WHITEPAPER PREVIEW

Engineering modern intelligent home appliances

Design challenges and emerging trends in the smart home domain: from vacuum cleaners to fridges, Matter, WBG and sensor solutions

Abstract

The smart kitchen is transforming the home appliance industry, driven by end consumers' demands for efficiency, convenience, and sustainability. This whitepaper examines the latest trends, challenges, and enabling technologies that shape next-generation appliances, including induction cooktops, refrigerators, cordless vacuum cleaners, and washing machines. Modern electrical designs focus on sustainability through energy-efficient components, recyclable materials, and longer product lifespans.

In **Chapter 1**, the paper highlights the growing importance of energy-efficient and recyclable designs that align with global sustainability goals, supported by advanced technologies such as wide bandgap (WBG) semiconductors and optimized motor control systems. AI and machine learning add intelligence for predictive maintenance, personalized experiences, and efficiency optimization. Connectivity solutions, particularly the adoption of the Matter standard, enable seamless interoperability across smart home ecosystems, while advanced sensors enhance safety and interaction.

Chapter 2 dives into the engineering challenges per home appliance such as managing system complexity while meeting demands for energy efficiency, intuitive interfaces, and robust connectivity. Induction cooktops are integrating GaN and SiC technologies for carbon neutrality, while refrigerators must balance low energy use with compliance and affordability. Cordless vacuum cleaners focus on extending battery life and reducing weight, and washing machines require advanced motor control for resource efficiency and smart monitoring.

Matter plays a key role in enabling device compatibility, simplifying integration, and enhancing security, marking a significant step toward a cohesive smart home experience (**Chapter 3**). The whitepaper's second half (**Chapter 4**) presents the Infineon Technologies offered solutions to meet these challenges, including WBG power devices, AI-enabling micro-controllers, advanced sensing technologies, and secure connectivity. Infineon's portfolio empowers manufacturers to design appliances that are energy-efficient, intelligent, and interoperable.

This whitepaper concludes that as technology continues to advance, the smart kitchen will become increasingly interconnected, efficient, and user centric. By adopting open standards like Matter and leveraging cutting-edge semiconductor technologies, the industry is poised to address future challenges and redefine the home appliance landscape.

Download the full version here.

Additionally, don't miss out the latest version of the Home Appliance Selection Guide: The ultimate buyer's guide: Trend insights, product recommendations and complete overview for your design.

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