



SHENZHEN APTUS TECHNOLOGY CO., LIMITED

PRODUCT SPECIFICATION

10.1" MONO TFT-LCD 11520 X 5120 MODULE

MODEL NAME: DBM101M12K01

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FOR CUSTOMER	
CUSTOMER APPROVED	

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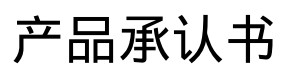
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2 . GENERAL SPECIFICATIONS

2.1 Description

This product is composed of a TFT LCD panel, Polarizers, driver IC, FPCa. The following describes the features of this product.

General SPEC	
Size	10.1"
Resolution	11520 x 5120
Dot Pitch(um)	19 x 24
Color Pixel Arrangement	Mono
Shipment Type	FOG
Technology	LTPS
Display Mode	Normal Black
Mechanical	
AA (mm)	218.88 x 122.88
CF Outline Dimension (mm)	227.43 x 135.93
Panel Outline Dimension (mm)	227.43 x 139.50
Border Dimension (mm) (U/D/L/R)	5.62/11/4.275/4.275
Weight (g)	93.3 (Typ)
Optical	
Contrast Ratio	300 (min) @ INX 405nm BLU
Panel Transmittance (w/i POL)	5% (Typ) @ INX 405nm BLU
Electrical	
Frame Rate	Typ. 20Hz
Interface	MIPI
Reliability	
Operation Temperature	0°C~ 70°C
Storage Temperature	-10°C~ 80°C



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3 . PIN ASSIGNMENT

Pin No.	Name	Type	Note
1	GND	P	Ground
2	GND	P	Ground
3	NC	-	NC
4	AVDD	I	Power input
5	AVDD	I	Power input
6	NC	-	NC
7	AVEE	I	Power input
8	AVEE	I	Power input
9	NC	-	NC
10	VDDIO	I	Power input
11	VDDIO	I	Power input
12	NC	-	NC
13	GND	P	Ground
14	GND	P	Ground
15	GND	P	Ground
16	A_D3P	I	MIPI port A lane 3 positive
17	A_D3N	I	MIPI port A lane 3 negative
18	GND	P	Ground
19	A_D2P	I	MIPI port A lane 2 positive
20	A_D2N	I	MIPI port A lane 2 negative
21	GND	P	Ground
22	A_CLKP	I	MIPI port A clock positive
23	A_CLKN	I	MIPI port A clock negative
24	GND	P	Ground
25	A_D1P	I	MIPI port A lane 1 positive
26	A_D1N	I	MIPI port A lane 1 negative
27	GND	P	Ground
28	A_D0P	I	MIPI port A lane 0 positive
29	A_D0N	I	MIPI port A lane 0 negative
30	GND	P	Ground
31	GND	P	Ground
32	B_D3P	I	MIPI port B lane 3 positive
33	B_D3N	I	MIPI port B lane 3 negative
34	GND	P	Ground
35	B_D2P	I	MIPI port B lane 2 positive
36	B_D2N	I	MIPI port B lane 2 negative



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37	GND	P	Ground
38	B_CLKP	I	MIPI port B clock positive
39	B_CLKN	I	MIPI port B clock negative
40	GND	P	Ground
41	B_D1P	I	MIPI port B lane 1 positive
42	B_D1N	I	MIPI port B lane 1 negative
43	GND	P	Ground
44	B_D0P	I	MIPI port B lane 0 positive
45	B_D0N	I	MIPI port B lane 0 negative
46	GND	P	Ground
47	GND	P	Ground
48	RESET	I	Reset pin
49	TE	I	Tearing effect
50	FRM	I	BIST control pin
51	GND	P	Ground



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4 . ABSOLUTE MAXIMUM RATINGS

4.1 Electrical Absolute Ratings

4.1.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	VDDIO	1.65	1.95	V	IC SPEC
Power Supply Voltage	AVDD	4.5	6.3	V	IC SPEC
Power Supply Voltage	AVEE	-6.3	-4.5	V	IC SPEC

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5 . ELECTRICAL CHARACTERISTICS

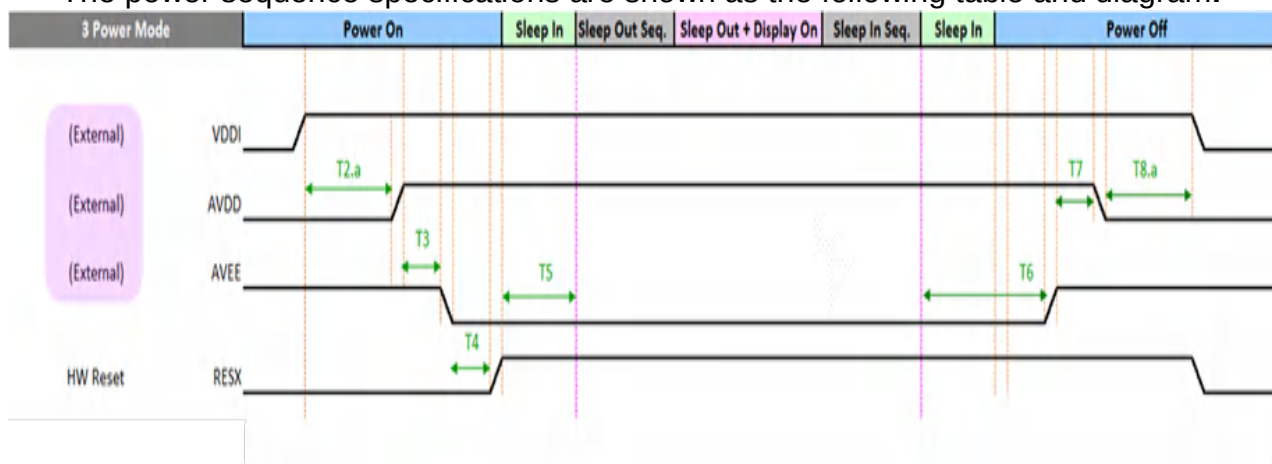
5.1 LCD Parameter

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power Supply Voltage	VDDIO	1.7	1.8	1.9	V	
Power Supply Voltage	AVDD	6.1	6.2	6.3	V	
Power Supply Voltage	AVEE	-6.3	-6.2	-6.1	V	
Full White	I_VDDIO	36	46.2	56	mA	VDDIO=1.8V at 20Hz, all White Pattern
	I_AVDD	23	29.4	38	mA	
	I_AVEE	23	31.3	38	mA	

(GND=0V, TA=25 °C)

5.2 Power Sequence

The power sequence specifications are shown as the following table and diagram.



Item	Description	Value		Unit
		Min	Max	
T2.a	VDDI ready(90% of final) to AVDD enable	0	-	ms
T3	AVDD ready(90% of final) to AVEE enable	0	-	ms
T4	AVEE (last power) ready to RESX go high	10	-	ms
T5	RESX go high to sleep out	10	-	ms
T6	Sleep in to AVEE disable	0	-	ms
T7	AVEE disable to AVDD disable	0	-	ms
T8.a	AVEE disable to VDDI disable	0	-	ms

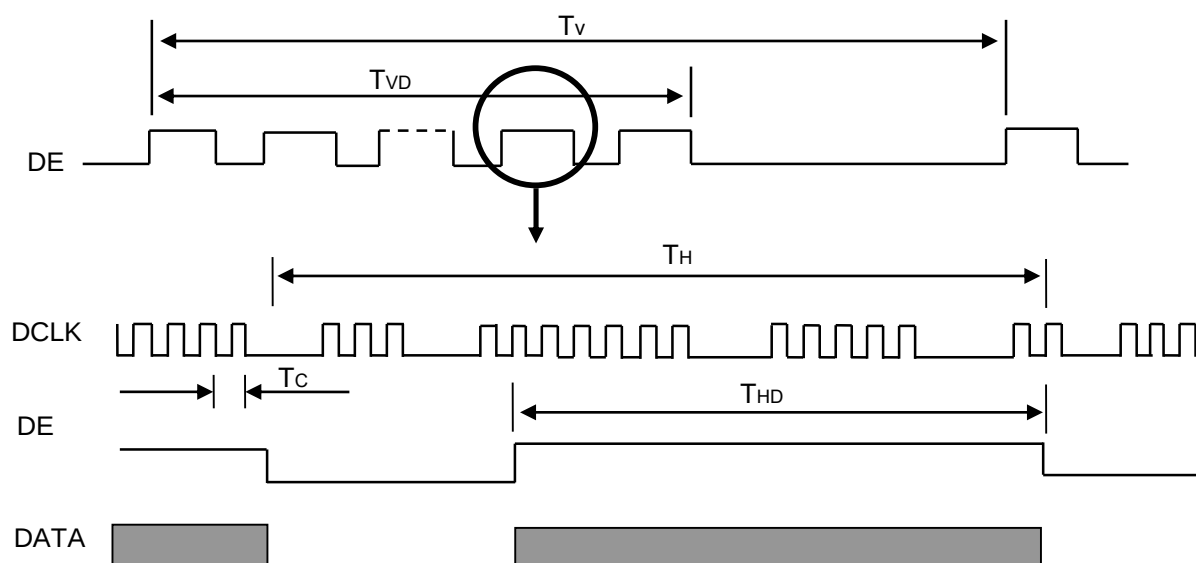
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5.3 Display Timing Specifications

The input signal timing specifications are shown as the following table and timing diagram.

Item	Symbol	Typical (@20Hz)	Unit	Note
PCLK Frequency	1/Tc	421.5	MHz	-
Vertical Total Time	TV	5160	TH	-
Vertical Active Display Period	TVD	5120	TH	-
Vertical Active Blanking Period	TVB	40	TH	VFP: VBP: VSW:
Horizontal Total Time	TH	4084	Tc	-
Horizontal Active Display Period	THD	3840	Tc	-
Horizontal Active Blanking Period	THB	244	Tc	HFP: HBP: HSW:

INPUT SIGNAL TIMING DIAGRAM



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6. OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Values			Remark
			Min.	Typ.	Max.	
Contrast Ratio	CR	Normal $\theta=\Phi=0^\circ$ Center	300		-	Note 1、2、3、6
Transmittance	T%		4%	5%	-	Note 1、2、4、6
Transmittance Uniformity	U%		85%			Note 1、2、5、6

Condition: w/o polarizer protection film

(Ta=25°C)

5.1 Definition of Optical Characteristics

Note 1 : Definition of viewing angle range

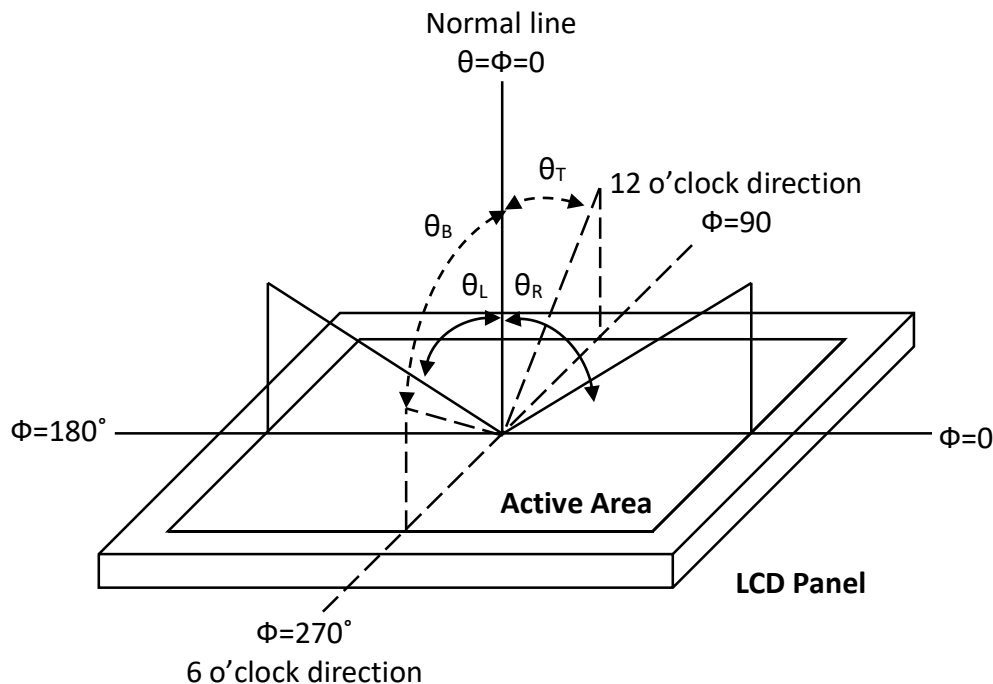


Fig. 1 Definition of viewing angle

Note 2 : Definition of optical measurement system

The optical characteristics should be measured in a dark room with ambient temperature Ta=+25°C. The optical properties are measured at the center point of the LCD screen after 1 minute's operation. The light on method and tooling is based on INX instruction. (Equipment: UV Light Meter)

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Note 3 : Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{P data measured when LCD on the " White" state}}{\text{P data measured when LCD on the " Black " state}}$$

Note 4 : Definition of Transmittance

$$\text{Transmittance (T\%)} = \frac{\text{P data measured when LCD on the " White" state}}{\text{P data of 405nm BLU}}$$

Note 5 : Definition of transmittance 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 circle as below.

$$\text{Transmittance Uniformity} = \frac{\text{Transmittance}_{\min}}{\text{Transmittance}_{\max}}$$

Transmittance_{max} : The measured maximum Transmittance of all measurement position.

Transmittance_{min} : The measured minimum Transmittance of all measurement position.

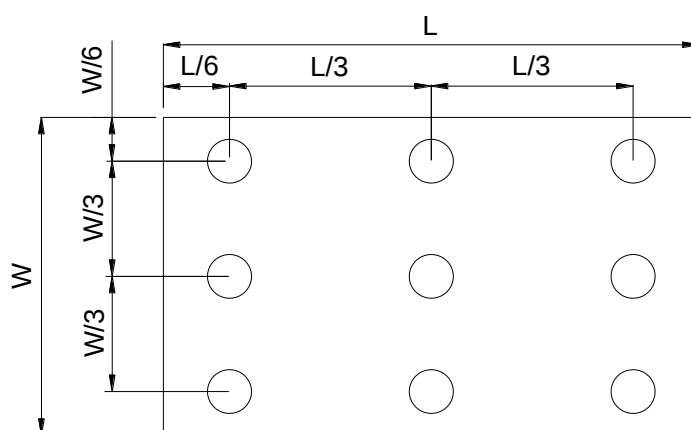


Fig. 2 Definition of luminance uniformity

L : Active area length

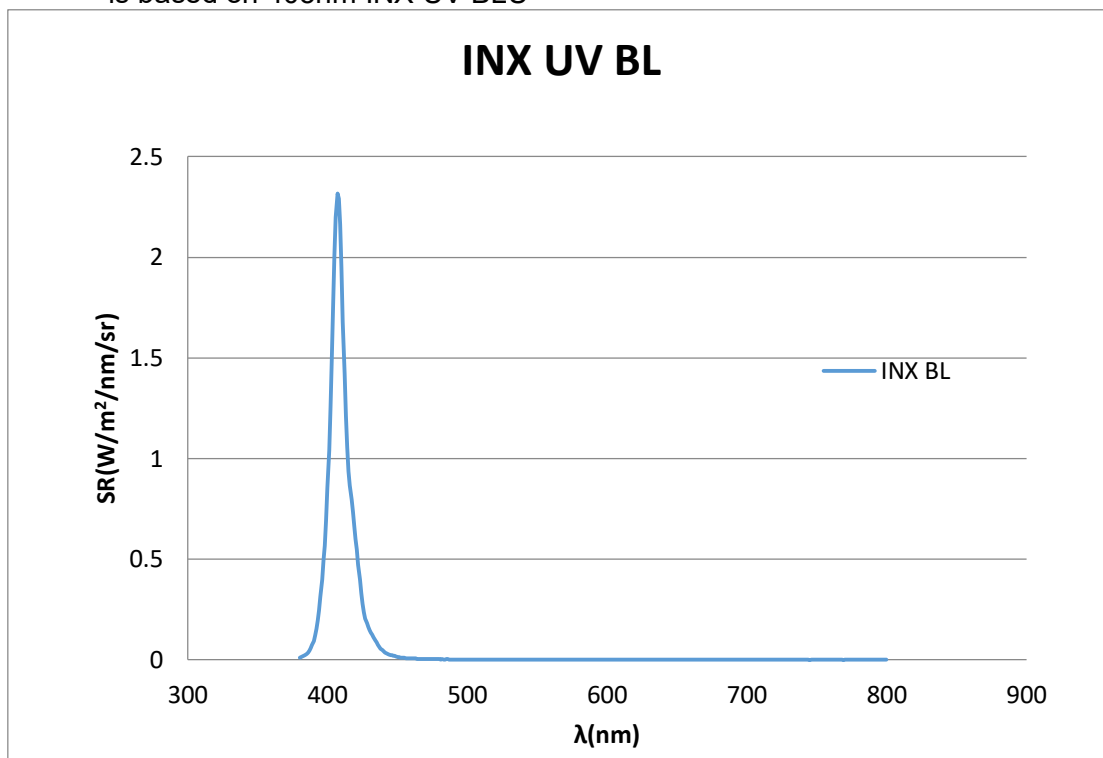
W : Active area width



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Note 6 : Definition of 405nm INX UV BLU spectrum

Contrast Ratio and Transmittance and Transmittance Uniformity Spec.
is based on 405nm INX UV BLU



8. HANDLING PRECAUTIONS

8.1 Safety

- i. 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.

8.2 Handling

- i. 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.
- ii. Do not handle the product by holding the flexible pattern portion in order to assure the reliability.
- iii. 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.
- iv. Provide a space so that the panel does not come into contact with other components.
- v. To protect the product from external force, put a covering lens (acrylic board or similar board) and keep an appropriate gap between them.
- vi. Transparent electrodes may be disconnected if the panel is used under environmental conditions where dew condensation occurs.
- vii. Property of semiconductor devices may be affected when they are exposed to light, possibly resulting in IC malfunctions.
- viii. 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.

8.3 Static Electricity

- i. Ground soldering iron tips, tools and testers when they are in operation.
- ii. Ground your body when handling the products.
- iii. Power on the LCD module BEFORE applying the voltage to the input terminals.
- iv. DO NOT apply voltage which exceeds the absolute maximum rating.
- v. Store the products in an anti-electrostatic bag or container.

8.4 Storage

- i. Store the products in a dark place at $+25^{\circ}\text{C}\pm 10^{\circ}\text{C}$ with low humidity (65%RH or less).
- ii. DO NOT store the products in an atmosphere containing organic solvents or corrosive gas.

8.5 Cleaning

- i. DO NOT wipe the touch panel with dry cloth, as it may cause scratch.
- ii. 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.



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9 . RELIABILITY TEST

Test Items	Test Conditions	Remark
High Temperature Storage	80℃ , 240 hours	Note(1)(2)(3)(4)
Low Temperature Storage	-10℃ , 240 hours	Note(1)(2)(3)(4)
High Temperature Operation	70℃ , 240 hours	Note(1)(2)(3)(4)
Low Temperature Operation	0℃ , 240 hours	Note(1)(2)(3)(4)
Operate at High Temperature and Humidity	60℃, 90%RH , 240 hours	Note(1)(2)(3)(4)

Note:

1. The test samples have recovery time need more than 2 hours at room temperature before the function check. In the standard conditions, there is no abnormal display function occurred.
2. After the reliability test, the product only guarantees operational function, but don't guarantee all of the cosmetic specification.
3. Under no condensation of dew.
4. It is based on BLU which is defined by INX's white BLU.

10. INSPECTION CRITERIA

1. 描述

這些檢驗標準適用於 INNOLUX Corporation 提供 CE 的 LCD open cell。

若 IIS 與產品規格書、材料採購規格書或其他文件衝突時，應優先以 IIS 為判定依據。

2. 缺陷分類

缺陷分為主要缺陷和次要缺陷兩種類型，分類定義如下：

(1) 主要缺陷

任何缺陷可能導致功能故障，或降低產品對其用途的可用性。

例如：電氣故障等。

(2) 次要缺陷

任何缺陷不降低產品的可用性。例如：不均勻性和點缺陷...等。

3. 抽樣方法及允收標準

(1) 抽樣計畫：MIL-STD-105E

(2) 允收標準：

2-1.) 批量大小：每批貨物的數量

2-2.) 抽樣計畫：一般檢驗，單次抽樣。

2-3.) 抽樣水準：Level II.

2-4.) 收標準(AQL): 主要缺陷: AQL=0.65；次要缺陷: AQL=1.0

4. 檢驗環境條件及目視檢標準

(1) 環境溫度：25±5 °C

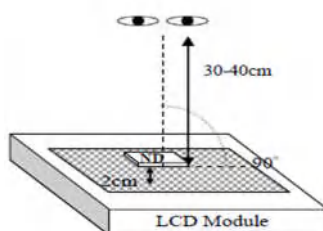
(2) 環境濕度：25~75 % RH

(3) 面板檢查，液晶模組與檢驗員眼睛之間的距離為 30~40cm 或以上。

(4) 環境照明：800~1200 Lux

(5) 檢驗角度：檢查員眼睛與液晶模組垂直角度為 0 度(圖.1)

(6) 檢驗距離：檢查員眼睛與液晶模組之間的距離為 30~40 公分(圖.1)





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(7) Open Cell 點燈檢驗需搭配背光，亮度值應介於以下區間：

7-1.) 輝點、暗點、點狀、線狀及電氣性不良：

白背光全白畫面下，模組中心點亮度：450±100nits

7-2.) Mura：

(1) UV 背光亮度 P 值：65~110 mW/cm²

(2)量測儀器：紫外輻射感測器 LS129

5. 檢驗規格

(1)顯示區內出現的點類缺陷定義

1-1.)輝點：全黑畫面下，無法完全遮光所引起之輝點

1-2.)暗點：全白畫面下，不完全動作所產生之暗點

1-3.)群輝/滿天星：10mm 直徑範圍內，包含 5 顆以上的輝點

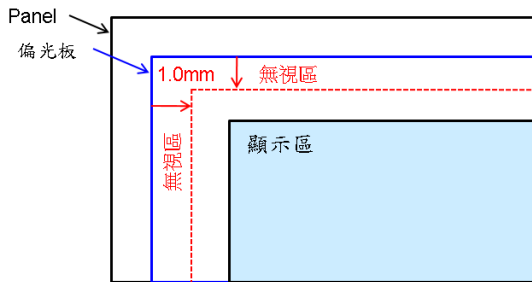
(2) 品位檢驗標準(點燈)

不良項目	允收數量
輝點、暗點及點狀不良	$D \leq 0.1\text{mm}$ ，不計 (群輝/滿天星，不可有) $0.1\text{mm} < D \leq 0.3\text{mm}$ ， $N \leq 2$ $0.3\text{mm} < D \leq 0.5\text{mm}$ ， $N \leq 1$ Total N(總數量) ≤ 2 ，DS(距離) $> 10\text{mm}$ 參照圖 2
線狀不良	$W \leq 0.02\text{mm}$ ，不計 $0.02\text{mm} < W \leq 0.05\text{mm}$ ， $L \leq 2.0\text{mm}$ $N \leq 2$ ，DS(距離) $> 10\text{mm}$ 參照圖 3
Mura (UV 光檢驗)	全黑畫面下，依照限樣判定
電氣性不良(無畫面、缺線)及液晶氣泡	不可有

備註: BM(Black Matric)區上，超出 AA(Active Area)區的缺陷，不記為缺陷。

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(3) 外觀檢驗標準(無點燈)

不良項目	規格
點狀不良	$D \leq 0.1\text{mm}$ ，不計 (群輝/滿天星，不可有) $0.1\text{mm} < D \leq 0.3\text{mm}$ ， $N \leq 2$ $0.3\text{mm} < D \leq 0.5\text{mm}$ ， $N \leq 1$ Total N(總數量) ≤ 2 ，DS(距離) $> 10\text{mm}$ 參照圖 2
線狀不良	$W \leq 0.02\text{mm}$ ，不計 $0.02\text{mm} < W \leq 0.05\text{mm}$ ， $L \leq 2.0\text{ mm}$ $N \leq 2$ ，DS(距離) $> 10\text{mm}$ 參照圖 3
裂痕	不可有；參照圖 4
角落破損	$W \leq 3.0\text{ mm}$ ，L 不計；參照圖 5
邊緣破損	$d_1 \geq 2.0\text{mm}$ 且無傷及端子，不計 $d_1 < 2.0\text{mm}$ ，不可有；參照圖 6
玻璃凸緣	$d_2 \leq 0.3\text{mm}$ ，不計 $d_2 > 0.3\text{mm}$ ，不可有；參照圖 7
偏光板無視區	1. 偏光板邊緣往內 1.0 mm 以內區域，不計。 2. 偏光板邊緣往內 1.0 mm 以外區域： 點狀 --- 以點狀不良規格判定 線狀 --- 以線狀不良規格判定 
FPC	無功能性問題，外觀忽略不計
連接器	無功能性問題，外觀忽略不計
保護膜	保護膜的缺陷，忽略不計。 例如：保護膜刮傷、保護膜氣泡、保護膜髒汙...等

備註: 1. 破損角度需大於 90 度. 參照圖 8 ($R > 90^\circ$).

2. 若有以上缺陷表中未包含的項目，應通過 Innolux 及客戶討論來判斷該缺陷。

3. 任何可擦拭的缺陷，忽略不計

4. 非用戶端可見區域的缺陷，忽略不計。

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1. W：寬度
2. L：長度
3. D：平均直徑
4. N：數量

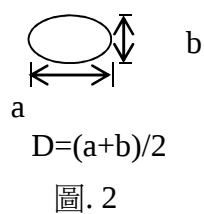


圖. 2



W: 寬度, L: 長度

圖. 3

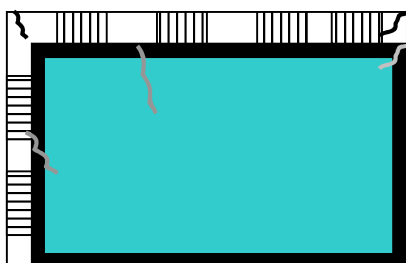


圖 4

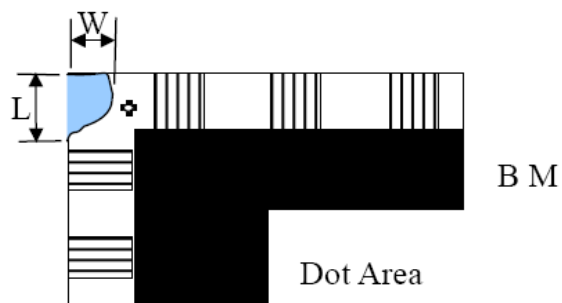


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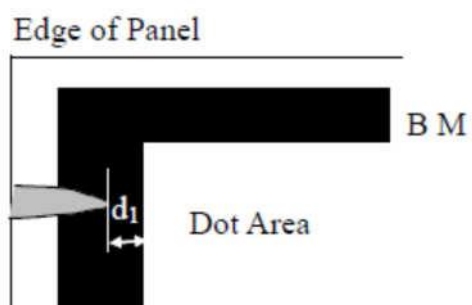


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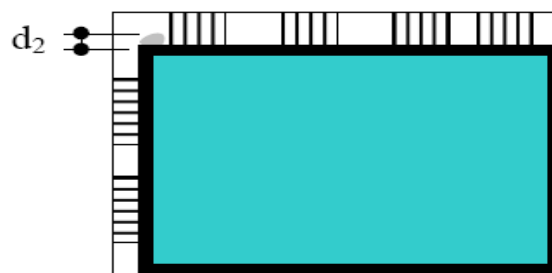


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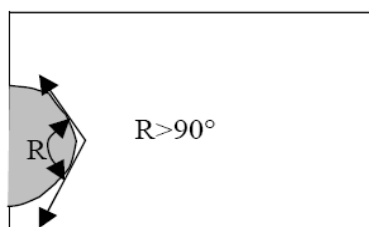


圖 8

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11. PACKING DRAWING

