where

V(P)
is the voltage at input P

V(N)
is the voltage at input N

GAIN
is the selected gain setting

m
is the mode setting. Use m=0 if CONFIG.MODE=SE, or m=1 if CONFIG.MODE=Diff

REFERENCE
is the selected reference voltage

The result generated by the ADC will deviate from the expected due to DC errors like offset, gain, differential non-linearity (DNL), and integral non-linearity (INL). See Electrical specification for details on these parameters. The result can also vary due to AC errors like non-linearities in the GAIN block, settling errors due to high source impedance and sampling jitter. For battery measurement, the DC errors are most noticeable.

The ADC has a wide selection of gains controlled in the GAIN field of the CH[n].CONFIG register. If CH[n].CONFIG.REFSEL=0, the input range of the ADC core is nominally ±0.9 V differentially, and the input must be scaled accordingly with proper gain setting.

The ADC has a temperature dependent offset. If the ADC is to operate over a large temperature range, we recommend running CALIBRATEOFFSET at regular intervals. The CALIBRATEDONE event will be generated when the calibration has been completed. Note that the DONE and RESULTDONE events will also be generated.

8.18.4 Analog inputs and channels

Up to eight analog input channels, CH[n](n=0..7), can be configured.

See Shared resources on page 554 for shared input with comparators.

Any one of the available channels can be enabled for the ADC to operate in one-shot mode. If more than one CH[n] is configured, the ADC enters scan mode.

An analog input is selected as a positive converter input if CH[n].PSELP is set, setting CH[n].PSELP also enables the particular channel.

An analog input is selected as a negative converter input if CH[n].PSELN is set. The CH[n].PSELN register will have no effect unless differential mode is enabled and CH[n].PSELP is set, see MODE field in CH[n].CONFIG register.

Important: It is not recommended to use the same analog input pin for multiple analog peripheral functions. See also Shared resources on page 554.

8.18.5 Operation modes

The ADC input configuration supports several modes of sampling.

- One-shot, one channel
- One-shot, scan (one sample for each channel)
- Continuous, one channel
- Continuous, scan