SPECIFICATION
产品说明书

Revision: 0.1
版本：0.1

TNS-G240320RGRSW-34S

This module uses ROHS material
模块用环保材料

REVISION RECORD
修改记录

REV NO. 版本号	REV DATE 修改日期	CONTENTS 内容	REMARKS 注释
0.1	2015-5-22	First release	Preliminary

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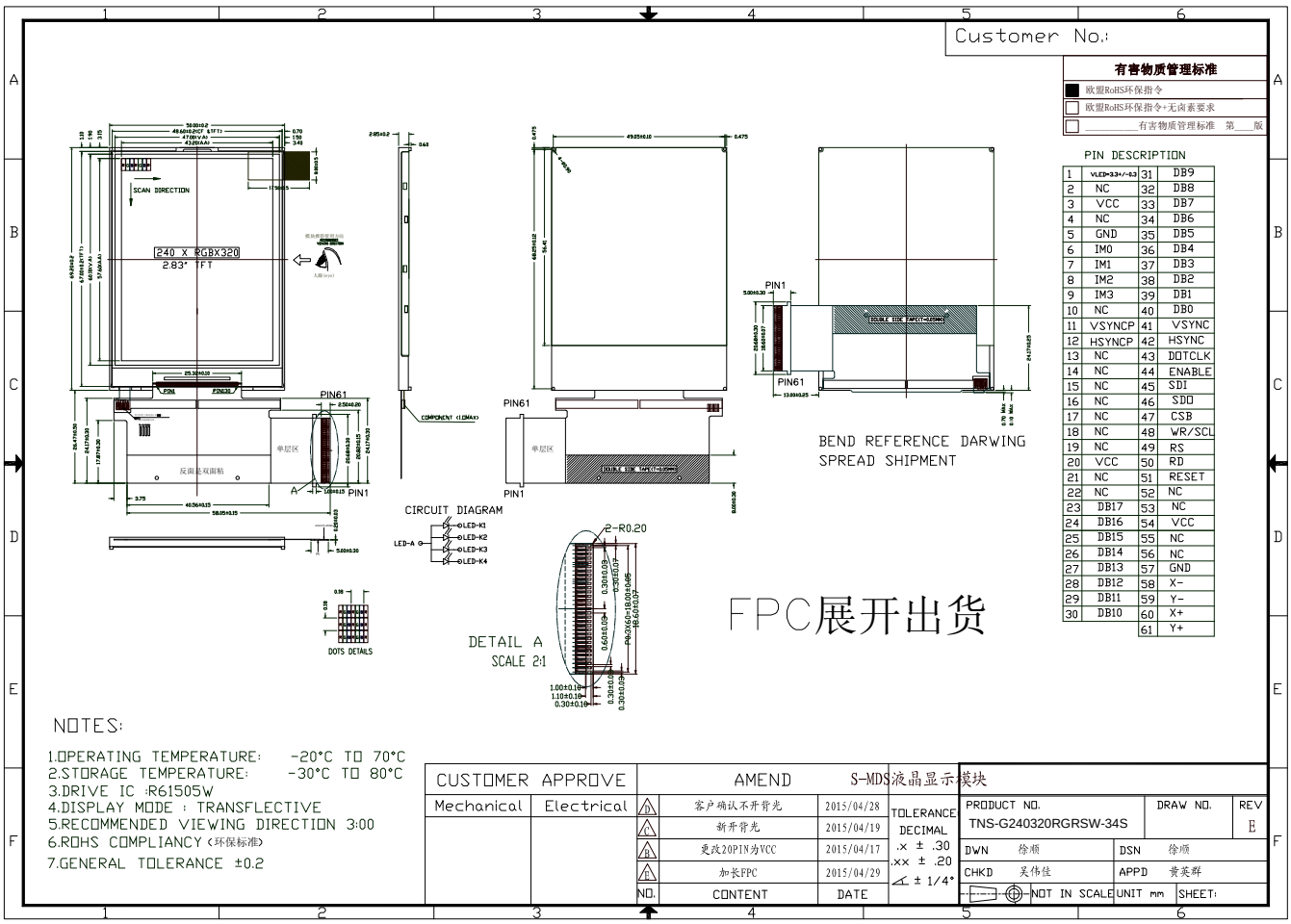
■ GENERAL INFORMATION
主要特征描述

Item of general information 项目	**Contents** 内容	**Unit** 单位
LCD Type 液晶显示类型	TFT/TRANSMISSIVE	/
Recommended Viewing Direction 模块推荐使用方向	3:00	O' Clock
Module area (W × H×T) 模块外围尺寸 (宽 × 高×厚)	50.00×69.20×2.85	mm^3
Viewing area (W×H) 可视区域 (宽 × 高)	47.00×60.10	mm^2
Active area (W×H) 有效区域 (宽 × 高)	43.20×57.60	mm^2
Number of Dots 点阵	240(RGB)×320	/
Pixel pitch (W × H) 像素间隙(宽 × 高)	0.18×0.18	mm^2
Driver IC 驱动集成电路	R61505W	/
Interface Type 接口类型	MPU/SPI+RGB	/
Input voltage 输入电压	3.3	V
Module Power consumption 模块功耗	TBD	mw
Backlight Type 背光类型	LED	/

■ EXTERNAL DIMENSIONS
外形尺寸



■ ABSOLUTE MAXIMUM 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 1 (REF:PIN20)	VCC	-0.3	4.6	V
Supply voltage 2 (REF:PIN3)	VCI	-0.3	4.6	V
Supply voltage 3 (REF:PIN54)	IOVCC	-0.3	4.6	V
Input voltage 输入电压	VIN	-0.3	IOVCC+0.3	V
Operating temperature 操作温度	Top	-20	70	°C
Storage temperature 储存温度	TST	-30	80	°C
Humidity 湿度	RH	-	90%(Max60 °C)	RH

Note: Absolute maximum ratings means the product can withstand short-term, NOT more than 120 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 120 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	IOVCC	1.65	/	3.3	V
Input Current 输入电流	Idd	-	TBD	TBD	mA
Input voltage 'H' level 输入高电平	VIH	0.8*IOVCC	-	IOVCC	V
Input voltage 'L' level 输入低电平	VIL	-0.3	-	0.2*IOVCC	V
Output voltage 'H' level 输出高电平	VOH	0.8*IOVCC	-	-	V
Output voltage 'L' level 输出低电平	VOL	-	-	0.2*IOVCC	V

■ BACKLIGHT CHARACTERISTICS
背光电气特性

Item of backlight characteristics 项目	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage正向电压	Vled	3.0	3.3	3.6	V	Iled（typ.）= 50 mA
Number of LED 灯数	-	-	4	-	Piece	-
Connection mode 连接类型	P	-	Parallel	-	-	-

Using condition: constant current driving method If=50mA(+/-10%).
使用条件：恒流的驱动方式是 If=50mA(+/-10%).

■ ELECTRO-OPTICAL CHARACTERISTICS
光电参数

Item of electro-optical 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+ Tf	θ=0° ∅=0° Ta=25℃	-	30	45	ms	Fig.1	4
Contrast ratio 对比度 (Transmissive mode)	Cr		36	72	-	---	FIG 2.	1
Contrast ratio 对比度 (Reflective mode)	Cr		-	3.7	-	---	FIG 2.	1
Luminance uniformity 均匀度	δ WHITE		80	-	-	%	FIG 2.	3
Surface Luminance 表面亮度	Lv		120	160	-	cd/m^2	FIG 2.	2
NTSC ratio色彩饱和度 (Transmissive mode)	-	-	-	40	-	%	-	-
NTSC ratio色彩饱和度 (Reflective mode)	-	-	-	0.5	-	%	-	-
Reflectivity反射率	R	-	-	3.5	-	%	-	-
Viewing angle range视角范围	θ	∅ = 90°	30	40	-	deg	FIG 3.	6
		∅ = 270°	10	20	-	deg	FIG 3.	
		∅ = 0°	40	50	-	deg	FIG 3.	
		∅ = 180°	15	25	-	deg	FIG 3.	
CIE (x, y) chromaticity CIE 色度坐标	Red x	θ=0° ∅=0° Ta=25℃	0.5175	0.5675	0.6175	-	FIG 2.	5
	Red y		0.3001	0.3501	0.4001			
	Green x		0.2835	0.3335	0.3835			
	Green y		0.5211	0.5711	0.6211			
	Blue x		0.1123	0.1623	0.2123			
	Blue y		0.0878	0.1378	0.1878			
	White x		0.2416	0.3016	0.3616			
	White y		0.2696	0.3296	0.3896			

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.。

对比度= 显示白色画面时平均表面亮度(P 1,P2, ……) /显示黑色画面时平均表面亮度(P 1,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 (δ WHITE) 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.

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

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.。

均匀度 =白色画面下表面亮度最小值 (P1, P2, ……) /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

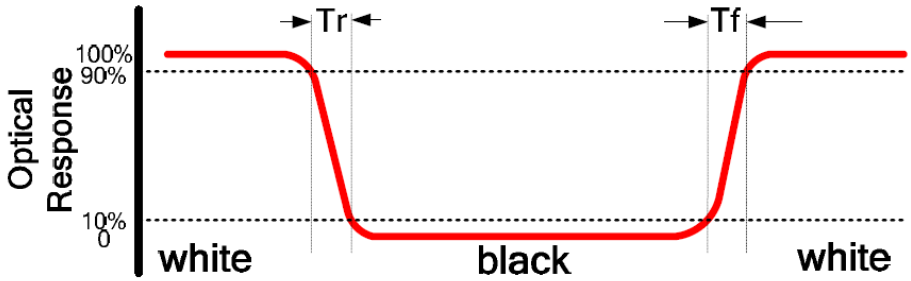


FIG.2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity,CIE (x, y) chromaticity

对比度，表面亮度，均匀度，CIE坐标测试方法

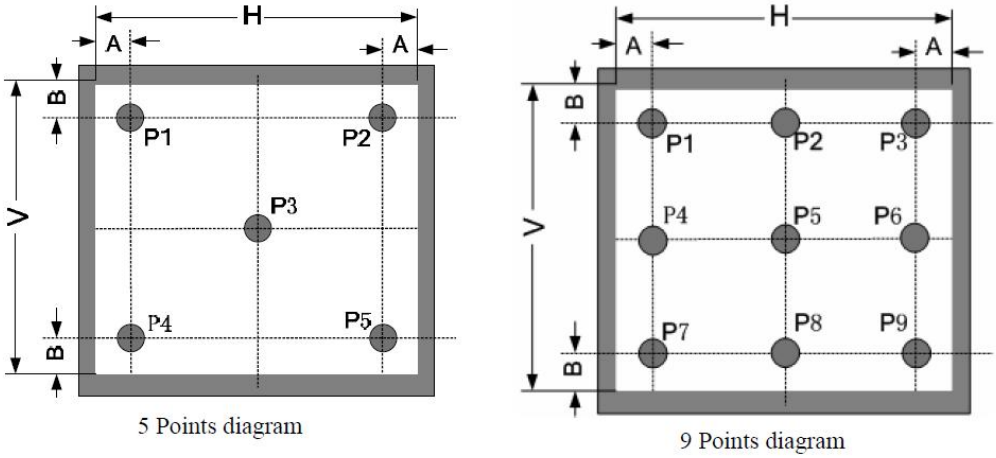


Fig2 Note1 For TFT Module Test point:9 points(as 9 Points diagram)

A : H/6 B : V/6

H,V : Active Area(AA) size

Measurement instrument: CS-2000; Light spot size ∅=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 ∅=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 ∅=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

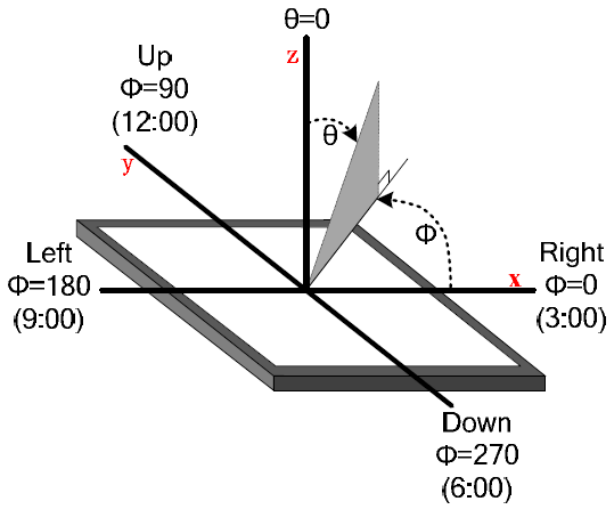
The test point is defined by the fact size and shape of module,but the center point and four edges should be selected.

3.1 Measurement instrument: CS-2000 is priority selected to measure..
Light spot size ∅=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 ∅=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



■ 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	When not in use 不用时
1	VLED	Power supply	LED Power supply(3.3V+/-0.3V)	/
2	NC	Not Connect	/	/
3	VCC	Power supply	connect VCI:Power supply to the liquid crystal Power supply analog circuit.(2.5V-3.3V)	/
4	NC	Not Connect	/	/
5	GND	Power supply	Power Ground	/
6	IM0	I	select a mode to interface to host processor. [IM3:IM2:IM1:IM0] 1.0010:80-system 16-bit interface DB[17:10] and DB[8:1]. 2.0011:80-system 8-bit interface DB[17:10]. 3. 0100:clock synchronous serial interface. 4.1010:80-system 18-bit interface DB[17:0]. 5.1011:80-system 9-bit interface DB[17:9]. others setting are disabled.	/
7	IM1			/
8	IM2			/
9	IM3			/
10	NC	Not Connect	/	/
11	VSYNCP	I	in factory test mode,use as "VSYNC"signal	GND or IOVCC
12	HSYNCP	I	in factory test mode,use as "HSYNC"signal	GND or IOVCC
13	NC	Not Connect	/	/
14	NC	Not Connect	/	/
15	NC	Not Connect	/	/
16	NC	Not Connect	/	/
17	NC	Not Connect	/	/
18	NC	Not Connect	/	/
19	NC	Not Connect	/	/
20	VCC	Power supply	connect VCC:power supply to internal logic regulator circuit.(2.5V-3.3V)	/
21	NC	Not Connect	/	/
22	NC	Not Connect	/	/
23	DB17	I/O	18-bit parallel bi-directional data bus for 80-system interface operation. 8-bit I/F :DB[17:10]are used; 9-bit I/F :DB[17:9]are used; 16-bit I/F :DB[17:10] and DB[8:1]are used; 18-bit I/F :DB[17:0]are used; 18-bit parallel bi-directional data bus for RGB interface operation. 16-bit I/F :DB[17:13] and DB[11:1]are used; 18-bit I/F :DB[17:0]are used;	GND or IOVCC
24	DB16			
25	DB15			
26	DB14			
27	DB13			
28	DB12			
29	DB11			
30	DB10			
31	DB9			
32	DB8			
33	DB7			
34	DB6			
35	DB5			

36	DB4	I/O	18-bit parallel bi-directional data bus for 80-system interface operation. 8-bit I/F :DB[17:10]are used; 9-bit I/F :DB[17:9]are used; 16-bit I/F :DB[17:10] and DB[8:1]are used; 18-bit I/F :DB[17:0]are used; 18-bit parallel bi-directional data bus for RGB interface operation. 16-bit I/F :DB[17:13] and DB[11:1]are used; 18-bit I/F :DB[17:0]are used;	GND or IOVCC
37	DB3			
38	DB2			
39	DB1			
40	DB0			
41	VSYNC	I	frame synchronous signal for RGB interface operation. (when use ,need SMT the R23&R24 of the FPC)	GND or IOVCC
42	HSYNC	I	line synchronous signal for RGB interface operation. (when use ,need SMT the R21&R22 of the FPC)	GND or IOVCC
43	DOTCLK	I	dot clock signal for RGB interface operation. The data input timing is on the rising edge of dotclk.	GND or IOVCC
44	ENABLE	I	data enable signal for RGB interface operation. Low:accessible(select);high:not accessible(not select) .The polarity of ENABLE signal can be inverted by setting the EPL bit.	GND or IOVCC
45	SDI	I	Serial data input pin in serial interface operation.The data is inputted on the rising edge of the SCL signal.	GND or IOVCC
46	SDO	O	serial data output in serial interface operation.The data is outputted on the falling edge of the SCL signal.	OPEN
47	CSB	I	CHIP Select signal. low:the R61505W is selected and accessible. high:the R61505W is not selected and not accessible.	IOVCC
48	WR/SCL	I	Write strobe signal in 80-system bus interface operation and enables write operation when WR is low.synchronous clock signal(SCL)in serial interface operation.	IOVCC
49	RS	I	Register select signal. low:select index register; high:select control register.	IOVCC
50	RD	I	Read strobe signal in 80-system bus interface operation and enables read operation when RD is low.	IOVCC
51	RESET	I	reset signal.the R61505W is initialized when the signal is at low level.make sure to execute a power-on reset when turning on power supply.	/
52	NC	Not Connect	/	/
53	NC	Not Connect	/	/
54	VCC	Power supply	connect IOVCC:power supply to the interface pins(1.65V-3.3V)	/
55	NC	Not Connect	/	/
56	NC	Not Connect	/	/
57	GND	Power supply	Power Ground	/
58	X-	Not Connect	/	/