



鲲游光电

North Ocean Photonics

Product Brochure

以晶圆级光学奠定光子AI的基石

Building Photonic AI on Wafer Level Optics



About North Ocean Photonics

Based in Shanghai, China, North Ocean Photonics (NOP) is a leading high-tech company specializing in wafer-level optics (WLO) and optical integration.

Leveraging extensive technical expertise and advanced manufacturing capabilities, NOP is committed to exploring cutting-edge applications in the fields of photonics and optoelectronics.



Core Team

NOP's team brings together professors and PhDs from world-class universities, senior executives from globally and nationally renowned companies, as well as recipients of the prestigious National Science and Technology Progress Award.

WLO Closed-loop R&D + Mass Production Platform

Since its establishment in 2017, NOP has built state-of-the-art facilities, including nearly 10,000 square meters of ultra-cleanrooms and cutting-edge hardware platforms. The NOP Shanghai R&D and Manufacturing Center features fully equipped office spaces, research labs, and in-house Class 100 and 1000 clean rooms.



NOP has also developed advanced quality control and software systems, along with comprehensive team training programs. This has enabled the realization of a fully integrated IDM system, covering the entire process from R&D, design, process development, mass production to quality testing.

Having undergone rigorous factory inspections and quality control certifications from top-tier multinational clients, the company has become one of the few globally to achieve shipments exceeding 10KK levels in the wafer-level optics field.



Intellectual Property

NOP has formed a competitive and holistic IP system, with hundreds of patents in portfolio.

Patent Applications:
370+

China Patents: 300+

US Patents: 11

PCT Patent: 16

GB/T29490 -2013



Qualifications

NOP holds the qualifications for mass production in the consumer electronics and automotive industries:

ISO 9001

ISO 14001

ISO 45001

IATF 16949



Three Key Product Lines

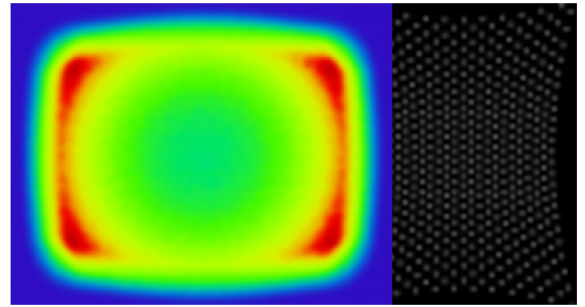
NOP has built three key product lines: sensing and machine vision, AR diffractive waveguide, and automotive LIDAR, all successfully adopted by leading clients around the globe.



Sensing and Machine Vision

Application: 3D Depth Sensing & Automatic Driving

- The core DOE of 3D depth imaging module must be designed using wafer-level processing and manufactured accordingly;
- LiDAR for autonomous driving and depth cameras.



AR Diffractive Waveguide

Application: AR Diffractive Waveguide

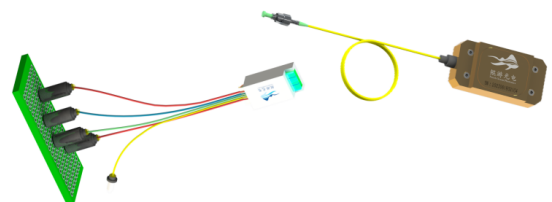
- The AR industry has tremendous potential, with the waveguide being the key display element in AR hardware with a high technical threshold.
- NOP can provide comprehensive solutions for AR waveguides that integrate multiple innovative approaches and enable cost-effective mass delivery.



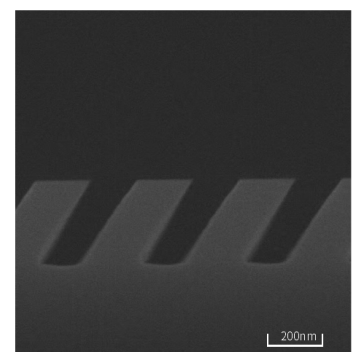
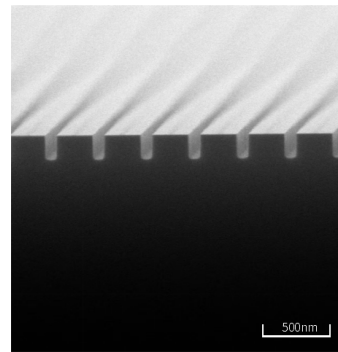
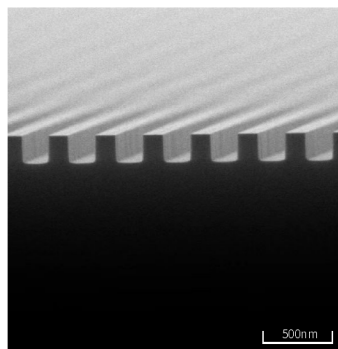
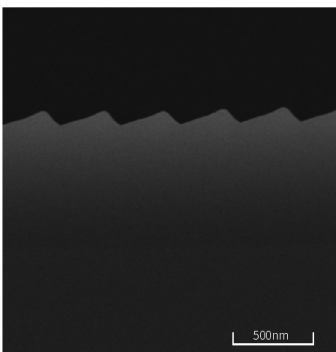
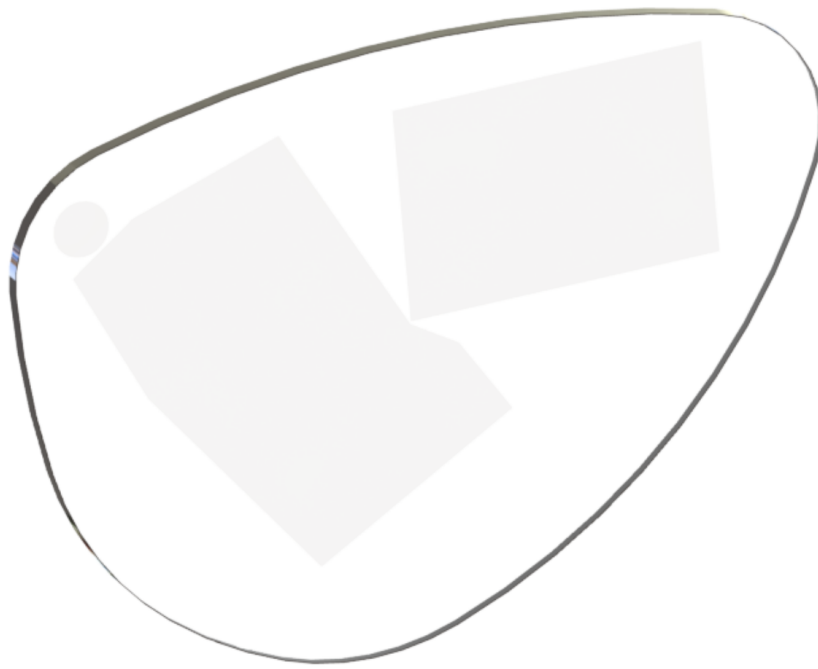
Automotive and LIDAR

Application: Fiber Optics and LIDAR

- Mainly used for high-speed (>100G) optical communication transceiver modules and high-precision coupling connections for silicon photonic chips;
- Optical transceiver module products for vehicle-mounted LiDAR, officially began to be integrated into mass production models of a well-known international brand at the beginning of 2022.



AR Diffractive Waveguide



- Different Grating Structures
- 1D/2D Pupil Expansion
- Angle/Depth Modulation

■ AR Waveguide Product Portfolio

To address diverse application scenarios and market demands, NOP is committed to delivering customized AR solutions by focusing on three key dimensions: form factor, optical performance and cost. Guided by these principles, NOP has developed six distinct AR product series – Qiushui, Xiaoyao, Fuyao, Mengdie, Yingning and Yuzhang – creating a comprehensive AR optical waveguide product portfolio.

						
Product Series	Qiushui II QS-C30	Xiaoyao XY-C25	Xiaoyao XY-Z25	Mengdie MD-C25	Yingning YN-C25	Yuzhang YZ-C20
Substrate Material	Polymer	Glass	Glass	Glass	Glass	Polymer
Manufacture Process	NIL	NIL	NIL	NIL	NIL+Etching	NIL
Field of view	30°	25°	25°	25°	25°	20°
Color	Mono Green	Mono Green	Mono Green	Full color	Full color	Full color
Efficiency	750nits/lm	900nits/lm	800nits/lm	1300nits/lm	1500nits/lm	1600nits/lm
Brightness Uniformity	30%	30%	50%	30%	45%	55%
Color Uniformity	NA	NA	NA	0.05	0.03	0.05
Thickness*	1.0mm	0.4mm	0.5mm	0.6mm	0.7mm	0.9mm
Weight*	2.2g	2.5g	5.9g	4.3g	4.7g	2.2g

* Efficiency and brightness uniformity are designed and measured with non-polarized light engines.

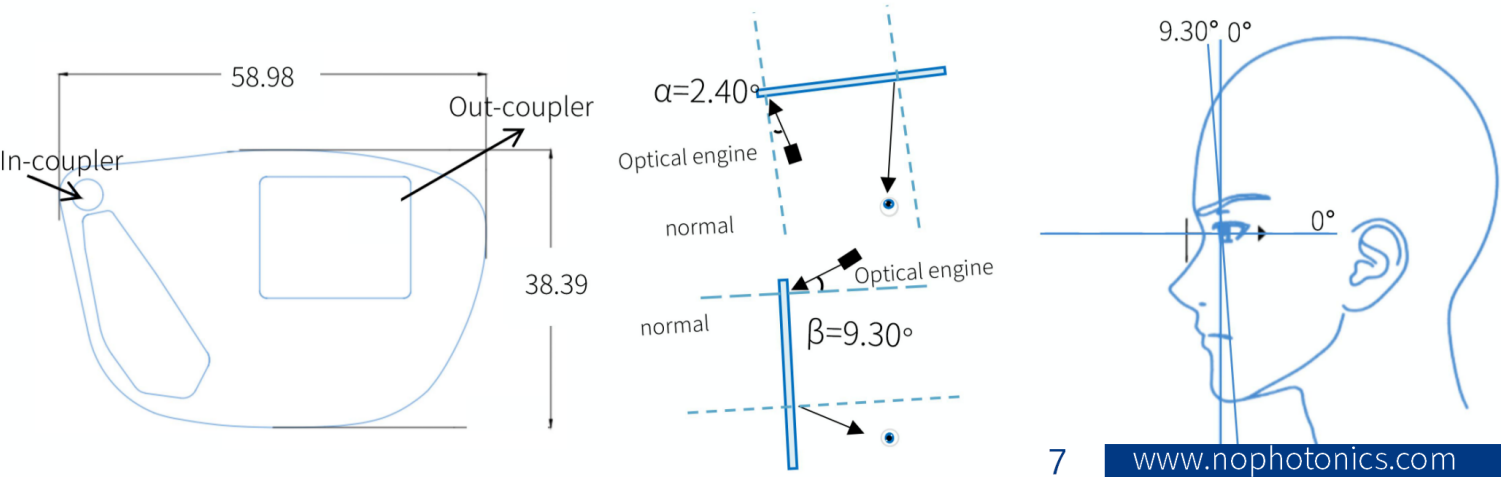
** Thickness, surface density and weight values do not include cover glass.



SRG AR Waveguide-QIUSHUI

QS-C30-B03

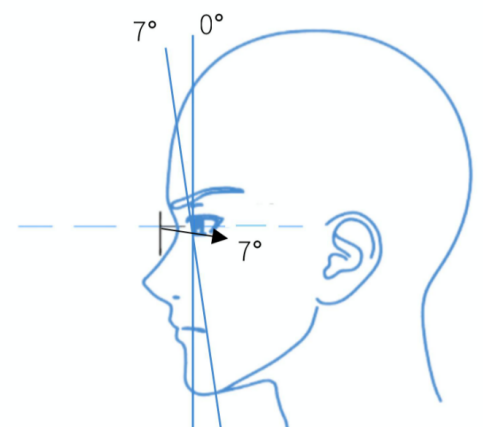
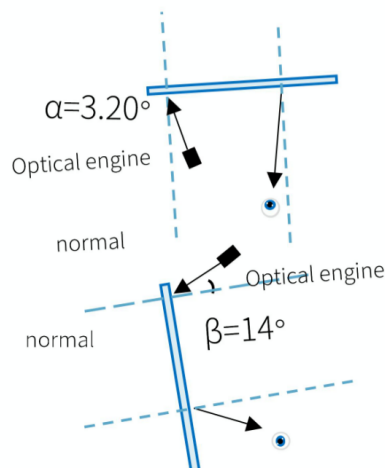
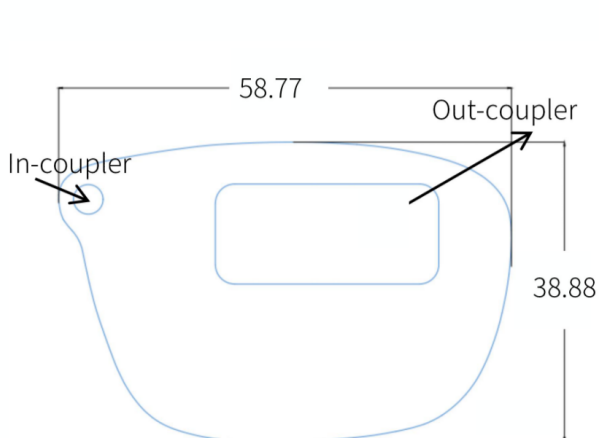
Parameters	Typical Value	Comment
Field of View	30°	
Aspect ratio	4:3	
Center wavelength	G: 528	
Angle α	2.40°	Angle between center of FOV and normal of waveguide in horizontal plane
Angle β	9.30°	Angle between center of FOV and normal of waveguide in vertical plane
In-coupler grating diameter	4.30mm	
Image focus distance	infinity	
Eye relief	20mm	
Eye box	12mm(H) x 10mm(V)	
Eyebox center position	33.30mm(X) 9.40mm(Y) from input pupil	
Efficiency	750 nits/lm	
MTF	60%@6.60lp/deg	
Contrast	60:1	ANSI 4 x 4 Checkerboard
Uniformity	35%	
Dimensions	58.98mm x 38.39mm	
Material	Polymer	
Number of Plates	Single	waveguide  cover
Thickness	1.90mm	waveguide: 1.00mm
Weight	3.87g	waveguide: 2.25g





SRG AR Waveguide-XIAOYAO XY-C25-B01

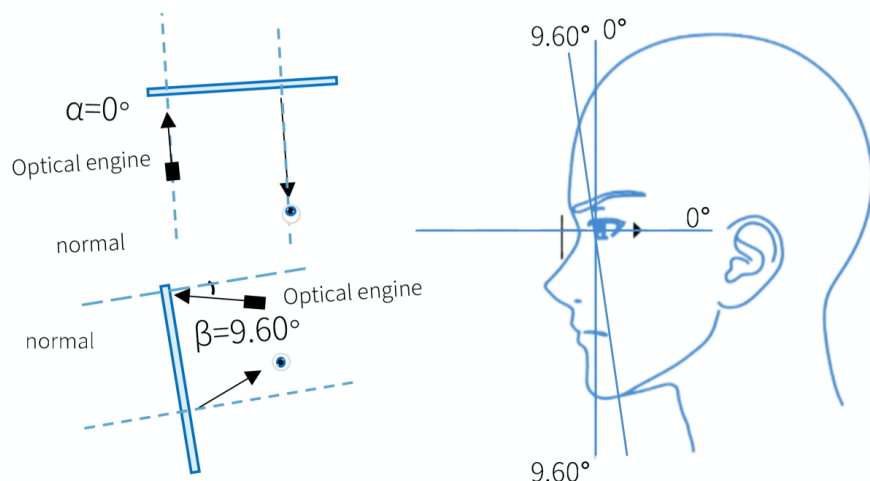
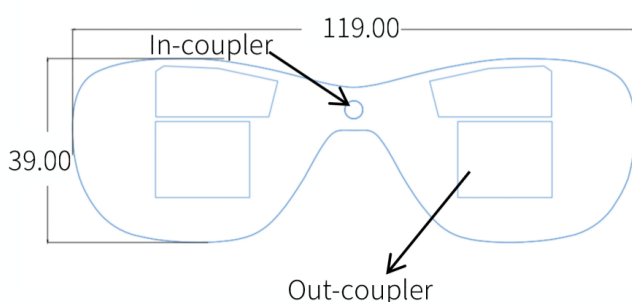
Parameters	Typical Value	Comment
Field of View	25°	
Aspect ratio	3:1	
Center wavelength	G: 527	
Angle α	3.20°	Angle between center of FOV and normal of waveguide in horizontal plane Angle between center of FOV and normal of waveguide in vertical plane
Angle β	14°	
In-coupler grating diameter	3.85mm	
Image focus distance	infinity	
Eye relief	20mm	
Eye box	15mm(H) x 10mm(V)	
Eyebox center position	34.50mm(X) 7.48mm(Y) from input pupil	
Efficiency	900 nits/lm	
MTF	50%@6.60lp/deg	
Contrast	60:1	ANSI 4 x 4 Checkerboard
Uniformity	30%	
Dimensions	58.77mm x 38.88mm	
Material	Glass	
Number of Plates	Single	
Thickness	0.83 mm	waveguide: 0.40mm
Weight	4.00g	waveguide: 2.52g





SRG AR Waveguide-XIAOYAO XY-Z25-B01

Parameters	Typical Value	Comment
Field of View	25°	
Aspect ratio	1:1	
Center wavelength	G:530	
Angle α	0°	Angle between center of FOV and normal of waveguide in horizontal plane Angle between center of FOV and normal of waveguide in vertical plane
Angle β	9.60°	
In-coupler grating diameter	3.80mm	
Image focus distance	Infinity	
Eye relief	18mm	
Eye box	14mm(H) x 10mm(V)	
Eyebox center position	32mm(X) 7.37mm(Y)	from input pupil
Efficiency	800 nits/lm	
MTF	50% @6.60lp/deg	
Contrast	60:1	ANSI 4 x 4 Checkerboard
Uniformity	50%	
Dimensions	119mmX39mm	
Material	Glass	
Number of Plates	Single	 WG — Cover Cover
Thickness	1.36	
Weight	11.60g	

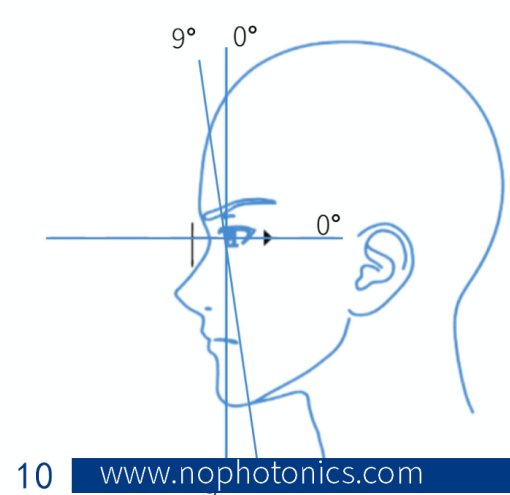
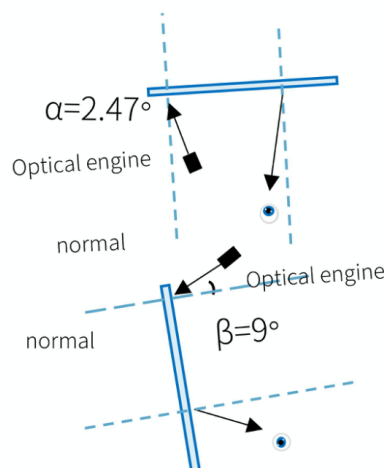
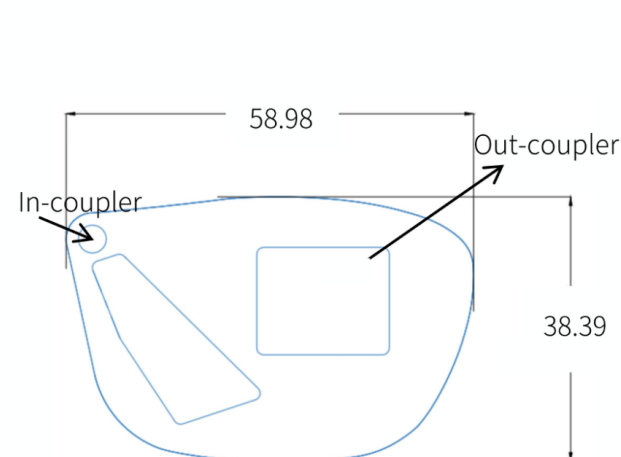




SRG AR Waveguide-MENGDIE

MD-C25-B01

Parameters	Typical Value	Comment
Field of View	25°	
Aspect ratio	4:3	
Center wavelength	R: 625 G: 525 B: 460	
Angle α	2.47°	Angle between center of FOV and normal of waveguide in horizontal plane
Angle β	9°	Angle between center of FOV and normal of waveguide in vertical plane
In-coupler grating diameter	4mm	
Image focus distance	infinity	
Eye relief	20mm	
Eye box	12mm(H) x 10mm(V)	
Eyebox center position	32.30mm(X)12.30mm(Y) from input pupil	
Efficiency	1300 nits/lm	
MTF	60%@6.60lp/deg	
Contrast	60:1	ANSI 4 x 4 Checkerboard
Color Uniformity	0.05	rms du'v'
Dimensions	58.98mm x 38.39mm	
Material	Glass	
Number of Plates	Single	waveguide  cover
Thickness	1.03 mm	waveguide: 0.60mm
Weight	5.84 g	waveguide: 4.32g

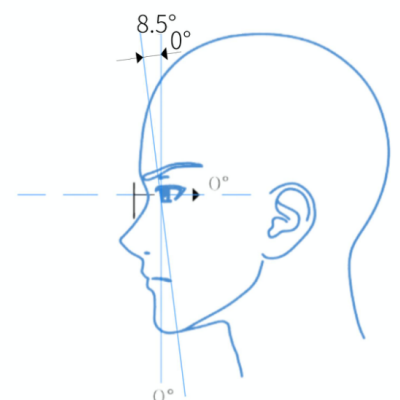
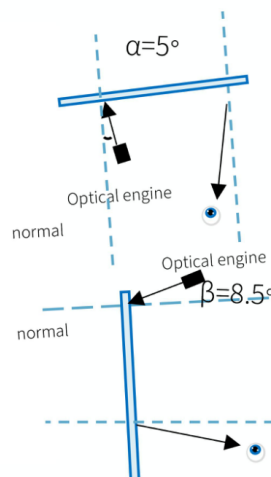
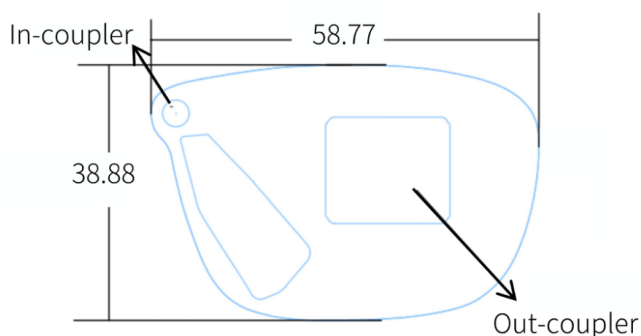




SRG AR Waveguide-YINGNING

YN-C25-B01

Parameters	Typical Value	Comment
Field of View	25°	
Aspect ratio	4:3	
Center wavelength	R: 636 G: 528 B: 462	
Angle α	5°	Angle between center of FOV and normal of waveguide in horizontal plane
Angle β	8.5°	Angle between center of FOV and normal of waveguide in vertical plane
In-coupler grating diameter	4mm	
Image focus distance	Infinity	
Eye relief	16mm	
Eye box	12mm(H) x 10mm(V)	
Eyebox center position	33mm(X) 9mm(Y)	from input pupil
Efficiency	1500nits/lm	
MTF	63%@6.60lp/deg	
Contrast	95:1	ANSI 4 x 4 Checkerboard
Color Uniformity	0.03	rms du'v'
Dimensions	58.77mm x 38.88mm	
Material	Glass	waveguide ———— cover
Number of Plates	Single	
Thickness	1.13mm	waveguide: 0.70mm
Weight	6.27g	waveguide: 4.75g

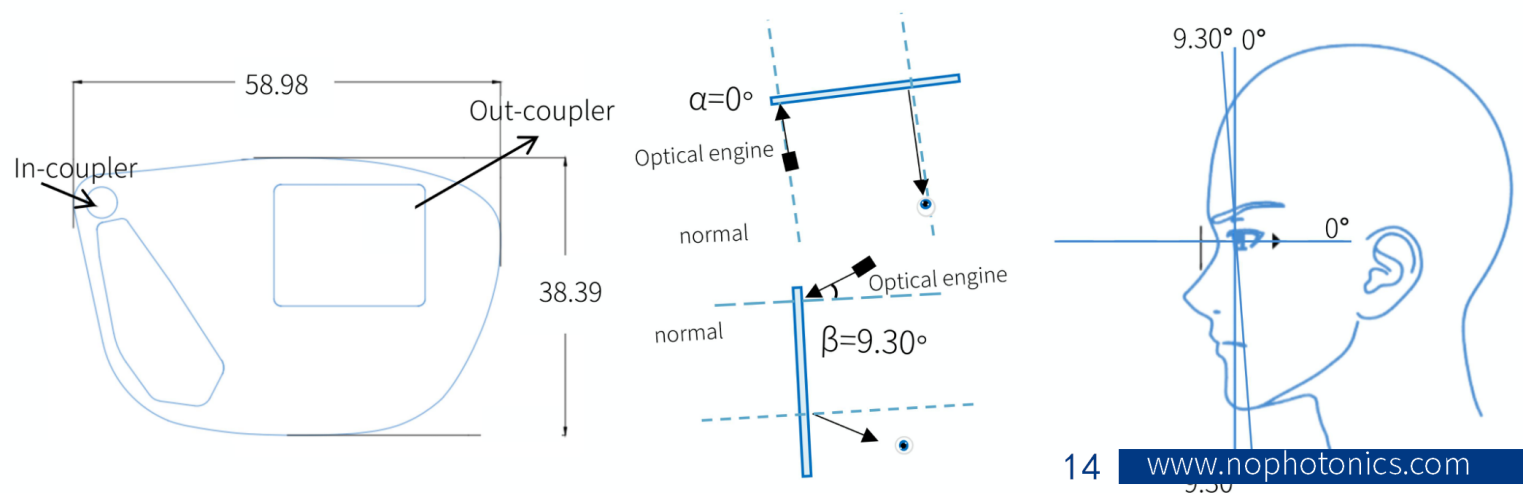




SRG AR Waveguide-YUZHANG

YZ-C20-B01

Parameters	Typical Value	Comment
Field of View	20°	
Aspect ratio	4:3	
Center wavelength	R: 635 G: 527 B: 460	
Angle α	0°	Angle between center of FOV and normal of waveguide in horizontal plane
Angle β	9.30°	Angle between center of FOV and normal of waveguide in vertical plane
In-coupler grating diameter	4.30mm	
Image focus distance	infinity	
Eye relief	20mm	
Eye box	12mm(H) x 10mm(V)	
Eyebox center position	34.20mm(X) 9.36mm(Y) from input pupil	
Efficiency	1600 nits/lm	
MTF	55%@6.60lp/deg	
Contrast	60:1	ANSI 4 x 4 Checkerboard
Color Uniformity	0.05	rms du'v'
Dimensions	58.98mm x 38.39mm	
Material	Polymer	
Number of Plates	Single	waveguide —  — cover
Thickness	1.78 mm	waveguide: 0.88mm
Weight	3.79 g	waveguide: 2.19g





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