

AAC-LC Encoder

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MPEG-2/4 AAC-LC (Advanced Audio Coding - Low Complexity version) is a popular audio coding technique recommended by MPEG committee. The codec handles audio signals sampled in the range of 8 kHz to 96 kHz. It operates on a frame of 1024 samples. The bit-rate can vary in the range 8 to 576 kbps/channel (depending on the sampling rate). Low Complexity version of AAC provides good compromise between the codec complexity and the audio quality.

Features

Supported

- MPEG2 and MPEG4 AAC-LC(Low complexity)
- Up to two channels
- Sample rates supported
 - 8KHz, 11.025KHz, 12KHz, 16KHz, 22.05KHz, 24KHz, 32KHz, 44.1KHz, 48KHz, 64KHz, 88.2 KHz, 96KHz
- Bit-rates supported 8-576 kbps/channel
- Channels: Mono/Stereo
- Bit-streams ADIF (Audio Data Interchange Format), ADTS (Audio Data Transport Stream)
- Average bit-rate
- Tools: MS (Mid-side Stereo), TNS (Temporal Noise shaping).
- Efficient psycho-acoustic model.
- C Callable interface for encoder
- Efficient scratch memory with reduced stack requirements.
- Optimized for low footprint & processing power.
- XMI API

Not Supported

- More than two channels of audio
- IS (Intensity Stereo) Coding

- PNS (Perceptual Noise Substitution)
- MP4 packetization

Encoder Validation

AAC-LC Encoder is an Informative standard. There is no standard measure or tool for evaluating the quality /fidelity of the encoder. The encoders produce complex artifacts, which is dependent on the source material. Taking these into consideration, the test bench for the audio coders includes the following types of test.

Features

- Bit Stream Compliance: Tests to ensure that the generated bit-stream is in conformance with the specification.
- Objective Quality Evaluation: Audio Quality test based on the ITU BS.1387 standard for objective audio quality evaluation.
- Subjective Quality Evaluation: Listening tests to evaluate the quality.
- Artifact Listening Tests: Listening tests to ensure that the encoder does not produce the artifacts.

Resource requirements on C64x

CPU Load (MCPS)		Program Memory (Kbytes)	Data Memory (Kbytes)			
Peak	Average		Table	Scratch	Stack	Persistent
25.8	17.8	121.6	27.8	22.7	2.1	19.2

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

MCPS/MIPS indicate the CPU usage for 44.1 kHz at 128 kbps with TNS enabled for the stereo file 27.wav.

MIPS or MCPS measurement on 0 wait-state memory access



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Details of C64x Resources required

CPU Loading

Description (128 kbps, 44.1kHz, stereo)	Simulator		Hardware	
	Peak MCPS	Avg MCPS	Peak MCPS	Avg MCPS
TNS enabled	25.8	17.8	52.6	35.9
TNS disabled	21.9	15.8	43.3	32.7

Memory Usage (KB)

Program	Tables	Persistent	Scratch	Stack	Input	Output
121.6	27.8	19.2	22.7	2.1	4	1.6

Note:

- Performance generated on *CCS 2.20.18 with C64x Cycle Accurate Simulator with 0 wait state memory access*
- Hardware Configuration performance generated on a DM642 processor with all data and program memory sections placed in the external memory, with cache configuration of 16 KB L1 P Cache, 16 KB L1 D Cache & 64 KB L2 Cache, and cache thrashed after encoding each frame.
- MCPS numbers on the hardware will vary with the I-Cache and D-Cache size and with the memory configuration/placement
- MCPS/MIPS indicate the CPU usage for processing stereo music stream 27.wav (SQAM file) at 44.1 kHz for 128 kbps with full bandwidth encode.
- 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

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