深圳市一众显示科技有限公司

SHEN ZHEN TEAM SOURCE DISPLAY TECH. CO, LTD.

TFT-LCD Module Specification

Module NO.：TST018QQHG-13

Version：V1.0

☐ APPROVAL FOR SPECIFICATION　　　☐ APPROVAL FOR SAMPLE

For Customer's Acceptance：	
Approved by	Comment

Team Source Display：		
Presented by	Reviewed by	Organized by

Version No.	Date	Content	Remark
V1.0	2019-1-24	Initial Release	

CONTENTS

1   General Characteristics

ITEM	Specification	Unit
LCD Type	a-Si TFT,Transmissive,Normally white,TN	-
LCD Size	1.77	inch
Resolution (W x H)	128x (RGB) ×160	pixel
LCM size	34(H) x 43.78(V) x 2.45(D)	mm
Active Area	28.03 (H) x 35.04 (V)	mm
Pixel size	0.219(H)x 0.219(V)	mm
Viewing Direction	6 o'clock	-
Gray Scale Inversion Direction	12 o'clock	-
Color Depth	65K	-
Pixel Arrangement	RGB-stripe	-
Backlight Type	2 LEDs，40mA	-
Surface Treatment	Anti-Glare	-
Interface Type	MCU8-bit	-
Input Voltage	2.8	V
With/Without TP	Without	-
Weight	4	g

Note 1: RoHS compliant

**Note 2: LCM weight tolerance: ± 5%.**

2 Product drawings

LCD Type	1.77"TFT,Transmissive, Normally white,TN
Resolution	128(RGB)*160
View Direction	6 O'CLOCK
Driver IC	GC9106
Color Depth	65K
Interface Types	MCU
Operating voltage	2.8V
TP/Lens	Without
BackLight LEDs	2 LEDs, 40mA,3.2V
Surface luminance	180min 220typ (cd/m2)
Operating temperature	-20 ℃~70 ℃
Storage Temperature	-30 ℃~80 ℃
Storage Humidity	60℃ 90% max

CURRENT:IF=20*2=40mA, 3.1V(REF.)

BL_A
BL_K

"☞" Need to pay attention to the key size with *

PIN	DESCRIPTION
1	BL_K
2	BL_A
3	GND
4	VDD
5	TE
6	TE
7	CS
8	RESET
9	RS
10	WR
11	RD
12	DB7
13	DB6
14	DB5
15	DB4
16	DB3
17	DB2
18	DB1
19	DB0
20	GND

版本(Version)	变更记录(Change History)	日期(Date)
V1	INITIAL RELEASE	Dec-20-2018
V2	修改FPC外形结构	2019-1-9
V3		

东莞市一众显示科技有限公司
DONG GUAN TEAM SOURCE DISPLAY TECH. CO, LTD.

视角(View):	单位(Unit): MM	产品型号(Product Type): TST018QQHG-13
比例(Proportion): 1:1	unnoted tolerance: ±0.2	版本(Version): V2

设计(DESIGN) | 审核(AUDITING) | 批准(APPROVED)

Dimensions on drawing:
- 15.60±0.5
- 43.78±0.15 (LCM OUTLINE)
- 41.42 (LCD OUT)
- 37.79 (POL OUT)
- 35.04 (LCD AA)
- 6.65±0.5
- 1.8±0.3
- 7.2
- P1.0*19=19±0.1 W=0.5±0.05
- 20.9
- 8.4
- 0.94
- 1.14
- 2.62
- 34±0.15 (LCM OUTLINE)
- 31.83 (LCD OUT)
- 28.03 (POL OUT)
- (LCD AA)
- 1.2
- 1.08
- 1.28
- 2.98
- PULL TAPE
- 128XRGBX160DOTS 1.77" TFT
- TST018QQHG-13
- 2.45 MAX
- 20.9
- 1.5±0.3

3 Interface description

PIN NO.	Symbol	description
1	BL_K	Backlight K Cathode input pin.
2	BL_A	Backlight A anode input pin.
3	GND	System Ground. (0V)
4	VDD	Power supply.
5-6	TE	Tearing effect output pin to synchronize MPU to frame writing, activated by S/W command.
7	CS	Chip select input pin ("Low" enable).
8	RESET	This signal will reset the device and must be applied to properly Signal is active low.
9	RS	This pin is used to select "Data or Command" in the parallel interface
10	WR	Write enable in 8080 MCU parallel interface.
11	RD	Read enable in 8080 MCU parallel interface.
12-19	DB7-DB0	Data bus.
20	GND	System Ground. (0V)

4   Timing Characteristics

4.1   Reset Timing
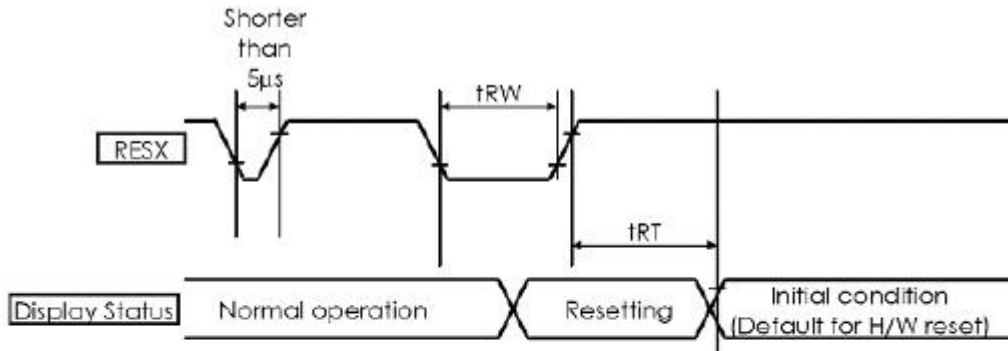
(VSS=0V, VDDI=1.65V to 1.95V, VCI=2.6V to 2.9V, Ta = -30 to 70℃)

Symbol	Parameter	Related Pins	MIN	TYP	MAX	Note	Unit
tRESW	*1) Reset low pulse width	RESX	10	-	-	-	μs
tREST	*2) Reset complete width	-	-	-	5	When reset applied during Sleep in mode	ms
		-	-	-	120	When reset applied during Sleep out mode	ms

Note

1. Spike due to an electrostatic discharge on RESX line does not cause system reset according to the table below

RESX Pulse	Action
Shorten than 5μs	Reset Rejected
Longer than 10μs	Reset
Between 5μs and 10μs	Reset starts (It depends on voltage and temperature condtion.)

2.   During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out – mode. The display remains the blank state in Sleep In – mode) and then return to Default condition for Hardware Reset.

3.   During Reset Complete Time, ID2 and VCOMOF value in OTP will be latched to internal register during this period. This loading is done every time when there is H/W reset complete time (tREST) within 5ms after a rising edge of RESX.

4.   Spike Rejection also applies during a valid reset pulse as shown below:
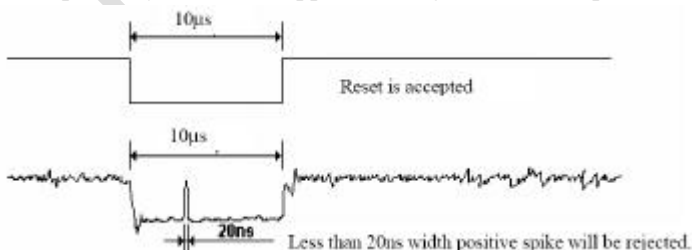

5. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

## 4.2   Display Parallel 8-bit Interface Timing Characteristics (8080)
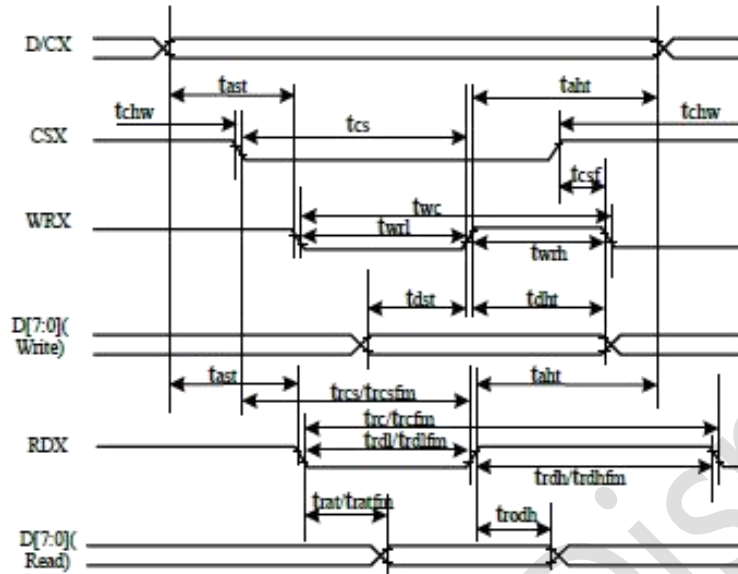
Signal	Symbol	Parameter	max	min	Unit	Description
DCX	tast	Address setup time	0	-	ns	
	taht	Address hold time(Write/Read)	0	-	ns	
CSX	tchw	CSX "H" pulse width	0	-	ns	
	tcs	Chip Select setup time(Write)	15	-	ns	
	trcs	Chip Select setup time(Read ID)	45	-	ns	
	trcsfm	Chip Select setup time(Read FM)	355	-	ns	
	tcsf	Chip Select Wait time (Write/Read)	10	-	ns	
WRX	twc	Write Cycle	66	-	ns	
	twrh	Write Control pulse H duration	15	-	ns	
	twrl	Write Control pulse L duration	15	-	ns	
RDX(FM)	trcfm	Read Cycle (FM)	450	-	ns	
	trdhfm	Read Control H duration(FM)	90	-	ns	
	trdlfm	Read Control L duration(FM)	355	-	ns	
RDX(ID)	trc	Read Cycle (ID)	160	-	ns	
	trdh	Read Control H pulse duration	90	-	ns	
	trdl	Read Control L pulse duration	45	-	ns	
D[7:0]	tdst	Write data setup time	10	-	ns	For maximum CL=30pF
	tdht	Write data hold time	10	-	ns	
	trat	Read access time	-	40	ns	For minimum CL=8pF
	tratfm	Read access time	-	340	ns	
	trod	Read output disable time	20	80	ns	

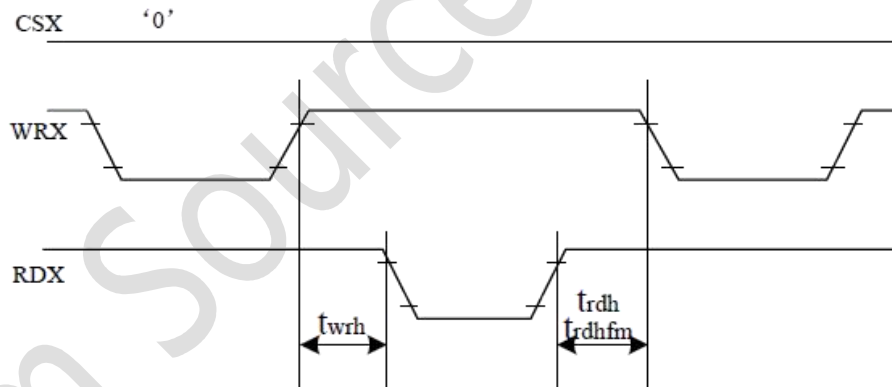Note: Ta = -30 to 70 ° C, VDDI=1.65V to 3.3V, VDD=2.5V to 3.3V, DGND=0V
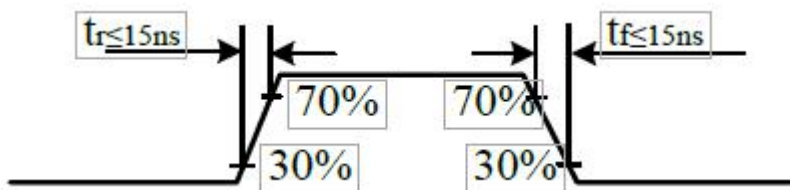
CSX timings :
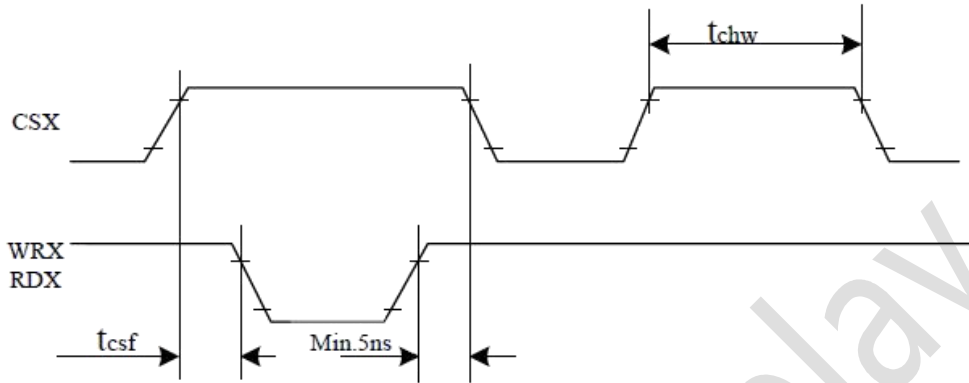
Note: Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

Write to read or read to write timings:

Note: Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

5   Absolute Maximum Ratings

PARAMETER	SYMBOL	MIN	MAX	UNIT
Power supply voltage	VDD	-0.3	4.6	V
Logic power supply voltage	IOVDD	-0.3	4.6	V
Operating Temperature	TOP	-20	+70	° C
Storage Temperature	TST	-30	+80	° C
Humidity	RH	-	90%(Max 60° C)	RH

6   Electrical   Characteristics

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Power supply voltage	VDD	2.5	2.8	3.3	V
Logic power supply voltage	IOVDD	1.65	2.8	VDD	V
Input Current	IDD	-	TBD	-	mA

7   Backlight   Characteristics

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
Voltage for LED backlight	V_f	2.9	3.1	3.3	V
Current for LED backlight	I_f	-	40	-	mA
Uniformity	Avg	80	-	-	%
LED Life Time	-	30000	40000	-	Hrs

Note:

1.The LED life time is defined as the module brightness decrease to 50% original brightness at Ta=25°C, 60%RH ±5 %.

2. The life time of LED will be reduced if LED is driven by high current, high ambient temperature and humidity conditions.

3. Typical operating life time is an estimated data.

4. Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded .Functional operation should be restricted to the conditions described under normal operating conditions.

8 LCD Optical specifications

Item	Symbol	Condition	Specification			Unit	Remark
			Min	Typ	Max		
Response time (By Quick)	Tr+Tf	-	-	8	16	ms	Note 2
Contrast ratio	CR	-	400	500	-	-	Note 3
Surface luminance	Lv	θ= 0°	180	220	-	Cd/m^2	Note 4
Luminance uniformity	Yu	θ= 0°	80	-	-	%	Note 6
NTSC	-	θ= 0°	45	50	-	%	Note 6
Viewing angle	Top	CR≧10	10	20	-	Deg.	Note 7
	Bottom	CR≧10	35	45	-		
	Left	CR≧10	35	45	-		
	Right	CR≧10	35	45	-		
CIE(x,y) chromaticity	Wx	θ= 0°	-0.03	0. 27	+0.03		Note 5
	Wy			0. 28			

Note 1: Ambient temperature = 25°C.

Note 2: Definition of response time:

The output signals of TRD-100 are measured when the input signals are changed to "White"

(falling time) and from "White" to "Black" (rising time), respectively. The interval is between the

10% and 90% of amplitudes. Refer to figure as below.
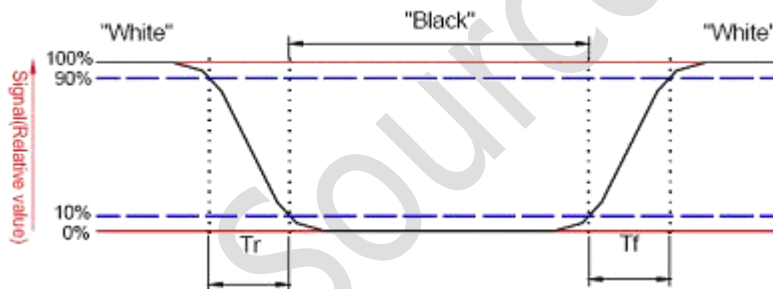
Note 3: Definition of contrast ratio:

Contrast ratio is calculated by the following formula.

$$\text{Contrast ratio (CR)}= \frac{\text{Brightness on the "white" state}}{\text{Brightness on the "black" state}}$$

Measured at the center area of the LCD.

Note 4:Definition of surface luminance

Surface luminance is the luminance with all pixels displaying white

Note 5: For contrast ratio, Surface Luminance, Luminance uniformity and CIE,the testing data is base on TOPCON's BM-7 photo detector or compatible.

Size : S≤4.3"(see Figure A B)

H,V : Active area

Light spot size=7.7mm (BM-7)50cm distance or compatible distance from the LCD surface to detector lens.

test spot position : see Figure B.

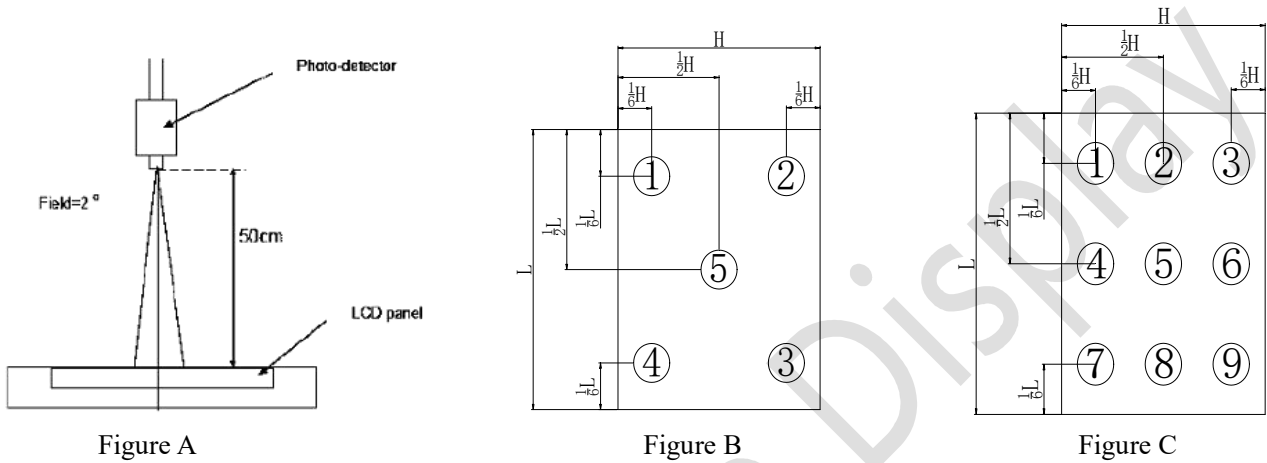measurement instrument : TOPCON's luminance meter BM-7 or compatible.

Size : 4.3<S≤12.3" (see Figure A C)

H,V : Active area

Light spot size=7.7mm (BM-7)50cm distance or compatible distance from the LCD surface to detector lens.

test spot position : see Figure C.

measurement instrument : TOPCON's luminance meter BM-7 or compatible.

Figure A	Figure B	Figure C

Note 6:Definition of Luminance Uniformity

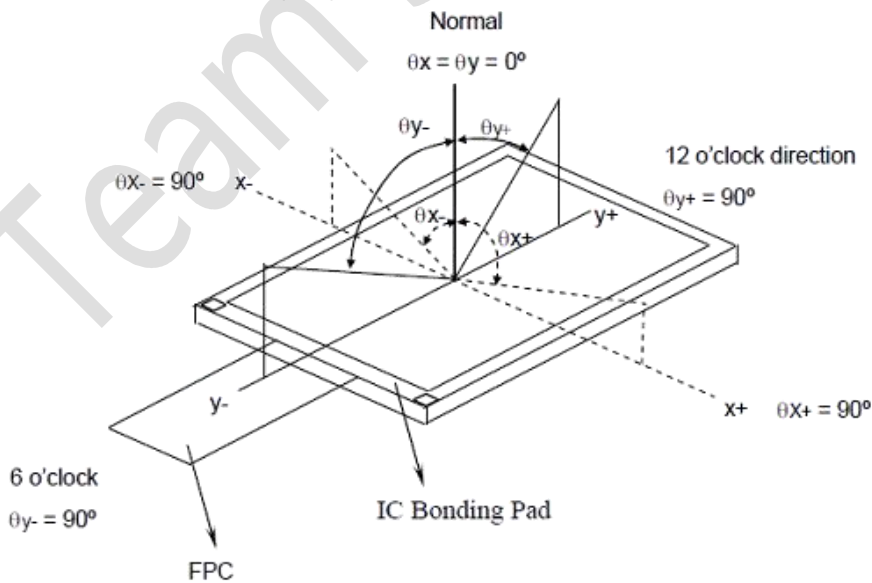Active area is divided into 5 or 9 measuring areas,Every measuring point is placed at the center of each measuring area

Bmax: The measured maximum luminance of all measurement position.

Bmin: The measured minimum luminance of all measurement position.

Luminance Uniformity (Yu)= (Bmin/Bmax)x100%

Note 7: Definition of viewing angle

9   RELIABILITY TEST

NO.	TEST ITEM	TEST CONDITION	INSPECTION AFTER TEST
1	High Temperature Storage	80±2°C/96 hours	Inspection after 2~4 hours storage at room temperature and humidity. The condensation is not accepted. The sample shall be free from defects: 1. Air bubble in the LCD 2. Seal leak 3. Non-display 4. Missing segments 5. Glass crack
2	Low Temperature Storage	-30±2°C/96 hours	
3	High Temperature Operating	70±2°C/96 hours	
4	Low Temperature Operating	-20±2°C/96 hours	
5	Temperature Cycle	-30±2°C ~ 25~ 80± 2°C × 10 cycles (30 min.) (5min.) (30min.)	
6	Damp Proof Test	60°C ±5°C × 90%RH/96 hours	
7	Vibration Test	Frequency 10Hz~55Hz Stroke: 1.5mm Sweep: 10Hz~150 Hz~10Hz 2 hours For each direction of X, Y, Z	
8	Packing Drop Test	Height: 50 cm 1 corner, concrete floor	
9	Electrostatic Discharge Test	C=150pF, R=330 Ω Air: ±8KV 150pF/330Ω 30 times Contact: ±4KV,20 times	

10 Suggestions for using LCD modules

10.1 Handling of LCM

1. The LCD screen is made of glass. Don't give excessive external shock, or drop from a high place.

2. If the LCD screen is damaged and the liquid crystal leaks out, do not lick and swallow. When the liquid is attach to your hand, skin, cloth etc, wash it off by using soap and water thoroughly and immediately.

3. Don't apply excessive force on the surface of the LCM.

4. If the surface is contaminated, clean it with soft cloth. If the LCM is severely contaminated, use Isopropyl alcohol/Ethyl alcohol to clean. Other solvents may damage the polarizer. The   following solvents is especially prohibited: water , ketone Aromatic solvents etc.

5. Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.

6. Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping   and   distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.

7. Don't disassemble the LCM.

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

-    Be sure to ground the body when handling the LCD modules.

-    Tools required for assembling, such as soldering irons, must be properly grounded.

-    To   reduce   the amount of static electricity generated, do not conduct assembling and other work under dry conditions.

-    The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

9. Do not alter, modify or change the the shape of the tab on the metal frame.

10. Do not make extra holes on the printed circuit board, modify its   shape   or   change the positions   of components to be attached.

11. Do not damage or modify the pattern writing on the printed circuit board.

12. Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector

13. Except for soldering the interface, do not make any alterations or modifications with a soldering iron.

14. Do not drop, bend or twist LCM.

10.2 Storage

1. Store in an ambient temperature of 5 to 45   C, and in a relative humidity of 40% to 60%. Don't expose to sunlight or fluorescent light.

2. Storage in a clean environment, free from dust, active gas, and solvent.

3. Store in antistatic container.