



**CONSUMER
TECHNOLOGY**

COMPREHENSIVE COMPLIANCE SOLUTIONS

FOR WEARABLE TECHNOLOGY PRODUCTS



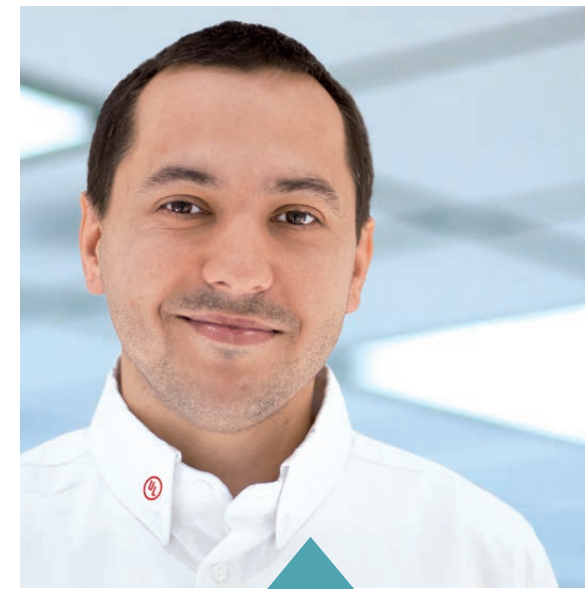
UL CONSUMER TECHNOLOGY: SUPPORTING SAFETY AND ENRICHING CONSUMER EXPERIENCE OF WEARABLE TECHNOLOGIES

For over 100 years, UL has been advancing safety science in support of successful product launches around the world. As one of the most recognized and trusted certification marks for consumer technology, UL also offers a complete range of services for wearable technology (WT) manufacturers.



THE COMPLETE SOLUTION FOR ALL YOUR COMPLIANCE NEEDS

UL is a symbol of trust in key markets around the world – with a solid reputation and unique set of values:



DRIVEN BY PURPOSE

Our sole purpose is to help ensure products are safe and compliant in order to help you get your product to market on time with minimal complications.

DEDICATED ENGINEERS

We attract and hire expert safety and compliance engineers who are committed to understanding your products and guiding you through the entire process.



TRUSTED ADVICE

We offer practical advice and support to help ensure you get the test result you need to launch on time. This includes regulatory updates, a wiki portal to answer general questions, specialist consultancy support, and a preliminary examination of your product to highlight any issues that may result in a test fail.

EFFECTIVE PLANNING

We are a single business who manages your project and gives you access to our comprehensive resources and facilities throughout the world. Our project kick-off sessions create a plan for your product launch and the project planning portal helps you stay up to date with access to all the updates, data and information you need.



YOUR PARTNER FOR THE WEARABLE PRODUCTS INDUSTRY

As technology advances, compliancy plays an important role in proving safety to consumers. Products must meet a range of regulations and standards. As wearables get smaller and more complex, it becomes more challenging to guarantee products work as intended, meet regulations and are delivered to market on time. UL founded the Consumer Technology division to help product innovators of high-tech devices overcome these hurdles.

Building on our extensive knowledge of the regulatory processes in key target markets, UL paves the way for WT manufacturers to help ensure they are on the path to a successful compliance certification. Our goal is not only to help you meet regulatory requirements, but also to meet and exceed your consumer's performance expectations.

Our comprehensive services cover customized product validation, advisory, testing, risk mitigation, and interoperability services. With our worldwide network of accredited labs, UL even offers bundled certifications for multiple countries without additional testing – translating into fast and efficient market access, and a clear competitive edge.

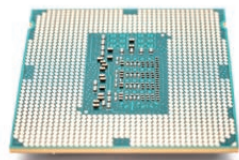
UL Consumer Technology helps customers meet the industry recognized requirements of these and other regulatory organizations requirements:

- A2LA
- American National Standards Institute (ANSI)
- Bluetooth SIG®
- California Energy Commission (CEC)
- CTIA
- ENERGY STAR®
- FCC
- IC
- IEC/IECEE
- CE Marking
- SCC
- UKAS
- Qi/PMA/A4WP Wireless Power Charging Certification
- Qualcomm
- Wi-Fi Alliance



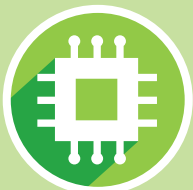
SERVING THE FULL ECOSYSTEM OF WEARABLE PRODUCTS

UL offers tailored services for virtually any type of wearable device or component. Our highly experienced engineers are at the forefront of advancing compliance solutions across a wide spectrum of products helping manufacturers understand and keep up with regulatory and commercial requirements. It's smart to partner with a safety and performance testing expert who knows the WT industry – inside and out.



COMPONENTS/ MATERIALS

Components for WT include batteries, cells, plastics, wireless communication modules and other subassemblies. In order to be eligible for integration in WT, they must meet complex and rapidly developing regulations.



FABRICS/ CLOTHING

Smart clothing is emerging as a promising sector for WT growth – from Bluetooth-enabled caps, heated vests, LED-lit jackets and bio-monitoring shoes to tablet-conductive gloves.



EARWEAR

Smart earwear is a relatively new frontier. In addition to an expanding suite of individual functionalities, smart earwear can also connect with smart-phones and augment other wearables.



EYEWEAR

Smart glasses account for well over half the sales in the booming WT sector. Manufacturers of this exciting new technology need to stay on top of current and upcoming regulations.



WATCHES/ WRISTBANDS

Smart watches and wristbands stand at the forefront of WT growth. Product safety, interoperability and usability are key factors in building consumer confidence and loyalty.



CHARGERS

Conventional rechargers are being repurposed and integrated into WT, such as bracelets, belts and purses – and progress is being made in using converted body heat and kinetic energy.



SAFETY	Product Safety	●	●	●	●	●	●
	Specific Absorption Rate (SAR)		●	●	●	●	●
	Chemical Content and Biocompatibility	●	●	●	●	●	●
	Battery Safety/Performance	●	●	●	●	●	●
	Textile quality assurance	●	●	●	●	●	●
PERFORMANCE	Electromagnetic Compatibility (EMC)	●	●	●	●	●	●
	Wireless Interoperability	●	●	●	●	●	●
	Wireless Coexistence		●	●	●	●	●
	M2M Approval	●	●	●	●	●	●
	Privacy and Data Security		●	●	●	●	●
	Energy Efficiency		●	●	●	●	●
RoHS / WEEE / REACH Compliance	●	●	●	●	●	●	
ENVIRONMENTAL	Environmental & Sustainability Considerations	●	●	●	●	●	●
USABILITY	User Experience and Usability		●	●	●	●	●

KNOW THE HAZARDS AND HOW TO AVOID THEM

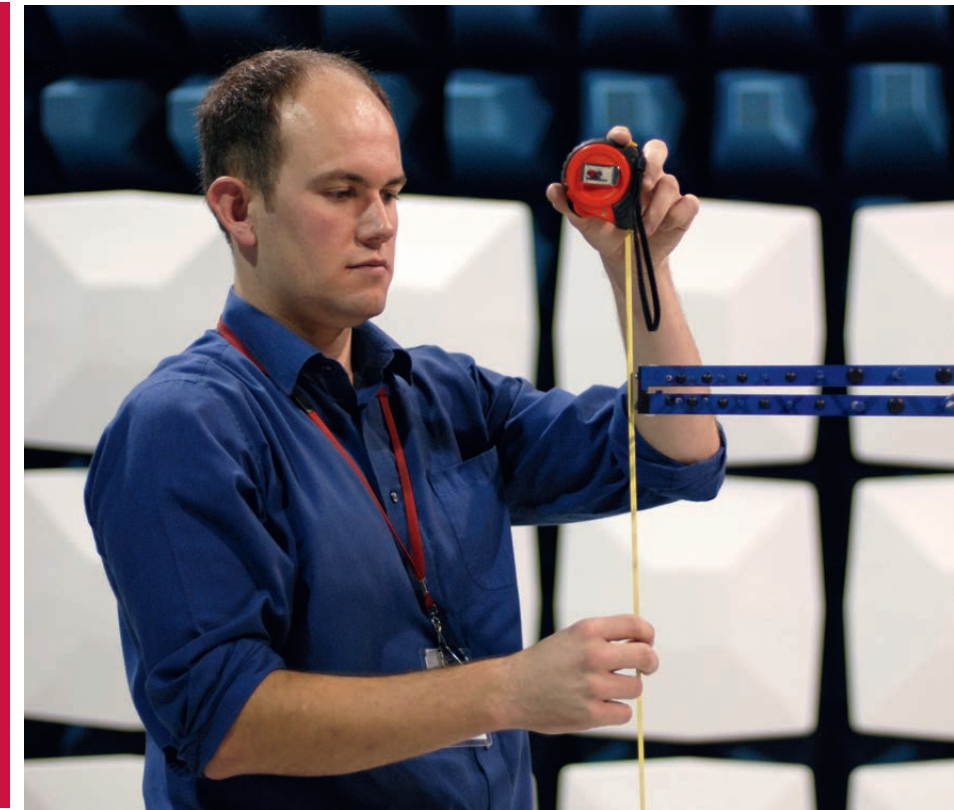


“ All developers and manufacturers of wearable technology need to address fundamental safety issues from the perspective of public safety. Even something as basic as lithium-ion batteries requires necessary testing and certification to be put in place before integration of the battery technology can be safely incorporated into wearable technology. “

Fernando Anura, Principal Engineer, UL

SAFETY ESSENTIALS FOR WEARABLES

Widespread acceptance in the marketplace depends greatly on customer confidence. In addition to privacy and data security, user safety is paramount for wearable technology products as they are used for a prolonged period in direct contact with the human skin and rely on wireless technologies to transmit and receive personal information. The following are potential safety hazards at a glance:



Electric shock

Many energized devices can pose a risk, and when they are designed to be placed in close proximity to the head or body for a prolonged period of time, the risk of unsafe electrical shock is clearly more significant.

Burns

The temperature of devices often increases during use. WT products typically incorporate powerful compact microprocessors and other modules that can produce elevated temperatures, which is a cause for concern when worn in close contact with the head or body.

Fire and explosion

Most WT products rely on battery power to allow the user to have freedom of movement. However, under certain conditions, lithium-ion batteries can overheat and explode or burst into flames.

Acoustic sound pressure

Earbuds and other hearing components incorporated into WT can produce unsafe sound pressure levels when improperly calibrated, leading to temporary or permanent loss of hearing.

Chemical reactions

WT product materials may contain chemicals that cause a rash or allergic response after extensive skin contact. A prolonged use of devices may result in sensitivity to elastomer materials, or cause bacterial build-up. Galvanic corrosion can also occur if sweat mixes with an electrical current between metals.

UL AND THE PATH TO CERTIFICATION

With WT products on the rise, manufacturers need to fully understand the mandatory evaluation and testing considerations applicable to their products. In addition to regulatory compliance issues, meeting product performance and reliability expectations are essential for global market success.

UL's expertise and precision make this daunting process smooth, and most of all effective. By helping manufacturers plan for all mandatory testing requirements, we mitigate unnecessary risks to users and help you steer clear of product recalls or returns. Through safety, we build user confidence in your WT products.



“UL is taking the lead in providing a wearable technology program broad enough to encompass the entire industry, yet one that is clear and robust enough to provide immense value to developers and manufacturers of wearable technologies, and them help get their products to the market efficiently.”

Stephen Kirk, Vice President and General Manager, UL Consumer Technology Division



EARLY ENGAGEMENT DESIGN SUPPORT

UL guides and supports the development of new products, at mature companies or startups, in critical areas such as:

- Choosing the most suitable components/materials
- Reducing development time and costs
- Complying with applicable consumer protection rules

TESTING AND CERTIFICATION

UL tests and confirms products for safety, performance, sustainability and usability, leading to:

- Global Market Access
- Region-specific regulatory compliance
- Applicable certifications

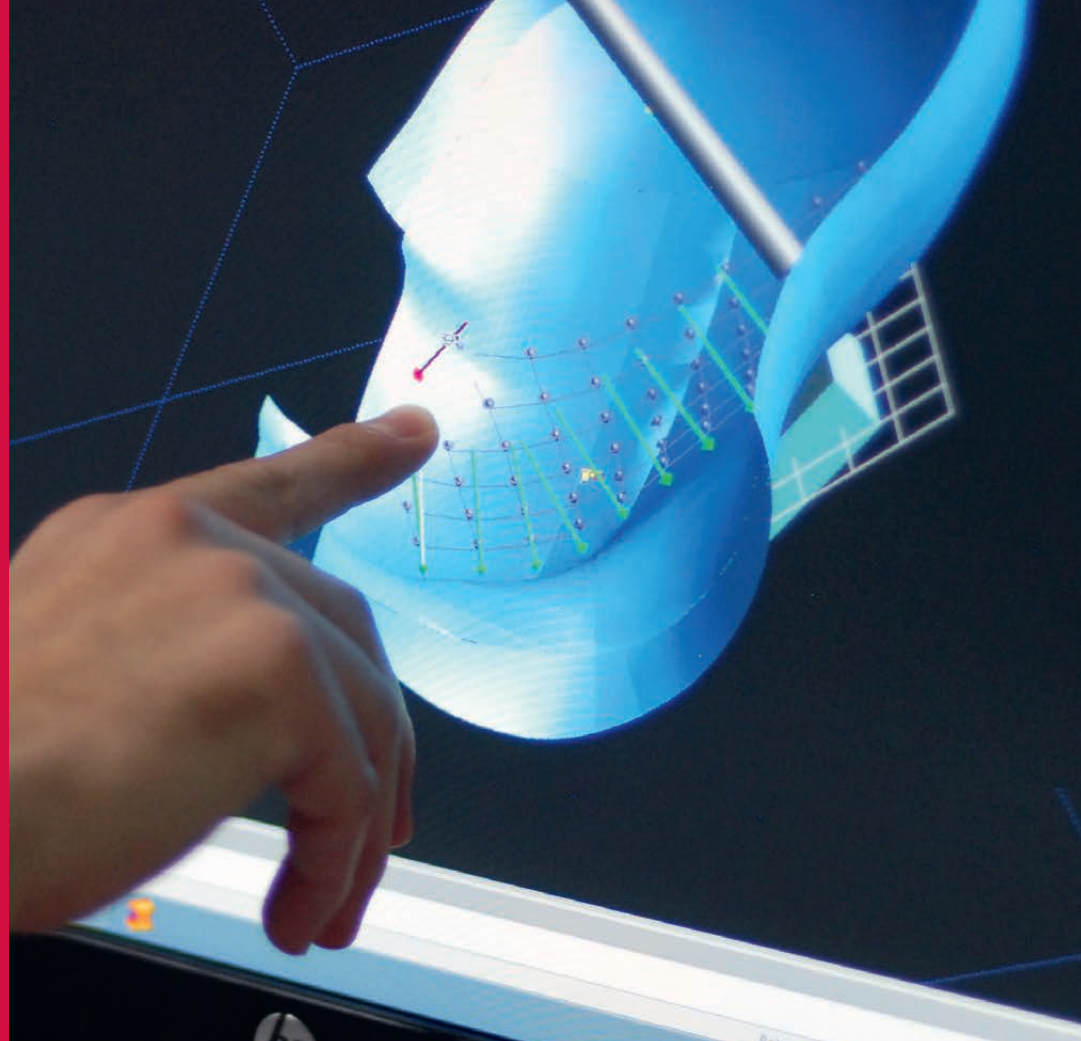
ADVISORY SERVICES

UL accelerates and simplifies safe-product development and deployment, by advising customers on key issues, including:

- Design-Flaw Avoidance/Mitigation
- Risk Management
- Supply Chain Management
- Customer Satisfaction



UL testing services start at the design phase, addressing everything from the safest materials to correct implementation – right up to usability assessments. Our aim is the same as yours: full consumer satisfaction and trust.



TESTING FOR SAFETY

Evaluating the safety of wearable technology products involves many different tests to demonstrate compliance with the regulatory requirements. In addition to safety issues, testing wireless technology products also includes performance assessments to determine the quality of the integration of multiple technologies and help ensure the device performs as promised. Depending on the construction or intended use of a device, the assessment of WT products can include the following tests.

Product Safety

At a minimum, this includes evaluating and testing a device for electrical shock and mechanical hazards. Some WT products, such as wearable medical or health and wellness devices, may be subject to additional product safety assessments.

Battery Safety

As part of the product development process, manufacturers should conduct an assessment of safety risks associated with lithium-ion batteries, including the thermal stability of active materials within the battery at high temperatures or the occurrence of internal short circuits that may lead to thermal runaway. UL employs failure modes & effects analysis and fault tree analysis to understand root causes and define tests to comply with product safety standards.

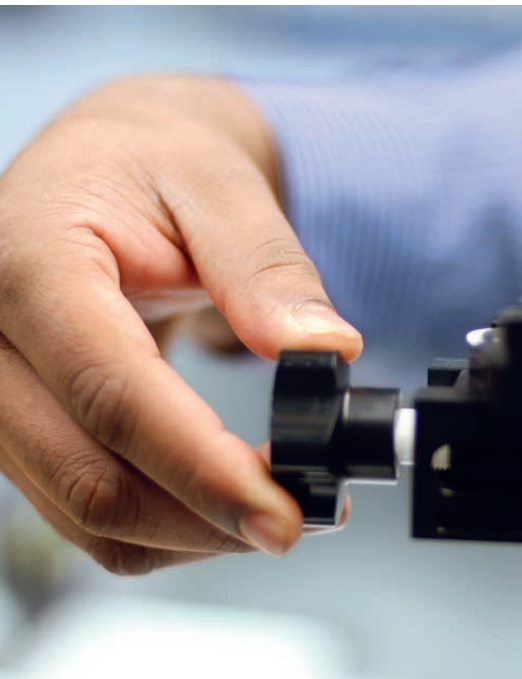
Specific Absorption Rate (SAR)

Certain WT devices incorporating wireless technology are often subject to testing to determine the amount of electromagnetic radiation produced by a device under the most extreme use conditions at a given distance from the human head or body.

Chemical Content and Biocompatibility

The components and materials used in WT devices may include chemicals which can be harmful as a result of prolonged exposure. A chemical content assessment identifies levels of potentially harmful chemicals in these materials.

TESTING FOR PERFORMANCE, SUSTAINABILITY AND USABILITY



PERFORMANCE

Electromagnetic Compatibility (EMC)

Regardless of their power source, electrical devices must not create unintended electromagnetic interference with other electrical devices, and must be immune to electromagnetic interference from other devices. Due to the environment in which wearable medical, health and wellness devices are used, it is recommended that testing be conducted for both emission and immunity characteristics.

Wireless Interoperability

WT products transmit data to other devices via wireless technologies and protocols. Wireless interoperability testing evaluates a particular technology's effectiveness in exchanging information with other compatible wireless technologies.

M2M Approval

UL works closely with customers to test and approve wireless M2M products that utilize communications protocols and technologies such as cellular (GSM/UMTS/LTE), Bluetooth (including 4.0), NFC, WiMAX and Wi-Fi.

Privacy and Data Security

In addition to wireless interoperability, securing private information during wireless transmission has become a primary concern. Privacy and security testing evaluates potential vulnerabilities that could make a WT product a target for malicious cyber or physical layer attacks.

Energy Efficiency

Users expect WT products to operate for reasonable periods of time between recharging, thereby requiring devices to use available energy as efficiently as possible.

ENVIRONMENTAL

Environmental and Sustainability Considerations

WT products that use materials from environmentally sustainable resources and minimize end-of-life environmental waste are important considerations for many buyers.

USABILITY

User Experience and Usability

With Human Factors Engineering (HFE) and usability evaluation and testing, UL assesses product functionality, performance and interoperability to key standards. Every effort is made at this stage to address all the customer's expectations for an excellent user experience.



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