
Optimizing the ST6 A/D Converter Accuracy

J. NICOLAI

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:

THE SOFTWARE INCLUDED IN THIS NOTE IS FOR GUIDANCE ONLY. SGS-THOMSON SHALL NOT BE HELD LIABLE FOR ANY DIRECT, INDIRECT OR CONSEQUENTIAL DAMAGES WITH RESPECT TO ANY CLAIMS ARISING FROM USE OF THE SOFTWARE.

OPTIMIZING THE ST6 A/D CONVERTER ACCURACY

```
***** 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
    jrc 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
```

Information furnished is believed to be accurate and reliable. However, SGS-THOMSON Microelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of SGS-THOMSON Microelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. SGS-THOMSON Microelectronics products are not authorized for use as critical components in life support devices or systems without the express written approval of SGS-THOMSON Microelectronics.

© 1994 SGS-THOMSON Microelectronics - All Rights Reserved

Purchase of I²C Components by SGS-THOMSON Microelectronics, conveys a license under the Philips I²C Patent. Rights to use these components in an I²C system, is granted provided that the system conforms to the I²C Standard Specifications as defined by Philips.

SGS-THOMSON Microelectronics GROUP OF COMPANIES

Australia - Brazil - France - Germany - Hong Kong - Italy - Japan - Korea - Malaysia - Malta - Morocco
The Netherlands - Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom -
U.S.A.



LittleDiode supplies new, hard to find or obsolete electronic components and semiconductors all over the world.

With over two million different components listed you are sure to find the part you need.

Feel free to visit us today at our online store:

LittleDiode.com

Looking forward to providing you with the best possible service.