# Grain Media GM8180

## H.264/MPEG-4/JPEG SoC Solution Targeting Digital Surveillance, Mega-Pixel IP Camera and Multi-Channel Video Streaming Devices

## Overview

The GM8180 is a highly integrated H.264/MPEG-4/JPEG SoC solution targeting Internet digital video applications especially on IP surveillance and IPTV station applications. With the pure hardwired video codec architecture, the max. 500 MHz FA626 ARM-based CPU can be used for computing of audio encoding & decoding or image analysis in intelligent surveillance applications, such as object or face detection. The video complex, high performance video solution, consists of the CPU, cache controller, video codec engine, highly efficient DMA controller, system bus architecture and special DDR SDRAM controller. The GM8180 SoC can meet requirement of bandwidth hungry video input or output processing of mega-pixel IP cameras and multi-channel hybrid DVRs. The H.264 encoder supports real-time 1280 x 720 pixels @ 30 fps or 1280 x 960 pixels @ 22.5 fps bitstream. With flexible video codec engine design, the GM8180 also supports multi-channel compression or de-compression of multi-channel video servers, PCI encoder/decoder adaptors or hybrid DVRs. H.264, the latest video codec algorithm, is supported as well, which provides 1/3 of bandwidth less than MPEG-4 at the same video quality, and has been proven the best solution for intranet storage or internet streaming applications.

To support the convergence of the intranet, internet and mobile phone network, the GM8180 is designed to support up to 4 real-time bitstreams with different video formats, H.264/MPEG-4/JPEG and resolutions to fit the bandwidth and display resolution of monitor devices. In order to improve the compression quality, a noise reduction filter is implemented in the SoC.

The GM8180 also has 8-/16-bit video input interface to support mega-pixel CCD/CMOS sensors for e-PT (Pan & Tilt) feature or multiplexer for multiple channels over the video input path. With the dual PCI host/device modes, two chip master/slave architectures reduce the system complexity of 4-channel DVR applications. Moreover, the hardwired AES/DES/3DES engine is supported to have highly efficient cipher bit stream, in order to protect the integrity of the surveillance system.

## GM8180 Linux SDK and GM Streaming Media (GSM)

GM Linux SDK is comprised of five components: Linux kernel, peripheral drivers, network protocol stack, sample video application software and web server/CGI interface. The Linux SDK is based on the embedded Linux 2.6.14 OS to provide drivers of all peripherals including 802.3 Ethernet MAC, USB 2.0 OTG, ATA-133 IDE controller, SD/MMC, I²S, capture and CCIR 656 or LCD display controller. Video codec algorithms, including H.264/MPEG-4/JPEG, are also provided. The Linux SDK provides but does not limit to network protocol stack, PPPoE, DHCP, DDNS, SMTP and HTTP.
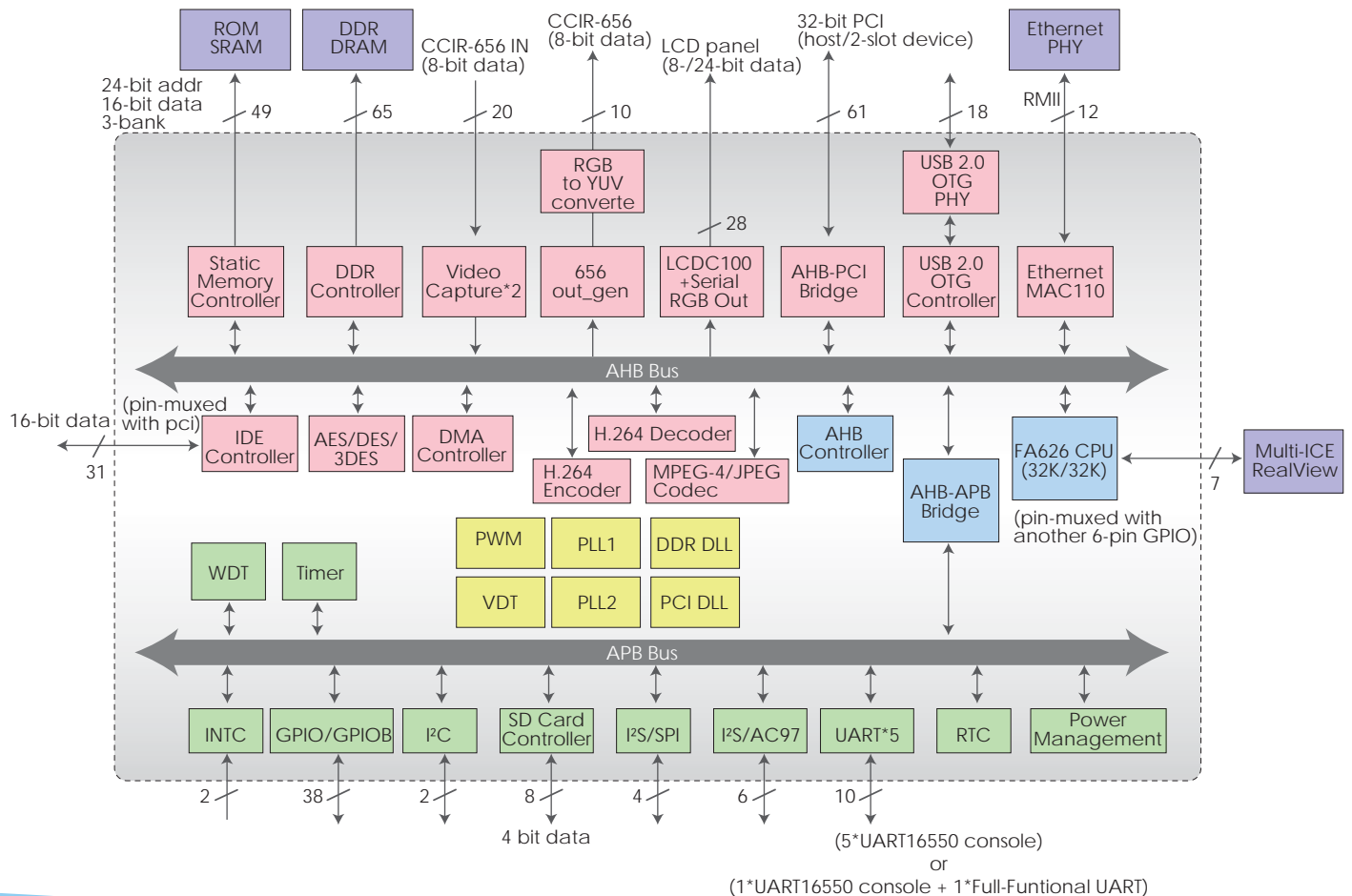
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Not only is Linux SDK the solution for dynamic IP address environment but also the foundation for easy installation. Video applications include video decoder – ffplay, video encoder – ffmpeg. They are the ideal reference coding to shorten schedule for development. The Linux SDK also provides a simple web server and CGI control interface that allow users to manage the related configurations.

GM Streaming Media (GSM) is an IP camera/IPTV station application software package. It integrates the video/audio codec algorithm and network streaming protocols with low latency tuning and dynamic bit rate control to adapt to the dynamic internet traffic. The GSM has two components: GSM server and the GSM client player which inclduing GMPlayer and GMSurviewer. GSM server is a full functional video/audio streaming server that runs in a Linux environment and supports the GM8180 video compression engine. It includes streaming server, encoder, control server and web server. The GMPlayer program is DirectShow-based application developed for streaming video playerand streaming server control . GMSurviewer is a software reference application that supports the basic functions to connect to the 1-/4-/9-/16-channel GSM server. RTSP, RTP over TCP/UDP, are supported for streaming players like QuickTime, RealPlayer, etc. GSM also supports 3GPP for mobile phones. Combined with GSM and GM Linux SDK, it is a turnkey software solution for customers with the UI interface provided for differentiation.

## Block Diagram

| CPU | FA626 ARM-architecture CPU, up to 500 MHz, 32K I-cache/32K D-cache |
|---|---|
| Memory Interface | 16-/32-bit DDR SDRAM Controller up to 333 MHz/1GB<br>8-/16-bit static memory controller, supporting NOR-type flash memory, SRAM and ROM |
| H.264 Codec | Encoder supporting Baseline Profile, from level 1 ~ 3.1 up to D1, 75 fps Supports VBR and CBR<br>Decoder supporting Baseline Profile, from level 1 ~ 3.0 up to D1, 60 fps ASO or FMO not supported |
| MPEG-4/JPEG Codec | MPEG-4 supporting Simple Profile level 0 ~ 3, encoder up to D1, 60 fps and decoder up to D1, 60 fps<br>JPEG is compliant with ISO/IEC 10918-1 baseline standard. |
| Video Capture | Supports 2 ITU 656 interfaces - YUV 4:2:2 and 16-bit YUV interface<br>Resolution: Up to 1280 x 1024<br>Supports noise reduction, color OSD and input scalar |
| Display Interface | ITU-656 8-bit video output, up to 720 x 480 or 720 x 576<br>8-/24-bit RGB interface, supporting TFT color display up to 1024 x 768<br>OSD with 256 programmable 12 x 16 fonts |
| PCI Interface | Compliant with PCI 2.2, up to 66 MHz*<br>Supports 2-slot PCI masters in the PCI host/device modes |
| AES/DES/3DES Cipher Controller | Hardware implementation of AES/DES/3DES algorithm with DMA functions |
| AHB Peripherals | 802.3 MAC, USB 2.0 OTG, ATA-133 IDE |
| APB Peripherals | SD 1.0/MMC 4.0 controller, timer, WDT, RTC, INTC, GPIO (16-pin), I²C, PMU, I²S, UART |
| Operating Voltage | 1.2 V (core), 2.5 V (DDR DRAM I/O) and 3.3 V (I/O) |
| Process | UMC 0.13 µm logic process |
| Package | 484-pin EDHSBGA (23 x 23 mm² ) |

*Supports on-board trace*

## GM8180 Linux SDK

- **ARM Linux 2.6.14**
- **Peripheral device drivers**
- **Protocol stacks**
  - DNS, DDNS, DHCP, HTTP, PPPoE, SMTP, FTP, TFTP, NTP, NFS client servers
- **Video streaming applications**
  - Video decoder - ffplay
  - Video encoder - ffmpeg
- **Web server**
  GM Linux SDK provides an easy development software package to accelerate image-, video- and audio-related streaming applications, such as video servers, IP cams or IPTV stations.

## GM Streaming Media (GSM)

- **GSM Server (Streaming Server, Control Server and Web Server)**
  - Supports RTSP, RTP and 3GP
  - Supports H.264/MPEG-4/JPEG/ADPCM/MP2/AMR-NB audio compression formats up to quarter streaming

- **GSM Client Player (GMPlayer and GMSurviewer)**
  - Supports RTSP, RTP and 3GP
  - Supports H.264/MPEG-4/JPEG/ADPCM/MP2/AMR-NB audio compression formats
  - Supports 1-/4-/9-/16-channel viewer (reference design)

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## Platform Evaluation Kit

● **Basic Parts**
  - GM8180 main board for video streaming applications
  - Accessories Board:
    - GM8180 GHDK V0: IPTV7137 Board and MT9M131.3Mpixel CMOS sensor
    - GM8180 GHDK V1: AV Codec Board and OV7720 VGA CMOS sensor
  - RS-232 cable for debugging console
  - Power supply adapter
  - GM8180 Linux SDK including drivers and BSP

● **Extension Parts**
  - OPENice (Provided by Aiji)
  - LCD module

## Availability & Pricing

- GM8180 EVB is available, priced at US$ 5,000.
- GM8180 is manufactured using UMC's 0.13 μm process for mass production.

## GM8180 Starter Kit

- PCI video encoder/decoder adaptors
- 4-channel video server
- Mega-pixel IP cam



*GM8180  Evaluation Board*

## GM8 Family Selection Table

| Part # | Speed | H.264 | MPEG-4/ JPEG | PCI | IDE | Parallel RGB | CCIR656 | UART | Package |
|---|---|---|---|---|---|---|---|---|---|
| GM8160SF-BD | 300 MHz | Enc/60 fps/D1, Dec/60 fps/D1 | V[A] | Dual mode | V | 24-bit | In*2, I/O*1 | x5[B] | BGA-484 |
| GM8180SF-BD | 333 MHz | Enc/75 fps/D1, Dec/60 fps/D1 | V[A] | Dual mode | V | 24-bit | In*2, I/O*1 | x5[B] | BGA-484 |
| GM8180SS-BD | 500 MHz | Enc/75 fps/D1, Dec/60 fps/D1 | V[A] | Dual mode | V | 24-bit | In*2, I/O*1 | x5[B] | BGA-484 |

Notes:  A. The performance of MPEG-4/JPEG is D1/30 fps encoder and decoder full duplex.
        B.  Support one UART and one full-functional UART

*The information provided here may be changed without further notice. Please contact GM sales for the latest update.*

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