

## Specification for Mono LCD Display module

### 240 x 128 Monochrome LCD Display module

Manufacturer	Yes Optoelectronics Co., Ltd
Part n°	YMS240128-02AIABDSL
Ordering n°	YMS240128-02AIABDSL
Customer Part n°	n/a
Revision n°	1.0
Issue Date	2012/05/25

### Customer's Approval

Company name	
Printed name	
Job title	
Signature	
Approval Stage:	<p>This product is approved for the following production stage: -</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Sample / Prototype</li> <li><input type="checkbox"/> Pre-Production</li> <li><input type="checkbox"/> Mass Production</li> </ul>
Approval Date	

Supplied by Anders Electronics plc  
 Manufactured by Yes Optoelectronics Co., Ltd



ANSHAN YES OPTOELECTRONICS DISPLAY CO.,LTD

# SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY MODULE

MODEL NO.: YMS240128-02AIABDSL

DATE: MAY.25.2012

Approved	Checked	Department

CUSTOMER:

MODEL NO.:

DATE:

Approved	Checked	Department

ADD: 215# QIANSHAN ROAD, ANSHAN LIAONING P.R.CHINA

TEL: 86-412-5211859 FAX: 86-412-5211729 P.C.:114044

E-mail : [yes@yes-lcd.com](mailto:yes@yes-lcd.com), [yeslcd@globalsources.com](mailto:yeslcd@globalsources.com)

Web: <http://www.yes-lcd.com>

<http://www.asiansources.com/sante.com>

DATE MAY.25.2012			TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL	Page 1 / 22

# LIST

I . General Specifications------(3-8)

II .The Characteristics and Reliability Test------(9-10)

III.The LCD Measuring Method and Equipment------(11-13)

IV .Standard Specifications for Product Quality------(14-17)

V . Attached Drawing------(18-19)

VI. Packing -----(20)

VII.Precautions For Use------(21-22)

DATE MAY.25.2012			TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL	Page 2 / 22

## I . General Specifications

### 1.Features

- A. Drive Method: 1/128 Duty, 1/13 Bias
- B. The Module Operating Voltage: 5.0V;
- C. The LCD Operating Voltage : 17.8V;
- D. Viewing Direction: 6:00
- E. Operating Temperature: 0°C~50°C
- F. Storage Temperature: -20°C~70°C
- G. Display type: STN mode, Transmissive, Negative type display

### 2.Mechanical Data and Conditions:

- (1) Module Size ----- 170.0(W) \* 102.9 (H) mm
- (2) Viewing Area ----- 128.0(W) \*74.0(H) mm
- (3) Dot Size ----- 0.47 (W) \* 0.47( H) mm
- (4) Number of Characters----- 240 \* 128 Dots
- (5) Outline Dimensions----- See Attached Drawing

DATE MAY.25.2012			TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL	Page 3 / 22

3.Pin Connections:

Pin No.	Symbol	Function
1	FG	Frame Ground
2	Vss	Ground
3	Vdd	Supply Voltage for Logic
4	VL	Power supply for LCD driving
5	WR	Write control bus
6	RD	Read control bus
7-14	CE	Chip enable signal
15	CD	Selection of COMMAN/STATUS or DATA for data transfer
16	N/C	No connection
17	RESET	Reset Signal
18	DB0-DB7	Data Bus
19	FS1	Selection of character font type
20	RV	DISPLAY DATA REVERSE RV=H: REVERSE DISPLAY RV=L: NORMAL DISPLAY

4. Absolute Maximum Ratings

(Ta=25°C)

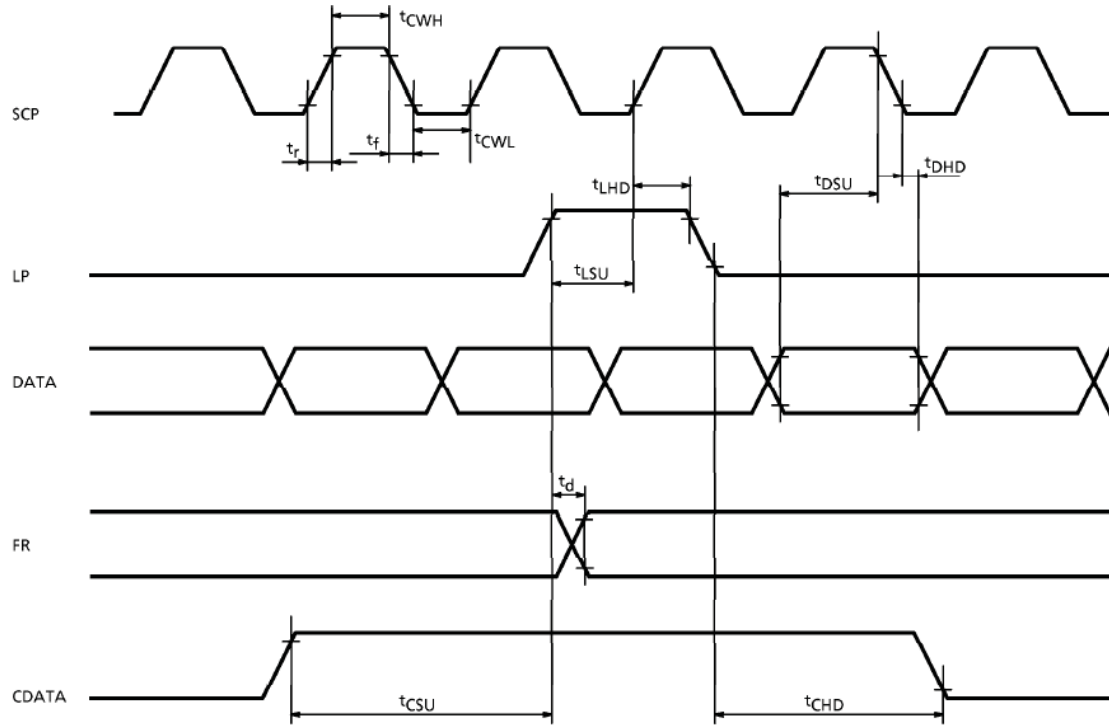
ITEM	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>DD</sub> (Note)	-0.3 to 7.0	V
Input Voltage	V <sub>IN</sub> (Note)	-0.3 to V <sub>DD</sub> + 0.3	V

(Note) Referenced to V<sub>SS</sub>=0V.

DATE MAY.25.2012			TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL	Page 4 / 22

### 5.Timing Characteristics:

- Switching Characteristics (1)



TEST CONDITIONS (Unless otherwise noted,  $V_{DD} = 5.0V \pm 10\%$ ,  $V_{SS} = 0V$ ,  $T_a = -20$  to  $70^\circ C$ )

ITEM	SYMBOL	TEST CONDITIONS	MIN	MAX	UNIT
Operating Frequency	$f_{scp}$	$T_a = -10 \sim 70^\circ C$	—	2.75	MHz
SCP Pulse Width	$t_{CWH}, t_{CWL}$	—	150	—	ns
SCP Rise / Fall Time	$t_r, t_f$	—	—	30	ns
LP Set-up Time	$t_{LSU}$	—	150	290	ns
LP Hold Time	$t_{LHD}$	—	5	40	ns
Data Set-up Time	$t_{DSU}$	—	170	—	ns
Data Hold Time	$t_{DHD}$	—	80	—	ns
FR Delay Time	$t_d$	—	0	90	ns
CDATA Set-up Time	$t_{CSU}$	—	450	850	ns
CDATA Hold Time	$t_{CHD}$	—	450	950	ns

DATE MAY.25.2012

TECHNICAL SPECIFICATION

LCM

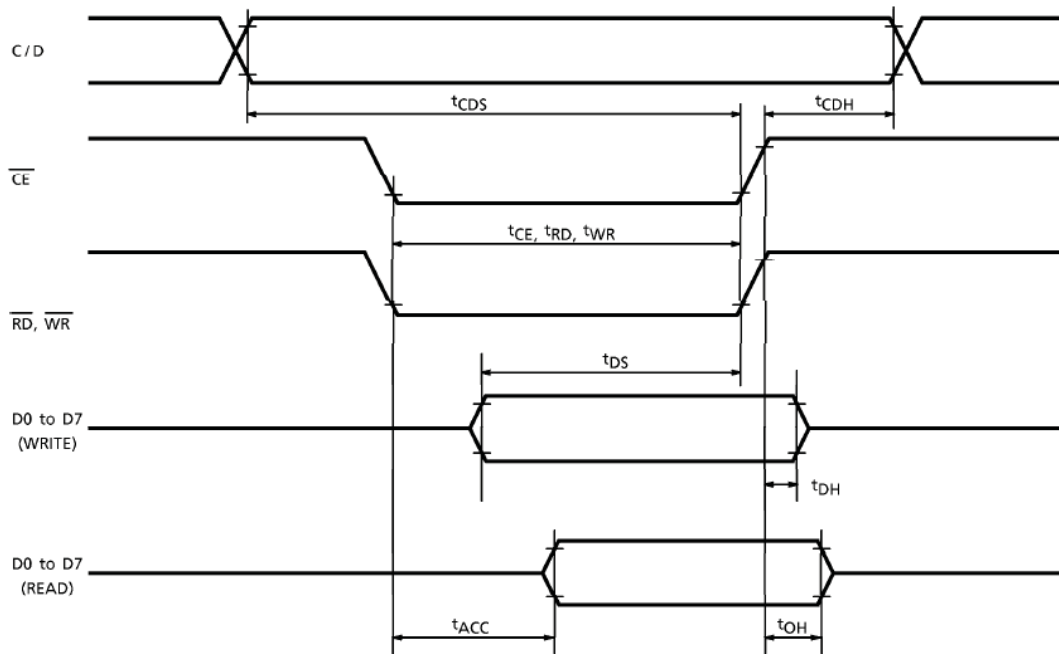
YES

YMS240128-02AIABDSL

Page 5 / 22

● Switching Characteristics (2)

Bus Timing



TEST CONDITIONS (Unless otherwise noted,  $V_{DD} = 5.0V \pm 10\%$ ,  $V_{SS} = 0V$ ,  $T_a = -20$  to  $75^\circ C$ )

ITEM	SYMBOL	TEST CONDITIONS	MIN	MAX	UNIT
C/D Set-up Time	$t_{CDS}$	—	100	—	ns
C/D Hold Time	$t_{CDH}$	—	10	—	ns
$\overline{CE}$ , $\overline{RD}$ , $\overline{WR}$ Pulse Width	$t_{CE}, t_{RD}, t_{WR}$	—	80	—	ns
Data Set-up Time	$t_{DS}$	—	80	—	ns
Data Hold Time	$t_{DH}$	—	40	—	ns
Access Time	$t_{ACC}$	—	—	150	ns
Output Hold Time	$t_{OH}$	—	10	50	ns

DATE MAY.25.2012

TECHNICAL SPECIFICATION

LCM

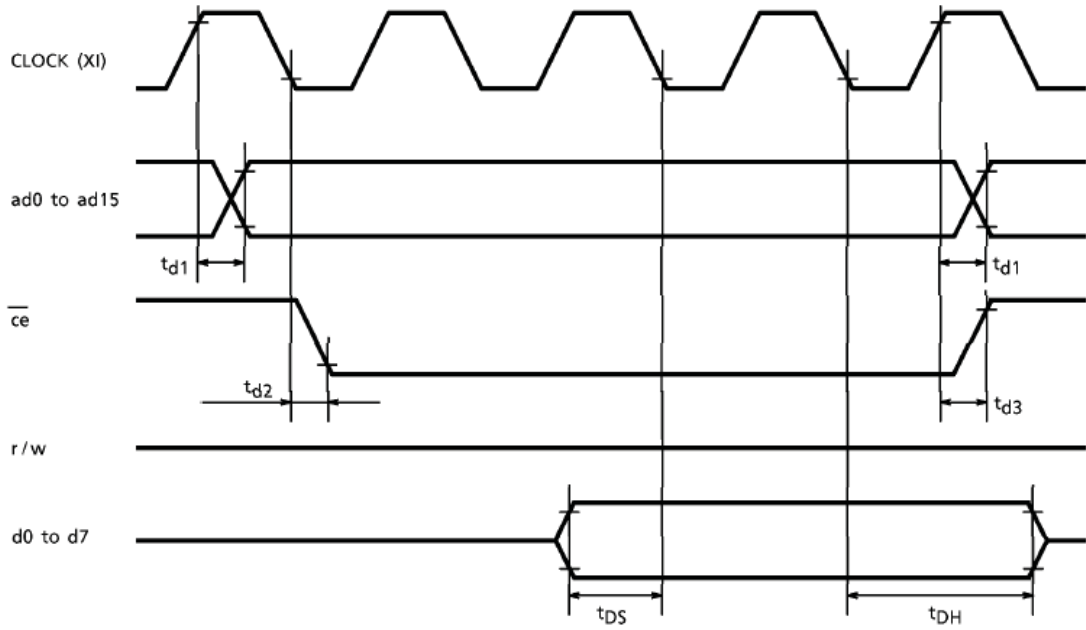
YES

YMS240128-02AIABDSL

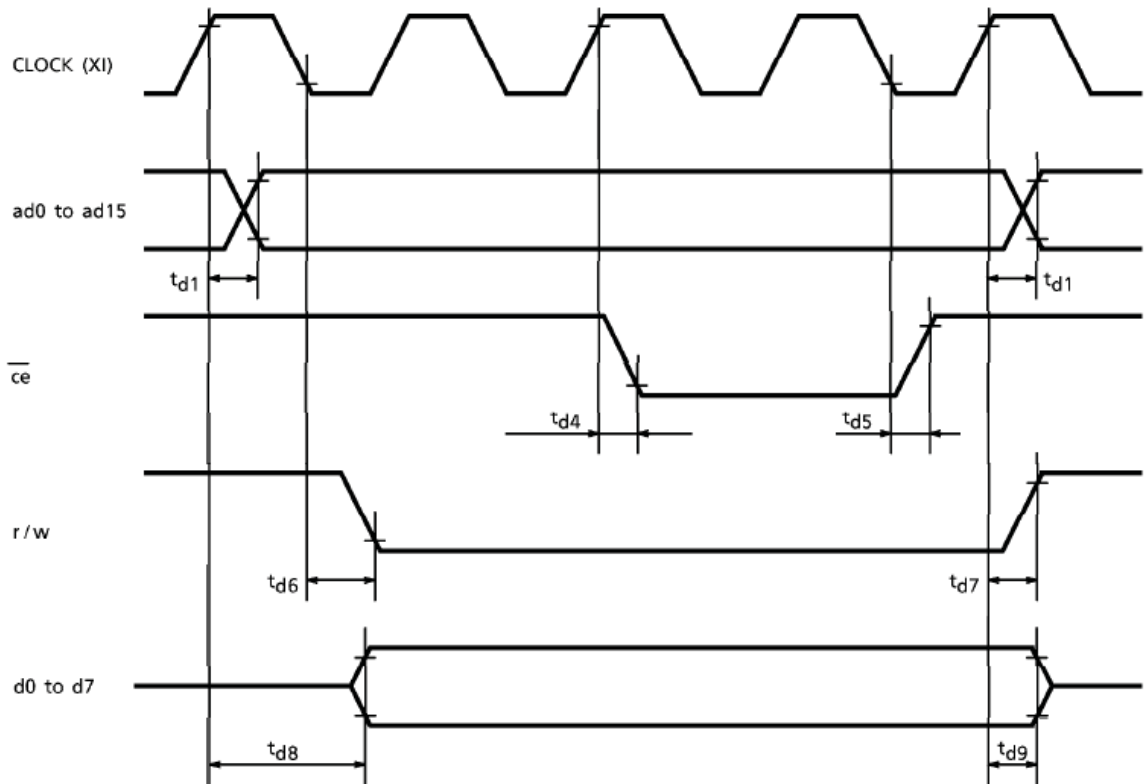
Page 6 / 22

● Switching Characteristics (3)

(1) External RAM Read mode



(2) External RAM Write mode



DATE MAY.25.2012			TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL	Page 7 / 22



TEST CONDITIONS (Unless otherwise noted,  $V_{DD} = 5.0V \pm 10\%$ ,  $V_{SS} = 0V$ ,  $T_a = -20$  to  $70^{\circ}C$ )

ITEM	SYMBOL	TEST CONDITIONS	MIN	MAX	UNIT
Address Delay Time	$t_{d1}$	—	—	250	ns
$\underline{ce}$ Fall Delay Time (Read)	$t_{d2}$	—	—	180	ns
$\underline{ce}$ Rise Delay Time (Read)	$t_{d3}$	—	—	180	ns
Data Set-up Time	$t_{DS}$	—	0	—	ns
Data Hold Time	$t_{DH}$	—	30	—	ns
$\underline{ce}$ Fall Delay Time (Write)	$t_{d4}$	—	—	200	ns
$\underline{ce}$ Rise Delay Time (Write)	$t_{d5}$	—	—	200	ns
r/w Fall Delay Time	$t_{d6}$	—	—	180	ns
r/w Rise Delay Time	$t_{d7}$	—	—	180	ns
Data Stable Time	$t_{d8}$	—	—	450	ns
Data Hold Time	$t_{d9}$	—	—	200	ns

DATE MAY.25.2012

TECHNICAL SPECIFICATION

LCM

YES

YMS240128-02AIABDSL

Page 8 / 22

## II .The Characteristics and The Reliability Test

### 1.Electro-Optic Characteristics:

Condition:TEMP=(23±3)°C

NO	Item	Symbol	Min	Typ.	Max	Unit	Condition
1	Supply Voltage(Logic)	Vdd-Vss		5.0		V	
2	LCD Operating Voltage	Vdd-V <sub>0</sub>		18.0		V	0°C
			17.6	17.8	18.0	V	25°C
				17.6		V	50°C
3	Response Time	Ton		65		ms	
		Toff		262		ms	
4	Contrast Ratio	CR	2				
5	Viewing Angle	12H	θ 1		60	Deg.	(CR≥2.0)
		6H	θ 2		70		
		3H	θ 3		65		
		9H	θ 4		65		

### 2. Characteristics of backlight (LED unit)

Color: White

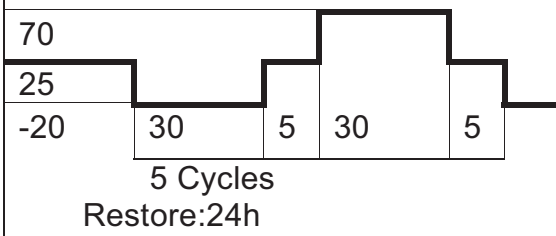
	Symbol	MIN	TYP.	MAX	UNIT	CONDITIONS
Forward Voltage	V <sub>f</sub>	2.9	3.2	3.5	V	I <sub>f</sub> =240mA
Forward Current	I <sub>f</sub>		240		mA	
Reverse Voltage	V <sub>R</sub>			5.0	V	Each chip
Reverse Current	I <sub>R</sub>			10	μA	
Power dissipation	P <sub>d</sub>		768		mW	I <sub>f</sub> =240mA
Luminous Intensity	L <sub>v</sub>		200		cd/m <sup>2</sup>	I <sub>f</sub> =240mA
Luminous Uniformity	ΔL <sub>v</sub>	65	--		%	
AVG.X OF 1931 C.I.E.	X	0.27		0.32		
AVG.Y OF 1931 C.I.E.	Y	0.27		0.32		
Operating Temperature	T <sub>opr</sub>	0°C TO +50°C				
	T <sub>sty</sub>	-10°C TO +60°C				

#### WARNING:

A BACKLIGHT IS A KIND OF CURRENT DEVICE,IT MUST CONNECT WITH A RESISTOR FOR LIMITING CURRENT ,OR IT WILL BE DAMAGED.

DATE MAY.25.2012			TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL	Page 9 / 22

### 3. Reliability Test

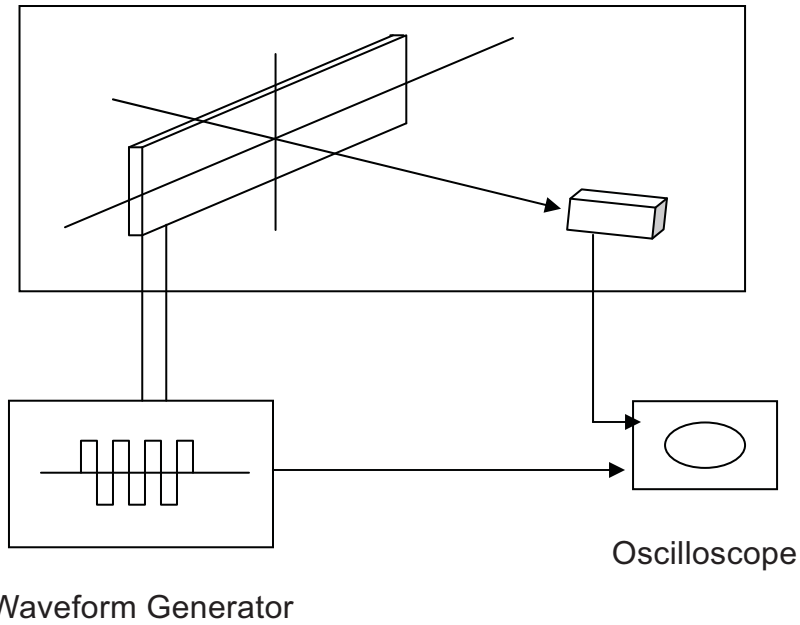
No	Items	Test Condition	Test Result
1	High Temp Storage	Temp:70±2℃ Time:96h Restore:24h	Passed
2	Low Temp Storage	Temp:-20±3℃ Time:96h Restore:24h	Passed
3	High Temp Operating	Temp:50±2℃ Vop:5V Time:24h Restore:24h	Passed
4	Low Temp Operating	Temp:0±3℃ Vop:5V Time:24h Restore:24h	Passed
5	High Temp High Hum Storage	Temp:40±2℃ Hum:95%Rh Time:96h Restore:24h	Passed
6	Thermal Shock	Temp:(℃)  <p>70 25 -20 30 5 30 5 5 Cycles Restore:24h</p>	Passed

DATE MAY.25.2012			TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL	Page 10 / 22

### III.The LCD Measuring Method and Equipment

#### 1. Threshold Voltage and Response Time Measuring

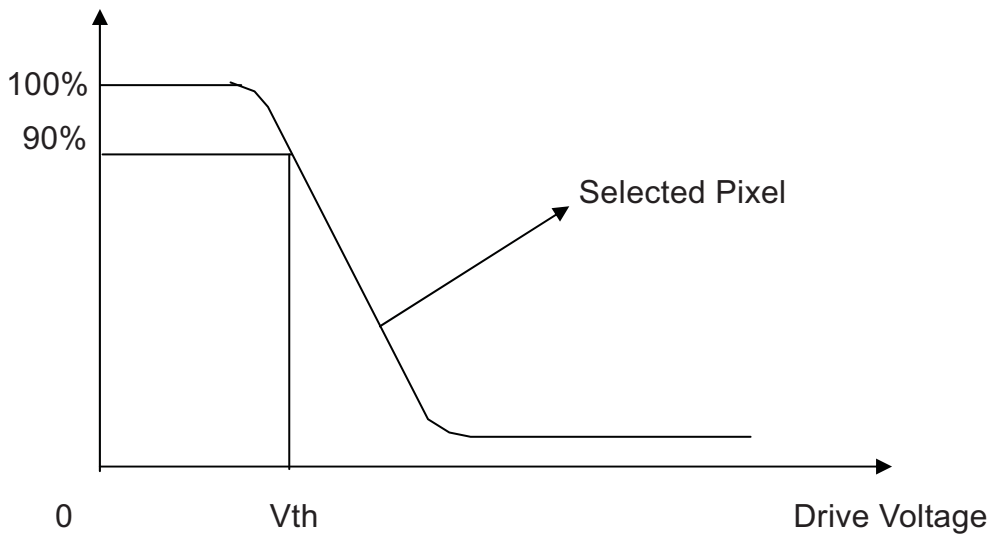
##### (1) Equipment



##### (2) Definition

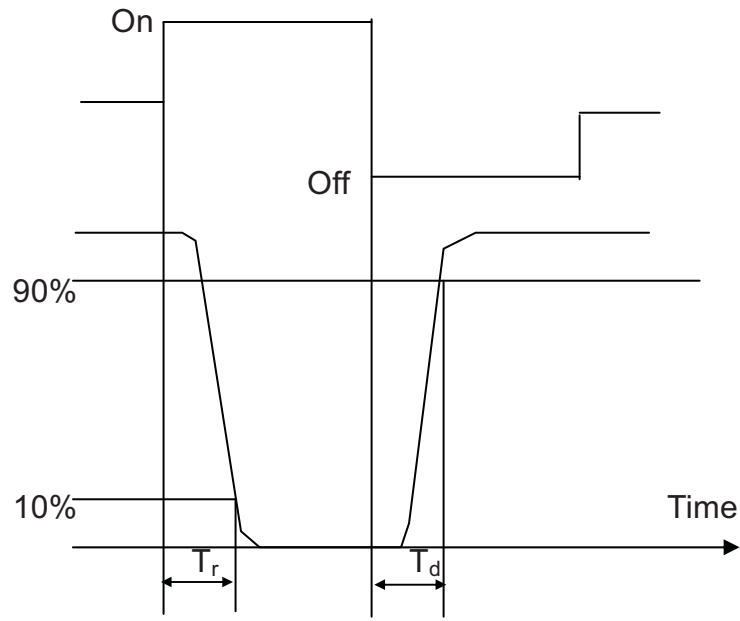
##### A. Threshold Voltage ( $V_{th}$ )

Brightness

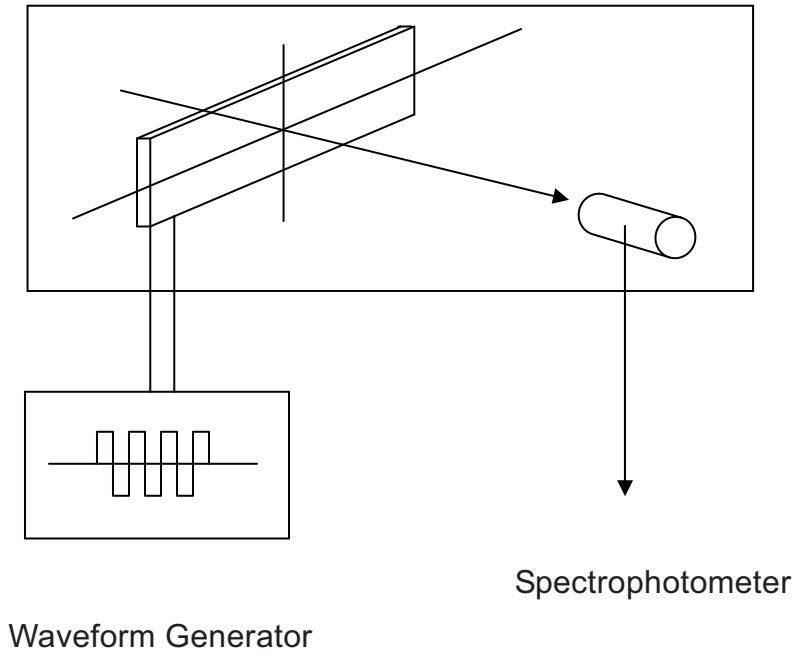


DATE MAY.25.2012			TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL	Page 11 / 22

**B. Response Time**



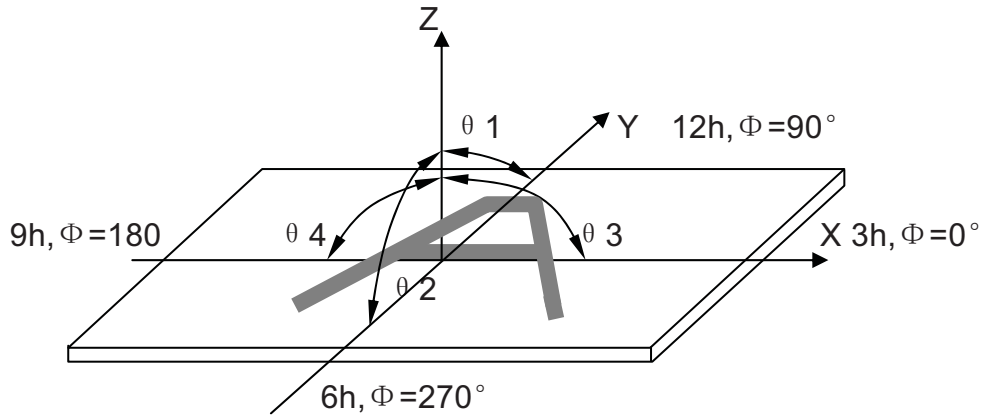
**2. Contrast Measuring**  
**(1) Equipment**



DATE MAY.25.2012			TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL	Page 12 / 22

(2)Definition:

A. Viewing Angle:



B. Contrast Ratio (Positive)

$$CR = \frac{\text{Brightness of non-selected pixel}}{\text{Brightness of selected pixel}}$$

3. Reliability Test:

Equipment : TENNY

DATE MAY.25.2012			TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL	Page 13 / 22

## IV. Standard Specifications for Product Quality

### 1.MTBF

More than 50,000 hours.

### 2. Method of Test::

(1)The Test Must Be Under 40W Fluorescent Lamp, And The Distance Of View Must Be At 30cm.

(2)The eye's Test Direction Is Based On the vertical direction 15° - 45° .

### 3. Definition Of Defects

#### (1) Major Defects

A:Non-Display

B:Segment Missing

C:Over Current

D:Segment Short

E: Wrong Polarizer Direction

(2)Minor Defects: The Others.

### 4. Quality specification

Major Defects Should Be In AQL 0.25,and The Minor In AQL 1.00

The sampling inspection plan is in accordance with the Level II and normal inspection.

Definition of area:

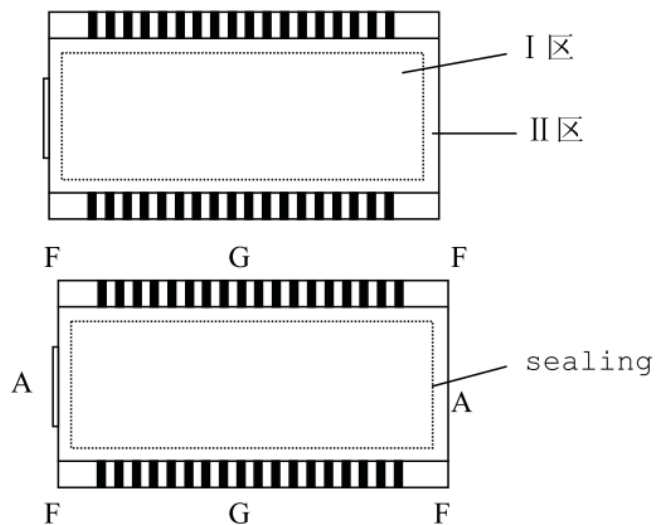
I area: viewing area

II area: Outside of viewing area

A area: The area outside sealing

G area : Electrode pad area

F area : Without electrode pad area



### 5.Inspection Item and Standards

DATE MAY.25.2012			TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL	Page 14 / 22

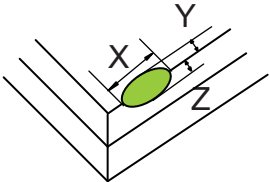
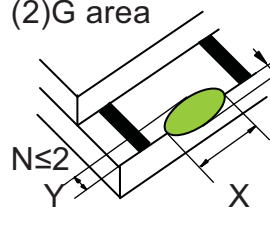
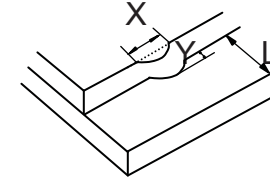
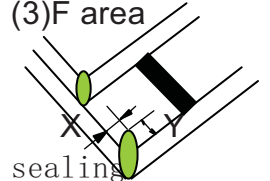
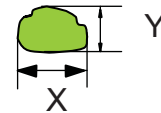
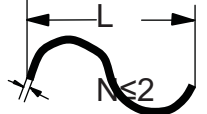
Item	The Standard Of Quality Inspection	Checking Method	Quantity Ratio
Frame	Smooth and even surface,no crack,no scratch,no rusty,and not be wrenched out of shape.the range between convex and concave is: $d \leq 0.35\text{mm}$ ,and the frame must be connected with the ground pad.	Checking With Eyes And Using Vernier Caliper, Multimeter	100%
The Relative Position of LCD and Frame	The end seal of the LCD must be at the same side with the frame's opening.	Checking With Eyes	100%
The Relative Position of PCB/Panel /Frame	The frame installing direction must be correct.the twisted angle of the leg is from $45^\circ$ to $60^\circ$ ,the leg is vertical to PCB panel and it must be in the middle position of the installing holes.	Checking With Eyes	100%
LED	1.The LED must be White 2.The LED must be uniform.	Checking With Eyes	100%
Function Test	1. The major defects must be reject. 2. Background changes evenly and no disorderly displaying phenomenon. 3. Display no shortage.	Check It When Displaying	100%

LCD:

DATE MAY.25.2012			TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL	Page 15 / 22



Standard of appearance test: (unit: mm)

No	Items	Criterion	Checking manner
1	<p>Substrate crack</p> <p>X: defect Length</p> <p>Y: defect Width</p> <p>Z: defect Depth</p> <p>T: glass Thickness</p> <p>N: defect QTY</p> <p>L:Connector Width</p>	<p>(1) A area</p>  <p><math>X \leq 3.0</math> Y: Don't allowed hurt sealing <math>Z \geq T/2</math> <math>N \leq 3</math>  <math>X \leq 5.0</math> Y: Don't allowed hurt sealing <math>Z \leq T/2</math> <math>N \leq 3</math>  <math>X \leq 1.0</math> <math>Y \leq 0.5</math> <math>Z \leq T/3</math> No check</p> <p>(2) G area</p>  <p><math>X \leq 3.0</math> <math>Y \leq 0.5</math> <math>Z \leq T/2</math></p> <p>(3) F area</p>  <p><math>X \leq 1/2</math> total length  <math>Y \leq 1/4L</math> <math>N \leq 1</math>                      Over the drawing tolerance is not allowed</p> <p>(3) F area</p>  <p><math>X \leq 2.0</math> <math>Y \leq 3</math> <math>Z \leq T</math> <math>N \leq 3</math>                      Don't allowed hurt sealing</p>	checking with eyes
2	<p>Black spot</p> <p>white spot</p> <p><math>D = (X+Y)/2</math></p> <p>Line</p>	<p>(1)</p>  <p><math>0.2 &lt; D \leq 0.25</math> <math>N \leq 1</math>  <math>0.1 &lt; D \leq 0.2</math> <math>N \leq 3</math>  <math>D \leq 0.1</math> No check</p> <p>(2)</p>  <p><math>L \leq 2.0</math> <math>W \leq 0.03</math>  <math>L \leq 1.0</math> <math>W \leq 0.05</math></p> <p><math>N \leq 1</math>  <math>W</math></p>	<p>Checking on the table with light and polarizer and checking with eyes directly.</p>

DATE MAY.25.2012

TECHNICAL SPECIFICATION

LCM

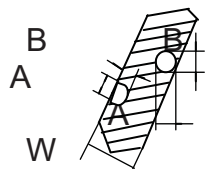
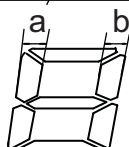
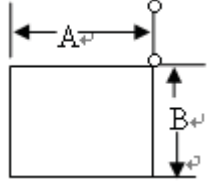
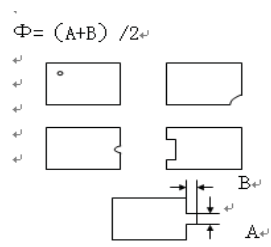
YES

YMS240128-02AIABDSL

Page 16 / 22

No	Items	Criterion	Checking manner
3	Polarizer Bubble	$D \leq 0.15$ No check $0.15 < D \leq 0.4$ $N \leq 2$	Checking on the table with light and polarizer, and checking with eyes directly
4	Rainbow Color	Allow tiny rainbow Allow 5% color contrast or accord limitative sample	Checking on the table with light and polarizer, And checking with eyes directly
5	END Seal	1. Dimension accord design require 2. Inject depth (d): $1/5D \leq d \leq D$ (D: seal design depth)	Checking with eyes
6	Polarizer or pad appearance	No dirty	Checking with eyes

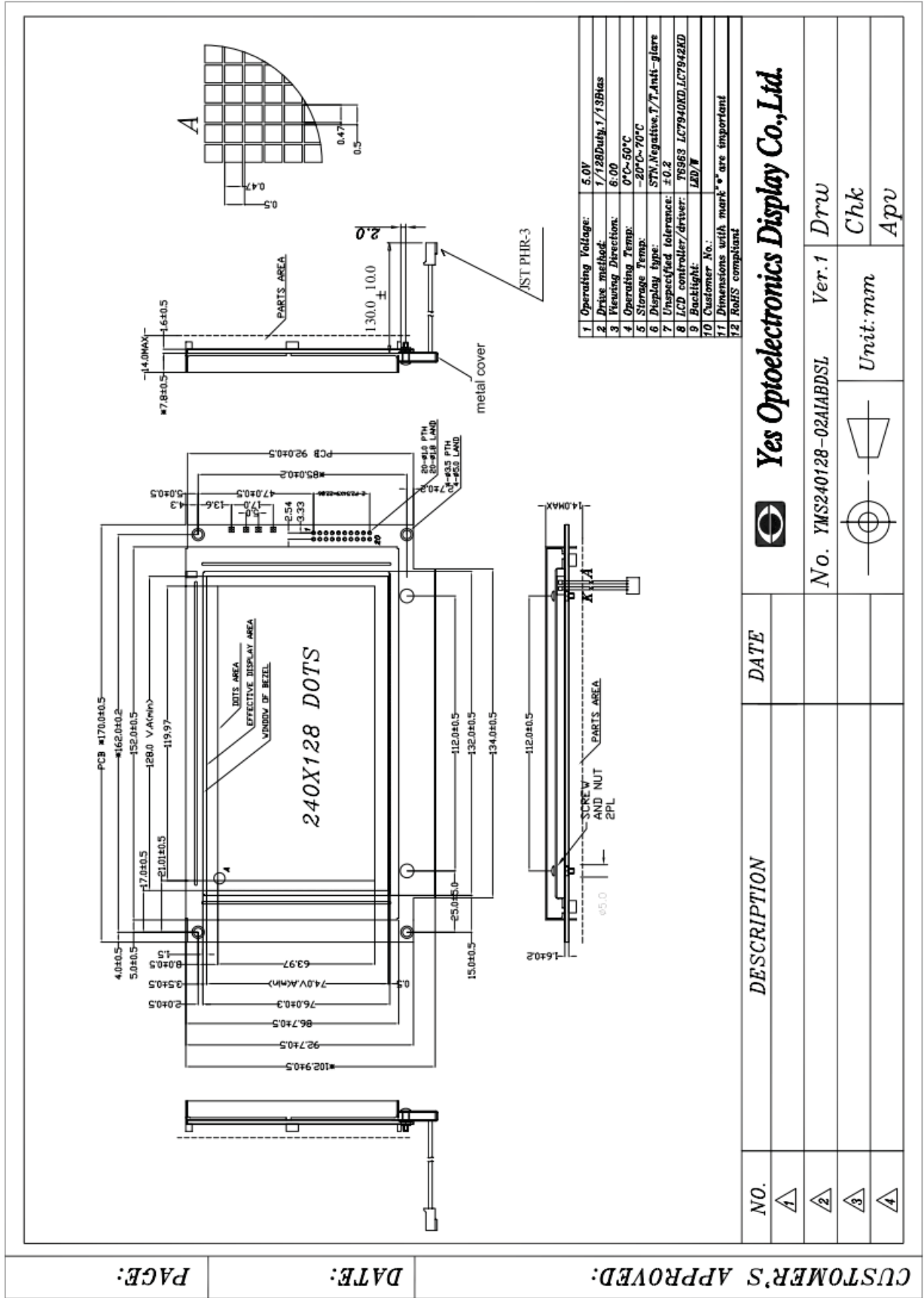
Standard of display test

No	Items	Criterion	Checking manner
1	Pin hole $D = (A+B)/2$ W: segment width	 $W \leq 0.4$ $D \leq 0.20$ And $D \leq 1/2W$ $N \leq 1$ $W > 0.4$ $D \leq 0.25$ And $D \leq 1/3W$ $N \leq 2$ $D \leq 0.05$ No check	Checking at the display state
2	Different width of segment	 $ a-b  < 0.25$ or $ a-b  \leq 1/4W$ No check	Checking at the display state
3	Different width		A: distortion $\leq 10\%$ B: distortion $\leq 10\%$ Superfluous Electrode lines display is not allowed
4	Pinhole	 $\Phi = (A+B) / 2$	$0.15 < \Phi \leq 0.2$ $N \leq 1$ $0.05 < \Phi \leq 0.15$ $N \leq 3$ $\Phi \leq 0.05$ Any number Note: Distance between two spots $\geq 10\text{mm}$ , $\Phi < 1/3$ pixels

Note:d~Diameter n~Quantity Unit:mm

DATE MAY.25.2012			TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL	Page 17 / 22

V. Attached Drawing

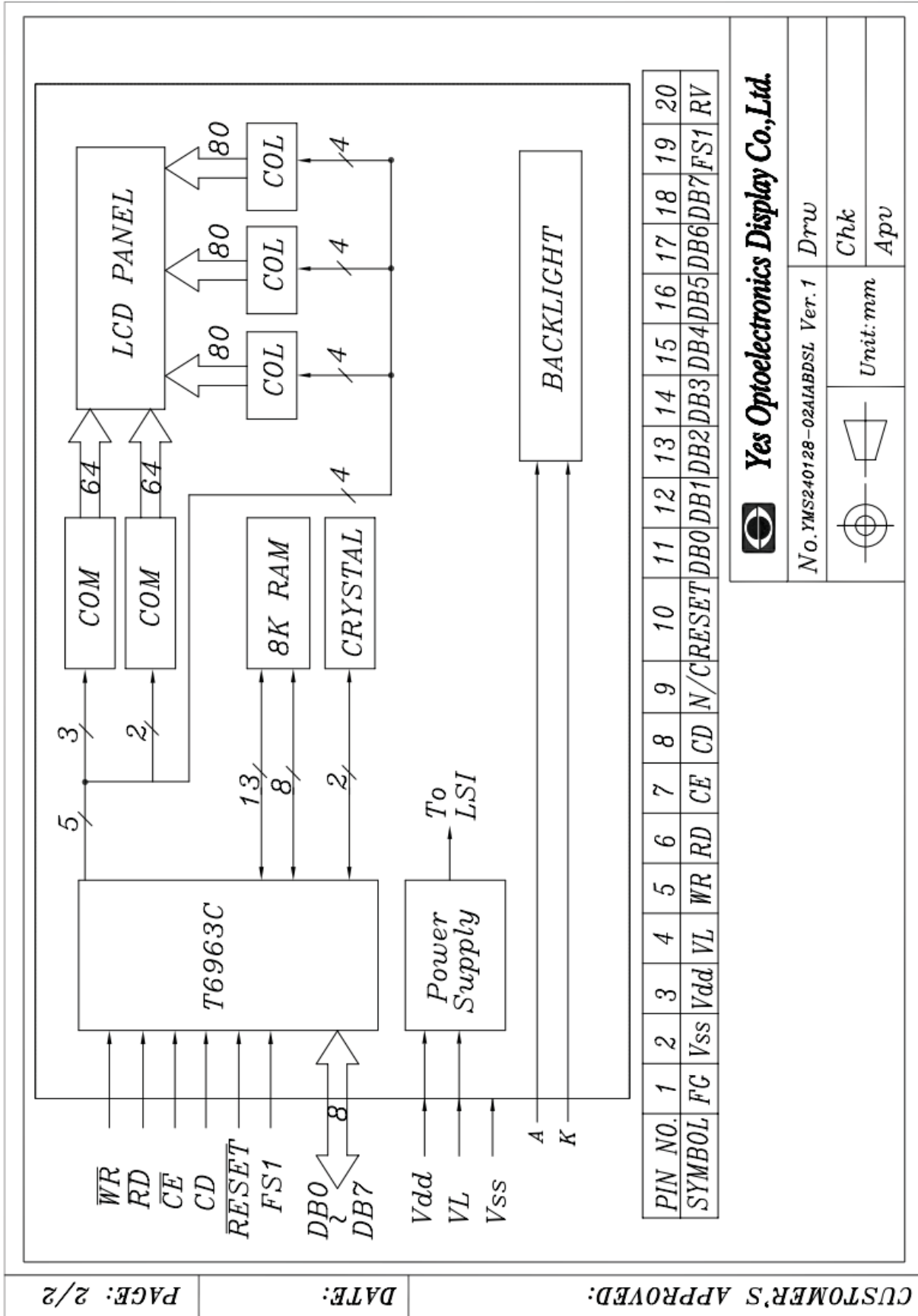


NO.	DESCRIPTION	DATE
	A	
	B	
	C	
CUSTOMER'S APPROVED:		
No. YMS240128-02AIABDSL		Ver.1
Unit: mm		Chk
Apv		

**Yes Optoelectronics Display Co., Ltd.**

PAGE: DATE: CUSTOMER'S APPROVED:

DATE MAY.25.2012			TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL	Page 18 / 22



PAGE: 2/2

DATE:

CUSTOMER'S APPROVED:

DATE MAY.25.2012			TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL	Page 19 / 22

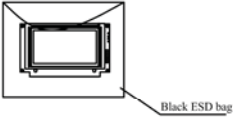
## VI. PACKING

<i>CUSTOMER'S APPROVED:</i>	<i>DATE: 2012.05.25</i>	<i>PAGE: 1/1</i>
-----------------------------	-------------------------	------------------

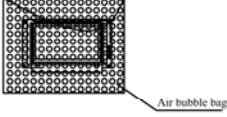
PRODUCT PART NO.:YMS240128-02AIABDSL

**Packing Process:**

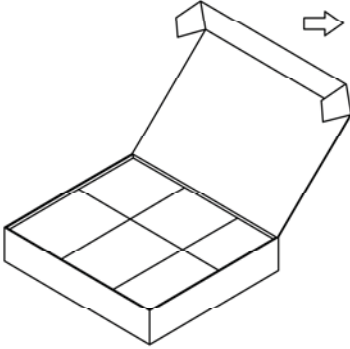
1) Putting Modules into each black ESD bag



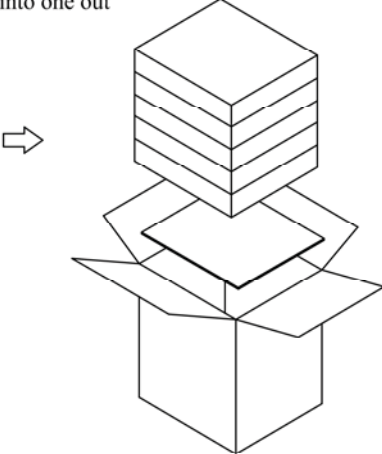
2) Putting Modules with black ESD bag into the air bubble bag



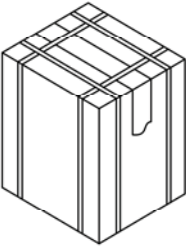
3) Putting 18 pcs Modules into the inner box (TYPE:H82) and space filled filling piece



4) Putting 5 small inner boxes into one out carton



5) Packing finished



Note: 18x5=90pcs/Outcarton  
 Dimension (Small carton) : 385\*325\*87mm      Dimension (Out carton) : 394\*344\*470mm

NO.	YMS240128-02AIABDSL	Ver. 1	Drw:	Chk:	Apv:
-----	---------------------	--------	------	------	------

**ANSHAN YES OPTOELECTRONICES DISPLAY CO., LTD**

DATE MAY.25.2012		TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL

## VII. Precautions For Use

### 1. Safety

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

### 2. Storage Conditions

- (1) Store the panel or module in a dark place where the temperature is  $23\pm 5^{\circ}\text{C}$  and the humidity is below  $50\pm 20\% \text{RH}$ .
- (2) Store in anti-static electricity container.
- (3) Store in clean environment, free from dust, active gas, and solvent.
- (4) Do not place the module near organics solvents or corrosive gases.
- (5) Do not crush, shake, or jolt the module.
- (6) Do not exposed to direct sun light of fluorescent lamps.

### 3. Installing LCD Module

Attend to the following items when installing the LCM.

- (1) Cover the surface with a transparent protective plate or touch panel to protect the polarizer and LC cell.
- (2) When assembling the LCM into other equipment, the spacer to the bit between the LCM and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements.

### 4. Precautions For Operation

- (1) Viewing angle varies with the change of liquid crystal driving voltage ( $V_o$ ). Adjust  $V_o$  to show the best contrast.
- (2) Driving the LCD in the voltage above the limit will shorten its lifetime.
- (3) Response time is greatly delayed at temperature below the operating temperature range. However, this does not mean the LCD will be out of the order. It will recover when it returns to the specified temperature range.

DATE MAY.25.2012			TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL	Page 21 / 22

(4) When turning the power on, input each signal after the positive/negative voltage becomes stable.

(5) Do not apply water or any liquid on product which composed of T/P.

5.Handling Precautions

(1) Avoid static electricity which can damage the CMOS LSI; please wear the wrist strap when handling.

(2) The polarizing plate of the display is very fragile. so, please handle it very carefully.

(3) Do not give external shock.

(4) Do not apply excessive force on the surface; it may cause display abnormal .

(5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.

(6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.

(7) Do not operate it above the absolute maximum rating.

(8) Do not remove the panel or frame from the module.

(9) Do not apply water or any liquid on product which composed of T/P.

DATE MAY.25.2012			TECHNICAL SPECIFICATION
LCM	YES	YMS240128-02AIABDSL	Page 22 / 22