

## IME6400: MPEG4/2/1 Multimedia Encoder



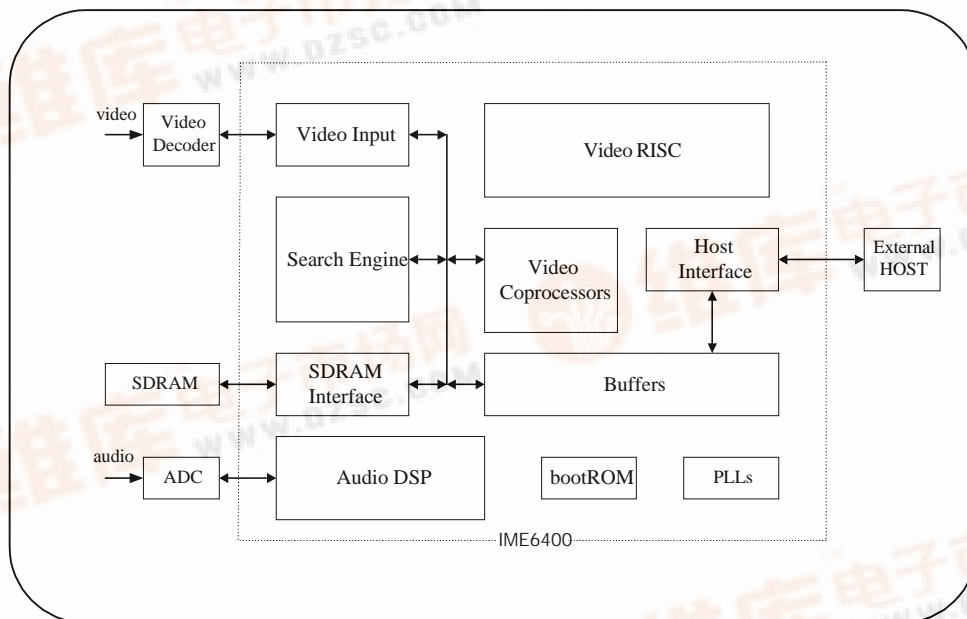
The **IME6400** is the world's first MPEG4 encoder for high resolution real-time video application.

The **IME6400** is a single chip integrated solution that is intended to encode audio/video, multiplex audio and video, and create MPEG4/2/1 elementary, program and transport streams. The chip captures uncompressed audio/video and encodes it according to MPEG4/2/1 standard. It also captures an uncompressed (PCM) or compressed audio (MPEG-1) and multiplexes video and audio streams.

The **IME6400** supports MPEG4 encoding format as well as MPEG2/1 encoding format. Its flexible output data format makes it ideal for use in the image data storage and transmission with multiple image sources, in business applications such as

- Surveillance and property management
- Distance learning and education
- Video conferencing and distribution via data networks
- Multimedia broadcasting system

In addition to the data processing capability needed, **IME6400** has an internal 32-bit RISC for the flexible application support, allowing the application to configure many of its operating characteristics, including the number of channels, image size and compression modes, as well as additional software functionality. Its external interface makes it suitable for both PC-based platforms (via PCI interface) and stand-alone systems (microcontroller interface).



IME6400 Block Diagram

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## Features

### Video Processing

- Real-time MPEG4/MPEG2/MPEG1 video encoding
  - ISO/IEC 13818-2, MP@ML & SP@ML
  - ISO/IEC 14496-2, MPEG4 SOP @LEVEL3
  - 525/60(NTSC) up to 720x480 @ 30fps
  - 625/50(PAL) up to 720x576 @ 25fps
- Supports I, P & B Frame Compression
- Flexible GOP Structure : Variable M,N - IBBP, IBP, IP, I frame only
- Variable Picture Size : programmable, up to 2048 x 2048
- Large Motion Estimation Search Range : with halfpel accuracy
  - P Pictures : X = [ -64 , +64 ], Y = [ -32 , +32 ]
  - B Pictures : X = [ -32 , +32 ], Y = [ -32 , +32 ]
- Motion Estimation in Frame/Field/16x8 Modes
- Bit rate control : VBR/CBR
- Color Format : 4:2:2 to 4:2:0 conversion
- Error Concealment/Resilience : Resync Marker
- Adaptive Field/Frame Modes, Field/Frame DCT
- Alternate & Zigzag Scan Support
- 8-11bit DC Precision
- Random Access within Video Stream
- Motion Detection (Scene Change Detection)
- Fade-In/Out, Flash Insertion & Detection
- Adaptive Decision (Intra/MC)
- 3:2 Pull-Down

### Audio Processing

- Supports ISO/IEC 13818-3 MPEG-1 Layer 2
- 48/44.1/32/24/22.05/16KHz Samplings Supported
- Encodes Stereo Channels
- Synchronous Serial Interface for Optional External Audio DSP

### System

- Real-time Video/Audio Multiplexing
- Elementary, Program, and Transport Stream Support
- User Data Insertion Supported.

### Peripheral Interface

- Glueless Interface to Industry Standard Video Decoders and CMOS Image Sensor
- 32-bit Synchronous DRAM Bus Interface
- I2C Master Interface
- Optional external boot ROM
- Optional external program SRAM memory for extension.



- Flexible Host Interface: 8/16 bits
  - Intel, Motorola type MCU interface
  - PLX local interface
  - MPC, netARM processors
  - USB controller

### Memory Requirement

- Single 8Mbytes SDRAM, 100MHz speed

### Physical Specification

- 27MHz external clock
- 3.3V 240-pin PQFP

### Description

The **IME6400** is a single chip MPEG4/2/1 encoder for audio, video, system. The **IME6400** encodes audio/video, multiplex audio and video, and creates MPEG4/2/1 elementary, program and transport streams. The **IME6400** is composed of high performance RISC processor core and DSP core with dedicated functional blocks for real-time audio/video applications.

The **IME6400** chip performs motion estimation on a wide search area of +/-64H, +/-32V for P pictures and +/-32H, +/-32V for B pictures at half PEL accuracy. The **IME6400** supports various motion estimation modes such as frame, field, 16x8 mode for improving compression efficiency.

The **IME6400** operation is based on downloadable microcode, thus providing high level of flexibility and ability to create customized solutions per specific applications, such as multi-channel systems. During software initialization, codes are loaded into the internal program memory in one of two ways; either the code is stored in a ROM attached on the external bus, or the code is downloaded from external host. Program memory is extendible by optional external SRAM. To fit into low cost system implementation, **IME6400** has internal booting ROM. As the result, the overall video system can be implemented using only one SDRAM and video decoder.

The **IME6400** requires external SDRAM for storing video frames, compressed data buffers, and user buffers. The **IME6400** supports many SDRAM configurations to meet specific application needs. One 32 bits SDRAM, Two 16 bits SDRAM, four 8 bits SDRAM, eight 4 bits SDRAM configurations are also possible on a 32 bits SDRAM bus. The **IME6400** generates all signals required for a glueless interface to SDRAM memory.

The **IME6400** video interface is designed to connect directly to digital composite decoders. The industry popular video encoders; Philips SAA7112/SAA7114, Brooktree Bt829A, Samsung KS0127 are supported. It also can directly interface with CMOS image sensor processors for low cost application.

To minimize power consumption, the **IME6400** uses multi-clock distribution and clock-gating schemes. The **IME6400** has two internal PLLs which provide 54Mhz clocks for core logic, and 81Mhz clocks SDRAM interface logic. The PLL multiplies external 27Mhz clock up to 54Mhz, 81Mhz each.

The **IME6400** may be programmed to achieve useful video functions, such as scene change detection, 3 to 2 pull down, variable/constant bit rate control, etc. These powerful features enable **IME6400** to be used to the following applications : desktop application, digital video recorders, digital camcorders, recordable DVD, PVR, etc.

The host interface in **IME6400** is used to send compressed image data for external host. The interface provides the functionality for applications both in the PC-based platforms or stand-alone systems.



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The PC-based platforms are supported with an internal PLX interface. This interface may be configured for 8, 16 bits data bus, depending on the bandwidth requirement, and an external PLX controller is connected to PCI bus.

Alternatively, **IME6400** may communicate directly with an external microcontroller, such as Motorola, Intel, netARM, MPC, and supports USB controllers.

The application also uses the host interface to program **IME6400**. The programmable features may vary depending on the firmware loaded into the CPU. The host interface may be used to download the CPU program, customized for the application, including the picture size, compression mode.

In addition to **IME6400** chips, complete reference designs are provided for accelerating time to volume. PC-based PCI reference board and standalone reference designs are both available with comprehensive software for application development.

For further information or purchase order, contact:

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