a hysteresis using the reference ladder (see Comparator in single-ended mode on page 251). This hysteresis is in the order of magnitude of $V_{DIFFHYST}$, and prevents noise on the signal to create unwanted events. See Hysteresis example where VIN+ starts below VUP on page 252 for an illustration of the effect of an active hysteresis on a noisy input signal.

An upward crossing will generate an UP event and a downward crossing will generate a DOWN event. The CROSS event will be generated every time there is a crossing, independent of direction.

The immediate value of the comparator can be sampled to register RESULT by triggering the SAMPLE task.

8.5.3 Current source on analog input

A selectable current can be applied through register ISOURCE on the selected AIN[n] line. Enabling the block creates a feedback path around the comparator, forming a relaxation oscillator. The circuit will sink current from VIN+ when the comparator output is high, and source current into VIN+ when the comparator output is low. The frequency of the oscillator is dependent on the capacitance at the analog input pin, the reference voltages, and the value of the current source. In this mode, only a capacitive sensor needs to be attached between the analog input pin and ground. With a selected current of 10 μA, VUP-VDOWN equal to 1 V, and an external capacity of typically 10 pF, the resulting oscillation frequency is around 500 kHz.

The frequency of the oscillator can be calculated as follows:

```
f_OSC = I_SOURCE / (2C·(VUP-VDOWN) )
```

8.5.4 Shared resources

The COMP shares analog resources with other analog peripherals.

Additionally, COMP shares registers and other resources with other peripherals that have the same ID as the COMP. See Peripherals with shared ID on page 214 for more information.

The COMP peripheral shall not be disabled (by writing to the ENABLE register) before the peripheral has been stopped. Failing to do so may result in unpredictable behavior.

8.5.5 Differential mode

In differential mode, the reference input VIN- is derived directly from one of the AINx pins.

Before enabling the comparator via the ENABLE register, the following registers must be configured for the differential mode:

- PSEL
- MODE
- EXTREFSEL

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