



USER MANUAL



VePAL CX310

Handheld DOCSIS 3.1 Installation Test Set

Please direct all questions to your local VeEX Sales Office, Representative, or Distributor. Or, contact VeEX technical support at www.veexinc.com.

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Table of Contents

[1.0 About this User Manual](#)

[2.0 Introduction](#)

[2.1 Package Contents](#)

[3.0 Safety Information](#)

[4.0 Basic Operation](#)

[4.1 Compact Platform Overview](#)

[4.2 Keypad](#)

[4.3 Touch-Screen Display](#)

[4.4 Battery](#)

[4.5 Connector Panels](#)

[4.5.1 Test Ports](#)

[4.5.2 Utility Ports](#)

[5.0 Home Screen and Menu](#)

[5.1 Screen Layout](#)

[5.2 Screen Icons](#)

[6.0 Setup](#)

[6.1 Channel Tables and Locations](#)

[6.1.1 Channel Tables](#)

[6.1.2 Locations](#)

[6.1.3 TP Compensation](#)

[6.1.4 Diplexer Setting](#)

[6.1.5 HIP Settings](#)

[7.0 Test Applications](#)

[7.1 VeCheck](#)

[7.2 Single Channel Measurement](#)

[7.2.1 Digital Channel Measurements](#)

[7.2.2 Constellation Measurements](#)

[7.3 Ingress](#)

[7.3.1 Setup](#)

[7.4 Cable Modem](#)

[7.4.1 Setup](#)

[7.4.2 Cable Modem Results](#)

[7.4.3 IP Tools Setup and Results](#)

[7.5 Advanced Tools](#)

[7.5.1 R-Server](#)

[7.5.2 TDR](#)

[7.5.2.1 Principles of Operation](#)

[7.5.2.2 Operation](#)

[7.5.2.3 Typical Fault Displays](#)

[7.5.3 OFDM Analysis](#)

[7.5.4 HIP](#)

[7.5.5 Upstream Signal Generator \(USG\)](#)

[8.0 Common Functions](#)

[8.1 Tools](#)

[8.1.1 Fiber Scope](#)

[8.1.1.1 Automatic Focus Detection and Analysis](#)

[8.1.1.2 Main Advantages of Automatic Focus Detection](#)

[8.1.1.3 The Importance of Fiber Connector Inspection](#)

[8.1.1.4 Fiber Connectors and Test Gear Vulnerabilities](#)

[8.1.1.5 About the DI-1000 Fiber Inspection Scope](#)

[8.1.1.6 Fiber Connector Inspection Setup](#)

[8.1.1.7 Analyze](#)

[8.1.1.8 Capture Tab \(View\)](#)

[8.1.2 Optical Power Meter \(OPM\)](#)

[8.1.2.1 Setting Pass/Fail Limits](#)

[8.1.3 Data Card](#)

[8.1.4 Signature Pad](#)

[8.1.5 WiFi inSSIDer](#)

[8.1.6 OTDR Viewer](#)

[8.2 Utilities](#)

[8.2.1 About](#)

[8.2.2 Screen Calibration](#)

[8.2.3 Bluetooth/WiFi Wiz](#)

[8.2.3.1 Bluetooth](#)

[8.2.3.2 WiFi Wiz](#)

[8.2.4 Power](#)

[8.2.5 Backlight](#)

[8.2.6 Global Settings](#)

[8.2.7 Date and Time](#)

[8.2.8 Remote Access](#)

[8.2.9 Help](#)

[8.3 File Management](#)

[8.3.1 File Manager: Working with Saved Results, Profiles, Images](#)

[8.3.2 USB Memory Browser](#)

[8.3.3 Manage SD Card](#)

[9.0 ReVeal Software](#)

[10.0 Warranty and Software](#)

[11.0 Product Specification](#)

[12.0 Certification and Declarations](#)

[13.0 About VeEX](#)

[Go back to top](#)

1.0 About This User Manual

This user manual is suitable for novice, intermediate, and experienced users and is intended to help you successfully use the features and capabilities of the different modules for test platforms. It is assumed that you have basic computer experience and skills, and are familiar with IP and telecommunication concepts, terminology, and safety.

Every effort was made to ensure that the information contained in this manual is accurate. However, information is subject to change without notice. We accept no responsibility for any errors or omissions. In case of discrepancy, the web version takes precedence over any printed literature.

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For more technical resources, visit the VeEX Inc. web site at www.veexinc.com. For assistance or questions related to the use of this product, call or e-mail our customer care department for customer support. Before contacting our customer care department, have the product serial number and software version ready. Please locate the serial number on the back of the chassis. Please provide this number when contacting VeEX customer service.

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Website: www.veexinc.com

[Go back to top](#) [Go back to TOC](#)

2.0 Introduction

Refer to the CX310 module specification sheet for information about platform highlights and key features.

2.1 Package Contents

- CX310 unit
- AC/DC adaptor:
 - Input: 100-240 VAC (50/60 Hz)
 - Output: 15 VDC, 3.5A
- Ethernet cable
- Li-ion battery (capacity depends on platform)
- OTG Micro-USB to USB adapter
- USB memory stick (2Gbyte) or CD-ROM containing:
 - OTDR Users' Manual (pdf)
 - Reveal and Fiberizer Desktop software
 - Software Upgrade Instructions
- Nylon Soft Carry case

[Go back to top](#) [Go back to TOC](#)

3.0 Safety Information



Safety precautions should be observed during all phases of operation of this instrument. The instrument has been designed to ensure safe operation however please observe all safety markings and instructions. Do not operate the instrument in the presence of flammable gases or fumes or any other combustible environment. VeEX Inc. assumes no liability for the customer's failure to comply with safety precautions and requirements.

Optical Connectors

The test sets display a laser warning icon when the laser source is active to alert the user about a potentially dangerous situation. It is recommended to:

1. Deactivate the laser before connecting or disconnecting optical cables or patchcords.
2. Never look directly into an optical patchcord or an optical connector interface (SFP+) while the laser is enabled. Even though optical transceivers are typically fitted with Class 1 lasers, which are considered eye safe, optical radiation for an extended period can cause irreparable damage to the eyes.
3. Never use a fiber microscope to check the optical connectors when the laser source is active.

Safe Module Handling

While replacing test modules, all work on the open panel must be performed only by suitably qualified personnel who is familiar with the dangers both to people and to the instrument itself.

- Modules are not hot swappable. The platform must be turned off and unplugged from VAC mains when removing or inserting test modules.
- For safety and EMC (Electromagnetic Compatibility), empty module slots must be properly covered with blank panel covers.
- Prevent foreign objects from entering the UX400, before, during and after module exchange or re-configuration process. They could create short circuits or damage internal fans.
- Always store test modules by themselves in individual ESD protected packaging (with no loose elements, like screws or tools).

Lithium-ion Battery Precautions

Lithium-ion (Li-ion) battery packs are compact and offer high capacity and autonomy, which make them ideal for demanding applications, like providing long lasting power to portable test equipment. For safety reasons, due to their high energy concentration, these batteries packs and products containing them must be used, charged, handled, and stored properly, according to the manufacturer's recommendations.

Li-ion battery packs contain individual Li-ion cells as well as battery monitoring and protection circuitry, sealed in its plastic container that shall not be disassembled or serviced.

The test set unit's battery pack is also fitted with a safety connector to prevent accidental short circuits and reverse polarity.

- Always charge the unit's battery pack inside the test platform battery bay using the AC/DC adapter supplied by VeEX.
- Do not charge or use the battery pack if any mechanical damage is suspected (shock, impact, puncture, crack, etc).
- Do not continue charging the battery if it does not recharge within the expected charging time
- Storage: For long term storage, the battery pack should be stored at 20°C/68°F (room temperature), charged to about 30 to 50% of its capacity. Spare battery packs should be charged and used at least once a year to prevent over-discharge (rotate them regularly).
- It is recommended to charge and use battery packs at least every three months. Battery packs shall not go without recharging (reconditioning) for more than six months.

After extended storage, battery packs may reach a deep discharge state or enter into sleep mode. For safety reasons, Li-ion batteries in deep discharge state may limit the initial charging current (pre-recharge) before starting their regular fast charging cycle. The pre-charging state may take several hours.

- Air transportation of Li-ion batteries is regulated by United Nations' International Air Transportation Association (IATA) Dangerous Goods Regulations and by country-specific regulations. Please check local regulations and with common carriers before shipping Li-ion battery packs or products containing relatively large Li-ion battery packs.

Electrical Connectors

Telephone lines may carry dangerous voltages. Always connect the electrical test ports to known test interfaces which carry low level signals.

ESD: Electrostatic Discharge Sensitive Equipment

Test modules could be affected by electrostatic discharge. To minimize the risk of damage when replacing or handling test modules, make sure to follow proper ESD procedures and dissipate any electrostatic charge from your body and tools and the use proper grounding gear.



- Perform all work at a workplace that is protected against electrostatic build-up and discharging.
- Never touch any exposed contacts, printed circuit boards or electronic components.
- Always store test modules in ESD protected packaging.
- Wear ESD protection and grounding gear when:
 - Inserting, extracting, or handling test modules.
 - Inserting or removing SFPs, XFPs, QSFPs, or CFPs from the platform.
 - Connecting or disconnecting cables from modules or platform.

[Go back to top](#) [Go back to TOC](#)

4.0 Basic Operation

- [4.1 Compact Platform Overview](#)
- [4.2 Keypad](#)
- [4.3 Touch-Screen Display](#)
- [4.4 Battery](#)
- [4.5 Connector Panels](#)
 - [4.5.1 Test Ports](#)
 - [4.5.2 Utility Ports](#)

4.1 Compact Platform Overview

4.2 Keypad

The keypad comprises the following keys:



- **Power:** Press for 2 seconds to turn the test set ON or OFF.
- **Sleep:** Press the Home key for 3 seconds. Once in Sleep Mode, press the Home key for 3 seconds to return to normal operation.
- **Save:** Saves test results in the unit's memory and provides automatic naming and time stamping function.
- **Home:** Returns the screen to the home menu.

[Go back to top](#) [Go back to TOC](#)

4.3 Touch-Screen Display

The LCD supports touch-screen operation. To operate the touch-screen, use the stylus located in the top cover to navigate the menus and tabs. Please observe the following precautions:

- Never use excessive pressure on the touch-screen as this may damage its functionality.
- Never use sharp objects such as a pen, screwdriver etc. as this may damage the surface.
- Clean the surface of the touch screen using a soft cloth and mild detergent only. Do not use alcohol.

[Go back to top](#) [Go back to TOC](#)

4.4 Battery

The V150 chassis is equipped with an intelligent Li-ion rechargeable battery pack which is located in the rear of the unit. The battery will be partially charged upon delivery, so it is recommended to charge the battery fully before use. Please charge the battery at room temperature to preserve its life and to obtain maximum charge. The battery is charged during operation provided the unit is connected to the AC Mains using the supplied AC adapter. Removing the battery, while the unit is powered on is not recommended - this may result in damage. Charge the battery by connecting the AC Main adapter to the power jack on the left side.

[Go back to top](#) [Go back to TOC](#)

4.5 Connector Panels

The connector panel located at the top of the unit comprises the following test ports (some are optional):



4.5.1 Test Ports

Test Ports: To access the test connectors, please open the top cover.

- **DOCSIS 3.1 Cable Modem:**
 - "F" Connector, 75 ohms for connection to the CATV network - Provides access to:
 - Signal Level Meter (SLM) and associated functions
 - Upstream Generator (optional)
 - **Note: Maximum Voltage input is 100VAC, 140VD**
- **TDR:**
 - "F" connector, 75 ohms for metallic TDR testing
- **10/100/1000-T, 1000-X, SFP+:**
 - For optional 1G and 10G Ethernet features

4.5.2 Utility Ports:

Optical Test Ports

5" Touch Screen
(indoor/outdoor usage)

Left screen-shift button

Save/Power/Home buttons

Power jack



Right screen-shift button

Power/Charge indicator

Micro USB

The Micro-USB port is located on the right side of the unit. Use an OTG adapter cable to connect a USB to the Micro-USB port. The port supports the following:

- memory drives

- USB add-on devices such as Fiber Inspection Scope

[Go back to top](#) [Go back to TOC](#)

5.0 Home Screen and Menu

[5.1 Screen Layout](#)

[5.2 Screen Icons](#)

5.1 Screen Layout

The Home menu can be accessed at any time during operation by pressing the **Home** key on the rubber keypad. The screen is divided into three presentation areas:



A. Side Panel

B. Test Applications specific to the test set.

C. Channel tables (Tbl), location thresholds (Loc), and test point compensation (TP).

[Go back to top](#) [Go back to TOC](#)

5.2 Screen Icons



File: Provides file storage information.



Exit: Return to the previous screen



Home: Return to the Home Menu



Test Application: Access to test applications



Background Test Application: Opens the Utilities menu.



Shift Key: Serve the same function as physical shift keys on the sides of the unit. Tap to reveal side panel icons.



Power Source Indicator: Indicates when unit is powered by external



AC power or battery. Tap to see battery charge status.

[Go back to top](#) [Go back to TOC](#)

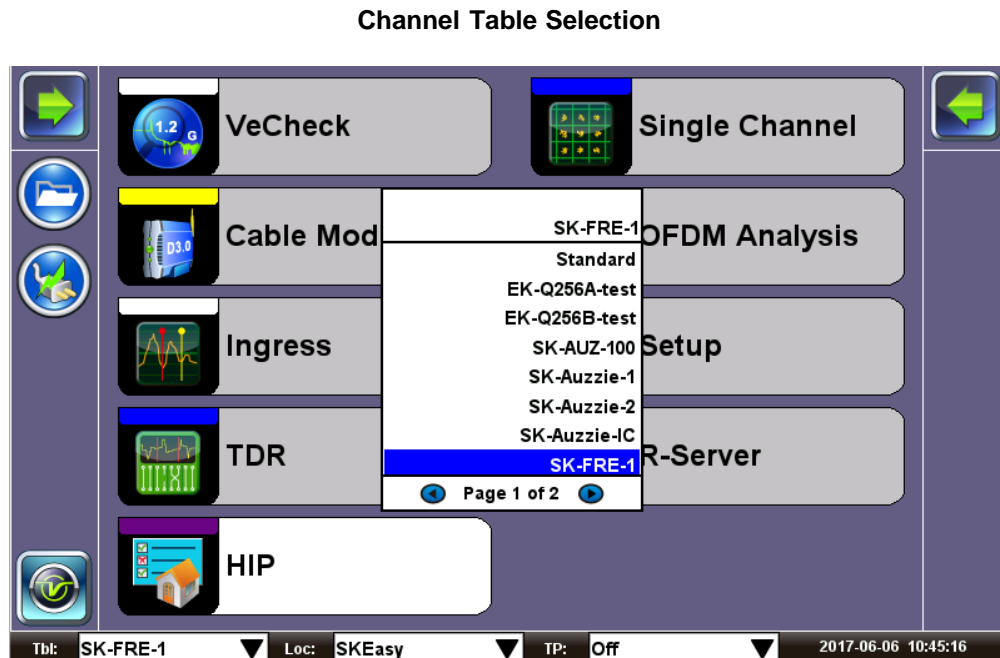
6.0 Setup

- [6.1 Channel Tables and Locations](#)
 - [6.1.1 Channel Tables](#)
 - [6.1.2 Locations](#)
 - [6.1.3 TP Compensation](#)
 - [6.1.4 Diplexer Setting](#)
 - [6.1.5 HIP Settings](#)

Test mode, test port(s) and network settings are required prior to performing any measurements or applications.

Selecting Channel Tables, Locations, and Test Point Compensation

Tap on ▼ next to Channel Tables (Tbl), Locations (Loc), or Test Point Compensation (TP) and make a selection from the drop-down menu.



[Go back to top](#) [Go back to TOC](#)


6.1 Channel Tables and Locations

6.1.1 Channel Tables

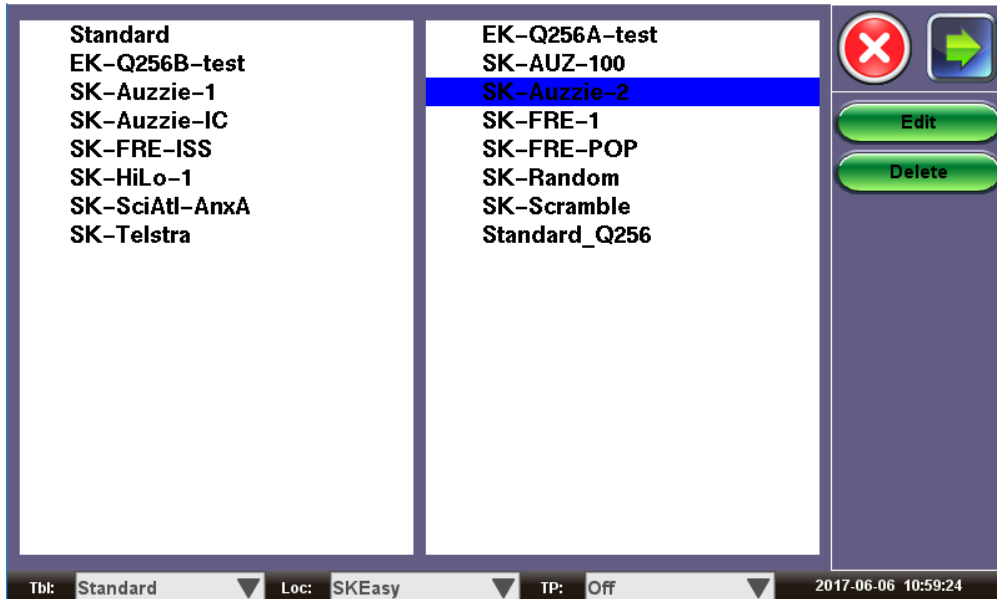
The unit requires Channel Tables to perform measurements in Single Channel mode. By default, the unit is preloaded with several channel tables, according to industry standard Annex A, B, and C systems.

Editing or Creating New Channel Tables

To edit or create new channel tables, complete the following:



1. Tap on **Setup**  **Setup**
2. Select ▼ next to the Channel Table box
3. Select **Manage** (from drop-down menu)
4. Select a table and press **Edit**

Channel Table Selection



Channel Table Editing

	Ch#	Label	Mod	FEC	V-freq	A1-freq	A2-freq	Sc/In	Symbol	Tilt	Inst
<input checked="" type="checkbox"/>	1	None	Q256	A	114	--	--	<input type="checkbox"/>	6.952	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	2	None	Q256	A	237	--	--	<input type="checkbox"/>	6.952	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	3	None	PAL	--	311	319	50	<input type="checkbox"/>	--	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	4	None	Q256	A	450	--	--	<input type="checkbox"/>	6.952	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	5	None	PAL	--	503	50	50	<input type="checkbox"/>	--	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	6	None	Q256	A	597	--	--	<input type="checkbox"/>	6.952	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	7	None	Q256	A	733	--	--	<input type="checkbox"/>	6.952	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	8	None	Q256	A	750	--	--	<input type="checkbox"/>	6.952	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Tbl: Standard Loc: SKEasy TP: Off 2017-06-06 11:01:42

Creating Channel Tables with ReVeal CX300

Alternatively, the channel tables can be created and managed using ReVeal CX300 PC software, which is a standard accessory. Additional tables can be created from a blank table or from existing templates. The test set and the PC software can exchange the tables for easy update. Please refer to the [ReVeal CX300](#) section for more details.

[Go back to top](#) [Go back to TOC](#)

6.1.2 Locations



Location settings are pre-set measurement thresholds. By default, the unit is pre-loaded with Groundblock, Set Top Box and Tap locators. When performing a measurement, one of these preset locations can be selected by tapping the check box.

The measurement thresholds for the preset locations can be edited via the **Setup** icon and Main menu.

The **Manage** function allows the user to modify the channel threshold settings. Once the new value has been entered, apply the threshold settings using the check box.

Location Editor

Digital Channel					
Test	Min	Max	Test	Min	Max
<input type="checkbox"/> Level(dBmV)	-11.00	5.00	<input type="checkbox"/> Tilt(dB)		20.00
<input type="checkbox"/> Peak-V(dB)		20.00			
<input type="checkbox"/> Q64 MER	30.00		<input type="checkbox"/> Q256 MER	30.00	
<input type="checkbox"/> Q64Pre-BER		1e-07	<input type="checkbox"/> Q256Pre-BER		1e-07
<input type="checkbox"/> Q64Pos-BER		1e-08	<input type="checkbox"/> Q256Pos-BER		1e-08
<input type="checkbox"/> Q128 MER	30.00		<input type="checkbox"/> 8-VSB MER	30.00	
<input type="checkbox"/> Q128Pre-BER		1e-07	<input type="checkbox"/> 8-VSBPre-BER		1e-07
<input type="checkbox"/> Q128Pos-BER		1e-08	<input type="checkbox"/> 8-VSBPos-BER		1e-08
<input type="checkbox"/> Level(dBmV) Q6	0.00	0.00	<input type="checkbox"/> Level(dBmV) Q2	0.00	0.00

Tbl: Standard Loc: Tap TP: Off 2017-07-26 15:09:00

6.1.3 TP Compensation

Test point compensation allows the loss at a certain test point to be automatically compensated. Values for the devices can be edited using the **Manage** function. When performing a measurement, one of these preset test points can be selected by tapping the check box. The test set stores 10 sets of TP compensation value by name.

6.1.4 Diplexer Setting

The CX310 test set is equipped with a dual diplexer: 85 MHz or 204 MHz. Select the value applicable to your system.

6.1.5 HIP Settings

The **Manage** function allows the user to customize settings for the HIP Auto Test.

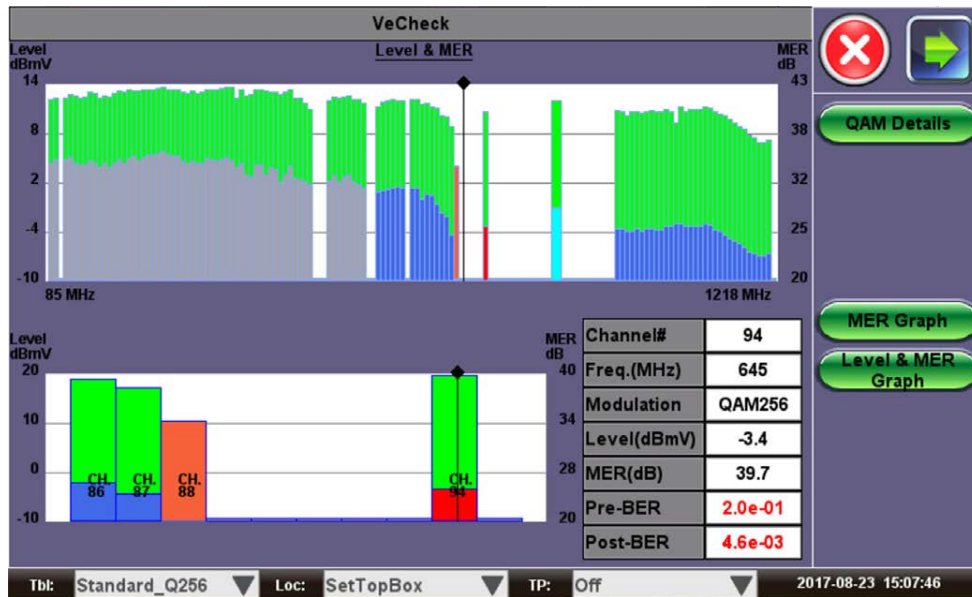
[Go back to top](#) [Go back to TOC](#)

7.0 Test Applications

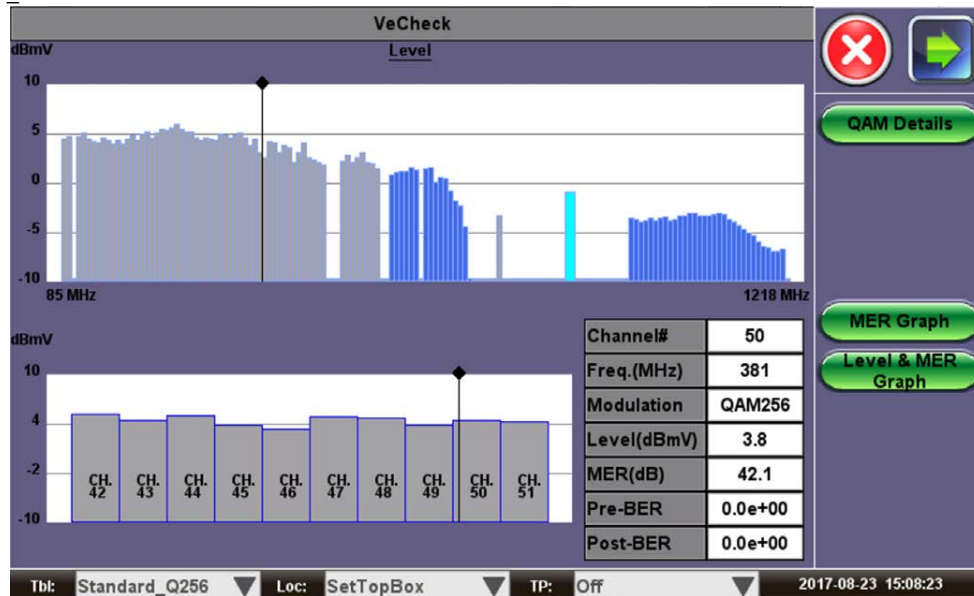
- [7.1 VeCheck](#)
- [7.2 Single Channel Measurement](#)
 - [7.2.1 Digital Channel Measurements](#)
 - [7.2.2 Constellation Measurements](#)
- [7.3 Ingress](#)
 - [7.3.1 Setup](#)
- [7.4 Cable Modem](#)
 - [7.4.1 Setup](#)
 - [7.4.2 Cable Modem Results](#)
 - [7.4.3 IP Tools Setup and Results](#)
- [7.5 Advanced Tools](#)
 - [7.5.1 R-Server](#)
 - [7.5.2 TDR](#)
 - [7.5.2.1 Principles of Operation](#)
 - [7.5.2.2 Operation](#)
 - [7.5.2.3 Typical Fault Displays](#)
 - [7.5.3 OFDM Analysis](#)
 - [7.5.4 HIP](#)
 - [7.5.5 Upstream Signal Generator \(USG\)](#)

7.1 VeCheck

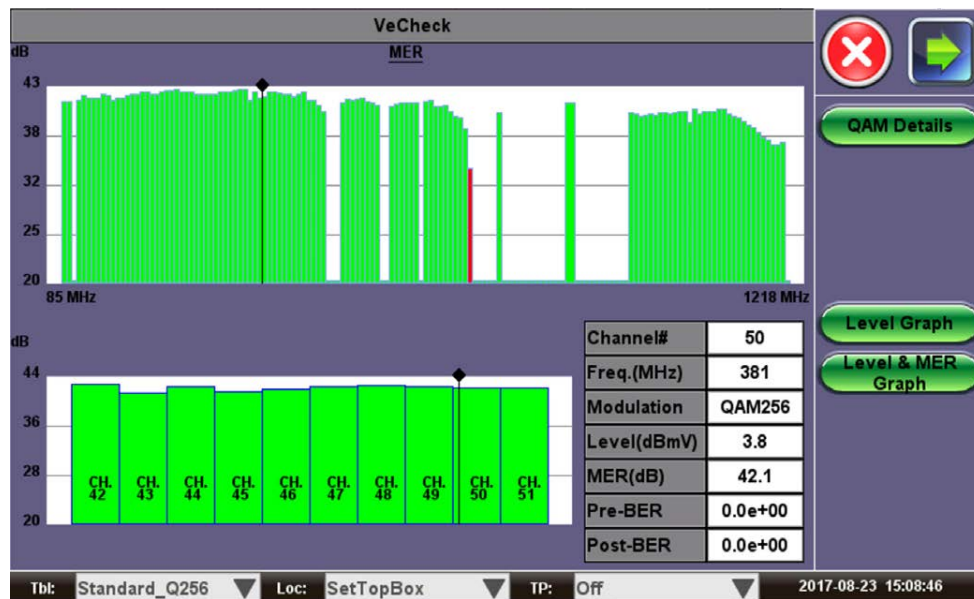
VeCheck Level & MER Graph



VeCheck Level Graph



VeCheck MER Graph



VeCheck is a Full Band Scan for the Forward Path, covering up to 1218 MHz. Key metrics include Level, Modulation Type, and MER for digital QAM, Single-Carrier DOCSIS QAM, and OFDM presented as graphs.

VeCheck scans and measures automatically upon entering the application. Full channel scan is shown in the top display and a 10 Channel Zoom displays on the bottom, based on the top display's marker location.

Depending on the channel selected from the marker location, certain measurements will be available.

- DOCSIS SC-QAM's – displays Level, MER, Pre and Post BER metrics
- DOCSIS 3.1 OFDM – Level and MER
- QAM Digital Video – Level, MER, and BER

Note: Analog channels are not supported.

Choose between three scan display graph modes with the Level, MER, or Level & MER Graph button. Level Graph displays the following scanned channels Level measurements:

- Gray: Video QAM
- Blue: DOCSIS SC-QAM Channel
- Light Blue: DOCSIS OFDM Channel

MER Graph shows the scanned channels' MER measurements. Green channels indicate that measurements are within threshold settings per the user's Location Profile settings. Red channels signify threshold violations.

Level & MER Graph displays both the Level and MER measurements on one graph.

The **Connect CM** option appears if a DOCSIS SC-QAM or DOCSIS OFDM channel is highlighted. When pressed, the test set will connect as a cable modem with the selected channel from the bottom display.

The **QAM Details** button displays channel details for the selected QAM Digital Video or DOCSIS SC-QAM channel from the bottom display.

The **OFDM Details** button displays the OFDM details for the selected DOCSIS OFDM Channel from the bottom display.

[Go back to top](#) [Go back to TOC](#)

7.2 Single Channel Measurement

Overview:

The Single Channel SLM function connects to a single Digital QAM Channel. It displays the following measurements of a user-selected frequency or a channel that is defined in the selected channel table:

- Channel number (defined in the channel table)
- Channel frequency
- Channel name (defined in the channel table)
- Modulation type (defined in the channel table)
- QAM Power Level including bar graph indication
- Pass/Fail status of Lock QAM
- Pass/Fail status of Lock FEC
- Modulation Error Ratio (MER) in dB including bar graph indication
- Pre & Post BER
- Constellation

Procedure

The channel to be measured can be entered by either tapping on the Channel box or the Frequency box and use the pop up keypad to enter the channel number or frequency respectively. The measurement starts a few seconds after entering the single channel application. The unit remembers the last channel measured, and upon entry, the last channel number will be used.

[Go back to top](#) [Go back to TOC](#)

7.2.1 Digital Channel Measurements

When testing a digital channel, the unit first tries to achieve digital lock. Once digital lock is achieved, the unit displays the related digital measurements, as well as the constellation diagram.

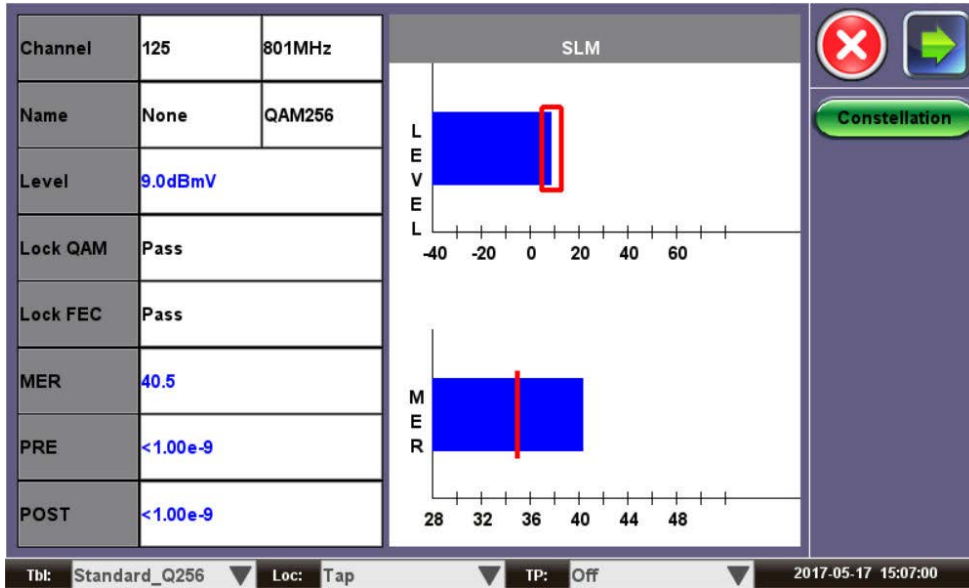
SLM button: Red lines and rectangles on the SLM graphs indicate user-defined threshold windows from Location settings (see Setup > [Locations](#)).



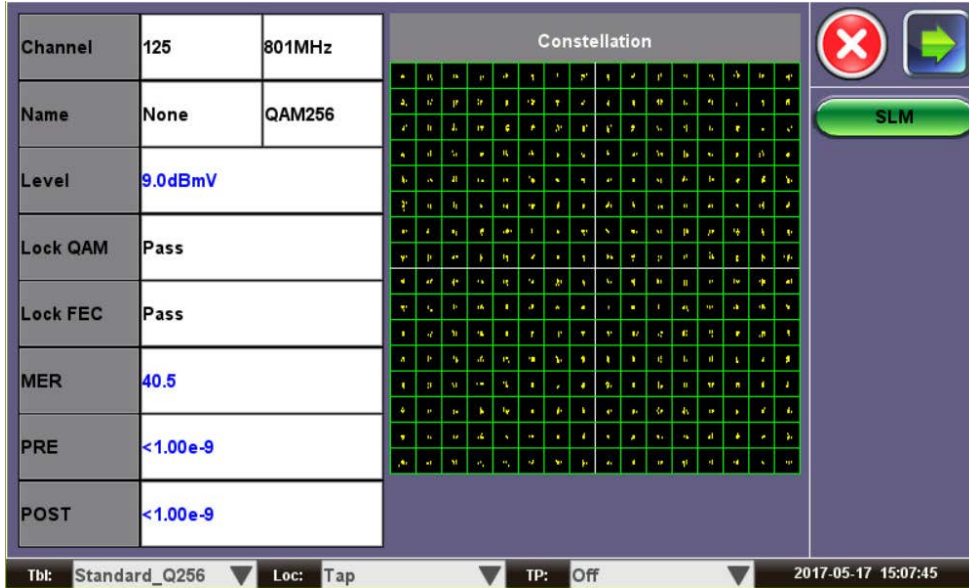
Note: QAM unlock

Always ensure QAM lock is achieved prior to making Constellation and related digital measurements.

SLM Measurement (Digital Carrier)



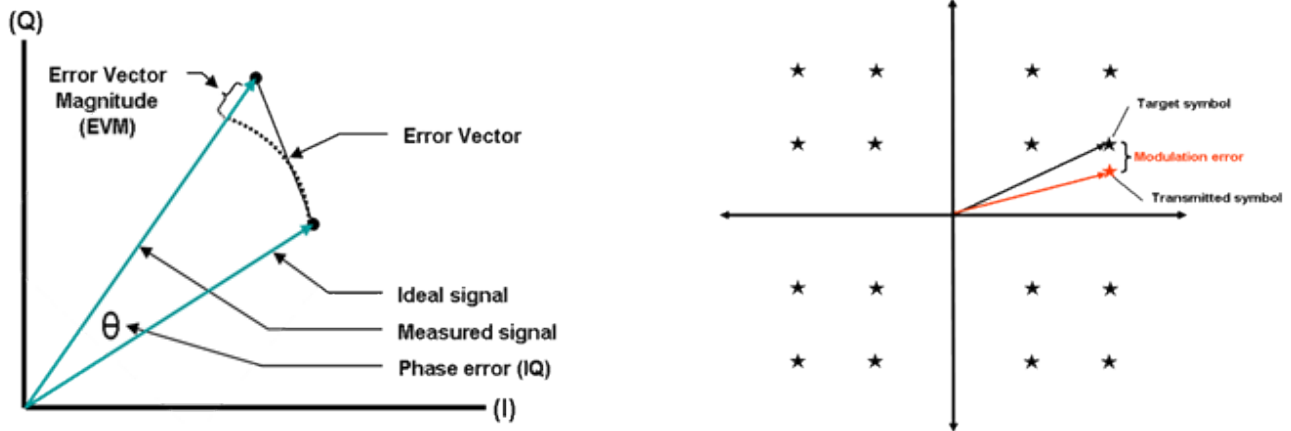
SLM Measurement (Digital Carrier-Constellation)



Note: Modulation Error Ratio (MER)

In digital systems, MER is very similar to Carrier to Noise (C/N) in analog systems. MER measures how tightly symbols are recorded with respect to an optimum location based on the Error Vector Magnitude (EVM).

Modulation Error Ratio (MER) and Error Vector Magnitude (EVM) Relationship



MER determines how much margin the system has available before a failure can be expected. A poor MER is not noticeable on the picture up until the point of system failure - this is often referred to as the "Cliff Effect". Ideally you should have at least 4 to 5 dB of margin from the MER where significant errors occur to allow for system degradation. MER measurements are useful for early detection of non-transient (noise) impairments, such as system noise, CSO, CTB and Ingress.

[Go back to top](#) [Go back to TOC](#)

7.2.2 Constellation Measurements

In contrast to the measuring techniques used on digital TV signals transmitted via satellite, a wider and necessary range of measuring techniques is provided for broadband cable testing. The influences acting on the broadband cable signal, which can be modulated with up to 256QAM, are more varied and critical than in the satellite domain.

Constellation measurements are an example of such advanced measurements and are an ideal tool to identify QAM modulator problems.



Note: QAM lock

- Ensure QAM lock is achieved on the digital carrier prior to making any Constellation measurement.



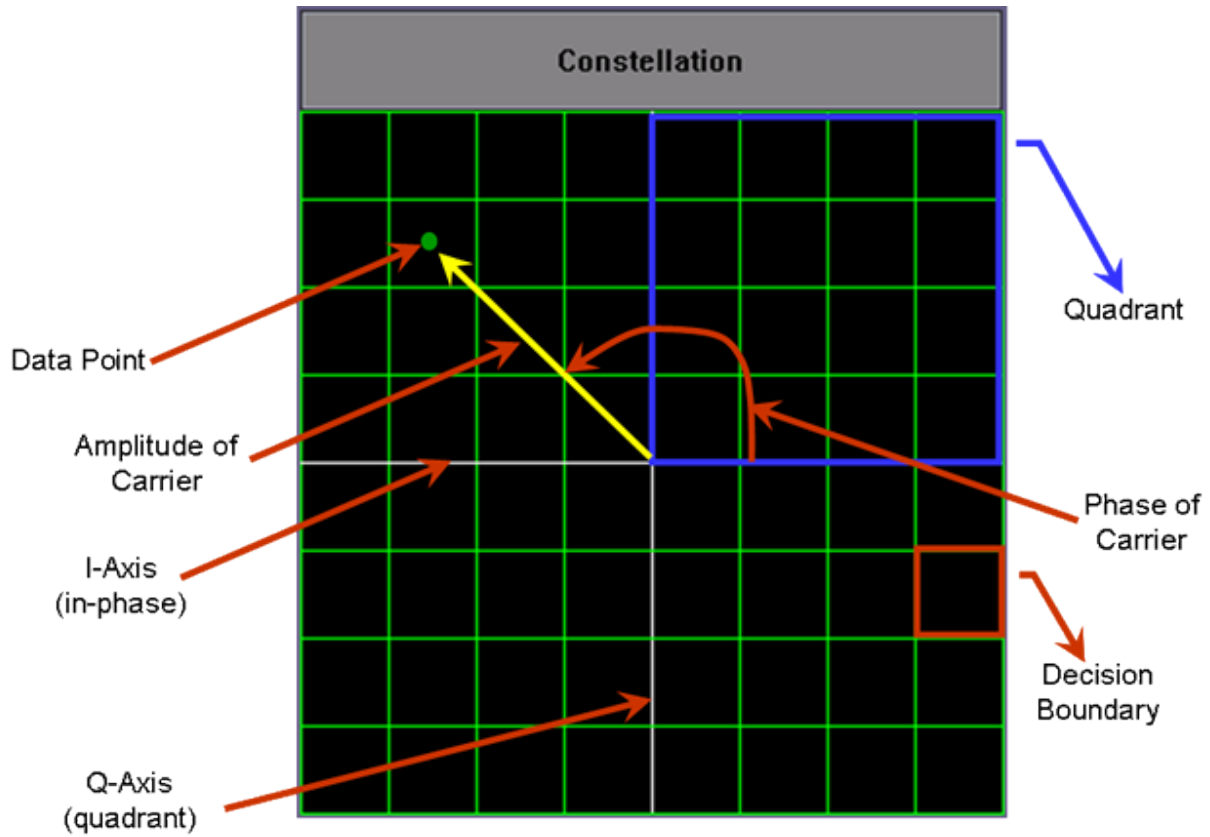
Note: Bit Error Rate (BER)

- Bit Error Rate (BER) measures how often an error occurs in a given amount of data.
- The more errors, the more difficult it is for the FEC circuitry to correct those errors before picture problems occur.
- BER is useful for measuring long term system performance and periodic transient impairments that can occasionally effect system performance.
- BER is usually displayed in scientific notation e.g.:
 - Where 1E-3 means one error in every 1000 bits
 - Where 1E-6 is one error in every 1,000,000 bits
- Ideally, the signal should have the highest exponent value - the higher the number, the lower the errors.

Constellation diagrams

- Constellation diagrams are used to graphically represent the quality and distortion of a digital signal.
- The diagram is an X/Y plot of the I (In-phase) and Q (Quadrature) axis components of the QAM signal and is particularly useful for viewing impairments due to ingress and/or modulation problems present on the digital signal.
- A symbol (essentially a waveform representing one or more bits) should ideally appear as a compact or clean dot in the center of each symbol box. Decision boundaries exist within the constellation so that if the symbol falls within the boundary, the correct data is received.
- If due to noise or other interference, the symbol falls outside the boundary, the data is in error. Error detection and correction (e.g. FEC) will attempt to correct these errors, thus avoiding video impairments.
- Observing the symbol's shape and location relative to their ideal positions allows you to draw some conclusions about the nature of an impairment

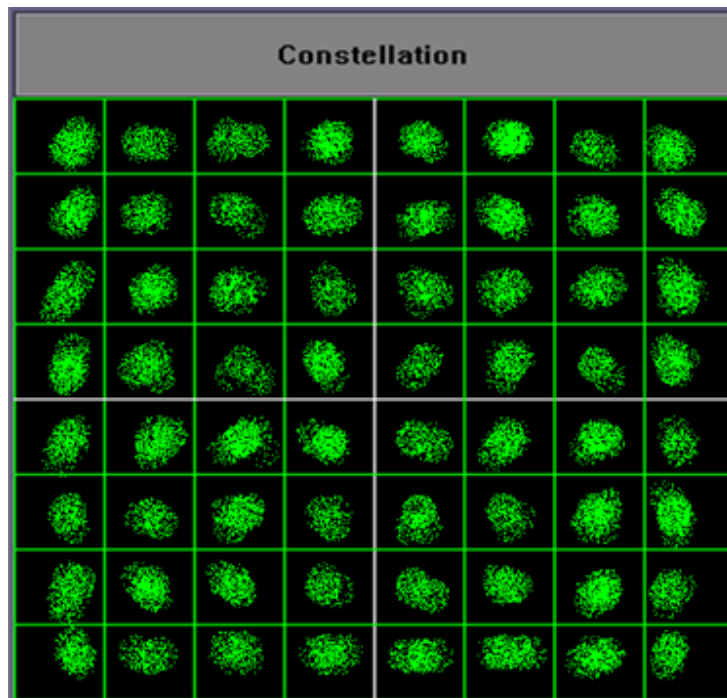
Understanding the Constellation Diagram



The following impairments can be assessed visually:

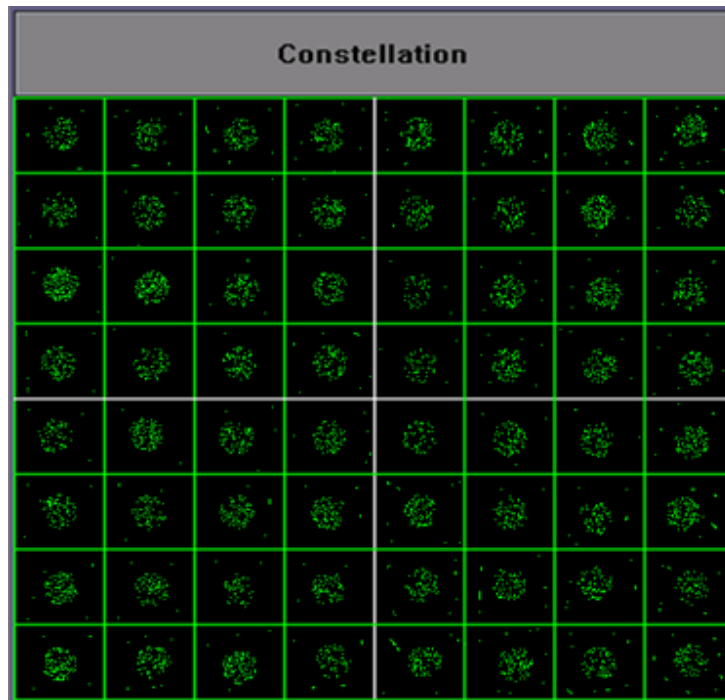
- **Gain compression** - Pulls the symbol clusters into the center while the middle ones are unaffected. Gain compression can result from poor or bad amplifiers, IF equalizers and up/down converters.

Gain Compression

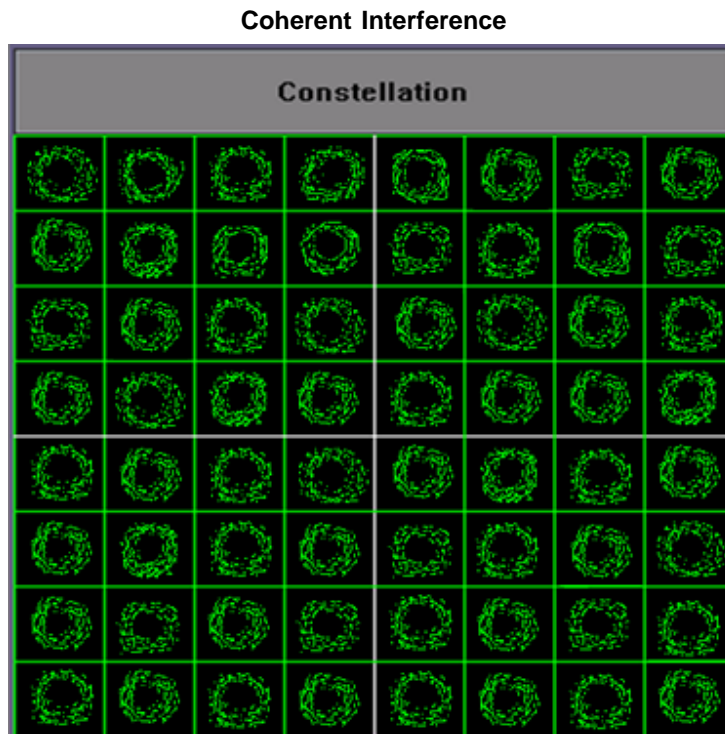


- **Broadband or system noise** - Causes symbol clusters to enlarge, which increases the probability of errors. An error occurs when the dot is pulled across a decision boundary.

System Noise - Incoherent Interference

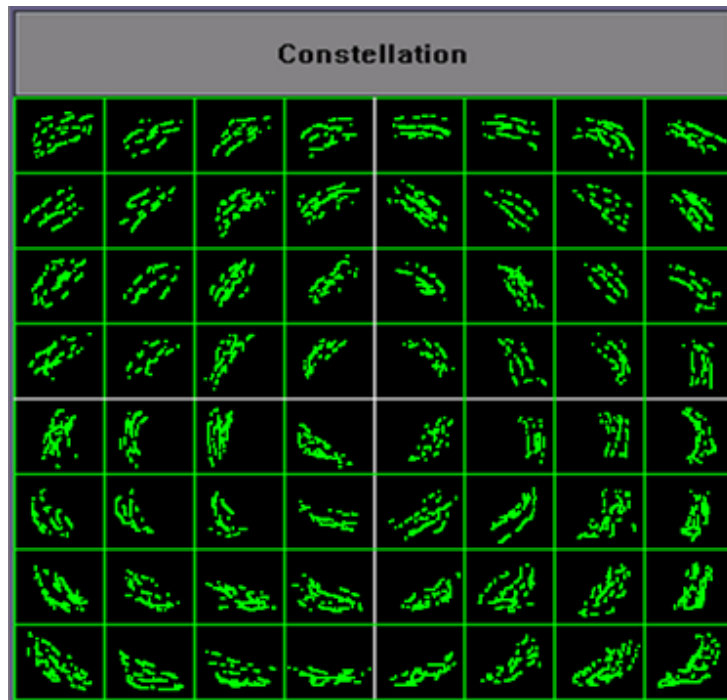


- **Coherent interference** - CSO/CTB, spurs or ingress produce symbol clusters with a hole in the center so they appear as "donuts". This can also be a result of laser clipping or sweep interference.



- **Phase noise** - Also known as Phase jitter in a QAM signal, it is caused by transponders in the transmission path or by the I/Q modulator. Phase jitter is a statistical quantity that affects the I and Q path equally. Phase noise causes the symbol clusters to appear as arcs, particularly those near the edges of the constellation. Phase noise can also result from faulty headend up/down converters.

Phase Noise



[Go back to top](#) [Go back to TOC](#)

7.3 Ingress

Background: The HFC network offers tremendous bandwidth in the downstream or forward direction provided it is free from excessive interference and impairments. The Ingress function helps the user to identify interfering signals in the Forward or Return path in order to minimize disturbance on downstream Video carriers or upstream DOCSIS cable modem communications.

The following buttons/modes provide spectrum analysis of the Forward or Return path. The CX310 is equipped with a Dual Diplexer, both 85 MHz and 204 MHz. Availability of Ingress type selections is dependent on the Diplexer Setting found in Setup.

- **RP 85 MHz or RP 204 MHz**, the Return Path mode analyzes the spectrum between 5 to 85 MHz or 5 to 204 MHz.
- **FP 1.2 GHz**, the Forward path analyzes the spectrum between either 85 to 1200 MHz or 204 to 1200 MHz.

[Go back to top](#) [Go back to TOC](#)

7.3.1 Setup

Tap the **Return (RP 85 MHz or RP 204 MHz)** or **Forward (1.2 GHz)** buttons to select the spectrum to test.

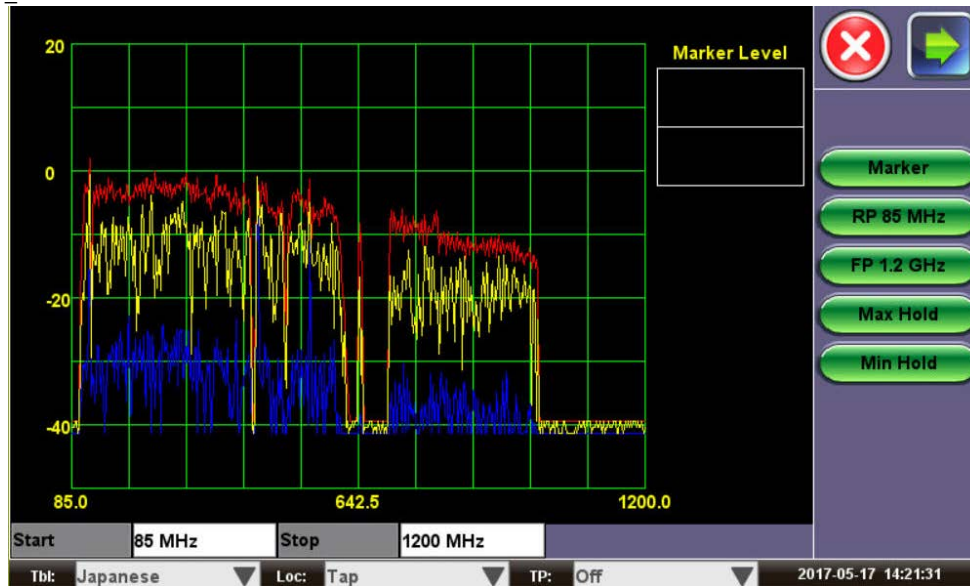
The x-scale of the frequency (MHz) graph can be further adjusted by tapping on the **Start** and **Stop** fields and entering a value in the pop-up keyboard.

To select and move markers, tap on the marker you wish to move. A circle indicates the selected marker.

Ingress Measurement function buttons:

- **Marker** toggles displayed markers on or off.
- **Min/Max Hold:** Minimum, Maximum or both per sweep are detected and displayed at their location.
- The Min is shown in blue and Max is in red.

Ingress Graph



Overview: Ingress Noise

Ingress is a term to describe any interference that is coupled into the forward or return path cable plant via an external source. Ingress can be broadly categorized as follows:

- **Narrow band ingress:** The predominant coupling mechanism for ingress noise is a poorly shielded drop coaxial cable that acts more like an antenna than a drop cable. AM modulated carriers, amateur band and maritime radio transmission generate unwanted signal frequencies at varying amplitudes according to the propagation conditions.
- **Location specific ingress:** Electronic equipment in the subscriber premises can pass strong signal carriers back into the cable system, and these can interfere with reverse signals, such as cable modems. Cable network architecture will determine ingress sources e.g. aerial cabling versus underground cabling

Once started, both good and bad signals are displayed on screen - the user has to determine which signals are valid and which signals appear as ingress.

The Ingress function is not limited to measuring interference only. The feature is very useful to identify valid signal types and presence and to identify DOCSIS bonding groups or channels in either upstream or downstream.

[Go back to top](#) [Go back to TOC](#)

7.4 Cable Modem

7.4.1 Setup

The CX310 offers a built-in DOCSIS 3.1 and 3.0 cable mode. The built-in cable modem is able to range, register and connect with the headend CMTS to obtain the necessary parameters and a valid IP address on the network.

Launch the cable modem application to access the setup screen.

Channel: Input your system's primary DOCSIS channel.

MAC Address: This is set as a default pre-programmed registered unique Cable Modem MAC address

DOCSIS Mode: DOCSIS 3.1, DOCSIS 3.0

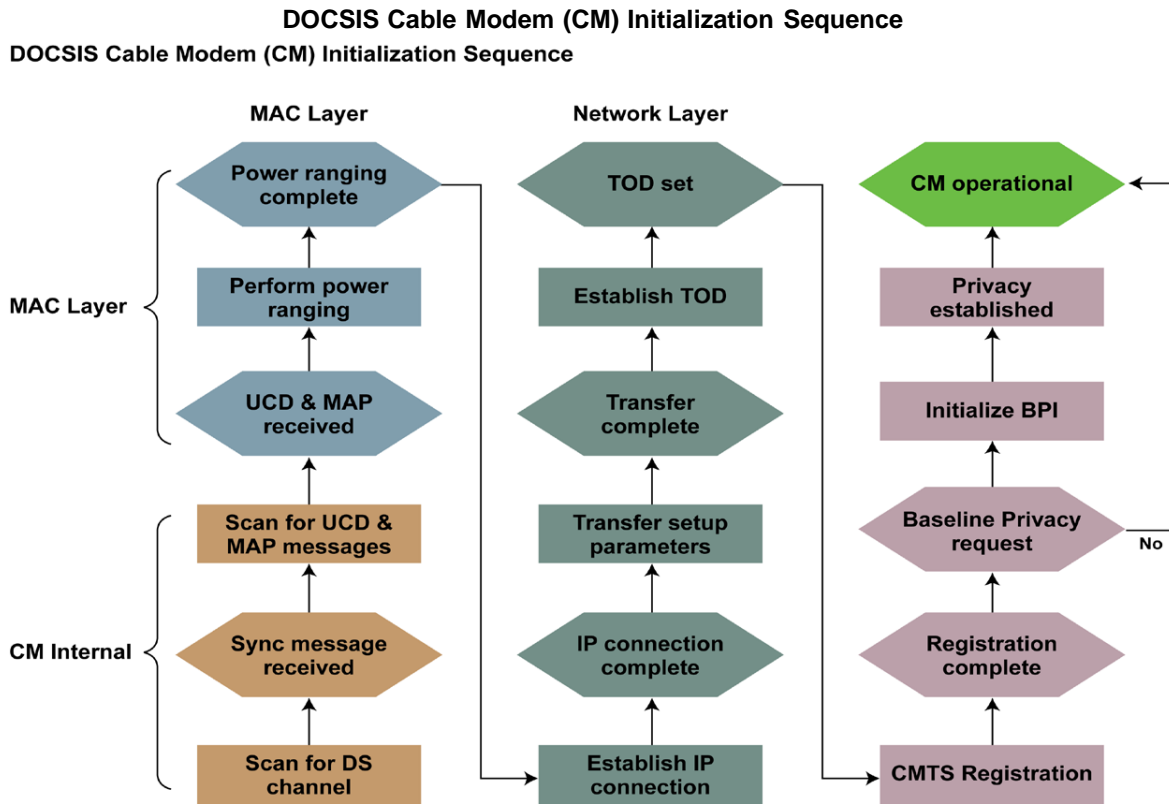
Note: Legacy DOCSIS 2.0/1.x systems are not supported.

Test Mode:

- **Terminate:** Terminate mode
- **Always On:** Terminate mode and also enables the cable modem to remain online when you exit from the cable modem application. This allows the user to have online connectivity to access other features, such as R-Server access.

Once these settings are completed, press **Connect**. Once connect is pressed, the test set will go directly to the **Ranging** tab, displaying results. Each step of the connection process is listed. As a step is performed, an "in progress" indicator informs the user

After a step is completed, a Pass or Fail status is provided. If any one of the steps fails during the connection process, the cable modem will stop and declare a failed connection. At this point, the user can either choose to reset the test and try again, or go back to setup and verify the settings.



Cable Modem (CM) Connection Procedure and Training Sequence:

1. CM scans the Downstream (DS) spectrum for a valid DOCSIS signal (either 64QAM or 256QAM). This can be a time consuming step if the CM is not on a channel.
2. CM demodulates the DOCSIS signal and looks for a SYNC message.
3. CMTS periodically broadcasts Upstream (US) Channel Descriptors (UCD) over the DS channel, from which a CM learns its assigned upstream operational frequency. The CM in turn scans for these UCD messages, which instructs the CM how to configure a burst profile (frequency, modulation, and burst parameters). The CM has now established both a US and a DS frequency.
4. CMTS periodically transmits US bandwidth allocation maps (MAP) in shared time slots in the DS direction. The CM looks for these MAP messages, which list the granted and contended Time Slots (TSs) for US communication.
5. CMTS assigns a temporary Service Identifier (SID) to the CM, which initiates a coarse power ranging and time synchronization process. The first Upstream burst that the CM sends is the initial maintenance - the CMTS responds with the Range-Response (RGN-RSP) message for frequency, power, and timing settings.
6. CMTS periodically sends keep-alive messages to verify link continuity between itself and all CM units in the same domain. When a CM receives its first keep-alive message, it reverts to a fine power ranging.
7. CM now forwards a bandwidth request to the CMTS, which in turn forwards a grant to the CM, permitting it to forward upstream information in allocated time slots.
8. CM now makes a DHCP discovery followed by a DHCP request. The CMTS forwards a DHCP acknowledgment from the DHCP server containing an IP address, a default gateway, the addresses of a TFTP and TOD server, and a TFTP configuration file name.
9. CM now initiates the TOD and TFTP process. From the TFTP server, the CM receives a configuration file containing QoS, security, applicable frequency assignments and any new software images.
10. CM forwards TFTP configuration file to the CMTS and initiates a registration request. If the configuration file is valid, the CMTS assigns the CM a permanent SID and registers the CM to online status.
11. Following registration, the CM optionally initiates the activation of the 56-bit DES encryption algorithm to provide security between the CMTS and itself over the cable plant.
12. CM is now operational and online.

Server connections:

DOCSIS specifies that for a system to become functional and operational, the CMTS and CM must interface with the following mandatory servers:

- **Dynamic Host Configuration Protocol (DHCP) server** - Defined by RFC2181, it provides the IP addresses for both the CM and subsequent PC devices that follow
- **Time of Day (TOD) server** - Defined by RFC868 for the purpose of time stamping operational system events
- **Trivial File Transfer Protocol (TFTP) server** - Defined by RFC1350 for the purpose of registering and downloading CM configuration files for individual customer service. These configurations could include Quality of Service (QoS) parameters, Vaseline Privacy Implementation (BPI), operating frequency assignments, the number of host devices, etc.

[Go back to top](#) [Go back to TOC](#)

7.4.2 Cable Modem Results



Ranging tab:

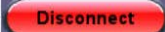
Provides information about the packets received, the downstream signal (frequency, modulation, level, SNR) and the upstream signal (frequency, level, modulation).


The option to **Reconnect** to the headend CMTS and **Reset** are available. If there are problems connecting to CMTS, it is recommended to use **Reset** to completely reset the Cable Modem.

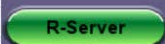
Cable Modem - Ranging Result Summary

Cable Modem		IP Tools			
Setup	Ranging	Graphs	Link	OFDM	IP
Primary DOCSIS Frequency	801.000 MHz	DOCSIS Mode	3.1		
Downstream Lock Status	PASS	Bonding DS	32 Channels		
Upstream Sync	UCD (1)	Bonding US	8 Channels		
Upstream Ranging	33.8 dBmV	OFDM DS (1)	PLC - 732 MHz		
DHCP	PASS	OFDM DS (2)	N/A		
ToD	PASS	OFDMA US (1)	N/A		
Configuration File	BPI_CM3_1.bin	OFDMA US (2)	N/A		
Registration	PASS		Downstream	UCD Transmit	
BPI Status	Enabled/PASS	Maximum	6.5 dBmV	33.8 dBmV	
Connection	Online	Minimum	1.1 dBmV	32.0 dBmV	
Status	Test Completed	Average	3.6 dBmV	32.7 dBmV	







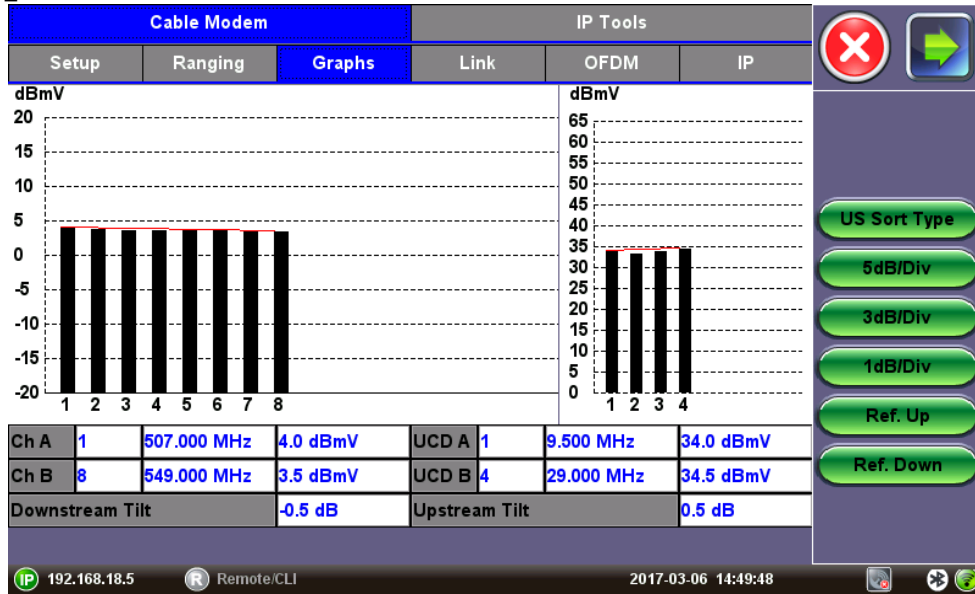
Tbl: Standard_Q256 Loc: Tap TP: Off 2017-05-17 14:53:43

[Go back to top](#) [Go back to TOC](#)

Graphs tab:

Provides a single screen graphical overview of all DOCSIS Downstream carriers and active UCDs.

Cable Modem - Graphs Results



[Go back to top](#) [Go back to TOC](#)

Link tab:

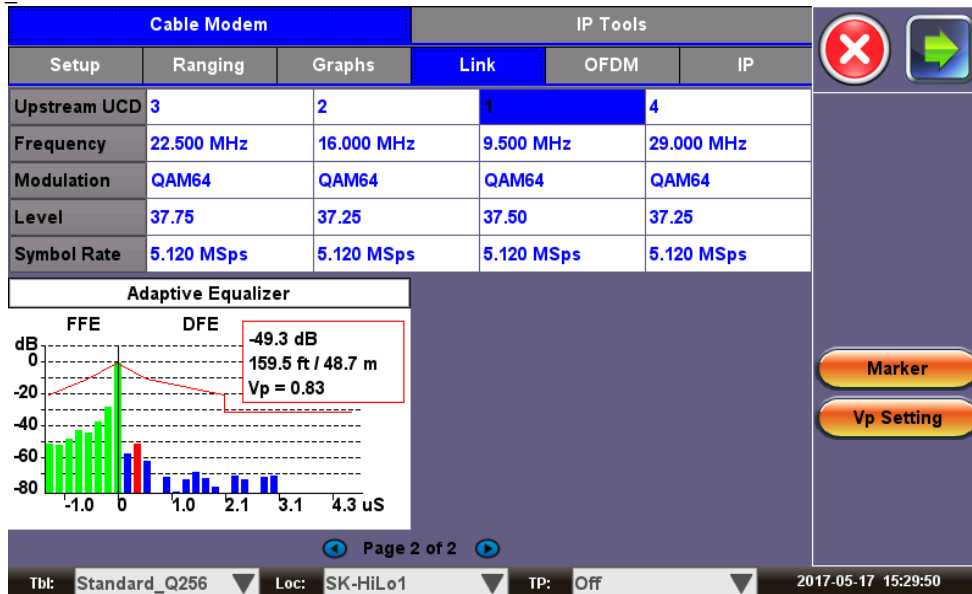
Provides information about the packets received, the downstream signal (frequency, modulation, level, SNR) and about the upstream signal (frequency, level, modulation).

Cable Modem - Link Statistics

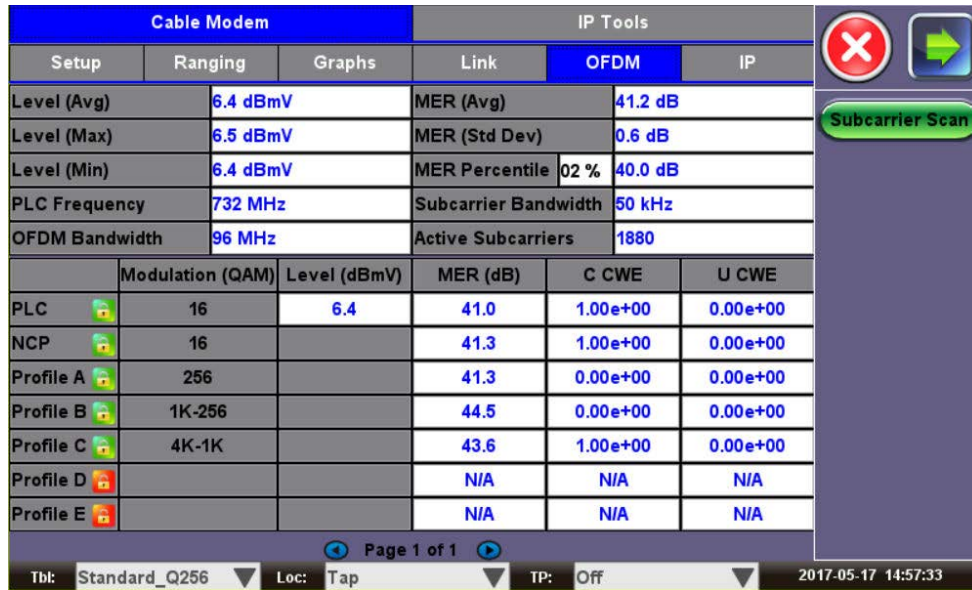
The screenshot shows the 'Link' tab in the Cable Modem interface, displaying a table of link statistics for 8 channels. The table includes the following data:

Channel #	1	2	3	4	5	6	7	8
DS (MHz)	801.00	807.00	813.00	819.00	825.00	831.00	837.00	843.00
MSymbol/Sec	5.361	5.361	5.361	5.361	5.361	5.361	5.361	5.361
Modulation	QAM256	QAM256	QAM256	QAM256	QAM256	QAM256	QAM256	QAM256
Level (dBmV)	5.5	5.1	4.5	4.3	4.4	4.0	4.2	4.1
MER (dB)	40.8	40.6	40.1	39.9	40.0	39.6	39.9	39.7
Pre BER	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Pre SEC	0	0	0	0	0	0	0	0
Post BER	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00	0.0e+00
Post SEC	0	0	0	0	0	0	0	0

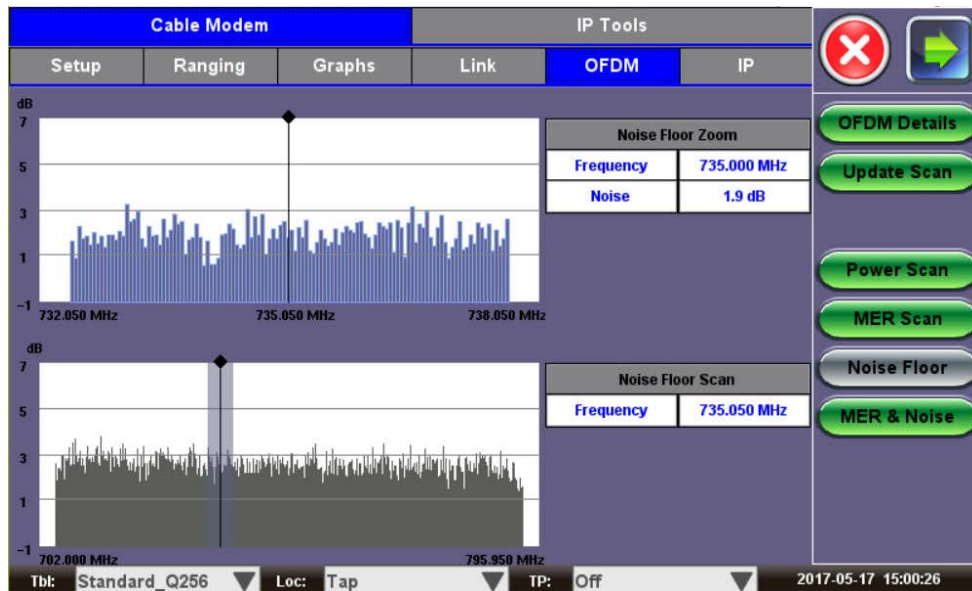
Cable Modem - Link EQ Taps



Cable Modem - OFDM Details Analyzer



Cable Modem - OFDM - Noise Floor



OFDM tab measurements:

- **Level:** reports Average, Maximum, and Minimum for the OFDM PLC.
- **Frequency:** Primary OFDM PLC Frequency.
- **Bandwidth:** OFDM Channel Bandwidth.
- **MER (Avg):** Average MER for the Active OFDM Subcarriers.
- **MER (Std Dev):** Standard Deviation for the Active OFDM Subcarriers.
- **MER Percentile (2):** the MER value for the lowest 2% of all OFDM Subcarriers. Can be modified from 2-50%.
- **Subcarrier Bandwidth:** bandwidth setting used for each OFDM Subcarrier.
- **Active Subcarriers:** the number of active Subcarriers in the OFDM channel.
- **PLC:** Phy Link Channel.
- **NCP:** Next Codeword Pointer.
- Modulation Profiles A, B, C, D, E.
- **C CWE:** Corrected Codeword Errors.
- **U CWE:** Uncorrectable Codeword Errors.



[Go back to top](#) [Go back to TOC](#)

IP tab:

Once online, the user can access the IP results. This screen provides all the information related to the various IP addresses acquired or used during the connection process.

Cable Modem - IP Results

Cable Modem			IP Tools		
Setup	Ranging	Graphs	Link	OFDM	IP
Cable Modem	192.168.20.11		2001:5c0:1111:7501::1:ae/64		
Subnet	255.255.255.0		2001:5c0:1111:7501::/64		
DHCP Server	192.168.1.10		2001:5c0:1111:7500::3		
CMTS Router	192.168.20.1		fe80::217:10ff:fe01:2d07		
TOD Server	192.168.1.10		2001:5c0:1111:7500::3		
TFTP Server	192.168.1.10		2001:5c0:1111:7500::3		
Client IP	192.168.18.6		2001:5c0:1111:7502::1:92/64		
Gateway	192.168.18.1		2001:5c0:1111:7500::3		
Subnet	255.255.255.0		2001:5c0:1111:7502::/64		
DNS	8.8.8.8		2001:5c0:1000:11::2		

Tbl: SK-FRE-1 Loc: SKEasy TP: Off 2017-06-23 16:03:44

[Go back to top](#) [Go back to TOC](#)

7.4.3 IP Tools Setup and Results

Web/FTP

Web Test

Web Test is used to verify that the internet is properly provisioned at the service point.

Setup:

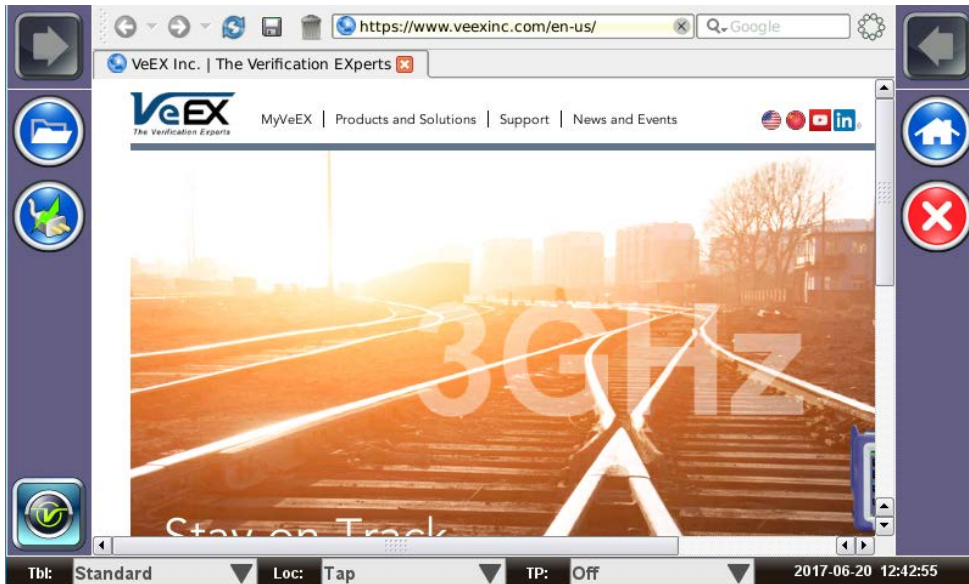
To perform a Web Test, follow the procedure below:

- **Mode:** Select Web from Mode selection
- **Profile:** Recall a known profile or enter the desired IP address or URL destination
- Enable/disable Javascript
- Press Browse when finished with setup to launch the web browser.

After the web browser launches, it's possible to navigate the links within the screen and use the slide keys to scroll up/down and left/right. Click the Close button in the top right hand corner to exit.

Note: If a DNS server is not detected, an error message will be displayed.

Web Browser



[Go back to top](#) [Go back to TOC](#)

VeTest

VeTest is a throughput test to an actual customer speed test server site.

Setup:

In the Web/FTP tab, select Mode as VeTest. Configure the Provider, VeTest Server, and Stream Numbers. If the selections you are looking for are unavailable, press **Update List**, which will check for the latest VeTest Server List site. **Note:** Update List requires the Cable Modem to be online.

Press **Start** to begin the test.

VeTest Results

Cable Modem		IP Tools	
Web/FTP	Ping	Trace Route	ARPWiz
Setup		Result	
Others Fremont 192.168.1.13			
Status	Pass		
Connection Time	134 ms		
Total Data Transfer Time	60506 ms		
PING Test			
Ping Response	PASS	14.600 ms	
Throughput	Download	Upload	
Line Rate - MAX	275.932 Mbps	64.494 Mbps	
Line Rate - AVG	275.655 Mbps	39.650 Mbps	
Data Rate - MAX	264.344 Mbps	61.612 Mbps	
Data Rate - AVG	264.079 Mbps	37.878 Mbps	
Start		Update List	
Tbl: SK-FRE-1	Loc: SKEasy	TP: Off	2017-07-11 15:44:37

[Go back to top](#) [Go back to TOC](#)

Ping Test

PING is a popular computer network tool used to test whether a particular host is reachable across an IP network. A Ping is

performed by sending an “echo request” or Internet Control Message Protocol (ICMP) to the target host and listening for “echo response” replies.

Ping Setup:

The following setup selections are available:

- **Profile:** Recall a Ping profile from memory or create a new test setup
- **Destination:** Enter the destination IP address or URL to Ping
- **Number of Pings:** Enter the number of Ping attempts that will be made to reach the network device
- **Length:** Enter the buffer size that will be sent to the network device to be detected
- **Pings/second:** Enter the Ping repetition rate
- **Time-out:** Enter the maximum time allowed (ms) between an ICMP Ping and echo response.

[Go back to top](#) [Go back to TOC](#)

Ping Result

The following results are displayed:

- Ping status - Pass or Fail
- Destination IP address
- Number of Pings Sent
- Number of Pings Received
- Unreachable and Missing Pings
- PING also estimates the round-trip time, in milliseconds
 - Current: The current time for a Ping request to be answered.
 - Minimum: The minimum time recorded for a Ping request to be answered.
 - Maximum: The maximum time recorded for a Ping request to be answered.
 - Average: The average time required for a Ping request to be answered.

Cable Modem		IP Tools	
Web/FTP	Ping	Trace Route	ARPWiz
Setup		Results	
PING: PASS			
Destination	172.217.6.68		
Send	10		
Received	10		
Network Unreachable	0		
Host Unreachable	0		
Port Unreachable	0		
Missing	0		
Round Trip (ms)			
Current	15	Average	24
MIN	15	MAX	48
Start			
Tbl:	Standard_Q256	Loc:	Tap
TP:	Off	2017-07-05 11:22:17	

[Go back to top](#) [Go back to TOC](#)

Trace Route

Trace Route is a common method used to find the route to the destination IP address or URL. It is often used to identify routing problems and unreachable destinations. All the remote IP addresses and their response times are displayed, indicating possible network congestion points.

Trace Route Setup:

The following setup options are available:

- **Profile:** Recall a trace route file or create a new test

- **Destination:** Enter the IP address or URL of the network device to be detected
- **Time-out:** Enter the maximum time allowed between an ICMP echo and response at each hop
- **Max Hop:** Enter the maximum number of network devices the packet is allowed to transmit

Once the parameters are configured, tap **Start**.

Trace Route Results:

The following results are displayed:

- Number of hops to destination
- Time to Live (TTL)
- Addresses up to the destination

Note: If there is no response from a particular hop, an asterisk will be displayed.

[Go back to top](#) [Go back to TOC](#)

Trace Route Result

Cable Modem		IP Tools	
Web/FTP	Ping	Trace Route	ARPWiz
Setup		Results	
Traceroute:PASS			
Hop	TTL(ms)	Address	
1	12	192.168.18.1	
2	11	192.168.0.1	
3	19	207.141.64.129	
4	12	12.251.100.245	
5	17	12.122.114.22	
6	21	12.122.1.117	
7	20	12.122.114.29	
Page 1 of 2			
Start			
Tbl: Standard_Q256	Loc: Tap	TP: Off	2017-07-05 11:22:51

ARP Wiz

ARP Wiz uses the Address Resolution Protocol (ARP) to verify the status of each IP address in a user-selectable IP range. ARP is the standard method for finding a host's hardware address when only its network layer address is known. In other words, ARP is used primarily to translate IP addresses to Ethernet MAC addresses. ARP is defined in [RFC826](#).

Setup:

- Profile: Recall an address stored as a profile or enter a desired IP address
- Source address: Enter the IP address range
- Destination address: Enter the IP address range
- Time-out
- Press Start

Result:

The MAC addresses associated with active IP addresses in the range are displayed.

ARP Wiz Result

Cable Modem		IP Tools	
Web/FTP	Ping	Trace Route	ARPWiz
Setup		Results	
ARP:In Progress			
Destination Address	Response Time(ms)	MAC Address	
192.168.18.1	16.890	00:17:10:01:2D:07	
192.168.18.2		*	
192.168.18.3	2.906	00:18:63:05:EF:FF	
192.168.18.4		*	
192.168.18.5	16.568	00:17:10:01:2D:07	
192.168.18.6		*	
192.168.18.7		*	
Page 1 of 3			
Stop			
Tbl: Standard_Q256	Loc: Tap	TP: Off	2017-07-05 11:18:29

**Note: ARP**

The ARP protocol only works within the same subnet as the IP address provided to the test set in IP Status.

[Go back to top](#) [Go back to TOC](#)

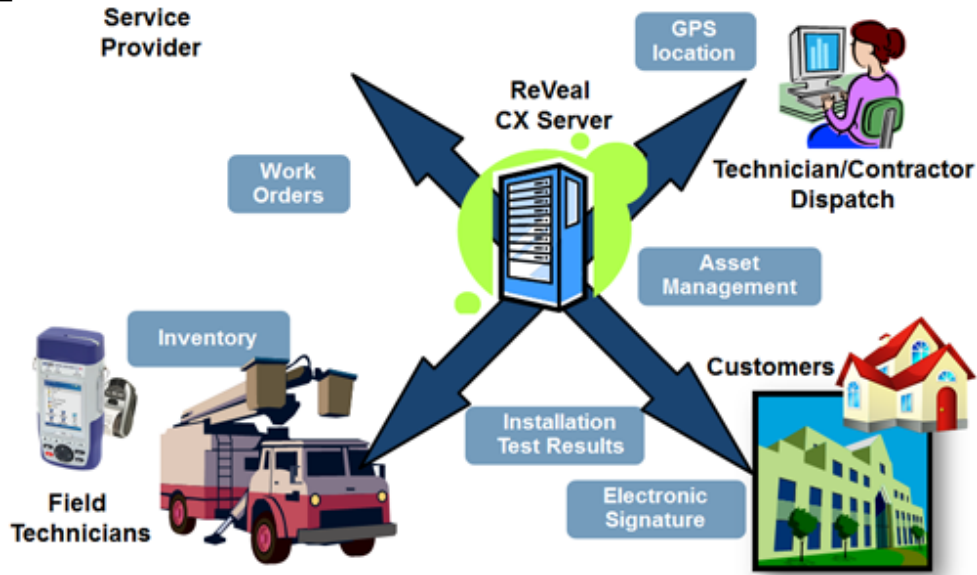
7.5 Advanced Tools

7.5.1 R-Server

The R-Server function is an optional feature that allows the CX310 to communicate with the CX-server for work force management. It is a complete centralized test and management system for devices, test results, and work orders.

The CX Server offers the following capabilities:

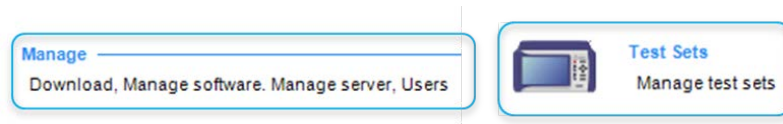
- Works with VeEX CX field meters
- Convenient internet connection via WiFi, Ethernet, Cable Modem, USB 3G data modem, USB Bluetooth with mobile phone dialing
- Automatic test results upload after each install
- GPS job location mapping
- Daily, weekly, monthly statistical analysis of job, technician and/or contractor performance
- Billing generation and verification
- Work order dispatch
- Warehouse management
- Automatic channel table and firmware updates
- Theft prevention



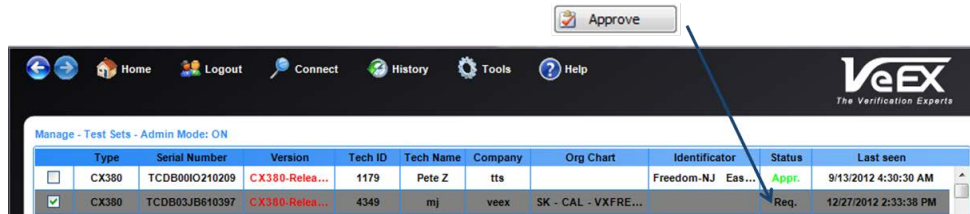
[Go back to top](#) [Go back to TOC](#)

Registering a CX Test Set

1. In the CX test set, input all parameters on the Register page. When done, press **Register**. A “Waiting for authorization” message will display.
Note: For field users, the **Supervisor ID** is a key parameter. It ties the test set to a specific Org Chart.
2. Make sure your PC is connected to the Internet and Launch the ReVeal V300 Client application. Log into ReVeal. From the Home screen of the ReVeal V300 Client application, select **Manage**, then **Test Sets**.



3. Locate and select the test set requiring approval and press **Approve** at the bottom.



4. Once approval is confirmed on the CX test set, press **Check**. A “Registration approved” message will display. If there are new Profiles, a download prompt will display.

Register	Upload	Download
Server Address	207.141.64.138	
Tech ID	13773	
Tech Name	mclovin	
Company	veex	
Supervisor ID	7788	
443/SSL	NO	
Registration approved. Currently register with Fremont Test Server 1		
Region	SK	
District	California	
System	Bears	

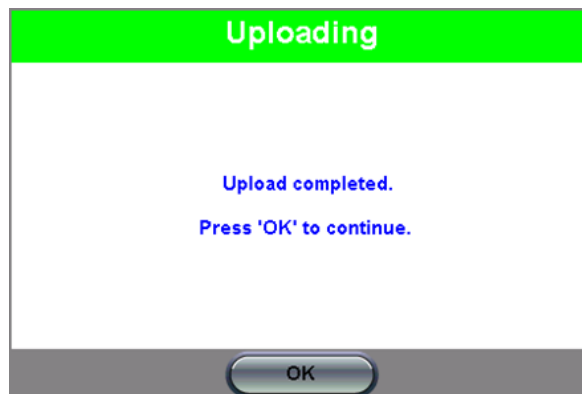
Tbl: SK-FRE-1 Loc: SK-310-1 TP: Off 2017-06-23 15:55:03

Uploading Test Results to R-Server

1. For CX test sets already registered with the V300 R-Server, the user can upload stored test results by going into the **Upload** tab.
2. Select the desired test results file and press the **Upload** button or **Upload&Del** to upload the file, then delete the test file on the unit. Results can also be filtered under the Job button. Upon successful upload, a confirmation message is displayed on the test set.

Register	Upload	Download			
Server Address	207.141.64.138				
<input checked="" type="checkbox"/>	Name	Size	Type	Port	Date
<input checked="" type="checkbox"/>	20170620_150026	1399	Single Ch	Cable	2017/06/20
<input checked="" type="checkbox"/>	20170620_142133	1375	Single Ch	Cable	2017/06/20
<input checked="" type="checkbox"/>	20170620_141311	1374	Single Ch	Cable	2017/06/20
<input checked="" type="checkbox"/>	20170621_125155	1359	Single Ch	Cable	2017/06/21
<input checked="" type="checkbox"/>	20170620_134513	631	CX310 Ingress	Cable	2017/06/20
<input checked="" type="checkbox"/>	20170620_140800	415	HIP	Cable	2017/06/20
<input checked="" type="checkbox"/>	20170620_132111	427	HIP	Cable	2017/06/20
<input checked="" type="checkbox"/>	20170620_133323	526	TDR	Cable	2017/06/20
<input checked="" type="checkbox"/>	20170620_133234	22619	VeCheck	Cable	2017/06/20
<input checked="" type="checkbox"/>	20170620_144816	22696	VeCheck	Cable	2017/06/20
Page 1 of 2					

Tbl: SK-FRE-1 Loc: SK-310-1 TP: Off 2017-06-23 15:55:24



Downloading Test Results from R-Server

Tables, profiles, and software are listed as new or current.

1. Tap **Download** to download all new changes.



2. Upon successful download, a confirmation message is displayed on the test set. Press **OK** to restart the unit.

[Go back to top](#) [Go back to TOC](#)

7.5.2 TDR

7.5.2.1 Principles of Operation

The TDR works on the same principle as radar where a pulse of energy is transmitted down a cable. When the pulse reaches a fault or the end of the cable, a portion or all of the pulse energy is reflected back to the instrument. The TDR measures the time it takes for the signal to travel down the coaxial cable, detect the cable impairments, and to reflect back. It then converts this time to distance and displays the information as a waveform with a corresponding distance reading. Possible impairments include opens, shorts, water damage, bad splices and other impedance mismatches.

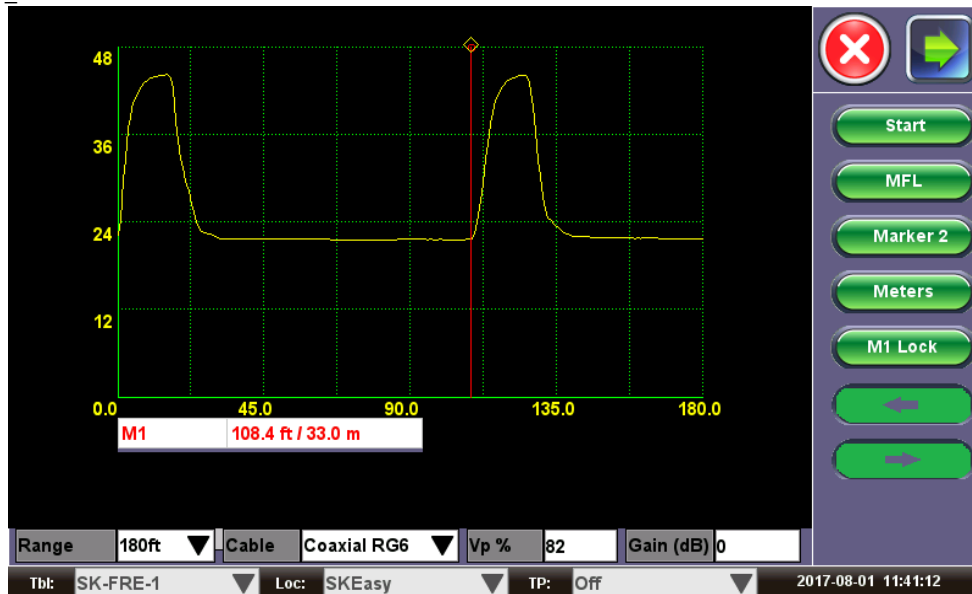
The Time Domain Reflectometer (TDR) is designed for identifying and locating faults on all metallic cables with two or more insulated conductors. There are several distance range scales, which automatically configure the pulsewidth appropriate for the range selected. Up to 5000 ft (1.5 km) is supported.

In Manual Fault Location (MFL) mode, the waveform can be visually scanned similar to conventional TDRs. The gain (dB setting) can be adjusted over a 20 dB range to magnify small events identified on the waveform. Velocity of Propagation (Vp %) can be manually set to match the Vp settings of the cable type under test.

A Cable type selection is available, which will update the Vp% and Impedance settings.

The TDR can be used to:

- Locate bad splices and unknown splices
- Find in-line components
- Locate water or moisture in the cable
- Verify new or partial cable reels
- Locate crushed, pinched or kinked cables
- Locate opens and shorts in the cable



- **MFL/AFL:** The TDR may be used in Manual Fault Location (MFL) or Auto Fault Location (AFL) modes.
 - **AFL:** When set in Auto Fault Location (AFL), the TDR will scan the cable and the cursor will automatically stop at the first event. To start the scan, press the **AFL** key then press **Start**. The end of the cable is normally identified as an open or short. Small events identified in the cable may be enlarged by increasing the Gain (dB) setting, making the fault more noticeable.
 - **MFL:** When set in Manual Fault Location (MFL), the user needs to visually scan the displayed trace and manually align the cursor to the event identified.
 - **Note:** MFL is the default mode. Press AFL button to switch to AFL mode.
- **Range:** Select approximate distance Range for measurement. This selection automatically configures the TDR Pulsewidth.
 - There are nine distance range scales (20 ft [7m] to 6000 ft [2 km]), which automatically configure the pulsewidth appropriate for the range selected.
 - The TDR's deadzone is 1 ft (0.5m).
- **Cable:** Select Cable Type.
- **Vp%:** Based on the Cable Type selected, this value will be populated. This can also be manually configured.
- **dB (Gain Settings):** Manual Gain control. The gain can be adjusted to a maximum of 20 dB in 1dB steps.
 - Tap on the dB area, which brings up a soft alphabet screen.
 - Input a dB value from 0 to 64 dB and press Apply. Select a value up to 64 dB to magnify small events.

Press Start to begin measurement.

[Go back to top](#) [Go back to TOC](#)

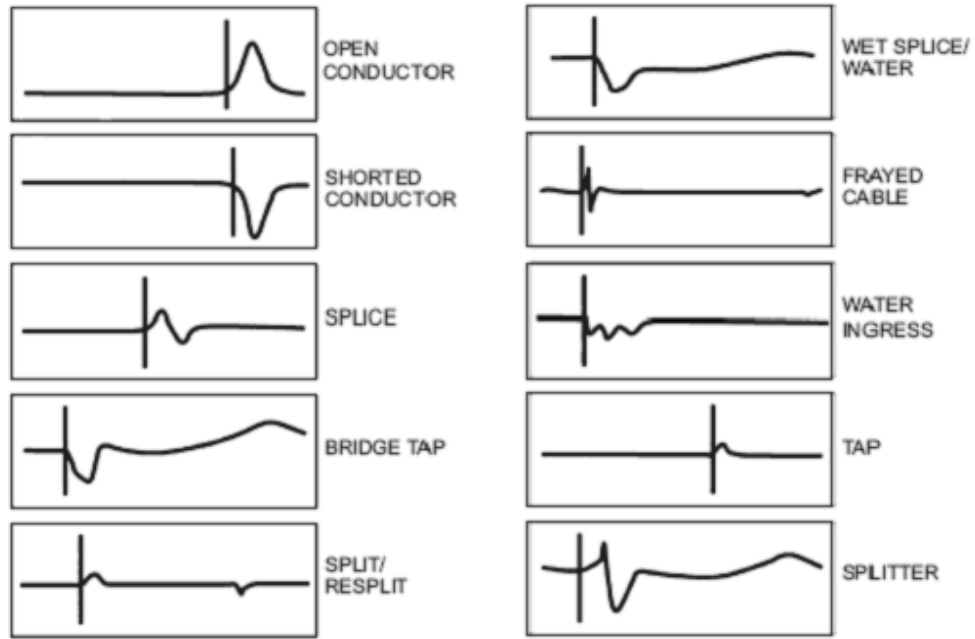
• 7.5.2.2 Operation

- **Distance Marker:** Tap on the M1 Label region to activate Marker 1. Use the left toggle key (physical switch on the unit) to control the marker. Up toggle moves the marker to the left. Down toggle moves the Marker to the right. The soft Right or Left arrow keys can also be used to control the marker. Corresponding distance is displayed. Tap **Marker 2** to add a second distance marker. When adding the 2nd Marker, the delta distance between the two cursors is reported.
- **M1 Lock** locks the position of Marker 1.
- Tap on **Meters/Feet** to toggle between English or Metric units.

[Go back to top](#) [Go back to TOC](#)

• 7.5.2.3 Typical Fault Displays

- The following diagrams show typical fault traces:



Typical Cable Vp and Impedance Values

Type	Vp	Z	Type	Vp	Z
Cat5 STP	72	100	T/Pair Jelly PE	64	100
Cat5 UTP	70	100	T/Pair PE	67	100
Coax Air	98	50/75	T/Pair PTFE	71	100
Coax Air Space	94	50/75	T/Pair PVC	58	100
Coax Foam PE	82	50/75	T/Pair Paper 72nF	88	100
Coax Solid PE	67	50/75	T/Pair Paper 83nF	72	100

[Go back to top](#) [Go back to TOC](#)

7.5.3 OFDM Analysis

The OFDM tab featured in the Cable Modem section requires a DOCSIS signal. OFDM Analysis accessed from the home menu does not require one.

Tap on Subcarrier Scan to scan all the subcarriers. Power Scan, MER Scan, Noise Floor, and MER & Noise measurements are available for view from the corresponding buttons once the scan finishes.

- **Power Scan** – Displays the Power Level of the OFDM signal in 6 MHz sections
- **MER Scan** – Displays the individual Subcarrier MER measurement
- **Noise Floor** – Displays Noise under the OFDM carrier
- **MER & Noise** – Displays the Full MER and Noise measurement in one screen.

For measurement descriptions featured in the table, refer to the [OFDM tab](#) in the Cable Modem section.

OFDM Table

Setup		OFDM			
Level (Avg)	11.8 dBmV	MER (Avg)	44.2 dB		
Level (Max)	11.8 dBmV	MER (Std Dev)	1.2 dB		
Level (Min)	11.8 dBmV	MER Percentile 02 %	43.2 dB		
PLC Frequency	732 MHz	Subcarrier Bandwidth	50 kHz		
OFDM Bandwidth	96 MHz	Active Subcarriers	1880 MHz		
	Modulation (QAM)	Level (dBmV)	MER (dB)	C CWE	U CWE
PLC	16	11.8	44.0	1.00e+00	0.00e+00
NCP	16		44.6	1.00e+00	0.00e+00
Profile A	256		44.6	0.00e+00	0.00e+00
Profile B	1K-256		47.9	0.00e+00	0.00e+00
Profile C	4K-1K		47.0	5.00e-02	0.00e+00
Profile D			N/A	N/A	N/A
Profile E			N/A	N/A	N/A

Page 1 of 1

IP 192.168.113.189 Remote/CLI 2017-01-26 11:30:00

OFDM Power Scan

Subcarrier Relative Power	
Frequency	732.000 MHz
Relative Power	-1.44 dB
Type	QAM Subcarrier

6MHz Power Level	
Frequency	735.000 MHz
Avg. Power	15.50 dBmV

IP 192.168.113.189 Remote/CLI 2017-01-26 11:32:29

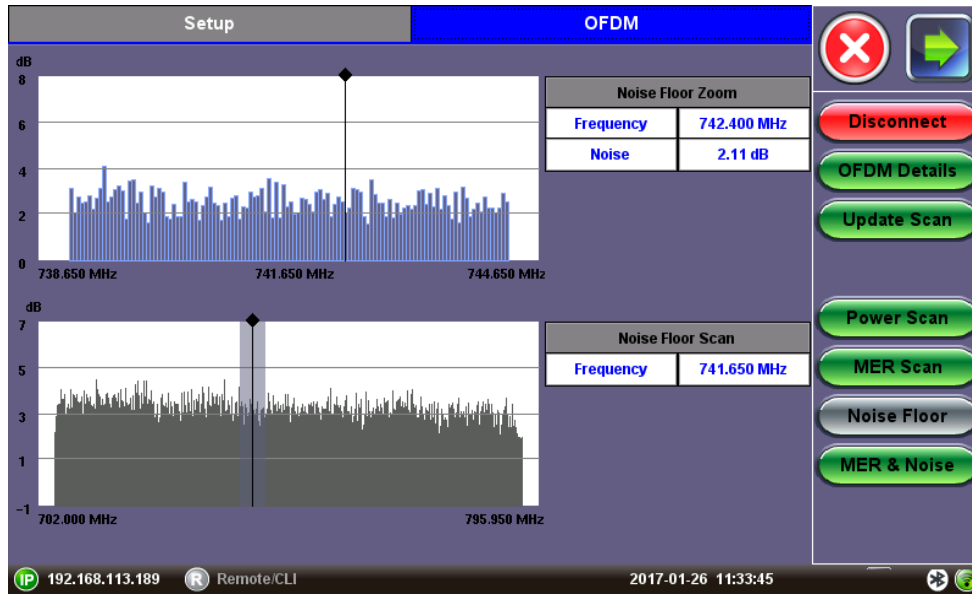
OFDM MER Scan

Subcarrier MER Zoom	
Frequency	742.400 MHz
MER	44.99 dB
Type	QAM Subcarrier

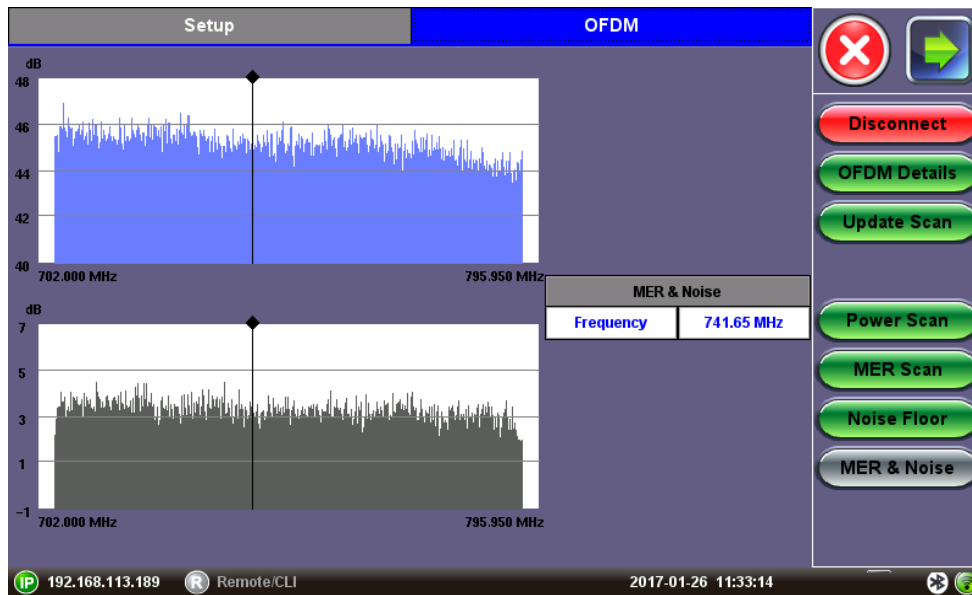
MER Scan	
Frequency	741.650 MHz

IP 192.168.113.189 Remote/CLI 2017-01-26 11:34:25

OFDM Noise Floor



OFDM MER & Noise Floor



[Go back to top](#) [Go back to TOC](#)

7.5.4 HIP

The HIP test is a customized test procedure that measures all installation tests in one Auto Test mode. Test results can be uploaded to a centralized Reveal R300 Server. The step-by-step installation test eliminates guesswork and rogue installation practices ensuring consistent service turn-up and delivery. This disciplined technique ensures the “Birth Certificate” of each new installation conforms to operating guidelines and ISO quality standards. Current tests include a Digital Channel Scan, DOCSIS Cable Modem Tests, VeTest, and RP Ingress. Press **Next** and follow the step-by-step instructions to complete the test procedure.

HIP Auto Test

Time	2017-06-23 15:59:14	
Digital Ch. Scan	PASS	Detail
DOCSIS	PASS	Detail
VeTest	Done	Detail
RP Ingress	Action required	

The Ingress Test will be done next.
Connect the test port to the appropriate test point.

Press "Next" continue.

Tbl: SK-FRE-1
Loc: SKEasy
TP: Off
2017-06-23 16:02:08

[Go back to top](#) [Go back to TOC](#)

7.5.5 Upstream Signal Generator (USG)

The Upstream Signal Generator (USG) is an option for the CX310 that transmits an Upstream CW signal in the return path. This feature is located in the Advanced Tools Menu.

- **Bandwidth:** CW
- **Frequency:** 5 MHz to 85 MHz (With 85 MHz Diplexer set), 5 MHz to 204 MHz (With 204 MHz Diplexer set)
- **Level:** 15 dBmV to 68 dBmV

Press Start to begin USG transmit. Press Stop to end USG transmit.

Upstream Signal Generator

Bandwidth	CW	
Frequency	36	MHz
Level	15.00	dBmV

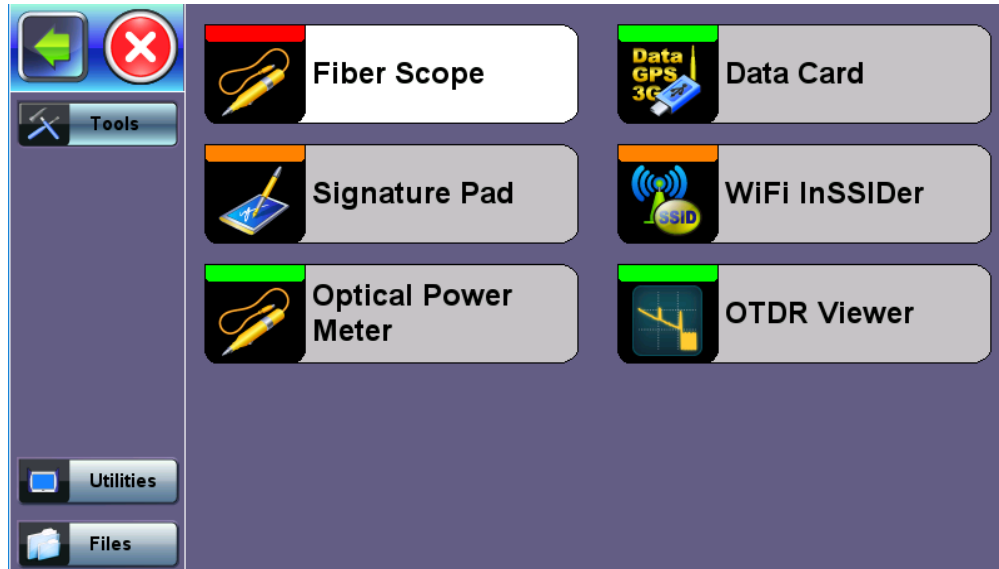
USG On

Tbl: Standard
Loc: Tap
TP: Off
2017-08-04 10:46:35

[Go back to top](#) [Go back to TOC](#)

8.0 Common Functions

Tools tab



The following functions are common to all CX-series units:

- Tool
- Utilities
- Files

[Go back to top](#) [Go back to TOC](#)

8.1 Tools

- [8.1.1 Fiber Scope](#)
 - [8.1.1.1 Automatic Focus Detection and Analysis](#)
 - [8.1.1.2 Main Advantages of Automatic Focus Detection](#)
 - [8.1.1.3 The Importance of Fiber Connector Inspection](#)
 - [8.1.1.4 Fiber Connectors and Test Gear Vulnerabilities](#)
 - [8.1.1.5 About the DI-1000 Fiber Inspection Scope](#)
 - [8.1.1.6 Fiber Connector Inspection Setup](#)
 - [8.1.1.7 Analyze](#)
 - [8.1.1.8 Capture Tab \(View\)](#)
- [8.1.2 Optical Power Meter \(OPM\)](#)
 - [8.1.2.1 Setting Pass/Fail Limits](#)
- [8.1.3 Data Card](#)
- [8.1.4 Signature Pad](#)
- [8.1.5 WiFi inSSIDer](#)
- [8.1.6 OTDR Viewer](#)

Tools Home Menu



[Go back to top](#) [Go back to TOC](#)

8.1.1 Fiber Scope

The Fiber Scope Inspector is an ideal tool for checking fiber optic connectors for dirt and end face quality. The handheld probe design enables easy inspection of patch cords and difficult to reach bulkhead or patch panel connectors. Clear images are displayed on the V300 products for immediate analysis and can be saved for record keeping.

Fiber Scope



Key features include:

- Optical connector end face inspection
- Easy to change adaptor tips
- Multi mode and single mode fiber patch cords
- Sharp images displayed on VeEX V300 products
- Visual comparison mode of saved image

The ISO/IEC 14763-3 standard for Testing Optical Fiber Cabling specifies visual standards for connector end face inspection with a fiber microscope. The ISO-related standards and general industry practices recommend the following:

- Markings on the core or damage to the cladding close to the core are unacceptable
- Slight scratches and small pits on the cladding away from the core are, however, acceptable
- Cracks are not permitted in neither core nor cladding

Equipped with 400x magnification, the VeEX Fiber Scope Inspector is well suited for general installation and maintenance checks on both single mode and multi mode fiber types. Contamination or damage that cannot be viewed at this magnification is unlikely to impact practical connector performance; thus, it is an ideal tool for patch cord inspection, optical laboratory or field test applications.

Lightweight construction and the ergonomic positioning of the rotary focus dial enables one-handed operation and fast viewing, leaving one's hand free to move the connector under test as needed. Interchangeable screw-on adaptors are available for most modern optical connectors, while the probe design blocks any hazardous infrared light from reaching the operator, resulting in completely eye-safe operation.

[Go back to top](#) [Go back to TOC](#)

8.1.1.1 Automatic Focus Detection and Analysis

In the past, fiber connector end-face inspection not only required a good Fiber Microscope (Fiber Scope), but certain amount of knowledge and hand-eye dexterity from the user. Results were prone to inconsistencies, subject to interpretation and PCs were required for post analysis against the criteria set forth by the IEC 61300-3-35 Sect 5.4 standard.

VeEX has made the task easier, faster and foolproof, with the introduction of its patent-pending revolutionary Automatic Focus Detection technology. Turning ordinary digital fiber scopes, like DI-1000, into accurate semi-automated inspection systems. All with the help of TX300S, FX300, RXT-1200 or SunLite OTDR test sets.

Instead of adding the extra complexity, fragility, cost, size and weight of other electromechanical focusing systems currently available in the market, VeEX's auto focus detection technology still relies on the incredible fast response and finesse of human hands, but leave the focus assessment, image capturing and analysis to the test set. Users could even try with their eyes closed and still achieve a perfectly focused image of the connector end-face in a few seconds. Moreover, users would still remain in control during non-trivial scenarios requiring the irreplaceable human dexterity and ingenuity.

[Go back to top](#) [Go back to TOC](#)

8.1.1.2 Main Advantages of Automatic Focus Detection

- Investment protection (no need to replace existing scopes, like DI-1000, with a more expensive ones)
- It's a simple software option upgrade to the test set
- Much faster focus, acquisition and analysis, compared to slow electro-mechanical auto-focusing scopes
- Robustness: Less moving parts and no internal motors makes a better choice for field applications
- No training necessary, yet get it right every time
- Smaller scope size
- Report generation (html and PDF)
- The test set detects when the image has reached optimal focus level, automatically freezes the picture, captures the image and runs the IEC 61300-3-35 analysis
- No need to move hands or press any buttons (movement and vibration are common causes of focus loss)
- No PC required for image acquisition or Pass/Fail analysis

[Go back to top](#) [Go back to TOC](#)

8.1.1.3 The Importance of Fiber Connector Inspection

Dirty or scratched connectors introduce loss, increase ORL and/or damage other connectors (Loss becomes more critical at

higher data rates). End-face contamination is a leading cause of fiber link failures in data centers, corporate networks, MSOs and Telecom environments.

Fiber Inspection Scopes provide a magnified image of the fiber optics connector's End Face, focusing on the contact areas (prone to loss or damage by mating). Images, visual inspection and automated tools are often used to grade the health and cleanliness of connectors, after polishing or cleaning and before being used.

[Go back to top](#) [Go back to TOC](#)

8.1.1.4 Fiber Connectors and Test Gear Vulnerabilities

Opposed to the permanent or semi-permanent connections often found in network environments, “promiscuous” Test Equipment and their patch cords connect to multiple devices on a daily basis, increasing the chances to damage or get damaged. Extra care must be taken, not only to avoid potentially expensive damage, but to make sure that any tests and their results remain valid. Bad fiber or dirty/damaged connectors can result in false anomalies, defects or errors, even expensive repairs.

[Go back to top](#) [Go back to TOC](#)

8.1.1.5 About the DI-1000 Fiber Inspection Scope

- Digital Fiber Inspection Probe
- Native USB 2.0 (no adapters required, no image degradation)
- Compatible with existing UX400, TX300S, FX300, RXT-1200 and SunLite OTDR
- Precise and stable single-finger focus knob for one hand operation
- Blue light source for better contrast
- 400X magnification
- Interchangeable tips – Most commonly used tips are available (FC, SC, LC, ST, MTP, E2000, including PC, APC, 60° angled tips, among others)
- Compatible with VeEX test sets offering built-in Auto Focus-Detection & Analysis
- Ergonomic design

[Go back to top](#) [Go back to TOC](#)

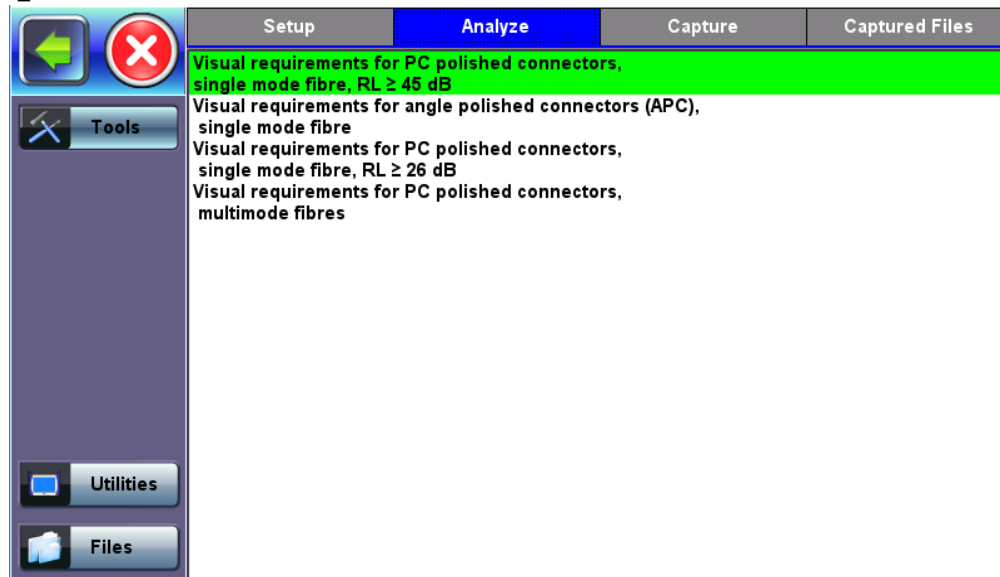
8.1.1.6 Fiber Connector Inspection Setup

The Setup tab allows basic settings

- **File Prefix:** String of alphanumeric characters to be appended at the beginning of the file name, every time the results are saved. For example Fiber0239-
- **Starting #:** Every time a result is saved, this suffix number will automatically increment. Users can manually enter the initial value here.
- **Scope Mode:** Use Local for USB fiber inspection scopes that directly attached to the test set. Use Remote if the probe is attached to a wireless transmitter using Wi-Fi connection.

[Go back to top](#) [Go back to TOC](#)

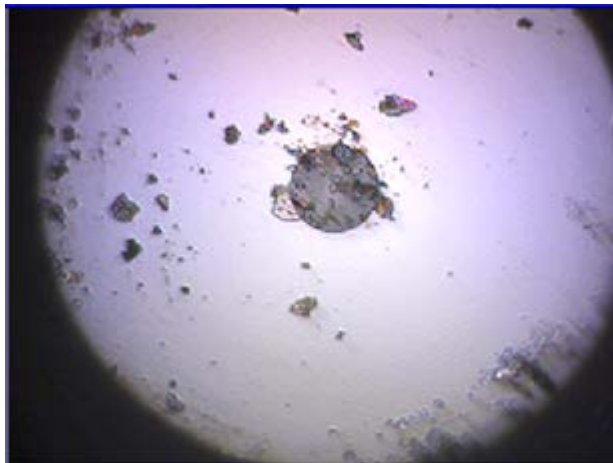
8.1.1.7 Analyze



8.1.1.8 Capture Tab (View)

The Capture tab is the main user interface for the connectors' face inspection and analysis. It presents a real-time view of the connector's end face allowing users to align and focus.

Fiber Scope - Capture tab



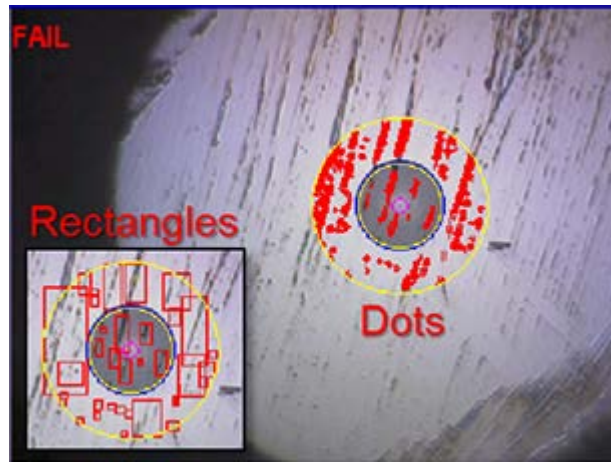
Important! The soft buttons in the action bar (right side of the screen) do not indicate the current state or setting, they indicate the action that would take place if pressed. For example, if user taps on the “Analysis OFF” button, the analysis function is turned OFF and the button toggles to show “Analysis ON”. These soft buttons should be interpreted as “Go to...”

Freeze: Allows users to manually freeze the image in the desired view. If the optional Auto Focus Detection feature is enabled, the test set will automatically freeze the image when the image comes into focus. Once the image is frozen, users can tap on the image to save it.

Analysis ON/OFF: Turns the optional auto-analysis feature ON and OFF. If turned ON, the test set automatically analyzed the image in real time. If the markers get in the way of seeing the picture details, users can turn this feature OFF and perform manual analysis.

Dots/Rectangles: They are two ways of highlighting the different impurities found in the face of the connector. The dots tightly contour each individual anomaly, capturing its area. In some cases users may want to see impurities or scratches that are otherwise covered by the dots, so rectangles are used in this case to highlight the anomaly and still keep them visible. The selection between dots or rectangles does not affect the area calculation or the Pass/Fail results; they are just operator's choice.

Save: The Save button appears after freezing an image. It performs the same action as tapping on the screen to save the current image. Use the >Utilities >Files function to View the report, export to PDF format and copy to USB.



MMF/SMF: Selects the type of connector/fiber to be analyzed and loads the correct Pass/Fail mask. Please note that the label in the button DOES NOT indicate the current mask type. It indicates that the mask would be changed to if activated.

Shake ON/OFF: Turning the Shake ON may help in situations when the image is not very stable, such as inspecting a female connector or bulkhead.



[Go back to top](#) [Go back to TOC](#)

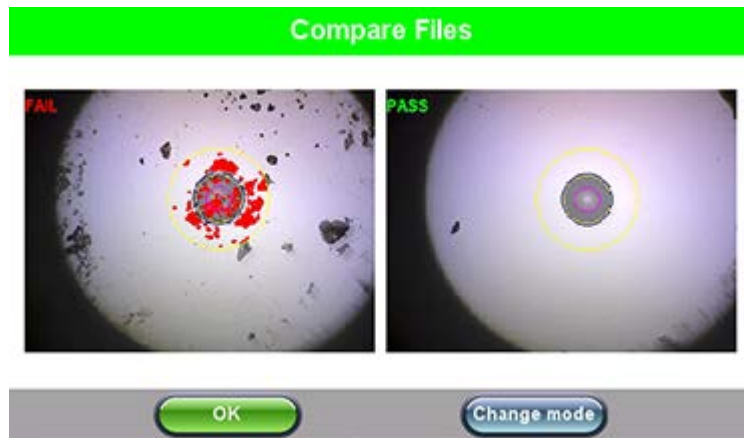
8.1.1.9 Captured Files Tab

This section of the user interface lists all the connectors' end face images that have been captured with the fiber inspection microscope. Users can add "Before" and "After" identifiers or remainders when comparing images before or after cleaning or polishing.

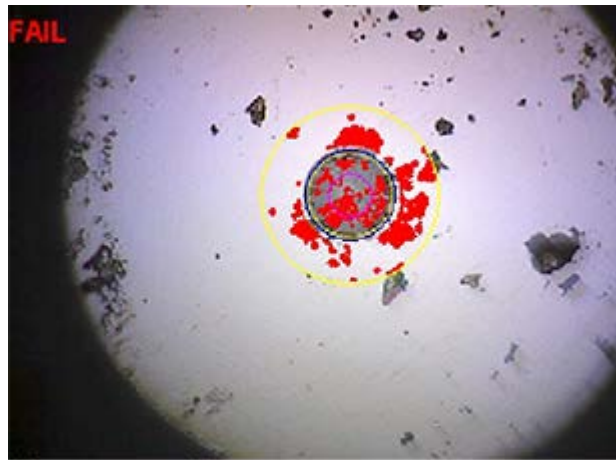
Clear All: Deletes all the image files in the Captured Files list

Delete: Deletes any selected files from the Captured Files list. Use the check-boxes to select

Compare: Compares two images, for example, ones taken before and after cleaning. Use the check-boxes to select any two image files and then tap on the Compare soft button. Use the Change Mode button on the comparison window to enable and disable the analysis overlay.



Analyze: This soft button opens a more detailed analysis and report generation. Use the check boxes to select the images to be analyzed



- **Image File:** shows the name of the picture currently being displayed. Use the Open button to navigate, select and load any other file.
- **Show/Hide Overlay:** Enables or disables the mask, anomalies identification and analysis.
- **Finer From/To:** User customizable labels to identify the fiber under test
- **Save Report:** Generates a full report including a table with measurements and images. Use the >Utilities >Files function to View the report, export to PDF format and copy to USB.

Analysis Report:

Setup

Parameter	Test Data
Fiber From	FremontHQ
Fiber To	ACME Telecom Inc. Hub
Comments	Outbound 100GE

Analysis Result

Zones	Scrathes			Defects		
	Criteria(um)	Thresholds	Count	Criteria(um)	Thresholds	Count
A:Core 0-65 um	[3;inf)	0	0	[0;5) [5;inf)	4 0	0 0
B:Cladding 65-120 um	[5;inf)	0	0	[2;5) [5;inf)	5 0	0 0
C:Adhesive 120-130 um	-	-	-	-	-	-
D:Contact 130-250 um	-	-	-	[10;inf)	0	0

Result

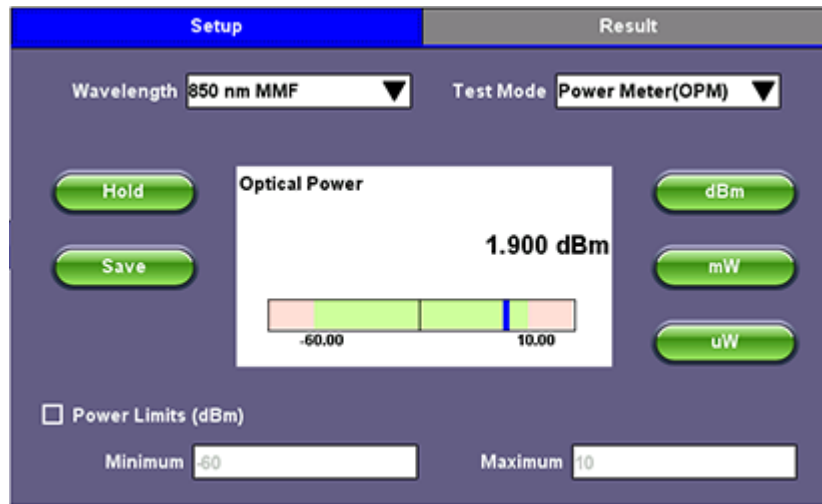
Results Table: Shows the defects and scratches count by sizes and position, used for the evaluation of the Pass/Fail criteria, according to the IEC 61300-3-35 standard.

Image/Report	Scrathes			Defects		
	Criteria(μm)	Thresholds	Count	Criteria(μm)	Thresholds	Count
A:Core 0-65 μm	[3;∞)	0	0	[0;5) [5;∞)	4 0	0 6
B:Cladding 65-120 μm	[5;∞)	0	0	[2;5) [5;∞)	5 0	0 6
C:Adhesive 120-130 μm	-	-	-	-	-	-
D:Contact 130-250 μm	-	-	-	[10;∞)	0	17

8.1.2 Optical Power Meter (OPM)

This function works in conjunction with Optical Power Meter dongles (USB), such the optional UPM-100.

Insert the OPM dongle to on of the test set's USB port before launching this application.



Optical Power and Loss Measurements

Wavelength: This pull-down menu provides a list of calibrated wavelengths to match the signal being measured.

Test Mode: Allows users to select between Power or Loss measurements.

- In Power Meter mode the test set presents the direct power readings, which are displayed in dBm, mW or uW units. Users can perform the conversions by using the button on the right side of the reading
- In Loss Meter mode the test set reports the difference in power readings between the Laser Source (LS) output being used and what is currently present at the connector after being attenuated by the fiber. The results are presented in dB. Loss meter requires to be referenced (calibrated) to the Laser Source output. You must connect the LS to the OPM dongle using a short patch cord and tap on the Reference button to record the 0dB point. Then that LS can be connected to the far-end of the fiber to measure the loss.

Hold: Freezes the last power or loss reading on the screen

Save: Records instantaneous power or loss readings in the Result's tab. This is useful when measuring multiple fibers or testing one fiber with multiple wavelengths. Up to 12 measurements can be logged in the Results tab. You must use the 1 button to save these results.

[Go back to top](#) [Go back to TOC](#)

8.1.2.1 Setting Pass/Fail Limits

Whether measuring optical power or loss, there are always power input limits (saturation and Loss) or attenuation allowances that determine whether the fiber cable meets the requirements for the desired application or network elements.

Power Limits (dBm): When check-box is ticked, users can enter the Minimum and Maximum power levels allowed for the application (e.g. in line with the transceiver's dynamic range). If the power reading falls beyond those limits, the power measurement reading will turn red.

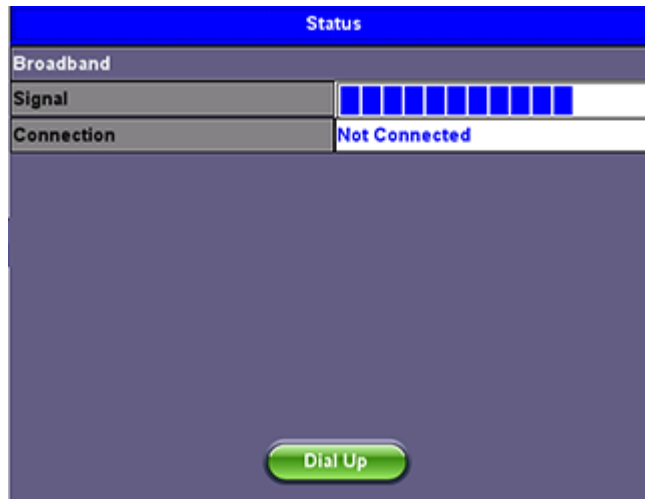
Loss Limits: Similar to power limits, user can set Minimum and Maximum amounts of optical power loss that are acceptable for the application or specified for the cable or installation. User can simply specify the total amount of attenuation in dB. Alternatively user can select the dB/km or dB/mi if the results are being compared against cable specifications. In this case, enter the length of the cable under test for the test set to make the conversion.

[Go back to top](#) [Go back to TOC](#)


8.1.3 Data Card

To establish an IP connection using a data card, please make sure that the data card is connected on the USB port. Note that only datacards provided by VeEX are supported and have the driver necessary for connection. The **Data Card** icon, as shown below, will appear at the bottom of the screen.

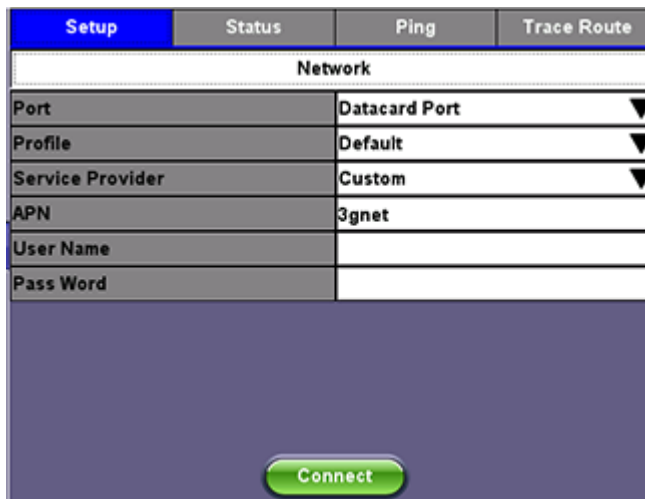
Data Card - Setup




Press the **Dial Up** key.

In the IP Tools Setup menu, the Port will be displayed as "Datacard Port." The D for Data icon in the bar on the lower end of the screen will have a red cross to show that datacard is not connected - .

Select the **configuration parameters**, then press **Connect**.



Now that a connection has been established:

- The **D** for Data in the icon turns green .
- The connection details are displayed in the IP Tools Status tab (shown below)
- It will automatically reconnect if the test set is powered off/on and you are in a good reception area
- It will automatically reconnect if you enter a bad cell area and return to a good one

Setup	Status	Ping	Trace Route
Connection Status		PASS	
Local IP	33.238.17.11		
Remote IP	33.238.17.11		
DNS IP	10.177.0.34		
Second DNS	10.166.208.148		

[Disconnect](#)

[Go back to top](#) [Go back to TOC](#)

8.1.4 Signature Pad

This feature enables a portion of the screen to be used as a signature pad. To begin, please make sure that the **Advanced Saving** Global Storage Setting feature is on. To verify, see **Utilities > Settings > Global > Storage Setting**. If the Signature Pad is not enabled, a warning message will appear.

Press **Clear** to erase all changes from the signature pad. Press **Save** to save the signature and the following Advanced Save Settings can be configured in the pop-up window (as shown below):

- Enter the desired Current Job ID, Current Account, Current Location, and Comments using the alphanumeric keypad
- Locator: None
- Type: None

Once the settings have been configured, press **OK**.

Note: The Signature and Advanced save setting fields will be added to all subsequent stored test results.

8.1.5 WiFi inSSIDer

WiFi inSSIDer Home

2.4GraphCH	5.0GraphCH	5.0Graph			
Scan		2.4Graph			
AP List					
WiFi Scan Finished					
ESSID	BSSID	Protocol	Rates	Channel	
CG3000DV200 Protected via WPA2	10:0D:7F:D4:18:27		48Mb/s	1	🔒 📊
VeEX Office Protected via WPA2	C4:04:15:0C:79:83		48Mb/s	6	🔒 📊
NighthawkX8_2.4G Protected via WPA2	2C:30:33:5B:AD:6C		48Mb/s	11	🔒 📊
VeEX Mobile Protected via WPA2	C4:04:15:1B:DF:C2		48Mb/s	11	🔒 📊

[Scan](#)

1. Plug the WiFi adaptor into the USB port. Allow at least 30-45 seconds for the unit to detect the wireless adaptor and for the software driver to load.

Note: Products support USB wireless adaptors supplied by VeEX only and have the necessary software driver built into the test set.

The WiFi InSSider supports 2.4GHz and 5.0GHz Bands. The home screen has tabs to display test results for both frequency bands and also for graphical presentation of results for both.

2. Tap the Scan button on the right side of the screen.

After the scan is completed, the unit displays the list of access points (AP) detected in the 2.4 GHz and 5GHz bands.

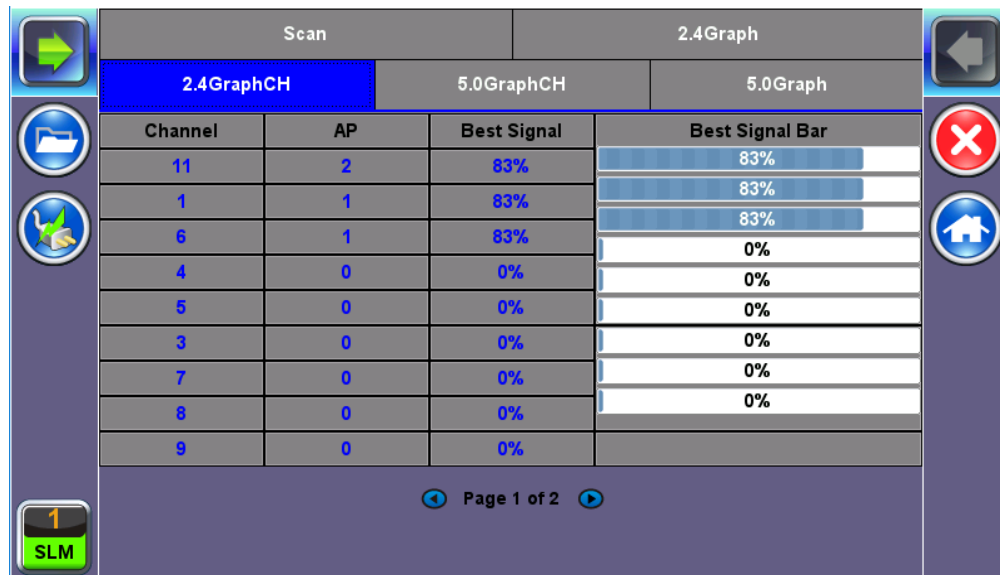
The following information is displayed for each AP:

- SSID name of the AP
- BSSID (MAC address) of the AP
- 802.11 protocol version supported by the AP
- Max data rate supported by the AP
- AP's radio channel number
- Lock symbol indicates if security is set on the AP (WEP, WPA or WPA2).
When the AP is unsecured, no lock symbol is displayed
- Signal strength of the AP

Access Points in the 5.0GHz spectrum can only be displayed if the VeEX USB Wifi adapter supports 802.11a/n or 802.11 a/n/ac. Refer to the USB Wifi adapter specifications.

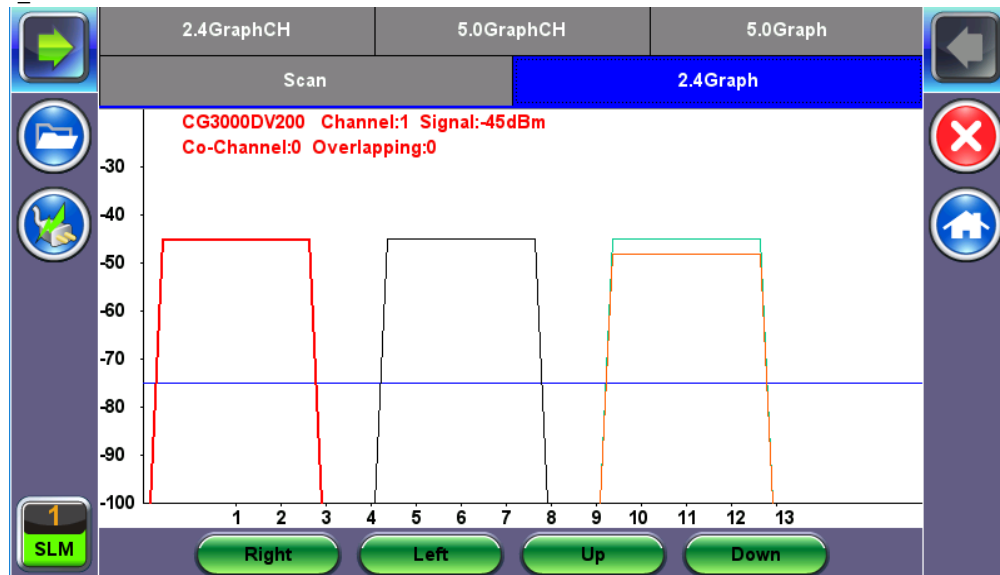
3. Use the 2.4GHz GraphCH and 5.0GraphCH tabs to view the number of Access Points detected for each channel in the 2.4GHz and 5GH bands and the strength of the strongest AP's signal for each channel.

2.4GHZ Channel



4. Tap the Graph tab of the respective Channel to view the results in a graphical presentation.

Graph



Use the Right/Left/Up/Down function keys or the arrow keys on the unit's keypad to navigate the graph and get additional information for the access points. Detailed information for each Access Point includes:

- SSID: name of the AP
- AP's radio Channel number
- Signal strength (dBm)
- Number of co-channel: Number of APs using the same radio channel
- Number of Overlapping APs: Number of APs using channels whose frequency band overlaps with the AP.

[Go back to top](#) [Go back to TOC](#)

8.1.6 OTDR Viewer

This functionality allows the test platform to open and analyze standard OTDR .SOR files created by the TX300S-OTDR, RXT-4100 OTDR, FX300 OTDR or SunLite OTDR test sets. It can also be used to control the wireless OPX BOX OTDR via Bluetooth or USB connection, offering full-featured OTDR functionality.

Please refer to the OTDR manual for further details about its operation.

[Go back to top](#) [Go back to TOC](#)

8.2 Utilities

- [8.2.1 About](#)
- [8.2.2 Screen Calibration](#)
- [8.2.3 Bluetooth/WiFi Wiz](#)
 - [8.2.3.1 Bluetooth](#)
 - [8.2.3.2 WiFi Wiz](#)
- [8.2.4 Power](#)
- [8.2.5 Backlight](#)
- [8.2.6 Global Settings](#)
- [8.2.7 Date and Time](#)
- [8.2.8 Remote Access](#)
- [8.2.9 Help](#)

The Utilities tab provides settings for the global parameters of the test set or platform (system settings).



[Go back to top](#) [Go back to TOC](#)

8.2.1 About

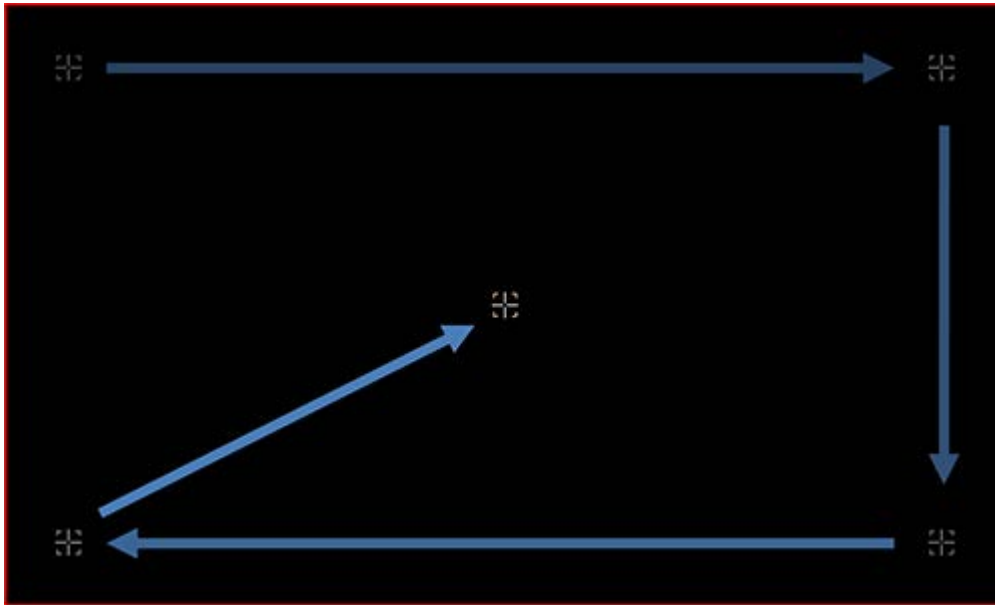
This section provides information about the software version, serial number, and MAC address of the management port of the unit, as well as a list of software licenses (optional test features) currently loaded in the test set.

[Go back to top](#) [Go back to TOC](#)

8.2.2 Screen Calibration

Go to this section to calibrate the touch screen.

Utility Settings - Screen Calibration



Follow the instructions and tap on the center of the five targets displayed at all four corners. A message displays when calibration is complete. If the touch screen is miscalibrated by mistake, please use the cursor and enter keys to start the calibration feature and repeat the procedure.

[Go back to top](#) [Go back to TOC](#)


8.2.3 Bluetooth/WiFi Wiz

8.2.3.1 Bluetooth

VeEX products support a micro USB Bluetooth adaptor offering wireless connectivity up to 10 meters (30 feet). Ultra compact and portable, the adaptor provides an untethered connection between the tester and other Bluetooth compatible devices such as a Notebook PC or cell phone, so the user can transfer test result files quickly and easily without having to hassle with memory sticks or Ethernet connections.


An overview of the application is shown below.



	<h3>Bluetooth Adaptors - Compatibility</h3> <p>Not all Bluetooth adaptors on the market are supported by the V300 product series. Please use adaptors that have been tested and supplied by VeEX only to ensure compatibility and correct operation.</p>
---	--

[Go back to top](#) [Go back to TOC](#)

Bluetooth Setup

Insert the Bluetooth adaptor into the USB port on the side of unit. If you are using more than one USB device, use an external USB hub to connect additional devices. Once detected, a **Bluetooth** icon  is displayed on screen.

Devices

The test platform will automatically detect the Bluetooth adaptor once plugged into the USB port. Details of the Bluetooth adaptor will be displayed including the MAC address of the device and the last 4 digits of the serial # of the V300 test set. The last 4 digits of the V300 series test set will be the pairing code between the unit and the external device. Press the **Connection** tab to view the passcode.

Bluetooth - Devices Tab

Bluetooth | WiFi Wiz

Devices	Scan	Connection
Status	OK	
Type	USB	
Name	RTK_BT_4.0	
MAC	34:C3:D2:FA:9C:62	
Manufacturer	Realtek Semiconductor Corporation (93)	
Pairing Passcode	0182	

1 SLM Scan

Bluetooth - Devices Tab

Bluetooth | WiFi Wiz

Devices	Scan	Connection
Scan Status : Finished		
Device Name	Device Address	
NANCY-X1 Unpaired	4C:34:88:2A:47:5B	
VEEX-PC Unpaired	34:02:86:03:77:3E	
[unknown] Unpaired	44:1C:A8:F4:89:E0	

1 SLM Scan

Bluetooth - Connection - Passcode

Bluetooth | WiFi Wiz

Devices	Scan	Connection
Pairing Status:		
Local Device Address		
Remote Device Name		
Remote Device Address		
Remote Service Number		

If requested from your pairing device, please use the following passcode:

0182

1 SLM Page 1 of 1
Scan

[Go back to top](#) [Go back to TOC](#)

1. Press **Scan** to check for available Bluetooth devices. Once scanning is complete, a list of discovered Bluetooth devices will be listed. Please ensure the peripheral device is set to **Discoverable** during Scanning and Pairing operation.
2. Press **Pair BT** to begin the pairing process. During the pairing operation, you will be prompted to enter a code on the peripheral device (PC or Mobile Phone) in order to pair successfully. Enter the last 4 digits of the V300 serial number as shown in the **Connection** tab.
3. Once paired, click the **Services** button at the bottom of the screen to check the service attributes. To upload test results via Bluetooth and Mobile phone to a UMTS or 3G network, full data upload service will be required.

[Go back to top](#) [Go back to TOC](#)

8.2.3.2 WiFi Wiz

This function allows you to test wireless WiFi 802.11a,b,g,n,ac networks (based on capabilities supported by WiFi USB adaptor provided by VeEX). A typical application is shown below.



The WiFi Wiz function supports:

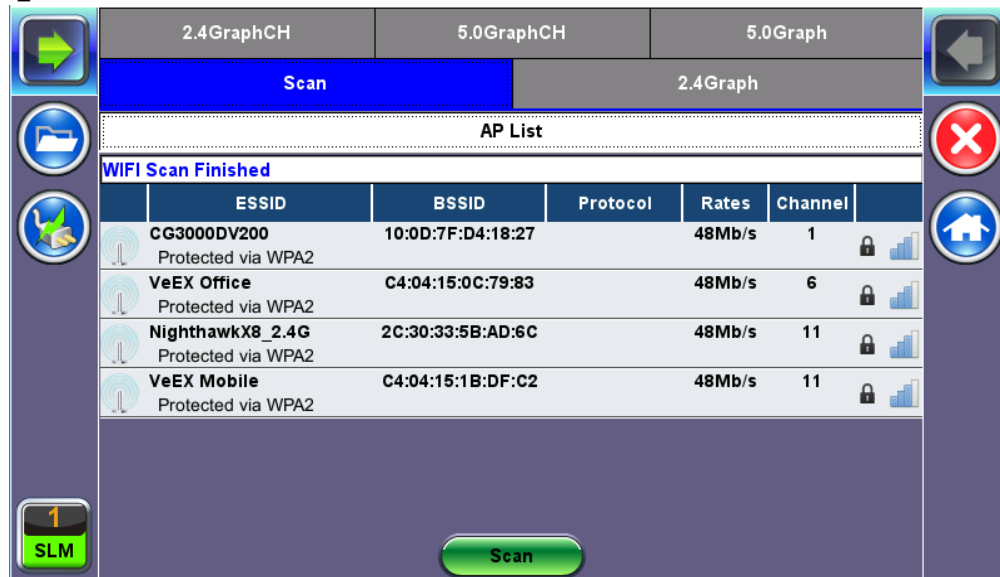
- 802.11 a/b/g/n/ac standards (refer to WiFi USB adaptor provided by VeEX)
- WEP, WPA, WPA2 Encryption
- Scanning
- SSID broadcasting and report
- Signal Strength
- IP Connection and Ping Test

[Go back to top](#) [Go back to TOC](#)

8.3.1 WiFi Procedure

- Plug the WiFi adaptor into the USB port. Allow at least 30-45 seconds for the unit to detect the wireless adaptor and for the software driver to load.
 - **Note:** Products support USB wireless adaptors supplied by VeEX only and have the necessary software driver built into the test set.
- Tap on the **Scan** tab once the test set has detected the wireless USB adaptor.

WiFi Wiz - AP List



AP List

The following information is displayed for each AP:

- SSID name of the AP
- BSSID (MAC address) of the AP
- 802.11 protocol version supported by the AP
- Max data rate supported by the AP
- AP's radio channel number
- Lock symbol indicates if security is set on the AP (WEP, WPA or WPA2).
When the AP is unsecured, no lock symbol is displayed
- Signal strength of the AP

Select one of the Access Points (AP) to start a connection. If the AP is locked, a network key is required to complete the connection. The key can either be 10 characters or 26 characters.

- **Note:** If the user enters the wrong network key, the test set will still connect to the Access Point, but will not be able to connect to the web or perform the Ping test.

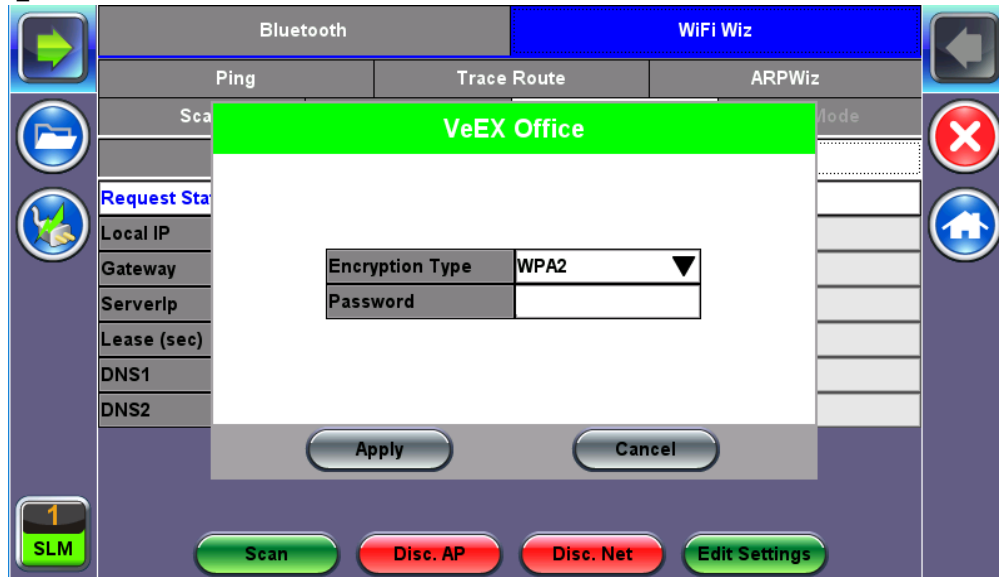
Once selected, an **Edit Settings** function key appears.

Tap on **Edit Settings** or **Connect AP** to change the Encryption Type and enter the WiFi Key.

- **Encryption Type:** Supported encryption types include WEP, WPA, and WPA2.
- **Key:** Security phrase or password necessary to access SSID and network. Tap the **Key** field to enter the AP password on the pop-up keypad.
 - ASCII formatting supported
 - The password/phrase can be hidden (**Global Settings > Show Password > Yes/No**)
 - **Note:** Passwords are case sensitive.

Hit **Apply** after selecting the Encryption Type and entering the key. If the encryption menu was accessed via **Edit Settings**, press **Connect AP** to connect to the AP. If the encryption menu was accessed via **Connect AP**, the test set will automatically connect to the AP after hitting **Apply**.

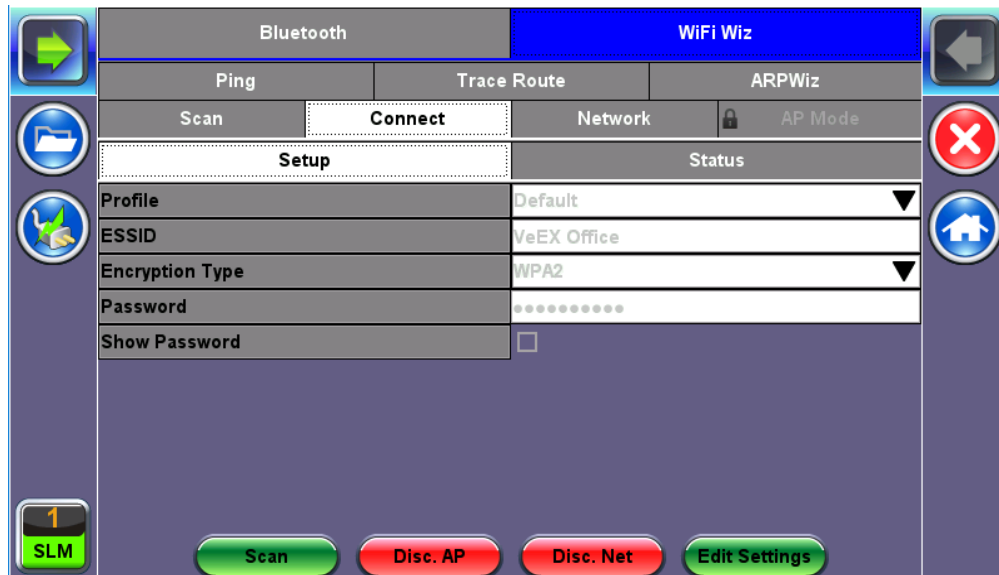
WiFi Wiz - AP Encryption Settings



Connect

The **Setup** tab displays the Profile, ESSID, Encryption Type and Password.

WiFi Wiz Connection Setup

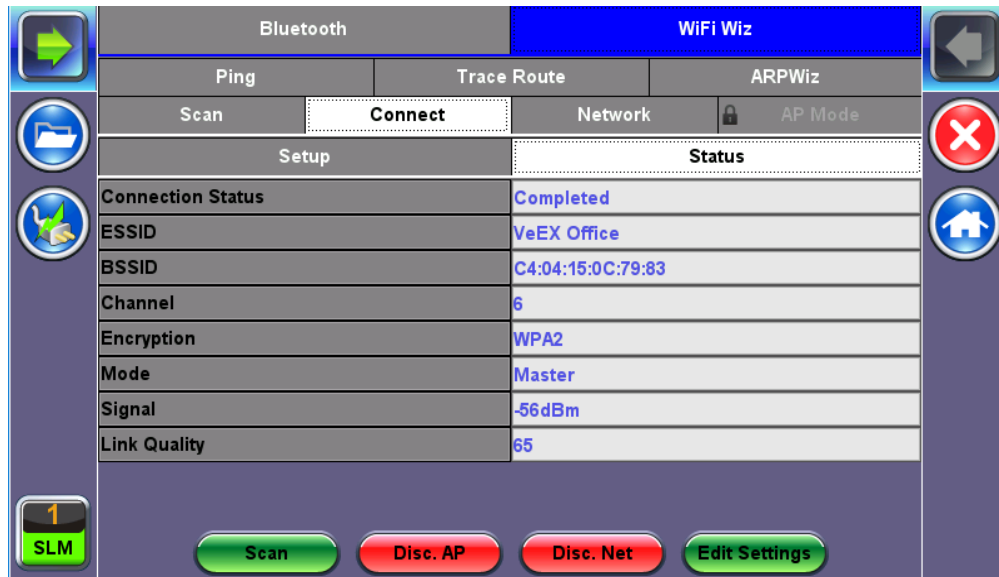


Status

The Status Tab displays the following information on the connection:

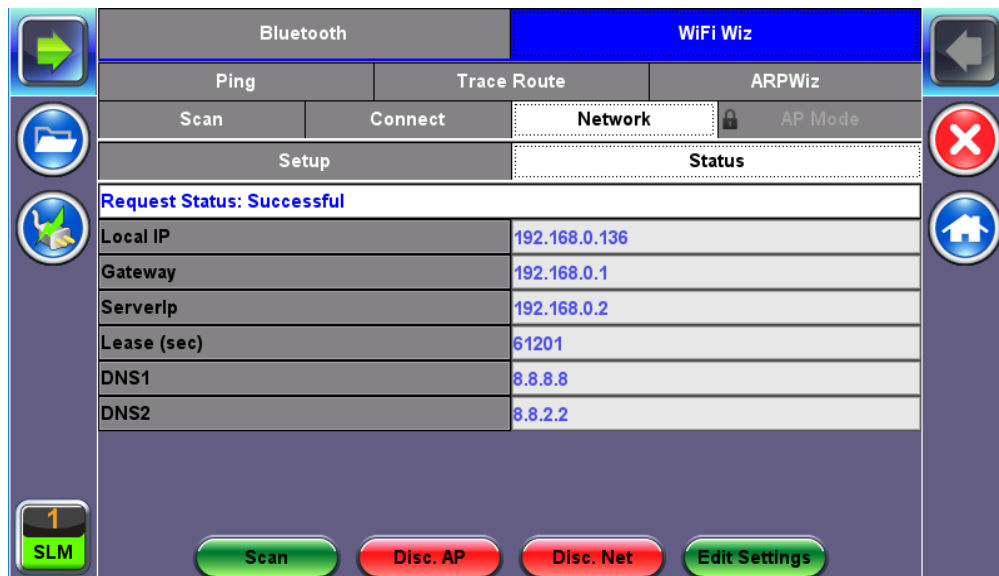
- **Connection Status**
- **ESSiD:** Name connected to
- **BSSiD:** MAC address of wireless router/device connected to
- **Channel:** WiFi Channel # connected to
- **Encryption:** Encryption type
- **Mode**
- **Signal:**
 - Radio signal level (dBm)
 - Link quality score
 - Max data rate
 - 802.11 protocols supported

WiFi Wiz Connection Status



After a successful connection to the Access Point press Connect IP to obtain an IP address and access the additional IP tests like Ping, Trace Route etc.

WiFi Wiz Connect IP

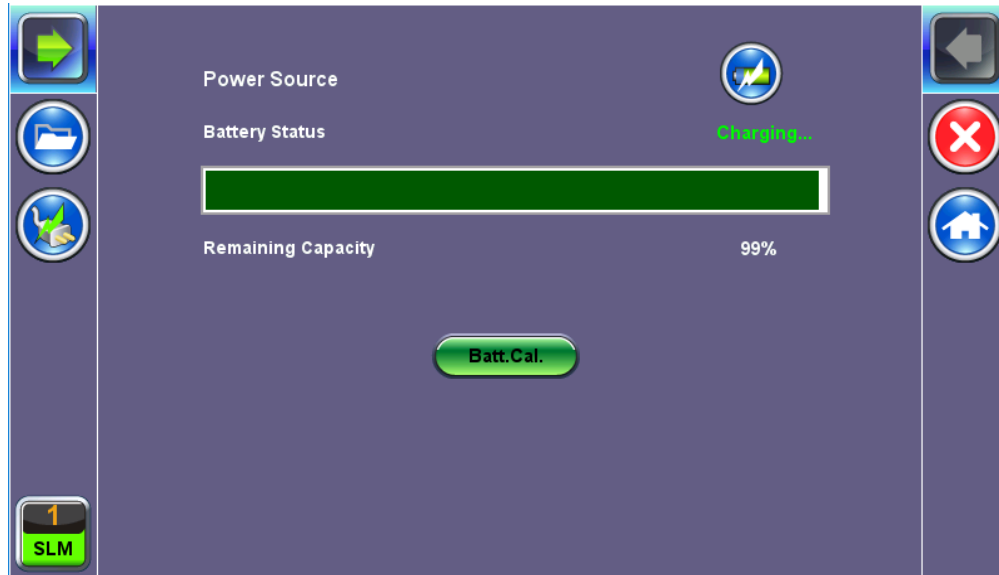


[Go back to top](#) [Go back to TOC](#)

8.2.4 Power

This section provides information about current power source and information about the battery gauge. Tap on the battery icon, on the top bar, to bring battery charge and estimated autonomy information.

Utility Settings - Battery Power



[Go back to top](#) [Go back to TOC](#)

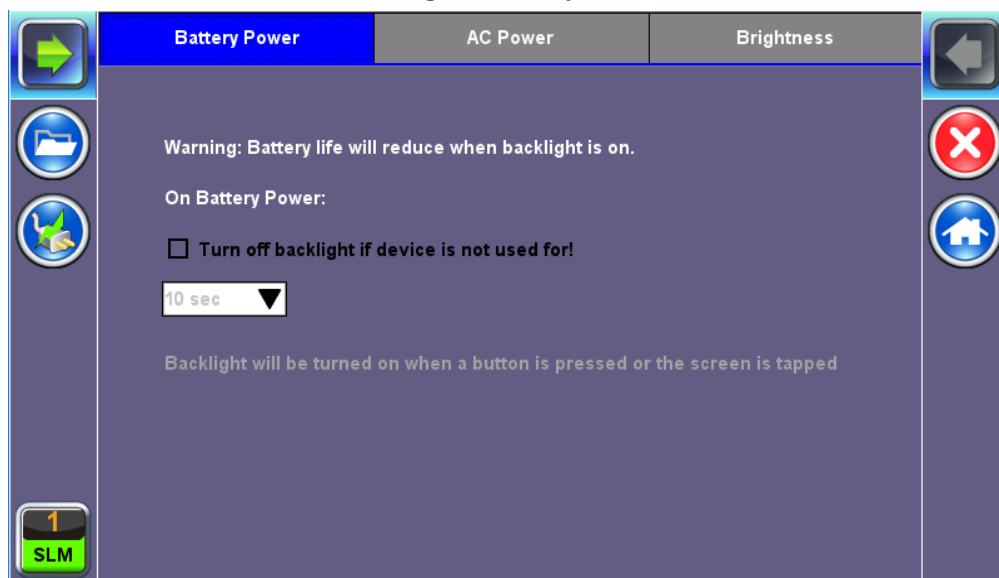
8.2.5 Backlight

This section provides backlight control of the unit.

Power: There are two settings -- one for Battery power and another for AC power.

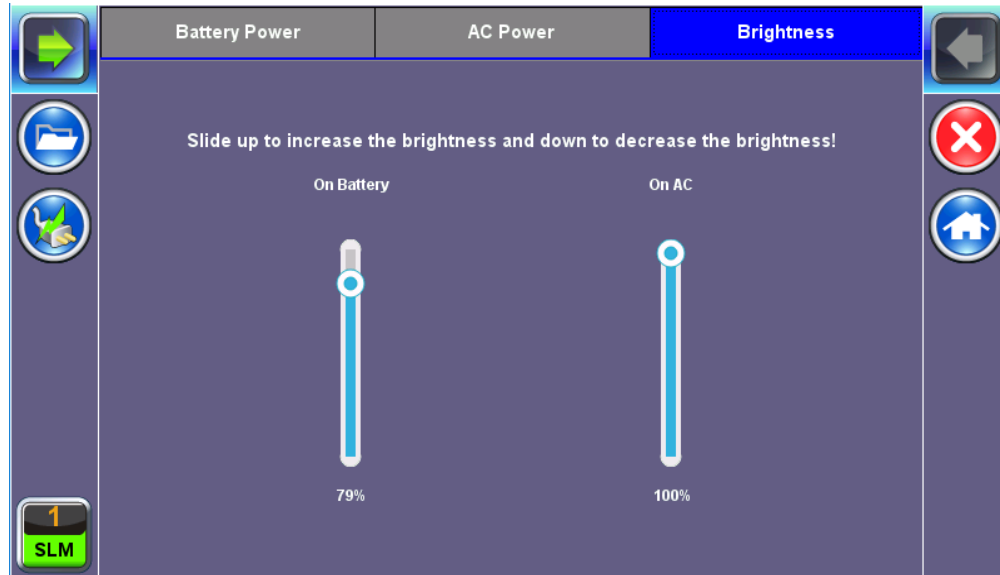
- The user has the option to select a timer to turn off the backlight if the unit is not in use. This function helps improve the battery autonomy and preserve LCD life
- To enable the timer, check "Turn off backlight if device is not used for" and with the drop-down menu, adjust the duration of the idle time before the backlight is turned off.
- Once the timer is active and the backlight turned off, any action on the test set (touch screen, keypad) will turn on the backlight again.

Backlight - Battery Power



Brightness: The user can select the brightness level for Battery and AC operation modes.

Backlight - Brightness



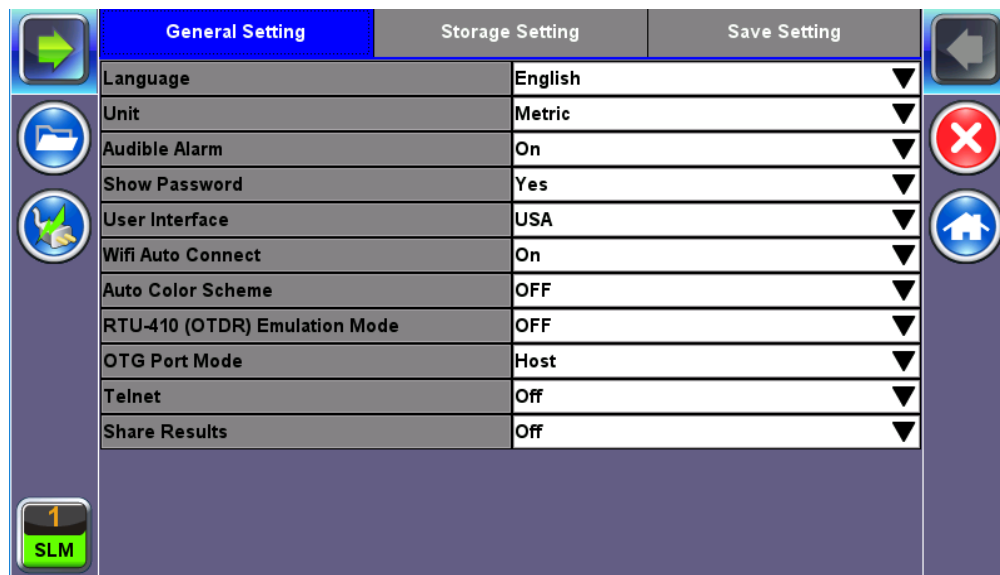
[Go back to top](#) [Go back to TOC](#)

8.2.6 Global Settings

General Setting

- **Language:** An alternative language for the user interface.
- **Units:** Measurement system (English - feet or Metric - meter).
- **Audible Alarm:** When enabled, the test set's buzzer will sound (beep) when alarms and errors are being detected.
- **Show Password:** Hides/unhides username and password information associated with FTP and related IP functions.
- **User Interface:** The USA user interface version presents SONET/DSn application-oriented menus, while the International setting is more open to all settings.

Utility Settings - General Setting



Storage Setting

- **File Name Prefix:** Tap on the box to enter the file name prefix using the pop up alphanumeric keypad.
- **Profile Deleting:** Auto Delete or Prompt User.
- **Profile Saving:** Auto Overwrite or Prompt User.
- **Result Saving:** Manual or Prompt User.
- **Advanced Saving:** On/Off. Allow users to add extra information to the results file to be uploaded to a centralized R300 Server. Requires Advanced Management Option.

Save Screen Settings

Save Screen tab: Helps control the behavior of the Lock key on the keypad. The Lock key can be set to do the following:

- **Lock/Unlock** the unit's screen to prevent accidental interruption during a long term test.
- **Save Screen Shots:** The following configurations can also be done:
 - The compression level of the screen picture.
 - Maximum number of screenshots that can be saved.

Each time user presses the lock key from the key pad a screen shot will be saved in memory. The screen shots can be recovered under Files > Saved.

[Go back to top](#) [Go back to TOC](#)

8.2.7 Date and Time

This screen allows the user to set the date and time. Daylight savings are automatically enabled in the utility.

Date Setup

Date & Time	
Date:	
Month	August
Date	29
Year	2017
Time:	
Hour	13
Minute	20
Second	27

Apply

[Go back to top](#) [Go back to TOC](#)

8.2.8 Remote Access

There are different ways to control or access the test set and the information it contains, from a local (LAN) or remote (WAN) connected PC:

- [ReVeal PC software](#)
- [VNC Client](#)

[Go back to top](#) [Go back to TOC](#)

ReVeal CX300

This VeEX application allows users to connect to the test set, using the platform's IP address. ReVeal intuitive user interface offers the following functions:

- Test Profiles Management: Create, Edit, upload and download complex Ethernet and Fibre Channel test profiles (BERT, Throughput, RFC2544, Y1564 SAM, Scan, IP, Ping/Trace, Packet Capture, etc)
- Test Results Management: Download results from the test set, manage local test results (PC HDD), generate detailed test reports, export to CSV or PDF, and print.
- View software options, licenses, serial numbers, perform remote software updates

ReVeal is a Windows® application that can be downloaded free of charge from www.veexinc.com.

Users are able to connect remotely from a desktop PC via ReVeal tool software or through Remote Access on the test set. To proceed with remote access, make sure that remote control software is installed on the PC device. The user is able to configure the Profile, VNC Server Service, Web Service, VNC and Web passwords on the Remote Access page. Input the test set IP

address and specified user password when prompted by the software to initiate Remote Access.

[Go back to top](#) [Go back to TOC](#)

Remote access with VNC Server/Viewer:

The test set VNC service can be managed in >Utilities >Settings >More >Remote Access menu, to enable or disable the VNC server and assign remote access passwords.

- **Super User Password:** Allows remote VNC clients to view and control the user interface via mouse
- **Regular User Password:** Allows remote VNC users (guests) to view what's currently on the test set screen, but no interactions with the GUI are allowed.

Although the test set VNC services allows multiple users to be connected simultaneously, it is a screen mirroring service, so all users would be seeing and interacting with the same GUI. Such feature can certainly be used for training purposes, but it is not recommended for multi-user or multi-test environments.

VNC clients, such as RealVNC®, are readily available for download for different platforms and form factors, including Windows®, Mac OS®, Linux, iOS, Android.

- **VNC Service:** Enable or disable the remote access to remote VNC clients running on PCs, Macs, tablets or smart phones.
- **VNC Super User Password:** Defines the password for users allowed to control the test set via standard VNC clients
- **VNC Regular User Password:** Defines the password given to users who are only allowed to view the test set current screen via standard VNC clients, but not make any changes to test or test set.

After configuring these settings in the Remote Access menu, run VNC on the PC. A message box will prompt the user to enter a Server number, which is the test set IP address. Enter the VNC Super/Regular password when prompted by the message box for a password.

Remote Access

Profile	Default
CLI Service	Enable
CLI Admin Password	admin
VNC Service	Enable
VNC Super User Password	
VNC Regular User Password	

1 SLM

Apply

VNC Viewer - Enter Server Address

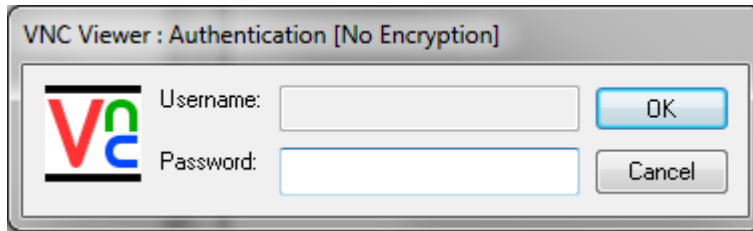
VNC Viewer : Connection Details

Server: 192.168.0.107

Encryption: Always Off

About... Options... OK Cancel

VNC Viewer - Password Prompt



[Go back to Remote Access](#)

[Go back to top](#) [Go back to TOC](#)

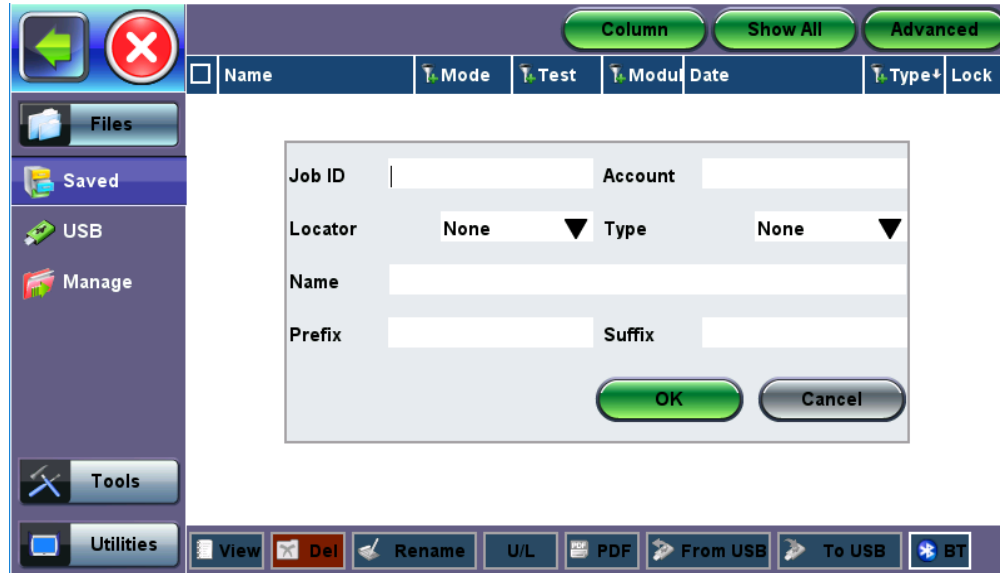
8.2.9 Help

The **Help** icon opens up the CX310 user manual. Use the scroll bars, table of contents, and hyperlinks to navigate the content.

[Go back to top](#) [Go back to TOC](#)

8.3 File Management

File Manager, Advanced



[Go back to top](#) [Go back to TOC](#)

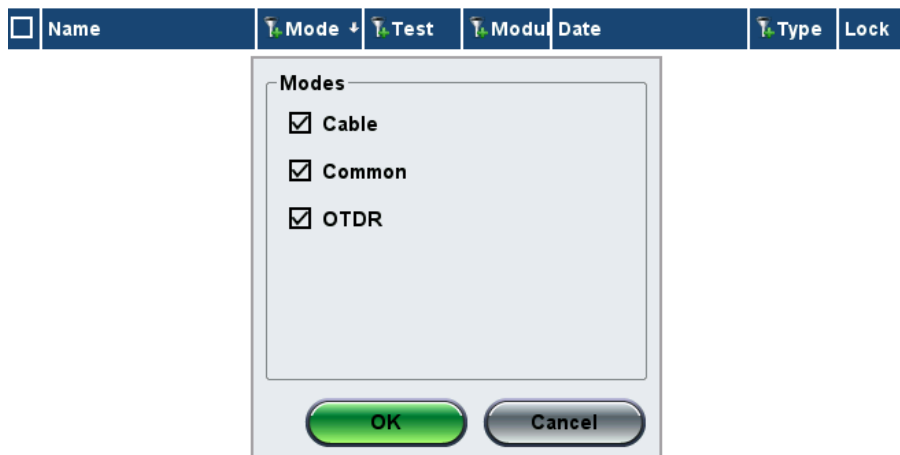
8.3.1 File Manager: Working with Saved Results, Profiles, Images

The Saved File Manager (**Files > Saved**) displays all results stored in the test set. Use the check box to select a file to view or edit.

Table Sorting

- Tap on any column header to sort the table in ascending or descending order by the column selected. Up and down arrow keys indicate that the table is sorted in ascending and descending order respectively.
- Tap on the filter icon in the heading to filter for specific test results stored on the unit
- **Column**: Hides/shows selected columns
- **Show All**: Shows all columns
- **Advanced**: Search for a specific file using advanced search terms

Filtering the Mode Header



Viewing and Managing Files

Selected files can be managed in the following ways:

Files can be viewed (**View**), deleted (**Del**), renamed (**Rename**)

- **U/L**: locks and unlocks files to prevent accidental deletion.
- **PDF**: Converts all selected files to PDF format
 - Requires FAT32 USB Memory stick
- Backup and Restore (USB Memory stick):
 - **To USB** copies all selected files to stick
 - **From USB** restores all files from the stick
- **BT** (Bluetooth®) File Transfer
 - Requires compatible USB dongle

[Go back to top](#) [Go back to TOC](#)

8.3.2 USB Memory Browser

The USB tool can be found in the Utilities section, under Files > USB.

It provides users with basic memory stick management tools to browse and interact with content without the need of a PC:

- **Reload:** Refreshes the USB stick info
- **Delete:** Erases the selected files or folders
- **Up:** Exits the current folder and moves up to a higher folder in the file tree hierarchy. The current folder structure is shown in the top bar
- **Open:** Opens certain file types

Use the USG cable Micro USB adapter to connect to the USB memory stick.

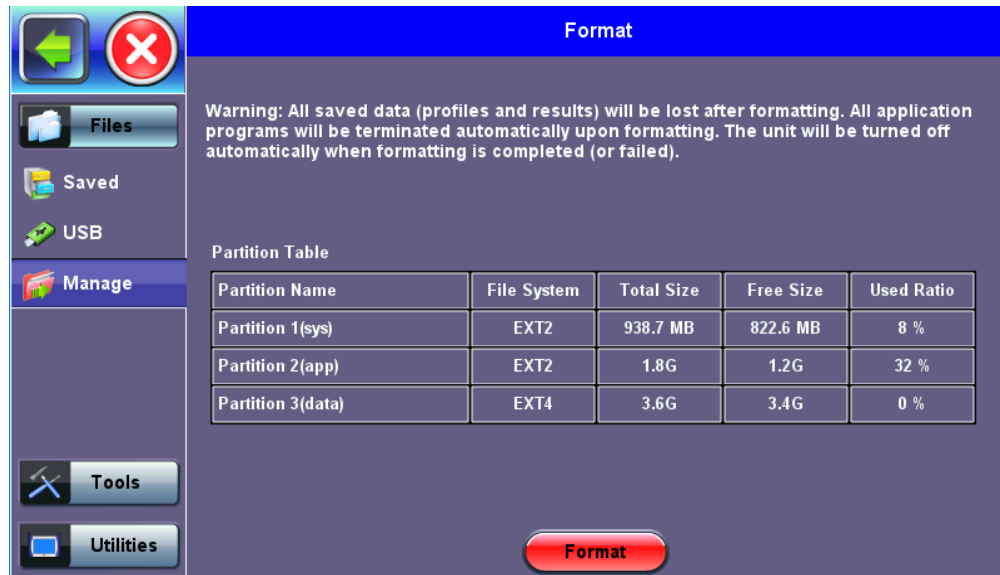
The following file types are supported:

- **HTML:** Launches the browser to display its content
- **TXT:** Launches a basic text viewer to display its content
- **PCAP:** Launches the built-in Wireshark® protocol analyzer
- **MTIE:** Launches the optional built-in Wander Analysis tool

[Go back to TOC](#)

8.3.3 Manage SD Card

Internal SD Card Format



The Files > Manage tool under utilities provides SD card's partition capacity information.

All the user information, such as test results, profiles, screenshots, protocol capture, etc., are stored in the Data partition (3). Use the > Files > Saved > To USB backup utility or Delete function if the Data partition is nearly full.

The Format function is exclusively a maintenance tool. Use ONLY when instructed by a VeEX Customer Care representative. It erases all the information stored in the test set.

Notes:

- The internal 2GB SD Card contains the System OS, all the Test Applications (Apps) and user's data
- Only the Data partition is accessible to users, through the test set's functions
- Do not remove or reformat the SD Card outside of the test set

[Go back to TOC](#)

9.0 ReVeal Software

For more information on using the ReVeal CX300 software, refer to the user manual on the [VeEX website](#).

[Go back to top](#) [Go back to TOC](#)

10.0 Warranty and Software

Warranty Period: The warranty period for hardware, software and firmware is three (3) years from the date of shipment to the customer. The warranty period for battery pack, LCD, LCD touch panel, LCD protective cover, and accessories (including, but not limited to patch cords, AC adaptor, SFP, USB adaptors, carrying case, carrying pouch) is limited to one (1) year.

Hardware Coverage: VeEX Inc. warrants hardware products against defects in materials and workmanship. During the warranty period, VeEX Inc. will, at its sole discretion, either

- Repair the products
- Replace hardware which prove to be defective

provided that the products that the customer elects to replace are returned to VeEX Inc. by the customer, along with Proof of Purchase, within thirty (30) days of the request by the customer, freight prepaid.

Software Coverage: VeEX Inc. warrants software and firmware materials against defects in materials and workmanship. During the warranty period, VeEX Inc. will, at its sole discretion, either

- Repair the products
- Replace software and/or firmware which prove to be defective

provided that the products that the customer elects to replace are returned to VeEX Inc. by the customer, along with proof of purchase, within thirty (30) days of the request by the customer, freight prepaid.

Additionally, during the warranty period, VeEX Inc. will provide, without charge to the customer, all fixes, patches and enhancements to the purchased software, firmware and software options. VeEX Inc. does not warrant that all software or firmware defects will be corrected. New enhancements attached to a software option require the option to be purchased (at the time of order or the time of upgrade) in order to benefit from such enhancements.

Limitations: The warranty is only for the benefit of the customer and not for the benefit of any subsequent purchaser or licensee of any merchandise (hardware, software, firmware and/or accessories).

Revoking the warranty: VeEX Inc. does not guarantee or warrant that the operation of the hardware, software or firmware will be uninterrupted or error-free. The warranty will not apply in any of the following cases:

- Improper or inadequate maintenance by the customer
- Damage due to software installed by the customer on the unit without prior authorization (written) from VeEX Inc.
- Unauthorized alteration or misuse
- Damage occurred from operating the unit outside of the environmental specifications for the product
- Improper installation by the customer

[Go back to top](#) [Go back to TOC](#)

11.0 Product Specifications

The most recent product specifications can be downloaded [here](#) from the VeEX website.

[Go back to top](#) [Go back to TOC](#)

12.0 Certifications and Declarations



Declaration of Conformity

What is CE?

The CE marking is a mandatory European marking for certain product groups to indicate conformity with the essential health and safety requirements set out in European Directives. To permit the use of a CE mark on a product, proof that the item meets the relevant requirements must be documented.

Use of this logo implies that the the unit conforms to requirements of European Union and European Free Trade Association (EFTA). EN61010-1

[Click here for CE Declaration of Conformity relating to VeEX products](#)



ROHS Statement

What is RoHS?

RoHS is the acronym for Restriction of Hazardous Substances. Also known as Directive 2002/95/EC, it originated in the European Union and restricts the use of specific hazardous materials found in electrical and electronic products. All applicable products imported into the EU market after **July 1, 2006** must pass RoHS compliance.

[Click here](#) for ROHS Statement relating to VeEX products

[Go back to top](#) [Go back to TOC](#)

13.0 About VeEX

VeEX, Inc., the Verification EXperts, is an innovative designer and manufacturer of test and measurement solutions addressing numerous technologies. Global presence through a worldwide distribution channel provides uncompromised product support.

Visit us online at www.veexinc.com for latest updates and additional documentation.

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[Go back to top](#) [Go back to TOC](#)