

LOW NOISE FIXED TUNED 490 GHz SIS MIXERS MADE OF EPOXY RESIN

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Abstract:

We developed a method to make identical copies of a master mixer block, using a simple molding technique [1]. A 490 GHz copper mixer block with a fixed backshort [2] was used as the molding form. The structures with critical dimensions in the mixerblock, the waveguide cavity and the substrate channel, are copied into a silicone negative. An epoxy resin is used to mold these structures from the negative. The resin is placed as an inlet in a copper block. After sputtering a 1 μm gold layer onto the resin, we thicken this layer to 3 μm using a standard galvanic gold bath. Both the silicone and the resin show detailed reproduction of the original mixer block down to 1 μm dimensions. Experiments show that the copper block with the gold plated epoxy inlet stands multiple cooling to 4.2 K. The thermal conductivity of the resin proves to be sufficient for cooling SIS junctions. We achieve receiver noise temperatures of about 110 K DSB in the frequency range of 440-500 GHz, which compares well to our results with copper mixer blocks [2]. The method presented here is a promising technique to manufacture mixer blocks for imaging array applications in submm wave astronomy.

References:

- [1] T. W. Crowe et al. Compilation of Abstracts of the 8. International Symposium on Space Terahertz Technology, March 1997
- [2] S. Haas et al. International Journal of Infrared and Millimeter Waves Vol. 17, No. 3, 1996