

POA Programmable Optical Attenuator



With the accelerated deployment of 5G networks and the surging demand for optical interconnection in data centers, Dimension Technology's programmable optical attenuators have two major forms: OMEGA series modular and XHASIS series rack-mount, with significant advantages such as low insertion loss, high attenuation rate, high density, low cost, customizability, and easy deployment. Its application scenarios have extended from traditional laboratory testing to multiple fields such as optical network automated operation and maintenance, optical fiber sensing, and laser equipment control.

Main Advantages

- Multimode EF (Encircled Flux) control, compliant with various source testing standards
- Lower insertion loss, with attenuation rate increased by 200%
- Built-in power monitoring with closed-loop monitoring, supporting three control modes
- Supports custom task settings and programming
- OMEGA series modular can integrate multiple functional modules into one for one-stop testing of optical devices
- XHASIS series rack-mount has high density, compact size, easy deployment and low cost.

Main Applications

- 800G optical module testing
- Optical path loss simulation
- Optical device BER and receiving sensitivity testing
- EDFA manufacturing and inspection
- Photodetector linearity test
- Tunable source power test

Main Categories

OMEGA Series Modular

- Mechanical Optical Attenuator
- MEMS Optical Attenuator

XHASIS Series Rack-Mount

- Mechanical Optical Attenuator
- MEMS Optical Attenuator

OMEGA Series Modular vs XHASIS Series Rack-Mount

Feature	OMEGA Series Modular	XHASIS Series Rack-Mount
Appearance		
Structural design	platform + modules	Rack-mounted, compact structure, small size, powerful functions
Scalability	The platform is compatible with a variety of functional test modules including optical attenuators, and supports adding or reducing modules on demand to meet the needs of diverse scenarios.	Suitable for rapid deployment of large-scale integrated test stations
Customization	Customizable channels for varied applications	Supports high-density data centers and telecom networks
Maintenance	Hot-swappable modules for quick replacement, minimizing downtime	Independent maintenance per 4 channels
Cost Efficiency	The modular solution only requires replacing modules instead of the platform	The long-term cost-effectiveness is outstanding, and it is an ideal solution for saving space and improving efficiency in 5G base stations and fiber optic network deployment.

Strict Control of Multimode EF (Encircled Flux) for Light Source Compatibility

Different multimode lasers exhibit varying EF during fiber transmission, leading to calibration errors if unaccounted. Dimension Technology's multimode attenuators utilize mode controllers and EF detection equipment to strictly comply with IEC-61280-1-4 and TIA-455-203 standards, ensuring good test accuracy under different light sources.

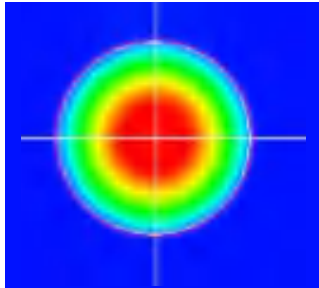


Figure 1 Overfilling

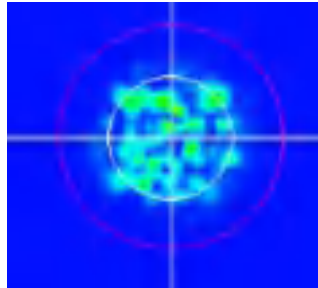


Figure 2 Under-injection

After ring flux optimization

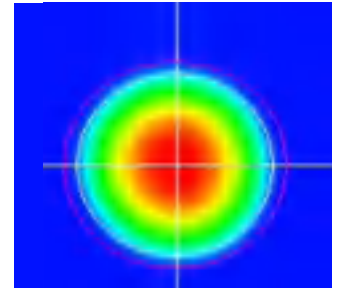
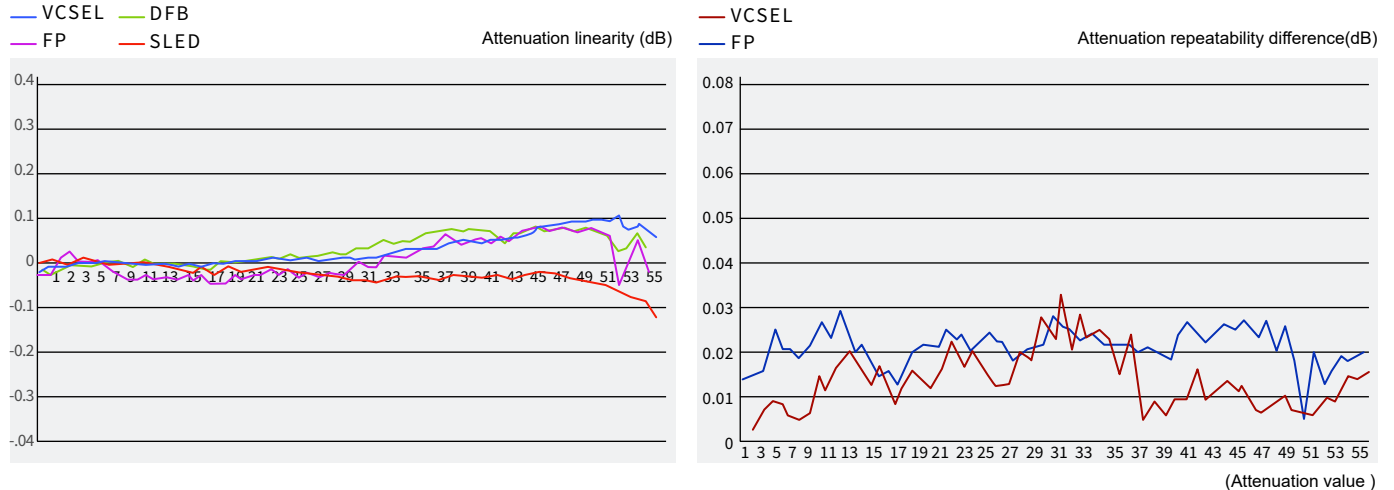


Figure 3 complies with EF standard

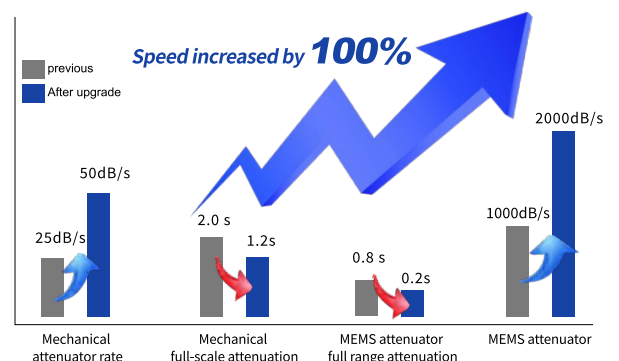
Note: [1] Test conditions: Use 850nm VCSEL source, OM3 optical fiber.

Test results after optimization: Full range attenuation linearity $\pm 0.10\text{dB}$



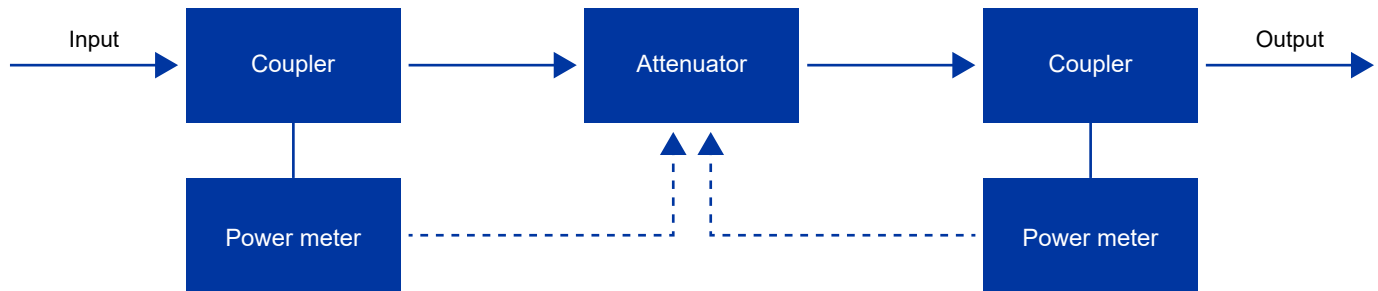
Ultra-low insertion loss and ultra-fast decay

- Insertion loss optimization:** Through optical path structure optimization, insertion loss SM $< 1.0\text{dB}$, MM $< 1.5\text{dB}$.
- Attenuation speed increased:** Mechanical attenuator speed increased from 25dB/s to 50dB/s, full-scale attenuation is 1.2s; MEMS attenuator increased from 1000dB/s to 2000dB/s, full-scale attenuation is 0.2s. The testing efficiency is greatly improved.



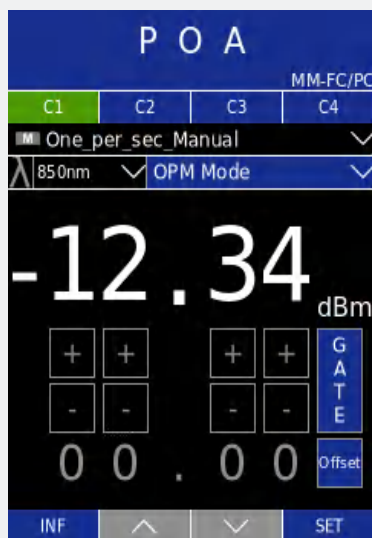
Built-in power monitoring closed-loop monitoring, three modes to control attenuation

- Power monitoring function:** Add built-in optical power meter components at the input and output ends of the attenuation optical path, adjust the attenuation value with real-time feedback, and improve the attenuation accuracy to $\pm 0.10\text{dB}$.



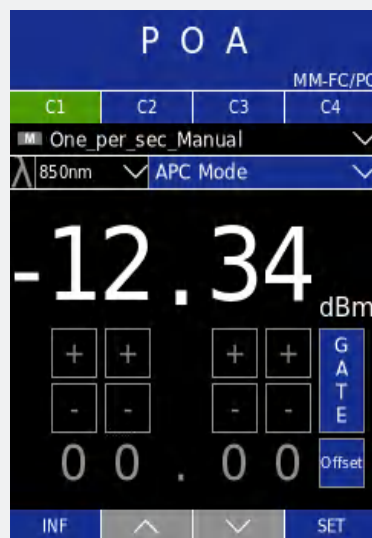
POA Power control schematic

- Three control modes:** Support multiple control modes to meet the needs of different application scenarios.



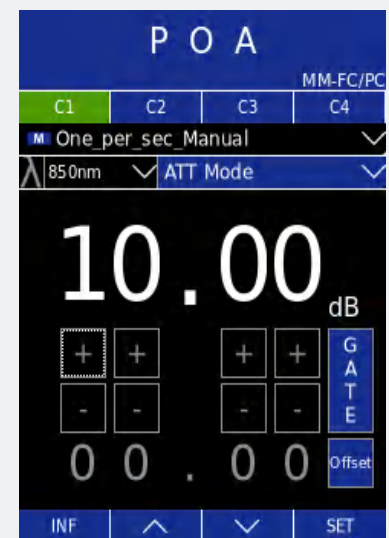
Power Monitor Mode

Real-time display of the current output power of the attenuator, making it convenient for users to detect the power intensity of the optical signal during instantaneous changes.



Power Feedback Mode

Set the attenuation according to the preset expected power value, and adjust it based on the feedback from the built-in power meter reading to ensure accurate output power.

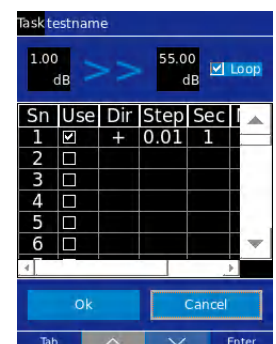


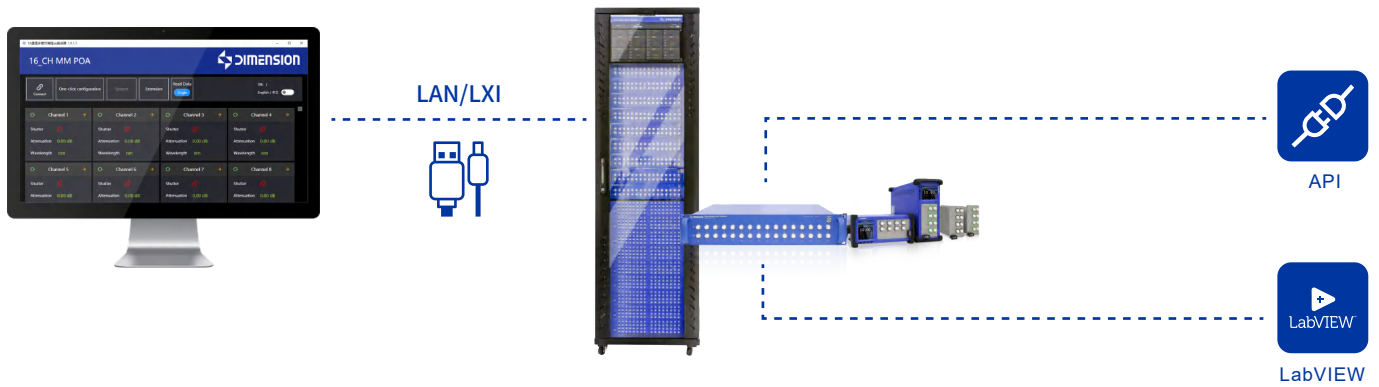
Attenuation Mode

Directly adjust the attenuation value.

Supports custom task settings and programming

- Multiple communication methods:** OMEGA v1.0 modular and XHASIS rack-mount optical attenuators provide TCP/IP or USB connection methods, while OMEGA v2.0 modular is further optimized to support LXI communication.
- Visual testing:** Equipped with visualization software, it is convenient for users to use, supports user-defined tasks, and quickly builds a test platform.
- Automated testing:** Provides API interfaces and control instructions that encapsulate LabVIEW statements to facilitate users to quickly embed into the test system.

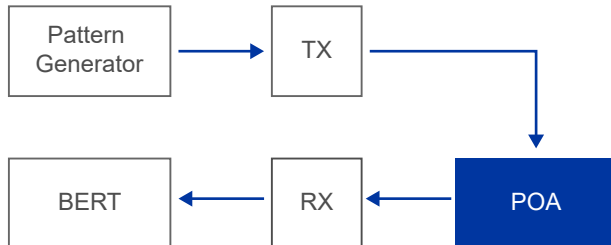




Main Application Scenarios

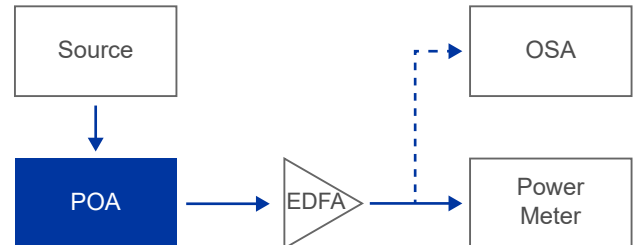
Optical module BER and receiving sensitivity test

The tunable attenuator plays a key role in the BER test and receiving sensitivity test of the optical module. It simulates different channel conditions by precisely controlling the input optical power to evaluate the performance limit and stability of the optical module.



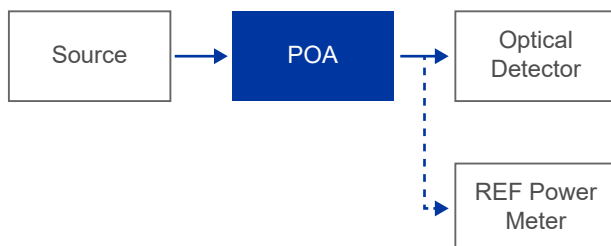
EDFA manufacturing and inspection

During the manufacturing and inspection process, it is necessary to accurately and dynamically adjust the input optical power to simulate different network scenarios (such as long-distance transmission and multi-wavelength multiplexing) to ensure the reliability, stability and consistency of the EDFA.



Photodetector linearity test

By adjusting the tunable attenuator and precisely controlling the input optical power, it is verified whether the electrical signal response of the detector under different light intensities maintains a linear relationship, thereby evaluating its linearity index.



Tunable light source power test

In the tunable light source power test, the stability of the output power of the tunable light source under different conditions can be verified by accurately adjusting the tunable attenuator, and the power flatness of the tunable light source at different wavelengths can also be tested.



Specifications

Parameter	Mechanical	MEMS
Fiber Type	MM 50/125μm or SM 9/125μm	SM 9/125μm
Wavelength range	850/1300nm	1260~1650nm
Attenuation range	>55dB	>40dB
IL(Typ.)	<1.5dB - without power monitoring <2.0dB - with power monitoring	<1.8dB - with power monitoring
RL (Typ.)	>30dB	>55dB
Attenuation accuracy	±0.10dB	±0.25dB
Attenuation resolution	0.01dB	0.01dB
Attenuation repeatability	±0.05dB	±0.15dB
Decay speed	50dB/s	2000dB/s
Maximum input power	±27dBm	
Closed loop power range	+20~-47dBm	
Power Monitoring Linearity	±0.15dB	
Power setting repeatability	±0.03dB	
Power setting resolution	0.01dB	
Warm-up time	20 minutes (storage and use temperature are the same), 60 minutes (storage and use temperature are different)	
Recommended calibration cycle	2 years	
Operating temperature	10°C~40°C	
Storage temperature	-40°C~70°C	
size	OMEGA series modular: chassis 359mmX274mmX115mm; module 285mmX133mmX71mm XHASIS series rack-mount: 2U or 3U	

Remark:

[1] 850nm/1300nm for multimode.

[2] Insertion loss and return loss measurements include the connector.

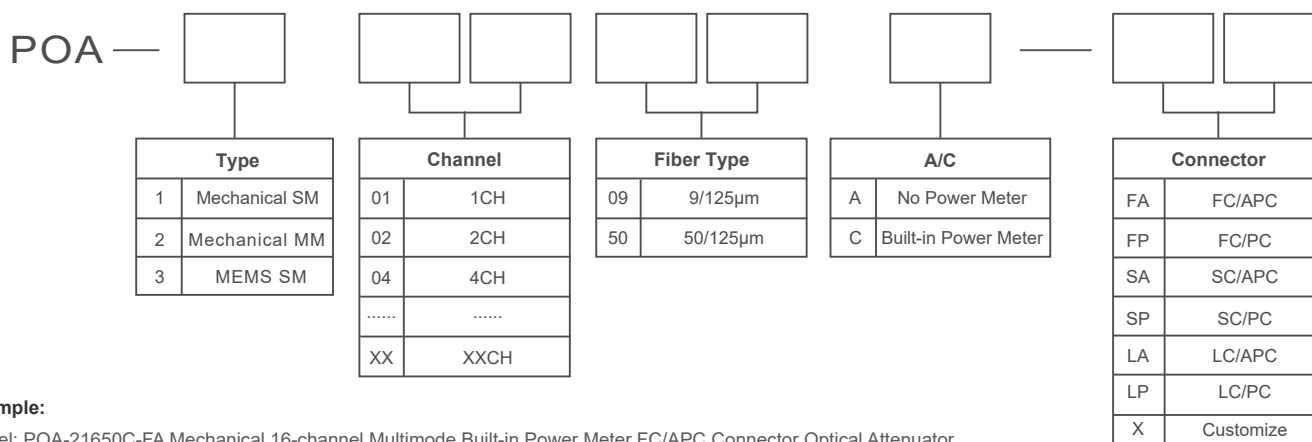
[3] The above indicators are all tested at 23±3°C.

[4] SM MEMS is only available in a version with power monitoring.

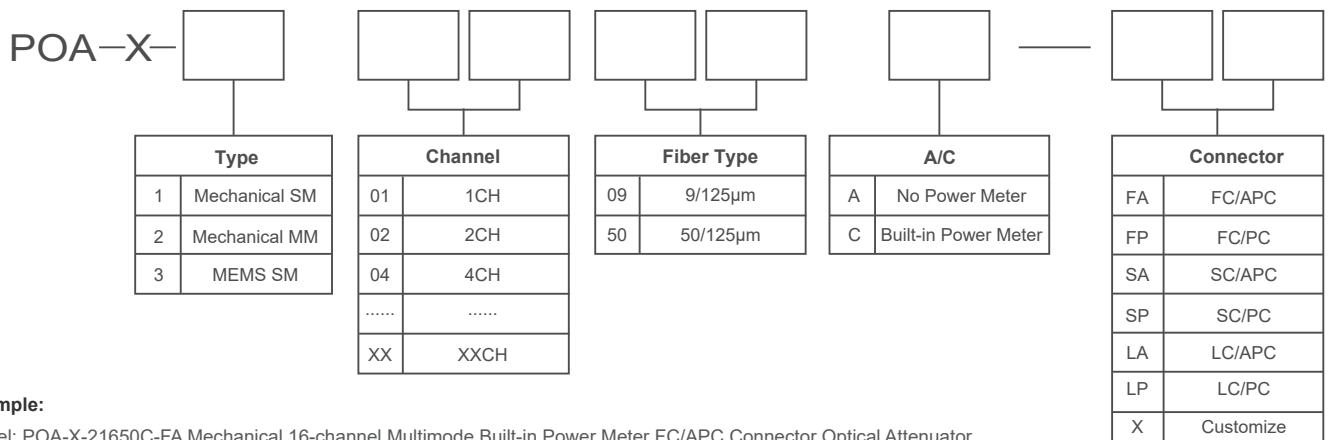
[5] The sizes of XHASIS series rack-mount products vary depending on the number of channels, including 2U and 3U.

Ordering Information

• OMEGA Series Modular



• XHASIS Series Rack-Mount



Example:

Model: POA-X-21650C-FA Mechanical 16-channel Multimode Built-in Power Meter FC/APC Connector Optical Attenuator

Related Products

1.6T/800G MPO Optical Module Testing Solution



CR600



112G Clock Recovery



Eye Diagram Analyzer

BERT800



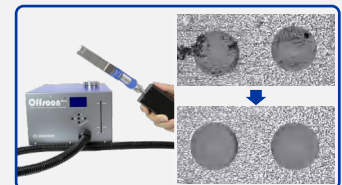
Bit Error Rate Tester

1.6T/800G MPO Optical Port Module

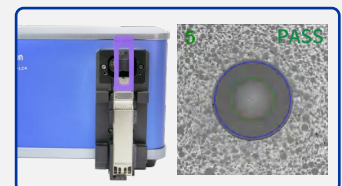


Optical Port
Cleaning and Inspection

Offsoon Pro



Smartchek 200M8



16 Channel Programmable Attenuator



Matrix Optical Switch



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