Electroactive Polymer Sensor

Instruction Manual

iDEAS
mateligentgroup

Table of Contents

Introduction

An EAP (electroactive polymer) Sensor is a flexible capacitor that acts as a displacement-to-capacitance transducer. The dielectric polymer exists between two stretchable or compressible electrodes. As the sensor is compressed, it thins and expands within the area, increasing its capacitance. Electronics convert the change in capacitance to a digital signal that can be calibrated to a particular application.

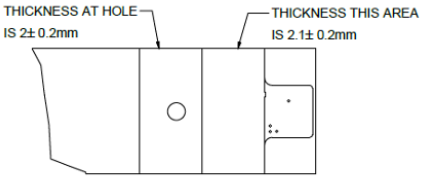
Health Care Solutions	Wearable Technology
The soft, conformable nature of EAP Sensors make them well-suited for medical applications such as edema detection, wound condition monitoring and measurement of body movement. The accurate, precise motion capture capabilities make the sensors ideal for: • Orthopedics and rehabilitation • Remote monitoring of chronic disease • Monitoring of young and elderly • Measurement of swelling, weight, wounds, and infection	EPA Sensors' ultra-stretch, pressure capabilities, and light-weight characteristics make them a perfect fit for wearable tech. Sensors can be placed in textiles and footwear substrates to measure movement and condition change while being comfortable and non-intrusive. EPA Sensors conforms to many shapes, and the sensors physical characteristics make them ideal for: • Footwear • Head impact monitoring • Motion capture for coaching • Workplace safety

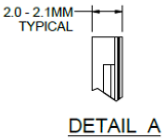
Why Electroactive Polymer Sensors?

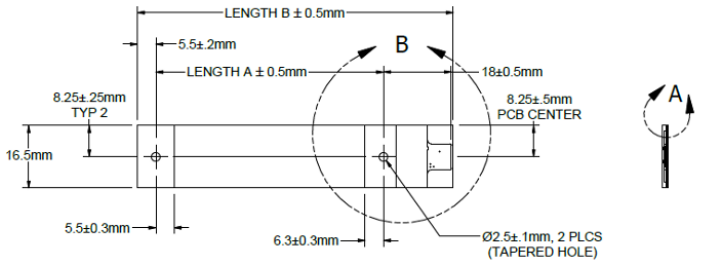
- Stretchable/Compressible
- Flexible/Comfortable/Soft
- High Resolution
- Rapid Response
- Highly Sensitive
- Economical
- Wireless Capable
- Washable
- Durable/Robust
- Low Power Requirement
- Unobtrusive/Comfortable

Sensor Dimensions

Length A	Length B	Description
4.49 (114mm)	5.500 (140mm)	4 inch (100mm) Sensor







Sensor Specifications

Parameter	Description	Digital Output	Analog Output
Output Type		Serial (ASCII) Data Format	Analog Voltage 0-V Supply (5V typ)
Active Area Dimensions		100mm x 14mm	
Maximum Extension		200mm total (100mm displacement)	
Stiffness		0.068 N/mm	
Full Range Life cycles		>5 million	
Strain Output		Percent Strain in 100ths of a percent of length of active area	
Temperature Output		Temperature in K°	
Sampling Rate		10Hz (standard configuration)	
Ambient Temperature		-40°F to +185°F (-40°C to +85°C)	
Install Torque		14 oz-in (M3 Fastener)	
Range	Maximum stretch	0-100% (0-100mm)	
Sensitivity	Minimum detectable output change per mm stretch	1%/mm	41.6mV/mm
Precision	Maximum error when stretching to same known value	0.20%	
Resolution	Smallest detectable output within noise	0.1% (100um)	6mV (142um)
Accuracy	Maximum difference between real stretch and sensor output	1.2% (0.6mm)	
Linearity	Maximum difference between output and ideal linear curve	1.2%	
Non-Linearity	Maximum input deviation / FS input X 100	1.2%	
Hystersis	Maximum measured width of hysteresis curve	<1%	
Response Time	Maximum time to reach steady state from step input	<10ms	

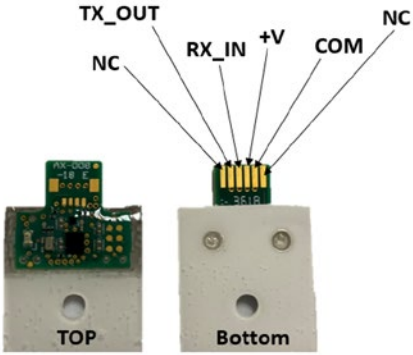
Environmental

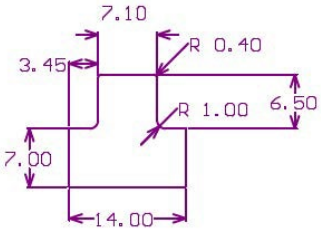
- Temperature (operational and storage): -40C to 85C
- Humidity: Up to 95% non-condensing
- Shelf Life: 5 Years
- ESD Protection: YES

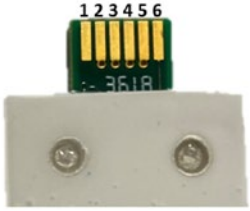
Environmental and Export Classifications

Attribute	Description
RoHS Status	RoHS3 Compliant
Moisture Sensitivity Level (MSL)	1 (Unlimited)
REACH Status	REACH Compliant
ECCN	EAR99
HTSUS	9031.80.80.85

Electrical







Pin	Description
1	No Connection
2	Tx (outgoing) TTL asynchronous serial data
3	Rx (incoming) TTL asynchronous serial data
4	Power (2.6-3.3 VDC, 25mA Max)
5	Ground
6	NC

Mating Female Plug

Manufacturer: FCI

Description:

6 Position FPC Connector Contacts,
Bottom 0.039" (1.00mm) Surface Mount,
Right Angle

Silicone Rubber Properties

White Sensing Area Silicone RTV Rubber

Property	Condition	Value	Method
Density in Water	23°C	1.1g/cm^3	DIN EN ISO 1183-1 A
Tear Strength	-	30 N/mm	ASTM D 624 B
Hardness Shore A	-	25	DIN ISO 48-4
Tensile Strength	-	6.5 N/mm^2	ISO 37 type 1
Elongation at Break	-	600%	ISO 37 type 1
Linear Shrinkage	-	< 0.1%	-

Mount Area Silicone Rubber

Typical Properties	Average Result	ASTM	NT-TM
Specific Gravity	1.09	D792	003
Durometer, Type A	48	D2240	006
Tensile Strength	830 psi (5.7 MPa)	D412, D882	007
Elongation	340%	D412, D882	007
Tear Strength	70 ppi (12.3 kN/m)	D642	009

Typical Sensor Output