

# X2000/X2000H



## Multi-CPU Heterogeneous Multi-App Micro-Processor

X2000/X2000H is a multi-CPU heterogeneous multi-app micro-processor, designed and delivered by Ingenic Inc., Ltd. It includes 2 CPU cores - an XBurst2 (a MIPS based Ingenic CPU core, which can be configured to work as two logic CPUs) and an XBurst0 (another Ingenic CPU core, MIPS based). Those 2 CPU cores combine the computing capacity of application processors with the real-time control ability and outstanding power efficiency of MCUs and cross-over application domains. As a system-on-a-chip, X2000 has 128Mbytes LPDDR3 on-chip, so that a Linux based application can run on it. X2000 is equipped with the interfaces to connect up to 3 cameras at simultaneously, and 2 of them can be hardware synchronized. Integrated video processor and two image signal processors put H.264 coding/encoding and image manipulations at the developer's disposal. Multiple interfaces are available, including USB, RGMII, GPIO, SSI, UART and others. X2000 is available in BGA-270 package. It operates over a temperature range of -40°C to +85°C. X2000's development kit, called Halley5, includes an evaluation board and comprehensive software package and documentation.

X2000H is pin-to-pin compatible with X2000, but with 512Mbytes DRAM inside.

## FEATURES

- A main CPU core (XBurst2), configurable as two logic CPUs, MIPS based, at 1.2GHz, L1 & L2 Cache, SRAM, FPU.
- A secondary CPU core (XBurst0), intended for real time control, MIPS based, at 240MHz.
- One Video Processing Unit consisting of H.264 encoder/decoder and JPEG encoder/decoder.
- Two Image Processing Units and Camera Interfaces support up to 3 cameras simultaneously.
- LPDDR3 128M/512Mbytes memory on chip.
- External memory interface for SPI Flash.
- An Audio CODEC, including ADC & DAC on chip together with three I2S ports, PCM interface and S/PDIF.
- MIPI-DSI with resolution up to 1920x1080@40Hz.
- SLCD display interface with resolution up to 640x480@60Hz, 24BPP.
- RGB display interface, with resolution up to 1280x720@60Hz, 24BPP.
- Up to 16 PWM channels.
- Interrupt controller with up to 64 sources.
- Watchdog with multiple clock source options.
- 6-channels A/D converter on chip with 10bit resolution.
- Real time clock.
- GPIO, I2C x6, SSI x2 and UART x10.
- MMC/SD/SDIO x2.
- USB 2.0 OTG.
- Reduced Gigabit Media Access Controller (RGMII), IEEE 1588-2002 compliant.
- Security subsystem with true random number generator and AES-256/RSA-2048/MD5/SHA/SHA2 engines.
- BGA270, 12mm x 12mm x 1.2mm, 0.65mm pitch.

**BENEFITS**

- Powerful Compute Engines – A main CPU core at 1.2GHz with Simultaneous Multi-Threading and a secondary CPU core at 240MHz.
- Low Power DDR3 on chip – Supporting Linux 4.4.94/5.10 and device drivers all to run on chip.
- Low power consumption – Hibernate mode (20uW) with waking up less than 100ms.
- Image/video/audio processors on chip – Connecting up to 3 cameras and 8 digital microphones.
- AI applications – Embedded device for edge AI.

**APPLICATION/SOLUTIONS**

- **Edge Deep Learning:** Detection solutions - Human body detection, vehicle detection, human face detection etc.; Recognition solutions - Plate recognition, speech recognition, facial recognition etc.
- **Baseline Algorithms:** QR Code Readers, Facial Recognition, Finger Print Recognition.
- **Human Machine Interfaces:** Smart Panels, Smart Air-conditioners, Smart Refrigerators, Smart Small Appliances.
- **Multi-app Solutions:** Cloud Printers.

**ORDERING INFORMATION**

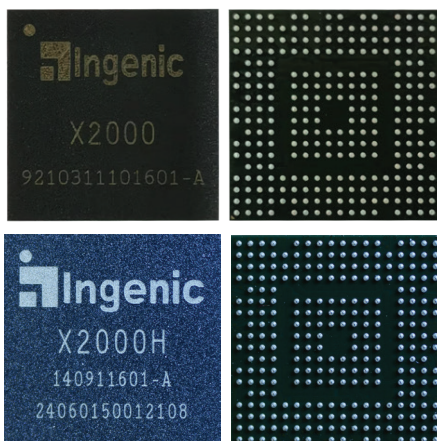
Chip

Part No.	Temperature Range	Package
X2000	-40°C ~ +85°C	BGA-270
X2000H	-40°C ~ +85°C	BGA-270

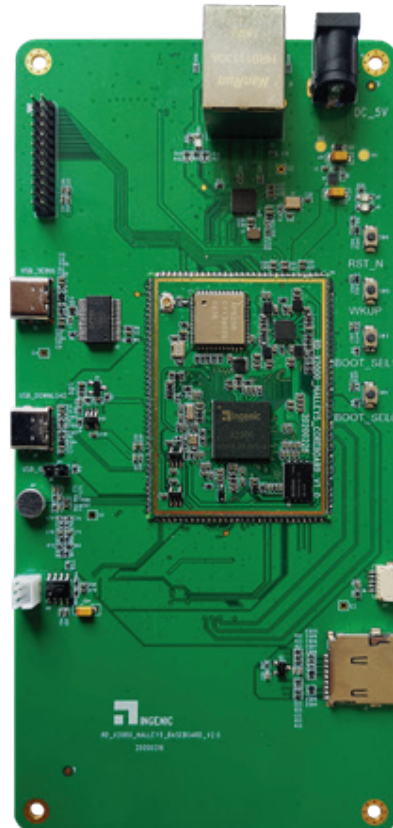
Development Board

Part No.	Temperature Range	Package
Halley5	-40°C ~ +85°C	BGA-270

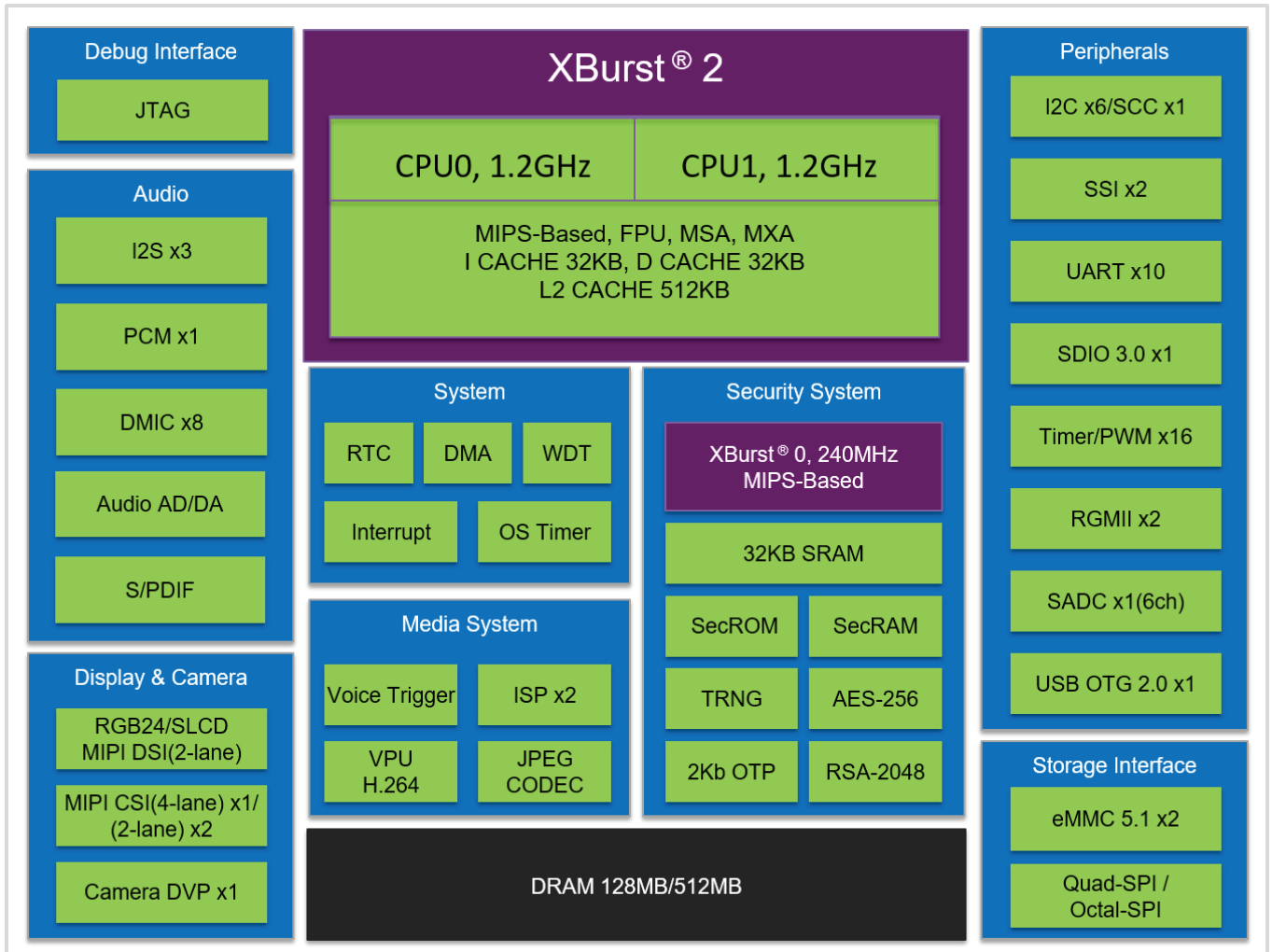
**CHIP IMAGE**



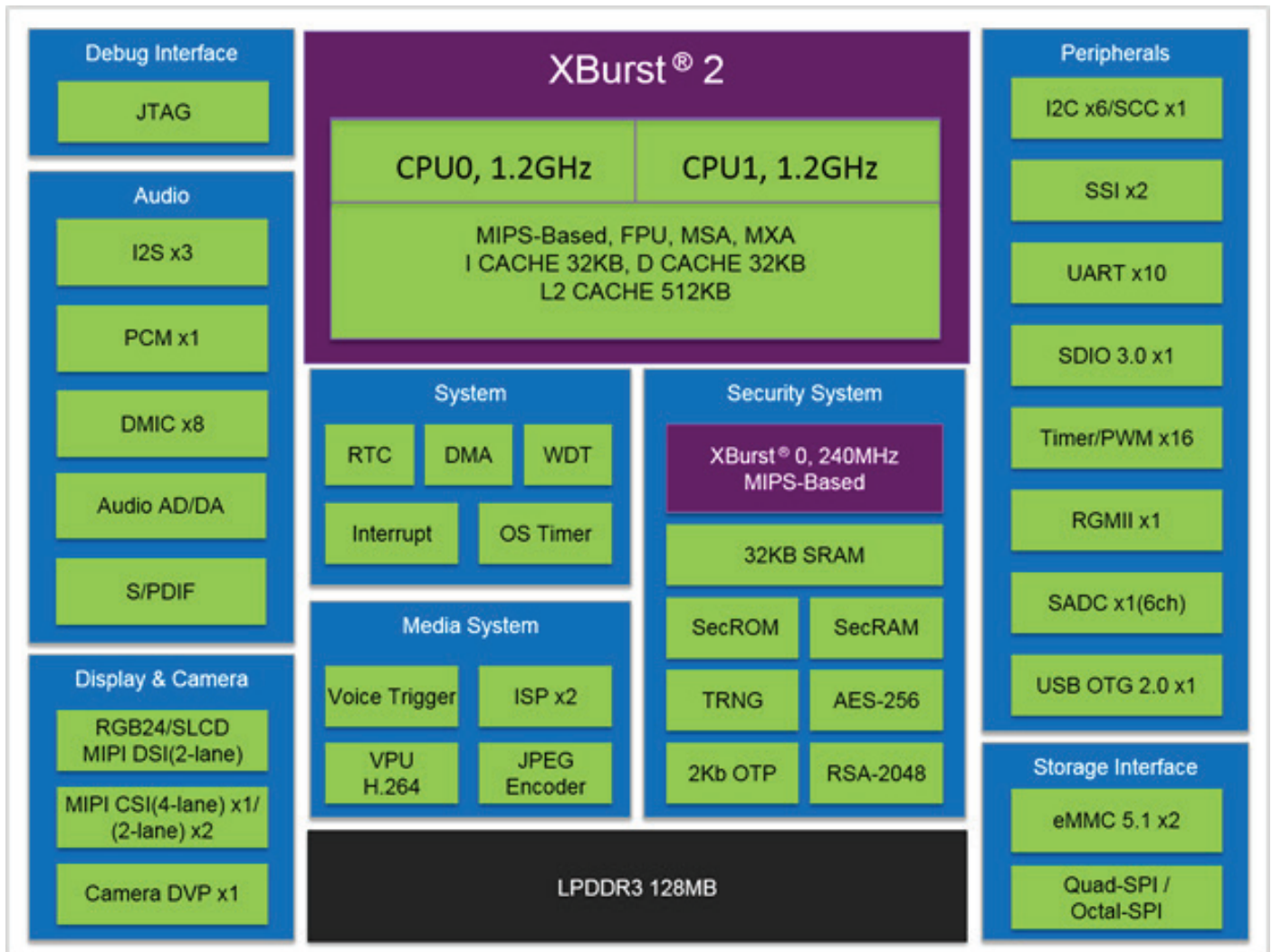
**DEVELOPMENT BOARD IMAGE**



**SYSTEM DIAGRAM**



**BLOCK DIAGRAM**



Questions or feedback may be sent to:  
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