



# Dual-Band Infrared Bandpass Filters

Dual-Band IR filters for the MWIR and LWIR provide high performance in-band and out-of-band



Image courtesy of FLIR

## DESCRIPTION

Reynard dual-band infrared (IR) bandpass filters provide high in-band transmission in both the MWIR (mid-wave, 3-5 $\mu$ m range) and the LWIR (long-wave, 7.5-13.5 $\mu$ m range) simultaneously, while providing high out-of-band (OOB) rejection.

In-band transmission levels above 90% have been demonstrated on multiple substrate materials with different wavelength and transmission performance requirements.

MIL-STD environmental testing has verified excellent durability and stable spectral performance. Direct spectral measurement at 80K (LN<sub>2</sub>) demonstrates cryogenic temperature durability and minimal wavelength shift from ambient conditions (dx/dT).

Coatings can be applied to small or large substrates with plano or curved surfaces, all with excellent part-to-part and edge-to-edge uniformity.

These coatings are ideal for current and next-generation infrared imaging systems that require high-performance in-band and out-of-band blocking in multiple wavelength bands.

Reynard can customize any filter to meet the performance needs of your system. All manufacturing is done in-house for improved quality, ease of communication and innovative customization.

## KEY SYSTEM BENEFITS

### REDUCE OVERALL SYSTEM WEIGHT

A dual-band optical system requires fewer optical elements compared to multiple, single-band systems. A smaller solution resulting simpler imaging applications.

### BETTER PERFORMANCE

Meets demanding IR system requirements with minimal layers that are stable & durable.

### FLEXIBILITY

Allows the use of color cameras for both day and night imaging when there are ambient light conditions.

### LOWER SYSTEM COST / AFFORDABILITY

Combining multiple optical functionalities into a single optical path can reduce procurement costs, inventory management costs and assembly costs.

### ENVIRONMENTAL

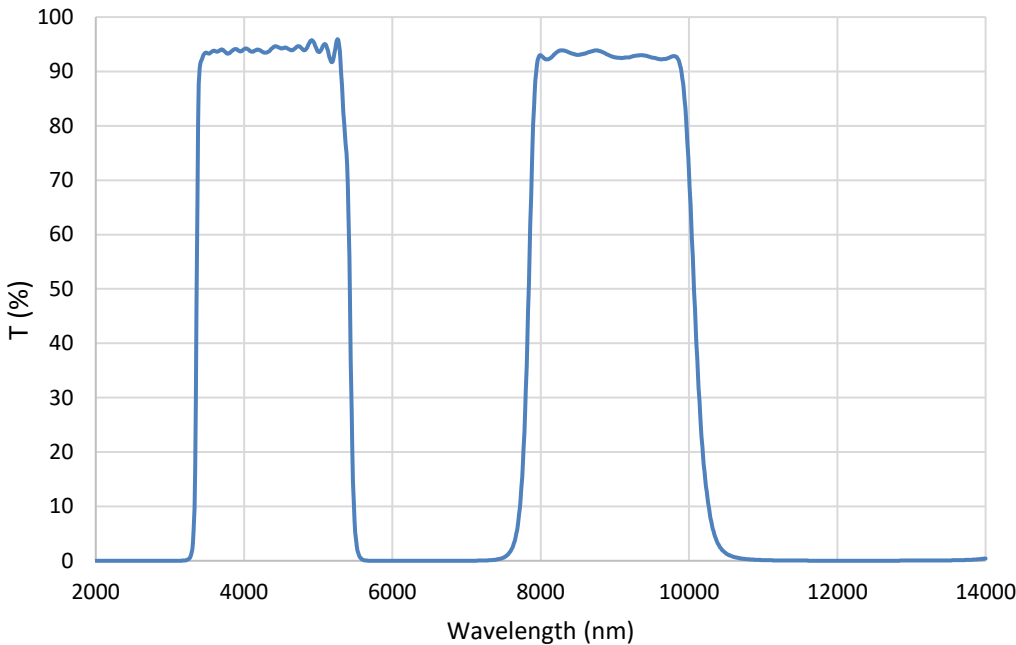
Able to withstand MIL-SPEC environmental testing including humidity, temperature, abrasion (moderate), and adhesion.

### BETTER IMAGING

Ensures clear and accurate images under most lighting conditions without using costly filter switching mechanisms.



Theoretical model for dual band pass filter at 80K temperature



**SPECIFICATIONS:**

Property	Value
<b>Material</b>	Ge, InAs, ZnS, ZnSe and others
<b>Size</b>	Custom upon request
<b>Surface</b>	Plano, Convex, Concave Polished edges/chamfers available
<b>Surface Quality</b>	Per MIL-C-48497/48616(MIL-PRF-13830) Standard: D-C (40-20) Limit: B-A (10-5)
<b>Wavelength Band</b>	3.0µm to 5.0µm 8.0µm to 13.5µm
<b>Spectral Performance</b>	0° AOI $T_{avg}$ (inband) > 85% $OD_{avg}$ (OOB) > 2 $T_{max}$ (inband) > 95% $OD_{max}$ (OOB) > 4
<b>Environmental</b>	MIL-C-48497A 3.4.1.1 – Adhesion 3.4.1.2 – Humidity 3.4.1.3 – Abrasion (moderate) 3.4.2.1 – Temperature Cryogenic cycling to 80K
<b>Damage Threshold</b>	Laser Damage enhanced designs available; design specific. Testing will be provided.

**KEY FEATURES:**

- MWIR/LWIR spectral discrimination on a single substrate.
- Custom tuning to specific wavelength band requirements available.
- Deposition on a variety of IR materials.
- Substrate configurations include large and small aspherical, lenses, flats, and spherical.
- Environmentally durable.
- Prototype to production volumes.
- Build-to-print manufacturing.

**APPLICATIONS:**

- Current and 3<sup>rd</sup> Gen FLIR Instruments
- Night imaging
- Gas sensing
- LIDR
- UAV's
- Imaging through smoke and fog
- Target detection and identification
- Weather Imaging
- Detection
- Thermal Imaging
- Avionics
- Security