



深圳市勋瑞光电科技有限公司

Xunrui Shenzhen Optoelectronics Technology Co., Ltd.

SPEC Code	PA-TF-3077
SLC Product Code	H020LQ40I3003
Customer	

TFT LCM Production Factory:	
Drafted By	
Audited by	
Approved by	

Customer
Company:
Signature:



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Revision History

Version	Date	Page (New)	Section	Description
A1	2015-12-26	All	All	Preliminary

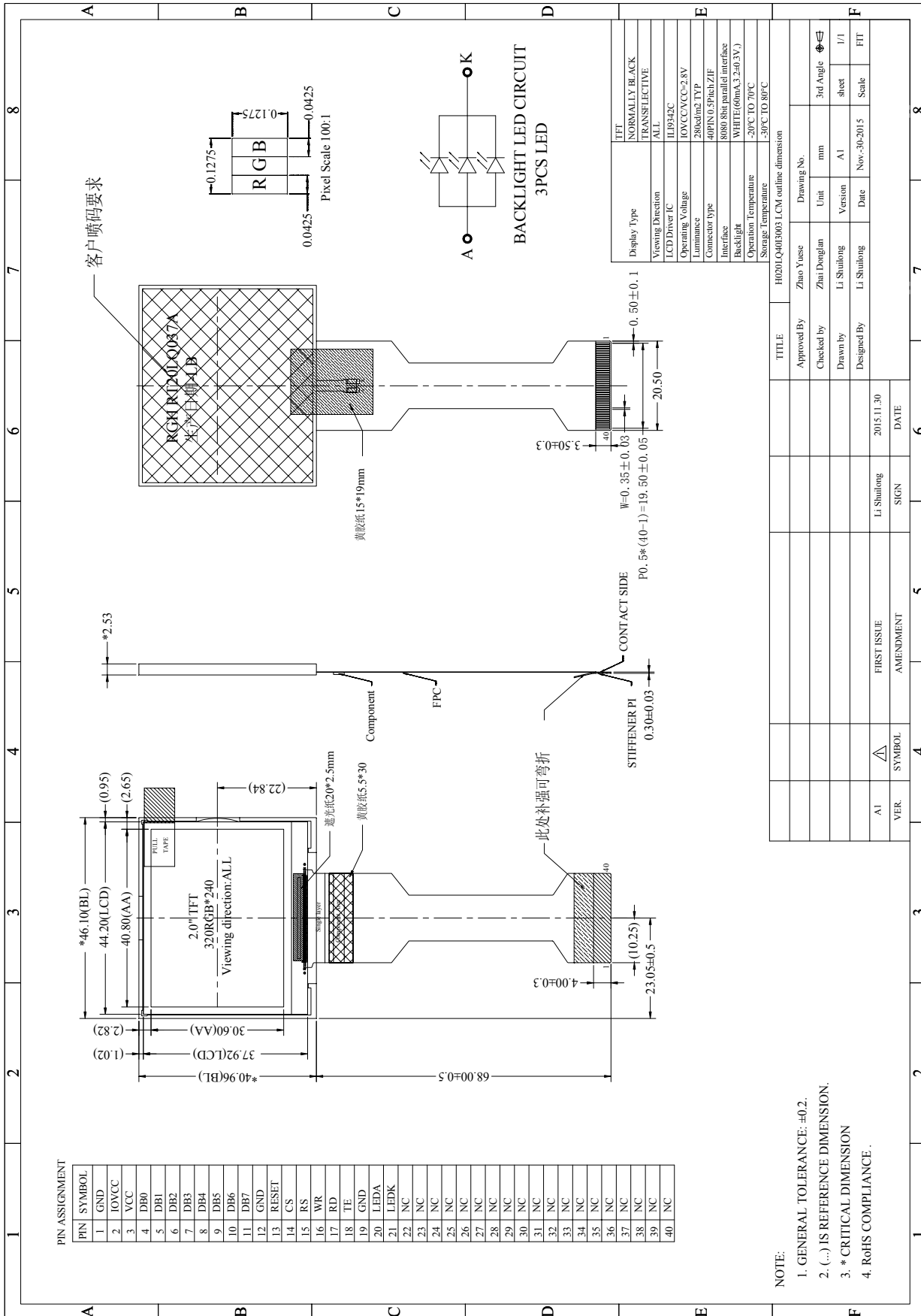


1. General Spec.

ITEM	STANDARD VALUES	UNITS
LCD type	2.0" TFT	--
Dot arrangement	320RGB * 240	dots
Color filter array	RGB vertical stripe	--
Display mode	AIFF / Transflective / Normally Black	--
Viewing direction	ALL	--
Driver IC	ILI9342C	--
Module size	46.10(W) * 40.96(H) * 2.53(T)	mm
Active area	40.8(H) * 30.6 (V)	mm
Dot pitch	0.0425(W) * 0.1275(H)	mm
Interface	MCU 8080 8-bit interface	--
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
Weight	TBD	g



2. Mechanical drawing





3. Interface Description

PIN NO.	PIN NAME	DESCRIPTION
1	GND	Ground .
2	IOVCC	Power supply for the logic power.
3	VCC	Power supply for the analog power.
4	DB0	Data bus.
5	DB1	
6	DB2	
7	DB3	
8	DB4	
9	DB5	
10	DB6	
11	DB7	
12	GND	Ground .
13	RESET	Reset pin.
14	CS	Chip selection pin.
15	RS	Displayed data/commend selection pin.
16	WR	Write enable in MCU parallel interface .
17	RD	Read enable in 8080 MCU parallel interface.
18	TE	Tearing effect output pin.
19	GND	Ground .
20	LEDA	Power supply for backlight anode input terminals.
21	LEDK	Power supply for backlight cathode input terminals.
22	NC	Not connected.
23	NC	Not connected.
24	NC	Not connected.
25	NC	Not connected.
26	NC	Not connected.
27	NC	Not connected.
28	NC	Not connected.
29	NC	Not connected.
30	NC	Not connected.
31	NC	Not connected.
32	NC	Not connected.
33	NC	Not connected.
34	NC	Not connected.
35	NC	Not connected.
36	NC	Not connected.
37	NC	Not connected.
38	NC	Not connected.
39	NC	Not connected.
40	NC	Not connected.



4. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Logic Supply Voltage	IOVCC	-0.3	4.6	V
Analog Supply Voltage	VCC	-0.3	4.8	V
Operating Temperature	T _{OP}	-20	70	°C
Storage Temperature	T _{ST}	-30	80	°C
Storage Humidity	HD	20	90	%RH

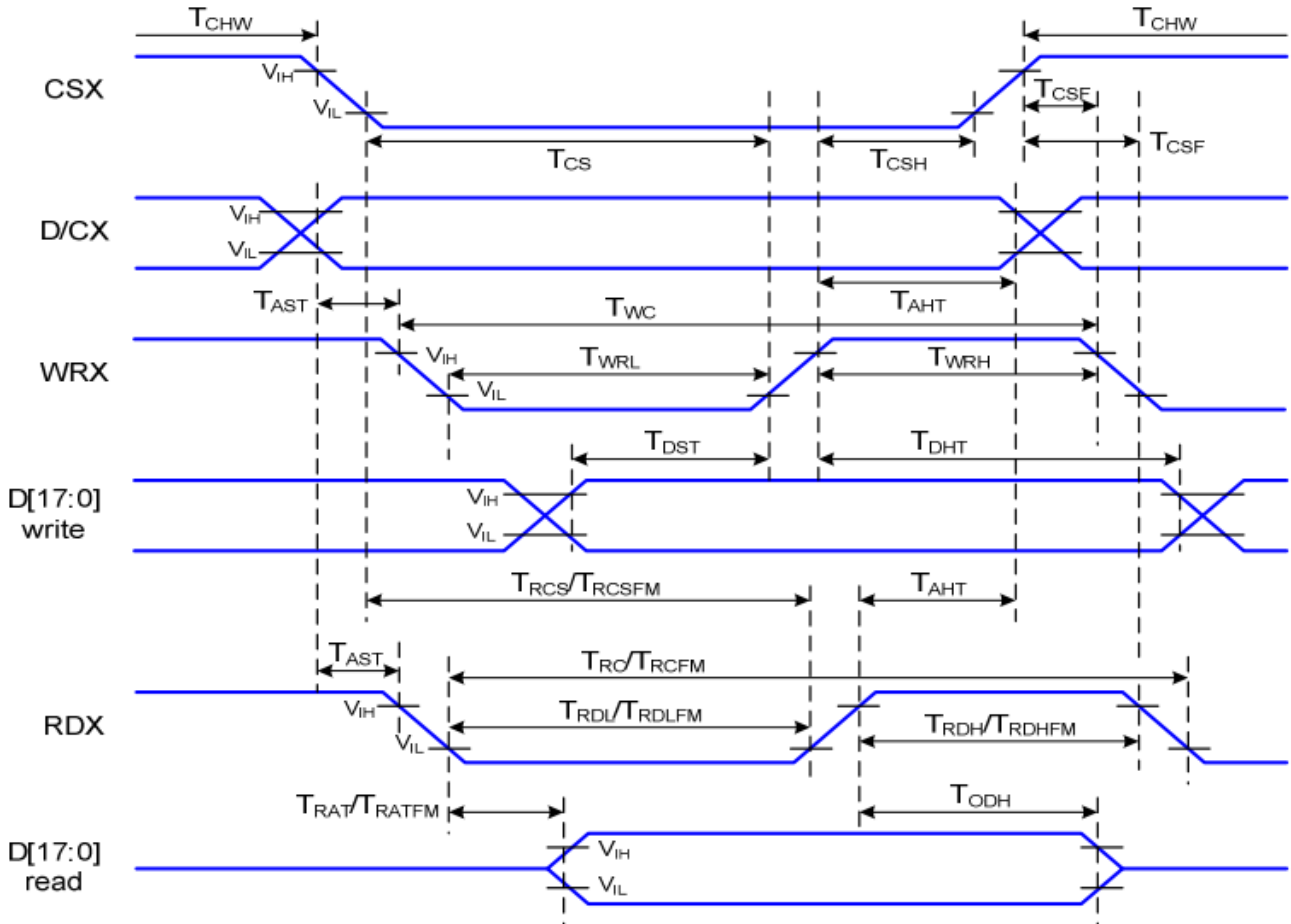
5. DC Characteristics

Item	Symbol	Min.	Typ	Max.	Unit	Remark
System Supply Voltage	VCC	2.6	2.8	3.3	V	-
I/O Supply Voltage	IOVCC	1.65	1.8	3.3	V	-
Input High Voltage	V _{IH}	0.7IOVCC	-	IOVCC	V	-
Input Low Voltage	V _{IL}	GND	-	0.3IOVCC	V	-
Output High Voltage	V _{OH}	0.8IOVCC	-	IOVCC	V	I _{OH} =-1.0mA
Output Low Voltage	V _{OL}	GND	-	0.2IOVCC	V	I _{OH} =1.0mA
I/O Leak Current	ILI	-	-	1	uA	-



6. Timing Characteristics

6.1 8080 series MCU parallel interface characteristics: 18/16/9/8-bit Bus





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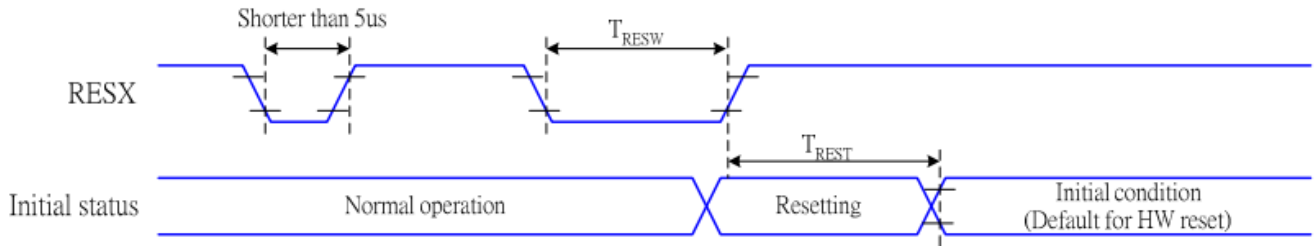
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Ta=25 °C, VDDI=1.65~3.7V, VDD=2.5~4.8V

Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	TAST	Address Setup Ttime	0		ns	-
	TAHT	Address Hold Time (Write/Read)	10		ns	
CSX	TCHW	Chip Select "H" Pulse Width	0		ns	-
	TCS	Chip Select Setup Time (Write)	15		ns	
	TRCS	Chip Select Setup Time (Read ID)	45		ns	
	TRCSFM	Chip Select Setup time (Read FM)	355		ns	
	TCSF	Chip Select Wait Time (Write/Read)	10		ns	
	TCSH	Chip Select Hold Time	10		ns	
WRX	TWC	Write Cycle	66		ns	
	TWRH	Control Pulse "H" Duration	15		ns	
	TWRL	Control Pulse "L" Duration	15		ns	
RDX (ID)	TRC	Read Cycle (ID)	160		ns	When Read ID Data
	TRDH	Control Pulse "H" Duration (ID)	90		ns	
	TRDL	Control Pulse "L" Duration (ID)	45		ns	
RDX (FM)	TRCFM	Read Cycle (FM)	450		ns	When Read from Frame Memory
	TRDHFM	Control Pulse "H" Duration (FM)	90		ns	
	TRDLFM	Control Pulse "L" Duration (FM)	355		ns	
D[17:0]	TDST	Data Setup Time	10		ns	For CL=30pF
	TDHT	Data Hold Time	10		ns	
	TRAT	Read Access Time (ID)		40	ns	
	TRATFM	Read Access Time (FM)		340	ns	
	TODH	Output Disable Time	20	80	ns	



6.2 Reset timing



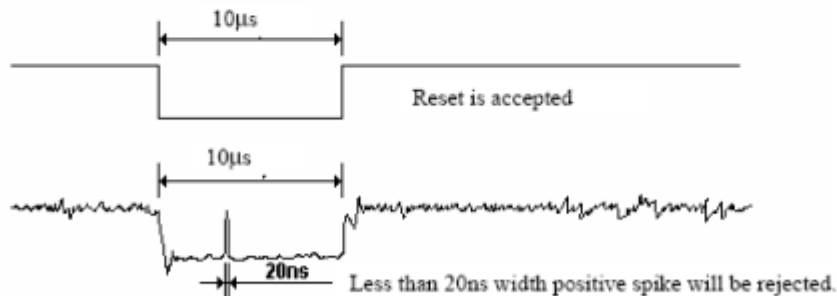
Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	tRESW	Reset pulse duration	10	-	us
	tREST	Reset cancel	-	5	ms
				120	ms

Notes:

- The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from EEPROM (or similar device) to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.
- Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below:

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 9us	Reset
Between 5us and 9us	Reset starts

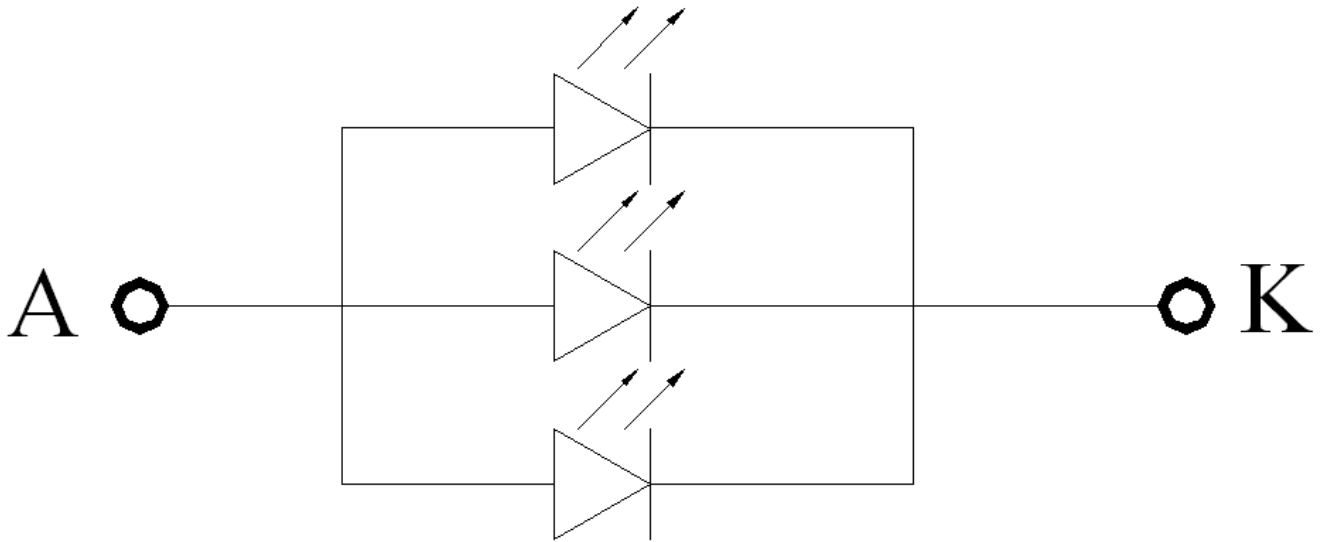
- During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In -mode.) and then return to Default condition for Hardware Reset.
- Spike Rejection also applies during a valid reset pulse as shown below:



- When Reset applied during Sleep In Mode.
- When Reset applied during Sleep Out Mode.
- It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.



7. Backlight Characteristics



Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	2.9	3.2	3.5	V	If=60mA
Supply Current	If	-	60	-	mA	-
Backlight Color	White					If=60mA



8. Electro-optical characteristics

8.1 Transmissive Mode

Item	Symbol	Specifications			Unit	Note
		Min.	Typ.	Max.		
Contrast ratio*	Cr ($\Theta=0^\circ$)	-	250	-		*[1]Here the data are design value. [2]Chromaticity measuring machine: CA310
Viewing angle ($Cr \geq 10$)*	$\Theta 21$	-	80	-	deg	
	$\Theta 22$	-	80	-		
	$\Theta 12$	-	80	-		
	$\Theta 11$	-	80	-		
Chromaticity of LCM	Red	x	0.478	0.528	0.578	
		y	0.283	0.333	0.383	
	Green	x	0.273	0.323	0.373	
		y	0.482	0.532	0.582	
	Blue	x	0.112	0.162	0.212	
		y	0.044	0.094	0.144	
White	x	-	0.281	-		
	y	-	0.294	-		
Color gamut of LCM(NTSC%)	S		50		%	
Luminous Intensity for LCM	-	-	280	-	Cd/m ²	
Uniformity for LCM	-	80	-	-	%	

8.2 Reflective Mode

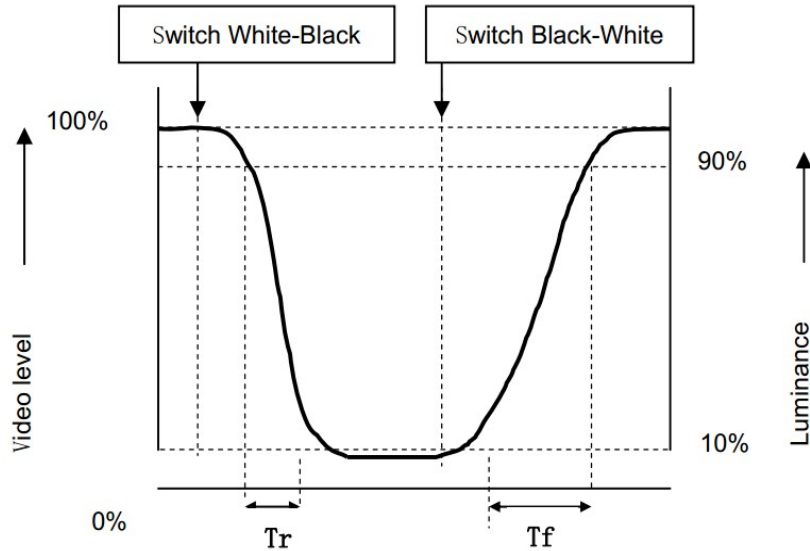
Item	Symbol	Specifications			Unit	Note
		Min.	Typ.	Max.		
Reflection Ratio*	Cr ($\theta = \phi = 0^\circ$)	-	7	-	%	Here the data are design value.
Reflective Contrast ratio*	Cr ($\Theta=0^\circ$)	-	15	-		
Viewing angle ($Cr \geq 10$)*	$\Theta 21$	-	45	-	deg	
	$\Theta 22$	-	45	-		
	$\Theta 12$	-	45	-		
	$\Theta 11$	-	45	-		



8.3 Definitions and measuring methods

[1] Response Time(Tr、 Tf)

The rise time 'Tr' is defined as the time for luminance to change from 90% to 10% as a result of a change of the electrical condition. The fall time 'Tf' is defined as the time for luminance to change from 10% to 90% as a result of a change of the electrical condition.

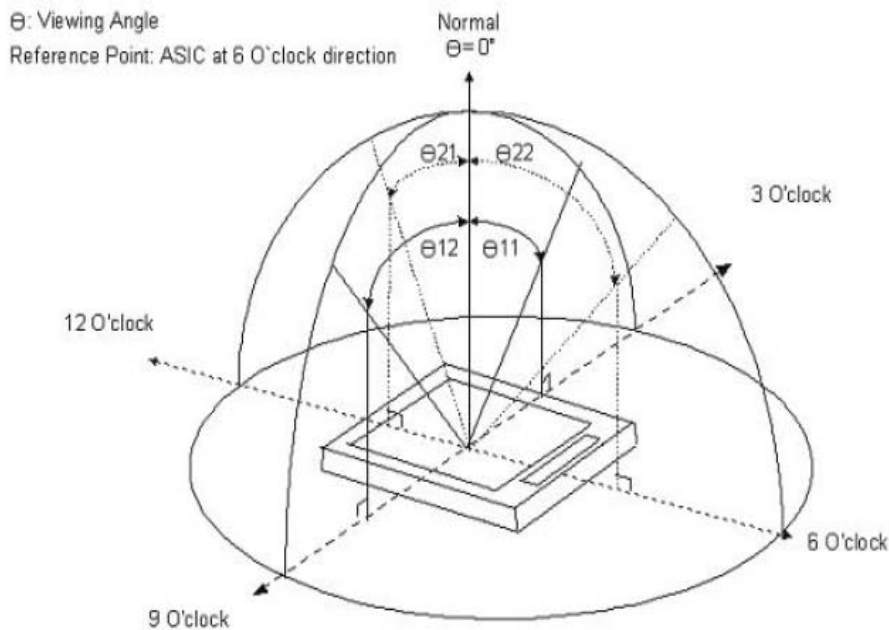


[2] Contrast ratio (Cr)

The contrast ratio (Cr), measured on a module, is the ratio between the luminance (L_w) in a full white area (R=G=B=1) and the luminance (L_d) in a dark area (R=G=B=0):

$$Cr = \frac{L_w}{L_d}$$

[3] Viewing angle diagram





[4] Definition of color gamut

Measuring machine: CFT-01. NTSC'S Primaries: R(x,y,Y)、G(x,y,Y)、B(x,y,Y).

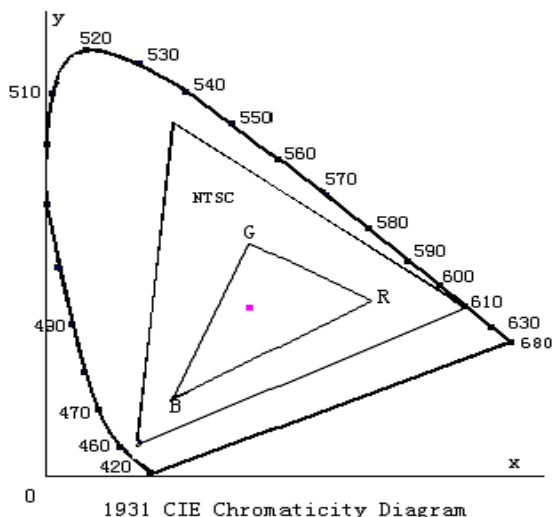


Fig. 1931 CIE chromaticity diagram

$$\text{Color gamut: } S = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}} \times 100\%$$

[5] Definition of luminance uniformity

Active area is divided into 9 measuring areas, every measuring points is placed at the center of each measuring area.

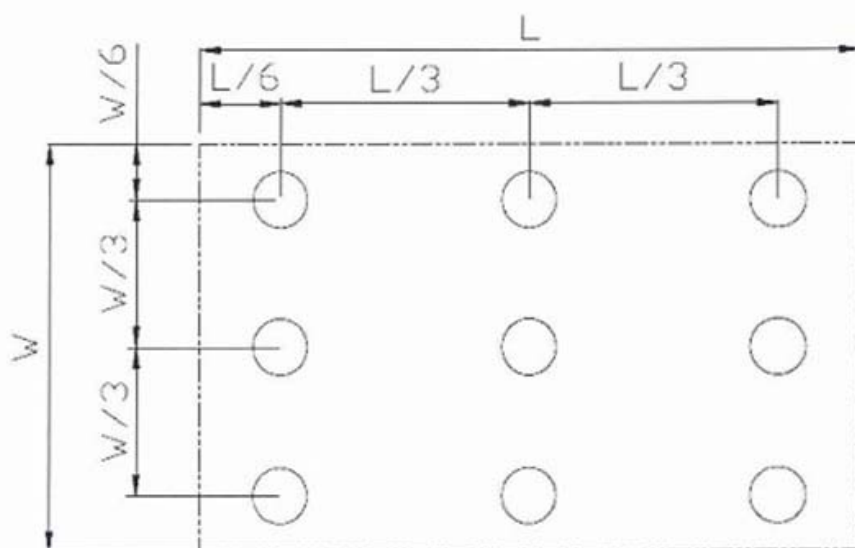
luminance uniformity = L_{\min} / L_{\max} .

L: Active area length .

W: Active area width.

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

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



[6] Definition of luminance

Measure the luminance of white state at center point.



9. Reliability Test Conditions And Methods

NO.	TEST ITEMS	TEST CONDITION	INSPECTION AFTER TEST
①	High Temperature Storage	80℃ * 6Hours	Inspection after 2~4hours storage at room temperature,the samples should be free from defects: 1,Air bubble in the LCD. 2,Seal leak. 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 characteristic requirements shall be satisfied.
②	Low Temperature Storage	-30℃ * 6Hours	
③	High Temperature Operating	70℃ * 6Hours	
④	Low Temperature Operating	-20℃ * 6Hours	
⑤	Damp Proof Test (Storage)	60℃ * 90%RH * 6Hours	

REMARK:

- 1,The Test samples should be applied to only one test item.
- 2,Sample for each test item is 3pcs.
- 3,For Damp Proof Test, Pure water(Resistance > 10MΩ)should be used.
- 4,Failure Judgment Criterion: Basic Specification Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.



10. Quality standards

10.1 Dot defects(operation)

Item	Size((mm))	Acceptable number	Remark
Bright dots (red / green / blue)	$D \leq 0.1$	Neglected	MI
	$0.1 < D \leq 0.2$	max, 2	MI
	$0.2 < D$	0	MI
Black dots	-	max, 2	Not adjoining black dots
	-	0	adjacent black dots

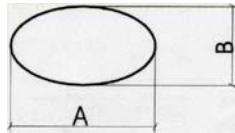
10.2 Major defects

Item	Acceptable number	Remark
Function defect	not allowed	
Abnormal operation including distinct RGB line defects and white line defect	not allowed	
RGB timing	not allowed	
Wrong color	not allowed	
Less brightness	not allowed	
No backlight	not allowed	
Broken glass	not allowed	

10.3 Minor defects (visual)

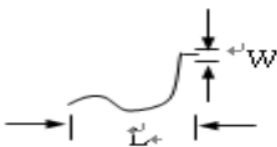
Item	Size(mm)	Acceptable number	Remark
Black spots or white spots	$D < 0.1$,	Neglected	(Note1)
	$0.1 < D \leq 0.2$	max, 2	
	$0.2 < D$,	max, 0	
Black lines, white lines	$W \leq 0.03$	Neglected	(Note2)
	$0.03 < W \leq 0.05$ $L \leq 2$,	max, 2	
	$0.05 < W$	max, 0	

Note1



$$D = (A+B) / 2$$

Note2



L: 长度↔

W: 宽度↔



11. Handling Precautions

11.1 Mounting method

The LCD panel of SC LCD module consists of two thin glass plates with polarizers which easily be damaged. And since the module is 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.

11.2 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), Sulfur (S)

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

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

11.3 Caution against static charge

The LCD module uses C-MOS LSI drivers, so we recommend 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.

11.4 Packing

- Module employs 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 directly to sunshine or high temperature/humidity

11.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage than the limit causes 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 than the operating temperature range and on the other hand at higher temperature LCD's show 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.

11.6 Storage

In the case of storing for a long period of time for instance, for years for the purpose of 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

11.7 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

12. Precaution For Use

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.

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.