



## FUNCTIONAL DESCRIPTION

The XE2004 implements a capacitance-to-voltage conversion. The output voltage is proportional to the supply voltage, and to a linearized expression including the sensor's capacitance and supply voltage.

### Analog signal path:

The XE2004 is based on floating charge-amplifier architecture. This allows the IC to operate only with capacitive sensors that have electrically floating electrodes. An output buffer drives up to 10 kOhm or 10 nF loads. The output related white noise is typical 7  $\mu\text{V}/\sqrt{\text{Hz}}$  in the DC – 0.5 kHz bandwidth.

### Digital calibration:

Offset, span and linearity of the analog output signal can be digitally adjusted.

### Sensor overload detection:

The XE2004 provides three programmable thresholds that allow the detection of the overflow of the input signal.

### Battery operation:

Low-power, low-voltage operation (2.4 V, 180  $\mu\text{A}$ ) make the XE2004 particularly suited for battery operated applications:

## ABSOLUTE MAXIMUM RATINGS

- Storage Temperature                   -55 °C – 150 °C
- Voltage on pins vs Vss                -0.3 V – 5.5 V

## OPERATING CONDITIONS

- Supply voltage                            2.4 – 5.5 V
- Sensor capacitors (C1+C2)           0 – 220 pF
- Sensor capacitors relative difference  
(C1-C2)/(C1+C2)                        +/- 50 %
- Load on output                         10 kOhm // 10 nF
- Temperature range (I-grade)       -40 °C – 85 °C
- Temperature range (E-grade)-55 °C – 125 °C

## ELECTRICAL CHARACTERISTICS

- Output swing                            Vss + 0.5 V, Vdd – 0.5 V
- Residual offset                         < 1.1 mV
- Output drift                             < 40  $\mu\text{V}/^\circ\text{C}$
- Span drift                                < 150 ppm/°C
- Noise at output                         < -95 dBV/sqrt(Hz)
- Start-up time                            20 ms

## PROGRAMMABLE PARAMETERS

- Gain                                        10 bits
- Offset, coarse                            5 bits
- Offset, fine                               8 bits
- Linearity                                 8 bits
- Bandwidth                                5 bits