PRODUCT : LCD MODULE
MODEL NO . : QD14414B
SUPPLIER :QDtech
DATE :March28,2018

SPECIFICATION

Revion:1.1

QD14414B

For Customer's Acceptance	
Approved by	**Comment**

	Signature	Date
Prepared by		
Checked by		
Approved by		

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1. Document Revision History :

DOCUMENT REVISION	DATE	DESCRIPTION	PREPARED BY
A	2018-04-04	First Release.	

No	Item	Specification	Remark
1	Screen Size	1.44inch	
2	Display Mode	Normally White	
3	Resolution	128×RGB ×128	
4	Active Area	26.2X27.2	
5	Outline Dimension	29. 5*36. 5*2. 6	
6	Viewing Direction	12 O'Clock	
7	Driver IC	ST7735S	
8	Color Number	262K	
9	Interface	SPI	
10	Back Light	White Led1	
11	Touch Panel	-	

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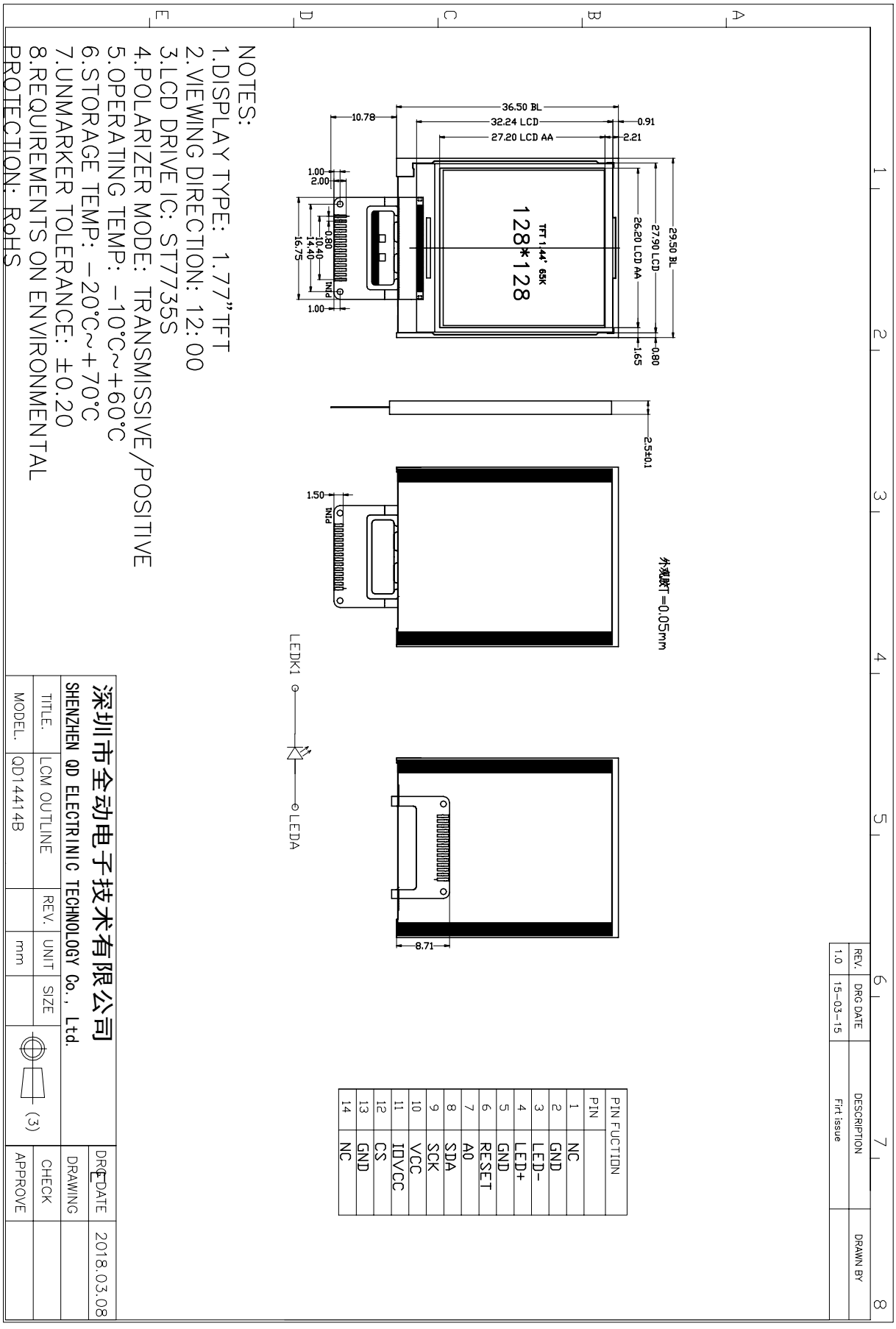
3. Outline Dimension



4.Interface Specification

Pin No	Symbol	Description	Note
1	NC	NC	
2	GND	System Ground	
3	LED-	Power Supply For LED Backlight Cathode Input	
4	LED+	Power Supply For LED Backlight Anode Input	
5	GND	System Ground	
6	RESET	Reset signal input Pin	
7	AO	Command/parameter or display data	
8	SDA	serial data input/output bi-direction pin	
9	SCK	High speed interface CLOCK differential signal input pins.	
10	VCC	Power supply input for LCM	
11	IOVCC	Power supply input for I/O	
12	CS	Chip select input signal	
13	GND	System Ground	
14	NC	NC	

5.Absolute Maximum Ratings

Electrical Maximum Ratings – for IC Only

Parameter	Symbol	Min.	Max.	Unit	Note
Power supply voltage (VCC)	VCC	-0.3	+4.0	V	1
Power supply voltage (IOVCC)	IOVCC	-0.3	+3.6	V	1

Note:

1.VCC, IOVCC, GND must be maintained.

2.The modules may be destroyed if they are used beyond the absolute maximum ratings.

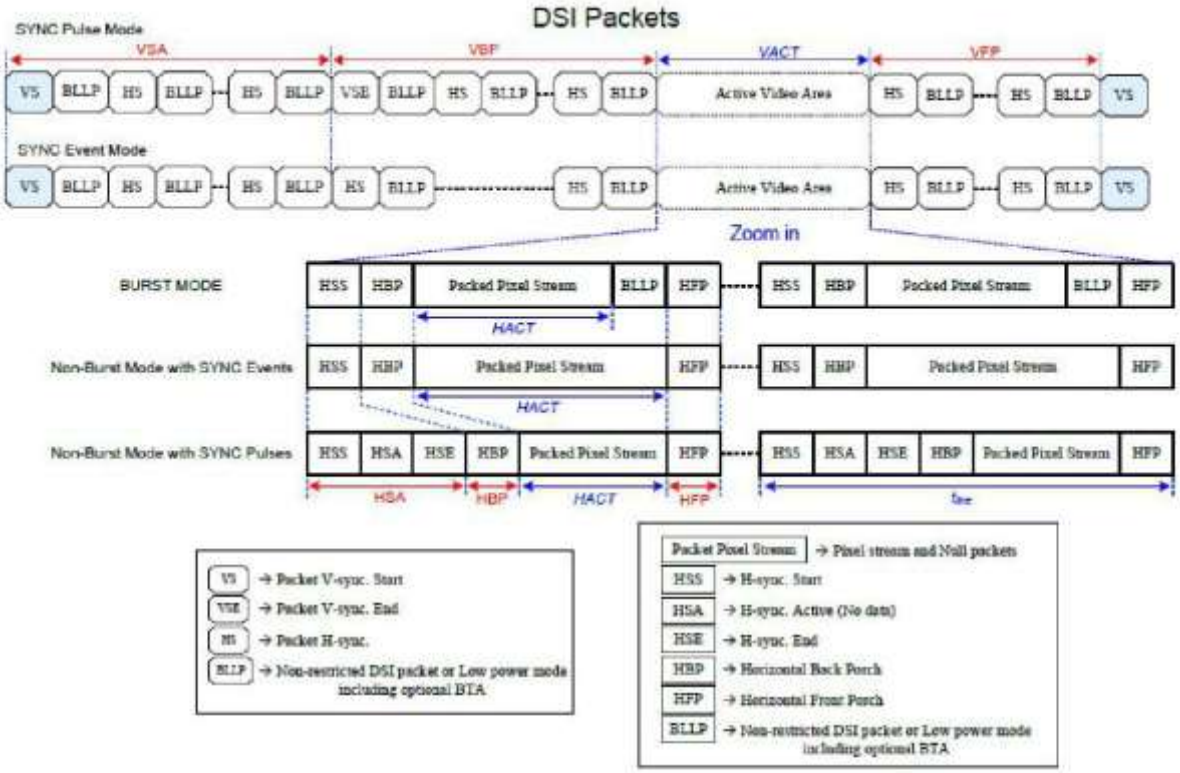
6. Electrical Specifications

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (analog)	VCC-GND		2.5	2.8	3.6	V
Supply voltage (logic)	IOVCC-GND		1.65	1.8	3.6	V
Supply current (Logic & LCD)	ICC	VDD2.8=2.8V	-	-	-	mA
Supply voltage of white LED backlight	VLED	Forward current =20mA Number of LED = 1	-	3	-	V

At Ta = 25 ℃, VCC = 2.6V to 3.3V, IOVCC= 1.65V to 3.3V GND=0V.

7.Timing Characteristics

DSI Timing Characteristics



Parameters	Symbols	Min.	Typ.	Max.	Units
Vertical sync. active	VSA	2 (Note 6)	-	-	Line
Vertical Back Porch	VBP	14 (Note 6)	-	-	Line
Vertical Front Porch	VFP	8 (Note 6)	-	-	Line
Active lines per frame	VACT	-	1280	-	Line
Horizontal sync. active	HSA	2	-	-	Pixel
Horizontal Porch period	HSA + HBP + HFP	1.5	-	-	us
Active pixels per line	HACT	-	720	-	Pixel
Bit rate	BR_{bps}	385		Note 5	Mbps/lane

1 UI=1/Bit rate

HSA(pixel)= (tHSA*lane number) / (UI* pixel format)

HBP(pixel)= (tHBP*lane number) / (UI* pixel format)

HFP(pixel)= (tHFP*lane number) / (UI* pixel format)

$$\text{Frame Rate} = \frac{BR_{bps} \times Lane_{num}}{(VACT+VSA+VBP+VFP) \times (HACT+HSA+HBP+HFP) \times \text{Pixel Format}}$$

Reset timing

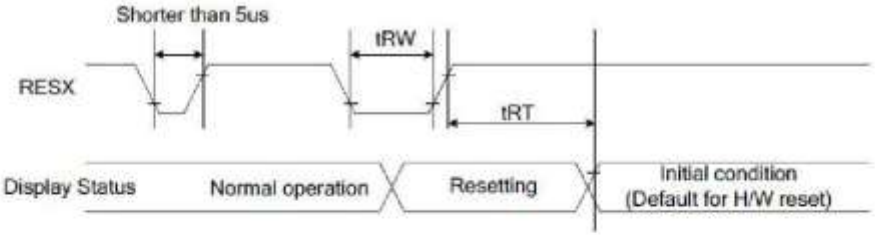


Table 47: Reset Timing

Signal	Symbol	Parameter	Min	Max	Unit
RESX	tRW	Reset pulse duration	10		uS
	tRT	Reset cancel		5 (note 1,5)	mS
				120 (note 1,6,7)	mS

Notes:

1. *The reset cancel also includes required time for loading ID bytes, VCOM setting and other settings from EEPROM to registers. This loading is done every time when there is H/W reset cancel time (tRT) within 5 ms after a rising edge of RESX.*
2. *Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the Table 48.*

Table 48: Reset Descript

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 10us	Reset
Between 5us and 10us	Reset starts

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

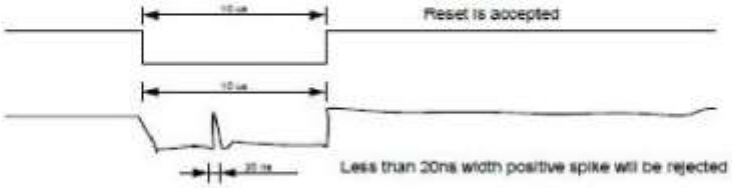


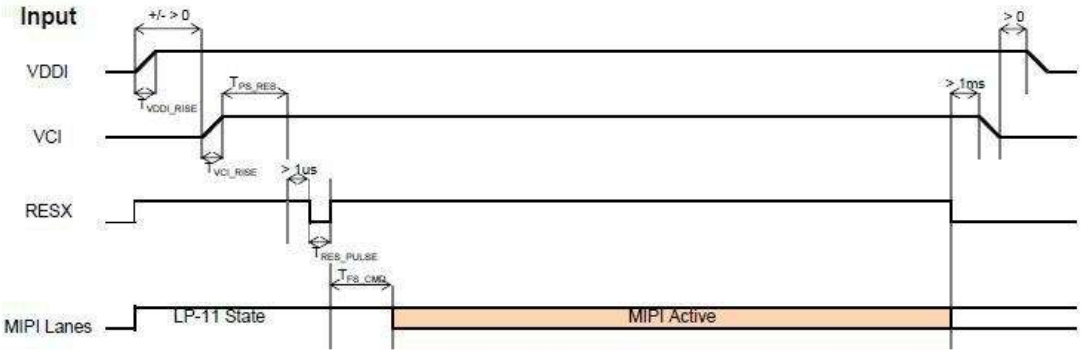
Figure 125: Positive Noise Pulse during Reset Low

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

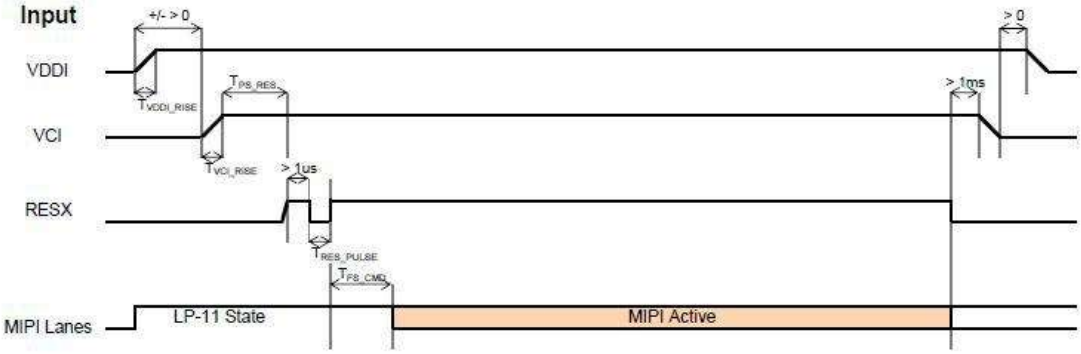
7.Power Supply Configuration

Power on/off sequence

Case A:



Case B:



Symbol	Characteristics	Min.	Typ.	Max.	Units
T_{VDDI_RISE}	VDDI Rise time	20	-	-	us
T_{VCI_RISE}	Case A: VCI Rise time	200	-	-	us
	Case B: VCI Rise time	40			
T_{PS_RES}	VDDI/VCI on to Reset high	5	-	-	ms
T_{RES_PULSE}	Reset low pulse time	10	-	-	us
T_{FS_CMD}	Reset to first command	10	-	-	ms

8.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° Φ=0° Ta=25°C	-	TBD		ms	1
Contrast ratio 对比度	Cr			TBD	-	-	2
Color gamut 饱和度	S(%)		-	TBD	-	%	-
Luminance uniformity 均匀度	δWHITE		80	-	-	%	3
Viewing angle range 视角范围	Θx+	CR≧10 Ta=25°C		65	-	deg	4
	Θx-			65	-	deg	
	Θy+			70	-	deg	
	Θy-			40	-	deg	
LCM Luminance LCM 亮度	Lv	Θ=0° Φ=0° Ta=25°C		100	-	Cd/m2	5
CIE (X,Y) Chromaticity 色度坐标	White(X)		0.27	0.30	0.33	-	6
	White(Y)		0.30	0.33	0.36	-	

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

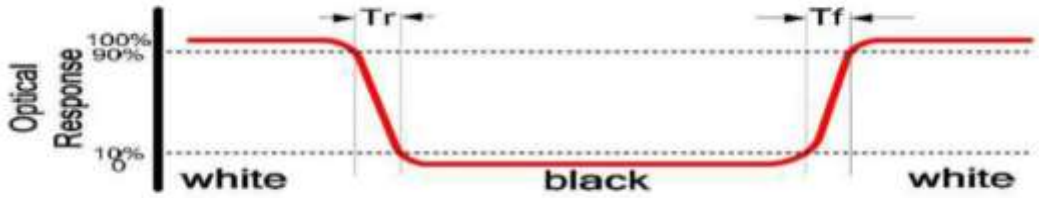
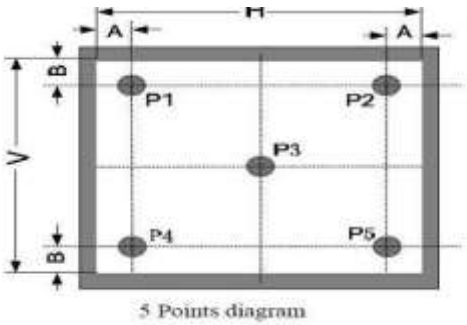
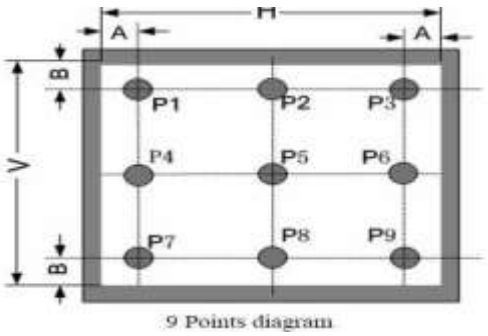


FIG2. Measuring method for Contrast ratio,surface luminance,Luminance uniformity,CIE(X,Y)chromaticity.

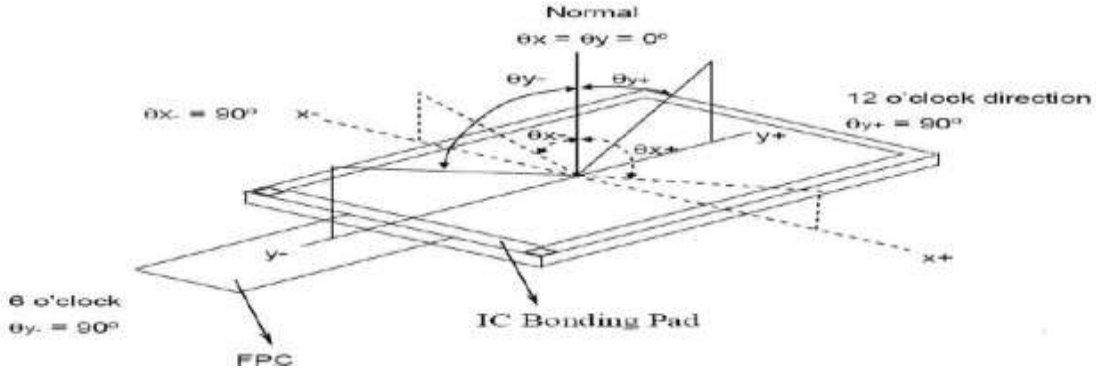


5 Points diagram



9 Points diagram

FIG3 The definition of viewing angle 视角定义



9.Reliability Test Items

Item	Test Condition	Criterion
High Temperature Storage	70 ℃, 48 hrs	Note1,Note2
Low Temperature Storage	-20℃, 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	60 ℃, 48 hrs	
Low temperature Operation	-10 ℃, 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.

Partial transformation of the module parts should be ignored.

10.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.

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.

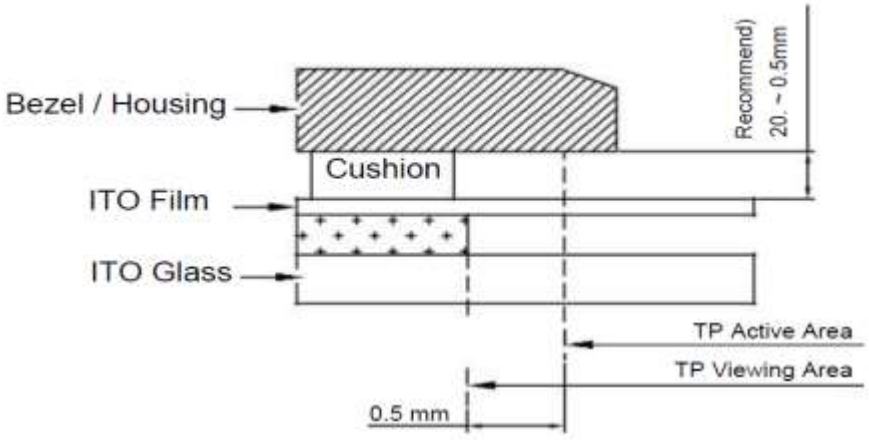
(e) Absolute maximum rating specified above has to be always kept in any case. Exceeding it may cause non-recoverable damage of electronic components or, nevertheless, burning.

(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.

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.



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.