

MPEG2 Main Profile Decoder (v02.10.00) on C64x+

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FEATURES

- eXpressDSP™ Digital Media (XDM 1.0 IVIDDEC2) interface compliant
- Validated on the DRX45X EVM
- MPEG-2 main-profile-at-high-level (MP@HL) feature of the ISO/IEC 13818-2 standard supported
- ISO/IEC 13818-4 conformance standard, based on Inverse Discrete Cosine Transform (IDCT) compliant
- YUV 420 planar and YUV 422 interleaved output formats supported
- Interlaced and progressive decoding supported
- Only elementary video stream input formats supported
- MPEG-1 Constrained Parameters Bit-streams (CPB) supported
- Bottom field reordering in case of nonprogressive sequences where bottom field

is sent ahead of top field for frame pictures supported

- Trick play and reverse play supported
- DisplayWidth feature supported
- Streams which are non-multiples of 16 supported
- Feature XDM_PARSE_HEADER supported. It allows parsing of only the headers, skipping the picture data decoding
- The codec library has been built and tested on Jacinto (DRX45X) platform

DESCRIPTION

MPEG2 video standard specifies the decompression and coded representation for entertainment-quality digital video. This codec has been built and tested on DRX45X EVM with XDS560 JTAG emulator, 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 MPEG2 Decoder on DRX45X EVM.

Table 1. Configuration Table

CONFIGURATION	ID
MP@ high level features. YUV 4:2:0 planar output, Default Memory	MPEG2_DEC_001

Table 2. Profiled on DRX45X EVM with Code Generation Tools Version 6.0.8

CONFIGURATION ID	PERFORMANCE STATISTICS (MEGA CYCLES PER SECOND) ^{(1) (2) (3)}		
	TEST DESCRIPTION	AVERAGE	PEAK ⁽⁴⁾
MPEG2_DEC_001	stefan250.m2v, 352 X 288 @ 4 mbps,250 frames	46.93	51.32
	TM5_football_4.0M.bs.mpg, 704 X 480 @ 4 mbps,148 frames	131.39	176.33
	gi_stream.mpeg, 720 X 480 @ 14.987 mbps,19 frames	177.66	192.41

(1) Measured with program memory, stack, and I/O buffers in external memory and with cache configuration 16K-bytes L1D cache and 64K-bytes L2 cache 32 bit DDR @ 166 MHz, CPU @ 330 MHz and only used by decoder.

(2) Average and peak MCPS measurements can vary by +/-5%.

(3) Average is calculated over number of frames specified for each stream.

(4) 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.

Note: For an input encoded stream in the big-endian format, byte swap inside the library with the frameLevelByteSwap flag ON, will lead to approximately 1 MHz increase in average cycles per sec for 1 mbps stream. For 4 mbps stream, it will be an increase of 4 MHz approximately.

Table 3. 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	
MPEG2_DEC_001 (352 X 288)	118.06	39.00	714	8.00	879.06
MPEG2_DEC_001 (704 X 480)	118.06	39.00	2151	8.00	2316.06
MPEG2_DEC_001 (720 X 480)	118.06	39.00	2197.49	8.00	2362.55

(1) All memory requirements are expressed in kilobytes (1K-byte = 1024 bytes) and there could be a variation of approximately 1-2% in values

(2) Internal memory is placed in L1D RAM.

(3) Includes frame buffers for 1080I resolution.

Table 4. Internal Data Memory Split-Up

CONFIGURATION ID	DATA MEMORY - INTERNAL ⁽¹⁾		
	SHARED		INSTANCE
	CONSTANTS	SCRATCH	
MPEG2_DEC_001	0.00	39.00	0.00

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

Table 5. Co-Processor(s) Memory Statistics

CONFIGURATION ID	SEQ DATA MEMORY	SEQ PROG MEMORY	IMX WORKING MEM	IMX IMG BUF	IMX CMD MEM
MPEG2_DEC_001	0.00	0	0	0	0

Note: The decoder does not use co-processors and hence, all the values are zero.

PRODUCT PREVIEW

Notes

- Evaluation version performance may be off by up to 30 MHz.
- Does not use internal memory for persistent buffers. Relieves algorithm from preserving persistent memory in task switch scenario.
- No constants are on internal memory.
- Display buffer for YUV422 interleaved format = 4050K-bytes
- Input buffer to algorithm is assumed to have at least one encoded frame data.
- Memory Configuration:
 - L1P: 32K-bytes program cache
 - L1D: 64K-bytes data memory and 16K-bytes data cache
 - L2: 64K-bytes cache
- The algorithm uses 4 QDMA channels totaling 32 linked transfers. The algorithm uses DMAN3 interface for logical allocation of these channels
- 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 11172-2:1993 Information technology -- Coding of moving pictures and associated audio for digital storage media at up to about 1.5 Mbits/s -- Part 2: Video (MPEG-1 video standard).
- ISO/IEC 13818-2:2000 Information technology -- Generic coding of moving pictures and associated audio information: Video (MPEG-2 video standard)
- *MPEG2 Main Profile Decoder on C64x+ User's Guide* (literature number: SPRUF00A)

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
CPB	Constrained Parameters Bit-streams
DMA	Direct Memory Access
DMAN3	DMA Manager
EVM	Evaluation Module
IDCT	Inverse Discrete Cosine Transform
MCPS	Mega Cycles Per Second
MPEG	Motion Picture Expert Group
QDMA	Quick Direct Memory Access
XDM	eXpressDSP Digital Media

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