SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Poster Session (P)

Author: Mr. Xiaodi Zhang
CASC, China, cyntina1984@hotmail.com

RESEARCH AND DESIGN OF THE RADIATION HARD FFT PROCESSOR FOR SATELLITE

Abstract

Fast-Fourier Transform is the most important and basic algorithm of digital signal processing, has a very wide range of applications in the field of digital audio codec, image processing, sonar signal analysis, spectrum analysis, radar signal processing, electronic countermeasures, digital communication, biomedical engineering. In this paper, based on the analysis of the FFT algorithm, using a parallel computing method combined with structure, built a DIT and DIF dynamically reconfigurable mixed-radix 32K point FFT processor ASIC design. The processor utilize synchronization control refreshing technology to reduce the the probability of the single event function interrupt(SEFI) of space applications. SRAM and D-flip-flop use indepently developed radiation hard standard cell libraries and DICE structure, effectively resolved space Single Event Upset(SEU). Using the chip layout reinforcement desin to solve the problem of the radiation damage in single event latch(SEL) and total ionizing dose(TID). The FFT processor ASIC with small-scale, low power consumption, the throughput of data processing is 300MIPS in 32bit complex operation, dynamic range up to 90dB, has applied on satellites, and shows good effects.