

## A Miniaturized X-Band 4-Stage LNA Designed Using a Novel Layout Optimization Technique

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S. Chaki, T. Takagi, Y. Tsukahara, H. Matsubayashi, N. Andoh, Y. Sasaki and M. Otsubo. "A Miniaturized X-Band 4-Stage LNA Designed Using a Novel Layout Optimization Technique." *1996 MTT-S International Microwave Symposium Digest 96.3 (1996 Vol. III [MWSYM]): 1213-1216.*

A novel layout optimization technique has been proposed and adapted to an X-band LNA. The layout pattern of the amplifier has been optimized in only two days by using simple equivalent circuits derived from electromagnetic simulation results. The amplifier has achieved a gain of 35 dB with a noise figure of 1.7 dB. These results have good agreement with simulated results, and the effective chip area is miniaturized to 4.8 mm<sup>2</sup>.

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