MIPS   microAptiv Processor Core

Wave Computing's MIPS microAptiv is the smallest, lowest-power CPU family available.

The microAptiv cores also have higher performance than competing converged microcontroller/DSP solutions in their class, delivering 1.7 DMIPS/MHz, and 3.44 CoreMark/MHz in microMIPS mode.

With a growing ecosystem of supported third partner products, and a comprehensive set of MIPS development tools, microAptiv provides a complete environment to accelerate SoC design and reduce time to market.

microAptiv is a high-performance, compact processor that features advanced DSP capabilities. microAptiv can be licensed in two configurations:

- a microprocessor (MPU) with a Memory Management Unit (MMU) and cache memories
- a microcontroller (MCU) with a Memory Protection Unit (MPU)

MIPS microAptiv features

Advanced DSP features
The microAptiv cores are enhanced with the addition of the MIPS DSP Application Specific Extension (ASE) release 2. microAptiv cores retain all of the features available in the M14K core, including the microMIPS code compression ISA and MCU ASE which deliver real-time performance and cost advantages in the development of microcontroller and embedded systems designs.

The DSP ASE r2 provides the microAptiv MCU core with high-performance, single-cycle throughput DSP and SIMD capabilities to address the requirements of a broad range of embedded applications requiring more signal processing functionality. These applications include industrial/motor control, smart meters, automotive, storage, mobile communications and security.

Secure debug
In addition, the microAptiv MCU core integrates a memory protection unit and a secure debug functionality, features that can be used to advantage in systems requiring a high level of security.

microAptiv cores offer a significant amount of configurability, including the choice of operating in MIPS32-only mode, MIPS32+microMIPS mode or microMIPS only mode.

The debug capabilities of the microAptiv cores have been further enhanced with the addition of a low-cost 2-wire cJTAG option (IEEE standard 1149.7).

microAptiv Key Features

- MCU/MPU
  - 5-stage pipeline
  - 10 cycle interrupt latency
  - 32x32-bit GPRs
  - microMIPS ISA
  - SRAM/cache option
  - Single operation instructions
  - Simple memory addressing
- DSP
  - Dedicated DSP pipeline
  - 8/16-bit SIMD engine
  - 159 DSP instructions
  - 70 SIMD instructions
  - 38 Multiply/MAC instructions
  - Single cycle throughput
  - Support up to 4 accumulators

Benefits

- High performance efficiency 5-stage pipeline architecture
- Optional, Integrated DSP ASE and enhanced MDU for high performance, low cost signal processing
- Cache/MMU or non-cached core options for use in a broad range of applications specific markets
- Low power, small footprint real-time embedded controller with integrated standard I/O interfaces
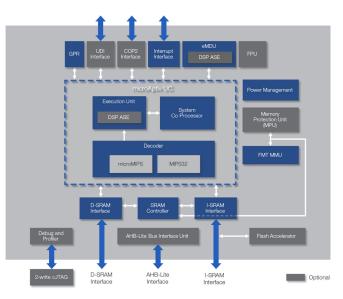- Superset of the popular M14K/c processor cores and microMIPS code compressions ISA

Applications

- Industrial control and automation
- Internet of Things (IoT), Machine to Machine (M2M)
- Wearables
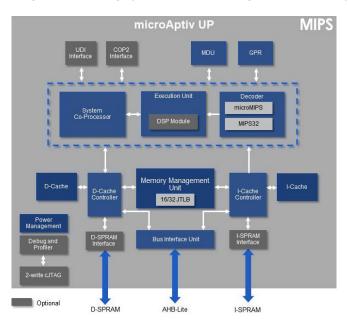- Home appliances, digital consumer products
- Automotive

microAptiv MCU

A cache-less implementation and superset of the MIPS32® M14K core for microcontroller applications.

microAptiv MPU

A superset of the MIPS32® M14Kc core with a cache controller and a Memory Management Unit (MMU) to facilitate embedded systems designs executing rich operating systems which manage virtual memory.

About Wave Computing

Wave Computing, Inc. is revolutionizing AI with its dataflow-based systems and solutions that deliver orders of magnitude performance improvements over legacy architectures. The company's vision is to bring deep learning to customers' data wherever it may be—from the edge to the datacenter—helping accelerate time-to-insight. Wave is powering the next generation of AI by combining its dataflow architecture with its MIPS embedded RISC multithreaded CPU cores and IP. Wave Computing has been named Frost & Sullivan's 2018 "Machine Learning Industry Technology Innovation Leader," and recognized by CIO Application Magazine's as one of the "Top 25 Artificial Intelligence Providers." Combined with MIPS, Wave now has over 400 granted and pending patents and hundreds of customers worldwide.

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