SPECIFICATION

产品说明书

Revision;1.0

版本：1.0

Model/型号：LCM320160-G101

中山市锦润电子有限公司 制作(PRO.)： 审核(REV.)： 批准(APP.)：	CUSTOMER/客户: 确认(PRO.)： 审核(REV.)： 批准(APP.)：

REVISION RECORD

修改记录

REV NO. 版本号	REV DATE 修改日期	CONTENTS 内容	REMARKS 注释
1.0	2024-5-28	First release	/

CONTENTS
内容

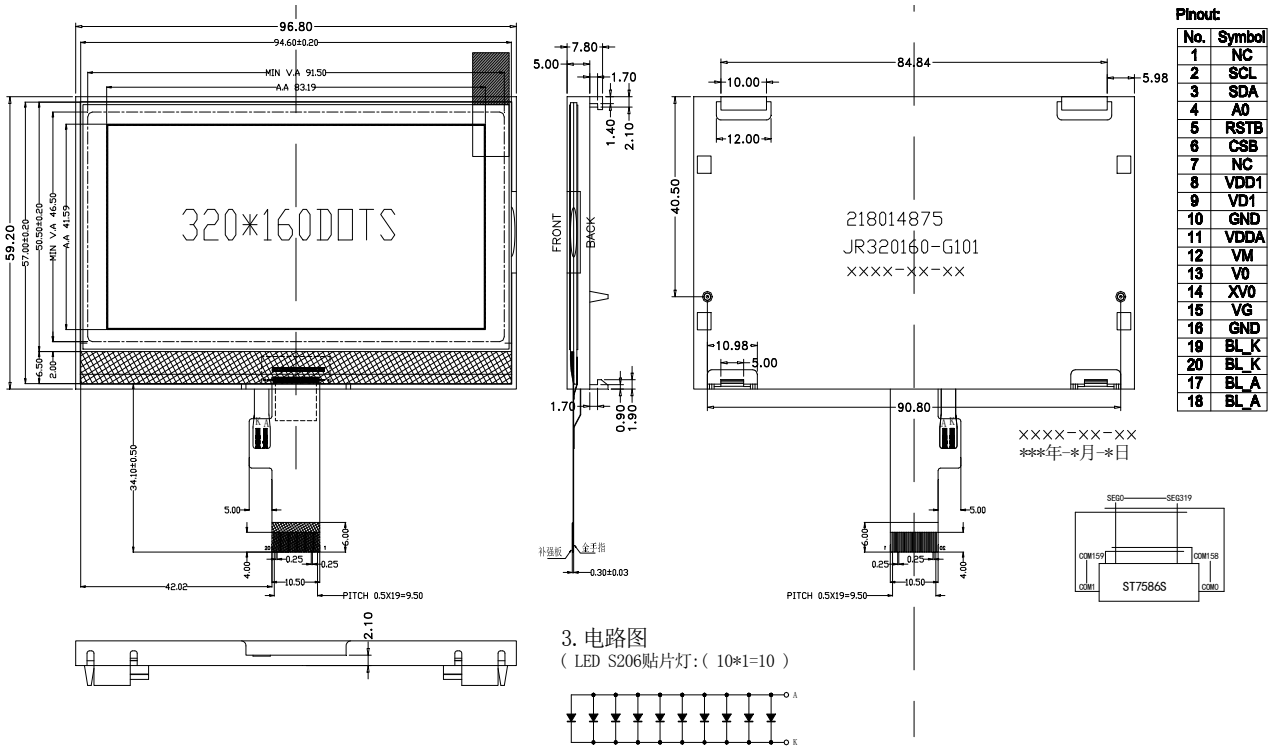
■ GENERAL INFORMATION

主要特征描述

ITEM OF GRNERAL INFORMATION 项目	CONTENTS 内容	UNIT 单位
LCD Type 液晶显示类型	FSTN /POSITIVE/TRANSFLECTIVE	/
Recommended Viewing Direction 模块推荐使用方向	6:00	O’ Clock
Module area (W*H*T) 模块外围尺寸（宽*高*厚）	96.80×59.20×5.00MM（不含定位柱和卡扣）	mm
Viewing area (W*H) 可视区域（宽*高）	91.50×46.50	mm
Active area (W*H) 有效区域（宽*高）	83.19×41.59	mm
Number of Dots 点阵	320×160	/
Pixel pitch (W*H) 像素间隙(宽*高)	0.26×0.26	mm
Driver IC 驱动集成电路	ST7586S	/
Interface Type 接口类型	SPI Interface	/
Input voltage 输入电压	3.0V	V
Module Power consumption 模块功耗	TBD	mW
Backlight Type 背光类型	LED WHITE	/

■ EXTERANL DIMENSIONS

外形尺寸



INTERFACE DESCRIPTION

接口定义描述

Interface NO. 接口序号	Symbol 符号	I/O or connect to 输入/出或连接到	Description 描述
1	NC	–	NC
2	SCL	I	Serial clock input.
3	SDA	IO	Serial data input.
4	A0	I	The function of this pin is different in parallel and serial interface. In parallel interface: A0 is register selection input. A0=”H”: inputs on data bus are display data; A0=”L”: inputs on data bus are command. In serial interface: this pin will be used as SCL(serial-clock)input
5	RSTB	I	Reset input pin. When /RST is ”L”, internal initialization procedure is executed.
6	CSB	I	Chip select input pin. /CS=”L”: This chip is selected and the MPU interface is active. /CS=”H”: This chip is not selected and the MPU interface is disabled(D[7:0] are high impedance).
7	NC	–	NC
8	VDD1	P	VDD1 is the power of interface I/O circuit.
9	VD1	P	Digital power source.

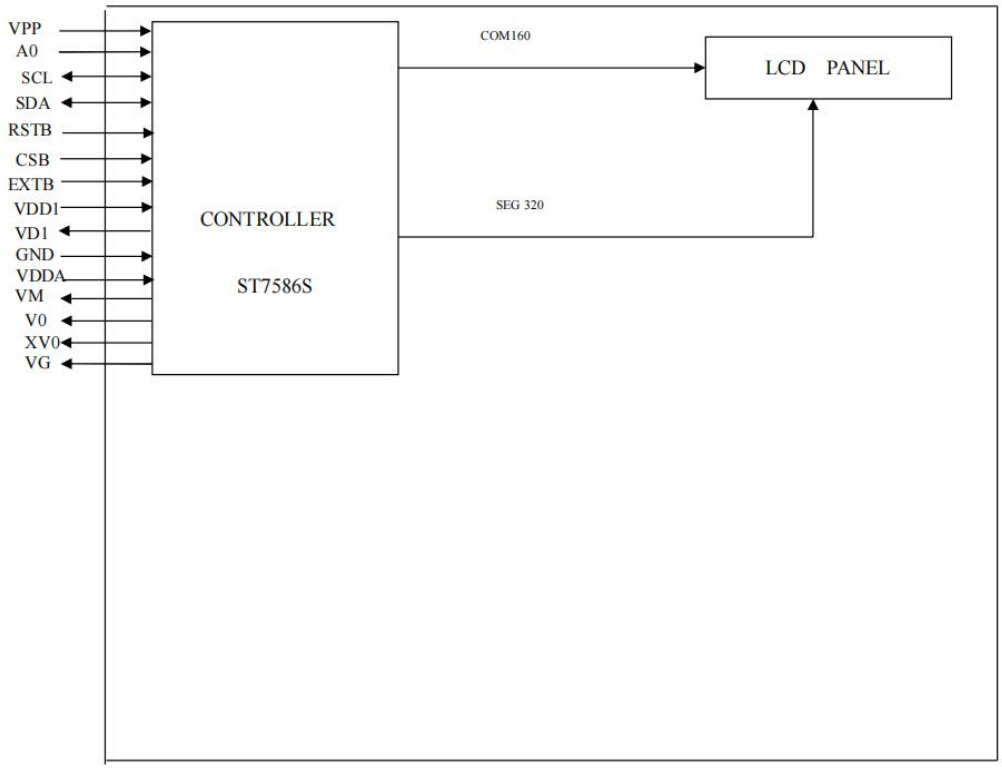
10	GND	P	Ground.
11	VDDA	P	VDDA is the analog power.
12	VM	P	VM is the non-select voltage level of COM-drivers.
13	VO	P	Positive operating voltage of COM-drivers.
14	XVO	P	Negative operating voltage of COM-drivers.
15	VG	P	VG is the power of SEG-drivers.
16	GND	P	Ground .
17~18	BLK	P	Cathode of Bachlight.
19~20	BLA	P	Anode of Bachlight.

■ REFERENCE APPLICATION CIRCUIT

参考应用电路

1、 BLOCK DIAGRAM

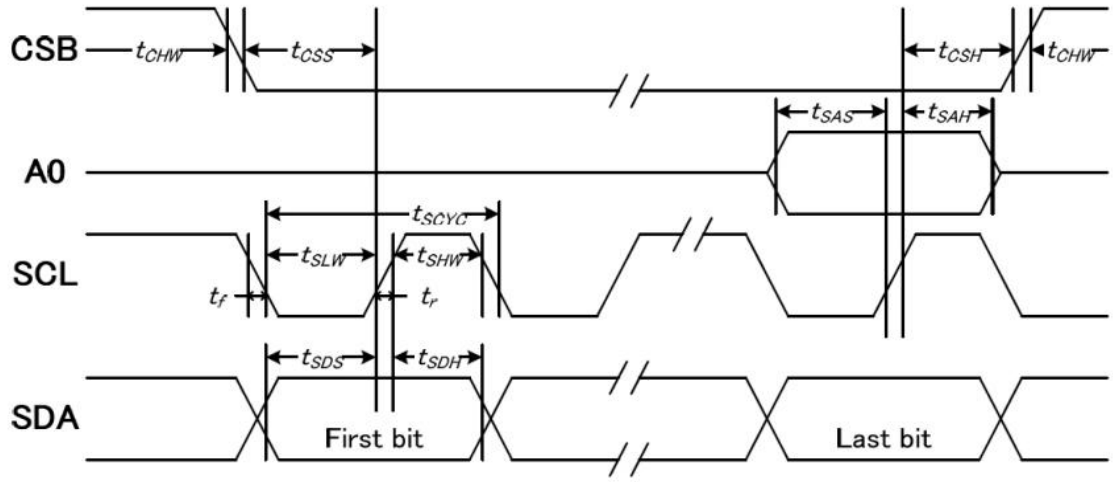
模块框图



■ TIMING CHARACTERISTICS

时序特征

System Bus Timing for 4-Line SPI MCU Interface



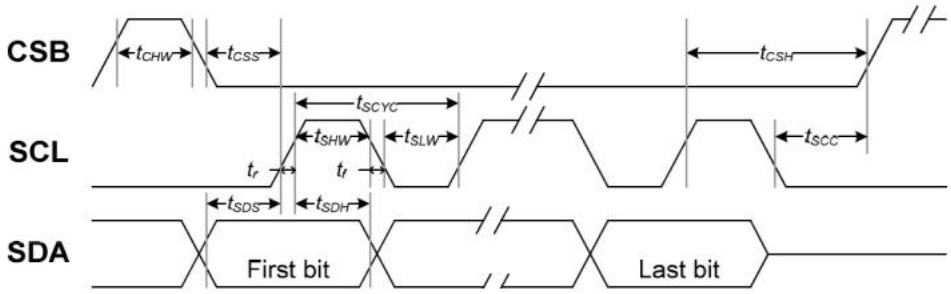
VDD1 = 1.8~3.3V, Ta = 25°C

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Serial clock period	SCLK	tSCYC		100	—	ns
SCLK “H” pulse width		tSHW		45	—	
SCLK “L” pulse width		tSLW		45	—	
Address setup time	A0	tSAS		20	—	
Address hold time		tSAH		20	—	
Data setup time	SDA	tSDS		20	—	
Data hold time		tSDH		20	—	
CSB-SCLK time	CSB	tCSS		20	—	
CSB-SCLK time		tCSH		20	—	
CS “H” pulse width		tCHW		0	—	

Note:

1. The input signal rise and fall time (tr, tf) are specified at 15 ns or less.
2. All timing is specified using 20% and 80% of VDD1 as the standard.

System Bus Timing for 3-Line SPI MCU Interface



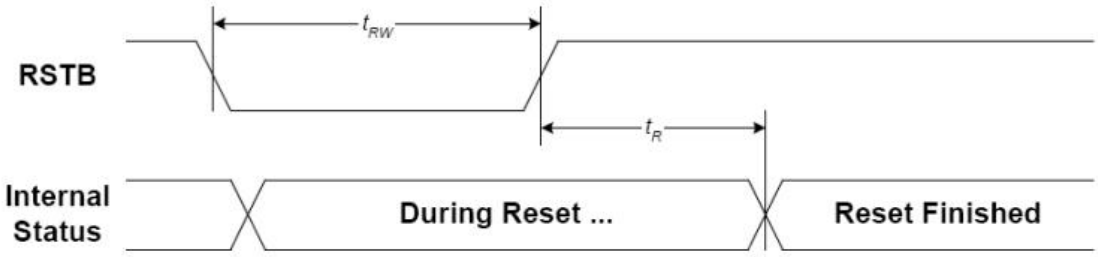
VDD1 = 1.8~3.3V, Ta = 25℃

Item	Signal	Symbol	Condition	Rating		Unit
				Min.	Max.	
Serial Clock Period	SCLK	tSCYC		100	—	ns
SCL “H” pulse width		tSHW		45	—	
SCL “L” pulse width		tSLW		45	—	
Data setup time	SDA	tSDS		20	—	
Data hold time		tSDH		20	—	
CS-SCL time	CSB	tCSS		30	—	
		tCSH		30	—	
CS “H” pulse width		tCHW		0	—	

Note:

1. The input signal rise and fall time (tr, tf) are specified at 15 ns or less.
2. All timing is specified using 30% and 70% of VDD1 as the standard.

Reset Timing



VDD1 = 1.8~3.3V, Ta = 25°C

Item	Symbol	Condition	Min.	Max.	Unit
Reset time	tR		120	—	ms
Reset "L" pulse width	tRW		10	—	us

Please refer ST7586S DATASHEES

具体请详细参考 ST7586S 规格书

■ COMMAND DESCRIPTION

命令描述

INSTRUCTION TABLE

INSTRUCTION	A0	R/W	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
NOP	0	0	0	0	0	0	0	0	0	0	No operation
RESET	0	0	0	0	0	0	0	0	0	1	Software reset
Power Save	0	0	0	0	0	1	0	0	0	SLP	Set power save mode SLP=0: Sleep in mode SLP=1: Sleep out mode
Partial Mode	0	0	0	0	0	1	0	0	1	PTL	Set partial mode PTL=0: Partial mode on PTL=1: Partial mode off
Inverse Display	0	0	0	0	1	0	0	0	0	INV	Set inverse display mode INV=0: Normal display INV=1: Inverse display
All Pixel ON/OFF	0	0	0	0	1	0	0	0	1	AP	Set all pixel on mode AP=0: All pixel off mode AP=1: All pixel on mode
Display ON/OFF	0	0	0	0	1	0	1	0	0	DSP	Set LCD display DSP=0: Display off DSP=1: Display on
Set Column Address	0	0	0	0	1	0	1	0	1	0	Set column address Starting column address: 00h≦XS≦7Fh Ending column address: XS≦XE≦7Fh
	1	0	XS15	XS14	XS13	XS12	XS11	XS10	XS9	XS8	
	1	0	XS7	XS6	XS5	XS4	XS3	XS2	XS1	XS0	
	1	0	XE15	XE14	XE13	XE12	XE11	XE10	XE9	XE8	
	1	0	XE7	XE6	XE5	XE4	XE3	XE2	XE1	XE0	
Set Row Address	0	0	0	0	1	0	1	0	1	1	Set row address Starting row address: 00h≦YS≦9Fh Ending row address: YS≦YE≦9FH
	1	0	YS15	YS14	YS13	YS12	YS11	YS10	YS9	YS8	
	1	0	YS7	YS6	YS5	YS4	YS3	YS2	YS1	YS0	
	1	0	YE15	YE14	YE13	YE12	YE11	YE10	YE9	YE8	
	1	0	YE7	YE6	YE5	YE4	YE3	YE2	YE1	YE0	
Write Display Data	0	0	0	0	1	0	1	1	0	0	Write display data to DDRAM
	1	0	D7	D6	D5	D4	D3	D2	D1	D0	
Read Display Data	0	0	0	0	1	0	1	1	1	0	Read display data from DDRAM
	1	1	D7	D6	D5	D4	D3	D2	D1	D0	
Partial Display Area	0	0	0	0	1	1	0	0	0	0	Set partial area Partial display address start: 00h≦PTS≦9Fh Partial display address end: 00h≦PTE≦9Fh Display Area: 64≦Duty≦160
	1	0	PTS15	PTS14	PTS13	PTS12	PTS11	PTS10	PTS9	PTS8	
	1	0	PTS7	PTS6	PTS5	PTS4	PTS3	PTS2	PTS1	PTS0	
	1	0	PTE15	PTE14	PTE13	PTE12	PTE11	PTE10	PTE9	PTE8	
	1	0	PTE7	PTE6	PTE5	PTE4	PTE3	PTE2	PTE1	PTE0	
Scroll Area	0	0	0	0	1	1	0	0	1	1	Set scroll area Top Area: TA=00h~A0h Scrolling Area: SA=00h~A0h Bottom Area: BA=00h~A0h TA+SA+BA=160
	1	0	TA7	TA6	TA5	TA4	TA3	TA2	TA1	TA0	
	1	0	SA7	SA6	SA5	SA4	SA3	SA2	SA1	SA0	
	1	0	BA7	BA6	BA5	BA4	BA3	BA2	BA1	BA0	
Display Control	0	0	0	0	1	1	0	1	1	0	Set scan direction of COM and SEG MY=0: COM0→COM159 MY=1: COM159→COOM0 MX=0: SEG0→SEG383 MX=1: SEG383→SEG0
	1	0	MY	MX	0	0	0	0	0	0	
Start Line	0	0	0	0	1	1	0	1	1	1	Set display start line S=00h~9Fh
	1	0	S7	S6	S5	S4	S3	S2	S1	S0	

INSTRUCTION	A0	R/W	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
Display Mode	0	0	0	0	1	1	1	0	0	M	Set display mode M=0: Gray mode M=1: Monochrome mode
Enable DDRAM Interface	0	0	0	0	1	1	1	0	1	0	Enable DDRAM interface
	1	0	0	0	0	0	0	0	1	0	
Display Duty	0	0	1	0	1	1	0	0	0	0	Set display duty DT=03h~9Fh
	1	0	DT7	DT6	DT5	DT4	DT3	DT2	DT1	DT0	
First Output COM	0	0	1	0	1	1	0	0	0	1	Set first output COM FC=00h~9Fh
	1	0	FC7	FC6	FC5	FC4	FC3	FC2	FC1	FC0	
FOSC Divider	0	0	1	0	1	1	0	0	1	1	Set FOSC dividing ratio
	1	0	0	0	0	0	0	0	FOD1	FOD0	
Partial Display	0	0	1	0	1	1	0	1	0	0	Set partial display mode
	1	0	1	0	1	0	0	0	0	0	
N-Line Inversion	0	0	1	0	1	1	0	1	0	1	Set N-Line inversion
	1	0	M	0	0	NL4	NL3	NL2	NL1	NL0	
Read Modify Write	0	0	1	0	1	1	1	0	0	RMW	Read modify write control RMW=0: Enable read modify write RMW=1: Disable read modify write
Set Vop	0	0	1	1	0	0	0	0	0	0	Set Vop
	1	0	Vop7	Vop6	Vop5	Vop4	Vop3	Vop2	Vop1	Vop0	
	1	0	-	-	-	-	-	-	-	Vop8	
Vop Increase	0	0	1	1	0	0	0	0	0	1	Vop increase one step
Vop Decrease	0	0	1	1	0	0	0	0	1	0	Vop decrease one step
BIAS System	0	0	1	1	0	0	0	0	1	1	Set BIAS system
	1	0	-	-	-	-	-	BS2	BS1	BS0	
Booster Level	0	0	1	1	0	0	0	1	0	0	Set booster level
	1	0	-	-	-	-	-	BST2	BST1	BST0	
Vop Offset	0	0	1	1	0	0	0	1	1	1	Set Vop offset
	1	0	0	VOF6	VOF5	VOF4	VOF3	VOF2	VOF1	VOF0	
Analog Control	0	0	1	1	0	1	0	0	0	0	Enable analog circuit
	1	0	0	0	0	1	1	1	0	1	
Auto Read Control	0	0	1	1	0	1	0	1	1	1	Auto read control XARD=0: Enable auto read XARD=1: Disable auto read
	1	0	1	0	0	XARD	1	1	1	1	
OTP WR/RD Control	0	0	1	1	1	0	0	0	0	0	OTP WR/RD control WR/RD=0: Enable OTP read WR/RD=1: Enable OTP write
	1	0	0	0	WR /RD	0	0	0	0	0	
OTP Control Out	0	0	1	1	1	0	0	0	0	1	OTP control out
OTP Write	0	0	1	1	1	0	0	0	1	0	OTP programming procedure
OTP Read	0	0	1	1	1	0	0	0	1	1	OTP up-load procedure
OTP Selection Control	0	0	1	1	1	0	0	1	0	0	OTP selection control Ctrl=0: Disable OTP Ctrl=1: Enable OTP
	1	0	0	Ctrl	0	1	1	0	0	1	
OTP Programming Setting	0	0	1	1	1	0	0	1	0	1	OTP programming setting
	1	0	0	0	0	0	1	1	1	1	

INSTRUCTION	A0	R/W	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
Frame Rate (Gray Scale Mode)	0	0	1	1	1	1	0	0	0	0	Frame rate setting in different temperature range (Gray scale mode)
	1	0	-	-	-	FRA4	FRA3	FRA2	FRA1	FRA0	
	1	0	-	-	-	FRB4	FRB3	FRB2	FRB1	FRB0	
	1	0	-	-	-	FRC4	FRC3	FRC2	FRC1	FRC0	
	1	0	-	-	-	FRD4	FRD3	FRD2	FRD1	FRD0	
Frame Rate (Monochrome Mode)	0	0	1	1	1	1	0	0	0	1	Frame rate setting in different temperature range (Monochrome mode)
	1	0	-	-	-	FRA4	FRA3	FRA2	FRA1	FRA0	
	1	0	-	-	-	FRB4	FRB3	FRB2	FRB1	FRB0	
	1	0	-	-	-	FRC4	FRC3	FRC2	FRC1	FRC0	
	1	0	-	-	-	FRD4	FRD3	FRD2	FRD1	FRD0	
Temperature Range	0	0	1	1	1	1	0	0	1	0	Temperature range setting
	1	0	-	TA6	TA5	TA4	TA3	TA2	TA1	TA0	
	1	0	-	TB6	TB5	TB4	TB3	TB2	TB1	TB0	
	1	0	-	TC6	TC5	TC4	TC3	TC2	TC1	TC0	
Temperature Gradient Compensation	0	0	1	1	1	1	0	1	0	0	Set temperature gradient compensation coefficient
	1	0	MT13	MT12	MT11	MT10	MT03	MT02	MT01	MT00	
	1	0	MT33	MT32	MT31	MT30	MT23	MT22	MT21	MT20	
	1	0	MT53	MT52	MT51	MT50	MT43	MT42	MT41	MT40	
	1	0	MT73	MT72	MT71	MT70	MT63	MT62	MT61	MT60	
	1	0	MT93	MT92	MT91	MT90	MT83	MT82	MT81	MT80	
	1	0	MTB3	MTB2	MTB1	MTB0	MTA3	MTA2	MTA1	MTA0	
	1	0	MTD3	MTD2	MTD1	MTD0	MTC3	MTC2	MTC1	MTC0	
	1	0	MTF3	MTF2	MTF1	MTF0	MTE3	MTE2	MTE1	MTE0	

Please refer ST7586S DATASHEES

具体请详细参考 ST7586S 规格书

■ MAXIMUM ABSOLUTE RATINGS

极限参数

Parameter of absolute maximum ratings 参数	Symbol 符号	Min 最小值	Max 最大值	Unit 单位
Supply voltage for logic 逻辑电压	VDD1	-0.3	3.6	V
Supply Voltage for LCD LCD 电压	VLCD	-0.3	19	V
Input Voltage 输入电压	Vin	-0.3	VDD	V
Supply Current for Backlight 背光电流	If(Ta=25° C)	-	200	mA
Operating temperature 操作温度	TOP	-20	70	° C
Storage temperature 储存温度	TST	-30	80	° C

Note: Absolute maximum ratings means the product can withstand short-term, NOT more than 240 hours. If the product is a long time to withstand these conditions, the life time would be shorter.

备注:极限条件仅指产品能短暂承受的范围,不可超过 240 小时。如果产品长时间在极限条件,将有损产品的使用寿命。

■ ELECTRICAL CHARACTERISTICS

模块电气特性

DC CHARACTERISTICS

直流特性

Parameter of DC characteristics 参数	Symbol 符号	Min 最小值	Typ 典型值	Max 最大值	Unit 单位
Supply voltage for logic 逻辑电压	VDD	2.85	3.0	3.15	V
Supply Voltage for LCD LCD 电压	VLCD	16.2	16.4	16.6	V
Input voltage 'H' level 输入高电平	VIH	0.7VDD	-	VDD	V
Input voltage 'L' level 输入低电平	VIL	VSS	-	0.3VDD	V
Output voltage 'H' level 输出高电平	VOH	0.7VDD	-	VDD	V
Output voltage 'L' level 输出低电平	VOL	VSS	-	0.3VDD	V
Supply Current 模块电流	Idd(注 1)	-	2.8	4.2	mA

(注 1)：V_{DD}=3.0V，Pattern= transverse line display

■ BACKLIGHT CHARACTERISTICS

背光电气特性

Item of backlight characteristics 项目(Yellow-Green Blacklight)	Symbol 符号	Min. 最小值	Typ. 典型值	Max. 最大值	Unit 单位	Condition 条件
Forward voltage 正向电压	Vf	2.7	2.9	3.1	V	If=120mA
Number of LED 灯数	-	-	10	-	Piece	-
Blacklight Colour 背光颜色	-	-	WHITE	-	-	-

■ ELECTRO-OPTICAL CHARACTERISTICS

光电参数

Item of backlight characteristics 项目	Symbol 符号	Condition 条件	Min. 最小值	Typ. 典型值	Max. 最大值	Unit 单位	Remark 注释	Note 备注
Response time 响应时间	Tr	θ=0° ø=0° Ta=25℃	-	180	280	ms	FIG 1	4
	Tf		-	200	300			
Contrast ratio 对比度	Cr		15:1	20:1	-	-	FIG 2	1
Luminance uniformity 均匀度	δ WHITE		75	-	-	%		3
Surface Luminance 表面亮度	Lv		-	-	-	cd/m2		2
Viewing angle range 视角范围	θ	ø = 90°	-10	20	-	deg	FIG 3	6
		ø = 270°	25	35	-	deg		
		ø = 0°	20	30	-	deg		
		ø = 180°	-20	-30	-	deg		

Note1. Contrast Ratio(CR) is defined mathematically by the following formula. For more information see FIG 2.

$$\text{Contrast Ratio(CR)} = \frac{\text{Average Surface Luminance with all white pixels (P1, P2, ……)}}{\text{Average Surface Luminance with all black pixels (P1, P2, ……)}}$$

备注 1. 对比度是由以下公式计算所得。详见 FIG 2.

$$\text{对比度} = \frac{\text{显示白色画面时平均表面亮度(P1,P2,…)}}{\text{显示黑色画面时平均表面亮度(P1,P2,…)}}$$

Note2. Surface luminance is the LCD surface luminance with all white pixels. For more information see FIG 2.

Lv = Average Surface Luminance with all white pixels(P1, P2,……)

备注 2. 表面亮度是在显示白色画面时，测试的亮度值，详见 FIG 2.

Lv = 平均的表面亮度(P1, P2,……)

Note3. The uniformity in surface luminance(δWHITE) is determined by measuring luminance at each test position, and then dividing the maximum luminance of all white pixels by minimum luminance of all white pixels. For more information see FIG 2.

$$\delta\text{WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels(P1, P2,……)}}{\text{Maximum Surface Luminance with all white pixels(P1, P2,……)}}$$

备注 3. 均匀度是在显示白色画面时，测试 P1 到 P9 的亮度，然后再用 9 个点亮度的最小值除以最大值。详见 FIG 2.

$$\text{均匀度} = \frac{\text{白色画面下表面亮度最小值 (P1, P2,……)}}{\text{\_白色画面下表面高度最大值 (P1,P2,……)}}$$

Note4. Response time is the time required for the display to transition from White to black(Rise Time, Tr) and from black to white(Decay Time, Tf). For additional information see FIG 1.

备注 4. 响应时间是 Tr（上升时间）与 Tf（下降时间）的和；Tr 指显示白色画面转为显示黑色画面需要时间，Tf 指显示黑色画面转为显示白色画面需要时间。详见 FIG 1.

Note5. CIE(x, y)chromaticity is the Center point value. For more information see FIG 2.

备注 5. 选择中心点分别测试 x,y 值。详见 FIG 2.

Note6. Viewing angle is the angle at which the contrast ratio is greater than a specific value. For TFT module, the specific value of conrast ratio is 10; For monochrome and color stn module, the specific value of conrast ratio is 2. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 3.

备注 6. 视角指对比度大于等于一个特定值时的可视范围，对 TFT 屏，对比度特定值为 10，对黑白屏，CSTN 屏，对比度特定值为 2。视角由横轴（x 轴），竖轴（y 轴）同 Z 轴（垂直于 LCD 表面）之间的夹角来定义。详见 FIG 3.

Note7. For Viewing angle and response time testing, the testing data is base on Autronic-Melchers’s ConoScope. Series Instruments. For contrast ratio, Surface Luminance, Luminance uniformity and CIE, the testing data is base on CS-2000 photo detector.

备注 7. 视角和响应时间，测试数据基于 Autronic-Melchers’s ConoScope.系列。而对比度，表面亮度，均匀度，CIE 坐标,测试数据基于 CS-2000 photo detector。

Note8. For TN type TFT transmissive module, Gray scale reverse occurs in the direction of panel viewing angle

备注 8. TN 型 TFT 全透产品,在视角方向会发生灰度反转。

FIG 1. The definition of Response Time
响应时间

响应时间定义

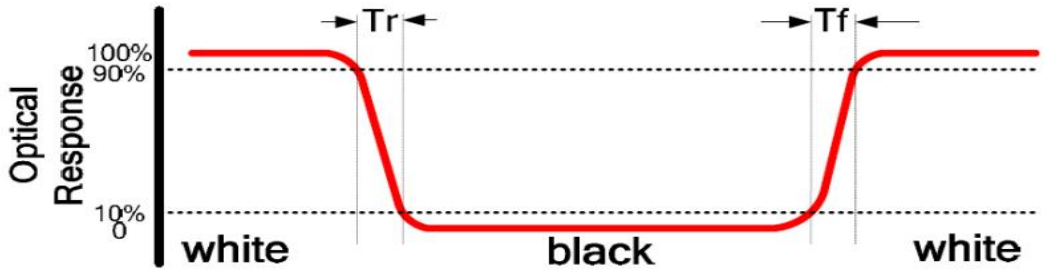


FIG 2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE(x, y) chromaticity.

对比度、表面亮度、均匀度、CIE 坐标测试方法

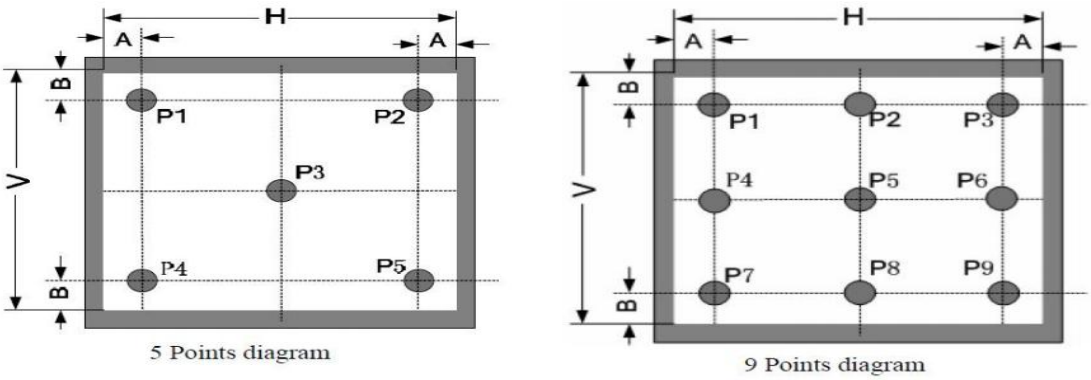


Fig2 Note1: For TFT Module Test point:9 points(as 9 Points diagram)

A : H/6 B : V/6

H,V : Active Area(AA) size

Measurement instrument:CS-2000;Light spot size ø=5mm, 350mm distance from the LCD surface to detector lens.

Fig2 Note2: For non-TFT Module and Dot-Matrix type Module

2.1 If the minimum side size is bigger than 20 mm, the testing method is the same as TFT module.

2.2 If the minimum side size is less than 20 mm, then testing 5 point datas (as 5 Points diagram), Both A and B are 5 mm.

2.3 Measurement instrument: CS-2000 is priority selected to measure. Light spot size ø=5mm, 350mm distance from the LCD surface to detector lens.

2.4 Measurement instrument : ConoScope will be selelected to measure If CS-2000 cannot meet the measurement requirement. Light spot size ø =0.2-2.0mm. About 2-3mm distance from the LCD surface to detector lens, but suggest to confirm the best distance on focusing the picture to be clearest when actually measuring.

Fig2 Note3: For non-TFT Module and non-Dot-Matrix type Module

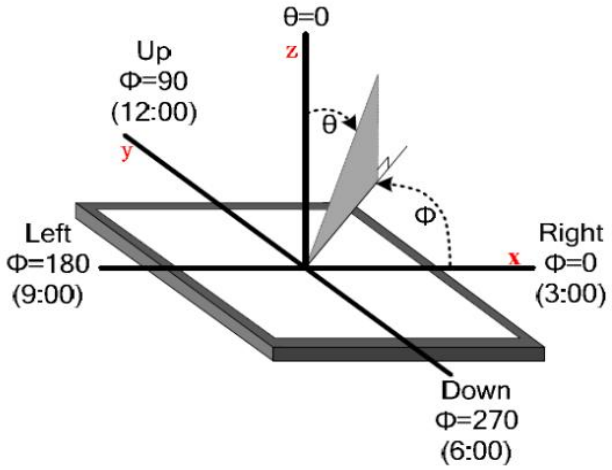
The test point is defined by the fact size and shape of module, but the center point and four edges should be selected.

3.1 Measurement instrument: CS-2000 is priority selected to measure. Light spot size Æ=5mm, 350mm distance from the LCD surface to detector lens.

3.2 Measurement instrument : ConoScope will be selelected to measure If CS-2000 cannot meet the measurement requirement. Light spot size Æ=0.2-2.0mm. About 2-3mm distance from the LCD surface to detector lens, but suggest to confirm the best distance on focusing the picture to be clearest when actually

measuring.

FIG.3. The definition of viewing angle
视角定义



■ RELIABILITY TEST CONDITIONS
可靠性试验条件

No. 序号	Test Item 试验项目	Test Condition 试验条件	Inspection after test 判断标准
1	High Temperature Storage 高温存放	80 ±2℃/240 hours	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 试验结束后,已测试的 LCD 样品必须在室内正常温湿度环境下放置 2~4 个小时以上才能进行功能和外观检查，样品不允许有以下缺陷： 1.Air bubble in the LCD;模块中有气泡； 2.Sealleak; 封口松脱； 3.Non-display;不显示； 4.missing segments; 漏笔 5.Glass crack;玻璃破碎； 6.Current Idd is twice higher than initial value.电流 Idd 大于初时值的 2 倍
2	Low Temperature Storage 低温存放	-30 ±2℃/240 hours	
3	High Temperature Operating 高温操作	70±2℃/240 hours	
4	Low Temperature Operating 低温操作	-20±2℃/240 hours	
5	Temperature Cycle storage 冷热循环存放	-20±2℃~25~70±2℃×10cycles (30min.) (5min.)(30min.)	
6	Damp proof Test operating 防潮试验操作	60℃±5℃×90%RH/240 hours	
7	Vibration Test 振荡试验	Frequency: 10Hz~55Hz~10Hz Amplitude:1.5mm, X, Y, Z direction For total 3hours (Packing condition)	
8	Dropping test 跌落试验	Drop to the ground from 1m height, one time, every side of carton.(Packing condition)	

Remark:注意：

1. The test samples should be applied to only one test item.
   每个被测试的模块只能用于其中的一个测试项目。
2. Sample size for each test item is 3~5pcs.
   每个测试项目的样品数量为 3～5 片.
3. For Damp Proof Test, Pure water(Resistance＞10MΩ) should be used.
   对于防潮试验，试验箱的用水必须是电阻大于 10M 欧姆的纯水。
4. In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting,it would be judged as a good part.
   如果由静电引起产品故障,当放置一段时间后能够恢复正常, 则不视为产品缺陷。
5. EL evaluation should be excepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
   带EL片的可靠性测试在高温高湿条件下,荧光粉会发生自然化学反应而产生黑点或瑕疵,因此不在高温高湿条件测试范围内.
6. FailureJudgment Criterion:Basic Specification,Electrical Characteristic,Mechanical Characteristic, Optical Characteristic.
   故障判断标准:基本规格,电气特性,机械特性,光电特性