INNOLUX DISPLAY CORPORATION
LCD MODULE
SPECIFICATION

Customer: _____

Model **CT032TN02 (Aaron)**
Spec. No.: **C032-02-TT-01**
Date: **2009/01/09**
Version: **1.0**

For Customer's Acceptance

Approved by	Comment

Record of Revision

Version	Revise Date	Page	Content
1.0	2009/01/09	All	Initial release

Contents

1. General Specifications

1.1. Description

The CT032TN02 is a color active matrix Thin Film Transistor (TFT) Liquid Crystal Display (LCD) that uses amorphous silicon (a-Si) TFT as a switching device. This module is composed of a single 3.2 inches transmissive type main TFT-LCD Panel. The resolution of the panel is 320 x 480 pixels and can display 262/65K color.

1.2. Features

-TM type for main TFT-LCD panel
-One backlight with 6 white LEDs
-i80 system 18/16/9/8-bit Parallel Interface
-Full, Partial, Still, Sleep & Standby modes are available

1.3. Application

-Display terminals for cellular phone

1.4. General Specification

No.	Item	Specification	Unit	Remark
1	LCD Size	3.2	inch	-
2	Panel Type	a-Si TFT active matrix	-	-
3	Touch Panel Type	NA		
4	Resolution	320 x RGB x 480	pixel	-
5	Display Mode	Normally white, Transmissive	-	-
6	Display Number of Colors	262/65K	-	-
7	Viewing Direction	12 o'clock	-	Note 1
8	Contrast Ratio	400	-	-
9	Luminance	200	cd/m^2	Note 2
10	Module Size	51.24(W) x 78.80(L) x 2.35(T)	mm	Note 1
11	Panel Active Area	44.64(W) x 66.96(L)	mm	Note 1
12	Touch Panel Active Area	NA	mm	Note 1
13	Touch Panel View Area	NA	mm	Note 1
14	Pixel Pitch	0.1395(W) x 0.1395(L)	mm	-
15	Weight	TBD	g	-
16	Driver IC	ILI9481	-	-
17	Driver IC RAM Size	320 x 18 x 480	bit	-
18	Light Source	6 white LEDs in parallel	-	-
19	Interface	80 system 18/16/9/8-bit Parallel	-	-
20	Operating Temperature	-20~70	℃	-
21	Storage Temperature	-30~80	℃	-

Note 1: Refer to mechanical drawing.

Note 2: Measured with touch panel attached.

2. Block Diagram

DETAIL A
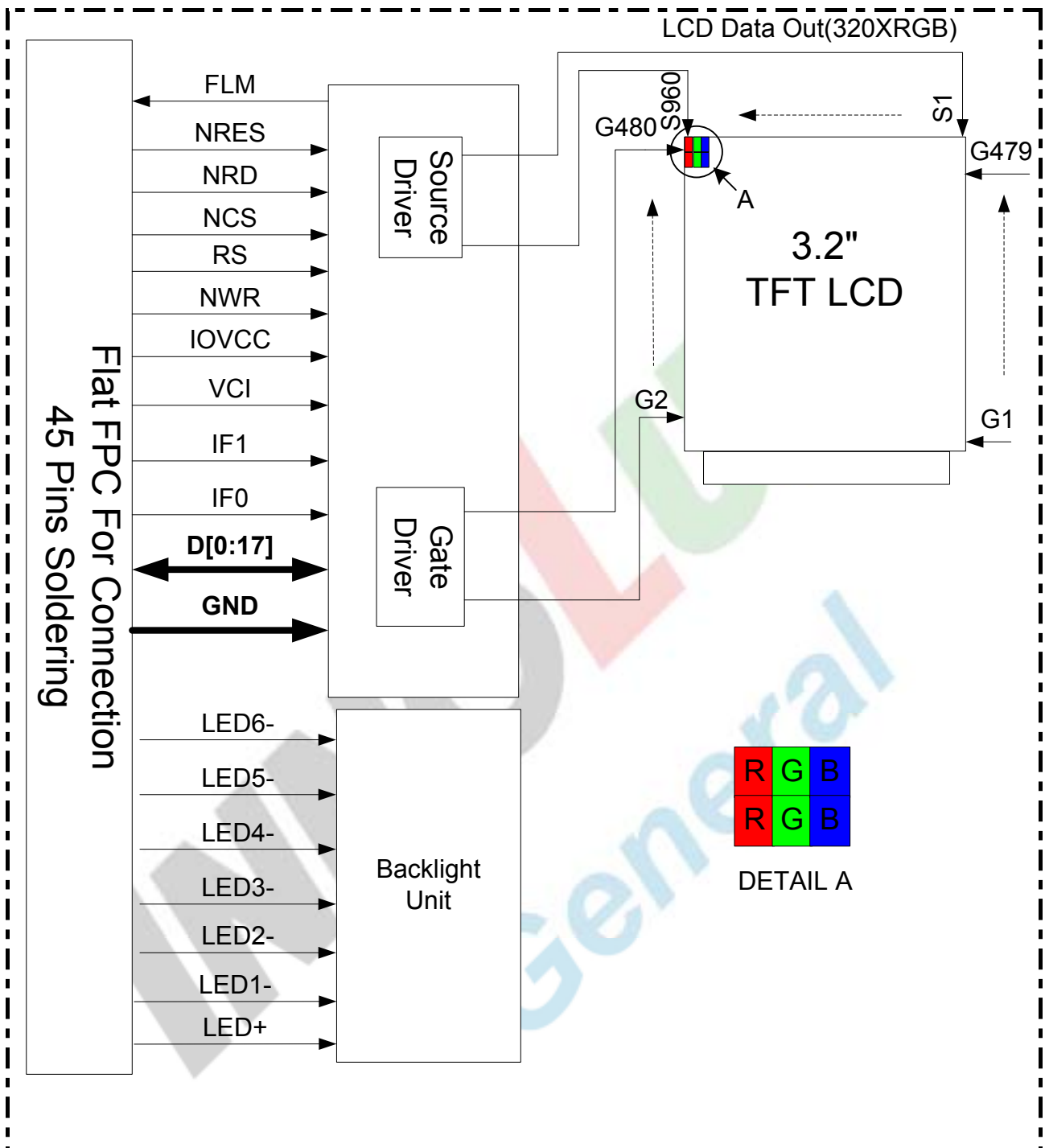
3. Pin Assignments

Pin No.	Symbol	I/O	Function	Remark
1	GND	P	Ground	-
2	FLM	O	Tearing effect output pin	-
3	NRES	I	Reset signal (Low: active)	-
4	NRD	I	Read data signal (Low: active)	-
5	NCS	I	Chip select (Low: active)	-
6	RS	I	Display Data/Command selection signal	-
7	NWR	I	Write data signal (Low: active)	
8	GND	P	Ground	-
9	D0	I/O	Data Bus (bit0)	-
10	D1	I/O	Data Bus (bit1)	-
11	D2	I/O	Data Bus (bit2)	-
12	D3	I/O	Data Bus (bit3)	-
13	D4	I/O	Data Bus (bit4)	-
14	D5	I/O	Data Bus (bit5)	
15	D6	I/O	Data Bus (bit6)	
16	D7	I/O	Data Bus (bit7)	
17	D8	I/O	Data Bus (bit8)	
18	D9	I/O	Data Bus (bit9)	
19	D10	I/O	Data Bus (bit10)	
20	D11	I/O	Data Bus (bit11)	-
21	D12	I/O	Data Bus (bit12)	-
22	D13	I/O	Data Bus (bit13)	-
23	D14	I/O	Data Bus (bit14)	-
24	D15	I/O	Data Bus (bit15)	-
25	D16	I/O	Data Bus (bit16)	-
26	D17	I/O	Data Bus (bit17)	-
27	IOVCC	P	Logic Supply Voltage	-
28	IOVCC	P	Logic Supply Voltage	-
29	VCI	P	Analogy Supply Voltage	-
30	VCI	P	Analogy Supply Voltage	-
31	IF1	I	Interface select pin	Note
32	IF0	I	Interface select pin	Note
33	LED6-	-	LED Cathode	-
34	LED5-	-	LED Cathode	-
35	LED4-	-	LED Cathode	-
36	LED3-	-	LED Cathode	-

37	LED2-	-	LED Cathode	-
38	LED1-	-	LED Cathode	-
39	LED+	-	LED Anode	-
40	GND	P	Ground	-
41	GND	P	Ground	-
42	GND	P	Ground	-
43	GND	P	Ground	-
44	GND	P	Ground	-
45	GND	P	Ground	-

Note: Interface selection:

IF1	IF0	MPU-Interface Mode	Data Bus
0	0	80-system 18-bit interface	DB[17:0]
0	1	80-system 9-bit interface	DB[8:0]
1	0	80-system 16-bit interface	DB[15:0]
1	1	80-system 8-bit interface	DB[7:0]

4. Electrical Specifications

4.1. Absolute Maximum Rating

$(T_a=+25℃)$

Item		Symbol	Values		Unit	Remark
			Min.	Max.		
TFT Module	I/O Circuit Supply Voltage	IOVCC	-0.3	4.6	V	Note 1
	Analog Supply Voltage	VCI	-0.3	4.6	V	Note 1
Backlight Unit	Current	I_B	-	180	mA	Note 2
	Power Consumption	P_{BL}	-	600	mW	Note 2

Note1: Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is applied. Functional operation should be restricted to the conditions described under normal operating conditions.

Note2: Without LED driver IC, please refer to (4.3)

4.2. Typical Operation Conditions

4.2.1. DC Characteristics

$(T_a=+25℃)$

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
I/O Circuit Supply Voltage	IOVCC	1.7	2.8	3.0	V	-
Analog Supply Voltage	VCI	2.7	2.8	3.0	V	-
Input High Voltage	V_{IH}	0.7 IOVCC	-	IOVCC	V	Note
Input Low Voltage	V_{IL}	0	-	0.3 IOVCC	V	Note
Output High Voltage	V_{OH}	0.8 IOVCC	-	-	V	-
Output Low Voltage	V_{OL}	-	-	0.2 IOVCC	V	-
Frame Frequency	f_{FRAME}	-	80	-	Hz	-

Note: To prevent IC latch up or DC operation in LCD panel, the power on/off sequence should follow the driver IC specification.

4.2.2. Current Consumption

Item	Symbol	Values		Unit	Remark
		Typ.	Max.		
MPU Interface (i80 system 18/16-bit Parallel Bus)					
Still Mode	IOVCC	TBD	TBD	uA	Note1
	VCI	TBD	TBD	mA	
Sleep Mode	IOVCC	TBD	TBD	uA	Note1,Note2
	VCI	TBD	TBD	uA	
Standby mode	IOVCC	TBD	TBD	uA	Note1,Note3
	VCI	TBD	TBD	uA	

Item	Symbol	Values		Unit	Remark
		Typ.	Max.		
Interface (3 line SRI + RBG)					
Still Mode	IOVCC	TBD	TBD	uA	Note1
	VCI	TBD	TBD	mA	
Sleep mode	IOVCC	TBD	TBD	uA	Note1,Note2
	VCI	TBD	TBD	uA	
Standby Mode	IOVCC	TBD	TBD	uA	Note1,Note3
	VCI	TBD	TBD	uA	

Note1: Test Condition

Typ: IOVCC=2.8V
       VCI=2.8V
       Display Pattern: 8 Color Bar
       Frame Rate=80Hz at Line Inversion
       Operating Temperature: 25℃
       Typ. current check pattern:
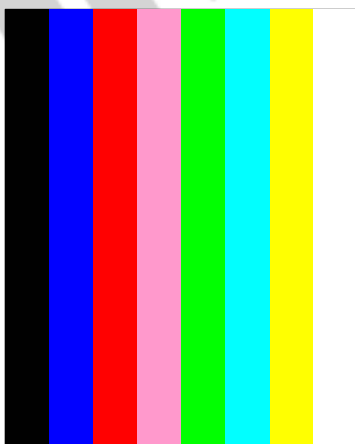
Max: IOVCC=3.0V
       VCI=3.0V
       Display Pattern: All Pixel Black
       Frame Rate=80Hz at Line Inversion
       Operating Temperature: 25℃
       Max. current check pattern:

8-Color Bar   **Black**

Note2: In the Sleep mode, all the internal display operations are suspended except for the R-C oscillator.
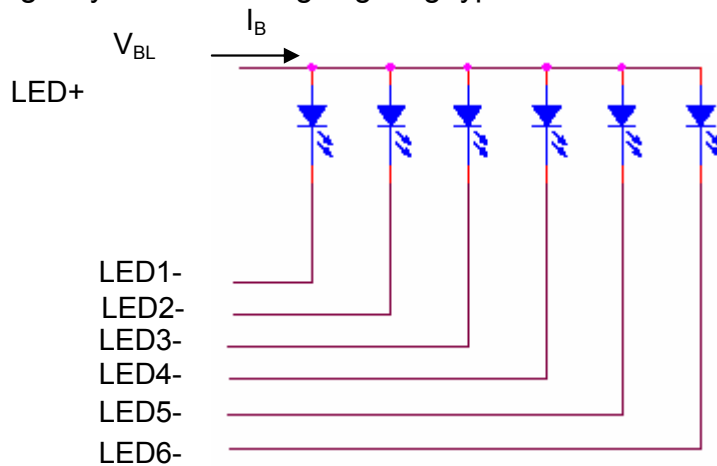
Note3: In the standby mode, all the internal display operations are suspended including the internal R-C oscillator.

4.3. Backlight Unit

The backlight system is an edge lighting type with 6 white LEDs.

$(T_a=+25℃)$

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current	I_B	-	120	-	mA	Note 1
Power Consumption	P_{BL}	-	400	-	mW	Note 2

Note1: 6 LEDs are connected in parallel; each LED forward current is 20mA.

Note2: Where I_B=120mA, $P_{BL} = I_B$ x V_{BL}, V_{BL} is backlight forward voltage.

4.4. Instruction Setting Flow

4.4.1. Initial Setting Sequence

TBD

4.4.2. Sleep In/Out Sequence

TBD

4.5. Display RAM Data Format and input Bus

4.5.1 i80 System Interface
TBD

4.5.2 Serial Peripheral Interface
TBD

4.6. Timing Characteristic

4.6.1. i80-System Interface Timing Characteristic
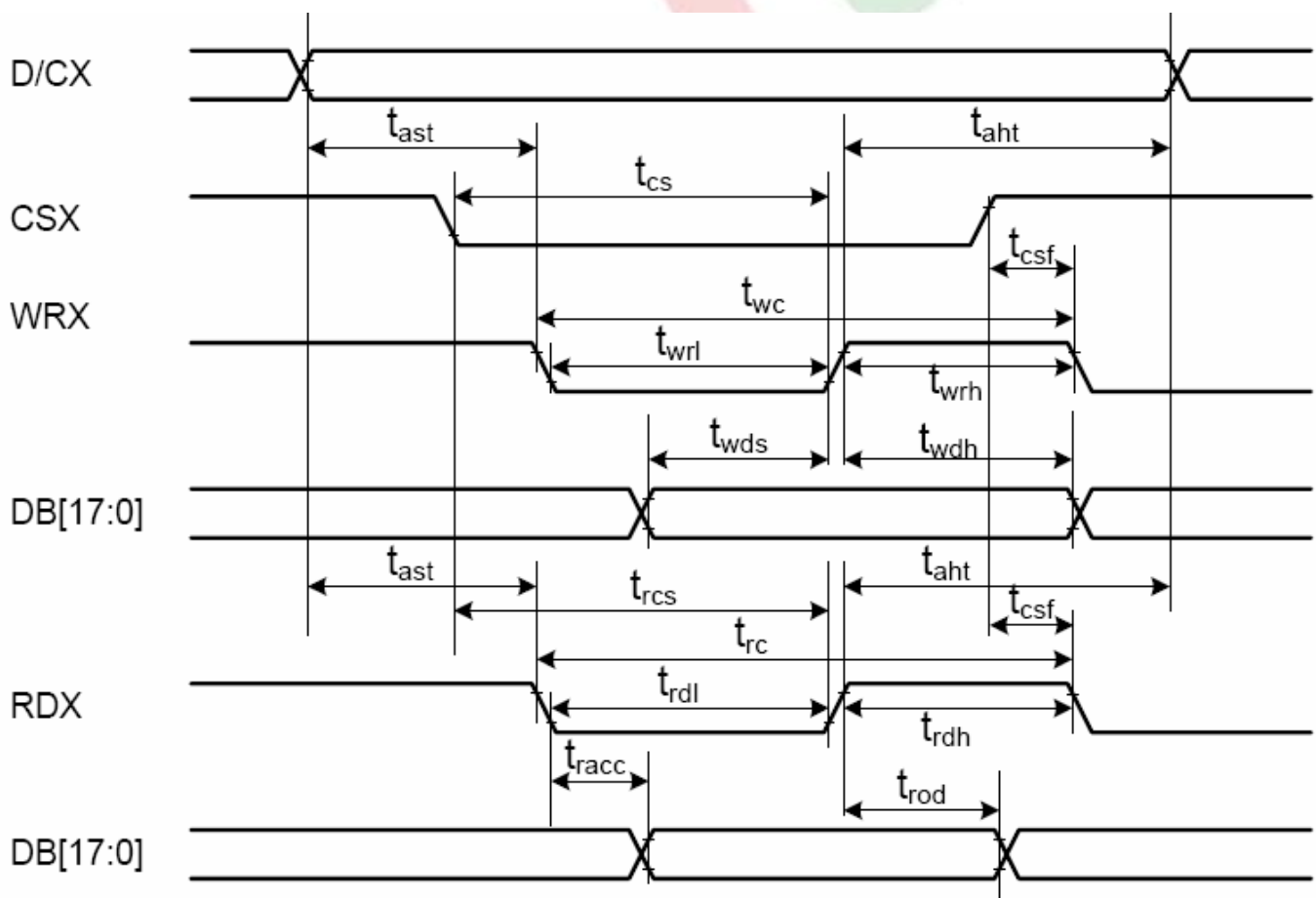
Signal	Symbol	Parameter	min	max	Unit	Description
D/CX	tast	Address setup time	10	-	ns	
	taht	Address hold time (Write/Read)	10	-	ns	
CSX	tcs	Chip Select setup time (Write)	20	-	ns	
	trcs	Chip Select setup time (Read)	20	-	ns	
	tcsf	Chip Select Wait time (Write/Read)	20	-	ns	
WRX	twc	Write cycle	100	-	ns	
	twrh	Write Control pulse H duration	30	-	ns	
	twrl	Write Control pulse L duration	25	-	ns	
RDX	trc	Read cycle	450	-	ns	
	trdh	Read Control pulse H duration	250	-	ns	
	trdl	Read Control pulse L duration	170	-	ns	
DB[17:0], DB[15:0], DB[8:0], DB[7:0]	twds	Write data setup time	15	-	ns	For maximum CL=30pF For minimum CL=8pF
	twdh	Write data hold time	25	-	ns	
	tracc	Read access time	10	340	ns	
	trod	Read output disable time	10	-	ns	

4.6.2 Serial Data Transfer Interface Timing Characteristics
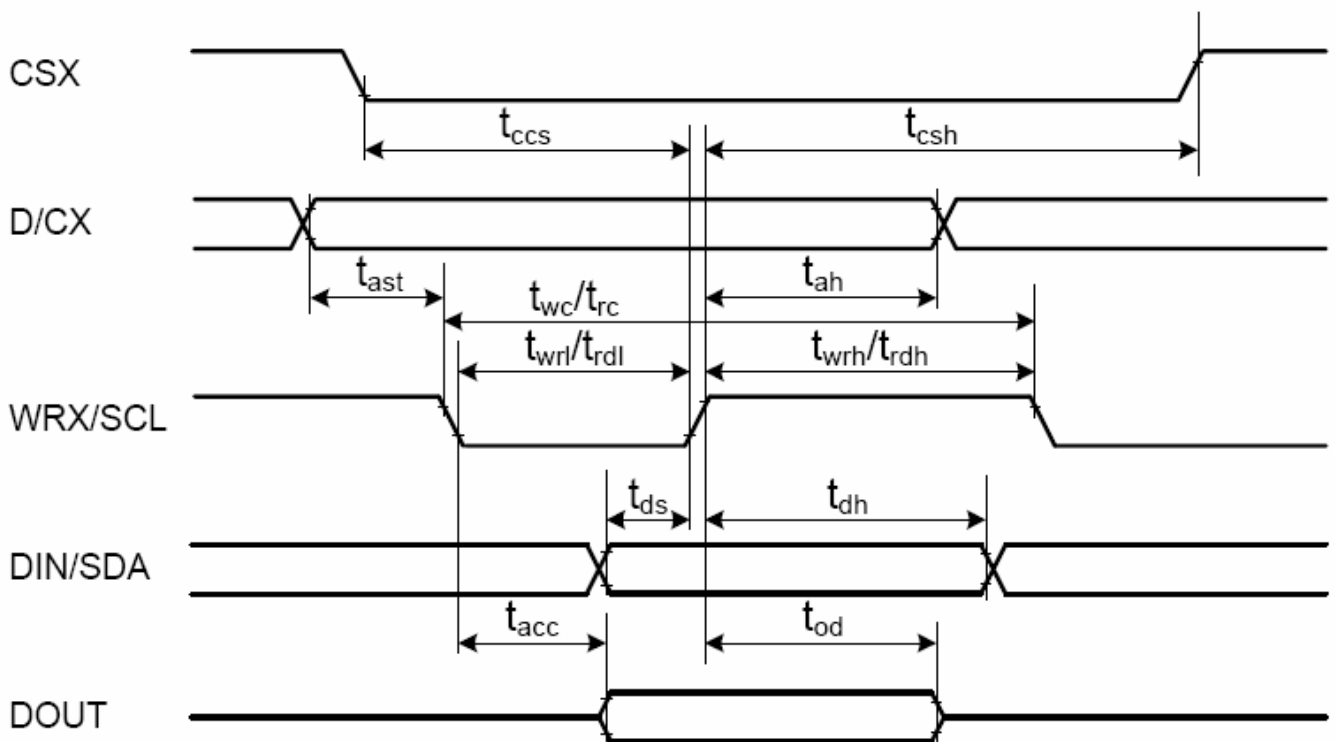
Signal	Symbol	Parameter	Min.	Max.	Unit	Description
CSX	t_{css}	Chip select setup time (Write)	40	-	ns	
	t_{csh}	Chip select hold time (Write)	40	-	ns	
D/CX	t_{as}	Address setup time	10		ns	
	t_{ah}	Address hold time (Write/Read)	10		ns	
WRX/SCL (Write)	t_{wc}	Write cycle	100		ns	
	t_{wrh}	SCL High duration (write)	40		ns	
	t_{wrl}	SCL Low duration (write)	40		ns	
WRX/SCL (Read)	t_{rc}	Read cycle	300		ns	
	t_{rdh}	SCL High duration (read)	120		ns	
	t_{rdl}	SCL Low duration (read)	120		ns	
DIN/SDA (Driver IC)	t_{ds}	Data setup time	30		ns	
	t_{dh}	Data hold time	30		ns	
DOUT (Driver IC)	t_{acc}	Access time	-	110	ns	
	t_{od}	Output disable time	10		ns	

5. Optical Specifications

$(T_a=+25℃,\ VCI=2.8V,\ IOVCC=2.8V,\ I_B=120mA)$

Item		Symbol	Condition	Values Min.	Values Typ.	Values Max.	Unit	Remark
Viewing Angle Range	Left	θ_L	CR 10		TBD	-	degree	Note 1,2
	Right	θ_R			TBD	-		
	Top	θ_T			TBD	-		
	Bottom	θ_B			TBD	-		
Response Time		$T_{on}+T_{off}$	Normal θ=Φ=0°	-	25	30	ms	Note 2,3
Contrast Ratio		CR	Normal θ=Φ=0°		400	-	-	Note 2,4
Luminance		L	Normal θ=Φ=0°		200	-	cd/m²	Note 2,5
Color Chromaticity (CIE1931)	White	W_x	Normal θ=Φ=0°		TBD		-	Note 2,6
		W_y			TBD			
	Red	R_x			TBD			
		R_y			TBD			
	Green	G_x			TBD			
		G_y			TBD			
	Blue	B_x			TBD			
		B_y			TBD			
Color Gamut		NTSC	CIE1931	-	61	-	%	-
Luminance Uniformity		U_L	Normal θ=Φ=0°	75	80	-	%	Note 2,7
Flicker		-	-	No Visible			-	Note 8
Crosstalk		-	-	No Visible			-	Note 9

Note 1: Definition of viewing angle range
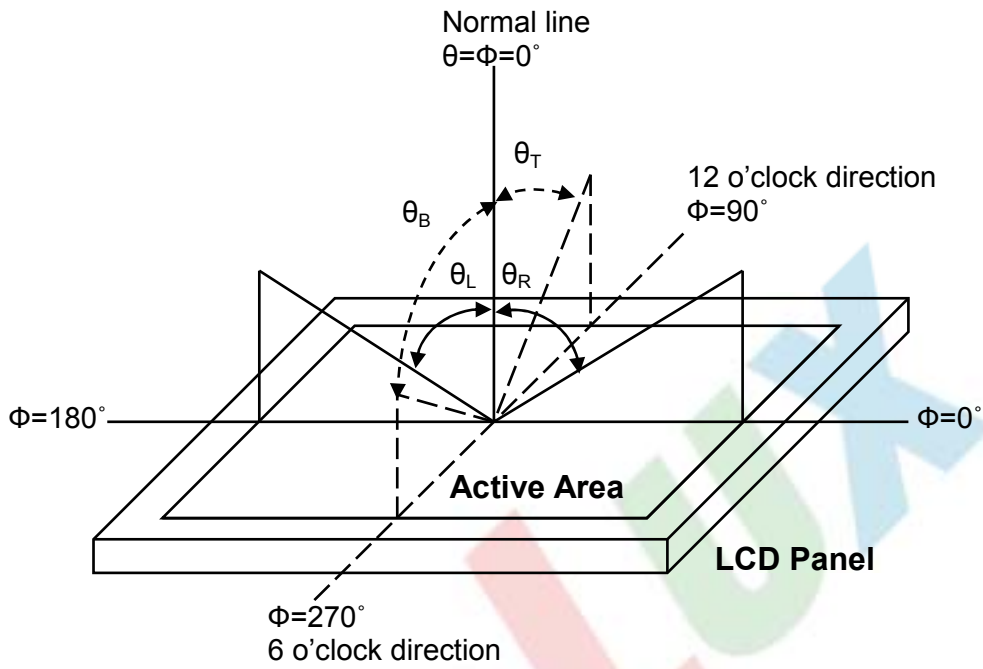
Fig. 1 Definition of viewing angle
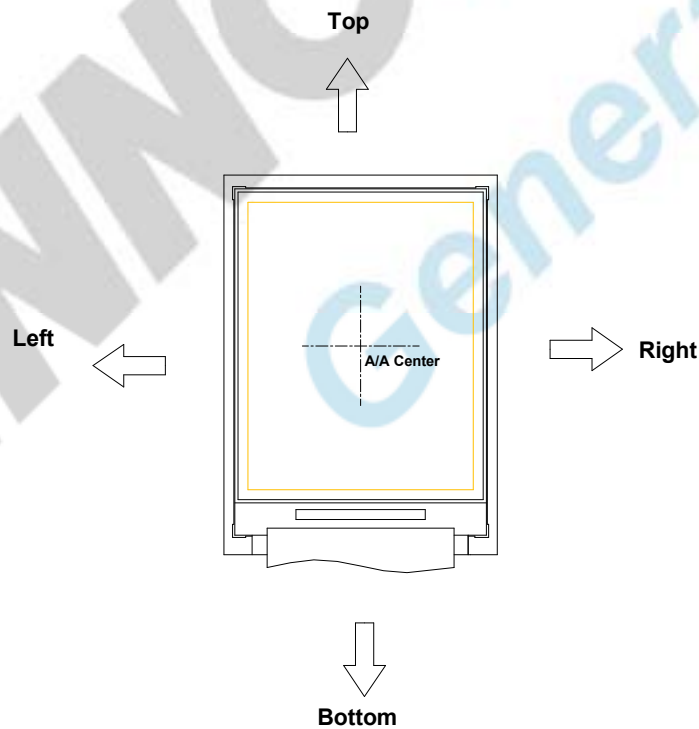
Fig. 2 Definition of viewing angle for display

Note 2: Definition of optical measurement system

The optical characteristics should be measured in a dark room and with ambient temperature T_a=+25℃.After 5 minutes operation, the optical properties are measured at the center point of the LCD screen.(Equipment: Photo detector TOPCON BM-5A or BM-7 /Field of view: 1° /Height: 500mm.)
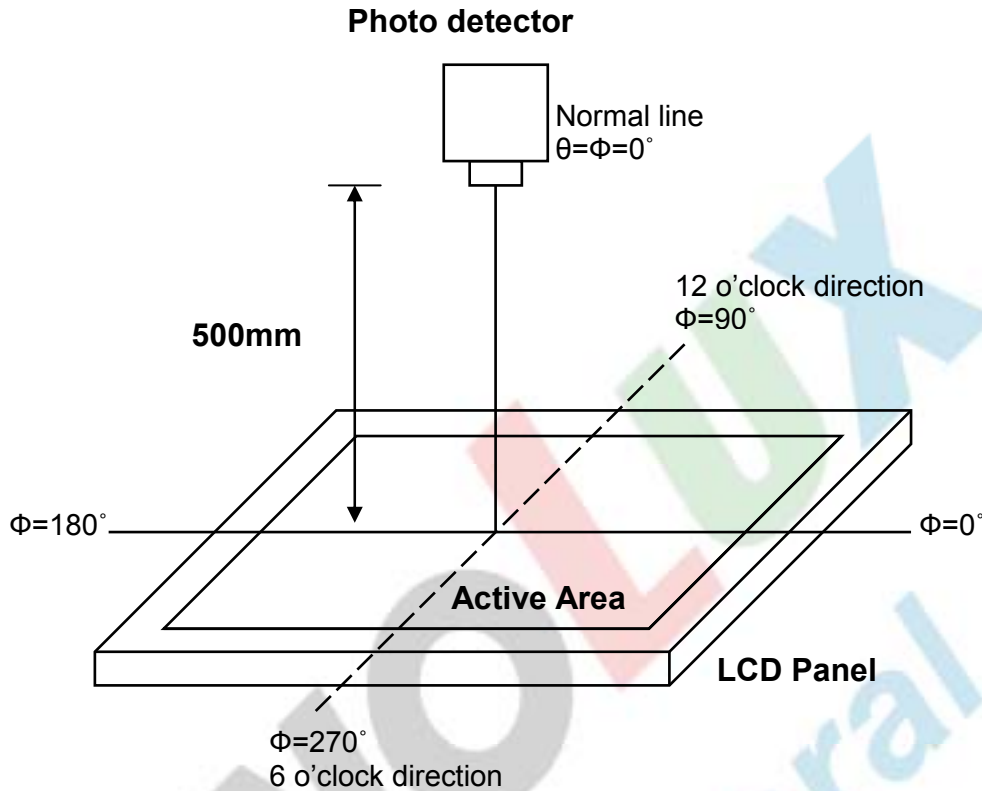
Photo detector

Normal line
$\theta=\Phi=0°$

500mm

12 o'clock direction
$\Phi=90°$

$\Phi=180°$ ——————————— $\Phi=0°$

Active Area

LCD Panel

$\Phi=270°$
6 o'clock direction

Fig. 3 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 (T_{on}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{off}) is the time between photo detector output intensity changed from 10% to 90%.

| **White (TFT OFF)** | **Black (TFT ON)** | **White (TFT OFF)** |

Photo detector output
(Relative value)

100%
90%

10%
0%

T_{on}　　　　　　　　　T_{off}
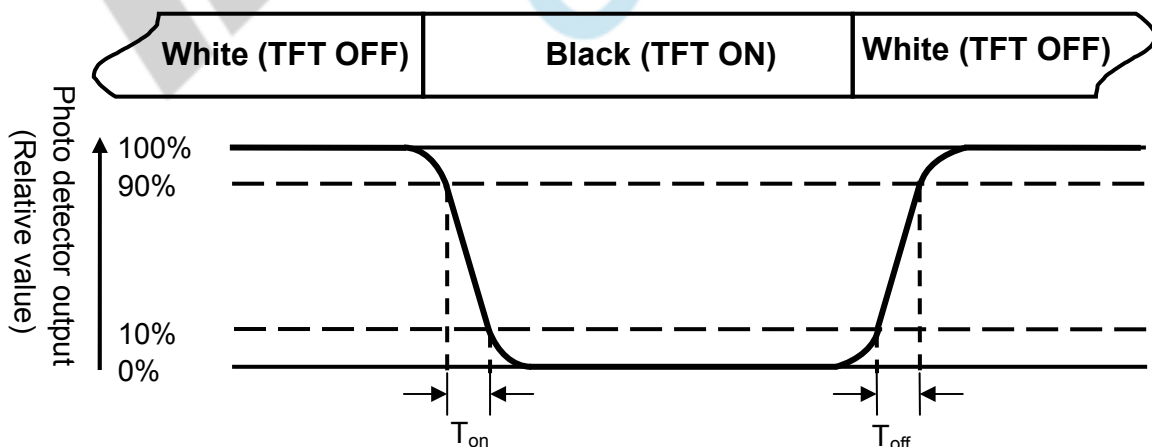
Fig. 4 Definition of response time

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 luminance

Measured at the center area of the panel when LCD panel is driven at "white" state.

Note 6: Definition of color chromaticity (CIE1931)

Color coordinates measured at the center point of LCD when panel is driven at "White", "Red", "Green" and "Blue" state respectively.

Note 7: Definition of luminance uniformity

To test for uniformity, the tested area is divided into 3 rows and 3 columns. The measurement spot is placed at the center of each box.

$$\text{Luminance Uniformity } (U_L) = \frac{L_{min}}{L_{max}}$$

L-------Active area length   W----- Active area width
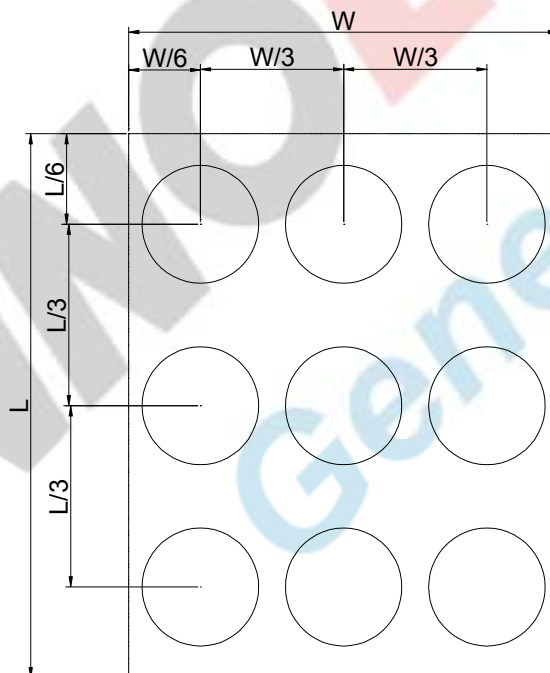
Fig. 5 Definition of luminance uniformity

L_{max} : The measured maximum luminance of all measurement position.

L_{min} : The measured minimum luminance of all measurement position.

Note 8: Definition of Flicker

Flicker is the pattern usually used to describe the visual sensation produced by a rapidly varying light intensity. There should be no visible flicker in normal direction of the display when the following figure is loaded.
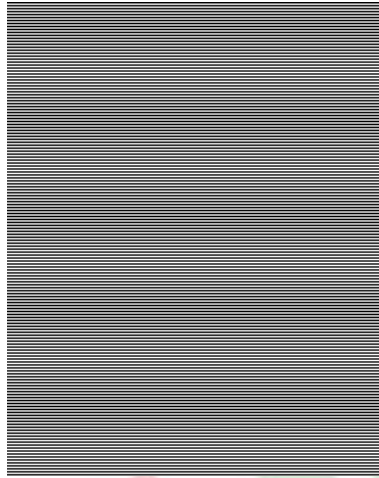
Fig.6 Flicker checker pattern

Note9: Definition of crosstalk

There should be no visible in normal direction of the display when the following figures are loaded.
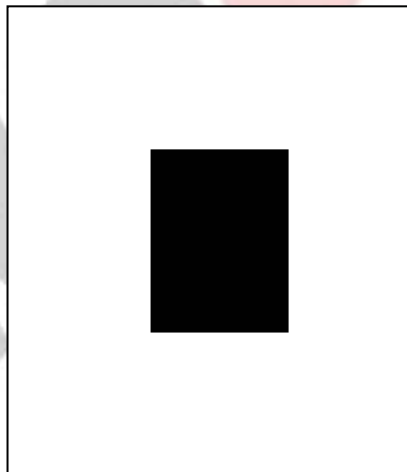

Fig.7 Crosstalk checker pattern

6. Reliability Test Items

Test Items	Test Conditions	Remark
High Temperature Storage	+80℃±3℃ for 240 hours	-
Low Temperature Storage	-30℃±3℃ for 240 hours	-
High temperature/humidity storage	+60℃±3℃, 95%±3%RH for 240 hours	-
High Temperature Operation	+70℃±3℃ for 240 hours	-
Low Temperature Operation	-20℃±3℃ for 240 hours	-
High Temperature and Humidity Operation	+55℃±3℃, 95%±3%RH max. for 240 hours	-
Thermal Shock	-20~80°C (3 min/ 30min / 3 min / 30min) 10 cycle	-
Vibration Test	Amplitude 1.5mm,f=10 to 55 Hz, 2 hours each in the X,Y and Z direction	-
Impact test	Apply 1g for operation time 6ms, 3 times each in X,Y and Z direction	-
Package Vibration-proof Test	2g, f=10->55->10Hz apply in each of X, Y, and Z direction for 30 min	-
Package Drop Test	Drop the packing from 75cm height, 3 times for 6-faces, 3-edges and 1-corner	-
Electro Static Discharge test	Air(330ohm,150pF): +/-4KV, 3 times	-

Note1: During the display practical test under normal operation condition, there shall be no change, which may affect display function.

Note2: Before function check, the test sample requires 2 hours stored at room temperature.

Before test the function of TP, the sample must be placed in room temperature for 24hrs after RA test.

7. Handling Precautions

7.1. Safety

7.1.1. The liquid crystal in the LCD is poisonous. **DO NOT** put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.

7.2. Handling

7.2.1. The LCD and touch panel is made of plate glass. **DO NOT** subject the panel to mechanical shock or to excessive force on its surface.

7.2.2. **Do not** handle the product by holding the flexible pattern portion in order to assure the reliability

7.2.3. Transparency is an important factor for the touch panel. Please wear clear finger sacks, gloves and mask to protect the touch panel from finger print or stain and also hold the portion outside the view area when handling the touch panel.

7.2.4. Provide a space so that the panel does not come into contact with other components.

7.2.5. To protect the product from external force, put a covering lens (acrylic board or similar board) and keep an appropriate gap between them.

7.2.6. Transparent electrodes may be disconnected if the panel is used under environmental conditions where dew condensation occurs.

7.2.7. Property of semiconductor devices may be affected when they are exposed to light, possibly resulting in IC malfunctions.

7.2.8. To prevent such IC malfunctions, your design and mounting layout shall be done in the way that the IC is not exposed to light in actual use.

7.3. Static Electricity

7.3.1. Ground soldering iron tips, tools and testers when they are in operation.

7.3.2. Ground your body when handling the products.

7.3.3. Power on the LCD module **BEFORE** applying the voltage to the input terminals.

7.3.4. **DO NOT** apply voltage which exceeds the absolute maximum rating.

7.3.5. Store the products in an anti-electrostatic bag or container.

7.4. Storage

7.4.1. Store the products in a dark place at +25℃±10℃ with low humidity (65%RH or less).

7.4.2. **DO NOT** store the products in an atmosphere containing organic solvents or corrosive gas.

7.5. Cleaning

7.5.1. **DO NOT** wipe the touch panel with dry cloth, as it may cause scratch.

7.5.2. Wipe off the stain on the product by using soft cloth moistened with ethanol. **DO Not** allow ethanol to get in between the upper film and the bottom glass. It may cause peeling issue or defective operation. **Do not** use any organic solvent or detergent other than ethanol.

8. Mechanical Drawing

10. Package Drawing

TBD

11. Cosmetic Specification

11.1. INCOMING INSPECTION

Both parties agree that the inspection specifications of TFT-LCD Modules (hereinafter known as "Modules") stipulated hereunder is the only and final standard applicable in the process of inspection. InnoLux shall be under no liability or obligation (including incidental loss, products liability or other consequential loss) whatsoever for any defect in quality or performance or shortage in quantity of the Modules that have passed such inspection.

11.2. LIABILITY

11.2.1 INSPECTION DEADLINE

The Customer should inspect the Modules either at the Delivery Point or within twenty (20) calendar days after arrival at the Delivery Destination.

11.2.2 NOTIFICATION OF REJECTION

The Customer may reject one or more defective or non-conforming Modules if the Modules fail to meet the AQL (Acceptable Quality Level) and pass the inspection. In that case, the customer should notify InnoLux of the rejection by either documents or mail within in five (5) business days from the date of reception of the Modules. Otherwise, the Modules shall be deemed to have met the AQL and passed the inspection.

11.3. INSPECTION SPECIFICATIONS

Both parties agree that the inspection shall contain and follow the inspection specifications stipulated in the Inspection Specifications (see attachment), including:

Scope
Sampling Plan
Panel Inspection Condition
Display Quality
Mechanics Specifications
Notification for Storage Handling

11.4 LIMITED WARRANTY

InnoLux represents and warrants that all Modules shall (i) conform to the specifications set hereunder, and (ii) be free from any defects in material and workmanship for twelve (12) months after the Customer's acceptance or deemed acceptance. InnoLux will replace, rework or refund the Customer for the defective or non-conforming Modules at InnoLux's option, provided that the Customer (i) promptly informs InnoLux of the defects or non-conformities within the warranty period, (ii) complies with the specifications and conditions hereunder, and (iii) complies with InnoLux's procedure for Modules replacement, reworking and/or return. The warranty period for the Modules replaced or reworked shall be the remaining term for such Modules.

11.5 THE WARRANTIES AND REMEDIES SET FORTH ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, TERMS OR CONDITIONS, EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, INCLUDING WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ALL OF WHICH ARE EXPRESSLY DISCLAIMED. INNOLUX'S WARRANTIES HEREIN APPLY ONLY TO THE CUSTOMER AND ARE NOT TO BE EXTENDED TO ANY THIRD PARTY.

11.6 GOVERNING LAW

This Agreement shall be governed and construed in accordance with the laws of the Republic of China. Both parties agree to submit any dispute, which cannot be amicably resolved, to Taipei District Court for the first instance.

11.7 INSPECTION SPECIFICATIONS EXPAND

11.7.1 SCOPE

Specifications contain

- Display Quality Evaluation
- Mechanics Specification

11.7.2 AMPLING PLAN

Unless there is other agreement , sampling plan for incoming inspection should follow MIL-STD-105E.

11.7.2.1 Lot size: Quantity per shipment as one lot (different model as different lot .)

11.7.2.2 Sampling type: Normal inspection, single sampling.

11.7.2.3 Sampling level: Level II.

11.7.2.4 AQL: Acceptable Quality Level

Major defect: AQL=0.4%
Minor defect: AQL=0.65%.

11.7.3 PANEL INSPECTION CONDITION

11.7.3.1 Environment:

Room Temperature: 23±3℃.
Humidity: 55±5% RH.
Illumination: 800~1200Lux.

11.7.3.2 Inspection Distance

35±5 cm from the inspector to the module.

11.7.3.3 Inspection Angle

The vision of inspector should be perpendicular to the surface of the module.

11.7.4 DISPLAY QUALITY

11.7.4.1 Function Related:

The function defects such as line defect, abnormal display, no display are considered as the major defects. (N:不良缺陷的數目; d:缺陷相互距離; D:點狀不良的直徑; L:線狀不良的長度; W:線狀不良的寬度.)

11.7.4.2 Bright/Dark Dots

Defect Type	Specification	Major	Minor
Bright Dots	N <= 0		●
Dark Dots	N <= 2		●
Total Bright and Dark Dots	N <= 2		●
Distance between defect dots	d>=10 mm		●
Distance between dark dots	d>=10 mm		●

Note 1: Dot defect is defined as the defective area of the dot area is larger than 50% of the dot area.

11.7.4.3 Pixel Definition

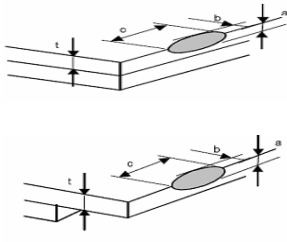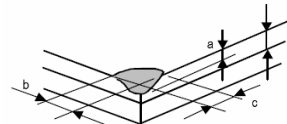|										
R	G	B	**R**	G	B	R	G	B		Dot Defective
R	G	B	**R**	G	B	R	G	B		Defective Pixel
R	G	B	**R**	G	B	R	G	B		Defective Adjacent Sub-Pixels
										Defective Adjacent Pixels

Note: In cases where partial sub-pixel or pixel defects exceed 50% of the affected sub-pixel or pixel area, it will be counted as 1 defect.

11.7.4.4 Visual Inspection specification

項目	規格		備註
1.點缺陷(點狀): 包括 LCD 的瘦污, 白點, 刺傷, 异物等. D=(X+Y)/2	D <= 0.1 mm	Ignored	
	0.1mm < D <= 0.2mm, N<=2	OK	
	D > 0.2mm	NG	
2.線缺陷(線狀): 包括 LCD 的線狀异物,刮傷等.	W<=0.02mm	Ignored	
	L<=2.0mm & 0.02mm<W<=0.03mm,N<=1	OK	
	L<=1.0mm & 0.03mm<W<=0.05mm,N<=1	OK	
	W>0.05mm	NG	
3.FPC 部分	(1)FPC 尺寸及其器件偏位超出圖紙要求	NG	
	(2)FPC 表面刮傷&刺傷, 露銅	NG	
	(3)FPC 瘦污: 金手指位置	NG	
	其他位置可擦查的	OK	
	瘦污爲粘膠	NG	
	(4)FPC 金手指氧化,破損	NG	
	(5)FPC 少器件, 分層, 損壞, 沾錫, 補強板剝離.	NG	
	(6)氣泡,位置在非線路區域的	OK	
	(7)FPC 出現死折,引線斷裂	NG	

4.偏光片	(1)偏移,不超出玻璃邊緣,不可進入視區 (active area)	OK	
	(2)髒污	NG	
	(3)偏光片損傷, 异物	按照 LCD 點,線缺陷判斷(第 1,2 點)	
	(4)保護膜翹起, 超出該邊長度的 1/4.	NG	
	(5)氣泡　　D<0.20mm	OK	
	0.20<=D<0.50mm, N<=2	OK	
	D>0.50mm	NG	
	若貼片雜質造成的氣泡按 LCD 點缺陷判斷 (第 1 點)		
5.LCD 氣泡(active area)	眼睛不可視	OK	
6.鐵框	(1)刮傷無手感,且鍍層未破損	OK	
	(2)變形,生鏽,氧化,脫落及尺寸超圖紙規格	NG	
7.膠框	(1)膠框突起, 若進入視區(AA 區)	NG	
	(2)膠框變形, 形變寬度超出膠框寬度 1/4	NG	
	(3)膠框氣泡, 出現連貫或密集氣泡　 氣泡區寬度超出膠框寬度 1/3	NG	
	(4)膠框斷裂	NG	
8.IC	(1)IC 邊角出現破損;IC 無遮光膠帶	NG	
	(2)ACF 邊緣必須超出 IC 邊緣 1mm 以上, (單邊 0.5mm)	OK	
	(3)封膠超出偏光片高度,溢出玻璃邊	NG	
	(4)膠水未完全覆蓋 ITO 線路	NG	
9.B/L	(1)背光分層		
	(2)背光不均, 色坐標偏移,亮度偏差,LED 燈顏色不均.	一般不允許,特殊情況參考限度樣本.	
	(3)背光髒污,	按照 LCD 點,線缺陷判斷(第 1,2 點)	
	(4)背光翹起, 變形, 尺寸不符,	NG	
	(5)背光卡口變形, 斷裂; 背光定位柱偏移, 斷裂.	影響裝配不允許.	
10.崩角	(1)引線腳上的 ITO 走線正面上.	NG	
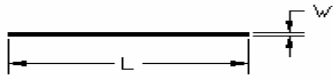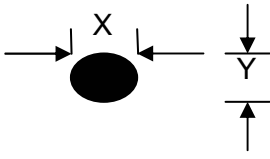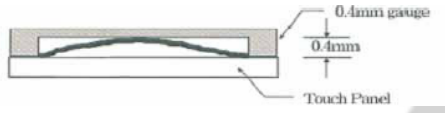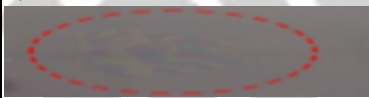
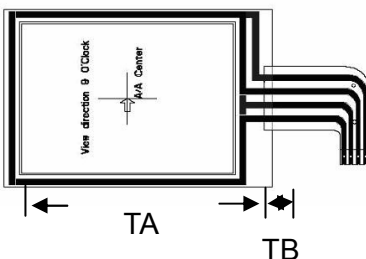|			
	(2)非引線腳 ITO 面. 　a<=t, b*c<2mm2(t 表示玻璃整體厚度)	OK	
	(3)轉角位置. 　a<=t, b*c<2mm^2 同時不允許進入膠框 　(t 同上)	OK	
11.其他	(1)元件虛焊	NG	
	(2)無噴碼,噴碼錯誤,噴碼模糊.	NG	
	(3)包裝混料少料,包裝破損骯污等.	NG	
	(4)LCD 有裂紋,破裂,露液晶等	NG	
	(5)Panel 磨邊/切割不良,	按圖紙要求.	

Note: Extraneous substance and scratch do not affect the display of image, for instance, the extraneous substance under polarizer film but outside the display area, scratch on metal bezel and backlight module or pola.

11.7.4.5 Function Inspection specification

項目	規格		備註
1.缺划(線缺陷)	屏幕出現部分不顯示	NG	
2.短路	出現部分多顯示或不顯示	NG	
3.無畫面	LCM 單體無測試畫面	NG	
4.無背光	黑屏	NG	
5.殘影	在切換畫面過程中,在下一畫面出現上一畫面的影像.	NG	
6.顯示不均	局部位置對比度出現顯示深/淺不一致的現象.	可按照限度樣本	
7.顯示條紋(Mura)	在全顯示狀態,出現斜紋	可按照限度樣本	
8.顯示模糊	顯示不清晰	NG	
9.顯示點缺陷	顯示出現亮暗點等缺陷	按照外觀點缺陷.	
10.大電流	功耗超出規格要求.	NG	

11.7.4.6 Touch Panel Visual Inspection specification

項目		規格		備註
TP	TP 測試	TP 功能測試不良	NG	
	TP 异物(線狀) 	W<=0.03mm	OK	
		0.03mm<W<=0.05mm & L<=5mm & N<=2	OK	
		W>0.05mm or L>5mm.	NG	
	TP 异物(點狀) D=(X+Y)/2 	D<=0.15mm	OK	
		0.15mm<D<=0.25mm & N<=2, d>=10mm	OK	
		D>0.25mm	NG	
	TP film 材鼓起 	高度<=0.4mm	OK	
	TP 表面 Film 材偏移	超出 TP 外緣小于 0.1mm	OK	
	牛頓環 	規則(橢圓或圓形):面積不超過 TP 區域的 1/3. 	OK	
		不規則形狀:面積不超過 TP 區域的 1/2. 	OK	
	贓污	TP 贓污	可按照限度樣本	
	刮傷	TP 表面刮傷	可按照限度樣本	
	延伸性裂痕	延伸性裂痕	NG	

崩邊崩角在 TB 區	傷及銀色線路	NG	
	不傷及銀色線路	OK	
崩角在 TA 區	a<=1.5mm 且 c<=3.0mm	OK	
崩邊在 TA 區	a<=1.0mm 且 b<=5.0mm	OK	
	a<=1.5mm 且 b<=3.0mm	OK	
TP 背膠: (a) 异物(線狀)	距離 TP 銀膠內緣 0.5mm 以內	Ignored	
	其他	以 TP 异物計	
(b) 异物(點狀)	(1)ICON 區域	以 TP 异物計	
	(2)非 ICON 區域: 距離 TP 銀膠內緣 0.5mm 以內	Ignored	
	D<=0.15mm	Ignored	
	0.15mm<D<=0.3mm &N<=2,d>=10mm.	OK	
	D>0.3mm	NG	

11.7.5. MECHANICS SPECIFICATION

As for the outside dimension, weight of the modules, please refer to product specification for more details.

11.7.6. NOTIFICATION FOR STORAGE AND HANDLING

11.7.6.1 Storage

11.7.6.1.1 Environment condition must be within the product specification, otherwise module might be damaged.

11.7.6.1.2 Pile of stacking should follow the advice from InnoLux.

11.7.6.2 Handling

11.7.6.2.1 Twist or Bending is not allowed for the module.

11.7.6.2.2 All chemicals are not fit for use unless there is advice from InnoLux.

11.7.6.2.3 Plug in & out

Be sure to make the module power off before plugging in or out the connector.

11.7.6.2.4 ESD protection

No touch on module without grounding.

11.7.6.2.5 High Voltage

No touch on the rear side of module without protection.

11.7.6.2.6 Power sequence

Should follow the instruction of InnoLux.

11.7.7 LIMITED WARRANTY

11.7.7.1 InnoLux represents and warrants that all Modules shall (i) conform to the specifications set forth in Article 5, 6 hereof and (ii) be free from any defects in material and workmanship for 12 month(s) after Customer's acceptance or deemed acceptance. InnoLux will replace, rework or refund the defective or non-conforming Modules; Provided that Customer (i) promptly informs Supplier of the defects or non-conformities within the warranty period, (ii) comply with the Specification and conditions hereunder and (iii) comply with InnoLux's procedure for Modules replace, rework and return. The warranty period for the Modules replaced or reworked shall be the remaining term for such Modules.

11.7.7.2 THE WARRANTIES AND REMEDIES SET FORTH ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, TERMS OR CONDITIONS, EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, INCLUDING WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ALL OF WHICH ARE EXPRESSLY DISCLAIMED. INNOLUX'S WARRANTIES HEREIN APPLY ONLY TO CUSTOMER AND ARE NOT TO BE EXTENDED TO ANY THIRD PARTY.

11.7.8. GOVERNING LAW

This Agreement shall be governed and construed in accordance with the laws of the R.O.C. Both parties agree to submit any dispute, which cannot be amicably resolved, to Taipei District Court for the first instance.