CASIX
A fabrinet Company

https://www.casix.com

CASIX

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CASIX

Reliable optics

CASIX

A fabrinet Company

福建华科光电有限公司

https://www.casix.com

Introduction

CASIX Inc.

Casix Inc., founded in September 1992, is a wholly-owned subsidiary of Fabrinet which is a renowned international company. Casix is located in the national AAAA scenic spot of Fuzhou in China. By striking the spirit of “safety, unity, struggle, innovation and excellence” as well as international advanced management philosophies, Casix is pursuing excellence throughout its operation and ensures that our products satisfy the needs of our customers and the target markets.

Engaged in R&D, manufacturing excellence and quality improvement, Casix focus on developing and manufacturing high-quality crystal, precision optics components and optical sub-assemblies for market applications in optical communication, commercial laser, instrumentation, surveying, measuring and scanning, and medical. Our products are widely used by global leading customers. As a global partner of optical components, we seek to develop long-term relationships with our customers and meet their needs with quality engineering, manufacturing and excellent customer service.

To ensure product quality, Casix has launched a comprehensive quality control system and a strict management system. The company was certified for ISO9001 by SGS UK in 1998, ISO14001 in 2006, ISO45001 (OHASA 18001) in 2009, ISO13485 in 2012 and IATF16949 in 2018. To enhance our core competitiveness, we have successfully implemented the Enterprise Resources Management System (ERP), allowing networked and improved company management and quality production.

Contents

Contents

CASIX is capable of fabricating a wide variety of optical components with various optical materials, which will be used for different applications. Details can be found as the following sheet.

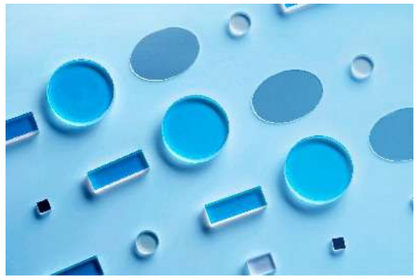
Material	Process	Growth	Application
Nd:YVO_4, YVO_4	Yes	Internally	Laser and Telecom
YAG: Nd:YAG, Cr:YAG	Yes	Outsource	Laser
LBO, BBO	Yes	Outsource	Non-Linear
KTP, $LiNbO_3$, MgO:$LiNbO_3$	Yes	Outsource	Non-Linear
Calcite, a-BBO	Yes	Outsource	Polarization
Quartz Crystal, MgF_2	Yes	Outsource	Polarization
CaF_2, Sapphire	Yes	Outsource	Window
Silicon, Germanium	Yes	Outsource	IR
General Glass (CDGM, Schott, Ohara, Corning) and Fused Silica	Yes	Outsource	Optics

Please contact us for getting more information on the material fabrication capability.

Optical Windows, Mirrors

CASIX offers a wide range of materials and degrees of precision windows. Special materials are available upon request.

Different types of coating can be applied to the windows as the application for Laser mirrors, beamsplitters, etc. Please refer to the page 44 for more information on coatings.



Normal Windows

Capability:

Attribute	Commercial	High Precision
Material	N-BK7, UV grade Fused Silica and other optical glass	
Diameter Tolerance	±0.1mm	±0.05mm
Thickness Tolerance	±0.1mm	±0.01mm
Parallelism	< 1 arc minute	< 10 arc seconds
Surface Quality(Scratch-Dig)	40-20	10-5
Wavefront Distortion	λ/4 per 25mm@632.8nm	λ/10 per 25mm@632.8nm

Light House Windows

Capability:

CASIX offers light house window assemblies for surveying measurement system application.

Attribute	Commercial	High Precision
Substrate Material	Float Glass / B270 / H-K9L	
Dimension Tolerance	± 0.25mm	± 0.12mm
Angle Tolerance	± 0.5°	± 0.2°
Surface Quality(Scratch-Dig)	60-40	40-20
Wavefront Distortion	< λ /4 at 632.8nm per ϕ14.3mm	< λ /8 at 632.8nm per ϕ14.3mm
Parallelism of substrate	y≤3"	y≤1.5"
Coating	T≥90%@500nm~700nm at 0° incident; T≥80%@500nm~700nm with ≤45° incident;	T≥95%@500nm~700nm at 0° incident; T≥85%@500nm~700nm with ≤45° incident;

Optics

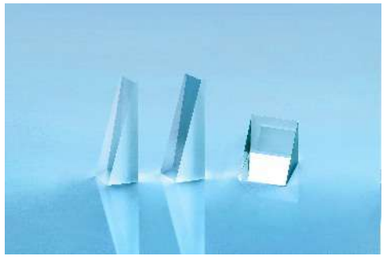
Optical Prisms

CASIX provides a broad range of prisms including right angle prisms, penta prisms, dove prisms, roof prisms, Corner Cube Retro-reflectors, Anamorphic prisms and wedge prisms.

Right-Angle Prisms

Capability:

Attribute	Commercial	High Precision
Material	N-BK7, Fused Silica and other optical glass	
Dimension Tolerance	+ 0.0/-0.2mm	+ 0.0/-0.05mm
Clear Aperture	> 90%	> 90%
Angle Tolerance	±30"	±5"
Flatness	Per 25.4mm λ/4 at 632.8nm	Per 25.4mm λ/10 at 632.8nm
Surface Quality(Scratch-Dig)	40-20	20-10



Penta Prisms

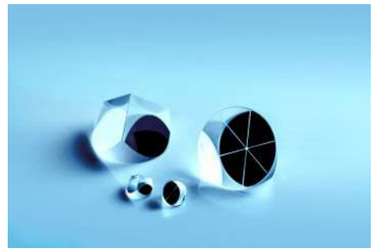
Capability:

Attribute	Commercial	High Precision
Material	N-BK7 / H-K9L	
Dimension Tolerance	±0.2mm	±0.1mm
90° Deviation Tolerance	<30 arc seconds	<2 arc seconds
180° Deviation Tolerance	<20 arc seconds	<5 arc seconds
Flatness Precision Series	< λ/4 at 632.8nm	< λ/8 at 632.8nm
Reflectivity	R>95%@630-680nm	R>99.5%@630-680nm
Surface Quality(Scratch-Dig)	60-40	40-20
Beamsplitter Ratio Transmission/Reflection	T/R=20/80+/-5%@630-680nm	Specify

Corner Cube Retro-Reflectors

Capability:

Attribute	Commercial	High Precision
Typical Material	N-BK7, Fused Silica and Other Optic Glass	
Typical Dimension (ϕ×h)(mm)	10×7.5, 12.7×9.5, 25.4×19, 38.1×28.5, 50.8×37.5mm	10×7.5, 12.7×9.5, 25.4×19, 38×28.5, 50.8×37.5mm
Dimension(ϕ) Tolerance	+0.0/-0.2mm	+0.0/-0.1mm
Dimension(h) Tolerance	±0.3mm	±0.1mm
Clear Aperture	> 85%	> 90%
Deviation	< 5"	< 3"
Surface Quality (Scratch-Dig)	60-40 (≤25.4×19mm) 80-50 (> 25.4×19mm)	40-20 (≤25.4×19mm) 60-40 (> 25.4×19mm)
Wavefront Distortion	λ/2@632.8nm (≤25.4×19mm) λ@632.8nm (> 25.4×19mm)	λ/4@632.8nm (≤25.4×19mm) λ/ 2@632.8nm (> 25.4×19mm)



Hollow Retro-Reflectors

Capability:

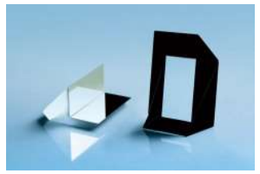
Attribute	Commercial	Precision	High Precision
Typical Material	Fused Silica, N-BK7, H-K9L		
Typical Dimension (ϕ×h)(mm)	8×7.6, 20×15.5, 22.5×18.6, 25.4×19.8		
Dimension(ϕ) Tolerance	+0.0/-0.2mm	+0.0/-0.2mm	+0.0/-0.1mm
Dimension(h) Tolerance	±0.2mm	±0.2mm	±0.1mm
Clear Aperture	> 90%	> 90%	> 90%
Deviation	< 15"	< 10"	< 5"
Surface Quality (Scratch-Dig)	60-40	60-40	40-20
Wavefront Distortion	1.0L@633mm	0.8L@633mm	0.4L@633mm
Coating	Metallic HR (AU+P/AL+P)		

Special Shape Prisms

CASIX are capable of providing special shape prisms with Different materials, CNC machine can support us to achieve special shape upon request with high quality. Contact us freely for your request.

Prism Assembly

CASIX is capable of prism assembly with different shapes and materials, including PBS, NPBS, TIR, waveguide for AR, porror prism, etc. Special assemblies are available per customer request.

Light Pipes

Solid rod light pipes are used in projection systems.

Our solid rod light pipes provide highly uniform illumination of the microdisplay, even though the light source may be non-uniform, Key functional characteristics of light pipes include transmission efficiency, angular and dimensional accuracy, and overall workmanship. Max. length of our light pipe up to 200mm.

Capability:

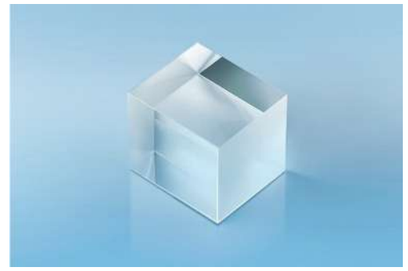
Attribute	Commercial	High Precision
Material	N-BK7 Grade A optical glass	
Dimension Tolerance	±0.2mm	±0.05mm
Surface Quality (Scratch-Dig)	80-50	60-40
Clear Aperture	100%	100%
Edge Chip	<0.1mm	<0.05mm
Parallelism	<3 arc minutes	<1 arc minute
Coating	R<0.5%@420-680nm, 0 degree incident	

Optical Diffused Bonding

CASIX can supply the new bonding technology now.

Advantages

- **High Precision, keep original parallelism of component and difference of flatness less than 0.5 λ**
- **Low loss (less than 0.01dB)**
- **High temperature endurability**
- **High Intensity (Shear strength: >45Kg/cm², Strength of intension: >138Kg/cm²**
- **Low Stress**
- **Water Endurability**
- **Endurability on Isopropyl alcohol, acetone and alcohol**



Please contact us for getting more information on the bonding type.

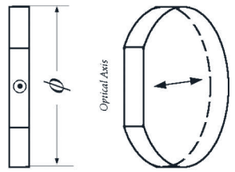
Optical Waveplates

Waveplates are made from materials that exhibit birefringence. The velocities of the extraordinary and ordinary rays through the birefringent material vary inversely with their refractive indices. This difference in velocities gives rise to a phase difference when the two beams recombine. In the case of an incident linearly polarized beam, this is given by $\alpha=2\pi d(n_e-n_o)/\lambda$, where is α phase difference; d is the thickness of waveplate; n_e, n_o are refractive indices of extraordinary and ordinary rays respectively; λ is the wavelength. At any specific wavelength, the phase difference is governed by the thickness of the retarder.

CASIX waveplates are widely used in the synthesis and analysis of light in vrious states of polarization. The wavelengths within the range of 240nm~2100nm are all available at CASIX.

Low-Order Waveplates

- **Thickness: 0.2-0.5mm**
- **High Damage Threshold**
- **Better Temperature Bandwidth**
- **Low Cost**



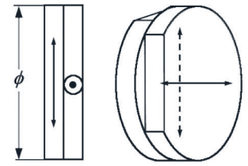
Capability:

Attribute	Commercial	High Precision
Material	Crystal Quartz, MgF_2	Crystal Quartz, MgF_2
Dimension Tolerance	+0.0/-0.13mm	±0.02mm
Wavefront Distortion	λ/8@632.8nm	λ/20@632.8nm
Retardation Tolerance	λ/120 measured at 632.8nm	λ/300 measured at 632.8nm
Wavelength Range	240~2100nm	240~2100nm
Parallelism	3 arc seconds	0.6 arc seconds
Surface Quality (Scratch-Dig)	20-10	10-5
AR/AR Coating	R<0.2% at central wavelength	R<0.1% at central wavelength

Zero-Order Waveplates

Cemented & Optically Contacted Zero-Order Waveplates

- **Double Plates**
- **Broad Spectral Bandwidth**
- **Wide Temperature Bandwidth**
- **AR Coated**

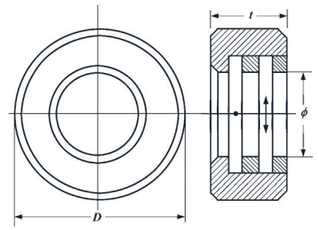


Capability:

Attribute	Commercial	High Precision
Material	Crystal Quartz	Crystal Quartz
Dimension Tolerance	+0.0/-0.2mm	±0.05mm
Wavefront Distortion	λ/4@632.8nm	λ/10@632.8nm
Retardation Tolerance	λ/120 measured at 632.8nm	λ/300 measured at 632.8nm
Wavelength Range	400~2100nm	240~2100nm
Parallelism (Single Plate)	3 arc seconds	0.6 arc seconds
Surface Quality (Scratch-Dig)	20-10	10-5
AR/AR Coating	R<0.2% at central wavelength	R<0.1% at central wavelength

Air-spaced Zero-Order Waveplates

- **Double Retardation Plates**
- **Wide Temperature Bandwidth**
- **Broad Spectral Bandwidth**
- **High Damage Threshold**
- **AR Coated and Mounted**



Capability:

Attribute	Commercial	High Precision
Material	Crystal Quartz	Crystal Quartz
Dimension Tolerance	+0.0/-0.2mm	±0.05mm
Wavefront Distortion	λ/4@632.8nm	λ/10@632.8nm
Retardation Tolerance	λ/120 measured at 632.8nm	λ/300 measured at 632.8nm
Wavelength Range	240~2100nm	240~2100nm
Parallelism(Single Quartz Plate)	3 arc seconds	0.6 arc seconds
Surface Quality (Scratch-Dig)	20-10	10-5
AR/AR Coating	R<0.2% at central wavelength	R<0.1% at central wavelength

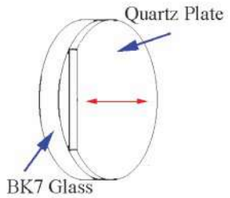
True Zero-Order Waveplates

Capability:

Attribute	Commercial	High Precision
Material	Crystal Quartz, N-BK7	Crystal Quartz, N-BK7
Dimension Tolerance	+0.0/-0.13mm	±0.02mm
Wavefront Distortion	λ/8@632.8nm	λ/20@632.8nm
Retardation Tolerance	λ/120 measured at 632.8nm	λ/300 measured at 632.8nm
Wavelength Range	240~2100nm	240~2100nm
Parallelism	3 arc seconds	1 arc seconds
Surface Quality (Scratch-Dig)	20-10	10-5
AR/AR Coating	R<0.2% at central wavelength	R<0.1% at central wavelength

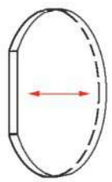
Cemented True Zero-Order Waveplates

- **Broad Spectral Bandwidth**
- **Wide Temperature Bandwidth**
- **Wide Angle Bandwidth**
- **Cemented by Epoxy**



Single Plate True Zero-Order Waveplates

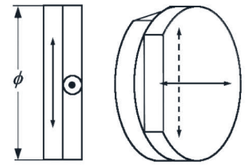
- **Broad Spectral Bandwidth**
- **Wide Temperature Bandwidth**
- **Wide Angle Bandwidth**
- **High Damage Threshold**
- **Standard Wavelength: 1310nm, 1550nm**
- **λ/2 Waveplate**
- **Thickness Down to 0.028mm**



Achromatic Waveplates

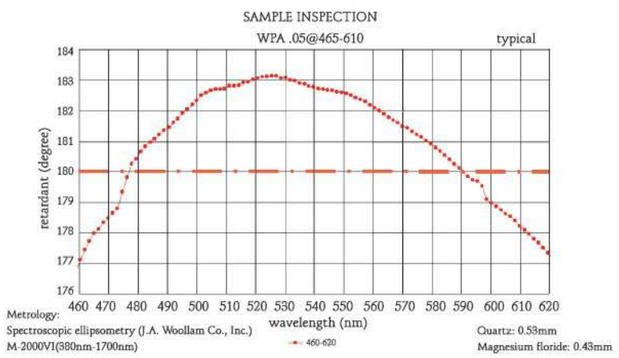
Achromatic waveplates are similar to zero-order except that the two plates are made of different materials, such as crystal quartz and magnesium fluoride. Since the dispersion of birefringence can be different for two materials, it is possible to specify the retardation value at a wavelength range. Hence, the retardation of the resulting waveplate can be made to low sensitivity to wavelength change.

Based on the contact methods of two plates, achromatic waveplates are classified into two types: air-spaced and cemented.



Capability:

Attribute	Commercial	High Precision
Substrate Material	Crystal Quartz and MgF_2	Crystal Quartz and MgF_2
Dimension Tolerance	+0.0/-0.2mm	±0.05mm
Wavefront Distortion	λ/4@632.8nm	λ/8@632.8nm
Retardation Tolerance	λ/50@700nm~1000nm(NIR)	λ/100@700nm~1000nm(NIR)
Wavelength Range	400~2100nm	400~2100nm
Parallelism (Single Plate)	3 arc seconds	1 arc seconds
Surface Quality (Scratch-Dig)	40-20	10-5
Standard Wavelength	VIS:465nm~610nm NIR:700nm~1000nm IR:1200nm~1650nm	VIS:465nm~610nm NIR:700nm~1000nm IR:1200nm~1650nm



Curved Optics

Lenses are used in many applications, from simple correction of a light beam to precision imaging and image transfer. Casix provides spherical lenses, cylindrical lenses, high-precision aspherical lenses, molded lenses, special lenses and lens assemblies. The typical materials for lenses are N- BK7, Fused Silica, CaF_2, other high-refraction optical glasses, sapphire etc.
CASIX provide design service on special focusing system upon request.

Spherical Lens

Capability:

Parameter	Commercial	Precision	High Precision
Outer Diameter	From 1mm to 200mm		
Radius*	From 0.7mm to 10000mm		
Diameter Tolerance	±0.1mm	±0.05mm	±0.01mm
Radius Tolerance*	±0.5%	±0.3%	±0.1%
Thickness Tolerance	±0.10mm	±0.05mm	±0.03mm
Transmission Centration*	⩽3 arc minutes	⩽2 arc minutes	⩽1 arc minute
Surface Accuracy@633nm*	λ/2	λ/4	λ/10
Surface Quality (Scratch-Dig)* (MIL-PRF-13830B)(ISO101110)	60/40 5/2*0.4; L1*0.060	20/10 5/2*0.1; L1*0.020	10/5 5/2*0.05; L1*0.010
* Depending on the customer's specifications.			

Cylindrical Lens

Capability:

Parameter	Commercial	Precision	High Precision
Dimensions	From 3mm to 260mm		
Radius*	From 2.5mm to 2000mm		
Dimensional Tolerance*	±0.10mm	±0.05mm	±0.02mm
Thickness Tolerance*	±0.10mm	±0.05mm	±0.03mm
Transmission Centration*	⩽6 arc minutes	⩽3 arc minutes	⩽1 arc minute
Surface Accuracy@633nm*	λ/2	λ/4	λ/8
Surface Quality (Scratch-Dig)*	60/40	20/10	10/5
(MIL-PRF-13830B)(ISO101110)	5/2*0.4; L1*0.060	5/2*0.1; L1*0.020	5/2*0.05; L1*0.010
* Depending on the customer's specifications.			

Material: Schott N-BK7, CDGM H-K9L, Fused Silica, CaF2, etc

Combined Optics

CASIX is available to provide combined optics including prism+spherical lens, prism+cylindrical lens, spherical lens+cylindrical lens, cylindrical lens+A-cylindrical lens.
Please contact us for your special request.

Aspherical Lens

CASIX has a special production line to build aspherical lenses internally. Detail Specs can be found as follows.

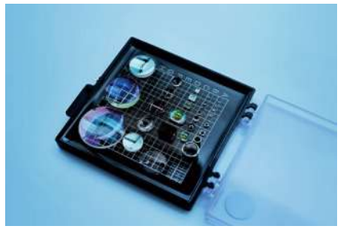
Parameter	Commercial	Precision	High Precision
Outer Diameter	From 10mm to 200mm		
Radius*	From 6mm to plano		
Diameter Tolerance*	±0.10mm	±0.05mm	±0.02mm
Thickness Tolerance*	±0.10mm	±0.05mm	±0.03mm
Transmission Centration*	⩽3 arc minutes	⩽2 arc minutes	⩽1 arc minute
PV @633nm (μm)*	1μm	0.6μm	0.3μm
Slope Error@0.5mm spacing*	N/A	0.05°	0.03°
Surface Quality (Scratch-Dig)* (MIL-PRF-13830B) (ISO101110)	60/40 5/2*0.4; L1*0.060	20/10 5/2*0.1; L1*0.020	10/5 5/2*0.05; L1*0.010
* Depending on the customer's specifications.			

A-cylindrical Lens

A-cylindrical Lens built by CNC machine:

Capability:

Parameter	Commercial	Precision	High Precision
Length x Width	From 6x6mm to 100x100mm		
Dimension Tolerance*	±0.05mm	± 0.02mm	± 0.01mm
Thickness Tolerance*	± 0.10mm	± 0.05mm	± 0.02mm
Transmission Centration*	⩽10 arc minutes	⩽3 arc minutes	⩽1 arc minute
Surface Figure (PV)*	5.0μm	2.0μm	1.5μm
RMS*	0.75μm	0.5μm	0.20μm
Surface Quality (Scratch-Dig)*	60-40	40-20	20-10
* Depending on the customer's specifications.			



Precision Molded Glass Aspherical Lens

Capability:

Parameter	Remarks	Lower Cost	Typical	High Precision	Unit
Center Thickness	(CT)	±0.050	±0.030	±0.015	mm
Outer Diameter	(OD)	±0.050	±0.015	±0.003	mm
Centration	Each surface relative to OD	±0.010	±0.005	±0.003	mm
Surface Tilt	Each surface relative to OD	<8'	<4'	<1.5'	min
Radius Error	Depend on radius size	±1.5%	±1%	±0.5%	
Irregularity PV	RMS of residual from error after radius error is removed	<635	<315	TBD*	nm
Irregularity RMS	RMS of residual from error after radius error is removed	<200	<100	TBD*	nm
Refractive Index	Dependent on glass type / supplier	±0.001			
Surface Roughness	RMS	<20	<10	<5	nm
Scratch/Dig	(MIL-PRF-13830B)	60/40	40/20	20/10	

Special Lens

CASIX provides all kinds of special lenses per custom design: We own CNC equipment to reach special shapes available, develop different material processing capabilities, like a sapphire lens; different processing way like molding lens.

Please contact CASIX for your special request.

Achromatic Lens

Introduction:

Super small Achromatic Lens for your specific application perform excellent wavefront quality, super small spot size, and improved modulation transfer function (MTF).

Features:

- Small diameter size down to 3mm
- Short focal length, such as 5mm
- Strict quality control, excellent quality
- AR-coating, mounts services

Specifications:

Diameter size	smallest 3mm
Diameter Tolerance:	+0.0/-0.05mm
Paraxial Focal Length Tolerance:	±2%
Centration:	5 arc minutes
Clear Aperture:	>80%
Surface Figure: Power(N)	<3
Irregularity(N)	<0.5
Surface Quality:	40/20 scratch and dig
Bevel:	< 0.2mm×45°
Coating:	Single layer MgF_2 broadband AR

Optical-Mechanical Sub-Assemblies

new

CASIX is dedicated to design and manufacturing of high-precision optical lenses assembly from sampling to mass production. We could support customer design based on performance requirements and could build Lens Assembly based on optical design from customer, which is widely used in biomedical testing, scanning recognition, Automotive LiDAR systems and more other industrial fields.

CASIX supplies OptiCentric 3D-100 & ImageMaster® HR MTF(from TriOptics) to ensure OMSA performance.

For further information, please contact us via sales@casix.com.

Precision optics for bio-medical application

new

Rod Lens

Capability:

Parameter	Commercial	Precision	High Precision
Diameter	From 1.5 to 10mm		
Radius*	From 2.5 to 50mm		
Length*	From 1.5 to 30mm		
Diameter Tolerance*	±0.05mm	± 0.02mm	± 0.0075mm
Thickness Tolerance*	± 0.10mm	± 0.05mm	± 0.02mm
Roundness	0.02nm	0.01nm	0.005mm
Transmission Centration*	⩽20 arc minutes	⩽10 arc minutes	⩽3 arc minutes
Surface Accuracy@633nm*	λ/2	λ/4	λ/6
Surface Quality (Scratch-Dig)*	60-40	20-10	10-5
* Depending on the customer's specifications.			

Flow Cells

Capability:

Parameter	Specification
Material	Fused silica
Usable range	190~2500nm
Assembly	Optical bonding
Channel size	⩾70μm*70μm
Channel size tolerance	5μm
Channel Length (cone head to cone head)	≥0.1mm
Channel surface roughness	⩽5A°
Surface quality	Per customer requirement
Anti-reflection coating	Per customer requirement

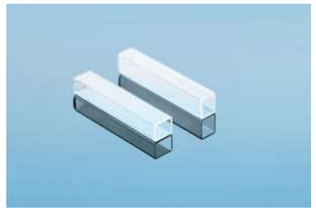
Applications:

Hematology analyzer, Urine analyzer, automated chemistry analyzer, flow cytometry, etc.
Supplying low-volume customized flow cells for the smallest startup or a capacity of over 500 cells/month for larger customers.

Glass Cells

Capability:

Parameter	Specification
Material	Borosilicate 33
Transmission @340nm	> 82%
Internal Dimension(mm)	5×5 or 4×5
Internal Dimension Tolerance(mm)	+/-0.025
Outer Dimension	Per customer requirement
Outer Dimension Tolerance(mm)	+/-0.02
Surface Quality in CA on Outer Surface	60-40
Corner Chamfer or Radian	Per customer requirement



Fabrication process:

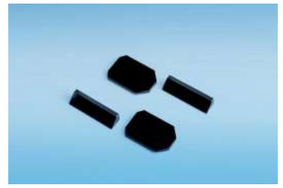
Process	Method
Long Tube Preparation	Drawing
Bottom Making	Bottoming
Outer Shaping	Grinding/Polishing

Applications:

Automated chemistry analyzer, etc.
Supplying high volume custom glass cells, internal dimension could be custom designed for new volume demand.

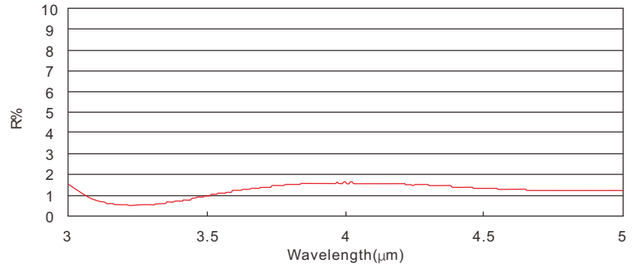
IR Optics new

CASIX provides infrared optics with various types of materials including Zinc Selenide(ZnSe), Zinc Sulfide(ZnS), Calcium Fluoride(CaF2), and Silicon(Si). These optics are available with AR or HR coating in 3-5μm (MWIR) and 8-12μm (LWIR) wavelengths, for applications in fields of life sciences, imaging, industry and defense.

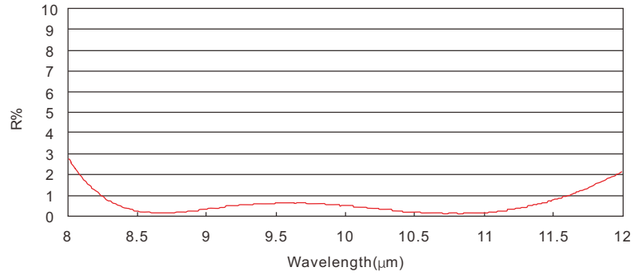


Please contact with us for details specifications request.

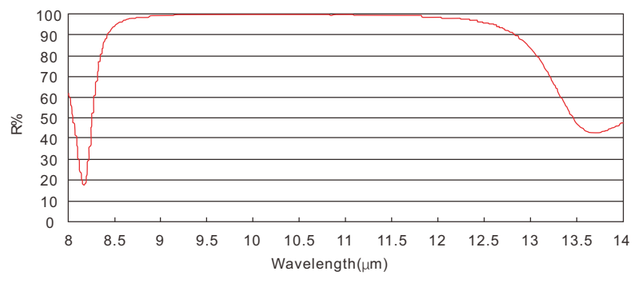
● **MWIR AR Coating in 3-5μm**



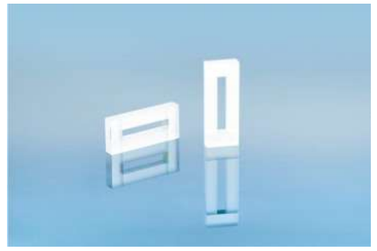
● **LWIR AR Coating in 8-12μm**



● **HR Coating in 10.6μm**



Etalons



Etalons are narrowband wavelength filters. They offer the advantages of transmission. Because etalons feature low wavefront distortion, lowinsertion loss, easy tenability, etc, they are widely applied in fiber communications such as WDM networks, tunable filters, wavelength locker, DWDM systems etc.

We offer two types of etalons for filter communication; Air-spaced Etalons and Solid Etalons.

Air-spaced Etalons:

Air-spaced etalons are two extremely parallel plates polished to very tight specifications with an air gap between them. Using a ULE or fused silica as a gasket that is optically contacted between the two plates creates an air gap. Designed with special partial reflecting etalon coating and AR coatings result in improved transmission.The mechanical design is robust and our etalon has great thermal stability. Out air-spaced etalons are available in a wide range of FSR values from 1500 Ghz to 10 Ghz.

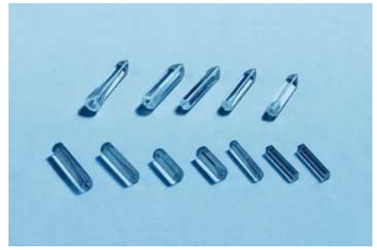
Solid etalons:

Solid etalons are two parallel plates but with a special coating to create the cavity. High-quality cavities result in higher transmission a compact size and lower cost. These etalons have the potential for a high damage threshold and are particularly good for intercavity use. Our solid etalons are available in a wide range of FSRs, from 1500 GHz to 10 GHz.

Capability:

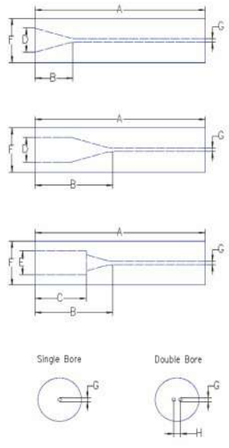
Attribute	Commercial		High Precision	
Operating Wavelength	1520-1620nm			
Material	Fused silica, optical-grade silicon, Zerodur			
Typical Free Spectral Range (FSR)	25 GHz / 50 GHz /100 GHz (Other FSR available)			
FSR Tolerance	25 GHz	±0.0025 GHz	25 GHz	±0.0015 GHz
	50 GHz	±0.005 GHz	50 GHz	±0.003 GHz
	100 GHz	±0.025 GHz	100 GHz	±0.015 GHz
Surface Quality (Scratch-Dig)	20-10		10-5	
Angle of Incidence	0°			
Single Surface Reflectivity	> 90%			
Operating Temperature	User specified			
Diameter D (mm)	1mm×1mm (minimum)			
Typical Lead Time	5-8 weeks			

Ferrules and Sleeves



VitroCom manufactures ultra-high-quality precision glass ferrules and alignment sleeves for the fiber optic market from borosilicate and clear fused quartz glasses. These custom-made ferrules are produced to customer specifications utilizing proprietary technology and processes. We can produce a variety of ID configurations to a tolerance of +/-0.001 mm in some cases. Just a few of the possibilities are shown on this page. We offer a variety of lead-in configurations as shown below. We can also work with custom-designed lead-ins.

Alignment sleeves are precision-drawn products made to customer specifications for aligning ferrules and lenses. Available materials include clear fused quartz glass and various types of Borosilicate glasses and soft glasses. The inner and outer diameters can be held to 0.005mm.



A=Overall Length ± Tolerance
B=Lead-in Depth ± Tolerance
C=Counter Sink Depth ± Tolerance
D=Lead-in Diameter ± Tolerance
E=Counter Sink Diameter ± Tolerance
F=Outer Diameter ± Tolerance
G=Inner Diameter ± Tolerance
H=Spacing Distance ± Tolerance


SINGLE BORE


TRIPLE BORE


DOUBLE BORE


6 BORE


OVAL BORE


DOUBLE FIGURE 8


SQUARE BORE

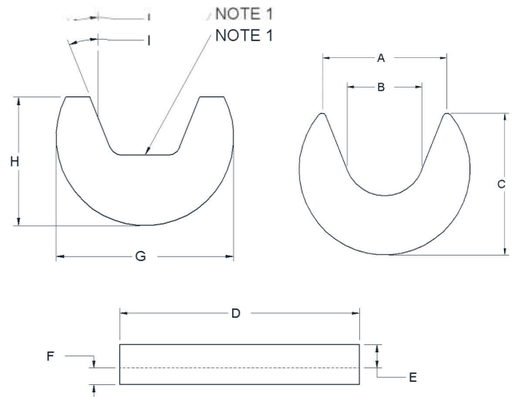

FIGURE 8 BORE

Capability:

Attribute	Commercial	High Precision
Substrate Material	Borosilicate or clear fused quartz	
Overall Length Tolerance	±0.2mm	±0.05mm
Outer Diameter	0.5, 1.0, 1.6~2.2mm	Some special diameter or square ferrule
Outer Diameter Tolerance	±0.005mm	±0.003mm
Inner Diameter Tolerance	±0.002mm	±0.001mm
Spacing Distance Tolerance	±0.002mm	±0.001mm
Surface of Lead-in End	Cutting surface	Fire-treatment surface
Chip on Lead-in Edge	< 0.4×1.0×0.4mm	< 0.1×0.4×0.1mm

Glass Substrates

Custom Clear Fused Quartz glass substrates and components are precision drew for use in fiber optic application and/or component packaging, and can be manufactured to customer specifications. Typical applications include fused coupler packaging for fiber support and/or alignment purpose, or for isolating fiber within the package. Very tight tolerance is achieved by VitroCom's proprietarytechnologies and processes and our expertise in manufacturing non -circular and irregular configurations are shown on this page.



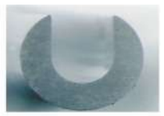
A=Maximum Width of Groove ± Tolerance
B=Minimum Width of Groove ± Tolerance
C=Overall Diameter ± Tolerance
D=Length of Piece ± Tolerance
E=Depth of Groove ±Tolerance
F=Distance between Bottom of Groove
G=Major Axis of Outer Piece ± Tolerance
H=Minor Axis of Outer Piece ± Tolerance
I=Angle Specifications (max./min)

NOTE 1:Specify shape requirements such as fullradiused, parallel sides, right angle sides, tapered, etc.

Also include:

- Glass Type
- Concentricity Specifications
- Ground and/or Polished Surfaces

C-CHANNEL



U-CHANNEL

V-CHANNEL

D-ROD

SQUARE-CHANNEL

RECTANGLE ROD

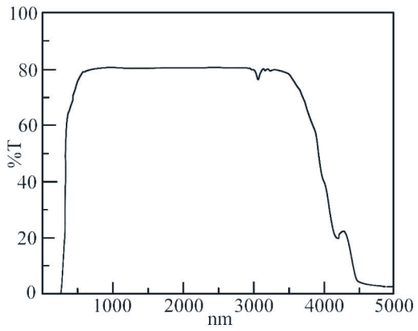
GROOVED RECTANGLE ROD

MULTI-GROOVED RECTANGLE ROD

Please contact us for a substrate custom quote.

Yttrium Vanadate (YVO_4) Crystals

Yttrium Vanadate (YVO_4) crystal is a positive uniaxial crystal grown using the Czochralski method. It has good mechanical, and physical properties and is ideal for optical polarizing components due to its wide transparency range and large birefringence. It's an excellent synthetic substitute for Calcite ($CaCO_3$) and rutile (TiO_2) in many applications including fiber optic isolators and circulators, beam displacers, Glan polarizers, and other polarizing optics.



Transparency Curve of YVO_4
(Thickness=1mm)

Capability:

Attribute	Commercial	High Precision
Optical Axis Orientation	±0.5°	±0.1°
Parallelism	20"	10"
Perpendicularity	15'	5'
Flatness	λ/4	λ/10
Surface Quality (Scratch-Dig)	40-20	10-5
Dimension Tolerance	±0.1mm	±0. 005mm
AR Coating	R < 0.2%@1550±40nm	Specified

Additional YVO_4 crystal and coating specifications are available upon request.

Neodymium Doped Yttrium Vanadate (Nd: YVO4) Crystals

CASIX applies Czochralski (CZ) crystal growth technology to grow high-grade Nd: YVO4 crystals. With strict control of materials and the growth process, our Nd: YVO_4 crystals feature low-lasing wavelength absorption and high conversion efficiency. CASIX offers Nd: YVO4 crystal boules with doping rates from 0.1atm% to 4.0atm% and crystal components in various sizes and coatings.

Main Features:

- **Low lasing threshold and high slope efficiency**
- **Large stimulated emission cross-section at lasing wavelength**
- **High absorption over a wide pumping wavelength bandwidth**
- **Optical uniaxial and large birefringence emits polarized laser light**

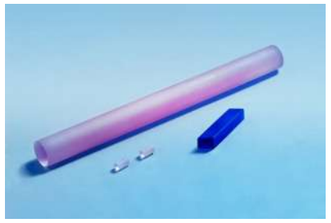
Capability:

Attribute	Commercial	High Precision
Nd: Dopant Level	0.1-4.0atm%	
Wavefront Distortion	λ/4	λ/8
Scattering Sites**	Invisible, probed with a He-Ne laser	
Orientation	±0.5°	±0.2°
Dimension Tolerance	±0.1mm	±0.01mm
End-faces Configuration	Flat	
Surface Quality(Scratch-Dig)	20-10	10-5
Flatness	λ/8	λ/10
Parallelism	20"	10"
Intrinsic Loss	Less than 0.1%cm^{-1}, @1064nm	

**: CASIX internal inspection criterion on this spec.

Additional Nd:YVO_4 crystal and coating specifications are available upon request.

Neodymium Doped Yttrium Aluminum Garnet (Nd:YAG) Crystals



Nd:YAG crystal is the most widely used solid-state laser material today. CASIX offers Nd: YAG rods with high optical homogeneity, consistent performance, high processing accuracy and on-time delivery. A variety of specifications and sizes from ϕ3×0.5mm to ϕ12×150mm are available.

Capability:

Attribute		Commercial	High Precision
Dopant Concentration		0.4atm%-1.1atm%	
Orientation		±5°	±0.5°
Wavefront Distortion		λ/8	λ/10
Extinction Ratio		28dB	30dB
Dimension Tolerance		Nd:YAG Rod: Dia ±0.1, L±0.5mm	Nd:YAG Rod: Dia ±0.025, L±0.25mm
		Nd:YAG slab: ±0.1mm	Nd:YAG slab: ±0.01mm
Ends Finish	Surface Figure	λ/8	λ/10
	Surface Quality(Scratch-Dig)	20-10	10-5
	Perpendicularity	15'	5'

Additional AR, HR etc. coating are available upon request.

Chromium Doped Yttrium Aluminum Garnet (Cr^{4+}:YAG) Crystals

Passive Q-Switching is preferred for simplicity of manufacturing and operation, low cost, and reduced system size and weight. Cr^{4+}: YAG ($Y_3Al_5O_{12}$) crystals are excellent for passive Q-Switching diode pumped or lamp-pumped Nd: YAG, Nd: YLF, Yb: YAG or other Nd and Yb doped lasers at wavelengths from 1.0 to1.2mm. Because they are chemically stable, durable, UV resistant, have good thermal conductivity, have a high damage threshold (>500mW/cm^2) and are easy to operate.

Capability:

Attribute	Commercial	High Precision
Flatness	λ/4	λ/10
Surface Quality (Scratch-Dig)	20-10	10-5

Additional AR, HR etc. coating are available upon request.

Diffusion Bonding Crystals

CASIX supplies diffusion bonding crystals consisting of two, three or more parts in different dopants levels or different dopant. Usually, one laser crystal and one or two undoped crystals are combined by optical contact and further bonded under high temperatures.

Diffusion Bonding Crystals are used to decrease the thermal lensing effect considerably. The bonded crystal used in laser applications can greatly improve laser performance and beam quality.

Advantage:

- **Decrease thermal effect**
- **Improve efficiency**
- **Improve beam quality**
- **Compact size**

Main Specifications of Diffusion Bonding Crystals:

Type I : Nd:YVO_4+YVO_4

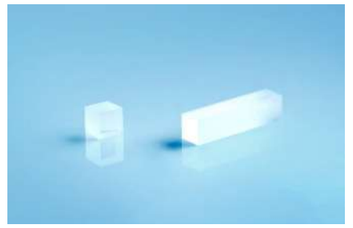
Flatness	<λ/10
Wavefront Distortion	<λ/4
Parallelism	≤20"
Perpendicularity	≤15'
Surface Quality	10/5(MIL-PRF-13830B)
Coating	Upon request of customer

Type II : Nd:YAG+YAG+Cr:YAG

Flatness	<λ/10
Wavefront Distortion	<λ/8 per inch of length
Parallelism	≤10"
Perpendicularity	≤10'
Surface Quality	10/5(MIL-PRF-13830B)
Coating	Upon request of customer

Please contact us for more information on the assembly types.

Lithium Triborate (LBO) Crystals



LBO(LiB_3O_5) is an excellent nonlinear optical crystal. It's phase matchable for the SHG and THG of Nd:YAG and Nd:YLF lasers, using either type I or type II interaction. LBO is a nonlinear optical crystal perfectly suited for harmonic generation as well as sum frequency mixing and OPO applications using widely spread Nd lasers, Ti:Sapphire and Dye lasers. Such physical LBO properties as excellent optical homogeneity, non-hygroscopicity, and very high damage threshold assure long and stable operation of crystal. LBO crystal is the first choice as the harmonic generator of high-peak power pulsed lasers.

Capability:

- **Optical:**

Attribute	Commercial	High Precision
Wavefront Distortion	L/4	λ/8
Orientation	±0.5°	±0.2°
End-faces Configuration	Flat	
Dimension Tolerance	±0.1mm	±0.01mm
Surface Quality (Scratch-Dig)	10-5	5-3
Flatness	λ/8	λ/10
Parallelism	20"	10"
Perpendicularity	15'	5'
Intrinsic Loss	Less than 0.1%/cm at 1064nm	

- **Coating:**
  - > DBAR, Nd:YAG Laser
  - > Lower reflection, R<0.2% at 1064nm, R<0.5% at 532nm
  - > High damage threshold, >500MW/cm^2 at both wavelengths 1064nm and 532nm
  - > High efficiency
  - > BBAR, Tunable Laser
  - > Customer designed coating

Barium Borate (BBO) Crystals

CASIX offers high-grade Czochralski (CZ) grown BBO crystals with good homogeneity, low defects, and low absorption.

CASIX's BBO Crystals Have Been Applied to :

- **Second, third, fourth and fifth harmonic generation of Nd: lasers**
- **Frequency-doubling, -tripling and -mixing of dye lasers**
- **Optical parametric amplifiers (OPA) and optical parametric oscillators (OPO)**
- **Frequency-doubling and -tripling of ultrashort pulse Ti: sapphire and dye lasers**
- **Frequency-doubling of Argon ions, Cu vapor and ruby lasers**
- **External intra-cavity SHG**

Capability:

Attribute	Commercial	High Precision
Wavefront Distortion	λ/4	λ/8
Orientation	±0.5°	±0.2°
End-faces Configuration	Flat	
Dimension Tolerance	±0.1mm	±0.01mm
Surface Quality(Scratch-Dig)	20-10	10-5
Flatness	λ/4	λ/8
Parallelism	20"	10"
Perpendicularity	15'	5'

The protective coating is strongly recommended due to the high hygroscopic susceptibility of BBO crystals, other nonlinear crystals like KTP are available upon request.

Lithium Niobate ($LiNbO_3$) Crystals

$LiNbO_3$ crystal is widely used as frequency doublers for wavelengths >1 μm and optical parametric oscillators (OPOs) pumped at 1064 nm as well as quasi-phase-matched (OPM) devices. Due to their large Electro-Optic (E-O) and Acousto-Optic (A-O) coefficients, LiNbOcrystals are the most commonly used material for Pockel cells, Q-switches, and phase modulators, waveguide substrates, surface acoustic wave (SAW) wafers, etc.

CASIX provides high-quality $LiNbO_3$ components with apertures of (2-15) × (2-15) mm^2 and lengths up to 50 mm for frequency doublers, OPOs 50×50×1mm^2 $LiNbO_3$ substrates for waveguide optics and 3" diameter SAW wafers are available in high volumes at low prices.

Capability:

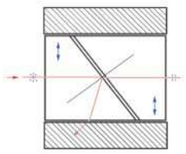
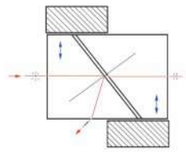
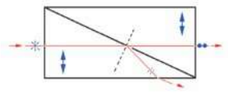
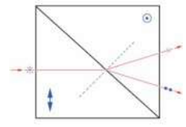
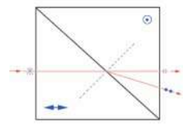
Attribute	Commercial	High Precision
Wavefront Distortion	λ/4	λ/8
Orientation	±0.5°	±0.2°
End-faces Configuration	Flat	
Dimension Tolerance	±0.1mm	±0.01mm
Surface Quality (Scratch-Dig)	20-10	10-5
Flatness	λ/8	λ/10
Parallelism	20"	10"
Perpendicularity	15'	5'

Additional $LiNbO_3$ crystals and coating specifications are available upon request.

CASIX is also available to manufacture other crystals like a-BBO, Calcite, etc., coating specifications are available upon request. Please contact us for more details.

Optical Polarizers

A polarizer is an important optical component that is widely used in optics to produce a state of linear polarization. CASIX provides polarizers with three materials, α -BBO, calcite, and VYO_4, making them suitable for the widest spectrum and high polarization purity application.

Polarizer	Material	Illustration	Properties and Applications
Glan Taylor Polarizer	α-BBO (200-3500) Calcite (350-2300) YVO_4 (450-5000)		● Air-spaced ● Cutting angle close to Brewster's angle ● The extraordinary ray passes through with little deviation ● Sealed mount without escape windows is suitable for low to medium power applications where the rejected beam is not required
Glan Laser Polarizer	α-BBO (200-3500) Calcite (350-2300)		● Cutting angle close to Brewster's angle ● Mounted with escape windows, therefore it is suitable for high power applications
Glan Thompson Polarizer	Calcite (350-2300)		● Cemented ● Suitable for low power applications ● Special design for the ratio of L/A (length/aperture) guarantees the wide acceptance angle
Wollaston Polarizer	Calcite (350-2300)		● Cemented ● Both ordinary and extraordinary beams are deviated ● Suitable for low power applications and where a large deviation is required
Rochon Polarizer	α-BBO (190-3500)		● Made by α-BBO material guaranteeing a wide transmission range, especially suited for UV applications ● Split the ordinary and extraordinary ray, but only extraordinary beam is deviated ● Wide wavelength range

Pigtail

For high optical quality fiber ends, coating on the end-face, or for accurate mounting in collimator applications, a practical solution is to glue the bare fiber to the core of a glass capillary. This provides a method of easy handling, resulting in a better finish.

Features:

- **High precision dimension control**
- **High stability and reliability**
- **Customer design available**

Application:

Collimators, Isolators, Switches, WDM, MEMS, Circulators.....

Capability:

Attribute	Commercial	High Precision
Diameter	1.0/1.6/1.8/2.2±0.005mm	
Length Tolerance	±0.25mm	±0.1mm
Bore	Single or dual	
Polishing Angle	0/6/8/10/12 degree	
Angle Tolerance	±0.3 degree	<±0.2 degree
Fiber	Single Mode/Multi Mode/PM	
Coating	R<0.2%@central wavelength (1310nm, 1550nm and so on)	Per customer requirement

Collimator

Fiber collimators consist of optical fiber tips precisely aligned to a collimating lens which is either a GRIN lens or a C-lens, it collimates the beam from fiber, or couples collimated beams into the fiber.

Features:

- **Low insertion loss**
- **High return loss**
- **Good uniformity**
- **Epoxy free in optical path**
- **Compact size**

Application:

Isolators, Circulators, Optical Switches, WDM, Signal processing.....

Capability:

Attribute	Commercial						High Precision
Center Wavelength	1310, 1550nm						
Working Distance	⩽20mm		⩽100mm	⩽200mm	⩽300mm	⩽600mm	Per requirement
Insertion Loss (Max.)	P	A	A	A	A	A	
	0.15dB	0.18dB	0.25dB	0.40dB	0.50dB	0.60dB	
Return Loss (Min.)	60dB						Per requirement
Optical Power	500 mW						
Housing Diameter	1.8/2.8mm for glass sleeve						Per requirement

PM Components

Features: Low insertion loss, High extinction ratio, Compact size

Parameter	Unit	Value
Operating Wavelength	nm	405, 457, 488, 561, 594, 639nm
Minimum Transmission	%	95%
Coating	-	R < 0.5%@400nm~640nm
Max Output Power CW	mW	500
Fiber		PM fiber
Fiber Length	m	1 or specify
Extinction Ratio	dB	> 23
Housing		Stainless Steel

PM Collimator

Application: PM Isolators, Switches, WDM, Circulators

Features: Low insertion loss, High extinction ratio, Compact size

Parameter	Unit	Value
Operating Wavelength	nm	1310/1550+/-20
Typical IL	dB	< 0.3
MAX IL	dB	< 0.35
Extinction Ratio	dB	> 23
Return Loss	dB	> 55
Lens Type		c-lens or grin lens
Working Distance	mm	5 or specify
Fiber		PM fiber
Fiber Length	m	1 or specify
Power Handling	mW	500
Dimensions	mm	ϕ2.78*8 or specify
Operating Temperature	℃	-5 to 75

PM Single Fiber Pigtail

Application: PM Collimators, Isolators, Switches, WDM, Circulators

Features: Low insertion loss, High extinction ratio, Compact size

Parameter	Unit	Value
Wavelength	nm	1260-1620
Angle Polish	°	8° or other degree
Tolerance of Stress Axis Deviation	°	+/-3
Return Loss	dB	> 55
Power Handling	mW	500
Fiber		PM fiber
Fiber Length	m	1 or specify
Dimensions	mm	ϕ1.0*5.0-5.5, ϕ1.8*5.0-5.5 or specify
Operating Temperature	℃	-5 to 75

Fused Fiber Couplers and WDMs

Fused fiber couplers enable accurate splitting and monitoring of optical signals in single-mode fiber. CASIX high-performance components are available in a wide variety of tap ratios, wavelength ranges, packaging sizes, and connector options.

Fused fiber WDM (Wavelength Division Multiplexing) couplers are used to combine and separate optical signals transmitted on different wavelengths. CASIX fused fiber WDMs are available in common NIR and telecom wavelengths. They are an ideal solution for combining pump and signal wavelengths in fiber lasers and amplifiers or for combining telecom signals.

Features

- Low insertion loss
- Low PDL
  Telcordia GR-1209, 1221 Qualified
- RoHS Compliant

Application

Network monitoring, test equipment, fiber lasers, fiber amplifiers, and other telecom applications.

Capabilities

- General Specifications:

Parameter	Value
Operating Band	1526~1570nm
Operating Temp	-5℃~75℃
Storage Temp	-50℃~85℃
Max Optical Power (Port1 Input)	1000mW
Package (mm)	30×45

- Couplers Performance Specifications:

Grade P							
Coupling Ratio	98:2	95:5	90:10	80:20	70:30	60:40	50:50
Max IL (dB)	0.20/17.80	0.40/13.60	0.60/10.80	1.15/7.60	1.70/5.50	2.60/4.40	3.30/3.30
Max WDL (dB)	0.05/0.15	0.10/0.15	0.10/0.13	0.10/0.12	0.15/0.15	0.15/0.15	0.10/0.15
Max PDL (dB)	0.05/0.10	0.05/0.10	0.10/0.10	0.05/0.10	0.10/0.10	0.10/0.10	0.10/0.10
Grade A							
Coupling Ratio	98:2	95:5	90:10	80:20	70:30	60:40	50:50
Max IL (dB)	0.25/18.20	0.40/14.00	0.70/11.00	1.20/8.00	1.80/5.80	2.70/4.60	3.40/3.40
Max WDL (dB)	0.05/0.25	0.05/0.30	0.05/0.20	0.10/0.20	0.15/0.15	0.15/0.15	0.15/0.15
Max PDL (dB)	0.05/0.15	0.05/0.15	0.05/0.10	0.05/0.10	0.05/0.10	0.10/0.10	0.10/0.10

- 980/1550nm WDMs Performance Specifications:

Parameter		**Min**	**Max**	**Unit**
Pump Wavelength(λ1)		970	990	nm
Signal Wavelength(λ2)		1527	1567	nm
Insertion Loss	Port 1-2@λ1		0.15	dB
	Port 1-3@λ2		0.15	dB
Isolation	Port 1-3@λ2	18		dB
	Port 1-2@λ1	18		dB
Flatness(WDL)	Port 1-2@λ1		0.08	dB
	Port 1-3@λ2		0.08	dB
PDL	Port 1-2@λ1		0.05	dB
	Port 1-3@λ2		0.05	dB
TDL	Port 1-2@λ1		0.1	dB
	Port 1-3@λ2		0.1	dB
Directivety/Return Loss	Port1, Port2, Port3	55		dB
PMD	Port 2-1@λ1		0.05	ps

Micro-Optics Passive Components

CASIX designs, develops, and manufactures a wide range of miniature passive optical components for test and measurement equipment, optical communications networks, and fiber sensor and laser applications. The current products include free-space isolators, in-line isolators, and isolator+thin film filter hybrid devices.

Features

- Low insertion Loss
- High Isolation
- Compact Size
- Optimized for Different Wavelengths
- Telcordia GR-1209, 1221 Qualified
- RoHS Compliant

Application

Fiber optic amplifiers, WDM and DWDM systems, transmitters and fiber lasers, EDFAs.

Capabilities

In-line isolators

- General Specifications:

Parameter	**Value**
Operating Temperature	-5℃~+70℃
Storage Temperature	-40℃~+85℃
Maximum Optical Power	500mW

- Performance Specifications:

Parameter	**Single Stage**		**Dual Stage**		**Mini**	
	Grade P	Grade A	Grade P	Grade A	Single Stage	Dual Stage
Wavelength (nm)	1310nm, 1550nm					
Min Isolation (dB)	22	20	42	40	20	40
Max IL (dB)	0.35	0.45	0.45	0.55	0.45	0.6
Max WDL (dB)	0.1	0.1	0.1	0.1	0.15	0.1
Max PDL (dB)	0.05	0.1	0.05	0.1	0.1	0.1
Min RL (dB)	60	55	60	55	55	55
Max PMD (ps)	0.05					
Package (mm)	3.6×30		3.6×30		3.0×30	

2-in 1 In-line isolators

- General Specifications:

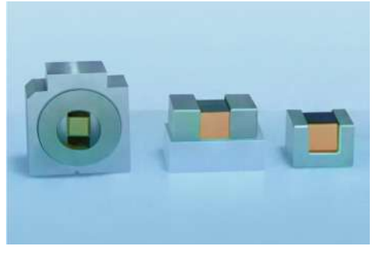
Parameter	Value
Operating Temperature	-5℃~+70℃
Storage Temperature	-40℃~+85℃
Maximum Optical Power	500mW

- Performance Specifications:

Parameter	Single Stage		Dual Stage		Mini	
	Grade P	Grade A	Grade P	Grade A	Single Stage	Dual Stage
Wavelength (nm)	1310nm, 1550nm					
Min Isolation (dB)	22	20	42	40	20	40
Max IL (dB)	0.45	0.6	0.50	0.65	0.6	0.65
Max WDL (dB)	0.1	0.15	0.1	0.15	0.15	0.15
Max TDL (dB)	0.15	0.2	0.15	0.2	0.2	0.2
Max PDL (dB)	0.1	0.15	0.1	0.15	0.15	0.15
Min RL (dB)	60	55	60	55	55	55
Max PMD (ps)	0.05					
Package (mm)	3.6×30		3.6×30		3.0×30	

Free-space isolator

Parameter	Single Stage FSI	Dual Stage FSI
Wavelength (nm)	1310nm, 1550nm, 1590nm	
Clear Aperture	0.7mm dia.	0.9mm dia.
Insertion Loss	0.3dB	0.5dB
Minimum Isolation	28dB	45dB
Operating Temperature	25℃~30℃	20℃~38℃
Storage Temperature	-50℃~85℃	-50℃~85℃
Maximum Optical Power	500mW	500mW



Hybrid devices

A hybrid device is built based on an isolator and thin-film filter (TFF) to fulfill isolator and TFF functions into a compact package. CASIX produces Tap+Isolator, Isolator+WDM, Tap+ WDM+ Isolator hybrid devices.

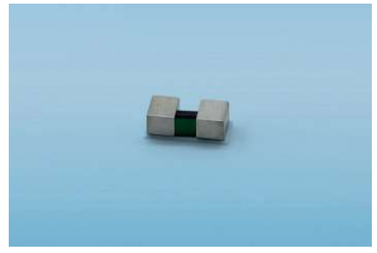
High Power Free Space Isolator

Features

- Wavelength 1064nm +/-10nm
- Average Power > 30W
- Pulsed Power > 20KW
- Peak Isolation > 33dB
- Maximum Insertion loss < 0.3dB
- Beam Diameter 2mm CA
- Extinction Ratio > 22dB
- Operating Temperature Range 0-50℃
- Option: Waveplate Available on Output

Free Space Isolator (low power)
(Based on Bismuth-doped rare-earth iron garnet + Polarcor)

	Communication Band		Special Wavelength				
	Single Stage	Double Stage	Single Stage				
Center Wavelength	1310nm,1430nm, 1550nm,1590nm,1620nm		780nm	800nm	820nm	850nm	10640nm
Bandwidth	+/−25nm	+/−25nm	+/−10nm	+/−10nm	+/−10nm	+/−10nm	+/−10nm
Minimum Isolation at central wavelength	32dB	55dB	32dB	32dB	32dB	32dB	32dB
Minimum Isolation over wavelength	26dB	48dB	23dB	23dB	23dB	23dB	28dB
Insertion Loss (Typical)	0.3dB	0.5dB	3.0dB	3.5dB	4.5dB	6.0dB	1.2dB
Insertion Loss (Maximum)	0.4dB	0.6dB	3.5dB	4.0dB	5.0dB	6.3dB	1.4dB
Minimum Size (mm^3)	Dia3XL2.5 for Cylindrical Packing, W2.2XH1.5XL1.8 for Flatpak, Or customer specify						
Optical power handling	200mW , CW						
Clear Aperature (mm^2)	0.7, 0.9, 1.4, 1.8, or Customer specify						
Operating Temperature	-20℃ to +85℃						
Storage Temperature	-40℃ to +85℃						



Free Space Isolator (low power)
(Based on Terbium Gallium Garnet (TGG) Crystal + Polarcor)

	Single Stage						
Center Wavelength	633nm	780nm	800nm	820nm	850nm	900nm	960nm
Bandwidth	+/−5nm	+/−5nm	+/−5nm	+/−5nm	+/−5nm	+/−5nm	+/−5nm
Minimum Isolation at central wavelength	33dB	33dB	33dB	33dB	33dB	33dB	33dB
Minimum Isolation over wavelength	30dB	30dB	30dB	30dB	30dB	30dB	30dB
Insertion Loss (Typical)	1.55dB	0.9dB	0.9dB	0.9dB	0.6dB	0.6dB	0.6dB
Insertion Loss (Maximum)	1.65dB	1.0dB	1.0dB	1.0dB	0.7dB	0.7dB	0.7dB
Minimum Size (mm^3)	Dia.22XL13	Dia.36XL28	Dia.36XL28	Dia.36XL28	Dia.36XL28	Dia.40XL32	Dia.40XL32
Optical power handling	200mW , CW						
Clear Aperature (mm^2)	2.0, 3.0, or Customer specify						
Operating Temperature	-20℃ to +85℃						
Storage Temperature	-40℃ to +85℃						



Free Space Isolator (high power)
(Based on Terbium Gallium Garnet (TGG) Crystal + PBS)

	Single Stage								
Center Wavelength	532nm	633nm	780nm	800nm	850nm	900nm	960nm	1030nm	1064nm
Bandwidth	+/−5nm	+/−5nm	+/−5nm	+/−5nm	+/−5nm	+/−5nm	+/−5nm	+/−5nm	+/−5nm
Minimum Isolation at central wavelength	33dB	33dB	33dB	33dB	33dB	33dB	33dB	33dB	33dB
Minimum Isolation over wavelength	30dB	30dB	30dB	30dB	30dB	30dB	30dB	30dB	30dB
Insertion Loss (Typical)	0.2dB	0.2dB	0.2dB	0.2dB	0.2dB	0.2dB	0.2dB	0.2dB	0.2dB
Insertion Loss (Maximum)	0.3dB	0.3dB	0.3dB	0.3dB	0.3dB	0.3dB	0.3dB	0.3dB	0.3dB
Minimum Size (mm^3)	Dia. 16XL20	Dia. 22XL20	Dia. 36XL36	Dia. 36XL36	Dia. 36XL36	Dia. 38XL48	Dia. 38XL48	Dia. 38XL65	Dia. 38XL65
Optical power handling	200mW , CW								
Clear Aperature (mm^2)	2.0, 3.0, or Customer specify								
Operating Temperature	-20℃ to +85℃								
Storage Temperature	-40℃ to +85℃								

Free Space Isolator (hight power)
(Based on Terbium Gallium Garnet (TGG) Crystal)

	Single Stage								
Center Wavelength	532nm	633nm	780nm	800nm	850nm	900nm	960nm	1030nm	1064nm
Bandwidth	+/−5nm	+/−5nm	+/−5nm	+/−5nm	+/−5nm	+/−5nm	+/−5nm	+/−5nm	+/−5nm
Minimum Isolation at central wavelength	33dB	33dB	33dB	33dB	33dB	33dB	33dB	33dB	33dB
Minimum Isolation over wavelength	30dB	30dB	30dB	30dB	30dB	30dB	30dB	30dB	30dB
Insertion Loss (Typical)	0.05dB	0.05dB	0.05dB	0.05dB	0.05dB	0.05dB	0.05dB	0.05dB	0.05dB
Insertion Loss (Maximum)	0.10dB	0.10dB	0.10dB	0.10dB	0.10dB	0.10dB	0.10dB	0.10dB	0.10dB
Minimum Size (mm^3)	Dia. 16XL12	Dia. 22XL12	Dia. 36XL30	Dia. 36XL30	Dia. 36XL30	Dia. 38XL40	Dia. 38XL40	Dia. 38XL50	Dia. 38XL50
Optical power handling	200mW , CW								
Clear Aperature (mm^2)	2.0, 3.0, or customerization								
Operating Temperature	-20℃ to +85℃								
Storage Temperature	-40℃ to +85℃								

Coatings

CASIX owns many kinds of coaters, including Veeco coater (IBS) from the USA, and Optorum coater (OMS) from Japan. Leybold coater (IAD & IBS) from Germany, Hanyi coater from Korea, and domestic coaters provide high surface quality, low absorption, and high laser damage threshold coatings and various filters for different applications.

CASIX provides a wide variety of coatings from simple single-layer antireflective coatings using MgF_2 and mirror coatings to complex multilayer dielectric stacks. Typical types of dielectric coatings are BBAR, V-coatings, and dual wavelength AR coatings.

Optorun Coater

Leybold Coater

Veeco Coater

Veeco Coater

Coating Type		Properties and Applications
Antireflection	Single Layer MgF_2	Applied to materials with refractive indices from 1.45 to 2.4. The most popular antireflective coating for visible wavelengths. It is insensitive to changes in incidence angles.
	Multilayer "V"	Used to provide low reflectance within a narrow durable wavelength band for most laser applications. The minimum reflection can be less than 0.1%.
	Broadband Multilayer	These coatings have excellent performance over broad special broadband. Coating performance is sensitive to the angle of incidence.
	Dual Wavelength Band	Offer very low reflectance at two widely spaced wavelengths, such as Nd: YAG Laser (1064nm) and its second harmonic (532nm).
Partial Reflection	Narrow Band	Provide 50% reflection and transmission at an angle of 45° incidence for a single wavelength. Perfect for beamsplitter applications. Transmission /reflection(T/R) ratio of 20/80. Additional T/R ratios for beamsplitter are available upon request.
	Broadband	Provide 50% reflection and transmission over a wide bandwidth. CASIX also provides coating with different R/T ratios and specific angles of incidence.
Beamsplitter	Laser Line Polarizing Beamsplitters	High reflection for s-polarized and antireflection for p-polarized for laser applications.
	Broadband Polarizing Beamsplitters	Wide wavelength bandwidths provide high reflection to s-polarized and antireflection to p-polarized.
	Dichroic Beamsplitter Mirrors	These coatings separate the laser fundamental and the pump wavelength or the fundamental and the second harmonic. They are specifically applied to laser mirrors.
DPSS Lasers	Diode Pumped Laser Optics Coating (DPO)	These coatings are designed for a diode-pumped laser. They can be deposited on a variety of substrates and have a high damage threshold.
High Reflection	Dielectric High Reflective Coatings	Provide high reflectance over a broad bandwidth and are ideal for tunable lasers or white light applications.
	Metallic High Reflective Coatings	The metallic coating has low cost for an extremely broad bandwidth high reflection and insensitive to the angle of incident light and polarization.

Coatings

Deep UV (DUV) Coating

Key working wavelength:

AR/HR for 193nm

AR/HR for 266nm

AR/HR for 355nm and Laser coating

Able to provide Customized coating for 193~355nm

Key coating materials:

HfO_2, LaF_2, Al_2O_3, SiO_2, MgF_2

Substrates:

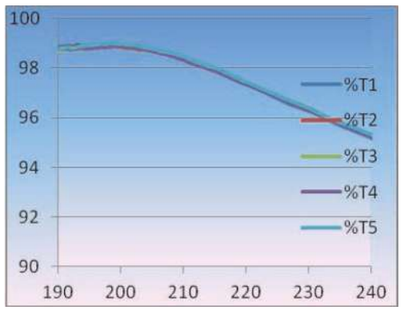
Lens, prisms, windows etc.

Material: UV grade FS

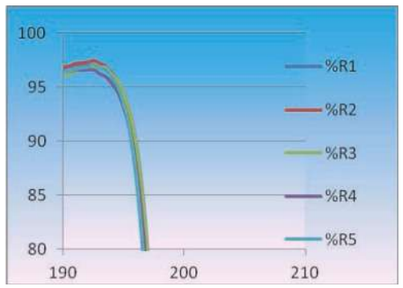
Typical dimension: 2mm~150mm

193nm AR and HR coating

AR for 193nm (T > 98.5%, AOI:0°)

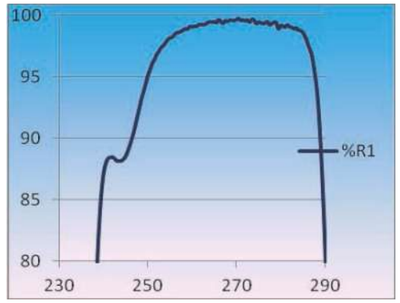


HR for 193nm (R > 96%, AOI:0°)

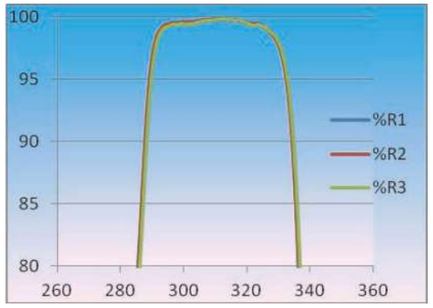


HR coating for 266nm and 308nm

HR for 266nm (R > 99.5%, AOI:0°)

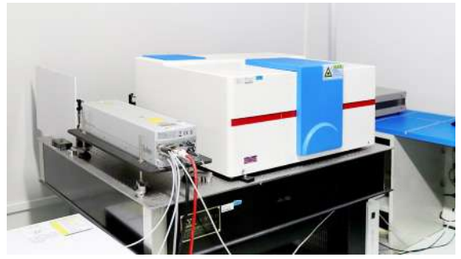


HR for 308nm (Random > 99.5%, AOI:45°)

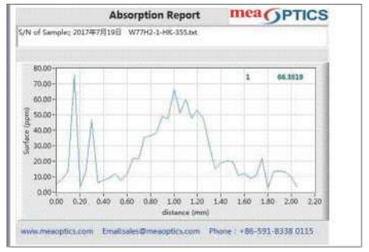


Laser coating for 355nm

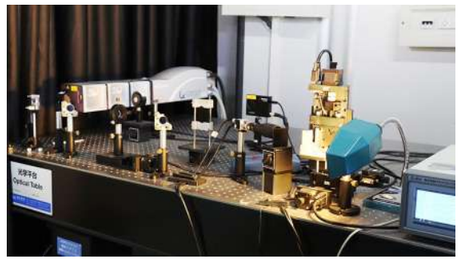
Absorption test station for 355nm



Absorption for HR coating at 355nm (< 100ppm) internal test



LIDT test station for 355nm

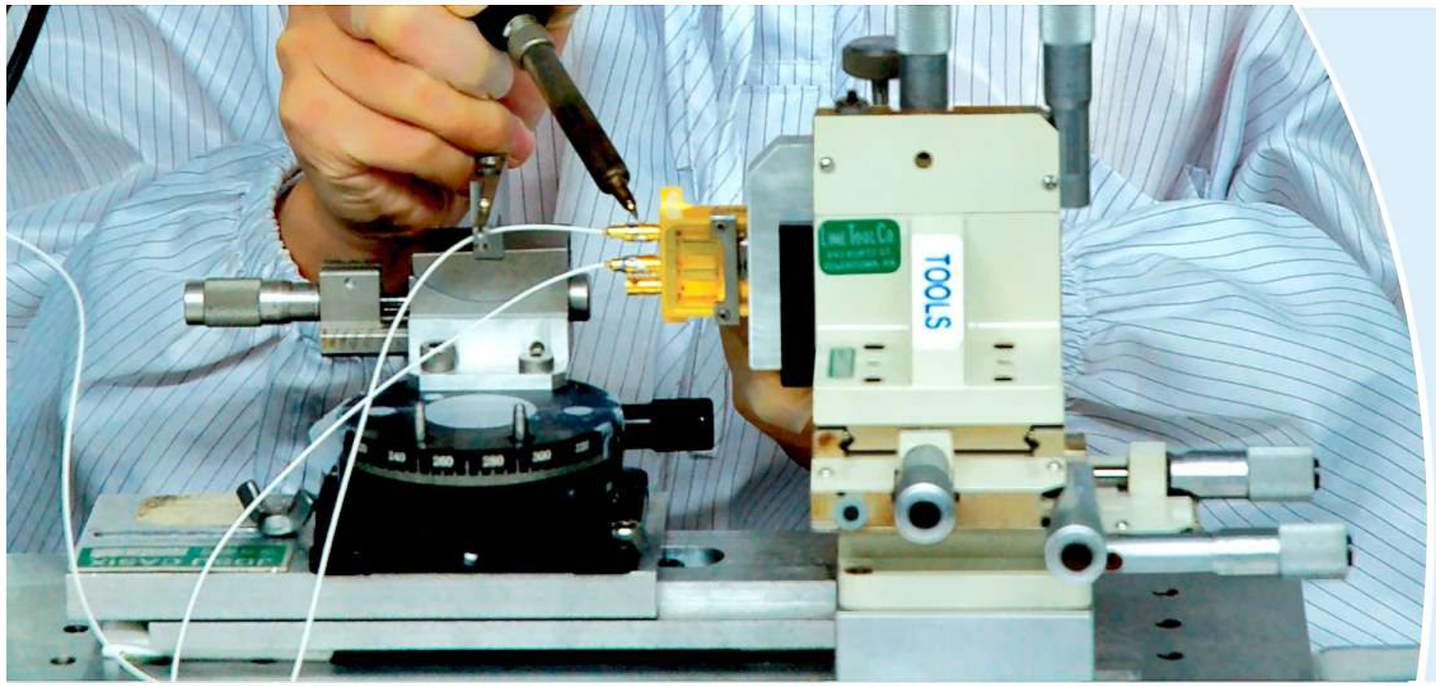


LIDT for HR coating at 355nm (10J/cm² 10ns, 10Hz, sample tested by Spica)

Test Number	59881
Run Number	T8794
Threshold	10.00 J/cm²

Fluence	Out of	Damage	No Damage
5.00	10	0	10
10.00	10	0	10
12.00	10	1	9
15.00	10	1	9
17.00	10	1	9
20.00	10	8	2
25.00	10	10	0

Metrology Capability



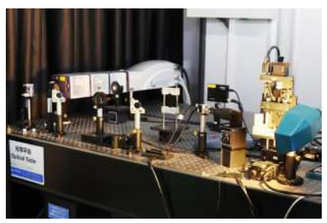
Metrology Capability:

Casix supplies all kinds of metrologies to ensure product quality and control the manufacturing process well. We own a testing center including ZYGO digital interferometer, odometer, Keyence image measurement machine, Nexview interferometer, ellipsometer, X-ray goniometer, Lambda 950/1050 spectrophotometer, Cary5000/UMA spectrophotometer, LUPHOScan 3D measuring equipment and so on. Moreover in the production line, we also set up test systems per customer application to ensure product quality. For example: Nd:YVO4 IL test system, TLS system, high power test system for combiner, RGB test system, laser output power (efficiency) test system. Furthermore, we have laser marking machines to ensure traceability.

Specification	Instrument and solution	Comment/Accuracy
Geometry	Image Measurement Machine/Projection Profiler CMM. Micrometer etc	Dimension, Bevel, chips, contamination, etc
Angle/Perpendicularity	Auto-collimator; High precision Goniometer	
PV, Irregularity, Wavefront Distortion, Parallelism	ZYGO Interferometer	
Aspherical Form and Parameter	Form Talysurf 1240/LUPHOScan 3D Measuring Equipment	
Radius/Focal Length	Focometer, ZYGO&CGH	
Cosmetic/SD	Visual Inspection/Microscope/Semi-Automatic Inspection Machine/Drip angle tester	Per MIL-PRF-13830B & ISO10110
Roughness/Irregularity	Nexview Interferometer	0.5A
Coating Spectrum	Lambda 950/1050; Cary5000/Cary UMA/ Olympus Spectrometer/TLS Test System/FTIR	0.5A
High Reflectivity(>99.99%)	CRD (Cavity Ring-Down) Tester	1064nm/532nm
Coating Film/Bulk Absorption	PCI(Photo-thermal Common-Path interferometers) Absorption Testing Machine	1064nm/532nm/355nm/946nm
Laser Damage Threshold (LIDT)	LIDT Testing Station	1064nm/532nm/355nm
Functional Test	Test Setup per customer application	

Digital Interferometer Zygo

Damage Threshold Tester



CRD Test machine

Optical Surfaces Inspection

Nexview Interferometer

3D Measuring Equipment LUPHOScan

Quality, Environmental, Occupational Health and Safety Policy

- Honest Business, Excellent Quality, and Persistent Innovation for Customer Satisfaction.
- Non-Pollution Operation, Energy, and Resource Conservation for Environment Protection.
- People Oriented and Comprehensive Management for a Safe and Healthy Work Environment.
- Law Compliance and Continuous Improvement for Top Performance and Steady Development.

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