StretchFABRIC Sensing Element

#0SEF – StretchFABRIC Sensing Element

Technical Data Sheet

Product overview

StretchFABRIC sensors are soft, flexible, and precise making them ideal for the measurement of soft object deformation. They connect to 10-channel SPI Sensing Boards which pair with the Android and iOS data visualization apps.

StretchFABRIC sensors come bonded onto white Lycra® fabric providing an integration zone for easy sewing into garments.

Figure 1: StretchFABRIC sensor

Features

- Soft, flexible, and lightweight for unobtrusive and comfortable measurement of motion
- Easy sewing integration into garments
- Highly precise measurement of deformation

Applications

- Smart garments
- Sports and fitness
- Wearables
- VR/AR

The data displayed in this document uses aggregated test data tested at room temperature.
These values are indicative only; individual sensing element performance may vary.

Contents

1. Physical Specifications

1.1 Technical Drawing

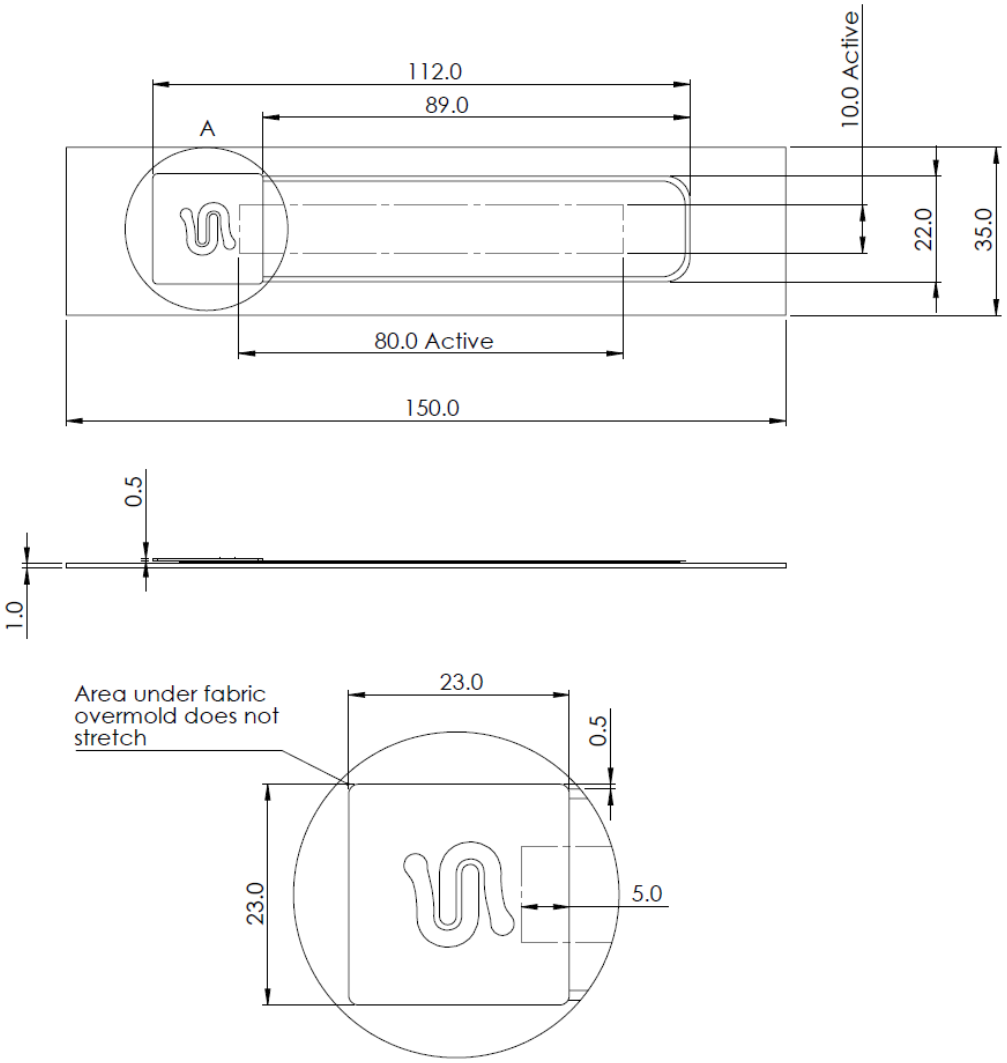

Figure 2: Engineering Drawing of a StretchFABRIC Sensing Element

1.2 Dimensions

Zone	Length (mm)	Tolerance (%)	Width (mm)	Tolerance (%)
Active Sensing Zone	80.0	±2.00	10.0	±2.00
Overall Silicone Zone	112	±2.00	22.0	±2.00
Fabric Backing	150	±4.00	35.0	±4.00
Coaxial Cable Length	1000	±1.00	0.445	-

2. Specifications

2.1 Sensing Characteristics

The data below was collected under the following testing conditions:

- The sensors underwent uniaxial stretch up to 80% stretch
- The sensors were clamped on both ends
- The sensors were pre-stretched to remove any slack

Parameter	Min	Typ	Max	Units	Notes
Base Capacitance	416	521	665	pF	
Sensitivity	6.87	8.53	10.7	pF/mm	
Noise With Standard 10 Channel Circuit (3 Sigma)	0.10	0.11	0.46	pF	
Operating Temperature Range	10.0		30.0	˚C	Recommended range only
Connection Pitch		2.54		mm	

All values shown at 3 s.f.
Base capacitance includes a cable capacitance of 112 ± 3pF

2.2 Capacitance vs Extension

Linear Fit

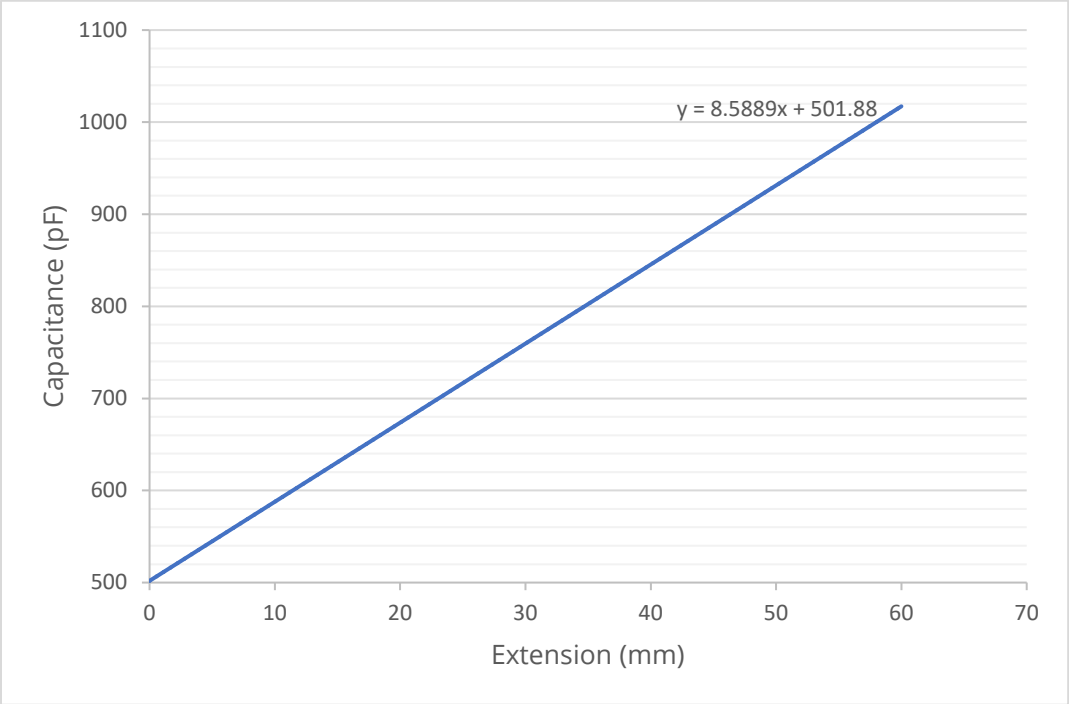

Figure 3: Typical StretchFABRIC Sensing Element performance based on a linear fit

Quadratic Fit

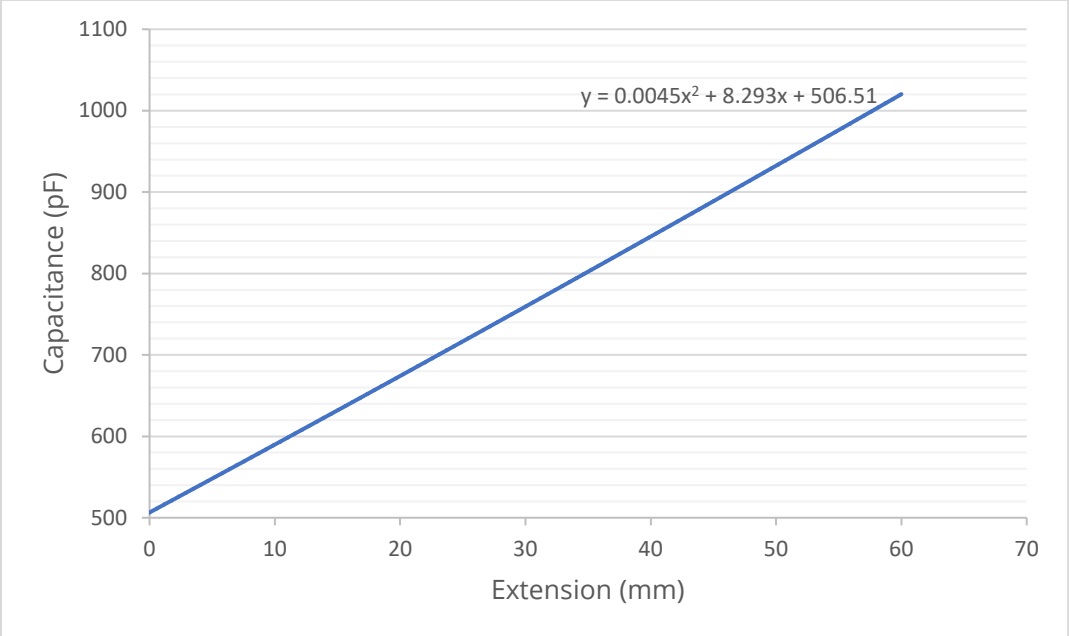

Figure 4: Typical StretchFABRIC Sensing Element performance based on a quadratic fit

2.2 Preliminary Temperature Testing Data

Summary

A single standard StretchFABRIC sensor was cycled between 80˚C and 22˚C five times, with the sensor's output recorded against temperature in real-time.

Equipment Used

- 1x StretchFABRIC sensor
- 1x 10-channel circuit
- 1x TENMA 72-7712 Digital thermometer
- 1x Thermo scientific oven – Lacktrockenschrank LUT 6050 F

Test Method

Two temperature probes were embedded to the top of the sensor's surface with wet silicone and then cured.

Real-time temperature and capacitance values were recorded as the sensor was heated to over 82 °C and then cooled back down to 22 °C.

Results

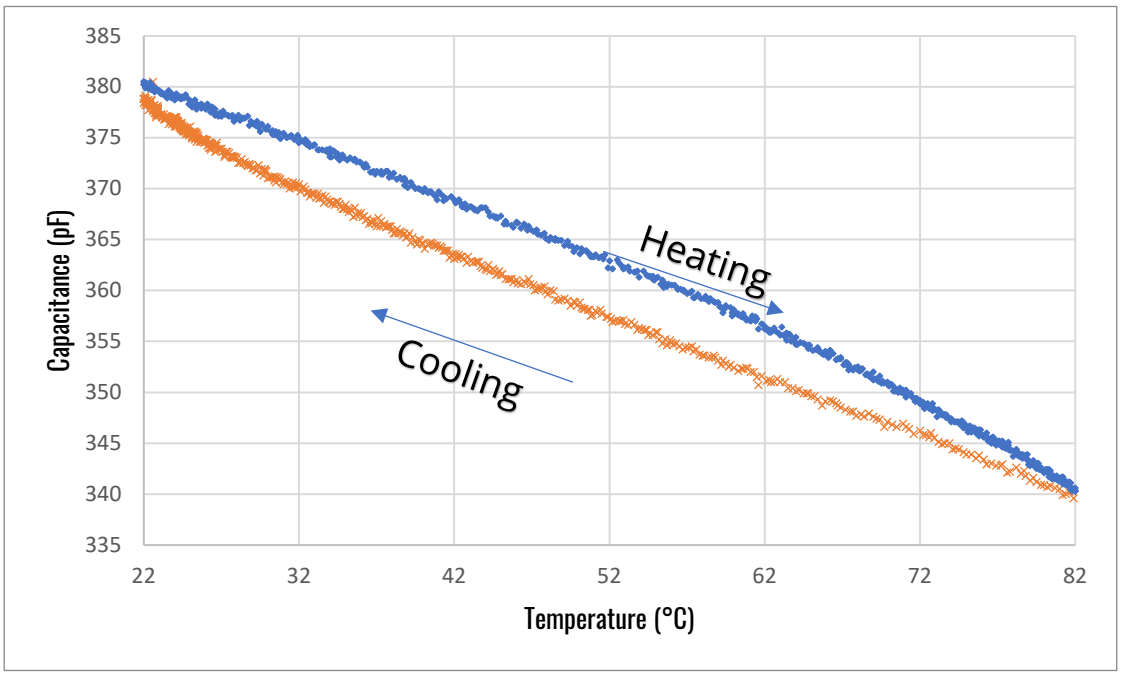

Figure 5: Temperature response of a StretchFABRIC sensor over one cycle of heating and cooling

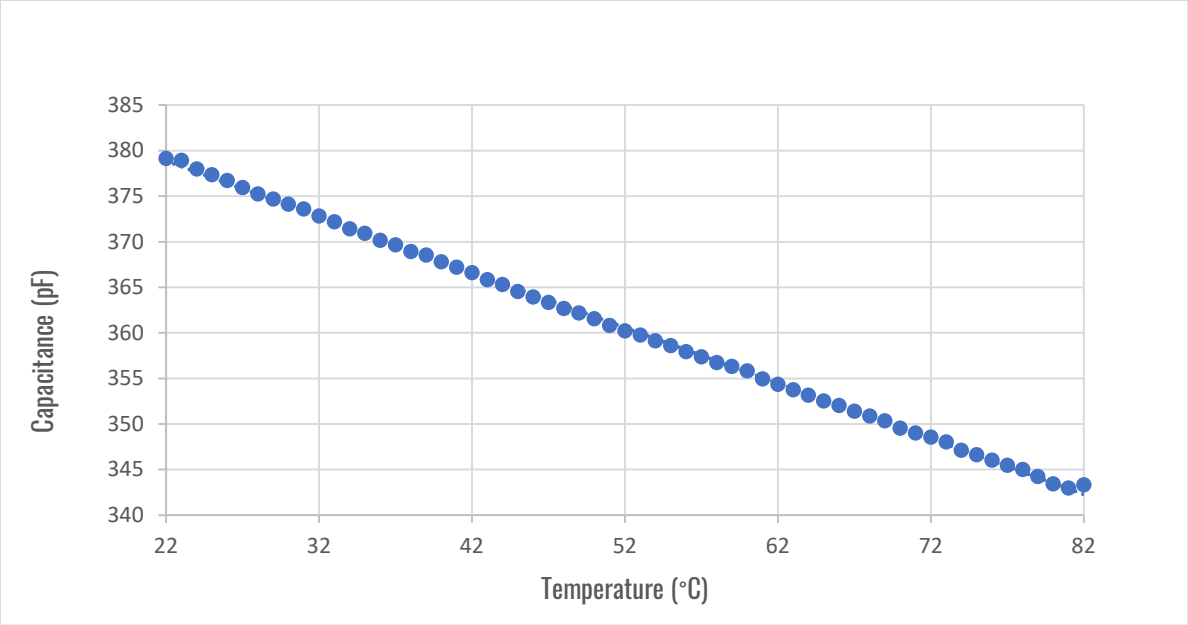

Figure 6: Average temperature response of a StretchFABRIC sensor over five cycles of heating and cooling

Temperature range	22 °C – 82 °C
Capacitance range	379 pF – 343 pF
Sensitivity	- 0.60 pF / °C
Sensitivity as a percentage of base capacitance (22 °C)	- 0.16 % / °C

Application Note

- For applications with large temperature variance, a reference sensor can be used to compensate for the change in temperature.

Disclaimer, Intellectual Property and Licensing

All resources including technical information, statements and recommendations are based on information StretchSense believes to be reliable, but the accuracy or completeness is not guaranteed. StretchSense is not liable for any loss of profit, revenue, savings, business, use, data (including data and design inputs), and/or goodwill or consequential, indirect, incidental or special damage or loss of any kind under or in connection with these resources.

For StretchSense's intellectual property policies, please refer to our website at https://stretchsense.com/legal/intellectual-property/

StretchSense has licensed technology from Parker Hannifin Corporation and from Auckland UniServices Limited:

PARKER HANNIFIN CORPORATION

StretchSense products that utilise certain dielectric electro-active polymer (DEAP) technology are manufactured and supplied under licence from the Quick Coupling Division of Parker Hannifin Corporation, Minneapolis, MN, USA ("Parker"). Such licence enables StretchSense to manufacture and supply Parker DEAP transducer products generally for evaluation and application validation purposes, and commercially for consumer electronics, motion capture and augmented/virtual reality, and sports and fitness industries. Commercial use in other industries is subject to Parker's prior consent.

AUCKLAND UNISERVICES LIMITED

StretchSense products that utilise certain sensor and dielectric elastomer generator technologies are manufactured and supplied under license from Auckland UniServices Limited in Auckland, New Zealand ("UniServices"). These licensed technologies originally being created by the Biomimetics Lab at the Auckland Bioengineering Institute. Such license enables StretchSense to manufacture and supply sensor and dielectric elastomer generator products for evaluation, application validation, and commercial purposes for all fields.