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OUTBRIEF: Sandia Transistor Experiment OMEGA 20 May 2015 DT High Yield

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Advanced Nuclear Concepts
Sandia National Laboratories



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Experimental Campaign Goals and Results at OMEGA



Goals

- Observe neutron damage to semiconductor devices using high yield DT pulses
 - Measured through degraded device gain in 2N1486 Si BJT power transistor, evolution from microseconds to seconds
- Exercise capability to perform neutron experiments at OMEGA
 - Full run through of experimental design, planning, execution
 - Full use of Sandia equipment – scopes, devices, data acquisition system
 - Exercise use of existing TIM cable chain, including buried coax in 19-pin MIL connector

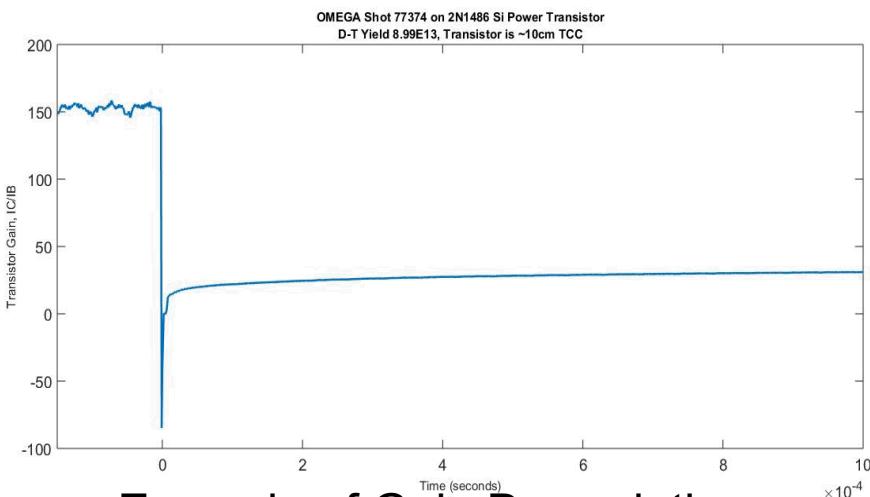
Results

- Observed transistor gain degradation of over 50% as early as 4-10 microseconds after pulse
- Current cable chain was utilized without major flaws
 - Little to no observable noise, signal reflections in coax cable may have been observed, but quickly subsided
- Sandia's Nuclear Effects Diagnostic (NED) design performed without issue
 - Adaptation from OMEGA's existing TAD diagnostic was successful, lowered "cost of entry" and enabled fielding in less than 6 months from start of task
- Successfully integrated Sandia's data acquisition into LLE's infrastructure
- Reviews, documentation and approvals were smooth
 - Includes the "new" methods for OMEGA transient diagnostic tracking, review/approval

Conclusions, Sample Data, and Pictures of Diagnostic

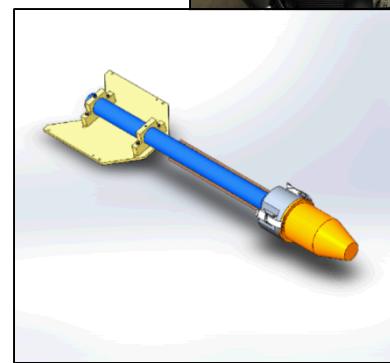
OVERALL CONCLUSION

Highly successful test campaign to exercise the use of OMEGA as supplement/compliment to Sandia's Z machine for high yield, high energy neutron testing



Example of Gain Degradation

Simple Data Acquisition Setup



“NED” Device and Fixture