

THE INTERMEC®

GUIDE TO

**RFID**

**TAG**

SELECTION

**Intermec®**  
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# RFID Tag Selection Guide

## Getting Started

One of the key factors to successfully implementing RFID technology in your operation depends on your selection of RFID tag. This guide serves as a way to quickly learn about tags, navigate through the different tag options and help you select the tag that's right for your application. As a leader in RFID as well as barcode technologies, Intermec is uniquely positioned to help as you transition your operations to take full advantage of new capabilities in automated data collection.

## What is RFID?

An RFID system typically consists of a radio-enabled device that communicates with or interrogates a tag or label, which is embedded with a single chip processor and an antenna.

The "interrogator" or RFID reader can be fixed or portable, just like barcode scanners. The tag itself is an extension of the bar code labels you see everywhere today, but with more intelligence.

The advantage of these more "intelligent" systems is that, unlike barcode tracking systems, an RFID system can read the information on a tag without requiring line of sight or a particular orientation. This means that RFID systems can be largely automated, reducing the need for manual scanning.

The following are recommended Intellitag® RFID tags and inserts, which are organized according to general application categories as a way to focus your selection process. We include with each tag and insert information on dimensions, operating temperatures, presentation format, frequency ranges and availability. We also include performance charts on how each tag or insert performs when applied to specific materials.



# The RFID Tag/Insert Selection Check List

*In choosing the right RFID tag for your application, there are a number of considerations, including:*

## 1 Frequency Range

RFID products currently on the market operate at a variety of frequencies, with each frequency targeted for specific geographical regions, applications and performance requirements. When selecting a tag or insert, you must first consider the general performance characteristics and the regulatory requirements associated with the permitted frequencies for your region of operation. Intermec's Intellitag® integrated circuit (IC) possesses frequency agility, allowing for operation at 2450 MHz, 869 MHz and 915 MHz with a single design. The actual frequency of operation for a particular tag or insert is determined by the tag's antenna design, but the same IC can be used regardless of which frequency is desired. This allows Intermec and its partners to provide RFID solutions in any region of the world.

## 2 Read/Write vs. Read-only Technology

With the ability to write comes the ability to dynamically change data stored on the tag. Flexibility is key, especially as business operations, information needs, industry standards, customer requirements and other variables change over time. Once a read-only RFID tag is programmed, the data cannot be altered for the life of the tag. Therefore, Intermec recommends the use of read/write technology. This allows you to alter the data content of the tag according to your specific needs. And if desired, you can permanently lock the data on a byte-by-byte basis at the time and place of your choosing. All Intermec Intellitag tags and inserts utilize read/write technology.

## 3 Range Performance

A tag's read range performance is usually considered the primary gauge of its suitability for a particular application. However, not all applications require maximum range. Many of Intermec's tag and insert designs, though optimized for maximum performance on specific materials, are often used with other materials for applications requiring less than optimal read range, or where greater range may actually be detrimental. Write range for Intermec's tags is approximately 70% of the read range.

## 4 Form Factor

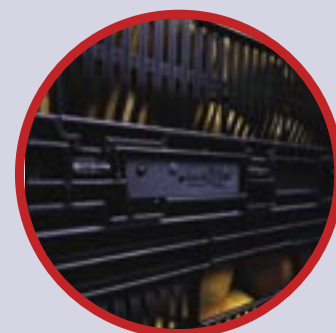
While range performance is often viewed as the best gauge for a tag design, the tag form factor cannot be overlooked. The general rule of thumb suggests that larger tags provide better range performance. Yet large tags are not always suitable for every application and it often becomes necessary to balance your choice between the tag size and its range performance. Intermec has developed a portfolio of tag and insert designs that utilize state of the art materials to provide a wide range of options for combining size and performance.

## 5 Environmental Conditions

How and where the tag or insert will be used plays a significant role in determining the right tag for your application. Performance will differ depending on what materials are adjacent to the tag. Other environmental conditions such as temperature and humidity may also affect performance. Intermec's Intellitag tags and inserts are available in a variety of designs and use materials capable of surviving even the harshest environments.

## 6 Standards Compliance

As with barcode technology, standards play an important role in the selection of RFID technology. Intermec maintains an active presence within the worldwide RFID standards community and will continue to develop products that meet existing and emerging standards, including the expected EPC Global Class 1/Generation 2 (C1/G2) and Class 2 requirements. This ensures compatibility and interoperability with other products meeting these standards and protects your investment against premature obsolescence. Intermec's Intellitag tags and inserts comply with all relevant adopted and emerging national and international standards, a list of which we've included on the back page of this guide.



# Expect More Choice with Intermec RFID Solutions - Intellitag RFID Tags and Inserts

## 915 MHz Container Tag



THE INTELLITAG® CONTAINER TAG is a high-performance durable product originally designed for use with plastic pallets, but which has a proven track record in a variety of applications. This tag is one of the most versatile designs in the Intellitag portfolio due to its consistent performance with a wide range of materials.

**Typical Applications:** Pallet, carton and container tracking

### Specifications

**Dimensions:** 1.28"x4.130"x125"  
**Operating Temperature:**  
-40C – 85+C/-40F – 185F  
**Frequency Range:** 915 MHz  
**Read Range:** 13 Feet  
**Presentation Format:** 2x10 panels  
**Tag Type:** passive, read/write  
**Availability:** now  
**Part #:** ITTP9152002

## 915 MHz Reusable Plastic Container (RPC) Tag



THE INTELLITAG® RPC TAG was originally designed for optimum performance on plastic. Its rugged, black packaging is both durable and matches the "look" of the reusable plastic containers produced by Georgia Pacific. The durability of this tag has made it attractive for a multitude of applications, including the tracking of truck engine blocks during the manufacturing process.

**Typical Applications:** Pallet, carton and container tracking

### Specifications

**Dimensions:** .85"x3.475"x185"  
**Operating Temperature:**  
-40C – 85+C/-40F – 185F  
**Frequency Range:** 915 MHz  
**Read Range:** 10 Feet  
**Presentation Format:** single  
**Tag Type:** passive, read/write  
**Availability:** now  
**Part #:** ITTP9151033

## 915 MHz Reusable Container (RPC) Insert



THE INTELLITAG® RPC INSERT is the core of the RPC tag. The insert is designed for optimum performance on plastic, is suitable for encapsulation and has been molded into numerous products for smart container applications.

**Typical Applications:** Pallet, carton and container tracking

### Specifications

**Dimensions:** .72"x3.475"x.17"  
**Operating Temperature:**  
-40C – 85+C/-40F – 185F  
**Frequency Range:** 915 MHz  
**Read Range:** 10 Feet  
**Presentation Format:** 1x8 panels  
**Tag Type:** passive, read/write  
**Availability:** now  
**Part #:** ITTP9152027

## 915 MHz Intelligent ID Card



THE INTELLITAG® ID CARD is the first credit card format RFID tag on the market to provide both long-range identification and multiple read/write capability. The tag is ideal for secure ingress/egress applications where a safe distance is required and is currently used for expedited border crossings between the United States and Canada. The tag is available as a blank card or with magnetic striping.

**Typical Applications:** Security access and control

### Specifications

**Dimensions:** 2.125"x3.375"x.03"  
**Operating Temperature:**  
-40C – 85+C/-40F – 185F  
**Frequency Range:** 915 MHz  
**Read Range:** 10 Feet  
**Presentation Format:** single  
**Tag Type:** passive, read/write  
**Availability:** now  
**Part #:** ITTP9151031

## 915 MHz Windshield Sticker Tag



THE INTELLITAG® WINDSHIELD TAG is optimized for attachment to vehicle windshields and is primarily used for highway toll applications and for access control in parking areas or gated communities. It has also been implemented into several civilian and military homeland security projects. The tag is produced on a flexible substrate and includes an adhesive release liner for ease of installation.

**Typical Applications:** Vehicle access, parking and toll

### Specifications

**Dimensions:** 1.81"x3.11"x.051"  
**Operating Temperature:**  
-40C – 85+C/-40F – 185F  
**Frequency Range:** 915 MHz  
**Read Range:** 13 Feet  
**Presentation Format:** 4x6 panels  
**Tag Type:** passive, read/write  
**Availability:** now  
**Part #:** ITTG9152004

### 869 MHz / 915 MHz Tire Tag Insert



THE INTELLITAG® TIRE TAG INSERT is designed to specifically meet the AIAG B-11 standard for read and write range at both 869 MHz and 915 MHz operational frequencies. The insert can be inserted under an adhesive label for temporary application to the tire exterior, or combined with a more aggressive adhesive applied to the insert's back surface for permanent mounting on a tire's inner wall.

**Typical Applications:** Work in Process (WIP), quality control (QC), and regulatory compliance

#### Specifications

**Dimensions:** .355"x2.560"x.075"  
**Operating Temperature:** -40C – 85+C/-40F – 185F  
**Frequency Range:** 869 MHz, 915 MHz  
**Read Range:** TBD  
**Presentation Format:** rolls  
**Tag Type:** passive, read/write  
**Availability:** Q4, 2003  
**Part #:** INIU4RRRT001

### 2450 MHz Metal Mount Tag



THE 2450 MHZ METAL MOUNT TAG is designed for use on metal or RF-reflective surfaces. The tag combines an impressive range with a rugged package designed for harsh manufacturing environments. The tag includes mounting holes for mechanical attachment and has a small amount of flexibility that allows for conformance to the mounting surface.

**Typical Applications:** Work in Process (WIP)

#### Specifications

**Dimensions:** .375"x3.20"x.285"  
**Operating Temperature:** -40C – 85+C/-40F – 185F  
**Frequency Range:** 2450 MHz  
**Read Range:** 48 inches  
**Presentation Format:** singles  
**Tag Type:** passive, read/write  
**Availability:** now  
**Part #:** ITTM2451010

### 2450 MHz Metal Mount Insert



THE 2450 METAL MOUNT INSERT is the core of the metal mount tag. It is suitable for encapsulation using a variety of molding processes and has been used in several applications requiring optimum performance on metal.

**Typical Applications:** Work in Process (WIP)

#### Specifications

**Dimensions:** .375"x3.20"x.050"  
**Operating Temperature:** -40C – 85+C/-40F – 185F  
**Frequency Range:** 2450 MHz  
**Read Range:** 48 inches  
**Presentation Format:** 1 x 15 panels  
**Tag Type:** passive, read/write  
**Availability:** now  
**Part #:** ITTM2452013

### 915 MHz Encapsulated Stick Tag



THE ENCAPSULATED STICK TAG is a ruggedized design that utilizes a metal back plane to provide consistent performance on a variety of materials. The long dipole design provides superior range performance and is ideal for tracking of metal parts and containers in manufacturing environments.

**Typical Applications:** Work in Process (WIP), pallet, carton and container tracking

#### Specifications

**Dimensions:** .590"x8.25"x.180"  
**Operating Temperature:** 0C – +50C/ 32F-F  
**Frequency Range:** 915 MHz  
**Read Range:** 13 Feet  
**Presentation Format:** singles  
**Tag Type:** passive, read/write  
**Availability:** now  
**Part #:** IT1U04MST001

### 915 MHz "Free Space" Insert



THE INTELLITAG® UHF FREE SPACE INSERT is designed for maximum range performance in open air. This tag is ideal for attachment to corrugated boxes, foam padding or any other material with significant air space and low RF reflectivity. The tag is built on a flexible substrate and includes a pre-applied adhesive for easy application.

**Typical Applications:** Carton and container tracking

#### Specifications

**Dimensions:** 1.81"x3.11"x.051"  
**Operating Temperature:** -40C – 85+C/-40F – 185F  
**Frequency Range:** 915 MHz  
**Read Range:** 13 Feet  
**Presentation Format:** panels  
**Tag Type:** passive, read/write  
**Availability:** now  
**Part #:** ITTF9152007

### 2450 MHz CIB Meander "Free Space" Insert



THE 2450 MHZ FREE SPACE TAG is designed for maximum performance in open air. It is used in Sensormatic's Sensor-ID RFID/Electronic Article Surveillance tags, which combine the security features of EAS with the supply chain management power of RFID. The insert construction includes a rigid substrate and is the smallest RFID transponder in the Intermec portfolio.

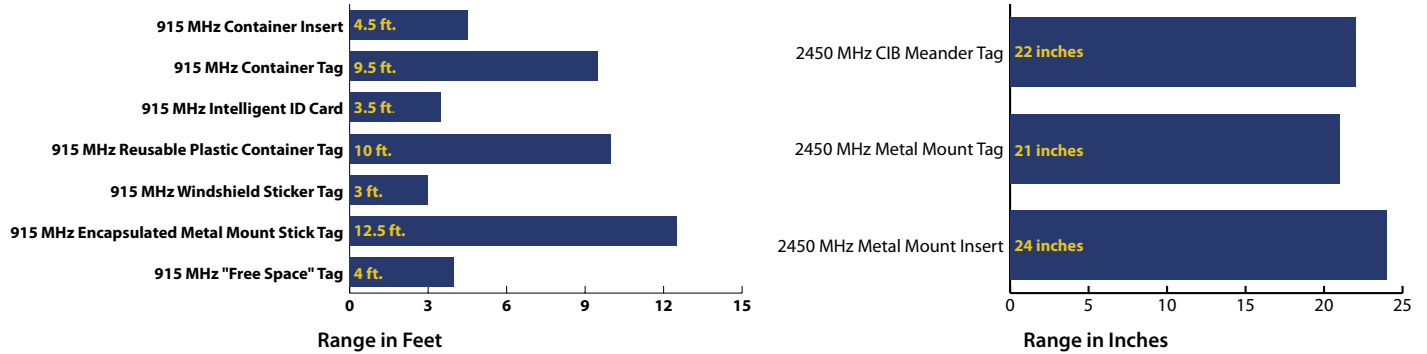
**Typical Applications:** Inventory management

#### Specifications

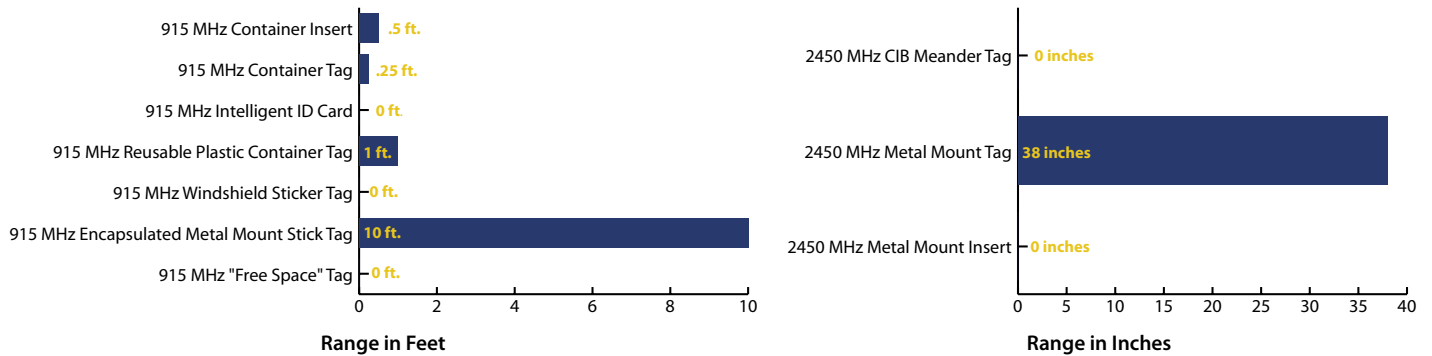
**Dimensions:** .235"x1.18"x.020"  
**Operating Temperature:** -40C – 85+C/-40F – 185F  
**Frequency Range:** 2450 MHz  
**Read Range:** 24 Inches  
**Presentation Format:** single  
**Tag Type:** passive, read/write  
**Availability:** now  
**Part #:** ITTP2451902

The following charts reflect how well each tag and insert performs when applied to the following materials: plastic, cardboard, free space, plywood, glass, metal (direct application), metal mounted on 0.06" of foam and metal mounted on 0.125" of foam.

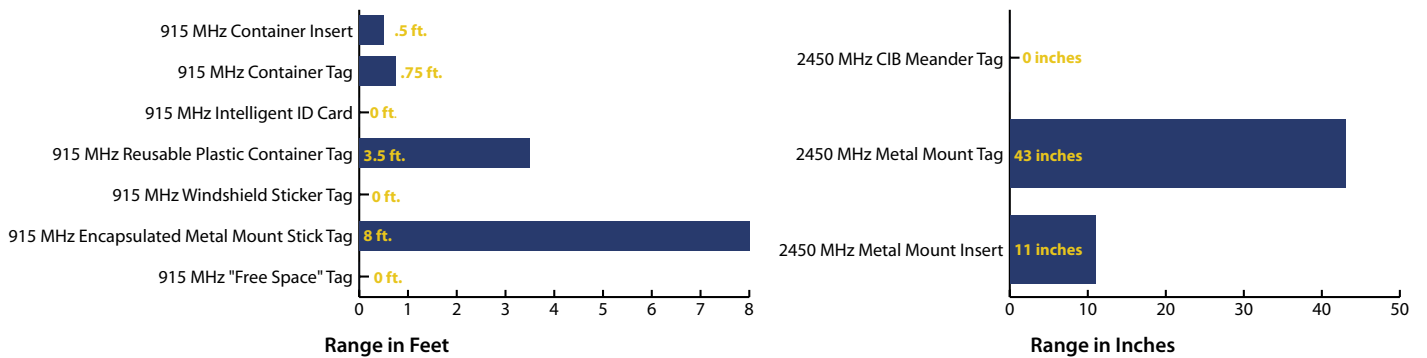
### Material: Plastic



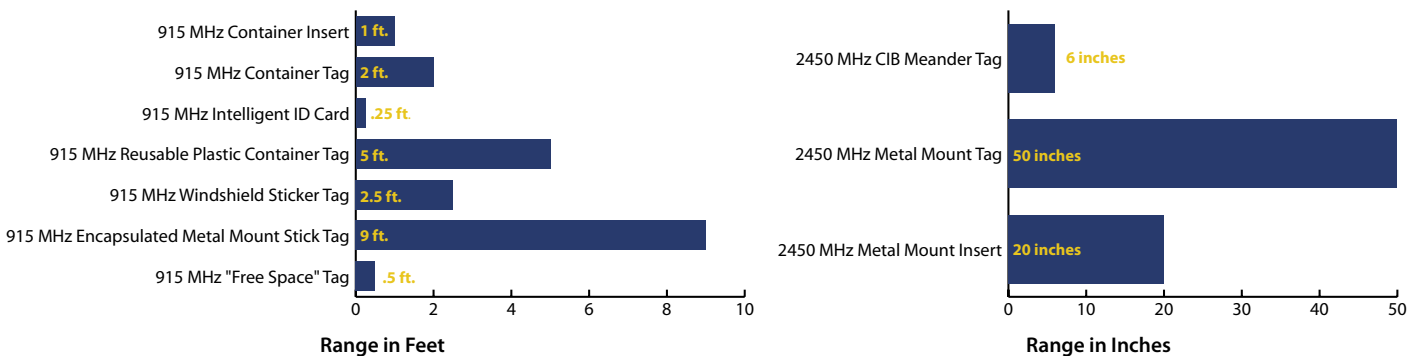
### Material: Metal, Direct Contact



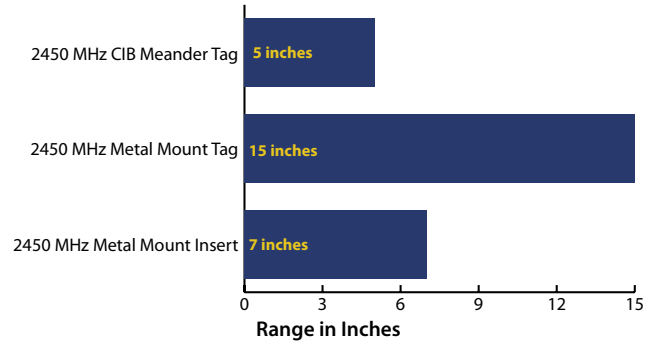
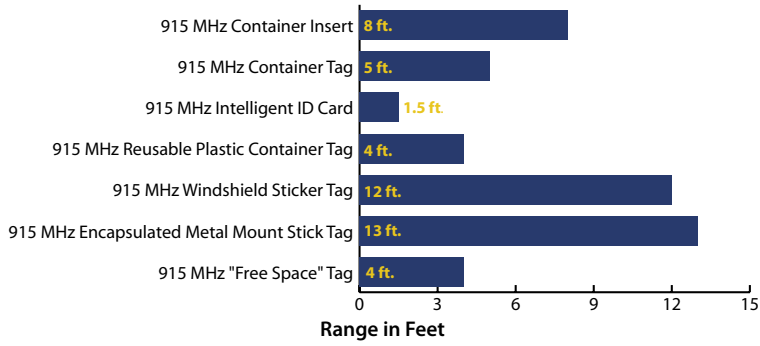
### Material: Metal, .06" Stand-off



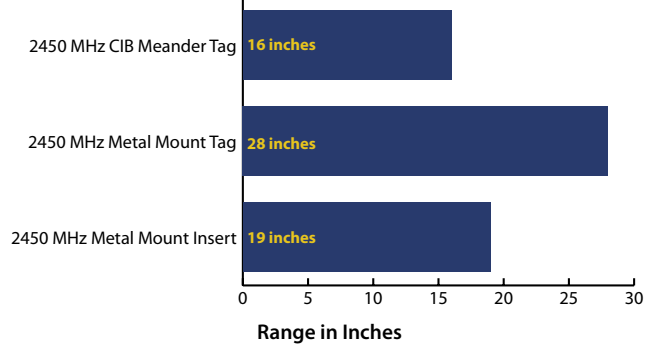
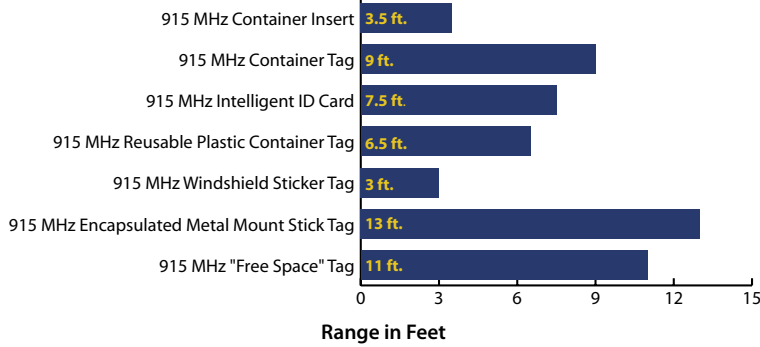
### Material: Metal, .125" Stand-off



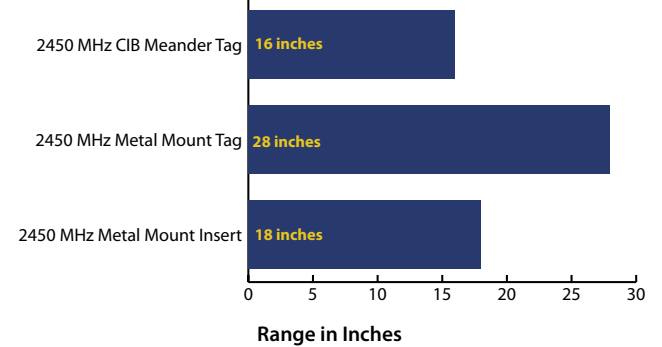
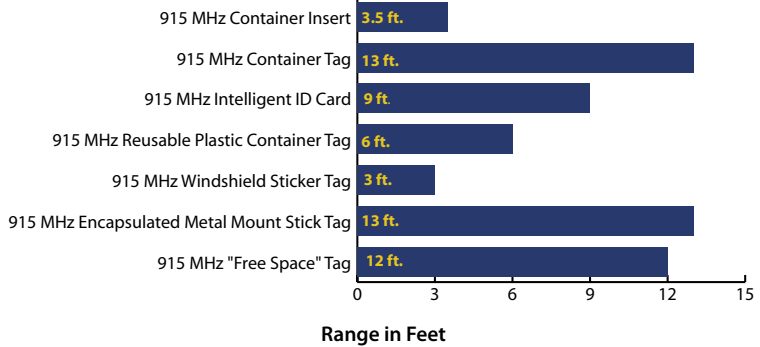
### Material: Glass



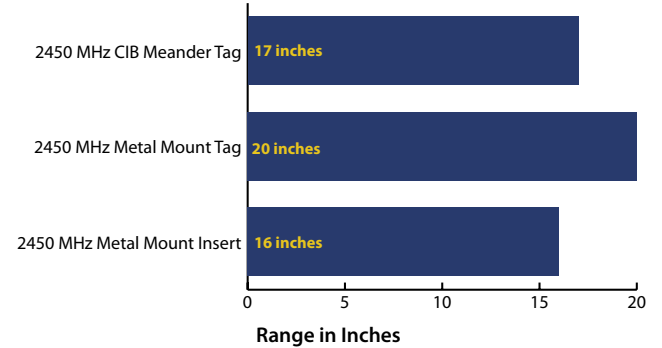
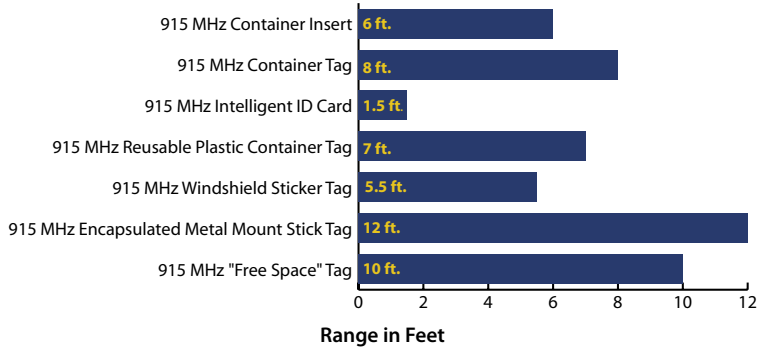
### Material: Cardboard



### Material: Free Space



### Material: Plywood



## A Word on Standards...

The Intermec technology behind Intellitag supports all relevant adopted and emerging national and international standards including:

- **ISO/IEC 18000 Part 6** – Air interface for item management at UHF
- **ISO/IEC 15961 & 15962** – Information interface for object oriented use of RFID in item management
- **ANSI INCITS 256:2001** – American RFID standard for item management
- **EAN.UCC GTAG™** – Application standard for use of RFID in the macro supply chain
- **ANSI MH10.8.4** – Application standard for RFID on reusable containers
- **ISO/IEC 18000 Part 4, Mode 1 (2450 MHz)**
- **ISO 18185 Electronic Seal Tags**
- **ISO 22389 RFID Read/Write for Containers**
- **Automotive Industry Action Group (AIAG) B-11 Tire and Wheel Identification**

With Intellitag®'s large, multiple-field read/write memory, each of Intermec's tags and inserts can simultaneously support EPC, GTIN, UPC content, and Advanced Shipping Notice reference codes, as well as original manufacturer and distributor-unique codes, delivering the user the ultimate flexibility to adapt as current and future standards evolve.

## Next Steps

RFID tag or insert selection is just one part of building your RFID system. Other questions to consider are how the tags/inserts will be read or interrogated, what infrastructure is needed, how will this system coexist with data collection systems already in place, and where will the data reside. Intellitag RFID-certified Intermec partners and Intermec Professional Services provide additional education, site survey, process re-engineering consulting, and project management services to enable companies to be piloting Intellitag RFID in a matter of hours as opposed to weeks.



For more information on getting started with RFID, call 1.800.934.3163 today (Refer to campaign number 9220).



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