Contribution ID: **105** Type: **Oral**

Progress on DC-DC converters for SiTracker for SLHC

Wednesday, 23 September 2009 15:00 (25 minutes)

Previous tests have shown that Enpirion EN5360, a 6 amp device is capable of taking sLHC radiation dosage but the input voltage is limited to a maximum of 5.5V. But from a systems point of view it is essential to have a factor of 10 in input/out voltage ratio in single stage i.e. maximum input voltage be >12 Volts.
The silicon foundry that made this device can now make 12 V FETS on the same 0.25 μm process with good irradiation results that are reported. Plug in power cards with x10 voltage ratio are being developed for testing the hybrids with ABCN chips, these have air coils but using commercial chips that may not be radiation hard but help in system noise and performance testing.

Summary

Our goal has been to have DC-DC converters capable of delivering an output of 1.2 volts with load currents of several amperes. To our knowledge there was no IC process that was capable of running at 12 volts to give us a 10:1 voltage ratio with the SiTracker radiation hardness. In 2008, IHP Microelectronics successfully added 12 V FET transistor switches to their existing process, by the addition of 2 more mask layers.
We emphasize that the radiation damage limits the maximum input voltage because of the processing and oxide thickness. IHP has worked on this Silicon LDMOS process for 5 years or more. To the best of our knowledge there is no other foundry making 12 V devices with 0.25 μm process. At the moment there is no commercial device available with this process.

Plug in power cards with commercial converters devices are being developed by our group to test the Hybrids being developed by the ATLAS Si tracker upgrade group. These cards will use commercial devices that are not likely to be radiation hard. The current requirements for the 20 chip hybrids are now 4 amps and we are developing boards for the
1. Converter chips Maxim 8864 and IR3841
2. Spiral and spring/ solenoid coils

The above will be 4 separate pcbs. We need to fully power the new hybrids from this power cards to study both conduction and radiated noise.

We are continuing to irradiate new commercial device that in our view may tolerate high radiation levels.

Author: Dr DHAWAN, Satish (Yale University)

Co-authors: Prof. MINCER, Allen (New York University); Mr MUSSO, Christopher (New York University); Dr LYNN, David (Brookhaven National Laboratory); Dr LANNI, Francesco (Brookhaven National Laboratory); Dr CHEN, Hucheng (Brookhaven National Laboratory); Dr KIERSTEAD, James (Brookhaven National Laboratory); Prof. BAKER, Oliver (Yale University); Mr KHANNA, Ramesh (National Semiconductor Corp)

Presenter: Dr DHAWAN, Satish (Yale University)

Session Classification: Parallel Session B4 - Power, Grounding and Shielding

Track Classification: Power, grounding and shielding