
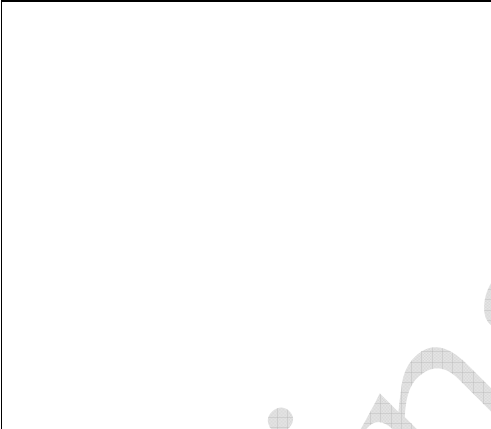


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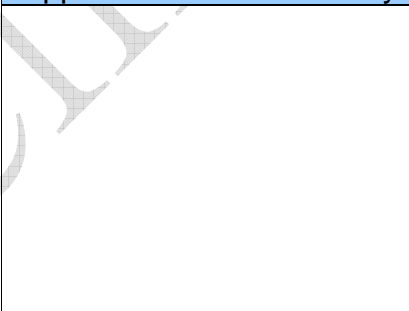
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Thin-Film-Transistor LCD Module With Touch Panel
Model: GATOA0SP8I1R0

Acceptance


Solomon Goldentek Display Corp.

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Approved and Checked by


Approved by	Checked by		Made by
			

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1 General Description and Features

GATOA0SP8I1R0 is a TM (Transmissive) type color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT-LCD module, a driver circuit, a back-light. The resolution of a 10.0" contains 1024RGBx600dots and can display up to 256K colors. The following table described the features of GATOA0SP8I1R0.

1.1 Features

- ◆ Transmissive and back-light with LED are available.
- ◆ TN (Twisted Nematic) mode.
- ◆ One channel LVDS interface
- ◆ Touch Screen Panel

1.2 General Specification


1.2.1 LCD Module

Item	Specification	Unit
Screen Size	10.0 inches	Diagonal
Display Resolution	1024 x RGB x 600	Dot
Dot Pitch	0.21525 (H) x 0.21525 (V)	mm
Active Area	220.416 (H) x 129.15 (V)	mm
Outline Dimension	235 (W) x145.8 (H) x 7.0 (D)	mm
Display Mode	Normally white	--
Pixel Arrangement	RGB-Stripe	--
Surface Treatment	Anti-glare	--
Display Color	256K	--
Viewing Direction	6 o'clock	--
Input Interface	LVDS Interface	--
Color Gamut(NTSC%)	NTSC 60%	--

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2 Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	234.5	235	235.5	mm	
	Vertical (V)	145.3	145.8	146.3	mm	
	Thickness (T)	--	7.0	--	mm	
Weight		--	--	--	g	--

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3 Absolute Maximum Ratings

3.1 Electrical Absolute Rating

3.1.1 TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
Logic Supply voltage	VCC	-0.3	6.0	V	
LED Power Supply voltage	VLED	-0.3	6.0	V	GND=0

3.1.2 Touch Panel Unit

Pin No.	Symbol	Function	Remark
1	X1	Touch Panel Left	
2	Y1	Touch Panel Down	
3	X2	Touch Panel Right	
4	Y2	Touch Panel Up	


3.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Storage temperature	T _{STG}	-30	80	°C	-
Operating temperature	T _{OPR}	-20	70	°C	-

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4 Input Terminal Pin Assignment

Pin No.	Symbol	I/O	Function	Remark
1	GND	P	Ground	
2	VCC	P	Logic power supply	
3	VCC	P	Logic power supply	
4	V_EDID	P	3.3V Power for NB	
5	ADJ	I	Adjust for LED brightness	
6	CLK_EDID	I	EDID Clock for NB	
7	DATA_EDID	I	EDID Data for NB	
8	RXIN0-	I	LVDS Signal- channel0-	
9	RXIN0+	I	LVDS Signal+ channel0+	
10	GND	P	Ground	
11	RXIN1-	I	Data input channel1-	
12	RXIN1+	I	Data input channel1+	
13	GND	P	Ground	
14	RXIN2-	I	Data input channel2-	
15	RXIN2+	I	Data input channel2+	
16	GND	P	Ground	
17	RXCLKIN-	I	Data input CLK-	
18	RXCLKIN+	I	Data input CLK+	
19	GND	P	Ground	
20	NC	I	NC	
21	NC	I	NC	
22	GND	P	Ground	
23	GND	P	Ground	
24	VLED	P	LED Power 5V	
25	VLED	P	LED Power 5V	
26	VLED	P	LED Power 5V	
27	NC	-	NC	
28	NC	-	NC	
29	NC	-	NC	
30	NC	-	NC	

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5 Optical Characteristics

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note (1).

Measuring equipment: BM-5A

(Ta=25±2°C , Vcc = V_{CI}=3.3V, I_f=20mA)

Item		Symbol	Condition	Min	Typ	Max	Unit	Note
Brightness		--	--	160	200	--	cd/m ²	(1)(2)(3)(4)
Response time		T _R	θ=0°	--	5	7	ms	(1),(2)
		T _F		--	20	28	ms	
Contrast ratio		CR	At optimized viewing angle	400	500	--	--	(1)(4)
Color Chromaticity	White	W _x	θ=0° Normal Viewing Angle	0.260	0.310	0.360	--	(1)
		W _y		0.280	0.330	0.380		
Viewing Angle (6H)	Hor.	θ _R	CR≥10	60	70	--	Degree	(1)
		θ _L		60	70	--		
	Ver.	φ _H		40	50	--		
		φ _L		50	60	--		

Note : (1) Measuring surrounding : dark room

(2) 15min. warm-up time


(3) With touch panel

(4) LED current I_L=200mA

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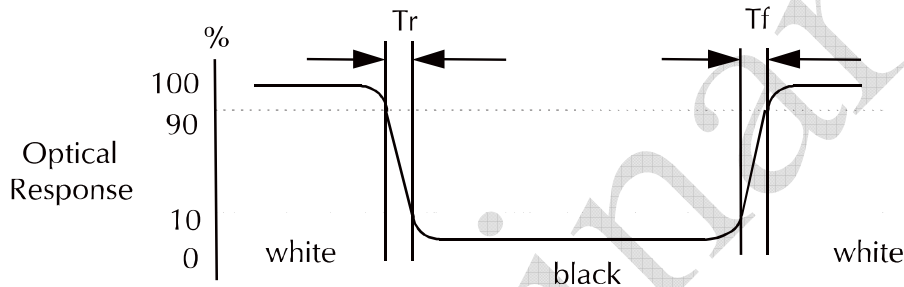
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a. Test equipment setup

After stabilizing and leaving the panel alone shall be warmed up for the stable operation of LCM, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7(fast) with a viewing angle of 2° at a distance of 50cm and normal direction.

b. Definition of response time: Tr and Tf

The response time is defined as the following figure and shall be measured by switching the input signal for “black” and “white”.



c. Definition of contrast ratio:


$$\text{Contrast Ratio (CR)} = \frac{\text{brightness measured when LCD is at "white state"}}{\text{brightness measured when LCD is at "black state"}}$$

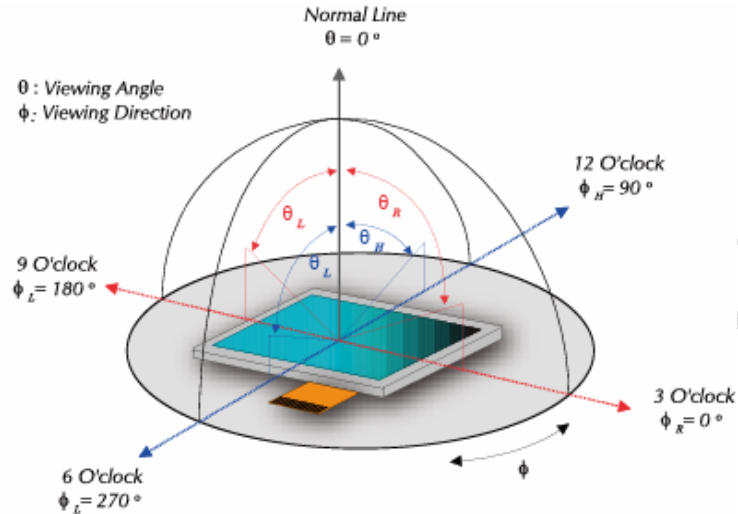
d. Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

e. View Angle

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f. Definition of Luminance of White: Luminance of white at the center points

Light Source of Back-Light Unit	LED Type
---------------------------------	----------

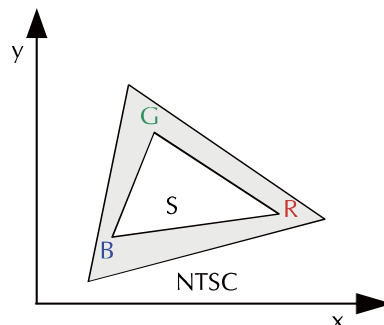
g. Definition of White Uniformity

$$\text{White Uniformity} = \frac{\text{Min. luminance of white among 9-points}}{\text{Max. luminance of white among 9-points}}$$

h. The definition of Color Gamut -Color Chromaticity CIE 1931


Color coordinate of white & red, green, blue at center point.

$$\text{Color Gamut : NTSC(\%)} = \left(\frac{\text{RGB Triangle Area}}{\text{NTSC Triangle Area}} \right) \times 100$$



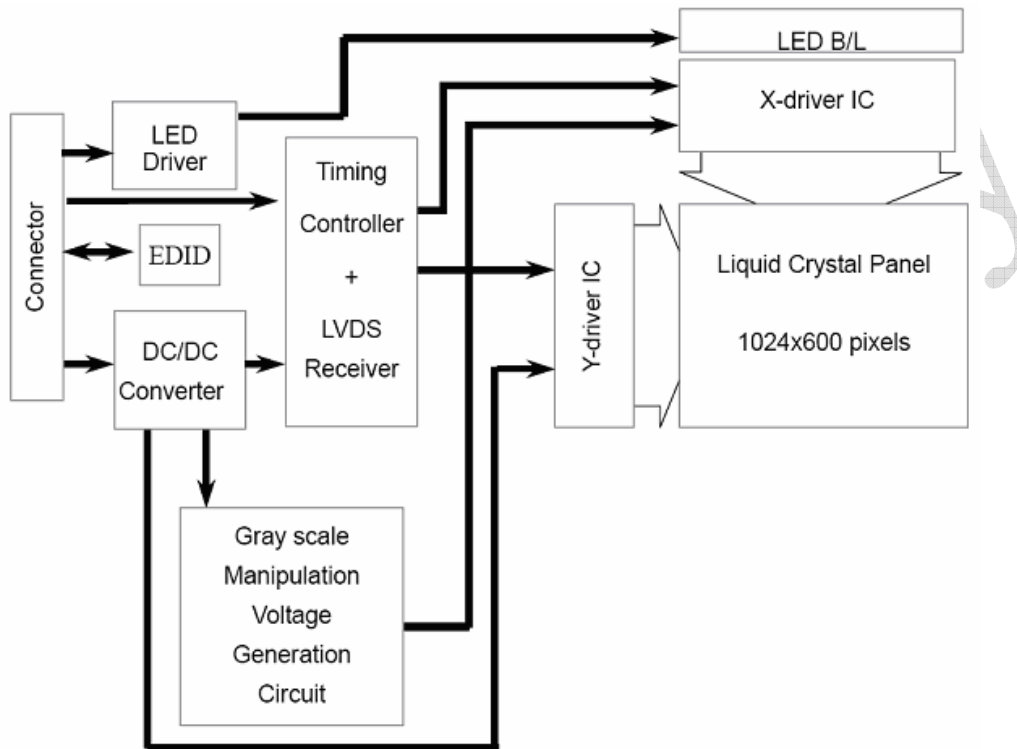
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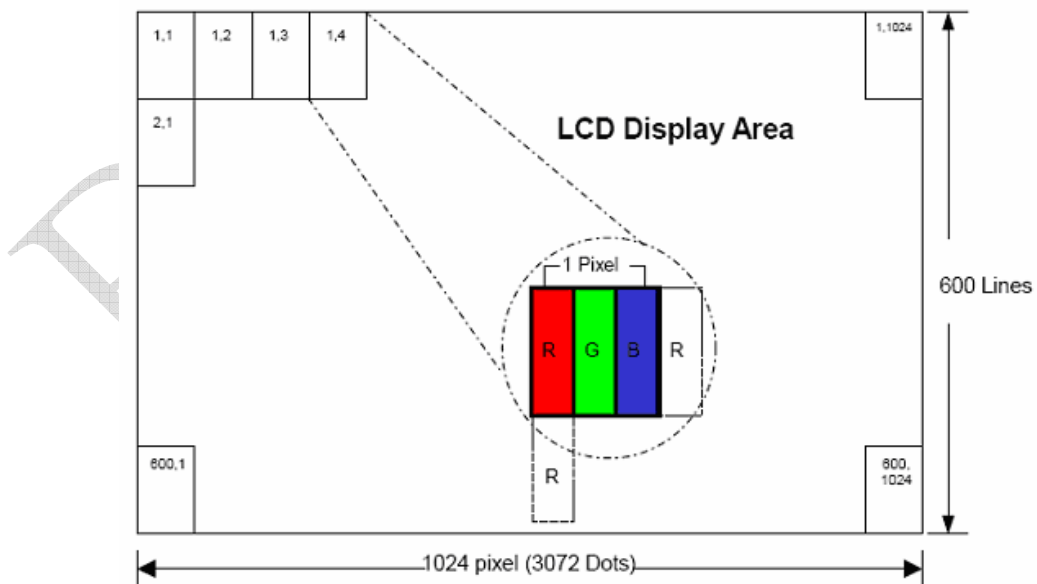
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6 Block Diagram

6.1 TFT LCD Module




6.2 Pixel Format



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7 Touch Screen Panel Specifications

7.1 electrical Characteristics

Item	Min.	Typ.	Max.	Unit	Note
Linearity	-1.5	-	1.5	%	Analog X and Y directions
Terminal resistance	400	-	1350	Ω	X(Glass side)
	100	-	600	Ω	Y(Film side)
Insulation resistance	10	-	-	M Ω	DC 25V
Voltage	-	-	7.0	V	DC
Response time	-	15	-	ms	
Transparency	-	80	-	%	Non-glare

Caution (1) : Do not operate it with a thing except a polyacetal pen (tip R0.8mm or less) or a finger, especially those with hard or sharp tips such as a ball point pen or a mechanical pencil.

7.2 Mechanical & Reliability Characteristics

Item	Min.	Typ.	Max.	Unit	Note
Activation force	-	-	80	g	(1)
Hitting Durability	1,000,000	-	-	times	(2)
Sliding Durability	100,000	-	-	times	
Surface hardness	3	-	-	H	JIS K5400

Note (1) Input : Finger or polyacetal pen 0.8R


Note (2) Pit 1,000,000 times on the Film with a R8.0 (Hardness 60°) silicon rubber.

- Force : Force : 200g
- Frequency : 3 times/sec

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8 Electrical Characteristics

8.1 TFT LCD Module

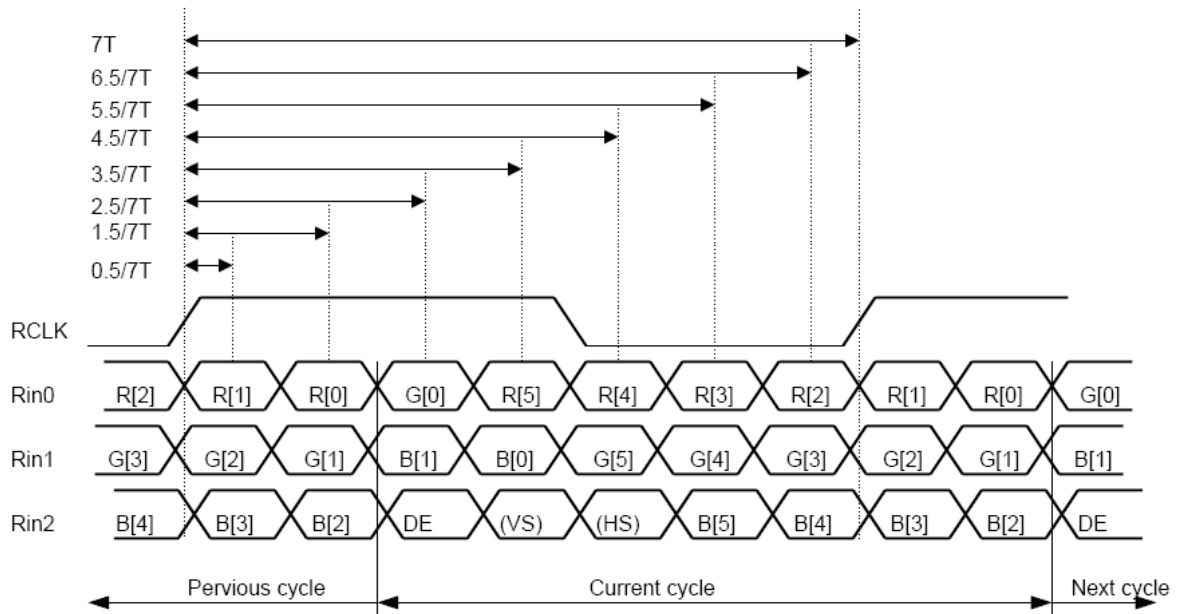
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	VCC	3.0	3.3	3.6	V	
	VLED	4.7	5.0	5.3	V	
Current of power supply	IDD	-	0.3	-	A	VCC =3.3V

Note: (1)The brightness of LCD panel could be changed by adjusting ADJ.

8.2 Switching Characteristics for LVDS Receiver

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Differential Input High Threshold	Vth	--	--	100	mA	V _{CM} =1.2V
Differential Input Low Threshold	Vtl	-100	--	--	mV	
Input Current	I _{IN}	-10	--	+10	uA	
Differential Input Voltage	V _{ID}	0.1	--	0.6	V	
Common Mode Voltage Offset	V _{CM}	(V _{ID} /2)	1.25	1.8-0.4-(V _{ID} /2)	V	

8.3 Bit Mapping & Interface Definition




LVDS Receiver Input Timing Definition
for 6bits LVDS input

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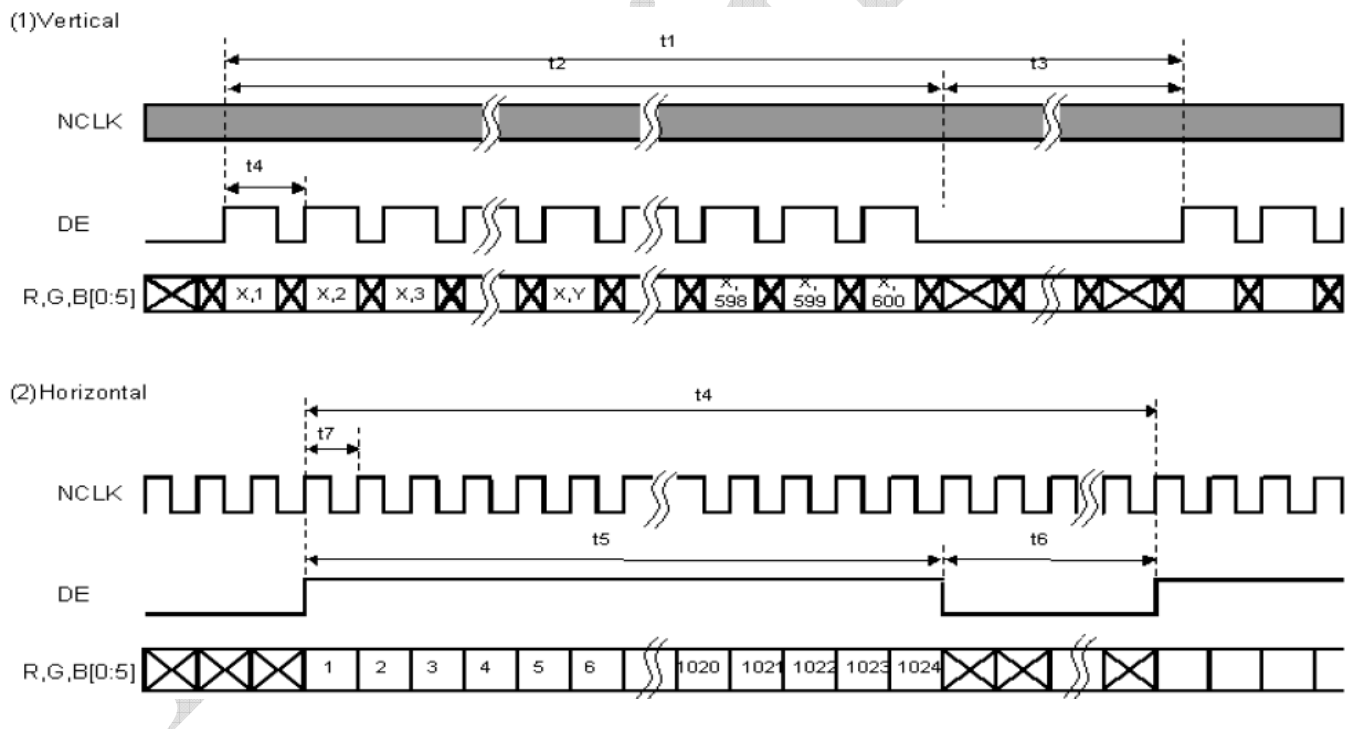
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8.4 Interface Timing(DE mode)

Item	Symbol	Min.	Typ.	Max.	Unit
Frame	--	55	60	65	Hz
Frame Period	t1	612	625	638	line
Vertical Display Time	t2	600	600	600	line
Vertical Blanking Time	t3	12	25	38	line
1Line Scanning Time	t4	1160	1200	1240	clock
Horizontal Display Time	t5	1024	1024	1024	clock
Horizontal Blanking Time	t6	136	176	216	clock
Clock Rate	t7	39	45	51.42	MHz

8.5 Timing Diagram of Interface Signal(DE mode)



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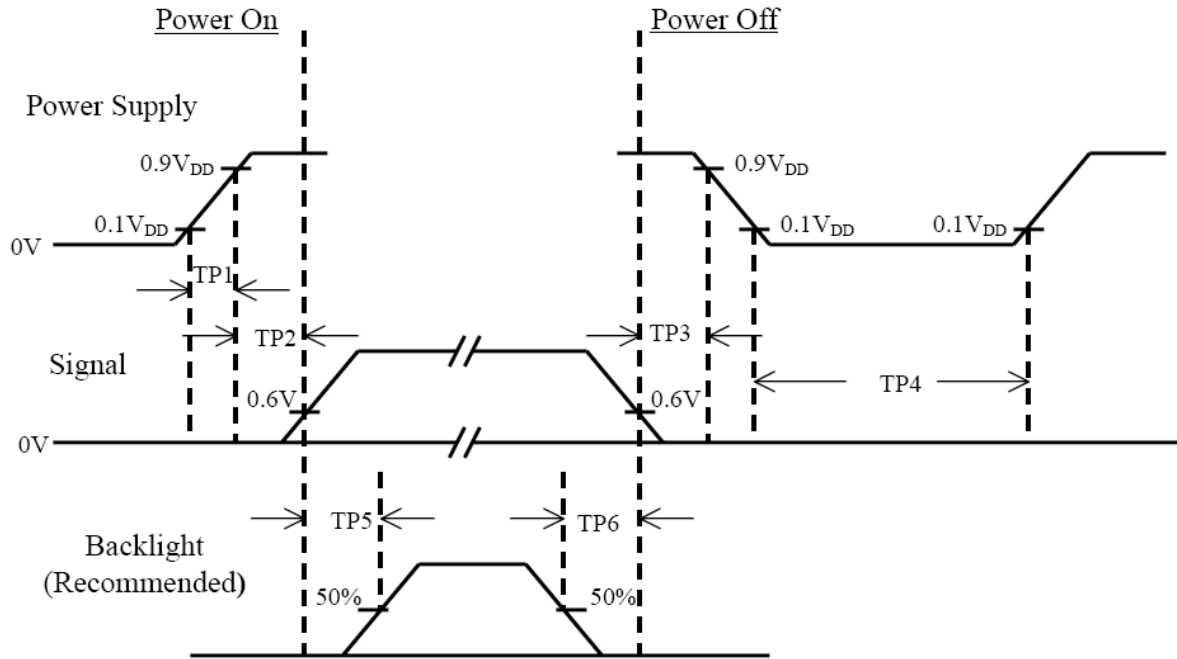
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8.6 Power Sequence




Item	Min.	Typ.	Max.	Unit	Remark
TP1	0.5	--	10	msec	
TP2	0	--	50	msec	
TP3	0	--	50	msec	
TP4	500	--	--	msec	
TP5	200	--	--	msec	
TP6	200	--	--	msec	

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9 Reliability test items

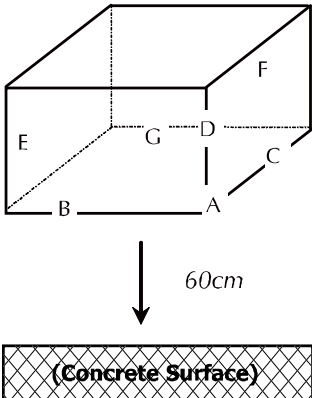
No change on display and in operation under the following test condition.

Condition: Unless otherwise specified, tests will be conducted under the following condition.

Temperature: 20±5°C.


Humidity: 65±5%RH.

Tests will be not conducted under functioning state.

No.	Parameter	Condition	Notes
1	High Temperature Operating	60°C±2°C, 120hrs (Operation state).	
2	Low Temperature Operating	-10°C±2°C, 120hrs (Operation state).	1
3	High Temperature Storage	70°C±2°C, 120hrs.	2
4	Low Temperature Storage	-20°C±2°C, 120hrs.	1,2
5	Damp Proof Test	40°C±2°C, 90~95%, 120hrs.	1,2
6	Vibration Test	Total fixed amplitude: 1.5mm. Vibration Frequency: 10~55Hz. One cycle 60 seconds to 3 direction of X, Y, Z each 15 minutes.	3
7.	Shock Test	To be measured after dropping from 60cm high on the concrete surface in packing state.  <div style="margin-left: 20px;"> <p><i>Dropping method corner dropping:</i></p> <p><i>A corner: Once edge dropping.</i></p> <p><i>B, C, D edge: Once face dropping.</i></p> <p><i>E, F, G face: Once.</i></p> </div>	

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10 Precautions





10.1 Operation

Burn-in sometimes happens when the same character was displayed at along time. Therefore, to prevent Burn-in, it is recommended to set up a Screen-saver function.

10.2 Safety

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.


10.3 Handling




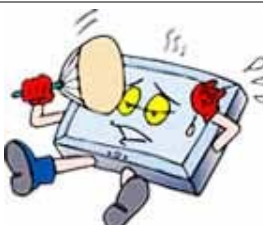

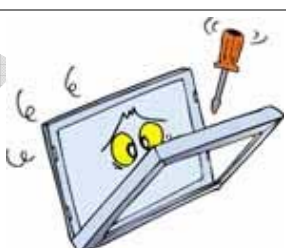
	<ul style="list-style-type: none"> a. The LCD module shall be installed flat, without twisting or bending. b. COF or FPC has narrow pattern width, so easily become open circuit by external force. DO NOT apply pressure to COF or FPC especially in bending area.
	<ul style="list-style-type: none"> c. To avoid damage in appearance or malfunction, DO NOT subject the module to mechanical shock or to excessive force on its surface.
	<ul style="list-style-type: none"> d. The polarizer attached to the display is very easy to damage, handle it with care to avoid scratching.
	<ul style="list-style-type: none"> e. To avoid contamination on the display surface, DO NOT touch the display surface with bare hands. f. Provide a space so that the LCD module does not come into contact with other components.

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	g. To protect the LCD panel from external pressure, put covering glass (acrylic board or similar board) to keep appropriate space between them.
	h. Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
	i. Property of semiconductor devices may be affected when they are exposed to light possibly resulting in malfunctioning of the ICs. To prevent such malfunctioning of the ICs, your design and mounting layout done are so that the IC is not exposed to light in actual use.
	j. Strong light exposure causes degradation of color filter. It may not recover
	k. DO NOT contact with water to avoid Metal corrosion. l. When it is not in use, the screen must be turned off or the pattern must be frequently changed by a screen saver. If it displays the same pattern for a long period of time, brightness down/image sticking may develop due to the LCD structure.
	m. Never disassemble LCD product under any circumstances. If unqualified operators or users assemble the product after disassembling it, it may not function or its operation may be seriously affected.

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10.4 Static electricity


Since a module is composed of electronic circuits, it is not strong to electrostatic discharge.

	<ol style="list-style-type: none">The LCD module shall be installed flat, without twisting or bending. Ground soldering iron tips, tools and testers when they operate.Ground your body when handling the products.DO NOT apply voltage to the input terminal without applying power supply.DO NOT apply voltage that exceeds the absolute maximum rating.Store the products in an anti-electrostatic container.Peel off protect tape, attached to polarizer, slowly to minimize ESD damage.
---	---


10.5 Storage

	<p>Store the products in a dark place at +5 ~ +25 degree C, low humidity (50%RH or less). DO NOT store the products in an atmosphere containing organic solvents or corrosive gases.</p>
--	--

10.6 Cleaning


	<ol style="list-style-type: none">DO NOT wipe the polarizer with dry cloth, as it might cause scratch.Wipe the polarizer with a soft cloth soaked with petroleum IPA, other chemical might damage.
---	---

10.7 Waste

	<p>When dispose of LCD module, manage it at the production waste according to the relevant laws and regulations.</p>
---	--

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11 Warranty

This product has been manufactured to your company's specifications as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, we cannot take responsibility if the product is used in medical devices, nuclear power control equipment, aerospace equipment, fire and security systems, or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required. If the product is to be used in any of the above applications, we will need to enter into a separate product liability agreement.

1. We cannot accept responsibility for any defect, which may arise from additional manufacturing of the product (including disassembly and reassembly), after product delivery.
2. We cannot accept responsibility for any defect, which may arise after the application of strong external force to the product.
3. We cannot accept responsibility for any defect, which may arise due to the application of static electricity after the product has passed your company's acceptance inspection procedures.
4. We cannot accept responsibility for industrial property, which may arise through the use of your product, with exception to those issues relating directly to the structure or method of manufacturing of our product. SGD-origin longer than one year from SGD production..

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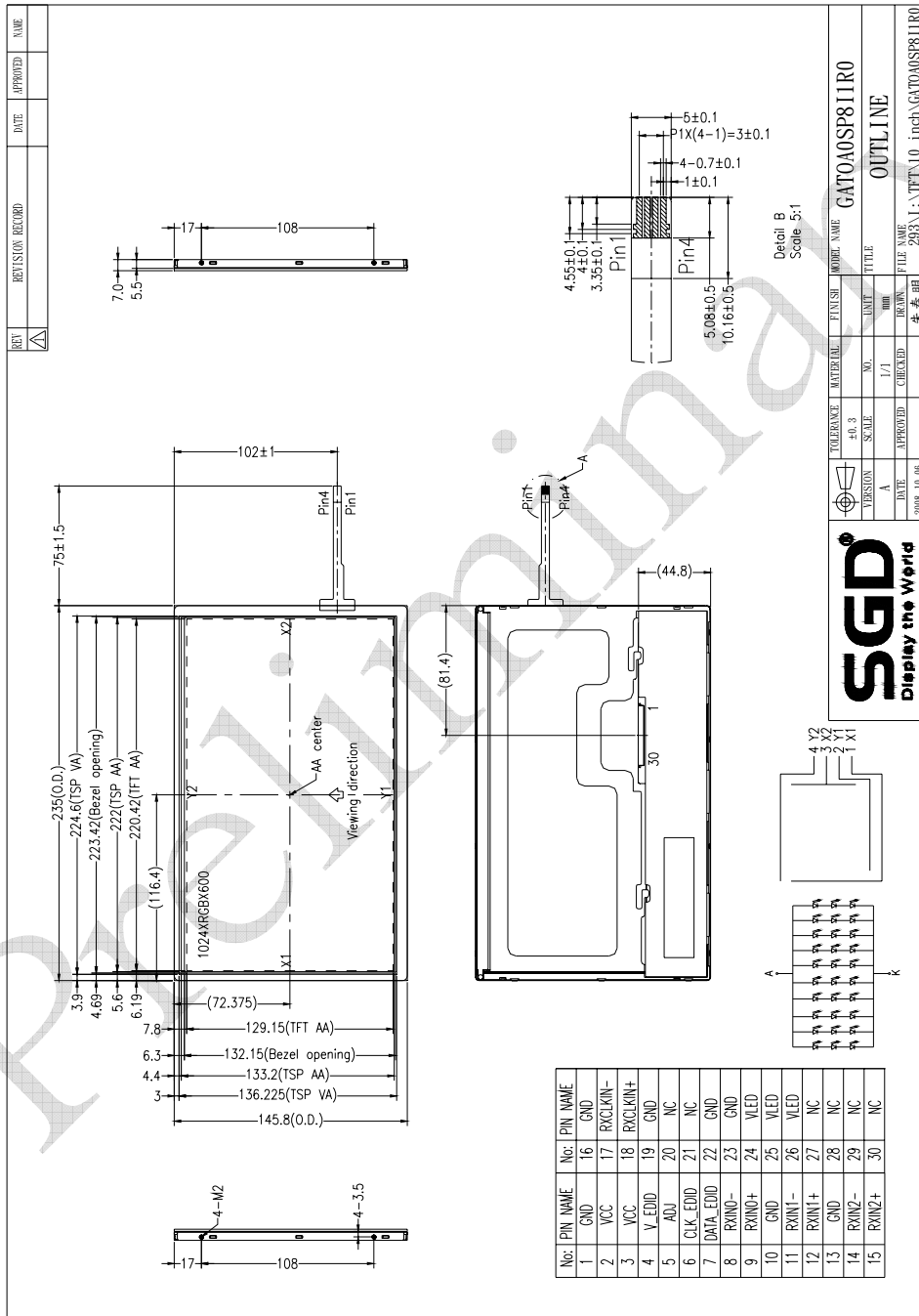
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12 Outline Dimension



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