



# MPEG-4 Advanced Simple Profile Decoder on DM648

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## Datasheet

Release version	v1.00
Framework	CE_1_20_02
API	XDM0.9
Platform	DM648-BIOS

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# Contents

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1.	Features and Validation.....	3
1.1	Description .....	3
1.2	Features Currently Supported by the Decoder .....	3
1.2.1	Toolsets Supported .....	3
1.2.2	Interface .....	3
1.3	Validation.....	3
2.	Performance and Resource Usage .....	4
2.1	Settings Used .....	4
2.1.1	Clock Settings .....	4
2.1.2	Memory Layout.....	4
2.2	Resource Usage.....	5
2.2.1	Memory Usage .....	5
2.2.2	DMA resource usage.....	5
2.2.3	I/O buffer memory requirement .....	5
2.3	Processor Loading .....	6
	Toolset Information .....	6
3.	Glossary.....	7

# 1. Features and Validation

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## 1.1 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 document covers the features supported by the Ittiam's MPEG-4 decoder, along with the performance footprints.

## 1.2 Features Currently Supported by the Decoder

### 1.2.1 Toolsets Supported

- Decodes streams compliant with MPEG-4 Advanced Simple profile.(Does not support GMC)
- Supports YUV420 planar and YUV422i as raw video output formats.

### 1.2.2 Interface

- Compliant with TI's XDM (0.9) interface
- Compliant with TI's IDMA3 callback function interfaces

## 1.3 Validation

The decoder has been validated by running it on the target 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 same as that of the Ittiam decoder).

## 2. Performance and Resource Usage

### 2.1 Settings Used

The sections below list down the platform configuration used to test and measure the performance of the video decoder:

#### 2.1.1 Clock Settings

Module	Clock Frequency (MHz)
DSP	900
DDR	162

**Table 2-1** Clock Frequencies of Various Modules

#### 2.1.2 Memory Layout

The sizes of the different types of memory used while measuring the performance of the decoder are given below:

Memory Name	Type	Size
L1P	Program Memory (Internal)	16 KB
L1P Cache	Instruction cache	16 KB
L1D	Data Memory (Internal)	64 KB
L1D Cache	Lowest level Data cache	16 KB
L2	Second level memory	0 KB
L2 Cache	Cache at L2 level	64 KB
DDR	External memory (both program and data)	128 MB

**Table 2-2** Memory Configuration used for Performance Benchmarking

**Note** The performance is highly sensitive to the size of all memory sections except that of DDR. The amount of DDR required depends on the system requirements as well as codec requirements.

## 2.2 Resource Usage

### 2.2.1 Memory Usage

The usage of memory by one instance of decoder is shown below.

Dimension	Code (KB)	Ext data (KB)		Int data (KB)		Tables (KB)	Stack (KB)
		Persistent	Scratch	Persistent	Scratch		
352 x 288	255	900	0	-	50	5	5
720 x 480	255	2050	0	-	55	5	5

**Table 2-3** Memory Usage for a single instance

The following points should be noted about these numbers:

- Input / Output buffers are excluded from external memory numbers
- Internal memory is not used for storing persistent data
- L1P and L2 memory hierarchies, if configured as RAM, will be used for running code. These memory regions are used as scratch areas and hence the code to be run is loaded run time.
- The actual numbers may vary within +/- 5% range.
- Internal memory numbers are inclusive of the memory required for the ACPY library

### 2.2.2 DMA resource usage

The decoder requires the following resources to properly configure the DMA engine

- 4 EDMA channels.
- 3 QDMA channels.
- 20 PaRAM sets.

### 2.2.3 I/O buffer memory requirement

The decoder requires the following different pools in the contiguous memory area

buffer size	number of buffers
350KB	1
675KB	1

**Table 2-4** Input output buffer requirements

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**Note** The numbers mentioned above are the worst case I/O buffer memory requirement for a standard definition decode. In case of dual core processors (e.g. DM6446) these buffers need to be allocated from the Contiguous Memory Area.

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## 2.3 Processor Loading

Content			MCPS	
Sequence	Dim	fps	Avg	Peak
footballSPIBQ.bits	720 x 480	30	312	445
sk5_ntsc_4mbps_15l.bits	720 x 480	30	182	279
nec013.m4v	352 x 288	30	95	114
mat036.m4v	176 x 144	30	31	34

**Table 2-5** Processor Loading in Terms of Average and Peak MCPS

**Note** MCPS number quoted here is as measured from the application side including the Codec Engine overheads. Peak MCPS is the maximum average MCPS calculated over a sliding window of 4 pictures. The actual MCPS number may vary within a +/- 5% range.

## Toolset Information

Content	Interlace	Quarter pel	B pics	Intra AC/DC pred	Inter4v
footballSPIBQ .bits	Y	Y	Y	Y	Y
sk5_ntsc_4mbps_15l.bits	N	N	N	Y	Y
nec013.m4v	N	N	Y	Y	Y
mat036.m4v	N	N	Y	Y	N

**Table 2-7** Toolset information

### 3. Glossary

Terms	Explanation
ACPY	Software module that abstracts DMA transfers from the codec
CAL	Codec Abstraction Layer. A library that abstracts the codec interface from the application, so that all the codecs have similar looking interfaces.
Decoder	Software that takes in compressed data (in this case, video) and produces an uncompressed output. The compressed data is associated with a pre-defined specification (in this case, WMV9)
DMAN	DMA Manager. This is responsible for managing the DMA resources in the system
Encoder	Software that takes in uncompressed content (in this case, video) and compresses it into data that is in accordance with a predefined specification
MCPS	Million Cycles Per Second. This parameter describes the performance of any software on a given processor. For example, when we say a codec takes 100 MCPS on a given processor, it means that it consumes 100 Million cycles of the processor every second.



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