TCC®

深圳三元晶科技有限公司
ShenZhen TCC LCD Hi-Tech Co., Ltd.

模组规格书
SPECIFICATION FOR LCM MODULE

客户名称(Customer Name)：	
客户料号(Customer P/N.)：	
模组型号(TCC P/N.)：	SYB19264AV11-5C9BLN3-B5NG
物料编号(TCC C/N.)：	
文件号(Version No.)：	A0
日期(Date)：	2011-2-16

公司签核 (Signature)	管理者 (Manager)	市场 (Sales)	工程 (Engineering)	品保 (QA)
			LSS	

客户确认 (Customer approval)	

目 录 Contents

版本记录 Revision History

版本 Revision#	日期 Date	描述 Description	编制 Organizer
A0	2011-2-16	初始 Original	keguodong

Http：http://www.lcmlcd.com   E-mail：tcc@lcmlcd.com   Tel: +86-755- 2964 4105/06/07

1、模组规格 Functions & Features

视角 Viewing direction	6:00
LCD 模式 LCD mode	STN/Blue/Negative/Transmissive,蓝模　负显　全透
驱动方式 Driving scheme	占空比(Duty)：1/64 偏压比(Bias)：1/9
背光颜色 Backlight color	White 白光
驱动电压(VDD)	5．0V	LCD 电压(VLCD)	7.5V(Ref.)
工作温度 Operation temp	-20～70℃	储存温度 Storage temp	-30～80℃

2、机械尺寸 Mechanical specifications

项目 Item	尺寸 Dimension	单位 Unit
显示容量 Number of Characters	192X64	Dots
模组尺寸 Module size	100(L)* 60.0(W)* 11.7(H)max	mm
可视区域 Viewing area	78.67(L)*26.19(W)	mm
点间距 Dot pitch	0.41(L)*0.41(W)	mm
点大小 Dot size	0.36(L)*0.36(W)	mm

3、原理框图 Block diagram
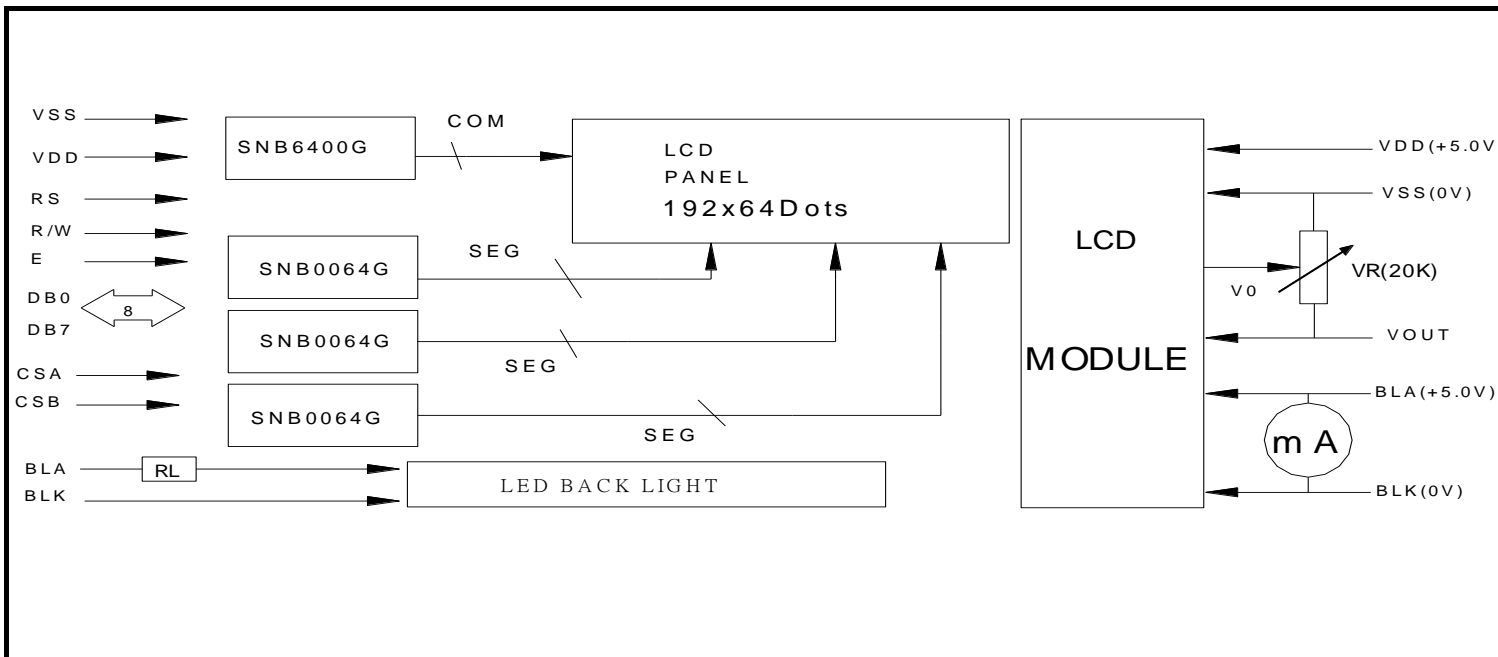
Note: when the temperature exceed 25℃, the approved current decrease rate for Backlight change as the temperature increase is: -0.36*30mA/℃(below 25℃, the current refer to constant, which would not hange with temperature).

4、模组外形图 Dimensional outline
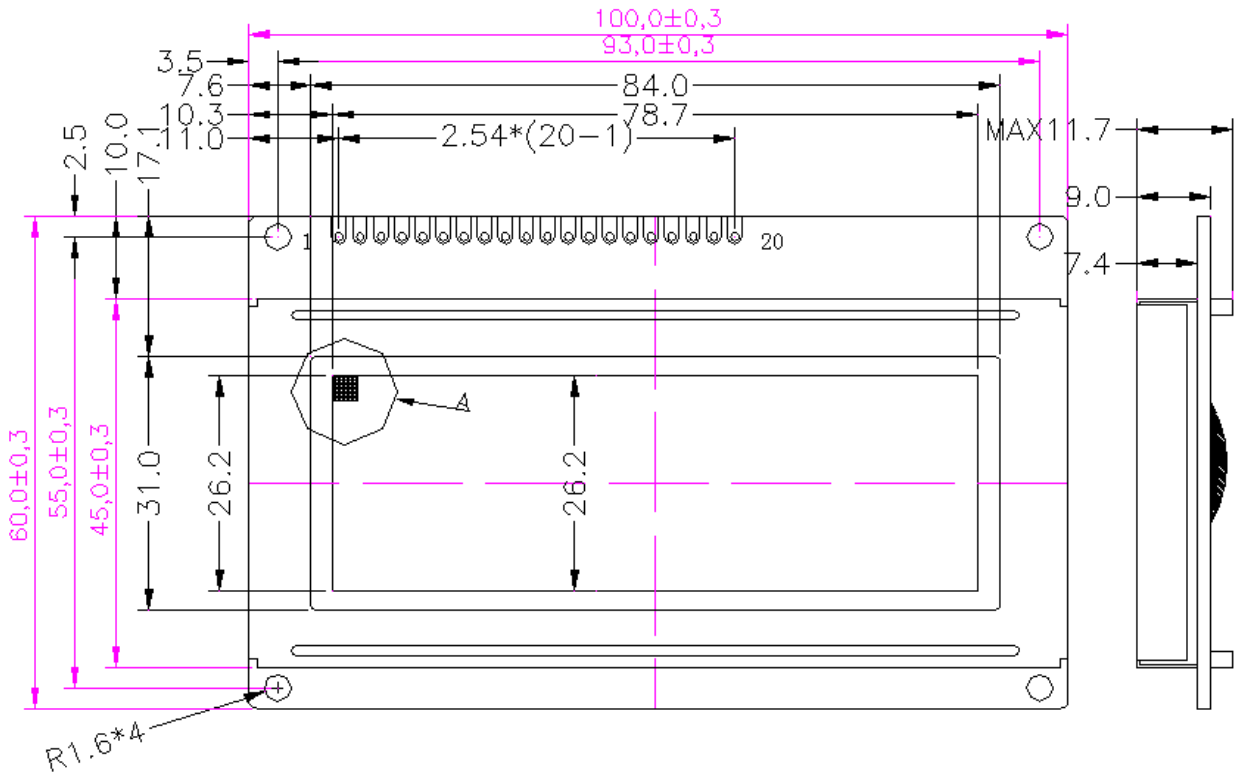
5、接口定义 Pin description

项目 Item	标号 Symbol	描述 Function
1~8	DB7~DB0	Data bus lines（数据总线）
9	E	Enable signal (使能信号)
10	R/W	Read/Write signal, R/W（数据读信号,低电平有效）
11	RS	Register selection (RS=H: 数据通道; RS=L: 指令通道)
12	V0	Power supply for the LCD drive 对比度调节端
13	VDD	Power supply for Logic 电源正(+5V)
14	VSS	Power Ground 电源地(0V)
15	CSB	Enable select signal for chip 2(使能信号 2)
16	CSA	Enable select signal for chip 1(使能信号 1)
17	VOUT	Negative voltage output(负压输出)
18	RST	Reset signal (复位信号)
19	BLA	POWER Supply for backlight(+)（背光正极）

20	BLK	POWER Supply for backlight(-)（背光负极）

6、极限参数 Absolute Maximum limit

项目 Item	符号 Symbol	最小值 MIN	最大值 MAX	单位 Unit
驱动电压 Supply Voltage for Logic	VDD	-0.3	7.0	V
LCD 电压 Supply Voltage for LCD	VLCD	VDD-10.0	VDD+0.3	V
输入电压 Input Voltage	Vin	-0.3	VDD+0.3	V
背光正向电流 Supply Current for Backlight	IF	---	30	mA
工作温度 Operating Temperature	Top	-20	70	˚C
储存温度 Storage Temperature	Tstr	-30	80	˚C

7、电性参数 Electrical characteristics

项目 Item	符号 Symbol	条件 Condition	最小值 MIN	典型值 Typ	最大值 MAX	单位 Unit
逻辑电压 Supply Voltage for Logic	VDD-VSS	Ta = 25˚C	4.75	5.0	5.25	V
输入高电压 Input High Voltage	VIH	Ta = 25˚C	2.5	---	VDD	V
输入低电压 Input Low Voltage	VIL	Ta = 25˚C	-0.3	---	0.6	V
输出高电压 Output High Voltage	VOH	Ta = 25˚C	2.4	---	VDD	V
输出低电压 Output Low Voltage	VOL	Ta = 25˚C	---	---	0.4	V
模块电流 Supply Current	IDD	Ta = 25˚C	---	15	25	mA
背光电压 Supply Voltage for LED	VLED	IF=25mA	3.1	3.3	3.5	V

8、光电特性 Electro-Optical characteristics

项目 Item	标号 Symbol	条件 Condition	最小 MIN	典型 Typ	最大 MAX	单位 Unit
工作电压 Operating Voltage	Vop	Ta = -20˚C	---	---	---	V
		Ta = +25˚C	7.2	7.5	7.8	

		Ta = +70°C	---	---	---	
响应时间 Response time	Tr	Ta = 25°C	---	185	---	ms
	Tf		---	200	---	ms
对比度 Contrast Ratio	Cr	Ta = 25°C	---	3	---	---
视角范围 Viewing angle range	θ	Cr≥2	-10	---	+40	deg
	Φ		-30	---	+30	deg

Definition of Operation Voltage (Vop)   Definition of Response Time (Tr , Tf)

[positive type]   [positive type]
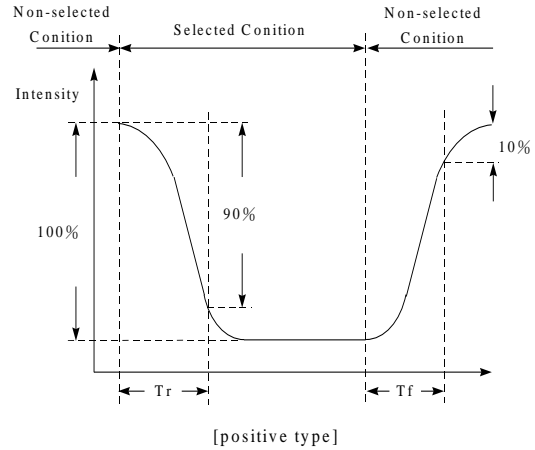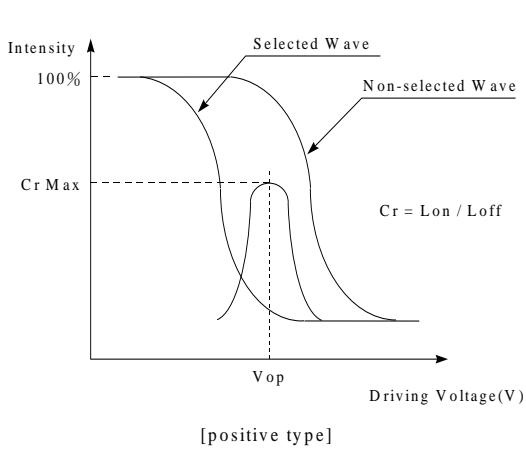
Conditions :

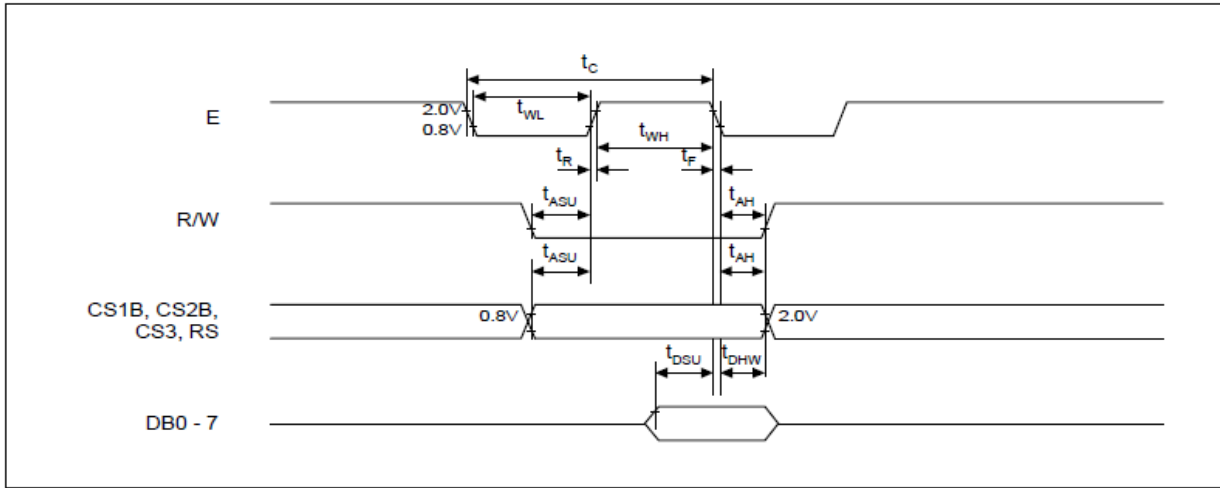Operating Voltage : Vop   Viewing Angle(θ ， φ) : 0°， 0°
Frame Frequency : 64 HZ   Driving Waveform : 1/N duty , 1/a bias

Definition of viewing angle(CR≧2)
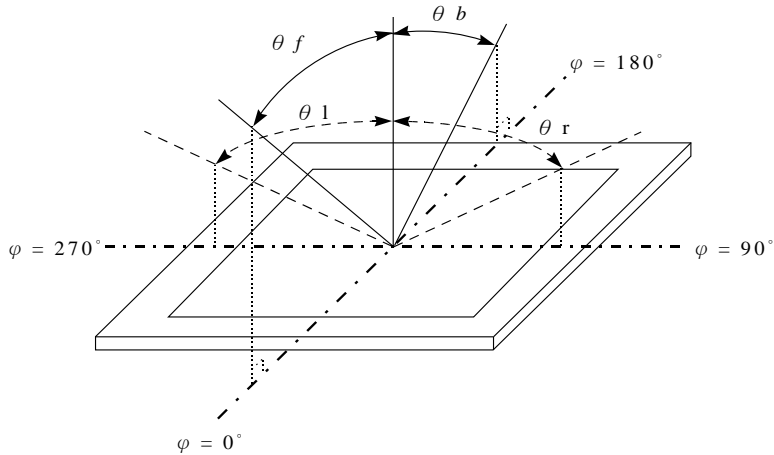
9、时序特性 Timing characteristics (8080 时序)

1）.写时序

MPU Interface

Characteristic	Symbol	Min	Typ	Max	Unit
E cycle	t_C	1000	-	-	ns
E high level width	t_{WH}	450	-	-	ns
E low level width	t_{WL}	450	-	-	ns
E rise time	t_R	-	-	25	ns
E fall time	t_F	-	-	25	ns
Address set-up time	t_{ASU}	140	-	-	ns
Address hold time	t_{AH}	10	-	-	ns
Data set-up time	t_{DSU}	200	-	-	ns
Data delay time	t_D	-	-	320	ns
Data hold time (write)	t_{DHW}	10	-	-	ns
Data hold time (read)	t_{DHR}	20	-	-	ns

2）.读时序
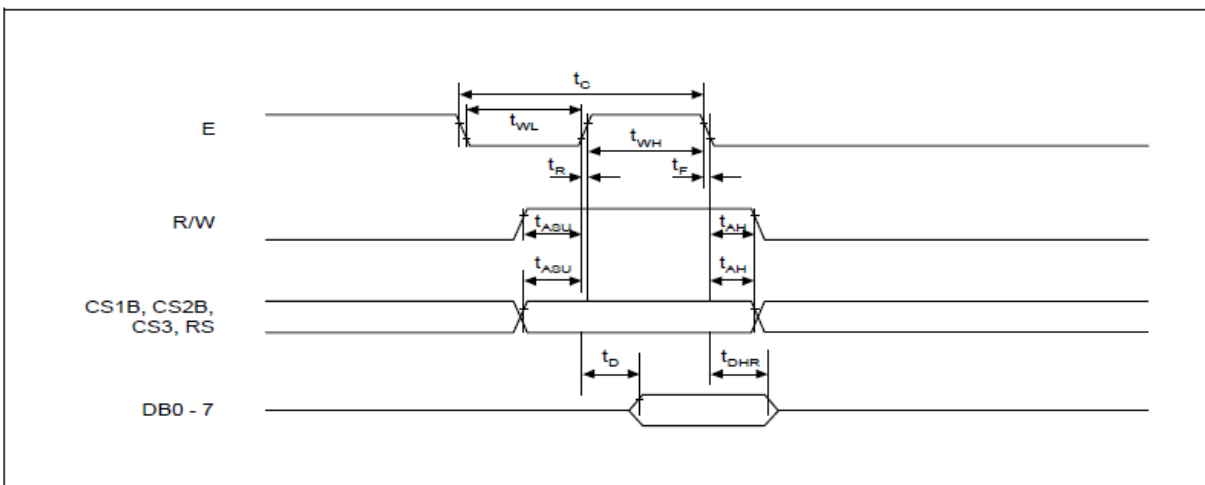
10.指令程序显示 Program instruction

指令名称	控制状态		指令代码							
	RS	R/W	D7	D6	D5	D4	D3	D2	D1	D0
显示开关设置	0	0	0	0	1	1	1	1	1	D
显示起始行设置	0	0	1	1	L5	L4	L3	L2	L1	L0
页面地址设置	0	0	1	0	1	1	1	P2	P1	P0
列地址设置	0	0	0	1	C5	C4	C3	C2	C1	C0
读取状态字	0	1	BUSY	0	ON/OFF	RESET	0	0	0	0
写显示数据	1	0	数据							
读显示数据	1	1	数据							

寄存器指令的具体参数

1). 读状态字（read status）
格式：

busy	0	NO/OFF	RESET	0	0	0	0

(1) BUSY=1 表示 KS0108 正在处理计算机发来的指令或数据。此时接口电路被封锁，不能
　接受除读状态字以外的任何操作。BUSY=0 表示 KS0108 接口控制电路已处于"准备
　好"状态，等待计算机的访问。
(2) ON/OFF：表示当前的显示状态。ON/OFF=1 表示关显示状态 ON/OFF=0 表示开显示状态。
(3) RESET 表示当前 KS0108 的工作状态，即反映 RST 端的电平状态。 当 RST 为低电平状态时 KS0108 处于复位工作状态，RESET=1。当 RST 为高电平状态时，KS0108 为正常工作状态，RESET=0。
(4) 在占领设置和数据读写时要注意状态字中的 BUSY 标志。只有在 BUSY=0 时，计算机 对 KS0108 的操作才能有效。因此计算机在每次对 KS0108 操作之前，都要读出状态 字判断 BUSY 是否为"0"。若不为"0"，则计算机需要等待，直至 BUSY=0 为止。

2). 显示开关（isplay on/off）

格式

0	0	1	1	1	1	1	D

　　　　该指令设置显示开关/触发器的状态，由此控制显示数据锁存器的工作方式，从而控制 显示上的显示状态。

　　　　D 位为显示开/关的控制位。当 D=1 为显示设置，显示数据锁存器正常工作，显示屏 上呈现所许的效果。此时在状态字中 ON/OFF=0。

　　　　当 D=0 为关显示设置，显示数据锁存器被置零，显示屏呈不显示状态，但显示存储器 并没有被破坏，在状态组中 ON/OFF=1。

3). 显示起始行设置（Display start line）

格式

1	1	L5	L4	L3	L2	L1	L0

　　　　该指令设置了显示起始行寄存器的内容。KS0108 有 64 行显示的管理能力，该指令 中 L5~L0 为显示起始行的地址，取值在 0~3FH（1~64）范围内，它规定了显示屏上最顶一行所对应的显示存储器的行地址。如果定时间隔地，等间距地修改（如加一或减一）显示起始行寄存器的内容，则显示屏将呈现显示内容向上或向下平滑滚动的显示效果。

4). 页面地址设置《Set page(X address)》

格式

1	0	1	1	1	P2	P1	P0

　　　　该指令设置了页面地址----X 地址寄存器的内容。KS0108 将显示存储器分成了 8 页，指令代码中 P2~P0 就是要确定当前所要选择的页面地址，取值范围为 0~7H，代表第 1~8 页。该指令规定了以后的读/写操作将在哪一个页面上进行。

5). 列地址设置(Set Y address)

格式

0	1	C5	C4	C3	C2	C1	C0

　　　　该指令设置了 Y 地址计数器的内容，C5~C0=0~3FH（1~64）代表某一页面上的某一 单元地址，随后的一次读或写数据将在这个单元上进行。Y 地址计数器具有自动加一功能，在每一次读/写数据后它将自动加一，所以在连续进行读/写数据时，Y 地址计数器不必每 次都设置一次。页面地址的设置和列地址的设置将显示存储器单元唯一地确定下来，为后来的显示数 据的读/写作了地址的选通。

6). 写显示数据(Write display data)

格式

数据（D7—D0）

该操作将 8 位数据写入先前已确定的显示存储器的单元内，操作完成后列
地址计数器 自动加1。

7). 读显示数据（**Read display data**）

格式

数据（D7—D0）

该操作将 **KS0108** 接口部的输出寄存器内容读出，然后列地址计数器自动加1

8)页地址与 DDRAM 的对应关系见 DDRAM 地址表。

	CSA=0,CSB=0				CSA=0,CSB=1					CSA=1,CSB=1				
X	0	1	...	63	0	1	2	...	63	0	1	2	63	行号
Y=0	DB0 | | DB7			DB0 | | DB7	DB0 | | DB7				DB0 | | DB7	DB0 | | DB7			DB0 | | DB7	0 | | 7
| | | |	DB0 | | DB7			DB0 | | DB7	DB0 | | DB7				DB0 | | DB7	DB0 | | DB7			DB0 | | DB7	8 | | 55
Y=7	DB0 | | DB7			DB0 | | DB7	DB0 | | DB7				DB0 | | DB7	DB0 | | DB7			DB0 | | DB7	56 | | 63

11. 品质保证 Quality Assurance

·Our company is qualified through ISO9001:2008（Certificate NO.: 04910Q10923R0S）. Our production plant has stringent quality control to guarantee absolute product quality. release and acceptance of finished LCM products in order to guarantee the quality required by the customer.

1·Scope

The criteria are applicable to all the LCM products manufactured by TCC, either supplied alone or embedded in or integrated with other components.

2・Inspection Apparatuses

Function testers, vernier calipers, microscopes, magnifiers, ESD wrist straps, finger cots, labels, ovens for high-low temperature tests, refrigerators, constant voltage power supply（DC），desk lamps, etc.

3・Reference Standards

3.1.1 GB/T 1619.96 Test Methods for TN LCD.

3.1.2 GB/T 12848.91 General Specifications for STN LCD.

3.1.3 GB2421-89 Basic Environmental Test Procedures for Electrical and Electronic Products

3.1.4 IPC-A-610C Acceptance Condition for Electrical Assemblies.

3.1.5 IEC-61000-4-2 Electrostatic Discharge immunity Tests

3.1.6 CISPR 22 Class B Conductive & Radiation limits

4・Inspection Conditions and Inspection Reference

4.1 Cosmetic inspection: shall be done normally at 25±5℃ of the ambient temperature and 45±20%RH of relative humidity, under the ambient luminance greater than 300cd/cm²and at the distance of 30cm apart between the inspector's eyes and the LCD panel and normally in reflected light. For back-lit LCMs, cosmetic inspection shall be done under the ambient luminance less than 100cd/cm² with the backlight on.

4.2　　The LCM shall be tested at the angle of 45°, left and right, and 0-45°, top and bottom (for STN LCM, at 20-55°）.

4.3　　Definition of VA

VA：Viewing area
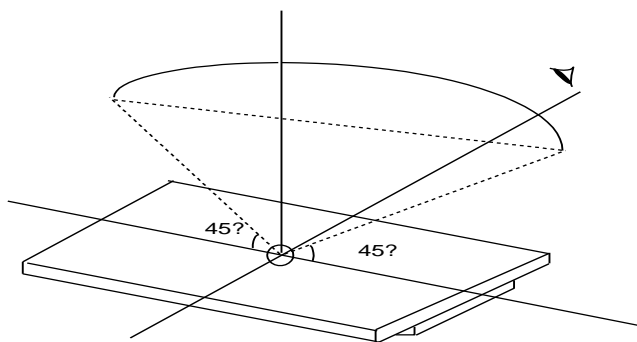
Non-VA：Non-viewing area
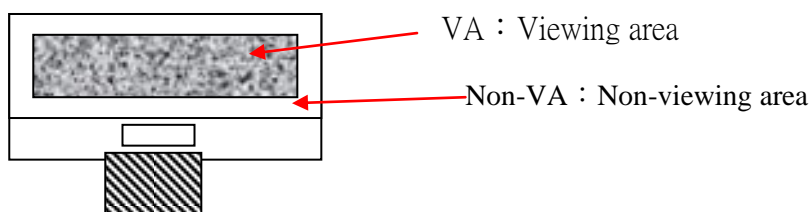
4.4　　Inspection with naked eyes（exclusive of the inspection of the physical dimensions of defects carried out with magnifiers）.

4.5　　Electrical properties

Inspection with the test jigs against the product specifications or drawings; display contents and parameters shall conform to those of the product specifications and the display effect to the sample.
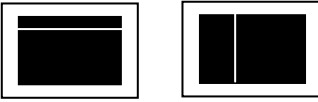
4.5.1 Test voltage（V）：

4.5.1.1 (Determined) according to the operating instruction of test jigs assuming the external circuit can be adjusted unless the customer otherwise specifies driving voltage(s). (Display) effects are controlled within the specified range of voltage variation (If no specific requirements, display effects are controlled at Vop = 9V or Vop ±0.3V when Vop is below 9V; if Vop is above 9V, display effects are controlled at Vop ±0.3% at least).For display products with the customer-specified fixed Vop, display effects are controlled by adjusting the internal circuit; if necessary, acceptable limit samples shall be built.

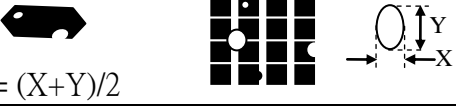4.5.2 Current Consumption（I）：refer to approved product specifications or drawings.

5·Defects and Acceptance Standards

5.1 Dimensions：the outline dimensions and the dimensions that could influence the assembly at the customer's side shall conform to those on the approved drawings.

5.2 Main Defects – Functionality Tests:

No.	Item	Description	MAJ	MIN	Acceptance Criteria
5.2.1	Missing Segments	Missing segments or dots caused by broken contact(s), loose connection or an internal open circuit.	√		Rejected
5.2.3	No display /Inaction	No segments, icons or graphics are displayed when the LCM is connected correctly.	√		Rejected
5.2.4	Mis-Display	Display pattern is deformed or jumbled-up under the normal scanning procedure.	√		Rejected
5.2.5	Wrong viewing angle	When powered up, the viewing angle at which the display is at its clearest is different from the required viewing angle or that of the approved samples.)	√		Rejected

5.2.6	Dim or Dark Display	Overall contrast is either too dark or too dim under normal operation.	√		If out of the voltage tolerance, Rejected
5.2.7	Slow response	Local response time varies when LCM is turned on or off.	√		Rejected
5.2.8	Extra segments, rows, or columns	Icons, traces, rows or columns that should not appear on the LCD screen and caused by LCD panel misalignment or insufficient corrosion.		√	Refer to dot/line standard
5.2.9	Dim segment	Under the normal voltage, the contrast of vertical and horizontal segments is uneven.		√	Reject or refer to samples
5.2.10	PI black/white spots	Partial black and white spots visible when changing display contents due to defective PI layer.		√	refer to the spot/line criteria for the visible spots when display image remains still; others OK.
5.2.11	pinhole/white spots	Deformed patterns appearing when LCD is turned on caused by missing ITO. d = (X+Y)/2		√	refer to spot/line standard
5.2.12	Pattern distortion	Segment is either wider , narrower or deformed than the specified, caused by panel misalignment, resulting in unwanted heave(s) or missing: ǀa-bǀ≤1/4W(W is the normal width)		√	Acceptable ǀa-bǀ>1/4W, rejected
5.2.13	High current	LCM current is larger than the designed value.		√	Rejected

5.3   LCD Visual Defects

5.3.1   Spot defect (defined within VA, spots out of VA do not count.)

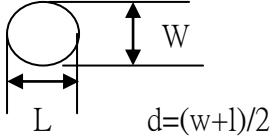| Defect	Average diameter （d）	Acceptable quantity	MAJ	MIN
Spot defect	d≤0.2	3		√

| （black spot, foreign matter, nick,　scratches, including LC mis-orientation.） | 0.2<d≤0.25 | 2 | | |
| | 0.25<d≤0.30 | 1 | | |

5.3.2　Line defects (defined within VA; those out of VA do not count.)

Defect	Length(L)	Width(W)	Acceptable quantity	MAJ	MIN
line defects (scratches, linear foreign matter)	≤5.0	≤0.02	3		√
	≤3.0	≤0.03	3		
	≤3.0	≤0.05	1		
note：　1.If the width is bigger than 0.1mm, it shall be treated as spot defect.					

5.3.3　Polarizer air bubble (defined within VA; those out of VA do not count.)

Defect	Average diameter（d）	Acceptable quantity	MAJ	MIN
Polarizer air bubble, Concave-Convex dot. $d=(w+l)/2$	d≤0.3	3		√
	0.3<d≤0.5	2		
	0.5<d≤0.8	1		

5.4　Backlight

No.	Item	Description	MAJ	MIN	Accept standard
5.4.1	Backlight not working, wrong color	/	√		Rejected
5.4.2	Color deviation	When powered on, the LCD color differs from that of the sample and is found after testing not conforming to the drawing.		√	Refer to sample and drawing
5.4.3	Brightness deviation	When powered on, the LCD brightness differs from that of the sample and is found after testing not conforming to the drawing; or if conforming to the drawing but over±30%.		√	Refer to sample and drawing
5.4.4	Uneven brightness	When powered on, the LCD brightness is uneven on the same LCD and out of the specification of the drawing.		√	Refer to sample and drawing
5.4.5	Spot/line scratch	Appearance of spot or line scratches on the LCD when turned on.		√	Refer to 6.3.1/6.3.2

5.5 Metal frame (Metal Bezel)

No.	Item	Description	MAJ	MIN	Accept standard
5.5.1	Material/surface treatment	Metal frame/surface treatment do not conform to the specifications.	√		Rejected
5.5.2	Tab twist inconformity/ Tab not twisted	Wrong twist method or direction and twist tabs are not twisted as required.	√		Rejected
5.5.3	Oxidization, chapped paint, discoloration, dents, and scratches	Oxidation on the surface of the metal bezel； the quantity of spot defect (chapped front surface paint and substrate-exposing scratches) ≤0.8mm exceeds 3; the quantity of linear defects with the length ≤5.0mm and width ≤0.05mm exceeds 2; the quantity of spot defect (front dent, bubble, side surface chapped paint and substrate-exposing scratches)≤1.0mm exceeds 3; the quantity of linear defects with the width ≤0.05mm exceeds 3.		√	Rejected
5.5.4	Burr	Burr(s) on metal bezel is so long as to get into viewing area.		√	Rejected

5.6 SMT (Refer to IPC-A-610C if not specified)

No.	Item	Description	MAJ	MIN	Accept standard
5.6.1	Soldering solder defects	Cold, false and missing soldering, solder crack and insufficient solder dissolution.		√	Rejected
5.6.2	Solder ball/splash	Solder ball/tin dross causing short at the solder point.		√	Rejected
5.6.3	DIP parts	Floated or tilted DIP parts，keypad，connectors.		√	Rejected
5.6.4	Solder shape	The welded spot should be concave and excessive or insufficient solder or solder burr on the welded spot must be rejected.		√	Rejected
5.6.5	Component pin exposure	For the DIP type components, 0.5~2mm component pin must be remained after cutting the soldered pin, and the solder surface should not be damaged nor should the component pin is fully covered with solder; otherwise		√	Reject

5.6.6	Poor Appearance	Caused by yellow-brown or black solder flux or resin or the white mist at the solder point caused by PCB cleaning.		√	reject
		rejected.			

6．Reliability test

Notes：①Reliability tests shall be done as required by the customer if they inform TCC of their special requirements when starting a project.

②Storage test at high-low temperature and functionality test shall be done with reference to the specified temperature range.

③Test conditions shall be controlled at the permissible tolerance of ±5℃.

Test item	Condition	Time(hrs)	Acceptance standard
High Storage Temp.	60°C	120	Functions and appearance are qualified before and after test
High Operating Temp.	50°C	120	
Low Storage Temp.	-10°C	120	
Low Operating Temp.	0°C	120	
Temp& Humidity Test	40°C/ 90%RH	120	
Thermal Shock	0°C ← 25°C →+50°C (30 min ← 5 min → 30min)	10 cycles	

7．Packing

Guarantee to offer ESD shield bag to protect the product from electrostatic or magnetic interference during delivery

8．Others

8.1 Items not specified in this document or released on compromise should be inspected with reference to the mutual agreement and limit samples.

12.注意事项Precaution for using LCD/LCM

After reliability test, recovery time should be 24 hours minimum. Moreover, functions, performance and appearance shall be free from remarkable deterioration within 50,000 hours（average） under ordinary operating and storage conditions room temperature (20±8°C), normal humidity (below 65% RH),

and in the area not exposed to direct sun light. Using LCM beyond these conditions will shorten the life time.

Precaution for using LCD/LCM

LCD/LCM is assembled and adjusted with a high degree of precision. Do not attempt to make any alteration or modification. The followings should be noted.

General Precautions:
1. LCD panel is made of glass. Avoid excessive mechanical shock or applying strong pressure onto the surface of display area.
2. The polarizer used on the display surface is easily scratched and damaged. Extreme care should be taken when handling. To clean dust or dirt off the display surface, wipe gently with cotton, or other soft material soaked with isoproply alcohol, ethyl alcohol or trichlorotriflorothane, do not use water, ketone or aromatics and never scrub hard.
3. Do not tamper in any way with the tabs on the metal frame.
4. Do not make any modification on the PCB without consulting TCC.
5. When mounting a LCM, make sure that the PCB is not under any stress such as bending or twisting. Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.
6. Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels and also cause rainbow on the display.
7. Be careful not to touch or swallow liquid crystal that might leak from a damaged cell. Any liquid crystal adheres to skin or clothes, wash it off immediately with soap and water.

Static Electricity Precautions:
1. CMOS-LSI is used for the module circuit; therefore operators should be grounded whenever he/she comes into contact with the module.
2. Do not touch any of the conductive parts such as the LSI pads; the copper leads on the PCB and the interface terminals with any parts of the human body.
3. Do not touch the connection terminals of the display with bare hand; it will cause disconnection or defective insulation of terminals.
4. The modules should be kept in anti-static bags or other containers resistant to static for storage.
5. Only properly grounded soldering irons should be used.
6. If an electric screwdriver is used, it should be grounded and shielded to prevent sparks.
7. The normal static prevention measures should be observed for work clothes and working benches.
8. Since dry air is inductive to static, a relative humidity of 50-60% is recommended.

Soldering Precautions:
1. Soldering should be performed only on the I/O terminals.

2. Use soldering irons with proper grounding and no leakage.
3. Soldering temperature: 350°C$\pm$10°C
4. Soldering time: 3 to 4 second.
5. Use eutectic solder with resin flux filling.
6. If flux is used, the LCD surface should be protected to avoid spattering flux.
7. Flux residue should be removed.

Operation Precautions:
1. The viewing angle can be adjusted by varying the LCD driving voltage Vo.
2. Since applied DC voltage causes electro-chemical reactions, which deteriorate the display, the applied pulse waveform should be a symmetric waveform such that no DC component remains. Be sure to use the specified operating voltage.
3. Driving voltage should be kept within specified range; excess voltage will shorten display life.
4. Response time increases with decrease in temperature.
5. Display color may be affected at temperatures above its operational range.
6. Keep the temperature within the specified range usage and storage. Excessive temperature and humidity could cause polarization degradation, polarizer peel-off or generate bubbles.
7. For long-term storage over 40°C is required, the relative humidity should be kept below 60%, and avoid direct sunlight.


Limited Warranty
TCC LCDs and modules are not consumer products, but may be incorporated by TCC's customers into consumer products or components thereof, TCC does not warrant that its LCDs and components are fit for any such particular purpose.

1. The liability of TCC is limited to repair or replacement on the terms set forth below. TCC will not be responsible for any subsequent or consequential events or injury or damage to any personnel or user including third party personnel and/or user. Unless otherwise agreed in writing between TCC and the customer, TCC will only replace or repair any of its LCD which is found defective electrically or visually when inspected in accordance with TCC general LCD inspection standard . (Copies available on request)
2. No warranty can be granted if any of the precautions state in handling liquid crystal display above has been disregarded. Broken glass, scratches on polarizer mechanical damages as well as defects that are caused accelerated environment tests are excluded from warranty.
3. In returning the LCD/LCM, they must be properly packaged; there should be detailed description of the failures or defect.

13.参考程序 Reference Program for LCD Modules

1).Module interface to MPU 接线图
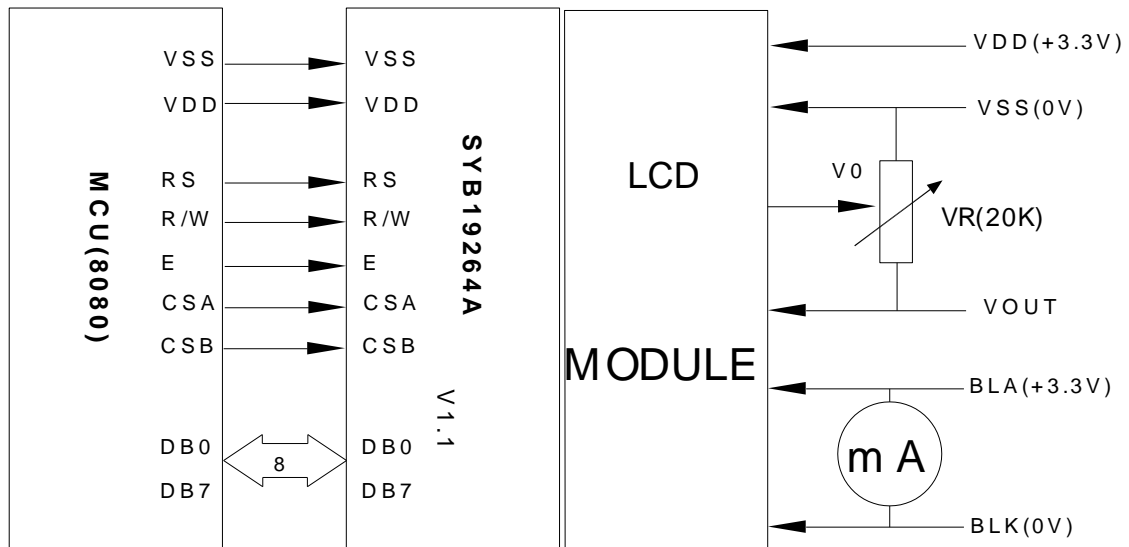
2). Reference Program 参考程序

（参考 SBN6400G 芯片资料）

```c
#include <reg52.h>
sbit E=P3^7;
sbit CSA=P2^7;
sbit CSB=P3^5;
sbit RS=P2^0;
sbit RW=P3^6;
#define lcd_data    P0
/*************************************************
函数：void read_busy()
功能：读忙函数
*****************************************************/
void read_busy()
{
    RS= 0;
    RW = 1;
    lcd_data = 0xFF;
    E   = 1;
    while(lcd_data & Lcdbusy);
    E   = 0;
}
/*************************************************
函数：void Locatexy()
功能：根据设定的坐标数据，定位 LCM 上的下一个操作单元位置
```

```
*********************************************************/
void Locatexy()
    {

    uchar   x,y;
    switch (col&0xc0)
        {
        case 0:           {lcdbusy();break;}
        case 0x40:        {lcdbusy();break;}
        case 0x80:        {lcdbusy();break;}
        }
    x = col&0x3F|SETX;
    y = row&0x07|SETY;
        read_busy();
        RS = 0;
        RW = 0;
        lcd_data = y;
        E = 1;
        E = 0;
        read_busy();
        RS= 0;
        RW = 0;
        lcd_data = x;
        E = 1;
        E = 0;
    }
/*********************************************************

函数：void lcd_datawrite(uchar X)
功能：写显示数据
*********************************************************/
void lcd_datawrite(uchar X)
    {
    Locatexy();          /*坐标定位，返回时保留分区状态不变    */
        RS = 1;
        RW = 0;
        lcd_data = X;
        E = 1;
        E = 0;
    }




void main()
```

```
{
 While(1)
{
   lcd_datawrite(0xff); //写入数据到液晶屏中
}

    }
```