JPEG Encoder (v02.01.01) on OMAP3530

FEATURES

- **eXpressDSP™ Digital Media (XDM 1.0 IIMGENC1) interface compliant**
- **Validated on the OMAP3530 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**
- **Includes a standard JPEG header and also supports JFIF style header**
- **Custom Huffman tables and 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**
- **This codec uses the iVLC hardware accelerator for implementations**

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 accepts grayscale input. This project is developed using Code Composer Studio 3.3.49 and code generation tools version 6.0.14.

PRODUCT PREVIEW

Performance Summary

This section describes the performance of the JPEG Encoder on OMAP3530 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 requires DMA resource. Default cache configuration (L1D cache: 32 K-bytes, L1P cache: 32 K-bytes, L2 cache: 64 K-bytes).

Table 2. Cycles Information - Profiled on OMAP3530 EVM with Code Generation Tools Version 6.0.14

CONFIGURATION ID	PERFORMANCE STATISTICS (CYCLES PER PIXEL) (1) (2)		
	TEST DESCRIPTION	AVERAGE (3)	PEAK (4)
JPEG_ENC_001	Measured on input file, remi003_422i.yuv with frame size 768x512 at 13:1 compression ratio	10.34	None

(1) Measured with program memory, stack, and I/O buffers in external memory.
(2) Average and peak MCPS measurements can vary by +/-5%.
(3) If OMAP3530 runs on 300 MHz, then Mega pixels/sec will be 300 MHz/Cycles per pixel = 300MHz/10.08 = 29.76 Mega pixels/second.
(4) Peak value is not calculated for this version of JPEG Encoder.

Table 3. Memory Statistics - Generated with Code Generation Tools Version 6.0.14

CONFIGURATION ID	MEMORY STATISTICS (1)				TOTAL
	PROGRAM MEMORY	DATA MEMORY			
		INTERNAL	EXTERNAL	STACK	
JPEG_ENC_001	44.53	2.50	168.09	8.00	223.12

(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	2.5	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)		
	SHARED		INSTANCE
	CONSTANTS	SCRATCH	
JPEG_ENC_001	8.3	158.25	1.54

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

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 Encoder on OMAP3530 User's Guide* (literature number: SPRUFN8)

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
EXIF	Exchangeable Image File Format
JFIF	Joint File Interchange Format
JPEG	Joint Photographic Experts Group
XDM	eXpressDSP Multimedia

Revision History

This revision history highlights the changes made to the SPRS531 codec specific user guide to make it SPRS531A

Table 6. Revision History for JPEG Encoder on OMAP3530

SECTION	CHANGES
Table 2	• Modified Average value
Table 3	• Modified Program Memory value

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		**Applications**	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DLP® Products	www.dlp.com	Communications and Telecom	www.ti.com/communications
DSP	dsp.ti.com	Computers and Peripherals	www.ti.com/computers
Clocks and Timers	www.ti.com/clocks	Consumer Electronics	www.ti.com/consumer-apps
Interface	interface.ti.com	Energy	www.ti.com/energy
Logic	logic.ti.com	Industrial	www.ti.com/industrial
Power Mgmt	power.ti.com	Medical	www.ti.com/medical
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
RFID	www.ti-rfid.com	Space, Avionics & Defense	www.ti.com/space-avionics-defense
RF/IF and ZigBee® Solutions	www.ti.com/lprf	Video and Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless-apps

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265