8.18.2 Overview

The ADC supports up to eight external analog inputs. It can be operated in One-shot mode with sampling under software control, or Continuous mode with a programmable sampling rate.

The analog inputs can be configured as eight single-ended inputs, four differential inputs or a combination of these. Each channel can be configured to select:

- GPIO pins with analog input function, see Pin assignments on page 859, also marked with name **AIN**. Input range is 0 to VDD.
- **VDD** (divided down to a valid range using the programmable gain stage)
- **DVDD**
- **AVDD**

Channels can be sampled individually in one-shot or continuous sampling modes, or, using scan mode, multiple channels can be sampled in sequence. To improve noise performance, channels can be oversampled.

Oversampling can be done with either noise shaping or by accumulation and averaging.

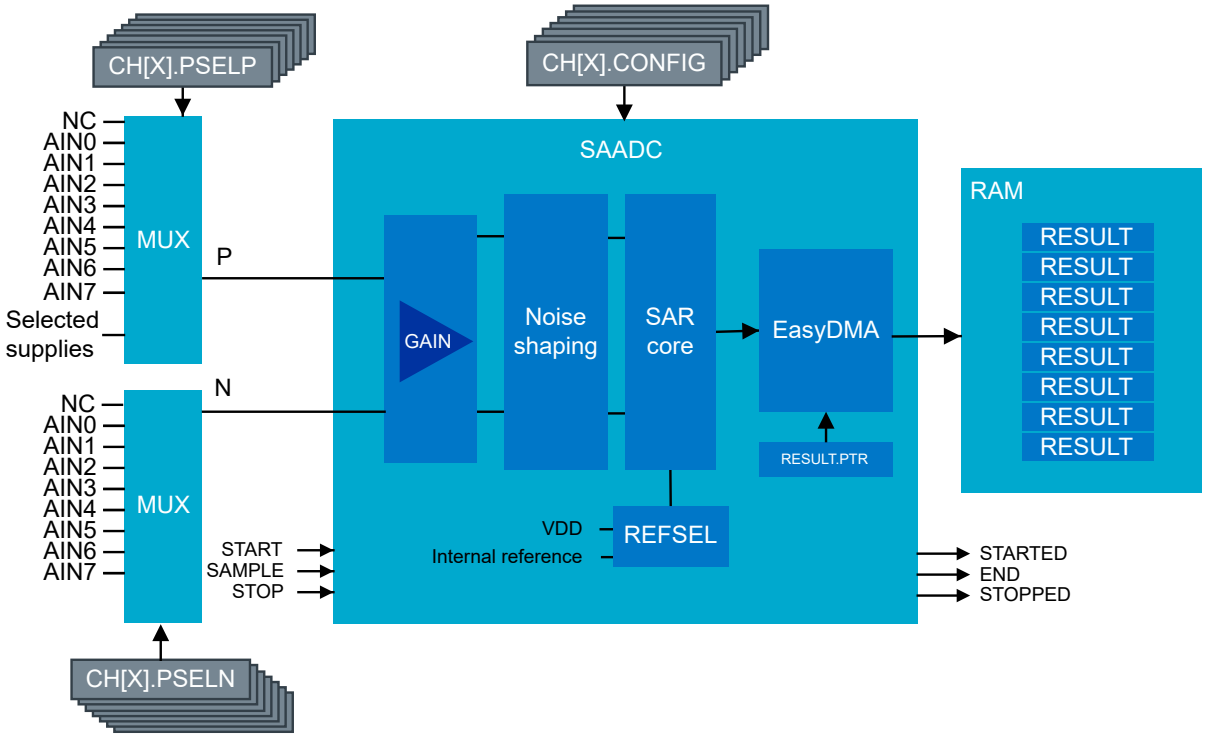

Figure 131: Simplified ADC block diagram

Internally, the ADC is always a differential analog-to-digital converter, but by default it is configured with single-ended input in the MODE field of the CH[n].CONFIG register. In single-ended mode, the negative input will be shorted to ground internally.

The assumption in single-ended mode is that the internal ground of the ADC is the same as the external ground that the measured voltage is referred to. The ADC is thus sensitive to ground bounce on the PCB in single-ended mode. If this is a concern we recommend using differential measurement.

8.18.3 Digital output

The output result of the ADC depends on the settings in the CH[n].CONFIG and RESOLUTION registers as follows:

$$RESULT = [V(P) - V(N)] * GAIN/REFERENCE * 2^{(RESOLUTION - m)}$$