Document No. 12201GGS

1.22 Inch 262K/65K Color TFT LCD Module SPECIFICATIONS

CUSTOMER	
MODEL	F122US01A
CUSTOMER APPROVED	

APPROVED BY	CHECKED BY	ORGANIZED BY

□APPROVAL FOR SPECIFICATIONS ONLY

■APPROVAL FOR SPECIFICATIONS AND SAMPLE

Revision

Document No.	12201GGS
Document Rev.	A/0

Rev Date	Sheet No.	Summary	Rev
2016.04.26	All	Initial Release	A/0

CONTENTS

Document No.	12201GGS
Document Rev.	A/0

Document	Specifications	No.	12201GGS
Section	1. General Specification	Sheet	1/3
		Rev.	A/0

1.1 Caution

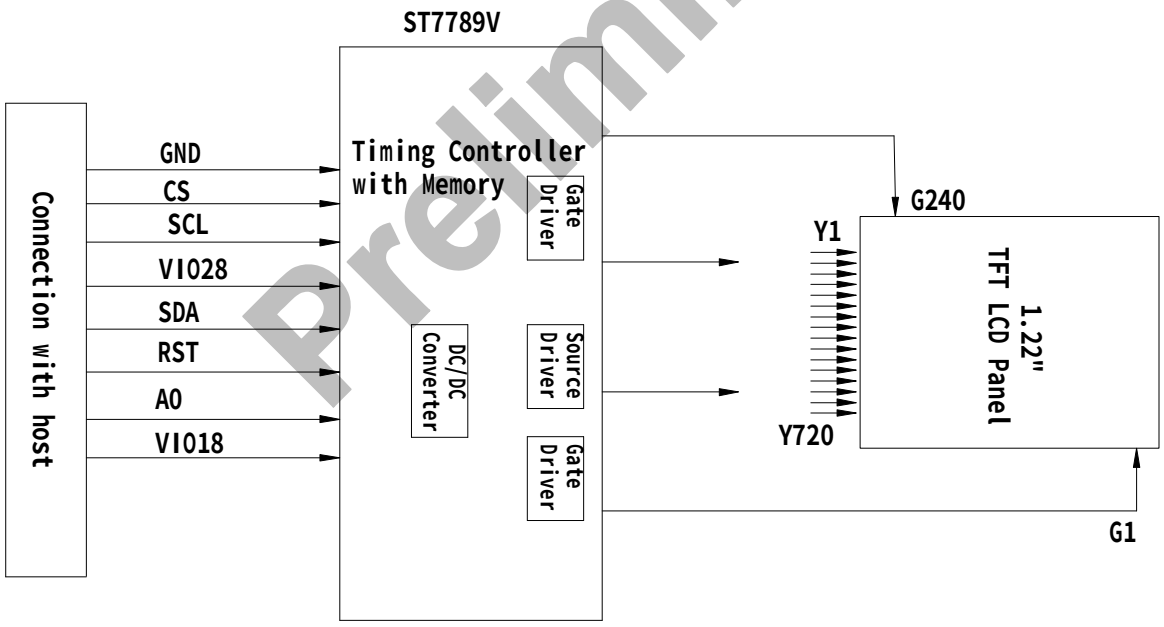
1. This Fanscoo LCD module has been specifically designed for use only in Electronic devices in the areas of mobile phone. The module should not be used in applications where panel failure could result in physical harm or loss of life, and Fanscoo expressly disclaims any and all liability relating in any way to the use of the module in such applications.

2. Customer agrees to indemnity, defend and hold Fanscoo harmless from and against any and all actions, claims, losses, damages, liabilities, awards, costs, and expenses, including legal fees, resulting from or arising out of Customer's use, or sale for use, of Fanscoo module in applications.

1.2 Description

F122US01A is a transmissive type color active matrix TFT liquid crystal display that use amorphous silicon TFT as switching devices. This module is composed of a TFT-LCD module , a driver circuit and back-light unit. The resolution of 1.22” contains 240*240 pixels and can display up to 262K/65K colors.

1.3 Block diagram



Document	Specifications	No.	12201GGS
Section	1. General Specification	Sheet	2/3
		Rev.	A/0

1.4 General Specifications

ITEM	Specification	
LCD Mode	TFT; RGB Color; Normal White; Transmissive	
Controllable Color	Indication data: Red-6/5bit, Green-6bit, Blue-6/5bit gradation control	262K/65K Colors
Background Color	Indication data: Red (1,1,1,1,1,(1)) / Green(1,1,1,1,1,1) / Blue (1,1,1,1,1,(1))	White
Viewing direction	6 O'Clock	
Backlight	LED white colored Backlight (LED unit, 2chip LED)	
Driver IC	ST7789V (Sitronix)	
Mounting methods	COG	
Operating temperature	-20℃~70℃	
Storage temperature	-30℃~80℃	
Operating humidity	Temp.≦40℃,85％RH MAX. Temp.＞40℃,Absolute humidity shall be less than 85%RH at 40℃	
Storage humidity	Temp.≦40℃,85％RH MAX. Temp.＞40℃,Absolute humidity shall be less than 85%RH at 40℃	

(Note) Color tone is slightly changed by temperature and driving voltage.
This product measure up Rohs standard.

1.5 Mechanical Specifications

ITEM	Specification
Outline Dimension	According to the annexed outline drawing No.F122US01AWX
Dots Matrix	(240×3) (W) × 240(H) Dots
Outline dimensions(mm)	24.66*28.2*1.53
Active Area (mm)	21.6*21.6
Mass	TBD

Document	Specifications	No.	12201GGS
Section	1. General Specification	Sheet	3/3
		Rev.	A/0

1.6 Terminal Functions

PIN NO.	SYMBOL	FUNCTION DESCRIPTIONS
1	IOVCC	Supply voltage to the interface pins(1.65V ~ 3.3V)
2	CS	Chip select
3	RESET	Reset signal
4	A0	Data/Instruction select input pin
5	SCL	Serial data input pin
6	SDA	Serial data input pin
7	LEDA	Anode of Backlight
8	LEDK	Cathode of Backlight
9	GND	Ground
10	VCI	Supply voltage to the analog circuit.(2.4V ~ 3.3V)

Document	Specifications	No.	12201GGS
Section	2. Electrical Characteristics	Sheet	1/4
		Rev.	A/0

2.1 Absolute maximum ratings

Item	Symbol	Value	Unit
Operation Temperature	Top	-20~70	℃
Storage Temperature	Tstr	-30~80	℃
Power supply voltage	V_{CI}	2.4~3.3	V

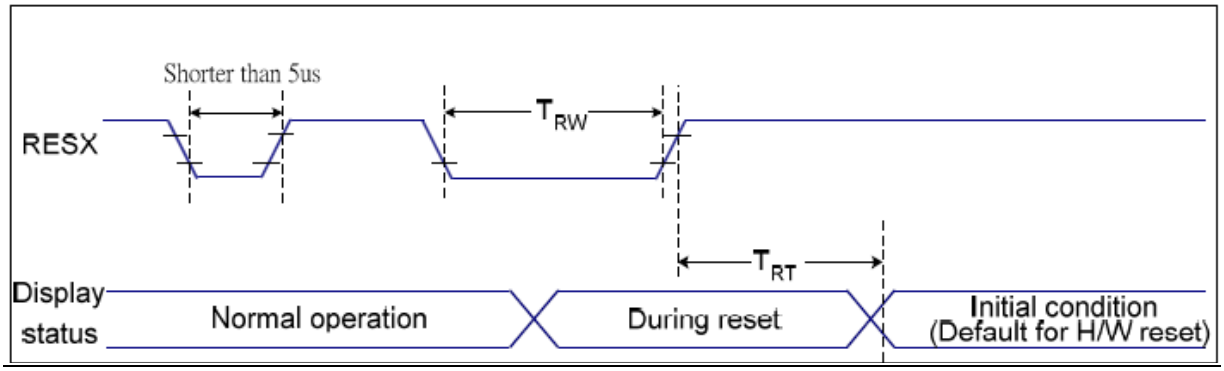
2.2 LED back light specification (per a Chip)

Item	Symbol	Condition	Min	Type	Max	Unit
Forward voltage	V_f	I_f=20mA /1-chip	-	3.2	-	V
Forward current	I_{pn}		-	20	-	mA
Reverse voltage	V_r	per chip	-	-	4.0	V
Reverse Current	I_r	V_r=4V	-	-	15	uA
Uniformity (with L/G)	-	I_f=20mA	80	-	-	%
Module brightness	Lv	I_f=20mA	70	100	-	cd/m2
Luminous color	White					

2.3 Electrical characteristics

Item	Symbol	Condition	Min	Type	Max	Unit
Input high voltage	Vih		0.8 V_{DD}	-	V_{DD}	V
Input low voltage	Vil		-0.3	-	0.2 V_{DD}	V
Output high voltage	Voh	Ioh=-0.1mA	0.8 V_{DD}	-	-	V
Output low voltage	Vol	Iol=0.1mA	-	-	0.2 V_{DD}	V
Input leakage current	Iil	Vin=0--Vdd	-1.0	-	1.0	uA
Current consumption	Idd	-	-	-	40.0	mA

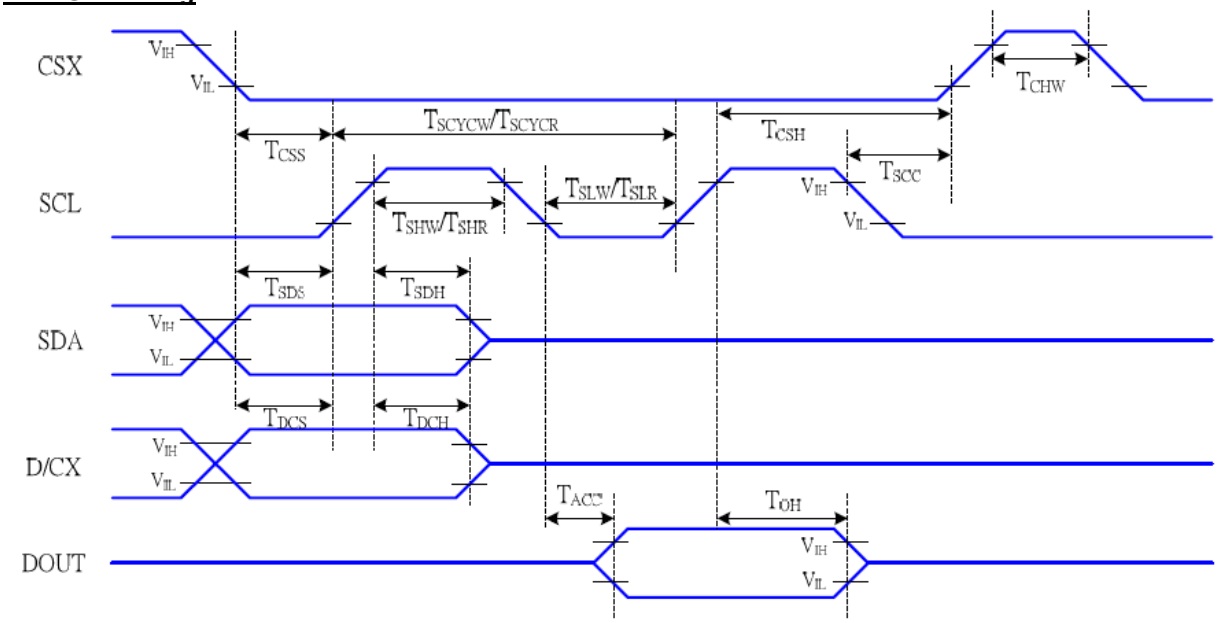
2.4.1 Reset Timing



Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
				120 (Note 1, 6, 7)	ms

Document	Specifications	No.	12201GGS
Section	2. Electrical Characteristics	Sheet	2/4
		Rev.	A/0

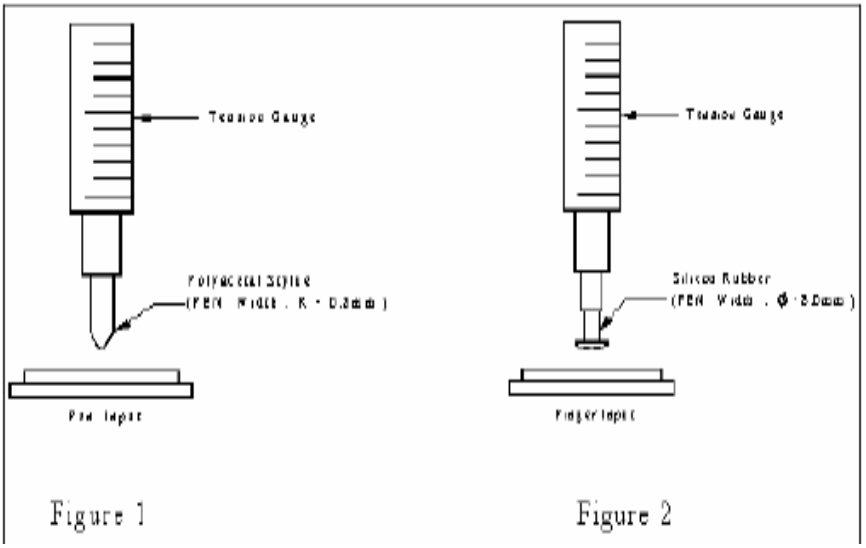
2.4.2 SPI Timing

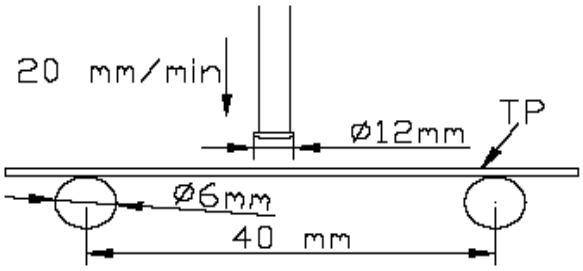


Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	T_{CSS}	Chip select setup time (write)	15		ns	
	T_{CSH}	Chip select hold time (write)	15		ns	
	T_{CSS}	Chip select setup time (read)	60		ns	
	T_{SCC}	Chip select hold time (read)	65		ns	
	T_{CHW}	Chip select "H" pulse width	40		ns	
SCL	T_{SCYCW}	Serial clock cycle (Write)	66		ns	-write command & data ram
	T_{SHW}	SCL "H" pulse width (Write)	15		ns	
	T_{SLW}	SCL "L" pulse width (Write)	15		ns	
	T_{SCYCR}	Serial clock cycle (Read)	150		ns	-read command & data ram
	T_{SHR}	SCL "H" pulse width (Read)	60		ns	
	T_{SLR}	SCL "L" pulse width (Read)	60		ns	
D/CX	T_{DCS}	D/CX setup time	10		ns	
	T_{DCH}	D/CX hold time	10		ns	
SDA (DIN)	T_{SDS}	Data setup time	10		ns	
	T_{SDH}	Data hold time	10		ns	
DOUT	T_{ACC}	Access time	10	50	ns	For maximum CL=30pF
	T_{OH}	Output disable time	15	50	ns	For minimum CL=8pF

Document	Specifications	No.	12201GGS
Section	2. Electrical Characteristics	Sheet	3/4
		Rev.	A/0

2.5 Touch Panel Specification

Item	Descripton
2.5.1 Rating	
The maximum voltage	DC5V Max
Operating temperature range	-20℃～60℃： -20℃～40℃ 90%RH or less 40℃～60℃ 60%RH or less
Storage temperature range	-40℃～70℃： -40℃～40℃ 90%RH or less 40℃～60℃ 60%RH or less 60℃～70℃ 50%RH or less and 168 hours or less Avoid storage in high temperature and high humidity. When long-term storage is required. Keep the panels at a temperature of 15℃ to 35℃ and a relative humidity of 60%RH or less.
2.5.2 Electrical	
Resistance between leads	Direction ”X” (Film side): 200～900Ω Direction ”Y” (Glass side): 200～900Ω
Linearity	±1.5%, Measured per appendix A
Insulation resistance	20MΩ or more, Apply DC 25V between upper and lower electrodes.
Chattering time	10 msec or less
2.5.3 Mechanical	
Activation force	Input with pen 10～80g (Use R0.8, Polyacetal stylus) see Figure 1 Input with finger 20g Min. (Use R8, HS40°Silicon Rubber) see Figure 2  Figure 1 Figure 2
Surface hardness	3 H min. (Pencil test per JISK5600)
FPC peeling strength	300g/cm at speed 100mm/min upward 90°

Static load test	Min.5kg at speed 20 mm/min, 
2.5.4 Optical	
Light Transparency	80%Min., Total light Transparency according to JISK7105
2.5.5 Durability	
Knocking life	1,000,000 time, The test shall be done at the load of 250g, 5Hz with 0.8R polyacetal stylus. After test, there is no pitting allowed on the product.
Pen sliding resistance	100,000 cycles, The test shall be done at least 5mm from A/A edge, Using R0.8 polyacetal stylus on the load of 250g and with a stylus change after every 10,000 cycles, one cycle is a 35mm straight line in one direction @60 mm/sec. No visible scratches when viewed with the naked eye, using office lighting conditions, at a distance of 6 inches and at viewing angles of 90 and 45 degrees with the backlight off.

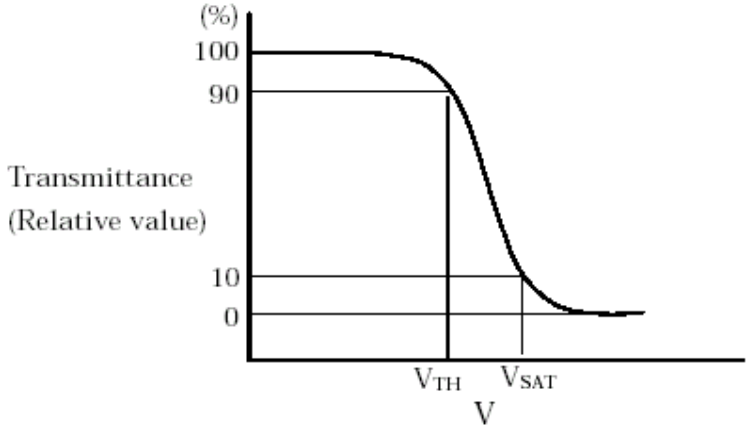
Document	Specifications	No.	12201GGS
Section	3. Optical Characteristics	Sheet	1/3
		Rev.	A/0

3.1 Optical Characteristics

Item	Symbol		Temp	Min	Type	Max	Unit	Condition
Response time*1	Tr		25℃	-	-	TBD	ms	Φ=0°θ=0°
	Td			-	-	TBD	ms	
Viewing Angle*1	Hor	θ_L	25℃	-	45	-	Deg.	CR>10
	Hor	θ_R		-	45	-		
	Ver	θ_U		-	60	-		
	Ver	θ_D		-	45	-		
Threshold voltage*1	Vsat		25℃	-	-	-	V	Φ=0° θ=0°
	Vth			-	-	-		
Contrast Ratio	Cr		25℃	-	-	-	-	Φ=0° θ=0°
Color of CIE Coordinate	W	x			0.315			Φ=0° θ=0°
		y			0.347			
	R	x			0.614			
		y			0.329			
	G	x			0.327			
		y			0.533			
	B	x			0.144			
		y			0.172			
NTSC Ratio	S				TBD		%	

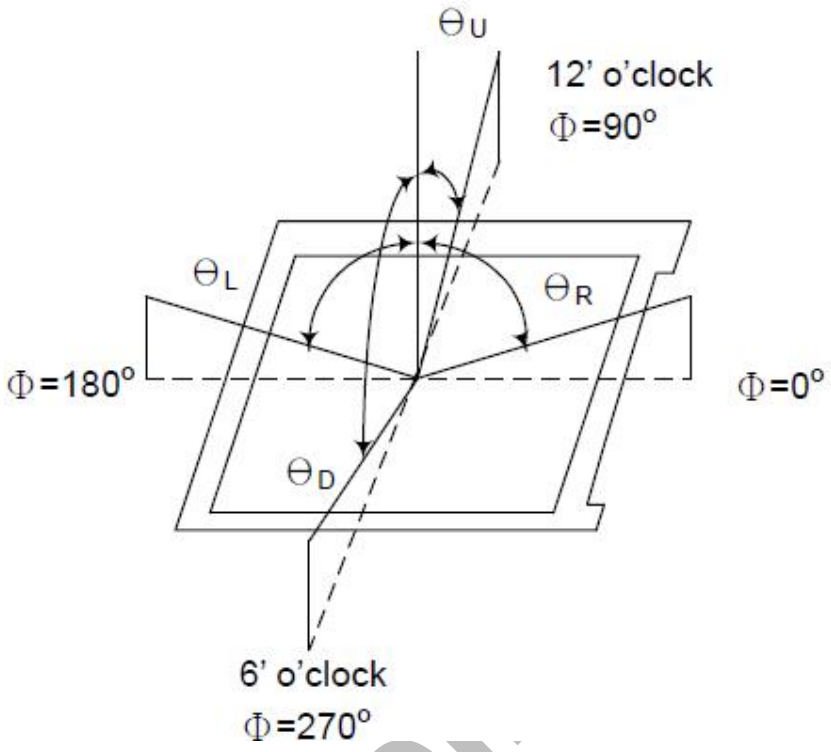
3.2 Definition of Optical Characteristics

3.2.1 Definition of Threshold voltage and Saturation voltage

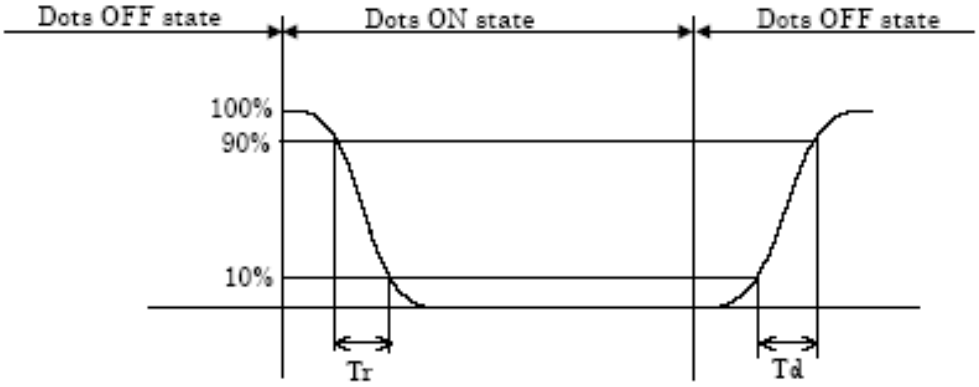


Document	Specifications	No.	12201GGS
Section	3. Optical Characteristics	Sheet	2/3
		Rev.	A/0

3.2.2 Definition of Viewing Angle

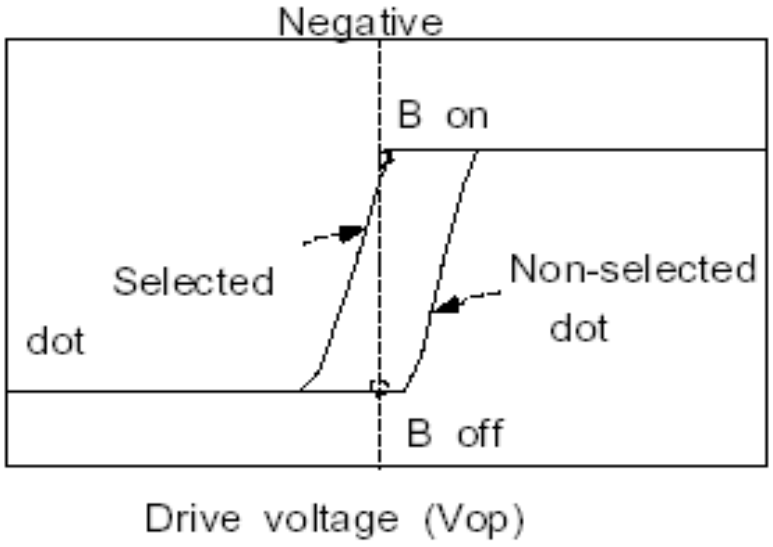


3.2.3 Definition of Response Time



Document	Specifications	No.	12201GGS
Section	3. Optical Characteristics	Sheet	3/3
		Rev.	A/0

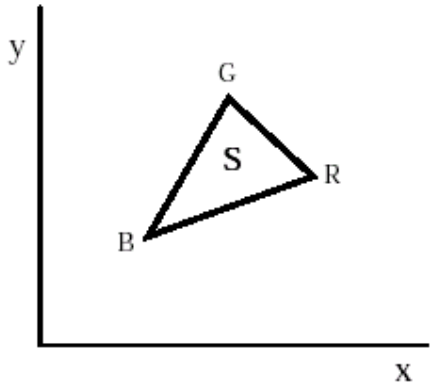
3.2.4 Definition of Contrast Ratio



$$\text{Contrast Ratio} = \frac{\text{Brightness of all pixel white}}{\text{Brightness of all pixel black}}$$

3.2.5 Definition of Color gamut

Color gamut: S= (RGB triangle Area / NTSC triangle Area) × 100



θ

Document	Specifications	No.	12201GGS
Section	4. Reliability test	Sheet	1/1
		Rev.	A/0

4.1 Content of Reliability Test

NO.	TEST ITEMS	TEST CONDITION
1	High Temperature Storage Test	TA=80℃, 48hrs/96hrs
2	Low Temperature Storage Test	TA=-30℃, 48hrs/96hrs
3	High Temperature and High Humidity Operation Test	TA=40℃, 90RH%, 48hrs/96hrs (No Condensation Dew)
4	High Temperature Operation Test	TA=70℃, 48hrs/96hrs
5	Low Temperature Operation Test	TA=-20℃, 48hrs/96hrs
6	Heat Shock Test	TA=-30℃(0.5hrs)~80℃(0.5hrs)/10Cycle

* A test LCD panel can be used in each test, but each test item uses a test LCD panel only once. The tested LCD panel is not used in any other tests.
* The LCD panel is tested in circumstances in which there is no condensation.
* The tested LCD is inspected after 2 hours of storage at room temperature and room humidity after each test is finished.

Document	Specifications	No.	12201GGS
Section	5. Precaution for Use of LCD Module	Sheet	1/2
		Rev.	A/0

5.1 Handling Precautions of panel

*As LCD module is glass product of precision processing and special treatment, it is vulnerable enough to have chips and cracks easily. And especially edges should be protected from shocks. If the liquid crystals in LCD flows out when the product is broken pay most attention to that you do not put the liquid crystal into your eyes and mouth. If the liquid crystal touches your hand, skin, or clothing, wash it away with soap and water immediately and completely.

*The polarizer on LCD is soft and easily scratched. If the surface is stained, use soft dry cloth and wipe gently. If the surface is heavily stained, use the following solvents: 1, Isopropyl alcohol. 2, Ethyl alcohol. Other solvents may damage the polarizer. Especially, do not use water, ketone and aromatic solvents.

*Do not give any pressure to the surface of LCD, and do not give excessive stresses to the side of LCD module. It may cause a distortion of color on the LCD.

*As LCD module uses CMOS devices, it is very sensitive to static electricity.

*Touching the IC of LCD module may cause abnormal display that cannot recover. Do not touch the IC of LCD module.

*If the logic circuit power is OFF, do not apply the input signals.

*Be sure to ground the body when handling the LCD module.

*Tools required for assembly, such as soldering irons, must be properly grounded.

*To prevent destruction of the elements by static electricity be careful to maintain an optimum work environment.

*Do not forcibly pull or bend the I/O cable.

*Do not disassemble or process the LCD module.

*NC terminal should be open. Do not connect anything.

*To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

*The LCD module is coated with a film to protect the display surface. Take care when peeling off this protective film since static electricity may be charged.

*Please handle carefully, because the glass has a sharp edge.

5.2 Storage Precautions

*Take care to minimize corrosion of the electrode. Moisture condensation on a current flow in a high humidity environment accelerates corrosion of the electrode.

*When storing the LCD module, avoid exposure to direct sunlight or to the light of fluorescent lamps. Keep the LCD module in bags designed to prevent static electricity charging under low temperature/normal humidity conditions (avoid high temperature/ high humidity and low temperature below 0℃).

5.3 Design Precautions

*The absolute maximum ratings represent the rated value beyond which LCD module can not exceed. When the LCD module is used in excess of this fated value, their operating characteristics may be adversely affected. To prevent the occurrence of erroneous operation caused by the noise, attention must be paid to satisfy VIL, VIH specification values, including taking the precaution of using signal cables that are short.

*The liquid crystal display exhibits temperature dependency characteristics. Since recognition of the display becomes difficult when the LCD is used out of its designated operating temperature range, be sure to use the LCD within this range.

* We recommend that power supply lines (VDD, VEE) have over-current protection line. (Fuse etc.)

*Sufficiently notice the mutual noise interference occurred by peripheral devices.

*To cope with EMI, take measure basically on outputting side.

*When fixing LCD module, which is consisted of glass panel, TCP fixes it at plastic case side. In case PCB is fixed, there is the possibility that the disconnection is occurred by somewhat stress.

*When mounting the LCD module, make sure that it is free of twisting, warping and distortion. Distortion has great influence upon display quality. Also keep the shiftiness enough regarding the outer case.

Document	Specifications	No.	12201GGS
Section	5. Precaution for Use of LCD Module	Sheet	2/2
		Rev.	A/0

5.4 Other

*Liquid crystal solidify under low temperatures (below the storage temperature range) leading to defective orientation or the generation of air bubbles. Air bubbles may also be generated if the LCD module is subjected to a strong shock at a low temperature.

*If the LCD module has been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contract irregularity may also appear. A normal operating status can be regained by suspending use for some time it should be noted that this phenomenon does not adversely affect performance reliability.

*To minimize the performance degradation of the LCD modules resulting from destruction caused sections by static electricity, etc, take care to avoid touching the following sections when handing the module.

①Terminal electrode sections, ②Part of pattern wiring on FPC, etc.

Document	Specifications	No.	12201GGS
Section	6. Drawing	Sheet	1/1
		Rev.	A/0

6.1 Module outline