COBHAM

The most important thing we build is trust

ADVANCED ELECTRONIC SOLUTIONS | AVIATION SERVICES | COMMUNICATIONS AND CONNECTIVITY | MISSION SYSTEMS

Developing and qualifying parts using third party libraries and manufacturing services

Presenter: Sandi Habinc
Managing Director
Cobham Gaisler AB

Cobham Gaisler AB
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Cobham – an overview

Aviation Services

Outsourced aviation services for military and civil customers worldwide through military training, special mission flight operations, outsourced commercial aviation and aircraft engineering

- Air Traffic Display Systems
- Electronic Warfare Training
- Fly-In Fly-Out Services for the Natural Resource Industry
- Helicopter Services
- Maritime Surveillance and Border Protection
- Regional Airline Services for Qantas

Communications & Connectivity

End-to-end avionics; law enforcement and national security solutions; wireless communication and test equipment for public safety and building infrastructure; and satellite communication equipment for land, sea and air applications

- Antenna Systems for Communication, Navigation, Electronic Warfare and Radar
- Cockpit and Cabin Communications
- Composite Technologies
- Public Safety and Wireless Communications for Infrastructure
- Satcom Equipment for Aerospace, Land and Maritime
- Wireless Surveillance Technology
- Wireless and Radio Test Solutions

Mission Systems

Provides safety and survival systems for extreme environments, nose-to-tail refuelling systems and wing-tip to wing-tip mission systems for jets, transport aircraft and rotor craft, and remote controlled robots and fully-equipped bomb disposal vehicles for homeland security and military applications

- Advanced Restraint Systems
- Air-to-Air Refuelling Systems
- On Board Inert Gas Generation Systems
- On Board Oxygen Generation Systems
- Unmanned Systems
- Weapons Carriage and Release

Advanced Electronic Solutions

Provides mission critical, differentiated components and systems that protect and enhance lives, specializing in radio frequency and microwave electronics for defense and commercial applications

- AESA Sensors
- Avionics and Radar Technology
- Data Link Systems
- Electronic Warfare Systems
- High-reliability Microelectronics
- **Integrated Circuit Design and Assembly**
- Radiation Test Services

Cobham Gaisler AB

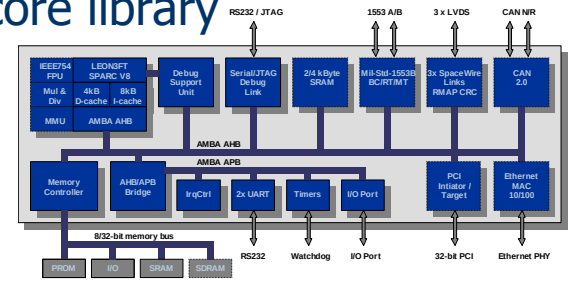
Official name since 10 December 2014

- Located in Gothenburg, Sweden
- Fully owned subsidiary of Cobham plc
- Management team with 50 years combined experience in the space sector:
  - Sandi Habinc: Managing Director
  - Per Danielsson: Senior Advisor
  - Jan Andersson: Director of Engineering
- 23 employees with expertise within electronics, ASIC and software design
- Complete design facilities in-house for ASIC and FPGA design

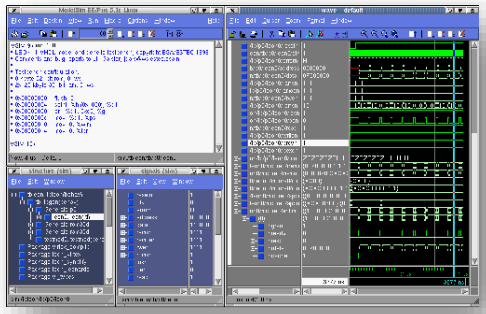
Cobham Gaisler - processing solutions

One-Stop-Shop supplier

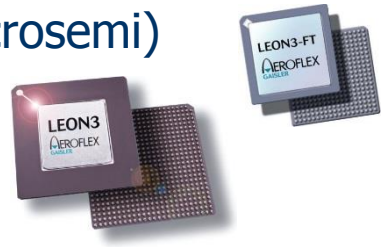
LEON compatible IP core library

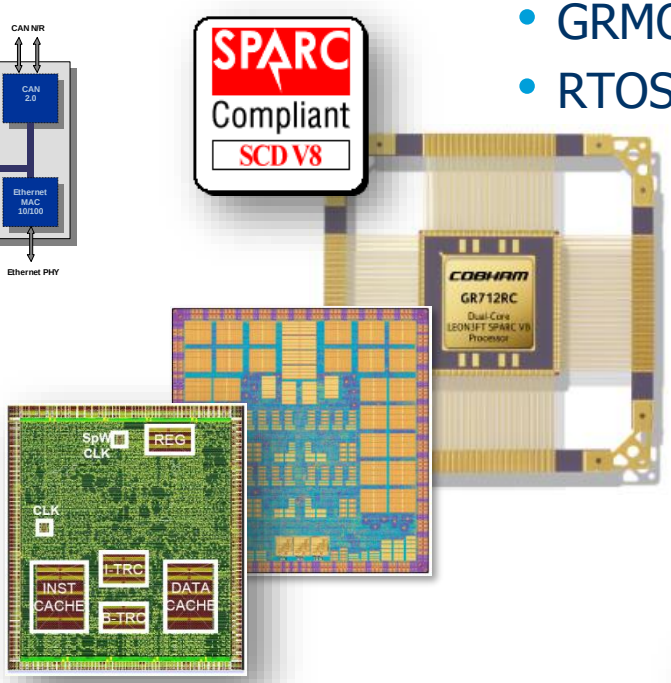


- TSIM and GRSIM: LEON simulators
- GRMON: LEON debug monitor
- RTOS: VxWorks, RTEMS, Linux...



- FT FPGA Processors (Microsemi)

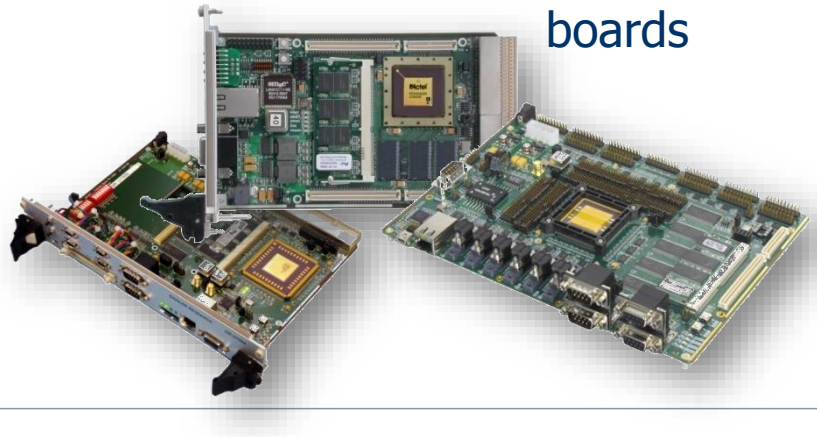




- LEON3/LEON4 processors

- System Testbeds

- LEON development boards



Component development approach

- Commercial foundries, third party libraries
  - IHP 250 nm – IHP internal
  - TowerJazz 180 nm - Ramon Chips RadSafe
  - UMC 180 nm – imec DARE, ICSense, Arquimea
  - XFAB 180 nm – imec DARE (future)
  - TSMC 250 nm, 130 nm – Aeroflex (for US products)
  - IBM 90 nm – Aeroflex (for US products)
  - ST Microelectronics 65 nm – C65SPACE
- Assembly and test services, packages

– HCM	- Microtest / imec	- MASER / imec
– SERMA	- HIREX	- e2v
– Presto	- Micross	- TRAD
– Kyocera	- NTK	- Aeroflex RAD Europe

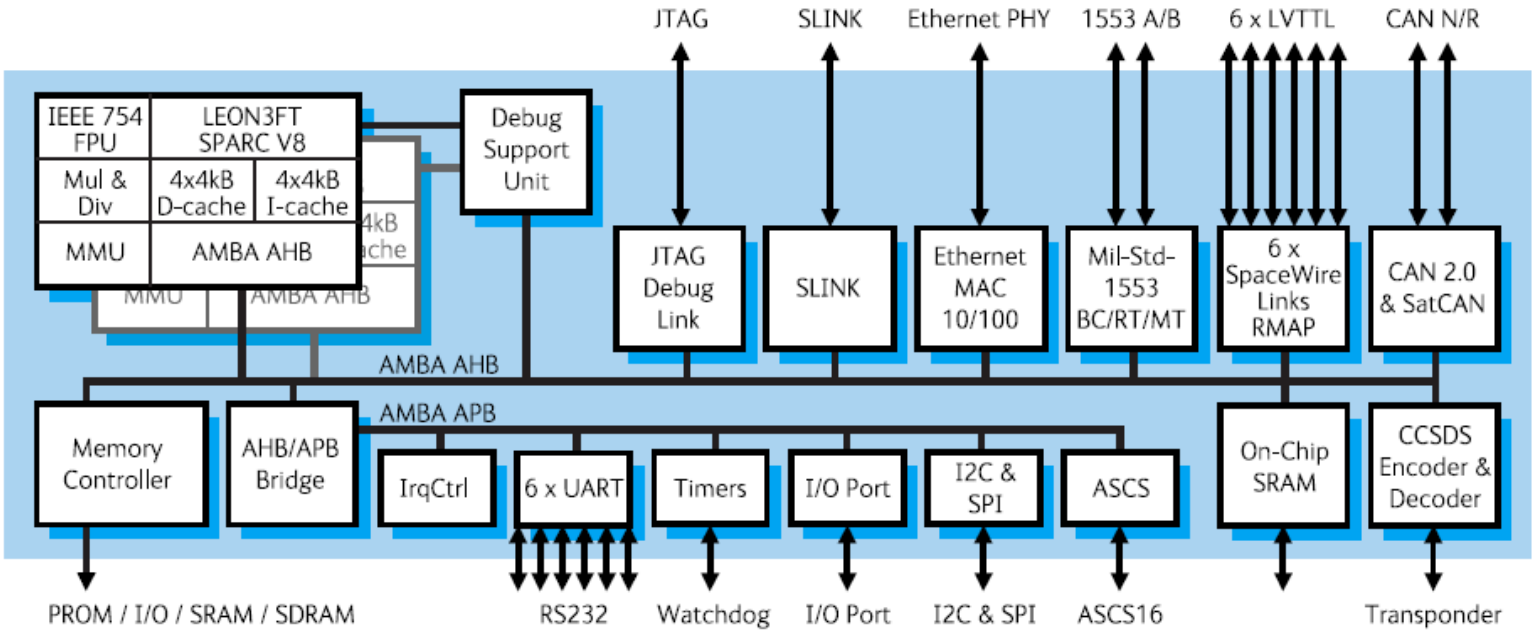
- Sales channels

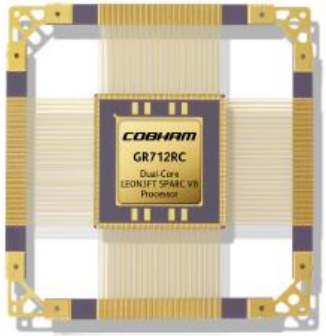
– Direct	- Dimac Red (rep)	- Alter/Tesat (CPPA)

Component qualification approach

- Mil-Std - Class S – vendor specific flow
- ESCC 9000 – lot validation / EPPL
  - One wafer lot for lifetime of product
  - One assembly lot for validation
  - How to repeat assembly lot validation
- QPL – future?
- QML-V – alterative?
- Cobham Gaisler's role
  - Product specification
  - Digital/Analogue design
  - Subcontractor management and follow-up
  - Contractual obligation versus customer - full responsibility
  - Customer support

GR712RC - Dual-Core LEON3FT Processor

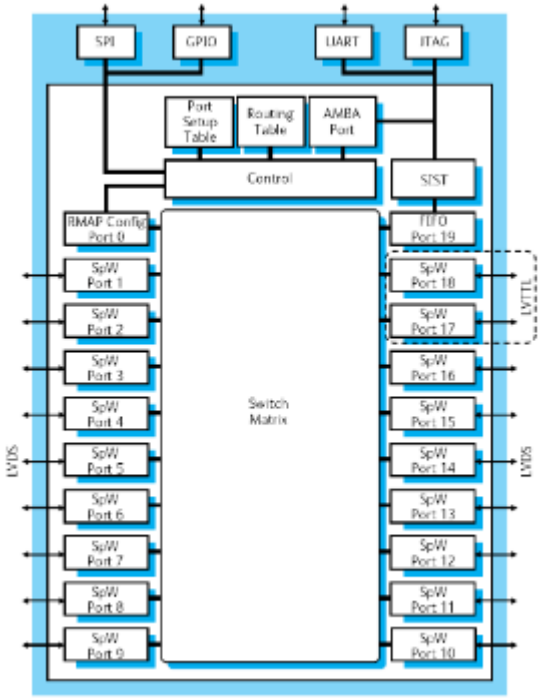


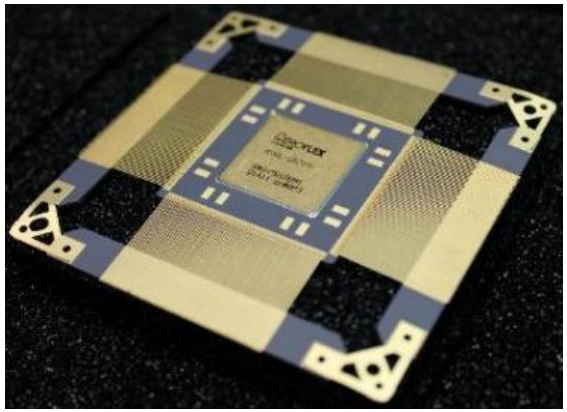


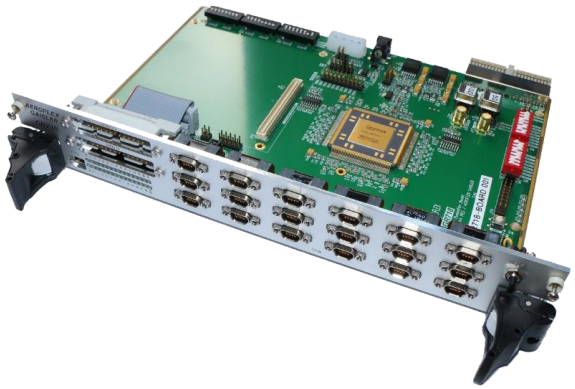
- Dual Core LEON3FT Fault-tolerant processor (SMP)
- TowerJazz 180nm, Ramon Chips RadSafe library
- CQFP240, 0.5 mm pitch, 32x32 mm, hermetically sealed
- Class-S, vendor specific flow, Cobham controlled
- Sold to vendor specific product specification
- Flight heritage

GR718 - 18-port SpaceWire Router

- Router implements 18 external SpaceWire ports
  - 16 with on-chip LVDS transceivers
  - 2 with LVCMOS to off-chip LVDS transceivers
- 180nm UMC , DARE180+ library from imec
- ESCC 9000 lot validation, through subs
- Cobham controlled
- Super-set of ECSS 9000, Class S and QML

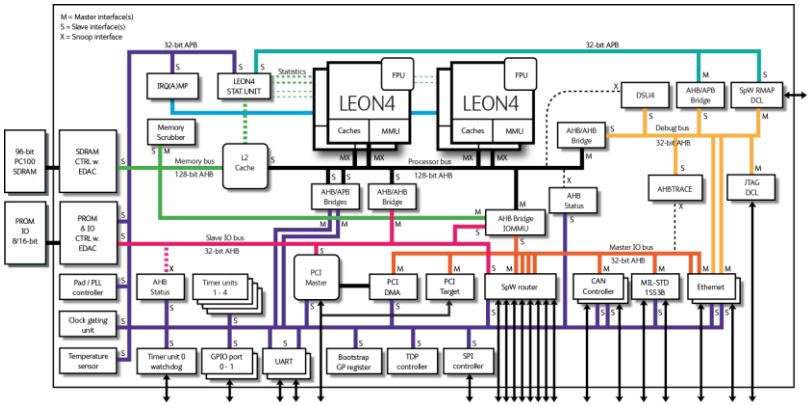


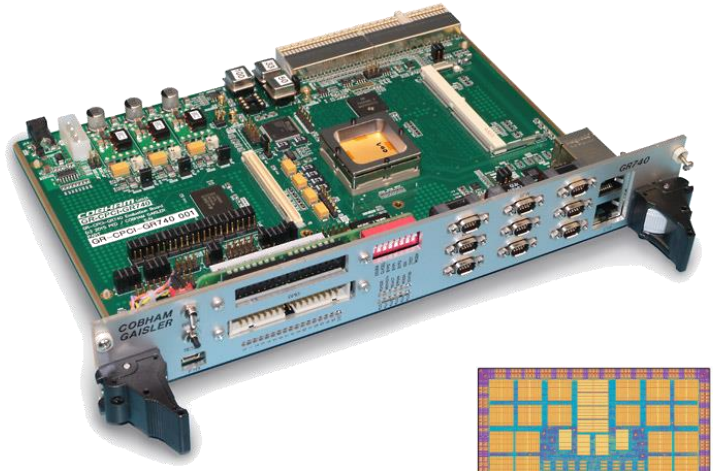


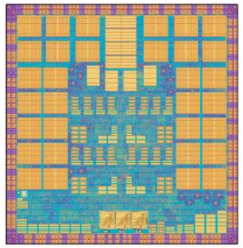


GR740 - Quad-Core LEON4FT Processor

- 250 MHz (estimated) quad-core LEON4FT rad-tolerant device in LGA625 package
- Developed as part of ESA activity Next Generation Microprocessor
- ST Microelectronics 65nm, C65SPACE
- Taped-out in Q2 2015
- Tested prototype parts: Q1 2016
- Evaluation boards with proto parts: Q1 2016
- Qualification: ESA is committed, contract pending successful validation
- Qualification flow: under evaluation
- Flight model parts: expected 2017



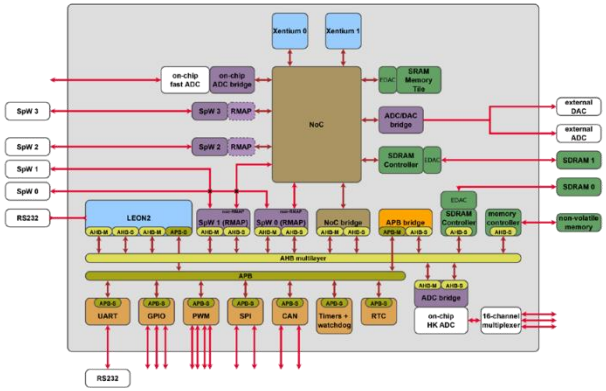


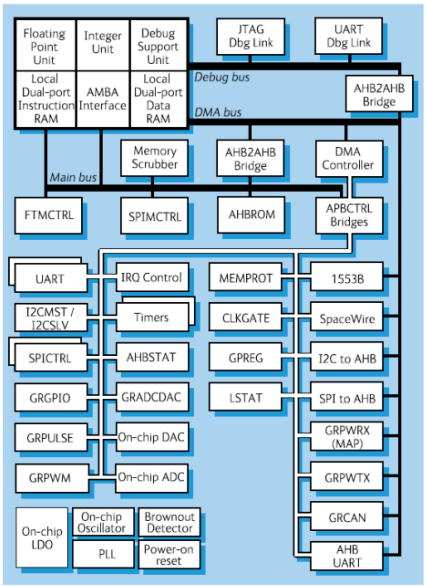


Other developments

ESA prototyping/qualification activities

- ESA Scalable Sensor Data Processor (SSDP)
  - Thales Alenia Space prime
  - Cobham Gaisler to commericalize device
  - 2x Xentium DSP cores & 1x LEON3FT CPU
  - CQ352 package, imec DARE180+, UMC
  - ESCC 9000 qualification 2017, through imec
- ESA Microcontroller
  - LEON3FT with 16-bit instruction set (REX)
  - CQ132 package, imec DARE180+, UMC
  - Prototypes only at this stage
- ESA LVDS
  - Dual transmitter/receiver, 049 type
  - imec DARE180+/custom, UMC
  - ESCC 9000 qualification 2017, through subs





ESA's AMICSA & DSP event

Joint event in Gothenburg 2016

- Cobham Gaisler is hosting ESA's:
  - 6th International Workshop on Analogue and Mixed-Signal Integrated Circuits for Space Applications
  - 3rd Workshop on Digital Signal Processing for Space Applications

- Web site open:

  http://amicsa.esa.int/2016