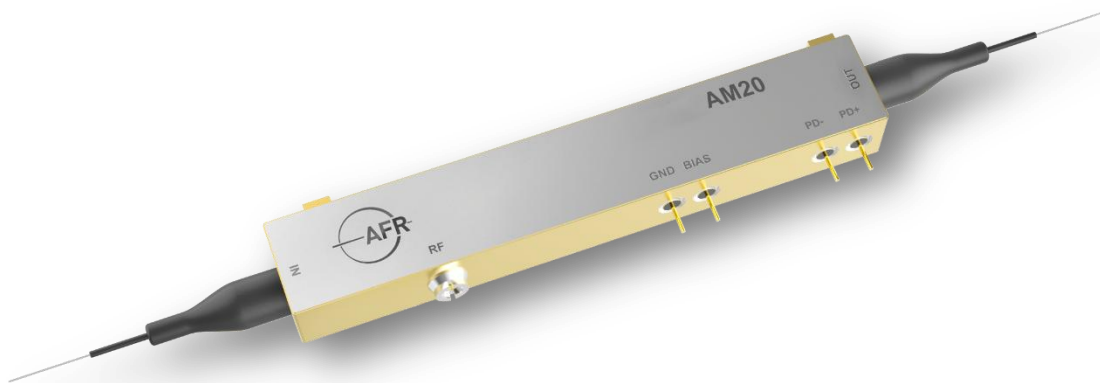


20/40 GHz Intensity Modulators for Analog Applications AM20, AM40



AFR high bandwidth Zero-Chirp modulators are based on the Mach-Zehnder Interferometer (MZI) architecture. The AM20 & AM40 broadband analog intensity modulators combine high linearity with low driving voltage and small footprint, covering all the frequency range from 20 GHz to beyond 40 GHz (AM20: 20-30 GHz; AM40: > 30 GHz). The increasing demand to shift the transmission frequency in analog fiber optic links towards higher frequency finds in AFR analog modulators the most advanced and suitable answer. The experience and know-how of AFR engineers is available to customize our products to the customer's specific requirements.

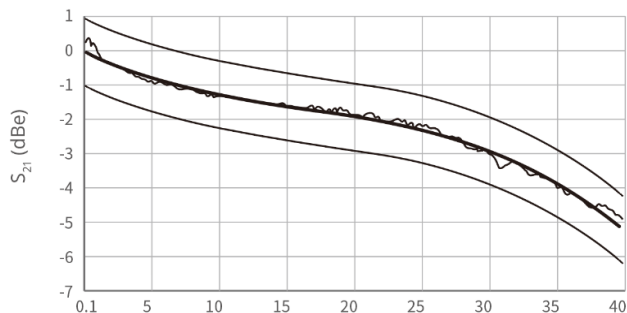
Key Features

- Titanium Indiffused Waveguides
- X-Cut LiNbO₃
- C+L-Band Operation
- Operating up to 60 GHz
- Zero-Chirped Modulator
- Low Drive Voltage
- Low Optical Insertion Loss
- Integrated Monitor Photodiode
- Integrated Polarizer
- RoHS Compliant

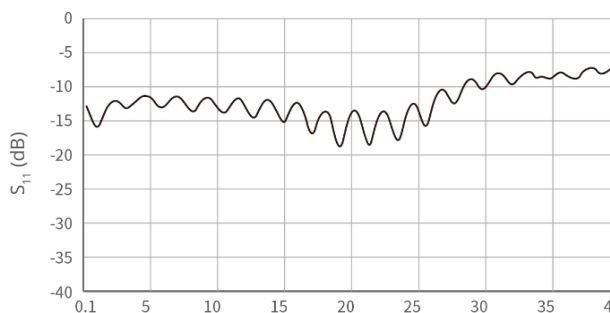
Applications

- Digital Transmission
- Analog Transmission
- High Frequency Fiber Optic Links
- Delay Lines Telemetry Systems
- Instrumentation

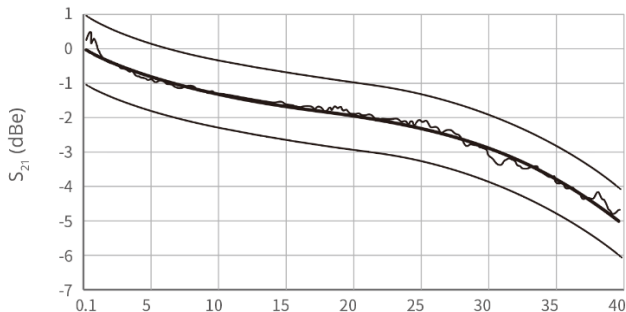
Performance Characteristics



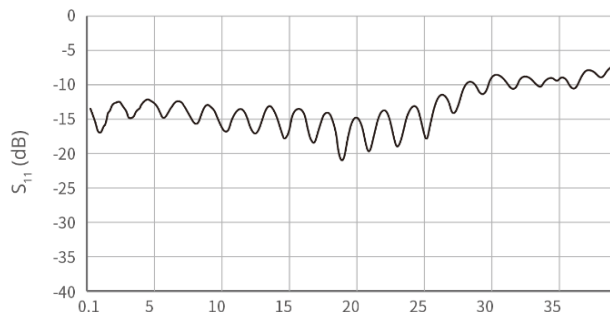
Electrical optical response (20 GHz example)



Electrical return loss (20 GHz example)



Electrical optical response (40 GHz example)



Electrical return loss (40 GHz example)

Absolute Maximum Ratings

| Parameters | Conditions | Min. | Max. | Unit |
|--|------------|------|------|--------|
| Maximum RF Input Power | AC coupled | - | 25 | dBm |
| Maximum Optical Input Power | CW | - | 100 | mW |
| Operating Case Temperature | - | 0 | + 70 | °C |
| Storage Temperature | - | 40 | + 85 | °C |
| Maximum Operating Temperature Variation Rate | - | - | 1 | °C/min |
| Operating Humidity | - | 5 | 85 | % |
| Leads Soldering Temperature | - | - | 250 | °C |
| Leads Soldering Time | - | - | 10 | s |

Optical and Electrical Specifications

| Parameters | Conditions | Value (AM20) | Value (AM40) | Unit |
|---|-----------------|------------------------|------------------------|------|
| Optical | | | | |
| Operating Wavelength | - | 1525 - 1615 | 1525 - 1615 | nm |
| Insertion Loss | No connectors | < 4.5 (3.5 typ) | < 5.0 (4.0 typ) | dB |
| | With connectors | < 5.0 (4.0 typ) | < 5.5 (4.5 typ) | |
| Optical Return Loss | No connectors | > 45 | > 45 | dB |
| Polarization Extinction ratio | - | > 20 (23 typ) | > 20 (23 typ) | dB |
| Electrical – RF Port | | | | |
| S ₂₁ Electro-Optic Bandwidth | - 3 dB | > 20 (23 typ) | > 30 (31 typ) | GHz |
| S ₁₁ Electrical Return Loss | 40 MHz - 20 GHz | < - 10 (- 12 typ) | < - 10 (- 12 typ) | dB |
| | 20 GHz - 35 GHz | - | < - 8 (- 10 typ) | |
| RF V _π Voltage | @ 1 kHz | < 5.0 (4.5 typ) | < 5.2 (4.7 typ) | V |
| | @ 20 GHz | 6.0 | 6.0 | V |
| Electrical – Bias Port | | | | |
| Bias V _π Voltage | @ 1 kHz | < 5.5 (5.0 typ) | < 5.5 (5.0 typ) | V |
| Bias Port Impedance | @ DC | 1 | - | MΩ |
| Photodiode Characteristic | | | | |
| Monitor PD Reverse Current | - | - | 2 | mA |
| Monitor PD Forward Current | - | - | 10 | mA |
| Monitor PD Reverse Voltage | - | - | 15 | V |
| Photodiode Responsivity | - | > 1 x 10 ⁻³ | > 1 x 10 ⁻³ | mA/W |
| Linearity | - | ± 10 | ± 10 | % |

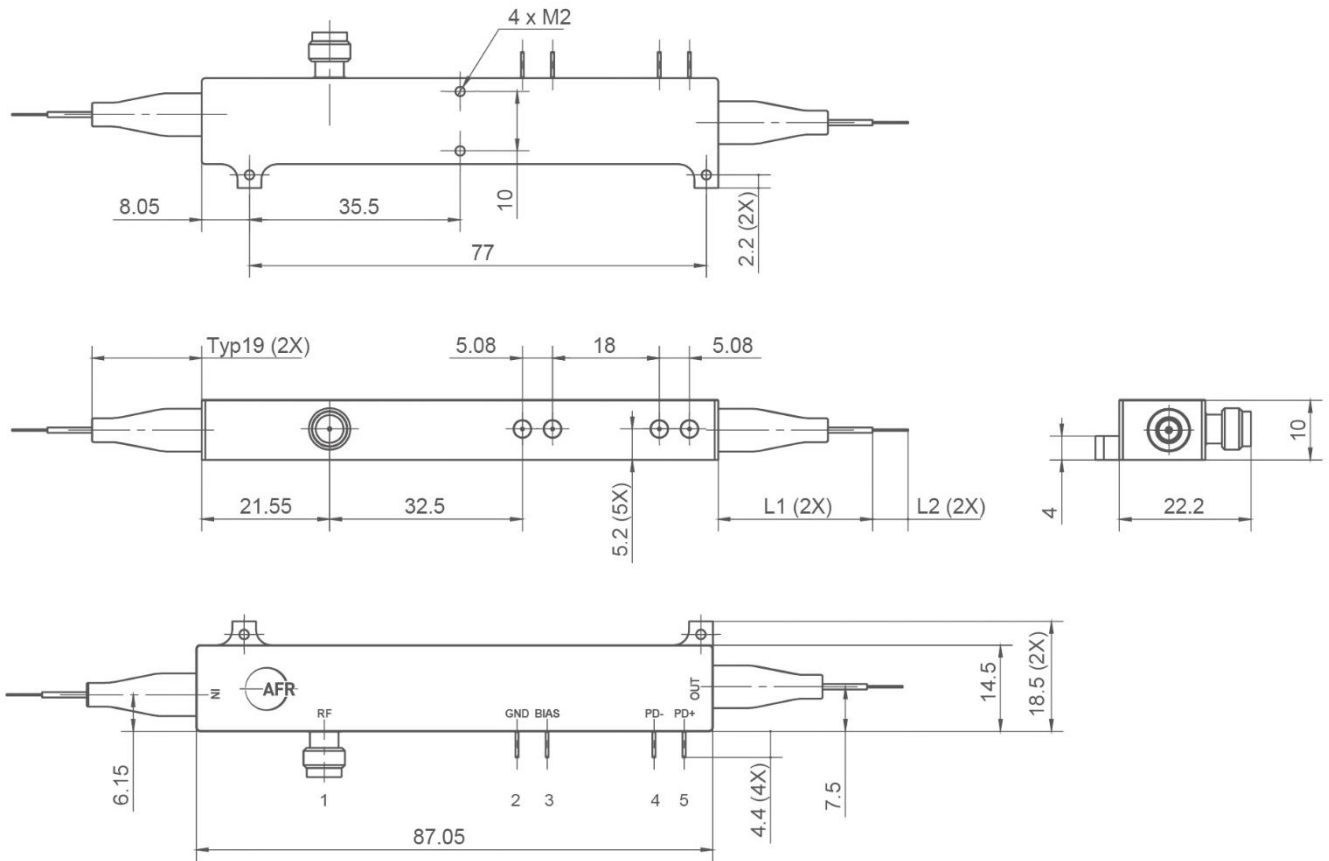
All requirements at T_{op} = 25 °C, wavelength 1550 nm and BOL unless otherwise specified.

Pinout and Fiber Specifications

| | |
|------------------------|---|
| RF Connector | V-Connector ¹ |
| Bias and PD Connector | LEAD pins |
| Input Fiber | Corning/Fujikura SM15P UV/UV250 (Panda fiber), L1 (900 μm loose tube fiber without connector) > 1.3 m & L2 (bare fiber) ≥ 5 cm, or >1.2 m 900 μm loose tube fiber with connectors |
| Output Fiber | Corning/Fujikura SM15P UV/UV250 (Panda fiber), L1 (900 μm loose tube fiber without connector) > 1.3 m & L2 (bare fiber) ≥ 5 cm, or >1.2 m 900 μm loose tube fiber with connectors |
| Minimum Bending Radius | 15 mm |

¹ V-Connector is a registered trademark of the Anritsu Corporation.

Mechanical Outline



* AM20 and AM40 is having same footprint. All dimension measured in mm. L1 is fiber length with 900 μm loose tube. L2 is length of bare fiber.

Pinout Information

| Pin | Name | Description |
|-----|------|------------------------|
| 1 | RF | RF input, V-connector |
| 2 | GND | Ground |
| 3 | Bias | Bias Voltage |
| 4 | PD-C | Photodiode cathode (-) |
| 5 | PD-A | Photodiode anode (+) |

Electrostatic Discharge (ESD)

Caution: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



RoHS Compliance

This series of modulators are RoHS compliant.

Reliability requirements

This series of modulators are designed to meet Telcordia GR-468-Core requirements.

Ordering Information:

For more information on this product and its availability, please contact your local AFR account manager or AFR directly at sales@fiber-resources.com.

| Product Description | Part Number |
|--|-------------|
| AM20, C-Band 20 GHz Intensity modulator for analog applications (PMF-PMF, > 1.3 m 900 µm loose tube fiber + > 5 cm bare fiber, no connectors) | 7910511-A |
| AM20, C-Band 20 GHz Intensity modulator for analog applications (PMF-PMF, > 1.2 m 900 µm loose tube fiber with connector, FC/PC connectors) | 792000980 |
| AM20, C-Band 20 GHz Intensity modulator for analog applications (PMF-PMF, > 1.2 m 900 µm loose tube fiber with connector, FC/APC connectors) | 7910508-A |
| AM40, C-band 40 GHz Intensity modulator for analog applications (PMF-PMF, > 1.3 m 900 µm loose tube fiber + > 5 cm bare fiber, no connectors) | 7910512-A |
| AM40, C-band 40 GHz Intensity modulator for analog applications (PMF-PMF, > 1.2 m 900 µm loose tube fiber with connector, FC/PC connectors) | 792000990 |
| AM40, C-band 40 GHz Intensity modulator for analog applications (PMF-PMF, > 1.2 m 900 µm loose tube fiber with connector, FC/APC connectors) | 7910507-A |



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