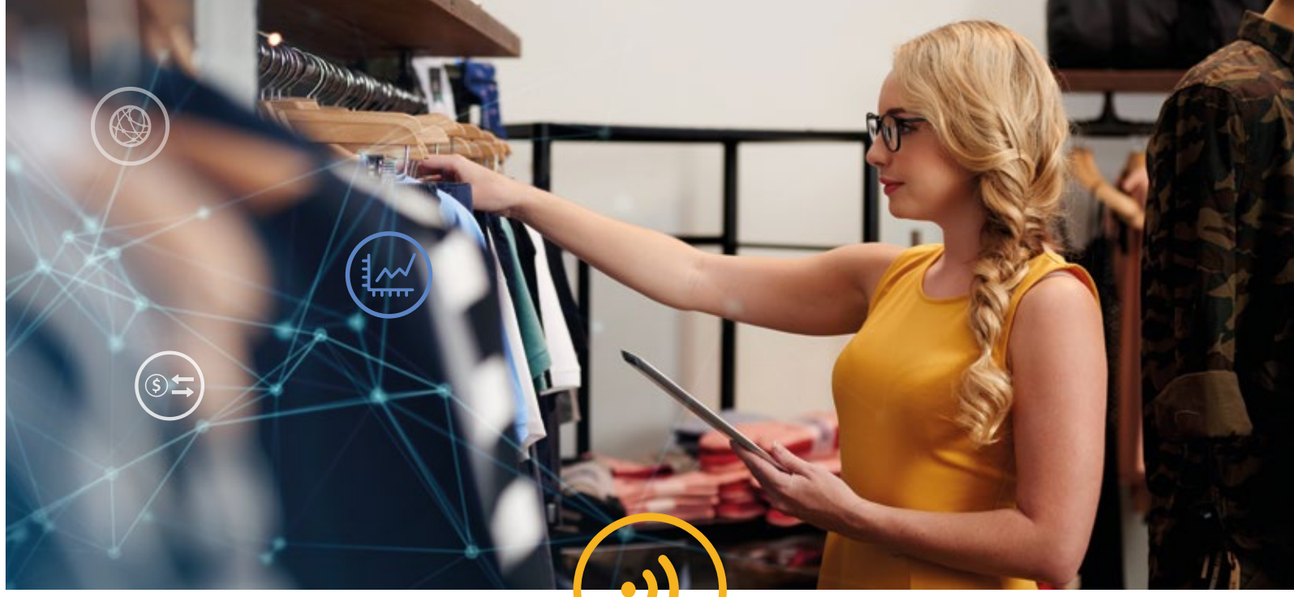
SMART RETAIL:
EFFICIENT, ENERGIZED & ENGAGED

An application guide to *NXP's RAIN RFID/ NFC* portfolio

RETAIL REVIVAL

There is a **retail revolution** underway, driven by technology. Technology is helping retailers drive sales, interact with shoppers, enhance consumer satisfaction, nurture customer relationships and loyalty, increase shopping convenience, improve operational efficiency, and generally bring new energy to the shopping experience, by engaging with consumers at deeper, more meaningful levels.

It's called Smart Retail, and it's what happens when businesses successfully integrate online, offline, logistics, and data across a single value chain. Whether deployed in-store or online, via e-commerce or m-commerce, smart retail generates a competitive advantage by creating omni-channel retail opportunities that not only make shopping easier but also transform consumer experiences.



The Future is Here

Smart retail builds on the Internet of Things (IoT), which uses connected objects to gather real-time data, generate new insights, deliver personalized shopper experiences, and make better-informed operational decisions – at any point in the retail process and at any time. A large number of these retail-focused IoT setups, in turn, build on Radio Frequency IDentification (RFID), a key battery-less wireless technology that has become almost omnipresent in today's IoT-driven world.

Three variants of RFID technology – RAIN RFID, NFC, and Vicinity RFID – work separately and together to transform retail. Supporting wireless, cloud-based, and mobile use cases, they reach from manufacturing, warehousing, and distribution to the store itself, and even into the consumer's hands. They digitalizing the supply chain, make cashierless stores a reality, and let consumers engage like never before.

NXP Leads the Way

Many of today's most important smart retail applications are enabled by technologies pioneered by NXP. Having shipped billions of RFID ICs, we continue to refine and evolve our wireless architectures. We deliver exceptional performance, with best-in-class range, speed, and accuracy, and regularly introduce new functionality, such as self-adjusting operation and open-status detection – all while offering the highest levels of security.

We understand how to blend the worlds of mobile and brick-and-mortar retail, and help retailers create opportunities by enabling a holistic and seamless consumer experience. Our portfolio supports the most relevant use cases in retail, and includes tailored solutions that bring unprecedented flexibility, convenience, and security to the smart retail era. Through our extended network of support partners, we supply everything retailers need to develop smart, connected applications.

TRANSFORMATIONAL TECHNOLOGY

RFID technologies are already used throughout the retail universe, because they help retailers get ahead and stay ahead. Offering fast, accurate data acquisition and secure data management, RFID enables transformation, whether it's in the supply chain, in the store, or in the customer's hand. Here are just some of the ways:

1. MANUFACTURING

Raw materials production

2. DISTRIBUTION

Customs, warehousing distribution centers

5. REPLENISHMENT & RECYCLING

End of life

3. RETAIL

In-store inventory point of sale

4. CONSUMER

Point of use
Next purchase

RFID TECHNOLOGIES LET RETAILERS

NXP Wireless for Smart Retail

Use each item's unique, serialized ID to distinguish individual items from the same manufacturing line, even if they're the same category, size, or color.

Authenticate Brands

Combat counterfeits, protect brand trust, and safeguard revenue by letting anyone, anywhere digitally verify that a product is genuine and safe to use.

Track and Trace

Assure product provenance and traceability, and help prevent grey-market diversions, by giving products better visibility in the supply chain.

Protect Integrity

Assure a product's correct handling profile, by monitoring environmental changes in transit and storage or by detecting if a product has been interfered with prior to sale.

Drive Sales

Take control of inventory management, by knowing what's missing from stock and what needs to be reordered to replenish shelves, or discount products near their expiration dates.

Automate Transactions

Give consumers new, more highly automated ways to see their options, access information, or make purchases.

Connect and Engage

Activate shoppers with dynamic digital content and services pre-sale, and continue building on relationships with personalized and exclusive experience after the purchase.

Gather Insights

Acquire valuable first-party data, straight from the customer, to gauge product usage and performance, and improve marketing tactics.

AT A GLANCE

NXP Wireless for Smart Retail

NXP wireless includes all three of the categories most relevant to smart retail.

1. **Long-range (UHF) RAIN RFID** can read tags over the greatest distance – up to 10 meters or more – and without direct line of sight. The ability to scan up to 1,000 items per second makes long-range RFID a leading choice for warehousing, inventory, and other supply-chain applications.

2. **Vicinity (HF) RFID**, which is defined by the ISO 15693 standard, operates at up to 1.2 meters with a dedicated reader. It's also compatible with Near Field Communication (NFC), so tags can be read by any standard, off-the-shelf NFC-enabled device. As a hybrid technology, it supports mid- and close-range use cases, thereby expanding the options in supply chain, retail, and consumer applications.

3. **Proximity NFC**, which works at close range (just a few centimeters), is a trusted feature in mobile devices of all kinds. It's the technology used for contactless payments, in smartcard and mobile formats. In retail, before and after the purchase, it creates a dynamic link to an otherwise static object. Everyday products, now able to present digital content, become more useful to consumers and create better experiences.

LONG-RANGE (UHF)

840 to 960 MHz, Up to 10+m with special reader

Key Features	NXP Smart Retail
• Reads up to thousands of items in a second • No line of sight required • Available with high-level security • GS1 Conforming to GS1 EPC Gen2V2 Standard	UCODE 8 UCODE DNA Track

VICINITY (HF) RFID

13.56 MHz, Up to 1.2 m (special reader), Up to 10cm (NFC reader)

Key Features	NXP Smart Retail
• Identifies multiple tags at once with special reader • Compatible with NFC (NFC Forum Type 5 Tag) • Available with high-level security • Supported by ISO 15693/ISO 18000-3 compliant infrastructures	ICODE SLIX 2 ICODE DNA

PROXIMITY NFC

13.56 MHz, Up to 10 cm (NFC reader)

Key Features	NXP Smart Retail
• Identifies a single tag at once • Readable by any NFC-enabled mobile device • Compatible with entire ISO/IEC 14443 contactless smartcard infrastructure • Supports mobile payment schemes used worldwide • Available with high-level cryptographic security and tamper evidence • Standard operation (NFC Forum Type 2 and 4 Tags)	NTAG 21x, NTAG 21x Tag Tamper NTAG 424 DNA, NTAG 424 DNA Tag Tamper

SMART SUPPLY CHAINS

Always Know What's Where

Retail supply chains are notoriously complex, hard to manage, and difficult to optimize. With RFID/NFC, retailers have a way to turn big data into smart data, so the entire process of getting products into customer hands is more efficient and much easier to control.

Each item has its own unique serial ID number embedded inside its RFID/NFC tag. Tagged items can be identified at any time, and the cloud-connected reader infrastructure can digitally report the provenance and pedigree of those items as they're tracked and traced along the supply chain, all the way to the store shelf. Through the backend system that supports RFID and NFC, retailers gain global, real-time visibility into supplier, warehouse, and retail inventories, so operations are more streamlined, most cost-effective, and more secure.

Equipped with digital security features, tagged items can be authenticated with secure mechanisms at every point, assuring the authenticity of any product, whether it's sold online or off. This makes it much harder to divert products into grey markets and unauthorized channels, or to sell cheaper fakes as genuine products.

Goods In and Goods Out

Retailers can identify where products are in the supply chain at any time and in real time. Receiving at distribution centers is more efficient, since there's no need to open boxes or containers to count what's inside. When sealed boxes pass by the RFID read point, the system can automatically read hundreds, even thousands, of items in an instant.

Item-Level Tracking

Individual items can be tagged and monitored, so retailers can know what's in the shop, what's in the storeroom, and what's on its way from the warehouse. This extreme level of detail can even be made accessible to consumers, so they can find what they want without having to ask for assistance or wait for help.

Inventory Management

What used to take days, with an army of clerks, can now take minutes and be managed by just one person. Compared to barcodes, RAIN RFID is dramatically faster, with the ability to read up to 1000 items per second, while barcodes have a read rate of about 1 item per second. Cycle counting can take place more frequently, with less disruption, which in turn adds to better inventory accuracy and helps ensure the right products are always available on store shelves.

Brand Protection

Tagged items can be identified at any time and, when equipped with higher security features for advanced authentication (such as digital signatures or cryptographic cores), can be digitally verified that they're genuine. That means it's much easier to tell what's legitimate and what's not, and it's much harder for counterfeiters to present fakes as genuine items. And, because NFC-enabled tags can be verified by anyone with an NFC smartphone, everyone – brand staff, inspectors, even consumers – can join in the fight against counterfeits and help protect brands.

Monitoring Perishables

Retailers of foods, medications, and other perishables need to ensure quality and get goods to shelves before they expire. To protect items while they're in transit, in storage, or on display, smart RFID labels can be equipped with temperature sensors and data loggers that monitor ambient temperature changes at any time and report whether a product has been treated properly. Individual items can be traced if problems occur, for faster remediation and greater consumer assurance.

As of 2018, roughly ***10 billion*** apparel items were already IoT connected, using ***RAIN RFID*** to enable online interaction.

[Source: NXP]

DECATHLON	biologid	lululemon athletica
This global sports retailer used **RAIN RFID** and software analytics to improve stock visibility, and saw a 2.5% increase in sales.	This French company's **Smart NFC** labels with temp sensors protect life-saving plasma-derived drugs.	Regular **RAIN RFID** inventorying, accurate to 98%, let this U.S.-based athletic apparel company minimize stock-room SKUs.

SMART STORES

Add Intelligence and Automation

RAIN RFID and NFC are changing the in-store experience, making it sleeker, more engaging, and more efficient. Retailers are exploring new ways to provide interactive, personalized, and contextual content in strategic locations, with things like display monitors and dressing-room mirrors that offer suggestions for complementary accessories, as well as tools that provide more functionality or amplify the in-store experience.

Retailers are also using RAIN RFID and NFC to add in-store digitalization, automate the checkout process, and reduce friction at the point of purchase. Digital signage, especially small signs displayed on shelves, is quick to update, can offer rich media content with text, audio, and video, and can give consumers new opportunities to interact, by using their NFC smartphones to access on-demand production information or interactive digitized tools.

With increased automation, the goal is to create a seamless, friction-free shopping experience that delivers the levels of convenience and efficiency sought after by consumers who are in a hurry. Larger unmanned stores reduce cost yet increase inventory efficiency, while smaller unmanned formats enable quick purchases, including perishables, in a footprint that is easier and less expensive to maintain. The format varies but, in general, consumers use a mobile app to register as shoppers and initiate a buy session. Then, when they're ready to complete their purchase, they use the mobile app again to authorize payment.

Smart Fitting Rooms

Smart mirrors read the RAIN RFID tag of the merchandise and display the item on a touchscreen behind the mirror's glass while a recommendation engine displays matching accessories. Consumers can view alternative colors, check for availability of other sizes, get more information about recommended items, or request the help of a shop assistant.

Electronic Shelf Labels (ESLs)

These shelf-mounted displays can be updated wirelessly, anywhere onsite, so there's no more need for staff to manually change price labels or print, sort, and replace labels when prices change. Prices can also be set more strategically, with gradual markdowns or in response to competitor offers. RAIN RFID coexists with other onsite technologies, including WiFi, and NFC enables innovative marketing services such as geo-location, customer identification, and targeted offers in real time.

Unmanned Box Stores

Similar in size to a convenience store and accommodating several people at once, these cashierless stores can succeed where others struggle, in places where the labor market is tight, profit margins are low, building permits are hard to come by, rents are high, or the customer base is relatively small.

Smart Vending Machines & Shelves

When consumers want to replenish basic supplies or are just looking for a snack, they're often in a hurry and don't want to wait in line to pay. An NFC-enabled smartphone can unlock the case, track selections, and manage payment, while RAIN RFID can keep inventory, transmit restocking requests, and, when used with refrigerated cases, monitor temperature status.

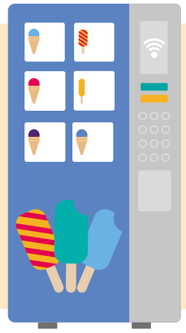
Electronic Article Surveillance (EAS)

The same RFID tags used in the supply chain can be used in store to deter theft. Used in combination with EAS gates, RFID tags can expand the system to reveal a product's unique identity, so any missing or stolen items can be identified, updated in inventory, and replaced.

Autonomous Retail

Some of the biggest investments to date have come from major online players and private investors new to retail but wanting to build on a foundation of digitalization. Of the various approaches being deployed, all involve the kinds of advanced technologies that leading online companies are already using in their supply chains and with their customers, including mobile payments, the IoT, and sophisticated track-and-trace functions, as well as biometric identification and even machine learning.

In China, all the retailers currently operating unmanned stores predict rapid expansion. One plans to have **100,000** stores open by the end of 2020.



The Japan Vending Machine Manufacturers Association reports that the country's vending machines account for **$60 billion** in sales each year.

RALPH LAUREN	REBECCA MINKOFF	ses STORE ELECTRONIC SYSTEMS	storaenso
The smart fitting rooms in their flagship Manhattan store have seen an engagement rate of 90%.	Mostly known for handbags, this high-end designer tripled clothing sales after adding smart fitting rooms.	Having deployed millions of **NFC** tags in ESLs, this French company enables added customer interactions in-store.	This Finnish company's unmanned refrigerator uses **RAIN RFID** to sell refreshments.

SMART ENGAGEMENT WITH CONSUMERS

NFC for Better, More Personal Experiences

In today's hyper-connected shopping environment, where consumers have so many online and offline options to choose from, attracting and keeping customers is one of the biggest retail challenges. Wireless technology in general, and NFC in particular, are valuable tools here, since they offer new ways to connect and engage with tech-savvy consumers. And, when used creatively, wireless technologies like NFC create a competitive advantage, by triggering purchases and building deeper relationships that can in turn foster brand ambassadors and increase loyalty.

NFC functionality, built into smartphones, smart watches, and other wearables, is already a worldwide phenomenon. According to ABI Research and Strategy Analytics, the installed base for NFC-enabled smartphones alone now stands at over 2 billion, and is expected to keep growing. Beyond using NFC to accept cashless payments, retailers can leverage the fact that increasing numbers of people have NFC to let consumers do more, such as open doors in automated retail outlets, interact with digitized store shelves, or add items to a cart while in the store, for faster checkout.

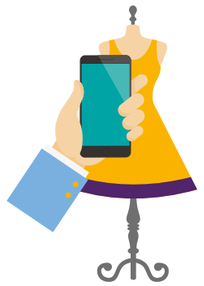
Similarly, with NFC functionality built into physical products and packaging, consumers gain direct access to valuable information, from extra details and usage tips to provenance, ingredient lists, and expiration dates. NFC tags offer a direct link to the cloud and can support context-driven, personalized messages, so consumers can interact with brands on a more personal level. Tags can also be pre-configured with certain settings, for use with accessories, so consumers save time, reduce effort, and stay safe.

Contactless Payment

Convenience and speed are the two main reasons why contactless payments, which take place with just a tap, are so popular. What's more, since NFC is compatible with MIFARE, the leading brand in contactless solutions, retailers who accept NFC payments become part of an infrastructure, used daily by millions of people in more than 750 cities worldwide, for transit, access, micropayments, and more.

"Last Mile" Interactions

Go the extra distance and cover that "last mile" to the customer by using NFC tags, on the product or its package, to offer helpful advice, useful information, promotions, special services, loyalty programs, or access to exclusive online communities, even after a product leaves the store. Tags, labels, caps, and other form factors with NFC on board let consumers connect with the brand long after they've left the store, for an enhanced product experience. A quick tap of an NFC smartphone starts each dialog and works to create a more engaged, more loyal customer.



Brand Protection

Each tagged item has a unique serial ID number and can be equipped with higher-level security features, such as digital signatures or cryptographic cores, to enable more advanced authentication schemes in the retail process, including in the store. Brand staff and consumers can quickly verify the originality of a tagged product, just by tapping an NFC smartphone to the label, and be sure that what they're buying is the real thing and not a knock-off. What's more, when anyone can uncover a fake, counterfeiters have fewer places to hide, and are less likely to impact a brand's reputation and revenues.

Loyalty

Reward customers for purchases and make ownership more valuable with individualized services, exclusive offers, and unique buying privileges. NFC supports different formats, be it a smartcard, a smartphone, wristband, key fob, or whatever, so there's more flexibility in how loyalty programs are implemented. Consumers can use loyalty points at contactless payment stations, and retailers can easily give members access to exclusive offers as part of cobranding campaigns. NFC can even ensure authenticity of coupons and gift vouchers, to avoid counterfeits, and supports digital campaigns and loyalty offers while preventing misuse, by securing one-time-use promotional URLs.

Accessories

NFC-tagged refills, for use with printers, personal-care devices, kitchen appliances, drug-delivery devices, and the like, can store configuration data, so accessories are easier to use and require less customer support. Also, by storing expiration data, the tag can ensure any refill is still within its recommended use period. Tamper evidence, which indicates if a product has been opened or interfered with, prior to sale, can reassure customers, too, and remove doubts about whether a consumable is safe to use.

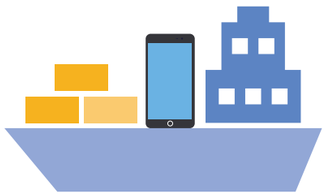
Marketing Metrics

Broader user of analytics, with deeper NFC data collection, enables a more profound understanding of consumer behavior. Armed with more knowledge about their customers, retailers can do a better job of meeting expectations and fulfilling desires. At the same time, the customer experience becomes more personal, with targeted content based on accurate behavioral metrics.

Is NFC Secure?

The short answer is yes. When a secure element is used to authenticate an NFC transaction, whether it's on a smartphone, a wristband, or a plastic smartcard, the payment can be trusted. But with other payment methods, such as QR codes (or even cash), the absence of electronic security features leaves the transaction vulnerable to fraud. With NFC tags, since each tag carries a unique ID and can support advanced security features, including cryptographic algorithms, any data stored on the tag can be authenticated and trusted, too. What's more, special permissions based on a two-way authentication scheme can ensure that only authorized users and reader devices access sensitive tag data, for secure end-to-end protection from the tag to the reader and the server.

Google reports that **82%** of smartphone users **consult their smartphones** to get ideas, look up information, and make decisions on purchases they're about to make in a store.



In **2019**, total shipments of **NFC-enabled smartphones** will be just under **1 billion units**, and the installed base will reach 2.3 billion units. (ABI Research, Strategy Analytics)

NBA	Pernod Ricard UK	schreiner MediPharm	Vitamix
Fans can access exclusive content when they tap their phone to the NFC tag on their Nike-branded player jersey.	NFC-enabled labels on specialty spirits are part of unique promos. Malibu Rum achieved a mobile engagement rate of 4% versus just 0.5% with other digital channels.	This German company's secure, tamper-evident NFC labels verify medications are authentic, haven't been opened, and are safe to use.	This family-owned U.S. company's professional-grade Ascent blender uses NFC tags to verify authenticity of attachments and automatically adjust settings.

NXP'S RETAIL EXPERTISE

Decades of Leadership

Our RFID-NFC solutions are already in smart products all over the world, helping retailers and brand owners make the most of the digital era by stay strong, streamlined, and connected.

Recognized Innovation

Not only did we co-invent NFC, we currently hold the top position in every key RFID-NFC segment, including tags and authentication, NFC for mobile, contactless readers, POS terminals, and high-security applications, such as smart identity cards for banking and access, and eGov documents, including ePassports. Having shipped billions of RFID-NFC ICs, we continue to refine and evolve our architectures, delivering exceptional range, accuracy, and security at each operating frequency.

End-to-End Solutions

We use the latest technologies to support the complete range of RFID-NFC formats, and deliver true, end-to-end ecosystem solutions that enable smart, secure functionality with the best in accuracy and speed. We're known for our ability to drive innovation and continuously build on our extensive patent portfolio, which covers foundational RFID-NFC technologies.

Value-Added Services

We offer a complete suite of value-added services to enhance system security, provide high-volume scalability, and enable faster time to market. The NXP Encoding and Trust Provisioning Services creates and provisions customized data and crypto keys at ultra-high speeds during wafer production, leveraging NXP's secure CC EAL 5+ certified manufacturing environment. Our NTAG 2GO Secure Services support tag management with rules-based validation, secure key handling, and a robust authentication platform.

Extensive Ecosystems

We support all of our RFID-NFC technologies with an extensive network of support partners, to provide local application and solution expertise anywhere in the world.

Long-Term Investment

Our commitment to RFID-NFC for the long term leads us to invest significantly in R&D and drives us to be a leading participant in standardization and regulation activities, like those of the GS1, ISO, IEC, the NFC Forum, and the RAIN Alliance.

NXP PORTFOLIO FOR SMART RETAIL

Selection, Performance, and Security

As the identification industry's number-one supplier of semiconductor technology, we've assembled a best-in-class portfolio for smart retail. Our products deliver standout performance across every operating range and at every level of security, so it's easy to find the right fit for any application in smart retail, now and in future.

Our portfolio for smart retail builds on our long-standing expertise in security and contactless technologies. Every day, and in every part of the world, billions of people rely on our portfolio to protect their privacy and enable secure transactions. Retailers and brand owners can be confident that every solution we offer for smart retail builds on the trusted security we already provide to banking, secure government ID, corporate access, and public transport.

UCODE

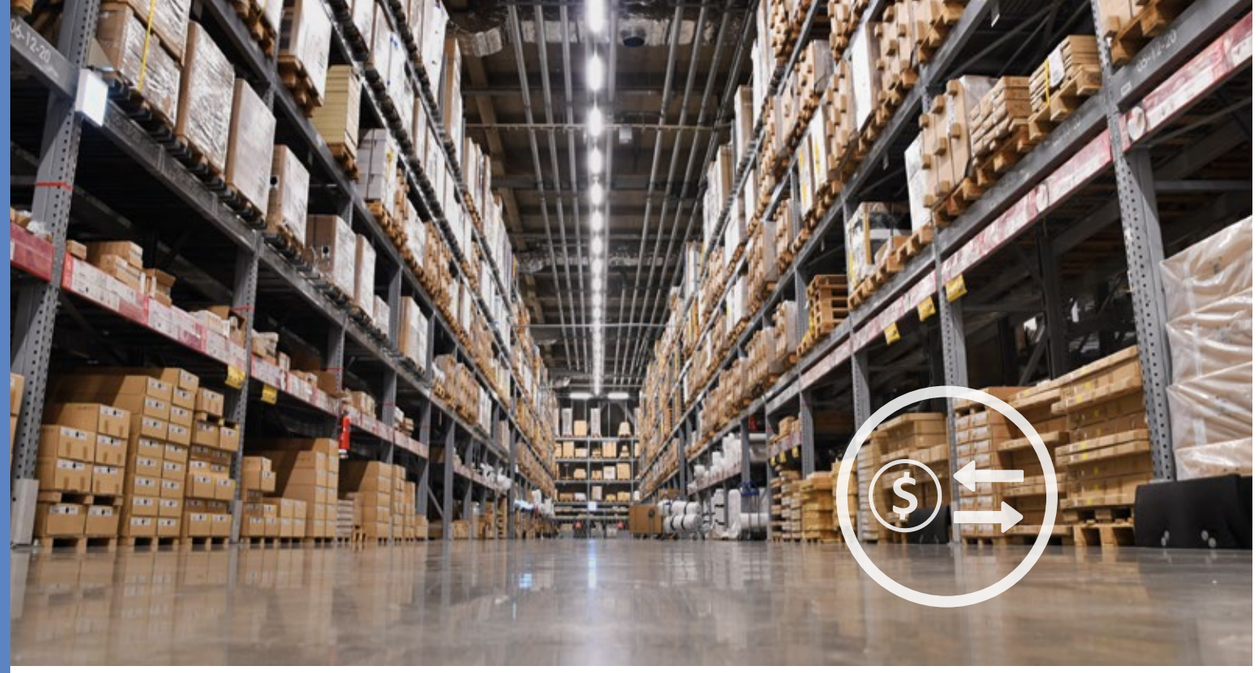
UCODE RAIN RFID

With billions of ICs already deployed in the field across thousands of successful installations, NXP's Now in its eighth generation, UCODE RAIN RFID delivers the speed, accuracy, and security required for peak performance in retail applications. UCODE helps retailers be more responsive and make better decisions – in the distribution center, in the stockroom, on the shelf, in a fitting room, or during a purchase. Our industry-leading solutions are recognized for their accuracy, reliability, speed, and security.

UCODE RAIN RFID can read tags, without line of sight, at a rate of up to 1000 items per second. UCODE also offers read/write capability, so tags can be updated and reused – a useful feature if products are returned and put back onto the store shelf. Tamper detection helps combat theft, and the exceptionally high accuracy rate of 99.9% minimizes misreads and faulty data. Crypto authentication protects against cloning and ensures reliable proof of origin.

UCODE 8

As the latest UCODE architecture, UCODE 8 delivers top-of-the-line performance in every category. To begin with, UCODE 8 uses at least 20% less power than other solutions. This helps boost read sensitivity (-23 dBm), which in turn increases read range and read rates, for faster inventory counts with handheld readers without compromising accuracy.



The maximized backscatter strength means UCODE 8 tags give a strong, clear response to the reader device, so the reader does a better job of reading data from the chip. A self-adjust feature automatically adjusts itself to the highest read sensitivity during each power-up cycle, taking into account current environmental conditions.

This helps improve accuracy in difficult situations, such as when items are densely stacked and their RFID labels are close together.

The UCODE 8 architecture also includes up to 128 bits of EPC memory and up to 32 bits of user memory. Higher anti-collision rates improve accuracy and wider frequency range (with EPCglobal compliance) supports worldwide use.

UCODE DNA Track

Our groundbreaking UCODE DNA product is the first RAIN RFID implementation to combine exceptionally long-range contactless performance with a cutting-edge cryptographic security implementation for proof of origin based on AES. Designed in accordance with GS1 UHF RFID Gen2 v2.0, UCODE DNA supports up to two 128-bit AES authentication keys for tag authentication or privacy protection. The keys are stored in the tag IC's securely guarded memory vault, and can be preprogrammed and locked by NXP or inserted by the user.

UCODE Family	
Read Sensitivity	Up to -23 dBm
Write Sensitivity	Up to -18 dBm
Encoding Speed	32 bits in 1.2 ms
Power Consumption	20% lower than nearest competitor

To simplify development while strengthening the security of end applications, we offer a unique **Trust Provisioning service** that results in a secure product that is ready to use as shipped. We use the tag's Unique ID (UID) and a customer- or project-specific master key to generate a unique private crypto key, dedicated for use with an individual tag, and then encode that private crypto key into the IC. We follow a similar process for Kill and Access passwords, by generating a master password for Kill and Access, deriving individual Kill and Access passwords for each tag, and then inserting those passwords into the tag. We also generate AES master keys, deriving all unique and tag-specific keys and then inserting them into the tag.

ICODE

With billions of ICs already deployed in the field across thousands of successful installations, NXP's ICODE platform represents the largest installed base in this area. ICODE is the de facto standard for high-frequency (HF) smart label solutions operating at 13.56 MHz and supporting ISO 15693/ISO 18000-3 compliant infrastructures with read ranges of up to 1.2 meters. ICODE offers compliance with NFC Forum Type 5 Tags, so it's compatible with NFC. Anyone with a standard NFC-enabled phone can read an ICODE tag at close range. ICODE variants come with a range of protections, including protection for EAS, Application Family Identifier (AFI), memory access, and privacy.

ICODE SLIX2

The ICODE SLIX2 IC enhances retail with faster read rates, a larger user memory, and support for the NXP originality signature.

ICODE DNA

The ICODE DNA version, which combines mid-range readability with high-level security, is ideally suited to supply-chain and retail applications that involve high-value items or otherwise need a higher level of protection. Each tag offers 2016 bytes of user memory and a customer-programmable originality signature, along with AES 128-bit cryptography for tag and mutual authentication schemes. Other valuable features include privacy mode (which prevents tracing via the unique device ID), fast read, and persistent quite mode for increased identification speed and accuracy.

NTAG

NTAG

Our NTAG portfolio of NFC tags and label ICs lead the market in the consumer and industrial segments of the IoT. These powerful, flexible tags enable smart, digitally connected products and, in terms of consumer interaction, enable new user experiences by engaging more dynamically and with a higher degree of personalization. The NTAG family works seamlessly with our NFC reader chip technology, which is used in more than 90% of all NFC-equipped mobile handset models.

All our NTAG products are passively powered, so they don't need a battery. They are fully NFC Forum-compliant and can store NDEF (NFC Data Exchange Format (NDEF) data, so they're interoperable with any NFC-enabled device as well as the entire ISO/IEC infrastructure for contactless smartcards. Available as Type 2 or Type 4 tags, the NTAG portfolio consists of NTAG 21x, NTAG 213 Tag Tamper and the highly advanced NTAG 4xx DNA line, and addresses a wide variety of use cases. Features include a UID of 7 bytes, a range of memory sizes, advanced functionality, such as originality signature and static or dynamic memory protection, along with AES-128 cryptography for secure authentication schemes.

NTAG 424 DNA

Setting a new standard in secure NFC and IoT applications, the NTAG 424 DNA offers state-of-the-art features for security and privacy protection. The product is architected to provide AES-128 cryptographic operation, along with a new Secure Unique NFC (SUN) message authentication mechanism, which generates a unique authentication code each time the tag is read by an NFC-enabled mobile devices, as well as additional protection for sensitive data, with crypto-secure access permissions. These high-level security features combine to support a range of new, trusted NFC applications that are serviced in almost real time, including advanced product authentication, protection of monetary value and sensitive supply-chain data, and the creation of truly unique customer experiences.

TagTamper Versions

The TagTamper versions include a tamper loop, to protect product integrity by detecting if a product has been mishandled or opened before sale. Extra circuitry in the tag detects if a wire loop on the label or the tag has been broken. Breaking the loop triggers an irreversible change in the data read by an NFC device, thus letting the tag indicate that tampering has taken place. The tamper status is securely protected against manipulation, for added reassurance. The TagTamper feature can also be used to support pre- and post-sale messaging, with tailored content provided for sealed and open states.

NTAG Family		
	NTAG 21x **NTAG 21x TagTamper**	**NTAG 424 DNA** **NTAG 424 TagTamper**
Standard Compliance	NFC Forum Type 2 Tag (T2T) ISO/IEC 14443	NFC Forum Type 4 Tag (T4T) ISO/IEC 14443
Memory Size (Bytes)	48 to 888	Up to 416
Interaction Counter	Yes	Yes
Originality Signature	32-byte	56-byte
Memory Access Protection	32-bit password	AES 128-bit
SUN Message Authentication (Android and iOS Compatible)	No	Yes
Mutual Authentication and Encrypted Communication Mode	No	Yes
Data Retention (Years)	Up to 10	Up to 25
Write Endurance (Cycles)	Up to 100,000	Up to 500,000

TAKE THE NEXT STEP

To learn more about NXP's solutions for smart retail, visit nxp.com/rfid or contact us at rfid.info@nxp.com