- **eXpressDSP™ Digital Media (XDM IVIDDEC3 Compliant)**
- **Multi-channel, reentrant implementation.**
- **Compliant with JPEG2K Core Coding System as specified in ISO/IES 154444-1 and ITU-T T.800.**
- **Supports Class 0 (Profile 0/1), Class 1 (Profile 0/1), and 2K/4K Digital Cinema Profiles**
- **Validated on the C6678 EVM using multiple cores**
- **Supports up to 12-bits per color sample**
- **Supports 4:4:4, 4:2:2, 4:2:0 sub-sampling of components.**
- **Supports ICT/RCT color transform**
- **Supports arbitrary tile sizes**
- **Supports 9/7 and 5/3 wavelet filters.**
- **Supports up to 8 resolution levels**
- **Support for frame sizes up to 4096 x 2160 pixels**
- **Supports JP2, J2K and JPC file formats.**

DESCRIPTION

JPEG2000 Standard was introduced in the year 2000. It provides improved compression performance and flexible code-stream format when compared to the JPEG Standard. It supports both lossy as well as lossless operating modes. JPEG2K Decoder is validated on C6678 EVM with Code Composer Studio version 5.2.1.00018 and code generation tools version 7.4.0.

PRODUCT PREVIEW

Summary of performance

Table 1. Configuration Table

CONFIGURATION	ID
Class-0 Profile-0	J2D_DEC_L1
Class-0 Profile-1	J2D_DEC_L2
Class-1 Profile-0	J2D_DEC_L3
Class-1 Profile-1	J2D_DEC_L4
2K Digital Cinema Profile @ 24 FPS	J2D_DEC_L5
2K Digital Cinema Profile @ 48 FPS	J2D_DEC_L6
4K Digital Cinema Profile @ 24 FPS	J2D_DEC_L7

Table 2. Cycles Information – Profiled on C6678 EVM with CGTools Version 7.4.0

CONFIGURATION	PERFORMANCE STATISTICS (IN MEGA CYCLES PER SECOND)[1]	
	TEST DESCRIPTION	PEAK
J2D_DEC_L1	P0_05.j2k (1024 x 1024, 1-tile, 4 components, 8 bits/component, IDWT mode -- mixed, max levels of decomposition – 6)	6.5 MHz
J2D_DEC_L2	P1_03.j2k (1024 x 1024, 1-tile, 4 components, 8 bits/component, IDWT mode – mixed, max level of decomposition – 6)	17.6 MHz
J2D_DEC_L3	P0_07.j2k (2048 x 2048, 256 tiles, 3 components, 12 bits/component, IDWT mode – 5/3, max level of decomposition – 4)	3865 MHz
J2D_DEC_L4	P1_03.j2k (1024 x 1024, 1-tile, 4 components, 8 bits/component, IDWT mode – mixed, max level of decomposition – 6)	866 MHz
J2D_DEC_L5	MM_2K_XYZ_115_12b_24fps.jpc (2048 x 858, 3 components, 12 bits/component, IDWT mode – 9/7, max level of decomposition – 5, compression ratio – 0.16)	674 MHz
J2D_DEC_L6	MM_2K_XYZ_15909_12b_48fps.jpc (2048 x 858, 3 components, 12 bits/component, IDWT mode – 9/7, max level of decomposition – 5, compression ratio – 0.08)	484 MHz
J2D_DEC_L7	Reel_2ab_13054_12b_24fps.jpc (4096 x 1716, 3 components, 12 bits/component, IDWT mode – 9/7, max level of decomposition – 6, compression ratio – 0.04)	1174 MHz

[1]Program placed in SL2, I/O buffers in external memory, stack in LL2, 32-KB L1P Cache, 32-KB L1D Cache, 64-KB L2 Cache, DDR speed at 1333 MHz, DSP at 1000 MHz, and executing the module on a single-core only.

Table 3. Memory Statistics - Generated with Code Generation Tools Version 7.4.0

CONFIGURATION ID	MEMORY STATISTICS				
	PROGRAM MEMORY[2]	DATA MEMORY			
		INTERNAL	EXTERNAL[3]	STACK	TOTAL DATA
J2D_DEC_L1	140 KB	243.2 KB	2329 KB	1 KB	2573.2 KB
J2D_DEC_L2	140 KB	243.2 KB	2329 KB	1 KB	2573.2 KB
J2D_DEC_L3	140 KB	243.2 KB	2329 KB	1 KB	2573.2 KB
J2D_DEC_L4	140 KB	243.2 KB	2329 KB	1 KB	2573.2 KB
J2D_DEC_L5	140 KB	243.2 KB	2329 KB	1 KB	2573.2 KB
J2D_DEC_L6	140 KB	243.2 KB	2329 KB	1 KB	2573.2 KB
J2D_DEC_L7	140 KB	243.2 KB	2329 KB	1 KB	2573.2 KB

All memory requirements are expressed in kilobytes (1 kilobyte = 1024 bytes)
[2]Program placed in SL2
[3]External memory placed in DDR3

Table 4. Internal Data Memory Split-up

CONFIGURATION ID	DATA MEMORY – INTERNAL[4]		
	CONSTANTS	SCRATCH	INSTANCE[5]
J2D_DEC_L1	2 KB	240 KB	1.2 KB
J2D_DEC_L2	2 KB	240 KB	1.2 KB
J2D_DEC_L3	2 KB	240 KB	1.2 KB
J2D_DEC_L4	2 KB	240 KB	1.2 KB
J2D_DEC_L5	2 KB	240 KB	1.2 KB
J2D_DEC_L6	2 KB	240 KB	1.2 KB
J2D_DEC_L7	2 KB	240 KB	1.2 KB

[4]Constants are placed in SL2 and Scratch buffer is placed in LL2. All memory requirements are expressed in kilobytes and there could be a variation of around 1-2% in numbers.
[5]I/O buffers not included. Some of the instance memory buffers could be scratch

notes

- Evaluation version performance values may be higher than the values specified in the performance table.
- Output buffer size for supporting up to 4096 x 2160 frame size at 16-bits per color component requires 50.625 MB.

- Input buffer to algorithm is assumed to have at least one encoded frame data. Maximum input buffer size for input bitstream allowed is 8 MB
- The performances obtained in Table 2 are sensitive to algorithm code placement. Refer the sample linker file provided in the test application setup for algorithm code placement. This is used for profiling in Table 2.
- Memory configuration:
  - L1P: 32 KB program cache
  - L1D: 32 KB data cache
  - L2: 64 KB cache
- The algorithm uses 2 EDMA channels. Channel 0 and 1 use a maximum of 12 PARAM sets.

references

1.	ITU-T T.800 ISO/IEC 15444-1	Information technology – JPEG 2000 image coding system: Core coding system (2004)
2.	ITU-T T.803 ISO/IEC 15444-4	Information technology -- JPEG 2000 image coding system: Conformance Testing (2004)

glossary

Constants	Elements that go into const memory section
Scratch	Memory space that can be reused across different instances of the algorithm or across different algorithms
Shared	Sum of Constants and Scratch
Instance	Memory that contains persistent information - allocated for each instance of the algorithm

acronyms

XDAIS	eXpressDSP Algorithm Interface Standard
XDM	eXpressDSP Digital Media
DMA	Direct Memory Access
EVM	Evaluation Module
JPEG	Joint Picture Expert Group
MJPEG	Motion JPEG
ISO	International Organization for Standardization
ITU-T	International Telecommunications Union – Telecommunications Standardization Sector

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