Product Bulletin

JPEG Encoder and Decoder Software for TMS320C64x™ DSP-Based Processors

Key Benefits

- Optimized for C64x™ DSP-based processors
- Provides flexible, complete and well-documented algorithms for rapid time-to-market
- Reduces cost of creation, optimization, testing and implementation associated with developing your own software
- Offers high-quality, low-cost solution for video imaging needs

Overview

Texas Instruments' JPEG Encoder and Decoder image compression software has been designed to work exclusively with TI's C64x™ DSPs and TMS320DM64x™ DSP-based digital media processors. This software enables decoders to trade off decoding speed against image quality by using fast but accurate approximations to the required calculations. These TI developed and tested codes provide optimal flexibility on C64x DSP-based processors and allow users to obtain remarkable encoder and decoder speeds.

The JPEG Standard

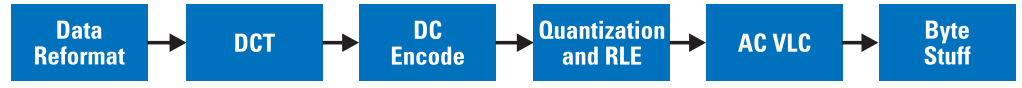
An acronym for Joint Photographic Experts Group, the JPEG standard is the most common format used for storing high-quality color and grayscale photographs in bitmap form. By exploiting the known limitations of the human eye, notably that small color changes are perceived less accurately than small changes in brightness, JPEG allows the designer to vary the degree of lossiness (the degree of which image quality is lost when the image is compressed) by adjusting compression parameters. This allows the designer to trade off file size against output image quality.

Key Features

- eXpressDSP™ software compliant (supports the TMS320™ Algorithm Standard, eXpressDSP Reference Frameworks, and DSP/BIOS™ kernel)
- DCT-based, sequential, 8-bit precision samples of image components (Y–Cb–Cr 4:4:4/4:2:2/4:2:0)
- Encoder provides simple compression ratio control capability
- Two quantization tables (luma and chroma); supports tables K1 and K2 in the standards document
- The encoder expects the image data as three separate raster-scanned components in memory (i.e., non-interleaved Y-Cr-Cb)
- Arbitrary quantization tables are supported; tables may change per image
- Two DC and two AC tables (separate sets for luma and chroma); supports tables K3, K4, K5 and K6 in the standards document, which is limited to these tables only
- Decoder outputs image as three separate raster-scanned components in contiguous memory
- Decoder can only decode bitstreams that have a structure identical to that produced by JPEG Encoder version 2.0 released by TI

Get Started Today

- Free 60-day evaluation period with four hours support provided by TI Third Party Authorized Software Providers. For more information, contact your local TI sales representative
- Purchase a Digital Media Development Kit (DMDK) at the DSP eStore – **www.dspestore.com**



JPEG Encoder Block Diagram

JPEG Decoder Block Diagram

Summary of Performance

Memory Statistics – Generated with Code Generation Tools Included with Code Composer Studio™ IDE 2.2

Configuration	Memory Statistics[†]					
	Program Memory		Data Memory			
	Internal	External	Internal	External	Stack	Total
JPEG Encode, D1 resolution	9.79	0	3.03	0	N/A	
JPEG Decode, D1 resolution	9.4	0	1.97	0	N/A	

[†] All memory requirements are expressed in kilobytes (1 kilobyte = 1024 8-bit Bytes).
Profiled on the TMS320DM642 EVM using silicon revision 1.1 running at 600 MHz using Code Composer Studio IDE version 2.2.18
D1 = 720 × 480, frame rate = 30 fps

Cycle Performance for TMS320DM642 Digital Media Processors for Specified JPEG Test Parameters

Configuration ID	Performance Statistics (Megacycles per Second)
	Average
JPEG Encode, D1 resolution	108
JPEG Decode, D1 resolution	90

Profiled on the TMS320DM642 EVM using silicon revision 1.1 running at 600 MHz using Code Composer Studio IDE version 2.2.18
D1 = 720 × 480, frame rate = 30 fps

Internal Data Memory Split-Up – Generated with Code Generation Tools Included with Code Composer Studio IDE 2.2

Configuration	Data Memory – Internal[§]		
	Shared		
	Constants	Scratch	Instance
JPEG Encode, D1 resolution	2.91	N/A	0.125
JPEG Decode, D1 resolution	1.84	N/A	0.13

[§] All memory requirements are expressed in KB (1 KB = 1024 Bytes, 1 Byte = 8 bits).
Profiled on the TMS320DM642 EVM using silicon revision 1.1 running at 600 MHz using Code Composer Studio IDE version 2.2.18
D1 = 720 × 480, frame rate = 30 fps