

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



Generic photo used for illustration purpose only. See 2.5GHz Bi-directional System enclosure/modules drawings in pages 3, 4.

RFOptic's high reliability multi-channel programmable RFoF redundant system provides RF performance that is superior to 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 in providing 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-67 rated outdoor enclosure. Special tactical SM fiber bundle cables may be used to connect the two enclosures.

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 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 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 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.

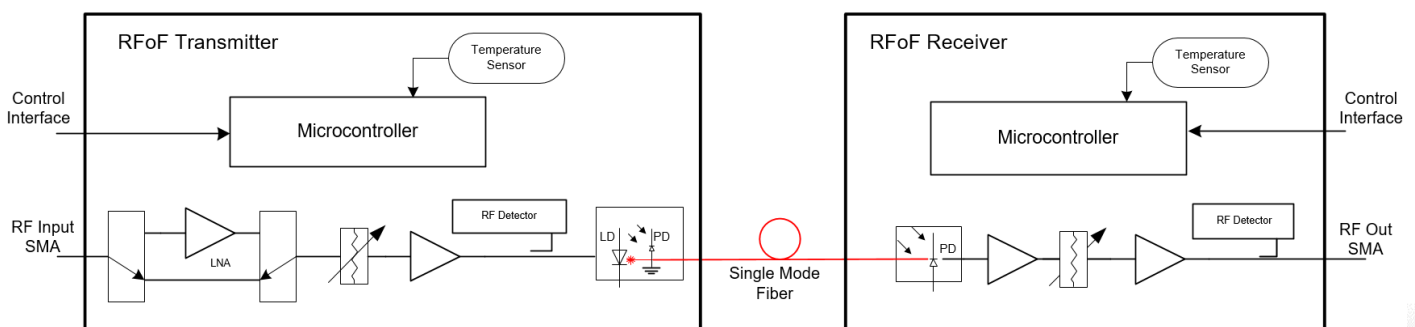
Configuration:

- One 19" 1U indoor enclosure and one outdoor IP-67 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.

Applications:

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

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



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

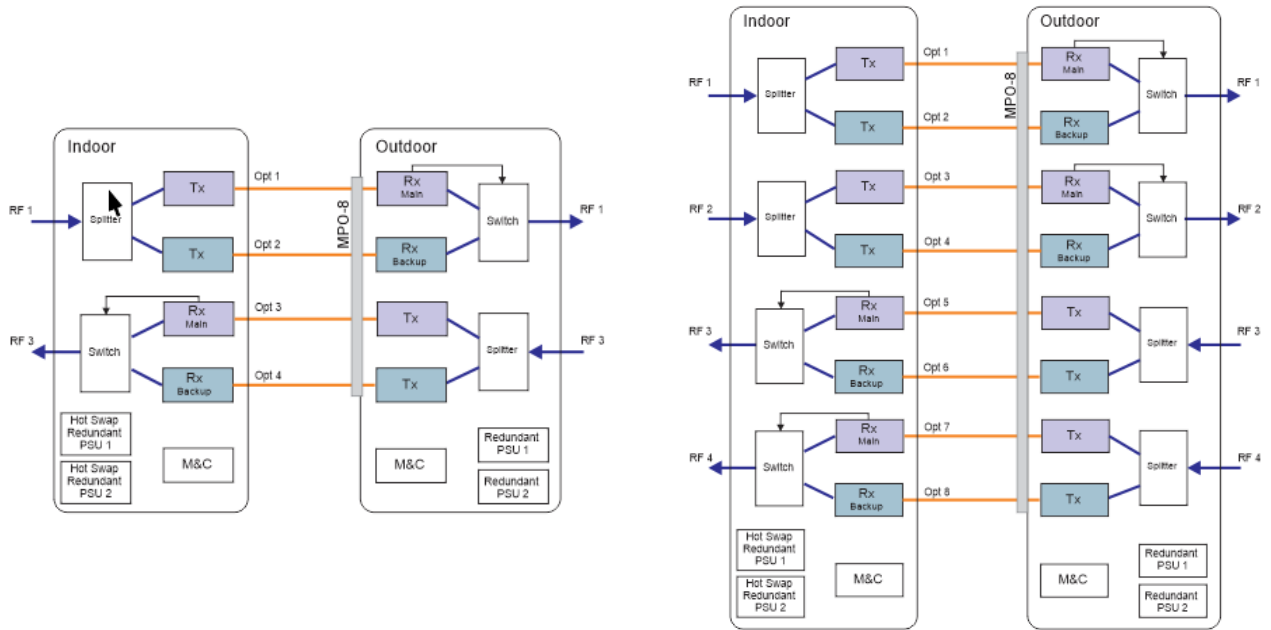
RFOF Link Specifications	Unit	Specification LNA "OFF" (typical)	Specification LNA "ON" (typical)
Frequency Range	MHz	10 – 2500	10 - 2500
Adjustable Link Gain (nominal value) ^[1]	dB	8	38
Attenuator 31 dB (Tx, Rx) ^[2]	dB	0.5	0.5
Gain Flatness	dB	±1.4	±1.4
Input P1 dB ^[3]	dBm	0	-30
Noise Figure ^[3]	dB	28	8
SFDR ^[3]	dB/Hz ^{2/3}	104	100
Gain Flatness any 36 MHz	dB	±0.25	±0.25
Maximum Input No damage	dBm	20	20
Spurious	dBm	-100	- 68
VSWR Input / Output	dBm	1.7:1	1.7:1
Group Delay	ns	≤5	≤5
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	2U 19" Rack mountable system which is capable of mounting up to 8 Tx or Rx units, Splitter modules, redundancy switches, Dual redundant hot-swappable PSU modules and M&C Controller module with SNMP/HTML interface. Front panel is customizable as per customer specific requirements.	
Outdoor Chassis Specification	mm	Size: 357.5 (L) x 330 (W) x 85 (H) This chassis is an outdoor weather proof enclosure with MIL-std connectors for Power, Control, RF & Optical interface. The enclosure is capable of mounting up to 8 Tx or Rx units, Splitter modules, redundancy switches, Dual redundant PSU modules and M&C Controller module with SNMP/HTML interface.	
Number of Modules per Enclosure (TX/RX)	4 or 8	Each pair; main and backup forms a redundant channel	
Power Supply redundant		110-220V AC Input	
Remote Management		HTML/SNMP	
Data Interface		RJ-45	
Optical Connector		SC/APC (for Indoor chassis) / MPO (for outdoor chassis)	
RF Connector		SMA (Indoor) / Type N (Outdoor) BNC/TNC with adaptor	
Operating temperature	°C	-20 to +70	-20 to +70
Storage temperature	°C	-40 to +85	-40 to +85
EMC and Safety	-	CE & FCC	CE & FCC

[1] LNA 'ON' or 'OFF' is selected by RFOptic manufacturing, or by using the RFOF user software.

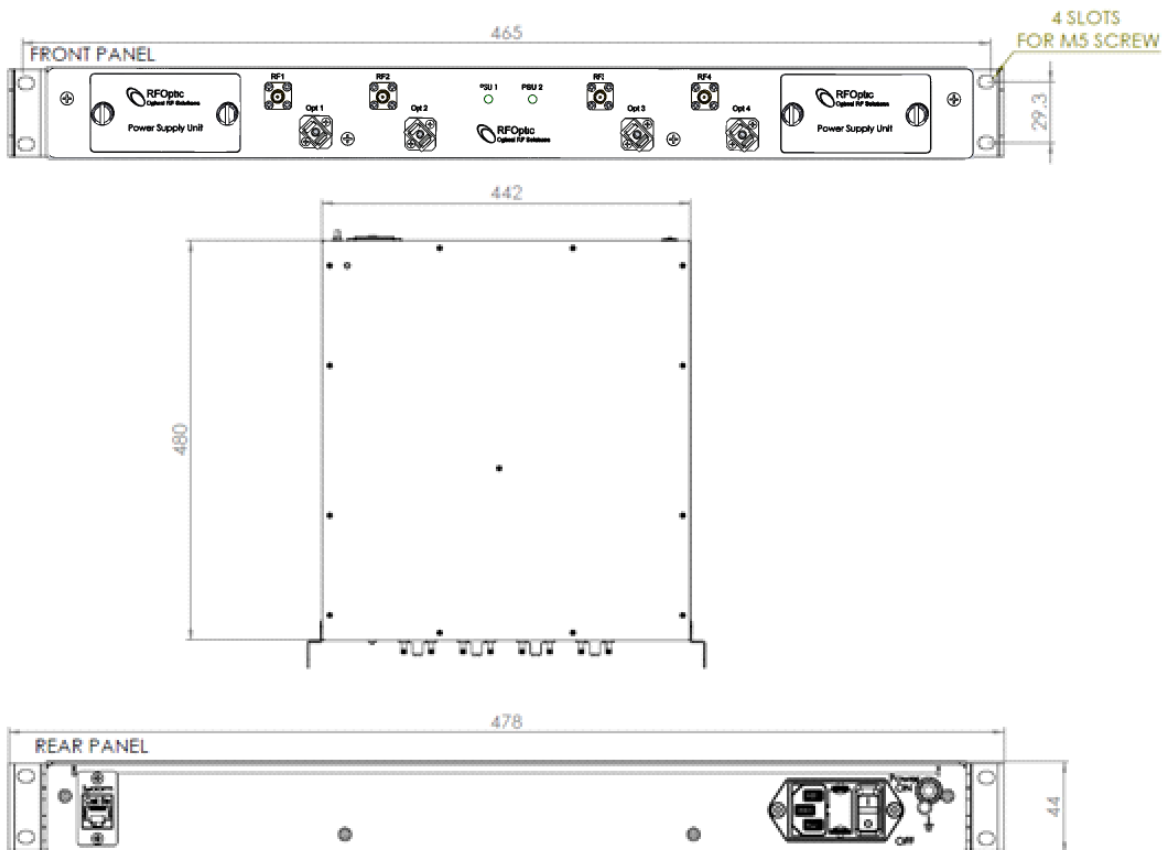
[2] *No Attenuation* is the default for Tx and Rx units. Attenuation values can be selected by the user software.

[3] Noise Figure, Input P1 dB, Input IP3 and SFDR measured at 1.5GHz, can be selected by 'LNA Off/ON' and Tx Attenuator.

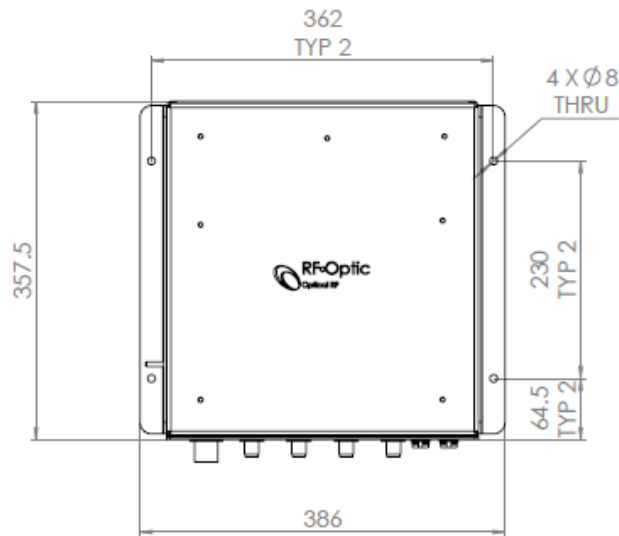
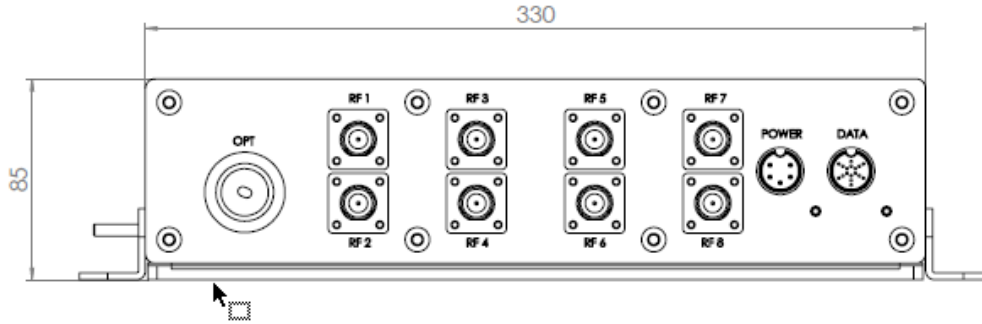
2 / 4 Channel 1:1 Redundant Programmable 2.5GHz RF over Fiber System Bloc diagrams



19" 1U enclosure drawings



B8 Outdoor enclosure drawings



Ordering Information:

Part Number	Product Description
RFoF-c-I1SS2T2RIHNA-02S1	1U 19" Rack mountable system with 2.5GHz RFoF with 1 Tx and 1 Rx both with 1:1 redundancy and dual hot swappable redundant AC Power Supply.
RFoF-c-I1SS4T4RIHNA-02S2	1U 19" Rack mountable system with 2.5GHz RFoF with 2 Tx and 2Rx both with 1:1 redundancy and dual hot swappable redundant AC Power Supply.
RFoF-c-B8NM2T2RIHA-02S1	B8 Outdoor system with 2.5GHz RFoF with 1 Tx and 1 Rx both with 1:1 redundancy and dual redundant AC power supplies.
RFoF-c-B8NM4T4RIHA-02S2	B8 Outdoor system with 2.5GHz RFoF with 2 Tx and 2 Rx both with 1:1 redundancy and dual redundant AC power supplies.