# H.264 High Profile Decoder (v01.10.05) on DM6467

**Check for Samples:**

## FEATURES

- **eXpressDSP™ Digital Media (XDM 1.0 IVIDDEC2) compliant**
- **Up to level 4 features of the High Profile (HP) supported**
- **Validated on DM6467 EVM**
- **Progressive, interlaced, Picture Adaptive Frame Field (PicAFF) and Macro-block Adaptive Frame Field (MBAFF) type picture decoding supported**
- **Multiple slices and multiple reference frames supported**
- **CAVLC and CABAC decoding supported**
- **All intra-prediction and inter-prediction modes supported**
- **Up to 16 MV per MB supported**
- **Frame based decoding supported**
- **Picture width greater than 64 pixels supported**
- **Tested for compliance with JM version 10.1 reference decoder**
- **Long term reference frame and adaptive reference picture marking supported**
- **Reference picture list reordering supported**
- **PCM macro block decoding supported**
- **Gaps in frame_num supported**
- **Error resiliency and concealment supported**
- **SEI and VUI parsing supported**

## DESCRIPTION

H.264 is a popular video coding algorithm enabling high quality multimedia services on a limited bandwidth network. H264 Decoder is validated on DM6467 EVM with Code Composer Studio version 3.3.49 and code generation tools version 6.0.8.

PRODUCT PREVIEW

## Performance Summary

This section describes the performance of the H264 Decoder on DM6467 EVM.

**Table 1. Configuration Table**

| CONFIGURATION | ID |
|---|---|
| H264 High Profile Decoder | DM6467_HP_001 |

**Table 2. Cycles Information in MHz - Profiled on DM6467 EVM(1) with Code Generation Tools Version 6.0.8**

| CONFIGURATION ID | PERFORMANCE STATISTICS (MEGA CYCLES PER SECOND)(2) (3) | | | | |
|---|---|---|---|---|---|
| | TEST DESCRIPTION | NON-BLOCKING DSP CYCLES@675MHz | | BLOCKING DSP CYCLES@675MHz | |
| | | AVERAGE(4) | PEAK(5) | AVERAGE(4) | PEAK(5) |
| DM6467_HP_001 | BALLOONS.264; High Profile, 1920 X 1088, MBAFF, IPBB… | 320.2 | 355.3 | 571.3 | 598.5 |
| | fball_60.264; High Profile, 1920 X 1088, MBAFF, IPBB… | 333.1 | 352.4 | 584.2 | 597.1 |
| | letterman1_30.264; High Profile, 1920 X 1088, MBAFF, IPBB… | 334.3 | 352.6 | 584.4 | 596.1 |

(1) C64x+ is clocked at 675MHz. DDR is 32-bit, clocked at 310MHz, 8 bank. HDVICP is clocked at 337MHz.
(2) Measured with program memory, stack, and I/O buffers in external memory and with cache configuration 64 K bytes L2 cache, 32 K L1D and 32 K L1P cache.
(3) Average and peak MCPS measurements can vary by +/-5%.
(4) Average values are calculated based on the average of all frames in the sequence.
(5) 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 3. Memory Statistics - Generated with Code Generation Tools Version 6.0.8**

| CONFIGURATION ID | MEMORY STATISTICS(1) | | | | |
|---|---|---|---|---|---|
| | PROGRAM MEMORY(2) | DATA MEMORY | | | TOTAL |
| | | INTERNAL(3) | EXTERNAL(4) | STACK | |
| DM6467_HP_001 | 300.38 | 22.63 | 24144.12 | 4.00 | 24462.47 |

(1) All memory requirements are expressed in kilobytes (1K-byte = 1024 bytes).
(2) Program memory quoted also includes the HDVICP APIs used by the decoder.
(3) Internal memory is placed in L2 SRAM.
(4) Includes frame buffers for 1080P resolution.

**Table 4. Internal Data Memory Split-Up**

| CONFIGURATION ID | DATA MEMORY - INTERNAL (1) | | |
|---|---|---|---|
| | SHARED | | INSTANCE |
| | CONSTANTS | SCRATCH | |
| DM6467_HP_001 | 0 | 22.63 | 0 |

(1) All memory requirements are expressed in kilobytes.

**Table 5. External Data Memory Split-Up**

| CONFIGURATION ID | DATA MEMORY - EXTERNAL (1) | | |
|---|---|---|---|
| | SHARED | | INSTANCE |
| | CONSTANTS | SCRATCH | |
| DM6467_HP_001 | 207.70 | 0 | 23936.42 |

(1) All memory requirements are expressed in kilobytes.

## Notes

The performance values shown in Table 2 is a result of the following configurations:

- HDVICP
  - The entire HDVICP is a video resource and uses 16K ITCM and 8K DTCM.
  - The decoder is configured to run either on HDVICP-0 or HDVICP-1.
- Cache configuration

**Table 6. Cache Configuration**

| | AVAILABLE | USED |
|---|---|---|
| L1 p (Program Memory) | 32K | 32K – cache |
| L1d (Data Memory) | 32K | 32K – cache |
| L2 | 128K | 64K – cache |

- DMA configuration

**Table 7. DMA Configuration**

| TC Qs | TC 0 | TC 1 | TC 2 | TC 3 | TOTAL | MAXIMUM(1) |
|---|---|---|---|---|---|---|
| **Usage** | Writes to L2 SRAM | Writes to HDVICP | Writes to HDVICP | Writes to HDVICP | - | - |
| **Priority(2)** | 3 | 2 | 2 | 3 | - | |
| **EDMA channels** | 1 | 8 | 8 | 4 | 21 | 64 |
| **QDMA channels** | 0 | 0 | 0 | 0 | 0 | 8 |
| **Num PARAMS** | - | - | - | - | 159 | 512 |

(1) Maximum corresponds to the maximum number of EDMA/QDMA channels or maximum number of PARAMS available on the chip. It does not indicate the maximum number requested by the codec.
(2) Lesser number corresponds to higher TC priority. Default priority is 2. When different TCs have same priority, the arbitration order is TC0 > TC1 > TC2 > TC3.

- Code Placement

  All the algorithm code are placed in external memory. The performance values in Table 2 are sensitive to algorithm code placement. See the sample linker file provided in the test application setup for algorithm code placement.

## References

- ISO/IEC 14496-10: March 2005 (E) Rec. H.264 (E) ITU-T Recommendation
- *H.264 High Profile Decoder on DM6467 User's Guide* (literature number: SPRUFE0A)

## 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 |
|---|---|
| 625SD | Level 3.0 Maximum resolution format size 720x576 |
| CIF | Common Intermediate Format |
| CPB | Coded Picture Buffer |
| D1 | SDTV image resolution (720x480) |
| DMA | Direct Memory Access |

| ACRONYM | DESCRIPTION |
|---|---|
| EVM | Evaluation Module |
| HD | High Definition |
| HDVICP | High Definition Video and Imaging Co-Processor |
| MBAFF | Macro Block Adaptive Frame Field |
| PCM | Pulse Code Modulation |
| PicAFF | Picture Adaptive Frame Field |
| QCIF | Quarter Common Intermediate Format |
| QDMA | Quick Direct Memory Access |
| SDTV | Standard Definition Television |
| SEI | Supplemental Enhancement Information |
| SRAM | Static Random Access Memory |
| VGA | Video Graphics Array (640x480 resolution) |
| VUI | Video Usability Information |
| XDM | eXpressDSP Digital Media |

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