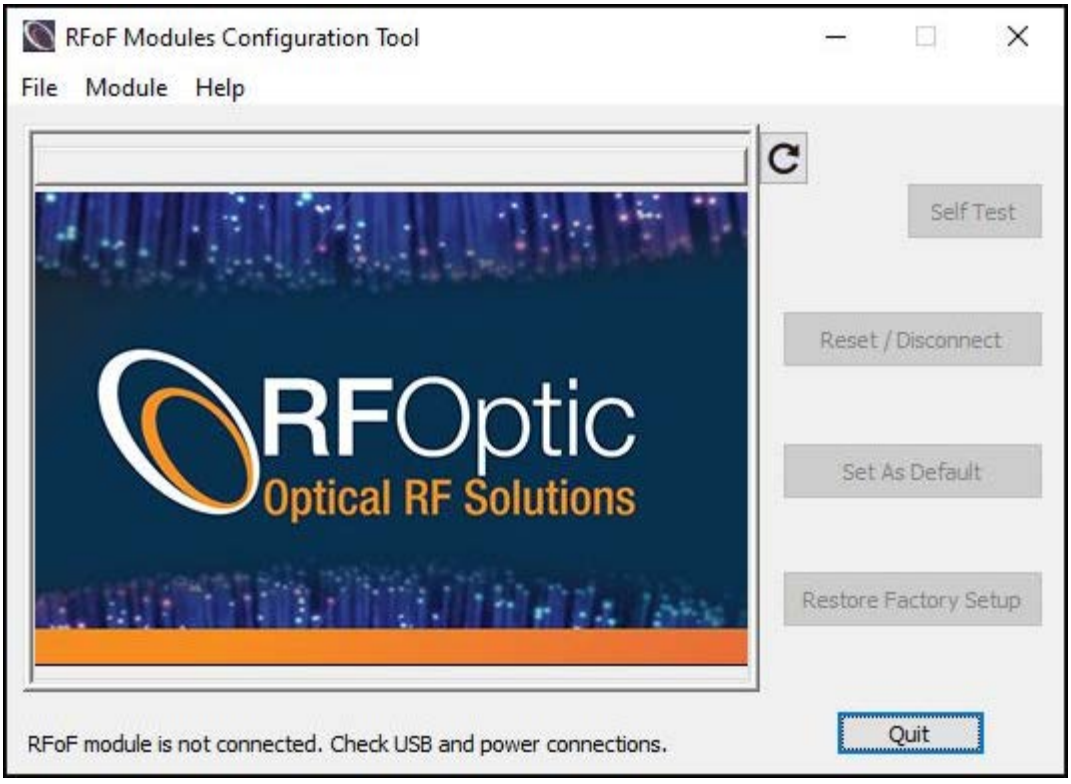
RF Optic® RFOptic configuration tool V2.0

Overview

RF Optic® The RFOptic Configuration tool is designed to be used with USB enabled RFOptic products. This software app can interface and control one or more modules including:

RFoF Link Series	**Programmable**	**Bi-Directional**	**High Frequency**	**ODL**
Getting Started guides	Get Started	Get Started	Get Started	Get Started

Overview	Using this app	Using this app
Advanced functions	Advanced guide	Advanced guide
Troubleshooting	Troubleshooting	Troubleshooting



An RF Optic® RFoF module needs be powered up and connected by a suitable USB cable to a computer or tablet to interface with this app. Connected modules are detected automatically.

Features

- Connect to Transmit and Receive RF Optic® RFoF modules
- Simultanously connect to multiple modules
- Obtain status information and verify optical connetion
- Set operating configuration
- Define power-up default setup
- Initiate module Self Test
- Restore module to Factory settings
- RF module test and RF Link test

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Getting started with RFOptic's RFoF programmable links



RFOptic's programmable RFoF modules

The RFoF programmable series modules can be controlled and configured using the RFOptic configuration software. This software is available from RFOptic. It is designed to work on PC/Laptops having Windows 7, 8 or 10 operating system versions. The RFOptic RFoF software does not operate on previous operating system versions such as Windows XP.

Power requirements for the RFoF modules



Standard positive center plug OD:3.5mm, ID:1.35mm, L:9mm



110/220VAC to 5VDC converter.

The RFoF modules require an AC/DC Power converter: 110/220VAC to 5VDC converter rated at 3W or higher with a standard positive center plug 3.5*1.35*9mm. The modules are designed to operate from any regulated DC power supply with voltage between 4.5VDC and 12VDC.

USB control interface of the RFoF modules

The connection to PC/Laptop requires a MicroUSB cable. Please make sure that the MicroUSB plug is mechanically stable in the RFoF MicroUSB socket.



This MicroUSB plug fits the RFoF module and is mechanically stable when connected to the module.



This MicroUSB plug does not fit to RFoF module; it is too short due to its extended plastic enclosure.

Panel LED indicators of the RFoF modules

Normal Factory configured LED status indications for powered RFoF modules are:

- If the optical fiber is disconnected, the panel LED of the Tx is Green and the panel LED of the Rx is blinking Red.
- If the optical fiber is connected between Tx and Rx units, the panel LEDs of both Tx and Rx are Green.

Getting started with RFOptic's RFoF Bi-Directional programmable links



RFOptic's Bi-directional programmable RFoF links

The RFoF bi-directional links employ CWDM (Corse Wavelength Division Multiplexing) technology to offer bi-directional communication over a common fiber. On either end of the bi-directional link a module consisting of an RFoF transmitter and an RFoF receiver is used, with independent RF ports. The modules are identical to the RFoF programmable series and offer the same functionality. The RFOptic configuration software interfaces individually with each of the modules using a separate USB connection. The individual modules may be configured to operate according to the application requirements using the RFoF configuration software. This software is available from RFOptic. It is designed to work on PC/Laptops having Windows 7, 8 or 10 operating system versions. The RFOptic RFoF software does not operate on previous operating system versions such as Windows XP.

Note 1: Unlike RFoF programmable links, the bi-directional link modules are not interchangable with other bi-directional modules because each module has a transmitter that operates on a different wavelength. Only modules with the same transmitter wavelength are interchangable. The transmitter wavelength of each bi-directional module is listed as part of its part number and is found in the module identification line in the RFoF config tool or on the label affixed to the module.

Note 2: A typical application of the bi-directional RFoF link is to set up an RF bi-directional interface to an antenna operating over the same frequency range in both directions. When such an application is considered the RF ports at each end must be coupled together but in doing so an RF signal loop is created. It is therefore important to make sure that the loop gain of that loop does not exceed unity (0dB) over the entire RFoF link bandwidth. This can be accomplished by using a suitable isolating coupler or a directional combiner.

Power requirements for the RFoF modules



Standard positive center plug OD:3.5mm, ID:1.35mm, L:9mm



110/220VAC to 5VDC converter.

The RFoF bi-directional programmable series modules require two AC/DC Power converters for each module. Typically each RFoF programmable module requires a 110/220VAC to 5VDC converter rated at 3W or higher with a standard positive center plug 3.5*1.35*9mm. The modules are designed to operate from any regulated DC power supply with voltage between 4.5VDC and 12VDC.

USB control interface of the RFoF modules

The connection to PC/Laptop requires a total of four MicroUSB cables, one for the transmitter and one for the receiver in each end module. Please make sure that the MicroUSB plug is mechanically stable in the RFoF MicroUSB socket.



This MicroUSB plug fits the RFoF module and is mechanically stable when connected to the module.



This MicroUSB plug does not fit to RFoF module; it is too short due to its extended plastic enclosure.

Panel LED indicators of the RFoF modules

Normal Factory configured LED status indications for powered RFoF modules are:

- If the optical fiber is disconnected, the panel LED of the Tx is Green and the panel LED of the Rx is blinking Red.
- If the optical fiber is connected between Tx and Rx units, the panel LEDs of both Tx and Rx are Green.

Getting started with RFOptic's RFoF HF links



FOptic's High Frequency series of RFoF links

The RFoF HF modules can be controlled and configured using the RFOptic configuration software. This software is available from RFOptic. It is designed to work on PC/Laptops having Windows 7, 8 or 10 operating system versions. A custom version that is compatible with Windows Xp can be made available upon request.

Safety considerations

The Transmitter uses a **Class 3B laser** source at around 1550nm. The invisible light output from the transmitter can be hazardous if viewed directly by the eye. The optical power from the laser diode may cause retinal or coronal damage. Always observe the following precautions for safe use of the transmitter:



1. Never look directly into the operating transmitter output or an output of a fiber connected to the transmitter when the distance of the output is less than 50cm from your eye.



2. Never look into the operating transmitter output or an output of a fiber connected to the transmitter using optical instruments (a microscope etc.)

Power and heat sink requirements for RFoF HF modules

The power requirements of the RFoF HF series depend on module configuration. The modules operate from a +5V supply. Transmitters in basic configuration require 1.5A power supply minimum rating. When an optional RF amplifier is integrated within the transmitter module then the current requirement can go up to 2A.

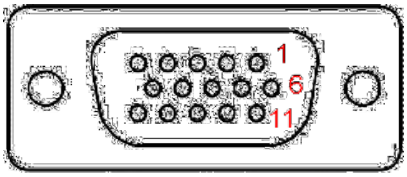
The RFoF HF receiver modules require less than 0.1A in their basic configuration and up to 1A if an optional RF amplifier is integrated inside the module.

Due to their power consumption it is required to mount the RFoF HF Transmitter modules on a suitable heat sink to maintain resonable operating temperatures. Similarly when RF amplifiers are integrated into the Receiver it is appropriate to use a similar heat sink mounting.

Power and USB control interface for RFoF HF modules

The RFoF HF modules use a Dsub 15pin male cable to supply DC power and provide USB interface as well as optional user controls. Use #26 wires to both

Vdc pins (1, 6) and to both GND pins (2, 7) to mimimize voltage drop over the power supply wires



P1 - Dsub 15pin	Pin Number
Vdc	1
GND	2
Ext LED red	3
USB D+	4
Reserved - do not connect	5
Vdc	6
GND	7
Ext LED green	8
USB D-	9
Reserved - do not connect	10
Ext Cont1 - Optional	11
Ext Cont2 - Optional	12
Ext LED blue / optional Ext Cont3	13
USB Host +5V signal	14
Digital GND	15

Panel LED indicators of the RFoF modules

Panel LED status indications for powered RFoF HF modules

- For transmitter modules, as power is first applied, the module goes through a short Laser stabilization procedure during which the panel LED blinks blue.
- The Receiver module panel LED blinks red if the optical signal received is below the preset optical alarm threshold.
- Once the laser stabilization is complete the Laser is powered automatically and the panel LED becomes green.
- If an optical fiber is connected between Tx and Rx units, the panel LEDs of both Tx and Rx are Green.
- If the transmitter optical power falls below the preset optical alarm level its panel LED will blink red.
- When the laser is turned Off after the Laser stabilization procedure the panel LED will alternate blink red/green.
- If the optical fiber is disconnected, the panel LED of the Tx is Green and the panel LED of the Rx is blinking Red.

Getting started with RFOptic's Optical Delay Lines (ODL)

FOptic's High Frequency series of RFoF links

The RFOptic ODL's can be controlled and configured using the RFOptic configuration software. This software is available from RFOptic. It is designed to work on PC/Laptops having Windows 7, 8 or 10 operating system versions. A custom version that is compatible with Windows Xp can be made available upon request.

Safety considerations for ODL's with External Fiber ports

The ODL may include a **Class 3B laser** source at around 1550nm. The invisible light output from the ODL can be hazardous if viewed directly by the eye. The optical power from the laser diode may cause retinal or coronal damage. Always observe the following precautions for safe use of the ODL:



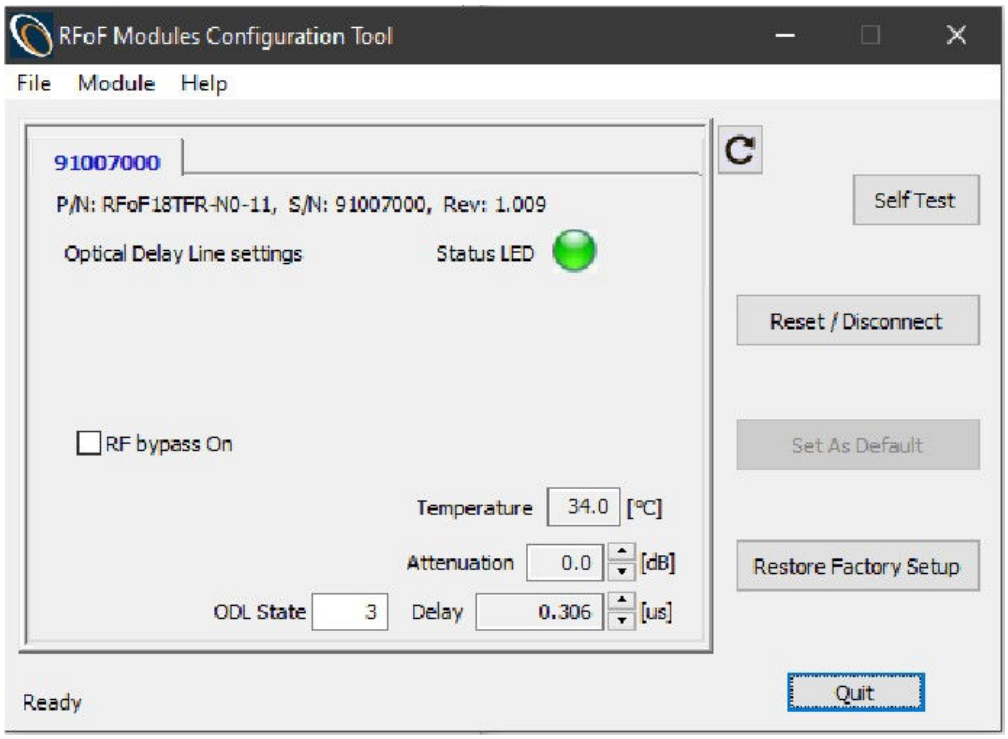
1. Never look directly into the operating ODL Fiber Port or into the output of a fiber connected to the ODL when the distance of the output is less than 50cm from your eye.



2. Never look into the operating ODL Fiber Ports or into the output of a fiber connected to the ODL using optical instruments (a microscope etc.)

RFOptic ODL's overview

RFOptic Produces a number of ODL products with a large number of configuration options. Most of these ODL products can be operated using front panel controls and/or using the RFOptic configuration tool. This help document refers to the RFOptic configuration tool operation only. Refer to the Operating manual for each specific ODL for custom features which might be available, power supplay requirements and interface connections.



RFOptic Configuration Tool - ODL display mode

ODL controls

The Screen of the RFOptic Configuration tool displays a tab for each product labeled by the Serial number or a user defined name. Once the tab is selected the ODL part number and Revision is displayed just below the tab heading. Specific ODL optional controls and features may be present as shown below the heading information. These optional custom features include:

Status LED indicator for ODL products

The LED status indications for ODL provide information about certain ODL conditions when present. Some ODL products show status LED's for each of the consituent RFoF converters inside. In such cases please refer to the Status LED information section for the appropriate modules. Internal temperature indication is provided as an aid for assessing any slight time delay variations which may result from temperature variations in the ODL.

- The ODL status LED blinks red if the optical signal received past the Delay section(s) is below the preset optical alarm threshold.
- For HF ODLs, as power is first applied, the module goes through a short Laser stabilization procedure during which the status LED blinks blue.
- Once the laser stabilization is complete the Laser is powered automatically and the status LED becomes green.

Controls for ODL products

- RF Bypass - which provide an RF direct path between the input and output ports of the ODL. This option provides the shortest practical path which bypasses the ODL usually for calibration purposes.
- Digital step attenuator control allows amplitude control for the ODL signal.
- Delay control - The Delay is displayed in **us units with 1ns resolution and as a state number. Delay control becomes active for progressive ODL products which contain a set of delay sections which can combine to adjust the ODL delay length. These sections are customizable and may not always follow an arithmetic sequence. Delay can be specified in two ways as a numeric State which can be selected from the 2^n available states, where n is the number of Delay sections, or by stepping through the steps in the Delay**

RFOptic Configuration Tool window

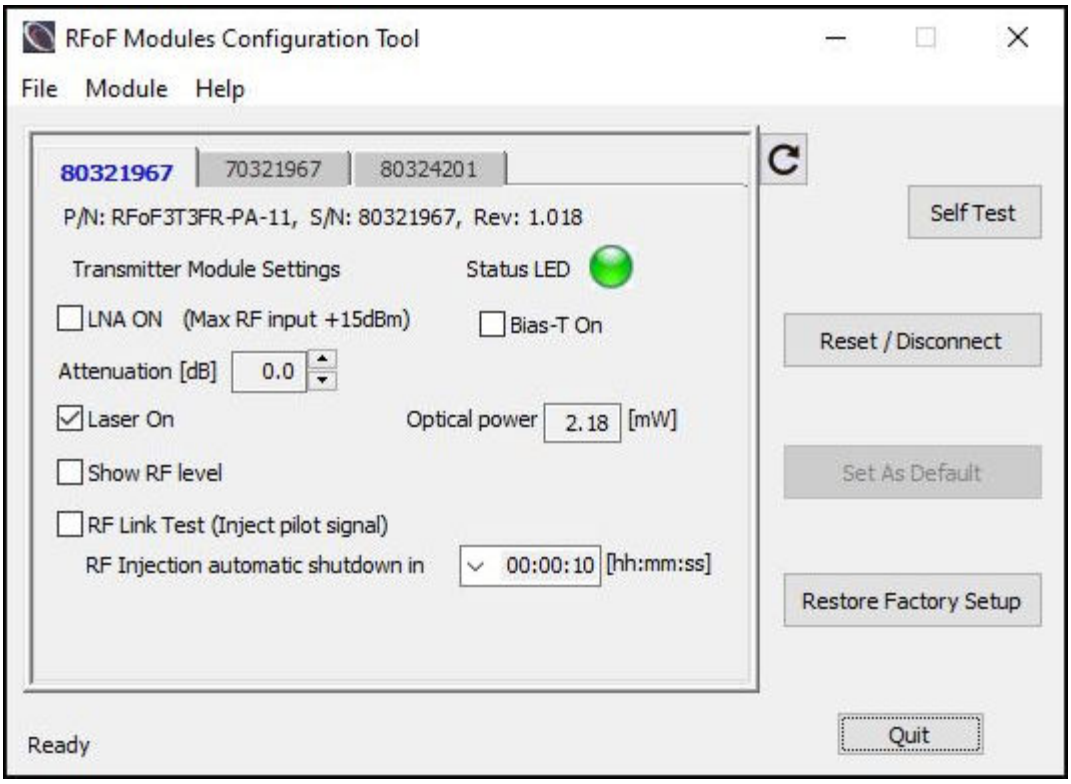
Module identification

The App window displays properties of RFoF modules which are powered up and attached by USB cable. The App automatically identifies the type and identity of the module including: Type Transmitter or Receiver, Serial number, Part number and Production data. When a module is connected to a host (PC, tablet or Laptop) the panel indicator flashes blue to indicate that a USB connection was made. Note that a special driver is not required for this application. When a Host identifies the RFoF module it will automatically activate a stock Plug-and-Play Operating System driver.

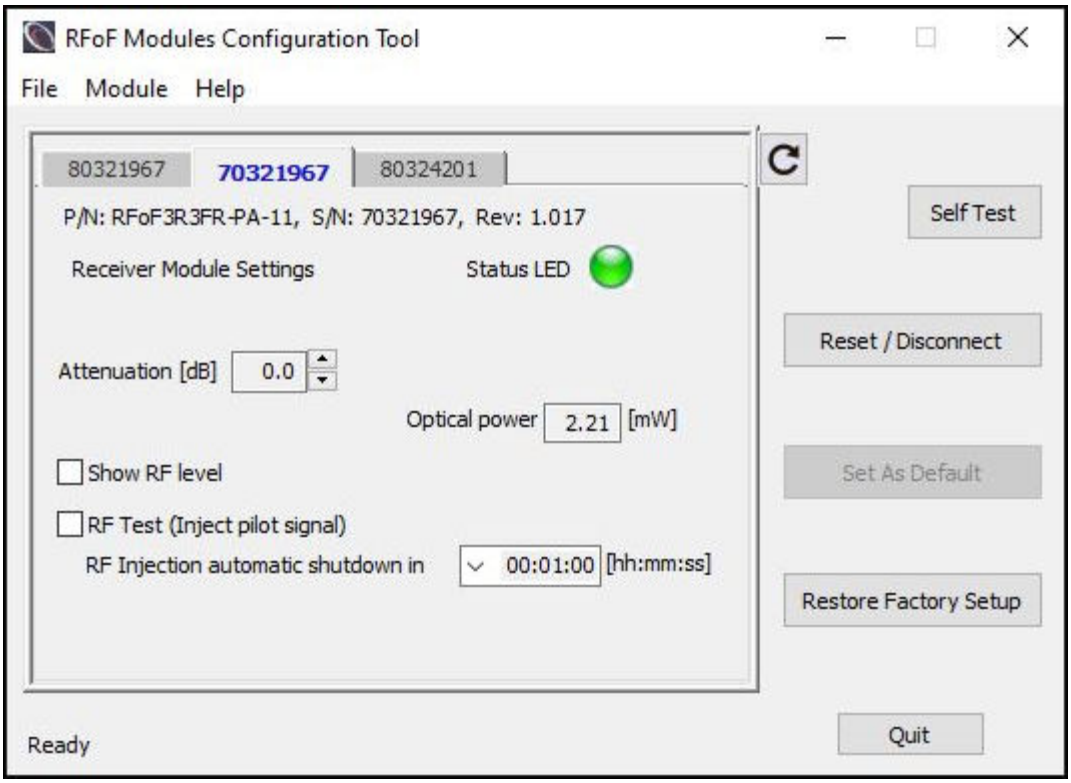
Module data

The App reads the current configuration parameter values of the module as well as the operational conditions. These parameters are displayed in a Tab for each connected module. Module operating parameters and attenuation settings. Additionally for Transmitter modules the Laser state (On/Off), and LNA state are shown. Module operatinng conditions include the optical power level and optionally the RF level and RF test signal status.

Screenshots of the App for Transmitter and Receiver modules:



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Built-In-Test diagnostics

Diagnostic features can be activated by the Self test button that activates the BIT capability of the module. It reads the current state of the module and verifies that the module is operating within specifications. The test is initiated and result reported for the selected module.

RF signal diagnostics

The Show RF level and RF Test options provide RF signal level diagnostics. They respectively activate features that can measure the output RF signal of the module and can Inject RF pilot signal at the input of the module. Together these two features enable module level signal pass through verification as well as overall RFoF Link signal pass through verification when the RF pilot is injected into the transmitter module and measured at the receiver module of the same link. When RF pilot signal is active it is normal to notice a change in Optical power reported by the App. This is true also if strong RF signal levels are present at the input of the transmitter module.

The RF Link test is limited to a user selected time interval after which it is discontinued automatically. This automatic shutdown insures that the pilot test signal would not remain active inadvertently which could interfere with desired signals. By clicking Off the RF Link Test option the RF pilot signal injection may be discontinued immediately. The interval of RF pilot signal injection is controlled by the RFoF module. Therefore the countdown will not be affected by a disconnection of the USB cable or by quitting the App.

Default Setup

Buttons on the right enable the redefinition of the Power On default state of the module and can restore the module setup to the factory settings. A Reset/Disconnect button provides a software equivalent to power cycling the module for those cases where the module power plug is inaccessible.

More Info

Software installation

The RFoFconfig tool does not require installation, simply copy the executable and help file to any computer running a Windows OS and run it. There is no need for special driver for this application. When a Host identifies the RFoF module it will automatically activate a stock Plug-and-Play Operating System driver.

RFoF HF Configuration Tool window

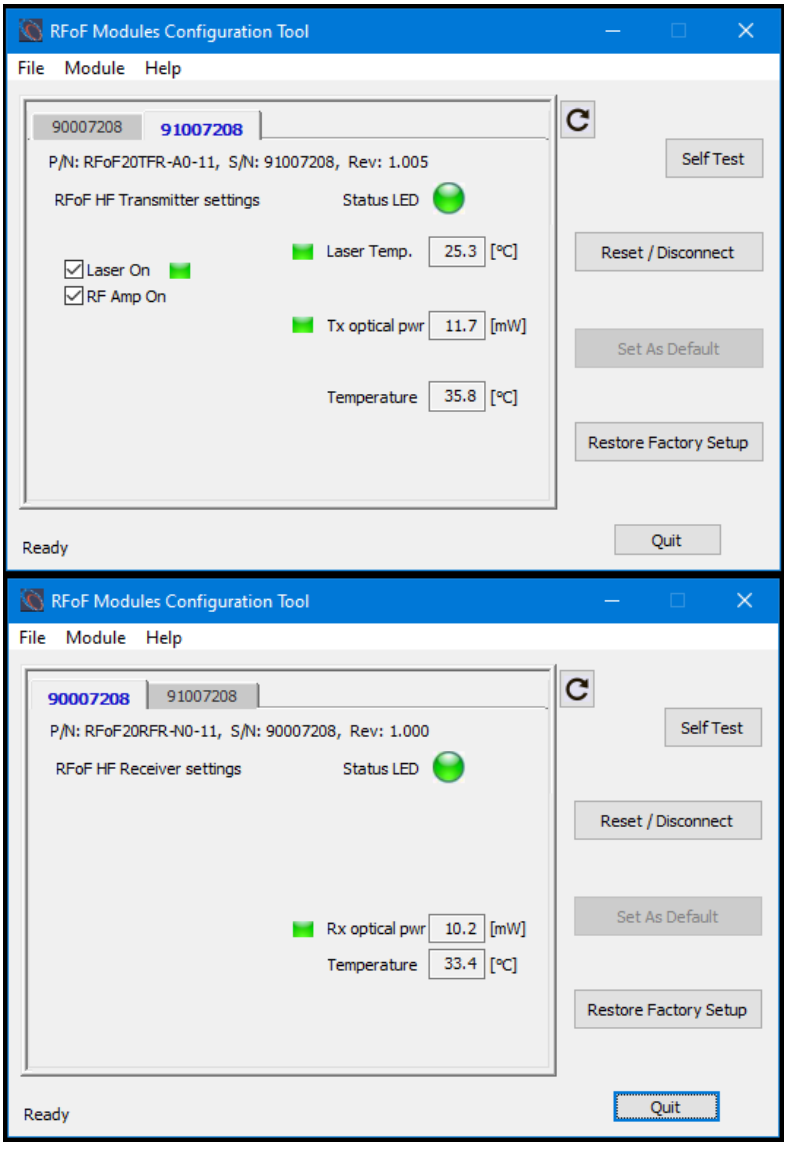
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Module data

The App reads the current configuration parameter values of the module as well as the operational conditions. These parameters are displayed in a Tab for each connected module. Module operating parameters and attenuation settings. Additionally for Transmitter modules the Laser state (On/Off), and LNA state are shown. Module operatinng conditions include the optical power level and optionally the RF level and RF test signal status.

Screenshots of the App for RFoF HF Transmitter and Receiver modules:



Built-In-Test diagnostics

Diagnostic features can be activated by the Self test button that activates the BIT capability of the module. It reads the current state of the module and verifies that the module is operating within specifications. The test is initiated and result reported for the selected module.

Default Setup

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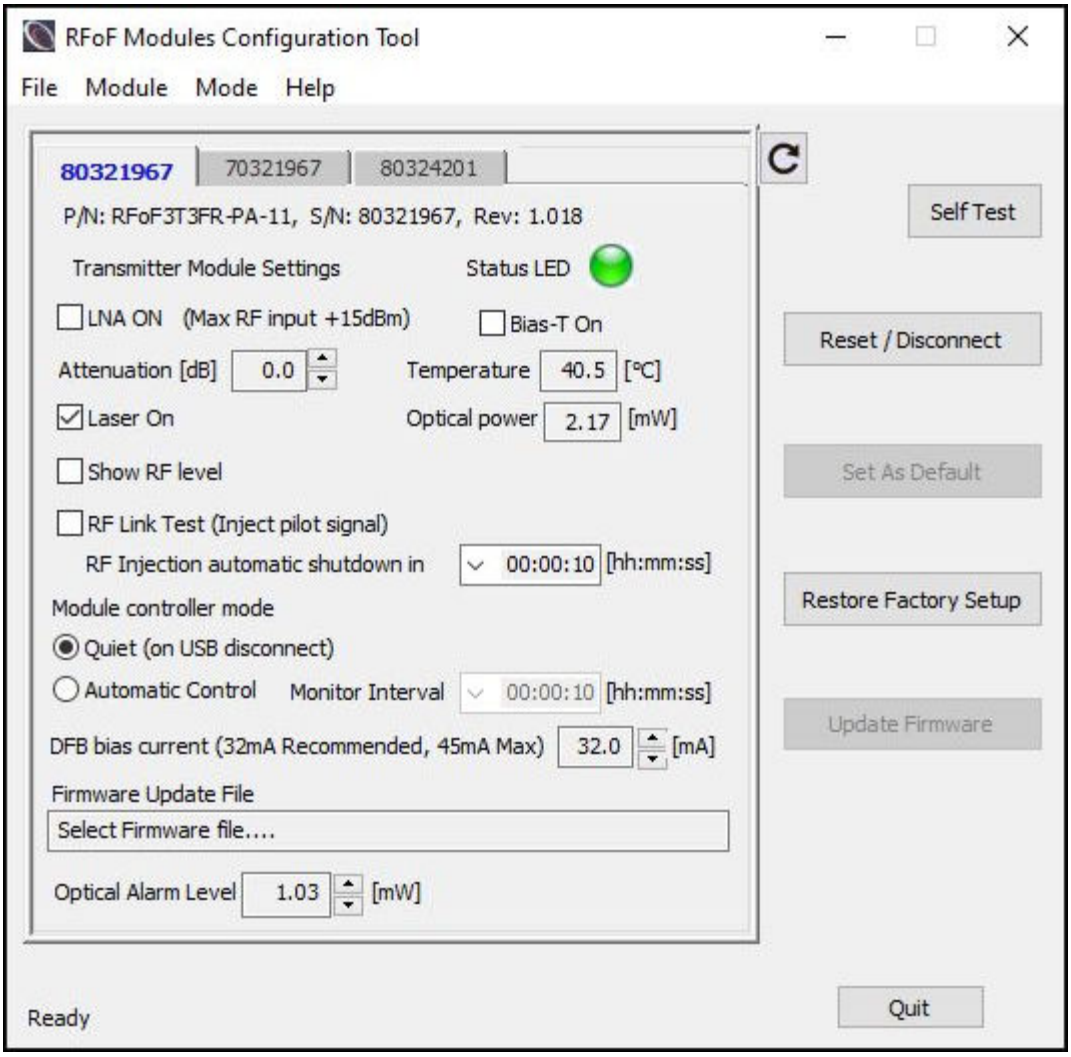

More Info

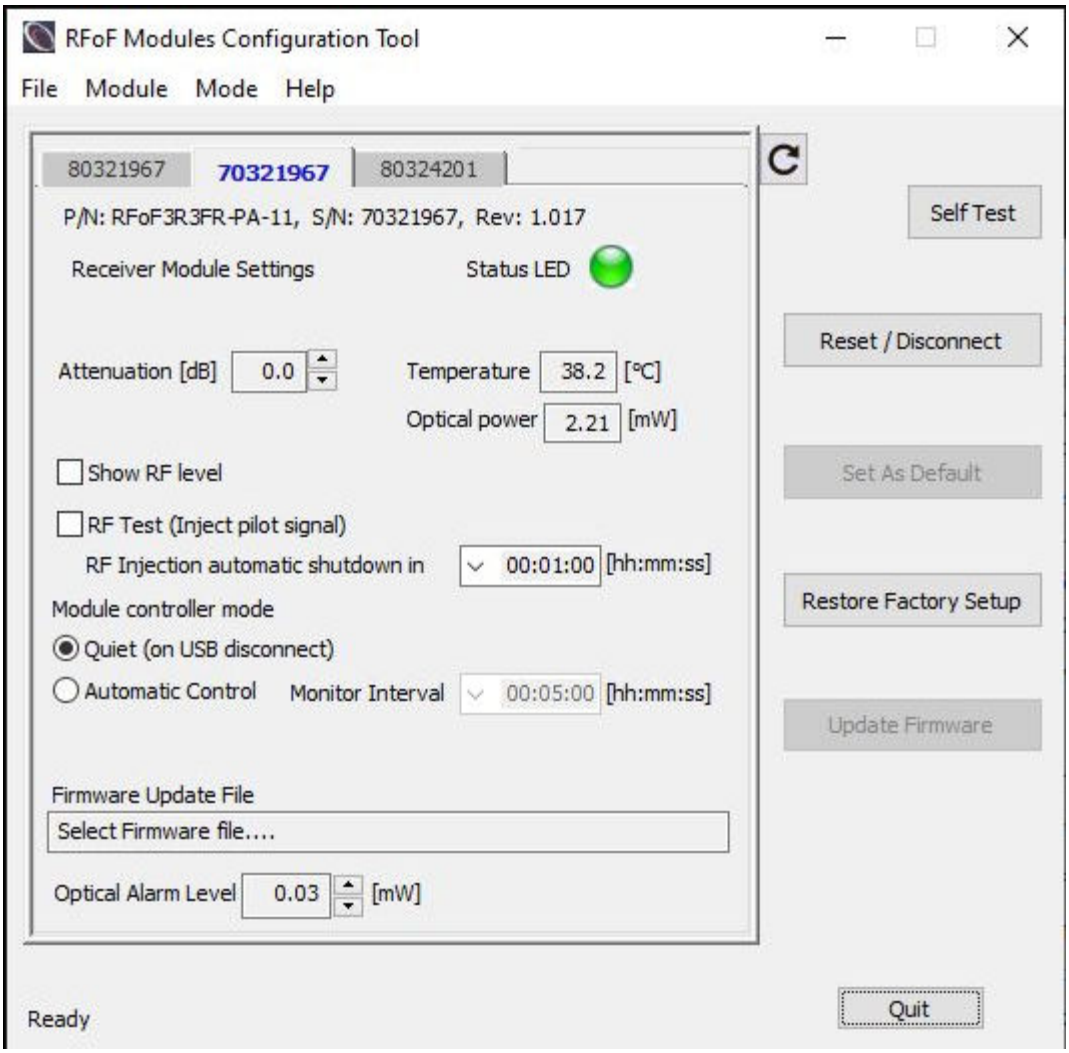
RFoF Advanced Configuration Tool window

Module identification

The App advanced window adds condition reporting and controls to set additional operating parameters for the RFoF module. These parameters may effect the performance of the module in significant manner. Access to the Advanced mode requires a special RF Optic authorization.

Screenshots of the App in Advanced mode for Transmitter and Receiver modules:





The Advanced mode App provides controls for the following operational parameters.

- **Temperature -** Sensor reading of the internal module temperature.
- **Module controller mode -** The module offers a choice of two operating modes.

  The default 'Quiet (on USB disconnect)' mode is used to maintain a fixed setting and reduce noise. This mode is activated by the disconnect of the USB cable from the module. As long as the module is connected via USB to a computer (even if the RFOptic Configuration tool is not running) the module controller remains fully active. It is possible to disable the sensing of the USB connection by electronically disconnecting the USB signal and power lines. This needs to be done using a USB hub with a tri-state capability. Please contact RF Optic® for applicaations requiering this capability.

  The 'Active control' mode allows the module controller to make adjustments of attenuation and optical power to compensate for temperature variations. When this mode is selected the module monitors and corrects the operating parameters once per monitor interval (by default every 5 minutes). A different monitor interval may be selected from the drop-down selection box. Note that a minimum of 2dB attenuation is recommended to allow the controller to provide positive gain correction based on the operating temperature in this mode.
- **Monitor interval -** Time interval for operating parameters update when the module is in the Active Control mode. This interval can be set from few seconds to several hours as best suits the application of the RFoF link. An associated progress indicator shows a countdown of the interval untill the next correction while the RFOptic configuration App is attached to the module.
- **Firmware update file -** This field shows the filename that is selected to update the firmware of the module. Such firmware update may be required to resolve some application issues or provide custom functionality. The file would be supplied by RF Optic® and should be saved on the computer. Select the file using by menu File->Open->Firmware file. Once a valid Firmware update file is selected the Firmware Update button would be enabled.
- **Firmware Update -** Button used to update the firmware of the RFoF module. The procedure takes a few minutes. The module should be powered and USB connection must be maintained during Firmware update otherwise the module may be rendered inoperable.
- **DFB nominal bias -** This ia a Transmitter module only parameter which sets the Laser bias current. The setup range is limited to protect the module against immediate damage. Any change to this value should be made only after consulting with RF Optic®. The increase of this value may reduce the Laser lifetime while a decrease of the bias current may limit the dynamic range of the RFoF link.
- **Optical Alarm Level -** This property defines the alarm level for loss of optical power (OPLA). The value is different for a Transmitter module and a Receiver module. In a transmitter module the OPLA is checked at the Laser output. It is set to a high value and an alarm condition may indicate

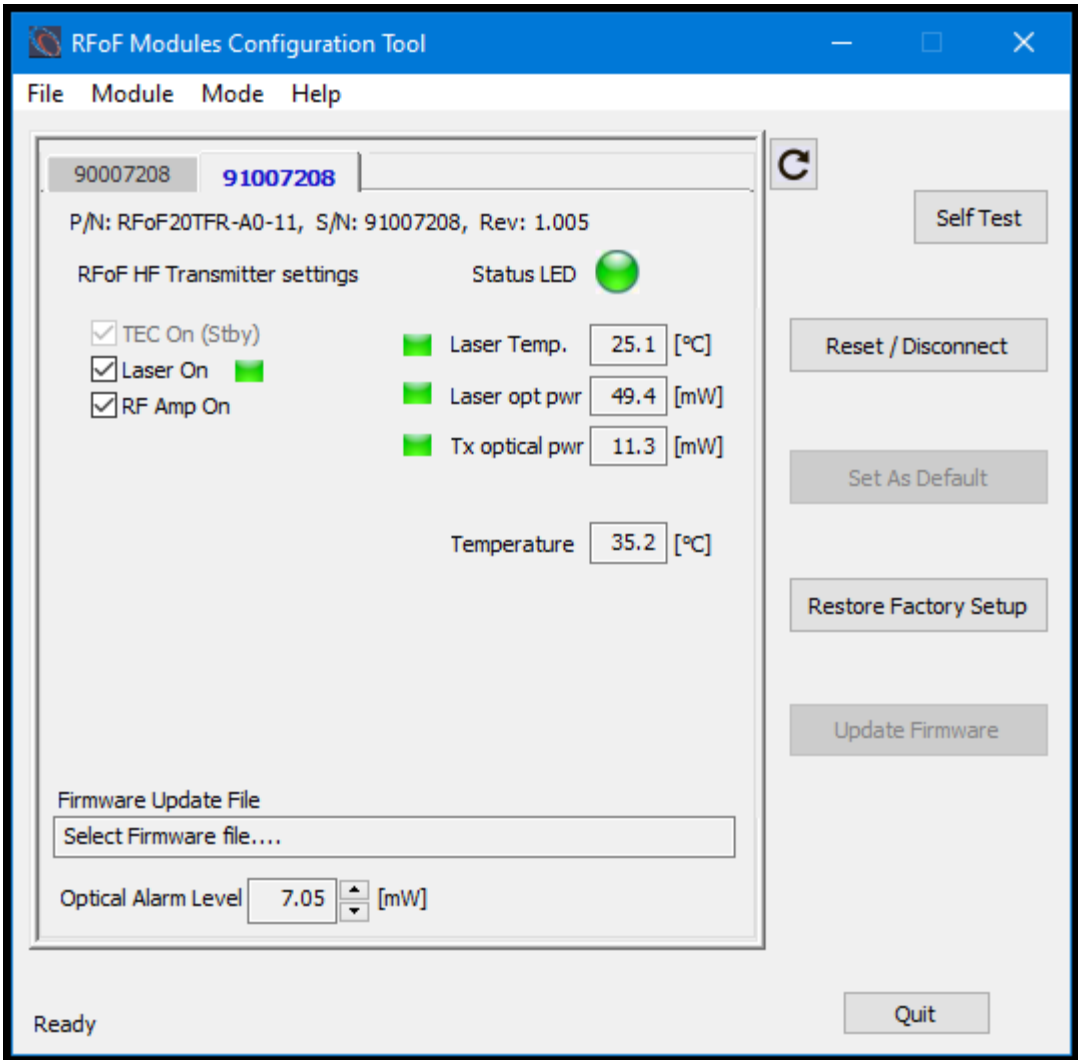
Laser failure or that the Laser was turned off. In a Receiver module the OPLA is lower allowing for some fiber caused loss of optical power. In this case the alarm condition indicates a high fiber loss or improper optical connection.

RFoF Advanced HF Configuration Tool window

Module identification

The App advanced window adds condition reporting and controls to set additional operating parameters for the RFoF HF module. These parameters may effect the performance of the module in significant manner. Access to the Advanced mode requires a special RF Optic authorization.

Screenshots of the App in Advanced mode for Transmitter and Receiver modules:

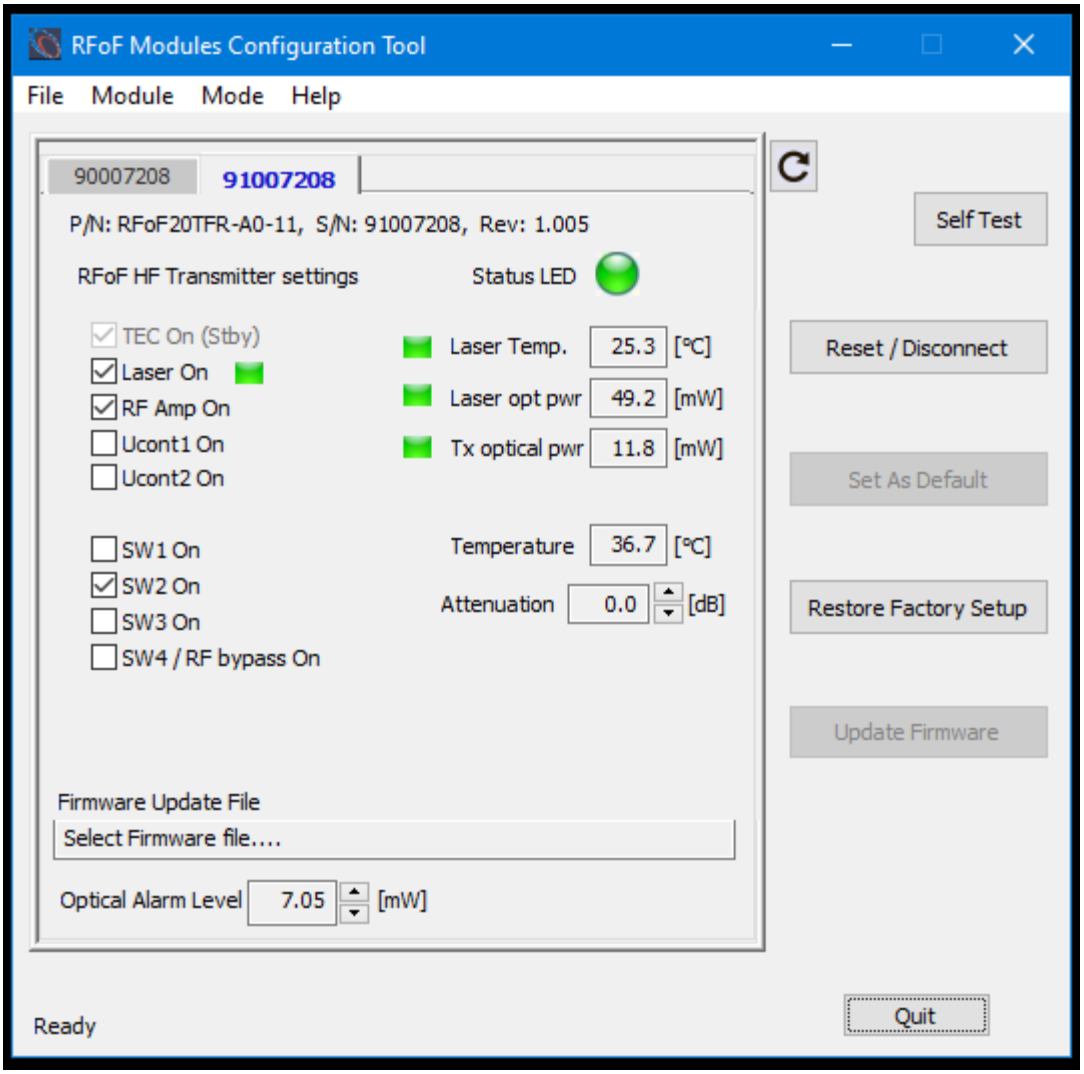


The Advanced mode App provides controls for the following operational parameters.

- **Laser temperature -** Sensor reading of the laser TEC controlled temperature, and status LED.
- **Laser power -** Sensor reading of the internal laser output power, and status LED.
- **Temperature -** Sensor reading of the internal module temperature.
- **Firmware update file -** This field shows the filename that is selected to update the firmware of the module. Such firmware update may be required to resolve some application issues or provide custom functionality. The file would be supplied by RF Optic® and should be saved on the computer. Select the file using by menu File->Open->Firmware file. Once a valid Firmware update file is selected the Firmware Update button would be enabled.
- **Firmware Update -** Button used to update the firmware of the RFoF module. The procedure takes a few minutes. The module should be powered and USB connection must be maintained during Firmware update otherwise the module may be rendered inoperable.
- **Optical Alarm Level -** This property defines the alarm level for loss of optical power (OPLA). The value is different for a Transmitter module and a Receiver module. In a transmitter module the OPLA is checked at the Laser output. It is set to a high value and an alarm condition may indicate Laser failure or that the Laser was turned off. In a Receiver module the OPLA is lower allowing for some fiber caused loss of optical power. In this case the alarm condition indicates a high fiber loss or improper optical connection.

- **Optional user controls -** If configured, additional control functions are displayed. Such options include RF amplifier activation, user and internal RF switches or digital attenuator.

Examples of advanced optional controls that are available, if configured, in the Advanced Mode



Troubleshooting guide

RFoF modules and Control software

Problem 1: Module LED is dark

When powered RFoF modules are properly powered the panel LED never remains dark. If the LED is dark it is an indication that the module is not receiving proper DC power. This can be caused by these reasons:

- Power is not connected to the RFoF module.
- The DC power source is not connected to a working outlet.
- The DC power source is unable to power the module due to a current limit.
- The DC power source is wired incorrectly or is outside the voltage range 5V to 12V.

Troubleshooting steps

1. If a standard DC power supply is used

- Verify that the power supply is connected to a working outlet.
- Connect the power supply to the module and verify that the LED is not dark.

2. If a non-standard DC power supply is used

- Check the physical connection and wiring polarity.
- Verify that the power supply is connected to a working outlet.
- Verify that the current limit is at least 1.5A per module (this current is required for the rush current at the start-up of the module).
- Verify that the Voltage in the range of 5V to 12V.
- Connect the power supply to the module and verify that the LED is not dark.

Problem 2: Transmitter module LED is Red

When a Transmitter RFoF module LED is red it is an indication that the Laser is not working. This can be caused by these reasons:

- The DC power source is unable to power the module due to a current limit.
- Laser was turned off using the RFoF Control software.

Troubleshooting steps

1. If a non-standard DC power supply is used

- Verify that the DC power supply capable of delivering 5V to 12V DC and has a current limit of 1.5A or more.

2. If a standard power supply is used or the DC power source is verified good

- Turn on the Laser using the RFoF control software.

Problem 3: Transmitter module LED is Green but Receiver module LED is blinking RED

When a Transmitter RFoF module LED is green it is an indication that the Laser is working properly. When the Receiver module is blinking red it is an indication that the Receiver is not detecting sufficient optical power. This can be caused by these reasons:

- The fiber link between the Transmitter and the Receiver modules is defective or broken.
- The fiber used to connect the Transmitter module to the Receiver modules is an incompatible type.
- The fiber link between the Transmitter and the Receiver modules is not connected or not connected well.
- The fiber interfaces of the Transmitter module and/or the Receiver module are dirty.

Troubleshooting steps

1. Inspect the connecting fiber.

- Look for any sharp bends or kinks which might result from a crack or break of the inner core. Note that the fiber should be relaxed and not knotted or bent sharply.
- If in doubt try a different fiber link and a short one to eliminate this potential cause.
- You must use a Single-Mode fiber with APC connectors suitable for your link (typically FC/APC).

2. Check the connections on either side of the fiber.

- Verify proper fiber connections. On both ends of the fiber check that the mating connector key is inserted into the mating slot and that the collar is closed moderately tight.
- Note that in many cases over tight connections could feature a significantly higher loss because the fiber ends jam into each other and are pushed out of alignment.
- **Disconnect the DC power from the modules to avoid eye injury** and visually inspect the interior of the FC/APC female receptacle for debris or dust. If any dirt is found, please use a proper fiber cleaning toolkit to clean the tips of both ends of the connecting fiber and both panel connectors of the modules as needed. **Do Not use any abrasive materials or oils to clean with nor any material which might leave some residue**.


Proper insertion of an FC/APC connector.

▲Problem 4: Transmitter module LED is Green, fiber connection was verified but Receiver module LED is blinking RED

Check the optical parameters of the link parameters for any invalid specifications. These parameters can be checked by using the RFoF control software. Possible causes can be:

- The parameters of the Transmitter and/or the Receiver modules were set to incorrect values.
- The fiber interface between the Transmitter module and Receiver module has substantial optical losses.

Troubleshooting steps

1. Power up and Connect both Transmitter and Receiver modules to a computer running the RFoF control software.

- Connect both Transmitter and Receiver modules to a DC power source.
- Connect the Transmitter to the Receive using a single-mode fiber with appropriate APC connectors.
- Connect both modules with a micro-USB cable to a computer that is running the RFoF control software.
- This procedure can be performed on one module at a time if both modules are not accessible simultaneously.

2. Check the Transmitter module parameters.

- In the RFoF control software, select the Transmitter module.
- Verify that the module is operating properly by clicking the **Self Test button** - a Green check mark should display next to the button.
- Verify that the Transmitter laser is On - that the checkbox **Laser On** is checked.
- Verify that the **Optical power** as reported by the software is nominally between 1mW and 4mW. Typical values are between 2mW and 3mW.
- Record the Transmitter module optical power for later reference.

3. Check the Receiver module parameters and fiber connection quality. For this test both Transmitter and Receiver modules must be powered, Transmitter Laser is On and it is connected to the Receiver module with a proper optical Fiber.

- In the RFoF control software, select the Receiver module.
- Verify that the module is operating properly by clicking the **Self Test button** - a Green checkmark should display next to the button.
- Verify that the **Optical power** as reported by the software is above 0.03mW. If the optical power value is borderline or lower then the fiber connection is at fault.
- If a low optical power is reported by the Receiver module, replace the fiber connection between the modules with a short 0.5 meter {1.5 ft} patch fiber and verify that the Receiver reports an optical power that is about 0.3mW lower than the optical power that was recorded for the transmitter in step 2.

▲Problem 5: Transmitter module LED is Green and Receiver LED is Green but RF signal is not getting through the link.

Check the RF signal flow in the link using the RFoF control software. Possible causes can be:

- Broken or faulty RF connection.
- The input signal is too weak to be detected at the output of the link.

Troubleshooting steps

1. Power up and Connect both Transmitter and Receiver modules to a computer running the RFoF control software.

- Connect both Transmitter and Receiver modules to a DC power source.

- Connect the Transmitter to the Receive using a single-mode fiber with appropriate APC connectors.
- Connect both modules with a micro-USB cable to a computer that is running the RFoF control software.
- This procedure can be performed on one module at a time if both modules are not accessible simultaneously.

2. Use the Link test diagnostic to confirm that RF signal is passing through the link from the Transmitter input to the Receiver output.

- In the RFoF control software, select the Transmitter module.
- Verify that the module is operating properly by clicking the **Self Test button** - a Green checkmark should display next to the button.
- Verify that the Transmitter laser is On - that the checkbox **Laser On** is checked.
- Activate the LNA if it is not already active using the **LNA On** - verify that the checkbox is checked.
- Reduce the Transmitter Attenuation to 0dB using the down arrow.
- Verify that the **Optical power** as reported by the software is nominally between 1mW and 4mW. Typical values are between 2mW and 3mW.
- If the Transmitter module is not located near the receiver module set the **RF injection automatic shutdown** to allow sufficient time to reach and evaluate the reading at the receiver module.
- Activate the **Show RF level** - verify that the checkbox is checked.
- Activate the **RF Link Test** - verify that the checkbox is checked. The **Output RF Level** reading should increase substantially.

3. Check the Receiver module parameters and fiber connection quality. For this test both Transmitter and Receiver modules must be powered, Transmitter Laser is On and it is connected to the Receiver module with a proper optical Fiber.

- In the RFoF control software, select the Receiver module. The Automatic shutdown allows sufficient time for travel to the Receiver module location.
- Activate the **Show RF level** - verify that the checkbox is checked. The RF level reported by the RFoF control software for the Receiver should be substantially higher than the no signal level of about -60dBm.

▲Problem 6: Module(s) fail to register in the RFoF control software

When powered RFoF modules are connected to a host PC/Laptop and the RFOptic configuration software tool is running, the modules would be automatically detected and added in separate tabs to the software. If a module is not automatically identified by the software or if the **"RFoF module is not connected. Check USB and Power connections"** notice is displayed on the bottom (status line) of the software window the problem may be easily corrected by following a simple set of troubleshooting steps. In most cases the failure to register is caused by one or more of these reasons:

- Power is not connected to the RFoF module.
- USB to Micros cable is damaged or not connected firmly to the RFoF module.
- RFOptic configuration Software is not running or not running properly due to an incompatible operating system such as Windows XP.
- Generic HID driver problem or USB hub problem.

Troubleshooting steps

1. Connect the RFoF module to the power, and verify that the module is powered:

- If the LED on the RFoF panel is 'On' (any color), then the module is getting power.
- If LED is not lit, than check for a problem with the DC power supply or its connection to the module.

In all the following tests it is assumed that the RFoF module is powered and LED is 'On' and the PC software is running.

2. Connect each of the RFoF modules Tx and Rx one at a time with the same USB cable.

- If you do not receive the Notice (i.e. ***"RFoF module is not connected. Check USB and Power connections"***) for either RFoF Tx and Rx module than the issue was caused by bad USB cable or USB connection and is now resolved.
- If the Notice is received with only one module the problem might be in that module.
- If the Notice is received with both RFoF modules, go to Step #3.

3. Change the Micros/USB cable, and re-check both RFoF Tx and Rx modules - this clarifies if a problem exists on the PC, or the module/USB cable:

- If the Notice disappears and Software recognizes all the connected modules, than the issue is resolved, and the former USB cable was bad.
- If the Notice is still received, than go to Step #4.

4. While software is running on PC and the USB cable is connected between the RFoF module and PC – disconnect power to the module, and reconnect power after 10 seconds.

That should allow the computer to “forget” the RFoF module, so when it reconnects the RFoF module should re-register in the software.

- If the Notice disappears and Software is registered, than the issue is resolved.
- If the Notice is still received, then USB cable may be the problem, or PC USB HID driver may be problematic- see Step #5.

5. Check the HID driver which provides the USB interface on the PC:

Disconnect the USB cable from the RFoF module. Open Computer->Properties->Device Manager and look at the list of Human Interface Devices (HID), remember the number of USB items in the list. Now reconnect the USB cable, verify that a new HID device was added to the list of HID devices.

- If a new device was added, then the HID driver of the computer is good and the problem lies with the software or the module. The problem can be traced further by examining the HID device properties and by using the RFoF Logfile trace (contact RF Optic for more information).
- If device was not added, then the problem lies in the USB communication with the computer USB driver. oi may want to try to use the RFoF PC software on a different computer

▲Creation of a logfile for reporting a problem for further technical assistance and troubleshooting

The RFoF link modules operational parameters can be logged by the RFoF control software to improve technical support.

Logfile creation steps

1. Power up and Connect both Transmitter and Receiver modules to a computer running the RFoF control software.

- Connect both Transmitter and Receiver modules to a DC power source.
- Connect the Transmitter to the Receive using a single-mode fiber with appropriate APC connectors.
- Connect both modules with a micro-USB cable to a computer that is running the RFoF control software.
- This procedure can be performed on one module at a time if both modules are not accessible simultaneously. In such case two logfiles will be created each should be renamed and e-mailed to RF Optic separately.

2. Activate the logfile and review the steps that demonstrate the problem with each relevant Transmitter and Receiver modules.

- In the RFoF control software, select File->Logfile menu option - this menu item should now be checked.
- In the RFoF control software, select the Transmitter module. Perform any action that demonstrates the problem.
- In the RFoF control software, select the Receiver module. Perform any action that demonstrates the problem.
- In the RFoF control software, unselect File->Logfile menu option - this menu item should not be checked now.
- If you are using Outlook as your e-mail application, select menu **Help->Email Log File** to create a new e-mail message, add your problem description of the problem and send.
- Manually create a support request e-mail: Navigate on the computer to the directory from which the RFoFconfig executable software was run and locate the Logfile named **RFoFConfigTool.log** that was just created, then e-mail this file along with a detailed description of the problem to **support@RFOptic.com** for technical support.

Troubleshooting guide

RFoF HF modules and Control software

Problem 1: Module LED is dark

When powered RFoF modules are properly powered the panel LED never remains dark. If the LED is dark it is an indication that the module is not receiving proper DC power. This can be caused by these reasons:

- Power is not connected to the RFoF module.
- The DC power source is not connected to a working outlet.
- The DC power source is unable to power the module due to a current limit.
- The DC power source is wired incorrectly or is outside the operational voltage range 4.8V to 5.4V maximum.

Troubleshooting steps

1. If a standard DC power supply is used

- Verify that the power supply is connected to a working outlet.
- Connect the power supply to the module and verify that the LED is not dark.

2. If a non-standard DC power supply is used

- Check the physical connection and wiring polarity.
- Verify that the power supply is connected to a working outlet.
- Verify that the current limit is at least 2A per module (this current is required to accomodate the consumption of an RF amplifier if integrated and the the rush current at the start-up of the module).
- Verify that the Voltage in the range of voltage range 4.8V to 5.4V maximum.
- Connect the power supply to the module and verify that the LED is not dark.

Problem 2: Transmitter module LED is Red

When a Transmitter RFoF module LED is not green it is an indication that the Laser is not working properly. This can be caused by these reasons:

- The DC power source is unable to power the module due to a current limit.
- The Laser was turned off using the RFoF Control software. In this case the status LED will alternate blink red and green.
- The Laser has not reached its operating conditions.

Troubleshooting steps

1. If a non-standard DC power supply is used

- Verify that the DC power supply capable of delivering 5V to 12V DC and has a current limit of 1.5A or more.

2. If a standard power supply is used or the DC power source is verified good

- Turn on the Laser using the RFoF control software

3.Wait for the Laser setup process to complete.

- At startup the Laser setup process may take 10 to 30 seconds at room temperature, more at ambient temperatures that significantly differ from 25C.
- If using the RFoF config software it is possible to follow the stabilization process with the sensor displays.
- If the setup process takes an inordinate amount of time please contact RF Optic technical support and report the issue along with the conditions (ambient temperature and power supply voltage and current consumption if available for further assistance).

Problem 3: Transmitter module LED is Green but Receiver module LED is blinking RED

When a Transmitter RFoF module LED is green it is an indication that the Laser is working properly. When the Receiver module is blinking red it is an indication that the Receiver is not detecting sufficient optical power. This can be caused by these reasons:

- The fiber link between the Transmitter and the Receiver modules is defective or broken.
- The fiber used to connect the Transmitter module to the Receiver modules is an incompatible type.
- The fiber link between the Transmitter and the Receiver modules is not connected or not connected properly.
- The fiber interfaces of the Transmitter module and/or the Receiver module are dirty.

Troubleshooting steps

1. Inspect the connecting fiber.

- Look for any sharp bends or kinks which might result from a crack or break of the inner core. Note that the fiber should be relaxed and not knotted or bent sharply.
- If in doubt try a different fiber link and a short one to eliminate this potential cause.
- You must use a Single-Mode fiber with APC connectors suitable for your link (typically SC/APC push to connect or FC/APC screw on connection).

2. Check the connections on either side of the fiber.


Proper insertion of an FC/APC connector.

- Verify proper fiber connections. On both ends of the fiber check that the mating connector key is inserted into the mating slot and that the collar is closed moderately tight.
- Note that in many cases over tight connections could feature a significantly higher loss because the fiber ends jam into each other and are pushed out of alignment.
- **Disconnect the DC power from the modules to avoid eye injury from the Class3 laser** and visually inspect the interior of the FC/APC female receptacle for debris or dust. If any dirt is found, please use a proper fiber cleaning toolkit to clean the tips of both ends of the connecting fiber and both panel connectors of the modules as needed. **Do Not use any abrasive materials or oils to clean with nor any material which might leave some residue**.

▲Problem 4: Transmitter module LED is Green, fiber connection was verified but Receiver module LED is blinking RED

Check the optical properties of the link for invalid configuration. The RFoF link performance can be measured by optical sensors in the end modules using the RFoF control software or calculated using RF Optic's Link simulation tool found on RF Optic's website. Possible causes can be:

- The parameters of the Transmitter and/or the Receiver modules were set to incorrect values.
- The fiber interface between the Transmitter module and Receiver module has substantial optical losses.

Troubleshooting steps

1. Power up and Connect both Transmitter and Receiver modules to a computer running the RFoF control software.

- Connect both Transmitter and Receiver modules to a DC power sources.
- Connect the Transmitter to the Receive using a single-mode fiber with appropriate APC connectors.
- Connect both modules with a micro-USB cable to a computer that is running the RFoF control software and evaluate the measured optical power reported at each end of the optical link.
- This procedure can be performed on one module at a time if both modules are not accessible simultaneously.

2. Check the Transmitter module parameters.

- In the RFoF control software, select the Transmitter module.
- Verify that the module is operating properly by clicking the **Self Test button** - a Green check mark should display next to the button.
- Verify that the Transmitter laser is On - that the checkbox **Laser On** is checked, the Laser status indicator is Green.
- Verify that the **Tx Optical Power** reading is resonabley close to the ATR data of the particular module. RFoF HF modules have a wide range of configurations each with different output optical power.
- Record the Transmitter module optical power for later reference.

3. Check the Receiver module parameters and fiber connection quality. For this test both Transmitter and Receiver modules must be powered, Transmitter Laser is On and it is connected to the Receiver module with a proper optical Fiber.

- In the RFoF control software, select the Receiver module.
- Verify that the module is operating properly by clicking the **Self Test button** - a Green checkmark should display next to the button.
- Verify that the **Optical power** as reported by the software is above 0.1mW. If the optical power value is borderline or lower then the fiber connection is at fault.
- If a low optical power is reported by the Receiver module, replace the fiber connection between the modules with a short 0.5m {1.5ft} patch fiber and verify that the Receiver reports an optical power that is about 0.3mW lower than the optical power that was recorded

for the transmitter in step 2.

▲Problem 5: Transmitter module LED is Green and Receiver LED is Green but RF signal is not getting through the link.

Check the RF signal flow in the link using the RFoF control software. Possible causes can be:

- Broken or faulty RF connection.
- The input signal is too weak to be detected at the output of the link.

Troubleshooting steps

1. Inspect the RF signal source, connections and cables

- Connect both Transmitter and Receiver modules to a DC power source.
- Connect the Transmitter to the Receive using a single-mode fiber with appropriate APC connectors.
- Check that the signal source is connected to the RF input port of the Transmitter module.
- Verify that the RF coaxial cables and connectors of the connecting cables are appropriate for the frequency range and compatible with the RFoF modules.

1. Inspect the RF signal source, connections and cables

- Check that the signal source frequency and output level is appropriate for the RFoF link.

▲Problem 6: Module(s) fail to register in the RFoF control software

When powered RFoF modules are connected to a host PC/Laptop and the RFOptic configuration software tool is running, the modules would be automatically detected and added in separate tabs to the software. If a module is not automatically identified by the software or if the **"RFoF module is not connected. Check USB and Power connections"** notice is displayed on the bottom (status line) of the software window the problem may be easily corrected by following a simple set of troubleshooting steps. In most cases the failure to register is caused by one or more of these reasons:

- Power is not connected to the RFoF module.
- USB cable is damaged.
- RFOptic configuration Software is not running or not running properly due to an incompatible operating system such as Windows XP.
- Generic HID driver problem or USB hub problem.

Troubleshooting steps

1. Connect the RFoF module to the power, and verify that the module is powered:

- If the LED on the RFoF panel is 'On' (any color), then the module is getting power.
- If LED is not lit, than check for a problem with the DC power supply or its connection to the module.

In all the following tests it is assumed that the RFoF module is powered and LED is 'On' and the PC software is running.

2. Connect each of the RFoF modules Tx and Rx one at a time with the same USB cable.

- If you do not receive the Notice (i.e. ***"RFoF module is not connected. Check USB and Power connections"***) for either RFoF Tx and Rx module than the issue was caused by bad USB cable or USB connection and is now resolved.
- If the Notice is received with only one module the problem might be in that module.
- If the Notice is received with both RFoF modules, go to Step #3.

3. Change the USB cable, and re-check both RFoF Tx and Rx modules - this clarifies if a problem exists on the PC, or the module/USB cable:

- If the Notice disappears and Software recognizes all the connected modules, than the issue is resolved, and the former USB cable was bad.
- If the Notice is still received, than go to Step #4.

4. While software is running on PC and the USB cable is connected between the RFoF module and PC – disconnect power to the module, and reconnect power after 10 seconds.

That should allow the computer to “forget” the RFoF module, so when it reconnects the RFoF module should re-register in the software.

- If the Notice disappears and Software is registered, than the issue is resolved.
- If the Notice is still received, then USB cable may be the problem, or PC USB HID driver may be problematic- see Step #5.

5. Check the HID driver which provides the USB interface on the PC:

Disconnect the USB cable from the RFoF module. Open Computer->Properties->Device Manager and look at the list of Human Interface Devices (HID), remember the number of USB items in the list. Now reconnect the USB cable, verify that a new HID device was added to the list of HID devices.

- If a new device was added, then the HID driver of the computer is good and the problem lies with the software or the module. The problem can be traced further by examining the HID device properties and by using the RFoF Logfile trace (contact RF Optic for more information).
- If device was not added, then the problem lies in the USB communication with the computer USB driver. oi may want to try to use the RFoF PC software on a different computer

▲Creation of a logfile for reporting a problem for further technical assistance and troubleshooting

The RFoF link modules operational parameters can be logged by the RFoF control software to improve technical support.

Logfile creation steps



1. Power up and Connect both Transmitter and Receiver modules to a computer running the RFoF control software.

- Connect both Transmitter and Receiver modules to a DC power source.
- Connect the Transmitter to the Receive using a single-mode fiber with appropriate APC connectors.
- Connect both modules with a USB cable to a computer that is running the RFoF control software.
- This procedure can be performed on one module at a time if both modules are not accessible simultaneously. In such case two logfiles will be created each should be renamed and e-mailed to RF Optic separately.

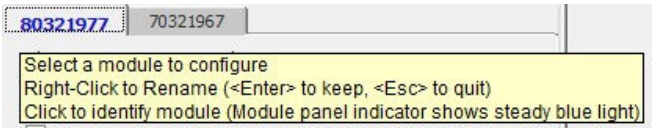


2. Activate the logfile and review the steps that demonstrate the problem with each relevant Transmitter and Receiver modules.

- In the RFoF control software, select File->Logfile menu option - this menu item should now be checked.
- In the RFoF control software, select the Transmitter module. Perform any action that demonstrates the problem.
- In the RFoF control software, select the Receiver module. Perform any action that demonstrates the problem.
- In the RFoF control software, unselect File->Logfile menu option - this menu item should not be checked now.
- If you are using Outlook as your e-mail application, select menu **Help->Email Log File** to create a new e-mail message, add your problem description of the problem and send.
- Manually create a support request e-mail: Navigate on the computer to the directory from which the RFoFconfig executable software was run and locate the Logfile named **RFoFConfigTool.log** that was just created, then e-mail this file along with a detailed description of the problem to **support@RFOptic.com** for technical support.

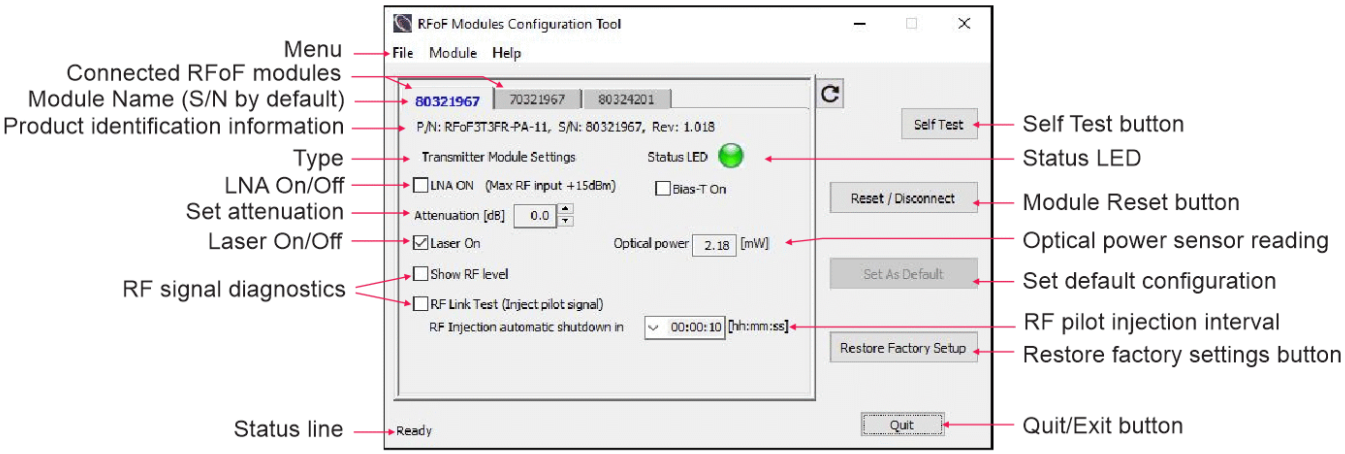
User Guide for RFoF Programmable series

The elements of the App window are highlighted below for a Transmitter module. Receiver modules display a subset of these elements. The App features on screen tips which diplay when the pointer hovers over any of the controls for a few seconds. The following sample shows the tip for the module Name Tab header which is discussed below.



The tips provide usage information about each of the fields or controls.

Control and information elements



- **Module Name Tab header -** The module name is set to the serial number of the module by default. An Asterisk is appended to the module name whenever there is an unsaved (As default) modification to the module settings.

  A module can be renamed by right-clicking on the name field. A new name (32 characters maximum) can be saved by pressing the [Enter] key. Alternately use the [Esc] key to leave the name unchanged.

  A modified name is only used for the current session of the App. Use the 'Set As Default' to preserve the name for future sessions.

  Click on the module name field to make the panel LED indicator of the module show steady blue light for a couple of seconds to positively identify the active module with which the RFOptic configuration App is communicating. When several modules are connected by USB, the application will display each module in a separate tab with the active module showing a light backgrouns while other tabs are grayed out. Click on one of the gray tabs to select a different active module.
- **Module information, Module Type -** These lines show the module type (Transmitter or Receiver), part number (P/N), module Serial number (S/N) and Revision.
- **Status LED -**Shows the state of the modules panel LED during normal operation. The LED is Green when all is ok, Steady blue for module identification and blinking blue during firmware update. It blinks in red when there is a loss of optical power. It is also possible to adjust the level at which this Optical Power Level Alarm (OPLA) will become active.
- **LNA On -** The checkbox option is only available for Transmitter modules. When active it adds an LNA gain block at the input of the module. The gain of the LNA is fixed. The additional gain improves the noise performance of the module at the expense of the maximum signal level.
- **Attenuation -** The Attenuation value can be adjusted between 0dB and 31.5dB using the up/down arrows. The attenuator is placed after the LNA and before the Laser driver. Use this adjustment to equalize the link gain among several links or set the performance preference of noise versus the maximum signal.
- **Optical power -** Sensor reading of the output optical power in a Transmitter module or the input optical power of a Receiver module. Note that the Optical power is affected by the RF signal and may vary considerably when the RF signal power is high.
- **Temperature -** Sensor reading of the module internal temperature.
- **Self test -** Button that activates the BIT capability of the module. This test is automatically done on module power up and when a module USB port is connected. The result of the test is displayed in the Status line and by an Icon next to the button.

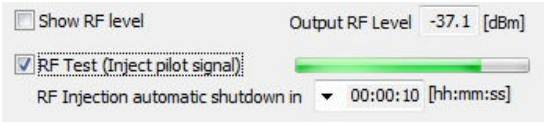
  

- **Reset / disconnect -** Button that causes the module to reset to its default power on configuration. It is equivalent to cycling the DC power supply to the module (turning the power Off and back On). This is particularly useful when the module power line is inaccessible. A warning message will be displayed if any changes were made and were not saved to make sure that they are not lost with the Reset operation.
- **Set as Default -** Button that stores the current configuration settings as the Power On default state of the module.
- **Restore Factory Setup -** Button that restores the module settings to the factory configuration. All user modifications are overwritten. The updated setup will remain in effect as long as the module is powered and is not Reset. To preserve the factory settings as the power on defaults use the 'Set As Default' button.
- **Show RF level -** When selected this option activates an RF power sensor that is integrated at the output of the module. The App displays the measured signal RF power and refreshes it once a second while connected by USB and monitored with the RFOptic configuration App. The RF power is also displayed automatically if the RF Link Test option is activated.



- **RF Link Test (Transmitter) or RF Test (Receiver) -** When selected this option activates an RF pilot signal injection into the input of the module and also enables an RF power sensor that is integrated at the output of the module. Together these two provide an indication for the signal pass-through within the module. While the test signal is active the color of the panel indicator LED will change to Cyan to indicate that RF signal is being injected.

Transmitter:



Receiver:



When a link consisting of a Transmit module, Fiber and Receive module is connected and the 'RF Link Test' option is activated at the Transmitter module, it is possible to use the 'Show RF Level' option at the Receive module to verify the signal pass-through through the entire RFoF link. The power of the RF signal that is injected at the input of the transmitter will register at the output of the transmitter and at the output of the receiver of that link.

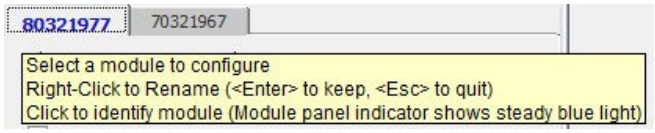
The 'RF Link Test' pilot injection is limited to a selectable time interval. The RF pilot signal is automatically discontinued after the selected interval. This automatic shutdown insures that the pilot test signal would not remain active inadvertently which could interfere with desired signals. The RF pilot signal may be stopped at any time by clicking off the 'RF Link Test" option. The RF pilot interval is controlled by the module and is independent from the software App. Therefore the RF pilot injection will proceed for the prescribed time even if the module is disconnected from the software App.

- **RF injection automatic shutdown -** This selection box defines the time interval for the RF pilot injection. The RF signal is discontinued after the expiration of the selected interval. Interval selections are offered from few seconds up to 6 hours. An associated indicator shows the remaining interval while the RFOptic configuration App is attached to the module.
- **Status line -**The status line displays messages concerning the App state and module
- **Quit / Exit button -**Quits the configuration App. Any changes made for each module and were not saved will remain in effect until the DC power of the module is recycled.

RFOptic configuration tool advanced mode

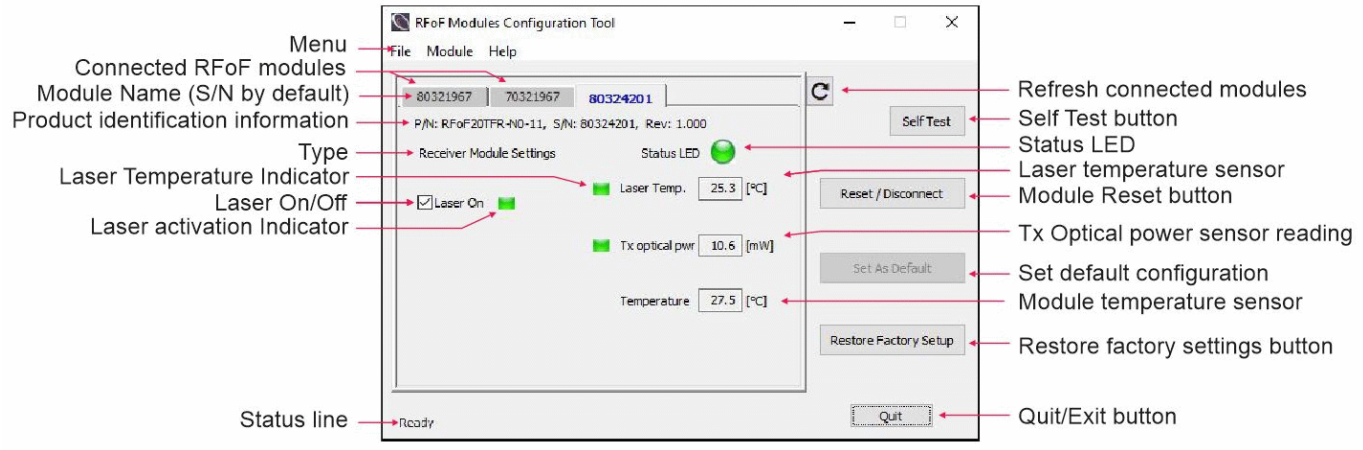
User Guide for RFoF HF series

The elements of the App window are highlighted below for a Transmitter module. For Receiver modules a field that displays the Rx optical power is shown along with the interior temperature of the module. The App features on screen tips which diplay when the pointer hovers over any of the controls for a few seconds. The following sample shows the tip for the module Name Tab header which is discussed below.



The tips provide usage information about each of the fields or controls.

Control and information elements



- **Module Name Tab header -** The module name is set to the serial number of the module by default. An Asterisk is appended to the module name whenever there is an unsaved (As default) modification to the module settings.

  A module can be renamed by right-clicking on the name field. A new name (32 characters maximum) can be saved by pressing the [Enter] key. Alternately use the [Esc] key to leave the name unchanged.

  A modified name is only used for the current session of the App. Use the 'Set As Default' to preserve the name for future sessions.

  Click on the module name field to make the panel LED indicator of the module show steady blue light for a couple of seconds to positively identify the active module with which the RFOptic configuration App is communicating. When several modules are connected by USB, the application will display each module in a separate tab with the active module showing a light backgrouns while other tabs are grayed out. Click on one of the gray tabs to select a different active module.
- **Module information, Module Type -** These lines show the module type (Transmitter or Receiver), part number (P/N), module Serial number (S/N) and Revision.
- **Status LED -**The status LED replicates the panel LED of the module. It is green for normal operation of the module and blinks red in case of a fault. The LED turns to blue when the module is addressed by the software for module identification and blink fast in cyan during firmware update. In tarnsmitter modules it will blink blue during the Laser setup period and will alternate blink green and red when the laser is at the operating conditions but the is turned off
- **Laser On/Off -** The checkbox option is only available for Transmitter modules. When activated it schedules the laser to turn On once its temperature reaches the target temperature (set to 25C by default). This stabilization procedure depends on the ambient temperature and takes about 10s to 30s
- **Laser activation indicator -** This indicator is dark when the Laser is set to Off, It turns amber when the Laser is scheduled to turn on and to green when the laser is actually on.
- **Tx Optical power -** Sensor reading of the output optical power of a Transmitter module.
- **Rx Optical power (not shown) -** Sensor reading of the input optical power reaching the Receiver.
- **Laser temperature -** Sensor reading of the Laser temperature within the transmitter. The laser temperature is maintained by the module near 25C. Significant deviation from this value indicates a failure that must be addressed quickly to avoid damage to the Laser.
- **Laser temperature indicator -** The laser temperature indicator is dark when the laser control is off. It turns amber when the control is operating to bring the laser to its operating conditions, abd to green when the laser is locked into its operating range.
- **Temperature -** Sensor reading of the module internal temperature.
- **Self test -** Button that activates the BIT capability of the module. This test is automatically done on module power up and when a module USB port is connected. The result of the test is displayed in the Status line and by an Icon next to the button.

- **Reset / Disconnect button -**Resets the module. This is a software equivalent to power cycling of the module. The module reverts to its default settings.
- **Set As Default button -**Saves the module settings as the Defaults. Saved defaults will be restored if the module is Reset or power to the module is cycled.
- **Restore Factory Setup-**Restore the factory configuration parameters of the module.

- **Status line -**The status line displays messages concerning the App state and module
- **Status LED -**Shows the state of the modules panel LED during normal operation. The LED is Green when all is ok, It blinks in red when there is a loss of optical power. It is also possible to adjust the level at which this Optical Power Level Alarm (OPLA) will become active.
- **Quit / Exit button -**Quits the configuration App. Any changes made for each module and were not saved will remain in effect until the DC power of the module is recycled.

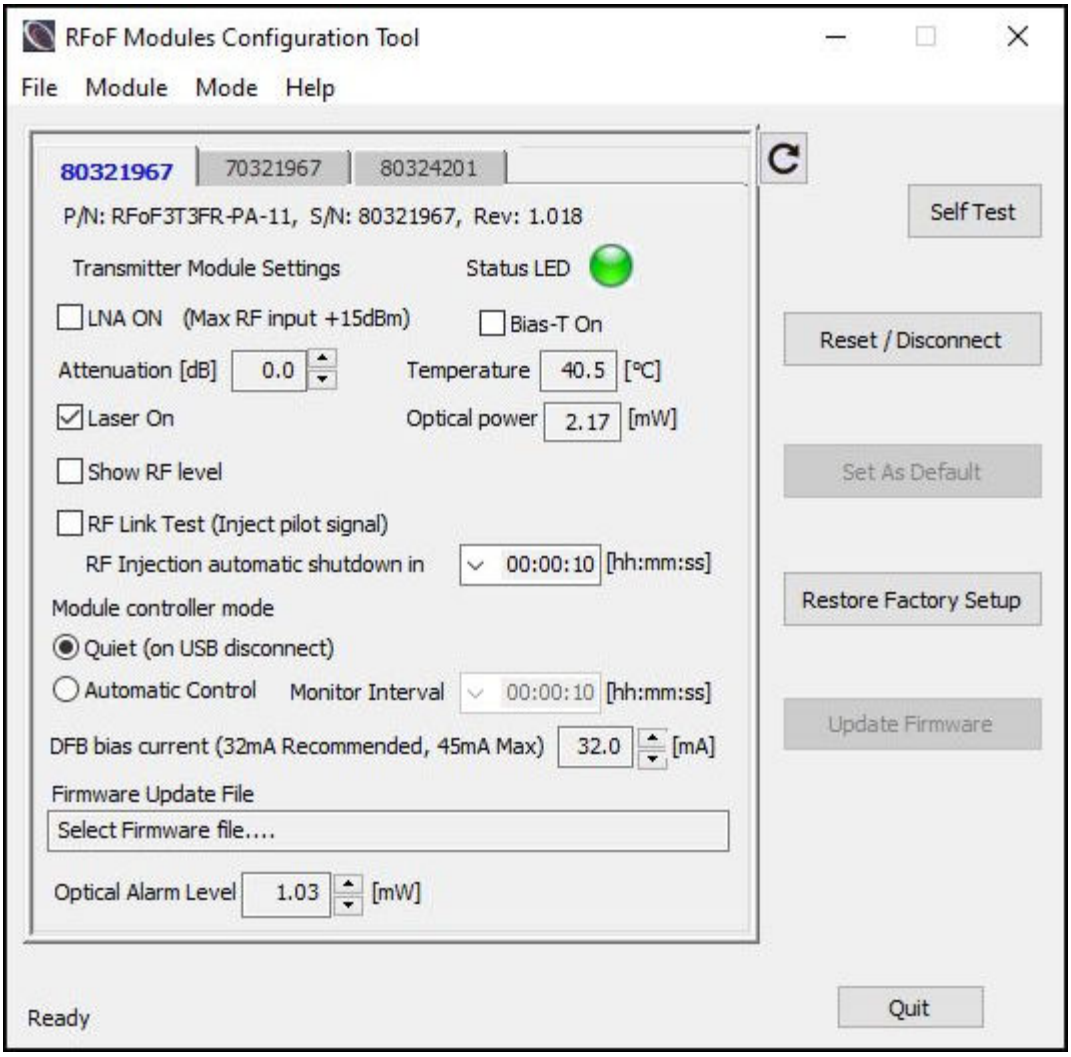

RFOptic configuration tool advanced mode

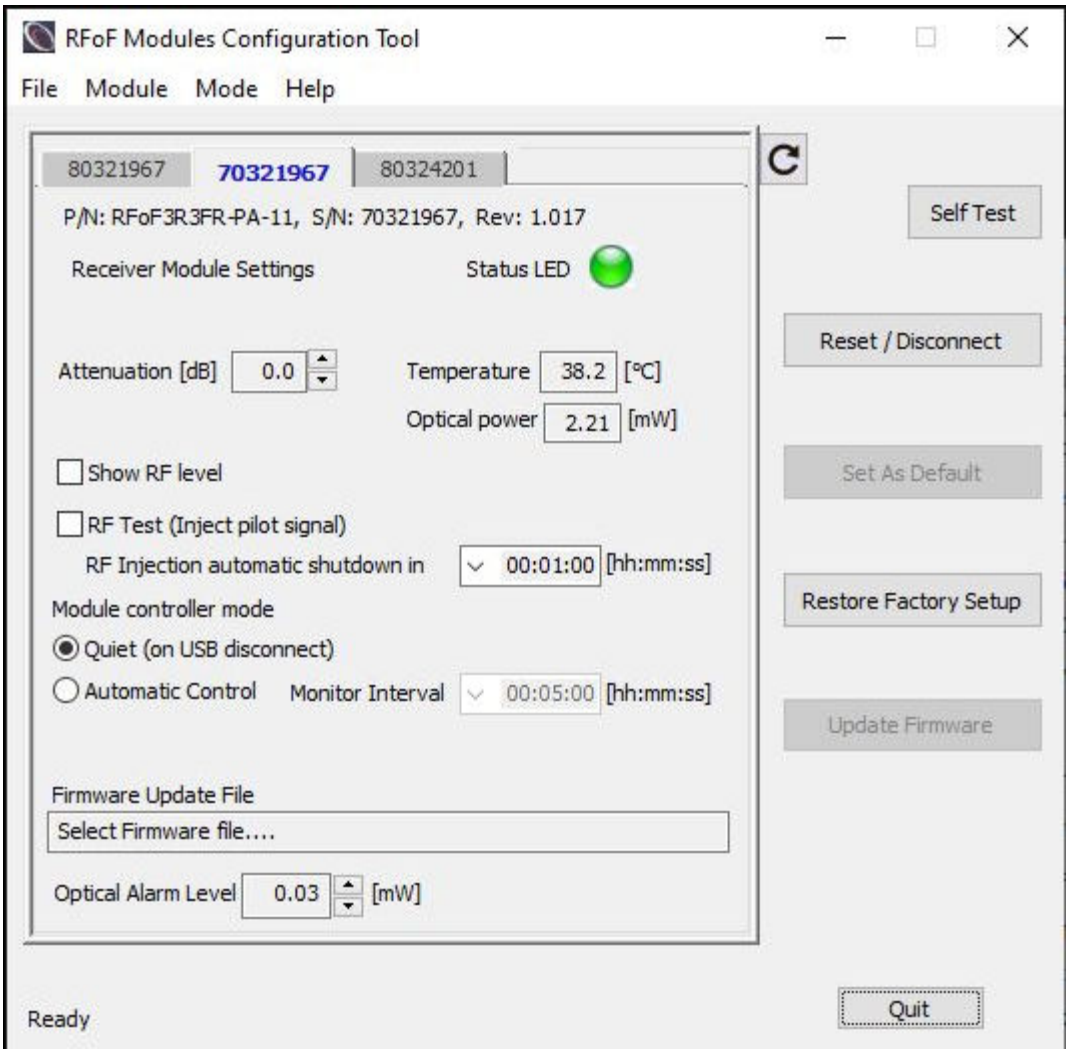
RFoF Advanced Configuration Tool window

Module identification

The App advanced window adds condition reporting and controls to set additional operating parameters for the RFoF module. These parameters may effect the performance of the module in significant manner. Access to the Advanced mode requires a special RF Optic authorization.

Screenshots of the App in Advanced mode for Transmitter and Receiver modules:





The Advanced mode App provides controls for the following operational parameters.

- **Temperature -** Sensor reading of the internal module temperature.
- **Module controller mode -** The module offers a choice of two operating modes.

  The default 'Quiet (on USB disconnect)' mode is used to maintain a fixed setting and reduce noise. This mode is activated by the disconnect of the USB cable from the module. As long as the module is connected via USB to a computer (even if the RFOptic Configuration tool is not running) the module controller remains fully active. It is possible to disable the sensing of the USB connection by electronically disconnecting the USB signal and power lines. This needs to be done using a USB hub with a tri-state capability. Please contact RF Optic® for applicaations requiering this capability.

  The 'Active control' mode allows the module controller to make adjustments of attenuation and optical power to compensate for temperature variations. When this mode is selected the module monitors and corrects the operating parameters once per monitor interval (by default every 5 minutes). A different monitor interval may be selected from the drop-down selection box. Note that a minimum of 2dB attenuation is recommended to allow the controller to provide positive gain correction based on the operating temperature in this mode.
- **Monitor interval -** Time interval for operating parameters update when the module is in the Active Control mode. This interval can be set from few seconds to several hours as best suits the application of the RFoF link. An associated progress indicator shows a countdown of the interval untill the next correction while the RFOptic configuration App is attached to the module.
- **Firmware update file -** This field shows the filename that is selected to update the firmware of the module. Such firmware update may be required to resolve some application issues or provide custom functionality. The file would be supplied by RF Optic® and should be saved on the computer. Select the file using by menu File->Open->Firmware file. Once a valid Firmware update file is selected the Firmware Update button would be enabled.
- **Firmware Update -** Button used to update the firmware of the RFoF module. The procedure takes a few minutes. The module should be powered and USB connection must be maintained during Firmware update otherwise the module may be rendered inoperable.
- **DFB nominal bias -** This ia a Transmitter module only parameter which sets the Laser bias current. The setup range is limited to protect the module against immediate damage. Any change to this value should be made only after consulting with RF Optic®. The increase of this value may reduce the Laser lifetime while a decrease of the bias current may limit the dynamic range of the RFoF link.
- **Optical Alarm Level -** This property defines the alarm level for loss of optical power (OPLA). The value is different for a Transmitter module and a Receiver module. In a transmitter module the OPLA is checked at the Laser output. It is set to a high value and an alarm condition may indicate

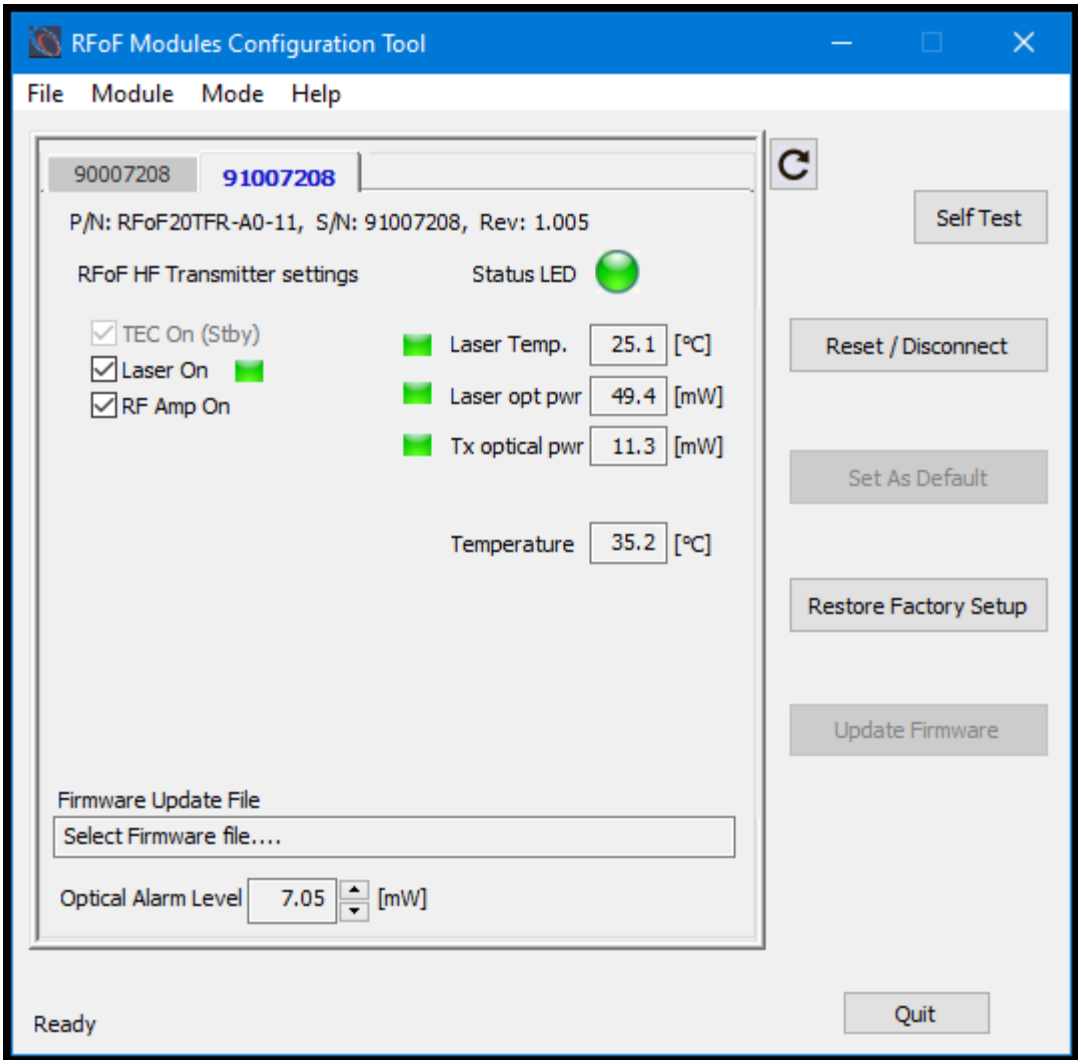
Laser failure or that the Laser was turned off. In a Receiver module the OPLA is lower allowing for some fiber caused loss of optical power. In this case the alarm condition indicates a high fiber loss or improper optical connection.

RFoF Advanced HF Configuration Tool window

Module identification

The App advanced window adds condition reporting and controls to set additional operating parameters for the RFoF HF module. These parameters may effect the performance of the module in significant manner. Access to the Advanced mode requires a special RF Optic authorization.

Screenshots of the App in Advanced mode for Transmitter and Receiver modules:



The Advanced mode App provides controls for the following operational parameters.

- **Laser temperature -** Sensor reading of the laser TEC controlled temperature, and status LED.
- **Laser power -** Sensor reading of the internal laser output power, and status LED.
- **Temperature -** Sensor reading of the internal module temperature.
- **Firmware update file -** This field shows the filename that is selected to update the firmware of the module. Such firmware update may be required to resolve some application issues or provide custom functionality. The file would be supplied by RF Optic® and should be saved on the computer. Select the file using by menu File->Open->Firmware file. Once a valid Firmware update file is selected the Firmware Update button would be enabled.
- **Firmware Update -** Button used to update the firmware of the RFoF module. The procedure takes a few minutes. The module should be powered and USB connection must be maintained during Firmware update otherwise the module may be rendered inoperable.
- **Optical Alarm Level -** This property defines the alarm level for loss of optical power (OPLA). The value is different for a Transmitter module and a Receiver module. In a transmitter module the OPLA is checked at the Laser output. It is set to a high value and an alarm condition may indicate Laser failure or that the Laser was turned off. In a Receiver module the OPLA is lower allowing for some fiber caused loss of optical power. In this case the alarm condition indicates a high fiber loss or improper optical connection.

- **Optional user controls -** If configured, additional control functions are displayed. Such options include RF amplifier activation, user and internal RF switches or digital attenuator.

Examples of advanced optional controls that are available, if configured, in the Advanced Mode

