Abstracts

LIGA micromachined planar transmission lines and filters

T.L. Willke and S.S. Gearhart. "LIGA micromachined planar transmission lines and filters." 1997 Transactions on Microwave Theory and Techniques 45.10 (Oct. 1997, Part I [T-MTT]): 1681-1688.

This paper introduces a new class of three-dimensional (3-D) micromachined microwave and millimeter-wave planar transmission lines and filters. The LIGA process allows tall (10 /spl mu/m-1 mm), high-aspect ratio metal structures to be very accurately patterned and is compatible with integrated circuit-fabrication processes. The tall metal transmission lines will enable the development of high-power monolithic circuits as well as couplers and filters that require very high coupling. Using conductor thickness as a new variable in filter design permits the fabrication of elements requiring a wider than usual range of even- and odd-mode characteristic impedances by lowering the attainable odd-mode impedance without greatly influencing even-mode impedance. Bandpass and low-pass filters fabricated using 200-/spl mu/m tall nickel microstrip lines are demonstrated at X-band. Insertion losses of the network testing setup and waveguides were calibrated out using the thru-reflection-line (TRL) calibration method via LIGA-fabricated calibration standards. The high aspect ratio and slope that the LIGA process offers will enable the design of end-coupled narrow-band bandpass filters and planar side-coupled 3-dB couplers. Filter structures were fabricated possessing coupling gaps with aspect ratios of better than 6.75 and conductor sidewall slope >89.9/spl deg/, figures that are easily obtainable with the LIGA process. Additionally, W-band 3-dB coplanar waveguide-coupler LIGA geometries suitable for implementation on gallium arsenide or membrane (i.e., air dielectric) substrates are presented. A thin film-to-LIGA tapered waveguide transition is presented which will allow integration of conventional planar transmission lines with these LIGA devices.

❑ Return to main document.