

# Multi-Channel Programmable 6.0GHz RF over Fiber Bi-Dir System (B1-B2)



Generic photo used for illustration purpose only. See RFoF 6GHz Bi-directional sub-system modules drawings in page #3.

**RFOptic's** bi-directional programmable RFoF system provides RF performance that is superior to coaxial cable interface. The system is composed of two terminals (B1, B2) that are connected to each other by single mode fibers (SMF). The system is tailored to the 5G cellular band and covers the entire 0.5GHz to 6GHz bandwidth. Each enclosure contains 4 RFoF terminals that use CWDM technology to route RF signal in both directions on a fiber connection. The bi-directional RFoF channels that are formed in this way provide excellent SFDR and are independently configurable. 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. Bi-directional link operation requires attention to loop gain as detailed in RFOptic's Bidirectional System Loop Gain Application Note.

### Key Features:

- Integrated and flexible multi-channel RFoF sub-systems.
- Full support for the 0.5GHz to 6.0GHz 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.

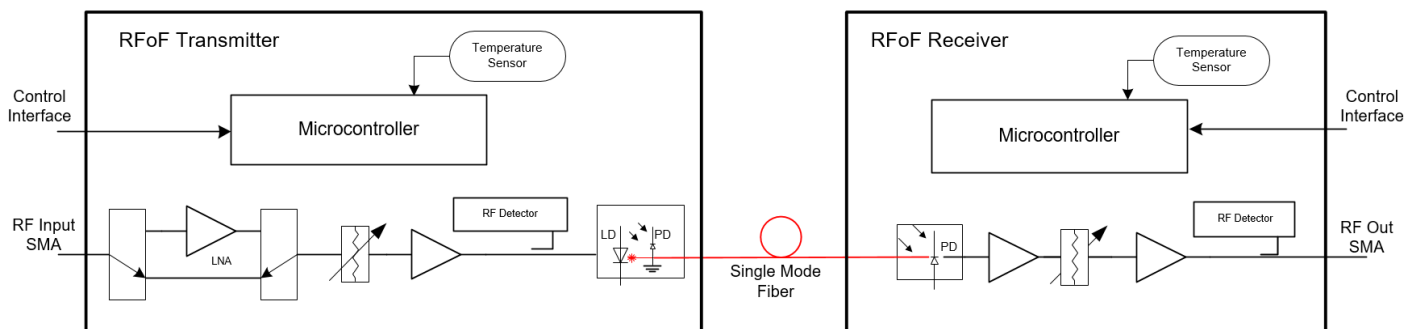
### Configuration:

- Two 19" 1U indoor enclosures
- B1 and B2 cages with 4 pairs of RFoF Tx 1310nm/1550nm and 4 Rx units integrated with combiners and filters.
- Outdoor configuration is available.

### Applications:

- 5G test sites
- DAS
- Distributed Antenna

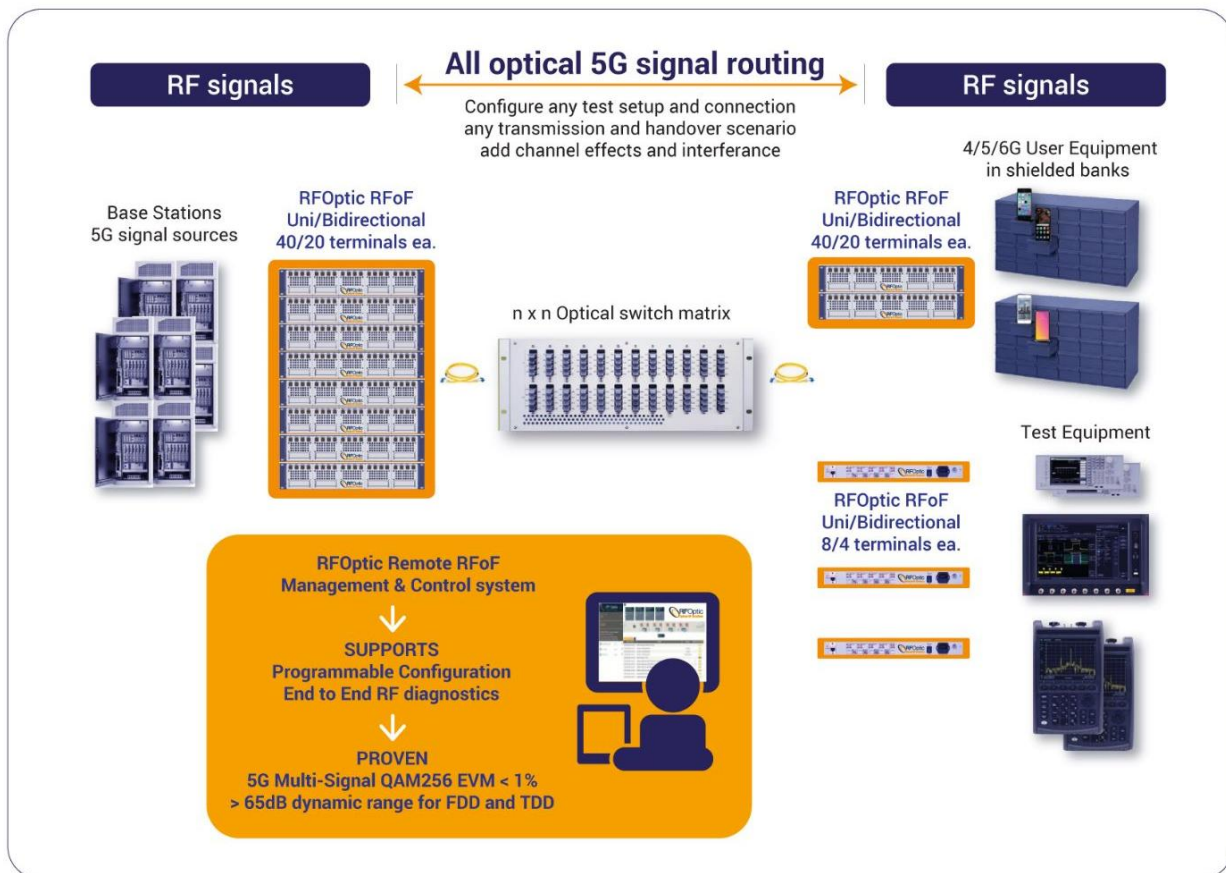
Each of the signals is transmitted over an RFoF programmable link. A simplified block diagram of such a link is shown below.



## 5G Testing Applications overview

Interoperability test of cellular 4G/5G and 6G as well as product testing has been migrating to use RFoF infrastructure as the preferred interface between test equipment and devices under test. The obvious benefits of optical fiber routing include compact and low-cost interconnects, excellent EMC performance and effectively unlimited bandwidth for the RF test environment that insures that the expensive infrastructure can be migrated to future RF bandwidth needs easily at minimal expense. Unlike coaxial cables the RFoF transport of test signals provides excellent and frequency independent dynamic range performance that can be upgraded as new frequency bands are introduced. RFOptic offers proven RFoF products with exceptional performance that are specifically tailored to the demanding requirements of such applications. All RFOptic RFoF terminals are supported with API driven Management and Control system which makes tight and efficient integration of the testing environment simple and flexible. Having done so the integrated test environment can be configured to handle different test protocols in a matter of minutes with minimal or no setup crew involvement. This flexibility is a huge multiplier in test equipment usage rates and provides access of the test infrastructure to many more applications.

The setup diagram below shows an implementation of such flexible environment with RFoF terminals and an optical switch matrix serving as the main interconnect fabric between Signal sources, devices under test and test equipment. RFOptic's Management and Control system which is API enabled is integrated into the test bed configuration management along with other equipment which allows that test environment to meet any test configuration when and as it may be needed. Furthermore, the flexible programmable environment can support multiple concurrent tests as long as there are sufficient and free resources to handle them all. Immediate diagnostics are available at any critical signal transmission point make calibration and validation simple and quick. No more test equipment sitting idle on work benches and no more setup crews working long shifts to reroute and reconnect equipment and devices. In fact, the environment can be configured to report usage levels and therefore it is simple to apply OPEX criteria to optimize management decisions including Buy/Rent.

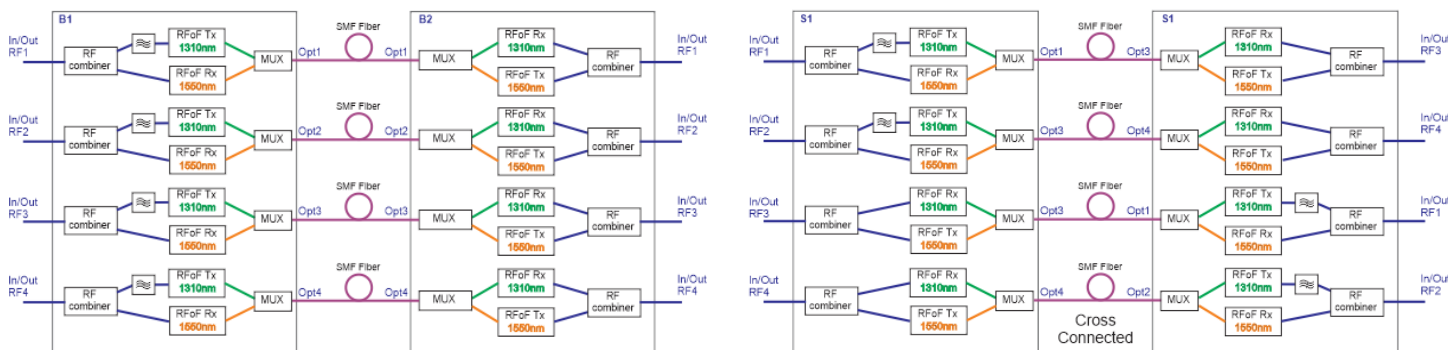


## Multi-Channel Programmable 6.0GHz RF over Fiber Bi-Dir System Specifications - B1-B2 Configuration

RF Performance <sup>[1]</sup>	Unit	Specification (typical)	
		LNA Off	LNA ON <sup>[3]</sup>
Frequency Range	MHz	500 - 6000	500 - 6000
Nominal Link Gain (adjustable) <sup>[1]</sup>	dB	-4	5
Tx/Rx Attenuators 0 to 31dB, 0.5 step	dB	0.5	0.5
Gain Flatness	dB	±2.5	±2.5
Input P1dBc <sup>[2]</sup>	dBm	7	-22
Noise Figure <sup>[2]</sup>	dB	32	12
Calculated SFDR <sup>[2]</sup>	dB/Hz <sup>2/3</sup>	106	100
Max Input Return Loss	dB	-11	-11
Max Output Return Loss	dB	-11	-11
Maximum Input No damage	dBm	+20	+20
Input / Output impedance	Ohm	50	50
<b>Optical and Electrical</b>			
Laser diode wavelength	µm	1.310/1.550	
System Monitor & Control	-	HTML/REST/SNMP/USB	
Optical Power	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 bi-directional links	-	4	
RF Input/Output Connectors	-	SMA	
Optical Connectors <sup>[4]</sup>	-	LC/UPC	
Power Connectors	-	HP Socket	
Data Connector	-	RJ-45	
Operating temperature	°C	-20 to +70	
Storage temperature	°C	-40 to +85	

- [1] The link Gain is measured using a short fiber patch cord, and can be adjusted by the Tx Attenuator using the user software.
- [2] Noise Figure and Input P1 dB are measured at 3GHz, and can be adjusted by using the Tx Attenuator at 'LNA Off/On'.
- [3] Due to loop gain considerations, for LNA Off the Rx attenuators are set to 2dB. For LNA ON both Rx attenuators are set to 21dB.
- [4] FC/APC and SC/APC optical connectors are optional.
- [5] Safety EN60950-1:2006(2nd); EMC: ETSI EN 300 386 v1.6.1 (2012-04) and FCC CFR-47 part 15 Sub part B.

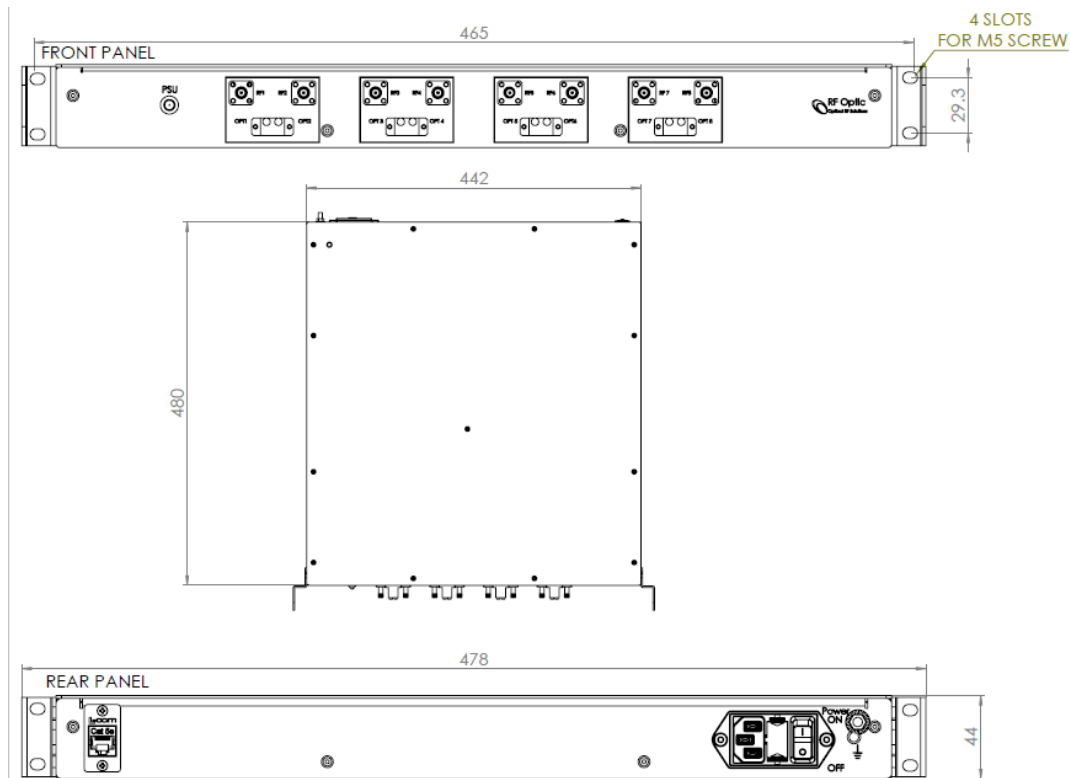
### Bidirectional Multi-Channel 6.0GHz RfOf sub-system block diagrams



**Multi-Channel Programmable 6.0GHz Bi-Directional RF over Fiber B1-B2 Config. Sub-System, February 2026**

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### 19" 1U enclosure drawings



### Ordering Information:

For specific configuration, define the following:

1. Enclosure type – 19" 1U Generic
2. Upper Frequency - 6.0GHz
3. Four of bi-directional 1310/1550nm terminals including RF combiners and filters
4. Communication type – HTML/REST/SNMP/USB
5. Power – 220 VAC
6. Optical connectors - LC/UPC
7. RF connectors – SMA

ERP P/N	Marketing P/N	Description
SYSA00329	RFoFc-I1SL4T4RIHNA06B1	19" 1U Enclosure with 4*RFoF 6GHz bidirectional 1310nm terminals, combiners, filters, 1310/1550nm multiplexers, SMA, LC/UPC, HTML
SYSA00331	RFoFc-I1SL4T4RIHNA06B2	19" 1U Enclosure with 4*RFoF 6GHz bidirectional 1550nm terminals, combiners, 1310/1550nm multiplexers, SMA, LC/UPC, HTML
SYSA00333	RFoFc-I1SL4T4RIHNA06S1	19" 1U Enclosure with 4*RFoF 6GHz bidirectional 2*1310+2*1550nm terminals, combiners, filters, 1310/1550nm multiplexers, SMA, LC/UPC, HTML