深圳三元晶液晶显示科技有限公司
ShenZhen TCC LCD Hi-Tech Co., Ltd.

液晶显示模组规格书

SPECIFICATION FOR LCM MODULE

客户名称(Customer Name)：	
客户料号(Customer P/N.)：	
模组型号(TCC P/N.)：	SYB240128AV21-5C5BLN7R-B5WI
物料编号(TCC C/N.)：	
文件号(Version No.)：	
日期(Date)：	2010-11-17

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

客户确认 (Customer approval)	

※ 本公司承诺所销售产品的品质与所送样品一致
We promise that our products conform to the sample furnished in quality,
※ 若对试样产品的品质有特殊要求，请与本公司销售工程师联系。
In case of any special requirement on the quality, please feel free to contact our sales engineers.
※ 感谢您给予本公司送样承认的机会，烦请将此表签回本公司便于归档。
Thanks for awarding this opportunity of sample approval, please return this form to us for filing after authentication.

目 录 Contents

版本记录 Revision History

版本 Revision#	日期 Date	描述 Description	编制 Organizer
A0	2010-11-18	初始 Original	KeGuodong

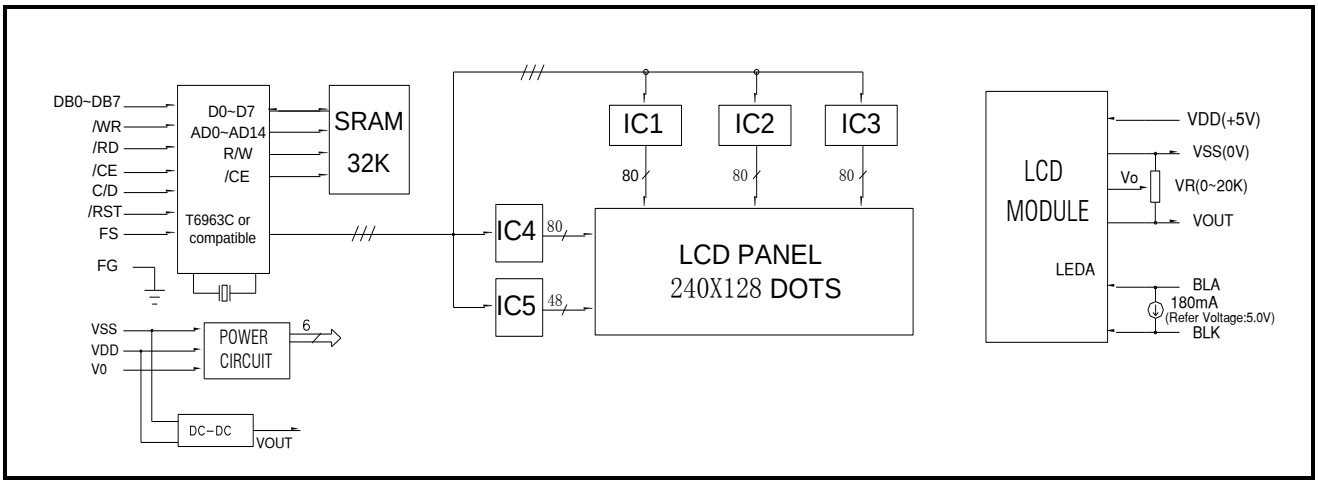
1、模组规格 Functions & Features

视角 Viewing direction	6:00		
LCD 模式 LCD mode	STN,Blue 蓝膜, Negative 反显, Transmissive 全透		
驱动方式 Driving scheme	占空比(Duty)：1/128 偏压比(Bias)：1/12		
背光颜色 Backlight color	EDGE,White		
驱动电压(VDD)	5.0V	LCD 电压(VLCD)	12.0V(Ref.)
工作温度 Operation temp	-20℃～70℃	储存温度 Storage temp	-30～80℃

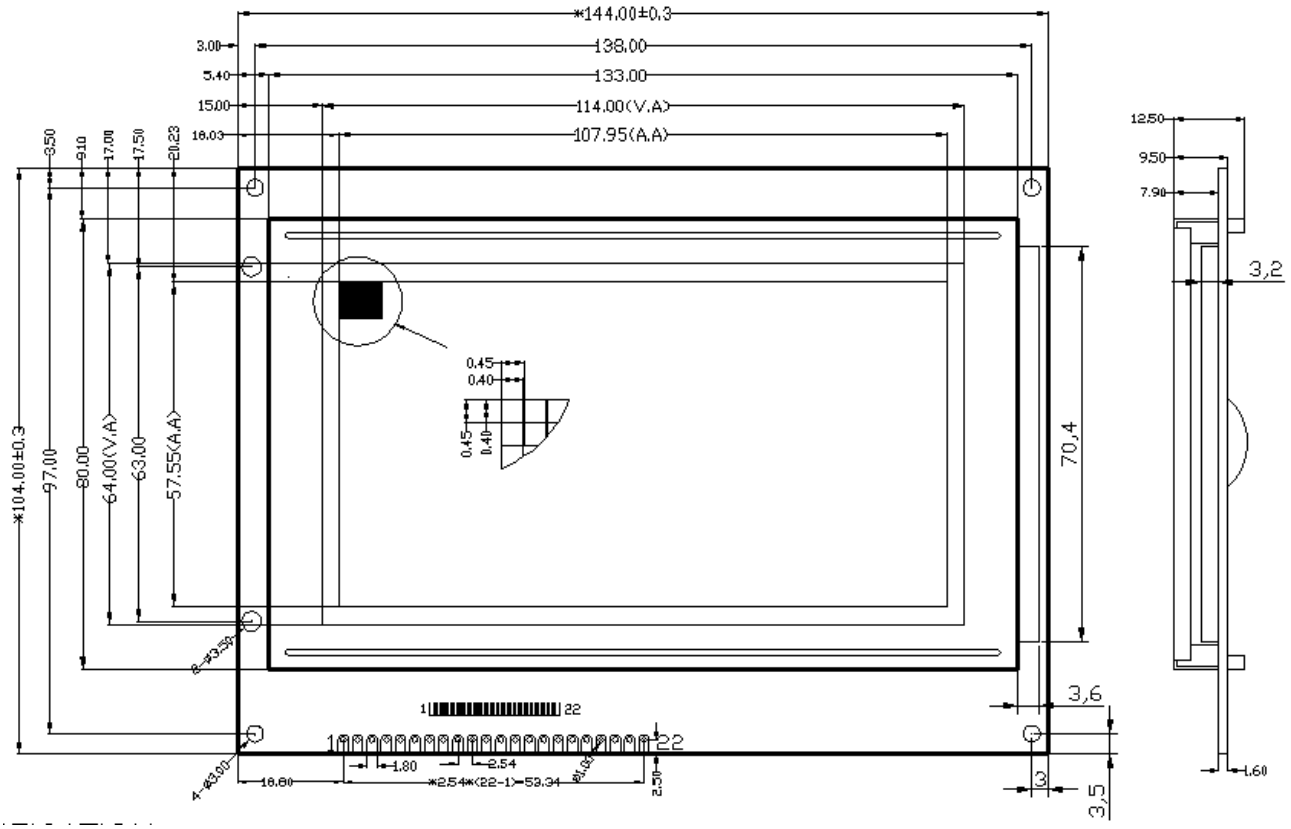
2、机械尺寸 Mechanical specifications

项目 Item	尺寸 Dimension	单位 Unit
显示容量 Number of Characters	240 x 128	dots
模组尺寸 Module size	144(L)* 104 (W)* 13.0(H)max	mm
可视区域 Viewing area	114.0 (L)*64.0(W)	mm
点间距 Dot pitch	0.45(L)*0.45(W)	mm
点大小 Dot size	0.40(L)*0.40(W)	mm

3、原理框图 Block diagram



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	FG	Frame Ground(铁框接地)
2	VSS	Power ground (电源地)
3	VDD	Power supply for Logic 电源正(+5V)
4	V0	Power supply for the (LCD drive 对比度调节端)
5	/WR	Write signal(写信号)
6	/RD	Read signal(读信号)
7	/CE	Enable signal for Chip(芯片使能，低电平效)
8	C/D	Register selection ， H: Instruction (指令) L: Data(数据)
9	/RST	Reset Signal(复位)
10~17	DB0~DB7	Data bus lines（数据总线）
18	FS	Font Select (字体选择)
19	VOUT	Negative voltage output(负压输出)

20	BLA	Anode of LED Backlight 背光电源正(+)
21	BLK	Cathode of LED Backlight 背光电源负(-)
22	NC	Not connection

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-19.0	VDD+0.3	V
输入电压 Input Voltage	Vin	-0.3	VDD+0.3	V
工作温度 Operating Temperature	Top	-20	70	℃
储存温度 Storage Temperature	Tstr	-30	80	℃

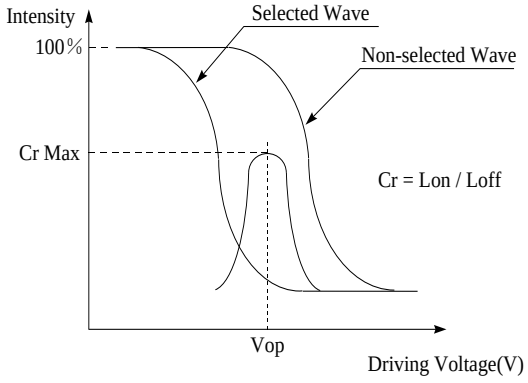
7、电性参数 Electrical characteristics

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℃	4.75	5.0	5.25	V
输入高电压 Input High Voltage	VIH	Ta = 25℃	VDD-2.2	---	VDD	V
输入低电压 Input Low Voltage	VIL	Ta = 25℃	0	---	0.8	V
输出高电压 Output High Voltage	VOH	Ta = 25℃	VDD-3.3	---	VDD	V
输出低电压 Output Low Voltage	VOL	Ta = 25℃	0	---	3.3	V
模块电流 Supply Current	IDD	Ta = 25℃	---	30	60	mA

8、光电特性 Electro-Optical characteristics

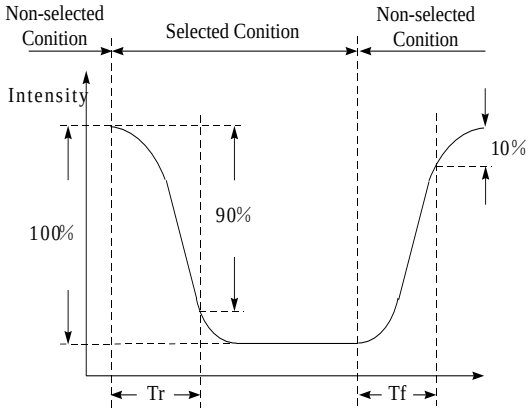
项目 Item	标号 Symbol	条件 Condition	最小 MIN	典型 Typ	最大 MAX	单位 Unit
工作电压 Operating Voltage	Vop	Ta = 0°C	---	---	---	V
		Ta = +25°C	11.8	12.0	12.3	
		Ta = +50°C	---	---	---	
响应时间 Response time	Tr	Ta = 25°C	---	185	---	ms
	Tf		---	200	---	ms
对比度 Contrast Ratio	Cr	Ta = 25°C	---	3	---	---
视角范围 Viewing angle range	θ	Cr≧2	-10	---	+40	deg
	Φ		-30	---	+30	deg

Definition of Operation Voltage (Vop)



[positive type]

Definition of Response Time (Tr , Tf)



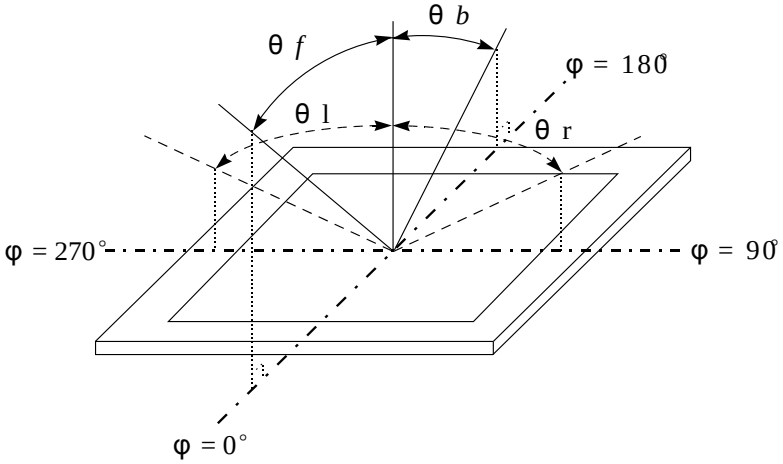
[positive type]

Conditions :

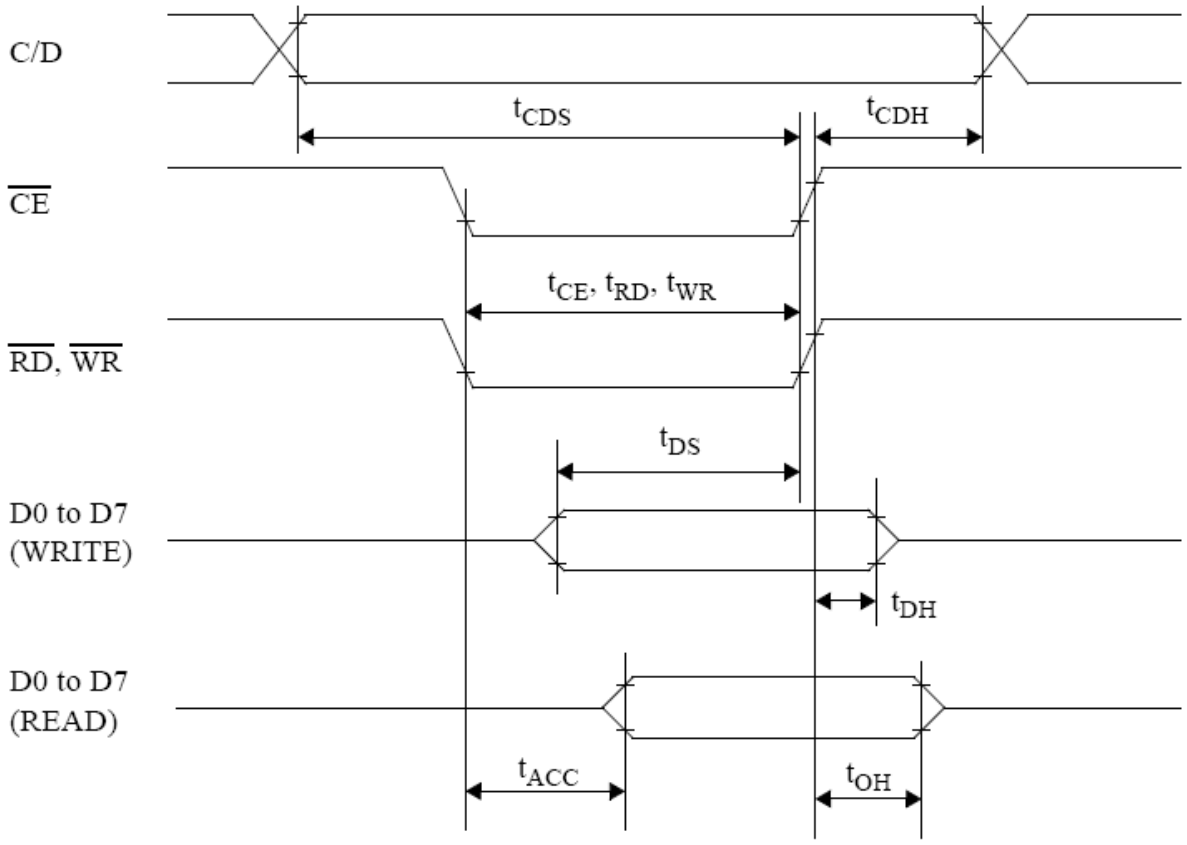
Operating Voltage : Vop　　Viewing Angle(θ ， φ) : 0°， 0°

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



Test Conditions(Unless Otherwise Noted, V_{DD}=5.0± 10%, V_{ss}=0V, Ta=-20 to 75℃)

Item	Symbol	Test Conditions	Min	Max	Unit
C/D Set-up Time	t_{CDS}	_	100	_	ns
C/DHold Time	t_{CDH}	_	10	_	ns
CE, RD, WR Pulse Width	t_{CE}, t_{RD}, t_{WR}	_	80	_	ns
Data Set-up Time	t_{DS}	_	80	_	ns
Data Hold Time	t_{DH}	_	40	_	ns
Access Time	t_{ACC}	_	_	150	ns
Output Hold Time	t_{OH}	_	10	50	ns

10.显示指令表 Control and display instruction

COMMAND	CODE	D1	D2	FUNCTION
REGISTERS SETTING	00100001 00100010 00100100	X address Data Low address	Y address 00H High address	Set Cursor Pointer Set Offset Register Set Address Pointer
SET CONTROL WORD	01000000 01000001 01000010 01000011	Low address Columns Low address Columns	High address 00H High address 00H	Set Text Home Address Set Text Area Set Graphic Home Address Set Graphic Area
MODE SET	1000*000 1000*001 1000*011 1000*100 10000*** 10001***	- - - - - -	- - - - - -	OR mode EXOR mode AND mode Text Attribute mode Internal CG ROM mode External CG RAM mode
DISPLAY MODE	10010000 1001**10 1001**11 100101** 100110** 100111**	- - - - - -	- - - - - -	Display off Cusor on, blink off Cursor on, blink on Text on, graphic off Text off, graphic on Text on, graphic on
CURSOR PATTERN SELECT	10100000 10100001 10100010 10100011 10100100 10100101 10100110 10100111	- - - - - - - -	- - - - - - - -	1-line cursor 2-line cursor 3-line cursor 4-line cursor 5-line cursor 6-line cursor 7-line cursor 8-line cursor
DATA AUTO READ/ WRITE	10110000 10110001 10110010	- - -	- - -	Set Data Auto Write Set Data Auto Read Auto Reset
DATA READ/WRITE	11000000 11000001 11000010 11000011 11000100 11000101	Data - Data - Data -	- - - - - -	Data Write and Increment ADP Data Read and Increment ADP Data Write and Decrement ADP Data Read and Decrement ADP Data Write and Nonvariable ADP Data Read and Nonvariable ADP
SCREEN PEEK	11100000	-	-	Screen Peek
SCREEN COPY	11101000			Screen Copy
BIT SET/RESET	11110*** 11111*** 1111*000 1111*001 1111*010 1111*011 1111*100 1111*101 1111*110 1111*111	- - - - - - - - - -	- - - - - - - - - -	Bit Reset Bit Set Bit 0 (LSB) Bit 1 Bit 2 Bit 3 Bit 4 Bit 5 Bit 6 Bit 7 (MSB)

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.

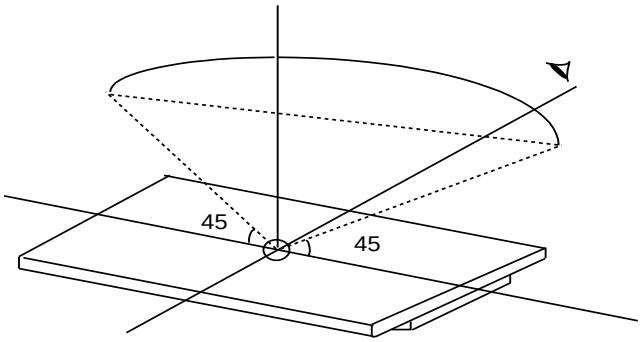
3.1.5 IEC-61000-4-2 Electrostatic Discharge immunity Tests

3.1.6 CISPR 22 Class B Conductive & Radiation limits

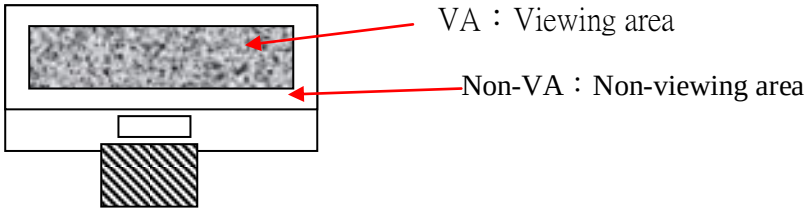
4・Inspection Conditions and Inspection Reference

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



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）：

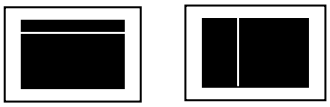
4.5.1.1 (Determined) according to the operating instruction of test jigs assuming the external circuit can be adjusted unless the customer otherwise specifies driving voltage(s). (Display) effects are controlled within the specified range of voltage variation (If no specific requirements, display effects 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.

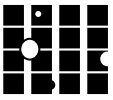
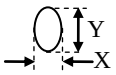
4.5.2 Current Consumption（I）：refer to approved product specifications or drawings.

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	√		Rejected

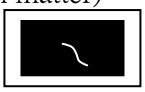
		under the normal scanning procedure.			
5.2.5	Wrong viewing angle	When powered up, the viewing angle at which the display is at its clearest is different from the required viewing angle or that of the approved samples.)	√		Rejected
5.2.6	Dim or Dark Display	Overall contrast is either too dark or too 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: Ia-Ib≤1/4W(W is the normal width) 		√	Acceptable Ia-Ib>1/4W, rejected
5.2.13	High current	LCM current is larger than the designed value.		√	Rejected

5.3 LCD Visual Defects

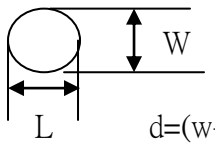
5.3.1 Spot defect (defined within VA, spots out of VA do not count.)

Defect	Average diameter (d)	Acceptable quantity	MAJ	MIN
Spot defect (black spot, foreign matter, nick, scratches, including LC mis-orientation.)	d≤0.2	3		√
	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		√	Refer to sample and drawing

		over±30%.			
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 rejected.		√	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

6・Reliability test

Test item	Condition	Time(hrs)	Acceptance standard
High Storage Temp.	80°C	120	Functions and appearance are qualified before and after test
High Operating Temp.	70°C	120	
Low Storage Temp.	-30°C	120	
Low Operating Temp.	-20°C	120	
Temp& Humidity Test	40°C/ 90%RH	120	
Thermal Shock	-20°C ← 25°C →+70°C (30 min ← 5 min → 30min)	10 cycles	

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℃.

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±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

Reference Program 参考程序

```
/**********12M Oscillator ************/
#include<reg52.h>
#include<intrins.h>

#define uchar unsigned char    //数据类型定义
#define uint unsigned int    //数据类型定义
/*******************************************************
函数：void lcd_cmdwrite(uint addr)
功能：写命令到 LCD 中
*******************************************************/
void lcd_cmdwrite(uchar addr)
{
   lcd_cd=1;
   lcd_cs=0;
   lcd_rd=1;
   lcd_wr=0;
   lcd_data=addr;
   lcd_wr=1;
   lcd_cs=1;
}
/*******************************************************
函数：void lcd_datawrite(uchar    dat)
功能：把数据写到 LCD 中
*******************************************************/
void lcd_datawrite(uchar    dat)
{
   lcd_cd=0;    //数据
   lcd_cs=0;
   lcd_rd=1;
   lcd_wr=0;
   lcd_data=dat;
   lcd_wr=1;
   lcd_cs=1;
}

/*******************************************************
函数: lcd_clear_ram()
功       能: 清理 LCD32k 的内存
*******************************************************
void lcd_clear_ram()
{
      uint i;
```

```
    lcd_datawrite(0x00);
    lcd_datawrite(0x00);
    lcd_cmdwrite(0x24);
    for (i=0;i<0x8000;i++)
    {
        lcd_datawrite(0x00);            // 写入数据 0x00
        lcd_cmdwrite(0xc0);         // 0xc0 为数据写入、增加指针  命令
    }
}
/*****************************************************
函数名称: lcd_clear_screen()
功      能: 清理 LCD 屏幕
*****************************************************/
void lcd_clear_screen(void)
{
    uint i;
    lcd_datawrite(0x00);
    lcd_datawrite(0x00);
    lcd_cmdwrite(0x24);
   for (i=0;i<3840;i++)                //
    {
        lcd_datawrite(0x00);            // 写入数据 0x00
        lcd_cmdwrite(0xc0);         // 0xc0 为数据写入、增加指针  命令
    }
}
/*****************************************************
函数名称: lcd_initial()
功      能: 初始化 LCD
*****************************************************/
void lcd_init(void)
{
     melay(10);
     lcd_datawrite(0x00);
     lcd_datawrite(0x00);
     lcd_cmdwrite(0x40);

     lcd_datawrite(0x00);
     lcd_datawrite(0x00);
     lcd_cmdwrite(0x42);

     lcd_datawrite(30);
     lcd_datawrite(0x00);
     lcd_cmdwrite(0x41);
```

```
        lcd_datawrite(30);
        lcd_datawrite(0x00);
        lcd_cmdwrite(0x43);

        lcd_datawrite(0x1c);
        lcd_datawrite(0x00);
        lcd_cmdwrite(0x22);

        lcd_cmdwrite(0x80);     //或方式显示
}
/*****************************************************
函数名称:void display_string(uchar x, y, unsigned char *string)
功       能: 向指定坐标写 n 个 CGROM 字符
 参       数: 坐标：x(0~29)，y(0~15),string
*****************************************************/
void display_string(uchar x, y, uchar code *string,bit FS)
{
   uint i;
   if(FS)fs=1;
     else fs=0;
   lcd_cmdwrite(0x94);
   lcd_datawrite(x);
   lcd_datawrite(y);
   lcd_cmdwrite(0x24);

   for(i=0;i<480;i++)
     {
     lcd_datawrite(string[i]-0x20); //设成 ASCII 码
     lcd_cmdwrite(0xc0);
     }
}
void main()
{
          uchar j,a;
          fs=0;
          lcd_init();
          lcd_clear_screen();
          while(1);
{
      display_string(0,0,english,0);   (显示字符)
     }
          }
}
```