

A Single-Chip Multistandard Video Codec

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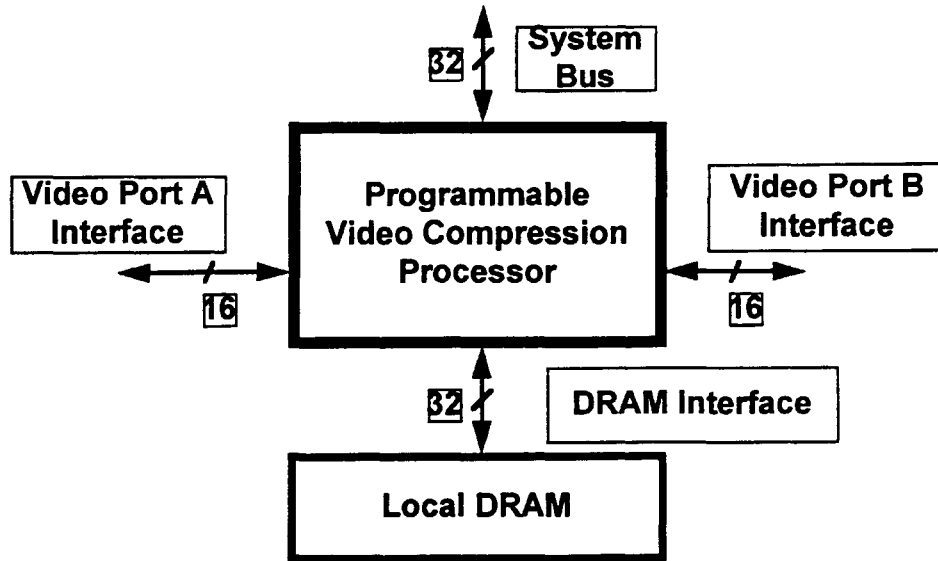


Features

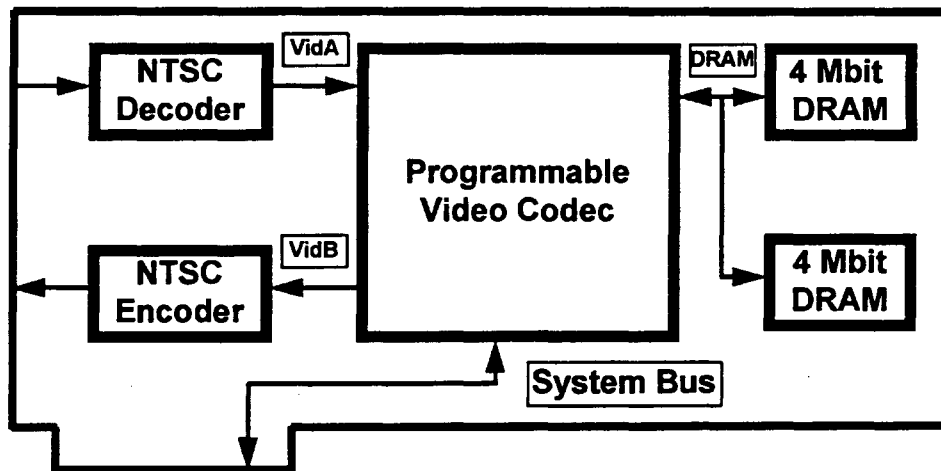
- ◆ Real time MPEG encoder or decoder for 352X240X30 frames/sec images
- ◆ Px64 full duplex codec for 352X288X15 frames/sec images
- ◆ Multiple chips can be used for encoding 720X480X30 frames/sec images.



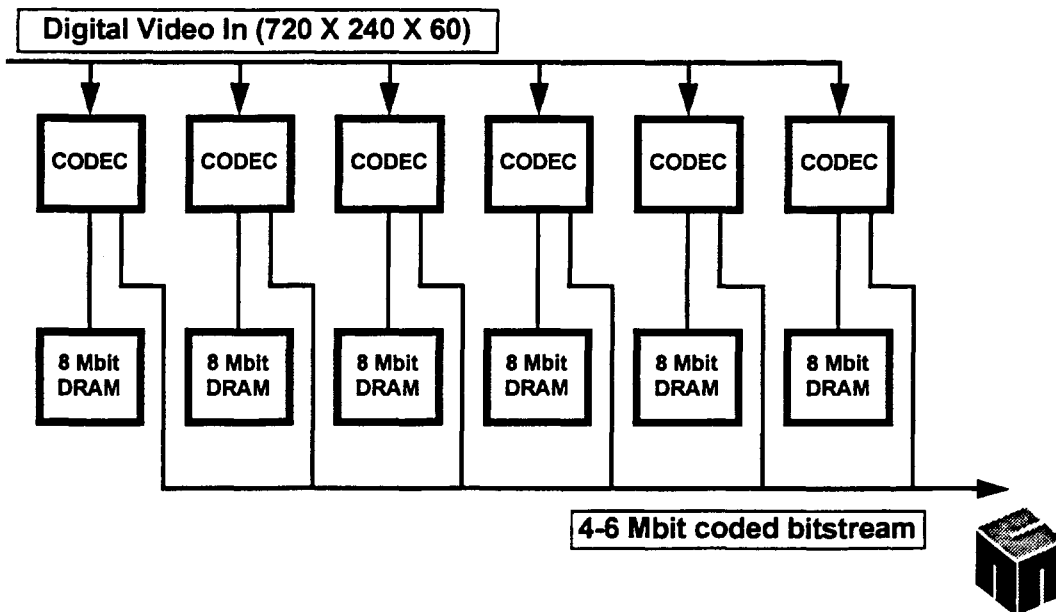
External Block Diagram



SIF Encoder Block Diagram



Broadcast Encoder Block Diagram

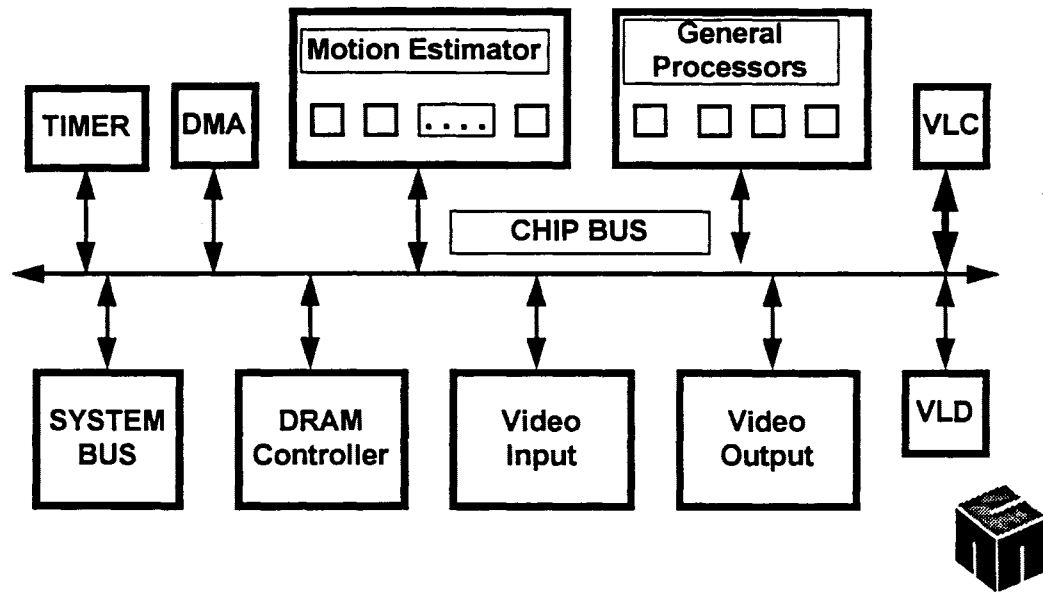


Architecture

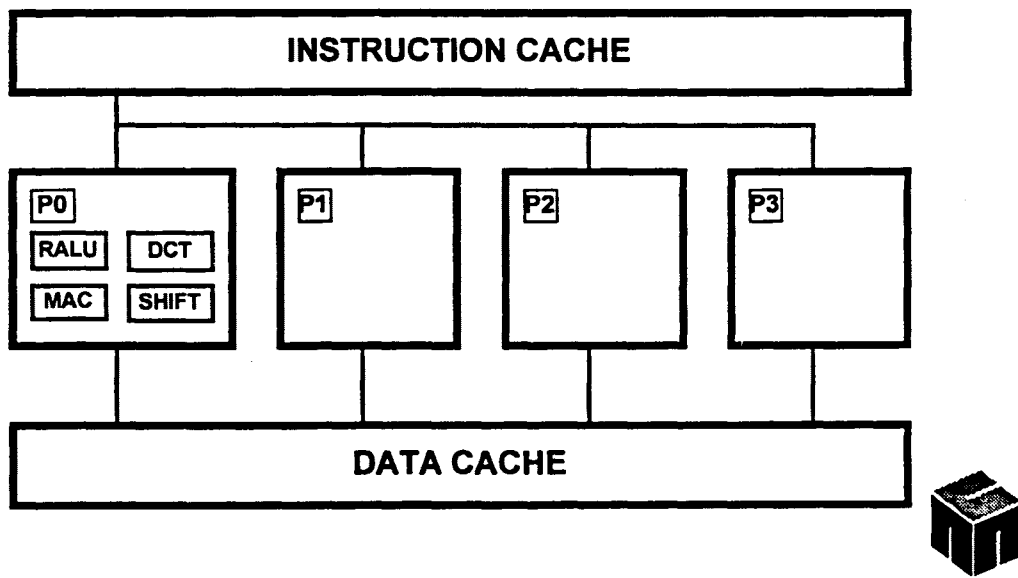
- ◆ 240 MOPS SIMD Processor
- ◆ 2000 MOPS Motion Estimator
- ◆ 50 MOPS Video Interface Unit
- ◆ Variable Length Encoder
- ◆ Variable Length Decoder
- ◆ 80 Mbyte/sec DRAM Controller
- ◆ System Bus Implements IEEE 1196 Interface



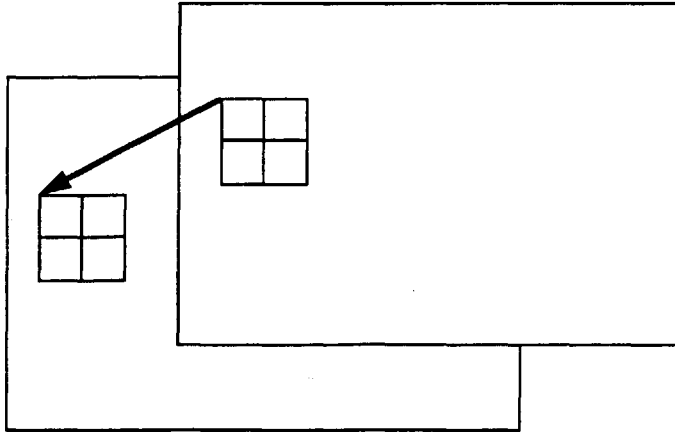
Codec Block Diagram



General Purpose Processors



Motion Estimation Algorithm

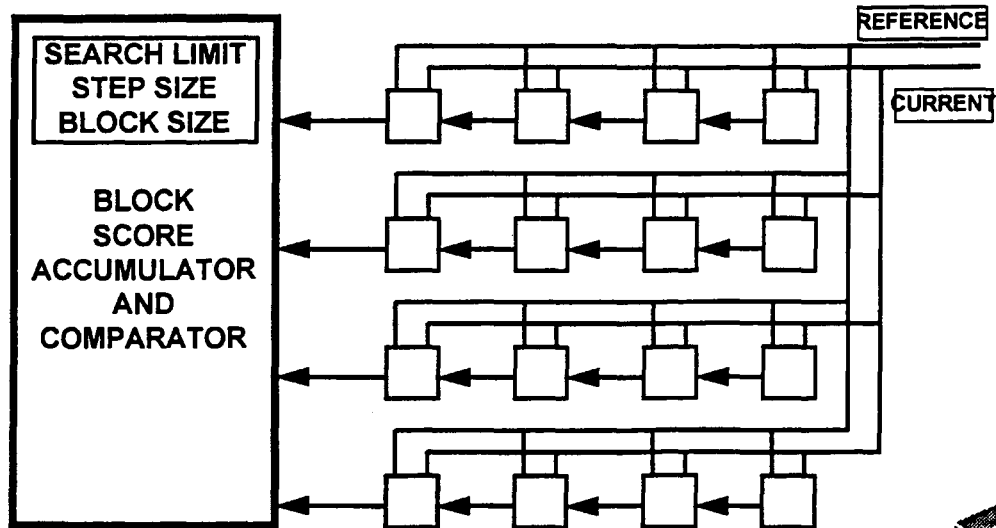


Motion Estimator

- ◆ Searches for half pel motion vectors
- ◆ 2000 MOPS performance
- ◆ Programmable search range
- ◆ Programmable block size



Motion Estimator Architecture



DMA Controller

- ◆ Arbitrates and schedules all DRAM accesses concurrent with CPU operation
- ◆ Supports two-dimensional address generation to fetch blocks of image data

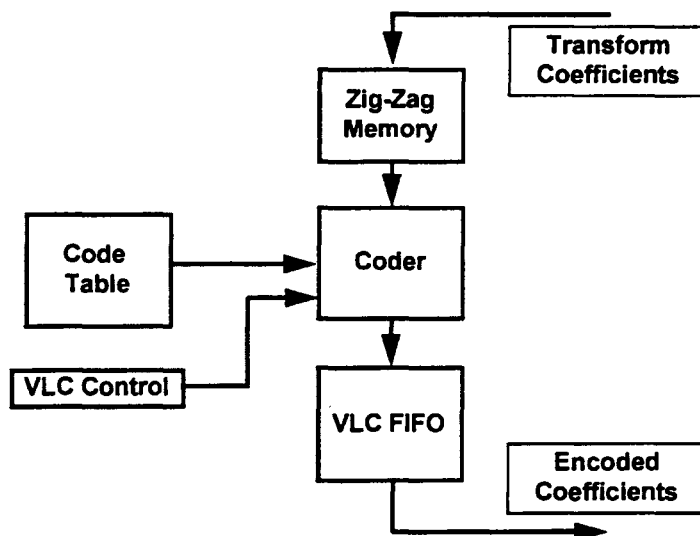


Variable Length Encoder

- ◆ Reorders DCT coefficients
- ◆ Counts runs of zeros
- ◆ Performs Huffman encoding of run-value pairs
- ◆ Huffman tables for Px64 and MPEG are stored in ROM
- ◆ Use of tables in RAM for other encoding standards is supported



Variable Length Encoder

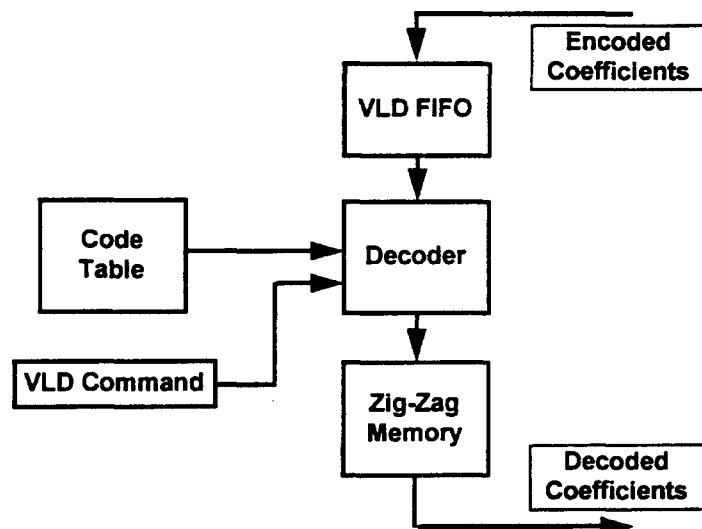


Variable Length Decoder

- ◆ ROM based decoder
- ◆ Performs Huffman decoding based on commands received from the CPU
- ◆ Expands and reorders run-value pairs



Variable Length Decoder



Video Ports

- ◆ Both video ports optionally interpolate output video data
- ◆ Both video ports can be used as high-speed data ports
- ◆ Video input port optionally performs a seven-tap decimation on input video pixels



Performance Summary

- ◆ 8X8 DCT and quantization 200 clocks
- ◆ 8X8 IDCT and dequant. 200 clocks
- ◆ FIR filter 4 FIR taps/clock
- ◆ MSE of two 16X16 blocks 70 clocks
- ◆ VLC peak rate 30 Msymbols/sec
- ◆ VLD peak rate 10 Msymbols/sec
- ◆ DRAM block transfer 80 Mbytes/sec
- ◆ Video bus 30 Mbytes/sec



Development Tools

- ◆ Simulator
- ◆ Debugger
- ◆ Assembler/Linker
- ◆ GNU C Compiler
- ◆ Libraries
- ◆ Host Software

