MULTI-INNO TECHNOLOGY CO., LTD.

LCD MODULE SPECIFICATION

Model : MI9696FK

Revision	
Engineering	
Date	
Our Reference	

History of Versions and Modifications

Version	Modifications	Date
A	Generation first version	2007-12-18

PRODUCT SPECIFICATIONS

◆ **MODULE CLASSIFICATION INFORMATION**

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◆ **MODULE CLASSIFICATION INFORMATION**

MI9696FK

MI：   **Multi-Inno standard module**

9696:   **96x96 dot**

F   :   **Serial Number**

K   :   **CSTN   Module**

-1   :   **Product Version:**   **1 , 2 , 3 . . .**

◆ **LCD MODULE PHYSICAL DATA**

● **General Description**

Display Type	65K CSTN
Viewing Direction	12o'clock
Connection Type	COG
Operation temperature	-20℃ ~70℃
Storage temperature	-30℃ ~80℃
Driving IC	ST7637
Driving Method	Duty	1/96
	Bias	1/12
	Vop	11.56V
Ppolarizer	TRANSMISSIVE /NEGATIVE

● **Mechanical Description**

Item	Standard Value	Unit
Number of dots	096RGB X096dots	-
LCM dimension	25.72(W) X29.80(H) X2.80(T)	mm
Viewing area	21.32(W) X20.80(H)	mm
Active area	18.71(W) X18.71 (H)	mm
Dot size	0.055(W) X0.185(H)	mm
Dot pitch	0.065(W) X0.195(H)	mm
Approx. weight	TBD	g
Backlight	1-chip white LED	/
The KEY and accessory materials of our product according with ROHS standard		

◆ EXTERNAL DIMENSIONS

Pin assignment table:

引脚号	名称
1	NC
2	NC
3	NC
4	VM
5	VG
6	A0
7	/WR
8	D0
9	D1
10	D2
11	D3
12	D4
13	D5
14	D6
15	D7
16	/RD
17	/RST
18	/CS
19	VDD
20	VSS
21	VDD
22	VOX
23	XVO
24	A
25	K
26	NC
27	NC
28	NC
29	NC
30	NC

MULTI-INNO TECHNOLOGY CO.,LTD.

D/N : MI9696FK
P/N :
SCALE : N.T.S.
UNIT : mm
PRO.(3):
SHEET : 1/1

TITLE: LCM OUTLINE DIMENSION
FILE NAME :
FILE NO. : LCD-DR-
Rev. : 0
Ver. : A
DRAWN BY
CHECKED BY
APPROVED BY
DATE

REVISION RECORD

客户参考图

背光电路图

A○ ▷|- ○K

"A"细节图

CUSTOMER'S MODEL NO.:

CUSTOMER APPROVED:

DATE:

手柄

双面胶（T=0.2mm）

1.1"CSTN 65K
DOTS:96*RGB*96

ST7637

PI TAPE

PI TAPE

双面胶（T=0.05）
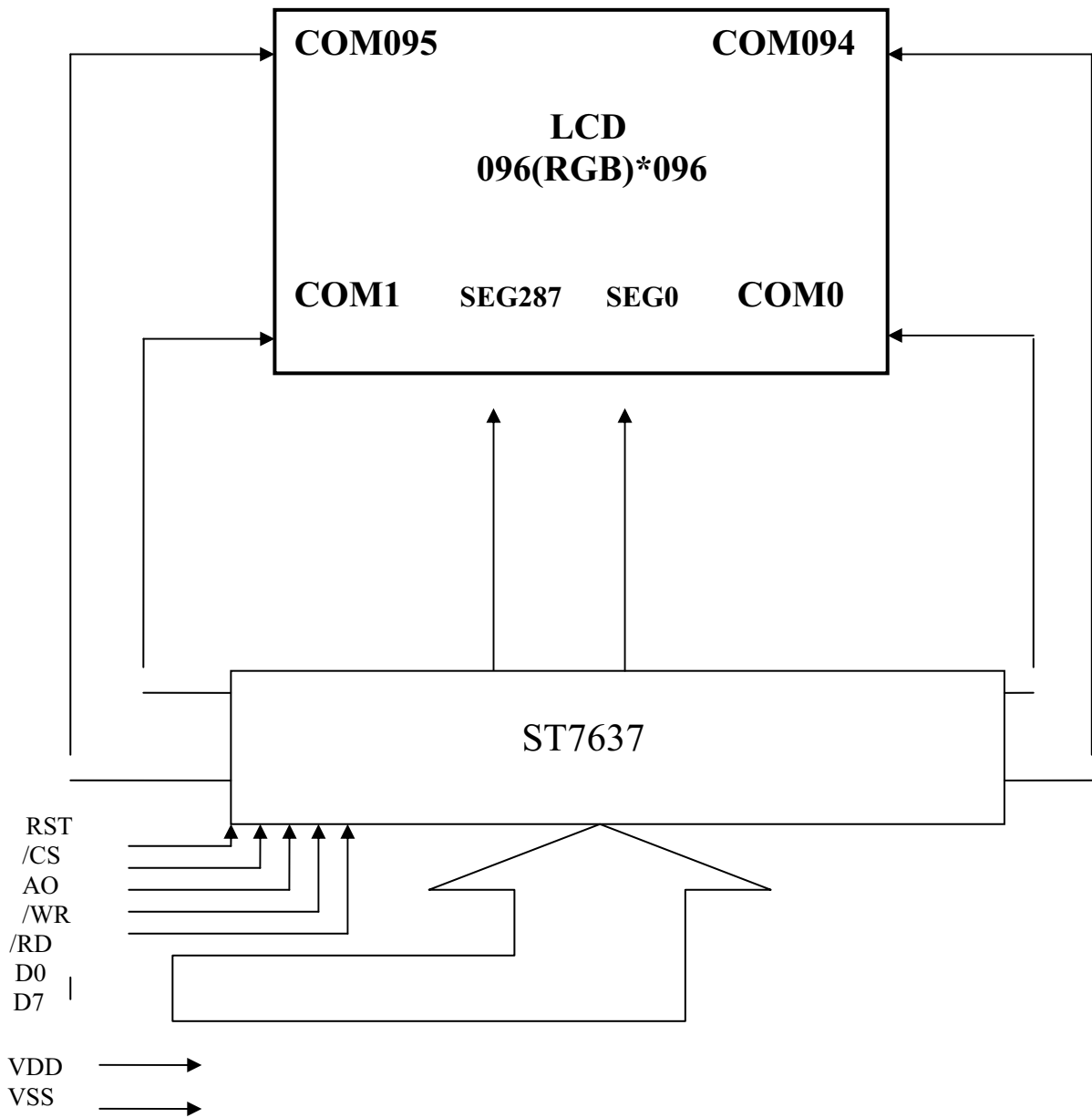
展开出货

要求：
1. 显示方式：1.1"CSTN 65K
2. 点阵：96*RGB*96
3. 驱动IC:ST7637(COG)
4. 偏光片：光面，全透/负性
5. 背光光源：一颗白灯
   工作电流20mA
   发光均匀度：80% MIN
6. 工作温度：-20°C~70°C
7. 存储温度：-30°C~80°C
8. 未注公差：±0.2
9. 标*号为重点尺寸，标△号为修改记录
10. 产品符合BHS-001标准

BLOCK DIAGRAM

◆ **ABSOLUTE MAXIMUM RATINGS**

Item	Symbol	Rating	Unit
Operating temperature	**Top**	**-20 to 70**	℃
Storage temperature	**Tst**	**-30 to 80**	℃
Input voltage	**Vin**	**2.8 to 3.3**	V
Supply voltage for logic	**VDD3**	**2.8 to 3.3**	V
Supply voltage for LCD	**VCC – VEE**	**18.0**	V

NOTE:
1. **If the module is used above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.**
2. **VDD>GND must be maintained.**

◆ **ELECTRICAL CHARACTERISTICS**

● **DC Characteristics**

Vss= 0V, Ta= 25℃

| Item	Symbol	Condition	Min	Typ	Max	Unit
Input high voltage	V_{IH}	-	0.7VDD	-	VDD	V
Input low voltage	V_{IL}	-	VSS	-	0.3VDD	V
Supply voltage for logic	V_{DD}-V_{SS}	Ta=25℃	-	2.8	-	V
Operating voltage for LCD	V_{op}	Ta=25℃	11.40	11.56	11.70	V
Current consumption for LCD normal operation	I_{DD}	V_{DD} =2.8V	-	0.5	2	mA

● **Back-Light unit**

Item	Symbol	Min	Typ	Max	Unit	Remark
Current	I_{BL}	-	20	-	mA	-
ICE	X	0.28	-	0.31	-	X>Y
	Y	0.28	-	0.31	-	
Brightness	-	3600	-		cd/m²	
Luminous Intensity Ratio		80	-		%	

Note:

1. Average Luminous Intensity of P1 ~ P5（Using a luminance meter BM-7）

2. Luminous Intensity Ratio = (max-min)/max * 100%
Measured Method (X*Y: Light Area).
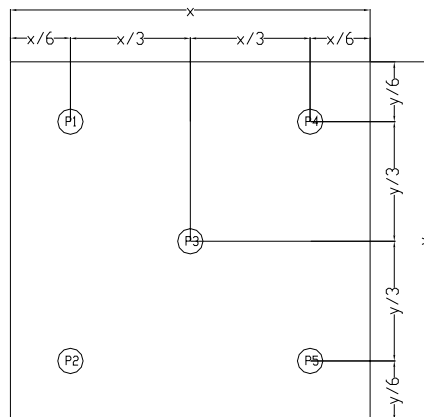
● **AC Characteristics**

Refer to the SPEC of ST7637

◆ **INTERFACE PIN CONNECTIONS**

NO.	Symbol	Function
1	NC	No connection
2	NC	
3	NC	
4	VM	I/O pin of LCD bias supply voltage
5	VG	I/O pin of LCD bias supply voltage
6	A0	Register select pin
7	/WR	Write signal
8	D0	Data bus
9	D1	
10	D2	
11	D3	
12	D4	
13	D5	
14	D6	
15	D7	
16	/RD	Read signal
17	/RST	Reset signal
18	/CS	Chip select signal
19	VDD	Power supply
20	VSS	Ground
21	VDD	Power supply
22	VOX	Positive LCD driver supply voltages
23	XV0	Negative LCD driver supply voltages.
24	A	Backlight positive
25	K	Backlight negative
26	NC	No connection
27	NC	
28	NC	
29	NC	
30	NC	

◆ **Recommand Initial Code**

```
void lcd_initial()
{
        write_command(0x01);                          //Software Reset
        delay1ms(150);                          //Delay 150mS

        write_command(0xD7);                          //Autoread control
        write_data(0xDF);                          //Disable Autoread
        write_command(0xE0);                          //Control OTP/MTP
        write_data(0x00);                          //Read Mode
        delay1ms(100);                          //Delay 100mS
        write_command(0xE3);                          //Control OTP/MTP
        delay1ms(100);                          //Delay 20mS
        write_command(0xE1);
        delay1ms(100);                          //Delay 100mS
//-----------------------------------------------------------------------------//
//----------------------------OTP/MTP Set [OTPA/OTPB/MTP ]------------------------//
//-----------------------------------------------------------------------------//
//------------------------------------OTPB Set--------------------------------------//
        write_command(0xC3);                          //Bias Set
        write_data(0x00);                          //1/12
        write_command(0xC4);                          //Booster Set
        write_data(0x05);                          //x5 boosting circuit
        write_command(0xC5);                          //Booster Efficiency Set
        write_data(0x21);                          //Level 2
        write_command(0xCB);                          //VG Booster Set
        write_data(0x01);                          //
        write_command(0xCC);                          //ID1 Set
        write_data(0x45);                          //
        write_command(0xCE);                          //ID3 Set
        write_data(0x00);                          //
//      write_command(0xB7);                          //Glass Direction
//      write_data(0xC8);                          //
        write_command(0xD0);                          //Follower Type set
        write_data(0x1D);                          //
//----------------------------------MTP Set--------------------------------------//
        write_command(0xD7);                          //Autoread control
        write_data(0xBF);                          //
        write_command(0xB5);                          //N-line Set
        write_data(0x94);                          //
        write_command(0xCD);                          //ID2 Set
        write_data(0x80);                          //
        write_command(0xD0);                          //Set Vg Source
        write_data(0x1D);                          //
        write_command(0xB4);                          //PTL Saving Mode Set
        write_data(0x18);                          //Power Normal Mode

//-----------------------------------------------------------------------------//
//----------------------------write_command Table 1------------------------------------//
//-----------------------------------------------------------------------------//
        write_command(0x11);                          //Sleep Out
        write_command(0x20);                          //Normal Display
```

```
        write_command(0x38);                        //Idle Mode Off
        write_command(0x25);                        //Contrast Difference Set
        write_data(0x3f);               //0x3F

        write_command(0x13);                         //Partial Mode Off

        write_command(0x2A);                         //Column Range
        write_data(0x24);              //Start Address-0 24
        write_data(0x83);              //End Address-95   83

        write_command(0x2B);                         //Page Range
        write_data(0x24);              //Start Address-0
        write_data(0x83);              //End Address-95

        write_command(0x34);                        //TE Off
        write_command(0x33);                         //Scroll Area Set
        write_data(0x00);              //Top Address
        write_data(0x80);              //Height Address
        write_data(0x00);              //Botton Address
        write_command(0x37);                        //Scroll Start Address Set
        write_data(0x00);              //
        write_command(0x3A);                         //Pixel Format Set
        write_data(0x05);              //
        write_command(0x36);                         //Memory Access Control
        write_data(0x80);              //
        write_command(0x29);                        //Display On
//--------------------------------------------------------------------------------//
//-----------------------write_command Table 2 [XXXX/XXXX/GAMM]-------------------------//
//--------------------------------------------------------------------------------//
        write_command(0xB0);                        //Duty Set
        write_data(0x5f);              //
        write_command(0xB1);                        //First COM Set
        write_data(0x00);              //
        write_command(0xB3);                        //OSC Div. Set
        write_data(0x00);              //

        write_command(0xC0);                        //V0 Voltage Set
        write_data(0xc7);     //51              //Vop=11.50v 0xb9 be
        write_data(0x00);              //

        write_command(0xC6);                        //V0 Bias Set
        write_data(0x00);              //
        write_command(0xB7);                        //Glass Direction
        write_data(0x00);              //
//-----------------------------Gamma Table Set------------------------------------//
        write_command(0xF9);                        //Gamma
        write_data(0x00);              //
        write_data(0x02);              //
        write_data(0x04);              //
        write_data(0x06);              //
        write_data(0x08);              //
        write_data(0x0A);               //
```

```
        write_data(0x0C);                    //
        write_data(0x0E);                    //
        write_data(0x10);                    //
        write_data(0x12);                    //
        write_data(0x14);                    //
        write_data(0x16);                    //
        write_data(0x18);                    //
        write_data(0x1A);                     //
        write_data(0x1C);                     //
        write_data(0x1E);                    //
        write_command(0x29);                    //Display On
//-------------------------------------------------------------------------------//
//---------------------------------Test write_command-------------------------------------//
//-------------------------------------------------------------------------------//
}
```

◆ ELECTRO-OPTICAL CHARACTERISTICS

Driving condition: VDD=　V, VIN1=　V, VBL=　V, Contrast Control Resister =　,
Temperature =23℃±5℃，Humidity=60%±20%RH

Item		Light angle（°）	Temp（℃）	Symbol	Specifications			Unit		Note
					Min.	Typ.	Max.			
Contrast ratio		0	25	Cr	30	32	40			(1)
Brightness(All white)		0	25		50			cd/m²		
Luminance uniformity (surface within panel)		0	25	Lu	70	80		%		(2)
Cross talk		0	25	CTV			30	%		(3)
Color variation	Within panel	0	25	CUw			0.01		Conditions	(4)
	Panel to panel	0	25	CUt			0.1			(4)
Chromaticity	W x	0	25	W x		TBD				
	W y			W y		TBD				
	R x			R x		TBD				
	R y			R y		TBD				
	G x			G x		TBD				
	G y			G y		TBD				
	B x			B x		TBD				
	B y			B y		TBD				
Color Reproduction Area(NTSC)		0	25			TBD		%	CIE1931(x,y)	(5)
Response time	Tr	0	25	-	-	TBD		ms	Viewing normal angle $\theta_X = \theta_Y = 0^0$	
	Tf				-	TBD				
Viewing angle	Hor. θ_{X+}	0	25		-	30		deg	Center CR≥2	
	θ_{X-}				-	-30				
	Ver. θ_{Y+}					40				
	θ_{Y-}					-35				

Note:

   (1) Definition of Contrast Ratio (C/R): Ratio of gray max (Gmax) & gray min (Gmin) at the center point.

$$CR = \frac{G(Max)}{G(Min)}$$

  Where

   Gmax: Luminance with all pixels white

   Gmin: Luminance with all pixels black

  (2). Surface luminance uniformity within panel

Measurement conditions:

Measuring Equipment	CS200 // BM-7
Measurement Point Diameter	3mm // 1mm
Measurement Point Location	Active Area
Light Source	Transmissive Mode: Internal (Backlight)
Test pattern	White

Measuring procedure:

Measure the luminance Li with the points in figure 1.
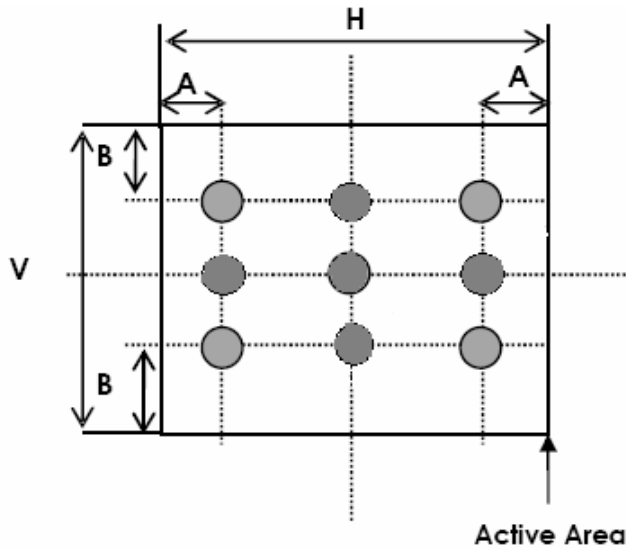
Figure 1

A: 5 mm   B: 5 mm
H, V: Active Area

Uniformity value (Lu):

$$Lu = \frac{\max(Li) - \min(Li)}{\max(Li)}$$

(3)．CROSS-TALK

Introduction：

Crosstalk is an effect where the contrast of a display pixel is influenced by the state of the related pixels. A measure for this effect is the Cross Talk Value (CTV)

Measurement conditions:

Measuring Equipment	CS200 // BM-7
Measurement Point Diameter	3mm // 1mm
Measurement Point Location	
Light Source	Transmissive Mode: Internal (Backlight)
Contrast setting	Maximum

●**Test Pattern (valid for all greyscales):**

W: The width of the rectangle in the following pictures;

5mm

w*h=5*5mm^2
in the centre

2*w=10mm

central line

Pattern A   **Pattern B**   **Pattern C**
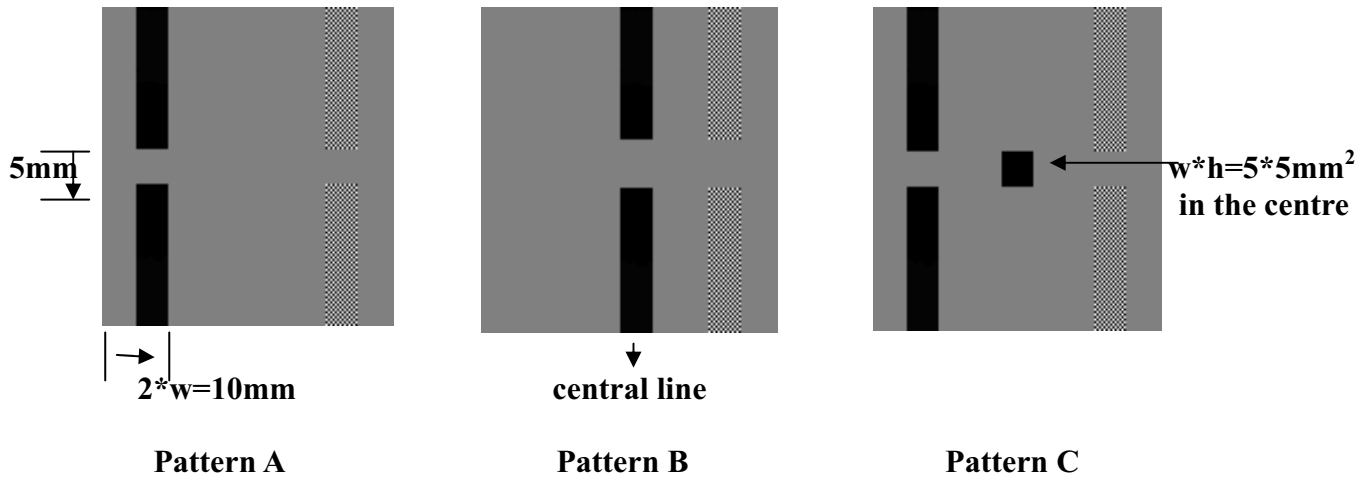
● **Definitions：**

Cross Talk Value：

CTV = |LvA - LvB| / LvA * 100%

  Where：

LvA: Luminance measured with the centre test point of pattern A

LvB: Luminance measured with the centre test point of pattern B.

● **Measuring procedure：**

   Adaptation of the display to the highest contrast ratio (CR = LvA/LvC) as defined by the

test patterns and a test area of 14 x 14 dots.

   Measurement of Luminance with test point A, B.

   Determination of Crosstalk value (CTV)

(4)．Colour uniformity

   Measurement conditions:

Measuring Equipment	CS200 // BM-7
Measurement Point Diameter	3mm // 1mm
Measurement Point Location	Active Area
Light Source	Transmissive Mode: Internal (Backlight)
Test pattern	White picture
Contrast setting	Maximum

●**WITHIN PANEL**

 Definitions:

   Spatial Colour Uniformity:

All spatial color variation is defined relative to the color coordinate values in the centre of the active area.

Test pattern: Figure 1.

Color distance definition:

(Maximum allowed color distance to specified typical color coordinate):

$$\Delta xy = \sqrt{(x_i - x_c)^2 + (y_i - y_c)^2}$$

Where

xc, yc are the color coordinates at the centre measuring point in figure 1;

xi, yi are the colour coordinates at measuring points in figure 1 except for the centre one.

Color uniformity:

$$CU_W = Max(\Delta xy)$$

●**PANEL TO PANEL**

Definition:

Several reasons, such as different light source or different polarizer angle etc, can cause an unacceptable color variation panel to panel.

Test pattern:
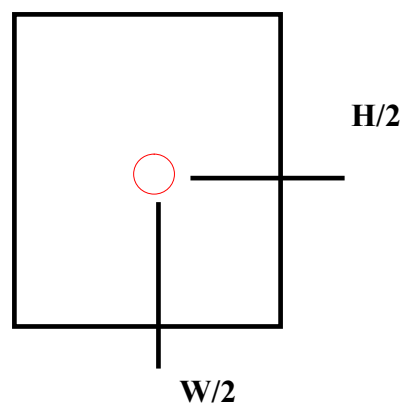
H/2

W/2

Color distance definition:

(Maximum allowed color distance to specified typical color coordinate):

$$\Delta xy = \sqrt{(x_i - 0.3101)^2 + (y_i - 0.3162)^2}$$

Where

(0.3101, 0.3162) is the coordinates of pure white in CIE 1931 chromaticity diagram.

xi, yi are the color coordinates at measuring centre point of each panel.

Color uniformity:

$$CU_t = \max(\Delta xy)$$

(5). NTSC

Measurement conditions:

Measuring Equipment	LCD-5200
Measuring Point Diameter	3mm//1mm
Measuring point location	Active Area center point
Light source	Transmissive Mode: internal(Backlight)
Test pattern	All Pixels White Red.Green.Blue.White: Maximum colour saturation (maximum gradation level)
Contrast setting	Maximum

<u>**Definitions**</u>

Panel colour coordinates according the CIE colour system (CIE 1931). In general,
It is always requested to measure the X, Y and Z values.
Here u´, v´ and L* are according CIE 1931:

$$x' = \frac{4 \cdot X}{X + 15 \cdot Y + 3 \cdot Z}$$

$$y' = \frac{9 \cdot Y}{X + 15 \cdot Y + 3 \cdot Z}$$

$$L^* = 116 \cdot \left(\frac{Y}{Y_n}\right)^{1/3} - 16$$

Colour distance definition (maximum allowed colour distance to specified typical colour coordinate):

$$\Delta x'y' = \sqrt{\Delta x'^2 + \Delta y'^2}$$

Where:

$$\Delta x' = Max\left\{\left|x'_{typ} - x'_{max}\right|, \left|x'_{typ} - x'_{min}\right|\right\}$$

$$\Delta y' = Max\left\{\left|y'_{typ} - y'_{max}\right|, \left|y'_{typ} - y'_{min}\right|\right\}$$
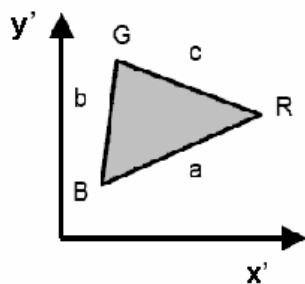
Color Gamut definition:

$$F = \sqrt{s(s-a)(s-b)(s-c)} * 1000$$

Where

$$s = \frac{(a+b+c)}{2}$$

$$a = \sqrt{\left(x'_{blue} - x'_{red}\right)^2 + \left(y'_{blue} - y'_{red}\right)^2}$$

$$b = \sqrt{\left(x'_{blue} - x'_{green}\right)^2 + \left(y'_{blue} - y'_{green}\right)^2}$$

$$c = \sqrt{\left(x'_{red} - x'_{green}\right)^2 + \left(y'_{red} - y'_{green}\right)^2}$$

Color Gamut Ratio (NTSC) related to NTSC':
NTSC: =F (display)/F (NTSC')
NTSC' primaries:

	x'	y'
Red	**0.67**	**0.33**
Green	**0.21**	**0.71**
Blue	**0.14**	**0.08**

F (NTSC') =74.42

Perpendicular line (θ=90°)
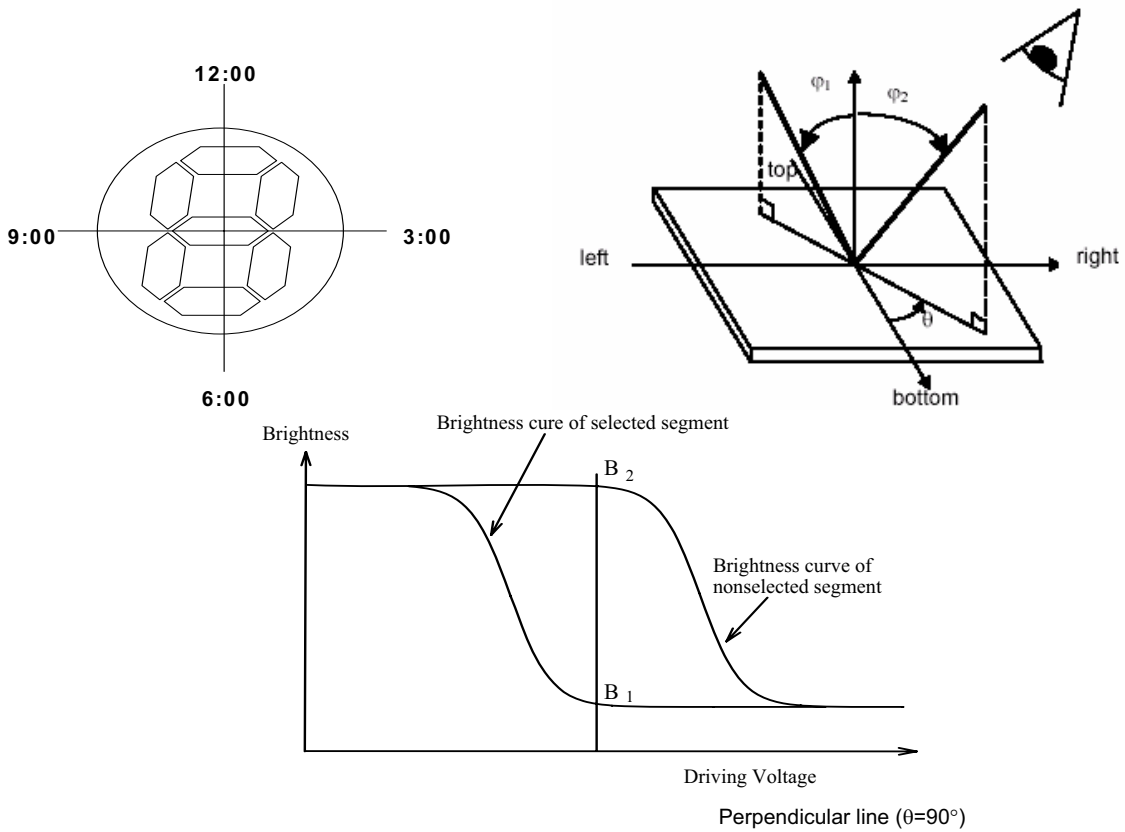
◆ **SPECIFICATION OF QUALITY ASSURANCE**
● **Summary**
The customer should check and accept the products of Multi-Inno within one month after reception. This standard for quality assurance should affirm the quality of LCD products to supply to purchaser by Multi-Inno technology co.,ltd. Entire process is controlled according to QS9000.

● **Warranty period**

Warranty period of this product is 12 months from manufacture code.

● **Standard for quality test**
1、 Inspection
Before delivering, the supplier should take the following test, and confirm the quality of product.
2、 Electro-Optical Characteristics
According to the individual specification to test the product.
3、 Test of Appearance Characteristics:
According to the individual specification to test the product.
4、 Test of Reliability Characteristics
According to the definition of reliability on specification for test product.
5、 Delivery Test
Before delivering, the supplier should take the delivery test

6、 Sampling Method: GB/T2828.1-2003, Level II
7、 The defects classify of AQL as following

Major defect :   AQL=0.65

Minor defect::   AQL= 1.5

● **Nonconforming Analysis & Deal With Manners**
✧ Nonconforming Analysis
1、 Purchaser should supply the detail data of nonconforming sample and the non-suitable state.
2、 After accepting the detail data from purchaser ,the analysis of nonconforming should be finished in two weeks.
3、   If supplier can not finish analysis on time ,must announce purchaser before two weeks.
✧ Disposition of nonconforming
1、   If find any supplier defect during assembly line, supplier must change the good product for every defect after recognition.
2、Both supplier and customer should analysis the reason and discuss the disposition of nonconforming when the reason of nonconforming is not sure.

● **Agreement items.**
Both sides should discuss together when the following problems happen:
1、 There is any problem of standard of quality assurance, and both sides think that must be modifier.
2、There is any argument item which does not record in the quality assurance.
3、Any other special problem.

- **Standard of the Product Appearance Test**
- ■ Manner of appearance test

1、The test must be under 20W*2 or 40W fluorescent light ,and the distance of view must be at 30±5 cm；

2、 When test the model of Transmissive product must add the reflective plate.

3、 The test direction is base on about around 30 degree(within θ range)of vertical line, and the test time is below 5s.
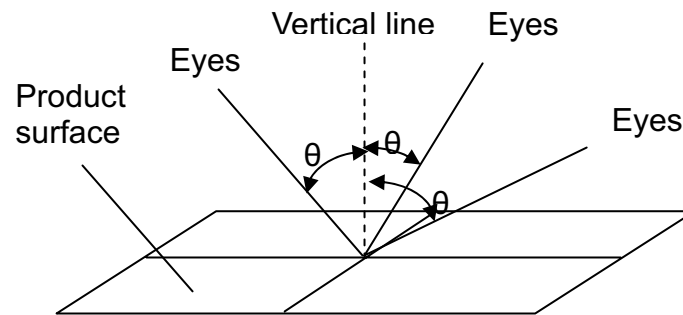
4、Definition of Area:
　　　　A Area: Active area
　　　　B Area: Viewing area
　　　　C Area: Out of viewing area
　　　　D Area: Seal area
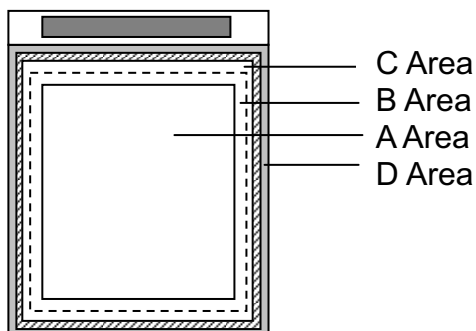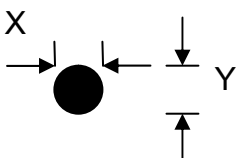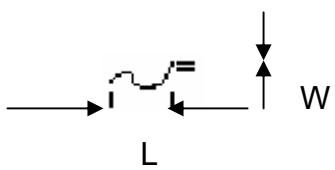
Note:
A: Active Area is drawn in the drawing
B: Viewing Area border is 2mm from Active Area border

- ■ Basic principle:

1、 It will accord to the AQL when the standard can not be described.

2、 The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.

3、 Must add new item on time when it is necessary.

- ■ **Inspection specification**

NO	Item	Criterion	AQL
01	Electrical Testing	1.1 Missing vertical, horizontal segment, segment contrast defect. 1.2 Missing character, dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 LCD viewing angle defect. 1.7 Contrast defect	0.65
02	LCM black spots, white spots, high luminous spots ,color spots, dim dots, contamination, scratches (display/non-display)	2.1 Round type: As following drawing $\Phi=(x+y)/2$ X Y	1.5

2.1 Round type table:

	Size	Acceptable QTY	Remark
Common dots defect	$\Phi \leqq 0.15$	Ignore	No more than 2 spots within 10mm
	$0.15 < \Phi \leqq 0.25$	3	
	$0.25 < \Phi \leq 0.30$	2	
	$0.30 < \Phi$	0	
Dim dots (1)	$0.80 \geq \Phi$	ignore	No more than 2 spots within 10mm
	$0.80 < \Phi$	0	

2.2 Line Type: (As following drawing)

W

L

Length	Width	Acceptable QTY	Remark
---	$W \leqq 0.03$	Ignore	**More than 10mm between two defects**
$L \leqq 3.5$	$0.03 < \;\leqq 0.05$	3	
$L \leqq 2.5$	$0.05 < \;\leqq 0.08$	3	
---	$0.08 < W$	0	

03	Polarizer bubbles	If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction.	1.5

Under item 03:

Size	Acceptable QTY	Remark
Φ≦0.3 0	ignore	More than 10mm between two defects
0.30<Φ≦0.60	2	
0.60<Φ	0	

04	Pin hole (it can be seen in all the picture, black, white, blue, red, green, et.)		**1.5**

Size	Acceptable QTY	
Φ≦0.10	Ignore	More than 10mm between two defects
0.10<Φ≦0.25	2	
0.25<Φ	0	

05	Backlight elements	5.1 Illumination source flickers when lit.	0.65
		5.2 Spots or scratches that appear when lit must be judged using LCD spot, lines and contamination standards.	1.5
		5.3 Backlight doesn't light or color is wrong	0.65

06	Soldering	6.1 No unmelted solder paste may be present on the PCB.	0.65
		6.2 No cold solder joints, missing solder connections, oxidation or icicle.	0.65
		6.3 No residue or solder balls on PCB.	1.5
		6.4 No short circuits in components on PCB.	0.65

07	General appearance	7.1 No oxidation, contamination, curves or, bends on interface pin (OLB) of FPC	1.5
		7.2 No cracks on interface pin(OLB) of FPC	0.65
		7.3 NO contamination, solder residue or solder balls on product.	1.5
		7.4 The IC on the FPC may not be damaged, circuits.	
		7.5 The residual rosin or tin oil of soldering (component or chip component) is not burned into brown or black color.	0.65
		7.6 Sealant on top of the ITO circuit has not hardened	1.5
		7.7 Pin type must match type in specification sheet.	
		7.8 LCD pin loose or missing pins.	1.5
		7.9 Product packaging must the same as specified on packaging specification sheet.	1.5
		7.10 Product dimension and structure must conform to product specification sheet.	0.65
			1.5
			1.5

Note:

(1) Dim dots defect:

DIM DOT, circle shaped and dim edged defects, may present a subtle punctuated shadow in the gray picture. It is caused by smudge or damnification in the internal LCD but not influence the display performance.

◆ RELIABILITY

Remark:

The normal temperature test conditions used for C-STN

1. Environmental reliability requirements

No	Test Item	Test Condition& Criteria	Sample Size	Determinant	AQL
1-1	High Temperature Storage	Temperature:70±3℃; Humidity: Except; Test method: Storage Duration: 240Hrs	≥2PCS	TS-1	**0/1** pass / reject
1-2	Low Temperature Storage	Temperature:-20±3℃; Humidity: Except; Test method: Storage Duration: 240Hrs	≥2PCS		
1-3	High Temperature / Humidity Storage	Temperature:50±3℃; Humidity: 90%±3%RH; Test method: Storage Duration: 240Hrs	≥2PCS		
1-4	High Temperature Operation	Temperature:60±3℃; Humidity: Except; Test method: Operation	≥2PCS	TS-2	

No.	Test Item	Test Condition & Criteria	Sample Size	Determinant Spec.
		Duration: 96Hrs		
1-5	Low temperature Operation	Temperature:-10±3℃; Humidity: Except; Test method: Operation Duration: 96Hrs	≥2PCS	
1-6	High Temperature / Humidity Operation	Temperature:40±3℃; Humidity: 90%±3%RH; Test method: Operation Duration: 96Hrs	≥2PCS	
1-7	Temperature Shock	–20° C for 30 minute, followed by transition to +70° C for 30 minute. Transition time shall not exceed 3minute. The devices shall be exposed to 20 cycles.	≥2PCS	TS-3

Item	FAULT JUDGMENT CRITERIA
TS-1	Inspection after normal recovery time is 3H: 1.no LC air bubble&leakage、 no polarizer shrinkage and warp; 2.no display function related objection contrast before test.
TS-2	Inspection after specified recovery time in room temperature: 1.No clearly visible defects; 2. display and function shall demonstrate normal performance
TS-3	Inspection after normal recovery time is 3H: 1. No clearly visible defects or deterioration of display quality allowed. 2. No display and function related abnormalities.

NOTE：

1. When temperature moves, LCD's valve voltage will be influenced by it, which leads to LCD's contrast and chroma change.

2. In high temperature operation and storage tests in MQE test will make LCD's power consumption increase. The reason is that a few crystal molecules are apart because of high temperature when there is a long time storage and operation in high temperature, which leads to decrease of gross resistance ratio of crystal molecules.Hence, LCD's power consumption go up than that of before test.

2. Mechanical Reliability requirements

No.	Test Item	Test Condition& Criteria	Sample Size	Determinant Spec.
2-1	ESD test	Discharge modality: Contact Discharge; Discharge voltage:±0.2KV~±2KV; (Discharge R=330Ω;C=150PF)	≥2PCS	No software error
2-2	Package Vibration	Vibration Frequency:10HZ~55HZ; Vibration Amplitude:0.75mm;	1box	The inspection of

		Acceleration: > 0.5g; Vibration Time:,Z axis 90min.		appearance, the whole structure no error

2-3	Package Drop	Drop high:
		$\boxed{\begin{array}{l}\text{A≤9KG:H=100CM;}\\\text{G<A≤18KG:H=80CM;}\\\text{A > 18KG:H=60CM.}\end{array}}$
		("A": Package total avoirdupois);
		drop direction /times:
		  a. one time each 6 faces
		  b. one time any 3 ridges
		  c. one time any 2 corner
			1box	The inspection of appearance, the whole structure no error

3. Soldering

(1) Soldering temperature: 340+/-10℃.
(2) Available times for repeated soldering: 5 times
(3) Attentions paid when soldering：
  A. FPC's golden finger and soldering pad are butt-jointed before soldered. Tolerance is within the 1/3 width of golden finger and 0.5~1mm of FPC's length is allowed to be exposed in the jointed soldering pad.
  B. Coat proper tin in the iron-head when soldering, with dragging speed of 2.5cm/sec.
  C. The soldering part is warmed up first with iron-head when there is a rework. Then heat it up from one side until tin is melted, last, take off FPC.

4. FPC cable flexing and bending test

Number of Bending / Flexing Cycles: <10 times
Radius of the Bend Mandrels: >0.4 mm
Degree of Bend: <180°

◆ SUGGESTIONS FOR USING LCD MODULES

● Handling of LCM

(1) The LCD screen is made of glass. Don't give excessive external shock, or drop from a high place.

(2) If the LCD screen is damaged and the liquid crystal leaks out, do not lick and swallow. When the liquid is attach to your hand, skin, cloth etc, wash it off by using soap and water thoroughly and immediately.

(3) Don't apply excessive force on the surface of the LCM.

(4) If the surface is contaminated, clean it with soft cloth. If the LCM is severely contaminated, use Isopropyl alcohol/Ethyl alcohol to clean. Other solvents may damage the polarizer. The following solvents are especially prohibited: water, ketone Aromatic solvents etc.

(5) Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity

environment.

(6) Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.

(7) Don't disassemble the LCM.

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

- Be sure to ground the body when handling the LCD modules.

- Tools required for assembling, such as soldering irons, must be properly grounded.

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

- The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

(9) Do not alter, modify or change the shape of the tab on the metal frame.

(10) Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.

(11) Do not damage or modify the pattern writing on the printed circuit board.

(12) Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector

(13) Except for soldering the interface, do not make any alterations or modifications with a soldering iron.

(14) Do not drop, bend or twist LCM.

(15) If the LCM is assembled with touch panel, pay more attention to using touch panel.

* Please wear clean finger sacks, gloves and mask to protect the products from fingerprint or stain attach, and also hold the portion outside the view area when handling the panel.

* Please use finger sacks or gloves to avoid injuries by sharp edges when handling the Film-Glass type touch panel because a glass edges are not chamfered.

* Cautions for installing and assembling

- Do not give excessive strain to the product.

- Flexible pattern cable is connected to the TP body by heat-seal(thermal pressure) method. So, do not apply excessive forces to the flexible pattern.

- In order not to apply load on the surface of the touch panel, please keep a clearance of 0.2mm-0.5mm between product and case.

- Pressing inside of boundary of the frame(part(A) as shown in below) may cause fault operation, so please design to avoid pressing of touch panel at part (A) such as

having gasket/cushion at part (C). Particularly the area (B) shall be free from burr. The gasket/cushion material at the part (C) should not be exceeded to inside of the boundary of the frame.
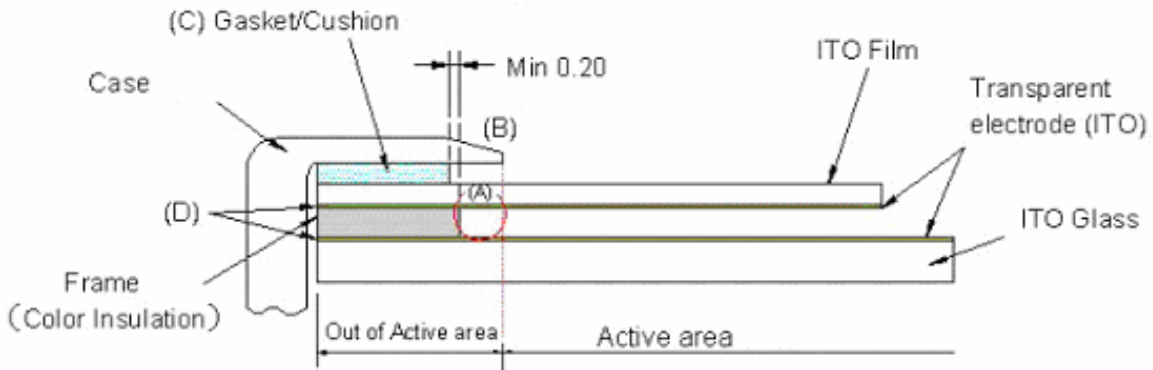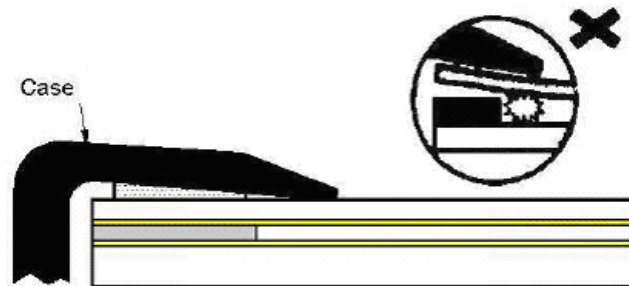

Do not make the following mistakes:
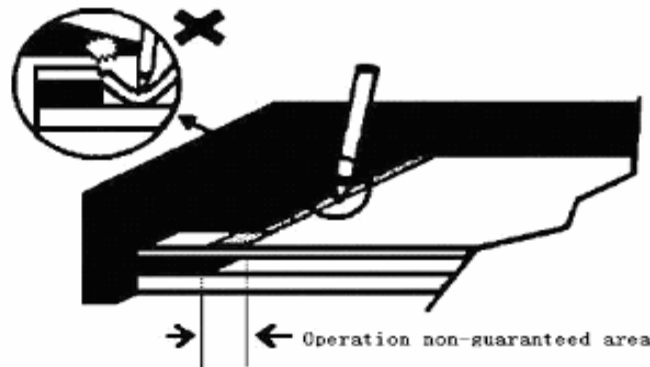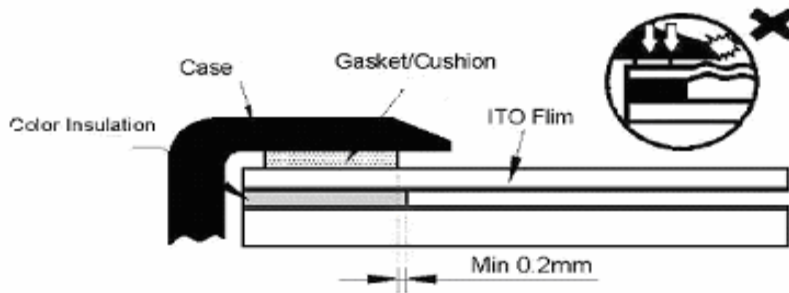
- When designing installment of case and touch panel, you would better consider to keep clearance of 0.2-0.3mm between touch panel and inside boundary of case.
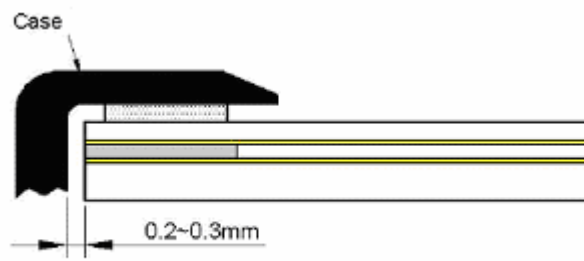
- Please keep your case flat in order not to touch with touch panel directly which causes serious damage of a transparent electrode.

- Do not use any organic solvent or detergent other than ethanol.

- The corners of the product are not chamfered. When positioning and fixing the product on the case, we suggest that you would provide a R part on the corner of the case so as net to apply load on the corner of the transparent touch panel.
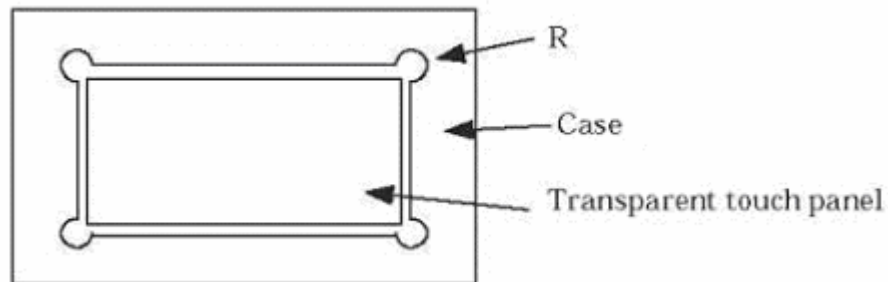
- Please confirm its characteristic in advance whether any damage is given to this product when attaching a protection sheet on this product at customer side. Some changes may arise in the characteristics of this product by the protection sheet attachment such as operation, cosmetic, etc.. However, those changes are out of our guarantee.

- *** <u>Storage</u>**

(1) Store in an ambient temperature of 5 to 45 ∘C, and in a relative humidity of 40% to 60%. Don't expose to sunlight or fluorescent light.

(2) Storage in a clean environment, free from dust, active gas, and solvent.
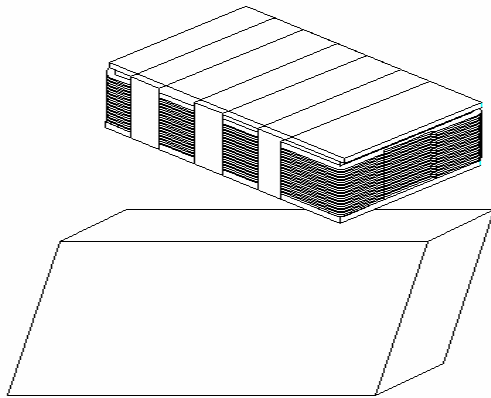
(3) Store in antistatic container.

◆ PACKING

● Packing Materials

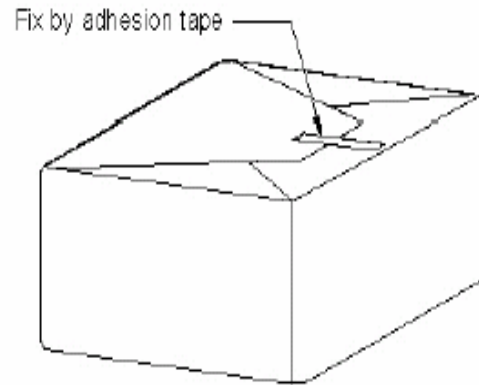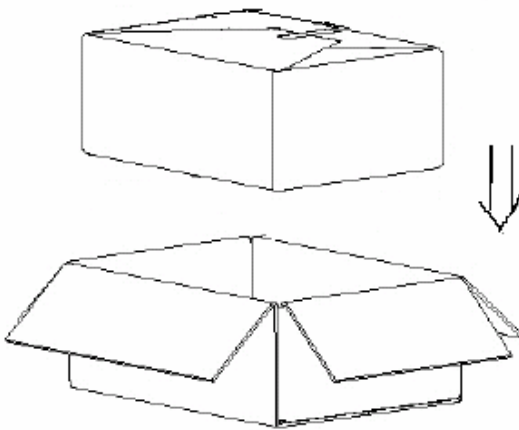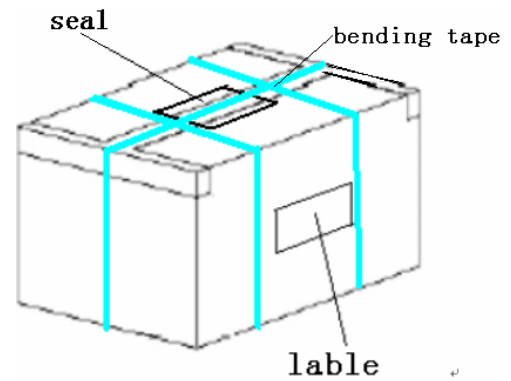| NO.	ITEM	Dimension(LXWXH) (mm)	Quantity
1	Tray	424X295X10.0	TBD
2	Carton	437X307X163	TBD

● Packing Method

(1)   (2)

(3)   (4)

(5)   (6)

Fix by adhesion tape

(7)   (8)

seal   bending tape

lable
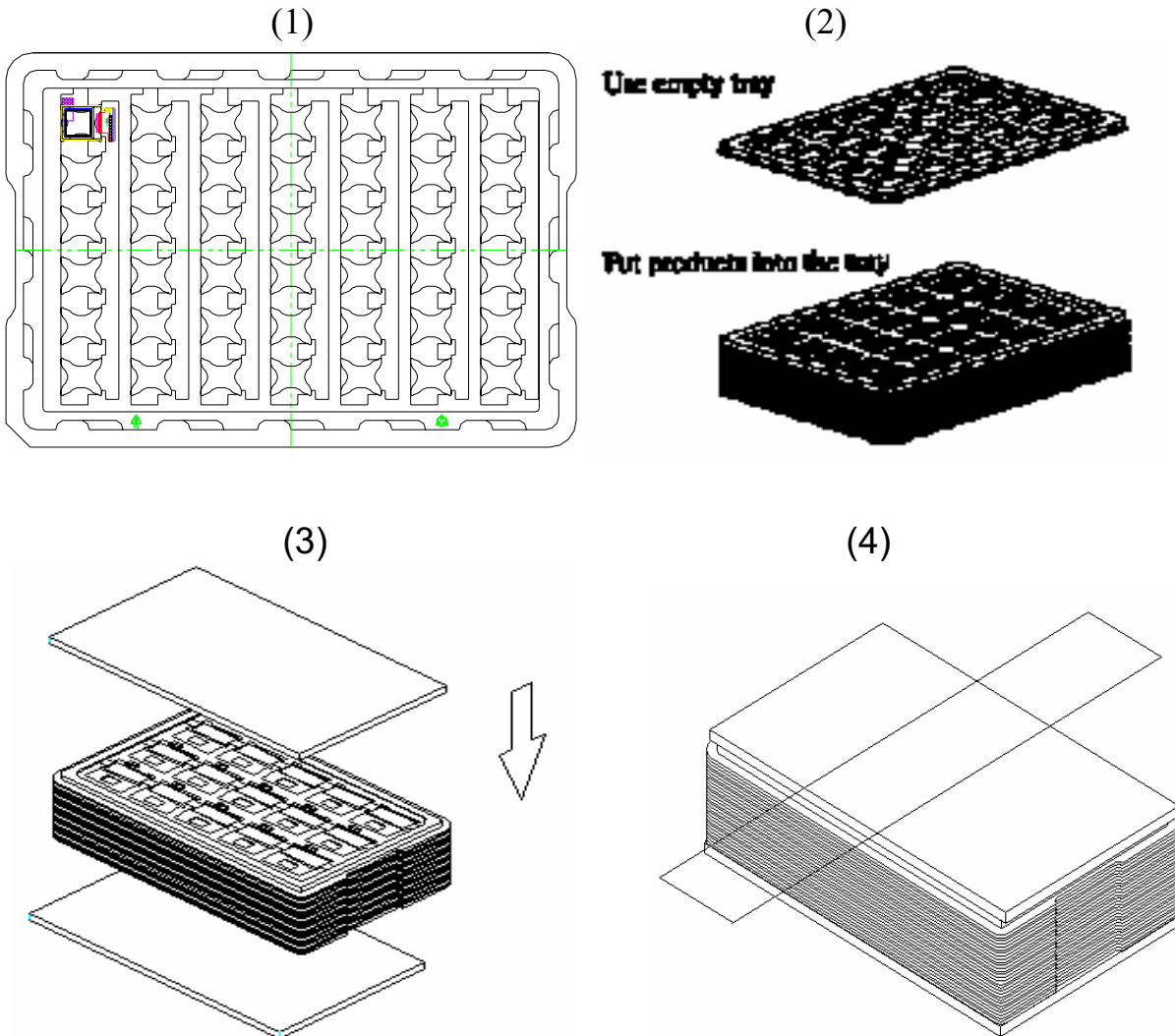
 (1). Put module into tray cavity :
(2). Tray stacking
(3). Put 1 cardboard under the tray stack and 1 cardboard above:
(4). Fix the cardboard to the tray stack with adhesive tape:
(5). Put the tray stack and 4 pcs desiccant into the LDPE bag
(6). Fix the LDPE bag with adhesive tape:
(7). Put LDPE bag with tray stack into carton.:
(8). Carton sealing with adhesive tape.