



LEADER IN OPTICAL FILTER SOLUTIONS

IRIDIAN
SPECTRAL TECHNOLOGIES



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Founded in 1998 and located in the capital city of Ottawa, Canada, **Iridian**

is a world leader in optical filter solutions for a wide range of applications.

Iridian's highly advanced, proprietary thin-film design deposition and manufacturing technology delivers durable high performance

THE LEADER IN OPTICAL FILTER SOLUTIONS

optics for use in telecommunications and datacenters, Raman and fluorescence spectroscopy, mid IR applications such as gas sensors, as well as astronomy and space.

Iridian also offers high performance optics for 3D eyewear. **Iridian** supports customers throughout their product's development; from initial prototyping to volume manufacturing, our automated production facility is able to ensure that the most cost effective optical solutions are found. **Iridian** also offers an extensive online catalogue of our standard products.



As data storage and computing resources move into the cloud, the demand on data centers (DC) for storage and data transfer capacity (data center interconnect (DCI) bandwidth) has increased dramatically driven by:

- Gigabit Ethernet: growth of 10, 25 and 40 Gigabit Ethernet (GE) network adapters
- Software as a Service (SaaS): less local computing ► more transactions in the cloud/DC
- Internet of Things (IoT): Many devices sending/receiving data to the cloud
- New storage technology: enhances the attractiveness of cloud storage

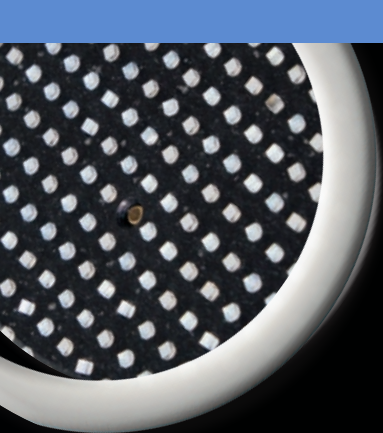
DATAKOM FILTERS Optical interconnect bandwidth enhancements are becoming necessary as the optical datacenter interconnects start to require data transfer rates approaching and exceeding those of the long haul fiber connections.

Datacom filter solutions are now available to address these needs:

- Wavelength division multiplexing (WDM) in transceivers
 - separating or combining multiple wavelengths onto a single device
 - WDM regions covered include: O - band (1260-1360nm), C - band (1530-1565nm), L - band (1565-1625nm)
- Broad bandpass filters to transmit the entire O, C, or L – band
- Silicon (Si) Etalons for TLA
 - providing controlled free-spectral range (FSR), finesse, and tunability to enable selection of specific wavelength peaks

Datacom filters often have similar optical functionality and requirements as traditional telecom filters however the optical design, filter size and thickness may be customized to meet the unique requirements of these ultra-compact products. As always, maintaining the optical performance required at the lowest possible cost in a robust and reliable format is critical.





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Telecom filters are important components in today's fiber optical communication networks. **Iridian's** telecom filters are used throughout the world in optical networks

TELECOM FILTERS

for wavelength multiplexing and de-multiplexing; dispersion compensation; laser source stabilization and optical gain amplification flattening to name but a few telecom applications. **Iridian** offers superior performance and high quality telecom filters at competitive prices to meet the ever increasing wireless and fiber to-the-home traffic demand.



Iridian offers:

- All band Gain-flattening filters and Hybrid-GFFs
- DWDM filters and 100GHz DWDM XskipY filters
- Band pass, Edge pass filters and beam splitters
- Multi-band pass filters (dual-band, triple-band, quad-band filters)
- Solid etalon, dispersion compensation filters
- Linear transmittance filters

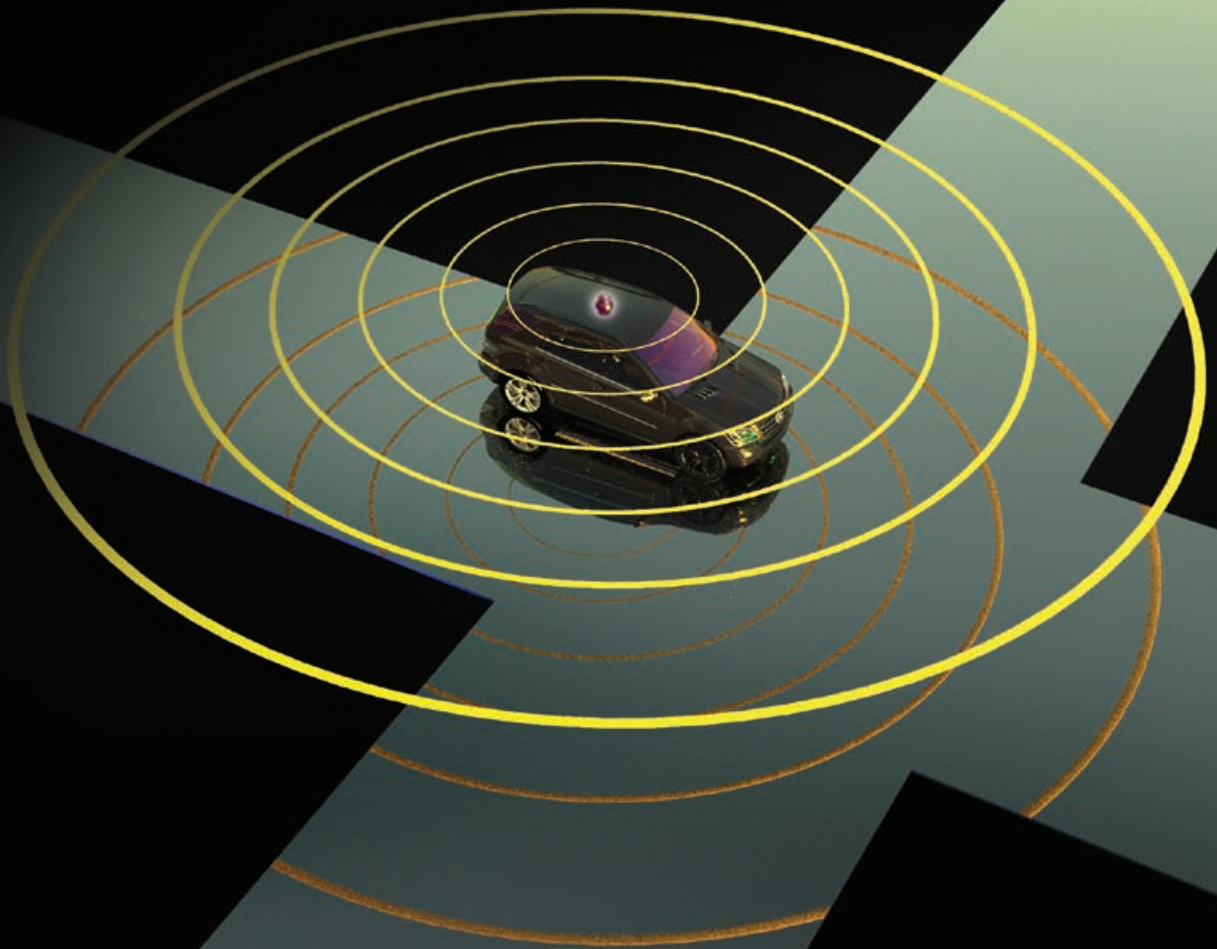
LiDAR FILTERS

LiDAR (laser detection and ranging) is employed in applications such as remote sensing, airborne laser scanning and autonomous vehicles. LiDAR systems can provide a point cloud of data that precisely describes the position and velocity of objects in the field of view of the system and optical filters are often needed to provide wavelength selectivity between the LiDAR wavelengths and other light sources in the environment.

Common LiDAR wavelengths include 532nm, 905nm, 940nm, 1064nm, and 1550nm.

Iridian offers customized optical filter solutions for LiDAR systems with:

- High transmission at the laser wavelength (>95%)
- Narrow bandwidths (<1nm to 20+ nm dependent on the system requirements)
- Deep blocking (OD 4-6 over detector range)
- Highly stable, environmentally robust and reliable
- Low angular wavelength shift to allow a wider angle of incidence (AOI) range 0-30 degree
- Low cost, high volume manufacturing capabilities



RAMAN AND SPECTROSCOPIC FILTERS

Iridian, the leader in optical filter solutions provides filters for a wide range of spectroscopic applications including biomedical, endoscopy, fluorescence microscopy, environmental monitoring, security and sensing. All of **Iridian's** filters use hard dielectric sputtered coatings, offering high performing and affordable filters. with superior reliability and durability, providing superior wavelength selectivity and signal to noise in these systems.

Iridian offers standard Band-Pass, Edge, Notch, and Dichroic filters for Raman and other spectroscopic applications and specializes in partnering with our customers to develop fit to purpose custom filter solutions for systems ranging from large bench-top instruments to portable hand-held devices. Iridian supports your product from prototype to manufacturing and is a proven high volume optical filter supply chain partner.

Band-pass Filters

Iridian's band-pass filters feature greater than 90% transmittance in the pass band, narrow bandwidth as low as 1 nm, and excellent blocking ($OD > 5$) in the 300 nm to 1200 nm wavelength range. We also offer multiple band-pass filters in the UV-Vis-IR region. The filters can have 2, 3 or even 4 band regions to allow use of multiple excitation sources or emission bands.

Notch Filters

A combination of high transmittance ($> 90\%$) and deep blocking ($OD > 6$) results in more signal with less background. **Iridian** offers both narrow (as low as 10 nm at 50% width) and standard notch filters as well as multiple notch filters.

Edge Filters

Iridian offers both short and long pass edge filters with industry leading cut-off values 25-100 cm^{-1} from OD_6 at the laser wavelength to the 50% transmission point.

Dichroic Filters

Iridian offers both long pass and short pass dichroic edge filters. A dichroic filter is typically used at angle of incidence of 45° to reflect (transmit) excitation light to the sample and transmit (reflect) the emitted signal to the detector.

Wide Angle Ultra-Steep Edge Filters

Our new line of standard Raman spectroscopic filters offers superior performance for wider angle of incidence (AOI 0-2 degree) and cone half angle (CHA 5 degree) for the edge filters and AOI 40-50 degree angle tunable capability for the dichroic filters.



FLUORESCENCE FILTERS

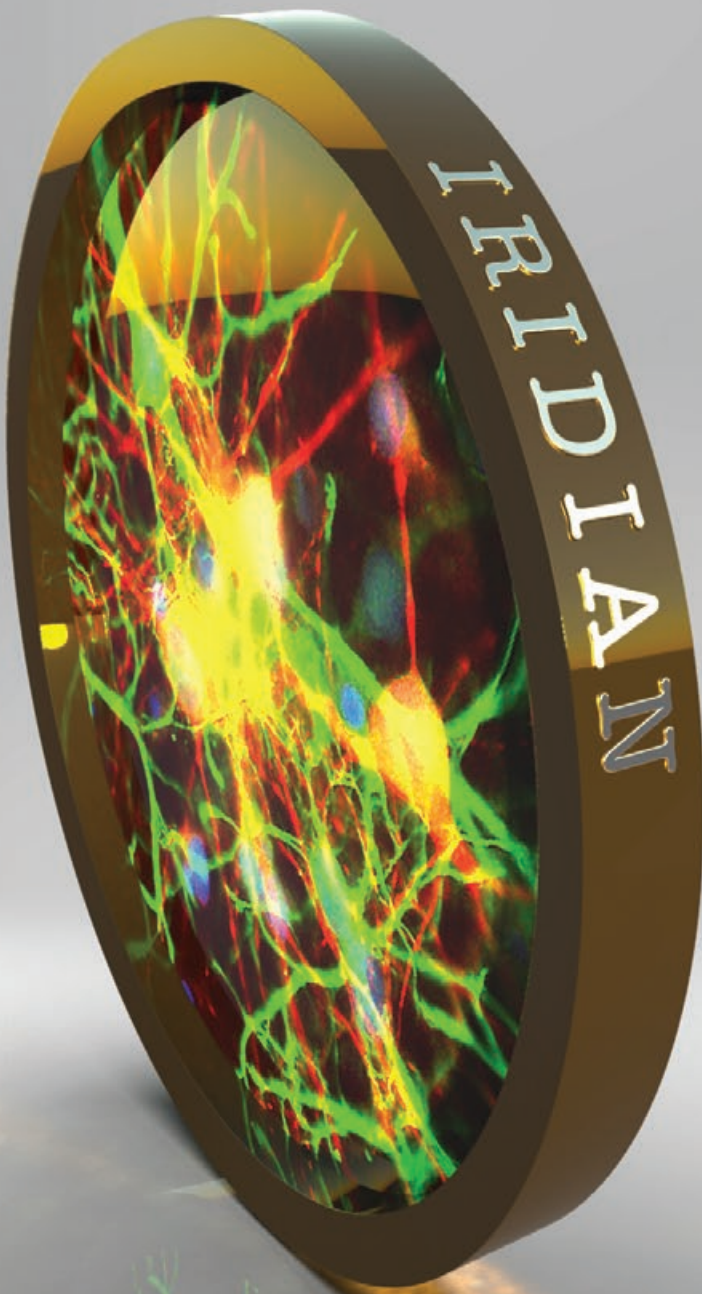
Iridian, offers fluorescence emission filters, dichroic filters, excitation filters, fluorescence filter sets and fluorescence multi-band filters for fluorescence analysis instruments, fluorescence

imaging instruments and fluorescence microscopes. Our affordable standard filter solutions are compatible with common excitation sources, microscopes and fluorophores. **Iridian** also specializes in partnering with our customers to develop custom filter solutions and we are a proven high volume optical filter supply chain partner.

Iridian's emission, excitation and dichroic filters provide more signal with less background to the fluorescence instrument users and OEMs. They provide:

- High transmission and reflection levels
- Low ripple
- Steep edges
- Deep blocking outside of pass band.

These features eliminate background excitation and overlap of emission signals from different fluorophores while maintaining high channel signal, leading to improved imaging or data capture and analysis.



OPTICAL FILTERS OPEN UP NEW USES FOR MWIR, LWIR SYSTEMS

The ability to image “invisible” features such as thermal profiles, gases, and other environmental constituents in a commercially viable manner has begun to open up new application areas for M/LWIR sensor systems, such as non-dispersive infrared (NDIR) and photo-acoustic spectroscopy (PAS). **Iridian’s** optical filter technology has helped open this new wavelength window.

Iridian’s new MLWIR BPF capabilities provide narrow, high transmission bandpass filters from 2-10 μm to detect the presence and concentration of gases of interest in environmental or process analysis applications such as: CH_4 , CO , CO_2 , H_2O , O_3 among others.

The future for photonics imaging is bright in this previously dark wavelength regime.



MULTIZONE FILTERS

The ability to offer spatially varying spectral performance on a single substrate can have many advantages for optical designers.

Iridian's MZF technology has been deployed in applications such as:

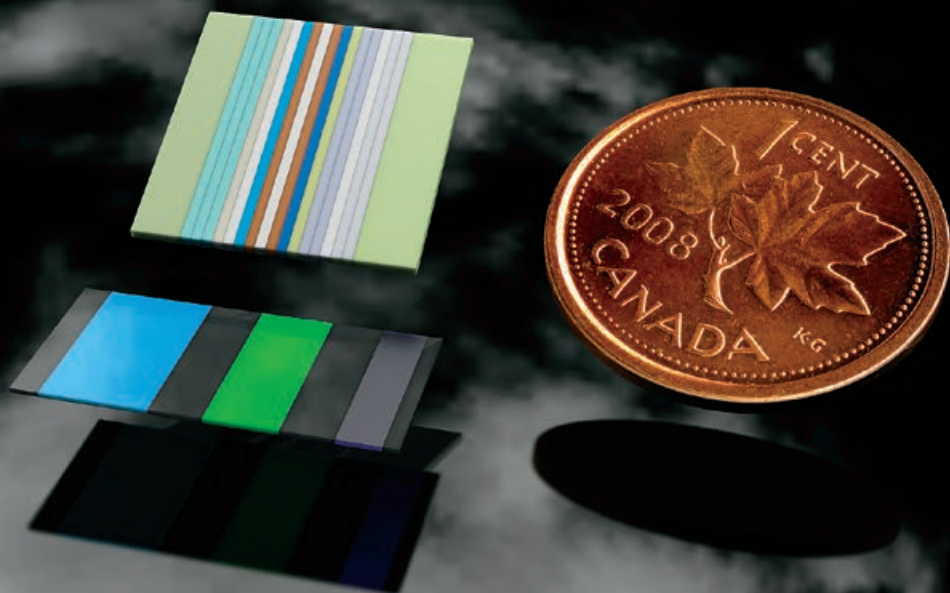
- Multi-spectral imaging: Remote sensing (environmental analysis, Earth observation (EO), defense and security)
- Multi-zone filter wheels: 3D cinema projection ("right-eye" and "left-eye" images)
- Order sorting for spectrometers or CCDs
- Multi-band tele/datacom: multiple WDM filter arrays

ASSEMBLIES

Iridian's multi-zone filter assemblies address needs in multi-spectral imaging applications requiring many bands, complex filter coatings, or with constraints on cost. In this process coatings are deposited on separate substrates that are then attached together using robust assembly methods. These assemblies can achieve zone-to-zone transitions of $< 100 \mu\text{m}$ and have been manufactured with as many as ten different spectral bands.

PATTERNING

For applications requiring a small transition zone or patterns not possible to achieve by assembly, **Iridian's** patterned multi-zone filters are the perfect choice. **Iridian's** in-house photo-lithography lab is housed a Class 1000 clean room capable of patterning up to 150 mm diameter wafers. Multi-step patterning can be performed creating MZF's with as many as five different zones and zone-to-zone transitions of as little as $20 \mu\text{m}$.





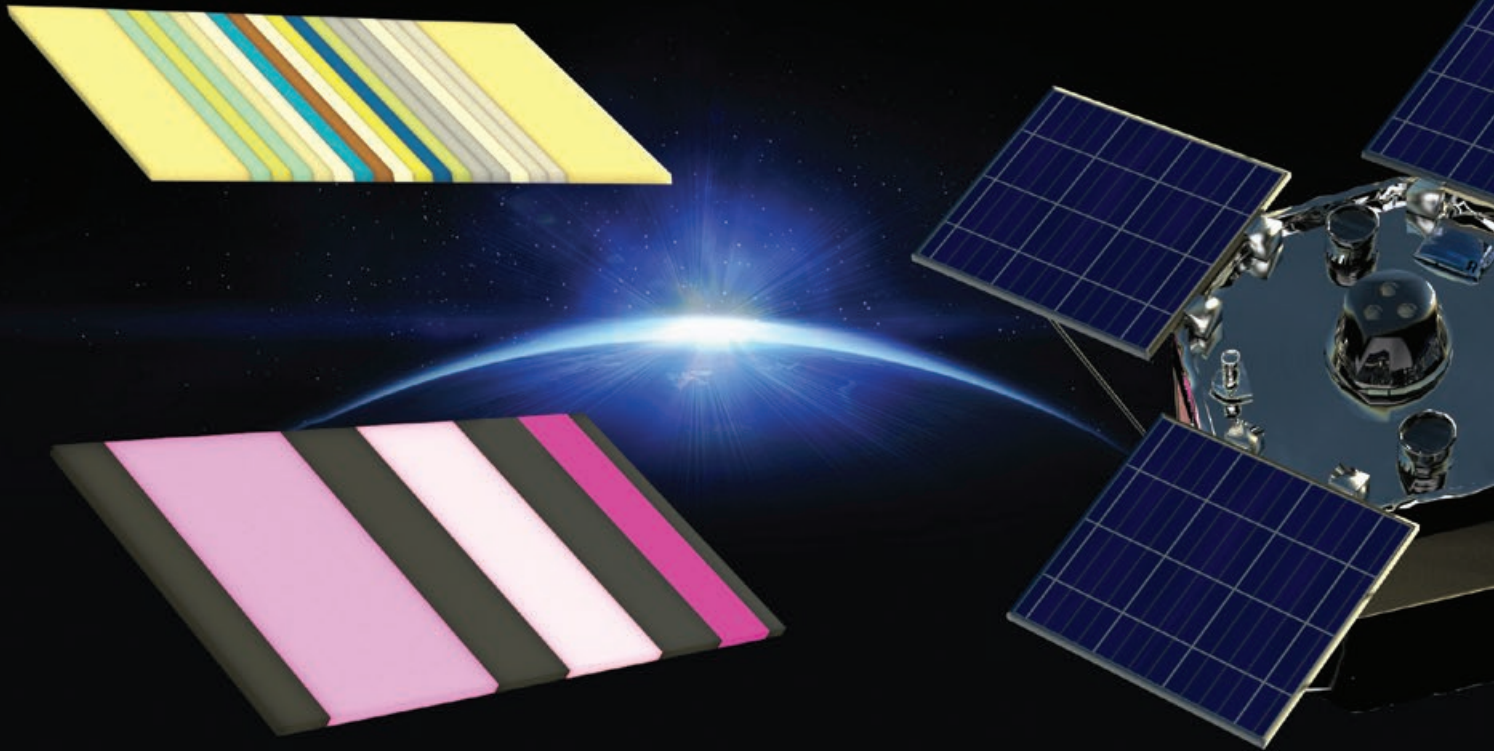
3D



3D GLASSES

Iridian has leveraged our established capability for design and manufacture of high-precision multiband optical filters to provide millions of pairs of re-usable 3D color band glasses for use in both lamp and laser based 3D cinema and theme park environments.

Iridian's 3D glasses consist of two separate multi-band filters each providing a different red, green, and blue spectrum to the viewer's left and right eye. The glasses are extremely durable, scratch-resistant and can be dishwasher cleaned to allow many hundreds of uses making them less costly per use compared with other "disposable" 3D glasses technologies minimizing the impact on the environment.



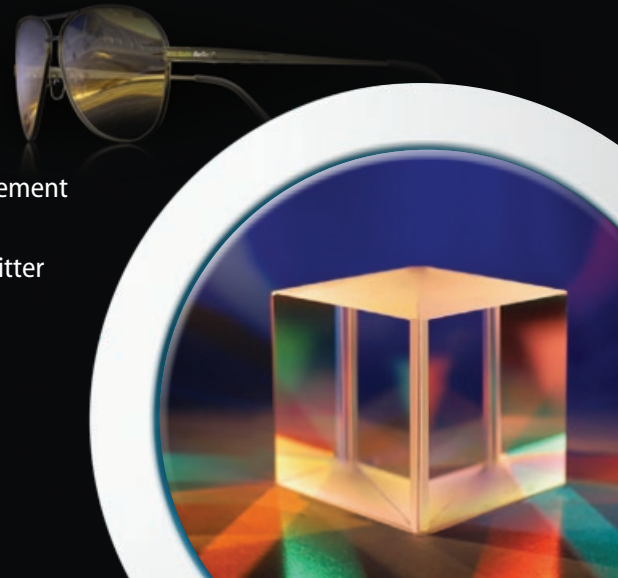
SPACE HERITAGE Due to their world leading optical performance and their inherent reliability and durability, **Iridian's** filters are particularly well suited for space applications.

- Iridian has produced individual filters and multi-spectral elements that have been tested and qualified to meet space usage requirements in a range of orbital environments.
- Testing and qualification completed includes:
 - Radiation exposure (gamma rays, protons, combined solar UV and electrons)
 - Vibration testing, Laser damage testing in excess of 1 MW/cm², Thermal vacuum cycling testing from 50K to 450K, Outgassing testing as per ASTM-E595, Thermal shock
 - Reliability as per MIL-C-48497A

CUSTOM OPTICS Iridian designs and manufactures custom one-of-a-kind filters as well as high volume filters for wide range of OEM applications including:



- LIDAR: 905nm, 1064nm and 1550nm
- Automotive Lighting
- LaseReflect anti-glare glasses
- Astronomy – Large filters for multi-element telescopes
- Analytical instrumentation – Beamsplitter cubes and optics for diagnostic and imaging instruments





You can contact **Iridian** by telephone, mail or email (see below), or submit an online Request for Quotation form.

A member of our Ottawa team or one of our international distributors will be pleased to assist.

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