DATA SHEET

Optical Node Series (NC)

FA4521V-03-AS, FA4521V-DC-03-AS EDFAs

High Output, Variable Gain Flattened Optical Amplifiers

FEATURES

- Gain Flattened for C-Band with variable gain from 20 dB to 30 dB
- FA4521V-DC-03-AS includes mid stage connections to add dispersion compensation fiber spools
- Extended optical range ITU Channels 14–63, 1527.2–1566.3 nm
- Microprocessor controlled
- User settable output level and/or amplifier gain
- Extended optical input sensor range -30 to +10 dBm
- Low noise figure
- Optical path isolation (input and output)
- Remote status monitoring and control
- Full auto-recovery
- User settable ASE muting with variable threshold
- Auto-limiting optical output for eye safety
- Hot plug-in/out

The FA4521V EDFAs are high-output, gain-flattened two stage optical amplifier modules with user selectable variable gain range from 20 dB to 30 dB designed specifically to support data links for distributed PON and RPD architectures in a two-slot module.

The FA4521V-DC-03 version includes connections to add mid stage dispersion compensation modules for extended links maintaining optimal performance.

These high-performance optical amplifiers allow operators to use DWDM transmitters over an extended optical range between ITU channels 14 to 63 to deliver high-quality data links over significant transmission distances in excess of 200 km when coupled with dispersion compensators.

The EDFAs are designed for applications where a flat optical gain spectrum is required. The flat gain spectrum is maintained over the selectable gain range from 20 dB to 30 dB over the full operating frequency band. The compact module is based on the third-generation optical amplifier platform using a microprocessor to offer significant enhancements in the deployment of digital links. Constant gain mode is the recommended mode of operation for multiwavelength applications where the optical level per wavelength remains constant with varying numbers of wavelengths. The EDFA can be switched to constant current mode and the unit will automatically set the internal gain to match the incoming optical signal.

The FA4521V EDFAs offer extended amplification of optical input range down to -26 dBm per wavelength[1] to better support low level data signals. Input sensor range is extended down to -30 dBm. Automatic ASE muting has a user settable threshold where the EDFA output is muted when the incoming optical signal is below the threshold value, with optical power automatically restored when the signal returns. The optical output power is auto limited to ensure laser Class 1M compliance and optical eye safety limits are always maintained.

Operational Opti-Trace® monitoring has been enhanced to include remote monitoring of optical levels, laser operating conditions, and alarm status. With the optional remote control established with a VT4250N transceiver all settings and alarm management can be individually adjusted and set remotely.

The units are designed as plug-in modules for CommScope's NC4000® series Fiber Node Platforms including all legacy NH4000 Virtual Hubs or Universal Virtual Hub (NH4000-UVPn) providing a practical alternative to OTN-style cabinets.

Note 1: See detailed specifications regarding minimum input power and OSNR.

SPECIFICATIONS

Characteristics	Specification
Physical	
Dimensions	4.0" L x 2.2" H x 4.5" W (10.2 cm x 5.6 cm x 11.4 cm)
Weight	1.6 lbs (0.7 kg)
Environmental	
Operating Temperature Range	-40° to +60°C (-40° to 140°F)
Storage Temperature Range	-40° to +85°C (-40° to 185°F)
Humidity	5% to 95% non-condensing
General	
	Hot plug-in/out
Modes of Operation	Constant Gain (preferred) or Constant Current
ASE Muting on Input Power	Automatic at -30 dBm and below User enable/disable with selectable threshold from -29 to +10 dBm Recovery threshold +1 dB over selected trigger threshold
Power Requirements	
Input Voltage	24 V_{DC}
Power Consumption	14 Watts
Status Indicator LEDs (5)	
CC (Constant Current Mode) LED	On/Green = operating in constant current (power) mode
CG (Constant Gain Mode) LED	On/Green = operating in constant gain mode
Warning LED	On/Yellow = when • at least one Major Alarm has occurred • at least one Minor Alarm has occurred (Summary of Minor Alarms) • any Alarm History is available
Alarm LED Major Alarm(s)	On/Red = when at least one Major Alarm has occurred Yellow Warning LED will also be on **NOTE:** Available module status alarm options are viewed and managed in Opti-Trace CMS. Alarm severity (Major or Minor) for each parameter and threshold (alarm) minimum/maximum levels for Major and Minor Alarms can be manually set in Opti-Trace CMS. Status indicator LEDs (Warning, Alarm, Status) are activated when a set threshold is exceeded.
Status LED	Red = laser switched off Green = laser switched on

SPECIFICATIONS

Characteristics	Specification		
Optical Interface			
Optical Connectors	SC/APC		
Optical			
Input Signal Wavelength	1527.2–1566.3 nm (ITU 63–14)		
Optical Signal Path Isolation	< -30 dB		
Gain Flatness (Peak to Valley)	2.5 dB for 1527.9 to 1564.7 nm (ITU 62—16) 4.5 dB for 1527.2 to 1566.3 nm (ITU 63—14)		
Constant Gain Mode (Preferred Operation Mode)	User sets gain value. Gain flatness and noise figure is only specified in gain range from 20 dB to 30 dB. Gain values outside this range is settable but performance is not specified.		
User Set Gain Region	**Low**	**Mid**	**High**
Representative Gain Value[1, 2, 4]	20 dB	25 dB	30 dB
Corresponding Input Power Range[3]	-15 to 1 dBm	-20 to -4 dBm	-25 to -9 dBm
Noise Figure	6.5 dB max/6.0 dB typ	6.0 dB max/5.5 dB typ	5.5 dB max/5.0 dB typ
Input Power for OSNR of 25 dB	-26 dBm per wavelength (λ) with one EDFA (FA4521V) in system. With N units of FA4521V in the link, the required input power for 25 dB OSNR is -26 dBm/λ + 10 $\log_{10}$(N). OSNR is defined as the ratio of signal power per wavelength to noise power in 0.1 nm bandwidth at the output of the EDFA.		
Constant Current Mode	User sets output power from 5 dBm to 21 dBm after providing a signal to the input port. Output power and input power determines EDFA gain. Specified gain flatness and noise figure is maintained if the EDFA gain is between 20 dB and 30 dB. Output power needs to be set again after input power is changed for optimal performance in constant current mode.		
Output Power Max	21 dBm. Automatically limited by the module to always ensure compliance to laser Class 1M safety requirements regardless of input power, gain, and output power settings.		
Output Power Min	5 dBm. Automatically ensured by the module to prevent pump laser power from being near its threshold to avoid pump laser fluctuation. Output power is kept 5 dBm or above regardless input power, constant gain, or constant current mode.		
Output Power Stability	Constant Gain Mode ± 0.7 dB; Constant Current Mode: ± 0.6 dB		
Remote Monitoring/Control Parameters			
Status Displayed	Optical input and output power, EDFA gain, board temperature, ASE muting status, laser status, local summary. Local parameters for monitoring are displayed through USB port access.		
Control Parameter	Constant gain and gain value; constant current mode and output power; ASE muting enable and threshold.		

NOTES:

1. FA4521V output power is ranged from 5 dBm to 21 dBm, thus specific EDFA gain value corresponds to specific input range. Gain is maintained automatically in constant gain mode when input power changes (add or remove channels), but input needs to be in the corresponding range.
2. Gain can be set at 0.1 dB per step.
3. Corresponding input power range is determined by the set gain value and the mandated minimum output power of 5 dBm. When input power is outside the indicated range, actual EDFA gain value will be different from the set value and EDFA gain flatness is not specified.
4. For the FA4521V-DC version the maximum gain will be reduced due to the mid stage insertion loss of the dispersion compensation fiber.

ORDERING INFORMATION

Model Name	Description
FA4521V-03-AS	High Output, Variable Gain Flattened, Dual Slot Optical Amplifier, SC/APC Connector
FA4521V-DC-03-AS	Gain flattened EDFA for NC4 VHubs with variable gain for digital data only. Single 21 dBm Output, gain range 20–30 dB, ASE Muting & Power Limiting, two slot module mid stage connection option for DCM, SC/APC connectors.

RELATED PRODUCTS

NH4000-UVP1 or -UVP2 VHub housings	VT4250N-50-00 VHub Monitoring
DC4520-00-0-AS 20 km VHub dispersion compensation fiber spool	DC1520, DC1540, DC1560 Chassis Fiber dispersion compensation Chassis
DC4522-00-0-AS 2x 20 km VHub dispersion compensation fiber spools	Fiber Service Cables

Contact Customer Care for product information and sales:

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Note: Specifications are subject to change without notice.

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