1:1 Redundant Multi-Channel Programmable 2.5GHz RF over Fiber System

Indoor and outdoor enclosures. The number of ports will differ according to required configuration.

Key Features:

- Integrated, flexible, and reliable multi-channel RFoF sub-system
- Full support for the 10MHz to 2.5GHz bandwidth
- Excellent linearity, gain flatness and gain control
- Programmable RF and Optical performance
- Built-in end-to-end diagnostics which reduce installation and maintenance time
- Integrated RF power sensors
- Reduced gain variation over temperature option
- Remote management and control via HTML/REST/SNMP interface

Applications:

- High-reliability broadcast networks
- Emergency band communication networks
- Unmanned or unserviceable remote installations

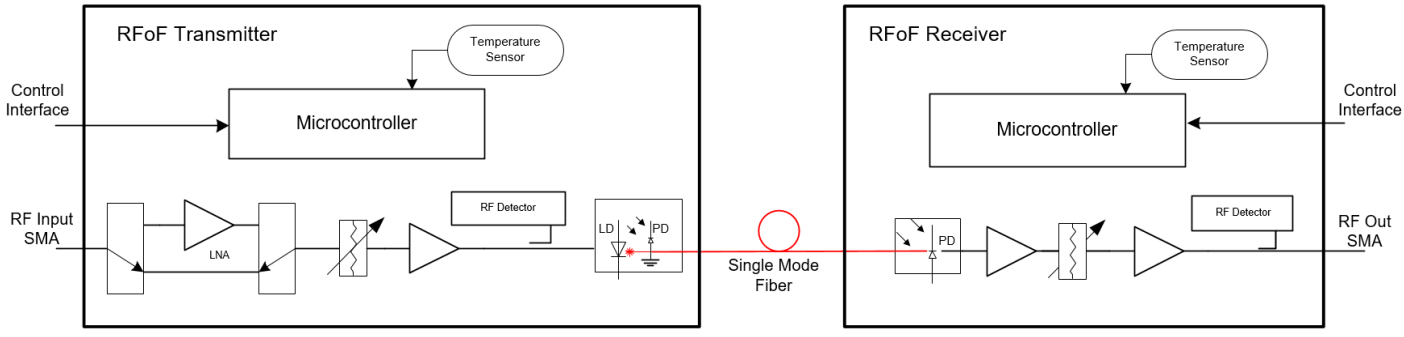
Configuration:

- One 19" 1U indoor enclosure and one outdoor IP-54 enclosure
- Indoor enclosure with 2 or 4 redundant channels and dual redundant hot-swappable power supplies.
- Outdoor enclosure with 2 or 4 redundant channels and dual redundant power supplies.

RFOptic's high reliability multi-channel programmable RFoF redundant system provides RF performance that is superior to the coaxial cable interface. The system is composed of 2 or 4 redundant auto-switch RFoF channels that are connected to each other by independent single-mode fibers (SMF). It is tailored to the 5G cellular band and covers the entire 10MHz to 2.5GHz bandwidth. This 2 or 4-channel system is offered with 2 or 4 RFoF Tx units and 2 or 4 RFoF Rx units in each enclosure. Each pair of these units forms a redundant group with a main channel and a backup channel. Normally the main channel is used for RF transport, and the backup channel is in standby mode. In the event of an optical failure in the main channel, the backup channel is automatically routed to provide uninterrupted service. Under M&C control, it is possible to manually effect a switchover from main to backup for maintenance and validation. The system includes an indoor enclosure and a hermetically sealed IP-54 rated outdoor enclosure. Special tactical SM fiber bundle cables may be used to connect the two enclosures.

Both enclosures include high-reliability redundant Tx and Rx RFoF terminal units with auto-switch on optical power loss. Each of these RFoF channels includes LNAs and variable attenuators, which can be used to customize the Noise Figure, Input P1dB, and IP3 over a wide range of values. For special applications requiring temperature stability operation, a unique optional temperature compensation algorithm supports ±0.5 dB over 100°C variation of ambient temperature. The RFoF link has excellent gain flatness with 0.5dB gain adjustment and tracking among different links. Furthermore, mixed links of low and high frequencies can be accommodated on the same link.

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



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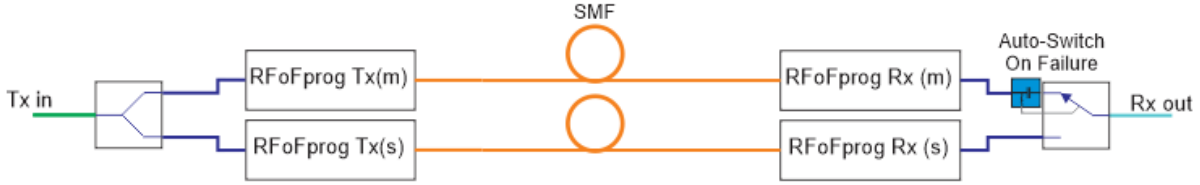
Redundant Multi-Channel (2/4) Programmable 2.5GHz RF over Fiber System Specifications

RFoF Link Specifications	Unit	Specification LNA "OFF" (typical)	Specification LNA "ON" (typical)
Frequency Range	MHz	10 – 2500	10 - 2500
Adjustable Link Gain (nominal value) [1,5]	dB	8	38
Attenuator range, step (Tx, Rx) [2]	dB	31.5, 0.5	31.5, 0.5
Gain Flatness	dB	±1.4	±1.4
1dB compression point [3]	dBm	0	-30
Noise Figure [3,5]	dB	28	8
SFDR (calculated) [3,5]	$dB/Hz^{2/3}$	101	97
Gain Flatness any 36 MHz	dB	±0.25	±0.25
Maximum Input No damage	dBm	20	20
Spurious	dBc	-85	-75
VSWR Input / Output	dBm	1.7:1	1.7:1
Group Delay (excluding interconnect fiber)	ns	≤ 15	≤ 15
Input / Output impedance	Ohm	50	50
Optical and Electrical			
Laser diode wavelength	µm	1.310	1.310
Optical Power in the fiber	mw	2.3 ±0.5	2.3 ±0.5
System Enclosure			
Indoor Chassis	1U 19'' Rack	1U 19'' Rack-mountable system, which is capable of mounting up to 8 Tx / Rx units, splitters, redundancy switches, two PSU, and M&C controller module with SNMP/HTML interface.	
Outdoor Chassis	mm	Size: 357.5 (L) x 330 (W) x 85 (H) outdoor enclosure IP-54, which is capable of mounting up to 8 Tx / Rx units, splitters, redundancy switches, PSU and M&C controller module with SNMP/HTML interface.	
Number of Modules per Enclosure (Tx/Rx)	4 or 8	Each pair; main and backup which forms a redundant channel	
Power Supply redundant		110-220V AC Input; VDC is optional for the outdoor enclosure	
Remote Management		HTML/SNMP	
Data Interface		RJ-45 (for indoor chassis and for outdoor enclosure)	
Optical Connector		FC/APC (for Indoor chassis) / MPO (for outdoor chassis)	
RF Connector		SMA (Indoor) / Type N (Outdoor)	
Operating temperature	°C	-20 to +70	
Storage temperature	°C	-40 to +85	
EMC and Safety	-	CE & FCC	

[1] LNA 'ON' or 'OFF' is selected by RFOptic manufacturing or by using the RFoF user software.
[2] *No Attenuation* is the default for Tx and Rx units. Attenuation values can be selected by the user software.
[3] Noise Figure, P1dB are measured at 1.5GHz; Gain, NF and P1dB values can be selected by using 'LNA Off' or 'LNA ON' and Tx Attenuator.
[4] For an additional information of this product, see brochure of *Programable 2.5GHz RF Over Fiber.*
[5] NF and Gain are provided for a short patch fiber. Network optical connection losses will reduce the gain and increase the NF respectively.

Simplified 1:1 Redundant Programmable 2.5GHz RF over Fiber block diagram



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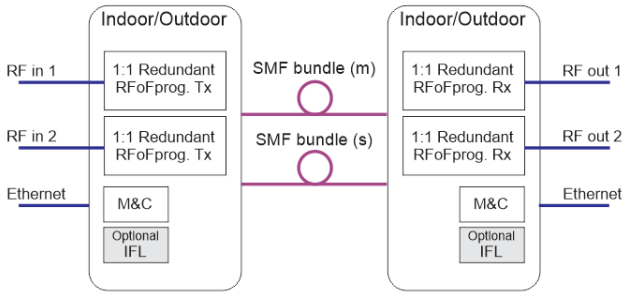
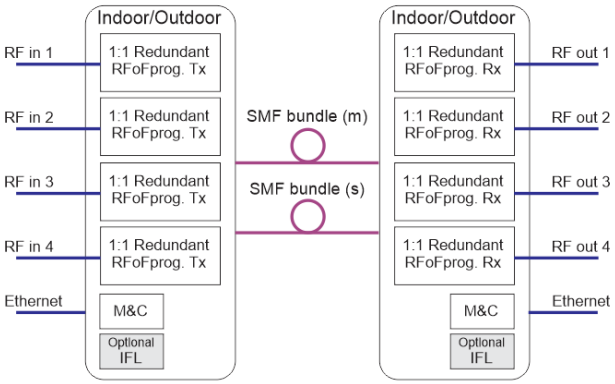
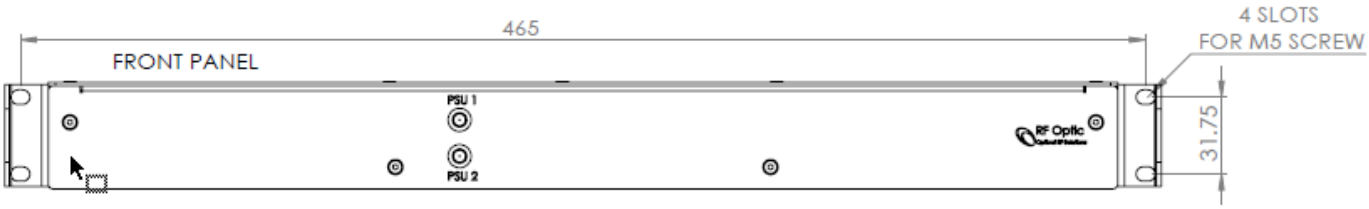
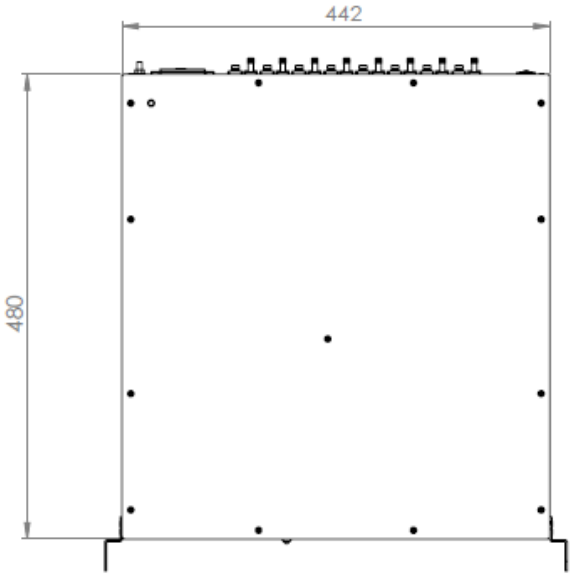
2 / 4 Channel 1:1 Redundant Programmable 2.5GHz RF over Fiber System Bloc diagrams

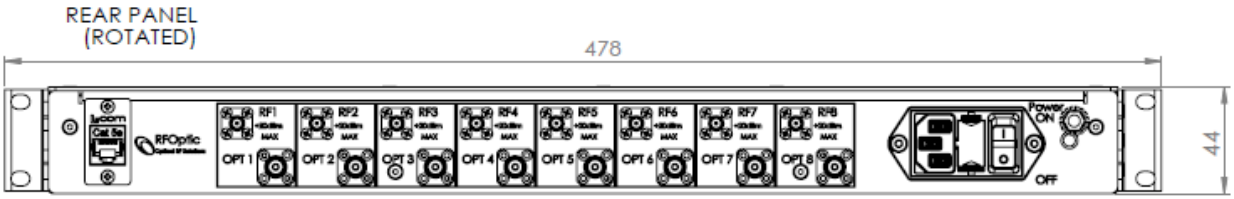




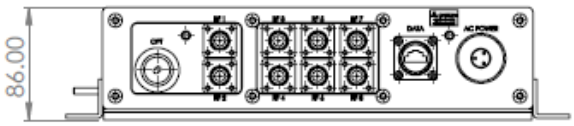
19” 1U enclosure drawings

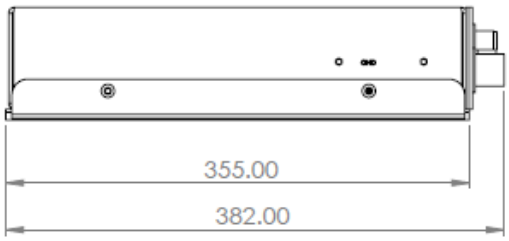


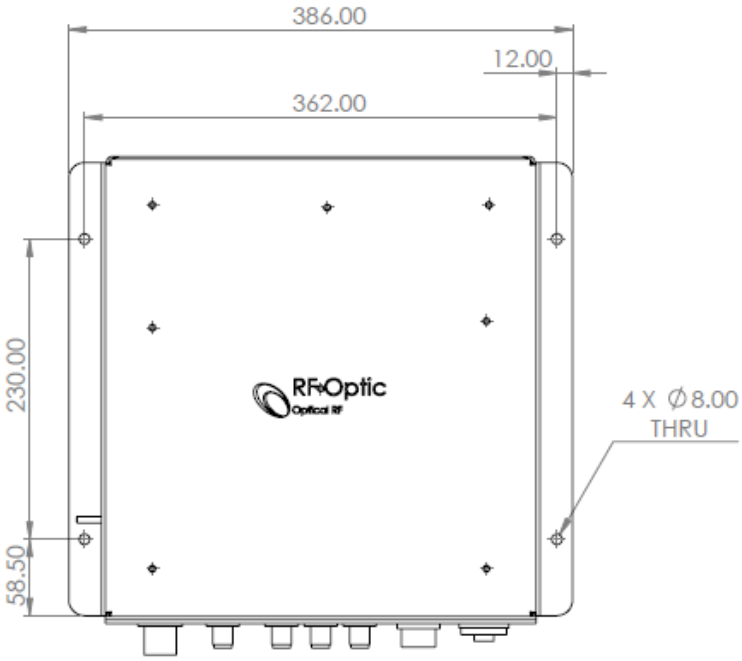




B8 Outdoor enclosure drawings







Ordering Information:

Part Number	Product Description
RFoFc-I4SF0T4RIHYR02S	1U 19'' Rack-mountable system with 2.5GHz RFoF with 2 Rx with 1:1 redundancy, IFL and dual redundant AC Power Supply.
RFoFc-I4SF0T8RIHYR02S	1U 19'' Rack-mountable system with 2.5GHz RFoF with 4 Rx with 1:1 redundancy, IFL and dual redundant AC Power Supply.
RFoFc-B8NM4T0RIHYA02S	B8 Outdoor system with 2.5GHz RFoF with 2 Tx with 1:1 redundancy, IFL and AC power supply.
RFoFc-B8NM8T0RIHYA02S	B8 Outdoor system with 2.5GHz RFoF with 4 Tx with 1:1 redundancy, IFL and AC power supply.
RFoFc-B8NM4T0RIHYD02S	B8 Outdoor system with 2.5GHz RFoF with 2 Tx with 1:1 redundancy, IFL and DC power supply.
RFoFc-B8NM8T0RIHYD02S	B8 Outdoor system with 2.5GHz RFoF with 4 Tx with 1:1 redundancy, IFL and DC power supply.

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