

## Programmable RFoF units – Bidirectional



## Outdoor Enclosure for Bidirectional RFoF Transceiver



### Key Features of Programmable Bidirectional RFoF Units:

- ❖ Next generation of RFoF modules with significant performance improvement
- ❖ Frequency 0.05-3GHz
- ❖ Utilizes WDM technology
- ❖ Better linearity, excellent gain flatness, and Tx, Rx and Link gain control
- ❖ Noise figure down to 6 dB with LNA
- ❖ Internal microcontroller allows RF and Optical control enabled by software
- ❖ End-to-end diagnostics reduce installation and maintenance time, enabled by software
- ❖ Gain control; S21(f) typical of  $\pm 1$  dB for 90°C variation, utilizing special algorithm
- ❖ Remote management by GUI on PC
- ❖ Impedances of 50 Ohms and 75 Ohm
- ❖ An SNMP remote management can be added
- ❖ Optional Bias-T

### Configurations of Programmable Bidirectional RFoF units:

- ❖ Outdoor enclosure (unidirectional/bidirectional)
- ❖ 1U generic enclosure
- ❖ Standalone unit

### Applications for Programmable Bidirectional RF Over Fiber units:

- ❖ Remote Antennas Communication
- ❖ Satcom
- ❖ 4G LTE
- ❖ Broadcast

RFOptic has developed an innovative compact bidirectional (2 way) RF over Fiber (RFoF) transceiver. It is comprised of an uplink of Tx and Rx (at 1550nm) and a downlink of Tx and Rx at 1310nm. The transceiver employs WDM technology to use only 1 fiber link instead of 2. An optional control card for SNMP remote management might be added at a later stage.

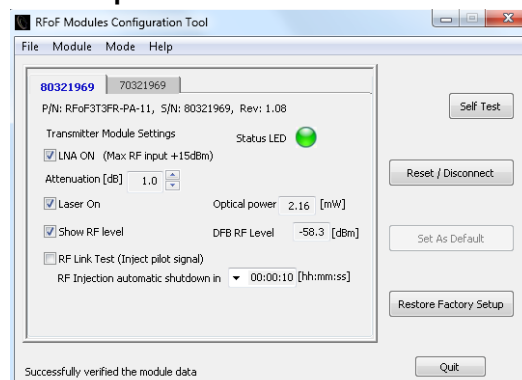
The bidirectional modules are designed for applications where an uplink as well as a downlink are required such as Transmit/Receive antenna interfaces. In such a case, applications are looking for a single fiber solution utilizing WDM method.

The internal modules are similar to the other RFoF programmable units from RFOptic. The company's programmable RFoF product line of both Tx and Rx units includes an LNA and variable attenuators that allow customers to select an optimal configuration of the noise figure, Input P1dB, IP3 providing a wide dynamic range of performances. The built-in LNA is be activated through the RFoF configuration software. It provides a low noise figure of 6 dB typical and improved MDS. The RFoF link has excellent gain flatness and can be configured to have 0.5dB gain tracking between different links. For special applications that require temperature stability operation, a unique algorithm supporting 0.5 dB over -20°C to +70C may be activated. The RFoF links operate from a flexible DC power from 5 to 12 Volts.

User-friendly RFoF software enables adjustment of the RF and Optical parameters, such as: link gain, noise figure, P1dB, optical power, LED indication and module information - either locally or remotely.

Furthermore, the RFoF link has full diagnostic capability including Tx, Rx and complete link test (Optical and RF). These features save test equipment costs, and provide real-time diagnostic of deployed links.

### Example of the RFoF Tx Screen



## Programmable 3.0 GHz RFoF Bidirectional Transceiver Typical Specifications

Electrical	Unit	Specification LNA "OFF"	Specification LNA "ON"
Frequency Range	MHz	0.5-3000	0.5-3000
Adjustable Link Gain (nominal value) <sup>[1]</sup>	dB	12	42
Attenuator 31 dB (Tx, Rx) <sup>[2]</sup>	dB	0.5	0.5
Gain Flatness	dB	±1.5	±1.5
Input P1 dB <sup>[3]</sup>	dBm	-3	-33
Noise Figure <sup>[3]</sup>	dB	23	6.5
SFDR <sup>[3]</sup>	dB/Hz <sup>2/3</sup>	104	100
Gain Flatness any 36 MHz	dB	±0.25	±0.25
Uncorrected gain variation over temperature	dB	±3.5	±3.5
Corrected gain variation over temperature <sup>[4]</sup>	dB	±1	±1
Corrected gain tracking between RFoF links <sup>[5]</sup>	dB	±0.5	±0.5
Maximum Input No damage	dBm	20	20
VSWR Input/Output	dB	1.7:1	1.7:1
Input/Output Impedance <sup>[6]</sup>	Ohm	50	50
<b>Optical and Electrical</b>			
Current consumption of Tx unit (at 5VDC)	mA	260	385
Current consumption of Rx unit (at 5VDC)	mA	225	225
Laser diode wavelength	um	1.31/ 1.55	1.31 /1.55
Optical Power in the fiber	mw	2.5 ±0.5	2.5 ±0.5
LED status indicators (Tx/Rx)	-	RGB	RGB
<b>Mechanical and Environmental Parameters</b>			
Size	mm	130*90*40	130*90*40
Operating temperature	°C	-20 to 70	-20 to 70
Storage temperature	°C	-40 to 85	-40 to 85
EMC and Safety <sup>[7]</sup>	-	CE & FCC	CE and 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 with the RFoF User Software.

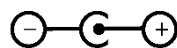
[3] Noise Figure, Input P1 dB, Input IP3 and SFDR measured at mid band, can be selected by 'LNA Off/ON' and Tx Attenuator.

[4] Using internal temperature compensation algorithm selected by the RFoF User Software.

[5] Using the Tx and/or Rx Attenuators.

[6] 75 Ohm is optional with similar VSWR, by using SMA/BNC adaptor.

[7] Safety EN60950-1:2006(2<sup>nd</sup>), EMC: ETSI EN 300 386 v1.6.1(2012-04) and FCC CFR-47 part 15 Subpart B.



DC connector: positive center plug OD: 3.5mm, ID: 1.3mm, L: 9mm

## Product Information:

<b>RFoF-3G-5531S-B1</b>	<b>3.0 GHz 1550 &amp; 1310 Tx and two Rx units with one SM Fiber and Mux, SC/APC, Programmable</b>
<b>RFoF- AC-DC-Programmable</b>	<b>Two 220/110 AC/5VDC converters for programmable RFoF need two sets of RFoF- AC-DC-Programmable for the Bidirectional link</b>
<b>RFoF Outdoor LF</b>	<b>Outdoor enclosure for RFoF, with mux, capable of holding up to four Tx and Rx units for unidirectional or bidirectional applications.</b>
<b>RFoF 1U Generic</b>	<b>Indoor 19" 1U Enclosure for RFoF, with 2 power supplies and HUB, capable of holding up to four Tx and Rx units for unidirectional or bidirectional applications</b>