# RF Over Fiber Analog/Digital Link System

## (10MHz ~ 40GHz, SM28 Fiber)

This series of RF over Fiber (RFOF) links is designed to transmit both analog and digital RF signals with high fidelity, covering frequencies up to 40 GHz over distances as far as 20 km. The system works by converting an electrical RF signal into an optical signal using either a directly modulated laser or an external modulator at the transmitter. On the receiving end, a high-linearity photodiode and low-noise amplifier convert the optical signal back into the RF signal, ensuring a transparent data transmission channel. These modules support a wide range of wavelengths from 1310 nm to 1650 nm, and incorporate Wavelength Division Multiplexing (WDM), allowing multiple RF channels to share a single optical fiber. Furthermore, it has an option using WDM adaptors for bidirectional RF communication over a single fiber strand.

The system is housed in a network-ruggedized rack case for ease of operation and is applicable in various fields, including telecommunications, satellites, radio telescopes, distribution antennas, and broadcasting. For instance, point-to-point antennas can be connected over fiber spanning several kilometers, or base stations can link to remote sector antennas using RF over fiber technology. Similarly, satellite antennas can be connected to remote control sites via fiber for efficient RF signal transmission. Both low noise RF amplifiers and optical amplifier can be incorporated to reduce noise figure.

## Features

- 0.01 ~ 40 GHz
- Up to 100 km
- Dispersion Compensation
- Loss Compensation
- Analog or Digital
- Low Distortion
- Stable

## Applications

- GSM Repeater
- CDMA Repeater
- WCDMA Repeater
- PHS Repeater
- Digital TV Repeater
- Broadcast Repeater

## Specifications

| Parameter | Min | Typical | Max | Unit |
|---|---|---|---|---|
| Optical Wavelength | 1310 ± 20 | 1490 ± 20 | 1550 ± 20 | nm |
| Optical Output Power | 2 | 5 | 8 | dBm |
| Optical Input Power | -16 | | -6 | dBm |
| RF Frequency Range | 0.01 | | 40 | GHz |
| | 20 | | 800 | MHz |
| Flatness | | 4 | 6 | dB |
| RF Output Power (@-10dBm optical input) | | | -30 | dBm |
| Input RF Return Loss | 10 | 12 | | dB |
| RF Input Power | -45 | -40 | -30 | dBm |
| RF AGC Variation | | ± 2 | | dB |
| IMD 2nd Order (two input tones at -20dBm) | 32 | 50 | | dB |
| IMD 3nd Order (two input tones at -20dBm) | 55 | | | dB |
| Noise (0dB RF gain, 0dB optical decrease)* | -90 | | -130 | dBm/Hz |
| Link Gain | | 0 | | dB |
| Delay | 60 | | | ns |
| Fiber Type | Single Mode | 9μm /125μm | | |
| RF Impedance | | 75 | | Ω |
| RF Connector | | F-Type | | |
| Power Consumption | 3 | | | W |
| Weight | 0.5 | | | kg |
| Operating Temperature | -20 | | 50 | °C |
| Storage Temperature | -45 | | 85 | °C |

***** Adding a low noise RF amplifier can reduce the noise figure by about 15dB



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## Dimensions (mm)

*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

## Operation Instruction

- Connect the optical connector on the front
- Connect the RF connector on the front
- Connect AC power (110-240VA) using the accompanied power cord
- Turn on the power rock switch on the back panel
- The system should function smoothly
- Any issues, please email us

## Ordering Information

| | ☐ | ☐ | ☐ | ☐☐ | ☐☐ | ☐☐ | ☐ | ☐ |
|---|---|---|---|---|---|---|---|---|
| **Prefix** | **Type** | **Wavelength** | **Direction*** | **Link Length** | **Max RF Frequency** | **Channel #** | **Fiber Connector** | **RF Connector** |
| **RFOF-** | Standard = 2<br>Special = 0 | 1310 nm = 1<br>1550 nm = 2<br>1410 nm = 3<br>IUT 1 = A<br>IUT 2 = B<br>IUT 3 = C<br>IUT 4 = D<br>IUT 5 = E<br>IUT 6 = F<br>IUT 7 = G<br>Special = 0 | One Direction = 1<br>Bidirectional = 2 | < 5km = 01<br>5km = 05<br>10km = 10<br>15km = 15<br>20km = 20 | 2GHz = L2<br>6GHz = L6<br>10GHz = 10<br>15GHz = 15<br>20GHz = 20<br>30GHz = 30<br>40GHz = 40<br>100MHz = 01<br>500MHz = 05<br>800MHz = 08 | 1 Transmitter = T1<br>1 Receiver = R1<br>1TX and 1RX = X1<br>2TX and 2RX = X2<br>3TX and 3RX = X3<br>NTX and NRX = XN<br>Special = 0 | FC/APC = 2<br>FC/UPC = 3<br>SC/APC = 4<br>SC/UPC = 5<br>LC/APC = A<br>LC/UPC = U<br>Special = 0 | SMA = 1<br>N type = 2<br>Special = 0 |

**Note**:

* Bidirectional means two-way communications via a single fiber link.



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## Application Notes

**Fiber Core Alignment**
Note that the minimum attenuation for these devices depends on excellent core-to-core alignment when the connectors are mated. This is crucial for shorter wavelengths with smaller fiber core diameters that can increase the loss of many decibels above the specification if they are not perfectly aligned. Different vendors' connectors may not mate well with each other, especially for angled APC.

**Fiber Cleanliness**
Fibers with smaller core diameters (<5 μm) must be kept extremely clean, contamination at fiber-fiber interfaces, combined with the high optical power density, can lead to significant optical damage. This type of damage usually requires re-polishing or replacement of the connector.

**Maximum Optical Input Power**
Due to their small fiber core diameters for short wavelength and high photon energies, the damage thresholds for device is substantially reduced than the common 1550nm fiber. To avoid damage to the exposed fiber end faces and internal components, the optical input power should never exceed 20 mW for wavelengths shorter 650nm. We produce a special version to increase the how handling by expanding the core side at the fiber ends.


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