A Low jitter, Fast recoverable, Fully analog DLL using Tracking ADC
For High Speed and Low Stand-by power DDR I/O interface

Se Jun Kim, Sang Hoon Hong, *Jae-Kyung Wee, Jin Hong Ahn, Jin Yong Chung
Advanced design TFT, NDP team, Memory R&D, Hynix Semiconductor
*Department of Electronics Engineering, Hallym University
Sejun.kim@hynix.com

Abstract

For high bandwidth and low stand-by power DDR (Double Data Rate) I/O interface, a new fully analog DLL (Delay Locked Loop) are designed and implemented in 0.16µm DRAM process. Utilizing a tracking ADC (Analog-to-Digital Converter), a large stand-by current of the analog DLL is suppressed without losing locking information nor compromising jitter performance. Two-step duty correction scheme using multiphase clocks and phase mixing corrects an inherent duty-error of a system clock with more precision and speed, especially for a large duty-error. Proposed DLL has a 100MHz~520MHz wide lock-range and a 65psec peak-to-peak jitter and 0.064psec/mv supply sensitivity at 2.3v supply voltage consuming 1.1mA of stand-by current.