C8051F015

25 MIPS, 32 kB Flash, 10-Bit ADC, 64-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)

Two 12-Bit DACs

- Voltage output
- 10 µsec settling time

Two Comparators

- 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

Supply Voltage: 2.7 to 3.6 V

- Typical operating current: 12.5 mA at 25 MHz
- Multiple power saving sleep and shutdown modes

Temperature Range: –40 to +85 °C

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 clock
- Expanded interrupt handler; up to 21 interrupt sources

Memory

- 2304 bytes data RAM
- 32 kB Flash; in-system programmable in 512-byte sectors (512 bytes are reserved)

Digital Peripherals

- 32 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

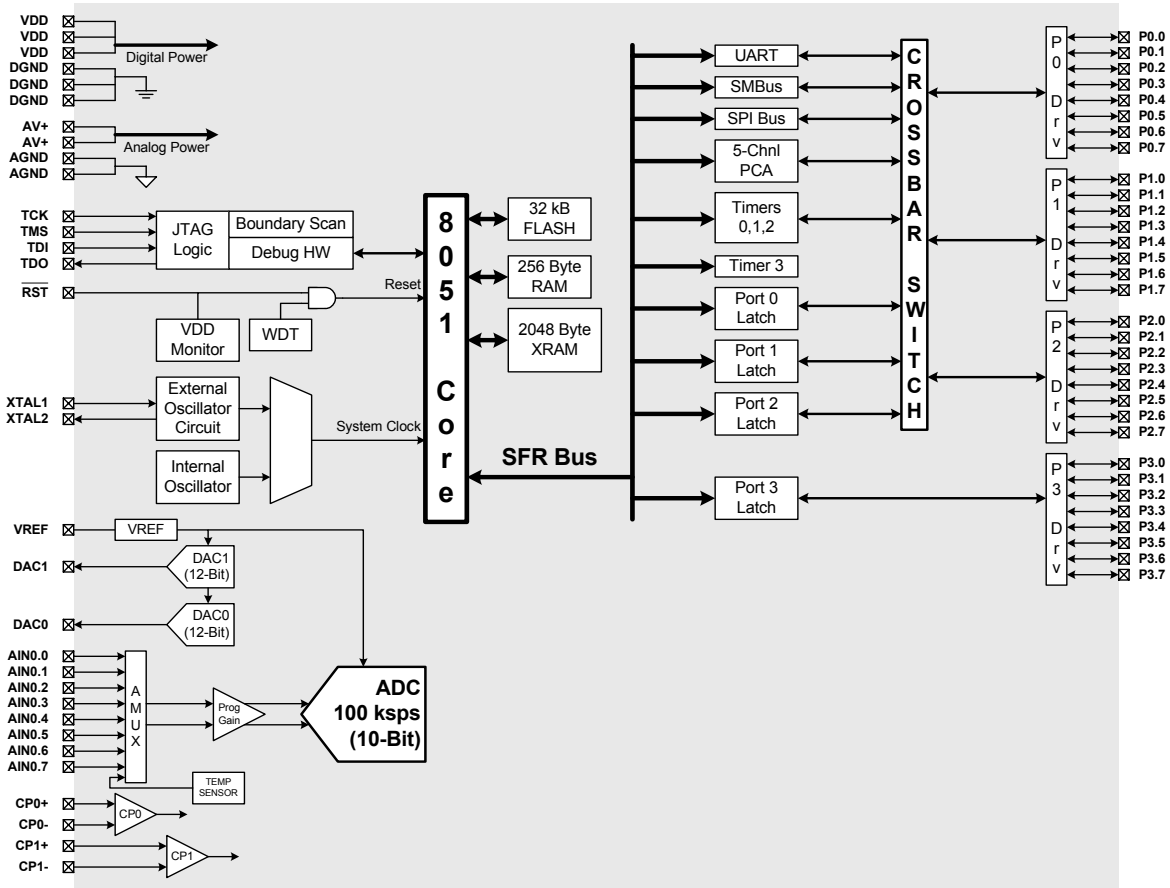
- Internal programmable oscillator: 2–16 MHz
- External oscillator: Crystal, RC, C, or Clock
- Can switch between clock sources on-the-fly

Package

- 64-pin TQFP (standard lead and lead-free packages)

Ordering Part Numbers

- Lead-free package: C8051F015-GQ
- Standard package: C8051F015

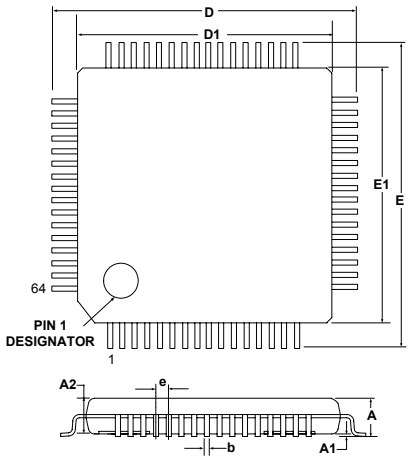


Selected Electrical Specifications

(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 = 25 MHz Clock = 1 MHz Clock = 32 kHz		12 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		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		0.8 x V_{DD}			V
Input Low Voltage				0.2 x 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
COMPARATORS					
Supply Current	(each Comparator)		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	-	-	1.20
A1	0.05	-	0.15
A2	0.95	-	1.05
b	0.17	0.22	0.27
D	-	12.00	-
D1	-	10.00	-
e	-	0.50	-
E	-	12.00	-
E1	-	10.00	-

C8051F005DK Development Kit