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LIST OF SYMBOLS AND ABBREVIATIONS

Symbols

ω_{3dB}	-	3dB bandwidth
ω_{ref}	-	Angular frequency of reference clock
ω_{VCO}	-	Angular frequency of VCO
I_{avg}	-	Average Charge pump output current
I_{ss}	-	Bias current defined in one of the parallel transistor in delay element
C_{cons}	-	Capacitance of constant delay buffer stage
I_{cp}	-	Charge pump current
I_{cp}	-	Charge pump current
k_{fast}	-	Coeffecient associated with fast path
k_{slow}	-	Coeffecient associated with slow path
V_{ctrl}	-	Control voltage
V_{ctrl_FLL}	-	Control voltage of FLL
V_{ctrl_PLL}	-	Control voltage of PLL
ΔV	-	Control voltage ripple magnitude
ΔT	-	Control voltage ripple pulse width
ζ	-	Damping factor
A	-	Delay element gain
kp	-	Device transconductance parameter of PMOS transistor
F_{div}	-	Divided feedback clock
C_{eff}	-	Effective capacitance of oscillator
V_t'	-	Ideal control voltage under locked condition
ΔV_{ctrl}	-	Incremental change in control voltage
$\Delta\omega_{out}$	-	Incremental change in VCO angular frequency

ΔI_{cp}	-	Incremental charge pump current
F(s)	-	Loop filter
μ_p	-	Mobility of PMOS transistor
β	-	Modulation index
ω_n	-	Natural resonant angular frequency
H_{CP}	-	NTF of Charge Pump
H_{DIV}	-	NTF of divider
H_{LPF}	-	NTF of loop filter
H_{VCO}	-	NTF of VCO
C_B	-	Output capacitance of delay element
$\overline{i^2_{cp,n}}$	-	Output noise current PSD of charge pump
C_{ox}	-	Oxide capacitance
K_{PD}	-	PD gain
K_{PD}	-	PD gain
P	-	Peak power
θ_e	-	Phase error
H(s)	-	PLL closed loop transfer function
F_{out}	-	PLL output clock
N	-	Prescalar value
t_p	-	Propagation delay
$\overline{v^2_{lpf,n}}$,	-	PSD of loop filter noise voltage
$\overline{\Phi^2_{cp,n}}$	-	PSD of Output phase noise of PLL due to noise source in charge pump
$\overline{\Phi^2_{div,n}}$	-	PSD of Output phase noise of PLL due to noise source in divider
$\overline{\Phi^2_{out,n}}$	-	PSD of Output phase noise of PLL due to noise source in divider
$\overline{\Phi^2_{lpf,n}}$	-	PSD of Output phase noise of PLL due to noise source in loop filter

$\overline{\Phi^2_{vco,n}}$	-	PSD of Output phase noise of PLL due to VCO noise sources
y	-	Ratio of current defined in integral charge pump to the current defined in delay element
x	-	Ratio of current defined in proportional charge pump to the current defined in delay element
z	-	Ratio of current defined in transconductance stage to the current defined in delay element
F_{ref}	-	Reference clock
T_{ref}	-	Reference period
R_{slow}	-	Resistance of constant delay buffer stage
R_{fast}	-	Resistance of fast path delay element stage
R_{cons}	-	Resistance of slow path delay buffer stage
σ_t	-	RMS jitter
V_{bp}	-	Symmetric load bias voltage
R_{on}	-	Symmetric load resistance
V_{bn}	-	Tail current bias voltage
V_{bn_FLL}	-	Tail current bias voltage of FLL in dualloop
V_{bn_PLL}	-	Tail current bias voltage of PLL in dualloop
V_{TO}	-	Threshold voltage of MOS transistor
τ_{fast}	-	Time constant of fast path
τ_{slow}	-	Time constant of slow path
g_m	-	transconductance
W/L	-	Transistor aspect ratio
θ_{out}	-	VCO instantaneous phase
V_x	-	Virtual node voltage of opamp

Abbreviations

BG	-	Bias Generator
BSIM	-	Berkley Short Channel Insulated Gate Field Effect Transistor Model
CMFB	-	Common Mode Feed Back
CMOS	-	Complementary Metal Oxide Semiconductor
CP	-	Charge Pump
DLL	-	Delay Locked Loop
FD	-	Frequency Detector
FLL	-	Frequency Locked Loop
FoM	-	Figure of Merit
NTF	-	Noise Transfer Function
PFD	-	Phase Frequency Detector
PLL	-	Phase Locked Loop
PSD	-	Power Spectral Density
RMS	-	Root Mean Square
TSPC	-	True Single Phase Clocked
UGB	-	Unity Gain Bandwidth
UI	-	Unit Interval
UMC	-	United Microelectronics Corporation
UP / DN	-	Up / Down
VCO	-	Voltage Controlled Oscillator