OPTICAL TECHNOLOGIES
an IDEX Corporation platform

IRIDIAN
SPECTRAL TECHNOLOGIES

Multi-Functional Optical Filters for New-Gen Telecom Networks

多功能光滤波片在当前通信网络中的应用

Who we are at Iridian

Canadian supplier of custom optical filter solutions

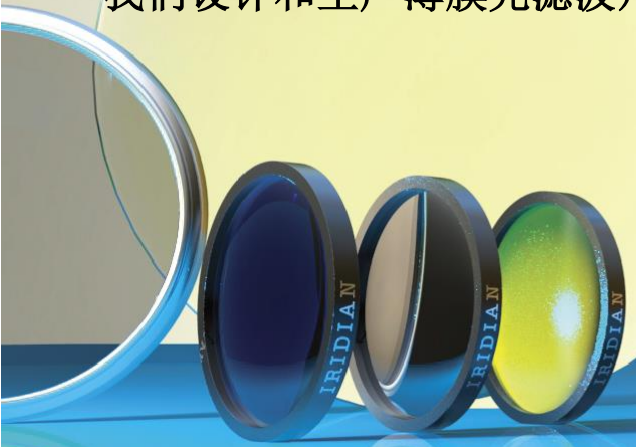
- ~170 staff providing extensive expertise in optical filter design and manufacturing
- Canadian corporation, established in 1998; ***now part of IDEX Optical Technologies***
- All manufacturing done in Ottawa, Ontario, Canada
- Achieved ISO9001: 2015 certification in May 2016
- *Officially opened 45,000 sq. ft. custom-built facility Nov 2012*

我们是定制光滤波片的加拿大供应商

- 拥有170名丰富经验的光滤波片设计和生产人员
- 公司成立于1998年，现在成为IDEX Optical Technologies 的一个部分
- 所有的生产制造都在加拿大渥太华
- 2016年5月通过了ISO9001的认证
- 45000平方英尺的厂房建于2012年11月

Iridian designs and manufactures thin-film dielectric optical filters

我们设计和生产薄膜光滤波片



Capabilities:

- WL range: 300nm to 15um
- Customized solutions
- Single/Multi-band; Multi-zone
- <1mm^2 to >150mm diameter

设计生产能力：

- 波长范围 300nm-15um
- 提供定制方案
- 单波段/多波段、多域
- 滤波片尺寸从< 1 mm^2 到直径 > 150 mm

More Signal, Less Background

Technologies:

- Energetic sputtering (25 chambers) + 1 Evaporator
- Custom design/control software
- In-house polishing, dicing/coring, photolithography

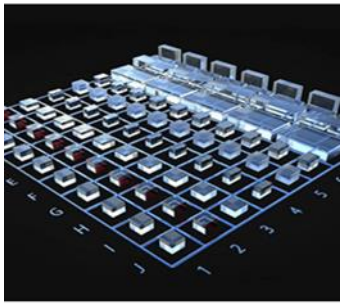
我们的技术：

- 高能溅射（25 台镀膜机）+ 1 个蒸发镀膜机
- 定制设计/控制软件
- 抛光、切割/取芯、光刻

Global leader in optical filter solutions for:
世界领先的光滤波片设计方案

Telecommunications

- Terrestrial and Submarine Fibre-optic networks – WDM, GFF
- Datacom – data center TOSA/ROSA, ITLA
- Satcom - OISL



通信

- 陆地和海底光纤网络 – WDM、GFF
- 数据通信 – 数据中心 TOSA/ROSA、ITLA
- 卫星通信 - OISL

Global leader in optical filter solutions for:

Bioanalytical
- Raman Spectroscopy
- Fluorescence

Sensing and Detection
- Earth Observation
- Gas Detection (MWIR)
- LiDAR

Aerospace
- Satcom
- Earth Observation
- Astronomy

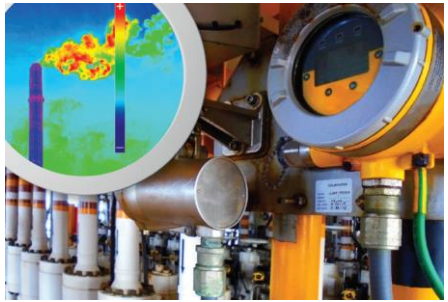
3D Cinema

生物学分析
- 拉曼光谱
- 荧光分析

传感和检测
- 地球观测
- 气体检测（中波红外）
- 激光雷达

航天
- 卫星通信
- 地球观测
- 天文学

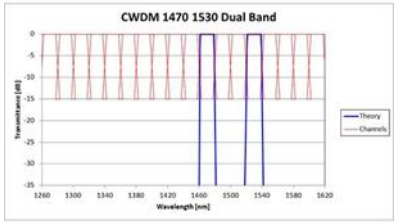
三维电影



Multi Band WDM Filters 多通带WDM滤波片

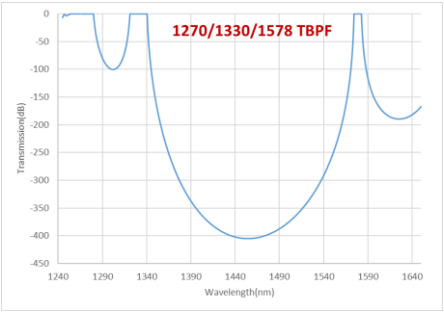
Why use multi-band pass filters?

- Traditionally, single band pass filters have been used in telecom modules to perform wavelength/channel add-drop functionality and are commonly used components in WDM system and PON modules.
- Iridian has previously developed CWDM and wide band multi-band pass filters to reduce accumulated insertion loss in these module/systems by “grouping” of ITU channels/wavelengths.
- With this method, module and system designers can improve the performance of these optical modules by using less components, resulting in a reduction in IL and a more compact module size.



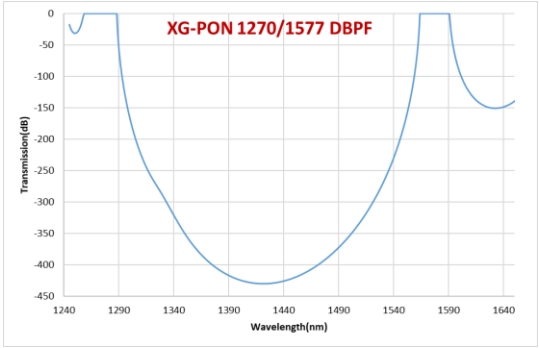
为什么使用多通带滤波片？

- 传统应用上，单带通滤波器已用于通信模块以实现波长/信道波分复用，并且是 WDM 系统和 PON 模块中常用的组件。
- Iridian 之前已开发出 CWDM 和宽带多带通滤波片，通过“分组” ITU 信道/波长来减少这些模块/系统中的累积插入损耗。
- 通过这种方法，模块和系统设计人员可以使用更少的组件来提高这些光学模块的性能，从而减少 IL 并缩小模块尺寸。

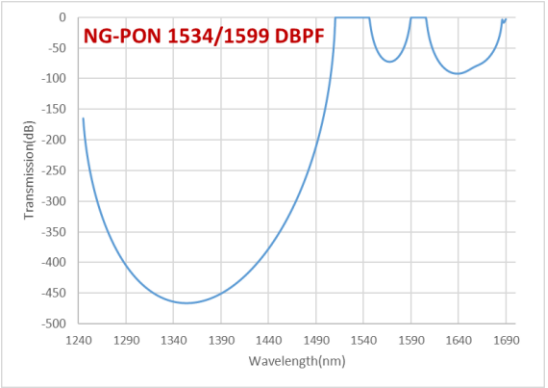


Multi-band filter in PON Application 多通带滤波片在PON中的应用

From the application level, the Passive Optical Network (PON) solution has feasible, lower cost, better performance, and stronger competitive advantages.
Compared with the optical Ethernet solution, industrial PON has fewer layers, lower cost, more reliable features, easier to be expanded, and satisfy telecom operation experience.
Our multi-band filters are demonstrated with many advantages in GPON, XG-PON, XGS-PON, 25G-PON, 50G-PON module applications.



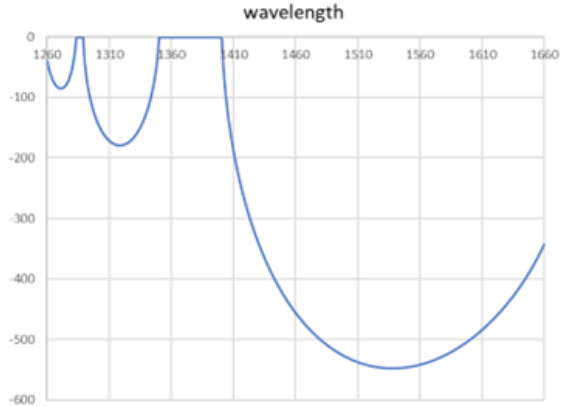
- 从应用层面看，无源光网络（PON）解决方案具有可行性、成本更低、性能更优、竞争优势更强等特点。
- 与光以太网解决方案相比，工业级PON具有层数更少、成本更低、可靠性更高、易于扩展、满足通信运营体验等特点。
- 我们的多通带滤波片在GPON、XG-PON、XGS-PON、25G-PON、50G-PON模块应用中展现出诸多优势。



DBPF in 25G-PON and 50G-PON

New generation of multi-band filter designs are being applied in PON modules recently. They provide narrower pass band and reflect band width, steeper in transition band, and custom pass band, reflect band wavelength and isolation requirement.

新一代多通带滤波片设计最近应用于PON模块。要求通带和反射带宽更窄，过度带更陡峭，以及定制通带、反射带波长和隔离度等需求。



25G-PON 1286/1358 DBPF

Hybrid GFF in EDFA Module 混合型GFF在光放大器模块中的应用

- Iridian has developed Hybrid GFF, which combines the functionality of both a WDM and the GFF on one component.
- The Hybrid GFF can block the pump laser from light in the range of 980 nm or 1480 nm while providing gain flattening for signal light amplification — without need additional pump WL blocking filter
- Moreover, a Hybrid GFF can be designed to pass or block other wavelengths in the 900 - 1700 nm band

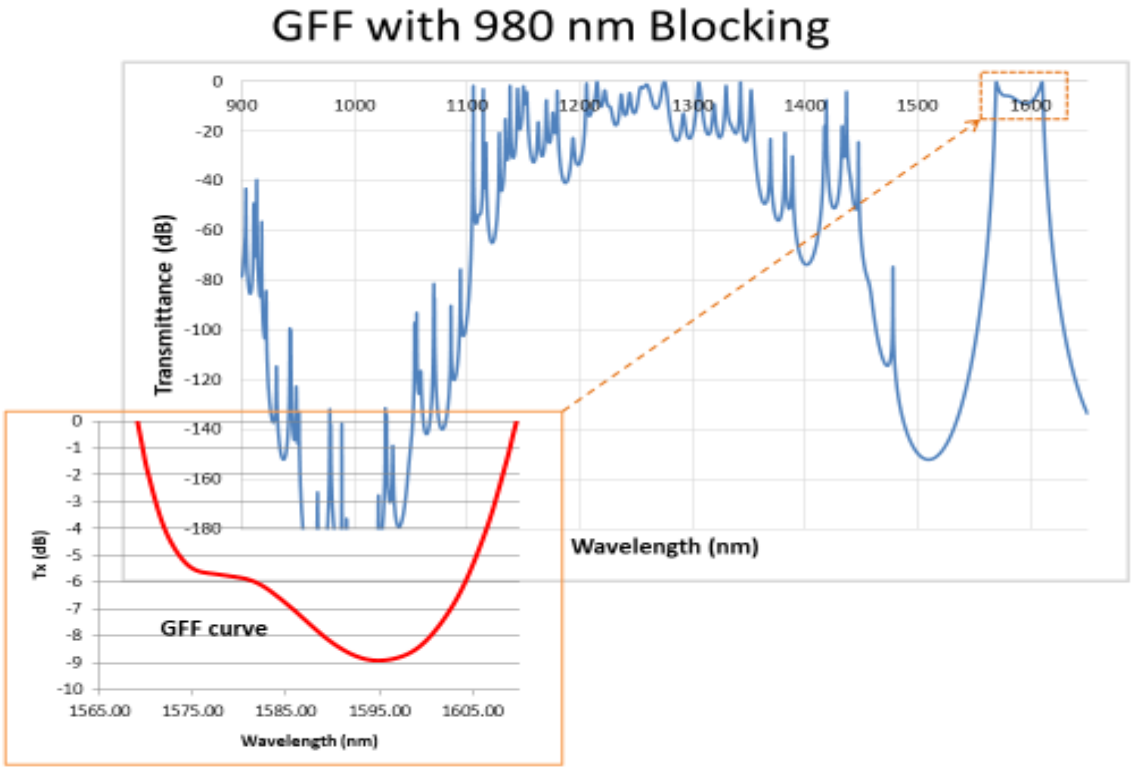
- Iridian 开发了混合 GFF，它将 WDM 和 GFF 的功能组合在一个组件上。
- 混合 GFF 可以阻挡 980 nm 或 1480 nm 范围内的泵浦光进入信道，同时为信号光放大提供增益平坦化 — 无需额外的泵浦阻挡滤波片。
- 此外，混合 GFF 也可以设计为通过或阻挡 900 - 1700 nm 波段中的其他波长。

- The most obvious benefit of Hybrid GFF is substantial cost savings; the Hybrid GFF cost is barely more than a base GFF while offering the functionality of two components.
- Using of a Hybrid GFF reduces system design complexity by cutting out a now-unnecessary element; eliminating the separate WDM leads to more compact dimensions for the EDFAs and other optical amplifiers

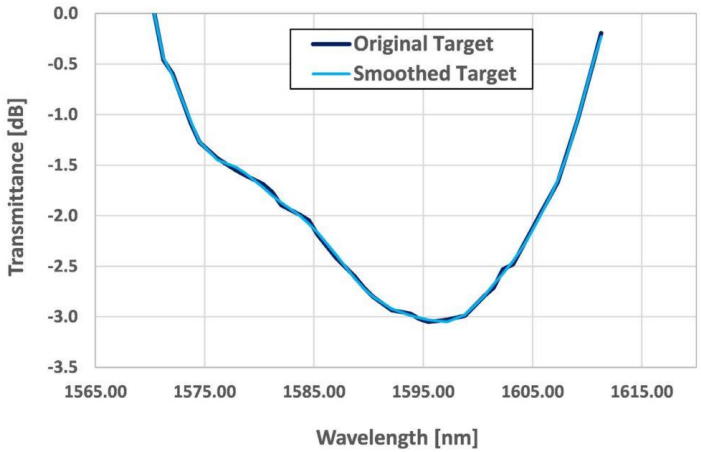
混合 GFF 最明显的好处是大幅节省成本；成本仅比基本 GFF 略高，同时提供两个组件的功能。

使用混合 GFF 可减少系统设计的复杂性，因为省去了不必要的元件，消除了单独的 WDM，使 EDFA 和其他光放大器的尺寸更紧凑。

GFF with 980 nm Blocking



Premium GFFs Improve EDFA Performance and Optimize Module Design
改进 EDFA 性能并优化模块设计的高性能GFF



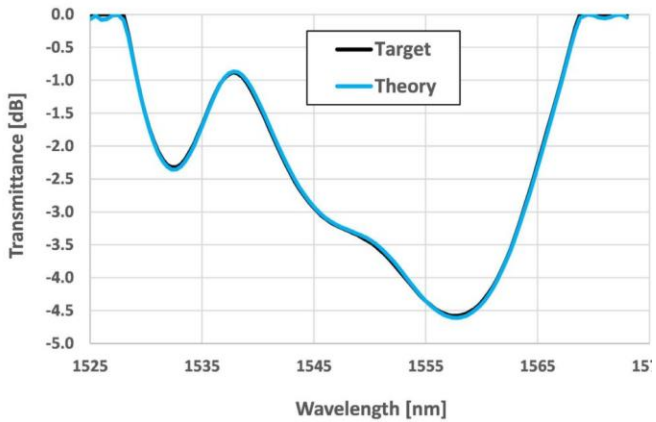
- **Case 1: Noisy target curve correction**

EDFA spectrum curve, usually is measured directly from the erbium fiber. Sometimes, significant measurement deviation is present on the curve, rendering it noisy (i.e., erratic and bumpy). It is not truly representative of the EDFA's performance, and make a low PPEF difficult because the modulation depth and steepness.
Before sending GFF design, Iridian has the experience and capability to smooth the target curve, bringing it closer to its theoretical optimization and the client's intent.

案例 1：噪声目标曲线的校正

EDFA 光谱曲线通常是直接从铒光纤测出的。有时曲线上存在明显的测试偏差，显现出噪音曲线（不光滑和颠簸）。它不能真正反映 EDF 的性能，加上调制深度和陡度因素，难以给出低PPEF 指标。在提供 GFF 设计之前，Iridian 拥有平滑目标曲线的经验和能力，使其更接近理论优化和客户意图。

Premium GFFs



- **Case 2: GFF curve edge treatment**

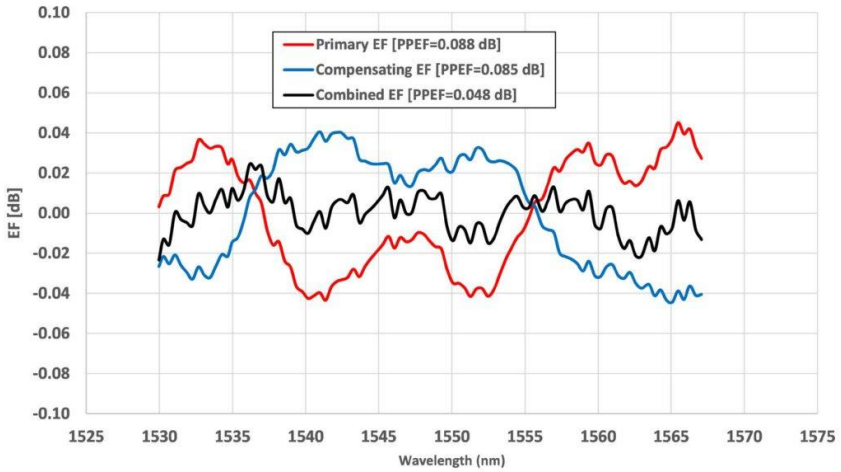
Help customers to create a passband near the edge of the target curve, maintaining high transmission outside the gain-flattened region.

Traditional GFF curve is smoother on the edges, whereas extending the GFF wavelength branches the curve slightly on either side or both sides. Sometimes referred to as “wings,” then become flat in the desired spot. These edges are very small, often only a few nanometers, but it is difficult for most GFF filter providers to accomplish. Iridian can optimize the “wing areas” performance in design to satisfy customer’s requirement.

案例 2：GFF 曲线边缘处理

帮助客户在目标曲线边缘附近创建通带，在增益平坦区域之外保持高透射率。传统的 GFF 曲线在边缘上更平滑，而延长 GFF 曲线范围会之在一侧或两侧略微分支。有时被称为“翼”，在所需位置变平。这些边缘非常小，通常只有几纳米，但对于大多数 GFF 滤光片供应商来说很难实现。益瑞电可以在设计中优化“翼区”性能，以满足客户的要求。

Premium GFFs



- **Case 3: GFF pairing for PPEF compensation**

Iridian has the ability to compensate the EF in GFFs. By designing and producing a filter set with opposite error functions, we can reduce the combined PPEF. Stated differently, we can produce a filter with a precise error function, and then compensate for that error function to cancel it out by using a pair of filters, achieving lower overall PPEF throughout the system.

案例 3：GFF 配对用于 PPEF 补偿

Iridian 能够补偿 GFF 中的 EF。通过设计和生产具有相反误差函数的滤波片组合，可以降低组合 PPEF。换句话说，我们可以生产具有精确误差函数的滤波片，然后使用一对滤波片补偿该误差函数以将其抵消，从而降低整个系统的整体 PPEF。

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Why IRIDIAN

- Reliable Partner
- Valuable Expertise
- Custom solutions
- Highest Quality & Reliability
- Competitive pricing

- 可靠的合作伙伴
- 宝贵的专业知识
- 定制的解决方案
- 高质量和可靠性
- 有竞争力的价格

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