



UHF RFID Tags : A Short Buyer's Guide

Different Data Structures, Different Frequencies, Different Solutions

The growth in popularity of UHF RFID tags has been because of their capability, standardisation and a significant fall in costs over the last few years. However there are several different formats of data used by the tags and different frequencies are used in different countries. Failing to take account of this may result in selecting the wrong tags for a particular application. This short guide names the main types and their characteristics to help users select the ones they need.

Types of UHF Tags

There are six main types of passive UHF tags. This excludes specialised battery assisted passive tags or active tags which may also operate on the same frequencies. The differences between these six main types are:

Tag Type	Monza 2	Monza ID	Monza 3	G2XL	G2XM	Higgs3 & 2
Tag ID	X	32 bits	32 bits	64 bits (32:TID, 32:SN)	64 bits (32:TID, 32:SN)	64 bits (64:TID)
EPC	96bits	96bits	96bits	240 bits	240 bits	96 or 480 bits
User memory	X	X	X	X	512 bits	512 bits
Examples in the Confidex range			Steelwave Micro Cruiser	Halo Ironside Survivor Carrier Casey	Corona Pino Steelwing	Steelwave Micro
Examples in the Omni-ID range						All Omni-ID

Tag ID is a value encoded on the tag by the manufacturer. It should be unique to a particular tag. It is usually locked by the manufacturer and cannot be altered by the user's system. In G2XL and G2XM tags it consists of two parts, a Tag Identity and a Serial Number. The EPC (Electronic Product Code) can be used to assign a meaningful number to the tag associating it with a particular item.

The EPC is user-writable *BUT* its structure, content and values are defined by a set of standards managed by the organisation EPC Global. The EPC is not unique. EPC assigns a unique number to each user organisation that encodes tags (the "EPC Manager Number") and the remainder of the EPC is used to identify the class of object that the tag is attached to and the unique number of that object. For tags following the EPC Global standards any one item can be identified globally, across a number organisations. *HOWEVER*, because the EPC area on a tag may be used in a non-standard way by a user organisation not complying to the standard and because EPC values can be cloned easily, the EPC value of a tag cannot be considered to be truly unique in and of itself.

In addition some UHF tags carry a user memory area that can be freely written to by the user, without interfering with the standard numbering systems.

Note that all the above values refer to the number of BITS on the tag not the number of characters. Because of the limited data storage capacity available users may need specialised storage algorithms to pack data into the available space.

The table lists tags that match these different tag types to demonstrate that a given tag is rarely available in all types. For example the Steelwing is only available as a G2XM tag while Omin-ID uses the Higgs2 and 3 versions.

A Note On Frequencies

Although UHF tags have been well standardised in terms of their data structures, the same cannot be said of the frequencies that they operate over. Although they all operate in the UHF band, the actual frequencies used are different in different countries / geographic regions. Of these the most significant are (as at Dec 2009):-

- ETSI standard: EU Member states and most other European countries 865.6 to 867.6 MHz
- FCC standard: USA / Canada / Mexico (also South & Central America) 902 to 928 MHz
- JPN Standard: Japan 952 to 955 MHz

This is not an exhaustive list, however. For example China uses a different frequency standard from any of the above as does Australia and Israel. A number of web sites are available listing the current status of different territories but the most reliable source is always the country body responsible for frequency allocation and licensing.

As a result of these different standards, it is important to be sure that the tags (and readers) planned for use in a particular region will operate on the frequencies required by the legislation in the territory concerned. When purchasing tags users should be sure to specify the region standard required. All of the tags mentioned in the table above are available in versions for ETSI and FCC standards. Some are also available for the JPN standard. Taking the example of the Steelwing tag mentioned earlier; this is available for ETSI, and FCC with one version covering the frequency ranges from 865 to 928MHz. Other Confidex wide-band tags include the Carrier, Casey, Corona, Cruiser and Pino. Omni-ID tags are available both in region specific and wide band version. The Confidex Steelwave tag supports ETSI and FCC by using two different product numbers.

Other Criteria

In addition to these factors users also need to select tags for their ability to be attached to certain materials, for their environmental limits, for their read range (remember manufacturers usually quote "up to" ranges – very much a maximum!) and responsiveness, their physical size and their attachment method. Consideration may also need to be given to specialised requirements such as the need to operate in an explosive atmosphere, meet industry user standards, or (in Europe) to conform to the ROHS directive. CoreRFID is happy to advise on the selection of tags addressing any and all of these issues as well as to identify which version of a tag is required for data format or frequency reasons.

About CoreRFID

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