XactFSR Application Guide

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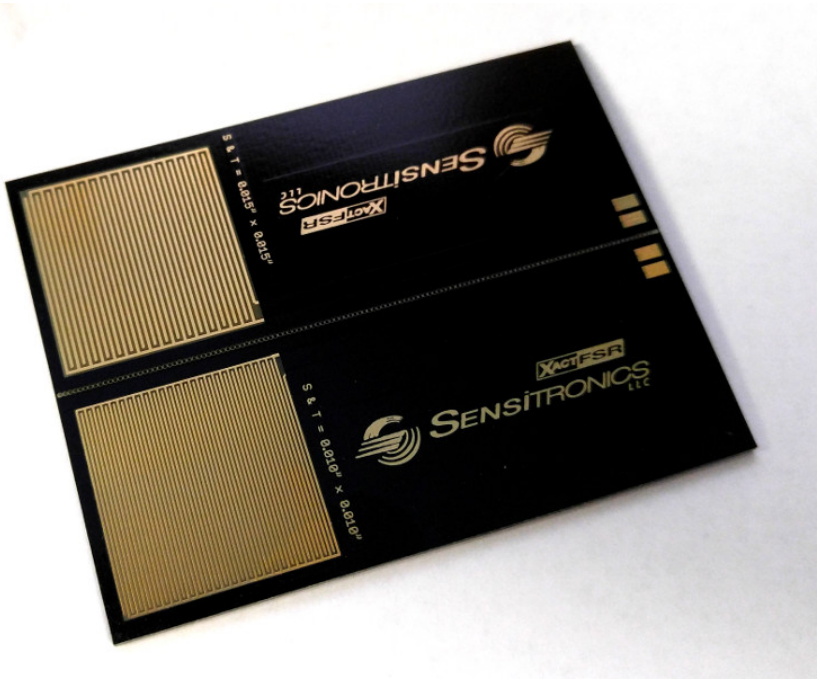
Sensitronics XactFSR improves the precision of force-sensing resistors (FSRs). Screen-printed force-sensing resistors have a part-to-part variability of 15-20%. XactFSR, through a more precisely controlled resistive coating, reduces this to 10%, with 5% being typical. Engineers and hobbyists alike can now create their own custom force-sensing resistors easily and with unparalleled consistency.

Creating force-sensing resistors with XactFSR is simple. It works like this:

1. Manufacture a circuit with patterns of interdigitated “finger” conductors wherever you want a sensor to be located. (Some additional guidance on the design of these circuits is provided below.)



Above: An XactResponse board showing interdigitated finger patterns on two breakaway PCBs. These boards are offered as a quick way to evaluate XactFSR and observe the influences of different conductor dimensions and spacing.

2. Cut a piece of XactFSR to cover the conductors. This can be done using a die, laser, or simply a pair of scissors. The piece should be slightly larger than necessary to cover the conductors so that it can be adhered to the circuit at its edges using double-sided adhesive.

3. Adhere the XactFSR over the conductors. The adhesive should form a border around the conductors, *but should not cover them*. There should also be a small gap or vent in the adhesive border to allow air to move freely in/out of the space between the XactFSR and the conductors.

Above: Adhering XactFSR over copper conductors. Note the narrow border of adhesive at the edge of the XactFSR.

Guidance on the Design of Interdigitated Fingers

The geometry of the interdigitated fingers, as well as the FSR resistance value, will affect a sensor's performance. Here are some things to consider when designing your circuit:

- If your circuit will be on a conventional rigid or flexible printed circuit board with copper conductors, consider using a gold or ENIG finish. These finishes provide the most uniform thickness, and therefore the most consistent sensor performance.

- When practical, consider a minimum trace width and spacing of 10mil. Finer traces and spacing will work, but may exhibit poorer consistency due to variations in etch quality.

- Trace width and spacing will affect a sensor's resistance range. All else being equal, finer, more closely spaced conductors will result in a lower-resistance part while wider conductors and spacing will result in a higher-resistance part.

- When practical, consider a maximum finished copper weight of 1oz. Heavier weight copper creates deeper valleys between conductors. This results in greater deformation of the XactFSR material under force, and allows the sharp edges of the copper to cut into the coating, reducing its lifespan.

Available XactFSR Formats

- 65 kOhm/square; 11.5” print width; PET thicknesses of 4, 5, and 7mil
- 225 kOhm/square; 11.5” print width; PET thicknesses of 4 and 5mil
- 400 kOhm/square; 13.25” print width; 5mil PET
- Other/custom formats available. Please email info@sensitronics.com for information.