

# molex

## CONSUMER REFRIGERATOR – PEDOT

**PEDOT-based conductive polymer for capacitive switch offer vital design solution for appliance manufacturer – and easily accessible controls to savvy consumers**

### BUSINESS CHALLENGE

Today, consumers are seeking high-tech cars, kitchen appliances, fitness equipment and thermostats that are more like their smartphones. But they are also seeking innovative products with added-value features. Capacitive capabilities are a must for consumers, but integrating touch-activated switches can be a challenge for manufacturers.

In this new era of high-tech kitchen appliances with capacitive touch and smart connectivity, a broadening portfolio of electronics solutions and design strategies exists to help manufacturers innovate appliances. As more consumers seek feature-loaded yet budget-friendly appliances, a leading global manufacturer of economy-to-premium appliances approached Molex to support the design of enhanced refrigerators.

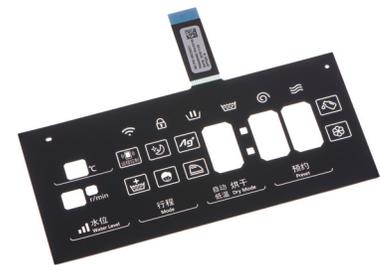
While designing capacitive touch technology for a refrigerator seemed straight-forward, it actually presented a unique challenge to our customer. Known as a trusted and respected appliance brand, our customer found that, because refrigerator manufacturing processes vary, the appliance design limited their ability to add capacitive touch technology.

In home appliance design today, capacitive touch icons, sliders and switches are now outpacing mechanical interfaces and resistive touch controls. Available in multiple switch formats and layouts, capacitive designs can include discrete switches, slide switches, rotary wheels, and combinations of tactile and non-tactile products. Capacitive sensing technology uses an electrical field to detect the presence of a human finger or other conducting objects that initiate switch activation. When a conductive object enters the field, the switch recognizes a change in the capacitance, triggering actuation.

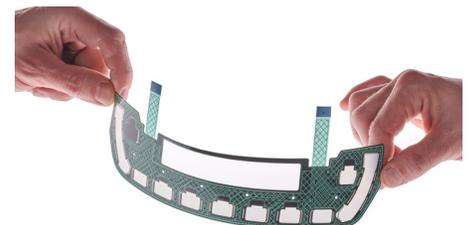
### SOLUTION

As consumer demand for touch-based applications grows, appliance manufacturers have sought to move away from technologies built around Indium Tin Oxide (ITO), with its inherent weaknesses (brittle, inflexible and costly to pattern). Instead, a conductive polymer called PEDOT, an acronym for the chemical name Poly (3, 4-ethylenedioxythiophene) is emerging as a popular solution. Molex applies this polymer mixture as a dispersion of gelled particles suspended in water. The conductive switch is formed by screen printing a layer of the PEDOT ink over the surface of a flexible PET substrate and following up with a heat cure.

This particular customer sought a capacitive solution that could work with their manufacturing processes. The most cost-effective way to add capacitive touch switches with backlit icons to the front surface of the refrigerator door was to use a screen-printed polyester circuit with conductive PEDOT ink. In lieu of using ITO technologies, the manufacturer worked with Molex's design and engineering team to develop a fully qualified PEDOT-based capacitive switch that allowed them to incorporate touch-activation capabilities at a low-cost — despite the foam insulation. Without a PEDOT capacitive switch, the manufacturer likely would not have been able to add cost-effective touch capabilities.



*Capacitive Touch Home Appliance Panel with PEDOT Circuitry*



*Flexible PEDOT Circuitry*



## **PEDOT Advantages**

PEDOT mixtures have good adhesion qualities and are known for their high chemical stability, optical translucency and electrical conductivity. As a conductive ink for backlit capacitive switches, PEDOT allows low-profile, user-friendly interfaces to be made at a lower cost. Molex has developed a unique approach to the PEDOT compound to meet highly demanding optical applications, which made Molex the ideal solution partner in designing the new refrigerator switch interface.

Today, Molex continues to offer fully qualified PEDOT-based translucent capacitive switches for a variety of applications. Molex was able to work closely with this appliance customer to design and test several solution options and ultimately select the right option for their unique needs.

## **PEDOT-Based Applications**

The PEDOT technology offers numerous advantages over traditional mechanical and PCB capacitive switches in a range of consumer applications, including home appliances, automotive infotainment, medical devices, thermostats and fitness equipment. The possibilities for incorporating user-friendly controls and icons onto PEDOT-based switches are virtually limitless. Whether an application is a back-lit capacitive touch key or a panel with patterned transparent conductive structures, PEDOT-based switch solutions can help customers build better products and realize cost savings. Molex offers fully qualified PEDOT-based capacitive switches to help manufacturers bring new products to market faster.

**To learn more [www.molex.com/link/pedot.html](http://www.molex.com/link/pedot.html)**

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