W-BAND TRANSMISSION STUDIES

E.I. Smirnova (Los Alamos National Laboratory, ISR-6); R.D. McDonald (Los Alamos National Laboratory, NHMFL)

Introduction

Interest in millimeter-waves has increased in recent years due to applications in environmental monitoring and arms-control treaty verification. Remote detection of airborne chemicals, such as chemical effluent from materials processing facilities, is non-intrusive and suitable for examining large areas, compared to the alternative point detection or sampling techniques. ISR-6 group at Los Alamos National Laboratory is conducting research in area of millimeter-wave vacuum electronics and constructing a millimeter-wave travelling-wave tube. The ability to test 100 GHz and 300 GHz components is critical for the success of the ISR-6 projects.

Results and Discussion

An AB Millimetre MVNA-8-350-1-2 Network Analyzer can be utilized for to do vector measurements (simultaneous measurements of both, the amplitude and the phase of transmitted/reflected signal) over very broad frequency range extending from 8 to 300 GHz (wavelengths from 4 cm to 1 mm). We have employed the AB Millimetre MVNA-8-350-1-2 Network Analyzer to conduct the proof of principal measurements of several W-band (100 GHz) components. The tested components were: a 6 dB attenuator, a phase shifter and a wide-band ceramic window. The transmission and reflection coefficients were measured at the frequency band of 90-100 GHz. The results were compared to the previous measurements conducted with the Agilent HP8510C system, owned by ISR-6 group at LANL and excellent agreement was observed. The measured transmission through a ceramic window in the frequency range of 90-100 GHz is shown in Figure 1. Later on, we plan to conduct the proof of principle measurements of several 300 GHz components, which are only possible with the An AB Millimetre MVNA-8-350-1-2 Network Analyzer and are impossible with the existing the Agilent HP8510C system.

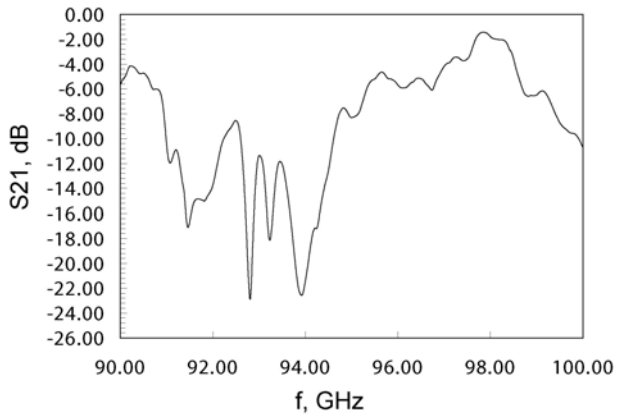

Figure 1: Transmission through a ceramic window.