



**SPECIFICATION  
OF  
LCD MODULE TYPE**

CUSTOMER	
MODEL NUMBER	<b>RXL043105-A</b>
CUSTOMER APPROVAL	
DATE	

DEPARTMENT	NAME	SIGNATURE	DATE
PREPARED BY			
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## Revision History

<b>Version</b>	<b>Contents</b>	<b>Date</b>	<b>Note</b>
A	Original	2019.11.30	

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## 1. General Specifications

No.	Item	Specification	Remark
1	LCD Size	4.3 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	WVGA: 480 x 3(RGB) x 800	
4	Display mode	IPS, Normally Black, Transmissive	
5	Dot pitch	0.117(W) x 0.117(H) mm	
6	Active area	56.16(W) x 93.60(H) mm	
7	Module size	62.4(W) x 105.40(H) x 4.18(D) mm	Note 1
8	Surface treatment of Cover Lens	Glare	
9	Color arrangement	RGB vertical stripe	
10	Interface	TFT: SPI+24 bits RGB CTPM: IIC	
11	Gray scale inversion	-	
12	View direction	ALL	
13	Driver	TFT: ILI9806E CTPM: GT911	
14	Colors	16.7M	
15	Backlight type	8-DIES White LED	
16	Touch panel type	Capacitive Touch Panel	

Note 1: Refer to Mechanical Drawing.

## 2. Pin Assignment

### 2.1 TFT Pin Assignment

Pin No.	Symbol	I/O	Function	Remark
1	LEDA	P	Anode of LED backlight	
2	LEDK	P	Cathode of LED backlight	
3	GND	P	Ground	
4	GND	P	Ground	
5	VCC(3.3V)	P	Power supply	
6	VDDIO	P	Power supply	
7	VSYNC	I	Vertical sync signal	
8	HSYNC	I	Horizontal sync signal	
9	DE	I	Data enable	
10	PCLK	I	Pixel clock	
11	RESET	I	Reset pin	
12	CS	I	Chip select signal input terminal, active at "L"	
13	SCL	I	Serial clock	
14	SDI	I	Serial data input pin	
15	SDO	O	Serial data output pin	
16	DB0(B0)	I	Blue data(LSB)	
17	DB1	I	Blue data	
18	DB2	I	Blue data	
19	DB3	I	Blue data	
20	DB4	I	Blue data	
21	DB5	I	Blue data	
22	DB6	I	Blue data	
23	DB7(B7)	I	Blue data(MSB)	
24	GND	P	Ground	
25	DB8(G0)	I	Green data(LSB)	
26	DB9	I	Green data	
27	DB10	I	Green data	
28	DB11	I	Green data	
29	DB12	I	Green data	
30	DB13	I	Green data	
31	DB14	I	Green data	
32	DB15(G7)	I	Green data(MSB)	
33	GND	P	Ground	
34	DB16(R0)	I	Red data(LSB)	
35	DB17	I	Red data	
36	DB18	I	Red data	
37	DB19	I	Red data	
38	DB20	I	Red data	
39	DB21	I	Red data	
40	DB22	I	Red data	
41	DB23(R7)	I	Red data(MSB)	
42	GND	P	Ground	

## 2.1 TFT Pin Assignment

Pin No.	Symbol	I/O	Function	Remark
1	VDD	P	Power Voltage for CTPM.	
2	SCL	I	I <sup>2</sup> C clock input.	
3	SDA	I/O	I <sup>2</sup> C data input and output.	
4	INT	O	External interrupt to the host.	
5	WAKEUP	I	The reset signal from host to CTP, active low, and the low pulse width should be more than 1ms.	
6	GND	P	Ground	

### 3. Operation Specifications

#### Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Supply voltage for analog	VCC	-0.3	6.0	V	
Supply voltage for CTPM	VDD	2.66	3.47	V	
Supply voltage for logic	VDDIO	-0.3	4.5	V	
Operation Temperature	T <sub>OP</sub>	-20	70	°C	
Storage Temperature	T <sub>ST</sub>	-30	80	°C	
LED Forward Current	I <sub>F</sub>		30	mA	Each LED

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. A module should be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme condition, the module may be permanently destroyed.

## Typical operation conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Supply voltage for analog	VCC	2.5	3.3	3.6	V	
Supply voltage for logic	VDDIO	1.65	1.8	3.6	V	
Input logic high voltage	V <sub>IH</sub>	0.7xVDD	-	VDD	V	
Input logic low voltage	V <sub>IL</sub>	0	-	0.3xVDD	V	
Current for analog	I <sub>VCC</sub>	-	TBD	-	mA	
Current for logic	I <sub>VDDIO</sub>	-	TBD	-	mA	

## Backlight Driving Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V <sub>L</sub>	11.2	12.8	13.6	V	Note 1
Current for LED Backlight	I <sub>L</sub>	-	40	-	mA	
Power consumption	P	-	0.512	-	W	
LED life time	-	30,000	-	-	Hr	Note 2

Note 1: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C and I<sub>L</sub>=40mA. The LED lifetime could be decreased if operating I<sub>L</sub> is larger than 40mA.

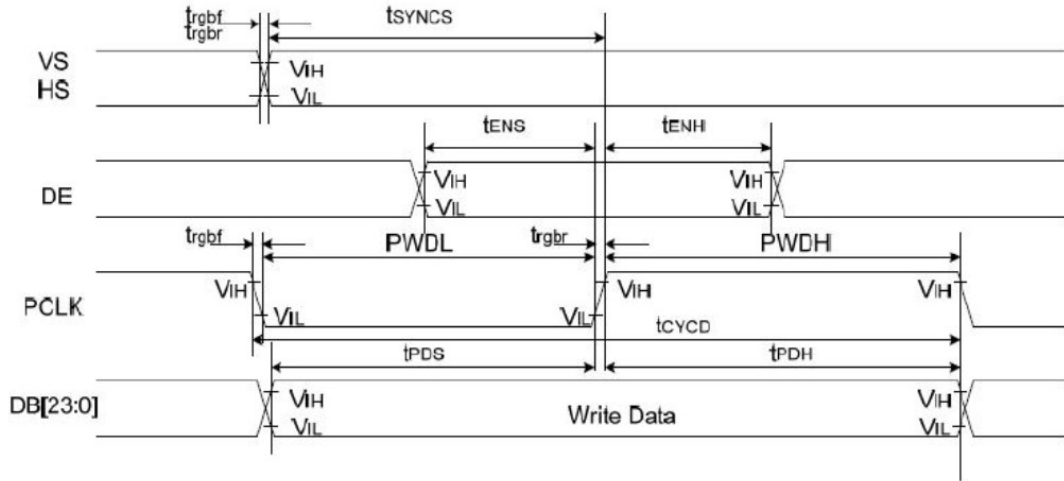
## CTPM Characteristics

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage for CTP	VDD	2.8	-	3.3	V	
Input voltage	V <sub>IL</sub>	0	-	0.25xVDD	V	
	V <sub>IH</sub>	0.75xVDD	-	VDD	V	
Normal mode current	Iopr	-	8	-	mA	VDD = 2.8V Ta=25°C
Green mode current	Ig	-	3.3	-	mA	VDD = 2.8V Ta=25°C
Sleep mode current	Islp	-	95	-	uA	VDD = 2.8V Ta=25°C



# Timing Characteristics

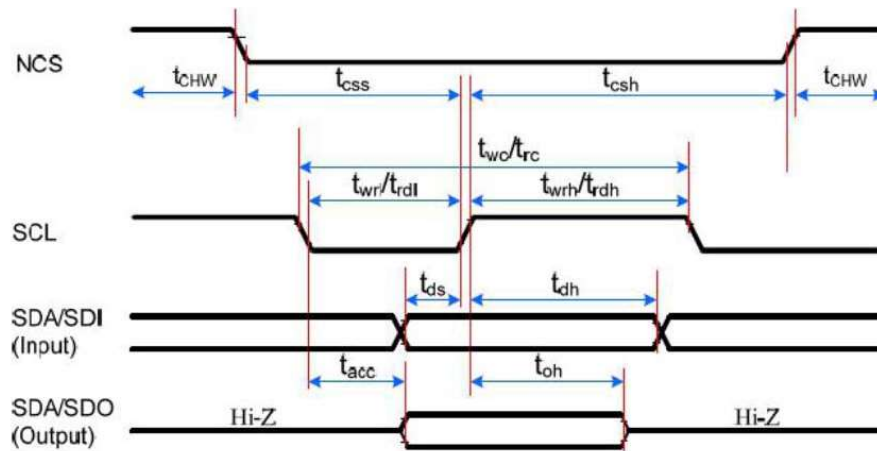
## Parallel RGB Mode Timing Diagram



Signal	Symbol	Parameter	min	max	Unit	Description
VS/ HS	$t_{SYNCS}$	VS/HS setup time	5	-	ns	24/18/16-bit bus RGB interface mode
	$t_{SYNCH}$	VS/HS hold time	5	-	ns	
DE	$t_{ENS}$	DE setup time	5	-	ns	
	$t_{ENH}$	DE hold time	5	-	ns	
DB[23:0]	$t_{POS}$	Data setup time	5	-	ns	
	$t_{PDH}$	Data hold time	5	-	ns	
PCLK	$PWDH$	PCLK high-level period	13	-	ns	
	$PWDL$	PCLK low-level period	13	-	ns	
	$t_{CYCD}$	PCLK cycle time	28	-	ns	
	$t_{RGBF}$ , $t_{RGBR}$	PCLK,HS,VS rise/fall time	-	15	ns	

Note:  $T_a = -30$  to  $70$  °C,  $IOVCC=1.65V$  to  $3.6V$ ,  $VCI=2.5V$  to  $3.6V$ ,  $DGND=0V$

### 3-Line SPI Timing Characteristics



Signal	Symbol	Parameter	min	max	Unit	Description
CSX	$t_{css}$	Chip select time (Write)	15	-	ns	
	$t_{csh}$	Chip select hold time (Read)	15	-	ns	
	$t_{CHW}$	CS "H" pulse width	40	-	ns	
SCL	$t_{wc}$	Serial clock cycle (Write)	30	-	ns	
	$t_{wrh}$	SCL "H" pulse width (Write)	10	-	ns	
	$t_{wrl}$	SCL "L" pulse width (Write)	10	-	ns	
	$t_{rc}$	Serial clock cycle (Read)	150	-	ns	
	$t_{rdh}$	SCL "H" pulse width (Read)	60	-	ns	
	$t_{rdl}$	SCL "L" pulse width (Read)	60	-	ns	
SDA/SDO (Output)	$t_{acc}$	Access time (Read)	10	100	ns	For maximum CL=30pF
	$t_{oh}$	Output disable time (Read)	15	100	ns	For minimum CL=8pF
SDA/SDI (Input)	$t_{ds}$	Data setup time (Write)	10	-	ns	
	$t_{dh}$	Data hold time (Write)	10	-	ns	

## I<sup>2</sup>C Interface For CTPM

### CTPM interface to Host

GT911 provides a standard I2C interface for SCL and SDA to communicate with the host.

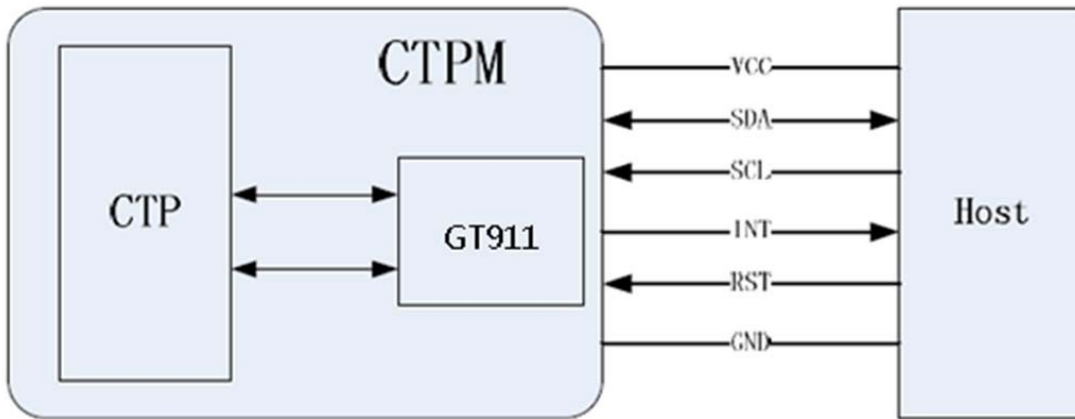
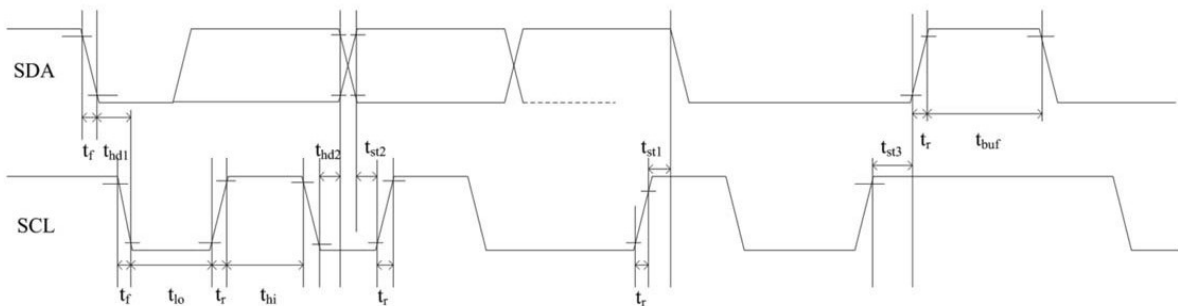


Figure 1-1 CTPM and Host connection

### I<sup>2</sup>C Timing

GT911 always serves as slave device in the system with all communication being initialized by the host. It is strongly recommended that transmission rate be kept at or below 400Kbps.

The I2C timing is shown below:

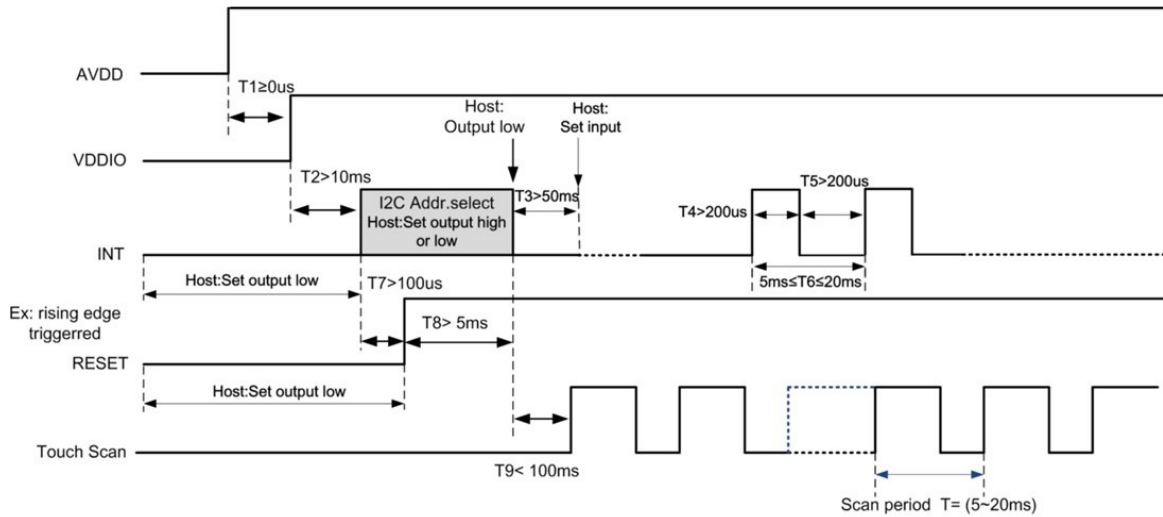


Test condition 2: 3.3V host interface voltage, 400Kbps transmission rate, 2K $\Omega$  pull-up resistor

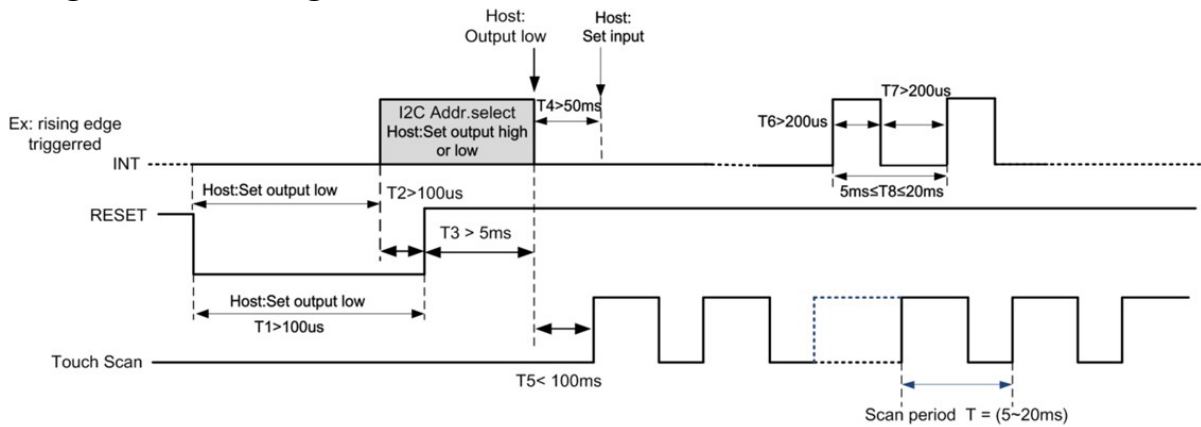
Parameter	Symbol	Min.	Max.	Unit
SCL low period	$t_{lo}$	1.3	-	us
SCL high period	$t_{hi}$	0.6	-	us
SCL setup time for Start condition	$t_{st1}$	0.6	-	us
SCL setup time for Stop condition	$t_{st3}$	0.6	-	us
SCL hold time for Start condition	$t_{hd1}$	0.6	-	us
SDA setup time	$t_{st2}$	0.1	-	us
SDA hold time	$t_{hd2}$	0	-	us

GT911 supports two I2C slave addresses: 0xBA/0xBB and 0x28/0x29. The host can select the address by changing the status of Reset and INT pins during the power-on initialization phase. See the diagram below for configuration methods and timings:

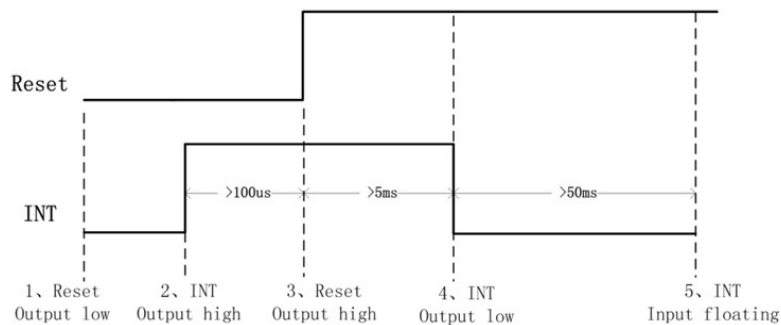
**Power-on Timing:**



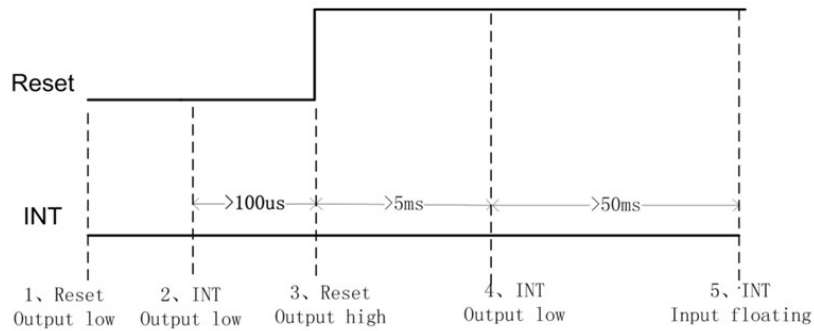
**Timing for host resetting GT911:**



**Timing for setting slave address to 0x28/0x29:**



**Timing for setting slave address to 0xBA/0xBB:**



**I<sup>2</sup>C Read/Write Interface description**

**a) Data Transmission**

(For example: device address is 0xBA/0xBB) Communication is always initiated by the host. Valid Start condition is signaled by pulling SDA line from “high” to “low” when SCL line is “high”. Data flow or address is transmitted after the Start condition.

All slave devices connected to I2C bus should detect the 8-bit address issued after Start condition and send the correct ACK. After receiving matching address, GT911 acknowledges by configuring SDA line as output port and pulling SDA line low during the ninth SCL cycle. When receiving unmatched address, namely, not 0XBA or 0XBB, GT911 will stay in an idle state.

For data bytes on SDA, each of 9 serial bits will be sent on nine SCL cycles. Each data byte consists of 8 valid data bits and one ACK or NACK bit sent by the recipient. The data transmission is valid when SCL line is “high”.

When communication is completed, the host will issue the STOP condition. Stop condition implies the transition of SDA line from “low” to “high” when SCL line is “high”.

**b) Writing Data to GT911**

(For example: device address is 0xBA/0xBB)



**Timing for Write Operation**

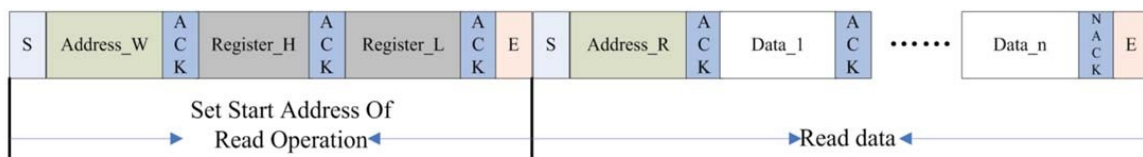
The diagram above displays the timing sequence of the host writing data onto GT911. First, the host issues a Start condition. Then, the host sends 0XBA (address bits and R/W bit; R/W bit as 0 indicates Write operation) to the slave device.

After receiving ACK, the host sends the 16-bit register address (where writing starts) and the 8-bit data bytes (to be written onto the register).

The location of the register address pointer will automatically add 1 after every Write Operation. Therefore, when the host needs to perform Write Operations on a group of registers of continuous addresses, it is able to write continuously. The Write Operation is terminated when the host issues the Stop condition.

### c) Reading Data from GT911

(For example: device address is 0xBA/0xBB)



### Timing for Read Operation

The diagram above is the timing sequence of the host reading data from GT911. First, the host issues a Start condition and sends 0xBA (address bits and R/W bit; R/W bit as 0 indicates Write operation) to the slave device.

After receiving ACK, the host sends the 16-bit register address (where reading starts) to the slave device. Then the host sets register addresses which need to be read.

Also after receiving ACK, the host issues the Start condition once again and sends 0xBB (Read Operation). After receiving ACK, the host starts to read data.

GT911 also supports continuous Read Operation and, by default, reads data continuously. Whenever receiving a byte of data, the host sends an ACK signal indicating successful reception. After receiving the last byte of data, the host sends a NACK signal followed by a STOP condition which terminates communication.

## **Interrupt signal from CTP to Host**

When touched, GT911 sends a pulse via INT pin in every scanning cycle to notify the host to read coordinates. Host will then set a triggering mechanism via relevant register “INT” bit. INT as “0” indicates rising edge-triggered, which means GT911 will notify the host by driving INT output from low to high when operated by user; INT as “1” indicates falling edge-triggered, which means GT911 will notify the host by pulling INT output from high to low when operated by user .

## 4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR $\geq$ 10)	$\theta_L$	$\Phi=180^\circ$ (9 o'clock)	70	80	-	degree	Note 1
	$\theta_R$	$\Phi=0^\circ$ (3 o'clock)	70	80	-		
	$\theta_T$	$\Phi=90^\circ$ (12 o'clock)	70	80	-		
	$\theta_B$	$\Phi=270^\circ$ (6 o'clock)	70	80	-		
Response time	$T_{ON}$	Normal $\theta = \Phi = 0^\circ$	-	15	20	msec	Note 3
	$T_{OFF}$		-	20	30	msec	
Contrast ratio	CR		650	800	-	-	Note 4
Color chromaticity	$W_X$		-	0.297	-	-	Note 2
	$W_Y$		-	0.339	-	-	Note 5 Note 6
Luminance	L		250	300	-	cd/m <sup>2</sup>	Note 6
Luminance uniformity	$Y_U$		75	80	-	%	Note 7

Test Conditions:

- $V_{CC}=3.3V$ ,  $I_L=40mA$  (Backlight current), the ambient temperature is  $25^\circ C$ .
- The test systems refer to Note 2.

Note 1: Definition of viewing angle range

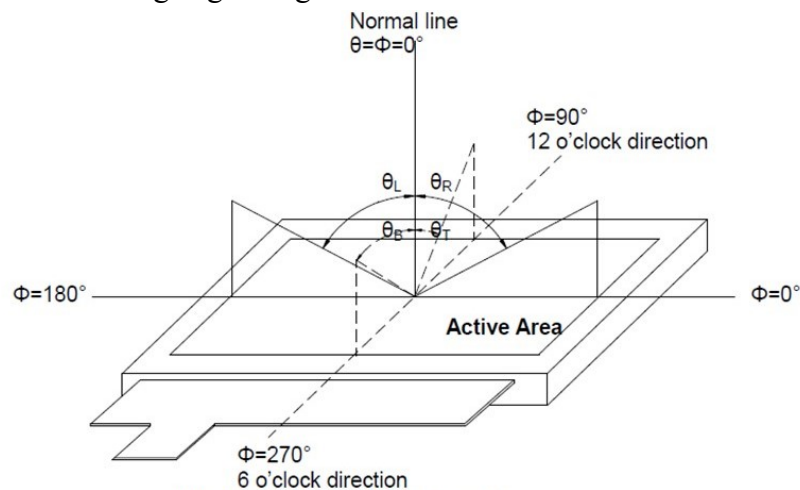


Fig. 4-1 Definition of viewing angle



Note 2: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen.

(Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° /Height: 500mm.)

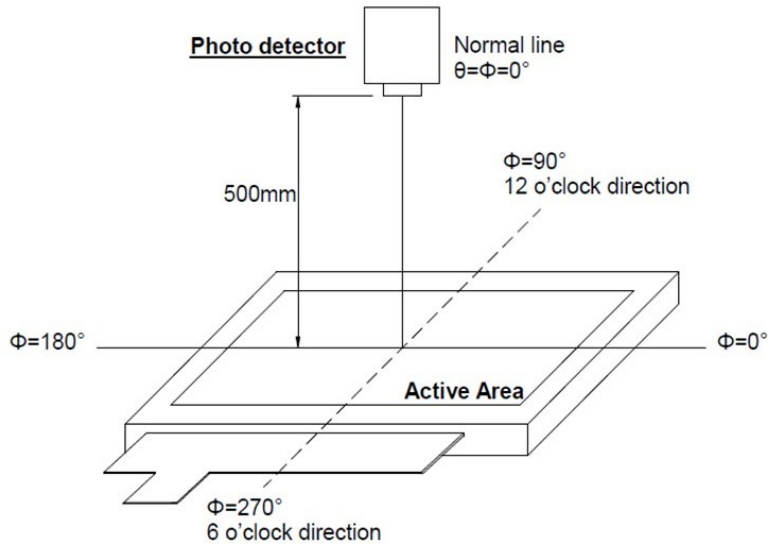
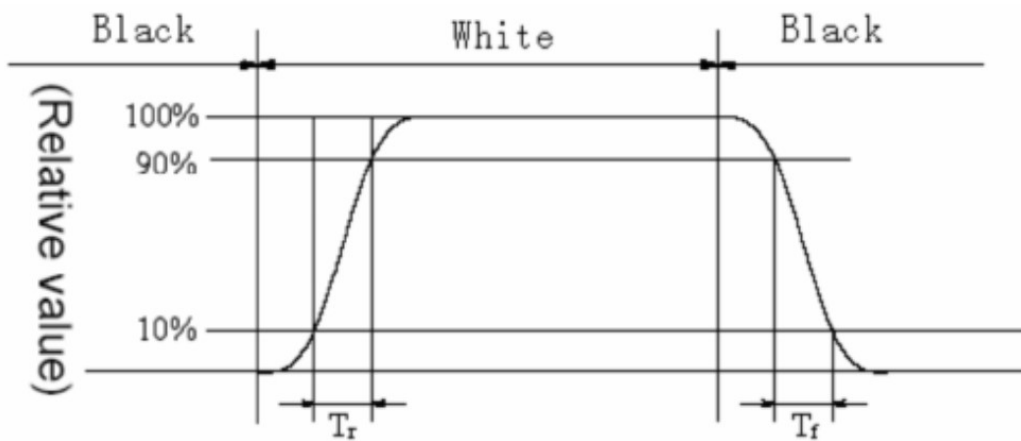


Fig. 4-2 Optical measurement system setup

Note 3: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.



Note 4: Definition of contrast ratio

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

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: Definition of luminance: Measured at the center area of the panel when LCD panel is driven at “white” state.

Note 7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to Fig. 4-4).

Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity } (Yu) =$$

L-----Active area length

W----- Active area width

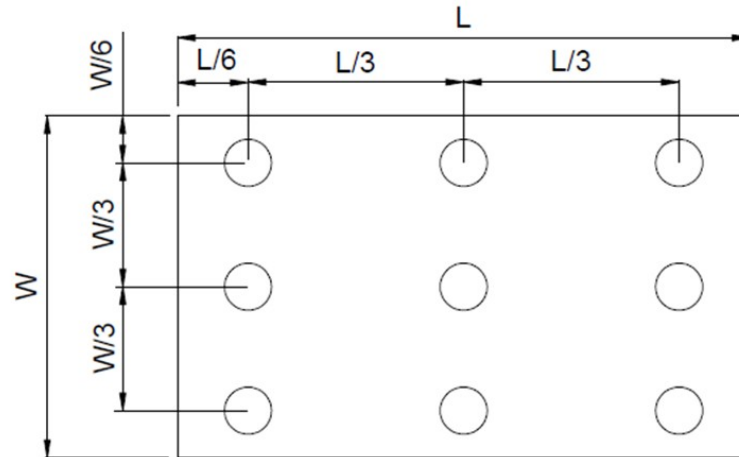


Fig. 4-4 Definition of measuring points

*Bmax*: The measured maximum luminance of all measurement position.

*Bmin*: The measured minimum luminance of all measurement position.

## 5. Reliability Test Items

(Note3)

Item	Test Conditions	Remark
High Temperature Storage	Ta = 80°C 240 hrs	Note 1,Note 4 IEC60068-2-2, GB2423.2-89
Low Temperature Storage	Ta = -30°C 240 hrs	Note 1,Note 4 IEC60068-2-1 GB2423.1-89
High Temperature Operation	Ta = 70°C 240 hrs	Note 2,Note 4 IEC60068-2-2 GB2423.2-89
Low Temperature Operation	Ta = -20°C 240 hrs	Note 1,Note 4 IEC60068-2-1 GB/T2423.1-89
Operate at High Temperature and Humidity	+60°C, 90% RH 240 hrs	Note 4 IEC60068-2-1 GB/T2423.3-2006
Thermal Shock	The sample should be allowed to stand the following 10 cycles : -20°C for 30 minutes → normal temperature for 5minutes → +70°C for 30 minutes → normal temperature for 5 minutes, as one cycle.	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87
Package Vibration Test	Frequency range : 10Hz ~ 55Hz Amplitude of vibration : 1.5mm Sweep time: 12 min X,Y,Z 2 hours for each direction.	IEC61000-2-6 GB/T2423.5-1995
Package Drop Test	According to ASTM-D-5327.	IEC60068-2-32 GB/T2423.8-1995
Electro Static Discharge	Air: +/-4KV 150pF/330 Ω 5 times	IEC61000-4-2 GB/T17626.2-1998
	Contact: +/-2KV 150pF/330 Ω 5 times	

Note 1: Ta is the ambient temperature of samples.

Note 2: Ts is the temperature of panel's surface.

Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but doesn't guarantee all the cosmetic specification.

Note 4: Before cosmetic and function tests, the product must have enough recovery time, at least 2 hours at room temperature.

## 6. General Precautions

### Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

### Handling

The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.

The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.

To avoid contamination on the display surface, do not touch the module surface with bare hands.

Keep a space so that the LCD panels do not touch other components.

Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.

Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.

Do not leave module in direct sunlight to avoid malfunction of the ICs.

### Static Electricity

Be sure to ground module before turning on power or operating module.

Do not apply voltage which exceeds the absolute maximum rating value.

### Storage

Store the module in a dark room where must keep at  $25 \pm 10^{\circ}\text{C}$  and 65%RH or less.

Do not store the module in surroundings containing organic solvent or corrosive gas.

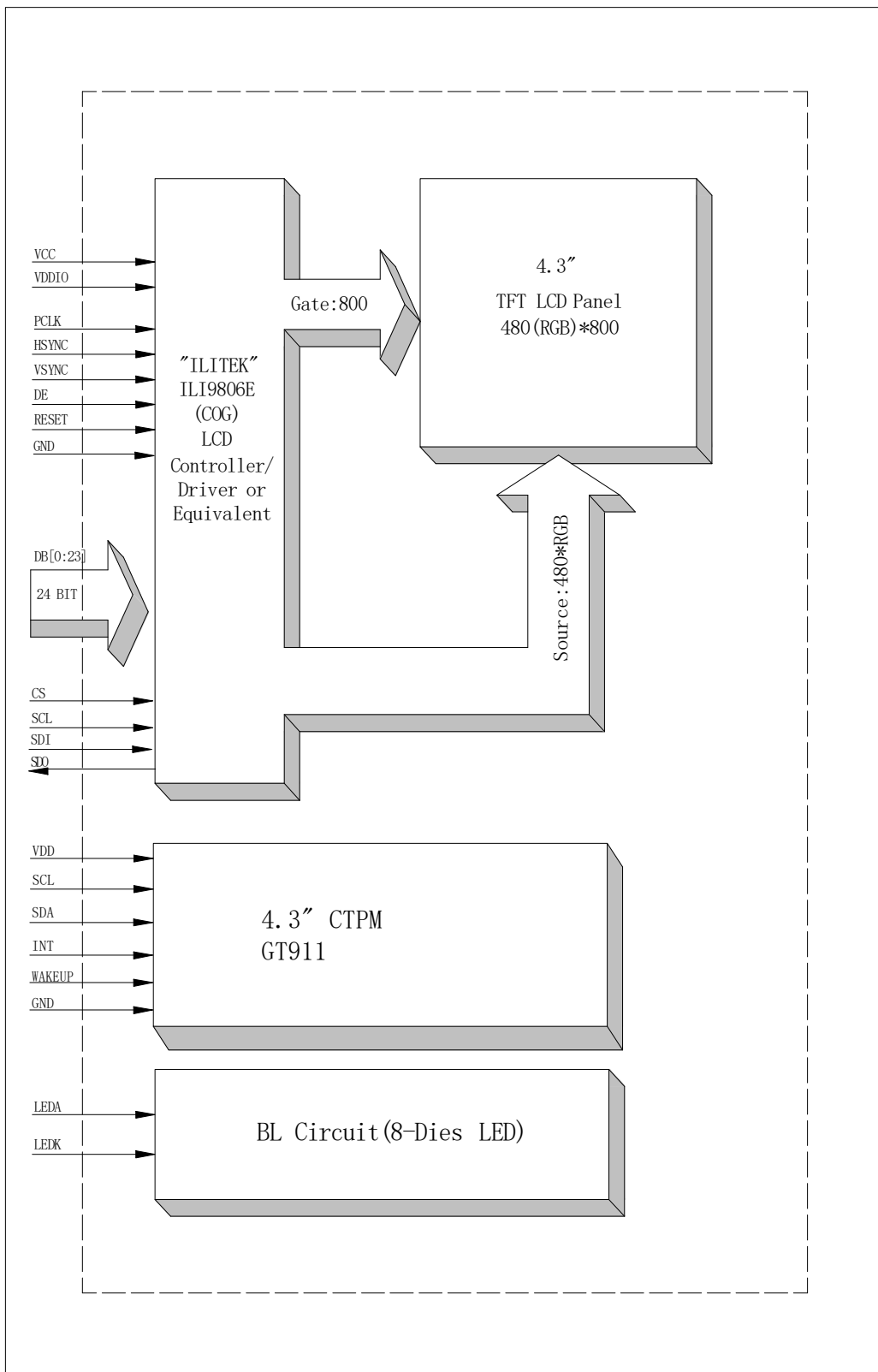
Store the module in an anti-electrostatic container or bag.

### Cleaning

Do not wipe the polarizer with dry cloth. It might cause scratch.

Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

## 7. Block Diagram



# 8. Mechanical Drawing

**FRONT**

4.3" WGA  
480x800x800  
Free viewing direction

BACK

LED CIRCUIT DIAGRAM  
LED 10.8" 13.4V (0mA)

PIN NO	SYMBOL
1	LED_A
2	LED_K
3	GND
4	GND
5	VCC(3.3V)
6	VDDIO
7	VSYNC
8	HSYNC
9	DE
10	PCLK
11	RESET
12	CS
13	SCL
14	SDI
15	SDO
16	DB0(B0)
17	DB1
18	DB2
19	DB3
20	DB4
21	DB5
22	DB6
23	DB7(B7)
24	GND
25	DB8(G0)
26	DB9
27	DB10
28	DB11
29	DB12
30	DB13
31	DB14
32	DB15(G7)
33	GND
34	DB16(R0)
35	DB17
36	DB18
37	DB19
38	DB20
39	DB21
40	DB22
41	DB23(R7)
42	GND

Display Type: 4.3inch IPS TFT+CTPM  
Normally BACK

Optimum Viewing Direction: ALL

Surface Treatment of CL: Glare

LCD Driver IC: TFT: ILI9806E; CTPM: GT9111

Operating Voltage: VCC=3.3V, VDD=3.3V

Operation Temperature: -20°C TO 70°C

Storage Temperature: -30°C TO 80°C

Interface: TFT: SPI+24 BIT-RGB  
CTPM: IIC

Backlight: 8-CHIP WHITE LED

Surface luminance: 300 cd/m<sup>2</sup> (TYP.)

White X/Y: ---

4.3" WGA  
480x800x800  
Free viewing direction

LED CIRCUIT DIAGRAM  
LED 10.8" 13.4V (0mA)

VER. SYMBOL: V00

First issue

AMENDMENT

Chenzheng

2019.11.30A

SIGN

DATE

CUSTOMER'S APPROVAL

APPROVED

EE CHECKED

ME CHECKED

DRAWN

TITLE: MODULE SPEC.

DRAWING NO.: RXL043105-A

UNIT: mm

SCALE: 1:1

SHEET 1 OF 1

3rd Angle

Reshine Display (HK) Technology Co., Limited