



SPECIFICATION

Product Model: GST3D2043-P1 (Rev.A)

Designed by	R&D Checked by	Quality Department by	Approved by

Approval by Customer

<p>OK</p> <p>NG, Problem survey:</p> <p style="text-align: right;">Approved By _____</p>

1. If there is no special request from customer, Shenzhen GT Optronics Tech Co.Ltd. Will not reserve the tooling of the product under the following conditions:
 - 1.1 There is no response from customer in one year after Shenzhen GT Optronics Tech Co.Ltd. Submit the samples;
 - 1.2 There is no order in one year after the latest mass production.
 2. All correlated data (include quality record) will be reserved one year more after tooling was discarded.
 3. If there is no special request from customer, The product of quality Co., ltd. Will repair only one year.
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Revision Record

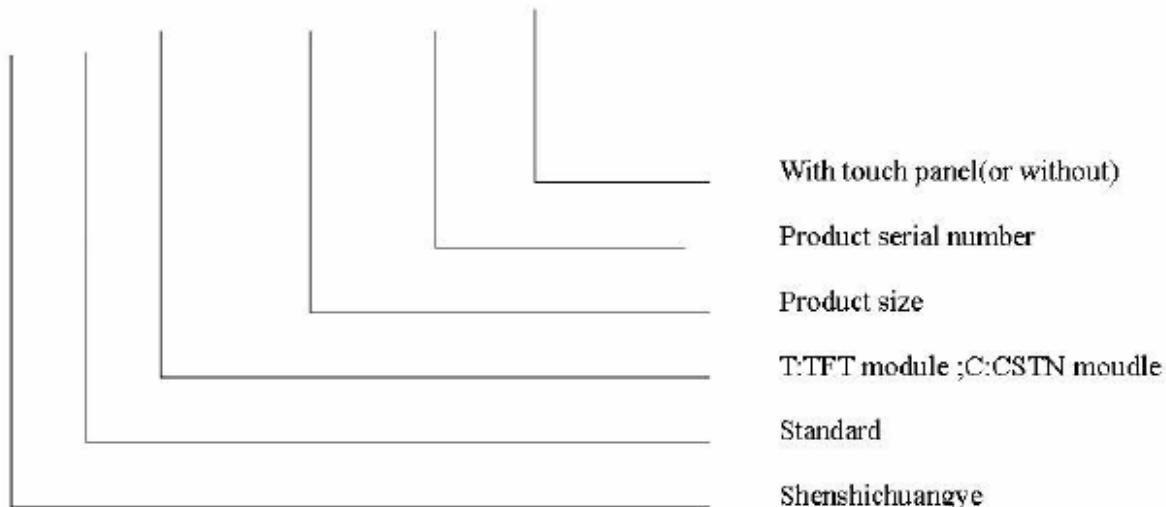
VEV NO.	REV DATE	CONTENTS	Note
A	2011-06-11	NEW ISSUE	

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1. Numbering System

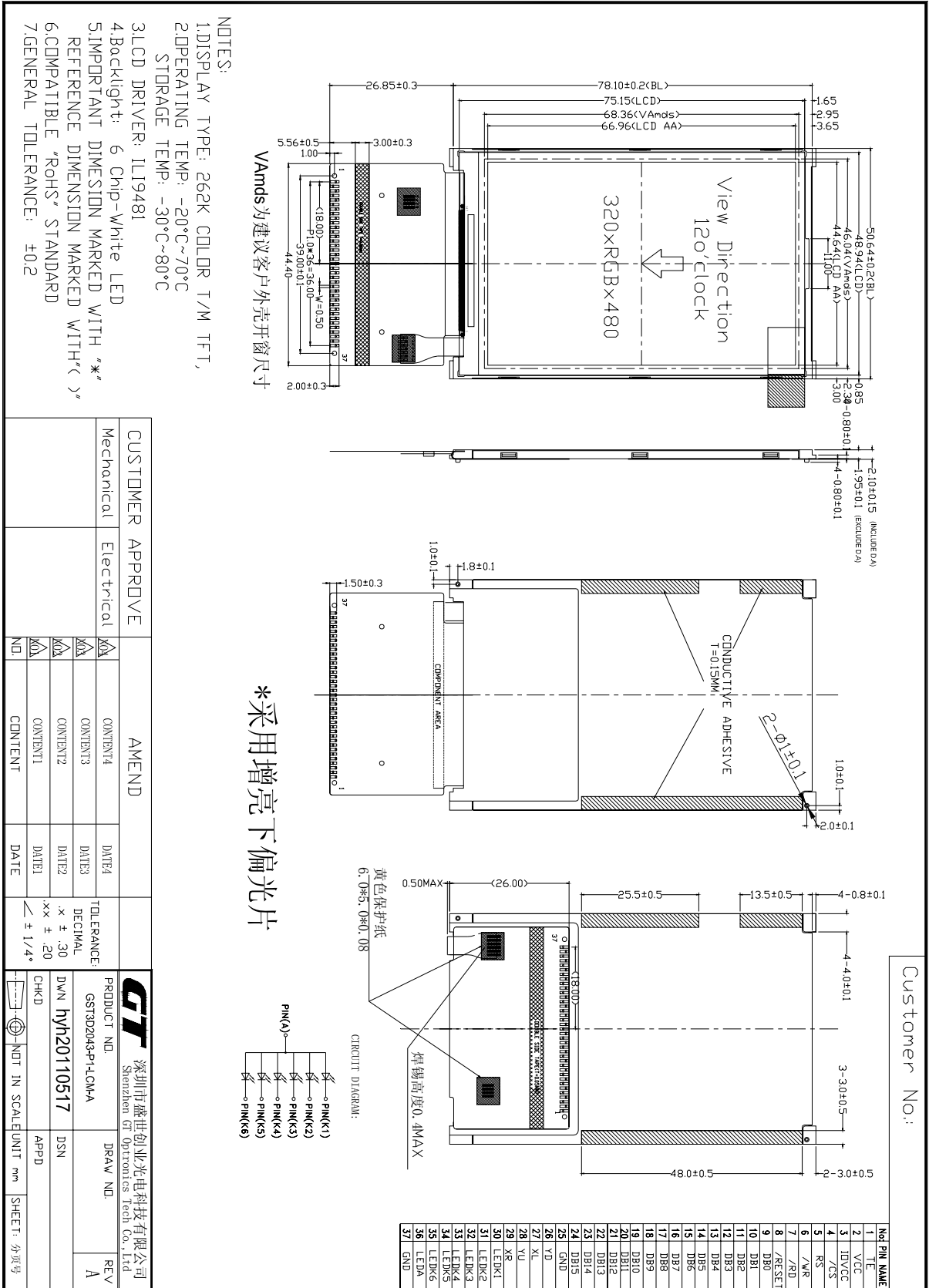
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2. General Information

ITEM	STANDARD VALUES	UNITS
LCD type	3.2" TFT	-
Dot arrangement	320(RGB) × 480	dots
Color filter array	RGB vertical stripe	-
Display mode	TN / Transmissive / Normally White	-
Viewing Direction	12 o'clock	-
Driver IC	ILI9481	-
Module size	50.64(W) × 78.10(H) × 2.10(T)	mm
Active area	44.64(W) × 66.96(H)	mm
Dot pitch	0.1395(W) × 0.1395(H)	mm
Interface	i80-system 16-bit parallel interface	-
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
Back Light	6 White LED In Parallel	-
Weight	TBD	g

3. External Dimensions



4. Interface Description

PIN NO.	PIN NAME	DESCRIPTION
1	TE	Tearing effect output pin to synchronies MCU to frame writing, activated by S/W command. When this pin is not activated, this pin is low. If not used, please open this pin.
2	VCC	System power supply (2.5V~3.3V).
3	IOVCC	System power supply (1.65V~3.3V).
4	/CS	Chip select signal input terminal, Active at 'L'.
5	RS	Register select signal input terminal: RS='H': Command; RS='L': Data.
6	/WR	Write signal input terminal, Active at 'L'.
7	/RD	Read signal input terminal, Active at 'L'.
8	/RESET	Reset signal input terminal, active at 'L'.
9	DB0	i80-system 16-bit data bus.
10	DB1	
11	DB2	
12	DB3	
13	DB4	
14	DB5	
15	DB6	
16	DB7	
17	DB8	
18	DB9	
19	DB10	
20	DB11	
21	DB12	
22	DB13	
23	DB14	
24	DB15	
25	GND	Power ground.
26	YD	TOUCH PIN (NC).
27	XL	
28	YU	
29	XR	
30	LEDK1	LED backlight kathode.
31	LEDK2	LED backlight kathode.
32	LEDK3	LED backlight kathode.
33	LEDK4	LED backlight kathode.
34	LEDK5	LED backlight kathode.
35	LEDK6	LED backlight anode.
36	LEDA	LED backlight anode.
37	GND	Power ground.

5. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Logic Supply Voltage	IOVCC	-0.3	4.6	V
Analog Supply Voltage	VCC	-0.3	4.6	V
Input Voltage	V _{in}	0	IOVCC+0.3	V
Operating Temperature	T _{OP}	-20	70	°C
Storage Temperature	T _{ST}	-30	80	°C
Storage Humidity	HD	-	90	%RH

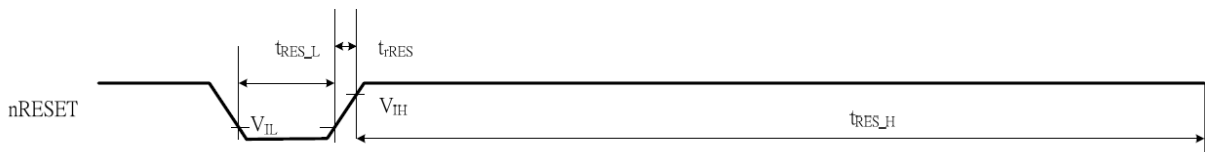
6. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Logic Supply Voltage	IOVCC	1.65	1.8/2.8	3.0	V	-
Analog Supply Voltage	VCC	2.5	2.8	3.0	V	-
Input High Voltage	V _{IH}	0.7IOVCC	-	IOVCC	V	Digital input pins
Input Low Voltage	V _{IL}	0	-	0.3IOVCC	V	Digital input pins
Output High Voltage	V _{OH}	0.8IOVCC	-	IOVCC	V	Digital output pins
Output Low Voltage	V _{OL}	0	-	0.2IOVCC	V	Digital output pins

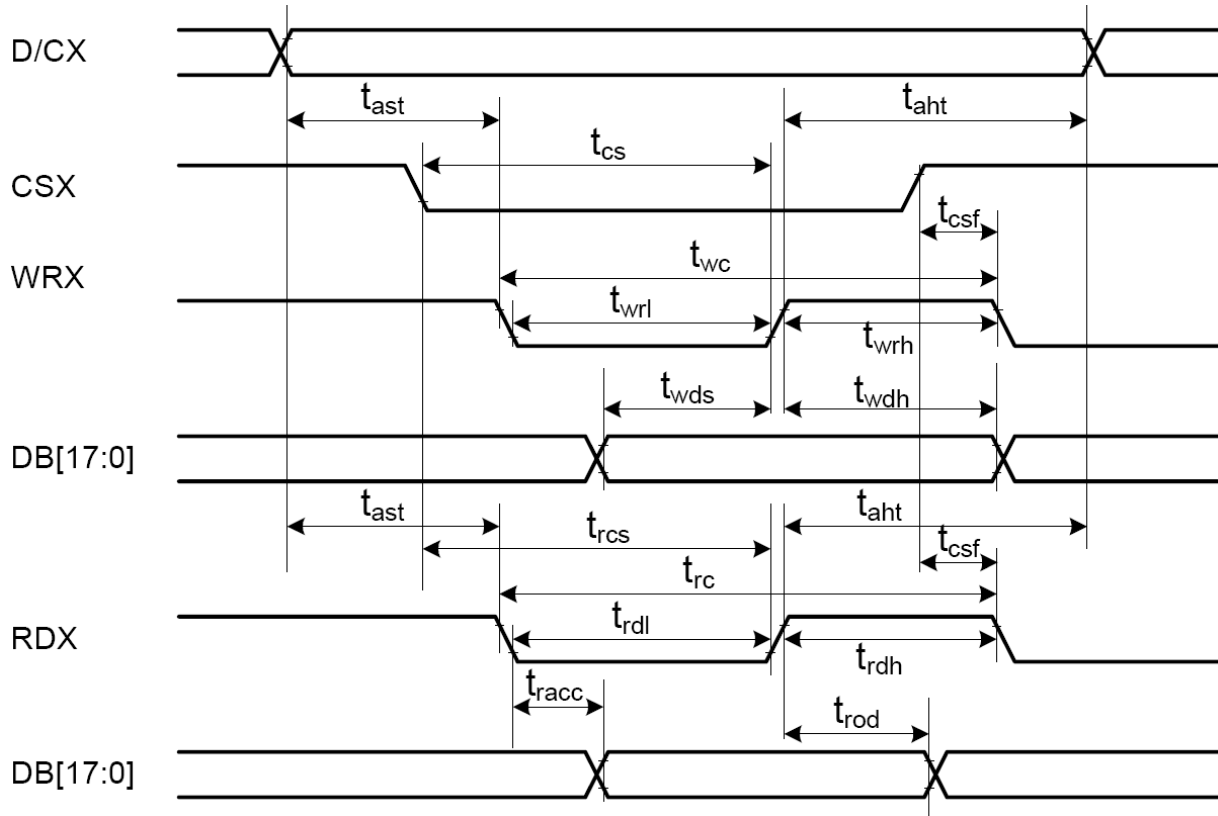
7. Timing Characteristics

7.1 Reset Timing Characteristics

Item	Symbol	Unit	Min.	Typ.	Max.
Reset low-level width	t _{RES_L}	ms	1	-	-
Reset rise time	t _{RES}	μs	-	-	10
Reset high-level width	t _{RES_H}	ms	50	-	-

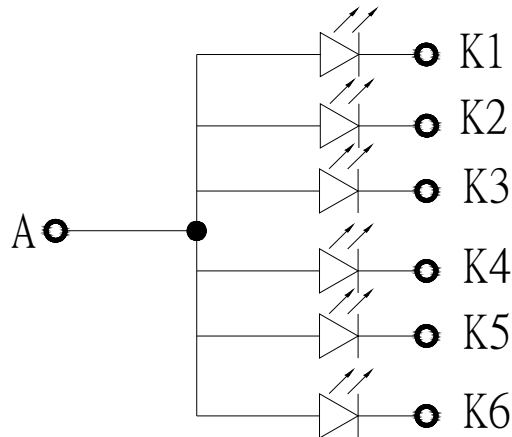


7.2 i80-System Interface Timing Characteristics.



Signal	Symbol	Parameter	min	max	Unit	Description
D/CX	t_{ast}	Address setup time	10	-	ns	
	t_{ah}	Address hold time (Write/Read)	10	-	ns	
CSX	t_{cs}	Chip Select setup time (Write)	20	-	ns	
	t_{rcs}	Chip Select setup time (Read)	20	-	ns	
	t_{csf}	Chip Select Wait time (Write/Read)	20	-	ns	
WRX	t_{wc}	Write cycle	100	-	ns	
	t_{wrh}	Write Control pulse H duration	30	-	ns	
	t_{wrl}	Write Control pulse L duration	20	-	ns	
RDX	t_{rc}	Read cycle	450	-	ns	
	t_{rdh}	Read Control pulse H duration	250	-	ns	
	t_{rdl}	Read Control pulse L duration	170	-	ns	
DB[17:0], DB[15:0], DB[8:0], DB[7:0]	t_{wds}	Write data setup time	15	-	ns	For maximum CL=30pF For minimum CL=8pF
	t_{wdh}	Write data hold time	25	-	ns	
	t_{racc}	Read access time	10	340	ns	
	t_{rod}	Read output disable time	10	-	ns	

8. Backlight Characteristics



Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	3.0	3.2	3.4	V	If=90mA
Supply Current	If	-	90	120	mA	-
Luminous Intensity for LCM	-	-	200	-	Cd/m ²	If=90mA
Uniformity for LCM	-	80	-	-	%	If=90mA
Life Time	-	50000	-	-	Hr	If=90mA
Backlight Color	White					

9. Optical Characteristics

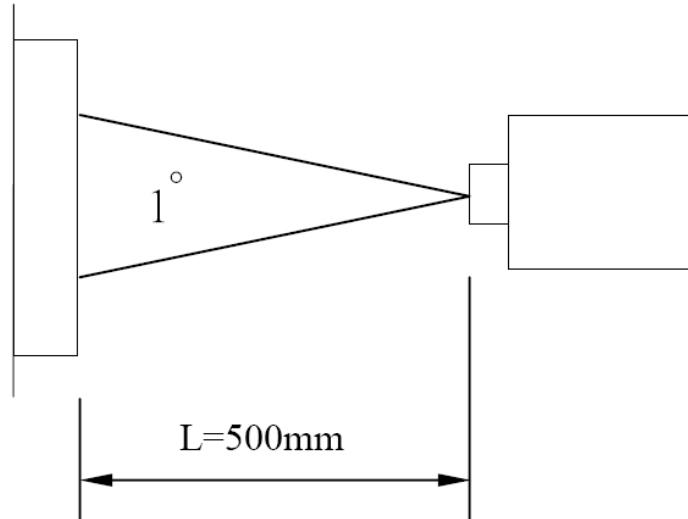
(Note1, Note2)

(Using CPT LC+ EWV Polarizer+Corresponding Backlight, reference only)

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
Transmittance		T			4.7		%	
Contrast Ratio		CR	*1)		400	-	--	Note 3
Response Time		Tr+ Tf	*3)	-	25		ms	Note 4
Viewing Angle	Vertical	θ *2)	CR \geq 10	105	115	-		Note 5
	Horizontal	ϕ *2)		110	120	-		
Color Filter Chromaticity	White	x	$\theta = \phi = 0^\circ$	(0.288)	(0.308)	(0.328)		Note 6
		y		(0.322)	(0.342)	(0.362)		
		Y		(27.488)	(30.488)	(33.488)		
	Red	x	$\theta = \phi = 0^\circ$	(0.632)	(0.652)	(0.672)		
		y		(0.310)	(0.330)	(0.350)		
		Y		(15.153)	(18.153)	(21.153)		
	Green	x	$\theta = \phi = 0^\circ$	(0.297)	(0.317)	(0.337)		
		y		(0.555)	(0.575)	(0.595)		
		Y		(54.617)	(58.617)	(62.617)		
	Blue	x	$\theta = \phi = 0^\circ$	(0.117)	(0.137)	(0.157)		
		y		(0.112)	(0.132)	(0.152)		
		Y		(11.694)	(14.694)	(17.694)		
NTSC				-	(61%)	-		

Note 1. Ambient condition: $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, $60 \pm 10\% \text{RH}$, under 10 Lux in the darkroom.

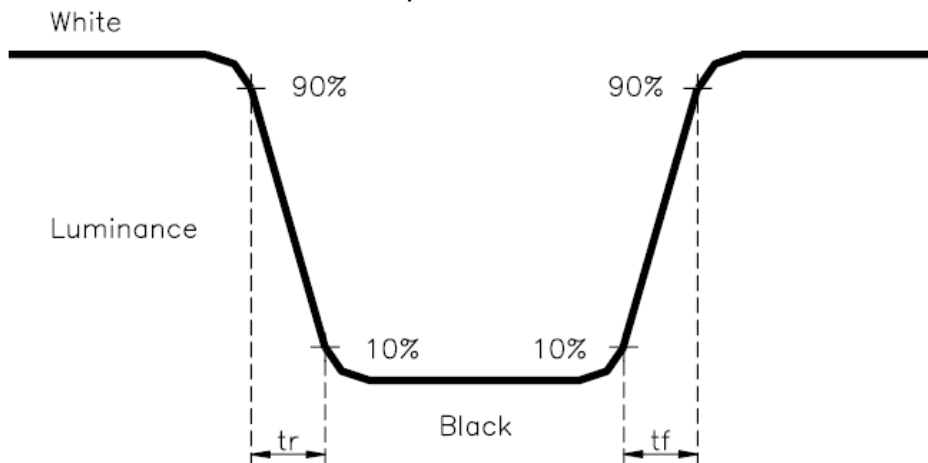
Note 2. Measure device: BM-5A (TOPCON), viewing cone= 1° , IL=20mA.



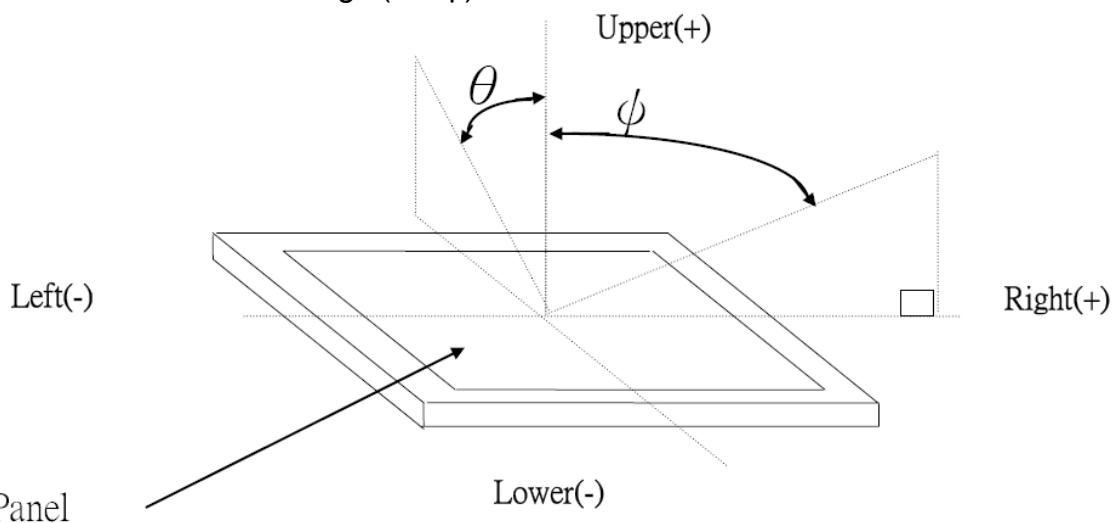
Note 3. Definition of Contrast Ratio:

$$\text{CR} = \text{White Luminance (ON)} / \text{Black Luminance (OFF)}$$

Note 4. Definition of response time: The response time is defined as the time interval between the 10% and 90% amplitudes.



Note 5. Definition of view angle(θ , ψ):



Note 6. Light source: C light.

10. Reliability Test Conditions And Methods

NO.	TEST ITEMS	TEST CONDITION	INSPECTION AFTER TEST
①	High Temperature Storage	80°C±2°C×200Hours	Inspection after 2~4hours storage at room temperature,the samples should be free from defects: 1,Air bubble in the LCD. 2,Sealleak. 3,Non-display. 4,Missing segments. 5,Glass crack. 6,Current IDD is twice higher than initial value. 7,The surface shall be free from damage. 8,The electric charateristic requirements shall be satisfied.
②	Low Temperature Storage	-30°C±2°C×200Hours	
③	High Temperature Operating	70°C±2°C×120Hours	
④	Low Temperature Operating	-20°C±2°C×120Hours	
⑤	Temperature Cycle(Storage)	-20°C ↔ 25°C ↔ 70°C (30min) (5min) (30min) ← 1cycle → Total 10cycle	
⑥	Damp Proof Test (Storage)	50°C±5°C×90%RH×120Hours	
⑦	Vibration Test	Frequency:10Hz~55Hz~10Hz Amplitude:1.5M X,Y,Z direction for total 3hours (Packing Condition)	
⑧	Drooping Test	Drop to the ground from 1M height one time every side of carton. (Packing Condition)	
⑨	ESD Test	Voltage:±8KV,R:330Ω,C:150PF, Air Mode,10times	

REMARK:

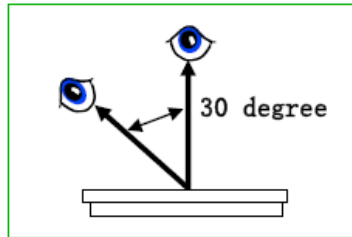
- 1,The Test samples should be applied to only one test item.
- 2,Sample side for each test item is 5~10pcs.
- 3,For Damp Proof Test,Pure water(Resistance > 10MΩ)should be used.
- 4,In case of malfunction defect caused by ESD damage,if it would be recovered to normal state after resetting,it would be judge as a good part.
- 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.
- 6,Failure Judgment Criterion:Basic Specification Electrical Characteristic,Mechanical Characteristic,Optical Characteristic.

11. Inspection Standard

This standard apply to TFT module specification.

1. Inspection condition:

Under daylight lamp 20~40W, product distance inspector'eye 30cm,incline degree 30° 。



2. Inspection standard

NO.	Item	Inspection standard	Rate															
2.1	Dot	<p>Case of Dot defect is below</p> <p>① Bright Dot (whit spot) : "0"</p> <p>② Dark Dot (black spot) : "0" (In case of Dark Dot on Main TFT LCD)</p> <p>- NG if there's full Dot defect.</p> <p>- Damaged less than the size of sub-pixel is not counted as defect</p> <p>- Dots darker than the size of sub-pixel are not defined as bright dot defect</p> <table border="1"> <thead> <tr> <th>area size (mm)</th> <th>Acceptable number</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.10$</td> <td>ignore</td> </tr> <tr> <td>$0.10 < \Phi \leq 0.15$</td> <td>3</td> </tr> <tr> <td>$0.15 < \Phi \leq 0.20$</td> <td>2</td> </tr> <tr> <td>$0.25 < \Phi \leq 0.25$</td> <td>1</td> </tr> <tr> <td>$0.25 < \Phi$</td> <td>0</td> </tr> </tbody> </table>	area size (mm)	Acceptable number	$\Phi \leq 0.10$	ignore	$0.10 < \Phi \leq 0.15$	3	$0.15 < \Phi \leq 0.20$	2	$0.25 < \Phi \leq 0.25$	1	$0.25 < \Phi$	0	minor			
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2.2	line	<table border="1"> <thead> <tr> <th colspan="2">Size (mm)</th> <th>Acceptable number</th> </tr> </thead> <tbody> <tr> <td>ignore</td> <td>$W \leq 0.03$</td> <td>ignore</td> </tr> <tr> <td>$L \leq 4.0$</td> <td>$0.03 < W \leq 0.04$</td> <td>2</td> </tr> <tr> <td>$L \leq 4.0$</td> <td>$0.04 < W \leq 0.05$</td> <td>1</td> </tr> <tr> <td></td> <td>$0.05 < W$</td> <td>Treat with dot non-conformance</td> </tr> </tbody> </table>	Size (mm)		Acceptable number	ignore	$W \leq 0.03$	ignore	$L \leq 4.0$	$0.03 < W \leq 0.04$	2	$L \leq 4.0$	$0.04 < W \leq 0.05$	1		$0.05 < W$	Treat with dot non-conformance	
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	$0.05 < W$	Treat with dot non-conformance																

12. Handling Precautions

12.1 Mounting method

The LCD panel of SC LCD module consists of two thin glass plates with polarizes which easily be damaged. And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

12.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent [recommended below] and wipe lightly

- Isopropyl alcohol
- Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water
- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated:

- Soldering flux
- Chlorine (Cl) , Salfur (S)

If goods were sent without being sili8con coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happen by miss-handling or using some materials such as Chlorine (Cl), Salfur (S) from customer, Responsibility is on customer.

12.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you:

Connect any unused input terminal to Vdd or Vss, do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

12.4 packing

- Module employ LCD elements and must be treated as such.
- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity

12.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life.
- An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the maximum operating temperature, 50%Rh or less is required.

12.6 storage

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it .
And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.
[It is recommended to store them as they have been contained in the inner container at the time of delivery from us

12.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water

13. Precaution For Use

13.1

A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

13.2

On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- When a question is arisen in this specification
- When a new problem is arisen which is not specified in this specifications
- When an inspection specifications change or operating condition change in customer is reported to GT LCD , and some problem is arisen in this specification due to the change
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

14. Packing Method

