

Ultra-Low Power

- 160 μ A/MHz active current from 1.8–3.6 V @ 25 MHz
- 10 nA sleep current with data retention; BOD disabled
- 50 nA sleep current with data retention; BOD enabled
- 300 nA sleep current with smaRTClock (internal oscillator)
- 600 nA sleep current with smaRTClock (external crystal)
- 2 μ s wake up from sleep
- 1.5 μ s analog settling time

Supply Voltage: 0.9 to 3.6 V

- One-cell mode supports 0.9–3.6 V operation; bypass feature automatically shuts off the dc-dc converter when not needed
- Two-cell mode supports 1.8–3.6 V operation
- Built-in dc-dc converter with 1.8–3.3 V output (65 mW max) for use in one-cell mode; can supply external devices

12-Bit Analog to Digital Converter

- Up to 75 ksp/s 12-bit mode or 300 ksp/s 10-bit mode
- Up to 15 external inputs
- External pin or internal VREF (no external capacitor required)
- On-chip PGA allows measuring voltages up to twice the reference voltage
- Autonomous Burst Mode with 16-bit automatic averaging accumulator
- Built-in temperature sensor

Two Comparators

- Programmable hysteresis and response time
- Configurable as interrupt or reset source
- Low current (400 nA typical)
- Up to 15 Capacitive Touch Sense inputs

Internal 6-Bit Current Reference

- Up to ± 500 μ A; source and sink capability
- Enhanced resolution via PWM interpolation

Development Kit: C8051F912DK

High-Speed 8051 μ C Core

- Pipe-lined instruction architecture; executes 70% of instructions in 1 or 2 system clocks
- 25 MIPS peak throughput with 25 MHz clock
- Expanded interrupt handler

Memory

- 768 bytes internal data RAM (256 + 512)
- 16 kB Flash; In-system programmable; Full read/write/erase functionality over the entire supply range

Digital Peripherals

- 16 port I/O; All 5 V tolerant with programmable drive strength
- Hardware enhanced UART, 2 SPI and SMBus™ serial ports available concurrently
- Low power 32-bit smaRTClock operates down to 0.9 V
- Four general purpose 16-bit counter/timers
- 16-bit programmable counter array (PCA) with six capture/compare modules and watchdog timer

Clock Sources

- Precision internal oscillators: 24.5 MHz with $\pm 2\%$ accuracy supports UART operation; spread-spectrum mode for reduced EMI
- Low power internal oscillator: 20 MHz
- External oscillator: Crystal, RC, C, CMOS clock
- smaRTClock oscillator: 32.768 kHz crystal or 16.4 kHz LFO
- Can switch between clock sources on-the-fly; useful in power saving modes

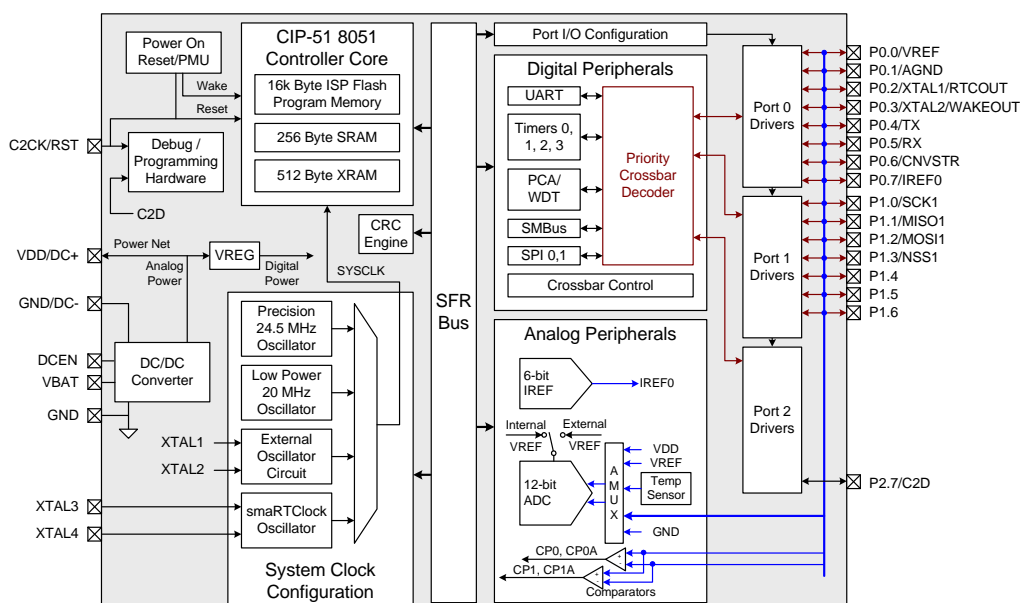
On-Chip Debug

- On-chip debug circuitry facilitates full speed, non-intrusive in-system debug (no emulator required)
- Provides 4 breakpoints, single stepping

Package Options

- 24-pin QFN (4x4 mm), RoHS compliant
- 24-pin QSOP (easy to hand solder), RoHS compliant

Temperature Range: –40 to +85 °C

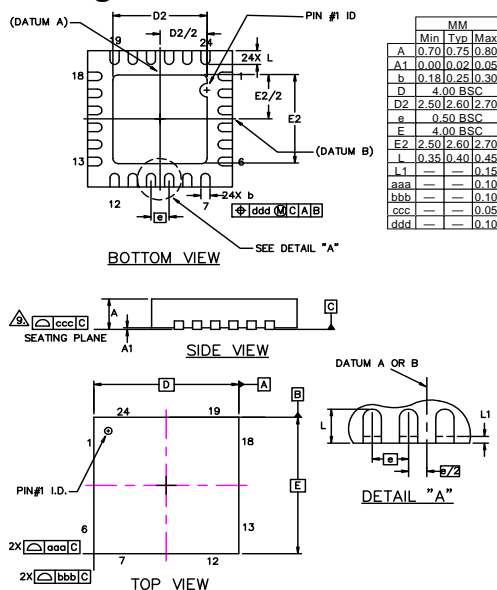


Selected Electrical Specifications

(At 25 C°)

| Parameter | Conditions | Min | Typ | Max | Units |
|---|--|-----|------|--------|--------|
| Supply Input Voltage two-cell mode one-cell mode | DC-DC converter disabled | 1.8 | — | 3.6 | V |
| | DC-DC converter enabled | 0.9 | — | 3.6 | V |
| Supply Current with CPU Active | VDD = 1.8–3.6 V Clock = 24.5 MHz (±2% internal precision oscillator) | — | 160 | — | µA/MHz |
| Supply Current (shutdown) (V _{BAT} = 1.8 V) | Sleep mode; BOD off | — | .010 | — | µA |
| | Sleep mode; BOD on | — | .050 | — | µA |
| | Sleep mode; smaRTClock running | — | .300 | — | µA |
| Clock Frequency Range | | DC | — | 25 | MHz |
| Wakeup Time | two-cell mode | — | 2 | — | µs |
| | one-cell mode | — | 10 | — | µs |
| Analog Settling Time | | — | 1.5 | — | µs |
| Internal Oscillator | | | | | |
| Frequency | Precision oscillator | 24 | 24.5 | 25 | MHz |
| | Low power oscillator | 18 | 20 | 22 | MHz |
| A/D Converter | | | | | |
| Resolution | | | | 12/10 | bits |
| Throughput Rate | | — | — | 75/300 | ksps |

Package Information: 24-Pin QFN



Product Family

| Part Number | Package | Package Size (mm) | ADC | Flash (kB) | RAM (bytes) | RTC sleep (nA) | BOD Disableable |
|--------------|----------|-------------------|--------|------------|-------------|----------------|-----------------|
| C8051F912-GM | 24p QFN | 4x4 | 12-bit | 16 | 768 | 300 | Yes |
| C8051F912-GU | 24p QSOP | 9x6 | 12-bit | 16 | 768 | 300 | Yes |
| C8051F911-GM | 24p QFN | 4x4 | 10-bit | 16 | 768 | 600 | No |
| C8051F911-GU | 24p QSOP | 9x6 | 10-bit | 16 | 768 | 600 | No |
| C8051F902-GM | 24p QFN | 4x4 | 12-bit | 8 | 768 | 300 | Yes |
| C8051F902-GU | 24p QSOP | 9x6 | 12-bit | 8 | 768 | 300 | Yes |
| C8051F901-GM | 24p QFN | 4x4 | 10-bit | 8 | 768 | 600 | No |
| C8051F901-GU | 24p QSOP | 9x6 | 10-bit | 8 | 768 | 600 | No |