1.77 inch TFT LCD
without Touch Panel
SPECIFICATION
MODEL NAME: LMMAB017DPN2

Date: 2019/07/22

Customer Signature		
Customer		
Approved Date	**Approved By**	**Reviewed By**

Contents

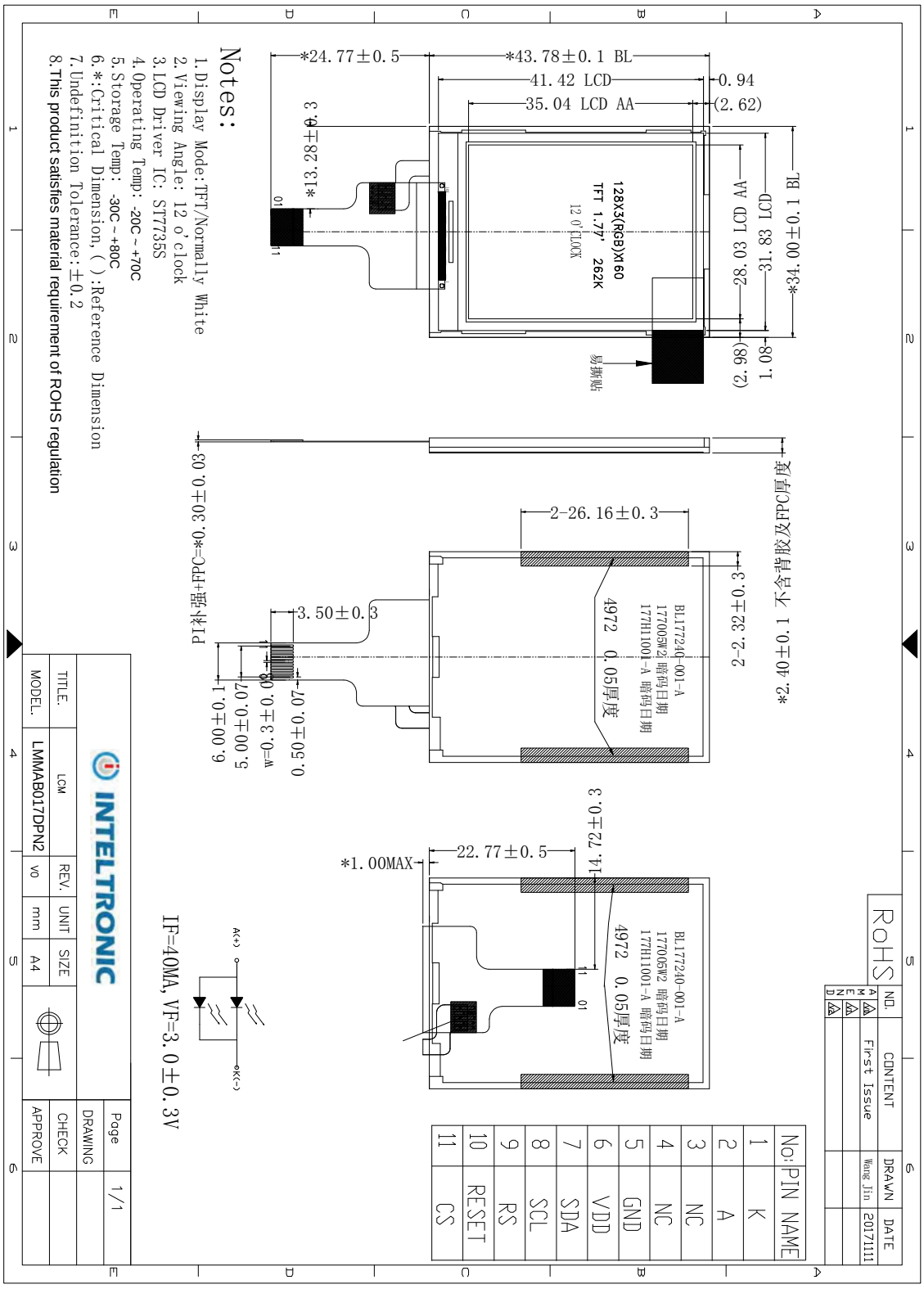
1. Document Revision History :

DOCUMENT REVISION	DATE	DESCRIPTION	PREPARED BY
A	2018-08-14 2019-01-04 2019-04-25 2019-07-22	First Release. Add supply current Update operation and storage temperature Add packing method	

2. General Description

No	Item	Specification	Remark
1	Screen Size	1.77 inch	
2	Display Mode	Normally White	
3	Resolution	128 × RGB × 160	
4	Active Area	28.03*35.04	mm
5	Outline Dimension	34*43.78*2.4	mm
6	Viewing Direction	12 o’ clock	
7	Driver IC	ST7735S	
8	Interface	SPI	
9	Back Light	White Led*2	
10	Touch Panel	-	

3. Outline Dimension



4. Interface Specification

Pin No	Symbol	Description	Note
1	K	Power Supply For LED Backlight Cathode Input.	
2	A	Power Supply For LED Backlight Anode Input.	
3	NC	No Connection.	
4	NC	No Connection.	
5	GND	Ground	
6	VDD	Power Supply For LCD.	
7	SDA	Serial data input/output pin.	
8	SCL	Serial clock signal pin.	
9	RS	Data / Command Selection pin.	
10	RESET	Reset signal input Pin	
11	CS	Chip selection signal.	

5.Absolute Maximum Ratings

Electrical Maximum Ratings – for IC Only

Parameter	Symbol	Min.	Max.	Unit	Note
Power supply voltage (VDD)	VDD	-0.3	+4.8	V	1

Note:

1. VDD, GND must be maintained.
2. The modules may be destroyed if they are used beyond the absolute maximum ratings.

6. Electrical Specifications

At Ta = 25 ℃ VCC = 2 5V to 4 8V GND=0V

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (analog)	VDD -GND		2.5	2.8	4.8	V
Supply current (Logic & LCD)	ICC	VCC=2.8V	-	-	30	mA
Supply voltage of white LED backlight	VLED	Forward current =40mA Number of LED = 2	2.7	3.0	3.3	V

Ta=25℃, Frame rate = 60Hz, Bare die, the registers setting are IC default setting.

Operation Mode	Image	Current Consumption			
		Typical		Maximum	
		IDDI (mA)	IDD (mA)	IDDI (mA)	IDD (mA)
Normal Mode	Note 1	0.01	0.9	0.02	2
	Note 2	0.01	0.9	0.02	2
Partial + Idle Mode (40 lines)	Note 1	0.01	0.8	0.02	2
	Note 2	0.01	0.8	0.02	2
Sleep-In Mode	N/A	0.005	0.015	0.01	0.03

Table 3 Power Consumption

7.Timing Characteristics

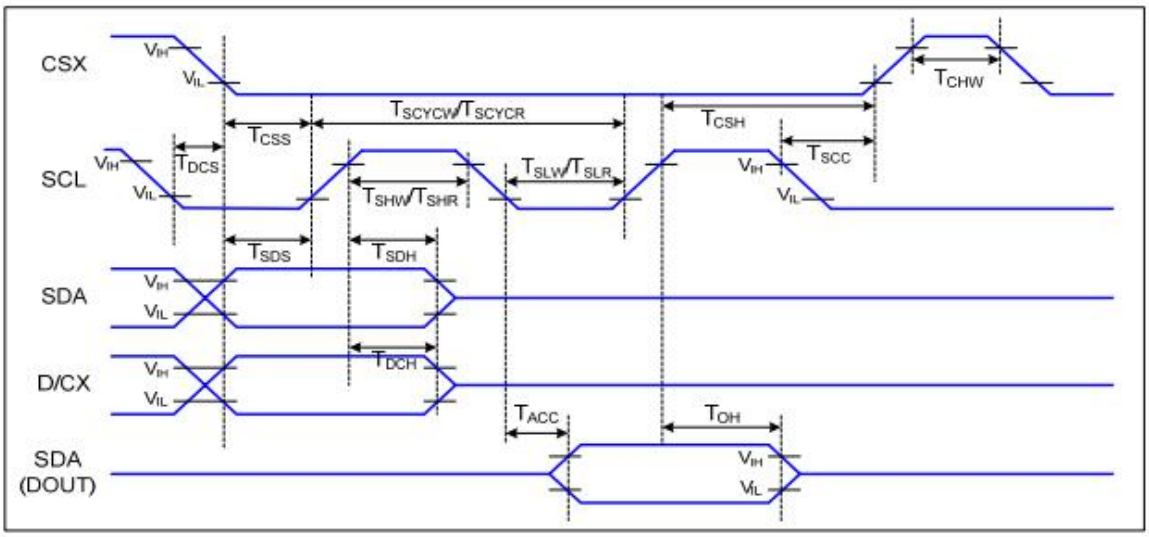


Figure 7 4-line Serial Interface Timing

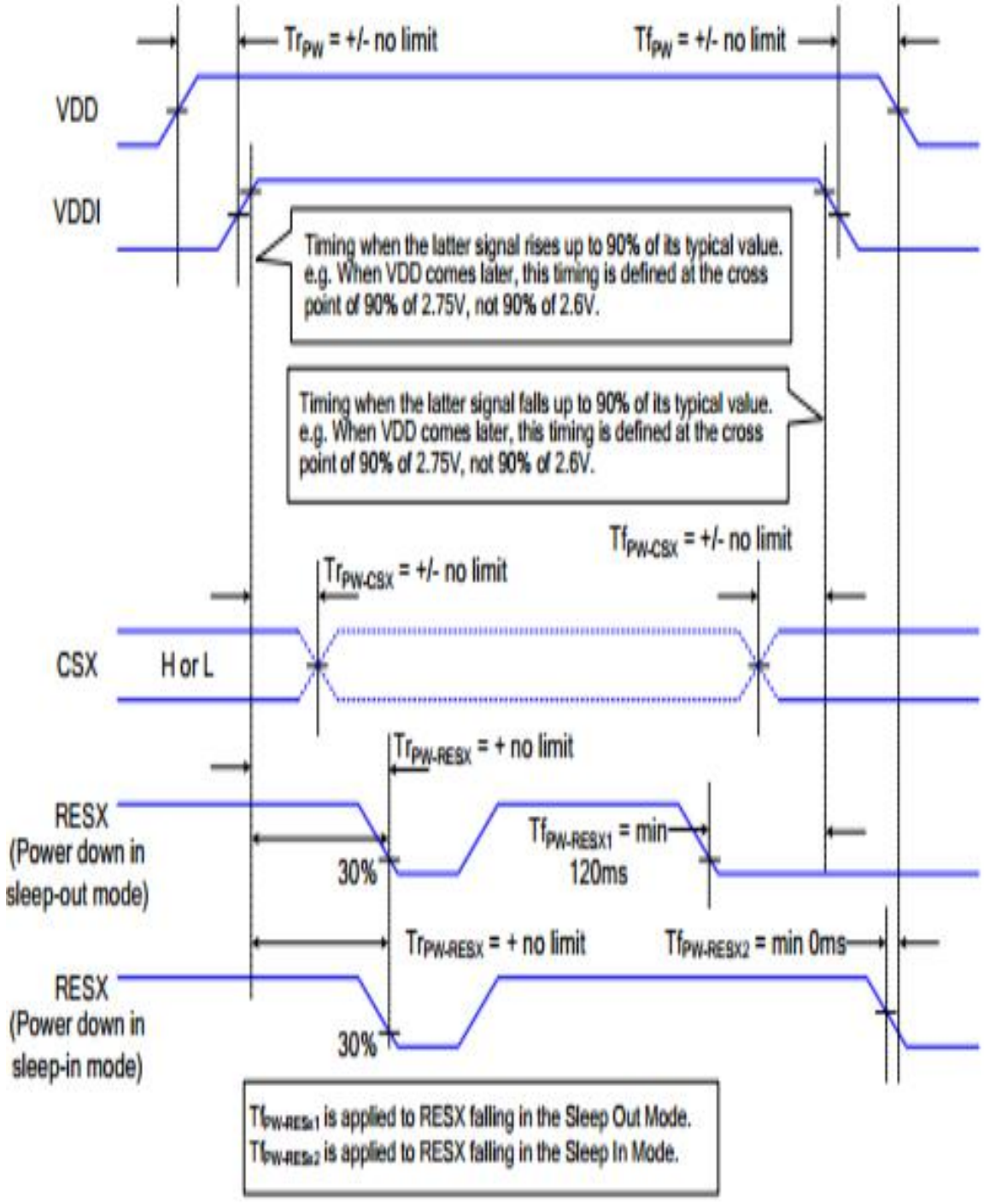
Ta=25 ℃, VDDI=1.65~3.7V, VDD=2.5~4.8V

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	TCSS	Chip Select Setup Time (Write)	45		ns	
	TCSH	Chip Select Hold Time (Write)	45		ns	
	TCSS	Chip Select Setup Time (Read)	60		ns	
	TSCC	Chip Select Hold Time (Read)	65		ns	
	TCHW	Chip Select "H" Pulse Width	40		ns	
SCL	TSCYCW	Serial Clock Cycle (Write)	66		ns	-Write Command & Data Ram
	TSHW	SCL "H" Pulse Width (Write)	15		ns	
	TSLW	SCL "L" Pulse Width (Write)	15		ns	
	TSCYCR	Serial Clock Cycle (Read)	150		ns	-Read Command & Data Ram
	TSHR	SCL "H" Pulse Width (Read)	60		ns	
	TSLR	SCL "L" Pulse Width (Read)	60		ns	
D/CX	TDCS	D/CX Setup Time	10		ns	
	TDCH	D/CX Hold Time	10		ns	
SDA (DIN) (DOUT)	TSDS	Data Setup Time	10		ns	For Maximum CL=30pF For Minimum CL=8pF
	TSDH	Data Hold Time	10		ns	
	TACC	Access Time	10	50	ns	
	TOH	Output Disable Time	15	50	ns	

Table 7 4-line Serial Interface Characteristics

8.Power Supply Configuration

The power on/off sequence is illustrated below



9.Optical Specification

Item 项目	Symbol 符号	Condition 条件	Min 最小值	Typ 典型值	Max 最大值	Unit 单位	Note 备注
Response time 响应时间	Tr+Tf	Θ=0° Ø=0° Ta=25°C	-	8	16	ms	1
Contrast ratio 对比度	Cr		400	500	-	-	2
Color gamut 饱和度	S(%)		-	60	-	%	-
Luminance uniformity 均匀度	δWHITE		80	-	-	%	3
Viewing angle range 视角范围	Θx+	CR≧10 Ta=25°C	-	45	-	deg	4
	Θx-		-	45	-	deg	
	Θy+		-	45	-	deg	
	Θy-		-	20	-	deg	
LCM Luminance LCM 亮度	Lv	Θ=0° Ø=0° Ta=25°C	-	120	-	Cd/m^2	5
CIE (X,Y) Chromaticity 色度坐标	White(X)		-	-	-	-	6
	White(Y)		-	-	-	-	

Note1.Response time is the time required for the display to transition from White to black(Rise Time,Tr)and from black to white(Decay Time,Tf).For additional information see FIG1...

Note2.contrast Ratio(CR) is defined mathematically by the following formula ,For more information see FIG2.

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

Note3.The uniformity in surface luminance(WHITE) is determined by measuring luminance at eath test position,and then dividing the maximum luminance of all white pixels by minimum luminance of all white pixels,For more information seeFIG2.

WHITE=Minimum Surface Luminance with all white pixels(P1,P2,.....)/Maximum Surface Luminance with all white pixels(P1,P2,.....)

Note4.Viewing angle is the angel at which contrast ratio is greater than a specific value.For TET module,the specific value of contrast ratio is 10.For monochrome and color stn module,the specific value of contrast ratio is2.The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface.For more information see FIG3

Note5. Surface luminance is the LCD surface luminance with all white pixels,For more information see FIG2.

LV=Average Surface Luminance with all white pixels(P1,P2,.....)

Note6.CIE(X,Y)chromaticity is the Center point value.For more information see FIG2.

Note7.For Viewing angle and response time testing,the testing date is base on Autronic-Melchers’s ConScope.Series instruments.For contrast ratio,Surface Luminance,Luminance uniformity and CIE,the testing date is base on CS-2000 photo detector.

Note8.For TN type TFT transmissive module,Gray scale reverse occurs in the direction of panel viewing angle

FIG1. The definition of Response time

响应时间定义

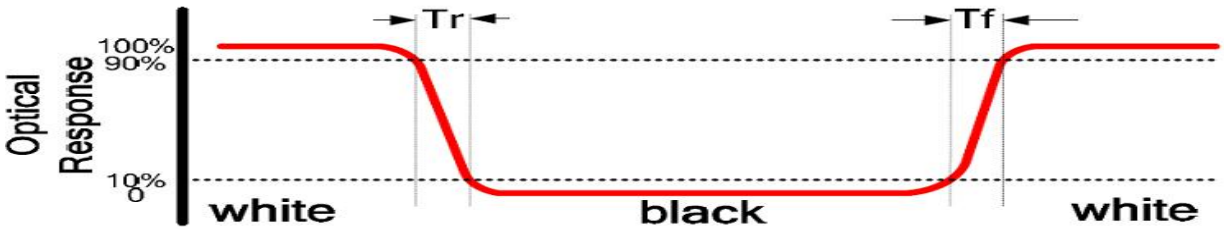


FIG2. Measuring method for Contrast ratio,surface luminance,Luminance uniformity,CIE(X,Y)chromaticity.

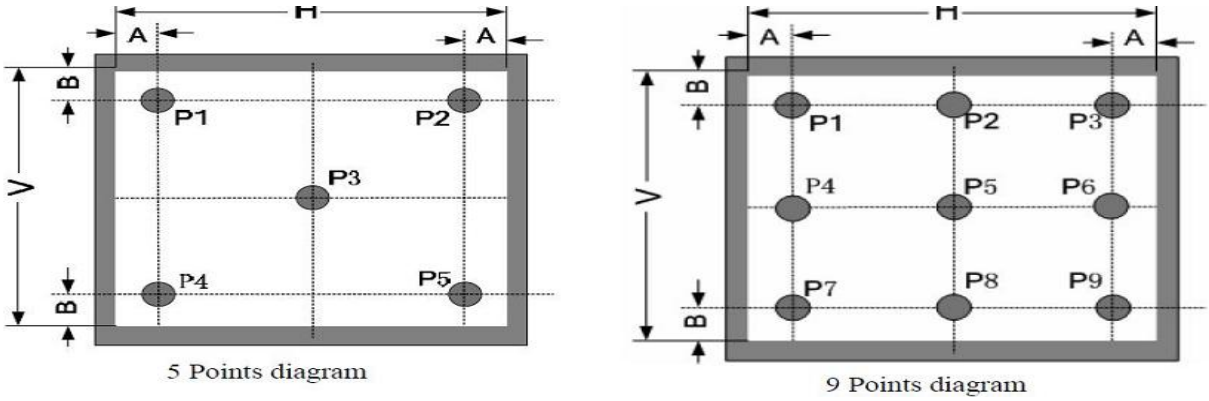
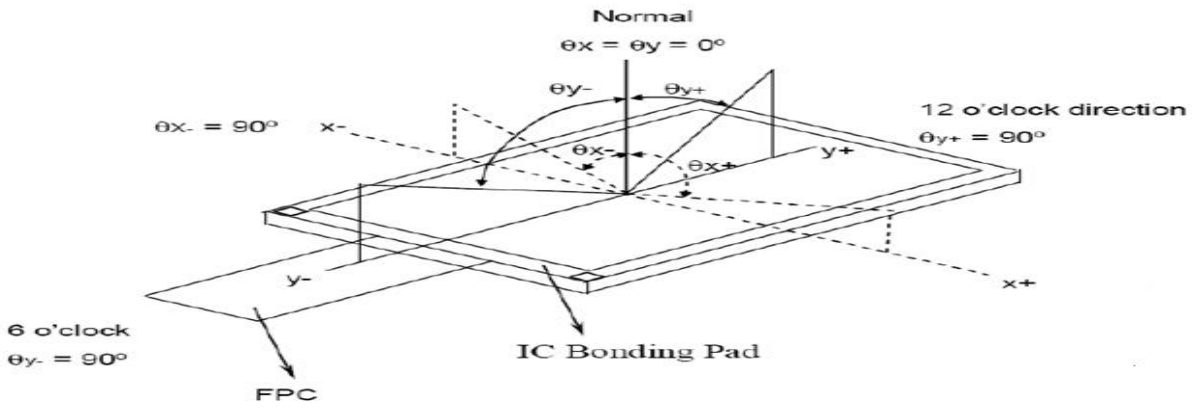


FIG3 The definition of viewing angle 视角定义



10.Reliability Test Items

Item	Test Condition	Criterion
High Temperature Storage	80 ℃, 48 hrs	Note1,Note2
Low Temperature Storage	-30 ℃, 48 hrs	
High Temp. & High Humidity Storage	40 ℃, 80％ RH, 48hrs	
Thermal Shock (Static)	-20℃, 30 min /70℃, 30 min, 20 cycles	
High Temperature Operation	70 ℃, 48 hrs	
Low temperature Operation	-20 ℃, 48 hrs	

Note1:Evaluation should be tested after storage at room temperature for two hours.
Note2:
Pass: Normal display image no line defect.
Fail: No display image, or line defects.

11.Precautions

Please pay attentions to the followings as using the LCD module.

Handling

(a) Do not apply strong mechanical stress like drop, shock or any force to LCD module. It may cause improper operation, even damage.

(b) Because the polarizer is very fragile and easy to be damaged, do not hit, press or rub the display surface with hard materials.

(c) Do not put heavy or hard material on the display surface, and do not stack LCD modules.

(d) If the display surface is dirty, please wipe the surface softly with cotton swab or clean cloth.

(e) Avoid using Ketone type materials (e.g. Acetone), Toluene, Ethyl acid or Methyl chloride to clean the display surface. It might damage the touch panel surface permanently. The recommended solvents are water and Isopropyl alcohol.

(f) Wipe off water droplets or oil immediately.

(g) Protect the LCD module from ESD. It will damage the LSI and the electronic circuit.

(h) Do not touch the output pins directly with bare hands.

(i) Do not disassemble the LCD module.

(j) Do not lift the FPC of Touch Panel.

Storage

(a) Do not leave the LCD modules in high temperature, especially in high humidity for a long time.

(b) Do not expose the LCD modules to sunlight directly.

(c) The liquid crystal is deteriorated by ultraviolet. Do not leave it in strong ultraviolet ray for a long time.

(d) Avoid condensation of water. It may cause improper operation.

(e) Please stack only up to the number stated on carton box for storage and transportation. Excessive weight will cause deformation and damage of carton box.

Operation

(a) When mounting or dismounting the LCD modules, turn the power off.

(b) Protect the LCD modules from electric shock.

(c) The Driver IC control algorithms stated above should always obeyed to avoid damaging the LSI and electronic circuit.

(d) Be careful to avoid mixing up the polarity of power supply for backlight.

(e) Absolute maximum rating specified above has to be always kept in any case. Exceeding it may cause non-recoverable damage of electronic components or, nevertheless, burning.

(f) When a static image is displayed for a long time, remnant image is likely to occur.

(g) Be sure to avoid bending the FPC to an acute shape, it might break FPC.

(h) Most of the touch screens have air vent to equalize the inside air pressure to the outside one. The air vent must be open and liquid contact must be avoided as the liquid may be

absorbed if the liquid is accumulated near the air vent.

(i) For the fragility of ITO film, it should avoid to use too tapering pen as the input material.

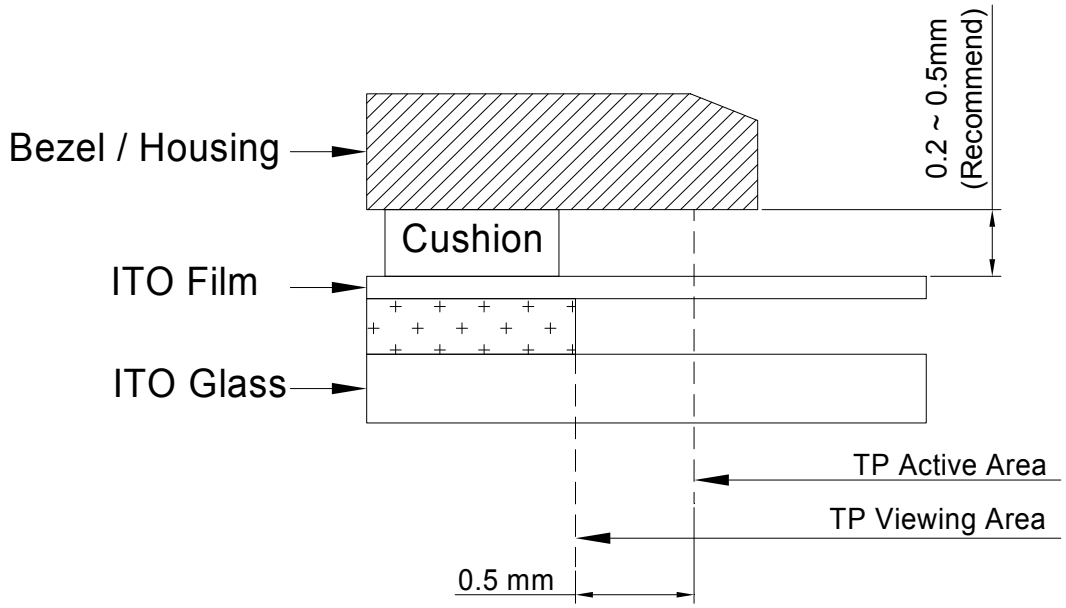
Touch Panel Mounting Notes

(a) If a cushion is used between bezel/housing and film must be choose as free as enough to absorb the expansion and contraction to avoid the distortion of film.

(b) The cushion must be placed out of the Viewing Area.

(c) Bezel/Housing edge must be posited between Key Area and Viewing Area. The edge enters the Key Area may cause unexpected input if the gap is too narrow or foreign particles like dusts exist between Bezel/Housing and ITO film.

(d) Mounting example:



The corner part has conductivity. Do not touch any metal part after mounting.

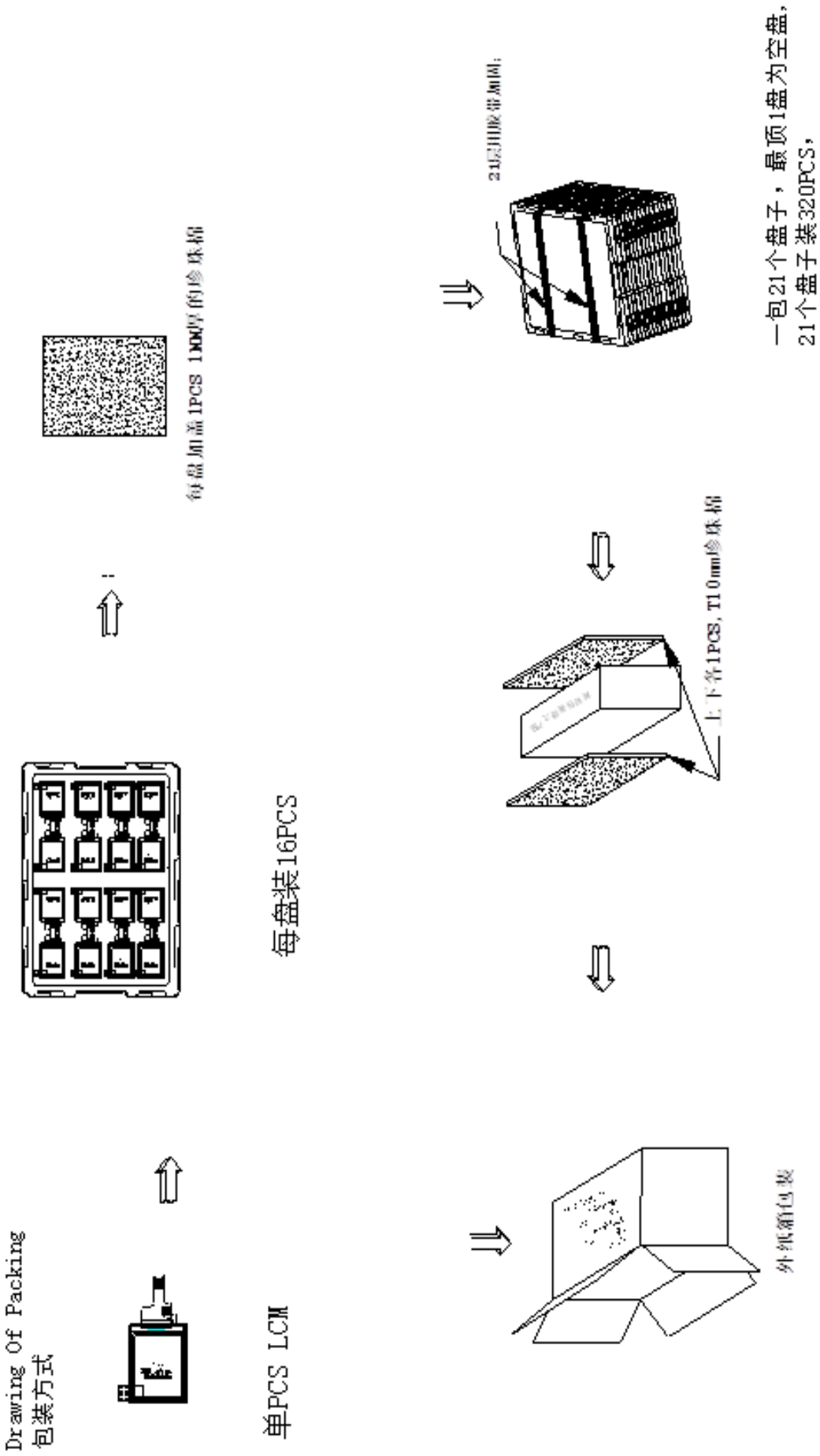
Others

a) If the liquid crystal leaks from the panel, it should be kept away from the eyes or mouth.

b) For the fragility of polarizer, it is recommended to attach a transparent protective plate over the display surface.

c) It is recommended to peel off the protection film on the polarizer slowly so that the electrostatic charge can be minimized.

12.Package (Carton:410*310*235MM)



■ Inspection Specifications

The buyer (customer) shall inspect the modules within twenty calendar days since the delivery date (the "inspection period") at its own cost. The results of the inspection (acceptance or rejection) shall be recorded in writing, and a copy of this writing will be promptly sent to the seller.

The buyer may, under commercially reasonable reject procedures, reject an entire lot in the delivery involved if, within the inspection period, such samples of modules within such lot show an unacceptable number of defects in accordance with this incoming inspection standards, provided however that the buyer must notify the seller in writing of any such rejection promptly, and not later than within three business days of the end of the inspection period.

Should the buyer fail to notify the seller within the inspection period, the buyer's right to reject the modules shall be lapsed and the modules shall be deemed to have been accepted by the buyer.

■ Warranty

Inteltronic Inc. warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for one year from the date of purchase.

Inteltronic Inc. will be limited to replace or repair any of its module which is found and confirmed defective electrically or visually when inspected in accordance with Inteltronic Inc. general module inspection standard.

This warranty does not apply to any products which have been on customer’s production line, repaired or altered by persons other than repair personnel authorized by Inteltronic Inc., or which have been subject to misuse, abuse, accident or improper installation. Inteltronic Inc. assumes no liability under the terms of this warranty as a consequence of such events.

If an Inteltronic Inc. product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. In returning the modules, they must be properly packaged with original package; there should be detailed description of the failures or defect.

■ RMA

Products purchased through Inteltronic Inc. and under warranty may be returned for replacement. Contact support@inteltronicinc.com for RMA number and procedures

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