T10 Smart Video Processor

Best balance in Price-Quality-Performance-Power

V1.1

Production overview

Integration XBurst, ultra-low power CPU technology, the Ingenic T10 smart video processor is the most advanced solution for the video device to develop intelligent analysis. T10 is one best balance design, it has high level imaging and encoding technology, up to 1.0GHz CPU with MXU2.0(SIMD128), and the very low running power. Integrating audio codec, 64MB DDR2, T10 also can make the hardware desgin easily and shorten the time to market.

Highlights

◆ CPU operating at 1.0Ghz, base on MIPS

◆ 128KB L2-cache

◆ MXU2.0 (SIMD128)

◆ Video and audio intelligent analysis

◆ High Level ISP, support 3D denoise, WDR

◆ H.264 baseline, mainprofile, up to 960P resolution

◆ Package with 64MB DDR2

◆ Low to less than 400mw power consumption including DDRII in working time

Ingenic XBurst technology

The XBurst is best energy efficiency RISC core based on the MIPS Instruction Set Architecture (ISA). Based on the Ingenic unique ultra low power pipeline technology, the dynamic power consumption of XBurst core consumes only 0.09mW/MHz while the frequency operating at up to 1.0 GHz. And when it gets into sleep mode, the static power is only 0.2mW.

The SIMD128 instruction set, which called MXU2.0, inplemented by XBurst engine, together with opencv opeator, it can make the real-time intelligentanalysis algorithm which is developed by Ingenic or deveolpers.

Surveillance level ISP engine

The ISP core supports high level imaging quality with up to 1280x960 resolution. Besides the 3A, lens shading correction, 2D denoise, tonning map technology, ISP engine supports muti-frame wide dynamic range (True WDR) and 3D denoise. Additionally, Ingenic ISP suports extreme low illumination, enhancement color/contrast technology, de-fog, etc to deliver optimum video quality.

Video processing engine

Ingenic's proprietary VPU (Video Processing Engine) uses a combination of custom hardware and a microcode engine to provide a low power, yet flexible and upgradeable solution to video encoding. This approach make the VPU consumes less than 25mw when H.264 960P@40fps streams to be encoded with Main profile. The VPU supports ROI, dynamic frame rate,

Key benefits of T10

### High performance with extreme low power consumption

With up to 1Ghz XBurst CPU and 128K Byte L2 cache, T10 can support various complex application basing on video and audio. But beyond imagination, it just consums less than 400mw including DDR2, which is packaged in the chip, when it is encoding the 960P@30fps video coming from the ISP, doing the analyzation to the video and running some apllication on the Linux.

Flexible and changeable intelligent analysis operator and algorithm

For the MXU2.0(SIMD128), which is a part of XBurst, runing at 1Ghz, it gives the T10 a super caculation power. Basing on that, T10 can supports flexible and changeable intelligentanalysis algorithm in real time, just like motion detecion, body detection, license plate recognition and so on. For easy to use, basic operators and tool chain is opened to all the users. People can choose different way to get the intelligent analysis algorithm, just like use Ingenic's or deveop by self with using Ingenic operators or develop operators by himself. All the operators and alogirthm can be constantly upgraded.

Dual voice communication and voice recognition

Without any other DSP's help, the advanced echo cancellation algorithm can be used in T10 to supply good effect on dual voic communication. For the high performance of CPU with MXU2.0, the T10 also can support the voice recognition applications, which is widely used in IOT, mobile, etc.

Low Energy Computing Enalling Smart Devices
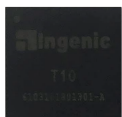
T10 Block Diagram
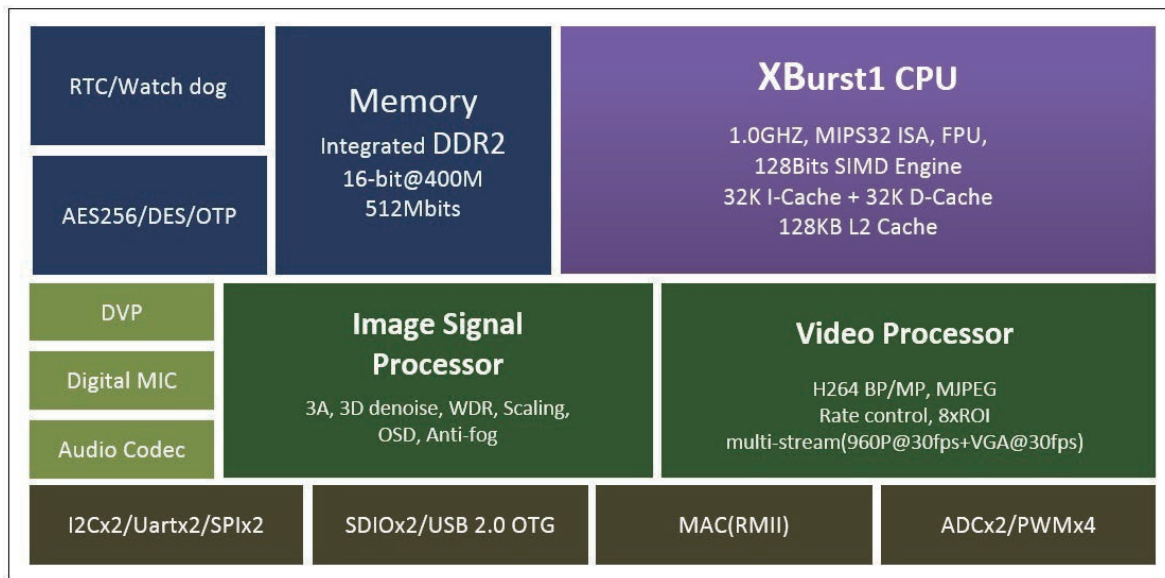
Product Feactures

CPU Core
- XBurst single core, 1GHz
- MXU2.0 IVS Engine, innovative 128 bit SMID extension instruction set
- 64KB L1 Cache, 128KB L2-Cache
- Hardware floating point unit

Video Encoder
- H264 baseline, main profile
- MJPEG/JPEG Baseline

Video Encode Performance
- Max resolution 1280x960
- Up to H264 960P@40fps encode
- H264 multiple streams
  · 720P@30fps+VGA@30fps+JPEG@15fps
  · 960P@30fps+VGA@30fps+JPEG@15fps
- ABR/VBR/CBR/CQP
- 8 ROIs

Integrated Memory
- Embedded16bit@400MhzDDRII
- Maximum capacity of 512Mbit

Computer Vision
- Motion Detection
- Perimeter Protection
- Face Detection
- Gesture Recognition, etc.
- Provide MXU2.0 optimized CV operator libraries

Image Signal Processor
- AE, AWB, AF
- Lens shading correction
- Advanced spatial noise reduction
- Motion-adaptive temporal noise reduction (3D de-noise)
- Multi-exposure HDR image fusion (WDR)
- Space-variant HDR processing
- 2 channel image outputs with scaling
- Host tuning tools

Graphic Capability
- 5-layer OSD with hardwaren

Physical Feature
- Power: 400mw including DDRII
- Package: ball pitch of 0.65mm and body size of 10mmx10mm, TFBGA181 ROHS

CMOS Sensor Interface
- Maximum 12 bit HSYNC/VSYNC (DVP)
- I2C sensor control, Flash and DC control
- Programmable sensor clock output
- Up to 100M pixels/sinput

Audio Interface
- Integrated Audio Codec, 93db SNR

Audio Processing
- AAC, G726, G711, PCM encoding
- Echo cancellation by software
- Sound Localization by software
- Voice Recognition by 3rd party

Security Engine
- AES/DES/3DES by Hardware
- Global unique Chip ID
- 32Byte customer OTP

Peripheral
- POR, RTC, WDT
- 2 channel ADC
- UART x 2, SMB x 2, SPI x 2, GPIO x 12
- SDIO x 2, support SDHC
- PWM x 4
- USB OTG
- RMII EMAC, support PHY clock output

Storage
- Boot from SD, SPI-Nor, SPI-Nand, USB
- Maximum 128GB TF/MMC card

Software Development Support
- Linux-3.10 BSP, GCC tool chain, Glibc
- SDK, Sample code
- Host development and debug tools
- Production test tools

Ingenic Semiconductor