

Analog Peripherals

10-Bit ADC

- ± 1 LSB INL; no missing codes
- Programmable throughput up to 100 ksp/s
- 4 external inputs; programmable as single-ended or differential
- Programmable amplifier gain: 16, 8, 4, 2, 1, 0.5
- Data-dependent windowed interrupt generator
- Built-in temperature sensor (± 3 °C)

Two 12-Bit DACs

- Voltage output
- 10 μ sec settling time

Comparator

- 16 programmable hysteresis values
- Configurable to generate interrupts or reset

Internal Voltage Reference

V_{DD} Monitor/Brown-out Detector

On-Chip JTAG Debug

- On-chip emulation circuitry facilitates full-speed, non-intrusive, in-circuit emulation
- Supports breakpoints, single stepping, watchpoints, inspect/modify memory, and registers
- Superior performance to emulation systems using ICE-chips, target pods, and sockets
- Fully compliant with IEEE 1149.1 specification

High-Speed 8051 μ C Core

- Pipelined instruction architecture; executes 70% of instructions in 1 or 2 system clocks
- Up to 20 MIPS throughput with 20 MHz clock
- Expanded interrupt handler; up to 21 interrupt sources

Memory

- 256 bytes data RAM
- 32 kB Flash; in-system programmable in 512-byte sectors (512 bytes are reserved)

Digital Peripherals

- 8 port I/O; all are 5 V tolerant
- Hardware SMBus™ (I2C™ compatible), SPI™, and UART serial ports available concurrently
- Programmable 16-bit counter/timer array with five capture/compare modules
- 4 general-purpose 16-bit counter/timers
- Dedicated watchdog timer; bidirectional reset

Clock Sources

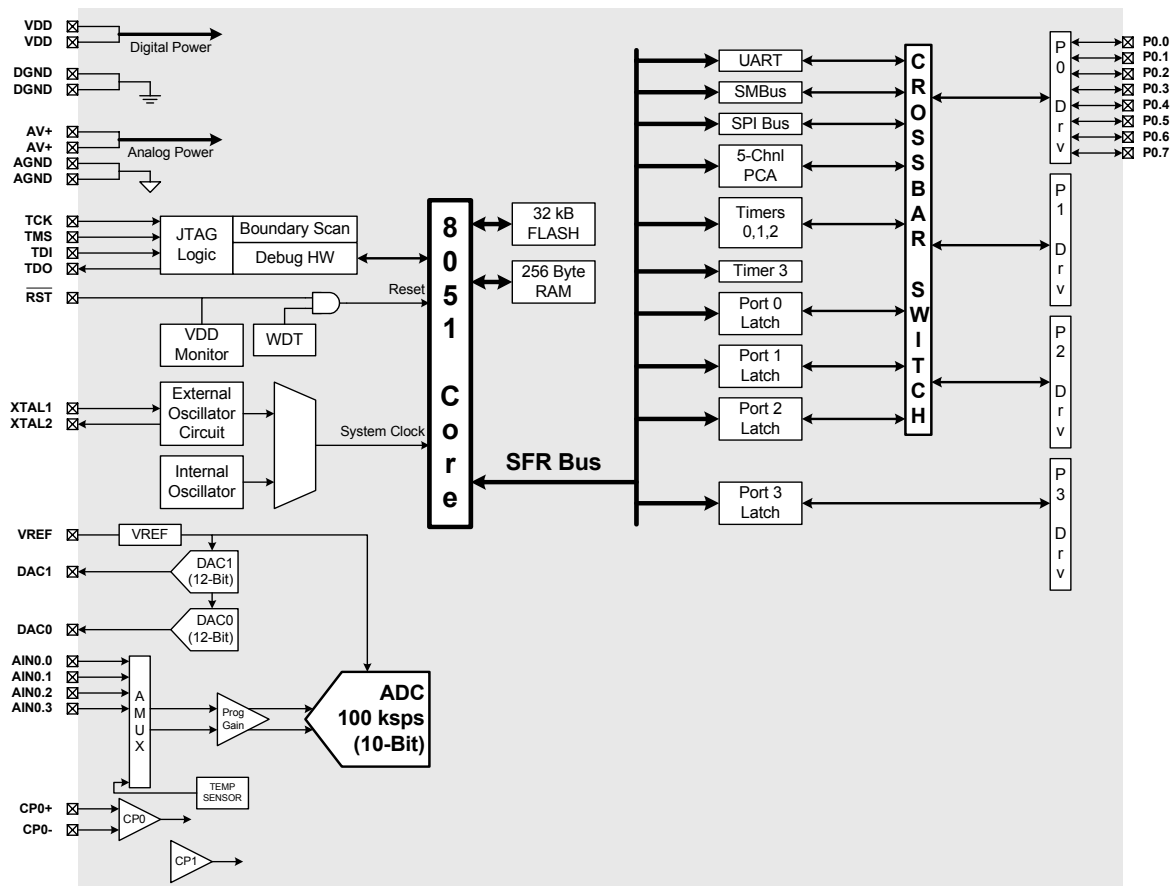
- Internal programmable oscillator: 2–16 MHz
- External oscillator: Crystal, RC, C, or Clock
- Can switch between clock sources on-the-fly

Supply Voltage: 2.7 to 3.6 V

- Typical operating current: 10 mA at 20 MHz
- Multiple power saving sleep and shutdown modes

32-Pin LQFP

Temperature Range: -40 to $+85$ °C

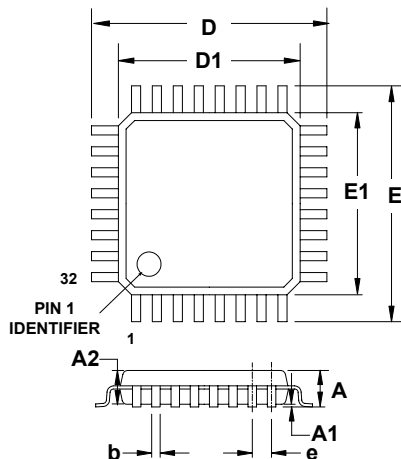


Selected Electrical Specifications

($T_A = -40$ to $+85$ C°, $V_{DD} = 2.7$ V unless otherwise specified)

| PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|--|---|---------------------|-----------------|---------------------|----------------|
| GLOBAL CHARACTERISTICS | | | | | |
| Analog Supply Voltage | | 2.7 | | 3.6 | V |
| Analog Supply Current | Internal REF, ADC, DAC, Comparators all active | | 0.8 | | mA |
| Analog Supply Current with analog sub-systems inactive | Internal REF, ADC, DAC, Comparators all disabled | | 5 | | μA |
| Digital Supply Voltage | | 2.7 | | 3.6 | V |
| Digital Supply Current with CPU active | Clock = 20 MHz Clock = 1 MHz Clock = 32 kHz | | 10 0.5 20 | | mA mA μA |
| Digital Supply Current (shutdown mode) | Oscillator not running | | 2 | | μA |
| V_{DD} Data Retention Voltage | RAM remains valid | | 1.5 | | V |
| CPU & DIGITAL I/O | | | | | |
| Clock Frequency Range | | DC | | 20 | MHz |
| Port Output High Voltage | $I_{OH} = -3$ mA, Port I/O push-pull | $V_{DD} - 0.7$ | | | V |
| Port Output Low Voltage | $I_{OL} = 8.5$ mA | | | 0.6 | V |
| Input High Voltage | | $0.8 \times V_{DD}$ | | | V |
| Input Low Voltage | | | | $0.2 \times V_{DD}$ | V |
| SMBus SCL Frequency | SYSCLK = MCU system clock | | | SYSCLK/8 | MHz |
| SPI Bus Clock Frequency | SYSCLK = MCU system clock | | | SYSCLK/2 | MHz |
| A/D CONVERTER | | | | | |
| Resolution | | 10 | | | bits |
| Integral Nonlinearity | | | | ±1 | LSB |
| Differential Nonlinearity | Guaranteed Monotonic | | | ±1 | LSB |
| Throughput Rate | | | | 100 | ksps |
| Input Voltage Range | | 0 | | V_{REF} | V |
| D/A CONVERTERS | | | | | |
| Resolution | | 12 | | | bits |
| Integral Nonlinearity | Specified from Data Word 014h to FEBh | | ±4 | | LSB |
| Differential Nonlinearity | Guaranteed Monotonic | | | ±1 | LSB |
| Offset Error | Data Word = 014h | | ±3 | | LSB |
| Output Settling Time | To ½ LSB of full-scale | | 10 | | μs |
| Output Voltage Swing | | 0 | | $V_{REF} - 1$ LSB | V |
| COMPARATOR | | | | | |
| Supply Current | | | 1.5 | | μA |
| Response Time | $ (CP+) - (CP-) = 100$ mV | | 4 | | μs |
| Input Voltage Range | | -0.25 | | (AV+) +0.25 | V |
| Input Bias Current | | -5 | 0.001 | +5 | nA |
| Input Offset Voltage | | -10 | | +10 | mV |

Package Information



| | MIN (mm) | NOM (mm) | MAX (mm) |
|----|----------|----------|----------|
| A | - | - | 1.60 |
| A1 | 0.05 | - | 0.15 |
| A2 | 1.35 | 1.40 | 1.45 |
| b | 0.30 | 0.37 | 0.45 |
| D | - | 9.00 | - |
| D1 | - | 7.00 | - |
| e | - | 0.80 | - |
| E | - | 9.00 | - |
| E1 | - | 7.00 | - |

C8051F005DK Development Kit

