# MiMagic 3 Application Processor

## Product Highlights

**The MiMagic 3 (NMS7210) Applications Processor provides:**

• **High System Performance** 110 MHz 32-bit ARM V4T compliant RISC processor (ARM720T) with two independent bus architecture (32-bit Static Memory bus and 16-bit SDRAM bus) providing separate interfaces for simultaneous access to program store and system memory eliminating shared bandwidth bottleneck. Split bus enables XIP feature, optimizing system performance. Dynamically assignable DMA controller

• **Very Low System Power Consumption** Low power 0.18 µm 1.8 V process. SDRAM interface operates at 1.8 V or 3.3 V; 80 KB of internal SRAM buffer for display refresh without external memory access; frequently used code (e.g. MP3 Software decode) or data (e.g. MPEG-4 decoded intermediate data) can be stored in the SRAM buffer to minimize external memory fetches during program executions. Multiple power down modes including run mode at programmable frequencies, idle and standby. For Standby mode, both CPU and system bus clocks are shut off with LCD display either on or off

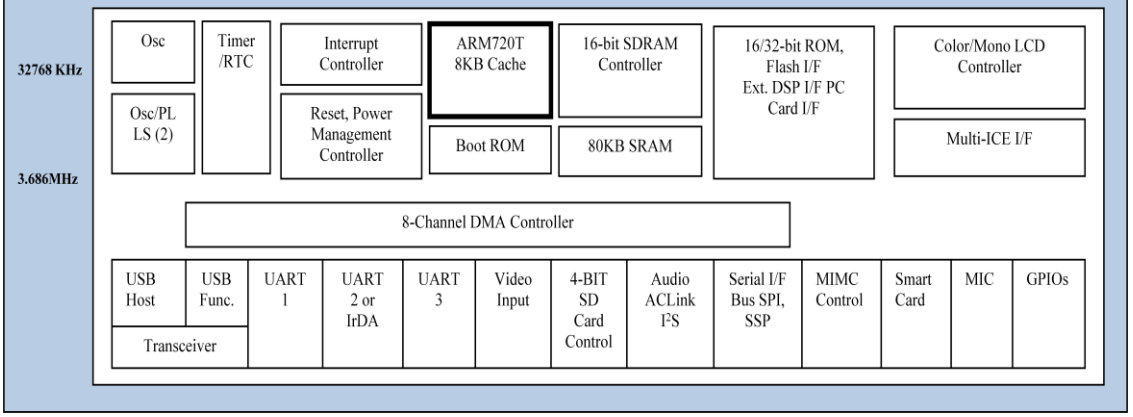
• **Multimedia** High speed DMA-backed Video Port

• **Wireless connectivity** Support for Bluetooth, IrDA and Baseband through serial (UARTs, USB, SPI) interfaces

• **Multiple Boot Options** Flash, UART, Multimedia Card, and serial EPROM. These options are useful in product development, production or for field software upgrade

• **Low System Cost through High Integration** Supports low-cost NAND Flash. Rich set of on-chip peripherals including color LCD controller, SD Card, Multimedia Card, USB Host and Function (including USB transceiver), serial I/O, and audio I/O resulting in lower Bill of Materials and very small footprint (11x11x1.0 mm)

**MIMAGIC 3 INTERNAL BLOCK DIAGRAM**




## MiMagic™ 3 (NMS7210) Specifications

**High Performance, Low Power ARM720T CPU**
• 32-bit ARM V4T instruction set with 16-bit extensions (THUMB)
• 8 KB four-way set-associative unified cache
• MMU with 64 entry TLB
• Up to 110 MHz in Asynchronous Mode
**Dual Memory Subsystem**
• Dynamic/Static Memory Control
• SDRAM for high performance systems
− Two physical banks of up to 16 MB each
− 2 or 4 internal banks per SDRAM device
− Supports 16 bit wide 1.8-3.3 V SDRAM at speeds up to 74 MHz
− Separate data path for LCD refresh activities
• Static Memory Control
− 16/32 bit wide data path for SRAM, Flash (NOR and NAND), ROM and External I/O
− Five memory segments of up to 64 MB each
− Each segment configurable as 16/32 bits
− Programmable access time
• PC Card /Compact Flash
− Interface to PC Card/Compact Flash through NeoMagic NMC1121
80 KB On Chip SRAM
• On-Chip LCD frame buffer: reduces power and memory bandwidth requirements
• On-Chip program/data storage to speed up program execution
**Display Subsystem**
• Color/Mono LCD Controller
− 640 x 480 STN/DSTN or TFT
− Supports up to 16 bpp (64 k colors)
**Video Support**
• High speed data port, 16 MBytes/s with DMA (video port) SD Card Controller (24 MHz)
• MMC Compatible
**MMC Card Controller**
**Smart Card interface**
**Audio Interface with DMA**
• AC97 Interface (V 2.1)
− Stereo Audio support
− Variable Sample rate, 16-Bit
− Modem support
• I²S Serial Interface
− Stereo Audio support, 16-Bit
**USB Host (USB 1.1)**
• Host interface at 1.5 and 12 Mbps
• On-chip transceiver option
• DMA support
**USB Function (USB 1.1)**
• Function interface 12 Mbps
• Control, bulk in/out and interrupt transfer modes
• On-chip transceiver option

**Serial Communication Subsystem**
**• 3 DMA backed UARTs, up to 460 Kbps**
− One with modem control signals
− Support for Bluetooth rates
**• IrDA 115 Kbps, 1.152 Mbps and 4 Mbps**
**Serial Interface Bus with DMA**
**• Philips UCB1200 Interface (telephone codec, touch-screen interface, audio codec)**
**Synchronous Serial Ports with DMA**
• SPI/ Micro wire interface with Master/Slave modes, runs up to 9.2 MHz
**Power Management Control**
• Run/Idle/Standby Modes
• Software controlled state transitions
• Supports low power SDRAM chips (1.8 V Core/IO)
• Built-in 80 KB low power SRAM for LCD frame buffer to reduce power consumption
• Dynamic Frequency Switching
18/ 36/ 74 MHz in synchronous CPU mode, 110 MHz Async Mode
**System Control**
• Two 16 bit timer/counters
• Interrupts
− 3 external IRQ lines
− 1 external FIQ lines
• Programmable buzzer output
• 32-bit real time clock (RTC)
• Up to 77 GPIOs
• 8 DMA Channels
• Tri-State Outputs and I/O allow high impedance test mode
**On-Chip Debug and ICE support**
• JTAG for Multi ICE interface
**1 KB On-chip Boot ROM**
• Boot through Multi Media Card, UART or MIIC
• Sequence programmable by bootstrap options
**Small Package**
• BGA package 280-pin 0.8 mm ball pitch
− Body size 16 x 16 mm, 1.2 mm high
• TABGA package 280-pin 0.5 mm ball pitch
− Body size 11 x 11 mm, 1.0 mm high
**Operating Range**
• 1.8V ± 5% core; 3.3V ± 10% I/O
• Commercial/Industrial Temperature Support
**Estimated Typical Power Consumption**
• Run : 90 mW at 74 MHz, 1.8V
• Run : 120 mW at 110 MHz, 1.8V, CPU Async Mode
• Idle : 35 mW
• Standby : 0.6 mW

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# MiMagic 3 Application Processor

**NeoMagic Products:**

SOC Application Processors:

MiMagic 3
MiMagic 6+
MiMagic 8

Arm Microcontroller:

ARM 720T
ARM 926EJ

## MiMagic Family

NeoMagic's solutions include NeoMagic's family of SOC processors and software you need to produce your device quickly- from OS, drivers and APIs, to applications. Our low power consumption solutions were designed to reduce our OEM's development cycles, while offering them cost effective, high performance, and highly flexible SOC technology.

NeoMagic provides complete development and manufacturing kits to enable OEMS to develop their own unique devices. Our kits use NeoMagic's powerful MiMagic family system-on-chip (SOC) technology at its core and come with complete hardware and software to round out our total solution. OEMs have utilized our kits to develop a diverse line of products; MP3 players, countertop/mobile POS systems, vehicle toll collection, IP camera and mobile phones.

### MiMagic 3 Development Systems

The MiMagic 3 Development System is available to evaluate MiMagic 3 Applications Processor and for rapid software development. It provides time-to market advantage and lower development costs. The MiMagic 3 Development System provides full access to all of the major features and interfaces of the MiMagic 3 Applications Processor. It includes 32 MB SDRAM, up to 32 MB Flash, debug UARTs, Ethernet port, MultiMedia Card / SD Card socket, PC Card socket, USB Host, USB Function, AC97 Stereo module, and LCD panels, among others. The Development System software includes APIs, sample codes, and comes with a choice of operating systems – Microsoft Windows CE, Symbian and Linux. It comes with full documentation including MiMagic 3 user's manuals and application notes. The development toolkit such as compilers, assemblers, linkers, and debuggers is available from ARM Ltd. In addition, NeoMagic makes available a PDA reference design based on MiMagic 3 Applications Processor that combines a form-factor plug-in board with a debug board. The form-factor board implements 16 MB Flash, 32 MB SDRAM, SD Card, and SIM Card. The debug board contains complete debug facilities including logic analyzer probes, Ethernet, debug UART, and LEDs, etc.

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About NeoMagic
NeoMagic designs and delivers consumer electronic device solutions with semiconductors and software offering exciting new product functionality for Video, TV, Imaging, Graphics, and Audio. We provide low cost, innovative multimedia chip technology for tomorrow's entertainment and communication needs. Our capabilities give our partners and their customer's high quality answers to excite and enhance the consumer's lifestyle.

Our focus on Vision and Sound is enhanced through our commitment to quality, paired with our unique architecture and experience developed over the life of the company. Working with multiple operating systems, customized drivers, and ready-to-go Manufacturing Kits allow our partners quick entrance to consumer markets with enhanced feature sets enabling a clear differentiation for their customers and the consumer.



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