MULTI-INNO TECHNOLOGY CO., LTD.

LCD MODULE SPECIFICATION

Model : MI0240ST

Revision	1.0
Engineering	
Date	
Our Reference	

History of Versions and Modifications

Version	Modifications	Date
1.0	**Generation first version**	2009-7-1

PRODUCT SPECIFICATIONS

◆ MODULE CLASSIFICATION INFORMATION

MI 0240 ST

MI: MULTI-INNO standard module

0240: Display Size 2.41 inch

S : Serial Number

T:Display Mode

T : TFT module

◆ LCD MODULE PHYSICAL DATA

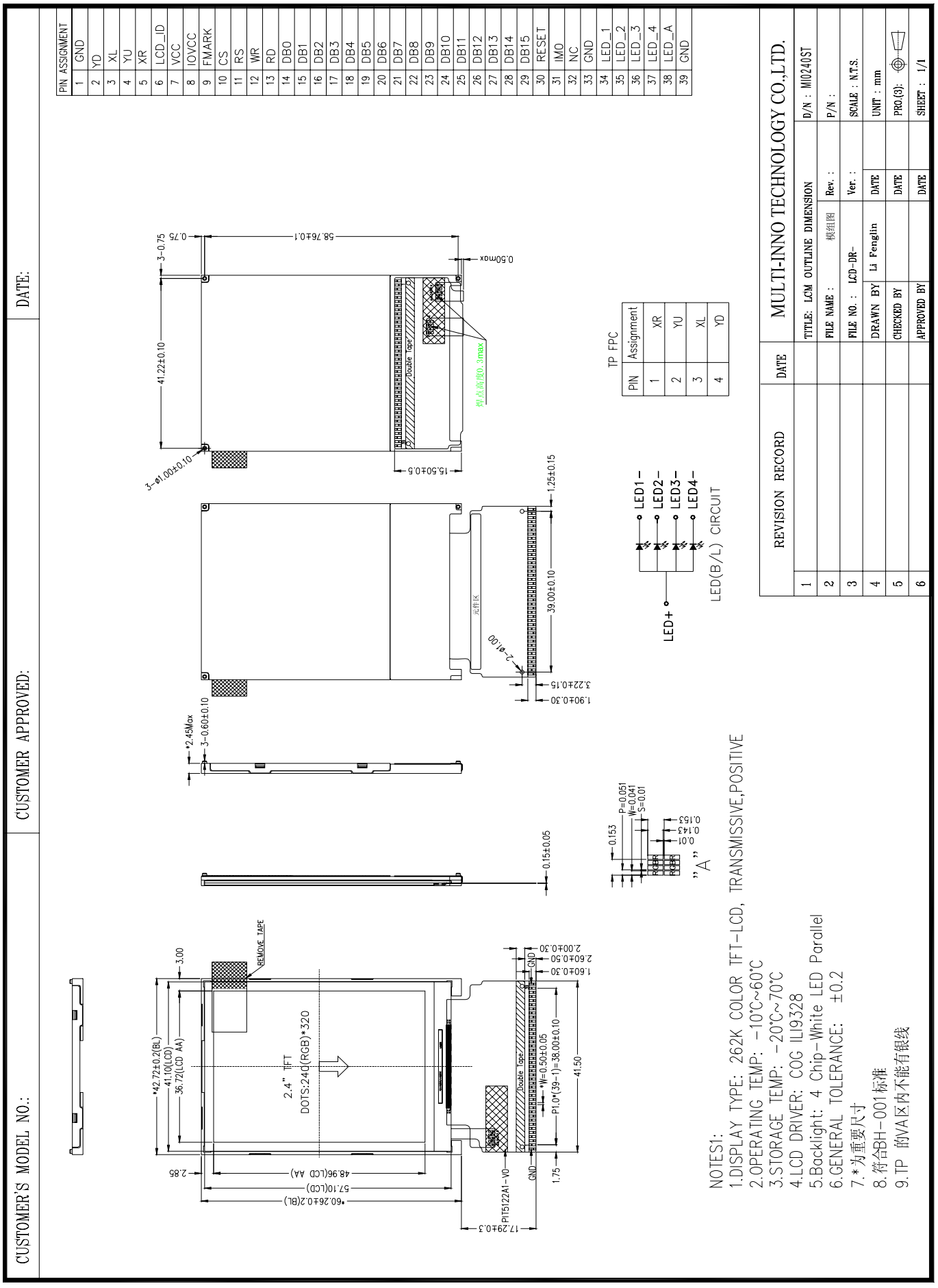
- **General Description**

Size	**2.4"**
Display Type	**262K TFT**
Display Mode	**POSITIVE**
Viewing Direction	**12 o'clock**
Connection Type	**COG**
Operation temperature	**-10℃ ~60℃**
Storage temperature	**-20℃ ~70℃**
Driving IC	**ILI9328**

- **Mechanical Description**

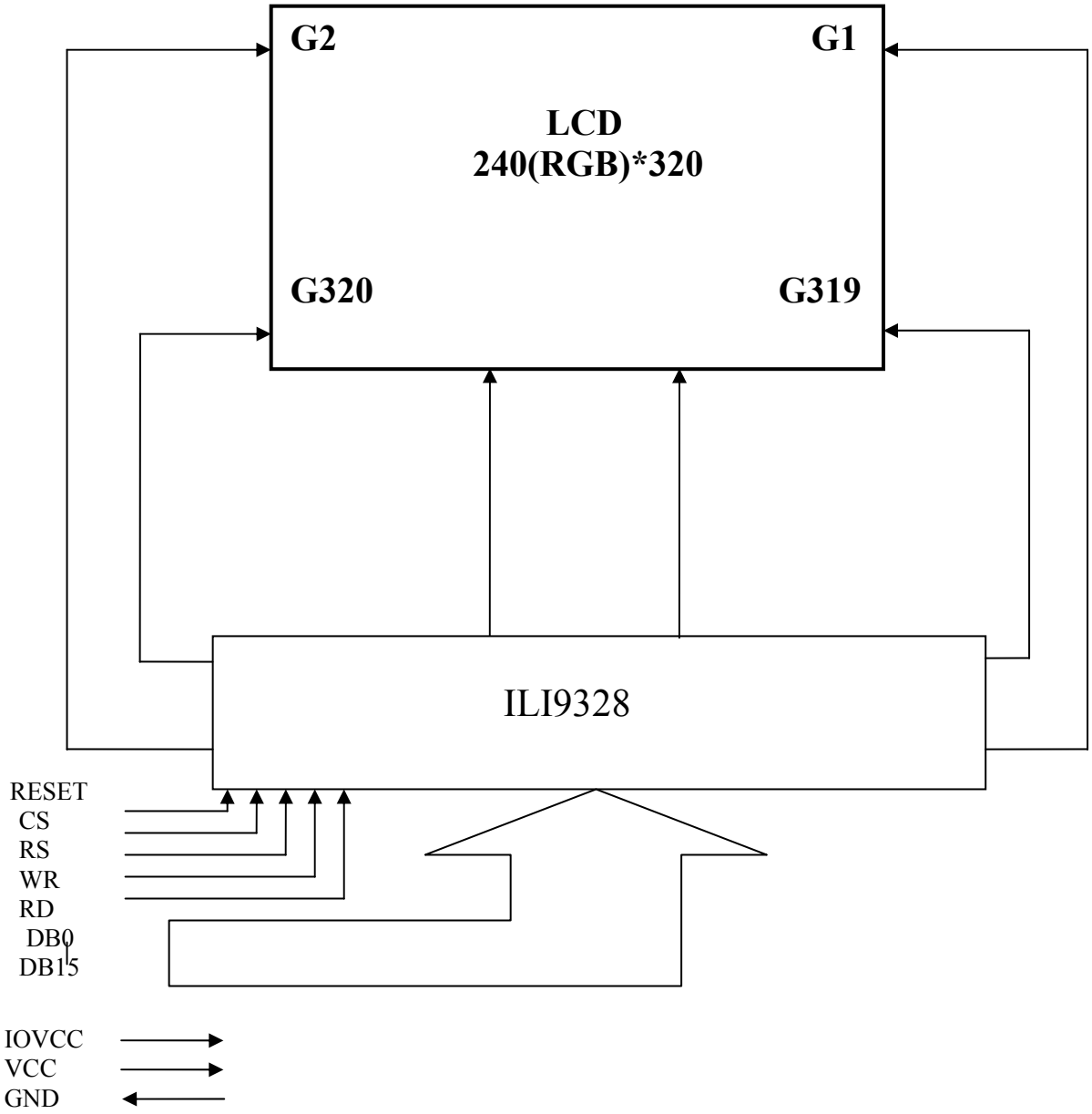
Item	Standard Value	Unit
Number of dots	**240RGB×320dots**	-
LCM dimension	**42.72(W)×60.26(H)×2.45(T)**	**mm**
Active area	**36.72(W)×48.96(H)**	**mm**
Dot size	**0.143 (W)×0.143(H)**	**mm**
Dot pitch	**0.153 (W)×0.153(H)**	**mm**
Backlight	**4 CHIP LEDS PARALLEL**	/
The KEY and accessory materials of our product according with BHS-001 standard		

◆ EXTERNAL DIMENSIONS

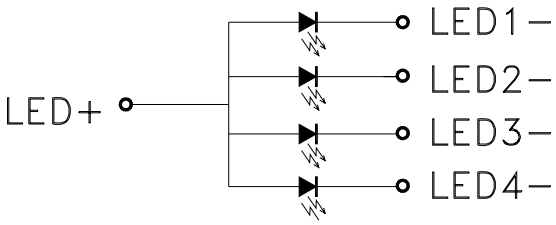


◆ BLOCK DIAGRAM

● TFT-LCD Module (Interface System Structure)



● Black Light Unite



◆ ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Rating	Unit
Operating temperature	Top	-40 to 85	℃
Storage temperature	Tst	-55 to 110	℃
Input voltage	Vin	0 to VCC	V
Supply voltage for logic	VCC	-0.3 to 4.6	V
Supply voltage for LCD	VGH ~ VSSA	-0.3 to 18.5	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
Supply voltage for logic	V_{DD}-V_{SS}	Ta=25℃	-	2.8	-	V
Operating voltage for LCD	V_{GH}	Ta=25℃	9	-	16.5	V
Operating voltage for LCD	V_{GL}	Ta=25℃	-16.5	-	-4	V
Current consumption for LCD normal operation	I_{DD}	V_{DD} =2.8V	-	-	9	mA

● Back-Light unit

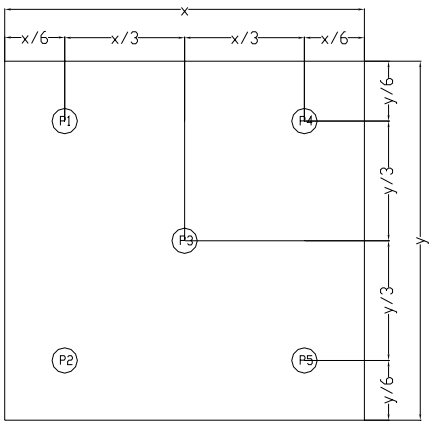
Item	Symbol	Min	Typ	Max	Unit	Remark
Current	I_{BL}	-	20	-	mA	1 LED
CIE	X	0.25	-	0.29	-	X>Y
	Y	0.24	-	0.28	-	
Brightness	-	3500	-	-	cd/m²	-
Luminous Uniformity Ratio	-	80	-	-	%	-
Bezel(BE) must be connected to ground of the main board						

Note:

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

2. Luminous Uniformity Ratio =(The Lvmin/Lvmax) * 100%

Measured Method (X*Y: Light Area).



● AC Characteristics

Refer to the SPEC of ILI9328

◆ INTERFACE PIN CONNECTIONS

NO.	Symbol	Function
1	GND	Ground
2	YD	TP pin（NC）
3	XL	
4	YU	
5	XR	
6	LCD-ID	LCM identify
7	VCC	Power supply
8	IOVCC	Power supply
9	FMARK	Frame head pulse signal
10	CS	Chip select
11	RS	Register select pin
12	WR	Write signal
13	RD	Read signal
14	DB0	16-bit data bus.
15	DB1	
16	DB2	
17	DB3	
18	DB4	
19	DB5	
20	DB6	
21	DB7	
22	DB8	
23	DB9	
24	DB10	
25	DB11	
26	DB12	
27	DB13	
28	DB14	
29	DB15	
30	RESET	Reset signal
31	IM0	Interface select pin
32	NC	No connection
33	GND	Ground
34	LED-1	Cathode of backlight
35	LED-2	
36	LED-3	
37	LED-4	
38	LED-A	Anode of backlight
39	GND	Ground

◆ Recommand Initial Code

```
void initial()
  {
       reset=0;
       delay(100);
       reset=1;
       delay(50);
//------------Start Initial Sequence ----------------//
//    Set_LCD_8B_REG(0x00E3, 0x3008); // Set internal timing
//    Set_LCD_8B_REG(0x00E7, 0x0012); // Set internal timing
//    Set_LCD_8B_REG(0x00EF, 0x1231); // Set internal timing
      Set_LCD_8B_REG(0x0001, 0x0100); // set SS and SM bit
      Set_LCD_8B_REG(0x0002, 0x0700); // set 1 line inversion
      Set_LCD_8B_REG(0x0003, 0x1030); // set GRAM write direction and BGR=1.1030
      Set_LCD_8B_REG(0x0004, 0x0000); // Resize register
      Set_LCD_8B_REG(0x0008, 0x0207); // set the back porch and front porch
      Set_LCD_8B_REG(0x0009, 0x0000); // set non-display area refresh cycle ISC[3:0]
      Set_LCD_8B_REG(0x000A, 0x0000); // FMARK function
      Set_LCD_8B_REG(0x000C, 0x0000); // RGB interface setting
      Set_LCD_8B_REG(0x000D, 0x0000); // Frame marker Position
      Set_LCD_8B_REG(0x000F, 0x0000); // RGB interface polarity
      //*************Power On sequence ****************//
      Set_LCD_8B_REG(0x0010, 0x0000); // SAP, BT[3:0], AP, DSTB, SLP, STB
      Set_LCD_8B_REG(0x0011, 0x0007); // DC1[2:0], DC0[2:0], VC[2:0]
      Set_LCD_8B_REG(0x0012, 0x0000); // VREG1OUT voltage
      Set_LCD_8B_REG(0x0013, 0x0000); // VDV[4:0] for VCOM amplitude
      delay(200);                                 // Dis-charge capacitor power voltage
      Set_LCD_8B_REG(0x0010, 0x1490); // SAP, BT[3:0], AP, DSTB, SLP, STB
      Set_LCD_8B_REG(0x0011, 0x0227); // R11h=0x0221 at VCI=3.3V, DC1[2:0], DC0[2:0], VC[2:0]
      delay(50);                                  // Delay 50ms
      Set_LCD_8B_REG(0x0012, 0x001C); // External reference voltage= Vci;
      delay(50);                                  // Delay 50ms
      Set_LCD_8B_REG(0x0013, 0x1800); // VDV[4:0] for VCOM amplitude//1a15
      Set_LCD_8B_REG(0x0029, 0x0017); // VCM[5:0] for VCOMH//1d10
      Set_LCD_8B_REG(0x002B, 0x000C); // Frame Rate = 91Hz
      delay(50);                                  // Delay 50ms
      Set_LCD_8B_REG(0x0020, 0x0000); // GRAM horizontal Address
      Set_LCD_8B_REG(0x0021, 0x0000); // GRAM Vertical Address
      // ----------- Adjust the Gamma Curve ----------//
      Set_LCD_8B_REG(0x0030, 0x0000);
      Set_LCD_8B_REG(0x0031, 0x0506);
      Set_LCD_8B_REG(0x0032, 0x0104);
      Set_LCD_8B_REG(0x0035, 0x0207);
      Set_LCD_8B_REG(0x0036, 0x000F);
      Set_LCD_8B_REG(0x0037, 0x0306);
      Set_LCD_8B_REG(0x0038, 0x0102);
      Set_LCD_8B_REG(0x0039, 0x0707);
      Set_LCD_8B_REG(0x003C, 0x0702);
      Set_LCD_8B_REG(0x003D, 0x1604);
      //------------------ Set GRAM area ---------------//
      Set_LCD_8B_REG(0x0050, 0x0000); // Horizontal GRAM Start Address
      Set_LCD_8B_REG(0x0051, 0x00EF); // Horizontal GRAM End Address
      Set_LCD_8B_REG(0x0052, 0x0000); // Vertical GRAM Start Address
      Set_LCD_8B_REG(0x0053, 0x013F); // Vertical GRAM end Address
      Set_LCD_8B_REG(0x0060, 0xA700); // Gate Scan Line
      Set_LCD_8B_REG(0x0061, 0x0001); // NDL,VLE, REV
      Set_LCD_8B_REG(0x006A, 0x0000); // set scrolling line
      //-------------- Partial Display Control ---------//
```

```
    Set_LCD_8B_REG(0x0080, 0x0000);
    Set_LCD_8B_REG(0x0081, 0x0000);
    Set_LCD_8B_REG(0x0082, 0x0000);
    Set_LCD_8B_REG(0x0083, 0x0000);
    Set_LCD_8B_REG(0x0084, 0x0000);
    Set_LCD_8B_REG(0x0085, 0x0000);
    //-------------- Panel Control --------------------//
    Set_LCD_8B_REG(0x0090, 0x0010);
    Set_LCD_8B_REG(0x0092, 0x0600);

    Set_LCD_8B_REG(0x0007, 0x0133); // 262K color and display ON
    write_command(0x0022);

}
```

◆ ELECTRO-OPTICAL CHARACTERISTICS

Driving condition: VDD= 2.8V, I_{BL}=20mA/LED, Temperature =23℃±5℃Humidity=60%±20%RH

Item			Light angle (°)	Temp (°C)	Symbol	Specifications			Unit	Conditions	Note
						Min.	Typ.	Max.			
Transmittance			0	25	-	4.5	5	-	%	(Equipment :BM-7/CS200)	(1)
Contrast ratio			0	25	Cr	-	900	-	-		(2)
Brightness			0	25	-	-	240	-	cd/m²		-
Luminance uniformity (surface within panel)			0	25	Lu	70	80	-	%		(3)
Cross talk			0	25	CTV	-	-	20	%		(4)
Chromaticity	R x		0	25	Rx	0.2236	0.2736	0.3236	-		-
	R y				Ry	0.2930	0.3430	0.3930			
	G x				Gx	0.2793	0.3293	0.3793			
	G y				Gy	0.5467	0.5967	0.6467			
	B x				Bx	0.0937	0.1437	0.1937			
	B y				By	0.0447	0.0947	0.1447			
	W x				Wx	0.2236	0.2736	0.3236			
	W y				Wy	0.2631	0.3131	0.3631			
Color Reproduction Area(NTSC)			0	25	-	-	60	-	%	CIE1931(x,y)	(5)
Response time	Tr		0	25	-	-	10	-	ms	Viewing normal angle $\theta_X = \theta_Y = 0^0$	-
	Tf					-	20	-			
Viewing angle	Hor.	θ_{X+}	0	25	-	-	45	-	deg	Center CR≥10	-
		θ_{X-}			-	-	45	-			
	Ver.	θ_{Y+}			-	-	35	-			
		θ_{Y-}			-	-	15	-			

Note:

(1) .Transmittance

Introduction

Transmittance (diffuse transmission factor) is a measure for the LCD panel transparency. The Light Source for this measurement is the accompanying LCD-module backlight system (LEDs, Lightguide…)

Measurement conditions:

Measuring Equipment	BM-7/CS-200
Measurement Point Diameter	3mm
Measurement Point Location	Active Area Center Point
Light source	LCD module backlight
Reflectance Plate	Reflectance Standard(cal. plate)
Test pattern	All pixels white
Contrast setting	Maximum

Measuring procedure:

Transmittance:

The light source is located at the backside of the panel.

1、 Measure the light source

2、 Place the LCD panel in front of the light source. Measure the luminance on the LCD panel surface

Definitions

$$\tau = \frac{Lv_{LCD-panel}}{Lv_{lightsource}} * 100\%$$

(2) 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

(3). Surface luminance uniformity within panel

Measurement conditions:

Measuring Equipment	**CS-200 // 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.

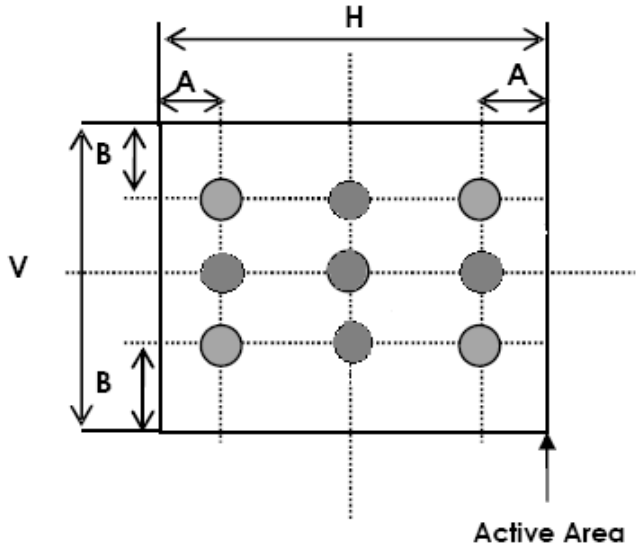


Figure 1

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

Uniformity value (Lu):

$$Lu = \frac{\min(Li)}{\max(Li)} * 100\%$$

(4).CROSS-TALK

Introduction：

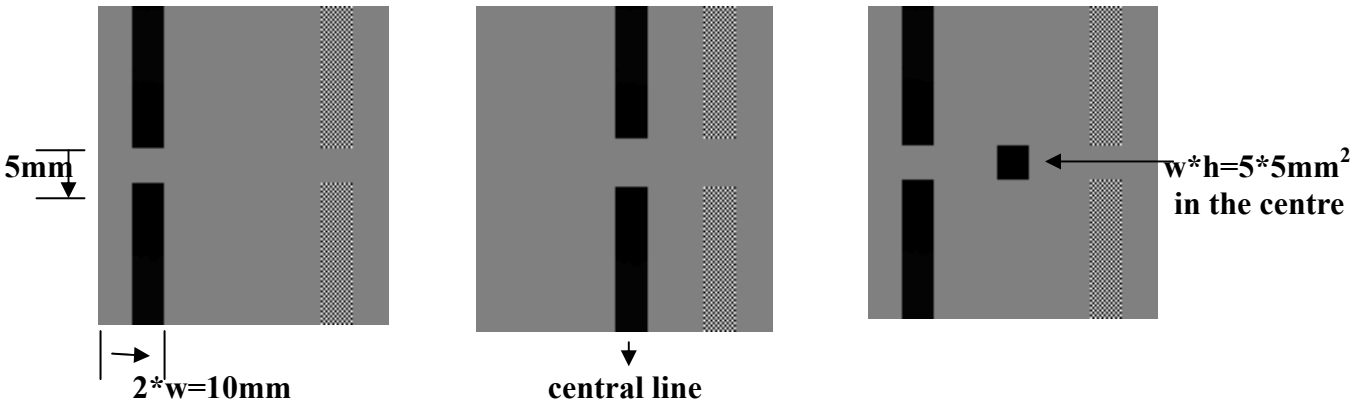
Crosstalk is an effect where the contrast of a display pixel is influenced by the state of the related pixels. A measure for this effect is the Cross Talk Value (CTV)

Measurement conditions:

Measuring Equipment	**CS-200 // 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;



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)

(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

Definitions

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:

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

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

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

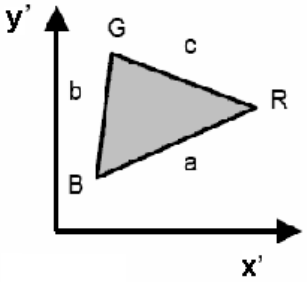
Colour distance definition (maximum allowed colour distance to specified typical colour coordinate):

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

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

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

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

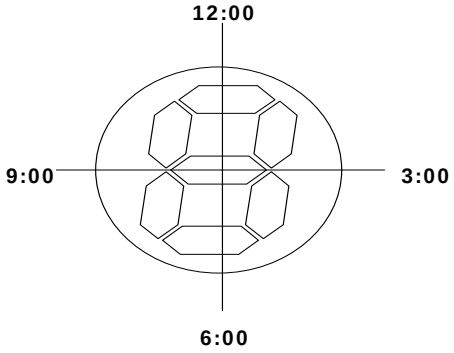
$$b = \sqrt{\left(x'_{blue} - x'_{green}\right)^2 + \left(y'_{blue} - y'_{green}\right)^2}$$

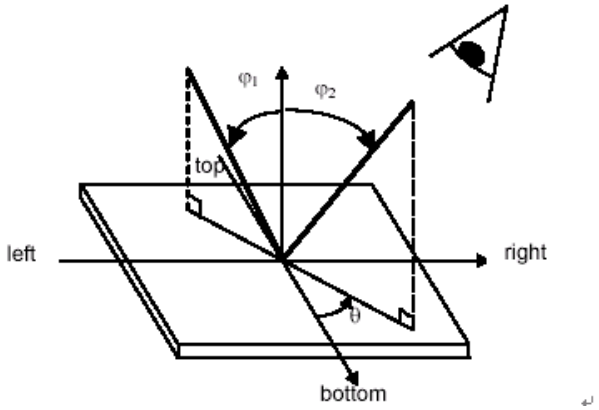
$$c = \sqrt{\left(x'_{red} - x'_{green}\right)^2 + \left(y'_{red} - y'_{green}\right)^2}$$

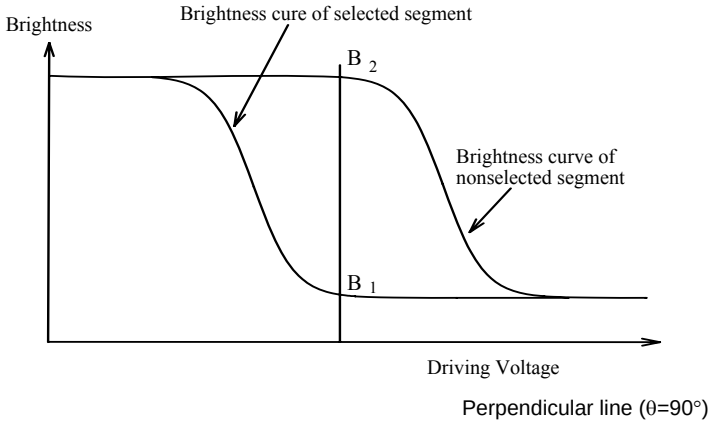
Color Gamut Ratio (NTSC) related to NTSC':
NTSC: =F (display)/F (NTSC')
NTSC' primaries:

	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 ISO9001.

- **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.

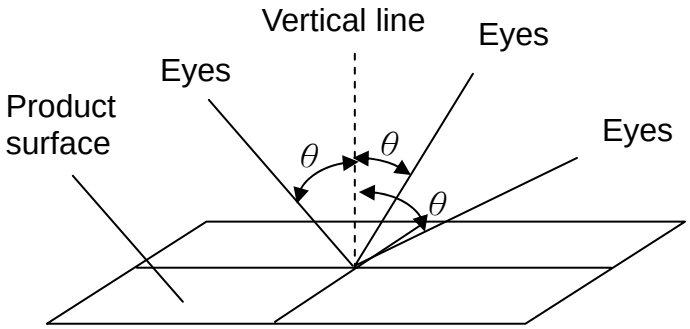
- **Standard of the Product Appearance Test**

■ 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;

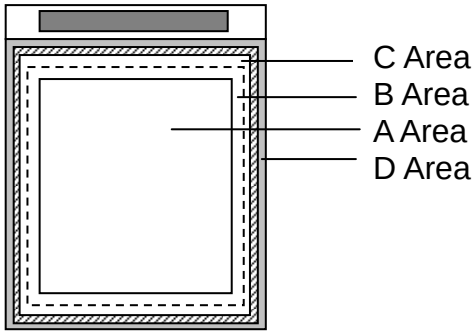
2、 When test the model of Transmissive product must add the reflective plate.

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:

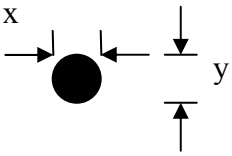
1、 It will accord to the AQL when the standard can not be described.

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.	

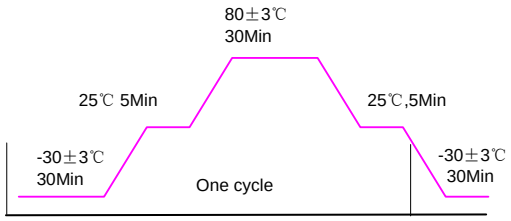
<table>
<tr><td></td><td></td><td>1.4 No function or no display.
1.5 Current consumption exceeds product specifications.
1.6 LCD viewing angle defect.
1.7 Contrast defect</td><td>0.65</td></tr>
<tr><td>02</td><td>LCM black spots, white spots, bright spots , contamination (display/non-display)</td><td>Φ=(x+y)/2
x
 
y
<table>
<tr><td></td><td>Size</td><td>Acceptable QTY</td><td>Remark</td></tr>
<tr><td rowspan="4">Common dots defect</td><td>Φ≦0.10</td><td>Ignore</td><td>/</td></tr>
<tr><td>0.10<Φ≦0.20</td><td>2</td><td>No more than 2 spots within 10mm</td></tr>
<tr><td>0.20<Φ≤0.25</td><td>1</td><td>/</td></tr>
<tr><td>0.25<Φ</td><td>0</td><td>/</td></tr>
</table></td><td rowspan="2">1.5</td></tr>
<tr><td>03</td><td>Scratches/line type contamination (display/non-display)</td><td>As following drawing
 
W
L
<table>
<tr><td>Length</td><td>Width</td><td>Acceptable QTY</td><td>Remark</td></tr>
<tr><td>---</td><td>W≦0.02</td><td>Ignore</td><td>/</td></tr>
<tr><td>L≦3.0</td><td>0.02< W≦0.03</td><td>3</td><td rowspan="2">More than 10mm between two defects</td></tr>
<tr><td>L≦2.5</td><td>0.03< W≦0.05</td><td>3</td></tr>
<tr><td>---</td><td>0.05< W</td><td>0</td><td>/</td></tr>
</table>The LCD with extensive crack is not acceptable.</td></tr>
</table>

<table>
<tr><td>04</td><td>Polarizer bubbles</td><td>If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction.
<table><tr><th>Size</th><th>Acceptable QTY</th><th>Remark</th></tr><tr><td>Φ≦0.2 0</td><td>ignore</td><td>/</td></tr><tr><td>0.20<Φ≤0.50</td><td>2</td><td>More than 10mm between two defects</td></tr><tr><td>0.50<Φ</td><td>0</td><td>/</td></tr></table></td><td>1.5</td></tr>
<tr><td rowspan="4">05</td><td rowspan="3">TP black spots, white spots, concavo-convex spots, scratches (display/non-display)</td><td>5.1 spots
<table><tr><td>Size</td><td colspan="2">Acceptable QTY</td></tr><tr><td>Φ≦0.2</td><td>ignore</td><td>/</td></tr><tr><td>0.2 <Φ≦0.3</td><td>2</td><td>More than 10mm between two defects</td></tr><tr><td>0.3 <Φ</td><td>0</td><td>/</td></tr></table></td><td>1.5</td></tr>
<tr><td>5.2 lines(not scratch): L:Length; W:Width
<table><tr><td>L≦10</td><td>W≦0.05</td><td>Ignore</td><td>/</td></tr><tr><td>L≦10</td><td>0.05< W≦0.10</td><td>2</td><td>More than 10mm between two defects</td></tr><tr><td>------</td><td>0.1< W</td><td>0</td><td>/</td></tr></table></td><td>1.5</td></tr>
<tr><td>5.3 lines(scratch): L:Length; W:Width
<table><tr><td colspan="2">W≦0.03</td><td>Ignore</td><td>/</td></tr><tr><td>L≦2.0, 0.03< W≦0.05</td><td>2</td><td rowspan="2">More than 10mm between two defects</td></tr><tr><td>L≦1.0, 0.05< W≦0.1</td><td>2</td></tr><tr><td colspan="2">L≥2.0, W≥0.05 or L≥1.0, W≥0.1</td><td>0</td><td>/</td></tr></table></td><td>1.0</td></tr>
<tr><td>TP Newton’s ring and Interference fringes</td><td>a: Area of Newton’s ring and Interference fringes
A: Whole TP surface
a≦1/3*A</td><td>1.5</td></tr>
<tr><td>TP- Positioning disabled or losing</td><td>Not allowed</td><td>1.5</td></tr>
</table>

06	Backlight elements	6.1 Illumination source flickers when lit. 6.2 Spots or scratches that appear when lit must be judged using LCD spot, lines and contamination standards. 6.3 Backlight doesn't light or color is wrong	0.65 1.5 0.65
07	Soldering	7.1 No unmelted solder paste may be present on the PCB. 7.2 No cold solder joints, missing solder connections, oxidation or icicle. 7.3 No residue or solder balls on PCB. 7.4 No short circuits in components on PCB.	0.65 0.65 1.5 0.65
08	General appearance	8.1 No oxidation, contamination, curves or, bends on interface pin (OLB) of FPC 8.2 No cracks on interface pin(OLB) of FPC 8.3 NO contamination, solder residue or solder balls on product. 8.4 The IC on the FPC may not be damaged, circuits. 8.5 The residual rosin or tin oil of soldering (component or chip component) is not burned into brown or black color. 8.6 Sealant on top of the ITO circuit has not hardened 8.7 Pin type must match type in specification sheet. 8.8 LCD pin loose or missing pins. 8.9 Product packaging must the same as specified on packaging specification sheet. 8.10 Product dimension and structure must conform to product specification sheet.	1.5 0.65 1.5 0.65 1.5 1.5 1.5 0.65 1.5 1.5

◆ RELIABILITY

1. Environmental Test

No	Test Item	Test Condition& Criteria	Sample Size	Determinant Stand.
1-1	High Temperature Operation	Temperature:70±3℃; Humidity: Except; Test method: Operation Duration: 96Hrs	Sample Do:≥2PCS On Going:≥3PCS/ LOT	TS-01 TS-02
1-2	Low temperature Operation	Temperature:-20±3℃; Humidity: Except; Test method: Operation Duration: 96Hrs	Sample Do:≥2PCS On Going:≥3PCS/ LOT	TS-01 TS-02
1-3	High Temperature / High Humidity Operation	Temperature:60±3℃; Humidity: 95%±3%RH; Test method: Operation Duration: 96Hrs	Sample Do:≥2PCS On Going:≥3PCS/ LOT	TS-01 TS-02
1-4	Temperature Shock test	Shock Temperature & Time:  Duration: 20cycle	Sample Do:≥2PCS On Going:≥3PCS/ LOT	TS-01 TS-02
1-5	Temperature Cycle test	normal temperature 2H→-30±3℃,10H(3H) →60±3℃,90±3%,RH10H(3H) →80±3℃,10H(2H) →(25℃) 5 cycles	Sample Do:≥2PCS On Going:≥3PCS/ LOT	TS-01 TS-02

Item	FAULT JUDGMENT CRITERIA
TS-01	1. Contrast ratio must be at least 50% of initial value. 2. R, G and B color area must be at least 0.5 times initial value. 3. Current consumption must not exceed 2 times initial value.
TS-02	1. No clearly visible defects or deterioration of display quality allowed. 2. No 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 goes up than that of before test.

2. Mechanical Reliability Test

No.	Test Item	Test Condition& Criteria	Sample Size	Determinant Spec.
2-1	ESD test	Discharge modality: Contact voltage: ±1KV、±2KV; Air voltage: ±2KV、±4KV、±6KV; (Discharge R=330Ω;C=150PF)	2 PCS	No software error
2-2	LCM monomer drop test	Drop high:60cm~80cm; Drop to ground: marble Drop direction /times:3 times each obverse and inverse	2 PCS	The inspection of appearance,the whole structure no error
2-3	Static compression test	Pressed area: at the panel center; Diameter:4mm，Length:50mm; press speed:V≤30mm/Min.	10 PCS	The minimum and average of all Static compression value according with corresponding Standard.
2-4	Low temperature knock test	-20±3℃,Storage:24H, Steel ball (Ø=10±1mm,G=5.5±0.5g) knock:10cm to ground and knock 5 times.	2 PCS	The inspection of appearance, capability and 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 is 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 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.

Storage

(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.

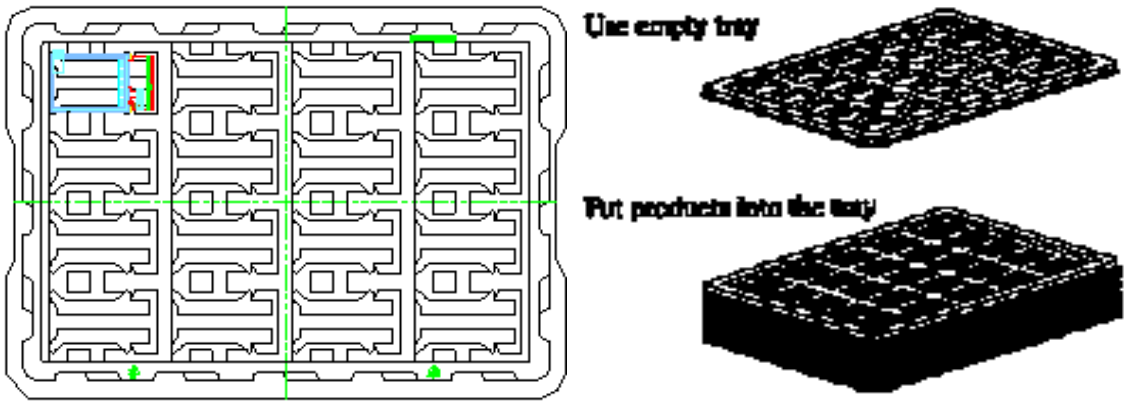
◆ PACKING

- **Packing Materials**

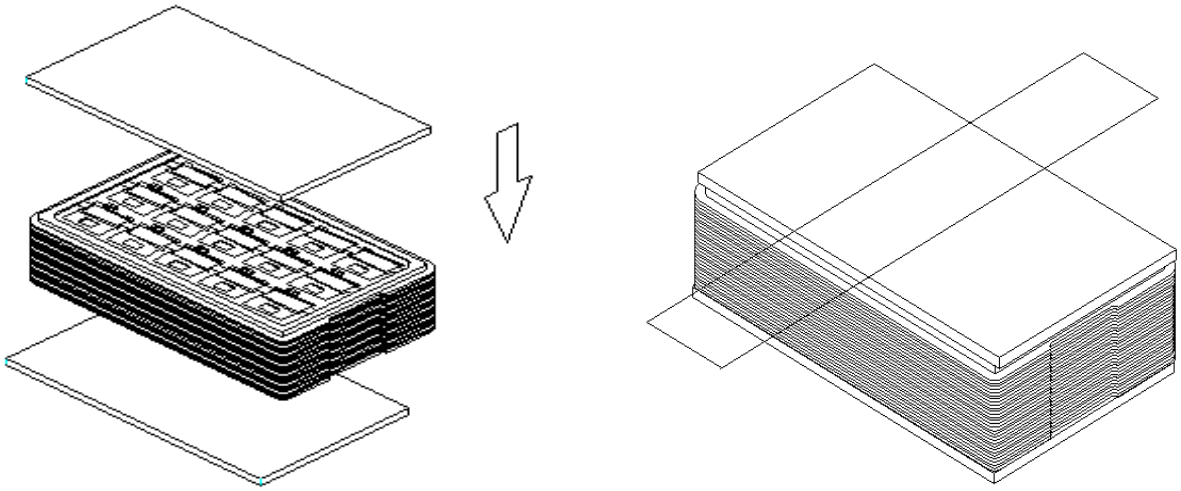
NO.	ITEM	Dimension(LXWXH) (mm)	Quantity
1	Tray	424X295X11	16
2	Carton	437X307X163	240

- **Packing Method**

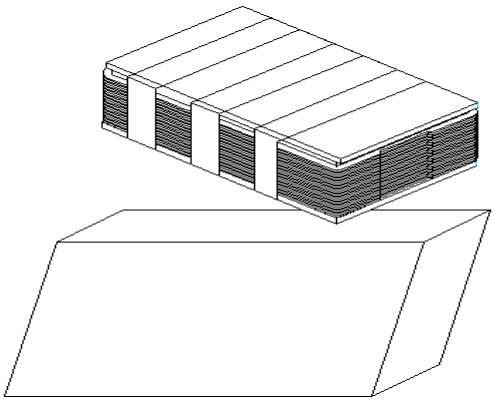
(1) (2)



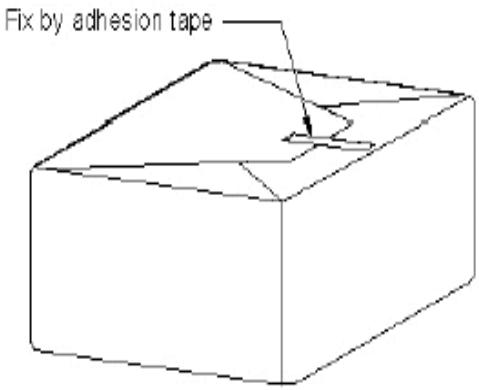
(3) (4)



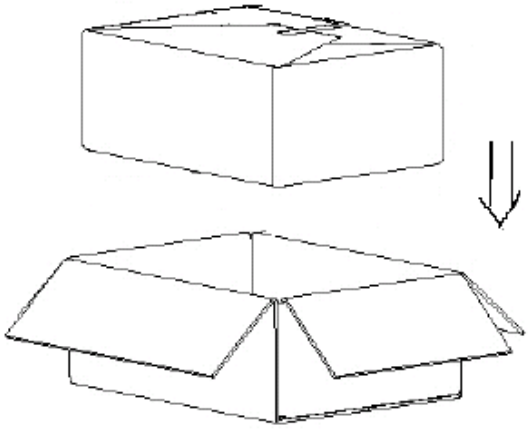
(5)



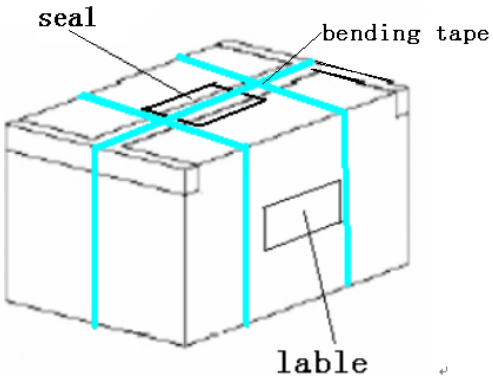
(6)



(7)



(8)



(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.

◆ ENVIRONMENT-RELATED SUBSTANCES

- Meet with Environment-Related Substances Controlled Standard BHS-001