MPEG2 Main Profile Decoder (v02.00.02) on C64x+

FEATURES

- **eXpressDSP™ Digital Media (XDM 1.0 IVIDDEC2) interface compliant**
- **Validated on the DM644x EVM**
- **Davinci specific NON-Accelerated version supported**
- **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 for non-progressive sequences where bottom field is sent ahead of top field for frame pictures supported**
- **Trick play and reverse play supported**
- **Display width feature supported**
- **Streams that are non-multiples of 16 are supported**
- **Feature XDM_Parse_Header supported. This allows parsing of only the headers, skipping the picture data decoding**
- **The codec library will run as is on the following devices : DM6446, DM6437, DM6467, and OMAP3530. (Note: L1-D, L1-P and DDR addresses may be different across the devices)**

DESCRIPTION

MPEG2 video standard specifies the decompression and coded representation for entertainment-quality digital video. This codec has been built and tested on DM644x EVM with XDS560 JTAG emulator, Code Composer Studio version 3.3.49 and code generation tools version 6.0.8.

PRODUCT PREVIEW

Performance Summary

This section describes performance of the MPEG2 main profile decoder on DM644x EVM.

Table 1. Configuration Table

CONFIGURATION	ID
MP@ high level features. YUV 4:2:0 planar output, default memory	MPEG2_DEC_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(3)	AVERAGE(4)	PEAK(3)
MPEG2_DEC_001	stefan250.m2v, 352 X 288 @ 4 mbps,250 frames	44.03	48.6
	TM5_football_4.0M.bs.mpg, 704 X 480 @ 4 mbps,148 frames	121.05	155.58
	gi_stream.mpeg, 720 X 480 @ 14.987 mbps,19 Frames	172.1	187.59

(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) There may be a variation of +/- 5% in the mentioned profiling data.
(3) 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.
(4) Average is calculated over number of frames specified for each 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 approx.

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	STACK	
MPEG2_DEC_001 (352 x 288)	115.19	39.00	714	8.00	876.19
MPEG2_DEC_001 (704 x 480)	115.19	39.00	2151	8.00	2313.19
MPEG2_DEC_001 (720 x 480)	115.19	39.00	2197.49	8.00	2359.68

(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.

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(1)

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

(1) The decoder does not use co-processors; therefore, all the values are zeroes.

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 is 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 Mbps -- 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 SPRUEA4B)

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
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

Revision History

This data sheet revision history highlights the changes made to the SPRS318C codec specific data sheet to make it SPRS318D.

Table 6. Revision History for MPEG2 Main Profile Decoder (v02.00.02) on C64x+

SECTION	CHANGES
Table 2	• Modified values for average and peak
Table 3	• Modified program memory

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