



深圳市拓普微科技开发有限公司

SHENZHEN TOPWAY TECHNOLOGY CO., LTD.

LMT070DAMFWA-NTD

LCD Module User Manual

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Rev.	Descriptions	Edit	Release Date
0.1	Preliminary release	Song Mao	2021-01-16

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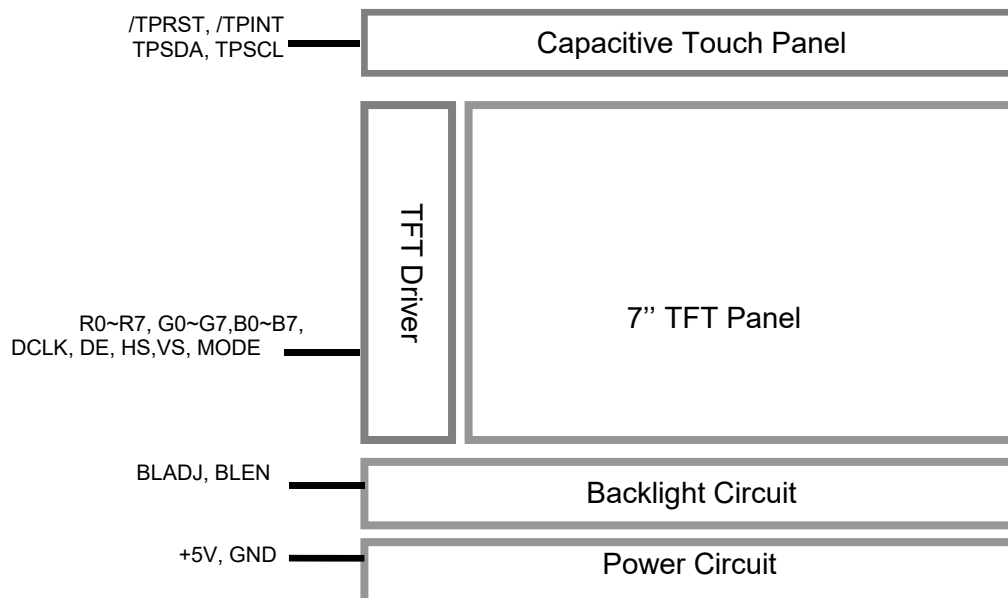
1. General Specification

Signal Interface :	Digital 24-bits RGB
Display Technology :	a-Si TFT active matrix
Display Mode :	Normally Back
Screen Size(Diagonal) :	7.0"
Outline Dimension :	185.9 x 109.5 x 13.1 MAX (mm) (see attached drawing for details)
Active Area :	154.21 x 85.92 (mm)
Number of dots :	1024 x 600
Pixel Pitch :	0.1506 x 0.1432 (mm)
Pixel Configuration :	RGB Stripe
Backlight :	LED
Viewing Direction :	Full
Touch Panel Type:	Capacitive Touch Panel
Operating Temperature :	-20 ~ +70°C
Storage Temperature :	-30 ~ +80°C

Note:

*1. For saturated color display content (eg. pure-red, pure-green, pure-blue or pure-colors-combinations).

2. Block Diagram



3. Terminal Function (Input Terminal)

Pin No.	Pin Name	I/O	Descriptions
1	5V	Power	5V power supply
:	:		
5	5V		
6	GND	Power	0V power supply
:	:		
10	GND		
11	BLADJ	Input	Backlight brightness PWM signal (active low)
12	BLEN	Input	Backlight enable signal (active high)
13	MODE	Input	when MODE = "1": DE mode (default). when MODE = "0": SYNC mode, DE must be grounded.
14	DE	Input	Data Input Enable
15	VS	Input	Vertical sync signal
16	HS	Input	Horizontal sync signal
17	B7	Input	Blue data line
:	:		
23	B1		
24	B0	Input	Blue data line(*1)
25	G7	Input	Green data line
:	:		
31	G1		
32	G0	Input	Green data line(*1)
33	R7	Input	Red data line
:	:		
39	R1		
40	R0	Input	Red data line(*1)
41	GND	Power	Ground, 0V
42	DCLK	Input	Pixel clock(*2)
43	GND	Power	Ground, 0V
44	NC	NC	No Connection
45	GND	Power	Ground, 0V
46	/TPRST	Input	Reset signal, active low reset
47	/TPINT	Output	Interrupt signal, active low interrupt
48	TPSDA	I/O	I2C data (*3)
49	TPSCL	Input	I2C clock (*3)
50	GND	Power	Ground

Note:

*1. When input 18bits RGB data, the two low bits of R,G and B data must be grounded.

*2. Data shall be latched at the falling edge of DCLK.

*3. With internal resistor(4.7k) pull up.

4. Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit	Condition
Power Voltage	V_{5V}	-0.3	+5.5	V	GND = 0V
Operating Temperature	T_{OP}	-20	+70	°C	No Condensation
Storage Temperature	T_{ST}	-30	+80	°C	No Condensation

Cautions:

Any Stresses exceeding the Absolute Maximum Ratings may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

5. Electrical Characteristics

5.1 DC Characteristics

GND=0V, $V_{5V}=5.0V$, $T_{OP}=25^{\circ}C$

Items	Symbol	MIN.	TYP.	MAX.	Unit	Applicable Pin
Power Voltage	V_{5V}	4.5	5.0	5.5	V	5V
Operating Current (*1)	I_{5V}	-	450	-	mA	
Input High Voltage	V_{IH}	3.0	-	3.6	V	Input pins
Input Low Voltage	V_{IL}	0	-	0.3	V	Input pins
Output Signal High Voltage	V_{OH}	3.0	-	3.6	V	
Output Signal Low Voltage	V_{OL}	0	-	0.6	V	

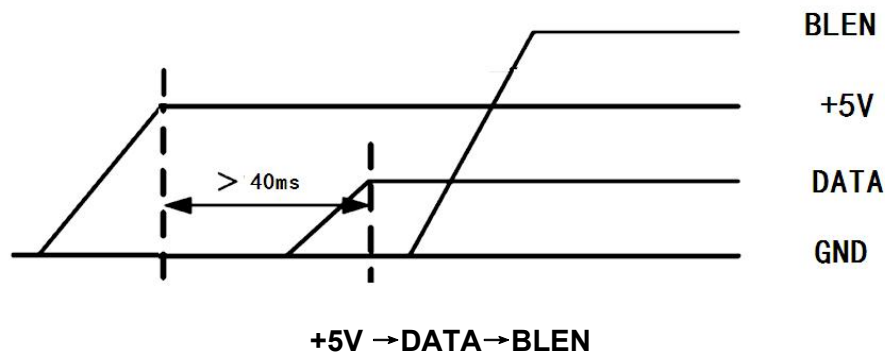
Note:

*1. For different LCM, the value may have a bit of difference.

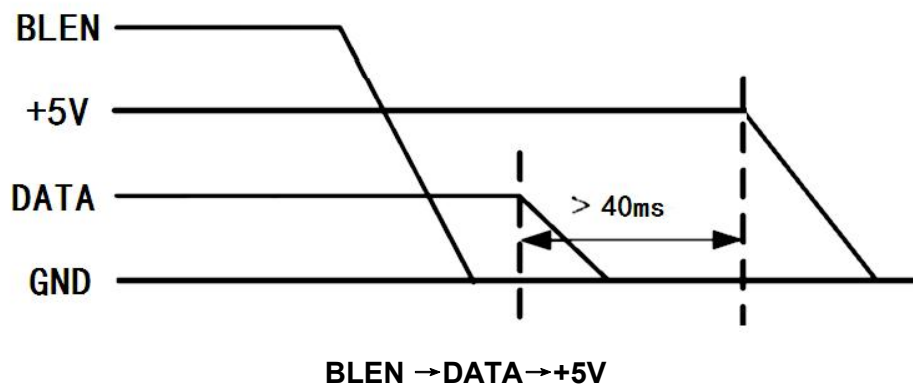
*2. To test the current dissipation, use "all Black Pattern".

5.2 Power Sequence

Power on:



Power off:



Note :Data include R0~R7,B0~B7,G0~G7, DCLK, HS, VS, DE, MODE, /TPRST, /TPINT, TPSDA, TPSCL.

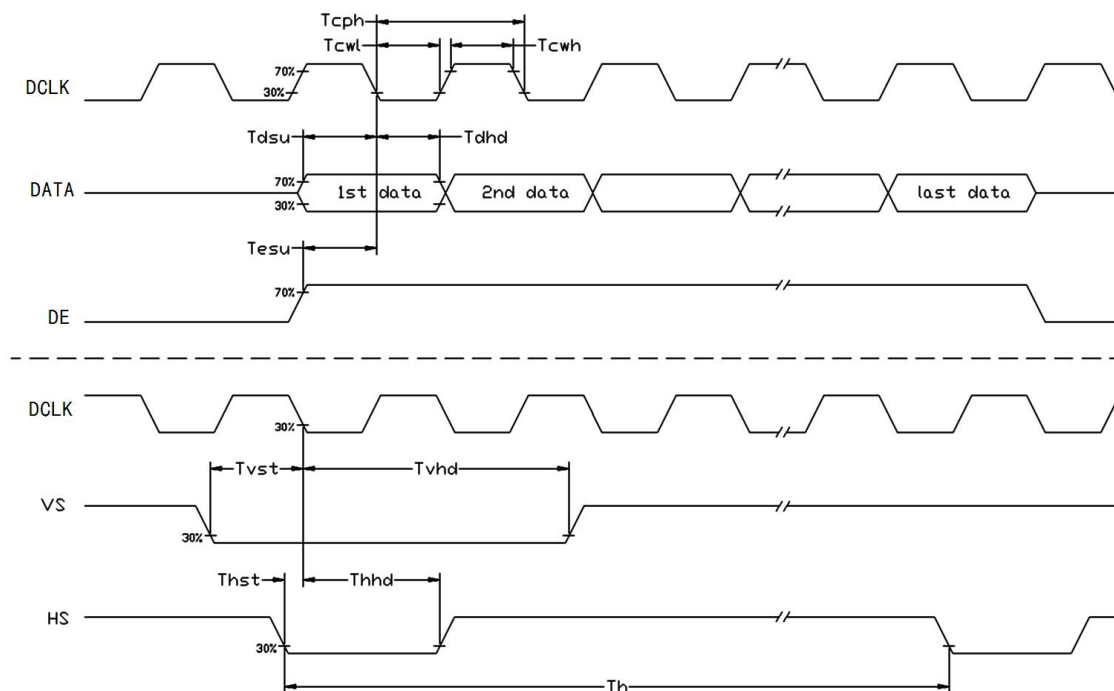
6. AC Characteristics

6.1 Timing Characteristics

Item	Symbol	MIN.	TYP.	MAX.	Unit	Remark
HS setup time	Thst	5	-	-	ns	
HS hold time	Thhd	5	-	-	ns	
VS setup time	Tvst	5	-	-	ns	
VS hold time	Tvhd	5	-	-	ns	
Data setup time	Tdsu	5	-	-	ns	
Data hole time	Tdhd	5	-	-	ns	
DE setup time	Tesu	5	-	-	ns	
DVDD Power On Slew rate	TPOR	-	-	20	ms	From 0 to 90% DVDD
DCLK cycle time	Tcph	14	-	-	ns	
DCLK pulse duty	Tcwh	40	50	60	%	

Note: For the details of the timing, please see the Driver IC data sheet.

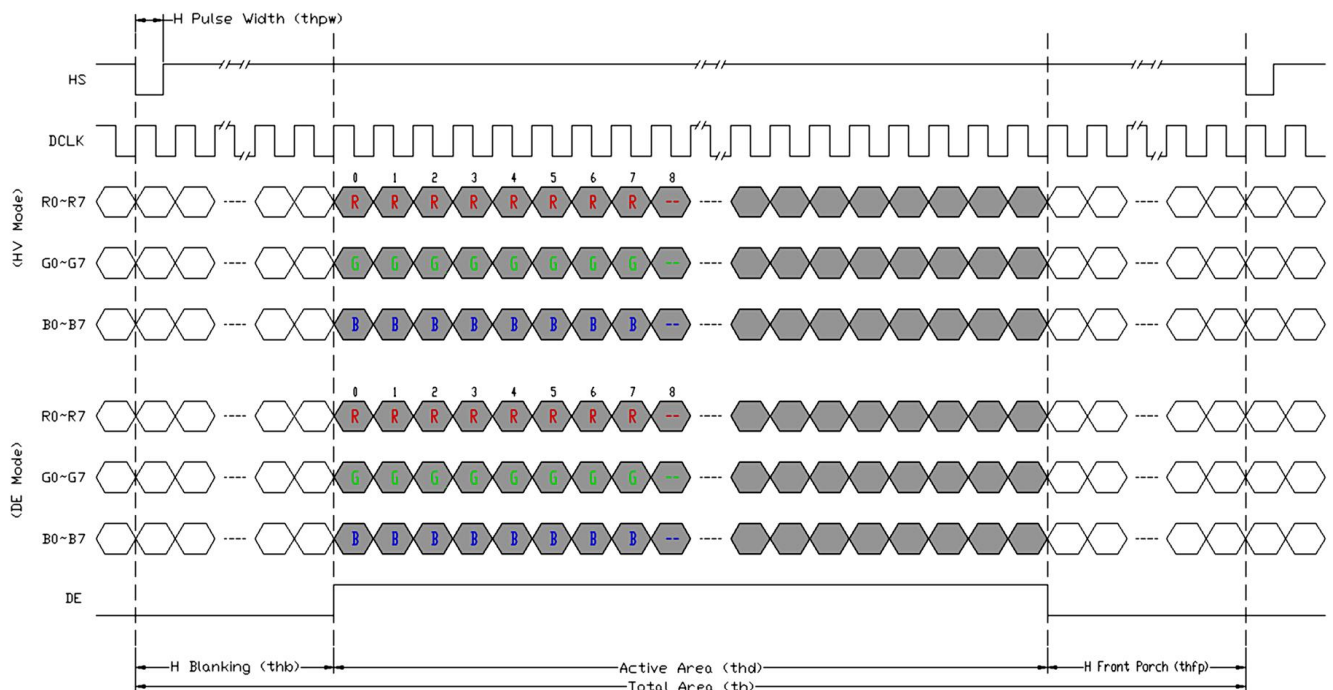
6.2 Input Clock and Data Timing Diagram



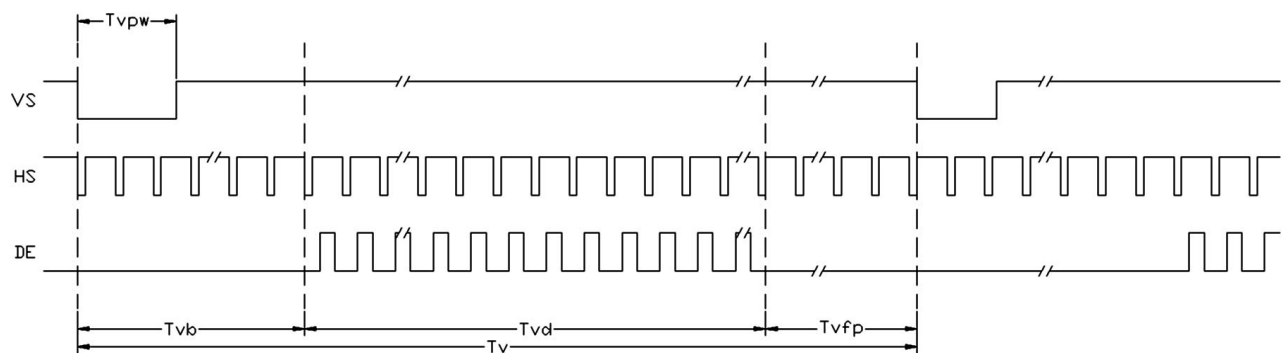
6.3 AC Timing

Item	Symbol	MIN.	TYP.	MAX.	Unit	Remark
Clock Frequency	fclk	40.8	51.2	67.2	MHz	
Horizontal Display Area	thd	-	1024	-	DCLK	
HSD Period	th	1114	1344	1400	DCLK	
HSD Blanking	thb+thfp	90	320	376	DCLK	
Vertical Display Area	tvd	600			TH	
VSD Period	tvbp	610	635	800	TH	
VS Blanking	tvbp+tvfp	10	35	200	TH	

6.4 Data Input Format



Horizontal input timing diagram.



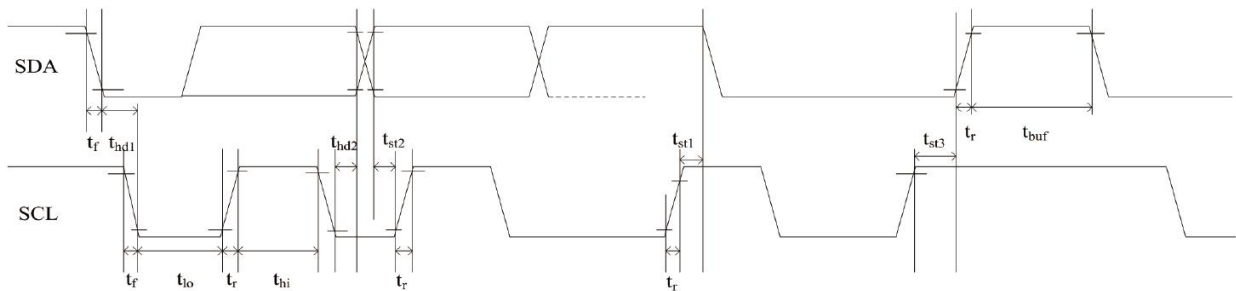
Vertical input timing diagram.

7. CTP Function Characteristics

7.1 I²C Communication

CTP provides standard I²C interface for communication. In the system, CTP always works in slave mode, all communications are initiated by master, and the baud rate can be up to 400Kbps. The definition of I²C timing is as following:

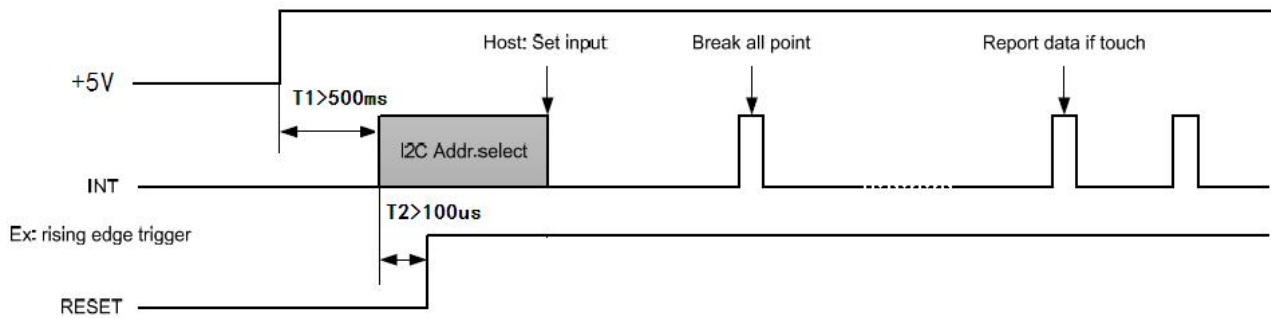
Parameter	Symbol	Min.	Max.	Unit
SCL low period	t_{lo}	1.3	-	us
SCL high period	t_{hi}	0.6	-	us
SCL setup time for start condition	t_{st1}	0.6	-	us
SCL setup time for stop condition	t_{st3}	0.6	-	us
SCL hold time for start condition	t_{hd1}	0.6	-	us
SDA setup time	t_{st2}	0.1	-	us
SDA hold time	t_{hd2}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



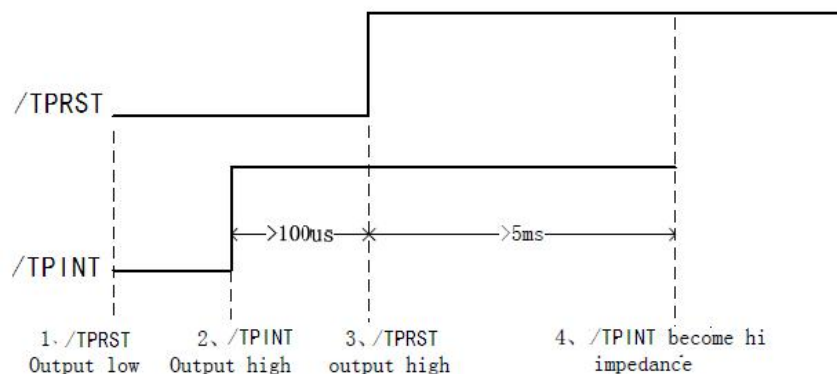
I²C Timing

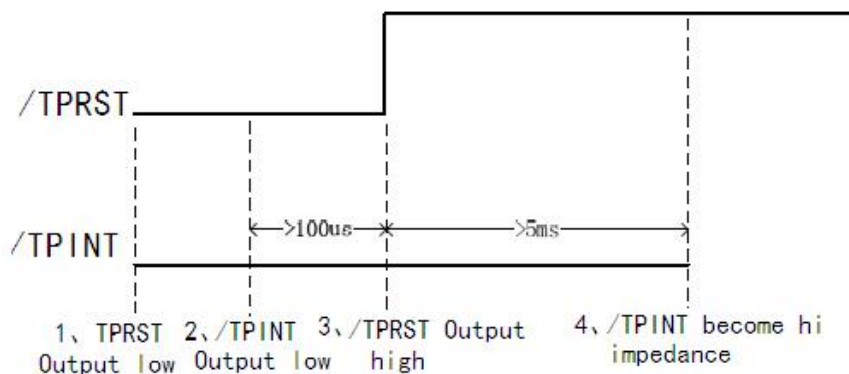
CTP has 2 sets of slave address 0xBA/0xBB & 0x28/29. Master can control Reset & INT pin to configure the slave address in power on initial state like following:

7.2 Power on diagram:



Timing of setting slave address to 0x28/0x29:



Timing of setting slave address to 0xBA/0xBB:**7.3 Data Transmission**

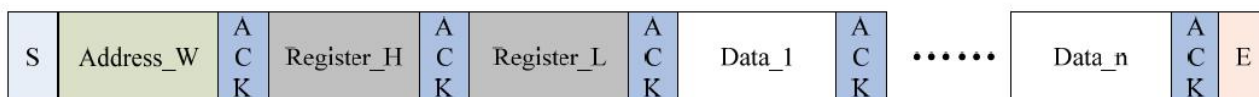
(ex: slave address is 0xBA/0xBB)

Communication is always initiated by master, A high-to-low transition of SDA with SCL high is a start condition.

All addressing signal are serially transmitted to and from on bus in 8-bit word. CTP sends a "0" to acknowledge when the addressing word is 0xBA/BB (or 0x28/0x29). This happens during the ninth clock cycle. If the slave address is not matched, CTP will stay in idle state.

The data words are serially transmitted to and from in 9-bit formation: 8-bit data + 1-bit ACK or NACK sent by CTP. Data changes during SCL low periods & keeps valid during SCL high.

A low-to-high transition of SDA with SCL high is a stop condition.

Write Data to CTP**Write Operations**

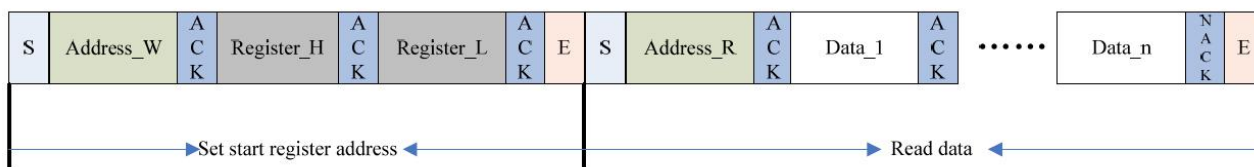
Please check the above figure, master start the communication first, and then sends device address 0xBA preparing for a write operation.

After receiving ACK from CTP, master sends out 16-bit register address, and then the data word in 8-bit, which is going to be wrote into CTP.

The address pointer of CTP will automatically increase one after one byte writing, so master can sequentially write in one operation. When operation finished, master stop the communication.

Read Data from CTP

(ex: slave address is 0xBA/0xBB)

**Read Operations**

Please check the above figure, master start the communication first, and then sends device address 0xBA for a write operation.

After receiving ACK from CTP, master sends out 16-bit register address, to set the address pointer of

CTP. After receiving ACK, master produce start signal once again & send device address 0xBB, then read data word from CTP in 8-bit.

CTP also supports sequential read operation, and the default setting is sequential read mode. Master shall send out ACK after every byte reading successfully but NACK after the last one. Then sends stop signal to finish the communication.

7.4 Register Information of CTP

Real Time Order(Write Only)

Addr	Name	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0x8040	Command	0: read coordinate 1: read diff data or raw data 2: software reset3:baseline update 4: baseline calibration 5: screen off 3&4 are still internal test							

Configuration Information(R/W)

	Config Data	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0x8047	Config_ Version	Version of the configuration							
0x8048	X Output Max (Low Byte)	Resolution of X axis							
0x8049	X Output Max (High Byte)								
0x804A	Y Output Max (Low Byte)	Resolution of Y axis							
0x804B	Y Output Max (High Byte)								
0x804C	Touch Number	Reserved				Touch number: 1~5			
0x804D	Module_ Switch1	Reserved		Stretch_rank		X2Y	Reserved		INT trigger method 00: rising edge trigger 01: falling edge trigger 02: low level enquiry 03: high level enquiry
0x804E	Module_ switch2								Reserved
0x804F	Shake_Count	Reserved				Finger shake count			
0x8050	Filter	First_Filter		Normal_Filter (filtering value of original coordinate					

				window, coefficient is 1)
0x8051	Large_Touch	Number of touch in large area		
0x8052	Noise_Reduction	Reserved		Value of noise elimination (coefficient is 1, 0~15)
0x8053	Screen_Touch_Level	Threshold of touch grow out of nothing		
0x8054	Screen_Leave_Level	Threshold of touch grow out of nothing		
0x8055	Low_Power_Control	Reserved		Time to low power consumption (0~15s)
0x8056	Refresh_Rate	Reserved		Coordinate report rate (Cycle: 5+N ms)
0x8057	x_threshold	Reserved		
0x8058	y_threshold			
0x8059	X_Speed_Limit	Reserved		
0x805A	Y_Speed_Limit			
0x805B	Space	Blank area of boarder-top (coefficient is 32)		Blank area of Boarder-bottom (coefficient is 32)
0x805C		Blank area of boarder-left (coefficient is 32)		Blank area of Boarder-right (coefficient is 32)
0x805D	Stretch_Rate	Reserved		Level of weak stretch (Stretch X/16 Pitch) (beta version is valid, published version is not)
0x805E	Stretch_R0	Interval 1 coefficient		
0x805F	Stretch_R1	Interval 2 coefficient		
0x8060	Stretch_R2	Interval 3 coefficient		
0x8061	Stretch_RM	All intervals base number		
0x8062	Drv_GroupA_Num	All_Driving	Reserved	Driver_Group_A_number
0x8063	Drv_GroupB_Num	Reserved		Driver_Group_B_number
0x8064	Sensor_Num	Sensor_Group_B_Number		Sensor_Group_A_Number
0x8065	FreqA_factor	Driver frequency double frequency coefficient of Driver group A GroupA_Frequency = Multiplier factor * baseband Driver frequency double frequency coefficient of Driver group B GroupB_Frequency = Multiplier factor * baseband		
0x8066	FreqB_factor			
0x8067	Pannel_BitFreqL	Baseband of Driver group A\B (1526HZ<baseband<14600Hz)		
0x8068	Pannel_BitFreqH			

0x8069	Pannel_Sensor_TimeL	Time interval of the neighbouring two driving signal (Unit: us), Reserved.				
0x806A	Pannel_Sensor_TimeH					
0x806B	Pannel_Tx_Gain	Reserved		Pannel_Drv_outp ut_R 4 gears	Pannel_DAC_Gain 0:Gain maximum 7: Gain minimum	
0x806C	Pannel_Rx_Gain			Pann el_PG A_C	Pannel_PGA_R	Pannel_Rx_Vcmi (4 gears)
0x806D	Pannel_Dump_Shift	Reserved			Magnification coefficient of original value (The Nth power of 2)	
0x806E	Drv_Frame_Control	Reserved	SubFrame_DrvNum			Repeat_Num
0x806F	NC	Reserved				
0x8070	NC	Reserved				
0x8071	NC	Reserved				
0x8072	NC	Reserved				
0x8073	NC	Reserved				
0x8074	NC	Reserved				
0x8075	NC	Reserved				
0x8076	NC	Reserved				
0x8077	NC	Reserved				
0x8078	NC	Reserved				
0x8079	NC	Reserved				
0x807A	Freq_Hopping_Start	Frequency hopping start frequency (Unit: 2KHz, 50 means 100KHz)				
0x807B	Freq_Hopping_End	Frequency hopping stop frequency (Unit: 2KHz, 150 means 300KHz)				
0x807C	Noise_Detect_Times	Detect_Stay_Times	Detect_Confirm_Times			
0x807D	Hopping_Flag	Hopping_En	Reserved	Detect_Time_Out		

0x807E	Hopping_Threshold	Large_Noise_Threshold	Hopping_Hit_Threshold
0x807F	Noise_Threshold	Threshold of noise level	
0x8080	NC	Reserved	
0x8081	NC	Reserved	
0x8082	Hopping_seg1_BitFreqL	Frequency hopping segment band 1 central frequency (for driver A/B)	
0x8083	Hopping_seg1_BitFreqH		
0x8084	Hopping_seg1_Factor	Frequency hopping segment 1 central frequency coefficient	
0x8085	Hopping_seg2_BitFreqL	Frequency hopping segment band 2 central frequency (for driver A/B)	
0x8086	Hopping_seg2_BitFreqH		
0x8087	Hopping_seg2_Factor	Frequency hopping segment 2 central frequency coefficient	
0x8088	Hopping_seg3_BitFreqL	Frequency hopping segment band 3 central frequency (for driver A/B)	
0x8089	Hopping_seg3_BitFreqH		
0x808A	Hopping_seg3_Factor	Frequency hopping segment 3 central frequency coefficient	
0x808B	Hopping_seg4_BitFreqL	Frequency hopping segment band 4 central frequency (for driver A/B)	
0x808C	Hopping_seg4_BitFreqH		
0x808D	Hopping_seg4_Factor	Frequency hopping segment 4 central frequency coefficient	
0x808E	Hopping_seg5_BitFreqL	Frequency hopping segment band 5 central frequency (for driver A/B)	
0x808F	Hopping_seg5_BitFreqH		
0x8090	Hopping_seg5_Factor	Frequency hopping segment 5 central frequency coefficient	
0x8091	NC	Reserved	
0x8092	NC	Reserved	
0x8093	Key 1	Key 1 Position: 0-255 valid (0 means no touch, it means independent touch key when 4 of the keys are 8 multiples, Reserved	
0x8094	Key 2	Key 2 position, Reserved	

0x8095	Key 3	Key 3 position, Reserved	
0x8096	Key 4	Key 4 position, Reserved	
0x8097	Key_Area	Time limit for long press(1~16 s) , Reserved	Touch valid interval setting: 0-15 valid, Reserved
0x8098	Key_Touch_Level	Key threshold of touch key, Reserved	
0x8099	Key_Leave_Level	Key threshold of touch key, Reserved	
0x809A	Key_Sens	KeySens_1(sensitivity coefficient of key 1, same below) , Reserved	KeySens_2, Reserved
0x809B	Key_Sens	KeySens_3, Reserved	KeySens_4, Reserved
0x809C	Key_Restrain	Finger from screen left after inhibition of key time(Unit:100ms,0 means 600ms) , Reserved	The independent button pro key inhibition parameters, Reserved
0x809D	NC	Reserved	
0x809E	NC	Reserved	
0x809F	NC	Reserved	
0x80A0	NC	Reserved	
0x80A1	NC	Reserved	
0x80A2	NC	Reserved	
0x80A3	NC	Reserved	
0x80A4	NC	Reserved	
0x80A5	NC	Reserved	
0x80A6	NC	Reserved	
0x80A7	NC	Reserved	
0x80A8	NC	Reserved	
0x80A9	NC	Reserved	
0x80AA	NC	Reserved	
0x80AB	NC	Reserved	
0x80AC	NC	Reserved	
0x80AD	NC	Reserved	
0x80AE	NC	Reserved	
0x80AF	NC	Reserved	
0x80B0	NC	Reserved	
0x80B1	NC	Reserved	
0x80B2	NC	Reserved	
0x80B3	NC	Reserved	
0x80B4	NC	Reserved	
0x80B5	NC	Reserved	
0x80B6	NC	Reserved	
0x80B7	Sensor_CH0~	ITO Sensor corresponding chip channel number	

~ 0x80C4	Sensor_CH13	
0x80C5 ~ 0x80D4	NC	Reserved
0x80D5 ~ 0x80EE	Driver_CH0~ Driver_CH25	ITO Driver corresponding chip channel number
0x80EF ~ 0x80FE	NC	Reserved
0x80FF	Config_Chksum	configuration information verify (the complement number of total byte from 0x8047 to 0x80FE)
0x8100	Config_Fresh	signal of updated configuration (the host writes)

Coordinates Information

Addr	Access	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0x8140	R	Product ID (first byte, ASCII) Product ID (second byte, ASCII) Product ID (third byte, ASCII) Product ID (forth byte, ASCII) Firmware version (HEX.low byte) Firmware version (HEX.high byte) x coordinate resolution (low byte) x coordinate resolution (high byte) y coordinate resolution (low byte) y coordinate resolution (high byte)							
0x8141	R								
0x8142	R								
0x8143	R								
0x8144	R								
0x8145	R								
0x8146	R								
0x8147	R								
0x8148	R								
0x8149	R								
0x814A	R	Vendor_id (current module option information)							
0x814B	R								
0x814C	R								
0x814D	R								
0x814E	R/W	buffer status	large detect		Reserved		number of touch points		
0x814F	R	track id							
0x8150	R	point 1 x coordinate (low byte)							
0x8151	R	point 1 x coordinate (high byte)							
0x8152	R	point 1 y coordinate (low byte)							
0x8153	R	point 1 y coordinate (high byte)							
0x8154	R	Point 1 size (low byte)							
0x8155	R	point 1 size (high byte)							
0x8156	R	Reserved							
0x8157	R	track id							

0x8158	R	point 2 x coordinate (low byte)
0x8159	R	point 2 x coordinate (high byte)
0x815A	R	point 2 y coordinate (low byte)
0x815B	R	point 2 y coordinate (high byte)
0x815C	R	point 2 size (low byte)
0x815D	R	point 2 size (high byte)
0x815E	R	Reserved
0x815F	R	track id
0x8160	R	point 3 x coordinate (low byte)
0x8161	R	point 3 x coordinate (high byte)
0x8162	R	point 3 y coordinate (low byte)
0x8163	R	point 3 y coordinate (high byte)
0x8164	R	point 3 size (low byte)
0x8165	R	point 3 size (high byte)
0x8166	R	Reserved
0x8167	R	track id
0x8168	R	point 4 x coordinate (low byte)
0x8169	R	point 4 x coordinate (high byte)
0x816A	R	point 4 y coordinate (low byte)
0x816B	R	point 4 y coordinate (high byte)
0x816C	R	point 4 size (low byte)
0x816D	R	point 4 size (high byte)
0x816E	R	Reserved
0x816F	R	track id
0x8170	R	point 5 x coordinate (low byte)
0x8171	R	point 5 x coordinate (high byte)
0x8172	R	point 5 y coordinate (low byte)
0x8173	R	point 5 y coordinate (high byte)
0x8174	R	point 5 size (low byte)
0x8175	R	point 5 size (high byte)
0x8176	R	Reserved
0x8177	R	Reserved

Note:

Please refer to GT911 IC datasheet for details.

8. Optical Characteristics

Item	Symbol	Condition	MIN.	TYP.	MAX.	UNIT	Note.
Viewing angle ($CR \geq 10$)	θ_L	$(CR \geq 10)$	70	85	-	degree	*2
	θ_R		70	85	-		
	θ_T		70	85	-		
	θ_B		70	85	-		
Response Time	T_f	Normal $\theta = 0^\circ$	-	25	35	msec	*3
	T_r		-	25	35	msec	
Contrast ratio	CR		600	800	-	-	*1
Color chromaticity	W_X		0.265	0.315	0.365	-	
	W_Y		0.265	0.315	0.365	-	
Luminance	L		-	400	-	cd/m ²	*4
Luminance uniformity	Y_U		70	75	-	%	*4

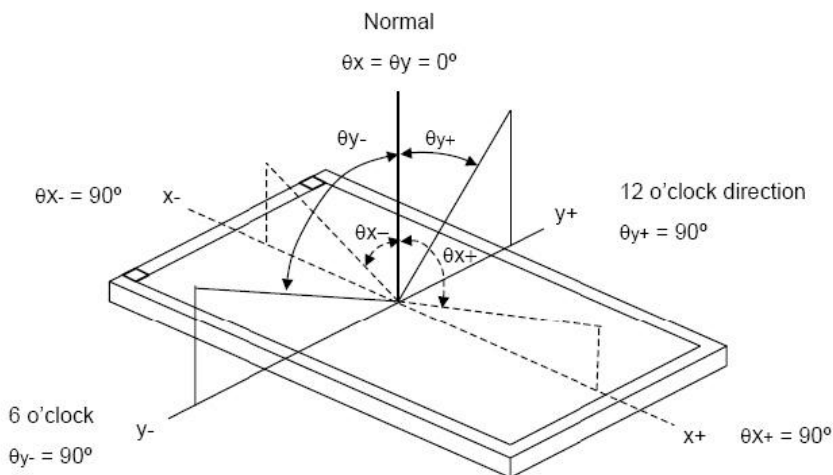
Note:

*1. Definition of Contrast Ratio

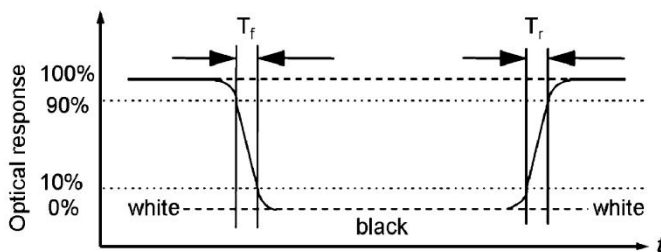
The contrast ratio could be calculate by the following expression:

Contrast Ratio (CR) = Luminance with all pixels white / Luminance with all pixels black

*2 Definition of Viewing Angle



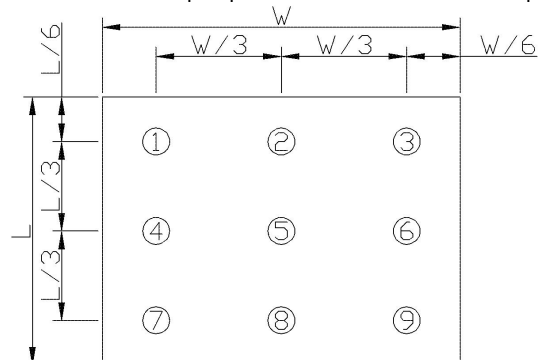
*3 Definition of response time



*4 Definition of Luminance Uniformity

Luminance uniformity (Lu)=

Min. Luminance form pt1~pt9 / Max Luminance form Pt1~pt9



9. LCD Module Design and Handling Precautions

- Please ensure V0, VCOM is adjustable, to enable LCD module get the best contrast ratio under different temperatures, view angles and positions.
- Normally display quality should be judged under the best contrast ratio within viewable area. Unexpected display pattern may come out under abnormal contrast ratio.
- Never operate the LCD module exceed the absolute maximum ratings.
- Never apply signal to the LCD module without power supply.
- Keep signal line as short as possible to reduce external noise interference.
- IC chip (e.g. TAB or COG) is sensitive to light. Strong light might cause malfunction. Light sealing structure casing is recommended.
- Make sure there is enough space (with cushion) between case and LCD panel, to prevent external force passed on to the panel; otherwise that may cause damage to the LCD and degrade its display result.
- Avoid showing a display pattern on screen for a long time (continuous ON segment).
- LCD module reliability may be reduced by temperature shock.
- When storing and operating LCD module, avoids exposure to direct sunlight, high humidity, high or low temperature. They may damage or degrade the LCD module.
- Never leave LCD module in extreme condition (max./min storage/operate temperature) for more than 48hr.
- Recommend LCD module storage conditions is 0 C~40 C <80%RH.
- LCD module should be stored in the room without acid, alkali and harmful gas.
- Avoid dropping & violent shocking during transportation, and no excessive pressure press, moisture and sunlight.
- LCD module can be easily damaged by static electricity. Please maintain an optimum anti-static working environment to protect the LCD module. (eg. ground the soldering irons properly)
- Be sure to ground the body when handling LCD module.
- Only hold LCD module by its sides. Never hold LCD module by applying force on the heat seal or TAB.
- When soldering, control the temperature and duration avoid damaging the backlight guide or diffuser which might degrade the display result such as uneven display.
- Never let LCD module contact with corrosive liquids,

9.液晶显示模块设计和使用须知

- 请注意 V0, VCOM 的设定, 以确保液晶显示模块在不同的使用温度下以及在不同的视角和位置观察模块显示, 均能达到最佳对比度, 请务必将应用电路上设置为对比度可调。
- 请注意液晶显示模块的显示品质判定是指在正常对比度下以及视窗 (V. A) 范围内进行的, 非正常对比度下液晶可能会出现非预期的显示不良, 应注意区分。
- 请勿在最大额定值以外使用液晶显示模块。
- 请勿在没有接通电源的条件下, 给液晶显示模块输送信号。
- 请尽可能缩短信号线的连接, 以避免对液晶显示模块的信号干扰。
- 集成电路因 IC 芯片 (如 TAB 或 COG) 对紫外线极为敏感, 强光环境下可能会引起液晶显示模块功能失效, 故应采用不透光的外壳。
- 请在液晶显示模块与外壳之间保留足够的空间 (可使用衬垫), 以缓冲外力对液晶显示模块的损坏或因受力不均而产生的显示不匀等异常现象。
- 避免液晶显示屏在某一画面下长时间点亮, 否则有出现残影的风险; 请通过软件每隔一段时间改变一次画面。
- 液晶显示模块的可靠性可能因温度冲击而降低。
- 请勿在阳光直射、高湿、高温或低温下储存和使用液晶显示模块, 这将造成液晶显示模块的损坏或失效。
- 请勿在极限环境 (最大/最小存储/工作温度) 下使用或放置液晶显示模块超过 48 小时以上。
- 液晶显示模块建议存储条件为: 0 C~40 C <80%RH。
- 请勿让液晶显示模块存储于带有 酸性, 碱性, 有害气体环境之中。
- 在运输过程中, 请勿让液晶显示模块跌落与猛烈震动, 同时避免 异常挤压, 高湿度, 与阳光照射。
- 液晶显示模块极易受静电损坏, 请务必保证液晶显示模块在防静电的工作环境中使用或保存。(如: 烙铁正确接地, 等)
- 拿取液晶显示模块时需注意操作人员的接地情况。
- 请手持液晶显示模块的边沿取放模块, 防止热压纸或 TAB 部位受力。
- 焊接液晶模块时, 请注意控制烙铁的温度、焊接时间, 以免烫坏导光板或偏光片, 导致显示不匀等不良现象发生。
- 请勿使用洗板水等腐蚀性液体接触液晶模块, 以免腐

which might cause damage to the backlight guide or the electric circuit of LCD module.

- Only clean LCD with a soft dry cloth, Isopropyl Alcohol or Ethyl Alcohol. Other solvents (e.g. water) may damage the LCD.
- Never add force to components of LCD module. It may cause invisible damage or degrade the module's reliability.
- When mounting LCD module, please make sure it is free from twisting, warping and bending.
- Do not add excessive force on surface of LCD, which may cause the display color change abnormally.
- LCD panel is made with glass. Any mechanical shock (e.g. dropping from high place) will damage the LCD module.
- Protective film is attached on LCD screen. Be careful when peeling off this protective film, since static electricity may be generated.
- Polarizer on LCD gets scratched easily. If possible, do not remove LCD protective film until the last step of installation.
- When peeling off protective film from LCD, static charge may cause abnormal display pattern. The symptom is normal, and it will turn back to normal in a short while.
- LCD panel has sharp edges, please handle with care.
- Never attempt to disassemble or rework LCD module.
- If display panel is damaged and liquid crystal substance leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes promptly wash it off using soap and water.

10. CTP Mounting Instructions

10.1 Bezel Mounting (Figure 1)

- The bezel window should be bigger than the CTP active area. It should be $\geq 0.5\text{mm}$ each side.
- Gasket should be installed between the bezel and the CTP surface. The final gap should be about $0.5\sim 1.0\text{mm}$.
- It is recommended to provide an additional support bracket for backside support when necessary (e.g. slim type TFT module without mounding structure). They should only provide appropriate support and keep the module in place.
- The mounting structure should be strong enough to prevent external uneven force or twist act onto the module.

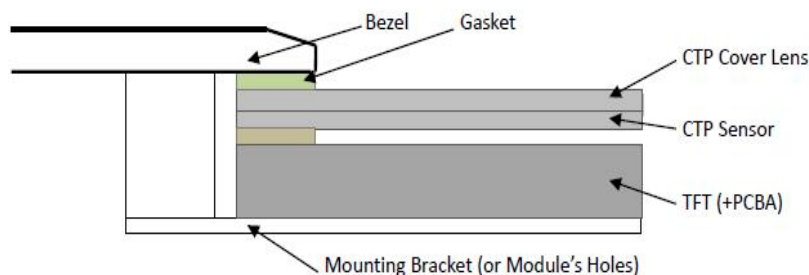


Figure 1

10.2 Surface Mounting (Figure 2)

- As the CTP assembling on the countersink area with

蚀导光板或模块电路。

- 仅可使用柔软的干布，异丙醇或乙醇清洁液晶屏表面，其他任何溶剂(如:水)都有可能损坏液晶模块。
- 请勿挤压液晶显示模块上的元器件，以避免产生潜在的损坏或失效而影响产品可靠性。
- 装配液晶显示模块时，请务必注意避免液晶显示模块的扭曲或变形。
- 请勿挤压液晶显示屏表面，这将导致显示颜色的异常。
- 液晶屏由玻璃制作而成，任何机械碰撞(如从高处跌落)均有可能损坏液晶显示模块。
- 液晶屏表面带有保护膜，揭除保护膜时需要注意可能产生的静电。
- 因液晶显示屏表面的偏光片极易划伤，安装完成之前尽量不要揭下保护膜。
- 请缓慢揭除保护膜，在此过程中液晶显示屏上可能会产生静电，此为正常情况，可在短时间内消失。
- 请注意避免被液晶显示屏的边缘割伤。
- 请不要试图拆卸或改造液晶显示模块。
- 当液晶显示屏出现破裂，内部液晶液体可能流出；相关液体不可吞吃，绝对不可接触嘴巴，如接触到皮肤或衣服，请使用肥皂与清水彻底清洗。

10. 电容触摸屏安装指导

10.1 面框安装（附图 1）

- 客户面框窗口应大于 CTP 动作区域，各边离动作区应 $\geq 0.5\text{mm}$ 。
- 面框与 CTP 面板间应垫有胶垫，其最终间隙约为 $0.5\sim 1.0\text{mm}$ 。
- 建议必要时在背面提供附加支架(例如无安装结构的薄型 TFT 模块)，应仅利用适当支撑以保持模块位置。
- 安装结构应具有足够的强度，以防止外部不均匀力或扭曲力作用到模块上。

10.2 嵌入安装（附图 2）

- 客户面框应具有使用双面胶粘贴 CTP 的结构沉台面，

double side adhesive.

The countersink area should be flat and clean to ensure the double side adhesive installation result.

- The Bezel is recommend to keep a gap ($\geq 0.3\text{mm}$ each side) around the cover lens for tolerance.
- It is recommended to provide an additional support bracket with gasket for backside support when necessary (e.g. TFT module without mounding structure). They should only provide appropriate support and keep the module in place.
- The mounting structure should be strong enough to prevent external uneven force or twist act onto the module

其粘贴面要求平整且洁净无污染以保证粘贴牢靠.

- 考虑到制作误差, 建议面框与 CTP 盖板之间四周留有 $\geq 0.3\text{mm}$ 间隙.
- 建议必要时在背面提供垫有胶垫附加支架 (例如无安装结构的 TFT 模块), 应仅利用适当支撑以保持模块位置.
- 安装结构应具有足够的强度, 以防止外部不均匀力或扭曲力作用到模块上.

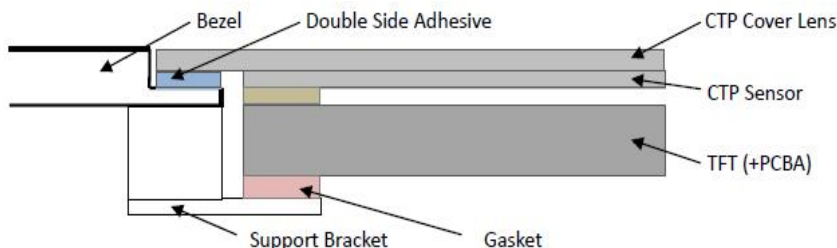


Figure 2

10.3 Additional Cover Lens Mounting (Figure 3)

- For the case of additional cover Lens mounting, it is necessary to recheck with the CTP specification about the material and thickness to ensure the functionality.
- It should keep a $0.2\sim 0.3\text{mm}$ gap between the cover lens and the CTP surface..
- The cover lens window should be bigger than the active area of the CTP. It should be $\geq 0.5\text{mm}$ each side.
- It is recommended to provide an additional support bracket for backside support when necessary (e.g. slim type TFT module without mounding structure). They should only provide appropriate support and keep the module in place.
- The mounting structure should be strong enough to prevent external uneven force or twist act onto the module.

10.3 覆加盖板 (附图 3)

- 需要覆加玻璃盖板的安装, 为确保其功能, 有必要查看产品规格书中有关盖板材料和厚度的说明.
- 玻璃盖板与 CTP 表面之间应留有 $0.2\sim 0.3\text{mm}$ 间隙.
- 玻璃盖板视窗应大于 CTP 动作区域, 各边离动作区应 $\geq 0.5\text{mm}$.
- 建议必要时在背面提供附加支架 (例如无安装结构的薄型 TFT 模块), 应仅利用适当支撑以保持模块位置.
- 安装结构应具有足够的强度, 以防止外部不均匀力或扭曲力作用到模块上.

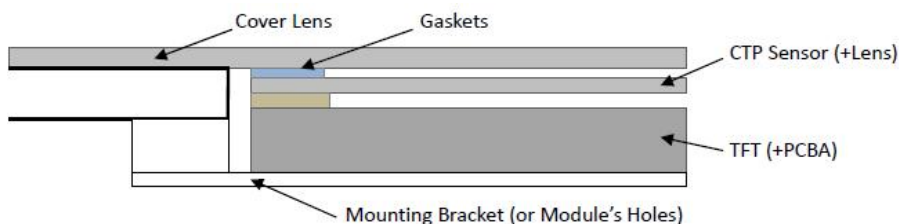


Figure 3

11. RTP Mounting Instructions

- It should bezel touching the RTP Active Area (A.A.) to prevent abnormal touch. It should left gap $D=0.2\sim 0.3\text{mm}$ in between. (Figure 4)
- Outer bezel design should take care about the area outside the A.A. Those areas contain circuit wires which is having different thickness. Touching those areas could de-form the ITO film. As a result bezel the ITO film be damaged and shorten its lifetime. It is suggested to protect those areas with gasket

11. 电阻触摸屏安装指导

- 为避免面框直接压在动作区 (A. A.) 上造成误动作, 面框与电阻触摸屏 (RTP) 之间应留有一定的空隙 $D=0.2\sim 0.3\text{mm}$ 之间. (附图 4)
- 设计面框时, 要注意用面框保护触摸屏四周的非保证操作区域, 因为布线区域在此处形成一台阶, 在此区域附近操作时 ITO Film 变形较大, 容易导致 ITO 损坏而降低寿命. 为保护 RTP 和避免误操作, 在 RTP 与面框之间垫缓冲物 (Gasket), 我们建议设计面框应覆盖动作区的边缘, 面框边缘到 V. A. 区的距离 $B\geq 0.50\text{mm}$;

(between the bezel and RTP). The suggested figures are $B \geq 0.50\text{mm}$; $C \geq 0.50\text{mm}$. (Figure 4)

- The bezel side wall should keep space $E = 0.2 \sim 0.3\text{mm}$ from the RTP. (Figure 4)

垫圈内边缘到 V. A. 区的距离 $C \geq 0.50\text{mm}$. (附图 4)

- 在设计面框与 RTP 组装时, 应考虑到面框内侧与 RTP 外侧的间距 $E \geq 0.2\text{mm}$. (附图 4)

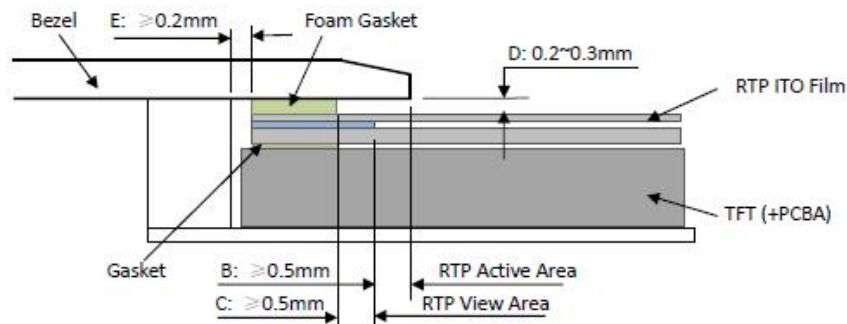


Figure 4

- In general design, RTP V.A. should be bigger than the TFT V.A. and RTP A.A. should be bigger than the TFT A.A. (Figure 5)

- 通常设计时:
RTP 的可视区 V. A. 应不小于 TFT 的可视区 V. A.
及 RTP 的动作区 A. A. 应不小于 TFT 的动作区 A. A.
(附图 5)

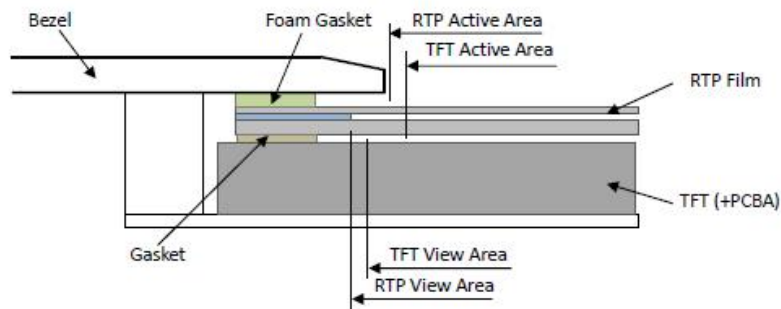


Figure 5

12. Warranty

This product has been manufactured to our 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.

- We cannot accept responsibility for any defect, which may arise from additional manufacturing of the product (including disassembly and reassembly), after product delivery.
- We cannot accept responsibility for any defect, which may arise after the application of strong external force to the product.
- We cannot accept responsibility for any defect, which may arise due to the application of static electricity after the product has passed our company's acceptance inspection procedures.
- When the product is in CCFL models, CCFL service life and brightness will vary according to the performance of the inverter used, leaks, etc. We cannot accept responsibility for product performance, reliability, or defect, which may arise.
- We cannot accept responsibility for intellectual property of a third part, which may arise through the application of our product to our assembly with exception to those issues relating directly to the structure or method of manufacturing of our product.

