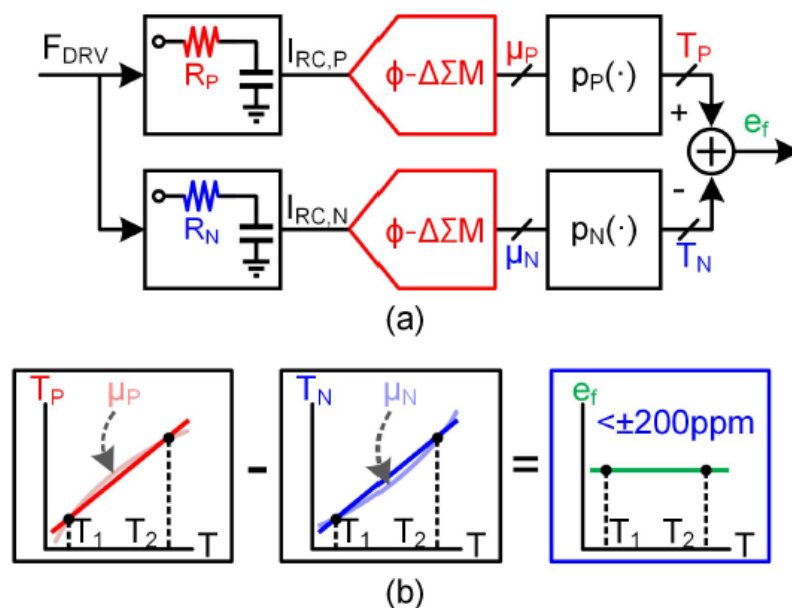


**Title:** RC Frequency References based on Dual-RC FLLs

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**Abstract:** This talk introduces a dual RC frequency reference. It consists of a digital frequency-locked loop (FLL) in which the frequency of a digitally controlled oscillator (DCO) is locked to a temperature-independent phase shift derived from two RC networks. It covers the operation principle of the dual RC architecture and a few design examples. The measurement results show the dual-RC frequency references achieve an inaccuracy of  $\pm 200\text{ppm}$  from  $-40^\circ\text{C}$  to  $85^\circ\text{C}$  after two-point trimming. It also has a potential to be used in battery-powered internet-of-things (IoT) applications, such as Bluetooth Low Energy (BLE).



Digital Temperature Compensation of Dual-RC Frequency Reference  
(a) Block diagram (b) Resulting temperature inaccuracy

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