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PRODUCT SPECIFICATION

VXT500BWEF-01

☐Preliminary Specification

☐Final Specification



CUSTOMER:

Made By:
Checked By:
Approved By:
Quality:
Date:
Note:

Approved By:
Date:
Note:

2. Revision Record

Date	Rev.No.	Page	Revision Items	Prepared
2024.10.26	V00		The first release	Solon

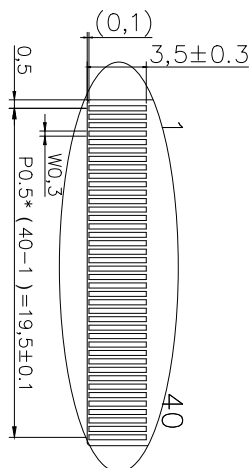
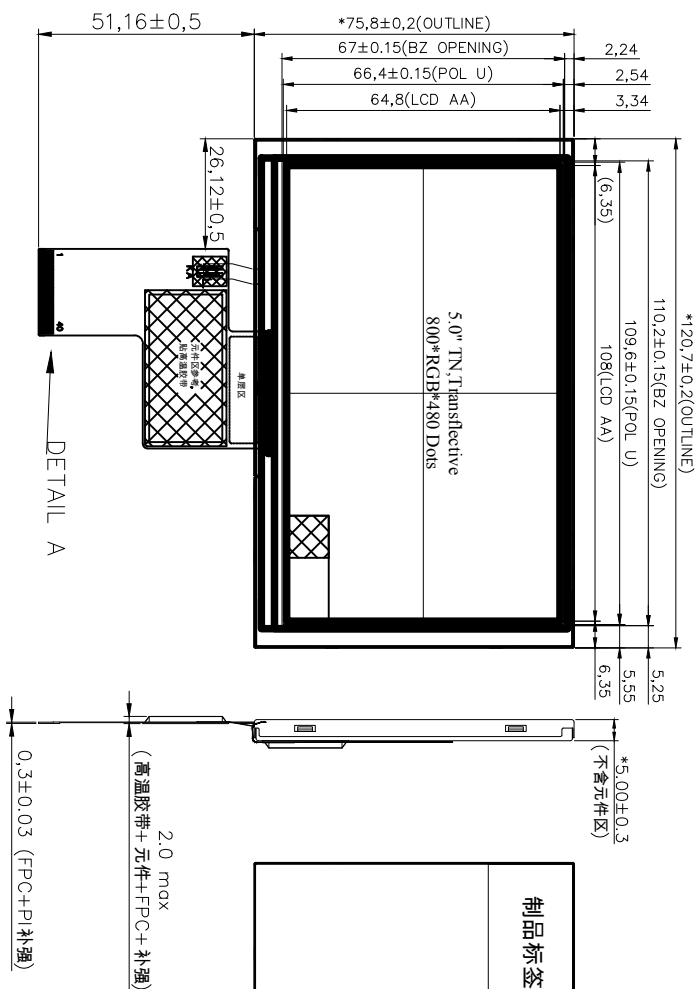
3. General Specifications

VXT500BWEF-01 is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC,a back light unit. The 5.0" display area contains 800X480 pixels and can display up to 16.7M colors. This product accords with RoHS environmental criterion.

Item	Contents	Unit	Note
LCD Type	TFT	-	
Display color	16.7M		
Viewing Direction	6	O’Clock	
Gray scale inversion direction	12	O’Clock	
Operating temperature	-20~+70	°C	
Storage temperature	-30~+80	°C	
Module size	Refer to outline drawing	mm	
Active Area(W×H)	108X64.8	mm	
Number of Dots	800x480	dots	
Driver IC	JD9165	-	
Power Supply Voltage	3.3	V	
Outline Dimensions	Refer to outline drawing	-	
Backlight	6S2P-LEDs (white)	pcs	
Interface	RGB	-	

Note:

1. DISPLAY TYPE: 5.0", ADS/IPS TFT LCD ;
2. Viewing Angle range: U/D/L/R
Trans: Typ. 60/60/60/50 (CR>2)
Ref: Typ. 70/60/70/60 (CR>2) ;
3. TFT Driver IC : JD9165 ;
4. Top : -20°C ~ 70°C, Tst : -30°C ~ 80°C ;
5. LCM Luminance: LED / 200 cd/m² (Typical)
6. Modify the marker, with * accent size,
with () as the reference size, general tol
7. Meets RoHS standards



PIN	SYMB	PIN	SYMB
1	LEDK LE	21	B0 LE
2	LEDA	22	B1
3	GND	23	B2
4	VDD	24	B3
5	RO	25	B4
6	R1	26	B5
7	R2	27	B6
8	R3	28	B7
9	R4	29	GND
10	R5	30	DCLK
11	R6	31	DISP
12	R7	32	HSYN C
13	G0	33	VSYN C
14	G1	34	DE
15	G2	35	NC
16	G3	36	GND
17	G4	37	NC
18	G5	38	NC
19	G6	39	NC
20	G7	40	NC

Approved By		SIZE: 5.0inch TFT
Checked By		
Drawn By	Solon 2024.3.1	DWARKING_NO.: VX1500BWEF-01
mm		CUSTOMER_NO.

5. Absolute Maximum Ratings(Ta=25°C)

5.1 Electrical Absolute Maximum Ratings.(Vss=0V ,Ta=25°C)

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V _{DD}	-0.3	3.96	V	1, 2

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.
2. V_{DD} > V_{SS} must be maintained.
3. Please be sure users are grounded when handing LCD Module.

5.2 Environmental Absolute Maximum Ratings.

Item	Storage		Operating	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	-30°C	80°C	-20°C	+70°C
Humidity	-	-	-	-

1. The response time will become lower when operated at low temperature.
2. Background color changes slightly depending on ambient temperature.

The phenomenon is reversible.

3. Ta≤40°C:85%RH MAX.

Ta>40°C:Absolute humidity must be lower than the humidity of 85%RH at 40°C.

6. Electrical Specifications

6.1 Electrical characteristics(V_{ss}=0V ,T_a=25°C)

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply		VDD	T _a =25°C	2.5	3.0	3.3	V	
Input voltage	‘H’	V _{IH}	V _{DD} =3.3V	0.7V _{DD}	-	V _{DD}	V	
	‘L’	V _{IL}	V _{DD} =3.3V	0	-	0.3V _{DD}	V	

Note: If one of the above items is exceeded its maximum limitation momentarily, the quality of the product may be degraded. Absolute maximum limitation, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the recommend range.

6.2 LED backlight specification(V_{SS}=0V ,T_a=25°C)

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage VLED	V _f	I _f =60mA	16.8	18	19.8	V	
Uniformity	ΔBp	I _f =60mA	75	-	-	%	
LED Life Time	-	-	30K	-	-	hr	1

Note 1: Brightness to be decreased to 50% of the initial value at ambient temperature T_A=25°C

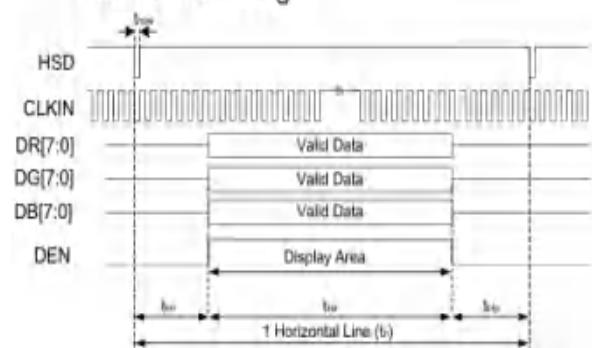
6.3 Interface signals

Pin No.	Symbol	I/O	Function
1	VLED-	P	LED back light(Cathode).
2	VLED+	P	LED back light(Anode).
3	GND	P	Ground.
4	VDD	P	Power supply .
5-12	R0~R7	I	Red data bus.
13-20	G0~G7	I	Green data bus.
21-28	B0~B7	I	Blue data bus.
29	GND	P	Ground.
30	PCLK	I	Data clock.
31	DISP	I	Normal display and Standby mode select pin.
32	HSYNC	I	Line sync signal.
33	VSYNC	I	Frame sync signal.
34	DE	I	Data enable pin.
35	NC	-	No connection.
36	GND	P	Ground.
37	XR	O	Touch Panel Control pin
38	YD	O	
39	XL	O	
40	YU	O	

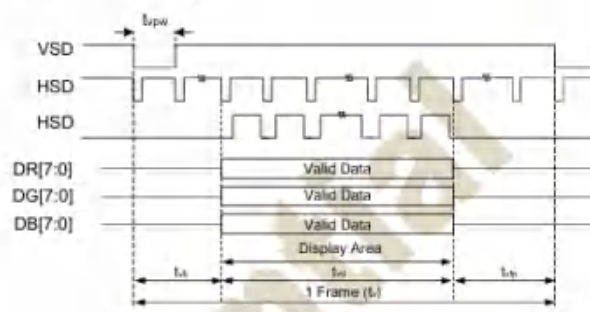
6.4 AC Characteristics

6.4.1 24-bit parallel RGB data input format

• Horizontal timing



• Vertical timing



6.2 TTL timing characteristic

24-bit parallel RGB Input Timing	Symbol	1024RGBx768			1024RGBx600			800RGBx600			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
DCLK Frequency	-	52	65	71	40.8	51.2	67.2	32.6	39.6	62.4	MHZ
Horizontal Total	tht	1114	1344	1400	1114	1344	1400	890	1000	1300	DCLK
Hsync Pulse Width	ths	1	24	HBP-1	1	24	HBP-1	1	24	HBP-1	DCLK
Horizontal Back Porch	thb	60	160	160	60	160	160	60	88	250	DCLK
Horizontal Valid Data	thd	1024			1024			800			DCLK
Horizontal Front Porch	thfp	30	160	216	30	160	216	30	112	250	DCLK
Vertical Total	vt	778	806	845	610	635	800	610	660	800	THT
Vsync Pulse Width	ths	1	2	VBP-1	1	2	VBP-1	1	2	VBP-1	THT
Vertical Back Porch	tvb	8	23	33	8	23	100	8	39	100	THT
Vertical Valid Data	tvd	768			600			600			THT
Vertical Front Porch	tvfp	2	15	44	2	12	100	2	21	100	THT

24-bit parallel RGB Input Timing	Symbol	640RGBx480			480RGBx272			Unit
		Min	Typ	Max	Min	Typ	Max	
DCLK Frequency	-	32.6	39.6	53.4	24.8	32.6	37.6	MHZ
Horizontal Total	tht	890	1000	1114	830	890	950	DCLK
Hsync Pulse width	ths	1	24	HBP-1	1	24	HBP-1	DCLK
Horizontal Back Porch	thb	140	88	220	180	210	240	DCLK
Horizontal Valid Data	thd	640			480			DCLK
Horizontal Front Porch	thfp	110	272	254	170	200	230	DCLK
Vertical Total	vt	610	660	800	498	610	660	THT
Vsync Pulse Width	ths	1	2	VBP-1	1	2	VBP-1	THT
Vertical Back Porch	tvb	28	39	160	126	180	210	THT
Vertical Valid Data	tvd	480			272			THT
Vertical Front Porch	tvfp	102	141	160	100	158	178	THT

6.3 TTL AC electrical characteristic

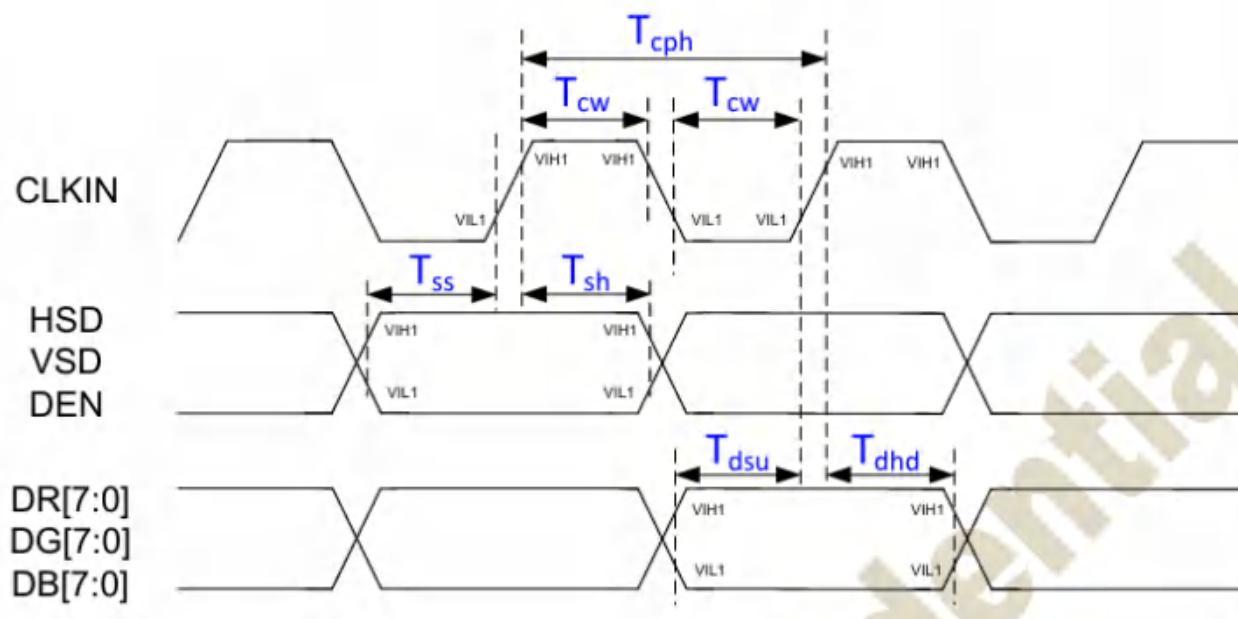


Figure: Input signal timing

Input data /sync. parameters

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
CLKIN period	T_{cph}	14	-	-	ns
CLKIN duty ratio	T_{cw}	40	50	60	%
Data setup time	T_{dsu}	5	-	-	ns
Data hold time	T_{dhd}	5	-	-	ns
VSD setup time	T_{ss}	5	-	-	ns
VSD hold time	T_{sh}	5	-	-	ns
HSD setup time	T_{ss}	5	-	-	ns
HSD hold time	T_{sh}	5	-	-	ns
DEN setup time	T_{ss}	5	-	-	ns
DEN hold time	T_{sh}	5	-	-	ns

Table:TTL mode AC electrical characteristics

7. Optical Characteristics

Item	Symbol		Condition	Min.	Typ.	Max.	Unit	Note
Brightness	Bp		$\theta=0^{\circ}$ $\Phi=0^{\circ}$	-	200	-	Cd/m ²	1
Uniformity	Δ Bp			75	-	-	%	1,2
Viewing Angle	3:00		Cr≥10	-	50	-	Deg	3
	6:00			-	60	-		
	9:00			-	60	-		
	12:00			-	60	-		
Contrast Ratio	Cr		$\theta=0^{\circ}$ $\Phi=0^{\circ}$	-	60:1	-	-	4
Response Time	T _r +T _f			-	15	20	ms	5
Color of CIE Coordinate	W	x	$\theta=0^{\circ}$ $\Phi=0^{\circ}$	Typ-0 .05	TBD	Typ+0. 05	-	1,6
		y					-	
	R	x					-	
		y					-	
	G	x					-	
		y					-	
	B	x					-	
		y					-	
NTSC Ratio	S		-	50	-	%		

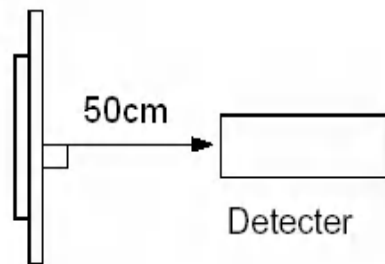
Note: The parameter is slightly changed by temperature, driving voltage and materiel

Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment BM-7 ($\Phi 5mm$)

Measuring condition:

- Measuring surroundings: Dark room.
- Measuring temperature: $T_a=25^\circ C$.
- Adjust operating voltage to get optimum contrast at the center of the display.

Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.

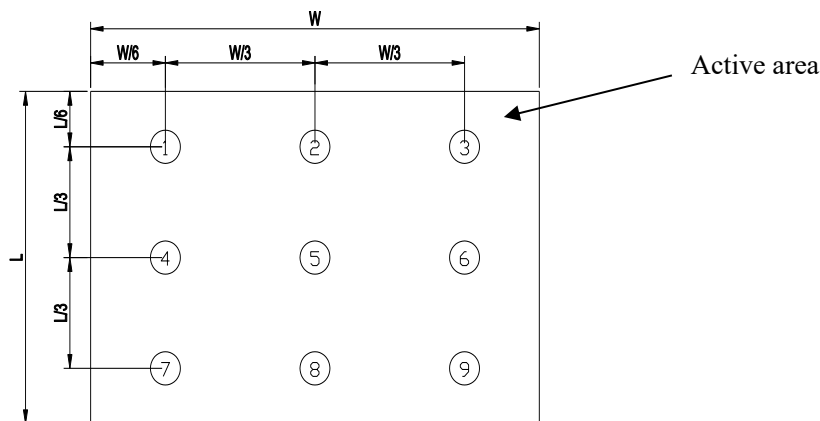


Note 2: The luminance uniformity is calculated by using following formula.

$$\Delta Bp = Bp \text{ (Min.)} / Bp \text{ (Max.)} \times 100 \text{ (\%)}$$

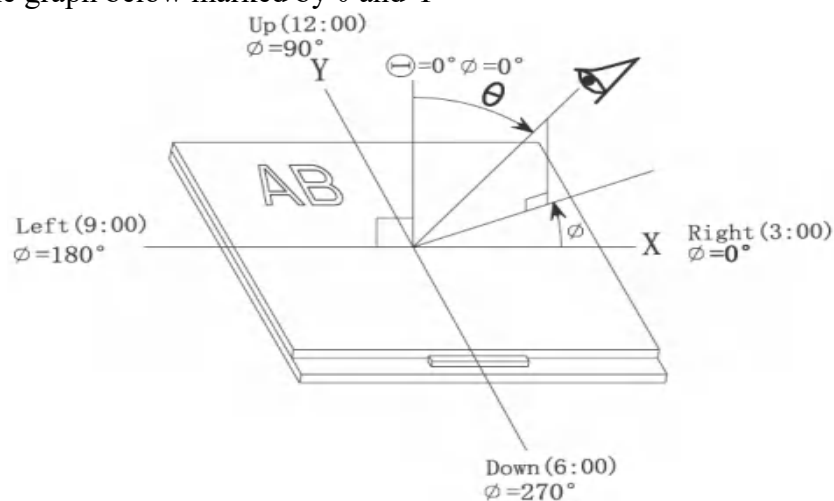
$Bp \text{ (Max.)}$ = Maximum brightness in 9 measured spots

$Bp \text{ (Min.)}$ = Minimum brightness in 9 measured spots.

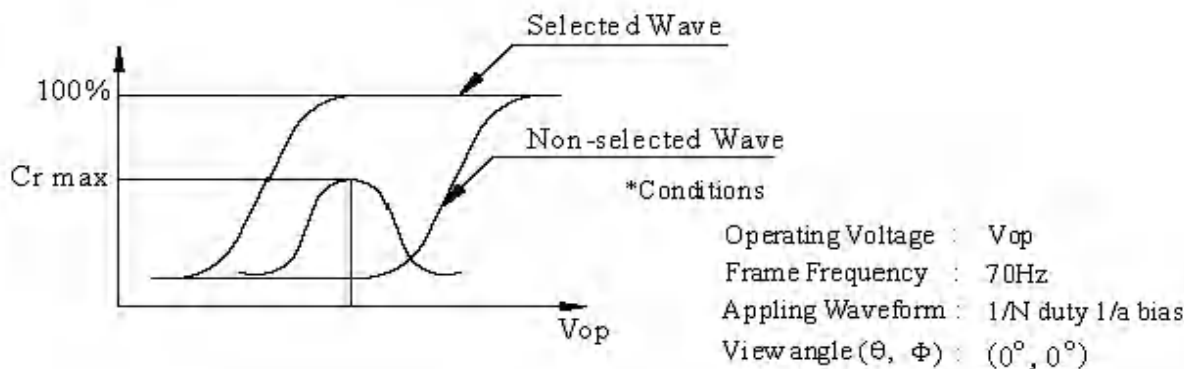


Note 3: The definition of viewing angle:

Refer to the graph below marked by θ and Φ



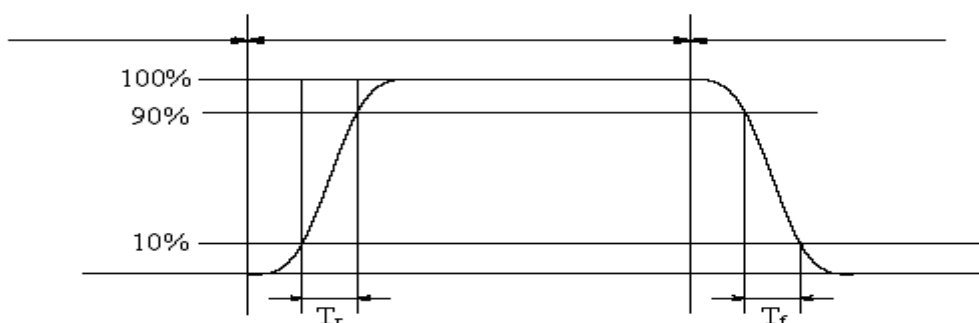
Note 4: Definition of contrast ratio.(Test LCD using DMS501)



$$\text{Contrast ratio}(Cr) = \frac{\text{Brightness of selected dots}}{\text{Brightness of non-selected dots}}$$

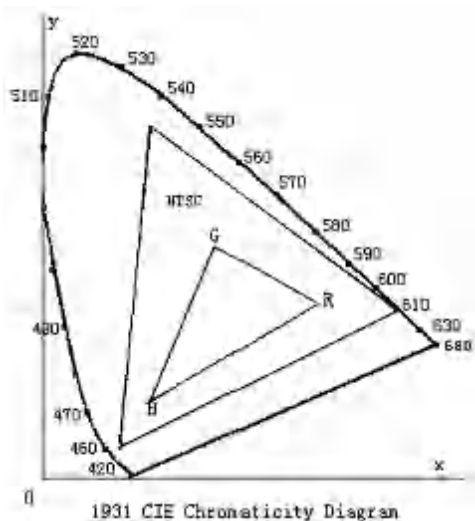
Note 5: Definition of Response time. (Test LCD using DMS501):

The output signals of photo detector are measured when the input signals are changed from “black” to “white”(falling time) and from “white” to “black”(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.



The definition of response time

Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.

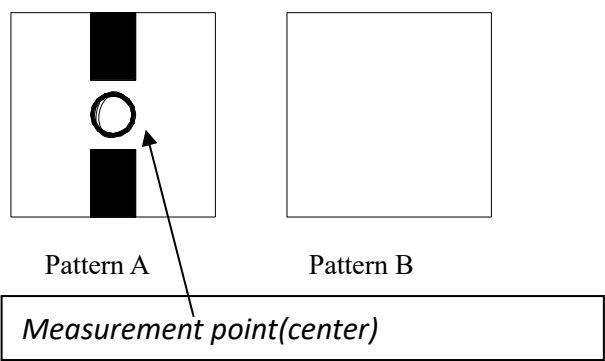


Color gamut:

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 7: Definition of cross talk.

Cross talk ratio(%) = $\frac{|\text{pattern A Brightness} - \text{pattern B Brightness}|}{\text{pattern A Brightness}} \times 100$



Electric volume value=3F+/-3Hex

8. Reliability Test Items and Criteria

No	Test Item	Test condition	Criterion
1	High Temperature Storage	80°C±2°C 96H Restore 2H at 25°C Power off	1. After the reliability test, the product only guarantees operation, but not guarantee all of the cosmetic specification. 2. Total current consumption should not be more than twice of initial value.
2	Low Temperature Storage	-30°C±2°C 96H Restore 2H at 25°C Power off	
3	High Temperature Operation	70°C±2°C 96H Restore 2H at 25°C Power on	
4	Low Temperature Operation	-20°C±2°C 96H Restore 4H at 25°C Power on	
5	High Temperature/Humidity Operation	60°C±2°C 90%RH 96H Power on	
6	Temperature Cycle	-30°C → 80°C 30min 5min 30min after 5 cycle, Restore 2H at 25°C Power off	

Note: Operation: Supply 3.3V for logic system.

The inspection terms after reliability test, as below

ITEM	Inspection
Contrast	CR>50%
IDD	IDD<200%
Brightness	Brightness>60%
Color Tone	Color Tone+/-0,05

9. Precautions for Use of LCD Modules

9.1 Handling Precautions

9.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

9.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

9.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

9.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

9.1.5 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

— Isopropyl alcohol — Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

— Water — Ketone — Aromatic solvents

9.1.6 Do not attempt to disassemble the LCD Module.

9.1.7 If the logic circuit power is off, do not apply the input signals.

9.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

- a. Be sure to ground the body when handling the LCD Modules.
- b. Tools required for assembly, such as soldering irons, must be properly ground.
- c. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
- d. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

9.2 Storage precautions

9.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

9.2.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : $0^{\circ}\text{C} \sim 40^{\circ}\text{C}$

Relatively humidity: $\leq 80\%$

9.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

9.3 The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.

END