



OPTIGER

光虎视觉



MACHINE VISION LENS PRODUCT GUIDE

1st Edition of Year 2022

COMPANY PROFILE

Optiger Optoelectronics Technology (Tianjin) Co., Ltd. ("OPTIGER" for short) devotes itself to the development and manufacture of high-precision industrial lenses for precision measurement and defect inspection applications in the field of machine vision. With high-precision bi-telecentric lenses as its core products, OPTIGER's products line also includes telecentric lenses, zoom lenses and supporting products such as coaxial illuminations, telecentric illuminations and other related products. Mass production as well as R&D and manufacture tailored to customers' requirements are available.

Committed to R&D and manufacture of proprietary products, OPTIGER is rated as a high-tech enterprise obtaining over 20 independent intellectual property rights. Besides, it is also a member of Machine Vision Industry Union of ZGC.

Dr. Liu Lu, acting as CTO of OPTIGER, is a PhD degree holder of Oxford University with his research project funded by European Research Council, a top academic institution in Europe. OPTIGER's proprietary products are all designed by a highly experienced team of experts in Germany.

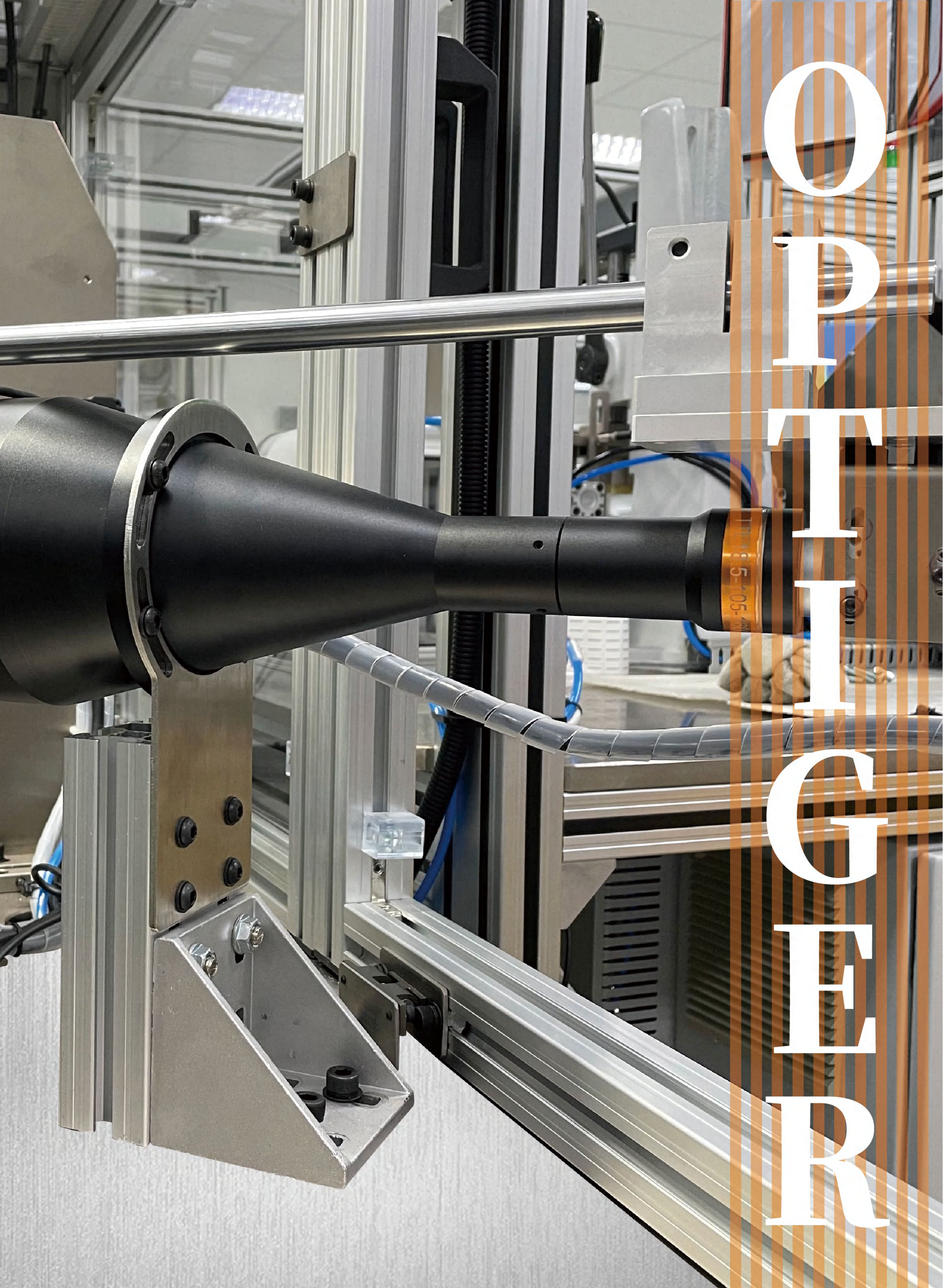
OPTIGER is equipped with advanced testing instruments, including ZYGO interferometer, PERKIN ELMER spectrophotometer, KYORITSU ELECTRIC centering instrument, etc. Also, an optical vacuum coating laboratory, equipped with a SATIS VACUUM optical coating machine, has been established for technical staff from OPTIGER's process technology department to carry on continuous in-depth research on coating technology, enabling OPTIGER's industrial lenses to possess optimal performance in optics with customer satisfaction.

All lenses are delivered after stringent quality control procedure and it is guaranteed that each of them meets design requirements in all the following aspects:

- || Full range of FOV
- || Full range of DOF
- || Full range of wavelength

Consistency in image quality is ensured in center and edge of the FOV. All parameters meet the requirements in the said three aspects.





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-

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With Working Distance of 110mm and Offering Options between High Resolution and Deep DOF
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-

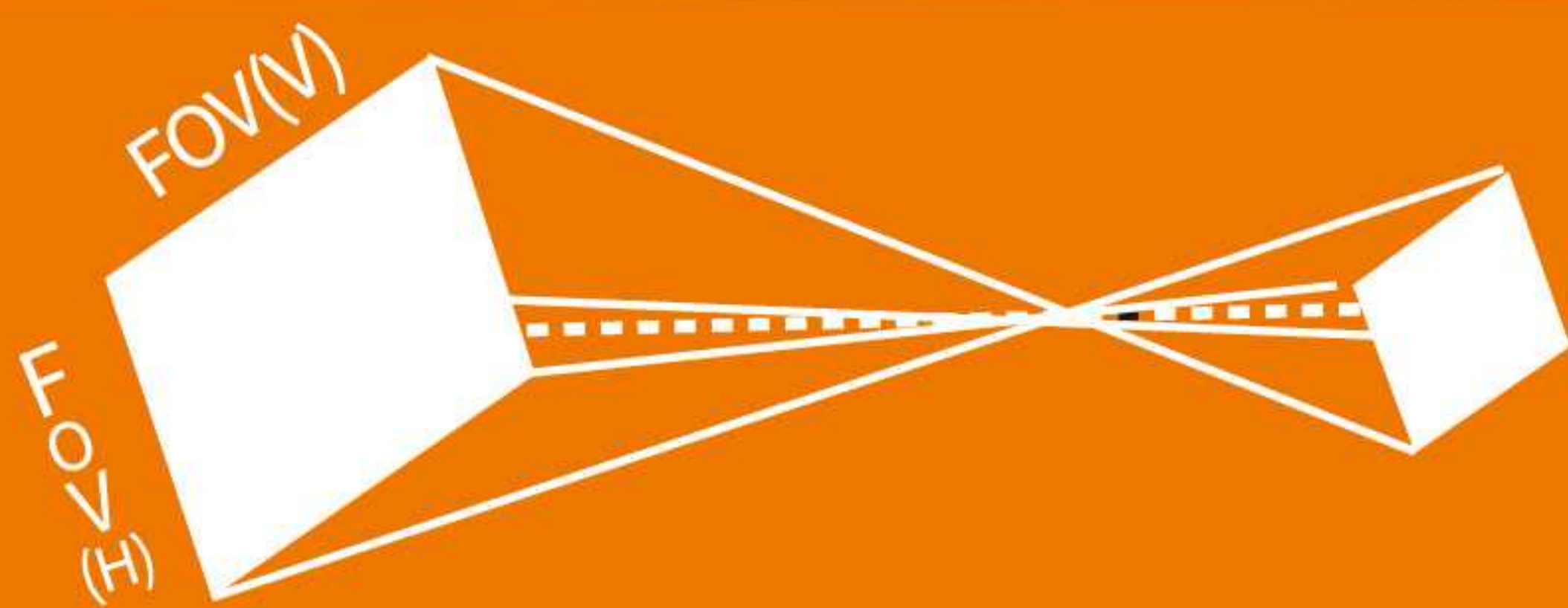
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TTL SERIES

Bi-telecentric Lenses with Large FOV and High Precision

- || Designed in Germany
- || CTO—Phd Degree Holder of Oxford University
- || Available for Industrial Cameras with Sensor Size from 2/3" to 62mm
- || Large FOV from 11.5mm-315mm
- || Distortion: <0.05%
- || Telecentricity: <0.05°
- || IP 65 for Use in Harsh Industrial Environments

Magnification



Magnification is the ratio between the size of an object on the camera sensor and the actual size of it.

$$\text{Magnification } (\beta) = \frac{\text{Sensor } (V), (H) \text{ or } (D)}{\text{FOV } (V), (H) \text{ or } (D)}$$

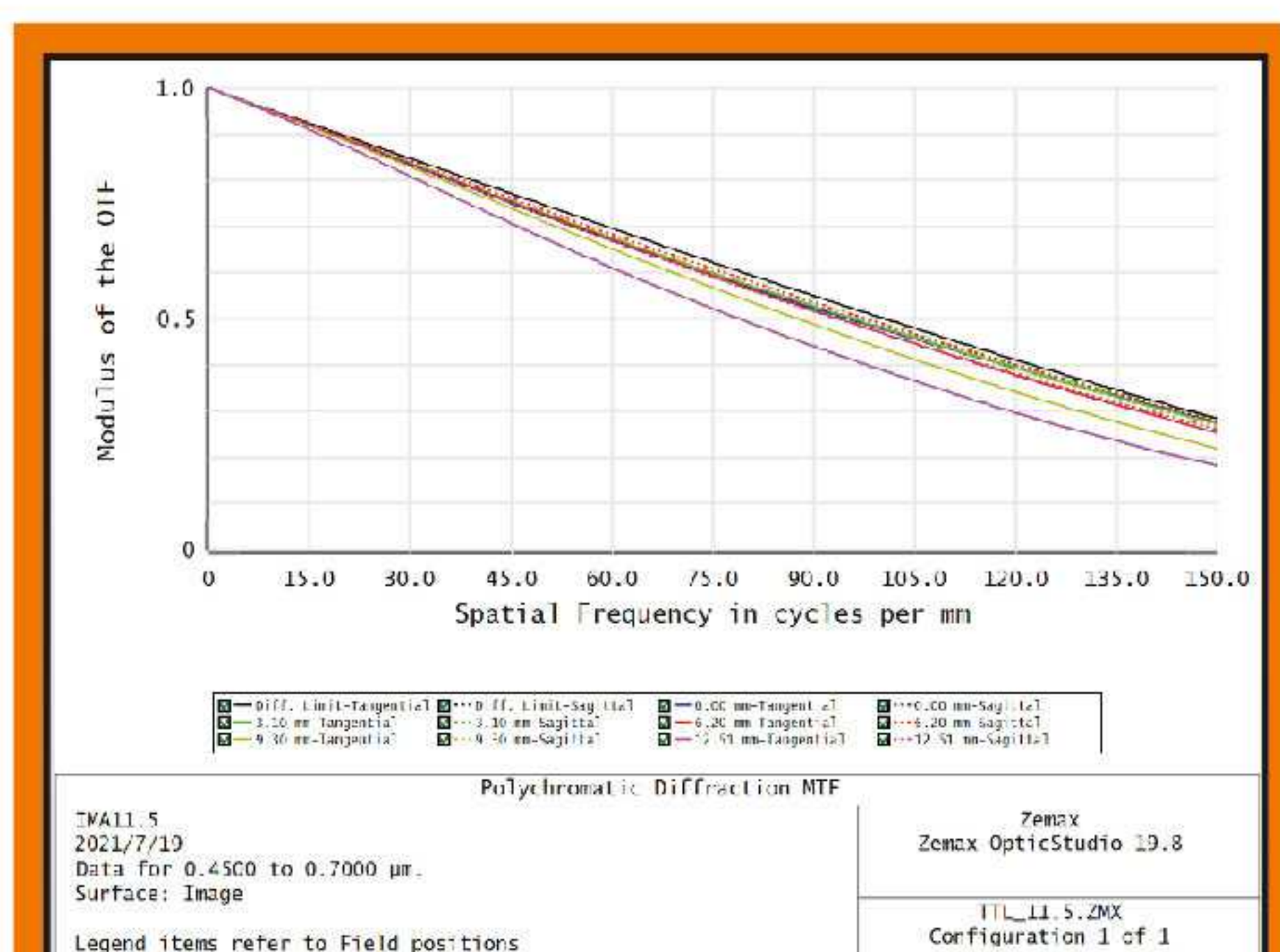


TTL11.5

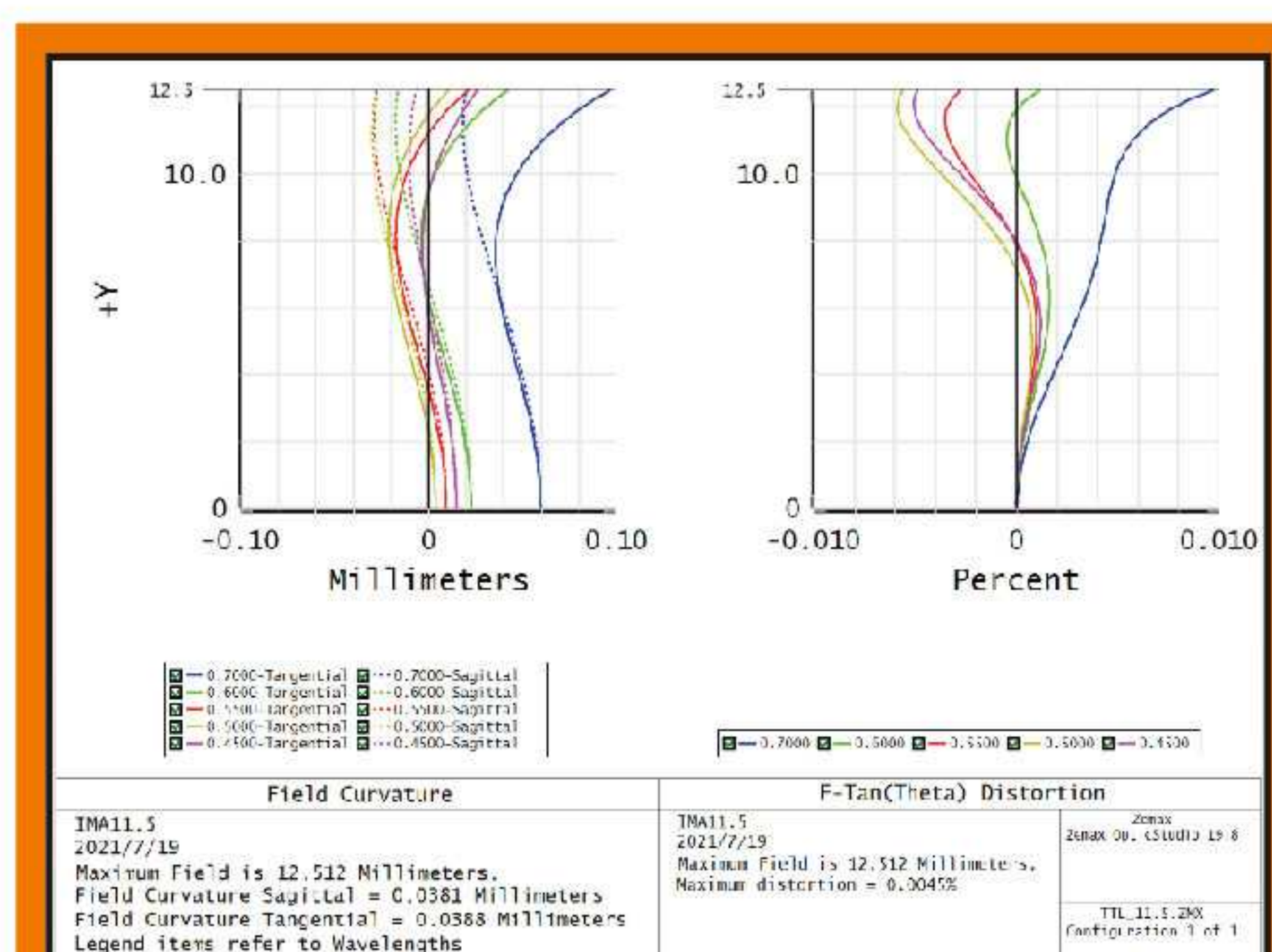
FEATURES

1. Optical magnification: 1.000x-0.037x
2. FOV: 11.5mm -315mm, satisfying different requirements on field of view
3. WD: 25mm-545mm, satisfying different requirements on working distance
4. Distortion: <0.05%, telecentricity: <0.05°
5. Bi-telecentric design, very deep DOF, high resolution
6. Multi-layer coating, high transmittance
7. IP 65 for use in harsh industrial environments
8. Options between high resolution and deep DOF are available, satisfying different technical requirements
9. Customized aperture is available
10. Working distance can be adjusted within certain limits as per customers' requirements

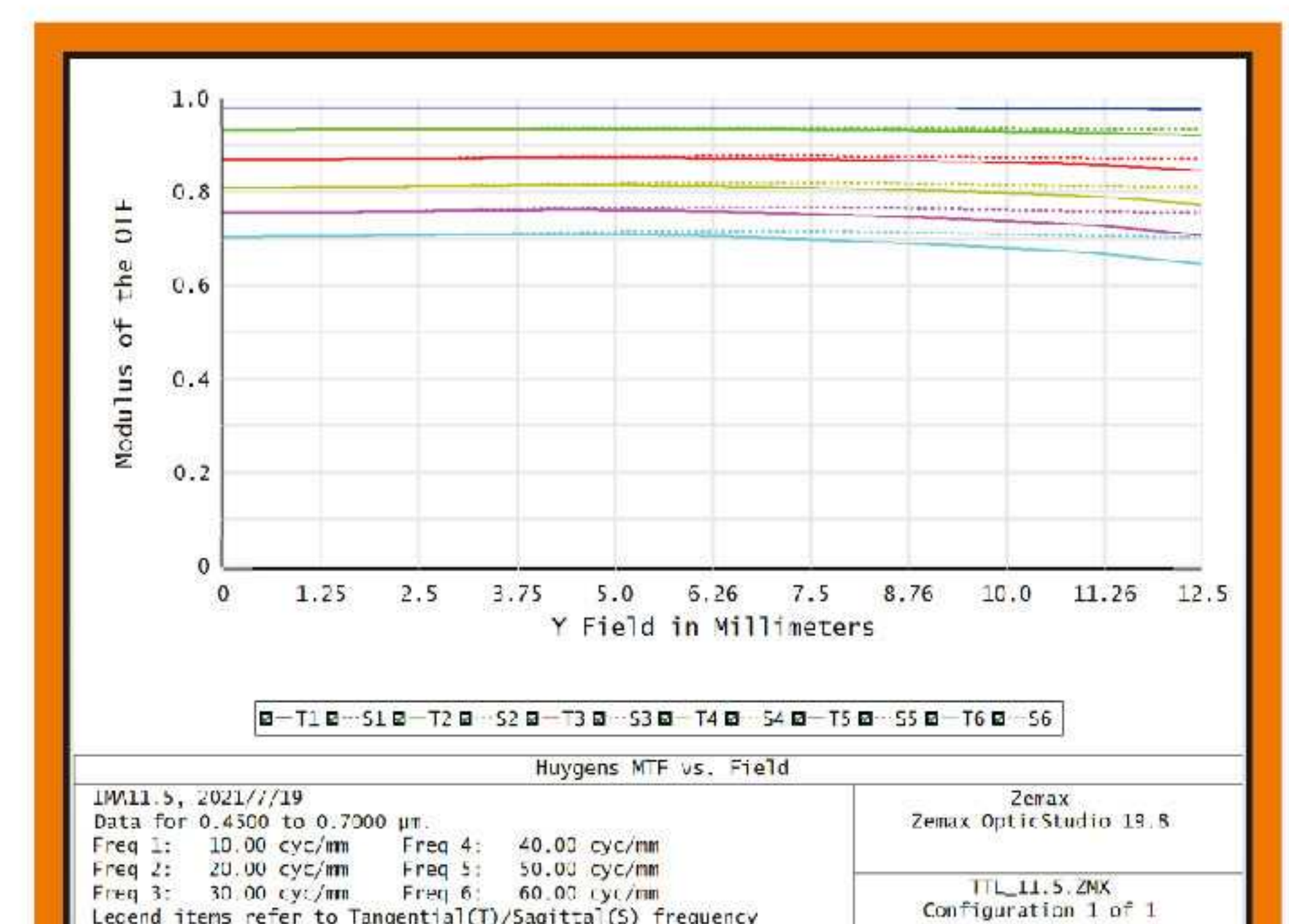
OPTICAL CHARACTERISTICS



11.5-MTF

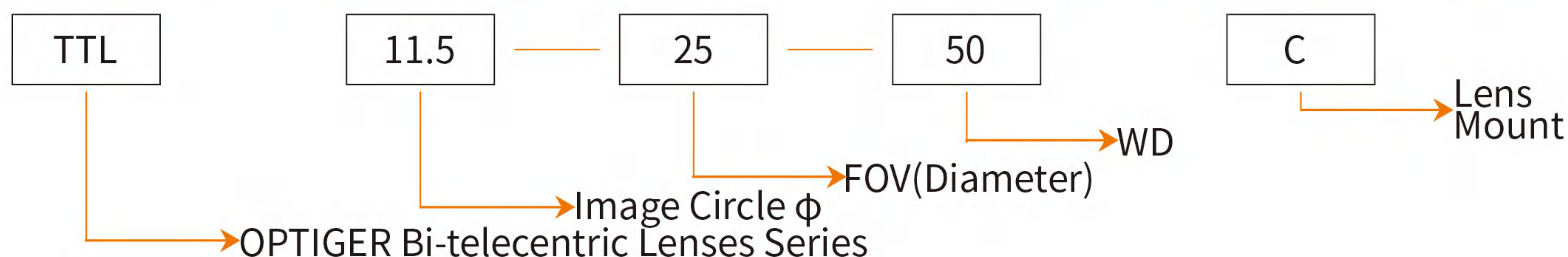


11.5-Distortion



11.5-Contrast

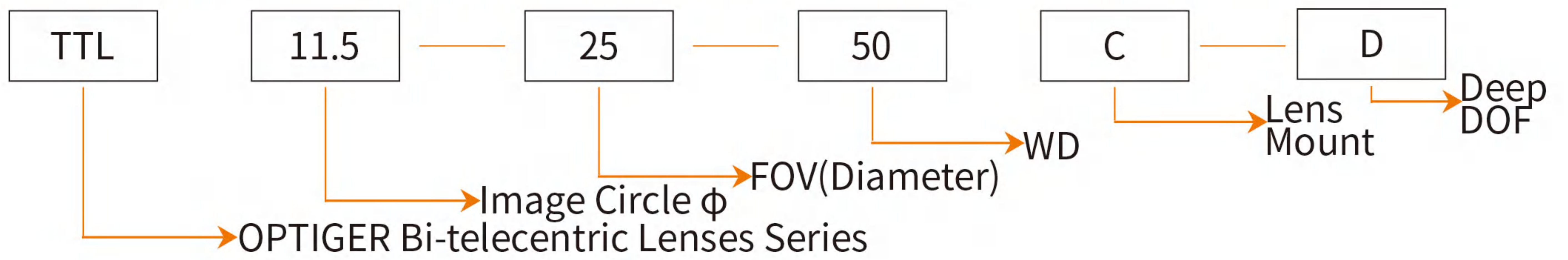
MODEL DESCRIPTION OF LENS SERIES WITH HIGH RESOLUTION



SPECIFICATIONS

Model	Max. FOV (mm)	Magnification	WD (mm)	2/3"			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^{\circ}$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				9.2	6.9	11.5						
TTL11.5-11.5-25C	11.5	1.000	25 \pm 2	9.2	6.9	11.5	7	4.70	0.56	<0.04	<0.02	C
TTL11.5-25-50C	25	0.460	50 \pm 1	20.0	15.0	25.0	7	10.21	2.65	<0.02	<0.035	C
TTL11.5-25-110C	25	0.460	110 \pm 1	20.0	15.0	25.0	7	10.21	2.65	<0.05	<0.05	C
TTL11.5-35-60C	35	0.329	60 \pm 5	28.0	21.0	35.0	7	14.28	5.17	<0.05	<0.05	C
TTL11.5-45-70C	45	0.256	70 \pm 5	35.9	27.0	44.9	7	18.35	8.54	<0.03	<0.035	C
TTL11.5-45-120C	45	0.256	120 \pm 5	35.9	27.0	44.9	7	18.35	8.54	<0.025	<0.02	C
TTL11.5-60-80C	60	0.192	80 \pm 5	47.9	35.9	59.9	7	24.46	15.19	<0.05	<0.05	C
TTL11.5-70-100C	70	0.164	100 \pm 5	56.1	42.1	70.1	7	28.64	20.82	<0.02	<0.04	C
TTL11.5-70-150C	70	0.164	150 \pm 5	56.1	42.1	70.1	7	28.64	20.82	<0.05	<0.05	C
TTL11.5-70-180C	70	0.164	180 \pm 5	56.1	42.1	70.1	7	28.64	20.82	<0.008	<0.01	C
TTL11.5-85-125C	85	0.135	125 \pm 5	68.1	51.1	85.2	7	34.79	30.73	<0.05	<0.05	C
TTL11.5-105-160C	105	0.110	160 \pm 5	83.6	62.7	104.5	7	42.70	46.28	<0.015	<0.03	C
TTL11.5-105-260C	105	0.110	260 \pm 5	83.6	62.7	104.5	7	42.70	46.28	<0.05	<0.05	C
TTL11.5-125-195C	125	0.092	195 \pm 5	100.0	75.0	125.0	7	51.05	66.16	<0.05	<0.05	C
TTL11.5-155-255C	155	0.074	255 \pm 5	124.3	93.2	155.4	7	63.47	102.26	<0.05	<0.05	C
TTL11.5-185-320C	185	0.062	320 \pm 5	148.4	111.3	185.5	7	75.76	145.68	<0.05	<0.05	C
TTL11.5-215-375C	215	0.053	375 \pm 5	173.6	130.2	217.0	7	88.62	199.36	<0.05	<0.05	C
TTL11.5-245-420C	245	0.047	420 \pm 5	195.7	146.8	244.7	7	99.94	253.51	<0.05	<0.05	C
TTL11.5-270-480C	270	0.043	480 \pm 5	214.0	160.5	267.4	7	109.23	302.87	<0.05	<0.05	C
TTL11.5-315-545C	315	0.037	545 \pm 5	248.6	186.5	310.8	7	126.95	409.06	<0.05	<0.05	C

MODEL DESCRIPTION OF LENS SERIES WITH DEEP DOF



SPECIFICATIONS

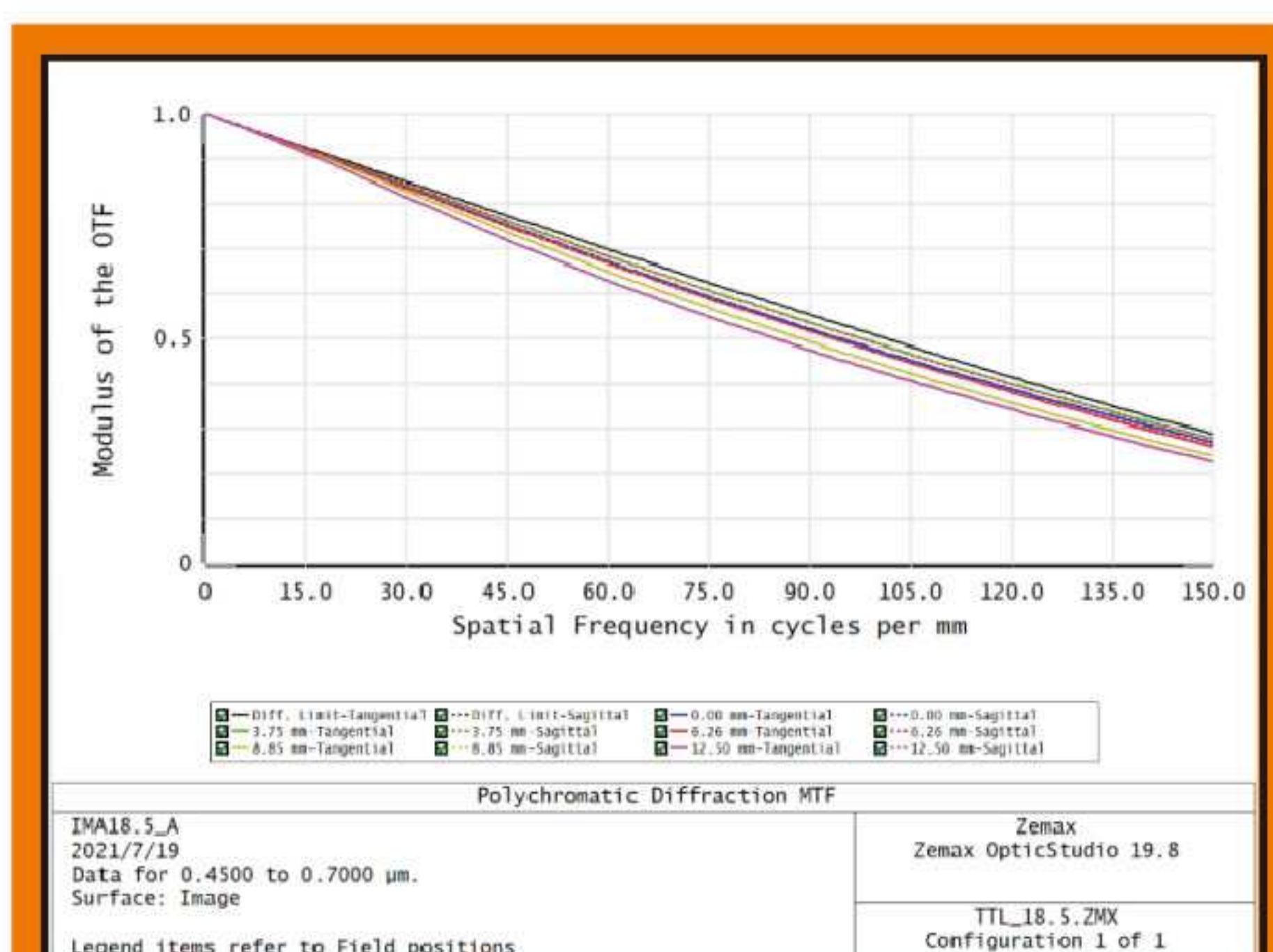
Model	Max. FOV (mm)	Magnification	WD (mm)	2/3"			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^{\circ}$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				9.2	6.9	11.5						
TTL11.5-11.5-25C-D	11.5	1.000	25 \pm 2	9.2	6.9	11.5	16	10.74	1.28	<0.05	<0.05	C
TTL11.5-25-50C-D	25	0.460	50 \pm 1	20.0	15.0	25.0	16	23.34	6.05	<0.05	<0.05	C
TTL11.5-25-110C-D	25	0.460	110 \pm 1	20.0	15.0	25.0	16	23.34	6.05	<0.05	<0.05	C
TTL11.5-35-60C-D	35	0.329	60 \pm 5	28.0	21.0	35.0	16	32.67	11.86	<0.05	<0.05	C
TTL11.5-45-70C-D	45	0.256	70 \pm 5	35.9	27.0	44.9	16	42.01	19.60	<0.05	<0.05	C
TTL11.5-45-120C-D	45	0.256	120 \pm 5	35.9	27.0	44.9	16	42.01	19.60	<0.02	<0.01	C
TTL11.5-60-80C-D	60	0.192	80 \pm 5	47.9	35.9	59.9	16	56.01	34.84	<0.05	<0.05	C
TTL11.5-70-100C-D	70	0.164	100 \pm 5	56.1	42.1	70.1	16	65.35	47.43	<0.05	<0.05	C
TTL11.5-70-150C-D	70	0.164	150 \pm 5	56.1	42.1	70.1	16	65.35	47.43	<0.05	<0.05	C
TTL11.5-70-180C-D	70	0.164	180 \pm 5	56.1	42.1	70.1	16	65.35	47.43	<0.002	<0.01	C
TTL11.5-85-125C-D	85	0.135	125 \pm 5	68.1	51.1	85.2	16	79.35	69.93	<0.05	<0.05	C
TTL11.5-105-160C-D	105	0.11	160 \pm 5	83.6	62.7	104.5	16	98.02	106.71	<0.05	<0.05	C
TTL11.5-105-260C-D	105	0.11	260 \pm 5	83.6	62.7	104.5	16	98.02	106.71	<0.05	<0.05	C
TTL11.5-125-195C-D	125	0.092	195 \pm 5	100.0	75.0	125.0	16	116.70	151.23	<0.05	<0.05	C
TTL11.5-155-255C-D	155	0.074	255 \pm 5	124.3	93.2	155.4	16	144.70	232.53	<0.05	<0.05	C
TTL11.5-185-320C-D	185	0.062	320 \pm 5	148.4	111.3	185.5	16	172.71	331.25	<0.05	<0.05	C
TTL11.5-215-375C-D	215	0.053	375 \pm 5	173.6	130.2	217.0	16	202.57	455.68	<0.05	<0.05	C
TTL11.5-245-420C-D	245	0.047	420 \pm 5	195.7	146.8	244.7	16	228.72	580.96	<0.05	<0.05	C
TTL11.5-270-480C-D	270	0.043	480 \pm 5	214.0	160.5	267.4	16	249.67	692.27	<0.05	<0.05	C
TTL11.5-315-545C-D	315	0.037	545 \pm 5	248.6	186.5	310.8	16	290.16	934.99	<0.05	<0.05	C

TTL18.5

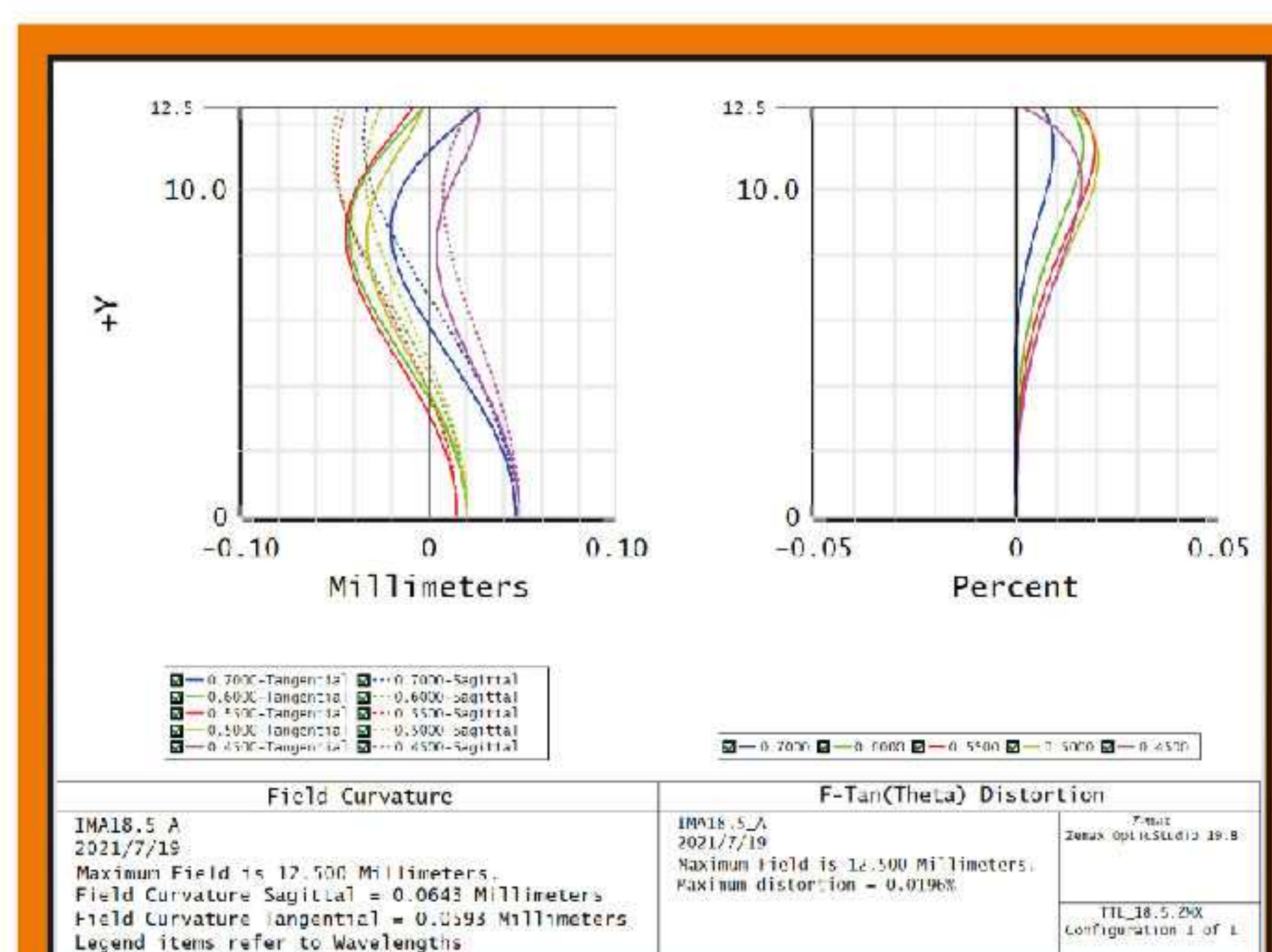
FEATURES

1. Optical magnification: 1.609x-0.059x
2. FOV: 11.5mm -315mm, satisfying different requirements on field of view
3. WD: 25mm-545mm, satisfying different requirements on working distance
4. Distortion: <0.05%, telecentricity: <0.05°
5. Bi-telecentric design, very deep DOF, high resolution
6. Multi-layer coating, high transmittance
7. IP 65 for use in harsh industrial environments
8. Options between high resolution and deep DOF are available, satisfying different technical requirements
9. Customized aperture is available
10. Working distance can be adjusted within certain limits as per customers' requirements

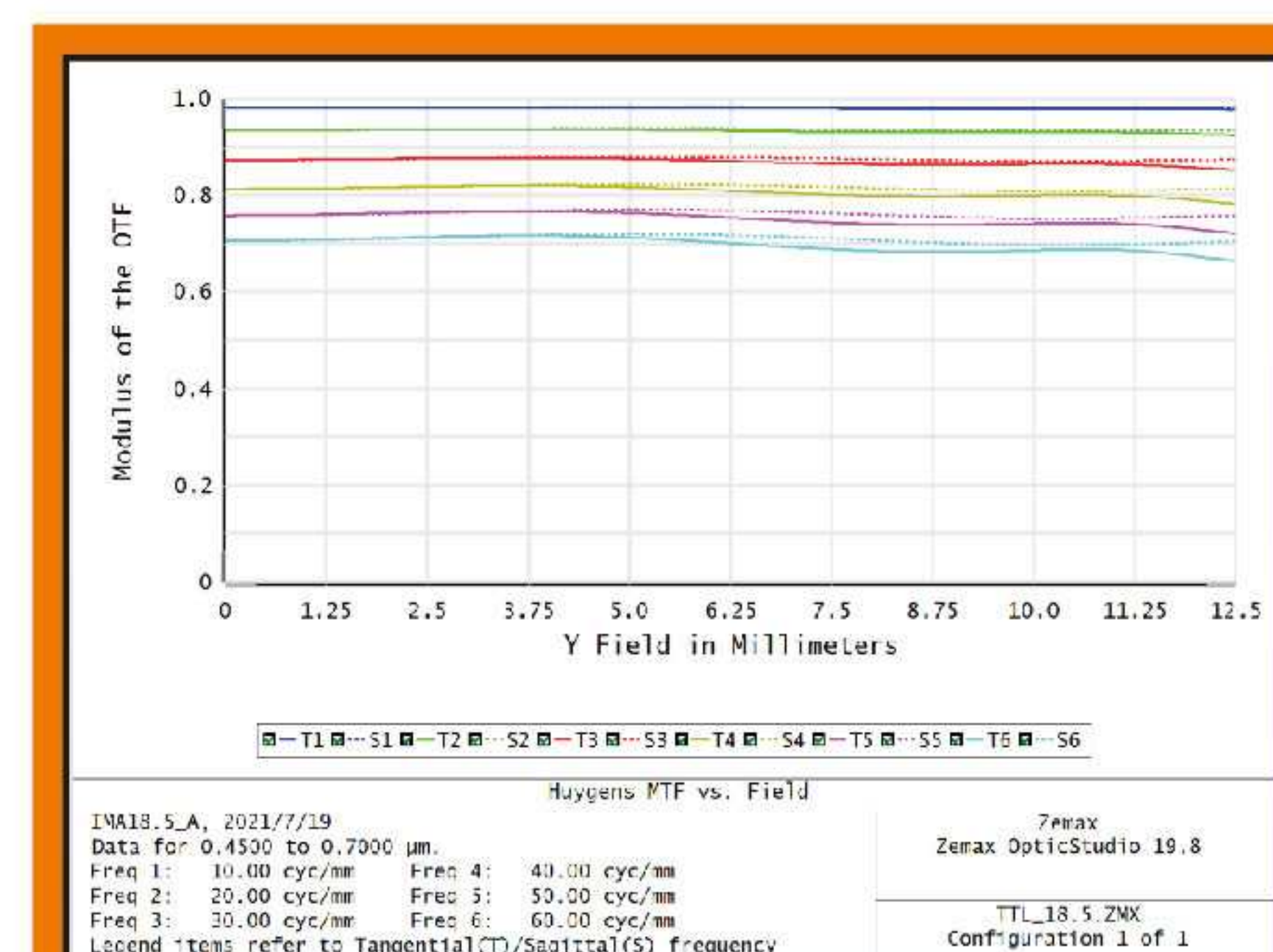
OPTICAL CHARACTERISTICS



18.5-MTF

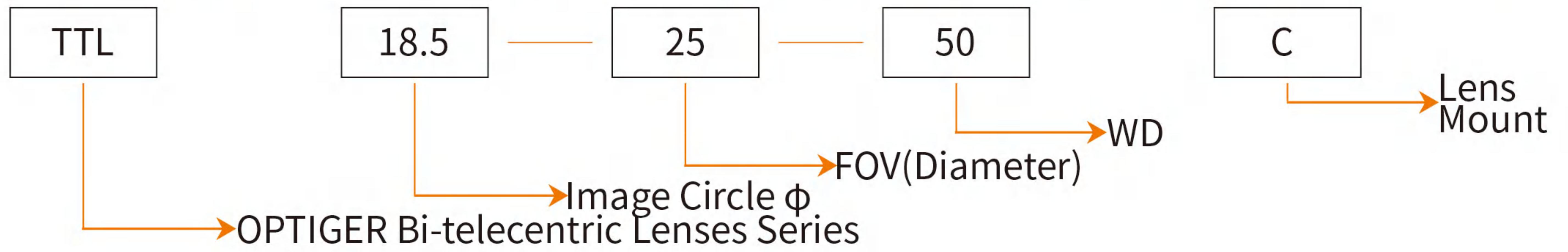


18.5-Distortion



18.5-Contrast

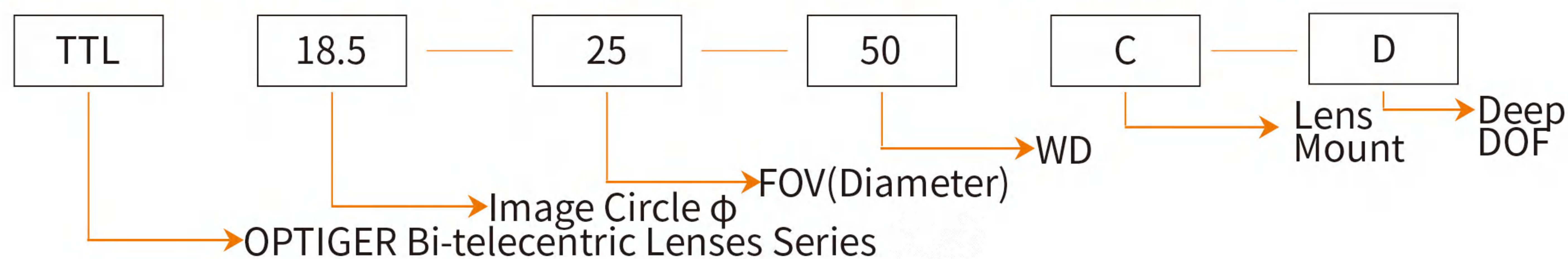
MODEL DESCRIPTION OF LENS SERIES WITH HIGH RESOLUTION



SPECIFICATIONS

Model	Max. FOV (mm)	Magnification	WD (mm)	1.1"			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^{\circ}$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				14.8	11.1	18.5						
TTL18.5-11.5-25C	11.5	1.609	25 \pm 2	9.2	6.9	11.5	7	2.92	0.22	<0.04	<0.025	C
TTL18.5-25-50C	25	0.740	50 \pm 1	20.0	15.0	25.0	7	6.35	1.02	<0.035	<0.03	C
TTL18.5-35-60C	35	0.529	60 \pm 5	28.0	21.0	35.0	7	8.88	2.00	<0.05	<0.05	C
TTL18.5-45-70C	45	0.411	70 \pm 5	36.0	27.0	45.0	7	11.43	3.32	<0.01	<0.02	C
TTL18.5-60-80C	60	0.308	80 \pm 5	48.1	36.0	60.1	7	15.25	5.90	<0.05	<0.05	C
TTL18.5-60-160C	60	0.308	160 \pm 5	48.1	36.0	60.1	7	15.25	5.90	<0.05	<0.05	C
TTL18.5-70-100C	70	0.264	100 \pm 5	56.1	42.0	70.1	7	17.79	8.03	<0.03	<0.04	C
TTL18.5-70-150C	70	0.264	150 \pm 5	56.1	42.0	70.1	7	17.79	8.03	<0.05	<0.05	C
TTL18.5-85-125C	85	0.218	125 \pm 5	67.9	50.9	84.9	7	21.55	11.78	<0.05	<0.05	C
TTL18.5-105-160C	105	0.176	160 \pm 5	84.1	63.1	105.1	7	26.69	18.08	<0.01	<0.02	C
TTL18.5-105-220C	105	0.176	220 \pm 5	84.1	63.1	105.1	7	26.69	18.08	<0.03	<0.03	C
TTL18.5-125-195C	125	0.148	195 \pm 5	100.0	75.0	125.0	7	31.74	25.57	<0.05	<0.05	C
TTL18.5-155-255C	155	0.119	255 \pm 5	124.4	93.3	155.5	7	39.47	39.55	<0.05	<0.05	C
TTL18.5-185-320C	185	0.100	320 \pm 5	148.0	111.0	185.0	7	46.97	56.00	<0.05	<0.05	C
TTL18.5-215-375C	215	0.086	375 \pm 5	172.1	129.1	215.1	7	54.62	75.72	<0.05	<0.05	C
TTL18.5-245-420C	245	0.076	420 \pm 5	194.7	146.1	243.4	7	61.80	96.95	<0.05	<0.05	C
TTL18.5-270-480C	270	0.069	480 \pm 5	214.5	160.9	268.1	7	68.07	117.62	<0.05	<0.05	C
TTL18.5-315-545C	315	0.059	545 \pm 5	250.8	188.1	313.6	7	79.61	160.87	<0.05	<0.05	C

MODEL DESCRIPTION OF LENS SERIES WITH DEEP DOF



SPECIFICATIONS

Model	Max. FOV (mm)	Magnification	WD (mm)	1.1"			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^{\circ}$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				14.8	11.1	18.5						
TTL18.5-11.5-25C-D	11.5	1.609	25 \pm 2	9.2	6.9	11.5	16	6.67	0.49	<0.05	<0.05	C
TTL18.5-25-50C-D	25	0.740	50 \pm 1	20.0	15.0	25.0	16	14.51	2.34	<0.05	<0.05	C
TTL18.5-35-60C-D	35	0.529	60 \pm 5	28.0	21.0	35.0	16	20.31	4.58	<0.05	<0.05	C
TTL18.5-45-70C-D	45	0.411	70 \pm 5	36.0	27.0	45.0	16	26.11	7.57	<0.05	<0.05	C
TTL18.5-60-80C-D	60	0.308	80 \pm 5	48.1	36.0	60.1	16	34.82	13.46	<0.05	<0.05	C
TTL18.5-60-160C-D	60	0.308	160 \pm 5	48.1	36.0	60.1	16	34.82	13.46	<0.05	<0.05	C
TTL18.5-70-100C-D	70	0.264	100 \pm 5	56.1	42.0	70.1	16	40.62	18.33	<0.05	<0.05	C
TTL18.5-70-150C-D	70	0.264	150 \pm 5	56.1	42.0	70.1	16	40.62	18.33	<0.05	<0.05	C
TTL18.5-85-125C-D	85	0.218	125 \pm 5	67.9	50.9	84.9	16	49.33	27.02	<0.05	<0.05	C
TTL18.5-105-160C-D	105	0.176	160 \pm 5	84.1	63.1	105.1	16	60.93	41.23	<0.05	<0.05	C
TTL18.5-105-220C-D	105	0.176	220 \pm 5	84.1	63.1	105.1	16	60.93	41.23	<0.03	<0.03	C
TTL18.5-125-195C-D	125	0.148	195 \pm 5	100.0	75.0	125.0	16	72.54	58.44	<0.05	<0.05	C
TTL18.5-155-255C-D	155	0.119	255 \pm 5	124.4	93.3	155.5	16	89.95	89.85	<0.05	<0.05	C
TTL18.5-185-320C-D	185	0.100	320 \pm 5	148.0	111.0	185.0	16	107.36	128.00	<0.05	<0.05	C
TTL18.5-215-375C-D	215	0.086	375 \pm 5	172.1	129.1	215.1	16	124.77	172.88	<0.05	<0.05	C
TTL18.5-245-420C-D	245	0.076	420 \pm 5	194.7	146.1	243.4	16	141.26	221.61	<0.05	<0.05	C
TTL18.5-270-480C-D	270	0.069	480 \pm 5	214.5	160.9	268.1	16	155.59	268.85	<0.05	<0.05	C
TTL18.5-315-545C-D	315	0.059	545 \pm 5	250.8	188.1	313.6	16	181.97	367.71	<0.05	<0.05	C

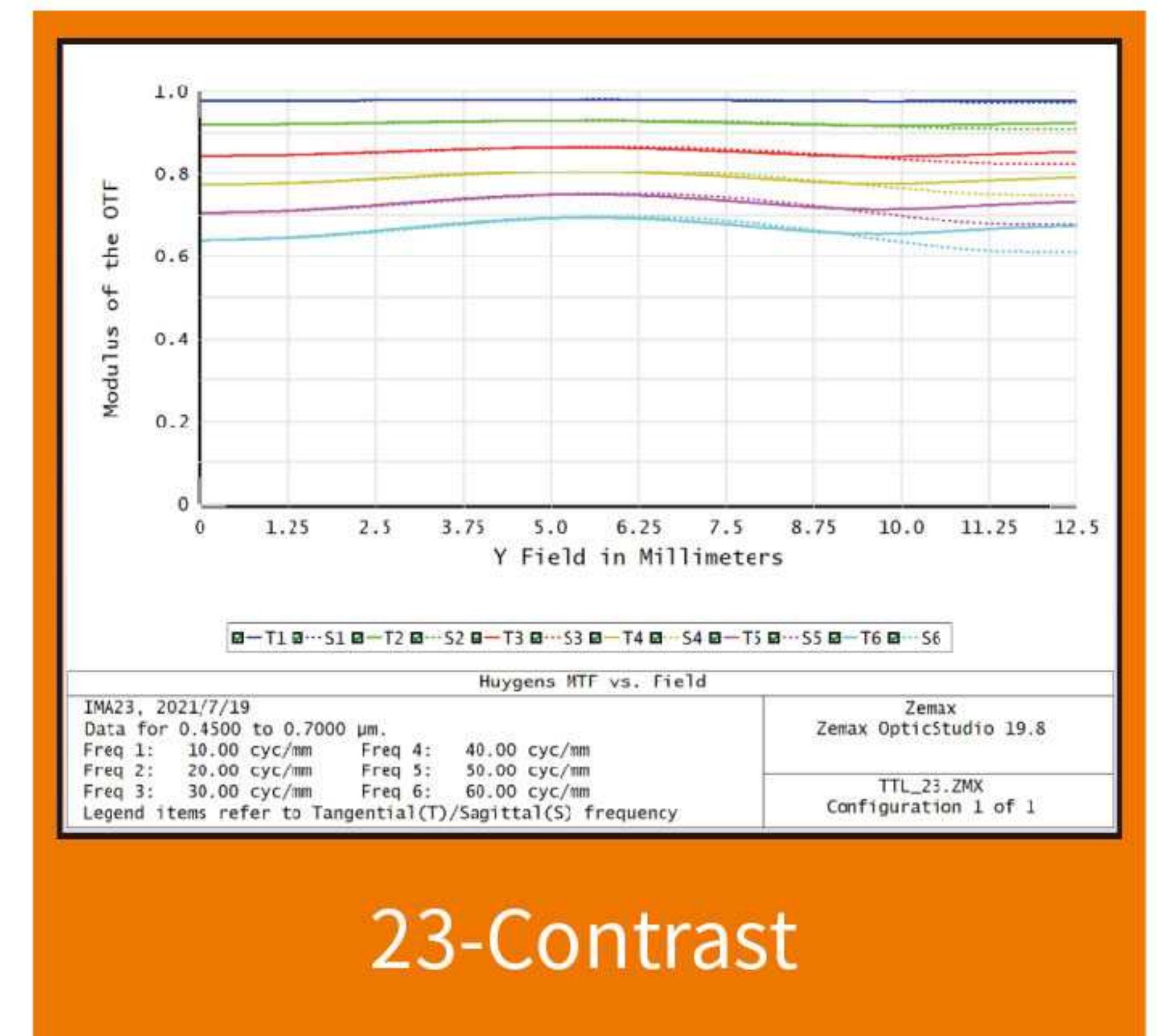
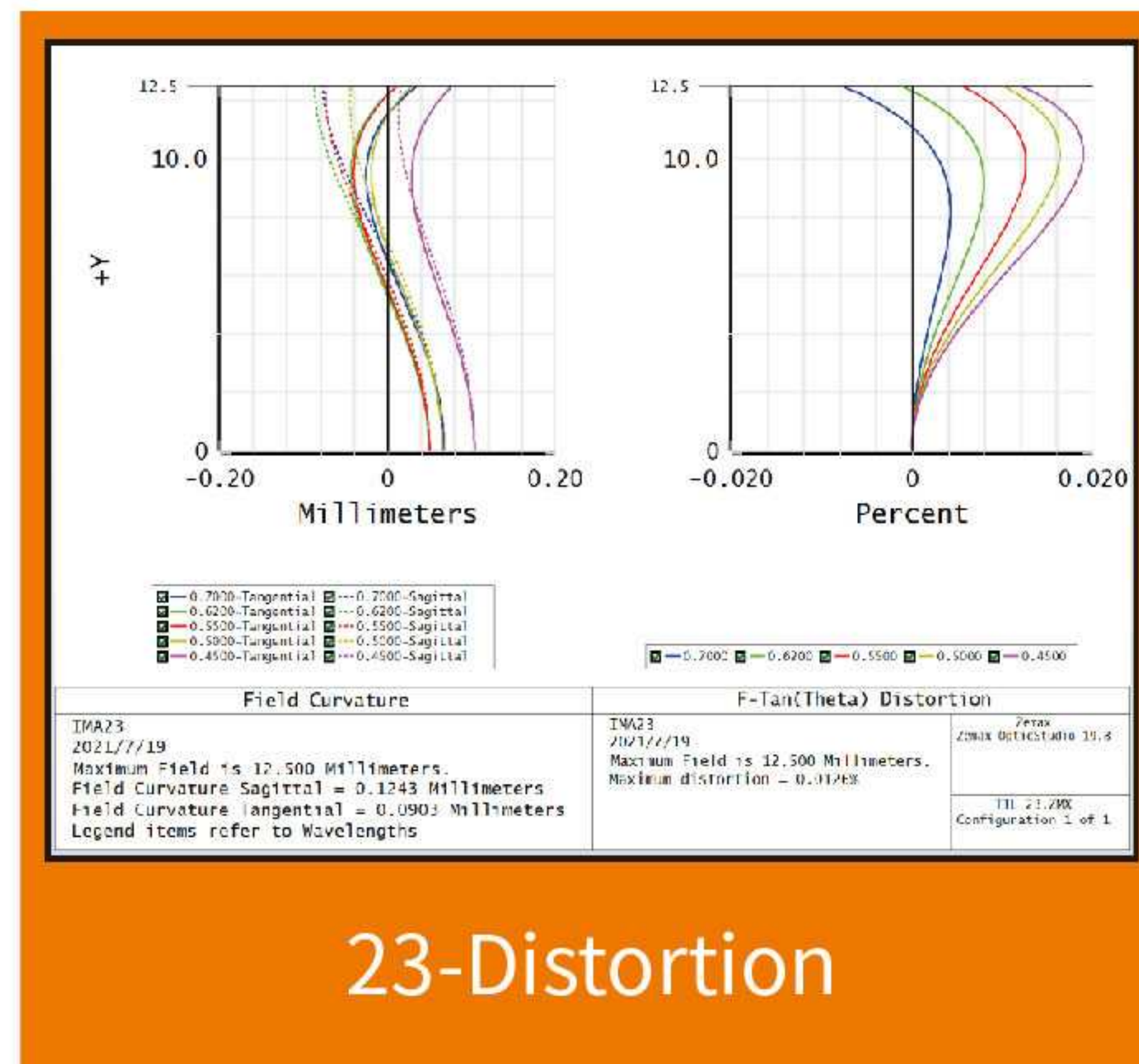
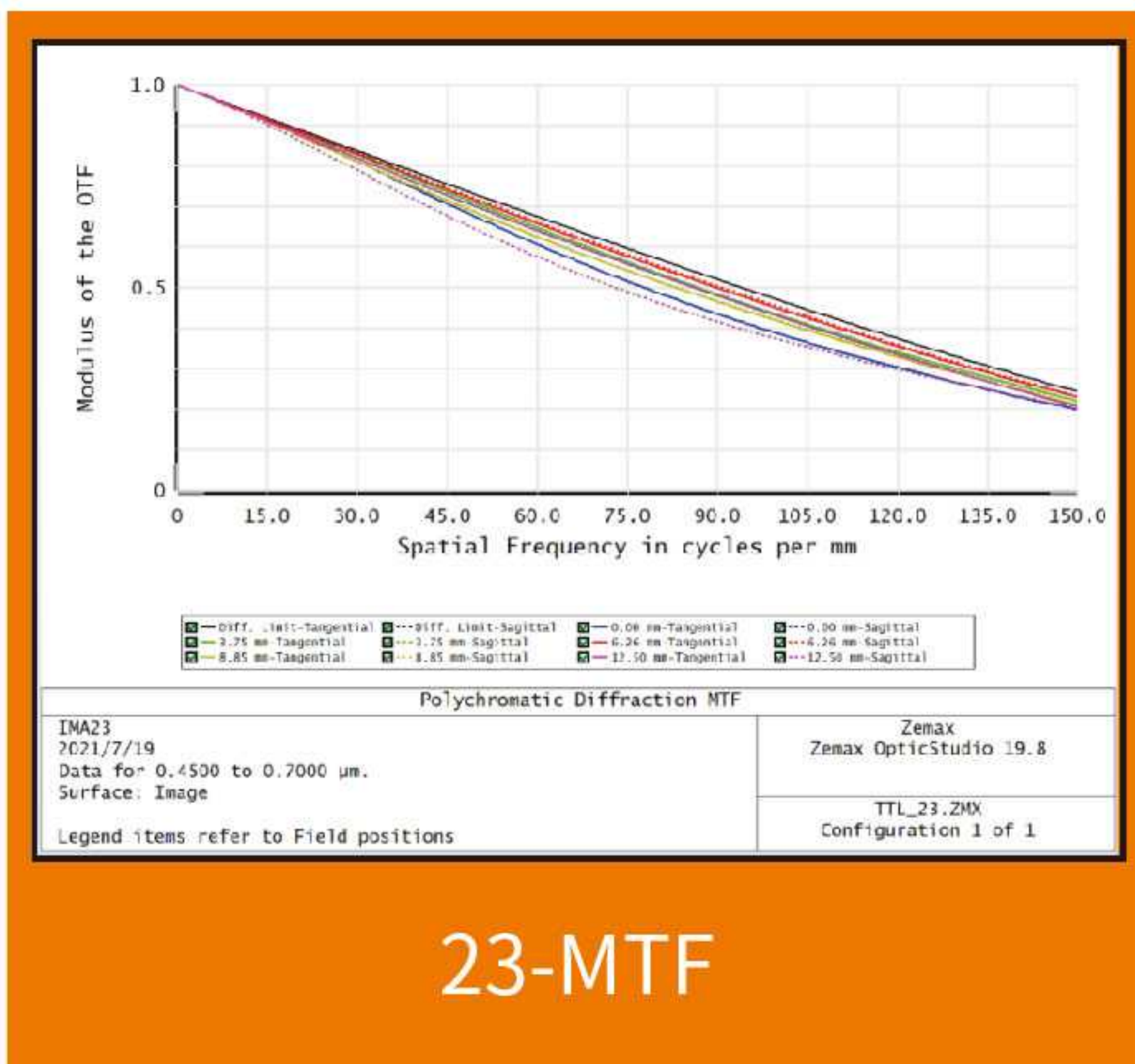
TTL23

FEATURES

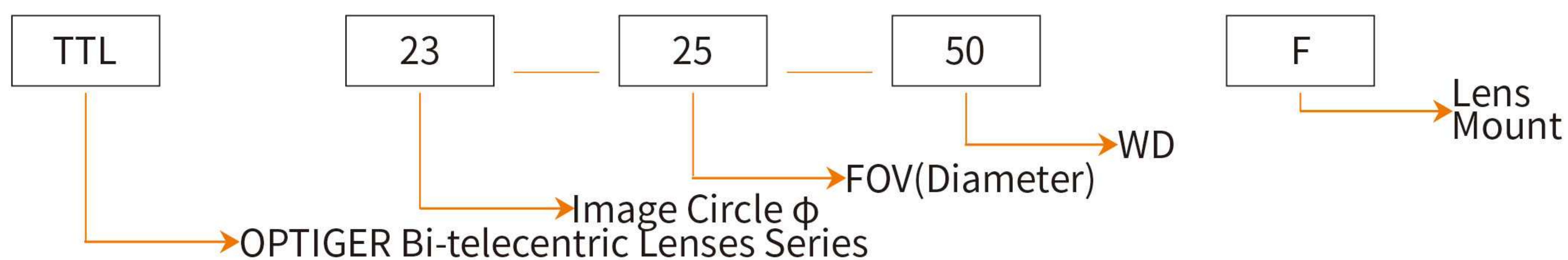
1. Optical magnification: 0.920x-0.073x
2. FOV: 25mm -315mm, satisfying different requirements on field of view
3. WD: 50mm-545mm, satisfying different requirements on working distance
4. Distortion: <0.05%, telecentricity: <0.05°
5. Bi-telecentric design, very deep DOF, high resolution
6. Multi-layer coating, high transmittance
7. IP 65 for use in harsh industrial environments
8. Options between high resolution and deep DOF are available, satisfying different technical requirements
9. Customized aperture is available
10. Working distance can be adjusted within certain limits as per customers' requirements



OPTICAL CHARACTERISTICS



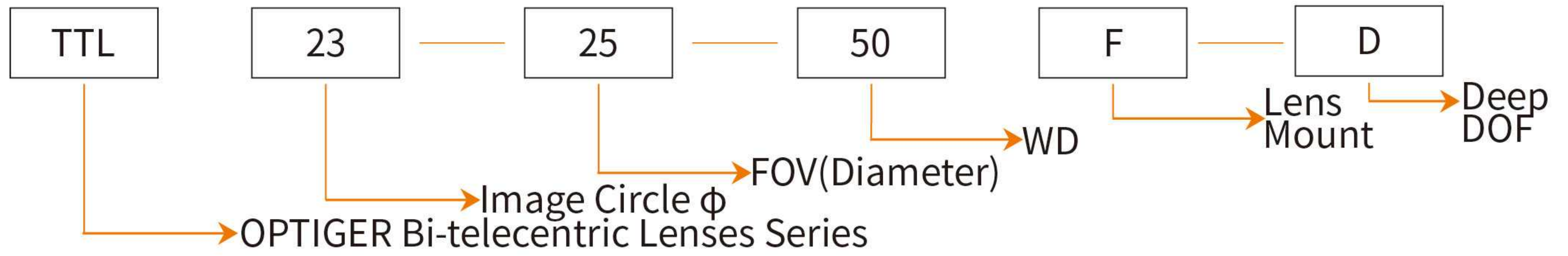
MODEL DESCRIPTION OF LENS SERIES WITH HIGH RESOLUTION



SPECIFICATIONS

Model	Max. FOV (mm)	Magnification	WD (mm)	4/3"			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^{\circ}$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				18.4	13.8	23.0						
TTL23-25-50F	25	0.920	50 \pm 5	20.0	15.0	25.0	7.5	5.47	0.71	<0.05	<0.05	F
TTL23-35-60F	35	0.657	60 \pm 5	28.0	21.0	35.0	7.5	7.66	1.39	<0.05	<0.05	F
TTL23-45-70F	45	0.511	70 \pm 5	36.0	27.0	45.0	7.5	9.85	2.30	<0.05	<0.05	F
TTL23-60-80F	60	0.383	80 \pm 5	48.0	36.0	60.1	7.5	13.14	4.09	<0.05	<0.05	F
TTL23-70-100F	70	0.329	100 \pm 5	55.9	41.9	69.9	7.5	15.30	5.54	<0.05	<0.05	F
TTL23-70-150F	70	0.329	150 \pm 5	55.9	41.9	69.9	7.5	15.30	5.54	<0.05	<0.05	F
TTL23-85-125F	85	0.271	125 \pm 5	67.9	50.9	84.9	7.5	18.57	8.17	<0.05	<0.05	F
TTL23-105-160F	105	0.219	160 \pm 5	84.0	63.0	105.0	7.5	22.98	12.51	<0.05	<0.05	F
TTL23-125-195F	125	0.184	195 \pm 5	100.0	75.0	125.0	7.5	27.35	17.72	<0.05	<0.05	F
TTL23-155-255F	155	0.148	255 \pm 5	124.3	93.2	155.4	7.5	34.00	27.39	<0.05	<0.05	F
TTL23-185-320F	185	0.124	320 \pm 5	148.4	111.3	185.5	7.5	40.58	39.02	<0.05	<0.05	F
TTL23-215-375F	215	0.107	375 \pm 5	172.0	129.0	215.0	7.5	47.03	52.41	<0.05	<0.05	F
TTL23-245-420F	245	0.094	420 \pm 5	195.7	146.8	244.7	7.5	53.54	67.90	<0.05	<0.05	F
TTL23-270-480F	270	0.085	480 \pm 5	216.5	162.4	270.6	7.5	59.21	83.04	<0.05	<0.05	F
TTL23-315-545F	315	0.073	545 \pm 5	252.1	189.0	315.1	7.5	68.94	112.59	<0.05	<0.05	F

MODEL DESCRIPTION OF LENS SERIES WITH DEEP DOF



SPECIFICATIONS

Model	Max. FOV (mm)	Magnification	WD (mm)	4/3"			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^{\circ}$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				18.4	13.8	23.0						
TTL23-25-50F-D	25	0.920	50 \pm 5	20.0	15.0	25.0	16	11.67	1.51	<0.05	<0.05	F
TTL23-35-60F-D	35	0.657	60 \pm 5	28.0	21.0	35.0	16	16.34	2.96	<0.05	<0.05	F
TTL23-45-70F-D	45	0.511	70 \pm 5	36.0	27.0	45.0	16	21.01	4.90	<0.05	<0.05	F
TTL23-60-80F-D	60	0.383	80 \pm 5	48.0	36.0	60.1	16	28.01	8.71	<0.05	<0.05	F
TTL23-70-100F-D	70	0.329	100 \pm 5	55.9	41.9	69.9	16	32.67	11.86	<0.05	<0.05	F
TTL23-70-150F-D	70	0.329	150 \pm 5	55.9	41.9	69.9	16	32.67	11.86	<0.05	<0.05	F
TTL23-85-125F-D	85	0.271	125 \pm 5	67.9	50.9	84.9	16	39.68	17.48	<0.05	<0.05	F
TTL23-105-160F-D	105	0.219	160 \pm 5	84.0	63.0	105.0	16	49.01	26.68	<0.05	<0.05	F
TTL23-125-195F-D	125	0.184	195 \pm 5	100.0	75.0	125.0	16	58.35	37.81	<0.05	<0.05	F
TTL23-155-255F-D	155	0.148	255 \pm 5	124.3	93.2	155.4	16	72.35	58.13	<0.05	<0.05	F
TTL23-185-320F-D	185	0.124	320 \pm 5	148.4	111.3	185.5	16	86.53	82.81	<0.05	<0.05	F
TTL23-215-375F-D	215	0.107	375 \pm 5	172.0	129.0	215.0	16	100.36	111.85	<0.05	<0.05	F
TTL23-245-420F-D	245	0.094	420 \pm 5	195.7	146.8	244.7	16	114.36	145.24	<0.05	<0.05	F
TTL23-270-480F-D	270	0.085	480 \pm 5	216.5	162.4	270.6	16	126.03	176.39	<0.05	<0.05	F
TTL23-315-545F-D	315	0.073	545 \pm 5	252.1	189.0	315.1	16	147.04	240.09	<0.05	<0.05	F

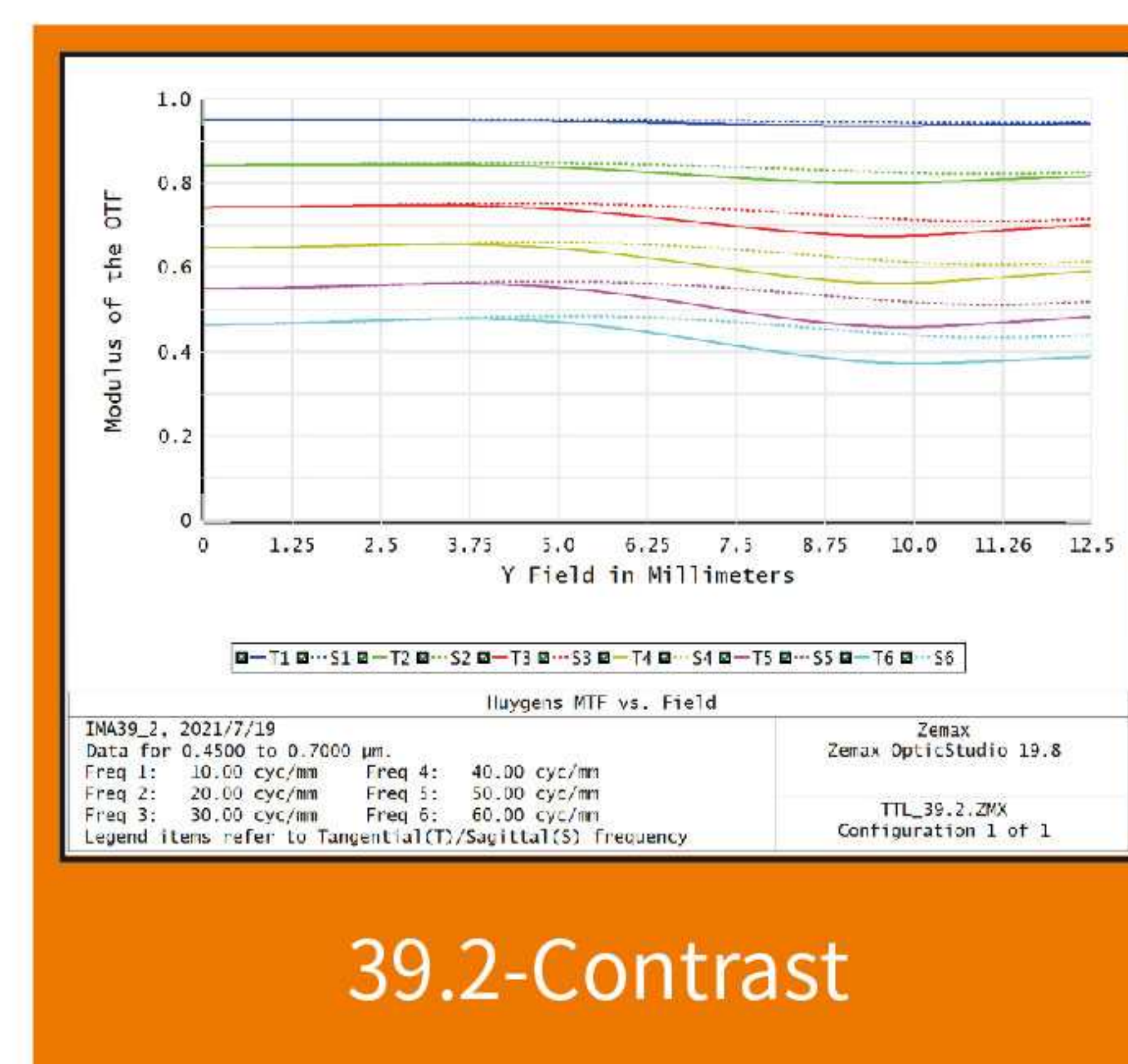
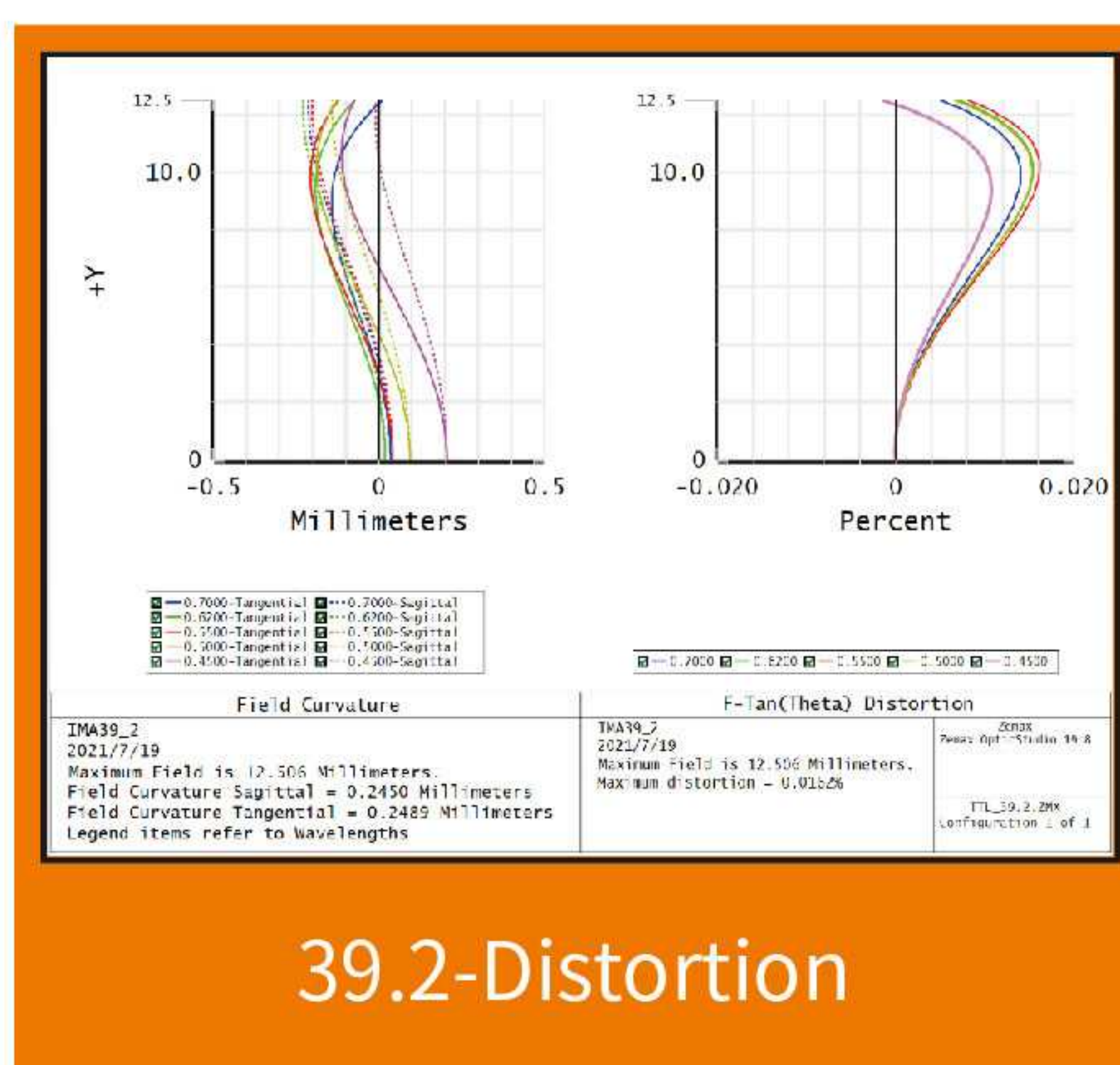
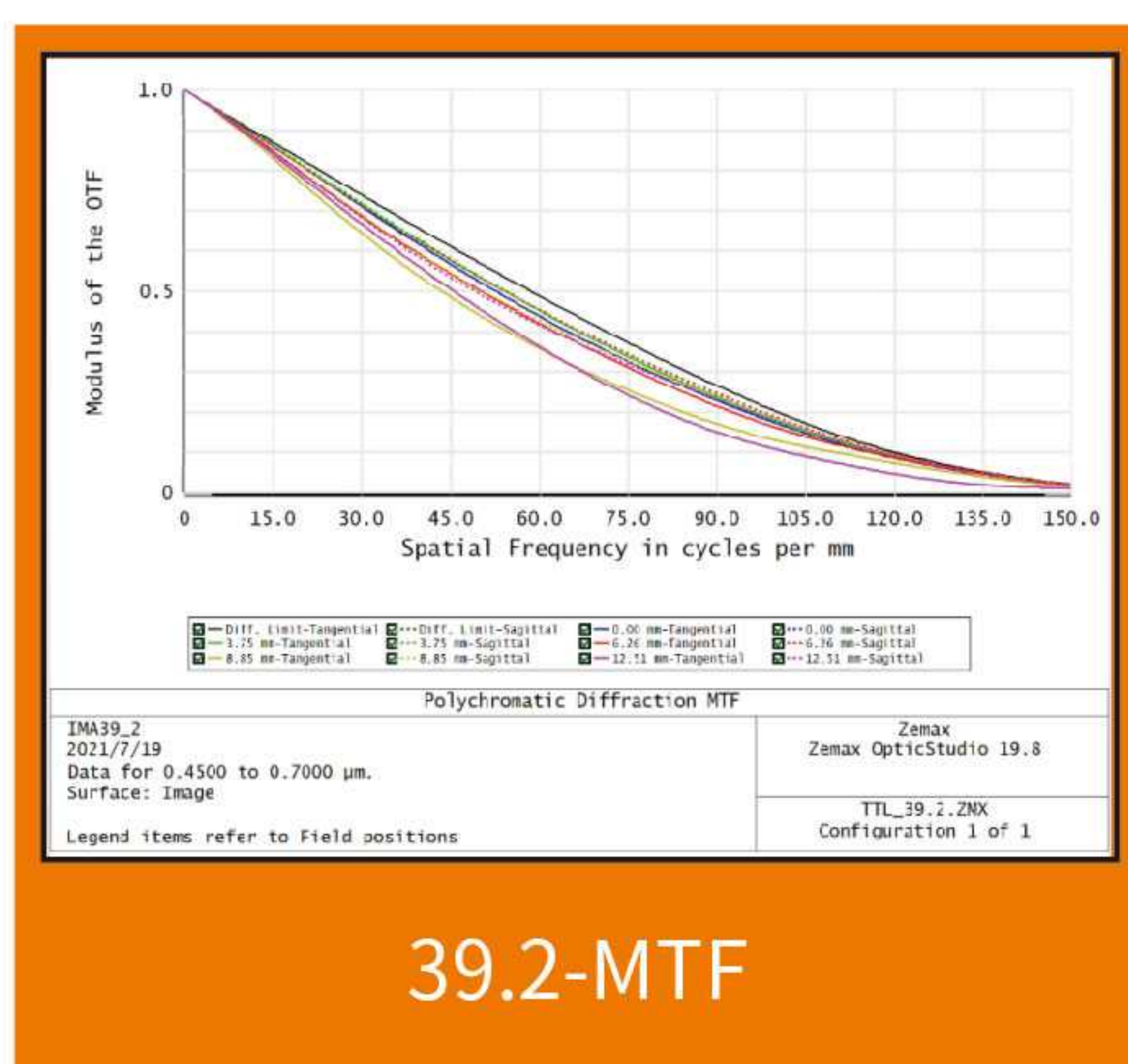
TTL39.2

FEATURES

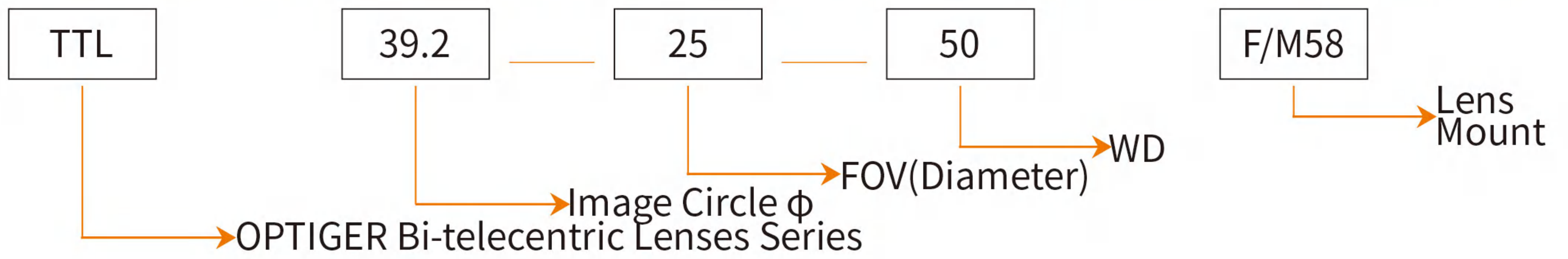
1. Optical magnification: 1.568x-0.124x
2. FOV: 25mm -315mm, satisfying different requirements on field of view
3. WD: 50mm-545mm, satisfying different requirements on working distance
4. Distortion: <0.05%, telecentricity: <0.05°
5. Bi-telecentric design, very deep DOF, high resolution
6. Multi-layer coating, high transmittance
7. IP 65 for use in harsh industrial environments
8. Options between high resolution and deep DOF are available, satisfying different technical requirements
9. Customized aperture is available
10. Working distance can be adjusted within certain limits as per customers' requirements



OPTICAL CHARACTERISTICS



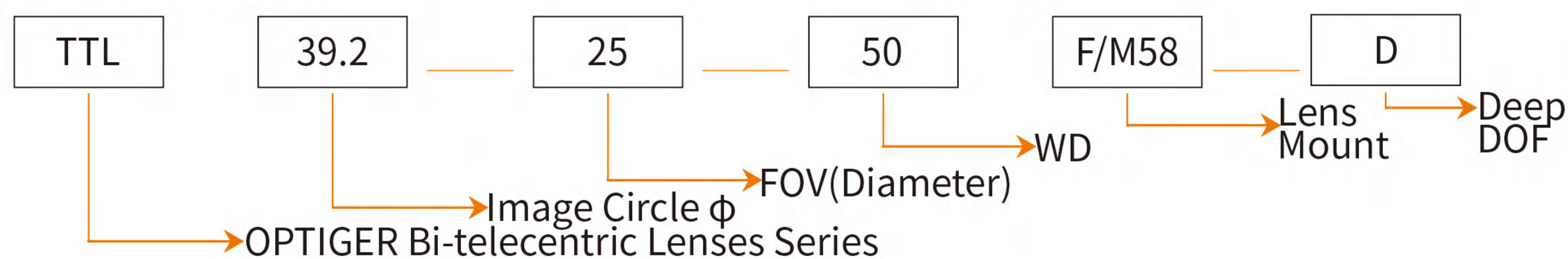
MODEL DESCRIPTION OF LENS SERIES WITH HIGH RESOLUTION



SPECIFICATIONS

Model	Max. FOV (mm)	Magnification	WD (mm)	39.2mm			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^\circ$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				31	24.1	39.2						
TTL39.2-25-50F/M58	25	1.568	50 \pm 5	19.8	15.4	25.0	12	5.14	0.39	<0.015	<0.015	F/M58
TTL39.2-35-60F/M58	35	1.120	60 \pm 5	27.7	21.5	35.0	12	7.19	0.77	<0.05	<0.05	F/M58
TTL39.2-45-70F/M58	45	0.871	70 \pm 5	35.6	27.7	45.0	12	9.24	1.27	<0.01	<0.02	F/M58
TTL39.2-60-80F/M58	60	0.653	80 \pm 5	47.5	36.9	60.0	12	12.33	2.25	<0.05	<0.05	F/M58
TTL39.2-70-100F/M58	70	0.560	100 \pm 5	55.4	43.0	70.0	12	14.38	3.06	<0.05	<0.05	F/M58
TTL39.2-70-150F/M58	70	0.560	150 \pm 5	55.4	43.0	70.0	12	14.38	3.06	<0.05	<0.05	F/M58
TTL39.2-85-125F/M58	85	0.461	125 \pm 5	67.2	52.3	80.0	12	17.47	4.52	<0.05	<0.05	F/M58
TTL39.2-105-160F/M58	105	0.373	160 \pm 5	83.1	64.6	105.1	12	21.59	6.9	<0.01	<0.025	F/M58
TTL39.2-125-195F/M58	125	0.314	195 \pm 5	98.7	76.8	124.8	12	25.64	9.74	<0.05	<0.05	F/M58
TTL39.2-155-255F/M58	155	0.253	255 \pm 5	122.5	95.3	154.9	12	31.83	15	<0.05	<0.05	F/M58
TTL39.2-185-320F/M58	185	0.212	320 \pm 5	146.2	113.7	184.9	12	37.98	21.36	<0.05	<0.05	F/M58
TTL39.2-215-375F/M58	215	0.182	375 \pm 5	170.3	132.4	215.4	12	44.24	28.98	<0.05	<0.05	F/M58
TTL39.2-245-420F/M58	245	0.160	420 \pm 5	193.8	150.6	245.0	12	50.33	37.5	<0.05	<0.05	F/M58
TTL39.2-270-480F/M58	270	0.145	480 \pm 5	213.8	166.2	270.3	12	55.53	45.66	<0.05	<0.05	F/M58
TTL39.2-315-545F/M58	315	0.124	545 \pm 5	250.0	194.4	316.1	12	64.94	62.43	<0.05	<0.05	F/M58

MODEL DESCRIPTION OF LENS SERIES WITH DEEP DOF



SPECIFICATIONS

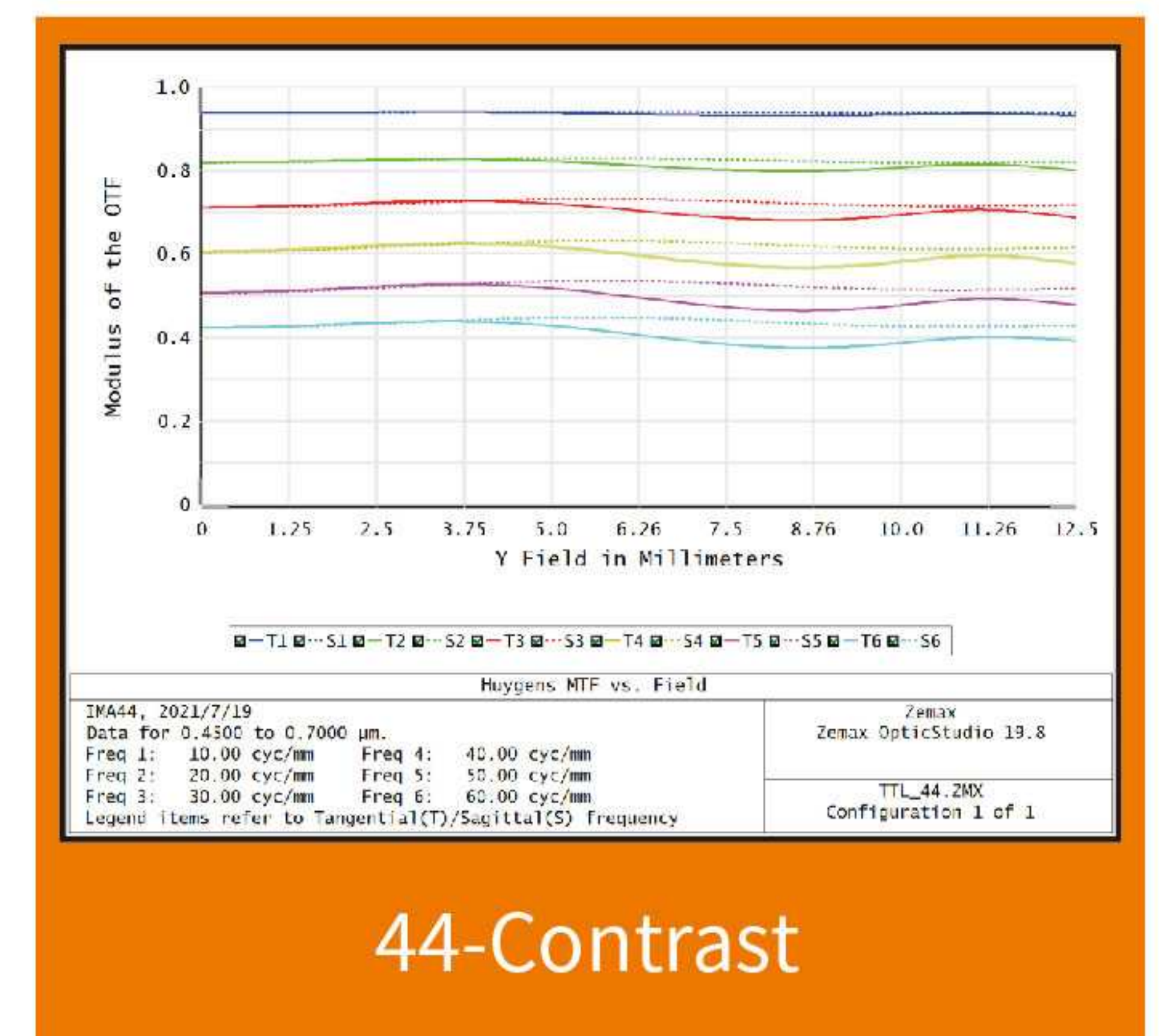
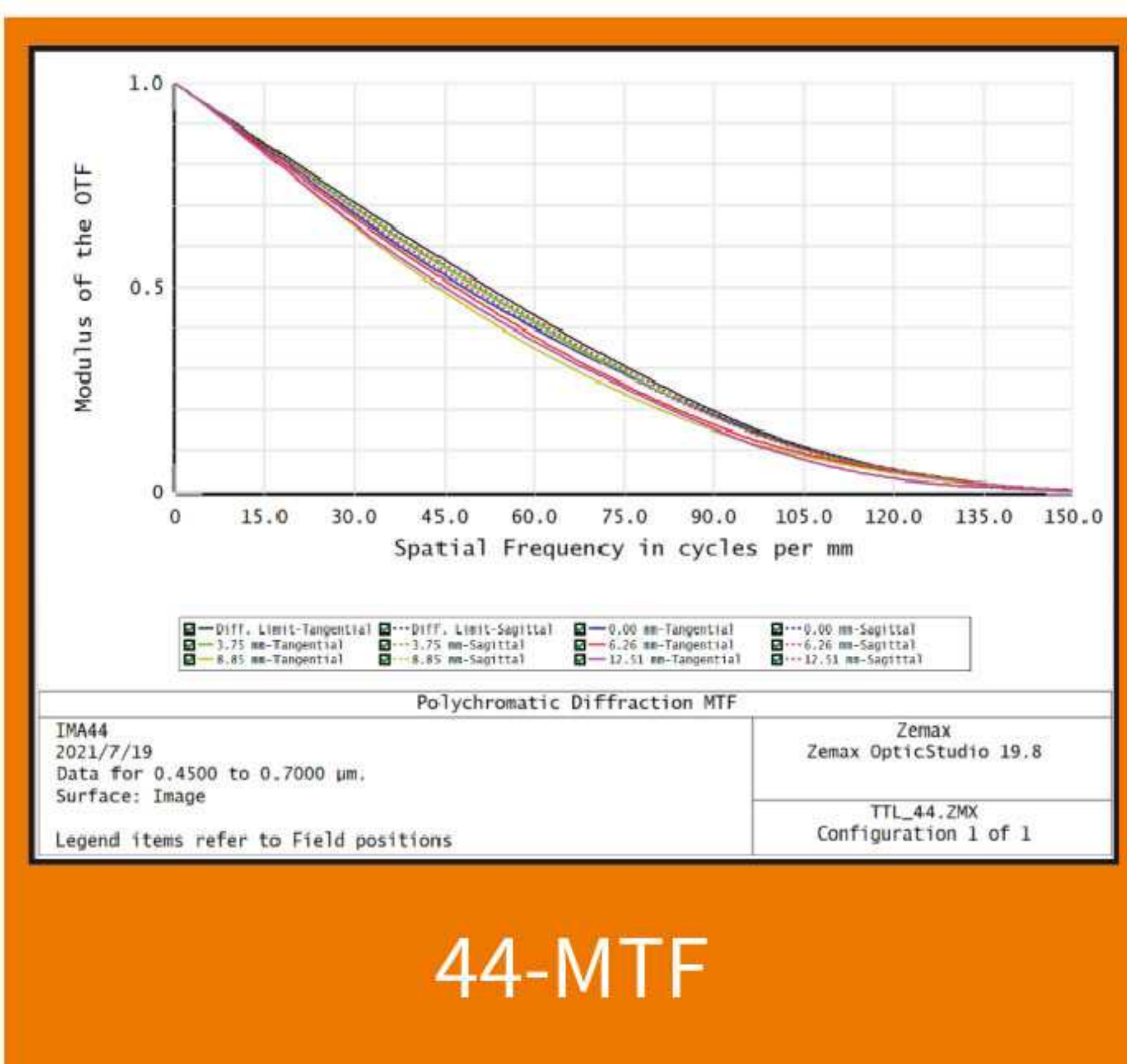
Model	Max. FOV (mm)	Magnification	WD (mm)	39.2mm			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^{\circ}$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				31	24.1	39.2						
TTL39.2-25-50F/M58-D	25	1.568	50 \pm 5	19.8	15.4	25.0	20	8.56	0.65	<0.05	<0.05	F/M58
TTL39.2-35-60F/M58-D	35	1.120	60 \pm 5	27.7	21.5	35.0	20	11.98	1.28	<0.05	<0.05	F/M58
TTL39.2-45-70F/M58-D	45	0.871	70 \pm 5	35.6	27.7	45.0	20	15.41	2.11	<0.05	<0.05	F/M58
TTL39.2-60-80F/M58-D	60	0.653	80 \pm 5	47.5	36.9	60.0	20	20.54	3.75	<0.05	<0.05	F/M58
TTL39.2-70-100F/M58-D	70	0.560	100 \pm 5	55.4	43.0	70.0	20	23.96	5.10	<0.05	<0.05	F/M58
TTL39.2-70-150F/M58-D	70	0.560	150 \pm 5	55.4	43.0	70.0	20	23.96	5.10	<0.05	<0.05	F/M58
TTL39.2-85-125F/M58-D	85	0.461	125 \pm 5	67.2	52.3	85.0	20	29.10	7.52	<0.05	<0.05	F/M58
TTL39.2-105-160F/M58-D	105	0.373	160 \pm 5	83.1	64.6	105.1	20	35.95	11.48	<0.05	<0.05	F/M58
TTL39.2-125-195F/M58-D	125	0.314	195 \pm 5	98.7	76.8	124.8	20	42.79	16.27	<0.05	<0.05	F/M58
TTL39.2-155-255F/M58-D	155	0.253	255 \pm 5	122.5	95.3	154.9	20	53.06	25.02	<0.05	<0.05	F/M58
TTL39.2-185-320F/M58-D	185	0.212	320 \pm 5	146.2	113.7	184.9	20	63.33	35.64	<0.05	<0.05	F/M58
TTL39.2-215-375F/M58-D	215	0.182	375 \pm 5	170.3	132.4	215.4	20	73.60	48.13	<0.05	<0.05	F/M58
TTL39.2-245-420F/M58-D	245	0.160	420 \pm 5	193.8	150.6	245.0	20	83.88	62.50	<0.05	<0.05	F/M58
TTL39.2-270-480F/M58-D	270	0.145	480 \pm 5	213.8	166.2	270.3	20	92.43	75.91	<0.05	<0.05	F/M58
TTL39.2-315-545F/M58-D	315	0.124	545 \pm 5	250.0	194.4	316.1	20	107.84	103.32	<0.05	<0.05	F/M58

TTL44

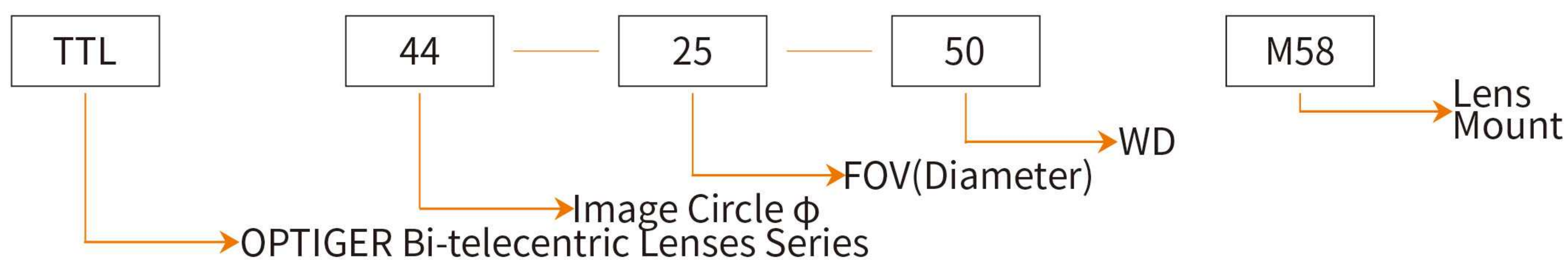
FEATURES

1. Optical magnification: 1.760x-0.140x
2. FOV: 25mm -315mm, satisfying different requirements on field of view
3. WD: 50mm-545mm, satisfying different requirements on working distance
4. Distortion: <0.05%, telecentricity: <0.05°
5. Bi-telecentric design, very deep DOF, high resolution
6. Multi-layer coating, high transmittance
7. IP 65 for use in harsh industrial environments
8. Options between high resolution and deep DOF are available, satisfying different technical requirements
9. Customized aperture is available
10. Working distance can be adjusted within certain limits as per customers' requirements

OPTICAL CHARACTERISTICS



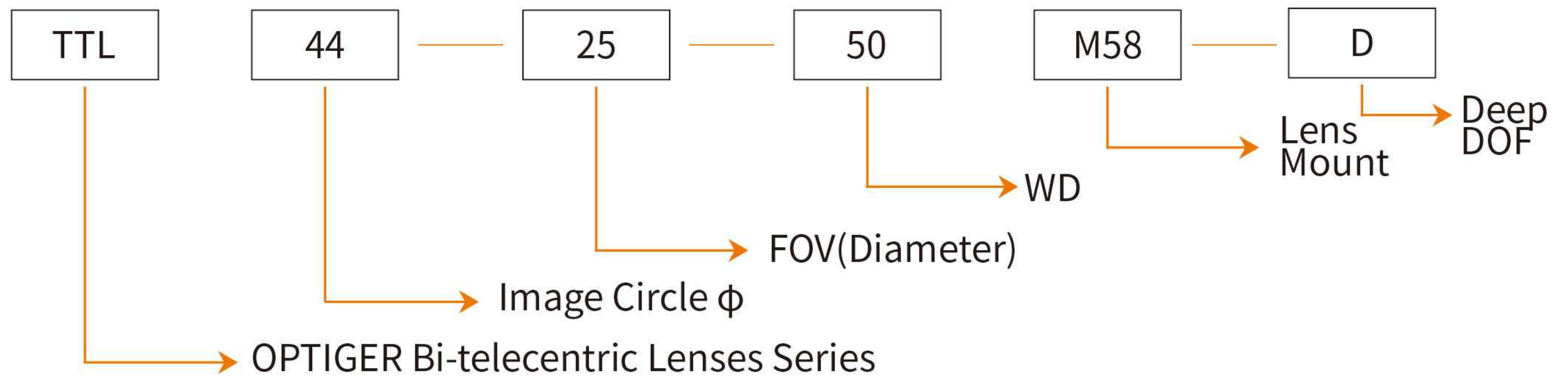
MODEL DESCRIPTION OF LENS SERIES WITH HIGH RESOLUTION



SPECIFICATIONS

Model	Max. FOV (mm)	Magnification	WD (mm)	35 Full			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^{\circ}$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				35.2	26.4	44						
TTL44-25-50M58	25	1.760	50 \pm 5	20.0	15.0	25.0	13.5	5.15	0.35	<0.05	<0.05	M58
TTL44-35-60M58	35	1.257	60 \pm 5	28.0	21.0	35.0	13.5	7.21	0.68	<0.05	<0.05	M58
TTL44-45-70M58	45	0.978	70 \pm 5	36.0	27.0	45.0	13.5	9.26	1.13	<0.05	<0.05	M58
TTL44-60-80M58	60	0.733	80 \pm 5	48.0	36.0	60.0	13.5	12.36	2.01	<0.05	<0.05	M58
TTL44-70-100M58	70	0.629	100 \pm 5	56.0	42.0	70.0	13.5	14.4	2.73	<0.05	<0.05	M58
TTL44-85-125M58	85	0.518	125 \pm 5	68.0	51.0	84.9	13.5	17.49	4.02	<0.05	<0.05	M58
TTL44-105-160M58	105	0.419	160 \pm 5	84.0	63.0	105.0	13.5	21.62	6.15	<0.05	<0.05	M58
TTL44-125-195M58	125	0.352	195 \pm 5	100.0	75.0	125.0	13.5	25.73	8.72	<0.05	<0.05	M58
TTL44-155-255M58	155	0.284	255 \pm 5	123.9	93.0	154.9	13.5	31.9	13.39	<0.05	<0.05	M58
TTL44-185-320M58	185	0.238	320 \pm 5	147.9	110.9	184.9	13.5	38.06	19.07	<0.05	<0.05	M58
TTL44-215-375M58	215	0.205	375 \pm 5	171.7	128.8	214.6	13.5	44.19	25.7	<0.05	<0.05	M58
TTL44-245-420M58	245	0.180	420 \pm 5	195.6	146.7	244.4	13.5	50.33	33.33	<0.05	<0.05	M58
TTL44-270-480M58	270	0.163	480 \pm 5	216.0	162.0	269.9	13.5	55.57	40.65	<0.05	<0.05	M58
TTL44-315-545M58	315	0.140	545 \pm 5	251.4	188.6	314.3	13.5	64.7	55.1	<0.05	<0.05	M58

MODEL DESCRIPTION OF LENS SERIES WITH DEEP DOF



SPECIFICATIONS

Model	Max. FOV (mm)	Magnification	WD (mm)	35 Full			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^\circ$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				35.2	26.4	44						
TTL44-25-50M58-D	25	1.760	50 \pm 5	20.0	15.0	25.0	20	7.63	0.52	<0.05	<0.05	M58
TTL44-35-60M58-D	35	1.257	60 \pm 5	28.0	21.0	35.0	20	10.68	1.01	<0.05	<0.05	M58
TTL44-45-70M58-D	45	0.978	70 \pm 5	36.0	27.0	45.0	20	13.73	1.67	<0.05	<0.05	M58
TTL44-60-80M58-D	60	0.733	80 \pm 5	48.0	36.0	60.0	20	18.30	2.98	<0.05	<0.05	M58
TTL44-70-100M58-D	70	0.629	100 \pm 5	56.0	42.0	70.0	20	21.35	4.05	<0.05	<0.05	M58
TTL44-85-125M58-D	85	0.518	125 \pm 5	68.0	51.0	84.9	20	25.93	5.97	<0.05	<0.05	M58
TTL44-105-160M58-D	105	0.419	160 \pm 5	84.0	63.0	105.0	20	32.03	9.11	<0.05	<0.05	M58
TTL44-125-195M58-D	125	0.352	195 \pm 5	100.0	75.0	125.0	20	38.13	12.91	<0.05	<0.05	M58
TTL44-155-255M58-D	155	0.284	255 \pm 5	123.9	93.0	154.9	20	47.28	19.86	<0.05	<0.05	M58
TTL44-185-320M58-D	185	0.238	320 \pm 5	147.9	110.9	184.9	20	56.43	28.29	<0.05	<0.05	M58
TTL44-215-375M58-D	215	0.205	375 \pm 5	171.7	128.8	214.6	20	65.58	38.20	<0.05	<0.05	M58
TTL44-245-420M58-D	245	0.180	420 \pm 5	195.6	146.7	244.4	20	74.73	49.61	<0.05	<0.05	M58
TTL44-270-480M58-D	270	0.163	480 \pm 5	216.0	162.0	269.9	20	82.35	60.25	<0.05	<0.05	M58
TTL44-315-545M58-D	315	0.140	545 \pm 5	251.4	188.6	314.3	20	96.08	82.00	<0.05	<0.05	M58

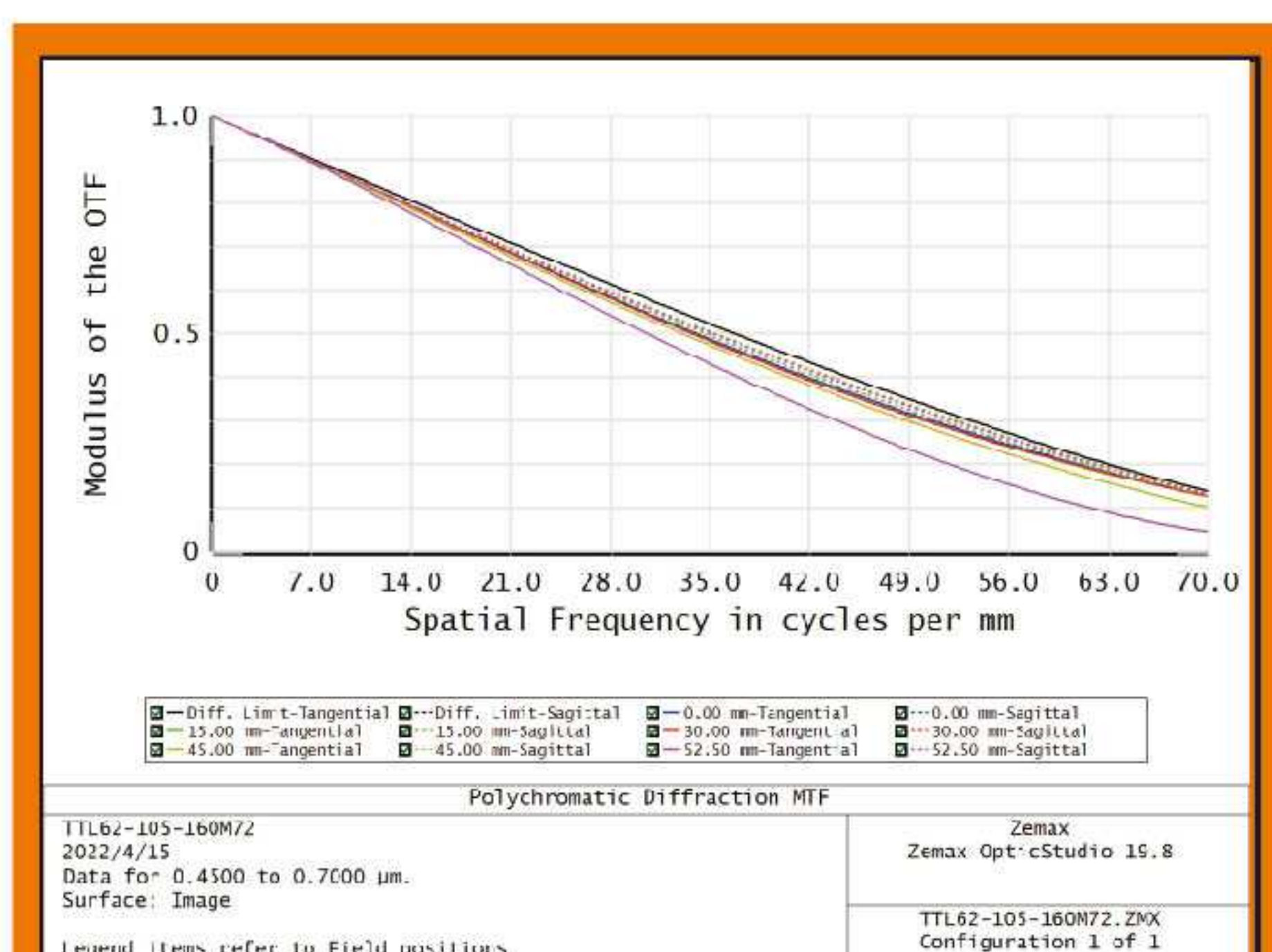
TTL62

FEATURES

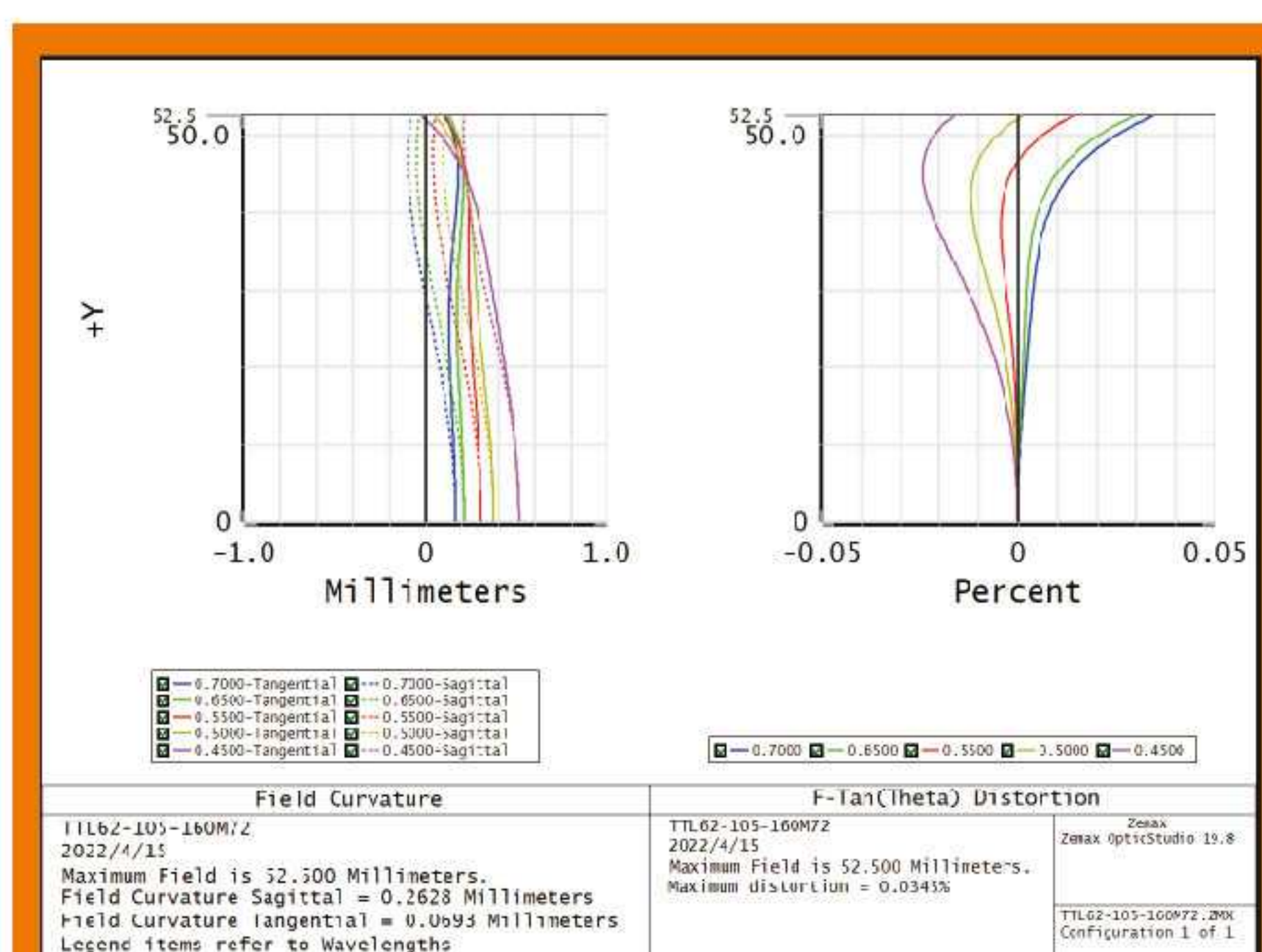
1. Optical magnification: 2.48x-0.197x
2. FOV: 25mm -315mm, satisfying different requirements on field of view
3. WD: 50mm-545mm, satisfying different requirements on working distance
4. Distortion: <0.05%, telecentricity: <0.05°
5. Bi-telecentric design, very deep DOF, high resolution
6. Multi-layer coating, high transmittance
7. IP 65 for use in harsh industrial environments
8. Options between high resolution and deep DOF are available, satisfying different technical requirements
9. Customized aperture is available
10. Working distance can be adjusted within certain limits as per customers' requirements



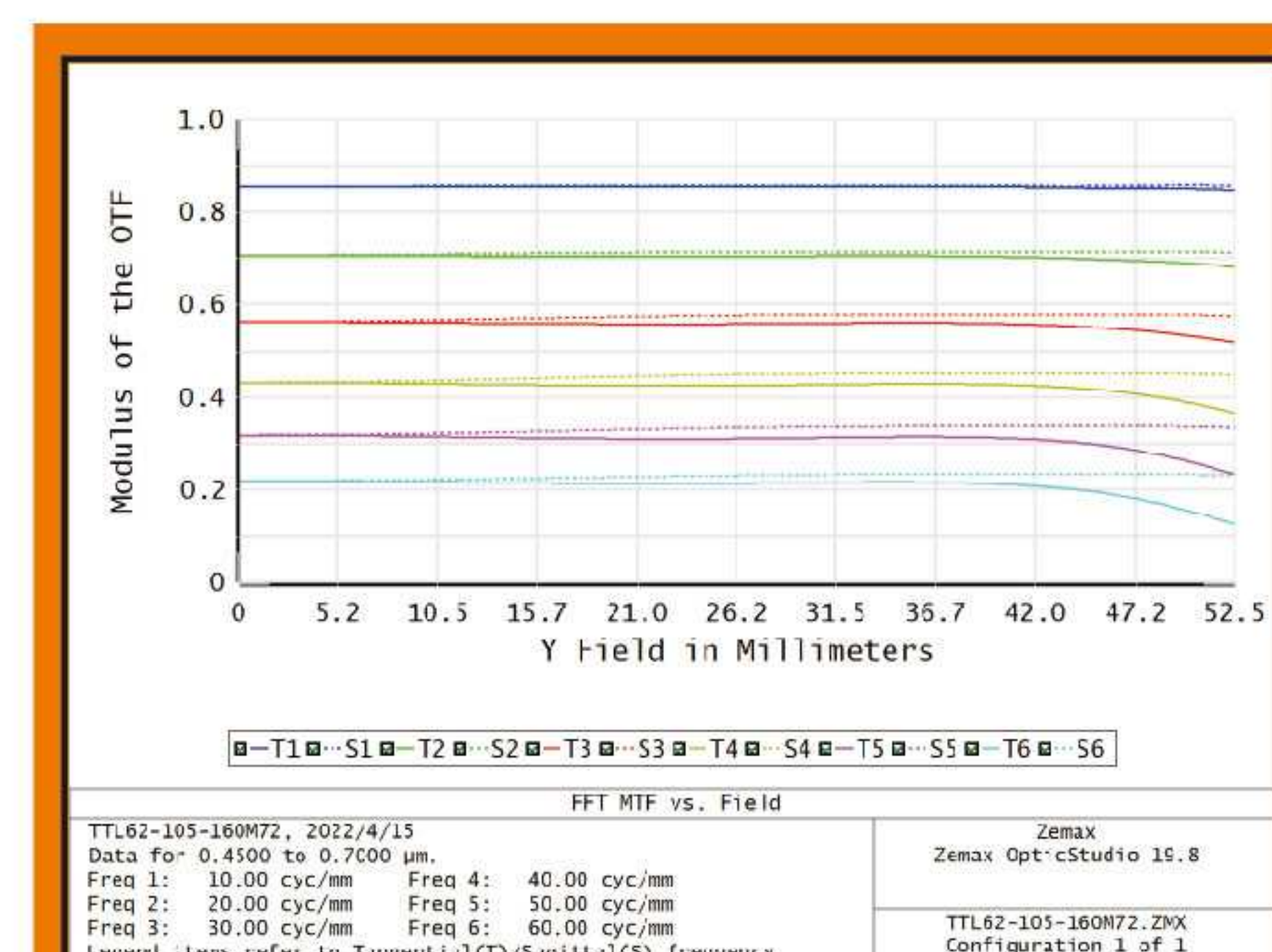
OPTICAL CHARACTERISTICS



62-MTF

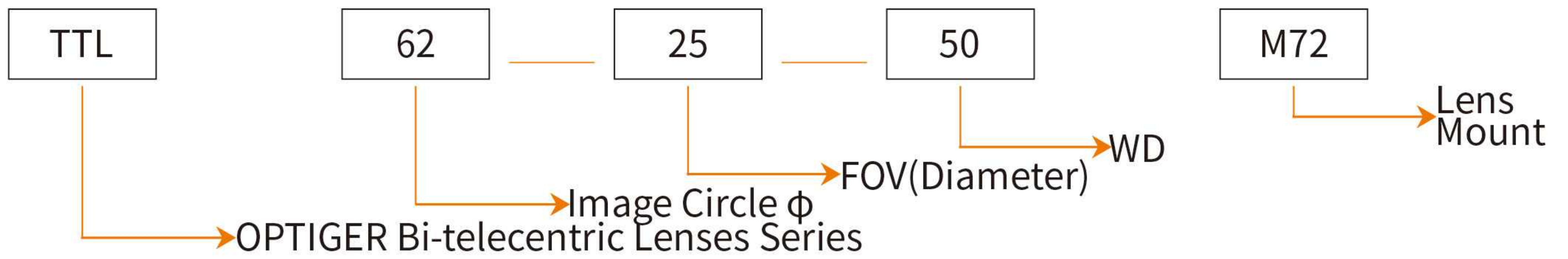


62-Distortion



62-Contrast

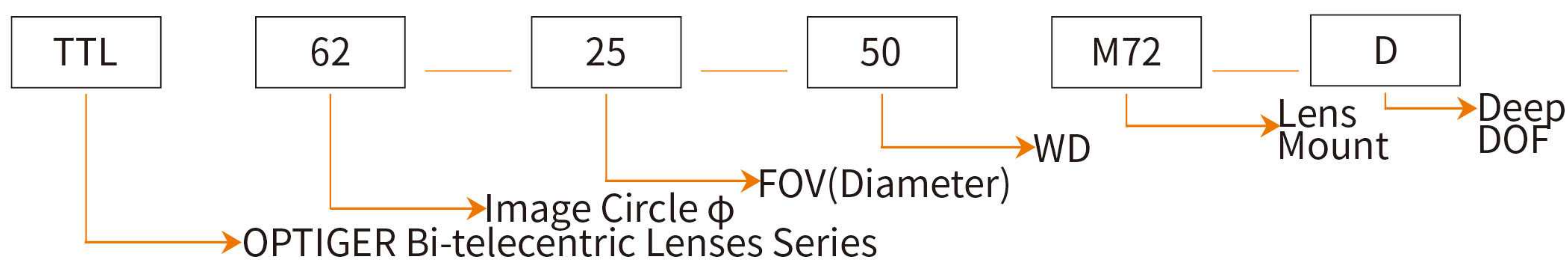
MODEL DESCRIPTION OF LENS SERIES WITH HIGH RESOLUTION



SPECIFICATIONS

Model	Max. FOV (mm)	Magnification	WD (mm)	62mm			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^\circ$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				49.6	37.2	62						
TTL62-25-50M72	25	2.48	50 \pm 5	20	15	25	19	5.14	0.24	<0.05	<0.05	M72
TTL62-35-60M72	35	1.771	60 \pm 5	28	21	35	19	7.2	0.48	<0.05	<0.05	M72
TTL62-45-70M72	45	1.378	70 \pm 5	36	27	45	19	9.25	0.8	<0.05	<0.05	M72
TTL62-60-80M72	60	1.033	80 \pm 5	48	36	60	19	12.34	1.42	<0.05	<0.05	M72
TTL62-70-150M72	70	0.886	150 \pm 5	56	42	70	19	14.39	1.93	<0.05	<0.05	M72
TTL62-85-125M72	85	0.729	125 \pm 5	68	51	85	19	17.48	3.85	<0.05	<0.05	M72
TTL62-105-160M72	105	0.59	160 \pm 5	84.1	63.1	105	19	21.59	4.35	<0.05	<0.05	M72
TTL62-125-195M72	125	0.496	195 \pm 5	100	75	125	19	25.7	6.178	<0.05	<0.05	M72
TTL62-155-320M72	155	0.4	320 \pm 5	124	93	155	19	31.87	9.5	<0.05	<0.05	M72
TTL62-185-320M72	185	0.335	320 \pm 5	148.1	111	185	19	38.04	13.53	<0.05	<0.05	M72
TTL62-215-375M72	215	0.288	375 \pm 5	172.2	129.2	215	19	44.21	18.27	<0.05	<0.05	M72
TTL62-245-420M72	245	0.253	420 \pm 5	196	147	245	19	50.38	23.73	<0.05	<0.05	M72
TTL62-270-480M72	270	0.23	480 \pm 5	215.7	161.7	270	19	55.52	28.82	<0.05	<0.05	M72
TTL62-315-545M72	315	0.197	545 \pm 5	251.8	188.8	315	19	64.77	39.23	<0.05	<0.05	M72

MODEL DESCRIPTION OF LENS SERIES WITH DEEP DOF



SPECIFICATIONS

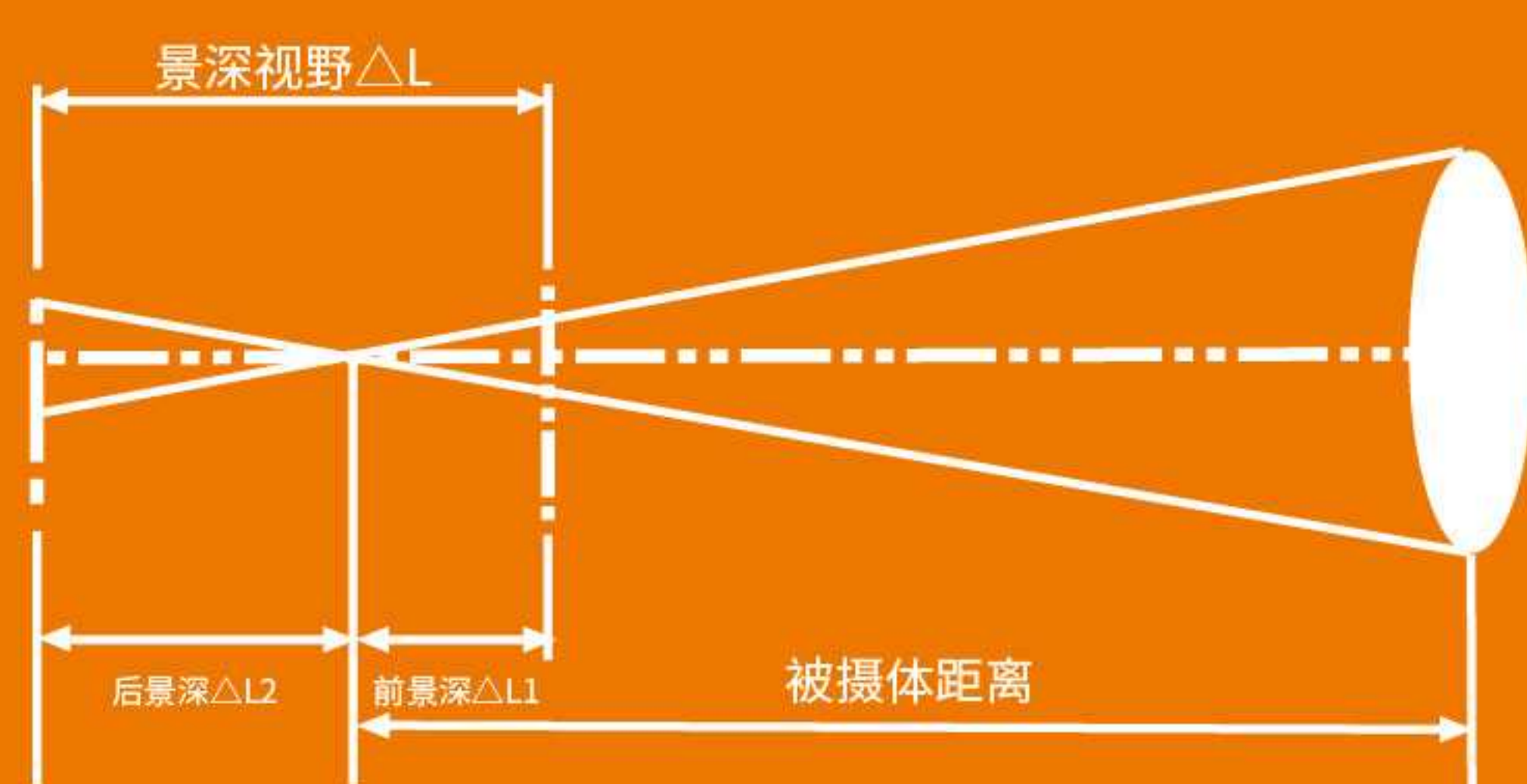
Model	Max. FOV (mm)	Magnification	WD (mm)	62mm			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^{\circ}$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				49.6	37.2	62						
TTL62-25-50M72-D	25	2.48	50 \pm 5	20	15	25	64	17.32	0.83	<0.05	<0.05	M72
TTL62-35-60M72-D	35	1.771	60 \pm 5	28	21	35	64	24.24	1.63	<0.05	<0.05	M72
TTL62-45-70M72-D	45	1.378	70 \pm 5	36	27	45	64	31.17	2.70	<0.05	<0.05	M72
TTL62-60-80M72-D	60	1.033	80 \pm 5	48	36	60	64	41.56	4.80	<0.05	<0.05	M72
TTL62-70-150M72-D	70	0.886	150 \pm 5	56	42	70	64	48.49	6.53	<0.05	<0.05	M72
TTL62-85-125M72-D	85	0.729	125 \pm 5	68	51	85	64	58.87	9.62	<0.05	<0.05	M72
TTL62-105-160M72-D	105	0.59	160 \pm 5	84.1	63.1	105	64	72.73	14.68	<0.05	<0.05	M72
TTL62-125-195M72-D	125	0.496	195 \pm 5	100	75	125	64	86.58	20.81	<0.05	<0.05	M72
TTL62-155-320M72-D	155	0.4	320 \pm 5	124	93	155	64	107.36	32.00	<0.05	<0.05	M72
TTL62-185-320M72-D	185	0.335	320 \pm 5	148.1	111	185	64	128.14	45.59	<0.05	<0.05	M72
TTL62-215-375M72-D	215	0.288	375 \pm 5	172.2	129.2	215	64	148.92	61.57	<0.05	<0.05	M72
TTL62-245-420M72-D	245	0.253	420 \pm 5	196	147	245	64	169.70	79.95	<0.05	<0.05	M72
TTL62-270-480M72-D	270	0.23	480 \pm 5	215.7	161.7	270	64	187.01	97.10	<0.05	<0.05	M72
TTL62-315-545M72-D	315	0.197	545 \pm 5	251.8	188.8	315	64	218.18	132.16	<0.05	<0.05	M72

OTL SERIES

Standard Industrial Telecentric Lenses with Large Magnification

- || CTO—Phd Degree Holder of Oxford University
- || Various Working Distances Satisfy Different Applications
- || Various Magnifications Satisfy Different Technical Requirements
- || Distortion: <0.05%
- || Telecentricity: <0.05°
- || High Cost Performance, Suitable for Systems Used for Batch Testing and Inspection
- || IP 65 for Use in Harsh Industrial Environments

Depth of Field (DOF)



DOF is the maximum range where the object appears to be in acceptable focus.

$$\text{Depth of Field} = \Delta L_1 + \Delta L_2 = \frac{2 \cdot \delta \cdot F}{\beta^2}$$

ΔL_1 refers to front DOF, ΔL_2 refers to rear DOF and δ refers to diameter of permissible circle of confusion.

In this brochure, diameter of permissible circle of confusion is 40 μ m and F refers to effective F number.





O P T I C A L G E R

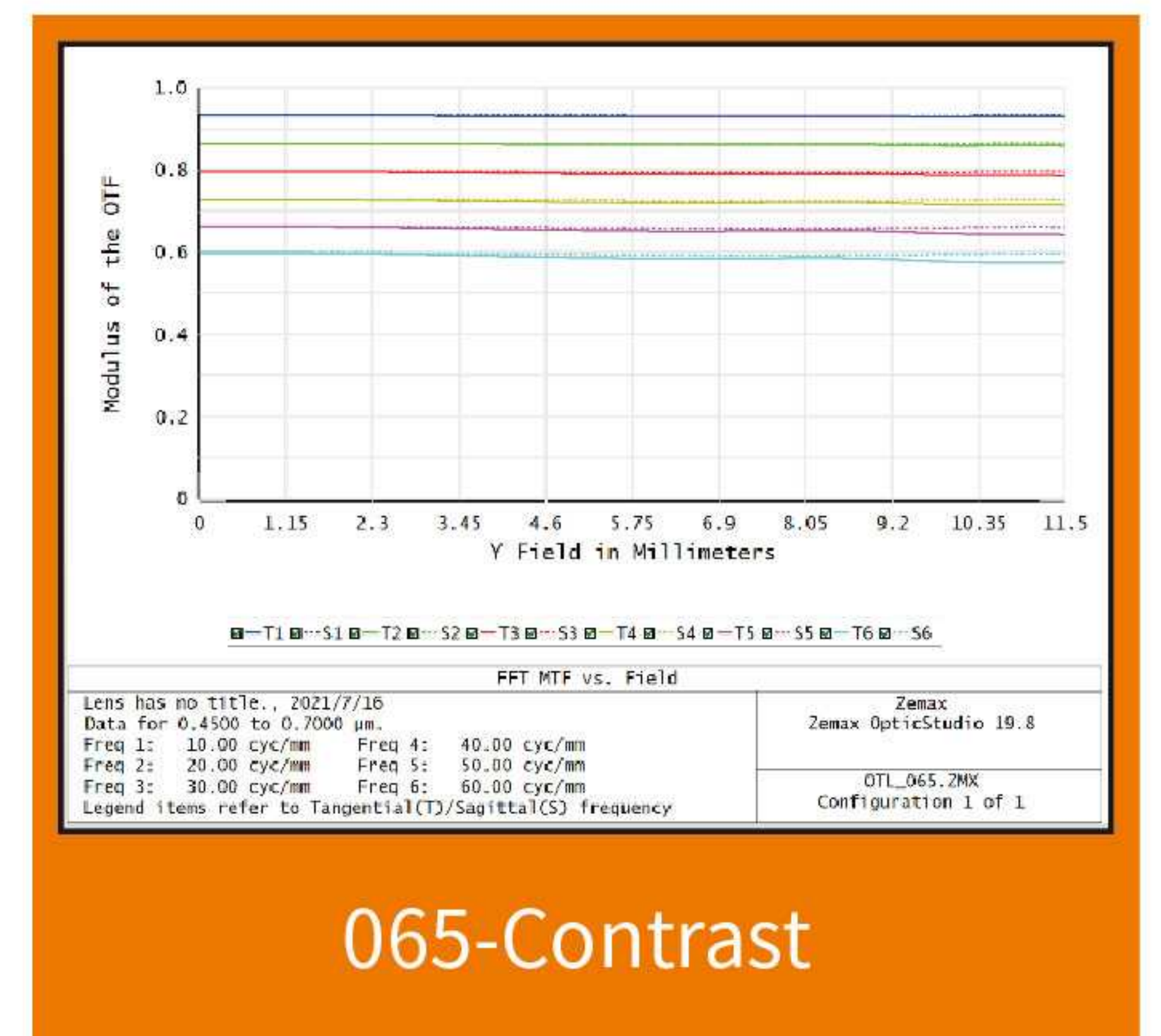
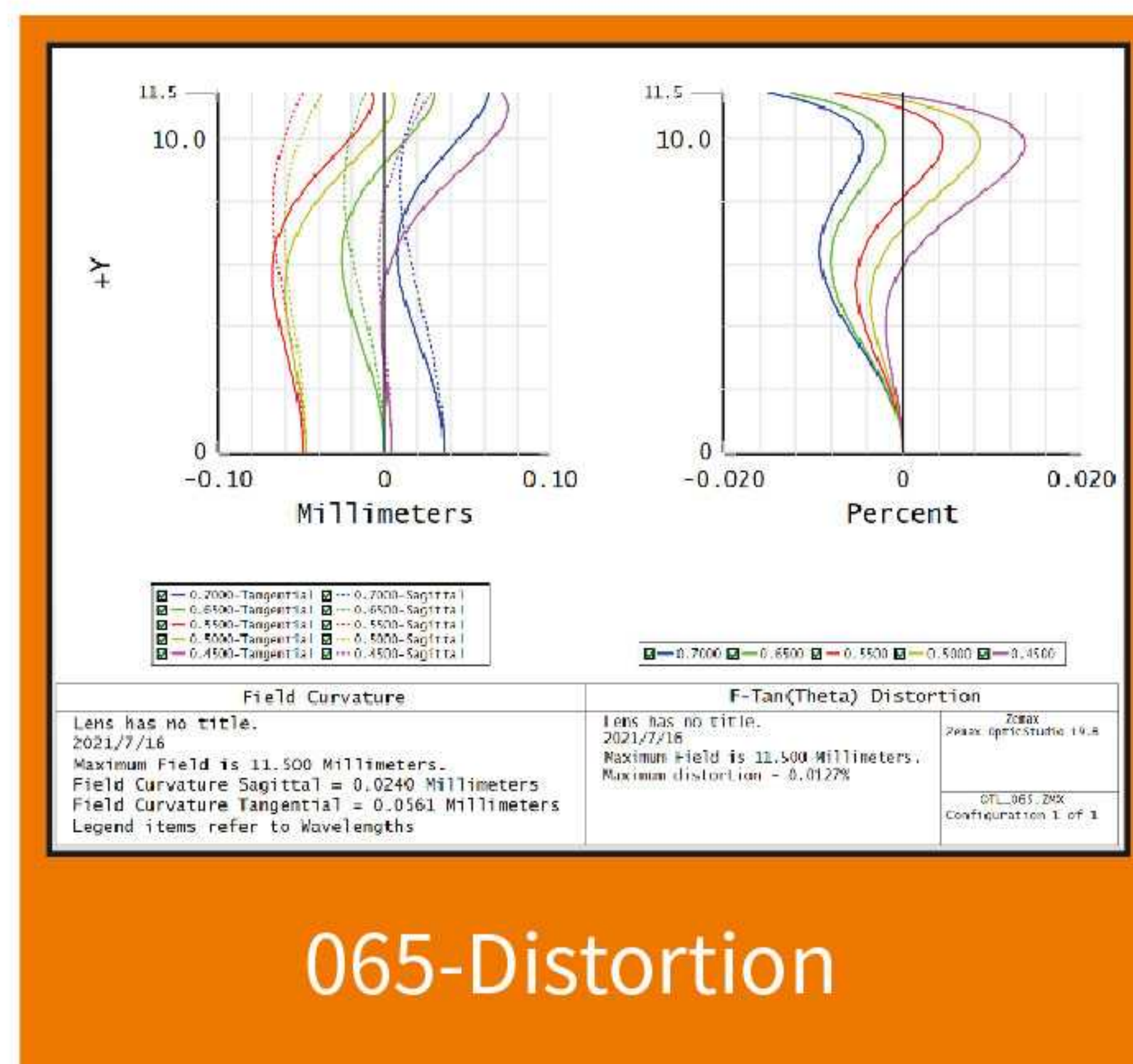
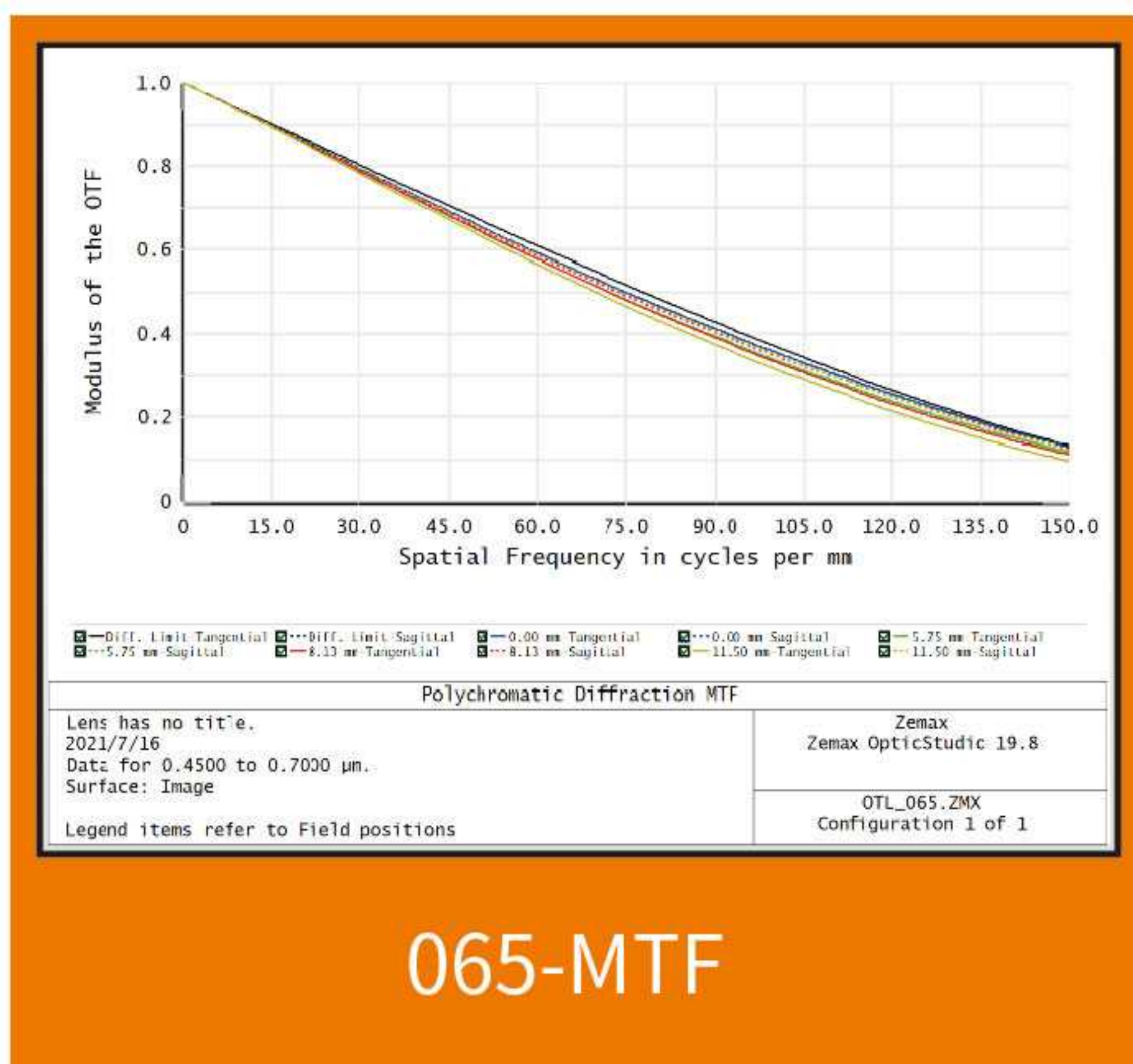
OTL065

FEATURES

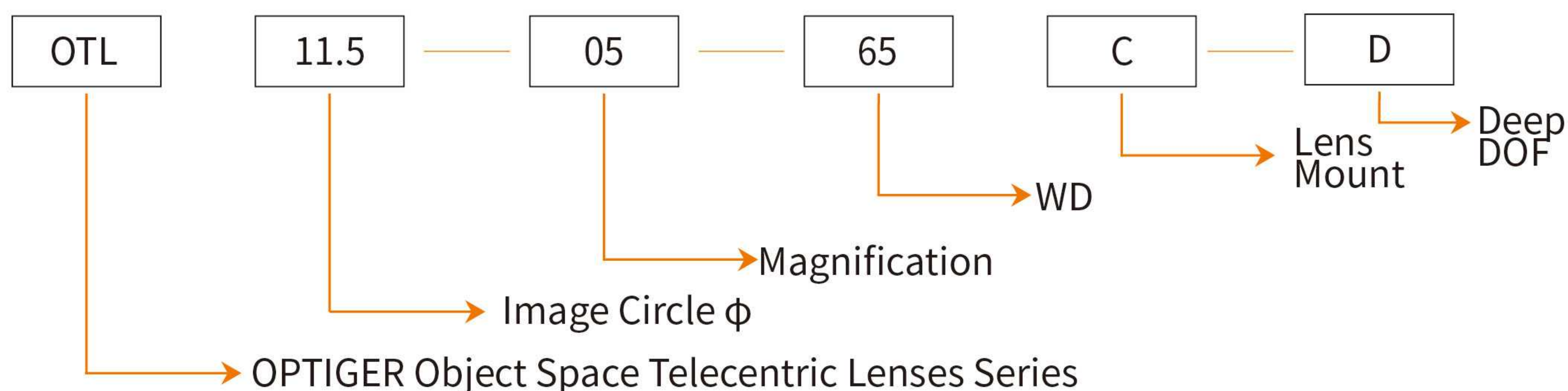
1. Various optical magnifications, satisfying different requirements on field of view
2. Options between high resolution and deep DOF are available, satisfying different technical requirements
3. WD=65mm
4. Distortion: $<0.05\%$, telecentricity: $<0.1^\circ$
5. Telecentric design, deep DOF and high resolution
6. Multi-layer coating, high transmittance
7. High cost performance, suitable for systems used for batch testing and inspection
8. Customized aperture is available



OPTICAL CHARACTERISTICS



MODEL DESCRIPTION



SPECIFICATIONS ON LENS SERIES WITH HIGH RESOLUTION

Model	Max. FOV (mm)	Magnification	WD (mm)	2/3"			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity (°)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				9.2	6.9	11.5						
OTL11.5-05-65C	23.00	0.5	65	18.4	13.80	23.00	9	12.078	2.88	<0.1	<0.05	C
OTL11.5-08-65C	14.37	0.8	65	11.5	8.63	14.37	8	6.710	1.00	<0.1	<0.05	C
OTL11.5-10-65C	11.50	1.0	65	9.2	6.90	11.50	11	7.381	0.88	<0.1	<0.05	C
OTL11.5-20-65C	5.75	2.0	65	4.6	3.45	5.75	13	4.362	0.26	<0.02	<0.04	C

SPECIFICATIONS ON LENS SERIES WITH DEEP DOF

Model	Max. FOV (mm)	Magnification	WD (mm)	2/3"			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity (°)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				9.2	6.9	11.5						
OTL11.5-05-65C-D	23.00	0.5	65	18.4	13.80	23.00	18	24.156	5.76	<0.1	<0.05	C
OTL11.5-08-65C-D	14.37	0.8	65	11.5	8.63	14.37	16	13.420	2.00	<0.1	<0.05	C
OTL11.5-10-65C-D	11.50	1.0	65	9.2	6.90	11.50	20	13.420	1.60	<0.1	<0.05	C
OTL11.5-20-65C-D	5.75	2.0	65	4.6	3.45	5.75	20	6.710	0.40	<0.035	<0.02	C

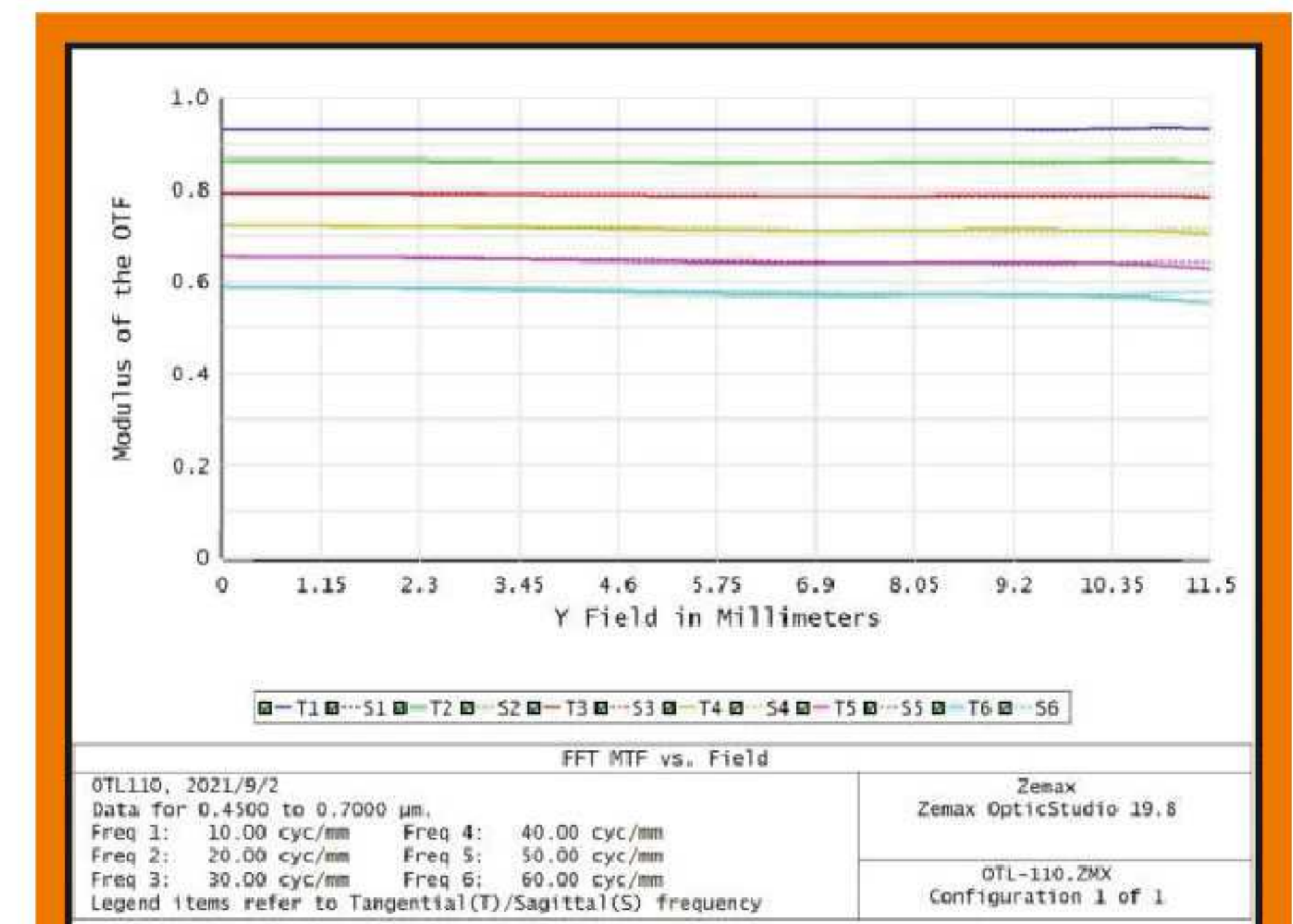
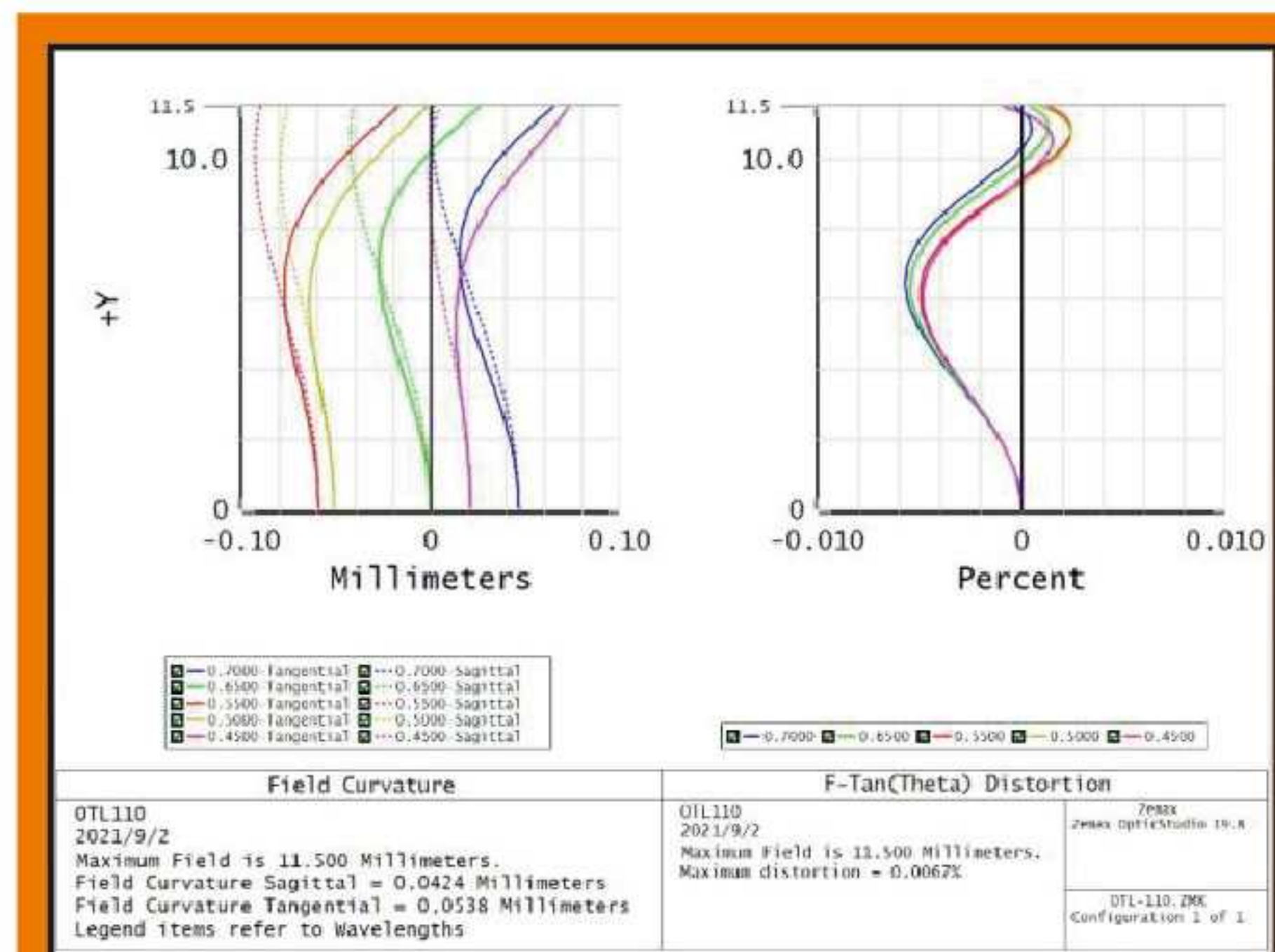
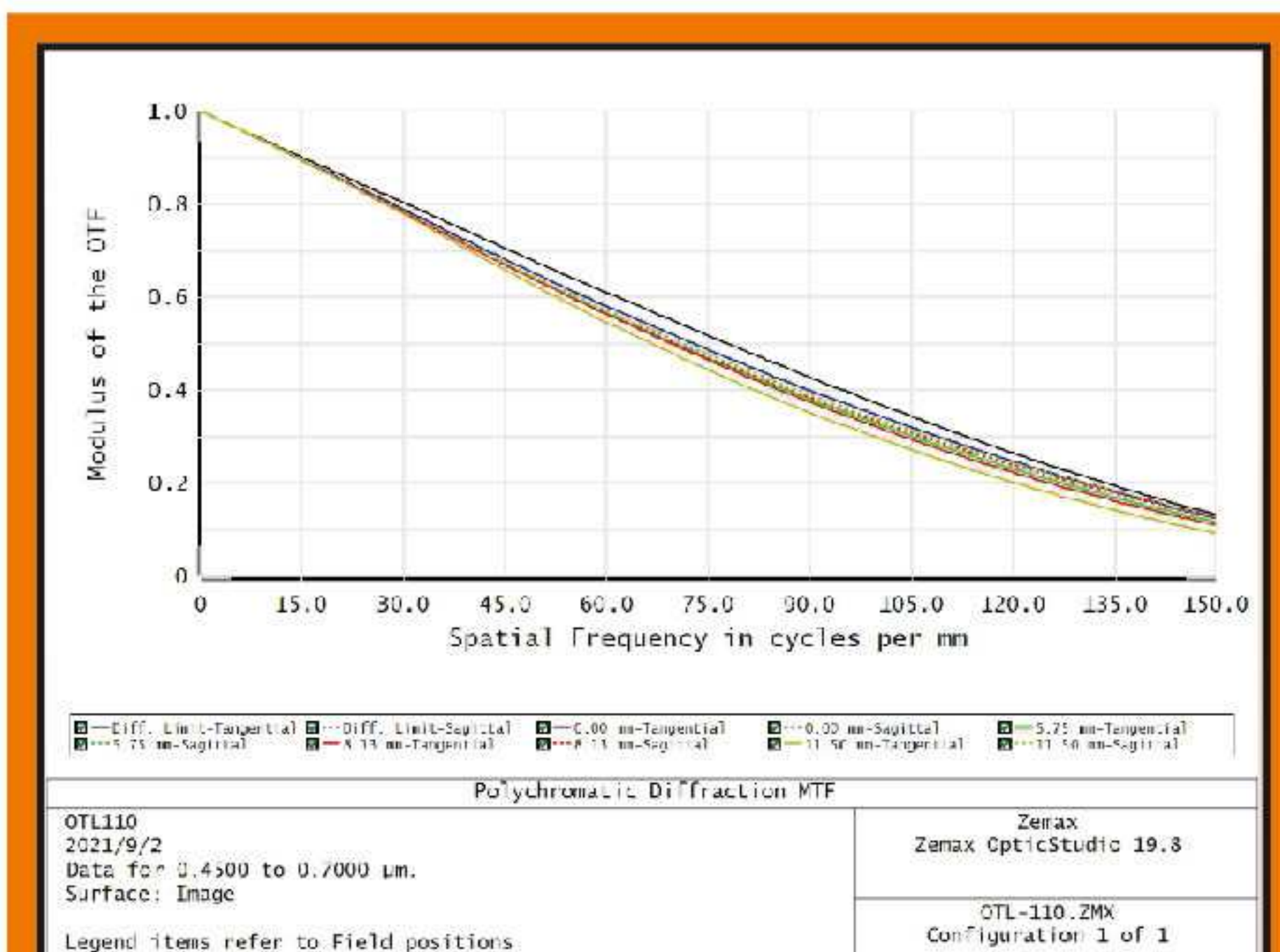
OTLIIO

FEATURES

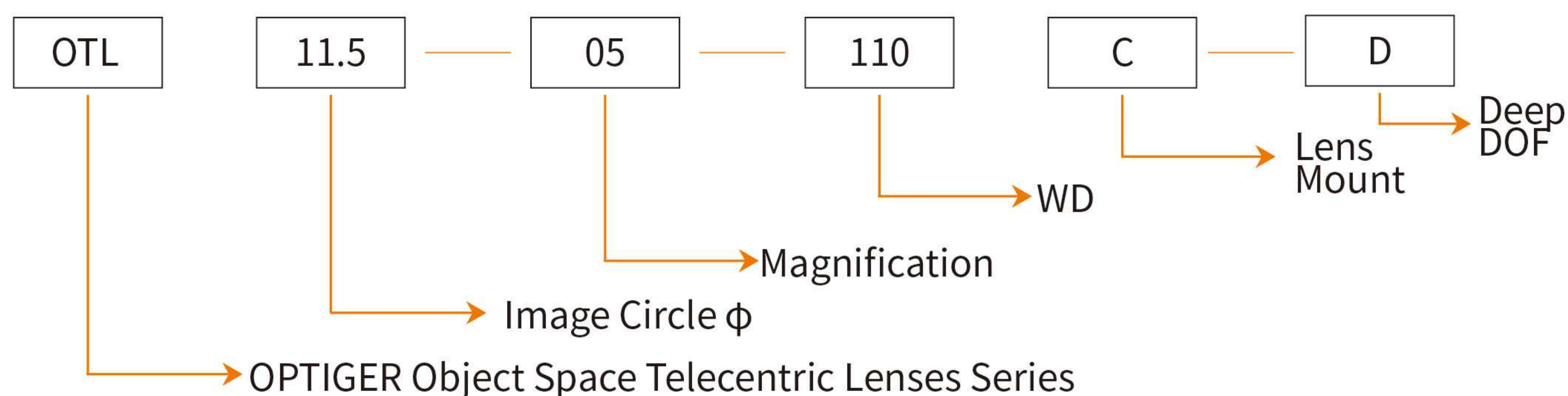
1. Various optical magnifications, satisfying different requirements on field of view
2. Options between high resolution and deep DOF are available, satisfying different technical requirements
3. WD=110mm
4. Distortion: <math><0.05\%</math>, telecentricity: <math><0.1^\circ</math>
5. Telecentric design, deep DOF and high resolution
6. Multi-layer coating, high transmittance
7. High cost performance, suitable for systems used for batch testing and inspection
8. Customized aperture is available



OPTICAL CHARACTERISTICS



MODEL DESCRIPTION



SPECIFICATIONS ON LENS SERIES WITH HIGH RESOLUTION

Model	Max. FOV (mm)	Magnification	WD (mm)	2/3"			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^{\circ}$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				9.2	6.9	11.5						
OTL11.5-05-110C	23.00	0.5	110	18.4	13.80	23.00	9	12.078	2.88	<0.1	<0.05	C
OTL11.5-08-110C	14.37	0.8	110	11.5	8.63	14.37	8	6.710	1.00	<0.1	<0.05	C
OTL11.5-10-110C	11.50	1.0	110	9.2	6.90	11.50	11	7.381	0.88	<0.03	<0.035	C
OTL11.5-20-110C	5.75	2.0	110	4.6	3.45	5.75	13	4.362	0.26	<0.025	<0.015	C

SPECIFICATIONS ON LENS SERIES WITH DEEP DOF

Model	Max. FOV (mm)	Magnification	WD (mm)	2/3"			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^{\circ}$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				9.2	6.9	11.5						
OTL11.5-05-110C-D	23.00	0.5	110	18.4	13.80	23.00	18	24.156	5.76	<0.1	<0.05	C
OTL11.5-08-110C-D	14.37	0.8	110	11.5	8.63	14.37	16	13.420	2.00	<0.1	<0.05	C
OTL11.5-10-110C-D	11.50	1.0	110	9.2	6.90	11.50	16	10.736	1.28	<0.02	<0.02	C
OTL11.5-20-110C-D	5.75	2.0	110	4.6	3.45	5.75	20	6.710	0.40	<0.025	<0.015	C

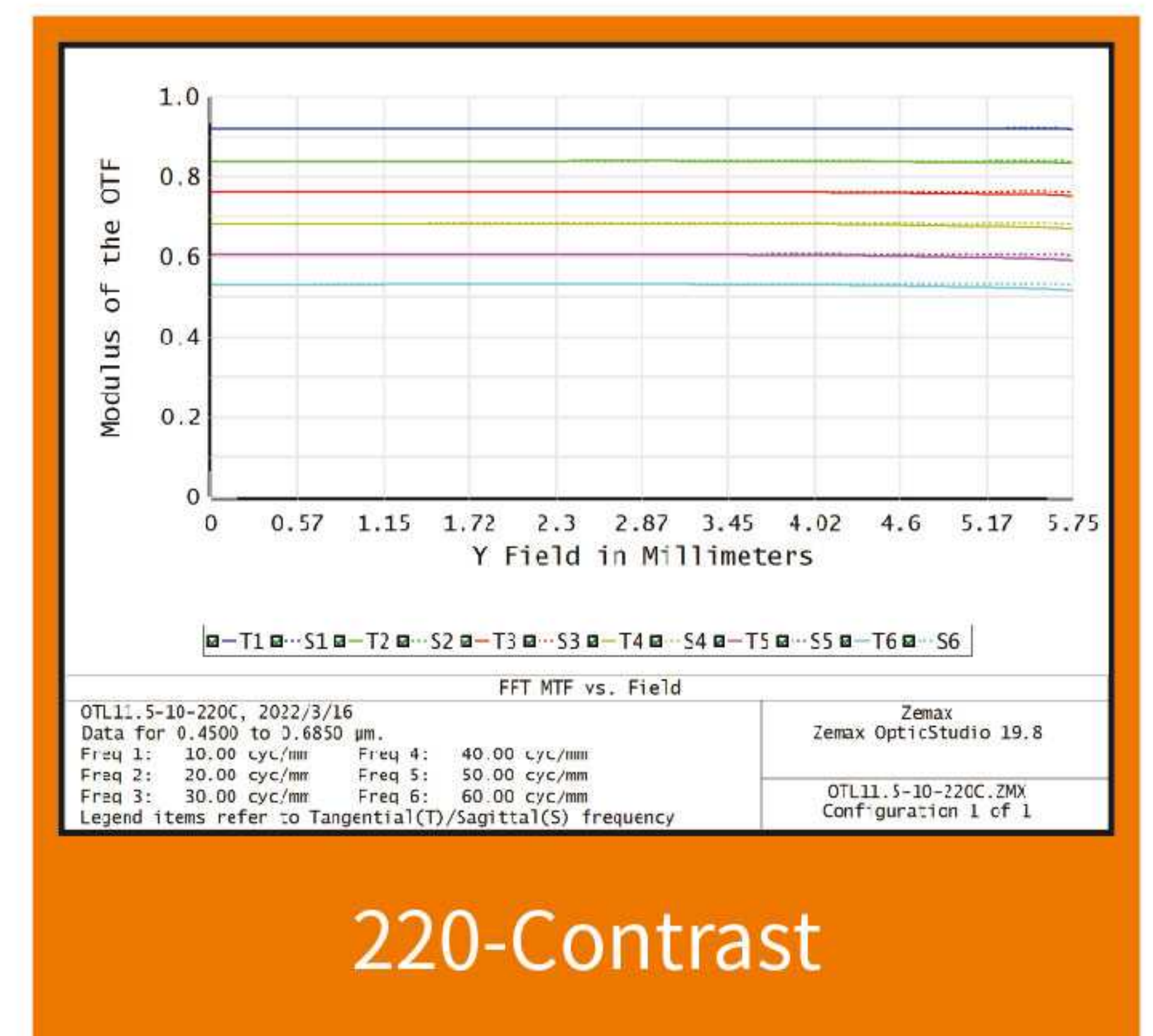
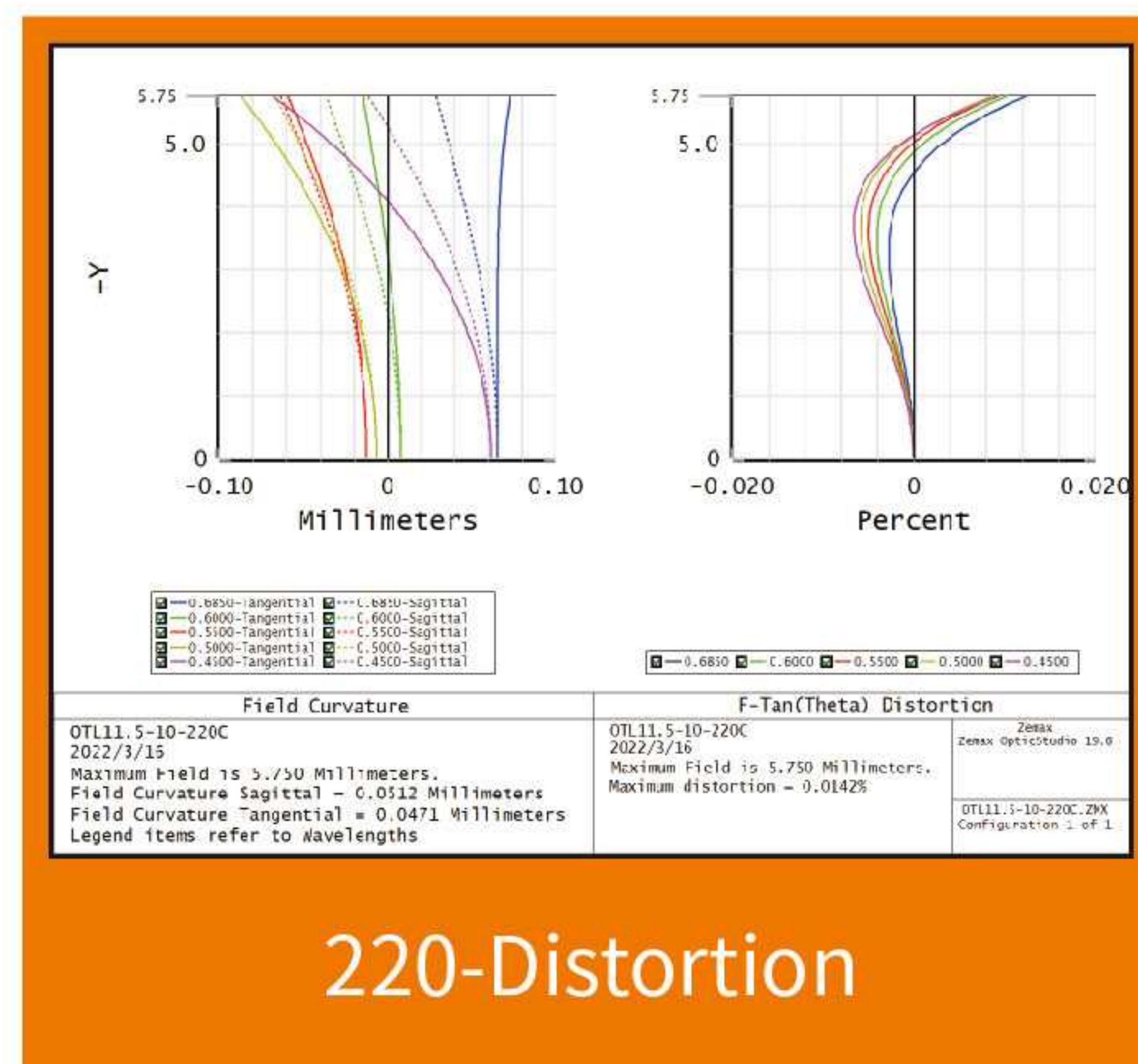
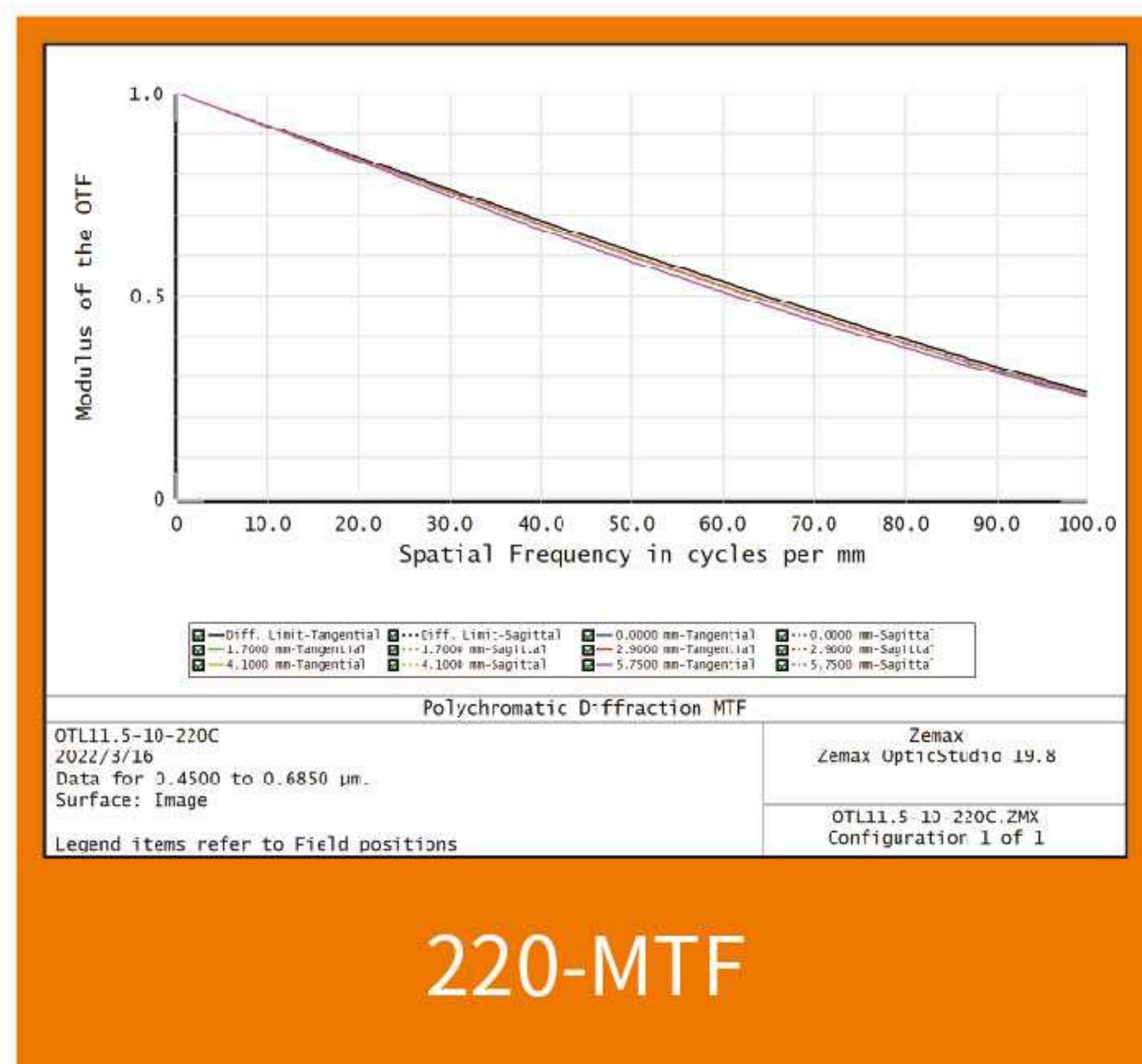
ULWD SERIES

FEATURES

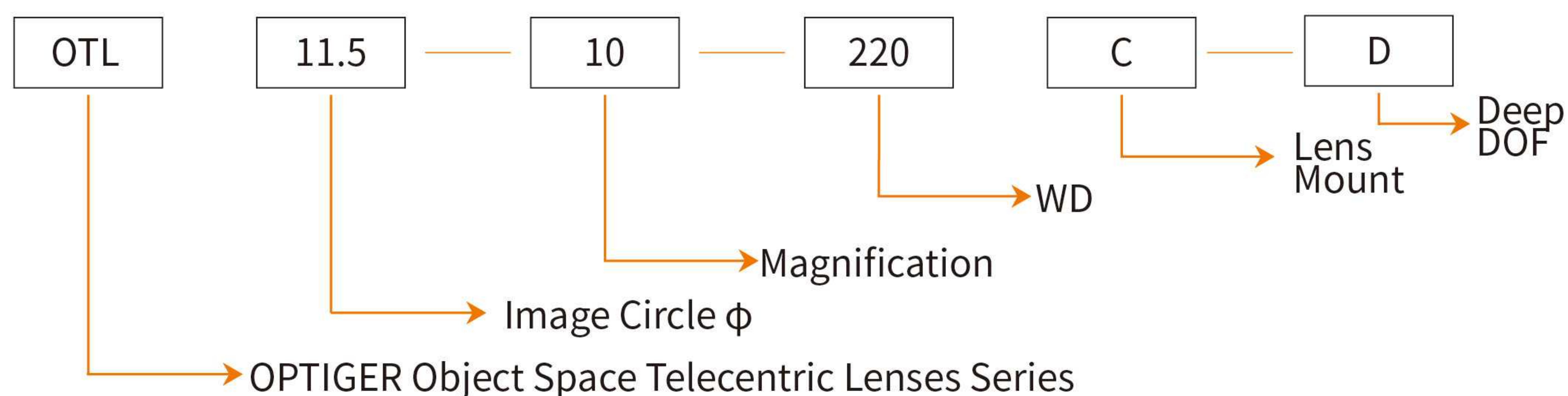
1. Multiple ULWD Lenses satisfy different requirements on fields of view
2. Options between high resolution and deep DOF are available to satisfy different technical requirements
3. Distortion: $<0.05\%$, telecentricity: $<0.1^\circ$
4. Telecentric design in object space
5. Multi-layer coating, high transmittance
6. High cost performance, suitable for systems used for batch testing and inspection
7. Customized aperture is available



OPTICAL CHARACTERISTICS



MODEL DESCRIPTION



SPECIFICATIONS ON LENS SERIES WITH HIGH RESOLUTION

Model	Max. FOV (mm)	Magnification	WD (mm)	2/3"			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^\circ$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				9.2	6.9	11.5						
OTL11.5-10-220C	11.50	1	220	9.2	6.9	11.5	11	7.381	0.88	<0.1	<0.05	C

Model	Max. FOV (mm)	Magnification	WD (mm)	1.1"			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^\circ$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				14.8	11.1	18.5						
OTL18.5-05-300C	37.00	0.5	300	29.6	22.2	37.0	13	17.446	4.16	<0.1	<0.05	C

SPECIFICATIONS ON LENS SERIES WITH DEEP DOF

Model	Max. FOV (mm)	Magnification	WD (mm)	2/3"			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^\circ$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				9.2	6.9	11.5						
OTL11.5-10-220C-D	11.50	1	220	9.2	6.9	11.5	20	13.42	1.6	<0.1	<0.05	C

Model	Max. FOV (mm)	Magnification	WD (mm)	1.1"			Effective F-number	Object Space Resolution (μm)	DOF (mm)	Actual Measured Telecentricity ($^\circ$)	Actual Measured Distortion (%)	Lens Mount
				H	V	D						
				14.8	11.1	18.5						
OTL18.5-05-300C-D	37.00	0.5	300	29.6	22.2	37.0	20	26.84	6.4	<0.1	<0.05	C

PRODUCT FEATURES

Example Comparisons · Applications

- || Edge Sharpening
- || Constant Magnification
- || Deep DOF
- || Zero Parallax
- || High Precision Vision Localization
- || Precision Measurement

Object Space Resolution

Object space resolution is the minimum distance between two points that can still be distinguished as separate points.

$$Resolution = \frac{0.61 * \lambda}{NA}$$

In this brochure, value of λ is 550nm and NA refers to numerical aperture.

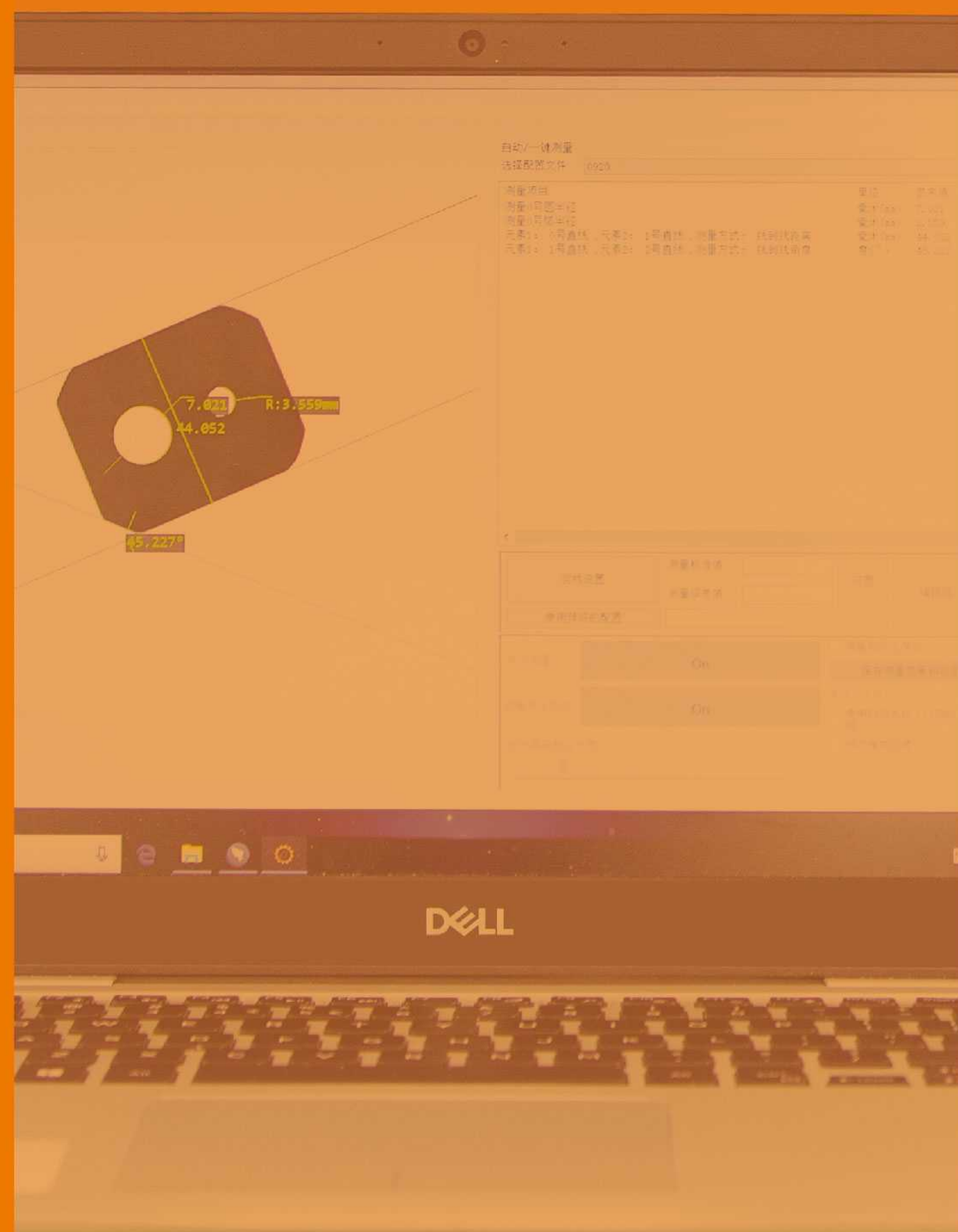
Telecentricity

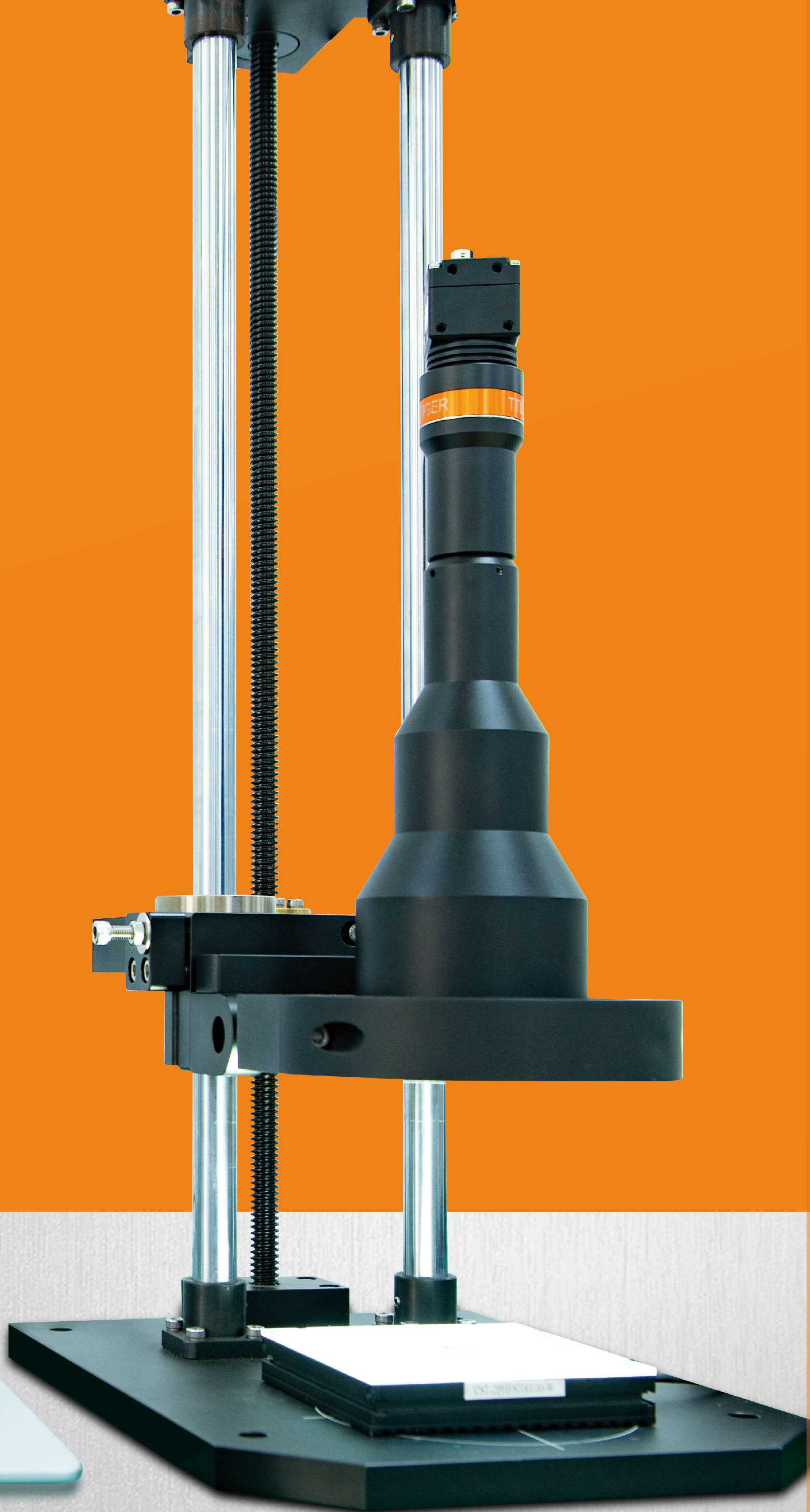
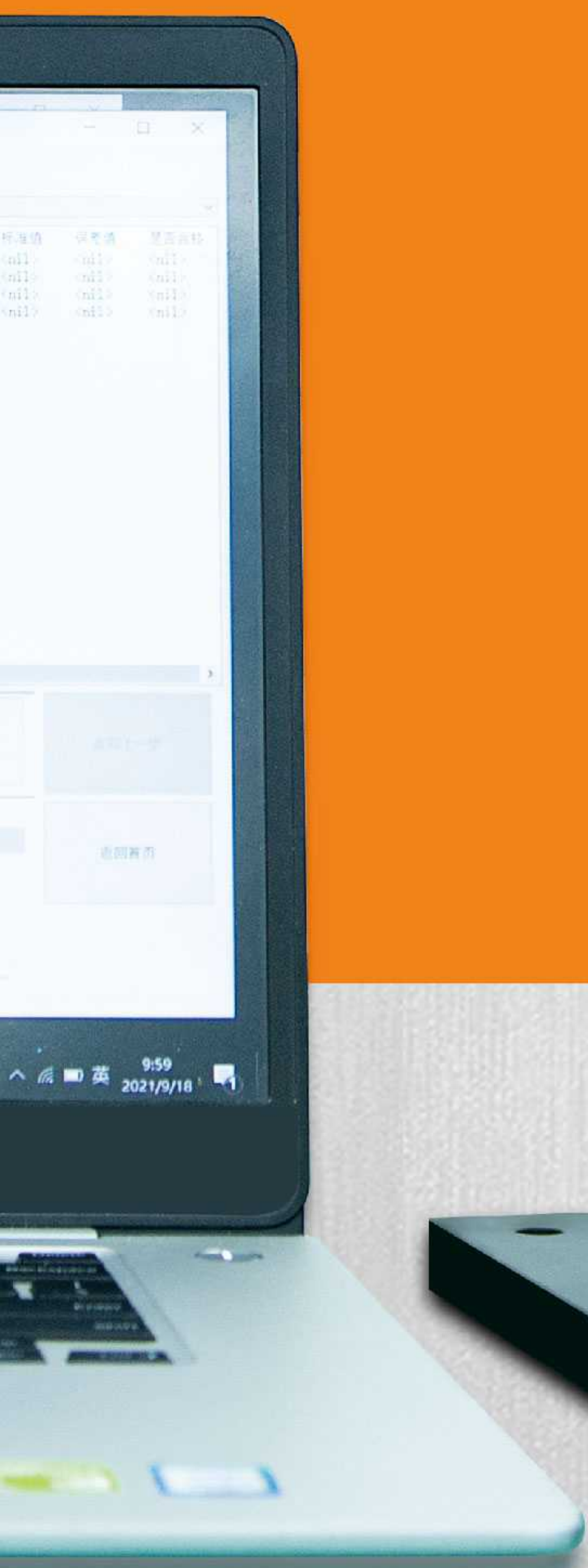
Telecentricity refers to the angle of which chief optical ray deviates from the optical axis. The smaller the angle, the higher the telecentricity. The smaller the magnification error, the more precise the image.

Optical Distortion

Distortion refers to an optical aberration that deforms and bends physically straight lines. It is calculated by relating the actual distance to the predicted distance of the image.

$$Distortion = \frac{y' - y_0}{y_0} \times 100\%$$





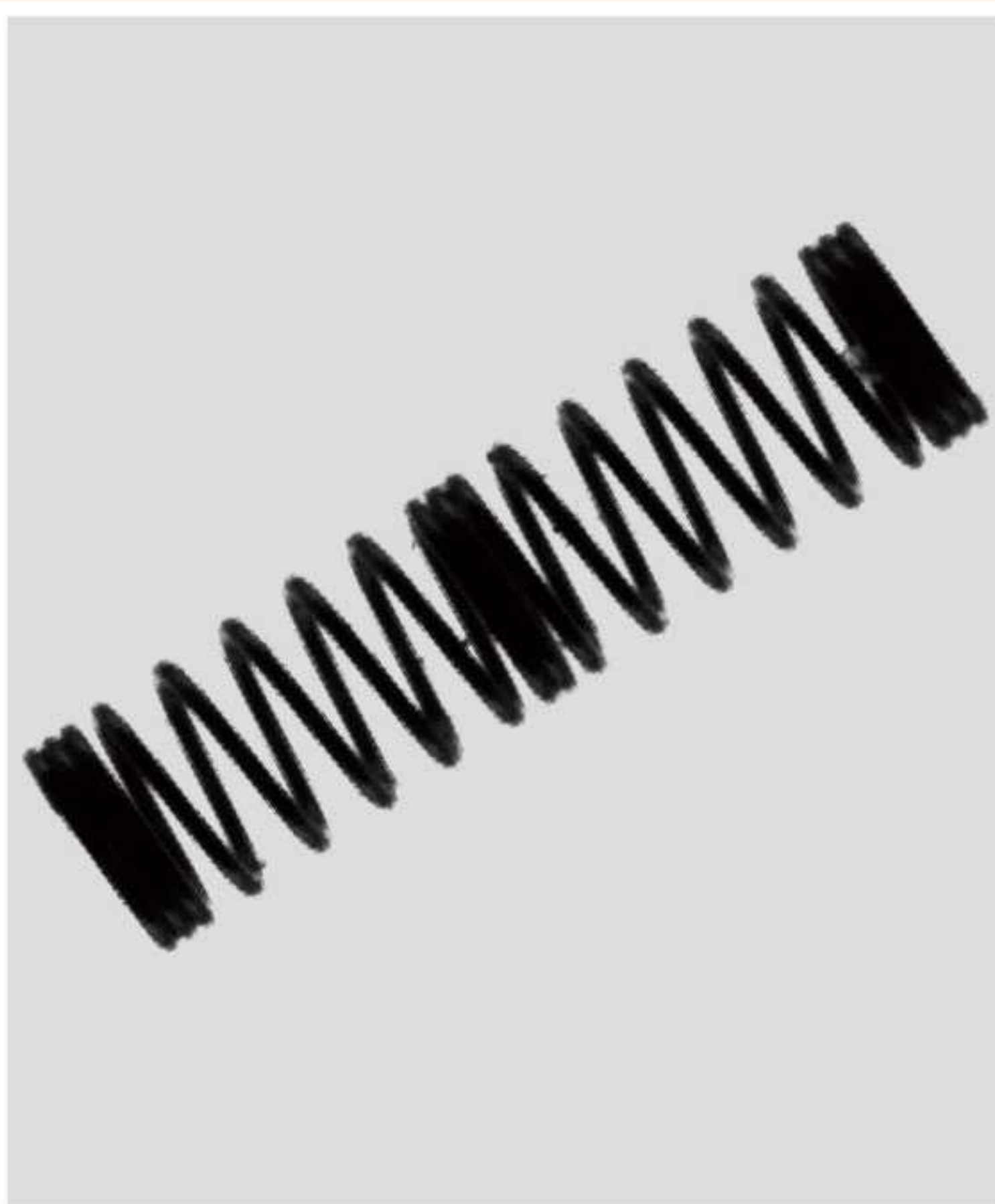
OPTICAL FEEDBACK

EXAMPLES

COMPARISONS

PICTURES TAKEN WITH A BI-TELECENTRIC LENS

Edge Sharpening

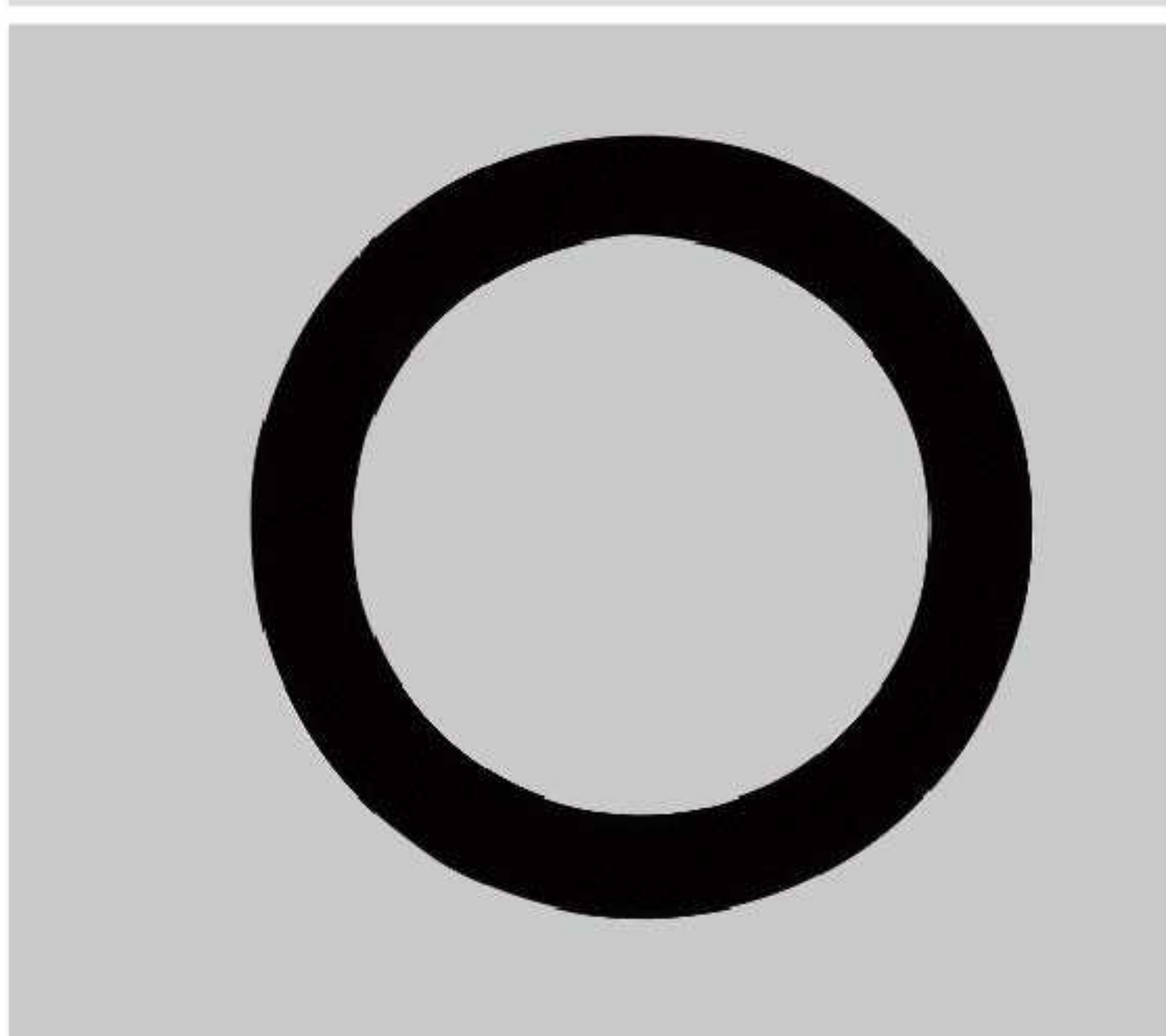


Bi-telecentric lens has constant magnification, so pictures taken with it are free from magnification error caused by different object distances, which solves precision measurement related problems arising from parallax.

Deep DOF of bi-telecentric lens makes both front and back sides of the spring in focus.

Incidence of parallel light avoids the incidence of stray lights, ensuring high definition of the object's contour and facilitating the subsequent image processing.

Constant Magnification

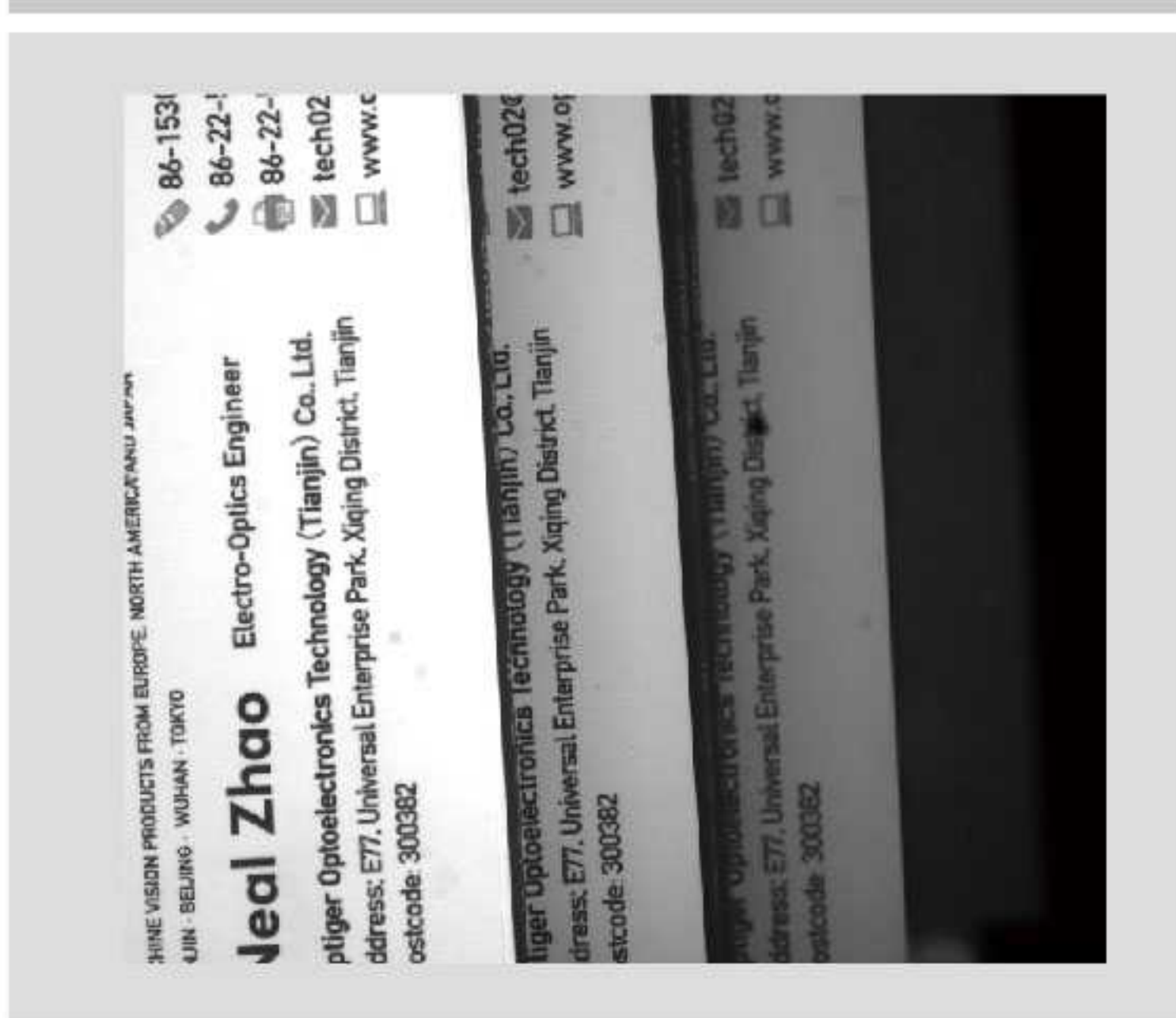


Incidence of parallel light makes it possible for a bi-telecentric lens to have a constant magnification to take pictures of the distance ring's front and back sides, which completely solves the precision measurement related problems arising from parallax.

Incidence of parallel light avoids the incidence of stray lights and therefore enhances the edge acutance and ensures measurement precision.

The bi-telecentric lens can obtain uniform illuminance over FOV under the same illumination conditions.

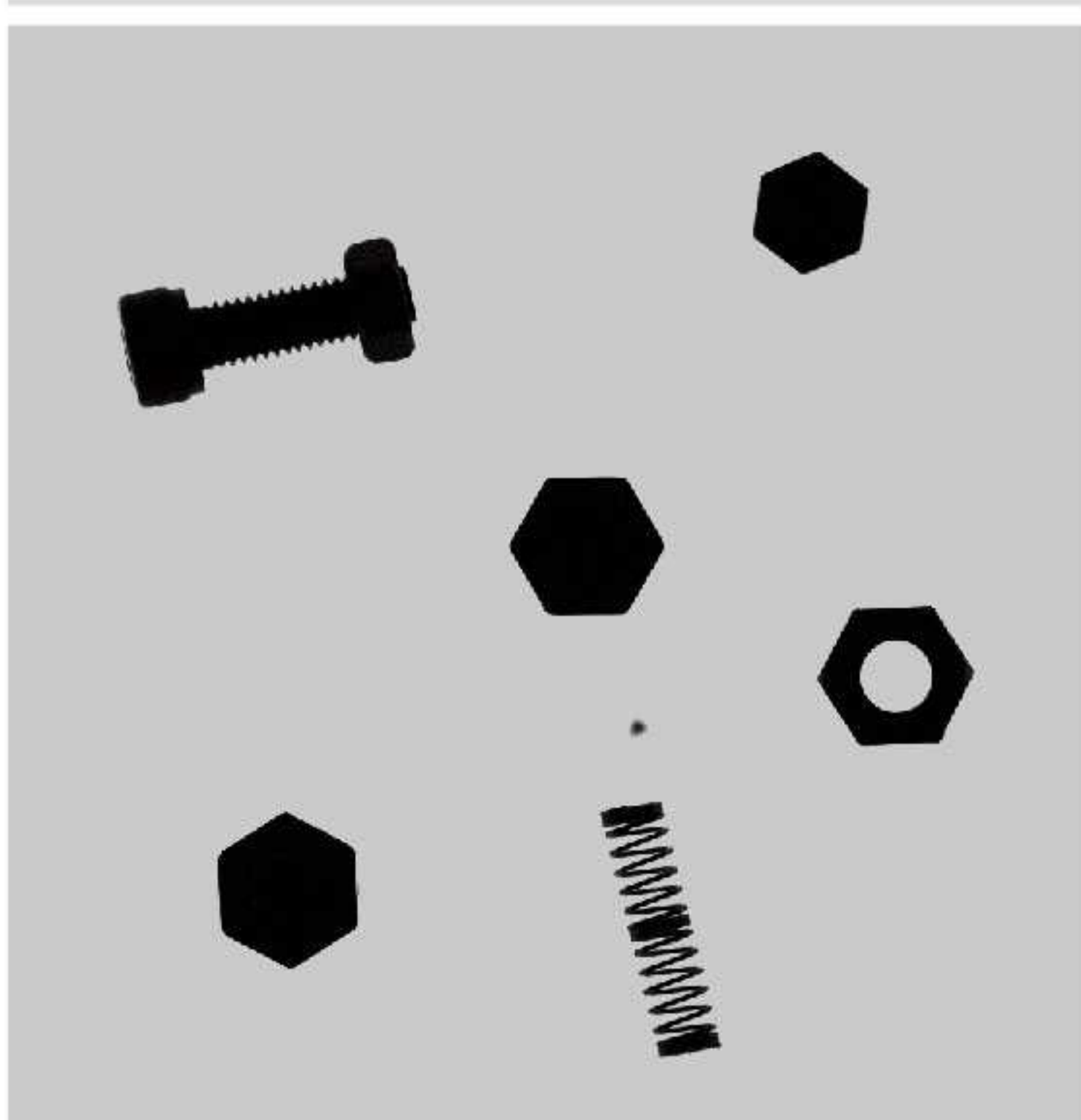
Deep DOF



With deeper DOF, it is possible for the lens to capture a clear image of all the three name cards placed at different planes.

Besides, bi-telecentric lenses feature constant magnification, thus the image acquired is free from errors caused by different magnification, making precision measurement achievable.

Zero Parallax



Because a bi-telecentric lens is parallax-free in horizontal and vertical directions, dimension measurement will not be influenced by different positions of targets.

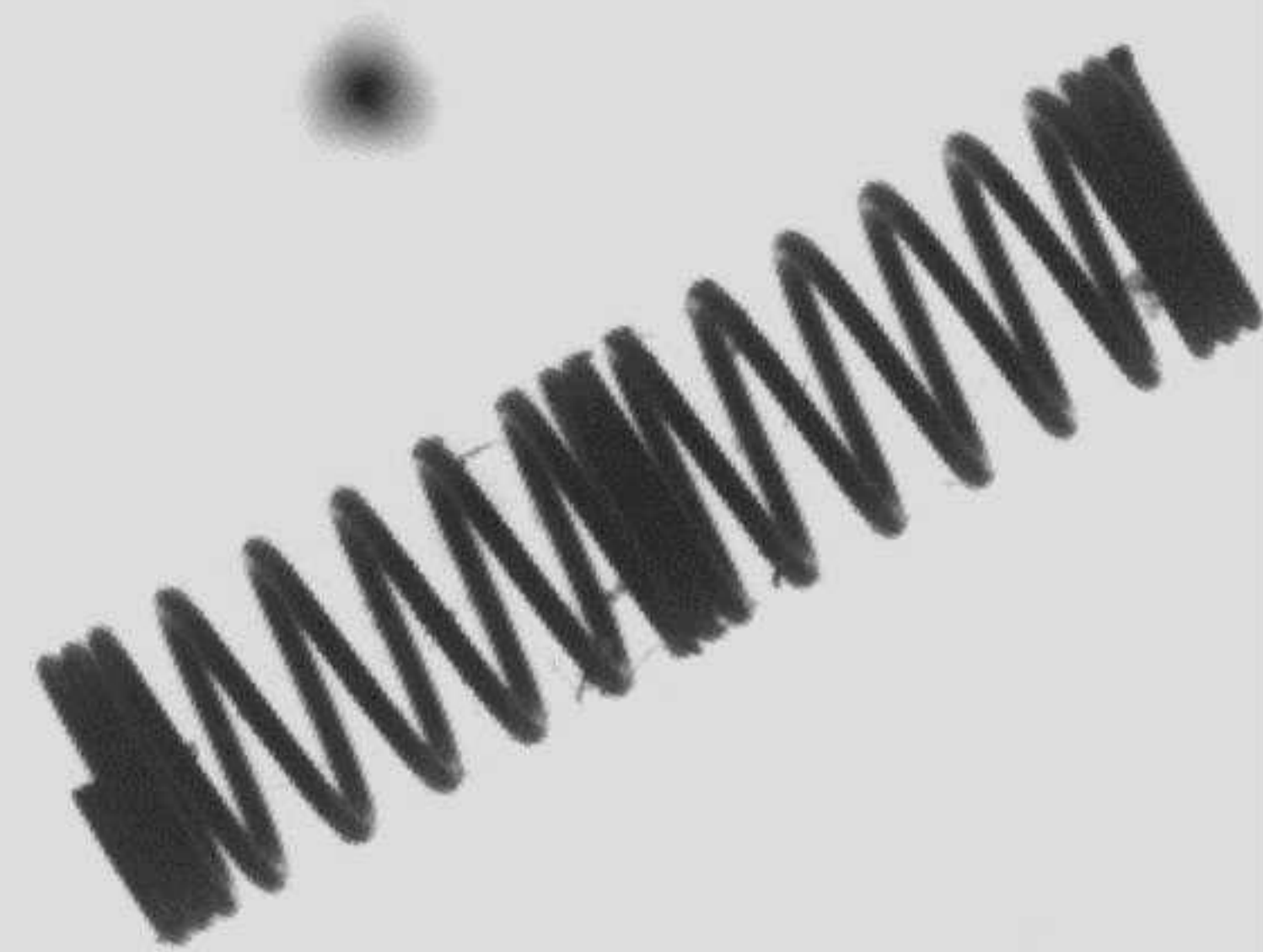
Deep DOF of the bi-telecentric lens ensures high quality imaging for targets at different planes, which guarantees the measurement accuracy of images and makes measurement easier.

In general, the distortion of bi-telecentric lenses is less than 0.1% with small deformation, so they can take clear images of targets' edge and ensure high measurement precision.

APPLICATIONS



PICTURES TAKEN WITH A CONVENTIONAL LENS



Imaging magnification error between front and back sides of the spring caused by different object distances leads to severe data error when measuring dimensions.

Conventional lenses' DOF is not deep enough to make both front and back sides of the spring in focus.

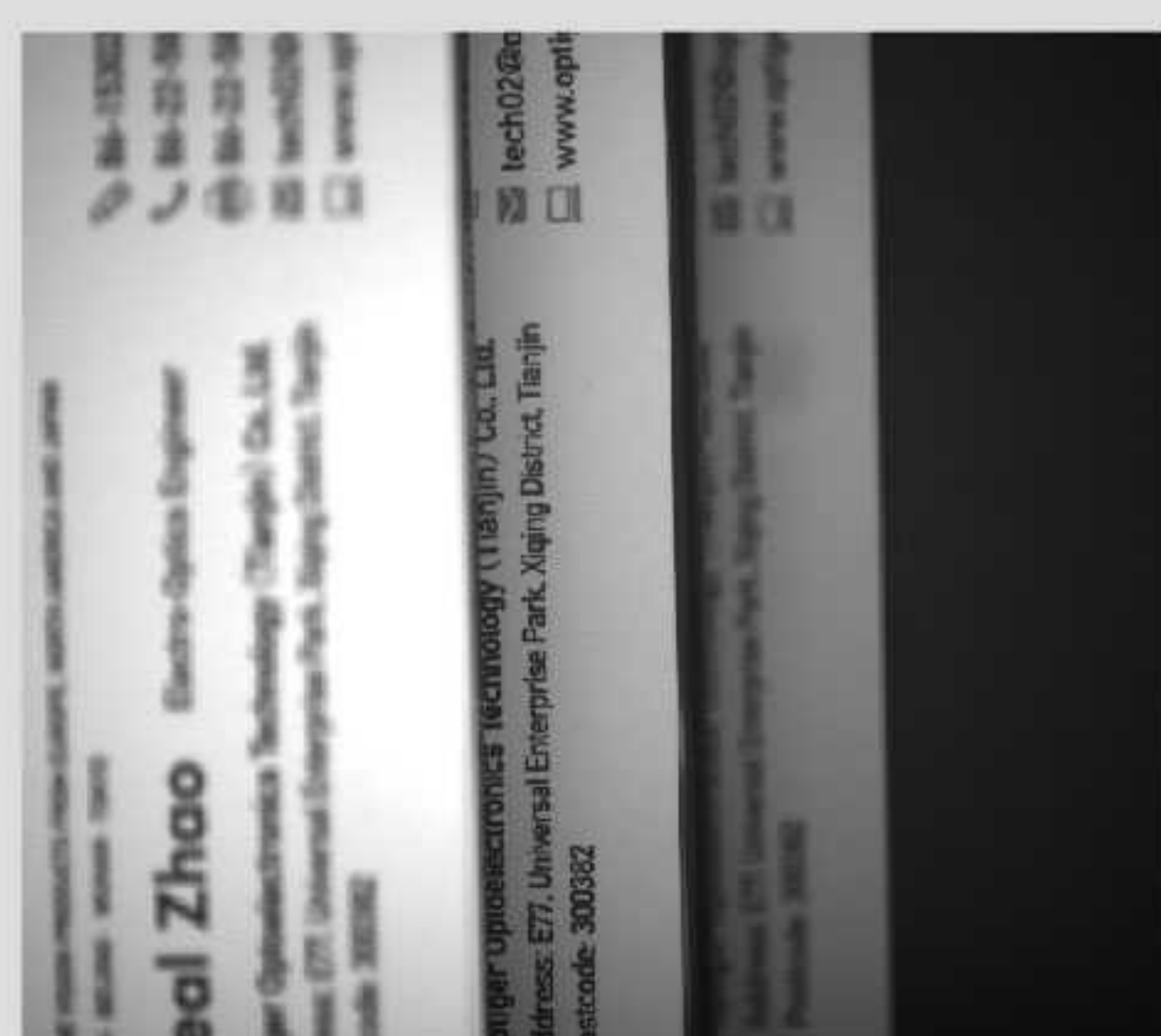
Due to its metal material and spiral structure of the spring, reflex of stray lights at the spring's edge when a conventional lens is used leads to a blurred image of the edge, increasing measurement error and finally influencing the accuracy of results.



When a conventional lens takes pictures of the distance ring's front and back sides, its imaging magnification will change, resulting in large deviation in the inside diameters from front and back sides of the distance ring.

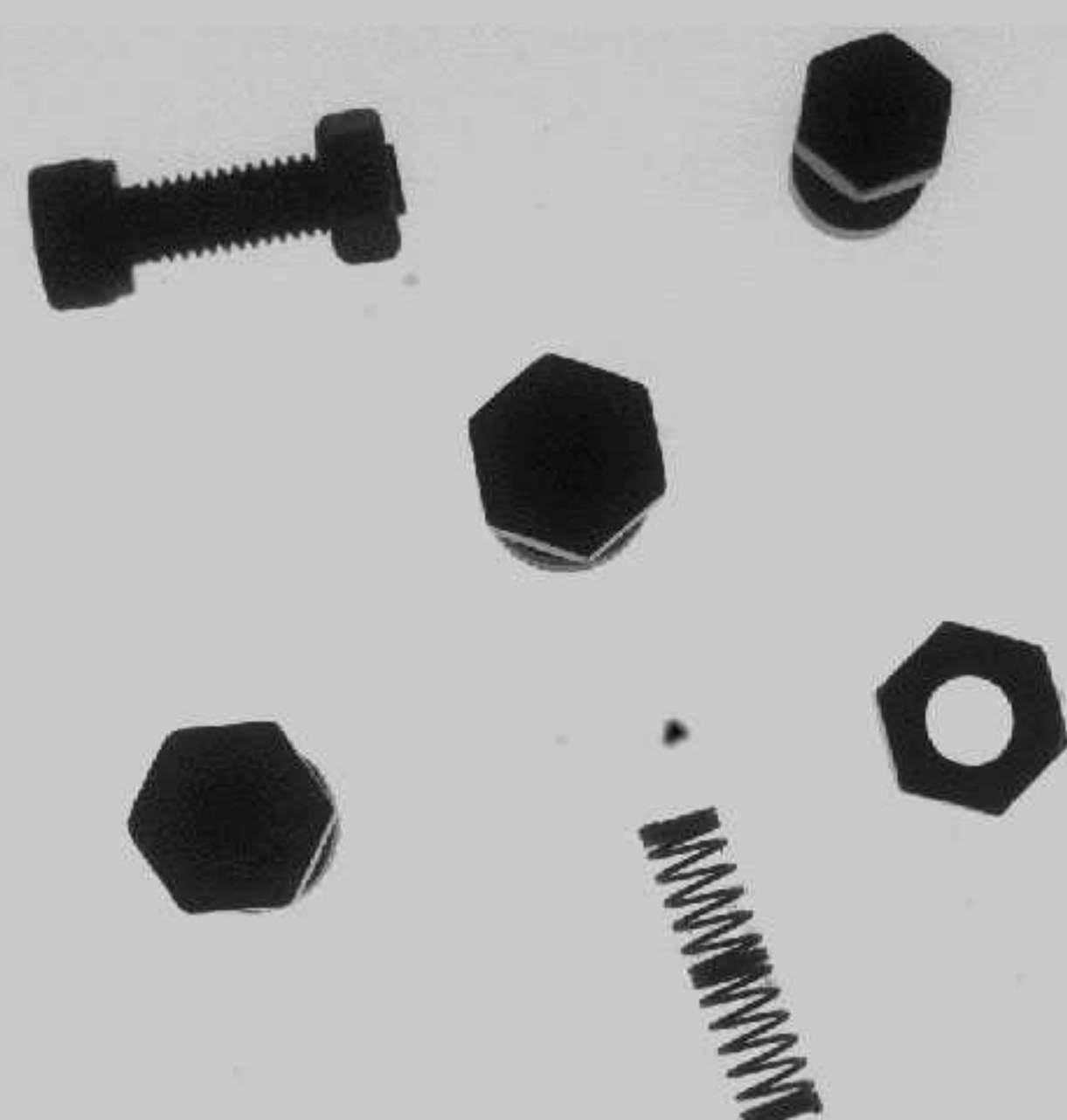
Reflex of stray lights at the metal edge leads to blurred image of the edge, making precision measurement unachievable.

The conventional lens is unable to obtain uniform illuminance over FOV under the same illumination conditions.



Taken with a conventional lens, the three name cards at different planes are unable to be in focus simultaneously because of the shallow DOF of the lens.

Due to the magnification error caused by different object distances, objects in the image taken with a conventional lens look small in the distance and big on the contrary, influencing measurement precision.



For a conventional lens, different positions of targets lead to horizontal or vertical parallax.

Shallow DOF makes it impossible for conventional lenses to keep targets at different positions in focus at the same time, which generating negative impact on measurement precision.

Distortion of conventional lenses is no less than 2%, which especially influences the FOV of edge portion of targets, leading to distortion of targets' contours and measurement inaccuracy.

CONTACTS

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HQ-Tianjin: E77, Universal Enterprise Park, No.1 Sizhi Rd., Xiqing District, Tianjin, China

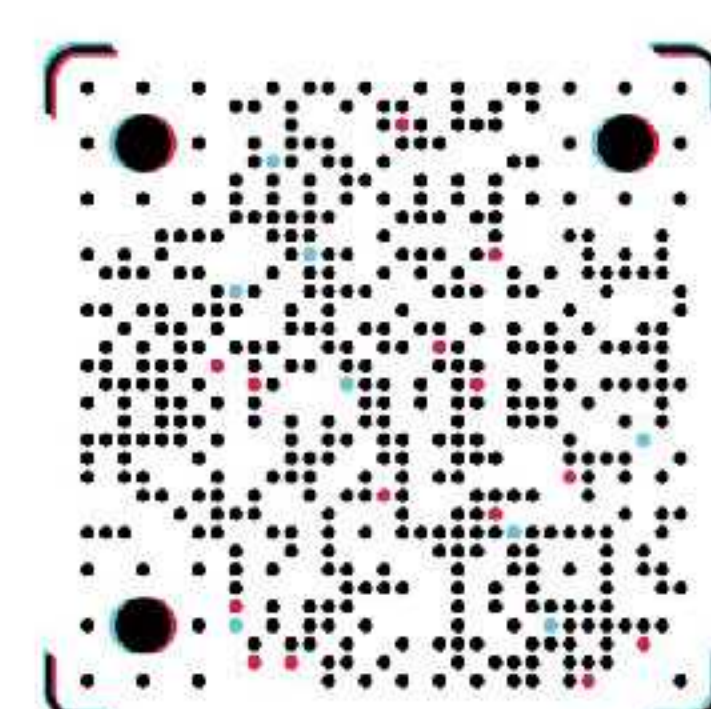
Branch-Suzhou: Room 1410, Block B, Huoli Building, Xiangcheng District, Suzhou, Jiangsu Province, China



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