Demo Guide for RF Editor

920-RF-EDIT-DEMO

A Bird Technologies Company

Introduction

RF Editor is a drag and drop graphical spectrum editing tool that allows easy modification of I&Q signals of any length. It also provides the ability to combine spectrum files in the time and frequency domains to create custom spectrum specifically suited to an application. This demo guide present exercises that illustrate numerous RF Editor functions in a self-guided format. To take best advantage of this guide, readers should familiarize themselves with the operation of Spectro-X; a spectrum visualization and analysis software tool that can be downloaded from the X-COM website (www.xcomsystems.com). Also available on the web site is a demo guide for Spectro-X.

RF Editor provides a broad range of frequency domain modifications, and can specify the relative time position of each spectrum segment that will be combined in to a new, single spectrum file. Ten tracks are available for time domain positioning, working in a manner directly analogous to audio and video editing tools. This allows a precise selection of the start and stop time of each waveform segment. Also, it displays how they overlap and combine in the frequency domain. The duration of recorded data can be shortened or lengthened; segments can be concatenated, filtered and shifted in frequency.

Once all waveform segments are placed in the time domain, a new composite waveform file can be built, named and stored with a single mouse click. Transferring the files to Spectro-X for viewing and analysis is as simple as selecting the waveform in the RF Editor library and clicking a radio button in the intuitive graphical user interface.

RF Editor's Advanced Modify functionality allows single editing operations to be grouped and performed simultaneously. With this feature, functions that shift frequency, perform file decimation or interpolation by any integer value, apply a filter with a bandwidth as narrow as 10% of the signal span and add attenuation or gain can be combined. A single mouse click then applies these functions to either an individual spectrum file or a group of them.

Autoscaling of files in a group is also available. This is extremely useful when the file will be used to drive a vector signal generator and one wishes to maximize the VSG's DAC dynamic range.

An additional feature explored in this demo guide is the application of a linear amplitude ramp to the beginning or end of a spectrum file. This feature can be extended in application to minimize the frequency domain impact of what would otherwise be abrupt time domain transitions where segments are concentrated as a way of extending their time duration.

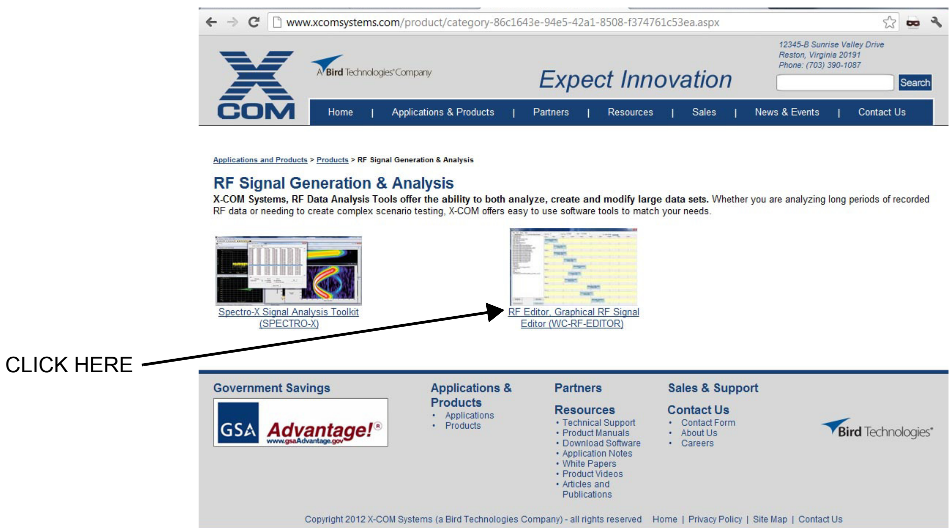
Table of Contents

Installing the Demo

Downloading the Demo from the Internet

1. In an internet browser, go to:
   www.xcomsystems.com
2. Go to Applications & Products > Products > RF Signal Generation & Analysis.
3. Click on the RF Editor, Graphical RF Signal Editor (WC-RF-EDITOR).

Figure 1 RF Signal Generation & Analysis Webpage



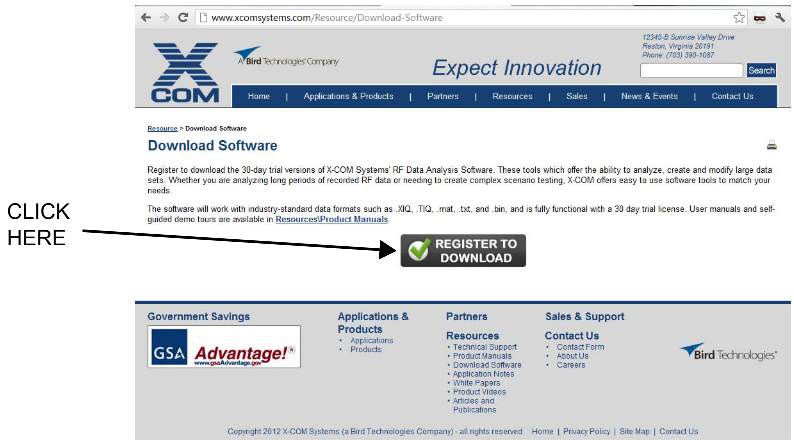
4. On the RF Editor webpage, go to the Downloads section on the right side of the page and click on Download RF Editor.

   Note: *Registration will be required to download RF Editor.*

Figure 2 RF Editor Product Webpage

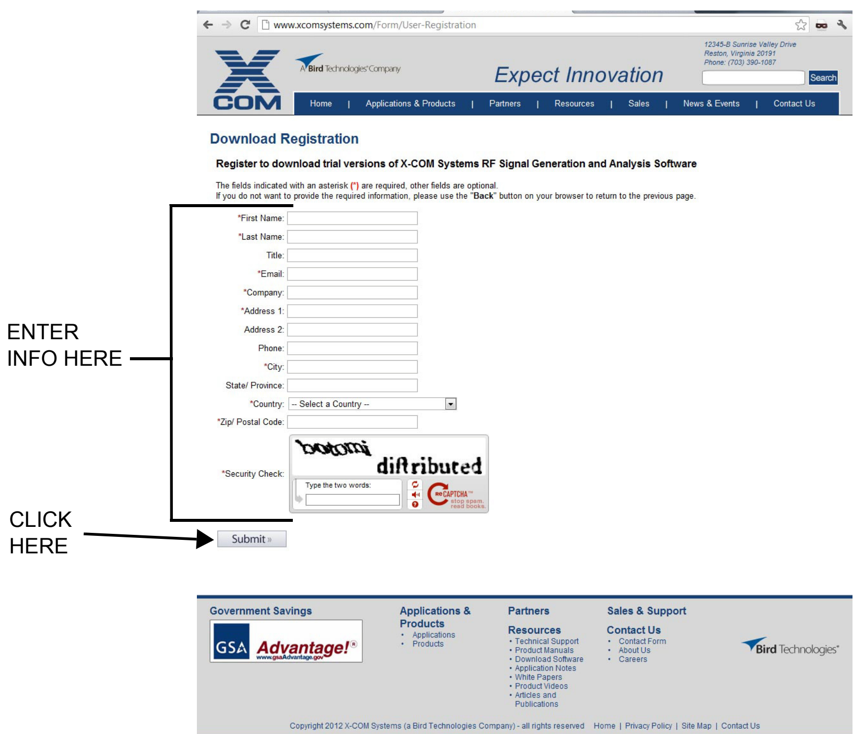
5. On the Download Software webpage, click on Register to Download.

Figure 3 Download Software Webpage



6. On the Download Registration webpage, fill out the form and click Submit.

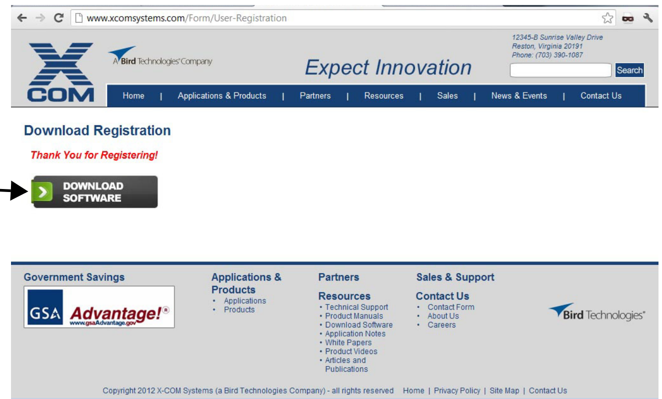
Figure 4 Download Registration Webpage



7. Once the form has been submitted, on the Registration Complete webpage, click on Download Software.

Figure 5 Registration Complete Webpage

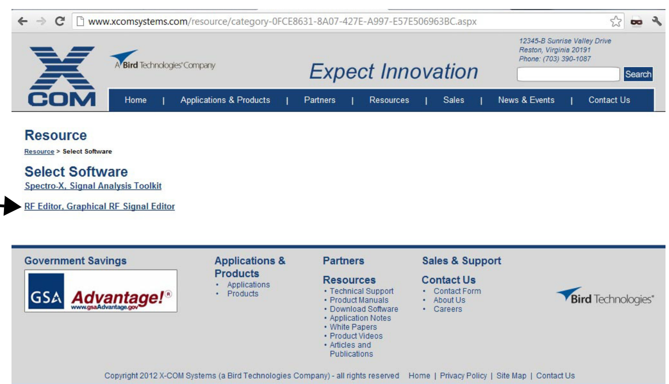
CLICK HERE



8. On the Resource webpage, click on RF Editor, Graphical RF Signal Editor.

Figure 6 Resource Webpage

CLICK HERE



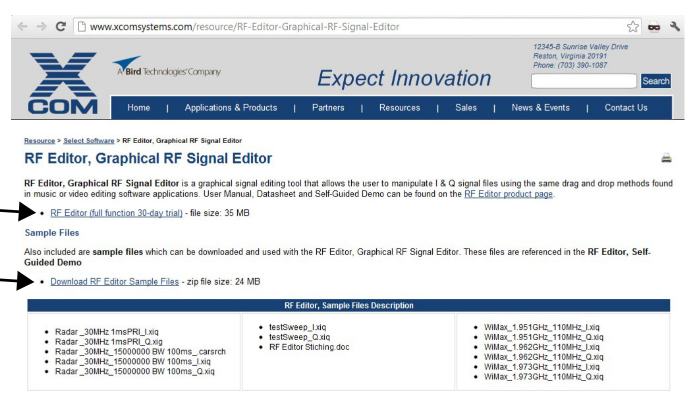
9. On the RF Editor, Graphical RF Signal Editor webpage select RF Editor (full function 30-day trial).
10. Follow the instructions for download.
11. Once the program has been downloaded, click on Download RF Editor Sample Files.
12. Follow the instruction for download.

> **Note:** *The files will be stored in: C:\Libraries\Documents\X-Com\RF Editor\Sample Files.*

Figure 7 RF Editor, Graphical RF Signal Editor Download Webpage

CLICK HERE

CLICK HERE



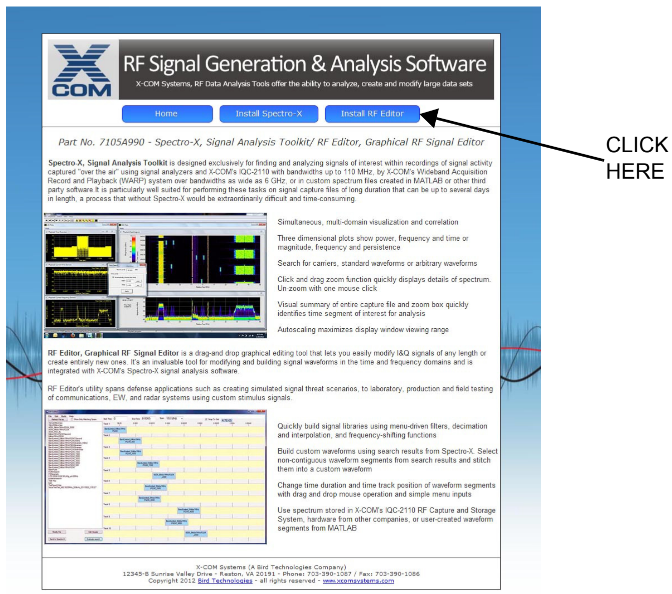
Loading the Demo from the CD

1. Insert the CD into the CD drive of the computer.

    Note: *The CD will automatically launch the install program.*

2. Click on the Install RF Editor at the top of the screen.

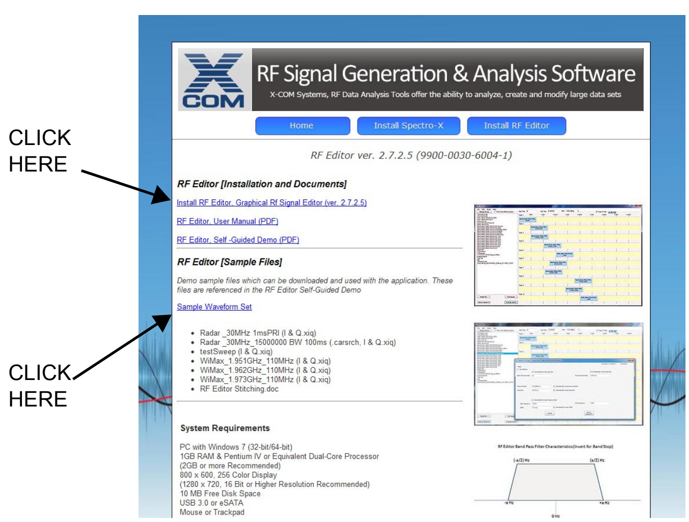
Figure 8 CD Launch Screen



3. Click on Install RF Editor, Graphical RF Signal Editor.
4. Follow the instructions to install the program and demo files.
5. Click on Sample Waveform Set.
6. Follow the instructions to install the program and demo files.

    Note: *The files will be stored in: C:\Libraries\Documents\X-Com\RF Editor\Sample Files.*

Figure 9 RF Editor Screen

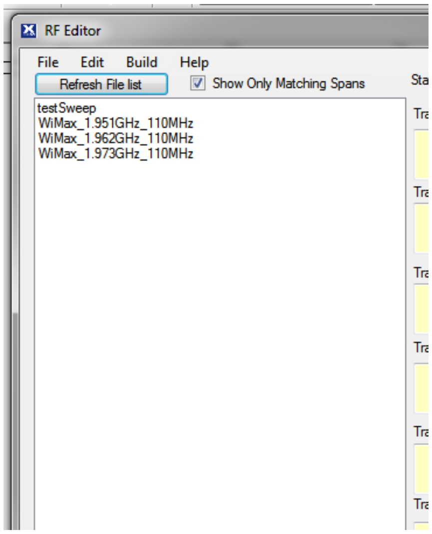


Locating Files

Waveform Library

RF Editor files consist of an I/Q pair with file names ending _I.xiq and _Q.xiq respectively. Typically, RF Editor looks for the C:\IQCFiles directory upon installation. If that directory cannot be found then it defaults to the root directory. The files list shows all data files with matching I/Q pairs in the default directory with a matching span or sample rate equivalent to the Span selected in the Span drop box.

Figure 10 Waveform Library



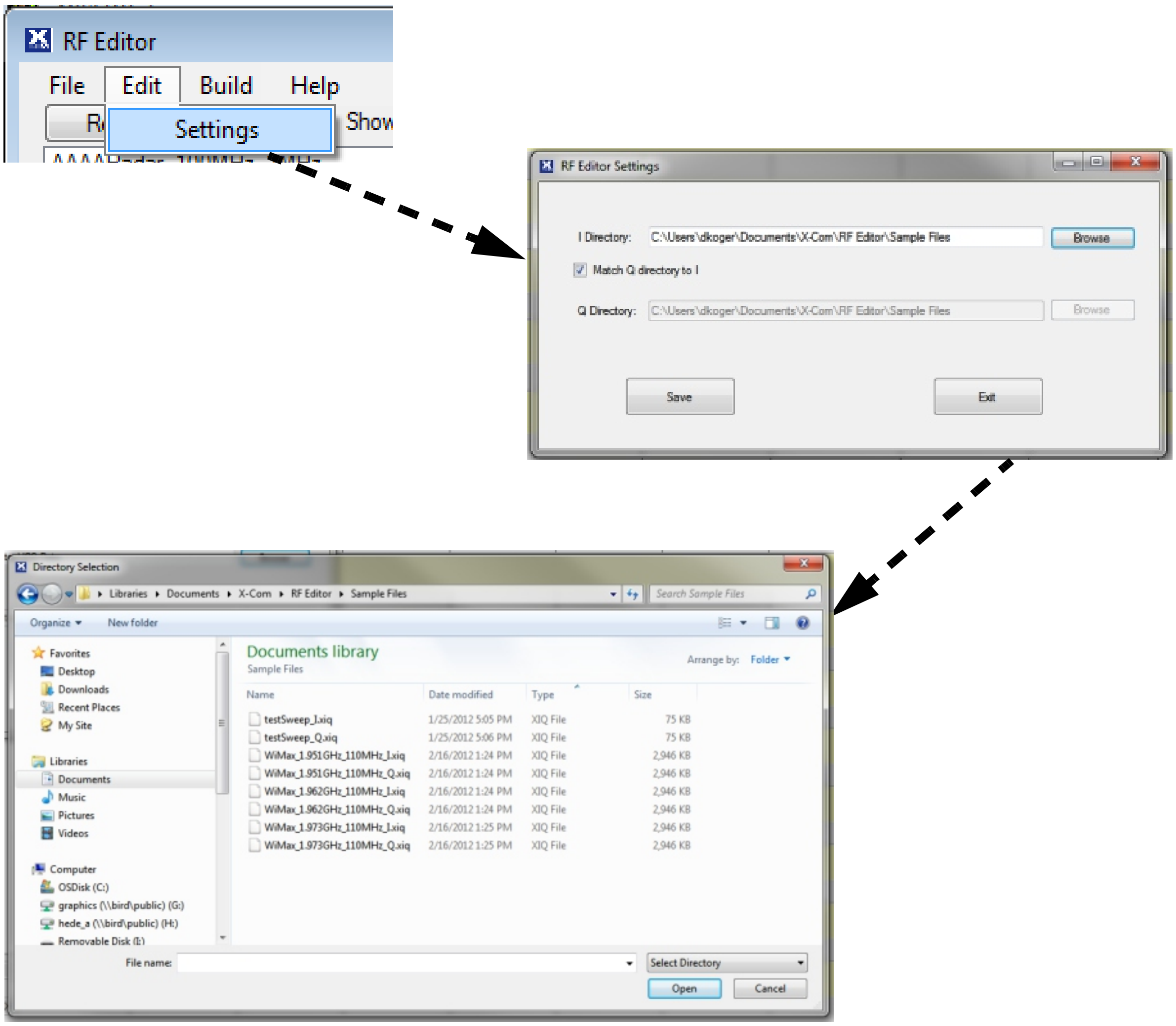
Changing I and Q Directories

Note: *For this procedure, refer Figure 11 on page 8.*

1. Go to Edit in the Toolbar at top of the window.
2. Select Settings from the drop down menu.
3. Click on Browse.
4. Locate and click on the correct I directory.
5. Do one of the following:
   - **If Q directory is the same as I directory:** Click on Match Q directory to I.
   - **If Q directory is not the same as I directory:** Repeat Steps 3 - 5 for the Q directory.

     Note: *By default, the I and Q files reside in the same directory. With the "Match Q directory to I" box checked, any changes to the I directory will automatically be reflected in the Q directory as well. Uncheck the "Match Q directory to I" if the I and Q files are in different directories or drives.*
6. Click on Save.
7. Click on the Refresh File List button.

Figure 11 Settings Dialog



Note: *If there are issues with files not appearing in the list, uncheck the "Show Only Matching Spans" box to see all I/Q file pairs in the selected directory.*

Frequency Span

If the Span drop box does not match the span of the desired file, you need to change the Span. If your files are not in the default directory, you must change the directory to the location of the files.

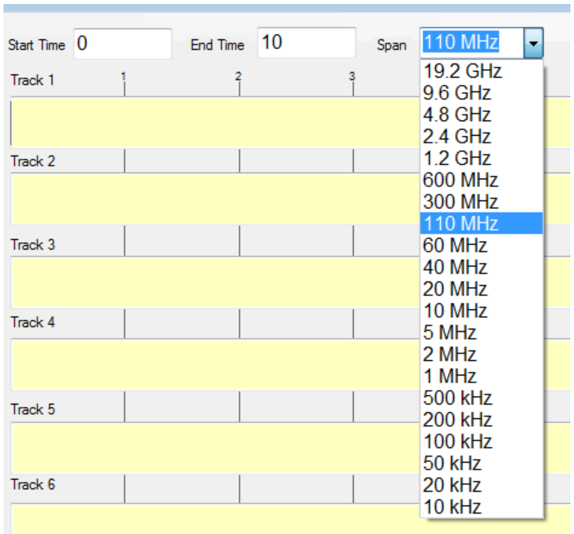
Changing Frequency

Do one of the following:

To change the Span drop box you can either

- Enter in the new span
- Select a span from the drop down list

Figure 12 Frequency Span Drop Box

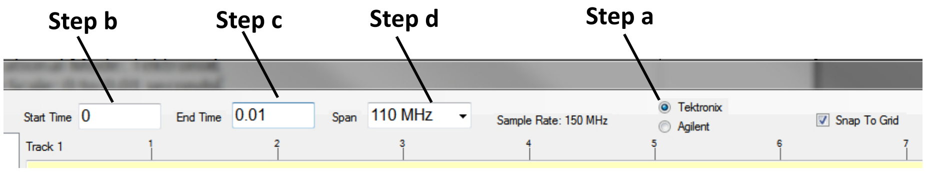


Creating a WiMax 1ms Long Short Version

This exercise demonstrates how to use RF Editor to shorten a file's duration and how to combine multiple files in the frequency domain.

1. Configure the following settings (refer to Figure 13):
    a. Operational Mode: Tektronix
    b. Start Time: 0
    c. End Time: 0.01
    d. Span: 110 MHz

Figure 13 Configuration



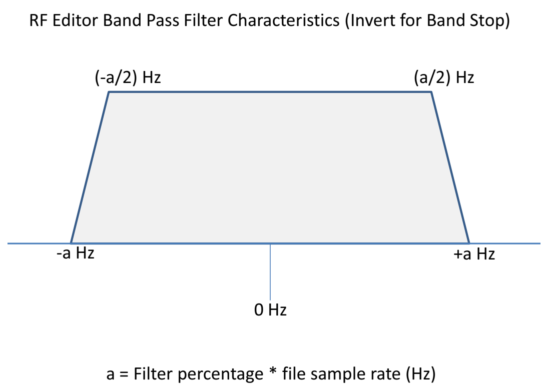
2. Drag-and-drop WiMax_1.951GHz_110MHz on Track 1 starting at 0.0.
3. Right-Click the blue label on Track 1 to bring up the Edit File Screen.
4. Uncheck the "Maintain Width" checkbox.
5. Enter 0 in the "Start On Track" field.
6. Enter 0.001 in the "End On Track" field.
7. Click on the "Done" button.
8. Select Build RF File from the Build Menu.
9. Enter WiMax_1.951GHz_short in the filename field and click on the OK button.
10. Select "New RF Worksheet" from the File menu.
11. Repeat steps 2-8 for WiMax_1.962GHz_110MHz.
12. Enter WiMax_1.962GHz_short in the filename field and click on the OK button.

13. Select “New RF Worksheet” from the File menu.
14. Repeat steps 2-8 for WiMax_1.973GHz_110MHz.
15. Enter WiMax_1.973GHz_short in the filename field and click on the OK button.
16. View each of the files in Spectro-X to see the frequencies for each. Refer to “View Newly Created Signals Using Spectro-X” on page 11.
17. Go to File>Select>New RF Worksheet.
18. Set End Time to 0.01 seconds.
19. Drag and Place WiMax_1.951GHz_short _110 MHz on Track 1 starting at .001 seconds.
20. Drag and Place WiMax_1.962GHz_short_110 MHz on Track 2 starting at .002 seconds.
21. Drag and Place WiMax_1.973GHz_short_110 MHz on Track 3 starting at .002 seconds.
22. Right-click on the WiMax_1.973GHz_short_110 MHz blue button to bring up the Edit File.
23. Set the Start on Track to 0.0021.
24. Check the Maintain Width checkbox.
25. Click on the “Done” button.
26. Select Build RF File from the Build Menu.
27. Enter WiMax_Test01 as the filename.
28. Click OK on the Build Module screen.
29. Check the file that was created in Spectro-X. Refer to “View Newly Created Signals Using Spectro-X” on page 16.

Using Filters

This exercise will filter a spectrum file and remove the lower spectral component. The graphic below shows the filtering characteristics of the Band Pass filter that will be used in the exercise.

Figure 14 Filter Characteristics

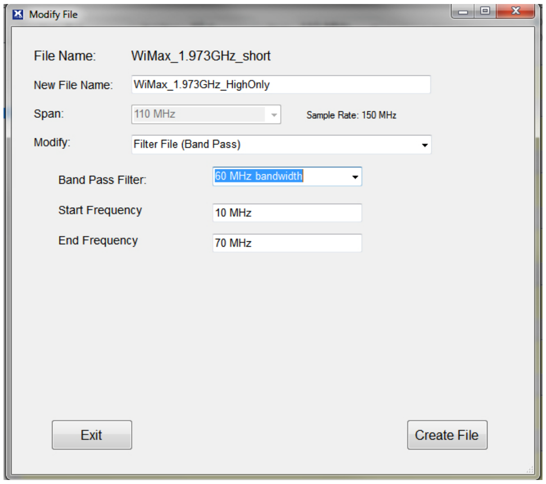


1. Change the Span to 110 MHz.
2. View the WiMax_1.973GHz_short in Spectro-X. Refer to “View Newly Created Signals Using Spectro-X” on page 11.
3. Click on the WiMax_1.973GHz_short to select the file.
4. Click the Modify File button to open the Modify File dialog.
5. Enter WiMax_1.973GHzShort_HighOnly in the New File Name Field.
6. Select “Filter File (Band Pass)” in the Modify Field.
7. Select the filter of “60 MHz bandwidth”.
8. Enter 10 MHz for the Start Frequency.

   Note: *70 MHz will automatically be entered for the End Frequency.*

9. Click on Create File button.

Figure 15 Modify File, High Band Pass



10. Check the file in Spectro-X. Refer to “View Newly Created Signals Using Spectro-X” on page 11.

Figure 16 WiMax 1.9763 GHz Waveform (before filtering)

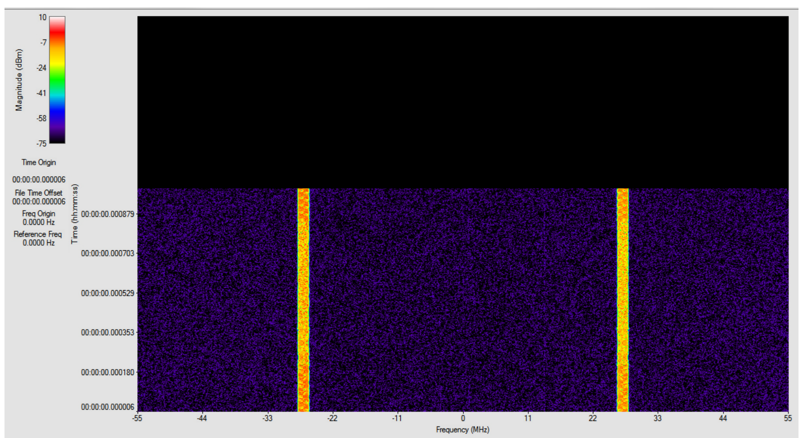
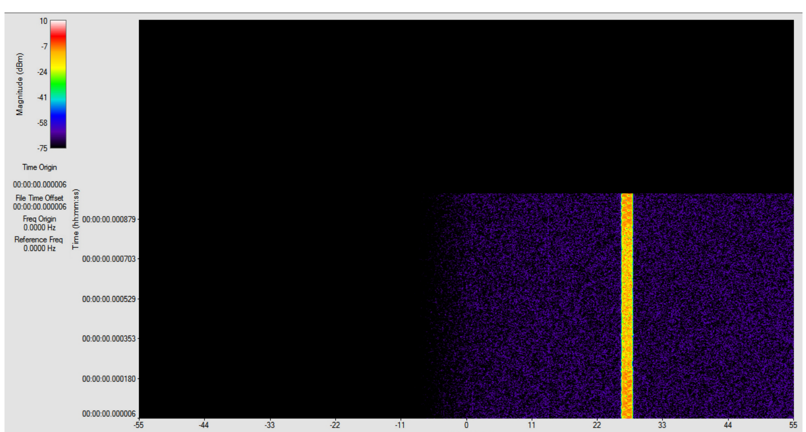


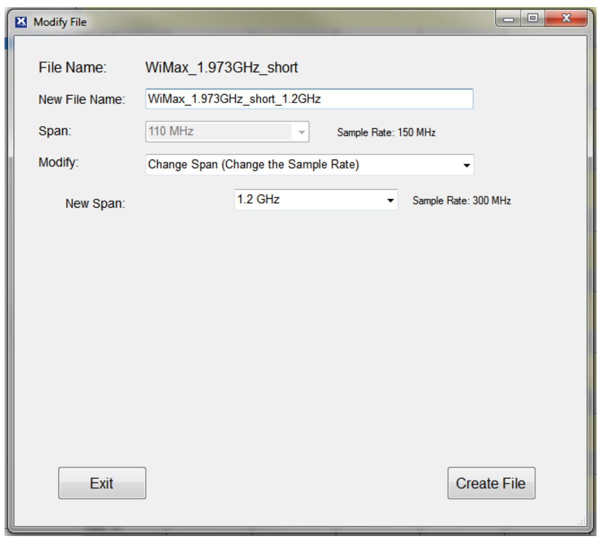
Figure 17 WiMax 1.9763 GHz Waveform, Band Pass Filter (after filtering)



Changing the Span

1. Open a new RF worksheet.
2. Click on the WiMax_1.973GHz_short to select the file.
3. Click the Modify File button, at the bottom of the RF Editor window, to open the Modify File dialog.
4. Enter WiMax_1.973GHz_short_1.2GHz in the New File Name Field.
5. Select "Change Span (Change the Sample Rate)" in the Modify Field.
6. Select a New Span of 1.2 GHz.
7. Click on Create File button to begin.

Figure 18 Modify File



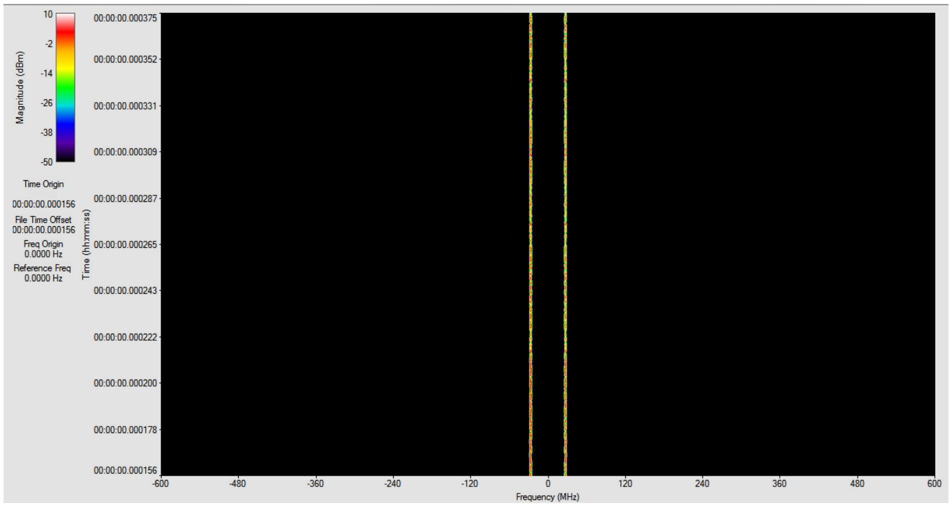
8. Click on Span to open the drop down menu.
9. Change Span to 1.2 GHz.
10. Click on "WiMax_1.973GHz_short_1.2GHz".

    Note: *If the file does not appear in the Waveform Library, click on "Refresh File List."*

11. Check the file in Spectro-X. Refer to "View Newly Created Signals Using Spectro-X" on page 16.

    Note: *It should look similar to the Spectrogram in Figure 19.*

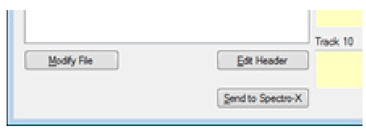
Figure 19 Change Span Waveform



Move the -28MHz WiMax Signal in WiMax_1.973GHz_110MHz_Short to +30MHz

1. Create a new worksheet.
2. Click on WiMax_1.973GHz_110MHz_Short in the file list.
3. Click on the Modify File button below the file list to bring up the Modify File dialog.

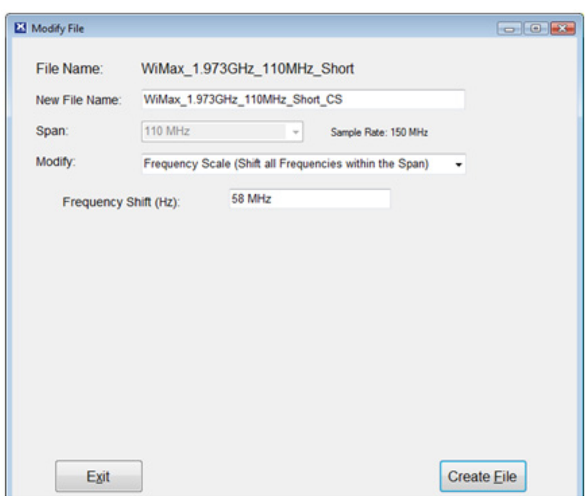
Figure 20 Modify File



4. Use WiMax_1.973GHz_110MHz_Shifted for the new file name.
5. Select Frequency Scale (Shift all Frequencies within the Span) from the Modify pull-down.

Note: *We want to move the -28MHz signal to +30MHz so we need to shift the signal 58MHz so we need to enter 58MHz in the Frequency Shift Field.*

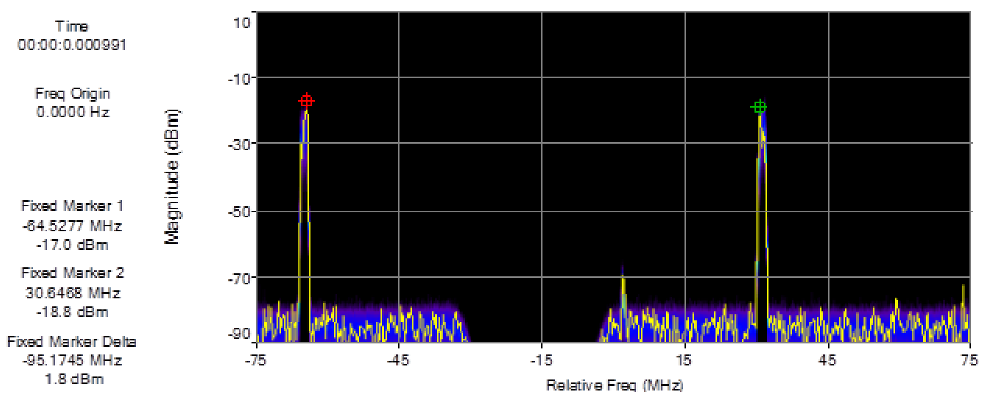
Figure 21 Modify File Dialog



6. Click on the Create File button to build the shifted file.
7. Check out the results in Spectro-X.
8. Expand the frequency settings to the Nyquist limits:
   a. Click on Playback>Control>Frequency Settings.
   b. Set the following:
      - **Start:** -75 MHz
      - **Stop:** 75 MHz

Note: *In the mathematical equations, one cannot simply push the upper signal component of the original spectrum off the end of the frequency limit. Those frequencies will wrap around in both directions. In this case, the upper component originally located at +28MHz is also shifted by 58MHz to +86MHz, but the upper Nyquist limit has been set to +75MHz. Therefore, the +28Mhz wraps around to the lower level of -75MHz +11MHz to a new location of -64MHz. This could then be filtered if desired.*
Also, note the dropout in the noise floor from about -30MHz to about 0Hz. This is created from the analyzer's filter when the signal was captured.

Figure 22 Spectro-X Reading



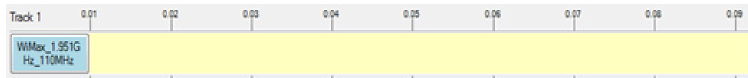
Creating a 100ms Long Output File

This exercise utilizes a 2 ms segment of a file that is 10 ms in length to create an output file that in 100 ms in total length. RF Editor will create 50 copies of the 2 ms segment to generate the output file.

Note: *Use WiMax_1.951GHz_110MHz I/Q file pair. It can be found in the zip file on the X-Com Systems website. This file is 10ms long and has a bandwidth of 110MHz with a WiMax signal at approximately 48MHz.*

1. Select the appropriate directory for the file.
2. Select 110MHz Span.
3. Set Start Time to 0 seconds.
4. Set Stop Time to 1 second.
5. Click on the WiMax_1.951GHz_110MHz file in file list.
6. Drag and drop WiMax_1.951GHz_110MHz on to Track 1 at 0 seconds.
7. WiMax_1.951GHz_110MHz is only 10ms in length so it appears as a very thin line.
8. Change the Stop Time to 0.1 seconds and WiMax_1.951GHz_110MHz will be represented much larger on Track1.

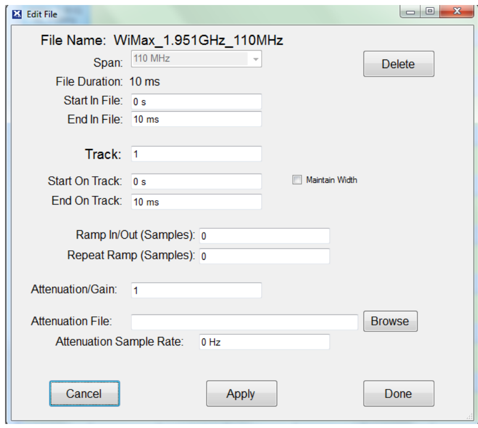
Figure 23 Track



9. Right-click on the blue box that represents WiMax_1.951GHz_110MHz to bring up the Edit File dialog box.

   Note: *A 2 ms segment will start at 6 ms into the file and ends at 8 ms into the file and then loop it 50 times to create a 100ms long output file.*

Figure 24 Edit File

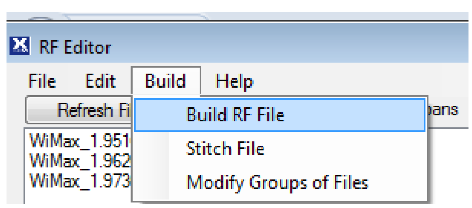


10. Set the Start In File to 0.006 seconds.
11. Set the End In File to 0.008 seconds.
12. Uncheck the Maintain Width checkbox to allow you to extend the signal across 100ms.

    Note: *This will allow the selected data in the file between 6ms to 8ms to correctly fill the time that you will select for the track.*

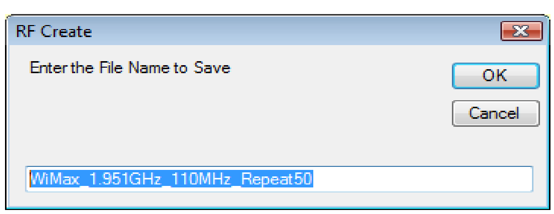
13. Set the Start On Track to 0 seconds.
14. Set the End On Track to 0.1 seconds.
15. Hit the Done button to activate the changes.
16. Build the file by selecting the Build RF File option from the Build men.

Figure 25 Build RF File Menu



17. Enter the name WiMax_1.951GHz_110MHz_Repeat50 in the RF Create File dialog box.

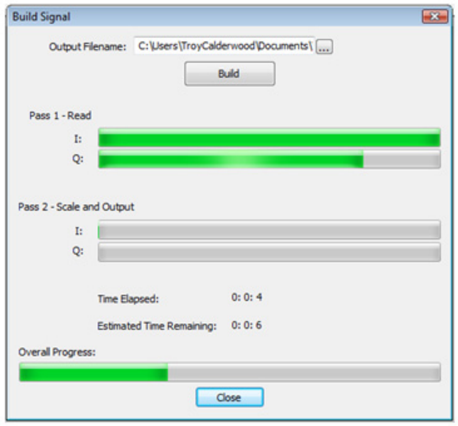
Figure 26 Create File Dialog



18. Click OK to build the file.

    Note: *The build dialog will show the build progress.*

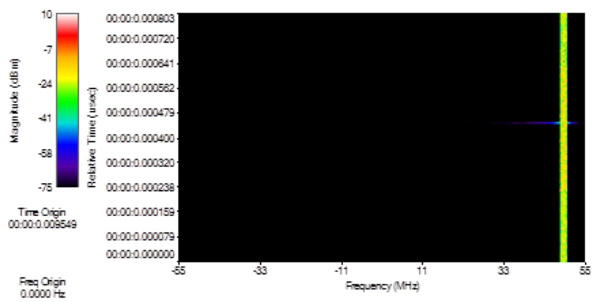
Figure 27 Build Dialog



19. Send the file to Spectro-X.

    Note: *Some frequency splatter at each repeated location will appear due to a discontinuity at the head and tail junction. Refer to "Ramp Function" on page 21.*

Figure 28 Spectro-X



View Newly Created Signals Using Spectro-X

1. Ensure Spectro-X is installed, running, and set to accept Remote Connections.

   Note: *See Spectro-X user manual for proper connections.*

2. Click on the desired file within the Waveform Library to highlight it.

   Note: *If it is not showing in the list, click on the "Refresh File List" button to reload the directory.*

3. Click on the "Send to Spectro-X" button.

   Note: *This will bring up the Spectro-X Control dialog.*

4. Go to Spectro-X.
5. Click on the Play button in Spectro-X to start the playback of the file.

Note: *It is important to know the signals before beginning to modify or combine waveform segments. Creating a plan or storyboard before beginning to build RF signals is advised.*

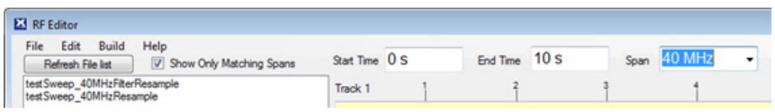
Change Test Sweep from 110MHz Span Down to 40MHz

This exercise illustrates how to resample, in this case, decimate a file to reduce its frequency span.

1. Create a new worksheet.
2. Look at testSweep in Spectro-X.
3. Ensure the frequency sweeps from about -45MHz to +45MHz.
4. Select testSweep and click on the Modify button.
5. Use testSweep_40MHzResample for the new file name.
6. Select Change Span (Change the Sample Rate) for the Modify pull-down.
7. Select 40 MHz for the new span.
8. Click on the Create File button to build the resampled file.
9. Look at the new file in Spectro-X.

Note: *The files are organized by Span or Sample Rate. A file with a Span of 40MHz has been created.*

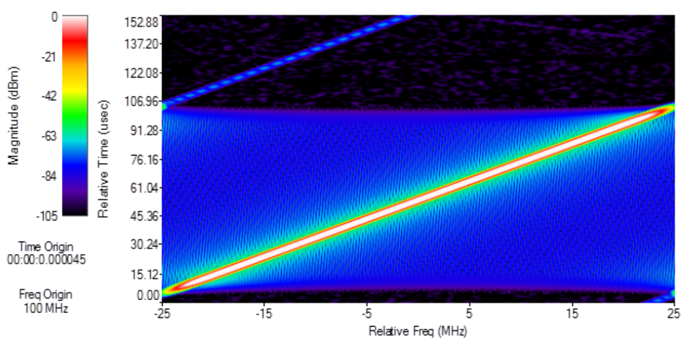
Figure 29 Span



10. Ensure the Span is changed to 40MHz.

Note: *The entire sweep can no longer be accurately represented with a span of 40MHz (sample rate of 50MHz) so the data gets folded back in to the spectrum creating odd effects.*

Figure 30 Spectrogram



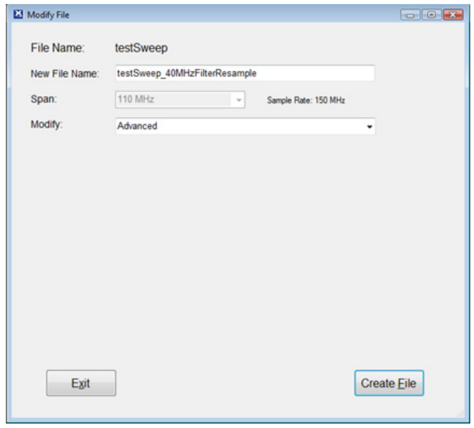
Advanced Modify Function

This exercise uses the Advanced Modify functions to accomplish multiple modifications from one dialog box.

1. Select testSweep and click on the Modify button.
2. Rename the file testSweep_40MHzFilterResample.
3. Select Advanced from the Modify pull-down.
4. Click on the Create File button to build the resampled file.

Note: *The raw XIQ Modify screen where you can combine many steps in series will pop up. Run each operation by checking the box and entering the correct parameters. Each operation is run sequentially to build the output file.*

Figure 31 Modify File Dialog



5. Select the Filter checkbox and choose the 20% filter.

   Note: *This enables filtering 20% of the sample rate on either side of 0 Hz. In this case that is 20% of 150MHz or 30MHz on either side of 0 for a total of 60MHz of bandwidth.*

6. Select the last Decimate checkbox and put a 3 in the Decimate field.

   Note: *This enables eliminating 2 out of every 3 samples in the data. In this case, taking the sample rate from 150MHz to 50MHz and that is a 3 to 1 ratio.*

7. Click on the run button to build the output.

   Note: *Processing will occur in the order selected.*

8. Send the file to Spectro-X.

   Note: *To see the entire spectrum, set the start and end frequencies to -25MHz and 25MHz respectively.*

9. Ensure the difference in the spectrum has virtually no inappropriate frequencies at the beginning and end.

Figure 32 Advanced Modify File

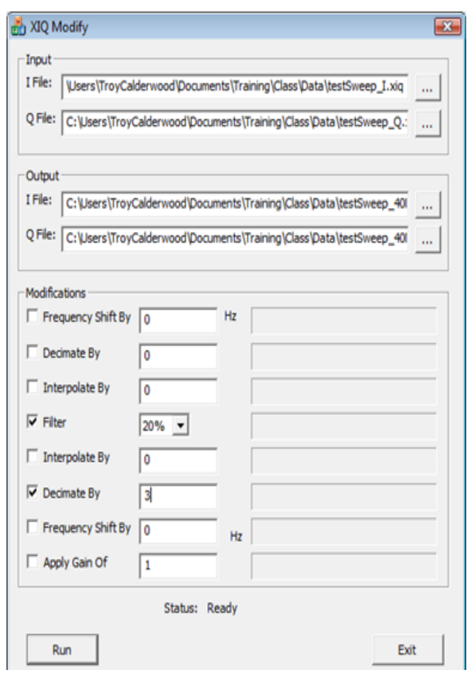
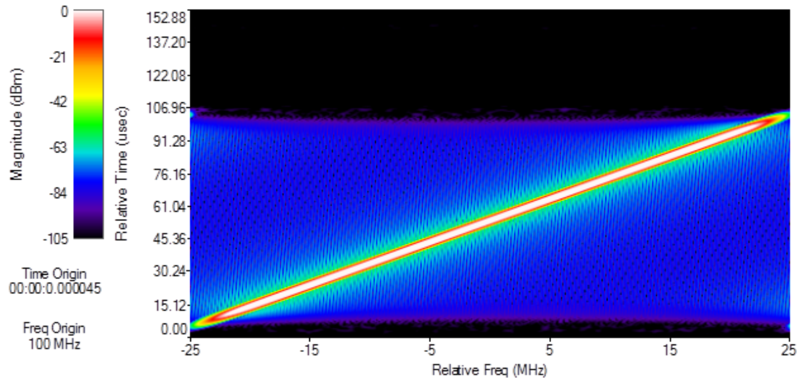


Figure 33 Spectrogram

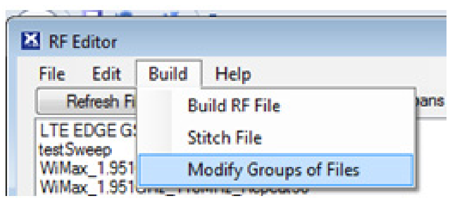


Use Modify Groups of Files to Increase the Sample Rates

Note: *The files must have the same sample rate/span to be grouped together.*

1. Set the Span to 110MHz.

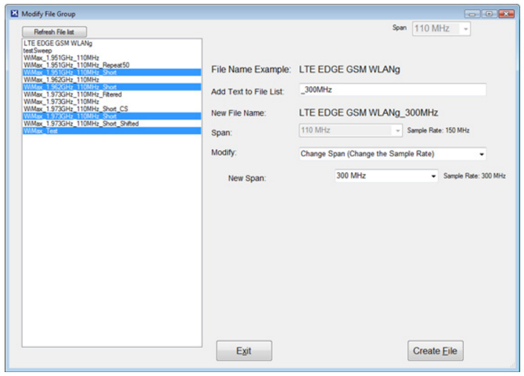
Figure 34 Build Menu



2. Use the Modify Groups of Files option from the build menu to get to the Modify File Group screen.
3. Select the following from the file list:
   - WiMax_1.951GHz_110MHz_Short
   - WiMax_1.962GHz_110MHz_Short
   - WiMax_1.973GHz_110MHz_Short
   - WiMaxTest
4. Use _300MHz for the Add Text to File List field.

   Note: *This is what will be added to each file name to create the new file at the new sample rate.*
5. Select 300 MHz from the New Span pull-down.
6. Click the Create File button.

Figure 35 Modify File Group Dialog



7. Exit the Modify File Group screen.
8. Set the Span to 300 MHz to see the new files in the file list.

Use the Edit Header Function to Change Frequency Origin

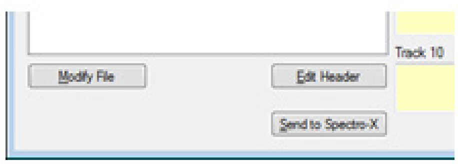
1. View WiMax_Test_300MHz in Spectro-X.

   Note: *The Frequency Origin should be 0Hz.*

2. Highlight WiMax_Test_300MHz in the file list.
3. Click on the Edit Header button.

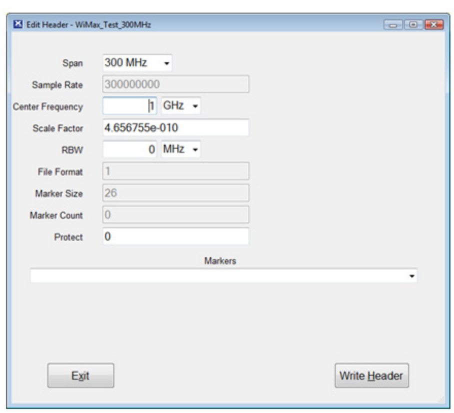
   Note: *BE CAREFUL, Changes made to the parameters of the data are permanent. Be aware of the consequences of the changes being made.*

Figure 36 Edit Header Button



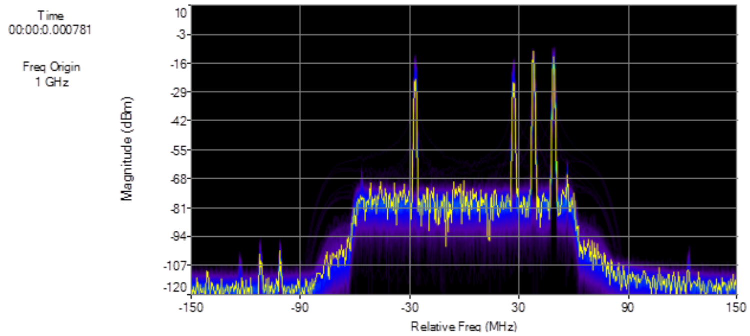
4. Change Center Frequency to 1 GHz.

Figure 37 Edit Header Dialog



5. Click on the Write Header button.
6. Check the results in Spectro-X.
7. Ensure Free Origin is 1 GHz.

Figure 38   Spectro-X Reading



Ramp Function

This function removes the frequency discontinuities and splatter observed where multiple copies of a spectrum clipping were concatenated in to a longer file consisting of repeated segments. The splatter at each segment end-to-beginning transition point occurs because of the abrupt, time-domain file transition. Ramping can reduce the abrupt transition in the time domain between segments and therefore the number of frequency components necessary in the frequency domain to reproduce the segment to segment transition.

1. Drag and drop WiMax_1.95GHz_110MHz on to track 1.
2. Set RF Editor Start time to 0sec and End time to 10 ms.
3. Right click on the blue representation of the waveform on track 1.
4. Set up the Edit file window as shown below (same as in "Creating a 100ms Long Output File" on page 9.).
5. Enter “10,000” in the dialog box next to “Repeat Ramp (Samples).”

   Note: *By doing this, you are specifying the number of samples over which the waveform amplitude is ramped down and then up, by approximately 60 dB, to eliminate frequency splatter at the point of concatenation of waveform segments in the time domain.*

6. Hit Apply and then Done.
7. Build the file and call it "WiMax_1.95GHz_110MHz_RptRamp".
8. Observe the file in Spectro-X.

   Note: *The ramp function can also be applied to the beginning or end of a single spectrum segment by specifying the number of samples and therefore the slope of the ramp attenuator in the Ramp In/Out (Samples) portion of the RF Editor Edit File window.*

Figure 39 Edit File Window

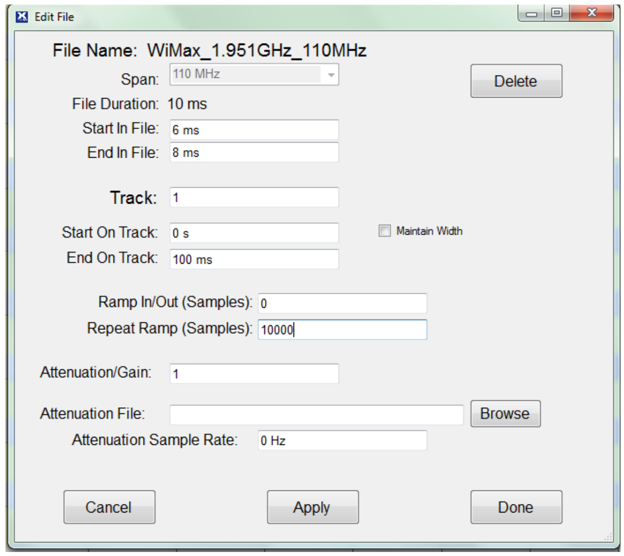
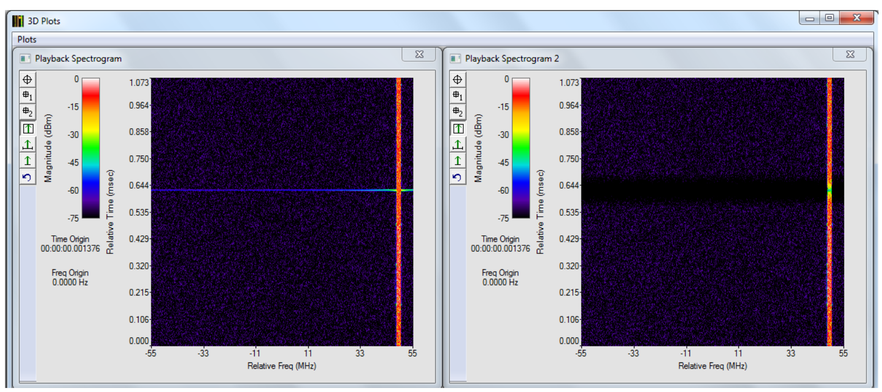


Figure 40 Spectro-X



Note: *Shown is a comparison of the spectrograms of the result of this file concatenation without (left spectrogram) and with (right spectrogram) the ramp function implemented. Notice the elimination of frequency splatter at the transitions between waveform segments.*

Stitch Function

Using Spectro-X Search Results

Stitching is a process that concatenates segments of a spectrum capture file which have been selected by the user. It effectively provides a way to cut out undesired portions of a file and reconnect the remaining segments.

Segments can be delineated in two ways. The first is via file markers inserted in the file during receipt and processing, by the IQC5000A, of TTL level pulses presented to either of its two trigger input BNC connectors. Spectro-X search results can also be used to denote segments.

> ***Example -*** *A carrier search is conducted in Spectro-X looking for carriers in a capture file that exceed -40dBm in power and, using search pruning, have a duration not exceeding 50 microseconds (See Spectro-X User Manual and Spectro-X Self Guided Demo manual, both available for free download at www.xcomsystems.com). Spectro-X can export the results of this pruned search to a file that delineates each portion of the capture file in which these user selected criteria have been met and in a manner usable by RF Editor.*

RF Editor can utilize either type of segment designation; search results or markers in the Stitch Function. If RF Editor stitches using markers then, the new file will contain the segments delineated by the markers and the segments will be concatenated with no blank time between them. A stitched file using search results will result in something slightly different.

> ***Example -*** *A capture file of 100 µs in length is searched for carriers with the criteria of power levels above -15dBm. Further, assume there are three time segments in which carriers meet this threshold. The first segment occurs in the file from time 1 µs to 5 µs. The second segment occurs during the file time from 10 µs to 12 µs and the third from 15 µs to 25 µs. If these search results are brought in to the RF Editor Stitch Function and the first and third search results are checked as the ones to be stitched, then the resulting file will be 25µs long. The first microsecond of the file will contain zeros (no spectrum). File time 1µs to 5 µs will contain whatever was in the searched file during that time period. There will be zeros from file time 5µs sample to 15 µs and it will contain whatever was in the searched file from time 15µs to 25 µs.*

The Stitching function can use the results from Carrier Search, Waveform Search, or Pulse Search. The time value entered in the Offset field will be used to adjust the Start for each search result. Entering a negative value will back the start in time. While Carrier Search and Pulse Search results contain durations, the Waveform Search results do not. When using Carrier Search or Pulse Search results, the time entered in the Duration field will be added (use a negative number to decrease the amount of time) to each result's duration. When using the Waveform Search, the amount entered in the Duration field will serve as the duration for each result.

Figure 41 Carrier Search

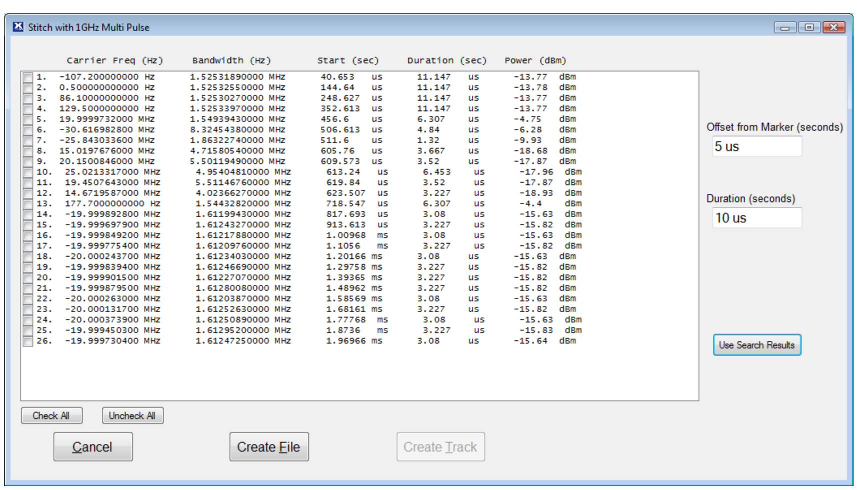
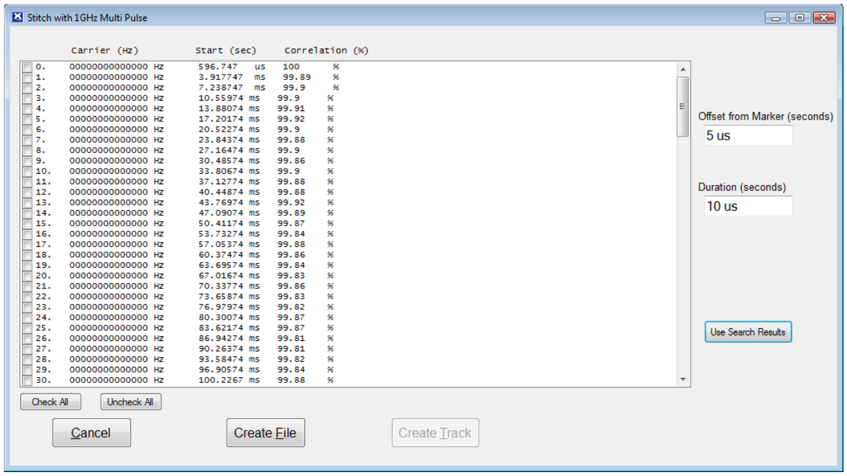


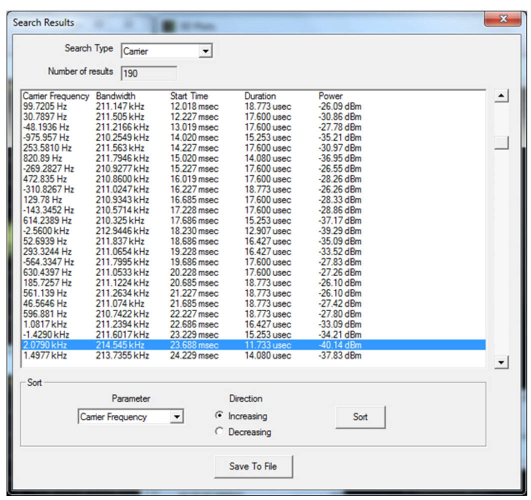
Figure 42 Waveform Search



In the following exercise we will rapidly produce a custom waveform that consists of waveform segments which were found to match specific criteria. The segments are part of a much more complex spectrum capture. Using Spectro-X and RF Editor, we can quickly isolate only what we want and use those desired segments to build the exact waveform we need without any custom code needing to be written.

1. Open Radar _30MHz_15000000 BW 100ms.xiq file in Spectro-X. Refer to “View Newly Created Signals Using Spectro-X” on page 11.
2. Use Carrier Search to find all signals above -45dBm.

Figure 43 Carrier Search Window



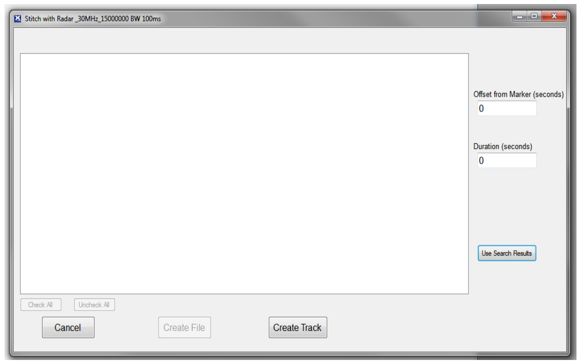
3. Export the results to a text file by clicking on the Save To File button.
4. Ensure to save the file in a text format and not the binary format.
5. Name the file Radar _30MHz_15000000 BW 100ms_.carsrch.
6. Return to RF Editor.
7. Select the Agilent radio button.
8. Enter 15MHz for the span.

> **Note:** *Radar _30MHz_15000000 BW 100ms should show in your file list. If not, you will need to find it by changing the directory in the Settings dialog.*

9. In the file directory window, highlight (left click) the file "Radar_30MHz_150000000BW 100 ms".
10. Go to Build>Stitch.

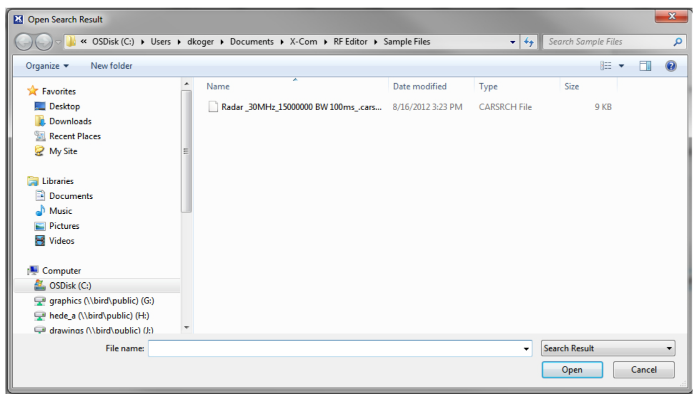
    Note: *The Stitch dialog window will appear.*

Figure 44 Stitch File Dialog



11. Click on the Use Search Results.
12. Select radar _30MHz_15000000 BW 100ms_.carsrch.

Figure 45 Use Search Results Window



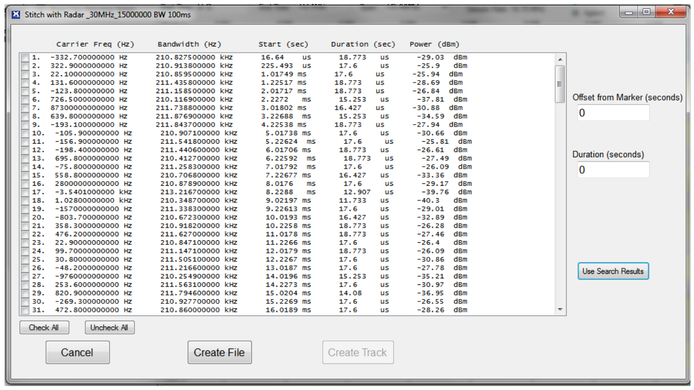
13. Select the desired pulses by checking the box next to each signal.

    Note: *This example will create a signal that has pulses of a 1ms PRI.*

14. Check the boxes next to (search result numbers) 8, 9, 11, 13 and 15.

    Note: *Doing this, you are selecting search results whose start times are 1 ms apart (3.22688 ms, 4.22538 ms ... 9.22613 ms). These are the search results that the Stitch generator will use to create the new composite waveform.*

Figure 46 Stitch File Worksheet



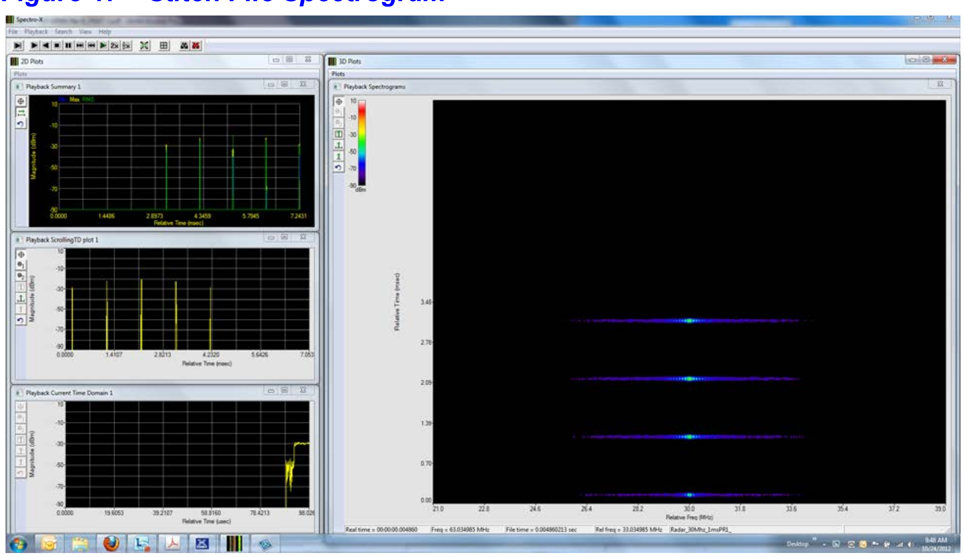
Note: *If needed, Offset from Marker and Duration fields give precise control and adjustment of the start and end points. In a carrier search, the results contain a duration so the Duration field is added to the duration. In search results without durations, a positive value must be entered in the Duration field. Keep in mind; both Offset from Marker and Duration can be either positive or negative in some situations. A negative value for Offset from Marker will make the start point sooner that the Start value in the search results. A negative value for Duration is valid only when using a carrier search and indicates the duration will be less than the value returned from the search results.*

15. Click on the Create File button to build the desired file.

Note: *You now have built a file that only contains the search results you wanted by placing check marks next to them in Step 14.*

16. Name the file “Radar_30Mhz_1msPR1” using the Save dialog.
17. Click on OK to begin building the file.
18. Check the file in Spectro-X. Refer to “View Newly Created Signals Using Spectro-X” on page 11.

Figure 47 Stitch File Spectrogram

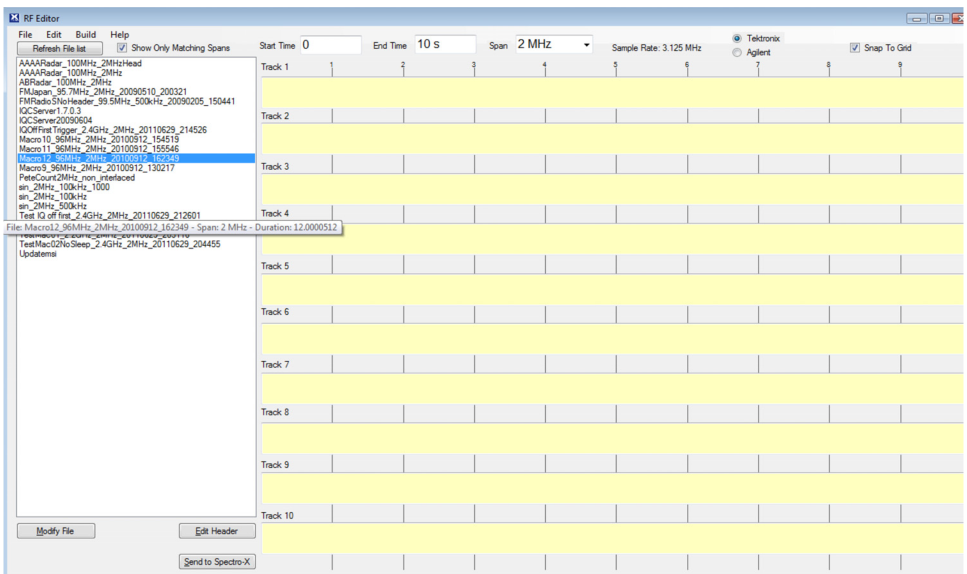


Using File Markers

1. Start a new worksheet.
2. Set Analyzer Setting to Tektronix.
3. Change the Span to 2 Mhz.
4. Set the Start Time to 0 and End Time to 1.
5. Highlight Macro12_96MHz_2MHz_20100912_162349_I from the file list.

    Note: *This file was created by using the IQC5000A in conjunction with the RSA spectrum analyzer. Seven 2MHz frequency bands were captured throughout the FM radio spectrum by changing the center frequency of the spectrum analyzer during the capture. The capture frequency starts at 95MHz and runs through 103MHz. After each step, the Forced Trigger function was used in the RSA to send a trigger to the IQC5000A. This placed a marker in the data file at a point near where the frequency has changed. The objective was to create a file that has 0.1 seconds of data with each frequency band captured. This gives a picture of the static spectrum for each of these bands in a single file for a precise length of time.*

Figure 48 RF Worksheet



6. Select the Stitch File option from the build menu.

    Note: *The Stitch dialog will automatically load the markers and select all markers except for the first and last. The first and last markers are automatically generated with the capture while the remaining markers were generated during the capture to mark each frequency change.*

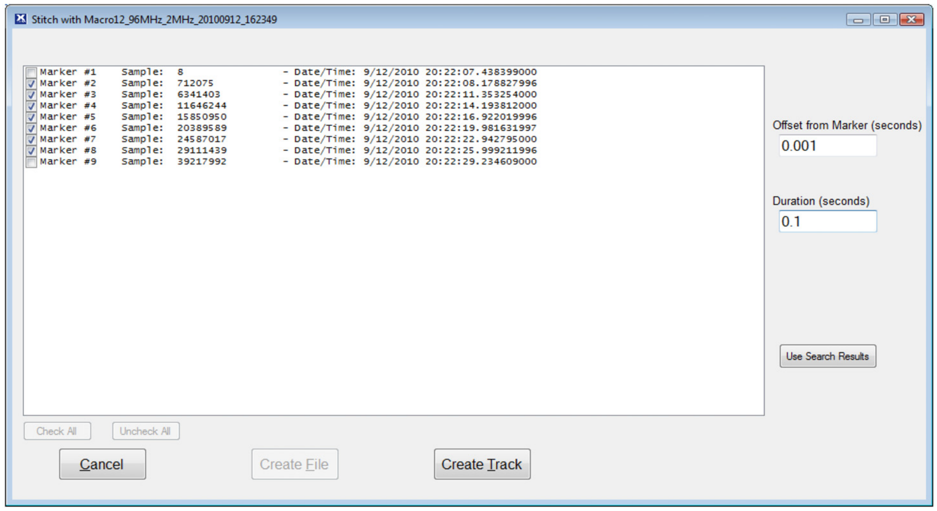
7. Uncheck the boxes for the first and last markers.

    Note: *Any of these markers can be removed by unchecking the box next to the marker to give precise control over the file being built.*

8. Set the Marker Offset to 0.001.
9. Set the Duration to 0.1.

    Note: *Duration must be set in the Duration field. Duration will determine how much data to put in the output file.*

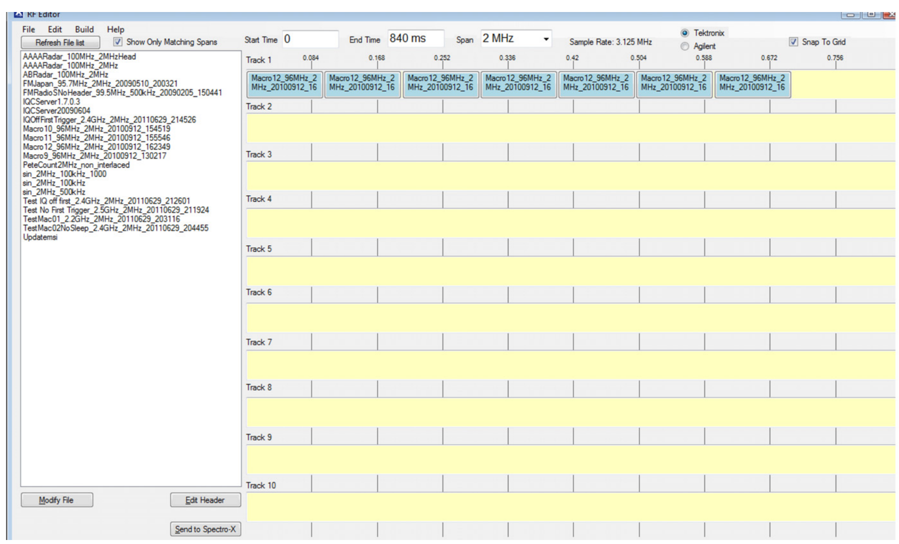
Figure 49   Stitch File Dialog



10. Click on Create Track.

Note: *The track should look like the first track in Figure 50.*

Figure 50   RF Worksheet with Stitched Track



Note: *Each of the file blocks can be manipulated as any other worksheet including moving them to different tracks and changing the lengths.*

11. Once the worksheet is set to a desired configuration, build the RF file.
12. Name the file "Macro12_100ms segments".
13. Check the file in Spectro-X. Refer to "View Newly Created Signals Using Spectro-X" on page 11.
14. In Spectro X, set the Time Increment setting to 1.13 msec.

Note: *Several segment transitions in the Scrolling Spectrogram screen will be visible. Notice the lines in the display where the transitions occur.*

Note: *Max Hold may be used on the Frequency Domain plot to give a picture of the entire file that was created.*

Figure 51 Stitch File Spectrogram