xCORE

xCORE MULTICORE MICROCONTROLLERS

The xCORE family of 32-bit multicore microcontrollers are programmed in a C language environment; and yet operate deterministically and with low latency. They can even execute hardware-type functions – including peripherals and I/O – in software.

More than 70 family members across three product ranges offer a wide choice of performance and resource grades. We support our devices with a comprehensive range of xSOFTip soft peripherals and functional blocks.

FLEXIBLE MULTICORE MICROCONTROLLERS WITH HARDWARE RESPONSE

xCORE provides a comprehensive range of 32-bit multicore microcontrollers that feature ease-of-use, low latency and timing determinism.

Software-programmable in an environment that will be familiar to any C programmer, xCORE devices allow you to blend control code, DSP and software-defined interfaces.

The low latency and determinism of the architecture allows even demanding time-critical functions to be addressed in software, with hardware levels of response. Using our xTIMEcomposer Studio design flow, you can not only write and debug code, you can also simulate your program like hardware, and perform static timing analysis.

You can choose between the xCORE-General Purpose, xCORE-Analog and xCORE-USB device series, as well as the amount of processing power, DSP and hardware integration you need. The result is a solution that is tightly tailored to your requirements.

To customize your xCORE multicore microcontroller we provide a range of xSOFTip soft peripherals and processing blocks that are ideal for embedded applications in audio, automotive, consumer and industrial products. xSOFTip brings the associated benefits of easy maintenance and fast compilation time, while being accessible to anyone with embedded C skills.

To speed project development we provide a range of reference designs and development kits, including the industry's leading Ethernet AVB solution, and the sliceKIT modular development board system.

- **Multicore compute**
  - 4-32 logical cores
  - 400-1600 MIPS
- **General Purpose, Analog and USB-equipped variants**
- **Flexibility**
  - Implement exact mix of peripherals
- **Low latency**
  - 100x faster real-world I/O response
- **Timing determinism**
  - Never miss a deadline
- **Easy to use**
  - Proven xSOFTip function blocks
  - C-based development flow
- **DSP**
  - Native 32b/64b instruction set
- **Security**
  - Secure OTP to protect IP

WHY xCORE?

Unlike conventional microcontrollers, xCORE multicore microcontrollers execute multiple real-time tasks simultaneously. Devices consist of one or more xCORE tiles, each containing up to eight logical cores. Each core can execute computational code, advanced DSP code, control software (including logic decisions and executing a state machine) or software that handles I/O.

xCORE multicore microcontrollers include a hardware scheduler that ensures deterministic execution by implementing functions similar to those of a real-time operating system (RTOS). Almost all instructions complete in a single cycle, guaranteeing that code will behave predictably.

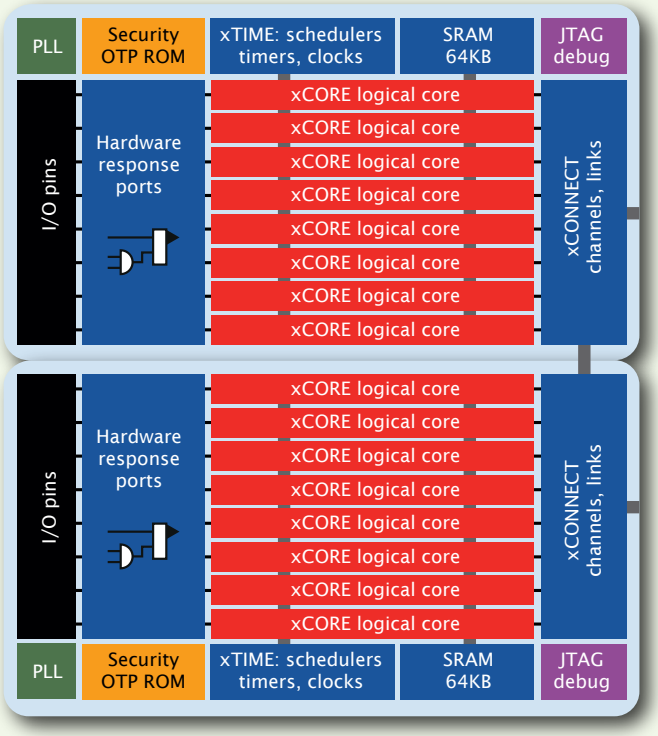
Each tile also includes hardware response ports that enable an intimate connection between the processor resource and I/O signals, reducing latency to an absolute minimum. Inputs respond much faster and you can be sure that your precise timing requirements will be met.

With 64-bit precision DSP capability, xCORE is also particularly well suited for signal conditioning and control tasks. In the xCORE-Analog and xCORE-USB Series devices, the processor tiles are supplemented with analog and USB PHY functions to enable greater system integration.

xCORE-GENERAL PURPOSE DEVICE SERIES

The xCORE-General Purpose (L/G-Series) are a perfect fit for a broad range of applications, from simple stepper-motor control to highly-integrated.

Devices are available with 4, 6, 8, 10, 12, 16 and 32 logical cores, and processing power of 400 to 1600MIPS. The entire L-Series is organized into two pin-compatible groups, allowing you to build multiple end-product variants using a single hardware platform, and to performance-enhance or cost-optimize designs as requirements evolve.



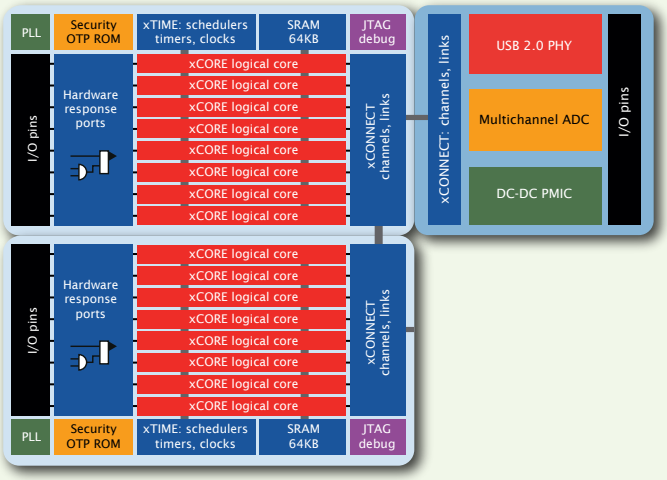
The XS1-L16A-128 consists of two xCORE tiles

L-Series devices	Logical cores	RAM (Kbytes)	I/O (max)	MIPS (max)
XS1-L4A-64	4	64	28	400
XS1-L6A-64	6	64	64	500
XS1-L8A-64	8	64	64	500
XS1-L8A-128	8	128	84	1000
XS1-L10A-128	10	128	84	1000
XS1-L12A-128	12	128	84	1000
XS1-L16A-128	16	128	84	1000
XS1-G04B	32	256	256	1600

xCORE-USB SERIES

The xCORE U-Series (USB-equipped multicore microcontroller) combines the flexibility, low latency and determinacy of L-Series xCORE devices, with an integrated High Speed USB 2.0 PHY supporting 480Mbps data rates and USB Audio Class 2.

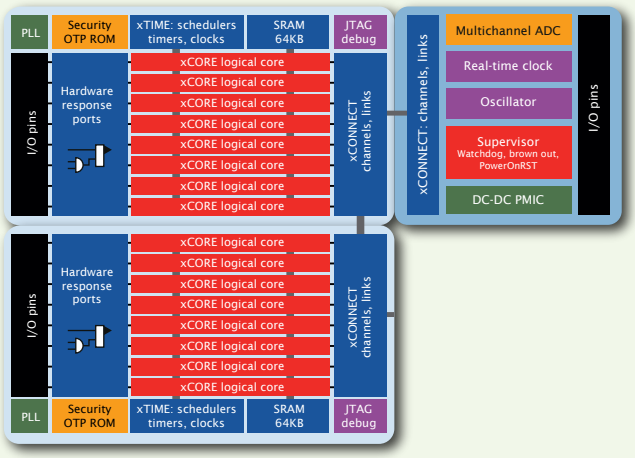
Available in variants with 6, 8, 10, 12 and 16 logical cores, the family addresses a range of demanding applications including high performance peripherals, audiophile consumer audio, sound-bars, multi-channel USB audio interfaces, DJ products, USB speakers, and protocol conversion plus bridging.



U-Series devices	Logical cores	RAM (Kbytes)	I/O (max)	MIPS (max)
XS1-U6A-64	6	64	38	500
XS1-U8A-64	8	64	38	500
XS1-U8A-128	8	128	73	1000
XS1-U10A-128	10	128	78	1000
XS1-U12A-128	12	128	78	1000
XS1-U16A-128	16	128	78	1000

xCORE-ANALOG SERIES

The xCORE A-Series supplements xCORE processing tiles with a targeted set of analog functions, including up to eight channels of 12-bit, 1 MSPS analog-to-digital conversion; power-on reset, brown-out protection and watchdog facilities; integrated oscillator; deep sleep memory; and integrated DC/DC converter. These features combine to reduce the number of external components required and to allow designs to be implemented using simple two-layer printed circuit boards. The devices' power management features enable low sleep-mode power consumption of 500 µW.



A-Series devices	Logical cores	RAM (Kbytes)	I/O (max)	MIPS (max)
XS1-A6A-64	6	64	42	500
XS1-A8A-64	8	64	42	500
XS1-A8A-128	8	128	90	1000
XS1-A10A-128	10	128	90	1000
XS1-A12A-128	12	128	90	1000
XS1-A16A-128	16	128	90	1000

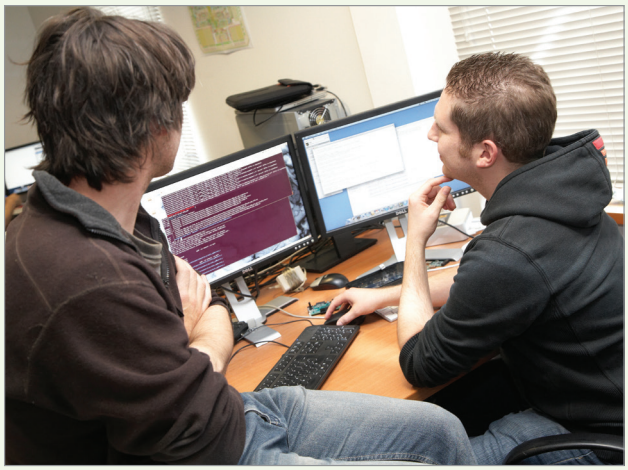
SUPPORT FOR DEVELOPERS

xTIMEcomposer Studio - a best-in-class development flow

The xTIMEcomposer Studio development environment comprises a highly efficient compiler, debugger and device programming tools. In addition it includes cycle-accurate simulation with waveform view, high speed in-circuit instrumentation and a unique timing analyzer, which guarantees timing of your code.

You can browse our extensive library of xSOFTip, integrate blocks rapidly with your own code, then test on the xCORE device, shortening your development time and speeding your time to market.

Our tools are available to download from our website **www.xmos.com** free of charge.



xSOFTip and xSOFTip Explorer

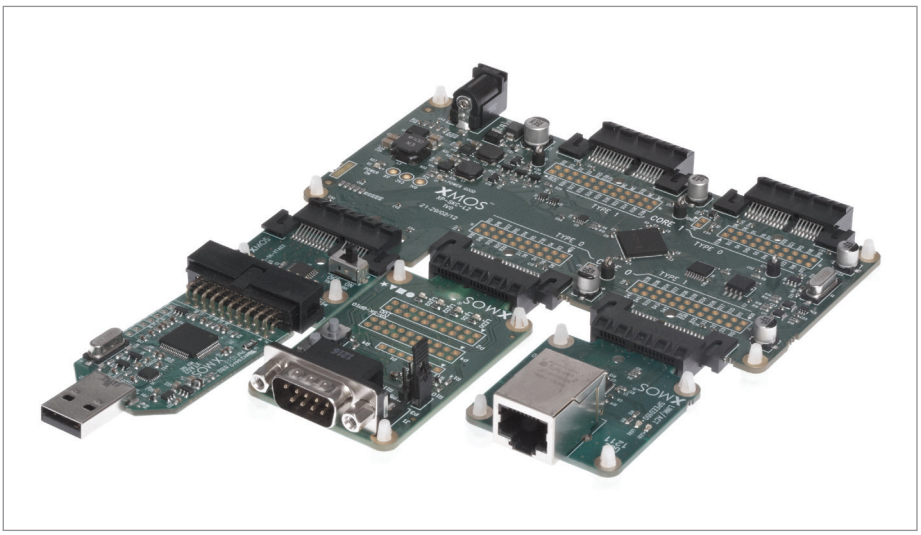
XMOS provides xSOFTip - a comprehensive selection of soft peripheral IP and processing blocks backed up by software libraries and drivers. To make choosing and deploying xSOFTip as easy as possible, we provide a free of charge tool called xSOFTip Explorer™. Our graphical tool allows you to browse xSOFTip blocks from our library and configure them to your specification to create a custom chip that exactly meets your needs.

sliceKIT MODULAR DEVELOPMENT SYSTEM

Evaluating and developing with xCORE multicore microcontrollers is easy thanks to our flexible design kit, called sliceKIT™.

sliceKIT provides everything needed to develop, debug and prototype xCORE applications. Based on a core board which can be configured with up to four I/O extension cards (slices), sliceKIT is supported by the xTOOLS C-based design environment and xSOFTip™ library of soft peripherals.

We provide an extensive choice of slices that connect to the core board using low-cost PCIe style connectors, reducing the cost of slices and making it easy to add your own slice. Our current range supports: Ethernet; GPIO; LCD graphics; audio; MUART; SDRAM; CAN; LIN; RS232; and WiFi. The choice is growing daily: check www.xmos.com for the latest list.



MORE INFORMATION AND AVAILABILITY

For pricing and availability, please contact your nearest distributor – see **www.xmos.com/support/distributors**

For more details on xCORE multicore microcontrollers visit our website **www.xmos.com**, or email **info@xmos.com**