

MEMS Capacitive Accelerometers

## Data sheet

# SF2005S.A / SF2005SN.A

30S.SF2005.D.08.07

### Features

**Very low noise level of 800 ng<sub>rms</sub>/√Hz**

**Wide dynamic range of 114 dB (100Hz BW)**

**DC to 1000Hz frequency response**

**± 4.5g full scale, ± 4g linear output**

**Analog servo accelerometer**

**Self test input**

### Applications

**Seismic sensing**

Structure / building monitoring

Industrial / process control

Strong motion

Geophysics

Railway technology

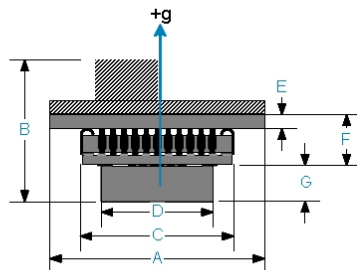
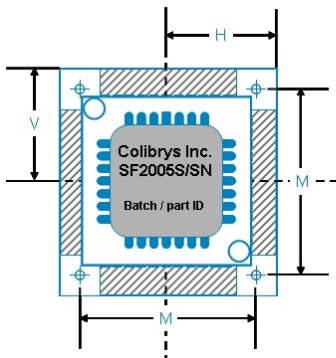
### Description

The SiFlex™ SF2005 accelerometer has been designed and developed by Colibrys Inc. for “strong motion” structure monitoring applications. This MEMS capacitive product is one of the best in class for seismic and vibration sensing when extreme low noise measurement is required at lower price point. Features such as wide dynamic range, excellent bandwidth, low distortion, high shock tolerance, and thermal stability make it ideal for applications such as building monitoring, industrial and process control or structure monitoring. Used as a tilt sensor, it also provides a very high resolution of

measurement.

The SF2005 operates from a bipolar power supply voltage that can range from ± 6V to ± 15V with a typical current consumption of 12mA at ± 6V. The linear full acceleration range is ± 4.5g (± 4g linear output) with a corresponding sensitivity of 0.8V/g. The SF2005S and SF2005SN can operate over a wide temperature range from -40°C to +125°C and can withstand a shock of up to 1500g without performance degradation. The frequency response over the full scale range is DC to > 1000Hz for the full signal as for small signal, it can raise to higher bandwidth.

| Full scale range | ± 4g (with oscillator) | ± 4g (without oscillator) |
|------------------|------------------------|---------------------------|
| Products         | <b>SF2005S.A</b>       | <b>SF2005SN.A</b>         |



|   | Inch | mm   |
|---|------|------|
| A | 0.96 | 24.4 |
| B | 0.59 | 15.0 |
| C | 0.69 | 17.5 |
| D | 0.46 | 11.7 |
| E | 0.07 | 1.7  |
| F | 0.24 | 6.1  |
| G | 0.11 | 2.8  |
| H | 0.48 | 12.2 |
| M | 0.78 | 19.8 |
| V | 0.48 | 12.2 |

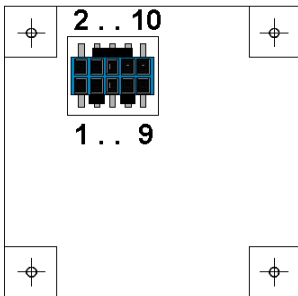
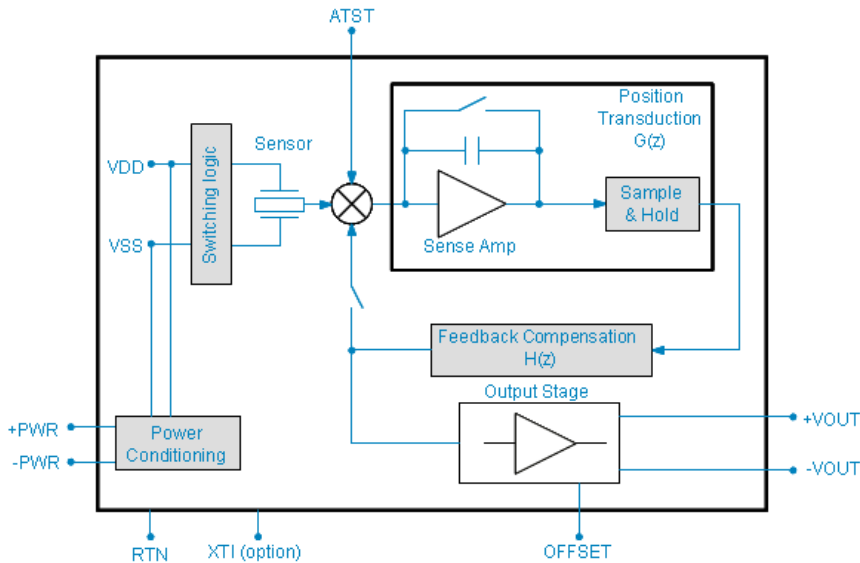
### Specifications

|                                     | Units                  | SF2005S.A / SF2005SN.A |
|-------------------------------------|------------------------|------------------------|
| Linear output range                 | g peak                 | ± 4                    |
| Full Scale Output (at clip)         | g peak                 | ± 4.5                  |
| Sensitivity (differential)          | V/g                    | 0.8 (1.6)              |
| Frequency response (full signal)    | Hz                     | DC to > 1000           |
| Dynamic range (100 Hz BW)           | dB                     | 114                    |
| Noise (10 to 1000 Hz)               | ng <sub>rms</sub> /√Hz | 800                    |
| Cross-axis rejection                | dB                     | > 40                   |
| Shock limit (0.5 ms ½ sine)         | g peak                 | > 1500                 |
| Operating temperature range         | °C                     | -40 to +85             |
| Sensitivity temperature coefficient | ppm/°C                 | -100                   |
| DC offset (max)                     | mg                     | ± 300                  |
| Offset thermal coefficient          | µg/°C                  | ± 300                  |
| Linearity error                     | % Full scale           | ± 0.1                  |
| Input voltage                       | Volts DC               | ± 6 to ± 15            |
| Quiescent current                   | mA                     | 11.6                   |

### Block diagram and electrical connections

Both the (+) and (-) power supplies must be applied simultaneously to the input pins (within 50 ms). The power supply should have less than 100  $\mu\text{V}/\sqrt{\text{Hz}}$  noise in order to avoid the possibility of adding noise to the output of the sensor. The ASIC and on-board electronics operate on  $\pm 5\text{V}$  DC provided by internal power conditioning circuitry, reducing the effects of power supply variations on sensor operation. The input power supply connections are reverse polarity protected by a diode bridge. Should reverse polarity power be applied, the unit will self-correct and start normally.

The output of the Si-Flex accelerometer is fully buffered and ready to connect to common inputs found on many analog to digital converters, oscilloscopes and digital multi-meters. The nominal output impedance for the Si-Flex accelerometers is typically 10 Ohms. A 10cm unterminated mini-ribbon cable is provided with a single mating connector for the SF2005 (connector Samtec part no. FTSH-105-01-L-DV-K-P-TR). The on-board amplifiers are capable of driving typical twisted pair cable of 1000 meters or more in length.



### Electrical connections

|        |          |   |
|--------|----------|---|
| P1     | -Vout    | Inverted output signal                        |
| P2     | +Vout    | Output signal                                 |
| P3     | ATST *   | Sensor self test input                        |
| P4, P8 | RTN *    | Signal return (common)                        |
| P5     | OFFSET * | Used to remove DC offset                      |
| P6     | XTI *    | Oscillator input. N/C for SF1500S and SF2005S |
| P7     | N/C      | Not connected                                 |
| P9     | -PWR     | Negative power supply                         |
| P10    | +PWR     | Positive power supply                         |

\* : see SiFlex™ product description for more details

A detailed SiFlex™ Product Description (30D.SFx.x.xx.xx) and further Application Notes are available on demand or on our web site. In order to provide an ideal support to our customers, our standard SF2005S.A and SF2005SN.A products are available

worldwide through a wide network of distributors and agents or directly at Colibrys. Do not hesitate to access our web site for precise contacts or directly Colibrys in Europe or in US for more details.