

SATCOM OPTICAL FILTERS & COATINGS



IRIDIAN SPECTRAL TECHNOLOGIES

The desire for low latency, high capacity, secure, uninterrupted internet connectivity everywhere on earth, at all times has driven explosive growth in the satellite communications (**Satcom**) market. Iridian designs and manufactures custom wavelength selective windows and transceiver filters to improve the signal to noise in these systems.

Iridian has over 20 years of experience producing industry leading optical telecommunication and datacom filters for terrestrial systems. This communication filter expertise is combined with a space heritage providing filters flown in satellite applications such as earth observation and is supported by a dedicated **Aerospace and Specialty Optics** group to guide customers from initial specification and design through to full volume production from our Ottawa, Canada facility.

Satcom and Optical Filters

Commercial Satcom networks will consist of constellations of 100's to 1000's of satellites in an interconnected low earth orbit (**LEO**) mesh. Many of these systems rely on an optical intersatellite link (**OISL**) architecture to connect satellites via laser based optical communications. Optical filters provide wavelength selectivity to these systems addressing different functional needs from solar rejection windows to beam steering wavelength selective dichroic filters.

Solar Rejection Windows (SRW) allow the transmission of the communication band (typically around 1550nm) between satellites while blocking the background solar radiation, providing improved signal-to-noise while helping minimize solar heating inside the satellite.

– Typical optical filter performance requirements:

- high transmittance in signal band
 - typically 1550nm; wavelength is customizable
- broad deep blocking of solar spectrum
- large (up to 150mm) windows
- low transmitted wavefront error (TWE)

Dichroic filters enable the receiver to selectively receive specific wavelength bands of interest. These may be used as stand-alone clean-up filters or in series to direct different signals to different detectors in the optical train.

– Optical filter requirements:

- high transmittance and high reflection
- steep edges
- may need to preserve polarization (for QKD encryption signals)

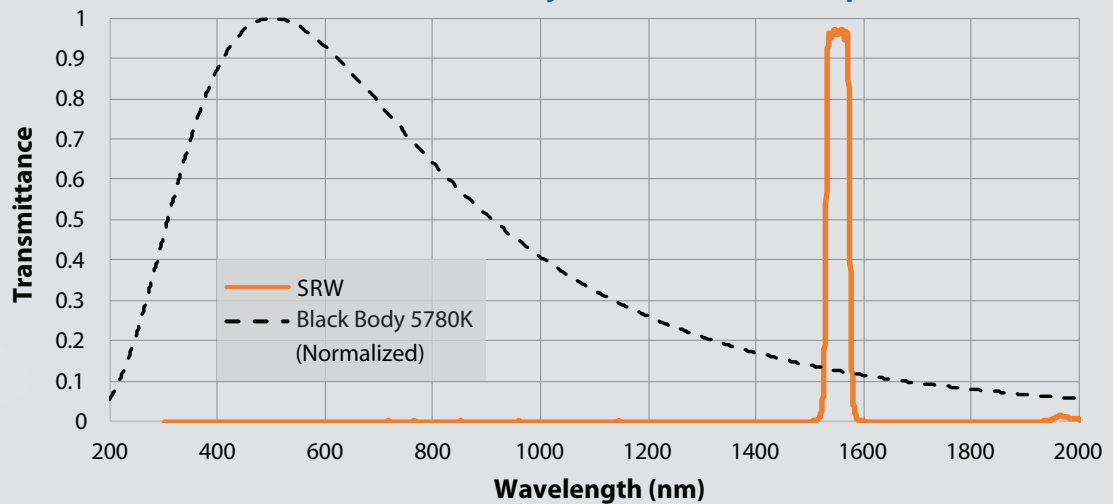


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THE LEADER IN OPTICAL FILTER SOLUTIONS

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Iridian Solar Rejection Filter Example



Space Heritage

Iridian has produced individual filters and multi-spectral elements that have been tested and qualified for a range of orbits and space environments. **Iridian** is a registered participant in the Canadian Controlled Goods Program.

Some of our filters and coatings for space:

- Multi-zone filter arrays currently in LEO orbit with commercial customers. These include:
 - Assembled arrays; as many as 10 zones with dark seam coatings to provide isolation between colour bands
 - Monolithic patterned arrays; as many as 5 zones
- Light absorbing coatings on International Space Station
 - LEO at 350 km
- 532/1550 nm partial reflectors and AR coatings for Fabry - Perot etalons used on NASA's ICE Sat-2 satellite
 - LEO at 500 km
- AR coatings on NASA's Solar Dynamics Observatory (SDO)
 - Geosynchronous orbit
- Large format NIR Bandpass filters for NASA LADEE free space communications test, Lunar Laser Communication Demonstration (LLCD)
- Large, highly uniform narrow bandpass filters and SRW for MTG-Lightning Imager at 777.7nm
 - Geosynchronous orbit

Completed Space Environment Tests:

Radiation exposure including:

- gamma, proton, combined solar UV and electron
- Thermal shock/survivability: multiple liquid N2 dips
- Vibration testing (customer performed)
- Laser damage testing: in excess of 1 MW/cm²
- Thermal vacuum cycling testing from 50K to 450K
- Reliability as per MIL-C-48497A
- Outgassing testing (ASTM-E595)

Iridian Spectral Technologies Ltd (Iridian) is a diversified optical filter manufacturer that is an international leader in filter design and manufacture especially for application in the fields of fiber optic communications, optical spectroscopy, 3D entertainment, and in aerospace. Iridian is a global supplier with distributors in many countries.



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