

Analog Peripherals

10-Bit ADC (C8051F380/1/2/3/8/9/A/B/C Only)

- Up to 500 ksps
- Built-in analog multiplexer with single-ended and differential mode
- VREF from external pin, internal reference, or V_{DD}
- Built-in temperature sensor
- External conversion start input option

Two Comparators

Internal Voltage Reference (C8051F380/1/2/3/8/9/A/B/C Only)

Brown-Out Detector and POR Circuitry

USB Function Controller (C8051F380/1/2/3/4/5/6/7/C)

- USB specification 2.0 compliant
- Full-speed (12 Mbps) or low-speed (1.5 Mbps) operation
- Integrated clock recovery; no external crystal required for full-speed or low-speed
- Supports eight flexible endpoints
- 1 kB USB buffer memory
- Integrated transceiver; no external resistors required

On-Chip Debug

- On-chip debug circuitry facilitates full-speed, non-intrusive, in-system debug (no emulator required)
- Provides breakpoints, single stepping, inspect/modify memory, and registers
- Superior performance to emulation systems using ICE-chips, target pods, and sockets

Supply Voltage: 1.8 to 3.6 V

- Voltages from 2.7 to 5.25 V supported using on-chip voltage regulators

Memory

- 4352 or 2304 Bytes RAM
- 64, 32, or 16 kB Flash; In-system programmable in 512-byte sectors

Temperature Range: -40 to +85 °C

High-Speed 8051 μ C Core

- Pipelined instruction architecture; executes 70% of instructions in 1 or 2 system clocks
- Up to 48 MIPS operation
- Expanded interrupt handler

Digital Peripherals

- 40/25 Port I/O; All 5 V tolerant with high sink current
- Hardware enhanced SPI™, two I²C/SMBus™, and two enhanced UART serial ports
- Six general purpose 16-bit counter/timers
- 16-bit programmable counter array (PCA) with five capture/compare modules
- External Memory Interface (EMIF)
- Clock Sources

Clock Sources

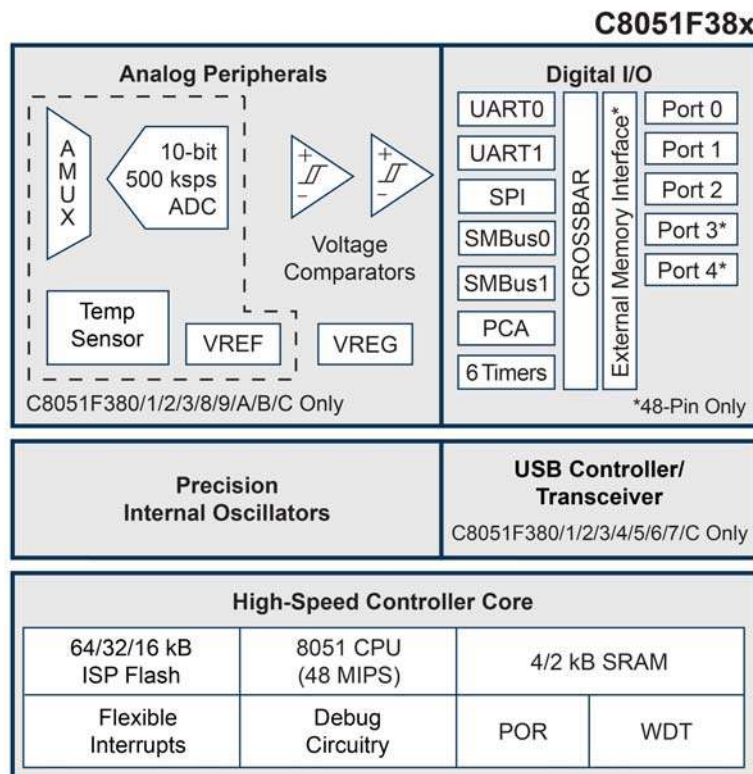
- Internal Oscillator: $\pm 0.25\%$ accuracy with clock recovery enabled. Supports all USB and UART modes
- External Oscillator: Crystal, RC, C, or clock (1 or 2 Pin modes)
- Low Frequency (80 kHz) Internal Oscillator
- Can switch between clock sources on-the-fly

Package

- 48-pin TQFP (C8051F380/2/4/6/8/A)
- 32-pin LQFP (C8051F381/3/5/7/9/B/C)
- 5x5 mm 32-pin QFN (C8051F381/3/5/7/9/B/C)
- Die sales available

Development Kits

- C8051F380DK: full-featured kit for full evaluation
- ToolStick381DC: low-cost kit for quick and easy evaluation
- ToolstickBA: base adapter for use with ToolStick daughter cards





C8051F38x

Full-Speed USB and Broad-Based Flash MCU Family

Product Selection Guide

Ordering Part Number	MIPS (Peak)	Flash Memory (Bytes)	RAM	Calibrated Internal Oscillator	Low Frequency Oscillator	USB with 1k Endpoint RAM	Supply Voltage Regulator	SMBus/I2C	Enhanced SPI	UARTs	Timers (16-bit)	Programmable Counter Array	Digital Port I/O	External Mem Interface (EMIF)	10-bit 500 ksp/s ADC	Temperature Sensor	Voltage Reference	Analog Comparators	Package
C8051F380-GQ	48	64k	4352	Yes	Yes	Yes	Yes	2	Yes	2	6	Yes	40	Yes	Yes	Yes	Yes	2	TQFP48
C8051F381-GQ	48	64k	4352	Yes	Yes	Yes	Yes	2	Yes	2	6	Yes	25	—	Yes	Yes	Yes	2	LQFP32
C8051F381-GM	48	64k	4352	Yes	Yes	Yes	Yes	2	Yes	2	6	Yes	25	—	Yes	Yes	Yes	2	QFN32
C8051F382-GQ	48	32k	2304	Yes	Yes	Yes	Yes	2	Yes	2	6	Yes	40	Yes	Yes	Yes	Yes	2	TQFP48
C8051F383-GQ	48	32k	2304	Yes	Yes	Yes	Yes	2	Yes	2	6	Yes	25	—	Yes	Yes	Yes	2	LQFP32
C8051F383-GM	48	32k	2304	Yes	Yes	Yes	Yes	2	Yes	2	6	Yes	25	—	Yes	Yes	Yes	2	QFN32
C8051F384-GQ	48	64k	4352	Yes	Yes	Yes	Yes	2	Yes	2	6	Yes	40	Yes	—	—	—	2	TQFP48
C8051F385-GQ	48	64k	4352	Yes	Yes	Yes	Yes	2	Yes	2	6	Yes	25	—	—	—	—	2	LQFP32
C8051F385-GM	48	64k	4352	Yes	Yes	Yes	Yes	2	Yes	2	6	Yes	25	—	—	—	—	2	QFN32
C8051F386-GQ	48	32k	2304	Yes	Yes	Yes	Yes	2	Yes	2	6	Yes	40	Yes	—	—	—	2	TQFP48
C8051F387-GQ	48	32k	2304	Yes	Yes	Yes	Yes	2	Yes	2	6	Yes	25	—	—	—	—	2	LQFP32
C8051F387-GM	48	32k	2304	Yes	Yes	Yes	Yes	2	Yes	2	6	Yes	25	—	—	—	—	2	QFN32
C8051F388-GQ	48	64k	4352	Yes	Yes	—	Yes	2	Yes	2	6	Yes	40	Yes	Yes	Yes	Yes	2	TQFP48
C8051F389-GQ	48	64k	4352	Yes	Yes	—	Yes	2	Yes	2	6	Yes	25	—	Yes	Yes	Yes	2	LQFP32
C8051F389-GM	48	64k	4352	Yes	Yes	—	Yes	2	Yes	2	6	Yes	25	—	Yes	Yes	Yes	2	QFN32
C8051F38A-GQ	48	32k	2304	Yes	Yes	—	Yes	2	Yes	2	6	Yes	40	Yes	Yes	Yes	Yes	2	TQFP48
C8051F38B-GQ	48	32k	2304	Yes	Yes	—	Yes	2	Yes	2	6	Yes	25	—	Yes	Yes	Yes	2	LQFP32
C8051F38B-GM	48	32k	2304	Yes	Yes	—	Yes	2	Yes	2	6	Yes	25	—	Yes	Yes	Yes	2	QFN32
C8051F38C-GQ	48	16k	2304	Yes	Yes	Yes	Yes	2	Yes	2	6	Yes	25	—	Yes	Yes	Yes	2	LQFP32
C8051F38C-GM	48	16k	2304	Yes	Yes	Yes	Yes	2	Yes	2	6	Yes	25	—	Yes	Yes	Yes	2	QFN32

Selected Electrical Specifications

Parameter	Conditions	Min	Typ	Max	Units
Global Electrical Characteristics					
Digital Supply Voltage		V _{RST}	3.3	3.6	V
Digital Supply RAM Data Retention Voltage		—	1.5	—	V
SYSCCLK (System Clock)		0	—	48	MHz
Specified Operating Temperature Range		-40	—	+85	°C
Voltage Regulator (REG0)					
Input Voltage Range		2.7	—	5.25	V
Output Voltage (V _{DD})	Output Current = 1 to 100 mA	3.0	3.3	3.6	V
Output Current		—	—	100	mA

Parameter	Conditions	Min	Typ	Max	Units
ADC-DC Accuracy					
Resolution			10		bits
SAR Conversion Clock		—	—	8.33	MHz
Throughput Rate		—	—	500	ksp/s
Voltage Reference					
Output Voltage	25 °C ambient	2.38	2.42	2.46	V
VREF Short-Circuit Current		—	—	7	mA
Comparators					
Response Time: Mode 0, V _{cm} = 1.5 V	CP0+ – CP0– = 100 mV	—	100	—	ns
	CP0+ – CP0– = -100 mV	—	250	—	ns