



# C8051F120

128K Flash, 8.25K RAM, 12-bit ADC, 100-Pin MCU

ADVANCED INFORMATION

## ANALOG PERIPHERALS

- **12-bit ADC**
  - $\pm 1$ LSB INL; No Missing Codes
  - Programmable Throughput up to 100ksps
  - Eight 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 ( $\pm 3^\circ\text{C}$ )
- **8-bit ADC**
  - $\pm 1$ LSB INL; No Missing Codes
  - Programmable Throughput up to 500ksps
  - Eight External Inputs
  - Programmable Amplifier Gain: 4, 2, 1, 0.5
- **Two 12-bit DACs**
  - Can Synchronize Outputs to Timers for Jitter-Free Waveform Generation
- **Two Comparators**
- **Internal Voltage Reference**
- **VDD Monitor/Brown-out Detector**

## ON-CHIP JTAG DEBUG & BOUNDARY SCAN

- On-Chip Debug Circuitry Facilitates Full Speed, Non-Intrusive In-System Debug (No Emulator Required!)
- Provides Breakpoints, Single Stepping, Watchpoints, Stack Monitor
- Inspect/Modify Memory and Registers
- Superior Performance to Emulation Systems Using ICE-Chips, Target Pods, and Sockets
- IEEE1149.1 Compliant Boundary Scan
- Low Cost, **Complete** Development Kit

## HIGH SPEED 8051 $\mu\text{C}$ CORE

- Pipelined Instruction Architecture; Executes 70% of Instructions in 1 or 2 System Clocks
- Up to **100MIPS** Throughput with 100MHz System Clock
- Expanded Interrupt Handler

## MEMORY

- 8448 Bytes Internal Data RAM (256 + 8k)
- 128k Bytes FLASH; In-System Programmable in 512-Byte Sectors
- External Parallel Data Memory Interface

## DIGITAL PERIPHERALS

- 64 Port I/O (All are 5V Tolerant with High Sink Current)
- Hardware SMBus™ (I2C™ Compatible), SPI™, and **Two** UART Serial Ports Available Concurrently
- Programmable 16-bit Counter/Timer Array with Six Capture/Compare Modules
- Five General Purpose 16-bit Counter/Timers
- Dedicated Watch-Dog Timer; Bi-directional Reset
- Real-Time Clock Mode using Timer 3 or PCA

## CLOCK SOURCES

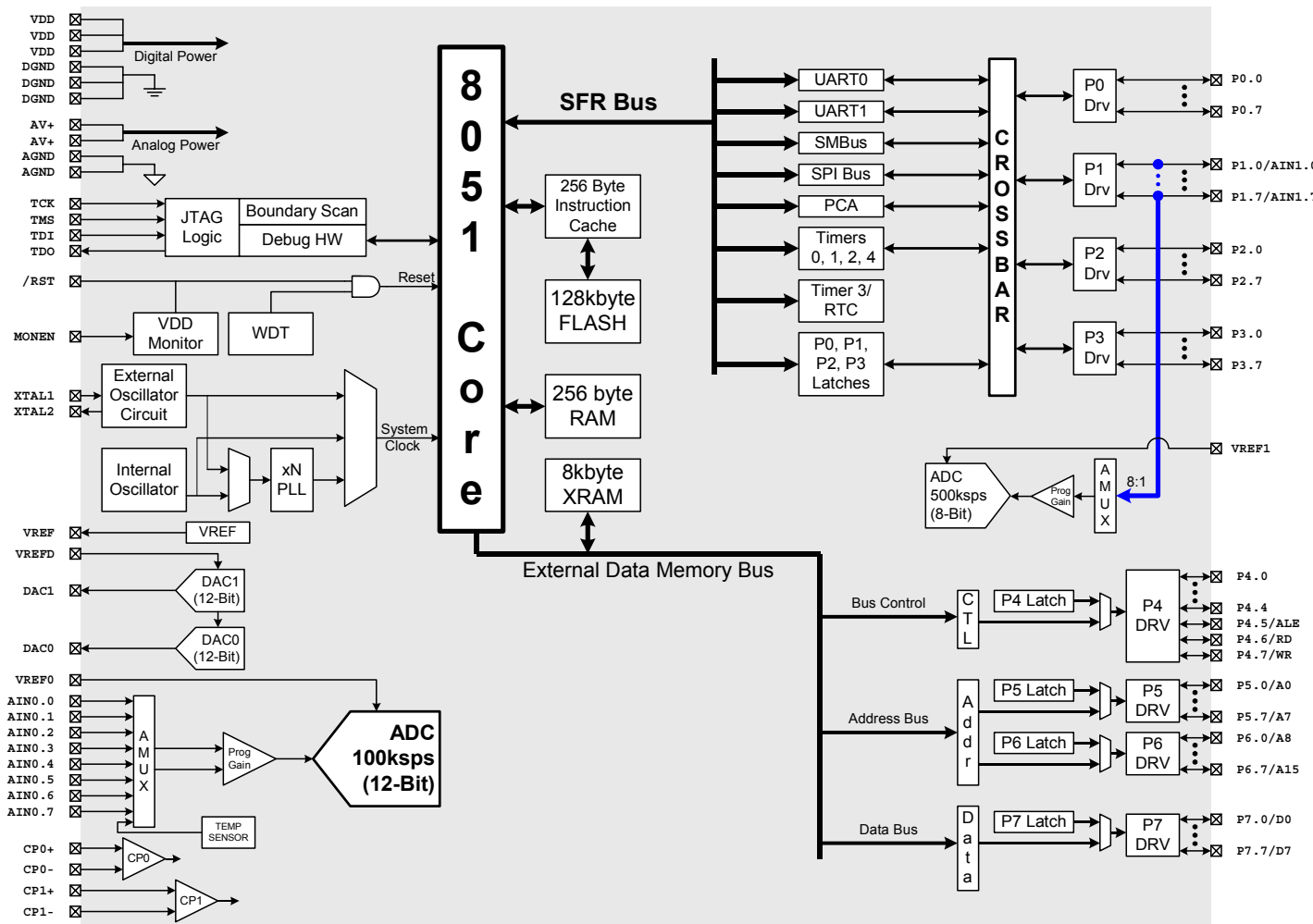
- Internal Oscillator: 24.5Mhz, 2% Accuracy Supports UART Operation
- On-Chip Programmable PLL: up to 100MHz
- External Oscillator: Crystal, RC, C, or Clock

## SUPPLY VOLTAGE ..... 2.7V to 3.6V

- Typical Operating Current: 50mA @ 100MHz
- Typical Stop Mode Current: <0.1uA

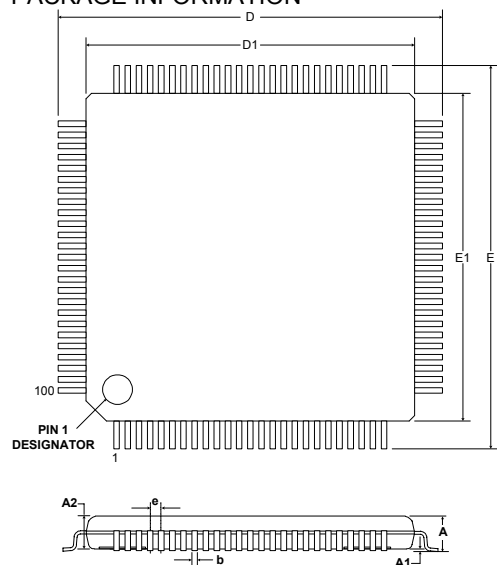
## 100-Pin TQFP

Temperature Range:  $-40^\circ\text{C}$  to  $+85^\circ\text{C}$



**C8051F120****128K Flash, 8.25K RAM, 12-bit ADC, 100-Pin MCU****ADVANCED INFORMATION****SELECTED ELECTRICAL SPECIFICATIONS** TA = -40°C to +85°C unless otherwise specified.

| PARAMETER                       | CONDITIONS                           | MIN  | TYP  | MAX  | UNITS |
|---------------------------------|--------------------------------------|------|------|------|-------|
| <b>GLOBAL CHARACTERISTICS</b>   |                                      |      |      |      |       |
| Supply Voltage                  |                                      | 2.7  |      | 3.6  | V     |
| Supply Current (CPU active)     | Clock=100MHz                         |      | 50   |      | mA    |
|                                 | Clock=1MHz                           |      | 1    |      | mA    |
|                                 | Clock=32kHz                          |      | 25   |      | μA    |
| Supply Current (shutdown)       | Oscillator off; VDD Monitor Enabled  |      | 10   |      | μA    |
|                                 | Oscillator off; VDD Monitor Disabled |      | <0.1 |      | μA    |
| Clock Frequency Range           |                                      | DC   |      | 100  | MHz   |
| <b>INTERNAL CLOCKS</b>          |                                      |      |      |      |       |
| Oscillator Frequency            |                                      | 24.0 | 24.5 | 25.0 | MHz   |
| PLL Frequency                   |                                      | 96   | 98   | 100  | MHz   |
| <b>A/D CONVERTER</b>            |                                      |      |      |      |       |
| Resolution                      |                                      |      | 12   |      | bits  |
| Integral Nonlinearity           |                                      |      |      | ± 1  | LSB   |
| Differential Nonlinearity       | Guaranteed Monotonic                 |      |      | ± 1  | LSB   |
| Signal-to-Noise Plus Distortion |                                      | 66   | 69   |      | dB    |
| Throughput Rate                 |                                      |      |      | 100  | ksps  |
| <b>D/A CONVERTERS</b>           |                                      |      |      |      |       |
| Resolution                      |                                      |      | 12   |      | bits  |
| Differential Nonlinearity       | Guaranteed Monotonic                 |      |      | ± 1  | LSB   |
| Output Settling Time            |                                      |      | 10   |      | μS    |
| <b>COMPARATORS</b>              |                                      |      |      |      |       |
| Supply Current                  | (each Comparator)                    |      | 1.5  |      | μA    |
| Response Time                   | (CP+) – (CP-) = 100mV                |      | 4.0  |      | μS    |

**PACKAGE INFORMATION**

|    | MIN<br>(mm) | NOM<br>(mm) | MAX<br>(mm) |
|----|-------------|-------------|-------------|
| A  | -           | -           | 1.20        |
| A1 | 0.05        | -           | 0.15        |
| A2 | 0.95        | 1.00        | 1.05        |
| b  | 0.17        | 0.22        | 0.27        |
| D  | -           | 16.00       | -           |
| D1 | -           | 14.00       | -           |
| e  | -           | 0.50        | -           |
| E  | -           | 16.00       | -           |
| E1 | -           | 14.00       | -           |

**C8051F120DK DEVELOPMENT KIT**