EXPRESS
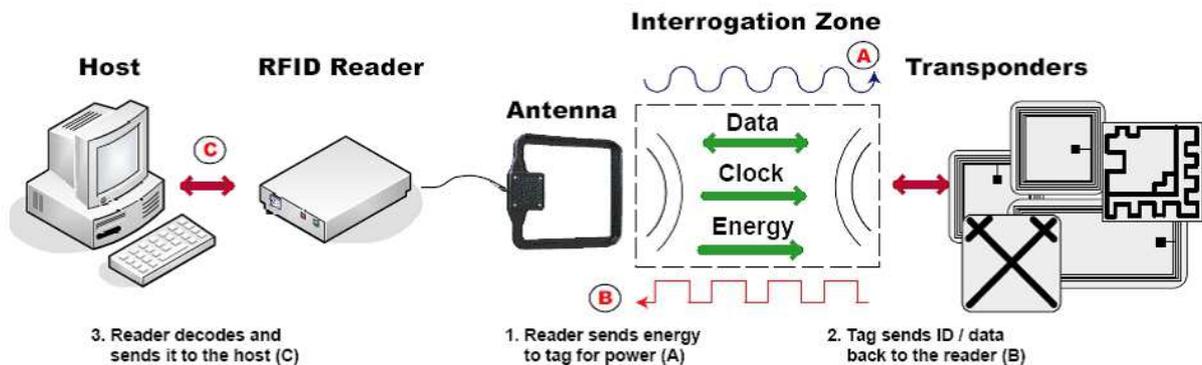*IDENTIFICATION MADE SIMPLE*

Rugged RFID™

RFID FAQs

What is RFID?

- Radio frequency identification, or RFID, is a generic term for technologies that use radio waves to automatically identify people or objects.
- There are several methods of identification, but the most common is to store a serial number that identifies a person or object, and perhaps other information, on a microchip that is attached to an antenna (the chip and the antenna together are called an RFID transponder or an RFID tag).
- The antenna enables the chip to transmit the identification information to a reader.
- The reader converts the radio waves reflected back from the RFID tag into digital information that can then be passed on to computers that can make use of it.
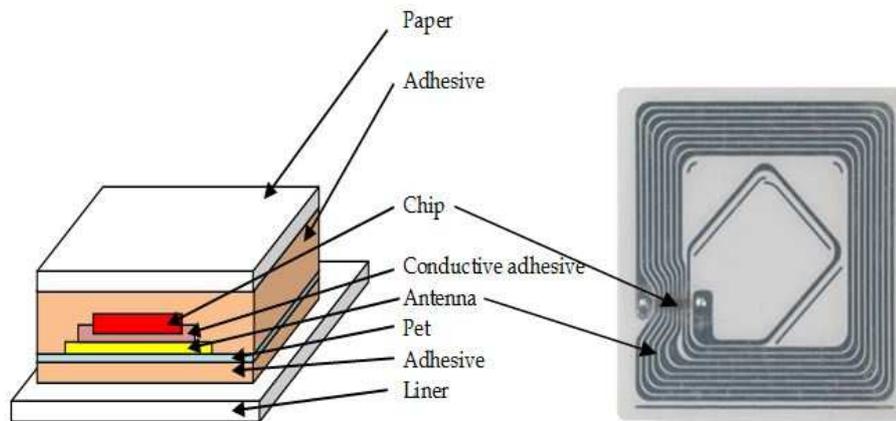
- An RFID *system* consists of a tag, which is made up of a microchip with an antenna, and an interrogator, or reader with an antenna. The reader sends out electromagnetic waves. The tag antenna is tuned to receive these waves.
- A passive RFID tag draws power from the field created by the reader and uses it to power the microchip's circuits. The chip then modulates the waves that the tag sends back to the reader and the reader converts the new waves into digital data for use in the application.

Interrogation Zone

Host   RFID Reader   Antenna   Data   Clock   Energy   Transponders

3. Reader decodes and sends it to the host (C)

1. Reader sends energy to tag for power (A)

2. Tag sends ID / data back to the reader (B)

What is the purpose of RFID?

- RFID allows data to be transmitted by a product containing an RFID tag, which is read by an RFID reader.
- The data transmitted can provide identification or location information about the product, or specifics such as date of purchase or price, similar to a birth certificate.

What is the advantage of using RFID technology?

- No contact or even line-of-sight is needed to read data from a product that contains an RFID tag. This means no more checkout scanners at grocery stores, no more unpacking shipping boxes to see what is in them, and no more getting keys out of your pocket to start your car.
- RFID technology also works in rain, snow and other environments where bar code or optical scan technology would be useless.

What are the advantages of RFID versus linear or 2D bar codes?

- Barcode readers require a direct line of sight to the printed barcode; RFID readers do not require a direct line of sight.
- Line of sight requirements also limit the ruggedness of barcodes as well as the reusability of barcodes. (Since line of sight is required for barcodes, the printed barcode must be exposed on the outside of the product, where it is subject to greater wear and tear.) RFID tags are typically more rugged, since the electronic components are better protected in a plastic cover. RFID tags can also be implanted within the product itself, guaranteeing greater ruggedness and reusability.
- RFID tags can be read at much greater distances than barcodes; some RFID readers can pull information from a tag at distances up to 300 feet. The range to read a barcode is much less, typically no more than fifteen feet.
- RFID readers can interrogate, or read, RFID tags much faster; read rates of hundreds tags per second are possible. Reading barcodes is much more time-consuming; due to the fact that a direct line of sight is required, if the items are not properly oriented to the reader it may take seconds to read an individual tag. Barcode readers usually take a half-second or more to successfully complete a read.
- Barcodes have no read/write capability; that is, you cannot add to the information written on a printed barcode. RFID tags, however, can be read/write devices; the RFID reader can communicate with the tag, and alter as much of the information as the tag design will allow.

What information is on an RFID tag?

- RFID tags can typically hold 96 bits of information (24 alpha numeric characters).
- Express Rugged RFID™ Tags can have any alpha-numeric identification combination within the 24 character limit.

What are the different types of RFID Tags?

Passive Tags	Active Tags
Powered from electromagnetic field generated by the reader	Powered by an internal battery
Less Expensive	More expensive
Unlimited lifetime	Finite lifetime (due to battery life)
Less Weight	Greater range (up to 200 yards)
Lesser Read Range (10 to 20 feet)	Can be effective with less powerful readers
Lower data transmission rates	Higher data transmission rates
Fewer tags can be read simultaneously	More tags can be read simultaneously

- Express Rugged RFID™ tags are all Passive

Are there different frequencies for RFID?

- There are 4 major frequency ranges that RFID systems operate at.
- As a rule of thumb, low-frequency systems are distinguished by short reading ranges, slow read speeds, and lower cost.
- Higher-frequency RFID systems are used where longer read ranges and fast reading speeds are required, such as for vehicle tracking and automated toll collection.
- Microwave requires the use of *active* RFID tags.

Frequency	Range	Applications
Low-frequency 125 - 148 KHz	3 feet	Pet and ranch animal identification; car key locks
High-frequency 13.56 MHz	3 feet	library book identification; clothing identification; smart cards
Ultra-high freq 915 MHz	25 feet	Supply chain tracking: Box, pallet, container, trailer tracking
Microwave: 2.45GHz	100 feet	Highway toll collection; vehicle fleet identification

What is a Rugged RFID™ Tag?

- A Rugged RFID™ tag takes a standard RFID inlay (chip and antenna on a substrate) and encapsulates it in plastic.
- The encapsulation protects the inlay from harsh environments where the product might be handled in a rough manner.
- These environments include: material handling, produce, shipping, solid waste, and many other commercial or industrial scenarios.

What are RFID Readers?

- RFID Readers, sometimes referred to as 'interrogators', are electronic devices that transmit and receive radio waves. Readers not only interrogate tags for information, but some can also be used to program (write) information to tags.
- The RFID reader uses an antenna to send and receive signals to and from RFID tags. The antenna can be either an internal or an external addition.

  - Some barcode scanning devices can add an RFID sled on to them to become a reader.
  - Readers can also be fixed mounted; fixed mounted readers can be found at a receiving dock's bay door or at an EZPass toll booth.
  - A standard dock door or choke point fixed reader configuration is often called a "portal". Portals create a field which the tag passes through, allowing the reader to send and receive information.
  - Readers can also be incorporated into other equipment such as fork lifts or assembly lines.

- **Handheld Readers**

  - An RFID Handheld Computer is a handheld device which emits a radio wave, in order to reach the RFID tags that are in a predefined range.
  - When the RFID tags receive the signal emitted, the RFID tag sends the data stored in the tag back to the handheld computer.
  - The user then uses the handheld computer to view the information which the tag collected, as well as run the RFID software application.

- **Fixed Mount Readers / Door Portals**

  - o Fixed Mount readers are permanently mounted to a structure whereby products with RFID tags will pass by the reader and antenna.
  - o Fixed mount readers require a separate antenna to transmit the radio waves.
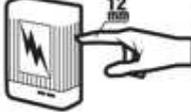

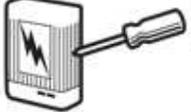

RFID Antennas

RFID Antennas
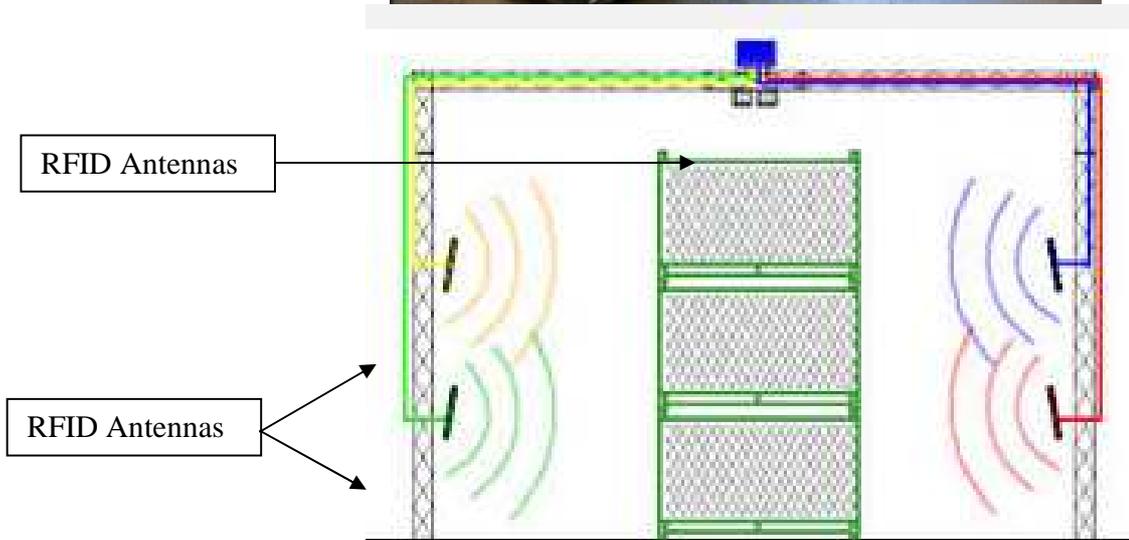
What is Ingress Protection Rating?

- IP stands for Ingress Protection and indicates the degree of protection provided by an enclosure.
- The numbers following IP represent levels of sealing and can range from none at all (IP00) to protection against dust and continuous immersion in water (IP68).
- The table provides a description of the protection at each level.

The table below gives a representation of the concept behind Ingress Protection.

IP (Ingress Protection) Ratings Guide

SOLIDS

1 — Protected against a solid object greater than 50 mm such as a hand.

2 — Protected against a solid object greater than 12.5 mm such as a finger.

3 — Protected against a solid object greater than 2.5 mm such as a screwdriver.

4 — Protected against a solid object greater than 1 mm such as a wire.

5 — Dust Protected. Limited ingress of dust permitted. Will not interfere with operation of the equipment. Two to eight hours.

6 — Dust tight. No Ingress of dust. Two to eight hours.

WATER

1 — Protected against vertically falling drops of water. Limited ingress permitted.

2 — Protected against vertically falling drops of water with enclosure tilted up to 15 degrees from the vertical. Limited ingress permitted.

3 — Protected against sprays of water up to 60 degrees from the vertical. Limited ingress permitted for three minutes.

4 — Protected against water splashed from all directions. Limited ingress permitted.

5 — Protected against jets of water. Limited ingress permitted.

6 — Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities.

7 — Protection against the effects of immersion in water between 15 cm and 1 m for 30 minutes.

8 — Protection against the effects of immersion in water under pressure for long periods.

Rating Example:

IP65

INGRESS PROTECTION