

**LOW-SWAP, HIGH-PERFORMANCE
SWIR, MWIR & LWIR LENSES
FOR HALE TO TACTICAL DRONE UASs**



WHATEVER YOUR NEEDS, WE'VE GOT THE LENS

MKS Ophir® products are designed and produced for the most advanced aerial optical systems, meeting the challenging requirements for small form factor, lightweight designs and low power consumption, all to enhance flight time and visibility even under extreme conditions.

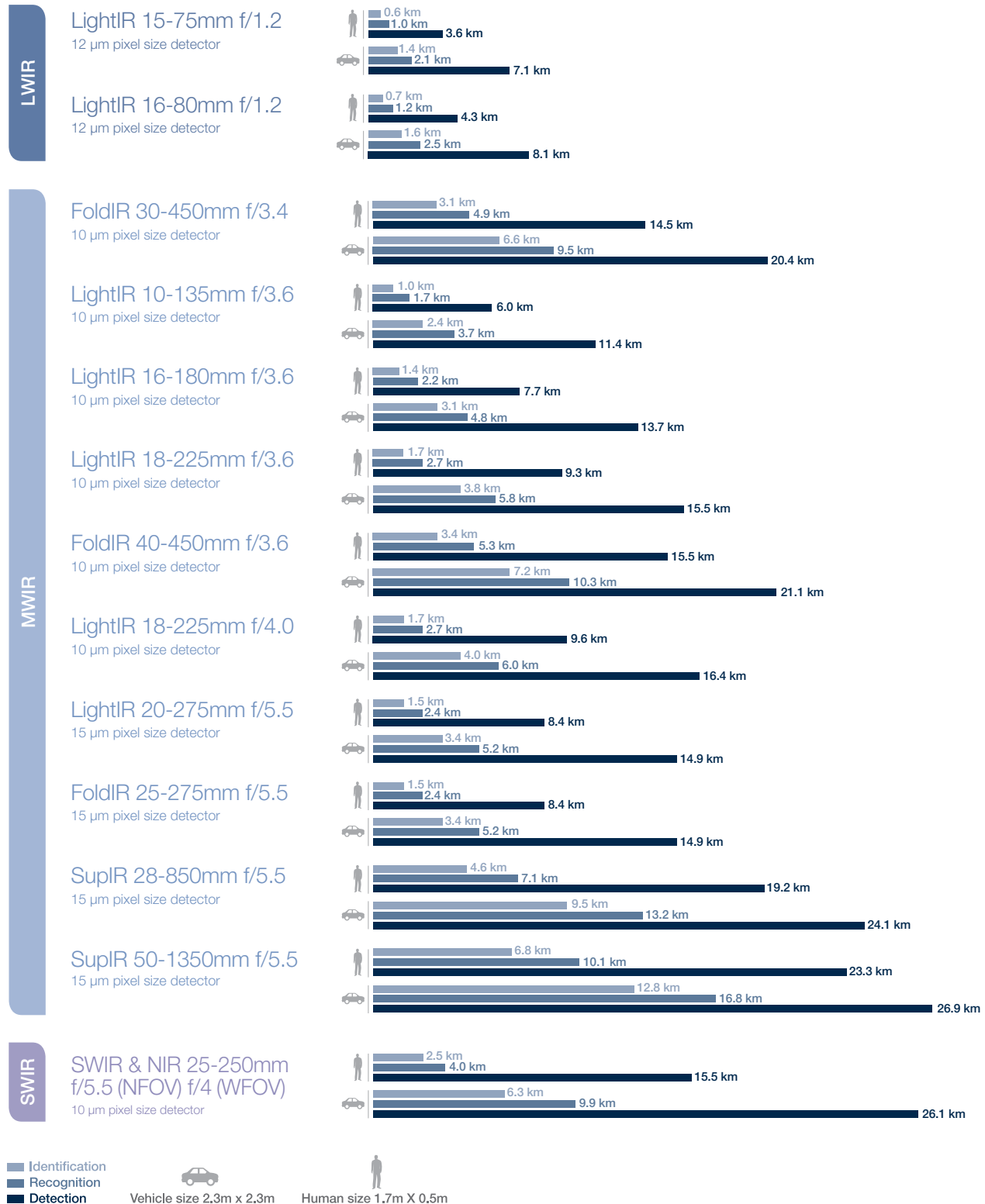
Our product portfolio offers a wide range of LWIR, MWIR and SWIR IR complex lens assemblies with fixed, motorized focus and zoom lenses, providing a global solution for infrared imaging systems in UAS emerging applications.

Our in-house R&D team works in collaboration with customers to develop and design products meeting the Size Weight and Power (SWaP) constraints of UAS, with an unparalleled optical performance, for which we are known worldwide.

Key features

- High MTF performance
- Lightweight, compact, continuous zoom and fixed focus lenses
- Folded optic design for min volume utilization
- Low power consumption
- Suitable for a wide range of reduced SWaP applications
- Available coatings: High durability (HD), hard carbon (HC) and low-reflection hard carbon (LRHC)
- Fast FOV change
- Continuous zoom, with fixed F# and zoom maintained through the full zoom range
- Accurate thru-zoom bore sight
- Compatible with major SWIR, MWIR & LWIR detectors
- Diffraction-limited optical designs
- Athermal compensation
- CPU controlled via RS 485 or RS 232

Continuous Zoom Lenses Detection, Recognition, Identification (DRI) Performance



Note: Calculations used are based on "Johnson Criteria" | Real world performance may vary depending on the weather onditions

* Assumptions: 23mK NETD for f/4.0, 10μm and f/5.5, 15μm cooled detectors | 35.5mK NETD (f/3.4) for 10μm cooled detectors | 32mK NETD (f/3.6) for 10μm cooled detectors | 50mK NETD (f/1.0) for LWIR uncooled detectors | 30Hz frame rate | 50% detection probability | 0.2km⁻¹ atmospheric attenuation coefficient | human ΔT = 5°C | vehicle ΔT = 2°C

** SWIR assumptions: 10μm pixel size SWIR 1280 detectors | TRM4 model | Day mode | 0.7μm to 1.7μm spectral range | 25Hz frame rate | Overcast daylight irradiance | 0.2 path radiance factor | 0.2km⁻¹ atmospheric attenuation coefficient | 50% detection probability | Human and vehicle target 50% reflectivity | 15% background reflectivity

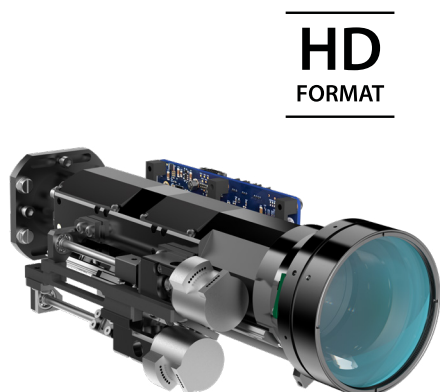
Low-SWaP SWIR, MWIR & LWIR Solutions WHERE MINIMAL IS CRITICAL



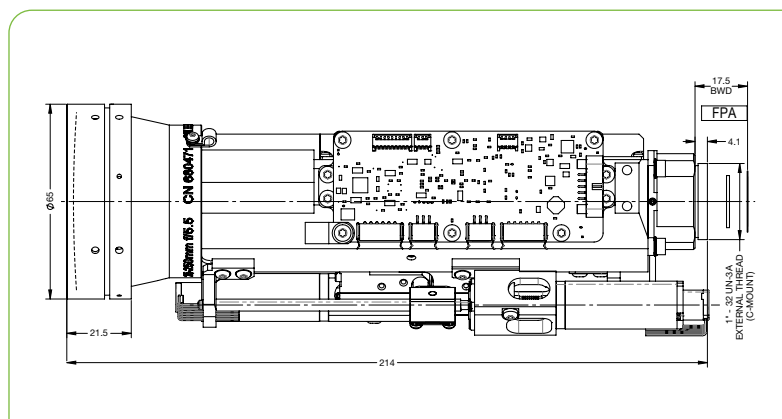
SWIR & NIR 25-250mm f/5.5 (NFOV) f/4.0 (WFOV) Continuous Zoom 680471

SWIR & NIR

TYPICAL ICD



**HD
FORMAT**



WFOV (25mm)

HFOV[deg]	640x512	1280x1024
15μ	21.7°	
10μ	14.6°	28.7°
5μ	7.3°	14.6°

NFOV (250mm)

HFOV[deg]	640x512	1280x1024
15μ	2.2°	
10μ	1.5°	2.9°
5μ	0.7°	1.5°

Property	Value	
Optical	WFOV	NFOV
Focal Length	25mm	250mm
F#	4.0	5.5
Average transmission (0.7-1.7μm / 1.1-1.7μm)	85%	
Back Focal Length	34.47mm in air (±0.1)	
Minimum Focusing Range	2m	20m
Mechanical		
Focus Mechanism	Motorized. Adjustable	
Focus Time (minimum range to ∞)	≤1sec.	
Zoom Time (NFOV to WFOV)	≤5sec.	
Max. Dimensions	Ø65mm x 214mm	
Weight	840gr	
Electrical		
Lens Control	Designated lens controller	
Supply Voltage	12V	
Current Consumption	<0.5A (max)	
Communication Protocol	RS422	
Environmental		
Operation Temperature	-32°C to +75°C	
Storage Temperature	-40°C to +80°C	
Sealing	IP67 front lens only	

FoldIR 30-450mm f/3.4*, Motorized Continuous Zoom 680465



HD
FORMAT

Cooled MWIR

WFOV (30mm)

HFOV[deg]	640x480	1280x1024
15μ	19.3°	
10μ	12.5°	26.9°

NFOV (450mm)

HFOV[deg]	640x480	1280x1024
15μ	1.3°	
10μ	0.8°	1.7°

Property	Value	
Optical	WFOV	NFOV
Focal Length	30mm	450mm
F#	3.4	
Cold stop to FPA Distance	19.4mm	
Minimum Focusing Range	20m	50m
Mechanical		
Max. Dimensions	Ø146mm x 247mm	
Weight	2kg	
Electrical		
Supply Voltage	12V	
Current Consumption	0.5A average, 1.0A peak	
Communication Protocol	RS422, RS232	

* Requires export license

LightIR 10-135mm f/3.6, Motorized Continuous Zoom 680451



Cooled MWIR

WFOV (10mm)

HFOV[deg]	640x512
10μ	37.0°

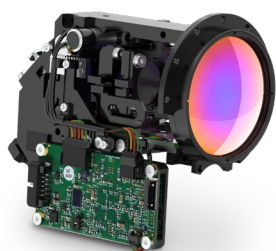
NFOV (135mm)

HFOV[deg]	640x512
10μ	2.67°

Property	Value	
Optical	WFOV	NFOV
Focal Length	10mm	135mm
F#	3.6	
Cold stop to FPA Distance	12mm	
Back Focal Length	≥17mm in air	
Minimum Focusing Range	5m	50m
Mechanical		
Max. Dimensions	Ø46mm x 86.4mm	
Weight	250gr	
Electrical		
Supply Voltage	12V	
Current Consumption	< 0.5A average, 1.0A peak	
Communication Protocol	RS422	

FoldIR 16-180mm f/3.6, Motorized Continuous Zoom 680389

Cooled MWIR



WFOV (16mm)

HFOV[deg]	640x480
10μ	22.6°

NFOV (180mm)

HFOV[deg]	640x480
10μ	2°

Property	Value	
Optical	WFOV	NFOV
Focal Length	16mm	180mm
F#	3.6	
Cold stop to FPA Distance	12mm	
Back Focal Length	23.08mm in air	
Minimum Focusing Range	5m	50m
Mechanical		
Max. Dimensions	Length 121mm; Width 70mm; height 102mm	
Weight	460gr	
Electrical		
Supply Voltage	12V	
Current Consumption	< 0.5A average, 1.0A peak	
Communication Protocol	RS232, RS422	

LightIR 18-225mm f/3.6, Motorized Continuous Zoom 680442

Cooled MWIR



WFOV (18mm)

HFOV[deg]	640x512
10μ	20°

NFOV (225mm)

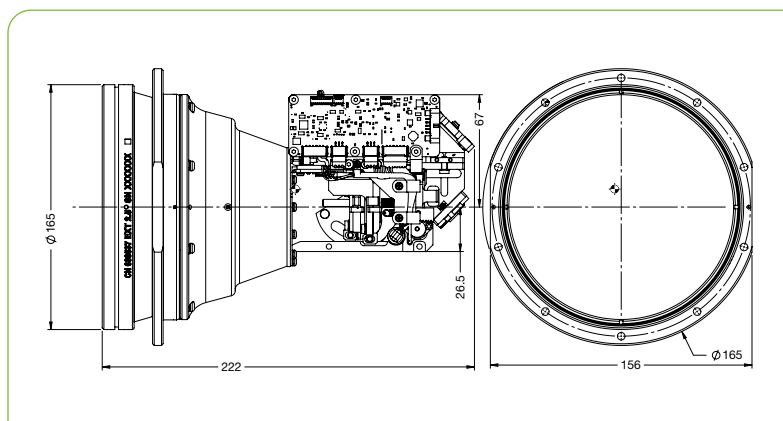
HFOV[deg]	640x512
10μ	1.6°

Property	Value	
Optical	WFOV	NFOV
Focal Length	18mm	225mm
F#	3.6	
Cold stop to FPA Distance	12mm	
Back Focal Length	18.5mm in air	
Minimum Focusing Range	5m	50m
Mechanical		
Max. Dimensions	Ø63mm x 84.6mm	
Weight	305gr	
Electrical		
Drive Voltage	12V	
Current Consumption	< 0.5A average, 1.0A peak	
Communication Protocol	RS422	

FoldIR 40-450mm f/3.6*, Motorized Continuous Zoom 680533

Cooled MWIR

TYPICAL ICD



WFOV (40mm)

HFOV[deg]	640x480
10μ	8.9°

NFOV (450mm)

HFOV[deg]	640x480
10μ	0.85°

Property	Value	
Optical	WFOV	NFOV
Focal Length	40mm	450mm
F#	3.6	
Average transmission (3.4-4.2μm)	80% (HD) / 76% (HC)	
Cold stop to FPA Distance	12mm	
Cold Stop CA	3.37mm	
Minimum Focusing Range	50m	5m
NUC	Mechanical shutter	
Mechanical		
Focus Mechanism	Motorized	
Focus Time (minimum range to ∞)	≤5.5 sec	
Zoom mechanism	Motorized	
Zoom Time (NFOV to WFOV)	≤1 sec	
Max. Dimensions	Ø165 x length 222mm	
Weight	1.85kg	
Electrical		
Lens Control	Designated lens controller	
Drive Voltage	12VDC	
Current Consumption	< 0.5A average, 1.0A peak	
Communication Protocol	RS422	
Environmental		
Operation Temperature	-32°C to +75°C	
Storage Temperature	-54°C to +85°C	
Sealing	IP67 front lens only	

* Requires export license

LightIR 18-225mm f/4, Motorized Continuous Zoom 680473

Cooled MWIR



HD
FORMAT

WFOV (18mm)

HFOV[deg]	640x512	1280x1024
15μ	29.9°	
10μ	20.2°	39.1°

NFOV (225mm)

HFOV[deg]	640x512	1280x1024
15μ	2.4°	
10μ	1.6°	3.3°

Property	Value	
Optical	WFOV	NFOV
Focal Length	18mm	225mm
F#	4.0	
Cold stop to FPA Distance	19.4mm	
Back Focal Length	26.9mm in air (with 1+0.5mm Ge windows)	
Minimum Focusing Range	5m	50m
Mechanical		
Max. Dimensions	Ø61.4mm x 84mm	
Weight	324gr	
Electrical		
Supply Voltage	12V	
Current Consumption	< 0.5A average, 1.0A peak	
Communication Protocol	RS422	

LightIR 20-275mm f/5.5, Motorized Continuous Zoom 680314

Cooled MWIR



WFOV (EFL 20mm)

HFOV[deg]	640x512
15μ	28.0°

NFOV (EFL 275mm)

HFOV[deg]	640x512
15μ	1.9°

Property	Value	
Optical	WFOV	NFOV
Focal Length	20mm	275mm
F#	5.5	
Back Focal Length	23.52mm in air	
Cold stop to FPA distance	19.7mm	
Minimum Focusing Range	5m	50m
Mechanical		
Max. Dimensions	Ø58mm x 67.1mm	
Weight	264 gr	
Electrical		
Supply Voltage	12V	
Current Consumption	0.2A average, 1.0A peak	
Communication Interface	RS485, RS422	

FoldIR 25-275mm f/5.5, Motorized Continuous Zoom 680520

Cooled MWIR



NEW

WFOV (25mm)

HFOV[deg]	640x480
15μ	23.4°

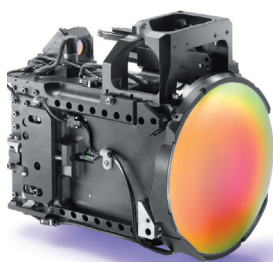
NFOV (275mm)

HFOV[deg]	640x480
15μ	2.0°

Property	Value	
Optical	WFOV	NFOV
Focal Length	25mm	275mm
F#	5.5	
Back Focal Length	23.37mm in air	
Cold stop to FPA distance	19.4mm	
Minimum Focusing Range	50m	5m
Mechanical		
Max. Dimensions	Ø60 x 96 x 84.2mm	
Weight	302g	
Electrical		
Supply Voltage	12V	
Current Consumption	< 0.5A average, 1.0A peak	
Communication Interface	RS485, RS422	

SupIR 28-850mm f/5.5*, Motorized Continuous Zoom 680072

Cooled MWIR



HD
FORMAT

WFOV (28mm)

HFOV[deg]	640x512	1280x1024
15μ	19.8°	39.8°

NFOV (850mm)

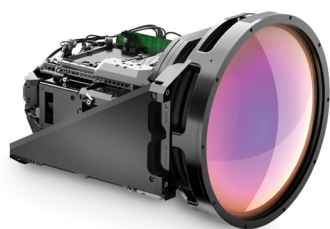
HFOV[deg]	640x512	1280x1024
15μ	0.6°	1.3°

Property	Value	
Optical	WFOV	NFOV
Focal Length	28mm	850mm
F#	5.5	
Back Focal Length	≥37.6mm in air	
Cold stop to FPA distance	28mm	
Minimum Focusing Range	3m	50m
Mechanical		
Max. Dimensions	Length 256mm; Width 176mm; Height 257.5mm	
Weight	4.6kg	
Electrical		
Supply Voltage	28VDC	
Current Consumption	1.25A average, 2.5A peak	
Communication Interface	RS422	

* Requires export license

SuplR 50-1350mm f/5.5*, Motorized Continuous Zoom 680072

Cooled MWIR



HD
FORMAT

WFOV (50mm)

HFOV[deg]	640x512	1280x1024
15μ	10.8°	20.5°

NFOV (1350mm)

HFOV[deg]	640x512	1280x1024
15μ	0.4°	0.8°

Property	Value	
Optical	WFOV	NFOV
Focal Length	50mm	1350mm
F#	5.5	
Back Focal Length	37.6mm in air	
Cold stop to FPA distance	28mm	
Minimum Focusing Range	5m	200m
Mechanical		
Max. Dimensions	Length 376.4mm; Ø281mm; height 293mm	
Weight	15.6kg	
Electrical		
Supply Voltage	28VDC	
Current Consumption	1.25A average, 2.5A peak	
Communication Interface	RS422	

* Requires export license

SuplR 15-60mm f/1.4, Motorized Continuous Zoom 680164

Uncooled LWIR



WFOV (15mm)

HFOV[deg]	320x240	640x480
17μ	21.1°	44.2°
12μ	14.8°	30.2°

NFOV (60mm)

HFOV[deg]	320x240	640x480
17μ	5.2°	10.4°
12μ	3.7°	7.3°

Property	Value	
Optical	WFOV	NFOV
Focal Length	15mm	60mm
F#	1.4	
Minimum Focus Range	1m	2m
Back Focal Length	≥25mm in air	
Mechanical		
Max. Dimensions	Ø62mm x 83.5mm	
Weight	500gr	
Electrical		
Supply Voltage	12V	
Current Consumption	0.2A average, 0.5A peak	
Communication Interface	RS 422	

LightIR 15-75mm f/1.2, Motorized Continuous Zoom 680386

Uncooled LWIR



WFOV(15mm)

HFOV[deg]	320x240	640x480
17μ	20.9°	43.4°
12μ	14.7°	29.9°
10μ		24.8°

NFOV(75mm)

HFOV[deg]	320x240	640x480
17μ	4.1°	8.2°
12μ	2.9°	5.8°
10μ		4.9°

Property	Value	
Optical	WFOV	NFOV
Focal Length	15mm	75mm
F/#	1.2	
Minimum Focus Range	7m	18m
Back Focal Length	20.3mm in air	23.83mm in air
Mechanical		
Max. Dimensions	Ø75mm x 79.1mm	
Weight	328gr	
Electrical		
Supply Voltage	12V	
Current Consumption	<0.15A average, 0.3A peak	
Communication Interface	RS 485, RS 422, RS 232	

SupIR 16-80mm f/1.2, Motorized Continuous Zoom 680531

Uncooled LWIR



NEW

HD
FORMAT

WFOV (16mm)

HFOV[deg]	1280x1024
12μ	54°
10μ	45°

NFOV (80mm)

HFOV[deg]	1280x1024
12μ	10.6°
10μ	9°

Property	Value	
Optical	WFOV	NFOV
Focal Length	16mm	80mm
F#	1.2	
Minimum Focus Range	2m	20m
Back Focal Length	19mm in air	
Mechanical		
Max. Dimensions	Ø93.6mm x 108.4mm	
Weight	705gr	
Electrical		
Drive Voltage	12VDC	
Communication Interface	RS485, RS232	

SuplR 7.5mm f/1.2, Fixed Athermalized 680331

Uncooled LWIR



HD
FORMAT

HFOV[deg]	320x240	384x288	640x480	1024x768
17μ	42.5°	51.4°	90.9°	
12μ	29.7°	35.8°	61.1°	106.5°

Property	Value
Optical	
Focal Length	7.5mm
F/#	1.2
Back focal length	12.8mm in air
Mechanical	
Max. Dimensions	Ø25.12mm x 18.8mm
Weight	24.5gr

SuplR 13.6mm f/1.0, Fixed Athermalized 680412

Uncooled LWIR



HFOV[deg]	320x240	384x288	640x480
17μ	22.8°	27.3°	
12μ	16.2°	19.3°	32.0°
10μ	13.5°	16.2°	26.8°

Property	Value
Optical	
Focal Length	13.6mm
F/#	1.0
Back focal length	4.8mm in air
Mechanical	
Max. Dimensions	Ø20.6mm x 18mm
Weight	12.5gr

SuplR 16.7mm f/1.25, Fixed Athermalized 680186

Uncooled LWIR



HFOV[deg]	320x240	384x288	640x480
17μ	18.7°	22.4°	37.5°
12μ	13.2°	15.8°	26.4°

Property	Value
Optical	
Focal Length	16.7mm
F/#	1.25
Back focal length	11.41mm in air
Mechanical	
Max. Dimensions	Ø34.9mm x 16.4mm
Weight	25.5gr

SuplR 19mm f/1.1, Fixed Athermalized 65221

Uncooled LWIR



HD
FORMAT

HFOV[deg]	320x240	384x288	640x480	1024x768
17μ	16.1°	19.3°	32.1°	
12μ	11.4°	13.7°	22.7°	36.3°

Property	Value
Optical	
Focal Length	19mm
F/#	1.1
Back focal length	11.51mm in air
Mechanical	
Max. Dimensions	Ø25.12mm x 18.8mm
Weight	20gr

SuplR 25mm f/1.2, Fixed Athermalized 680108

Uncooled LWIR



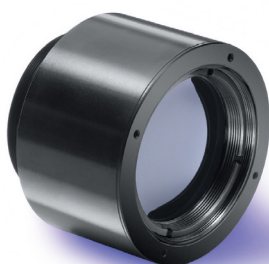
HD
FORMAT

HFOV[deg]	320x240	384x288	640x480	1024x768
25μ	18.2°	21.8°	36.4°	
17μ	12.4°	14.9°	24.8°	
12μ	8.7°	10.5°	17.5°	27.9°

Property	Value
Optical	
Focal Length	25mm
F/#	1.2
Back focal length	18.3mm in air
Mechanical	
Max. Dimensions	Ø34.9mm x 29mm
Weight	52gr

SuplR 35mm f/1.2, Fixed Athermalized 680111

Uncooled LWIR



HD
FORMAT

HFOV[deg]	320x240	384x288	640x480	1024x768
17μ	8.9°	10.6°	17.6°	
12μ	6.3°	7.5°	12.5°	19.7°

Property	Value
Optical	
Focal Length	35mm
F/#	1.2
Back focal length	22.62mm in air
Mechanical	
Max. Dimensions	Ø45mm x 35.4mm
Weight	102gr



About Ophir Infrared Optics

With decades worth of knowledge and experience, Ophir Optronics Solutions LTD., Infrared Optics, an MKS Brand (NASDAQ: MKSI), is a world-leading designer and manufacturer of high-performance IR thermal imaging lenses and optical elements for SWIR, MWIR & LWIR imaging. Using advanced technologies, innovative engineering, and design configurations, Ophir provides a global solution for homeland security, surveillance, defense and commercial applications: IR components and complex lens assemblies with fixed or motorized focus and zoom lenses.

International Headquarters Ophir Optronics Solutions Ltd.

Science based industrial park
Har hotzvim P.O.B 45021
Jerusalem, 9145001 Israel
Tel: 972-2-5484444
MKTG@mksinst.com

USA MKS Instruments Inc.

2 Tech Drive, Suite 201
Andover, MA 01810
United States
Tel: +1 (603) 4398517
USA.ophiroptics@mksinst.com

EUROPE Ophir optronics solutions Ltd.

La chenevarie 42140
Virigneux, France
Tel: +33 6 7347 1072
europe.ophiroptics@mksinst.com

INDIA MKS Instruments Atotech Products

Plot No. 446 G & H, Sector 8,
Phase IV, IMT Manesar-122050
Gurugram - Haryana
Tel: +91 124 6447900
MKTG@mksinst.com

JAPAN Ophir Japan Ltd.

Kudan First Place 6F,
4-1-28 Kudan-kita, Chiyoda-ku,
Tokyo 102-0073 Japan
Tel: +81-33-556-2791
oj.optics@mksinst.com

KOREA MKS Instruments Korea

6th Floor, Leaders Tower
12, Wongomae-Ro Giheung-Gu,
Yongin-Si
Gyeonggi-Do, 17086 South Korea
Tel: +82-10-9191-6142
hera.park@mksinst.com

AUSTRALIA AIS (Applied Infrared Sensing)

Level 1, 16-18 Carlotta street,
Artmon, NSW 2064, Australia
Tel: 1300-557-205 Australia
Tel: 09-889-2477 New Zealand
dmitri.l@applied-infrared.com.au

