

TMPR3922U 32-bit MIPS® RISC Microprocessor

Description

The TMPR3922U 32-bit MIPS® RISC processor is a single-chip integrated digital Application Specific Standard Product (ASSP) for use with such devices as Hand-held PCs (HPC), PalmPCs, TV Set-Top Boxes (STB), DVD players, Webphones, Auto PC devices, and Windows®-based terminals (WBT).

The TMPR3922U is an enhanced version of the TMPR3912U 32-bit MIPS RISC microprocessor. The TMPR3922U integrates a high-performance, low power TX39 family processor core with necessary support logic and added peripheral support modules to present a complete personal digital assistant (PDA) solution.

The TMPR3922U supports the Microsoft® Windows CE v2.0 operating system, as well as, external color display capability with a liquid crystal display (LCD) controller.

Microprocessor Features

- Built-in TLCS3920 Processor Core
 - Developed based on the MIPS RISC R3000A architecture
 - Instruction cache 16kB and Data cache 8kB
 - Five-stage pipeline: Fetch, Decode, Execute, Memory access, and Register write
 - Incorporates single-cycle DSP function Multiply-Accumulate (MAC) for functions such as soft modem, high-performance data and fax protocols
 - Integrated Translation Lookaside Buffer (TLB) which maps 4k/16k/64k/128k/256k/1M/4M Byte page
- Maximum Operating Frequency: 133MHz
- Power Supply: 3.3V (I/O)/ 2.5V (internal operation)
- CPU clock stop mode
- Power-down modes for individual peripherals
- Standby current: 10µA (typical)
- Package: 208-pin plastic LQFP

On-Chip Peripheral Features

- Integrated Power Management Unit
- Multiple DMA channels
- Clock generator
 - Built-in 16x frequency phase locked loop (PLL)
- Write buffer
 - Four channel support

- Interrupt and I/O Modules
- Timer Module
- Bus Interface Unit (BIU)
 - Memory controllers for DRAM (EDO), SDRAM, SRAM, ROM, Flash memory, and PCMCIA
- System Interface Unit (SIU)
 - Multiple-channel 32-bit DMA controller
 - Independent channel for SIB to/from codecs, serial port, IrDA, and general purpose Universal Asynchronous Receiver/Transmitter (UART)
- Concentration Highway Interface (CHI) Module
 - Interfacing support to external full-duplex time-division-multiplexed (TDM) communication peripherals
 - Supports ISDN line and other serial PCM/TDM serial devices
- IR Module
 - Supports IR consumer, IrDA, and IR FSK communication modes, and carrier detect
- Serial Interconnect Bus (SIB) Module
- Serial Peripheral Interface (SPI) Module
- UART Module
 - Two full-duplex UARTs

Development Tool Support

A wide range of development tools for the TX39 family are available from Toshiba and third-party partners including support software, reference kits, and all the necessary technical support and training needed for design applications.

Language Tools

- Compilers
 - Green Hills Software
 - Cygnus
 - Microsoft Visual C++ 5.0
 - Microsoft Windows CE Toolkit for Visual C++ 5.0

Operating Systems

- Microsoft Windows CE
- µITRON

Reference Platform

- A complete development system and reference kit for Windows CE v2.0 applications is available from Toshiba

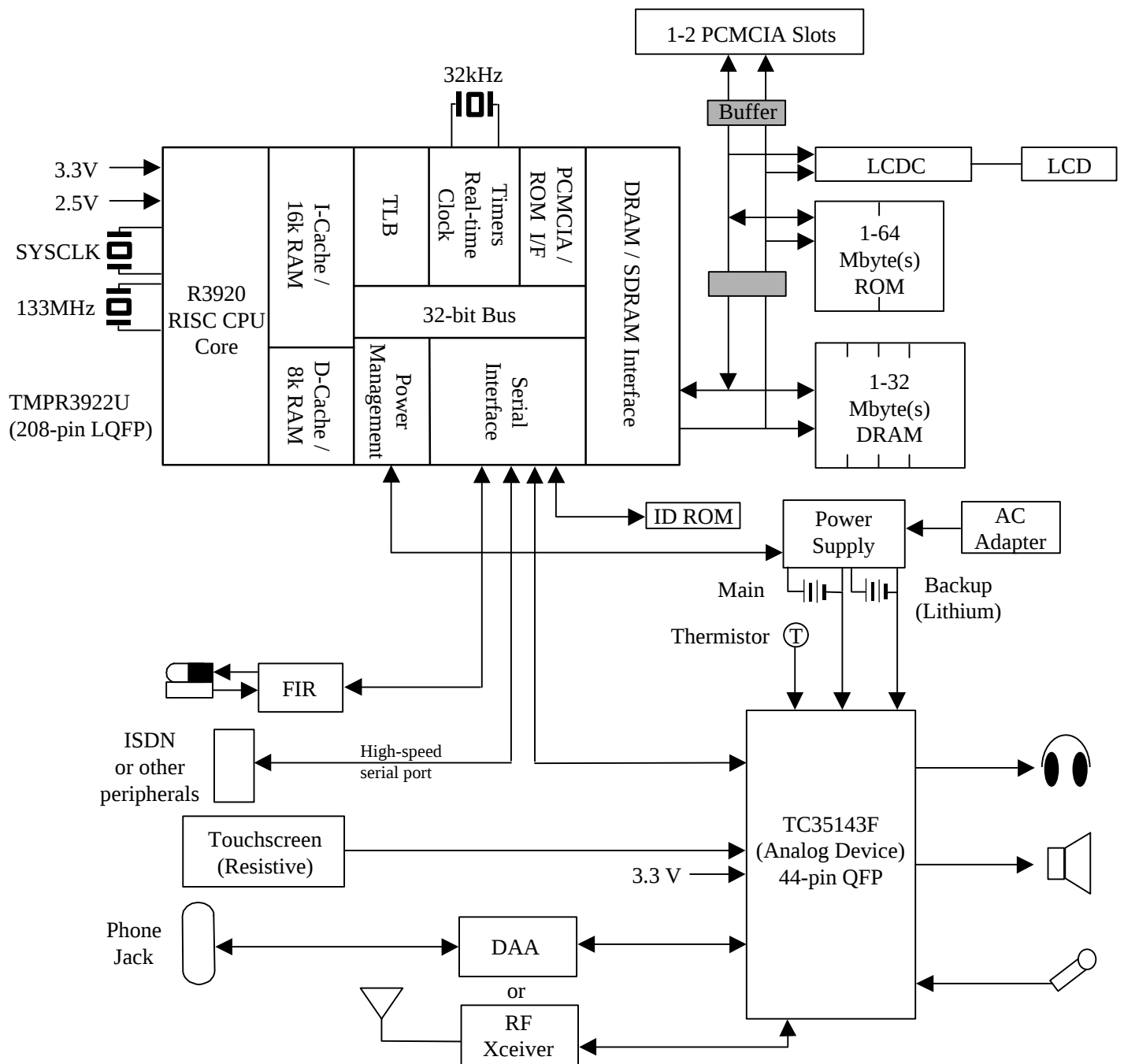


Figure 1. TMPR3922U System Block Diagram

Electric Characteristics

Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V_{DDH}	TBD	V
	$V_{DDL}, V_{DDL S}$	TBD	V
Input voltage	V_{IN}	$V_{SS} - 0.5$ to $V_{DDH} + 0.5$	V
Storage temperature	T_{STG}	-55 to 125	°C
Maximum dissipation ($T_A = 70^{\circ}\text{C}$)	P_D	1	W

NOTE: Using at specifications higher than the maximum ratings can cause permanent damage. For normal operation, use under the recommended operating conditions. Exceeding the recommended operating conditions may affect the reliability.

Recommended Operating Conditions

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply voltage	V_{DDH}		3.0	3.3	3.6	V
	$V_{DDL}, V_{DDL S}$		2.3	2.5	2.7	V
Operating temperature	T_{OPR}		0	–	70	°C

DC Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating current	I_{DD}	$V_{IN} = V_{DDH}$ or V_{SS} , $V_{DDH} = \text{MAX}$, $V_{DDL} = V_{DDL S} = \text{MAX}$, $I_{OH} = I_{OL} = 0$ mA, $f_{in}(6) = 10\text{MHz}$	–	TBD		mA
Static current	$I_{DD S}$	$V_{IN} = V_{DDH}$ or V_{SS} , $V_{DDH} = 3.3\text{V}$, $V_{DDL} = 2.5\text{V}$, $V_{DDL S} = 0\text{V}$, $I_{OH} = I_{OL} = 0$ mA, SLEEP mode & RTC stop mode	–	TBD		mA
	$I_{DD S}$	$V_{IN} = V_{DDH}$ or V_{SS} , $V_{DDH} = 3.3\text{V}$, $V_{DDL} = 2.5\text{V}$, $V_{DDL S} = 0\text{V}$, $V_{DDL S} = I_{OL} = 0$ mA, SLEEP & RTC Running mode	–	TBD		mA
Input Leakage current	I_{IN}	$V_{IN} = V_{DDH}$ or V_{SS}		TBD		mA
Input voltage (1)	V_{IH1}	$V_{DDH} = 3.6\text{V}$		TBD		V
	V_{IL1}	$V_{DDH} = 3.0\text{V}$		TBD		V
Input voltage (2)	V_{IH2}	$V_{DDH} = 3.6\text{V}$		TBD		V
	V_{IL2}	$V_{DDH} = 3.0\text{V}$		TBD		V
Output voltage (3)	V_{OH1}	$V_{DDH} = 3.0\text{V}$, $I_{OH} = -4\text{mA}$		TBD		V
	V_{OL1}	$V_{DDH} = 3.0\text{V}$, $I_{OL} = -4\text{mA}$		TBD		V
Output voltage (4)	V_{OH2}	$V_{DDH} = 3.0\text{V}$, $I_{OH} = -8\text{mA}$		TBD		V
	V_{OL2}	$V_{DDH} = 3.0\text{V}$, $I_{OL} = -8\text{mA}$		TBD		V
Output voltage (5)	V_{OH3}	$V_{DDH} = 3.0\text{V}$, $I_{OH} = -16\text{mA}$		TBD		V
	V_{OL3}	$V_{DDH} = 3.0\text{V}$, $I_{OL} = -16\text{mA}$		TBD		V
Input current (Pull-down resistor)	I_{IHP}	$V_{DDH} = \text{MAX}$ $V_{IN} = V_{DDH}$		TBD		μA

(1) SYSCLKIN, (2) Other inputs, (3) D[31:0], RAS0*, RAS1*, DCS0*, DCKE*, DQMH, DQML, DREQ*, DGRNT*, BC32K, VDAT[3:0], CP, LOAD, DF, FRAME, DISPON, VIDDONE, PWRCS, TXD, RXD, CS3-O*, CHIFS, CHICLK, CHIDOUT, CHIDIN, IO[6:0], SPICLK, SPIOU, SPIIN, SIBSYNC, SIBDOUT, SIBMCLK, SIBCLK, RXPWR, IROUT, CARD1WAIT*, CARD2WAIT*, MIOX[2:0], (4) A[12:0], ALE, RD*, WE*, CAS3-O*, CARDREG*, CARDIOWR*, CARD1CSL*, CARD1CSH*, CARD2CSL*, CARD2CSH*, (5) DCLKOUT, (6) MBUSCLK, MBUSDATA

TMPR3922U 32-bit MIPS RISC Microprocessor

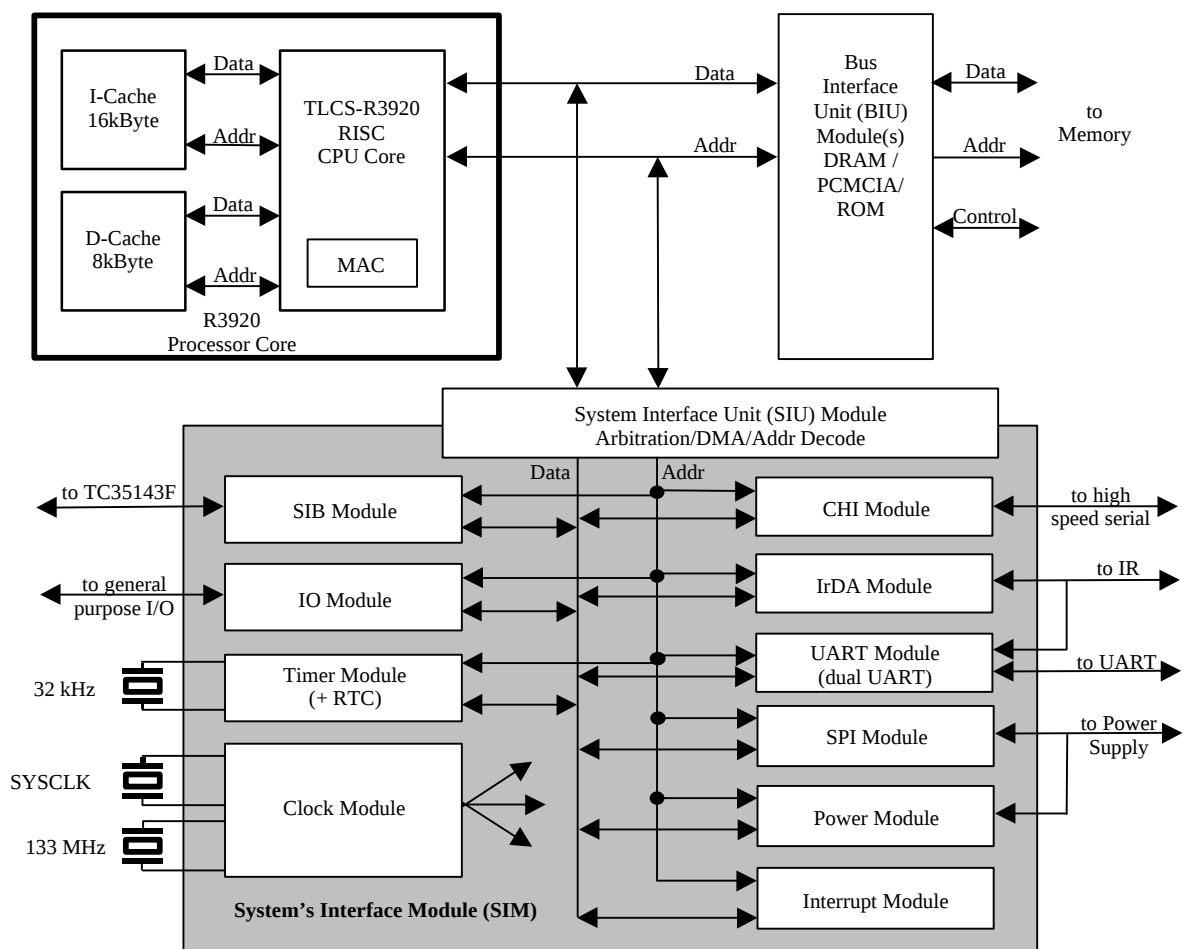


Figure 2. TMPR3922U Internal Block Diagram

MIPS® is a registered trademark and R3000A is a trademark of MIPS Technologies, Inc.

www.toshiba.com/taec

1. This technical data may be controlled under U.S. Export Administration Regulations and may be subject to the approval of the U.S. Department of Commerce prior to export. Any export or re-export, directly or indirectly, in contravention of the U.S. Export Administration Regulations is strictly prohibited.
2. The information in this document has been carefully checked and is believed to be reliable; however, no responsibility can be assumed for inaccuracies that may not have been caught. All information in this document is subject to change without prior notice. Furthermore, Toshiba cannot assume responsibility for the use of any license under the patent rights of Toshiba or any third parties.

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

Regional Sales Offices

Irvine, CA
TEL:(714)453-0224
FAX:(714)453-0125

Atlanta, GA
TEL:(770)931-3363
FAX:(770)931-7602

Boston, MA
TEL:(617)224-0074
FAX:(617)224-1096

Portland, OR
TEL:(503)629-0818
FAX:(503)629-0827

San Jose, CA
TEL:(408)456-8900
FAX:(408)456-8910

Chicago, IL
TEL:(708)945-1500
FAX:(708)945-1044

Edison, NJ
TEL:(908)248-8070
FAX:(908)248-8030

Dallas, TX
TEL:(972)480-0470
FAX:(972)235-4114

TOSHIBA