TABLE 1—8-BIT MICROPROCESSORS

	Company	EEMBC member	Device family	Bus interface	Hardware multiplication support	CPU frequency (MHz)	Operating voltage (V) (logic/I/O)	Typical power at maximum frequency
8051	**Analog Devices** www.analog.com/microconverter Enter No. 416	Yes	AD µC 812	8-bit	No	16	3 or 5	16 mA
	Atmel www.atmel.com/ Enter No. 417	No	AT-89	8-bit	8×8-bit	0 to 33	2.7 to 6	0.08W
	Atmel www.atmel-wm.com/nt/micro/ Enter No. 418		T80C5x family 80C51	8-bit	8×8-bit	0 to 60	2.7 to 5.5	0.12W
			T80C51Rx2 family	8-bit	8×8-bit	0 to 60	2.7to 5.5	0.12 to 0.14W
			T80C51xx low-pin-count family	8-bit	8×8-bit	0 to 66	2.7 to 5.5	0.12W
			T80C51FP1	8-bit	8×8-bit	0 to 33	2.7 to 5.5	
			T89C51 CC01	8-bit	8×8-bit	0 to 40	4.5 to 5.5	
			T8xC51 SND1	8-bit	8×8-bit	0 to 40	2.7 to 3.3	
	Cybernetic Micro Systems www.ControlChips.com/p51.htm Enter No. 419	No	N/A	16-bit address, 8-bit data, plus ISA bus interface	8×8-bit	1 to 51	3.3/5-tolerant	150 mW
	Cypress Semiconductor www.cypress.com Enter No. 420	No	EZ-USBEZ-USB FXEZ-USB FX2	16-bit address, 8-bit data (nonmultiplexed)	8×8-bit	12 to 48	3.3/5-tolerant	100 mW
	Dallas Semiconductor www.dalsemi.com/products/micros/ Enter No. 421	No	8051 Plus	16- to 24-bit address, 8-bit data (multiplexed and demultiplexed)	8-bit all, 16/32-bit hardware DS80C390	0 to 40	5	15 mA
	Infineon Technologies www.infineon.com/products Enter No. 422	Yes	SAB C500	16-bit address, 8-bit data	Support for 16×16, 16/16, and 32/16 bits	DC to 40	4.5 to 5.5	90 mW to 260 mW
	Philips www-us2.semiconductors.philips.com/ Enter No. 423	Yes	87LPC76x	16/8-bit	No	20	2.7 to 5.5	75 mW at 20 MHz
			87C51	16/8-bit	No	33	2.7 to 5.5	75 mW at 33 MHz
			87C51Fx	16/8-bit	No	33	2.7 to 5.5	75 mW at 33 MHz
			Rx+	16/8-bit	No	33	2.7 to 5.5	75 mW at 33 MHz
			Rx2	16/8-bit	No	20	5	110 mW at 20 MHz
			87C591 CAN µCs	16/8-bit	No	12	2.7 to 5.5	100 mW at 12 MHz
	Silicon Storage Technology www.ssti.com Enter No. 424	No	SST89CXX	8-bit	No	0 to 33	3 or 5	169 mW at 5V, 49 mW at 3V
65C02	**Western Design Center** www.westerndesigncenter.com/chips.html Enter No. 425	No	65C02	16/8-bit	No	20	1.2 to 5.25	0.090 at 5V
			65C816	24/8-bit	No	14	1.2 to 5.25	0.070 at 5V
AVR	**Atmel** www.atmel.com/atmel/products/prod23.htm Enter No. 426	No	AVR	16/8-bit	No	0 to 12	2.7 to 6	0.05W
			megaAVR	16/8-bit	8×8-bit	0 to 8	2.7 to 5.5	0.05W
			tinyAVR	16/8-bit	No	0 to 8	1.8 to 6	0.05W
Hitachi H8/300L	**Hitachi Semiconductor** http://semiconductor.hitachi.com/ Enter No. 427	Yes	H8/3664		No	10	2.5 to 5.5	15 at 5V, 8.5 at 3V, 25 at 5V
			H8/3802		No	10	2.5 to 5.5	9 at 5V 13 at 5V

Power-down modes	Nonvolatile memory	SRAM	Timers	Serial I/O	Additional features	Price (10,000)
5 µA	8-kbyte program flash/EEPROM, 640-kbyte data	256 bytes	Standard 8051: three 16-bit	UART, I²C, SPI	Eight-channel, 12-bit, 100k-sample/sec ADC; two 12-bit voltage-output DACs; on-chip reference; watchdog; power-supply monitor	$7
Idle: 2 mA, power-down: 12 µA	1- to 32-kbyte flash, 128- to 512-byte EEPROM	128 to 512 bytes	One to three 16-bit	SPI, full-duplex UART	In-system-programmable flash memory, three-level lock-bit security, EEPROM	$1 to $5
Idle: 15 mA, power-down: 20 µA	8- to 64-kbyte ROM/OTP	256 bytes	Three 16-bit	One to two full-duplex UARTs	Watchdog timer	$1 to $4
Idle: 15 mA, power-down: 20 to 50 µA	8- to 64-kbyte ROM/OTP, 16- to 64-kbyte flash, 0- to 2-kbyte EEPROM	512 to 2304 bytes	Four 16-bit	Full-duplex UART, SPI, I²C	PCA, watchdog timer, real-time clock, in-system programming	$2 to $6
Idle: 15 mA, power-down: 20 µA	4- to 16-kbyte ROM/OTP	256 to 512 bytes	Two to four 16-bit	Full-duplex UART, SPI	PCA, watchdog timer, 10-bit ADC, real-time clock	$1.50 to $3
	32-kbyte ROM/OTP	512 bytes	Three 16-bit	Full-duplex UART, SPI, I²C	PCA, watchdog timer, keyboard, two-line X24-character LCD dot-matrix controller	$5 to $8
	32-kbyte flash, 2-kbyte EEPROM	1280 bytes	Four 16-bit	CAN 2.0B, full-duplex UART	In-system programming, PCA, watchdog timer, 10-bit ADC	$4 to $8
	32-kbyte ROM/flash	512 bytes	Two 16-bit	Full-speed USB, SPI, I²C	MP3 decoder, MMC, audio and keyboard interfaces, 10-bit ADC, in-system programming	$4 to $8
No	No	8-kbyte code RAM, 4-kbyte dual-port data RAM shared with ISA bus	Three 16-bit	One UART	8052: special-function-register set, breakpoint and single-step, square root, dual data pointer, PC/104 bus, 100-pin SQFP	$10
Power-down: 175 µA	No	8-kbyte code RAM	Three 16-bit	Two UARTs	USB interface; special-function-register set; DMA; dual data pointers; programmable-bus interface; 44-, 48-, 52-, 80-, and 128-pin PQFPs	$6 to $10
1 µA	1-kbyte MOVX SRAM on some models	1 kbyte	Three 16-bit and watchdog	Two USARTs	Eight-channel, 10-bit ADC, four-channel, 8-bit PWM, two CAN-bus controllers, power monitor/reset control, expanded address capability, 16/32-bit arithmetic coprocessor, additional interrupts, dual data pointers, low-power modes	$3 to $12
Power-down: 10 µA, idle: from 3 mA	8- to 64-kbyte ROM, 8-to 64-kbyte OTP	256 to 3328 bytes	Three to five 16-bit	One to two synchronous with asynchronous option	As many as 19 interrupts, 10-bit ADC with as many as 15 channels, capture compare with as many as 29, real-time clock, CAN interface, PWM timer	$1 to $13
5 µW	2- to 4-kbyte OTP	128 bytes	Two 16-bit	I²C, UART	Low-power, internal oscillator, ADC, PWM, DAC	$1.10
15 µW	4-kbyte OTP	128 bytes	Two 16-bit	UART	Low power	$1.55
15 µW	8- to 32-kbyte OTP	256 bytes	Three 16-bit	UART	Standard 80C51 with extra timer	$3.24
15 µW	16-to 64-kbyte OTP	512 to 1024 bytes	Three 16-bit	UART	Hardware watchdog timer	$2.50
5 µW	16- to 64-kbyte flash	512 to 1024 bytes	Three 16-bit and watchdog	UART	In-system-programmable, in-application-programmable, six-clock core/IAP	$4.50
30 µW	16-kbyte OTP	512 bytes	Three 16-bit	I²C, UART	CAN 2.0b PeliCAN	$4.95
Idle: 18 mA at 5V, 5 mA at 3V; power-down: 30 µA	20 to 36 kbytes	256 bytes	Three 16-bit Three 16-bit	One UART	In-application-programmable, watchdog timer, security lock	$2.95 to $3.92
Wait: 5 µA, stop: 1 µA	4-kbyte mask ROM	192 bytes	Four 16-bit	One UART	Serial interface bus, watchdog timer, monitor ROM	$3 to $6
Wait: 5 µA, stop: 1 µA	8-kbyte mask ROM	576 bytes	Eight 16-bit	Four UARTs	Parallel interface bus, watchdog timer, monitor ROM, two DACs	$4 to $14
Idle: 2 mA, power-down: 1 µA	1-to 8-kbyte flash, 0- to 512-byte EEPROM	0 to 512 bytes	One to four 8-, 16-bit	SPI, full-duplex UART	10-bit ADC, SPI, analog comparator, real-time counter	$1.50 to $5
Idle: 2 mA, power-down: 1 µA	16- to 128-kbyte flash, 512-byte to 4-kbyte EEPROM	1 to 4 kbytes	Three to four 8-, 16-bit	SPI, full-duplex UART	10-bit ADC, self-programming memory, analog comparator, real-time counter	$6 to $11
Idle: 2 mA, power-down 1 µA	1- to 2-kbyte flash, 0- to 128-byte EEPROM	0 to 128 bytes	One to two 8-bit	SPI, full-duplex UART	10-bit ADC, SPI, analog comparator, real-time counter	$1 to $1.5
Sleep: 2 to 10 mA at 5V, subactive: 1 to 2 mA at 5V, standby: 5 µA	32-kbyte flash	2 kbytes	One 8-bit, one 16-bit; one 14-bit PWM, one watchdog	One I²C, one synchronous/asynchronous SCI	32-kHz subclock generator; eight-channel, 10-bit, 12.4-µsec-conversion ADC	$5.01 to $10
Sleep: 4 to 7 mA at 5V, subactive: 22 to 65 µA at 2.7V, standby: 0 to 5 µA	16-kbyte OTP	1 kbyte	Four 8-bit, one 16-bit	One synchrounous/asynchronous SCI	LCD controller; 32-kHz subclock generator; eight-channel, 8-bit, 12.4-usec-conversion ADC	$5.01 to $10

TABLE 1—8-BIT MICROPROCESSORS (CONTINUED)

	Company	EEMBC member	Device family	Bus interface	Hardware multiplication support	CPU frequency (MHz)	Operating voltage (V) (logic/I/O)	Typical power at maximum frequency
Imsys Cjip	**Imsys** www.javamachine.com Enter No. 428	Yes		8-bit I/O-bus, 8- or 16-bit dedicated DRAM interface	8×8-bit, 19-bit accumulator	67 to 80	2.7 to 3.6	135 mW
Microchip PICmicro	**Microchip Technology Inc** www.microchip.com Enter No. 429	Yes	PIC12CXXX	14/8-bit	No	10	2.5 to 5.5	
			PIC14CXXX	14/8-bit	No	20	2.7 to 6	
			PIC16C5X	14/8-bit	No	20	2 to 6.25	
			PIC16C6X	14/8-bit	No	20	2.5 to 6.25	
			PIC16C7XX	14/8-bit	No	20	2.5 to 6.25	
			PIC16C92X	14/8-bit	No	8	2.5 to 6	
			PIC16F8XX	14/8-bit	No	20	2.5 to 6	
			PIC17CXXX	16/8-bit	8×8-bit	33	2.5 to 6	
			PIC18CXXX	16/8-bit	8×8-bit	40	2.5 to 5.5	
NEC K Series	**NEC Electronics** www.necel.com Enter No. 430	Yes	K0	16-bit address, 8-bit data	8×8-bit	10	1.8 to 5.5	2 mA at 3V
			K0S	16-bit address, 8-bit data	8×8-bit	10	1.8 to 5.5	2 mA at 3V
Scenix SX	**Scenix Inc** www.scenix.com Enter No. 431	No	SX18AC, SX18AC75, SX28AC, SX28AC75	8-bit	No	DC to 75	2.7 to 5.5/ 4.5 to 5.5	
			SX48BD, SX52BD, SX52BD100	8-bit	No	DC to 100	2.7 to 5.5	
Toshiba TLCS 870/C	**Toshiba** www.toshiba.com/taec Enter No. 432	Yes	TLCS870/C	8/8-bit	8×8-bit	0.032 to 16	1.8 to 5.5	0.05W at 8 MHz
			TLCS870/X	8-bit	8×8-bit, 16×8-bit	0.032 to 16	1.8 to 5.5	0.05W at 8 MHz
Xemics CoolRISC	**Xemics** www.xemics.com Enter No. 433	No	CoolRISC88, CoolRISC816	16/18-bit instruction, 16/8-bit data	No	8	1 to 5.5	
Xemics XE8000 series	**Xemics** www.xemics.com Enter No. 434		Xemics XE8000 series AB181E	16/18-bit instruction, 16/8-bit data	8×8-bit	4	1.2 to 5.5	2.9 mW
Zilog Z80/Z180	**AB Semicon** www.absemiconductor.com Enter No. 435	No	Z180	20-bit external address, 16-bit internal. 8-bit data	8×8-bit	20	3.3/3.3 or 5	66 mW (5V) 51 mW (3.3V)
	Rabbit Semiconductor www.rabbitsemiconductor.com Enter No. 436	No	Rabbit 2000	20-bit address, 8-bit data	16×16-bit	As high as 30 MHz	2.5 to 5.5	Approximately 110 mA at 29.4912 MHz
	Zilog www.zilog.com/products/zx80.html Enter No. 437	No	Z80	As much as 24-bit external address, 8-bit data	8×8-bit	DC to 33	3 to 5.5	500 mW
	Zilog www.zilog.com/ez80/ Enter No. 438	No	EZ80	24-bit linear address, 8-bit data	16×16 multiply and 40-bit accumulate engine (MAC)	0 to 80	3, 5-tolerant	600 mW

Power-down modes	Nonvolatile memory	SRAM	Timers	Serial I/O	Additional features	Price (10,000)
Sleep: 35 mW	No	No	Any number and width (microcoded)	UART, I²C, and other interfaces buffers; microcoded	3-kbyte SRAM for stack cache, I/O, and string IEEE-754-compliant FPU; as much as 128 Mbytes of 8/16-bit-wide EDO DRAM	$19
	768- to 3584-byte OTP, 16-byte EEPROM	25 to 128 bytes	One		Eight-pin package, 4-MHz internal oscillator, 8-bit ADC, in-circuit serial programming	N/A
	7-kbyte OTP	192 bytes	Two	I²C/SMB	8-bit ADC, comparators, voltage reference, programmable reference generator, internal oscillator, in-circuit serial programming	N/A
	576- to 3072-byte OTP	24 to 73 bytes	One			N/A
	896-byte to 14-kbyte OTP, 128-byte EEPROM	80 to 368 bytes	One to three	USART, I²C, SPI	Comparators, brown-out reset, programmable voltage reference, in-circuit serial programming	N/A
	896-byte to 14-kbyte OTP	36 to 368 bytes	One to two	USART, I²C, SPI, MI²C	8- to 12-bit ADCs, programmable brown-out reset, low-voltage detection, voltage reference, in-circuit serial programming	N/A
	7.2-kbyte OTP	176 bytes	Three	I²C, SPI	8-bit ADC, LCD controller, in-circuit serial programming	N/A
	68- to 256-kbyte flash	36 to 368 bytes	Three	USART, I²C, SPI, MI²C	10-bit ADC, brown-out reset, in-circuit serial programming	N/A
	4- to 32-kbyte OTP	232 to 902 bytes	Four	USART, I²C, SPI, MI²C	10-bit ADC, brown-out reset, in-circuit serial programming	N/A
	16- to 32-kbyte OTP	512 to 1536 bytes	Two	USART, I²C, SPI, MI²C	10-bit ADC, programmable brown-out reset, programmable low-voltage detection, in-circuit serial programming	N/A
Halt, stop	Flash	256 bytes to 3 kbytes	Two to eight 8- and 16-bit	One or three channels	ADC, DAC, I²C, IRDA, CAN	$2 to $5
Halt, stop	Flash	128 bytes to 1 kbyte	Two to six 8- and 16-bit	One or two channels	ADC, I²C, USB	$4
	3-kbyte flash	136 bytes	8-bit real-time clock/counter, watchdog	12 to 20 individually programmable I/O pins, UART, I²C, SPI, IrDA, implemented as virtual-peripheral software modules	Brown-out, 31.25-kHz, 4-MHz R/C, ±8% analog comparator, MIWU, 30-mA output, in-system programming	$2.51 to $5
	6-kbyte flash (4-kbyte 12-bit words)	262 bytes	8-bit real-time clock/counter, watchdog, two 16-bit multifunction with 8-bit prescalers	36 to 40 individually programmable I/O pins, UART, I²C, SPI, IrDA, implemented as virtual-peripheral software modules	Brown-out, 31.25-kHz to 4-MHz R/C, ±8% analog comparator, MIWU, 30-mA output, in-system programming	$2.51 to $5
Stop, slow, idle, and sleep	As much as 60 kbytes of ROM	256 to 1024 bytes	8-, 16-, and 24-bit	One to two UARTs	LED, VFT drivers, clock gear, ADC	$3 to $7
Stop, slow, idle, and sleep	16-kbyte ROM	512 bytes	8- and 16-bit	One UART, I²C	LED, clock gear, ADC	$15 to $18
Static	As much as 176 kbytes	As much as 64 kbytes	N/A	N/A	N/A	IP core
Sleep: 1 μW, 7.2 μW in real-time clock	22-kbyte ROM or MTP	512 bytes	Four 8-bit with compare, capture, PWM	UART	16+6 bits Zooming ADC	$2.63 to $7.33
N/A	N/A	No	Two 16-bit	One synchronous two asynchronous	Z80-compatible, one interupt mode, two DMA channels, DRAM-refresh circuit, PLL	$4.95
Sleep: 100 μA at 32.768 kHz	No	No	Five 8-bit cascadable, one 10-bit with two reloadable match registers, periodic timer interrupt	Four asycnhronous serial ports, two with synchronous capability and SPI capability	Three times faster than Z180, remote cold boot and onboard flash programming via serial/parallel port, slave port, fast integer/floating math, numerous clock-control options, battery-backed real-time clock, watchdog timer, 40 I/O ports	$8 to $10
Six low-power modes, less than 20-μA minimum sleep current	N/A	As much as 2 kbytes	As many as four 8- and 16-bit channels	As many as four channels, UART and SDLC/HDLC with 32-bit CRC	Optional real-time clock, eight-channel ADC, 10-bit DAC, 32-bit GPIO, ZDI, watchdog timer	$2.50 to $13.50
Six low-power modes, less than 20-μA minimum sleep current	N/A	0 to 8 kbytes	As many as six 16-bit channels	Two channels of I²C, SPI, or UART	32-bit GPIO, ZDI, on-chip oscillator, watchdog timer, 4x CS	$6.50