

## Abstract

Research Title : The Develop of Electronically Controllable Current-mode Multiphase Sinusoidal Oscillator

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This research presents the development and design of a multiphase sinusoidal oscillator (MSO) using CCCCTA-based allpass filters. The features of the proposed MSO are that: (1) Use of grounded capacitors and identical circuit configuration for each section in the MSO topology which are suitable for integration. (2) The electronic tunability of oscillation condition and oscillation frequency. (3) High-impedance current outputs. (4) The possibility of generating multi-phase signals for both an even and an odd number of equally-spaced in phases. (5) Independent tuning of the oscillation frequency and the oscillation condition. (6) Equality of amplitudes of each phase due to utilizing identical sections. (7) Requirement for only one CCCDTA as the active element for each phase without any additional current amplifiers and floating elements. The proposed circuit is then suitable for IC architecture

The PSpice simulations using the parameters of a 0.25 $\mu$ m TSMC CMOS technology with  $\pm 1.5$ V voltage supply,  $C=10$ pF,  $I_{B1}=50\mu$ A and  $I_{B2}=103\mu$ A show that at 6MHz, 3.51MHz and 5.8MHz of oscillation frequencies for 2, 3 and 4 phase system, the total harmonic distortions (THD) are about 1.84%, 1.27% and 0.63%, respectively. Moreover, the experimental results using commercial ICs (AD844 and LT1228) agree well with the theoretical anticipation.

Keywords: multiphase sinusoidal oscillator, CCCCTA, First order allpass filter, Current-mode