



## ASI-T-3971NA2SR6/AN

No.	Item	Specification	Unit	Remark
1	LCD Size	3.97"	inch	-
2	Panel Type	a-si TFT	-	-
3	Resolution	480x(RGB)x800	pixel	-
4	Display Mode	Trans-Reflective	-	-
5	Display Number of Colors	16.7M	-	-
6	Viewing Direction	ALL	-	Note 1
7	Contrast Ratio	300	-	-
8	Luminance	250	cd/m <sup>2</sup>	
9	Module Size	55.44(W)X96.17(L)X4.4(T)	mm	Note 1
12	Weight	TBD	g	-
13	Driver IC	ST7701SI	-	-
14	Driver IC RAM Size	480x16x800	bit	-
15	Light Source	4 LEDs in Serial 2 Parallel	-	-
16	Interface	3线SPI-16/18/24Bit RGB interface	-	-
17	Operating Temperature	-20~70	°C	-
18	Storage Temperature	-30~80	°C	-



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## 1. General Specifications

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Note 1: Please refer to the mechanical drawing.

## 2. Pin Assignments

Pin No.	Symbol	Type	Function
1	K	I	LED back light(Cathode)
2	A	I	LED back light(Cathode)
3	GND		Ground
4	VCC	I	Power supply_3.3V
5	R0	I	Red data bus
6	R1	I	Red data bus
7	R2	I	Red data bus
8	R3	I	Red data bus
9	R4	I	Red data bus
10	R5	I	Red data bus
11	R6	I	Red data bus
12	R7	I	Red data bus
13	G0	I	Green data bus
14	G1	I	Green data bus
15	G2	I	Green data bus
16	G3	I	Green data bus
17	G4	I	Green data bus
18	G5	I	Green data bus
19	G6	I	Green data bus
20	G7	I	Green data bus
21	B0	I	Blue data bus
22	B1	I	Blue data bus
23	B2	I	Blue data bus
24	B3	I	Blue data bus
25	B4	I	Blue data bus
26	B5	I	Blue data bus
27	B6	I	Blue data bus
28	B7	I	Blue data bus
29	GND		Ground
30	CLK	I	Data clock
31	NC		NC
32	HS	I	Line SYNC signal
33	VS	I	Frame SYNC signal
34	DE	I	Data enable pin
35	NC		NC
36	GND		Ground
37	RESET	I	This signal will reset the LCD device, Active low
38	SDI	I	Serial data input/output bidirectional pin
39	SCL	I	The SPI Interface (SCL): Serves as a write signal and writes data at the rising edge.
40	CS	P	A chip select signal.

### 3. Electrical Specifications

#### 3.1. Absolute Maximum Rating

(T<sub>a</sub>=+25°C)

Item	Symbol	Values		Unit	Remark	
		Min.	Max.			
TFT Module	I/O Circuit Supply Voltage	VDD	-0.3	4.6	V	Note 1
	Analog/Logic Supply Voltage	VCI	-0.3	4.6	V	Note 1
Backlight Unit	Current	I <sub>B</sub>	-	40	mA	Note 2
	Forward voltage	V <sub>B</sub>	11.2	12.8	V	Note 2

Note1: Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is applied.

#### 3.2. Typical Operation Conditions

##### 3.2.1 DC Characteristics

(T<sub>a</sub>=+25°C, VCI=+2.8V)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Logic Supply Voltage	VDD	2.6	2.8	3.3	V	Ta=25°C
Analog Supply Voltage	VCI	2.6	2.8	3.3	V	
Input High Voltage	V <sub>IH</sub>	0.7VDD	-	VDD	V	
Input Low Voltage	V <sub>IL</sub>	0		0.3VDD	V	
Output High Voltage	V <sub>OH</sub>	0.8VDD	-	VDD	V	
Output Low Voltage	V <sub>OL</sub>	0	-	0.2VDD	V	
Frame Frequency	f <sub>FRAME</sub>	-	65	-	Hz	

Note: To prevent IC latch up or DC operation in LCD panel, the power on/off sequence should follow the driver IC specification.

##### 3.2.2 Current Consumption

Item	Symbol	Values		Unit	Remark
		Typ.	Max.		
MCU Interface (8080 16-bit parallel Interface)					
Still Mode	VDD	-	TBD	uA	Note1
	VCI	-	TBD	mA	
Sleep Mode	VDD	-	TBD	uA	Note1, Note3
	VCI	-	TBD	uA	

Note1: Test Condition

Typ: VDD=2.8V

VCI=2.8V

Display Pattern: 8 Color Bar

Frame Rate=80Hz at Line Inversion

Operating Temperature: 25°C

**Typ. current check pattern:**

Max: VDD=3.0V

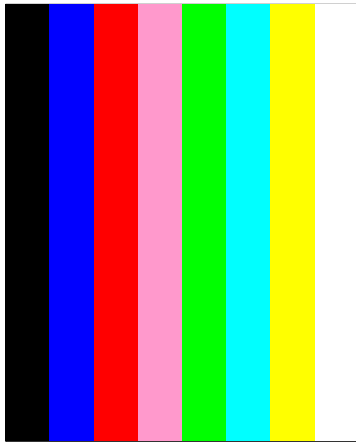
VCI=3.3V

Display: Pattern:All Pixel Black

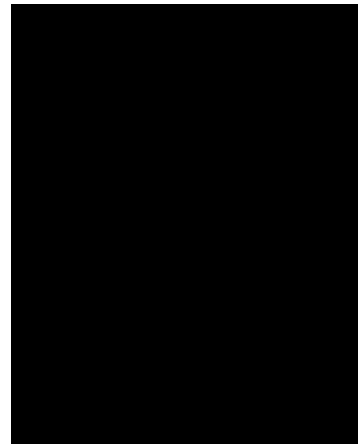
Frame Rate=80Hz at Line Inversion

Operating Temperature: 25°C

**Max. current check pattern:**



**8-Color Bar**



**Black**

Note2: In the standby mode, all the internal display operations are suspended including the internal R-C oscillator.

Note3: In the sleep mode, all the internal display operations are suspended except the internal R-C oscillator.

### 3.3. Backlight Unit

The backlight system is an edge lighting type with 8 white LEDs.

(T<sub>a</sub>=+25°C)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current	I <sub>B</sub>	-	40	-	mA	Note 1
	V <sub>BL</sub>	11.2	12	12.8	V	Note 2
Power Consumption	P <sub>BL</sub>	-	480	-	mW	Note 2

Note1: 8 LEDs are connected in parallel; each LED's current consumption is 20mA. Note2: Where I<sub>B</sub>= 40 mA, P<sub>BL</sub> = I<sub>B</sub> x V<sub>BL</sub>, V<sub>BL</sub> is backlight forward voltage.

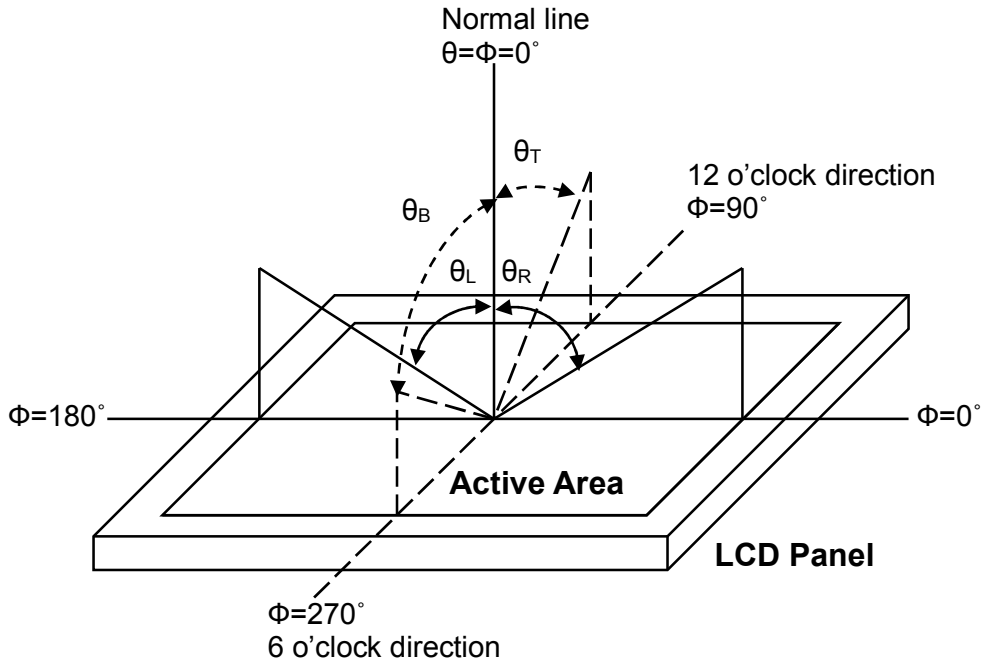
## 4. Optical Specifications

( $T_a=+25^{\circ}\text{C}$ ,  $V_{CI}=2.8\text{V}$ ,  $V_{DD}=1.8\text{V}$ ,  $I_B=46\text{mA}$ )

	Item	B2 SPEC	Remark
Transmittance	Transmittance	Min 1.1%; Typ 1.5%	Test equipment: M1 , Note 4.3
	CR	Min 30:1; Typ 45:1	Test equipment: M3 , Note 4.2
	Color Gamut (NTSC)	Min 15%; Typ 20%	Only CF, C Light, without OC, Note 4.5
	R (x, y)	(0.478, 0.301) $\pm 0.03$	
	G (x, y)	(0.315, 0.454) $\pm 0.03$	
	B (x, y)	(0.180, 0.190) $\pm 0.03$	
	View Angle (12/6/9/3点)	All	Test equipment: M1 source pad down, CR>10 Note 4.1
	人眼观看角度	6点	Source Pad Down
	Response Time (25°C)	Max 30ms	Test equipment: M1 Tr+Tf, W90%/B10%. Note 4.4
Reflection	Reflection (SCI)	Min 8%; Typ 9.5%	Test equipment: M2 Note 4.3
	CR	Min 6; Typ 8	Test equipment: M2 Note 4.2
	Color Gamut (NTSC)	Min 13%; Typ 17%	NTSC Test equipment: M2 Note 4.5
	W (x, y)	(0.316, 0.370) $\pm 0.03$	
	View Angle (12/6/9/3点)	All	Test equipment: M1 source pad down, CR>2 Note 4.1



Note 1: Definition of viewing angle



range

Fig. 1 Definition of viewing angle



Note 4: Definition of contrast ratio

$$\text{Contrast ratio (CR)} \ll \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of luminance

Measured at the center area of the panel when LCD panel is driven at "white" state.

Note 6: Definition of color chromaticity (CIE1931)

Color coordinates measured at the center point of LCD when panel is driven at "White", "Red", "Green" and "Blue" state respectively.

Note 7: Definition of luminance uniformity

To test for uniformity, the tested area is divided into 3 rows and 3 columns. The measurement spot is placed at the center of each circle as below.

$$\text{Luminance Uniformity (U}_L) = \frac{L_{\min}}{L_{\max}}$$

L-----Active area length      W----- Active area width

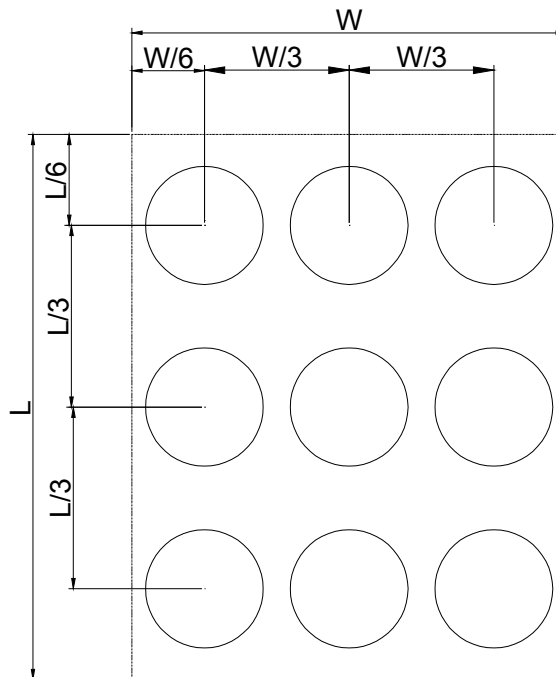


Fig. 5 Definition of luminance uniformity

$L_{\max}$  : The measured maximum luminance of all measurement position.

$L_{\min}$  : The measured minimum luminance of all measurement position.

**Note 8: Definition of Flicker**

Flicker is the pattern usually used to describe the visual sensation produced by a rapidly varying light intensity. There should be no visible flicker in normal direction of the display when the following figure are loaded.

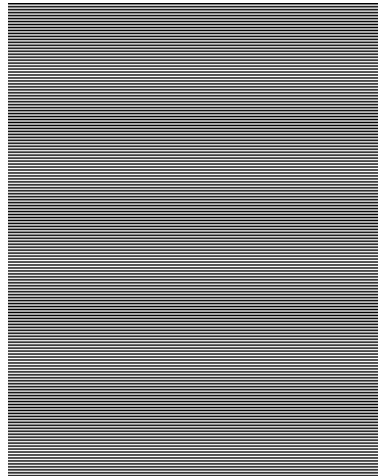


Fig.6 Flicker checker pattern

**Note9: Definition of crosstalk**

There should be no visible in normal direction of the display when the following figures are loaded.

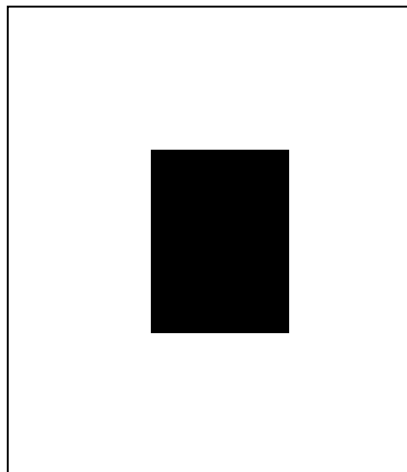


Fig.7 Crosstalk checker pattern

## 5. Reliability Test Items

Test Items	Test Conditions	Remark
High Temperature Storage	+70°C±3°C for 240 hours	-
Low Temperature Storage	-20°C±3°C for 240 hours	-
High Temperature Operation	+60°C±3°C for 240 hours	-
Low Temperature Operation	-10°C±3°C for 240 hours	-
High Temperature and Humidity Operation	+60°C±3°C, 90%±3%RH max. for 240 hours	-
Thermal Shock	-20°C/0.5h ~ +70°C/0.5h for a total 100 cycles, Start with cold temp and end with high temp	-
Vibration Test	Frequency range:10~55Hz Stoke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X. Y. Z. (6 hours for total)	-
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	-
Package Vibration Test	Random Vibration : 0.015G <sup>2</sup> /Hz from 5-200Hz, -6dB/Octave from 200-500Hz 1 hour for each direction of X. Y. Z. (3 hours for total)	-
Package Drop Test	Height :76cm(Weight ≤ 10kg); 60cm(Weight > 10kg) 1 corner, 3 edges, 6 surfaces	-
Electro Static Discharge	± 2KV, Human Body Mode, 100pF/1500Ω	-

Note1: During the display practical test under normal operation condition, there shall be no change, which may affect display function.

Note2: Before functional check, the test sample requires a 2 hours storage time at room temperature.

## **6. Handling Precautions**

### **6.1. Safety**

- 6.1.1. The liquid crystal in the LCD is poisonous. DO NOT put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.**

### **6.2. Handling**

- 6.2.1. The LCD and touch panel is made of plate glass. DO NOT subject the panel to mechanical shock or to excessive force on its surface.**
- 6.2.2. Do not handle the product by holding the flexible pattern portion in order to assure the reliability**
- 6.2.3. Transparency is an important factor for the touch panel. Please wear clear finger sacks, gloves and mask to protect the touch panel from finger print or stain and also hold the portion outside the view area when handling the touch panel.**
- 6.2.4. Provide a space so that the panel does not come into contact with other components.**
- 6.2.5. To protect the product from external force, put a covering lens (acrylic board or similar board) and keep an appropriate gap between them.**
- 6.2.6. Transparent electrodes may be disconnected if the panel is used under environmental conditions where dew condensation occurs.**
- 6.2.7. Property of semiconductor devices may be affected when they are exposed to light, possibly resulting in IC malfunctions.**
- 6.2.8. To prevent such IC malfunctions, your design and mounting layout shall be done in the way that the IC is not exposed to light in actual use.**

### **6.3. Static Electricity**

- 6.3.1. Ground soldering iron tips, tools and testers when they are in operation.**
- 6.3.2. Ground your body when handling the products.**
- 6.3.3. Power on the LCD module BEFORE applying the voltage to the input terminals.**
- 6.3.4. DO NOT apply voltage which exceeds the absolute maximum rating.**
- 6.3.5. Store the products in an anti-electrostatic bag or container.**

### **6.4. Storage**

- 6.4.1. Store the products in a dark place at  $+25^{\circ}\text{C}\pm 10^{\circ}\text{C}$  with low humidity (65%RH or less).**
- 6.4.2. DO NOT store the products in an atmosphere containing organic solvents or corrosive gas.**

### **6.5. Cleaning**

- 6.5.1. DO NOT wipe the touch panel with dry cloth, as it may cause scratch.**
- 6.5.2. Wipe off the stain on the product by using soft cloth moistened with ethanol. DO Not allow ethanol to get in between the upper film and the bottom glass. It may cause peeling issue or defective operation. Do not use any organic solvent or detergent other than ethanol.**

## 7. Mechanical Drawing

