LUCA

TN-30: Executive summary

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Prepared by: Thierry DELMOT

Verified by: Thierry DELMOT

Accepted by: Thierry DELMOT
Richard JANSEN (ESA ESTEC)

Revision History

Date	Version	Description	Author
2024-01-12	0.00	Initial version.	Thierry DELMOT
2024-01-13	0.10	Review. Improve text.	Thierry DELMOT
2024-01-14	0.20	Another review	Thierry DELMOT
2024-01-18	0.30	Review	Drahoslav LÍM
2024-01-18	1.00	Final review	Thierry DELMOT

Validation

Name	For		
	Acceptation	Verification	Information
Thierry DELMOT	v1.00	v1.00	X
Richard JANSEN (ESA ESTEC)	TO DO	TO DO	X

Confidentiality Statement

Executive summary

A dynamic latch-up detector/protector and current limitation ASIC (LUCA) has been designed at the architectural level, implemented in silicon and a first prototype has been manufactured. The first level of tests validates the latch-up detection and protection functionality.

A programmable and controllable latch-up detector/protector and current limitation ASIC (LUCA) is beneficial to the space industry. There are other latch-up protection solutions already available but none of them provide the variety of features that the LUCA provides. The LUCA also enables the integration of a programmable and dynamic latch-up protection into a smaller footprint and at a lower cost than existing solutions. This is essential: it allows the application to deploy the protection and supply monitoring/control features at several levels and regions of the hardware. It improves coverage, control, reliability and safety.

It is believed that LUCA will enable new architectures and new possibilities of installing fail-over protection in the hardware used in spacecrafts systems. It will also permit an increase in hardware redundancy.

The LUCA can be used with or without control and monitoring by a micro-controller. This makes it possible to incorporate the LUCA into low-cost and low-complexity space craft (micro-satellites). It reduces the difficulties and disadvantages associated with using standard integrated devices (COTS) in hardware exposed to space radiation. The ease of the programing and operation is compatible with the New Space approach.

A test chip was designed in the early stages of the project. This helped to lower the risks and avoid pitfalls before the design of the first prototype was sent for manufacturing.

Some samples of the first prototype of the LUCA have been assembled and tested. The tests demonstrate that this first prototype is functional. The available trimming controls have been also verified as well, including the programming of the one-time programmable memory (OTP).

This first prototype of the LUCA can now be used for complementary tests and trials in real systems.

The next step of the development can be elaborated and started. This will drive the project to its Flight Model (FM) validation.