

# 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 100 family members across the XMOS 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.

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.

Devices are also available in eXtended Architecture versions that combine XMOS multicore microcontroller technology with an ultra-low-power ARM® Cortex® M3 processor, to create programmable system-on-chip (SoC) products.

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 behaves predictably.

Each tile includes hardware response ports that enable an intimate connection between the processor resource and I/O signals, reducing latency to a minimum. Inputs respond much faster and you can be sure that your precise timing requirements will be met. xCORE-XA devices also include ultra-low-energy fixed function peripherals, including a USB 2.0 interface.

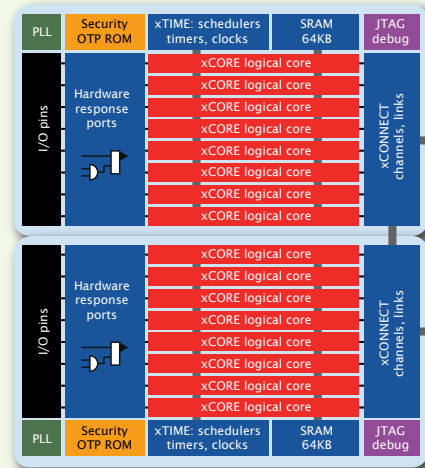
With 64-bit precision DSP capability, xCORE is particularly well suited for signal conditioning and control tasks. In xCORE-Analog and xCORE-USB devices, the processor tiles are supplemented with analog and USB PHY functions to enable greater system integration.

- **Multicore compute**
  - 4-16 logical cores
  - 400-1000 MIPS
- **More than 100 device variants**
  - General purpose
  - USB 2.0-equipped
  - Analog-equipped
  - XA, with ARM® Cortex® M3
- **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 blocks
  - C-based development flow
- **DSP**
  - Native 32/64b instructions
- **Security**
  - Secure OTP to protect IP

## xCORE-GENERAL PURPOSE FAMILY

The xCORE-General Purpose devices are a perfect fit for a broad range of requirements, from simple stepper-motor control to highly-integrated real-time systems and time-sensitive networking applications.

Devices are available with 4, 6, 8, 10, 12 and 16 logical cores, and processing power of 400 to 1000MIPS. The entire xCORE-General Purpose family 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.

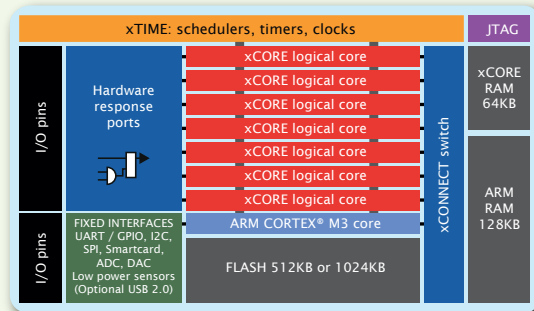


xCORE-GENERAL PURPOSE	LOGICAL CORES	RAM (KB)	I/O (max)	MIPS (max)
XS1-L4A-64	4	64	28	400
XS1-L6A-64	6	64	64	500
XS1-L8A-64	8	64	64	500
XS1-L8A-128	8	128	84	1000
XS1-L10A-128	10	128	84	1000
XS1-L12A-128	12	128	84	1000
XS1-L16A-128	16	128	84	1000

## xCORE-eXtended Architecture FAMILY

xCORE-eXtended Architecture (XA-Family) combines multicore microcontroller technology with an ultra-low-power ARM Cortex-M3 processor.

Designers use high-level software to configure a device with the exact set of interfaces and peripherals needed for their design, while at the same time re-using existing ARM binary code and taking advantage of ultra-low energy fixed-function peripherals. Users can also add real-time data-plane plus control processing and DSP blocks, using multiple xCORE processor cores, with the ARM available to run control plane software such as communication protocol stacks, standard graphics libraries, or complex monitoring systems.

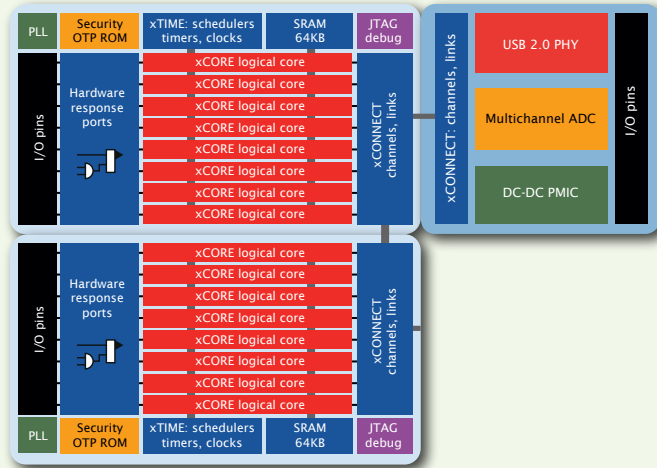


xCORE-XA	LOGICAL CORES	RAM (KB)	FLASH (KB)	I/O (xCORE/ARM)	MIPS (max)
XS1-XA8A-9	7+CORTEX-M3	192	512	40/72	500
XS1-XAU8A-9	7+CORTEX-M3	192	512	40/72	500
XS1-XA8A-10	7+CORTEX-M3	192	1024	40/72	500
XS1-XAU8A-10	7+CORTEX-M3	192	1024	40/72	500

## xCORE-USB FAMILY

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

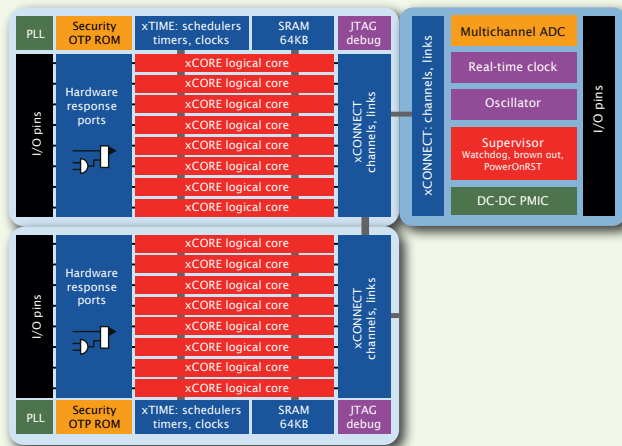
Available in variants with 6, 8, 10, 12 and 16 logical cores, the family addresses a range of demanding applications including high performance peripherals, audiophile consumer audio, sound-bars, multi-channel USB audio interfaces, DJ products, USB speakers, and protocol conversion plus bridging.



xCORE-USB	LOGICAL CORES	RAM (KB)	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 FAMILY

The xCORE-Analog family 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  $\mu$ W.



xCORE-ANALOG	LOGICAL CORES	RAM (KB)	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

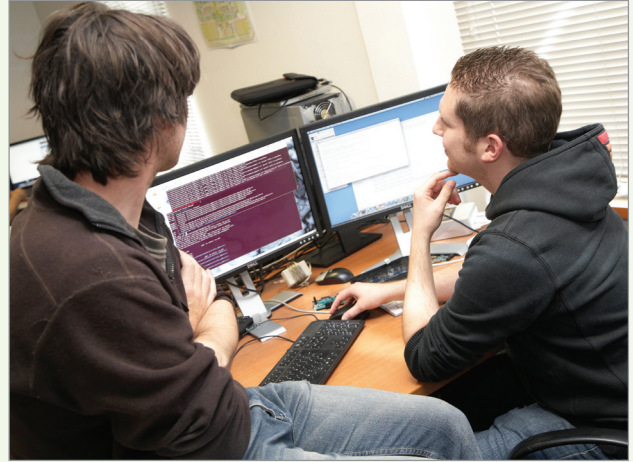
## SUPPORT FOR DEVELOPERS

### xTIMEcomposer Studio - a best-in-class development flow

The xTIMEcomposer Studio development environment includes a highly efficient compiler, debugger and device programming tools. In addition it features 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](http://www.xmos.com) free of charge.



### xSOFTip and xSOFTip Explorer

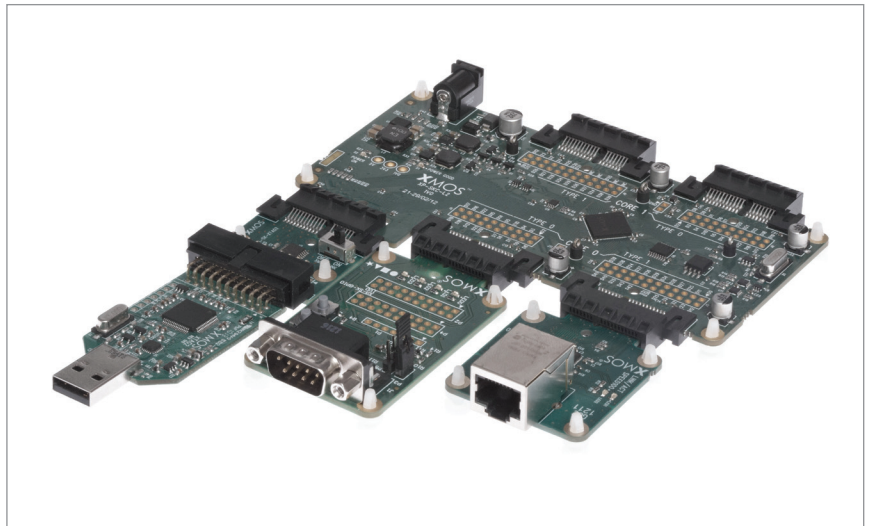
XMOS provides xSOFTip - a comprehensive selection of soft peripheral IP and processing blocks backed up by software libraries and drivers. To make choosing and deploying xSOFTip as easy as possible, we provide a free of charge tool called xSOFTip Explorer™. Our graphical tool allows you to browse xSOFTip 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. It is based on a core board with a 16 core xCORE General Purpose, xCORE-USB or xCORE-Analog device, and 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. Check [www.xmos.com](http://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](http://www.xmos.com/support/distributors)

For more details on xCORE multicore microcontrollers visit our website [www.xmos.com](http://www.xmos.com), or email [info@xmos.com](mailto:info@xmos.com)