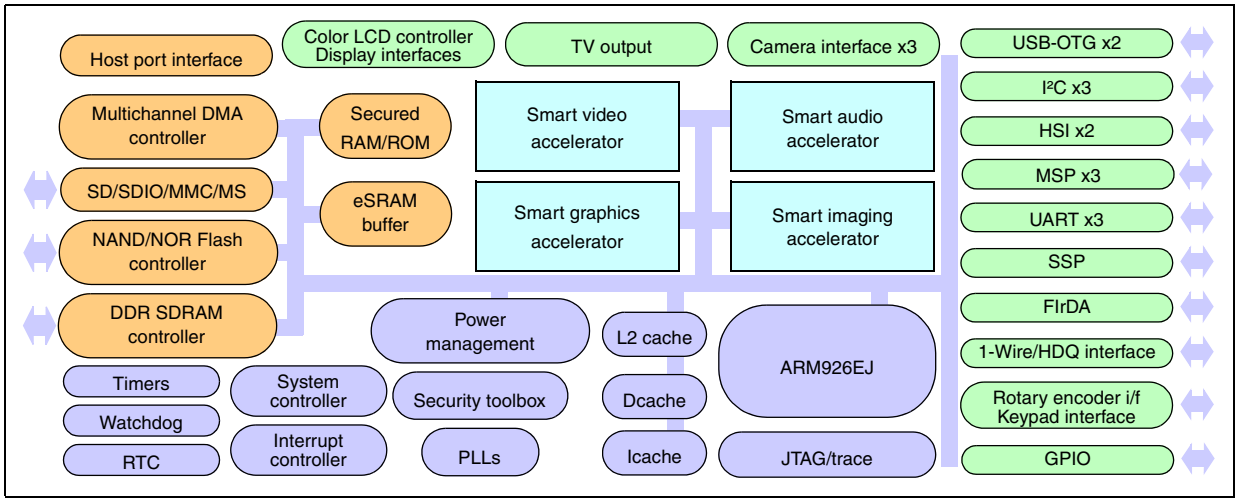
STn8815

Nomadik mobile multimedia application processor

Data Brief

Nomadik is a registered trademark of STMicroelectronics

- Smart video accelerator
  - MPEG-4 SP real-time encoding/decoding up to SDTV 30 fps
  - H.264/AVC real-time decoding up to VGA 30 fps and encoding up to VGA 15 fps
  - JPEG encode up to 30 Mpixel/s,
  - Ultra low-power implementation
- Smart audio accelerator
  - Extensive digital-audio software library
  - Ultra low-power implementation
- Smart imaging accelerator
  - 2 SMIA CCP2 camera interfaces
  - Parallel camera CCIR-656 interface
  - Real-time image reconstruction up to 80 Mpixel/s
  - 10-bit raw Bayer interface
  - Ultra low-power implementation
- Smart graphics accelerator
- Advanced power management unit
  - Run, idle, doze and sleep modes
  - CPU clock with programmable frequency
  - Enhanced dynamic power-domain management
  - Dynamic voltage scaling
- TV output
- ARM926EJ® 32-bit RISC CPU, up to 334 MHz
  - 16-Kbyte instruction cache, 16-Kbyte data cache
  - 128-Kbyte level 2 cache
  - 3 instruction sets: 32-bit for high performance, 16-bit (Thumb) for efficient code density, byte Java mode (Jazelle™) for direct execution of Java code
  - Embedded medium trace module (ETM Medium+)
- On-chip SRAM and ROM
- Advanced security
  - Enhanced security framework
  - Protected access to secured ROM and RAM
- 16-bit DDR/SDR-SDRAM memory controller (up to 166 MHz)
- NOR Flash/NAND Flash/CompactFlash/CF+ controller
- High-speed MMC/SD Card/SDIO/Memory Stick Pro host controller
- Color LCD controller for STN or TFT panels or display interface for display module
  - 24-bpp true color
  - MIPI™ legacy DBI and DPI



- Two high speed USB 2.0 On-The-Go controller interfaces
  - ULPI v1.1 compliance
  - ULPI DDR support
- Host port interface
- I/O peripherals
  - 3 autobaud UARTs
  - IrDA (SIR/MIR/FIR) interface
  - Synchronous serial port (SSP)
  - 3 multichannel serial ports (MSP)
  - 3 I²C master/slave interfaces
  - Two 8-channel, full-duplex high-speed serial interfaces (MIPI legacy HSI)
  - Rotary encoder interface; keypad matrix interface
  - 1-Wire®/HDQ interface [(a)]
- General-purpose I/Os (muxed with peripheral I/Os)
- System and peripheral controller
  - Multichannel DMA controller
  - 64-source interrupt controller
  - Timers/counters
- Programmable PLL for CPU and system clocks
- Two crystal oscillators:
  32 kHz and 13/19.2 MHz
- JTAG IEEE 1149.1 boundary scan
- 14 x 14 mm package for stacked and package-on-package versions
- Pin-to-pin compatible with STn8810

a. 1-Wire is a registered trademark of Dallas Semiconductor.

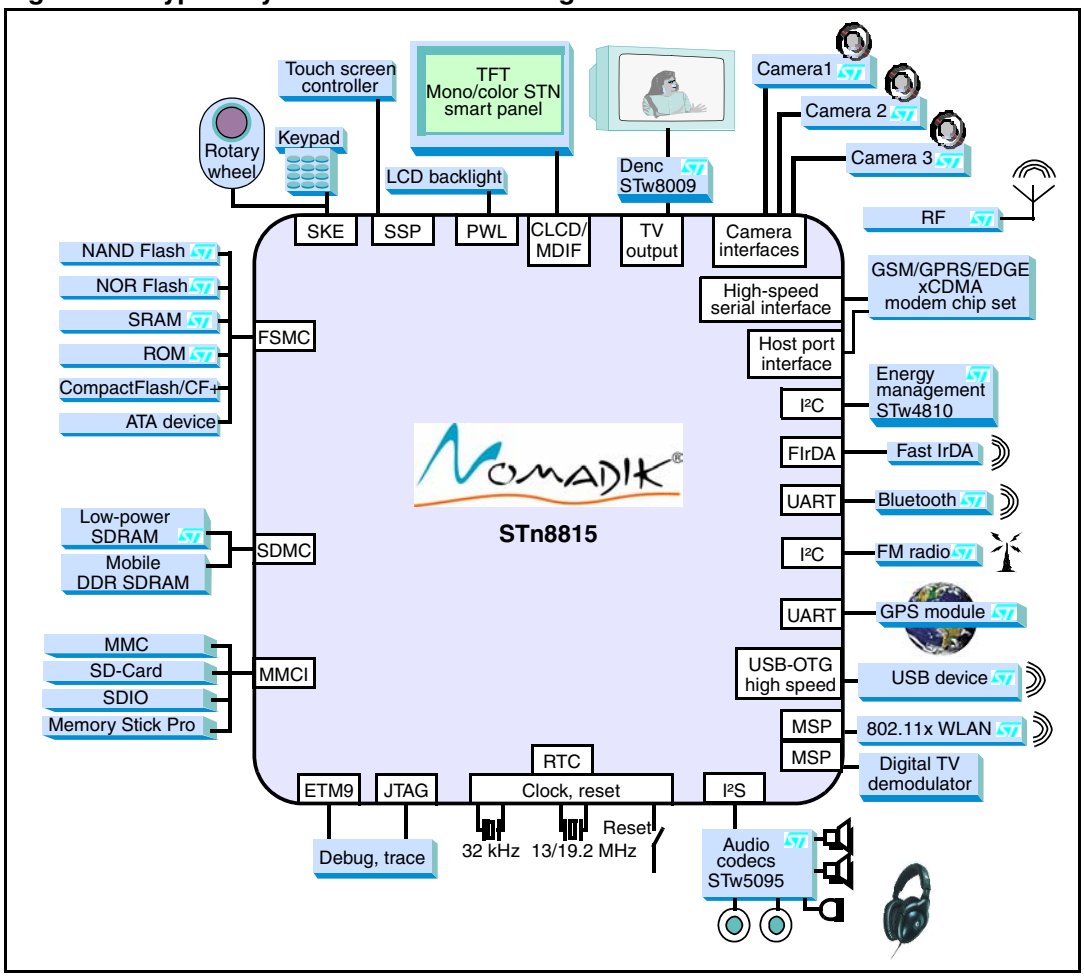
STn8815 overview

The convergence of computing, multimedia and mobile communications is well underway. Already the familiar voice phone is being transformed into a personal device with a wide range of multimedia capabilities. Soon mobile users will be able to benefit from a broad spectrum of multimedia features and services, to include capturing, sending and receiving images, videos and music. To deliver such data-heavy, processing-intensive services, portable handheld systems must be optimized for high performance but low power, space and cost.

In response to this need, the STn8815 processor platform from STMicroelectronics is a culmination of breakthroughs in video coding efficiency, inventive algorithms and chip implementation schemes. It will enable smart phones, wireless PDAs, internet appliances and car entertainment systems to play back media content, record pictures and video clips, and perform bidirectional audio-visual communication with other systems in real time.

The STn8815 focuses on the essential features to meet the future needs of mobile products and services: a high-performance multimedia capability coupled with low power consumption, and based on an open platform strategy.

Figure 1. Typical system architecture using the STn8815



Key benefits

The STn8815 brings the following key benefits to mobile manufacturers and consumers:

- Unsurpassed audio, video and imaging quality,
- Ultra-low power consumption for longer battery operation,
- Easier application development for shorter time-to-market,
- Scalability for multiple market segments and future multimedia applications.

Main features

The STn8815 processor platform enables compelling multimedia applications by means of its unique distributed-processing architecture.

The application processor features low-power smart accelerators which handle all audio, video and graphics functions. These free the main CPU for control and program flow tasks, or allow the CPU to enter power-saving modes to prolong battery life. The smart accelerators operate independently and concurrently to ensure the lowest absolute system power and deterministic high-performance.

The main features of the platform are:

- A smart video accelerator for SDTV video encoding and decoding, with MIPI and SMIA camera interfaces.
- A smart audio accelerator containing a comprehensive set of digital audio decoders and encoders, and offering a large number of 3-D surround effects.
- A smart imaging accelerator, providing real-time, programmable image reconstruction engine.
- A smart graphics accelerator.
- A dynamic, multi-mode power management unit.
- The ARM926EJ processor, a powerful industry-standard CPU with Java acceleration.
- On-chip ROM and SRAM memory devices, including a 3-Mbit frame buffer.
- Security framework for enhanced mobile security, including stronger DRM.
- Multichannel DMA controller for efficient data transfer without CPU intervention.
- A multi-layer AMBA crossbar interconnect for optimized data transfers between the CPU, accelerators, memory devices and peripherals.
- Hardware semaphores for flexible inter-process management.
- A wide range of peripheral interfaces (GPIO, USB-OTG high speed, UART, I²C, FIrDA, SD/SDIO/high-speed MMC/Memory Stick Pro, fast serial ports, TV output, color LCD and camera interfaces, scroll-key encoder, key-pad scanner).
- Direct support for high-level operating system such as Symbian™, Linux and WinCE® operating systems (OSs).

Low power consumption

The new multimedia functionality of mobile products brings with it an increase in power consumption that is outpacing advances in battery technology. The STn8815 chip saves on power by avoiding the need for high clock speeds wherever possible, but its extremely low power consumption results from a systematic effort at all design levels to reduce power requirements. These include:

- The use of smart accelerators and distributed processing to off load from the CPU,
- Efficient code execution by means of innovative algorithms, energy-efficient instruction set architectures and Java acceleration,
- The efficient use of bandwidth for on-chip data transport, achieved by data compression, buffering and image scaling,
- Aggressive power management which includes turning off inactive parts of the chip and keeping the CPU in power-saving modes as much as possible.

Open platform strategy

STMicroelectronics is a founding member of the MIPI™ Alliance working towards mobile software and hardware interface standards.

Our open platform strategy provides manufacturers with roadmap flexibility, allowing them to avoid becoming locked into a proprietary CPU architecture or vendor technology. This approach is facilitated by the following design points.

- The STn8815 employs the third-party ARM® processor which is the standard CPU for mobile devices, with industry-wide application support.
- Open, standard APIs are provided for the development of application code on a level which is abstracted from the physical hardware. This allows the development of multimedia plug-ins that are portable between products and which can be reused on future products without modification.
- The STn8815 facilitates best-in-class algorithm development on its smart accelerators.
- The STn8815 is provided with development kits and tools that speed-up the integration of new operating systems, middleware, and signal processing algorithms.

Stacked memory options

The STn8815S12 and STn8815S22 build on the STn8815 by stacking their respective amounts of both SDRAM and Flash memories in pin-compatible packages, a technology that STMicroelectronics has mastered for commercial use. In addition to saving space, the footprint of the stacked chips is the same as that for the STn8815, a critical factor for today's compact clamshell designs. These stacked versions give manufacturers unprecedented flexibility on the production line.

The stacked versions promise lower product costs, added system security, faster data throughput, and future performance enhancements.

Revision history

Table 1. Document revision history

Date	Revision	Changes
9-Feb-2006	1	Initial release.

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