

ANALYSIS AND DESIGN OF ANALOG INTEGRATED CIRCUITS

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Symbol Convention

Unless otherwise stated, the following symbol convention is used in this book. *Bias* or *dc* quantities, such as transistor collector current I_c and collector-emitter voltage V_{CE} are represented by uppercase symbols with uppercase subscripts. Small-signal quantities, such as the incremental change in transistor collector current i_c , are represented by lowercase symbols with lowercase subscripts. Elements such as transconductance g_m in small-signal equivalent circuits are represented in the same way. Finally, quantities such as *total* collector current I_c , which represent the sum of the bias quantity *and* the signal quantity, are represented by an uppercase symbol with a lowercase subscript.

On other hand, almost all the design of analog circuits has been oriented towards MOS transistorbased circuits mainly due to their low power consumption. Studies that address the sizing of circuits based on bipolar transistors remain very scarce although they have better speed (switching times) and wider bandwidths [1]. In addition, these studies deal with design considering the intrinsic parameters of bipolar transistors as fixed, such as the works [2,3] where an usual analog circuits are sized in which the current gain (β^2) and the baseemitter. For test and measurement purpose, an output buffer was designed and integrated with this LNA. Inductorless design approach of this LNA, together with the use of MOSCAPs as capacitors, help to minimize the die size.