Quick Card

CT-X Setup Guide

This 10-step guide will show how to program the CT-X and set the 4 possible tagging frequencies in the guard band of the QAM carrier or in the exclusion zone of a OFDM carrier.
NOTE: If Tag levels are set too low then leaks may not be recorded by the Leakage receiver.

Prerequisite

Please Review CT-X Getting Started Guide

System Requirements

CT-X
10/100 BaseT Ethernet connection with static IP or DHCP
ONX-620/630

Step 1
Decide what frequencies, up to 4, to be used for leakage detection / monitoring

- Spread leakage monitoring across the frequency spectrum of your network to provide the best coverage, keeping in mind sensitive channels to off-air interference
- Up to 4 tag Frequencies from 130 MHz to 2018 MHZ
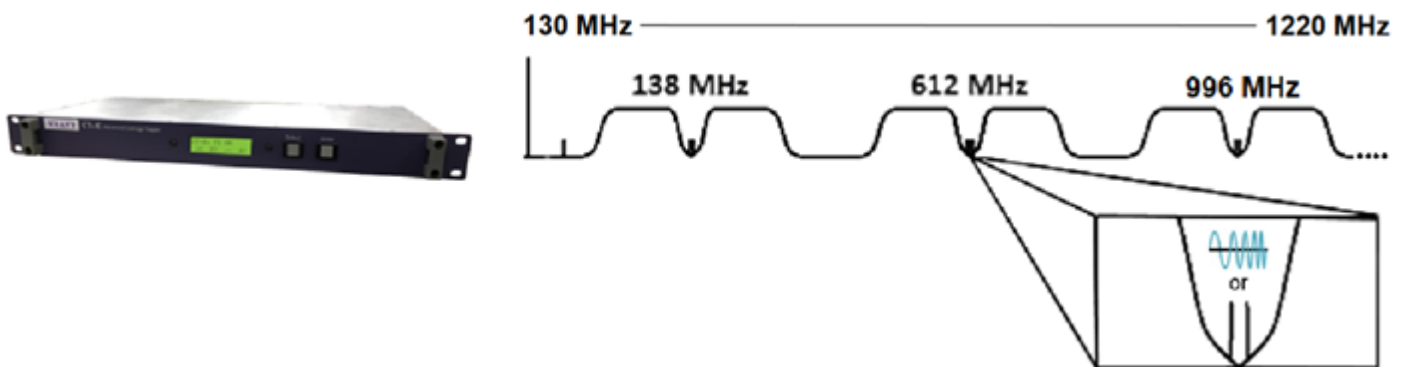- They can be set for Chirp or Dual CW's
- See Figure 1

Figure 1: Tag Frequency Placement

Step 2
Decide what types of leakage carriers to be used
- Dual CW's – Carriers can be detected by Seeker D or Seeker X
- o Good – noise discrimination and sensitivity are good with the Seeker D, even better with the Seeker X using the same inserted signals
- Chirp – Carriers can be detected by Seeker X only
- o Best in the business for meter sensitivity and noise discrimination inserting a very robust tag signal
- OFDM – Carriers can be detected by Seeker X only - Meter setup only (CT-X not required)
- o Better – excellent sensitivity and noise discrimination using full strength carriers

Note: In an all-digital plant these days typically 138 MHz is used for FCC rules compliance.

Step 3
Off-Air survey to avoid interference to leakage detection
- Connect an OneExpert or spectrum analyzer to the antenna feed intended for the Seeker meter in the vehicle
- Adjust the analyzer to view spectrum of interest and visually inspect the off-air noise level.

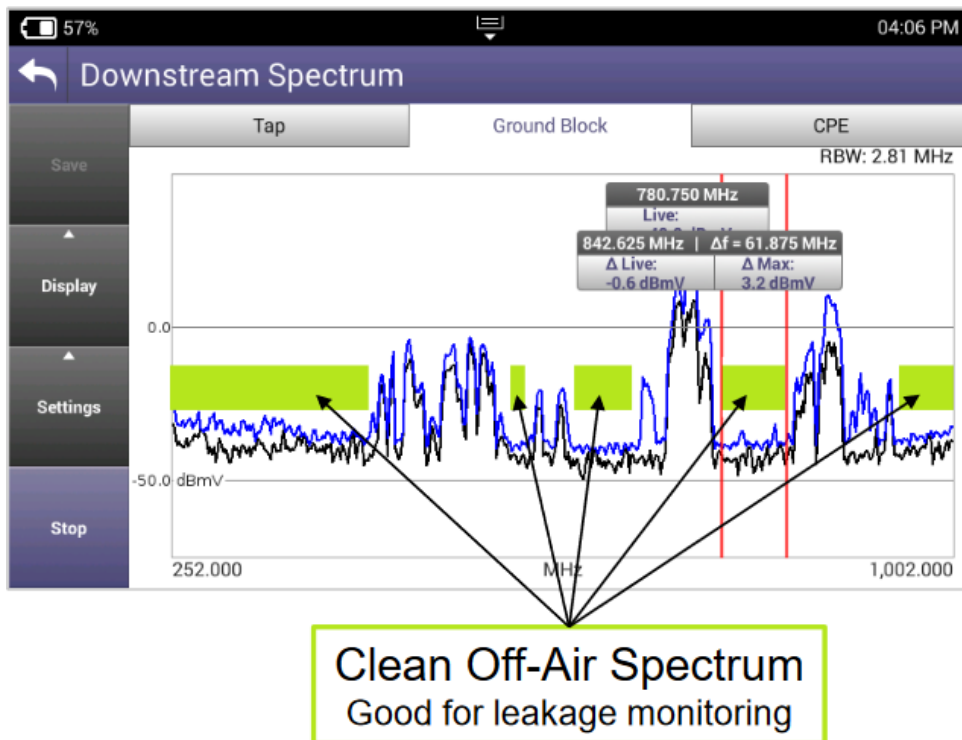- Looking for low noise, quite spaces in the spectrum void of off-air carriers.
- o See figure 2

Figure 2: Downstream off air carriers

Step 4 and 5
Installation

- Close to the combining network for CT-X RF output to combine with the Modulator RF out to the plant
- Connect the OneExpert meter to a drop to measure QAM's on either side of the selected leakage frequencies.
- See figure 3 ,4 ,5

Front View

1. **Display screen** – Displays the setup and operational status. Most of the setup can be adjusted here using the front panel.

2. **Select** – Scrolls through the main menus, scrolls through the options in the submenus, and adjusts settings.

3. **Enter** – Enters the menus/submenus and selects options to adjust settings

Figure 3: CT-X Front Panel

Back View

1. **RF output**

2. **Ethernet** – Used to remotely configure the unit and update firmware through your network

3. **SFP** – SFP optical port

4. **AC power input**

Figure 4: CT-X Back Pane
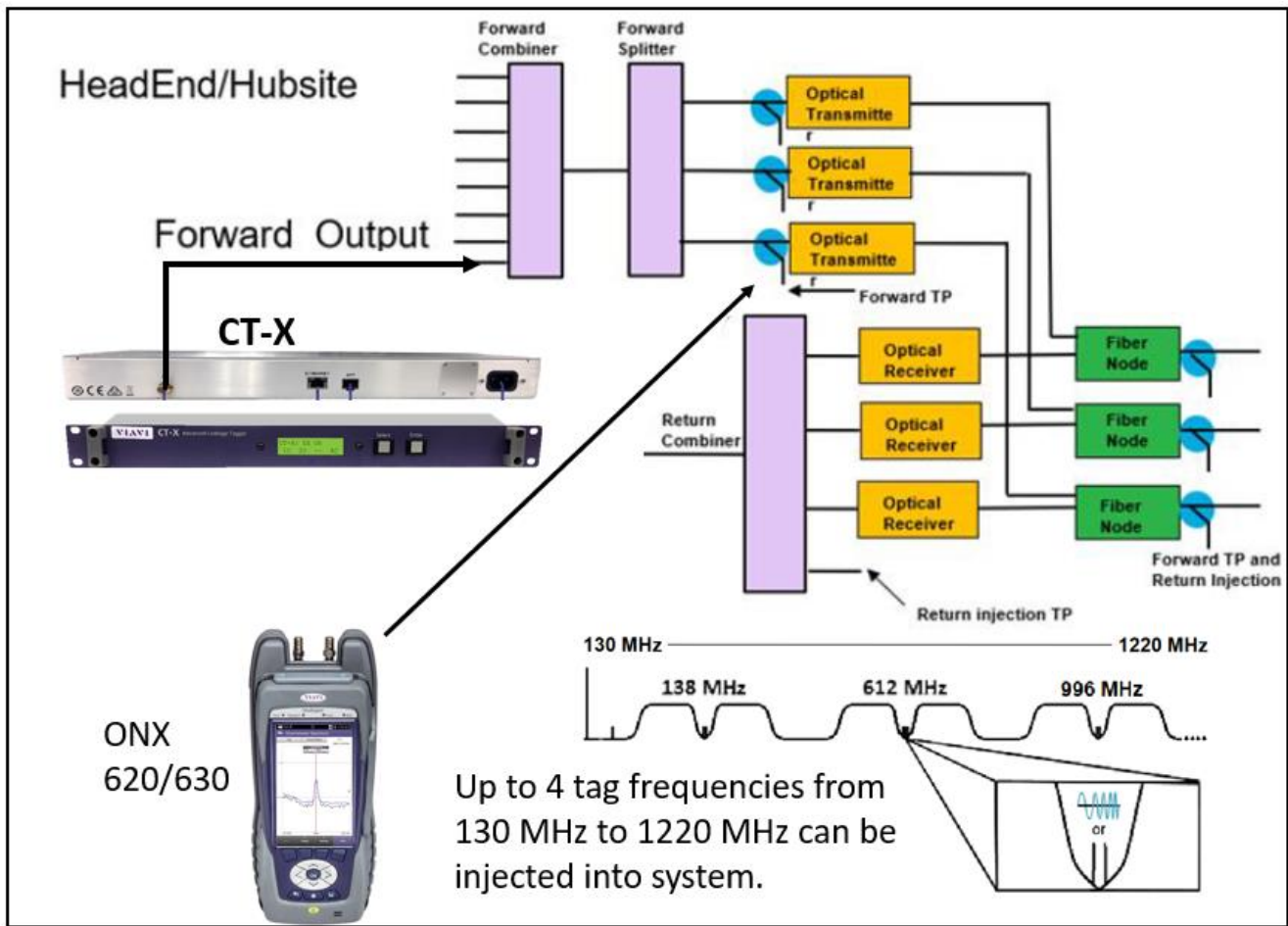
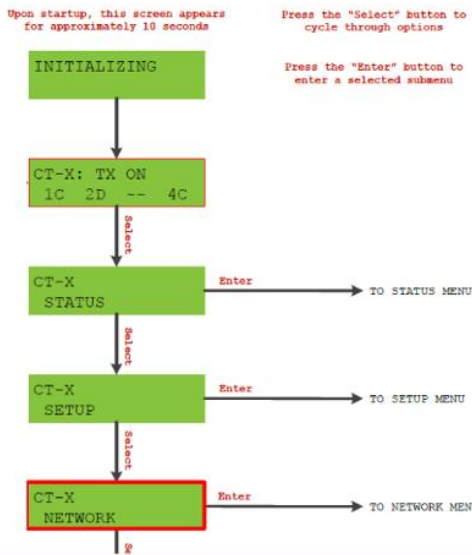*Figure 5: CT-X placement in Headend*

Step 6
Log into CT-X over ethernet

- From the CT-X interface, go into network settings to obtain the IP address
- See figure 6

- In a web browser, enter the IP address of the CT-X to access the web portal of the CT-X
- See figure 7

Obtaining IP Address of the CT-X

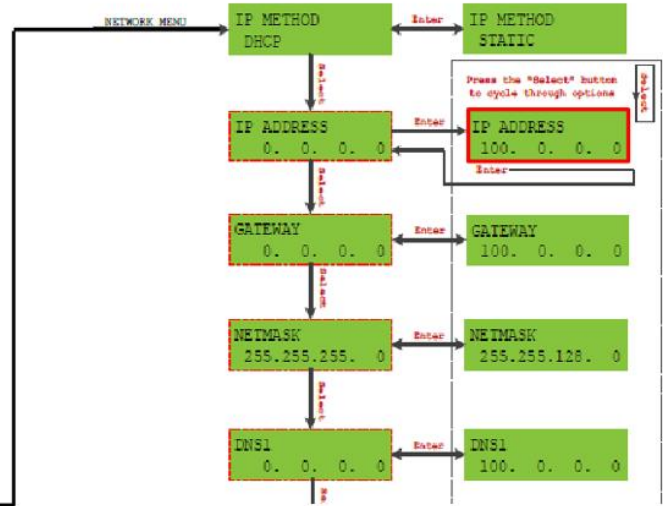Follow the menu path below to obtain the CT-X's IP address used for remote programming.

Figure 6: CT-X IP

Figure 7: Logging into CT-X

Step 7
Setting Tag types, Frequencies and Level

1. Set Ouput
2. Set the Chip Tag 1 to 4 typical is 2
3. Set Dual CW tag for 1 to 8 typical is 2
4. Set dBmV
5. Enable Signal 1 to 4
6. Set the type for tag for each frequency dual or chirp.
7. Set Output level (This may change when setting up for proper levels)
8. Frequency (Typically in Guard band of QAM or Exclusion Zone of OFDM)
9. Put CT-X in Setup mode to properly measure and adjust the RF output levels
10. Press and save the Save to CT-X button
    See Figure 8 for visual
    Note: if any changes occur then user must save to CT-X for changes to take affect
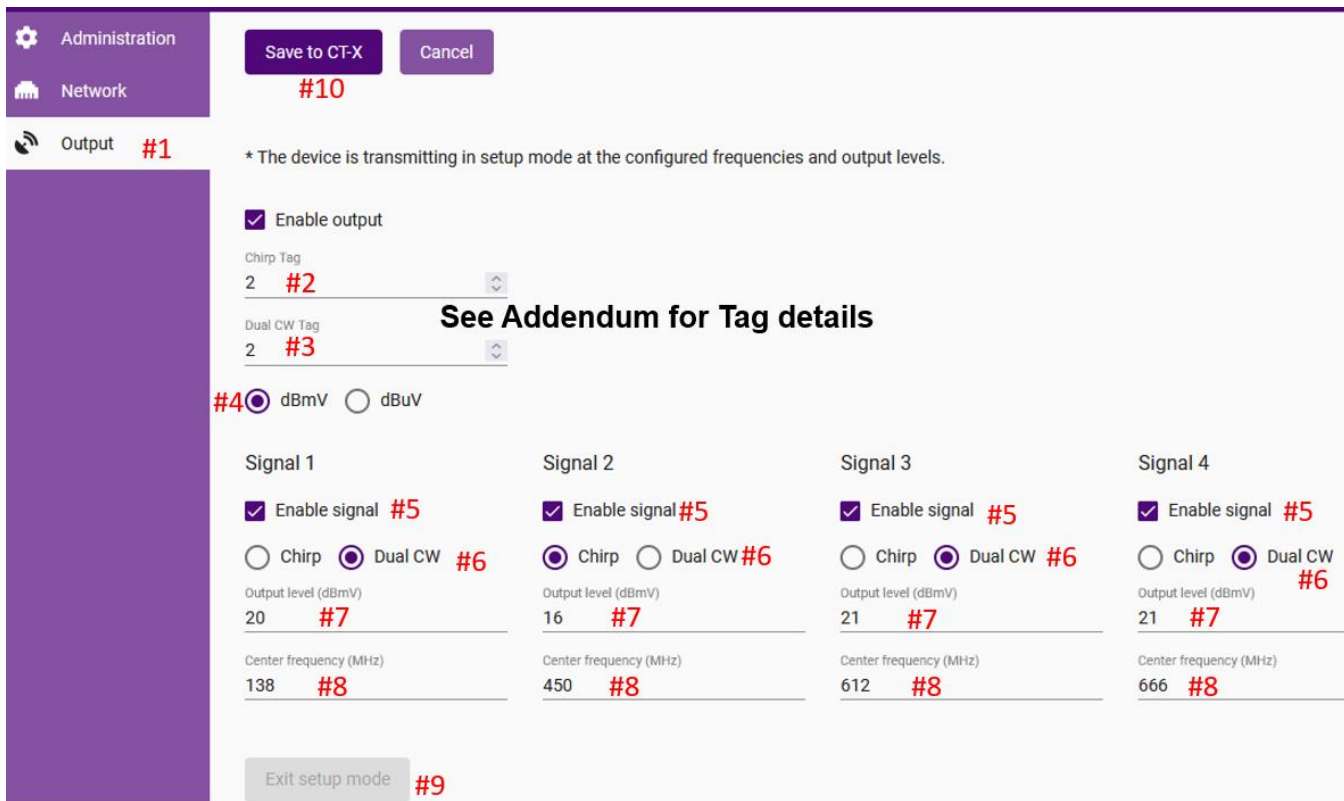
Figure 8: Setting the tagging frequencies and type of tag

Step 8
Using the ONX to set the proper tag Level

Measure adjacent QAM Channels to 612 MHz and 138 MHz
•Ch. 88 or 89, and 16 or 17 respectively

•Log channel power levels for each
•Measure the peak value of the dual CW's combined (Not in Low-Res mode)
•612 MHz and 138 MHz

•Log peak value of both frequencies

Connect signal to port 1 of the ONX

CATV Home Screen
select
"Channel Check"

Figure 9: Channel Check

Channel Check Setup
select

"Start"
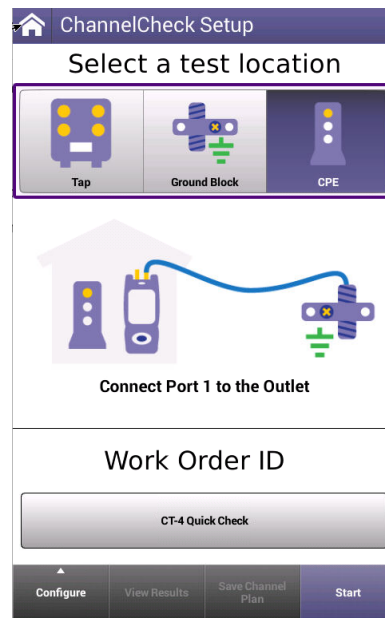
Figure 10: Channel Check Start

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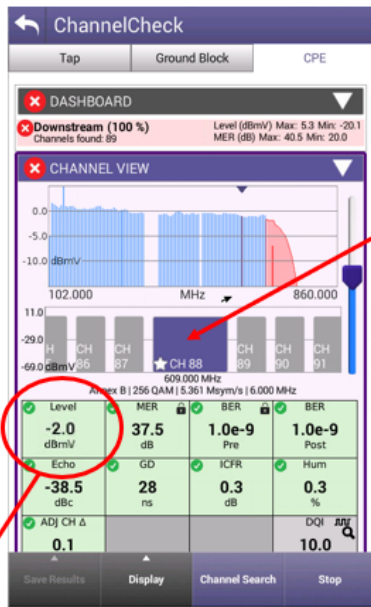ONX builds channel plan and provides measurement for all channels in the plan
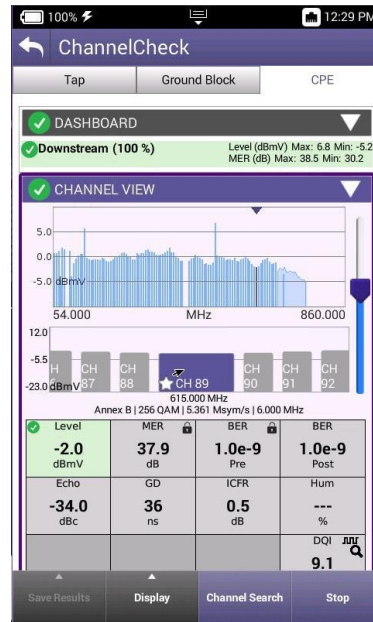
Figure 11: Channel Check Start

Note the Power Level of the selected Channels

Channel 88
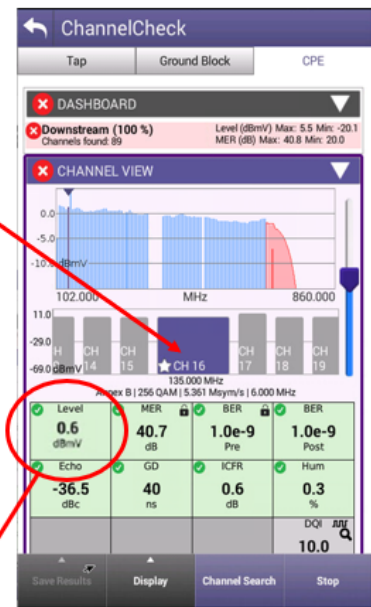
-2.0 dBmV − 30dB = -28 dBmV

Channel 16

0.6 dBmV − 30dB = -29.4 dBmV

This will be the target level of the CW tag frequency to be measured on the ONX meter in the spectrum mode
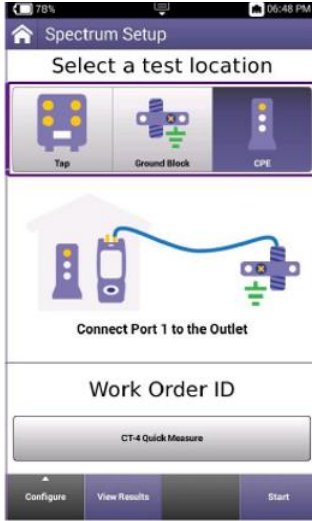
Note: If Type Chirp tag then the tag level would be 6 dB higher
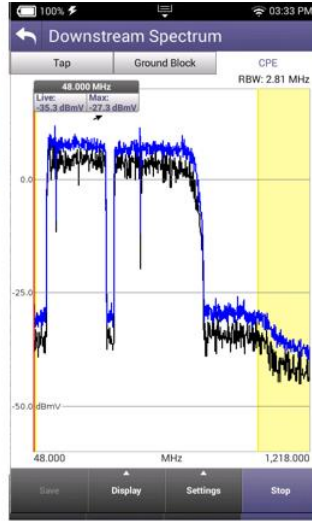
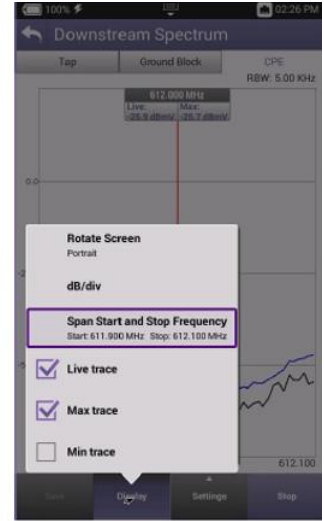# Downstream Spectrum Setup (612 MHz)

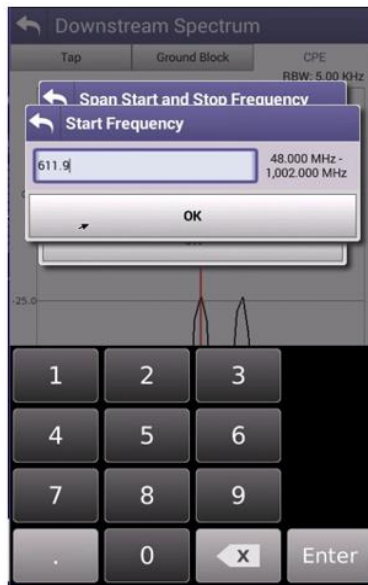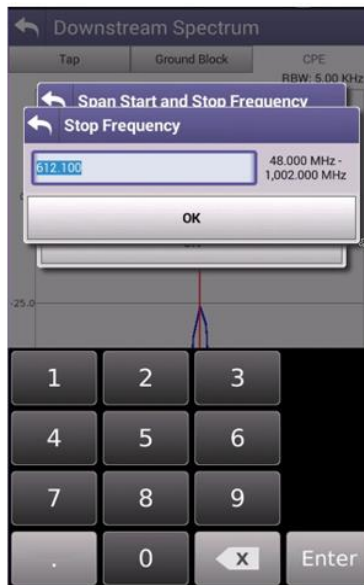| CATV Home Screen select **"Spectrum"**	Spectrum Setup select **"Start"**	Spectrum select **"Display"**	Enter **Start** and **Stop** Frequencies
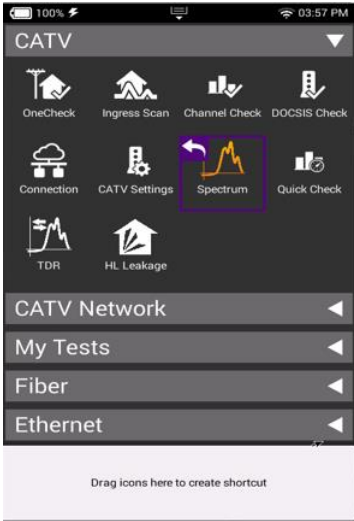
Downstream Spectrum Setup (612 MHz) Continued

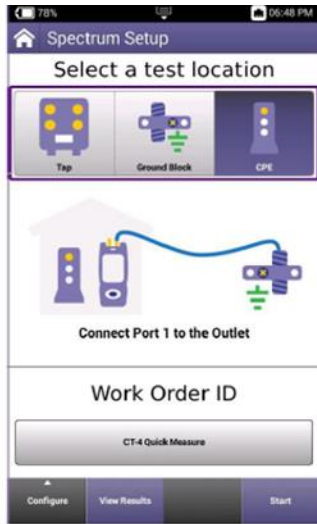| Enter Start Freq 611.9 MHz	Enter Stop Freq 612.1 MHz	Move Marker to Peak Level

Downstream Spectrum Setup (138 MHz)

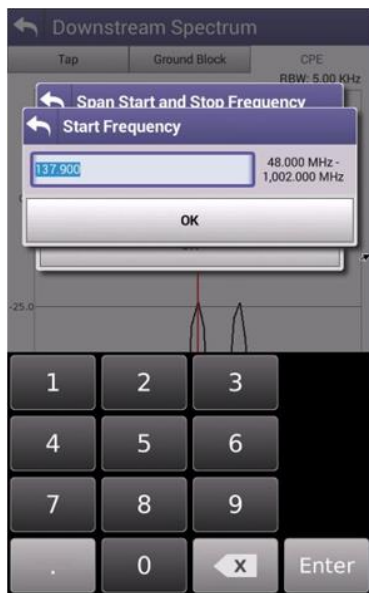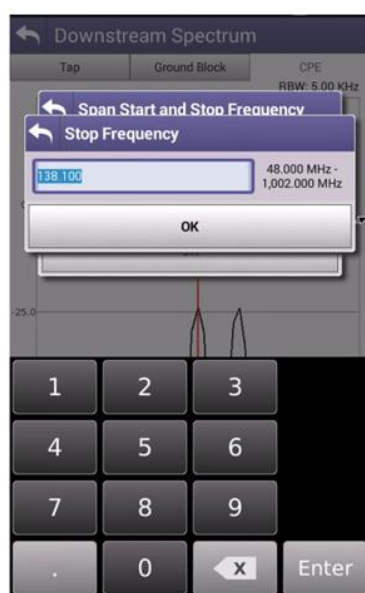| CATV Home Screen select **"Spectrum"**	Spectrum Setup select **"Start"**	Spectrum select **"Display"**	Enter **Start** and **Stop** Frequencies
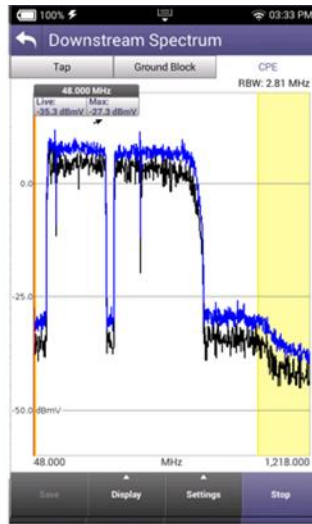
Downstream Spectrum Setup (138 MHz) Continued

Enter Start Freq 137.9 MHz	Enter Stop Freq 138.1 MHz	Move Marker to Peak Level
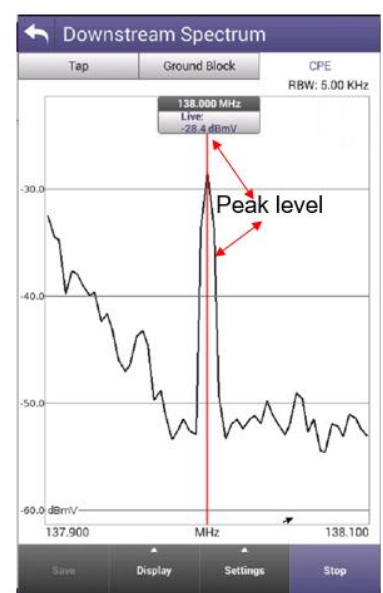
Step 9
Return CT-X to normal setting.

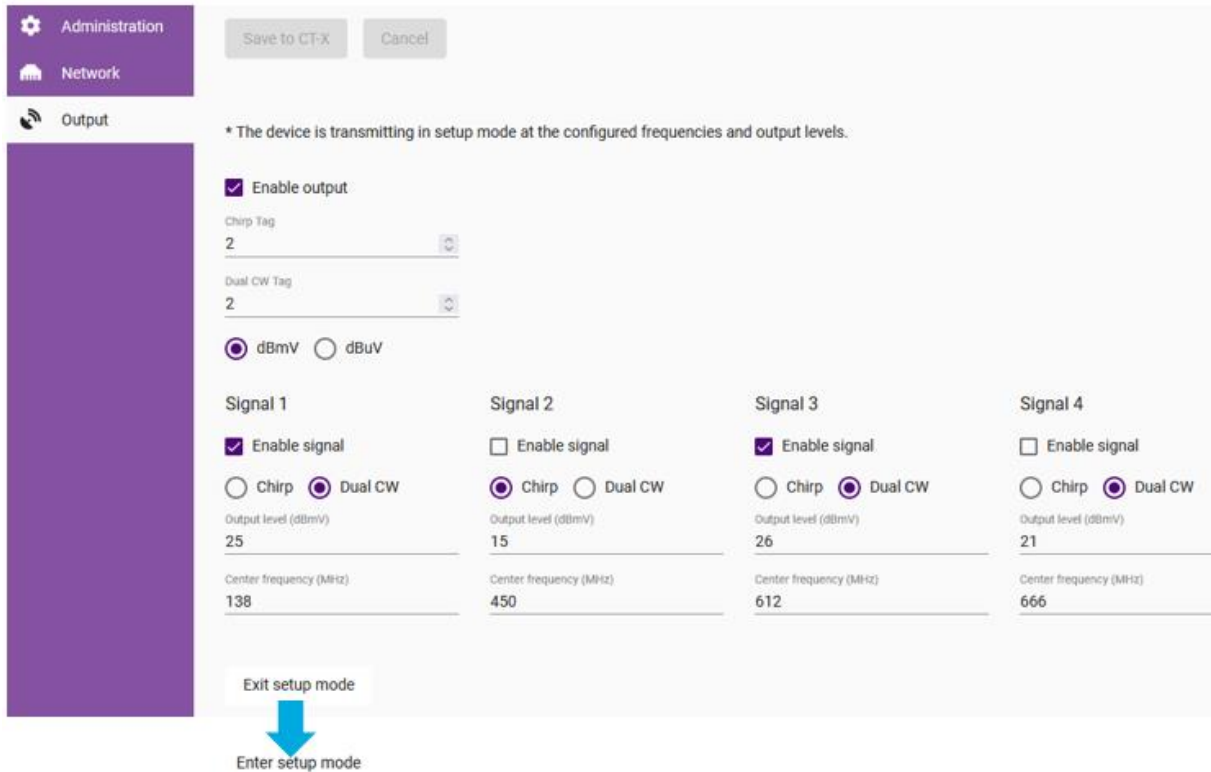Press the Exit setup mode for normal operation

See figure 12

Figure 12: Exit Setup

Step 10
Test the system

Note: If levels are off by 6dB too low, then leakage readings will be cut by ½.

Example:
A 20 microvolt leak would be only 10 microvolts.

Addendum

Tag information

Dual CW Settings
When the Signal Type is set to Dual CW, the Tag dropdown allows for the selection of spacing between the two carriers of the Dual CW tag. The Seeker X supports the following tag spacings
1 – Sets the spacing to 156.25 Hz
2 – Sets the spacing to 625 Hz
3 – Sets the spacing to 312.5 Hz
4 – Sets the spacing to 468.75 Hz
5 – Sets the spacing to 781.25 Hz
6 – Sets the spacing to 937.5 Hz
7 – Sets the spacing to 1093.75 Hz
8 – Sets the spacing to 1250 Hz

Chirp Settings
Chirp is a Digital Spread Spectrum technology that is designed to provide the following improvements over traditional dual CW leakage tags

- Robust tag identification to minimize false detection
- Increased immunity to high levels of off-air interference/noise of up to 30 dB over Dual CW leakage tags
- Increased sensitivity of 6 dB over Dual CW leakage tags

VIAVI provides four distinct patterns to allow unique signatures in the case of adjacent providers using the same VIAVI technology and tagging.
1 – Chirp Type 1
2 – Chirp Type 2
3 – Chirp Type 3
4 – Chirp Type 4