

Variable Gain Erbium Doped Fibre Amplifier

Bookham Technology's MultiWavelength Gain Modules are supplied with the EDFA optical, optoelectronic and electronic functions built in, requiring only a +5 V power supply for operation. They allow sophisticated optical amplifier card level solutions to be easily implemented.

This variable gain amplifier provides flat, full-band, amplification over a wide range of gain settings. The unit contains an integrated VOA to enable rapid, remote gain adjustment.

In addition to variable gain capability, the product provides high performance gain control and transient suppression, making the agile, switched optical network a reality.

All versions have an integrated optical output monitor port to enable external amplifier and system monitoring.

Features

- Flattened, C-band amplification over a 10 to 25 dB gain setting range
- Ultra-fast gain control with transient suppression
- Extended dynamic range
- Semi-custom design flexibility
- High Reliability

Applications

- Agile Optical Network Pre, Line and boost Amplification
- Metro and Long Haul Optical Systems



Schematic Diagram/Functional Diagram

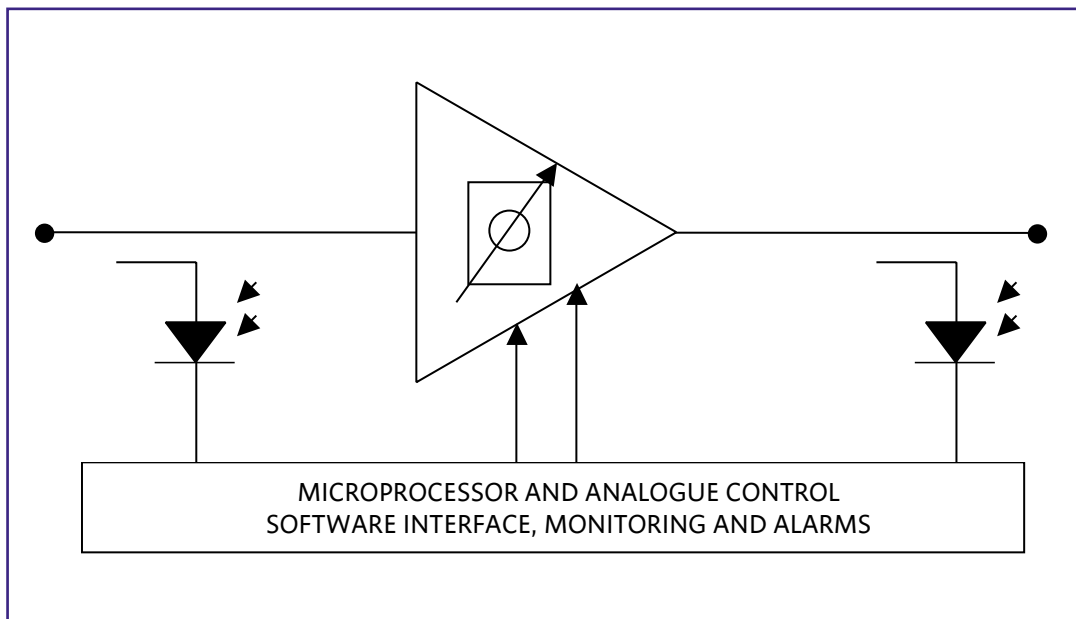


Figure 1: Schematic Diagram

Applications Diagram

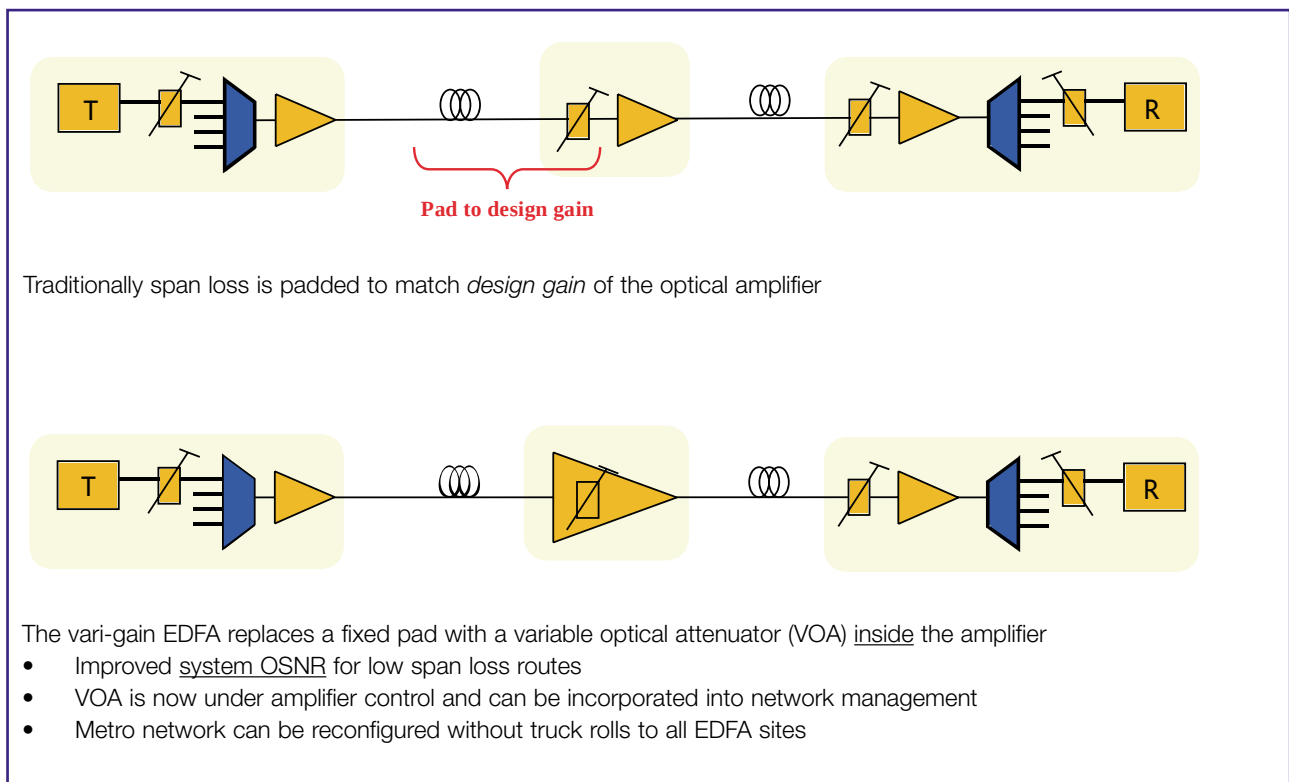


Figure 2: Applications Diagram

Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Storage temperature	T _{stg}	-25 to +75	°C
Operating temperature (1)	T _{op}	0 to 65	°C
Optical input power	P _{in}	+10	dBm
Fibre tensile strain (10 sec max)		10	N
Fibre bend radius (min)		30	mm
Fibre bend point distance from body		18	mm
Maximum power supply voltages		-0.3 to +5.5	V

Notes: (1) Temperature at the hottest point on the module enclosure.

Performance

Optical Parameters	Min	Typ	Max	Units	Notes
Wavelength range	1530		1563	nm	
Input power	-29		+7	dBm	
Output power			+17	dBm	
Nominal gain	10		25	dB	
Gain flatness at 40°C			1.5	dBpk-pk	(a)
Noise figure at 10 dB gain			15	dB	(a)(b)
Noise figure at 15 dB gain			11.1	dB	(a)(b)
Noise figure at 20 dB gain			9.4	dB	(a)(b)
Noise figure at 25 dB gain			5.5	dB	(a)(b)
Transient suppression time		500		µs	
Transient over/undershoot			1	dB	

(a) Worst case, 3s.

(b) Noise Figure over temperature and life (Number reported in the table corresponds to maximum I/P power).

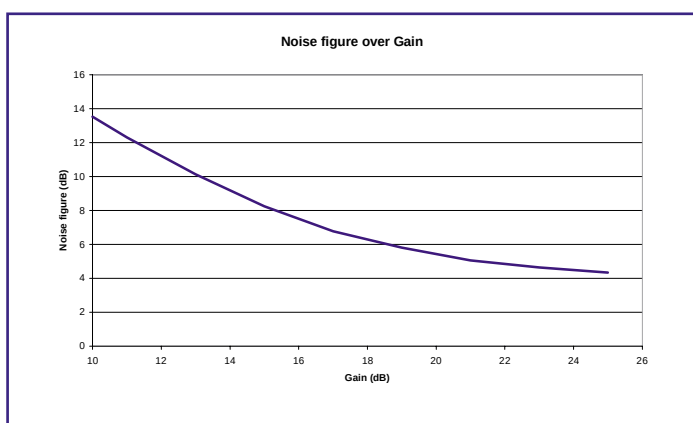


Figure 3: Typical Noise Figure Over Gain

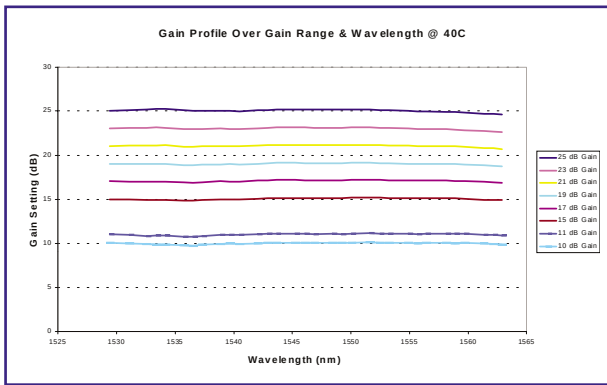


Figure 4: Gain Profile Over Gain Range & Wavelength

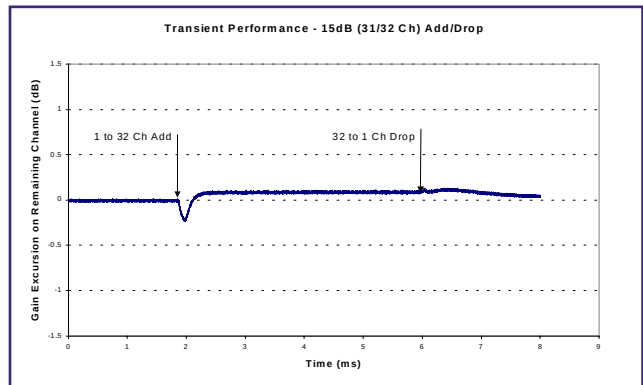


Figure 5: Transient Suppression Plot

Module Outline Drawing

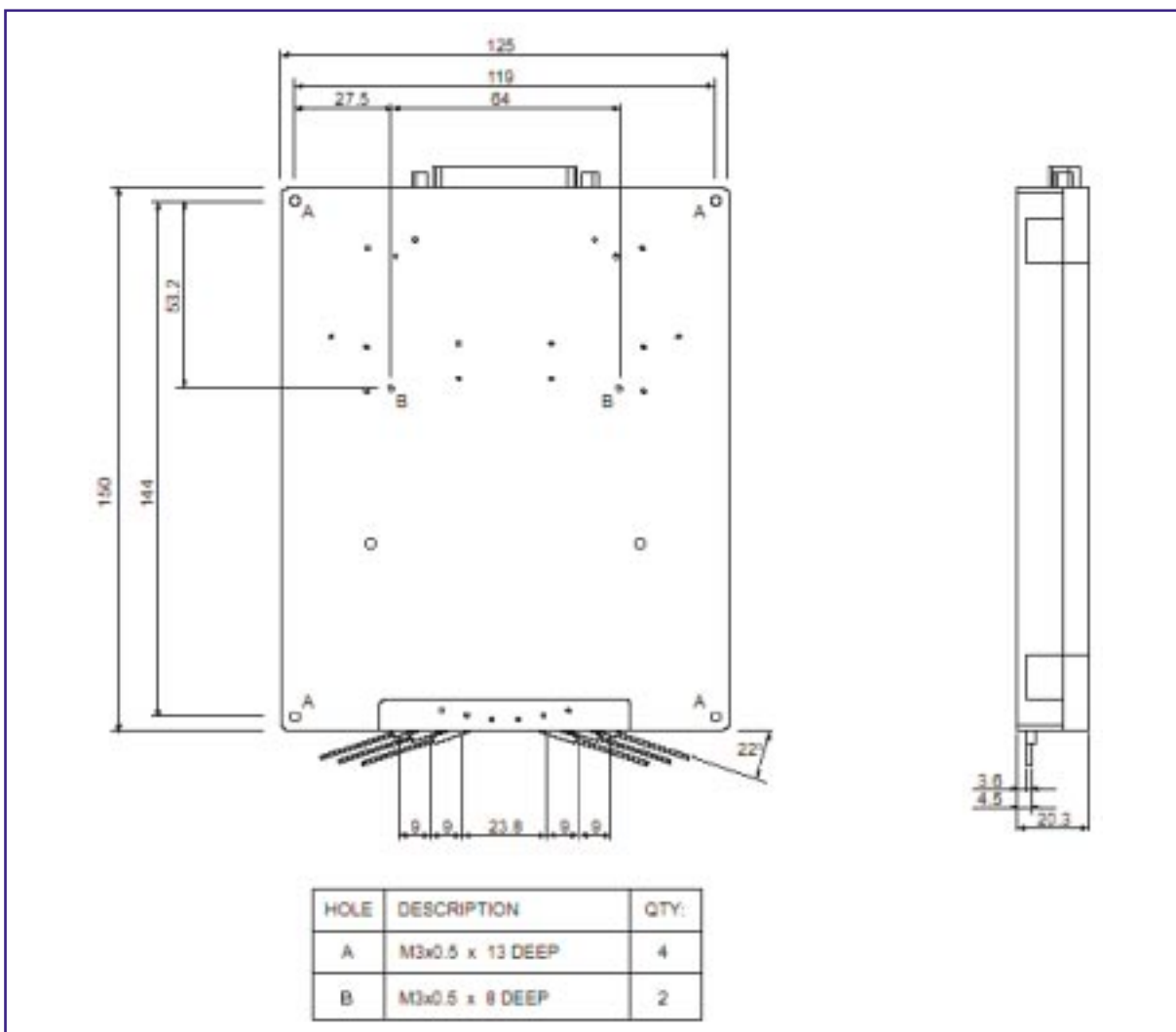


Figure 6: Module Outline

Connector Pin Out

PIN #	Function	PIN #	Function
1	+5.0 V	14	GND
2	+5.0 V	15	GND
3	+5.0 V	16	GND
4	+5.0 V	17	GND
5	Output Power Monitor	18	RS-232 OUT (TTL Levels)
6	Input Power Monitor	19	Loss of Input Power Alarm
7	EDFA Temperature Alarm	20	Output Power Mute Input
8	Loss of Output Power Alarm	21	Amplifier Disable Input
9	Pumps Bias Alarm	22	RS-232 IN (TTL Levels)
10	Pumps Temperature Alarm	23	GND
11	GND	24	+5.0 V
12	+5.0 V	25	GND
13	GND	--	--

Optical

The amplifiers have been optimized for full-band gain-bandwidth WDM operation by careful selection of both passive and active components. All amplifiers are pumped with high reliability 980 nm and 1480 nm pumps and all are provided with optical monitor outputs to allow customer spectral analysis or monitoring of the amplified signal.

Electrical

Electrical connection is through a male DB25 way connector.

Package

The units are housed within Bookham Technology's MG Release 1 packages. Optical connections are made through single mode fibre pigtailed with SC/PC connectors as standard.

Analogue Outputs

Two analogue voltage output ports are provided for optical input and output power monitoring.

TTL Outputs

These TTL compatible alarm outputs are all active high logic. i.e. TTL LOW = normal operation, TTL HIGH = alarm. Hysteresis is included on all alarms to prevent alarms oscillating.

EDFA Temperature Alarm

This alarm is activated if the case temperature should exceed 60°C.

Loss of Output Power Alarm

If the output power degrades by more than 2 dB from its beginning of life value in constant output power modes, or if the gain cannot be maintained within 2 dB of its set point in constant gain modes then this alarm will be set.

Pump Bias Alarm

Set if any of the pumps are driven at greater than 95% of their end of life value.

Pumps Temperature Alarm

Set if any of the pump submount temperatures are higher or lower than the set temperature by greater than 10°C.

TTL Inputs

Output Power Mute

The Output Power Mute will clamp the output power to a nominal 10 mW. This may be used when servicing the "live" system to improve eye safety. TTL LOW = normal operation, TTL HIGH = reduced output power.

Amplifier Disable Input

Amplifier Disable will turn the pump lasers off. The pump thermo electric coolers and other module electronics are unaffected by this input. TTL LOW = normal operation, TTL HIGH = pump drive disabled.

NOTE THAT UNDER HIGH INPUT POWER CONDITIONS, CONSIDERABLE OUTPUT POWER CAN STILL EXIST EVEN WHEN THE AMPLIFIER IS DISABLED. THIS INPUT MUST NOT BE REGARDED AS AN INTERLOCK AND THE AMPLIFIER MUST STILL BE CONSIDERED AS CLASS IIIb.

Electrical Power Supplies

Electrical power to the unit is supplied from a single power supply rail.

Parameter	Minimum	Typical	Maximum
Positive supply voltage	+4.75 V	+5.0 V	+5.25 V
Power dissipation (start of life)	-	5 W	-
Power dissipation (end of life)	-	-	23.5 W
Ripple noise	-	-	2%PP
Transient pulse	+4.6 V for 75 ms	-	+6.0 V for 75 ms
Radiated emissions	EN5022 Class B		
Conducted emissions	EN5022 Class B		
Radiation immunity	IEC801-3		
ESD	IEC801-2		

Ordering Information

The above specification is a guide to the operating parameters that can be achieved with the MultiWavelength Gain Module V-1 Series of amplifiers. Please contact your Bookham Technology's representative to discuss any issues regarding customisation of these units to meet specific system needs.



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