深圳市拓普微科技开发有限公司
SHENZHEN TOPWAY TECHNOLOGY CO., LTD.

LMT050DNCFWU-NEC

LCD Module User Manual

Prepared by:	Checked by:	Approved by:
LU		
Date: 2018-06-07	Date:	Date:

Rev.	Descriptions	Release Date
0.1	Preliminary release	2018-06-07

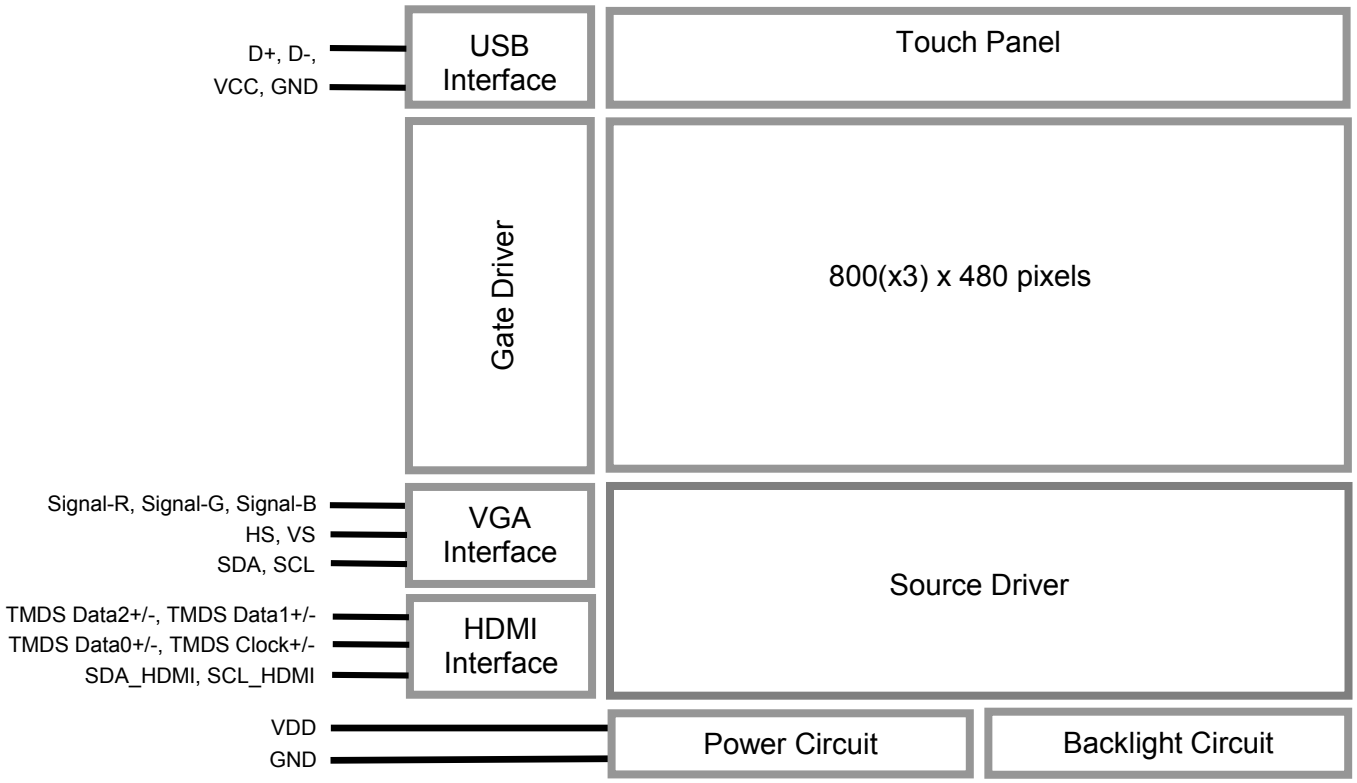
Table of Content

1. General Specification

Signal Interface :	VGA/HDMI
Display Mode :	Transmissive / Normal White
Screen Size(Diagonal) :	5.0”
Outline Dimension :	143.5 x 81.0x 16.3max (mm) (see attached drawing for details)
Active Area :	108.0 x 64.8 (mm)
Color Depth:	16.7M
Number of dots :	800 x 480
Pixel Pitch :	0.135 x 0.135 (mm)
Pixel Configuration :	RGB Stripe
Backlight :	LED
Viewing Direction :	6H (*1) (gray scale inverse) 12H (*2)
Touch Panel Type:	Capacitive Touch Panel
Surface Treatment :	HC Treatment
Operating Temperature :	0 ~ +50°C
Storage Temperature :	-10 ~ +60°C

Note:
*1. For saturated color display content (eg. pure-red, pure-green, pure-blue, or pure-colors-combinations).
*2. For “color scales” display content.
*3. Color tone may slightly change by temperature and driving condition.

2. Block Diagram



3. Terminal Function

3.1 K1 Power Terminal

Pin No.	Pin Name	IO	Descriptions
1	VDD	Power	Positive Power Supply(12.0V)
2	VDD	Power	Positive Power Supply(12.0V)
3	NC	-	No connection
4	NC	-	No connection
5	GND	Power	Power Supply GND (0V)
6	GND	Power	Power Supply GND (0V)

3.2 K2 HDMI Terminal

Pin No.	Pin Name	IO	Descriptions
1	TMDS Data2+	Input	HDMI receiver positive signal channel 2
2	TMDS Data2 Shield	Power	Signal Ground
3	TMDS Data2–	Input	HDMI receiver negative signal channel 2
4	TMDS Data1+	Input	HDMI receiver positive signal channel 1
5	TMDS Data1 Shield	Power	Signal Ground
6	TMDS Data1–	Input	HDMI receiver negative signal channel 1
7	TMDS Data0+	Input	HDMI receiver positive signal channel 0
8	TMDS Data0 Shield	Power	Signal Ground
9	TMDS Data0–	Input	HDMI receiver negative signal channel 0
10	TMDS Clock+	Input	HDMI receiver positive signal clock
11	TMDS Clock Shield	Power	Signal Ground
12	TMDS Clock–	Input	HDMI receiver negative signal clock
13	NC	-	No connection
14	NC	-	No connection
15	SCL_HDMI	Input	Serial data clock
16	SDA_HDMI	Output	Serial data out
17	GND	Power	Signal Ground
18	+5V Power	Power	Power supply for DDC memory
19	Hot Plug Detect	Output	Hot Plug Detect signal

Note: HDMI terminal should be well connect before power on (hot-plug is not allowed)

3.3 K3 VGA Terminal

Pin No.	Pin Name	IO	Descriptions
1	GND	Power	Signal Ground
2	VS	Input	Analogue VGA Vertical Sync signal input
3	HS	Input	Analogue VGA Horizontal Sync signal input
4	GND	Power	Signal Ground
5	Signal-R	Input	Analogue VGA Red signal input
6	GND	Power	Signal Ground
7	Signal-G	Input	Analogue VGA Green signal input
8	GND	Power	Signal Ground
9	Signal-B	Input	Analogue VGA Blue signal input
10	GND	Power	Signal Ground
11	SDA	Output	Serial data out
12	SCL	Input	Serial data clock

Note: VGA terminal should be well connect before power on (hot-plug is not allowed)

3.4 K4 Touch Panel Controller Terminal

Pin No.	Pin Name	I/O	Descriptions
1	GND	Power	Ground
2	VCC	Power	Positive Power Supply(5.0V) *1
3	GND	Power	Ground
4	D+	I/O	USB D+ signal
5	D-	I/O	USB D- signal
6	NC	-	No connection
7	NC	-	No connection
8	NC	-	No connection
9	NC	-	No connection
10	NC	-	No connection

Note:
*1:This power is no use

4. Absolute Maximum Ratings

Top=25℃, VDD =12.0V ,GND=0V

Items	Symbol	Min.	Max.	Unit	Condition
Power Supply Voltage	VDD	-0.3	+12.5	V	
Operating Temperature	T_{OP}	0	50	°C	No Condensation
Storage Temperature	T_{ST}	-10	60	°C	No Condensation

Note:
*1. This rating applies to all parts of the module. And should not be exceeded.
*2. The operating temperature only guarantees operation of the circuit. The contrast, response speed, and the other specification related to electro-optical display quality is determined at the room temperature, T_{OP}=25℃
*3. Ambient temperature when the backlight is lit (reference value)
*4. 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 Driving TFT LCD Panel

Top=25℃, VDD =12.0V ,GND=0V

Items	Symbol	MIN.	TYP.	MAX.	Unit	Note
Supply Voltage	VDD	11.5	12.0	12.5	V	
VDD Power Consumption	I_{VDD}	-	185	370	mA	

6. Function Specifications

The USB HID type and the right function parameters are defined by the JP point

JP1	JP2	JP3	JP4	JP5	JP6	USB HID type	Function of right button	Press and hold time
OPEN	CLOSE	OPEN	CLOSE	OPEN	CLOSE	Touch screen(*1)(*2)	NO(*3)	--
OPEN	CLOSE	OPEN	CLOSE	CLOSE	OPEN	Mouse	YES(*4)	1000ms
OPEN	CLOSE	CLOSE	OPEN	OPEN	CLOSE			1500ms
OPEN	CLOSE	CLOSE	OPEN	CLOSE	OPEN			2000ms
CLOSE	OPEN	OPEN	CLOSE	OPEN	CLOSE			2500ms
CLOSE	OPEN	OPEN	CLOSE	CLOSE	OPEN			3000ms
CLOSE	OPEN	CLOSE	OPEN	OPEN	CLOSE			3500ms
CLOSE	OPEN	CLOSE	OPEN	CLOSE	OPEN			4000ms

*1 default setting
*2 window XP does not support
*3 Win7, win8, win10, use the built-in drive right button function
*4 Ubuntu,Win7, win8, win10, support the right button of firmware

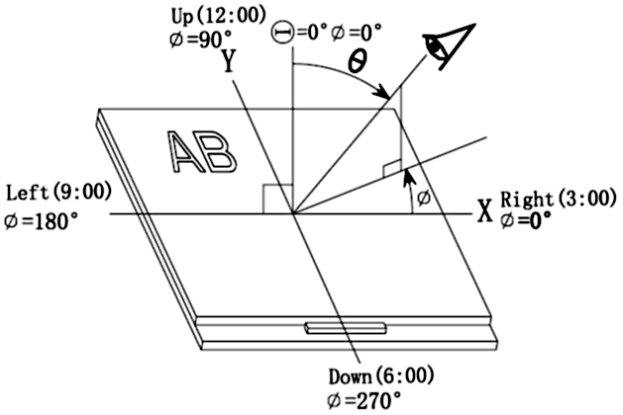
7. Optical Characteristics

Item		Symbol	Condition	MIN.	TYP.	MAX.	UNIT	Note.
Viewing angle		θ_T	(CR≥10)	40	50	-	degree	Note 2
		θ_B		60	70	-		
		θ_L		60	70	-		
		θ_R		60	70	-		
Contrast ratio		CR	θ=0°	500	600	-	-	Note 1,3
Response Time		T_{on}	25℃	-	20	30	msec	Note 1,4
		T_{off}					msec	
Chromaticlty	White	X	Backlight is on	0.260	0.310	0.360		Note 1,5
		Y		0.280	0.330	0.380		
	Red	X		0.540	0.590	0.640		
		Y		0.300	0.350	0.400		
	Green	X		0.298	0.348	0.398		
		Y		0.520	0.570	0.620		
	Blue	X		0.095	0.145	0.195		
		Y		0.060	0.110	0.160		
Luminance		L		-	200	-	cd/m^2	Note 1,6
NTSC				-	50		%	Note 5
Luminance uniformity		U		75	80	-	%	Note 1,7

Test Conditions:
1. IF= 36 mA, VF=22.1V, and the ambient temperature is 25. ℃
2. The test systems refer to Note 1 and Note 2.

Note 1:
The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment SR-3A (1°)
Measuring condition:
- Measuring surroundings: Dark room
- Measuring temperature: Ta=25℃.
- Adjust operating voltage to get optimum contrast at the center of the display.

Note 2:
The definition of viewing angle:
Refer to the graph below marked by θ and Φ

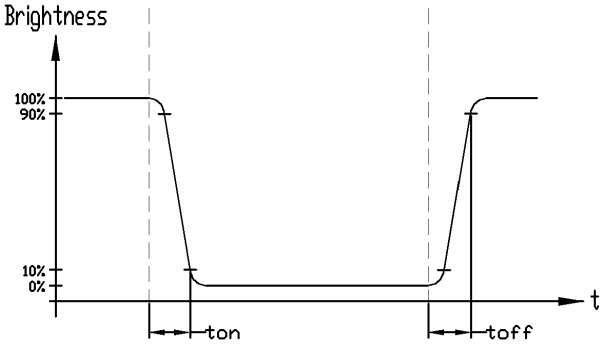


Note 3:
The definition of contrast ratio (Test LCM using SR-3A (1°)):

$$\text{Contrast Ratio(CR)} = \frac{\text{Luminance When LCD is at "White" state}}{\text{Luminance When LCD is at "Black" state}}$$

(Contrast Ratio is measured in optimum common electrode voltage)

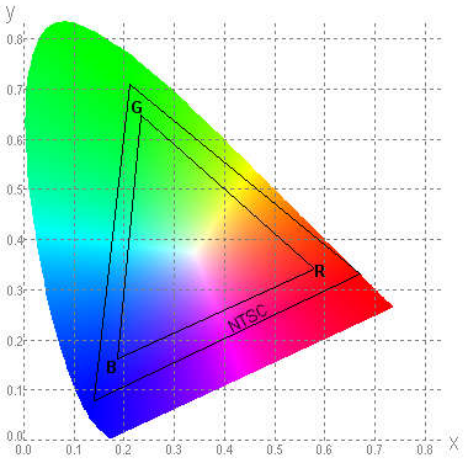
Note 4:
Definition of Response time. (Test LCD using BM-7A(2°)):
The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes.Refer to figure as below.



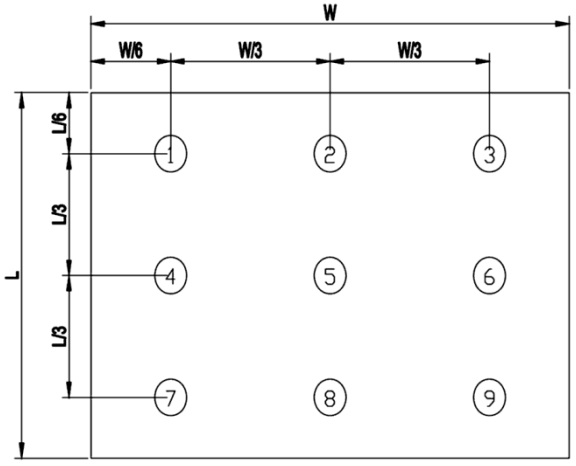
Note 5:
Definition of Color of CIE1931 Coordinate and NTSC Ratio.

Color gamut:

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



Note 6:
The luminance uniformity is calculated by using following formula.
△Bp = Bp (Min.) / Bp (Max.)×100 (%)
Bp (Max.) = Maximum brightness in 9 measured spots
Bp (Min.) = Minimum brightness in 9 measured spots.



Note 7:
Measured the luminance of white state at center point

8. Precautions of using LCD Modules

Mounting

- Mounting must use holes arranged in four corners or four sides.
- The mounting structure so provide even force on to LCD module. Uneven force (ex. Twisted stress) should not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
- It is suggested to attach a transparent protective plate to the surface in order to protect the polarizer. It should have sufficient strength in order to the resist external force.
- The housing should adopt radiation structure to satisfy the temperature specification.
- Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
- Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. Never rub with dust clothes with chemical treatment. Do not touch the surface of polarizer for bare hand or greasy cloth.(Some cosmetics deteriorate the polarizer.)
- When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzine. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.
- Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer

Operating

- The spike noise causes the mis-operation of circuits. It should be within the ±200mV level (Over and under shoot voltage)
- Response time depends on the temperature.(In lower temperature, it becomes longer.)
- Brightness depends on the temperature. (In lower temperature, it becomes lower.) And in lower temperature, response time(required time that brightness is stable after turned on) becomes longer.
- 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.
- When fixed patterns are displayed for a long time, remnant image is likely to occur.
- Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference

Electrostatic Discharge Control

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly.

Strong Light Exposure

Strong light exposure causes degradation of polarizer and color filter.

Storage

When storing modules as spares for a long time, the following precautions are necessary.

- Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.
- The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.

Protection Film

- When the protection film is peeled off, static electricity is generated between the film and polarizer. This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.
- The protection film is attached to the polarizer with a small amount of glue. If some stress is applied to rub the protection film against the polarizer during the time you peel off the film, the glue is apt tore main on the polarizer. Please carefully peel off the protection film without rubbing it against the polarizer.
- When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the polarizer after the protection film is peeled off.
- You can remove the glue easily. When the glue remains on the polarizer surface or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.

Transportation

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.

附录一： 电容触摸屏(CTP)模组应用注意事项

1. 安装注意事项

1.1 面框安装（如附图 1）

- 客户面框窗口应大于 CTP 动作区域，各边离动作区应≥0.5mm。
- 面框与 CTP 面板间应垫有胶垫，其最终间隙约为 0.5～1.0mm。
- 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。

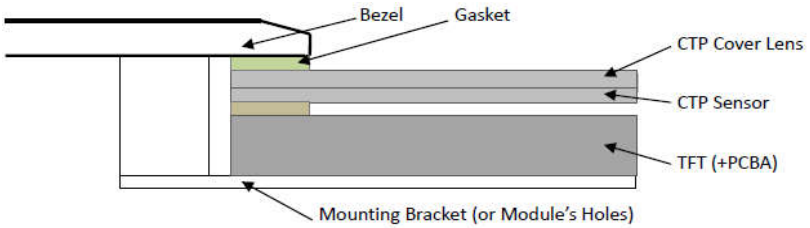


图 1

1.2 嵌入安装（如附图 2）

- 客户面框应具有使用双面胶粘贴 CTP 的结构沉台面，其粘贴面要求平整且洁净无污以保证粘贴牢靠，
- 考虑到制作误差，建议面框与 CTP 盖板之间四周留有≥0.3mm 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。

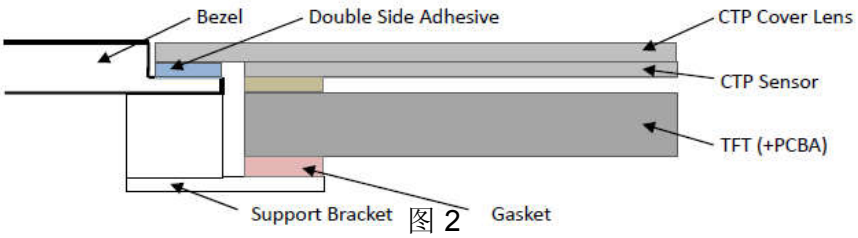


图 2

1.3 覆加盖板（如附图 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 0.2～0.3mm 间隙。
- 玻璃盖板视窗应大于 CTP 动作区域，各边离动作区应≥0.5mm。
- 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。

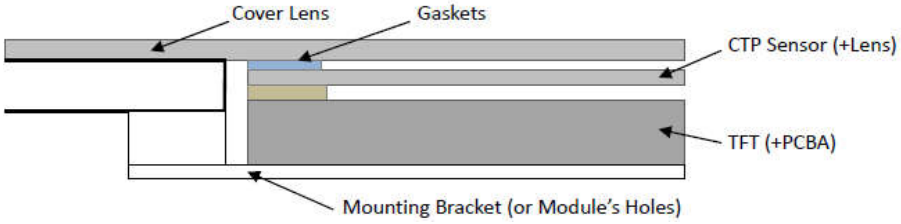


图 3

2. 操作注意事项

2.1 产品系玻璃制品，不要从高处抛下或受到机械冲击等。

2.2 不要对产品施加过大或不均匀的力，否则会影响产品的性能。

2.3 如盖板玻璃表面被污涂，可将表面湿润后用干燥软布轻轻擦拭即可。如仍不清透，可用溶剂异丙基酒精或乙基酒精湿润软布擦拭。如使用其它溶剂可能会损坏产品，特别是不要使用水、酮、芳香族溶剂。

2.4 请勿试图拆卸 CTP 模组。

2.5 逻辑电路断电时，不应再输入信号。

2.6 为防止静电对元件的破坏，应注意保持最佳的工作环境。

- 在操作 CTP 模组时，一定要将机身接地。
- 装配所需的工具必须正确接地，如烙铁等。
- 为减少静电产生，请勿在干燥条件下进行组装等操作。
- 在 CTP 模组上覆层薄膜以保护显示表面，剥去保护膜时要小心产生静电。

3. 储运注意事项

3.1 储存模组时，应避免阳光直射或日光灯照射。

3.2 模组应储存在要求温度范围内。如果 CTP 模组储存时间较长，建议在温度为 0℃~ 40℃及相对湿度≤80%条件下存放。

3.3 模组应存放在无酸、无碱、无有害气体的房间内。

3.4 模组在运输过程中应防止坠落、剧烈震动，避免过度压伤、进水、受潮及日照等。

附件一：

CTP Application Precautions

1. CTP Mounting Precaution

1.1 Bezel Mounting (Figure 1)

- The bezel window should be bigger than the CTP active area. It should be≥0.5mm each side.
- Gasket should be installed between the bezel and the CTP surface. The final gap should be about 0.5~1.0mm.
- 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.

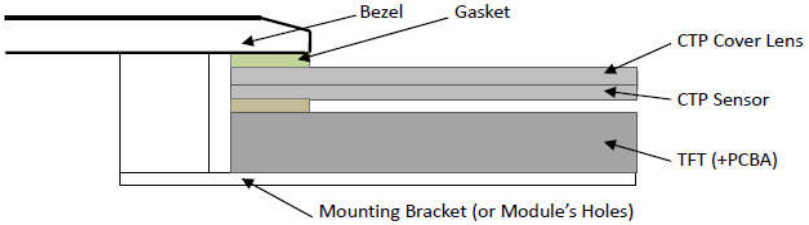


Figure 1

1.2 Surface Mounting (Figure 2)

- As the CTP assembling on the countersink area with 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 (≥0.3mm 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.

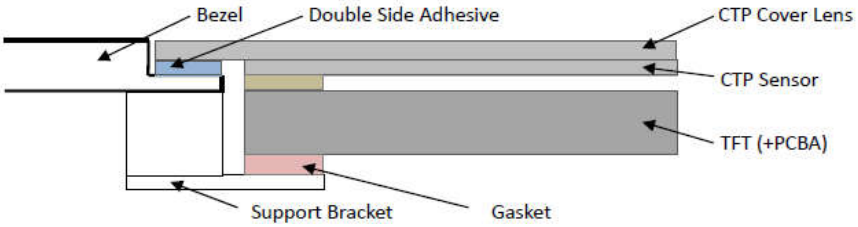


Figure 2

1.3 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 0.2~0.3mm 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≥0.5mm 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.

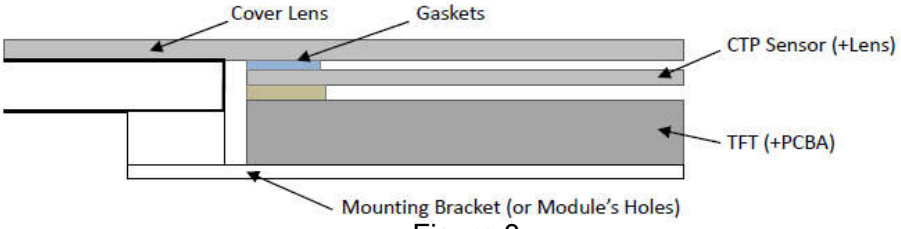


Figure 3

2. Handling Precautions

2.1 The product made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

2.2 Do not apply excessive or uneven force to the product since this may damage to the performance.

2.3 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with Isopropyl alcohol or Ethyl alcohol solvents. Solvents other than those mentioned above may damage the product. Especially, do not use Water, Ketone, Aromatic solvents.

2.4 Do not attempt to disassemble the CTP Module.

2.5 If the logic circuit power is off, do not apply the input signals.

2.6 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

a. Be sure to ground the body when handling the CTP Modules.

b. Tools required for assembly, such as soldering irons, must be properly ground.

c. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

d. The CTP Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

3. Storage and Transportation Precautions

3.1 When storing the CTP modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

3.2 The CTP modules should be stored the required temperature range. If the CTP modules will be stored for a long time, the recommend condition is the temperature of 0~40 ℃ and relative humidity of ≤80%.

3.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

3.4 The CTP modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.