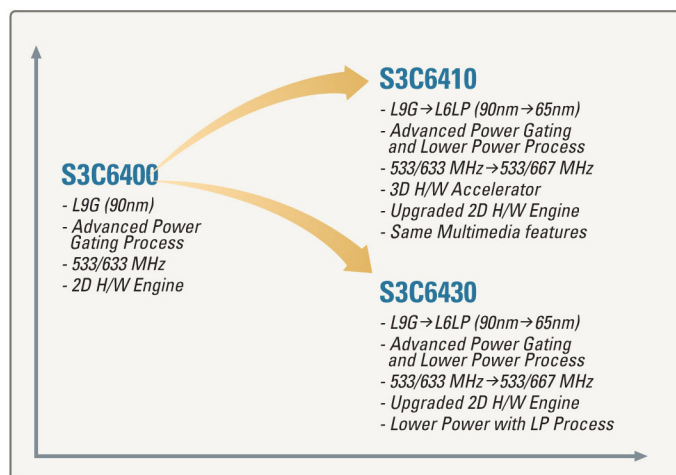# Samsung S3C6410

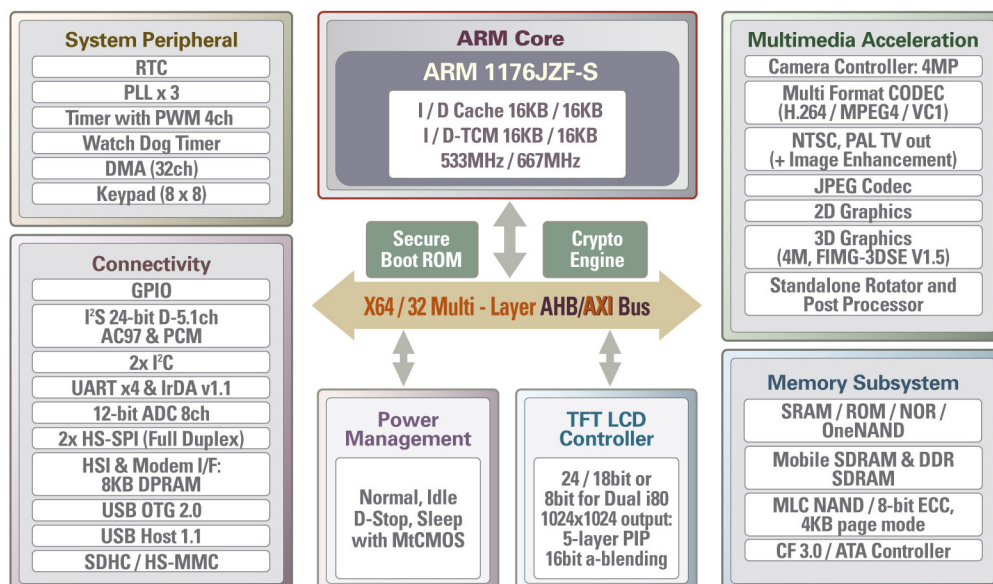## ARM 1176-based Mobile Application Processor

## Product Brief

From smartphones to personal navigation devices, the Samsung ARM 1176-based S3C6410 Mobile Application Processor supports the requirements of a broad array of applications. The S3C6410 is both pin and software compatible with other members of its family - the S3C6400 and S3C6430 application processors. Taking advantage of the performance scalability of these processor platforms, the S3C6410 offers advanced mobile design capabilities with a fast time-to-market by replacing either existing application processor and reusing the hardware and software design resources already invested.

## The S3C6410 Roadmap

**S3C6410**
- L9G→L6LP (90nm→65nm)
- Advanced Power Gating and Lower Power Process
- 533/633 MHz→533/667 MHz
- 3D H/W Accelerator
- Upgraded 2D H/W Engine
- Same Multimedia features

**S3C6400**
- L9G (90nm)
- Advanced Power Gating Process
- 533/633 MHz
- 2D H/W Engine

**S3C6430**
- L9G→L6LP (90nm→65nm)
- Advanced Power Gating and Lower Power Process
- 533/633 MHz→533/667 MHz
- Upgraded 2D H/W Engine
- Lower Power with LP Process

The high-end (S3C6410) application processor differs from the mid-end (S3C6400) and cost-effective (S3C6430) processors both in terms of performance and cost.

## S3C6410 Block Diagram

### System Peripheral
- RTC
- PLL x 3
- Timer with PWM 4ch
- Watch Dog Timer
- DMA (32ch)
- Keypad (8 x 8)

### Connectivity
- GPIO
- I²S 24-bit D-5.1ch AC97 & PCM
- 2x I²C
- UART x4 & IrDA v1.1
- 12-bit ADC 8ch
- 2x HS-SPI (Full Duplex)
- HSI & Modem I/F: 8KB DPRAM
- USB OTG 2.0
- USB Host 1.1
- SDHC / HS-MMC

### ARM Core
**ARM 1176JZF-S**
- I / D Cache 16KB / 16KB
- I / D-TCM 16KB / 16KB
- 533MHz / 667MHz

Secure Boot ROM

Crypto Engine

X64 / 32 Multi - Layer AHB/AXI Bus

### Power Management
Normal, Idle D-Stop, Sleep with MtCMOS

### TFT LCD Controller
24 / 18bit or 8bit for Dual i80 1024x1024 output: 5-layer PIP 16bit a-blending

### Multimedia Acceleration
- Camera Controller: 4MP
- Multi Format CODEC (H.264 / MPEG4 / VC1)
- NTSC, PAL TV out (+ Image Enhancement)
- JPEG Codec
- 2D Graphics
- 3D Graphics (4M, FIMG-3DSE V1.5)
- Standalone Rotator and Post Processor

### Memory Subsystem
- SRAM / ROM / NOR / OneNAND
- Mobile SDRAM & DDR SDRAM
- MLC NAND / 8-bit ECC, 4KB page mode
- CF 3.0 / ATA Controller

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# Samsung S3C6410
## ARM 1176-based Mobile Application Processor

## 3D Hardware Accelerator enables faster graphics performance at lower power consumption

Application processors introduced before the Samsung S3C6410 did not leverage the full capabilities of 3D hardware accelerators. The S3C6410 processor features a built-in, state-of-the-art 3D, 4M triangles/sec hardware accelerator with OpenGL ES 1.1/ 2.0 and D3DM API support. Products incorporating this hardware accelerator in the S3C6410 enjoy the following advantages:

• 3D graphics performance unmatched by software-only implementations
• Reduced board space, since no external 3D graphics hardware is required
• Better load balancing by relieving the CPU from cycle intensive 3D graphics functions
• Lower power consumption due to optimized and dedicated hardware, resulting in longer battery life

## Additional S3C6410 Advantages

High-quality video playback is fast becoming a must-have feature for smartphones, portable media players, GPS navigation units, and TV-enabled mobile devices. The S3C6410 provides a cost-effective, low power, high-performance solution for portable designs:

• **Built-in hardware and Multi-Format Codec to enhance the multimedia experience:** Supports Standard Definition (SD) level encoding/decoding of multiple content formats including MPEG4, H.263, H.264 and VC1, for real-time video conferencing and TV-out.

• **Optimized interface for high memory bandwidth requirements:** Memory system has dual DRAM and Flash/ROM external memory ports for parallel access. The Flash/ROM ports support NAND Flash, NOR-Flash, OneNAND and ROM type external memory. The DRAM port can be configured to support mobile DDR or standard SDRAM.

• **Software support to reduce application design time:** Existing applications on Samsung application processor families can be ported to S3C6410 application processors with minimal changes to the BSP. An evaluation board, allowing different operating system support (such as for Windows CE, Windows Mobile, Linux, and Symbian), is provided to reduce application design time.

• **Rich peripherals to reduce total system cost and enhance overall functionality:** Examples include an 8-bit ITU camera interface of up to 4M pixel (for scaled) and 16M pixel (for unscaled) resolutions; a TFT 24-bit true color LCD controller; a System Manager (for power management); an On-chip USB 2.0 OTG operating at high speed (480 Mbps), etc.

• **Memory stacking options for smaller footprints:** The S3C6410 can be combined with various memory choices via Package-on-Package (POP) or Multiple-Chip-Package (MCP), which results in higher design flexibility as well as reductions in Bill of Material (BoM) costs, power consumption and board space.

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