JPEG Baseline Profile Encoder (v02.02.01) on C66x

FEATURES

- **eXpressDSP™ Digital Media (XDM 1.0 IIMGENC1) interface compliant**
- **Validated on TMS320C6678 EVM**
- **Baseline sequential mode for interleaved data formats (single scan) supported**
- **Multiple scans for planar formats YUV420, YUV411, YUV422, and YUV444 supported**
- **Arbitrary image size supported**
- **Maximum of three scans supported**
- **Comment insertion into the JPEG header supported**
- **Frame-based mode encoding supported**
- **Standard JPEG header included and JFIF style header is also supported**
- **Huffman tables are hard-coded and built into the application at compile-time**
- **Custom quantization tables supported**
- **Quantization tables are fixed with a quality factor (1 – 100) adjusting the quantization level**
- **Encoding images with pixel resolution more than 8 bits per pixel not supported**
- **Thumbnail supported**
- **DRI Marker insertions in the compressed bit-stream supported**
- **Insertion of application data APP0, APP1 and APP13 supported**
- **Supports ELF ABI Format**

DESCRIPTION

JPEG Encoder accepts planar image data in YUV 4:2:0, YUV 4:1:1, YUV 4:2:2, and YUV 4:4:4 formats. It accepts interleaved image data in YUV 4:2:2 format and grayscale input. This codec is developed using Code Composer Studio 5.2.1.00018 and code generation tools version 7.4.0.

PRODUCT PREVIEW

Performance Summary

This section describes the performance of the JPEG Baseline Profile Encoder on TMS320C6678 EVM.

Table 1. Configuration Table

CONFIGURATION	ID
Normal configuration (4:2:2 interleaved Input and 4:2:2 output)	JPEG_ENC_001 (1)

(1) This configuration of JPEG Encoder does not require DMA resource. Default cache configuration (L1D cache: 32 K-bytes, L1P cache:32 K-bytes, L2 cache: 128 K-bytes).

Table 2. Cycles Information – Profiled on TMS320C6678 EVM with Code Generation Tools Version 7.4.0

CONFIGURATION ID	PERFORMANCE STATISTICS (IN CYCLES PER PIXEL) (1)		
	TEST DESCRIPTION	AVERAGE	PEAK (2)
JPEG_ENC_001	Measured on input file, Input_422.yuv with frame size 768 x 512 at 10:1 compression ratio	12.96	None

(1) Measured with program memory in MSMCSRAM, stack in L2SRAM and I/O buffers in ERAM. (2) Peak value is not calculated for this version of JPEG Encoder.

Note:

- Default cache configuration (L1D cache: 32 K-bytes, L1P cache: 32 K-bytes, L2 cache: 128K-bytes).
- If TMS320C6678 EVM runs at 1000 MHz, then Mega pixels/sec will be 1000 MHz/Cycles per pixel = 1000 MHz/15 = 66.66 Mega pixels/second.

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

CONFIGURATION ID	MEMORY STATISTICS (1)				TOTAL
	PROGRAM MEMORY	DATA MEMORY			
		INTERNAL	EXTERNAL	STACK	
JPEG_ENC_001	38.5	0	173.65	8	220.15

(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	
JPEG_ENC_001	0	0	0

(1) All memory requirements are expressed in kilobytes. (2) Does not include I/O buffers.

Table 5. External Data Memory Split-Up

CONFIGURATION ID	DATA MEMORY - EXTERNAL (1) (2) (3)		
	SHARED		INSTANCE
	CONSTANTS	SCRATCH	
JPEG_ENC_001	4.1	164.75	4.8

(1) All memory requirements are expressed in kilobytes.
(2) Measured with values Thumbnail Width =200 and Thumbnail Height =200. (3) Constants are mapped to MSMCSRAM.

Notes

- Total data memory for N non pre-emptive instances = Constants + Scratch + N * (Instance + I/O buffers + Stack)

References

- TMS320 DSP Algorithm Standard Rules and Guidelines (literature number SPRU352)
- *JPEG Baseline Profile Encoder(v02.02.00) on C66x (on C6678EVM) User's Guide* (SPRUHB2)

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
ABI	Application Binary Interface
ELF	Executable and Linkable Format
EXIF	Exchangeable Image File Format
JFIF	Joint File Interchange Format
JPEG	Joint Photographic Experts Group
XDM	eXpressDSP Digital Media

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