



# ARC<sup>®</sup> SOUND ADVANCED SUBSYSTEM

SUBSYSTEM

**First Multi-Standard Subsystem for Advanced  
High Fidelity Audio Applications**

## Applications

### HIGH-FIDELITY AUDIO PRODUCTS

- Car Infotainment Subsystems
- Multi-Channel Camcorders
- Home Theater Receivers
- HD DVD and Blu-Ray Optical Disc Players

### Audio Encoder Support

#### ENCODER STANDARDS

- AAC High-Speed Ripping
- Dolby<sup>®</sup> Digital (AC-3)
- MP2
- MP3

### Audio Decoder Support

#### DECODER STANDARDS

- AAC-LC
- MP2
- WMA
- Dolby Digital (AC-3)

### SRC (SAMPLE RATE CONVERTER)

- Multi-stream, multi-standard SRC
- Input at up to 96 KHz sample rates
- Output 44.1 KHz or 48 KHz

## Key Components

- Configurable ARC<sup>®</sup> 700 family CPU
- Award-winning 128-bit SIMD accelerator
- Media-centric DMA engine
- Pre-verified audio codec libraries, including binaries and source code

ARC<sup>®</sup> Sound Advanced Subsystem is the third in a line of ARC Media Subsystems. It combines ARC's award-winning 128-bit SIMD accelerator and DMA engine with a 700 family configurable RISC processor. This combination provides a highly tuned audio solution that efficiently processes widely used audio codecs: Advanced Audio Coding (AAC), Dolby<sup>®</sup> Digital (AC-3), MPEG Audio Layer 3 (MP3) and Windows Media Audio (WMA).

The 128-bit SIMD engine includes over 60 audio-specific instructions that accelerate commonly used audio algorithms, such as the discrete cosine transform (DCT) and digital sub-band filtering. In addition, the SIMD unit can operate on eight 16-bit or four 32-bit audio samples in parallel. Along with the ARC High Fidelity Audio Library and ARC Media Library, a complete set of hardware and software development tools that support ARC's 700 family processors are available.

Advanced capabilities include ripping an entire CD of audio to a hard drive in less time than it takes for the first track to play, while concurrently decoding and playing back multiple audio streams; each with different sample rates (e.g. 44.1 KHz, 48 KHz, 96 KHz), sample resolutions (e.g. 16-bit, 20-bit, 24-bit) and compression algorithms (e.g. WMA, MP3, AAC).

Because all ARC Media Subsystems are configurable, SoC designers can add or remove instructions to better differentiate from their competition. By leveraging the programmable nature of ARC's subsystems, additional algorithms can be included beyond the optimized and pre-verified audio codecs supplied as part of the subsystem.

### Typical Performance Characteristics

RAM	87.25 KBytes
Total Die Area*	2.54 mm <sup>2</sup>
Power*	0.24 mW/MHz

\* Note: Power and die size both measured in 90nm TSMC G process. Die size includes all standard cells and subsystem memory



# ARC® Sound Advanced Subsystem Features\*

## Very low power design

- 12x speed audio encode at less than 35 mW
- For use in power-sensitive apps

## Very low-frequency operation

- 12x speed audio encode at less than 130 MHz
- Synthesizable up to 400 MHz

## Continuously scalable audio resolutions and fidelity

- 16- to 32-bit audio samples
- Sample rates up to 192 KHz

## Multi-standard and programmable

- High-speed CD ripping with the AAC-LC encoder
- AAC, WMA, MP3 and AC-3 decoders
- Simultaneous encode/decode
- Multiple audio stream processing
- Sample Rate Conversion module
- Ability to port additional algorithms to CPU

## Consists of 3 tightly integrated engines:

- High-performance ARC® 700 CPU
- 128-bit SIMD audio engine
- Audio-optimized DMA engine

## Unified memory system architecture

- Shared SDRAM with system CPU

## Interface port for hard-wired IP blocks

## Architecture capable of operation in excess of 500 MHz at 130nm\*

## Over 9.5 GOPS in processing power

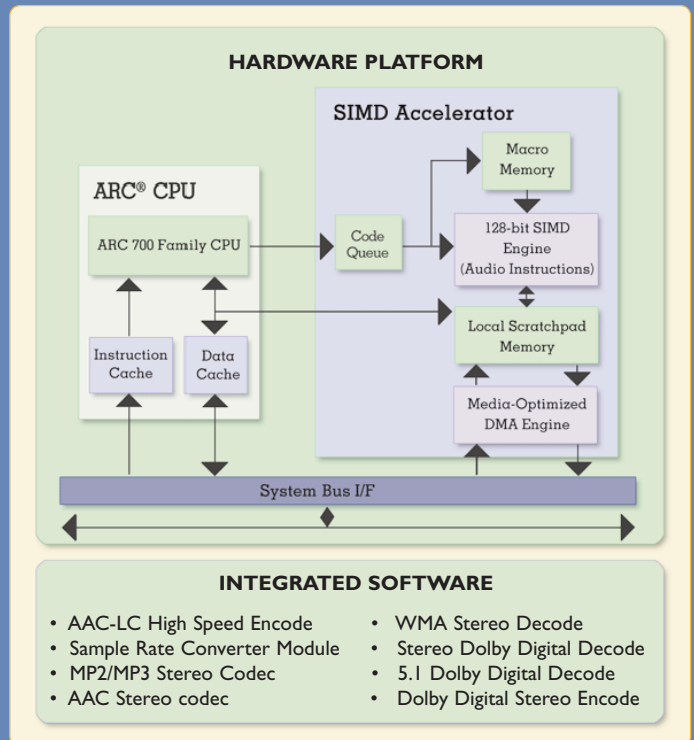
## System compatibility with ARC, ARM, MIPS, PPC or any other system host CPU

\* Estimates based on customer simulations in TSMC 0.13 µm LVOD process

\*\* Dolby (a registered trademark of Dolby Laboratories) Digital also known as AC-3 (5.1)

# ARC® Sound Advanced Subsystem

*ARC® Sound Advanced Subsystem: Complete Audio Solution*



ARC's patented technology enables users to customize cores for a wide range of uses, including wireless, voice, video, security etc., which may be subject to patents considered essential. Users are responsible for obtaining the necessary licenses for their intended use.

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