IMOB

iMOB780 Series

Integrated Micro-Optics Benches for beam splitting/ beam combining

The iMOB780 are fibered optical benches exploiting micro-optics technologies to integrate optical functions such as power splitting, combining, optical switching, frequency shifters, within a compact and ultra-stable package. Usual free-space optics set-ups are now turned into turn-key maintenance-free fibered sub-systems. They feature remarkable stability and have a high optical power level capability to several watts.

With the iMOB780 series, a range of standard configurations is available at 780nm: starting with 1 or 2 inputs and allowing the customer to choose from 2 to 6 outputs. Of course wavelength of the product can be adjusted to your needs.

Exail's key knowledge is to master perfectly gluing process, letting the user free of optical alignment issues or optics cleaning constraints and achieving high levels of reliability and stability for the component.

The micro-optics solutions proposed by Exail have been initially developed for the telecom industry and were later adapted to support Quantum Technologies. As a matter of fact Exail itself relies on this technology for its commercial Quantum Sensors, Quantum Gravimeter and our cold-atom clock.

Benefits & Features

- Many configurations available: 1 or 2 inputs, up to 6 outputs
- Wide choice of operating wavelength: from 400 nm to 2000 nm
- Input power up to 2 W

Applications

- Quantum technologies (sensing, communication, simulation, computing)
- High-precision measurement
- Spectroscopy

Options

- Variable splitting stage, mechanical shutters, AOMs
- Choice of fibers and connectors
- Ditherless version

Main advantages

The iMOB780 components are designed to be fully compatible with Exail's laser systems.

Integration: once the power ratio is adjusted by the user, there is no need to optimize the alignment nor to clean the optics.

Robustness: micro-optical components are glued on the base plate. Materials have been carefully selected and engineered to feature ultra-low thermal expansion and great robustness with respect to shocks and vibrations.

Polarization quality: iMOB780 modules integrate by default polarizers acting as polarization filters. As a result, the typical PER at the output of an iMOB is 30 dB.

Small footprint: the iMOB780 modules are developed to be compact and small. They can be equipped with input and output fibers of several meters in length.

Thanks to a fully integrated architecture and assembling processes developed for optical fiber telecommunications, these modules feature an exceptional alignment stability over an extended operating temperature range.

iMOB780 SERIES

iMOB780 are fibered in and out sub-systems that integrate polarizers, wave-plates, polarizing beam splitters (PBS) of small size within compact physics packages. The catalog configurations of the iMOB780 series correspond to fixed and optimized designs, providing fully adjustable output power ratios.

Catalog configurations are:

Optical power splitting

1x2 iMOB780	1 input into 2 outputs
1x3 iMOB780	1 input into 3 outputs
1x4 iMOB780	1 input into 4 outputs
1x6 iMOB780	1 input into 6 outputs

Optical power combining & splitting

2x2 iMOB780	2 inputs into 2 outputs
2x3 iMOB780	2 inputs into 3 outputs
2x4 iMOB780	2 inputs into 4 outputs
2x6 iMOB780	2 inputs into 6 outputs

The catalog configuration features Optical Power Monitoring at the inputs, providing an integrated measurement of optical power.

Legend:

iMOB780 SERIES

Available options on standard design as shown upper:
- Acousto Optic Modulator: an AOM can be mounted as an option on the input(s) and/or at the output(s) if requested.
- Optical Shutter: it can be added to block the light beam, it is disposed either at the input(s) or the output(s)

Specifications

Parameter	**Min**	**Typ**	**Max**	**Unit**
Wavelength	-	780 +/- 1	-	nm
Operating Temperature Range	+10	-	+40	°C
Storage Temperature Range	-15	-	+55	°C
Input Power	-	-	2	W
IL variation over temperature range	-	-	0.7	dB
Polarization Extinction Ratio	> 25	> 30	-	dB
Fiber type	-	Nufern PM780	-	-
Fiber length (by default, in and out)	-	1	-	m
Connectors (in and out)	-	FC / APC	-	-
Excess Insertion Loss	-	2	2.5	dB
Tap monitoring photodiode specifications				
Dark current	0.1	-	1	nA
Cut-off frequency	-	-	900	MHz

Options

Shutter stage	**Min**	**Typ**	**Max**	**Unit**
Insertion loss	No additional insertion loss			-
Optical extinction	-	140	-	dB
Rise and fall time	-	< 1	-	ms
Jitter	-	< 100	-	µs
Delay		< 2	-	ms
AOM stage				
Additional Insertion Loss	-	3.5	-	dB
Rise and fall time	-	< 1	-	µs
Optical extinction		60	-	dB

iMOB780 SERIES

Ordering information

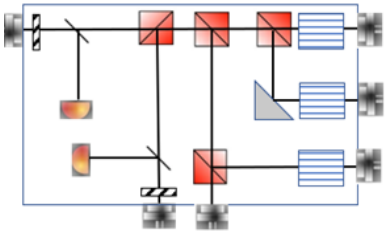
iMOB780-NxM-AOMin-SHin-AOMom-SHom-FA

NxM: Inputs x Outputs
AOMin: AOM at the input, with n = 1 to N
SHin: Shutter at the input, with n = 1 to N
AOMom: AOM at the output, with m = 1 to M
SHom: Shutter at the output, with m = 1 to M
0: if no AOM and no shutter are wanted for the input and output
FA: PM fiber, FC/APC optical connector

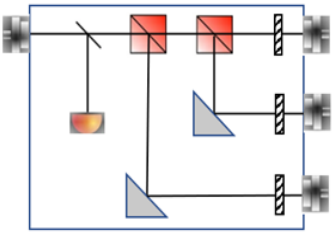
Special requests / customization

As special requests, it is also possible to have dedicated custom designs developed by Exail to perfectly match your need.
It is possible to choose the length of the input and output fibers.
Thus, typical configurations meet your specific requirements: any custom request is possible to look at.
Please feel free to draw us your optical design, we'll be very happy to take a look at it and to let you know the feasibility.

Example of a custom-designs and their references



iMOB780-2x4-0-SH1-SH2-AOM1-AOM2-AOM3-0-FA



iMOB780-1x3-0-0-0-SH1-SH2-SH3-FA

Legend:

References

D. O. Sabulsky et al., "**A fibered laser system for the MIGA large scale atom interferometer**",
Nature Scientific Report, 10:3268 (2020)
Special explanations over IMOB780 : **Figure 3**

About us

Exail Photonics produces specialty optical fibers and Bragg gratings based fiber optics components and provides optical modulation solutions based on the company lithium niobate ($LiNbO_3$) modulators and RF electronic modules.
Exail Photonics serves a wide range of industries: sensing and instruments, defense, telecommunications, space and fiber lasers as well as research laboratories all over the world.

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