10 things you need to know for a successful smart home product launch

Empowering Trust™

UL offers independent and comprehensive pre-compliance testing and certification services. These services cover a range of requirements for selling your smart home products globally, from performance and safety to cybersecurity and interoperability. Pre-launch testing gives you a chance to resolve design flaws such as overheating caused by battery design and minimize the risks of costly delays and product recalls.

Smart home devices or home automation products, such as smart lighting and smart locks, are gaining traction with consumers. With enhanced digital connectivity, the smart home industry is expected to reach $400 billion worldwide by 2030[1], with the Asia Pacific region making up for a quarter of the installed base. Some manufacturers are creating new smart home solutions to capture business opportunities, while others are redesigning existing products.

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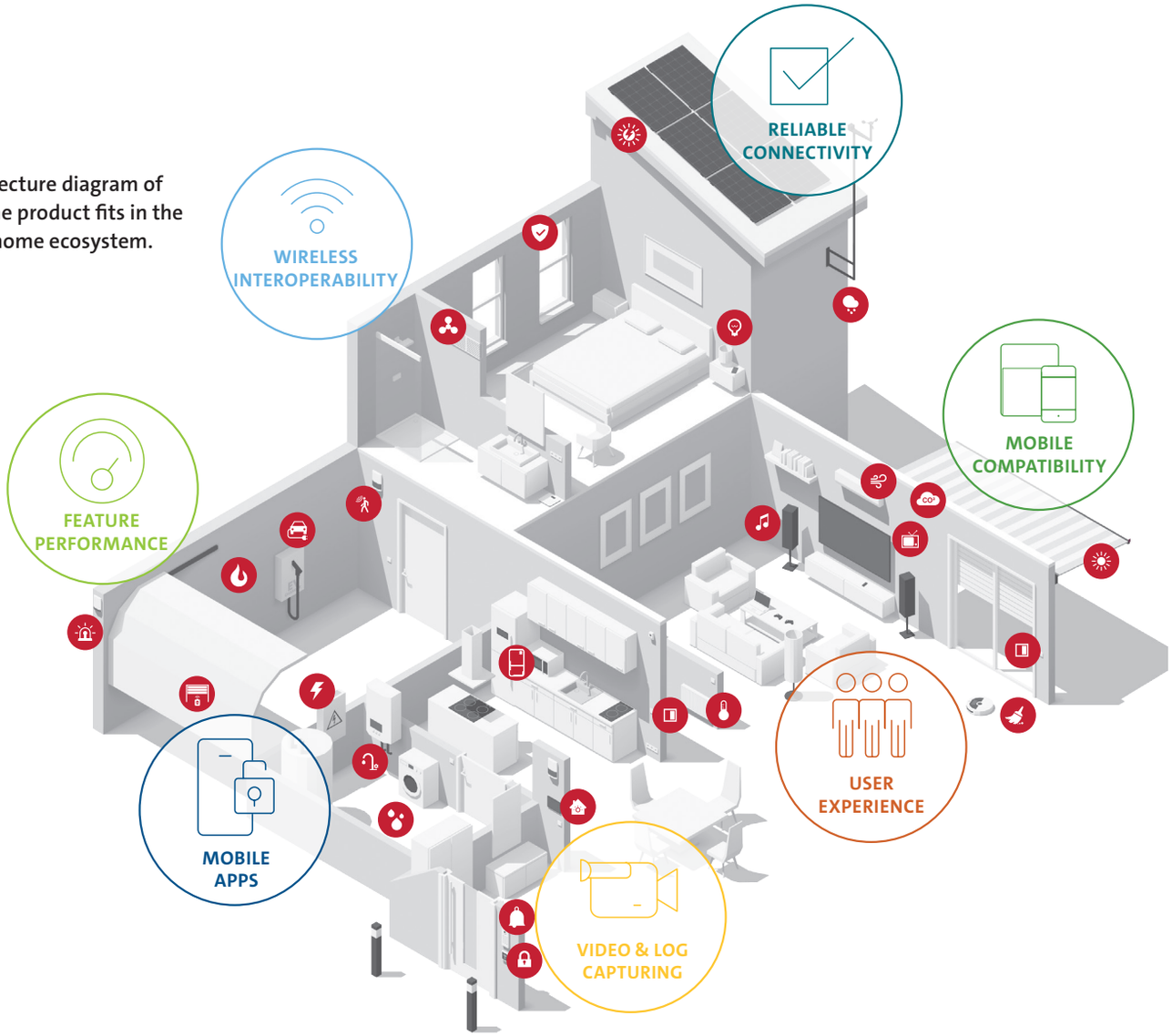
But market launch can be slowed and consumer confidence lost if companies fail to consider how smart home products fail in real-world settings or the required global regulatory standards.

What makes a smart home device smart is its ability to bridge the physical and digital world with sensors and software to automate everyday tasks. For example, smart lighting connected to a smart home mobile application can be controlled using voice control. Connectivity to other devices and the internet creates additional challenges for smart home product designers. Smart home devices must comply with electromagnetic capability (EMC) and safety standards for electronic products and deliver secure connectivity for a positive user experience.

Here's an architecture diagram of how smart home product fits in the broader smart home ecosystem.



Drawing on our years of experience working with manufacturers and suppliers, here's a list of key considerations of

10 things you need to know about smart home testing and certification:

1

How robust is your EMC design?

Smart home devices operate in a complex electromagnetic interference (EMI) environment. The presence of sensors from other connected devices in a smart home may affect device performance and increase consumers' safety risks. For example, a malfunctioning, smart smoke detector due to EMI may leave the residents at risk if a fire occurs. It is no surprise that many countries require electronics to be certified to relevant EMC standards and requirements before market entry.

If a product fails EMC testing the first time around, it may require design modification and retesting to demonstrate compliance. As such, manufacturers of smart home devices should plan for EMC compliance and pre-compliance testing to avoid delays and additional costs to the launch schedule.

UL performs EMC testing according to the latest EMC directives and regulatory requirements to help ensure smart home devices can withstand electronic interference. UL holds ISO/IEC 17025 accreditations for EMC laboratories in all major markets.

2

Do you comply with SAR exposure standards?

Like other devices with radio antennas, such as microwaves and mobile phones, smart home devices emit radio frequencies (RF), which may be absorbed by the environment and human bodies. Industry studies have shown that long-term exposure to high RF radiation levels may lead to health hazards such as tissue damage. Smart home devices should be designed and manufactured not to exceed safe RF exposure regulations, such as those in (Federal Communications Commission) FCC requirements, even if they add a transmitter to an existing product.

Specific absorption rate (SAR) measures the rate of absorption of the amount of RF energy absorbed by biological tissue when using a wireless device over a period of time. Many countries require all wireless devices to be evaluated for RF exposure through SAR testing. The SAR limit may vary for each country. For example, in the U.S., the FCC limit for SAR is 1.6 Watts/Kilogram (W/kg), whereas the SAR limit is 2.0 W/kg in Europe.

We can help you demonstrate compliance with SAR standards by testing your smart home device for RF exposure. For SAR testing, UL uses a head and torso model filled with liquids to simulate different body tissue to measure SAR from RF radiations.

3

What's the RF exposure for your 5G device?

With faster speed and broader availability, 5G is expected to boost smart home adoption worldwide. However, multiple input, multiple output (MIMO) antennas that allow users to send and receive data simultaneously, adds to 5G smart home devices' complexity. Besides, 5G technology introduces a new millimeter-wave (mmWave) spectrum that operates between 24-90 gigahertz (GHz), a higher frequency than sub 6GHz for existing 4G deployments.

Manufacturers face various challenges for testing 5G smart home devices for mmWave compliance. For example, traditional test equipment for mmWave is limited to an upper frequency of 50Ghz and requires the addition of external harmonic mixers to measure wider bandwidths.

According to Mobile & Wireless Forum, compliance tests for 5G devices require many field combinations and configurations. Manufacturers need to assess exposure from multiple simultaneous transmitters across a wide channel bandwidth, including combined exposure of SAR and power density.

UL simplifies 5G testing using human factor power density testing for mmWave and advanced mmWave test chambers with dual antenna designs for faster turnaround time. UL actively helps formulate test standards and procedures as 5G evolves. UL offers mmWave tests and certification in the U.S., the U.K., China, Korea and Japan.

4

How safe is your battery-powered smart home?

Batteries for smart home devices come in various sizes and form factors. A wearable device may require a flexible lithium polymer battery, while a robotic vacuum may use a multicell battery pack for longer battery life. High-density batteries such as lithium-ion batteries increase safety risks such as overheating and fire.

Our experts recommend manufacturers to test for battery safety to protect consumers and rectify potential safety risks before launch. At the same time, devices with lithium-ion batteries must pass battery safety tests to be shipped anywhere in the world.

Manufacturers may lack advanced testing and analytical equipment to conduct battery safety tests on their own. In countries like India and Korea, batteries need to be tested and certified in the country before they are allowed to be sold.

UL helps manufacturers navigate regulatory requirements and test to battery standards such as UL 2054, the Standard for Household and Commercial Batteries and IEC 62133 for international compliance.

5

Does your smart home device function as intended?

Each year, the Consumer Product Safety Commission (CPSC) in the U.S. recalls hundreds of unsafe products, from smart plugs to hoverboards. Selling products that have been subject to recalls may put your consumers and brand reputation at risk.

Manufacturers are responsible for the safety of your smart home products. You need to understand what safety regulations apply to your product sectors, such as toys, electronic products, and home appliances. For example, IEC/UL 60730 Standard Class A applies to home appliances such as lighting controls and switches.

Whether you're creating a new smart home product or integrating smart home functionality to an existing product, UL can help you test for functional safety specified by the latest safety standards. By conducting pre-compliance testing in the design stage, manufacturers can repair defects and minimize risks and end-user liability.

6 Is your PCB UL Certified?

At the heart of any electronic device, including smart home devices, the ubiquitous green printed circuit board (PCB) electronically connects electronic components such as a processor or Bluetooth antenna along copper tracks. PCB defects such as short circuits may cause consumers to experience electric shock when using the finished product.

PCBs are getting smaller and more complex to meet consumer demands for slimmer devices. As such, the smaller form factor places demand on more components that may affect PCB quality. Also, PCBs used in 5G products must be designed to manage higher speeds and higher frequency signals, impacting everything from the laminate material requirements to the electrical and mechanical designs. Pre-compliance testing compliments your review for your product and components and can help you save time and money by avoiding design iterations due to failures before your smart home device is approved for final production.

UL developed a widely accepted PCB safety Standard for Printed-Wiring Boards, UL 796, which outlines a rigorous set of safety requirements to protect consumer safety. Smart home products that comply with UL requirements can use the UL Mark as a valuable product differentiator. UL offers a wide range of services to meet PCB testing needs from design to launch.

7 Does your smart home device put data at risk?

High-profile incidents where smart home devices are used to launch cyberattacks on other devices raise public concerns. It is no surprise that governments worldwide are introducing Internet of Things (IoT) security measures such as the California IoT Bill, EU Cybersecurity Act and Singapore's Cybersecurity Labelling Scheme to protect device users and others from cyber risks.

Common sources for cybersecurity vulnerabilities include:

- Poor product design without necessary security measures
- Nonsecure communication protocols that are vulnerable to hacking
- Inadequate authentication procedures such as easy-to-guess default passwords

UL assists to minimize cybersecurity risks through UL Cybersecurity Assurance Program. UL CAP provides testable cybersecurity criteria to measure a smart home product's security and the likelihood of exploitation.

8

Are you staying ahead of global regulatory changes?

Be it EMC or cybersecurity, compliance requirements differ around the world. Manufacturers of smart home devices need to understand the differences in national, state and local regulations to sell in a global marketplace.

As a leading National Certification Body (NCB) of the IECEE Certification Body (CB) Scheme, UL helps manufacturers accept and fulfil local country requirements using CB test results to facilitate their testing and certification needs. Manufacturers can test their smart home product based on an integrated test plan that incorporates local country requirements. Using the test results, UL issues a CB Test Report and certificate accepted by participating CB Scheme member countries.

9

Does your smart home device consume power efficiently?

Energy consumption of home appliances is a crucial consideration for many households. From a consumer standpoint, energy-efficient products can help reduce environmental impact and energy bills. At the same time, manufacturers must comply with minimum energy performance standards (MEPS)in most countries for major appliances such as washing machines and televisions.

UL helps manufacturers prove the energy performance of their smart home products to win over energy-conscious consumers. As an Energy Star program partner, UL can complete the Energy Star program evaluations. We can also test your product to energy efficiency claims, specific requirements and regulatory needs to allow for global market access.

10

Can your smart home device get connected and stay connected?

In a smart home environment, consumers expect smart home devices to work together. To achieve such interoperability, manufacturers need to assess how their device interacts with other devices across wireless protocols, within the ecosystem and in a real-world setting. Manufacturers also need to ensure the devices can adjust to new apps, device models and upgraded operating systems. Many leading brands and retailers require interoperability testing to validate that accessories, routers, voice assistants and multiple devices connect seamlessly for high-quality user experiences.

UL simulates a real-world test environment to evaluate the impact of signal disturbances for example the microwave or physical obstacles such as concrete walls on smart home products.

Summary

Smart home applications continue to evolve as IoT technology matures. Your smart home device can stand out from the competition by meeting consumer expectations regarding connectivity and security and regulatory needs.

Contact us at ctech.ul.com/contact or email us at ConsumerTechInfo@UL.com to find out how UL can help you meet safety and technical requirements for a successful launch.

Sources:
[1]https://iotnews.asia/wp-content/uploads/2017/01/The-Battle-for-the-Smart-Home-Open-to-All.pdf

Learn more about our wireless device testing and solutions at UL.com/wireless

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