

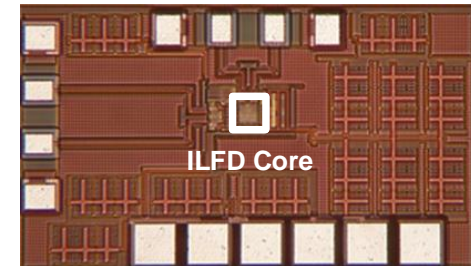
A Divide-by-4 and Divide-by-6 Injection-locked Frequency Divider using Even-Harmonic Direct Injection Method for V-band Applications

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A two-step mixing operation based on 4-stage ring-based ILFD using even-harmonic direct injection technique is proposed [1]. By first mixing the injection signals with stronger harmonic which naturally exists in a ring oscillator, locking range for higher order division ratios, *i.e.*, 4 and 6, can be improved. In this proposed topology, a reduction of required voltage headroom and an improved sensitivity over a large injection signal are achieved through the use of direct injection method and current tuning approach. The proposed ILFD is implemented in 65nm CMOS process, it achieves widest locking range reported for divide-by-6 operation resulting in an FoM of 4.0% per mW power consumption. For divide-by-4 operation, it can achieve an FoM of 7.8% per mW power consumption which is comparable to the state-of-the-art work.



- [1] T. Siriburanon, W. Deng, A. Musa, K. Okada, and A. Matsuzawa, "A 13.2% Divide-by-6, 3.1mW, ILFD using Even-Harmonic-Enhanced Direct Injection Technique for Millimeter-Wave PLLs," *IEEE European Solid-State Circuits Conference (ESSCIRC)*, pp. 403-406, Sep. 2013.