SIEMENS

C509
Microcontroller for High
Performance Applications
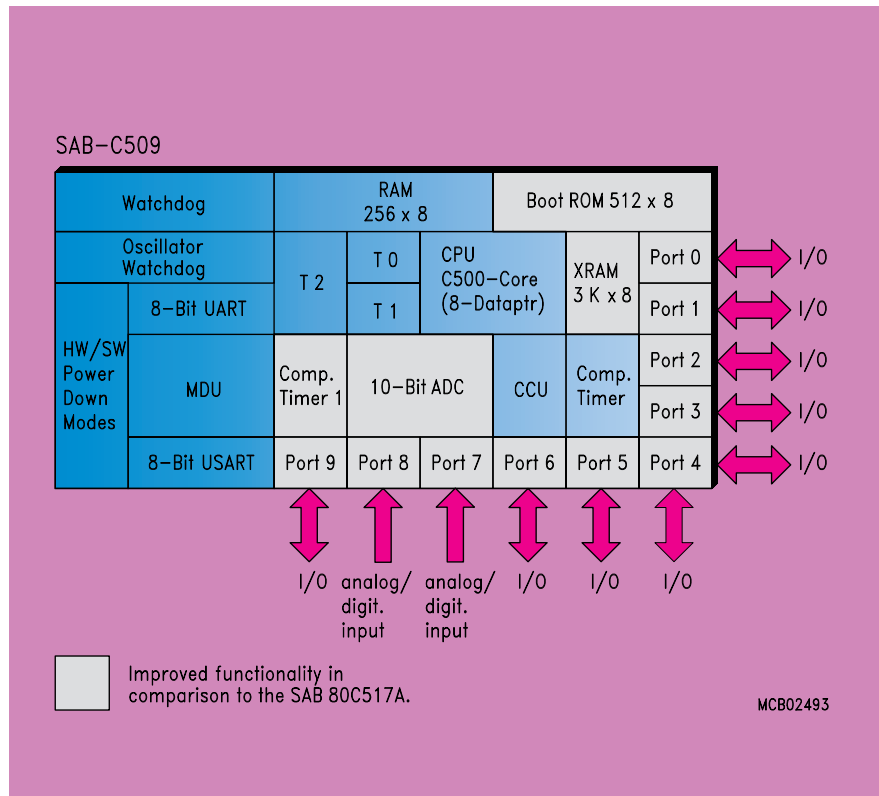
Microcontrollers

The C509 addition to Siemens C500 family of 8-Bit CMOS controllers covers new applications in the high-end range. The optimized C500 kernel has an instruction cycle of 375 ns (internal/external clock rate of 16 MHz), features an extra arithmetic unit and comprehensive peripherals as a 15-Channel 10-Bit A/D Converter and a 29-Channel Capture/Compare and PWM generation unit.

The C509 incorporates a bootstrap loader to support the programming of external Flash memories up to 128 KByte.

Typical applications for the C509 are sophisticated motor management systems and other high-end applications. In these domains the chip offers an attractive price-performance ratio.

- Enhanced 8-Bit C500-CPU – Fully Software/Toolset Compatible to Standard 80C51/80C52 Microcontrollers
- Fully Upward Compatible with SAB 80C517A and other SAB 80C51x-Derivatives
- 375 ns Instruction Cycle Time at 16 MHz CPU Clock
- 19 Interrupt Vectors with 4 Priority Levels selectable
- 256 Byte On-Chip Internal RAM (IRAM)
- 3 KByte On-Chip Extended RAM (XRAM)
- 512 Byte Boot ROM with Bootstrap Loader for External Flash Memory Programming Support
- 8 Datapointers with 16 Bit for Indirect Addressing of Program and Data Memory
- Supports external Address Range up to 128 K Byte Program and Data Memory

- Arithmetic Unit with Fast 32-Bit division (2,25 μs), 16-Bit Multiplication (1,5 μs), 32-Bit Normalize and Shift (2,25 μs)
- Five 16-bit Timer/Counters
- 15-Channel 10-Bit A/D Converter with Programmable Sample and Conversion Clock (Minimum Conversion Time is 7μs). A/D Converter Inputs can be used as Digital Inputs.
- 2 Full Duplex Serial Interface with Asynchronous and Synchronous Modes and Programmable Baudrate Generators
- Up to 29 Channel Capture/ Compare Unit for PWM Generation with 2 Independent 16-Bit Compare Timers (Minimum Resolution of 62,5ns)
- 80 Multifunctional Input/Output Pins

- User Selectable Port Structure (TTL/CMOS)
- Enhanced Fail Safe Mechanisms with Programmable Watchdog Timer and Oscillator Watchdog
- Extended Power Saving Modes
- Fast Power-On Reset
- 100-Pin P-MQFP Package – Pin-Compatible to SAB 80C517A-M and SAB 80C517-M
- Temperature ranges:
  Extended   –40°C to +85°C
               –40°C to +110°C

C509
Block Diagram

SAB–C509

Watchdog	RAM 256 x 8		Boot ROM 512 x 8		
Oscillator Watchdog	T 2	T 0	CPU C500–Core (8–Dataptr)	XRAM 3 K x 8	Port 0
8–Bit UART		T 1			Port 1
HW/SW Power Down Modes	MDU	Comp. Timer 1	10–Bit ADC	CCU	Comp. Timer
8–Bit USART	Port 9	Port 8	Port 7	Port 6	Port 5

Improved functionality in comparison to the SAB 80C517A.

MCB02493

C509
Pin Configuration

MCP02494