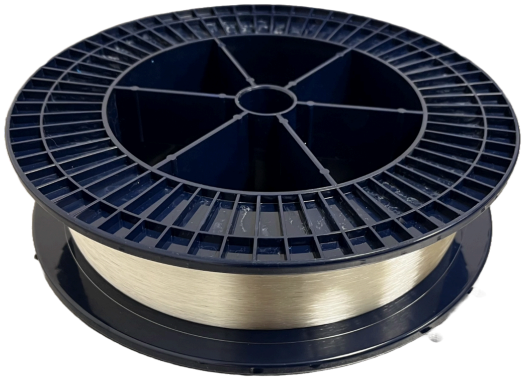
SENTEK INSTRUMENT

Advanced Optical Sensing

Enhance your DAS with Broadband Fiber Bragg Grating Arrays



Our gratings demonstrate exceptional thermal stability, even at temperatures exceeding 300°C. Sentek's state-of-the-art gratings offer several major benefits for Rayleigh ϕ-OTDR or DAS interrogators.

Key Advantages of Sentek FBG Technology

- Significant sensitivity enhancement
- Suppression of random sensitivity fluctuations across fiber segments and over time
- Large bandwidth
- Customer-specified varying grating reflectivities with individual grating tailorability and their distributions along the fiber
- Minimum polarization dependence
- Excellent thermal stability
- Precision grating spacing control

DAS Applications and Limitations

Optical fiber has emerged as a powerful platform for long-distance distributed acoustic sensing (DAS), enabling continuous monitoring over kilometers of infrastructure. In Rayleigh-based DAS systems, laser pulses are launched into the fiber, and a small fraction of the light is naturally backscattered. Acoustic disturbances along the fiber induce subtle phase changes in this backscattered signal, which are detected and processed by an optoelectronic interrogator.

While a variety of interrogator architectures and signal processing approaches exist, conventional Rayleigh DAS systems face two fundamental limitations:

Intrinsic Sensitivity Constraints
Rayleigh backscatter is weak, limiting acoustic detection sensitivity.

Signal Variability and Fading
Rayleigh backscatter is inherently stochastic, resulting in spatial and temporal signal fluctuations. At any given time, portions of the sensing fiber exhibit reduced sensitivity ("fading zones"), which shift unpredictably along the fiber.

Sentek Instrument LLC recently achieved a breakthrough in manufacturing ultrahigh-quality broadband FBGs in any fiber, including pure silica core fiber with various coating options. The quality of each FBG is continuously monitored during fabrication to ensure uniform optical power reflection within tight tolerances. Precise control over fiber and upstream grating loss compensation is maintained at an individual grating level. Customers can request broadband reflectance-weighted gratings with either constant or varying spacing. Moreover, a fiber can incorporate multiple grating zones, each containing numerous FBGs, and these zones can be arranged according to the customer's requirements.

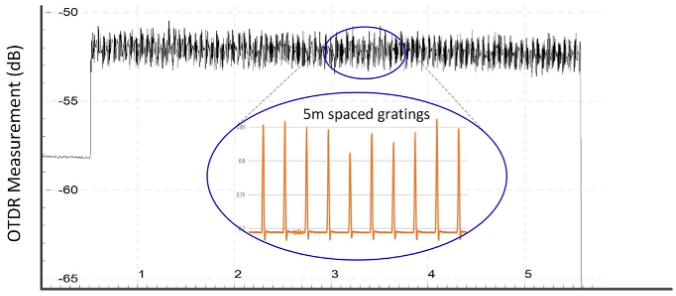
Custom FBG Arrays

Sentek has achieved a breakthrough in the fabrication of ultra-high-quality broadband FBGs — now available in virtually any optical fiber, including pure silica core fiber with a wide range of coating options.

The platform offers unmatched design flexibility:

- Broadband, reflectance-weighted gratings with constant or custom-varying spacing
- Multiple grating zones within a single fiber, each containing numerous FBGs
- Fully configurable zone placement and architecture tailored to specific application requirements

The result is a highly engineered sensing backbone that combines precision, scalability, and application-specific customization — enabling next-generation performance in demanding sensing environments.



Every grating is continuously monitored in real time during fabrication, ensuring highly uniform optical power reflection within tightly controlled tolerances. This process enables precise, grating-by-grating control of both fiber characteristics and upstream loss compensation, delivering exceptional consistency and performance.

Please send your quote request to sales@sentekinstrument.com and specify your requirements on number of gratings, their reflectance, bandwidth, spacing and fiber.

FBG Array Specifications

Parameter		
FBG reflecting strength	-40 to -55dB	
3dB bandwidth	>20nm	
Grating spacing	1m to 50m or custom	
Grating spacing precision	±2mm or 0.2% of spacing, whichever gives greater uncertainty	
Grating reflectance distribution	Uniform reflectance or uniform reflected power	
Standard deviation of reflected powers	0.5dB typical	
Fiber types	Pure silica core fiber, telecom fiber such as SMF-28	
Fiber coatings	Standard and high-temperature acrylate, polyimide	
Grating zone partition options	Any	
Maximum fiber length	10km, actual max length dependent on grating quantity and reflectance	