

Abstracts

A Miniature Microwave Measurement Fixture for Operation Up to 40 GHz and at Temperatures Approaching Absolute Zero

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Research of sub micrometer structures in semiconductor physics often requires measurement of extremely weak signals at millimeter wave frequencies generated by small semiconductor chips at temperatures close to the absolute zero. In this paper we present a miniature fixture, in which such a semiconductor chip can be assembled. The fixture is attached to the end of a long 19 mm diameter metal pipe, which is part of the refrigeration system. These mechanical and environmental constraints dictate special design to achieve good performance up to 40 GHz. The complete fixture with a 50 ohm microstrip line exhibits a loss of 0.5 db at 20 GHz and 1.3 db at 40 GHz. The return loss is better than 15 db at 20 GHz and better than 10 db at 40 GHz, which is more than adequate for the required measurements.

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