

Telecentric Lens



远心镜头

深圳市东正光学技术股份有限公司

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DZOPTICS



公众号/DZOPTICS



官网/Website

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Serving The World



东正光学 DZO

深圳市东正光学技术股份有限公司（DZO）是一家聚焦于光学及光电子技术研发的国家级高新技术企业、国家级专精特新“小巨人”企业。2013年成立于广东省深圳市，目前拥有近600名员工，业务遍及全球60多个国家和地区。

在十多年的发展历程中，DZO始终坚持投入光学、光电子技术的开发融合及光学镜头、光学模组、光学系统等产品的创新应用，致力服务于工业质量控制、影视工业、消费影像、半导体检测技术、医疗检测及生命科学等领域，创立并自主运营DZOPTICS、DZOFILM、Thypoch、全球化市场品牌。

在未来，DZO将不断挑战想象极限，秉承敬畏市场、尊重规律的核心价值观，为全球用户持续奉献更为极致的视觉体验。

Shenzhen Dongzheng Optical Technology Co., Ltd. (DZO) is a national high-tech enterprise and a national-level specialized and innovative "little giant" enterprise focusing on the research and development of optical and optoelectronic technologies. Founded in Shenzhen, Guangdong Province in 2013, it currently has nearly 600 employees and its business spans more than 60 countries and regions worldwide.

Over the past decade, DZO has consistently invested in the development and integration of optical and optoelectronic technologies, as well as the innovative application of products such as optical lenses, optical modules, and optical systems. It is committed to serving fields such as industrial quality control, film and television industry, consumer imaging, semiconductor testing technology, medical testing, and life sciences, and has established and independently operated the DZOPTICS, DZOFILM, Thypoch, and global market brands.

In the future, DZO will continue to push the limits of imagination, uphold the core values of respecting the market and respecting the rules, and continue to offer users around the world a more ultimate visual experience.

DZOPTICS



OPTICAL MANUFACTURING

远心镜头

Telecentric Lens

DZOPTICS 远心镜头聚焦行业检测痛点，对光路进行了优化设计，保证了产品性能的高水准。产品支持1.3M-16K分辨率，靶面覆盖1/2inch到 $\phi 82\text{mm}$ 超大尺寸，规格多种可快速满足不同场景视觉检测需求

DZOPTICS telecentric lenses address industry inspection pain points by optimizing the optical path, ensuring high-level product performance. The products support resolutions from 1.3M to 16K, and target surface coverage ranges from 1/2 inch to ultra-large $\phi 82\text{mm}$, offering various specifications to quickly meet the visual inspection needs of different scenarios.



标准1/2"
Standard 1/2"



标准2/3"
Standard 2/3"



定制2/3~1.1"
Customized 2/3~1.1"



标准1.2"
Standard 1.2"



红外1.1"
Infrared 1.1"



定制1.75"
Customized 1.75"



定制33mm
Customized 33mm



定制38mm
Customized 38mm



58mm16K



82mm16K

产品目录 / Product Catalog

01

标准1/2"
Standard 1/2"

15



02

标准2/3"
Standard 2/3"

16



03

定制2/3~1.1"
Customized 2/3~1.1"

19



04

标准1.2"
Standard 1.2"

21



05

红外1.1"
Infrared 1.1"

22



06

定制1.75"
Customized 1.75"

23



07

定制33mm
Customized 33mm

25



定制38mm
Customized 38mm

26

08

58mm16K
58mm16K

27



82mm16K
82mm16K

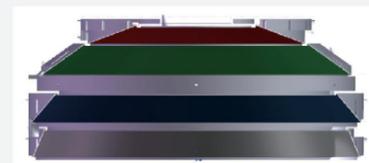
28

远心镜头应用痛点

Pain points in the application of telecentric lenses

切换不同色光时，当蓝光、绿光调试清晰，红光不清晰，或者红光清晰、绿光又不是最清晰点，调节Z轴改变镜头高度，不同色光最佳焦点对应镜头高度存在差异，这种差异同时导致镜头有效景深的减小，不利于高精度检测。

When switching between different colors of light, if the blue and green light are clear but the red light is not, or if the red light is clear but the green light is not at its clearest point, adjusting the Z-axis to change the lens height will result in differences in the optimal focal point of the lens for different colors of light. This difference will also reduce the effective depth of field of the lens, which is not conducive to high-precision detection.



远心镜头RGB共焦设计

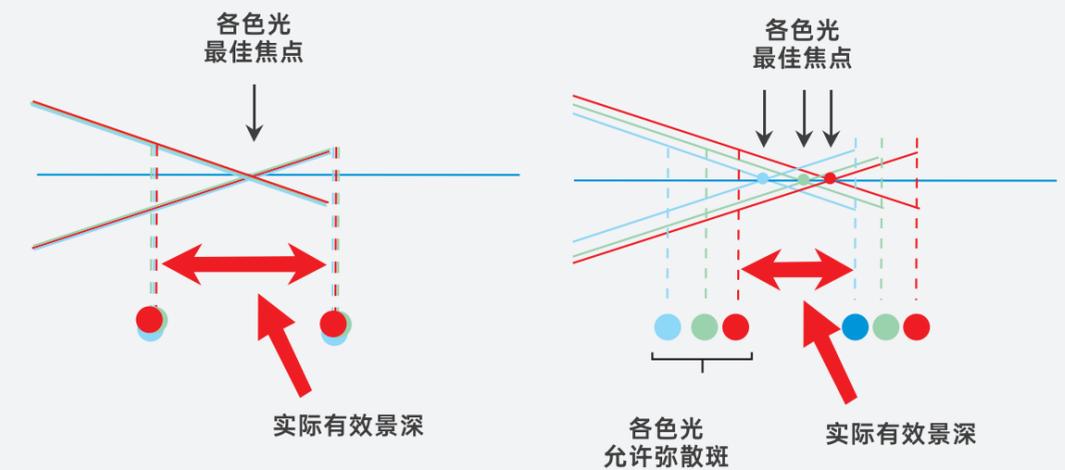
Telecentric lens RGB confocal design

共焦

不同颜色的光线经过镜头后在像面聚焦点重合

Confocal:

Light of different colors converges at the focal point on the image plane after passing through the lens.



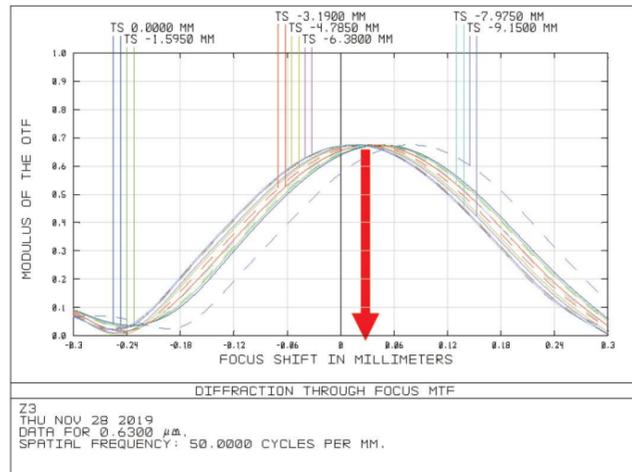
共焦的优势

- 1、切换不同色光时成像保持清晰锐利
- 2、获取理论景深上限

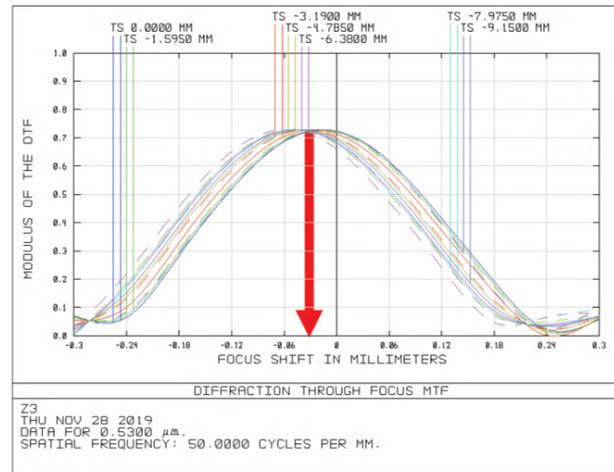
Advantages of confocal focusing:

1. Maintains sharp and clear imaging when switching between different colors of light;
2. Achieves the theoretical upper limit of depth of field .

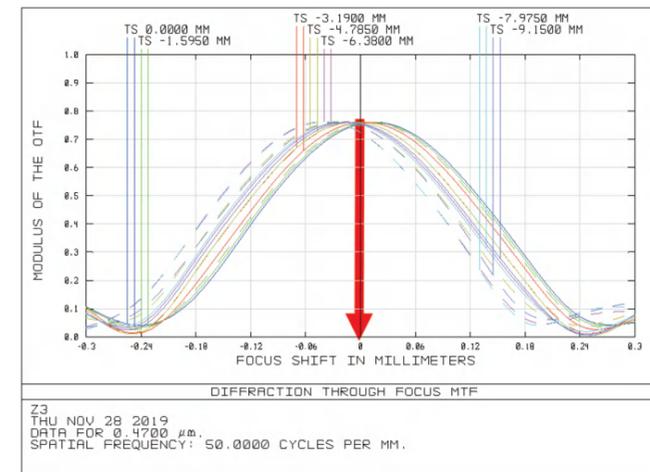
RGB共焦优化前 / Before RGB confocal optimization



Red light - 630nm



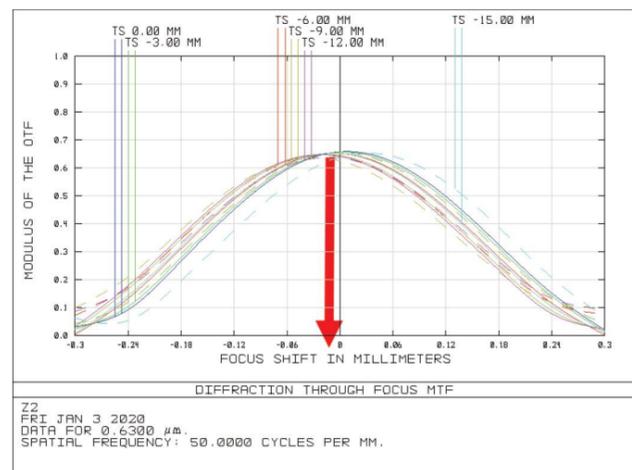
Green light - 530nm



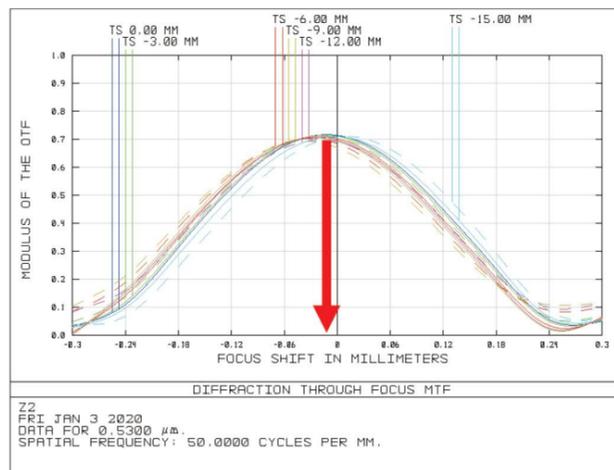
Blue light - 470nm



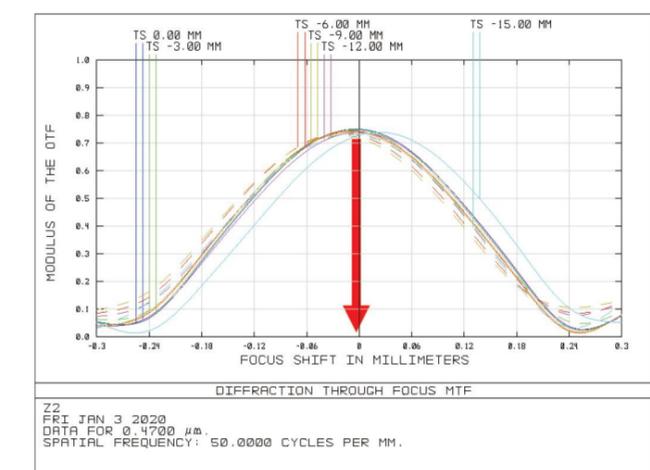
RGB共焦优化后 / After RGB confocal optimization



Red light - 630nm



Green light - 530nm



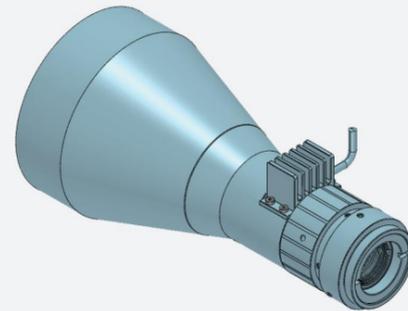
Blue light - 470nm

同轴照明均匀性

Coaxial illumination uniformity

对同轴光源进行特殊优化设计，改善同轴照明均匀性问题

Special optimization design of the coaxial light source improves the uniformity of coaxial illumination.



同轴照明不均匀存在以下问题：

测不准	光照不均导致图像边缘位置偏移，精密尺寸测量重复性差，数据忽大忽小
看不透	视场内明暗不一，导致细微划伤被亮区掩盖（漏检），或暗区脏污被误报（过杀）
稳不住	算法被迫增加预处理来补偿光照，不仅拖慢检测速度，且光源老化后需频繁调试参数维护成本高

Uneven coaxial illumination presents the following problems:

Inaccuracy: Uneven illumination causes image edge position shifts, resulting in poor repeatability of precise dimensional measurements and inconsistent data.

Inaccuracy: Inconsistent brightness within the field of view causes minor scratches to be masked by bright areas (missed detection) or dirt in dark areas to be falsely detected (over-detection).

Instability: The algorithm is forced to add preprocessing to compensate for illumination, which not only slows down the detection speed but also requires frequent parameter adjustments after the light source ages, resulting in high maintenance costs.

同轴照明实拍效果

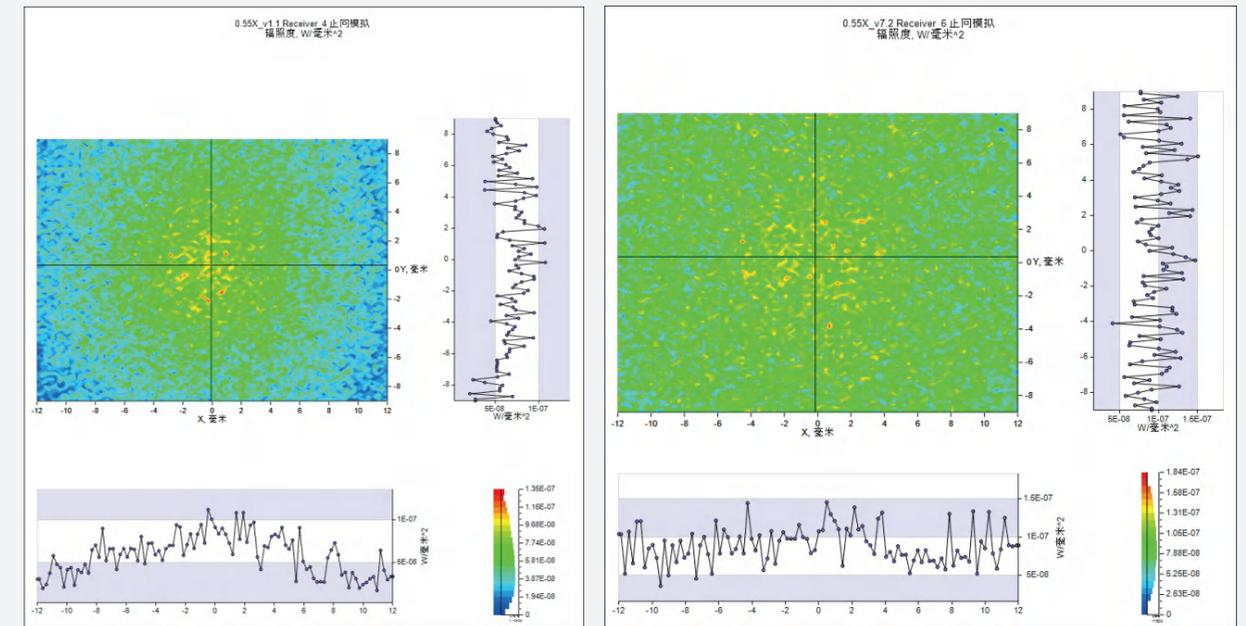
Real photos of coaxial lighting



改善前
Before improvement



改善后
After improvement

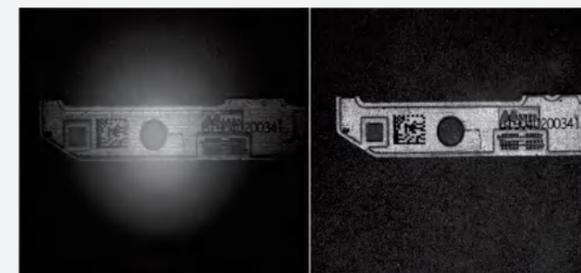


改善前
Before improvement

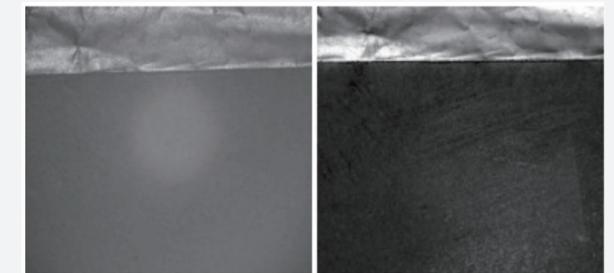
改善后
After improvement

实拍一同轴照明优化前后的图像对比

Real-world comparison of images before and after coaxial illumination optimization



电路板
circuit board



锂电池极片
Lithium battery electrode

标准1/2"

Standard 1/2"



特点 / Features

- | | |
|--------------------------------------|-----------------------------------------------------------------|
| (1) 倍率范围 0.8x-2x | (1) Magnification range: 0.8x-2x |
| (2) 工作距 110mm, 外径 $\phi 16\text{mm}$ | (2) Working distance: 110mm, outer diameter: $\phi 16\text{mm}$ |
| (3) 物像距一致, 方便更换 | (3) Consistent object-image distance, easy to replace |

应用场景 / Application

定位 Location

参数 / Parameter

产品型号 Model	靶面/mm Img.Circle	倍率 Mag	光圈/F#	畸变/% Distortion	工作距/mm Working Distance	共轭距/mm Conjugate Distance	接口 Mount
TL080110A1_8C	$\phi 8$	0.8	F18	0.02%	110	210	C
TL100110A1_8C	$\phi 8$	1	F20	0.02%	110	211	C
TL150110A1_8C	$\phi 8$	1.5	F19	0.01%	110	210	C
TL200110A1_8C	$\phi 8$	2	F25	0.02%	110	217	C

标准2/3"

Standard 2/3"



特点 / Features

- | | |
|----------------------|---------------------------------------------------|
| (1) 支持5M 3.45u 相机 | (1) Supports 5M 3.45u cameras |
| (2) 倍率范围0.3x-6x | (2) Magnification range 0.3x-6x |
| (3) 65mm、110mm 工作距可选 | (3) 65mm and 110mm working distances are optional |

应用场景 / Application

3C、定位
3C、Location

参数 / Parameter

产品型号 Model	靶面/mm Img.Circle	倍率 Mag	光圈/F# F#	畸变/% Distortion	工作距/mm Working Distance	共轭距/mm Conjugate Distance	接口 Mount
TL030110A	φ11	0.3	F5.6	0.02%	110	246	C
TL050110C	φ11	0.5	F9.6	0.05%	110	246	C
TL080110B	φ11	0.8	F11	0.05%	110	246	C
TL100110B	φ11	1	F11	0.05%	110	246	C
TL150110A	φ11	1.5	F10	0.04%	110	256	C
TL200110A	φ11	2	F12.2	0.04%	110	261	C
TL300110A	φ11	3	F18.3	0.02%	110	293	C
TL400110A	φ11	4	F22	0.02%	110	258	C
TL500110A	φ11	5	F31	0.26%	110	288	C
TL600110A	φ11	6	F38.6	0.04%	110	283	C
TC030110A	φ11	0.3	F5.6	0.02%	110	248	C
TC050110C	φ11	0.5	F9.6	0.05%	110	258	C
TC080110B	φ11	0.8	F11	0.05%	110	249	C
TC100110B	φ11	1	F11	0.05%	110	262	C
TC150110A	φ11	1.5	F10	0.04%	110	262	C
TC200110A	φ11	2	F12.2	0.04%	110	265	C
TC300110A	φ11	3	F18.3	0.02%	110	298	C
TC400110A	φ11	4	F22	0.02%	110	262	C
TC500110A	φ11	5	F31	0.26%	110	293	C
TC600110A	φ11	6	F38.6	0.04%	110	288	C

产品型号 Model	靶面/mm Img.Circle	倍率 Mag	光圈/F# F#	畸变/% Distortion	工作距/mm Working Distance	共轭距/mm Conjugate Distance	接口 Mount
TL030065A	φ11	0.3	F10	0.02%	65	169	C
TL050065A	φ11	0.5	F10	0.05%	65	172	C
TL080065A	φ11	0.8	F10	0.05%	65	172	C
TL100065A	φ11	1	F11	0.05%	65	163	C
TL150065A	φ11	1.5	F12.5	0.12%	65	158	C
TL200065A	φ11	2	F13.2	0.045%	65	162	C
TL300065A	φ11	3	F20.2	0.04%	65	167	C
TL400065A	φ11	4	F17.9	0.06%	65	188	C
TL500065A	φ11	5	F22	0.05%	65	198	C
TL600065A	φ11	6	F24.6	0.05%	65	195	C
TC030065A	φ11	0.3	F10	0.01%	65	172	C
TC050065A	φ11	0.5	F10	0.05%	65	174	C
TC080065A	φ11	0.8	F10	0.05%	65	176	C
TC100065A	φ11	1	F11	0.05%	65	166	C
TC150065A	φ11	1.5	F12.5	0.12%	65	160	C
TC200065A	φ11	2	F13.2	0.045%	65	166	C
TC300065A	φ11	3	F20.2	0.04%	65	171	C
TC400065A	φ11	4	F17.9	0.06%	65	191	C
TC500065A	φ11	5	F22	0.05%	65	203	C
TC600065A	φ11	6	F24.6	0.05%	65	200	C

定制2/3~1.1"

Customized 2/3~1.1"



特点 / Features

- | | |
|--------------------------|---------------------------------------------------------------------------------|
| (1) 倍率范围0.12x-2x | (1) Magnification range 0.12x-2x |
| (2) 工作距范围40mm-250mm | (2) Working distance range 40mm-250mm |
| (3) RGB 共焦, 保证不同色光下清晰度一致 | (3) RGB confocal, ensuring consistent sharpness under different colors of light |
| (4) 低畸变&抗震设计, 保证图像拼接效果 | (4) Low distortion & shockproof design, ensuring image stitching effect |

应用场景 / Application

3C、SPI、AOI

参数 / Parameter

产品型号 Model	靶面/mm Img.Circle	倍率 Mag	光圈/F# F#	畸变/% Distortion	工作距/mm Working Distance	共轭距/mm Conjugate Distance	接口 Mount
TL150220A	φ11	1.5	F10	0.02%	220	425	C
TL200040B	φ11	2	F33	0.03%	40	112	C
TL012250A	φ11	0.12	F8	0.02%	250	592	C
TL0143220A	φ11	0.143	F8-22	0.05%	220	419	C
TL022220A	φ11	0.22	F8-22	0.023%	220	398	C
TL0275220A	φ16	0.275	F8-22	0.02%	220	400	C
TC025150A	φ17.6	0.25	F8-22	0.03%	150	415	C
TC031150A	φ17.6	0.31	F8-22	0.05%	150	401	C
TC023150A1	φ17.6	0.23	F6-14	0.03%	150	349	C
TC0287150A1	φ17.6	0.287	F6-14	0.03%	150	350	C
TC0345150A1	φ17.6	0.345	F6-14	0.025%	150	350	C
TC043150A1	φ17.6	0.43	F6-14	0.021%	150	348	C
TC069150A1	φ17.6	0.69	F6-14	0.05%	150	349	C
TC100150B2_18C	φ17.6	1	F6-14	0.05%	150	350	C
TC060080D	φ17.6	0.6	F8-22	0.02%	80	250	C
TL032220A	φ19.2	0.32	F8-22	0.02%	220	445	C
TL039220A	φ19.2	0.39	F8-22	0.05%	220	440	C

DZOPTICS

标准1.2"

Standard 1.2"



特点 / Features

- (1) 倍率范围0.5x-2x, 工作距 110mm
- (2) 同轴/非同轴可选
- (3) RGB 共焦, 保证不同色光下清晰度一致

- (1) Magnification range 0.5x-2x, working distance 110mm
- (2) Coaxial/non-coaxial selectable
- (3) RGB confocal, ensuring consistent sharpness under different colors of light

应用场景 / Application

3C

参数 / Parameter

产品型号 Model	靶面/mm Img.Circle	倍率 Mag	光圈/F#	畸变/% Distortion	工作距/mm Working Distance	共轭距/mm Conjugate Distance	接口 Mount
TL080110A1_20C	φ19.2	0.8	F8-30	0.01%	110	264	C
TL150110A1_20C	φ19.2	1.5	F10-30	0.02%	110	276	C
TC050110A1_20C	φ19.2	0.5	F8-30	0.02%	110	274	C
TC080110A1_20C	φ19.2	0.8	F8-30	0.01%	110	264	C
TC100110A1_20C	φ19.2	1	F10.5-30	0.01%	110	260	C
TC150110A1_20C	φ19.2	1.5	F10-30	0.02%	110	276	C
TC200110A1_20C	φ19.2	2	F10-30	0.02%	110	287	C

红外1.1"

Infrared 1.1"



特点 / Features

- (1) 针对800nm-1700nm SWIR专门设计
- (2) 支持1.1"靶面, 搭配InGaAs传感器
- (3) 倍率 1x、1.5x

- (1) Specifically designed for 800nm-1700nm SWIR
- (2) Supports 1.1" target surface, compatible with InGaAs sensors
- (3) Magnification 1x, 1.5x

应用场景 / Application

半导体晶圆、面板

Semiconductor wafers, panels

参数 / Parameter

产品型号 Model	靶面/mm Img.Circle	倍率 Mag	光圈/F#	畸变/% Distortion	工作距/mm Working Distance	共轭距/mm Conjugate Distance	接口 Mount
TC100110A1-18C-SWIR	φ17.6	1	F7-F24	0.10%	108	261	C
TC150110A1-18C-SWIR	φ17.6	1.5	F8-F22	0.10%	108	260.37	C

定制1.75"

Customized 1.75"



特点 / Features

- | | |
|-------------------------------------|-------------------------------------------------------------------------------|
| (1) 适配12M/21M相机 | (1) Compatible with 12M/21M cameras |
| (2) 倍率范围0.31x-2x, 工作距离范围110mm-250mm | (2) Magnification range 0.31x-2x, working distance range 110mm-250mm |
| (3) RGB 共焦, 保证不同色光下清晰度一致 | (3) RGB confocal, ensuring consistent clarity under different colors of light |
| (4) 低畸变&抗震设计, 保证图像拼接效果 | (4) Low distortion & shockproof design, ensuring image stitching effect |

应用场景 / Application

SPI, AOI

参数 / Parameter

产品型号 Model	靶面/mm Img.Circle	倍率 Mag	光圈/F# F#	畸变/% Distortion	工作距/mm Working Distance	共轭距/mm Conjugate Distance	接口 Mount
TL037220A	φ30	0.37	F8-22	0.02%	220	450	M42
TL046220A	φ30	0.46	F8-22	0.05%	220	440	M42
TL055220A	φ30	0.55	F8-22	0.05%	220	449	M42
TL068220A	φ30	0.68	F8-22	0.05%	220	425	M42
TC031250A	φ30	0.31	F8-22	0.05%	250	455	M36/M42
TC037250A	φ30	0.37	F8-22	0.05%	250	462	M36/M42
TC046250A	φ30	0.46	F9-22	0.03%	250	450	M36/M42
TC055250A	φ30	0.55	F9-22	0.05%	250	455	M36/M42
TC079230A	φ30	0.79	F11-22	0.03%	230	560	M36
TC037150A	φ30	0.37	F8-22	0.03%	150	448	M36
TC046150A	φ30	0.46	F9-22	0.03%	150	440	M36
TC055150A	φ30	0.55	F9-22	0.03%	150	436	M36
TC068150A	φ30	0.68	F10-32	0.03%	150	445	M36
TC079150A	φ30	0.79	F11-32	0.03%	150	448	M36
TC110150A	φ30	1.1	F12-44	0.03%	150	444	M36
TC150110W	φ30	1.5	F12-64	0.02%	110	357	M42
TC200110W	φ30	2	F13-64	0.02%	110	395	M42

DZOPTICS

定制33mm

Customized 33mm



特点 / Features

- (1) 支持IMX342 芯片, $\phi 33\text{mm}$ 靶面
- (2) 倍率范围1x-2x
- (3) 大视野、高精度检测

- (1) Supports IMX342 chip, $\phi 33\text{mm}$ target surface
- (2) Magnification range 1x-2x
- (3) Wide field of view, high-precision detection

应用场景 / Application

半导体AOI、miniled、半导体晶圆

Semiconductor AOI, miniled, semiconductor wafer

参数 / Parameter

产品型号 Model	靶面/mm Img.Circle	倍率 Mag	光圈/F#	畸变/% Distortion	工作距/mm Working Distance	共轭距/mm Conjugate Distance	接口 Mount
TC100142A1	$\phi 33$	1	F8-22	0.02%	142	369	M42/M58
TC150128A1	$\phi 33$	1.5	F8-22	0.01%	128	379	M42/M58
TC200115A1	$\phi 33$	2	F8-22	0.01%	115	396	M42/M58

定制38mm

Customized 38mm



特点 / Features

- (1) 支持65M 大面阵相机, 靶面 $\phi 38\text{mm}$
- (2) 倍率0.64x/0.91x
- (3) 大视野、高精度检测

- (1) Supports 65M large-area array camera, target surface $\phi 38\text{mm}$
- (2) Magnification 0.64x/0.91x
- (3) Wide field of view, high-precision detection

应用场景 / Application

半导体AOI、miniled、半导体晶圆

Semiconductor AOI, miniled, semiconductor wafer

参数 / Parameter

产品型号 Model	靶面/mm Img.Circle	倍率 Mag	光圈/F#	畸变/% Distortion	工作距/mm Working Distance	共轭距/mm Conjugate Distance	接口 Mount
TC064130A1	$\phi 38$	0.64	F8-22	0.05%	130	400	M58
TC091130A1	$\phi 38$	0.91	F8-22	0.02%	130	393	M58



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