## FEATURES

- eXpressDSP Digital Media (XDM IVIDDEC3) interface compliant.
- Validated on OMAP4 ES1.0 hardware platform
- VC1 Advanced Profile up to Level 3 is supported.
- Progressive, Interlaced field and Interlaced Frame types are supported
- Multiple slices decoding is supported
- Range reduction and Range mapping is supported
- Intensity compensations is supported
- Both RCV(RCV V1, RCV V2) and Elementary stream formats are supported
- Tested for compliance with VC1 SMPTE reference decoder version 7
- All features of Simple Profile, Main Profile and Advanced Profile are supported
- Supports all block type partitioned and prediction modes.
- Supports resolutions from all standard resolutions from QCIF to 1080p/1080i
- Picture width and height minimum 64x64 to maximum 1920x1088 pixel supported
- Performance measured for 1920x1088 picture resolution for progressive as well interlace format in normal conditions means without erroneous conditions
- Supports YUV420 semi-planar Chroma format
- Supports multi-channel functionality
- Ability to plug in any multimedia frameworks (e.g. Codec engine, OpenMax, GStreamer etc)
- Independent of any Operating system (DSP/BIOS, Linux, windowCE, symbian etc)
- Error concealment is supported
- Graceful exit from codec under error conditions is supported
- Cache aware decode library

PRODUCT PREVIEW

### DESCRIPTION

VC1 is the Society of Motion Picture and Television Engineers (SMPTE) standardized video decoder.VC1 consists of three profiles namely, simple, main, and advanced. Simple and main profiles were developed for use in lower-bit-rate networked computing environments. VC1 standard defines several profiles and levels that specify restrictions on the bit stream, and hence limits the capabilities needed to decode the bit-streams. This project is developed using Code Composer Studio version 4.2.0.09000 and code generation tools version 4.5.1.

## Performance Summary

This section describes the performance of the VC1 Advanced Profile Decoder on IVAHD.

**Table 1. Configuration Table**

| CONFIGURATION | ID |
|---|---|
| VC1 Advanced profile level 0,1,2,3 | VC1_DEC_001 |

**Table 2. Cycles Information– Profiled on OMAP4 ES1.0 with Code Generation Tools 4.5.1**

| CONFIGURATION ID | PERFORMANCE STATISTICS (MEGA CYCLES PER SECOND)(1) (2) | | |
|---|---|---|---|
| | TEST DESCRIPTION(3) | AVERAGE(4) | PEAK(5) |
| VC1_DEC_001 | sa00040_progressive_frame_1920x1080_22mbps_30fps.vc1 | 222 | 226 |
| | sa00040_interlaced_frame_1920x1080_26mbps_30fps.vc1 | 211 | 222 |
| | sa00040_interlaced_field_1920x1080_27mbps_30fps.vc1 | 259 | 259 |
| | SA20033_progressive_frame_1280x720_5mbps_IPP_30fps.vc1 | 105 | 112 |
| | SA10189_progressive_frame_720x480_3mbps_IPP_30fps.vc1 | 49 | 51 |
| | SA10210_interlaced_field_720x480_3mbps_IPP_30fps.vc1 | 61 | 61 |
| | tennis_p640x360_1mbps_IPPP_30fps.vc1 | 37 | 38 |

(1) Measured with OMAP4 ES1.0 having M3 @ 166 MHz, IVAHD @ 266 MHz and DDR @ 333 MHz. Also, M3 Code and codec Memtab request being in External Memory. All 2D image buffers of codec being in TILED_8Bit Memory and Chroma 2D buffers of codec for YUV420 semi-planar output being in TILED_16Bit Memory.
(2) Peak MCPS measurements can vary by +/-5%. Peak is the maximum of first 30 frames.
(3) Test cases have mixed variation and resolution as mentioned in test case name. Also, no latency from system process call and processing unit as frame (i.e., no sub-frame communication).
(4) Based on average cycles for 1 second @ 30 fps.
(5) Based on worst case cycles for high bit-rate frame decoding, in this scenario appropriate output buffering is required.

**Table 3. Memory Statistics - Generated with Code Generation Tools Version 4.5.1**

| CONFIGURATION ID | RESOLUTION | MEMORY STATISTICS(1) | | | | |
|---|---|---|---|---|---|---|
| | | PROGRAM MEMORY | DATA MEMORY | | | TOTAL |
| | | | PERSISTENT | CONSTANT | STACK | |
| VC1_DEC_001 | 1920 x 1088 | 14 | 16 | 595 | 2 | 627 |

(1)All memory requirements are expressed in kilobytes (1K-byte = 1024 bytes).

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

| CONFIGURATION ID | DATA MEMORY – INTERNAL(1) | | |
|---|---|---|---|
| | SHARED | | INSTANCE(2) |
| | CONSTANTS | SCRATCH | |
| VC1_DEC_001 | 0 | 0 | 0 |

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

## Notes

- I/O buffers:
  - Input buffer size = 2000 Kbytes (average case for a 1920x1088 picture resolution)
  - Output buffer size = 3800 Kbytes (average case for a 1920x1088 picture resolution)
- 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)
- Entire IVA-HD is considered as a resource for VC1 decoding process.

### Reference

• SMPTE 421M – VC1 compressed video bit-stream format and decoding process
• VC1 Advanced Profile Decoder on IVAHD User's Guide

## 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 |
|---|---|
| SMPTE | Society of motion picture and television engineering group |
| DCT | Discrete Cosine Transform |
| DSP | Digital Signal Processing |
| XDM | eXpressDSP Digital Media |
| HDTV | High Definition Television |

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