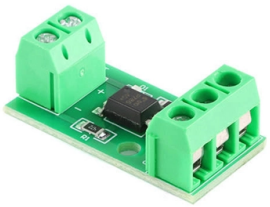
Comparison of Low Temperature Resistance and Comparative Performance of AWG Wavelength Division Multiplexer



AI Overview

Athermal AWGs exhibit superior low-temperature resistance and stable performance compared to conventional AWGs, with minimal wavelength shift and low insertion loss across a wide temperature range.Low-Temperature ResistanceAthermal AWGs are specifically designed to maintain stable operation regardless of ambient temperature changes. By using silica-on-silicon planar technology and proprietary athermalization techniques, these AWGs achieve temperature dependence of less than ±0.015 nm for center wavelength and ±0.1 dB for insertion loss across all channels, eliminating the need for active temperature control or power supply for thermal stabilization . In contrast, conventional silica or silicon photonic AWGs without athermal design exhibit significant thermo-optical wavelength shifts, typically ranging from tens to hundreds of picometers per degree Celsius, which can degrade DWDM system performance . Silicon nitride (SiN) AWGs further enhance temperature tolerance due to the low thermo-optical coefficient of SiN, achieving thermal shifts below 12 pm/°C, making them highly suitable for environments with fluctuating temperatures . This is particularly advantageous for deployment in outdoor or unpowered locations.Comparative PerformanceInsertion Loss and Crosstalk:Athermal silica AWGs achieve insertion losses below 2.8 dB for 48-channel 100-GHz modules, with low crosstalk, ensuring high signal integrity .SiN-based AWGs demonstrate insertion losses below 2.2 dB and crosstalk better than -29 dB for TE and TM polarizations, providing polarization-independent performance . Channel Count and Spacing:Commercial athermal AWGs support 32 to 96 channels with 50 GHz or 100...

Article Content

Ultra-Low-Crosstalk Silicon Arrayed-Waveguide

A high-performance silicon arrayed-waveguide grating (AWG) with 1.6-nm channel spacing is proposed and realized for dense wavelength-division

Temperature Insensitive New Super Athermal AWG with Extreme Low ...

Conventional athermal AWGs are made to support a total of 60pm or larger wavelength drift, which amounts to compensating 0.5pm /°C shift in the AAWG operating temperature range of

Design and fabrication optimization of low-crosstalk silicon arrayed ...

A performance comparison is given in Table 2 for the silicon AWG demonstrated with 100 GHz spacing or no less than 32 wavelength channels. It can be found that this work shows the most

Design and fabrication of SiN AWGs on an SOI platform

In this study, two SiN-based Arrayed Waveguide Gratings (AWGs) were designed and fabricated: one serving as a wavelength multiplexer (MUX) and the other as a demultiplexer

Review Paper of Array Waveguide Grating (AWG)

Abstract – An array waveguide grating multiplexer and demultiplexer in particular is one of most successful optical filters and it is a key component of photonic networks and it is cost-effective

Design of 4-channel AWG Multiplexer/demultiplexer for CWDM system ...

Arrayed Waveguide Grating (AWG) for Coarse wavelength division multiplexing (CWDM) system is a key component of above 100Gb/s high-speed optical transmission module in

Athermal Silicon Photonics | Springer Nature Link

This chapter reviews the various approaches to overcome the high temperature-dependent wavelength shift of photonic waveguide devices and discuss the possibility of athermal technology

Compact low-loss low-crosstalk echelle grating ...

This letter reports on the design of an ultra-compact echelle grating (EG) demultiplexer in O-band for Coarse wavelength division multiplexing (CWDM) systems based on silicon-on-insulator

TFF (Thin-Film Filter) vs. AWG (Arrayed Waveguide

Explore Wavelength Division Multiplexing (WDM) technology and its two prevalent techniques: Thin-Film Filter (TFF) and Arrayed Waveguide Grating

High Reliability Evaluation and Lifetime Prediction of 50 GHz ...

This study performed reliability and accelerated life tests on a 96-channel (50 GHz-spacing) athermal AWG module fabricated by installing a temperature compensation board on the

Evaluation of the Reliability and Lifetime Prediction of 150 GHz ...

We have developed a 17-channel (150 GHz-spacing) athermal arrayed waveguide grating (AAWG), which has a wider operation range than that of the existing AWGs, by designing a metal

Optimization Method for Center Frequency Accuracy of

The arrayed waveguide grating (AWG) is an essential component in dense wavelength division multiplexing (DWDM) systems. With advancements in

Design and fabrication optimization of a 4-channel

A wavelength division (de)multiplexing (WDM) filter with ultra-low channel crosstalk (XT) and high tolerance was proposed for a 1×4 O-band

Temperature dependence of low loss polymeric AWG

The temperature-dependent wavelength shift for a polymeric AWG detached from the substrate is maintained within 0.1 nm from 20 to 80 °C. But we observe a degradation of insertion

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Polarization independent and temperature tolerant AWG based on a ...

Compared to other methods, this technique allows for the reduction of the polarization dependence of an AWG over a large spectral range, paving the way to the realization of efficient polarization insensitive

Research on Optimization and Application of Wavelength Division ...

This paper discusses in detail the wavelength division multiplexing (WDM) technology, which effectively increases the communication capacity and transmission speed by simultaneously transmitting

Arrayed waveguide grating

Arrayed waveguide gratings (AWG) are commonly used as optical (de)multiplexers in wavelength division multiplexed (WDM) systems. These devices are capable of multiplexing many wavelengths

Temperature Insensitive New Super Athermal AWG

Conventional athermal AWGs are made to support a total of 60pm or larger wavelength drift, which amounts to compensating 0.5pm /°C shift in the

Silicon-Based Arrayed waveguide gratings for WDM and

We compare the performance of silicon-based arrayed waveguide gratings (AWGs) with star couplers of Rowland and Confocal configurations, respectively, for both TE and TM polarizations.

Furukawa Review

The developed module has achieved excel-lent performance with a temperature dependence of the center wavelength of not more than ±0.015 nm for all channels over a temperature range of

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Silicon-Based Polarization and Wavelength Synchronous

Additionally, the polarization-dependent loss measures at 1 dB. These experimental results underline the superior performance characteristics of the designed polarization-insensitive AWG. To the best of our

High-Performance Wavelength Division Multiplexers Enabled by Co ...

Abstract Wavelength division multiplexers are fundamental to the functioning and performance of integrated photonic circuits, with applications ranging from optical interconnects to sensing and

Design and fabrication of E-band silica based dense wavelength

This means that the temperature coefficient decreases by an order of magnitude, and the center wavelength drift caused by temperature changes is effectively reduced, meeting the

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