LH7xxxx BlueStreak™ Product Overview

Product Line Microcontrollers

Business Line Standard ICs

October, 2007

Introduction

What is BlueStreak?

- ARM-Based MCUs
  - 4x ARM7TDMI
  - 3x ARM720T
  - 2x ARM922T
- Rich Feature Set (including LCD Controller)
- Industrial Temperature Range
- UMC Fab: 0.18u Process
  - 1.8V Core, 3.3V I/O
- Amkor Packaging House
  - LQFP, CABGA and PBGA Packages

- Tools and Development Systems
- 3rd Party Partners
- Worldwide Customer Base
- Diversified Markets
  - Industrial/Commercial
  - Consumer
  - Medical
  - Point Of Sale
  - Fleet Management
  - Test & Measurements
  - Automotive (After Market)
  - Recreational (GPS/Fish Finders)

New Additions to NXP MCU Portfolio

	MMU	RAM/ Cache	Frame Buffer	LCD	Touch Screen	USB	Ethernet	DMA	Memory Interface	NAND Boot
LH7A404	√	8KB I 8KB D	80KB	√	√	Host & Device		√	CF, SDRAM, PCMCIA, MMC/ SD/SDIO	√
LH7A400	√	8KB I 8KB D	80KB	√		Device		√	CF, SDRAM, PCMCIA, MMC	
LH79524	√	16KB RAM 8KB cache		√	√	Device	√	√	SDRAM	√
LH79520	√	32KB RAM 8KB cache		√				√	SDRAM	
LH79525	√	16KB RAM 8KB cache		√	√	Device	√	√	SDRAM	√
LH75411		32KB SRAM		√	√			√		
LH75410		32KB SRAM		√	√			√		
LH75401		32KB SRAM		√	√			√		
LH75400		32KB SRAM		√	√			√		

Feature Set Overview

FEATURES	DESCRIPTION	LH75400*	LH75401	LH75410*	LH75411	LH79524	LH79525	LH79520	LH7A400	LH7A404
CPU	ARM7TDMI-S 32-bit RISC CPU (MHz)	84	84	84	84					
	ARM720T 32-bit RISC CPU, 8KB Unified Cache MMU (MHz)					76.2	76.2	77.4		
	ARM922T 32-bit RISC CPU, 8K Instruction Cache 8K Data Cache MMU (MHz)								200/250	200/266
Memory	16-bit External Data Bus	●	●	●	●		●			
	32-bit External Data Bus					●		●	●	●
	Internal SRAM	●	●	●	●	●	●	●	●	●
	Tightly Coupled Memory	●	●	●	●					
	SDRAM Controller					●	●	●	●	●
	NAND Flash Boot Capability					●	●			●
LCD	Color/Grayscale LCD Controller		●		●	●	●	●	●	●
	Grayscale LCD Controller	●		●						
ADC	Integrated Touch Screen Controller	●	●	●	●	●	●			●
	Multi-Channel High Resolution ADC	●	●	●	●	●	●			●
Communications	10/100 Base T Ethernet MAC					●	●			
	USB 2.0 Full Speed Host									●
	USB 2.0 Full Speed Device					●	●		●	●
	Multiple UARTs	●	●	●	●	●	●	●	●	●
	IrDA					●	●	●	●	●
	Synchronous Serial Port	●	●	●	●	●	●	●	●	●
	I²C or SM Bus					●	●		●	●
	CAN 2.0B	●	●							
Programmable I/O	GPIO	●	●	●	●	●	●	●	●	●
Timers	Multiple Counter/Timers	●	●	●	●	●	●	●	●	●
	Watch Dog Timer	●	●	●	●	●	●	●	●	●
	Real Time Clock	●	●	●	●	●	●	●	●	●
Audio	Audio CODEC AC97 Interface								●	●
	I²S Interface					●	●			
Memory/IO Card	MMC								●	●
	Smart Card								●	●
	Secure Digital Interface									●
	PCMCIA/CF								●	●
External Direct Memory Access	Multiple DMA Channels	●	●	●	●	●	●	●		●
Waveform Generation	Multiple PWMs	●	●	●	●	●	●	●		●
Vectored Interrupts	Vectored Interrupt Controller	●	●	●	●	●	●	●		●
Keyboard/Mouse	PS/2 Interface									●
Time Base	Oscillator/PLL	●	●	●	●	●	●	●	●	●
Power	1.8 V Core Voltage	●	●	●	●	●	●	●	●	●
	3.3 V IO Voltage	●	●	●	●	●	●	●	●	●
	3.3 V to 1.8 V Linear Regulator	●	●	●	●	●	●			
Environmental	Industrial Operating Temperature Range (-40°C to +85°C)	●	●	●	●	●	●	●	●	●
Packaging	Package Type	144 LQFP	144 LQFP	144 LQFP	144 LQFP	208 CABGA	176 LQFP	176 LQFP	256 PBGA 256 CABGA	324 CABGA

End Product Examples

Snap-On-Diagnostics, US

Ceiva, US

Raymarine, UK

Saeco, Italy

GE Appliances, US

Mon Roi, Canada

Niles Audio, US

Sharp, Japan

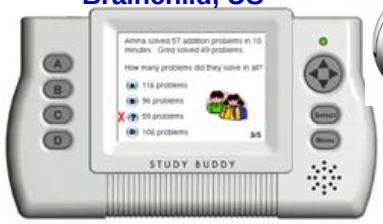
Goldline, US

Bristol Babcock, US

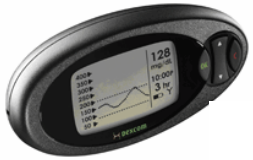
Fisher Price, US

Nordic ID, UK

Brainchild, US



Dexcom, US



Qualcomm, US

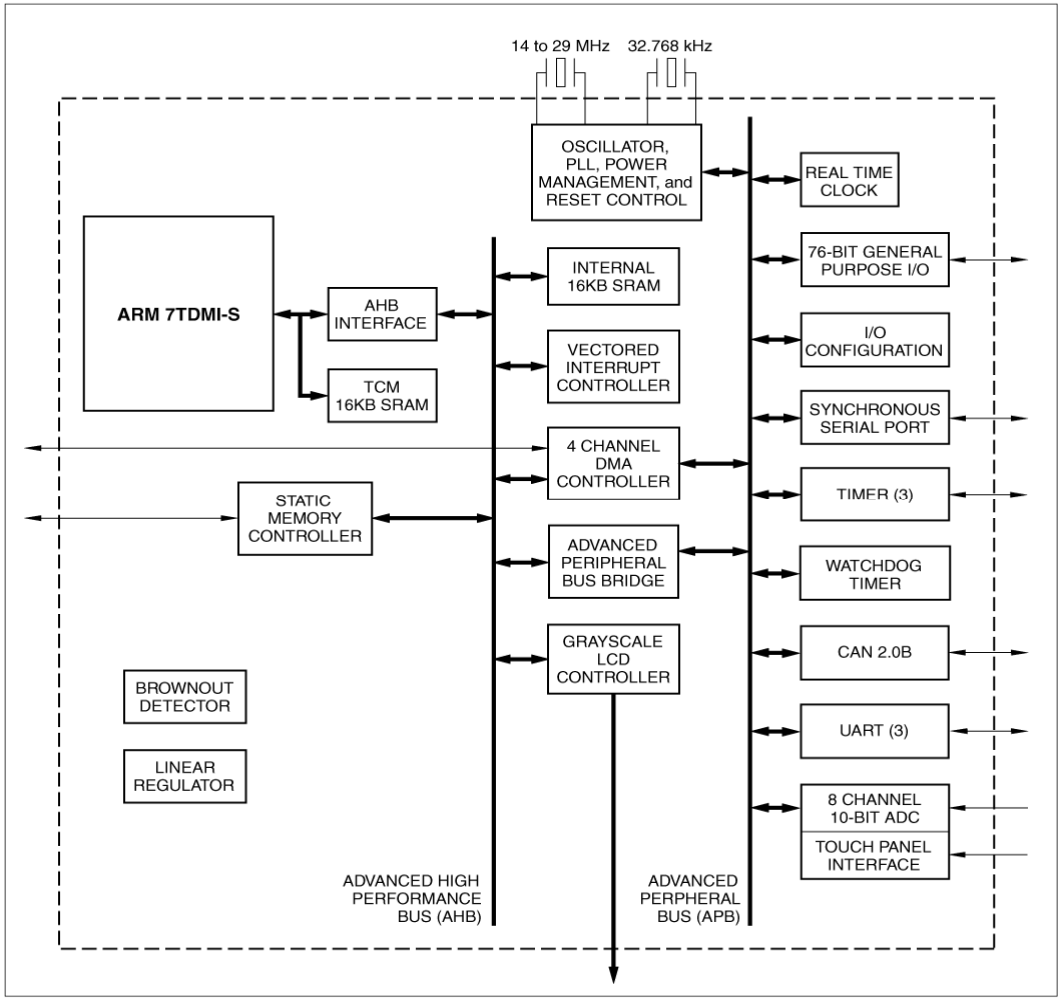
Classe` Audio, Canada

Features

LH75400/01/10/11

Key Features:

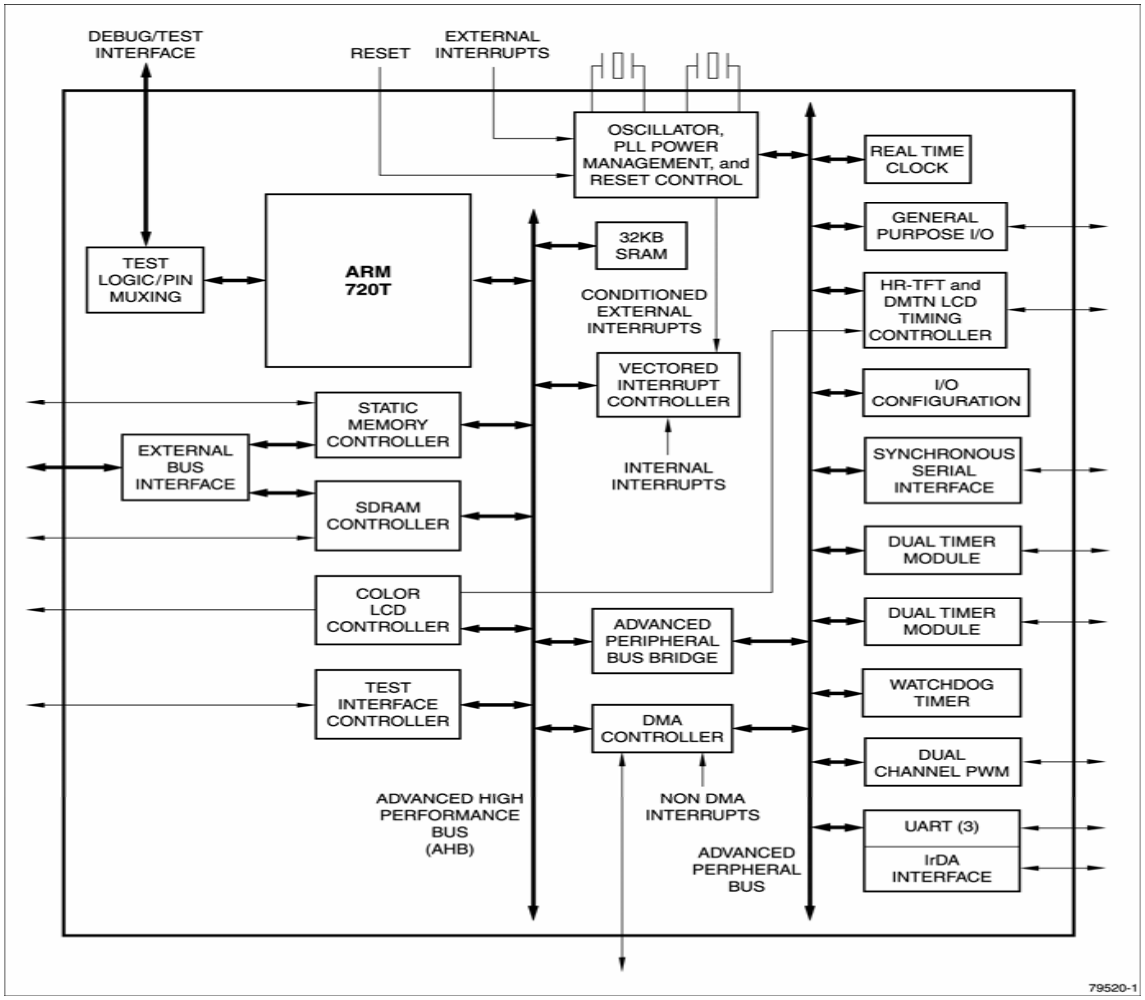
- ARM7TDMI-S @ 84 MHz
- 16KB Tightly Coupled SRAM
- 16KB Internal AHB SRAM
- 16-bit External Data Bus
- LCD Controller
  - 4 bit Grayscale to XGA
  - 12 bit Color to VGA
- Touch Screen Interface
- CAN 2.0B
- 8 Channel 10-bit ADC
- 3 UARTs, SPI/SSP
- 3 Counter/Timers/PWM
- Real Time Clock, Watch Dog Timer
- 4 Channel DMA
- Oscillator / PLL
- Vectored Interrupt Controller
- Linear Regulator



LH79520

Key Features:

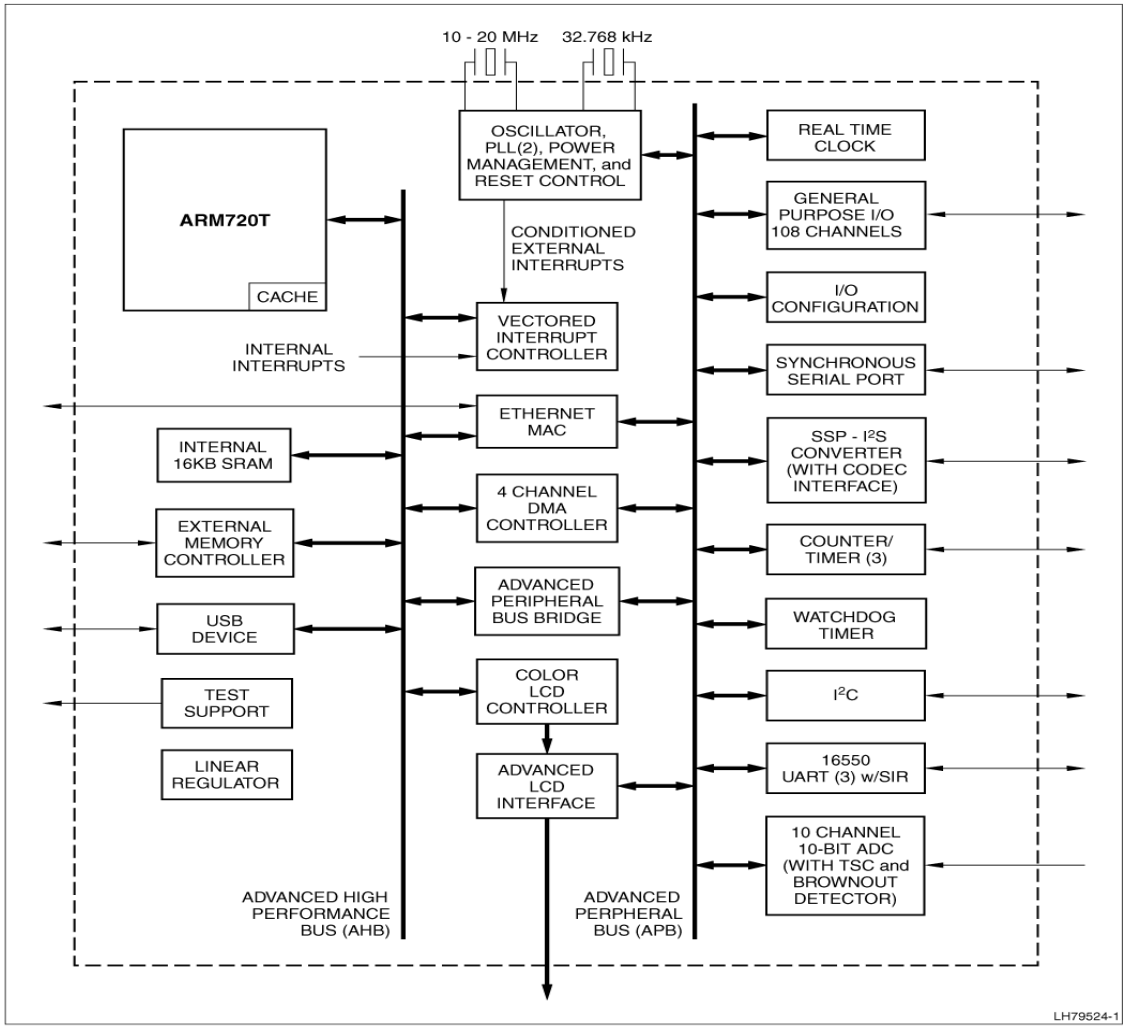
- ARM720T @ 77.4 MHz
- 8KB Unified Cache / MMU
- 32KB Internal AHB SRAM
- SDRAM Controller
- 32-bit External Data Bus
- Color/Grayscale LCD Controller – 16-bit Video
- 3 UARTs / One With IrDA
- Synchronous Serial Port
- 4 Counter/Timers
- Real Time Clock
- 4 Channels DMA
- 2 PWMs
- Oscillator / PLL
- Vectored Interrupt Controller
- Watch Dog Timer



LH79524 / LH79525

Key Features

- ARM720T @ 76.2 MHz
- 8KB Unified Cache / MMU
- 16KB Internal AHB SRAM
- SDRAM Controller
- NAND Flash Boot Capability
- Color/Grayscale LCD Controller
- 10 Channel 10-bit ADC with TSC
- 10/100 BaseT Ethernet MAC
- USB 2.0 Full Speed Device
- 3 UARTs With IrDA
- Synchronous Serial Port
- I^2C / I^2S
- 3 Counter/Timers/PWM
- Real Time Clock & Watch Dog Timer
- Vectored Interrupt Controller
- 4 Channels DMA
- Oscillator / PLL
- Linear Regulator



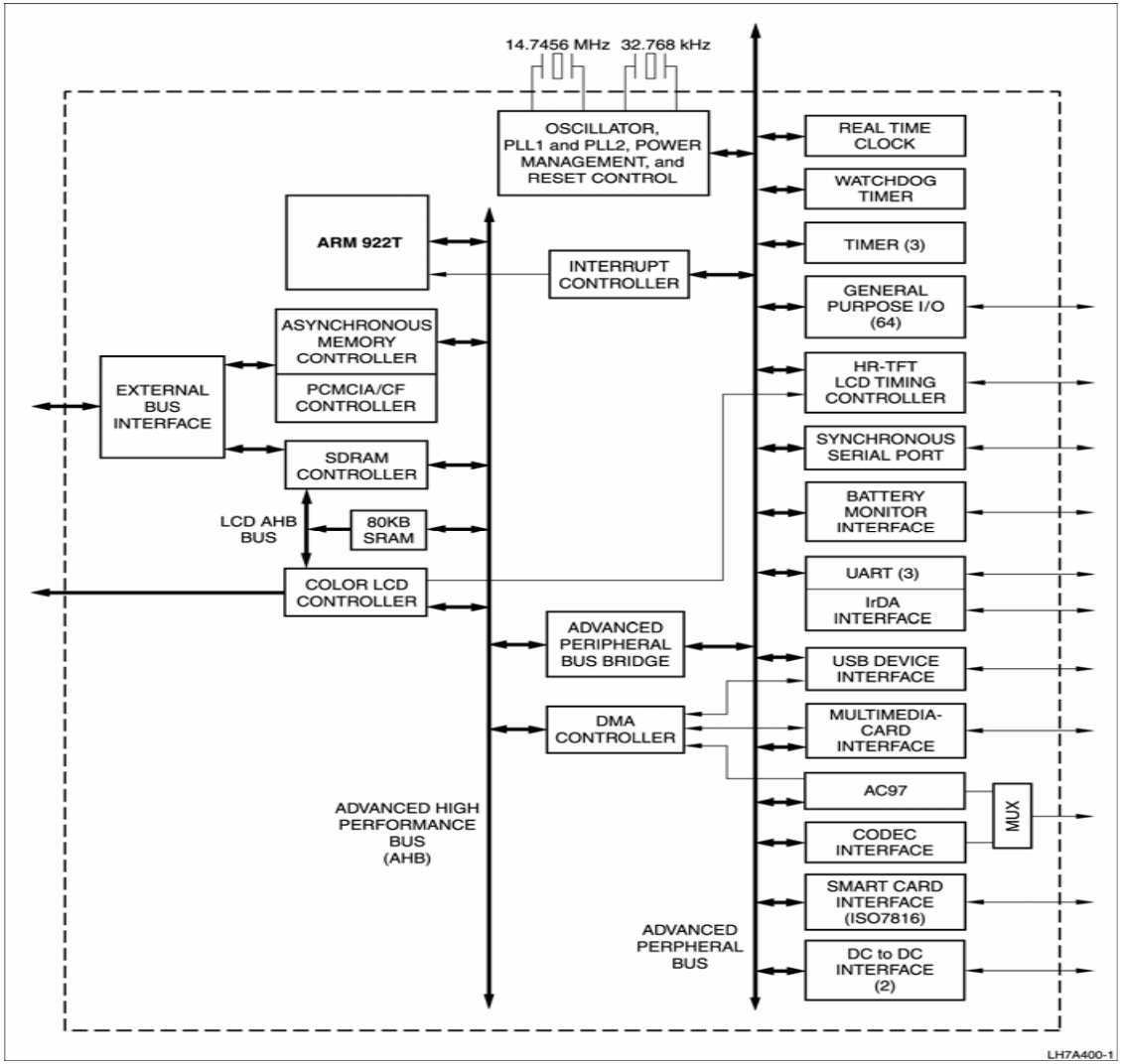
LH79524/LH79525 Differences

	LH79524	LH79525
Ext Data Bus	32-bit	16-bit
Video	16-bit	12-bit
GPIO	108	86
Package	208 CABGA	176 LQFP

LH7A400

Key Features:

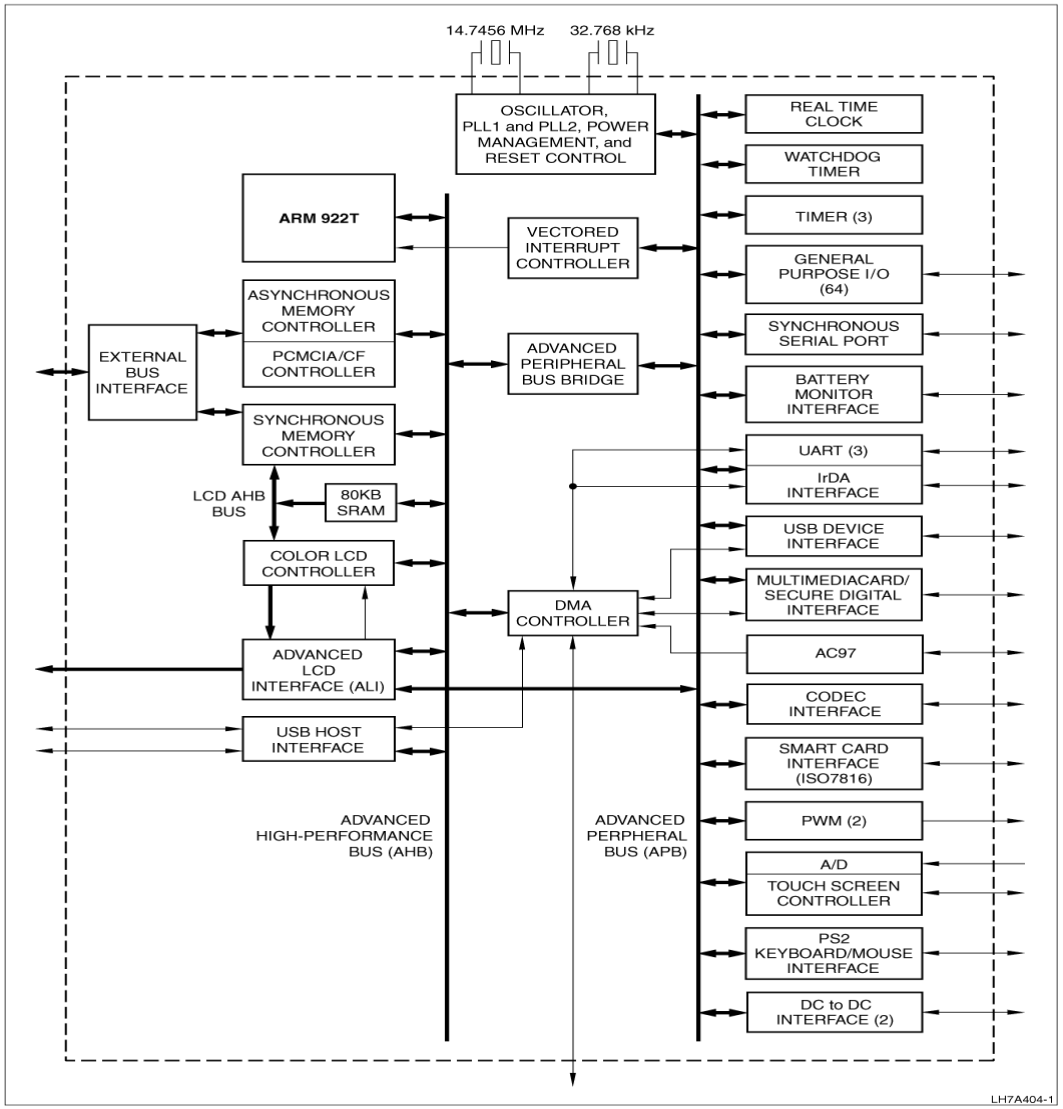
- ARM922T @ 255 MHz
- 8K Instruction Cache
- 8K Data Cache
- MMU
- 80KB Internal AHB SRAM
- SDRAM Controller
- 32-bit External Data Bus
- Color/Grayscale LCD Controller 16-bit Video
- USB 2.0 Full Speed Device
- 3 UARTs / One With IrDA
- Synchronous Serial Port
- 3 Counter/Timers
- Real Time Clock
- Audio CODEC AC97 Interface
- 10 Channels DMA
- MMC and Smart Card
- PCMCIA / CF
- Oscillator / PLL
- DC to DC Converter
- Watch Dog Timer



LH7A404

Key Features:

- all of the LH7A400 features plus
  - 266MHz
  - Vectored Interrupt Controller
  - 10 Channel, 10-bit ADC
  - Touch Screen Controller
  - Brownout Detector
  - 2 External DMA Channels
  - USB 2.0 Full Speed Host / Device
  - Secure Digital Interface
  - NAND Flash Boot Capability
  - PS/2 Interface
  - 2 PWMs



Development Tools & Operating Systems

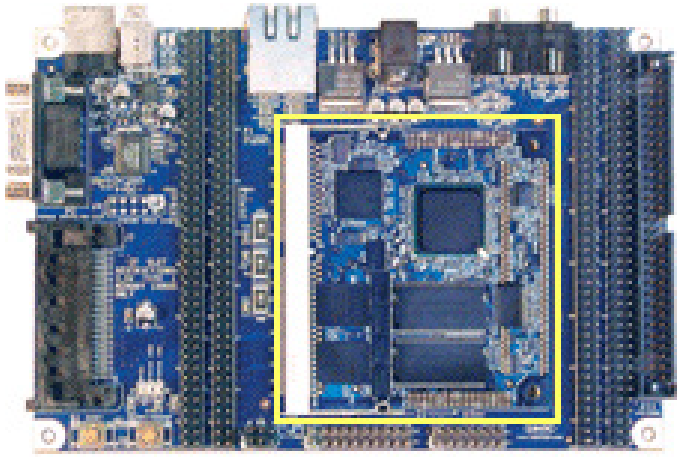
Third Party Network

Training
OS/RTOS
Design Services
Development Boards
JTAG ICE Debuggers
Graphical & Media Applications
Compilers/Assemblers/Debuggers

ENEA
Microsoft Windows Embedded Partner
Mentor Graphics
hitex DEVELOPMENT TOOLS
MICOM TECH
Green Hills SOFTWARE, INC.
旋极科技 WATERTEK
Garz & Fricke
noHau
ABRON
EPI EMBEDDED PERFORMANCE INC
TROLLTECH Code Less. Build More. Compile Anywhere.
Micrium
ASHLING THE DEVELOPMENT SYSTEMS COMPANY
ARM
LOGIC
WIND RIVER
REVELY
Accelerated Technology Embedded Systems Division of Mentor Graphics
LAUTERBACH
SIGNUM SYSTEMS
Brendes
KEIL An ARM® Company
Micro Digital RTOS INNOVATORS
eL express
SoftRISC
CodeSourcery
YOKOGAWA Yokogawa Digital Computer Corporation
SEGGER
esi 嵌入式系統設計院 Embedded Systems Institute
b SQUARE
tao
COGENT
IAR SYSTEMS
esmertec
SWELL SOFTWARE Inc.
Computex for Hopeful Future
ACTIMAGINE SMART DISPLAY SOFTWARE

Logic PD – Zoom Starter Development Kit

- Card Engines for LH7A400, LH7A404, LH75401, LH79520, LH79524
- Operating Systems (depending on card engine):
  - Windows CE 5.0, Linux, VxWorks, Nucleus, MQX RTOS, Micro Digital SMX RTOS
- Standard peripheral connectors supporting: Ethernet, LCD, Audio In/Out, Serial, Compact Flash, USB Host/Device
- LogicLoader™ (bootloader/monitor) in executable format
- GNU cross-development tools (compiler, linker, assembler, debugger) are included.
- Available from NXP, Distributors or Logic PD
  - $299 - $399 depending on card engine



Auckland EVA Evaluation Board

- Supports LH7A400/404
- Ready-to-run starting kit with power supply and all necessary cables
- Flash´nGo Tool for software download, Flash programming and setup
- Two RS232 ports, USB Host, IrDA, Ethernet 10/100 Base-T connectors, 2 MMC/SD card slots
- Special port for LCD-kit adaptation
- All processor pins connected to 2,54 mm headers
- Board support packages and support for Windows CE and Linux available
- 499 Euro directly from Manufacturer
- http://www.garz-fricke.de

Compilers, Assemblers and Debuggers

- ARM
  - RealView Development Suite
- Keil
  - µVision IDE
- Green Hills Software
  - MULTI IDE
- IAR Systems
  - IAR Embedded Workbench
- Mentor Graphics
  - EDGE Developer Suite
- CodeSourcery
  - Sourcery G++ (GNU)

JTAG Debuggers (1)

Abatron	BDI2000
ARM	RealView Multi-ICE
Ashling	Opella, PathFinder, and Vitra
Brendes	BICEPS
Embedded Performance	MAJIC JTAG Debug Probes
Green Hills Software	Green Hills Probe
Hitex Development	Tanto
Keil	ULINK2
Lauterbach	ICD In-Circuit Debugger
Nohau	EMUL-ARM
Signum Systems	JTAGjet

JTAG Debuggers (2)

IAR Systems	**J-Link**
Yokogawa Digital	**advicePRO**
Computex	**PalmiCE2**

Operating Systems

- WinCE Version 4.2 Board Support Package (BSP) for LH7A400/404
  - Free binary download from B-Square
  - Free 120-day evaluation download from Logic PD
- WinCE Version 5.0 Board Support Package (BSP) for LH7A404
  - Free binary download from www.nxp.com/microcontrollers
- Linux Version 2.16.18 Board Support Package (BSP) for LH7A404, LH7A400, LH79524 and LH79520
  - Free binary download from www.nxp.com/microcontrollers
- Other software available at www.nxp.com/microcontrollers includes:
  - Visual Basic Graphical Application Set-up Tool
  - Drivers for the Logic PD board
  - uC/OS II port
  - ARM9 Clock Set utility
  - Much more…

OS Support Summary (1)

Platform OS

Real-time OS for deeply embedded applications

Windows CE.net — Royalty based kernel. Free BSP's available from: bSQUARE, LOGIC

Linux — Royalty free kernel. Free BSP's available from:

WIND RIVER VxWorks 5.x — License based kernel. Free BSP's available from Wind River

Accelerated Technology Mentor Graphics Nucleus Real Time Operating System — License based kernel. Free BSP's available from Accelerated Technology

Green Hills SOFTWARE, INC. INTEGRITY — License based kernel. Free BSP's available from Green Hills

µd MicroDigital smx — License based kernel. Free BSP's available from Micro Digital

eL express THREADX — License based kernel. Free BSP's available from Sharp & Express Logic

Micrium µC/OS-II — License based kernel. Free BSP's available from Sharp & Micrium

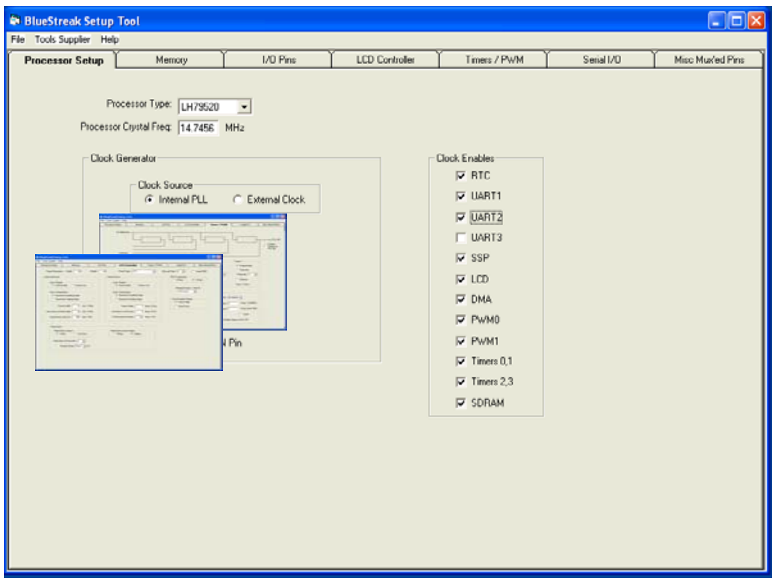
OS Support Summary (2)

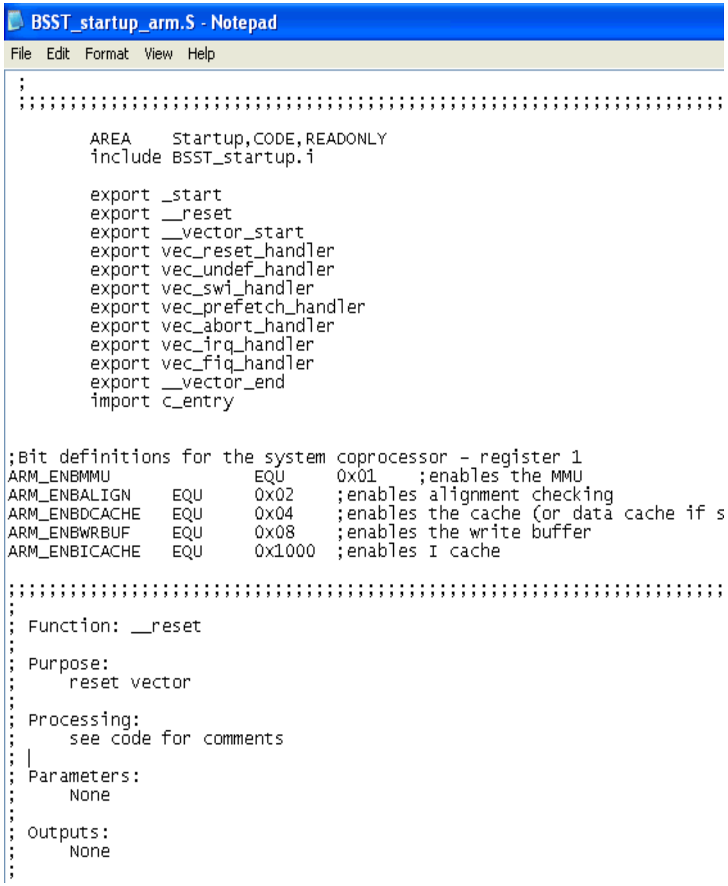
Part Number	*Operating System*									
	WinCE 4.2 / 5.0	Linux	EmbOS	ThreadX	SMX	µC/OS II	VxWorks	OSE	Integrity	Nucleus+
LH754xx	No	No	Yes	Yes	Yes	Yes	No	No	No	Yes
LH79525	No	Yes	No	No	No	Yes	No	No	No	No
LH79520	No	Yes	No	Yes	Yes	Yes	No	No	No	No
LH79524	No	Yes	No	No	No	Yes	No	No	No	No
LH7A400	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LH7A404	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes

Design Support

Development Wizard

- New MCU Development Tool
- Graphical Interface to initialize registers
- BlueStreak Setup Tool (BSST)




BSST_startup_arm.S - Notepad

File Edit Format View Help

```
;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

        AREA    Startup,CODE,READONLY
        include BSST_startup.i

        export _start
        export __reset
        export __vector_start
        export vec_reset_handler
        export vec_undef_handler
        export vec_swi_handler
        export vec_prefetch_handler
        export vec_abort_handler
        export vec_irq_handler
        export vec_fiq_handler
        export __vector_end
        import c_entry

;Bit definitions for the system coprocessor - register 1
ARM_ENBMMU              EQU     0x01    ;enables the MMU
ARM_ENBALIGN    EQU     0x02    ;enables alignment checking
ARM_ENBDCACHE   EQU     0x04    ;enables the cache (or data cache if s
ARM_ENBWRBUF    EQU     0x08    ;enables the write buffer
ARM_ENBICACHE   EQU     0x1000  ;enables I cache

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;
; Function: __reset
;
; Purpose:
;     reset vector
;
; Processing:
;     see code for comments
;
; Parameters:
;     None
;
; Outputs:
;     None
;
```

BlueStreak™ Software Library

- Web-based software library
- www.nxp.com/microcontrollers

English	Software Board Support Package for the LH754xx/SDK75401 updated
English	Software Board Support Package for the LH79520/SDK79520 updated
English	Software Board Support Package for the LH79524/LH79525/SDK79524 updated
English	Software Board Support Package for the LH7A400/SDK7A400 updated
English	Software Board Support Package for the LH7A404/SDK7A404 updated

BlueStreak™ @ www.nxp.com/microcontrollers

Products

Click for **datasheet**. Also, see **datasheet disclaimer**.
✓, △, ✗ indicate product status. Click or for more or less detail.

All LH7 Products

LH75400 △	Microcontroller with LCD controller, external memory interface
LH75401	System-on-Chip with ARM7TDMI-S microcontroller, 32KB SRAM, LCD controller up to 12-bit or XGA, AHB, APB, external memory interface, CAN
LH75410 △	Microcontroller with LCD controller, external memory interface
LH75411	System-on-Chip with ARM7TDMI-S microcontroller, 32KB SRAM, LCD controller up to 12-bit or XGA, AHB, APB, external memory interface
LH79520	System-on-Chip with ARM720T microcontroller, 32KB SRAM, LCD controller up to true color or SVGA, Windows CE MMU, AHB, APB, external memory interface
LH79524	System-on-Chip with ARM720T microcontroller, 16KB SRAM, LCD controller up to true color or XGA, touch screen controller, Windows CE MMU, AHB, APB, 32-bit external memory interface, USB 1.1 full speed device, 10/100 ethernet, I^2C, 10-bit ADC
LH79525	System-on-Chip with ARM720T microcontroller, 16KB SRAM, LCD controller up to true color or XGA, touch screen controller, Windows CE MMU, AHB, APB, 16-bit external memory interface, USB 1.1 full speed device, 10/100 ethernet, I^2C, 10-bit ADC

Datasheet (Jul 16, 2007) Erratasheet User Manual

LH79525N0M100A0	LQFP-176	Not for Design	SOT1017-1	Has Pb	MSL=3
LH79525N0Q100A0	LQFP-176	Not for Design	SOT1017-1	Pb-Free	MSL=3
LH79525N0Q100A1	LQFP-176	Production	SOT1017-1	Pb-Free	MSL=3

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