

## IR THERMAL IMAGING LENSES FOR COUNTER UNMANNED AERIAL SYSTEMS (C-UAS)





**SupIR 80-1200mm f/5.5**  
Target\* detection range >2.5km  
15µm pixel pitch detector



**SupIR 50-1350mm f/5.5**  
Target\* detection range >3.5km  
15µm pixel pitch detector



**SupIR 60-1200mm f/4**  
Target\* detection range >3.0km  
10µm pixel pitch detector

\* Target dimensions 40x40cm quadcopter/drone



# MINIMIZE FALSE POSITIVE ALERTS WITH OPHIR'S INFRARED CONTINUOUS ZOOM LENSES FOR HIGH-PERFORMANCE, EXTENDED VISION RANGE

Drones' proliferation in recent century raise potential security threats to both civilian and military entities. Such threats triggered to a new, rapidly emerging Counter-Unmanned Aerial Systems (C-UAS) technologies. Its mission is to detect, identify and disable such threats. Infrared (IR) based systems, or IR imaging combined in such multi-sensor types systems, is a prevalent technology enabling **detection, identification and tracking** the small unmanned aerial system (sUAS). Ophir designs and manufactures precise, long-range IR continuous zoom lenses for integration into premier C-UAS platforms.

**Partnering with leading defense OEMs** to design IR based C-UAS electro-optical systems, along with a proven track-record of numerous deployments in the field, Ophir delivers a wide selection of extended range IR thermal continuous zoom lenses.

**Ophir lenses provide outstanding** detection and identification, crisp clean imagery over the full zoom range, with MTF close to the diffraction limit quality, and accurate line-of-sight (LOS). The lenses work with various FPA formats including High Definition SXGA and VGA – for mission success.

**The key to successful identification** of a UAV or drone is to make sure that it covers enough pixels of the chosen sensor. Ophir's continuous zoom lenses provide optical reach to take advantage of early radar detection. A precision zoom lens allows the operator to scan the area in wide field of view to note terrain or other interference as well as to view multiple drones operating in a swarm. Use of narrow field of view allows the operator to further identify the threat **without loss of track or focus**. Automated zoom interfaces allow C-UAS products to clearly show the target. This allows either operators or advanced artificial intelligence (AI) interfaces to determine the threat category of the target.

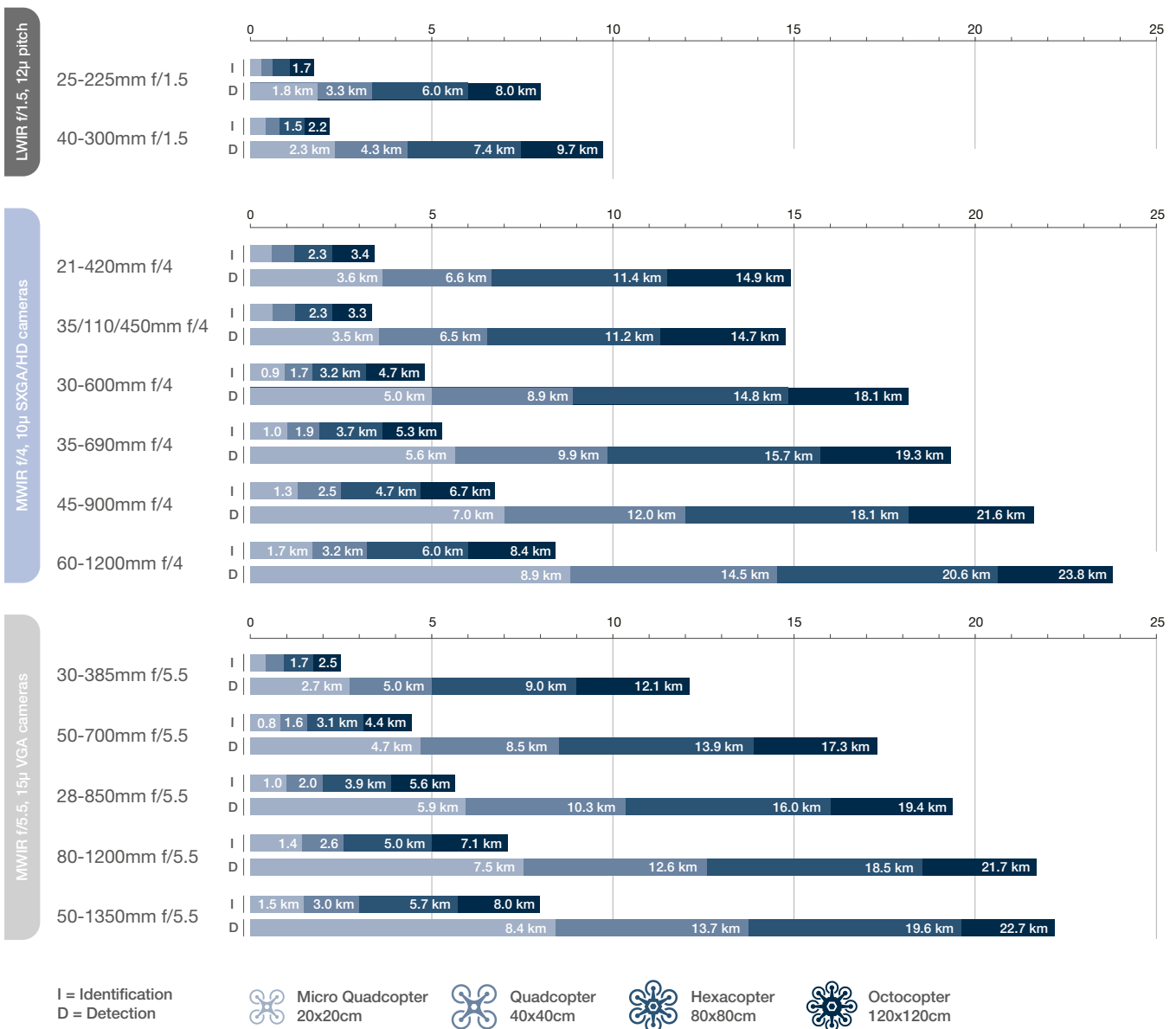
**Ophir's engineers have perfected** the continuous zoom to maintain focus at each point in the full length of lens capability. MTF close to the diffraction limit allows for clearer images that both human and machine vision use for identification. These properties allow for high frame rate sensors to avoid image blurring on quick, fast-moving targets. Early, accurate, identification is key to reducing false positive alerts. Thanks to continuous zoom capabilities - tracking the target without losing sight.

## Products Characteristics

- High precision optics with MTF close to the diffraction limit
- Continuous zoom providing adequate, focused pixels on target
- Focus maintained through the full zoom range/ entire field-of-view range
- Tight boresight retention

- Extended identification ranges exceeding 8km
- Ruggedized design for durability in harshest environmental conditions
- Accurate Line-of-Sight (LOS)
- Focal length ranges from 21mm to 1350mm
- US and European military standard compliance for temperature, shock, vibration and environmental sealing including DIN 3140, IPC 620, MIL-PRF 13830, Mil-PRF 85285, MIL STD 810, MIL-C-48497, MIL-C-48616, ISO 10110 sections 1-19, ANSIASQ Z1.4.
- Available with high durability (HD) or hard carbon (HC) coatings

## Target Identification and Detection Ranges (Km)



\* Assumptions: NETD LWIR f/1.5 50mK | NETD MWIR (f/4, f/5.5) 23mK | 2°C target ΔT | 30Hz frame rate | 0.2km<sup>-1</sup> atmospheric attenuation coefficient | 50% detection probability

# SupIR 25-225mm f/1.5, Motorized Continuous Zoom 680157

LWIR  
f/1.5



HD  
FORMAT

## WFOV (25mm)

HFOV	160x120	320x240	384x288	640x480	1024x768
25μ	9.2°	18.4°	22.2°	37.6°	
17μ	6.2°	12.5°	15.0°	25.2°	41.1°
12μ	4.4°	8.8°	10.6°	17.7°	28.6°

## NFOV (225mm)

HFOV	160x120	320x240	384x288	640x480	1024x768
25μ	1.0°	2.0°	2.4°	4.1°	
17μ	0.7°	1.4°	1.7°	2.8°	4.4°
12μ	0.5°	1.0°	1.2°	1.9°	3.1°

Property	Value	
<b>Optical</b>	<b>WFOV</b>	<b>NFOV</b>
F/#	1.5	
Minimum Focus Range	2m	20m
<b>Mechanical</b>		
Focus Mechanism	Motorized	
Focus Time (minimum range to ∞)	≤3 sec.	
Zoom mechanism	Motorized	
Zoom Time (NFOV to WFOV)	≤8 sec. (continuous zoom mode); ≤5 sec. (multi-field of view mode)	
Weight	4.3kg	
Max. Dimensions	Ø178 x 239mm	
<b>Electrical</b>		
Lens Control	Designated lens controller	
Supply voltage	12V (Can be configured to 6V-12V using Gen3)	
Current consumption	0.5A average, 3.5A peak	
Communication Protocol	RS422	

# SupIR 40-300mm f/1.5, Motorized Continuous Zoom 680264

LWIR  
f/1.5



HD  
FORMAT

## WFOV (40mm)

HFOV	160x120	320x240	384x288	640x480	1024x768
25μ	6.1°	12.2°	14.6°	24.5°	
17μ	4.1°	8.3°	9.9°	16.6°	26.8°
12μ	2.9°	5.8°	7.0°	11.7°	18.8°

## NFOV (300mm)

HFOV	160x120	320x240	384x288	640x480	1024x768
25μ	0.8°	1.5°	1.8°	3.0°	
17μ	0.5°	1.0°	1.2°	2.1°	3.3°
12μ	0.4°	0.7°	0.9°	1.5°	2.3°

Property	Value	
<b>Optical</b>	<b>WFOV</b>	<b>NFOV</b>
F/#	1.5	
Minimum Focus Range	2m	10m
<b>Mechanical</b>		
Focus Mechanism	Motorized	
Focus Time (minimum range to ∞)	≤1 sec.	
Zoom mechanism	Motorized	
Zoom Time (NFOV to WFOV)	≤9 sec. at -32°C; ≤6 sec. at T ≥ 0°C	
Weight	9.5kg	
Max. Dimensions	Ø204mm x 299.5mm	
<b>Electrical</b>		
Lens Control	Designated lens controller	
Supply voltage	12V (Can be configured to 6V-12V)	
Current consumption	< 0.8A average, 1.5A peak	
Communication Protocol	RS422	

# SupIR 21-420mm f/4.0, Motorized Continuous Zoom 680160

MWIR  
f/4.0



HD  
FORMAT

### WFOV (21mm)

HFOV	320x240	480x384	640x512
30μ	24.1°		
20μ	17.1°	25.1°	
15μ	13.0°	19.1°	25.1°
10μ	17.1°		

### WFOV (33mm)

HFOV	1280x1024
10μ	20.0°

### NFOV (420mm)

HFOV	320x240	480x384	640x512	1280x1024
30μ	1.3°			
20μ	1.2°	1.3°	1.7°	
15μ	0.6°	1.0°	1.3°	
10μ	1.2°			

Property	Value	
<b>Optical</b>	<b>WFOV</b>	<b>NFOV</b>
F/#	4.0	
Minimum Focus Range	10m	100m
<b>Mechanical</b>		
Focus Mechanism	Motorized	
Focus Time (minimum range to ∞)	≤1 sec. at maximum speed	
Zoom mechanism	Motorized	
Zoom Time (NFOV to WFOV)	≤8 sec. at -32°C; ≤5 sec. at T≥20°C (at max speed)	
Through-Zoom Boresight	within a radius of 0.25mm at the focal plane along the full zoom range	
Weight	1.6kg	
Max. Dimensions	Ø132x200.5mm	
<b>Electrical</b>		
Lens Control	Designated lens controller	
Supply voltage	12V (Can be configured to 6V- 12V)	
Current consumption	0.5A average, 1.0A peak	
Communication Protocol	RS422	

# SupIR 35/110/450mm f/4.0, Motorized Continuous Zoom 680374

MWIR  
f/4.0



HD  
FORMAT

### WFOV (35mm)

HFOV	320x240	480x384	640x512	1280x1024
30μ	15.3°	22.3°	28.5°	
20μ	10.3°	15.3°	20.0°	
15μ	7.8°	11.5°	15.2°	
10μ	10.3°			20.0°

### MFOV (110mm)

HFOV	320x240	480x384	640x512	1280x1024
30μ	4.9°	7.2°		
20μ	3.3°	4.9°	6.4°	
15μ	2.4°	3.7°	4.9°	
10μ	3.3°			6.4°

### NFOV (450mm)

HFOV	320x240	480x384	640x512	1280x1024
30μ	1.2°	1.8°		
20μ	0.8°	1.2°	1.6°	
15μ	0.6°	0.9°	1.2°	
10μ	0.8°			

Property	Value		
<b>Optical</b>	<b>WFOV</b>	<b>MFOV</b>	<b>NFOV</b>
F/#	4.0		
Minimum Focus Range	5m	10m	50m
<b>Mechanical</b>			
Focus Mechanism	Motorized		
Focus Time (minimum range to ∞)	≤5.5 sec.		
Zoom mechanism	Motorized		
Zoom Time (NFOV to WFOV)	≤1 sec. at T≥ 0°C; ≤2 sec. at -40°C		
Through-zoom Boresight WFOV	Within Diameter of 0.3mm		
Through-zoom Boresight NFOV&MFOV	Within Diameter of 0.12mm		
Weight	2.4kg		
Max. Dimensions	Ø134mmx218.6mm		
<b>Electrical</b>			
Drive voltage	7.5V-12V		
Current consumption	0.05A Average, 0.06A peak		

# SupIR 30-600mm f/4.0, Motorized Continuous Zoom 680384/5

MWIR  
f/4.0



HD  
FORMAT

## WFOV (30mm)

HFOV	320x240	480x384	640x512
30μ	17.2°	23.6°	
20μ	11.9°	17.2°	21.7°
15μ	9.0°	13.3°	17.2°
10μ			11.9°

## WFOV (60mm)

HFOV	1280x1024
10μ	11.4°

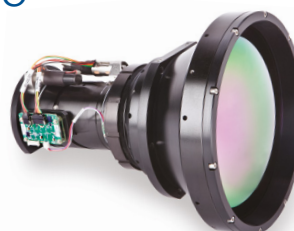
## NFOV (600mm)

HFOV	320x240	480x384	640x512	1280x1024
30μ	0.9°	1.3°		
20μ	0.6°	0.9°	1.2°	
15μ	0.5°	0.7°	0.9°	
10μ			0.6°	1.2°

Property	Value
<b>Optical</b>	<b>WFOV</b>
F/#	4.0
Minimum Focus Range	5m
<b>Mechanical</b>	<b>NFOV</b>
Focus Mechanism	Motorized
Focus Time (minimum range to ∞)	≤1 sec.
Zoom mechanism	Motorized
Zoom Time (NFOV to WFOV)	≤7 sec. at -32°C; ≤5 sec. at T≥ 0°C
Through-Zoom Boresight	Within a radius of 0.22 mm at the focal plane along the full zoom range
Weight	3.1kg
Max. Dimensions	Ø173mmx251.9mm
<b>Electrical</b>	
Lens Control	Designated lens controller
Supply voltage	12V (Can be configured to 6V- 12V)
Current consumption	0.5A average, 1.0A peak
Communication Protocol	RS422

# SupIR 35-690mm f/4.0, Motorized Continuous Zoom 680294/5

MWIR  
f/4.0



HD  
FORMAT

## WFOV (35mm)

HFOV	320x256	480x384	640x512
30μ	15.2°		
20μ	10.4°	15.2°	
15μ	7.9°	11.6°	15.2°
10μ			10.4°

## WFOV (60mm)

HFOV	1280x1024
10μ	13.5°

## NFOV (690mm)

HFOV	320x256	480x384	640x512	1280x1024
30μ	0.9°			
20μ	0.6°	0.9°	1.0°	
15μ	0.5°	0.7°	0.9°	
10μ			0.5°	1.0°

Property	Value
<b>Optical</b>	<b>WFOV</b>
F/#	4.0
Minimum Focus Range	5m
<b>Mechanical</b>	<b>NFOV</b>
Focus Mechanism	Motorized
Focus Time (minimum range to ∞)	≤1 sec.
Zoom mechanism	Motorized
Zoom Time (NFOV to WFOV)	≤7 sec. at -32°C; ≤5 sec. at T≥ 0°C
Through-Zoom Boresight	Within a radius of 0.35 mm at the focal plane along the full zoom range
Weight	~4.3kg
Max. Dimensions	Ø210mm x 264mm
<b>Electrical</b>	
Lens Control	Designated lens controller
Supply voltage	12V (Can be configured to 6V- 12V)
Current consumption	0.5A average, 1.0A peak
Communication Protocol	RS422

# SupIR 45-900mm f/4.0, Motorized Continuous Zoom 680425/6

MWIR  
f/4.0



HD  
FORMAT

### WFOV (45mm)

for configuration 680425-001/2 & 680426-001/2

HFOV	320x256	480x384	640x512
30μ	11.4°		
20μ	7.9°	11.4°	
15μ	6.0°	8.8°	11.4°
10μ			7.9°

### WFOV (72mm)

for configuration 680425-003/4 & 680426-003/4

HFOV	320x256	480x384	640x512	1280x1024
15μ	3.8°	5.6°	7.3°	
10μ			5.0°	9.3°

### NFOV (900mm)

all configurations

HFOV	320x256	480x384	640x512	1280x1024
30μ	0.6°	0.9°		
20μ	0.4°	0.6°	°0.8	
15μ	0.3°	0.5°	°0.6	
10μ			0.4°	0.8°

Property	Value	
<b>Optical</b>	<b>WFOV</b>	<b>NFOV</b>
F/#	4.0	
Minimum Focus Range	5m	200m
<b>Mechanical</b>		
Focus Mechanism	Motorized	
Focus Time (minimum range to ∞)	≤1 sec.	
Zoom mechanism	Motorized	
Zoom Time (NFOV to WFOV)	≤7 sec. at -32°C; ≤5 sec. at T ≥ 0°C	
Through-Zoom Boresight	Within a radius of 0.22 mm at the focal plane along the full zoom range	
Weight	~8kg	
Max. Dimensions	Ø286 x 343.6mm	
<b>Electrical</b>		
Lens Control	Designated lens controller	
Supply voltage	12V (Can be configured to 6V- 12V)	
Current consumption	0.5A average, 1.0A peak	
Communication Protocol	RS422	

# SupIR 60-1200mm f/4 Motorized Continuous Zoom 680475/6

MWIR  
f/4.0



HD  
FORMAT

### WFOV (60mm)

HFOV	640x512
15μ	8.6°
10μ	5.9°

### WFOV (100mm)

HFOV	640x512	1280x1024
15μ	5.3°	
10μ	3.6°	6.8°

### NFOV (1200mm)

HFOV	640x512	1280x1024
15μ	0.5°	
10μ	0.3°	0.6°

Property	Value	
<b>Optical</b>	<b>WFOV</b>	<b>NFOV</b>
F/#	4.0	
Minimum Focus Range	<5m	<200m
<b>Mechanical</b>		
Focus Mechanism	Motorized	
Focus Time (minimum range to ∞)	≤1 sec.	
Zoom mechanism	Motorized	
Zoom Time (NFOV to WFOV)	≤ 8 sec at -32°C; ≤ 5 sec. at T ≥ 20°C (at max. speed)	
Weight	14.6kg	
Max. Dimensions	Ø388mm x 409.2mm	
<b>Electrical</b>		
Lens Control	Designated lens controller	
Drive voltage	12VDC	
Current consumption	0.5A average, 1.0A peak at T = -32°C; 0.2A average, 1.0A peak at T ≥ 20°C	
Communication Protocol	RS422	



# SupIR 30-385mm f/5.5, Motorized Continuous Zoom 680459

MWIR  
f/5.5

## WFOV (30mm)

HFOV	320x240	480x384	640x512
20μ	12.5°	18.6°	
15μ	9.4°	14.0°	18.6°

## NFOV (385mm)

HFOV	320x240	480x384	640x512
20μ	0.9°	1.4°	1.8°
15μ	0.7°	1.0°	1.4°

Property	Value	
<b>Optical</b>	<b>WFOV</b>	<b>NFOV</b>
F/#	5.5	
Minimum Focus Range	5m	70m
<b>Mechanical</b>		
Focus Mechanism	Motorized	
Focus Time (minimum range to ∞)	≤8 sec.	
Zoom mechanism	Motorized	
Zoom Time (NFOV to WFOV)	≤ 5 sec.	
Weight	740gr	
Max. Dimensions	Ø98mm X 137.9mm	
<b>Electrical</b>		
Lens Control	Designated lens controller	
Supply voltage	12V (Can be configured to 6V-12V)	
Current consumption	0.5A average, 1.0A peak at T = -32°C; 0.2A average, 1.0A peak at T ≥ 20°C	
Communication Protocol	RS485, RS422	

# SupIR 50-700mm f/5.5, Motorized Continuous Zoom 680472

MWIR  
f/5.5



## WFOV (50mm)

HFOV	320x240	384x288	640x512
20μ	7.6°	9.1°	
15μ	5.7°	6.8°	11.4°

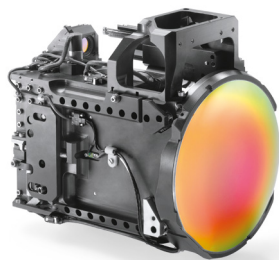
## NFOV (700mm)

HFOV	320x240	384x288	640x512
20μ	0.5°	0.6°	
15μ	0.4°	0.5°	0.8°

Property	Value	
<b>Optical</b>	<b>WFOV</b>	<b>NFOV</b>
F/#	5.5	
Minimum Focus Range	1m	33m
<b>Mechanical</b>		
Focus Mechanism	Motorized	
Focus Time (minimum range to ∞)	≤8 sec.	
Zoom mechanism	Motorized	
Zoom Time (NFOV to WFOV)	≤ 5 sec.	
Weight	1.64kg	
Max. Dimensions	Ø156.2mm X 176.7mm	
<b>Electrical</b>		
Lens Control	Designated lens controller	
Supply voltage	12V (Can be configured to 6V-12V)	
Current consumption	0.5A average, 1.0A peak at T = -32°C; 0.2A average, 1.0A peak at T ≥ 20°C	
Communication Protocol	RS485, RS422	

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

MWIR  
f/5.5



HD  
FORMAT

## WFOV (28mm)

HFOV	320x240	480x384	640x512	1280x1024
30μ	19.8°	29.7°	39.8°	
20μ	13.2°	19.8°	26.4°	
15μ	9.9°	14.8°	19.8°	39.8°

## NFOV (850mm)

HFOV	320x240	480x384	640x512	1280x1024
30μ	0.6°	1.0°	1.3°	
20μ	0.4°	0.6°	0.9°	
15μ	0.3°	0.5°	0.6°	1.3°

Property	Value	
<b>Optical</b>	<b>WFOV</b>	<b>NFOV</b>
F/#	5.5	
Minimum Focus Range	3m	50m
<b>Mechanical</b>		
Focus Mechanism	Motorized	
Focus Time (minimum range to ∞)	≤8 sec.	
Zoom mechanism	Motorized	
Zoom Time (NFOV to WFOV)	≤8 sec.	
Weight	4.6kg	
Max. Dimensions	Length 256mm; Width 176mm; Height 257.5mm	
<b>Electrical</b>		
Lens Control	Designated lens controller	
Supply voltage	28VDC	
Current consumption	1.25A average, 2.5A peak	
Communication Protocol	RS422	

\* Requires export license

# SupIR 80-1200mm f/5.5 Motorized Continuous Zoom 680478

MWIR  
f/5.5



## WFOV (80mm)

HFOV	640x512
15μ	7.1°

## NFOV (1200mm)

HFOV	640x512
15μ	0.5°

Property	Value	
<b>Optical</b>	<b>WFOV</b>	<b>NFOV</b>
F/#	5.5	
Minimum Focus Range	5m	220m
<b>Mechanical</b>		
Focus Mechanism	Motorized	
Focus Time (minimum range to ∞)	≤8 sec.	
Zoom mechanism	Motorized	
Zoom Time (NFOV to WFOV)	≤5 sec.	
Weight	7.4kg	
Max. Dimensions	Ø268mm x 325.5mm	
<b>Electrical</b>		
Lens Control	Designated lens controller	
Supply voltage	12VDC	
Current consumption	0.5A average, 1.0A peak at T = -32°C; 0.2A average, 1.0A peak at T ≥ 20°C	
Communication Protocol	RS458, RS422	

# SupIR 50-1350mm f/5.5, Motorized Continuous Zoom 680356\*

MWIR  
f/5.5



**HD**  
FORMAT

## WFOV (50mm)

	320x256	640x512	1280x1024
HFOV	7.3°	14.4°	
20μ	5.4°	10.8°	20.5°
15μ		7.3°	14.4°

## NFOV (1350mm)

	320x256	640x512	1280x1024
HFOV	0.3°	0.5°	
20μ	0.2°	0.4°	0.8°
15μ		0.3°	0.5°

Property	Value	
<b>Optical</b>	<b>WFOV</b>	<b>NFOV</b>
Focal Length	50mm	1350mm
F/#	5.5	
Average transmission (3.4-0.5μm)	70% (LRHC)	
Based on Zoom Lens	28-900mm f/5.5 680072	
Cold stop to FPA Distance	28mm	
Cold Stop CA	Ø5.09mm	
Back focal length	37.6mm in air	
Distortion (in diagonal)	<5%	<5%
Minimum focus range	5m	200m
Nuc (by defocus)	Yes	
<b>Mechanical</b>		
Focus Mechanism	Motorized	
Focus Time (minimum range to ∞)	≤8 sec.	
Zoom Mechanism	Motorized	
Zoom Time (NFOV to WFOV)	≤8 sec.	
Max. Dimensions	Length 376.4mm; Ø281mm; height 293mm	
Weight	~13.7kg	
<b>Electrical</b>		
Lens Control	Designated lens controller	
Supply voltage	28VDC	
Current consumption	1.25A average, 2.5A peak	
Communication interface	RS422	
<b>Environmental</b>		
Operation Temperature	-20°C to +65°C	
Storage Temperature	-54°C to +71°C	
Sealing	IP 67 front element only	
<b>Configurations</b>		
680356-001	LRHC	

\* Requires export license



### About Ophir IR Optics

With decades worth of knowledge and experience, Ophir Optronics Solutions LTD., Infrared Optics, an MKS Company (NASDAQ: MKSI), is a world-leading designer and manufacturer of high performance IR thermal 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, commercial and defense applications: IR Components and complex lens assemblies with fixed or motorized focus and continuous zoom lenses.

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