

# T20 FHD Smart Video Processor

Best choice for smart video application

V1.0



## Production overview

Integration XBurst, ultra-low power CPU technology, the Ingenic T20 smart video processor is the most popular solution for the video and intelligent analysis device. T20 is a high performance video processor. It has high level ISP and H.264 encoding technology, maximum resolution up to 3MP, and CPU frequency up to 1.0GHz, with MXU2.0(SIMD128) instruction. T20 integrated audio codec and 64MB/128MB DDR2, can make hardware design 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
- ◆ Smart H.264, high profile, maximum 2048x2048 resolution
- ◆ Package with 64MB/128MB DDR2
- ◆ Less than 600mw typical power consumption
- ◆ Fast boot and quick stream

### 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, implemented by XBurst engine, together with openCV operator, it can run real-time intelligent analysis algorithm.

### Surveillance level ISP engine

The ISP core supports high level imaging quality with up to 2048x2048 resolution. Besides the 3A, lens shading correction, 2D de-noise, toning map technology, ISP engine supports multi-frame wide dynamic range (WDR) and 3D de-noise. Additionally, Ingenic ISP supports extreme low illumination, enhancement color/contrast technology, de-fog etc.

### 3MP Smart H.264 Video engine

Ingenic's proprietary Hilex Video Processing Engine (VPU) uses a combination of hardware and a micro-code engine to provide a low power, yet flexible and upgradeable solution to video encoding. This approach make the VPU consumes less than 50mw when H.264 1080P@40fps stream encoding under High Profile. More than low power, T20 video technology support Smart H.264 protocol, which can save 20% bitrate when encoding a same stream.

## Key benefits of T20

### High performance with extreme low power consumption

With up to 1.0Ghz XBurst CPU and 128K Byte L2 cache, T20 can support various complex application basing on video and audio. But beyond imagination, it just consumes less than 600mw including DDR2 when it encoding 1080P@30fps video coming from the ISP, meanwhile doing video analyzation and running applications on Linux.

### Flexible and changeable intelligent analysis operator and algorithm

For the MXU2.0 (SIMD128), which is a part of XBurst, running at 1.0Ghz, it gives T20 very high computing performance. Base on that, T10 can supports flexible and changeable intelligent analysis algorithm in real time. Such as motion detection, 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. All the openCV operators and algorithms can be constantly upgraded.

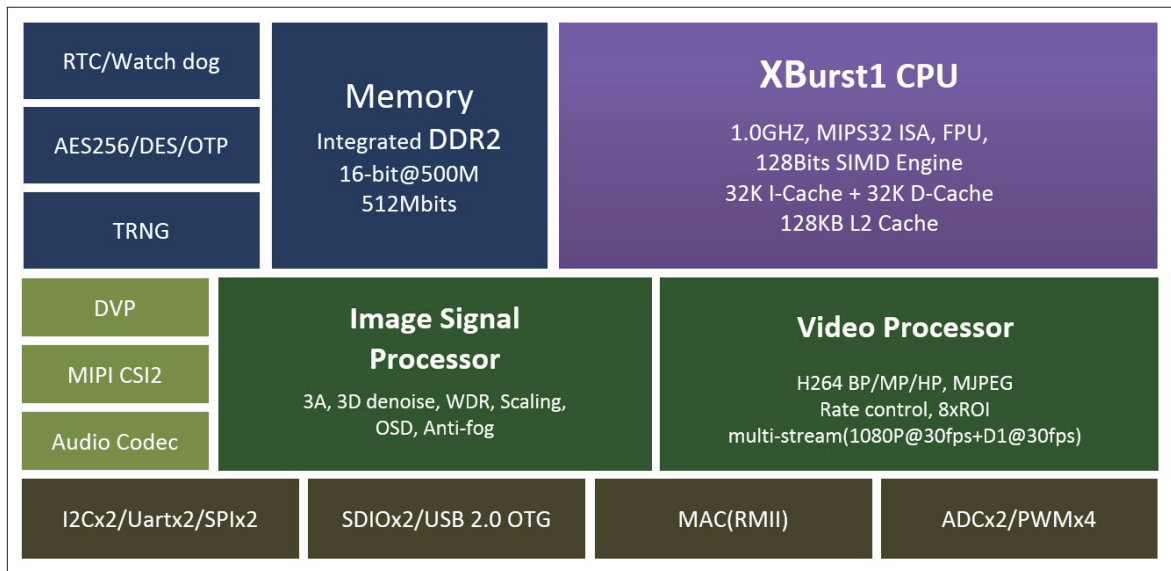
### Low light noise reduction engine

For surveillance application, Ingenic develop a powerful low light noise reduction engine (NCU). With the benefit from NCU, T20 optimized the post ISP stream, enabling starlight night vision ability in further production.

### Battery powered camera and doorbell

Beside low power ability, T20 also provide a unique fast boot and quick stream technology base on Linux OS. Together with low power WIFI modular, T20 can fulfill battery powered camera and doorbell product with 6 months battery life.

## T20 Block Diagram



## Product Features

### CPU Core

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

### Video Encoder

- ◆ Max resolution 2048x2048
- ◆ Up to H264 1080P@40fps encode
- ◆ H264 multiple streams  
1080P@30fps+D1@30fps+JPEG@15fps  
2048x1536@25fps+D1@25fps+JPEG@15fps  
2048x2048@15fps+D1@15fps+JPEG@15fps
- ◆ Smart H.264
- ◆ ABR/VBR/CBR/CQP, 8 ROIs
- ◆ 5-layer OSD

### Integrated Memory

- ◆ Embedded DDRII
- ◆ Maximum capacity of 512Mbit or 1Gbit

### Computer Vision

- ◆ Motion Detection
- ◆ Perimeter Protection
- ◆ Face Detection
- ◆ Figure Recognition, etc.
- ◆ Provide MXU2.0 optimized CV operator libraries

### Image Signal Processor

- ◆ AE, AWB, AF
- ◆ Lens shading correction
- ◆ Advanced spatial noise reduction
- ◆ 2D/3D de-noise, DRC
- ◆ Multi-exposure HDR image fusion (WDR)
- ◆ 2 channel image outputs with scaling
- ◆ Host tuning tools

### Physical Feature

- ◆ Power: 600mw including DDRII
- ◆ Package: ball pitch of 0.65mm and body size of 10mmx10mm, TFBGA181 ROHS

### CMOS Sensor Interface

- ◆ 12 bit HSYNC/VSYNC (DVP)
- ◆ MIPI-CSI 2lane
- ◆ Programmable sensor clock output

### Audio Subsystem

- ◆ Integrated Audio Codec, 93db SNR
- ◆ G726, G711, PCM encoding
- ◆ Echo cancellation by software

### Security Engine

- ◆ AES/DES/3DES by Hardware
- ◆ Global unique Chip ID

### Peripheral

- ◆ POR, RTC, WDT
- ◆ 2 channel ADC
- ◆ UART, SMB, SPI, GPIO
- ◆ SDIO, support SDHC
- ◆ PWM
- ◆ 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 BSP, GCC tool chain, Glibc
- ◆ fast boot and quick stream
- ◆ SDK, Sample code
- ◆ Host development and debug tools
- ◆ Production test tools