DESIGN OF SUBSYSTEMS FOR MULTIBAND WIRELESS TRANSCEIVER

ARJUNA BIN MARZUKI

UNIVERSITI MALAYSIA PERLIS

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DESIGN OF SUBSYSTEMS FOR MULTIBAND WIRELESS TRANSCEIVER

by

ARJUNA BIN MARZUKI
(0640110116)

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LIST OF SYMBOLS

Ω	Ohm
γ	Noise parameter, γ = 2/3 for long-channel
δ	Coefficient of gate noise, $\delta = 2\gamma = 4/3$ for long-channel
α	Noise parameter, $\alpha = g_m / g_{d0}$
Γ	Reflection coefficient
Γ_S	Reflection coefficient looking into the source
Γ_{in}	Reflection coefficient looking into the input
Γ_L	Reflection coefficient looking into the load
Γ_{out}	Reflection coefficient looking into the output
μ_n	Mobility of electron
μ_p	Mobility of hole
ξ	Noise parameter of the uncorrelated portion of the transistor's gate noise
ξ_1	V_{DS} to V_{OV} ratio
κ	Noise parameter of the correlated portion of the transistor's gate noise
χ	Noise parameter that includes both correlated and uncorrelated portions of the transistor's gate noise
ρ	$\rho = V_{OV} / LE_{sat}$
ε_0	Permittivity of free space, $\varepsilon_0 = 8.854 \times 10^{-12}$ F/m
λ	Wavelength of the frequency of operation
A_d	Area drawn
A_v	Voltage gain
A_{vo}	Open-circuit voltage gain
B_c	Correlation susceptance
B_{opt}	Optimum susceptance
B_S	Source noise susceptance

B_{system}	System bandwidth
c	Correlation coefficient, c = j0.395 for long-channel devices
C_a	Areal capacitance
C_c	Coupling capacitor
C_{db}	Drain-Body capacitance
C_f	Feedback capacitor
C_{gd}	Gate-Drain capacitance
C_{gs}	Gate-Source capacitance
C_{gsn}	Gate-Source capacitance of NMOS
C_{gsp}	Gate-Source capacitance of PMOS
C_{gsT}	Total Gate-Source capacitance
c_{light}	Speed of light, $c_{light} = 3 \times 10^8$ m/s
C_{ox}	Oxide capacitance of NMOS
C_{oxn}	Oxide capacitance of PMOS
C_{oxp}	Oxide capacitance
C_p	Capacitance per unit periphery
C_t	Total capacitance
d	Largest dimension of the design
E_b	Average bit energy
$(E_b/N_t)_{eff}$	Average bit energy to noise and interference power spectral density minimum ratio
E_C	Average energy per PN chip
$\overline{e_n}$	External voltage noise generator
E_{sat}	Field strength at which the carrier velocity has dropped to one half the value extrapolated at low-field mobility
f	Frequency
F	Noise factor
f_{block}	Frequency of the block signal

fcw	Spurious response frequencies
f_{IF}	Frequency of the IF Signal
f_{LO}	Frequency of the LO Signal
F_{min}	Minimum noise factor
$F_{min}{}^{o}$	Minimum noise factor for the classical noise matching input stage of the LNA
f_{RF}	Frequency of the RF signal
f_T	Transition frequency
F_{UW}	Frequency of unwanted signal
F_{UW1} (CW)	Frequency of the first unwanted signal of the CW nature
F_{UW2} (Modulated)	Frequency of the second unwanted signal of the modulated nature
f_{wanted}	Frequency of the wanted signal
G_c	Correlation conductance
g_{d0}	Drain-Source conductance at 0 V_{DS}
G_f	Conductance of C_f
g_g	Real, noiseless conductance in the gate circuit
g_m	Transconductance of the transistor
G_m	Transconductance of the circuit
g_{mb}	Body-effect transconductance of the MOSFET
G_m-C	Transconductance-Capacitor
G_{m_eff}	Effective transconductance of the circuit
g_{mT}	Total transconductance
G_n	Conductance contributing to thermal noise due to $\overline{i_n^2}$
G_{opt}	Optimum conductance
G_S	Conductance contributing to thermal noise due to $\overline{i_S^2}$ or source conductance
$I_{blocking}$ (CW)	Blocking signal (CW) band power spectral density

I_c	Noise current correlated with e_n
I_D	DC drain current
$\overline{i_d^2}$	Channel thermal noise source
i_g^2	Shunt noise current to g_g
$\overline{i_{g,c}^2}$	Gate noise current source correlated with the drain noise
$\overline{i_{g,u}^2}$	Gate noise current source uncorrelated with the drain noise
$\overline{i_n}$	External current noise generator
I_{or}	The total transmit power spectral density of the forward link at the base station antenna connector.
$\hat{I}_{or}$	The received power spectral density of the forward link as measured at the UE antenna connector.
I_{ouw}	Unwanted signal specified by the W-CDMA standard for linearity tests
i_S	Noise source
i_u	Noise current uncorrelated with e_n
k	Boltzmann constant, $k = 1.38 \times 10^{-23}$ J/°K
K	Stability factor
K_{ox}	Relative permittivity of silicon dioxide
k Ω	kilo-ohm
L	MOSFET's channel length
L_d	Length drawn
L_g	Gate inductor
L_s	Source inductor
N_o	Noise spectral density
N_t	Noise and interference power spectral density
$P_{2ndorder(blocker}$	Power of the second-order products of the blocker signal
$P_{allowed}$	Noise power allowed
P_{AVN}	Power available from the network

P_{AVS}	Power available from the source
P_{BLeak}	Power of the blocker leakage
$P_{BLOCKER\ (in\text{-}band)}$	Power of the in-band blocker
$P_{CW(interferer)}$	Power of the CW interferer signal
P_D	Power dissipated by the LNA
P_d	Perimeter
$P_{DPCH(Rx)}$	Power of the dedicated physical channel at the receiver
P_I(acceptable)	Maximum allowable interference level
P_{INT}	Power of the interfering signal
$P_{intermodulation}$	Power of an intermodulation signal
$P_{modulated(interferer)}$	Power of the modulated interferer signal
P_N	Noise power
P_{N+I}	Power of noise + interference
$P_{N(actual)}$	Actual noise power
$P_{N(max)}$	Maximum allowable noise power
$P_{N(osc)}$	Noise power of the oscillator
P_o	A constant which is dependent on the process parameters v_{sat} and E_{sat}
P_{TxLeak}	Power of the Tx leakage signal
q	Electronic charge, q = 1.6 x 10^{-19} C
Q_{in}	Quality factor of the input stage
Q_{in,opt,P_D}	Optimum quality factor of the input stage
Q_{ind}	Quality factor of the inductor
Q_{opt}	Optimum quality factor
$Q_{parallel}$	Quality factor of the parallel output impedance
Q_S	Quality factor in the form of the actual source (input) conductance
Q_{series}	Quality factor of the series output impedance