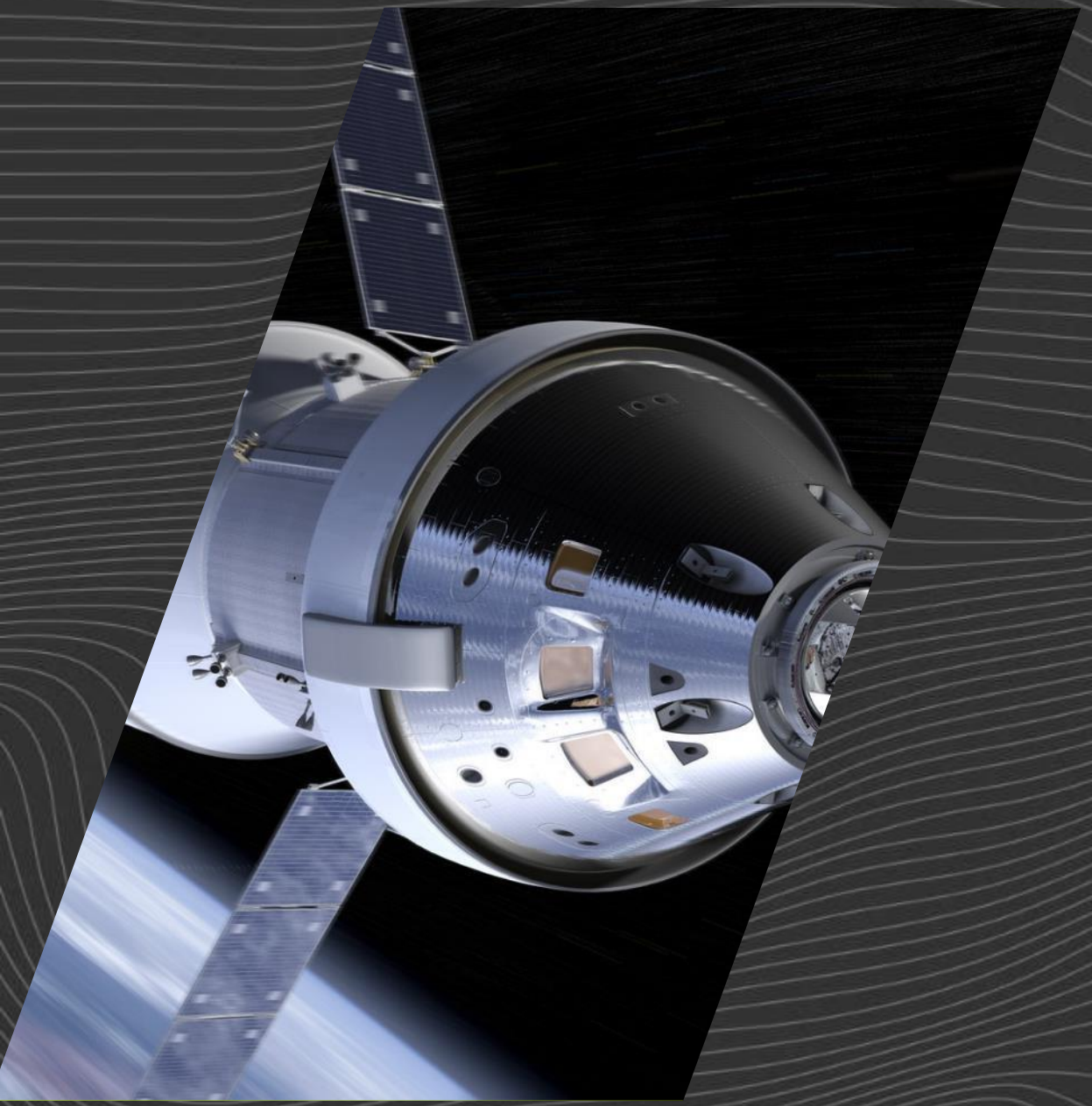

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GR740 Development Status

GR740 User Day 2022

GR740 - Quad-core LEON4FT Processor

Value proposition

- Highest performance, wide range of interfaces
- Quad-Core LEON4: SPARC V8, Rad-hard and Fault-Tolerant
- Designed as ESA's Next Generation Microprocessor, NGMP
- LEON Technology – re-use of Development and Software ecosystem
- SEU errors corrected without software interruption
- Low risk, off-the-shelf product
- QML Q/V qualified
- Excellent performance/watt ratio
    - Very low power, < 3 W (core typical)
    - Performance 1700 DMIPS (1000 MIPS)

Applications

- High-performance general-purpose processing
- Symmetric and asymmetric multiprocessing
- Shared resources can be monitored to support mixed-criticality applications

For more information -> GR740 webpage

GR740 - Quad-core LEON4FT Processor

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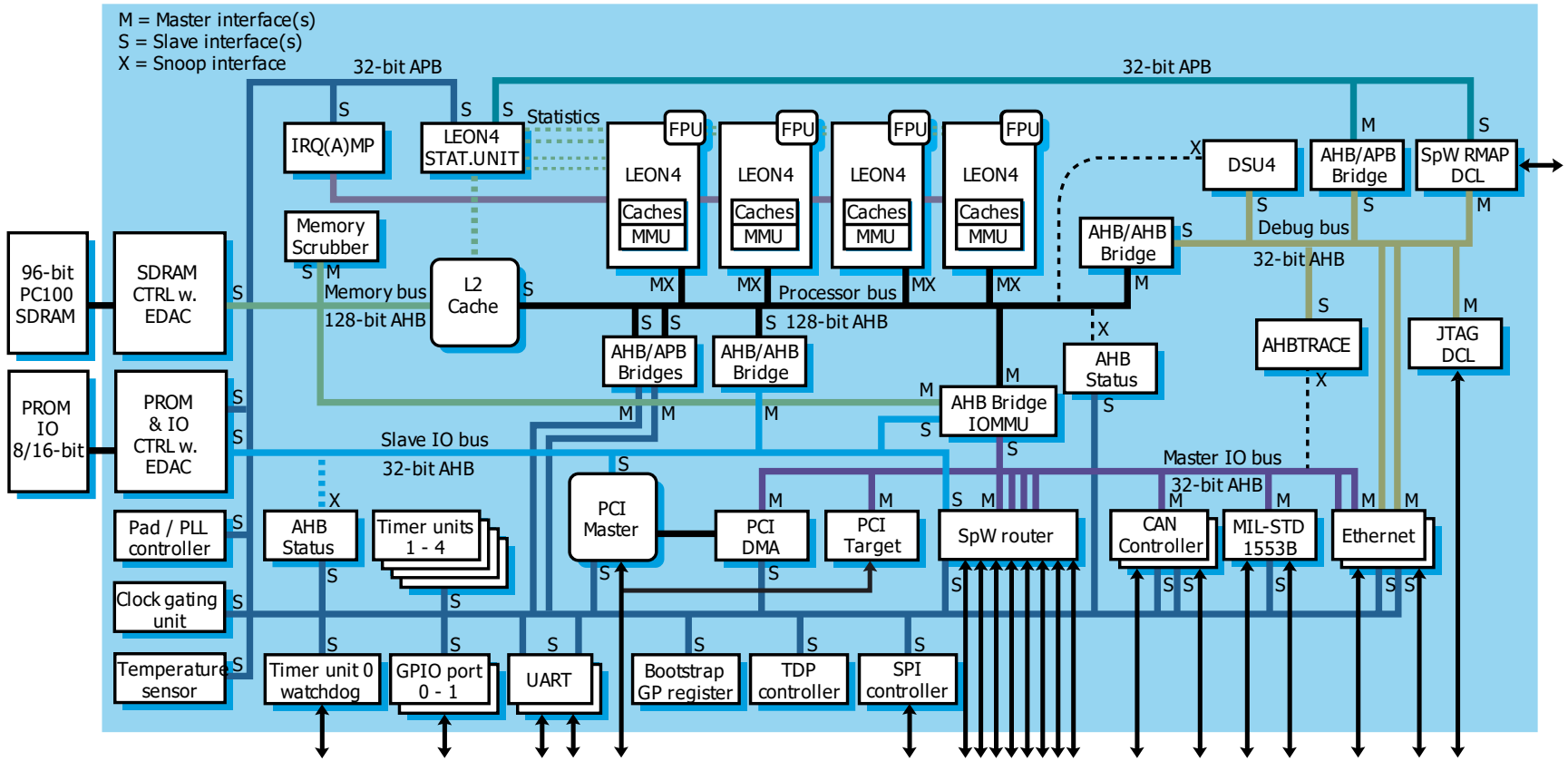
Features

- Fault-Tolerant quad-core LEON4 processor
  - SPARC V8 integer unit with 7-stage pipeline
  - 8 register windows
  - 4x4 KiB instruction and 4x4 KiB data caches, EDAC protected
- Double-precision IEEE-754 FPU (1 FPU/Core)
- 250 MHz system frequency
- >1700 DMIPS (1000 MIPS)
- Typical core power consumption < 3W
- 2 MiB Level-2 cache
- 64-bit PC100 SDRAM memory interface with Reed-Solomon EDAC
- 8/16-bit PROM/IO interface with EDAC
- CPU and I/O memory management units
- Multi-core and multi-thread support (SMP & AMP)
- Support for time synchronisation with SpaceWire TDP controller



Interfaces

- SpaceWire router with 8 SpaceWire links (300 MHz)
- 2x 10/100/1000 Mbit Ethernet interfaces
- MIL-STD-1553B interface
- 2x CAN 2.0 controller interface
- 2x UART, SPI, Timers and watchdog, 16+22 pin GPIO
- PCI Initiator/Target interface
- JTAG

GR740 - QML-V qualified!

DEFENSE LOGISTICS AGENCY
DLA Land and Maritime
Standard Microcircuit Cross-Reference

May 6, 2022 Home Logout | [-]

New SMCR Search

Part Number / Key Word Search Results

Caution: Do not use Vendor PN for item acquisition (procurement). Items acquired to this number may not satisfy the performance requirements of the Standard PN as specified in the SMD or MIL-M-38510 slash sheet.

Standard PN contains 21204
Show only QML parts
Show only radiation hardened parts

Previous 1 Next Total Records Received: 7 25

Standard PN	Source	Vendor PN	EOL Date	Description
5962F2120401QXF	STMICRO	GR740-MSQ-CG625		PROCESSOR, SPARC V8, LEON4, QUAD CORE
5962F2120401QZC	STMICRO	GR740-MSQ-LG625		PROCESSOR, SPARC V8, LEON4, QUAD CORE
5962F2120401VXF	STMICRO	GR740-MSV-CG625		PROCESSOR, SPARC V8, LEON4, QUAD CORE
5962F2120401VZC	STMICRO	GR740-MSV-LG625		PROCESSOR, SPARC V8, LEON4, QUAD CORE

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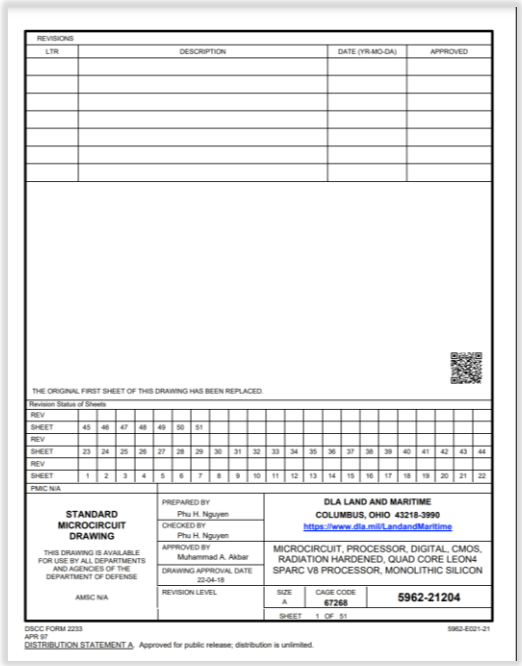


REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED

THE ORIGINAL FIRST SHEET OF THIS DRAWING HAS BEEN REPLACED.

Revision Status of Sheets																						
REV																						
SHEET	45	46	47	48	49	50	51															
REV																						
SHEET	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
REV																						
SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

PMIC N/A

STANDARD MICROCIRCUIT DRAWING

THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

AMSC N/A

PREPARED BY Phu H. Nguyen
CHECKED BY Phu H. Nguyen
APPROVED BY Muhammad A. Akbar
DRAWING APPROVAL DATE 22-04-18
REVISION LEVEL

DLA LAND AND MARITIME
COLUMBUS, OHIO 43218-3990
https://www.dla.mil/LandandMaritime

MICROCIRCUIT, PROCESSOR, DIGITAL, CMOS, RADIATION HARDENED, QUAD CORE LEON4 SPARC V8 PROCESSOR, MONOLITHIC SILICON

SIZE A | CAGE CODE 67268 | **5962-21204**

SHEET 1 OF 51

DSCC FORM 2233 APR 97 5962-E021-21

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

esa

LEON

SPARC Compliant SCD V8

GR740 - PBGA project completed!

ESA contract 4000129200/19/NL/CLP -
GR740 in Plastic Package completed

ESCC-Q-60-13C class 2 evaluation ongoing

European Space Agency

GR740 - Quad-core LEON4FT Processor

Part no.	Processor core	Clock freq. (MHz)	Perf. (DMIPS)	TID krad (Si)	SEL LET (MeV-cm^2/mg)	Power cons.	Package	Temp. range	Qualification status	Availability	Development board
GR740 SMD: 5962-21204	Quad-Core LEON4FT	250	>1700 *	300	> 125	< 2W at 40 °C*	625-Pin Ceramic **Land** Grid Array	-40°C / +125°C (junction)	**QML Q/V**	Now	GR-CPCI-GR740 GR-VPX-GR740
GR740 SMD: 5962-21204	Quad-Core LEON4FT	250	>1700 *	300	> 125	< 2W at 40 °C*	625-Pin Ceramic **Column** Grid Array	-40°C / +125°C (junction)	**QML Q/V**	Now	
GR740 PBGA	Quad-Core LEON4FT	250	>1700 *	300	> 125	< 2W at 40 °C*	625, **PBGA**	-40°C / +105°C (case)	ESCC-Q-60-13C class 2 evaluation ongoing	• Prototypes available • Flight Models	

* For more information:
https://www.gaisler.com/doc/gr740/GR740-VALT-0010.pdf

GR-CPCI-GR740 Development Board

Development board designed to support development and fast prototyping of systems based on the GR740

Features

- GR740 quad-core 32-bit fault-tolerant LEON4FT SPARC V8 processor
- cPCI interface (32 bit) configurable with jumpers for Host or Peripheral operation
- PCI arbiter implemented in separate on-board FPGA
- On-board memory:
  - SDRAM SODIMM module - Delivered with two 256 MiB modules that provide a total 256 MiB of accessible data RAM plus ECC check bits
  - Parallel Boot Flash 64 Mbit (16 bit wide x 4M or 8 bit wide x 8M)
  - Additional memory via memory expansion connector
- Development Box GR-CPCI-GR740-BOX is available

GR-CPCI-GR740 Development Board

Front panel interfaces:

- Dual 10/100/1000 Ethernet interface
  - 2x RJ45
- 8x SpaceWire interfaces (8x MDM9S)
- SpaceWire debug communications link (MDM9S)
- 16-bit General purpose I/O (34 pin 0.1" ribbon cable style connector)
- FTDI Serial to USB Debug interface
  - FT4232HL with USB-Mini-AB
- LED indicators connected to GPIO signals
- DIP switch for bootstrap and PLL interface configuration
- Push button switch for reset and toggle switch (on/off) for DSU break

Interfaces at back edge of board:

- cPCI interface (32-bit), configurable for Host or Peripheral slot
- Input power connector: 5V nominal

Interfaces on-board:

- SPI interface on pin headers
- JTAG Debug interface
- 4-pin IDE style power connector
- Assorted jumpers and Test Points for configuration and test of the board

To accommodate the optional/alternative I/O interfaces the accompanying accessory board provides:

- Dual MIL-1553 Interface (Transceiver/Transformer and D-sub 9 Male connector)
- Dual CAN Interface (CAN Transceivers and two D-sub 9 Male connectors)
- Two Serial UART (RS232 transceivers and two D-sub 9 female connectors)
- SPI interface (available via 10 pin header)

GR-VPX-GR740 Development Board

Development board designed to support development and fast prototyping of systems based on the GR740

Features

- Single board computer based on the GR740 quad-core 32-bit fault-tolerant processor
- Use in OpenVPX chassis or stand-alone
  - SpaceWire connectivity to the GR740 and to the FMC connector
- FMC connector
- On-board memory:
  - SDRAM SODIMM module - 256 MiB modules provides 128 MiB of accessible data RAM plus ECC check bits.
  - Parallel Boot MRAM 128 KiB & SPI Flash memory 32 MiB
- Front panel interfaces:
  - MIL-STD-1553B Interface (Transceiver/Transformer and D-sub 9)
  - RJ45 10/100/1000 Mbit GMII/MII Ethernet interface (KSZ9021GN)
  - 8-bit General purpose I/O (2x5 pin DIL header)
  - UART/JTAG interface using FTDI Serial-USB converter (FT4232HL/USB-uAB)
  - PPS (Pulse Per Second) input for synchronization (SMB)

- The board is provided together with an FMC mezzanine board (GR-VPX-SPW-MEZZ) which provides two SpaceWire interfaces on the front panel.

See the website for complete information

GR740 MINI Board

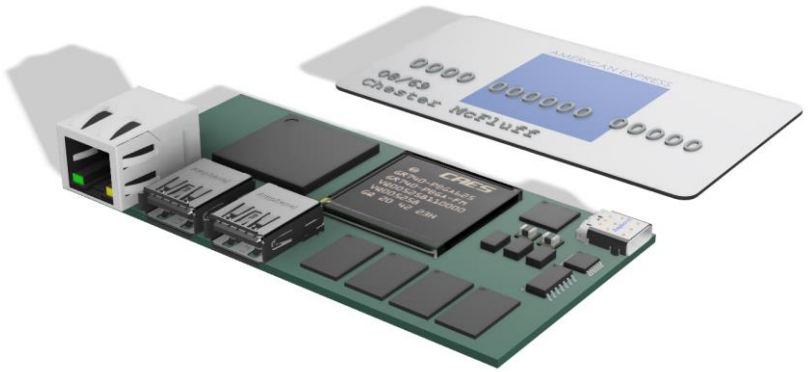
Evaluation Board featuring GR740PGBA & UT24C1007 Lattice FPGA

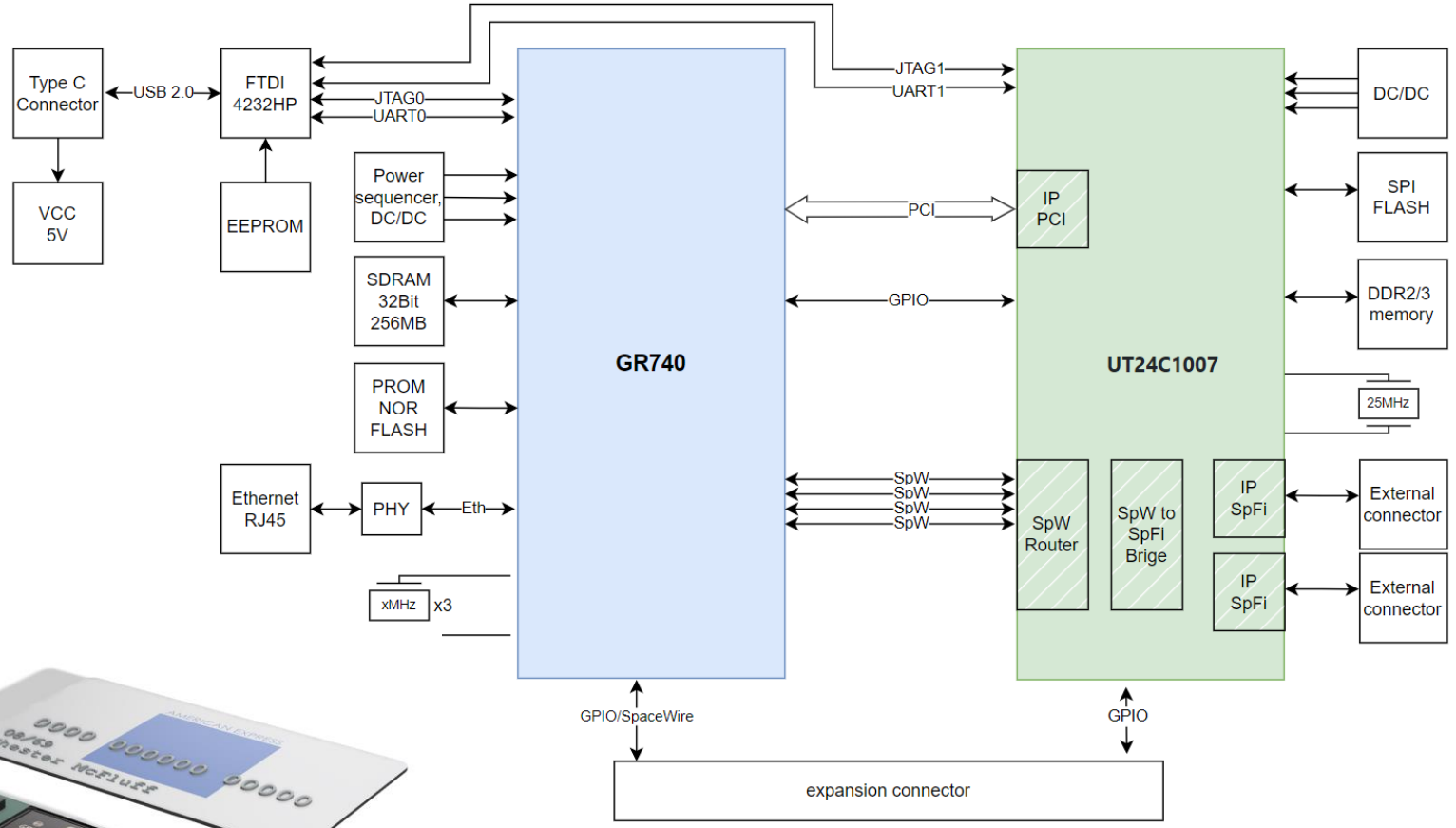
Main features:

- Small form factor
- USB-C connector for debug and power
- 1x Ethernet for communication & debug
- 2x eSATA connectors for SpaceFibre
- 1x Expansion connector with GPIO and SpaceWire
- 256 MiB SDRAM connected to GR740
- DDR2/3 connected to the FPGA

Availability: 1H2023

(to be available for loan)





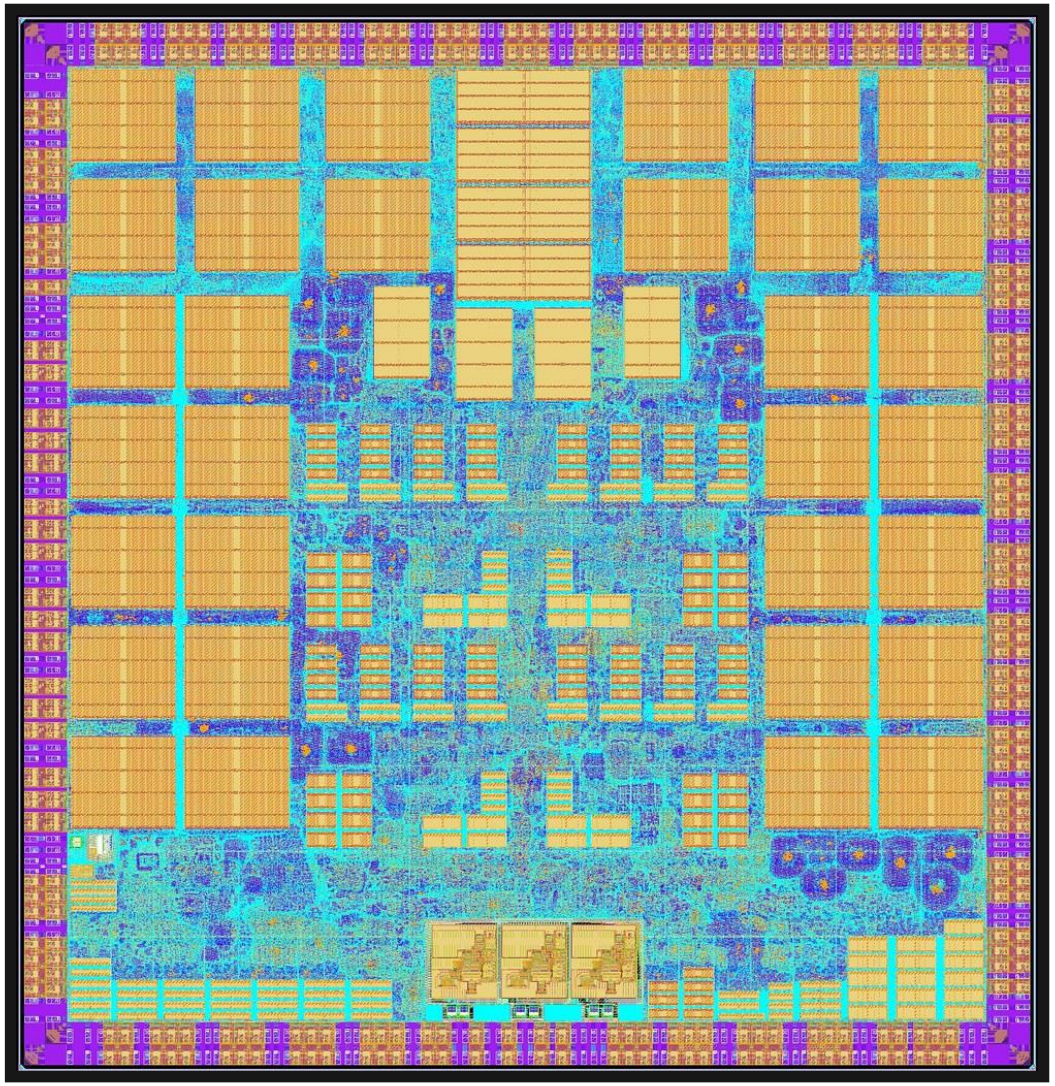
GR740 Development Status

Completed:

- Activities from specification to QML-V approval
  - Final presentation with qualification results and lessons learned: https://escies.org/download/webDocumentFile?id=68442
- GR740 plastic package development completed
- Two capable developments boards available
- SBC reference design to be presented today

Development does not stop here:

- Increased allocation of product marketing and engineering resources to improve and expand collateral
- GR740 evaluation board development in progress
- Continuous extensions and improvements of the software ecosystem – GR740 also benefiting from efforts put into successor components
- Lessons still being learned from users designing with the GR740, leading future app and technical notes

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