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UTBB FDSOI Suitability for IoT Applications : Investigations at Device, Design and Architectural Levels

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Abstract

In this paper, we propose to analyze Ultra Thin Body and Box FDSOI technology suitability and architectural solutions for IoT applications and more specifically for autonomous Wireless Sensor Nodes (WSNs). As IoT applications are extremely diversified there is a strong need for flexible solutions at design, architectural level but also at technological level. Moreover, as most of those systems are recovering their energy from the environment, they are challenged by low voltage supplies and low leakage functionalities. We detail in this paper some Ultra Thin Body and Box FDSOI 28nm characteristics and results demonstrating that this technology could be a perfect option for multidisciplinary IoT devices. Back biasing capabilities and low voltage features are investigated demonstrating efficient high speed/low leakage flexibility. In addition, architectural solutions for WSNs microcontroller are also proposed taking advantage of Ultra Thin Body and Box FDSOI characteristics for full user applicative flexibility. A partitioned architecture between an Always Responsive part with an asynchronous Wake Up Controller (WUC) managing WSN current tasks and an On Demand part with a main processor for application maintenance is presented. First results of the Always Responsive part implemented in Ultra Thin Body and Box FDSOI 28nm are also exposed.

Keywords: UTBB FDSOI, IoT, Asynchronous Processor, Power Estimation, MCU
2016 MSC: ,

1. Introduction

The Internet of Things is supposed to encompass billions of connected devices. Among them, Wireless Sensor Nodes (WSN) are distributed and communicate through a network. They are able to measure physical or environmental conditions while transferring data through RF communication. Versatility and energy management are key concerns for those objects handling many different applications and requiring different performances in an autonomous way (Figure

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