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Title:WR-3 band waveguides and filters fabricated using SU8 photoresist micromachining technology
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Abstract:This paper demonstrates a two-layer SU8 photoresist micromachining technology that has similar performance to conventionally machined metal. The technology is demonstrated in the WR-3 band (220-325 GHz). Three different WR-3 band circuits, namely a WR-3 band straight through waveguide, a bandpass filter and a dual-band filter are demonstrated. For the measurements, a conventionally precision machined metal block was used for the WR-3 band waveguide and the bandpass filter to achieve good calibration and accurate interconnection with standard waveguide flanges; whereas, for the dual-band filter, two back-to-back right-angle bends are added in order to achieve accurate, reliable waveguide interconnection without using the metal block. A measured average insertion loss of 0.03 dB/mm has been achieved for the 14.97 mm long straight through waveguide. This is comparable to the loss of around 0.02 dB/mm for a standard metal waveguide at this frequency. The fifth-order waveguide filter exhibits an 8% 3 dB bandwidth at a central frequency of around 300 GHz. The minimum passband insertion loss was measured to be around 1 dB and the return loss was better than 10 dB throughout the passband. The filter results showed a notable improvement over those obtained from the separate SU8 layer technique that was also used to make the same devices for comparison. To further demonstrate the advantages of the new two-layer SU8 micromachining technique, the dual-band filter included isolated regions in the waveguide channels that would have not been possible for micromachining using the previous separate single layer technique. The performance of the micromachined dual band filter was excellent in terms of very low insertion losses on both passbands. © 2011-2012 IEEE.
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