HTG240160R-33W-26C05-V01

产品名称（Product name）	:	黑白点阵 COG
型　　号（Model）	:	HTG240160R-33W-26C05-V01
编　　号（EDC number）	:	
日　　期（Date）	:	2026-06-26

编码：QR-R-011　A/0　　序号：

深圳市鑫洪泰电子科技有限公司 Shenzhen Hot Display Technology Co.,Ltd		
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Rev.	Descriptions	Date
01	Prelimiay Release	2026-06-26

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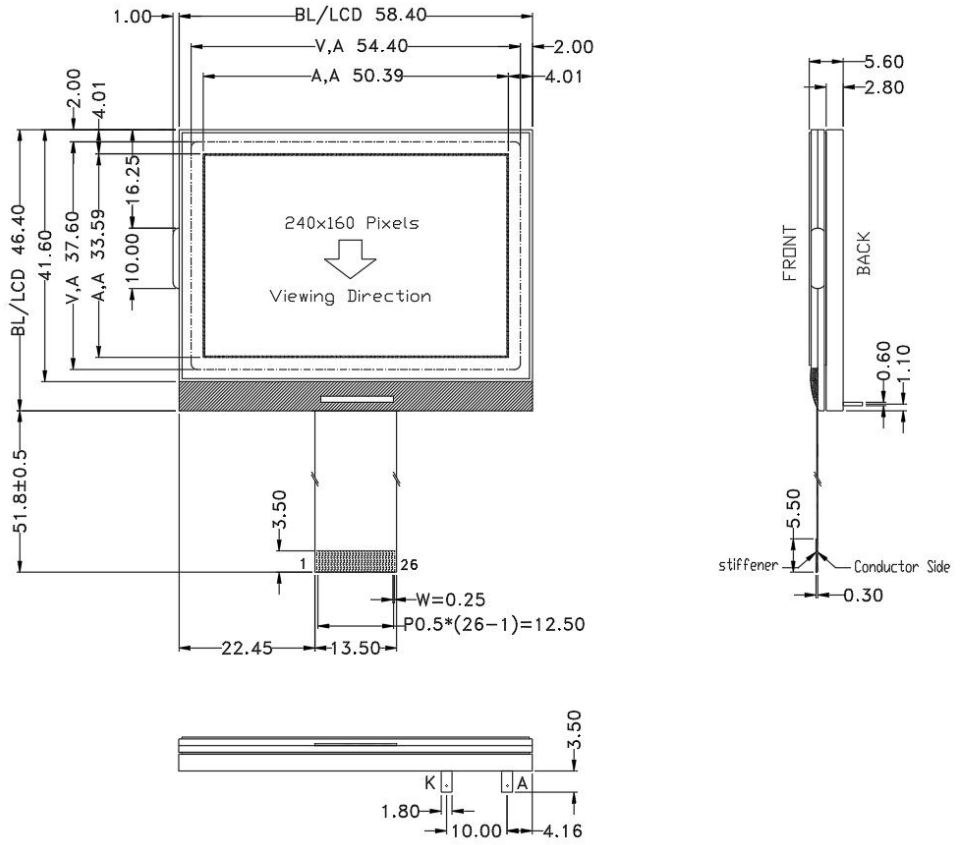
1. Bsaic Specifications

1.1 Display Specifications

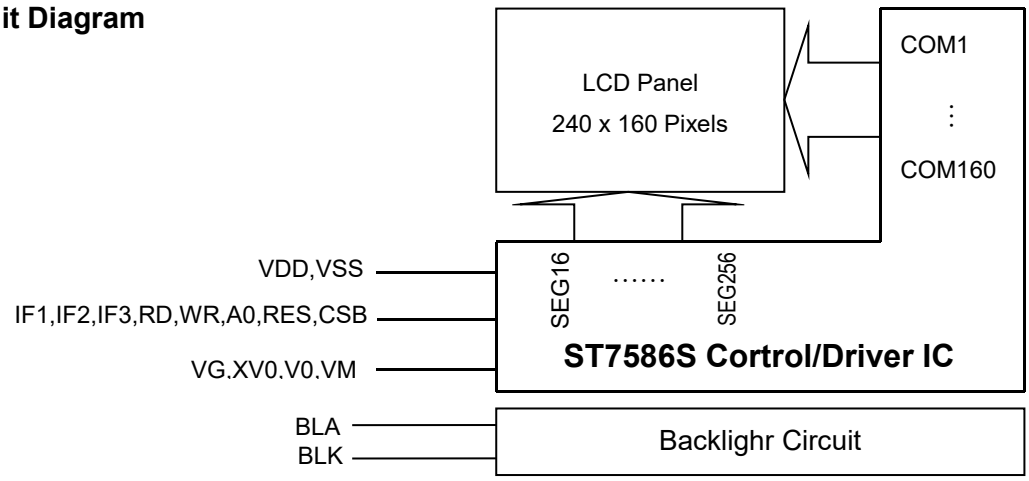
1>LCD Display Mode : FSTN, Positive, Transflective
2>Viewing Angle : 12H
3>Driving Method : 1/160 Duty, 1/11 Bias
4>Backlight : White LED (3PCS)

1.2 Mechanical Specifications

1>Outline Dimension : 58.4 x 46.4 x 5.6mm (See attached Outline Drawing for Details)



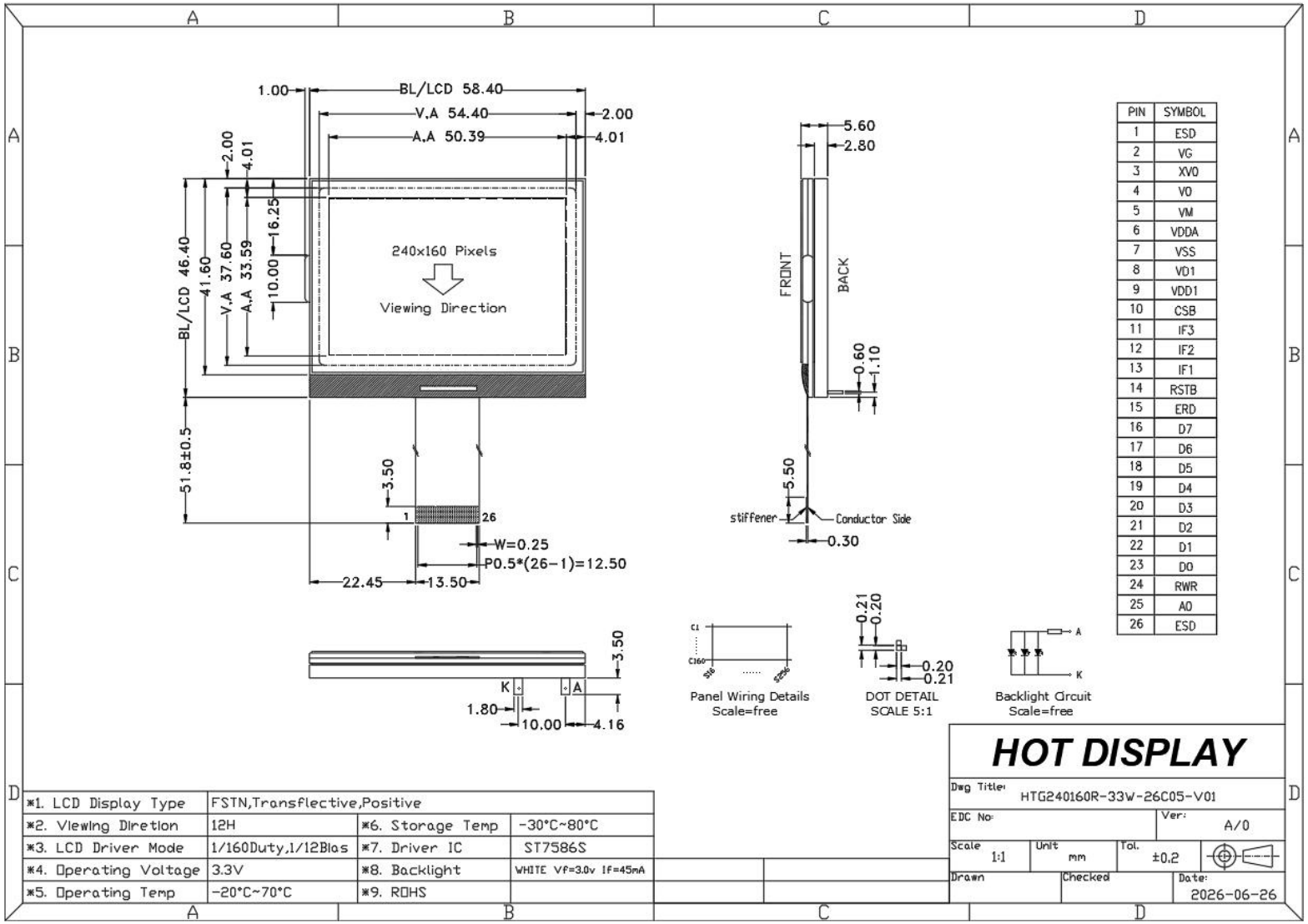
1.3 Circuit Diagram



1.4 Terminal Function

<table>
<tr><th>Pin No.</th><th>Pin Name</th><th>Function</th></tr>
<tr><td>1</td><td>ESD</td><td>Connect VSS</td></tr>
<tr><td>2</td><td>VG</td><td>Connect a 1UF capacitor between VG and VSS</td></tr>
<tr><td>3</td><td>XVO</td><td>Connect a 1UF capacitor between V0 and XV0</td></tr>
<tr><td>4</td><td>V0</td><td>Connect a 1UF capacitor between V0 and XV0</td></tr>
<tr><td>5</td><td>VM</td><td>Connect a 1UF capacitor between VM and VSS</td></tr>
<tr><td>6</td><td>VDDA</td><td>Power supply voltage (Positive)</td></tr>
<tr><td>7</td><td>VSS</td><td>Negative power supply,0V</td></tr>
<tr><td>8</td><td>VD1</td><td>Connect a 1UF capacitor between VD1 and VSS</td></tr>
<tr><td>9</td><td>VDD1</td><td>Power supply voltage (Positive)</td></tr>
<tr><td>10</td><td>CSB</td><td>This is the chip select signal</td></tr>
<tr><td>11</td><td>IF3,</td><td rowspan="3">These pins select interface operation mode.
<table><tr><th>IF3</th><th>IF2</th><th>IF1</th><th>MPU interface type</th></tr><tr><td>H</td><td>H</td><td>L</td><td>80 series 8-bit parallel</td></tr><tr><td>H</td><td>L</td><td>L</td><td>68 series 8-bit parallel</td></tr><tr><td>L</td><td>H</td><td>H</td><td>8-bit serial (4-Line)</td></tr><tr><td>L</td><td>H</td><td>L</td><td>9-bit serial (3-Line)</td></tr></table>Note: Refer to “Interface Selection” for detailed information.</td></tr>
<tr><td>12</td><td>IF2</td></tr>
<tr><td>13</td><td>IF1</td></tr>
<tr><td>14</td><td>RSTB</td><td>Reset Pin(L->H)</td></tr>
<tr><td>15</td><td>ERD</td><td>Read (/RD) control signal input.</td></tr>
<tr><td>16</td><td>D7</td><td rowspan="8">Data Bus</td></tr>
<tr><td>17</td><td>D6</td></tr>
<tr><td>18</td><td>D5</td></tr>
<tr><td>19</td><td>D4</td></tr>
<tr><td>20</td><td>D3</td></tr>
<tr><td>21</td><td>D2</td></tr>
<tr><td>22</td><td>D1</td></tr>
<tr><td>23</td><td>D0</td></tr>
<tr><td>24</td><td>RWR</td><td>Write (/WR) control signal input.</td></tr>
<tr><td>25</td><td>A0</td><td>Register select input pin
- A0 = “H” : DB0 to DB7 are display data
- A0 = “L” : DB0 to DB7 are control data</td></tr>
<tr><td>26</td><td>ESD</td><td>Connect VSS</td></tr>
</table>

1.5 Product Outline



PIN	SYMBOL
1	ESD
2	VG
3	XV0
4	V0
5	VM
6	VDDA
7	VSS
8	VD1
9	VDD1
10	CSB
11	IF3
12	IF2
13	IF1
14	RSTB
15	ERD
16	D7
17	D6
18	D5
19	D4
20	D3
21	D2
22	D1
23	D0
24	RWR
25	A0
26	ESD

*1. LCD Display Type	FSTN,Transflective,Positive		
*2. Viewing Direction	12H	*6. Storage Temp	-30°C~80°C
*3. LCD Driver Mode	1/160Duty,1/12Bias	*7. Driver IC	ST7586S
*4. Operating Voltage	3.3V	*8. Backlight	WHITE Vf=3.0v If=45mA
*5. Operating Temp	-20°C~70°C	*9. ROHS	

2. Absolute Maximum Ratings

Items	Symbol	MIN.	MAX.	Unit	Condition
Supply Voltage	VDD	-0.3	+3.6	V	Vss = 0V
	VDD2	-0.3	+3.6	V	Vss = 0V
Input Voltage	VIN	-0.3	VDD+0.3	V	Vss = 0V
Operating Temperature	TOP	-10	+60	℃	No Condensation
Storage Temperature	Tst	-20	+70	℃	No Condensation

3. Electrical Characteristics

3.1 DC Characteristics

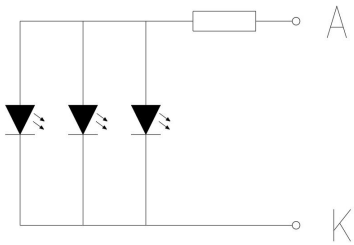
(VSS = 0V, VDD = 2.4 to 3.6V, Ta = -40~85°C)

Items	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Operating Voltage(1)	VDD	3.0	-	3.3	V	
Driver Voltage	VLCD	-0.3	-	19.0	V	
Input High Voltage	VIH	0.8 x VDD	-	VDD	V	
Input Low Voltage	VIL	VSS	-	0.2 x VDD	V	
Output High Voltage	VOH	0.8 x VDD	-	VDD	V	IOH = -0.5mA
Output Low Voltage	VOL	VSS	-	0.2 x VDD	V	IOL = 0.5mA
Input Leakage Current	ILI	-	-	1.5	μA	VIN = VDD or VSS

3.2 LED Backlight Circuit

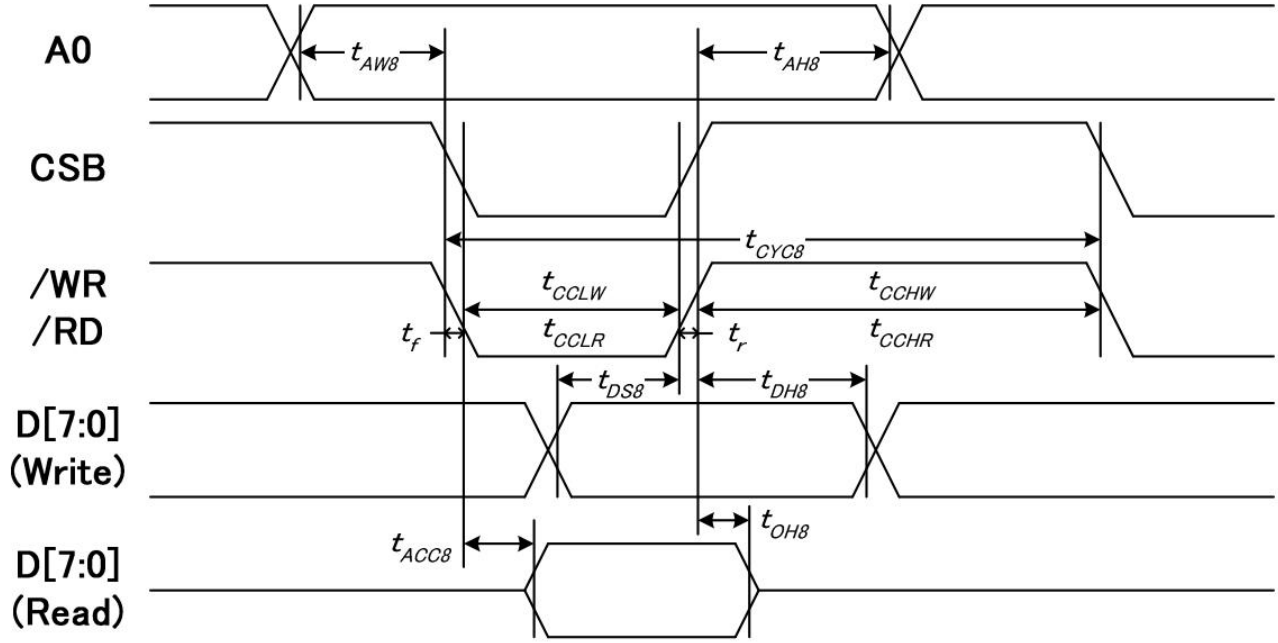
Vss = 0V,Top = 25℃

Items	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Forword Voltage	Vf BLA	-	3.0	-	V	VDD
Forword Current	If BLA	-	45	60	mA	VDD

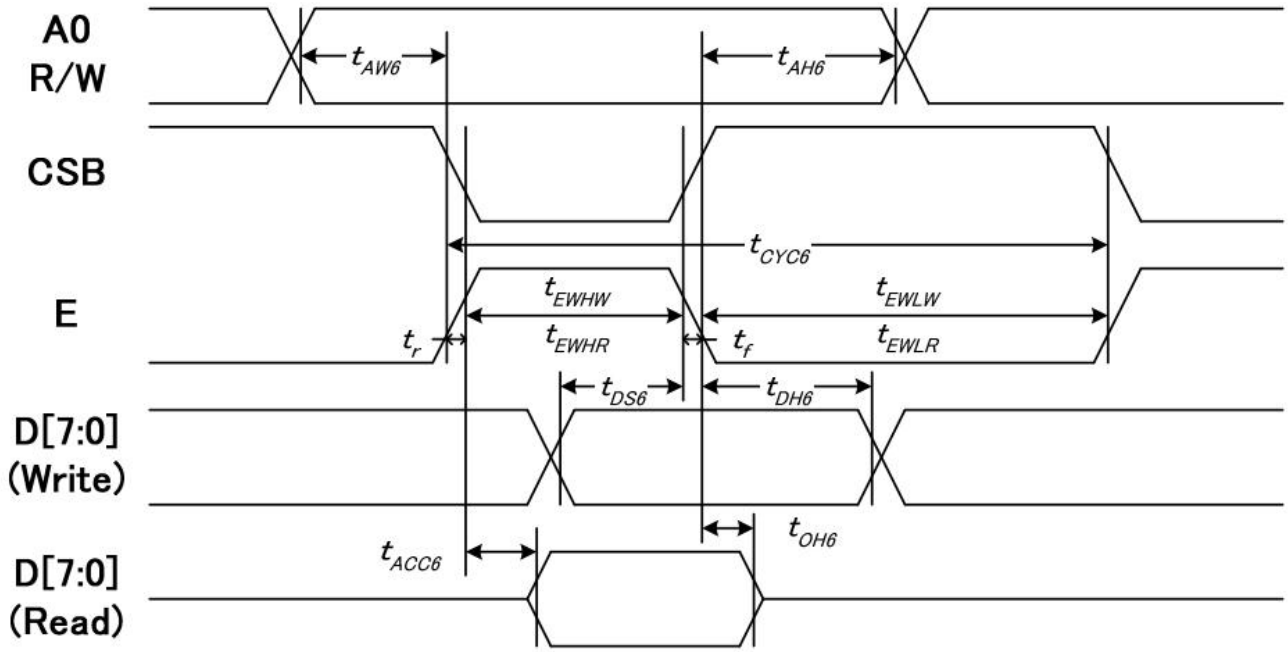


3.3 AC Characteristics

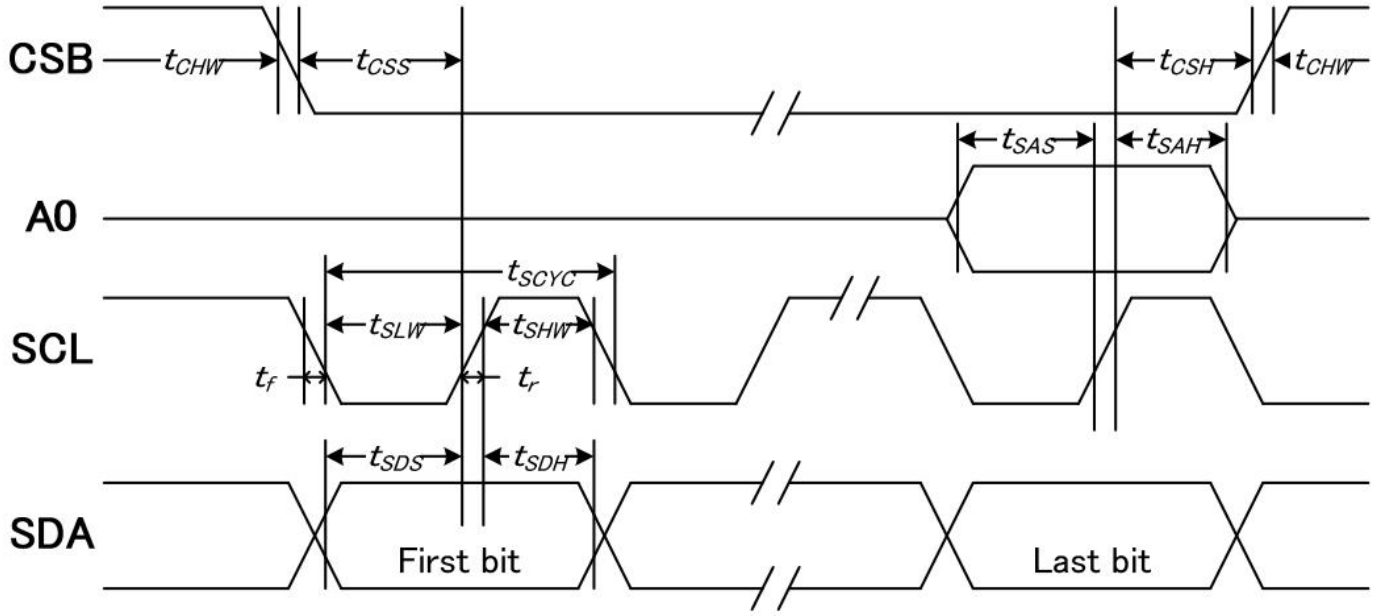
Read/Write Characteristics (8080-series MPU)



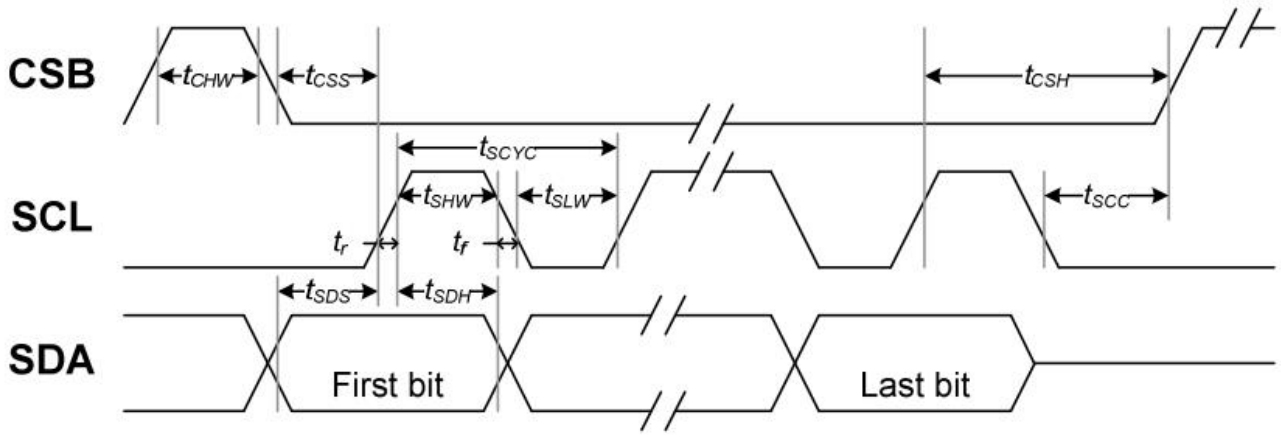
Read/Write Characteristics (6800-series MPU)



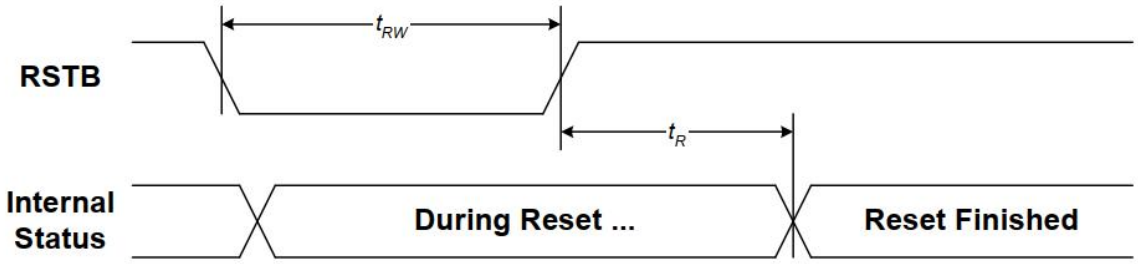
Write Characteristics (4L-SPI MPU)



Write Characteristics (3L-SPI MPU)



3.4 Resret Timing

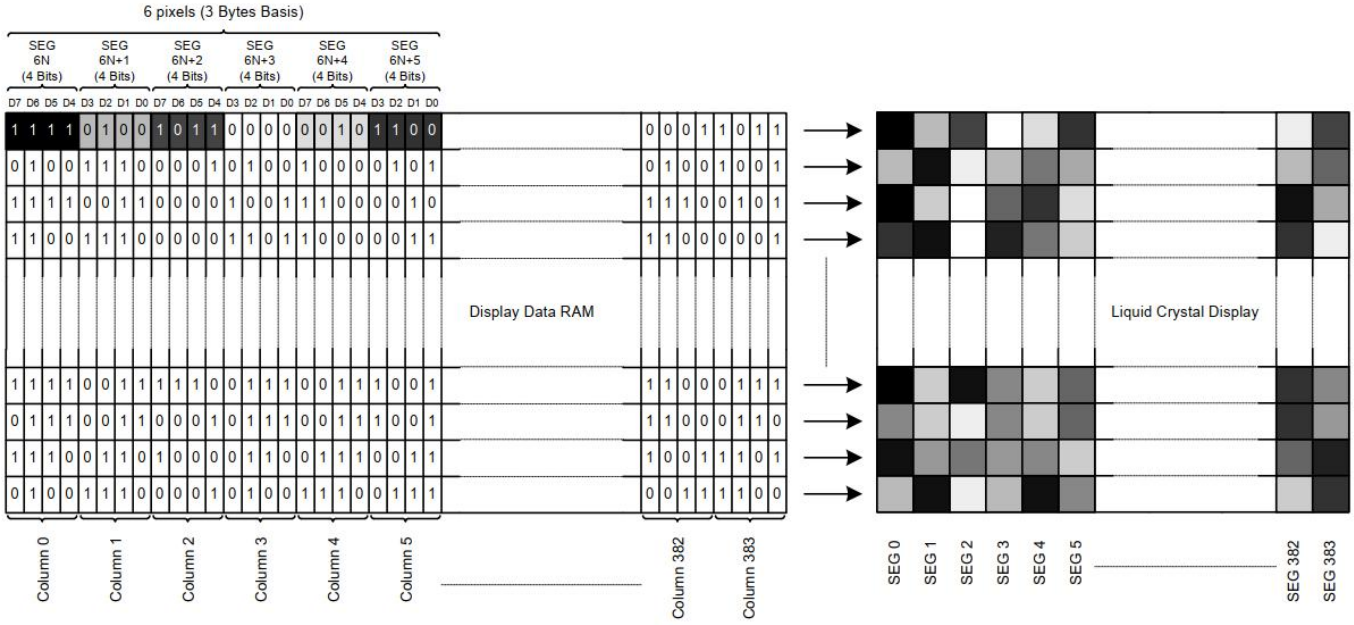


VDD1 = 1.8~3.3V, Ta = 25°C

Item	Symbol	Condition	Min.	Max.	Unit
Reset time	tR		120	—	ms
Reset “L” pulse width	tRW		10	—	us

4. Function specifications

4.1 Display data format



Pixel Data				LCD
D7 (D3)	D6 (D2)	D5 (D1)	D4 (D0)	
1	1	1	1	
1	1	1	0	
1	1	0	1	
1	1	0	0	
1	0	1	1	
1	0	1	0	
1	0	0	1	
1	0	0	0	
0	1	1	1	
0	1	1	0	
0	1	0	1	
0	1	0	0	
0	0	1	1	
0	0	1	0	
0	0	0	1	
0	0	0	0	

Fig. 3 DDRAM Mapping (16-Level Gray Scale Mode)

4.3 Commands Table

INSTRUCTION	A0	R/W	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
NOP	0	0	0	0	0	0	0	0	0	0	No operation
RESET	0	0	0	0	0	0	0	0	0	1	Software reset
Power Save	0	0	0	0	0	1	0	0	0	SLP	Set power save mode SLP=0: Sleep in mode SLP=1: Sleep out mode
Partial Mode	0	0	0	0	0	1	0	0	1	PTL	Set partial mode PTL=0: Partial mode on PTL=1: Partial mode off
Inverse Display	0	0	0	0	1	0	0	0	0	INV	Set inverse display mode INV=0: Normal display INV=1: Inverse display
All Pixel ON/OFF	0	0	0	0	1	0	0	0	1	AP	Set all pixel on mode AP=0: All pixel off mode AP=1: All pixel on mode
Display ON/OFF	0	0	0	0	1	0	1	0	0	DSP	Set LCD display DSP=0: Display off DSP=1: Display on
Set Column Address	0	0	0	0	1	0	1	0	1	0	Set column address Starting column address: 00h≦XS≦7Fh Ending column address: XS≦XE≦7Fh
	1	0	XS15	XS14	XS13	XS12	XS11	XS10	XS9	XS8	
	1	0	XS7	XS6	XS5	XS4	XS3	XS2	XS1	XS0	
	1	0	XE15	XE14	XE13	XE12	XE11	XE10	XE9	XE8	
	1	0	XE7	XE6	XE5	XE4	XE3	XE2	XE1	XE0	
Set Row Address	0	0	0	0	1	0	1	0	1	1	Set row address Starting row address: 00h≦YS≦9Fh Ending row address: YS≦YE≦9Fh
	1	0	YS15	YS14	YS13	YS12	YS11	YS10	YS9	YS8	
	1	0	YS7	YS6	YS5	YS4	YS3	YS2	YS1	YS0	
	1	0	YE15	YE14	YE13	YE12	YE11	YE10	YE9	YE8	
	1	0	YE7	YE6	YE5	YE4	YE3	YE2	YE1	YE0	
Write Display Data	0	0	0	0	1	0	1	1	0	0	Write display data to DDRAM
	1	0	D7	D6	D5	D4	D3	D2	D1	D0	
Read Display Data	0	0	0	0	1	0	1	1	1	0	Read display data from DDRAM
	1	1	D7	D6	D5	D4	D3	D2	D1	D0	
Partial Display Area	0	0	0	0	1	1	0	0	0	0	Set partial area Partial display address start: 00h≦PTS≦9Fh Partial display address end: 00h≦PTE≦9Fh Display Area: 64≦Duty≦160
	1	0	PTS15	PTS14	PTS13	PTS12	PTS11	PTS10	PTS9	PTS8	
	1	0	PTS7	PTS6	PTS5	PTS4	PTS3	PTS2	PTS1	PTS0	
	1	0	PTE15	PTE14	PTE13	PTE12	PTE11	PTE10	PTE9	PTE8	
	1	0	PTE7	PTE6	PTE5	PTE4	PTE3	PTE2	PTE1	PTE0	
Scroll Area	0	0	0	0	1	1	0	0	1	1	Set scroll area Top Area: TA=00h~A0h Scrolling Area: SA=00h~A0h Bottom Area: BA=00h~A0h TA+SA+BA=160
	1	0	TA7	TA6	TA5	TA4	TA3	TA2	TA1	TA0	
	1	0	SA7	SA6	SA5	SA4	SA3	SA2	SA1	SA0	
	1	0	BA7	BA6	BA5	BA4	BA3	BA2	BA1	BA0	
Display Control	0	0	0	0	1	1	0	1	1	0	Set scan direction of COM and SEG MY=0: COM0→COM159 MY=1: COM159→COOM0 MX[1:0]=(0,0): SEG0→SEG383 MX[1:0]=(1,1): SEG383→SEG0
	1	0	MY	MX1	0	0	MX0	0	0	0	
Start Line	0	0	0	0	1	1	0	1	1	1	Set display start line S=00h~9Fh
	1	0	S7	S6	S5	S4	S3	S2	S1	S0	

INSTRUCTION	A0	R/W	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
Display Mode	0	0	0	0	1	1	1	0	0	M	Set display mode M=0: Gray mode M=1 : Monochrome mode
Enable DDRAM Interface	0	0	0	0	1	1	1	0	1	0	Enable DDRAM interface RIF=0: Monochrome mode & 4-level gray scale mode RIF=1: 16-level gray scale mode
	1	0	0	0	0	0	0	0	1	RIF	
Display Duty	0	0	1	0	1	1	0	0	0	0	Set display duty DT=03h~9Fh
	1	0	DT7	DT6	DT5	DT4	DT3	DT2	DT1	DT0	
First Output COM	0	0	1	0	1	1	0	0	0	1	Set first output COM FC=00h~9Fh
	1	0	FC7	FC6	FC5	FC4	FC3	FC2	FC1	FC0	
FOSC Divider	0	0	1	0	1	1	0	0	1	1	Set FOSC dividing ratio
	1	0	0	0	0	0	0	0	FOD1	FOD0	
Partial Display	0	0	1	0	1	1	0	1	0	0	Set partial display mode
	1	0	1	0	1	0	0	0	0	0	
N-Line Inversion	0	0	1	0	1	1	0	1	0	1	Set N-Line inversion
	1	0	M	0	0	NL4	NL3	NL2	NL1	NL0	
Read Modify Write	0	0	1	0	1	1	1	0	0	RMW	Read modify write control RMW=0: Enable read modify write RMW=1: Disable read modify write
Set Vop	0	0	1	1	0	0	0	0	0	0	Set Vop
	1	0	Vop7	Vop6	Vop5	Vop4	Vop3	Vop2	Vop1	Vop0	
	1	0	-	-	-	-	-	-	-	Vop8	
Vop Increase	0	0	1	1	0	0	0	0	0	1	Vop increase one step
Vop Decrease	0	0	1	1	0	0	0	0	1	0	Vop decrease one step
BIAS System	0	0	1	1	0	0	0	0	1	1	Set BIAS system
	1	0	-	-	-	-	-	BS2	BS1	BS0	
Booster Level	0	0	1	1	0	0	0	1	0	0	Set booster level
	1	0	-	-	-	-	-	BST2	BST1	BST0	
Analog Control	0	0	1	1	0	1	0	0	0	0	Enable analog circuit
	1	0	0	0	0	1	1	1	0	1	
Auto Read Control	0	0	1	1	0	1	0	1	1	1	Auto read control XARD=0: Enable auto read XARD=1: Disable auto read
	1	0	1	0	0	XARD	1	1	1	1	
OTP WR/RD Control	0	0	1	1	1	0	0	0	0	0	OTP WR/RD control WR/RD=0: Enable OTP read WR/RD=1: Enable OTP write
	1	0	0	0	WR /RD	0	0	0	0	0	
OTP Control Out	0	0	1	1	1	0	0	0	0	1	OTP control out
OTP Write	0	0	1	1	1	0	0	0	1	0	OTP programming procedure
OTP Read	0	0	1	1	1	0	0	0	1	1	OTP up-load procedure
OTP Selection Control	0	0	1	1	1	0	0	1	0	0	OTP selection control Ctrl=0: Disable OTP Ctrl=1: Enable OTP
	1	0	0	Ctrl	0	1	1	0	0	1	
OTP Programming Setting	0	0	1	1	1	0	0	1	0	1	OTP programming setting
	1	0	0	0	0	0	1	1	1	1	

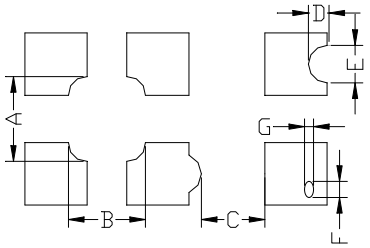
INSTRUCTION	A0	R/W	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
Frame Rate (Gray Scale Mode)	0	0	1	1	1	1	0	0	0	0	Frame rate setting in different temperature range (Gray scale mode)
	1	0	-	-	-	FRA4	FRA3	FRA2	FRA1	FRA0	
	1	0	-	-	-	FRB4	FRB3	FRB2	FRB1	FRB0	
	1	0	-	-	-	FRC4	FRC3	FRC2	FRC1	FRC0	
	1	0	-	-	-	FRD4	FRD3	FRD2	FRD1	FRD0	
Frame Rate (Monochrome Mode)	0	0	1	1	1	1	0	0	0	1	Frame rate setting in different temperature range (Monochrome mode)
	1	0	-	-	-	FRA4	FRA3	FRA2	FRA1	FRA0	
	1	0	-	-	-	FRB4	FRB3	FRB2	FRB1	FRB0	
	1	0	-	-	-	FRC4	FRC3	FRC2	FRC1	FRC0	
	1	0	-	-	-	FRD4	FRD3	FRD2	FRD1	FRD0	
Temperature Range	0	0	1	1	1	1	0	0	1	0	Temperature range setting
	1	0	-	TA6	TA5	TA4	TA3	TA2	TA1	TA0	
	1	0	-	TB6	TB5	TB4	TB3	TB2	TB1	TB0	
	1	0	-	TC6	TC5	TC4	TC3	TC2	TC1	TC0	
Temperature Gradient Compensation	0	0	1	1	1	1	0	1	0	0	Set temperature gradient compensation coefficient
	1	0	MT13	MT12	MT11	MT10	MT03	MT02	MT01	MT00	
	1	0	MT33	MT32	MT31	MT30	MT23	MT22	MT21	MT20	
	1	0	MT53	MT52	MT51	MT50	MT43	MT42	MT41	MT40	
	1	0	MT73	MT72	MT71	MT70	MT63	MT62	MT61	MT60	
	1	0	MT93	MT92	MT91	MT90	MT83	MT82	MT81	MT80	
	1	0	MTB3	MTB2	MTB1	MTB0	MTA3	MTA2	MTA1	MTA0	
	1	0	MTD3	MTD2	MTD1	MTD0	MTC3	MTC2	MTC1	MTC0	
	1	0	MTF3	MTF2	MTF1	MTF0	MTE3	MTE2	MTE1	MTE0	
Frame PWM Set	0	0	1	1	1	1	1	0	0	1	Set Grey Scale Level
	1	0	-	-	-	P14	P13	P12	P11	P10	
	1	0	-	-	-	P24	P23	P22	P21	P20	
	:	:	:	:	:	:	:	:	:	:	
	1	0	-	-	-	P154	P153	P152	P151	P150	
	1	0	-	-	-	P164	P163	P162	P161	P160	

4.4 Basic Operating Sequence

Initialization Sequence

```
void Initialization_ST7586S(void)
{
    Reset_ms(10);
    Delay_ms(120);
    Write(Command, 0xD7);          // Disable Auto Read
    Write(Data, 0x9F);
    Write(Command, 0xE0);          // Enable OTP Read
    Write(Data, 0x00);
    Delay_ms(10);
    Write(Command, 0xE3);          // OTP Up-Load
    Delay_ms(20);
    Write(Command, 0xE1);          // OTP Control Out
    Write(Command, 0x11);          // Sleep Out
    Write(Command, 0x28);          // Display OFF
    Delay_ms(50);
    Write(Command, 0xC0);          // Vop = B9h
    Write(Data, 0xB9);
    Write(Data, 0x00);
    Write(Command, 0xC3);          // BIAS = 1/9
    Write(Data, 0x05);
    Write(Command, 0xC4);          // Booster = x8
    Write(Data, 0x07);
    Write(Command, 0xD0);          // Enable Analog Circuit
    Write(Data, 0x1D);
    Write(Command, 0xB5);          // N-Line = 0
    Write(Data, 0x00);
    Write(Command, 0x39);          // Monochrome Mode
    Write(Command, 0x3A);          // Enable DDRAM Interface
    Write(Data, 0x02);
    Write(Command, 0x36);          // Scan Direction Setting
    Write(Data, 0x00);
    Write(Command, 0xB0);          // Duty Setting
    Write(Data, 0x9F);
    Write(Command, 0xB4);          // Partial Display
    Write(Data, 0xA0);
    Write(Command, 0x30);          // Partial Display Area = COM0 ~ COM
    Write(Data, 0x00);
    Write(Data, 0x00);
    Write(Data, 0x00);
    Write(Data, 0x77);
    Write(Command, 0x20);          // Display Inversion OFF

    Write(Command, 0x2A);          // Column Address Setting
    Write(Data, 0x00);             // SEG0 -> SEG384
    Write(Data, 0x00);
    Write(Data, 0x00);
    Write(Data, 0x7F);
    Write(Command, 0x2B);          // Row Address Setting
    Write(Data, 0x00);             // COM0 -> COM160
    Write(Data, 0x00);
    Write(Data, 0x00);
    Write(Data, 0x9F);

    Clear_DDRAM();                 // Clear whole DDRAM by "0" (384 x 160 x 2)

    Write(Command, 0x2A);          // Column Address Setting
    Write(Data, 0x00);             // SEG0 -> SEG239
    Write(Data, 0x00);
    Write(Data, 0x00);
    Write(Data, 0x4F);
    Write(Command, 0x2B);          // Row Address Setting
    Write(Data, 0x00);             // COM0 -> COM120
    Write(Data, 0x00);
    Write(Data, 0x00);
    Write(Data, 0x78);

    Disp_Image();                  // Fill the DDRAM Data by Panel Resolution

    Write(Command, 0x29);          // Display ON
}
```

5. Inspection Standards

Item	Criterion for defects	Defect type
1) Display on inspection	(1) Non display (2) Vertical line is deficient (3) Horizontal line is deficient (4) Cross line is deficient	Major
2) Black / White spot	Size Φ(mm) Acceptable number Φ≤0.3 Ignore (note) 0.3<Φ≤0.45 3 0.45<Φ≤0.6 1 0.6<Φ 0	Minor
3) Black / White line	Length (mm) Width (mm) Acceptable number L≤10 W≤0.03 Ignore 5.0≤L≤10 0.03<W≤0.04 3 5.0≤L≤10 0.04<W≤0.05 2 1.0≤L≤10 0.05<W≤0.06 2 1.0≤L≤10 0.06<W≤0.08 1 L≤10 0.08<W follows 2) point defect Defects separate with each other at an interval of more than 20mm	Minor
4) Display pattern	 $\frac{A+B}{2}\leq 0.28$ | $0<C$ | $\frac{D+E}{2}\leq 0.25$ | $\frac{F+G}{2}\leq 0.25$ Note: 1) Up to 3 damages acceptable 2) Not allowed if there are two or more pinholes every three-fourth inch.	Minor
5) Spot-like contrast irregularity	Size Φ(mm) Acceptable Number Φ≤0.7 Ignore (note) 0.7<Φ≤1.0 3 1.0<Φ≤1.5 1 1.5<Φ 0 Note: 1) Conformed to limit samples. 2) Intervals of defects are more than 30mm.	Minor
6) Bubbles in polarizer	Size Φ(mm) Acceptable Number Φ≤0.4 Ignore (note) 0.4<Φ≤0.65 2 0.65<Φ≤1.2 1 1.2<Φ 0	Minor
7) Scratches and dent on the polarizer	Scratches and dent on the polarizer shall be in the accordance with “2) Black/white spot”, and “3) Black/White line”.	Minor
8) Stains on the surface of LCD panel	Stains which cannot be removed even when wiped lightly with a soft cloth or similar cleaning.	Minor
9) Rainbow color	No rainbow color is allowed in the optimum contrast on state within the active area.	Minor
10) Viewing area encroachment	Polarizer edge or line is visible in the opening viewing area due to polarizer shortness or sealing line.	Minor
11) Bezel appearance	Rust and deep damages that are visible in the bezel are rejected.	Minor
12) Defect of land surface contact	Evident crevices that are visible are rejected.	Minor
13) Parts mounting	(1) Failure to mount parts (2) Parts not in the specifications are mounted (3) For example: Polarity is reversed, HSC or TCP falls off.	Minor
14) Part alignment	(1) LSI, IC lead width is more than 50% beyond pad outline. (2) More than 50% of LSI, IC leads is off the pad outline.	Minor
15) Conductive foreign matter (solder ball, solder hips)	(1) 0.45<Φ, N≥1 (2) 0.3<Φ≤0.45, N≥1, Φ: Average diameter of solder ball (unit: mm) (3) 0.5<L, N≥1, L: Average length of solder chip (unit: mm)	Minor
16) Bezel flaw	Bezel claw missing or not bent	Minor

6. Handling Precautions

6.1 Mounting method

A panel of LCD module made by our company consists of two thin glass plates with polarizers that easily get damaged.
And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board (PCB), extreme care should be used when handling the LCD modules.

6.2 Cautions of LCD handling and cleaning

When cleaning the display surface, use soft cloth with solvent (recommended below) and wipe lightly.
-Isopropyl alcohol
-Ethyl alcohol
-Trichlorotriflorothane
Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.
Do not use the following solvent:
-Water
-Ketene
-Aromatics

6.3 Caution against static charge

The LCD module use C-MOS LSI drivers. So we recommend you:
Connect any unused input terminal to V_{dd} or V_{ss}. Do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

6.4 Packaging

-Module employs LCD elements, and must be treated as such. Avoid intense shock and falls from a height.
-To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity.

6.5 Caution for operation

-It is an indispensable condition to drive LCD module within the limits of the specified voltage since the higher voltage over the limits may cause the shorter life of LCD module.
-An electrochemical reaction due to DC (direct current) causes LCD undesirable deterioration so that the uses of DC (direct current) drive should be avoided.
-Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD module may show dark color in them. However those phenomena do not mean malfunction or out of order of LCD module, which will come back in the specified operating temperature.

6.6 Storage

In the case of storing for a long period of time, the following ways are recommended:
-Storage in polyethylene bag with the opening sealed so as not to enter fresh air outside in it. And with not desiccant.
-Placing in a dark place where neither exposure to direct sunlight nor light is. Keeping the storage temperature range.
-Storing with no touch on polarizer surface by any thing else.

6.7 Safety

-It is recommendable to crash damaged or unnecessary LCD into pieces and to wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
-When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well at once with soap and water.