

MPEG-2 S-Series Encoders

The professional digital video solution

Highlights

No matter what MPEG-2 video encoding needs you have, IBM's family of encoders can help you deliver competitive products that offer technical advantages. The MPEG S-Series chips are based on IBM's successful three-chip encoder family.

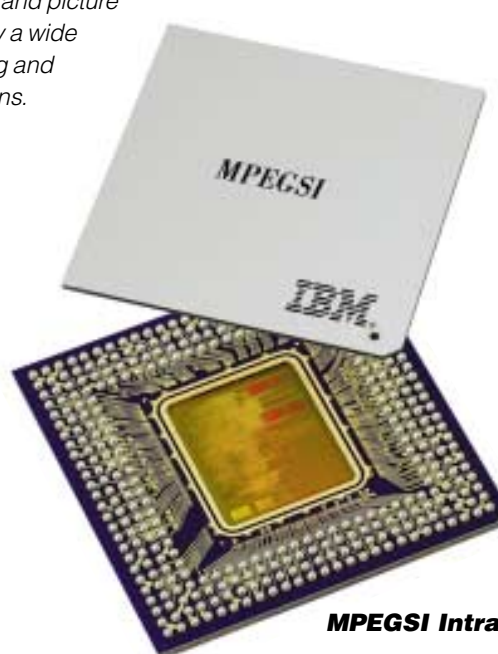
Our MPEGS422 Professional Studio Encoder provides superior quality for high-end video compression applications.

If you are building transmission or access products, our MPEGS420 Professional Broadcast Encoder is well-suited to your needs.

The MPEGSI Intra-Frame Encoder features flexibility and picture quality that satisfy a wide range of authoring and editing applications.



**MPEGS422
Professional
Studio Encoder**



IBM Microelectronics

MPEG422 Professional Studio Encoder

The MPEG422 Professional Studio Encoder maintains IBM's leadership position in 4:2:2 profile applications and addresses the special needs of high quality applications. The chip supports MPEG-2 IBP encoding for 4:2:2 Profile at Main Level and compressed data rates up to 50 Mb/s. It maintains this conformance with a search range of +/-101H, +/-64V.

MPEG420 Professional Broadcast Encoder

IBM's MPEG420 Professional Broadcast Encoder is the right choice for real-time 4:2:0 MPEG-2 encoding at CCIR601 resolution. MPEG420 offers high performance and functionality at a search range of +/-101H, +/- 64V and

data rates up to 50 Mb/s. To help reduce overall system cost, the MPEG420 can also be configured by the user for 15 Mb/s (or less) compressed data rates, and for a search range of +/-64H, +/-56V. This allows inexpensive ASRAM to replace SSRAM on the search memory interface. User selectable chrominance down-sampling from 4:2:2 and 4:2:0 in either progressive or interlaced mode assures color quality.

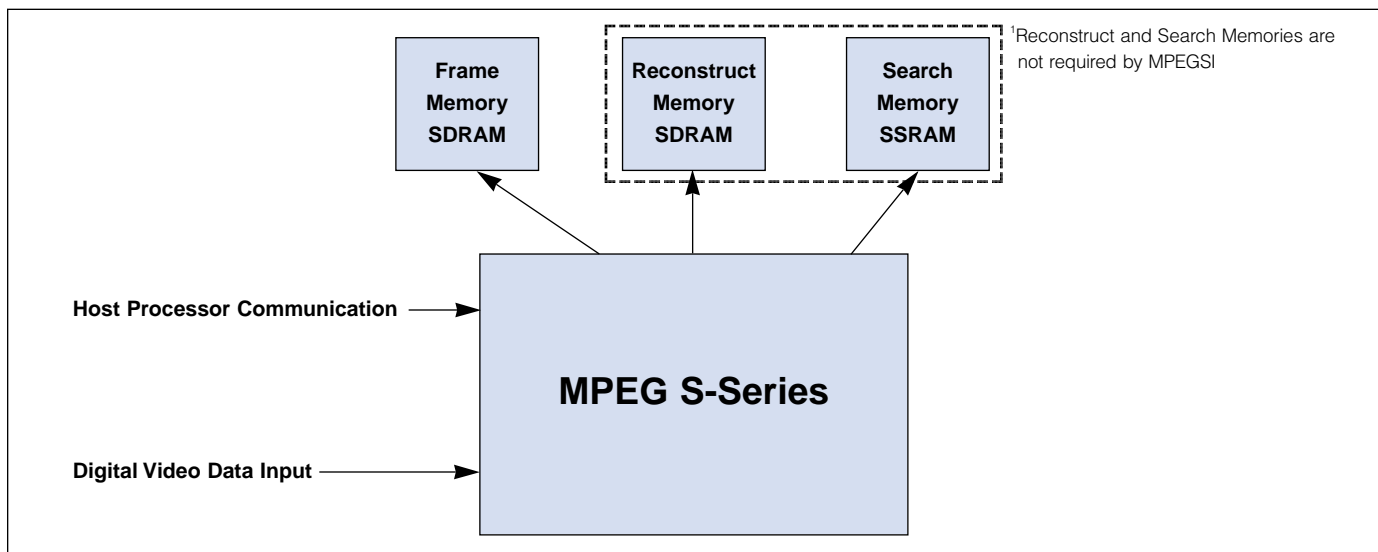
MPEGSI Intra-Frame Encoder

IBM's MPEGSI Intra-Frame Encoder offers the flexibility and editability of an intra-frame bitstream along with the excellent picture quality achieved through many of the rate control features available on the MPEG422 product. Image statistics and user-specified encoding functions combine to produce high-quality images

at rates of up to 50 Mb/s. The MPEGSI, a low power solution, is well-suited for applications with high picture quality and minimal hardware requirements.

Reduced Development and Debug Time

IBM offers expanded microcode packages with the new MPEG S-Series encoder products at no additional charge. This advanced microcode shortens development time through flexible dynamic parameter selection. The user controls the encoder microcode and dynamically selects video compression parameters by posting real-time commands through host registers. This eliminates the need for complex, low-level device programming, and the associated debug time.



MPEG S-Series Encoder Supporting Hardware

Features

The MPEG S-Series of encoders are highly integrated, single-chip solutions for digital video compression. They share powerful features including:

- 4:2:2 Profile @ Main Level support²
- Support for all picture modes including IBP, IBBP, IP, and I-only
- Dynamic GOP structure²
- User-specified quantizer tables—2 sets with 4 tables per set²
- Repeat field detection²
- Reduced power consumption²
- JTAG support²
- Low latency

²Note: New features introduced since IBM's ME30/ME31 encoders.

Statistical Multiplexing, Variable Bit Rate (VBR)

The MPEG S-Series encoders are designed to deliver refined picture quality in broadcast, distribution and studio applications requiring VBR and statistical multiplexing. Using the statistics for each encoded picture provided by the encoders, users can balance multi-channel image quality. They can also control compression results and picture quality on a picture-by-picture basis, using programmable GOP structure and encoding parameters.

Constant Bit Rate (CBR)

Adaptive field/frame DCT, automatic adaptive quantization and automatic rate control provide maximum picture quality in CBR applications. Field or frame compression and motion estimation decisions are made in real-time, allowing automatic adjustments based on picture content.

Scene Change Detection

The scene change detection feature, which can be controlled internally or externally, identifies the scene changes in the source material, thereby enabling automatic tailoring of the compression scheme to the source content. The encoders also support fade detection.

User Selectable Chrominance Down-Sampling

For sharp colors, the MPEG S-Series provides selectable progressive or interlaced down-sampling from 4:2:2 to 4:2:0 chrominance format.

Repeat Field Detection

For further compression, the MPEG S-Series supports internal and external repeat field detection to identify fields added during the telecine process of converting the frame rate from 24 to 30 frames per second.

Half Horizontal Resolution (HHR)

MPEG S-Series provides conversion from CCIR601 to HHR resolutions for compatibility in MPEG-1 system designs.

Programmable Quantization Tables

The MPEG S-Series enables the user to program separate luminance and chrominance quantization tables to tailor compression towards picture scene content (chrominance tables are not enabled in 4:2:0 chroma format).

Pin Compatibility

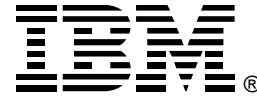
The MPEGS422, MPEGS420, MPEGSI chips are pin compatible with one another, enabling multiple uses of a single system design. In addition, these chips have host and pixel interfaces common to previous-generation IBM encoders, helping to protect the initial designs of our existing customers, and reduce time to market.

Low Latency

For real-time applications that require minimal delay, the MPEG S-Series encoders operate at a maximum delay of three frames and have a latency of only one frame for I-frame or IP encoding.

Tuned for Quality

Extensive studies conducted at our research laboratories show that a large motion estimation search range is not always better if accuracy is compromised. Based on these studies, IBM's MPEG S-Series encoders are tuned for quality through an optimal balance between search range and accuracy of motion estimation.



Feature Comparisons	MPEGS422	MPEGS420	MPEGS1
MPEG-2 422P@ML	X	–	X
MPEG-2 MP@ML, SP@ML, MPEG-1	X	X	X
4:2:0 output chroma format	X	X	X
4:2:2 output chroma format	X	–	X
Field or frame chroma down-sampling	X	X	X
Real-time VBR and CBR support	X	X	X
Statistical multiplexing support	X	X	X
Frame accurate start/stop	X	X	X
Picture user data insertion	X	X	X
DC precision	8 to 11 bits	8 to 11 bits	8 to 11 bits
Compressed data rates	up to 50 Mb/s	up to 50 Mb/s	up to 50 Mb/s
Dynamic GOP structure (Real-time variable)	I-only, IP, IBP, IB, IBBP	I-only, IP, IBP, IB, IBBP	I-only
Video resolution	up to 720x512 NTSC or up to 720x608 PAL	up to CCIR601	up to 720x512 NTSC or up to 720x608 PAL
Adaptive field and frame motion estimation search ranges with half pel accuracy	+/-101H, +/- 64V	+/-101H, +/- 64V	–
Conversion to HHR	X	X	X
Adaptive field/frame DCT	X	X	X
Adaptive quantization and rate controls	X	X	X
Automatic scene change detection	X	X	X
Output picture statistics	X	X	X
Repeat field detection	X	X	X
16-bit YCbCr	X	X	X
16-bit generic host interface	X	X	X
Output compressed data to FIFO	X	X	X
External FIFO feedback for dynamic rate control	X	X	X
User-specified quantizer tables	luma & chroma	luma	luma & chroma
Memory requirements (3.3 or 5 V)			
100 MHz SDRAM/SGRAM	8MB	7MB	4MB
8 ns SSRAM	256KB	256KB	
JTAG	X	X	X
Latency	3 frames max	3 frames max	1 frame

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Digital Video Products' quality is demonstrated by the certification of its quality management system in accordance with the ISO 9001 standard.

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Specifications

- CMOS 0.27 μm (L effective)
- Plastic ball grid array package
- 35 mm module package
- 352 I/O
- MPEGS422, 4.4 watts (nominal)
- MPEGS420, 4.1 watts (nominal)
- MPEGS420 – reduced search range @ 15 Mb/s, 3.8 watts (nominal)
- MPEGS1, 1.7 watts (nominal)
- 0.5 m/s airflow min. at 40° C ambient

Part Numbers

IBM39 MPEGS422 PBA 17C
IBM39 MPEGS420 PBA 18C
IBM39 MPEGS1 PBA 18C

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