



# Securing the digital payment experiences of tomorrow

Which innovations will transform our payment world by 2030?

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# Welcome to the future of payments, delivered by Infineon

Join us on this exciting journey as consumer trends evolve in line with technical innovation.

The past few years have seen adoption of new payment devices, such as mobiles and wearables, accelerate significantly. At the same time, consumers have grown familiar with biometric authentication and increased their calls for a more sustainable world.

Banks and fintechs are understandably looking for ways to differentiate themselves with consumers, to meet and exceed their expectations. Some are offering different types of cards, such as premium metal cards or innovative LED designs that light up when a card is used. In the coming years, banks and fintechs will want to give consumers even more choice, providing more sustainable card options and greater convenience using biometrics. This is critical to securing their loyalty, as consumers seek versatile payment solutions that can seamlessly fit in with their lifestyle.

While there are challenges to overcome, not least always-changing customer demands, regulations and fraud risks, there is so much to be excited about in the future of payments.

In five years' time you might find yourself paying to charge your electric vehicle without needing to leave your car or take out your wallet and you might be paying for goods and services online and in-store via a new digital currency.

While optimal convenience and security are crucial, it's also essential to consider user options and financial inclusion. The goal is to create highly secured, convenient omnichannel payment experiences. This encompasses physical, digital and embedded options that place consumer choice at the forefront of technological innovation, enabling new use cases, business models and form factors.

How? With Infineon! Let's explore ...

## Content

In this brochure, we explore the challenges and innovations that will shape our payment world by the end of the decade, including:

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## SUSTAINABLE PAYMENTS

# What expectations do consumers have for more sustainable payments?

Climate change is one of the top three concerns for consumers, according to [research commissioned by Visa](#), while [Credit Suisse](#) found that 90% of consumers are concerned or very concerned about the state of the overall environment. We must all play our part in driving the green transition, including the payments industry.

There is a clear market demand for more eco-friendly materials (most used materials are recycled PVC and PETG), especially when it comes to physical payment cards. Steep growth is coming, with recycled PVC shipments expected to increase from 350 million in 2022 to 850 million by 2026. In 2022, 30% of all cards

shipped in Europe were made with eco-friendly materials making it the largest region for “eco-card delivery”, while in 2028 approximately 50% of the entire payment market will be based on recycled materials (source: ABI research 2023). The number of recycled PETG cards made from manufactured recycled waste is also set to rise, from 45 million in 2022 to 65 million in 2026. PETG shows huge potential as a future, more sustainable card material thanks to its use of existing recycling infrastructure. Being able to offer consumers more sustainable payment cards – potentially as part of a Premium service – helps to deliver on this demand for greener options.



### Optimising green energy usage – why is sustainability important to Infineon?

Infineon ranks among the most sustainable companies in the world. In 2021, we reduced our carbon footprint and delivered a net ecological benefit of 113 million tons of CO<sub>2</sub> emissions reductions. “Making more out of less” is the Infineon approach when it comes to helping solve today’s challenges and actively

creating a better future. Sustainability starts with the right choice of partner, and as the market leader for power semiconductors, Infineon enables energy efficiency optimization both today and for the future along the entire electrical energy chain – in mobility, industry, communication and beyond.





## SUSTAINABLE PAYMENTS

# What sustainable substitutes will make payments more environmentally friendly?

Infineon innovation is already enabling the production of thinner, more durable and eco-friendly, long-lasting cards. For instance, Infineon's groundbreaking development of the world's thinnest dual interface module has resulted in cards with 70% less weight and 50% less thickness. This trend will continue, with the next generation of cards manufactured using ever more sustainable materials. Thanks to Infineon's technology and long-lasting **TEGRION™** security controllers, cards will also be usable for longer time, potentially reducing the frequency of new cards being manufactured.

In order to produce an environmentally friendly payment card, manufacturers should consider constructing the card without sandwich layers for the copper wire antenna sheet. By eliminating the embedded copper and simplifying the architecture, the card can be designed using one material stack. Removing this one component can lead to an impressive 85% reduction in the CO<sub>2</sub> emissions associated with the sourcing and logistics of payment cards' electrical components (source: Climate Partner Report: "Product Carbon Footprint" for SECORA™ Pay Green).

By adopting new card system designs that eliminate the need for antenna inlays, it would be possible to use truly sustainable and fully recyclable materials, which can be sourced and produced locally. This would significantly reduce the amount of energy and material required, including copper for copper-wire antenna and decrease carbon emissions related to mining and transportation.

### What is inductive coupling and its benefits?

Infineon's Coil on Module dual interface chip packaging technology uses a radio frequency link instead of the traditional mechanical-electrical connection used between a card's antenna and the chip module. Known as inductive coupling, this method simplifies card design while also increasing cards' robustness and long-term reliability by removing mechanical stress.

## BIOMETRIC PAYMENTS

# Why offer biometric payment cards?

In recent years, there has been a clear shift in global payments trends towards contactless payments. Today's consumers expect their payment experiences to be convenient and secured. The question for banks and fintechs is how can they deliver more convenient payment experiences using second factor authentication?

Biometric smart cards can help enable the convenient, innovative and personalized payment experiences that your customers desire. We're familiar using biometrics in our daily lives to unlock devices or paying with a fingerprint on our smart phones. Biometric smart cards enable verification for payment transactions just using a banking card in their pocket – a huge convenience boost for consumers. The next step is for banks to get these cards into the hands of consumers at scale, helping boost top of wallet status with a card that delivers more than just cosmetic value.

### Benefits of fingerprint authentication solutions on payment cards



- **Convenient**  
Biometric two-factor authentication
- **Privacy**  
Allows fingerprint data to be processed inside the security controller only
- **Data protection**  
Biometric credentials are stored in the card, not in a background system
- **Hygienic**  
Touchless interaction with POS terminal
- **Fast**  
Biometric two-factor authentication can be used as a PIN alternative
- **Peace of mind**  
Two-factor authentication
- **Ready to use**  
No infrastructure upgrade required
- **Consumer interest**  
77% of consumers are satisfied with the use of biometric authentication  
Source: Payments Cards & Mobile



### Enabling consumers with biometric payment cards

Payment cards remain the most common and important physical touchpoint between issuers and customers. Payment cards in circulation worldwide will continue to rise, with the [Nilson Report](#) projecting numbers will reach 29.99 billion by December 2028, up from 25.8 billion at the end of 2022.

Biometric cards enable a similar authentication experience like mobile payments and provide biometric two-factor authentication that can be used as a PIN alternative. Consumers are also comfortable with biometrics, with [research](#) showing 88% of respondents want their banks to upgrade their contactless payment cards to support biometrics.

## BIOMETRIC PAYMENTS

# How do banks securely get biometric cards into the hands of consumers?

Infineon is the only company with a pre-certified, all-in-one module solution for biometric sensor cards. Based on its easy-to-integrate inductive coupling technology (Biometric Coil on Module), this solution reduces the cards' Bill of Materials (BOM) and complexity – enabling scalable and cost-effective production of high-quality, robust, high-yield biometric cards. This technology reduces card manufacturing efforts, shortens time-to-market and is helping banks get cards to a greater number of consumer wallets faster. The pre-certified payment solution enables card manufacturers to get a paper approval within 2 – 3 weeks.

But consumers will not adopt biometric payment cards unless enrollment is easy and hassle-free. That's why Infineon and its industry partners are facilitating three methods of enrolling biometric authentication onto cards.

### Smartphone enrollment

enables cardholders to enroll their biometric onto their card using a mobile application on their NFC-enabled smart phone. To make this process even easier, Infineon can provide its unique enrollment sheet: by placing the card and phone next to each other on the enrollment sheet, a connection is made between the two and the biometric is enrolled, hassle-free.

### In-field enrollment

will see consumers authenticate their biometrics over the course of their normal shopping routine. Each time a user uses their fingerprint at a POS, it confirms their biometric credential linked to the card. After a set number of transactions, the card is automatically enrolled to this fingerprint.



### Sleeve enrollment

will use a dedicated device which is delivered alongside the card. The card is inserted into the sleeve and the user then only has to place their finger on the card sensor to enroll the biometric from the comfort of their own home.



In the spirit of choice, these enrollment options can also be completed in-branch for those who prefer an in-person experience.



Scan QR code and find out more about [enrollment options](#)

## SMART WEARABLES AND PAYMENT ACCESSORIES

# What will turn wearables from a “nice-to-have” to a true payments value-add?



Use of wearable devices has accelerated in recent years, offering a quick and easy way to pay for goods and services without needing to take out your wallet. The payment capabilities of wearable devices are enabled by end users via payment tokenization, with transactions trackable via an app on a smartphone.

OEMs will continue to explore ways of turning everyday wearable objects – such as rings or bracelets – into connected devices that can be used for payment.

This is in addition to smart, battery-powered active wearables – such as smartwatches – that can provide more features like fitness tracking and texting capabilities.

Infineon has developed a unique design approach to small, passive wearables, with an ultra-small antenna that enables the device to combine payment and NFC wireless charging capabilities.



The rise of smart wearables has given users greater flexibility of choice when it comes to payment form factors. Wearables provide users with the choice to pay with something they may find more convenient than a phone. For instance, a ring can be worn on the user's body and is a good option for those who value ultimate convenience. By enabling wider choice, OEMs can offer consumers a true value-add, embedding seamless payment capabilities and choice into their daily lives by providing more device versatility.

### Empowering Smart Wearables and IoT devices with payments and beyond

Wearables will drive more convenient travel experiences as use of new wireless technologies like Ultra Wideband (UWB) offer better, more precise location range accuracy. This will enable a secured, touchless, hands-free experience, for example: transit ticket gates could recognize a traveler as they arrive at the gate, identify their linked payment methods and authenticate payment, so they can proceed on their journey without needing to physically present their device.



## INTERNET OF THINGS

# How will digital payments accelerate consumer convenience?

Globally, we've seen a surge in digital payments as consumers increasingly transact online remotely from anywhere they choose. In the EU, digital payments already have a 60% market share, which will only continue to rise. By 2027, new digital payment methods will make up approximately 30% of the total global payments volume.

Digitizing payment cards into different devices and accessories such as wearables, laptops or gaming consoles has been a priority to increase convenience and reduce the barriers to payment either in person, online or as part of an in-app experience. Of course, security and connectivity are key to enabling these convenient digital payments.

In the years to come, expect payment form factors to continue to diversify as consumer behavior

changes. For example, the rise in electric vehicles will require more frequent charging stops, driving in-car payment functionality for consumer comfort so they do not have to leave their car while it recharges. Vehicles will become like a payment device for multiple transactions, such as paying for toll roads, parking and charging, enabling ultimate convenience and encouraging uptake of newer, smarter, greener cars.

As the trend of enabling payment functionality in more devices continues, industries that have never had to contemplate payment security will have to verify they deliver convenience and security, or risk losing ground to rivals. Working together with one-stop-shop technology partners that can help them achieve this balance will be crucial.

## How can we protect new digital payments?

What do smart wearables, notebooks/tablets, gaming consoles and in-car-payments have in common? A need for high levels of security. If any device can be a payment device, layered security is critical to verify convenience does not compromise protection from potential scams and fraud.



### Secure Element

For some devices, this may make use of the Secure Element (SE). An SE is a secured payment chip which stores sensitive data required for payment applications and can be used in any device. The SE is also the hub for providing digital connectivity through its numerous interfaces. Infineon SEs have secured storage and tamper detection capabilities to protect the confidentiality, integrity and authenticity of information and devices. This provides high levels of security at the source.



### Tokenization

Payment tokenization will be another important solution in the coming years, especially for industries and OEMs who are not used to handling payments. To enable payment on a device, tokenization is required, as it helps to encrypt customer payment information on the device by replacing the sensitive card information (Primary Account Number, or PAN) with substitute data or "tokens". These tokens can then be securely stored in systems for future without the original data being held.



### CDCVM\*

Infineon also provides further security through a biometric authentication method between IoT devices and cloud-based payments, requiring a cardholder to verify a transaction on their device by using a passcode or with a biometric verification method. This helps to make the user experience as frictionless and convenient as possible, without compromising on security.

\* Consumer Device Cardholder Verification Method

### The rise of the digital wallet

Digital wallets will enjoy significant adoption by the end of the decade, enabling individuals to use a verified digital identity to perform a range of tasks from providing proof of age, to accessing healthcare services or making payments. Juniper Research estimates digital wallet users will exceed 5.2 billion globally as soon as 2026, representing strong growth of over 53% from 2022. As more payments are made from digital wallets stored on more devices, authentication methods are also changing. For instance, use of FIDO passkeys –

alternative sign-in credentials that don't require a password – to verify a user's identity is on the rise, enabling a more convenient, passwordless authentication experience on websites and apps. These passkeys should be stored in a SE rather than the cloud. This will allow the necessary security levels to provide peace of mind that sensitive user data is protected, and safeguard OEMs against constantly rising fraud rates for card-not-present payment transactions.



## DIGITAL CURRENCIES

# Will CBDCs complement cash and cards?



### Central bank digital currencies

As cryptocurrencies and stablecoins both gained and lost momentum in recent years, governments began exploring central bank digital currencies (CBDCs) as a way to preserve the financial authority of central banks and offer a trusted, alternative payment option for citizens. Think of CBDCs as digital money that can be issued by a country's central bank alongside cash.

Different technologies are being explored, such as the EUDI digital wallet for EU citizens, which will be stored on a citizen's smart phone, which will enable offline use of CBDCs so consumers can spend digital money no matter where they are. This offline functionality will be critical to provide resilience and boost inclusion.

Whichever form factor is used to pay with a CBDC – be that a smartphone, wearable, smart card – securing offline usage will be critical for central banks, as well as delivering trust within each pilot project and any subsequent roll-out.

Hardware-based security is one option being explored to increase protection and resilience. This includes existing solutions such as the Secure Element, which enables personal data and financial information to be stored in a secured area on the payment device or smart card. Solutions based on eSIM will be another hardware-based security option to protect CBDCs, embedded within a mobile or IoT device to reduce the risk of bad actors accessing and extracting sensitive information.

### Rising in popularity: CBDC pilot projects across the world

Research from the Atlantic Council's [CBDC tracker](#) shows over 130 countries are exploring a CBDC, representing 98% of global GDP. For instance, in early 2024, the European Central Bank began inviting potential suppliers of components and services related to the creation of a Digital Euro CBDC to submit applications to establish framework agreements.

As part of this, central banks must understand the importance of creating a robust, resilient system capable of protecting a nation's economy against rising fraud levels without relying on a network connection.



# Innovations enabling your growth

## Why is Infineon trusted worldwide to enable highly secured, convenient payment experiences?

Infineon means innovation and innovation means opportunities for business growth. Here are just some of the recent innovations from Infineon that help to expand and protect payment offers globally:



### SOLID FLASH™

This future-proof memory concept meets the growing demand for supply chain flexibility. The smart design supports loading software during card production and accelerates time-to-market by over 50%.



### Integrity Guard 32

Integrity Guard 32 enables higher levels of security without compromising on performance and reliability. The solution takes a holistic approach, integrating the system's processing core, on-chip memories, buses, caches, crypto accelerators and peripheral interfaces into a comprehensive security architecture.



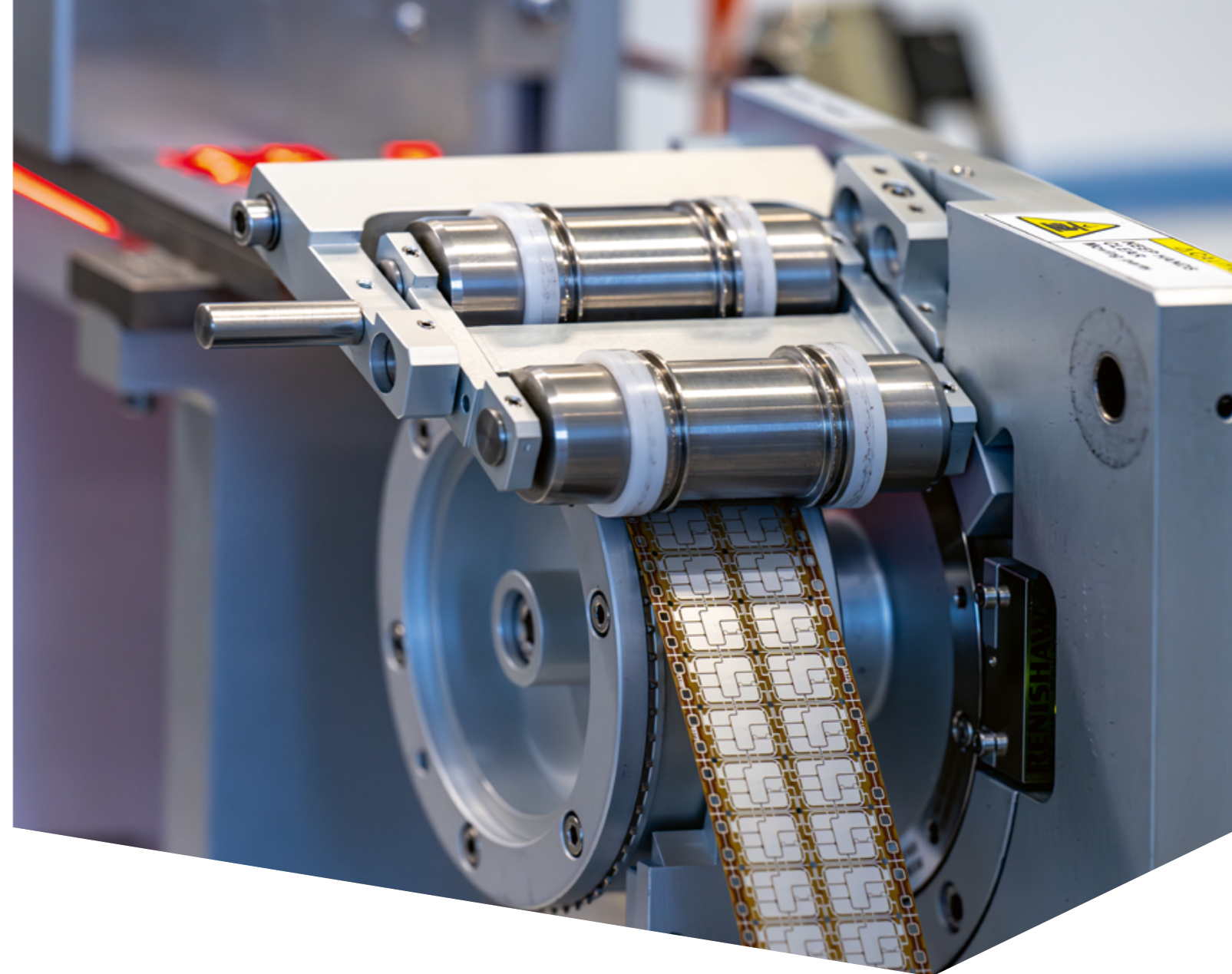
### Coil on Module

Coil on Module (CoM) technology simplifies the transition from contact-based to dual-interface schemes that enable contactless.



### Biometric Coil on Module

The Biometric Coil on Module (BCoM) solution integrates the Secure Element and a biometric sensor into a small package, based on inductive coupling technology. This significantly improves the robustness and long-term reliability of biometric payment cards.



### TEGRION™

TEGRION™ security controllers deliver hardware security, efficiency, performance and ease of implementation at the same time. This level of security also supports an extended product lifetime, meaning cards are in consumers' wallets for longer.

Infineon will continue to support TEGRION™ security controllers as part of our latest 28 nm payment portfolio for enhanced security.

#### Discover more



Coil on Module



Integrity Guard 32



BCoM



TEGRION™

# Which Infineon payment security products are right for you and your customers?

Digitalization is making our lives easier and more convenient, but it also increases the need to protect identities and personal information. Infineon's security solutions for smart payment cards and beyond can give you peace of mind that you and your customers' sensitive data and payments are safeguarded:

## SECORA™ Pay Bio

is an all-in-one solution for biometric payment card applications, pre-certified for Visa and Mastercard applets without additional functional approvals required. It provides best-in-class contactless performance and advanced fingerprint sensor technology in a tiny chip. This will simplify and standardize biometric payment card production for card manufacturers while also enabling frictionless payment experiences for cardholders, with an additional authentication option.

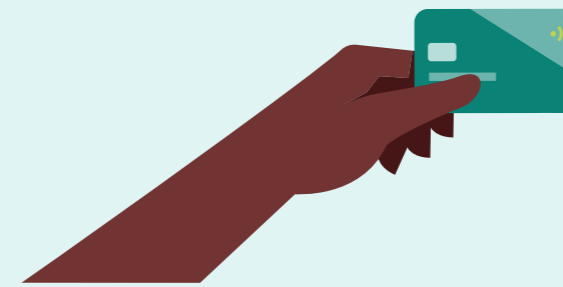
## SECORA™ Pay

represents a family of Infineon solutions, which enables contactless payment functionality. SECORA™ Pay products use a security controller with certified software integrated into Coil on Module (CoM) chips. This results in easier, quicker card production, and faster contactless transaction performance without compromising on security.

## SECORA™ Connect

is designed to enable embedded payments such as smart wearables, laptop payment wallets or in-car payments to provide contactless secured payment and transportation ticketing via Near Field Communication (NFC). This enables contactless payment functionality to be securely integrated in virtually any device, providing limitless choice and ultimate convenience for consumers.

# Infineon fast facts



## Global payment market leader

According to ABI Research, Infineon has held the number one market share position over the last 7 years.



**28 nm**

is the size of our technology node for payment chips, offering a great balance between reliability, performance, and cost.



**43%**

payment global market share: nearly every second card contains an Infineon payment chip.

Source: ABI Research "Payment and Banking card Secure IC Technologies", 2024 QTR 1



**-100%**

Infineon is committed to binding CO<sub>2</sub> reduction targets: -70% in 2025 and -100% in 2030

Source: Infineon Sustainability Report, RE100 Renewable Energy 100

## > 20 BSI approvals

feature Infineon among the highest numbers of approved EAL6+ products.

Source: BSI



# Taking your next step forward

## How will Infineon and the payments industry navigate this next leap forward together?

Behaviors, trends, technologies and regulations are evolving quickly, as preferences change and new use cases emerge that add value to our daily lives.

Of course, the great unknown on the horizon is the arrival of quantum computing. While nobody can say when, it will have a huge impact on the payments landscape as the technology offers bad actors the opportunity to break complex encryption algorithms and potentially decrypt sensitive information, compromising the security of financial transactions.

The good news is the industry is ready, with “post-quantum cryptography (PQC)” alternatives already available and strong enough to protect payment transactions

As an innovator and global security leader, Infineon continues to invest millions into research and development to allow that its technologies help keep you and your customers secured, long into the future.



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