Low-K/Cu CMOS Logic Based SoC Technology for 10Gb Transceiver with 115GHz f_T, 80GHz f_{MAX} RF CMOS, High-Q MiM Capacitor and Spiral Cu Inductor

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Abstract

For the first time, foundry CMOS logic based RF technology is introduced for 10Gb/s transceiver in which active and passive RF elements have been realized in a single chip. Superior RF CMOS of 115GHz f_T, 80GHz f_{MAX}, and 2.2dB NF_{min} at 10GHz has been fabricated by aggressive device scaling and layout optimization. High Q MiM capacitor and spiral Cu inductor have been successfully implemented in the same chip by 0.13μm low-K/Cu BEOL technology. Core 1.0V MOS and/or junction varactors for VCO at 10GHz are offerings free of extra cost but realized by elaborated layout. Triple well is introduced to provide superior substrate noise isolation by >10dB suppression at 10GHz and beyond.