



2004 EDN Microcontroller/Microprocessor directory

16-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
STMicroelectronics www.st.com	ST10F269	80C166	40	Up to 24/16 (custom)	16	5	120mA	Idle: (20+Fc _{pu})mA, powerdown: 15mA	One-cycle MAC		
	ST10R272	80C166	50	Up to 24/16 (custom)	16	3.3/5 tolerant	140mA	Idle: (10+0.9xFc _{pu}) mA, powerdown: 200mA	One-cycle MAC		
Sharp Microelectronics of the Americas www.sharpsma.com	LH79525	ARM	77.4	16 data	16, 32	1.8/ 3.3, 5 tolerant	85mA	Standby: 50mA Sleep: 3.8mA Stop1: 420µA Stop2: 25µA	Yes		8-kbyte
Infineon Technologies www.infineon.com/microcontrollers	C161CS/JC/JI	C166 V1	25	24/32 or 16, external: 24/16 or 8	16	5	300mW	Idle, sleep, powerdown	16x16		
	C161K/O	C166 V1	25 (20 at 3.3V)	24/16, external: 19/16 or 8	16	3.3 or 5.5	250mW	Idle, powerdown	16x16		
	C161PI	C166 V1	25 (20 at 3.3V)	24/16, external: 23/16 or 8	16	3.3 or 5.5	187mW	Idle, powerdown	16x16		
	C161S	C166 V1	25 (20 at 3.3V)	16/8	16	5 or 3.3	300mW (maximum)	0.25mW, idle, slowdown, powerdown	16x16		
	C164CI/CM	C166 V1	25	24/16 or 32, external: 21/16 or 8	16	5	250mW (ROM)	Idle, sleep, powerdown	16x16		
	C164SV	C166 V1	25	16/8	16	5	488mW (maximum)	0.25mW, idle, slowdown, powerdown	16x16		
	C165	C166 V1	25 (20 at 3.3V)	24/16, external: 24/16 or 8	16	3.3 or 5.5	250mW	Idle, powerdown	16x16		
	C167CR/CS	C166 V1	25, 33, 40	24/16, external: 24/16 or 8	16	5 or 3.3	600mW	Idle, sleep, powerdown	16x16		
	XC161CJ	C166 V2	40	24/16, external: 24/16 or 8	16	2.5/5	245mW	Idle, sleep, powerdown	Single-cycle MAC		
	XC164CM	C166 V2	40	16/8	16	2.5/5	250mW	Idle, sleep, powerdown	Single-cycle MAC		
	XC164CS	C166 V2	40	24/16, external: 24/16 or 8	16	2.5/5	250mW	Idle, sleep, powerdown	Single-cycle MAC		
	XC167CI	C166 V2	40	24/16 or 64, external: 24/16 or 8	16	2.5/5	250mW	Idle, sleep, powerdown	Single-cycle MAC		
Cyan Technology Ltd www.cyantechology.com	eCOG1	eCOG1	25	16	16	3.3	36mW	Stop 0.4µA, sleep, 10.1µA at 16 KHz running code	16x16		2-kbyte
Fujitsu Micro-electronics America www.fma.fujitsu.com	F2MC16L	F2MC-16	8 to 16, 32.768 KHz	24/16, external: 8 or 16	16	1.8 to 5.5	125mW	Stop, sleep, subclock, hardware standby, watch, timer			

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Memory	Memory controller	MMU	Package selection	Timers	Serial, Parallel I/O	Interrupts	ADC/DAC	Temperature ranges (degrees Celsius)	Additional features	Price (10,000)
256-kbyte Flash, 12-kbyte SRAM	Up to 16-Mbyte, 8- or 16-bit data, (de)multiplexed	Yes	144 TQFP/PQFP	Two units with five timers	Two CAN, (a)synchronous, high-speed	Eight, 56 sources, 16 levels	16 channel 10-bit	0 to +70 -40 to +85 -40 to +105 -40 to +125	On-chip bootstrap loader and PLL	\$13.35
1-kbyte SRAM	Up to 16-Mbyte, 8- or 16-bit data, (de)multiplexed	Yes	100 TQFP	Two units with five timers	(A)synchronous, high-speed	Eight, 56 sources, 16 levels		0 to +70 -40 to +85		\$4
16-kbyte SRAM	SDRAM, NAND, Flash, four-channel DMA	WinCE enabled	176 LQFP	Three 16-bit with PWM, realtime, watchdog	Three 16C550-type UART, 9-bit capability, IrDA (115 kbit/s); USB 2.0 Full Speed Device	16 vectored, 16 standard (both can be FIQ or IRQ)	9-bit, touchscreen controller, brownout detector	-40 to +85	Color or grayscale LCDC, STN, TFT, Advanced-TFT support, Ten Input, NAND Flash Boot, 10/100Ethernet	\$10.96
10-kbyte RAM, 256-kbyte ROM, or ROMless	8-bit, 16-bit, up to 16-Mbyte		128 PTQFP	Nine 16-bit, realtime, watchdog, 16-channel PWM	Up to two CAN, two UART, SPI, I2C, up to one J1850, 93 PIO	Up to 59, up to 19 external	12 channel 10-bit	-40 to +85 -40 to +125	PLL	\$12 (ROMless)
1- to 2-kbyte RAM	8-bit, 16-bit, up to 16-Mbyte		80 PMQFP	Three to five 16-bit, watchdog	UART, SPI, 63 PIO	10 to 13, four to seven external		0 to +70 -40 to +85		\$4.50
3-kbyte RAM	8-bit, 16-bit, up to 16-Mbyte		100 PTQFP, 100 PMQFP	Five 16-bit, realtime, watchdog	UART, SPI, I2C, 76 PIO	19, eight external	Four channel 10-bit	0 to +70 -40 to +85	PLL	\$5
2-kbyte SRAM	8-bit, 16-bit, up to 16-Mbyte		80 PMQFP	Five 16-bit, realtime, watchdog	UART, SPI, 63 I/O	30		0 to +85	Motor control peripheral, PLL	\$2.94
2- to 4-kbyte RAM, 32- to 64-kbyte ROM or OTP	8-bit, 16-bit, up to 4-Mbyte		80 PMQFP, 64 PTQFP	Seven 16-bit, realtime, watchdog, 19-channel PWM	CAN, UART, SPI, up to 59 PIO	Up to 28, up to 11 external	Up to eight channel 12-bit	-40 to +85 -40 to +125	Motor control peripheral, PLL	\$5 to \$10
2-kbyte SRAM	8-bit, 16-bit, up to 64-kbyte		64 PTQFP	Six 16-bit, 10-bit, realtime, watchdog	UART, SPI, 50 I/O	32	Eight channel 10-bit	-40 to +125	Motor control peripheral, PLL	\$5.37
2-kbyte RAM	8-bit, 16-bit, up to 16-Mbyte		100 PTQFP, 100 PMQFP	Five 16-bit, watchdog	UART, SPI, 77 PIO	13, eight external		0 to +70 -40 to +85		\$7.50
Up to 11-kbyte RAM, up to 128-kbyte ROM, or ROMless	8-bit, 16-bit, up to 16-Mbyte		144 PMQFP	13 16-bit, realtime, watchdog, 36-channel (maximum) PWM	Up to two CAN, UART, SPI, up to two CAN 2.0B, 111 PIO	Up to 55, up to 33 external	16 to 24 channel 10-bit	0 to +70 -40 to +85 (R only) -40 to +125	PLL	\$10 to \$14 (ROMless)
8-kbyte RAM, 128-kbyte Flash	8-bit, 16-bit, up to 12-Mbyte		144 PTQFP	Nine 16-bit, realtime, watchdog, 32-channel PWM	TwinCAN, two UART, two SPI, I2C, J1850, two CAN 2.0B, 103 PIO	Up to 74, up to 32 external	16 channel 10-bit	-40 to +85 -40 to +125	PLL	\$13
6-kbyte SRAM			64 PTQFP	Seven 16-bit, realtime, watchdog	Two CAN, two UART, two SPI, 47 I/O	75	14 channel 10-bit	-40 to +125	Motor control peripheral, PLL	\$7.73
6-kbyte RAM, 128-kbyte Flash	8-bit, 16-bit, up to 12-Mbyte		100 PTQFP	11 16-bit, realtime, watchdog, 19-channel PWM	TwinCAN, UART, two SPI, two CAN 2.0B, 79 PIO	Up to 75, up to 11 external	14 channel 10-bit	-40 to +85 -40 to +125	PLL	\$12
8-kbyte RAM, 128-kbyte Flash	8-bit, 16-bit, up to 12-Mbyte		144 PTQFP	11 16-bit, realtime, watchdog, 19-channel PWM	TwinCAN, two UART, two SPI, two CAN 2.0B, 103 PIO	Up to 77	16 channel 10-bit	-40 to +85 -40 to +125	PLL	\$14
64-kbyte Flash, 4 kbyte SRAM	32-Mbyte external memory, DMA	Logical to physical address translations	128 TQFP	Seven 16 bit, 24-bit	Two UART, two USART, I2C, IrDA, SPI, smart card interface	29 GPIO level or edge sensitive	Four channel 12 bit	-40 to +85	Vdd sensor, temperature sensor, eICE real time debug port	\$8.36
32- to 384-kbyte masked ROM, 64 to 512-kbyte Flash, 640-byte to 16-kbyte RAM			48/120 QFP/LQFP /SQFP/SDIP (plastic)	16-bit, reload, PPG, PWM, 18-bit watchdog, PWC, timebase	SIO, triple CAN, I2C, UART, IE Bus, up to 102 GPIO	Eight external	Four, eight, or 16 channel 8/10-bit; two channel 8-bit DAC	-40 to +85	LCD controller, PLL, AC/DC and stepper-motor control, sound and wave generator, level comparator, input capture, output compare	From \$2.30

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	F2MC16LX	F2MC-16	8 to 24, 32.768 KHz	24/16, external: 8 or 16	16	1.8 to 5.5	200mW	Stop, sleep, subclock, hardware standby, watch, timer			
Renesas Technology www.renesas.com	H8/300H Series H8/3062F	H8	25	24/16, external: 16/8	32	3 to 5.5	175mW	Five	8x8, 16x16		
	H8/300H Series H8/3069F	H8	25	24/16, external: 16/8	32	4.5 to 5.5	120mW	Five	8x8, 16x16		
	Tiny Series H8/3664	H8	16	16/16	8 to 80	2.7 to 5.5	75mW	Six	8x8		
	Tiny Series H8/3672	H8	16	16/16	8 to 80	2.7 to 5.5	75mW	Four	8x8		
	Tiny Series H8/3687	H8	20	16/16	8 to 80	2.7 to 5.5	100mW	Six	8x8		
	Tiny Series H8/3694	H8	20	16/16	8 to 80	2.7 to 5.5	100mW	Six	8x8		
	Tiny Series H8/36014	H8	20	16/16	8 to 80	2.7 to 5.5	75mW	Four	8x8		
	H8S/2100 Series H8S/2145B	H8S	10, 20	24/16	16 to 80	2.7 to 5.5	90mW	Watch, sleep, sub-sleep, sub-active, module stop, hardware and software standby	8x8, 16x16 multiply, 16/8, 32/16 divide		
	H8S/2100 Series H8S/2148B	H8S	10, 20	24/16	16 to 80	2.7 to 5.5	90mW	Watch, sleep, sub-sleep, sub-active, module stop, hardware and software standby	8x8, 16x16 multiply, 16/8, 32/16 divide		
	H8S/2100 Series H8S/2166	H8S	33	24/16	16 to 80	3 to 3.6	140mW	Watch, sleep, sub-sleep, sub-active, module stop, hardware and software standby	8x8, 16x16 multiply, 16/8, 32/16 divide		
	H8S/2100 Series H8S/2167	H8S	33	24/16	16 to 80	3 to 3.6	140mW	Watch, sleep, sub-sleep, sub-active, module stop, hardware and software standby	8x8, 16x16 multiply, 16/8, 32/16 divide		
	H8S/2100 Series H8S/2168	H8S	33	24/16	16 to 80	3 to 3.6	140mW	Watch, sleep, sub-sleep, sub-active, module stop, hardware and software standby	8x8, 16x16 multiply, 16/8, 32/16 divide		

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32- to 384-kbyte masked ROM, 64 to 512-kbyte Flash, 640-byte to 16-kbyte RAM			48/64/100/120 QFP/LQFP/SQFP/SDIP (plastic)	16-bit, reload, PPG, PWM, 18-bit watchdog, PWC, timebase	SIO, triple CAN, I2C, LIN, UART, IE Bus, up to 102 GPIO	Eight external	Four, eight, 16, or 24 channel 8/10-bit; two channel 8-bit DAC	-40 to +85 -40 to +105	92 segment LCD controller, PLL, AC/DC and stepper-motor control, sound and wave generator, level comparator, input capture, output compare, embedded dual operation Flash memory.	From \$2.50
128-kbyte Flash			100 QFP/TQFP	Four 8-bit, three 16-bit, watchdog	Two (a)synchronous	27, seven external	Eight channel 10-bit; two channel 8-bit DAC	-40 to +85	Bus controller, interrupt controller, TPC, smart card interface	\$7.65
512-kbyte Flash	Four-channel M-M, two-channel M-I/O	DRAM interface	100 QFP/TQFP	Four 8-bit, three 16-bit, watchdog	Three (a)synchronous	30, seven external	Eight channel 10-bit; two channel 8-bit DAC	-40 to +85	Bus controller, TPC, refresh controller	\$12.80
32-kbyte Flash, 8 to 32-kbyte Mask ROM			42 DIP, 48 LQFP, 64 QFP/LQFP	Two 8-bit, 16-bit, watchdog, three PWM	(A)synchronous	21, 11 external	Eight channel 10-bit	-40 to +105	Address break, on-chip debug, 32-kHz subclock	\$2.40 to \$4.30
16-, 32-kbyte Flash			48/64 LQFP	8-bit, 16-bit, watchdog, three PWM	(A)synchronous	17, seven external	Four channel 10-bit	-40 to +85	Address break, on-chip debug	\$2.10 to \$3.25
32-, 56-kbyte Flash, 16- to 56-kbyte Mask ROM			64 QFP/LQFP	Three 8-bit, two 16-bit, watchdog, seven PWM	I2C, two (a)synchronous	38, 11 external	Eight channel 10-bit	-40 to +125	Address break, on-chip debug, power on reset, low-voltage detect, 32-kHz subclock	\$2.85 to \$5.45
32-kbyte Flash, 8 to 32-kbyte Mask ROM			42 DIP, 48 LQFP, 64 QFP/LQFP	Two 8-bit, 16-bit, watchdog, three PWM	(A)synchronous, I2C	22, 11 external	Eight channel 10-bit	-40 to +125	Address break, on-chip debug, power on reset, low-voltage detect, 32-kHz subclock	\$2.30 to \$4.50
16-, 32-kbyte Flash, 8- to 32-kbyte Mask ROM			48/64 LQFP	8-bit, 16-bit, watchdog, three PWM	Two (a)synchronous	21, nine external	Four channel 10-bit	-40 to +125	Address break, on-chip debug	\$2.10 to \$4.10
256-kbyte Flash, 8-kbyte RAM	Yes		100 QFP	Four 8-bit, 16-bit, two 14-bit PWM, watchdog	Three (a)synchronous, IrDA, I2C	50, 33 external	Eight channel 10-bit; two channel 8-bit DAC	-20 to +75	Low-pin-count interface, data-transfer controller	\$11.25
128-kbyte Flash, 4-kbyte RAM	Yes		100 QFP	Four 8-bit, 16-bit, two 14-bit PWM, two watchdog	Three (a)synchronous, IrDA, I2C	50, 33 external	Eight channel 10-bit; two channel 8-bit DAC	-40 to +85	Low-pin-count interface, data-transfer controller	\$10.65
512-kbyte Flash, 40-kbyte RAM	Yes		144 TQFP	Four 8-bit, 16-bit, two watchdog	Three (a)synchronous, IrDA, six I2C	48 internal, 41 external	Eight channel 10-bit; two channel 8-bit DAC	-40 to +85	Low-pin-count interface, data-transfer controller, boundary scan	\$17.85
384-kbyte Flash, 40-kbyte RAM	Yes		144 TQFP	Four 8-bit, 16-bit, two watchdog	Three (a)synchronous, IrDA, six I2C	48 internal, 41 external	Eight channel 10-bit; two channel 8-bit DAC	-40 to +85	Low-pin-count interface, data-transfer controller, boundary scan	\$16.25
256-kbyte Flash, 40-kbyte RAM	Yes		144 TQFP	Four 8-bit, 16-bit, two watchdog	Three (a)synchronous, IrDA, six I2C	48 internal, 41 external	Eight channel 10-bit; two channel 8-bit DAC	-40 to +85	Low-pin-count interface, data-transfer controller, boundary scan	\$14.35

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	H8S/2200 Series H8S/2212	H8S	24	24/16	16 to 80	2.7 to 3.6	135mW	Watch, sleep, sub-sleep, sub-active, module stop, hardware and software standby	8x8, 16x16 multiply, 16/8, 32/16 divide		
	H8S/2200 Series H8S/2215	H8S	16	24/16	16 to 80	2.7 to 3.6	89mW	Sleep, module stop, hardware and software standby	8x8, 16x16 multiply, 16/8, 32/16 divide		
	H8S/2200 Series H8S/2239	H8S	16	24/16	16 to 80	2.7 to 3.6	80mW	Watch, sleep, sub-sleep, sub-active, module stop, hardware and software standby	8x8, 16x16 multiply, 16/8, 32/16 divide		
	H8S/2200 Series H8S/2268	H8S	13, 20	24/16	16 to 80	3 to 5.5	80mW	Watch, sleep, sub-sleep, sub-active, module stop, hardware and software standby	8x8, 16x16 multiply, 16/8, 32/16 divide		
	H8S/2300 Series H8S/2317BL	H8S	25	24/16	16 to 80	3 to 3.6	165mW	Sleep, module stop, hardware and software standby	8x8, 16x16 multiply, 16/8, 32/16 divide		
	H8S/2300 Series H8S/2327BL	H8S	25	24/16	16 to 80	3 to 3.6	181mW	Sleep, module stop, hardware and software standby	8x8, 16x16 multiply, 16/8, 32/16 divide		
	H8S/2300 Series H8S/2377	H8S	33	24/16	16 to 80	3 to 3.6	264mW	Sleep, module stop, hardware and software standby	8x8, 16x16 multiply, 16/8, 32/16 divide		
	H8S/2600 Series H8S/2612	H8S	20	24/16	16 to 80	4.5 to 5.5	325mW	Sleep, module stop, hardware and software standby	8x8, 16x16 multiply, MAC, 16/8, 32/16 divide		
	H8S/2600 Series H8S/2636	H8S	20	24/16	16 to 80	4.5 to 5.5	375mW	Sleep, module stop, hardware and software standby	8x8, 16x16 multiply, MAC, 16/8, 32/16 divide		
	H8S/2600 Series H8S/2674R	H8S	33	24/16	16 to 80	3 to 3.6	264mW	Sleep, module stop, hardware and software standby, module stop, clock division	8x8, 16x16 multiply, MAC, 16/8, 32/16 divide		
Freescale www.freescale.com	HCS12 family E series	HCS12	25	16	16	3.3 to 5	325mW	Wait, stop, pseudo stop, low-voltage inhibit, auto-wakeup			
	HCS12 family D series	HCS12	25	16	16	5	275mW	Wait, stop, pseudo stop, low-voltage inhibit, auto-wakeup			
	HCS12 family A series	HCS12	25	16	16	5	325mW	Wait, stop, pseudo stop, low-voltage inhibit, auto-wakeup			

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128-kbyte Flash, 12-kbyte RAM	Four DMA		64 LQFP	Three 16-bit, realtime, watchdog	Two (a)synchronous, full speed USB 2.0, Smart Card interface	31 internal, 7 external	Six channel 10-bit	-40 to +85	Data-transfer controller, PLL	\$9.10
256-kbyte Flash, 16-kbyte RAM	Four DMA		120 TQFP, 112 BGA	Two 8-bit, three 16-bit, watchdog	Three (a)synchronous, full speed USB 2.0	40, eight external	Six channel 10-bit; two channel 8-bit DAC	-40 to +85	Data-transfer controller, PLL	\$10.80
384-kbyte Flash, 32-kbyte RAM	Yes		100 QFP	Four 8-bit, six 16-bit, two watchdog	Four (a)synchronous, I2C	65, nine external	Eight channel 10-bit; two channel 8-bit DAC	-40 to +85	Data-transfer controller, smart-card interface	\$14.95
256-kbyte Flash, 16-kbyte RAM			100 QFP	Four 8-bit, six 16-bit, watchdog	Three (a)synchronous, I2C	48, 14 external	10 channel 10-bit; two channel 8-bit DAC	-40 to +85	40x4 LCD, data-transfer controller	\$14.95
128-kbyte Flash, 8-kbyte RAM	Yes		100 TQFP	Four 8-bit, six 16-bit, watchdog	Three (a)synchronous	43, nine external	Eight channel 10-bit; two channel 8-bit DAC	-40 to +85	Data-transfer controller, smart-card I/F, on-chip debug	\$4.99
128-kbyte Flash, 8-kbyte RAM	Four DMA		128 QFP	Four 8-bit, six 16-bit, watchdog	Three (a)synchronous	52, nine external	Eight channel 10-bit; two channel 8-bit DAC	-40 to +85	Data-transfer controller, smart-card interface, on-chip debug	\$5.99
384-kbyte Flash, 24-kbyte RAM	SDRAM		144 LQFP	Four 8-bit, six 16-bit, watchdog	Five (a)synchronous, IrDA	62, 17 external	16 channel 10-bit; six channel 8-bit DAC	-40 to +85	Data-transfer controller, smart-card interface, PLL	\$15.35
128-kbyte Flash, 4-kbyte RAM	Yes		80 QFP	Six 16-bit, watchdog	Three (a)synchronous, HCAN	49, seven external	12 channel 10-bit	-40 to +125	Data-transfer controller, motor-management timer, PC-break controller	\$12
128-kbyte Flash, 4-kbyte RAM	SDRAM		128 QFP	Six 16-bit, PWM, two watchdog	Three (a)synchronous	50, seven external	12 channel 10-bit; two channel 8-bit DAC	-40 to +85	HCAN, data-transfer controller, 8-bit PPG, PLL, smart-card I/F	\$15.85
32-kbyte RAM, ROM-less	SDRAM		144 LQFP	Two 8-bit, six 16-bit, watchdog	Three (a)synchronous	57, 17 external	12 channel 10-bit; four channel 8-bit DAC	-40 to +85	Data-transfer controller, 16-bit PPG, SDRAM I/F, PLL, IrDA	\$7.80
64- to 256-kbyte Flash, 4 to 12-kbyte RAM			112 LQFP, 80 QFP	Three or four 16-bit, six 8-bit, three 16-bit PWM	Up to 90 GPIO, up to three SCI, SPI, I2C	IRQ, XIRQ, 20 sources with wakeup	16 channel 10-bit; two 8-bit DAC	-40 to +85 -40 to +125	Background debug, single-pin interface, on-chip hardware breakpoints; six-channel PMF	\$6.40 to \$8.30
64- to 256-kbyte Flash, 1- to 4-kbyte EEPROM, 4- to 12-kbyte RAM,			112 LQFP, 80 QFP	Eight 16-bit, up to eight 8-bit, four 16-bit PWM	Up to two SCI, up to three SPI, I2C, up to 91 GPIO, up to five CAN	IRQ, XIRQ, 20 sources with wakeup	Up to two eight channel 10-bit	-40 to +85 -40 to +105 -40 to +125	Background debug, single-pin interface, on-chip hardware breakpoints; digital BDLC (Byte Data Link)	\$7.85 to \$13.42
64- to 256-kbyte Flash, 1- to 4-kbyte EEPROM, 4- to 12-kbyte RAM,			112 LQFP, 80 QFP	Eight 16-bit, up to eight 8-bit, four 16-bit PWM	Up to two SCI, up to two SPI, I2C, up to 91 GPIO	IRQ, XIRQ, 20 sources with wakeup	Up to two eight channel 10-bit	-40 to +85	Background debug, single-pin interface, on-chip hardware breakpoints	\$6.80 to \$11.80

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	HCS12 family B series	HCS12	25	16	16	3.3 to 5	325mW	Wait, stop, pseudo stop, low-voltage inhibit, auto-wakeup			
	HCS12 family C series	HCS12	25	16	16	3.3 to 5	325mW	Wait, stop, pseudo stop, low-voltage inhibit, auto-wakeup			
	HCS12 family H series	HCS12	16	16	16	5	325mW	Wait, stop, pseudo stop, low-voltage inhibit, auto-wakeup			
	HCS12 family T series	HCS12	16	16	16	5	325mW	Wait, stop, pseudo stop, low-voltage inhibit, auto-wakeup			
Renesas Technology www.renesas.com	M16C/1N	M16C	16	20/16	16	4.2 to 5.5	500mW	Stop: 1mA	16x16		
	M16C/24	M16C	16	20/16	16	3 to 3.6	300mW		16x16		
	M16C/26	M16C	20		16	2.7 to 5.5	16mA	Stop: 0.7mA wait: 1.8mA	16x16		
	M16C/62P	M16C	24	20/16	16	2.7 to 5.5	300mW	Stop: 0.8mA wait: 2.0mA	16x16		
	M16C/6N	M16C	20	20/16	16	4.2 to 5.5	700mW	Stop: 0.8mA wait: 3.0mA	16x16		
	M16C/80	M16C	20	20/16	16	2.7 to 5.5	500mW	Stop: 1.0mA	16x16		
	M32C/83	M16C	32	20/16	16	3 to 5.5	500mW	Stop: 0.4mA wait: 470mA	16x16		
	R8C/10	M16C	16	16/8	16	2.7 to 5.5	40mW	Medium speed and divide by eight, ring oscillator and divide by eight, wait, stop	8x8, 16x16		
	R8C/11	M16C	20	16/8	16	2.7 to 5.5	45mW	Medium speed and divide by eight, ring oscillator and divide by eight, wait, stop	8x8, 16x16		

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16-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)
64- to 256-kbyte Flash, 1- to 4-kbyte EEPROM, 4- to 12-kbyte RAM,			112 LQFP, 80 QFP	Eight 16-bit, up to eight 8-bit, four 16-bit PWM	Up to two SCI, up to two SPI, I2C, up to 91 GPIO	IRQ, XIRQ, 20 sources with wakeup	Up to two eight channel 10-bit	-40 to +85	Background debug, single-pin interface, on-chip hardware breakpoints	\$6.27 to \$10.73
32- to 128-kbyte Flash, 2- to 4-kbyte RAM			80 QFP, 52 QFP, 48 QFP	Eight 16-bit or PWM	SCI, SPI, CAN, up to 60 GPIO	IRQ, XIRQ, 20 sources with wakeup	Eight channel 10-bit	-40 to +85 -40 to +125	Background debug, single-pin interface, on-chip hardware breakpoints	\$4.75 to \$7.80
32- to 256-kbyte Flash, 1- to 4-kbyte EEPROM, 2- to 12-kbyte RAM			112 LQFP, 144 LQFP	Eight 16-bit, up to six 8-bit, three 16-bit PWM	Up to two SCI, up to two SPI, I2C, up to 99 GPIO	IRQ, XIRQ, 20 sources with wakeup	Sixteen channel 10-bit	-40 to +85 -40 to +105 -40 to +125	Background debug, single-pin interface, on-chip hardware breakpoints	\$11.5 to \$14.23
64- kbyte Flash, 2- to 4-kbyte RAM, CalRAM			112 LQFP, 80 QFP	Eight 16-bit, up to eight 8-bit, four 16-bit PWM	Up to two SCI, up to two SPI, I2C, up to 91 GPIO	IRQ, XIRQ, 20 sources with wakeup	Up to two eight channel 10-bit	-40 to +85 -40 to +105 -40 to +125	Background debug, single-pin interface, on-chip hardware breakpoints	\$6.30 to \$7
64-kbyte Flash, 3 kbyte RAM			48 LQFP	Four 8-bit, 16-bit, real-time, watchdog	Two (a)synchronous, CAN, 37 GPIO (eight high current)	Eight external	14 channel 10-bit; 8-bit DAC	-40 to +85	Internal ring oscillator	\$7.75
128-kbyte Flash, 10-kbyte RAM	Four DMA		100 LQFP	Five 16-bit, watchdog	Four (a)synchronous, four I2C, USB, 82 GPIO (eight high-current)	Three external	Eight channel 10-bit	-20 to +85	3.25-kbyte of USB FIFO, nine end points, SSI	\$9.30
24- to 64-kbyte Flash, 4-kbyte Virtual EEPROM, 1- or 2-kbyte RAM	Two DMA		48 LQFP	Eight 16-bit, real-time, watchdog	Three (a)synchronous, I2C, 38 GPIO	Seven external	Eight channel 10-bit	-40 to +85	Virtual EEPROM, BOD, three-phase, internal ring oscillator	\$4.25 to \$5.60
64- to 384-kbyte Flash, 4-kbyte Virtual EEPROM, 4- to 31-kbyte RAM	Two DMA		100 QFP, 100/128 LQFP	11 16-bit, real-time, watchdog	Five (a)synchronous, three I2C, 87 or 113 GPIO	Eight external	26 channel 10-bit; two channel 8-bit DAC	-40 to +85	Virtual EEPROM, PLL, CRC, three-phase, internal ring oscillator	\$6.60 to \$13
128- to 256-kbyte Flash, 5- to 10-kbyte RAM	Two DMA		100 QFP	11 16-bit, watchdog	Four (a)synchronous, three I2C, up to two CAN, 87 GPIO	Nine external	26 channel 10-bit; two channel 8-bit DAC	-40 to +85	CRC, three-phase, internal ring oscillator	\$12 to \$16
128- to 256-kbyte Flash, 10- to 20-kbyte RAM	Four DMA		100 QFP, 100/144 LQFP	11 16-bit, real-time, watchdog	I2C, five (a)synchronous, 87 or 123 GPIO	Eight external	10 channel 10-bit; two channel 8-bit DAC	-40 to +85	DRAMC, high-speed interrupt, XYC, CRC, three-phase	\$16 to \$19
512-kbyte Flash, 31-kbyte RAM	Four DMA		100 QFP, 144 LQFP	11 16-bit, watchdog	Eight (a)synchronous, five I2C, CAN, 88 or 124 GPIO	Eight external	10, 16, or 24 channel 10-bit; two channel 8-bit DAC	-40 to +85	DRAMC, XYC, three-phase, HDLC, RTP, internal ring oscillator	\$15 to \$17
8- to 16-kbyte Flash, 0.5- to 1-kbyte RAM			32 LQFP	Three 8-bit, 16-bit, watchdog	Two (a)synchronous	17 internal, 5 external	Eight channel 10-bit	-40 to +85	Ring oscillator, clock stop detect	\$2.20 to \$2.50
8- to 16-kbyte Flash, 0.5- to 1-kbyte RAM			32 LQFP	Three 8-bit, 16-bit, watchdog	Two (a)synchronous	19 internal, 5 external	Eight channel 10-bit	-40 to +85	Ring oscillator, clock stop detect, power-on reset, low voltage detect	\$2.35 to \$2.70

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16-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
	R8C/12	M16C	16	16/8	16	2.7 to 5.5	40mW	Medium speed and divide by eight, ring oscillator and divide by eight, wait, stop	8x8, 16x16		
	R8C/13	M16C	20	16/8	16	2.7 to 5.5	40mW	Medium speed and divide by eight, ring oscillator and divide by eight, wait, stop	8x8, 16x16		
Microchip Technology www.microchip.com	dsPIC motor control/power conversion family	Modified Harvard	120	No external	24	2.5 to 5.5		low power sleep, individual peripheral enable	Single-cycle 16x16 MAC, barrel shifter, two 40-bit accumulators, 32/16 and 16/16 divide		
	dsPIC sensor and general purpose family	Modified Harvard	120	No external	24	2.5 to 5.5		low power sleep, individual peripheral enable	Single-cycle 16x16 MAC, barrel shifter, two 40-bit accumulators, 32/16 and 16/16 divide		
Texas Instruments www.ti.com/msp430	MSP430 C1101	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 C1111	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 C1121	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 C1122	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 C1132	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 C1331	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 C1351	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 C412	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 C413	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F1101A	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F1111A	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F1121A	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F1122	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			

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16-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 16-kbyte Flash, 0.5- to 1-kbyte RAM, 4-kbyte dataFlash			32 LQFP	Three 8-bit, 16-bit, watchdog	Two (a)synchronous	17 internal, 5 external	Eight channel 10-bit	-40 to +85	Ring oscillator, clock stop detect	\$2.25 to \$2.60
8- to 16-kbyte Flash, 0.5- to 1-kbyte RAM, 4-kbyte dataFlash			32 LQFP	Three 8-bit, 16-bit, watchdog	Two (a)synchronous	19 internal, 5 external	12 channel 10-bit	-40 to +85	Ring oscillator, clock stop detect, power-on reset, low voltage detect	\$2.50 to \$2.85
12-kbyte to 144-kbyte Flash, 0- to 4-kbyte EEPROM, 512 to 8192-byte RAM,			28/80 SPDIP/ SOIC/TQFP/ QFN	Up to five 16-bit, can pair for 32-bit, watchdog	Up to two UART, CAN 2.0B, SPI, up to one I2C, PWM, up to 54 GPIO, quadrature encoder	Up to 45 sources, seven levels	Six to sixteen channels 10-bit 500Ksps, 16 deep result buffer	-40 to +125	Software stack, 16 general purpose registers, brown out/low voltage detect, buffered peripherals	\$3.70 to \$12.90
12-kbyte to 144-kbyte Flash, 0- to 4-kbyte EEPROM, 512 to 8192-byte RAM,			18/80 PDIP/SPDIP/ SOIC/TQFP/ QFN	Up to five 16-bit, can pair for 32-bit, watchdog	Up to two UART, CAN 2.0B, SPI, up to one I2C, PWM, codec interface	Up to 45 sources, seven levels	Eight to sixteen channels 12-bit 100Ksps, 16 deep result buffer	-40 to +125	Software stack, 16 general purpose registers, brown out/low voltage detect, Buffered peripherals	\$3.70 to \$12.90
1-kbyte Flash, 128-byte ROM			20 SOP, 20 TSSOP, 24 QFN	16-bit watchdog, 16-bit PWM	14 PIO	All peripherals and I/O	slope	-40 to +85	Comparator	60 cents
2-kbyte Flash, 128-byte ROM			20 SOP, 20 TSSOP, 24 QFN	16-bit watchdog, 16-bit PWM	14 PIO	All peripherals and I/O	slope	-40 to +85	Comparator	1.1
4-kbyte Flash, 256-byte ROM			20 SOP, 20 TSSOP, 24 QFN	16-bit watchdog, 16-bit PWM	14 PIO	All peripherals and I/O	slope	-40 to +85	Comparator	\$1.35
4-kbyte Flash, 256-byte ROM			20 SOP, 20 TSSOP	16-bit watchdog, 16-bit PWM	14 PIO	All peripherals and I/O	Five channel 10-bit	-40 to +85	temperature sensor, Brown Out Reset	\$1.50
8-kbyte Flash, 256-byte ROM			20 SOP, 20 TSSOP	16-bit watchdog, 16-bit PWM	14 PIO	All peripherals and I/O	Five channel 10-bit	-40 to +85	temperature sensor, Brown Out Reset	\$1.70
8-kbyte Flash, 256-byte ROM			64 QFP, 64 QFN	16-bit watchdog, 16-bit PWM	USART, 48 PIO	All peripherals and I/O	slope	-40 to +85	Comparator	\$2
16-kbyte Flash, 512-byte ROM			64 QFP, 64 QFN	16-bit watchdog, 16-bit PWM	USART, 48 PIO	All peripherals and I/O	slope	-40 to +85	Comparator	\$2.30
4-kbyte Flash, 256-byte ROM			64 QFP, 64 QFN	Two 8-bit, 16-bit watchdog, 16-bit PWM	USART, 48 PIO	All peripherals and I/O	slope	-40 to +85	Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$1.90
8-kbyte Flash, 256-byte ROM			64 QFP, 64 QFN	Two 8-bit, 16-bit watchdog, 16-bit PWM	USART, 48 PIO	All peripherals and I/O	slope	-40 to +85	Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$2.10
1-kbyte Flash, 128-byte RAM			20 SOP, 20 TSSOP, 20 TVSOP, 24 QFN	16-bit watchdog, 16-bit PWM	14 PIO	All peripherals and I/O	slope	-40 to +85	Comparator	99 cents
2-kbyte Flash, 128-byte RAM			20 SOP, 20 TSSOP, 20 TVSOP, 24 QFN	16-bit watchdog, 16-bit PWM	14 PIO	All peripherals and I/O	slope	-40 to +85	Comparator	\$1.35
4-kbyte Flash, 256-byte RAM			20 SOP, 20 TSSOP, 20 TVSOP, 24 QFN	16-bit watchdog, 16-bit PWM	14 PIO	All peripherals and I/O	slope	-40 to +85	Comparator	\$1.70
4-kbyte Flash, 256-byte RAM			20 SOP, 20 TSSOP, 32 QFN	16-bit watchdog, 16-bit PWM	14 PIO	All peripherals and I/O	Five channel 10-bit	-40 to +85	Temperature sensor, Brown Out Reset	\$2

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16-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
	MSP430 F1132	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F122	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F1222	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F123	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F1232	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F133	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F135	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F147	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 F1471	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 F148	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 F1481	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 F149	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 F1491	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 F155	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F156	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F157	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F1610	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 F1611	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 F1612	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		

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Memory	Memory controller	MMU	Package selection	Timers	Serial, Parallel I/O	Interrupts	ADC/DAC	Temperature ranges (degrees Celsius)	Additional features	Price (10,000)
8-kbyte Flash, 256-byte RAM			20 SOP, 20 TSSOP, 32 QFN	16-bit watchdog, 16-bit PWM	14 PIO	All peripherals and I/O	Five channel 10-bit	-40 to +85	Temperature sensor, Brown Out Reset	\$2.25
4-kbyte Flash, 256-byte RAM			28 SOP, 28 TSSOP, 32 QFN	16-bit watchdog, 16-bit PWM	USART, 22 PIO	All peripherals and I/O	slope	-40 to +85	Comparator	\$2.15
4-kbyte Flash, 256-byte RAM			28 SOP, 28 TSSOP, 32 QFN	16-bit watchdog, 16-bit PWM	USART, 22 PIO	All peripherals and I/O	Eight channel 10-bit	-40 to +85	Temperature sensor, Brown Out Reset	\$2.40
8-kbyte Flash, 256-byte RAM			28 SOP, 28 TSSOP, 32 QFN	16-bit watchdog, 16-bit PWM	USART, 22 PIO	All peripherals and I/O	slope	-40 to +85	Comparator	\$2.30
8-kbyte Flash, 256-byte RAM			28 SOP, 28 TSSOP, 32 QFN	16-bit watchdog, 16-bit PWM	USART, 22 PIO	All peripherals and I/O	Eight channel 10-bit	-40 to +85	Temperature sensor, Brown Out Reset	\$2.50
8-kbyte Flash, 256-byte RAM			64 QFP, 64 QFN	16-bit watchdog, two 16-bit PWM	USART, 48 PIO	All peripherals and I/O	Eight channel 12-bit	-40 to +85	Temperature sensor, Brown Out Reset	\$3
16-kbyte Flash, 512-byte RAM			64 QFP, 64 QFN	16-bit watchdog, two 16-bit PWM	USART, 48 PIO	All peripherals and I/O	Eight channel 12-bit	-40 to +85	Temperature sensor, Brown Out Reset	\$3.60
32-kbyte Flash, 1024-byte RAM			64 QFP, 64 QFN	16-bit watchdog, two 16-bit PWM	Two USART, 48 PIO	All peripherals and I/O	Eight channel 12-bit	-40 to +85	Temperature sensor, Brown Out Reset	\$5.05
32-kbyte Flash, 1024-byte RAM			64 QFP, 64 QFN	16-bit watchdog, two 16-bit PWM	Two USART, 48 PIO	All peripherals and I/O	slope	-40 to +85	Comparator	\$4.60
48-kbyte Flash, 2048-byte RAM			64 QFP, 64 QFN	16-bit watchdog, two 16-bit PWM	Two USART, 48 PIO	All peripherals and I/O	Eight channel 12-bit	-40 to +85	Temperature sensor, Brown Out Reset	\$5.75
48-kbyte Flash, 2048-byte RAM			64 QFP, 64 QFN	16-bit watchdog, two 16-bit PWM	Two USART, 48 PIO	All peripherals and I/O	slope	-40 to +85	Comparator	\$5.30
60-kbyte Flash, 2048-byte RAM			64 QFP, 64 QFN	16-bit watchdog, two 16-bit PWM	Two USART, 48 PIO	All peripherals and I/O	Eight channel 12-bit	-40 to +85	Temperature sensor, Brown Out Reset	\$6.05
60-kbyte Flash, 2048-byte RAM			64 QFP, 64 QFN	16-bit watchdog, two 16-bit PWM	Two USART, 48 PIO	All peripherals and I/O	slope	-40 to +85	Comparator	\$5.60
16-kbyte Flash, 512-byte RAM			64 QFP	16-bit watchdog, two 16-bit PWM	USART, I2C, 48 PIO	All peripherals and I/O	Eight channel 12-bit; two channel 12-bit DAC	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, Comparator	\$4.95
24-kbyte Flash, 1024-byte RAM			64 QFP	16-bit watchdog, two 16-bit PWM	USART, I2C, 48 PIO	All peripherals and I/O	Eight channel 12-bit; two channel 12-bit DAC	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, Comparator	\$5.55
32-kbyte Flash, 1024-byte RAM			64 QFP	16-bit watchdog, two 16-bit PWM	USART, I2C, 48 PIO	All peripherals and I/O	Eight channel 12-bit; two channel 12-bit DAC	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, Comparator	\$5.85
32-kbyte Flash, 5120-byte RAM			64 QFP	16-bit watchdog, two 16-bit PWM	USART, I2C, 48 PIO	All peripherals and I/O	Eight channel 12-bit; two channel 12-bit DAC	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, Comparator	\$8.25
48-kbyte Flash, 10.2-kbyte RAM			64 QFP	16-bit watchdog, two 16-bit PWM	USART, I2C, 48 PIO	All peripherals and I/O	Eight channel 12-bit; two channel 12-bit DAC	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, Comparator	\$8.65
55-kbyte Flash, 5120-byte RAM			64 QFP	16-bit watchdog, two 16-bit PWM	USART, I2C, 48 PIO	All peripherals and I/O	Eight channel 12-bit; two channel 12-bit DAC	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, Comparator	\$8.95

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16-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
	MSP430 F167	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 F168	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 F169	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 F412	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F413	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F415	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F417	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F423	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 F425	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 F427	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 F435	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F436	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F437	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 F447	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		

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16-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, 1024-byte RAM			64 QFP	16-bit watchdog, two 16-bit PWM	USART, I2C, 48 PIO	All peripherals and I/O	Eight channel 12 bit, two channel 12-bit DAC	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, Comparator	\$6.75
48-kbyte Flash, 2048-byte RAM			64 QFP	16-bit watchdog, 16-bit PWM	USART, I2C, 48 PIO	All peripherals and I/O	Eight channel 12 bit, two channel 12-bit DAC	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, Comparator	\$7.45
60-kbyte Flash, 2048-byte RAM			64 QFP	16-bit watchdog, two 16-bit PWM	USART, I2C, 48 PIO	All peripherals and I/O	Eight channel 12 bit, two channel 12-bit DAC	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, Comparator	\$7.95
4-kbyte Flash, 256-byte RAM			64 QFP, 64 QFN	Two 8-bit, 16-bit watchdog, 16-bit PWM	48 PIO	All peripherals and I/O	slope	-40 to +85	Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$2.60
8-kbyte Flash, 256-byte RAM			64 QFP, 64 QFN	Two 8-bit, 16-bit watchdog, 16-bit PWM	48 PIO	All peripherals and I/O	slope	-40 to +85	Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$2.95
16-kbyte Flash, 512-byte RAM			64 QFP	Two 8-bit, 16-bit watchdog, 16-bit PWM	48 PIO	All peripherals and I/O	slope	-40 to +85	Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$3.40
32-kbyte Flash, 1024-byte RAM			64 QFP	Two 8-bit, 16-bit watchdog, 16-bit PWM	48 PIO	All peripherals and I/O	slope	-40 to +85	Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$3.90
8-kbyte Flash, 256-byte RAM			64 QFP	Two 8-bit, 16-bit watchdog, 16-bit PWM	USART, 14 PIO	All peripherals and I/O	16-bit	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, LCD Driver	\$4.50
16-kbyte Flash, 512-byte RAM			64 QFP	Two 8-bit, 16-bit watchdog, 16-bit PWM	USART, 14 PIO	All peripherals and I/O	16-bit	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, LCD Driver	\$4.95
32-kbyte Flash, 1024-byte RAM			64 QFP	Two 8-bit, 16-bit watchdog, 16-bit PWM	USART, 14 PIO	All peripherals and I/O	16-bit	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, LCD Driver	\$5.40
16-kbyte Flash, 512-byte RAM			80/100 QFP	Two 8-bit, 16-bit watchdog, two 16-bit PWM	USART, 48 PIO	All peripherals and I/O	Eight channel 12 bit	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$4.45
24-kbyte Flash, 1024-byte RAM			80/100 QFP	Two 8-bit, 16-bit watchdog, two 16-bit PWM	USART, 48 PIO	All peripherals and I/O	Eight channel 12 bit	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$4.70
32-kbyte Flash, 1024-byte RAM			80/100 QFP	Two 8-bit, 16-bit watchdog, two 16-bit PWM	USART, 48 PIO	All peripherals and I/O	Eight channel 12 bit	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$4.90
32-kbyte Flash, 1024-byte RAM			100 QFP	Two 8-bit, 16-bit watchdog, two 16-bit PWM	Two USART, 48 PIO	All peripherals and I/O	Eight channel 12 bit	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$5.75

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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
	MSP430 F448	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 F449	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 FE412	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 FE413	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA	One-cycle MPY, MPYS, MAC, MACS		
	MSP430 FE423	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 FE425	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 FE427	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 FG437	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 FG438	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 FG439	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 FW423	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 FW425	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			
	MSP430 FW427	MSP	Up to 8	16/16	16	1.8 to 3.6	250mA/MIP	standby: 0.8mA, off: 0.1mA			

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Memory	Memory controller	MMU	Package selection	Timers	Serial, Parallel I/O	Interrupts	ADC/DAC	Temperature ranges (degrees Celsius)	Additional features	Price (10,000)
48-kbyte Flash, 2048-byte RAM			100 QFP	Two 8-bit, 16-bit watchdog, two 16-bit PWM	Two USART, 48 PIO	All peripherals and I/O	Eight channel 12-bit	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$6.50
60-kbyte Flash, 2048-byte RAM			100 QFP	Two 8-bit, 16-bit watchdog, two 16-bit PWM	Two USART, 48 PIO	All peripherals and I/O	Eight channel 12-bit	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$7.05
4-kbyte Flash, 256-byte RAM			64 QFP	Two 8-bit, 16-bit watchdog, two 16-bit PWM	14 PIO	All peripherals and I/O	16-bit	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, LCD Driver	\$3.50
8-kbyte Flash, 256-byte RAM			64 QFP	Two 8-bit, 16-bit watchdog, two 16-bit PWM	14 PIO	All peripherals and I/O	16-bit	-40 to +85	Temperature sensor, Supervisor Protection, Brown Out Reset, LCD Driver	\$3.95
8-kbyte Flash, 256-byte RAM			80 QFP	Two 8-bit, 16-bit watchdog, two 16-bit PWM	USART, 48 PIO	All peripherals and I/O	16-bit	-40 to +85	E meter, temperature sensor, Supervisor Protection, Brown Out Reset, LCD Driver	\$4.85
16-kbyte Flash, 512-byte RAM			80 QFP	Two 8-bit, 16-bit watchdog, two 16-bit PWM	USART, 48 PIO	All peripherals and I/O	16-bit	-40 to +85	E meter, temperature sensor, Supervisor Protection, Brown Out Reset, LCD Driver	\$5.45
32-kbyte Flash, 1024-byte RAM			80 QFP	Two 8-bit, 16-bit watchdog, two 16-bit PWM	USART, 48 PIO	All peripherals and I/O	16-bit	-40 to +85	E meter, temperature sensor, Supervisor Protection, Brown Out Reset, LCD Driver	\$5.95
32-kbyte Flash, 1024-byte RAM			80 QFP	Two 8-bit, 16-bit watchdog, two 16-bit PWM	USART, 48 PIO	All peripherals and I/O	Twelve channel 12-bit; two channel 12-bit DAC	-40 to +85	OPAMP, DMA, temperature sensor, Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$6.50
48-kbyte Flash, 2048-byte RAM			80 QFP	Two 8-bit, 16-bit watchdog, two 16-bit PWM	USART, 48 PIO	All peripherals and I/O	Twelve channel 12-bit; two channel 12-bit DAC	-40 to +85	OPAMP, DMA, temperature sensor, Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$7.35
60-kbyte Flash, 2048-byte RAM			80 QFP	Two 8-bit, 16-bit watchdog, two 16-bit PWM	USART, 48 PIO	All peripherals and I/O	Twelve channel 12-bit; two channel 12-bit DAC	-40 to +85	OPAMP, DMA, temperature sensor, Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$7.95
8-kbyte Flash, 256-byte RAM			64 QFP	Two 8-bit, 16-bit watchdog, two 16-bit PWM	48 PIO	All peripherals and I/O	slope	-40 to +85	Scan I/F Flow Meter, Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$3.75
16-kbyte Flash, 512-byte RAM			64 QFP	Two 8-bit, 16-bit watchdog, two 16-bit PWM	48 PIO	All peripherals and I/O	slope	-40 to +85	Scan I/F Flow Meter, Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$4.05
32-kbyte Flash, 1024-byte RAM			64 QFP	Two 8-bit, 16-bit watchdog, two 16-bit PWM	48 PIO	All peripherals and I/O	slope	-40 to +85	Scan I/F Flow Meter, Supervisor Protection, Brown Out Reset, Comparator, LCD Driver	\$4.45

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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
STMicroelectronics www.st.com	ST92F250 ST92F150 ST92F124	ST9	24	external: 22/8	8, 16	4.5 to 5.5	45mA	Slow: 2.5mA/MHz, halt/stop: 10mA	Hardware multiply and divide		
Toshiba America Electronic Components www.toshiba.com	900/H family	TLCS	Up to 25	24/16	8, 16, 32	2.7 to 5.5	40mA	Idle2: 30mA, idle1: 3.5mA, stop: 0.5mA	16x16 to 32-bits signed/unsigned		
	900/L family	TLCS	Up to 20	24/16	8, 16, 32	2.7 to 5.5	24mA	Run: 17mA, idle2: 2.5mA, idle1: 0.7mA, stop: 0.2mA	16x16 to 32-bits signed/unsigned		
	900/L1 family	TLCS	Up to 27	24/16	8, 16, 32	1.8 to 5.5	30mA	Idle2: 4.5mA, idle1: 2mA, stop: 1.0mA	16x16 to 32-bits signed/unsigned		
Intel www.intel.com	80386DX	x86	16, 20, 25, 33	32/32	32	5	300mA				
	80C186EB 80C188EB		8, 13, 16, 20, 25	external: 16/16	8, 16	3, 5	115mA	Idle, powerdown		Co-processor	
	80C186EC 80C188EC		13, 16, 20, 25	external: 16/16	8, 16	5/3, 5.5 tolerant	125mA	Idle, powerdown, powersave		Co-processor	
	MCS-296 80C296SA		40, 50	16 to 24/16	24	4.4 to 5.5	150mA	Idle, powerdown	Enhanced instructions, 40-bit accumulator		
	MCS-96 EPA 8XC196 Cx/Nx/EA		14, 16, 20, 25, 40, 50	16 to 24/16	24	4.4 to 5.5	150mA	Idle, powerdown			
	MCS-96 HSIO 8XC196Kx		16, 20	16 to 24/16	24	4.4 to 5.5	150mA	Idle, powerdown			
	MCS-96 Motion 8XC196Mx		16	16 to 24/16	24	4.4 to 5.5	150mA	Idle, powerdown			
National Semiconductor www.national.com	CP3000 Family CP3BT10		24	22/16	16	2.25 to 2.75/ 2.25 to 3.63	60mW	Active idle: 2.5mW, sleep: 800uW	16x16 MAC		
	CP3000 Family CP3BT13		24	22/16	16	2.25 to 2.75/ 2.25 to 3.63	60mW	Active idle: 2.5mW, sleep: 800uW	16x16 MAC		
	CP3000 Family CP3BT23		24	22/16	16	2.25 to 2.75/ 2.25 to 3.63	60mW	Active idle: 2.5mW, sleep: 800uW	16x16 MAC		
	CP3000 Family CP3BT26		24	22/16	16	2.25 to 2.75/ 2.25 to 3.63	60mW	Active idle: 2.5mW, sleep: 800uW	16x16 MAC		

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Memory	Memory controller	MMU	Package selection	Timers	Serial, Parallel I/O	Interrupts	ADC/DAC	Temperature ranges (degrees Celsius)	Additional features	Price (10,000)
64K to 256-kbyte Flash or ROM, 2- to 8-kbyte SRAM, 1-kbyte EEPROM	Up to 4-Mbyte, 8- or 16-bit data, (de)multiplexed	Yes	100 PQFP, 64/100 TQFP	Two 16-bit, two extended, watchdog	Two CAN, J1850, two UART, I2C, SPI	128, 23 external, seven levels, NMI	16 channel 10-bit	0 to +70 -40 to +85 -40 to +105 -40 to +125		\$4.90 to \$6.50
Up to 256-kbyte Flash/ROM, up to 8-kbyte RAM	Four micro DMA channels		64/144 QFP/LQFP	Up to eight 8-bit, up to two 16-bit, 22-bit watchdog	Up to three UART, synchronous SIO, SEI, CAN, IrDA, I2C, up to 81 PIO	28, nine CPU, 10 external, seven levels	Up to eight channel 10-bit		Four 32-bit register banks	\$3.75 to \$8
Up to 192-kbyte ROM, up to 4-kbyte RAM	Four micro DMA channels		80/100 QFP, 44/100 LQFP	Up to four 8-bit, up to five 16-bit, 22-bit watchdog, 8/14-bit PWM	Up to five UART, synchronous SIO, I2C, up to 85 PIO	14, nine CPU, six external, seven levels	Up to 16 channel 8-bit; up to eight channel 10-bit DAC		Four 32-bit register banks	\$3 to \$10
Up to 256-kbyte Flash/ROM, up to 16-kbyte SRAM	Four micro DMA channels	Yes	64/144 QFP/LQFP	Up to eight 8-bit, up to two 16-bit, 22-bit watchdog, real-time, 8/16-bit PWM	Up to five UART, synchronous SIO, SIE, CAN, I2C, up to 81 PIO	28, nine CPU, 10 external, seven levels	Up to 12 channel 10-bit		Four 32-bit register banks	\$4.50 to \$10
			132 PGA/PQFP			Maskable, NMI				\$5.90 to \$21
			80 QFP, 80 SQFP, 84 PLCC	Three 16-bit	Two	Up to 129 external				\$5.05 to \$7.75
			100 QFP(EIAJ)/PQFP/SQFP	Three 16-bit	Two	External (8259A)				\$8.81 to \$10
512-byte register RAM, 2-kbyte code RAM			SQFP	Two 16-bit, PWM	UART	19			Six chip selects, 6-Mbyte linear address range, EPA	\$14 to \$15.40
4-, 32-, 56-kbyte OTP, ROM, +1000-, 1500-byte register RAM, 256-, 512-, 3072-byte Code RAM			PLCC, QFP, SQFP, SDIP, CDIP	Two to four 16-bit, PWM, HSIO	One to three UART, CAN 2.0 (CA/CB)	19 to 37	Eight channel 10-bit		EPA	\$11.73 to \$19.53
8-, 16-, 32-kbyte OTP, ROM, 232-, 488-, +1000-byte register RAM			PLCC, QFP	Two 16-bit, PWM, HSIO	UART	19 to 37	Eight channel 10-bit		PTS	\$5.27 to \$16.07
16-, 32-kbyte OTP, ROM, 488-, 744-byte register RAM			PLCC, QFP, SQFP	Two 16-bit, PWM, HSIO	Two UART (MH only)	19 to 37	Eight channel 10-bit		PTS, three-phase waveform generator, frequency generator	\$7.33 to \$13.33
256-kbyte Flash; 10-kbyte RAM, 8-kbyte Data Flash	RAM, Flash, BIU, four channel DMA		48 CSP, 144 LQFP	Four 8-bit, Two 16-bit, TWU, PWM	SPI, I ² C, USB, USART, PCM/SSI, Blue-RF, up to 37 GPIO	Up to 30 vectored peripheral		-40 to +85		\$7.25
256-kbyte Flash; 10-kbyte RAM, 8-kbyte Data Flash	RAM, Flash, BIU, four channel DMA		48 CSP, 100 LQFP	Four 8-bit, Two 16-bit, TWU, PWM	SPI, I ² C, CAN2.0B, USART, PCM/SSI, Blue-RF, up to 40 GPIO	Up to 30 vectored peripheral		-40 to +85		\$7.50
256-kbyte Flash; 32-kbyte RAM, 8-kbyte Data Flash	RAM, Flash, BIU, four channel DMA		128 LQFP, 144 LQFP	Four 8-bit, Two 16-bit, PWM	SPI, I ² C, two CAN2.0B, four USART, PCM/SSI, Blue-RF, up to 50 GPIO	Up to 43 vectored peripheral	Eight channel 12-bit	-40 to +85	Touchscreen drivers (on parts with ADC)	\$8.55
256-kbyte Flash; 32-kbyte RAM, 8-kbyte Data Flash	RAM, Flash, BIU, four channel DMA		128 LQFP, 144 LQFP	Four 8-bit, Two 16-bit, PWM	USB, SPI, I ² C, two CAN2.0B, four USART, PCM/SSI, Blue-RF, up to 48 GPIO	Up to 43 vectored peripheral	Eight channel 12-bit	-40 to +85	Touchscreen drivers (on parts with ADC)	\$8.45

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16-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
	CP3000 Family CP3CN17		24	22/16	16	2.25 to 2.75/ 2.25 to 3.63	60mW	Active idle: 2.5mW, sleep: 800uW	16x16 MAC		
	CP3000 Family CP3CN23		24	22/16	16	2.25 to 2.75/ 2.25 to 3.63	60mW	Active idle: 2.5mW, sleep: 800uW	16x16 MAC		
	CP3000 Family CP3UB17		24	22/16	16	2.25 to 2.75/ 2.25 to 3.63	60mW	Active idle: 2.5mW, sleep: 800uW	16x16 MAC		
	CP3000 Family CP3UB26		24	22/16	16	2.25 to 2.75/ 2.25 to 3.63	60mW	Active idle: 2.5mW, sleep: 800uW	16x16 MAC		

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16-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)
256-kbyte Flash; 10-kbyte RAM, 8-kbyte Data Flash	RAM, Flash, BIU, four channel DMA		48 CSP, 100 LQFP	Four 8-bit, Two 16-bit, TWU, PWM	CAN2.0B, SPI, USART, I ² C, PSM/SSI, up to 40 GPIO	Up to 30 vectored peripheral		-40 to +85		\$6.75
256-kbyte Flash; 32-kbyte RAM, 8-kbyte Data Flash	RAM, Flash, BIU, four channel DMA		128 LQFP, 144 LQFP	Four 8-bit, Two 16-bit, PWM	SPI, two CAN, four USART, two I ² C, up to 50 GPIO	Up to 43 vectored peripheral	Eight channel 12 bit	-40 to +85	Touchscreen drivers (on parts with ADC)	\$8.25
256-kbyte Flash; 10-kbyte RAM, 8-kbyte Data Flash	RAM, Flash, BIU, four channel DMA		48 CSP, 100 LQFP	Four 8-bit, Two 16-bit, TWU, PWM	USB, SPI, USART, I ² C, PCM/SSI, up to 37 GPIO	Up to 30 vectored peripheral		-40 to +85		\$6.65
256-kbyte Flash; 32-kbyte RAM, 8-kbyte Data Flash	RAM, Flash, BIU, four channel DMA		128 LQFP, 144 LQFP	Four 8-bit, Two 16-bit, PWM	USB, SPI, two CAN, four USART, two I ² C, up to 48 GPIO	Up to 43 vectored peripheral	Eight channel 12 bit	-40 to +85	Touchscreen drivers (on parts with ADC)	\$8.34