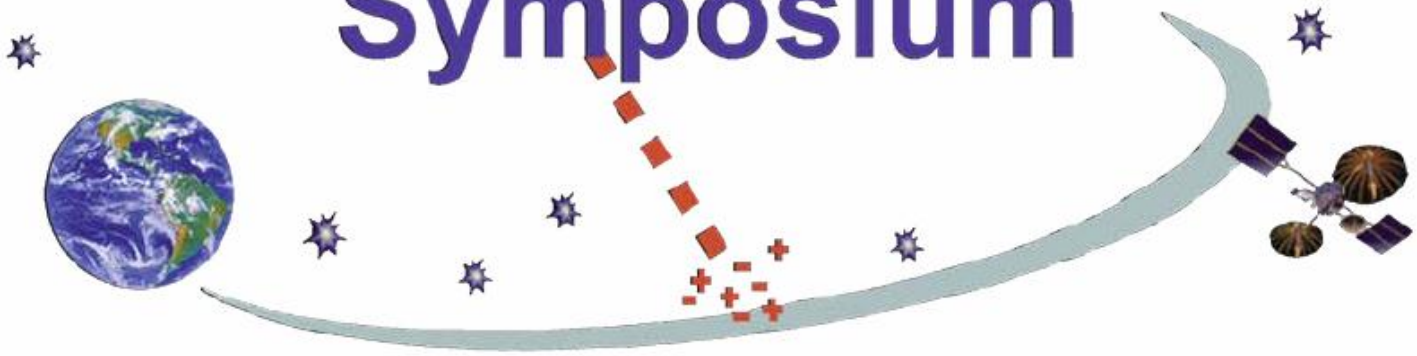
2012 Single Event Effects Symposium



San Diego, April 3rd – 5th, 2012

Conference agenda

List of sessions:

- Design and Process Hardening
- Single Event Test Facilities
- SEE on Commercial Memories
- Single-Event Transients
- Single-Event Test Methods
- Destructive SEE
- Product, Technology, System SEE

Conference agenda

- Lot of space and army oriented topics
- Memory test (NAND flash), Point of load DC/DC converters, ADC converters, FPGAs…
- SET
- Mitigation techniques like “scrubing” (removing errors from a memory's content by re-writing it periodically with correct values)
- SEL protection by an adjustable over current detection that forces a power cycling of the full system in case of SEL detection
- Device hardening by placement of redundant blocks sufiicciently far apart to not be influenced by the same incident partcle

Quantity of laser aided diagnostics

AEROFLEX

Single Event Functional Interrupt Location and Elimination via Pulsed Laser Scanning on a RadHard CMOS 16-bit ADC

Alfio Zanchi, Shinichi Hisano, Craig Hafer, and David B. Kerwin

Aeroflex Colorado Springs, Inc. – Colorado Springs, CO

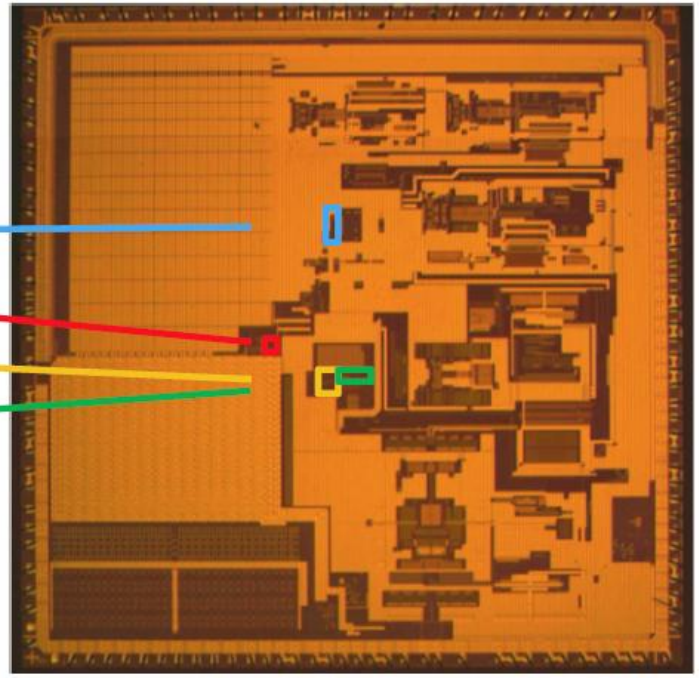
SEE Symposium – San Diego, CA (U.S.A.) – April 3rd, 2012

SET effects due to E-H in various blocks

Pulsed laser scanning

- Factors of uncertainty of the test
  - no direct pulse energy sense (photodiode) available in Aeroflex
  - is metallization completely open over sensitive block: no de-rating?

- Areas subject to laser pulses
  - Bandgap
  - POR
  - VREF generator
  - Voltage drivers



Studies of SET with short X-ray pulses

AEROSPACE
Assuring Space Mission Success

Single Event Transients Induced by the Absorption of Picosecond X-ray Pulses

David Cardoza, Stephen D. LaLumondiere, Michael A. Tockstein
Steven C. Witczak, Yongkun Sin, William T. Lotshaw and Steven C. Moss

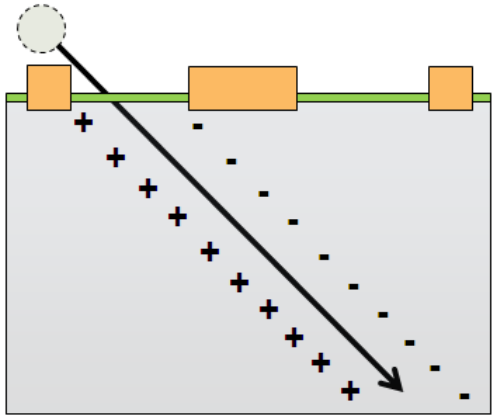
The Electronics and Photonics Laboratory
The Aerospace Corporation

4 April 2012

SEU location by Laser or X-ray

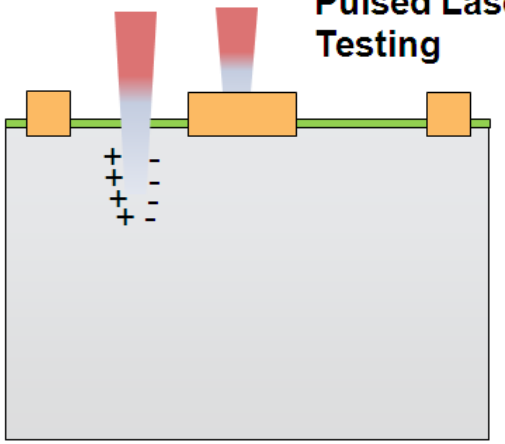
Motivation for Short X-ray Pulses

Traditional Accelerator Facility



- Large Penetration Depth
  - Generates Charge Tracks
- Penetrates Metallization
- Unless microbeam facility or mask used, difficult to spatially locate upset location.

Pulsed Laser Testing



- Focusable – relatively high spatial resolution.
- Charge carriers generated in skin-depth volume around focus
- Unable to penetrate metallization
- Two photon techniques can be used to evade metallization via backside illumination.

David.M.Cardoza@aero.org
The Electronics and Photonics Laboratory/The Aerospace Corporation

XILINX FPGA Devices SEE evaluation

From 250nm to 28nm Terrestrial SER Xilinx FPGA Devices

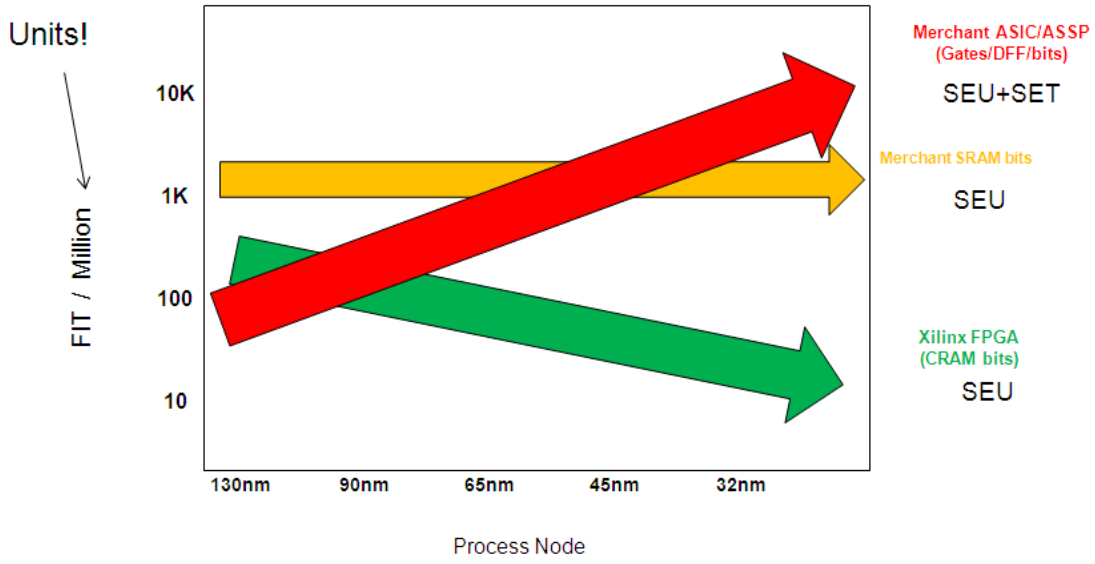
Austin Lesea

For Presentation

XILINX FPGA Devices SEE evaluation

Advances in protection of the configuration memory

Xilinx View: our per bit FIT gets better



XILINX.

Destructive test of IGBTs

Trench Fieldstop Insulated Gate Bipolar Transistor (IGBT) failures at ground level

Antoine Touboul, Lionel Foro, Frédéric Wrobel, Frédéric Saigné

Destructive test of IGBTs

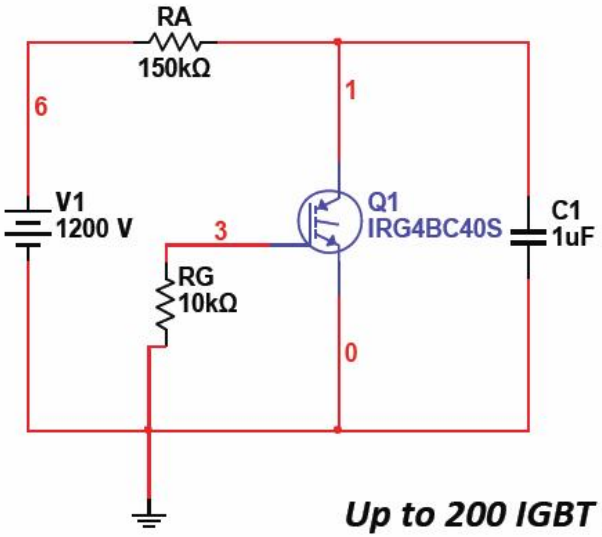
1200V-IGBT failures under ANITA atmospheric like spectrum,TSL

Sensitive state for SEE triggering is OFF state

V_{CE} from 70% to 100% of V_{CEMAX}, V_{GE}=0V

Contrary to test of digital devices, the failure does not affect a bit but the whole device itself.

1 failure=1 device lost
Hard to get good statistics

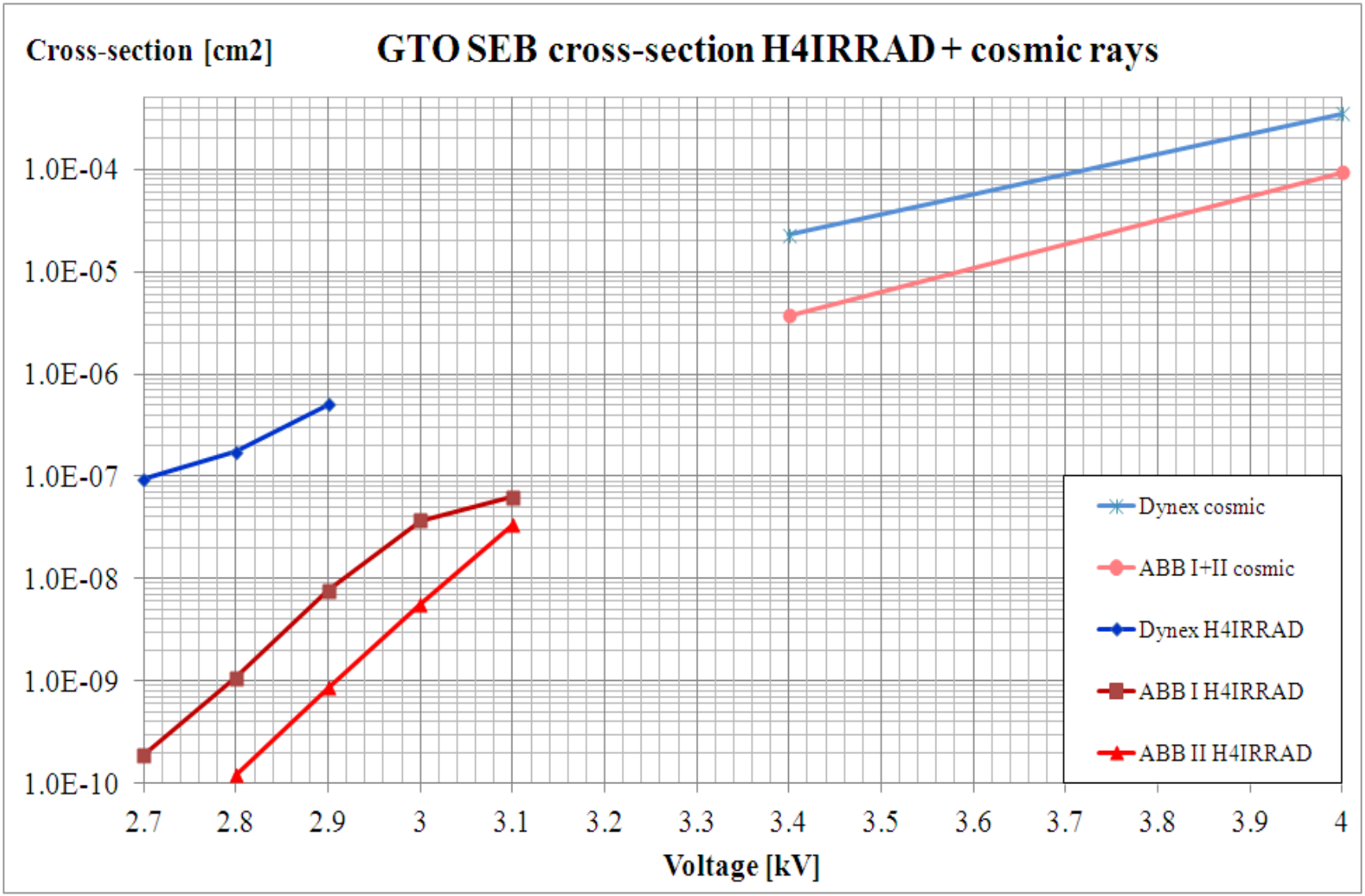


Up to 200 IGBT tested in the same time

Conference agenda

Non-destructive SEB tests of HV GTO-like thyristors

Conference agenda



Conference agenda

Measurement output example

- Influence of experienced SEBs to c-s measurement - Dynex at 2.7 kV:
  - c-s = $1{,}22.10^{-7}$ cm^2 after first 49 SEBs
  - c-s = $1{,}24.10^{-7}$ cm^2 after 99 SEBs
  - c-s = $0{,}92.10^{-7}$ cm^2 after 162 SEBs