

# Why SATO

With a comprehensive offering of printers, labels/tags, applications, and global support,



## Consumables

- SATO has its own facility capable of handling the entire RFID label/tag manufacturing process, from designing and producing RFID antennas to inspecting and shipping finished products.
- As a label manufacturer with years of experience, we can offer customers RFID labels that meet their needs.



## Printers and Print Engines

- SATO designs and manufactures its own RFID printers.
- SATO's IoT-ready printers not only print and encode, but also have a built-in OS (operating system) so that solution software for cloud-connected printing and various peripherals can be installed on the printer itself.



## Scanners & Readers/Writers

SATO offers customers the best combination of our own printers, software, PJM RFID desktop, tunnel, and shelf readers.



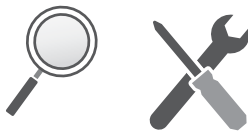
## Software

SATO provides tailored software solutions to address customers' challenges. We develop original and packaged software for printers, PCs, scanners and more.



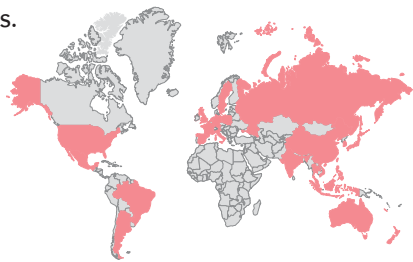
## Servicing

SATO's support extends beyond installation. We develop long-term relationships with our customers to address issues in the field and continually improve operations.



## Global Network

SATO operates in 26 countries, with business activities extending to 90 nations. We provide customized solutions to meet the diverse needs of our global customers.



- RFID products contain sensitive semiconductor chips that may cause their read performance to vary substantially depending on the environment where they are used.
- Field testing for RFID solutions is required in the customer's actual operating environment prior to implementation.
- As RFID solutions are built based on field testing, any subsequent changes to tagging positions and other conditions may affect their intended performance.

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# Smarter Workflows, Safer Care

Streamline healthcare supply chains and elevate patient safety with SATO's reliable RFID technology.



Watch video





# What is RFID

Short for Radio Frequency Identification, RFID is an auto-ID technology that enables advanced information services and bring us closer to a ubiquitous society.

Besides barcodes and two-dimensional (2D) barcodes that are conventionally used to carry data, newer technologies such as RFID and voice recognition are now being introduced at a greater speed for improving business operations and security.

As RFID develops and its product lineup continues to expand, the technology is set to become an increasingly important tool for many applications in various industries such as manufacturing, logistics, retail, service, transportation and healthcare.

Wristbands

Blood bags

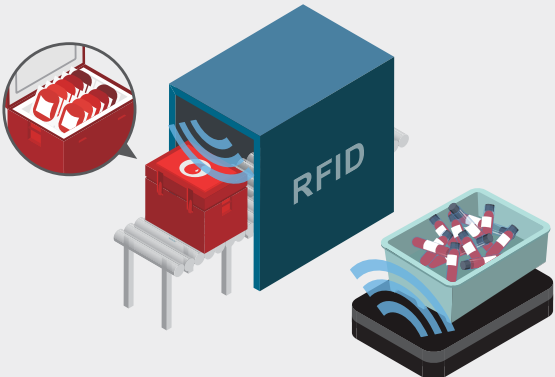
Medical devices

## Advantages of using RFID

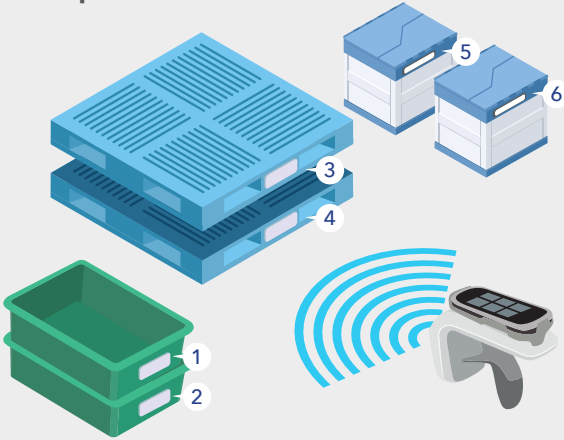
✓ Read and write data without making physical contact



✓ No line of sight required  
✓ Bulk reading






✓ Individual identification by unique ID



✓ High levels of security



## Comparison with other auto-ID technologies Comparison

	RFID	2D barcode (QR code)	Barcode
			
Data capacity	Several kilobytes	Several kilobytes	Several tens of bytes
Rewritability	Supported	Not supported	Not supported
Line of sight	Not required	Required	Required
Multiple read capability	Supported	Possible, subject to conditions	Possible, subject to conditions
Replication	Difficult	Easy	Easy
Resilience against dirt	Strong	Weak	Weak

## SATO's RFID lineup

Leveraging its know-how as a leading global provider of auto-ID technologies, SATO offers RFID solutions combining RFID labels/tags it produces with RFID printers it develops for printing the labels/tags themselves and writing data to the RFID chips embedded within. SATO is the only company in Japan that manufactures and sells RFID consumables and printers as part of its core business.

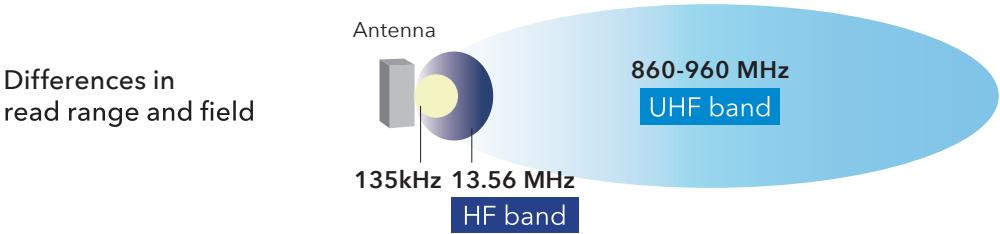
RFID-enabled printer	RFID labels/tags	Peripherals	Support for system setup
			Consultation on implementation
			Know-how from experience

SATO offers total RFID support for customers, starting from sourcing readers/writers most suited to your usage.



# Main frequencies used in RFID systems

RFID systems operate in various frequency ranges. Primarily used are the low frequency (LF), high frequency (HF), micro-wave, and ultra-high frequency (UHF) bands, and RFID labels/tags read differently at each of these frequencies. SATO offers a wide range of mainly UHF and HF (including NFC and PJM RFID) products, tailoring our RFID solutions to meet customers’ needs and applications.



## Comparison of RFID frequencies

RFID systems behave differently depending on the frequency used.

Frequency	Read range	Data read rate	Read field	Simultaneous identification	Performance near liquids	Performance near metals	Stacked readability
UHF 860-960 MHz	9 - 26ft	Limited	Good	Good	Limited	Limited *2	Limited
HF (PJM) 13.56 MHz	2 - 20 in	Good	Limited	Good*1	Good	Limited	Good
HF (NFC) 13.56 MHz	2 - 20 in	Limited	Limited	Not good*1	Good	Limited	Not good

\*1 Dependent on HF standard \*2 Use metal-compatible tags for metal surfaces  
What is PJM RFID see page 5

## Characteristics of UHF ( 860–960 MHz ) RFID

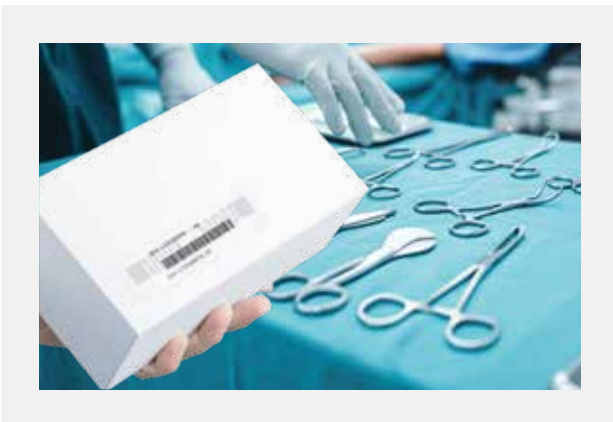


**UHF**

UHF RFID has a long read range and wide directivity, making it suitable for far-field operations. The tags have anti-collision capabilities, ensuring excellent reading efficiency.

### ✓ Bulk reading

Simultaneous scanning of multiple tags to automate inventory checks for medical supplies, pharmaceuticals, blood products, and surgical kits, minimizing shortages, overstock, and expired items.



### ✓ Long read range

Typically used at reading distances between 9ft and 26ft, ideal for real-time location tracking of high-value assets such as infusion pumps, ventilators, wheelchairs, and MRI machines, reducing loss and ensuring availability when needed.



\*Stocktaking time can be reduced to as much as 10% in some use cases.  
(Dependent on operating environment/ conditions, system configuration, etc.)

## Characteristics of PJM ( 13.56 MHz ) RFID



**HF  
(PJM)**

PJM stands for Phase Jitter Modulation and is our unique HF band RFID technology. It is used in the management of blood products because of its excellent readability near liquids, and in the management of medical devices because of its ability to withstand sterilization processes.

### ✓ Reliable reading at close range

HF RFID tags affixed to medication containers enable real-time verification, tracking expiration dates, and preventing administration errors. This supports anti-counterfeiting and regulatory compliance by verifying drug authenticity and chain of custody.



### ✓ Capable of reading around liquids

Well-suited for use in blood products and specimen tube labels as the read performance remains stable in the presence of liquids.



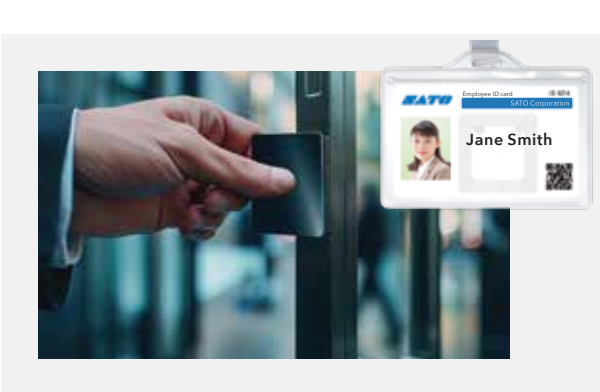
## Characteristics of NFC ( 13.56 MHz )

**HF  
(NFC)**

NFC is a type of HF RFID chip that is designed for close-proximity communication. Besides being commonly used in personal identification cards, it is also popular among many low-cost consumer services due to its high compatibility with smartphones and tablets.

### ✓ Tap for identity verification

Proximity technology is the ideal choice for access control for restricted areas (e.g., operating rooms, drug storage), ensuring only authorized personnel can enter.



### ✓ Linking to online content

PJM tags also support NFC reading. The latest PJM chips support both PJM-based and NFC-based communication. Therefore, in environments where PJM readers are not available, such as hospital rooms or other facilities, mobile devices can be read by readers for NFC.



# What is PJM RFID

PJM stands for Phase Jitter Modulation and is HF band RFID technology with unique advantages that complies with the ISO18000-3 Mode 2 international standard. It is used in the healthcare and medical field due to its unique ability to read products even when stacked or containing liquids, its fast and accurate reading, and its resistance to radiation and negative temperatures.



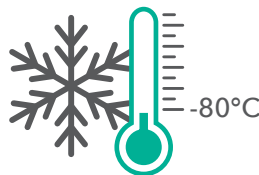
## What are the core advantages of PJM RFID?

100% data accuracy <sup>\*1</sup>



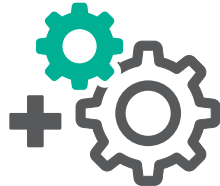
\*1 Readability in specific environments may vary. The 100% accuracy refers to the data on the tag, not a guarantee of reading the data in all situations.

Ability to work down to -80°C <sup>\*2</sup>



\*2 PJM IC chip support down to -80°C but the operating temperature of PJM Labels varies depending on the materials used.

Retrofittable



Radiation-hardened memory unaffected by medical grade sterilization with gamma or e-beam <sup>\*3</sup>

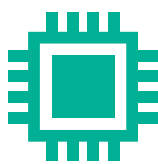


\*3 PJM performance may not be compatible with some environments

Fastest RFID Technology able to identify hundreds of tags per second



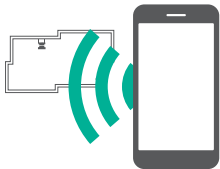
PJM RFID tags large memory capacity allow for complete product information to be stored, not just the item code



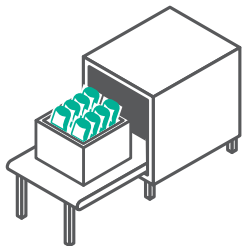
Performance is unaffected by liquids and cells



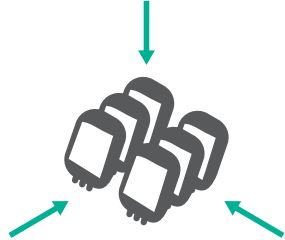
Smartphones/Tablets- Compatible NFC-HF protocol Hybrid Tags



Designed for stacking - Even tightly packed items will be accurately read



3D Orientation - Three-Dimensional reading field



Safe for use with all Blood Products <sup>\*4</sup> and biological agents



\*4 Guidelines for the Use of RFID Technology in Transfusion Medicine. Vox Sanguinis, 98: 1-24. <https://doi.org/10.1111/j.1423-0410.2010.01324.x>

## Standard Readers & Customizable Hardware For Integration

### Standard Readers

#### Desktop Readers



#### Features

Small footprint MDR-1109 and 3D compact MDR-4330AT desktop readers provide outstanding read and write capabilities at high speed and reliability.

#### Applications

Blood, Specimens, Reagents, Access-controlled drugs and substances.

#### Tunnel Readers



#### Features

The tunnel readers (400mm x 400mm, 500mm x 500mm, 640mm x 640mm) can read up to 600 tags per second with high reading accuracy and precision, even when densely stacked.

#### Applications

Blood, Reagents, Access-controlled drugs and substances.

### Customizable Readers

#### Retrofit Kits <sup>\*5</sup>



#### Features

A range of retrofit kits effortlessly integrate into existing storage appliances, preserving capacity while enhancing item tracking and offering optional access control.

#### Applications

Blood, Specimens, Reagents, Access-controlled drugs and substances.

#### Plug-and -Play Antennas



#### Features

The smart compact trays (Single/Dual) feature a hassle-free installation, allowing simple placement on existing appliance shelves.

#### Applications

Blood, Specimens, Reagents, Access Controlled-drugs and substances.

#### Open Shelves <sup>\*5</sup>



#### Features

Mobile or fixed open shelves with built-in PJM RFID antennas enable precise, high-speed reading of hundreds of items, ideal for use in temperature-controlled rooms.

#### Applications

Blood, Reagents, Access-controlled drugs and substances.

### PJM Labels



#### Features

A variety of sterilization-hardened and NFC-ready PJM RFID labels for the blood, medical devices, specimen and drugs value chains.

#### Applications

Blood, Specimens, Reagents, Access-controlled drugs and substances.

### PJM Printers



CT4-LX HC PJM Model

CL4NX Plus

#### Features

PJM RFID enabled CL4NX-Plus & CT4-LX-HC printers allowing for reliable printing and encoding of PJM RFID labels.

#### Applications

Blood, Specimen, Reagents, Access controlled drugs and substances.

### PJM Software



PJM Global

#### Features

- PJM Global – global data management platform designed for large scale projects (up to thousands of readers).

#### Applications

Blood, Specimen, Reagents, Access controlled drugs and substances.

\*5 PJM performance may not be compatible with some environments



# SATO's advanced RFID print and encode solutions

SATO's RFID printers represent the pinnacle of industrial encoding solutions, offering unparalleled precision, reliability and efficiency. These advanced capabilities are crucial for businesses seeking to optimise their supply chain operations with cutting-edge technology. SATO's versatile printers accommodate a wide array of tag types and sizes, ensuring adaptability across diverse industrial environments.



## Key Features

**High-Speed Printing and Encoding:** SATO printers excel at managing large volumes swiftly, significantly reducing operational delays. This high-speed capability is essential for businesses with demanding throughput requirements.




**User-Friendly Operation:** Intuitive interfaces and straightforward setup processes minimise downtime and reduce training needs. This ease of use ensures rapid deployment and seamless integration into existing workflows.

**Robust Durability:** Engineered to withstand harsh industrial conditions, SATO printers deliver consistent performance over time, even in challenging environments.

**Unmatched Versatility:** SATO printers can print and encode a diverse range of tag types and sizes, making them suitable for multiple applications across various industries.

**Advanced Monitoring Capabilities:** Real-time monitoring and diagnostic tools help maintain optimal performance and prevent costly downtime, ensuring continuous operational efficiency.

# SATO's RFID Printer Range

<b>CL4NX Plus Series</b> A high-performance printer renowned for its reliability and precision. <b>Key Features:</b> High-speed printing, easy setup, durable design, wide RFID tag support.	<div>UHF RFID</div> <div>PJM</div> <div>HF NFC</div> 
<b>CT4-LX Series</b> Compact and efficient, perfect for smaller spaces without compromising on performance. <b>Key Features:</b> Compact size, high-speed printing, versatile tag support, intuitive touchscreen interface.	<div>UHF RFID</div> <div>HF NFC</div> 
<b>CT4-LX HC PJM Model</b> An upgraded model from CT4-LX Series with PJM RFID encoding capabilities. <b>Key Features:</b> Anti-microbial and detergent-friendly casing, compact size, high-speed and PJM-enabled encoding.	<div>PJM</div> 



# SATO AEP - Intelligence inside the Printer

## SATO AEP (Application Enabled Printing) for higher labeling productivity

SATO AEP is a powerful onboard intelligence that enables customization of printer operations to meet the user's needs and to reduce business costs.

**SATO AEP**  
Application Enabled Printing

Cost-saving

Simple to use

Easy to implement

Connect directly with IT systems

PC-free app on printer

Exchange data directly with peripheral devices

Control multiple data streams

Manage printers

Small footprint

Sustainable



### Features

- ✓ **Cloud enablement**  
Connects the printer directly to IT and cloud systems.
- ✓ **Automatic RFID Data logging**  
Generate an RFID log (EPC, TID) of the encoded RFID labels and upload to server or cloud.
- ✓ **Onboard Intelligence**  
Reduces business downtime and system maintenance costs.
- ✓ **PC-less (Stand-alone)**  
Eliminates the need for costly computers, third-party software for the OS & middleware, and licenses for easier update rollouts.
- ✓ **Peripheral device connection**  
Users can easily connect the printers with peripheral devices such as USB keyboards, scanners, weighing scales, thermometers, or PLCs for factory automation.

### Customer benefits

- ✓ **Direct connectivity to IT and cloud systems**  
Reduces system complexity meaning less things can go wrong and makes troubleshooting easier.
- ✓ **Reduce TCO (Total Cost of Ownership)**  
Reduces business downtime and system maintenance costs.
- ✓ **Simpler to use**  
Easy and intuitive labeling process that improves efficiency and productivity, while minimizing the risk for human errors.
- ✓ **Perfect fit**  
Ideal for areas where space is minimal, or where the environment is unsuitable for a PC.

### Watch videos : SATO AEP solutions

For patient identification & management



Print RFID labels and keep print logs automatically



Print labels automatically from CSV data without a PC



# PJM RFID Softwares and Data Integration

SATO offers a comprehensive approach to RFID implementation. We understand that each supply chain is unique, and a successful RFID deployment requires a seamless data transmission and integration system.

Our solutions allow efficient data collection, validation, and real-time transfer. It is designed for flexibility and supports various AIDC technologies.

## PJM Global

PJM Global is a cloud-based service provided by SATO enabling a flexible environment to connect PJM readers to either cloud-base or locally hosted applications.

- Connect all PJM readers to the applications smoothly.
- Manage all PJM reader operation, maintenance and remote support efficiently.
- Shield all PJM readers with access control and data security robustly.



PJM Global

## PJM NFC Reader Application

(for D-Chip PJM RFID tag)

PJM NFC Reader App is an Android™ OS application for mobile NFC reading. This intuitive tool enables users to showcase the seamless reading of D-Chip PJM RFID tags directly on their Android devices.

- Reading / encoding PJM RFID tags
- Displaying PJM RFID tag information (blood bags, specimens)

### PJM RFID NFC Demo



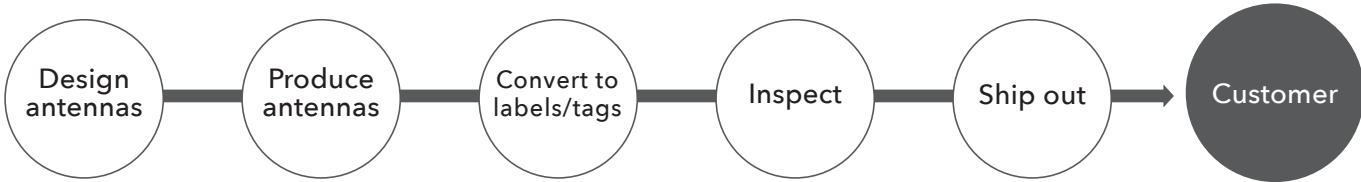


# RFID Labels & Tags

## SATO-original RFID labels



We have established a comprehensive system for RFID label/tag design, manufacturing, quality control, shipping, and ongoing support to meet your needs. Leveraging our extensive experience in label manufacturing, we also propose RFID labels tailored to specific operating environments and conditions.



## UDI Compliance, Traceability, and SPD Management

RFID labels help hospitals comply with Unique Device Identification (UDI) regulations and manage Sterile Processing Departments (SPD). They enhance traceability by enabling real-time tracking of medical devices from production to patient use, reducing misplacements and unauthorized usage. This ensures accurate record-keeping, faster recalls, and better product lifecycle management.

## UHF RFID Wristband for Patient Safety

Image	Product name/Code	Use Type	Material	Features
	<b>UHF RFID Direct Thermal Adhesive Wristband II</b>  Item code: 162016371	Patient management	Paper	Size: W1 x L14 in Memory size: EPC: 128bit/User: 0 bit IC: NXP Ucode8



## PJM RFID Labels for Blood Transfusion Medicine

SATO RFID PJM Labels for Blood bags comply with FDA Code of Federal Regulations, Title 21 (Section 175.105) specifying requirements for adhesives.

Image	Product name/Code	Use Type	Material	Features
	<b>PJM StackTag CC5 Blood Bag Primary Paper Label (D42)</b> Item code: 062003421 FDA-compliant Primary Label	Blood management	Paper	Size: W3 x L2 in Memory size: 3472 bits IC: PJM D-Series
	<b>PJM StackTag CC5 Blood Bag Secondary Label</b> Item code: 062001301 FDA-compliant Secondary Label	Blood management	Paper	Size: W4 x L4 in Memory size: 3472 bits IC: PJM C-Series
	<b>PJM StackTag TT9 Paper Label (D42)</b> Item code: 062003441	Specimen management	Paper	Size: W2 x L1.25 in Memory size: 3472 bits IC: PJM D-Series





# RFID Application Map in Healthcare Industry



## Blood

### Vein-to-vein traceability with PJM RFID

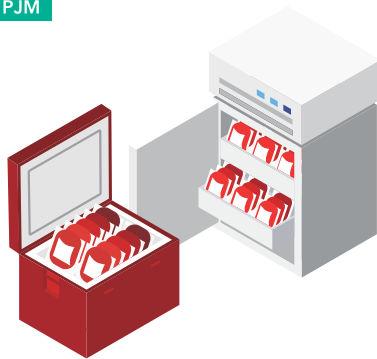
Ensure the proper management of blood components in blood centers and blood banks. Save time and money while increased operational accuracy.

Watch video



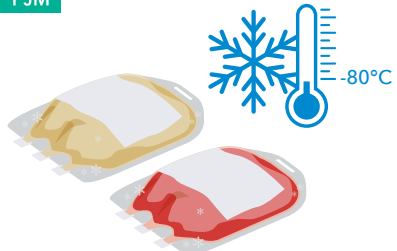
Very high speed & orientation insensitive reading of blood bags.

PJM



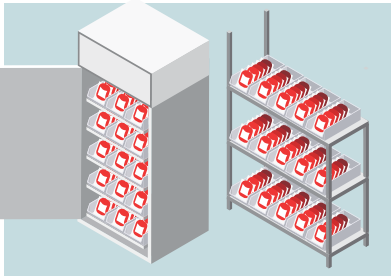
Can be used across the complete supply chain: management of fresh, refrigerated, or frozen blood components with RFID.

PJM



Can be interfaced with any existing storage appliance without any loss of storage capacity.

PJM



## Patients

### Patient safety & Patient flow management

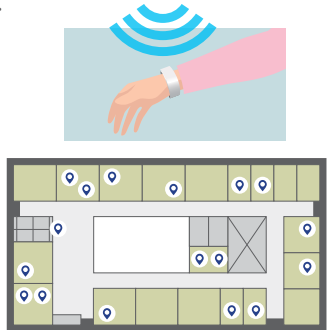
Identify and manage patients throughout the hospital wards with SATO's UHF RFID Direct Thermal Wristbands.

Watch video



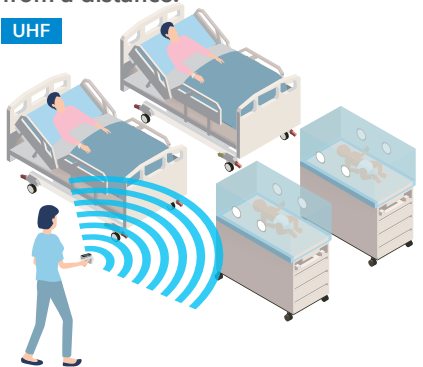
Manage the location of patients zone by zone to ensure proper resources allocation and connect with patient safety.

UHF



Minimize in-hospital spread of viruses by enabling reading of patient IDs from a distance.

UHF



Offer best balance between patient comfort and reading performance (up to 2.5m read range).

UHF



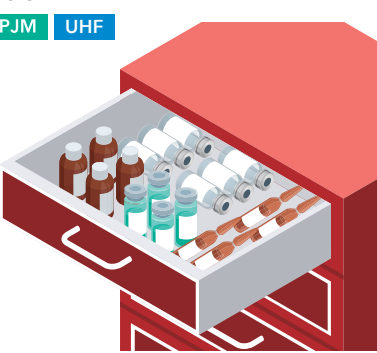
## Diagnostics & Pharmacy

### Specimen & controlled substances management

Leverage the unique benefits of RFID to quickly and reliably identify patient samples and securely manage the inventory of controlled drugs and substances in the central hospital pharmacy.

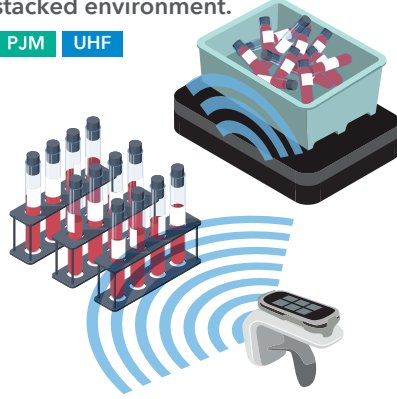
Liquid-friendly small footprint FDA-certified labels for tubes and vials.

PJM UHF



Very high reading performance in a stacked environment.

PJM UHF



PJM retrofit kits which can be interfaced in any existing cabinet, fridge or freezer.

PJM

