

Cortus Presentation

Thursday 3 October 2019

The Cortus logo is displayed in a dark red color within a large white circle. The logo consists of a stylized infinity symbol followed by the word "cortus" in a lowercase, sans-serif font.

Who is Cortus?



Cortus is a French ASIC Design Company with a very large range of own IPs including processors.

Cortus provides **embedded intelligence** in electronic devices **to enable a smart future**



- Cortus was founded by two **experienced high-tech entrepreneurs** Michael Chapman and Duc Nguyen-Huu in 2005.
 - Experts in SoC architecture, design and embedded processing (HW and SW)
 - Extensive IP portfolio (Digital, Analog, RF, Security, Safety, Compiler, etc)
- Cortus is an European Group with Headquarters based in France and is present in Italy, Russia, Israel, Korea and Taiwan
- Michael Chapman is the original designer and implementer of the CAN (i82256 + many others) and creator of System C.
- Billions of devices have been produced using Cortus processors and IPs

Michael Chapman Bio



Michael Chapman is the creator of microprocessors, micro-controllers, CAN (Controller Area Network) and System C.

He has worked on a Silicon on Sapphire radiation hard microprocessor chip set for Marconi Space and Defence, a pure asynchronous chip for Acorn computers, and developed all the initial CAN implementations including the Intel 82526 and those for Bosch internal implementations, Philips, Motorola, National, NEC, Siemens as well as the Intel 82527 and those on Intel MCUs. He also developed MCUs for engine management and ABS.

He designed a new generation 16 bit micro-controller for Siemens and modeled that controller in 'C'. The simulation environment he created escaped from Siemens and became the foundation of System C.

In 2003, he created the first Cortus processor which is at the heart of security solutions used in bank cards, sim/smart cards, e-passport and is the root of trust in many devices including Blackberry, Renesas, Intel, Fujitsu, etc.

Cortus Strengths



- Cortus has a unique combination of expertise in:-
 - Processor design (Cortus proprietary ISA and RISC-V) & implementation
 - Compiler, Debugger and IDE implementation (i.e. complete eco-system)
 - RTOS development (and implementing RTOS aware debuggers)
 - Toolchain development
 - Multi-core design (and debug tools for multi-core)
 - Digital IP Design
 - RF and Analog IP Design
 - Security IP Design
 - SoC Design for customers
 - IoT chips for Smart Buildings/Homes
 - Automotive MCUs
- Cortus processors are widely deployed in many different applications
- Cortus' business is creating and designing Integrated Circuit solutions with embedded processors

Cortus IP portfolio (short abstract)

Cortus has a rich, flexible high-end portfolio supporting the “From Idea to Silicon” philosophy

Processors	Applications	Other IP Tools
RISC-V Processors <ul style="list-style-type: none"> • APS1V • APS3V • APS5V • FPS29V • FPS69V 	<ul style="list-style-type: none"> • IoT • Wireless • Image processing • Industrial control • Industrial control 	Analog RF IP Security IP
Cortus ISA Processors <ul style="list-style-type: none"> • APS23 • APS25 • APS25s • FPS26 • APS29 	<ul style="list-style-type: none"> • Image processing, security, industrial • BLE, WI-FI, radio • Industrial control • Image processing, Industrial, set-top box 	Digital IP <ul style="list-style-type: none"> • Standard microcontroller peripherals; timers, interrupt controllers, UARTs, I2C, SPI, debugging, memory controllers, etc • Interface and communications IP; Ethernet, USB (device and host), JTAG, and so on Advanced peripherals such as MMU, MPU, Security peripherals
Cortus ISA Low Gate Count <ul style="list-style-type: none"> • APS3R • APS5 • FPS6 	<ul style="list-style-type: none"> • IDs, cards, metering, pay-TV • Image proc. and IR image proc. • Industrial control, high-end audio 	Tools / toolchain
APSX2 <ul style="list-style-type: none"> • High perf. application processors 	<ul style="list-style-type: none"> • STB, mobile terminal, internet routers, HPC 	Tools <ul style="list-style-type: none"> • IDE • Prototyping platform • Debug connectivity
		Toolchain <ul style="list-style-type: none"> • Based on GNU GCC • Compiler (including customized version) • Debugger

IP spanning across entire portfolio

The RISC-V Opportunity

- RISC-V can provide a long life, 100% self owned independent alternative to Arm and Intel for aeronautics/aerospace, military, automotive, server and HPC applications.
- RISC-V is a free-instruction set architecture specification allowing a Free, Open, Scalable and Flexible design supported by more than 235 member organizations.
- RISC-V has a fair shot at becoming a market standard and represents an alternative to the incumbent IP designs, in particular ARM.
- Cortus had understood the trends in the industry and became one of the dozen Founding Platinum Members, with other companies like Google, Qualcomm, Microsemi, Western Digital, NVIDIA, etc.
- With its **'Idea to Silicon'** capabilities, extensive toolchain and leading expertise Cortus has all the elements to become a key player.
- RISC-V ecosystem lacks a player with Cortus capabilities, and Cortus need to execute quickly on the opportunity.



Cortus is a Founding Platinum Member of the RISC-V Foundation!

What is new with RISC-V?

- There are other Open Source Instruction Sets and processor implementations around. Such as SPARC and Open-Risc.
- RISC-V ISA is not in any way revolutionary. Effort has been made to trace each feature back to a ISA features which have been around a long time and are out of the reach of any patents.
- Performance is intrinsically no better than any other ISA. Code density is worse than ARM and Cortus (and may be others as well) – even when using “compressed” instructions.
- The only difference is the size of the RISC-V Foundation, and its founding members.
- However, for many embedded applications the real standards are the OS API and C/C++ . i.e. the programming environment as seen by the firmware engineer.



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Customer Projects using the Cortus RISC-V cores



We have designed and are designing different chips using the Cortus solutions including RISC-V processors for the following applications:-

- * satellite: robust radiation-hard system-on-chip. Likely to migrate to avionics and military
- * automotive : micro-controller with safety features for ISO26262 etc.
- * IoT (Smart Building): turnkey low cost/high volume micro-controller for Chinese customer
- * Industrial: micro-controller with redundancy for safety critical systems

And one current project which is using a Cortus ISA processor and not a RISC-V processor:-

- * Secure smart card (code density was main criteria for choice)

In planning stage with government institutions:-

- * HPC (processor is small and simple part of overall project)

Cortus has helped many companies to be successful



4.6 billion devices have been produced using Cortus processors and IPs

Applications



The processor is a small part of the solution

- An embedded system includes many other components such as:-
 - Multiple on/off chip oscillators or clock sources and their dividers, PLLs etc
 - Intelligent peripherals (sometimes complex, sometimes very high speed and/or large data volume)
 - Hierarchical memory systems and IP protection mechanisms
 - Non-volatile memory
 - ADC/DAC
 - Timers and various time/angle measurement systems
 - Redundancy, protection against errors, hacking (laser, differential power analysis, physical, etc), system performance, bus throughput
 - **Software**
- The choice of processor ISA for Cortus is an independent choice which can be made at the very last minute in a SoC design.

Cortus has a unique combination of expertises

Cortus owns all the main ingredients needed to make a chip and to disrupt the IP design market

- Cortus ISA
- RISC-V ISA
- Security IP
- AI/CNN (ongoing)

- IDE
- Compiler (including customized version)
- Debugger
- Prototyping platform
- Open OCD
- Profiling / coverage RTOS

Processors
& Digital IP

Tools /
Toolchain

RF &
Analog
design

IoT chip /
MCU

- RF design
- Analog design

RF Transceiver

Processor

Peripherals

Memory

Very small silicon area in 55nm

SoC



Cortus Differentiators

- Cortus has large selection of IPs available which together with its ASIC Design Services enable customers to architect, design and implement innovative chips
- More than 5 billion devices have been produced using the Cortus processors and IPs
- Cortus has a track record of making customers successful
- Cortus is able to offer cost-effective connectivity and secure chips with a complete software solution from **Chip to Cloud** through its IoT platform as well as platforms for consumer and automotive MCUs
- Cortus is leveraging its own large IPs (Digital and Analog) and its expertise (integration and implementation) in helping its IP customers develop successful chips
- Cortus has a unique combination of compiler, HW, SW, system architecture and integration expertise enabling efficient implementation of complex systems
- The Cortus Processor IPs which have industry leading code density (ca 18% better than Arm Cortex M3) and performance (MIPS/uW and MIPS/mm²)

SoC



Thank you for your attention

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cortus

**Your ASIC Solution
Partner**