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RADIATION HARDENED SYSTEM ON MODULE APPROACH TO REUSABLE SPACECRAFT
PROCESSING ELEMENTS

Abstract

This paper presents a proof of concept point design for modular on-board spacecraft processing elements. The demonstrated module will significantly reduce design timelines, cost and risk of increasingly complex board and box designs. Additionally, this design will maximize the flexibility to adapt to a wide array of mission requirements and new device technologies as they emerge. Integrated solutions known as System on a Chip (SoC) Field Programmable Gate Arrays (FPGAs) provide significant utility while driving up the complexity of board designs due to the high Input/Output (IO) density and necessary support circuitry. The complexity and risk of these SoC devices can be contained (and subsequently reduced) by designing them into a System on Module (SoM). This RADSoM design is the only proposed radiation hardened System on Module (SoM) solution for the Space market. RADSoM contains the design complexity of cutting edge radiation hardened/tolerant SoC FPGA and high-speed memory solutions to an easy-to-use, highly-reusable mezzanine card that will truly be “build to print” for a wide variety of space applications. This paper presents the entirety of the RADSoM design and test of prototype RADSoM units, followed by a brief discussion of the many potential uses for a space grade FPGA SoM.