RADIATION EFFECTS DATA WORKSHOP

W-28L **HBI Hardening of Texas Instruments' VC33 DSP**

R. T. Fuller, W. Morris, D. Gifford, R. Lowther, Silicon Space Technologies; J. Salzman, Texas Instruments; D. Alexander, Air Force Research Laboratory

Hardening of Texas Instruments' commercial 250nm VC33 DSP without design or mask changes has been demonstrated. TID, SEU, and dose rate results are compared for each functional block of the commercial and hardened circuit.

W-29L **SEU Testing of SiGe Bipolar and BiCMOS Circuits**

D. L. Hansen, A. Le, K.-C. Chesnut, E. J. Miller, S. Pong, S. Sung, J. Truong, Boeing

Bipolar and BiCMOS divider circuits were tested using heavy ions to determine their sensitivity to single-event effects (SEE). Both devices showed acceptable upset characteristics and no catastrophic upset modes were observed.

W-30L **Single Event Transient and ELDRS Characterization Test Results for LM4050 2.5V Precision Reference**

E. Donatoni, K. Kruckmeyer, R. Eddy, T. Thang, S. Tom, National Semiconductor

National Semiconductor’s 100 krad(Si) low dose rate qualified, 2.5V precision reference, LM4050WG2.5RLQV, was put through heavy ion testing and low dose rate total ionizing dose characterization. The results are presented here.

W-31L **Single-Event Latchup (SEL) and Functional Interrupt (SEFI) Characterization of the 65nm Virtex-5QV Field Programmable Gate Array**

G. M. Swift, C. H. Carmichael, C. Tseng, Xilinx; G. R. Allen, JPL

Device-level measurements for the XQR5VFX130 FPGA, Xilinx first upset-hardened-by-design device, demonstrate latchup immunity (even at maximum temperature, voltage and LETs) and almost immeasurably small proton and heavy-ion SEFI susceptibilities.

SESSION D SINGLE-EVENT EFFECTS: MECHANISMS AND MODELING

PD-10L Monte-Carlo Based Charge Sharing Investigations on a Bulk 65nm RHBD Flip-Flop

S. Uznanski, G. Gasiot, P. Roche, ST Microelectronics; J.-L. Autran, Aix-Marseille University and CNRS

Charge sharing between different transistors of a dual-interlocked storage cell (DICE) manufactured in 65nm CMOS Bulk is analyzed using a new proprietary Monte-Carlo tool suite named TIARA (Tool suIte for rAdiation Reliability Assessment).

PD-11L Muon-Induced Single Event Upsets in Deep-Submicron Technology

B. D. Sierawski, M. A. Clemens, R. A. Reed, M. H. Mendenhall, R. A. Weller, R. D. Schrimpf, Vanderbilt University; E. W. Blackmore, TRIUMF; R. C. Baumann, Texas Instruments

Experimental data are presented that show low-energy muons are capable of upsetting microelectronic devices. Muon-induced single event upsets are reported for 65 nm and 45 nm CMOS SRAMs using a surface muon beamline.

SESSION E RADIATION EFFECTS IN DEVICES AND INTEGRATED CIRCUITS

PE-9L TID in Flash-Based FPGA: Power Supply-Current Rise and Logic Function Mapping Effects in Propagation-Delay Degradation

F. L. Kastensmidt, R. Chipana, G. Wirth, UFRGS; E. Junior, R. Galhardo, O. Goncalez, IEAv

We exposed flash-based FPGA to radiation to measure variations in current, temperature, propagation-delay and duty-cycle in logic circuits. Propagation-delay degradations vary from 400% to 1100% before functional failure, according to circuit.

SESSION F SINGLE-EVENT EFFECTS: TRANSIENT CHARACTERIZATION

PF-7L A Comprehensive Understanding of the Efficacy of N-Ring SEE Hardening Methodologies in SiGe HBTs

S. D. Phillips, K. A. Moen, L. Najafizadeh, R. Diestelhorst, J. D. Cressler, Georgia Institute of Technology; A. K. Sutton, IBM; G. Vizkelethy, P. Dodd, Sandia National Laboraties; P. W. Marshall, Consultant

The practice of incorporating N-Rings in SiGe HBTs is re-examined for single device and circuits using measured microbeam data and 3D simulations; exploring the consequential trade-offs and benefits of this hardening methodology.

SESSION G HARDNESS ASSURANCE

PG-6L **Laser-Plasma-Accelerators as Novel Ultra-Versatile Tools for Space Radiation Studies**

B. Hidding, T. Koenigstein, O. Willi, G. Pretzler, Heinrich-Heine-University Duesseldorf; J. Rosenzweig, UCLA; K. Nakajima, KEK

Laser-Plasma-Accelerators are proposed for advanced space radiation studies. They have the potential to provide cost-effective beam time, to access totally new radiation regimes and to substantially increase reliability of future space missions.

PG-7L **Methodology for Testing Low Energy Proton Effect on Electronic Devices**

C. Weulersse, F. Miller, SI/EN; D. Alexandrescu, E. Schaefer, iRoC Technologies; R. Gaillard, Consultant

A patented methodology is proposed to experimentally assess the sensitivity of a component with regard to the direct ionization of protons. The efficiency of the methodology is evaluated on a 65nm bulk SRAM device.

SESSION H DOSIMETRY

PH-5L **Las Dos Torres: a Radiation Monitor for NANOSAT 1B**

J. J. Jimenez, J. Martinez-Oter, V. Apestigue, I. Arruego, S. Ibarmia, S. Esteve, J. Sanchez, C. Hernando, M. Alvarez, H. Guerrero, INTA; W. Hajdas, PSI

The proton monitor on board NANOSAT 1B, Las Dos Torres (i.e. The Two Towers), and its data are presented. This work summarizes preliminary results of the first nine months of in-orbit operation.

SESSION I SINGLE-EVENT EFFECTS: DEVICES AND INTEGRATED CIRCUITS

PI-8L **Effect of Shielding on SER in Devices That Are Sensitive to Particle Range**

L. D. Edmonds, L. Z. Scheick, JPL

Single-event rates in space can include contributions from low-energy particles such that the LET is not constant, which is often important for SEGR. A rate calculation algorithm for such a situation is derived.