## Hi3560E Network Media Processor

# Main Features

## CPU Core

- ARM926EJ-S, 16 KB instruction cache and 16 KB data cache
- Built-in 2 KB instruction tightly-coupled memory
- 32-bit RISC processor in the Harvard architecture
- DSP enhanced architecture with 32 x 16 MAC
- Java hardware acceleration
- Built-in MMU, supporting multiple open operating systems
- Up to 400 MHz operating frequency

## Video Decoding

- H.264 MP@Level 3.0
- H.264 HP@Level 3.0
- AVS baseline profile@Level 4.0
- MPEG-1 (ISO/IEC 11172-2)
- MPEG-2 (ISO/IEC 13818-2) MP@ML
- MPEG-4 ASP@Level 5 or earlier and SP@Level 3.0 or earlier
- DivX 4/5/6
- Xvid
- JPEG decoding, supporting up to 64 megapixel hardware accelerated decoding.

## Graphics Processing

- Supporting video horizontal and vertical scaling
- Five hardware graphic layers, supporting multiple graphic data formats
- Supporting video denoising and image enhancement
- Supporting the interleaved de-interlace processing with motion detection, median filter, and edge detection
- Supporting anti-flick processing
- Supporting RGB dithering
- Supporting gamma correction
- 2D graphic acceleration engine, supporting games and abundant graphic interfaces

## Audio Processing

- Supporting decoding in common audio formats

## Encryption Engine

- Implementing various encryption and decryption algorithms such as AES, DES, and 3DES through the hardware
- Compatible with various CA solutions and supporting DVB CSA descrambling
- Supporting the Macrovision 7.1 copy protection (optional)

## Video Interfaces

- Integrated with a 4-channel video DAC, supporting multiple output formats such as YPbPr/RGB, CVBS, and S-Video
- 1-channel input interface
  - CCIR 656/601 YCbCr 4:2:2, 8 bits
  - Supporting the digital camera interface
- Output
  - CCIR 656 YCbCr 4:2:2, 8 bits
  - Supporting the LCD interfaces with 12-/16-/18-/24-bit data width, up to 800 x 600@60Hz (optional)
  - Integrated TV NTSC/PAL encoding
- Integrated with TV encoding, supporting multiple standards such as NTSC, PAL, and SECAM

## Audio Interfaces

- Integrated with an audio DAC with two channels, supporting the functions of pop suppression and mute
- Two $I^2S$ audio interfaces, each interface with a separate input/output channel
- 16-/24-/32-bit sampling accuracy supported by the $I^2S$ interface, with configurable sampling rate
- PCM interface
- SPDIF audio output interface

## Ethernet Interfaces

- Supporting two 10 or 100 Mbit/s Ethernet interfaces and MII/RMII interfaces
- Supporting the 2-layer switching function
- Supporting VLAN

## Transport Stream Interfaces

- Supporting transport stream input interface
- ISO 13818-1 MPEG-2 transport stream, supporting serial/parallel interface
- 32 PID filtering

## Peripheral Interfaces

- Smart card interface, supporting the ISO/IEC 7816 protocol and the EMV standard
- Supporting two USB 2.0 Host interfaces with low-speed, full-speed, and high-speed transfer rates, embedded PHY
- Supporting two UART and two $I^2C$ serial ports
- Providing the IR interface that supports various codes of different IR remote controls
- Supporting LED output and keyboard input control
- Supporting nine groups of GPIOs. Each group provides eight programmable input/output pins

## External Memory Interfaces

- Supporting 8-/16-bit DDRII-SDRAM interfaces. The SDRAM supports a maximum space of 512 MB.
- Supporting 8-/16-bit external bus interfaces, which are connected to the external SRAM, ROM, NOR flash, and NAND flash. Each NOR flash supports a maximum space of 32 MB.
- The NAND flash supports 1-/4-/8-bit ECC error correction
- Supporting 1-/2-/4-bit SPI flash interfaces. Each SPI flash supports a maximum space of 16 MB.

## Network Protocols

- Supporting TCP/IP protocols

## Embedded Operating System

- Supporting Linux and VxWorks

## Physical Specifications

- Typical power consumption: 1.2 W
- Multiple-level power-saving modes
- Technology: 0.13 μm
- Chip supply voltage: 1.2/1.5/1.8/3.3 V
- Operating temperature: 0℃–70℃
- Providing three optional encapsulation types QFP256, QFP208, and BGA based on functions and applications

# Introduction

The Hi3560E is a highly-integrated and programmable network media processor based on the ARM926EJ-S processor core and engine. It supports multiple video and audio protocols. Besides the efficient video and graphics processing units, the Hi3560E provides multiple reliable and secure solutions. It applies to various multi-media terminals, such as the IPTV STB, DVB STB, and mobile television receiver.

# Features of the Hi3560E

■ **Complicated Applications**
  – 400-MHz high-performance CPU and VFB/JAVA accelerator provide powerful processing capability
  – Multiple decoding formats such as H.264, MPEG4, MPEG2, and AVS support multiple applications

■ **Home Gateway**
  – Built-in dual network ports support 2-layer switching and VLAN

■ **Rich Digital Home Entertainment**
  – Digital home photo frame: built-in JPEG decoding hardware, up to 64 megapixel
  – Vivid game experience: keyboard and menu sound effect and background music
  – Two USB 2.0 host interfaces support multiple peripherals such as the USB flash drive, card reader, portable hard driver, and WiFi
  – PVR recording: PVR recording in IP mode
  – Unified videoconferencing: This function is achieved when the Hi3560E works with the HiSilicon encoding chips of the Hi35XX series

■ **Powerful Graphics Display**
  – Dual OSD, flexible menu, and neat GUI
  – Optimization based on the HTML browser improves user experiences

■ **Flexible Storage Configuration**
  – NAND flash, high-capacity memory but with low cost
  – DDRII-SDRAM with cost reduction

# Block Diagram of Functions
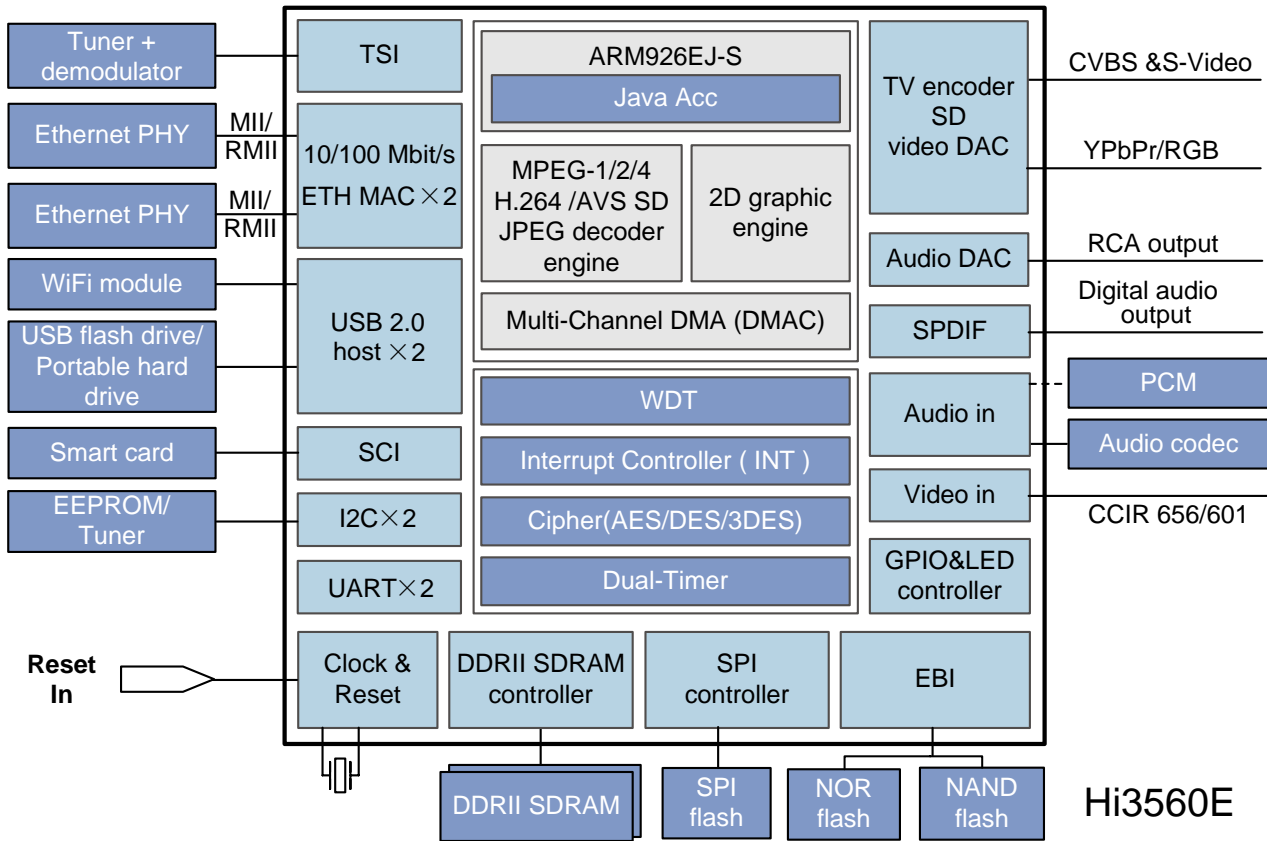


# Application Fields and Typical Application Diagram

- Single-mode IP STB
- Dual-mode DVB/IP STB
- Mobile television receiver

- Digital media adapter (DMA)
- Personal media player (PMP)
- Digital photo frame (DPF)

# System Block Diagram of the Typical Hi3560E Application

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