Single Event Transients in Low Voltage Dropout (LVDO) Voltage Regulators

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Outline

- Background – Introduction
- Summary of recent test results
  - RHLP4913
  - MSK5900
- Conclusion
Background

- Voltage regulators are sensitive to heavy ion induced Single Event Transients
  - SET amplitude is small (<1V) because of large output capacitors used in typical applications

SET in voltage regulators are critical for FPGA RTAX
  - DC core absolute max rating = 1.6V
  - 1.5V core supply voltage recommended operating conditions: 1.425V min, 1.575V max
Summary of test results, RHLP4913 from STM, Bias condition

RHL4913 from STM SET cross section curves - Effect of load
RHLP4913 from STM SET cross section curves - Effect of filter

To be presented by Christian F. Puey at the 2009 Single Event Effects Symposium (SEE/SYM), April 10, 2009 to April 12, 2009 in Long Beach, CA.

RHLP4913 from STM, Typical SETs, Cout=10μF, no filter

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RHLP4913 from STM, Typical SETs, Cout=660μF, no filter

RHLP4913 from STM, Typical SETs, Cout=10μF, with filter
Summary of test results, MSK5900 from MS Kennedy, Bias condition 1

Summary of test results, MSK5900 from MS Kennedy, Bias condition 2
MSK5900, SET cross section curves

MSK5900, Typical SETs, RC filter
Conclusion

- SET sensitivity changes significantly from type to type
- Worst case bias is different from type to type
- Adding up output capacitors is not always effective
- Filtering does not remove all SETs
- Filtering methods without resistor elements proved to be effective