Quick Reference Cards

Anritsu

Site Master

Cable and Antenna Analyzer

Technical Support

An Internet list of contacts is available at the following URL:

http://www.anritsu.com/Contact.asp

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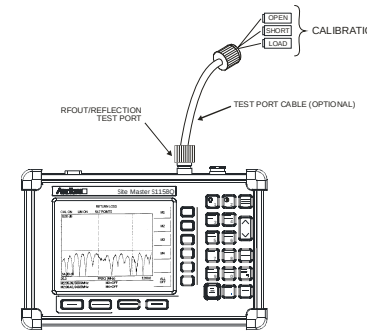
Return Loss

Return Loss Measurement Procedure

1. Connect one end of the test port cable to the port labeled **RF Out/Reflection**.
2. Press the **MODE** function hard key and select Freq-Return Loss and press **ENTER**.
3. Enter the frequency range
   a. Press the **FREQ/DIST** function hard key.
   b. Press the F1 soft key. Use the number keys to enter the lower frequency and press the **ENTER** key.
   c. Press the F2 soft key. Use the number keys to enter the upper frequency and press the **ENTER** key.
4. Calibrate the instrument
   a. If the message in the upper-left corner says Cal Off, then you need to perform a calibration. If the message says Cal On, and you have not changed the test port cable, then the calibration is valid, and you can go to Step 6.
   b. Press **SYS**, press Application Options, and press CAL Mode. The bottom left part of the display will say OSL Cal or FlexCal. Toggle to select the preferred calibration method.



NOTE	Flexcal is a broadband calibration that allows you to change the frequency after calibration. It is more time efficient, and is particularly helpful, if you are troubleshooting the system. For optimum accuracy, the OSL Cal method is recommended.

   c. Press **START CAL** (#3)key
   d. Connect the **"Open"** to the end of the test port cable and press **ENTER**.
   e. Connect the **"Short"** to the end of the test port cable and press **ENTER**.
   f. Connect the **"Load"** to the end of the test port cable and press **ENTER**.
   g. Verify that the calibration was performed properly by checking that the Cal On message is now displayed in the upper left corner.

NOTE	The Cal On message will change to Cal Off when the calibration is no longer valid. If you change the frequency range without using the FlexCal method, then the calibration will no longer be valid. A new calibration is also required if the temperature changes too much from the original temperature at the time that the last calibration was performed.

5. Setup the Display
   a. Press the **MEAS/DISP** function hard key and the Resolution soft key. Select 130, 259, or 517 data points.
   b. Verify that the bottom display says Fixed CW Off. This is the best settings in RF rich environments.
6. Set Limit
   a. Press the **LIMIT** (#7) key, press Single Limit, and press Edit. Then enter the value of the limit and press **ENTER**.
   b. Press the **On/Off** key to display the limit.
7. Connect the test port cable to the line to be tested. Use appropriate adapters to make the connection. Fig shows the return loss trace of a passing measurement.
8. Turn on Markers
   a. Press **MARKER**, press M1, and press On/Off to turn on Marker 1.

b. Press Edit and use the **Up/Down** arrow key to move the marker, or enter a frequency range manually using the keypad.
c. Press Marker To Peak to move the marker to the maximum peak of the trace.
d. Press Marker To Valley to move the marker to the minimum value of the trace.
e. To turn on one more Marker, press Back and select M2

9. Save Display
   a. Press **SAVE DISPLAY**.
   b. Use the soft keys to enter a file name.

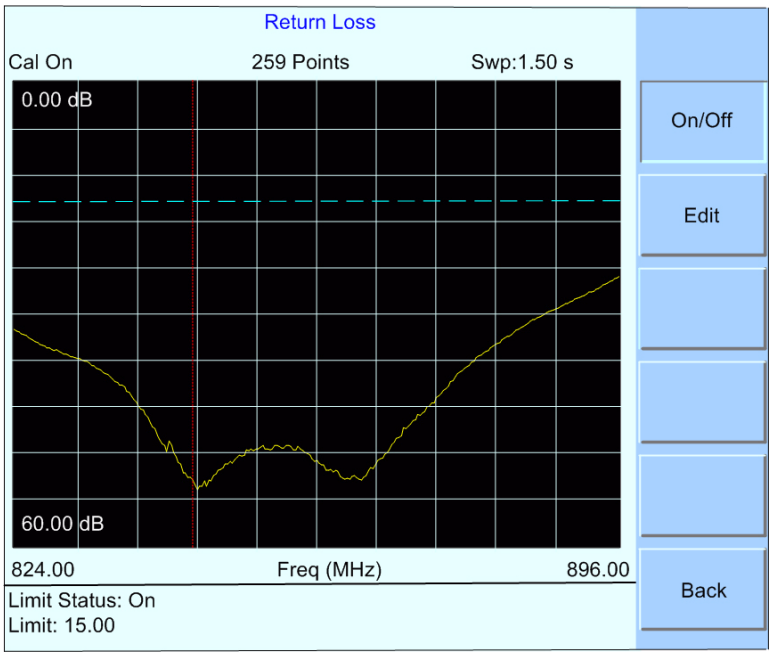


Figure RL-1. Return Loss Measurement – Passing

Return Loss Interpretation

Return Loss and VSWR Interpretation

The Return Loss/VSWR measurements are used to characterize the system and to ensure conformance to system engineering specifications. This measurement is important because the return loss of the system affects how efficiently power is transmitted at the antenna. The limit lines that are available in the Site Master simplify test interpretation. If the Return Loss trace is above the limit line, then the Return Loss of the system is failing, which results in less power transmitted from the base station. The result from a customer standpoint can be dropped calls, loss of data, or missed connections.

Note how the majority of the return loss display of the following measurement (Figure RLI-1) is above the limit line. This measurement is not passing the 15 dB limit test. Turning on the limit beep can be helpful for interpreting marginal results.

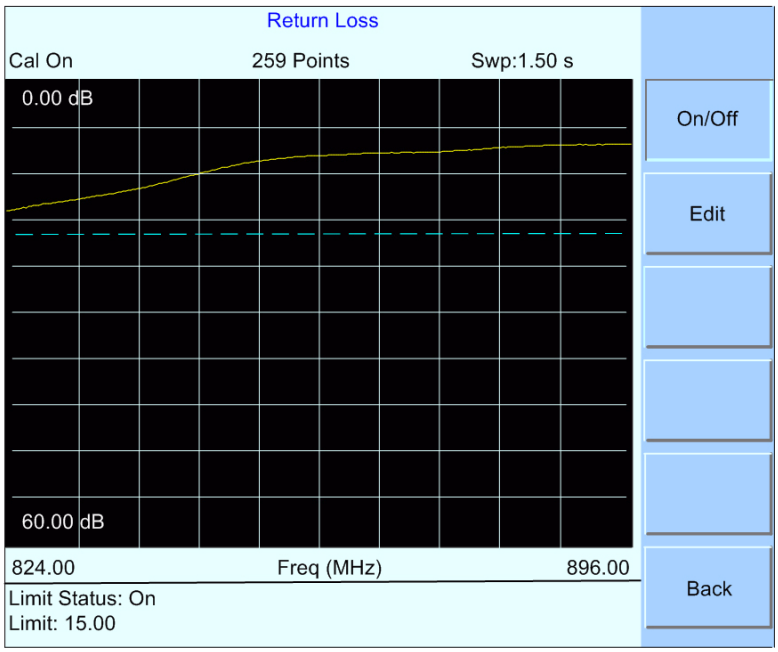


Figure RLI-1. Return Loss Above Limit Line

The trace in the following measurement shows a cable and antenna system that has been swept from 824 MHz to 896 MHz. The limit line is set to 15 dB, and the entire trace is below the limit line. This test is passing.

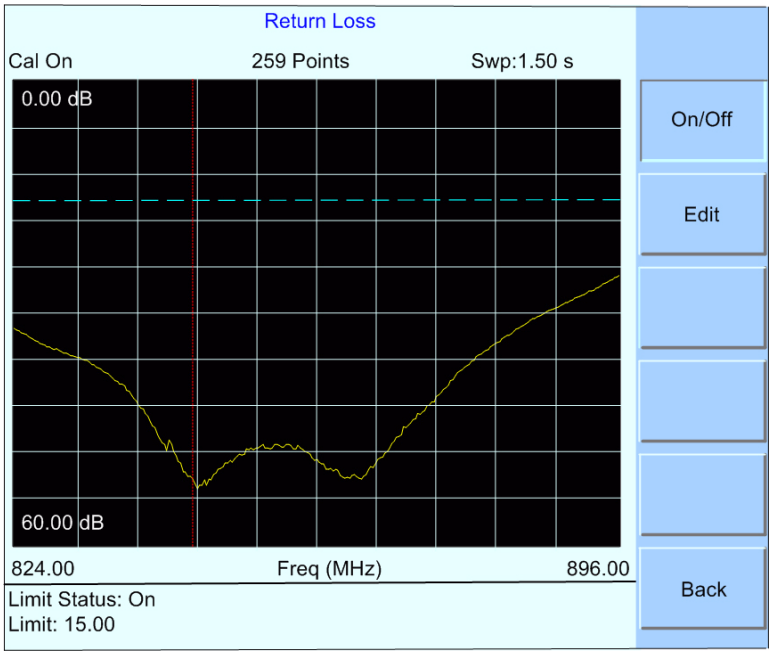


Figure RLI-2. Return Loss Below 15 dB Limit Line

The amplitude scale on the following VSWR display has been set to display VSWR values between 1 and 3. This particular measurement shows a system that is passing the 1.5 VSWR limit.

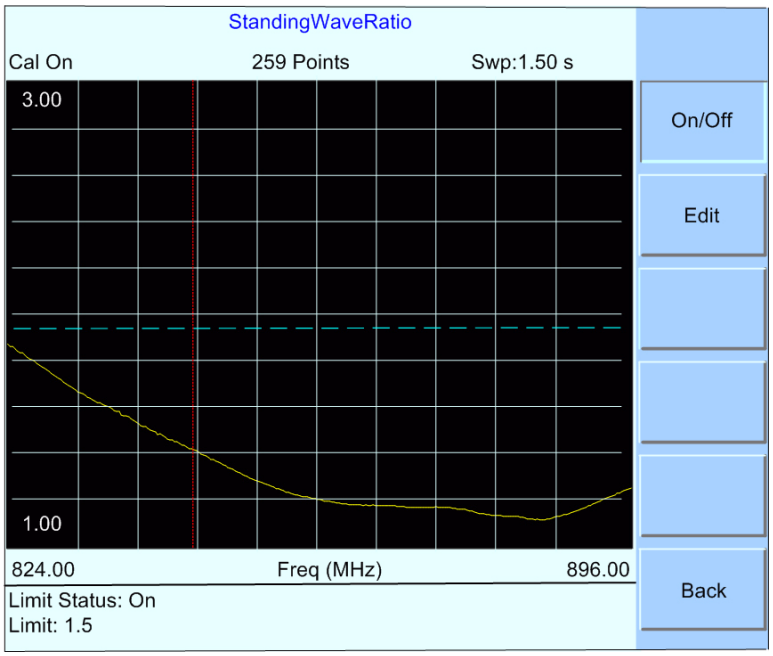


Figure RLI-3. VSWR Below 1.5 Limit Line

Distance-To-Fault (DTF)

DTF Measurement Procedure

1. Connect one end of the test port cable to the port labeled **RF Out/Reflection**.
2. Press the **MODE** function hard key, select DTF Return Loss, and press **ENTER**
3. Set the Distance (refer to Figure DTF-1)
   a. Press the D1 soft key, enter the start distance, and press **ENTER**.
   b. Press the D2 soft key, enter the stop distance, and press **ENTER**.

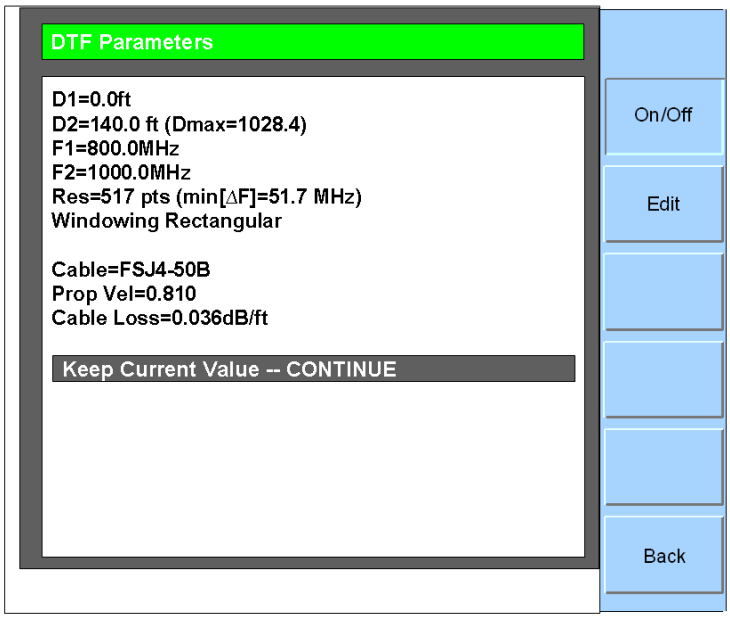


Figure DTF-1.DTF Parameters

4. DTF Aid
   a. Press the DTF Aid soft key. (The DTF menu is used to set all of the parameters that affect the DTF measurement. DMax needs to be greater than D2. If DMax is not greater than D2, then DMax needs to be increased. The way to do this is to increase the number of data points or to lower the span either by increasing F1 or by decreasing F2).
   b. Set the start frequency by moving the highlighted selection to F1. Press **ENTER** and use the key pad to enter the desired start frequency. When done press **ENTER**.
   c. Move the highlighted selection to F2 and press **ENTER**. Enter the stop frequency and press **ENTER**.
   d. Move the highlighted selection to Resolution. Currently, three selections are available: 130, 259, and 517

e. Select the Cable by moving the selection to Cable and pressing **ENTER**. Locate the cable using the **Up/Down** arrow keys or the Page Up and Page Down soft keys. Press **ENTER** to select the cable.

NOTE	Selecting the correct cable addresses two issues. It sets the propagation velocity factor of the cable. This ensures that the distance accuracy of the measurement is optimized. Selecting the cable also sets the cable loss of the cable, which affects the accuracy of the amplitude reading. In other words, selecting the correct cable improves the distance and amplitude accuracy.

f. If the cable is not in the list, manually enter the Prop Vel and Cable Loss values.

NOTE	You can add cables to the cable list using handheld software tools. See handheld software tools section for this.

g. Move the selection to Keep Current Value – CONTINUE and press **ENTER**.

5. Calibrate the instrument.
   a. If the message in the upper left corner says Cal Off, then you need to perform a calibration. If the message says Cal On, and if you have not changed the test port cable, then the calibration is valid and you can go to step 6.
   b. Press **SYS**, press Application Options, and press CAL Mode. The bottom left part of the display will say OSL Cal or FlexCal. Toggle to select the preferred calibration method.

NOTE	Flexcal is a broadband calibration that allows you to change the frequency after calibrating. It is more time efficient and is particularly helpful if you are troubleshooting the system. For optimum accuracy, the OSL Cal method is recommended.

   c. Press the **START CAL** (#3) key.
   d. Connect the **"Open"** to the end of the test port cable and press **ENTER**.
   e. Connect the **"Short"** to the end of the test port cable and press **ENTER**.
   f. Connect the **"Load"** to the end of the test port cable and press **ENTER**.
   g. Verify that the calibration was performed properly by checking that the Cal On message is now displayed in the upper-left corner.
6. Set Limit
   a. Press the **LIMIT** (#7) key, press Single Limit, and press Edit. Then enter the value of the limit and press **ENTER**.
   b. Press the On/Off soft key to display the limit.
7. Connect the test port cable to the line that is to be tested. Use appropriate adapters to make the connection.
8. Turn on Markers (refer to Figure DTFI-1)
   a. Press **MARKER**, press M1, and press On/Off to turn on Marker 1.
   b. Press Edit and use the **Up/Down** arrow key to move the marker, or manually enter the distance by using the keypad.
   c. Press Marker To Peak to move the marker to the peak of the trace.
   d. To turn on one more Marker, press Back and select M2.
9. Save Display
   a. Press **SAVE DISPLAY**.
   b. Use the soft keys to enter a file name.

Distance-To-Fault Interpretation

DTF Interpretation

When interpreting the DTF display, the use of limit lines and markers can simplify the job.

The display in Figure DTFI-1 shows an 8 ft jumper cable connected to a 60 ft main line with an antenna connected to the end of the cable. The first lower connector is at 27.6 dB. This is typically not considered a passing reading. Looking at the relative data and comparing this trace with previous data would be of great value to get an idea of possible degradations over time.

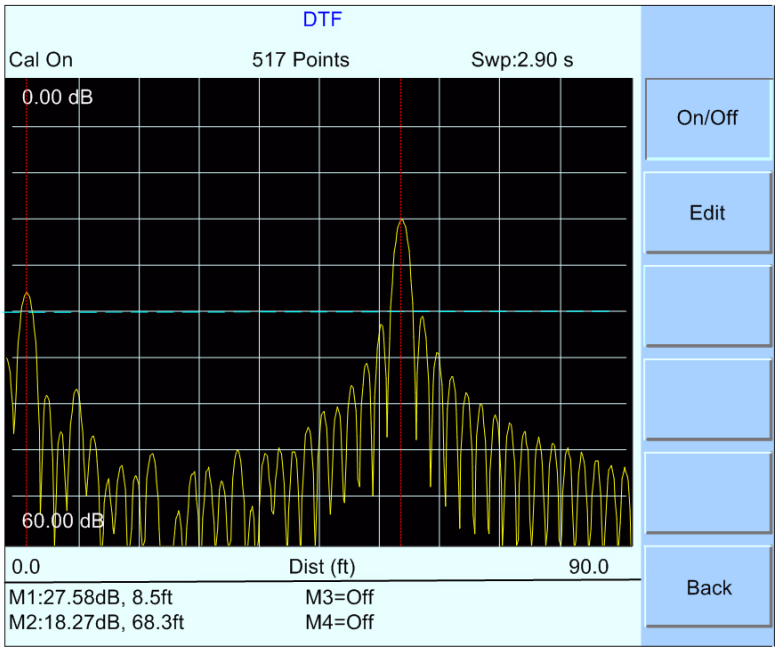


Figure DTFI-1.Transmission Line Terminated with Antenna

A fundamental aspect to understand about DTF is that the absolute readings should be read with care because so many different variables affect both the distance and amplitude accuracy. Table 1 shows typical values for different end terminations. These values should be used only to get an idea of how a typical system might look.

Table 1: Typical Passing DTF Amplitude Values

Open or Short	0 dB to 5 dB
Antenna	15 dB to 25 dB
Connectors	30 dB to 40 dB

The display in Figure DTFI-2 shows the exact same measurement as Figure DTFI-1, but with a short connected to the end of the cable for the main purpose of finding the length of the system.

NOTE	An open or a short should be used only to find the length of the transmission system. The load or the antenna should be used to troubleshoot the system.

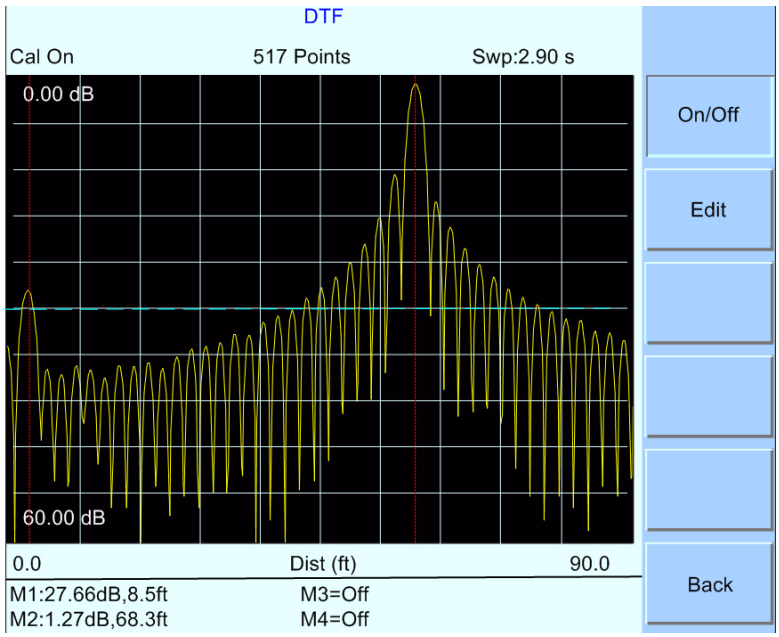


Figure DTFI-2.Transmission Line Terminated with a Short

The display in Figure DTFI-3 shows a 6 ft jumper cable connected to a 35 ft cable with a load at the end. As you can see, both the jumper connector and the end connector are about 35 dB down. This is a good transmission system.

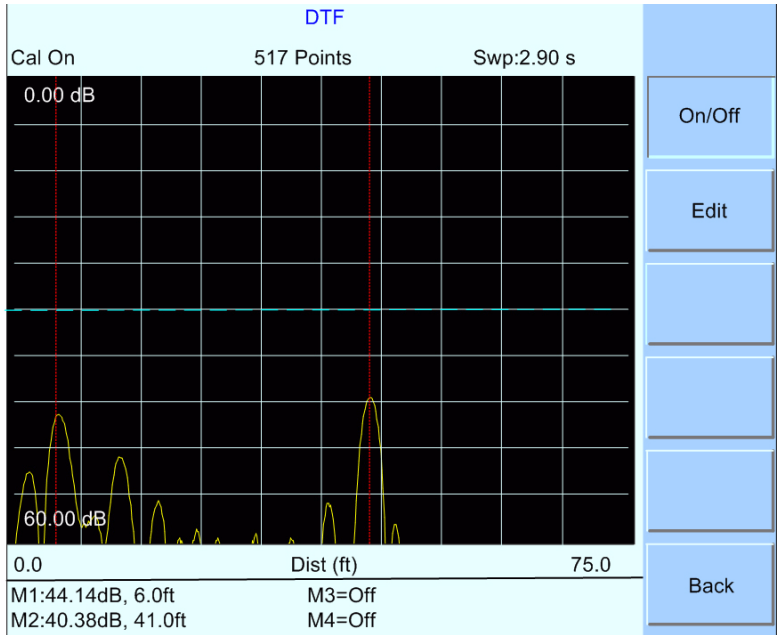
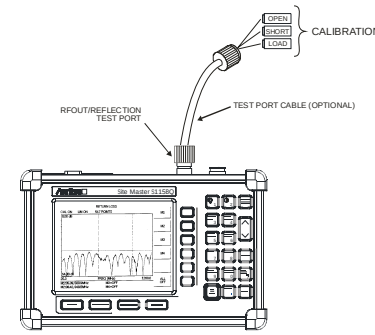


Figure DTFI-3.Transmission Line Terminated with a Load

Cable Loss

Cable Loss Measurement Procedure

1. Connect one end of the test port cable to the port labeled RF Out/Reflection.
2. Press the **MODE** function hard key and select Cable Loss – One Port and press **ENTER**
3. Enter the frequency range.
   a. Press the **FREQ/DIST** function hard key.
   b. Press the F1 soft key. Use the number keys to enter the lower frequency and press the **ENTER** key.
   c. Press the F2 soft key. Use the number keys to enter the upper frequency and press the **ENTER** key.
4. Calibrate the instrument.
   a. If the message in the upper-left corner says Cal Off, then you need to perform a calibration. If the message says Cal On, and if you have not changed the test port cable, then the calibration is valid and you can go to Step 5..
   b. Press **SYS**, press Application Options, and press CAL Mode. The bottom-left part of the display will say OSL Cal or FlexCal. Toggle to select the preferred calibration method.



NOTE	Flexcal is a broadband calibration that allows you to change the frequency after calibration. It is more time efficient and particularly helpful if you are troubleshooting the system. For optimum accuracy, the OSL Cal method is recommended.

   c. Press the **START CAL** (#3) key.
   d. Connect the **"Open"** to the end of the test port cable and press **ENTER**.
   e. Connect the **"Short"** to the end of the test port cable and press **ENTER**.
   f. Connect the **"Load"** to the end of the test port cable and press **ENTER**.
   g. Verify that the calibration was performed properly by checking that the Cal On message is now displayed in the upper-left corner.

NOTE	The Cal On message will change to Cal Off when the calibration is no longer valid. If you change the frequency range without using the FlexCal method, then the calibration will no longer be valid. A new calibration is also required if the temperature changes too much from the original temperature at the time the calibration was performed.

5. Setup the Display
   a. Press the **MEAS/DISP** function hard key and the Resolution soft key. Select 130,259, or 517 data points.
   b. Verify that the bottom display says Fixed CW Off. This is the best setting in RF-rich environments.
6. Connect the test port cable to the line to be tested. Use appropriate adapters to make the connection.
7. Save Display.
   a. Press **SAVE DISPLAY**.
   b. Use the soft keys to enter a file name.

8. The average cable loss value over the swept frequency range is displayed in the bottom part of the display, as shown in Figure CL-1.

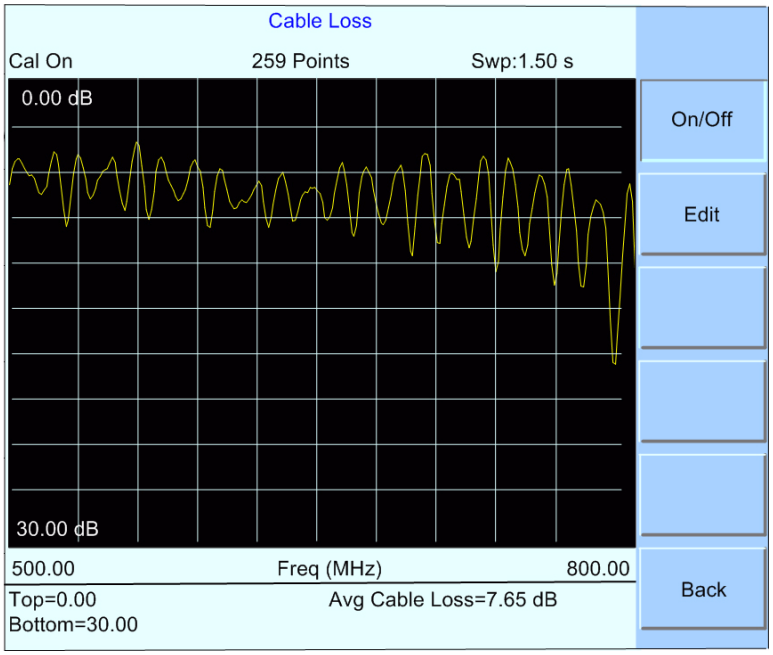


Figure CL-1. Cable Loss Measurement

Anritsu

Quick Reference Cards

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