

## Synergistic Effect of Mixed Neutron and Gamma Irradiation on Bipolar Operational Amplifier OP07

*Saturday 26 September 2015 19:40 (1 minute)*

This paper presents the synergistic effects on bipolar operational amplifier OP07. The radiation effects were investigated by neutron beam, gamma ray, mixed neutron and gamma ray environments. The trend and character of the synergistic effects were studied through comparison and analysis on different experiment results. Results show that the bipolar operational amplifier OP07 exhibited significant synergistic effects of mixed neutron and gamma irradiation. Besides, the bipolar transistor was considered as the most sensitive unit of the operational amplifiers. In this paper, a series of experiments were done on bipolar transistors in different radiation environments. The synergistic effect was also observed on these transistors in the mixed neutron and gamma irradiation environments, which leads to the faster degradation of bipolar operational amplifiers. In the theoretical simulation, the geometric and calculation model based on the Medici software package have been constructed for analyzing bipolar components. The effect of mixed neutron and gamma irradiation has been simulated based on the mechanism understanding of the radiation effect on bipolar transistors, and the simulated results show that the trend is consistent with the experimental data. The results of the experiments and simulation indicate that the radiation effect of the bipolar devices in mixed neutron and gamma environments is not a simple combination of TID effect and displacement damage, and the TID effect could enhance the displacement damage. The synergistic effect should not be neglected in complex radiation environments.

**Author:** Mr LIU, Yan (State Key Laboratory of Intense Pulsed Radiation Simulation and Effect, Northwest Institute of Nuclear Technology, P. O. Box 69-10, 710024, Xi'an, China)

**Co-authors:** Ms WANG, Chenhui (State Key Laboratory of Intense Pulsed Radiation Simulation and Effect, Northwest Institute of Nuclear Technology, P. O. Box 69-10, 710024, Xi'an, China); Mr LIN, Dongsheng (State Key Laboratory of Intense Pulsed Radiation Simulation and Effect, Northwest Institute of Nuclear Technology, P. O. Box 69-10, 710024, Xi'an, China); Mr YANG, Shanchao (State Key Laboratory of Intense Pulsed Radiation Simulation and Effect, Northwest Institute of Nuclear Technology, P. O. Box 69-10, 710024, Xi'an, China); Prof. CHEN, Wei (State Key Laboratory of Intense Pulsed Radiation Simulation and Effect, Northwest Institute of Nuclear Technology, P. O. Box 69-10, 710024, Xi'an, China)

**Presenter:** Mr LIU, Yan (State Key Laboratory of Intense Pulsed Radiation Simulation and Effect, Northwest Institute of Nuclear Technology, P. O. Box 69-10, 710024, Xi'an, China)

**Session Classification:** After dinner POSTER session, with drinks: (All presenters are requested/encouraged to attend their posters; All participants are requested to participate the session, with drinks!)

**Track Classification:** Radiation damage, Environmental radiation monitoring