

SeeYA_SY103WAG01_Optical Module

Preliminary Specification

Model Name: SY103WAG01

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Title	
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Date	

Revision

Version	Date	Description
V0.0	2022.5.31	Initial release
V0.1	2021.10.13	Correct optical specification Note2, 0.6F's image height (Page5), Correct optical specification Note7, Not8, 0.6F's image height (Page7)
V0.2	2022.5.18	Add inspection criteria
V0.3	2023.6.26	Correct Field of View ² definition

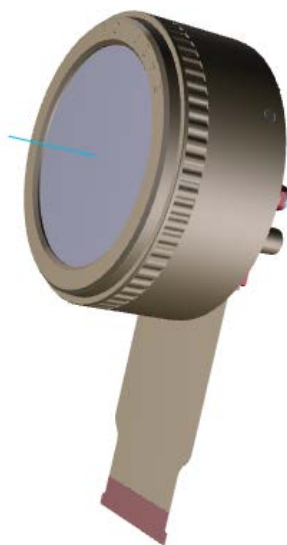
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1 GENERAL DESCRIPTION

This Optical assembly module is a see-close type applied in near eye display application. It consists of a 1.03inch OLEDoS module, several lenses and optical films, inner and outer tubes and other mechanical parts. It has following main features

- Support diopter adjust in range from +1D to -5D
- With 90°Field of View
- Eye box 8mm
- Eye relief 12mm
- Display Resolution 2560×2560, with 90% DCI-P3 Color Gamut



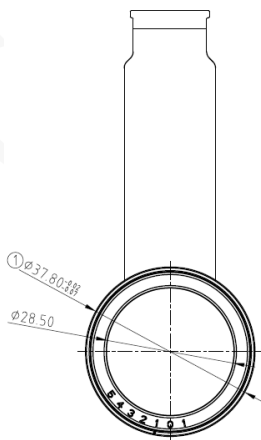
2 OPTICAL SPECIFICATION

- Temperature=30℃

Item	Description	Minimum Value	Typical Value	Maximum Value	Unit
Diopter Accuracy	Diopter -1D setting, Note1	-0.5D	-1D	-1.5D	diopter
Field of View¹	0.6F, Diopter -1D setting, Note2	53.8	54.3	54.8	degree
Field of View²	1.0F, Diopter -1D setting		90		degree
MTF (30lp/mm, Diopter -1D)	Center Average Note3	0.29			
	Center Minimum Note4	0.26			
	0.5F Average Note5	0.20			
	0.5F Minimum Note6	0.15			
	0.6F Average Note7	0.18			
	0.6F Minimum Note8	0.15			
Center Brightness	Display emission brightness 900nits	50	63	76	nit
Center Chromaticity	Gray255 CIE1931 x	0.32	0.335	0.35	
	Gray255 CIE1931 y	0.34	0.36	0.38	

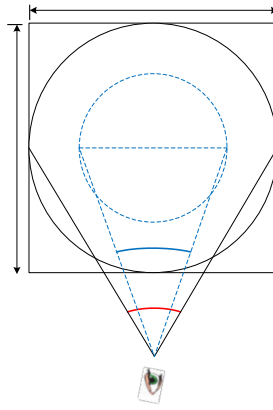
Note1: Diopter Accuracy

Fix the mark on the focusing ring to the -1D, measure the Diopter value.



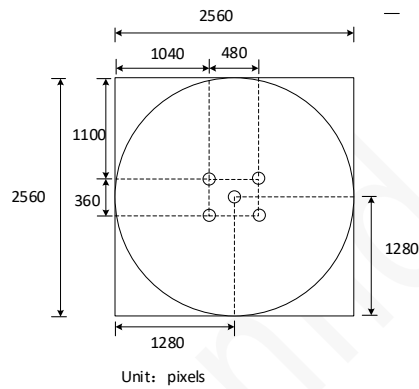
Note2: Field of view at 0.6F

Fix the mark on the focusing ring to the -1D, measure the field of view at 0.6F. The image height of 0.6F covers 1630pixels.



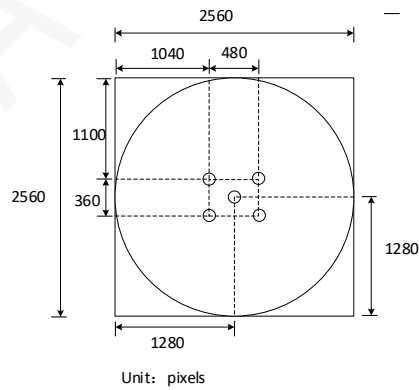
Note3: MTF (30lp/mm) center average

Fix the mark on the focusing ring to the-1D, measure the MTF value of five spots which are defined by the following figure. Calculate the average value.



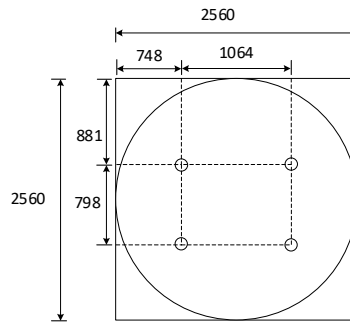
Note4: MTF (30lp/mm) center minimum

Fix the mark on the focusing ring to the-1D, measure the MTF value of five spots which are defined by the following figure. Get the minimum value among those.



Note5: MTF (30lp/mm) average of 0.5F

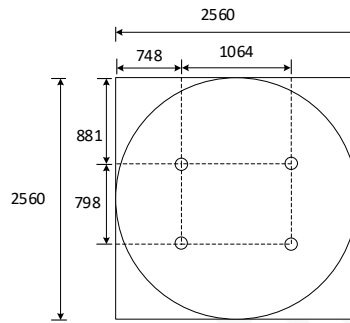
Fix the mark on the focusing ring to the-1D, measure the MTF value of four spots which are defined by the following figure. Calculate the average value.



Unit: pixels

Note6: MTF (30lp/mm) minimum of 0.5F

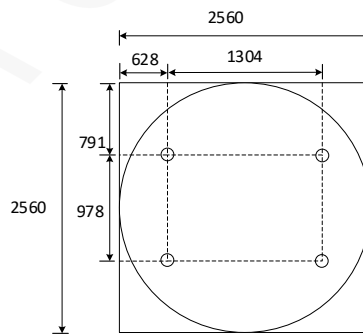
Fix the mark on the focusing ring to the-1D, measure the MTF value of four spots which are defined by the following figure. Get the minimum value among those.



Unit: pixels

Note7: MTF (30lp/mm) average of 0.6F

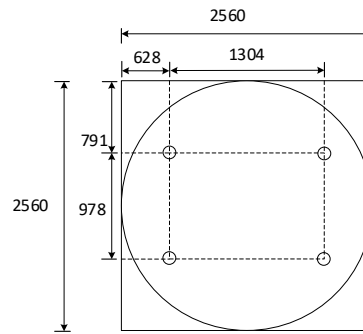
Fix the mark on the focusing ring to the-1D, measure the MTF value of four spots which are defined by the following figure. Calculate the average value.



Unit: pixels

Note8: MTF (30lp/mm) minimum of 0.6F

Fix the mark on the focusing ring to the-1D, measure the MTF value of four spots which are defined by the following figure. Get the minimum value among those.



Unit: pixels

3 MECHANICAL DRAWING

TBD

4 ELECTRICAL

Please refer to the specification of SeeYA's 1.03inch OLEDoS

5 INSPECTION CRITERION

Incoming inspection standards applied to 1.03 optical machines (hereinafter referred to as "OM") provided by See YA Technology Co., LTD .

5.1 Incoming Inspection

The customer shall inspect the OM within 20 calendar days after the date of delivery (" Inspection Period "). Inspection results (acceptance or rejection) should be documented

Form records and send a copy document to the seller in a timely manner. if the buyer's inspection results are not on the delivery date within 20 calendar days, will be considered acceptable.

If the customer fails to notify the Seller within the inspection period, the Buyer's right to reject the OM will be invalid and will be deemed to have been accepted by the Buyer.

5.2 Inspection Sampling Method

5.2.1 Lot size: Quantity per shipment lot per model

5.2.2 Sampling type: Normal inspection, Single sampling

5.2.3 Inspection level: II

5.2.4 Sampling table: MIL-STD-105D

5.2.5 Acceptable quality level (AQL)

Major defect: AQL=0.4

Minor defect: AQL=1.00

5.3 Inspection Conditions

5.3.1 Ambient conditions:

a. Temperature: $23\pm 3^{\circ}\text{C}$

b. Humidity: $(55\pm 5)\% \text{RH}$

c. Illumination: Appearance $1000\pm 200 \text{ Lux}$, Display $< 50 \text{ Lux}$

5.3.2 Viewing distance

Keep the eyes 5-10 mm away from the surface of the optical machine.

5.3.3 Viewing Angle

Front view

5.4 Define

5.4.1 Defect definition

Point defect: a defect with a point shape, measured in accordance with its maximum diameter

Line defects: defects in the shape of a straight line or curve. The longest length shall prevail when measuring the size

Clearance: the gap between the joint surfaces of two or more parts

Segment difference: the vertical (Z) direction distance at the joint of two or more parts

Same-color point: the point whose color is similar to that of the component

Heterochromatic point: the point where the color differs greatly from that of the component

Heterochromatic point: the point where the color differs greatly from that of the component

Fine scratches: Scratches without depth

5.4.2 Appearance level definition

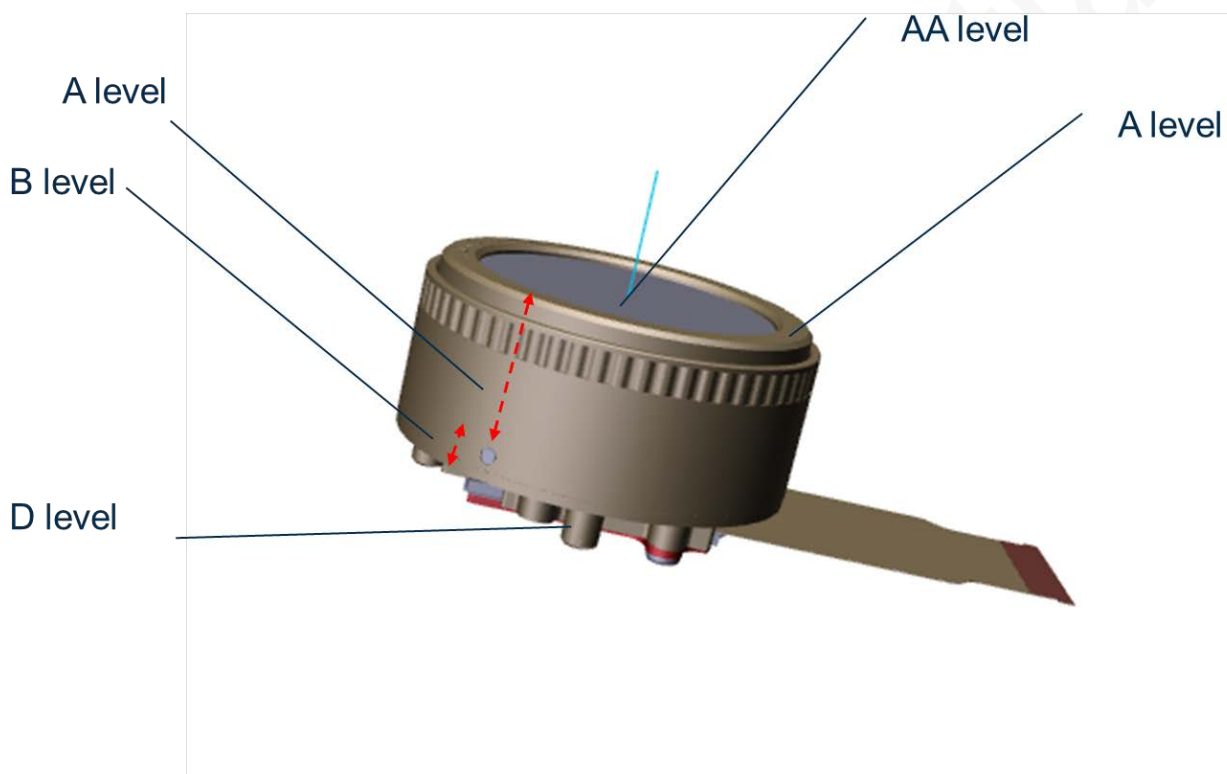
AA : lens display area

A: the graduated ring area and the part above the top of the locating pin of the side mirror barrel

B: the part below the top of the positioning pin of the side mirror barrel

D : the surface that cannot be seen directly after assembly, except for the above A B parts

The schematic diagram is as follows



5.5 Inspection items

5.5.1 Visual inspection

Observation distance: 20 ± 10 cm from the human eye

Inspection method: first check the A level surface, then check the B level surface, and finally check the D level surface

Viewing Angle: Rotate the viewing surface 45 to 90 degrees in each direction during the inspection.

Observation time: 10 ± 5 seconds for each surface

Visual acuity: naked or corrected visual acuity of 1.0 or above and no color blindness

5.5.2 Electrical inspection

Inspection distance: 5~10mm from the surface of the optical machine

Inspection Angle: positive Angle

Focus to the display surface inspection, the clearest state to determine

Routine inspection items and contents

Appearance inspection items are as follows:

- Linear defects

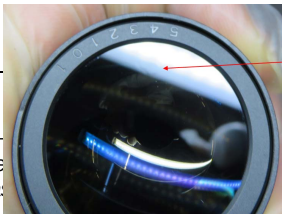
Inspection items	Surface classification	Defect description（mm或mm2）	Defect judgement	
		Defect size spacing requirements	Acceptable number	
	A	L≤2mm and W≤0.03mm， ignore； L≤3.00mm， 0.03mm＜W≤0.08mm and DS≥10mm， N≤3；	N≤3	minor
	AA	L≤2mm and W≤0.03mm， ignore； L≤3.00mm， 0.03mm＜W≤0.06mm and DS≥10mm， N≤2；	N≤2	minor
	B	Does not affect the overall appearance and assembly， judgement OK	-	minor
	Remark: AA surface POL imprint, POL warping, POL stains, POL lines and shrinkage shall be subject to the limit sample. For the rest, refer to the above specifications D surface does not affect the assembly judgment OK A surface outer mirror barrel scratches and stains/bright prints shall be determined by reference to limit samples			

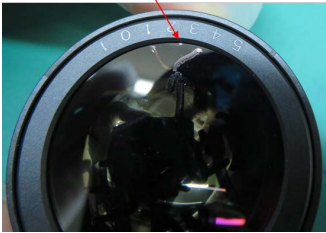
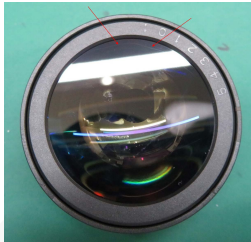
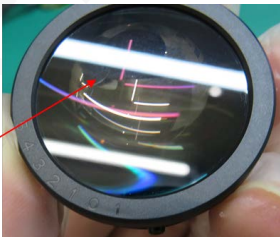
- Point defects

Inspection items	Surface classification	Defect description (mm or mm ²)		Defect judgement	
		Defect size spacing requirements		Acceptable number	
	A	Same color points	D≤0.10mm and DS≥1mm, ignore; D≤0.25mm and DS≥10mm, N≤3	N≤3	minor
		Different color points	D≤0.10mm and DS≥1mm, ignore; D≤0.25mm and DS≥10mm, N≤3	N≤3	minor
	AA	Point defect	D≤0.10mm and DS≥1mm, ignore; D≤0.15mm, N≤1;	N≤2	minor

	B	-	Does not affect the overall appearance and assembly, judgment OK	-	minor
	Remark: AA surface POL imprint, POL warping, POL stains, POL lines and shrinkage shall be subject to the limit sample. For the rest, refer to the above specifications. D surface does not affect the assembly judgment OK. A surface outer mirror barrel scratches and stains/bright prints shall be determined by reference to limit sample.				

• Other appearance items

Inspection items	Defect description	Inspection methods	Defect judgement
Lens	no gap around the lens	Visual inspection	Min
	No breakage or loss of lens	Visual inspection	Min
POL	POL scratch and POL damage Refer to AA point line specification.	Visual inspection	Min
	POL mark reference limit sample: If the distance from the edge of the barrel cover is less than 6mm, the positive view shall not be visible; Within 6mm, refer to the sample. If the degree is less than or equal to the limit, it is deemed OK 	Visual inspection	Min
	POL dent limit sample: If the distance from the edge of the barrel cover is less than 6mm, the positive view shall not be visible; Within 6mm, refer to the sample. If the degree is less than or equal to the limit, it is deemed OK 	Visual inspection	Min

	POL warping: Refer to limit sample, 4 defects of which the extent do not exceed the limit sample are allowed, they have to be separated. 	Visual inspection	Min
	POL fine line limit which can be seen only from a specific Angle of view. The length and extent of the card is greater than or equal to the limit sample is not allowed. 	Visual inspection	Min
	POL stain limit sample: The extent which is greater than or equal to the limit sample is not allowed. 	Visual inspection	Min
Focus Ring	- The scale has no wear or cannot be identified - Mark point rotation shall cover all measuring range	Visual inspection	Min
Dowel Pin	No missing dowel pin; The dowel pin protruding reference limit (does not affect assembly) : less than or equal to the limit is allowed, greater than the limit is not allowed. 	Visual inspection	Min

Screw	Screw should not be missed, not in place, screw hole lock flower	Visual inspection	Min
FPC	No damage, no impact on the function	Visual inspection	Min
Mirror tube stain/bright print	Stain/bright print limit sample: when the degree is equal, the card control area is less than or equal to the limit; Degree is lighter than the limit does not card control area 	Visual inspection	Min
Hard scratch/mark	Refer to limit sample, the extent which do not exceed the limit sample is allowed. 	Visual inspection	Min
Qr code blurred/ink/partial missing	Does not affect scanning	Visual inspection + scanning	Min
Shrink	Refer to limit sample, the extent which do not exceed the limit sample is allowed. 	Visual inspection	Min

Gap between the lens cover and POL	Refer to limit sample, the extent which do not exceed the limit sample is allowed. 	Visual inspection	Min

5.5.3 Electrical inspection

5.5.3.1 Function

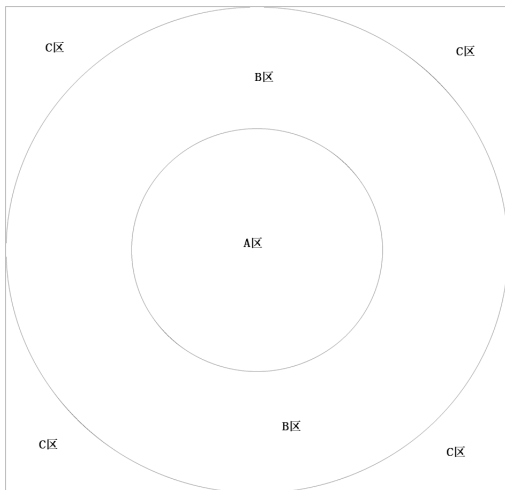
Items	Defect judgement	Inspection standard
No display	Major	Not allowed
Abnormal display		
Performance and optical test	Major	Exceeding specifications is not allowed

5.5.3.2 Display

Items	Defect judgement	Inspection standard				
Dark dot	Minor	Case		Criteria	Number	Distance
		1 dark dot		L≤5%Gray255	≤10	-
		2 continuous dots		L≤5%Gray255	≤2	≥2pixel
		≥3 continuous dark dots		L≤5%Gray255	0	-
		Remark: 1 dark dot consists of 1 pixel , 1 Pixel is unit of the Dark dot defect				
Bright dot	Minor	Case	Criteria	Number	Distance	
		Bright dot	L≤5%Gray255	ignore	-	
		Bright dot	20%≥L>5%Gray255	≤2	≥2 Sub pixel	
		Bright dot	L>20%Gray255	0	-	
		Remark: 1 Dot is unit of the Bright dot defect. 1 Subpixel is unit of the Bright dot defect				

Bright line	Major	Visible, not allowed
Dark line	Major	Visible, not allowed
Point of impurities	Minor	Refer to the limit sample, the negligible limit does not count, greater than the negligible limit does not count and between the OK limit, the number requirements are as follows: The number of foreign bodies in zone A ≤ 1 , zone B ≤ 4 , and Total ≤ 4 in zone AB are not allowed to gather. Only large plastic particles were trapped in zone C Zones A/B/C are defined as follows
Mura	Minor	Limit samples if necessary

The A/B/C region is defined below



6 RELIABILITY

No.	Item	Test condition	Judgement
1	High Temperature and High humidity Storage	60℃ , 90%Relative humidity, 48hours	No function issue and appearance defect.
2	High Temperature and High humidity Operation	55℃ , 90%Relative humidity, 48hours	
3	Low temperature Storage	-40℃ , 48hours	
4	Low temperature Operation	-20℃ , 12 hours	
5	Thermal Shock	-40℃ , 45minutes ~ 65℃ , 45minutes, 20cycles	
6	IP5X	Dust Proof: Talcum powder (pass through wire diameter 50μm and sieve opening 75μm) ; Dust Capacity: 2kg/ m ³ ; Flow speed: 2m/s; 4.8hours	No dust enters and causes image issue

7 HANDLING PRECAUTION

Please notice the following items, when using the module.

Please consider cooling system to make it work at appropriate temperature.

It should avoid pressure, strong impact, and being dropped from a height.

Please do the ESD prevention to avoid damage the module.

Please do not operate or store them in a place where they are directly exposed to sunlight or high temperature/humidity.

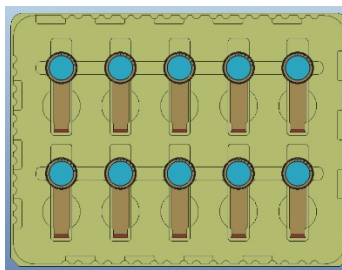
Please follow normal POWER ON, OFF sequence, or abnormal operating will be damage the module.

Please avoid display with static pattern for a long term, it will cause image sticking.

Please do not disassemble and re-assemble the module by yourself.

8 PACKING

- 8.1 There are 10 pieces of modules placed in a tray. There are 7 trays in a full packing carton. The upper tray is a empty tray.



- 8.2 All the trays are vacuum packed in ESD bags, then add the EPE foam for buffering.



- 8.3 The carton outline is 450×350×200mm。

