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28/40/44-pin, enhanced flash-based 8-bit cmos microcontrollers with nanowatt technology

high-performance risc cpu:• only 35 instructions to learn:- all single-cycle instructions except branches• operating speed:- dc – 20 mhz oscillator/clock input- dc – 200 ns instruction cycle• interrupt capability• 8-level deep hardware stack• direct, indirect and relative addressing modesspecial microcontroller features:• precision internal oscillator:- factory calibrated to ± 1%- software selectable frequency range of 8 mhz to 31 khz- software tunable- two-speed start-up mode- crystal fail detect for critical applications- clock mode switching during operation for power savings• power-saving sleep mode• wide operating voltage range (2.0v-5.5v)• industrial and extended temperature range• power-on reset (por)• power-up timer (pwrt) and oscillator start-uptimer (ost)• brown-out reset (bor) with software controloption• enhanced low-current watchdog timer (wdt) with on-chip oscillator (software selectablenominal 268 seconds with full prescaler) withsoftware enable• multiplexed master clear with pull-up/input pin• programmable code protection• high endurance flash/eeprom cell:- 100,000 write flash endurance- 1,000,000 write eeprom endurance- flash/data eeprom retention: > 40 years• program memory read/write during run time• in-circuit debugger (on board)low-power features:• standby current:- 50 na @ 2.0v, typical• operating current:- 11µ a @ 32 khz, 2.0v, typical- 220µ a @ 4 mhz, 2.0v, typical• watchdog timer current:- 1µ a @ 2.0v, typicalperipheral features:• 24/35 i/o pins with individual direction control:- high current source/sink for direct led drive- interrupt-on-change pin- individually programmable weak pull-ups- ultra low-power wake-up (ulpwu)• analog comparator module with:- two analog comparators- programmable on-chip voltage reference(cvref) module (% of vdd)- fixed voltage reference (0.6v)- comparator inputs and outputs externallyaccessible- sr latch mode- external timer1 gate (count enable)• a/d converter:- 10-bit resolution and 11/14 channels• timer0: 8-bit timer/counter with 8-bitprogrammable prescaler• enhanced timer1:- 16-bit timer/counter with prescaler- external gate input mode- dedicated low-power 32 khz oscillator• timer2: 8-bit timer/counter with 8-bit periodregister,

prescaler and postscaler• enhanced capture, compare, pwm+ module:- 16-bit capture, max. resolution 12.5 ns- compare, max. resolution 200 ns- 10-bit pwm with 1, 2 or 4 output channels, programmable " dead time" , max. frequency 20 khz- pwm output steering control• capture, compare, pwm module:- 16-bit capture, max. resolution 12.5 ns- 16-bit compare, max. resolution 200 ns- 10-bit pwm, max. frequency 20 khz• enhanced usart module:- supports rs-485, rs-232, and lin 2.0- auto-baud detect- auto-wake-up on start bit• in-circuit serial programmingtm (icsptm) via two pins• master synchronous serial port (mssp) module supporting 3-wire spi (all 4 modes) and i2c™ master and slave modes with i2c address mask

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