

# **NuDot-433 Dual-Active RFID Tag**

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## *Installation Manual*



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Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.”

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### ***IC Compliance***

**IC: 4671A-433NUDOT09**

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**Document Revisions**

Number	Changes	Author	Date
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**U.S. Patents**

6,034,603	6,294,953 B1	6,570,487 B1	6,954,859
7,005,985 B1	7,271727	7,286158	7,629886

Other patents pending.

**Customer Service**

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# General Installation Information

## **Safety**

- Personal safety is of first importance in the performance of any job.
- Installation and configuration of the NuDot-433 system should only be performed by experienced installers.
- Where practical or required by code, all wiring should be enclosed in conduit or equivalent protection, firmly anchored to sturdy structural elements and protected from mechanical damage.
- Hand tools should be of good quality and properly maintained.
- Hand tools should be used in the applications for which they were intended.
- Always wear eye protection when using power tools.
- When drilling, cutting or drilling, do not damage wires, pipes or structural components.

## **Information Flags**

Information Flags draw your attention to important information:



### **IMPORTANT!**

These sections provide information you must have to ensure proper operation of hardware or software. If this advice is not followed, system recovery can be difficult or time-consuming. **ALWAYS READ THESE ITEMS.**



### **NOTE**

These sections provide helpful information that can make the installation go more smoothly and quickly.

# NuDot-433 System Overview

## *History*

Radio Frequency Identification (RFID) systems have existed for many years. Initially, systems were developed so that military aircraft and ships could be quickly identified by electronic methods. Radio equipment (transponder) on a plane or vessel would broadcast a coded signal to identify it as a friend to an appropriate receiving station. A plane or vessel not able to transmit the correct identification would be considered a possible enemy. Similar technology is employed today for air traffic control as well as vessel identification in shipping lanes and ports – and the RF device is still called a transponder.

Other present-day applications include “tagging” vehicles, assets or people for identification within a designated area – or as they pass through portals. For example, a transmitting device can be placed on a laptop computer so it can be identified if carried out of a building. Further, if people in that building also carry transmitting devices, it is easy to ascertain not only that the computer left the building – but that it was not carried by the person to whom it was assigned!

Obviously, such technology has quickly found its way into disciplines such as vehicle entry, fleet management, inventory control, asset management and controlled access to buildings or other areas.

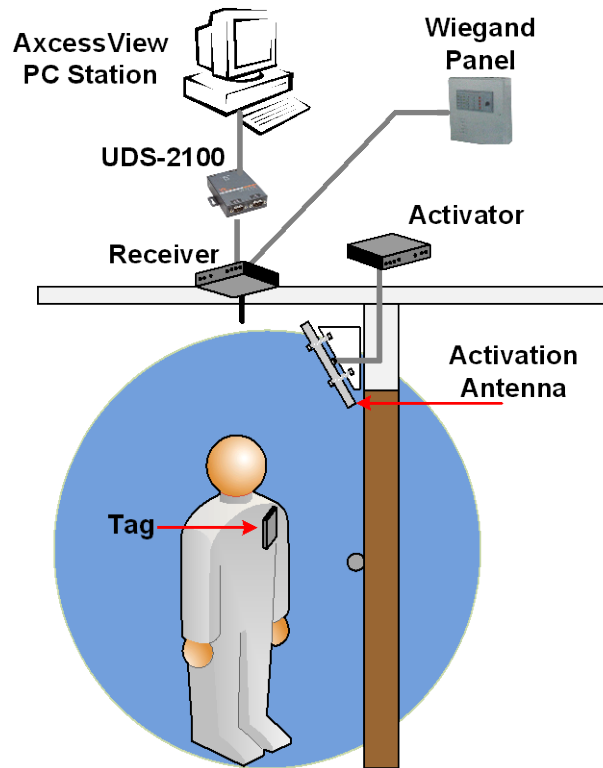
## ***NuDot-433 System Components***

The following diagram (1) shows a very basic Axcoss International, Inc. NuDot-433 system. The system has the following components:

- An activator to send radio signals to a transmitting antenna.
- A receiver to receive radio signals from a receiving antenna and outputs the data to some device – a computer or a Wiegand control panel, for instance.
- A transmitting antenna to “wake up” any Tags in the area.
- Tags to receive wake-up radio signals and broadcast their IDs to the receiving antenna. Tags can be carried by individuals, placed on equipment or in vehicles.
- A receiving antenna to intercept radio signals from the Tags and to pass the signals to the receiver.
- One or more of the following: a computer for data storage, a peripheral device such as a light, buzzer, door strike, gate controller, camera, etc., and/or a control panel that accesses a computer or a device.



A NuDot system may be as simple as a single activator, receiver and Thin Plex Antenna controlling the front door of a small office or it may comprise a network of interconnected devices controlled by a server.



*Figure 1: A simple Access NuDot-433 System*

## NuDot Tag Overview

A Tag is a very small transponder (transmitter + responder) that remains in a sleep state (off) until awakened. When the Tag receives a special wake-up signal from the activator, the Tag will wake up (turn on) and emit a radio signal of its own. The signal emitted by the Tag is typically its pre-programmed identification number – but could include other data as well. The signal is generally used for detection, identification and location of people or objects.

A NuDot Tag, encased in black or beige plastic, is about the size of a credit card. Some Tags have slots to attach personnel ID pictures to them. Other Tags may be attached permanently to vehicles or assets such as computers.

### *Types of Tags*

The typical types of RFID Tags are:

#### *Passive Tags*

A passive tag does not have an on-board power source (battery). It is powered from the antenna radiation field of the transmitter that is trying to wake the tag up. It uses the same antenna for transmitting and receiving.

#### *Active Tags*

An active tag has its own battery and is capable of a greater transmit distance (range) than the passive tag. An active tag only has a transmitting antenna. It is common for active tags to continually transmit and the system will only report those tags in the reception field.

#### *Axcess NuDot Tags*



Axcess International, Inc. Tags, based on Axcess' Dual-Active architecture, are a hybrid of the active/passive approach and do not respond until awakened. The tag is in a "sleep" state that requires almost no power until the tag is activated. NuDot Tags receive on a low frequency and transmit on an ultra high frequency.

The Tag checks the wakeup signal for proper modulation and an Activator ID code then transmits its own ID number along with the Activator ID that woke it up.

# Tag Mounting

Because of the low frequency used for transmission, NuDot Tags can be mounted in a variety of positions on assets and vehicles without the signal being blocked. Personnel can carry Tags on chains, clips, pockets or purses.

## Mounting Tags to Assets

### Required Materials

- LED Test Tag
- Mounting materials for asset Tags – cyanoacrylate (ProCement from ProTec Technology, Super Glue), MEK (methyl ethyl ketone), double-sided tape, or a Mylar enclosure that has a sticky back
- Latex gloves if you are using one of the above adhesives
- Washable marker or pencil



**IMPORTANT!** Before using either cyanoacrylate or MEK, consult the vendor's instructions and the compound's Material Safety Data Sheet. For all assets, mount the Asset Tag with the flat side attached to the asset.

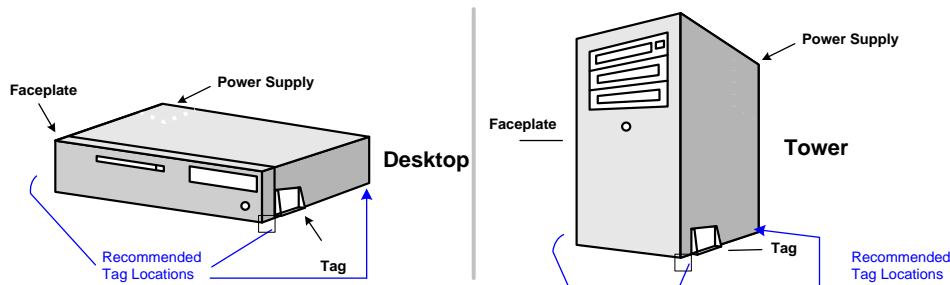


Figure 2: Asset Tag Desktop Locations

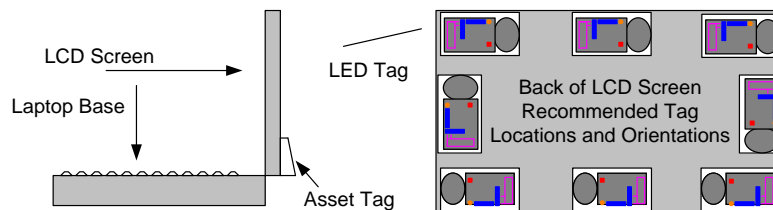


Figure 3: Asset Tag Laptop Locations

## ***Mounting a Tag to an Asset***

Some electronic devices (for example, laptop computers) generate radio frequency emissions (noise) that may cause the tag to exit the “sleep” mode and continue to examine the “noise”. This unintended wakeup (but not transmission) could result in unnecessary battery drainage. Use the following procedure for mounting a Tag to an asset to prevent this from occurring:

**Step 1:** Turn on the laptop or other asset and ensure that the device is on.

**Step 2:** Position the asset so that it is in a comfortable working position.

**Step 3:** Place the LED Test Tag flat side down on the outside of the asset.

**Step 4:** Observe the LED Test Tag as you slide it on the asset – find a location that does not activate the LED.

**Step 5:** Ensure that when the Tag is mounted, it will not interfere with normal operation of the asset (docking station, battery, screen, etc).



**Step 6: IMPORTANT!** Ensure that the Tag can be read by the receiver when the asset is carried normally through the transmit field. In addition, place the Tag on the asset where it cannot be easily pried off or removed. Do not place the Tag on a removable surface (i.e., battery cover).

**Step 7:** Once a location is found, use a pencil to trace around the edge of the LED Test Tag.

**Step 8:** Use a cyanoacrylate adhesive (for example, ProCement from ProTec Technology). Practice the following steps with similar materials of lesser value until the proper amount of adhesive and application pressure is established.

**Step 9:** Closely follow the instructions provided with the adhesive kit. You may have to lightly sand the surface inside the marked area if the asset is painted or has a protective surface applied.

**Step 10:** Wearing latex gloves thoroughly clean the sanded area with the supplied isopropyl alcohol pad.

**Step 11:** Carefully apply adhesive to the back of the Tag that will be bonded to the asset. Ensure a continuous bead close to the edge, but not so thick that the excess will ooze beyond the edge once the Tag is positioned.

**Step 12:** Carefully position the Tag onto the marked area of the asset, applying pressure for the time specified in the instructions.



Note: Only an extreme level of prevention is a guarantee against loss or damage at the hands of a determined thief. However, when assets are tagged as described here, they will remain tagged for tracking purposes even under heavy industrial or business usage.

## Mounting Tags to Vehicles

### Required Materials

- LED Tag
- Mounting materials – Velcro tape, double-sided tape, Mylar enclosure
- Washable marker or pencil

### Mounting locations

The first choice for mounting a Tag in a vehicle is on the upper left or upper right side of the back window. Tags should be mounted on the side that is closest to the receiver's whip Antenna.

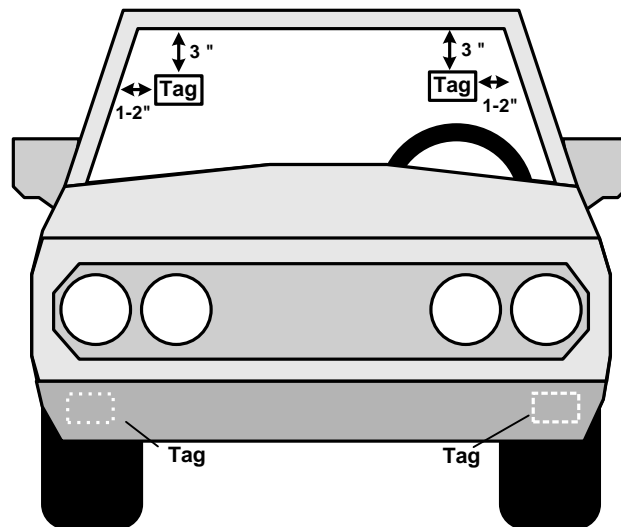


Figure 4: Vehicle Tag Locations

Other mounting places include the lower right or left corner of the windshield, behind the rearview mirror, and above either the right or the left visor.



**IMPORTANT!** Placing a Tag directly on the dashboard in very hot climates is not recommended.

### Testing for the Best Tag Location

This test is primarily for Tags that need to be mounted in the front windshield area. This test may not be necessary for back window mounting.

**Step 1:** With the car out of range of the Road Loop Antenna, sit in the car and locate a spot about 3 inches from the dashboard and hold LED test tag there.

**Step 2:** Turn on the car while watching the LED to see if it turns on. (Note: this usually happens only in older vehicles with very noisy alternators.)

**Step 3:** If the Tag turns on, move the tag up ½ inch and repeat test until the Tag no longer turns on.

**Step 4:** Mark the spot you found on the windshield with some scotch tape or a washable marker.



Note: The LED light can be hard to see in bright daylight. Shield the LED with your hand while holding it against the windshield.

**Step 5:** Test the various positions to find the one that works best for your installation and the vehicles involved.

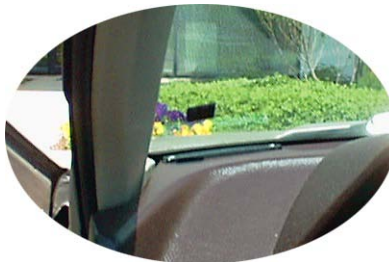
### Mounting a Vehicle Tag

**Step 1:** Apply mounting tape/Velcro on the back of the Tag. Push the mounting tape/Velcro securely on the back of the Tag.



**IMPORTANT!** To receive maximum range from the antenna, the Tag must be mounted with the back of the Tag facing the glass at least 3 inches off the dashboard.

**Step 2:** If using Velcro, apply one side of the Velcro mount to the location where the LED Tag was successfully tested. Then mount the Tag with the other piece of Velcro onto the Velcro on the windshield.



*Figure 5: Velcro applied to window*

**Step 3:** If using double-sided tape, peel the cover off the double-sided tape attached to the Tag. Firmly apply the Tag to the windshield location you found earlier and press the Tag to the windshield ensuring solid contact.

## ***Tags and Personnel***

### **Required Materials**

- Mounting materials – clips, chains, etc.

Personnel Tags can be threaded onto a chain, placed in a pocket, or hooked on a clip. A picture ID card can fit in the Tag's recess.



*Figure 6: Personnel Tag with Photo ID and Bulldog Clip*



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