

## V121a Measured Transmission Losses of Superconducting CPW and MS at 2mm Wavelength

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The transmission loss of superconducting thin-film transmission lines is a critical parameter in the design and assessment of millimeter-wave and sub-millimeter-wave superconducting RF circuits. Due to the extreme conditions of high frequencies and low temperatures, experimental measurement of transmission becomes prohibitively challenging. To overcome this, we have conducted loss measurements using on-chip silicon membrane-based transitions, a novel type of metal waveguide-to-thin-film transmission line transitions. Forming a two-port network, two back-to-back transitions are connected by thin-film transmission lines and measured with a network analyzer. We have successfully obtained the loss of coplanar waveguides and microstrip lines with high reliability by measuring a long transmission line approximately 60 wavelengths in length at a 2 mm wavelength. These results align consistently with measurements taken on half-wave resonators, as reported in the ASJ meeting last year. The findings reveal that the transmission loss is higher than the BCS prediction at 4 K, yet sufficiently low for the application of SIS mixers in astronomical observations.