



CONSUMER THERMOSTAT - PEDOT

Hot New Capacitive Screen Technology Powers Cool Interactive, Programmable Home Thermostat Featuring State-of-the-Art Capacitive Control Display

PEDOT-based conductive polymer for capacitive switch design delivers cost-savings to appliance manufacturer – and high efficiency one-touch environmental control to savvy consumers

BUSINESS CHALLENGE

Standard mechanical thermostats typically require multiple buttons and switches for selecting temperature and programming features. A leading global manufacturer of economy-to-premium home thermostats approached Molex to support the design of an entirely new and innovative thermostat without the limitations of a traditional mechanical design.

A well-respected and trusted brand, our customer wanted Molex to help create the best quality, premium product at a price point accessible to homeowners, contractors and building owners who shop home improvement stores. From a branding and design standpoint they aimed to give consumers more “bang for the buck” with value-added features packaged in an economical yet sleek, appealing capacitive screen design.

Capacitive sensing technology uses an electrical field to detect the presence of a human finger or other conducting object as switch activation. When a conductive object enters the field, the switch recognizes a change in the capacitance, indicating an actuation.

Capacitive designs can incorporate and combine multiple switch formats and layouts, including discrete switches, slide switches, rotary wheels and combinations of tactile and non-tactile products. Whether for consumer or harsher industrial and automotive applications, environmental factors are important considerations in capacitive screen design, material selection and fabrication. While most homes maintain a relatively stable environment, thermostats and appliances do confront daily shifts in temperature and humidity, in addition to frequent use – and occasional misuse by consumer homeowners.

SOLUTION

Capacitive interfaces can be built on PCBs, polyimide or polyester circuits for direct contact with flat or curved surfaces. Each possesses unique design challenges, manufacturing costs and operational limitations. With touch-based applications becoming increasingly popular, the use of technologies built around Indium Tin Oxide (ITO), with its inherent weaknesses (brittle, inflexible, highly reflective and costly to pattern), has led to a search for alternative materials that offer high optical clarity, similar resistivity and easy processing, but at lower overall application costs. Of these, conductive polymers are receiving growing attention. An acronym for the chemical name Poly (3, 4-ethylenedioxythiophene), PEDOT is emerging as one of the most promising materials offering excellent

electrochemical, thermal and solution-processing properties ideal for capacitive switch design.

Through a highly collaborative process, the Molex switch team worked with the customer to develop an integrated PEDOT-based thermostat user interface. A fully qualified PEDOT-based capacitive switch will deliver cost savings over ITO technologies. An economical conductive polymer that has been successfully deployed in a range of flat panel displays in consumer and automotive applications, Molex PEDOT technology combines electronic conductivity with optical clarity. PEDOT-based capacitive switches are an economical alternative technology to standard ITO substrates.

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 thermostat switch interface. Most other applications would use PEDOT behind a plastic bezel. In this thermostat application, the user looks through the transparent screen, which must be optically clear to ensure a pleasing aesthetic.

Molex offers fully qualified PEDOT-based transparent capacitive switches for a variety of applications. Whether an application has a back-lit capacitive touch-key or screen, or a low profile touch-panel with patterned transparent conductive structures, Molex is ready to help develop high-quality switch solutions to help customers realize greater product designs and cost savings.



PEDOT ADVANTAGES

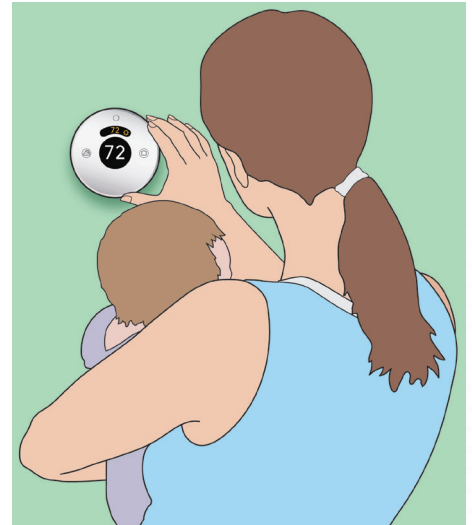
For home appliance manufacturers, PEDOT as a conductive ink for backlit capacitive switches provides optimal design flexibility, including low temperature processing and easy application for lower overall production costs. The versatility of the PEDOT application enables patterned transparent conductive structures to be created. The resulting thermostat features a smart and sophisticated design with a clear backlit display, showing the current and set temperature and time, and menu-driven programming for effortless set-up.

Key Consumer Benefits in Thermostat Design

- Attractive design – high optical clarity
- Precision accuracy
- Excellent product reliability
- Low cost, high performance alternative to standard ITO

PEDOT-BASED CONSUMER GOODS AND APPLIANCE APPLICATIONS

The PEDOT technology offers numerous advantages to traditional mechanical and PCB capacitive switches in a range of consumer applications including home appliances, set top boxes 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 realize greater products and cost savings. Molex offers fully qualified PEDOT-based, capacitive switches to help manufacturers bring new products to market faster.



To learn more visit www.molex.com/ab/capacitiveswitches1948.html