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Optics for Laser Cutting & Marking

TEL ： (03)462-6569 (桃園-總公司) / (04)2261-0357 (台中) / (06)208-6651 (台南)

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Galvo Scanners

Unice offers a selection of series galvo-scanners to professional system integrators who desire to assemble their own scanning systems.

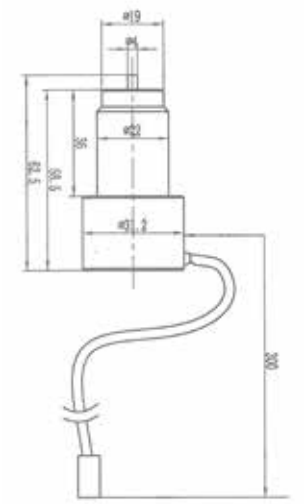
UNI-S-9xxx series are available with housing and as a module without housing, consisting of two galvo-scanners and two driver-boards. UNI-S-9xxx series more using of different materials, achieving higher precision and more uniform reflectivity.

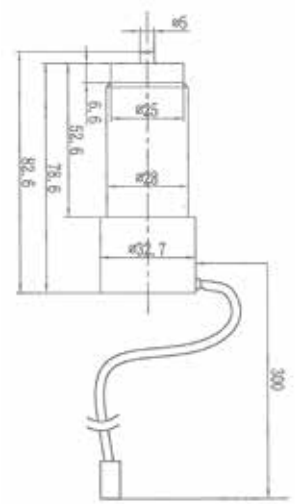
2D scanning system can be selected by aperture size, speed, accuracy and cost.

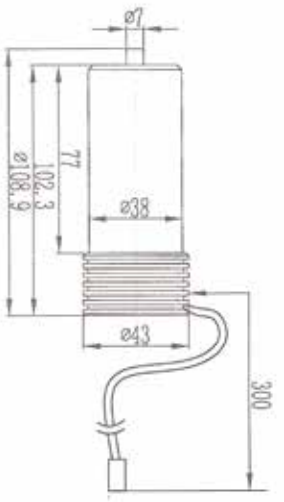
UNI-S-9210

UNI-S-9320

UNI-S-9650







Specifications

Model	UNI-S-9210	UNI-S-9320	UNI-S-9650
Aperture size(mm)	9 /10	10 / 20	30 / 40
Max. scan angle	±12.5°	±12.5°	±12.5°
Small step response time(1) (ms)	0.22	0.35	0.6
Tracking error(ms)	0.12	0.19	0.33
Rotor Inertia, g*cm^2,±10%	0.25	1.9	7.2
Torque constant, dyne.cm/amp,±10%	0.7x10^5	1.9x10^5	3.9x10^5
Max. RMS current(A/axis)	2.5	4	5
Peak current (A)	15	20	30
Zero drift (μRad./°C)	<15	<15	<15
Scale drift (ppm/°C)	<50	<50	<50
Linearity(2)	≧99.90%	≧99.90%	≧99.90%
Repeatability (μRad.)	<8	<8	<8
Long-term drift over 8 hours (mrad.)	<0.5	<0.5	<0.5
Operating temperature	25/°C±10°C		
Weight (without cables)(g)	125	225	480

· All angles are in mechanical degrees.
· All above specifications are applicable after 60 sec Power on.
(1) Setting to 1% full scale with Min. Y mirror of each model
(2) With ±20°C optical angle.

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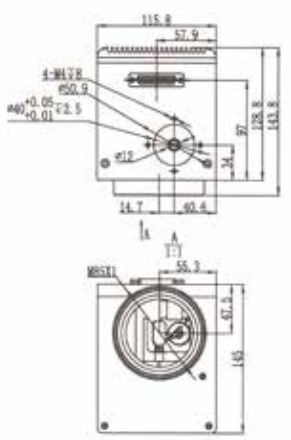
2D Scan Head

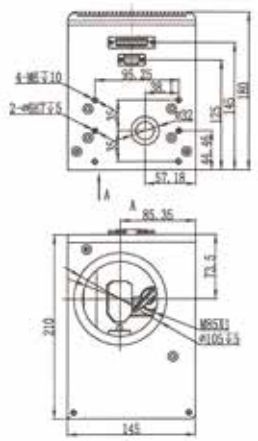
UNI-S-9xxx series are available with housing or as a module without housing, consisting of two gavlo-scanners and two driver-boards. UNI-S-9xxx series of scan-heads based on UNI-S-9xxx series galvo-scanners is characterized by lower drift, higher speed, better torque performance.
2D scanning system can be selected by aperture size, speed, accuracy and cost.

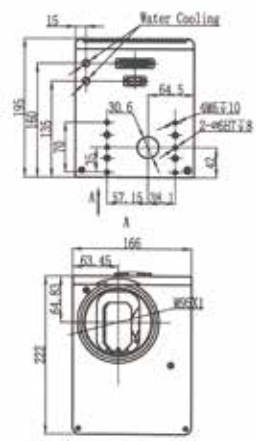
UNI-S-9210A/D

UNI-S-9320A/D

UNI-S-9650A/D







Specifications

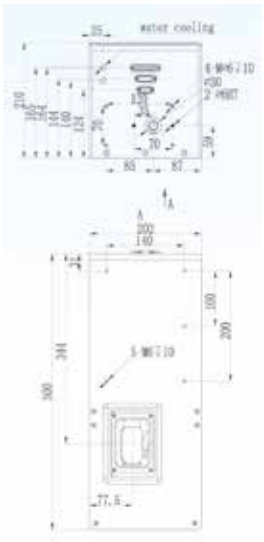
Model		UNI-S-9210A/D		UNI-S-9320A/D		UNI-S-9650A/D	
Aperture size(mm)		9	10	15	20	30	40
Max. scan angle		±12.5°		±12.5°		±12.5°	
Active scan angle		±12.5°					
Max. laser	Nd:YAG@1064nm	80	120	150	200	500	1000
Power(W)	CO2	70	70	100	150	600	1000
Small step response time[1] (ms)		0.22		0.35	0.4	0.6	
Tracking error(ms)		0.12		0.2	0.25	0.33	
Marking speed[2] (m/s)		4	4	3	3	1	-
Positioning speed[2](ms)		18	18	10	8	5	-
Writhing speed cps[3]	Good quality	1000	800	600	500	400	-
	High quality	760	690	450	360	290	
Zero drift (μRad./°C)		<15		<15		<15	
Scale drift (ppm/°F)		<50		<50		<50	
Long-term drift over8 horus(mrad)		<0.5		<0.5		<0.5	
linearity[4]		≧99.90%		≧99.90%		≧99.90%	
Repeatability(μRad.)		<8		<8		<8	
Max. RMS current(A/axis)		2.5		4		5	
Peak current(A)		15		25		30	
Input signals		XY2-100 or Analog±5V,±10V					
Input power		±24VCD±10%, Max. RMS 3.5A/axis					
Operating temperature		25°C±10°C					
Weight(without lens)(kg)		2.1		4.2	4.7	8.4	
Application		High speed mark Mark-on-the-fly Trimming Research & science		Laser mark Welding Cutting Drilling		Welding Cutting Drilling Rapid prototyping	

· All angles are in mechanical degrees.
· All above specifications are applicable after 60 sec warm-up
(1) Settling to 1% of full scale with Min. Y mirror which the scanner can carry.
(2) With F=160mm Lens.
(3) With F=160mm Lens, mark 1mm height SHX font characters(including letters and digits)
(4) witgin ±20°C optical angle

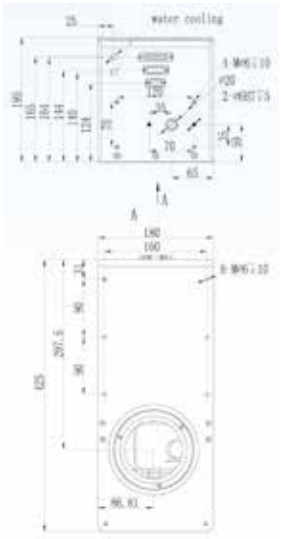
3D Scanning Systems

3D scanning systems that we offer suitable for small beam size, for large scanning fields, applicable with YAG, CO2 and fiber laser. The systems are used for large-scale marking, engraving, cutting, welding, drilling, rapid prototying.

UNI-3D-SH-300-15D



UNI-3D-SH-300-5D



Specifications

Model		UNI-3D-SH-300-15D		UNI-3D-SH-300-5D
Aperture for 2D module inside		30mm	40mm	14mm
Aperture for 3D scanning system		15mm		-
Max. laser power(W)	YAG-1064nm	1500W		-
	CO2-10600nm	1000W		-
	355nm	-		50W
Mark field size		300-750mm		300-750mm
Max. marking speed(1)		3.5m/s	2m/s	5m/s
Max. positioning speed(1)		5m/s	4m/s	15m/s

(1) Test with mark flied of 500mm*500mm

1064nm Laser

Mark fieldsize(mm^2)		300x300	400x400	450x450	500x500	600x600	750x750
Work distance(mm)		350	450	500	550	660	820
Average spot size(μm)	30mm	30	40	45	50	60	70
Average spot size(μm)	40mm	upon request	upon request	upon request	upon request	upon request	upon request

10600nm Laser

Mark fieldsize(mm^2)		300x300	400x400	450x450	500x500	600x600	750x750
Work distance(mm)		350	450	500	550	660	820
Average spot size(μm)	30mm	200	260	285	330	380	500
Average spot size(μm)	40mm	upon request	upon request	upon request	upon request	upon request	upon request

355nm Laser

Mark fieldsize(mm^2)	300x300	400x400	450x450	500x500	600x600	750x750
Work distance(mm)	350	450	500	550	660	820
Average spot size(μm)	upon request	upon request	upon request	upon request	upon request	upon request

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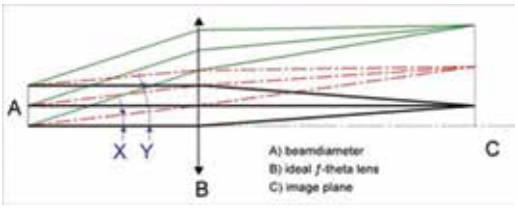
Technical Informations

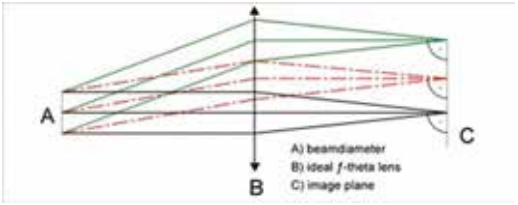
f-Theta Lenses

Lenses employed in combination with XY galvanometer scanner are called *f*-theta lenses, plane field objectives or simple scan lenses. *f*-theta lenses are used in various applications from industrial material processing, drilling, welding of synthetic material and cutting in addition to medical and biotechnology (confocal microscopy, ophthalmology) to science and research.

The design and the quality of the optical components are playing a decisive role. A standard lenses focus the laser beam on a spherical plain in contrast to an ideal flat or plane field. The use of *f*-theta lenses provides a plane focusing surface and almost constant spot size over the entire XY image plane or scan field.
The position of the spot on the image plane is directly proportional to the scan angle.
The scan length specifications in this catalogue are based on mirror spacings of typical scan heads. For other scan systems the parameter „aperture stop“ defines the distance of the geometrical center between the mirrors to the mechanical edge of the lens housing.



Telecentric *f*-theta lenses focus the laser beam so it is almost perpendicular (within 1 degree) to the work surface over the entire scan field. This ensures the spot is round even in the corners of the scan field and if holes or channels are machined, they are perpendicular to the work surface.



Color Corrected *f*-Theta Lenses

Color corrected *f*-Theta lenses are designed to accommodate multiple wavelengths. Normally each wavelength would focus to a different point on the work surface. In a color corrected lens the focal point for each wavelength coincide. This is achieved by selecting an ideal combination of different glass types for the various lens elements in the lens. Color corrected *f*-theta lens are primarily used for simultaneously viewing the work surface through the scan lens with a camera while laser processing. Another common application for color corrected scan lenses are for use in confocal scan microscopes which require a broad range of visible wavelengths.

Beam Expanders

Beam expanders are optical system used to increase or decrease the beam diameter. The product of beam diameter and divergence of the laser beam is a constant and therefore it remains unchanged, i.e. increasing the beam diameter means reducing the divergence of the beam to the same degree. This is true for the expanders with fixed expansion factor as well as for the zoom expanders, where the magnification is variable.

Anti-Reflective and Low-Absorption Coatings

Our anti–reflective coatings are optimized for a certain wavelength or wavelength ranges. They allow a high transmittance of the laser light and less absorption of energy in the lens for specific wavelengths. Low–absorption coatings are recommended for lasers with a high peak power. These coatings are only available for fused silica lenses. Beside our standard coatings we also offer customized coatings.

EXT	Type	Specs	Typical Damage Threshold*
/075	anti-reflex coating	340 nm - 370 nm, R < 0.2 %	1 /cm²
/081	anti-reflex coating	1064 nm, R < 0.2 %; 532 nm, R < 0.25 %	1 J/cm²
/094	anti-reflex coating	800 nm - 980 nm, R < 0.25 %	5 J/cm²
/121	anti-reflex coating	532 nm, R < 0.2 %	2 J/cm²
/123	anti-reflex coating	633 nm, R < 0.2%	1 J/cm²
/126	anti-reflex coating	1064 nm, R < 0.2 %	5 J/cm²
/173	anti-reflex coating	400 nm - 410 nm, R < 0.2 %	1 J/cm²
/292	low-absorption coating	515 nm - 545 nm, R < 0.2%	2 J/cm²
/328	low-absorption coating	1030 nm - 1090 nm, R <0.2%	5 J/cm²

Thermal Focus Shift

With increased beam quality of material processing lasers with an average power of some kilo watt the issue of thermal induced focal shifts occurs for collimating, beam adjusting and processing lenses. In this case only lenses made of fused silica in combination with anti - absorption coatings should be used. Following a simple system like a fiber collimator combined with a focusing lens creates a thermal focal shift of one Rayleigh length for a laser with one kW average power.

For *f*-theta lenses which are not only made of fused silica this value will increase dramatically. The disadvantage of systems only made of fused silica is no color correction is possible. This is an immense drawback especially for online monitoring systems.

Diffraction Value M^2

The ability of focusing laser light is defined by ISO standard 11146 and is described by the diffraction value M^2. This parameter is defined as the ratio of the divergence angle of the laser beam as compared to the divergence angle of an ideal Gaussian beam. An ideal Gaussian beam would provide the smallest possible focus diameter and would have an M^2 value of 1. Sometimes the quality of the laser beam is also described by a parameter K which is the reciprocal of M^2.The quality of a fiber laser is often defined by the Beam Parameter Product (BPP). This value is given by the product of the diffraction value M^2 and the wavelength λ divided by π .

Beam Shaping

Beam shaping describes a re-distribution of intensity and phase of a laser beam. A typical conversion is the change ofa Gaussian profile into a top-hat profile. This is achieved by specially designed aspheric lenses. Beam shaping leads to a more homogeneous removal of surface material, steeper borders between removal zone and surrounding material and a smaller heat induction zone.

Beam Diameter Dg ($1/e^2$)

$1/e^2$ the point in the beam diameter where the optical intensity is 13.5% of the peak intensity of the laser beam. The laser beam diameter is truncated by $1/e^2$ in other words at an intensity level of around 13.5% of the maximal laser intensity.

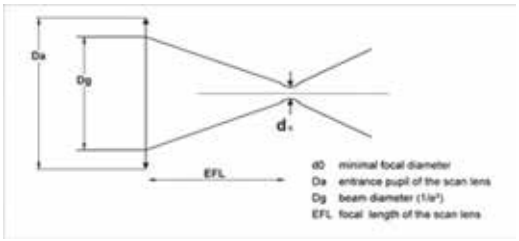
APO Factor

The ratio of the beam diameter Dgand the entrance pupil of the scan lens Da lead to the APO factor. This factor is required for calculation of the minimal possible focus diameter.

Da/Dg	APO
2.00	1.27
1.50	1.41
1.25	1.56
1.00	1.83
0.90	1.99
0.75	2.32
0.50	2.44

Spot size ($1/e^2$)

The minimal adjustable focal size is calculated by the wavelength of the laser multiplied with the focal length of the scan lens, the APO factor and the diffraction parameter M^2 of the laser divided by the $1/e^2$ beam diameter Dg. Spot size ($1/e^2$): $d0 = (\lambda \bullet EFL \bullet APO \bullet M^2) / Dg$



Rayleigh Length

The Rayleigh length describes a distance along the optical axis, which encloses the location of the focal plane and the position where the beam area has been doubled.
In other words this parameter defines a distance in front or after the focal plane where the illuminated area by the laser beam is twice as large as in the focal plane.
The Rayleigh length is calculated by the focus area multiplicated with a factor (depending on the APO-factor) divided by the wavelength and the diffraction value M^2 of the laser.
$z_R = (d_0 /2)^{2} * \pi * (APO/1{,}27)^2/(\lambda * M^2)$
The depth of focus of the scan lens is defined by a doubled Rayleigh length.

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Beam Expanders "ALPHA" with Fixed Magnification - Fused Silica

Sill Optics fused silica beam expanders series "ALPHA" (Absorption Low Plus High Aperture) are especially designed for high power lasers emitting from 1030 nm to 1090 nm. All beam expanders are highly corrected two-lens systems to keep the number of surfaces in the laser system to a minimum. The lenses are made of fused silica to increase the damage threshold and are combined with low absorption coatings to minimize thermal lensing which would lead to a focal shift and possibly cause unstable operation. The combination of fused silica lenses and this special low absorption coating is already well proven with lasers in the several kilowatt laser power segments. The series „ALPHA" allows easy adjustment of the output beam divergence.

1030nm-1090nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Max. Outside-Φ [mm]	Length [mm]
S6ASS0807/328	1.1	24	50	77	84
S6ASS0812/328	1.2	24	50	77	84
S6ASS0884/328	1.8	24	50	77	84
S6ASS3116/328[1]	1.5	24	50	77	84
S6ASS3121/328[1]	2	24	50	77	120.2
S6ASS3126/328	2.5	24	50	77	138.4
S6ASS3132/328	3	24	50	77	150.2
S6ASS3140/328	4	24	50	77	249
S6ASS6008/328	0.8	12	20	46	85
S6ASS6012/328	1.2	12	28	46	85

[1] C.A. with S6MEC0107 only 22.5 mm

Beam Expanders with Fixed Magnification - Fused Silica

For collimation, we use an air spaced two lens system in order to minimize aberrations and reach diffraction limited performance. In addition, the divergence of the expanded beam can be easily adjusted. The design is a Galilean type, i.e. there is no internal focus and the system length is short, compared to a Kepler type system.

1850nm - 1980nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Max. Outside-Φ [mm]	Length [mm]
S6EXP0015/159[1]	1.5	8	30	46	85
S6EXP0020/159[1]	2	6	30	46	85
S6EXP0025/159[1]	2.5	6	30	46	85
S6EXP0030/159[1]	3	6	30	46	85
S6EXP0040/159[1]	4	6	30	46	85
S6EXP0050/159[1]	5	6	30	46	85
S6EXP0060/159[1]	6	6	30	46	85
S6EXP0070/159[1]	7	6	30	46	85
S6EXP0080/159[1]	8	6	30	76	85
S6EXP0090/159[1]	9	6	30	46	85
S6EXP0100/159[1]	10	6	30	46	85
S6EXP0120/159[1]	12	6	30	46	85

[1] length at divergence setting "0". Max. lengthening of 3 mm is possible

1550nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Max. Outside-Φ [mm]	Length [mm]
S6EXP0015/008[1]	1.5	8	30	46	85
S6EXP0020/008[1]	2	6	30	46	85
S6EXP0025/008[1]	2.5	6	30	46	85
S6EXP0030/008[1]	3	6	30	46	85
S6EXP0040/008[1]	4	6	30	46	85
S6EXP0050/008[1]	5	6	30	46	85
S6EXP0060/008[1]	6	6	30	46	85
S6EXP0070/008[1]	7	6	30	46	85
S6EXP0080/008[1]	8	6	30	76	85
S6EXP0090/008[1]	9	6	30	46	85
S6EXP0100/008[1]	10	6	30	46	85
S6EXP0120/008[1]	12	6	30	46	85

[1] length at divergence setting "0". Max. lengthening of 3 mm is possible

Beam Expanders with Fixed Magnification - Fused Silica

1030nm - 1090nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Max. Outside-Φ [mm]	Length [mm]
S6EXP0015/328[1]	1.5	8	30	46	85
S6EXP0020/328[1]	2	6	30	46	85
S6EXP0025/328[1]	2.5	6	30	46	85
S6EXP0030/328[1]	3	6	30	46	85
S6EXP0040/328[1]	4	6	30	46	85
S6EXP0050/328[1]	5	6	30	46	85
S6EXP0060/328[1]	6	6	30	46	85
S6EXP0070/328[1]	7	6	30	46	85
S6EXP0080/328[1]	8	6	30	76	85
S6EXP0090/328[1]	9	6	30	46	85
S6EXP0100/328[1]	10	6	30	46	85
S6EXP0120/328[1]	12	6	30	46	85
S6EXP0150/328[1]	15	6	30	46	85
S6EXP0200/328[1]	20	6	30	46	85

[1] length at divergence setting “0”. Max. lengthening of 3 mm is possible

1064nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Max. Outside-Φ [mm]	Length [mm]
S6EXP0015/126[1]	1.5	8	30	46	85
S6EXP0020/126[1]	2	6	30	46	85
S6EXP0025/126[1]	2.5	6	30	46	85
S6EXP0030/126[1]	3	6	30	46	85
S6EXP0040/126[1]	4	6	30	46	85
S6EXP0050/126[1]	5	6	30	46	85
S6EXP0060/126[1]	6	6	30	46	85
S6EXP0070/126[1]	7	6	30	46	85
S6EXP0080/126[1]	8	6	30	76	85
S6EXP0090/126[1]	9	6	30	46	85
S6EXP0100/126[1]	10	6	30	46	85
S6EXP0120/126[1]	12	6	30	46	85
S6EXP0150/126[1]	15	6	30	46	85
S6EXP0200/126[1]	20	6	30	46	85

[1] length at divergence setting “0”. Max. lengthening of 3 mm is possible

808nm - 980nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Max. Outside-Φ [mm]	Length [mm]
S6EXP0020/126[1]	2	8	30	46	85
S6EXP0030/126[1]	3	6	30	46	85
S6EXP0050/126[1]	5	6	30	46	85
S6EXP0100/126[1]	10	6	30	46	85

[1] length at divergence setting “0”. Max. lengthening of 3 mm is possible

515nm - 545nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Max. Outside-Φ [mm]	Length [mm]
S6EXP0015/292[1]	1.5	8	30	46	85
S6EXP0020/292[1]	2	6	30	46	85
S6EXP0025/292[1]	2.5	6	30	46	85
S6EXP0030/292[1]	3	6	30	46	85
S6EXP0040/292[1]	4	6	30	46	85
S6EXP0050/292[1]	5	6	30	46	85
S6EXP0060/292[1]	6	6	30	46	85
S6EXP0070/292[1]	7	6	30	46	85
S6EXP0080/292[1]	8	6	30	76	85
S6EXP0090/292[1]	9	6	30	46	85
S6EXP0100/292[1]	10	6	30	46	85
S6EXP0120/292[1]	12	6	30	46	85
S6EXP0150/292[1]	15	6	30	46	85
S6EXP0200/292[1]	20	6	30	46	85

[1] length at divergence setting “0”. Max. lengthening of 3 mm is possible

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Beam Expanders with Fixed Magnification - Fused Silica

532nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Max. Outside-Φ [mm]	Length [mm]
S6EXP0015/121[1]	1.5	8	30	46	85
S6EXP0020/121[1]	2	6	30	46	85
S6EXP0025/121[1]	2.5	6	30	46	85
S6EXP0030/121[1]	3	6	30	46	85
S6EXP0040/121[1]	4	6	30	46	85
S6EXP0050/121[1]	5	6	30	46	85
S6EXP0060/121[1]	6	6	30	46	85
S6EXP0070/121[1]	7	6	30	46	85
S6EXP0080/121[1]	8	6	30	76	85
S6EXP0090/121[1]	9	6	30	46	85
S6EXP0100/121[1]	10	6	30	46	85
S6EXP0120/121[1]	12	6	30	46	85
S6EXP0150/121[1]	15	6	30	46	85
S6EXP0200/121[1]	20	6	30	46	85

[1] length at divergence setting “0”. Max. lengthening of 3 mm is possible

405nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Max. Outside-Φ [mm]	Length [mm]
S6EXP0015/173[1]	1.5	8	30	46	85
S6EXP0020/173[1]	2	6	30	46	85
S6EXP0030/173[1]	3	6	30	46	85
S6EXP0050/173[1]	5	6	30	46	85
S6EXP0070/173[1]	7	6	30	46	85
S6EXP0100/173[1]	10	6	30	46	85
S6EXP0200/173[1]	20	6	30	46	85

[1] length at divergence setting “0”. Max. lengthening of 3 mm is possible

355nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Max. Outside-Φ [mm]	Length [mm]
S6EXP0015/075[1]	1.5	8	30	46	85
S6EXP0020/075[1]	2	6	30	46	85
S6EXP0025/075[1]	2.5	6	30	46	85
S6EXP0030/075[1]	3	6	30	46	85
S6EXP0040/075[1]	4	6	30	46	85
S6EXP0050/075[1]	5	6	30	46	85
S6EXP0060/075[1]	6	6	30	46	85
S6EXP0070/075[1]	7	6	30	46	85
S6EXP0080/075[1]	8	6	30	76	85
S6EXP0090/075[1]	9	6	30	46	85
S6EXP0100/075[1]	10	6	30	46	85
S6EXP0120/075[1]	12	6	30	46	85
S6EXP0150/075[1]	15	6	30	46	85
S6EXP0200/075[1]	20	6	30	46	85

[1] length at divergence setting “0”. Max. lengthening of 3 mm is possible

266nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Max. Outside-Φ [mm]	Length [mm]
S6EXP0015/199[1]	1.5	8	30	46	85
S6EXP0020/199[1]	2	6	30	46	85
S6EXP0030/199[1]	3	6	30	46	85
S6EXP0050/199[1]	5	6	30	46	85
S6EXP0100/199[1]	7	6	30	46	85
S6EXP0100/199[1]	10	6	30	46	85

[1] length at divergence setting “0”. Max. lengthening of 3 mm is possible

Zoom Beam Expanders - Fused Silica

Our zoom beam expanders are highly corrected 4-lens element systems. The version with divergence adjustment is very user friendly, as the agnification setting and the divergence setting are independent from each other, i.e. the divergence remains unchanged while changing the expansion factor. In addition, the total length of the beam expanders remain constant during zooming and/or divergence setting.

1030nm - 1090nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Max. Outside-Φ [mm]	Length [mm]	Thread
S6EXZ5310/328	1.0 – 3.0	10	20	47	85.2	C – mount
S6EXZ5311/328	1.0 – 3.0	10	20	47	85.2	M30x1
S6EXZ5312/328[1]	1.2 – 3.0	18.5	43	80	230.2	M30x1
S6EXZ5076/328[2]	1.0 – 8.0	10	30	58	162	C – mount

[1] The max. beam-diameter is 12 mm respectively limited by the magnification factor
[2] The max. beam-diameter is 6 mm respectively limited by the magnification factor

1064nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Max. Outside-Φ [mm]	Length [mm]	Thread
S6EXZ5310/126[1]	1.0 – 3.0	10	20	47	85.2	C – mount
S6EXZ5311/126	1.0 – 3.0	10	20	47	85.2	M30x1
S6EXZ5076/126[1]	1.0 – 3.0	10	30	58	162.6	C – mount

[1] The max. beam-diameter is 6 mm respectively limited by the magnification factor

515nm - 545nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Max. Outside-Φ [mm]	Length [mm]	Thread
S6EXZ5310/292	1.0 – 3.0	10	20	47	85.2	C – mount
S6EXZ5311/292	1.0 – 3.0	10	20	47	85.2	M30x1
S6EXZ5312/292[1]	1.0 – 3.0	18.5	43	80	230.2	M30x1
S6EXZ5076/292[2]	1.0 – 3.0	10	30	58	162	C – mount

[1] The max. beam-diameter is 12 mm respectively limited by the magnification factor
[2] The max. beam-diameter is 6 mm respectively limited by the magnification factor

532nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Dimension [mm]	Mounting Plate [mm]	Thread
S6EXZ5310/121[1]	1.0 – 3.0	10	20	47	85.2	C – mount
S6EXZ5311/121	1.0 – 3.0	10	20	47	85.2	M30x1
S6EXZ5076/121[1]	1.0 – 8.0	10	30	58	162	C – mount

[1] The max. beam-diameter is 6 mm respectively limited by the magnification factor

355nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Dimension [mm]	Mounting Plate [mm]	Thread
S6EXZ5310/075[1]	1.0 – 3.0	10	20	47	85.2	C – mount
S6EXZ5311/075	1.0 – 3.0	10	20	47	85.2	M30x1
S6EXZ5075/075[1]	1.0 – 8.0	10	30	58	162	C – mount

[1] The max. beam-diameter is 6 mm respectively limited by the magnification factor

266nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Dimension [mm]	Mounting Plate [mm]	Thread
S6EXZ5075/199[1]	1.0 – 8.0	10	30	58	162	C – mount

[1] The max. beam-diameter is 6 mm respectively limited by the magnification factor

TEL : (03)462-6569 (桃園-總公司) / (04)2261-0357 (台中) / (06)208-6651 (台南)

Zoom Beam Expanders - Optical Glass

1064nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Max. Outside-Φ [mm]	Length [mm]	Thread
S6EXZ2075/126[1]	1.0 – 8.0	10	30	58	157	C – mount
S6EXZ2076/126[1]	1.0 – 8.0	10	50	77	158.5	C – mount

[1] The max. beam-diameter is 6 mm respectively limited by the magnification factor

532nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Max. Outside-Φ [mm]	Length [mm]	Thread
S6EXZ2075/121[1]	1.0 – 8.0	10	30	58	157	C – mount
S6EXZ2076/121[1]	1.0 – 8.0	10	50	77	158.5	C – mount

[1] The max. beam-diameter is 6 mm respectively limited by the magnification factor

Power-Zoom Beam Expanders - Fused Silica

For challenging applications, our fully motorized high precision system Power Zoom can be used. These industry-proven systems offer outstanding repeatability and reliability in divergence and magnification adjustment.

1030nm - 1090nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Dimension [mm]	Mounting Plate [mm]
S6EXZ3976/328[1]	1.0 - 8.0	9	30	200.4 x 160.0 x 67.0	220 x 100

[1] The max. beam-diameter is 6 mm respectively limited by the magnification factor

1064nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Dimension [mm]	Mounting Plate [mm]
S6EXZ3975/126[1]	1.0 - 8.0	9	30	200.4 x 160.0 x 67.0	220 x 100
S6EXZ3976/126[1]	1.0 - 8.0	9	30	200.4 x 160.0 x 67.0	220 x 100

[1] The max. beam-diameter is 6 mm respectively limited by the magnification factor

515nm - 545nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Dimension [mm]	Mounting Plate [mm]
S6EXZ3976/292[1]	1.0 - 8.0	9	30	200.4 x 160.0 x 67.0	220 x 100

[1] The max. beam-diameter is 6 mm respectively limited by the magnification factor

532nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Dimension [mm]	Mounting Plate [mm]
S6EXZ3975/121[1]	1.0 - 8.0	9	30	200.4 x 160.0 x 67.0	220 x 100
S6EXZ3976/121[1]	1.0 - 8.0	9	30	200.4 x 160.0 x 67.0	220 x 100

[1] The max. beam-diameter is 6 mm respectively limited by the magnification factor

355nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Dimension [mm]	Mounting Plate [mm]
S6EXZ3975/075[1]	1.0 - 8.0	9	30	200.4 x 160.0 x 67.0	220 x 100

[1] The max. beam-diameter is 6 mm respectively limited by the magnification factor

266nm

Part Number	Magnification	Max. Entrance Aperture [mm]	Max. Exit Aperture [mm]	Dimension [mm]	Mounting Plate [mm]
S6EXZ3975/199[1]	1.0 - 8.0	9	30	200.4 x 160.0 x 67.0	220 x 100

[1] The max. beam-diameter is 6 mm respectively limited by the magnification factor

Laser Beam Expanders

More detail information please see L Series Optics - page 907~910

* Achromatic (Dual Wavelength) Beam Expanders
* Large Output Beam Expanders
* UV Beam Expanders
* IR Variable Beam Expanders
* UV Variable Beam Expanders

High Power Beam Expanders

IR Beam Expanders

Low Power Beam Expanders

VIS Beam Expanders

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Telecentric f-Theta Lenses- Fused Silica

Telecentric *f*-theta lenses provide a perpendicular angle of the laser beam onto the image surface. This is necessary for drilling holes and structuring the surface. Besides lenses made of optical glass which are suited for a large field of applications, we offer *f*-theta lenses made of fused silica. These are recommended for high power laser applications. Thermal lensing, leading to a focal shift, will be minimized.

1030nm - 1090nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT4031/328	32.8	6x6	10	16.5	28.7	90	39.9	M85x1	---
S4LFT3046/328	50	7x7	15	26	60.5	90	69.9	M85x1	S4LPG3102/328
S4LFT3050/328	60.5	20x20	6	22.3	81.9	87	39.8	M85x1	S4LPG4056/328
S4LFT0082/328	82	20x20	15	33	84.5	93.8	103.1	M85x1	S4LPG0082/328
S4LFT4010/328	100.3	35x35	10	32	129.9	106	78.7	M85x1	S4LPG2250/328
S4LFT3162/328[1]	163.5	90x90	15	27.7	201.5	130	102	M85x1	S4LPG4160/328

[1] maximum telecentricity error 5.6°

1064nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT4031/126	32.8	6x6	10	16.5	28.7	90	39.9	M85x1	---
S4LFT3046/126	50	7x7	15	26	60.5	90	69.9	M85x1	S4LPG3102/126
S4LFT3050/126	60.5	20x20	6	22.3	81.9	87	39.8	M85x1	S4LPG4056/126
S4LFT0082/126	82	20x20	15	33	84.5	93.8	103.1	M85x1	S4LPG0082/126
S4LFT4010/126	100.3	35x35	10	32	129.9	106	78.7	M85x1	S4LPG2250/126
S4LFT3162/126[1]	163.5	90x90	15	27.7	201.5	130	102	M85x1	S4LPG4160/126

[1] maximum telecentricity error 5.6°

515nm - 545nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT4031/292	32.2	6x6	10	16.5	28.4	90	39.9	M85x1	---
S4LFT3046/292	48.1	7x7	15	26	60.2	90	64.9	M85x1	S4LPG3102/292
S4LFT3050/292	58.5	20x20	6	21	79.3	87	39.7	M85x1	S4LPG4056/292
S4LFT4010/292	100	35x35	10	30	130.1	106	78.7	M85x1	S4LPG2250/292
S4LFT3161/292	163.9	90x90	10	26.3	219	122	98	M85x1	S4LPG4160/292
S4LFT3300/292[1]	305.5	120x120	10	30	506	215	228.3	M85x1	---

[1] maximum telecentricity error 4.9°

532nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT4031/121	32.2	6x6	10	16.5	28.4	90	39.9	M85x1	---
S4LFT3046/121	48.1	7x7	15	26	60.2	90	64.9	M85x1	S4LPG3102/121
S4LFT3050/121	58.5	20x20	6	21	79.3	87	39.7	M85x1	S4LPG4056/121
S4LFT4010/121	100	35x35	10	30	130.1	106	78.7	M85x1	S4LPG2250/121
S4LFT3161/121[1]	163.9	90x90	10	26.3	219	122	98	M85x1	S4LPG4160/121

[1] maximum telecentricity error 4.9°

405nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT4110/173	111.4	63x63	6	33.1	157.6	121	86	M85x1	S4LPG4160/173

355nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT4031/075	32	6x6	10	16.5	29	90	39.9	M85x1	---
S4LFT3046/075	45	7x7	15	26	55.7	90	64.9	M85x1	S4LPG3102/075
S4LFT3050/075	56	20x20	6	19.5	75.9	87	39.5	M85x1	S4LPG4056/075
S4LFT4010/075	100.2	35X35	10	34.6	132	106	78.7	M85x1	S4LPG2250/075
S4LFT4110/075	109.4	63X63	6	33.1	154.6	121	86	M85x1	S4LPG4160/075
S4LFT4262/075	163	65X65	10	34.6	193.7	121	145.5	M85x1	S4LPG4160/075
S4LFT3170/075[1]	163.4	90X90	10	26	221.7	127	103.7	M85x1	S4LPG4160/075
S4LFT5256/075	256.8	86X86	6	24	145.4	138	173.5	M85x1	---
S4LFT3300/075	290	130X130	10	30	484	210	226.5	M85x1	---

[1] maximum telecentricity error 4.3°

266nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT3050/199	53.5	20x20	6	17.8	72	87	39	M85x1	---
S4LFT4105/199	96.1	50x50	5	26.9	134.5	121	86.2	M85x1	S4LPG3102/075
S4LFT4163/199	159.8	64x64	10	32.6	213.6	121	173	M85x1	S4LPG4056/075

f-Theta Lenses - Fused Silica

Standard fused silica *f*-theta lenses are suitable for all high-power-laser applications like welding, cleaning and structuring. Thermal lensing, leading to a focal shift, will be minimized.

1030nm - 1090nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT2175/328[1]	163.4	94x94	20	30.5	205.5	150	110.2	M85x1	S4LPG2175/328
S4LFT3260/328	277.1	142x142	15	31	346.2	105	61	M85x1	S4LPG2250/328
S4LFT1330/328	340	215x215	20	38.5	203.4	163	174.6	M85x1	S4LPG2175/328
S4LFT1420/328	420	280x280	14	28.3	499.2	122	67.7	M85x1	S4LPG4160/328
S4LFT1500/328	500	340x340	20	30.5	569.8	148	68	M85x1	S4LPG2175/328
S4LFT2500/328[2]	500	280x280	30	48.5	620.2	198	127	M85x1	S4LPG1118/328

[1] for design wavelength 1941 nm, SPL suitable
[2] for design wavelength 1908 nm

1064nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT2175/126	163.4	94x94	20	30.5	205.5	150	110.2	M85x1	S4LPG2175/126
S4LFT3260/126	277.1	142x142	15	31	346.2	105	61	M85x1	S4LPG2250/126
S4LFT1330/126	340	215x215	20	38.5	203.4	163	174.6	M85x1	S4LPG2175/126
S4LFT1420/126	420	280x280	14	28.3	499.2	122	67.7	M85x1	S4LPG4160/126
S4LFT1500/126	500	340x340	20	30.5	569.8	148	68	M85x1	S4LPG2175/126

515nm - 545nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT3100/292	112.8	74x74	5	19.2	151.5	89	48.5	M85x1	S4LPG3100/292
S4LFT3260/292	259.4	162x162	10	26	325.5	105	61	M85x1	S4LPG2250/292
S4LFT1330/292	347.9	212x212	14	36	279	122	108.4	M85x1	S4LPG4160/292

532nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT3100/121	112.8	74x74	5	19.2	151.5	89	48.5	M85x1	S4LPG3100/121
S4LFT3260/121	259.4	162x162	10	26	325.5	105	61	M85x1	S4LPG2250/121
S4LFT1330/121	347.9	212x212	14	36	279	122	108.4	M85x1	S4LPG4160/121

405nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT3160/173	176	110x110	6	21.1	220.9	89	36.8	M85x1	S4LPG3100/173
S4LFT3260/173	263.9	164x164	10	26	331.3	105	61	M85x1	S4LPG2250/173
S4LFT0580/173	594.1	326x326	10	39	686.1	89	38	M85x1	S4LPG3100/173

355nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT3100/075	108.3	76x76	6	17.1	145.7	89	49	M85x1	S4LPG3100/075
S4LFT3160/075	174.1	109x109	6	21.1	218.1	89	36.8	M85x1	S4LPG3100/075
S4LFT3260/075	250.3	155x155	10	28.1	209.8	105	61	M85x1	S4LPG2250/075
S4LFT1330/075	329.3	210x210	14	36	260.5	122	108.4	M85x1	S4LPG4160/075
S4LFT0580/075	580.8	320x320	10	39	671.4	98	38	M85x1	S4LPG3100/075
S4LFT0815/075	829.4	440x440	14	25	981.1	90	62.5	M85x1	S4LPG0815/075
S4LFT0920/075	919.9	470x470	14	41	1035.1	89	40	M85x1	---

266nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT3100/199	101.5	73x73	5	17.1	136.5	89	49	M85x1	S4LPG3100/199
S4LFT3160/199	162.5	105x105	5	21.1	203.9	89	36.8	M85x1	S4LPG3100/199
S4LFT0256/199	245.4	148x148	4	13.5	249.3	90	47	M85x1	---

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Telecentric f-Theta Lenses - Optical Glass

In telecentric *f*-theta lenses, the aperture stop location is the front focal point. Deflected from this position, a laser beam is always perpendicular onto the image field. The scan length specification of this catalog is based on often used scan systems with a certain mirror distance. For other scan systems the parameter “aperture stop” defines the distance of the geometrical center between the mirrors to the mechanical edge of the lens housing.

1064nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT0058/126	56.5	16x16	10	26.4	58.4	90	40.7	M85x1	S4LPG0001/126
S4LFT0055/126	59.7	19x19	14	20.1	66.6	89	58	M85x1	---
S4LFT0080/126	79.9	39x39	25	27.2	79.5	107	84.1	M85x1	S4LPG1080/126
S4LFT6125/126	99.2	40x40	25	37.4	115	116	80.4	M85x1	S4LPG6100/126
S4LFT5100/126	107.7	69x69	12	34.9	137.9	128	85.5	M85x1	S4LPG0300/126
S4LFT5365/126	162.9	73x73	20	61.5	197.8	154	115	M85x1	S4LPG2175/126
S4LFT5165/126	163.6	75x75	10	58.3	13.7	136	128	M85x1	S4LPG0300/126
S4LFT0141/126	183.1	50x50	15	108.7	216.4	108	70.6	M85x1	S4LPG0090/126
S4LFT0220/126	207.3	139x139	14	46	288.4	281	162	TK267.0	---
S4LFT0221/126	207.3	139x139	14	46	273.4	281	178.7	TK267.0	S4LPG0220/129

808nm - 980nm

Part Number	Focal Length		Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance		Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
	@808nm [mm]	@980nm [mm]				@808nm [mm]	@980nm [mm]				
S4LFT0053/094	56.3	57.4	14x14	10	17.5	69.3	70.8	90	55.2	M85x1	S4LPG0057/094
S4LFT0075/094	76.8	78.2	19x19	10	32.6	103.6	105.5	70	45	M85x1	---
S4LFT0080/094	79.6	81	39x39	25	27.7	79.5	81.3	107	83.4	M85x1	S4LPG1080/094
S4LFT0089/094	88.6	89.6	30x30	10	36.6	119	120.3	98	55	M85x1	---
S4LFT5100/094	105.6	107.2	68x68	12	35	135.2	137.2	128	85.5	M85x1	S4LPG0300/094

532nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT0058/121	53.1	15x15	6	25.5	52.6	90	40.7	M85x1	S4LPG0001/121
S4LFT0055/121	59.3	20x20	10	16.9	72.1	89	58	M85x1	---
S4LFT0080/121	77	49x49	14	22.8	74.1	107	83.8	M85x1	S4LPG1081/121
S4LFT1094/121	88	36x36	16	33.8	107.3	85	66.3	70	S4LPG0005/121
S4LFT5100/121	100.1	69x69	10	30	127.7	128	85.5	M85x1	S4LPG0300/121
S4LFT5165/121	162.7	75x75	10	53.9	194.6	136	128	M85x1	S4LPG0300/121
S4LFT0141/121	171	50x50	10	102.1	196.6	108	70.6	M85x1	S4LPG0090/121
S4LFT0200/121	198.4	75x75	20	111.6	231.9	142	94	TK133.0	---
S4LFT0220/121	201.5	139x139	10	46	280.5	281	162	TK267.0	---
S4LFT0221/121	201.5	139x139	10	46	264	281	178.7	TK 267.0	S4LPG0220/121

405nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT8050/173	55.1	30x30	6	16.2	67.3	90	52	M85x1	---

f-Theta Lenses - Optical Glass

Our *f*-theta lenses have been optimized for galvanometer scan systems, i.e. beam deflection systems where the scan mirrors have a certain separation from each other. The aperture stop given in the data lists, is the position where the scan mirrors should be placed symmetrically around in order to reach best performance.

1064nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT0063/126[1]	63	36x36	8	15	74.5	59.2	35.8	M39x1/M55x1	S4LPG0105/126
S4LFT0101/126	99.7	55x55	10	16.5	110.8	90	40	M85x1	S4LPG0004/126
S4LFT0162/126	160.1	100x100	8	15	180.1	59.2	25.2	M39x1/M55x1	S4LPG0105/126
S4LFT0162/126	162.4	107x107	12	22	181.2	89	43.1	M85x1	S4LPG0005/126
S4LFT2162/126	163	106x106	20	29	192.3	128	66	M85x1	S4LPG0300/126
S4LFT3162/126	163	120x120	15	22.9	186.7	103	52	M85x1	S4LPG0090/126
S4LFT7163	163	95x95	10	27	197.2	89	44	M85x1	S4LPG0005/126
S4LFT0192/126	191.4	125x125	20	40	220.5	128	57.9	M85x1	S4LPG0300/126
S4LFT0202/126[2]	201.6	90x90	30	43	242.2	132	85	M85x1	S4LPG0300/126
S4LFT3254/126	253.9	115x115	30	48.9	297.2	130	75.5	M85x1	S4LPG0300/126
S4LFT4255/126	254	168x168	20	38	292.7	130	70.1	M85x1	S4LPG0300/126
S4LFT1254/126	254.7	160x160	12	23.5	306.5	109	55.3	M85x1	S4LPG0250/126
S4LFT0300/126	298	175x175	20	35	350.8	128	78	M85x1	S4LPG0300/126
S4LFT0350/126	346.3	212x212	12	22.5	412.2	95	52.3	M85x1	S4LPG0003/126
S4LFT0352/126[3]	354.5	160x160	30	53.5	396.5	128	48.5	M85x1	S4LPG0300/126
S4LFT0411/126	409.6	210x210	20	44	472.5	105	56.8	M85x1	S4LPG0090/126
S4LFT0420/126	420	242x242	30	59.5	480.1	136	52	M132x1	---
S4LFT0508/126	569.7	325x325	20	45	647.6	127	56.9	M85x1	---
S4LFT0635/126	657.3	370x370	25	75	732.8	133	48.5	M110x1	---
S4LFT0825/126	819.7	560x560	24	43.3	894.9	130	58	M102x1	S4LPG0300/126

[1] maximum telecentricity error of 5.4°
[2] maximum telecentricity error of 6.8°
[3] in the data-sheets you will find data for two different entrance pupil diameter

808nm - 980nm

Part Number	Focal Length @808nm [mm]	Focal Length @980nm [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance @808nm [mm]	Working Distance @980nm [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT0101/094	97.5	99.5	53x53	10	1635	108	110.3	90	40	M39x1/M55x1	S4LPG0004/094
S4LFT0163/094	158.3	161.4	108x108	12	20.8	176.4	180.0	89	43.1	M85x1	S4LPG0005/094
S4LFT2163/094	158.9	162.0	103x103	20	29	187.2	191.0	128	66	M39x1/M55x1	S4LPG0300/094
S4LFT0202/094[1]	196.8	200.4	90x90	30	43	236.2	240.7	132	85	M85x1	S4LPG0300/094
S4LFT3254/094	248.7	253.1	115x115	30	47.9	290.1	295.5	130	75.5	M85x1	S4LPG0300/094
S4LFT0300/094	292.2	294.5	175x175	20	35	344.1	349.1	128	78	M85x1	S4LPG0300/094
S4LFT0400/094	397.9	401.6	209x209	20	33	486.9	491.0	118	53	M85x1	---
S4LFT0420/094	410.9	419.6	250x250	30	54.6	469.6	478.4	136	52	M132x1	---
S4LFT0635/094	639.8	653.0	415x415	30	58.3	713.6	728.1	133	48.5	M85x1	---
S4LFT0825/094	803.5	812.2	450x450	30	54	876.2	885.5	90	69.9	M85x1	S4LPG0300/094

[1] maximum telecentricity error of 6.8°

532nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Mounting Thread	Protective Window
S4LFT0101/094[1]	62.9	30x30	7	15	75.8	59.2	35.7	M39x1/M55x1	S4LPG0105/121
S4LFT0163/094	89.7	58x58	6	16.5	94.6	90	40	M85x1	S4LPG0004/121
S4LFT2163/094	147.1	77x77	7	20	161.8	89	43.1	M85x1	S4LPG0005/121
S4LFT0202/094	148.3	114x114	10	29	172.4	128	66	M85x1	S4LPG0300/121
S4LFT3254/094	162.1	100x100	7	16.1	183.5	59.2	25.2	M39x1/M55x1	S4LPG0105/121
S4LFT0300/094	162.8	120x120	10	28	186.5	106	47	M85x1	S4LPG0090/121
S4LFT0400/094	233.5	148x148	10	24.7	282.1	109	55.3	M85x1	S4LPG0250/121
S4LFT0420/094	276.9	200x200	14	29	324.1	128	72	M132x1	S4LPG0300/121
S4LFT0635/094	528.3	330x300	16	43	603.8	127	56.9	M85x1	---
S4LFT0825/094	768.6	585x585	16	43	842.9	130	58	M102x1	S4LPG0300/121

[1] maximum telecentricity error of 4.5°

405nm

Part Number	Focal Length [mm]	Scan Area [mmxmm]	Max. Beam-Ø [mm]	Aperture Stop [mm]	Working Distance [mm]	Max. Outside-Ø [mm]	Length [mm]	Mounting Thread	Protective Window
S4LFT0375/173	375.3	300x300	10	35.5	447.9	116	47.9	M92x1	---

TEL : (03)462-6569 (桃園-總公司) / (04)2261-0357 (台中) / (06)208-6651 (台南)

Telecentric Lenses Series TCL

The series TCL have been developed for applications in the visible spectrum. These lenses have a fixed stop and are often used in laboratory.

Serie Correctal® TCL

Part Number	Magnification	Working Distance [mm]	Max. Object Size for [mm x mm]				Max. Distortion [%]	Length [mm]	Mount
			1/3" (4.8x3.6)	1/2" (6.4x4.8)	2/3" (8.8x6.6)	1" (12.8x9.6)			
S5LPJ3599	0.2	89	24.0x18.0	32.0x24.0	---	---	0.1	153.4	C-mount
S5LPJ3499	0.25	89	19.2x14.4	25.6x19.2	35.2x26.4	---	0.2	153.5	C-mount
S5LPJ3399	0.33	89	14.5x10.9	19.3x14.5	26.6x20.0	---	0.25	153.5	C-mount
S5LPJ3299	0.5	89	9.6x7.2	12.8x9.6	17.6x13.2	---	0.3	153.5	C-mount

Serie Correctal® TCL85

Part Number	Magnification	Working Distance [mm]	Max. Object Size for [mm x mm]				Max. Distortion [%]	Length [mm]	Mount
			1/3" (4.8x3.6)	1/2" (6.4x4.8)	2/3" (8.8x6.6)	1" (12.8x9.6)			
S5LPJ6677	0.077	136	62.3x46.7	---	---	---	0.7	144.9	C-mount
S5LPJ6611	0.11	136	43.6x32.7	58.1x43.6	---	---	0.8	143.5	C-mount
S5LPJ6614	0.142	136	33.8x25.3	45.0x33.8	61.9x46.4	---	0.4	142	C-mount
S5LPJ6621	0.211	136	22.7x17.0	30.3x22.7	41.7x31.2	60.6x45.4	<0.05	171.8	C-mount

Serie Correctal® TCL120

Part Number	Magnification	Working Distance [mm]	Max. Object Size for [mm x mm]				Max. Distortion [%]	Length [mm]	Mount
			1/3" (4.8x3.6)	1/2" (6.4x4.8)	2/3" (8.8x6.6)	1" (12.8x9.6)			
S5LPJ4699	0.068	260	70.5x52.9	94.1x70.5	---	---	0.6	319.7	C-mount
S5LPJ4599	0.098	260	48.9x36.7	65.3x48.9	89.7x67.3	---	0.05	328.7	C-mount
S5LPJ4499	0.132	260	36.3x27.2	48.4x36.3	66.6x50.0	---	0.2	332.5	C-mount
S5LPJ4399	0.165	260	29.0x21.8	38.7x29.0	53.3x40.0	77.5x58.1	<0.05	332.5	C-mount

Serie Correctal® TCL120 for Line Sensors

Part Number	Magnification	Working Distance [mm]	Max. Object Size for [mm x mm]				Max. Distortion [%]	Length [mm]	Mount
			28.6	35	43.3(36x24)	60			
S5LPJ4299	0.38	260	75.2	92.1	113.9(94.7x63.1)	---	0.8	338.3	M58x0,75
S5LPJ4299/212	0.38	260	75.2	92.1	---	---	0.5	303.5	F-mount

Telecentric Lenses Correctal® T

The series T have been developed for the ambitious user. The lenses of these series have the same workingdistance and a similar length. Thus they are easy to be exchanged. Most of the lenses are available witha variable stop and C-mount. Other mounts are available upon request.

Serie Correctal® T compact

Part Number	Magnification	Working Distance [mm]	Max. Object Size for [mm x mm]				Max. Distortion [%]	Length [mm]	Mount
			1/3" (4.8x3.6)	1/2" (6.4x4.8)	2/3" (8.8x6.6)	1" (12.8x9.6)			
S5LPJ2799	0.125	92	38.4x28.8	---	---	---	0.25	147.3	C-mount
S5LPJ2699	0.15	92	32.0x24.0	---	---	---	0.4	146.6	C-mount
S5LPJ5016	0.16	88	30.0x22.5	40.0x30.0	---	---	0.5	154.5	C-mount
S5LPJ1199	0.2	92	24.0x18.0	32.0x24.0	44.0x33.0	---	0.15	164.4	C-mount
S5LPJ2298	0.244	92	19.6x14.7	36.2x19.6	36.0x27.0	---	0.1	135.7	C-mount
S5LPJ2899	0.291	92	16.4x12.3	21.9x16.4	30.2x22.6	---	0.2	181.1	C-mount
S5LPJ2399	0.336	92	14.2x10.7	19.0x14.2	26.1x19.6	38.0x28.5	2.6	127.7	C-mount
S5LPJ2599	0.393	92	12.2x9.1	16.2x12.2	22.3x16.7	32.5x24.4	0.5	150.3	C-mount
S5LPJ2499	0.492	92	9.7x7.3	13.0x9.7	17.8x13.4	26.0x19.5	0.4	156.4	C-mount
S5LPJ2999	0.732	92	6.5x4.9	8.7x6.5	12.0x9.0	17.4x13.1	0.15	185	C-mount
S5LPJ2999/M42	0.732	92	6.5x4.9	8.7x6.5	12.0x9.0	17.4x13.1	0.15	161.6	M42x1
S5LPJ3099	1.011	92	4.7x3.5	6.3x4.7	8.7x6.5	12.6x9.4	0.1	193.5	C-mount
S5LPJ3099/M42	1.011	92	4.7x3.5	6.3x4.7	8.7x6.5	12.6x9.4	0.1	169.6	M42x1

Serie Correctal® T60

Part Number	Magnification	Working Distance [mm]	Max. Object Size for [mm x mm]				Max. Distortion [%]	Length [mm]	Mount
			1/3" (4.8x3.6)	1/2" (6.4x4.8)	2/3" (8.8x6.6)	1" (12.8x9.6)			
S5LPJ1204	0.11	190	43.6x32.7	---	---	---	0.13	242	C-mount
S5LPJ1201	0.132	190	36.3x27.2	---	---	---	0.08	223	C-mount
S5LPJ1213	0.157	190	30.5x22.9	40.7x30.5	---	---	0.15	259.7	C-mount
S5LPJ1240	0.212	190	22.6x16.9	30.1x22.6	41.5x31.1	---	0.22	233.6	C-mount
S5LPJ1252	0.265	190	18.1x13.5	24.1x18.1	33.2x24.9	48.3x36.2	0.3	229.6	C-mount
S5LPJ1260	0.313	190	15.3x11.5	20.4x15.3	28.1x21.0	40.8x30.6	0.25	228.1	C-mount
S5LPJ1275	0.394	190	12.1x9.1	16.2x12.1	22.3x16.7	32.4x24.3	0.2	263.5	C-mount
S5LPJ1290/216	0.465	190	10.3x7.7	13.7x10.3	18.9x14.1	27.5x20.6	0.25	269.6	C-mount

Serie Correctal® T85

Part Number	Magnification	Working Distance [mm]	Max. Object Size for [mm x mm]				Max. Distortion [%]	Length [mm]	Mount
			1/3" (4.8x3.6)	1/2" (6.4x4.8)	2/3" (8.8x6.6)	1" (12.8x9.6)			
S5LPJ6016	0.079	180	60.7x45.5	---	---	---	0.2	270.9	C-mount
S5LPJ6020	0.1	180	48.0x36.0	64.0x48.0	---	---	0.12	284.9	C-mount
S5LPJ6024	0.121	180	39.6x29.7	52.8x39.6	---	---	0.2	254.2	C-mount
S5LPJ6036	0.127	180	37.7x28.3	50.3x37.7	---	---	0.4	292.1	C-mount
S5LPJ6030	0.144	180	33.3x25.0	44.4x33.3	61.1x45.8	---	0.15	302.7	C-mount
S5LPJ6040	0.171	180	28.0x21.0	37.4x28.0	51.4x38.5	---	0.05	250.7	C-mount
S5LPJ6041	0.195	180	24.6x18.4	32.8x24.6	45.1x33.8	---	0.25	273	C-mount
S5LPJ6045	0.218	180	22.0x16.5	29.3x22.0	40.3x30.2	57.7x44.0	0.09	288.9	C-mount
S5LPJ6050	0.246	180	19.5x14.6	26.0x19.5	35.7x26.8	52.0x39.0	0.3	272.9	C-mount
S5LPJ6050/212	0.246	180	19.5x14.6	26.0x19.5	35.7x26.8	52.0x39.0	0.3	246.8	C-mount
S5LPJ6058	0.28	180	17.1x12.8	22.8x17.1	31.4x23.5	45.7x34.2	0.05	304.9	C-mount
S5LPJ6060	0.292	180	16.4x12.3	21.9x16.4	30.1x22.6	43.8x32.8	0.3	269.6	C-mount
S5LPJ6075	0.367	180	13.0x9.8	17.4x13.0	23.9x17.9	34.8x26.1	0.2	299	C-mount

TEL : (03)462-6569 (桃園-總公司) / (04)2261-0357 (台中) / (06)208-6651 (台南)

Serie Correctal® T120

Part Number	Magnification	Working Distance [mm]	Max. Object Size for [mm x mm]				Max. Distortion [%]	Length [mm]	Mount
			1/3" (4.8x3.6)	1/2" (6.4x4.8)	2/3" (8.8x6.6)	1" (12.8x9.6)			
S5LPJ1516	0.054	284	88.8x66.6	---	---	---	0.25	389	C-mount
S5LPJ1520	0.067	284	71.6x53.7	95.5x71.6	---	---	0.15	389.9	C-mount
S5LPJ1523	0.082	284	58.5x43.9	78.0x58.5	---	---	0.3	369.8	C-mount
S5LPJ1530	0.098	284	48.9x36.7	65.3x48.9	89.7x67.3	---	0.2	428.1	C-mount
S5LPJ1541	0.132	284	36.3x27.2	48.4x36.3	66.6x50.0	---	0.3	389.1	C-mount
S5LPJ1551	0.165	284	29.0x21.8	38.7x29.0	53.3x40.0	77.5x58.1	0.4	391.6	C-mount
S5LPJ1565	0.195	284	24.6x18.4	32.8x24.6	45.1x33.8	65.6x49.2	0.25	384.5	C-mount

Serie Correctal® T150

Part Number	Magnification	Working Distance [mm]	Max. Object Size for [mm x mm]				Max. Distortion [%]	Length [mm]	Mount
			1/3" (4.8x3.6)	1/2" (6.4x4.8)	2/3" (8.8x6.6)	1" (12.8x9.6)			
S5LPJ1821	0.044	300	109.0x81.8	---	---	---	0.08	587	C-mount
S5LPJ1824	0.056	300	85.7x64.2	114.2x85.7	---	---	0.2	509	C-mount
S5LPJ1830	0.065	300	73.8x55.3	98.4x73.8	---	---	0.08	605.9	C-mount
S5LPJ1835	0.076	300	63.1x47.3	84.2x63.1	---	---	0.6	550.6	C-mount
S5LPJ1841	0.088	300	54.5x40.9	72.7x54.5	100.0x75.0	---	0.15	574.2	C-mount
S5LPJ1852	0.122	300	42.8x32.1	57.1x42.8	78.5x58.9	---	0.2	580.7	C-mount
S5LPJ1860	0.134	300	35.8x26.8	47.7x35.8	65.6x49.2	95.5x71.6	0.1	579.1	C-mount
S5LPJ1875	0.169	300	28.4x21.3	37.8x28.4	52.0x39.0	75.7x56.8	0.1	606.6	C-mount

Serie Correctal® T160 SillVision

Part Number	Magnification	Working Distance [mm]	Max. Object Size for [mm x mm]				Max. Distortion [%]	Length [mm]	Mount
			1/3" (4.8x3.6)	1/2" (6.4x4.8)	2/3" (8.8x6.6)	1" (12.8x9.6)			
S5LPJ7290	0.055	318	87.2x65.4	116.3x87.2	---	---	0.55	391.7	C-mount
S5LPJ7290/M42	0.055	318	87.2x65.4	116.3x87.2	---	---	0.5	374.2	M42x1
S5LPJ7280	0.07	318	68.5x51.4	91.4x68.5	125.7x94.2	---	0.55	391.3	C-mount
S5LPJ7280/M42	0.07	318	68.5x51.4	91.4x68.5	125.7x94.2	---	0.55	368.7	M42x1
S5LPJ7270	0.095	318	50.5x37.8	67.3x50.5	92.6x69.4	---	0.5	403.5	C-mount
S5LPJ7270/M42	0.095	318	50.5x37.8	67.3x50.5	92.6x69.4	---	0.5	383.3	M42x1
S5LPJ7260	0.134	318	35.8x26.8	47.7x35.8	65.6x49.2	95.5x71.6	0.5	403.6	C-mount
S5LPJ7260/M42	0.134	318	35.8x26.8	47.7x35.8	65.6x49.2	95.5x71.6	0.5	382.5	M42x1

Serie Correctal® T200

Part Number	Magnification	Working Distance [mm]	Max. Object Size for [mm x mm]				Max. Distortion [%]	Length [mm]	Mount
			1/3" (4.8x3.6)	1/2" (6.4x4.8)	2/3" (8.8x6.6)	1" (12.8x9.6)			
S5LPJ2710	0.032	300	150x112.5	---	---	---	0.4	478.5	C-mount
S5LPJ2716	0.021	300	94.1x70.5	125.4x94.1	---	---	0.7	498	C-mount
S5LPJ2720	0.062	300	77.4x58.0	103.2x77.4	141.9x106.4	---	0.7	469.2	C-mount
S5LPJ2725	0.074	300	64.8x48.6	86.4x64.8	118.9x89.1	---	1	514.7	C-mount

Serie Correctal® XT300 SillVision

Part Number	Magnification	Working Distance [mm]	Max. Object Size for [mm x mm]				Max. Distortion [%]	Length [mm]	Mount
			1/3" (4.8x3.6)	1/2" (6.4x4.8)	2/3" (8.8x6.6)	1" (12.8x9.6)			
S5LPJ7325	0.027	408.8	177.7x133.3	237.0x177.7	---	---	0.5	537.4	C-mount
S5LPJ7325/M42	0.027	408.8	177.7x133.3	237.0x177.7	---	---	0.5	526.5	M42x1
S5LPJ7330	0.035	408.8	137.1x102.8	182.8x137.1	251.4x188.5	---	0.5	551.3	C-mount
S5LPJ7330/M42	0.035	408.8	137.1x102.8	182.8x137.1	251.4x188.5	---	0.5	528.8	M42x1
S5LPJ7320	0.047	408.8	102.1x76.5	136.1x102.1	187.2x140.4	---	0.5	574	C-mount
S5LPJ7320/M42	0.047	408.8	102.1x76.5	136.1x102.1	187.2x140.4	---	0.5	551.9	M42x1
S5LPJ7315	0.067	408.8	71.6x53.7	95.5x71.6	131.3x98.5	191.0x143.2	0.5	606.8	C-mount
S5LPJ7315/M42	0.067	408.8	71.6x53.7	95.5x71.6	131.3x98.5	191.0x143.2	0.5	581.2	M42x1

Telecentric Lenses Correctal® T

Part Number	Magnification	Working Distance [mm]	Max. Object Size for [mm x mm]				Max. Distortion [%]	Length [mm]	Mount
			1/3" (4.8x3.6)	1/2" (6.4x4.8)	2/3" (8.8x6.6)	1" (12.8x9.6)			
S5LPJ5060	0.193	309	24.8x18.6	33.1x24.8	45.5x34.1	---	0.8	344.1	C-mount
S5LPJ5160	0.2	297	24.0x18.0	32.0x24.0	---	---	0.2	333.1	C-mount
S5LPJ3060	0.338	174	14.2x10.6	18.9x14.2	26.0x19.5	---	0.5	208.1	C-mount
S5LPJ2660	0.377	15	12.7x9.5	16.9x12.7	23.3x175.5	---	0.6	190.2	C-mount
S5LPJ2060	0.502	117	9.5x7.1	12.7x9.5	17.5x13.1	---	0.3	148.9	C-mount
S5LPJ1560	0.664	87	7.2x5.4	9.6x7.2	13.2x9.9	---	0.6	121.1	C-mount

Telecentric Lenses Correctal® T Standard Compact

Part Number	Magnification	Working Distance [mm]	Max. Object Size for [mm x mm]				Max. Distortion [%]	Length [mm]	Mount
			1/3" (4.8x3.6)	1/2" (6.4x4.8)	2/3" (8.8x6.6)	1" (12.8x9.6)			
S5LPJ0200	0.102	205	47.0x35.2	---	---	---	1	249	C-mount
S5LPJ0204	0.118	182	40.6x30.5	---	---	---	1.5	222.1	C-mount
S5LPJ2204	0.133	144	36.0x27.0	48.1x36.0	---	---	0.15	216	C-mount
S5LPJ0202	0.136	150	35.2x26.4	47.0x35.2	---	---	2	198.2	C-mount
S5LPJ0203	0.17	100	28.2x21.1	37.6x28.2	---	---	2.1	177.7	C-mount
S5LPJ0199	0.2	98	24.0x18.0	32.0x24.0	---	---	4	155.9	C-mount
S5LPJ0198	0.25	71	19.2x14.4	25.6x19.2	---	---	1.5	132.6	C-mount

Telecentric Lenses Correctal® T with Long Working Distance

Part Number	Magnification	Working Distance [mm]	Max. Object Size for [mm x mm]				Max. Distortion [%]	Length [mm]	Mount
			1/3" (4.8x3.6)	1/2" (6.4x4.8)	2/3" (8.8x6.6)	1" (12.8x9.6)			
S5LPJ1235	0.083	400	57.8x43.3	77.1x57.8	---	---	2.5	432.8	C-mount
S5LPJ0110	0.097	307	49.4x37.1	65.9x49.4	---	---	1.1	375.1	C-mount
S5LPJ0125	0.131	300	36.6x27.4	48.8x36.6	---	---	1.1	345.9	C-mount
S5LPJ1365	1	365	4.8x3.6	6.4x4.8	---	---	0.05	203.8	C-mount
S5LPJ0635	1.102	230	4.3x3.2	5.8x4.3	7.9x5.9	---	1.15	178.5	C-mount
S5LPJ7625	1.331	145	3.6x2.7	4.8x3.6	6.6x4.9	---	<0.05	175.2	C-mount
S5LPJ1360	1.6	310	3.0x2.2	4.0x3.0	5.5x4.1	8.0x6.0	0.08	262.2	C-mount
S5LPJ1366	1.6	308	3.0x2.2	4.0x3.0	---	---	0.15	268.1	C-mount
S5LPJ1390	1.87	365	2.5x1.9	3.4x2.5	4.7x3.5	6.8x5.1	0.08	279.1	C-mount
S5LPJ1302	2	192.1	2.4x1.8	3.2x2.4	4.4x3.3	---	<0.05	179.3	C-mount
S5LPJ1304/216	4	184	1.2x0.9	1.6x1.2	2.2x1.6	---	<0.05	298.8	C-mount

Telecentric Lenses Correctal® T – Special

Part Number	Magnification	Working Distance [mm]	Max. Object Size for [mm x mm]				Max. Distortion [%]	Length [mm]	Mount
			1/3" (4.8x3.6)	1/2" (6.4x4.8)	2/3" (8.8x6.6)	1" (12.8x9.6)			
S5LPJ3799	0.13	171	36.9x27.6	49.2x27.6	---	---	0.2	213.1	C-mount
S5LPJ5725	0.252	158	19.0x14.2	25.3x19.0	34.9x26.1	---	0.15	137.9	C-mount
S5LPJ3075	0.375	90	12.8x9.6	17.0x12.8	23.4x17.6	---	0.1	93.1	C-mount
S5LPJ2005/216	0.522	195	9.1x6.8	12.2x9.1	16.8x12.6	24.5x18.3	0.17	231.7	C-mount
S5LPJ0695	0.6	95	8.0x6.0	10.6x8.0	---	---	0.06	52	C-mount
S5LPJ4061/216	0.6	121	8.0x6.0	10.6x8.0	14.6x11.0	21.3x16.0	0.1	179.7	C-mount
S5LPJ2605/216	0.7	145.6	6.8x5.1	9.1x6.8	12.5x9.4	18.2x13.7	0.2	178.4	C-mount
S5LPJ2606/216	0.713	143	6.7x5.0	8.9x6.7	12.3x9.2	17.9x13.4	0.07	178.9	C-mount
S5LPJ7626	0.793	170	6.0x4.5	8.0x6.0	---	---	<0.05	145.1	C-mount
S5LPJ1005/216	0.924	100	5.1x3.8	6.9x5.1	9.5x7.1	13.8x10.3	0.2	164.4	C-mount
S5LPJ0625	1	187	4.8x3.6	6.4x4.8	8.8x6.6	---	0.5	136.2	C-mount
S5LPJ1007/216	1	91	4.8x3.6	6.4x4.8	8.8x6.6	12.8x9.6	0.2	149.7	C-mount
S5LPJ2425	1	106	4.8x3.6	6.4x4.8	8.8x6.6	---	0.8	87.4	C-mount
S5LPJ2425/121	1	106	4.8x3.6	6.4x4.8	8.8x6.6	12.8x9.6	0.8	87.4	C-mount
S5LPJ4425	1	107.5	4.8x3.6	6.4x4.8	8.8x6.6	---	0.05	85.4	C-mount
S5LPJ2428	1.5	92.5	3.2x2.4	4.2x3.2	5.8x4.4	8.5x6.4	0.7	105.1	C-mount
S5LPJ0492/216	2	96.5	2.4x1.8	3.2x2.4	4.4x3.3	6.4x4.8	0.12	203.4	C-mount
S5LPJ2426	2	85.7	2.4x1.8	3.2x2.4	4.4x3.3	6.4x4.8	0.4	129.2	C-mount
S5LPJ0426	2.5	102.1	11.9x1.4	2.5x1.9	3.5x2.6	5.1x3.8	0.08	180	C-mount
S5LPJ0420	3	98.5	1.6x1.2	2.1x1.6	2.9x2.2	---	<0.05	207.2	C-mount
S5LPJ0423/216	3.5	95.9	1.3x1.0	1.8x1.3	2.5x1.8	3.6x2.7	<0.05	234.2	C-mount
S5LPJ8325	5	69.5	0.9x0.7	1.2x0.9	1.7x1.3	2.5x1.9	<0.05	240.5	C-mount
S5LPJ8425	5	85	0.9x0.7	1.2x0.9	1.7x1.3	---	<0.05	255.4	C-mount
S5LPJ0452/216	8	50.3	0.6x0.4	0.8x0.6	1.1x0.8	1.6x1.2	<0.05	223.3	C-mount
S5LPJ0455	10	49.7	0.4x0.3	0.6x0.4	0.8x0.6	1.2x0.9	<0.05	266.5	C-mount

Miniature Telecentric Lenses with C-Mount

Part Number	Magnification	Working Distance [mm]	Max. Object Size for [mm x mm]				Max. Distortion [%]	Length [mm]	Mount
			1/3" (4.8x3.6)	1/2" (6.4x4.8)	2/3" (8.8x6.6)	1" (12.8x9.6)			
S5LPJ8111	1	113	4.8x3.6	6.4x4.8	8.8x6.6	---	0.1	79.5	C-mount
S5LPJ8165	1	65.9	4.8x3.6	6.4x4.8	---	---	0.1	95.4	C-mount
S5LPJ8211	2	11	2.4x1.8	3.2x2.4	4.4x3.3	---	0.1	87	C-mount
S5LPJ8265	2	66.7	2.4x1.8	3.2x2.4	4.4x3.3	---	0.1	63.5	C-mount
S5LPJ8411	4	11	1.2x0.9	1.6x1.2	2.2x1.6	---	0.1	91.4	C-mount
S5LPJ8465	4	64.5	1.2x0.9	1.6x1.2	2.2x1.6	---	0.4	67.6	C-mount
S5LPJ8611	6	109.5	0.8x0.6	1.0x0.8	1.4x1.1	---	0.1	118.5	C-mount
S5LPJ8665	6	64.5	0.8x0.6	1.0x0.8	1.4x1.1	---	0.1	80.3	C-mount
S5LPJ8811	8	109.1	0.6x0.4	0.8x0.6	1.1x0.8	---	0.1	137	C-mount
S5LPJ8865	8	64	0.6x0.4	0.8x0.6	1.1x0.8	---	0.1	95	C-mount

TEL : (03)462-6569 (桃園-總公司) / (04)2261-0357 (台中) / (06)208-6651 (台南)

Airspaced - Focusing Lenses

Achromatic or multi-element systems can be used for collimating fiber delivered laser beams or for imaging systems. Doublets can be used as focusing lenses in static or flying optical systems for focusing a laser beam. We offer also mounted doublets and mounted air spaced multi element systems.

Mounted - Fused Silica

1030nm - 1090nm

Part Number	Focal Length [mm]	Clear-Ø [mm]	Housing-Ø [mm]	Length [mm]	Working Distance [mm]	Number of Lenses
S6ASS2020/328	25.1	12.5	25	13.5	19.8	3
S6ASS2550/328	49.7	23	30	20	48.3	2
S6ASS2560/328	59.9	23	30	22.5	57.5	2
S6ASS2060/328	63.9	34	40	32	49.3	3
S6ASS5080/328	79.6	48	54	36	60	3
S6ASS1093/328	100.6	40	48	22	86.1	2
S6ASS6101/328	100.6	50	56	22.5	85.9	2
S6ASS6120/328	120.1	48	54	59	112.4	2
S6ASS5120/328	128.7	40	48	20	118.7	2
S6ASS5150/328	148.9	45	50	43	152.3	2
S6ASS5151/328	148.9	48	54	43	152.3	2
S6ASS5152/328	153.4	68	75	34	128.4	2
S6ASS5170/328	171.1	45	50	43	175.2	2
S6ASS5201/328	200.1	68	75	23	185.9	2
S6ASS6200/328	201	48	54	15	193.3	2
S6ASS2250/328	249.8	50	54	20	247.5	2

1064nm

Part Number	Focal Length [mm]	Clear-Ø [mm]	Housing-Ø [mm]	Length [mm]	Working Distance [mm]	Number of Lenses
S6ASS2020/126	25.1	12.5	25	13.5	19.8	3
S6ASS2550/126	49.7	23	30	20	48.3	2
S6ASS2560/126	59.9	23	30	22.5	57.5	2
S6ASS2060/126	63.9	34	40	32	49.3	3
S6ASS5080/126	79.6	48	54	36	60.1	3
S6ASS1093/126	100.6	40	48	22	86.1	2
S6ASS6101/126	100.6	50	56	22.5	85.9	2
S6ASS6120/126	120.1	48	54	59	112.4	2
S6ASS5120/126	128.7	40	48	20	118.7	2
S6ASS5150/126	148.9	45	50	43	152.3	2
S6ASS5151/126	148.9	48	54	43	152.3	2
S6ASS5152/126	153.4	68	75	34	128.4	2
S6ASS5170/126	171.1	45	50	43	175.2	2
S6ASS5201/126	200.1	68	75	23	185.9	2
S6ASS6200/126	201	48	54	15	193.3	2
S6ASS2250/126	249.8	50	54	20	247.5	2

Mounted - Optical Glass

1064nm

Part Number	Focal Length (mm)	Clear-Ø (mm)	Housing-Ø (mm)	Length (mm)	Working Distance (mm)	Number of Lenses
S6ASS1030/126	30	14	20	11	26.5	2
S6ASS1035/126	35	16	20	11	32	2
S6ASS0065/126	40.1	26	28	22.5	31.6	3
S6ASS0063/126	40.3	20	23	14	29.8	2
S6ASS0030/126	50	23.5	35	34	27.5	3
S6ASS0159/126	56	35	41	26.5	42.7	3
S6ASS5060/126	59.9	48	54	36	42.5	3
S6ASS0064/126	60	26	28	22.5	54.7	2
S6ASS0074/126	60	20	23	14	54.5	2
S6ASS0168/126	65.8	33	41	24	57.2	2
S6ASS0311/126	70.8	26	28	22.5	64.9	2
S6ASS0177/126	76.7	35	41	24	64.2	3
S6ASS6001/126	79.6	48	54	36	67.3	3
S6ASS0067/126	80.6	41	48	22	70.1	2
S6ASS0078/126	85.3	26	28	22.5	80	2
S6ASS0115/126	90	35	41	32	89.1	3
S6ASS0091/126	100.2	31	41	22	85.4	2
S6ASS0098/126	121.6	35	41	24	110.8	3
S6ASS0169/126	125.2	43	52	29	109.8	3
S6ASS0097/126	134.8	45	52	22	125	3
S6ASS0066/126	162.2	35	41	22	153.3	2

532nm

Part Number	Focal Length (mm)	Clear-Ø (mm)	Housing-Ø (mm)	Length (mm)	Working Distance (mm)	Number of Lenses
S6ASS1030/121	29.8	14	20	11	24.9	2
S6ASS0177/121	76.6	35	41	24	64	3
S6ASS6001/121	80	48	54	36	63.8	3
S6ASS5340/121	88.9	31	41	21.8	64.4	2
S6ASS0115/121	89.4	35	41	32	88.7	3
S6ASS5320/121	114.5	31	41	15.5	105.8	2

Mounted - Fused Silica

515nm - 545nm

Part Number	Focal Length (mm)	Clear-Ø (mm)	Housing-Ø (mm)	Length (mm)	Working Distance (mm)	Number of Lenses
S6ASS2020/292	24.5	12.5	25	13.5	19.3	3
S6ASS2550/292	49.3	23	30	20	45.7	2
S6ASS2560/292	58.4	23	30	24.5	56	2
S6ASS2060/292	62.4	34	40	32	47.9	3
S6ASS5300/292	99.8	20	41	16	87.6	3
S6ASS6150/292	486.3	50	56	22.5	135	2
S6ASS5370/292	174.5	35	41	24	173.2	2
S6ASS6200/292	196.2	48	54	15	188.6	2

532nm

Part Number	Focal Length (mm)	Clear-Ø (mm)	Housing-Ø (mm)	Length (mm)	Working Distance (mm)	Number of Lenses
S6ASS2020/121	24.5	12.5	25	13.5	19.3	3
S6ASS2550/121	49.3	23	30	20	45.7	2
S6ASS2560/121	58.4	23	30	24.5	56	2
S6ASS2060/121	62.4	34	40	32	47.9	3
S6ASS5300/121	99.8	20	41	16	87.6	3
S6ASS6150/121	486.3	50	56	22.5	135	2
S6ASS5370/121	174.5	35	41	24	173.2	2
S6ASS6200/121	196.2	48	54	15	188.6	2

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355nm

Part Number	Focal Length (mm)	Clear-Ø (mm)	Housing-Ø (mm)	Length (mm)	Working Distance (mm)	Number of Lenses
S6ASS2020/075	25.4	12.5	25	17	17.9	3
S6ASS2550/075	48.2	23	30	20	43.5	2
S6ASS2060/075	60	34	40	30	46.5	3
S6ASS5185/075	86.4	30	40	15	77.8	2
S6ASS5120/075	114.4	40	48	20	104.4	2

266nm

Part Number	Focal Length (mm)	Clear-Ø (mm)	Housing-Ø (mm)	Length (mm)	Working Distance (mm)	Number of Lenses
S6ASS2020/199	23.8	12.5	25	17	16.9	3
S6ASS2550/199	44.3	23	30	20	42.9	2
S6ASS2060/199	57.3	34	40	30	43.9	3
S6ASS5185/199	81.9	30	40	15	73.4	2
S6ASS5120/199	109	40	48	20	99.1	2

Achromatic Doublets

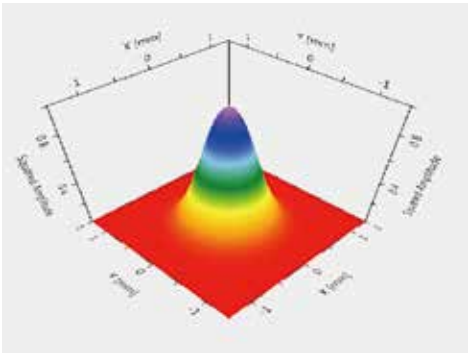
Cemented - Optical Glass

1064nm

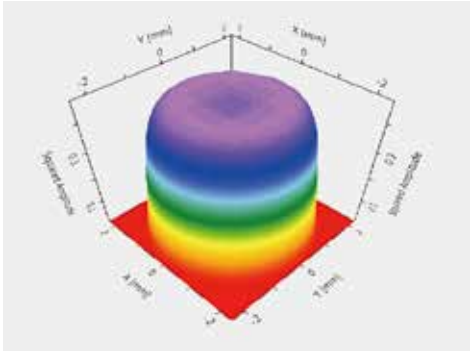
Part Number	Focal Length (mm)	Lens-Ø (mm)	Center Thickness (mm)
S1LAO0103/126	25	12.5	5.5
S1LAO0063/126	50	25	9.1
S1LAO0079/126	50	20	6.9
S1LAO0167/126	50	31.5	14.3
S1LAO0025/126	60	30	12.5
S1LAO0071/126	60	25.4	9.5
S1LAO0075/126	60	18	6
S1LAO6022/126	60	22.4	10
S1LAO0705/126	75	25	7
S1LAO0028/126	80	31.5	11.2
S1LAO0054/126	80	18	5.2
S1LAO0067/126	80	50	20.2
S1LAO0080/126	80	25	8.2
S1LAO0115/126	90	30	11
S1LAO0026/126	100	30	17.5
S1LAO0066/126	100	50	17.5
S1LAO0072/126	100	25.4	7.2
S1LAO0029/126	120	31.5	9.4
S1LAO0065/126	120	50	15.5
S1LAO0073/126	120	25.4	7.2
S1LAO0061/126	160	50	13.5
S1LAO0070/126	160	31.5	8.6
S1LAO0069/126	190	50	13.6
S1LAO0099/126	190	75	25
S1LAO0098/126	200	50	12.6
S1LAO0200/126	200	19	5
S1LAO1098/126	200	63	17.2
S1LAO0068/126	300	50	12
S1LAO0101/126	300	80	18.5

Beam Shaper

This is our latest developed item from Wavelength Opto-Electronic. The beam shaper is functioned to change the Gaussian profile of a light source (commonly laser) to become a Top-Hat profile.

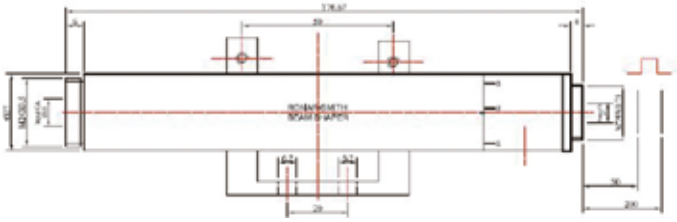


Original Gaussian Profile



Top Hat profile after Beam Shaper

The design is based on transmissive model that can be used with maximum input beam size of 4.6mm and output at 8mm. Currently, we have available design for 355nm, 532nm, 1064nm, 10.6um.



The output beam is collimated. Thus it can be used with normal lenses after the beam shaper. We are open for other wavelength requirement, depends on your specific applications.

BS - 1064/532/355/266

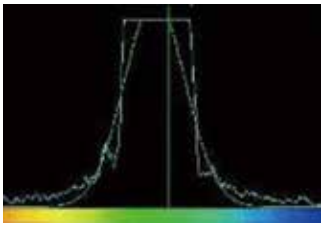
Part No.	Applicable Input Beam Size (mm)	Output Beam Size (mm)	Max. outer Dia (mm)	Total Length (mm)	Working Distance (mm)	Wavelength (nm)
BS-266	4.6 - 5.0	5.5 - 6.0	27	158.9	25 - 200	266
BS-355	4.6 - 5.0	5.5 - 6.0	27	170.7	25 - 200	355
BS-532	4.6 - 5.0	5.5 - 6.0	27	171.0	25 - 200	532
BS-1064	4.6 - 5.0	5.5 - 6.0	27	176.7	25 - 200	1064

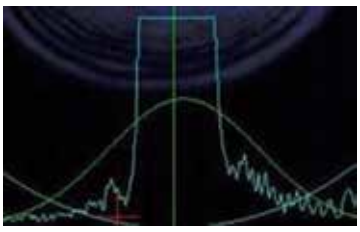
BS - 1064/532/355/266 W600

Part No.	Applicable Input Beam Size (mm)	Output Beam Size (mm)	Max. outer Dia (mm)	Total Length (mm)	Working Distance (mm)	Wavelength (nm)
BS-266-6-W600	5.8 - 6.0	5.0 - 5.5	30	151.6	100 - 600	266
BS-355-6-W600	5.8 - 6.0	5.0 - 5.5	30	160.5	100 - 600	355
BS-532-6-W600	5.8 - 6.0	5.0 - 5.5	30	171.5	100 - 600	532
BS-1064-6-W600	5.8 - 6.0	5.0 - 5.5	30	175.5	100 - 600	1064

BS - 10.6

Part No.	Applicable Input Beam Size (mm)	Output Beam Size (mm)	Max. outer Dia (mm)	Total Length (mm)	Working Distance (mm)	Wavelength (um)
BS-10.6	3.0 - 4.0	6.0 - 8.0	28	109.0	25 - 100	10.6
BS-10.6-12-W600	12.0	12.0	46	285.3	25 - 600	10.6





Applications

It is commonly used for drilling and marking applications. The Top Hat profile cut or mark result has higher quality than the Gaussian. It is widely used in the industry.

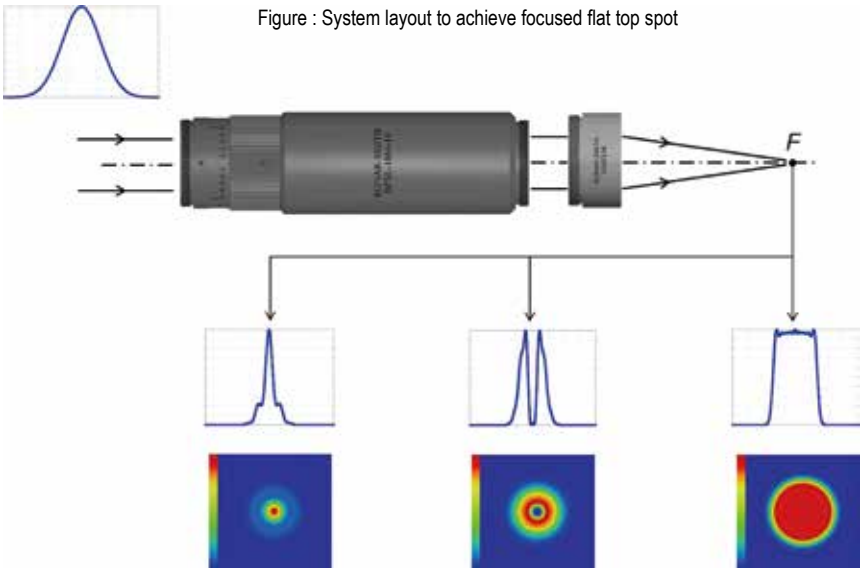
TEL : (03)462-6569 (桃園-總公司) / (04)2261-0357 (台中) / (06)208-6651 (台南)

Focal Beam Shaper

355nm / 532nm / 1064nm / 10.6um

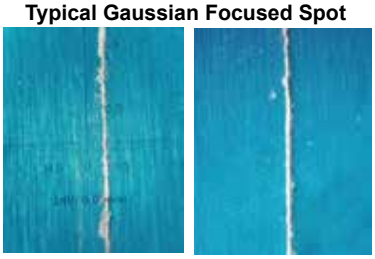
Wavelength Opto-Electronic has successfully developed our Focal Beam Shaper Series which converts a collimated Gaussian beam to a collimated output beam. This output beam is not a flat top profile while it was designed to achieve flat top profile at target plane.This beam shaper has to be used incorporated with a focusing lens or diffraction-limited performance lens to acquire a flat top focused spot at vicinity of target plane. The flat top spot size is able to achieve sub-micron level and good uniformity.Focusing lens is available at different Focal length for your specific application.

Figure : System layout to achieve focused flat top spot

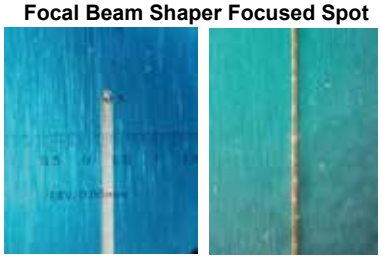


Testing Result

Typical Gaussian Focused Spot



Focal Beam Shaper Focused Spot



Work piece: Aluminum sheet Laser: CW 1064nm

Applications

Surface heat treatment, solar cell scribing, via-hole drilling, laser ablation, dicing, and micromachining, marking, and cutting

Part No	BSFL-355-6	BSFL-532-10	BSFL-1064-10	BSFL-10.6-20
Wavelength	355nm	532nm	1064nm	10.6μm
Beam Mode	TEM_{00}			
M^2	< 1.2			
Beam Ellipticity	~ 0.98 - 1			
Input beam waist diameter ($1/e^2$) [mm]	6	10	10	20
Output Beam Diameter [mm]	6	10	10	20
Input Full Beam Divergence Angle [mrad]	~ 0.1	~ 0.1	~ 0.2	~ 0.04
Output Full Beam Diver- gence Angle [mrad]	~ 1.0	~ 1.1	~ 1.6	~ 4.7