

Product Brief

NanoXplore, a European fabless company, is proud to offer innovative solutions in FPGA, SoC FPGA and ASICs technologies through a 100% European design and supply chain.

In partnership with ESA, CNES and the European Commission, NanoXplore offers sovereignty and ITAR-free solutions to European institutions and industries for Space, Defense and high-reliability systems.

Target Applications

On Board computing

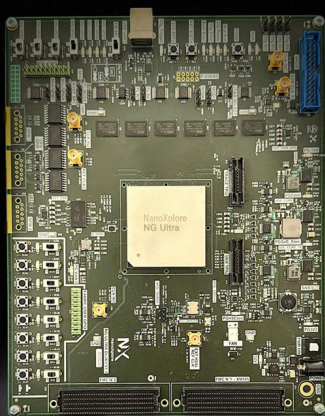
- » Control systems
- » Multi-sensor fusion and real-time compression
- » Housekeeping telemetry gathering and formatting
- » On board time synchronization and distribution
Telecommands execution or dispatching
- » Failure detection

High-Integration Avionics Controller

- » Quad-core ARM-R52 for real-time deterministic operations
- » Subsystem autonomy, platform management, fault-management software

Constellation Compute Node

- » Edge-computing onboard small and medium satellites



Applications examples

- » On-board Computing
- » Payload applications
- » Data management and routing
- » Real-time and video processing
 - » Image and video
 - » Software Defined Radio (SDR)

Overview

NG-ULTRA is the world's first Radiation Hardened By Design SoC FPGA. With an "all-in-one" SoC (System on Chip) architecture designed specifically for platform and onboard computing applications, NG-ULTRA combines a multi-core processor with programmable hardware on a single chip.

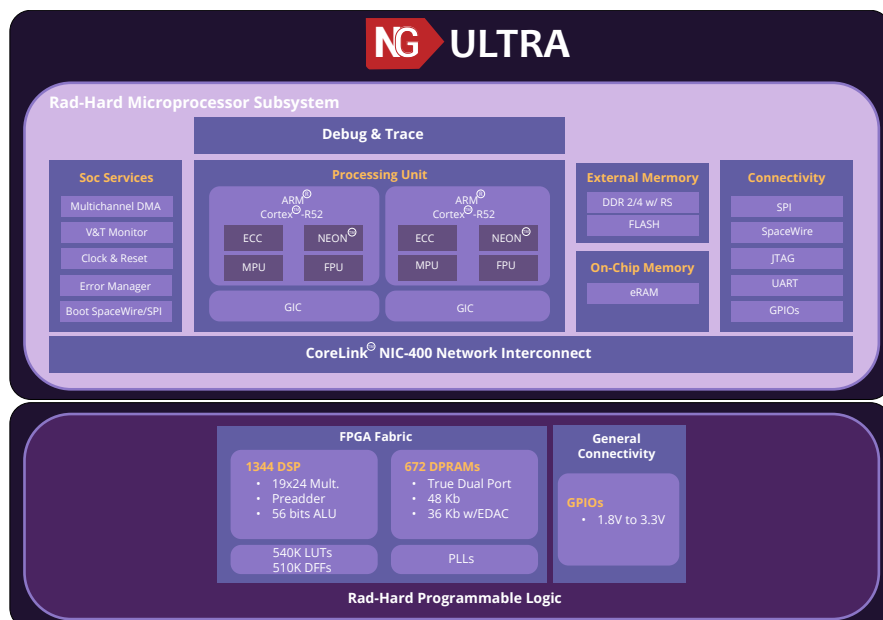
This all-in-one architecture is ideal for replacing traditional multi-chip solutions combining separate processor and FPGA devices

By consolidating processing and programmable logic into a single device, NG-ULTRA simplifies system design, reduces footprint and power consumption, and enhances overall reliability—key advantages for space and all mission-critical applications.

Key Differentiators

- » Full radiation immunity for high-reliability in harsh space environments.
- » "All-in-one" SoC (System on Chip) architecture for greater design agility, reduced electronic board complexity and component count, and optimized latency, mass, and power consumption.
- » SRAM-based architecture to enable an adaptive hardware approach, allowing for unlimited on-orbit reconfiguration.
- » 100% European Supply Chain to guarantee independence and long-term product availability.

Architecture Overview



Key Features

High-density FPGA fabric:

- » Logic: 4 LUT + DFF, Carry
- » Memory blocks
 - » 48 Kb DPRAM block with EDAC
 - » 32 x 18b DPREG (async FIFOs)
- » DSP 19 x 24 Multipliers MAC
- » PLLs & HW clocking primitives

High-speed I/O:

- » Up to 16 x 400 Mbps SpaceWire PHY
- » DDR 2/3 PHYs
- » SDR/DDR, IO Delays for other protocols

SoC features:

- » Quad-core ARM[®] Cortex-R52 (ARMv8-R), delivering 2.2 DMIPS/MHz @600 MHz
- » Interconnects to Programmable Logic (PL)
 - 2 AXI4 Master interfaces (128-bit)
 - 2 AXI4 Slave interfaces (128-bit)
 - 1 APB4 interface (32-bit)
 - 4 LLPP interfaces – AXI4 (32-bit)
 - 1 dedicated AXI4 Master interface (128-bit) for DDR access
- » Memory and Data Handling
 - DDR Controller with integrated Reed-Solomon error correction

Radiation Performance:

- » SEU immune up to LET > 62 MeV.cm²/mg.
- » Latch-up free up to LET > 62 MeV.cm²/mg.
- » Total ionizing dose up to 50 Krads (Si).

High-reliable configuration modes:

- » Master Serial SPI (Single, Sequential, TMR), SpaceWire

Device	NX2H540TSC
Capacity	
· ASIC Gates	8 000 000
Logic Modules	
· Register (#)	505 344
· LUT-4 (#)	536 928
· Carry (#)	126 336
Embedded RAM (Mb)	33
· DPRAM (Kb)	32 256
· Core Register Files (Kb)	2 632
· Core Register Files (Kb)	1 480
Clocks / CKGs	50/7
Additional Features	
· SpaceWire link PHY (8 IOBs)	20
· DDR2/3 PHY (11 IOBs)	20
· DSP Blocks	1 344
· SpaceWire link I/F 160Mbps	1
· Hard IP Processor core	4
· SoC Peripherals	YES
Design Security	YES
Inputs / Outputs	
· High-Speed I/O (HSIO) bank 1,2V-1,5V-1,8V)	10x34 I/Os
· General Purpose I/O (GPIO) bank 1,8 V - 2,5 V - 3,3 V	4x24 I/Os
· Service I/O bank 3,3V	1x44 I/Os
· Packages - User I/Os	740 I/Os

NG ULTRA Products

Space - NG-ULTRA	Commercial - NG-ULTRA
<ul style="list-style-type: none"> » Prototype, +25°C » Engineering model (-40°+125°C) » Equivalent Flight model » Flight Model ESCC 9030 Class 1 » Daisy Chain for continuity tests 	<ul style="list-style-type: none"> » Commercial grade (0°+70°) » Industrial grade (-40°+125°C)

For more information about  : www.nanoxplore.com