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C8051F70x/71x

Mixed Signal ISP Flash MCU Family

Analog Peripherals
- **10-Bit ADC**
  - Up to 500 ksps
  - Up to 16 external single-ended inputs
  - VREF from on-chip VREF, external pin or V_{DD}
  - Internal or external start of conversion source
  - Built-in temperature sensor
- **Comparator**
  - Programmable hysteresis and response time
  - Configurable as interrupt or reset source

Capacitive Sense Interface
- 16-bit precision measurement
- Up to 32 channels
- Auto-scan and compare
- Auto-accumulate 4x, 8x, and 16x samples
- High conversion speed (40 µs per input)

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
- Low cost, **complete** development kit

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

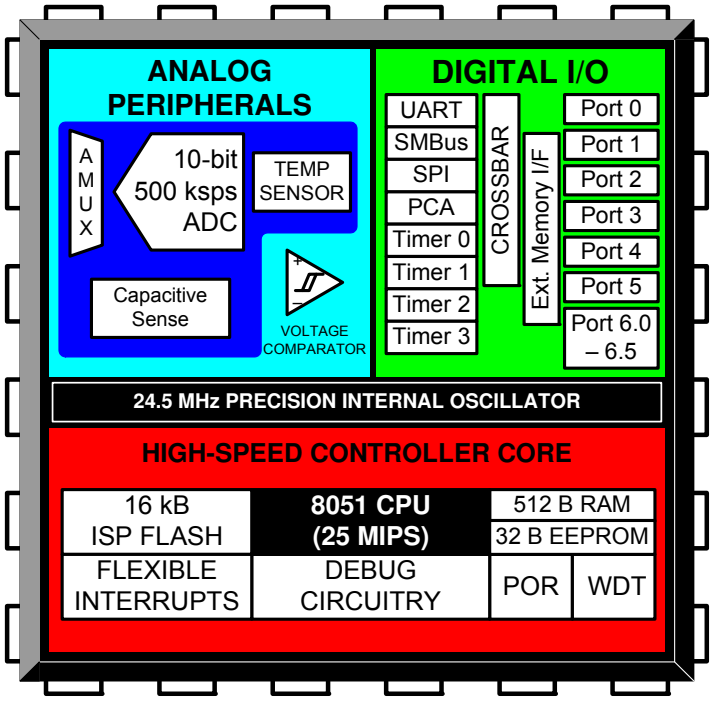
Memory
- 512 bytes internal data RAM (256 + 256)
- Up to 16 kB Flash; In-system programmable in 512-byte Sectors
- Up to 32-byte data EEPROM

Digital Peripherals
- Up to 54 Port I/O with high sink current
- Hardware enhanced UART, SMBus™ (I^2C compatible), and enhanced SPI™ serial ports
- Four general purpose 16-bit counter/timers
- 16-Bit programmable counter array (PCA) with 3 capture/compare modules and enhanced PWM functionality
- Real time clock mode using timer and crystal

Clock Sources
- 24.5 MHz ±2% Oscillator
  - Supports crystal-less UART operation
- External oscillator: Crystal, RC, C, or clock (1 or 2 pin modes)
- Can switch between clock sources on-the-fly; useful in power saving modes

Supply Voltage 1.8 to 3.6 V
- Built-in voltage supply monitor

64-Pin TQFP, 48-Pin TQFP, 48-Pin QFN
Temperature Range: –40 to +85 °C



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1. System Overview

C8051F70x/71x devices are fully integrated, mixed-signal, system-on-a-chip MCUs. Highlighted features are listed below. Refer to Table 2.1 for specific product feature selection and part ordering numbers.

- High-speed pipelined 8051-compatible microcontroller core (up to 25 MIPS)
- In-system, full-speed, non-intrusive debug interface (on-chip)
- 10-bit 500 ksps Single-ended ADC with 16-channel analog multiplexer and integrated temperature sensor
- Precision calibrated 24.5 MHz internal oscillator
- 16Kb of on-chip Flash memory
- 512 bytes of on-chip RAM
- SMBus/I^2C, Enhanced UART, and Enhanced SPI serial interfaces implemented in hardware
- Four general-purpose 16-bit timers
- Capacitive Sense interface with 32 input channels
- Programmable Counter/Timer Array (PCA) with three capture/compare modules
- On-chip internal voltage reference
- On-chip Watchdog timer
- On-chip Power-On Reset and Supply Monitor
- On-chip Voltage Comparator
- 54 general purpose I/O

With on-chip power-on reset, V_{DD} monitor, watchdog timer, and clock oscillator, the C8051F70x/71x devices are truly stand-alone, system-on-a-chip solutions. The Flash memory can be reprogrammed even in-circuit, providing non-volatile data storage, and also allowing field upgrades of the 8051 firmware. User software has complete control of all peripherals, and may individually shut down any or all peripherals for power savings.

The C8051F70x/71x processors include Silicon Laboratories' 2-Wire C2 Debug and Programming interface, which allows non-intrusive (uses no on-chip resources), full speed, in-circuit debugging using the production MCU installed in the final application. This debug logic supports inspection of memory, viewing and modification of special function registers, setting breakpoints, single stepping, and run and halt commands. All analog and digital peripherals are fully functional while debugging using C2. The two C2 interface pins can be shared with user functions, allowing in-system debugging without occupying package pins.

Each device is specified for 1.8–3.6 V operation over the industrial temperature range (–45 to +85 °C). An internal LDO is used to supply the processor core voltage at 1.8 V. The Port I/O and $\overline{RST}$ pins are tolerant of input signals up to 2 V above the V_{DD} supply. See Table 2.1 for ordering information. Block diagrams of the devices in the C8051F70x/71x family are shown in Figure 1.1.

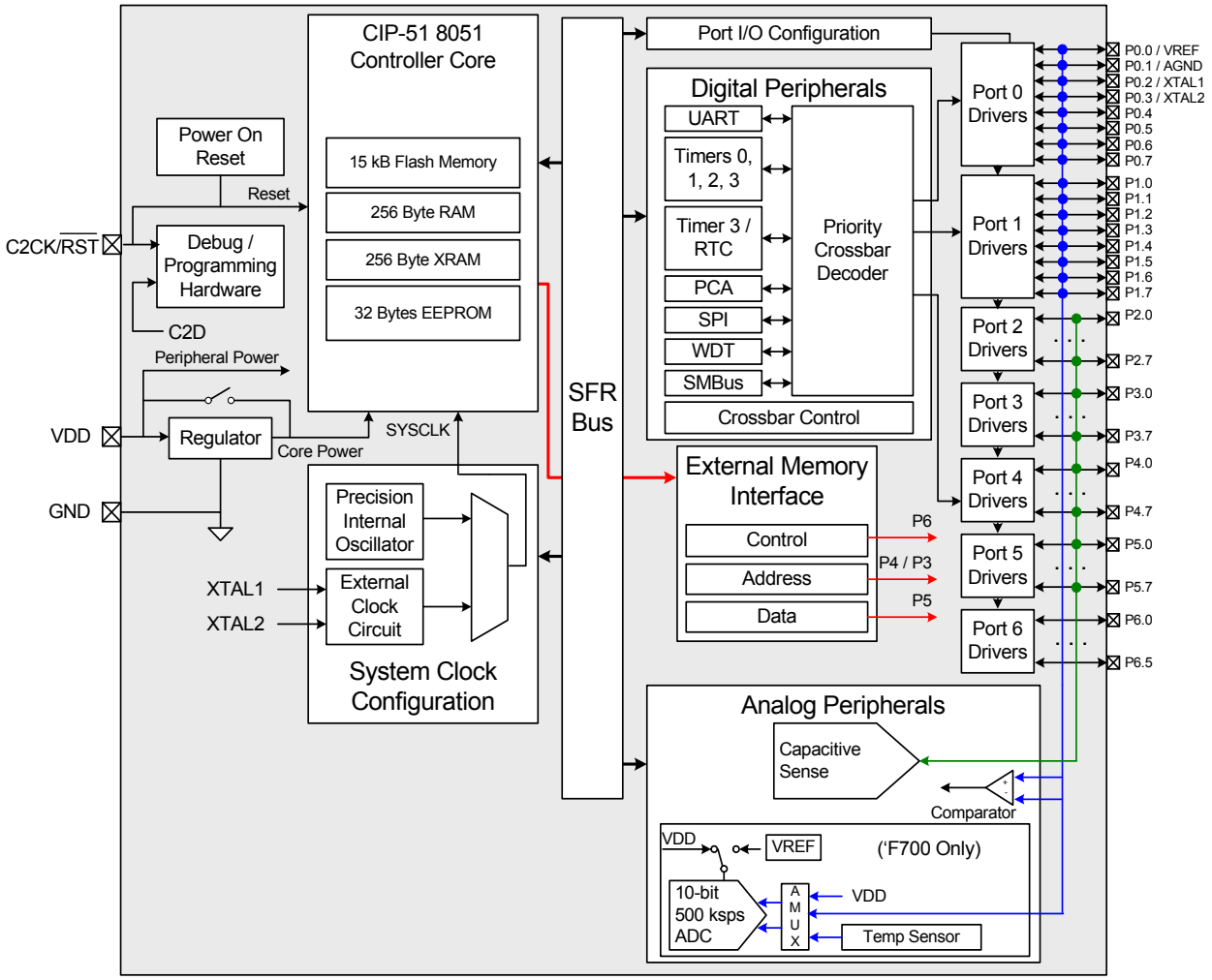

Figure 1.1. C8051F700/1 Block Diagram

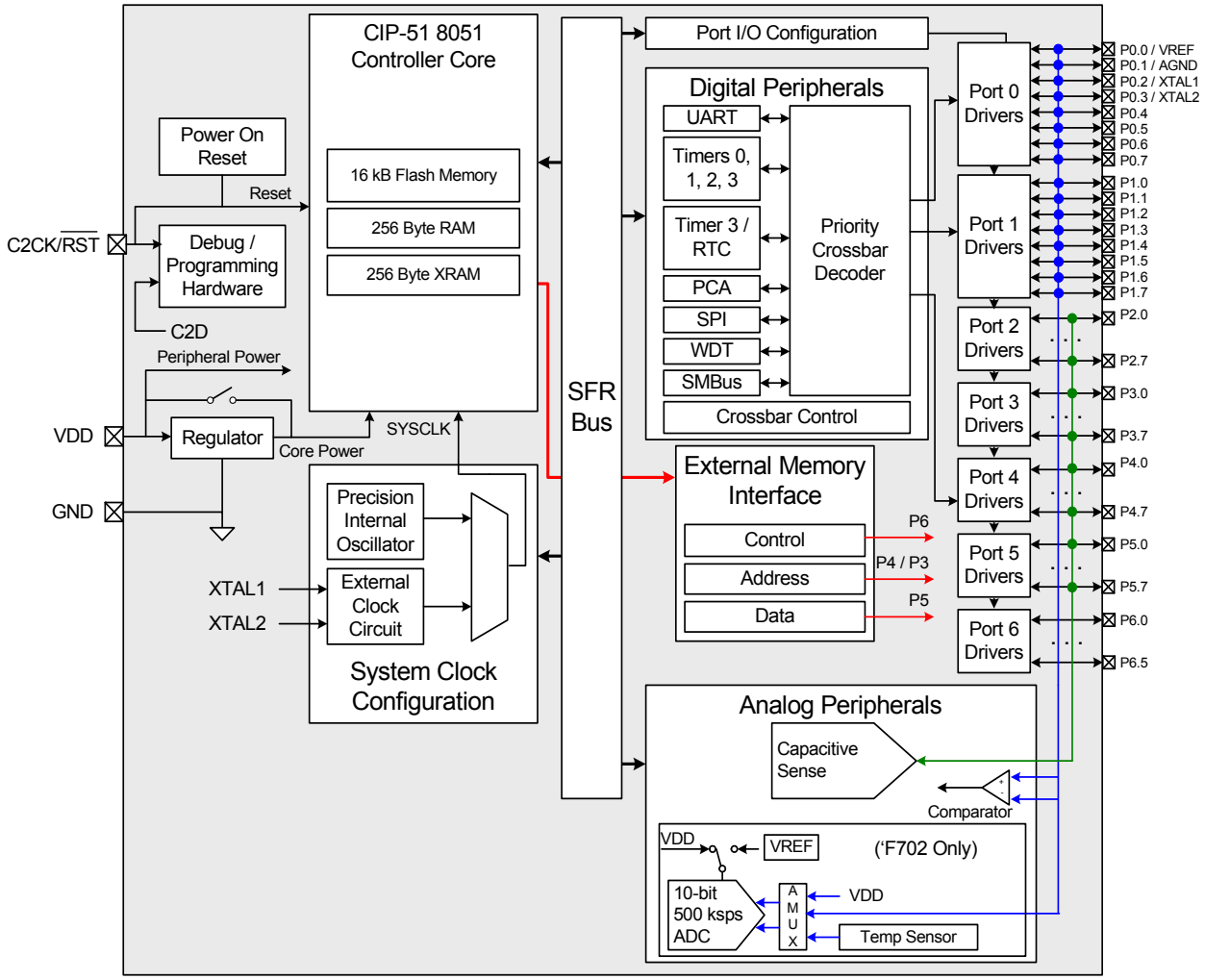

Figure 1.2. C8051F702/3 Block Diagram

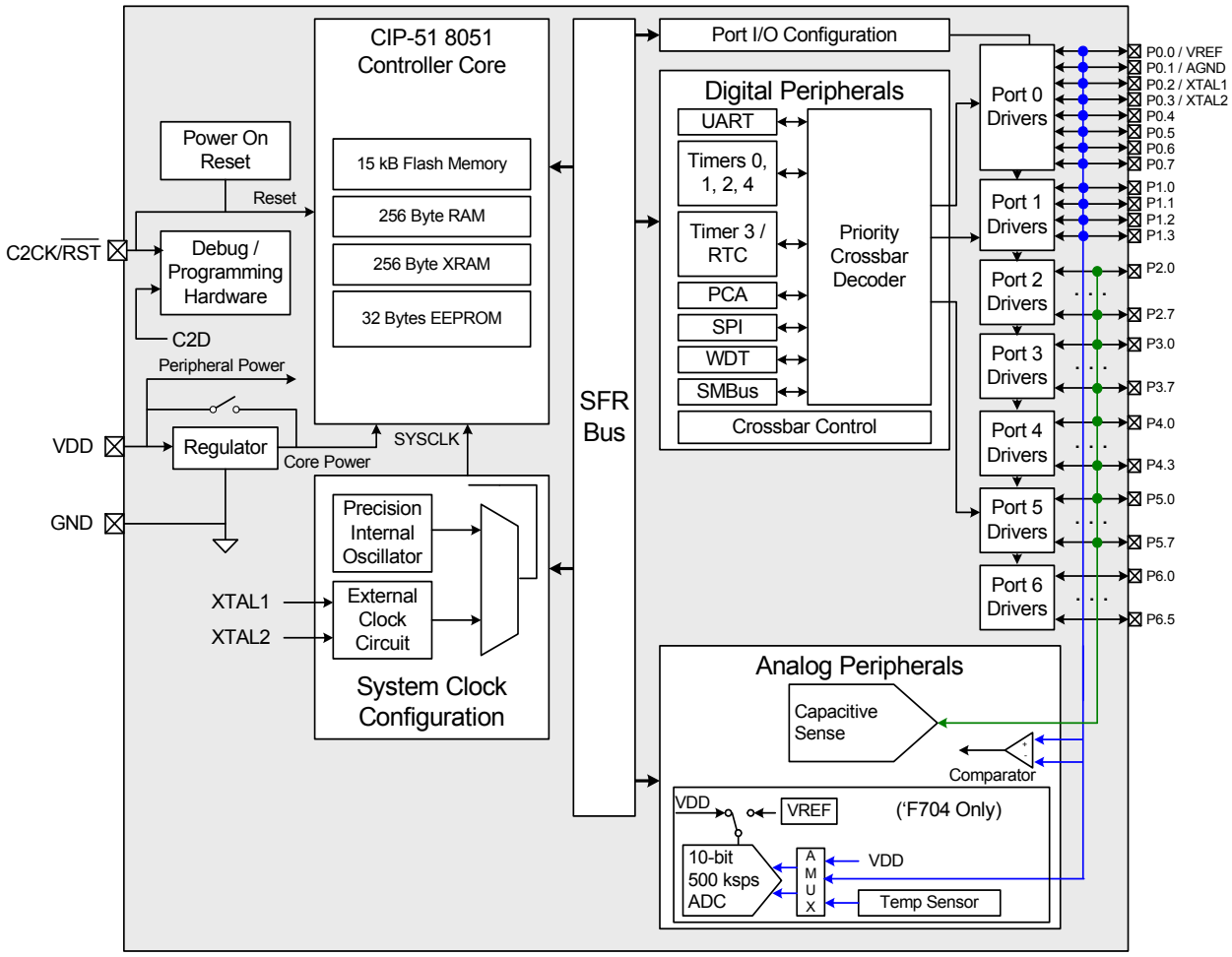

Figure 1.3. C8051F704/5 Block Diagram

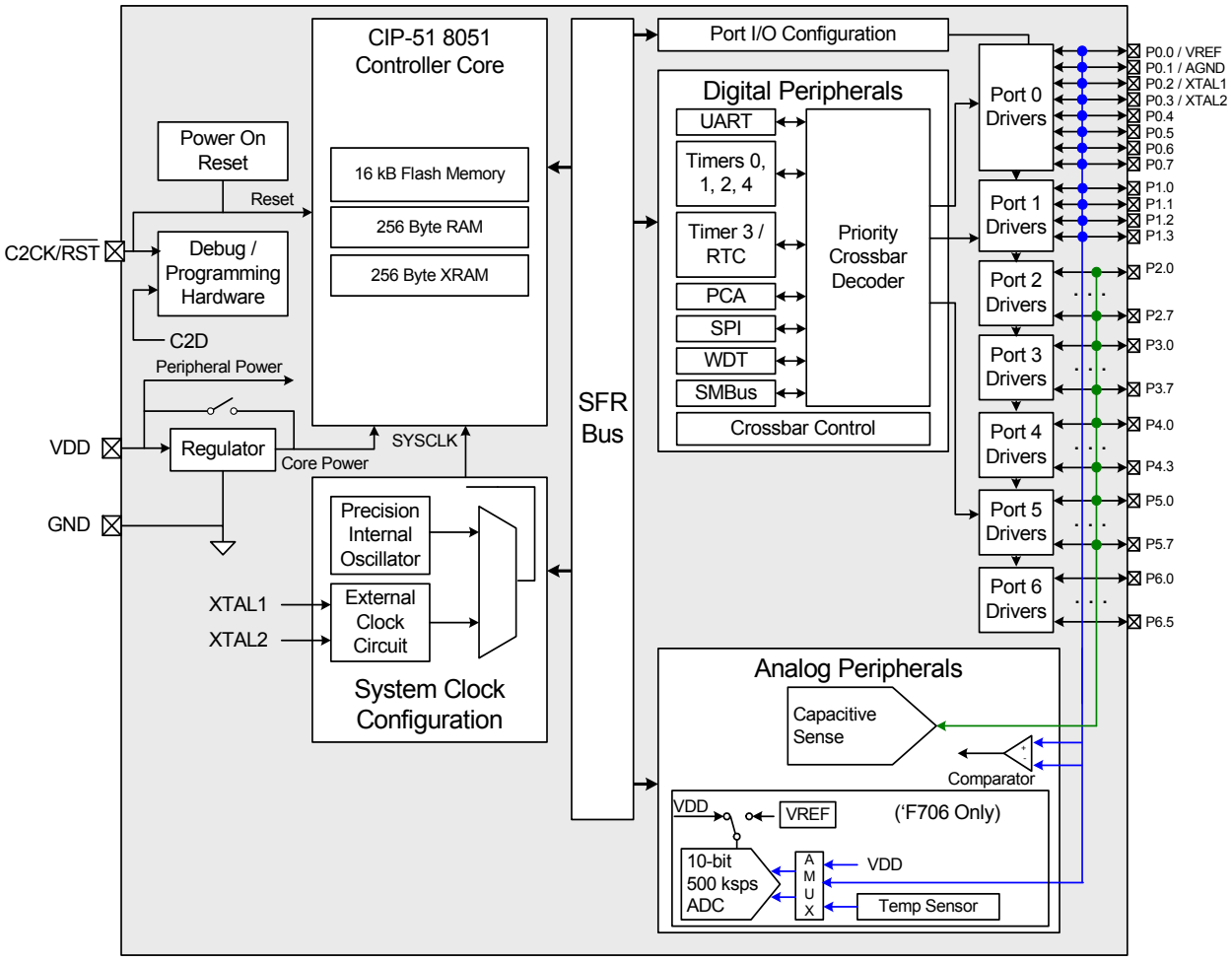

Figure 1.4. C8051F706/07 Block Diagram

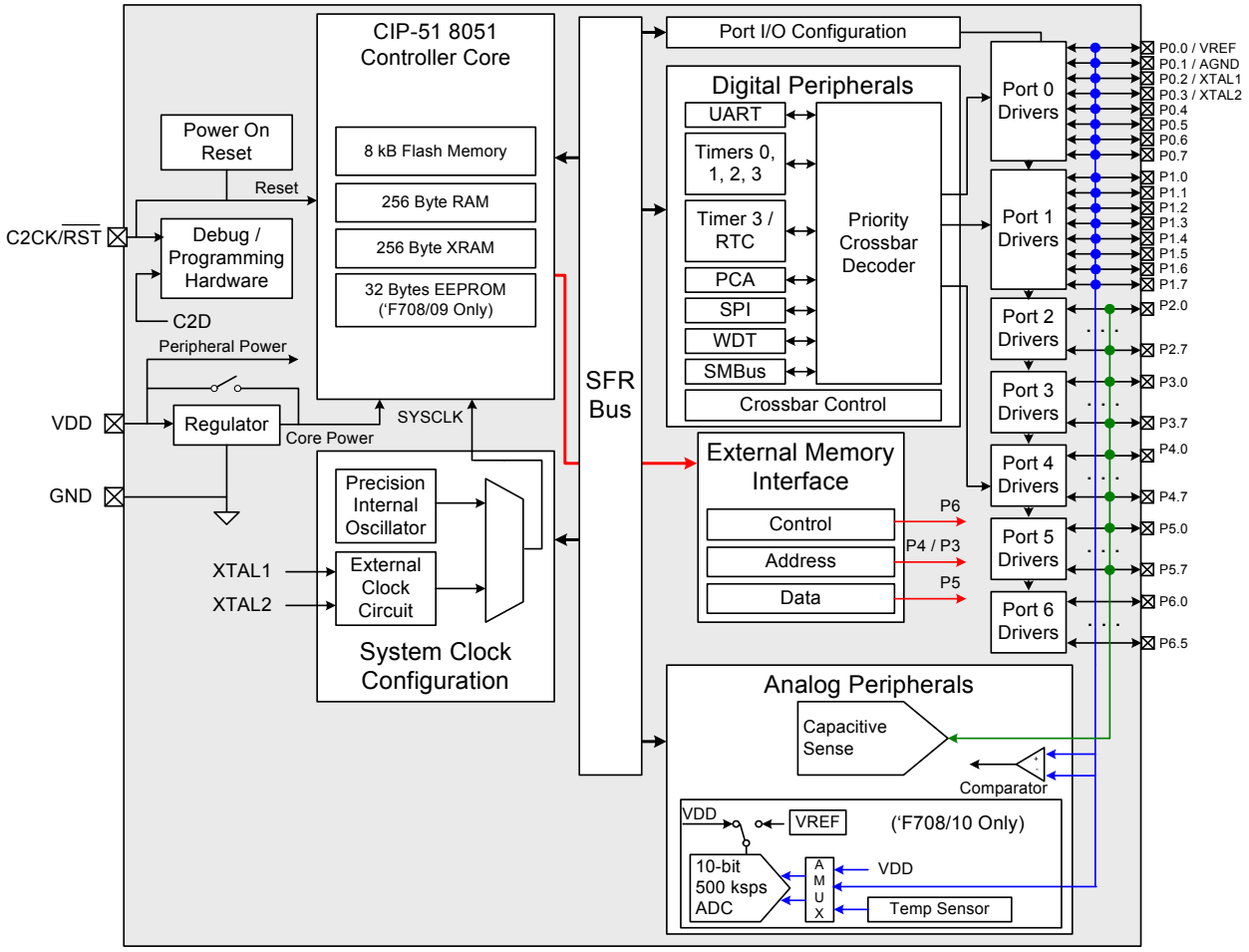

Figure 1.5. C8051F708/09/10/11 Block Diagram

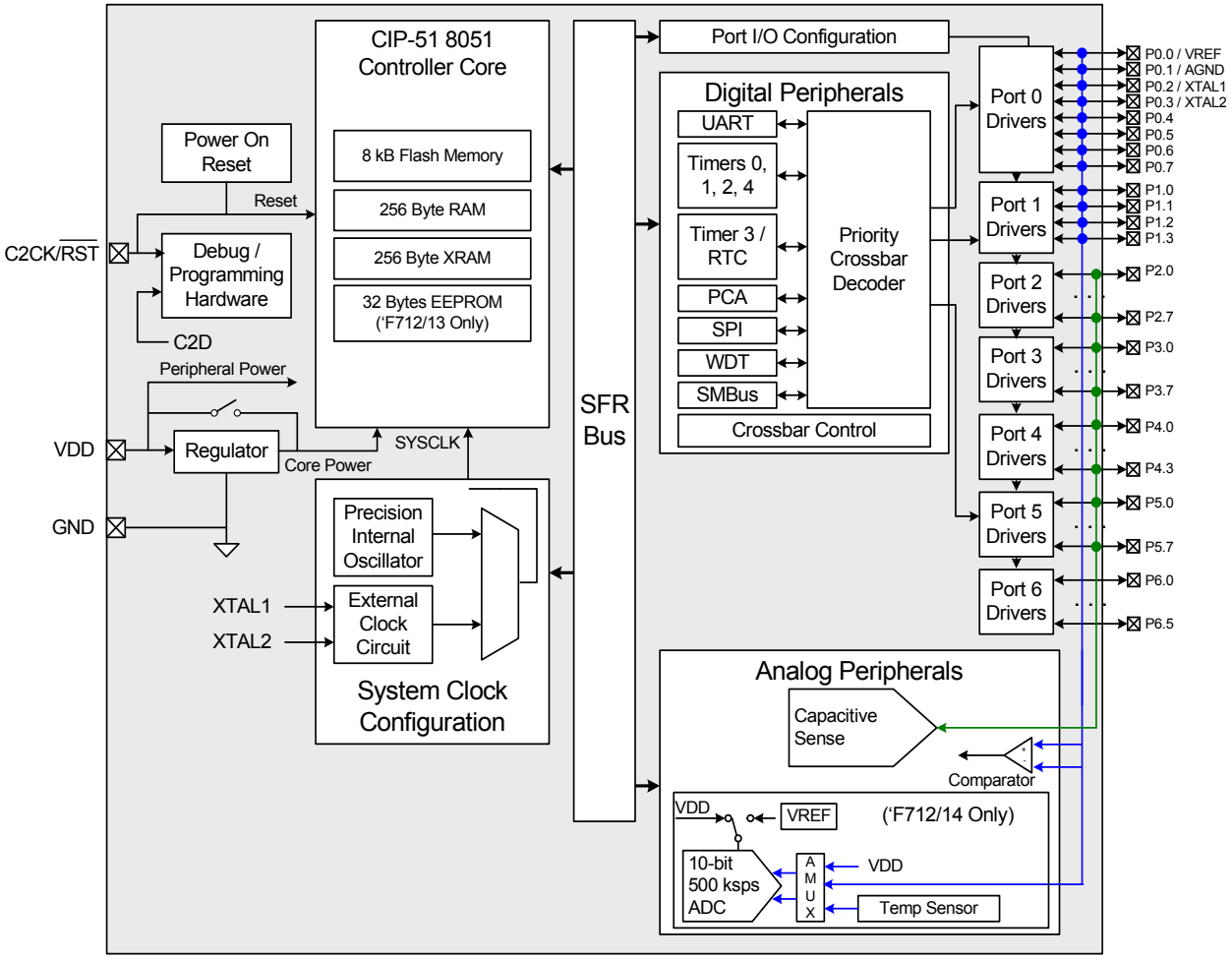

Figure 1.6. C8051F712/13/14/15 Block Diagram

2. Ordering Information

All C8051F70x/71x devices have the following features:

- 25 MIPS (Peak)
- Calibrated Internal Oscillator
- SMBus/I2C
- UART
- Programmable counter array (3 channels)
- 4 Timers (16-bit)
- 1 Comparator
- Lead-Free (RoHS compliant) package
- 512 bytes RAM

In addition to the features listed above, each device in the C8051F70x/71x family has a set of features that vary across the product line. See Table 2.1 for a complete list of the unique feature sets for each device in the family.

Table 2.1. Product Selection Guide

Part Number	Digital Port I/Os	Capacitive Sense Channels	Flash Memory (kB)	EEPROM (Bytes)	External Memory Interface	10-bit 500 ksps ADC	ADC Channels	Temperature Sensor	Package (RoHS)
C8051F700-GQ	54	32	15	32	Y	Y	16	Y	TQFP-64
C8051F701-GQ	54	32	15	32	Y	N	-	-	TQFP-64
C8051F702-GQ	54	32	16	-	Y	Y	16	Y	TQFP-64
C8051F703-GQ	54	32	16	-	Y	N	-	-	TQFP-64
C8051F704-GQ	39	24	15	32	N	Y	16	Y	TQFP-48
C8051F704-GM	39	24	15	32	N	Y	16	Y	QFN-48
C8051F705-GQ	39	24	15	32	N	N	-	-	TQFP-48
C8051F705-GM	39	24	15	32	N	N	-	-	QFN-48
C8051F706-GQ	39	24	16	-	N	Y	16	Y	TQFP-48
C8051F706-GM	39	24	16	-	N	Y	16	Y	QFN-48
C8051F707-GQ	39	24	16	-	N	N	-	-	TQFP-48
C8051F707-GM	39	24	16	-	N	N	-	-	QFN-48
C8051F708-GQ	54	32	8	32	Y	Y	16	Y	TQFP-64
C8051F709-GQ	54	32	8	32	Y	N	-	-	TQFP-64
C8051F710-GQ	54	32	8	-	Y	Y	16	Y	TQFP-64
C8051F711-GQ	54	32	8	-	Y	N	-	-	TQFP-64
C8051F712-GQ	39	24	8	32	N	Y	16	Y	TQFP-48
C8051F712-GM	39	24	8	32	N	Y	16	Y	QFN-48
C8051F713-GQ	39	24	8	32	N	N	-	-	TQFP-48
C8051F713-GM	39	24	8	32	N	N	-	-	QFN-48
C8051F714-GQ	39	24	8	-	N	Y	16	Y	TQFP-48
C8051F714-GM	39	24	8	-	N	Y	16	Y	QFN-48
C8051F715-GQ	39	24	8	-	N	N	-	-	TQFP-48
C8051F715-GM	39	24	8	-	N	N	-	-	QFN-48
Lead finish material on all devices is 100% matte tin (Sn).									