

# Analysis of S-Parameters for RF Coaxial Cables at Different Environmental Conditions

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**Abstract:** RF coaxial cables are essential components in radio frequency and microwave systems. RF coaxial cables are necessary for the test and measurement systems. In spacecraft (TTC & Payload subsystem) testing, RF coaxial cables are used to uplink the signal from signal sources to spacecraft and receive the signal from spacecraft to measuring equipment. The performance of the RF coaxial cable can affect the test results of the spacecraft. The primary performance parameter for coaxial cable is the loss or attenuation. The losses are attributed to several factors and are present in all the RF Coaxial Cables. Environmental conditions affect coaxial cables, including temperature, pressure, moisture, dampness, etc. In this paper, an analysis of S-Parameters for RF coaxial cables at different environmental conditions is given. For this purpose, in the thermo vacuum chamber (TVAC), an experiment was conducted on N-type Polytetrafluoroethylene (PTFE) or Teflon coaxial cables during TVAC IST. A vector network analyzer and a computer with a LabVIEW-based application were used as a data acquisition system. All the processing of acquired data is done using the matrix laboratory (MATLAB) tool.

**Keywords:** Coaxial Cables, Integrated Spacecraft Testing (IST), MATLAB, Radio Frequency, Scattering (S) Parameters, Telemetry, Tracking and Commanding (TTC), Vector Network Analyzer (VNA)

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