C8051F022

25 MIPS, 64 kB Flash, 10-Bit ADC, 100-Pin Mixed-Signal MCU

Analog Peripherals

10-Bit ADC
- ±1 LSB INL; no missing codes
- Programmable throughput up to 100 ksps
- 8 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)

8-Bit ADC
- ±1 LSB INL; no missing codes
- Programmable throughput up to 500 ksps
- 8 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
V_{DD} 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

High-Speed 8051 µC Core
- Pipelined instruction architecture; executes 70% of instructions in 1 or 2 system clocks
- Up to 25 MIPS throughput with 25 MHz system clock
- 22 vectored interrupt sources

Memory
- 4352 bytes data RAM
- 64 kB Flash; in-system programmable in 512-byte sectors (512 bytes are reserved)
- External parallel data memory interface

Digital Peripherals
- 64 port I/O; all are 5 V tolerant
- Hardware SMBus™ (I2C™ compatible), SPI™, and two UART serial ports available concurrently
- Programmable 16-bit counter/timer array with 5 capture/compare modules
- 5 general-purpose 16-bit counter/timers
- Dedicated watchdog timer; bidirectional reset
- Real-time clock mode using Timer 3 or PCA
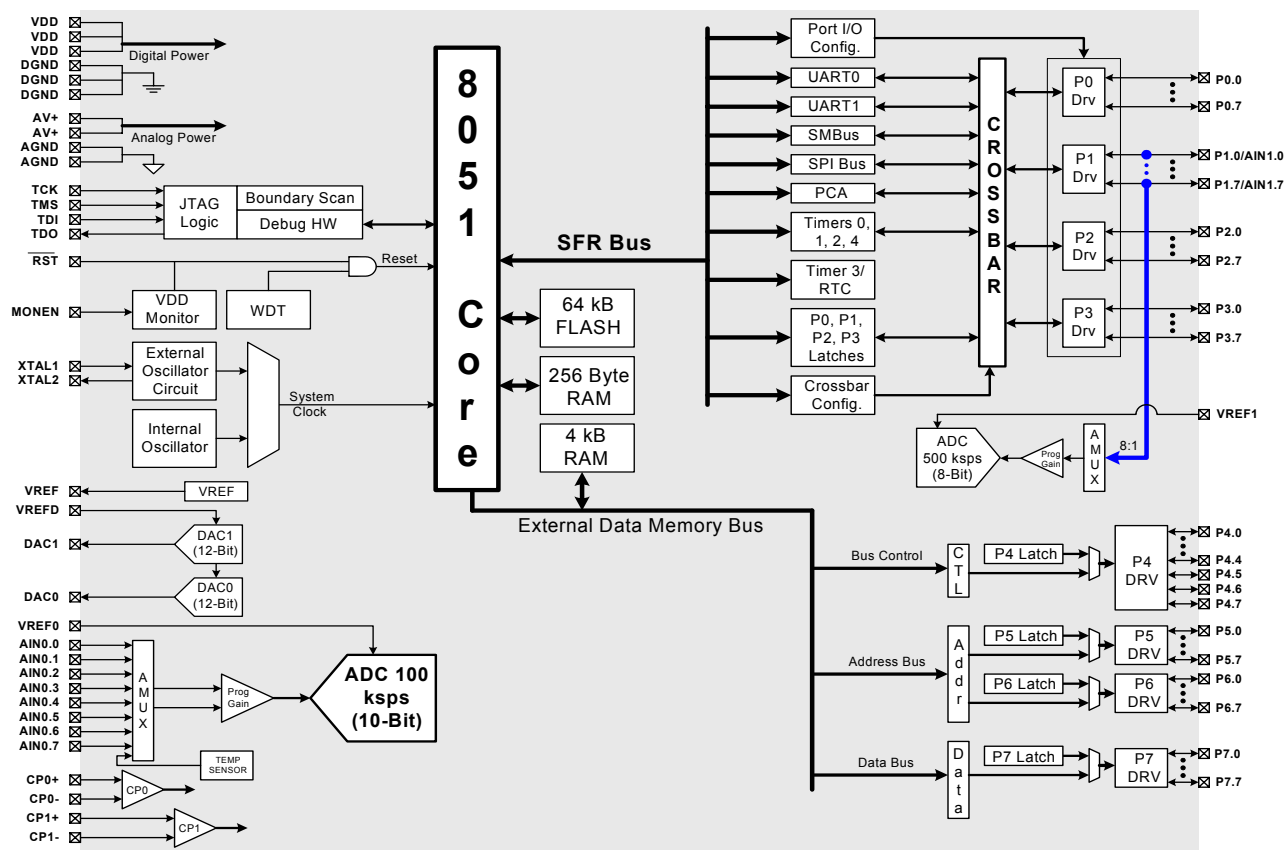
Clock Sources
- Internal programmable oscillator: 2–16 MHz
- External oscillator: Crystal, RC, C, or Clock
- Can switch between clock sources on-the-fly

Supply Voltage: 2.7 to 3.6 V
- Typical operating current: 10 mA at 25 MHz
- Multiple power saving sleep and shutdown modes
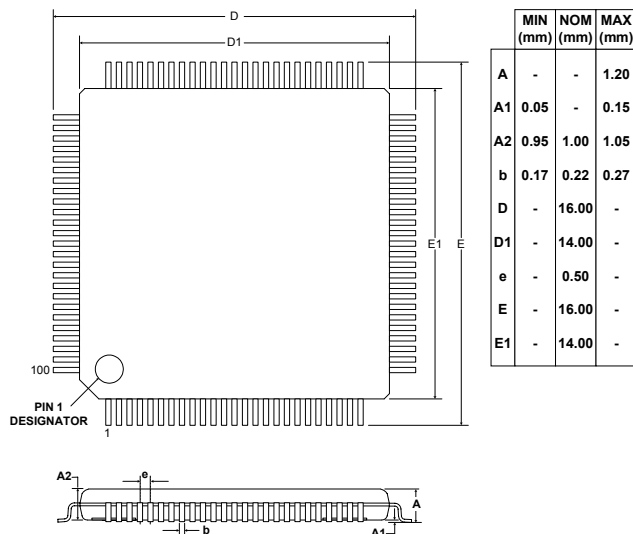
100-Pin TQFP

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					
Digital Supply Voltage		2.7		3.6	V
Digital Supply Current	Clock = 25 MHz		10		mA
with CPU active	Clock = 1 MHz		0.8		mA
(V_{DD} = 2.7 V)	Clock = 32 kHz; V_{DD} Monitor Disabled		20		µA
Digital Supply Current	Oscillator not running; V_{DD} Monitor Enabled		10		µA
(shutdown)	Oscillator not running; V_{DD} Monitor Disabled		0.1		µA
Digital Supply RAM Data Retention Voltage			1.5		V
CPU & DIGITAL I/O PORTS					
Clock Frequency Range		DC		25	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		$0.7 \times V_{DD}$			V
Input Low Voltage				$0.3 \times V_{DD}$	V
A/D CONVERTER					
Resolution			10		bits
Integral Nonlinearity				± 1	LSB
Differential Nonlinearity	Guaranteed Monotonic			± 1	LSB
Signal-to-Noise Plus Distortion		59			dB
Throughput Rate				100	ksps
Input Voltage Range		0		V_{REF}	V
COMPARATORS					
Response Time	$\mid$ (CP+) – (CP-) $\mid$ = 100 mV		4		µs
Input Voltage Range		–0.25		V_{DD} + 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	-	-	1.20
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	-

C8051F020DK Development Kit