

# Osptek Display

## TFT LCD SPECIFICATION

Model No:

**YDP160B001-V6**

*osptek*<sup>®</sup>

## Contents

1.Record of Revision .....	3
2 .General Specifications .....	4
3 .Input/Output Terminals .....	5
4. Absolute Maximum Ratings .....	5
5 .Electrical Characteristics .....	6
6 .Interface Timing .....	6
7. Optical Characteristics .....	8
8 . Environmental / Reliability Tests .....	10
9. Mechanical Drawing .....	12
10.Packing .....	13
11. Precautions For Use of LCD modules .....	14

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## 1. Record of Revision

Version	Revise Date	Content	Editor
1.0	2022/05/16	First Release.	Luo

## 2 . General Specifications

Feature		Spec
Characteristics	Size	1.6 inch
	Resolution	400(horizontal)*400(Vertical)
	Interface	QSPI
	Connect type	Connector
	Color Depth	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.0996x0.0996
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally Black
	LCD Driver IC	ST77903
	Viewing Direction	ALL
	Gray Scale Inversion Direction	
Mechanical	LCM (W x H x D) (mm)	42.92*45.89*2.2
	Active Area(mm)	39.840*39.840
	With /Without TSP	Without TSP
	Weight (g)	TBD
	LED Numbers	3 LED

Note 1: Viewing direction is following the data which measured by optics equipment.

Note 2: Requirements on Environmental Protection: RoHS

Note 3: LCM weight tolerance: +/- 5%

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### 3 . Input/Output Terminals

Pin NO.	Symbol	Description
1	LEDK	Back light cathode
2	LEDA	Back light anode
3	CS	chip select signal input(low active)
4	GND	Ground
5	DA0	DATA
6	DA1	DATA
7	DA2	DATA
8	DA3	DATA
9	SCL	Clock signal port
10	SDA/NC	DATA/NC
11	RESET	A reset pin.
12	IOVCC	Power 1.8v-3.3V
13	VDD	Power 3.3v
14	DC/NC	chip select signal input(low active)/NC
15	GND	Ground
16	ID	ID

### 4 . Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
Supply Voltage	$V_{DD}$	-0.3	5.0	V	
Supply Voltage	$I_{OVCC}$	-0.3	4.6	V	
Input Signal Voltage	$V_{in}$	-0.3	$V_{DD}+0.3$	V	
Logic Output Voltage	$V_{OUT}$	-0.3	$V_{DD}+0.3$	V	
Operating Temperature	$T_{OPR}$	-20	70	°C	
Storage Temperature	$T_{STG}$	-30	80	°C	

## 5 .Electrical Characteristics

### 5.1 Operating conditions:

Parameter	Symbol	MIN	TYP	MAX	Unit	Remark
Power Voltage	V <sub>DD</sub>	2.6	2.8	3.3	V	
Power Voltage	I <sub>OVCC</sub>	1.65	1.8	3.3	V	
Digital Operation Current	I <sub>CC</sub>		16		mA	

### 5.2 Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
LED current	I <sub>F</sub>	-	60	-	mA	Note 1 Note 2,3
Power Consumption			-	-	mW	
LED Voltage	V <sub>F</sub>	2.8	3	3.3	V	
LED Life Time	W <sub>BL</sub>	25000		-	Hr	

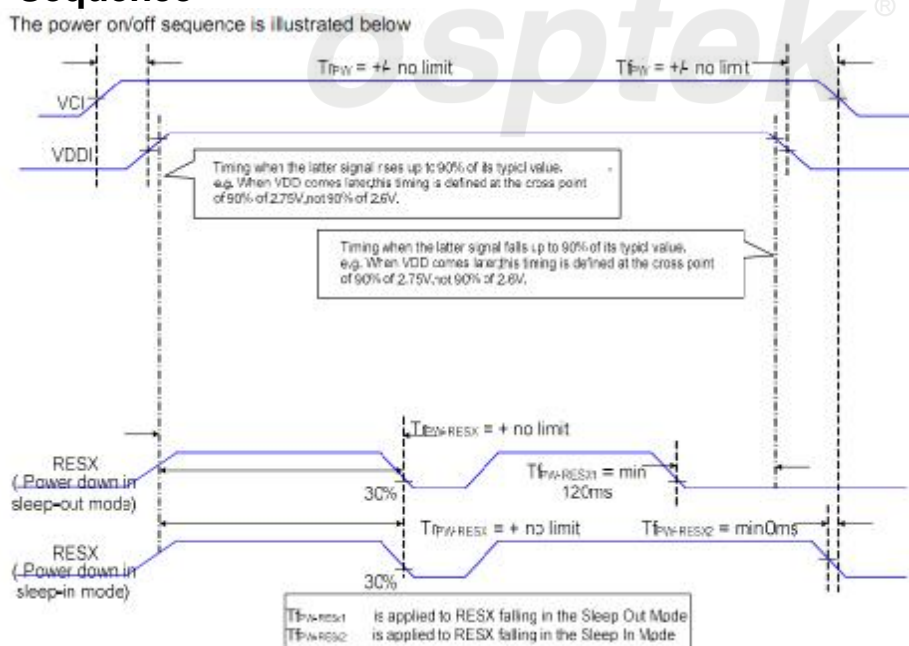
Note 1 : There are 3 Groups LED

Note 2 : Ta = 25℃

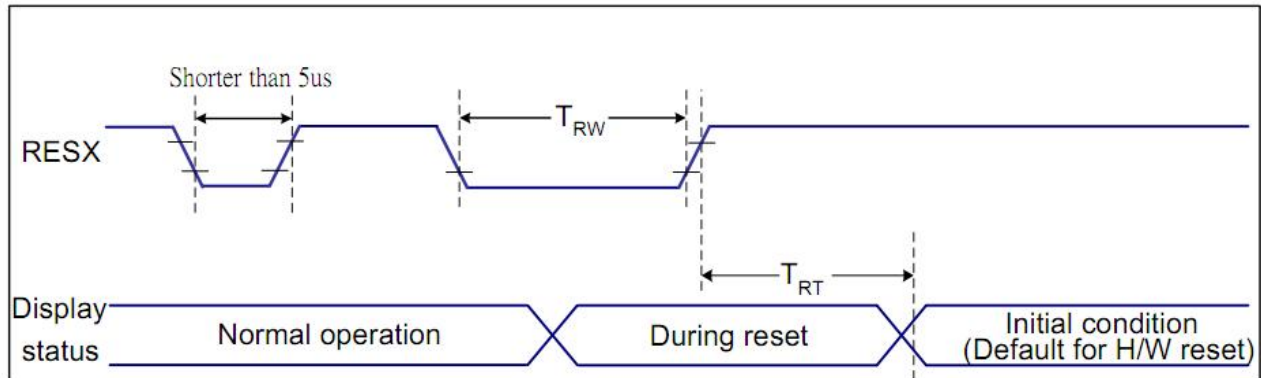
Note 3 : Brightness to be decreased to 50% of the initial value

## 6.Timing Characteristics of Input Signals

### 6.1Power Sequence



## 6-2 Rest Timing



VDDI and VCI can be applied in any order.

VCI and VDDI can be power down in any order.

During power off, if LCD is in the Sleep Out mode, VCI and VDDI must be powered down minimum 120msec

after RESX has been released.

During power off, if LCD is in the Sleep In mode, VDDI or VCI can be powered down minimum 0msec after

RESX has been released.

Note 1: There will be no damage to the display module if the power sequences are not met.

Note 2: There will be no abnormal visible effects on the display panel during the Power On/Off Sequences.

Note 3: There will be no abnormal visible effects on the display between end of Power On Sequence and before receiving Sleep Out command. Also between receiving Sleep In command and Power Off Sequence.

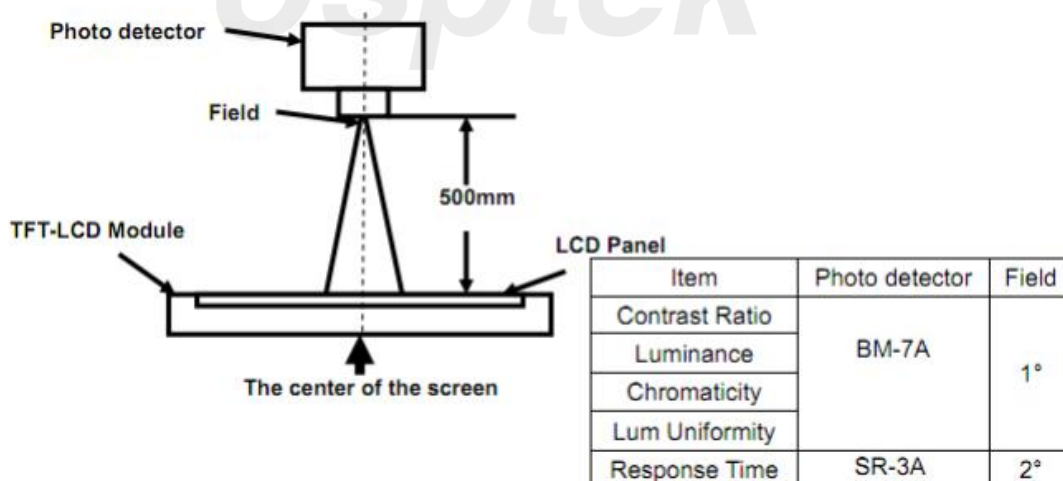
Note 4: If RESX line is not held stable by host during Power On Sequence as defined in the sequence below, then it will be necessary to apply a Hardware Reset (RESX) after Host Power On Sequence is complete to ensure correct operation. Otherwise function is not guaranteed.

## 7. Optical Characteristics

Items	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angles	$\theta_T$	Center CR $\geq$ 10	-	85	-	Degree.	Note2
	$\theta_B$		-	85	-		
	$\theta_L$		-	85	-		
	$\theta_R$		-	85	-		
Contrast Ratio	CR	$\Theta = 0$	800	1000	-	-	Note1, Note3
Response Time	T <sub>ON</sub>	25°C	-	30	40	ms	Note1, Note4
	T <sub>OFF</sub>		-	-	-		
Chromaticity	White	X <sub>W</sub>	-	0.303	-	-	Note1, Note5
		Y <sub>W</sub>	-	0.333	-	-	
	Red	X <sub>R</sub>	-	0.657	-	-	
		Y <sub>R</sub>	-	0.322	-	-	
	Green	X <sub>G</sub>	-	0.284	-	-	
		Y <sub>G</sub>	-	0.566	-	-	
	Blue	X <sub>B</sub>	-	0.139	-	-	
		Y <sub>B</sub>	-	0.108	-	-	
Uniformity	U		80	-	-	%	Note1, Note6
NTSC				65		%	Note5
Luminance	L		250	300			Note1, Note7

Test Conditions:

1. IF= 20mA (one channel),the ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.



Note 2: Definition of viewing angle range and measurement system.



Viewing angle is measured at the center point of the LCD by CONOSCOPE (ergo-80).

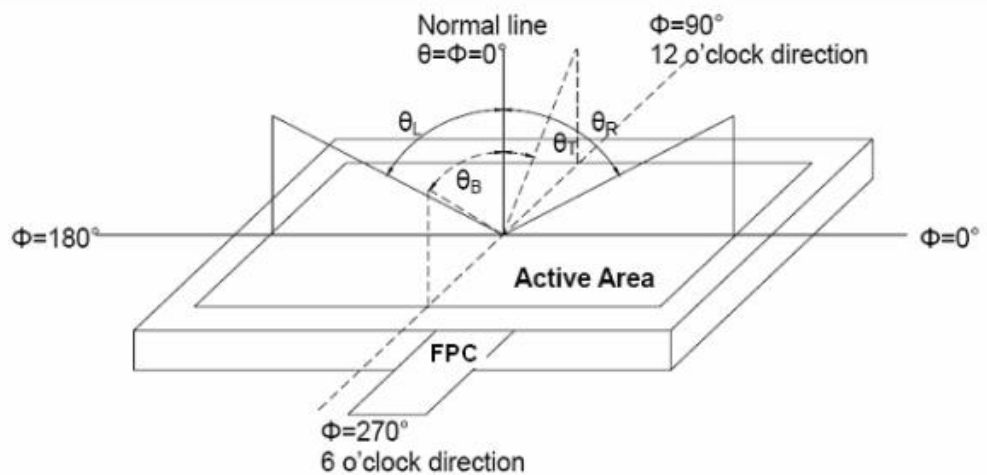


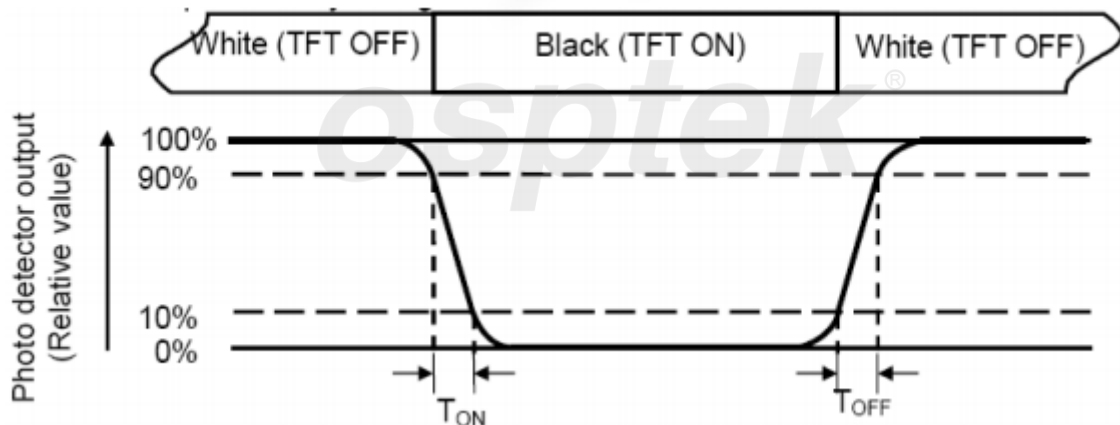
Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time ( $T_{ON}$ ) is the time between photo detector output intensity changed from 90% to 10%. And fall time ( $T_{OFF}$ ) is the time between photo detector output intensity changed from 10% to 90%.



Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the Center of each measuring area

Luminance Uniformity ( $U$ ) =  $L_{min} / L_{max} \times 100\%$

L-----Active area length W----- Active area width

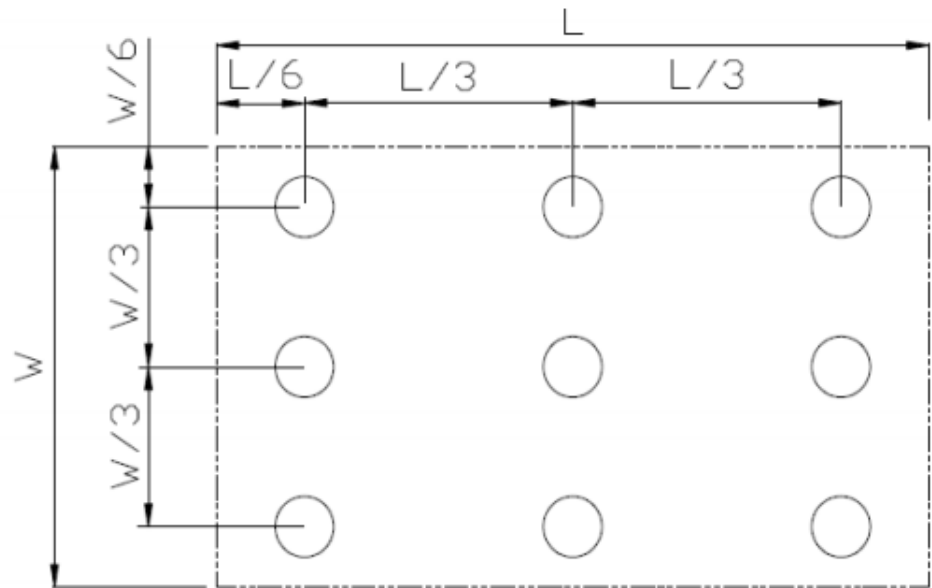


Fig. 2 Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.

Lmin: The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance:

Measure the luminance of white state at center point.

## 8. Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +70°C, 240hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	Ta= -20°C, 240hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +80°C, 240hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -30°C, 240hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	Ta= +60°C, 90% RH max, 160 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-30°C 30 min ~ +80°C 30 min Change time: 5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87

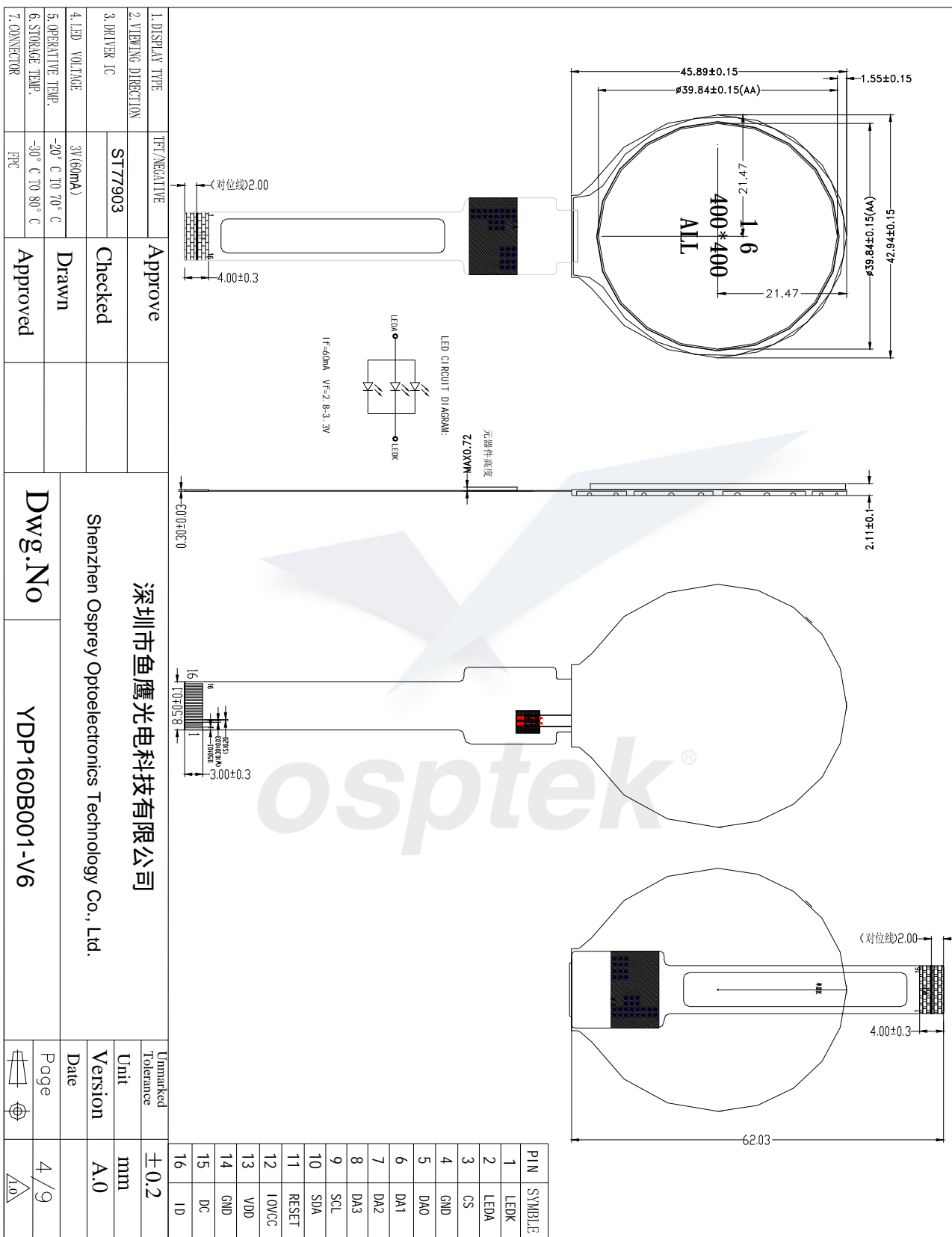
7	Electro Discharge (Operation)	Static C=150pF, R=330 $\Omega$ , 5 points/panel Air: $\pm 8\text{KV}$ , 5 times; Contact: $\pm 4\text{KV}$ , 5 times; (Environment: $15^{\circ}\text{C} \sim 35^{\circ}\text{C}$ , 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2 GB/T17626.2-1998
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (package condition)	IEC60068-2-6 GB/T2423.5-1995
9	Shock (Non-operation)	60G 6ms, $\pm X$ , $\pm Y$ , $\pm Z$ 3 times for each direction	IEC60068-2-27 GB/T2423.5-1995
10	Package Drop Test	Height: 80 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8-1995

Note: 1.  $T_s$  is the temperature of panel's surface.

2.  $T_a$  is the ambient temperature of sample.

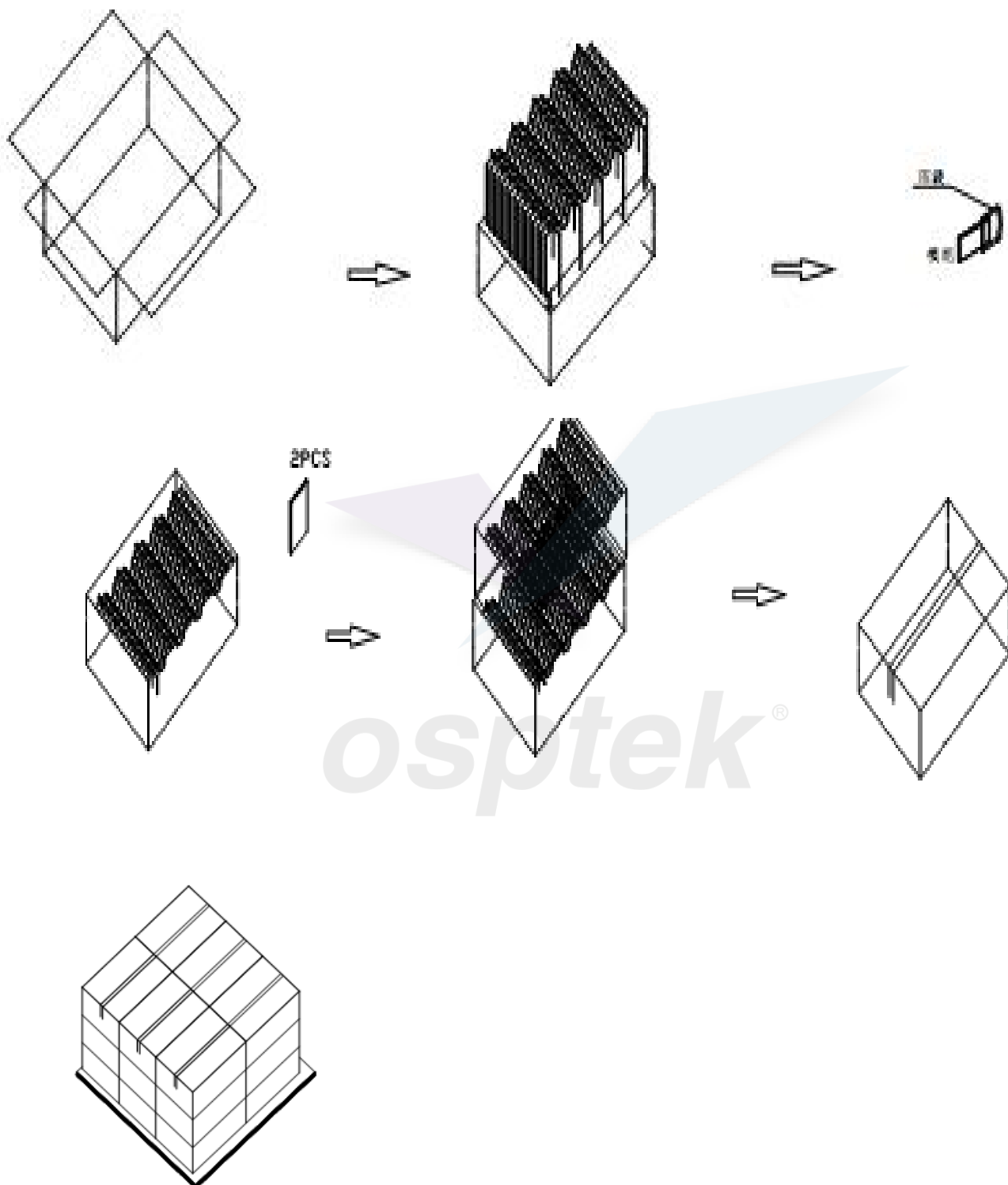


# 9. Mechanical Drawing



## 10. Packing

### Packing Method



## 11. Precautions for Use of LCD modules

### 11.1 Handling Precautions

11.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

11.1.2. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

11.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

11.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

11.1.5. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketene
- Aromatic solvents

11.1.6. Do not attempt to disassemble the LCD Module.

11.1.7. If the logic circuit power is off, do not apply the input signals.

11.1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

11.1.8.1. Be sure to ground the body when handling the LCD Modules.

11.1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.

11.1.8.3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

11.1.8.4. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

### 11.2 Storage Precautions

11.2.1. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

11.2.2. The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0℃ ~ 40℃      Relatively humidity: ≤80%

11.2.3. The LCD modules should be stored in the room without acid, alkali and harmful gas.

### 11.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.