Realtek Ameba1 ADC Calibration

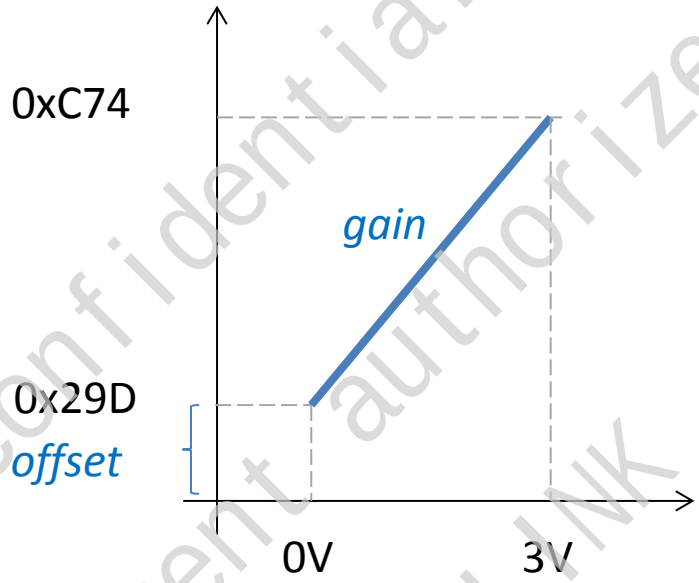
Version 1.2

Table of Contents

1 Introduction

1.1 ADC transfer curve

Ameba ADC circuit converts an input voltage to a comparable digital code. The below curve describes the transfer function.



1.2 GAIN and OFFSET

- GAIN: the slope of the ADC transfer curve.
- OFFSET: the difference at 0V.

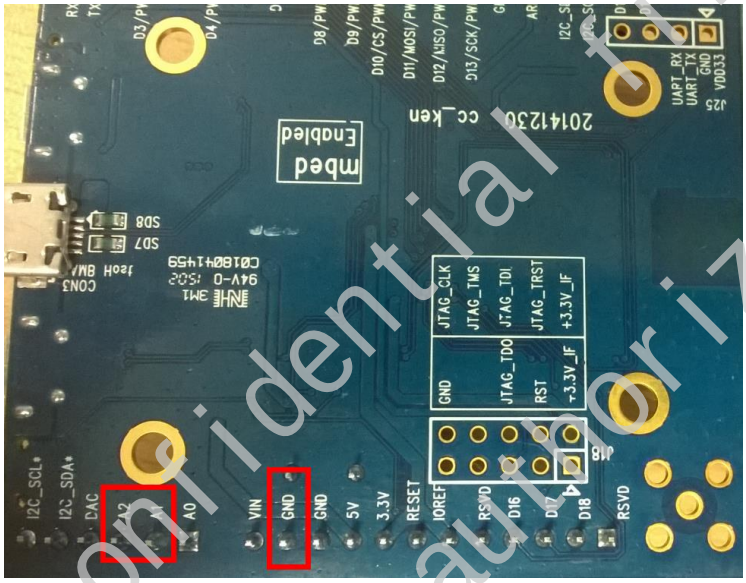
1.3 ADC transfer function

- *AT commands:* $\text{Voltage} = \frac{\text{ATSA-OFFSET}}{\text{GAIN}}$
- *API:*

$$\text{Voltage} = \frac{\frac{analogin\_read\_u16}{16} - OFFSET}{GAIN}$$

2 ADC Calibration

2.1 ADC of Ameba DEV board



2.2 AT Commands calibration and verification

- Select A1 or A2.
- ATSA=1 (if A1)
- ATSA=2(if A2)

Verify ADC at 1000mV.

1) Select A2 as ADC, (ATSA=2).

2) Set DC power supply to 0V, set it to record the ADC output value.

AT commands ATSA=2, get ADC_A2_0v = 0x029D.

3) Set DC power supply to 3V, set it to record the ADC output value.

AT commands ATSA=2, get ADC_A2_3v = 0x0C74

4)

$$GAIN = \frac{(0x0C74 - 0x029D)}{3} = 0x347$$

5) OFFSET = 0x029D.

6) Set DC power supply to 1V(1000mV).

By ADC transfer function, the evaluated ADC_1V is 0x5E4.

7) To verify 1000 mV

AT commands ATSA=2, get ADC_1v = 0x05E0

The estimated voltage is 995mV.

8) The tolerance is (1000 mV – 995 mV) / 1000 mV = 0.5%

2.3 Set/Get gain and offset

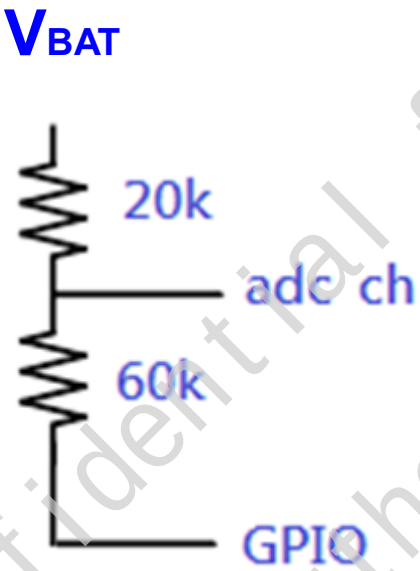
- ***Set gain and offset***

ATSA=k_set[offet(hex),gain(hex)]
E.q. # ATSA=k_set[0x29D,0x347]

- ***Get gain and offset***

ATSA=k_get
# ATSA=k_get
[ATSA] offset = 0x029D, gain = 0x0347

3 Application Circuit



- Voltage_abc ch range: 0~3.7V.
- SDK version: above SDK v3.4a
- Sample code is included
- ADC tolerance: +/- 25mV.