Electronic Components

By Terry Murphy

Terry Murphy, director of strategy & business development, TE Connectivity Ltd. is a $13 billion global technology and manufacturing leader creating a safer, sustainable, productive, and connected future. For more than 75 years, our connectivity and sensor solutions, proven in the harshest environments, have enabled advancements in transportation, industrial applications, medical technology, energy, data communications, and the home. With 78,000 employees, including more than 7,000 engineers, working alongside customers in nearly 150 countries, TE ensures that EVERY CONNECTION COUNTS. Learn more at www.te.com and on LinkedIn, Facebook, WeChat and Twitter.

In our increasingly connected world, quality, reliability and consistency matter a great deal, particularly in the context of the smart home ecosystem. The antennas, connectors, relays, sensors, switches, terminals and tubing inside these devices play critical roles in the product's ultimate functionality. If you don't focus on the right components or choose the wrong or incompatible ones, then device reliability becomes an issue.

With a faltering or failing device, the user loses trust in your products and may slow their adoption of more smart devices in general. The challenge is to know which components are crucial to your design and how to best minimize any failures.

Whether it's a washing machine, thermostat, home security system, coffee maker or other home appliance, users expect seamless operation from the connected and smart devices in their homes.

If devices don't function as advertised, users will slow adoption of new smart home devices. Because the smart connected home is just now beginning to expand from the early adopter phase to a larger share of the market, inconsistent performance or a poor experience in one device category can have negative repercussions for the adoption of these devices overall.

Continued growth of the connected home market hinges on consumer buy-in and trust. Gaining trust starts with providing reliable products with components that enable the device and the technology to perform as the user expects.

Product reliability: The importance of the componentry

As appliances and other home devices become more connected and smart, the electronic components and the interconnect products inside become more critical to overall function and relevance for the user. Accordingly, you need to strengthen the importance of components in your designs for these devices. Antennas, connectors, relays, sensors, switches, terminals and tubing have a variety of tasks and functions to facilitate the operation of any smart home device or appliance, including:
• Supporting data transmission, analysis and response
• Receiving and executing remote user commands
• Enabling user interface control at the device or appliance
• Providing power supply
• Allowing a level of autonomy in device operation through sensors and sensor inputs

A failure in any one of these functions can lead to an overall failure of the product. Are you giving components and interconnect products adequate attention in terms of application requirements, including function, specifications and design elements?

Antennas, connectors, relays, sensors, switches, terminals and tubing can be points of failure if not properly designed into the device system and tested based on specifications and requirements.

Consider that if there is a failure with one component, the device won't

Antenna Solutions

TE Connectivity's (TE) antennas offer endless possibilities for you to create wireless and smart devices, with several combinations of features in a variety of shapes and sizes. These solutions support high-clarity transmissions across a wide variety of technologies and frequencies including Bluetooth, Wi-Fi, LTE, ZigBee and more.

Heat Shrink Tubing

Our Raychem heat shrink tubing provides electrical insulation, mechanical protection, sealing, strain relief and wire management to help ensure reliability within appliances and devices. Available in various types, materials, heat-shrink ratios, and can withhold extreme temperatures, TE's heat shrink tubing is a great solution for your smart device needs.

Interconnect Solutions

With an expansive portfolio of power, data, and signal connectors, TE offers the right solution to enable reliable, consistent connectivity. Across a range of centerline spacing and position sizes, they come in multiple colors and materials – including glow wire and hot wire types. Terminal position assurance devices, connector position assurance devices, polarization and keying options help to provide reliable connections.

Relays

Cost-effective and reliable, TE relays are used throughout applications in the home. In nearly any design for access control systems, large and small appliances, lighting, HVAC, and an array of security applications, TE's relays offer a range of mounting and enclosure types, contact ratings and coil options to provide the design flexibility and performance you need.

Sensors

An expanding range of sensor technologies in small and large appliances and devices contribute to new levels of convenience and productivity for the home. TE's sensors help create smart appliances that respond to human touch, sense vibration, adjust to loads, detect temperature and humidity, and operate more efficiently.

Switches

TE's comprehensive line of reliable and cost-effective switches can be used in small and large appliances to ensure reliable and consistent inputs. From tactile switches to push buttons, slide switches, rotary types, rockers, and more, they offer a range of contact ratings, configurations, and mounting options. With comprehensive product data and trained technical specialists we can help you discover the best solution.

Terminals & Splices

From basic ring and FASTON terminals, to splices for various wire types and sizes, TE offers a broad portfolio of terminals and splices for home applications. Terminals such as Positive Lock receptacles have low insertion force, but high retention force to help ensure connections are properly made and stay that way. Tested electrically and mechanically by international agencies, they perform in extreme conditions for always-on connections.

work as designed. If you aren't already thinking carefully about these critical components, you may need to change the way you think about your design in order to ensure full product functionality and reliability.

For example, if a relay does not perform to specifications, then the motor might not turn on or off, which could result in operational failure. If a power connector does not meet specifications for a particular application, there may be no power for the system which is problematic. If an antenna is not placed at the right position in any given system, then the connectivity could be limited.

Again, system failures, especially in the eyes of a user who is trying to decide how, when and whether these connected devices can make their lives better will spoil their experience and slow adoption of future devices.

Component needs for connected home devices

How can you maximize the performance and reliability of smart home and other connected devices? Design in high quality components and at an earlier point in your design cycle. When choosing components for a smart device, you must consider the consequences of each decision.

High quality components and integrated component solutions can help fulfill the promise of the smart home—and help prevent a host of problems.

Nearly all connected devices for applications in our homes now feature touch screens, voice activation capability, sensing technology and remote wireless communication functionality.

These features can delight users and entice them toward greater smart device adoption if executed well:

Always-on connectivity: Consumers expect devices to work as designed, including motors to run, heaters to operate, and power to drive the connectivity throughout the device. It is important to select the right component that is designed for the intended application. These components must be high quality, reliable and meet industry and regulatory requirements. Selecting components with color or physical keying options, as well as ones that are ergonomically designed can aid in errorproofing the assembly process.

Touch screens: Most consumers are used to touch screens because of today's smart phones, and they expect every smart device to respond to their touch or swipe and act accordingly. However, if the component hardware behind the touch screen begins to fail, so does the value of the device. At this point, the device can cause frustration and may cease to be useful to the user. Starting with high quality components could prevent a faulty touch screen from cropping up in the first place.

Voice recognition: Voice activation capabilities are starting to gain traction with consumers, but several factors can affect accuracy. Because the program needs to "hear" the words spoken clearly, any extra noise will interfere. Low-quality sound cards, which provide the input for the microphone to send the signal to the computer, require adequate shielding from electrical signals produced by other

components in the system. They can introduce hum or hiss into the signal, thus hindering the device's performance. In addition, if the microphone or associated circuit malfunctions, it may not understand the command sent to the device.

Selecting the best components can prevent many of these problems. Another option is to use spring fingers. Spring fingers—single contact, surface mountable internal connectors with multiple functions on a printed circuit board—can be used for grounding to prevent EMI noise and static caused by a speaker, microphone or other vibration.

Sensing technology: Sensors are important to the connected home as a central input component in device and system operation. Using the wrong or inappropriate sensor in a heating and cooling system or application can adversely impact the overall efficiency of the system. That sensor could turn on the HVAC system and the compressor or motor when not needed, or cause the system to not operate when it should. A properly functioning sensor enables the system to run as intended.

Likewise with a security system, if the system fails because of communication issues or the sensors, this doesn't bode well for the security system, the user, or the smart home in general.

Remote wireless communication and control: Device-to-device communication and autonomous operation via sensor inputs are at the heart of the smart connected home.

Connectivity issues between the device itself and its hub or control platform can and do occur. An

engineer's job is to minimize the chance of this occurring through solid design and componentry choice. For example, choosing the right antenna based on application needs can help deliver seamless, uninterrupted service. High quality antennas provide high-clarity transmissions in wireless devices in a wide variety of frequencies such as Bluetooth, Wi-Fi, LTE and Zigbee, among others.

Choose a partner in design with expertise in the connected home

Many of these components may be invisible to the customer, but they are vital to the user experience. The success and functionality of each device are paramount to the continued adoption of the smart connected home.

Together, we need to think, not just in terms of the device you are designing, but also in terms of the big picture how the device will fit into the home and potentially complement other connected devices.

TE Connectivity (TE) engineers have been innovating and integrating smaller, lighter technology that connects and responds to persistent data, making homes and communities safer, smarter and more sustainable. For customers who aim to push the limits of connectivity and data capability to invent the future, we are advancing connectivity—from multifunction sensors to contactless power and data, interconnect solutions and more—to enable tomorrow's smart products and systems that are entirely reliant on data and power delivery to operate every day.

TE's customer relationships and expertise extend across many home product categories such as appliances, hubs, personal assistants, occupancy sensors, HVAC equipment, thermostats and more. We provide the broadest range of connectivity products available, suitable for a wide variety of applications and end products. We are uniquely positioned to deliver the most comprehensive, highest quality connectivity solutions and help customers succeed in the connected home market

Partnering with TE can help any designer, manufacturer and, ultimately, the user gain more from their smart home devices. Choosing the best, most reliable components is easier with experts like those found at TE, who can advise on high quality standard and customized components, as well as integrated solutions that will help enable better performance, consistency and quality in your product, and thus a better experience overall.