

MODULATOR

NIR-MPX950-LN Series

950 nm band Phase Modulators

The Exail NIR-MPX950 series are phase modulators especially designed to operate in the 950 nm wavelength band. They are available with various modulation bandwidth, from low frequency to 20 GHz and beyond.

Like all Exail Near InfraRed (NIR) modulators, the NIR-MPX950 series use a proton exchanged based waveguide process that confers them an unparalleled stability and a high photo-refractive threshold.



Features

- High optical power handling
- Wide bandwidth
- High stability
- Low V_{π}
- Low insertion loss

Applications

- Beam Combining
- Interferometric based sensors
- Quantum optics
- Frequency shifting
- Pound-Drever-Hall locking (PDH)
- Spectrum Broadening

Options

- 850 nm and 1060 nm versions
- Space grade version

Related Equipments

- RF amplifiers
- NIR-MX950-LN intensity modulators
- Reference transmitter Modbox-VNA
- 30ps optical pulse Modbox-PG

NIR-MPX950-LN-0.1 series Performance Highlights

| Parameter | Min | Typ | Max | Unit |
|----------------------------------|-----|-----|-----|------|
| Operating wavelength | 850 | 900 | 950 | nm |
| Usable electro-optical bandwidth | - | 300 | - | MHz |
| V_{π} RF @50 kHz | - | 2.2 | - | V |
| Insertion loss | - | 3.5 | - | dB |

NIR-MPX950-LN-05 series Performance Highlights

| Parameter | Min | Typ | Max | Unit |
|----------------------------------|-----|-----|-----|------|
| Operating wavelength | 850 | 900 | 950 | nm |
| Usable electro-optical bandwidth | - | 10 | - | GHz |
| V_{π} RF @50 kHz | - | 3.5 | - | V |
| Insertion loss | - | 3.5 | - | dB |

NIR-MPX950-LN-10 series Performance Highlights

| Parameter | Min | Typ | Max | Unit |
|----------------------------------|-----|-----|-----|------|
| Operating wavelength | 850 | 900 | 950 | nm |
| Usable electro-optical bandwidth | - | 16 | - | GHz |
| V_{π} RF @50 kHz | - | 4.5 | - | V |
| Insertion loss | - | 3.5 | - | dB |

NIR-MPX950-LN-20 series Performance Highlights

| Parameter | Min | Typ | Max | Unit |
|----------------------------------|-----|-----|-----|------|
| Operating wavelength | 850 | 900 | 950 | nm |
| Usable electro-optical bandwidth | - | 20 | - | GHz |
| V_{π} RF @50 kHz | - | 4.5 | - | V |
| Insertion loss | - | 3.5 | - | dB |

NIR-MPX950-LN-0.1

300 MHz Phase Modulator

Electrical Characteristics

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|--------------------------------|----------------------|-----------|-----|--------|-----|----------|
| Electro-optical (EO) bandwidth | S_{21} | - | 100 | 150 | - | MHz |
| Usable EO bandwidth | S_{21} | - | | 300 | - | MHz |
| V π RF @50 kHz | $V\pi_{RF\ 50\ kHz}$ | - | - | 2.2 | 3.2 | V |
| RF input impedance | Z_{in-RF} | - | - | 10 000 | - | Ω |

Optical Characteristics

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|----------------------|-----------|-----------------------------|------------------------------|-----|-----|------|
| Crystal | - | - | Lithium Niobate X-Cut Y-Prop | | | |
| Wavelength | - | - | Proton exchange | | | |
| Operating wavelength | λ | - | 850 | 900 | 950 | nm |
| Insertion loss | IL | Without optical connectors* | - | 3.5 | 5.5 | dB |
| Optical return loss | ORL | - | -40 | -45 | - | dB |

All specifications given at 25°C, 944 nm, unless differently specified.

(*) Consider an extra-loss up to 0.6 dB for each FC/APC optical connector

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

| Parameter | Symbol | Min | Max | Unit |
|-------------------------------|-----------|-----|-----|------|
| Modulation voltage range | EV_{in} | -20 | +20 | V |
| Optical input power (CW mode) | OP_{in} | - | 14 | dBm |
| Operating temperature | OT | 0 | +70 | °C |
| Storage temperature | ST | -40 | +85 | °C |

NIR-MPX950-LN-05

10 GHz Phase Modulator

Electrical Characteristics

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|----------------------------------|----------------------|---------------------------|-----|-----|-----|----------|
| Electro-optical (EO) bandwidth | S_{21} | RF electrodes, from 2 GHz | 5 | - | - | GHz |
| Usable electro-optical bandwidth | S_{21} | RF electrodes, from 2 GHz | - | 10 | - | GHz |
| Ripple S_{21} | ΔS_{21} | - | - | 0.5 | 1 | dB |
| Electrical return loss | S_{11} | - | - | -12 | -10 | dB |
| V _π RF @50 kHz | $V\pi_{RF\ 50\ kHz}$ | - | - | 3.5 | 4.5 | V |
| RF input impedance | Z_{in-RF} | - | - | 50 | - | Ω |

Optical Characteristics

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|----------------------|-----------|-----------------------------|------------------------------|-----|-----|------|
| Crystal | - | - | Lithium Niobate X-Cut Y-Prop | | | |
| Wavelength | - | - | Proton exchange | | | |
| Operating wavelength | λ | - | 850 | 900 | 950 | nm |
| Insertion loss | IL | Without optical connectors* | - | 3.5 | 5.5 | dB |
| Optical return loss | ORL | - | -40 | -45 | - | dB |

All specifications given at 25°C, 944 nm, unless differently specified.

(*): Consider an extra-loss up to 0.6 dB for each FC/APC optical connector

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

| Parameter | Symbol | Min | Max | Unit |
|-------------------------------|-----------|-----|-----|------|
| RF input power (CW mode) | EV_{in} | - | +28 | dBm |
| Optical input power (CW mode) | OP_{in} | - | 14 | dBm |
| Operating temperature | OT | 0 | +70 | °C |
| Storage temperature | ST | -40 | +85 | °C |

NIR-MPX950-LN-10

16 GHz Phase Modulator

Electrical Characteristics

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|----------------------------------|-------------------------|---------------------------|-----|-----|-----|----------|
| Electro-optical (EO) bandwidth | S_{21} | RF electrodes, from 2 GHz | 10 | 12 | - | GHz |
| Usable electro-optical bandwidth | S_{21} | RF electrodes, from 2 GHz | - | 16 | - | GHz |
| Ripple S_{21} | ΔS_{21} | - | - | 0.5 | 1 | dB |
| Electrical return loss | S_{11} | - | - | -12 | -10 | dB |
| V_{π} RF @50 kHz | $V_{\pi_{RF\ 50\ kHz}}$ | - | - | 4.5 | 5.5 | V |
| RF input impedance | Z_{in-RF} | - | - | 50 | - | Ω |

Optical Characteristics

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|----------------------|-----------|-----------------------------|------------------------------|-----|-----|------|
| Crystal | - | - | Lithium Niobate X-Cut Y-Prop | | | |
| Wavelength | - | - | Proton exchange | | | |
| Operating wavelength | λ | - | 850 | 900 | 950 | nm |
| Insertion loss | IL | Without optical connectors* | - | 3.5 | 5.5 | dB |
| Optical return loss | ORL | - | -40 | -45 | - | dB |

All specifications given at 25°C, 944 nm, unless differently specified.

*1 Consider an extra-loss up to 0.6 dB for each FC/APC optical connector

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

| Parameter | Symbol | Min | Max | Unit |
|-------------------------------|-----------|-----|-----|------|
| RF input power (CW mode) | EV_{in} | - | +28 | dBm |
| Optical input power (CW mode) | OP_{in} | - | 14 | dBm |
| Operating temperature | OT | 0 | +70 | °C |
| Storage temperature | ST | -40 | +85 | °C |

NIR-MPX950-LN-20

20 GHz Phase Modulator

Electrical Characteristics

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|----------------------------------|----------------------|---------------------------|-----|-----|-----|----------|
| Electro-optical (EO) bandwidth | S_{21} | RF electrodes, from 2 GHz | 16 | 20 | - | GHz |
| Usable electro-optical bandwidth | S_{21} | RF electrodes, from 2 GHz | - | 20 | - | GHz |
| Ripple S_{21} | ΔS_{21} | - | - | 0.5 | 1 | dB |
| Electrical return loss | S_{11} | - | - | -12 | -10 | dB |
| V π RF @50 kHz | $V\pi_{RF\ 50\ kHz}$ | - | - | 4.5 | 5.5 | V |
| RF input impedance | Z_{in-RF} | - | - | 50 | - | Ω |

Optical Characteristics

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|----------------------|-----------|-----------------------------|------------------------------|-----|-----|------|
| Crystal | - | - | Lithium Niobate X-Cut Y-Prop | | | |
| Wavelength | - | - | Proton exchange | | | |
| Operating wavelength | λ | - | 850 | 900 | 950 | nm |
| Insertion loss | IL | Without optical connectors* | - | 3.5 | 5.5 | dB |
| Optical return loss | ORL | - | -40 | -45 | - | dB |

All specifications given at 25°C, 944 nm, unless differently specified.

(*) Consider an extra-loss up to 0.6 dB for each FC/APC optical connector

Absolute Maximum Ratings

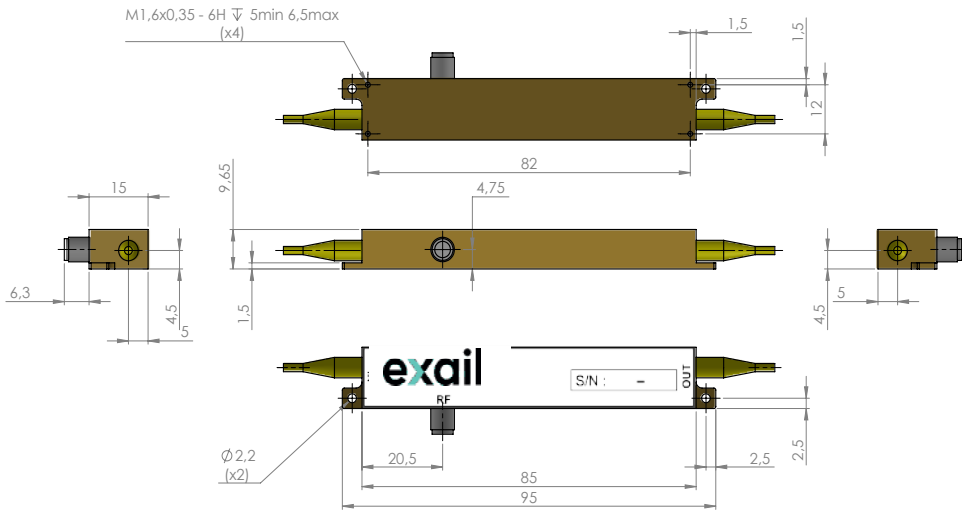
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| Parameter | Symbol | Min | Max | Unit |
|-------------------------------|-----------|-----|-----|------|
| RF input power (CW mode) | EV_{in} | - | +28 | dBm |
| Optical input power (CW mode) | OP_{in} | - | 14 | dBm |
| Operating temperature | OT | 0 | +70 | °C |
| Storage temperature | ST | -40 | +85 | °C |

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Mechanical Diagram and Pinout

All measurements in mm



| Port | Function | Note |
|------|---------------------|---|
| IN | Optical input port | Polarization maintaining fiber Corning PM 98-U25D Length: 1.5 meter, buffer diameter: 900 μm |
| OUT | Optical output port | Polarization maintaining fiber Corning PM 98-U25D Length: 1.5 meter, buffer diameter: 900 μm |
| RF | RF input port | Female K |

Ordering information

Bandwidth : **0.1** (150 MHz), **05** (5 GHz),
 Input fiber: **P** Polarization maintaining
 Output fiber: **P** Polarization maintaining
 Input connector: **00** (bare fiber), **FA** (FC/APC), **FC** (FC/SPC)
 Output connector: **00** (bare fiber), **FA** (FC/APC), **FC** (FC/SPC)

NIR-MPX950-LN-□-00-□-□-□-□

About us

Exail reserves the right to change, at any time and without notice, the specifications, design, function or form of its products described herein.

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