

IT9917TE

High Performance A/V Encoder SOC

Specification V1.0.0.0

ITE TECH. INC.

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1. Features

■ Host Processor

- 200MHz 32-bit general purpose high performance RISC processor
- Support separate 8K instruction and 8K data caches
- DSP extension instruction for 32*32 MAC
- Power saving

■ Audio Processor

- 200MHz 32-bit general purpose high performance RISC processor
- Support separate 8K instruction and 8K data caches
- DSP extension instruction for 32*32 MAC
- Power saving
- Support Audio Encoder
 - ADPCM
 - MPEG Audio
 - AAC-LC

■ Security Processor

- 200MHz 32-bit general purpose high performance RISC processor
- Support separate 4K instruction and 8K data caches
- DSP extension instruction for 32*32 MAC
- Power saving

■ DMA Controller

- Provide 8 configurable DMA channels
- Support chain transfer
- Memory-to-memory, memory-to-peripheral, and peripheral-to-peripheral transfer
- Group round-robin arbitration scheme with 4 priority levels
- Support 8-, 16-, and 32-bit wide data
- Support big-endian and little-endian

■ Interrupt Controller

- Provides both edge and level-triggered interrupt sources with positive and negative directions
- Provide de-bounce circuit for interrupt source

■ Timer with Pulse Width Modulation (PWM)

- Provide 2 independent 32-bit timer with PWM
- Programmable duty cycle and frequency
- Support external clock source
- It can merge two timers as 64-bit timer
- Support incrementing and decrementing mode

■ Remote Controller

- Hardware programmable to receive remote controller signal

■ General Purpose Input/output Ports

- Independent input, output and output enable buses for bi-directional I/O pins
- Each port can separately trigger the GPIO interrupt when it programmed as input pin
- Each port interrupt generation can be triggered by rising edge, falling edge, both edges, or high/low level when the interrupt option is set

■ UART

- Baud rate up to 6.25M bps
- Firmware compatible with high-speed NS 16C550A UART
- 128 bytes transmit/receive FIFOs
- Internal diagnostic capabilities:
 - *Break, parity, overrun, framing error simulation for UART mode*

■ Watch Dog Timer

- During timeout, outputs are one or a combination of the following signals:
 - *System reset*
 - *System interrupt*
 - *External interrupt*
- 32-bit down counter
- A variable time-out period of reset
- Access protection

■ IIC-Bus Interface

- Support stand, and fast mode through programming the clock division register
- Support 7-bit, 10-bit and general call addressing mode

- Glitch suppression throughout the de-bounce circuit
 - Programmable slave address
 - Master-transmit, Master-receive, Slave-transmit and Slave-receive modes are provided
 - Configurable multi-master mode supported
 - Slave mode general call address detection
- **Synchronous Serial Port Controller**
- Supports TI SSP, Motorola SPI, National Semiconductor Microwire
 - Supports master and slave modes
 - Internally or externally controlled serial bit clock
 - Internally or externally controlled frame/sync
 - Programmable frame/sync polarity
 - Programmable serial bit clock polarity, phase, and frequency
 - Programmable serial bit data sequence (MSB or LSB first)
 - Programmable threshold interrupt of transmit/receive FIFO
 - Independently programmable interrupt enable/disable
 - 16x32 transmit and receive data FIFO depth
 - Support 2nd SSP controller and include SPDIF function
 - SPDIF fully compliant with IEC958 standard
 - Support linear PCM and non-linear PCM (Compressed data)
- **USB Host/Device**
- Provide one Host/Device controller, and one Host controller
 - Compliant with USB specification revision 2.0
 - Compatible with EHCI 1.0
 - Supports point-to-point communications with one HS/FS/LS device
 - Hardware configurable endpoints as HS/FS device
 - Both host and device support isochronous/ interrupt/ control/ bulk transfers
 - Compatible with EHCI data structures
- **Host Interface**
- Supports addressing space up to 256MB
 - Supports SPI and IIC interface
- **Memory Interface**
- Support maximum 256 MByte 16-bit DDR/DDR2
 - Support ping-pong bank with tilling memory access
 - Support different tilling mode
- **Ethernet MAC**
- Compliant with the full IEEE 802.3-2002 specifications
 - Supports IEEE 802.1Q VLAN tag detection for reception frames
 - Support of CSMA/CD Protocol for Half-Duplex operation
 - Supports IEEE 802.3x flow-control for Full-Duplex operation
 - Supports IEEE 1588-2002 Time stamping on the transmit and received frames
 - IEEE 802.3 compliant RMI PHY interface
- **Video Input Interface**
- Support 24/30/36-bit RGB/YCbCr
 - Support BT601 : 16/20/24-bit YCbCr 4:2:2
 - Support BT656 : 8/10/12-bit YCbCr 4:2:2
 - Support HD BT1120 interface
 - BT656 like time multiplexed input with 54/108/144 MHz
 - Down sampling from YCbCr 4:4:4 to YCbCr 4:2:2 or 4:2:0
 - Dithering for conversion from 12-bit/10-bit component to 8-bit
- **Image Signal Processing**
- Image and video scaling engine for scaling up and down
 - *4-Tap scaling filter*
 - *Configurable filter coefficients*
 - Color space conversion
 - De-interlace filter
 - *2D deinterlace filter*
 - *3D deinterlace filter*
 - High Color OSD
- **Audio Input Interface**

- Up to Four I2S interface, with sample rates of 32~192KHz and sample sizes of 16~24 bits
- SPDIF interface supporting PCM and non-PCM data
- **H.264/AVC Encoder**
 - Support Baseline profile, from level 1.0~ 3.1 up to 720p@30fps
 - Support CBR and VBR
 - Programmable GOP structure
- **JPEG Encoder**
 - Compliant with Baseline JPEG standard ISO/IEC 10918
 - Support 5M pixel still image encode
 - Support 720p@30fps Motion JPEG encode
- **Cypher Engine**
 - Compliant with the Publication 197 from NIST (AES) encryption/decryption with 128-bit key size
 - Support DES/3DES encryption/decryption
 - Support DVB-CSA decryption
 - Support ECB, CBC, CFB, CTR and OFB operation mode
 - Support RSA1024
 - Support SHA256
 - Support scrambler
- **SD/MMC Controller**
 - Two MMC/SD interface
 - Fully compliant with MMCA v3.3
 - Compliant with low-voltage support and 4 bits data of MMCA v4.0
 - Compliant with SD/SDHC
 - FAT16/FAT32 boot loader
- **TSI**
 - Support serial interface
 - 32 PID filters
 - Maximum bits rate up to 100 Mbits
- **TSO**
 - Support serial interface
 - PCR Insertion
 - Maximum bits rate up to 80 Mbits
- **Boot Loader**
 - Configurable booting device
 - Serial NOR
 - SD Card
 - Co-operative mode
 - SPI
 - IIC
 - Support de-compressed boot code
- **Applications**
 - Video intercom

2. General Description

2.1 Introduction

IT9917 is a real-time and high performance A/V encoder SOC. It integrates a high performance H.264 Encoder, JPEG encoder, Audio encoder, 32-bit RISC CPU, USB, SD, Cypher Engine and versatile A/V input interfaces. It's easy to enable high quality and high performance video/audio recording.

IT9917 integrates 512Mbits DRAM in package to offer a small size, thus can help customer to design small size PCB board and also to shorten PCB board development cycle.

2.2 Multimedia Processor

2.2.1 Powerful Video Encoding Engine

IT9917 supports H.264 and JPEG encoder and encodes up to 1208x720 resolution. H.264 encoder is fully complies with ISO/IEC-14996-10 baseline profile. JPEG encoder is fully complies with ISO/IEC-10918 baseline profile. IT9917 also provides a video scaling engine for scaling up or down to the target encoding size.

2.2.2 Powerful Audio Encoding Solution

IT9917 embeds a 32-bit RISC CPU and a DSP engine. It can encode ADPCM, MPEG-1 and MPEG-2 layer 2 audio and AAC-LC streams.

2.2.3 High performance USB2.0 I/F

IT9917 supports a USB2.0 Host and a USB2.0 Device I/Fs. Users can have high speed data transfer experience through the USB2.0 I/F.

2.2.4 Flexible Storage Interface

IT9917 has MMC/SD cards I/F and NOR flash I/F. You can choose MMC/SD for multimedia contents storage space. If you want some other external cards I/F, IT9917 provides a USB host I/F allowing for an external card bus chip. Besides NOR and SD are the others solution for you to choose as a booting code storage space.

2.2.5 A/V Input Interface

IT9917 can accept BT.656, BT1120 and YCbCr 4:2:2 8/16 bits with separate H/V sync video. It is flexible to connect various external video A/D converters. The maximum resolution is up to 1280x720.

IT9917 supports I2S controller that can connect to various external A/D converters and can be configured as either master or slave mode. IT9917 also provides SPDIF interface supporting PCM and non-PCM data.

3. Block Diagram

Figure 3-1. Block Diagram of IT9917

