

# **A 17mW Transmitter and Frequency Synthesizer for 900MHz GSM Fully Integrated in 0.35- $\mu$ m CMOS**

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## ABSTRACT

A digital-to-frequency transmitter is implemented, where a sigma-delta phase-locked loop has sufficient resolution to select the channel and to modulate a GMSK signal with an on-chip VCO tuned to the GSM band. The system meets all GSM specifications for receive and transmit phase noise and spectral purity. Worst-case phase noise is  $-148.5$  dBc/Hz at 3 MHz offset and worst-case spur is  $-77$  dBc. The VCO contains a phase noise filter, and the SD modulator is 3<sup>rd</sup> or 2<sup>nd</sup> order in a 4<sup>th</sup> order PLL.