YES OPTOELECTRONICS CO.,LTD

SPECIFICATIONS FOR
LIQUID CRYSTAL DISPLAY MODULE

Product NO: YMS12864-15DFPBUGL

DATE: 2018-03-20

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

CUSTOMER'S APPROVAL

APPROVED BY: _____ DATE: _____

YES OPTOELECTRONICS CO.,LTD
DD: No.288Yueling Road Anshan,Liaoning,CHINA
TEL: 86-412-5211859 FAX: 86-412-5211729 P.C.:114045
E-mail : yes@yes-lcd.com, yeslcd@globalsources.com
Web: http://www.yes-lcd.com

REVISION HISTORY

Rev	Date	Item	Page	Remark
1.0	2018-03-20	New Creation	ALL	

LIST

Ⅰ.General Specifications

1.The Features :

(1).The module operating voltage: 3.0V

(2).Drive method: 1/65 duty,1/9 bias

(3). Viewing direction: 12:00

(4). Operating temperature: -20~70℃

(5). Storage temperature: -20~70℃

(6). Display type: STN-BLUE mode, Transmissive, Negative type display

2.Mechanical Data and Conditions:

(1) Module Size ---------- 93.70(W) * 53.15(H)mm

(2) Viewing Area ---------- 70.7(W) *38.8(H)mm

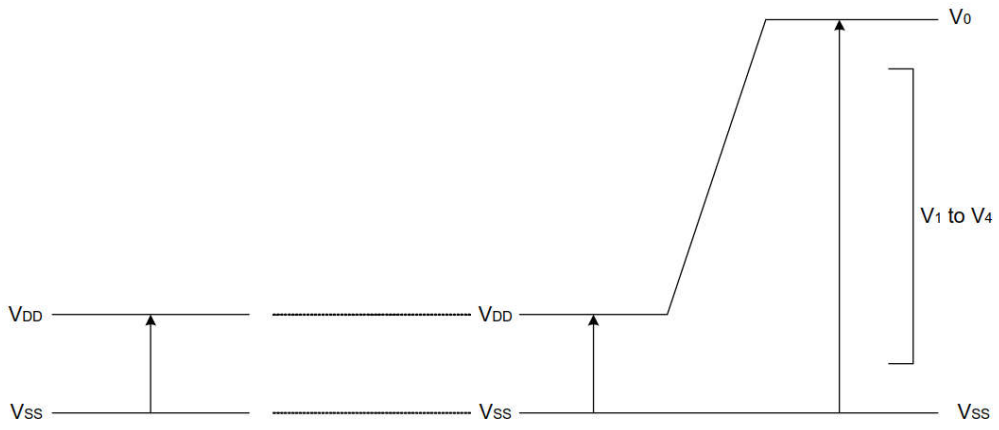
(3) Dot Size ---------- 0.48(W) * 0.48 (H)mm

(4) Number of Dots ---------- 128 * 64 Dots

(5) Outline Dimensions---------- See Attached Drawing

3. Absolute Maximum Ratings

Parameter	Symbol	Conditions	Unit
Power Supply Voltage	VDD	-0.3 ~ 3.6	V
Power supply voltage (VDD standard)	VDD2	-0.3 ~ 3.6	V
Power supply voltage (VDD standard)	V_0, VOUT	-0.3 ~ 13.5	V
Power supply voltage (VDD standard)	V_1, V_2, V_3, V_4	-0.3 to V_0	V



Notes and Cautions

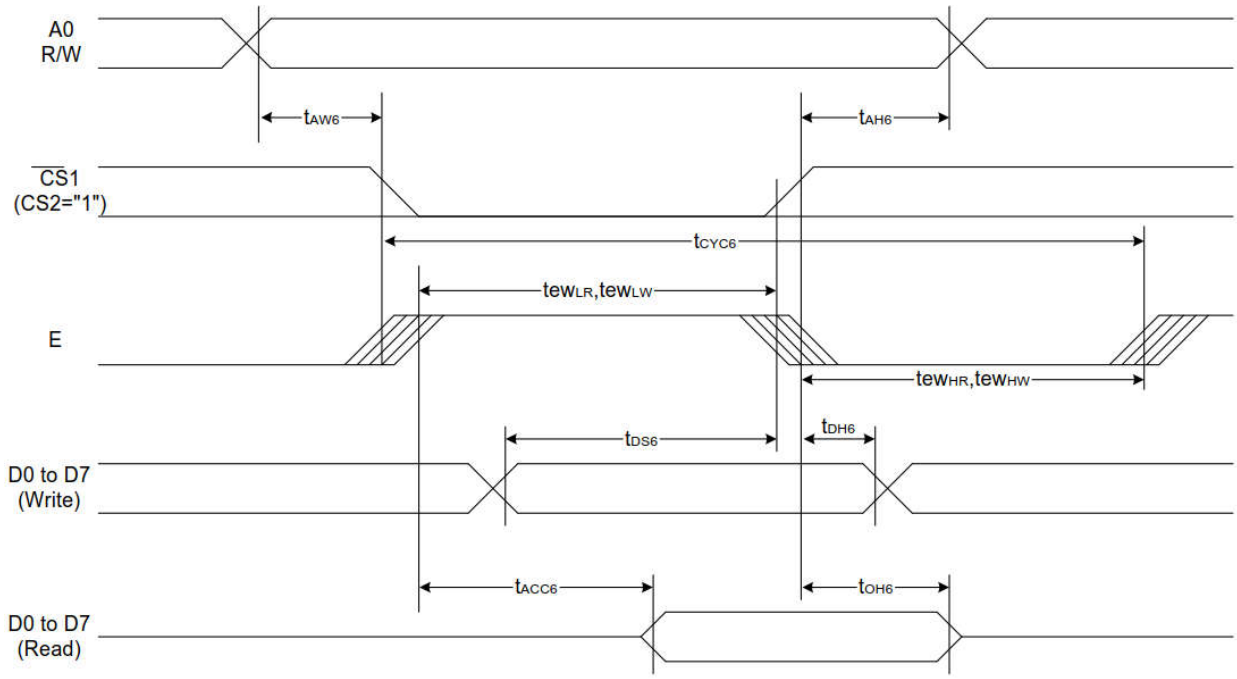
1. The VDD2, V_0 to V_4 and VOUT are relative to the VSS = 0V reference.
2. Insure that the voltage levels of V_1, V_2, V_3, and V_4 are always such that $V_{OUT} \geqq V_0 \geqq V_1 \geqq V_2 \geqq V_3 \geqq V_4$.
3. Permanent damage to the LSI may result if the LSI is used outside of the absolute maximum 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.

4.Pin Connections:

Pin No.	Symbol	Function
1	/CS1	Chip select input pins
2	/RES	Reset input pin
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 control signal input terminal
5	E	This is the enable clock input terminal of the 6800 Series MPU
6-13	D0-D7	Data bus
14	VDD	Power supply
15	VSS	Ground
16	VOUT	DC/DC voltage converter output
17	CAP3+	Capacitor 3+ pad for internal DC/DC voltage converter
18	CAP1-	Capacitor 1- pad for internal DC/DC voltage converter
19	CAP1+	Capacitor 1+ pad for internal DC/DC voltage converter
20	CAP2+	Capacitor 2+ pad for internal DC/DC voltage converter
21	CAP2-	Capacitor 2+ pad for internal DC/DC voltage converter
22-26	V4-V0	LCD driver supplies voltages

5. AC CHARACTERISTICS

System Bus Read/Write For the 6800 Series MPU



Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	t_{AH6}		0	—	ns
Address setup time		t_{AW6}		0	—	
System cycle time		t_{CYC6}		240	—	
Enable L pulse width (WRITE)	WR	t_{EWLW}		80	—	
Enable H pulse width (WRITE)		t_{EWHW}		80	—	
Enable L pulse width (READ)	RD	t_{EWLR}		80	—	
Enable H pulse width (READ)		t_{EWHR}		140		
WRITE Data setup time	D0 to D7	t_{DS6}		40	—	
WRITE Address hold time		t_{DH6}		0	—	
READ access time		t_{ACC6}	C_L = 100 pF	—	70	
READ Output disable time		t_{OH6}	C_L = 100 pF	5	50	

*1 The input signal rise time and fall time (t_r, t_f) is specified at 15 ns or less. When the system cycle time is extremely fast, ($t_r + t_f$) ≦ ($t_{CYC6} - t_{EWLW} - t_{EWHW}$) for ($t_r + t_f$) ≦ ($t_{CYC6} - t_{EWLR} - t_{EWHR}$) are specified.
*2 All timing is specified using 20% and 80% of V_{DD} as the reference.
*3 t_{EWLW} and t_{EWLR} are specified as the overlap between $\overline{CS1}$ being "L" (CS2 = "H") and E.

Ⅱ.The Characteristics and Reliability Test

1. Electro-Optic Characteristics(Condition:TEMP=(23±3)℃)

NO.	Item		Symbol	Min	Type	Max	Unit
1	Supply Voltage(Logic)		VDD		3.3		V
2	Operating Voltage		V0-VSS		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		CR	4	4.5		
6	Viewing Angle (CR≥2)	12H φ=90°	θ1	40	45		deg
		6H φ=270°	θ2	35	40		
		3H φ=0°	θ3	40	45		
		9H φ=180°	θ4	35	40		

2. Characteristics of backlight (LED unit)

Color:white

	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
Forward Voltage	V_f	--	4.0	--	V	V_f=4V
Forward Current	I_f	--	30	40	mA	—
Power Dissipation	P_d	--	—	0.16	W	V_f=4V
Reverse Voltage	V_R	--	—	5	V	—
Reverse Current	I_R	--	—	0.2	mA	V_R=5V
Luminous Intensity	Iv	240	—	--	cd/m^2	V_f=4V
Luminous Uniformity	△IV	70	—	--	%	V_f=4V
Emission Wavelength	X	0.27	—	0.32		If=20mA Ta=25° C Each chip
	Y	0.27	--	0.32		

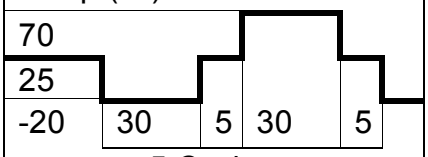
NOTE:

LIFETIME 20K HRS TYP. UNDER DRIVING CONDITION OF CURRENT LESS THAN 30MA , ROOM TEMPERATURE 25℃+/-5℃， HUMIDITY 60%+/-10%, MODULE SHOULD NOT IMPACT BY HEAVY CURRENT, VOLTAGE OR STATIC SHOCK ETC.

WARNING:

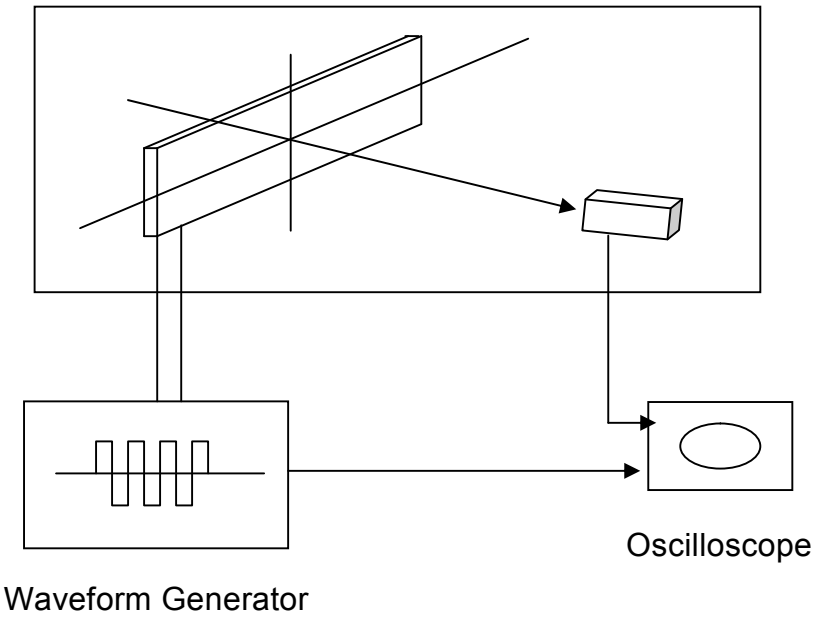
A BACKLIGHT IS A KIND OF CURRENT DEVICE,IT MUST CONNECT WITH A RESISTOR FOR LIMITING CURRENT ,OR IT WILL BE DAMAGED.

3.Reliability Test

No	Items	Test Condition	Equipment	Test Result
1	High Temp Storage	Temp:70±2℃ Time:96h Restore:24h	Tenny	Passed
2	Low Temp Storage	Temp:-20±3℃ Time:96h Restore:24h	Tenny	Passed
3	High Temp operating	Temp:70±2℃ Vop:3.0V Time:24h Restore:24h	Tenny	Passed
4	Low Temp operating	Temp: -20±3℃ Vop:3.0V Time:24h Restore:24h	Tenny	Passed
5	High Temp High Hum Storage	Temp:40±2℃ Hum:90%Rh Time:96h Restore:24h	Tenny	Passed
6	Thermal Shock	Temp:(℃)  5 Cycles Restore:24h	Tenny	Passed

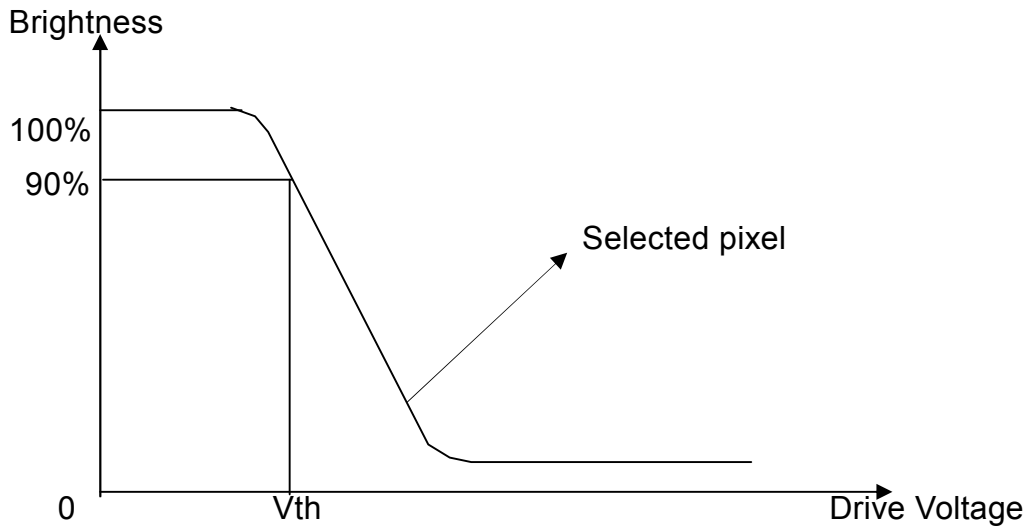
Ⅲ.The Equipment and LCD Measuring Method

1. Equipment

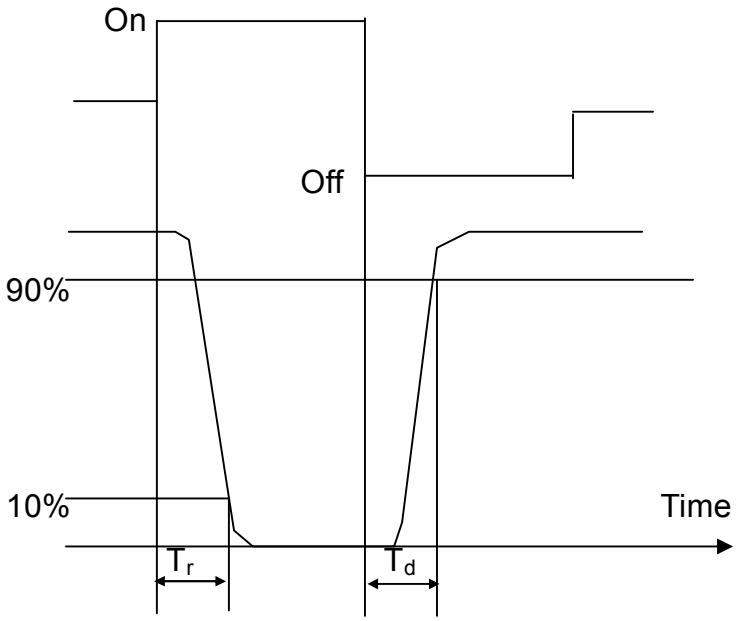


2. Definition

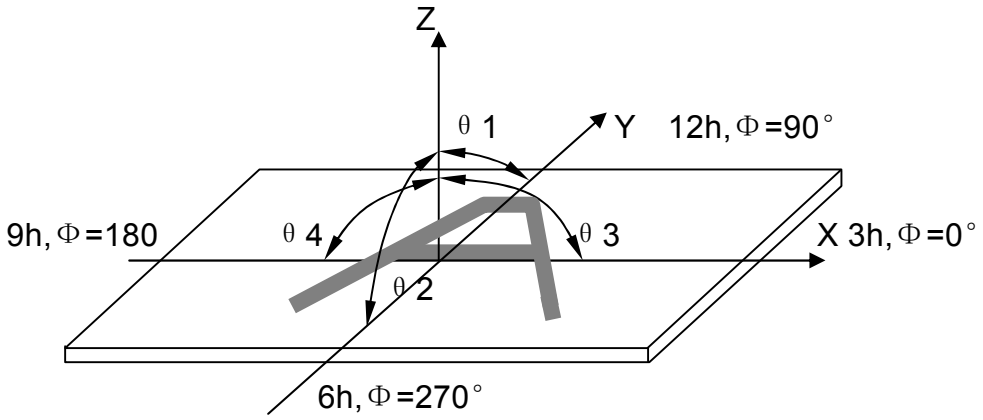
(1). Threshold Voltage (Vth)



(2). Response Time



(3).Viewing Angle:



(4).Contrast Ratio (Positive)

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

3. Reliability Test:

Equipment : TENNY

Ⅳ.Standard Specifications for Product Quality

1.Standard Specifications for Product Quality

1.1 Inspection conditions

Luminance : 15-60LUX minimum(Electrical inspection standard)

: 300-700LUX(Appearance inspection standard)

Inspection distance : 300mm(from the sample)

Temperature : 25±5℃ Direction:right above.

1.2 When defects specified in this inspection standards are inspected, operating voltage (Vop) shall be set at the level where optimized contrast is available. Display quality is applied up to effective viewing area.

1.3 This inspection standard about the image quality shall be applied to any defect within the effective viewing area and shall not be applicable to outside of the area.

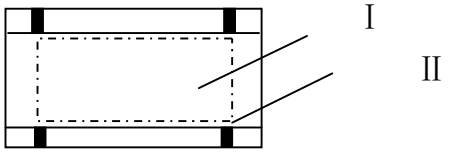
1.4 Should any defects which are not specified in this standard happen, additional standard shall be determined by mutual agreement between customer and YES opto.

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



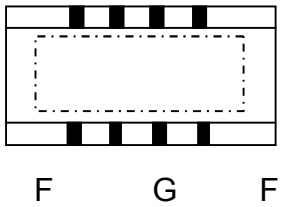
3.1 Ⅰ area: viewing area

Ⅱ area: outside viewing area

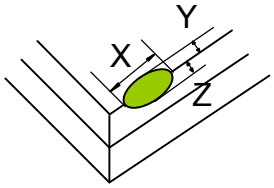
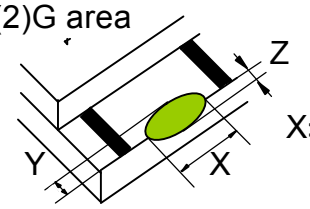
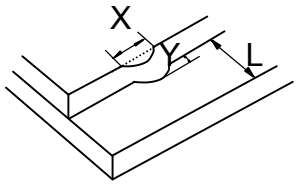
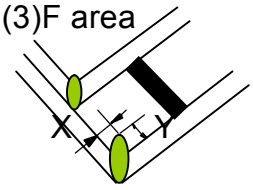
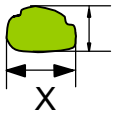
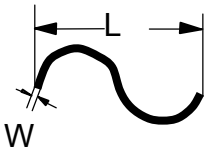
3.2 A area: The glass area outside sealant.

G area: Electrode pad area.

F area: Without electrode pad area.

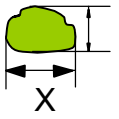
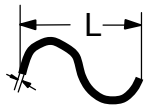
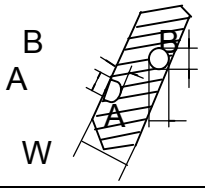
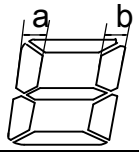


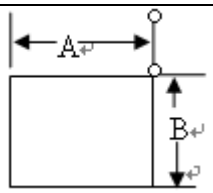
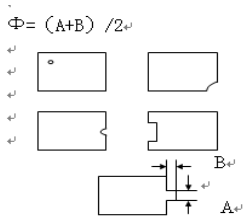
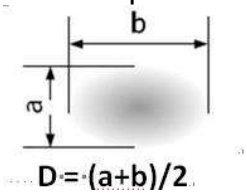
4.Standard of appearance test: (unit: mm)

№	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	(1) A area  X≤3.0 Y： Don't allowed hurt sealing Z≥T/2 N≤3 X≤5.0 Y： Don't allowed hurt sealing Z≤T/2 N≤3 X≤1.0 Y≤0.5 Z≤T/3 No check (2)G area  X≤3.0 Y≤0.5 Z≤T/2 N≤2  X≤total length Y≤1/4L N≤1 Over the drawing tolerance is not allowed (3)F area  X≤2.0 Y≤3 Z≤T N≤3 Don't allowed hurt sealing	checking with eyes
2	Black spot white spot D=(X+Y)/2 Line Note: Scratch, bubble and dent which can be observed in power off state.	(1)  0.2<D≤0.25 N≤1 0.1<D≤0.2 N≤3 D≤0.1 No check (2)  L≤2.0 W≤0.03 N≤2 L≤1.0 W≤0.05 N≤1	Checking on the table with light and polarizer and checking with eyes directly.

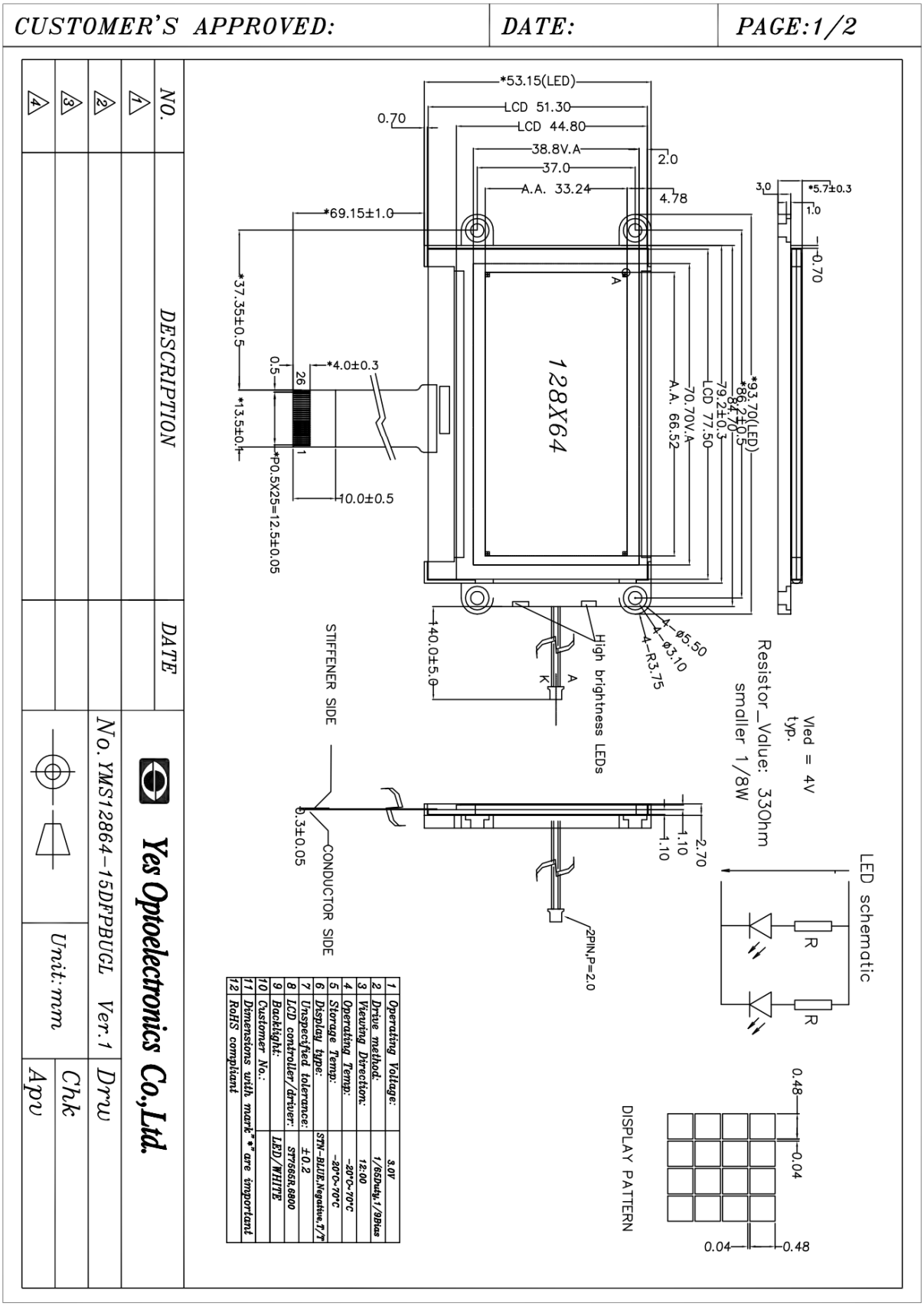
№	Items	Criterion	Checking manner
3	Polarizer Bubble	D≤0.15 No check 0.15<D≤0.4 N≤2	Checking on the table with light and polarizer, and checking with eyes directly
4	Rainbow Color	Allow tiny rainbow Allow 5% color contrast or accord limitative sample	Checking on the table with light and polarizer, And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

5 Standard of display test

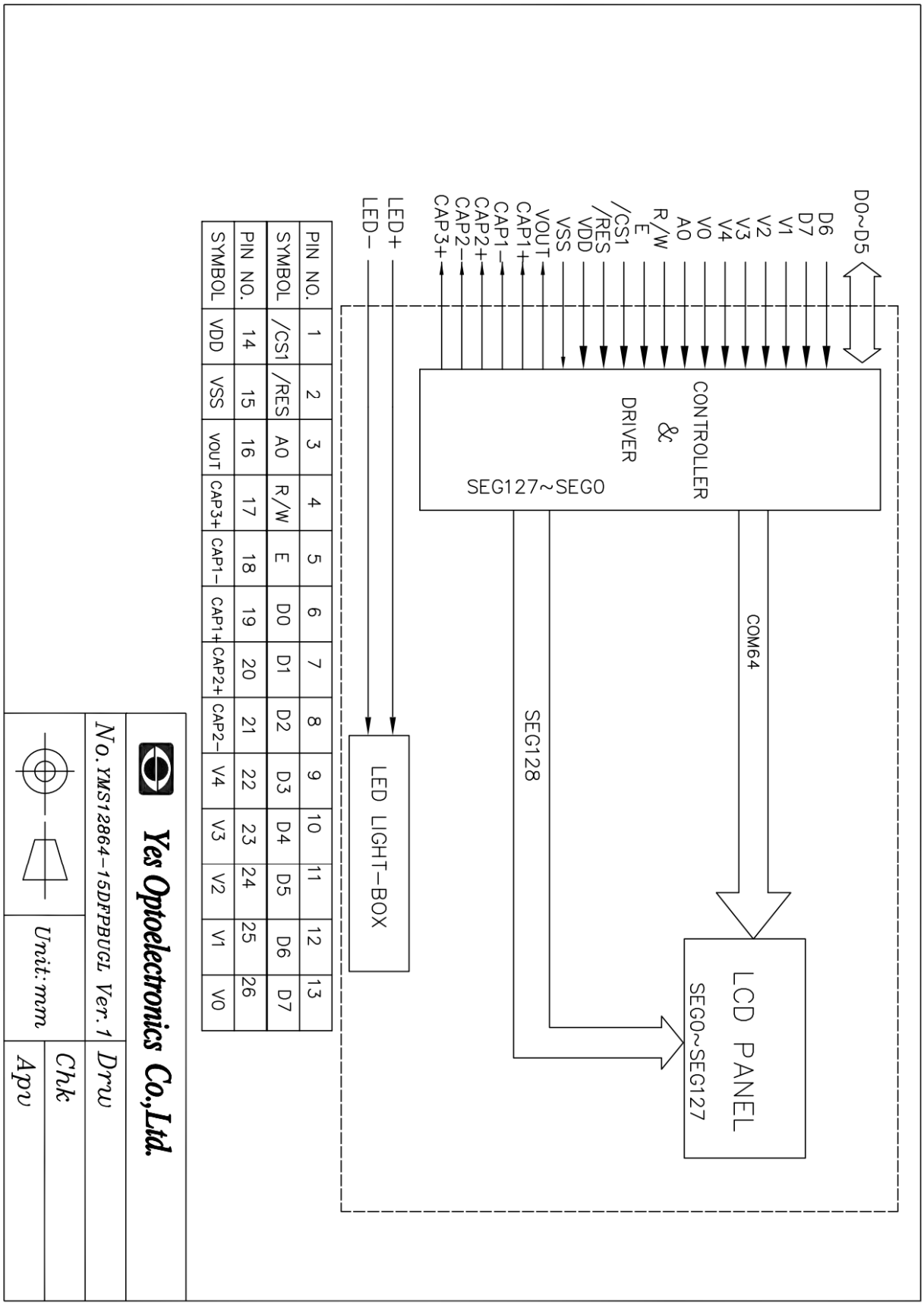
№	Items	Criterion	Checking manner
1	Black spot white spot D=(X+Y)/2 Line Note: Scratch, bubble and dent which can be observed at all image display mode at Von voltage and does not change with voltage.	(1)  0.2<D≤0.25 N≤1 0.1<D≤0.2 N≤3 D≤0.1 No check (2)  L≤2.0 W≤0.03 N≤2 L≤1.0 W≤0.05 N≤1	Checking at the display state
2	Pin hole D=(A+B)/2 W: segment width	 W≤0.4 D≤0.20 And D≤1/2W N≤1 W>0.4 D≤0.25 And D≤1/3W N≤2 D≤0.05 No check	Checking at the display state
3	Different width of segment	 |a-b|<0.25 or |a-b|≤1/4W No check	Checking at the display state

4	Different width		A：distortion≤10% B：distortion≤10% Superfluous Electrode lines display is not allowed
5	Pinhole		0.15＜Φ≤0.2 N≤1 0.05＜Φ≤0.15 N≤3 Φ≤0.05 Any number Note: Distance between two spots ≥10mm ，Φ〈1/3 pixels
6	Black spot white spot  Note: The phenomenon change with voltage	D≤0.5 No check 0.5<D≤0.7 N≤3 0.7<D Not allowed	Checking at the display state

V .Attached Drawing



CUSTOMER'S APPROVED:	DATE:	PAGE:2/2



PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13
SYMBOL	/CS1	/RES	A0	R/W	E	D0	D1	D2	D3	D4	D5	D6	D7
PIN NO.	14	15	16	17	18	19	20	21	22	23	24	25	26
SYMBOL	VDD	VSS	VOUT	CAP3+	CAP1−	CAP1+	CAP2+	CAP2−	V4	V3	V2	V1	V0

Yes Optoelectronics Co,Ltd.

	No. YMS12864-15DFPBUGL Ver. 1	Drw
	Unit: mm	Chk
		Apv

VI. Packing

CUSTOMER'S APPROVED:	DATE: 2018.03.21	PAGE: 1/1

PRODUCT PART NO.:YMS12864-15DFPBUGL

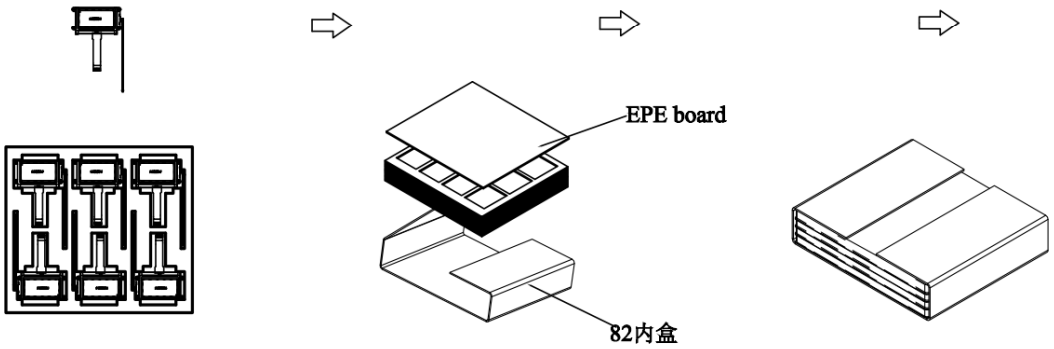
PACKING TYPE: BY EPE TRAY(T12864-446B)

PACKLING ORDER:

1) Putting 12 pcs Modules on each EPE tray.

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

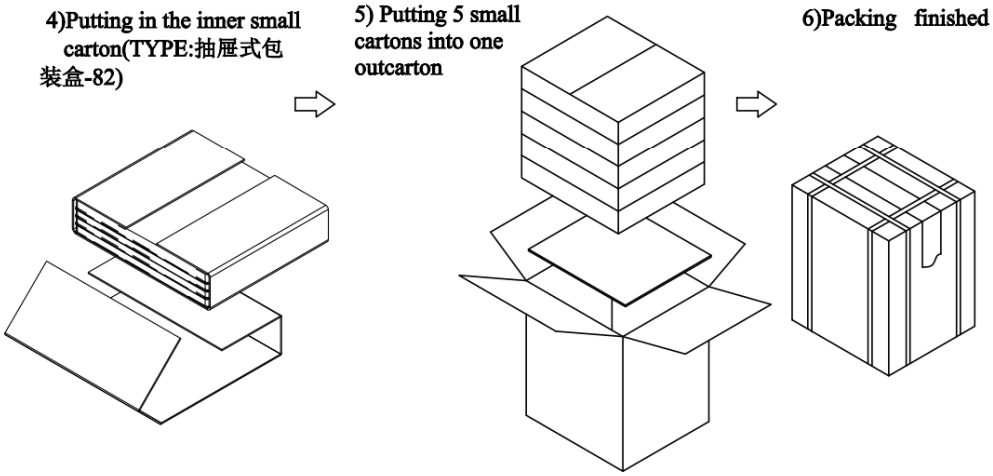
3) Putting in the inner small carton(TYPE:82内盒)



4)Putting in the inner small carton(TYPE:抽屉式包装盒-82)

5) Putting 5 small cartons into one outcarton

6)Packing finished



Note: 12 pcs in a tray,7 trays in a inner carton,5 inner cartons in a out carton, so 12x7x5=420pcs/Outcarton

Dimension (Small carton 抽屉式包装盒-82): 385*325*87mm Dimension (Out carton): 394*344*470mm

Dimension (Small carton 82内盒): 362*318*80mm

NO. YMS12864-15DFPBUGL Ver.1	DESIGN:		CHECK:		APPROVAL:	

YES OPTOELECTRONICES CO., LTD

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±5°C and the humidity is below 50±20%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 (Vo). Adjust 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.

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.