

# Ittiam AC3 Decoder

## AC3 Decoder

Dolby Digital™ AC-3 is a perceptual audio coding standard, used by several consumer applications, like digital terrestrial television broadcasting, several cable and satellite television standards, worldwide DVD audio. Its underlying perceptual coding engine provides high quality multi-channel audio at low bit-rates, a flexible format, integrated support for important consumer features, and moderate implementation complexity. It also supports a number of system features that improve the overall listening experience, such as volume normalization and dynamics processing.

Note on Licensing: Ittiam’s AC-3 Decoder implementation on C64xPlus is provided subject to the terms and conditions of the Dolby Laboratories Licensing Corporation and requires certification of the end product.

## Features

- 5.1 Channel decoding
- Sampling Rates 32, 44.1 and 48 kHz
- Bit-rates : 32 – 640 kbps
- Channel Coupling
- Re-matrixing
- Dialog normalization
- Dynamic Range Compression
- Down-mixing
- Error detection (CRC checking)
- Supports Annex C of ATSC-A52 (Karaoke Capable)
- Supports Annex D of ATSC-A52 (Extended bit-stream)
- Supports a simple C callable with flexible memory allocation scheme
- Multi-channel, Reentrant software
- Supports TI XMI/XDIAS interface

- The implementation has been tested on a variety bit-streams and audio files for robustness and quality.
- Optimized for low footprint & processing power

## Decoder Validation

The AC-3 decoder implementation has been validated using the test procedures designed by Dolby Laboratories and has been certified by Dolby Laboratories.

## Resource requirements on C64xPlus Processor

Function	MCPS	Pgm	Tables	Static	Scratch
	Peak	ROM (kb)		RAM (kb)	
Decode	21.7	49.0	6.25	8.5	3.5

**Note:** Input/ Output buffers details are given in the next page.

MCPS/MIPS indicate the CPU usage for processing 5.1, 48 kHz worst case stream. Difmus4.ac3

MCPS/MIPS measurement on 0-wait-state memory access.

## Details of C64xPlus Resources required

### CPU Loading

Description	Simulator		Hardware Configuration	
	MCPS	MCPS	MCPS	MCPS
	Ave	Peak	Ave	Peak
Difmus4.ac3 (48kHz, 5.1 channel)	14.15	21.74	28.44	37.81

### Memory Usage

Program	Tables	Static	Scratch	Input	Output
49	6.25	8.5	3.5	3.75	6

**Note:**

- I/O Buffers
  - Input Buffer Size : 3.75 kbytes
  - Output Buffer Size 6kbytes
- Performance generated on *CCS 3.2.39.5 with C64xPlus Cycle Accurate Simulator with 0 wait state memory access*
- Hardware Configuration performance generated on a DM6446 processor with all data and program memory sections placed in the external memory, with cache configuration of 32 kB L1 P Cache, 16 kB L1 D Cache & 64 kB L2 Cache, and cache thrashed after decoding each frame.
- MCPS numbers on the hardware will vary with the I-Cache and D-Cache size and with the memory configuration/placement
- Program memory doesn't include the code size of the test bench and standard library functions
- Data memory should be aligned to desired byte-boundary to meet the performance/functionality requirement

**Notice**

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