

Customized WISTHeat with 70 FBGs for a 550 °C industrial process

WISTHeat is a distributed high temperature sensor based on fiber Bragg grating (FBG) technology. The extreme long term stability of less than 1°C per year at 650°C makes it ideal to use in harsh environment industries and processes. By multiplexing numerous WISTHeat sensors thousands of sensing elements covering small or large areas can be accomplished. Compared to thermocouples, WISTHeat provides faster response time, improved accuracy, smaller form factor and insensitivity to EMI.

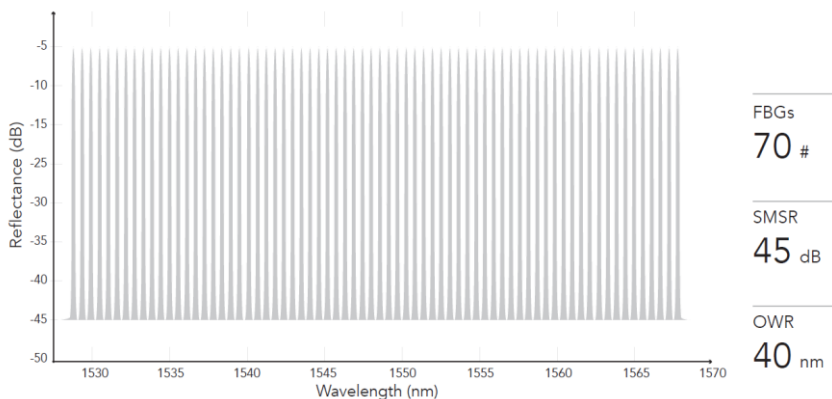
Key Features

- Customizable sensor number and spacing
- Broad temperature range
- Numerous packaging options
- Splice-free array
- Uniquely identifiable sensors

FBG Advantages

- Rugged: resistant to lightning, corrosion, EMI
- Safe: no spark hazard, no power
- Multiplexed: incredibly high sensor count
- Versatile: extremely small, light weight
- Permanent: no recalibration required

Custom WISTHeat with 70 FBGs



High Temperature Operation

The long term stability up to 650°C – even for the most advanced FBG arrays – can be guaranteed using a unique grating writing and assembly process. The highest temperature range is available with steel buffer. For temperature range up to 300°C the option of polyimide buffer is also available.

High Spatial Resolution

Each sensor handles 1 to 100 FBGs. The number and placement of FBGs along the WISTHeat sensor is fully configurable. Standard configuration is equidistant spacing of 5 mm. Despite the high FBG count and customizable FBG spacing the WISTHeat sensor is produced without any splices between the FBGs.

Physical Properties	Typ.	Min.	Max.
Number of FBGs per fiber	25	1	128 ^{a)}
FBG length	5 mm	1 mm	10 mm
Temperature Range ^{b)} For cryogenic use, see our WISTCryo sensor	N/A	-45 °C	+250 °C +450 °C +650 °C
Thermal response at			
-50 to 0 °C	7.5 pm/°C		
0 to 100 °C	10.0 pm/°C		
100 to 200 °C	11.8 pm/°C		
200 to 300 °C	13.3 pm/°C		
300 to 400 °C	14.4 pm/°C		
400 to 500 °C	15.1 pm/°C		
500 to 600 °C	15.5 pm/°C		
600 to 700 °C	16.0 pm/°C		
Response time ³⁾	70 ms		

Optical specifications	Typ.	Min.	Max.
Peak reflectivity	35%	0.1%	99.9999%
Transmission attenuation	5 dB	< 0.1 dB	> 60 dB
FWHM (-3dB point)	0.15 nm	0.03 nm	N/A
Isolation/SMSR	45 dB	10 dB	50 dB
Wavelength range	1520 to 1580 nm ^{d)}	N/A	990 to 1700 nm ^{e)}

Rugged

All WISTHeat sensors can be designed for extreme temperature, ionizing radiation, mechanical vibration, dust or EMI. We have experience of suitable fiber coatings, buffer materials, connectors and cabling.

Fast Response Time

Advanced packaging technology allows for a thermal constant of 70 ms for our smallest package. The fast response time is also valid for the most advanced configuration with regards to sensor density and temperature operation.

Small Form Factor

WISTHeat sensors can be installed in industries where it previously has not been possible to measure. Outer diameter with steel capillary is standard 1 mm, minimum outer diameter is 0.8 mm

WISTHeat Package	Typ.	Min.	Max.
Material	Stainless Steel 304 or 316		
	Silica, Teflon or PEEK		
Package Diameter	1 mm	0.25 mm	2 mm
	1.5 mm	0.4 mm	6 mm
Fiber pigtail length	1 m	0.1 m	10 m
Fiber pigtail type	SMF28e compatible		
Fiber pigtail coating	Acrylate or polyimide		
Fiber pigtail buffer	900 µm	None	2 mm
Fiber pigtail bend radius ^{f)}	17 mm	7.5 mm	
Connector type	LC/APC, SC/APC, FC/APC		
	E2000/MU/ST/LSA/ARINC on request		

- a) Max sensor value set by interrogator bandwidth specification
 b) +250 °C = standard, +450 °C = extended, +650 °C = high
 c) Time to rise to 90 % from ice to boiling water
 d) To suit WISTSense Ultra interrogator
 e) On a best efforts basis outside of 1520- 1606 nm
 f) Optional bend-insensitive fiber offers smaller radius

