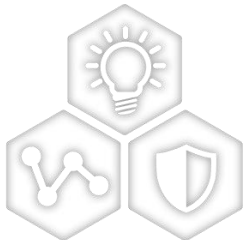


# FPGA long journey



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A Leading Provider of Smart, Connected and Secure Embedded Control Solutions



SMART | CONNECTED | SECURE

**Luca Cattaneo**

February '26

# Who is behind LEON-2



## GAISLER RESEARCH

- Founded by Jiri Gaisler
- 12 yrs experience in on on-board computers c/o ESTEC (European Space Research and Technology Centre)
- Based in Sweden, Gothenburg
- Well known & appreciated within all space community

## LEON-2 developed under ESA funding

- FREE Open source core
  - <http://www.gaisler.com> leon2-1.0.5
- SW simulator optional from Gaisler

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**Gaisler Research AB**  
**Första Långgatan 19**      **Tel: +46 31 7758650**  
**SE-413 27 Göteborg**      **Fax: +46 31 421407**  
**Sweden**  
**[www.gaisler.com](http://www.gaisler.com)**  
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# the long journey started few years ago ... 2002



## LEON2 porting completed in Actel leading edge technologies

### ● ProASIC Plus

- ◆ APA1000 19MHz -> 17MIPS
- ◆ Tiles  $10888/56320 = 19.3\%$
- ◆ RAM Blocks  $24/88 = 27.3\%$
- ◆ Used Ios 116

### ● Axcelerator

- ◆ Ax1000 53MHz -> 49MIPS
- ◆ SEQUENTIAL  $1822/6048 = 30.13\%$
- ◆ COMB  $5353/12096 = 44.25\%$
- ◆ RAM Blocks  $14/36 = \%$
- ◆ Used Ios 116



- ▶ Basic configuration w/o PCI, AMBA bus support
- ▶ Data/Instruction cache 2kB each

### 1. Board Description

In this section a reference board functional description is shown:

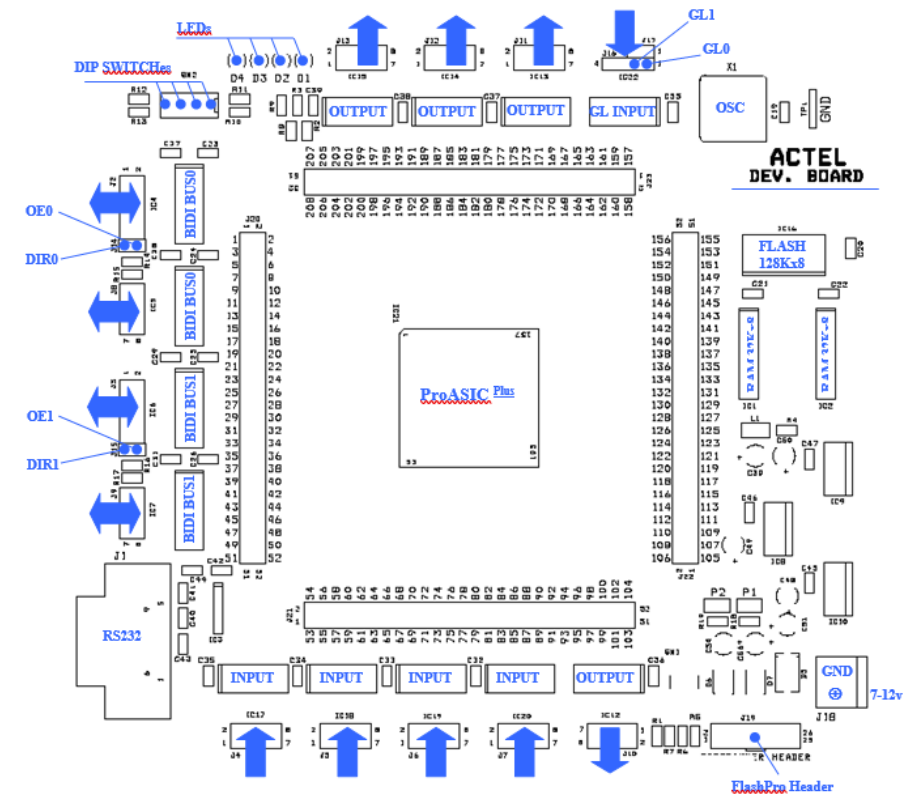
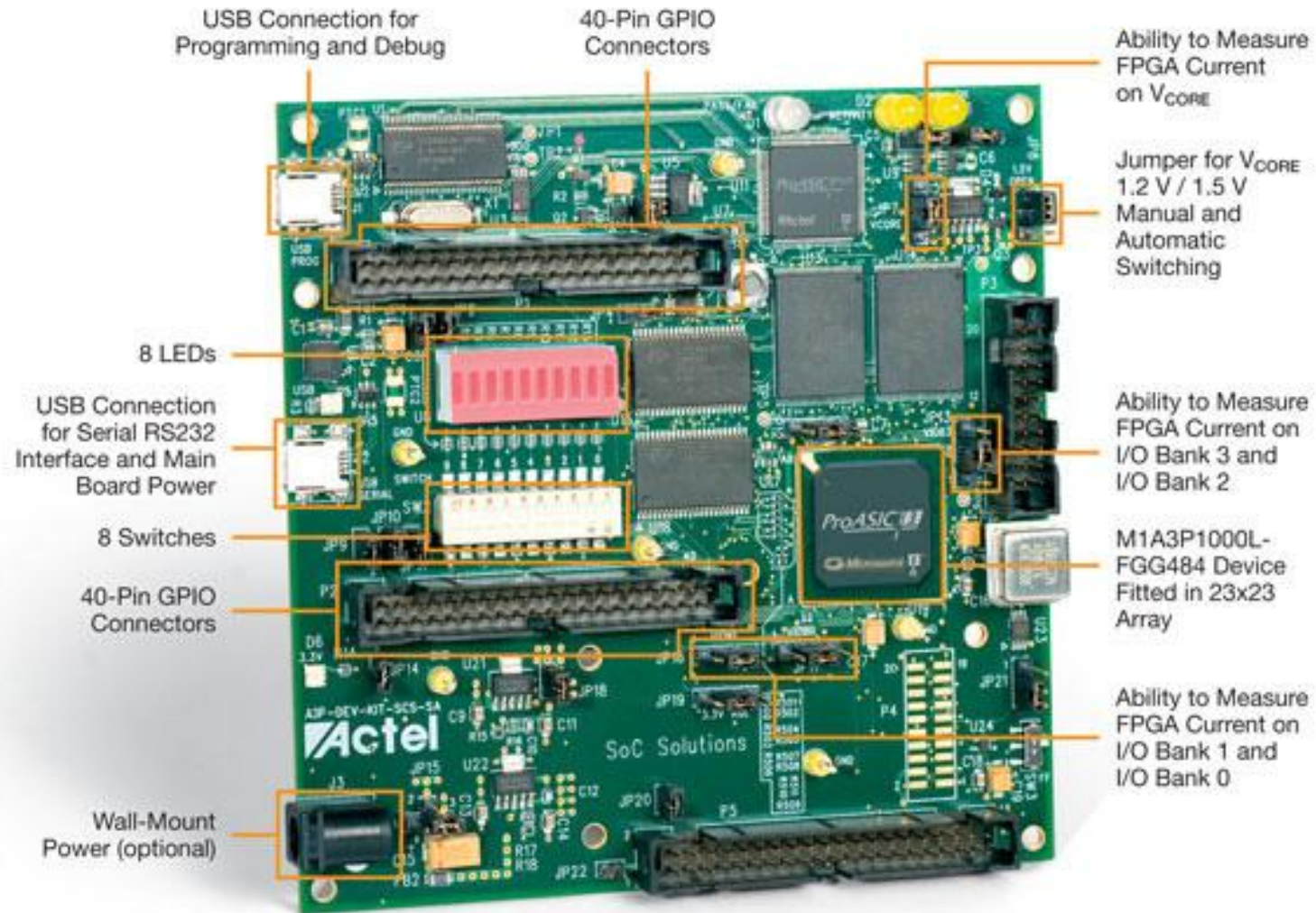


Figure 1.1 Board Reference Functionality

# initial test for LEON3 with ProASIC3 platform



## FIRST ARTICLE REQUEST AND RELEASE FORM

1-06-15004 Rev 8

Customer Company Name <b>Gaisler Research</b>		Customer PO# <b>175337</b>	
Design Name (from .afm OR .bit file) <b>**Zip Files Required**</b> <b>leon3mp</b>		Design Revision # <b>1</b>	Design File Size <b>20.282.012 Bytes</b>
Speed Grade	Temp Grade	Tape & Reel (see E.*) –	
Actel SW Rev Used: <b>Designer 6.2.52.7</b>	Design CHECKSUM, 4 alphanumeric: <b>2895</b>	QTY (Maximum of 5)	
Requestor Email Address <b>jiri@gaisler.com</b>		Requestor Phone <b>0046 31 7758650</b>	

**A. Marking Specification** (special marking IS REQUIRED for programmed parts)



# finally work became reality ... on Antifuse



GAISLER RESEARCH

SEU-RPT-02-JG

Issue 1, December 7, 2005

## LEON3-FT-RTAX SEU test results

Jiri Gaisler  
Gaisler Research

### 1 Introduction

#### 1.1 Scope

This document describes the results of the heavy-ion test of the LEON3-FT-RTAX-2000S device. The tests were performed in the RTAX SEU test system.

#### 1.2 Summary

The LEON3-FT processor has been implemented in an RTAX-2000S device and subjected to heavy-ion error injection using Californium (Cf-252). The tests were carried out for 168 hours, with a flux of  $\sim 22$  particles/s/cm<sup>2</sup> at the device surface. No computational errors, resets or other anomalies occurred and nominal operation was obtained during the full 168 hours of testing. The on-chip monitoring logic reported a total of 2,429 detected and corrected errors in the on-chip RAM blocks, resulting in an effective SEU rate of  $\sim 0.25$  errors/minute. These results verified that the fault-tolerance features in LEON3-FT-RTAX are able to detect and correct more than 99.95% of all effective SEU errors under standard operating conditions (20 MHz, 50°C).

**#1 sell in EMEA  
RTAX LEON3-FT system**



then in 2016 LEON4 on RTG4 came ...



**COBHAM**

The most important thing we build is trust

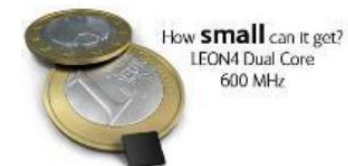
ADVANCED ELECTRONIC SOLUTIONS    AVIATION SERVICES    COMMUNICATIONS AND CONNECTIVITY    MISSION SYSTEMS

LEON4 4 RTG4

Cobham Gaisler  
May 20, 2016

Presenter: Sandi Habinc

Commercial in Confidence



... disruptive brand new ERA



SPACE-V

**Pleasure to be here  
grazie 1000**

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