



Expertise Applied | Answers Delivered

## Personal care and healthcare devices

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Appliances



Healthcare

*Users must independently evaluate the suitability of and test each product selected for their own specific applications. It is the User's sole responsibility to determine their fitness for a particular system or use based on their own performance criteria, conditions, specific application, compatibility with other parts, and environmental conditions. Users must independently provide appropriate design and operating safeguards to minimize any risks associated with their applications and products. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [littelfuse.com/disclaimer-electronics](https://littelfuse.com/disclaimer-electronics).*



# Personal care and healthcare products are becoming important aspects of everyday life





# The personal care and healthcare monitoring device market is growing globally at a CAGR of ~6%

## Market trends and drivers

Personal care and healthcare monitoring devices are becoming smarter, smaller, and battery powered with many electronic and sensing features

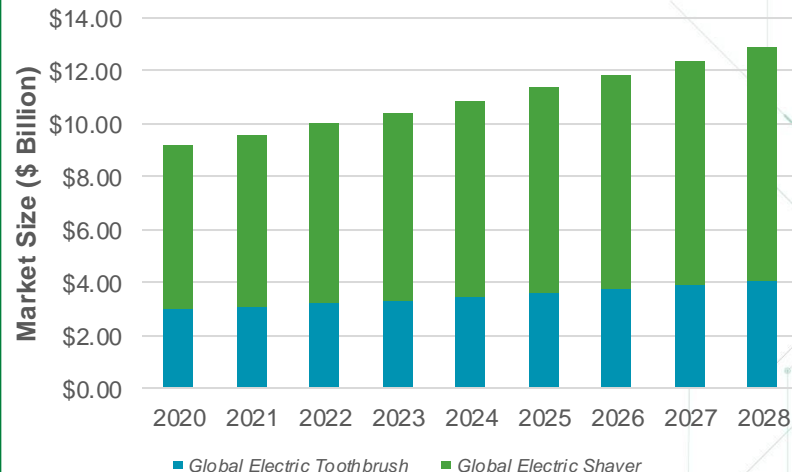
The personal care electrical appliances market size was valued at \$19.6 billion in 2020 and is projected to reach \$42.5 billion by 2031, at CAGR 7%

The global market for consumer healthcare devices has been estimated reach \$21.8 billion by 2027, steadily growing at a steady CAGR of 5%

Global health and wellbeing awareness is driving strong market growth of devices such as electric toothbrushes, blood pressure meters, heart rate monitors, as well as other innovative electronic healthcare products

Increased emphasis on incorporating AI technologies with use of real-time monitoring, recording, and reporting of information → increased use of electronic components and connectivity with mobile devices

## Personal care market projection





# Design complexities increasing as personal care and healthcare devices include more capabilities

## Key design challenges

**Faster time to market** → engineers are under pressure to release new designs more frequently with new and advanced features



## Littelfuse value proposition

Littelfuse UL/IEC certified devices can help reduce customer qualification time + Littelfuse can assist with global certifications, regulatory standards, and testing

**Extended battery life** → Longer battery life and faster charging to extend equipment up-time



Low resistance battery protection devices can help provide overcurrent and over-temperature protection while maximizing battery device run time & charging

**Innovative and compact designs** → small PCB designs needed to meet new ergonomic and aesthetic features + improve user end-product experience



Features such as small SMD packages enable for more compact designs and greater layout flexibility

Littelfuse helps designers improve safety, reliability, and efficiency + offers more design flexibility



# Examples of Littelfuse products found in personal care and healthcare devices

## AC input protection

Fuse



## User interface

Switch



## Battery protection

PPTC, TVS Diode, NTC



## Control board

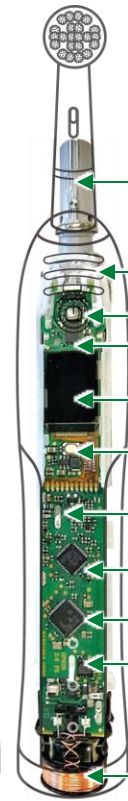
Microcontroller



Primary coil  
inside charger

AC main

Charging unit



Sensor

Motor

Mode select switch  
H-bridge motor driver

LCD Screen

ON/OFF switch

Battery protection

Main MCU


Bluetooth

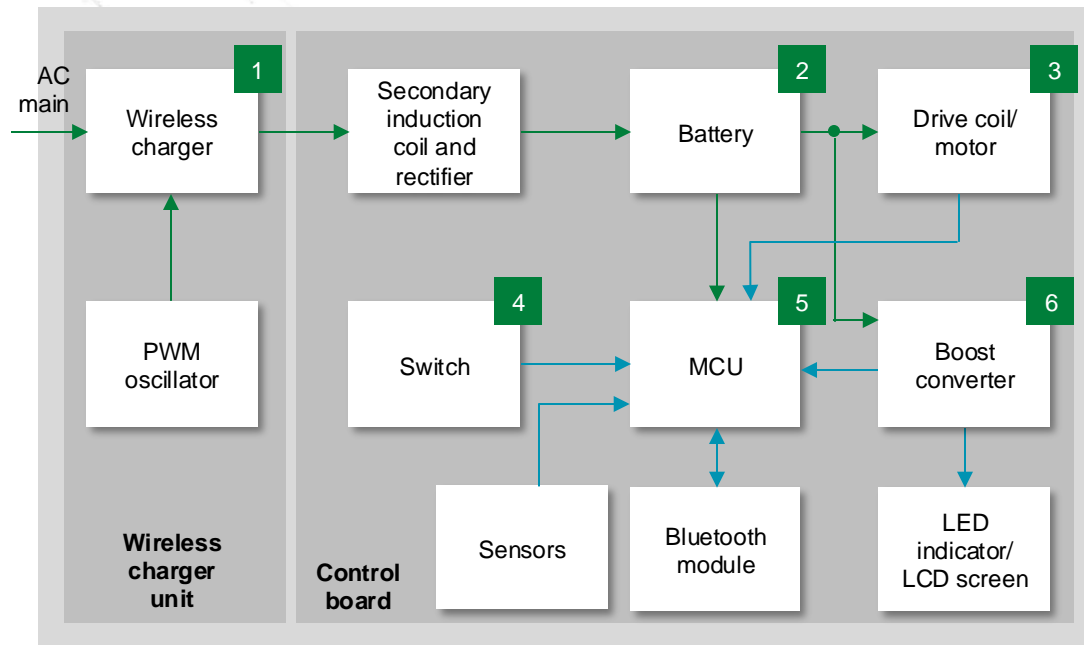
Flash memory

Secondary coil  
Inside toothbrush



# Many personal care and healthcare devices share a similar system architectures

 Click on the product series in the table below for more info



	Technology	Series
1	UL, IEC listed AC fuse	<a href="#">Axial/Radial (875)</a> <a href="#">TR/TE (389)</a>
2	PPTC	<a href="#">0805L</a> , <a href="#">1210L</a>
	Fuse	<a href="#">494</a>
	TVS Diode	<a href="#">P4SMA12A</a>
	NTC	<a href="#">KR</a>
3	PPTC	<a href="#">0805L</a> , <a href="#">1210L</a>
4	Switch	<a href="#">PTS815</a> , <a href="#">KMS</a>
5	MCU	<a href="#">S3F8S15</a> , <a href="#">S3F8S19</a> , <a href="#">S3F8S24</a> , <a href="#">S3F8S28</a> , <a href="#">S3F8S35</a> , Z8F1625*
6	PPTC	<a href="#">0805L</a> , <a href="#">1210L</a>

\* New product, please contact sales for detail



# Features and benefits of Littelfuse products found in typical personal care and healthcare devices



Click on the product series in the table below for more info

	Technology	Function in application	Product series	Benefits	Features
1	AC fuse	Protects the power stage from overcurrent events	<a href="#">Axial/Radial (875)</a> <a href="#">TR/TE (389)</a>	Reduces customer qualification time by complying with regulatory safety standards, such as UL/IEC	Compliant with UL/IEC standards; low internal resistance; shock safe; vibration resistant
2	PPTC	Protects battery from short circuit or over-current events	<a href="#">0805L</a> , <a href="#">1210L</a>	Resettable protection, space-saving by enabling use of smaller TVS diode, low resistance enables longer battery life and faster charging	PolySwitch devices with low internal resistance; higher current holding in smallest SMD package
	Fuse		<a href="#">494</a>	Allows for space saving	Surface mount, compact form factor, wide selection of current rating
	TVS diode	Input protection against voltage transients	<a href="#">P4SMA12A</a>	Saves space; promotes more robust operation	Small form factor; excellent clamping
	NTC	Temperature sensing	<a href="#">KR</a>	Promotes more robust operation; allows design flexibility	Surface mountable; small form factor
3	PPTC	Protects motor drive MOSFETs from overcurrent such as short-circuit or across the motor windings	<a href="#">0805L</a> , <a href="#">1210L</a>	Resettable devices protects when needed and can resume operation when OK again, board space saving; enables overall better user experience	Low internal resistance; higher current holding in smallest SMD package
4	Switch	Turns unit on/off, selects speed, and function	<a href="#">PTS815</a> , <a href="#">KMS</a>	Saves space; reliable and repeatable haptic performance elevates end-users' experience	C&K Switch Microminiature, short travel, PCB mount tactile with a minimum of 100 k-operations
5	MCU	Controlling specific functions such as turning on/off motor function and others	<a href="#">S3F8S15</a> , <a href="#">S3F8S19</a> , <a href="#">S3F8S24</a> , <a href="#">S3F8S28</a> , <a href="#">S3F8S35</a> , Z8F1625*	Simplifies design; low power consumption; smaller compared with 32-bit MCU (20-SSOP/SOP); available in pellet/die for chip on board	Robust to EFT (4 kV) and ESD; low power 5 V operation; LCD ON & IDLE mode: 2.5 $\mu$ A; Precision Internal Oscillator: $\pm 1\%$ @ 1.8 V~5.5 V and 25 $^{\circ}$ C; STOP mode: 1 $\mu$ A
6	PPTC	Protects the boost converter and LCD screen from inrush current damage during startup	<a href="#">0805L</a> , <a href="#">1210L</a>	Board space saving; promotes robust operations	Low internal resistance; higher current holding in smallest SMD package



# Select standards that may be applicable for personal care and healthcare medical devices

Standard	Title	General scope	Region
UL 1431	Standard for personal hygiene and health care appliances	These requirements cover household electric products with personal hygienics or health care applications, such as hydromassage units, contact lens disinfectors & cleaners, and toothbrushes, rated at 250 V or less, for use on premises that have wiring in accordance with the National Electrical Code	North America
IEC 60335	Household and similar electrical appliances–Safety–Part 1: General requirements	This standard deals with the safety of electrical appliances for household and similar purposes and their rated voltage being not more than 250 V for single-phase appliances and 480 V for other appliances, including direct current (DC) supplied appliances and battery-operated appliances	Global
UL 2054/1642	Household and commercial batteries	Safety standards that deal with cells and small portable batteries; UL1642 is applied to individual cells, whereas UL2054 is for small rechargeable battery packs	North America
IEC 62133-2 & UL 62133-2	Safety requirements for portable sealed secondary lithium cells	Evaluating protection during various battery-fault scenarios	Global
IEC 62368-1	Audio/video, information, and communication technology equipment–Part 1: safety requirements	This part of IEC 62368 is a product safety standard that classifies energy sources; prescribes safeguards against those energy sources; and provides guidance on the application of, and requirements for, those safeguards	Global



# Additional information can be found at [Littelfuse.com](http://Littelfuse.com)

Explore the world of Littelfuse products and applications with eCatalogs ([ecatalogs.littelfuse.com](http://ecatalogs.littelfuse.com))



Circuit Protection  
Selection Guide



Sensing Products  
Selection Guide



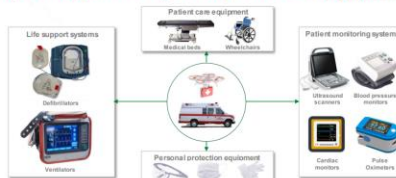
Lithium-Ion Battery Pack  
Protection with PPTC



Portable Medical Devices  
Protection Guide

Click on  
images for  
more  
information

## Immediate need for pulmonary, cardio-vascular, and diagnostic systems + general patient care equipment



Robust designs and quality components needed to help with reliable operation & equipment up-time

Emergency Medical  
Equipment Spotlight

## SWITCHES FOR PERSONAL CARE APPLICATIONS

Today's personal care products have evolved beyond basic hygiene and functionality to encompass every aspect of modern living, making it critical that the switches that control them can withstand regular daily usage and exposure to the elements. From a simple on/off switch to a complex multi-function switch, Littelfuse has the expertise and resources to help you design the switch that meets your needs.

Select a product to view technical specifications, always and request a sample.

Applications	Key Products
Electric Toothbrushes	PS, KMTD, K3M6, PPS445, K3C
Electric Shavers	KMT2, KMTD, PPS330, PPS410, K3C3, K3C, K3C
Electric Trimmers	S, L, LP, 1000
Shave Care	

Switches for Personal  
Care Applications



# Local resources supporting our global customers



## Legend

- Sales
- R&D
- Manufacturing



# Partner for tomorrow's electronic systems

## BROAD PRODUCT PORTFOLIO

An industrial technology manufacturing company empowering a sustainable, connected, and safer world

## APPLICATION EXPERTISE

Our engineers partner directly with customers to help speed up product design and meet their unique needs

## GLOBAL CUSTOMER SERVICE

Our global customer service team is with you to anticipate your needs and ensure a seamless experience

## COMPLIANCE AND REGULATORY EXPERTISE

We help customers in the design process to account for requirements set by global regulatory authorities

## TESTING CAPABILITIES

We help customers get products to market faster and offer certification testing to global regulatory standards

## GLOBAL MANUFACTURING

High-volume manufacturing that is committed to the highest quality standards





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