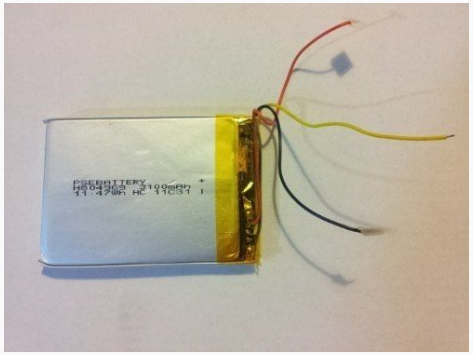
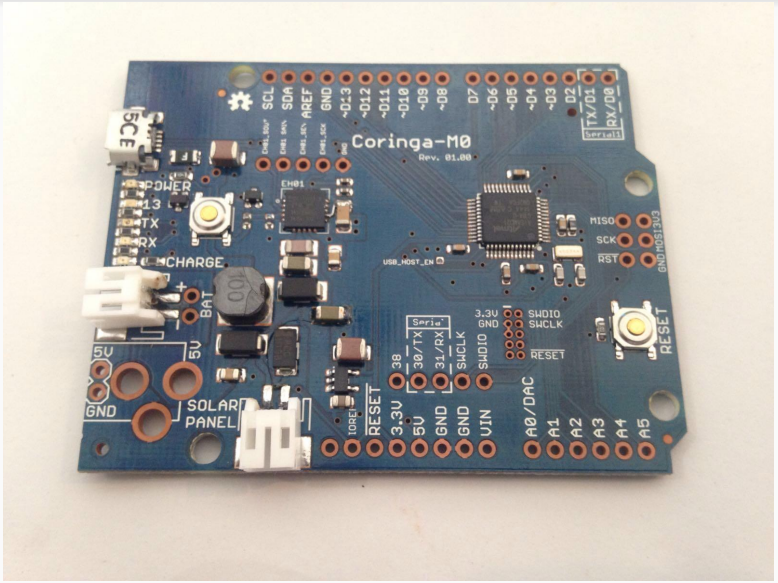
Oficina: Colhendo Energia e Performance #CPBR9

Apresentando: Coringa-M0

Kit Coringa-M0





First Things First

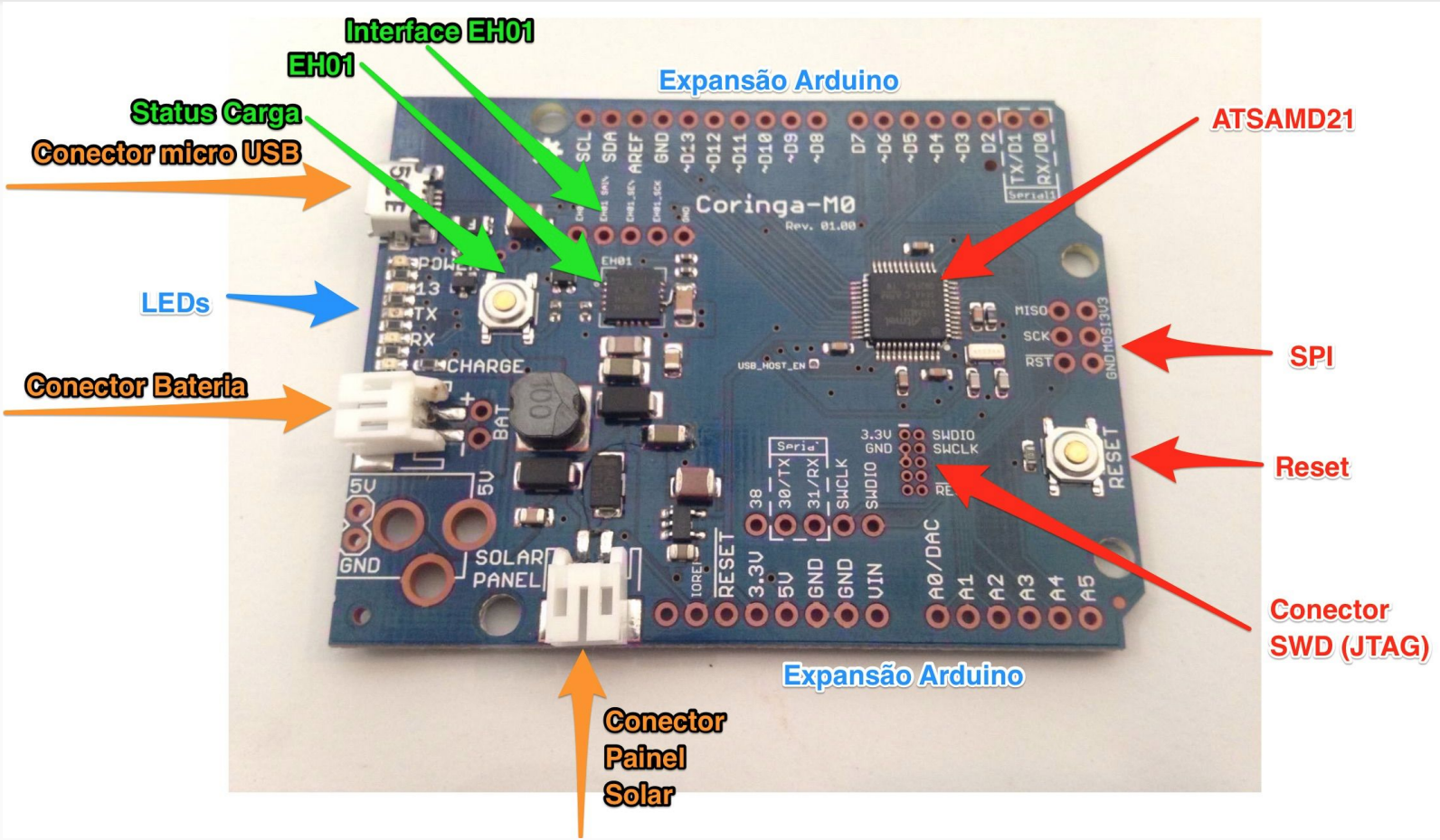
Link para o material:

- https://github.com/dtvp/coringa-m0

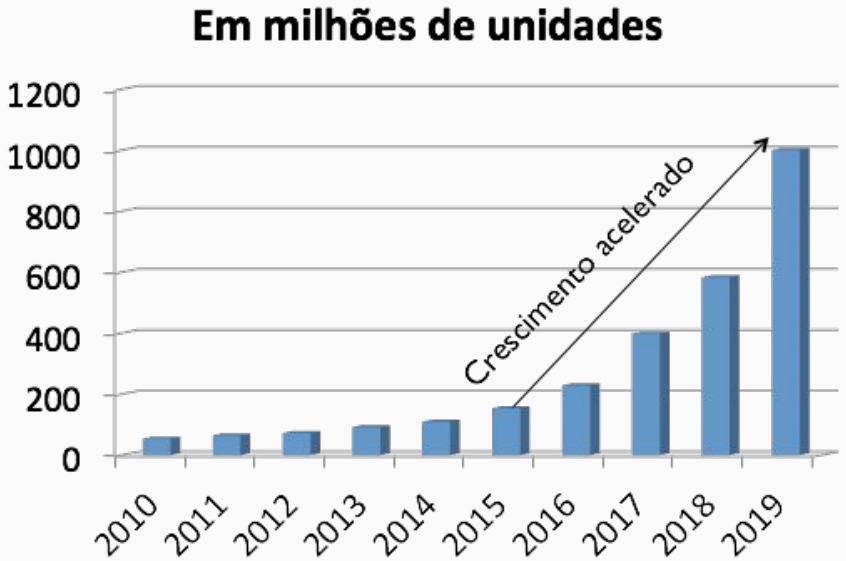
Setup de ambiente:

- IDE Arduino mais recente (v1.6.7)
- Board Arduino Zero
  - Tools -> Board -> Board Manager
  - Instalar "Arduino SAMD Boards (32-bits ARM Cortex-M0+)"
- Windows Users: Driver USB
  - https://learn.sparkfun.com/tutorials/samd21-minidev-breakout-hookup-guide/all#driver-install

Apresentando: Coringa-M0



Energy Harvesting - Oportunidade



Tamanho do mercado de Energy Harvesting para Consumer Electronics

Fonte:

IDTechEx

Silicon Reef - EH01

SiliconReef

Because Energy is Everywhere

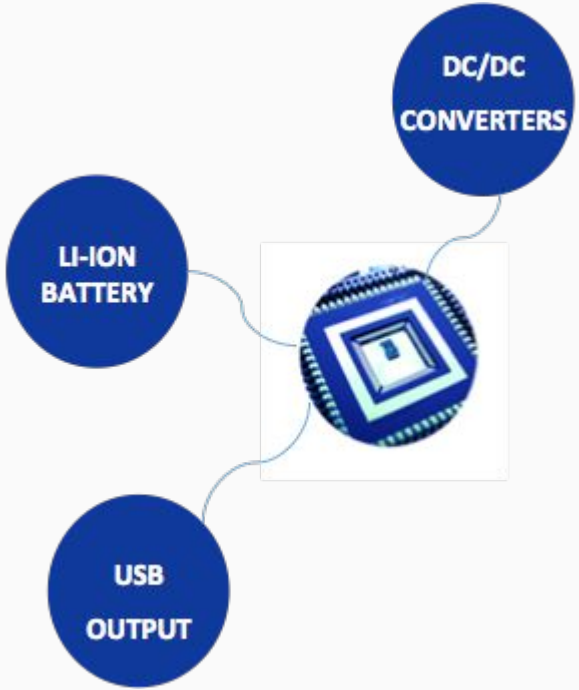
www.SiliconReef.com.br

SR - EH01

EH01 - Energy Harvesting 01

Três funções: um único chip:

- Recarga de bateria Lítio
- Conversor DC/DC a partir de painéis solares
- Saída regulada 5V (compatível com USB Charger)



SR - EH01 - Aplicações

SR - EH01 - Aplicações

Wearables

Consumer Electronics

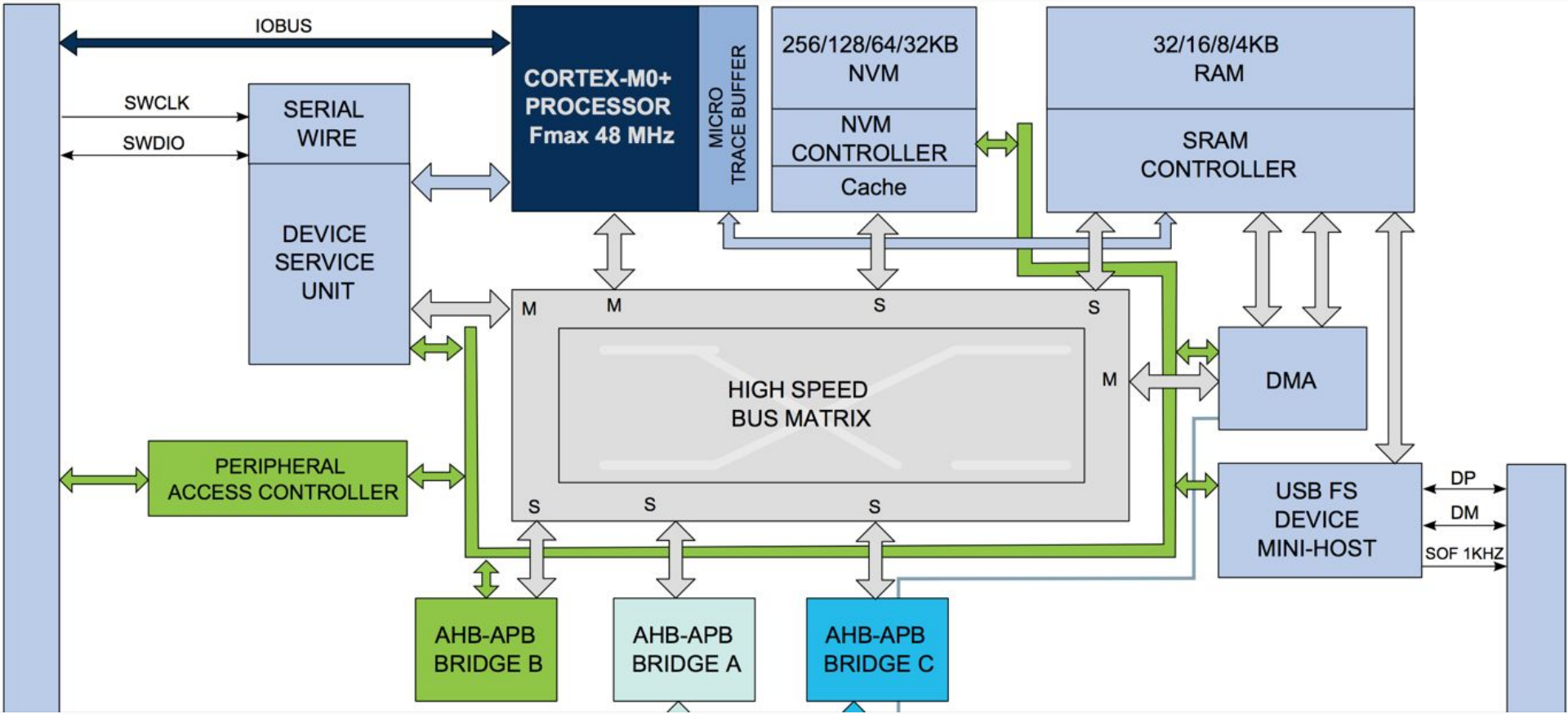
Agri-business

Road Sign
& SOS

Atmel ATSAMD21

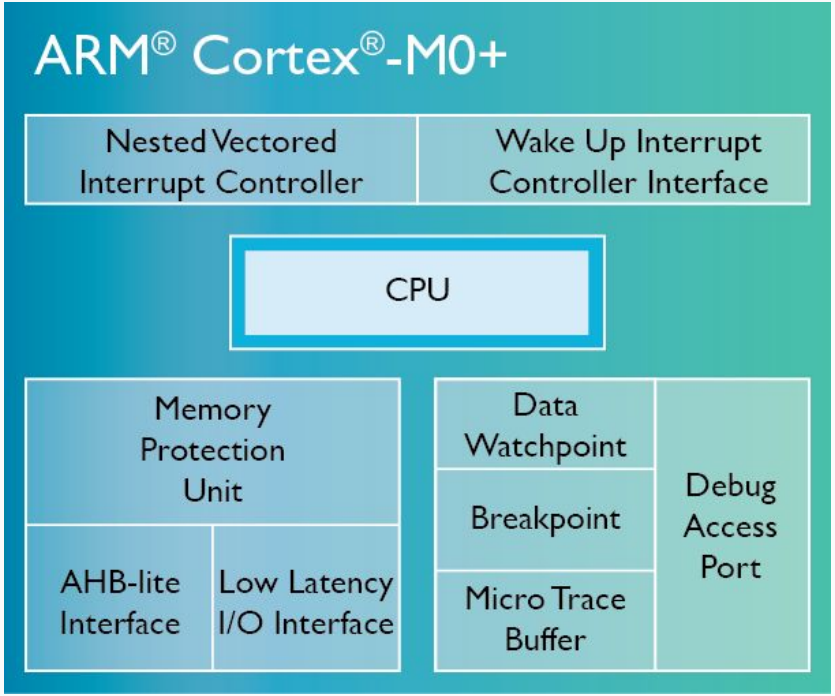
SAM D Family Features	SAM D09	SAM D10	SAM D11	SAM D20	SAM D21
Cortex-M0+ CPU	8-16KB Flash	8-16KB Flash		16-256KB Flash	32-256KB Flash
Event system					
SERCOM					
PTC*	14 and 24 pins	14, 20, and 24 pins		32, 48, and 64 pins	
12-bit 350 ksps ADC					
10-bit 350 ksps DAC*	6-ch DMA				12-ch DMA
2xAnalog Comparator*					
32-bit RTC w/Calendar		1x T/C for Control			3x T/C for Control
Serial Wire Debug					
BOD and POR			FS USB Device		FS USB H&D
Internal RCs					
Watchdog					I²S
High GPIO Count					

Atmel ATSAMD21



Atmel ATSAMD21 - ARM Cortex-M0+

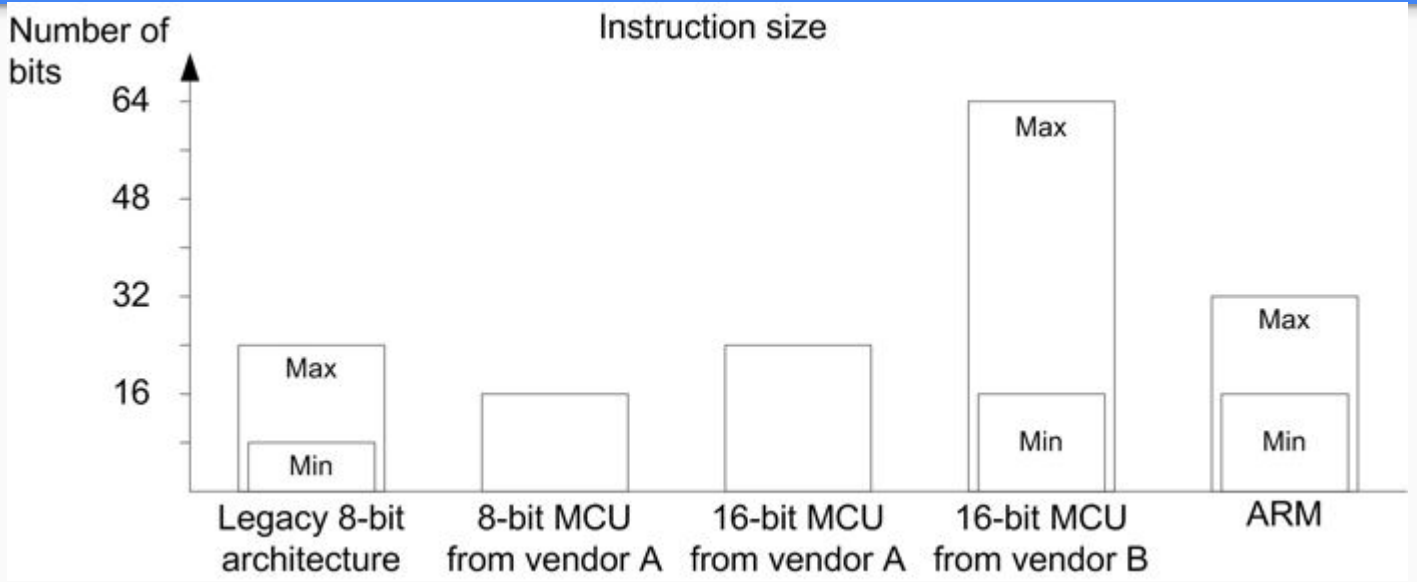
- Moderna arquitetura de 32-bits
- Ultra low-power
- Clock de até 48 MHz
- Interface de depuração



ARM Cortex-M0+ - Multiplicação de dois 16-bit

8-bits:

```
MOV A, XL ; 2 bytes
MOV B, YL ; 3 bytes
MUL AB; 1 byte
MOV R0, A; 1 byte
MOV R1, B; 3 bytes
MOV A, XL ; 2 bytes
MOV B, YH ; 3 bytes
MUL AB; 1 byte
ADD A, R1; 1 byte
MOV R1, A; 1 byte
MOV A, B ; 2 bytes
ADDC A, #0 ; 2 bytes
MOV R2, A; 1 byte
MOV A, XH ; 2 bytes
MOV B, YL ; 3 bytes
MUL AB; 1 byte
ADD A, R1; 1 byte
MOV R1, A; 1 byte
MOV A, B ; 2 bytes
ADDC A, R2 ; 1 bytes
MOV R2, A; 1 byte
MOV A, XH ; 2 bytes
MOV B, YH ; 3 bytes
MUL AB; 1 byte
ADD A, R2; 1 byte
MOV R2, A; 1 byte
MOV A, B ; 2 bytes
ADDC A, #0 ; 2 bytes
```



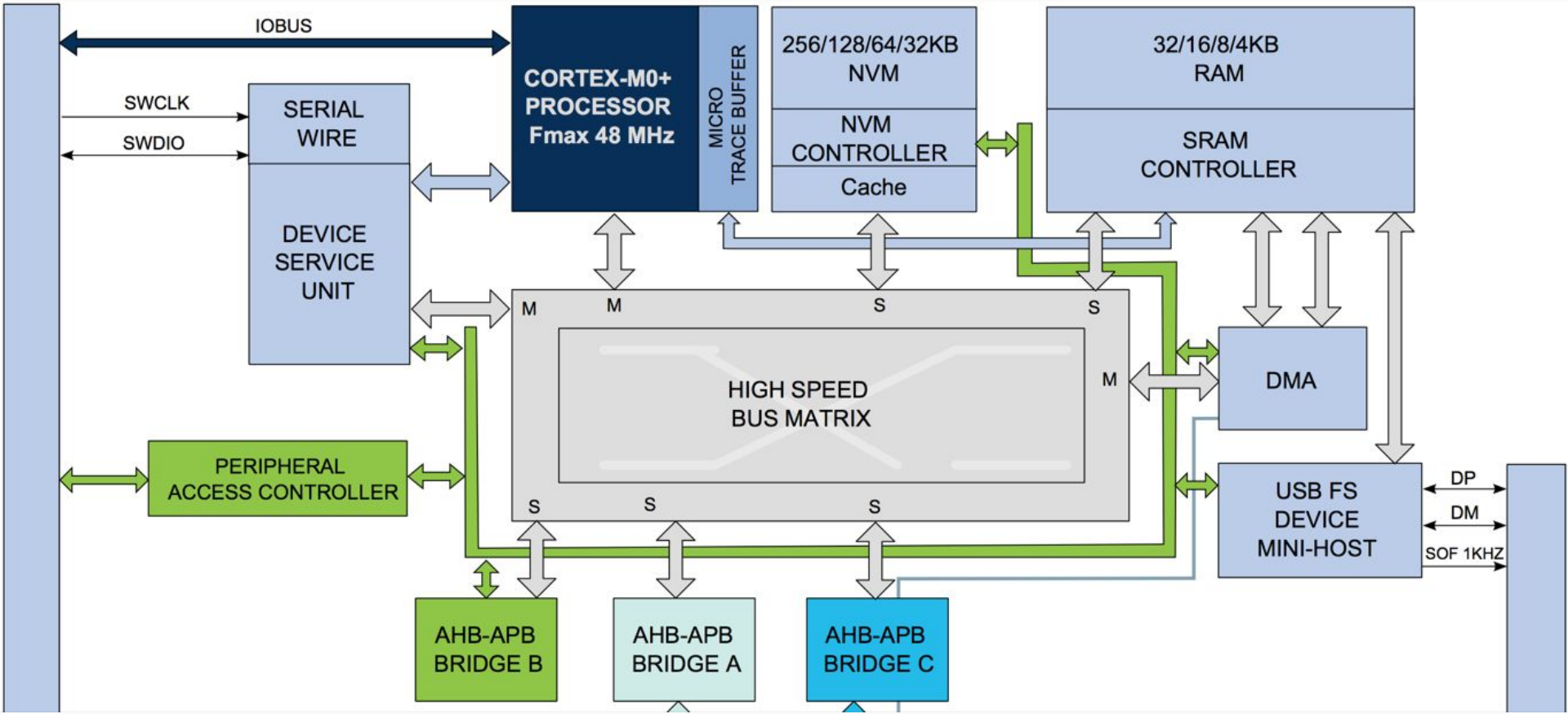
16-bits:

```
MOV R4,&0130h
MOV R5,&0138h
MOV SumLo,R6
MOV SumHi,R7
```

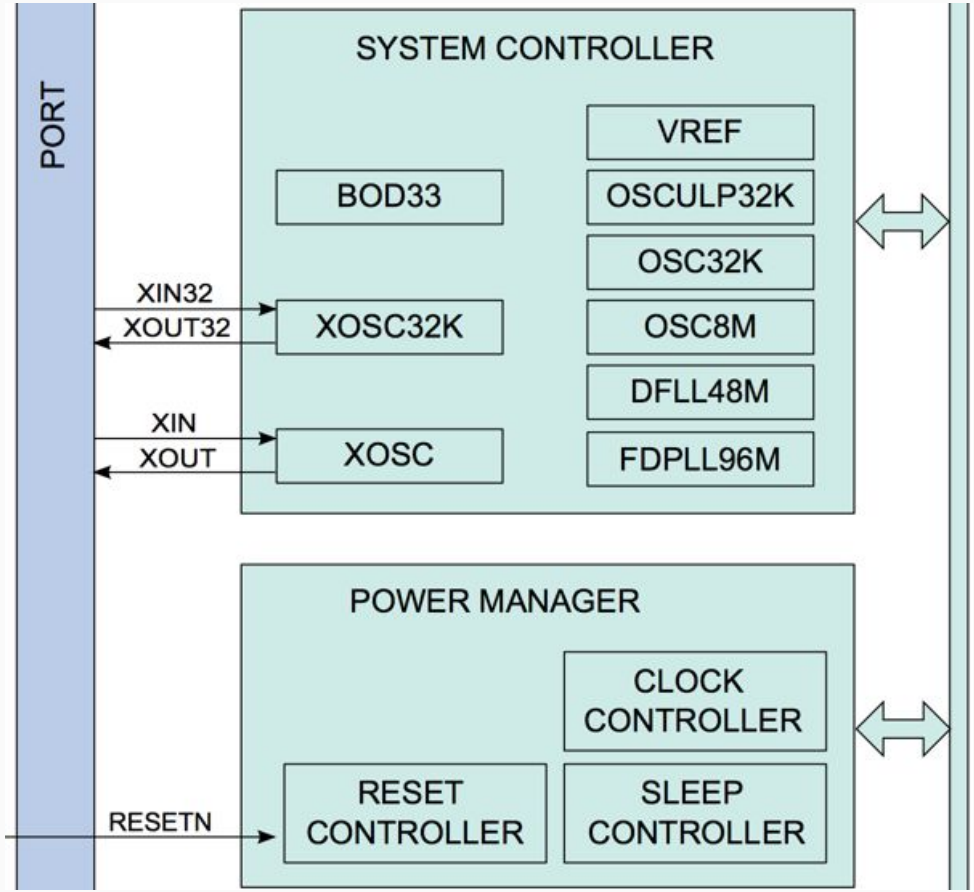
ARM Cortex-M:

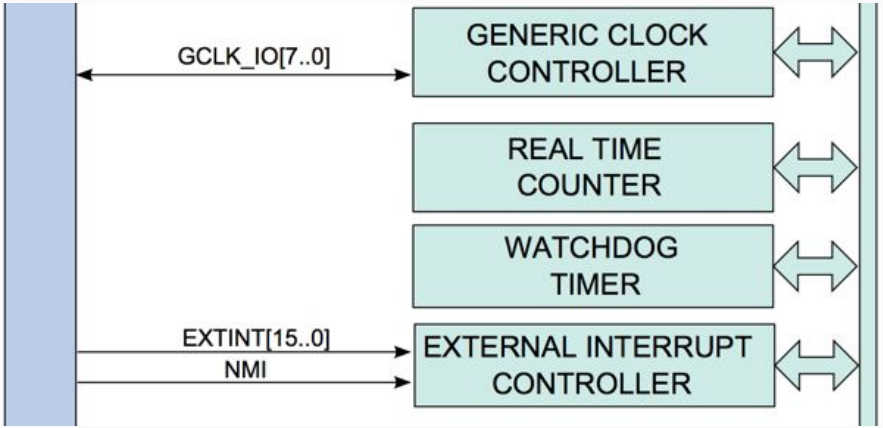
```
MULS r0,r1,r0
```

Atmel ATSAMD21 - Core

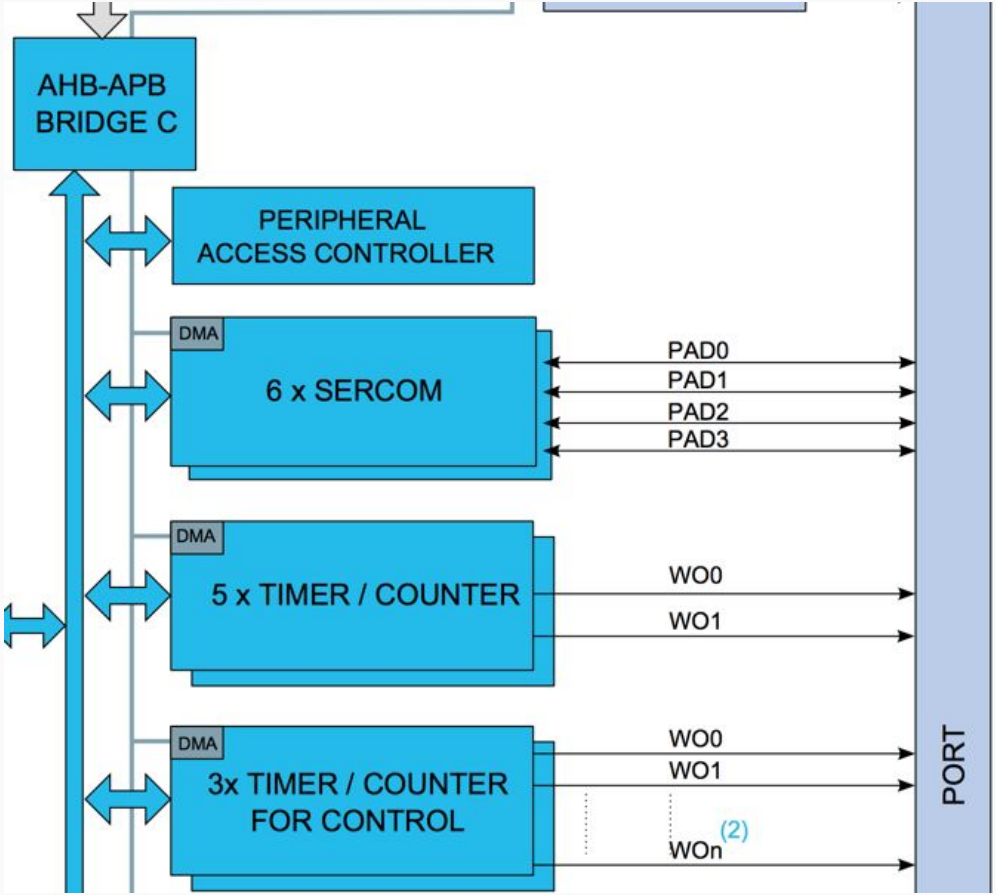


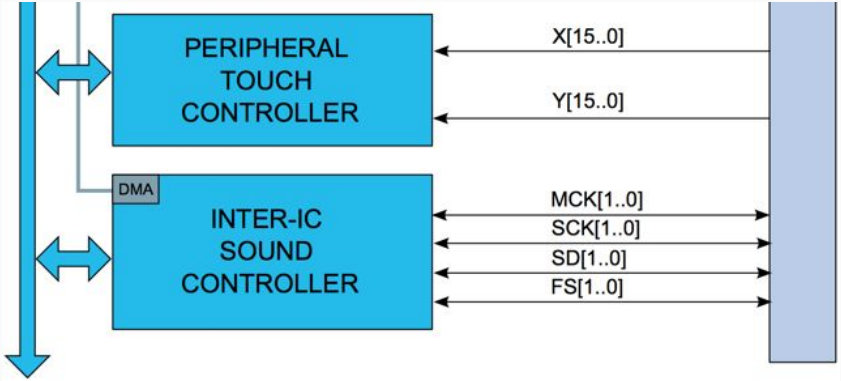
Atmel ATSAMD21 - Periféricos System



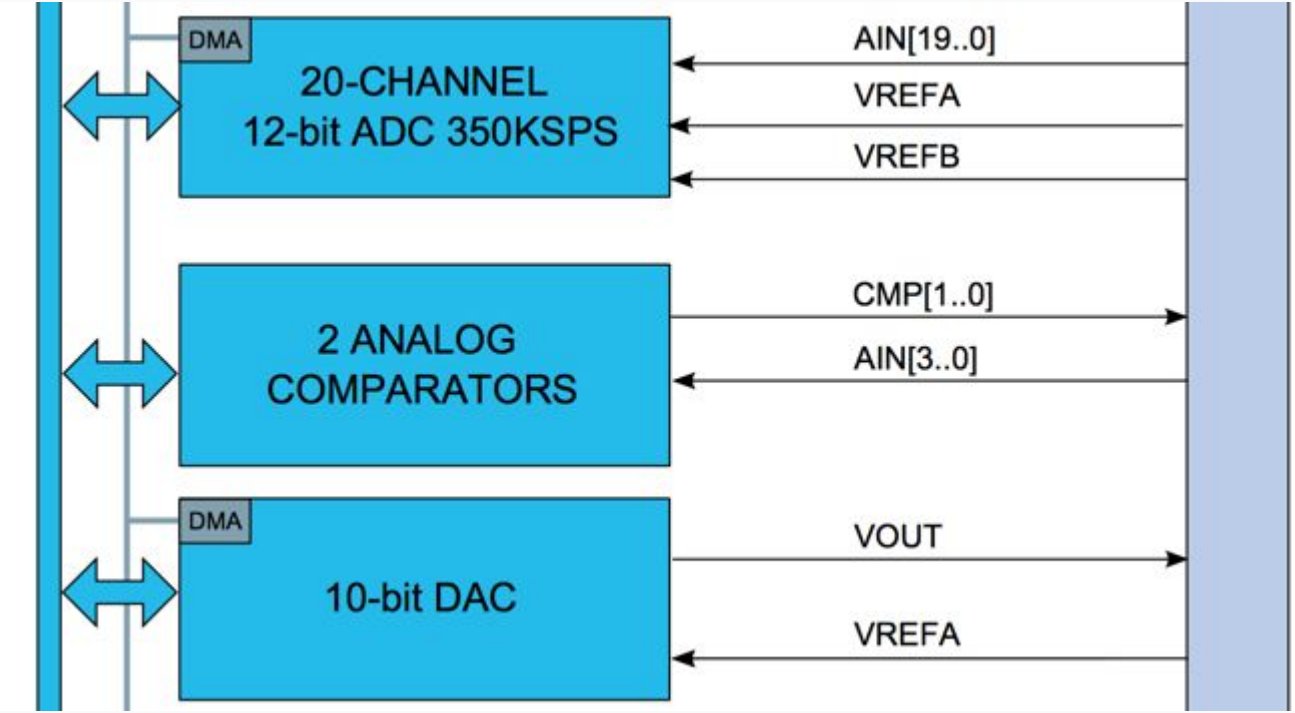


Atmel ATSAMD21 - Periféricos Timers





Atmel ATSAMD21 - Periféricos Analog



Mãos à Obra!!!

Projetos

1. Blink D13
    a. Hello World!!!
2. Serial USB
3. RTC