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

Video Port A Interface

Programmable Video Compression Processor

Video Port B Interface

DRAM Interface

Local DRAM

System Bus

SIF Encoder Block Diagram

NTSC Decoder

Programmable Video Codec

NTSC Encoder

DRAM

4 Mbit DRAM

System Bus

4 Mbit DRAM
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

• 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 Decoder

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