

YES OPTOELECTRONICS CO.,LTD

SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY MODULE	YMS12864-15DFCBUGL
STANDARD SPECIFICATIONS FOR PRODUCT QUALITY	YMS12864-15DFCBUGL
SPECIFICATIONS FOR PACKING	YMS12864-15DFCBUGL

**SPECIFICATIONS FOR
LIQUID CRYSTAL DISPLAY MODULE**

Product NO: YMS12864-15DFCBUGL
Customer: DIGIMAX
DATE: 2022-11-10

Prepared by	Checked by	Approved by
田卉	范玉芬	牛红丽



CUSTOMER'S APPROVAL

APPROVED BY: _____ DATE: _____

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DATE :2022-11-10	Version1.0		TECHNICAL SPECIFICATION
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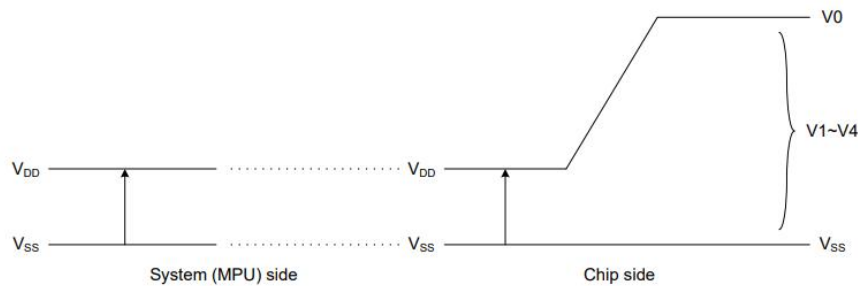
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1. General Specifications

Item	Contents	Unit
Drive Method	1/65Duty;1/9Bias	/
Operating voltage	3.0	V
Viewing direction	12: 00	O' Clock
Operating Temperature	-20~70	°C
Storage Temperature	-20~70	°C
Display type	STN-BLUE,Negative,Transmissive	/
Module Size	93.70*53.15*5.7	Mm
View Area	70.70*38.8	Mm
Dot Size	0.48*0.48	mm
Dot Pitch	0.52*0.52	mm
Number of Dots	128*64	DOT

2. Absolute Maximum Ratings

Parameter	Symbol	Conditions	Unit
Digital Power Supply Voltage	VDD	-0.3 ~ 3.6	V
Analog Power supply voltage	VDD2	-0.3 ~ 3.6	V
LCD Power supply voltage	VOUT, V0	-0.3 ~ 13.5	V
LCD Power supply voltage	V1, V2, V3, V4	-0.3 ~ V0	V
Operating temperature	TOPR	-25 to +80	°C
Storage temperature	TSTR	-55 to +125	°C



Notes

- Stresses above those listed under Limiting Values may cause permanent damage to the device.
- Parameters are valid over operating temperature range unless otherwise specified. All voltages are with respect to VSS unless otherwise noted.
- Insure the voltage levels of VOUT, V0, V1, V2, V3, V4 and VSS always match the correct relation:
 $VOUT \geq V0 \geq V1 \geq V2 \geq V3 \geq V4 \geq VSS$

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3.Electrical Characteristics(DC Character)

Item	Symbol	Condition	Rating			Unit	Applicable Pin		
			Min.	Typ.	Max.				
Operating Voltage (1)	VDD		2.4	—	3.3	V	VDD		
Operating Voltage (2)	VDD2		2.4	—	3.3	V	VDD2		
Input High-level Voltage	V _{IHC}		0.8 x VDD	—	VDD	V	MPU Interface		
Input Low-level Voltage	V _{ILC}		VSS	—	0.2 x VDD	V	MPU Interface		
Output High-level Voltage	V _{OHC}	I _{OUT} =1mA, VDD=1.8V	0.8 x VDD	—	VDD	V	D[7:0]		
Output Low-level Voltage	V _{OLC}	I _{OUT} =-1mA, VDD=1.8V	VSS	—	0.2 x VDD	V	D[7:0]		
Input Leakage Current	I _{LI}		-1.0	—	1.0	μA	MPU Interface		
Output Leakage Current	I _{LO}		-3.0	—	3.0	μA	MPU Interface		
External Step-up Voltage Circuit	V _{OUT}		—	—	13.5	V	VOUT		
Supply Voltage Regulator Circuit	V _{OUT}		6.0	—	13.5	V	VOUT		
Supply Voltage Follower Circuit	V ₀		4.0	—	13.5	V	V0		
Reference Voltage	V _{RS}	Ta=25°C	2.07	2.10	2.13	V	VRS		
Liquid Crystal Driver ON Resistance	R _{ON}	Ta=25°C	V0=13V	—	2.0	3.5	KΩ	COMx	
			V0=8V	—	3.2	5.4	KΩ	SEGx	
Oscillator Frequency	Internal Oscillator	f _{OSC}	1/65 Duty 1/33 Duty	Ta=25°C	17	20	24	kHz	
	External Oscillator	f _{CL}			17	20	24	kHz	CL
	Internal Oscillator	f _{OSC}	1/49 Duty 1/53 Duty	Ta=25°C	25	30	35	kHz	
	External Oscillator	f _{CL}			1/55 Duty	25	30	35	kHz

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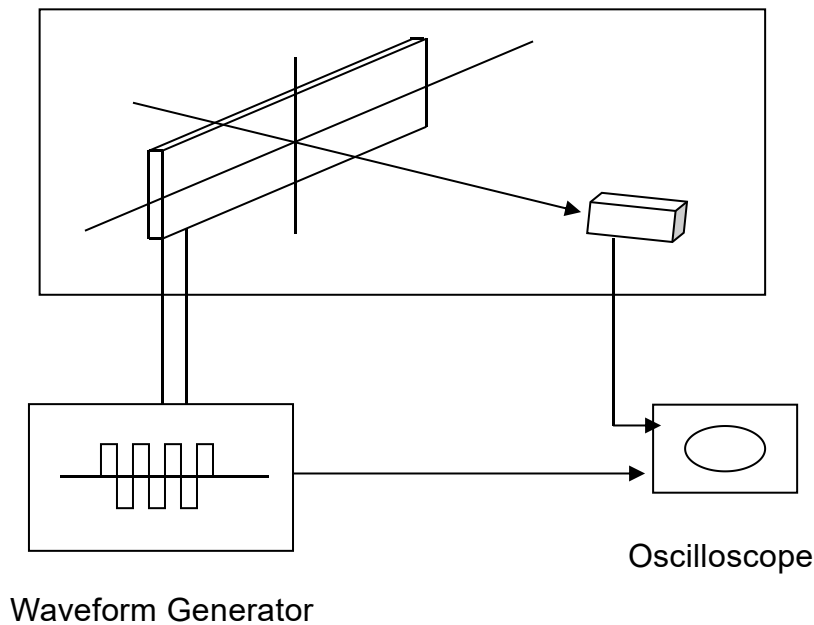
4. Electro-Optic Characteristics

4.1 Measuring Condition: TEMP=(23±3)°C , HUM= (55±10)%RH

NO.	Item	Symbol	Min	Type	Max	Unit	
1	Supply Voltage(Logic)	VDD	2.7	3.0	3.3	V	
2	Operating Voltage	VLCD	-	8.5	-	V	
3	Operating Frequency	F	-	100	-	Hz	
4	Response Time	Rising Time	Tr	-	120	180	mS
		Decay Time	Td	-	200	300	
5	Contrast Ratio (max)	CR	4	4.5			
6	Viewing Angle (CR≥2)	12H φ =90°	θ 1	40	45	deg	
		6H φ =270°	θ 2	35	40		
		3H φ =0°	θ 3	40	45		
		9H φ =180°	θ 4	35	40		

4.2 Threshold Voltage and Response Time Measuring

(1) Equipment

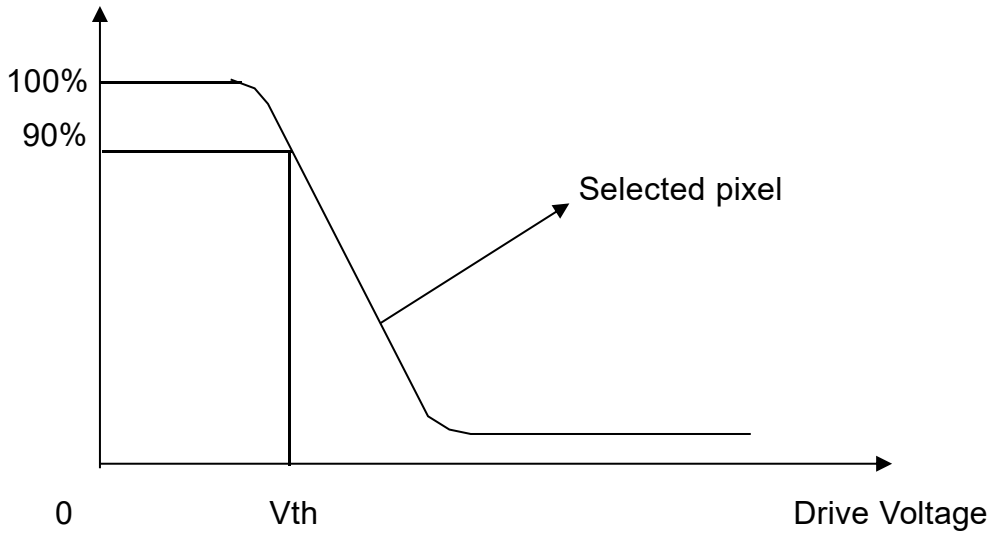


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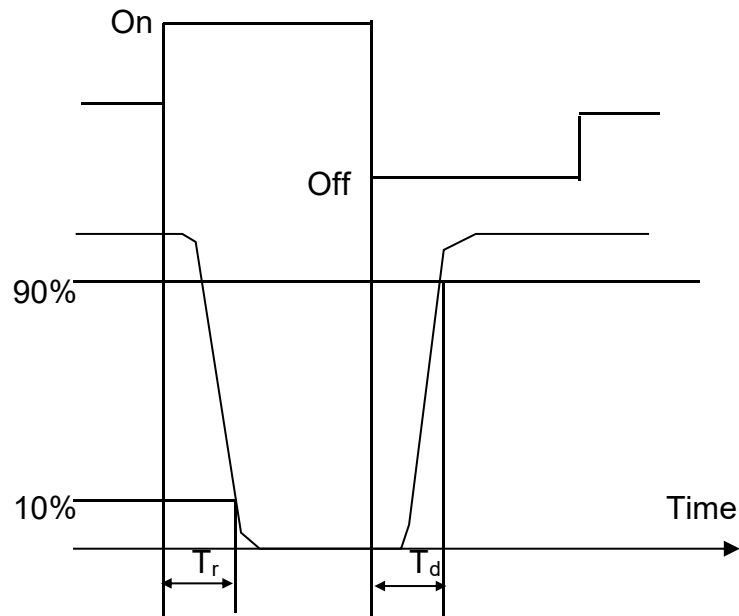
(2) Definition

A. Threshold Voltage (V_{th})

Brightness



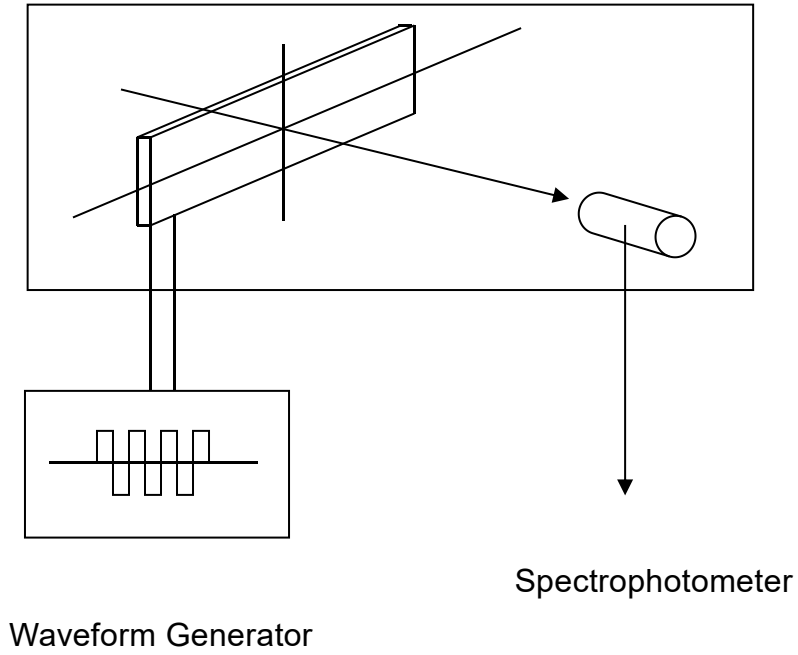
B. Response Time



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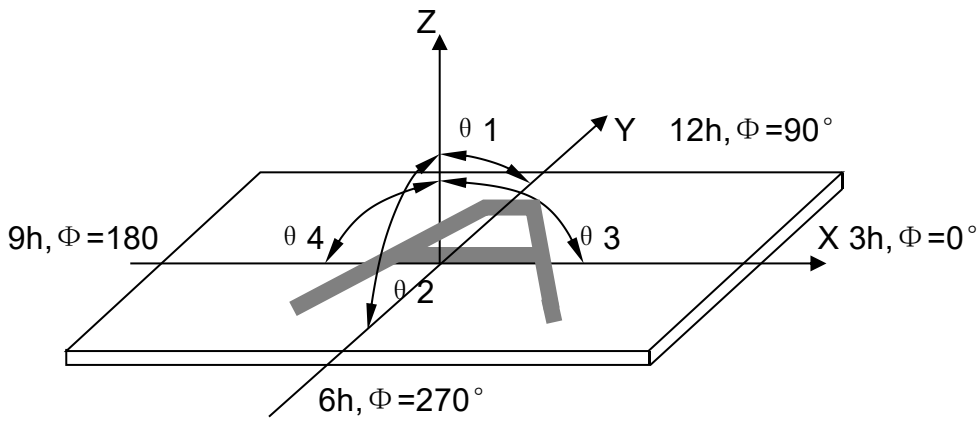
4.3. Contrast Measuring

(1) Equipment



(2) Definition:

A. Viewing Angle:



B. Contrast Ratio (Positive)

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

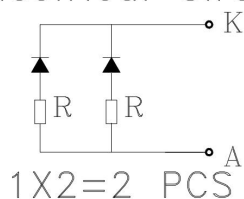
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5.Backlight Electric Characteristic

Color:White

	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
Forward Voltage	V_f	--	4.0	--	V	$V_f=4.0\text{ V}$
Forward Current	I_f	30		40	mA	
Power Dissipation	P_d			0.16	W	$V_f=4.0\text{ V}$
Reverse Voltage	V_R			5	V	
Reverse Current	I_R			0.2	mA	
Luminous Intensity	I_V	70			cd/m ²	$V_f=4.0\text{ V}$
Luminous Uniformity	ΔI_V	70			%	
Chromaticity coordinate	X	X=0.270	--	X=0.320		$I_f=20\text{mA}$ $T_a=25^\circ\text{C}$ Each chip
	Y	Y=0.270	--	Y=0.320		

Electrical Circuit



WARNING:

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

6.Pin Connections:

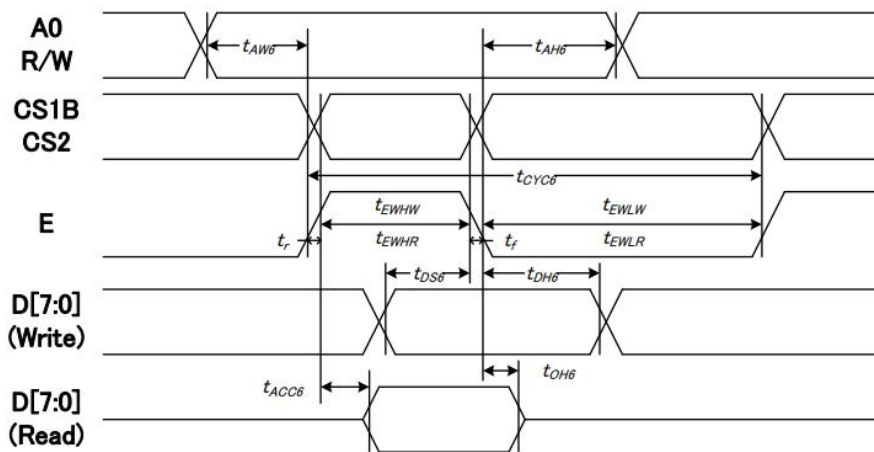
Pin No.	Symbol	Function
1	/CS1	Chip Select signal.
2	/RES	Reset Signal
3	A0	This is connected to the least significant bit of the normal MPU address bus,and it determines whether the data bits are data or a command.
4	R/W	Read/Write Select
5	E	Enable signal
6-13	D0~D7	Data Bus Line
14	VDD	Logic Supply Voltage(+3.0V)
15	VSS	Ground(0v)

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16	VOUT	Connection Pin for Voltage Converter
17	CAP3+	
18	CAP1-	
19	CAP1+	
20	CAP2+	
21	CAP2-	
22-26	V4-V0	LCD driver supply voltages.

7. Timing Characteristics

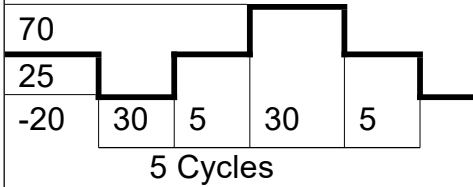
7.1 System BUS Read/Write Characteristics (For the 6800 Series MPU)



Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW6		0	—	ns
Address hold time		tAH6		0	—	
System cycle time	E	tCYC6		240	—	
Enable L pulse width (WRITE)		tEHLW		80	—	
Enable H pulse width (WRITE)		tEHWLW		80	—	
Enable L pulse width (READ)		tEHLR		80	—	
Enable H pulse width (READ)	tEHWHR		140	—		
Write data setup time	D[7:0]	tDS6		40	—	
Write data hold time		tDH6		10	—	
Read data access time		tACC6	CL = 100 pF	—	70	
Read data output disable time		tOH6	CL = 100 pF	5	50	

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8. Reliability Test

No	Items	Test Condition	Judgement
1	High Temp Storage	Temp:70±2℃ Time:96h Restore:24h	Display function:No defect Display quality: No defect Current consumption: No defect
2	Low Temp Storage	Temp:-20±3℃ Time:96h Restore:24h	Display function:No defect Display quality: No defect Current consumption: No defect
3	High Temp Operating	Temp:70±2℃ VDD:3.0V Time:96h Restore:24h	Display function:No defect Display quality: No defect Current consumption: No defect
4	Low Temp Operating	Temp: -20±3℃ VDD:3.0V Time:96h Restore:24h	Display function:No defect Display quality: No defect Current consumption: No defect
5	High Temp High Hum Storage	Temp:40±2℃ Hum:90%Rh Time:96h Restore:24h	Display function:No defect Display quality: No defect Current consumption: No defect
6	Thermal Shock	Temp:(℃)  70 25 -20 30 5 30 5 5 Cycles Restore:24h	Display function:No defect Display quality: No defect Current consumption: No defect

9. Warranty

9.1. Incoming inspection.

Please inspect the LCD within one month after your receipt.

9.2. Production warranty.

YES warrants its LCD's for a period of 12 months from the ship date. YES shall, by mutual agreement, replace or rework defective LCD's that are shown to be YES's responsibility.

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10.CAUTION

10.1 YES shall have the right, which Customer hereby acknowledges, to immediately scrap or destroy tooling for YES modules for which no Purchase Orders have been received from the Customer in a two-year period, as the same time the specifications become invalid.

10.2 In YES inspection process, if there is slight dents on terminals of FPC、FFC, which doesn't affect function, it will not be judged as defect.

10.3 In LCM production, it will occur slightly color difference, we can only guarantee the same color in the same batch.

11.Precautions For Use

11.1. 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.

11.2.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.

11.3.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.

11.4.Precautions For Operation

- (1) Viewing angle varies with the change of liquid crystal driving voltage (V_o). Adjust

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Vo 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.

(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.

11.5.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.

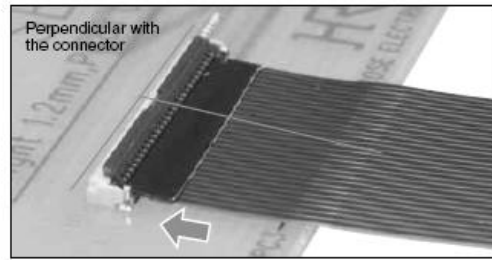
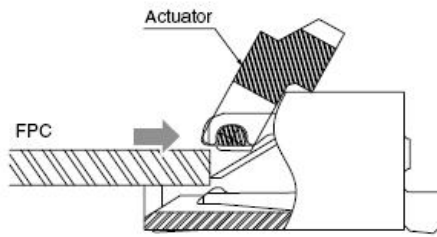
(9) Do not apply water or any liquid on product which composed of T/P

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11.6. FPC Precautions For Us

◆ FPC Insertion①

The FPC should be aligned parallel with the board surface and perpendicular with the connector (as shown), then completely inserted.

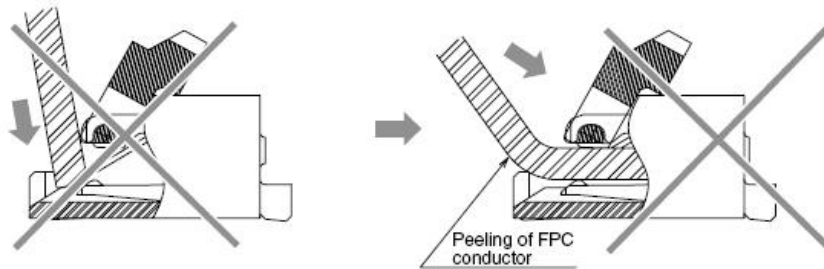


To assure correct electrical and mechanical connection do not insert FPC at angle. It must be fully inserted.

Make sure that the FPC is NOT MOVED during the closing of the actuator.

◆ FPC Insertion②

When inserting the FPC, do not forcefully rub against the bottom surface of the connector insertion entrance. Doing so will result in the contacts and FPC making strong contact and may cause deformation of the contacts, peeling of the FPC conductor, and other problems.



Fully insert the FPC in the connector parallel to mounting surface, with the exposed conductive traces facing down.

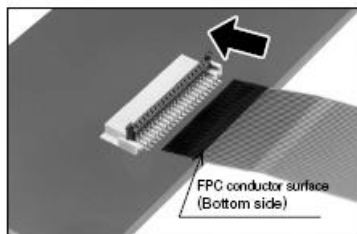


photo 1

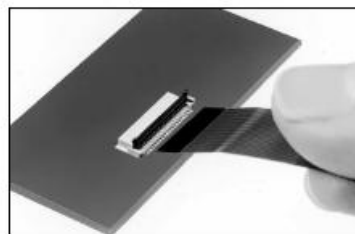


photo 2



photo 3

◆ Verification of the fully closed actuator.

The actuator should be fully closed (as illustrated) and the FPC held firmly in the connector.

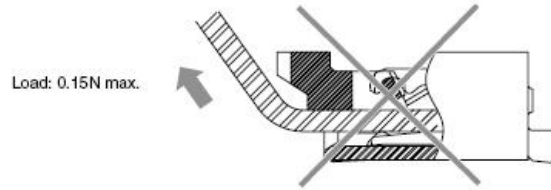
Do not press against the actuator when is fully closed. Max force applied to the fully closed actuator should not exceed 1 N.

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Routing the FPC (FPC fully inserted/ actuator closed)

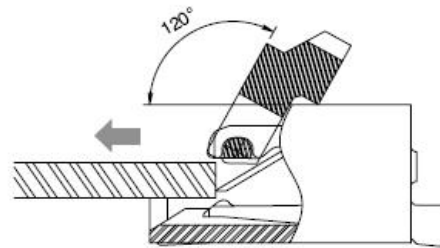
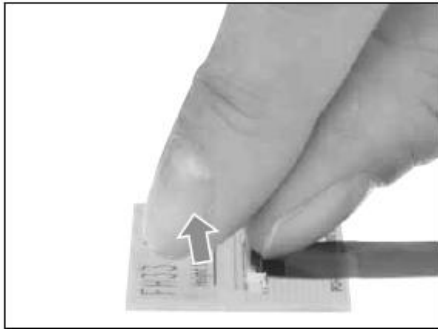
◆FPC Load

Do not apply force in excess of 0.15N max. in the upward direction (as illustrated). Do not bend the FPC too close to the actuator.

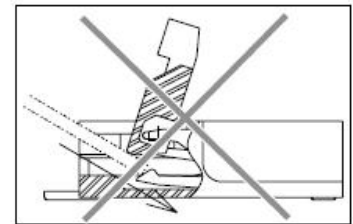


Removing the FPC

Rotate the actuator to the open position (maximum open angle of 120°). Carefully withdraw the FPC.

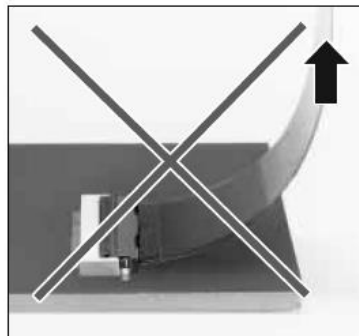


When inserting the FPC, do not forcefully rub against the bottom surface of the connector insertion entrance. Doing so will result in the contacts and FPC making strong contact and may cause deformation of the contacts, peeling of the FPC conductor, and other problems.



Application of excessive force to the inserted FPC/FFC may cause damage to connector and may affect the reliability of electrical connection.

If specific application requires continuous or repeated pull or bend of the inserted FPC/FFC, assure that the forces are NOT transmitted directly to the connector.



Except above FPC insert notice, pls also pay attention to anti-static when using the module, such as use in the temp. and humidity as recommended in our spec., workers must wear anti-static ring when operating

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12. Outline Drawing

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NO.	DESCRIPTION	DATE	
△1	Modify LCD		
△2			
△3			
△4			

Yes Optoelectronics Display Co., Ltd.

No. YMS12864-15DFCBUGL Ver.2

Unit: mm	
Dru	Chk
Apr	Apr

128X64

STIFFENER SIDE

CONDUCTOR SIDE

LED schematic

DISPLAY PATTERN

Resistor Value: 330Ωhm
typ. smaller 1/8W

Vled = 4V

2PIN,P=2.0

High brightness LEDs

*53.15(LED)
LCD 51.30
LCD 44.80
38.8V.A
37.0
A.A. 33.24
2.0
4.78
3.0
*5.7±0.3
1.0
0.70
*69.15±1.0
*37.35±0.5
0.5
*4.0±0.3
26
*P0.5X25=12.5±0.05
10.0±0.5
*13.5±0.1
140.0±5.0
4-φ3.10
4-R3.75
*89.70(LED)
*88.70(LED)
79.2±0.3
LCD 77.50
70.70V.A
A.A. 66.52
2.70
1.10
1.10
0.48
0.04
0.04
0.48

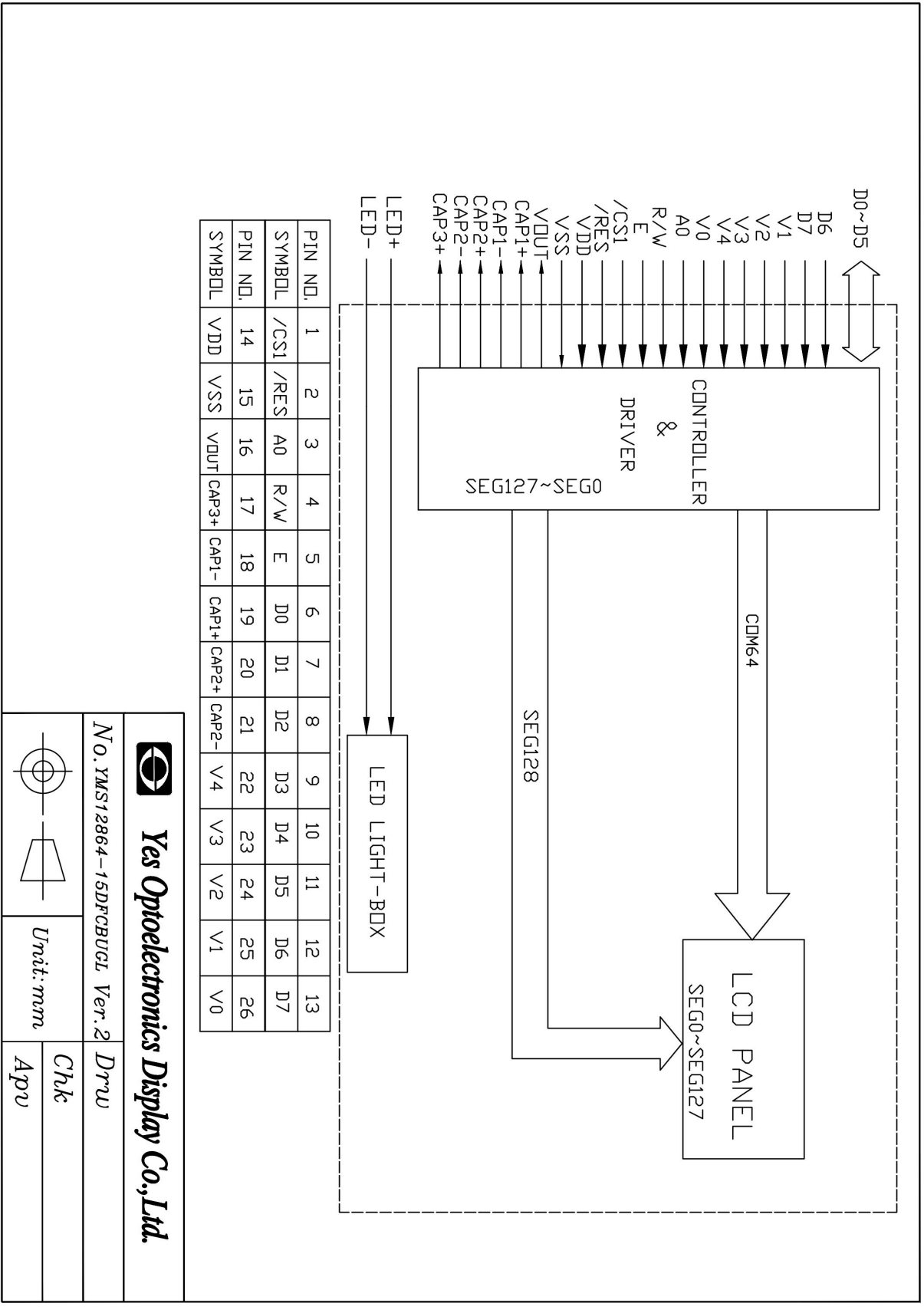
1 Operating Voltage:	3.0V
2 Drive method:	1/60 duty, 1/9bus
3 Viewing Direction:	12:00
4 Operating Temp:	-20°C~70°C
5 Storage Temp:	-30°C~70°C
6 Display type:	STN-BLUE, Negative, 1/7"
7 Unspecified tolerance:	±0.2
8 LCD controller/driver:	ST7565A, 6800
9 Backlight:	LED/WHITE
10 Customer No.:	
11 Dimensions with mark "*" are important	
12 RoHS compliant	

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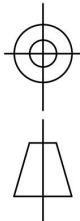
PAGE:2/2



Yes Optoelectronics Display Co., Ltd.

No. YMS12864-15DFCBUGL Ver.2

Drw



Unit: mm

Chk

App

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YES

LCM



YES OPTOELECTRONICS CO.,LTD

Standard Specifications for Product Quality

Product NO: YMS12864-15DFCBUGL
 Customer: DIGIMAX
 DATE: 2022-11-10

Prepared by	Checked by	Approved by
马丽	王法则	孙兴平

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

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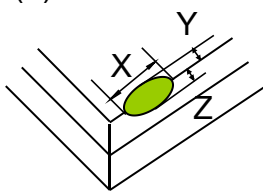
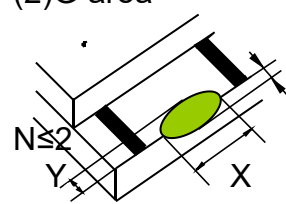
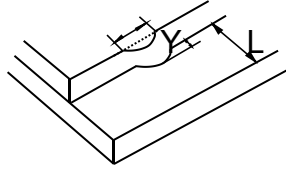
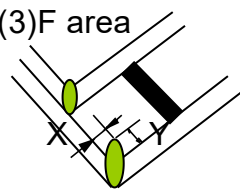
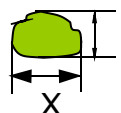
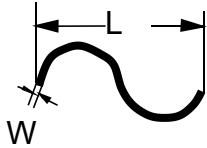
5.Inspection Item and Standards

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° to 60° ,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%

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LCD:

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>$X \leq 3.0$ Y: Don't allowed hurt sealing $Z \geq T/2$ $N \leq 3$ $X \leq 5.0$ Y: Don't allowed hurt sealing $Z \leq T/2$ $N \leq 3$ $X \leq 1.0$ $Y \leq 0.5$ $Z \leq T/3$ No check</p> <p>(2) G area</p>  <p>Z $X \leq 3.0$ $Y \leq 0.5$ $Z \leq T/2$ $N \leq 2$</p>  <p>$X \leq 1/2$ total length $Y \leq 1/4L$ $N \leq 1$ Over the drawing tolerance is not allowed</p> <p>(3) F area</p>  <p>$X \leq 2.0$ $Y \leq 3$ $Z \leq T$ $N \leq 3$ Don't allowed hurt sealing</p>	checking with eyes
2	Black spot white spot $D = (X+Y)/2$ Line	<p>(1)</p>  <p>$0.2 < D \leq 0.25$ $N \leq 1$ $0.1 < D \leq 0.2$ $N \leq 3$ $D \leq 0.1$ No check</p> <p>(2)</p>  <p>$L \leq 2.0$ $W \leq 0.03$ $N \leq 2$ $L \leq 1.0$ $W \leq 0.05$ $N \leq 1$</p>	Checking on the table with light and polarizer and checking with eyes directly.

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TECHNICAL SPECIFICATION

LCM

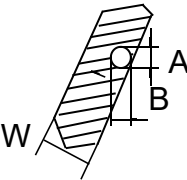
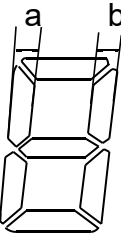
YES

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No	Items	Criterion	Checking manner
3	Polarizer Bubble	$D \leq 0.15$ No check $0.15 < D \leq 0.4$ $N \leq 2$	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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YES OPTOELECTRONICS CO.,LTD

Specifications for Packing

Product NO: YMS12864-15DFCBUGL
Customer: DIGIMAX
DATE: 2022-11-10

Prepared by	Checked by	Approved by
张泽宇	孙腾贺	牛红丽

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REVISION HISTORY

Rev	Date	Item	Page	Remark
1.0	2022-11-10	New Creation	ALL	

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Packing

CUSTOMER'S APPROVED:

DATE: 2022.11.11

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PRODUCT PART NO.: YMS12864-15DFCBUGL

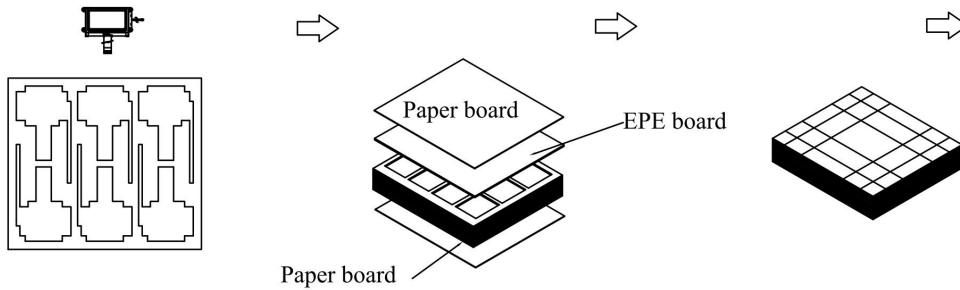
PACKING TYPE: BY EPE TRAY(T12864-446B)

PACKLING ORDER:

1) Putting 6 pcs Modules on each EPE tray.

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

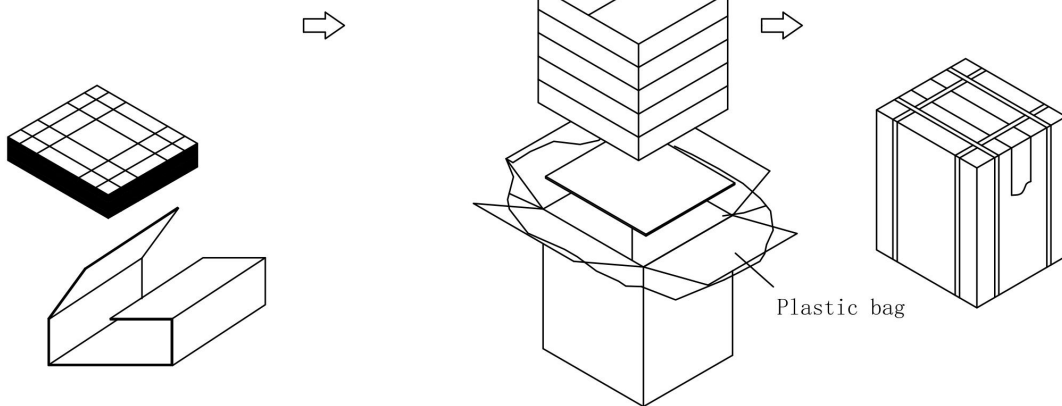
3) Assembling the boards and the tray together with adhesive tape



4) Putting in the inner small carton (TYPE:-82)

5) Putting 5 small cartons into one outcarton

6) Packing finished



Note: 6 pcs in a tray, 7 trays in a inner carton, 5 inner cartons in a out carton, so 6x7x5=210pcs/Outcarton

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

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

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Ver. 1

Drw:

Chk:

Apv:

Yes Optoelectronics Co.,Ltd

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TECHNICAL SPECIFICATION

LCM

YES

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