Quantum Effect Devices™

QED RISCMark™

RM7000™ RM7000A™

64-Bit Superscalar Microprocessor

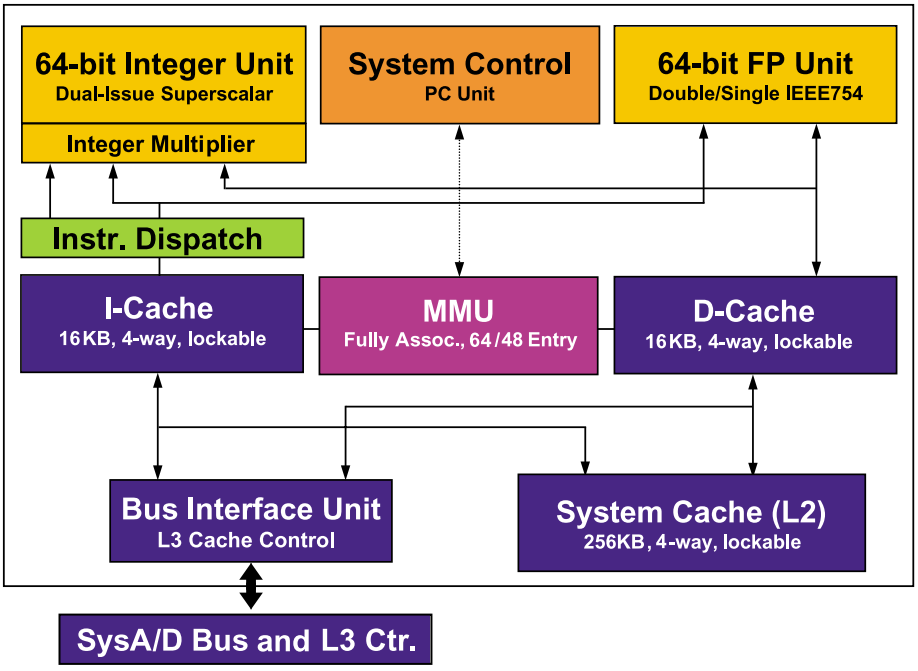
DESCRIPTION

The QED RM7000 (0.25µ) and RM7000A (0.18µ) are highly integrated symmetric superscalar microprocessors capable of issuing two instructions each processor cycle. The RM7000/A has two high-performance 64-bit integer units and a high-throughput, fully pipelined 64-bit floating point unit. To keep its multiple execution units running efficiently, the RM7000/A integrates 16KB of instruction cache and 16KB of data cache and backs them up with an integrated 256KB secondary cache. An optional external tertiary cache provides even higher performance capability in applications having very large data sets.

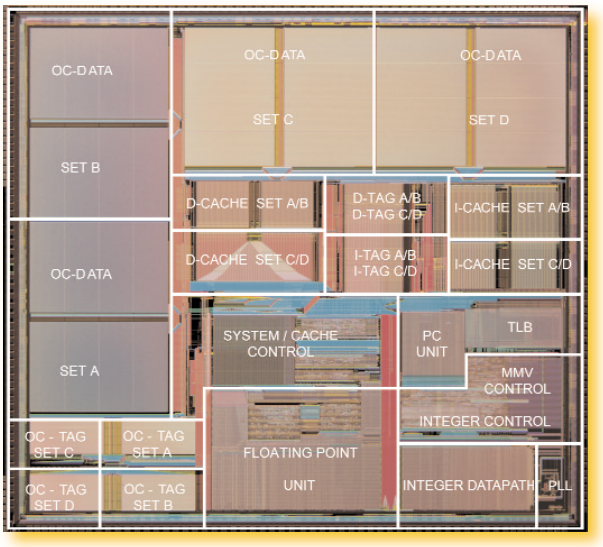
The RM7000/A ideally suits high-end embedded control applications such as internetworking, high performance image manipulation, high speed printing, and 3-D visualization.The RM7000/A has specific optimizations for internetworking including the "Fast Packet Cache". The "Fast Packet Cache" feature significantly increases data bandwidth and processor efficiency when operating on volatile information such as network packet information.

FEATURES

- RM7000 and RM7000A are pin-compatible with the RM5271, RM5271A and RM7071A.
- Dual-issue symmetric superscalar microprocessor with instruction prefetch
- High performance interface (RM52xx compatible)
  - 1000 MB per second peak throughput
  - 125 MHz max. frequency multiplexed address/data
  - Supports two outstanding reads with out-of-order return
  - Supports fractional clock multipliers (2, 2.5, 3, 3.5, 4, 4.5, 5, 6, 7, 8, 9)
  - IEEE 1149.1 JTAG (TAP) boundary scan
- Integrated primary and secondary caches - all are 4-way set associative with 32 byte line size
  - 16KB instruction
  - 16KB data: non-blocking and write-back or write-through
  - 256KB on-chip secondary: unified, non-blocking, block write-back
  - Per line cache locking in primaries and secondary
- Integrated external cache controller
  - Supports 512K, 1M, 2M, 4M, or 8 MByte block write-through
- MIPS IV instruction set
  - Data PREFETCH instruction allows the processor to overlap cache miss latency and instruction execution
  - Floating point combined multiply-add instruction increases performance in signal processing and graphics applications
- Integrated memory management unit (RM52xx compatible)
  - Fully associative joint TLB (shared by I and D translations)
  - 64/48 dual entries map 128/96 pages
  - 4 entry DTLB and 4 entry ITLB
  - Variable page size (4KB to 16MB in 4x increments)
- Embedded application enhancements
  - Specialized DSP integer Multiply-Accumulate instruction, (MAD/MADU) and three-operand multiply instruction (MUL/MULU)
  - I&D Test/Break-point (Watch) registers for emulation & debug
  - Performance counter for system and software tuning & debug
- Fourteen fully prioritized vectored interrupts - 10 external, 2 internal, 2 software
- Bypass secondary/tertiary cache option
- Fast Hit-Writeback-Invalidate and Hit-Invalidate cache operations for efficient cache management
- High-performance floating-point unit - 600 MFLOPS maximum
  - Single cycle repeat rate for common single-precision operations and some double-precision operations
  - Single cycle repeat rate for single-precision combined multiply- add operations



QED	RM7000	RM7000A
CPU Frequency (MHz)	200, 250, 266, 300	300, 350, 400, 450
I/D Cache	16KB/16KB	16KB/16KB
Secondary Cache	256KB on chip	256KB on chip
Ext. Bus Width	64-bit	64-bit
Ext. Bus Speed (MHz)	125	125
Dhrystone2.1 (MIPS)	450	525
Process	0.25µ	0.18µ
V_{CC} Int / V_{CC} IO	2.5V/3.3V	1.65V/(2.5V/3.3V)
Package	TBGA-304	TBGA-304



APPLICATIONS

Telecommunications	Image Processing	Consumer Appliances	Servers
Routers	Printers	Amusement Games	RAID Storage
Switches	Copiers	Set Top Boxes	Workstations

DEVELOPMENT TOOLS

Operating Systems: Accelerated Technology, Integrated Systems, Microsoft, QNX, Wind River
Compiler Suites: Algorithmics, Cygnus, Green Hills, Metrowerks
Simulation Tools: QED, Summit Design, SimPod, Synopsis
Logic Analyzers: HP, Tektronix, Corelis, Crescent Heart
Emulators: Embedded Performance

DEVELOPMENT BOARDS

Algorithmics			
	RM5230/1	P-4032	32-bit 33MHz PCI Board
	RM5271, RM7000	P-5064	32/64-bit 33/66MHz PCI Board
Galileo Technology			
	RM5230/1	EV-64111	32-bit 33/64MHz PCI board
	RM5271, RM7000	EV-64120	32/64-bit 33/66MHz PCI board
NKK			
	RM5271, RM7000	ND7000LBG-100	32-bit 33/64MHz PCI
V3 Semiconductor			
	RM5230/1	Hurricane	32-bit 33MHz PCI Board
	RM5271, RM7000	TBA	32/64-bit 33/66MHz PCI

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