TECH GUIDE

molex

# Radio Frequency Identification Solutions (RFID)

**www.molex.com**

Keyword: RFID

# What is an RFID Tag?

An RFID tag, or RFID device, is a small electronic system that consists of a chip and an antenna — it is used for the purpose of identification and tracking assets through radio waves. These tags can store and transmit data wirelessly to an RFID reader in proximity and they come in various forms, such as hard tags or labels.

### Passive Tag:

It relies on energy from an RFID reader in proximity to power up and transmit stored information.

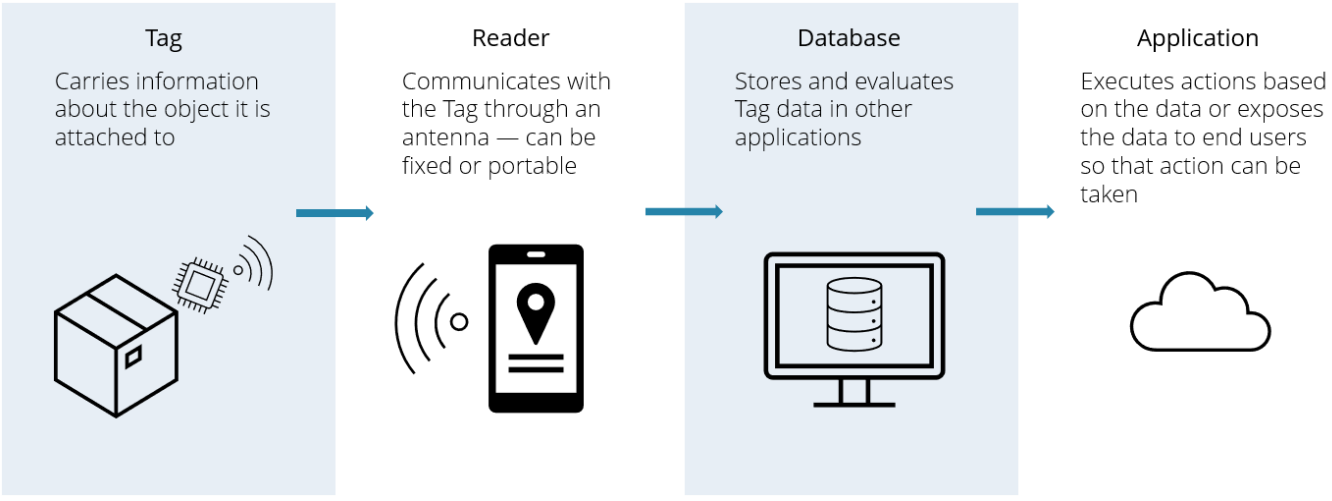
### Active Tag:

It has its own battery, allowing it to independently transmit signals. It offers longer ranges and frequent communication, making it suitable for real-time location tracking.

## Comparison of RFID Tags and Barcode Labels

| | RFID Tags | Barcode Labels |
|---|---|---|
| **Range & Line of Sight:** | • Can be read without direct line of sight | • Need to be in the line of sight |
| **Storage:** | • Can store larger amounts of data | • Only store static printed data |
| **Durability:** | • More durable as they can be embedded in materials or protected by casings | • May wear off or get damaged due to being printed on surfaces |
| **Speed:** | • Enables automated simultaneous reading of multiple tags | • Need to be directly scanned one at a time |

## How an RFID System Works



# High Frequency (HF)


13509


13511


13512


13513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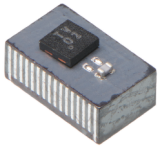
13521


13522



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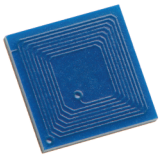


13527

# Ultra-High Frequency (UHF) - Global

For Non-Metallic Surfaces


13522


13528

For Metallic Surfaces


13516

# Ultra-High Frequency (UHF) - Country Specific

For Metallic Surfaces


13517


13518


1319

## SUPPORTED FREQUENCIES

## RFID High Frequency

Molex's RFID High-Frequency Solutions are commonly used in applications such as access control, payment systems and item-level tagging in retail.

### Features and Advantages

| | |
|---|---|
| Frequency | 13.56 MHz |
| Band | High Frequency (HF) |
| Read Range | Up to 29.97mm/1.18in. |
| User Memory | 896 to 2,048 bits |
| Attachment Method | Various |
| Operating Temperatures | -40 to +85°C |

## RFID Global Ultra-High Frequency

Molex's Global Ultra-High Frequency Solutions offer RFID tags in a variety of frequencies and designs to enable cost-effective, versatile, efficient and accurate monitoring of valuable inventory and assets.

### Features and Advantages

| | |
|---|---|
| Frequency | 860 to 960 MHz |
| Band | Ultra-High Frequency (UHF) |
| Read Range | Up to 7.9m/26 ft. |
| User Memory | 32 or 512 bits |
| Attachment Method | Adhesive and/or screw |
| Operating Temperatures | -40 to +85°C |

## RFID Country Specific Ultra-High Frequency

Molex's Ultra-High Frequency Solutions offer the same advantages as RFID Global Ultra-High Frequency but complies with country specific regulations that operates within frequencies from 902 to 928 MHz.

### Features and Advantages

| | |
|---|---|
| Frequency | 902 to 928 MHz |
| Band | Ultra-High Frequency (UHF) |
| Read Range | 2.0 to 16.8m/6.5 to 55 ft. |
| User Memory | 32 or 512 bits |
| Attachment Method | Various |
| Operating Temperatures | -40 to +85°C |

# Selecting Your RFID Solution

1

## STEP 1

**Frequency**

- HF
  - User Memory
- UHF
  - Read Range

2

## STEP 2

**Where It Will Be Used**

- Country Specific
- Global

**Surface Type**

- Metallic
- Non-Metallic

3

## STEP 3

**Physical Requirements**

- Size
- Attachment Method
- Environment

| Series | Frequency Band | Operating Frequency (MHz) | Read Range[1] | Memory (bits) |
|---|---|---|---|---|
| 13509 | HF (Global) | 13.56 | ~0.98 inch | 896 |
| 13511 | | | | 2000 |
| 13512 | | | ~0.79 inch | 896 |
| 13513 | | | ~0.98 inch | |
| 13514 | | | ~1.18 inch | |
| 13515 | | | | |
| 13521 | | | ~0.79 inch | 1152 |
| 13523 | | | ~ 1.18 inch | 2048 |
| 13525 | | | | 1152 |
| 13526 | | | ~0.87 inch | 2048 |
| 13527 | | | ~1.18 inch | |
| 13522 | HF + UHF (Global) | HF: 13.56<br>UHF: 860-960 | HF:~0.66 inch<br>UHF: ~ 8ft | 2040<br>(Shared memory) |
| 13516 | UHF (Global) | 865-928 | ~26 ft. | 32 |
| 13528 | | 860-960 | ~26 ft. | 512 |
| 13517 | UHF (Country Specific) | 902-928 (Country Specific) | ~55 ft. | 32 |
| 13518 | | | ~26 ft. | |
| 13519 | | | ~52 ft. | |
| 13524 | | | ~6.5 ft. | 512 |

| Series | Tag Size (in) | Optimized for | Attachment Method | Format |
|---|---|---|---|---|
| 13509 | Ø: 0.57 T: 0.11 | For non-metallic | Adhesive[2] | Hard tag |
| 13511 | Ø: 0.86 T: 0.11 | | | |
| 13512 | Ø: 0.39 T: 0.10 | For metallic | | |
| 13513 | Ø: 0.86 T: 0.11 | | Adhesive[2] or Screw[2] | |
| 13514 | Ø: 1.18 T: 0.11 | | | |
| 13515 | Ø: 1.33 T: 0.23 | | | |
| 13521 | Ø: 1.14 T: 0.01 | | Adhesive[2] | Label |
| 13523 | 0.19 x 0.11 T: 0.09 | | SMD | Hard tag |
| 13525 | Ø: 1.33 T: 0.23 | | Adhesive[2] or Screw[2] | |
| 13526 | 7.6 x 0.32 T: 0.35 | For non-metallic | Self attachment | Cable tie |
| 13527 | 0.26 x 0.26 T: 0.03 | | Adhesive[2] | Hard tag |
| 13522 | 1.96 x 1.18 T: 0.01 | | | Label |
| 13516 | 2.08 x 1.73 T: 0.43 | For metallic | Adhesive[2] or Screw[2] | Hard tag |
| 13528 | 1.96 x 3.26 T: 0.11 | For non-metallic | Adhesive[2], Other | Flexible tag |
| 13517 | 2.1 x 1.4 T: 0.49 | For metallic | Adhesive[2] or Screw[2] | Hard tag |
| 13518 | 1.96 x 0.98 T: 0.23 | | Adhesive[2] | |
| 13519 | 3.07 x 0.82 T: 0.43 | | Adhesive[2] or Screw[2] | |
| 13524 | Ø: 1.33 T: 0.23 | | | |

[1]Read Range estimated using: FEIG NFC Reader for HF and UHF: 4W EIRP. LOS for UHF

[2]Not included

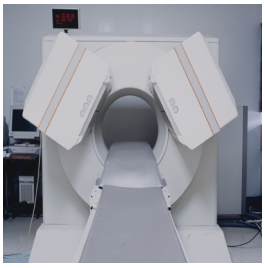
## MARKETS AND APPLICATIONS

### Healthcare
Inventory control equipment
Medical devices
Medication notification systems

### Industrial
Asset and inventory tracking systems
Logistics equipment
Real-time location (RTL) systems

### Automotive
Rental unit tracking devices
Vehicle tracking equipment



Get customized insights at: **molex.com keyword RFID**

**LOOKING FOR MORE INFO?**
Scan for full specification details!

Order No. 987652-6842 Rev. 2 USA/AG/2024.02