EDFA C-Band Amplifier

RedC Optical Networking's **EDFA C-Band Amplifier** is a self-adjusting, dynamic amplifier that enables transparent and scalable operation in an evolving WDM network environment.

Based on three pending patents, the **EDFA C-Band Amplifier** features an extremely high dynamic gain range over a wide input power range. The Amplifier automatically maintains the output flatness and presents a low noise figure throughout its extended operating range. These capabilities are achieved through the Amplifier's all-silica fiber technology.

The **EDFA C-Band Amplifier** can accommodate the full spectrum of EDFA applications such as **Metro**, **Long-haul** and **CATV**. It handles fast optical power transients and is integrated with autonomous electronics to facilitate monitoring and controlling of its components. The Amplifier's software runs on a fast RISC processor, utilizing high-level algorithms to maintain its functionality and flexibility. **RedC**'s **EDFA C-Band Amplifier** product line includes pre-amplifiers, booster amplifiers, and in-line amplifiers.

Extended Dynamic Gain Range

As opposed to standard EDFA amplifiers, which are designed to work in a specific gain range, **RedC**'s **EDFA C-Band Amplifier** features an extended dynamic gain range over the entire C-band. This unique capability offers the following benefits:

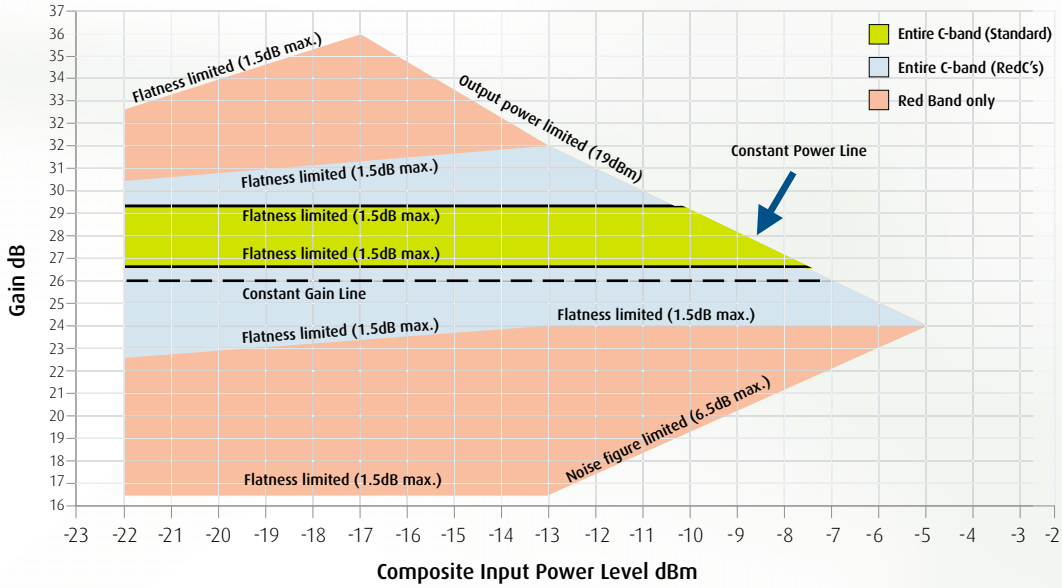
In system design

- Provides flexibility and resilience.
- Eliminates the use of Variable Optical Attenuators (VOAs) at EDFA input, thus presenting a low noise figure throughout the whole operating range.
- Eliminates the use of an external dynamic gain filters or power equalization at the amplifier's output.

In deployment

- Accommodates the upgrade and evolution of WDM networks, especially in capacity and channel count, thereby eliminating the replacement of deployed amplifiers that is usually necessary with a standard EDFA.
- Reduces the number of amplifier types in use to accommodate a wide variety of network topologies, fiber spans, and fiber losses.
- Ensures optimized network performance over time, compensating for fiber performance degradation, aging, and line instabilities.
- Remotely accommodates topology changes in a WDM network architecture, especially in a mesh configuration.
- Simplifies line mapping and span loss measurements during the network deployment.

Performance Demonstration of RedC's Extended Operating Range Example for a 19 dBm In-Line Amplifier



All-Fiber Dynamic Gain Equalization and Tilting Compensation

Based on its patented all-silica fiber technology, **RedC**'s **EDFA C-Band Amplifier** presents unique advantages:

- Spectral flattening of a multi-channel signal without the need for external dynamic filters or wavelength monitoring with power equalizers. This unique method, based on an internal all-silica fiber equalizer, saves the correlated insertion loss at the amplifier output stage.
- Equalizes and reshapes the tilt of the amplified channels. By optimizing a single amplifier, or more effectively, by remotely applying tilt adjustment on cascaded amplifiers, the Amplifier compensates for wavelength dependent loss and line non-linearities and reshapes the spectrum of the line's channels.
- Maintains high reliability exclusive to an all-silica fiber system.

Additional Features

- **Less than 50 µsec transient time** – By efficiently addressing the effect, a longer amplifier chain design can be accommodated.
- **Allows up to 9dB mid-stage loss access** – Standard EDFA amplifiers are designed to work per a specific mid-stage loss. RedC's EDFA C-Band Amplifier is completely flexible and automatically adjusts its operation to the measured mid-stage loss.
- **Remote correction of SMF or DCF wavelength dependent loss**
- **Automatic gain control or automatic power control modes of operation**
- **User remote management control**
- **Variable software adjusted gain** – The differences in span length or fiber loss can be addressed and remotely compensated.
- **Simple command set** – Commands are applied through a standard RS-232 port. The on-board electronics are highly integrated with the Amplifier's components, allowing an extended level of flexibility in changing amplifier parameters and monitoring its operation.
- **Fine tuning on channel count** – The channel count and wavelength can be optionally programmed to provide extra fine tuning of the Amplifier's gain.
- **Software upgradability** – Supports remote software upgrading for deployed amplifiers.
- **Low power consumption**
- **Low mechanical profile**

RedC's EDFA-C In-Line Amplifier Optical Specifications

Parameter	Min	Max	Units
Wavelength	1530	1562	nm
Composite Input Power Level	------	0	dBm
Saturation Power Available	------	22	dBm
Gain/Channel	------	35	
Dynamic Gain Range	------	8	dB
Multi-Channel Gain Flatness at Operating Range (all gain value)	------	±0.75	dB
Noise Figure	------	6.5	dB
Polarization Mode Dispresion	------	0.5	psec
Mid-Stage Access Loss (Optional for Double Stage Configuration)	------	9	dB
Polarization Dependent Loss	------	0.3	dB
Return Loss	------	40	dB
Operating Temperature	0	65	°C
Dimensions	151x151x18	240x145x30	mm
Total Power Consumption	9	30	W

RedC EDFA-C Pre-Amplifier Optical Specifications

Parameter	Min	Max	Units
Wavelength	1529	1561	nm
Composite Input Power Level	-39	-20	dBm
Small Signal Gain	25	35	dBm
Multi-channel Gain Flatness	------	±0.75	dB
Noise Figure	------	4.5	dB
Polarization Mode Dispersion	------	0.5	psec
Polarization Dependent Loss	------	0.3	dB
Return Loss	------	40	dB
Operating Temperature	0	65	^{0}C
Dimensions	------	151x131x18	mm
Total Power Consumption	------	4	W

RedC EDFA-C Booster Optical Specifications

Parameter	Min	Max	Units
Wavelength	1529	1561	nm
Composite Input Power Level	-5	5	dBm
Saturation Power Available	------	22	dBm
Multi-Channel Gain Flatness at Designated Gain	------	±0.75	dB
Noise Figure	------	7	dB
Multi-Channel Gain Flatness at Designated Gain ±1.5dB	------	±1	dB
Polarization Mode Dispresion	------	0.5	psec
Mid-Stage Access Loss (Optional for Double Stage Configuration)	------	9	dB
Polarization Dependent Loss	------	0.3	dB
Return Loss	------	40	dB
Operating Temperature	0	65	^{0}C
Dimensions	------	151x151x18	mm
Total Power Consumption	------	9	W

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