



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

19ECB211 – MICROCONTROLLER PROGRAMMING & INTERFACING

II YEAR IV SEM

UNIT V– ADVANCED MICROCONTROLLERS

TOPIC 1 – MSP430X22X2 Device Architecture



Advanced Microcontrollers



- A Micro controller is a small computer on a single integrated and architecture circuit.
- In Modern terminology, it's called Microcontroller because they have an execution time in the order of microseconds.
- While, the speed of [Microcontroller Programming](#) have increased over the years, but the name stuck.
- As much as, for the controller part, a microcontroller consists of a microprocessor unit, RAM, ROM, and some extra peripherals.



Types of Microcontrollers



- PIC Microcontrollers
- ARM Microcontrollers
- 8051 Microcontrollers
- AVR Microcontrollers
- MSP Microcontrollers

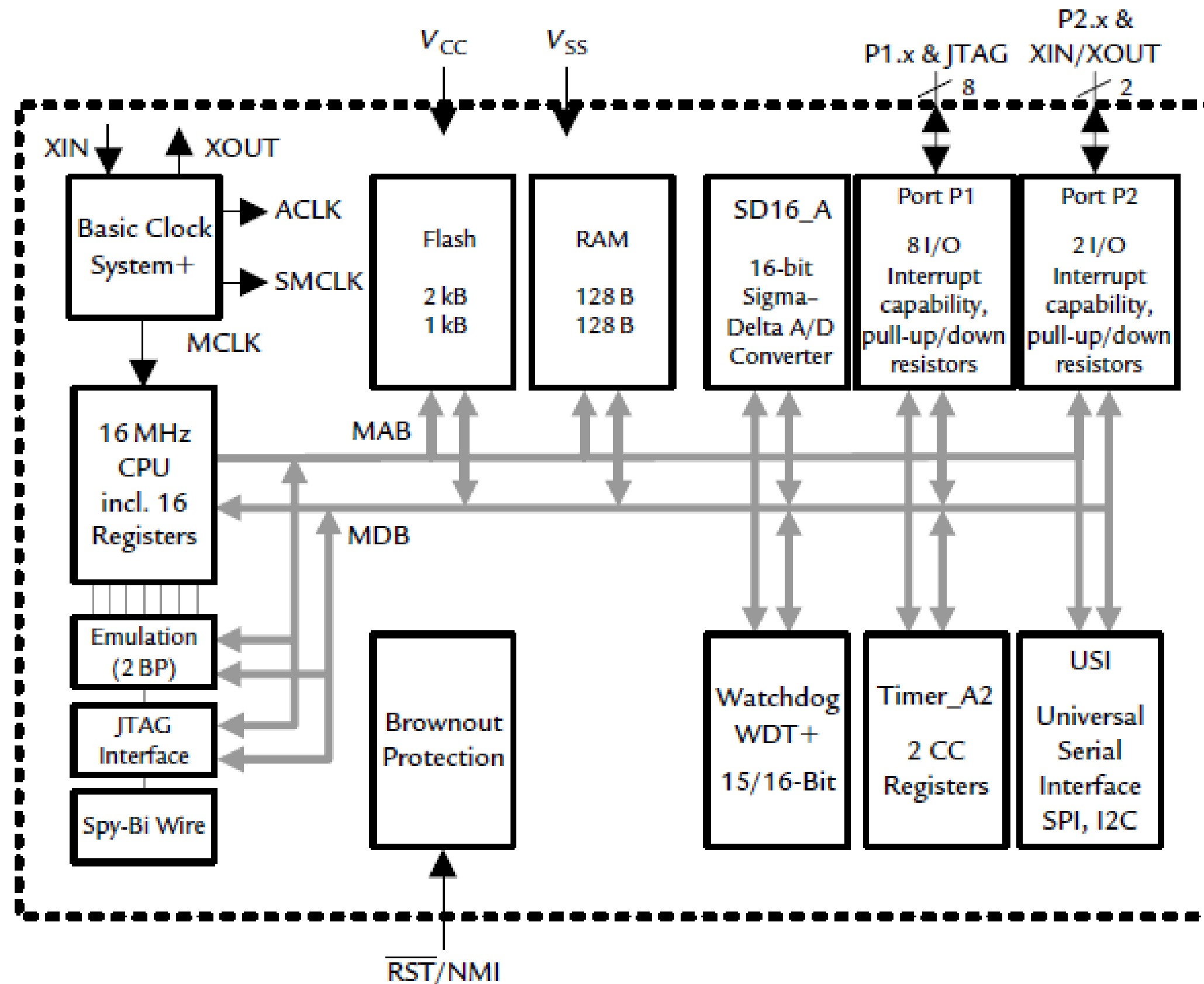
MSP Microcontroller



- MSP stands for Mixed Signal Processor family from Texas Instruments.
- It's the Built around a 16 -bit CPU, the MSP is designed for low cost and respectively, low power dissipation embedded statements.
- 16-bit data bus, and seven addressing modes and the decreased instructions set, which allows a shorter, denser programming code for fast performance.
- The Range of Microcontroller is an IC chip that executes programs for controlling other device or machines.
- It is a micro-device which is used for control of other device machines that's why it's called Microcontrollers Programming.



MSP Microcontroller –Architecture Diagram



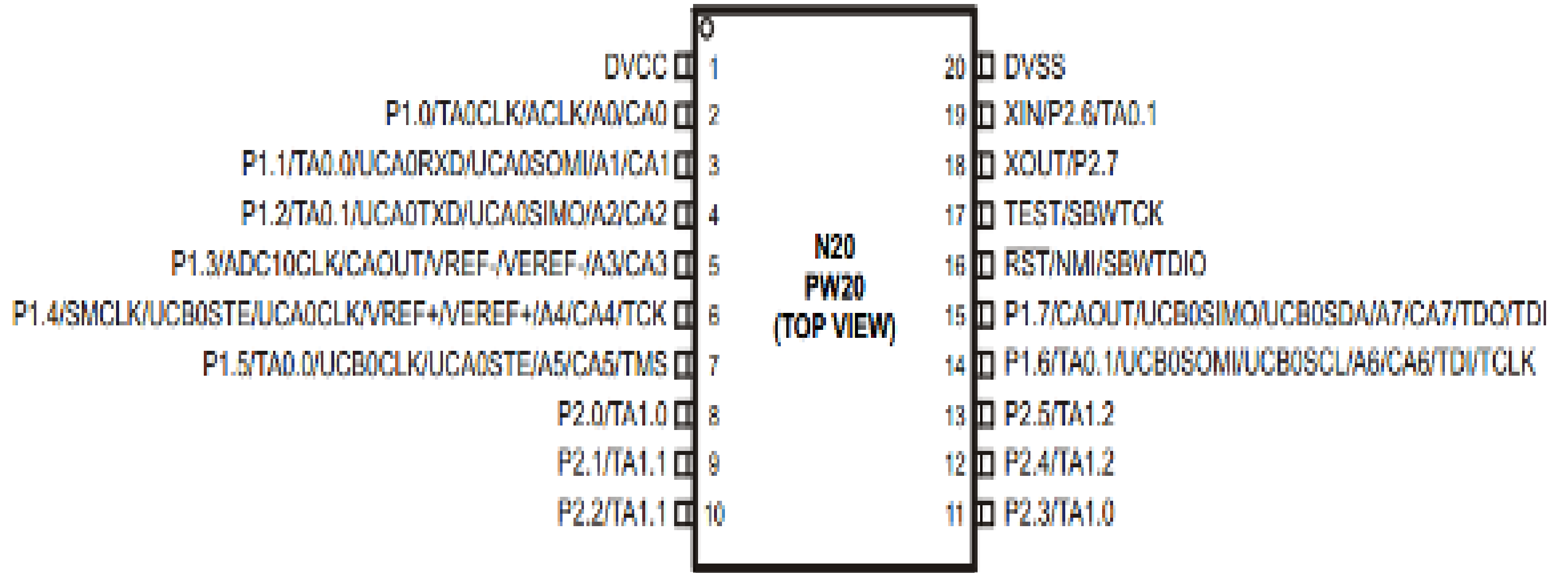


MSP430- Controller





MSP430X22X2-Pin Out Diagram





Features of MSP430



Features of MSP430

- A low power Microcontroller released by Texas Instruments in the late 1990s.
- A 16-bit RISC based mixed signal processing microcontroller.
- Large register file with 16 bits wide & can be used for either data or address.
- With a set of intelligent peripherals like I/O, Timers ADC, DAC, flexible clock and USCI
- low cost
- lowest power consumption
- Ultra low power optimization extends battery life
- multiple low power modes of operation



Features of MSP430

- Extensive interrupt capability relieves need for polling
- Prioritized nested interrupts
- Seven source-addressing modes
- Four destination-addressing modes
- Only 27 core instructions and
24 Emulated Instruction
- Fast hex-to-decimal conversion



Features of MSP430

- MSP430 requires
 - 0.1 μA for RAM data Retention,
 - 0.8 μA for RTC mode operation
 - 250 μA for active mode operation.
 - 1 μA for standby mode
- Low operation voltage (from 1.8 V to 3.6 V).
- Zero-power Brown-Out -Reset (BOR)



MSP430 Pheripherals



- Watchdog timer
- Real time clock
- Analog to Digital Converter
- Communication Interface
- Non volatile memory for data



Application of MSP430



- Automation
- Medical Devices
- Data Loggers
- Analog and Digital Sensor Systems
- Connection to USB hosts



References

https://www.ti.com/sc/docs/products/micro/msp430/userguid/ag_02.pdf

<https://unacademy.com/lesson/architecture-of-msp430-microcontroller/B3AQZF86>

<https://binaryupdates.com/bitwise-operations-in-embedded-programming/>

<https://www.youtube.com/watch?v=V0GrBUbomDA&t=82s>

John H Davies, MSP430 Microcontroller Basics, Newnes Publications, Elsevier, 2008.

Thank You