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MICROELECTRONICS

APPLICATION NOTE

Optimizing the ST6 A/D Converter Accuracy

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INTRODUCTION

When using the internal Analog to Digital Converter of the ST62 family and maximum A/D converter accuracy is required, it is desirable to filter out any noise present on the analog input, but also noise present on the ground and V_{cc} supply lines of the MCU as V_{cc} is also the voltage reference of the A/D converter. Good decoupling must be made with capacitors on the analog input and between V_{cc} and ground. It is also recommended to put the MCU in wait state while the conversion is in progress, so as to minimize noise injected into V_{cc} by the operation of the micro-controller itself.

Finally, when enough time is available, it is highly recommended to make several successive A/D conversions and take an average of the results. This is the most effective way to get the most accuracy out of the ST6 family A/D converter.

The following code fragment demonstrates a burst of 256 successive measurements, after which the average is put into the accumulator. The whole routine takes approximately 30 milli-seconds with an 8 MHz clock. When less time is available, it is of course possible to reduce the number of conversions: 8, 16 or 32 conversions also give good results, although the most conversions give the best results.

NOTES:
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```
;******************** SUBROUTINE AVERAGE ***********************
;description: measures ADC input 256  times and stores average *
;             of the 256 measures into accumulator             *
;***************************************************************
average
       ldi ior,10h     ; global enable interrupts
       clr aver_lo     ;aver_lo, aver_hi and count are RAM registers
       clr aver_hi
       ldi count,255   ; set for 256 measurements
aver1
       ldi adcc,10110000b   ; start conversion with interrupt
       wait
       ld a,adc
;======================= two byte addition of adc to 16-bit word:
       add a, aver_lo
       jrnc aver2
       inc aver_hi
aver2  ld aver_lo,a
;======================= end of two byte addition
       ld a,count
       jrz aver4
       dec count
       jp aver1       ;do it 256 times
aver4  ld a,aver_lo
       cpi a,127      ;round to next value if decimal part >0.5
       jrc aver3
       inc aver_hi
aver3  ld a, aver_hi  ;store high byte of result into accumulator,
       ret            ;the low byte is not significant
;*********************** interrupt service routine *************
adcint
       ldi adcc,10h
       reti

;*********************** interrupt vector **********************
.org 0ff0h
       jp adcint
```

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