MPEG4AAC High Efficiency Decoder (v01.30.03) on C64x+

FEATURES

- eXpressDSP Digital Media (XDM1.0 IAUDDEC1) Interface compliant
- MPEG4 AAC Low Complexity (LC) object type implementations supported
- MPEG2 AAC Low Complexity (LC) object type implementations supported
- MPEG4 AAC Long Term Prediction (LTP) object type implementations supported
- MPEG4 AAC High Efficiency (HE) object type implementations supported
- MPEG4 AAC Parametric Stereo (HEv2) object type implementations supported
- ARIB and ISO/IEC 13818-8 standard downmixing supported for multichannel streams
- Decoding of upto 6 channels including LFE supported
- RAW data input format supported
- Audio Data Interchange Format (ADIF), and Audio Data Transport Stream (ADTS) input formats, encoded with ISO/IEC 13818-7 or 14496-3 compliant encoders supported

- High quality AAC HE decode as per ISO/IEC 14496-3:AMENDMENT 8 supported
- AAC HEv2(Parametric Stereo) decode as per ISO/IEC 14496-3:AMENDMENT 11 supported
- Sampling frequency range of 8 kHz – 96 kHz as per ISO/IEC 14496-3 standard supported
- Supports bitrate ranging from 8kbps to 1152kbps
- Maximum bit-rate based on the sampling frequency as per standard supported
- Validated on DM644x with Code Composer Studio version 3.2.37.12 and Code Generation tools version 6.0.8

DESCRIPTION

Advance Audio Coding (AAC) is an audio data compression format. This coding technique uses a perceptual filter bank, a sophisticated masking model, noise-shaping techniques, and channel coupling. It is validated on DM644x with Code Composer Studio version 3.2.37.12 and Code Generation tools version 6.0.8.

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Performance Summary

This section describes the performance of MPEG4AAC High Efficiency Decoder on C64x+ (DM644x).

Table 1. Configuration Table

CONFIGURATION	ID
MPEG4 AAC HE, High quality	MPEG4_AAC_001

Table 2. Cycles Information – Profiled on DM644x EVM with Code Generation Tools Version 6.0.8

CONFIGURATION ID	PERFORMANCE STATISTICS (MEGA CYCLES PER SECOND)[1] [2]		
	TEST DESCRIPTION	AVERAGE	PEAK
MPEG4_AAC_001	LC-mj_48khz_128000.aac	19.77	23.8
	LTP- miami_44_adif.aac	28.64	37.3
	HEHQ-MJ_STEREO1_44kHz_64.aac	37.2	41.3
	PS-ps_mj_44kHz_32000.aac	49.53	51.52
MPEG4_AAC_002	LC - mj_48khz_128000.aac	19.83	23.88
	LTP - miami_44_adif.aac	29	37.7
	HEHQ - MJ_STEREO1_44khz_64.aac	37.2	41.5
	PS - ps_mj_44khz_32000.aac	49.6	52.7
	sbr_cm_48_5.1.aac	94.2	98.3

(1) Measured with program memory, stack, and I/O buffers in external memory and with cache configuration 32K-bytes L1P cache,
     16K-bytes L1D cache, and 64K-bytes L2 cache.
     L1 and L2 cache invalidation done for every frame.
     Measured with Optimal Function Placement Order (see Appendix A in User Guide)
     Measured with frame size=1024 samples for LC Profile.
     Measured with frame size=2048 samples for HEHQ Profile.
(2) Average and peak MCPS measurements may vary by +/-5%.

Table 3. Memory Statistics - Generated with Code Generation Tools Version 6.0.8

CONFIGURATION ID	MEMORY STATISTICS[1]				
	PROGRAM MEMORY	DATA MEMORY			TOTAL
		INTERNAL	EXTERNAL	STACK	
MPEG4_AAC_001	154	0.00	197.4	5	356.4
MPEG4_AAC_002	154	0.00	259.6	5	418.6

(1) All memory requirements are expressed in kilobytes (1K-byte = 1024 bytes).
     Measured with OptimalFunction Placement Order (See Appendix A in User Guide).

Table 4. External Data Memory Split-Up

CONFIGURATION ID	DATA MEMORY - EXTERNAL[1]		
	SHARED		INSTANCE[2]
	CONSTANTS	SCRATCH	
MPEG4_AAC_001	66	71.4	60
MPEG4_AAC_002	66	87.4	106.2

(1) All memory requirements are expressed in kilobytes (1K-byte = 1024 bytes).
(2) Does not include I/O Buffers.

Notes

- I/O buffers
  - Input buffer size = 3840 bytes
  - Output buffer size = 8192 bytes for 16-bit audio sample size, 2 channel output (stereo)
- Total data memory for N non pre-emptive instances = Constants + Runtime Tables + Scratch + N*(Instance + I/O buffers + Stack)
- Total data memory for N pre-emptive instances = Constants + Runtime Tables + N*(Instance + I/O buffers + Stack + Scratch)

References

- ISO/IEC 13818-7:2003 Information technology -- Generic coding of moving pictures and associated audio information -- Part 7: Advanced Audio Coding (MPEG2 AAC standards document)
- ISO/IEC 14496-3:1999(E) Information technology -- Coding of audio-visual objects -- Part 3: Audio (MPEG4 AAC standards document)
- ISO/IEC 14496-3:2001/AMENDMENT 1 Bandwidth extension (MPEG4 AAC-HE standards document)
- *MPEG4AAC High Efficiency Decoder on C64x+ User's Guide* (literature number: SPRUED8E)

Glossary

Term	Description
Constants	Elements that go into .const memory section
Scratch	Memory space that can be reused across different instances of the algorithm
Shared	Sum of constants and scratch
Instance	Persistent-memory that contains persistent information - allocated for each instance of the algorithm

Acronyms

Acronym/Abbreviation	Description
ADTS	Audio Data Transport Stream
ADIF	Audio Data Interchange Format
AAC	Advanced Audio Coding
AAC-HE	High Efficiency Advanced Audio Coding
DV-EVM	Digital Video Evaluation Module
ISO	International Organization for Standardization
IEC	International Electro-technical Commission
MPEG4	Moving Pictures Experts Group-4
XDM	expressDSP Digital Media

Revision History

This datasheet revision history highlights the technical changes made to the SPRS369D codec specific data manual to make it SPRS369E.

Table 5. Revision History of MPEG4AAC HE Decoder on C64x+

SECTION	CHANGES
Table 1	Added following features: • Supports MPEG4 AAC Long Term Prediction(LTP) object type implementations. • Supports Parametric Stereo AAC-HEv2, as per ISO/IEC 14496-4:AMENDMENT 11 • Supports bitrates ranging from 8kbps to 1152kbps. • Supports both ARIB and ISO/IEC 13818-8 standard down mixing. • eXpressDSP Digital Media (XDM 1.0 IAUDDEC1) compliant • Supports maximum bit-rate based on the sampling frequency as per standard.

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Table 5. Revision History of MPEG4AAC HE Decoder on C64x+ (continued)

SECTION	CHANGES
Table 2	Cycles Information: • Modified Average and Peak values
Table 3	Memory Statistics: • Modified Program Memory and Data Memory values
Table 4	External Data Memory Split-Up: • Modified Data Memory - External values

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IMPORTANT NOTICE