



YES OPTOELECTRONICS CO.,LTD

# SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY MODULE

Product NO: YMS162-22AGAYDCN

DATE: 2018-07-05

Prepared by	Checked by	Approved by
范玉芬	刘 辉	牛红丽



CUSTOMER'S APPROVAL

APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

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DATE 2018-07-05			TECHNICAL SPECIFICATION
LCM	YES	YMS162-22AGAYDCN	Page 1 of 21

### REVISION HISTORY

Rer	Date	Item	Page	Remark
1.0	2012-02-03	New Creation	ALL	
1.1	2018-07-05	Update	ALL	Modify IC from SPLC780 to ST7066U

DATE 2018-07-05			TECHNICAL SPECIFICATION
LCM	YES	YMS162-22AGAYDCN	Page 2 of 21

# LIST

I . General Specifications------(4-5)

II .The Characteristics and Reliability Test------(6)

III .The LCD Measuring Method and Equipment------(7-9)

IV .Instruction Sets------(10-12)

V .Standard Specifications for Product Quality------(13-16)

VI .Attached Drawing------(17-18)

VII .Packing------(19)

VIII .Precautions For Use------(20-21)

DATE 2018-07-05			TECHNICAL SPECIFICATION
LCM	YES	YMS162-22AGAYDCN	Page 3 of 21

# I .General Specifications

## 1.General

Item	Contents	Unit
Drive Method	1/16 duty,1/5 bias	/
Operating voltage	5.0	V
Viewing direction	6:00	O' Clock
Operating Temperature	-20~70	°C
Storage Temperature	-30~85	°C
Display type	STN mode, Reflective ,Positive type display	/
Module Size	85.0*36.0	mm
View Area	65.0*15.8	mm
Dot Size	0.56*0.66	mm
Character Size	2.96*5.56	mm

## 2.Pin Connections:

Pin No.	Symbol	Function
1	Vss	Ground(0v)
2	Vdd	Logic Supply Voltage(+5.0v)
3	Vee	LCD Driver Voltage Input
4	RS	Data/Instruction Register Select
5	R/W	Read/Write Select
6	E	Enable Signal
7-14	DB0-DB7	Data Bus Line
15-16	NC	No connection

DATE 2018-07-05

TECHNICAL SPECIFICATION

LCM

YES

YMS162-22AGAYDCN

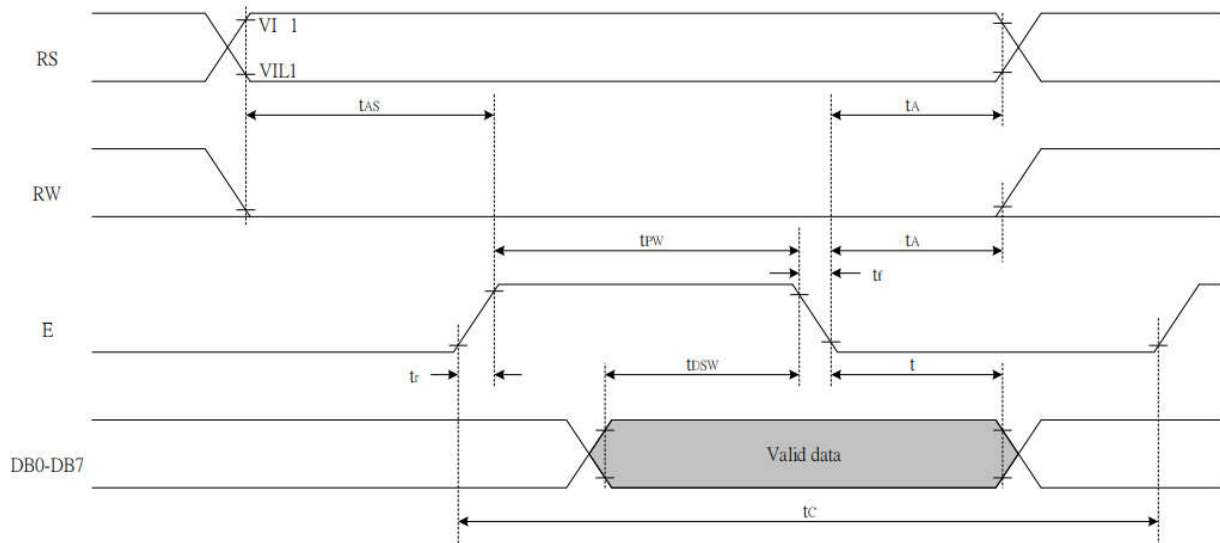
Page 4 of 21

### 3. Absolute Maximum Ratings

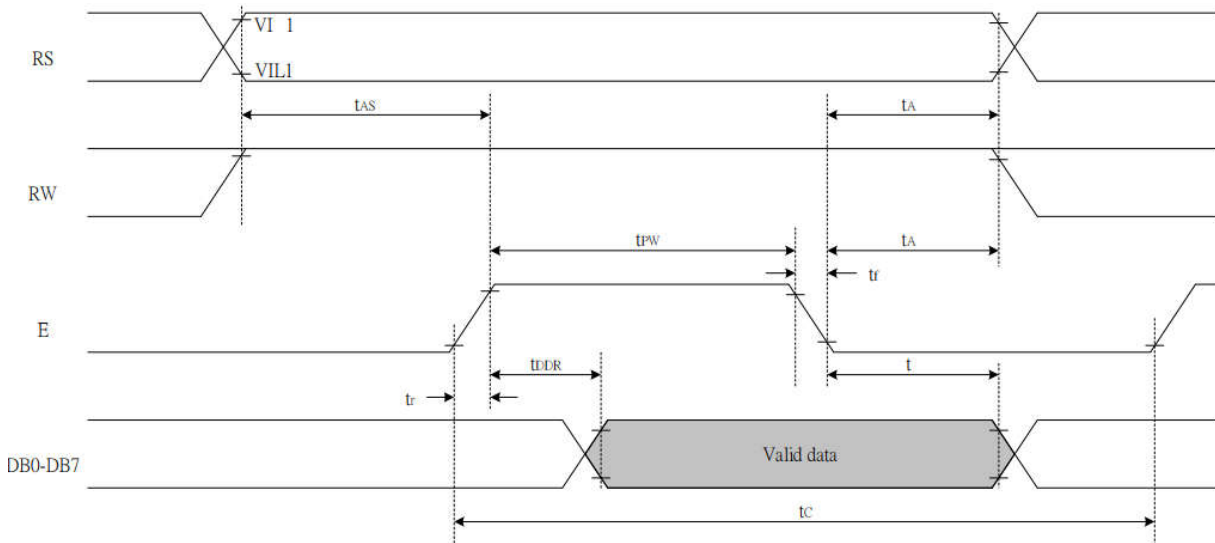
Characteristics	Symbol	Value
Power Supply Voltage	$V_{CC}$	-0.3 to +7.0
LCD Driver Voltage	$V_{LCD}$	$V_{CC}-10.0$ to $V_{CC}+0.3$
Input Voltage	$V_{IN}$	-0.3 to $V_{CC}+0.3$

### 4. Timing Characteristics:

Write Operation (Writing Data from MPU to ST7066U)



Read Operation (Reading Data from ST7066U to MPU)



DATE 2018-07-05			TECHNICAL SPECIFICATION
LCM	YES	YMS162-22AGAYDCN	Page 5 of 21

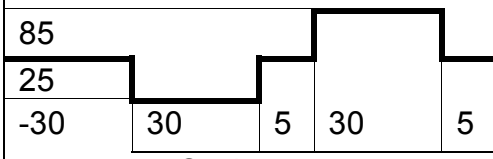
## II .The Characteristics and The Reliability Test

### 1. Electro-Optic Characteristics(module unit):

Condition:TEMP=(23±3)

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>	4.5	4.7	4.9	V	25℃
3	Response Time	Ton		136		ms	
		Toff		236		ms	
4	Contrast	CR	2				
5	Viewing Angel	12H	θ 1	45		Deg.	(CR≥ 2.0)
		6H	θ 2	60			
		3H	θ 3	50			
		9H	θ 4	50			

### 2.Reliability Test

No	Items	Test Condition	Test Result
1	High Temp Storage	Temp:85±2℃ Time:96h Restore:24h	Passed
2	Low Temp Storage	Temp:-30±3℃ Time:96h Restore:24h	Passed
3	High Temp Operating	Temp:70±2℃ Vop:5.0V Time:96h Restore:24h	Passed
4	Low Temp Operating	Temp: -20±3℃ Vop:5.0V Time:96h Restore:24h	Passed
5	High Temp High Hum Storage	Temp:40±2℃ Hum:90%Rh Time:96h Restore:24h	Passed
6	Thermal Shock	Temp:(℃)  5 Cycles Restore:24h	Passed

DATE 2018-07-05

TECHNICAL SPECIFICATION

LCM

YES

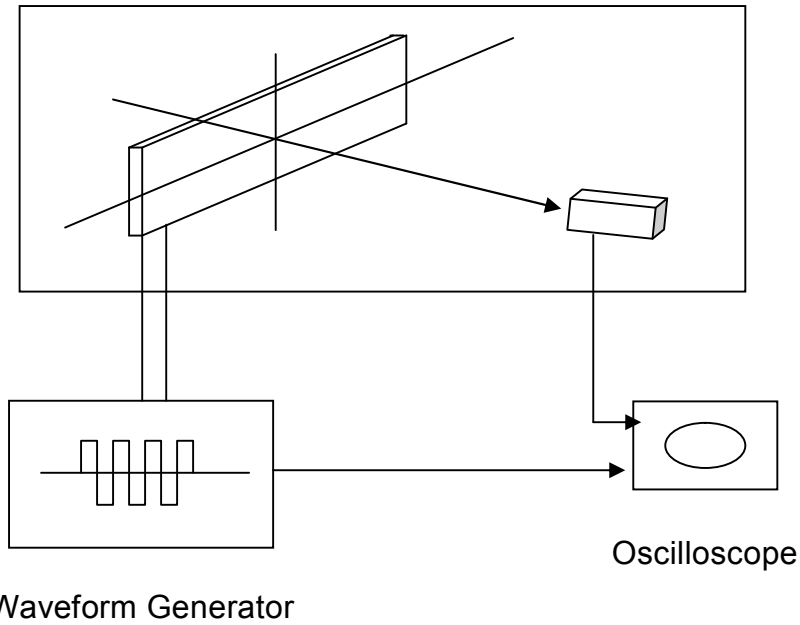
YMS162-22AGAYDCN

Page 6 of 21

### III.The LCD Measuring Method and Equipment

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

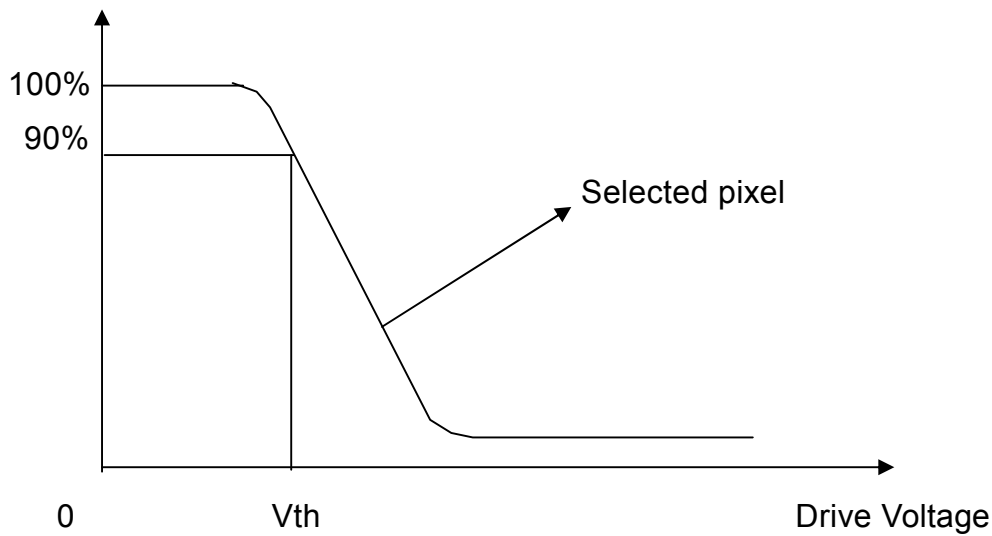
##### (1) Equipment



##### (2) Definition

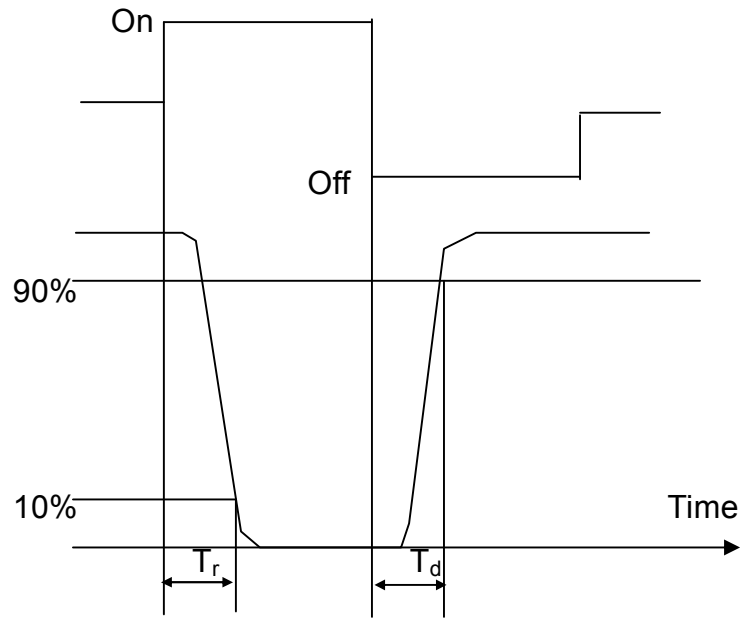
##### A. Threshold Voltage ( $V_{th}$ )

Brightness

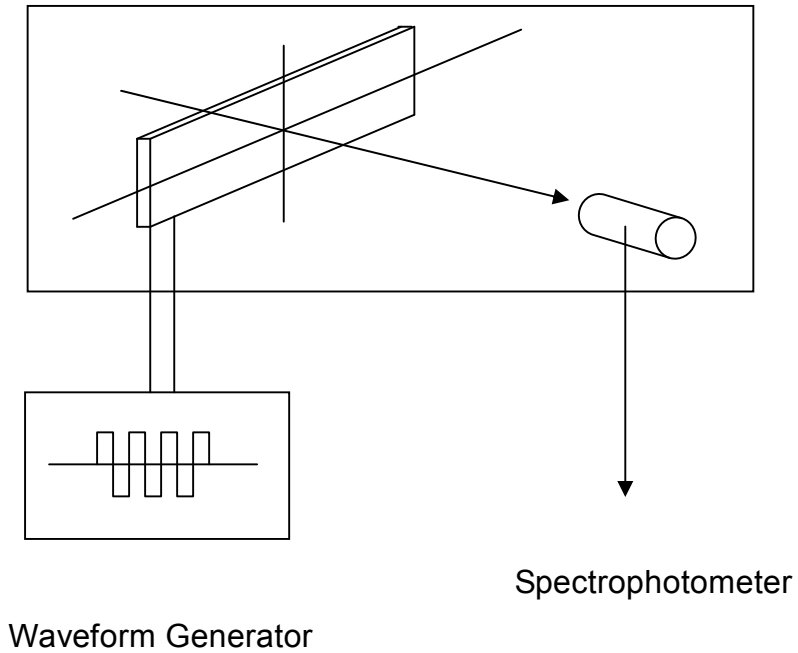


DATE 2018-07-05			TECHNICAL SPECIFICATION
LCM	YES	YMS162-22AGAYDCN	Page 7 of 21

B. Response Time



2. Contrast Measuring  
(1) Equipment

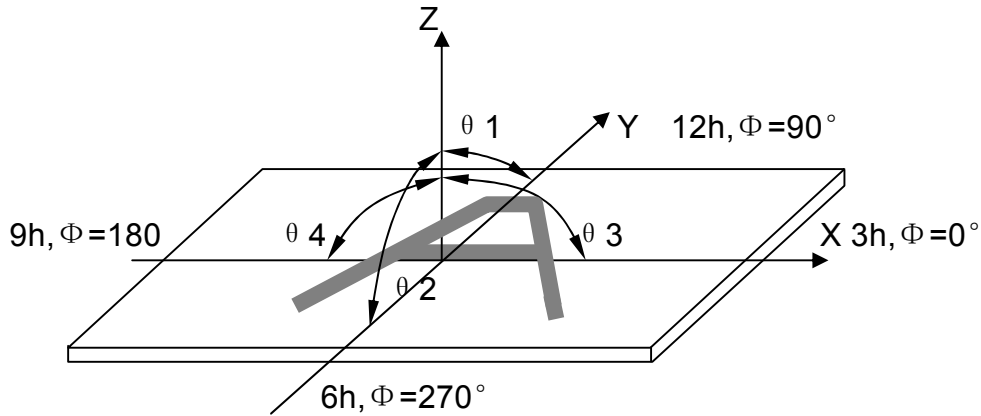


DATE 2018-07-05			TECHNICAL SPECIFICATION
LCM	YES	YMS162-22AGAYDCN	Page 8 of 21



(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 2018-07-05			TECHNICAL SPECIFICATION
LCM	YES	YMS162-22AGAYDCN	Page 9 of 21

## IV. Instruction Sets

### 1. Instruction Table

Instruction	Instruction Code										Description	Description Time (270KHz)	
	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0			
Clear Display	0	0	0	0	0	0	0	0	0	0	1	Write "20H" to DDRAM. and set DDRAM address to "00H" from AC	1.52 ms
Return Home	0	0	0	0	0	0	0	0	0	1	x	Set DDRAM address to "00H" from AC and return cursor to its original position if shifted. The contents of DDRAM are not changed.	1.52 ms
Entry Mode Set	0	0	0	0	0	0	0	0	1	I/D	S	Sets cursor move direction and specifies display shift. These operations are performed during data write and read.	37 us
Display ON/OFF	0	0	0	0	0	0	0	1	D	C	B	D=1:entire display on C=1:cursor on B=1:cursor position on	37 us
Cursor or Display Shift	0	0	0	0	0	0	1	S/C	R/L	x	x	Set cursor moving and display shift control bit, and the direction, without changing DDRAM data.	37 us
Function Set	0	0	0	0	1	DL	N	F	x	x		DL:interface data is 8/4 bits N:number of line is 2/1 F:font size is 5x11/5x8	37 us
Set CGRAM address	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0		Set CGRAM address in address counter	37 us
Set DDRAM address	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0		Set DDRAM address in address counter	37 us
Read Busy flag and address	0	1	BF	AC6	AC5	AC4	AC3	AC2	AC1	AC0		Whether during internal operation or not can be known by reading BF. The contents of address counter can also be read.	0 us
Write data to RAM	1	0	D7	D6	D5	D4	D3	D2	D1	D0		Write data into internal RAM (DDRAM/CGRAM)	37 us
Read data from RAM	1	1	D7	D6	D5	D4	D3	D2	D1	D0		Read data from internal RAM (DDRAM/CGRAM)	37 us

DATE 2018-07-05

TECHNICAL SPECIFICATION

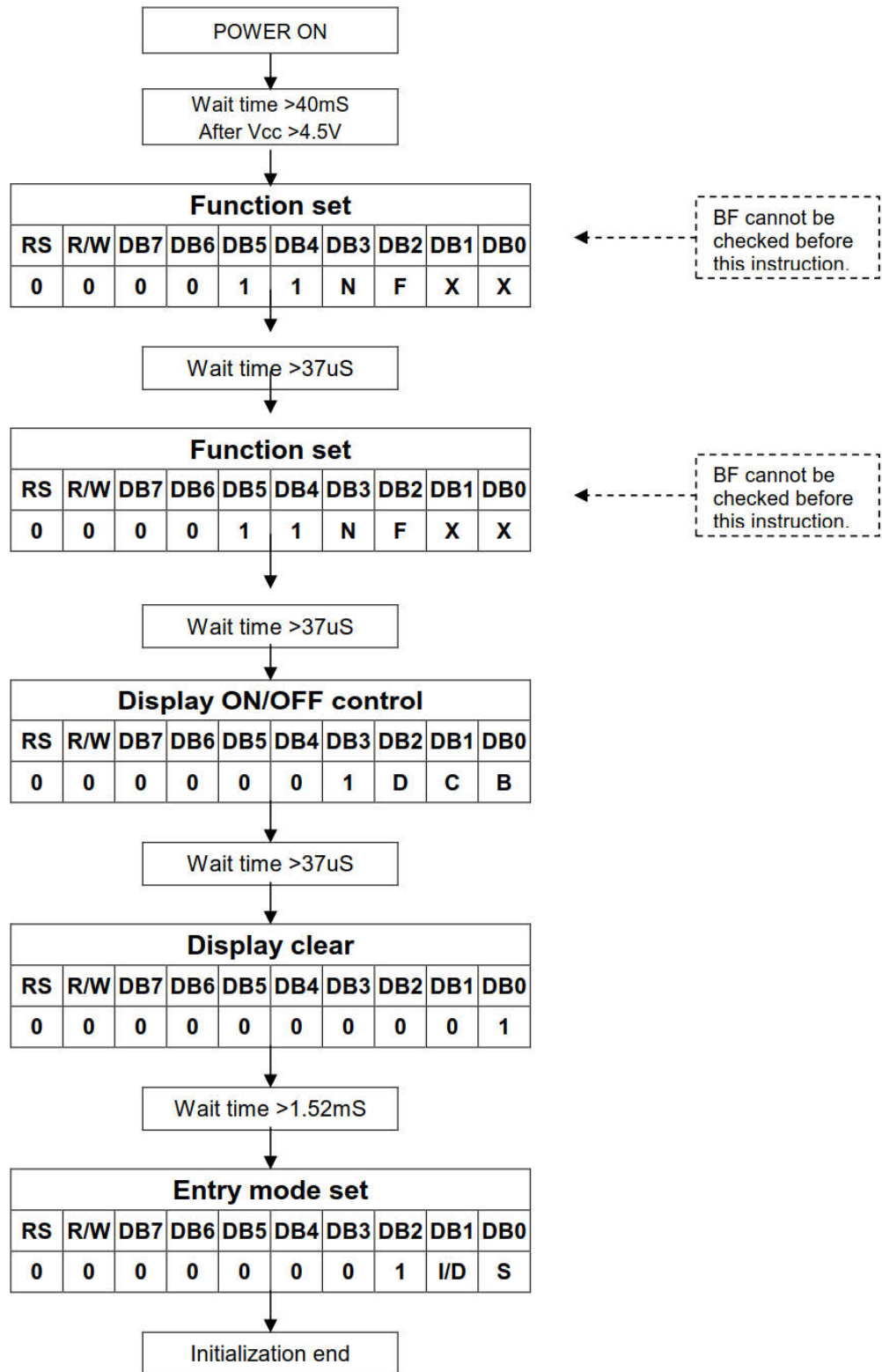
LCM

YES

YMS162-22AGAYDCN

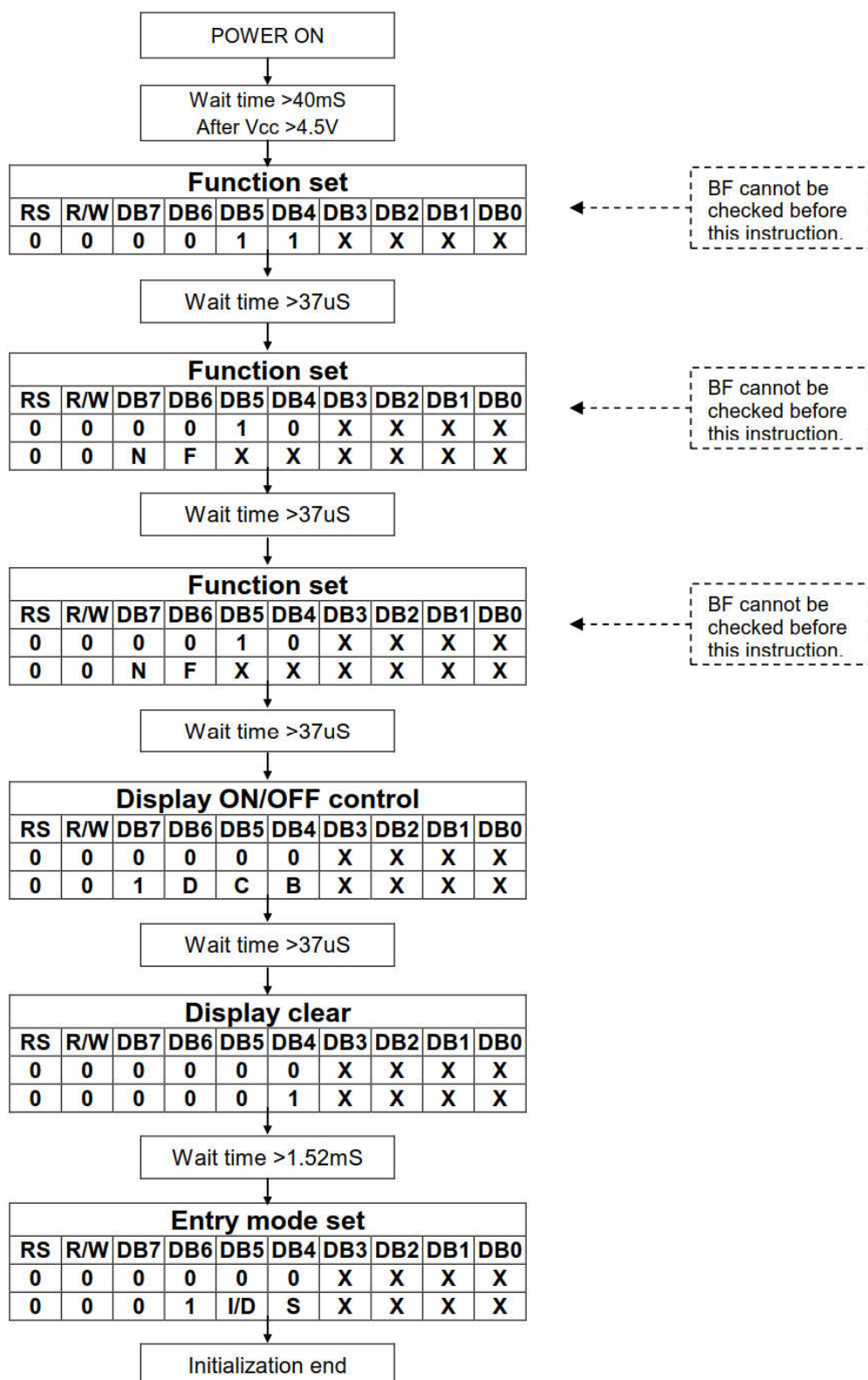
Page 10 of 21

2.Reset Function  
 (1).8-Bit Interface



DATE 2018-07-05			TECHNICAL SPECIFICATION
LCM	YES	YMS162-22AGAYDCN	Page 11 of 21

## (2).4-Bit Interface



DATE 2018-07-05

TECHNICAL SPECIFICATION

LCM

YES

YMS162-22AGAYDCN

Page 12 of 21

## V. Standard Specifications for Product Quality

### 1. Manner of test::

1.1 The test must be under 40W fluorescent light, and the distance of view must be at 30cm.

1.2 The test direction is based on around -10°- 30° of Vertical line.

### 2. Quality specification

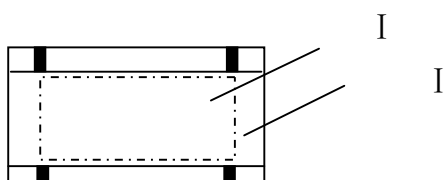
It shall be based on GB2828-87, Apply level II, Normal inspection by single sampling.

	IETM	CHECK LEVEL	AQL
MAJOR (MA)	1.LIQUID CRYSTAL LEAKAGE 2.WRONG POLARIZER 3.OUTSIDE DIMENSION 4.SEGMENT MISSING 5.SEGMENT SHORT	II	0.25
MINOR (MI)	1.BLACK SPOTS OR WHITE SPOTS. 2.FOREIGN SUBSTANCE, 3.WHITE SPOTS, 4.PINHOLE,SEGMENT 5.DEFORMATION      SCRATCHS(GLASS      & POLARIZER), 6.SEGMENT DEFECT, 7.AIR BUBBLES BETWEEN GLASS & POLARIZER, 8.COLOR VARIATION,GLASS CHIPS, 9.OTHER VISUAL DEFECTS.	II	1.0

### 3. Definition of area:

3.1 I area: viewing area

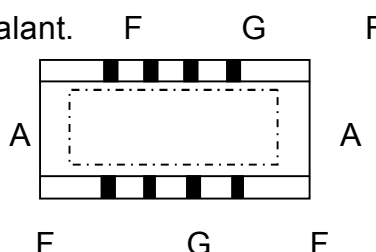
II area: outside viewing area



3.2 A area: The glass area outside sealant.

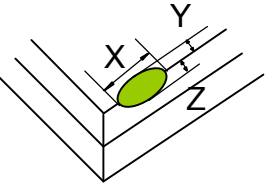
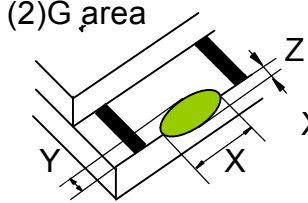
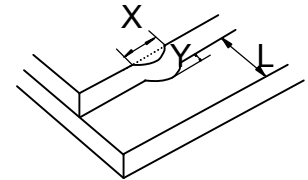
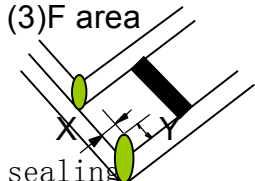
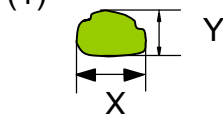
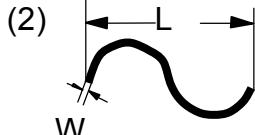
G area: Electrode pad area.

F area: Without electrode pad area.



DATE 2018-07-05			TECHNICAL SPECIFICATION
LCM	YES	YMS162-22AGAYDCN	Page 13 of 21

4. Standard of appearance test: (unit: mm)

No	Items	Criterion	Checking manner
1	Substrate crack X: defect Length Y: defect Width Z: defect Depth T: glass Thickness N: defect QTY L: Connector Width	<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> <math>N \leq 2</math></p>  <p><math>X \leq \text{total length}</math>  <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	Black spot white spot $D = (X+Y)/2$  Line	<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>N \leq 2</math>  <math>L \leq 1.0</math> <math>W \leq 0.05</math> <math>N \leq 1</math></p>	Checking on the table with light and polarizer and checking with eyes directly.

DATE 2018-07-05

TECHNICAL SPECIFICATION

LCM

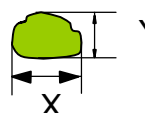
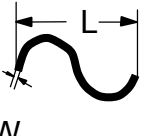
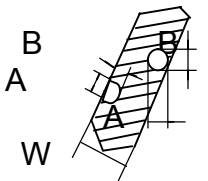
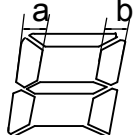
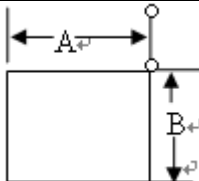
YES

YMS162-22AGAYDCN

Page 14 of 21

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

5 Standard of display test

No	Items	Criterion	Checking manner
1	Black spot white spot $D=(X+Y)/2$  Line	(1)  $Y$ $X$ $0.2 < D \leq 0.25$ $N \leq 1$ $0.1 < D \leq 0.2$ $N \leq 3$ $D \leq 0.1$ No check  (2)  $L$ $W$ $L \leq 2.0$ $W \leq 0.03$ $N \leq 2$ $L \leq 1.0$ $W \leq 0.05$ $N \leq 1$	Checking at the display state
2	Pin hole $D=(A+B)/2$ W: segment width	 $B$ $A$ $W$ $W \leq 0.4$ $D \leq 0.20$ 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
3	Different width of segment	 $a$ $b$ $ a-b  < 0.25$ or $ a-b  \leq 1/4W$ No check	Checking at the display state
4	Different width	 $A$ $B$ A: distortion $\leq 10\%$ B: distortion $\leq 10\%$ Superfluous Electrode lines display is not allowed	

DATE 2018-07-05

TECHNICAL SPECIFICATION

LCM

YES

YMS162-22AGAYDCN

Page 15 of 21

5	Pinhole	$\Phi = (A+B) / 2$	$0.15 < \Phi \leq 0.2 \quad N \leq 1$ $0.05 < \Phi \leq 0.15 \quad N \leq 3$ $\Phi \leq 0.05 \quad \text{Any number}$ Note: Distance between two spots $\geq 10\text{mm}$ , $\Phi < 1/3$ pixels
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6. Inspection Item

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%
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%

DATE 2018-07-05			TECHNICAL SPECIFICATION
LCM	YES	YMS162-22AGAYDCN	Page 16 of 21




VI.Attached Drawing

<b>CUSTOMER'S APPROVED:</b>	<b>DATE:</b>	<b>PAGE: 1/2</b>
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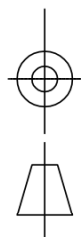
  

NO.	DESCRIPTION	DATE
1		
2		
3		
4		



**Yes Optoelectronics Co., Ltd.**



Unit: mm

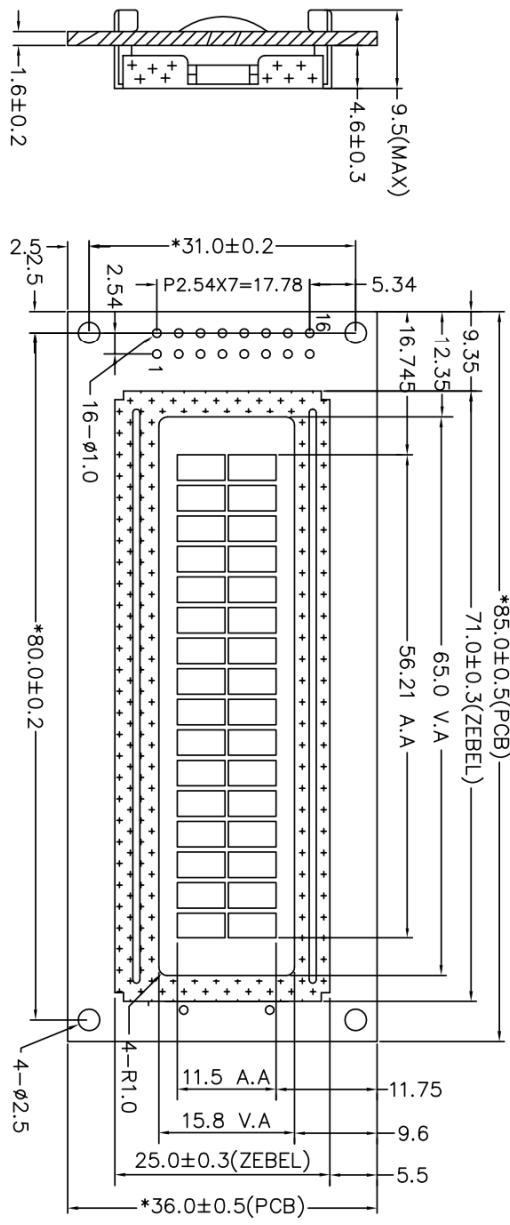
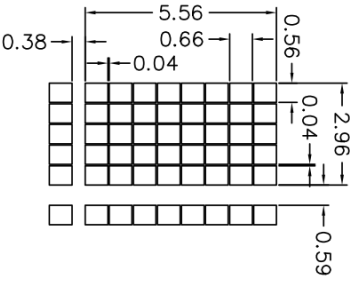
  

No. YMS162-22AGAYDCN	Ver.2	Drw
		Chk
		App

1	Operating Voltage:	5.0V
2	Drive method:	1/16Duty, 1/5Bias
3	Viewing Direction:	6:00
4	Operating Temp:	-20°C~70°C
5	Storage Temp:	-30°C~85°C
6	Display type:	STN, Positive, Reflective
7	Unspecified tolerance:	±0.2
8	LCD controller/driver:	ST7066U-0A
9	Backlight:	
10	Customer No.:	
11	Dimensions with mark "*" are important	
12	RoHS compliant	

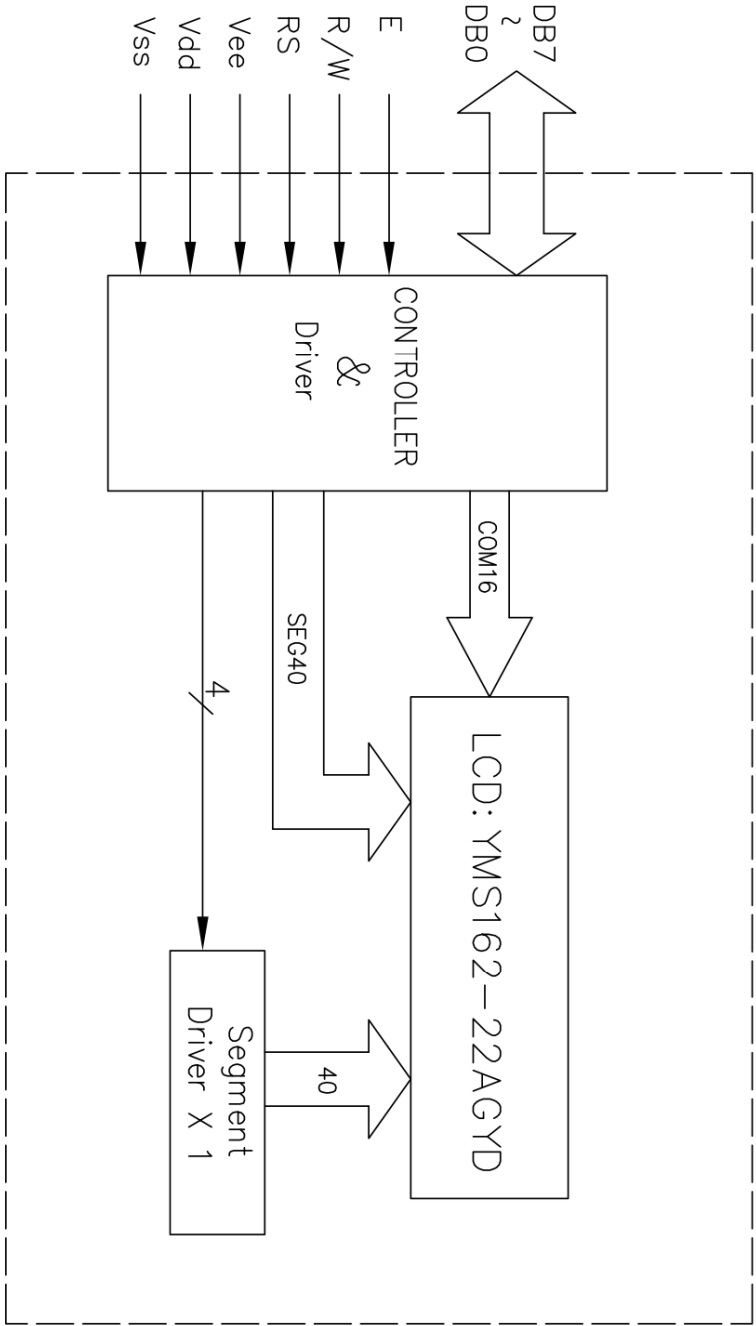
DATE 2018-07-05		TECHNICAL SPECIFICATION
LCM	YES	YMS162-22AGAYDCN
		Page 17 of 21

CUSTOMER'S APPROVED:

DATE:



PAGE: 2/2

PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SYMBOL	Vss	Vdd	Vee	RS	R/W	E	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7	NC	NC



**Yes Optoelectronics Co., Ltd.**

No. YMS162-22AGAYDCN Ver.2

 	Unit:mm
Drw	Chk
Aprv	

DATE 2018-07-05			TECHNICAL SPECIFICATION
LCM	YES	YMS162-22AGAYDCN	Page 18 of 21

## VII.Packing

<i>CUSTOMER'S APPROVED:</i>	<i>DATE: 2012.02.03</i>	<i>PAGE: 1/1</i>
<p>PRODUCT PART NO.:YMS162-22AGAYDCN</p> <p>PACKING TYPE: BY EPE TRAY(T12832-21B)</p> <p>PACKLING ORDER:</p> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="width: 30%;"> <p>1) Putting 21 pcs Modules on each EPE tray.</p> </div> <div style="width: 30%;"> <p>2) Putting 6 pcs EPE trays together with EPE paper on the top of EPE tray.</p> </div> <div style="width: 30%;"> <p>3) Assembling the boards and the tray together with adhesive tape</p> </div> </div> <div style="text-align: center; margin-top: 20px;"> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="width: 30%;"> <p>4) Putting in the inner small carton (TYPE:H82)</p> </div> <div style="width: 30%;"> <p>5) Putting 5 small cartons into one outcarton</p> </div> <div style="width: 30%;"> <p>6) Packing finished</p> </div> </div> <p style="margin-top: 20px;">Note: 21 pcs in a tray,6 trays in a inner carton,5 inner cartons in a out carton, so 21x6x5=630pcs/Outcarton</p> <p style="margin-top: 5px;">Dimension (Small carton ): 385*325*87mm                      Dimension (Out carton ): 394*344*470mm</p>		
NO. YMS162-22AGAYDCN	Ver. 1	Drw:                      Chk:                      Apv:
ANSHAN YES OPTOELECTRONICES DISPLAY CO., LTD		

DATE 2018-07-05		TECHNICAL SPECIFICATION
LCM	YES	YMS162-22AGAYDCN
		Page 19 of 21

## VIII. 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  $25\pm 5^{\circ}\text{C}$  and the humidity is  $50\pm 20\% \text{RH}$ .
- (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 2018-07-05			TECHNICAL SPECIFICATION
LCM	YES	YMS162-22AGAYDCN	Page 20 of 21

(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 2018-07-05			TECHNICAL SPECIFICATION
LCM	YES	YMS162-22AGAYDCN	Page 21 of 21