

# Multi-Channel Programmable 4.0GHz RF over Fiber System



Generic photo used for illustration purpose only.

**RFOptic's** multi-channel programmable RFoF system provides RF performance that is superior to coaxial cable interface. The system is composed of two identical terminals that are connected to each other by single mode fibers (SMF). The system is tailored to the 5G cellular band and covers the entire 0.5MHz to 4.0GHz bandwidth. The system can be delivered with two configurations; where each enclosure contains two RFoF transmitters (Tx) and two RFoF receivers (Rx). The double system is offered with four RFoF Tx units and four RFoF Rx units. All the transmitters use the same 1310nm optical wavelength (or mix with 1550nm transmitters) to transmit the RF signal to the corresponding receivers in an identical second enclosure (see page #3 B5 and B6 enclosure/modules). This flexibility of configuration and the sub-system remote management and control functionality through HTML/REST/SNMP interface allow the system to handle very different application requirements.

### Key Features:

- Integrated and flexible multi-channel RFoF sub-systems.
- Full support for the 0.5MHz to 4.0GHz bandwidth.
- Excellent linearity, gain flatness, and gain control.
- Programmable RF and Optical performance.
- Built-in end-to-end diagnostics reduces installation and maintenance time.
- Integrated RF power sensors.
- Reduced gain variation over temperature option.
- Remote management and control via HTML/REST/SNMP interface

Both enclosures are Tx and Rx RFoF terminal units. Each of these include LNAs and variable attenuators which can be used to customize the Noise Figure, Input P1dB, and IP3 over wide range of values. For special applications requiring temperature stability operation, a unique optional temperature compensation algorithm supports  $\pm 0.5$  dB over  $100^{\circ}\text{C}$  variation of the ambient temperature. The RFoF link has excellent gain flatness with 0.5dB gain adjustment and tracking between different links.

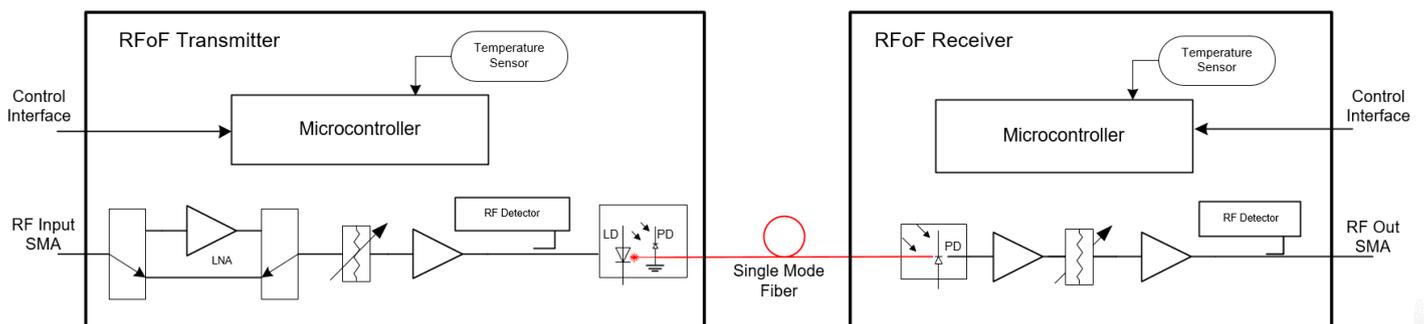
### Configuration:

- Two configurations in 19" 1U Indoor enclosure
- Two RFoF Tx 1310 nm units and two Rx units
- Four RFoF 1310 nm Tx units and Four Rx units
- Outdoor Configuration is available
- Option: Mix of 1310 and 1550nm Tx transmitters

### Applications:

- 5G test sites
- DAS
- Distributed Antenna

Each of the signals is transmitted over an RFoF programmable link. A simplified block diagram of such a link is shown below.



**Bi-directional Programmable 4.0GHz RF over Fiber Sub-System, November 24, 2021**

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## Multi-Channel Programmable 4.0GHz RF over Fiber System Specifications

RF Performance <sup>[1]</sup>	Unit	Specification (typical)	
		LNA Off	LNA ON
Frequency Range	MHz	0.5 - 4000	0.5 - 4000
Nominal Link Gain (adjustable) <sup>[2]</sup>	dB	14	45
Input Power Range	dBm	(-60) – (0)	(-60) – (0)
Tx/Rx Attenuators 0 to 31dB, 0.5 step	dB	0.5	0.5
Gain Flatness	dB	±2	±2
Input P1dBc <sup>[3]</sup>	dBm	-2	-33
Noise Figure <sup>[3]</sup>	dB	25	5
Calculated SFDR <sup>[3]</sup>	dB/Hz <sup>2/3</sup>	105	105
Max Input Return Loss	dB	-12	-12
Max Output Return Loss	dB	-12	-12
Maximum Input No damage	dBm	+20	+20
Input / Output impedance	Ohm	50	50
<b>Optical and Electrical</b>			
Laser diode wavelength <sup>[4]</sup>	µm	1.31	
System Monitor & Control	-	HTML/REST/SNMP	
Optical Power <sup>[5]</sup>	mw	3	
Power	-	110/220 VAC	
<b>Mechanical and Environmental Parameters</b>			
19" 1U Enclosure dimensions	mm	445(W)* 476(L)*44(H)	
Number of Unidirectional links	-	2 Tx and 2 Rx / 4 Tx and 4 Rx	
RF Input/Output Connectors	-	SMA	
Optical Connectors	-	LC/UPC	
Power Connectors	-	HP Socket	
Data Connector	-	RJ-45	
Operating temperature	°C	-20 to +70	
Storage temperature	°C	-40 to +85	

[1] The specifications are for 4.0GHz RFoF link between enclosure/module B5 to enclosure/module B6 with short fiber patch.

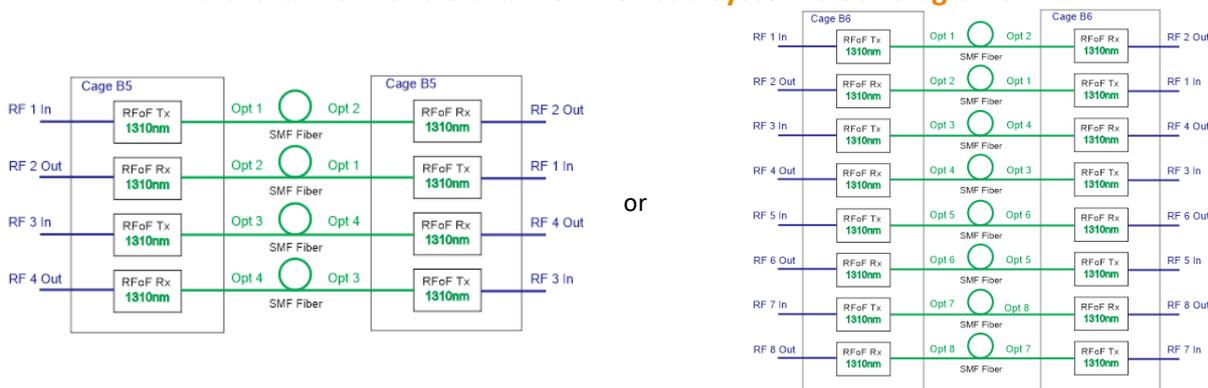
[2] The link Gain and IP1dB can be adjusted by the Tx Attenuator using the user software.

[3] Noise Figure and Input P1 dB are measured at 2.0GHz and can be adjusted by using the Tx Attenuator and 'LNA Off/On'.

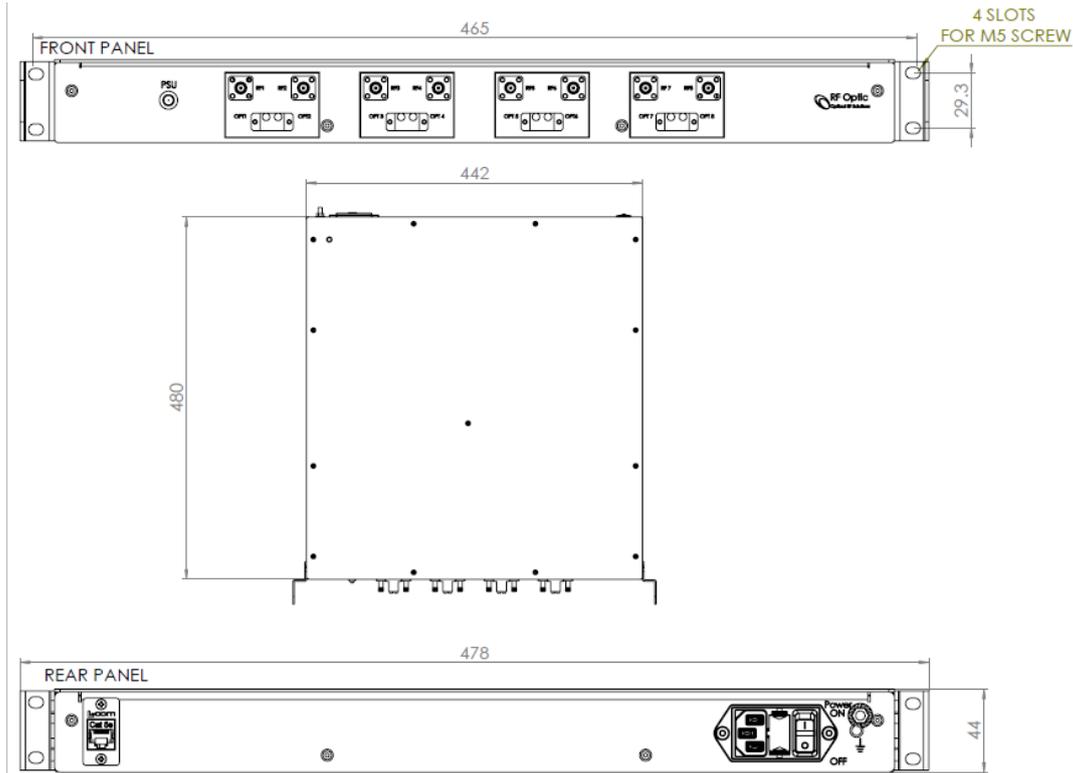
[4] Optional: 1.55 µm wavelength of the transmitter.

[5] Minimum optical power 1.6 mW (2 dBm).

### Multi-channel 4 and 8 channel RFoF sub-system block diagrams



## 19" 1U enclosure drawings



### Ordering Information:

For specific configuration, define the following:

1. Enclosure type – 19" 1U Generic
2. Upper Frequency - 4.0GHz
3. Number of Unidirectional links – 2 or 4 (B5 module) or 4 (B6 module)
4. Communication type - HTML
5. Power - 220 VAC
6. Optical connectors - LC/UPC
7. RF connectors – SMA

Part Number	Description
RFoFc-I1SL2T2RIHNA04B5	19" 1U Enclosure, 2*RFoF 4GHz Tx 1310nm units, 2*RFoF 4GHz Rx units, 220VAC, HTML, SMA, LC/UPC
RFoFc-I1SL4T4RIHNA04B6	19" 1U Enclosure, 4*RFoF 4GHz Tx 1310nm units, 4*RFoF 4GHz Rx units, 220VAC, HTML, SMA, LC/UPC