# Cable and Antenna Testing
# Fiber (OTDR) Testing
## OneAdvisor 800
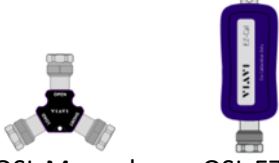
## Table of Contents

# 1. Cable and Antenna Testing

## 1.1    Scope

This document describes how to configure the OneAdvisor 800 for cable and antenna testing, including:
- Reflection tests: Return loss and VSWR
- Distance to Fault
- Cable Loss

The required products and parts to complete this procedure are as follows:

| Description | Diagram |
|---|---|
| OneAdvisor with the following functions:<br>- ONA-800 mainframe equipped with the following module:<br>    o  CA006MA: Cable and antenna analysis 6GHz | <br>ONA Front View.    ONA Side View |
| OSL calibration Kit either Electronic (Manual or EZcal)<br>- JD78050509: Manual OSL calibration kit Type-N(m)<br>- JD70050509: EZcal, electronic OSL calibration kit Type-N(m) | <br>OSL Manual    OSL EZcal |
| RF Cables<br>- G700050531: RF Cable DC to 8 GHz Type-N M to Type-N (F) 1.5 m | <br>RF Cable |

## 1.2    OneAdvisor Overview

The OneAdvisor is a portable instrument for Cell Site installation and maintenance, the main test functions of OneAdvisor for cell site installation include:
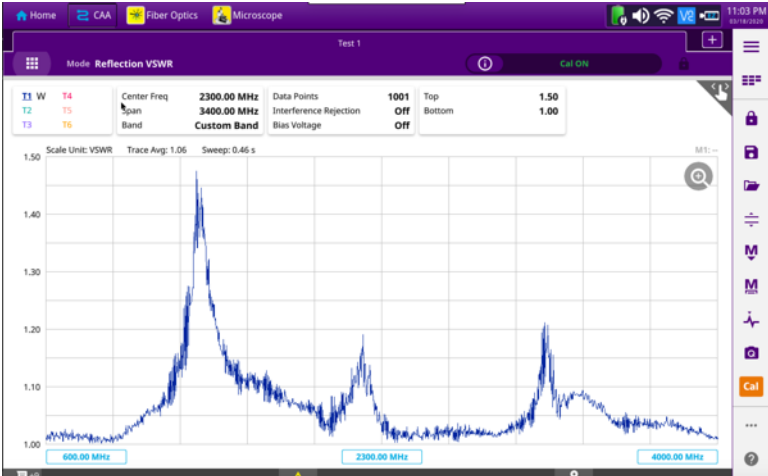
- Cable and antenna analysis up to 6GHz
- Fiber Inspection verification
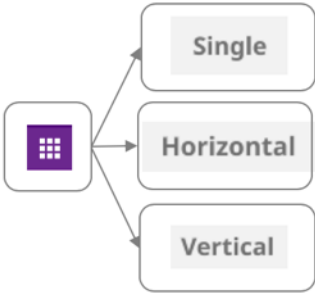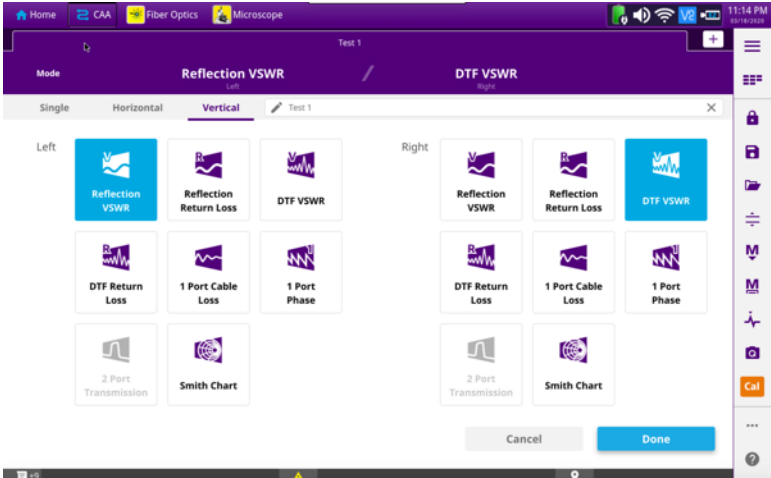- Fiber validation (OTDR)

## 1.3    Cable and Antenna Analysis

The following procedure describes the steps to perform cable and antenna analysis with OneAdvisor.
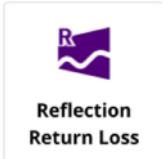
### 1.3.1   Initial Setup

The following procedure describes the initial setup of cable and antenna analysis, including turn-up and connectivity.
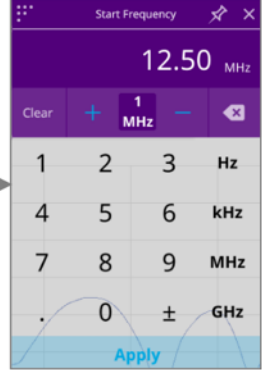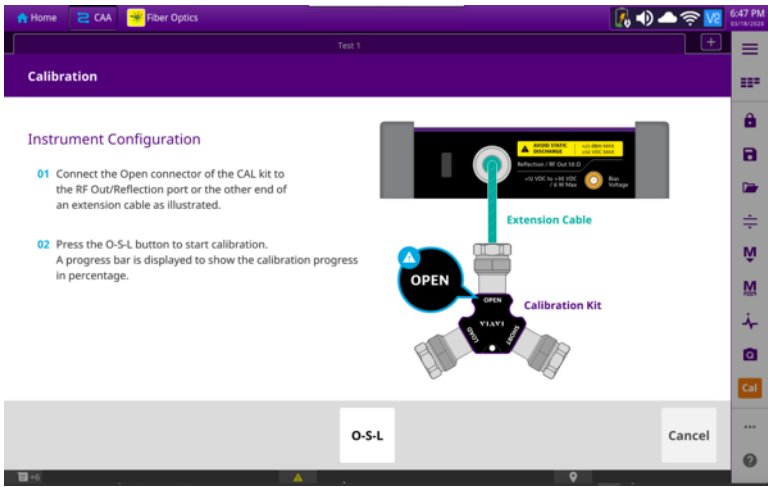
| Step | Action | Description |
|------|--------|-------------|
| 1 | Power ON OneAdvisor | Press and hold the ON/OFF button for 3 seconds to power on the OneAdvisor<br><br> |
| 2 | Connectivity: connect the RF cable (cable under test or extension cable) into the CAA Module Reflection / RF Output port. | <br><br>ONA Front View.　　　　　ONA Back View |
| 3 | Cable and Antenna Analysis mode:<br>- Select {Home}, {Tests}, {CAA}, {CAA}<br>- To select a measurement type, select the multi-grid icon ⊞<br>- Choose either single or dual testing selecting the corresponding layout:<br>　o　Single<br>　o　Horizontal<br>　o　Vertical<br>- Select the desired measurement type:<br>　o　Reflection VSWR<br>　o　Reflection Return Loss<br>　o　DTF VSWR<br>　o　DTF Return Loss<br>　o　1 Port Cable Loss<br>　o　1 Port Phase | <br>Cable and Antenna Analyzer Measurement Mode<br><br><br>Real-time Spectrum Measurement Screen |

| Step | Action | Description |
|------|--------|-------------|
| | o RF Source<br>o Smith Chart | <br>Measurement Types Layout<br><br><br>Cable and Antenna Measurement Types |
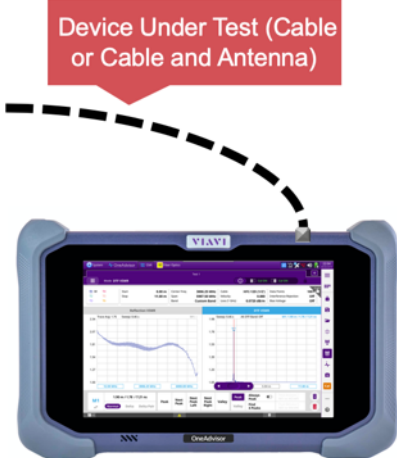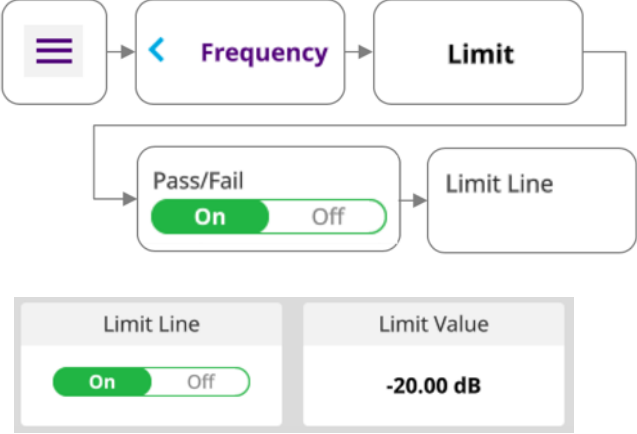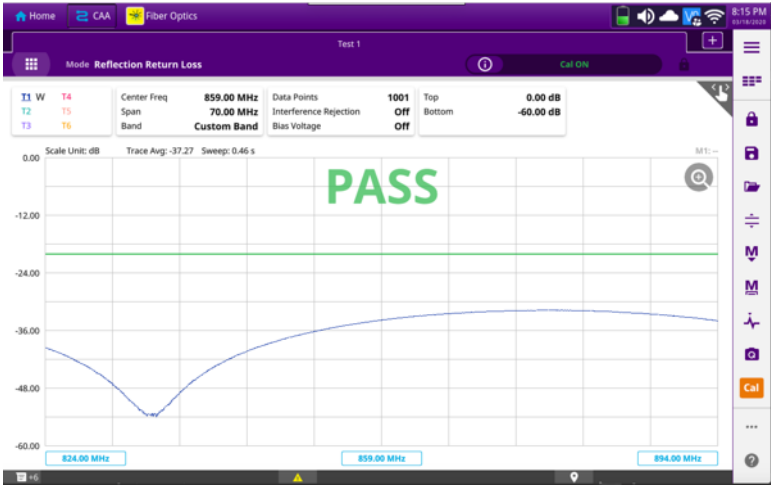
## 1.3.2  RF Reflection Test

The following procedure describes the steps to perform reflection tests (Return Loss or VSWR) with OneAdvisor.
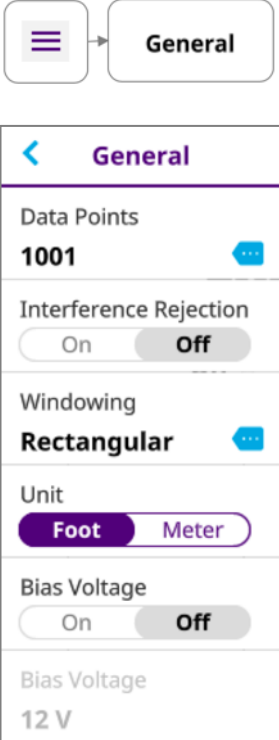
| Step | Action | Description |
|------|--------|-------------|
| 1 | Reflection measurement mode:<br>- Select the desired measurement layout.<br>- Select the corresponding reflection measurement icon (Return Loss or VSWR).<br><br>*Note: Refer to the "Initial Setup" section for initial configuration and connectivity with OneAdvisor* | <br>Reflection Test Measurement Types |

| Step | Action | Description |
|------|--------|-------------|
| 2 | Set the frequency band or range to perform reflection test:<br>- Select the frequency group of the top-bar navigation or the configuration icon from the side-bar navigation<br>- Set the required frequency range by selecting, the desired field, enter the frequency value and select {Apply}<br><br>*Note: Frequency is set by either {Start Frequency} and {Stop Frequency} or by {Center Frequency} and {Span Frequency}* | <br>Top bar frequency group      Side-bar configuration icon<br><br><br>Setting Frequency Range |
| 3 | Calibrate the instrument:<br>- Select {Cal} icon from the side-bar navigation and follow the on-screen instructions.<br><br>*Note: If an RF extension cable is required, connect the RF extension cable into the CAA Module Reflection / RF Output port and on the other end of the RF extension cable connect the calibration kit.* | <br><br><br>Calibration Process |

| Step | Action | Description |
|------|--------|-------------|
| 4 | Perform the reflection test:<br>- Connect the cable or cable and antenna system to be tested at the calibration point (CAA module RF port, or RF extension cable). |  |
| 5 | Enable a PASS/FAIL indicator by setting a limit line:<br>- Select the configuration icon from the side-bar navigation<br>- Select the configuration title (the default is "Frequency")<br>- Select {Limit}<br>- Select {Pass/Fail} to turn it ON<br>- Select {Limit Line}<br>- Set the limit line value from the bottom-bar navigation (e.g. -20)<br>- Select {Limit Line} to turn it ON | <br><br>Reflection Loss with PASS/FAIL indicator |

# VIAVI

## 1.3.3 RF Distance to Fault (DTF)

The following procedure describes the steps to perform distance to fault tests (Return Loss or VSWR) with OneAdvisor.
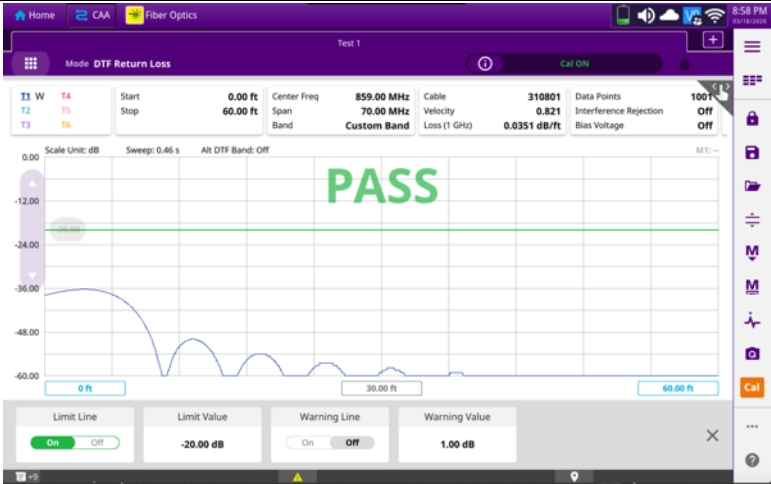
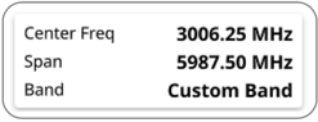| Step | Action | Description |
|------|--------|-------------|
| 1 | DTF measurement mode:<br>- Select the desired measurement layout.<br>- Select the corresponding DTF measurement icon (RTF in Return Loss or DTF in VSWR).<br><br>*Note: Refer to the "Initial Setup" and "RF Reflection Test" sections for initial configuration, connectivity and reflection test.* | DTF Measurement Types |
| 2 | Configure the DTF measurement:<br>- Select the configuration icon and select {General}<br>- Set the desired Data Points, Interference Rejection, Windowing, Units, and Bias. | General Cable and Antenna Settings |
| 3 | Configure the DTF distance measurement:<br>- Select the measurement title {General}<br>- Select {Distance}<br>- Set the desired Start Distance, and Stop Distance. | |

| Step | Action | Description |
|------|--------|-------------|
|  |  |  Distance Setting |
| 4 | Configure the cable type:<br>- Select the measurement title {Distance}<br>- Select {Cable Definition}<br>- Select the cable from the instruments data-base {Cable Name} or enter the corresponding propagation velocity and cable loss at 1GHz of the cable under test. |  Cable Type Setting |
| 5 | Enable a PASS/FAIL indicator by setting a limit line:<br>- Select the configuration icon from the side-bar navigation<br>- Select the configuration title (the default is "General")<br>- Select {Limit}<br>- Select {Pass/Fail} to turn it ON<br>- Select {Limit Line}<br>- Set the limit line value from the bottom-bar navigation (e.g. -20)<br>- Select {Limit Line} to turn it ON |  |

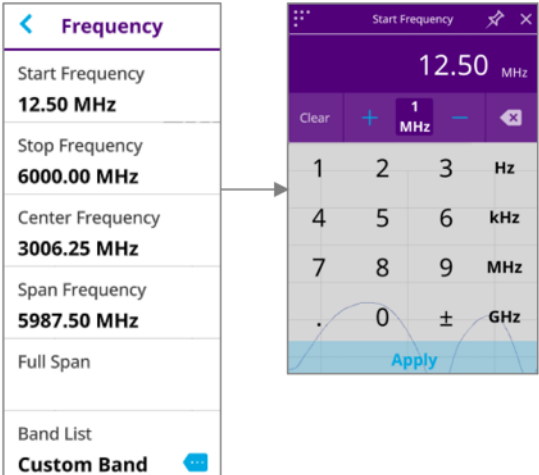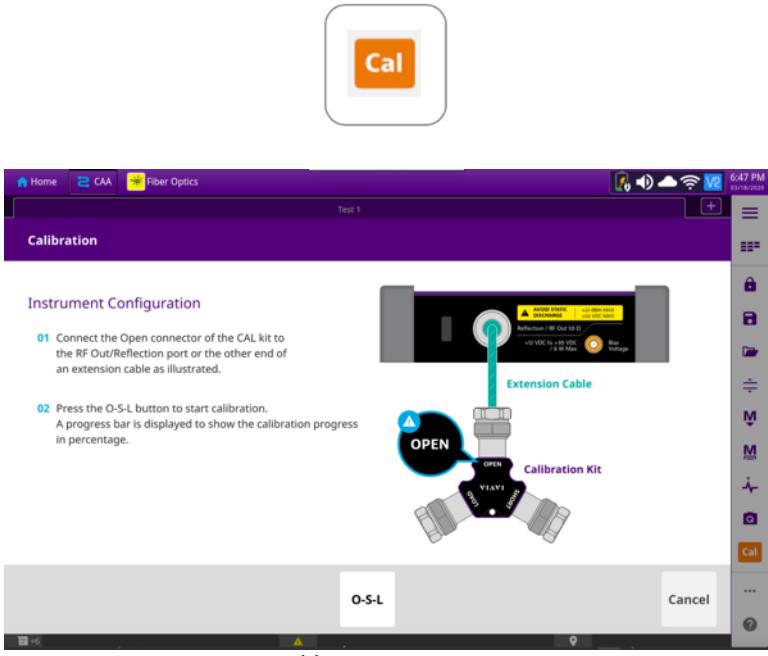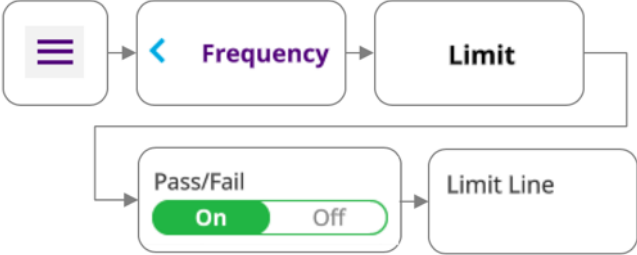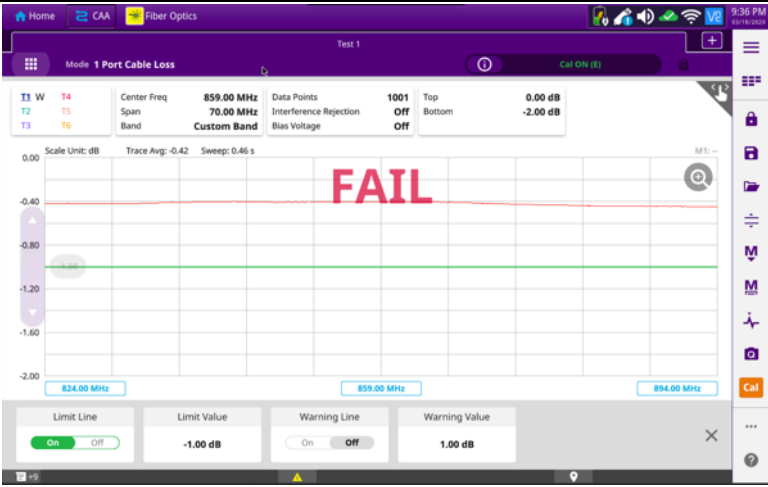| Step | Action | Description |
|------|--------|-------------|
|  |  |  DTF test with PASS/FAIL indicator |

### 1.3.4 RF Cable Loss

The following procedure describes the steps to perform cable loss tests with OneAdvisor.

| Step | Action | Description |
|------|--------|-------------|
| 1 | Cable Loss measurement mode:<br>- Select the desired measurement layout.<br>- Select the {Cable Loss} icon.<br><br>*Note: Refer to the "Initial Setup" section for initial configuration and connectivity.* |  Cable Loss Measurement |
| 2 | Set the frequency band or range to perform reflection test:<br>- Select the frequency group of the top-bar navigation or the configuration icon from the side-bar navigation<br>- Set the required frequency range by selecting, the desired field, enter the frequency value and select {Apply}<br><br>*Note: Frequency is set by either {Start Frequency} and {Stop Frequency} or by {Center Frequency} and {Span Frequency}* |  Top bar frequency group     Side-bar configuration icon |

| Step | Action | Description |
|------|--------|-------------|
| | | <br>Setting Frequency Range |
| 3 | Calibrate the instrument:<br>- Select {Cal} icon from the side-bar navigation and follow the on-screen instructions.<br><br>*Note: If an RF extension cable is required, connect the RF extension cable into the CAA Module Reflection / RF Output port and on the other end of the RF extension cable connect the calibration kit.* | <br><br>Calibration Process |
| 5 | Enable a PASS/FAIL indicator by setting a limit line:<br>- Select the configuration icon from the side-bar navigation<br>- Select the configuration title (the default is "Frequency")<br>- Select {Limit}<br>- Select {Pass/Fail} to turn it ON<br>- Select {Limit Line} | <br>Reflection Loss with PASS/FAIL indicator |

| Step | Action | Description |
|------|--------|-------------|
|  | - Set the limit line value from the bottom-bar navigation (e.g. -5) <br> Select {Limit Line} to turn it ON |  <br> Cable Loss test with PASS/FAIL indicator |

# 2. Fiber (OTDR) Testing

## 2.1    Scope

This document explains how to connect to a fiber under test, configure Fiber to the Antenna (FTTA) OTDR test setups, run tests, and analyze results with a VIAVI OneAdvisor 800 equipped with an OTDR module (4100 series).

The required products and parts to complete this procedure are as follows:

| Description | Diagram |
|---|---|
| OneAdvisor 800 with the following functions:<br>-    ONA-800 mainframe equipped with the following module:<br>    o    OTDR module (E4100 series)<br>    o    EFTTASLM: Fiber to the Antenna and SmartLink Mapper. |  ONA Front View.    ONA Side View |
| Fiber inspection tool, which can be one of the following:<br>-    FBP-SD101: Digital Probe P5000I<br>-    FIT-FC-KIT3: FiberCheck Autofocus WiFi Microscope |  Scope P5000I    FiberCheck |
| Fiber Accessories:<br>-    EPCSM10M-LC-LC: Fiber optic patch cable<br>-    Optical Coupler to connect Launch Cable to BBU Jumper Cable or Trunk Cable |  Fiber Patch Panel    Couplers |

The following information is required to complete the procedure:
- o    Type of Fiber (Multimode or Single Mode)
- o    Type of Connectors (SC UPC, SC APC, LC UPC, etc.)
- o    Tower architecture:
  - o    Is there a BBU jumper cable?
  - o    Is there an RRU jumper cable?
- o    RRU and BBU/Base Station IDs
- o    Fiber Code (1-Rx, 1-Tx, …, 24-Tx)

## 2.2 Fiber Inspection Guidelines

- All fiber end-faces must be clean and pass an inspection test prior to connection.
- Use the VIAVI P5000i or FiberChek Probe microscope to inspect both sides of every connection being used (SFP Port, bulkhead connectors, patch cables, etc.)
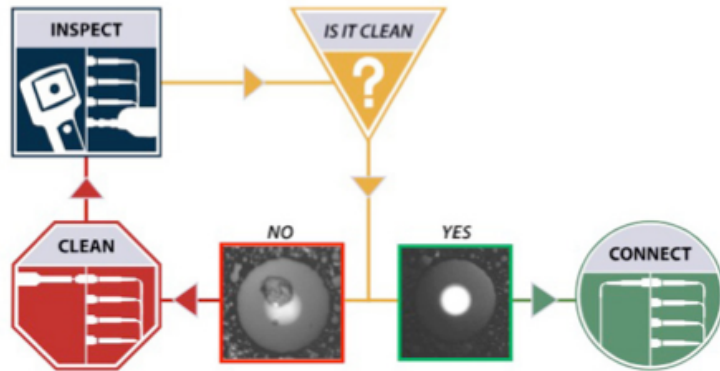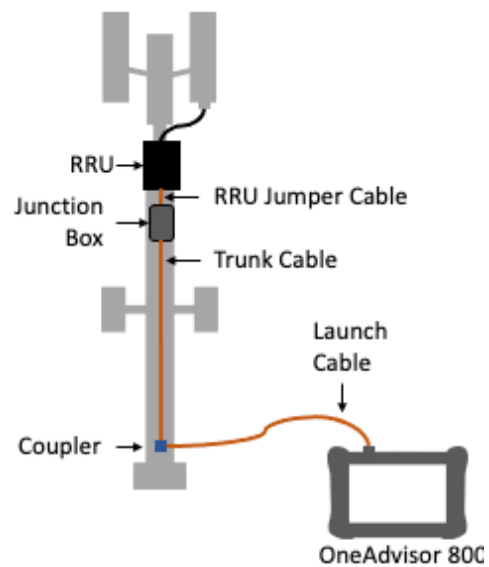
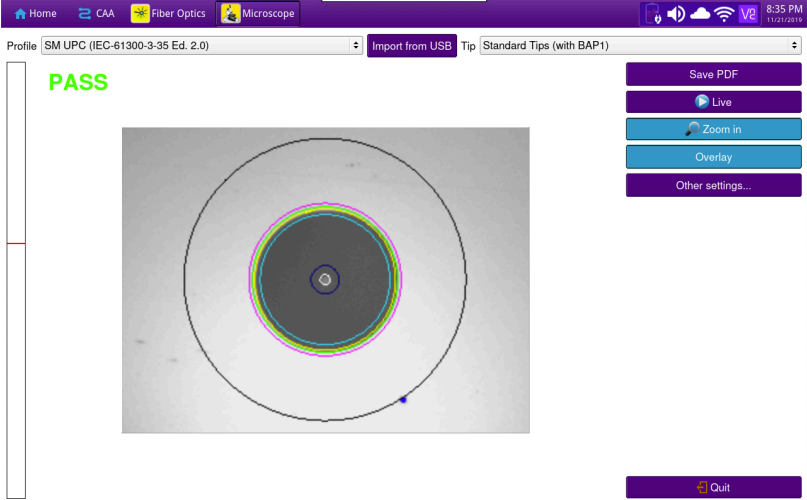## 2.3 Fiber Testing

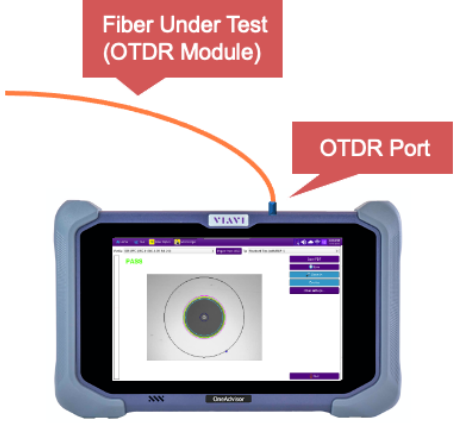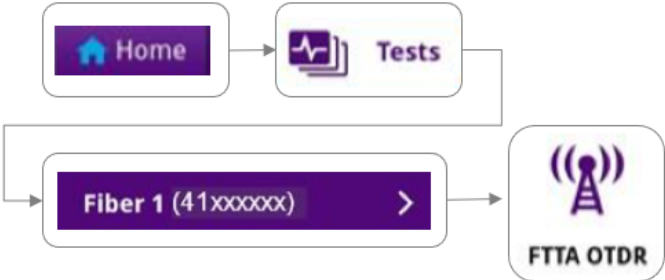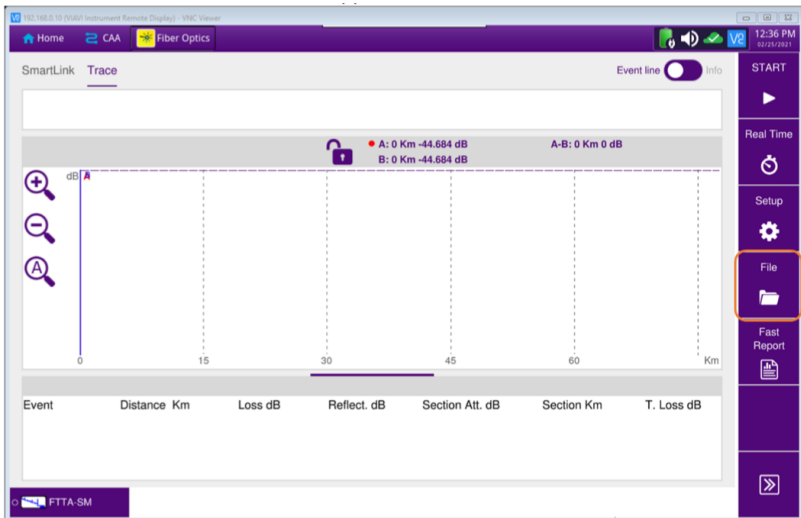All fibers and connectors should PASS the fiber inspection guidelines prior to connection. The OTDR may be connected to the fiber under test as follows:
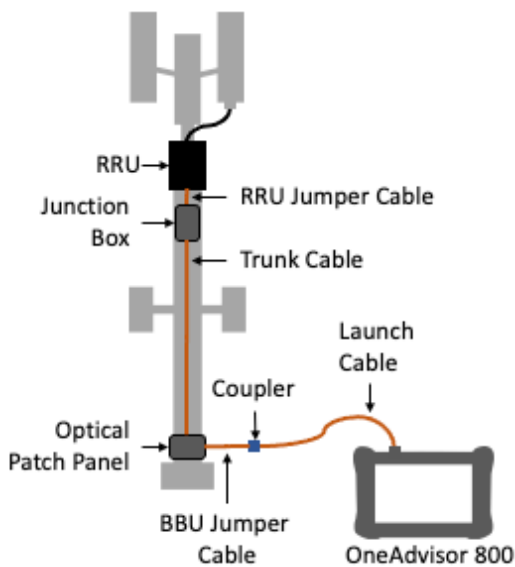
Tower Architecture with BBU Jumper
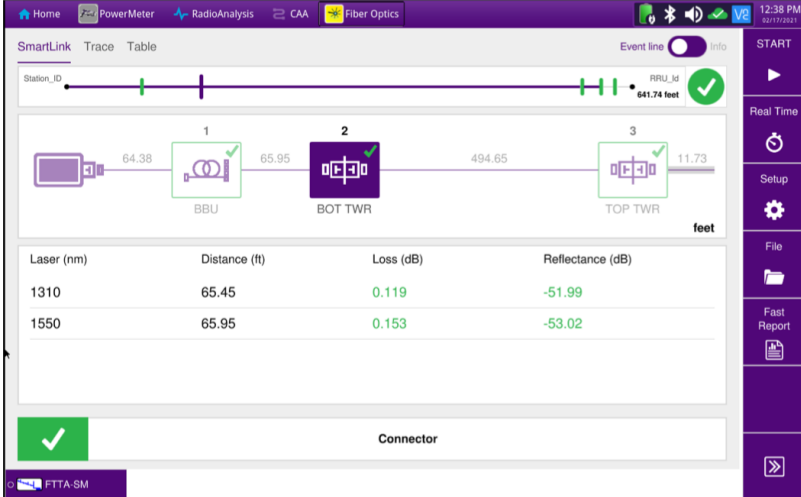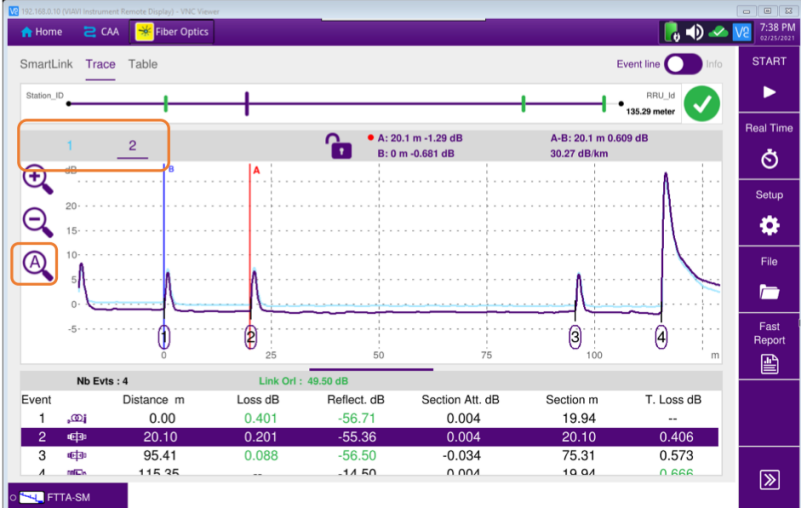
Tower Architecture without BBU Jumper
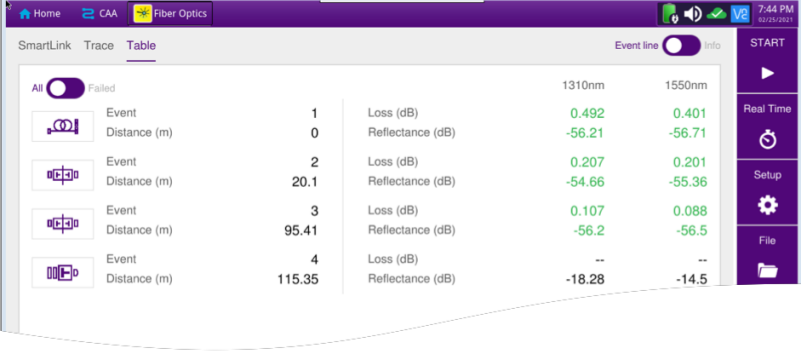
| Step | Action | Description |
|------|--------|-------------|
| 1 | Power ON OneAdvisor | Press and hold the ON/OFF button for 3 seconds to power on the OneAdvisor 800.<br><br> |
| 2 | Fiber Inspection:<br>- Connect the Fiber scope into the OneAdvisor 800 via USB.<br>- Select the Microscope icon:<br><br><br><br>Connect the Fiber Scope to the bulkhead and patch cord connector to inspect.<br><br>- Select the test icon:<br><br><br><br>Clean bulkhead or patch cord as needed until the test results PASS.<br><br>Inspect and Clean the following:<br>- OTDR port<br>- If the interface to the FUT is the BBU Jumper or Trunk Cable, connect the cable to an optical coupler with the same connector type. Inspect and clean the FUT connected to the coupler or Optical Patch Panel (OPP).<br>- Connectors of the Launch Cable.<br>- Connect the Launch Cable to the OTDR port.<br>- Connect the Launch Cable to the coupler or OPP leading to the RRU. | <br>OneAdvisor 800 with Fiber Scope<br><br><br>Bulkhead Inspection      Patch Cord Inspection<br><br><br>Fiber Inspection Test |

| Step | Action | Description |
|------|--------|-------------|
| 3 | Connectivity: connect the Fiber cable into the OTDR's port | <br>Fiber Under Test Connection to OneAdvisor 800 (OTDR) |
| 4 | Fiber to the Antenna measurement mode:<br>- Select {Home}, {Tests}, {Fiber 1 (41xxxxx)}, {FTTA OTDR}<br><br>Note: The 41xxxxx number will show the OTDR module number | <br>FTTA OTDR Measurement Mode<br><br><br>FTTA  Measurement Screen |

| Step | Action | Description |
|---|---|---|
| 5 | To open a measurement setup:<br>- Navigate to the ONA-800/disk/config/FTTA folder<br>- Testing setup options:<br>  o For testing an RRU at the far end select {File}, {FTTA_RRU_Maintenance-OTDR|, {Load}<br>  o For testing to a loopback at the far end select {FTTA_RRU_ConstrLoop.SM-OTDR}, {Load}<br><br>Configure Analysis settings as follows:<br>- Set BBU Jumper to Yes if there is a BBU Jumper Cable between the Launch Cable and OVP<br>- Set BBU Jumper to No if the Launch Cable is directly connected to the OVP.<br>- Set RRU Jumper to Yes if there is a Junction Box/OVP at the top of the tower between the Trunk Cable and RRU<br>- Set RRU Jumper to No if there is no Junction Box or no RRU Jumper.<br><br>Configure Link Description settings as follows:<br>- Set Base Station ID to the Base Station or BBU Identifier.<br>- Set RRU ID to the RRU Identifier or sector (Alpha, Beta, Gamma).<br>- Set Fiber Code to the fiber number and polarity using the up and down arrows.<br>- Set Change Fiber Nbr to Increment.<br>- Set Distance Unit to feet or meter. | Fiber Measurement Types (RRU far end or Loopback)<br><br>Measurement Analysis Setup |

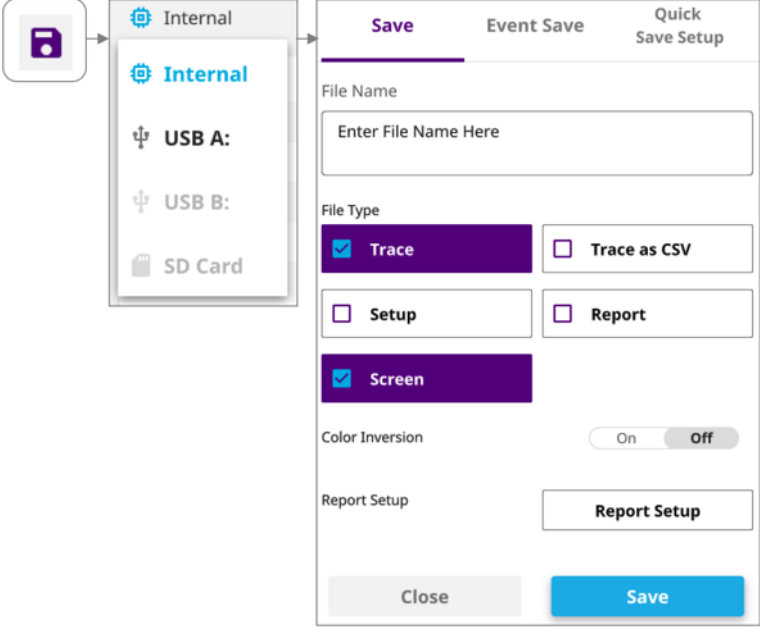| Step | Action | Description |
|---|---|---|
| 6 | Run the test and select SmartLink, Trace or Table.<br><br>**SmartLink view:**<br>Displays as a series of icons representing events (end-of-fiber, launch cable, connector, etc.). Swipe to display more events.<br><br>- The center of the display shows summary results per wavelength. Acquisitions for which all events are acceptable are marked with a green check.<br>- Tap on any icon to display event type and pass/fail status and to label each icon according to your tower architecture.<br>- In the lower display:<br>  o BBU: Connection (coupler) between launch cable and BBU Jumper Cable.<br>  o BOT TWR: Optical Patch Panel at bottom of tower<br>  o TOP TWR: Junction Box/Patch Panel at Top of tower<br>  o RRU: End of RRU Jumper Cable<br><br>**Trace view:**<br>Results for each wavelength are shown in different colors in the top section of the display.<br>Each event is listed in the lower section of the display. Any events that violate pass/fail thresholds for loss or reflectance are shown in RED.<br><br>Tap the icon following icon to Auto-zoom the trace.<br><br>Tap 1 or 2 at the top of the display to toggle between results for the two wavelengths. | <br>Run Test in either SmartLink, Trace, or Table<br><br><br>SmartLink View<br><br><br>Trace View |

| Step | Action | Description |
|---|---|---|
| | **Table View:**<br>Each event on the FUT is displayed in tabular format. | <br>Table View |

# 3. Save Measurement Results

The following procedure describes the steps to save measurement results with OneAdvisor

| Step | Action | Description |
|---|---|---|
| 1 | Saving measurement results:<br>- Select the {Save} icon from the side-bar navigation.<br>- Select {Internal} memory icon to set the file destination.<br>- Select the destination memory<br>- Enter the desired file name in the {File Name} field<br>- Select the measurement file type<br>- Select {Save} | <br>Save Measurement Results |

# 4. Technical Support

Technical support is provided by:
- Phone: 1-844-GO-VIAVI (1-844-468-4284) options 3-2-3
- Email: diagnostics.tac@viavisolutions.com

Regularly new firmware updates for the CellAdvisor 5G are released and it is recommended to keep the instrument in the latest firmware to provide all the enhancements and bug fixes.

- For firmware updates go to: http://celladvisor.updatemyunit.net/
- For additional information of cell site test go to: http://www.viavisolutions.com/en/products/network-test-and-certification/cell-site-test