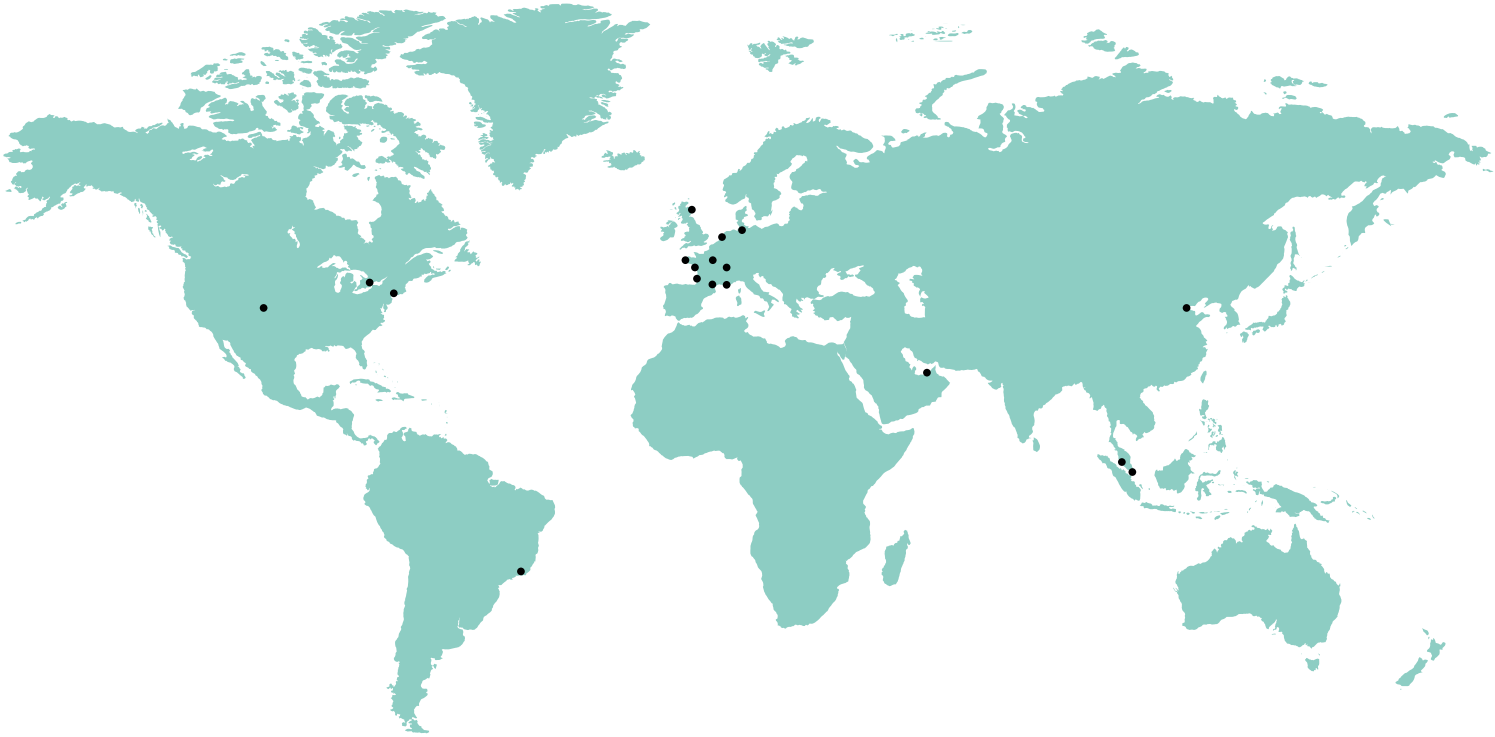

MODULATION
SOLUTIONS
exail

Modulation solutions: your challenge, our dedicated and custom solutions

With decades of expertise in electro-optics, Exail delivers high-performance modulation solutions tailored to the most demanding optical applications. From lithium niobate modulators to fully integrated ModBox systems, Exail covers the full spectrum of optical modulation needs. Manufactured in ISO 6 cleanroom facilities, these solutions offer a unique combination of performance, robustness, and reliability, even under extreme conditions, making them ideal for laser systems, sensing, communications, quantum technologies, and space applications. Thanks to in-house design, packaging, and testing capabilities, Exail provides scalable, field-ready systems.



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Your challenge, our dedicated and custom solutions.

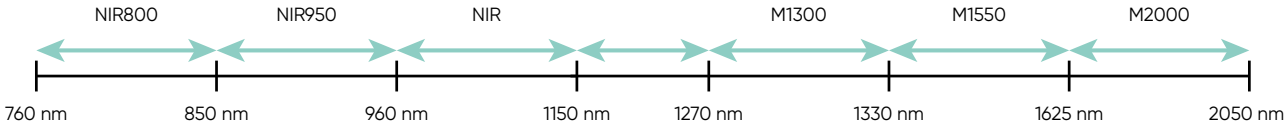
Visit our website to learn more about our products, technology and applications.

Our sales and technical team is ready to assist you. For any request, feel free to contact us:
contact.photonics@exail.com

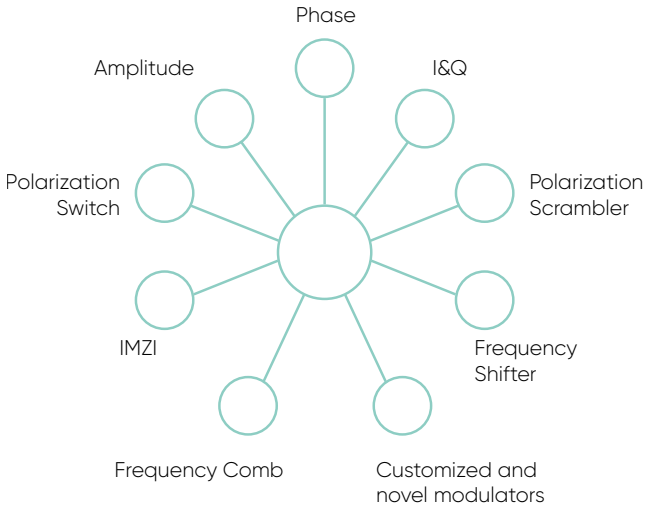
$LiNbO_3$ MODULATORS

Exail delivers the most comprehensive range of commercial $LiNbO_3$ modulators. Exail's modulators address a wide range of wavelength and frequencies. Leveraging our expertise in electro optics we stand ready to work with our customers on new requirements and customizations.

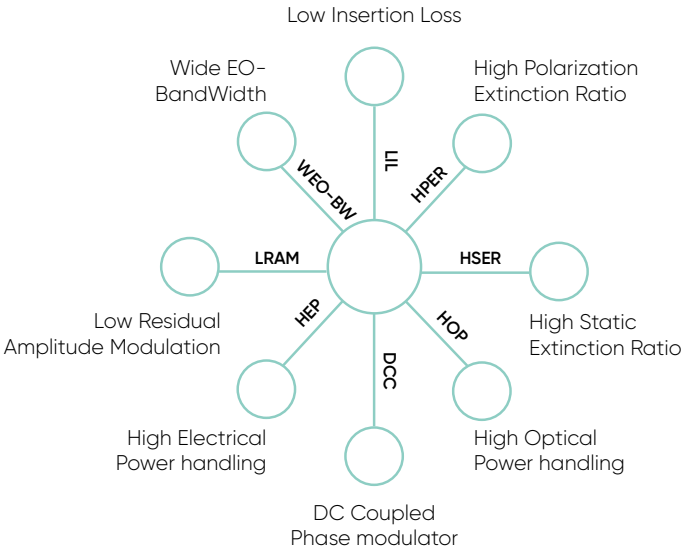
Operating wavelength



Modulator types



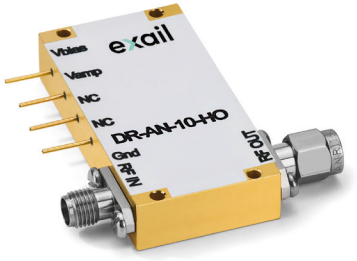
Key Features



DRIVERS

Modulators-matching components

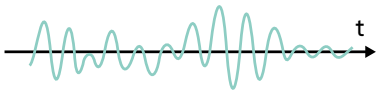
Exail's RF amplifiers product range offers a variety of matching drivers designed to drive an optional modulator in the best suited conditions.
The modulator driver comes in a compact connectorized module that matches (mechanically and impedance) directly with Exail modulators.



ANalog DRiver

Key Features
- Medium to high output voltage
- Low noise figure
- Linear amplifier
- Low group delay variation

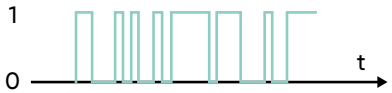
- **Modulation format**
- OFDM
- RF Over Fiber (RFoF)
- Linear amplification



DiGital DRiver

Key Features
- Medium to high output voltage
- Flat gain
- Gain & crossing point adjustments
- High quality eye diagram

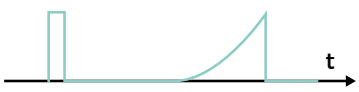
Modulation format
- NRZ, RZ
- QPSK
- DPSK



PuLse DRiver

Key Features
- Medium output voltage
- Short to long pulse widths
- Square and Gaussian pulses
- Arbitrary waveforms

Modulation format
- Pulse generation
- Pulse picking
- Pulse shaping



BIAS CONTROLLERS

Modulators-matching components

Exail's Modulator Biars Controllers are a product range of automatic bias controllers specially designed to lock the operating point of $LiNbO_3$ Mach-Zehnder modulators and ensure a stable operation over time and environmental conditions.

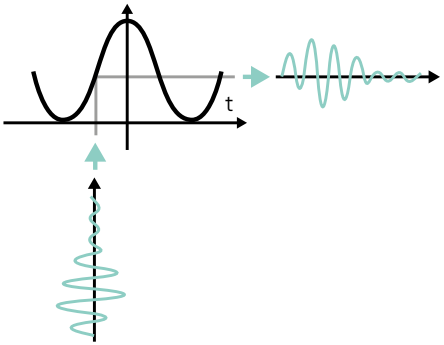
Analog modulation Scheme

Key Features

- Dither-less operation
- QUAD+ & QUAD-
- High sensitivity
- USB remote control

Modulation format

- RF Over Fiber (RFoF)
- Linear modulation
- Optical communications



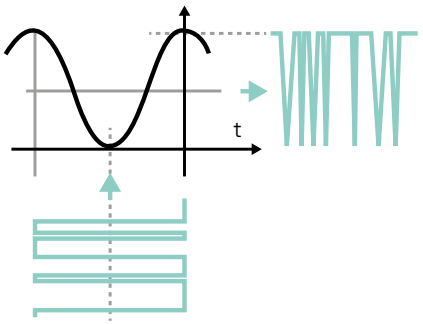
DiGital modulation Scheme

Key Features

- MIN, MAX, QUAD+ & QUAD-
- Any other operating points
- High sensitivity
- USB remote control

Modulation format

- NRZ, RZ
- QPSK, DPSK
- OFDM, CS-SSB



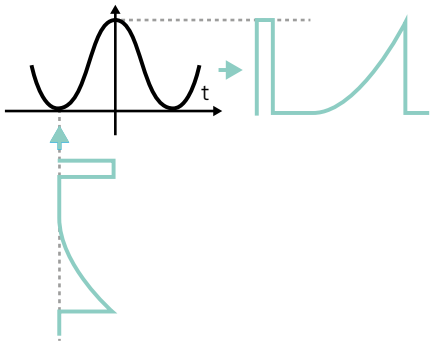
PuLse modulation Scheme

Key Features

- MIN & MAX
- High pulse contrast
- High stability over time
- USB remote control

Modulation format

- Pulse generation
- Pulse picking
- Pulse shaping



MODBOXES

Complete modulation systems

Exail's ModBoxes are custom turn-key Modulation Units and Transmitters. They incorporate a complete dedicated modulation stage with power supply, control electronics and optional laser source with receiver. ModBoxes can be tailored to accomodate a broad variety of applications: pulse picking or generation, spectral broadening, analog modulation and all formats of digital communications.

Analog Optical Transmitter

Key Features

- Linear transmission
- High linearity
- Wide bandwidth components
- Low RIN laser and dither-less MBC
- High harmonics suppression

Modulation format

- RF Over Fiber (RFoF)
- Linear modulation
- Optical communications
- [S] optical device measurement
- DP-CS-SSB generation
- Receiver test

Optical Reference Transmitter

Key Features

- 850 nm, CWDM & LAN-WDM, C-Band
- QPSK up to 64 Gbauds
- PAM-4 up to 56 Gbauds
- NRZ up to 56 Gb/s
- DPSK up to 28 Gb/s

Modulation format

- Space com / Data Com / Long Haul
- 100 GE and 400 GE in data centers
- Receiver test
- Transmission system test
- Receiver frequency test
- [S] optical device measurement

Optical Pulse Shaper Laser Front-End

Key Features

- 30 ps to 100 ns Pulse Generation
- Arbitrary waveform optical pulses
- To 125 µJ pulse energy
- Extremely low jitter
- 60 dB optical pulse contrast

Modulation format

- Laser cutting
- Inertial confinement fusion
- Interaction of intense light with matter
- Laser plasma interaction
- Laser implosion
- Interaction of ion beam with HP laser