

Optical Sensing Module | sm690

Preliminary

Applications

- High speed measurement and data logging of FBG sensors
- Characterization of transient and dynamic strains
- Vibration, shock and impact testing
- Ballistics testing and blast analysis
- Acoustic emissions monitoring
- High speed vibration mode analysis
- Multi-parameter dynamic measurements

Features

- 2 MHz sampling on four simultaneous channels
- High sensitivity of 20 $\mu\epsilon$ for dynamic deformations
- Ultra-wide range strain monitoring to 40,000 $\mu\epsilon$ events
- Intuitive, easy to use, LabVIEW graphical interface
- Interface source code and executable available for easy customization
- PXI Express compliant for simplified data acquisition and management
- Ideal for use in applications with high EM fields or hazardous locations

Description

The sm690 is a high sensitivity, high speed optical sensing interrogator capable of performing fast measurements - such as high speed strains and mechanical vibrations using optical fiber Bragg grating (FBG) sensors on up to four simultaneous channels with a continuous acquisition rate of 2 MHz. This is 20 times faster than its predecessor, the Micron Optics si920, and far faster than any other commercial fiber optic sensor interrogator.

The unmatched optical performance of Micron Optics' detection approach and systems provides the sm690 with high speed and high sensitivity measurement capabilities that are unparalleled in the industry. Both absolute and relative dynamic measurements are supported. High speed measurements of transient, dynamic and periodic physical parameters, such as vibration and many others, can be performed using the sm690. Among its applications are ballistics testing and blast analysis, acoustic emissions monitoring, shock and impact testing, vibration mode analysis and other high speed events that call for high-speed, real-time data logging and monitoring of FBG sensors.



PXIe Modularity and Operation

The sm690 is not a stand-alone instrument but rather a dual-slot 3U PXI Express high-speed data acquisition module to perform transient and dynamic measurements on FBG sensors. The sm690 module is designed to work with the National Instruments PXI Express system platform (and equivalents) and be integrated into the same chassis as other PXIe type modules to perform other data acquisition and control functions. The sm690 offers seamless integration with NI LabVIEW as well as providing modular I/O integration with other PXI Express devices. A PXIe main chassis and controller is required for the operation of the sm690.

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Specifications β ¹

sm690

Performance Properties

Acquisition Rate ^{2,3}	2 MHz on four simultaneous channels
Continuous Data Collection	Stream full 4 channel 2 MS/s data to disk in continuous, timed or triggered modes
Strain Range ⁴	~40,000 $\mu\epsilon$
Strain Sensitivity ^{4,5}	~20 $\mu\epsilon$
Detection Bandwidth	-3dB optical BW = 350 kHz (-6dB electrical), 2-pole, Butterworth filter, 20dB/decade
Measurement Repeatability ⁶	0.05% of full scale (standard deviation)
Dynamic Range	Total 12 dB loss budget (2x degradation in measurement repeatability 8 dB loss)
Max FBGs per Channel	1
Sensor Wavelength Range	1520 - 1570 nm
Optical Connectors	LC/APC
Optical FBG Specifications	1.0 nm Bandwidth, > 90% Reflectivity

Mechanical, Environmental, Electrical Properties

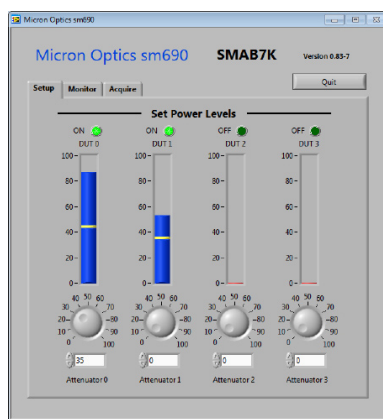
Dimensions	131 mm x 214 mm x 41 mm
Weight	0.2 kg (0.47 lbs)
Operating Temperature	0° to 55°C
Operating Humidity	0 to 90%, non-condensing
Storage Temperature	-40° to 70°C
Storage Humidity	5 to 95%, non-condensing
Input Voltage	See PXI Express Specifications
Interfaces	PXI Express

Data Management

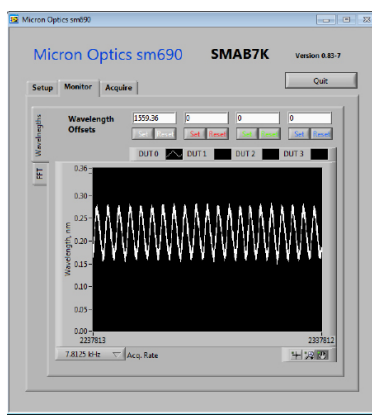
User Interface LabVIEW executable and source VI's provided for display, data capture, FFT and analysis

Notes:

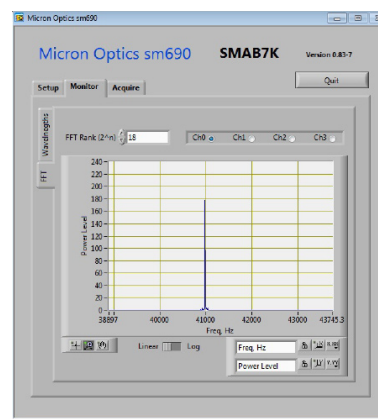
1. Denotes Beta product. For more detailed description see www.micronoptics.com/product_designation.php
2. Interleaving and averaging available at 2ⁿ rate divisors.
3. Four sensors sampled simultaneously at 2 MHz results in 70 MB/sec data flow.
4. Strain values assume ~1.2 pm/ $\mu\epsilon$.
5. For periodic signals.
6. Fiber optic leads must be held stationary during measurements to achieve stated repeatability.



Sensor Setup View



Time Domain Monitor View



Frequency Domain Monitor View