Fiber Optical Power Regulator

(450-2500nm, SM, MM, PM, feedback output power regulator, bidirectional)

(US patent 8,666,218 and other patents pending)

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The optical power regulator is engineered to maintain a constant output power by compensating for input fluctuations. It operates by tapping a small portion of the output light with a detector and feeding it into a precision closed-loop circuit, which controls a MEMS variable fiber optical attenuator positioned between the input and output. With a wide dynamic range, it effectively limits output against input surges of up to 40 dB. The output power level can be adjusted manually via a set screw or remotely through a USB-connected GUI. The system requires an insertion loss of approximately 2 dB to regulate the output power effectively. Additionally, it compensates for polarization-dependent loss (PDL) variations along with optical power fluctuations. This regulator provides a cost-effective solution for stabilizing and limiting optical power and is powered by a 5V wall-plug power supply included with the module.

Features

- Low Loss
- 0.1dB Repeatable
- Broadband
- 40dB Dynamic Range
- SM,PM,MM
- USB
- Linear Response

Applications

- Power Control
- Power Regulation
- Surge Protection
- Instrumentation

Specifications

Parameter		Min	Typical	Max	Unit
Wavelength		450		2500	nm
Insertion Loss [1]		1	1.2	2	dB
Attenuation Range		40	45	70	dB
Accuracy [2]	0.6-30dB		0.05	0.1	dB
	30-60dB		0.2	0.6	dB
	60-80dB		1	3	dB
Extinction Ratio (PM version only)		18	23	25	dB
Polarization Mode Dispersion (SM version only)			0.01	0.05	ps
Return Loss		55			dB
Response Time [3]		5	10	150	ms
Power Consumption				0.5	W
Optical Power handling (CW)			300	500	mW
Operating Temperature		-10		75	°C
Storage Temperature		-40		85	°C
Weight			30		g

Notes:

[1]. Without connector and at room temperature

[2]. Within 40nm wavelength range

[3]. Related to the light intensity fluctuation level

Note: The specifications provided are for general applications with a cost-effective approach. If you need to narrow or expand the tolerance, coverage, limit, or qualifications, please [click this link]:

Rev 12/29/25

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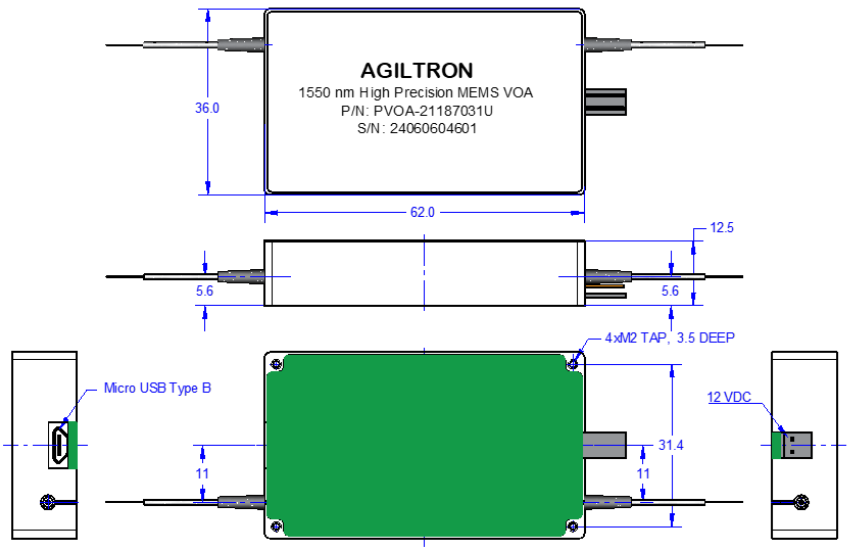
Electrical Control Interface

The VOA can be controlled by a computer via a USB interface. It uses a Micro USB type B connector that also provide power to the VOA at the same time. The device accept UART command and recognized as a serial device by the PC.

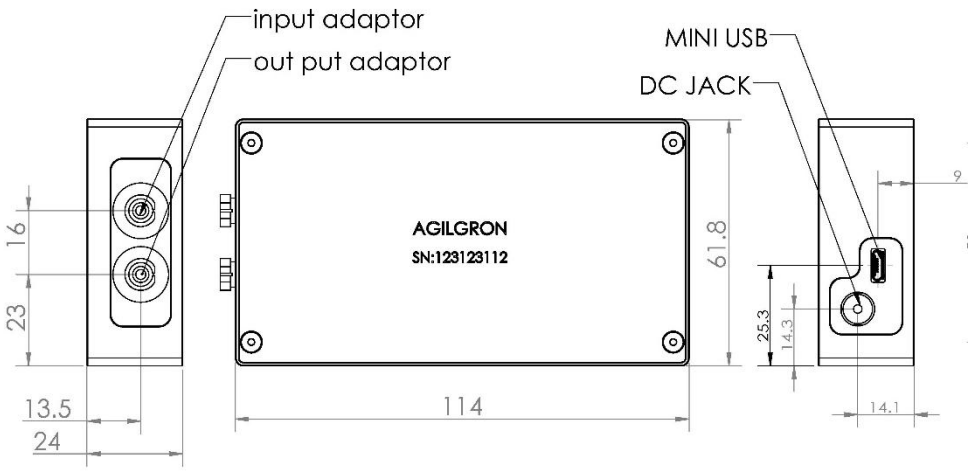
Pin 1 – 0V
Pin 2 – 5V DC Power
Pin 4 – 0V
Pin 5 – 0-5V Control

Mechanical Footprint Dimensions (mm)

- Regular Package



- Rugged Package



*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

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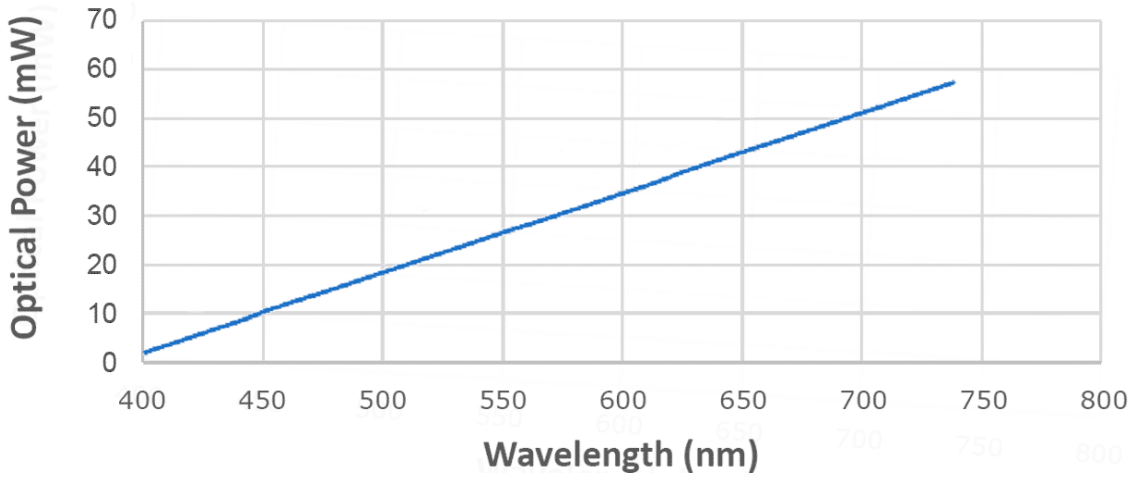
Optical Power Handling vs Wavelength for Standard SM Fibers



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Ordering Information (Part Number)

	1 1	☐	☐☐	☐	☐	☐	☐
Prefix	**Input Power**	**Wavelength**	**Output power [1]**	**Dynamic**	**Fiber Type**	**Fiber Length**	**Connector [2][3]**
MOPR-	< 0.5W = 11	1550 = 5 2000 = 2 1310 = 3 1480 = 4 1060 = 1 1625 = 6 780 = 7 850 = 8 650 = E 550 = F 400 = G Special = 0	0.001W = A1 0.002W = A2 ... 0.01W = B1 0.02W = B2 0.03W = B3 0.04W = B4 0.05W = B5 0.06W = B6 0.07W = B7 0.08W = B8 0.09W = B9 0.1W = C1 0.2W = C2 0.3W = C3 0.4W = C4 0.5W = C5	40dB = 1 70dB = 2	SMF-28 = 1 HI1060 = 2 780HP = 3 PM1550 = 5 PM850 = 8 PM980 = 9 SM400 = 4 SM450 = A PM400 = B PM460 = C SM600 = 6 PM630 = D PM780 = 7 SM800 = E 50/125 = F SM1950 = G PM1950 = H Special = 0	0.25m = 1 0.5m = 2 1.0 m = 3 Special = 0	None = 1 FC/PC = 2 FC/APC = 3 SC/PC = 4 SC/APC = 5 ST/PC = 6 LC/PC = 7 LC/APC = A LC/UPC = U Special = 0

[1]. Output power must be smaller than the input power.

[2]. Regular fiber connector has PER ~22dB. Connector with PER >27 dB is available using special process

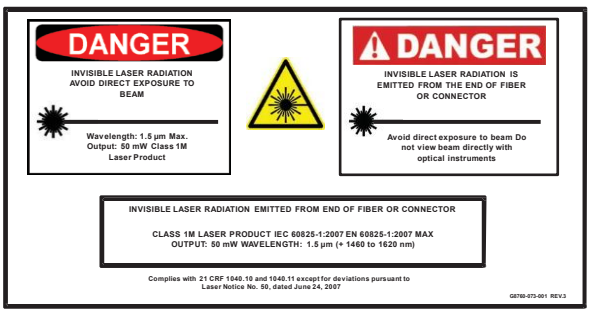
[3]. The default connector configuration uses fiber with 0.9 mm buffer protection. The connector cannot be installed directly onto bare fiber because the bare fiber is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. The customer may remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SMF-28 fiber and decreases further for smaller-core fibers.

Laser Safety

This product meets the appropriate standard in Title 21 of the Code of Federal Regulations (CFR). FDA/CDRH Class 1M laser product. This device has been classified with the FDA/CDRH under accession number 0220191. All versions of this laser are Class 1M laser products, tested according to IEC 60825-1:2007 / EN 60825-1:2007. An additional warning for Class 1M laser products. For diverging beams, this warning shall state that viewing the laser output with certain optical instruments (for example eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard. For collimated beams, this warning shall state that viewing the laser output with certain instruments designed for use at a distance (for example telescopes and binoculars) may pose an eye hazard.

Wavelength = 1.3/1.5 μm.

Maximum power = 30 mW.



Q&A

Q: Is it bright or dark? meaning, when powered off is the attenuation 0db or 40db?
A: In the unpowered state, **bright** corresponds to the VOA in the fully open (minimum loss) condition, while **dark** corresponds to the VOA in maximum attenuation. The bright and dark states are defined by the passive optical assembly and are not electrically driven.

Q: When choosing to order a unit with "output power = 20mW", that means that the output power can be adjusted to a maximum of 20mW but can also be less then that via the USB interface, right?
A: The system maintains a stable output power of 20 mW while accommodating input power fluctuations of ±20 dB, corresponding to the full dynamic range of the VOA of 40dB.

Q: Does the device remember the last configured attenuation after being powered off? Or must the used configure the attenuation via USB every time?
A: The current version requires manual configuration after each restart. A future version will incorporate non-volatile memory to automatically restore the last operating setting upon restart.