Measurement of Cable loss with the help of RFME Signal Source and Power Detector:

This application note discusses the measurement of any kind of loss in any coaxial cable with the help of RFME's signal source and Power Detector. Here, a spectrum analyzer is used for verification of the results.

A Coaxial cable is an electrical cable consisting of an inner conductor surrounded by conducting shield but separated by a dielectric material. It has a protective outer sheath or jacket. The coaxial cable is a transmission line which is used to carry high frequency low loss electrical signals.

During the operation, installation and maintenance of an RF and microwave system the connecting cables may get damaged or its performance degrade over time. Hence they are required to be tested over a certain period of time. RF and microwave cables are core components in all RF systems as there is no system that does not have cables. Problems occur even in high quality cables and cables are often the weakest link. Usually problems are due to bends in the cable and water entry at the junctions.

Thus cable measurements are required to be verified and troubleshoot the electrical performance of RF and microwave transmission systems.
They are used for connecting radio transmitters and receivers to their antennas and as a connection from one test equipment to the other.
To do measurement of any component, the user first needs to take the direct reading with the help of two 50 Ohms coaxial cable and an adaptor in between.

For eg. Take the RFME signal source and set its frequency to 2.45GHz and signal level to -1dBm which is given as an input to the RFME power detector with the help of two coaxial cables and one adaptor in between as shown in the Figure: 1. The received signal can be easily measured at RFME Power Detector of -1.6dBm if there is a loss of -0.6dB in the coaxial cables and adaptor connected in between both the units. The below setup shows selection of Single mode with the switch position at 'S" on the signal

source and in the power detector, the switch is selected for dBm. Thus on RFME signal source it will be displayed as “2.450” for 2.45GHz and on RFME power detector, the results will be displayed in dBm as “-01.6” for -1.6 dBm.

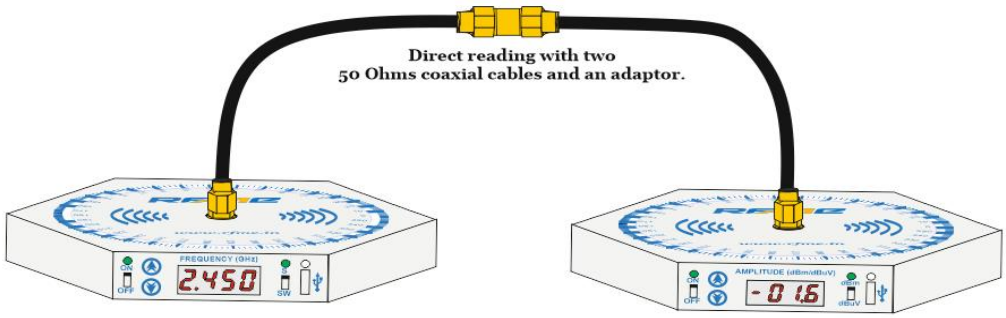

Figure: 1

In Figure: 2 A very similar setup is made but results on RFME power detector are displayed in dBuV.

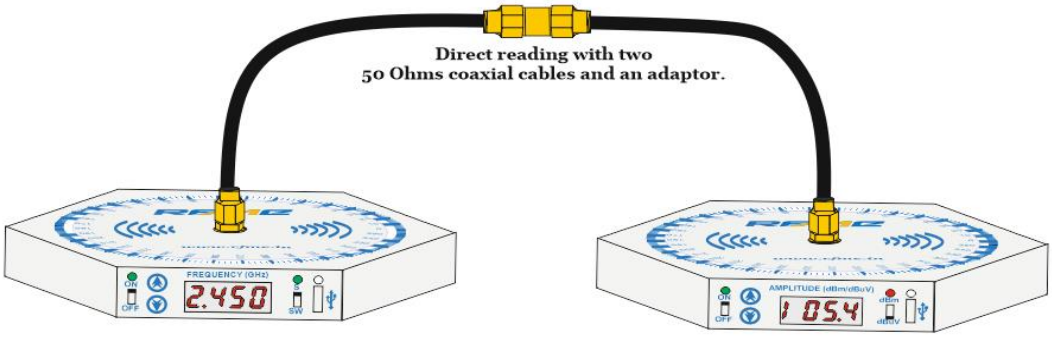

Figure: 2

In Figure: 3 a setup for testing a 50 Ohms coaxial cable can be observed in place of the adaptor in between the two coaxial cables. For the same frequency of 2.45 GHz It can be observed on the RFME power detector with the dBm selection as “-02.6” for 1dB loss in the cable tested at 2.45 GHz. *1

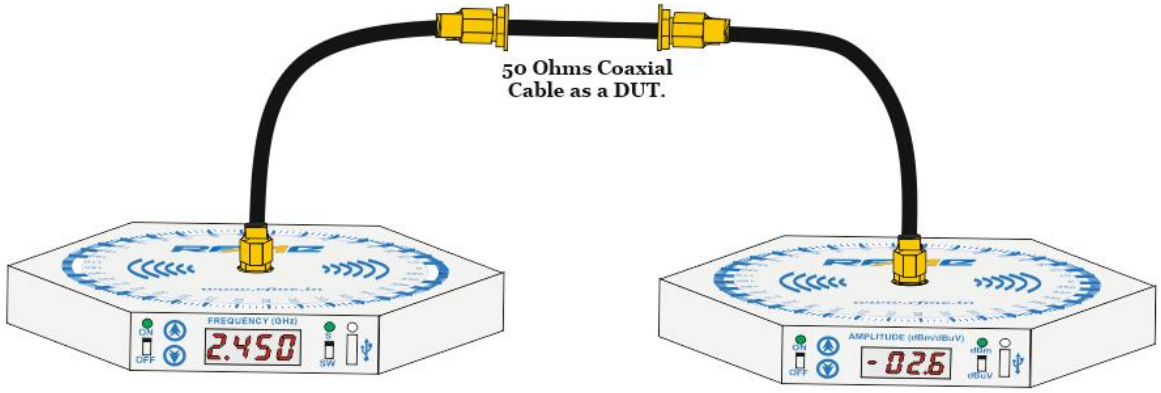

Figure: 3

Now if the user wants to check any other frequency which comes under the band of RFME signal source and 50Ohms coaxial cable. It can be easily checked with the same procedure listed above. *2

Note: *1) 1.6dB loss in the direct reading as measured.
*2) Coaxial cable can be checked in single mode only.
3) The measured data on the RF power detector can also be displayed in the dBuV when selected for dBuV with the help of the switch on the front panel.

Following is the table showing the cable measurements on Tx and Rx:

Sr.#	Frequency on signal source	Direct Reading on power detector	Reading on power detector with cable	Cable loss
1	**2.45 GHz**	**-01.6dBm**	**-02.6dBm**	**-01.0dBm**

*Cable loss = Reading on power detector with cable – Direct reading on power detector

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