



一众显示科技有限公司

TEAM SOURCE DISPLAY TECH. CO, LTD.


TFT-LCD Module Specification

Module NO.: TST062WSBE-02

Version: V0.2

☐ APPROVAL FOR SPECIFICATION

☐ APPROVAL FOR SAMPLE

For Customer's Acceptance:	
Approved by	Comment
	<div>Distributed by:  www.texim-europe.com</div>

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Revision history

Version No.	Date	Page	Content	Remark
V0.0	2025-4-8	All	The initial release	
V0.1	2025-4-29	All	Update the operation/storage temperature conditions	
V0.2	2025-10-22		Update drawings and PIN definitions	





CONTENTS

1 GENERAL CHARACTERISTICS	- 4 -
1.1 INTRODUCTION	- 4 -
1.2 GENERAL INFORMATION	- 4 -
2 MECHANICAL DRAWINGS	- 5 -
3 INTERFACE DESCRIPTION	- 6 -
3.1 LCM INTERFACE DESCRIPTION	- 6 -
4 TIMING CHARACTERISTICS	- 8 -
4.1 LCD SPI DATA INPUT TIMING	- 8 -
4.2 LCD RGB TIMING	- 8 -
4.3 POWER SEQUENCE	- 10 -
5 ABSOLUTE MAXIMUM RATINGS	- 11 -
6 ELECTRICAL CHARACTERISTICS	- 11 -
7 BACKLIGHT CHARACTERISTICS	- 11 -
8 LCD OPTICAL SPECIFICATIONS	- 12 -
9 RELIABILITY TEST	- 14 -
9.1 ABOUT IMAGE STICKING(关于残影)	- 15 -
9.1.1 What is Image Sticking?	- 15 -
9.1.2 What causes Image Sticking?	- 15 -
9.1.3 How to Avoid Image Sticking? (如何避免残影)	- 15 -
9.1.4 How to Fix the Image Sticking?	- 16 -
9.1.5 Is Image Sticking Covered by TSD RMA Warranty?	- 16 -
9.2 OTHERS	- 16 -
10 SUGGESTIONS FOR USING LCD MODULES	- 17 -
10.1 HANDLING OF LCM	- 17 -
10.2 STORAGE	- 17 -
11 LIMITED WARRANTY	- 17 -

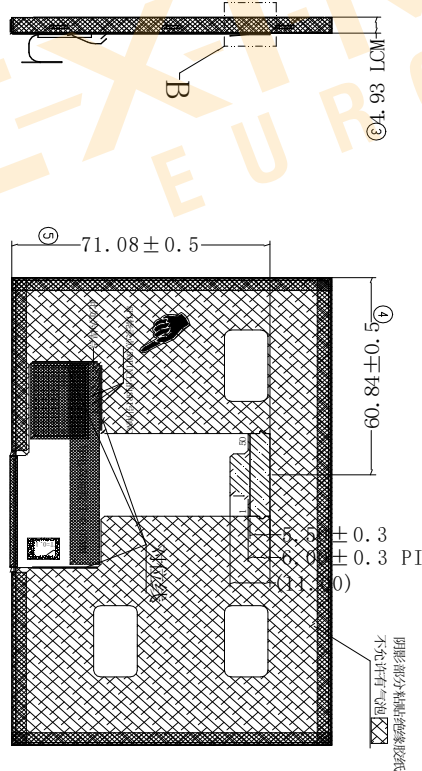
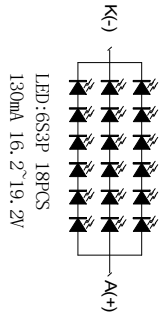
1 General Characteristics

1.1 Introduction


TST062WSBE-02 is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a Backlight, and a driving circuit. This TFT LCD has a 6.2 inch diagonally measured active display area with 1024 horizontal by 600 vertical pixel resolution.



1.2 General Information

ITEM	Specification	Unit
LCD Type	a-Si TFT, Transmissive, Normally black, ADS	-
LCD Size	6.2	inch
Resolution (W x H)	1024x (RGB) × 600	pixel
Outline size	144.27(H) x 88.10(V) x 4.93(T)	mm
Active Area	137.47 (H) x 77.23 (V)	mm
Pixel Pitch	0.1342(H) × 0.1287(V)	mm
Viewing Direction	ALL o'clock	-
Color Depth	16.7M	-
Pixel Arrangement	RGB-stripe	-
Surface Luminance	1100(TYP)	cd/m ²
Surface Treatment	AG	-
LCD Interface Type	RGB 24-bit	-
Weight	TBD	g



No	pin Name
1	VLED+
2	VLED+
3	VLED-
4	VLED-
5	VLED-
5	GND
6	NC
6	NC
7	VDD
8	NC
9	DE
10	VSNNL
11	HSNNL
12	DE
13	PE
14	B5
15	B4
16	B3
17	B2
18	B1
19	B0
20	G7
21	G6
22	G5
23	G4
24	G3
25	G2
26	G1
27	G0
28	R7
29	R6
30	R5
31	R4
32	R3
33	R2
34	R1
35	R0
36	GND
37	DCK
38	GND
39	NC
40	NC
41	NC
42	NC
43	NC
44	STPB
45	NC
46	NC
47	NC
48	GND
49	NC
50	ID

 此处预留电阻位置，默认则占R1

 一 众 显示	
TITLE:	页码 (Page) 1 / 1
LCM	单位 (Unit) mm
Drawing No.	比例 (SCALE) 1 : 1
TST1062MSBE-02	附注 (Note) 

3 Interface description

3.1 LCM interface description

Pin No.	Symbol	I/O	Function	Remark
1	V _{LED+}	P	Power for LED backlight (Anode)	
2	V _{LED+}	P	Power for LED backlight (Anode)	
3	V _{LED-}	P	Power for LED backlight (Cathode)	
4	V _{LED-}	P	Power for LED backlight (Cathode)	
5	GND	P	Power ground	
6	NC	-	Not Connection	
7	V _{DD}	P	Power for Digital Circuit	
8	NC	-	Not Connection	
9	DE	I	Data Input Enable	
10	VSYNC	I	Vertical Sync Input	
11	HSYNC	I	Horizontal Sync Input	
12	B7	I	Blue data(MSB)	
13	B6	I	Blue data	
14	B5	I	Blue data	
15	B4	I	Blue data	
16	B3	I	Blue data	
17	B2	I	Blue data	
18	B1	I	Blue data	
19	B0	I	Blue data(LSB)	
20	G7	I	Green data(MSB)	
21	G6	I	Green data	
22	G5	I	Green data	
23	G4	I	Green data	
24	G3	I	Green data	
25	G2	I	Green data	
26	G1	I	Green data	
27	G0	I	Green data(LSB)	



28	R7	I	Red data(MSB)	
29	R6	I	Red data	
30	R5	I	Red data	
31	R4	I	Red data	
32	R3	I	Red data	
33	R2	I	Red data	
34	R1	I	Red data	
35	R0	I	Red data(LSB)	
36	GND	P	Power Ground	
37	DCLK	I	Sample clock	
38	GND	P	Power Ground	
39	NC	-	Not Connection	
40	NC	-	Not Connection	
41	NC	-	Not Connection	
42	NC	-	Not Connection	
43	NC	-	Not Connection	
44	STBTB	I	Standby mode control. (Normally pull high)	
45	SPI-CS(NC)	-	Chip select pin(Not Connection)	
46	NC	-	Not Connection	
47	NC	-	Not Connection	
48	GND	P	Power Ground	
49	NC	-	Not Connection	
50	ID	-	Not Connection	

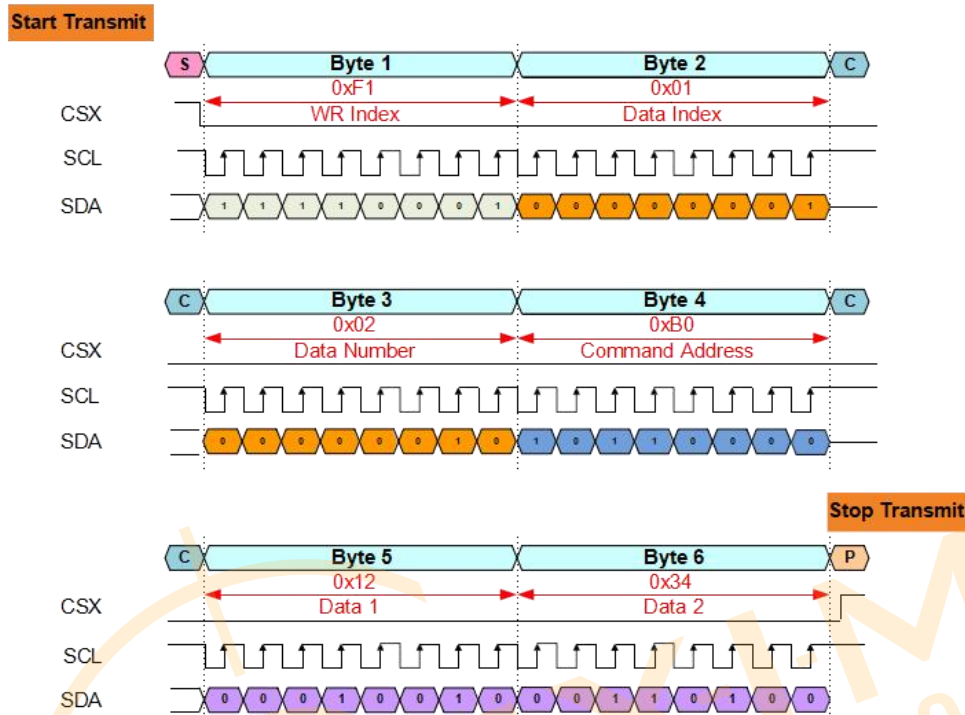
I: input, O: output, P: Power

Note (1): default scanning mode: left to right,up to down

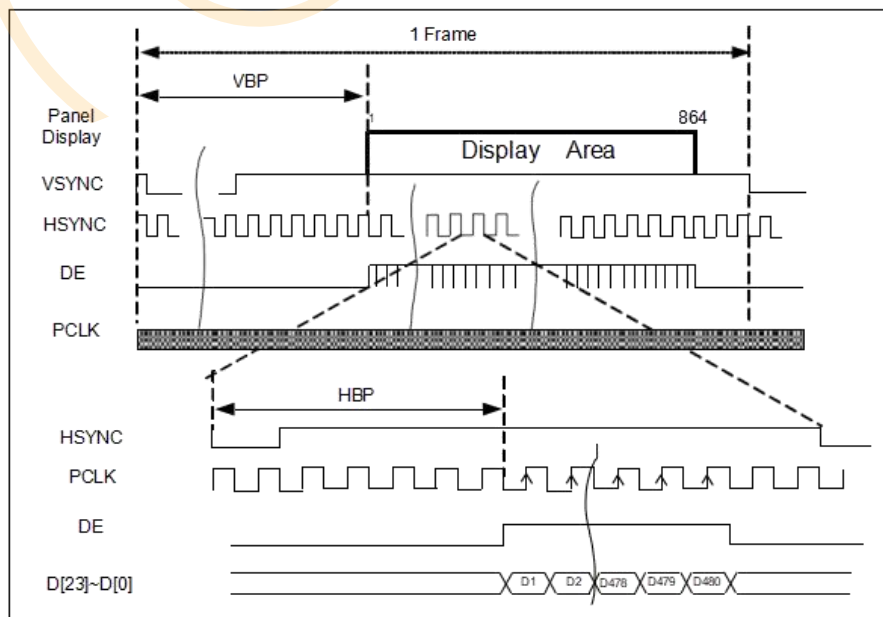


4 Timing Characteristics

4.1 LCD SPI Data input Timing



4.2 LCD RGB Timing



Resolution=1024x600 (T_A=25°C, IOVCC=3.3V, VCI=3.3V)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Vertical low pulse width	VS	-	2	-	Note ⁽¹⁾	Line
Vertical front porch	VFP	-	2	-	-	Line
Vertical back porch	VBP	-	2	-	Note ⁽¹⁾	Line
Vertical blanking period	VL	VS+VBP+VFP	6	-	-	Line
Vertical active area	-	VDISP	-	600	-	Line
Vertical Refresh rate	VRR	-	-	60	-	Hz

Note: The VS and VBP pulse width are related to GIP start pulse and GIP clock pulse timing. The GIP start pulse and GIP clock pulse must be set at corresponding position for LCD normal display.

RGB Resolution=1024x600 (T_A=25°C, VCCH=IOVCC=3.3V, VCI=3.3V)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
HS low pulse width	HS	-	100	-	-	ns
Horizontal back porch	HBP	-	100	-	-	ns
Horizontal front porch	HFP	-	400	-	-	ns
Horizontal blanking period	HBLK	HS+HBP+HFP	-	900 ⁽¹⁾	-	ns
Horizontal active area	HDISP	1024 pixels	-	12 ⁽²⁾	-	us

Note:

1. Below time limitation will apply in all DSI speed range.

(1) HS+HBP >= 500ns.

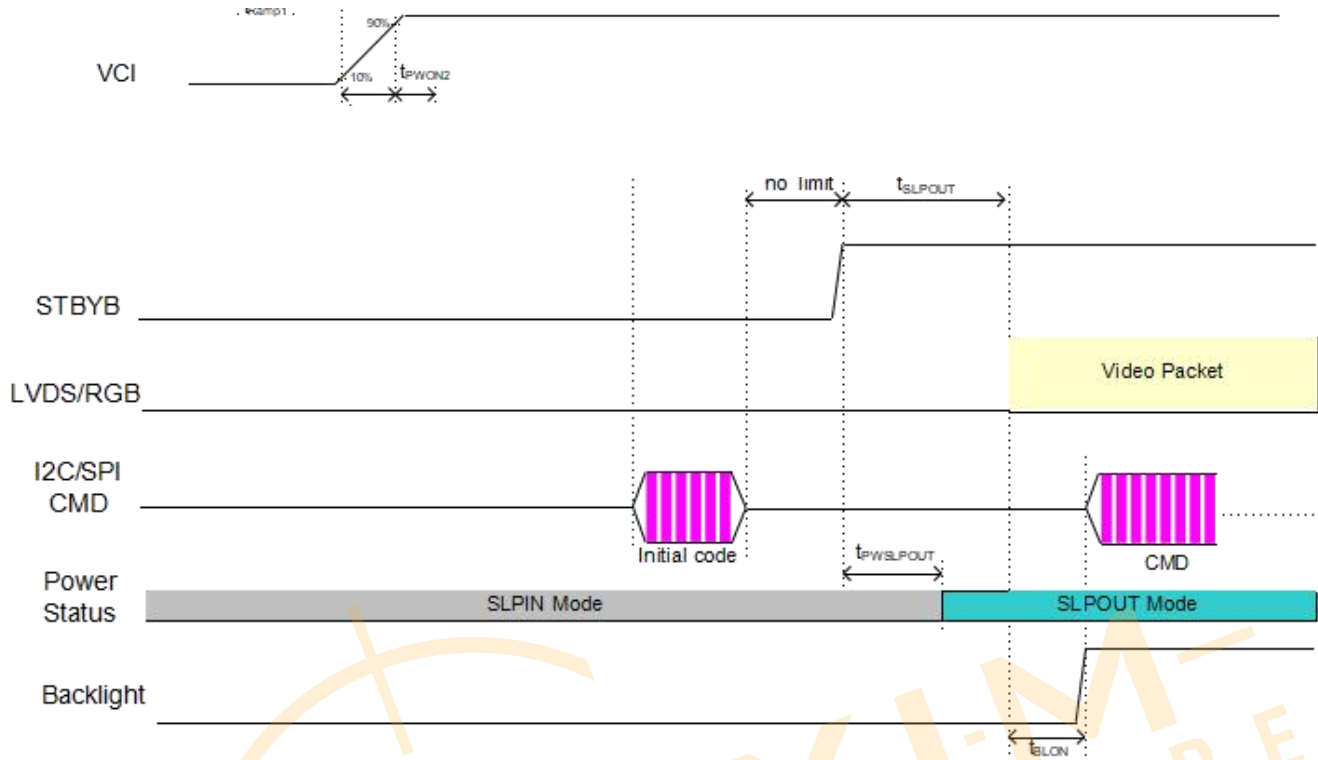
(2) HFP >= 400ns.

2. Base on frame rate = 60HZ,

(1) VS=2, VBP=2 and VFP=2.

4.3 Power sequence

3 power mode power on sequence – LVDS, RGB:



5 Absolute Maximum Ratings

PARAMETER	SYMBOL	MIN	MAX	UNIT
LCD Supply Voltage	VDD	-0.3	6.3	V
Operating Temperature	TOP	-30	80	°C
Storage Temperature	TST	-30	80	°C
Storage Humidity	RH	-	90%(Max 60°C)	RH

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

6 Electrical Characteristics

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
LCD Supply Voltage	VDD	2.8	3.3	3.6	V
LCD Input Current	IDD	-	TBD	-	mA
Input Voltage 'H' level	VIH	0.7VDD	-	VDD	V
Input Voltage 'L' level	VIL	GND	-	0.3VDD	

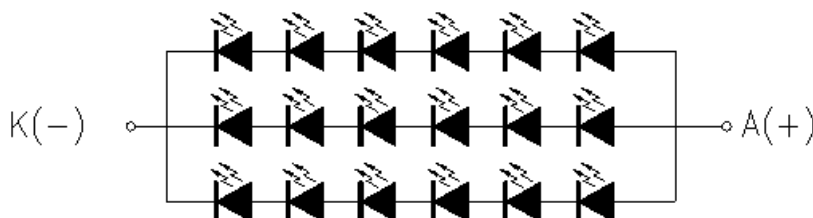
7 Backlight Characteristics

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
LED Voltage	Vf	16.2	18	19.2	V
LED Current	If	-	130	-	mA
Power consumption	Wbl	-	2.34	-	W
LED Life Time		-	40000	-	Hrs

Note (1) LED current is measured by utilizing a high frequency current meter as shown below:

Note (2) The lifetime of LED is defined as the time when it continues to operate under the conditions at $T_a = 25 \pm 2^\circ\text{C}$ and Typical operating current of LED until the brightness becomes $\leq 50\%$ of its original value.

Note (3) Please note that LED life will be shorter than the average life described in the specification if operate in higher ambient temperature.



LED: 6S3P 18PCS
210mA 16.2~19.2V

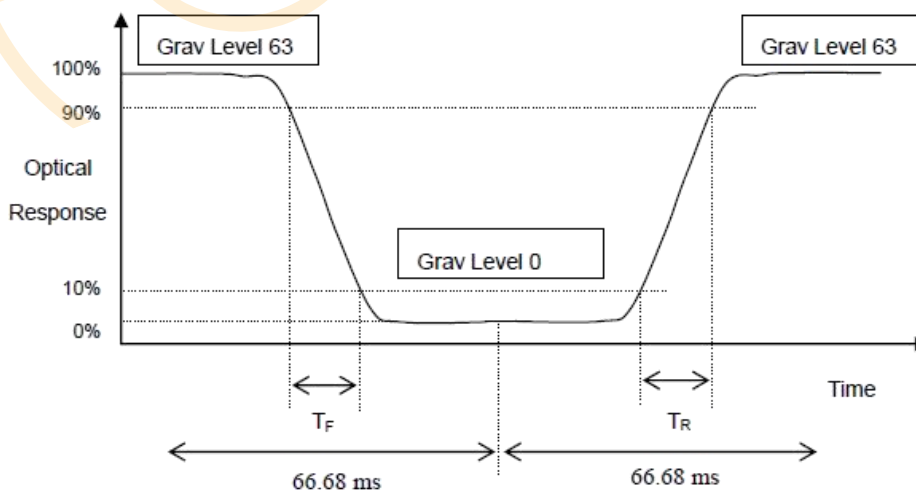
8 LCD Optical specifications

Item	Symbol	Condition	Specification			Unit	Remark
			Min	Typ	Max		
Response time	Tr+Tf	$\theta = 0^\circ$	-	30	35	ms	Note3
Contrast ratio	CR	$\theta = 0^\circ$	800	1000	-		Note4
Luminance(White)	L	$\theta = 0^\circ$	-	1100	-	cd/m2	Note2, 6
Uniformity (White)	-	$\theta = 0^\circ$	-	TBD	-	%	Note7
Viewing angle	Top	$CR \geq 10$	68	80	-	Deg.	Note5
	Bottom	$CR \geq 10$	68	80	-		
	Left	$CR \geq 10$	68	80	-		
	Right	$CR \geq 10$	68	80	-		
Color chromaticity (CIE1931)	Wx	$\theta = 0^\circ$	-0.03	TBD	+0.03		
	Wy			TBD			
	Rx			TBD			
	Ry			TBD			
	Gx			TBD			
	Gy			TBD			
	Bx			TBD			
	By			TBD			

Note 1: Ambient temperature = 25°C.

Note 2: To be measured with a viewing cone of 2° by Topcon luminance meter BM-7.

Note 3: Definition of Response Time (TR, TF) and measurement method:

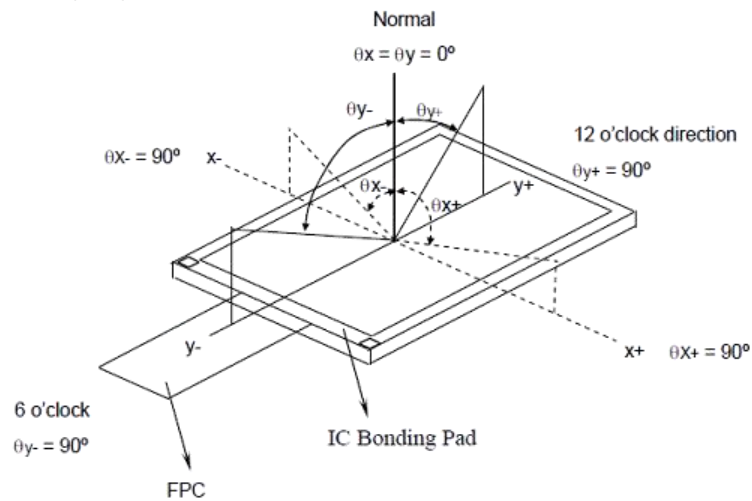


Note 4: Definition of contrast ratio:

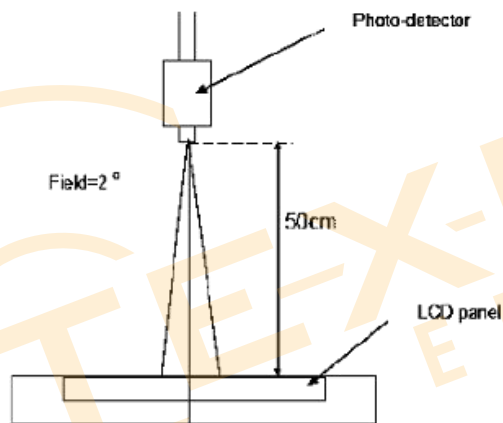
Contrast ratio is calculated by the following formula.

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

Note 5: Definition of viewing angle



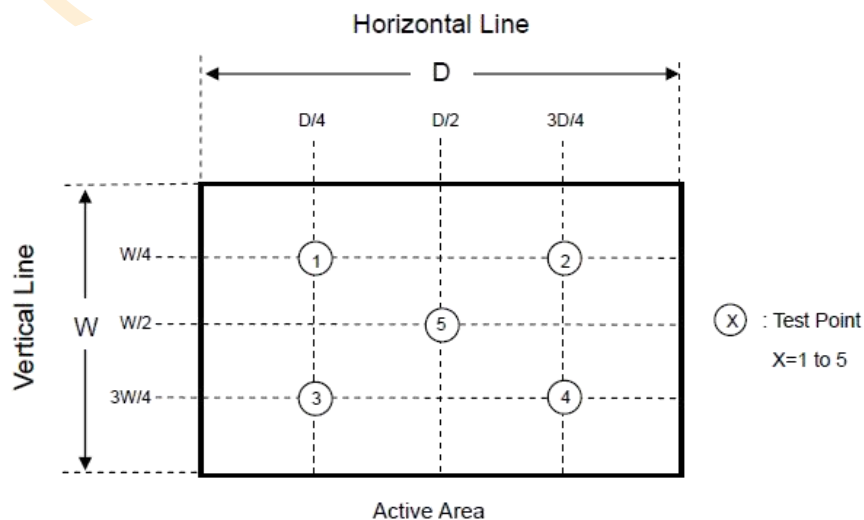
Note 6: Optical characteristic measurement setup.



Note 7: Definition of White Variation (δW):

Measure the luminance of gray level 63 at 5 points

$$\delta W = \text{Maximum} [L(1), L(2), L(3), L(4), L(5)] / \text{Minimum} [L(1), L(2), L(3), L(4), L(5)]$$



9 RELIABILITY TEST

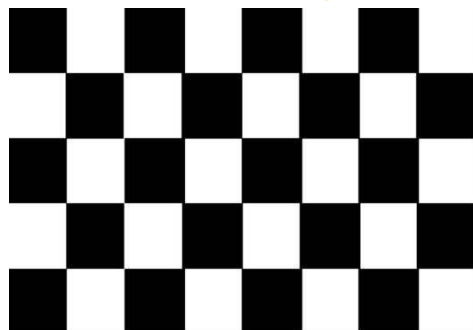
NO.	TEST ITEM	TEST CONDITION	Criterion
1	High Temperature Storage	80±2°C/48 hours	IEC60068-2-1, GB/T2423.2
2	Low Temperature Storage	-30±2°C/48 hours	IEC60068-2-1, GB/T2423.1
3	High Temperature Operating	80±2°C/48 hours	IEC60068-2-1, GB/T2423.2
4	Low Temperature Operating	-30±2°C/48 hours	IEC60068-2-1, GB/T2423.1
5	Temperature Cycle	-30±2°C(30 min.) , 80± 2°C (30min.) , 100 cycles	IEC60068-2-14, GB/T2423.22
6	High Temperature & Humidity Storage	60°C ±2°C × 90%RH/48 hours	IEC60068-2-78, GB/T2423.3
7	Vibration Test	Frequency 10Hz~55Hz Stroke: 1.5mm Sweep: 10Hz~150 Hz~10Hz 2 hours For each direction of X, Y, Z	IEC60068-2-6, GB/T2423.10
8	Shock Test (non operation)	"100G.6msmec,1/2 Sine Wave ±X ±Y ±Z each axis 3 times"	IEC60068-2-27,GB/T 2423.5
9	Electrostatic Discharge Test	C=150pF, R=330 Ω Air: ±8KV 150pF/330Ω 9 times Contact: ±4KV,9 times	IEC61000-4-2, GB/T17626.2
10	Image Sticking(残影)	25°C,60%RH/30 minutes	Note2

Note 1: 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
6. No mura: 50% gray(Grey 127) / ND 5%

Note 2: Switch the image to Grey 127 after displaying the 5*8 chess pattern for **30 minutes**, the after image disappears within **10 minutes**.

采用 5x8 的黑白棋盘格画面保持 30 分钟, 然后切换到 127 灰阶(16 位色则是 63 灰阶), 10 分钟内图像消失。



5*8 chess pattern



Gray127



9.1 About Image Sticking(关于残影)

9.1.1 What is Image Sticking?

If you remain a fixed image on LCD Display for a long period of time, you may experience a phenomenon called Image Sticking. Image Sticking - sometimes also called “image retention” or “ghosting” - is a phenomenon where a faint outline of a previously displayed image remains visible on the screen when the image is changed. It can occur at variable levels of intensity depending on the specific image makeup, as well as the amount of time the core image elements are allowed to remain unchanged on the screen. In POS applications, for example, a button menu which remains fixed, or in which the “frame” elements (core image) remain fixed and the buttons may change, may be susceptible to image sticking. It is important to note that if the screen is used exclusively for this application, the user may never notice this phenomenon since the screen never displays other content. It is only when an image other than the “retained” image is shown on the screen that this issue becomes evident. Image sticking is different than the “burn-in” effect commonly associated with phosphor based devices.

9.1.2 What causes Image Sticking?

Image sticking is an intrinsic behavior of LCD displays due to the susceptibility to polarization of the interior materials (liquid crystals) when used under static, charged conditions (continuously displaying the same image). The individual liquid crystals in an LCD panel have unique electrical properties. Displaying a fixed pattern - such as the POS menu described above - over prolonged periods can cause a parasitic charge build-up (polarization) within the liquid crystals which affects the crystals’ optical properties and ultimately prevents the liquid crystal from returning to its normal, relaxed state when the pattern is finally changed. This effect takes place at a cellular level within the LCD, and the effect can cause charged crystal alignment at the bottom or top of a crystal cell in the “z” axis, or even crystal migration to the edges of a cell, again based on their polarity. These conditions can cause image sticking over an entire area, or at boundaries of distinct color change respectively. In either case, when the liquid crystals in the pixels and sub-pixels utilized to display the static image are polarized such that they can not return fully to their “relaxed” state upon deactivation, the result is a faint, visible, retained image on the panel upon presentation of a new, different image. The actual rate of image retention depends on variation factors such as the specific image, how long it is displayed unchanged, the temperature within the panel and even the specific panel brand due to manufacturing differences amongst panel manufacturers.

9.1.3 How to Avoid Image Sticking? (如何避免残影)

- Try not to operate the LCD with a “fixed” image on the screen for more than 30 minutes.
- 尽量不要在屏幕上显示“固定”图像的情况下操作 LCD 超过 30 分钟。
- If you are operating the monitor in an elevated temperature environment and with a displayed image which is contrary to the recommendations in “For Software Developers” below, image stick can occur in as little as 30 minutes. Adjust your screen saver settings accordingly.
- 如果在高温环境中操作显示器，并且显示的图像与下面对“软件开发人员”中的建议相反，则图像粘贴可能在 30 分钟内发生。相应地调整屏幕保护程序设置。
- 1) Power down the unit during prolonged periods of inactivity such as the hours a store is closed or a shift during which the piece of equipment isn’t used.
- 在长时间不活动时，如商店关门或不使用设备的轮班时，应关闭设备电源。
- 2) Use a screensaver with a black or medium gray background that is automatically set to come on if the device is inactive for more than 5-10 minutes.



-使用黑色或中灰色背景的屏幕保护程序，如果设备处于非活动状态超过 5-10 分钟，屏幕保护程序会自动设置为打开。

3) Avoid placing the monitor in poorly ventilated areas or in areas that will create excess heat around the monitor for software developers.

-避免将显示器放置在通风不良的区域或显示器周围产生过多热量的区域。

4) In defining the icons, buttons, or windows in the screen, try to utilize block patterns instead of distinct lines as borders for dividing the display into distinct areas.

-在定义屏幕中的图标、按钮或窗口时，尝试使用块模式而不是不同的线作为边界，将显示划分为不同的区域。

5) If it is necessary to display a static image, try to use colors that are symmetric to the middle grey level at the boundary of two different colors, and slightly shift the borders line once in a while.

-如果需要显示静态图像，请尝试在两种不同颜色的边界处使用与中间灰度级对称的颜色，并偶尔稍微移动边界线。

6) Try to utilize medium gray hues for those areas that will have prolonged display times or remain static as other menu elements change.

-对于那些显示时间较长或随着其他菜单元素的变化而保持静止的区域，请尝试使用中等灰度色调。

9.1.4 How to Fix the Image Sticking?

Unlike the usually irreversible “burn-in” effects commonly associated with direct view phosphor display devices such as CRTs, an image retained on an LCD display can be reversed – often to a point of total invisibility. However, the severity of the underlying causes (as described above) of the image retained on a specific display, as well as the variation factors (see “For Software Developers” above) under which the retained image was created, will dictate the final level of retention reversal. One way to erase a retained image on a panel is to run the screen (monitor “on”) in an “all black” pattern for 4-6 hours. It is also helpful to do this in an elevated temperature environment of approximately 35° to 50° C. Again, utilizing a dynamic screen saver with an all black background during prolonged idle display periods is a good way to avoid image retention issues.

9.1.5 Is Image Sticking Covered by TSD RMA Warranty?

Image sticking is a phenomenon inherent to LCD Display technology itself, and as such, the occurrence of this “ghosting” effect is considered normal operation by the manufacturers of the LCD display modules which are integrated into today’s monitor solutions. TSD does not warrant any display against the occurrence of image sticking. We strongly advise that you follow the operating recommendations listed above to avoid the occurrence of this phenomenon.

9.2 Others

1. Issues that are not defined in this document shall be discussed and agreed with both parties. (Customer and supplier) 本文件中未定义的问题应由双方讨论并达成一致。（客户和供应商）。

2. Unless otherwise agreed upon in writing, the criteria shall be applied to both parties. (Customer and supplier) 除非另有书面约定，否则该标准适用于双方。（客户和供应商）。



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 25 °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 anti-static container.

11 Limited Warranty

- 1.Our warranty liability is limited to repair and/or replacement. We will not be responsible for any consequential loss.
- 2.If possible, we suggest customer to use up all LCD modules as soon as possible. If the LCD module storage time over twelve months, we suggest to recheck it before being used.
- 3.Any product issues must be feedback to TSD within 12 months since delivery, otherwise, we will not be responsible for the subsequent or consequential events.

Disclaimer

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It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application.

Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time.

All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts.

Please contact us if you have any questions about the contents of the datasheet.

This may not be the latest version of the datasheet. Please check with us if a later version is available.





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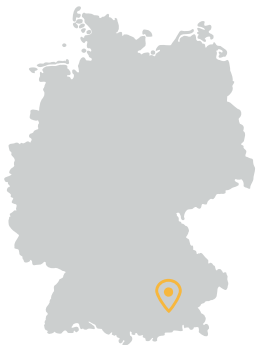
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