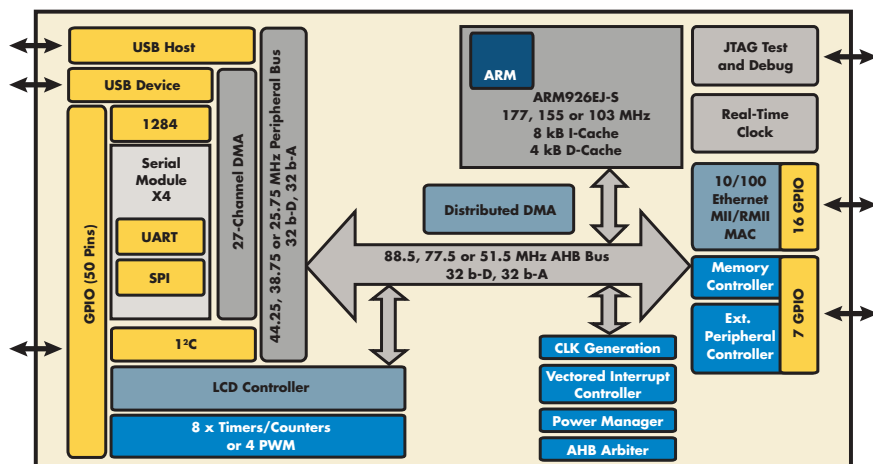


NetSilicon® NS9360

NET+ARM Processors

NS9360

272-Pin BGA, Lead-Free, RoHS Compliant



- 32-bit, 177, 155, 103 MHz NET+ARM processor
- 0.13 μ m CMOS process
- 10/100Base-T Ethernet
- Extensive on-chip peripherals
- Comprehensive networking software



Features/Benefits

- > High performance 32-bit processor with rich set of peripherals
- > 177 MHz ARM9 core (ARM926EJ-S)
- > Harvard architecture with 8 kB/4 kB instruction/data cache
- > DSP instruction set extensions
- > Jazelle® Java byte-code accelerator
- > Full-duplex 10/100Base-T Ethernet MAC
- > 88.5 MHz memory/peripherals controller
- > AM and PM color and monochrome LCD controller
- > USB 2.0 Full-Speed OHCI host and 13-EP device
- > Four multi-function serial ports; UART or SPI (master or slave)
- > I²C port (master or slave)
- > Programmable timers/counters/PWM
- > 73 General Purpose I/O (GPIO) pins
- > Highly configurable power management
- > Supported by the comprehensive and integrated NET+Works development suite
- > Complete Windows CE 5.0 Board Support Package (BSP) available
- > Royalty-free Linux 2.6 kernel distribution available (LxNETES)

Overview

The NetSilicon NS9360 is the third ARM9 processor in our award-winning family of NET+ARM 32-bit processors. It is targeted at network-enabling embedded electronic equipment that requires a rich set of peripherals. The NS9360 provides full duplex 10/100Base-T Ethernet functionality with additional processing performance and bandwidth to handle sophisticated embedded applications.

The NS9360 is based on the ARM926EJ-S, ARM's most powerful ARM9 core, which contains both DSP and Java byte code instructions. It operates at up to 177 MHz and contains a broad set of industry standard peripherals, including 10/100Base-T Ethernet, USB, I²C, 1284, serial ports and a highly configurable LCD controller.

Like all of our processors, the NS9360 is supported by the royalty-free NET+Works® software development tool suite. The integrated NET+Works package contains either Green Hills® MULTI® or Microcross GNU X-Tools™, MAJIC™ debugger, Express Logic's ThreadX® real-time operating system, a TCP/IP stack, networking applications, software, utilities and numerous networking applications examples. Support and Development kits for Linux and Microsoft® Windows® CE are also available.

Please contact us at 1-877-OEM-DIGI or 952-912-3444 for additional information or to discuss your specific application requirements.


www.digi.com

Making
DEVICE NETWORKING
easy™

Hardware Specifications

32-BIT ARM926EJ-S RISC PROCESSOR

- 103, 155, 177 MHz
- 5-stage pipeline
- Harvard architecture
- 8 kB I-cache and 4 kB D-cache
- 32-bit ARM and 16-bit Thumb instruction sets, can be mixed for performance/code density tradeoffs
- MMU to support virtual memory based OS's such as Linux, WinCE/Pocket PC, VxWorks, etc.
- DSP instruction extensions: improved divide, single cycle multiply accumulate
- ARM Jazelle, 1060 CM (Caffeine Marks) Java Accelerator
- Embedded ICE-RT debug unit
- JTAG boundary scan support
- Clock-gated processor for decreased power dissipation

EXTERNAL SYSTEM BUS INTERFACE

- 32-bit data bus, 28-bit external address bus
- Glueless interface to SDRAM, SRAM, EEPROM, buffered DIMM, Flash
- Up to 256 MB SDRAM, up to 2 GB DIMM
- 4 static and 4 dynamic chip selects
- 0-63 wait states per chip select
- Self-refresh during system sleep
- Automatic dynamic bus sizing to 8-bits, 16-bits, 32-bits
- Burst-mode support with automatic data width adjustment
- 2 external DMA channels for external peripheral support

SYSTEM BOOT

- High-speed boot from 8-bit, 16-bit, or 32-bit ROM or Flash
- Hardware-supported low cost boot from serial EEPROM through SPI port (patent pending)

OPTIMIZED 10/100 ETHERNET MAC

- MII or RMII PHY interfaces
- Full or half duplex
- Station, broadcast, multicast address filtering
- 2 kB Rx FIFO
- 256 B Tx FIFO with on-chip buffer descriptor ring (eliminates underruns and decreases bus traffic)
- Separate Tx and Rx DMA channels
- Intelligent receive-side buffer size selection
- Support for full statistics gathering
- Support for external CAM filtering

FLEXIBLE LCD CONTROLLER

- Supports commercially available displays up to SVGA
- Active-matrix color TFT displays
- Up to 18 bpp; 256K colors
- Single and dual-panel color passive-matrix displays
 - Up to 16 bpp 4:4:4 RGB; 3375 colors
- Single and dual-panel monochrome STN displays
- 1, 2, 4 bpp palletized grayscale
- Formats image data and generates timing control signals
- Internal programmable palette-LUT and grayscale support different color techniques
- Programmable panel-clock frequency

USB PORTS

- USB v.2.0 Full Speed (12 Mbps) and low speed (1.5 Mbps)
- OHCI host and 11 end points device
- Single PHY can be used with either host or device
- Interface to external PHY for simultaneous host and device operation
- USB host is a bus master
- Each USB device endpoint is supported by a dedicated DMA channel, 13 total
- 20 B Rx FIFO and 20 B Tx FIFO

SERIAL PORTS

- 4 serial modules, each independently configurable to UART mode, SPI master mode, or SPI slave mode
- Bit rates from 75 bps to 1.8 Mbps: asynchronous x8 mode
- Max bit rates for synchronous mode are:
 - 1/16 CPU speed for SPI master
 - 1/32 CPU speed for SPI slave
- UART provides:
 - High-performance hardware and software flow control
 - Odd, even, or no parity
 - 5, 6, 7 or 8 bits
 - 1 or 2 stop bits
 - Receive-side character and buffer gap timers
- Internal or external clock support for synchronous mode
- 4 receive-side data match detectors
- 2 dedicated DMA channels per module, 8 total
- 32 B Tx FIFO and 32 B Rx FIFO per module

I²C PORT

- I²C v.1.0, configurable to master or slave mode
- Bit rates: fast (400 kHz) or normal (100 kHz) with clock stretching
- 7-bit and 10-bit address modes

1284 PARALLEL PERIPHERAL-TO-HOST PORT

- All standard modes:
 - ECP, Byte, Nibble, Compatibility
- RLE (Run Length Encoding) decoding of compressed data in ECP mode
- Operating clock from 100 kHz to 2 MHz
- 4 dedicated DMA channels
 - 2 for data and 2 for control
- Microsoft Plug-and-Play, no Windows driver needed

Hardware Specifications

SYSTEM BUS DMA

- Every system bus peripheral is a bus master with dedicated DMA engine
- Deterministic bus bandwidth allocation (patent pending)

SYSTEM TIMERS

- Watchdog timer
- System bus monitor timer
- Peripheral bus monitor timer

CLOCK GENERATOR

- Low cost external crystal
- Internal Phase-Locked Loop (PLL)
- Software programmable PLL parameters
- Optional external oscillator
- Separate oscillator for USB

EXTERNAL PERIPHERAL DMA

- 2-channel DMA engine
- Supports memory-to-memory transfers

GENERAL PURPOSE I/O

- 73 programmable GPIO pins (muxed with other functions)
 - Includes 7 high-current (8 mA) GPIO pins
- Software-readable power-up status registers for customer-defined bootstrapping

OPERATING VOLTAGE

- Core: 1.5V \pm 0.1V
- I/O ring: 3.3V \pm 10%

POWER MANAGEMENT

- Power save during normal operation
- Disables unused modules
- Power save during sleep mode
 - Sets SDRAM to self-refresh mode
 - Individually disables every module except selected wakeup modules
 - Wakeup on valid packets or characters
- Patent pending technology

EXTERNAL INTERRUPTS

- 4 external programmable interrupts
 - Rising- or falling-edge sensitive
 - Low- or high-level sensitive

OPERATING FREQUENCY

- 103 MHz: 0° C to 70° C
- 155 MHz: -40° C to 85° C
- 177 MHz: 0° C to 70° C

VECTORED INTERRUPT CONTROLLER

- Holds pointers to all interrupt service routines for rapid service
- Services all peripherals
- Hardware interrupt prioritization

REAL TIME CLOCK

- Time of day clock
- Alarm
- 100 year calendar
- Programmable periodic interrupt
- 10 ms resolution
- Dedicated time domain in the system PLL
 - RTC-only mode available
- Initial time from network through SNTP routine
 - No battery backup
- Additional benefits
 - Frees CPU from math calculations
 - Decreased response time for queries

POWER CONSUMPTION

- 177 MHz: 0.64 W
- 155 MHz: 0.59 W
- 103 MHz: 0.52 W

GENERAL PURPOSE TIMERS/CONTROLLERS/PWM

- 8 independent 16- or 32-bit programmable timers, counters, or 4 PWM functions
- Each has an I/O pin
- Mode selectable into:
 - Internal timer mode*
 - External gated timer mode
 - External event counter
 - PWM
- Timers/counters can be concatenated
- Minute-range events measurable
- Source clock selectable
- Internal clock or external pulse event
- Individually enabled/disabled

MICROSOFT® WINDOWS® CE SUPPORT

- Complete Windows CE 5.0 Board Support Package (BSP)
- Custom-developed drivers to support peripherals, modules and Development Kits
- Exclusive software to provide debugging channel via Ethernet connection

LINUX SUPPORT (LXNETES)

- Based on Linux 2.6.x kernel
- Complete GNU ToolSuite of compilers and debuggers
- Bootloader for managing and installing software updates

NET+Works Integrated Development Package

NET+ARM network-attached processors are the core of the NET+Works family of solutions that add intelligence and connectivity to electronic devices. We offer extensive networking software to support industrial automation, building automation, point-of-sale, office automation and other enterprise applications.

DEVELOPMENT TOOLS

- Green Hills® MULTI® IDE or Microcross GNU X-Tools™

RTOS

- ThreadX® picokernel

BOARD SUPPORT PACKAGE

- 10/100Base-T Ethernet
- UART
- SPI
- HDLC
- I²C
- Flash
- USB host & device
- LCD
- 1284 peripheral
- Power save

MODEL.....PART NUMBERS

Model

103 MHz, 0° C to 70° C operation
155 MHz, -40° C to 85° C operation
177 MHz, 0° C to 70° C operation

Worldwide

NS9360B-0-C103
NS9360B-0-I155
NS9360B-0-C177

NETWORKING PROTOCOLS

- TCP/IP stack
- TCP and UDP Sockets API
- ICMP
- IGMP
- PPP for serial communications
- Address Configuration Executive (ACE):
 - ARP
 - RARP
 - Ping ARP
 - AutoIP
 - DHCP client
 - BootP
- Fast IP
- Fast sockets
- SSL, TLS

NETWORKING SERVICES

- FTP server/client; TFTP
- LDAPv3 agent, for access to network information services
- HTTP APIs for serving basic and advanced web pages
- HTTPS for security
- Email (POP3 and SMTP)
- SNMP v1/MIBII for remote management
- SNTp
- DNS
- Telnet
- Multi-homing

UTILITIES

- HTML compilation
- MIB compilation
- Download of Flash images
- Bootloader
- Code builds
- Integrated flash file system
- Code Profiler
- Boundary Scan Description Language (BSDI)

TECHNICAL SUPPORT

- One year of software maintenance and technical support

DEVELOPMENT BOARD

- NS9360 development board and JTAG debugger

DIGI SERVICE AND SUPPORT

You can purchase with confidence knowing that Digi is here to support you with expert technical support and a strong one-year warranty. www.digi.com/support

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