



# 2004 EDN Microcontroller/Microprocessor directory

## 8-BIT MICROPROCESSORS

Company name	Device name or family	Instruction set architecture	CPU frequency (MHz)	Bus interface (address/data) (bits)	Instruction width (bits)	Core / I/O operating voltages (V)	Typical power at maximum frequency	Powerdown modes and minimum power	DSP/ multiplication hardware support (bits)	FPU	Caching
<a href="http://www.actel.com">Actel Corporation</a> <a href="http://www.actel.com">www.actel.com</a>	Core8051	8051	Up to 45 MHz with 1 clock per instruction	1	8	1.5, 2.5, 3.3, 5		Idle, stop			
<a href="http://www.analog.com">Analog Devices</a> <a href="http://www.analog.com">www.analog.com</a>	ADuC812	8051	16	external: 16/8 code, 24/8 data	8	3/5	48mW (3V)	15mW			
	ADuC814	8051	131 KHz to 16.78	external: 16/8 code, 24/8 data	8	3/5	36mW (3V)	33 to 45mW			
	ADuC816 ADuC824	8051	98.3 KHz to 12.58	external: 16/8 code, 24/8 data	8	3/5	25mW (3V)	18 to 60mW			
	ADuC831 ADuC832	8051	131 KHz to 16.78	external: 24/8 data	8	3/5	25 to 50mW (3V)	33 to 39mW			
	ADuC836 ADuC834	8051	98.3 KHz to 12.58	external: 16/8 code, 24/8 data	8	3/5	25mW (3V)	18 to 60mW			
	ADuC841 ADuC842 ADuC843	8051	Up to 16.78	external: 24/8 data	8	3/5	25 to 50mW (3V)	33 to 39mW			
	ADuC844 ADuC846	8051	98 KHz to 12.58	external: 24/8 data	8	3/5	2.3mA (3.6V)	33 to 39mW			
	ADuC845	8051	98 KHz to 12.58	external: 24/8 data	8	3/5	2.3mA (3.6V)	33 to 39mW			
	ADuC847	8051	98 KHz to 12.58	external: 24/8 data	8	3/5	2.3mA (3.6V)	33 to 39mW			
	ADuC848	8051	98 KHz to 12.58	external: 24/8 data	8	3/5	2.3mA (3.6V)	33 to 39mW			
<a href="http://www.atmel.com">Atmel</a> <a href="http://www.atmel.com">www.atmel.com</a>	CAN Multiplexing	8051	40			2.7 to 5.5					

# 2004 EDN Microcontroller/Microprocessor directory

8-BIT MICROPROCESSORS

Memory	Memory controller	MMU	Package selection	Timers	Serial, Parallel I/O	Interrupts	ADC/DAC	Temperature ranges (degrees Celsius)	Additional features	Price (10,000)
Up to 64-kbyte program and 64-kbyte data memory			Licensee Option	Four 8-bit or two 16-bit	Four 8-bit ports, serial channel	13, four levels		N/A (Core)	OCI debug interface and FS2 debugger, reprogrammable or radiation tolerant block.	Royalty-free license
8-kbyte Flash/EE, 640-byte Flash/EE, 256-byte SRAM	DMA to external data memory		52 PQFP, 56 CSP	Three 16-bit	UART, I2C, SPI, four 8-bit ports	Nine	Eight channel 12-bit, 200Ksps; two 12-bit voltage-output DACs	-40 to +125	On-chip voltage reference and temperature sensor	\$6.85
8-kbyte Flash/EE, 640-byte Flash/EE, 256-byte SRAM			28 TSSOP	Three 16-bit, wake up, real-time	UART, I2C, SPI, 11 PIO	11	Six channel 12-bit, 5- $\mu$ sec; two 12-bit DAC	-40 to +125	On-chip voltage reference and temperature sensor	\$3.73
8-kbyte Flash/EE, 640-byte Flash/EE, 256-byte SRAM			52 PQFP, 56 CSP	Three 16-bit, wake up, real-time	UART, I2C, SPI, 26 PIO	11	Dual 24/16-bit with programmable gain; 12-bit DAC	-40 to +85	On-chip excitation and transducer burn-out current sources	\$7.51 to \$8.86
62-kbyte Flash/EE, 4-kbyte Flash/EE, 2-kbyte + 256-byte SRAM			52 PQFP, 56 CSP	Three 16-bit, wake up, real-time, dual 16-bit PWM	UART, I2C, SPI, four 8-bit ports	12	Eight channel 12-bit, 200Ksps; two 12-bit voltage-output DACs	-40 to +125	Dual data pointer, 11-bit stack pointer, on-chip PLL, upgrade for ADuC812	\$7.62
62-kbyte Flash/EE, 4-kbyte Flash/EE, 2-kbyte + 256-byte SRAM			52 PQFP, 56 CSP	Three 16-bit, wake up, real-time, dual 16-bit PWM	UART, I2C, SPI, 26 PIO	11	Dual 24/16-bit with programmable gain; 12-bit DAC	-40 to +125	Dual data pointer, 11-bit stack pointer, upgrade for ADuC824/816	\$8.70 to \$10.16
62-kbyte Flash/EE, 4-kbyte Flash/EE, 2-kbyte + 256-byte SRAM			8x8-mm CSP, 52 PQFP	Three 16-bit, wake up, real-time, dual 16-bit PWM	UART, I2C, SPI, four 8-bit ports	12	Eight channel 12-bit, 400Ksps; two 12-bit, voltage-output DAC; 20-ppm reference	-40 to +125	Single-cycle 8052 core, PLL, fast core version of ADuC831/832	\$4.45 to \$7.95
62-kbyte Flash/EE, 4-kbyte Flash/EE, 2-kbyte + 256-byte SRAM			8x8-mm CSP, 52 MQFP	Three 16-bit, wake up, real-time	UART, SPI, I2C	11	Dual 24/16-bit sigma-delta with programmable gain; 12-bit DAC	-40 to +125	Single-cycle 8052 core, on-chip PLL	\$8.20 to \$12.27
62-kbyte Flash/EE, 4-kbyte Flash/EE, 2-kbyte + 256-byte SRAM			8x8-mm CSP, 52 MQFP	Three 16-bit, wake up, real-time, single and dual PWM	UART, SPI, I2C	11	10 channel 24-bit, dual sigma-delta with PGA; 12-bit DAC	-40 to +125	Single-cycle 8052 core, on-chip PLL	\$7.37 to \$10.10
62-kbyte Flash/EE, 4-kbyte Flash/EE, 2-kbyte + 256-byte SRAM			8x8-mm CSP, 52 MQFP	Three 16-bit, wake up, real-time, single and dual PWM	UART, SPI, I2C	11	10 channel 24-bit, sigma-delta with PGA; 12-bit DAC	-40 to +125	Single-cycle 8052 core, on-chip PLL	\$5.25 to \$7.95
62-kbyte Flash/EE, 4-kbyte Flash/EE, 2-kbyte + 256-byte SRAM			8x8-mm CSP, 52 MQFP	Three 16-bit, wake up, real-time, single and dual PWM	UART, SPI, I2C	11	10 channel 16-bit, sigma-delta with PGA; 12-bit DAC	-40 to +125	Single-cycle 8052 core, on-chip PLL	\$4.65 to \$6.85
16- to 64-kbyte			44 CABGA, 24/28 SOIC, 28/44 PLCC, 32/44 VQFP	Three, PCA, watchdog	Four-channel CAN, UART	20 or 34	10-bit	0 to +70 -40 to +85	In-system programming	

# 2004 EDN Microcontroller/Microprocessor directory

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	MP3 Decoder	8051	20			2.7 to 3.6					
	Smart Card Reader	8051	16, 32			3.6 to 5.5					
	AVR	AVR	1 to 24	16/8	16	1.8 to 5.5	1 to 3mA	Less than 1mA	8x8 (un)signed, 16x16 signed	Two-cycle 8x8 fixed-point	
	C251 OTP/ROM/ROMLESS	8051	40			2.7 to 5.5					
	DVD AVR	AVR	1 to 40	16/8	16	3 to 3.6	1 to 3mA	Less than 1mA	8x8 (un)signed, 16x16 signed	Two-cycle 8x8 fixed-point	
	FPSLIC Secure		1 to 25	16/8	16	3 to 3.6	2 to 3mA/MHz	Less than 100mA	8x8 (un)signed, 16x16 signed	Two-cycle 8x8 fixed-point	
	LCD AVR	AVR	1 to 20	16/8	16	1.8 to 5.5	1mA/MHz	Less than 1uA	8x8 (un)signed, 16x16 signed	Two-cycle 8x8 fixed-point	
	MARC4		32 KHz to 4		8	1.8 to 6.5	220µA (3V)	Sleep: 600nA deep sleep: 300nA			
	Mask ROM	CISC	66			2.7 to 5.5					
	MCS 51 AT 89 family	8051	12 to 40	8	16	2.7 to 6	80mW	Idle: 2mA, powerdown: Less than 1uA	8x8		
	MEGA AVR	AVR	1 to 24	16/8	16	1.8 to 5.5	1 to 3mA	Less than 1uA	8x8 (un)signed, 16x16 signed	Two-cycle 8x8 fixed-point	
	One Time Programmable	CISC	66			2.7 to 5.5					
	RF AVR	AVR	1 to 19	16/8	16	2 to 5	1 to 3mA	Less than 1mA	8x8 (un)signed, 16x16 signed	Two-cycle 8x8 fixed-point	
	ROMless	CISC	60			2.7 to 5.5					

# 2004 EDN Microcontroller/Microprocessor directory

8-BIT MICROPROCESSORS

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64			80 TQFP, 81 BGA	Two	UART, TWI, USB, SPI, I2S	44	10-bit	0 to +70 -40 to +85	MP3 decoder, MMC, IDE, In-system programming	
16/32			24 SSOP, 20 TSSOP, 28/52 PLCC, 32/64 VQFP		UART, USB, SPI, PCMCIA			0 to +70 -40 to +85	ISO7816, DC/DC converter, EMV pre-certified software	
1- to 128-kbyte Flash, 64- to 4-kbyte EEPROM, 128-byte to 4-kbyte SRAM			20 SSOP, 8/20 SOIC, 32/44/64 TQFP, 8/20/28/40 DIP	Two 8-bit, two 16-bit	SPI, UART, I2C, 8-bit parallel (64-kbyte addressing)	27, eight external	Eight channel 10-bit		JTAG debug	50 cents to \$4
1- to 64-kbyte Flash			40 PDIL, 44 PLCC, 44 VQFP	Three, PCA, watchdog	UART, SPI, TWI	32		0 to +70 -40 to +85		
12-kbyte SRAM			128/208 LQFP		UART	27, eight external	10-bit	-40 to +85	DVD/CD ATAPI interface and servo controller	From \$1
20- to 32-kbyte program, 4- to 16-kbyte data, reconfigurable, EEPROM (Secure)			84 PLCC, 100 TQFP, 144/208 PQFP, 256 caBGA (Secure)	Two 8-bit, 16-bit	UART, I2C, 8-bit PIO	31, four external			5000- to 40,000-gate FPGA, JTAG debug	\$5 to \$85
16- to 32-kbyte Flash, 512-byte to 1-kbyte EEPROM, 1- to 2-kbyte SRAM			64 TQFP, 64 MLF, Die	Two 8-bit, 16-bit	SPI, UART, TWI, 8-bit parallel (64-kbyte addressing)	27, eight external	Eight channel 10-bit	-40 to +85	Self-programming memory, LCD, JTAG debug	\$2.50 to \$4
2- to 4-kbyte ROM, 256-nibbles RAM, 512-bit EE			20/44 SSO	One or two		Three or four, four to 10 external		-40 to +85 -40 to +105 -40 to +125	Switchable clock sources, brown out	\$1.25 to \$2.50 (60-kbyte ROM)
4- to 64-kbyte			20 SOIC, 44 TQFP, 64/80 VQFP, 44/52 PLCC, 20/28 SOIC, 24/16 SSOP, 20/24/40 PDIP	Three, PCA, watchdog	UART, SPI, USB, I2S	32 or 48	10-bit	0 to +70 -40 to +85	IDE, MMC, baud-rate generator, keyboard interface	
1- to 64-kbyte Flash, 2-kbyte EEPROM, 128 to 2048-bytes SRAM			20 SOIC, 44 TQFP, 64/80 VQFP, 44/52 PLCC, 20/28 SOIC, 24/16 SSOP, 20/24/40 PDIP	One to three 16-bit	SPI, full-duplex UART, CAN, USB	Nine, four levels	Eight channel 10-bit	0 to +70 -40 to +85 -40 to +125	MP3, In-system-programmable Flash, three-level lock bit security, smart-card reader interface	50 cents to \$4
4- to 256-kbyte Flash, 256-byte to 4-kbyte EEPROM, 128-byte to 8-kbyte SRAM			44 PLCC, 28/40 DIP, 32/44/64 TQFP, 32/44/64 MLF, Die	Two 8-bit, two 16-bit	SPI, UART, TWI, 8-bit parallel (64-kbyte addressing)	27, eight external	Eight channel 10-bit	-40 to +85	Self-programming memory, JTAG debug	\$1 to \$6
4- to 64-kbyte			20 SOIC, 44 TQFP, 64/80 VQFP, 44/52 PLCC, 20/28SOIC, 24/16 SSOP, 20/24/40 PDIP	Three, PCA, watchdog	UART, SPI	32 or 48	10-bit	0 to +70 -40 to +85	RC oscillator, programmable I/O	
2-kbyte Flash, 128-byte EEPROM, 128-byte SRAM			20 TSSOP	8-bit		27, eight external		-40 to +85	PLL-based RF transmitter, 250 to 450 MHz	\$1.20
			40 PDIL, 44/64 VQFP, 44/68/52 PLCC	Three, PCA, watchdog	UART, SPI, TWI	32 or 48		0 to +70 -40 to +85		

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	SECURE AVR	AVR		16/8	16	2.7 to 5.5	1 to 3mA	Less than 1 mA	8x8 (un)signed, 16x16 signed	Two-cycle 8x8 fixed-point	
	TCP Trusted Computing	AVR	1 to 33	16/8	16	3 to 3.6	1 to 3mA	Less than 1mA	8x8 (un)signed, 16x16 signed	Two-cycle 8x8 fixed-point	
	TINY AVR	AVR	1 to 20	16/8	16	1.8 to 5.5	1 to 3mA	Less than 1uA	8x8 (un)signed, 16x16 signed	Two-cycle 8x8 fixed-point	
	USB AVR	AVR	1 to 24	16/8	16	4.5 to 5.5	1 to 3mA	Less than 1uA	8x8 (un)signed, 16x16 signed	Two-cycle 8x8 fixed-point	
Cybernetic Micro Systems <a href="http://www.controlchips.com">www.controlchips.com</a>	P-51	8051	51	16/8 (8051), 20/8 (EISA)	8, 16	3.3/ 5 tolerant	150mW		8x8	Single-cycle square root: 8-bit root of 16-bit number	
Cypress MicroSystems <a href="http://www.cypress.com">www.cypress.com</a>	CY8C21123 CY8C21223 CY8C21323	M8C	24	16/8	8, 16, 24	2.4 to 5.25	2mA	Analog, digital, both			
	CY8C21234 CY8C21334 CY8C21434	M8C	24	16/8	8, 16, 24	2.4 to 5.25	3mA	Analog, digital, both			
	CY8C22113 CY8C22213	M8C	24	16/8	8, 16, 24	3 to 5.25	5mA	Analog, digital, both	8x8 multiply/32-bit accumulate unit		
	CY8C24123 CY8C24223 CY8C24423	M8C	24	16/8	8, 16, 24	3 to 5.25	5mA	Analog, digital, both	8x8 multiply/32-bit accumulate unit		
	CY8C27143 CY8C27243 CY8C27443 CY8C27543 CY8C27643	M8C	24	16/8	8, 16, 24	3 to 5.25	10mA	Analog, digital, both	8x8 multiply/32-bit accumulate unit		
	CY8C27466 CY8C27566 CY8C27666 CY8C27866	M8C	24	16/8	8, 16, 24	3 to 5.25	10mA	Analog, digital, both	Two 8x8 multiply/32-bit accumulate units		
	CY8C29466 CY8C29566 CY8C29666 CY8C29866	M8C	24	16/8	8, 16, 24	3 to 5.25	10mA	Analog, digital, both	Two 8x8 multiply/32-bit accumulate units		

# 2004 EDN Microcontroller/Microprocessor directory

8-BIT MICROPROCESSORS

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8- to 64-kbyte Flash, 32- to 256-kbyte MaskROM, 4- to 72-kbyte EEPROM, 1.5- to 6-kbyte SRAM			44 LQFP, Die, Module	Two 16-bit	TWI	27, eight external		-40 to +85	16-bit coprocessor, ISO 7816 external interface, common criteria EAL4+	From \$2
32-kbyte MaskROM, 32-kbyte EEPROM, 2-kbyte SRAM			28 TSSOP			27, eight external		-40 to +85	Fully TCG/TCPA-compliant security processor, TSS drivers	\$3
1- to 2-kbyte Flash, 64- to 128-kbyte EEPROM, 64-kbyte to 128-kbyte SRAM			32 TQFP, 32 MLF, 8/20 SOIC, 8/20/28 DIP, Die	Two 8-bit	8-bit parallel (64-kbyte addressing)	27, eight external	Four or 11 channel 10-bit	-40 to +85	In-system programming	39 cents to \$1
16- to 24-kbyte MaskROM, 16- to 24-kbyte EEPROM, 512-kbyte to 1-kbyte SRAM			48/64/100 LQFP	8-bit, 16-bit	SPI, full-speed USB	27, eight external	12 channel 10-bit	-40 to +85	Two- to four-hub port, three to six function endpoints	\$1.50 to \$4
4-kbyte dual-port RAM, 8-kbyte program RAM, direct host read, write access	Register to select code RAM or data RAM for direct host access	Pins/registers set address mapping into host address space	100 SQFP	Three 16-bit	Four 8-bit ports, full duplex UART, PC-104- or 8051-compatible 8-bit host interface	Seven, via write/read to specific memory location		0 to +70 -55 to +125 (storage)	Breakpoint/single-step debugging, selectable IRQ and memory addressing, looks like a memory device to host	\$12
4-kbyte program Flash, 256-kbyte SRAM			8 PDIP, 16 SOIC, 24 MLF	Up to four user-definable 8/16/24/32-bit, timers, counters, PWMs	Up to two user-definable SPI, up to one user definable UART, up to 12 PIO		Up to two 10-bit; up to two analog comparators	-40 to +85 -40 to +125	User definable comparators, pseudorandom sequence generator,	From 74 cents
8-kbyte program Flash, 512-kbyte SRAM			16 SOIC, 20 SSOP, 32 MLF	Up to four user-definable 8/16/24/32-bit, timers, counters, PWMs	Up to two user-definable SPI, up to one user definable UART, up to 28 PIO		Up to two 10-bit; up to two analog comparators	-40 to +85 -40 to +125	User definable comparators, pseudorandom sequence generator,	From \$1.03
2-kbyte program Flash, 256-kbyte SRAM			8 PDIP, 8 SOIC, 20 PDIP, 20 SSOP	Up to four user-definable 8/16/24/32-bit, timers, counters, PWMs	Up to two user-definable SPI, up to one user definable UART, up to 16 PIO	11	Up to one 13-bit; up to one 6/8-bit DAC	-40 to +85 -40 to +125	User definable filters, amplifier/scalers, comparators, pseudorandom sequence generator,	From 78 cents
4-kbyte program Flash, 256-kbyte SRAM			8 PDIP, 8 SOIC, 20 PDIP, 20SSOP	Up to four user-definable 8/16/24/32-bit, timers, counters, PWMs	Up to two user-definable SPI, up to one user definable UART, up to 24 PIO	12	Up to two 13-bit; up to two 6/8-bit DAC	-40 to +85 -40 to +125	User definable filters, amplifier/scalers, comparators, pseudorandom sequence generator,	From \$1.03
16-kbyte program Flash, 256-kbyte SRAM			8 PDIP, 20 SSOP, 28 PDIP, 28 SSOP, 44 TQFP, 48 SSOP, 48 MLF,	Up to eight user-definable 8/16/24/32-bit, timers, counters, PWMs	Up to four user-definable SPI, up to two user definable UART, up to 44 PIO	18	Up to two 13-bit; up to four 6/8-bit DAC	-40 to +85 -40 to +105	User definable filters, amplifier/scalers, comparators, pseudorandom sequence generator,	From \$1.76
32-kbyte program Flash, 1-kbyte SRAM			28 PDIP, 28SSOP, 44 TQFP, 48 SSOP, 48 MLF, 100 TQFP	Up to eight user-definable 8/16/24/32-bit, timers, counters, PWMs	Up to four user-definable SPI, up to two user definable UART, up to 64 PIO		Up to four 13-bit; up to four 6/8-bit DAC	-40 to +85 -40 to +125	User definable filters, amplifier/scalers, comparators, pseudorandom sequence generator,	From \$2.15
32-kbyte program Flash, 2-kbyte SRAM			28 PDIP, 28SSOP, 44 TQFP, 48 SSOP, 48 MLF, 100 TQFP	Up to 16 user-definable 8/16/24/32-bit, timers, counters, PWMs	Up to eight user-definable SPI, up to four user definable UART, up to 64 PIO		Up to four 13-bit; up to four 6/8-bit DAC	-40 to +85 -40 to +125	User definable filters, amplifier/scalers, comparators, pseudorandom sequence generator,	From \$2.52

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Dallas Semiconductor/Maxim <a href="http://www.maxim-ic.com">www.maxim-ic.com</a>	DS500x DS5240 DS5250 DS225x	8051	16, 25	16/8 or 24/8	8	4.5 to 5.5	30 to 100mA	Stop, idle			
	DS80C320 DS87C520 DS87C530 DS89C420 DS89C430 DS89C440 DS89C450	8051	18, 25, 33	16/8	8	2.7 to 5.5	10 to 100mA	Stop, idle			
	DS80C390 DS80C400	8051	40, 75	22/8 or 24/8	8	4.5 to 5.5	35 to 75mA	Yes	16x16 MAC		
	DS87C550 MAX765x	8051	12, 33	16/8	8	2.7 to 5.5	10 to 30mA	Yes			
Freescale <a href="http://www.freescale.com">www.freescale.com</a>	68HC08 family AB series	HC08	8	8	8	5	100mW	Wait, stop			
	68HC08 family AP series	HC08	8	8	8	3 to 5	500mW	Wait, stop, auto-wakeup			
	68HC08 family AS, AZ series	HC08	8	8	8	5	125mW	Wait, stop			
	68HC08 family GB, GT series (HCS08)	HC08	20	8	8	1.8 to 3.6	54mW	Powerdown: 20 nA, wait, stop, auto wake-up			
	68HC08 family GP, GT series	HC08	8	8	8	3 to 5	75mW	Wait, stop, auto-wakeup			
	68HC08 family GR, GZ series	HC08	8	8	8	3.3 to 5	100mW	Wait, stop, auto-wakeup			
	68HC08 family GR8 series	HC08	8	8	8	3 to 5	75mW	Wait, stop, auto-wakeup			
	68HC08 family JB series	HC08	3, 6	8	8	5	25mW	Wait, stop			
	68HC08 family JL, JK series	HC08	8	8	8	3 to 5	50mW	Wait, stop			
	68HC08 family KX series	HC08	8	8	8	3 to 5	75mW	Wait, stop, auto-wakeup			
	68HC08 family LJ, LK series	HC08	8	8	8	3.3 to 5	75mW	Wait, stop, auto-wakeup			
	68HC08 family MR series	HC08	8	8	8	5	125mW	Wait			

# 2004 EDN Microcontroller/Microprocessor directory

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ROMless versions, up to 5-kbyte nonvolatile SRAM, 32-, 64-, or 128-kbyte SRAM		MMU (DS5240only)	80/100 QFP, 40/72 SIMM	Two or three 16-bit, watchdog	One or two full-duplex UART	Six or 15		0 to +70 -40 to +85	In-system-programmable, nonvolatile memory-control circuitry	\$7 to \$50
8- or 16-kbyte EPROM, 16-, 32-, or 64-kbyte Flash, 256-byte, 1-, or 4-kbyte RAM			PDIP, PLCC, TQFP	Three 16-bit, real-time, watchdog	Two full-duplex UART	10 to 14		0 to +70 -40 to +85	In-system-programmable, EMI reduction, dual DPTR, nonvolatile SRAM	\$4 to \$25
256-bytes RAM, 4-kbyte SRAM, 512-bytes RAM for CAN		MMU	64 QFP, 68 PLCC, 100 LQFP	Three or four 16-bit, watchdog	Two full-duplex UART, CAN, 10/100 Ethernet	16		0 to +70 -40 to +85	TCP/IP network stack with integrated Ethernet. 1-Wire	\$8 to \$10
256-byte RAM, 1-kbyte SRAM, 8-kbyte EPROM, 16-kbyte Flash			64 TQFP, 68 PLCC, 80 PQFP, 68 Windowed CLCC	Three 16-bit, four-channel 8-bit PWM, watchdog	Two full-duplex UART	11 or 16	Eight channel 10-bit or 12-bit; PWM DAC	0 to +70 -40 to +85	Dual DPTR, EMI reduction	\$7.60 to \$12
32-kbyte Flash, 1k-byte RAM, 512-byte EEPROM			64 QFP	Eight 16-bit, PWM	SCI, SPI, 51 GPIO	IRQ, KBI (five pins)	Eight channel 8-bit	-40 to +85 -40 to +125	COP, Low-voltage inhibit	\$3.95 to 5.95
8k- to 64-kbyte Flash, 1k- to 2k-byte RAM			48 LQFP, 44 QFP, 42 SDIP	Four 16-bit, PWM	Two SCI, SPI, I2C, up to 32 GPIO	IRQ, KBI (eight pins)	Eight channel 10-bit	-40 to +85	COP, Low-voltage inhibit, Infrared SCI	\$2.50 to \$4.50
60-kbyte Flash, 2k-byte RAM, 1k-byte EEPROM			52 PLCC, 64 QFP	Eight 16-bit, PWM	SCI, SPI, CAN, BDLC, up to 50 GPIO	IRQ, KBI (five pins)	Fifteen channel 8-bit	-40 to +85 -40 to +105 -40 to +125	COP, Low-voltage inhibit	\$4.75 to \$6.75
32- to 60-kbyte Flash, 2- to 4-kbyte RAM			44/64 QFP, 42 SDIP, 48 QFN	Eight 16-bit, PWM	Two SCI, SPI, I2C, up to 56 GPIO	IRQ, KBI (up to eight pins)	Eight channel 10-bit	-40 to +85	Debug module with two comparators and nine trigger modes, single-pin interface, background debug, hardware breakpoint	\$2.75 to \$5.05
8- to 32-kbyte Flash, 512-byte RAM			20 DIP, 42 SDIP, 44 QFP	Four 16-bit, PWM	SCI, SPI, up to 33 GPIO	IRQ, KBI (eight pins)	Eight channel 8-bit	-40 to +85	COP, Low-voltage inhibit, high current pins	\$3.50 to \$5.50
16- to 60-kbyte Flash, 1k- to 2k-byte RAM			32 LQFP, 48 LQFP, 64 QFP	Four to eight 16-bit, PWM	ESCI, SPI, CAN, up to 53 GPIO	IRQ, KBI (eight pins)	Eight to 24 channel 8-bit	-40 to +85 -40 to +105 -40 to +125	COP, Low-voltage inhibit, high current pins	\$3.60 to \$4.20
4- to 8-kbyte Flash, 384-byte RAM			28 DIP, 28 SOIC, 32 LQFP	Three 16-bit, PWM	SCI, SPI, up to 21 GPIO	IRQ, KBI (four pins)	Six channel 8-bit	-40 to +85 -40 to +105 -40 to +125	COP, Low-voltage inhibit, high current pins	\$2.25 to \$3.30
8- to 16-kbyte Flash, 256- to 384-byte RAM			20 DIP, 44 QFP, 32 LQFP, 20 to 28 SOIC	Two to four 16-bit	USB 2.0, SCI, up to 37 GPIO	IRQ, KBI (up to eight pins)		0 to +70	COP, Low-voltage inhibit, high current pins	\$1.90 to \$4.25
1.5k to 4-kbyte Flash, 128- to 256-byte RAM			20 to 28 SOIC, 20 to 28 DIP, 20 to 28 PDIP, 32 to 48 LQFP, 32 SDIP	Two to four 16-bit, PWM	SCI, up to 26 GPIO	IRQ, KBI (up to eight pins)	12 to 14 channel 8-bit	-40 to +85 -40 to +125	COP, Low voltage inhibit, high current pins, RC oscillator option	\$1.25 to \$2.25
2- to 8-kbyte Flash, 192-byte RAM			16 DIP, 16 SOIC	Two 16-bit, PWM	SCI, up to 13 GPIO	IRQ, KBI (five pins)	Four channel 8-bit	-40 to +85 -40 to +105 -40 to +125	COP, Trimmable internal oscillator, Low-voltage inhibit, high current pins	\$1.95 to \$2.50
12- to 24-kbyte Flash, 512 to 768 byte RAM			64 QFP, 64 LQFP, 52 LQFP, 80 QFP, 80 LQFP	Four 16-bit, PWM	SCI with IR, SPI, LCD, up to 48 GPIO	IRQ, KBI (eight pins)	Six channel 10-bit	-40 to +85	COP, Low-voltage inhibit, high current pins	\$3.25 to \$4.90
16- to 32-kbyte Flash, 768-byte RAM			64 QFP, 56 SDIP	Six 16-bit, six 12-bit PWM	SCI, SPI, up to 42 GPIO	IRQ	Ten channel 10-bit	-40 to +85 -40 to +105	COP, Low-voltage inhibit, MC fault protection	\$3.60 to \$6.45

# 2004 EDN Microcontroller/Microprocessor directory

## 8-BIT MICROPROCESSORS

Company name	Device name or family	Instruction set architecture	CPU frequency (MHz)	Bus interface (address/data) (bits)	Instruction width (bits)	Core / I/O operating voltages (V)	Typical power at maximum frequency	Powerdown modes and minimum power	DSP/multiplication hardware support (bits)	FPU	Caching
	68HC08 family QT/QY series	HC08	3.2	8	8	3 to 5	30mW	Wait, stop, auto wakeup			
	68HC08 family SR12	HC08	8	8	8	3 to 5	120mW	Wait, stop, auto wakeup			
Fujitsu Micro-electronics America <a href="http://www.fma.fujitsu.com">www.fma.fujitsu.com</a>	F2MC - 8FX	F2MC-8L/8FX	1 to 10	16/8	16	1.8 to 5.5	17.5mW	Sleep, stop, subclock, watch, timer			
	F2MC - 8L	F2MC-8L	1 to 12.5	16/8	16	2.2 to 6	30mW	Sleep, stop, subclock, watch, timer			
Infineon Technologies <a href="http://www.infineon.com/microcontrollers">www.infineon.com/microcontrollers</a>	C504	8051 C500	40	16/8	8	5	154mW	Slow down, idle, powerdown	8x8		
	C505CA	8051 C500	40	16/8	8	5	143mW	Slow down, idle, powerdown	8x8		
	C505L	8051 C500	40	16/8	8	5	143mW	Slow down, idle, powerdown	8x8		
	C508	8051 C500	40	16/8	8	5	113mW	Slow down, idle, powerdown	8x8		
	C515C	8051 C500	20	16/8	8	5	94mW	Slow down, idle, powerdown	8x8		
	C868	8051 C500	40	16/8	8	3.3	52mW	Slow down, idle, powerdown	8x8		
Intel <a href="http://www.intel.com">www.intel.com</a>	80C186EA/XL 80C188EA/XL		8, 12, 13, 20, 25	external: 16/16	8, 16	3, 5	100 to 105mA	Idle, powerdown, powersave		Co-processor	
	MCS51 8XCxx 8XC51Fx 8XC51Rx 83C51KB	MCS51	12, 16, 24, 33	8	8	4.5 to 5.5 +/- 10%	24mA	Idle, powerdown	8x8		
Microchip Technology <a href="http://www.microchip.com">www.microchip.com</a>	PIC10	PICmicro	4	12/8	12	2 to 5.5	2mW	low power sleep			
	PIC12	PICmicro	20	14/8	12, 14	2 to 5.5	10mW	low power sleep, individual peripheral enable			

# 2004 EDN Microcontroller/Microprocessor directory

8-BIT MICROPROCESSORS

Memory	Memory controller	MMU	Package selection	Timers	Serial, Parallel I/O	Interrupts	ADC/DAC	Temperature ranges (degrees Celsius)	Additional features	Price (10,000)
1.5- to 4-kbyte Flash, 128-byte RAM			8 DIP/DFN, 16 PDIP, 16 TSSOP, 8 to 16 SOIC	Two 16-bit, PWM	Five to 13 GPIO	IRQ, KBI (up to six pins)	Four channel 8-bit	-40 to +85 -40 to +105 -40 to +125	COP, trimmable internal oscillator, Low-voltage inhibit, high current pins	70 cents to \$1.33
12-kbyte Flash, 512-byte RAM			48 LQFP, 42 SDIP	Four 16-bit, three 8-bit PWM	SCI, I2C, up to 31 GPIO	IRQ, KBI (eight pins)	14 channel 10-bit	-40 to +85 -40 to +125	COP, Low-voltage inhibit, Current sensor, temperature sensor	\$3.50 to \$4.00
128-byte to 2-kbyte RAM, 8- to 60-kbyte ROM, 32- to 60-kbyte Flash			28/48/64/80/100 QFP/QFP/SOP	8/16-bit, 21-bit time-base, 8 bit PWM, PPG, PWC, realtime, watchdog	SIO, I2C, SM bus, LIN-UART, up to 85 GPIO	Up to 16 external	Eight channel (maximum) 8/10-bit; DAC	-40 to +85	Ultra low power, Internal CR Osc, Brownout detect, remote-control carrier generator, LCD driver, embedded dual operation Flash memory	From \$1
128-byte to 18-kbyte RAM, 4- to 60-kbyte ROM, 16- to 60-kbyte Flash			48/64 QFP/LQFP	8/16-bit, 21-bit time-base, 8 bit PWM, PPG, PWC, watchdog	SIO, I2C, USB, SM bus, UART, up to 85 PIO	Up to 16 external	Eight channel (maximum) 8/10-bit; DAC	-40 to +85	Internal CR Osc, RTC, Buzzer output, remote-control carrier generator, DTMF generator, LCD driver, VFD, stepper-motor control, Inverter control	From 98 cents
16- to 32-kbyte ROM/OTP or ROMless, 512-bytes RAM	8-bit, up to 64-kbyte		44 PMQFP	Five 16-bit, seven-channel PWM	UART, 32 PIO	Six, six external	Eight channel 10-bit	0 to +70 -40 to +85 -40 to +125	Motor-control peripheral	\$3.50 (ROMless)
16- to 32-kbyte ROM/OTP or ROMless, 1.2-kbyte RAM	8-bit, up to 64-kbyte		44 PMQFP	Three 16-bit, four-channel PWM	CAN 2.0B, UART, 34 PIO	Six, six external	Eight channel 10-bit	0 to +70 -40 to +85 -40 to +125		\$4.50 (ROMless)
16- to 32-kbyte ROM/OTP or ROMless, 512-byte RAM	8-bit, up to 64-kbyte		80 PMQFP	Three 16-bit	UART, 46 PIO	Six, six external	Eight channel 10-bit	0 to +70 -40 to +85	128-segment LCD controller	\$5 (OTP)
16- to 32-kbyte ROM/OTP or ROMless, 1.2-kbyte RAM	8-bit, up to 64-kbyte		64 PMQFP	Five 16-bit, 11-channel PWM	UART, 40 PIO (eight-input only)	Nine, 10 external	Eight channel 10-bit	0 to +70 -40 to +85	Motor-control peripheral, PLL	\$3.50 (ROMless)
64-kbyte ROM/OTP or ROMless, 3.2-kbyte RAM	8-bit, up to 64-kbyte		80 PMQFP	Three 16-bit, four-channel PWM	CAN 2.0B, UART, SPI, 49 PIO, eight-input only	Seven, 10 external	Eight channel 10-bit	0 to +70 -40 to +85		\$5 (ROMless)
8-kbyte ROM/SRAM, 512-byte RAM			38 PTSSOP, 28 PDSO	Five 16-bit, seven-channel PWM	UART, SPI/I2C (for booting), 13 PIO (five-input only)	Nine, four external	Four channel 8-bit	-40 to +85 -40 to +125	Brownout, motor-control peripheral, PLL	Up to \$2
			68 PLCC, 68 PGA, 68 LCC, 80 QFP, 80 SQFP	Three 16-bit		Two, five external				\$3.90 to \$20.35
8-, 16-, or 32-kbyte EPROM, OTP, ROM, 256- or 512-byte RAM			44 PLCC, 44 PDIP, 44 MQFP	Three 16-bit, PCA, watchdog	Full-duplex UART	Eight, two levels				\$1.61 to \$5.48
384- to 768-byte Flash, 16- to 24-byte RAM			6 SOT-23, 8 PDIP	8-bit				-40 to +125	Comparator	49 to 65 cents
768- to 3584-byte ROM, OTP, Flash, 25- to 128-byte SRAM, 16- to 256-byte EEPROM			8 PDIP, 8 SOIC, 8 CERDIP, 8 DFN	8/16-bit real-time/counter (8-bit programmable prescaler)		Four to 12	Up to four channel 8/10-bit	-40 to +125	In-circuit serial programming, low-voltage detect, brownout reset, internal oscillator, analog comparator	80 cents to \$2

# 2004 EDN Microcontroller/Microprocessor directory

## 8-BIT MICROPROCESSORS

Company name	Device name or family	Instruction set architecture	CPU frequency (MHz)	Bus interface (address/data) (bits)	Instruction width (bits)	Core / I/O operating voltages (V)	Typical power at maximum frequency	Powerdown modes and minimum power	DSP/multiplication hardware support (bits)	FPU	Caching
	PIC16	PICmicro	20	14/8	12, 14	2 to 6	50mW	low power sleep, individual peripheral enable			
	PIC18	PICmicro	40	16/8	16	2 to 5.5	60mW	low power sleep, individual peripheral enable	8x8		
	rfPIC	PICmicro	20	14/8	12, 14	2.5 to 5.5	10mW	low power sleep, individual peripheral enable			
National Semiconductor <a href="http://www.national.com">www.national.com</a>	COP8 Family COP8AME	COP8, Modified Harvard	20 (on-chip frequency doubler)	All memory internal.	8	4.5 to 5.5	50mW	Active idle: 21mW, sleep: 48mW			
	COP8 Family COP8CBE9	COP8, Modified Harvard	20 (on-chip frequency doubler)	All memory internal.	8	2.7 to 5.5	50mW	Active idle: 21mW, sleep: 48mW			
	COP8 Family COP8CBR9	COP8, Modified Harvard	20 (on-chip frequency doubler)	All memory internal.	8	2.7 to 5.5	50mW	Active idle: 21mW, sleep: 48mW			
	COP8 Family COP8CCE9	COP8, Modified Harvard	20 (on-chip frequency doubler)	All memory internal.	8	4.5 to 5.5	50mW	Active idle: 21mW, sleep: 48mW			
	COP8 Family COP8CCR9	COP8, Modified Harvard	20 (on-chip frequency doubler)	All memory internal.	8	4.5 to 5.5	50mW	Active idle: 21mW, sleep: 48mW			
	COP8 Family COP8CDR9	COP8, Modified Harvard	20 (on-chip frequency doubler)	All memory internal.	8	2.7 to 5.5	50mW	Active idle: 21mW, sleep: 48mW			
	COP8 Family COP8SBE9	COP8, Modified Harvard	20 (on-chip frequency doubler)	All memory internal.	8	2.7 to 5.5	50mW	Active idle: 21mW, sleep: 48mW			
	COP8 Family COP8SBR9	COP8, Modified Harvard	20 (on-chip frequency doubler)	All memory internal.	8	2.7 to 5.5	50mW	Active idle: 21mW, sleep: 48mW			
	COP8 Family COP8SCE9	COP8, Modified Harvard	20 (on-chip frequency doubler)	All memory internal.	8	4.5 to 5.5	50mW	Active idle: 21mW, sleep: 48mW			
	COP8 Family COP8SCR9	COP8, Modified Harvard	20 (on-chip frequency doubler)	All memory internal.	8	4.5 to 5.5	50mW	Active idle: 21mW, sleep: 48mW			
	COP8 Family COP8SDR9	COP8, Modified Harvard	20 (on-chip frequency doubler)	All memory internal.	8	2.7 to 5.5	50mW	Active idle: 21mW, sleep: 48mW			
	COP8 Family COP8TAB	COP8, Modified Harvard	15	All memory internal.	8	2.25 to 2.75 (Flash, ROM)	7.5mW	Active idle: 1.5mW, sleep: 5mW			

# 2004 EDN Microcontroller/Microprocessor directory

8-BIT MICROPROCESSORS

Memory	Memory controller	MMU	Package selection	Timers	Serial, Parallel I/O	Interrupts	ADC/DAC	Temperature ranges (degrees Celsius)	Additional features	Price (10,000)
768-byte to 14-kbyte ROM, OTP, Flash, 68- to 368-byte SRAM, 64- to 256-byte EEPROM			14/44 DIP/SOIC/SSOP/PLCC/TQFP/MQFP/CERDIP/QFN	8-/16-bit, PWM, capture/compare	USART, I2C, SPI, LIN, USB, 13 to 33 GPIO,	Four to 12	Four- to eight channel 8/12-bit; 8-bit DAC	-40 to +125	Op amp, in-circuit programming, low-voltage detect, brownout reset, internal oscillator, analog comparator, voltage reference	\$1.10 to \$5.50
4- to 128-kbyte OTP/Flash, 256-byte to 4-kbyte SRAM, 128-byte to 1-kbyte EEPROM			18/84 DIP/SOIC/PLCC/TQFP/SDIP/QFN	Up to five 10-bit PWM, five 8-/16-bit watchdog, start up, power-up	Up to two UART, SPI, I2C, CAN 2.0B, USB 2.0, 23 to 68 GPIO	4 external, 18 internal	10-bit 30/200 Ksps	-40 to +125	In-circuit serial programming, low-voltage detect, brownout reset	\$1.60 to \$6.50
768- to 3584-byte OTP/Flash, 16- to 128-byte EEPROM, 25- to 128-byte SRAM,			18/20 CERDIP/SSOP/SOIC	8-bit, 16-bit, watchdog		Four to 12	Four 10-bit	-40 to +125	RF transmitter, 310 to 440 MHz, 85 to 930 MHz, in-circuit serial programming, low-voltage detect, brownout reset, 25-mA source/sink per I/O	\$1.94 to \$2.09
8-kbyte Flash, 512-byte RAM, Virtual EE to flash size	SRAM, Flash		28 DIP, 28 SOIC	Three 16-bit, PWM, idle	USART, SPI, MicroWire Plus, up to 14 GPIO	Up to 15 maskable	Six channel 10-bit; op-amps, temp sensor	-40 to +125	Dynamic allocated non-volatile memory on Flash devices; 32kHz dual clock	\$4
8-kbyte Flash; 256-byte RAM, Virtual EE to flash size	SRAM, Flash		44 LLP, 44 PLCC, 48 TSSOP	Two 16-bit, PWM, idle	USART, SPI, MicroWire Plus, up to 42 GPIO	Up to 11 maskable	Up to 16 channel 10-bit	-40 to +85	Dynamic allocated non-volatile memory on Flash devices	\$3.19
32-kbyte Flash; 1024-byte RAM, Virtual EE to flash size	SRAM, Flash		44 LLP, 44/68 PLCC, 48/56 TSSOP	Three 16-bit, PWM, idle	USART, SPI, MicroWire Plus, up to 50 GPIO	Up to 13 maskable	Up to 16 channel 10-bit	-40 to +85	Dynamic allocated non-volatile memory on Flash devices	\$3.89
8-kbyte Flash; 256-byte RAM, Virtual EE to flash size	SRAM, Flash		44 LLP, 44 PLCC, 48 TSSOP	Two 16-bit, PWM, idle	USART, SPI, MicroWire Plus, up to 42 GPIO	Up to 11 maskable	Up to 16 channel 10-bit	-40 to +85	Dynamic allocated non-volatile memory on Flash devices	\$3.19
32-kbyte Flash; 1024-byte RAM, Virtual EE to flash size	SRAM, Flash		44 LLP, 44/68 PLCC, 48/56 TSSOP	Three 16-bit, PWM, idle	USART, SPI, MicroWire Plus, up to 50 GPIO	Up to 13 maskable	Up to 16 channel 10-bit	-40 to +85	Dynamic allocated non-volatile memory on Flash devices	\$3.89
32-kbyte Flash; 1024-byte RAM, Virtual EE to flash size	SRAM, Flash		44 LLP, 44/68 PLCC, 48/56 TSSOP	Three 16-bit, PWM, idle	USART, SPI, MicroWire Plus, up to 50 GPIO	Up to 13 maskable	Up to 16 channel 10-bit	-40 to +85	Dynamic allocated non-volatile memory on Flash devices	\$3.89
8-kbyte Flash; 256-byte RAM, Virtual EE to flash size	SRAM, Flash		44 LLP, 44, 48 TSSOP	Two 16-bit, PWM, idle	USART, SPI, MicroWire Plus, up to 42 GPIO	Up to 11 maskable		-40 to +85	Dynamic allocated non-volatile memory on Flash devices	\$3.16
32-kbyte Flash; 1024-byte RAM, Virtual EE to flash size	SRAM, Flash		44 LLP, 44/68 PLCC, 48/56 TSSOP	Three 16-bit, PWM, idle	USART, SPI, MicroWire Plus, up to 50 GPIO	Up to 13 maskable		-40 to +85	Dynamic allocated non-volatile memory on Flash devices	\$3.52
8-kbyte Flash; 256-byte RAM, Virtual EE to flash size	SRAM, Flash		44 LLP, 44 PLCC, 48 TSSOP	Two 16-bit, PWM, idle	USART, SPI, MicroWire Plus, up to 42 GPIO	Up to 11 maskable		-40 to +85	Dynamic allocated non-volatile memory on Flash devices	\$3.16
32-kbyte Flash; 1024-byte RAM, Virtual EE to flash size	SRAM, Flash		44 LLP, 44/68 PLCC, 48/56 TSSOP	Three 16-bit, PWM, idle	USART, SPI, MicroWire Plus, up to 50 GPIO	Up to 13 maskable		-40 to +85	Dynamic allocated non-volatile memory on Flash devices	\$3.52
32-kbyte Flash; 1024-byte RAM, Virtual EE to flash size	SRAM, Flash		44 LLP, 44/68 PLCC, 48/56 TSSOP	Three 16-bit, PWM, idle	USART, SPI, MicroWire Plus, up to 50 GPIO	Up to 13 maskable		-40 to +85	Dynamic allocated non-volatile memory on Flash devices	\$3.52
2-kbyte Flash, 1-kbyte ROM; 128-byte RAM	SRAM, Flash		44 LLP; 20/28 SOIC	One 16-bit, idle	ACCESS.bus (I2C) with 1.8v option, SPI, MicroWire Plus, up to 40 GPIO	Up to 8 maskable		-40 to +85	Dynamic allocated non-volatile memory on Flash devices	\$1

# 2004 EDN Microcontroller/Microprocessor directory

## 8-BIT MICROPROCESSORS

Company name	Device name or family	Instruction set architecture	CPU frequency (MHz)	Bus interface (address/data) (bits)	Instruction width (bits)	Core / I/O operating voltages (V)	Typical power at maximum frequency	Powerdown modes and minimum power	DSP/multiplication hardware support (bits)	FPU	Caching
	COP8 Family COP8TAC	COP8, Modified Harvard	15	All memory internal.	8	2.25 to 2.75 (Flash, ROM)	7.5mW	Active idle: 1.5mW, sleep: 5mW			
NEC Electronics America <a href="http://www.necelam.com">www.necelam.com</a>	K0	NEC K	1 to 12	16/8	8	1.8 to 5.5	5 to 10mA (5V)	Halt, stop	8x8 multiply, 16x8 divide		
	K0/Kx1	NEC K	2 to 16	16/8	8	2.7 to 5.5	5 to 10mA (5V)	Halt, stop	16x16 multiply, 32x16 divide		
	K0S	NEC K	1 to 10		8	1.8 to 5.5	0.25 to 2.5mA (5V)	Halt, stop	8x8		
	K0S/Kx1	NEC K	10		8	2.7 to 5.5	6ma at 5V	Halt, stop			
Philips Semiconductors <a href="http://www.philips.semiconductors.com">www.philips.semiconductors.com</a>	P89LPC90x	8051	12	0/8	8	2 to 4		Idle, powerdown			
	P89LPC91x	8051	18	0/8	8	2 to 4		Idle, powerdown			
	P89LPC92x	8051	12	0/8	8	2 to 4		Idle, powerdown			
	P89LPC93x	8051	12	0/8	8	2 to 4		Idle, powerdown			
Rabbit Semiconductor <a href="http://www.rabbitsemi-conductor.com">www.rabbitsemi-conductor.com</a>	Rabbit 2000	Z80/Z180 style	30	20/8	8, 16	2.5 to 5.5	120mA (5V)	Sleepy: 60uA (2.5V)	16x16		
	Rabbit 3000	Z80/Z180 style	54	20/8	8, 16	1.8 to 3.6	108mA (3.3V)	Sleepy: 23uA, ultra sleepy: 2uA (1.8V)	16x16		
Renesas Technology <a href="http://www.renesas.com">www.renesas.com</a>	740 Series M37544	Accumulator	32 KHz to 8	16/8	8	4 to 5.5	40mW	Standby: 20mW, sleep: 0.1mW	Software multiply/divide		
	H8/38004	H8	5	16/8	16, 32	1.8 to 3.6	35mW	Eight	8x8		
	H8/38024	H8	8	16/8	16, 32	1.8 to 5.5	35mW	Eight	8x8		
Silicon Laboratories <a href="http://www.silabs.com">www.silabs.com</a>	C8051F02X	8051	25	16/8	8	2.7 to 3.6/ 5 tolerant	32mW	0.2uA	8x8		
	C8051F04X	8051	25	16/8	8	2.7 to 3.6/ 5 tolerant	46mW	0.2uA	8x8		
	C8051F06X	8051	25	16/8	8	2.7 to 3.6/ 5 tolerant	46mW	0.2uA	8x8		

# 2004 EDN Microcontroller/Microprocessor directory

8-BIT MICROPROCESSORS

Memory	Memory controller	MMU	Package selection	Timers	Serial, Parallel I/O	Interrupts	ADC/DAC	Temperature ranges (degrees Celsius)	Additional features	Price (10,000)
4-kbyte Flash, 1-kbyte ROM; 128-byte RAM	SRAM, Flash		44 LLP; 20/28 SOIC	One 16-bit, idle	ACCESS.bus (I2C) with 1.8v option, SPI, MicroWire Plus, up to 40 GPIO	Up to 8 maskable		-40 to +85	Dynamic allocated non-volatile memory on Flash devices	\$1.20
8- to 60-kbyte, ROM, Flash, OTP			QFP, SSOP, SDIP	8-bit, 16-bit, watchdog, RTC, PWM	UART, I2C, three-wire, two-wire	NMI, 20 maskable	Eight channel 8/10-bit	-40 to +85	Four LCD configurations	\$1.50 to \$7
8- to 60-kbyte, ROM, Flash			SSOP, QFP	8-bit, 16-bit, watchdog, RTC, PWM	UART, LIN	NMI, 28 maskable	Eight channel 8/10-bit	-40 to +85	Fail safe clock, POC, LVI & external device reset	\$1.50 to \$5
2- to 48-kbyte ROM, Flash			SSOP, LQFP	8-bit, 16-bit, watchdog, RTC, PWM	UART, I2C, three-wire	NMI, 15 maskable	Four to eight 8/10-bit	-40 to +85	Eight LCD configurations	\$1 to \$6
1- to 4-kbyte Flash			SSOP	8-bit, 16-bit, watchdog	UART, LIN	Up to 14 maskable	Eight channel 8/10-bit	-40 to +85	POC, LVI, 240 khz and 8 mhz on-chip osc	90 cents to \$1.50
128-byte RAM, 1-kbyte Flash, EEPROM			SO8, DIP8	Four, PWM, realtime	UART	Up to nine, one external	Two channel 8-bit	-40 to +85	Byte erasable Flash	66 cents to 88 cents
Up to 256-byte RAM, 2-kbyte Flash, EEPROM			TSSOP14, TSSOP16	Four, PWM, realtime	I2C, UART, SPI	Up to 13, four external	Four channel 8-bit	-40 to +85	Byte erasable Flash	83 cents to \$1.17
256-byte RAM, 8-kbyte Flash, EEPROM			TSSOP20, DIP20	Four, realtime	I2C, UART	12, three external	Four channel 8-bit	-40 to +85	76x pin-compatible, Byte erasable Flash	\$1.10 to \$1.60
Up to 768 B RAM, 8-byte Flash, EEPROM			HVQFN28, TSSOP28, PLCC28	Up to Five, realtime	I2C, UART, SPI	15, three external	Eight channel 8-bit	-40 to +85	Byte erasable Flash	\$1.27 to \$1.87
External Flash, ROM, SRAM	Three chip selects, two out/write enables, up to six devices	Yes	100 PQFP	Five 8-bit, 10-bit with two match registers, realtime, watchdog	Four asynchronous, two synchronous with SPI, 40 PIO	Four external			Slave port, bootstrap mode, spread spectrum circuitry for low-EMI	\$7.50
External Flash, ROM, SRAM	Three chip selects, two out/write enables, up to six devices	Yes	128 LQFP, 128 TFBGA	10 8-bit, 10-bit with two match registers, realtime, PWM, watchdog	Six asynchronous, IrDA, four synchronous or SPI, two with HDLC/SDLC, 56 PIO	Four to sixteen external			Slave port, bootstrap mode, quadrature decoder, pulse capture, auxiliary I/O bus, spread spectrum circuitry for low-EMI	\$8.75
8-kbyte OTP, mask, 256-byte SRAM			32 LQFP, 32 SDIP	Two 8-bit, 16-bit	UART or SIO, 25 GPIO	12 sources, five external	Six channel 8-bit	-20 to +85		\$1.15 to \$1.75
32-kbyte Flash, 16- to 32-kbyte mask ROM			64 QFP/TQFP	Two 16-bit, 8-bit, two PWM, watchdog	(A)synchronous	11 external	Four channel 10-bit	-40 to +85	25x4 LCD controller, on chip debug, 32-kHz subclock	\$2.15 to \$4.50
32-kbyte Flash, 8- to 32-kbyte mask ROM			80 QFP/TQFP	Three 8-bit, two 16-bit, two PWM, watchdog	(A)synchronous	13, nine external	Eight channel 10-bit	-40 to +85	25x4 LCD controller, on chip debug, 32-kHz subclock	\$2.20 to \$4.95
64-kbyte Flash, 4352-byte SRAM			64/100 TQFP	Five 16-bit timers, five-channel PCA, watchdog	SMBus, SPI, two UART, 64 PIO	22, two levels	Eight channel 12-bit 100Ksps; two eight channel 8-bit, 500Ksps; two channel 12-bit DAC	-40 to +85	Two Comparators, Vref, temperature sensor, On-Chip JTAG Debug	\$5.96 to \$8.03
64-kbyte Flash, 4352-byte SRAM			64/100 TQFP	Five 16-bit timers, six-channel PCA, watchdog	CAN 2.0B, SMBus, SPI, two UART, 64 PIO	20, two levels	13 channel 12-bit 100Ksps; eight channel 8-bit 500Ksps; two channel 12-bit DAC	-40 to +85	Three comparators, Vref, temperature sensor, 2% internal oscillator, 32 CAN message objects, ±60V PGA, on-chip JTAG Debug,	\$7.54 to \$8.97
64-kbyte Flash, 4352-byte SRAM			64/100 TQFP	Five 16-bit timers, six-channel PCA, watchdog	CAN 2.0B, SMBus, SPI, two UART, 59 PIO	22, two levels	Two channel 16-bit 1Msps; two eight channel 10-bit 200Ksps; two channel 12-bit DAC	-40 to +85	Three comparators, Vref, temperature sensor, 32 CAN message objects, 2% internal oscillator, DMA, On-Chip JTAG Debug	\$16.17 to \$18.02

# 2004 EDN Microcontroller/Microprocessor directory

## 8-BIT MICROPROCESSORS

Company name	Device name or family	Instruction set architecture	CPU frequency (MHz)	Bus interface (address/data) (bits)	Instruction width (bits)	Core / I/O operating voltages (V)	Typical power at maximum frequency	Powerdown modes and minimum power	DSP/ multiplication hardware support (bits)	FPU	Caching
	C8051F0XX	8051	25	16/8	8	2.7 to 3.6/5 tolerant	35mW	5uA	8x8		
	C8051F12X	8051	100	16/8	8	2.7 to 3.6/5 tolerant	145mW	0.2uA	8x8, 16x16 two-cycle MAC		63-entry branch target buffer
	C8051F2XX	8051	25	16/8	8	2.7 to 3.6/5 tolerant	24mW	0.1uA	8x8		
	C8051F30X	8051	25	16/8	8	2.7 to 3.6/5 tolerant	14mW	Less than 0.1uA	8x8		
	C8051F31X	8051	25	16/8	8	2.7 to 3.6/5 tolerant	17mW	Less than 0.1uA	8x8		
	C8051F32X	8051	25	16/8	8	2.7 to 5.25	20mW	Less than 0.1uA	8x8		
	C8051F33X	8051	25	16/8	8	2.7 to 3.6/5 tolerant	20mW	Less than 0.1uA	8x8		
	C8051F35X	8051	50	16/8	8	2.7 to 3.6/5 tolerant	49mW	Less than 0.1uA	8x8		
Silicon Storage Technology <a href="http://www.sst.com">www.sst.com</a>	FlashFlex51	MCS51	12, 33, 40	16/8	8	2.7 to 5.5	45mW (3V, 33MHz activemode)	Idle, standby, powerdown	8x8		
STMicroelectronics <a href="http://www.st.com">www.st.com</a>	CAN ST72(F)521	ST7	Up to 8		8	3.8 to 5.5	6.2mA (5V)		Hardware multiply		
	CAN ST72(F)561	ST7	Up to 8		8	4.5 to 5.5	9mA (5V)	Slow: 0.8mA Wait: 5.5mA Slow-wait: 5.5mA	Hardware multiply		
	Full-speed USB ST72(F)65	ST7	3, 6, 8		8	2.4 to 5.5	14mA (5V)	Wait, halt	Hardware multiply		
	Low-speed USB ST7261 ST72(F)62 ST72(F)63B	ST7	1, 2, 4, 8		8	3 to 5.5	12mA (5V)	Slow, wait, halt	Hardware multiply		
	microPSD 321x	8051	Up to 40	16/8	8	3.3 or 5					
	microPSD 323x	8051	Up to 40	16/8	8	3.3 or 5					
	microPSD 325x	8051	Up to 40	16/8	8	3.3 or 5					
	microPSD 33xx	8051	Up to 40	16/8	8	3.3/3.3 or 3.3/5					

# 2004 EDN Microcontroller/Microprocessor directory

8-BIT MICROPROCESSORS

Memory	Memory controller	MMU	Package selection	Timers	Serial, Parallel I/O	Interrupts	ADC/DAC	Temperature ranges (degrees Celsius)	Additional features	Price (10,000)
32-kbyte Flash, 2304-byte SRAM			32 LQFP, 48/64 TQFP	Four 16-bit timers, five-channel PCA, watchdog	SMBus, SPI, UART, 32 PIO	21, two levels	Eight channel 12-bit 100Ksps; two channel 12-bit DAC	-40 to +85	Two comparators, Vref, temperature sensor, On-Chip JTAG Debug	\$4.32 to \$5.87
128-kbyte Flash, 8448-byte SRAM			64/100 TQFP	Five 16-bit timers, six-channel PCA, watchdog	SMBus, SPI, two UART, 64 PIO	20, two levels	Eight channel 12-bit 100Ksps; eight channel 8-bit 500Ksps; two channel 12-bit DAC	-40 to +85	Two Comparators, Vref, temperature sensor, On-Chip JTAG Debug, 2% internal oscillator with PLL	\$7.88 to \$12.40
8-kbyte Flash, 1280-byte SRAM			48 TQFP, 32 LQFP	Three 16-bit timer, watchdog	SPI, UART, 32 PIO	22, two levels	32 channel 12-bit 100Ksps	-40 to +85	Two comparators, On-Chip JTAG Debug	\$2.39 to \$3.67
8-kbyte Flash, 256-byte SRAM			11 MLP	Three 16-bit timers, three-channel PCA, watchdog	SMBus, UART, eight PIO	12, two levels	Eight channel 8-bit 500Ksps	-40 to +85	Comparator, temperature sensor, 2% internal oscillator, On-Chip Debug	99 cents to \$1.59
16-kbyte Flash, 1280-byte SRAM			32 LQFP, 28 MLP	Four 16-bit timers, five-channel PCA, watchdog	SMBus, SPI, UART, 29 PIO	14, two levels	21 channel 10-bit 200Ksps	-40 to +85	Two comparators, temperature sensor, 2% internal oscillator, On-Chip Debug	\$2.94 \$3.28
16-kbyte Flash, 2304-byte SRAM			32 LQFP, 28 MLP	Four 16-bit, five-channel PCA, watchdog	USB 2.0, SMBus, SPI, UART, 25 PIO	16, two levels	17 channel 10-bit 200Ksps	-40 to +85	Two comparators, Vref, temperature sensor, 1.5% internal oscillator, On-Chip Debug	\$3.98 to \$4.27
8-kbyte Flash, 768-byte SRAM			20 MLP	Four 16-bit timers, three-channel PCA, watchdog	SMBus, SPI, UART, 17 PIO	13, two levels	16 channel 10-bit 200Ksps; 10-bit DAC	-40 to +85	Comparator, Vref, temperature sensor, 2% internal oscillator, On-Chip Debug	\$1.96 to \$2.24
8-kbyte Flash, 768-byte SRAM			32 LQFP, 28 MLP	Four 16-bit timers, three-channel PCA, watchdog	SMBus, SPI, UART, 17 PIO	12, two levels	Eight channel 24-bit 1Ksps; two channel 8-bit DAC	-40 to +86	Comparator, temperature sensor, 2% internal oscillator, On-Chip Debug	\$3.28 to \$4.64
20-, 36-, 40-, 72-kbyte Flash, 256-byte to 1-kbyte RAM			40 PDIP, 44 PLCC, 44 TQFP	Three 16-bit, PCA, watchdog	Full duplex UART, enhanced version, SPI	Six to eight, two to four levels		0 to +70 -40 to +85	In-application programming, BOD, second DPTR	\$1.30 to \$3
32- to 60-kbyte Flash or ROM, 1- to 2-kbyte RAM	Internal only		64/80 TQFP	Two 16-bit, PWM, 8-bit auto-reload, watchdog	SPI, SCI, I2C, CAN	14, 15 external, TLI, nested	16 channel 10-bit	0 to +70 -40 to +85 -40 to +105 -40 to +125	In-application Flash programming	\$4.15 to \$5.00
32- to 60-kbyte Flash or ROM, 1- to 2-kbyte RAM	Internal only		32, 44, 64 TQFP	16-bit PWM, 8-bit, 8-bit auto-reload PWM, watchdog, real-time	SPI, two LINSPI, CAN active	14, 21 external, TLI, nested	16 channel 10-bit	0 to +70 -40 to +85 -40 to +105 -40 to +125	In-application Flash programming	\$3.30 to \$4.85
16- or 32-kbyte, 1- to 5-kbyte SRAM	Internal only		64 TQFP	16-bit with compare, 6-bit PWM, 4-bit rate multiplier, watchdog	I2C, USB full speed, 47 PIO	16 external	Two channel 8-bit	0 to +70	In-application programming	\$4.85 to \$6.25
4- to 16-kbyte Flash, OTP, EEPROM, ROM; 256- to 768-byte SRAM	Internal only		PDIP, SO, TQFP, CSDIP	16-bit, 8-bit auto reload, 8-bit timebase unit, PWM, watchdog	SCI, SPI, I2C, USB low speed, 11 to 31 PIO	12 external	Eight channel 8/10-bit	0 to +70	In-application programming	\$1.65 to \$3.60
80-kbyte Flash, 2 kbyte RAM	Internal or external		TQFP52	Three timers, watchdog, five PWM	I2C, two UART	12, two external	Four channel 8-bit	-40 to +85	JTAG In-system programming, 16 Macrocell CPLD, Reset supervisor	\$3.80 to \$4.04
160- to 288-kbyte Flash, 8-kbyte RAM	Internal or external		TQFP52, TQFP80	Three timers, watchdog, five PWM	I2C, two UART, LS USB	12, two external	Four channel 8-bit	-40 to +85	JTAG In-system programming, 16 Macrocell CPLD, Reset supervisor	\$5.26 to \$6.30
160- to 288-kbyte Flash, 32-kbyte RAM	Internal or external		TQFP52, TQFP80	Three timers, watchdog, five PWM	I2C, two UART, LS USB	12, two external	Four channel 8-bit	-40 to +85	JTAG In-system programming, 16 Macrocell CPLD, Reset supervisor	\$6.35 to \$7.39
80- to 288-kbyte Flash, 2- to 32-kbyte RAM	Internal or external		TQFP52, TQFP80	Nine timers, watchdog, five PWM	SPI, I2C, two UART, IrDA	13, two external	Eight channel 10-bit	-40 to +85	JTAG In-system programming, 16 Macrocell CPLD, Reset supervisor	\$4.08 to \$7.59

# 2004 EDN Microcontroller/Microprocessor directory

## 8-BIT MICROPROCESSORS

Company name	Device name or family	Instruction set architecture	CPU frequency (MHz)	Bus interface (address/data) (bits)	Instruction width (bits)	Core / I/O operating voltages (V)	Typical power at maximum frequency	Powerdown modes and minimum power	DSP/multiplication hardware support (bits)	FPU	Caching
	Motor Control ST72FMC1 ST72FMC2	ST7	Up to 8		8	4.5 to 5.5	12mA (5V)	Slow: 5mA, Wait: 6mA, Slow-wait: 1.5mA	Hardware multiply		
	ST62xx family	ST6	Up to 8		8	3 to 6	3.3mA (5V)	Wait: 350mA, stop: 0.1mA			
	ST72(F)260 ST72(F)262 ST72(F)264	ST7	Up to 8		8	2.4 to 5.5	7.2mA (5V)	Halt, active-halt, wait, slow	Hardware multiply		
	ST72(F)321	ST7	Up to 8		8	3.8 to 5.5	6.5mA (5V)	Halt: 10mA (less than 85°C), halt: 50mA (less than 125°C)	Hardware multiply		
	ST72(F)324	ST7	Up to 8		8	3.8 to 5.5	7.1mA (5V)	Halt, active-halt: 650uA, wait: 4.5 mA, slow-wait: 350uA, slow: 1.1mA	Hardware multiply		
	ST72(F)324L	ST7	Up to 8		8	2.85 to 3.6	4.7mA (3V)	Halt: >1uA, active-halt: 350uA, wait: 3.2mA, slow: 700uA	Hardware multiply		
	ST7FLiteSx ST7FLite0x ST7FLite1x ST7FLite2x	ST7	Up to 8		8	2.4 to 5.5	4mA (5V)	Halt: 10mA, autowake-up, active-halt, wait, slow	Hardware multiply		
<a href="http://www.ti.com/msc">Texas Instruments www.ti.com/msc</a>	MSC120x	MSC	Up to 33	16/8	8	2.7 to 5.25	40mW	Stop: less than 1mA, idle, slow	8x8 32-bit accumulator		
	MSC121x	MSC	Up to 33	16/8	8	2.7 to 5.25	48mW	Stop less than 1mA, idle	8x8 32-bit accumulator		
<a href="http://www.toshiba.com">Toshiba America Electronic Components www.toshiba.com</a>	870 family	TLCS	32 KHz to 8	16/8	8 to 32	1.8 to 6	8mA	Idle: 4mA, slow: 30mA, sleep: 15mA, stop: 0.5mA	Yes		
	870/C family	TLCS	32 KHz to 16	16/8	8 to 40	1.8 to 5.5	7.5mA	Idle: 5.5mA, slow: 14mA, sleep: 6mA, stop: 0.5mA	Yes		
	870/X family	TLCS	32 KHz to 16	20/8	8 to 48	2.7 to 5.5	20mA	Idle: 10mA, stop: 0.5mA	Yes		
<a href="http://www.ubicom.com">Ubicom www.ubicom.com</a>	IP2022	Ubicom	120	Software I/O (See Ser/Par I/O for other busses)	16	2.5/2.5 or 3.3, 5 tolerant	175mW	Sleep: 500mW, runtime clock control, function disable	One-cycle 8x8 signed/unsigned		None, single-cycle program/data memory on-chip
<a href="http://www.xemics.com">XEMICS SA www.xemics.com</a>	XE88LC01A Sensing Machine	CoolRISC	2	16/8	22	2.4 to 5.5	0.3mA/MHz, not supply voltage dependant	Sleep, hibernate, selective function disable	8x8 single-cycle multiplication		Three-instruction pipeline

# 2004 EDN Microcontroller/Microprocessor directory

8-BIT MICROPROCESSORS

Memory	Memory controller	MMU	Package selection	Timers	Serial, Parallel I/O	Interrupts	ADC/DAC	Temperature ranges (degrees Celsius)	Additional features	Price (10,000)
8- to 60-kbyte Flash or ROM, 384-byte to 1.5-kbyte RAM	Internal only		TQFP32, TQFP44, TQFP64, TQFP80, SDIP56	8-bit autoreload with four PWM, two 16-bit with PWM, six channel PWM, realtime, watchdog	SPI, LINSCI	16 external, nested 4 levels, NMI	16 channel 10-bit	-40 to +85 -40 to +125	Dedicated motor control cell for three-phase brushless AC or DC motors and compressors	\$2.87 to \$4.35
1- to 8-kbyte OTP, ROM, up to 128 bytes EEPROM, up to 320 bytes SRAM	Internal only		DIP, SDIP, SO, SSOP, QFP (16 to +100)	8-bit, 16-bit, 8-bit autoreload, watchdog	UART, SPI	Six levels	Up to 21 channel 8-bit	0 to +70 -40 to +85 -40 to +105 -40 to +125	Low-voltage detector	70 cents to \$3
4- or 8-kbyte ROM or Flash, 256-byte RAM	Internal only		28 SO, 32 SDIP, 36 BGA (6x6 mm)	Two 16-bit, PWM, watchdog	SPI, I2C, SCI	10, 22 external (nested support)	Six channel 10-bit	0 to +70 -10 to +85 -40 to +85	PLL, in-application Flash programming	\$1.35 to \$2.08
32- to 60-kbyte ROM or high density Flash, 1- to 2-kbyte RAM	Internal only		44/64 TQFP, 42/56 SDIP	Two 16-bit, PWM, 8-bit auto-reload, watchdog	SPI, I2C, SCI	10, 15 external (nested support)	16 channel 10-bit	0 to +70 -40 to +85 -40 to +105 -40 to +125	In-application Flash programming	\$3.30 to \$4.60
8- to 32-kbyte ROM or Flash, 384- byte to 1-kbyte RAM	Internal only		32/44 TQFP, 32/42 SDIP	Two 16-bit, PWM, watchdog	SPI, SCI	10, nine external (nested support)	12 channel 10-bit	0 to +70 -40 to +85 -40 to +105 -40 to +125	Enhanced reset, in-application Flash programming	\$1.90 to \$2.90
8- to 32-kbyte ROM or Flash, 384- byte to 1-kbyte RAM	Internal only		32/44 TQFP, 32/42 SDIP	Two 16-bit, PWM, watchdog	SPI, SCI	10, nine external (nested support)	12 channel 10-bit	0 to +70 -40 to +85 -40 to +105 -40 to +125	Enhanced reset, in-application Flash programming	\$1.90 to \$2.90
1k- to 8-kbyte Flash, up to 256-byte EEPROM, 128- to 384-byte SRAM	Internal only		16/20 SO, 16/20 DIP	8-bit, 12-bit autoreload, up to four PWM, real-time, watchdog	SPI	10, four external	Five or seven channel 8/10-bit with op-amp	0 to +70 -10 to +85 -40 to +85	1% RC internal oscillator, PLL, DALI communication interface, in-application programming	60 cents to \$1.72
4- to 8-kbyte Flash, 128-byte SRAM			48 TQFP	Two 16-bit, four system	Basic SPI, I2C, UART, 16 PIO	20 sources	24-bit, 8-bit DAC	-40 to +85	Internal Oscillator, PLL, precision Vref and temperature sensor, PGA=128	\$5
4- to 32-kbyte Flash, 1.2-kbyte SRAM			64 TQFP	Two 16-bit, four system	Multimaster SPI and I2C, dual QUART, 34 PIO	21 sources	24-bit, Quad 16-bit DAC	-40 to +85	Precision Vref and temperature sensor, PGA=128	\$8 to \$14
4- to 60-kbyte ROM, up to 2-kbyte SRAM, up to 512 bytes EEPROM			SDIP, QFP, LQFP, SSOP, SOP	Up to four 8-bit, up to two 16-bit, up to 18-bit, watchdog	Up to one UART, up to three synchronous SIO, up to two I2C, up to one high-speed SIO	15	Up to 16 channel 8/10-bit; up to six comparator inputs; up to eight DAC		LED, LCD, VFT drivers, dual clock, clock gear, on-screen-display, remote-control pulse detector	\$1.50 to \$7
4- to 60-kbyte Flash/ROM, up to 2-kbyte SRAM			SDIP, QFP, LQFP, SSOP, SOP	Up to four 8-bit, up to two 16-bit, 18-bit, watchdog	Up to two UART, synchronous SIO, up to three I2C, up to one CAN, up to eight PWM	15	Up to 16 channel 10-bit; up to eight channel 8-bit; up to one 8-bit DAC		LED, LCD, VFT drivers, dual clock, clock gear, brushless motor control	\$1.25 to \$7
16- to 96-kbyte ROM, up to 3-kbyte SRAM	Yes		SDIP, QFP, LQFP, SOP	Up to four 8-bit, up to three 16-bit, watchdog	Up to one UART, up to two synchronous SIO, up to two I2C, up to 10 PWM	63	Up to 16 channel 10-bit; up to 12 channel 8-bit		LED, LCD, VFT drivers, dual clock, clock gear, brushless motor control	\$2.50 to \$8
64-kbyte Flash, 16-kbyte + 4-kbyte SRAM	SRAM		80 PQFP, 80 uBGA	Two 16-bit, 8-bit pre-scale, real-time, watchdog	Two Serdes units for Ethernet, USB, GPSI, SPI, UART, 52 GPIO	15	Eight channel 10-bit	-40 to +85 0 to +55	Software I/O, dual threads, three-cycle context switching	\$8.50 to \$9.90
22-kbyte MTP, 520-byte SRAM			44LQFP, 48VQFN	Four 8-bits, up-down, PWM, real time, Xtal, 22-bit prescaler	115-kbps UART, 24 PIO	Up to 24, 16 events	16 channel 10-bit; four differential or seven pseudo-differential inputs	-40 to +85 MTP -40 to +125 ROM	Prescaler with 1 Hz and 128 Hz interrupt	\$4.69

# 2004 EDN Microcontroller/Microprocessor directory

## 8-BIT MICROPROCESSORS

Company name	Device name or family	Instruction set architecture	CPU frequency (MHz)	Bus interface (address/data) (bits)	Instruction width (bits)	Core / I/O operating voltages (V)	Typical power at maximum frequency	Powerdown modes and minimum power	DSP/ multiplication hardware support (bits)	FPU	Caching
	XE88LC02 Sensing Machine	CoolRISC	7 (ROM), 2.5, 5 (MTP)	16/8	22	2.4 to 5.5 (MTP) 1.2 to 5.5 (ROM)	0.3mA/MHz, not supply voltage dependant	Sleep, hibernate, selective function disable	8x8 single-cycle multiplication		Three-instruction pipeline
	XE88LC05A Sensing Machine	CoolRISC	2	16/8	22	2.4 to 5.5	0.3mA/MHz, not supply voltage dependant	Sleep, hibernate, selective function disable	8x8 single-cycle multiplication		Three-instruction pipeline
	XE88LC06A Radio Machine	CoolRISC	2.5 (MTP), 7 (ROM)	16/8	22	2.4 to 5.5 (MTP) 1.2 to 5.5 (ROM)	0.3mA/MHz, not supply voltage dependant	Sleep, hibernate, selective function disable	8x8 single-cycle multiplication		Three-instruction pipeline
	XE88LC07A Radio Machine	CoolRISC	5 (MTP)	16/8	22	2.4 to 5.5	0.3mA/MHz, not supply voltage dependant	Sleep, hibernate, selective function disable	8x8 single-cycle multiplication		Three-instruction pipeline
ZILOG <a href="http://www.zilog.com">www.zilog.com</a>	eZ80190	Enhanced Z80/Z180	50	24/8	8, 16, 24	3 to 3.6/5 tolerant	50mA		16x16 MAC, 40-bit Accumulator		
	eZ80F91	Enhanced Z80/Z180	50	24/8	8, 16, 24	3 to 3.6/5 tolerant	230mA (maximum)	Sleep, halt			
	eZ80F91 Ethernet Module	Enhanced Z80/Z180	50	24/8	8, 16, 24	3 to 3.6/5 tolerant	230mA (maximum)	Sleep, halt			
	eZ80F91 Mini Enet Module	Enhanced Z80/Z180	50	24/8	8, 16, 24	3 to 3.6/5 tolerant	230mA (maximum)	Sleep, halt			
	eZ80F92	Enhanced Z80/Z180	20	24/8	8, 16, 24	3 to 3.6/5 tolerant	30mA	Sleep, halt			
	eZ80F93	Enhanced Z80/Z180	20	24/8	8, 16, 24	3 to 3.6/5 tolerant	30mA	Sleep, halt			
	eZ80L92	Enhanced Z80/Z180	20, 50	24/8	8, 16, 24	3 to 3.6/5 tolerant	40mA	Sleep, halt			
	eZ80L92 Ethernet Module	Enhanced Z80/Z180	48	24/8	8, 16, 24	3 to 3.6/5 tolerant	125mA	Sleep, halt			
	Z8F01xA Z8 Encore! XP 4K Series	eZ8	20	16/8	8 to 40	2.7 to 3.6/5 tolerant	12mA	Stop: 2uA, halt	8x8 multiply		
	Z8F02xA Z8 Encore! XP 4K Series	eZ8	20	16/8	8 to 40	2.7 to 3.6/5 tolerant	12mA	Stop: 2uA, halt	8x8 multiply		
	Z8F042x Z8 Encore! 8K Series	eZ8	20	16/8	8 to 40	2.7 to 3.6/5 tolerant	12mA	Stop: 6uA, halt	8x8 multiply		

# 2004 EDN Microcontroller/Microprocessor directory

8-BIT MICROPROCESSORS

Memory	Memory controller	MMU	Package selection	Timers	Serial, Parallel I/O	Interrupts	ADC/DAC	Temperature ranges (degrees Celsius)	Additional features	Price (10,000)
22/11-kbyte MTP, 1032-byte SRAM			80/100 LQFP	Four 8-bits, up-down, PWM, real time, Xtal, 22-bit prescaler	115-kbps UART, SPI, 60 PIO	Up to 24, 16 events	16 channel 10-bit; four differential or seven pseudo-differential inputs; four low-power comparator	-40 to +85 MTP -40 to +125 ROM	Prescaler with 1 Hz and 128 Hz interrupt and 120 segment LCD driver	\$7.50
22-kbyte MTP, 520-byte SRAM			64 LQFP	Four 8-bits, up-down, PWM, real time, Xtal, 22-bit prescaler	115-kbps UART, 24 PIO	Up to 24, 16 events	16 channel 10-bit; four differential or seven pseudo-differential inputs; 8- and 16-bit DAC	-40 to +85 MTP -40 to +125 ROM	Prescaler with 1 Hz and 128 Hz interrupt	\$5.63
22-kbyte MTP, 520-byte SRAM			32 TQFP	Four 8-bits, up-down, PWM, real time, Xtal, 22-bit prescaler	115-kbps UART, 24 PIO, 156-kbps Bitjockey (Radio UART)	Up to 24, 16 events	Four low-power comparators	-40 to +85 MTP -40 to +125 ROM	Prescaler with 1 Hz and 128 Hz interrupt	\$3.06
11-kbyte MTP, 520-byte RAM			32 TQFP	Four 8-bits, up-down, PWM, real time, Xtal, 22-bit prescaler	115-kbps UART, 24 PIO, 156-kbps Bitjockey (Radio UART)	Up to 24, 16 events	Four low-power comparators	-40 to +85 MTP	Prescaler with 1 Hz and 128 Hz interrupt	\$3.06
9-kbyte SRAM	Two DMA, external Flash		100 LQFP	Six PRT, watchdog	Two UART, I2C, SPI, 24 GPIO	44		-40 to +105	Ethernet/PPP drivers, TCP/IP stack, RTOS	\$5.99 to \$6.59
256-kbyte Flash, 8-kbyte SRAM, 8-kbyte EMAC Buffer	On-chip Flash/RAM		144 LQFP	Four PRT, capture/compare/PWM, watchdog with RC	Two 9-bit UART, IrDA, I2C, SPI, 10/100Ethernet, 32 GPIO	46		-40 to +105	Ethernet/PPP drivers, TCP/IP stack, IrDA stack, RTOS	\$9.25 to \$10.78
1.25-Mbyte Flash, 512-kbyte RAM	On-chip Flash/RAM, external Flash/RAM		Two 60-pin system-expansion interfaces	Four PRT, capture/compare/PWM, watchdog with RC	Two 9-bit UART, IrDA, I2C, SPI, 10/100Ethernet, 32 GPIO	46		0 to +70	Ethernet/PPP drivers, TCP/IP stack, IrDA stack, RTOS, RJ-45	\$60 (1000)
256-kbyte Flash, 128-kbyte RAM	On-chip Flash/RAM, external Flash/RAM		Two 56-pin system-expansion interfaces	Four PRT, capture/compare/PWM, watchdog with RC	Two 9-bit UART, IrDA, I2C, SPI, 10/100Ethernet, 32 GPIO	46		0 to +70	Ethernet/PPP drivers, TCP/IP stack, IrDA stack, RTOS, RJ-45	\$31.59
128-kbyte Flash, 8-kbyte SRAM	On-chip Flash/RAM		100 LQFP	Six PRT, watchdog	Two 9-bit UART, IrDA, I2C, SPI, 24 GPIO	36		-40 to +105	Ethernet/PPP drivers, TCP/IP stack, IrDA stack, RTOS	\$5.28 to \$5.91
64-kbyte Flash, 4-kbyte SRAM	On-chip Flash/RAM		100 LQFP	Six PRT, watchdog	Two 9-bit UART, IrDA, I2C, SPI, 24 GPIO	36		-40 to +105	Ethernet/PPP drivers, TCP/IP stack, IrDA stack, RTOS	\$4.91 to \$5.540
	External Flash		100 LQFP	Six PRT, watchdog	Two UART, IrDA, SPI, I2C, 24 GPIO	36		-40 to +105	Ethernet/PPP drivers, TCP/IP stack, IrDA stack, RTOS	\$4.39 to \$5.56
1-Mbyte Flash, 512-kbyte RAM	External Flash		Two 50-pin system-expansion interfaces	Six PRT, watchdog	Two UART, IrDA, SPI, I2C, 24 GPIO	36		0 to +70	IrDA, TCP/IP stack, RTOS, RJ45	\$45.90 (1000)
1-kbyte Flash or ROM, 256-byte SRAM, 16-byte NVDS			8, 20, 28	Two 16-bit, PWM	9-bit UART with RS485, IrDA encoder/decoder	18	Up to eight channel 10-bit (sigma/delta)	-40 to +105	One-pin in-circuit programming, on-chip debug, IPO, Comp., Temp. Sensor, VBO, POR	\$1.10
2-kbyte Flash or ROM, 512-byte SRAM, 64-byte NVDS			8, 20, 28	Two 16-bit, PWM	9-bit UART with RS485, IrDA encoder/decoder	18	Up to eight channel 10-bit (sigma/delta)	-40 to +105	One-pin in-circuit programming, on-chip debug, IPO, Comp., Temp. Sensor, VBO, POR	\$1.16
4-kbyte Flash or ROM, 1-kbyte SRAM			20, 28	Two 16-bit, PWM	9-bit UART with RS485, IrDA encoder/decoder, SPI, I2C	24	Up to five channel 10-bit (sigma/delta)	-40 to +105	One-pin in-circuit programming, on-chip debug, voltage brown out, power-on reset	\$1.15

# 2004 EDN Microcontroller/Microprocessor directory

## 8-BIT MICROPROCESSORS

Company name	Device name or family	Instruction set architecture	CPU frequency (MHz)	Bus interface (address/data) (bits)	Instruction width (bits)	Core / I/O operating voltages (V)	Typical power at maximum frequency	Powerdown modes and minimum power	DSP/multiplication hardware support (bits)	FPU	Caching
	Z8F04xA Z8 Encore! XP 4K Series	eZ8	20	16/8	8 to 40	2.7 to 3.6/ 5 tolerant	12mA	Stop: 6uA, halt	8x8 multiply		
	Z8F082x Z8 Encore! 8K Series	eZ8	20	16/8	8 to 40	2.7 to 3.6/ 5 tolerant	12mA	Stop: 2uA, halt	8x8 multiply		
	Z8F162x Z8 Encore! 64K Series	eZ8	20	16/8	8 to 40	3 to 3.6/ 5 tolerant	12mA	Stop: 6uA, halt	8x8 multiply		
	Z8F242x Z8 Encore! 64K Series	eZ8	20	16/8	8 to 40	3 to 3.6/ 5 tolerant	12mA	Stop: 6uA, halt	8x8 multiply		
	Z8F322x Z8 Encore! 64K Series	eZ8	20	16/8	8 to 40	3 to 3.6/ 5 tolerant	12mA	Stop: 6uA, halt	8x8 multiply		
	Z8F482x Z8 Encore! 64K Series	eZ8	20	16/8	8 to 40	3 to 3.6/ 5 tolerant	12mA	Stop: 6uA, halt	8x8 multiply		
	Z8F642x Z8 Encore! 64K Series	eZ8	20	16/8	8 to 40	3 to 3.6/ 5 tolerant	12mA	Stop: 6uA, halt	8x8 multiply		

# 2004 EDN Microcontroller/Microprocessor directory

8-BIT MICROPROCESSORS

Memory	Memory controller	MMU	Package selection	Timers	Serial, Parallel I/O	Interrupts	ADC/DAC	Temperature ranges (degrees Celsius)	Additional features	Price (10,000)
4-kbyte Flash or ROM, 1-kbyte SRAM, 128-byte NVDS			8, 20, 28	Two 16-bit, PWM	9-bit UART with RS485, IrDA encoder/decoder	18	Up to eight channel 10-bit (sigma/delta)	-40 to +105	One-pin in-circuit programming, on-chip debug, IPO, Comp., Temp. Sensor, VBO, POR	\$1.22
8-kbyte Flash or ROM, 1-kbyte SRAM			20, 28	Two 16-bit, PWM	9-bit UART with RS485, IrDA encoder/decoder, SPI, I2C	24	Up to five channel 10-bit (sigma/delta)	-40 to +105	One-pin in-circuit programming, on-chip debug, voltage brown out, power-on reset	\$1.42
16-kbyte Flash or ROM, 2-kbyte SRAM	Three-channel DMA		40, 44, 64, and 68	Four 16-bit, PWM	Two 9-bit UART with RS485, IrDA encoder/decoder, SPI, I2C	24	Up to 12 channel 10-bit (sigma/delta)	-40 to +105	One-pin in-circuit programming, on-chip debug, voltage brown out, power-on reset	\$2.36
24-kbyte Flash or ROM, 2-kbyte SRAM	Three-channel DMA		40, 44, 64, and 68	Four 16-bit, PWM	Two 9-bit UART with RS485, IrDA encoder/decoder, SPI, I2C	24	Up to 12 channel 10-bit (sigma/delta)	-40 to +105	One-pin in-circuit programming, on-chip debug, voltage brown out, power-on reset	\$2.68
32-kbyte Flash or ROM, 2-kbyte SRAM	Three-channel DMA		40, 44, 64, and 68	Four 16-bit, PWM	Two 9-bit UART with RS485, IrDA encoder/decoder, SPI, I2C	24	Up to 12 channel 10-bit (sigma/delta)	-40 to +105	One-pin in-circuit programming, on-chip debug, voltage brown out, power-on reset	\$3.05
48-kbyte Flash or ROM, 4-kbyte SRAM	Three-channel DMA		40, 44, 64, 68, and 80	Four 16-bit, PWM	Two 9-bit UART with RS485, IrDA encoder/decoder, SPI, I2C	24	Up to 12 channel 10-bit (sigma/delta)	-40 to +105	One-pin in-circuit programming, on-chip debug, voltage brown out, power-on reset	\$3.46
64-kbyte Flash or ROM, 4-kbyte SRAM	Three-channel DMA		40, 44, 64, 68, and 80	Four 16-bit, PWM	Two 9-bit UART with RS485, IrDA encoder/decoder, SPI, I2C	24	Up to 12 channel 10-bit (sigma/delta)	-40 to +105	One-pin in-circuit programming, on-chip debug, voltage brown out, power-on reset	\$3.75