Document No.: **TS18MDC501**

TopSun

TopSun Optronics, Inc.

PRODUCT SPECIFICATION

Preliminary

MODEL: TS18MDC501

VERSION: 1.3

ISSUED DATE: 08/01/2006

CUSTOMER'S APPROVAL	
BY	
DATE	

TOPSUN OPTRONICS, INC.	
PREPARED BY	DATE
APPROVED BY	DATE

Note:

1. TopSun Optronics reserves the right to make changes without further notice to any products herein to improve reliability, function or design.
2.

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Revisions

Revision	Description	Date
1.0	Initial Release	05/27/2006
1.1	1. Modify p.7: 3.2.1 TFT LCD Panel Interface FPC Pin Description	06/20/2006
1.2	1. Modify p.7: 3.2.1 TFT LCD Panel Interface FPC Pin Description 2. Modify p.12 Test Condition for Item 7	07/19/2006
1.3	1. Modify p.9 Viewing Angle	08/01/2006

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1. General Description and Features

TS18MDC501 is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT LCD panel, a driver IC, a FPC, and a WLED-backlight unit. The active display area is 1.79 inches diagonally measured and the native resolution is 128xRGBx160. Features of this product are listed in the following table.

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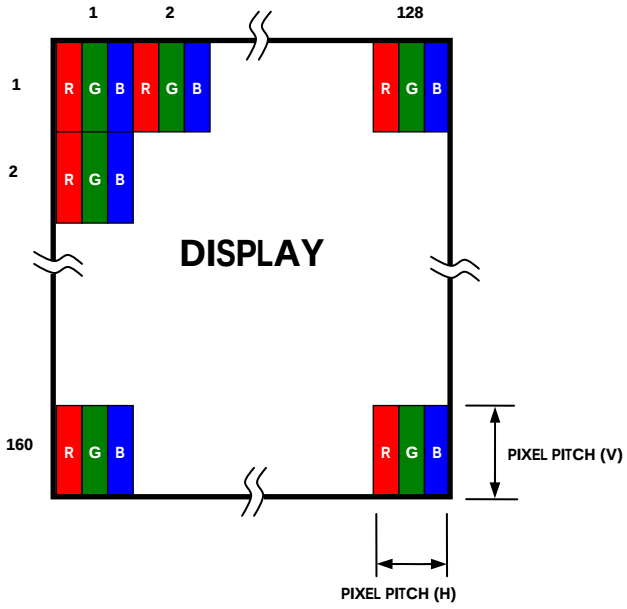
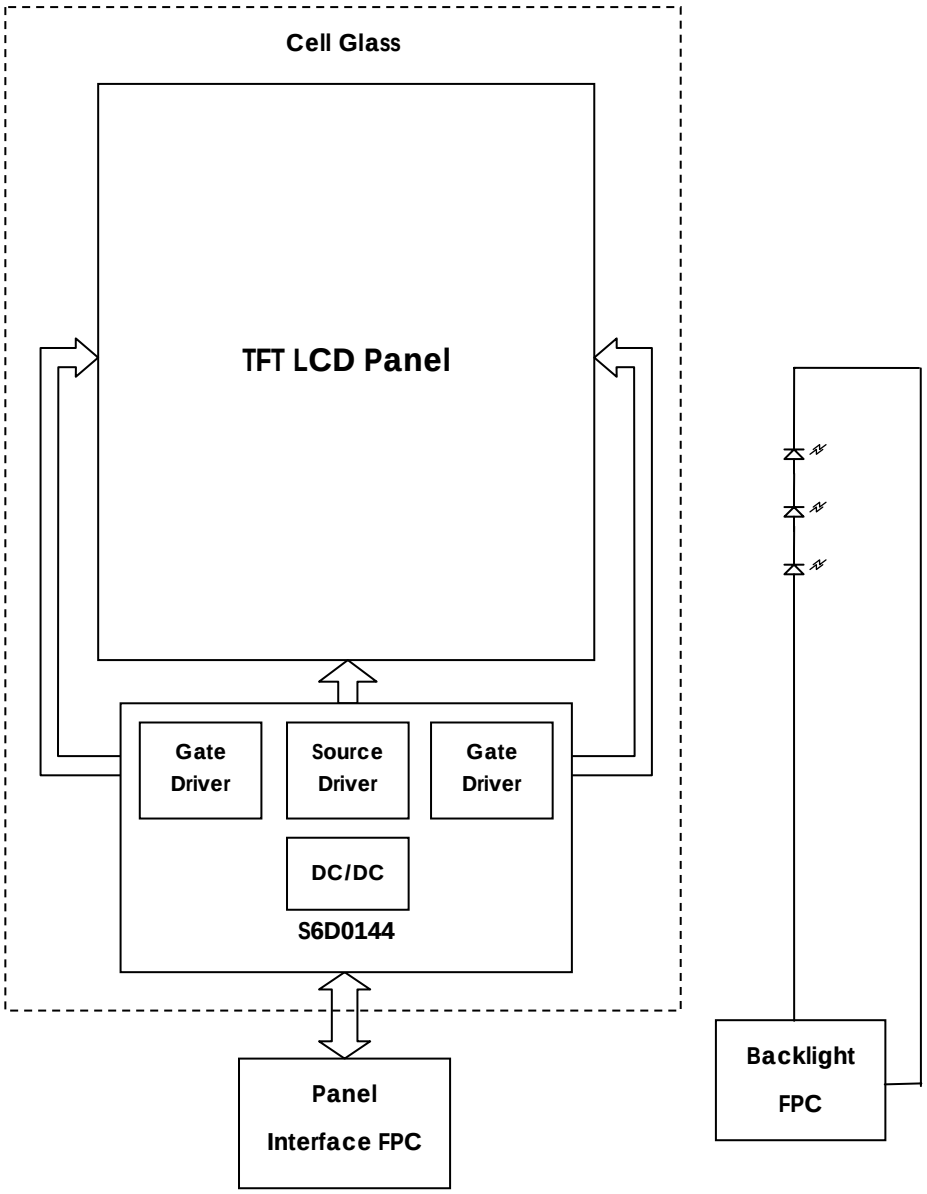
No.	Item	Specification	Remark
1	Screen Size	1.79 (inch)	diagonal
2	Number of Pixels	128 (H) x RGB x 160 (V)	pixels
3	Pixel pitch	0.222 (H) x 0.222 (V)	mm
4	LCD Type	a-Si TFT / Transmissive	
5	Pixel Arrangement	RGB-stripe	
6	Display Mode	Normally white	
7	Input Interface	80 or 68 system / 16-bit or 8-bit CPU I/F	
8	Display Color Number	65K	
9	Viewing Direction	12 o'clock	
10	Weight	TBD	g
11	Active Area	28.416 (W) × 35.52 (L)	mm
12	Outline Dimension	34.3 (W) × 46.0 (L) × 3.10 (T)	Without SMDs
13	Driver IC	S6D0144	



Pixel Arrangement

2. Functional Block Diagram



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3. Electrical Specifications

3.1 Absolute Maximum Ratings

If the operating condition exceeds the following absolute maximum ratings, the TFT LCD module may be damaged permanently.

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power Supply Voltage	VDD	-0.3	-	3.6	V	GND=0V
LED Forward Direction Current	I_F	-	-	20	mA	Per LED
LED Peak Pulse Forward Direction Current	I_{FP}	-	-	30	mA	Per LED

Note 1: Temp. ≤ 60℃, 90% RH MAX.

Temp. ＞ 60℃, absolute humidity shall be less than 90% RH at 60℃

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3.2 Pin Descriptions

3.2.1 TFT LCD Panel Interface FPC Pin Description

<table>
<tr><th>Pin No.</th><th>Symbol</th><th>I/O</th><th>Function</th><th>Remark</th></tr>
<tr><td>1</td><td>DUMMY</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>DUMMY</td><td></td><td></td><td></td></tr>
<tr><td>3</td><td>VSS</td><td>I</td><td>System Ground.</td><td></td></tr>
<tr><td>4</td><td>IM0</td><td>I</td><td rowspan="2">Select the mode interfacing with MCU.
<table>
<tr><td colspan="3"></td><td>IC</td><td>FPC</td></tr>
<tr><td>IM1</td><td>IM0</td><td>MPU interfacing mode</td><td>DB pins</td><td>D pins</td></tr>
<tr><td>VDD</td><td>VDD</td><td>80-system 8-bit interface</td><td>DB10-17</td><td>D8-15</td></tr>
<tr><td>VDD</td><td>VSS</td><td>80-system 16-bit interface</td><td>DB1-8,
DB10-17</td><td>D0-15</td></tr>
<tr><td>VSS</td><td>VDD</td><td>68-system 8-bit interface</td><td>DB10-17</td><td>D8-15</td></tr>
<tr><td>VSS</td><td>VSS</td><td>68-system 16-bit interface</td><td>DB1-8
DB10-17</td><td>D0-15</td></tr>
</table></td><td></td></tr>
<tr><td>5</td><td>IM1</td><td>I</td><td></td></tr>
<tr><td>6</td><td>VSS</td><td>I</td><td>System Ground.</td><td></td></tr>
<tr><td>7</td><td>CS</td><td>I</td><td>Chip select pin; Low active.</td><td></td></tr>
<tr><td>8</td><td>RS</td><td>I</td><td>Data or command.</td><td></td></tr>
<tr><td>9</td><td>E_WRB</td><td>I</td><td>Write strobe signal; Low active.</td><td></td></tr>
<tr><td>10</td><td>PWB_RDB</td><td>I</td><td>Read strobe signal; Low active.</td><td></td></tr>
<tr><td>11</td><td>D0</td><td>I/O</td><td>Data0</td><td></td></tr>
<tr><td>12</td><td>D1</td><td>I/O</td><td>Data1</td><td></td></tr>
<tr><td>13</td><td>D2</td><td>I/O</td><td>Data2</td><td></td></tr>
<tr><td>14</td><td>D3</td><td>I/O</td><td>Data3</td><td></td></tr>
<tr><td>15</td><td>D4</td><td>I/O</td><td>Data4</td><td></td></tr>
<tr><td>16</td><td>D5</td><td>I/O</td><td>Data5</td><td></td></tr>
<tr><td>17</td><td>D6</td><td>I/O</td><td>Data6</td><td></td></tr>
<tr><td>18</td><td>D7</td><td>I/O</td><td>Data7</td><td></td></tr>
<tr><td>19</td><td>D8</td><td>I/O</td><td>Data8</td><td></td></tr>
<tr><td>20</td><td>D9</td><td>I/O</td><td>Data9</td><td></td></tr>
<tr><td>21</td><td>D10</td><td>I/O</td><td>Data10</td><td></td></tr>
<tr><td>22</td><td>D11</td><td>I/O</td><td>Data11</td><td></td></tr>
<tr><td>23</td><td>D12</td><td>I/O</td><td>Data12</td><td></td></tr>
<tr><td>24</td><td>D13</td><td>I/O</td><td>Data13</td><td></td></tr>
<tr><td>25</td><td>D14</td><td>I/O</td><td>Data14</td><td></td></tr>
<tr><td>26</td><td>D15</td><td>I/O</td><td>Data15</td><td></td></tr>
<tr><td>27</td><td>RESETB</td><td>I</td><td>System reset pin; Low active.</td><td></td></tr>
<tr><td>28</td><td>VDD</td><td>I</td><td>Power supply.</td><td></td></tr>
<tr><td>29</td><td>VDD</td><td>I</td><td>Power supply.</td><td></td></tr>
<tr><td>30</td><td>VSS</td><td>I</td><td>System Ground.</td><td></td></tr>
<tr><td>31</td><td>DUMMY</td><td></td><td></td><td></td></tr>
<tr><td>32</td><td>DUMMY</td><td></td><td></td><td></td></tr>
<tr><td>33</td><td>DUMMY</td><td></td><td></td><td></td></tr>
</table>

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3.3 Electrical Characteristics

3.3.1 DC Characteristics

Item		Symbol	Values			Unit	Remark
			Min.	Typ.	Max.		
Power Supply		VDD	2.8	3	3.2	V	
Input Signal Voltage	H level	V_{IH}	0.8VDD	-	VDD	V	
	L level	V_{IL}	0	-	0.2VDD	V	
Output Signal Voltage	H level	V_{OH}	0.9VDD	-	VDD	V	
	L level	V_{OL}	0	-	0.1VDD	V	
Dissipation Current	Full	I_{DD}	-	TBD	TBD	mW	
	Sleep	I_{DDSLP}	-	TBD	TBD	mW	

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3.3.2 Backlight Unit

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply Voltage	V_{BAT}	-	10.5	12	V	
Forward current	I_F	-	18	20	mA	
Power Consumption	P_{BL}	-	189	240	mW	

Note: 3 LEDs in serial connection.

4. Optical Specifications

The following items are measured under stable conditions. The optical characteristics should be measured in dark room or equivalent state with the methods shown in Note 1.

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
Response Time		T_{R+TF}	Θ=0	-	25	-	ms	Note 2
Contrast Ratio		CR	At optimized viewing angle	-	300	-	-	Note 3
Brightness		Y_L		-	200	-	cd/m^2	Note 4
Color Chromaticity	White	Wx	Θ=0	TBD	TBD	TBD	-	Note 4
		Wy		TBD	TBD	TBD		
	Red	Rx		TBD	TBD	TBD		
		Ry		TBD	TBD	TBD		
	Green	Gx		TBD	TBD	TBD		
		Gy		TBD	TBD	TBD		
	Blue	Bx		TBD	TBD	TBD		
		By		TBD	TBD	TBD		
Viewing Angle	Hor.	$Θ_R$	CR≧10	-	60	-	Degree	Note 5
		$Θ_L$		-	60	-		
	Ver.	$φ_H$		-	50	-		
		$φ_L$		-	45	-		

Ta=25±2℃, I_F=18mA

Note: Test equipment setup

1. After stabilizing and leaving the panel alone at a given temperature for 30minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-5A (fast) with a viewing angle of 1° at a distance of 50cm and normal direction.

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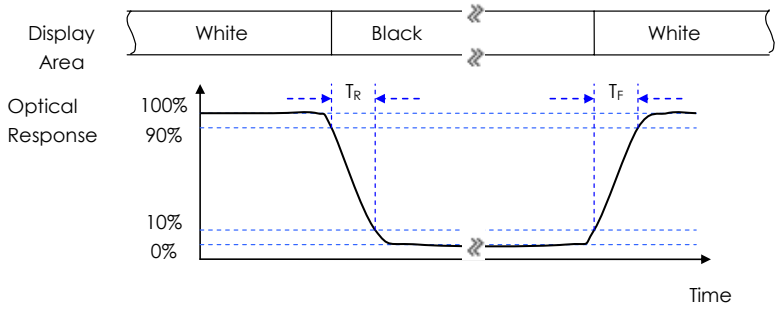
2. Definition of response time: T_R and T_F

The figure below is the output signal of the photo detector.

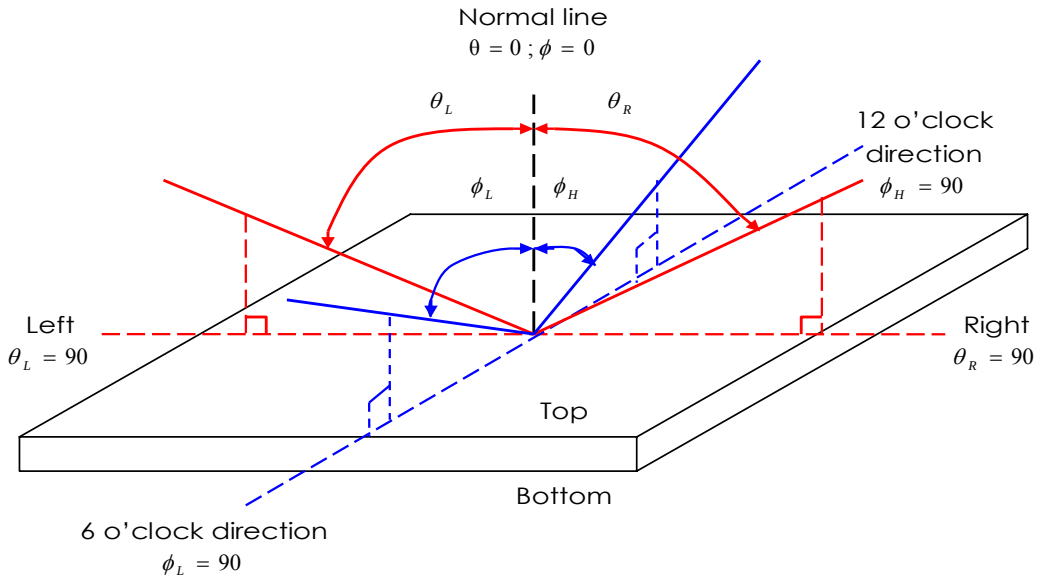


3. Definition of contrast ratio:

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness measured when LCD is at "white state"}}{\text{Brightness measured when LCD is at "black state"}}$$

Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

5. Definition of viewing angle:



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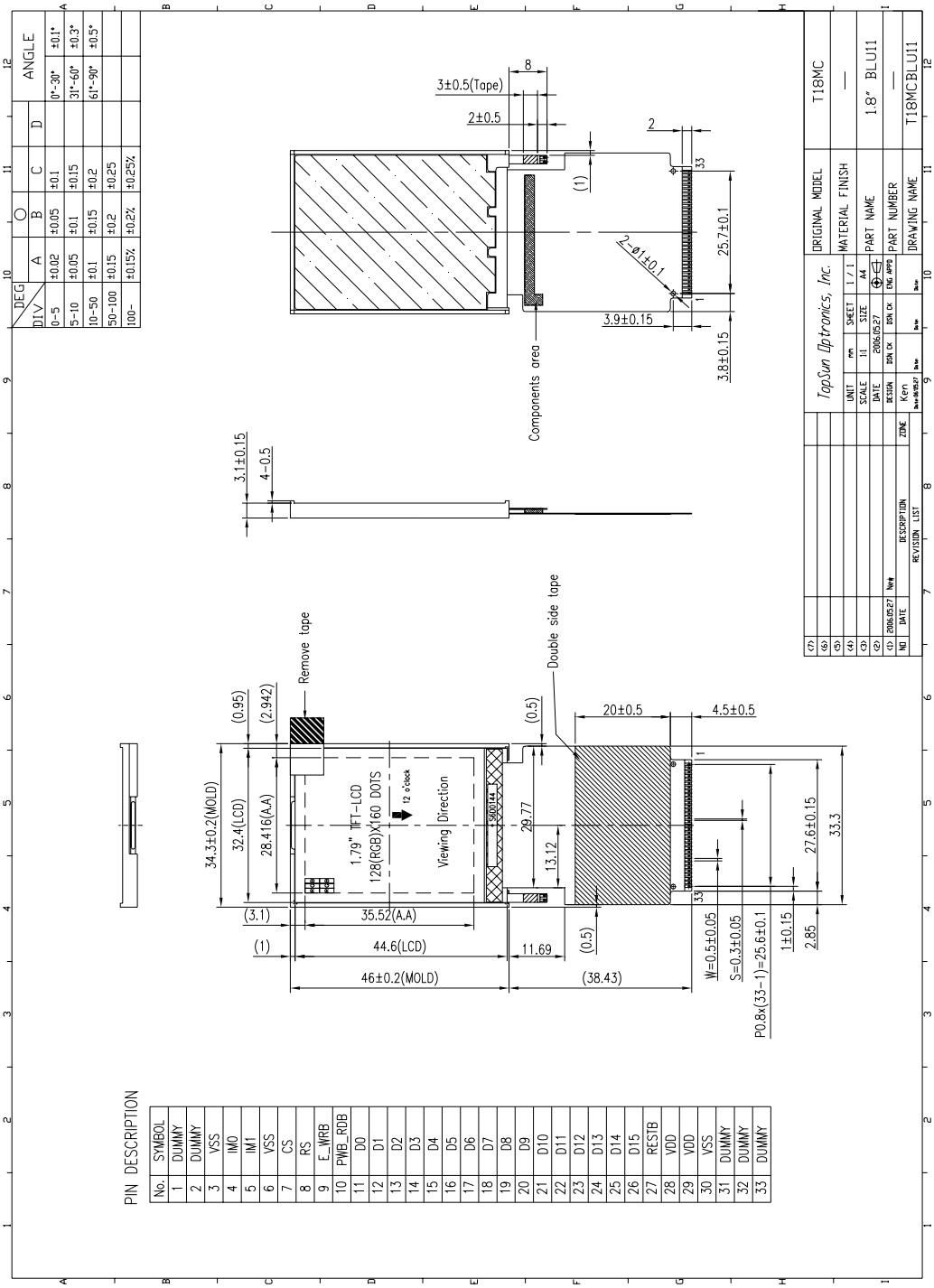
5. Mechanical Dimensions



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6. Reliability Test Items

NO	Test Item	Test Condition
1	High temperature operation	70℃ for 240 hours
2	High temperature and high humidity operation	60℃, 90%RH for 240 hours
3	Low temperature operation	-20℃ for 240 hours
4	High temperature storage	80℃ for 240 hours
5	Low temperature storage	-30℃ for 240 hours
6	Thermal shock	-25℃(0.5Hr) ~ +70℃(0.5Hr) for 200 cycles
7	Electrostatic discharge test	±200V, 200pF (0Ω), 1 time for each terminal
8	Drop Test (with carton)	Height：JIS 20202, Level 2 1 corner, 3 edges, 6 surfaces

Note:

The test samples have recovery time for 2 hours at room temperature before the function check. In the standard conditions, there is no display function NG issue occurred. All the cosmetic specifications are judged before the reliability stress.

7. Package

TBD

8. Handling Precautions

8.1 Safety

The liquid crystal in the LCD is poisonous. Keep away from your mouth and eyes. If the liquid crystal contacts with your skin, mouse or clothes, use soap to wash it off immediately.

8.2 Handling

i. The LCD panel is made by thin glass. Prevent the panel from mechanical shock or putting excessive force on its surface.

ii. The polarizer attached on the display is very easy to be damaged, handle it with special attention.

iii. To avoid contamination on the display surface, do not touch the display surface with bare hands.

iv. The transparent electrodes may be disconnected if you use the LCD panel under dew-condensing environment.

v. The characteristics of the semiconductor devices may be affected when they are exposed to light, possibly resulting in malfunctioning of the ICs. To prevent such malfunctioning of the ICs, make sure the application and the mounting of the panel are designed so that the IC is not exposed to light.

8.3 Static Electricity

Ground soldering iron tips, tools and testers when you operate. Also ground your body when handling the products and store the products in an anti-electrostatic container.

8.4 Storage

Store the products in a dark place where the temperature is within the range of 25±10℃ and with low humidity (65%RH or less). Do not store the LCD product in an atmosphere containing organic solvents or corrosive gases.

8.5 Cleaning

Do not wipe the polarizer with dry cloth, as it might cause scratching. Wipe the polarizer with a soft cloth soaked with petroleum IPA. Other chemical might damage the panel.