

Ittiam MPEG-4 ASP Decoder on TMS320DM6446



FEATURES

- eXpressDSP™ Algorithm Interface Standard (XDAIS) Compliant
- eXpressDSP™ Multimedia Interface (XDM) Compliant
- Decodes streams compliant with MPEG-4 Advanced simple profile
- Supports resolutions up to D1
- Re-entrant multi channel implementation
- Supports YUV420 planar and YUV422i as raw video output formats
- Error resilient
- Image coprocessors used (Accelerated Version)

- **Unsupported Feature**

- Global motion compensation

DESCRIPTION

The MPEG-4, defined by the ISO/IEC 14496 standard, is a video compression (coding) standard supporting a wide range of applications such as digital storage media, internet, video, interpersonal video communications, wireless video, etc.

This data sheet describes the features and performance of the Ittiam MPEG-4 Advanced simple profile (ASP) decoder on TI's DM6446 platform. This codec is designed to run on a TMS320DM6446 device. Performance data was taken using a DM644x DV-EVM processor.

Product Support

This product was developed and is supported by Ittiam Systems (P) Ltd. For product support, contact:

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Validation

The decoder has been validated by running it on the DM6446 platform and measuring the resource usage during this process. The output generated by this process is tested for bit exactness with the Microsoft reference decoder (with the IDCT of the reference decoder made the same as that of the decoder under test).

Performance Summary

This section describes the performance of the Ittiam MPEG-4 Decoder. Performance summary data generated using CCS 3.2.39.5 using a DM644x DV-EVM processor.

Table 1. Configuration Table

CONFIGURATION	ID
MPEG4 ASP	MPEG4_ASP_001

Table 2. Cycles Information - Profiled on a DM644x DV-EVM With Code Generation Tools v 6.0.8

CONFIGURATION ID	PERFORMANCE STATISTICS (MEGA CYCLES PER SECOND) ⁽¹⁾		
	TEST DESCRIPTION	AVERAGE	PEAK
MPEG4_ASP_001	MPEG4_ASP_001, 4.5 Mbps, 720 * 480, 30fps	230	247
	MPEG4_ASP_002, 2 Mbps, 352 * 288, 30fps	91	92
	MPEG4_ASP_002, 400 Kbps, 172 * 144 , 30fps	28	29

(1) Memory Configuration was as follows:

- L1P : 16 KB program cache and 16kB program memory
- L1D : 16KB data cache and 64KB data memory
- L2 : 32KB cache (data & program) and 32kB SRAM (data & program)

Table 3. Memory Statistics - Profiled with Code Generation Tools v 6.0.8

CONFIGURATION ID	MEMORY STATISTICS ⁽¹⁾				TOTAL
	PROGRAM MEMORY	DATA MEMORY			
		INTERNAL	EXTERNAL	STACK	
MPEG4_ASP_001	280	48	2067	8.0	2258
	280	42	896	8.0	1081
	280	40	507	8.0	690

(1) All memory requirements are expressed in kilobytes (1 kilobyte = 1024 bytes) and there could be a variation of around 1-2% in numbers.

Table 4. Internal Data Memory Split-Up

CONFIGURATION ID	DATA MEMORY - INTERNAL ⁽¹⁾⁽²⁾		
	SHARED		INSTANCE
	CONSTANTS	SCRATCH	
MPEG4_ASP_001	0	48 (L1D)	0
	0	42 (L1D)	0
	0	40 (L1D)	0

(1) Internal memory refers to L1D RAM. All memory requirements are expressed in kilobytes (1 kilobyte = 1024 bytes) and there could be a variation of around 1-2% in numbers.

(2) I/O buffers not included. Some of the instance memory buffers could be scratch

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Table 5. External Data Memory Split-Up

CONFIGURATION ID	DATA MEMORY - EXTERNAL ⁽¹⁾⁽²⁾		
	SHARED		INSTANCE
	CONSTANTS	SCRATCH	
MPEG4_ASP_001	15	0	2052
	15	0	881
	15	0	492

- (1) All memory requirements are expressed in kilobytes (1 kilobyte = 1024 bytes) and there could be a variation of around 1-2% in numbers
 (2) Does not include I/O Buffers

Table 6. Co Processor(s) Memory Statistics ⁽¹⁾

CONFIGURATION ID	SEQ DATA MEMORY	SEQ PROG MEMORY	IMX WORKING MEM	IMX IMG BUF	IMX CMD MEM
MPEG4_ASP_001	0	0	32	16	32
	0	0	32	16	32
	0	0	32	16	32

- (1) All memory requirements are expressed in kilobytes (1 kilobyte = 1024 bytes) and there could be a variation of around 1-2% in numbers.

Notes

- I/O Buffers
 - Input Buffer Size = 350 Kbytes
 - Output Buffer Size = Frame height * Frame Width * 2 bytes (for 422ILE format)
- 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)
- Stack also includes the requirement for local variables

References

- ISO/IEC 14496-2:2000(E) Information technology -- Coding of audio-visual objects -- Part 2: Visual
- ISO/IEC 14496-2:2001 / AMENDMENT 4 : Streaming video profile
- Ittiam MPEG4 ASP video decoder on C64x+ User Guide and API glossary

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
DV-EVM	Digital Video Evaluation Module
ISO	International Organization for Standardization
IEC	International Electro-technical Commission
MPEG4	Moving Picture Experts Group-4
ASP	Advanced Simple profile

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