because of the smallness of their features and the tightness of their tolerances, quadrature hybrids and finline OMTs for terahertz frequencies cannot be fabricated by conventional machining. However, recent advances in both electromagnetic-field-simulating software and microfabrication techniques have made it possible to design and construct complexly shaped waveguide structures. The development of the proposed receiver is planned to include the use of a combination of optical lithography and a micro-machining process based on deep reactive ion etching (DRIE) of silicon. This combination is expected to enable the realization of micron-size waveguide features and sub-micron tolerances in fabricating the aforementioned critical components.

This work was done by Goutam Chatopadhyay, John Ward, Harish Manohara, and Peter Siegel of Caltech for NASA’s Jet Propulsion Laboratory. In accordance with Public Law 96-517, the contractor has elected to retain title to this invention. Inquiries concerning rights for its commercial use should be addressed to:

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Refer to NPO-42935, volume and number of this NASA Tech Briefs issue, and the page number.
Efficient Multiplexer FPGA Block Structures Based on G₄FETs

Fewer G₄FETs than conventional transistors would be needed to implement multiplexers.

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Generic structures have been conceived for multiplexer blocks to be implemented in field-programmable gate arrays (FPGAs) based on four-gate field-effect transistors (G₄FETs). This concept is a contribution to the continuing development of digital logic circuits based on G₄FETs and serves as a further demonstration that logic circuits based on G₄FETs could be more efficient (in the sense that they could contain fewer transistors), relative to functionally equivalent logic circuits based on conventional transistors.

Results in this line of development at earlier stages were summarized in two previous NASA Tech Briefs articles: “G₄FETs as Universal and Programmable Logic Gates” (NPO-41698), Vol. 31, No. 7 (July 2007), page 44, and “Efficient G₄FET-Based Logic Circuits” (NPO-44407), Vol. 32, No. 1 (January 2008), page 38. As described in the first-mentioned previous article, a G₄FET can be made to function as a three-input NOT-majority gate, which has been shown to be a universal and programmable logic gate. The universality and programmability could be exploited to design logic circuits containing fewer components than are required for conventional transistor-based circuits performing the same logic functions. The second-mentioned previous article reported results of a comparative study of NOT-majority-gate