



## Applications

- CATV Systems
- Long Distance RF/Microwave Fiber Optic Communication Links
- Sensing and Control Systems
- High Performance Supertrunking Links
- High Power Distribution Networks
- Redundant Ring Architectures
- FTTx Networks

## Features

- Full Function Fiber Optic Amplifier Ready for Integration
- Low Noise Figure (Typ < 4.5 dB)
- Pin: -6 dBm to +12 dBm
- Pout: +14 dBm to +23 dBm
- RS-232 Monitor and Control Interface  
(SNMP V.1 is also possible)
- Standard and Optional Gain Flatness
- Low Electrical Power Consumption
- Input/Output Isolation >40/40 dB
- Polarization Dependant Gain < 0.1 dB
- Polarization Mode Dispersion < 0.2 ps
- Input & Output Return Losses < -40 dB
- Output Residual Pump Power < -30 dBm
- Back Reflection Monitoring

## MAFA 1000 Series Erbium Doped Fiber Micro Amplifier

EMCORE's MAFA 1000 Series Erbium Doped Fiber micro Amplifier ( $\mu$ EDFA) Gain Block Module is an ideal building block for OEM system integrators. The family of MAFA 1000 EDFA Gain Blocks is designed to meet the most demanding noise performance requirements of fiber optic communications and control systems, and performs all the functions required of an optical amplifier for system integration.

MAFA 1000 series EDFA Gain Blocks provide input and output optical isolation for stable, low noise operation. The input and output optical signal power levels are detected for monitoring and control. The input optical signal is amplified with active gain control for a constant output power level or with active output power control for constant gain mode operation.

The MAFA 1000 series EDFA Gain Blocks also provide monitors and associated alarms for all critical operating parameters. The optical output of the MAFA 1000 series EDFA Gain Blocks can be split into multiple ports by optional external splitter. Optional back reflection monitoring feature enables safe output optical power managing.

The compact mechanical footprint of the MAFA 1000 allows using this unit to be installed in small space environments.

Optical/Electrical Characteristics<sup>1</sup>

Property	Unit	Limit	Models					Comments
			1014	1017	1020	1022	1023	
Operating Input Power	Pin (dBm)	Max	12	12	12	12	12	
Operating Input Power	Pin (dBm)	Min	-6	-6	-6	-6	-6	Typical (May vary for some models)
Output Power	Po(dBm)	Nominal	14 +/- .25	17 +/- .25	20 +/- .25	22 +/- .25	23 +/- .25	Note 2
Noise Figure	NF (dB)	Typ	≤ 4.0 dB	≤ 4.0 dB	≤ 4.0 dB	≤ 4.0 dB	≤ 4.0 dB	@ Pin = 0 dBm, no Pin monitoring (Notes 3, 7, 8)
Static Gain Flatness	ΔGs (dB)	Max	+/-0.5	+/-0.5	+/-0.5	+/-0.5	+/-0.5	(Notes 4)
Dynamic Gain Flatness	ΔGd (dB)	Max	+/-1.0	+/-1.25	+/-1.5	+/-2.0	+/-2.0	(Notes 5, 7)
Output Power Stability	(dB)	Max	+/- 0.1	+/- 0.1	+/- 0.1	+/- 0.1	+/- 0.1	(Note 6)
Power Consumption (Steady state)	Psys(W)	Max	2	3	5	6	8	70°C Case

## Notes:

1. Unless stated otherwise, all specifications apply over the full operating temperature and humidity ranges
2. Measurement variations
3. Measured with 8 evenly spread input optical signals @ 25°C,  $\Sigma Pin \approx 0$  dBm. Measuring with 1 input optical signal with Pin  $\approx 0$  dBm and  $\lambda \approx 1550$  nm is also available
4. Measured with a swept Probe Signal (Pp), where Pp  $\approx 0$  dBm @ 25°C
5. Measured with a swept Probe Signal (Pp), and a fixed Tone Signal (Pt) @  $\sim 1550$  nm; (Pt  $\approx$  Pp+20 dB; Pt + Pp  $\approx 0$  dBm) @ 25°C; Gain Flattened Options with  $\Delta G \leq +/-0.75$ dB or  $\Delta G \leq +/-1.0$ dB are available (**for some models and for defined input optical power only**)
6. Over polarization and temperature
7. Specific ΔG can be guaranteed at a single specified Input Optical Power Level (Pin = Pt + Pp) equal or different from 0 dBm
8. If input power monitoring and input isolation are required then typical NF (Typ) for all units @ Pin = 0 dBm as  $\leq 4.5$  dB

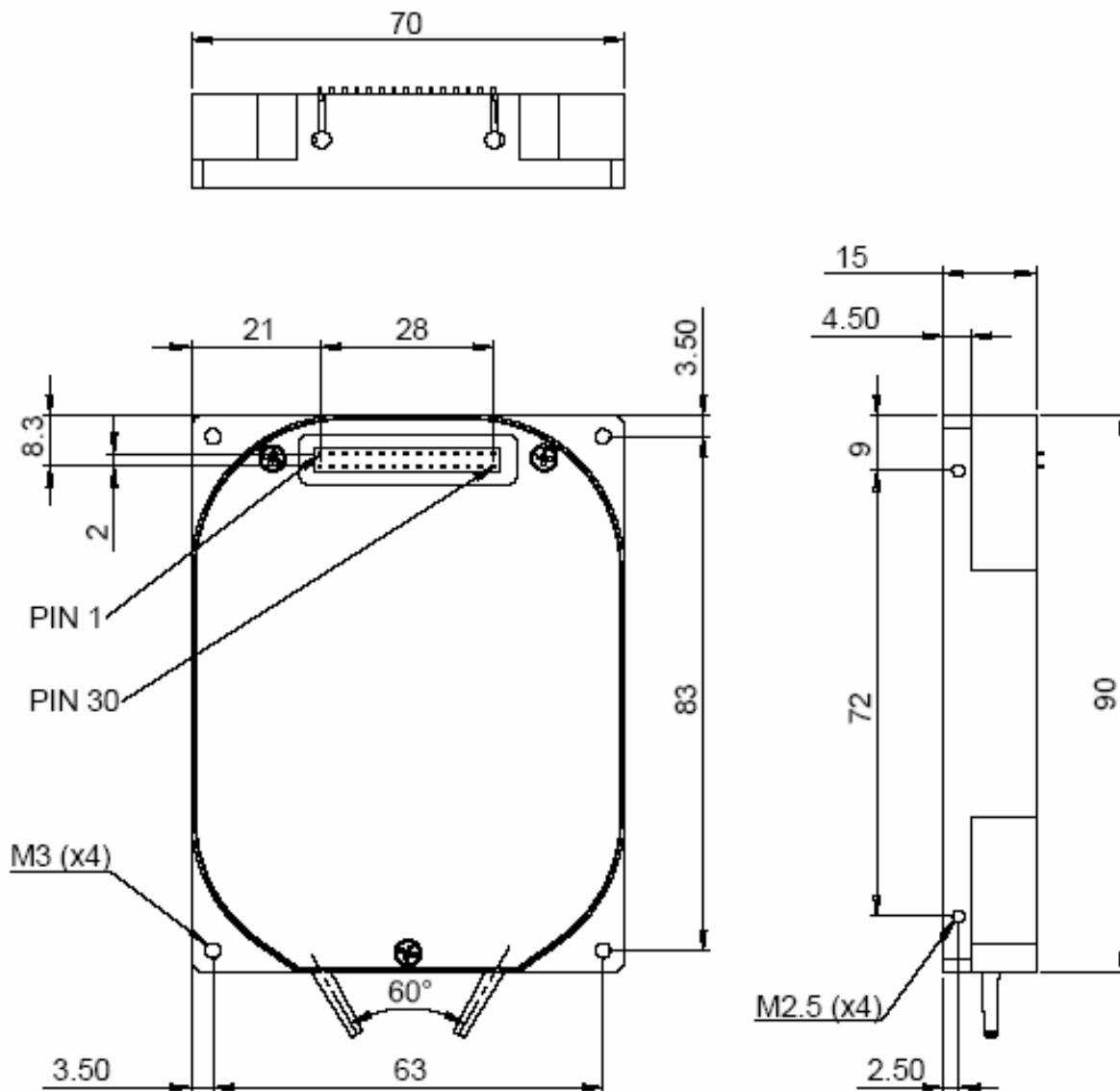
## General and Mechanical Specifications

Property	Requirement	Comments
Operating Wavelength	1532nm ~ 1565nm	Standard
Operating Case Temperature	0°C to 50°C	Standard*
Storage Temperature	-40°C to 85°C	Standard
Operating Humidity	20% to 85%	Non-condensing
Voltage Supply Range	+12VDC/+5VDC/+3.3VDC	All versions**
Optical Connectors	SC; FC; E2000	User Specified
Dimensions (mm)	70 x 90 x 15	All versions

\* - Extended temperature range of -40°C to +75°C is also possible

\*\* Transient Pulse to +X.XVDC + 5% for < 100 msec

Outline Drawing (dimensions in mm)



**Compliance and Reliability Information**

FCC: Subpart B. Part 15 class "A": Unintentional Radiators  
 EN 55013: Sound and Television Broadcast receivers and associated equipment – Radio disturbance characteristics- limits and methods of measurements – Electric Field Radiation Emissions (2001)  
 Fit Rate: 90% level of confidence - 290 @ 25°C

**Electrical Connector Pinout**

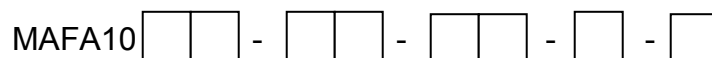
PIN #	Designation	PIN #	Designation
1	+12VDC/+5VDC/+3.3VDC	16	LED_Laser_ON
2	+12VDC/+5VDC/+3.3VDC	17	Display_SCLK**
3	+12VDC/+5VDC/+3.3VDC	18	Pump_Bias_Alarm *
4	+12VDC/+5VDC/+3.3VDC	19	Loss_Input_Power *
5	GND	20	Loss_Output_Power *
6	GND	21	Display_MOSI**
7	RS232_Rx	22	Display_SS**
8	RS232_Tx	23	Back_Reflection_Alarm *
9	GND	24	Key_Switch
10	GND	25	Key_Right
11	LED_Comm	26	Key_Left
12	EDFA_Reset	27	Key_Up
13	EDFA_Disable	28	Key_Down
14	Pout_Mute	29	CAN+***
15	EDFA_Temp_Alarm *	30	CAN-***

\* - software adjustable parameters; logic levels (low / high) TBD

\*\* - signals for driving VFD display

\*\*\* - signals for enabling SNMP

**Ordering Information**



Power Level	Connector Option	GF/NF Options	Temp Options	Voltage Options
1014 – 14 dBm	SC1 - SC/APC	00 - Standard	S- Standard	1 – “+12VDC”
1017 – 17 dBm	S21 - SC/PC	01 – Gain Flattened option		2 – “+5VDC”
1020 – 20 dBm	FC1- FC/APC	02 – No Pin monitoring, low NF option	E – Extended	3 – “+3.3VDC”
1020 – 22 dBm	FC2- FC/PC	03 – Standard with back reflection monitoring		
1023 – 23 dBm	EC1-E2000/APC			
	EC2-E2000/PC			

Example:

MAFA1014-SC-00-S-2: 14 dBm gain block with SC/APC optical connectors, standard NG/GF, standard temperature range, +5VDC power supply

Note:

Only some models can be order with Gain Flattened options. (-01 suffixes). **Please contact your Sales Representative for details**

**Laser Safety Information**

This product meets the applicable requirements of 21 CFR 1010 & 1040 and is classified as a Class IV laser product based on the maximum optical output power shown below. During use as intended, the laser energy is fully contained within the fiber network such that there is no accessible laser radiation and would meet the requirements for a Class I laser product. The laser product report has been submitted to the CDRH and the accession number is expected by October 2006.

Wavelength = 1535 ~ 1565 nm (dependant on input source)

Maximum Output Power = 0.2 W (single output, 23 dBm model)

