</td><td>A0</td><td>S1D(DB7)</td><td>Write only</td><td>SCLK(DB6)</td></tr>
<tr><td>H</td><td>L</td><td>L</td><td>IIC Serial</td><td>-</td><td>SDA</td><td>Read/Write</td><td>SCL</td></tr>
</table>
Note: In 4-Line, 3-Line and IIC serial mode, it is impossible to read data from the on-chip RAM.</td></tr>
<tr><td>6</td><td>PS1</td></tr>
<tr><td>7</td><td>PS2</td></tr>
<tr><td>8</td><td>CSB</td><td>I</td><td>Chip Select input pins<br>Data/instruction I/O is enabled only when CSB is “L”. When chip select is non-active , DB0 to DB7 may be high impedance.</td></tr>
<tr><td>9</td><td>RST</td><td>I</td><td>Reset input pin<br>When RESETB is “L”, initialization is executed.</td></tr>
<tr><td>10</td><td>A0</td><td>I</td><td>Register select input pin<br>-A0 = “H” : DB0 to DB7 are display data.<br>-A0 = “L” : DB0 to DB7 are control data.</td></tr>
<tr><td>11</td><td>RW_WR</td><td>I</td><td>Read/ Write execution control pin
<table>
<tr><th>PS1</th><th>MPU type</th><th>RW_WR</th><th>Description</th></tr>
<tr><td>H</td><td>6800-series</td><td>RW</td><td>Read/Write control input pin<br>RW = “H”: read<br>RW= “L”: write</td></tr>
<tr><td>L</td><td>8080-series</td><td>/WR</td><td>Write enable clock input pin<br>The data o DB0 to DB7 are latched at the rising edge of the /WR signal.</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>12</td><td>E_RD</td><td>I</td><td>Read/ Write execution control pin
<table>
<tr><td>PS1</td><td>MPU type</td><td>E_RD</td><td>Description</td></tr>
<tr><td>H</td><td>6800-series</td><td>E</td><td>Read/Write control input pin<br>When RW = “H” E is “H”, DB0 to B7 are in an output status.<br>When RW=”L”: The data on DB0 to DB7 are latched at the falling edge of the E signal.</td></tr>
<tr><td>L</td><td>8080-series</td><td>/RD</td><td>Read enable clock input pin<br>When /RD is “L”, DB0 to DB7 are in an output Status.</td></tr>
</table></td></tr>
<tr><td>13-20</td><td>DB0-DB7</td><td>I/O</td><td>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 is selected (P/S=”L”),then DB7 serves as the serial data input terminal (SI) and DB6 serves as the serial clock input terminal (SCL). At this time, DBO-DB5 are set to high impedance. When the chip select is inactive, DB0-DB7 are set to high impedance.</td></tr>
<tr><td>21</td><td>VDD</td><td>Supply</td><td>Positive Power Supply</td></tr>
<tr><td>22</td><td>VSS</td><td>Supply</td><td>Ground</td></tr>
<tr><td>23</td><td>VOUT_OU</td><td>Supply</td><td>If the internal Vout voltage generator is used , the VOUT_IN & VOUT_OUT must be connected together. If an external supply is used , this pin must be left open.</td></tr>
<tr><td>24</td><td>VOUT_IN</td><td>Supply</td><td>An external Vout supply voltage can be supplied using the VOUT_IN pad. In this case, VOUT_OUT Has to be left open, and the internal voltage generator has to be programmed to zero.</td></tr>
<tr><td>25</td><td>VR</td><td>I</td><td>V0 voltage adjustment pin<br>It is valid only when on-chip resistors are not used ( INTRS = “L”)<br>When using internal resistors ( INTRS = “H” ),open this pin</td></tr>
<tr><td>26</td><td>V4</td><td rowspan="5">I/O</td><td rowspan="5">LCD driver supply voltages. The voltage determined by LCD cell is impedance-converted by a resistive driver or and according to the following relationship:<br>VDD (=Vo) ≥ V1≥V2≥V3≥V4≥VSS<br>When the on-chip operating power circuit is on the following voltages are supplied to V1 to V4 by the on-chip power circuit.</td></tr>
<tr><td>27</td><td>V3</td></tr>
<tr><td>28</td><td>V2</td></tr>
<tr><td>29</td><td>V1</td></tr>
<tr><td>30</td><td>V0</td></tr>
</table>

### 1.4 Mechanical Drawing



## 2. Absolute Maximum Ratings

| Items | Symbol | Min | Max. | Unit | Condition |
|---|---|---|---|---|---|
| Supply Voltage (Logic) | $V_{DD}$-Vss | -0.5 | +3.6 | V | Vss=0V |
| Supply Voltage (LCD Driver) | $V_{OUT_IN}$ | -0.5 | 20 | V | Vss=0V |
| Input Voltage | $V_{IN}$ | -0.5 | VDD+0.5 | V | Vss=0V |
| Operating Temperature | $T_{OP}$ | -20 | +70 | ℃ | No Condensation |
| Storage Temperature | $T_{ST}$ | -30 | +80 | ℃ | No Condensation |

Cautions:

Any stresses exceeding the Absolute Maximum Ratings may cause substantial damage to the device Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability

## 3. Electrical Characteristics

### 3.1 DC Characteristics

| Items | Symbol | Min | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| Supply Voltage (Logic) | $V_{DD}$-Vss | 2.7 | 3.0 | 3.3 | V | |
| Supply Voltage (LCD Driver) | $V_O$ | -- | -- | -- | V | -- |
| | | -- | 10.0 | -- | | 25℃ |
| | | -- | -- | -- | | -- |
| Input Voltage | $V_{IH}$ | 0.7 $V_{DD}$ | -- | $V_{DD}$ | V | -- |
| | $V_{IL}$ | Vss | -- | 0.3 $V_{DD}$ | | |
| Logic Supply Current | $I_{DD}$ | -- | -- | 0.7 | mA | VDD-Vss=3.0V |

### 3.2 LED Backlight Circuit Characteristics

| Items | Symbol | MIN | TYP. | MAX. | Unit | Application pin |
|---|---|---|---|---|---|---|
| Forward Voltage | $Vf_{LED+}$ | - | 2.1 | - | V | LED+ |
| Forward Current | $If_{LED+}$ | - | 60 | 80 | mA | LED+ |

Cautions:

Exceeding the recommended driving current could cause substantial damage to the backlight and shorten its lifetime.

4. IC Contents Attachment:

**Reference Documents from SITRONIX ST7528_2.3V LCD Driver.**

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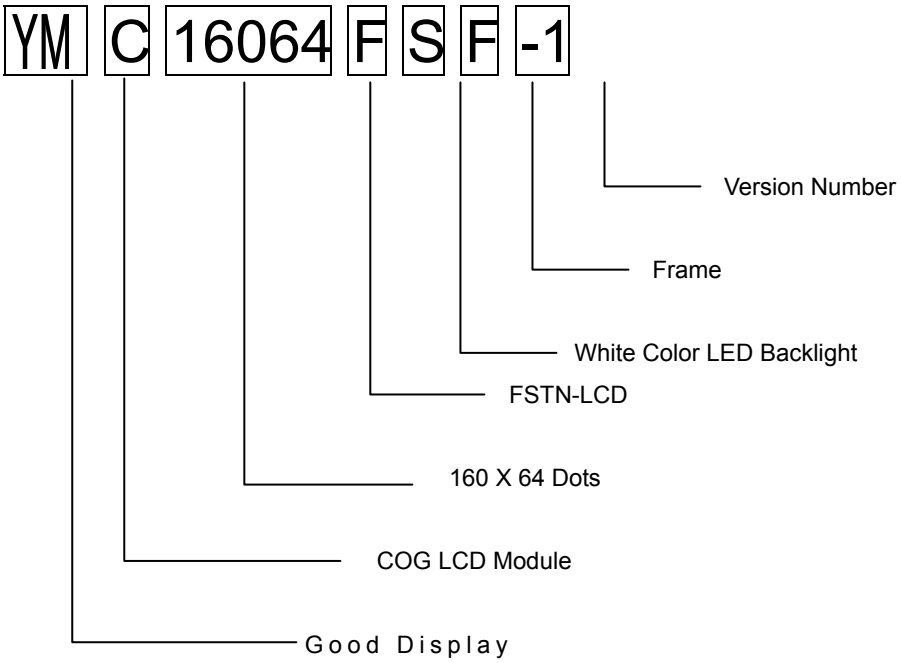
## 5. LCM Numbering System



## 6. Design and Handling Precaution

1.0 The LCD panel is made by glass. Any mechanical shock (eg. dropping form high place) will damage the LCD module.
2.0 Do not add excessive force on the surface of the display, which may cause the Display color change abnormally.
3.0 The polarizer on the LCD is easily get scratched. If possible, do not remove the LCD protective film until the last step of installation.
4.0 Never attempt to disassemble or rework the LCD module.
5.0 Only Clean the LCD with Isopropyl Alcohol or Ethyl Alcohol. Other solvents (eg. water) may damage the LCD.
6.0 When mounting the LCD module, make sure that it is free form twisting, warping and distortion.
7.0 Ensure to provide enough space (with cushion) between case and LCD panel to prevent external force adding on it, or it may cause damage to the LCD or degrade the display result.
8.0 Only hold the LCD module by its side. Never hold LCD module by adds force on the heat seal or TAB.
9.0 Never add force to component of the LCD module. It may cause invisible damage or degrade of the reliability.
10.0 LCD module could be easily damaged by static electricity. Be careful to maintain an optimum anti-static work environment to protect the LCD module.
11.0 When peeling off the protective film from LCD, static charge may cause abnormal display pattern. It is normal and will resume to normal in a short while.
12.0 Take care and prevent get hurt by the LCD panel sharp edge.
13.0 Never operate the LCD module exceed the absolute maximum ratings.
14.0 Keep the signal line as short as possible to prevent noisy signal applying to LCD module.
15.0 Never apply signal to the LCD module without power supply.
16.0 IC chip (eg. TAB or COG) is sensitive to the light. Strong lighting environment could Possibly cause malfunction. Light sealing structure casing is recommend.
17.0 LCD module reliability may be reduced by temperature shock.
18.0 When storing the LCD module, avoid exposure to the direct sunlight, high humidity, high temperature or low temperature. They may damage or degrade the LCD module