Electronics
an Open Access Journal by MDPI

Impact Factor 2.9
CiteScore 4.7

Section
Microelectronics

mdpi.com/
journal/
electronics

MDPI

Section Information

Analog, digital, mixed, radio frequency (RF), resonant, radiation tolerant, low power, in vivo and other integrated electronic topics are now expanding in the microelectronics market due to increasing global demand.
This Section on Microelectronics is dedicated to publishing original research articles and cutting-edge reviews for the applications of microelectronics in emerging, frontier and challenging technologies. Electronics operating in extreme environments, such as vacuum, space, harsh radiation, extreme cold and other niche applications, is today pushing microelectronic design beyond the frontier of standard electronics.

Section Editor-in-Chief
Dr. Alessandro Gabrielli

Author Benefits

Open Access

Unlimited and free access for readers

No Copyright Constraints

Retain copyright of your work and free use of your article

Thorough Peer-Review

2022 Impact Factor: 2.9

(*Journal Citation Reports* - Clarivate, 2023)

No Space Constraints, No Extra Space or Color Charges

No restriction on the maximum length of the papers, number of figures or colors

Coverage by Leading Indexing Services

Scopus, SCIE (Web of Science), CAPlus / SciFinder, Inspec, and other databases

Rapid Publication

A first decision is provided to authors approximately 15.6 days after submission; acceptance to publication is undertaken in 2.6 days (median values for papers published in this journal in the second half of 2023)

Selected Papers

Basic Mechanisms of Single-Event Occurrence in Silicon Carbide Semiconductor under Terrestrial Atmospheric Neutron Irradiation

Authors: Daniela Munteanu and Jean-Luc Autran

Abstract: This numerical simulation work investigates the basic physical mechanisms of single events induced in a target layer composed of silicon carbide exposed to natural radiation with atmospheric neutrons at the terrestrial level. Using direct calculations and extensive Geant4 simulations, this study provides an accurate investigation in terms of nuclear processes, recoil products, secondary ion production and fragment energy distributions. In addition, the thorough analysis includes a comparison between the responses to neutron irradiation of silicon carbide, carbon (diamond) and silicon targets. Finally, the consequences of these interactions in terms of the generation of electron–hole pairs, which is a fundamental mechanism underlying single-event transient effects at the device or circuit level, are discussed in detail.

https://doi.org/10.3390/electronics12214468

A Highly Configurable Packet Sniffer Based on Field-Programmable Gate Arrays for Network Security Applications

Authors: Marco Grossi, Fabrizio Alfonsi, Marco Prandini and Alessandro Gabrielli

Abstract: Web applications and online business transactions have grown tremendously in recent years. As a result, cyberattacks have become a major threat to the digital services that are essential for our society. To minimize the risks of cyberattacks, many countermeasures are deployed on computing nodes and network devices. One such countermeasure is the firewall, which is designed with two main architectural approaches: software running on standard or embedded computers, or hardware specially designed for the purpose, such as (Application Specific Integrated Circuits) ASICs. Software-based firewalls offer high flexibility and can be easily ported to upgradable hardware, but they cannot handle high data rates. On the other hand, hardware-based firewalls can process data at very high speeds, but are expensive and difficult to update, resulting in a short lifespan. To address these issues, we explored the use of an (Field-Programmable Gate Array) FPGA architecture, which offers low latency and high-throughput characteristics along with easy upgradability, making it a more balanced alternative to other programmable systems, like (Graphics Processor Unit) GPUs or microcontrollers. In this paper, we presented a packet sniffer designed on the FPGA development board KC705 produced by Xilinx, which can analyze Ethernet frames, check the frame fields against a set of user-defined rules, and calculate statistics of the received Ethernet frames over time. The system has a data transfer rate of 1 Gbit/s (with preliminary results of increased data rates to 10 Gbit/s) and has been successfully tested with both ad hoc-generated Ethernet frames and real web traffic by connecting the packet sniffer to the internet.

https://doi.org/10.3390/electronics12214412

Toward the Use of Electronic Commercial Off-the-Shelf Devices in Space: Assessment of the True Radiation Environment in Low Earth Orbit (LEO)

Authors: Oscar Gutiérrez, Manuel Prieto, Alvaro Perales-Eceiza, Ali Ravanbakhsh, Mario Basile and David Guzmán

Abstract: Low Earth orbit missions have become crucial for a variety of applications, from scientific research to commercial purposes. Exposure to ionizing radiation in Low Earth Orbit (LEO) poses a significant risk to both spacecraft and astronauts. In this article, we analyze radiation data obtained from different LEO missions to evaluate the potential of using electronic commercial off-the-shelf (COTS) devices in space missions. This study is focused on the total ionizing dose (TID). Our results demonstrate that COTS technology can effectively provide cost-effective and reliable solutions for space applications. Furthermore, we compare the data obtained from actual missions with computational models and tools, such as SPENVIS, to evaluate the accuracy of these models and enhance radiation exposure prediction. This comparison provides valuable insights into the true radiation environment in space and helps us to better understand the potential of COTS technology in reducing costs and development times by utilizing technology previously used in other areas.

https://doi.org/10.3390/electronics12194058

A 65-nm CMOS Self-Supplied Power Management System for Near-Field Wirelessly Powered Biomedical Devices

Authors: Seyedfakhreddin Nabavi and Sharmistha Bhadra

Abstract: This paper proposes a self-supplied power management system to efficiently rectify and regulate the AC voltage received from wireless power transmission techniques to power or recharge biomedical devices. The proposed power management system comprises three integrated functional units, namely, a fully cross-coupled rectifier, a self-biased reference voltage, and a capacitor-less low-dropout regulator (LDO). To reduce the current complexity of designing capacitor-less LDOs, a new architecture based on a pair of diode-connected transistors at the load of the LDO is devised which alleviates the need for a large load capacitor. The proposed power management system is implemented in a 65-nm CMOS process with an active chip area of 0.0810 mm^2. Experimental results indicate that this system is capable of rectifying an AC signal up to 5 V at a frequency of 6.78 MHz. This rectified signal is then regulated to a fixed DC voltage of 1.75 V, while the load current can vary between 0 and 75 mA, with a maximum voltage dropout of 170 mV. Furthermore, the ability of the power management system to drive low-power consumer electronics is demonstrated, and its superiority is evidenced by a performance comparison with the latest integrated power management systems presented in the literature.

https://doi.org/10.3390/electronics12224622

Invitation to Submit

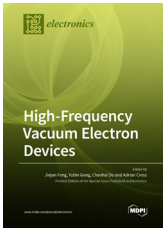
Microelectronics in Korea - Emerging Electronic Components and Electronic Devices in Industrial 4.0 Era

Guest Editors: Jonghwa Eom, Jonghwa Eom and Muhammad Farooq Khan
Deadline: 15 September 2024

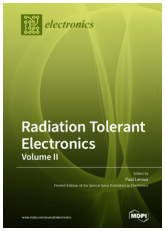
Advanced Non-Volatile Memory Devices and Systems

Guest Editors: Jérémy Postel-Pellerin and Vincenzo Della Marca
Deadline: 15 October 2024

Special Issue Reprints



High-Frequency Vacuum Electron Devices



Radiation Tolerant Electronics, Volume II

MDPI is a member of

Editorial Office
electronics@mdpi.com

MDPI
St. Alban-Anlage 66,
4052 Basel, Switzerland
Tel: +41 61 683 77 34
mdpi.com