

H.264 Base Profile Encoder (v1.00) on DM6467

FEATURES

- eXpressDSP™ Digital Media (XDM 1.0 IVIDENC1) compliant
- H.264 Baseline Profile for only progressive I and P frames supported
- Validated on DM6467 EVM
- YUV420 interleaved color sub-sampling (Y as a single plane and U and V components interleaved to form the second plane) formats supported
- Baseline Profile H.264 Encoder supported
- Limited Main Profile with CABAC method of entropy coding supported
- Limited High Profile with 8x8 transforms supported
- Skip macro-blocks supported
- Only 1 motion-vector per macro-block supported

- Rate control at frame level supported
- Use of C64x+ and ARM968 of HDVICP0 supported
- Supports DMA based framework

DESCRIPTION

H.264 is the latest video compression standard from the ITU-T Video Coding Experts Group and the ISO/IEC Moving Picture Experts Group. This H.264 Encoder is validated on the DM6467 EVM with Code Composer Studio version 3.3.49 and code generation tools version 6.0.8.

PRODUCT PREVIEW



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Performance Summary

This section describes the performance of the H264 Encoder Codec on DM6467.

Table 1. Configuration Table

CONFIGURATION	ID
H.264 Limited High Profile Encoder	DM6467_BP_E_001

Table 2. Cycles Information – Profiled on DM6467 EVM with Code Generation Tools Version 6.0.8

CONFIGURATION ID	PERFORMANCE STATISTICS (MEGA CYCLES PER SECOND) ⁽¹⁾		
	TEST DESCRIPTION ⁽²⁾	AVERAGE ⁽³⁾	PEAK ⁽⁴⁾
DM6467_BP_E_001	parkrun_1280x720p.yuv	330	334
	crew_p1280x720_30fps_420pl_600fr.yuv	338	339
	city_p1280x720_30fps_420pl_600fr.yuv	336	339

- (1) Measured with program memory, stack, and I/O buffers in external memory with cache configuration : 32 KB L1P Program Cache, 32 KB L1D Data Cache and 32 KB L2 Cache. There could be a variation of approximately 1-2% in the values.
- (2) The Intra Period for the test vectors is 30 frames. That is, with one I-frame and 29 P-frames.
- (3) Based on average number of cycles per frame @ 30fps.
- (4) Based on worst case cycles per frame @ 30fps.

Table 3. Cycles Information for 2 MB Processing - Profiled on DM6467 EVM with Code Generation Tools Version 6.0.8

CONFIGURATION ID	PERFORMANCE STATISTICS (CYCLES FOR 2 MB PROCESSING) ⁽¹⁾				
	TEST DESCRIPTION	DSP CYCLES AT 600 MHZ		IMCOP ARM 968 CYCLES AT 300 MHZ	
		AVG	PEAK ⁽²⁾	AVG	PEAK ⁽²⁾
DM6467_BP_E_001	parkrun_1280x720p.yuv	6111	6185	4000	5000
	crew_p1280x720_30fps_420pl_600fr.yuv	6223	6277	4000	5000
	city_p1280x720_30fps_420pl_600fr.yuv	6185	6277	4000	5000

- (1) Measured with program memory, stack, and I/O buffers in external memory with cache configuration : 32 KB L1P Program Cache, 32 KB L1D Data Cache and 32 KB L2 Cache. There could be a variation of approximately 1-2% in the values.
- (2) Peak values are calculated assuming that the most demanding frame is repeated 30 times in the sequence, rather than finding the most demanding 30 frames sequence in the bit-stream.

Table 4. Memory Statistics - Generated with Code Generation Tools Version 6.0.8

CONFIGURATION ID	MEMORY STATISTICS ⁽¹⁾				TOTAL
	PROGRAM MEMORY	DATA MEMORY			
		INTERNAL ⁽²⁾	EXTERNAL ⁽³⁾	STACK	
DM6467_BP_E_001	71	18	3748	10	3847

- (1) All memory requirements are expressed in kilobytes (1K-byte = 1024 bytes). There could be a variation of approximately 1-2% in the values.
- (2) Internal memory is placed in L2 SRAM.
- (3) Includes frame buffers for 720p resolution.

Table 5. Internal Data Memory Split-Up

CONFIGURATION ID	DATA MEMORY - INTERNAL ⁽¹⁾		
	SHARED		INSTANCE
	CONSTANTS	SCRATCH	
DM6467_BP_E_001	0	18	0

- (1) All memory requirements are expressed in kilobytes. There could be a variation of approximately 1-2% in the values.

Table 6. External Data Memory Split-Up

CONFIGURATION ID	DATA MEMORY - EXTERNAL ⁽¹⁾		
	SHARED		INSTANCE
	CONSTANTS	SCRATCH	
DM6467_BP_E_001	71	119	3558

(1) All memory requirements are expressed in kilobytes. There could be a variation of approximately 1-2% in the values.

Notes

- The entire HDVICP is a video resource and uses 16K ITCM and 8K DTCM.

References

- ISO/IEC 14496-10:2005 Information technology -- Coding of audio-visual objects -- Part 10: Advanced Video Coding.
- *H264 Encoder on DM6467 User's Guide* (literature number: SPRUFD9)

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	Description
CIF	Common Intermediate Format
DMA	Direct Memory Access
DMAN3	DMA Manager
EVM	Evaluation Module
GOP	Group of Pictures
HDVICP	High Definition Video and Imaging Co-Processor
LPF	Loop Filter
MV	Motion Vector
QCIF	Quarter Common Intermediate Format
QDMA	Quick Direct Memory Access
QPI	Quarter Pel Interpolation
QVGA	Quarter Video Graphics Array
SQCIF	Sub Quarter Common Intermediate Format
UMV	Unrestricted Motion Vectors
VGA	Video Graphics Array
XDM	eXpressDSP Digital Media

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
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