8051 Microcontroller IP Cores Family

Proven, capable, royalty-free 8/16-bit MCUs

Features	L8051XC1 Legacy	R8051XC2 Fast, Mature	T8051XC3 Tiny	S8051XC3 Super-Fast	FS8051XC3 Dual-lock-step
Performance					
DMIPS/MHz vs Original 80C51	1x, 2x or 4x	12.1x	13.5x	26.85x	26.85x
8x8 Multiply (Cycles)	24 or 12	4	8	1 or 2	1 or 2
16x16 Multiply w/o MDU (Cycles)	50	50	67	32	32
16x16 Multiply with MDU (Cycles)	38	38	N/A	N/A	N/A
32-bit Code/Data Bus	X	X	X	✓	✓
DPTR Arithmetic Acceleration	✓	✓	✓	✓	✓
Advanced Execution Architecture	X	X	X	✓	✓
Area (eq. NAND2 Gates @65nm)					
Basic CPU	7,900	7,900	4,400	7,200	15,600
Memory					
Program/Data Address Space	64K Bytes	64KB or 8MB	64K Bytes	64KB or 8MB	64KB or 8MB
Configurable Set of Peripherals	✓	✓	✓	✓	✓
24-bit DPTR	X	X	X	X	X
Optional Extra 16-bit DPTRs	1 to 7	1 to 7	0 to 1	0 to 1	0 to 1
32-bit Code/Data Bus	X	X	X	✓	✓
Separate XDATA Bus	X	X	X	✓	✓
Functional Safety	X	X	X	X	✓
Peripherals: 80C51-Like					
TIMER 0 — 16-bit Counter/Timer	✓	✓	✓	✓	✓
TIMER 1 — 16-bit Counter/Timer	✓	✓	✓	✓	✓
SERIAL — Full duplex sync/async serial port	✓	✓	✓	✓	✓
GPIO 0 — 8-bit Parallel Port	✓	✓	✓	✓	✓
GPIO 1-3 — 8-bit Parallel Ports	✓	✓	✓	✓	✓
ISR — Interrupt Controller: 6 sources and 2 priority levels	✓	✓	✓	✓	✓
Peripherals: SAB80C515-Like					
TIMER 2 — 16-bit Counter/ Timer/ Event Counter & Capture Compare Unit	✓	✓	X	X	X
WDT — 15-bit Watchdog timer	✓	✓	X	X	X
MDU — 32-bit Multiplication Division Unit	✓	✓	✓	✓	✓
ISR — Interrupt Controller: 18 sources and 4 priority levels	✓	✓	X	X	X
GPIO 4,5,6 — 8-bit Parallel Ports	✓	✓	✓	✓	✓
SERIAL 0 — Full duplex sync/async serial port	✓	✓	✓	✓	✓
SERIAL 1 — Full duplex sync/async serial port	✓	✓	✓	✓	✓
RTC — Real time clock	✓	✓	✓	✓	✓

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TIMER 2 — 16-bit Timer	X	X	✓	✓	✓
WDT — 14-bit Watchdog timer	✓	X	✓	✓	✓
PCA — Programmable Counter Array: Five 16-bit PWM	✓	X	✓	✓	✓
Peripherals: Proprietary					
MAC — 40-bit Multiply Accumulator Unit	X	X	X	✓	✓
PMU/DFS — Power Management Unit with Dynamic Frequency Scaling	X	X	✓	✓	✓
PMU — Power Management Unit	✓	✓	✓	X	X
I2C 0, 1 — I2C Master/Slave with SMBUS extension	✓	✓	✓	✓	✓
SPI_MS — SPI Master/Slave	✓	✓	✓	✓	✓
DMA — DMA Controller	✓	✓	X	✓	✓
OCDS — On Chip Debug Support	✓	✓	✓	✓	✓
XWDT — Extended Watchdog Timer	X	✓	X	X	X
ISR — Interrupt Controller: 23 sources and 4 priority levels	X	X	✓	✓	✓
CAN — CAN Bus Controller	✓	✓	✓	✓	✓
LIN — LIN Bus Controller	✓	✓	✓	✓	✓
LCD — LCD/TFT Display Controller	✓	✓	✓	✓	✓

✓= Included or user-configurable option ✓= On request **X** = Not supported

Notes

1. Performance data correspond to maximum speed configuration
2. DMIPS/MHz for original 80C51 is 0.00941
3. Basic Peripherals: 8-bit port, Timers 0 & 1, Serial 0, PMU, ISR (INT 0–1)

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