Projecto FST Novabase – Electrónica

Relatório Semanal - 23/11/2014

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Programming a dsPIC – ADC Module

Initialize ADC

- Set control registers:
  - ADCON1: AD on, idle mode, output format, conversion trigger source and status, sample start
  - ADCON2: reference select, channel scan, buffer mode, sequences per interrupt, alternate input setting
  - ADCON3: sample time and clock settings
  - ADCHS: channel select
  - ADPCFG: input port configuration
  - ADCSSL: scan selection
- Set interrupt and interrupt routine.

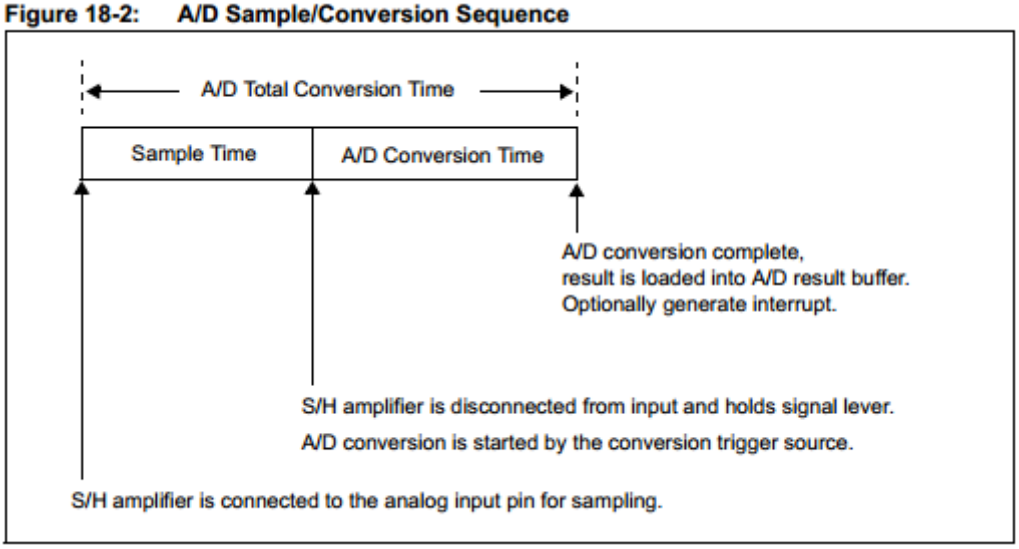
```
void init_adc(){
      TRISB=1;
      ADCON1bits.ADSIDL=0; //descontinue in idle
      ADCON1bits.FORM=0; //output format integer
      ADCON1bits.SSRC=7; // auto convert
      ADCON1bits.ASAM=1; //smapling bit is autoset

      ADCON2bits.VCFG=0; //VDD e VSS as ref
      ADCON2bits.CSCNA=0; //do not scan
      ADCON2bits.SMPI=0; //interrupts every convert
      ADCON2bits.BUFM=0; //one buffer 16-word
      ADCON2bits.ALTS=0; //mux a

      ADCON3bits.ADRC=1; //internal ad clock source
```

```
        ADCON3bits.ADCS=14; //TAD=1 us

        ADCHSbits.CH0NA=1; //negative input = AN1
        ADCHSbits.CH0SA=15; //positive input= AN15

        IEC0bits.ADIE=1; //interrupt enable
        IPC2bits.ADIP=5; //pripridade 5
        IFS0bits.ADIF=0; //clear interrupt flag

        ADPCFG=1; //analog input pin port 0 enabled

        ADCON1bits.ADON=1; //start adc
}

void __attribute__((interrupt, auto_psv, shadow)) _ADCInterrupt(void){
        //get adc value convert to OC1RS
        OC1RS=ADCBUF0;
        IFS0bits.ADIF=0; //clear interrupt flag
}
```

Total Conversion Time – TAD

TAD is defined in ADCON3, being the sum of the sample time and the AD conversion time.

Figure 18-2: A/D Sample/Conversion Sequence



It is dependable of the value of ADCS and the cycle frequency (FCY), as shown below. The value of TAD must be higher than 333,33 ns for a correct AD conversion.

Equation 18-1: A/D Conversion Clock Period

$$TAD = \frac{TCY(ADCS + 1)}{2}$$

$$ADCS = \frac{2\,TAD}{TCY} - 1$$

For a cycle frequency of 7,5 MHz, it is necessary ADCS>4.