

# AZ DISPLAYS

## SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY MODULE

MODEL NO.: AGM1264R-FLB-FBW

DATE: NOV.23.2011

Approved	Checked	Department

CUSTOMER:

MODEL NO.:

DATE:

Approved	Checked	Department

DATE NOV .23 .2011

TECHNICAL SPECIFICATION

LCM

YES

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## I . General Specifications

### 1.Features

- A. Drive Method: 1/64 Duty, 1/9 Bias
- B. The Module Operating Voltage: 3.3V;
- C. The LCD Operating Voltage : 9.7V;
- D. Viewing Direction: 6:00
- E. Operating Temperature: -20°C~70°C
- F. Storage Temperature: -30°C~85°C
- G. Display type: FSTN mode, Transflective, Positive type display

### 2.Mechanical Data and Conditions:

- (1) Module Size-----72.0( w ) \*52.0( h)mm
- (2) Viewing Area ----- 66.4( w )\* 39.4( h )mm
- (3) Dot Size -----0.45( w )\*0.53(h) mm
- (4) Dot Quality -----128\*64 DOTS
- (5) Outline Dimensions-----See Attached Drawing

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## 3.Pin Connections:

Pin No.	Symbol	Function
1	P/S	This is the parallel data input/serial data input switch terminal
2	C86	This is the MPU interface switch terminal
3-7	V5-V1	A multi-level power supply for the liquid crystal drive.
8	CAP2+	DC/DC voltage converter
9	CAP2-	DC/DC voltage converter
10	CAP1-	DC/DC voltage converter
11	CAP1+	DC/DC voltage converter
12	CAP3-	DC/DC voltage converter
13	VOOUT	dc/dc voltage converter
14	VSS	Ground
15	VDD	Power supply
16	D7(SI)	Data bus
17	D6(SCL)	Data bus
18-23	D5-D0	Data bus
24	$\overline{RD}(E)$	8080:RD signal 6800:Enable clock input terminal
25	$\overline{WR}(R/W)$	8080:WR signal 6800:when RWP="H":Read when RWP="L":Write
26	A0	This is connected to the least significant bit of the normal MPU address bus, and it determines whether the data bits are data or a command.
27	/RES	Reset signal
28	/CS1	The chip select signal

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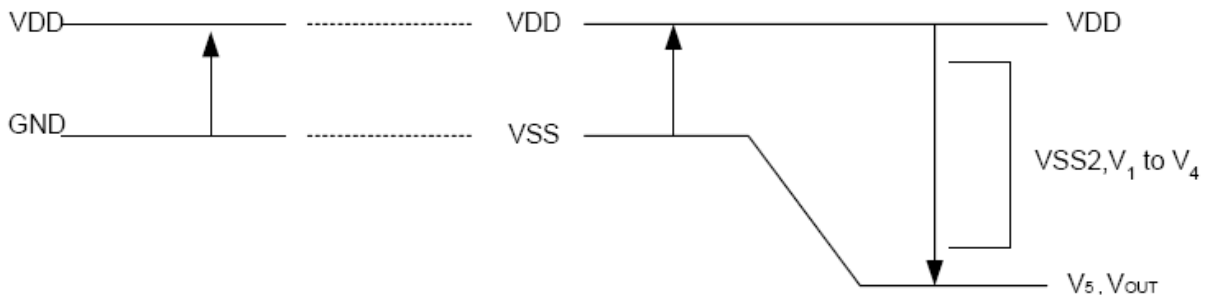
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## 4. Absolute Maximum Ratings

(Unless otherwise noted, VSS = 0V)

Parameter	Symbol	Conditions	Unit
Power Supply Voltage	VDD	-0.3 to + 7.0	V
Power supply voltage (2) (VDD standard)	VSS2	With Triple step-up	-7.0 to +0.3
		With Quad step-up	-4.0 to +0.3
			-3.0 to +0.3
Power supply voltage (3) (VDD standard)	$V_5, V_{OUT}$	-12.0 to +0.3	V
Power supply voltage (4) (VDD standard)	$V_1, V_2, V_3, V_4$	$V_5$ to +0.3	V
Input voltage	$V_{IN}$	-0.3 to VDD +0.3	V
Output voltage	$V_O$	-0.3 to VDD +0.3	V



System (MPU) side

SPLC501C chip side

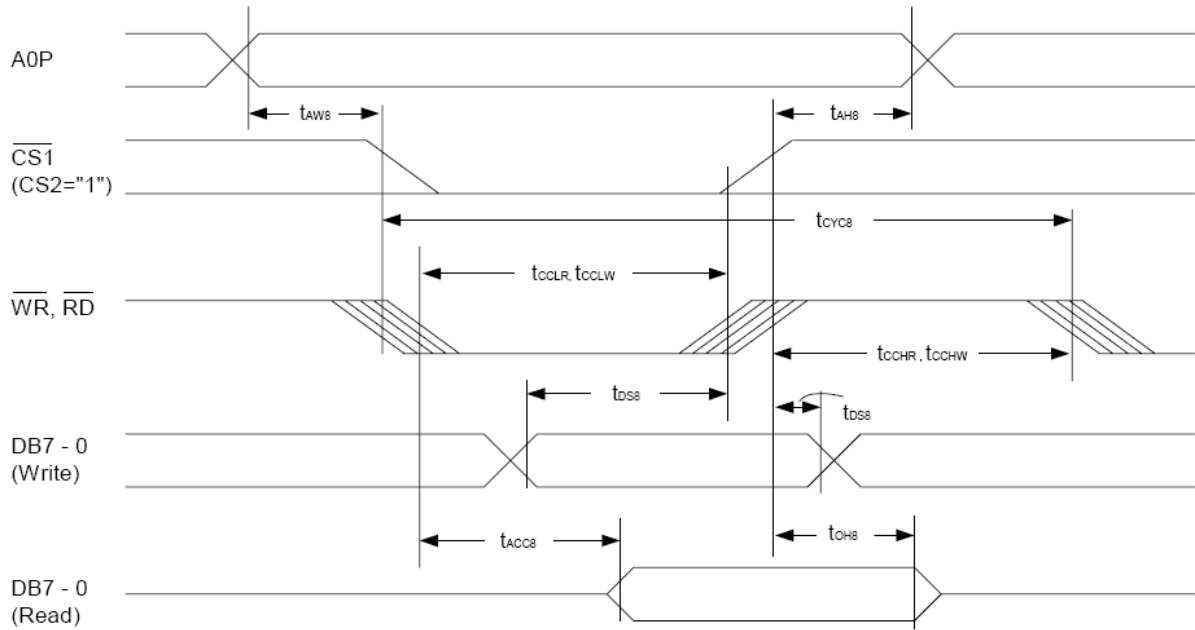
**Notes and Cautions:**

1. The VSS2,  $V_1$  to  $V_5$  and VOUT are relative to the VDD = 0V reference.
2. Insure that the voltage levels of  $V_1, V_2, V_3,$  and  $V_4$  are always such that  $VDD \geq V_1 \geq V_2 \geq V_3 \geq V_4 \geq V_5$ .
3. Permanent damage to the LSI may result if the LSI is used outside of the absolute maximum ratings. Moreover, it is recommended that in normal operation the chip be used at the electrical characteristic conditions, and use of the LSI outside of these conditions may not only result in malfunctions of the LSI, but may have a negative impact on the LSI reliability as well.

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## 5. Timing Characteristics:

### System bus read/write characteristics 1 (For the 8080 Series MPU)



(VDD = 2.7V to 4.5V, TA = 25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0P	t <sub>AHS</sub>		0	-	ns
Address setup time	A0P	t <sub>AWS</sub>		0	-	ns
System cycle time	A0P	t <sub>CYCS</sub>		300	-	ns
Control L pulse width (WR)	WR	t <sub>CCLW</sub>		60	-	ns
Control L pulse width (RD)	RD	t <sub>CCLR</sub>		120	-	ns
Control H pulse width (WR)	WR	t <sub>CCHW</sub>		60	-	ns
Control H pulse width (RD)	RD	t <sub>CCHR</sub>		60	-	ns
Data setup time	DB7 - 0	t <sub>DSS</sub>		40	-	ns
Address hold time		t <sub>DHS</sub>		15	-	ns
RD access time		t <sub>ACC8</sub>	C <sub>L</sub> = 100pF	-	140	ns
Output disable time		t <sub>OHS</sub>		10	100	ns

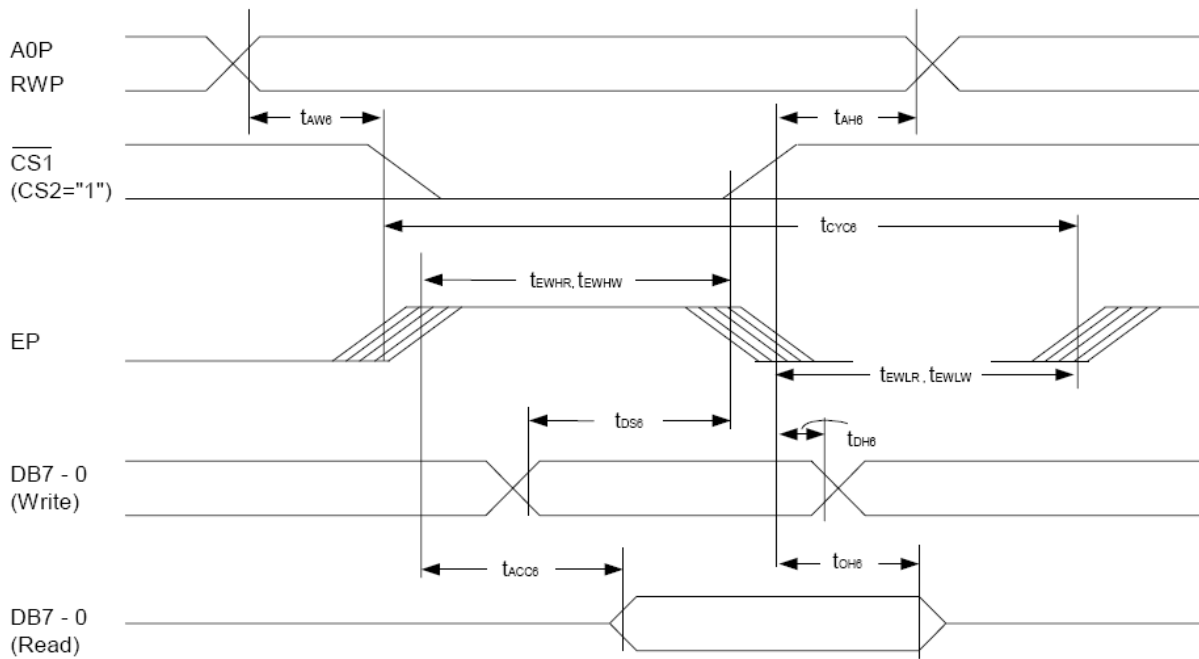
**Note1:** The input signal rise time and fall time (t<sub>r</sub>, t<sub>f</sub>) is specified at 15 ns or less. When the system cycle time is extremely fast, (t<sub>r</sub> + t<sub>f</sub>) ≤ (t<sub>CYCS</sub> - t<sub>CCLW</sub> - t<sub>CCHW</sub>) for (t<sub>r</sub> + t<sub>f</sub>) ≤ (t<sub>CYCS</sub> - t<sub>CCLR</sub> - t<sub>CCHR</sub>) are specified.

**Note2:** All timing is specified using 20% and 80% of VDD as the reference.

**Note3:** t<sub>CCLW</sub> and t<sub>CCLR</sub> are specified as the overlap between CS1 being 'L' (CS2 = 'H') and WR and RD being at the 'L' level.

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## System bus read/write characteristics 2 (6800 series MPU)



(VDD = 2.7V to 4.5V, T<sub>A</sub> = 25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0P	t <sub>AH6</sub>		0	-	ns
Address setup time	A0P	t <sub>AW6</sub>		0	-	ns
System cycle time	A0P	t <sub>CYC6</sub>		300	-	ns
Data setup time	DB7 - 0	t <sub>DS6</sub>	C <sub>L</sub> = 100pF	40	-	ns
Data hold time		t <sub>DH6</sub>		15	-	ns
Access time		t <sub>ACC6</sub>		-	140	ns
Output disable time		t <sub>OH6</sub>		10	100	ns
Enable H pulse time	Read	EP	t <sub>EWHR</sub>	120	-	ns
	Write			t <sub>EWHW</sub>	60	-
Enable L pulse time	Read	EP	t <sub>EWLR</sub>	60	-	ns
	Write			t <sub>EWLW</sub>	60	-

**Note1:** The input signal rise time and fall time (t<sub>r</sub>, t<sub>f</sub>) is specified at 15 ns or less. When the system cycle time is extremely fast, (t<sub>r</sub> + t<sub>f</sub>) ≤ (t<sub>CYC6</sub> - t<sub>EWLR</sub> - t<sub>EWHR</sub>) for (t<sub>r</sub> + t<sub>f</sub>) ≤ (t<sub>CYC6</sub> - t<sub>EWLR</sub> - t<sub>EWHR</sub>) are specified.

**Note2:** All timing is specified using 20% and 80% of VDD as the reference.

**Note3:** t<sub>EWLR</sub> and t<sub>EWLW</sub> are specified as the overlap between CS1 being 'L' (CS2 = 'H') and EP.

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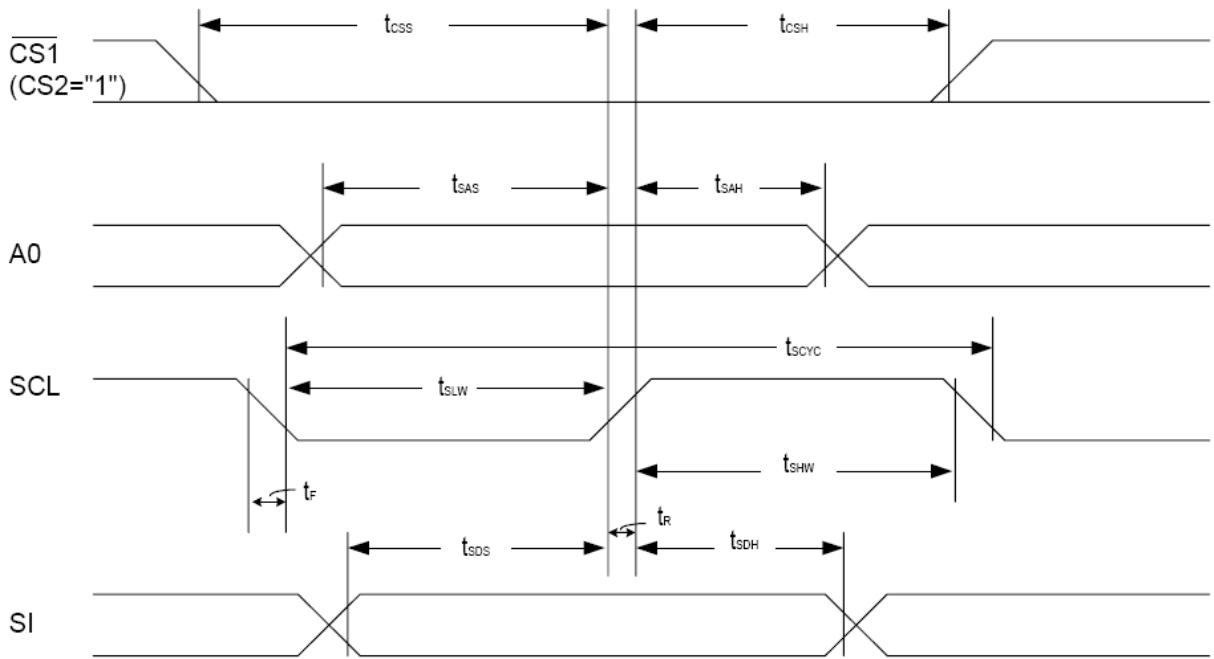
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## The serial interface



(VDD = 2.7V to 4.5V, TA = 25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial Clock Period		tscy	-	250	-	ns
SCL 'H' pulse width	SCL	tshw	-	100	-	ns
SCL 'L' pulse width		tslw	-	100	-	ns
Address setup time		tsas	-	150	-	ns
Address hold time	A0P	tсах	-	150	-	ns
Data setup time		tds	-	100	-	ns
Data hold time	SI	tsdh	-	100	-	ns
CS-SCL time	CS	tcsh	-	150	-	ns
		tcss	-	150	-	ns

**Note1:** The input signal rise and fall time ( $t_r$ ,  $t_f$ ) are specified at 15 ns or less.

**Note2:** All timing is specified using 20% and 80% of VDD as the standard.

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## 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		3.3		V	
3	LCD Operating Voltage	Vdd-V <sub>0</sub>		10.1		V	-20°C
			9.5	9.7	9.9	V	25°C
				9.3		V	70°C
4	Response Time	Ton		80		ms	
		Toff		320		ms	
5	Contrast Ratio	CR	2				
6	Viewing Angle	12H	θ 1		44	Deg.	(CR≥2.0)
		6H	θ 2		69		
		3H	θ 3		55		
		9H	θ 4		55		

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

Color:Blue

	Symbol	MIN	TYP.	MAX	UNIT	CONDITIONS
Forward Voltage	V <sub>f</sub>	2.85	3.2	3.5	V	I <sub>f</sub> =90mA
Forward Current	I <sub>f</sub>		90	120	mA	V <sub>f</sub> =3.2V
Spectral Line Half width	Δλ		25		nm	
Luminous Intensity	L <sub>v</sub>		60		cd/m <sup>2</sup>	I <sub>f</sub> =90mA
Emission Wavelength	λ <sub>p</sub>	470	472.5	475	nm	
Operating Temperature	T <sub>opr</sub>	-20°C TO +70°C				
	T <sub>sty</sub>	-30°C TO +80°C				

#### WARNING:

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

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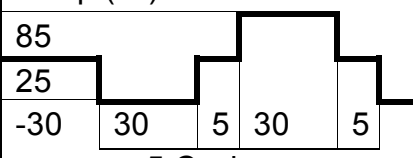
LCM

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### 3. Reliability Test

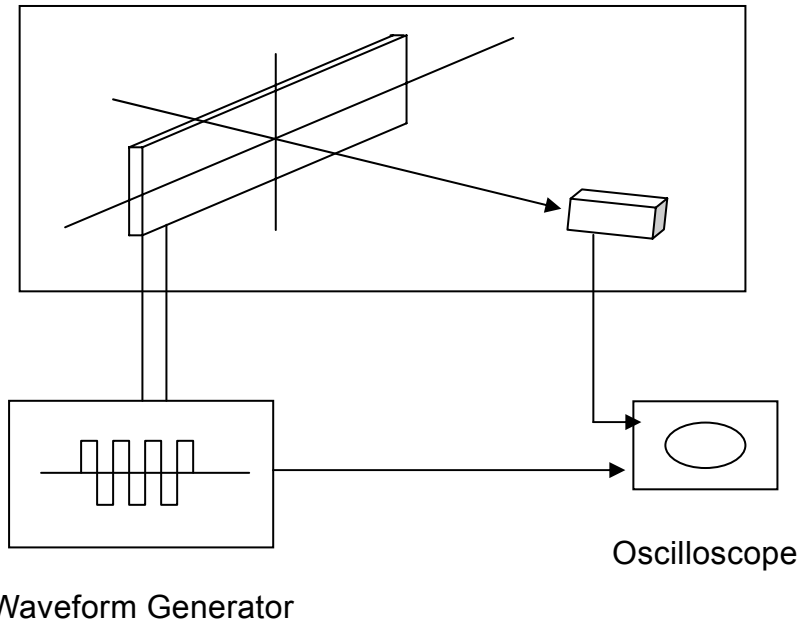
No	Items	Test Condition	Equipment	Test Result
1	High Temp Storage	Temp: $85 \pm 2^{\circ}\text{C}$ Time: 96h Restore: 24h	Tenny	Passed
2	Low Temp Storage	Temp: $-30 \pm 3^{\circ}\text{C}$ Time: 96h Restore: 24h	Tenny	Passed
3	High Temp Operating	Temp: $70 \pm 2^{\circ}\text{C}$ Vop: 3.3V Time: 24h Restore: 24h	Tenny	Passed
4	Low Temp Operating	Temp: $-20 \pm 3^{\circ}\text{C}$ Vop: 3.3V Time: 24h Restore: 24h	Tenny	Passed
5	High Temp High Hum Storage	Temp: $40 \pm 2^{\circ}\text{C}$ Hum: 95%Rh Time: 96h Restore: 24h	Tenny	Passed
6	Thermal Shock	Temp: ( $^{\circ}\text{C}$ )  5 Cycles Restore: 24h	Tenny	Passed

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### III. The LCD Measuring Method and Equipment

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

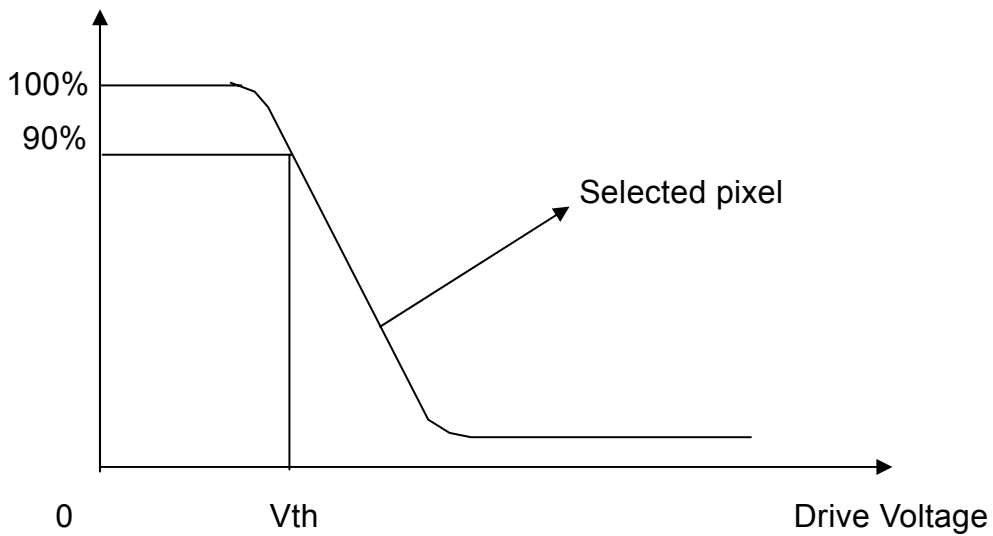
##### (1) Equipment



##### (2) Definition

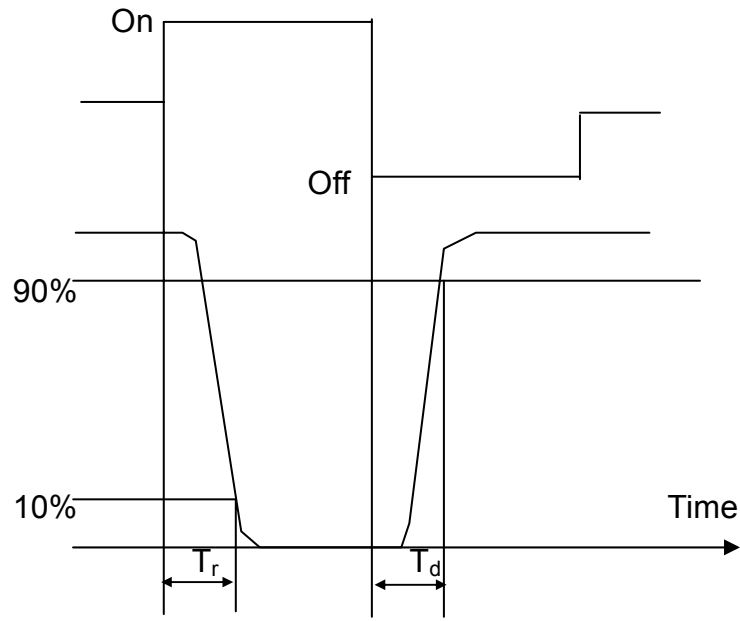
##### A. Threshold Voltage ( $V_{th}$ )

Brightness

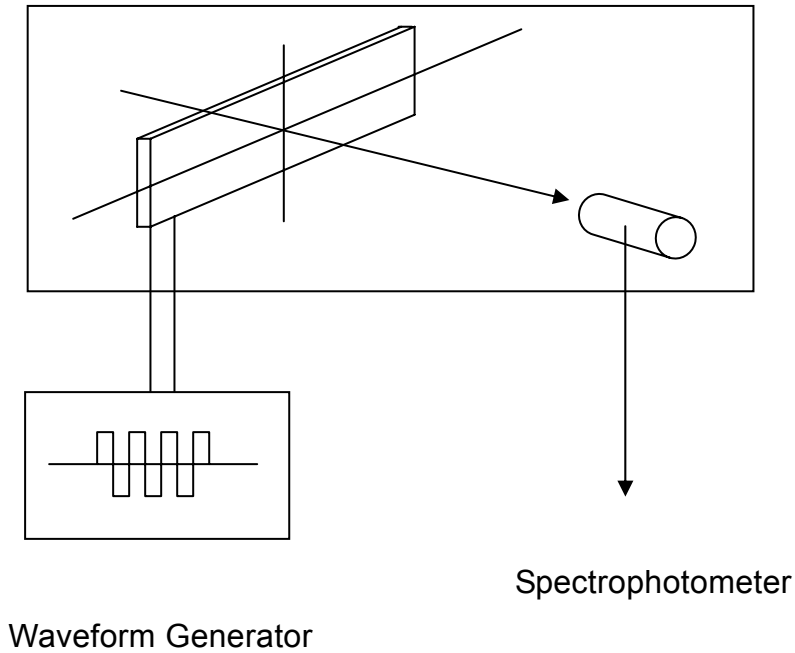


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**B. Response Time**



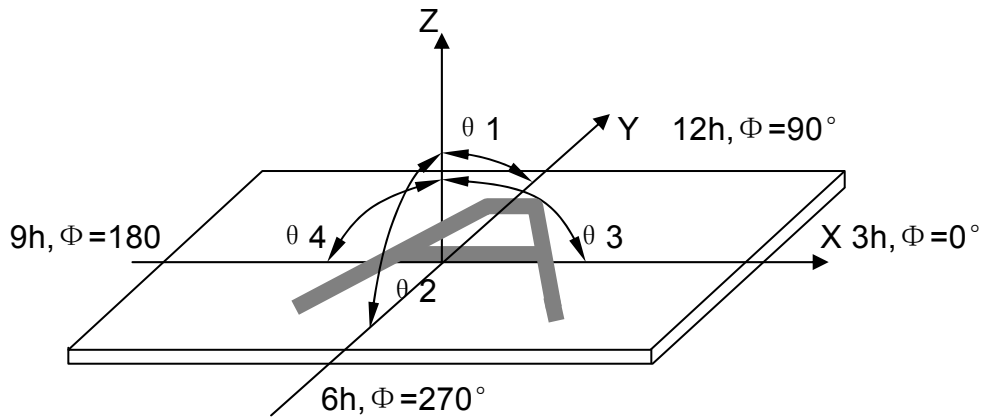
**2. Contrast Measuring**  
**(1) Equipment**



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(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

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## 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  $15^{\circ}$  -  $45^{\circ}$  .

### 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.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.

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## 5. Inspection Item and Standards

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 blue 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%

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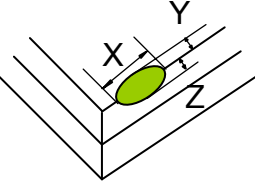
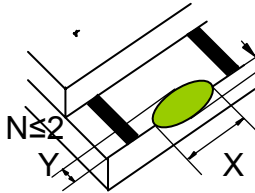
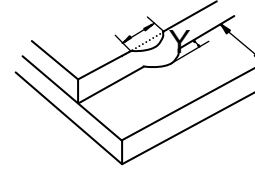
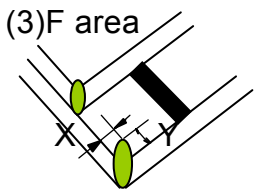
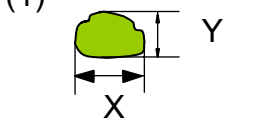
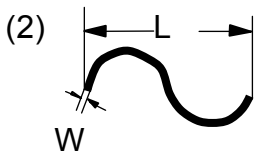
YES

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LCD:

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>Z</math>  <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>	<p>checking with eyes</p>
2	<p>Black spot white spot <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                      II area 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>                      II area No check</p>	<p>Checking on the table with light and polarizer and checking with eyes directly.</p>

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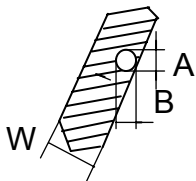
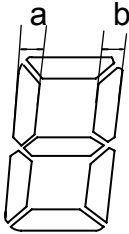
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No	Items	Criterion	Checking manner
3	Polarizer Bubble	$D \leq 0.15$ No check $0.15 < D \leq 0.4$ $N \leq 2$ II area No check	Checking on the table with light and polarizer, and checking with eyes directly
4	Rainbow Color	Allow tiny rainbow Allow 5% color contrast or accord limitative sample	Checking on the table with light and polarizer, And checking with eyes directly
5	Polarizer or pad appearance	No dirty	Checking with eyes

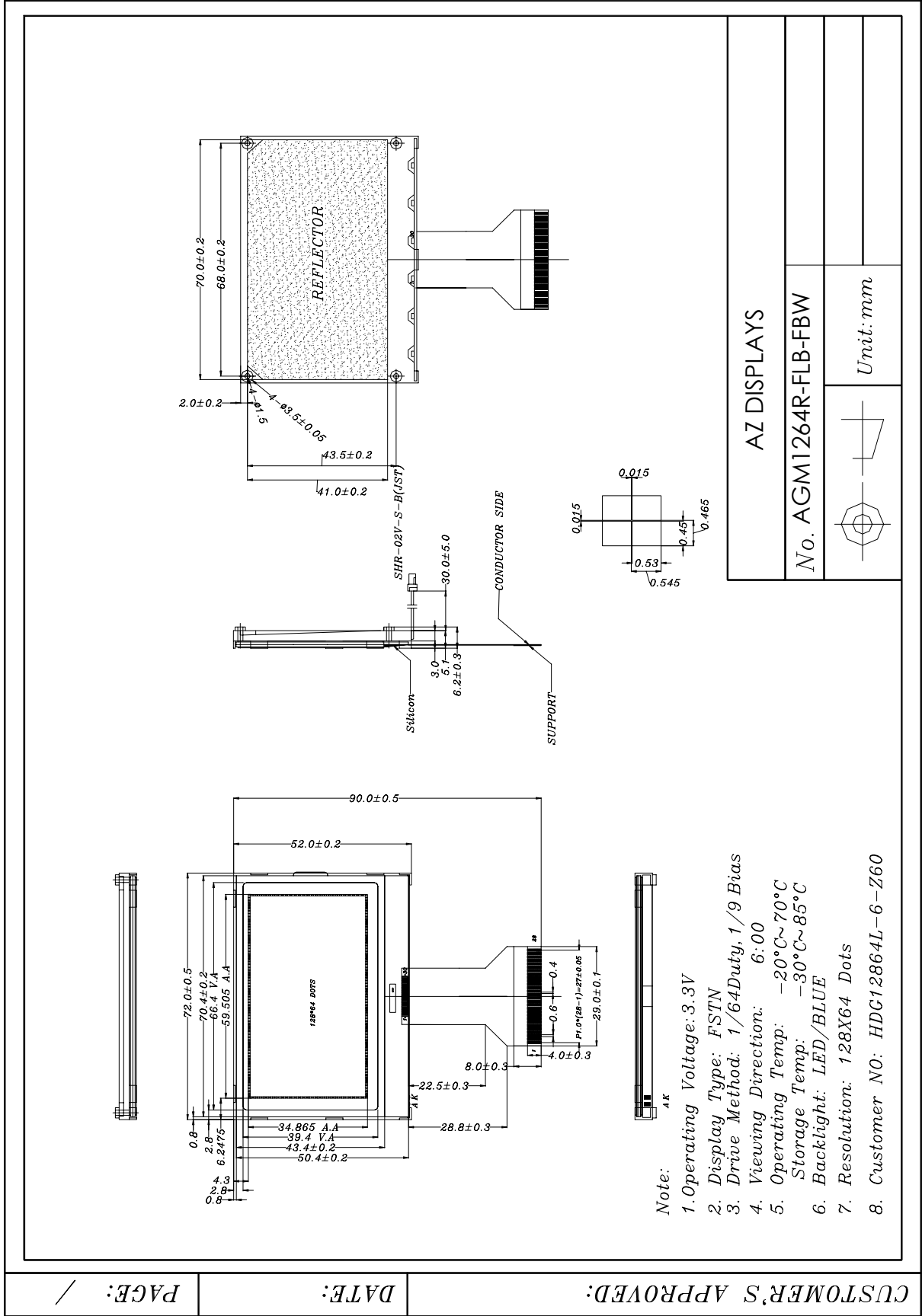
Standard of display test

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

Note: d ~ Diameter    n ~ Quantity    Unit: mm

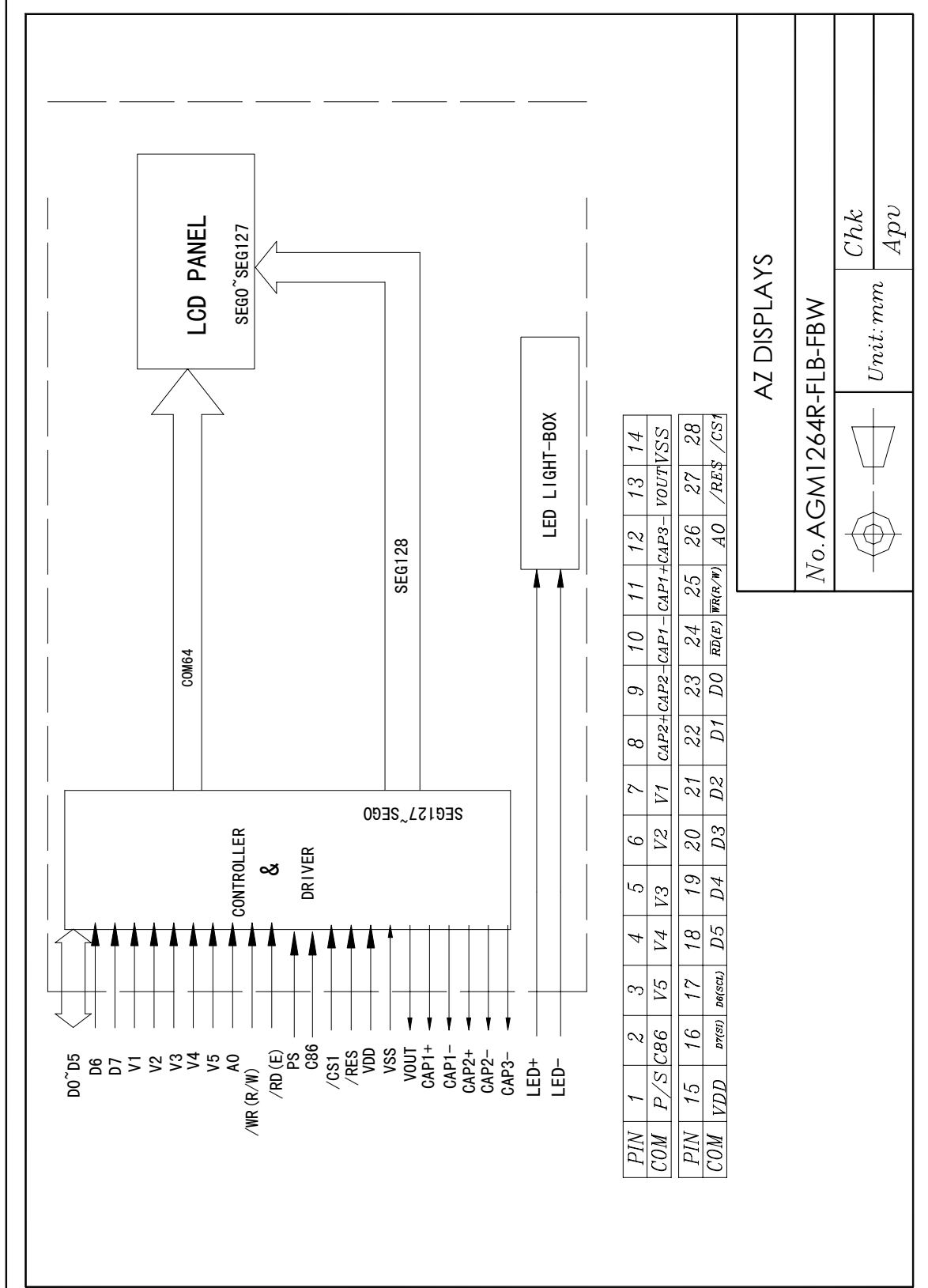
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V. Attached Drawing



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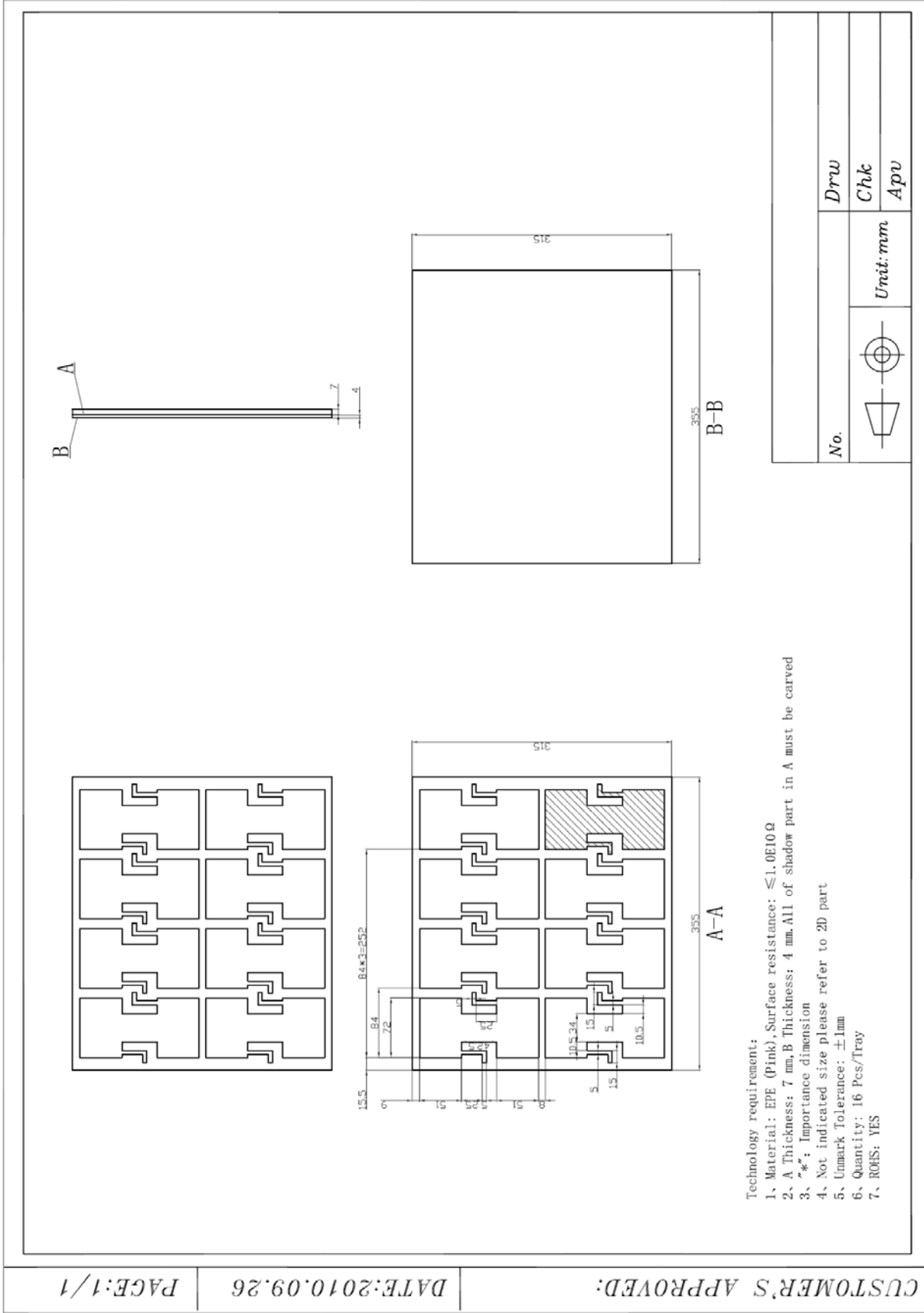
PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14
COM	P/S	C86	V5	V4	V3	V2	V1	CAP2+CAP2-	CAP1-CAP1-	CAP1+CAP3-	VOUT	VSS		
PIN	15	16	17	18	19	20	21	22	23	24	25	26	27	28
COM	VDD	pr(st)	pr(scl)	D5	D4	D3	D2	D1	D0	RD(E)	WR(R/W)	A0	RES	CS1

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Unit: mm  
 Chk  
 Apv

## VI. Packing



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PRODUCT PART NO.:YMS12864-18AEBFDGL

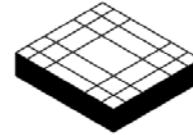
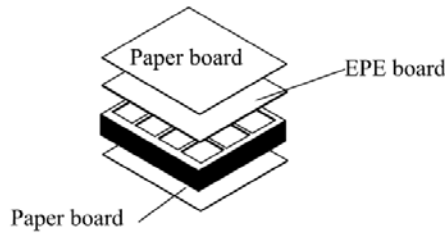
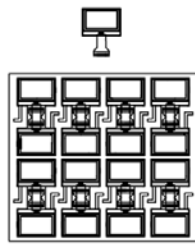
PACKING TYPE: BY EPE TRAY(T12864-18A)

PACKLING ORDER:

1) Putting 16 pcs Modules on each EPE tray.

2) Putting 7 pcs EPE trays together with EPE board on the top of EPE tray.

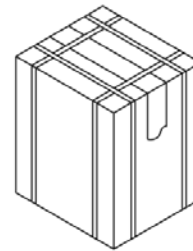
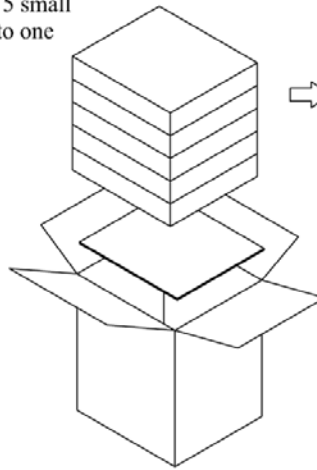
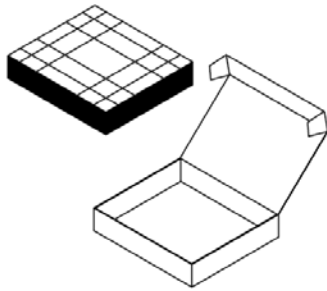
3) Assembling the boards and the tray together with adhesive tape



4) Putting in the inner small carton (TYPE:H82)

5) Putting 5 small cartons into one outcarton

6) Packing finished



Note: 16 pcs in a tray,7 trays in a inner carton,5 inner cartons in a out carton, so 16x7x5=560pcs/Outcarton

Dimension (Small carton ): 385\*325\*87mm

Dimension (Out carton ): 394\*344\*470mm

Drw:

Chk:

Apv:

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TECHNICAL SPECIFICATION

LCM

YES

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## 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.

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(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.

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