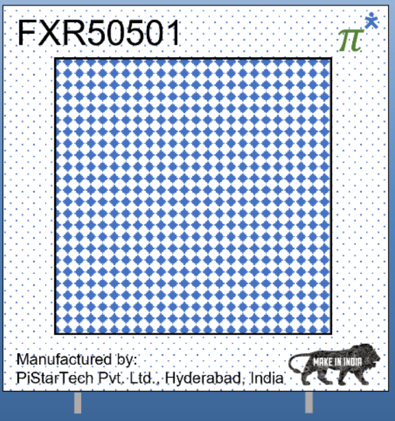
FlexiRes

Model: FXR50501



Description:

The FlexiRes model FXR50501 is a square flexible force sensing resistor. It is a part of the FlexiRes family with a sensing area of 50 mm x 50 mm. The FlexiRes sensors exhibit a decrease in resistance with an increase in force applied to the sensor. The FXR series comes in different models with varying sensing areas. You can also customize your flexible force sensing resistor according to your required shape, size, dimensions, and sensing area. This sensor is available off-the-shelf that can be used in various flexible and wearable sensing applications. They can be characterized for human-machine interface applications with a typical force range from 10 g to 4 kg. The sensing range can be varied according to your requirement by varying the value of the bias resistor of the read-out circuit.

Physical Properties:

Thickness	0.4 mm
Length	70 mm
Width	70 mm
Sensing Area	50 mm x 50 mm
Connecting pins	Male connecting pins

Features:

- Thin and Flexible
- Low-power
- Easy to use
- Ideal for integration and prototyping
- Cost effective

Sensor Characteristics:

Force Range	0.1 N - 40 N
Voltage Range	1.8 V – 5 V
Rise time	0.2 s
Delay time	0.13 s
Drift	<3% (for 1 kg load, 1 day)
Operating Temperature	-40^oC to 60^oC
Electromagnetic Interference (EMI)	Generates No EMI
Electrostatic Discharge (ESD)	Not ESD sensitive

Sensor Loading:

- The entire sensing area of FXR is a single contact point. Hence, the applied load should be distributed evenly across the sensing area to get an accurate and repeatable response.
- Sensor must be loaded consistently or in the same way each time. Readings may vary if the load distribution changes.
- If the load is bigger than the sensing area, then use a light-weight, rigid material with the dimensions same as the sensing area and then place the load on top of it.
- Use tape for mounting the sensor to the surface on which force has to be applied.
- The sensor has a saturation force above which the sensor response remains constant even after applying more force.

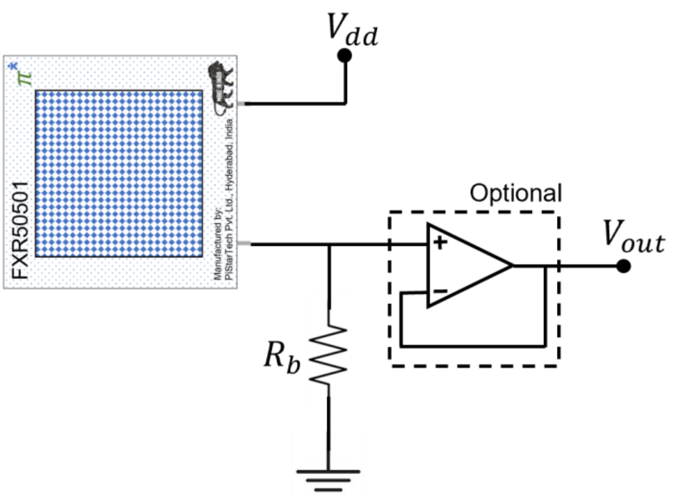
Sensor Application:

FXR sensors can be integrated into many applications. A recommended circuit is shown below. For simple force to voltage conversion, the FXR sensor is connected to a bias resistor, and the output is given by the following equation:

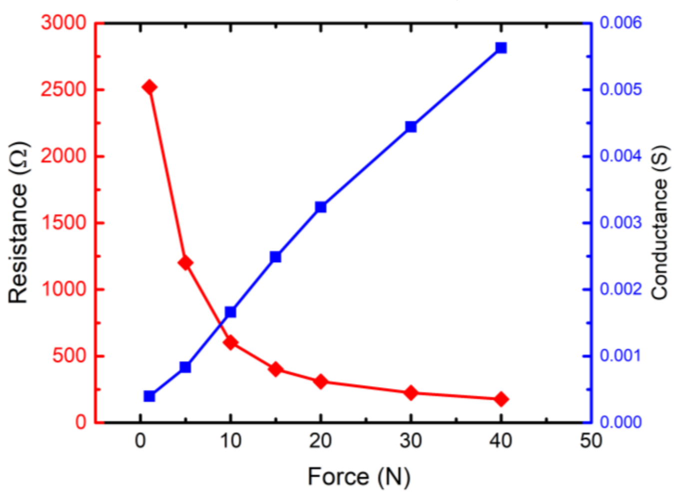
$$V_{out} = V_{in} * \left(\frac{R_b}{R_b + R_{sens}}\right)$$

where V_{in} is the input voltage, R_b is the bias resistor and R_{sens} is the resistance of the FXR. As the force is increased, the resistance of the sensor decreases and the output voltage increases. The measurement of force range can be varied by varying the bias resistor. The graph shown is plotted for $R_b = 1\ \text{k}\Omega$ and V_{in}= 5 V. It shows the force-resistance and force-conductance characteristics. Sensor resistance was measured after 20 seconds of applying load. The force was applied using a push-pull force gauge. The force range can be varied by varying the bias resistor. For measuring a lower range of forces, you have to use bigger resistance values and vice versa. We can also use a buffer (optional) at the output to avoid loading.

Conditioning of sensors is essential for achieving accurate results. To condition a sensor, place a test weight on the sensor for some time and allow it to stabilize. Repeat it for four to five times before using it for actual sensing

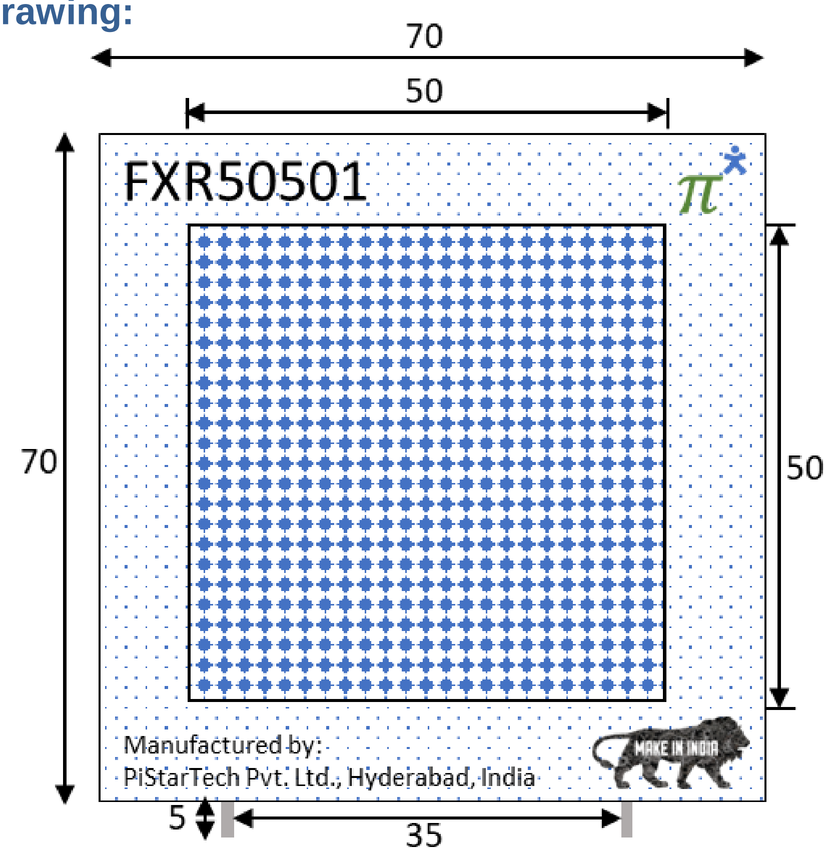


$R_b = 1\ \text{k}\Omega$



Mechanical Drawing:

Front side



*All the measurements are in mm

Back side