Standardized GPU Radiation Test Approaches – Part 2
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1. Introduction

While some Graphical Processing Units (GPUs) are discrete components (e.g., GTX 1050, Intel Xeon Phi), others take the form of an IP (e.g., BGA Flip Chip, BGA, SOC Flip Chip, BGA, SOM). The DUT preparation described allows an ideal situation to be developed for both soldered and socketed devices. Additionally, it is radiation tolerant by design so that the system can be used in space in a vacuum or radiation chamber. A direct path for radiation is created through thinning and polishing of the die. The cooling solution allows the DUT to operate at temperatures of 50°C (±2°C), while all other components are maintained below a critical value. The die can be thermally imaged and superimposed onto an optical image of the active regions (mirrored in the obverse side of the PCB, can also be employed using a thin (20mil) thermally conductive sapphire window and metal sink contact.

2. Test Bench Configuration

A simple mutex is being used within the kernel to allocate a single integer worth of memory space, do nothing with it and then release the memory space. This keeps the process resident in the GPU to allow for only 30 seconds per interval. The mutex can be adjusted to increase this time by two or more intervals. The mutex memory allocation can only be performed in a serial fashion. Therefore, while all the computation calls can take place in parallel, each and every thread must wait in line to allocate the single integer space.

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3. Test Execution and Logical Flow

When the test is finished, the output file is saved to disk and then stored on the hard drive. By using this method, the system thinks the GPU has halted. The output file is saved to disk and then stored on the hard drive. By using this method, the system thinks the GPU has halted. The output file is saved to disk and then stored on the hard drive.

4. Discussion & Conclusions

Test portability plays a major role in standardizing a test. It is not always possible to test all the GPUs that exist for military and space applications at the same time. Radiated devices are not easy to transport and transport radiation testing requires on-site equipment. This permits a test bench approach to test GPUs with minimal variation between device types. The monitoring should take place in parallel, each and every thread must wait in line to allocate the single integer space.