

HEVC/H.265 Main Profile Decoder (v01.00.00) on ARM (AM57xx Platform)

FEATURES

- Supports decoding of HEVC Main, Main Still profile bitstreams up to level 5.0
- Supports arbitrary resolutions from 64x64 up to 4kx2k
- Supports width and height as non multiple of 16
- Supports YUV 4:2:0 Planar Chroma format
- Supports decoding progressive content
- Supports SEI and VUI parameters decoding.
- Supports B frame decoding
- Supports CTU sizes 64x64,32x32,16x16
- Supports multiple slice, multiple tile decoding
- Supports decoding of streams with Wave front parallel processing
- Supports bitstreams encoded with Low delay and Random access configurations
- Supports Multiple reference frames
- Supports decoding of streams with scaling matrices
- Supports decoding of streams with Weighted Prediction
- Supports decoding PCM encoded CTUs
- Supports Deblocking and SAO features decoding
- Supports dependent slice decoding
- Supports IDR & CRA frame decoding
- Supports IRAP frame decoding
- Supports TSA,STSA feature decoding
- Supports decoding frames with LTRP feature
- Supports AMP feature decoding
- Supports TMVP feature decoding
- Supports constrained intra prediction
- Supports transform skip and trans quant bypass mode
- Supports unrestricted motion vectors which allows motion vectors to be outside frame boundary
- Supports input and output call back API functions for Low Delay Interface
- Shall accept video elementary stream in big endian format
- Supports decode only header mode
- Error resilient codec, supports error codes
- Supports error concealment at slice level

DESCRIPTION

HEVC/H265 is video compression standard from ITU-T Video Coding Experts Group and the ISO/IEC Moving Pictures Experts Group successor to H264/MPEG4 AVC. Higher Data compression ratio is achieved compared to H.264/MPEG-4 AVC at the same level of video quality. It can alternatively be used to provide substantially improved video quality at the same bit rate. It can support 8K UHD and resolutions up to 8192x4320.

PRODUCT PREVIEW



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Performance and Memory Summary

This section describes the performance and memory usage of the HEVC Main profile Decoder.

Table 1 Configuration Table

CONFIGURATION	ID
HEVC Main Profile, 1080p, IPPP, Low Delay, Multi core(2 Cores)	H265MP_DEC_001
HEVC Main Profile, 720p, IBBP, Multi core(2 Cores)	H265MP_DEC_002
HEVC Main Profile, 720p, IBBB, Random Access, Multi core(2 Cores)	H265MP_DEC_003
HEVC Main Profile, 720p, IPPP, Low Delay, Multi core(2 Cores)	H265MP_DEC_004
HEVC Main Profile, 720p, IPPP, Low Delay, Single core	H265MP_DEC_005

Table 2 Cycles Information with Linaro ARM GCC Toolchain Version 4.7-2013.03

CONFIGURATION ID	PERFORMANCE STATISTICS (MEGA CYCLES PER SECOND) ⁽¹⁾		
	TEST DESCRIPTION	AVERAGE ⁽²⁾	PEAK ⁽³⁾
H265MP_DEC_001	Rich_p1920x1080_420p_2Mbps_VC.265, YUV420, Low Delay, IPPP @ 2Mbps @ 25 frames per second	870	1007
H265MP_DEC_002	Airshow_p1280x720_420p_2Mbps.265, YUV420, IBBP @ 2Mbps @ 30 frames per second	785	836
H265MP_DEC_003	Airshow_p1280x720_420p_2Mbps_RA.265, YUV420, Random Access, IBBB @ 2Mbps @ 30 frames per second	797	855
H265MP_DEC_004	FourPeople_p1280x720_420p_1Mbps_VC.265, YUV420, Low Delay, IPPP @ 1Mbps @ 30 frames per second	488	529
H265MP_DEC_005	FourPeople_p1280x720_420p_1Mbps_VC.265, YUV420, Low Delay, IPPP @ 1Mbps @ 30 frames per second	873	962

(1) Measured with ARM Cortex-A15, 1500 MHz clock, DDR3 1333MHZ clock, Program memory, I/O buffers and Stack in external memory.

(2) Average cycles are calculated as (Total cycles*30/number of frames).

(3) Peak cycles are calculated as maximum of moving average of 30 frames, multiplied with 30 to get per second MHz.

Table 3 Memory Statistics of HEVC Decoder with Linaro ARM GCC Toolchain Version 4.7-2013.03

CONFIGURATION ID	MEMORY STATISTICS ⁽¹⁾⁽²⁾				
	PROGRAM MEMORY ⁽⁴⁾	DATA MEMORY ^{(3) (5)}			TOTAL
		PERSISTENT	CONSTANT	SCRATCH	
H265MP_DEC_001	271	76215	7	8880	85373
H265MP_DEC_002 H265MP_DEC_003 H265MP_DEC_004	271	37622	7	7468	45368
H265MP_DEC_005	271	37551	7	1321	39150

- (1) All these memory requirements are for HEVC Main Profile Decoder library only. They do not include any memory requirements from application side. Stack, heap and code requirements for application are extra.
- (2) All memory requirements are expressed in kilobytes (1K bytes = 1024 bytes).
- (3) The memory requirements given in Table 3 are calculated for YUV 420 Chroma sub sampling.
- (4) Typical input and output buffers for 1920x1080 resolutions with YUV planar 4:2:0 formats are as follows.
Input Buffer: 3072 KB
Output Buffer: 3060 KB

Notes

- I/O buffers:
 - Input buffer size = 3072 K-bytes (for 1920x1088 resolution, YUV420)
 - Output buffer size = 3060 K-bytes (for decode 1920x1088 resolution)

References

- ISO/IEC 23008-2:2013 Infrastructure of audiovisual services - Coding of moving video: High efficiency video coding.
- HEVC/H.265 Main Profile Decoder on ARM User's Guide (SPRUGH8).

Glossary

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

Acronyms

Acronym	Description
HEVC	High Efficiency Video Coding
ISO	International Organization for Standardization
EVM	Evaluation Module

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